

TM 9-2320-242 - 20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

FOR

TRUCK, CARGO: 1-1/4 TON, 6X6, M561

(2320-873-5407)

TRUCK, AMBULANCE: 1-1/4 TON, 6X6, M792

(2310 - 832- 9907)

HEADQUARTERS, DEPARTMENT OF THE ARMY

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Technical Manual

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No.

ORGANIZATIONAL MAINTENANCE MANUAL

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CHAPTER I INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains instructions for the *use* of organizational maintenance personnel maintaining the Truck, cargo: **1-¼** ton, 6 x 6, M561 and Truck, ambulance: 144 ton, 6 x 6, M792 as allocated by the Maintenance Allocation Chart. It provides information on organizational maintenance of the equipment, its accessories, auxiliaries, and material used in conjunction with equipment. This manual also includes instructions for shipment, limited storage, and deprocessing. TM 9-2320-242-20P contains the repair parts and special tool list authorized to organizational maintenance for the M561 cargo truck and M792 ambulance.

1-2. Forms and Records

a. *Authorized Forms.* The forms generally applicable to units maintaining this materiel are listed in appendix A. For a listing of all forms, refer to DA Pam 310-2. For instructions on the use of these forms, refer to TM 38-750.

b. *Field Report of Accidents.*

(1) *Injury to personnel or damage to materiel.* The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in AR 385-40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

(2) *Ammunition.* Whenever an accident or malfunction involving the use of ammunition occurs, firing of the lot which malfunctions will be immediately discontinued. In addition to any applicable reports required in (1) above, details of the accident or malfunction will be reported as prescribed in AR 700-1300-8.

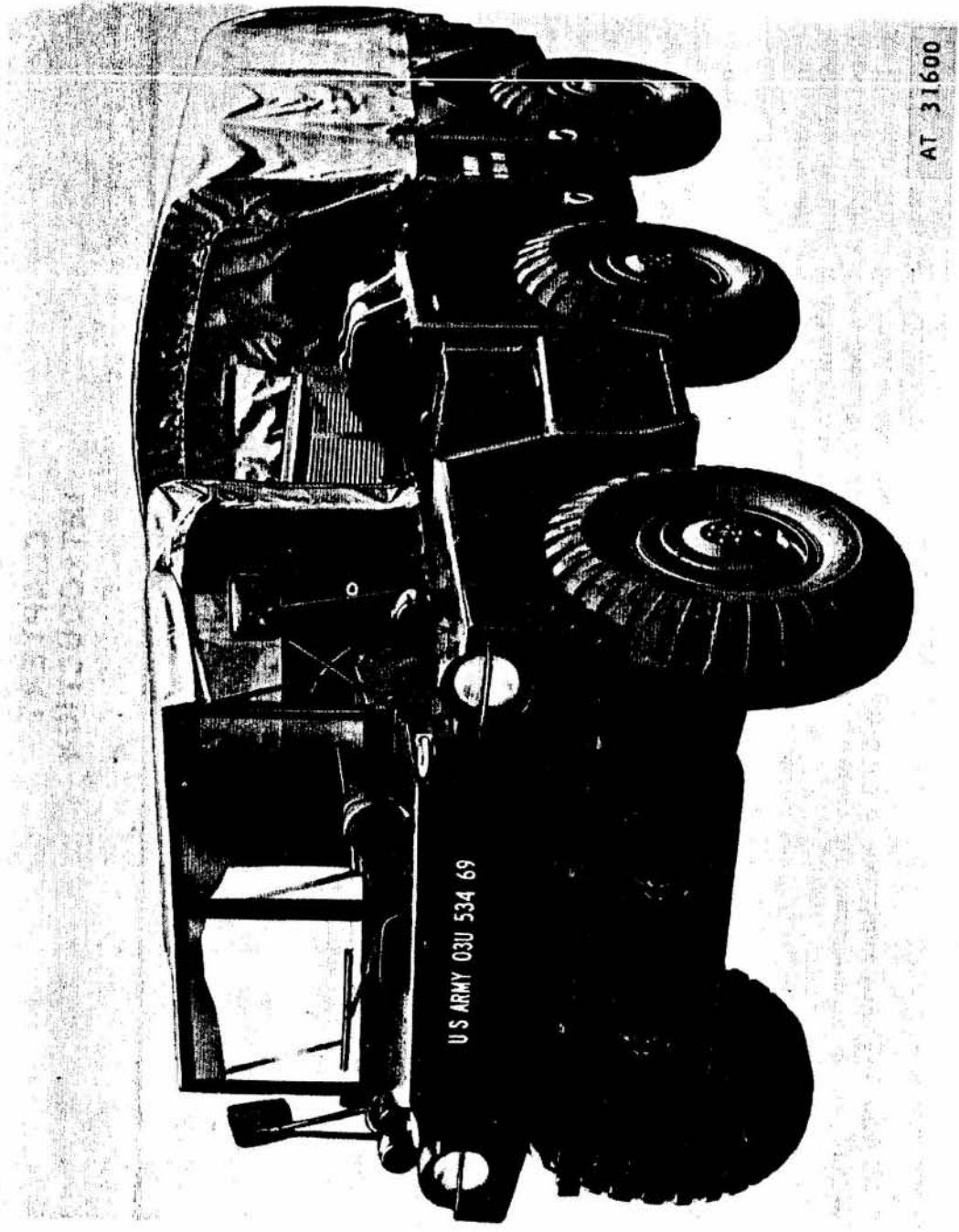
c. *Equipment Improvement Recommendations.* Deficiencies detected in the equipment or materials should be reported using the Equipment Improvement Recommendation section of DA Form 2407 in accordance with TM 38-750.

Section II. DESCRIPTION AND DATA

1-3. Description

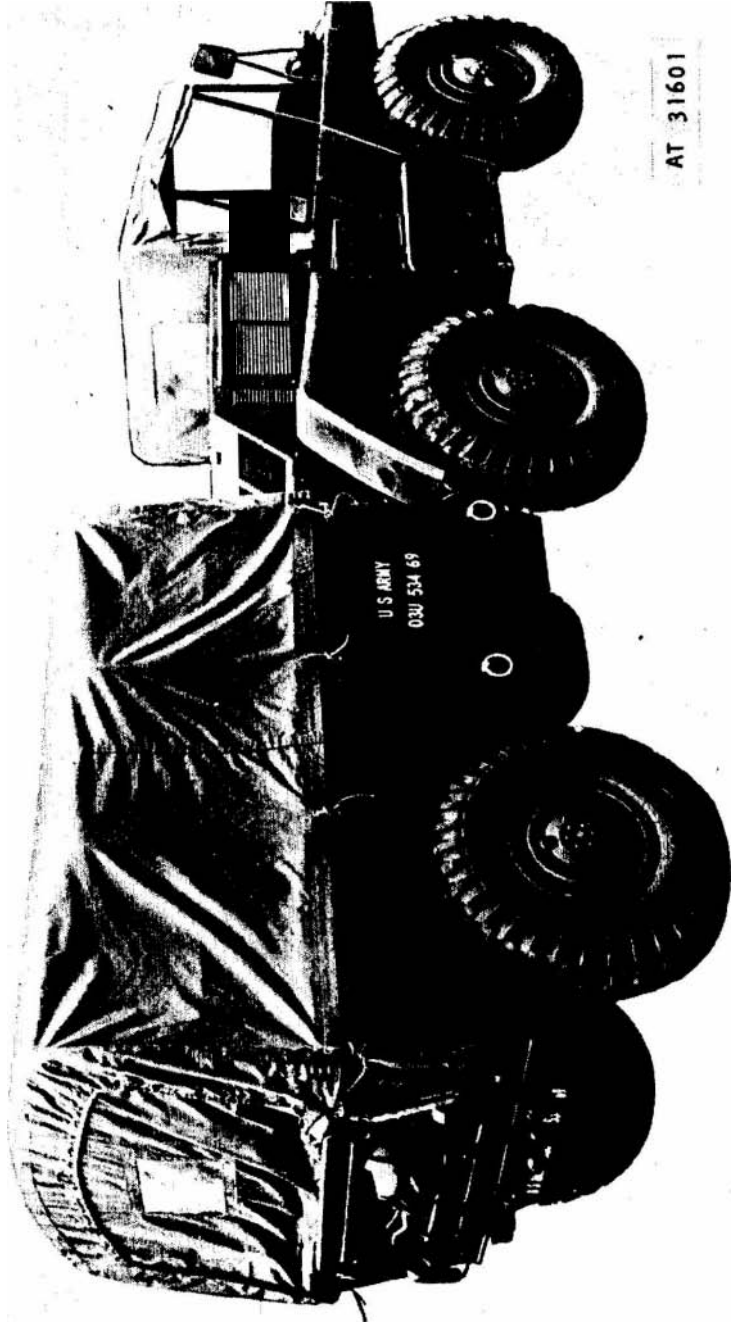
A general description of the M561 cargo truck and M792 ambulance and information pertaining to identification plates are contained in TM 9-2320-242-10. A more detailed description of specific components and assemblies is contained in

the applicable sections of this manual. Detailed descriptions of the components of the M561 cargo truck and M792 ambulance *are* provided in the applicable maintenance paragraphs of this manual (figs 1-1, 1-2, 1-3, and 1-4).

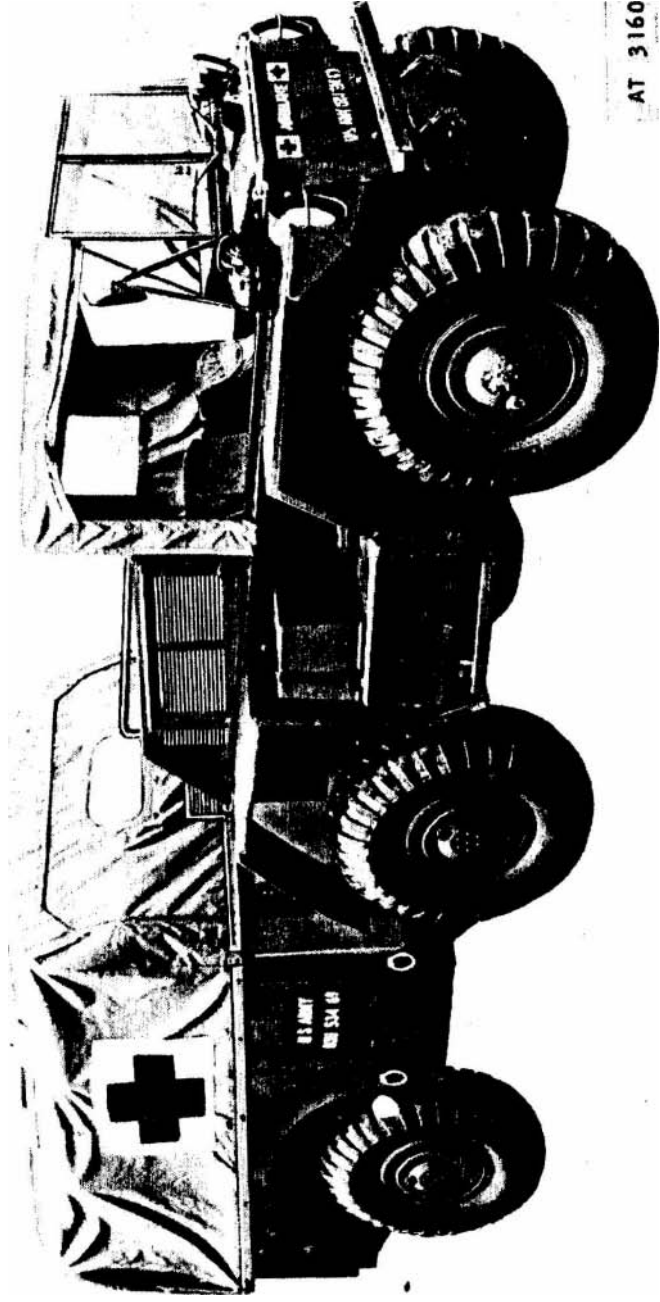


AT 31600

Figure 1-1. Truck, cargo, 1 1/4 ton, 6 x 6, M561 left front view.



AT 31601



AT 31602



AT 31603

Figure 14. Truck, ambulance: 1 1/4 ton, 6 x 6, M792 left rear view.

1-4. Identification and Tabulated Data

a. *Identification.* The M561 cargo truck and M792 ambulance have one major identification plate each. It is mounted on the instrument panel cowling immediately to the right of the master switch. The information contained on this plate is listed below.

Vehicle nomenclature	Inspection stamp
Manufactured by	FSN (Federal Stock Number)
Model	Number
Capacity	Contract number
Serial number	Height
Year manufactured	Width
Engine serial number	Length
Registration number	Gross vehicle weight
	Date shipped

b. *Tabulated Data.*

(1) *M561 Cargo Truck and M792 Ambulance.*

(a) *Weights.*

Curb weight	7,300 lb.
Payload	2,900 lb.
Gross weight	10,200 lb.

Front axle	2,745 lb.
Center axle	3,900 lb.
Rear axle	3,555 lb.
Center of gravity	Based on rated payload

(b) *Dimensions.*

Length	226.6 in.
Width	83.8 in.
Height (GVW)	90.8 in.
Reducible height (GVW)	65.0 in.
Tread	72.0 in.
Ground clearance	15.0 in.

(2) *Engine.*

Make	Detroit Diesel
Series	3-53
Type	Liquid cooled, vertical inline, two cycle, three cylinder diesel

Displacement	159.3 cubic in.
Horsepower	103 HP at 2,800 RPM
Firing Order	1-3-2
Torque	217 lbs-ft. at 1,500 RPM

(3) *Transmission.*

Type Manual
Speeds Four forward, one reverse
Synchronesh Second, third, fourth gears
Ratios:
First gear 7.06:1
Second gear 3.58:1
Third gear 1.71:1
Fourth gear 1.00 :1
Reverse gear 6.78:1
Lubricant capacity 5.5 pints

(4) *Transfer.*

Ranges High - low
Ratios :
High 1:1
Low 1.79:1
Torque rating 2,500 lbs-ft.
Lubricant capacity 4.5 pints

(5) *Differentials.*

(a) *Front.*

Type Dual Pack limited slip
Ratio 5.57:1
Lubricant capacity 4 pints

(b) *Center.*

Type Dual Pack limited slip
Ratio 5.57:1
Lubricant capacity 12 pints

(c) *Rear.*

Type Dual Pack limited slip
Ratio 5.57:1
Lubricant capacity 4 pints

(6) *Electrical system.*

Voltage 24 volts
Current 60 amperes
Battery :
Type **GTN** 100 ampere hours at 12V
Quantity Two, series connected

(7) *Fuel system.*

Capacity 20 gallons per tank
Recommended fuel types Federal Specification
Diesel VV-F-800
Jet MIL-J-5624
C.I.T.E. MIL-F-45121A

(8) *Cooling system.*

Capacity 19 qts.
Normal operating temperature 160-200 °F
Normal operating pressure 7-14 PSI

(9) *Steering system.*

Type Mechanical front and rear,
simultaneously operated
Steering ratio 24 : 1
Turning radius 29 feet

(10) *Suspension.*

Front and rear Independent coil springs
at each wheel.

Center Single leaf spring and
swing axle.

(11) *Brakes.*

Type Hydraulic, internal
expanding

(12) *Bilge pump.*

Type Electrically operated
Rating 54 GPM at 27.5 volts

(13) *Articulation.*

Roll at center axle **#.15** degrees
Roll at rear axle **#30** degrees
Pitch at rear axle **40**
Wall climb (vertical) 18 in.
Angle of approach 62 degrees
Angle of departure 45 degrees
Hump angle 140 degrees

(14) *Tires.*

Type Shreaded wire,
tubeless, NDCC
Size 11:00x 18, 6 ply
Pressure :
Highway 22 PSI
Cross-country 18 PSI
Snow, Sand, or Mud 12 PSI

(15) *Wiring diagram.*

(16) *Fuel system diagram, M561 cargo truck.*

(17) *Fuel system diagram, M792 ambulance.*

1-5. Difference in Models

a. *General.* The differences which affect the appearance and operating characteristics of the vehicles are the modifications and additions to the basic M561 cargo truck which provide a vehicle with the necessary capabilities to serve as an ambulance vehicle. Any other differences that affect organizational maintenance are noted in the applicable sections of this manual. The additions and modifications to the M561 cargo truck to provide the M792 ambulance consist of a personnel heater, warm air ducting, exhaust ducting, a heater control box, a fuel filter and a fuel pump. An insulated canopy assembly is provided for the carrier of the vehicle and the carrier is furnished with an attendant's seat, seat belts, seat cushions, head pads, a lamp and lamp support assembly, a dispenser bracket assembly, and bracket and strap assemblies for securing three litters in the carrier. A step is installed on the carrier tail gate to facilitate entrance into the carrier. Both sides, the carrier top and the rear panel of the carrier canopy are marked with the Red Cross emblem. The front of the tractor of the vehicle is marked with the word

"Ambulance" and two Red Cross designators. An all-purpose stowage rack is mounted on top of the tractor engine cover.

b. *Personnel Heater.*

(1) The personnel heater (fig 1-5) is damped to a mount which is bolted to the floor at the forward end of the carrier. Exhaust gases are expelled from the bottom of the heater through an exhaust pipe that extends toward the right side of the carrier and then rises vertically and exits through the canopy top. The exhaust pipe is provided with a heat shroud along its entire length

for protection of the vehicle personnel. The heater fuel is obtained from the vehicle engine fuel supply system by means of a tee coupling in the crossover fuel line between the two fuel tanks. The heater output is manually regulated by an electric control box mounted within the carrier. The intake-exhaust system is controlled by a 24-volt blower which draws in a selected volume of fresh air or recirculates the carrier air through an adjustable vent at the forward bulkhead of the carrier, impels it through four inch ducting across a heat exchanger within the heater, and then forces it through ducting mounted along the floor inboard of the left carrier seats.

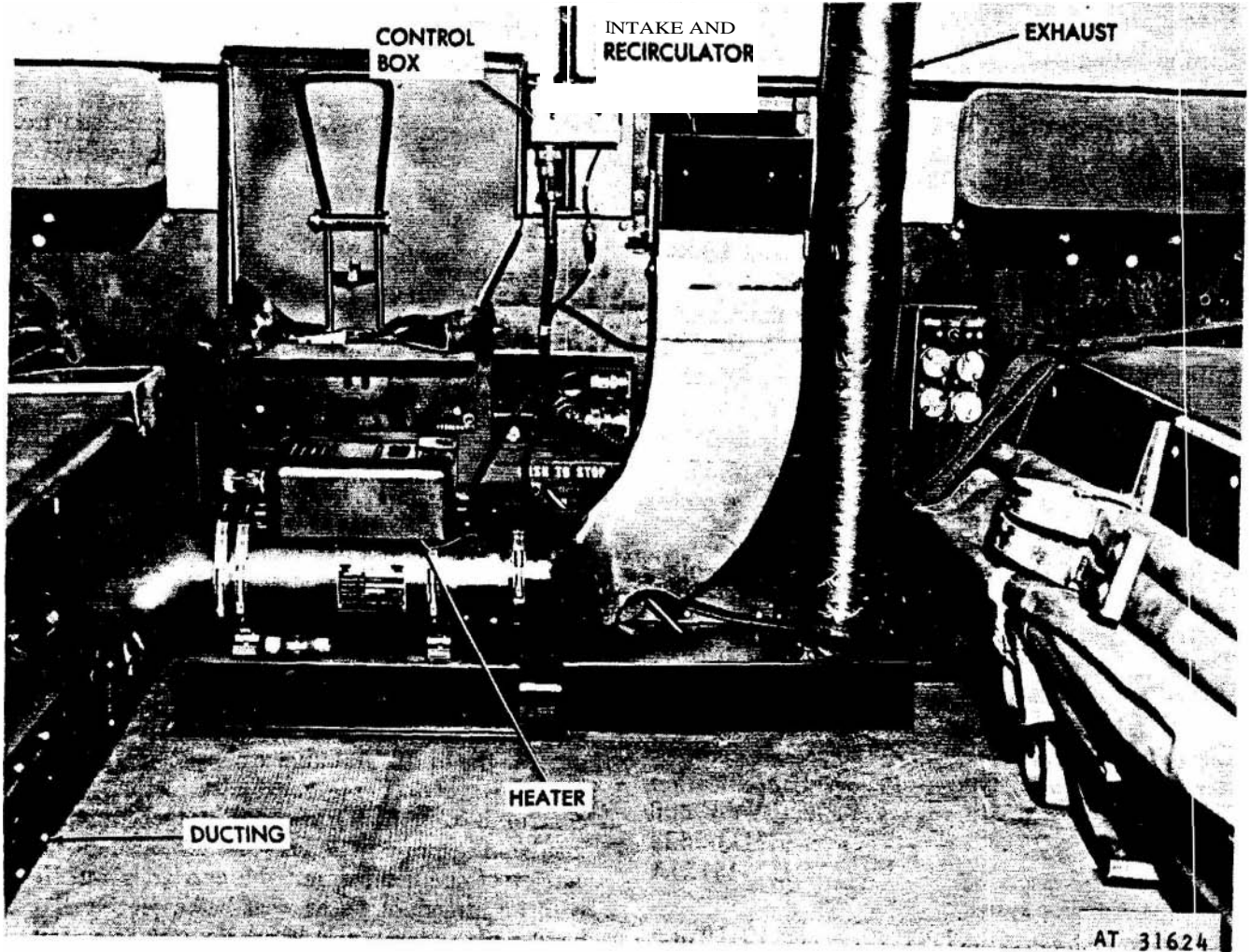


Figure 1-5. M792 ambulance, carrier personnel heater.

(2) The heater burns a mixture of fuel and air in a sealed, all welded steel heat exchanger. A second blower within the unit, mounted on the same shaft as the fresh air intake blower, supplies air for combustion. A fuel **control** valve (fig 1-6) mounted on the heater housing regulates the pressure of the inlet fuel, maintains fuel temperature within a range suitable for metering, and meters the fuel flow for high or low heat operation. A fuel valve heater is installed on the fuel control valve to **pre-heat** the inlet fuel. The fuel valve heating assembly consists of two heating elements and an automatic thermostat. These elements heat the entire fuel valve and prevent ice or wax from clogging the metering orifice and valve filters. The blower will operate from 1 to 3-1/2 minutes after the heater has been turned off and fuel has stopped flowing to cool down the heat exchanger and use up fuel remaining in the heater. Heat output can be regulated by changing position of the Hi-Lo heat output switch on the control box. An overheat switch in the fuel control valve electrical system serves to break the electrical circuit and shut off fuel flow in the event the temperature of the ventilating air system exceeds a safe maximum.

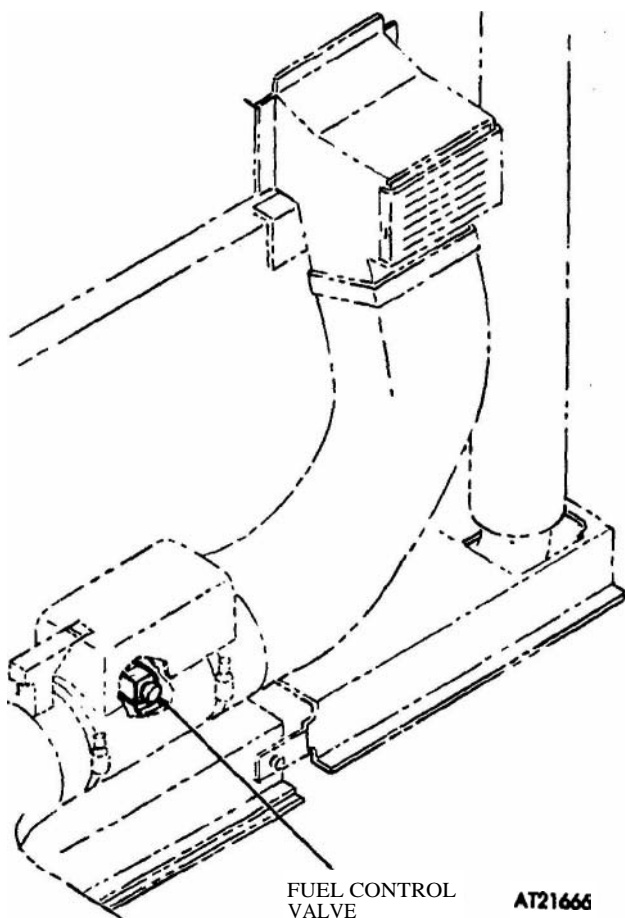


Figure 14. Fuel control valve.

c. Heater Fuel Pump and Fuel Filter.

(1) A 24 volt fuel pump (fig 1-7) is mounted on a bulkhead within the engine compartment and delivers fuel to the heater at a rate of 25 gallons per hour at 2 psi.

(2) The fuel is routed from the tee coupling in the crossover line between the fuel tanks to a fuel filter assembly (fig 1-7) mounted adjacent to the fuel pump. The filter serves to clean the input fuel prior to entering the pump and is a bowl type with a cleanable or replaceable filter element.

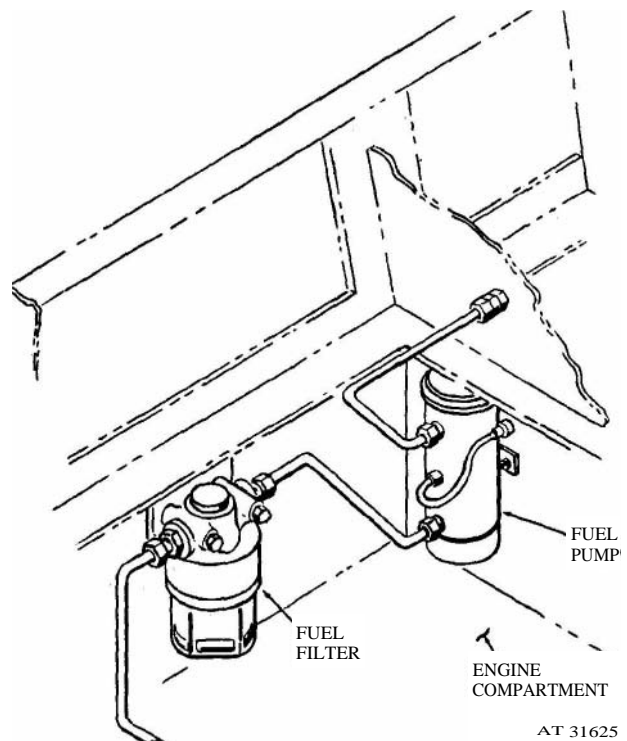


Figure 1-7. M792 ambulance, heater fuel pump and filter

d. Heater Control Box.

(1) A heater control box (fig 1-8) is provided for heat regulation. The box contains two toggle switches and an indicator lamp. The Hi-Lo switch is a double throw switch with two on positions and no center position. In LO position, the heater provides 14,000 BTU / hour and in HI position the heater provides 30,000 BTU / hour.

(2) The Run-Off-Start switch is a double-pole double throw switch with a closed and open position for RUN-OFF and a momentary **closed** position. Protection for the heater circuit is provided by an automatic reset type circuit breaker rated at 15 amperes.

(3) The indicator light is of the press-to-test type with a brilliance blackout control feature and an amber colored lens. Its purpose is to provide an indication of heater generation during the heater

start-up procedure. The Run-Off-Start switch is held in START position until the indicator lamp lights up, then it is switched to the RUN position to place heater in operation. The control box is mounted to the center post of the guard rail attached to the front bulkhead of the carrier.

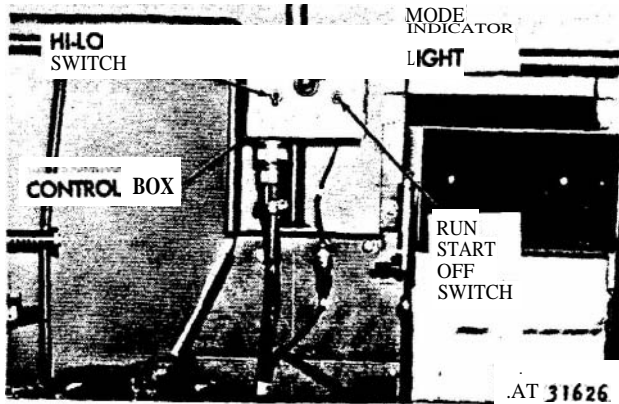


Figure 1-8. M792 ambulance, heater control box.

e. Canopy Assembly.

(1) An insulated canopy (figs 1-9, and 1-10) fits over the carrier bows and is secured to the carrier with nine metal strips or retainers in place of the tie-down cords utilized with the carrier of the M561 cargo truck.

(2) Windows are located in the fore canopy cover and aft canopy flap. Personnel access at the aft is through the aft access flap cover which fastens by means of hook and loop material. Red Cross designators are painted on each side, top and the rear cover of the canopy assembly.

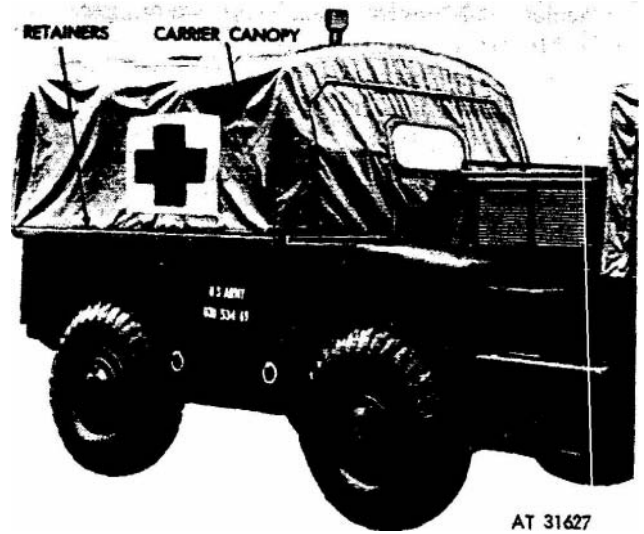


Figure 1-9. M792 ambulance carrier canopy assembly, exterior.

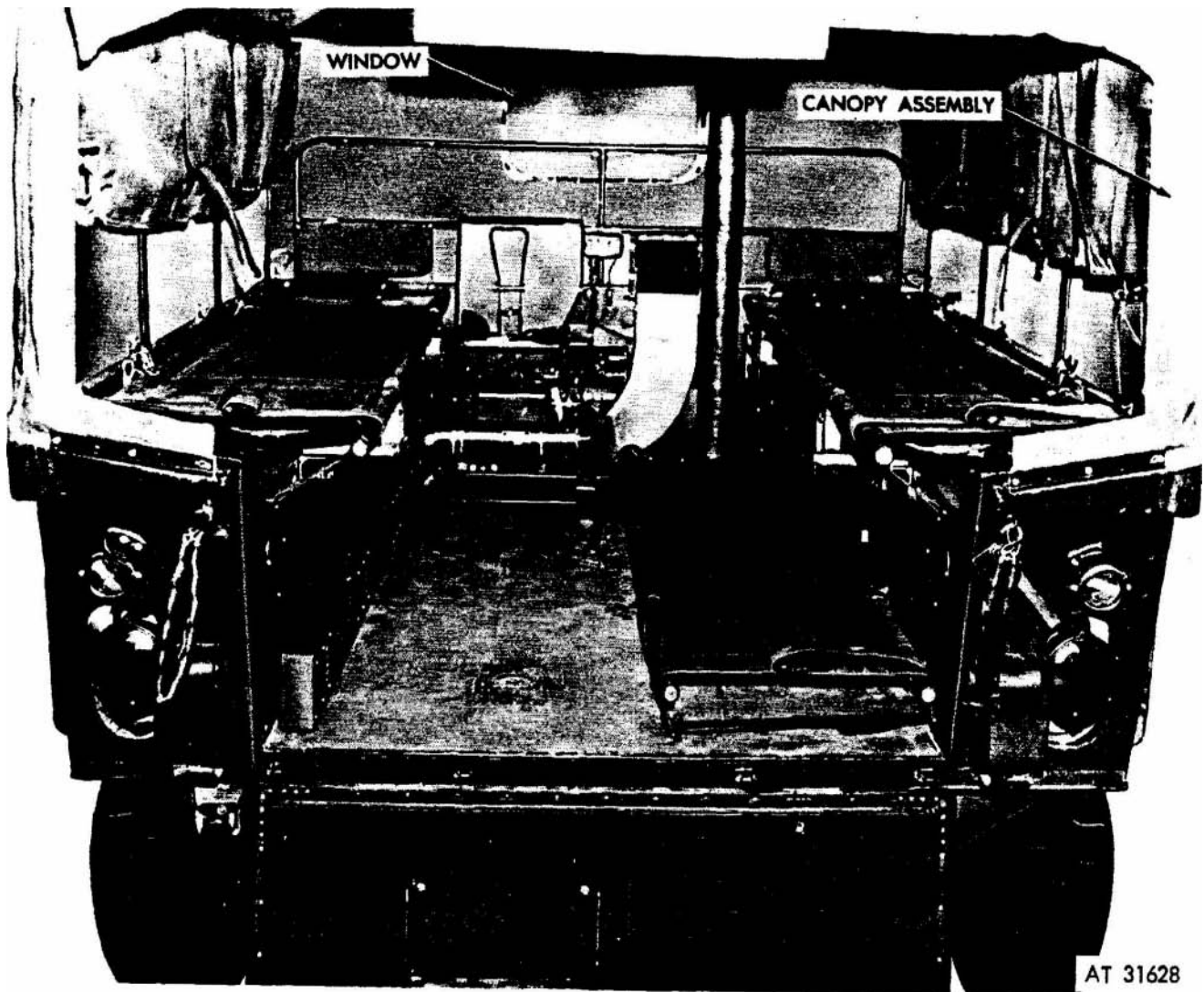


Figure 1-10. M792 ambulance carrier canopy assembly, interior.

f. Litter Shelf Assemblies.

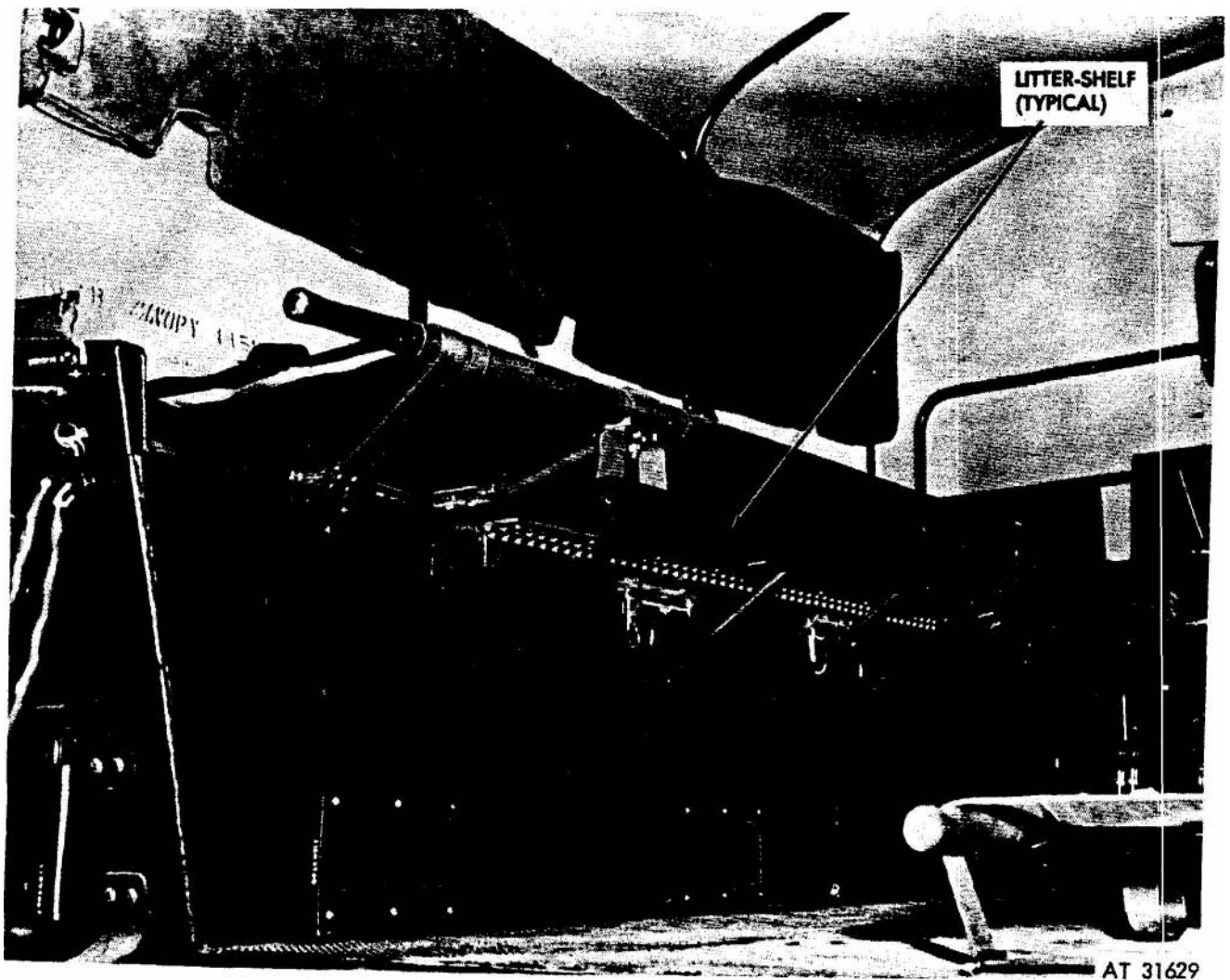
(1) The litter shelf assemblies (fig 1-11) are mounted adjacent to carrier seats and are utilized to accommodate the litters which are placed on the right hand and left hand seat panels. The seat litters are each secured to the shelf assemblies with two sets of straps. When ambulatory patients are carried, the shelf assemblies are lowered by pulling *up* on the shelf so that the shelf support rod comes out of the latches under the shelf. The shelf support is then lowered and secured by clips on the side of the seat. The shelf swings downward on its hinge.

(2) A third litter is accommodated on the

carrier floor. **The** forward ends .of the litter are inserted into cup assemblies attached to the forward bulkhead. The aft end of the litter is secured to the carrier by a strap attached to two footman loops.

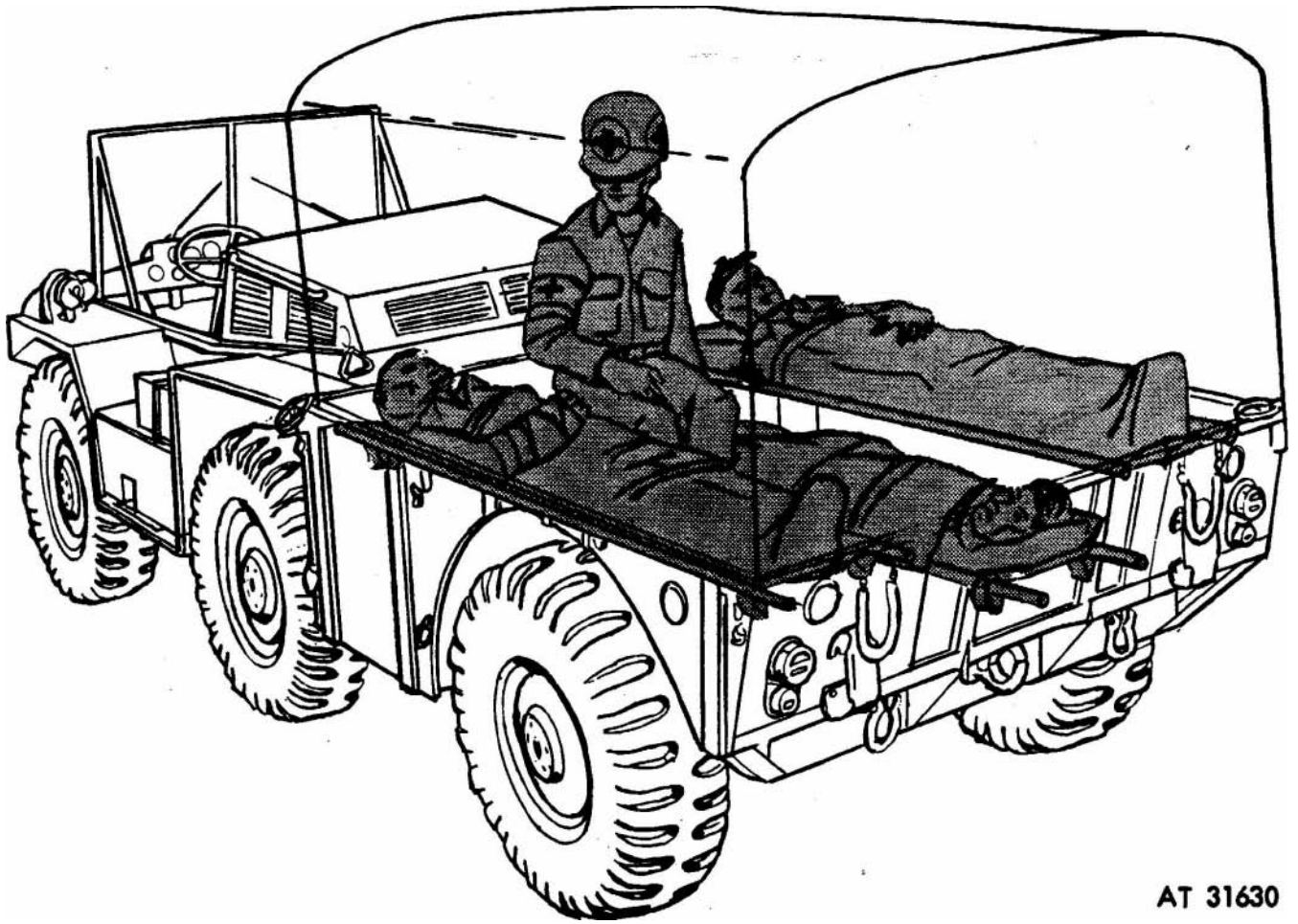
(3) The interior carrier arrangement of the ambulance for accommodating three litter patients and an attendant is shown in figure 1-12. The interior arrangement for accommodating two litter patients, three ambulatory patients and an attendant *is* shown in figure 1-13.

(4) Stowage for the three litters is provided alongside the right hand rest panel (fig 1-14).



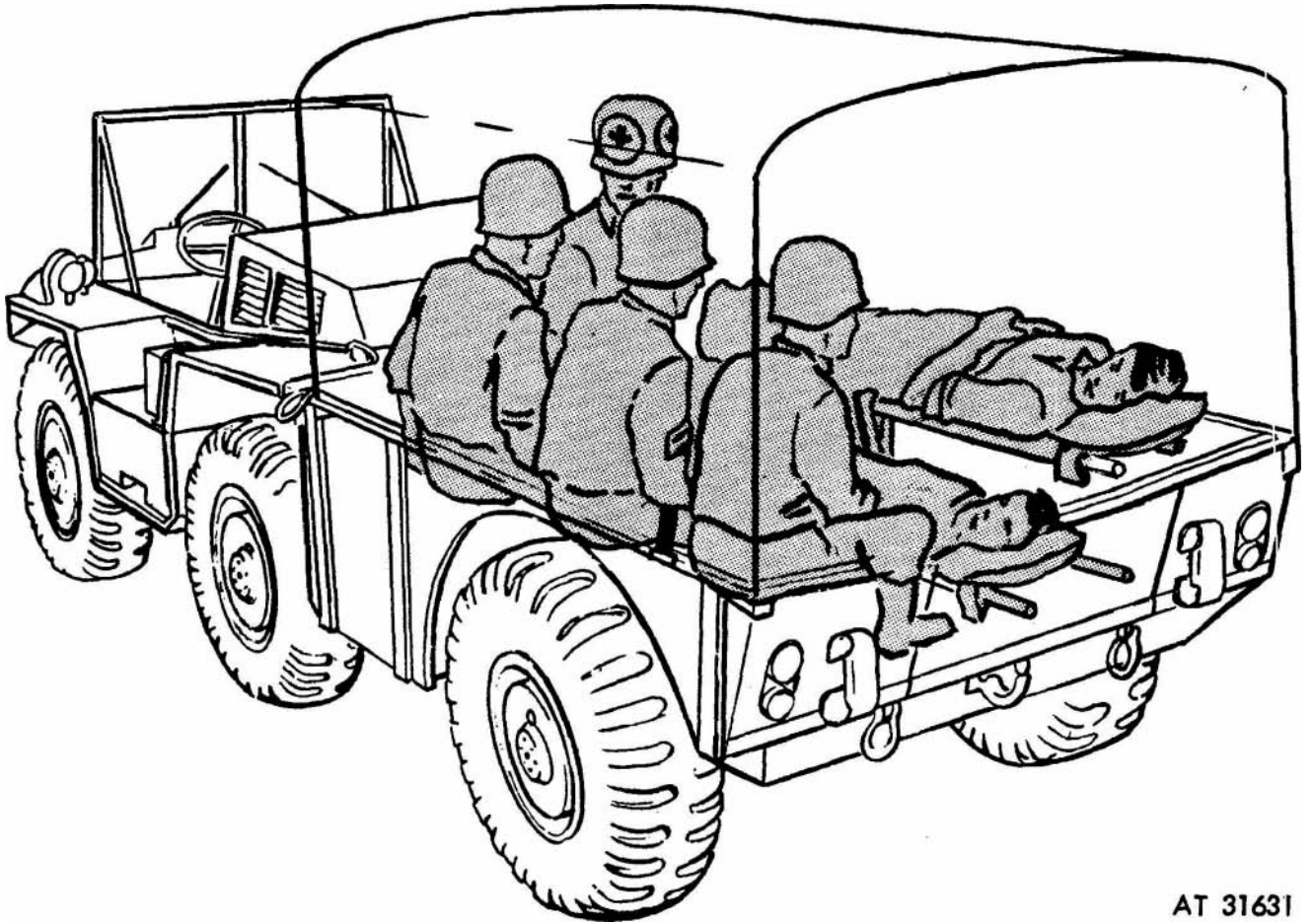
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Figure 1-11. M792 ambulance, litter shelf assemblies.



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Figure 1-12. M792 ambulance, accommodation for three litter patients.



AT 31631

Figure 1-13. M792 ambulance, accommodation for two liner patients and three ambulatory patients.

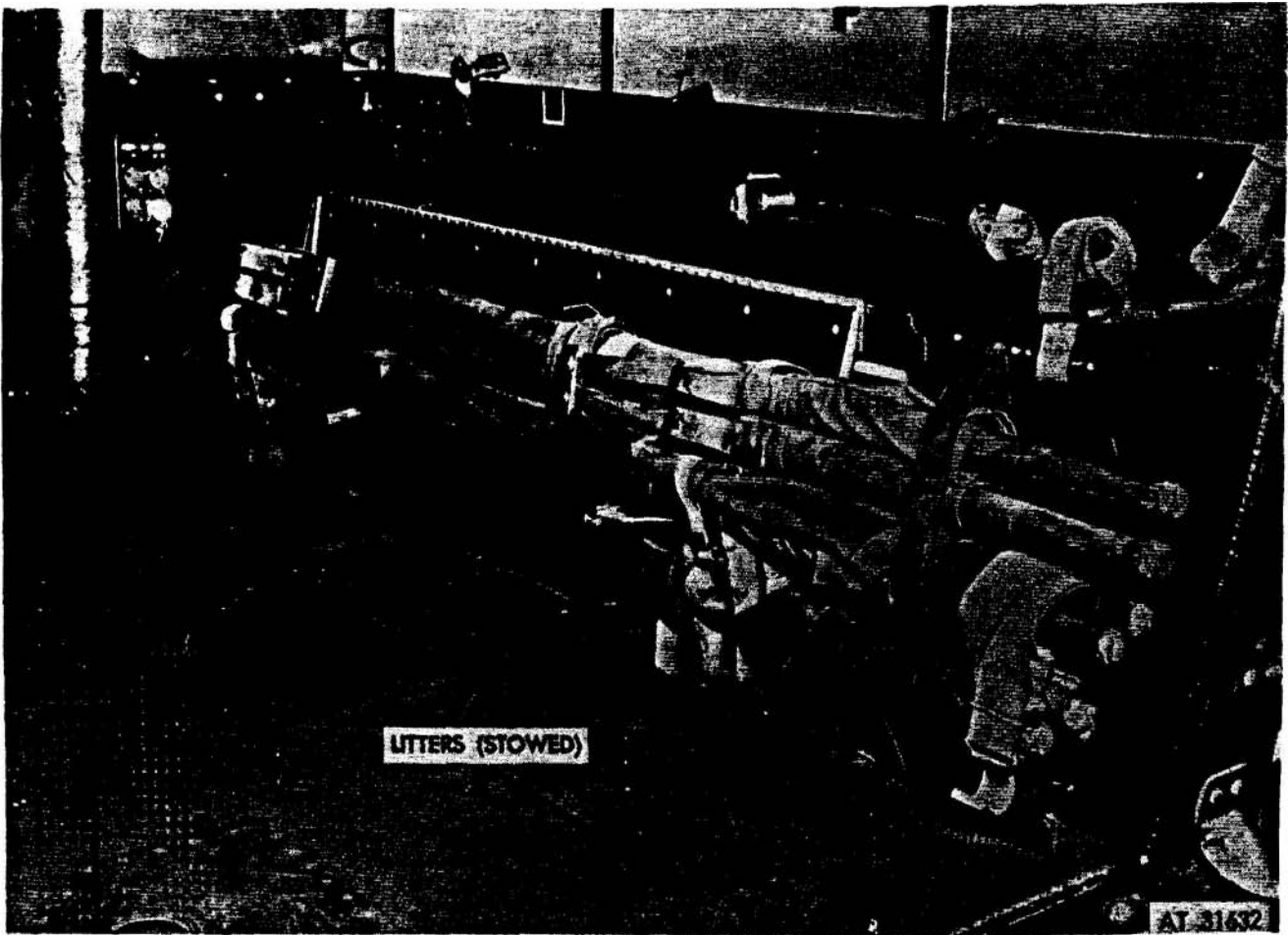


Figure 1-14. M792 ambulance, liner assembly stowage.

g. Seat Cushions. For the comfort of ambulatory patients, a cushion is provided for each right hand and left hand seat panel. Each cushion is secured to its panel with two sets of straps. When the carrier is

used only for litter patients, the cushions are stowed on clips above the seats (fig 1-15) and lashed to the carrier bows by means of straps attached to the bows.

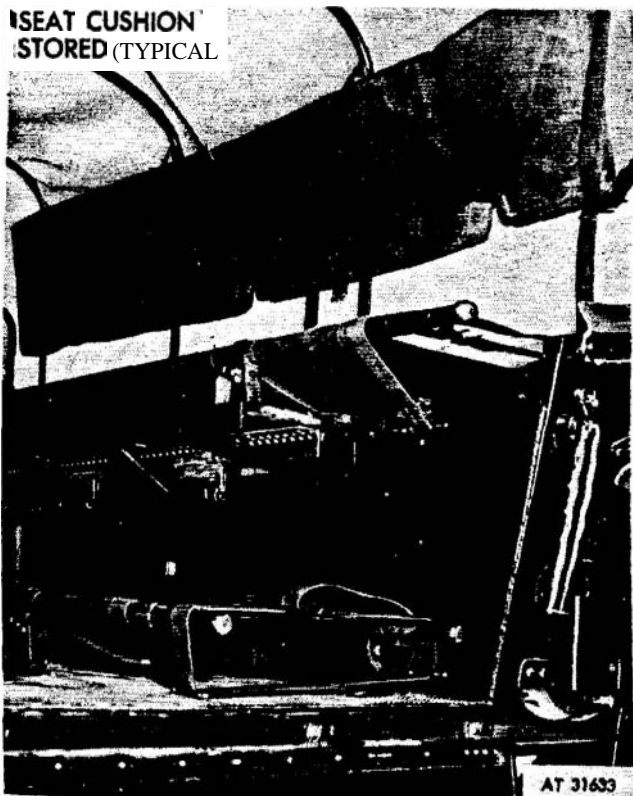


Figure 1-15. M792 ambulance, carrier seat cushions, stored on storage clips.

h. Safety Belts. (Refer to pages 2-234 and 2-260 and figs 2-331, 2-332, and 2-357.)

i. Head Pads. Two head pads (fig 1-16) are mounted on the forward carrier bulkhead and rail to prevent patient head injuries in the event of sudden stops or lurching of the carrier.

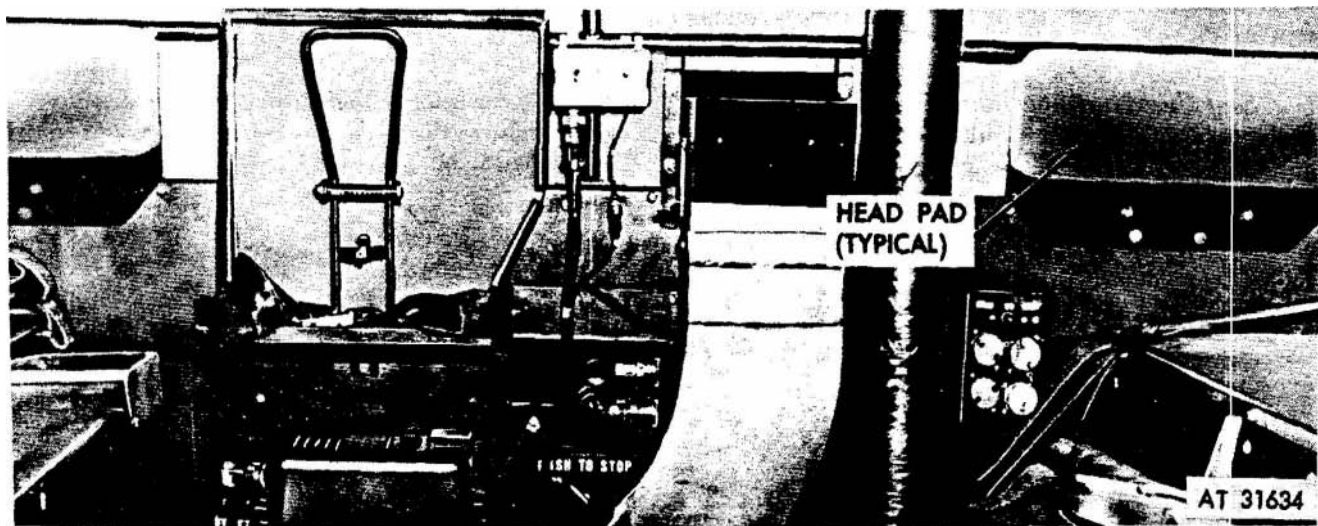


Figure 1-16. M792 ambulance, protective head pads.

j. *Surgical Light and Dispenser Bracket.* A surgical light (fig 1-17) is provided for illumination during operations or emergency situations. The *surgical* light utilizes a sealed beam type lamp which may be pointed in all directions in a hemisphere and locks by friction in any position. Loosening the knurled screw on the side of the light housing permits the lamp to swivel out of the housing and to *be set in* any required position. It is normally mounted between the two forward canopy bows. A bracket (fig 1-17) to accommodate plasma or other medical dispensers *is also* provided and may be located on the overhead bows or *wherever* required. The dispenser bottle is suspended from a hook on the bracket and swaying of the bottle is prevented by a strap and buckle which secures it to the **bracket**

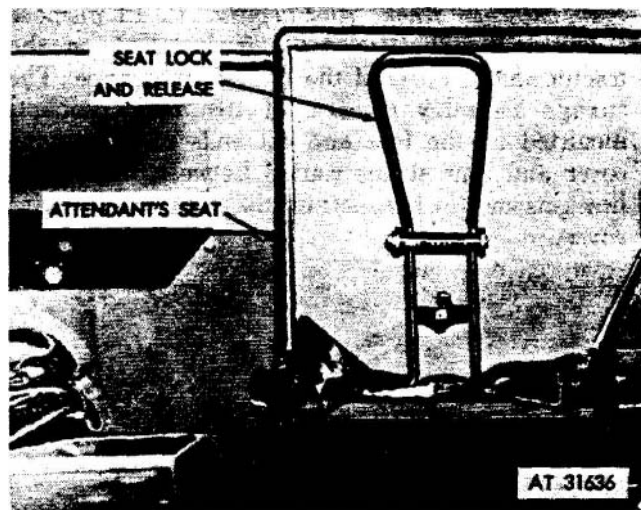


Figure 1-18. M792 ambulance, attendant's seat.

1. *Tailgate Step.* A step is mounted on the inside wall of the tailgate (fig 1-19). When the tailgate is fully opened and hanging down, the step is available for ease of accessibility into the carrier or exit from the carrier by ambulatory personnel.

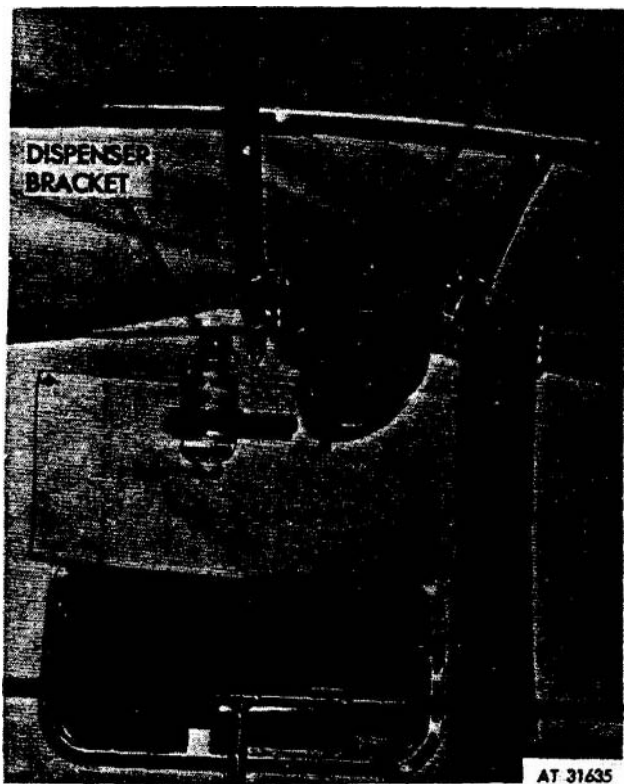


Figure 1-17. Surgical swivel light and dispenser bracket.

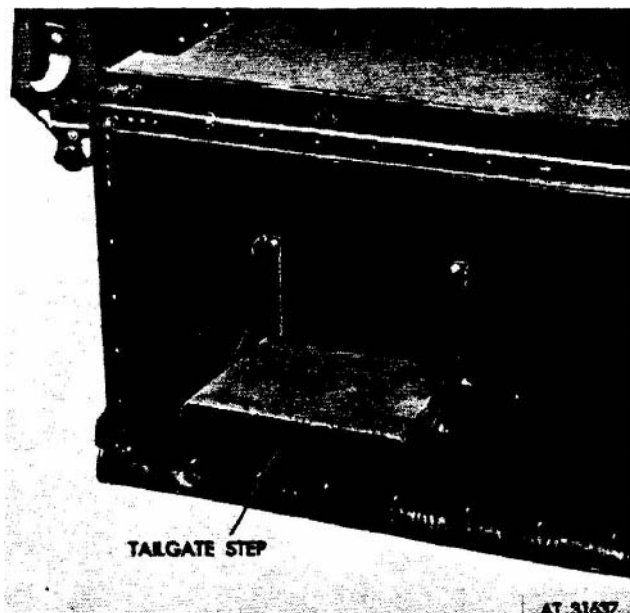


Figure 1-19. M792 ambulance, tailgate step.

k. *Attendant's Seat.* A seat is provided for the use of an attendant (fig 1-18). The seat is installed on the left side of the forward bulkhead of the carrier and is provided with a safety belt. The seat may be raised to a vertical position (out of use) and locked in that position by means of the handle assembly attached to the bottom of the seat. Depressing the handle allows the seat to be lowered to a horizontal position for use.

in. *Stowage Rack, All-Purpose.* An all purpose storage assembly (fig 1-20) is installed on the tractor engine cover of the M792 ambulance. The **storage** assembly consists of two rack brackets mounted on the fore and aft ends of the engine cover and four straps routed between these rack brackets and the brackets on the sides of the engine cover

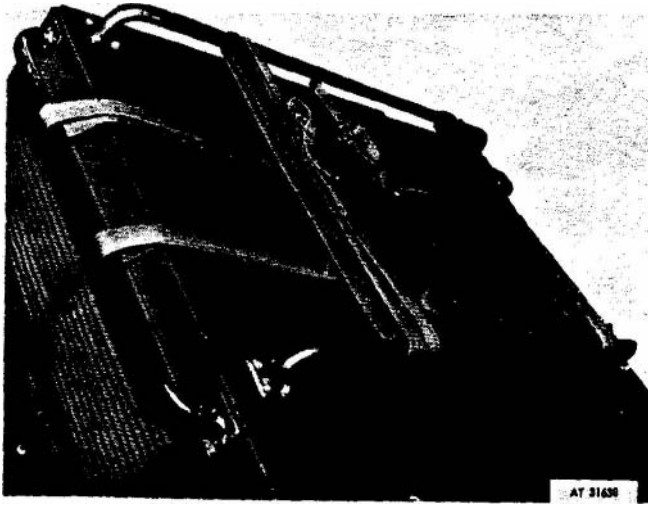


Figure 1-20. M792 ambulance, storage rack **all-purpose**.

n. *Utility Receptacle Box.* A junction box containing three receptacles (fig 1-21) is connected by means of an extension cable to one receptacle outlet in the forward bulkhead of the carrier. One of the three receptacles in the junction box serves as a connection for the surgical light in the carrier. The other two receptacles are of the general purpose type (twist lock and prong) for plugging in apparatus or appliances which may be brought aboard for *use in* the carrier of the ambulance.

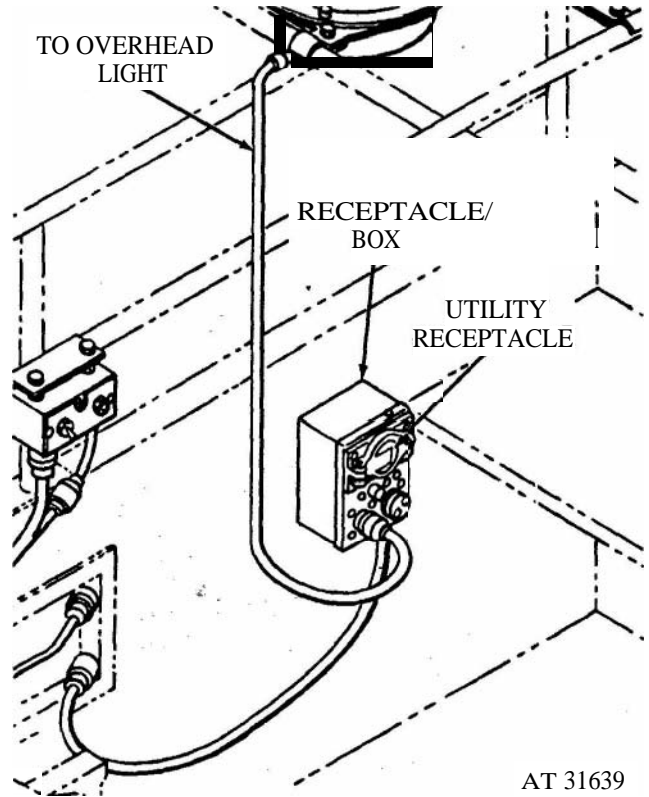


Figure 1-21. M792 **ambulance**, utility receptacle box.

CHAPTER 2

SERVICE AND MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

2-1. Unloading the Equipment

The M561 cargo truck and M792 ambulance may be shipped via air cargo, ship, rail, or truck (open or closed body), in an operative or non-operative condition. Procedures for unloading differ, depending on condition. The following instructions will cover unloading either vehicle by hoisting, drive-off, and tow-off.

a. Unloading by Hoisting.

(1) When transported by railway carrier, position flatcars on an isolated track or blocked siding, post end approaches to train with blue flag or light (to signify that men are working and that siding may not be entered).

(2) Position hoisting vehicle (capable of lifting a minimum of 11,000 pounds) so that boom point and hook are centered over tractor and carrier (fig 2-1).

(3) Remove paulin cover (if installed) and all **tie-downs**, blocking, and stripping that secures cargo truck to bed of carrier.

(4) Attach lifting sling to lifting eyes and remove cargo truck from bed of carrier, and position on *as nearly* level ground *as possible*.

Warning: Keep all personnel clear of hoisting operations, and make sure cargo truck does not twist or swing while being lowered from bed of carrier.

(5) Place chocks in front and rear of each wheel to prevent accidental movement.

(6) Disconnect lifting sling from lifting eyes.

(7) Perform all checks and services prescribed in paragraph 2-4.

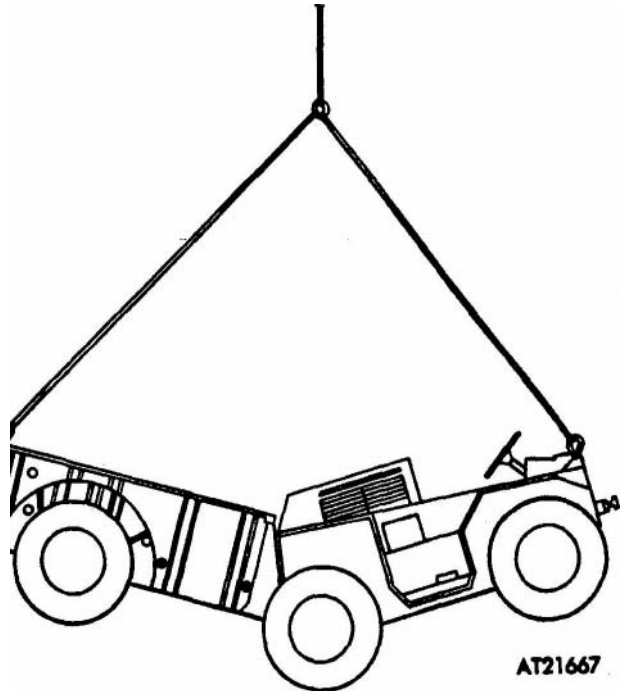


Figure 2-1. Hoisting M561 cargo truck

b. Unloading by Drive-Off Method.

(1) When transported by railway carrier or tractor-trailer in an operative condition, position carrier against an end ramp, preferably of earthen, or concrete construction, or where an end ramp may be constructed from **crossties** and / or planking (fig 2-2).

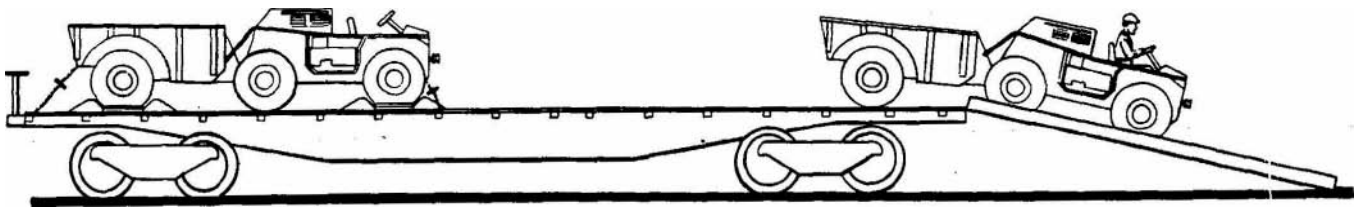
(2) Place chocks in front and rear of each wheel of carrier to prevent carrier from moving away from ramp during unloading operations.

(3) Remove all tie-downs, blocking, and cleats, securing cargo truck to bed of carrier.

(4) Perform all checks and services prescribed in paragraph 2-4.

Warning: Make sure transmission shift lever is in "NEUTRAL" position and all personnel are clear from front and rear of vehicle.

(5) Start engine (refer to TM 9-2320-242-10). Release hand (parking) brake, and drive vehicle **from bed of carrier**.



AT21668

Figure 2-2. Driving M561 cargo truck off carrier.

c. Unloading by Tow-Off.

(1) When cargo truck is shipped by rail or tractor-trailer in an inoperative condition, position carrier as instructed in b. (1) above.

(2) Position towing vehicle with winch at least 80 feet from and in front of ramp, connect winch cable to towing eyes, and take up slack (fig 2-3).

(3) Operator of towed vehicle will test foot and hand (parking) brake for holding power, then signal winch operator to apply power. Crew members with chocks will position themselves at wheels so that wheels may be blocked should brakes fail.

Caution: When no brake holding power is available on non-operative vehicle, a second winch vehicle should be positioned at rear end, hooked to rear towing eyes, to control progress down ramp.

(4) Carefully tow cargo truck off carrier, down ramp, and to a suitable work area. Perform all checks and services prescribed in paragraph 2-4.

Warning: Alert crew to danger' of snapping cables. Keep all personnel not engaged in tow-off operations clear of operating area.

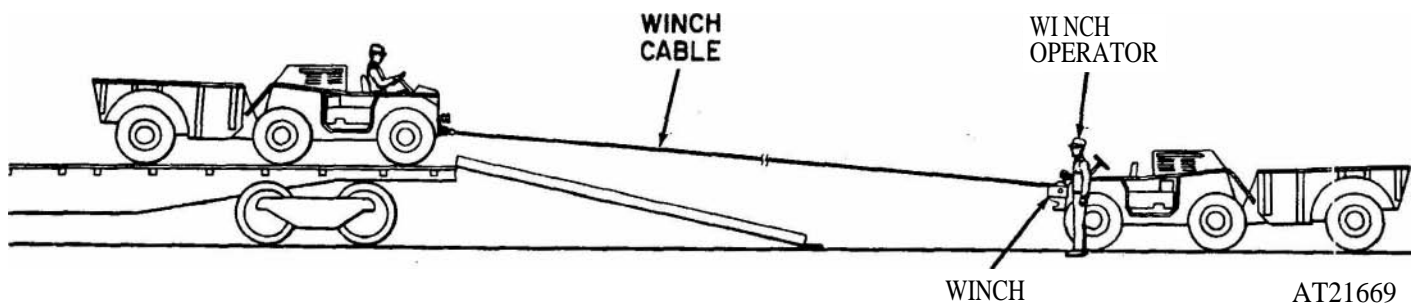


Figure 2-3. Towing M561 cargo truck off carrier.

2-2. Unpacking the Equipment

a. Remove and unpack carton containing basic issue items from bed of carrier.

b. Remove tape and barrier material from personnel seats in tractor.

c. Remove tape and polyethylene from dash panel of tractor.

d. Remove tape and polyethylene from horn button.

e. Remove tape from headlights, parking lights, black out driving lights, tail lights, and reflectors.

f. Remove tape from engine tail pipe opening.

g. Remove tape from engine air cleaner assembly.

h. Remove material securing battery cable ends to hold down straps, tape or plastic cups from battery terminals, paper and tape from battery cable ends.

i. Unwire and remove wooden block securing clutch pedal in a "depressed" position.

j. Remove banding material securing carrier canopy bows together.

k. Open box containing tractor and carrier canopy and remove canopies from polyethylene bags.

l. Remove plastic plug and / or tape from bilge pump outlet.

m. Install the windshield arms and blades (refer to paras 2-226 and 2-227).

2-3. Installation of Separately Packed Components

a. Install the following items (refer to TM 9-2320-242-10):

- (1) Tractor canopy frame assembly and canopy.
 - (2) Carrier canopy bows and canopy (M561 cargo truck).
 - (3) Connect battery cables.
 - (4) Windshield assembly.
 - (5) Rear steering gear box cover drain plug and tractor body drain plugs.
- b. Install M792 ambulance, carrier canopy and bows (refer to para 2-256).

2-4. Inspecting and Servicing Equipment

a. *Inspection.* When a cargo truck is received, inspect all items for damage that may have

occurred during shipping and unloading operations. Particular attention should be directed toward loose or missing nuts, bolts, screws, access plates, drain *plugs*, drain cocks, oil plugs, assemblies, sub-assemblies, or components that *may* be easily lost or broken in transit. Check basic issue items against check list to make sure of *presence and* servicibility, and carefully notate all discrepancies.

b. *Servicing.* Perform all services as *referenced in* Before Maintenance Checks and Services (refer to TM 9-2320-242-10).

2-5. Installation or Setting Up Instructions

No installation or setting up instructions are required for the M561 cargo truck or M792 ambulance.

Section II. MOVEMENT TO A NEW WORK SITE

2-6. Dismantling for Movement

a. If the vehicle is to be driven to a new work site, no dismantling is required.

b. For any other shipment of the vehicle refer to Chapter 4 for dismantling procedures.

Section III. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

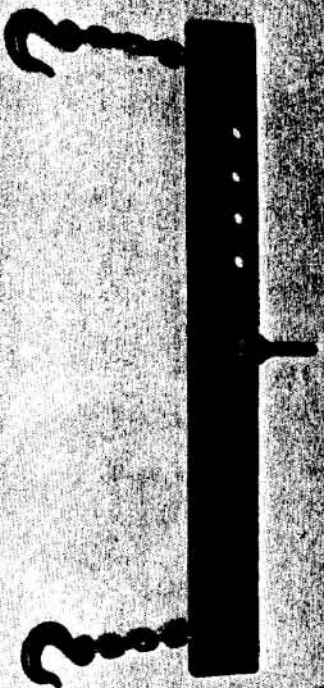
2-7. Special Tools and Equipment

Certain tools and equipment specially designed for organizational maintenance, repair, and general use with the M561 cargo truck and M792 ambulance are listed in table 2-1 and shown in

figures 2-4, 2-5, and 2-6 for information only. This list is not to be used for requisitioning replacements. Special tools for organizational maintenance are listed in TM 9-2320-242-20P which *is* the authority for requisitioning replacements.

Table 2-1. Special Tools and Equipment

Item	FSN or part No.	References		Use
		Fig	Para	
Engine sling	11595523	2-60	2-33	Lifting engine
Adapter	11660069	2-211	2-161	Master cylinder bleed adapter tool
Tube	11660072	2-212	2-161	Bleeding brake wheel cylinders
Installer	11660068-03	2-182	2-150	Installing deflector on stub axle
Installer	11660068-01	2-183	2-150	Installing seal on stub axle
Installer	11660068-04	2-233	2-162	Installing sealed brake spindle bushing
Installer	11660068-02	2-234	2-162	Installing brake spindle input seal
Installer	11660070-01	2-237	2-162	Installing brake spindle wiper and rear bearings
Installer	11660070-02	2-240	2-162	Installing brake hub bearing cup and wiper
Wrench	11660067	2-246	2-162	Wheel bearing nut
Remover	11595179	2-274	2-183	Removal of tie rods
Socket wrench	11595277	2-294	2-198	Removal and installation of upper suspension arm bolt
Hex bit	11602291	2-297	2-199	Removal and installation of lower suspension arm bolt



ENGINE SLING 1199523



THE ROD REMOVER 11995179



HEX BIT 11602291



SOCKET WRENCH 11995277

AR21670

Figure 2-4. Special tools.

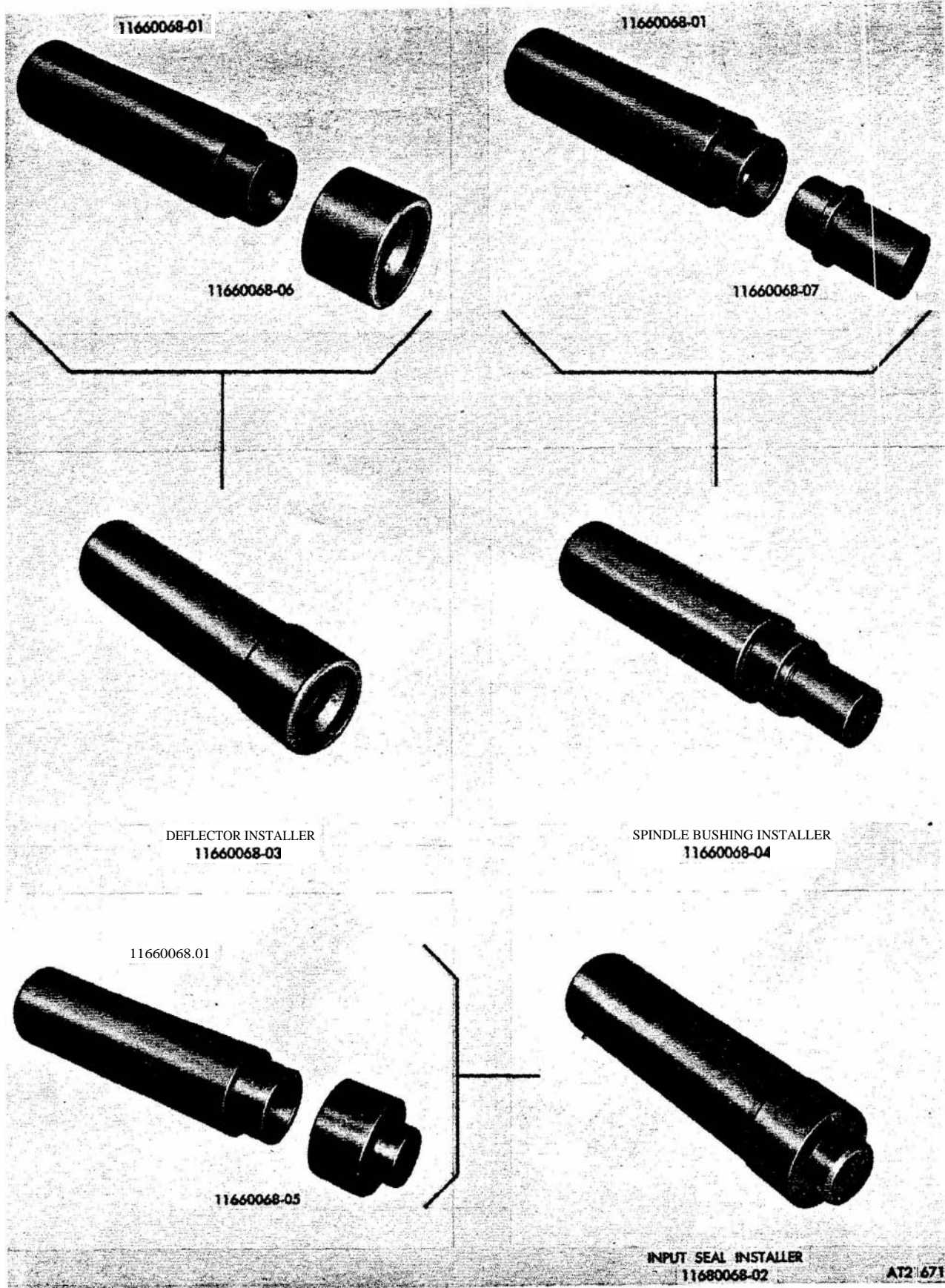


Figure 2-5. Special tools.



Figure 2-6. Special tools.

2-8. Organizational Maintenance Repair Parts

Repair parts are supplied to organizational maintenance for replacement of those parts most likely to become worn, broken, or otherwise

unserviceable, provided replacement of these parts is within their scope. Organizational repair parts supplied for the M561 cargo truck are listed in TM 9-2320-242-20P which is the authority for requisitioning replacements.

Section IV. LUBRICATION

2-9. Lubrication Order

The lubrication order LO 9-2320-242-12 prescribes cleaning and lubricating procedures as to locations, intervals, and proper materials for the M561 cargo truck or M792 ambulance. Lubrication to be performed will be in accordance with the lubrication order. Whenever necessary, the operator, crew, or user will assist the organizational-maintenance personnel in lubrication of the vehicles.

2-10. General Lubrication Instructions

a. *General.* Any special lubricating instructions required for specific mechanisms or parts are covered in the pertinent section.

b. *Service Intervals.* Service intervals specified on the lubrication order are for normal operation and where moderate temperature, humidity, and atmospheric conditions prevail.

c. *Reports and Records.*

(1) Report unsatisfactory performance of preserving materials in accordance with instructions in paragraph 1-2.

(2) Maintain a record of lubrication of the materiel on Form 2408-2, Equipment Lubrication Record.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-11. General

The system of preventive-maintenance services

for the M561 cargo truck or M792 ambulance is outlined in table 2-2.

Table 2-2. Outline of Preventive - Maintenance Services

Service	Interval	Accomplished by
Semiannually "5"	Semiannually or 6000 miles, whichever occurs first.	Regimental or battalion or separate company / battery maintenance personnel.

2-12. General Procedures

a. *Automatically Applied.* All of the general procedures given in the operator's manual will be followed. Organizational mechanics must be so thoroughly trained in these procedures that they apply them automatically at all times in the performance of their duties.

b. *Driver or Crew Participation.* The driver or crew usually accompanies the vehicle and assists the organizational mechanic in the performance of his services.

c. *Unwashed Vehicle.* The driver or crew should present the vehicle for a scheduled preventive-maintenance service in a reasonably clean condition; that is, it should be dry and not caked with mud to such an extent as to seriously hamper inspection and services. However, washing of the vehicle should be avoided immediately prior to an inspection, since certain types of defects such as

loose parts or oil leaks may not be evident immediately after washing.

d. *Plates.* Nameplates, caution plates, and instruction plates made of steel rust very rapidly. When they are found to be in a rusty condition, they should be thoroughly cleaned and heavily coated with an application of lacquer. Refer to TM 9-213.

e. *Services.* Organizational maintenance services are defined by, and restricted to, the following general procedures unless approval has been given by the supporting maintenance organization.

(1) *Adjust.* Make all necessary adjustments in accordance with instructions contained in the pertinent section of this technical manual or technical bulletins.

(2) *Clean.* Clean the unit as outlined in TM 9-2320-242-10 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.

(4) *Service.* This usually consists of performing special operations, such as replenishing battery water, draining and refilling units with oil, and changing or cleaning the oil filter, air cleaner, or cartridges.

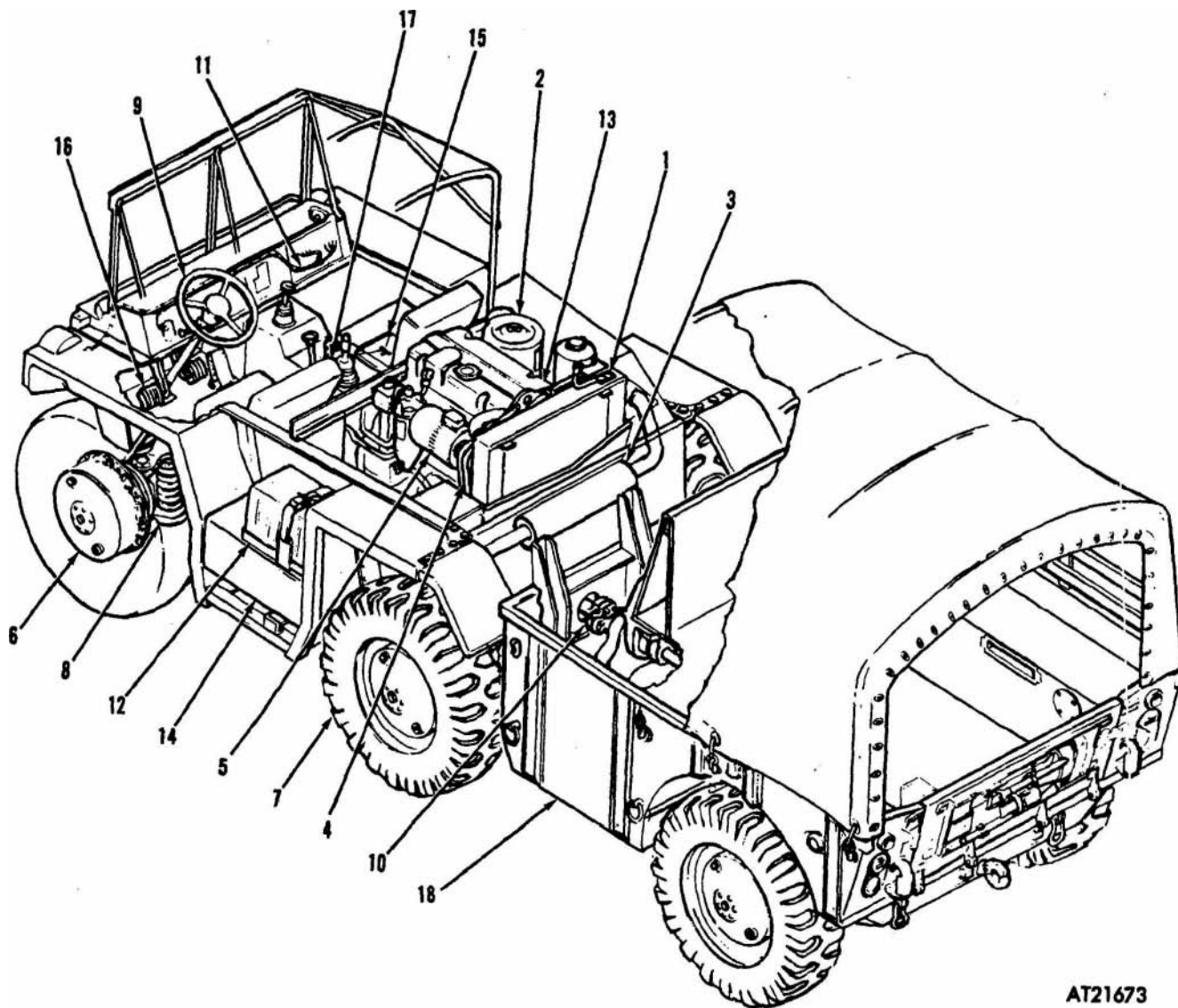
(5) *Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice. Use a torque-indicating wrench where specified. Also do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lock washers, lock nuts, locking wire, or cotter pins to secure the tightened nut. Torque specifications for attaching parts are included with the paragraph containing the maintenance procedure.

(6) *Modification work order application.* At

least every 6 months, a checkup will be made to see that all applicable modification work orders published in DA Pam 310-7 have been accomplished. Also refer to DA Form 2408-5 (Equipment Modification Record). If a field maintenance modification has not been applied, promptly notify the supporting maintenance officer. No alteration or modification, which will affect moving parts, will be made by organizational personnel, except as authorized by official publications.

f. Special Conditions. When conditions make it difficult to perform the complete preventive-maintenance procedures at one time, they can be handled in sections. Plan to complete all operations within a week if possible. **All** available time at halts and during bivouac must be utilized to assure that maintenance operations are completed.

g. DA Form 2404, Equipment Inspection and Maintenance Worksheet. Perform the "S" preventive-maintenance service in the sequence shown in figure 2-7 and table 2-3, using DA Form 2404 as a worksheet.



AT21673

- 1 - Cooling system
- 2 - Air intake system
- 3 - Exhaust system
- 4 - Fan and alternator belts
- 5 - Alternator and Wiring
- 6 - Service brake system
- 7 - Wheels and tires
- 8 - Suspension system
- 9 - Steering system

- 10 - Power train
- 11 - Cab electrical
- 12 - Batteries
- 13 - Engine compartment
- 14 - Fuel tanks
- 15 - On vehicle equipment
- 16 - Clutch pedal
- 17 - Seats frame and canvas
- 18 - Tractor and carrier body

Figure 2-7. Preventive maintenance locator.

2-13. Semiannual "S" Preventive Checks and Services

a. Purpose. The "S" preventive maintenance checks and services ensure the correct adjustment, securing, and assembly of all components of the M561 cargo truck and M792 ambulance. Necessary replacements, cleaning, lubrication, and protection of parts and / or assemblies will be accomplished as required, to give reasonable assurance of trouble-free operation until the next "S" preventive maintenance service is performed.

b. Intervals. The semiannual "S" preventive maintenance services are performed by the organizational mechanics every six months or at every 6,000 miles of vehicle operation, whichever occurs first.

2-14. Specific Procedures for Organizational Maintenance

Specific procedures for performing each item in the semiannual "S" preventive maintenance checks and services are outlined in table 2-3. Result of inspection and checking is authorization to take corrective action to remove the trouble found by performing the service or repair at organizational maintenance level. If repairs by a higher category of maintenance are required, a DA Form 2407, Maintenance Request, will be prepared and forwarded with the equipment to the supporting maintenance activity.

Table 2-3. Preventive Maintenance Checks and Services

Organizational	Vehicle	Semiannual schedule Para ref
Sequence Item to be inspected No.	Procedure	
1 Cooling system	Every 6000 or SEMIANNUAL: Inspect radiator for bent fins, cracks, damaged shrouds, condition of hoses and security of clamps, support braces, and gaskets. Inspect surge tank cap gaskets. Check coolant level and examine coolant for contamination. Test coolant with hydrometer to ascertain if the anti-freeze protection is adequate for seasonal requirements. If need is indicated, drain, flush and refill cooling system with proper coolant for anticipated climatic conditions.	2-70
2 Air intake system	Inspect preformed packing in shell, vacuator valve and clamp for security, cracks or deterioration. Clean element with soap and water if required. Inspect crankcase breather and air restriction lines for cracks or other damage.	2-61
3 Exhaust system	Inspect exhaust manifold, gaskets, pipes and muffler for damage and evidence of leakage during operation.	2-68
4 Fan and alternator belts	Inspect drive belts and pulleys for wear and proper belt tension. Fan belt deflection to be approximately $\frac{1}{2}$ inch for a new belt and $\frac{1}{2}$ inch for a used belt. This deflection is to be measured by applying 18 - 22 Um force between the fan pulley and the alternator pulley.	2-74
5 Alternator and engine compartment wiring	Check wiring for loose connections, terminals, and worn or frayed insulation. Check engine harness for damage.	2-120
6 Service brake system	Inspect one brake assembly cavity for evidence of contamination from water or other foreign material. Inspect condition of brake lining through inspection plugs. If brake shoe edge is visible pull drum and check lining. Inspect the remaining brake assemblies. Inspect brake master cylinder for proper reservoir fluid level, approximately $\frac{1}{2}$ inch from top surface. Check brake pedal travel, should be less than half way to tractor floor, free travel should be approximately $\frac{1}{2}$ - $\frac{3}{4}$ inch. Check air and hydraulic brake lines and couplings for damage or <i>evidence</i> of leakage.	2-162
7 Wheels and tires	Inspect wheel and tire assemblies for damage, cuts, bruises, wear, and debris lodged between rim and bead. Check for uneven tire wear indicating improper wheel alignment. Check wheel mounting nuts for security.	2.156
8 Suspension system	Check suspension springs, spring seats, spring perches, shock absorbers, jounce bumpers, suspension arms, and attaching parts for damage or excessive wear. Check shock absorbers for evidence of leakage.	2-196 2-202
9 Steering system	Inspect steering controls and components for looseness , damage or excessively worn parts.	2-168
10 Power train	Inspect <i>power</i> train components and parts for damaged, worn or loose propeller shafts, pillow block bearings, axle shafts, universal joints, and slip joints.	2-141
11 Tractor cab electrical	Check wiring conduits, connectors, terminals and shielding for frayed insulation and broken or damaged wiring in cab instrument panel harnesses. Check instrument panel indicator gages and panel lights for operation with master switch on. Check windshield wiper operation and blade positioning when stopped. Check horn, lights, turn signals, carrier stop or trouble warning lights, and bilge pump operation.	2-77 2-18
12 Carrier electrical	Check wiring conduits, connectors, terminals and shielding for frayed insulation and broken or damaged wiring. Check PUSH TO STOP switch for operation.	2-18
13 Carrier electrical (M792 frontline ambulance)	Perform 12 above and the following: Turn heater on (refer to TM 9-2320-242-10). Check for proper operation in HI and LOW settings. Press control box indicator lamp and check for bright illumination, insuring proper heater operation. Turn surgical light switch on and observe proper illumination of light.	2-18
14 Batteries	Check batteries for cracks, loose terminals, corrosion or leakage. Add distilled water to each cell as required to attain proper electrolyte level, just below base of filler neck. Grease battery terminals with heavy asbestos grease (GK).	2-80

Table 2-3. Preventive Maintenance Checks and Services—Continued

Organizational		Vehicle	Semiannual schedule
Sequence No.	Item to be inspected	Procedure	Para ref
15	Engine compartment	Check engine compartment for indication of fuel, engine oils, and coolant leaks, at all lines, hose connections, and fuel tank crossovers . Inspect bilge pump screen for obstruction. Inspect for loose or damaged engine mounting brackets and vibration isolators.	2-230 2-40 2-41
16	Fuel tanks	Drain approximately 1/2 pint (1 cup) of fuel from each tank and check for contamination by water or other foreign matter. Inspect fuel tanks and filler caps for damage.	2-47 2-48
17	Carrier heater fuel filter (M792 ambulance)	Inspect fuel filter for contamination, screen for bends or torn mesh, and metallic particles on magnet.	2-59
18	On vehicle equipment	Check for completeness, condition, and proper stowage of all tools and equipment on vehicle.	2-272
19	Clutch Pedal	Check clutch pedal free travel should be approximately $1\frac{1}{2}$ inch. Determine if action of pedal return spring is satisfactory. Note if clutch disengages completely or if it has a tendency to drag. Note if clutch engages smoothly or if it chatters, grabs, or slips. With transmission in neutral, depress clutch and listen for unusual noise which may indicate a defective release bearing.	2-43
20	Seats Frame and Canvas	Inspect tractor or carrier seats and canopies for bent or broken bows and condition of fabric. Inspect carrier straps and tie-down fittings for frays, cuts or broken straps and missing hardware from tie-down rings.	2-205
21	Tractor and Carrier Body	Inspect body for structural damage such as cracks, split beams and broken weldments which will impair the water-tight characteristic or lead to more serious defects. Inspect hitch fitting bearings and pins for excessive wear and proper security. Lubricate hitch pin.	2-205 LO 9-2320-242-12
22	Service Engine	1. Remove oil pan drain plug and drain engine oil. 2. Remove engine oil filter shell. Replace filter element and gaskets. Clean and install shell. 3. Remove, clean, and / or replace air cleaner element. 4. Install oil pan drain plug and add engine oil (OE) to full mark on dip stick plus an additional quart for filter. 5. Drain primary and secondary fuel filters. Replace elements and gaskets. Fill fuel filter shells with fuel and install filter shells.	2-39 2-38 2-61 2-39 2-50 2-51
23	Transmission and transfer case	Check lubricant level and add lubricant as required.	LO 9-2320-242-12
24	Steering gear box, front and rear	Check lubricant level and add lubricant as required.	1,0 9-2320-242-12
25	Differentials	Check lubricant level and add lubricant as required.	LO 9-2320-242.12
26	Vehicle	Lubricate vehicle with GAA at the following locations: governor throttle shaft (1), steering column U joint (1), steering shaft U joints (6), steering shaft bearings (4), steering slip joint (1), steering intermediate rod, carrier (2), idler housing, tractor or carrier (2), axles, front, center, and rear (18), stub axle seals (6), transmission shift levers (2), coupling assembly, inter-body (2), propeller shafts, tractor (2), propeller shafts, carrier (2), hitch pins, carrier (2), torus bearings (2), pintle (3), brake pedal (1), and coupling, transmission to transfer case (2).	LO 9-2320-242-12
27	Final Road Check	Perform final road test. Pay special attention to items which have been repaired or adjusted.	
28	Inspection	Annual Maintenance Checks and Services EVERY 12 MONTHS or 12,000 MILES: Perform all semiannual inspections and inspect service brakes and repack wheel bearings.	LO 9-2320-242-12
29	Service	Perform all semiannual service with the following exceptions:	
30	Transmission and transfer case	Drain lubricant from transmission and transfer case, discard and fill each to proper level with lubricant of correct grade for operating environment.	1,0 9-2320-242.12

Table 2-3. Preventive Maintenance Checks and Services—Continued

Organizational		Vehicle	Semiannual schedule
Sequence No.	Item to be inspected	Procedure	Para ref
31	Differentials	Drain lubricant from differentials, discard and fill to proper level with lubricant of correct grade for operating environment	LO 9-2320-242-12
32	Cooling System	Drain and flush complete cooling system. Refill with proper coolant for operating environment.	2-70

Section VI. TROUBLESHOOTING THE VEHICLE

2-15. General

a. This section contains troubleshooting information for locating and correcting some of the troubles which may develop in the M561 cargo truck or M792 ambulance. Each symptom of trouble or malfunction given for an individual unit or system is followed by a list of probable causes of the trouble and corrective actions necessary to remedy the malfunction.

b. This technical manual cannot cover all possible trouble and deficiencies that may occur under the many conditions of operation. If a specific malfunction, probable cause, and corrective action, therefore, 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 locate troubles. Do not neglect use of test instruments such as an ohmmeter, voltmeter, ammeter, test lamp, hydrometer, and pressure and vacuum gages that are available. Standard automotive theories and principles of operation apply in troubleshooting

these vehicles. Question the driver to obtain maximum number of observed malfunctions. The greater the number of malfunctions that can be evaluated, the easier will be the isolation of the defect.

c. The tests and remedies provided in this section are governed by the scope of the organizational level of maintenance.

2-16. Procedures

a. Table 2-4 lists possible malfunctions that may occur in the vehicles or in individual units or systems of the vehicles. Each malfunction is followed by a list of probable causes that must be considered in determining corrective action.

b. Where electrical malfunctions occur, only correction of minor and obvious causes, such as frayed cables or loose connections are listed in table 2-4. All other electrical malfunctions are covered fully in the Electrical Troubleshooting Chart, table 2-5.

Table 2-4. Troubleshooting

Malfunction	Probable causes	Corrective action
ENGINE		
1. Engine fails to crank or cranks slowly.	<ul style="list-style-type: none"> a. Batteries, wiring, connectors, or starting system defective. b. <i>Starter</i> does not <i>engage</i> flywheel c. Incorrect oil viscosity (cold weather only). d. Mechanical seizure of parts. 	<ul style="list-style-type: none"> a. Check for loosened cables or connectors at battery, battery to frame connection, starter switch, starter terminal stud or the engine to frame cable. Very often a poor connection in this high current circuit can be detected by feeling each connection for heat while the starter is energized. b. Refer to Electrical Troubleshooting chart, table 2-5. c. Inspect engine oil. Drain and fill with correct grade (LO 9-2320-242-12). d. Refer to direct and general support <i>maintenance</i>.
2. Engine cranks but fails to start.	<ul style="list-style-type: none"> a. Inoperative fuel system. b. Air intake clogged or defective. c. Engine preheat system defective (cold weather only). d. Cranking speed too low. e. Low compression pressures. f. Faulty fuel injector assembly. g. Insufficient air. 	<ul style="list-style-type: none"> a. Troubleshoot fuel system (refer to item 12 below). b. Service or replace air cleaner element (para 2-61). c. Refer to Electrical Troubleshooting chart, table 2-5. d. Refer to Electrical Troubleshooting chart, table 2-5. e. Refer to direct and general support <i>maintenance</i>. f. Refer to direct and general support <i>maintenance</i>. g. Service or replace air cleaner element (para 2-61).
3. Engine starts but fails to keep running.	<ul style="list-style-type: none"> a. Inoperative fuel system. b. Faulty fuel injector assembly. c. Low compression pressures. d. Governor defective. 	<ul style="list-style-type: none"> a. Troubleshoot fuel system (refer to item 12 below). b. Refer to direct and general support <i>maintenance</i>. c. Refer to direct and general support <i>maintenance</i>. d. Refer to direct and general support <i>maintenance</i>.
4. Engine starts but misfires. Runs rough .	<ul style="list-style-type: none"> a. Inoperative fuel system. b. Cylinder head seals defective. c. Valve or valve action defective. 	<ul style="list-style-type: none"> a. Troubleshoot fuel system (refer to item 12 below). b. Refer to direct and general support <i>maintenance</i>. c. Refer to direct and general support <i>maintenance</i>.
5. Engine does not develop full power.	<ul style="list-style-type: none"> a. Air intake clogged or defective. b. Inoperative fuel system. c. Engine overheating. d. Cylinder head seals defective. e. Exhaust system restricted. f. Governor defective. g. Piston rings worn or broken. 	<ul style="list-style-type: none"> a. Service or replace air cleaner <i>element</i> (para 2-61). b. Troubleshoot fuel system (refer to item 12 below). c. Refer to item 6. Troubleshoot cooling system (refer to item 10 below). d. Refer to direct and general support <i>maintenance</i>. e. Troubleshoot exhaust system (refer to item 16 below). f. Refer to direct and general support <i>maintenance</i>. g. Refer to direct and general support <i>maintenance</i>.

Table 2-4. Troubleshooting-Continued

Malfunction	Probable causes	Corrective action
6. Engine overheats (indicated on temperature indicator).	<ul style="list-style-type: none"> h. Valve or valve action defective. 	<ul style="list-style-type: none"> h. Refer to direct and general support maintenance.
7. Engine oil pressure low.	<ul style="list-style-type: none"> a. Cooling system defective. b. Low oil level c. Engine timing incorrect. d. Air flow to radiator restricted. e. Temperature gage, sending unit, or wiring defective. 	<ul style="list-style-type: none"> a. Troubleshoot cooling system (refer to item 10 below). b. Check oil level and fill if required. c. Refer to direct and general support maintenance. d. Remove restrictions. e. Refer to Electrical Troubleshooting chart, table 2.5.
8. Engine oil consumption excessive.	<ul style="list-style-type: none"> a. Low oil level b. Lubricating oil system defective. c. Engine damage. d. Incorrect oil viscosity. e. Oil too hot. f. Oil pressure gage sending unit, or wiring defective. 	<ul style="list-style-type: none"> a. Check oil level and fill if required. b. Refer to direct and general support maintenance. c. Refer to direct and general support maintenance. d. Drain and fill with correct grade (LO 9-2320-242-12). e. Refer to direct and general support maintenance. f. Refer to Electrical Troubleshooting chart, table 2-5.
9. Lubricating system defective.	<ul style="list-style-type: none"> a. External oil leaks. b. Crankcase overfilled. c. Piston rings stuck, worn, or broken. d. Valve guides worn. e. Oil cooler or lines leak. 	<ul style="list-style-type: none"> a. Check oil pan and oil filter for leaks. If oil pan leaks notify direct and general support maintenance. b. Drain oil to correct level (<i>LA</i>) 9-2320-242-12). c. Refer to direct and general support maintenance. d. Refer to direct and general support maintenance. e. Refer to direct and general support maintenance.
10. Engine overheats.	<p style="text-align: center;">COOLING SYSTEM</p> <ul style="list-style-type: none"> a. Low coolant level b. Loose or worn drive belts. c. Clogged cooling system. d. Faulty thermostat e. Leaks in cooling system. f. Air flow obstructed through radiator. g. Water pump defective. 	<ul style="list-style-type: none"> a. Refer to direct and general support maintenance. b. Replace element or filter (para 2-38).
	<ul style="list-style-type: none"> a. Replenish coolant. Fill to a level slightly below the bottom of the surge tank filler neck. Add anti-freeze solution as required. b. Adjust belt tension or replace belts (para 2-74). c. Clean cooling system. d. Remove and test thermostat. Replace if faulty (para 2-71). e. Inspect cooling system for leaks, paying particular attention to hoses or radiator connections. Replace hoses or leaking radiator (para 2-70). f. Remove obstructions to allow unrestricted flow of air. g. Rep ogasket or water pump (para 2-73). 	

Table 2-4. **Troubleshooting—Continued**

Malfunction	Probable causes	Corrective action
11. Engine fails to reach normal operating temperature.	<ul style="list-style-type: none"> h. Incorrect injector timing. <li style="padding-left: 20px;">Clogged muffler or exhaust outlet pipes. j. Excessive friction in power train. a. Defective or incorrect thermostat installed in vehicle. b. Temperature sending unit defective. 	<ul style="list-style-type: none"> h. Refer to direct and general support maintenance. i. Replace muffler or exhaust outlet pipes (pare 2-68). j. Check brake system and power train components for binding. a. Remove and teat thermostat. Replace if faulty (pare 2-711). b. Troubleshoot temperature indicator and sending unit (refer to Electrical Troubleshooting chart, table 2-5). Replace indicator or sending unit if defective (pars 2-91 and 2-110). c. Same as b. above.
12. Fuel does not reach injectors.	<ul style="list-style-type: none"> a. Fuel tanks empty. b. Fuel line leaks. c. Fuel filters clogged. d. Fuel pump pressure low. e.. Loss of prime after draining primary filter. 	<ul style="list-style-type: none"> a. Fill fuel tanks with proper grade of fuel b. Tighten connectors. Replace defective fuel lines (pars 2-53). c. Clean primary and replace secondary filter. d. Test fuel pump and replace if pressure is below 45 psi (pars 2-46). e. Fill filter shell with fuel
13. Engine floods.	<ul style="list-style-type: none"> a. Injector nozzle defective. b. Fuel pump pressure high. c. Fuel rack control not adjusted. 	<ul style="list-style-type: none"> a. Refer to direct and general support maintenance. b. Test fuel pump and replace if pressure is above 70 psi (pare 2-46). c. Refer to direct and general support maintenance.
14. Excessive fuel consumption.	<ul style="list-style-type: none"> a. Leaks. b. Fuel pump pressure high. c. Fuel rack control not adjusted. 	<ul style="list-style-type: none"> a. Carefully inspect tanks, lines, and fittings for leaks. Tighten fittings, replace tanks or lines (pars 2-53). b. Test fuel pump and replace if pressure is above 70 psi (para 2-46). c. Refer to direct and general support maintenance.
15. Unusual noise.	EXHAUST SYSTEM	
	<ul style="list-style-type: none"> a. Breaks or cracks in exhaust muffler, manifold or exhaust pipe. b. Loose connections or damaged gaskets. 	<ul style="list-style-type: none"> a. Inspect manifold muffler and exhaust pipe, replace if required (pars 2-68). b. Tighten hardware and clamps. Replace gasket (pars 2-68).
16. Exhaust system restricted.	Muffler outlet pipe or pipes plugged.	Clean or replace muffler or pipes (pars 2-68).

Table 24. Troubleshooting—Continued

Malfunction	Probable causes	Corrective action
17. Cold weather system defective.	<p style="text-align: center;">ENGINE STARTING AIDS</p> <ul style="list-style-type: none"> a. Ignitor electrode or plug defective. b. High tension coil or cable defective. c. Airbox nozzle clogged. d. Fuel pressure switch defective. e. Air pump defective. f. Cold start filter clogged. g. Fuel lines clogged. h. ON-OFF switch defective. 	<ul style="list-style-type: none"> a. Troubleshoot cold start system (refer to Electrical Troubleshooting chart, table 2-5). Refer to direct and general support maintenance for replacement. b. Refer to direct and general support maintenance. c. Refer to direct and general support maintenance. d. Refer to direct and general support maintenance. e. Refer to direct and general -support maintenance. f. Refer to direct and general support maintenance. g. Refer to direct and general support maintenance. h. Troubleshoot switch (refer to Electrical Troubleshooting chart, table 2-5). Replace if defective (pare 2-93).
18. Clutch chatters.	<p style="text-align: center;">CLUTCH</p> <ul style="list-style-type: none"> a. Grease on clutch disc, pressure plate, or flywheel b. Binding of clutch release linkage. c. Disc facings loose. d. Broken pressure plate. e. Loose engine mounts. 	<ul style="list-style-type: none"> a. Refer to direct and general support maintenance. b. Clean and free linkage. c. Refer to direct and general support maintenance. d. Refer to direct and general support maintenance. e. Torque engine mounting bolts 55 65 lbs-ft.
19. Clutch grabbing.	<ul style="list-style-type: none"> a. Grease on clutch disc, flywheel, or pressure plate. b. Clutch disc or pressure plate broken. c. Hub of disc not sliding freely on splined shaft. d. Release linkage binding. 	<ul style="list-style-type: none"> a. Refer to direct and general support maintenance. b. Refer to direct and general support maintenance. c. Refer to direct and general support maintenance. d. Clean and free linkage.
20. Clutch slipping.	<ul style="list-style-type: none"> a. Insufficient free play in release yoke. b. Release linkage binding. c. Pressure plate spring weak or broken. d. Disc facing worn. e. Pressure plate warped. f. Oil on disc face. 	<ul style="list-style-type: none"> a. Adjust linkage (para 2-44). b. Clean and free linkage. c. Refer to direct and general support maintenance. d. Refer to direct and general support maintenance. e. Refer to direct and general support maintenance. f. Refer to direct and general support maintenance.
21. Clutch dragging.	<ul style="list-style-type: none"> a. Excessive pedal free play. b. Clutch disc bent or dished. 	<ul style="list-style-type: none"> a. Adjust pedal free play (pars 244). b. Refer to direct and general support maintenance

Table 2-4. Troubleshooting—Continued

Malfunction	Probable causes	Corrective action
22. Clutch does not disengage.	e.. Clutch disc facing loose or broken. a. Release linkage binding. b. Disc or pressure plate broken.	c. Refer to direct and general support maintenance. a. Clean, free and adjust linkage (part 244). b. Refer to direct and general support maintenance.
TRANSMISSION		
23. Hard shifting in all gears.	a. Shifting linkage out of adjustment b. Clutch disc or other clutch parts damaged.	a. Adjust shifting linkage (pars 2-134). b. Refer to direct and general support maintenance.
24. <i>Slips out of gear or engages</i> two speeds.	Transmission parts worn or damaged.	Replace transmission (pars 2-135).
25. Lubricant leakage.	a. Lubricant level too high in transmission. b. Leak at bearing retainer cap screws. c. Loose drain plug. d. Loose filler plug. e. Transmission input shaft seal leaking. f. Transmission expansion plugs loose.	a. Drain to proper level (LO 9-2320-242-12). b. Torque cap screws to 40 lbs-ft. c. Torque drain plug 35 - 40 lbs-ft. d. Torque filler plug to 30 lbs-ft. e. Refer to direct and general support maintenance. f. Refer to direct and general support maintenance.
26. Transmission noisy.	g. Transmission cover gasket leaking. a. Loose mounting bolts. b. Flywheel housing alignment incorrect. c. Insufficient lubricant. d. Transmission parts worn or damaged.	g. Tighten cover mounting bolts. a. Tighten mounting bolts. b. Refer to direct and general support maintenance. c. Fill to proper level (LO 9-2320-242-12). d. Refer to direct and general support maintenance.
TRANSFER		
27. Transfer will not shift into gear.	a. Incorrect lubricant b. Transfer worn or damaged.	a. Drain transfer and fill to mark on dipstick (LO 9-2320-242-12). b. Replace transfer (para 2-140).
28. Transfer slips out of gear.	Transfer worn or damaged.	Replace transfer (pars 2-140).
29. Transfer not in operation.	a. Insufficient lubrication. b. Incorrect lubrication. c. Transfer worn or damaged. d. Defective oil pump.	a. Fill to mark on dipstick (LO 9-2320-242-12). b. Drain transfer and fill to mark on dipstick (LO 9-2320-242-12). c. Replace transfer (pars 2-140). d. Refer to direct and general support maintenance.
PROPELLER SHAFTS, DRIVE AXLE AND STUB AXLE		
30. Backlash or noise in universal joint.	Damaged or worn universal spider and bearing assembly.	Repair both universal spider and bearing assemblies (pars 2-144 or 2-146).
31. Backlash or vibration in propeller shaft, drive axle or stub axle.	a. Propeller shaft bent or misaligned. b. Damaged or worn pillow block bearing (center bearing).	a. Check alignment. H bent replace propeller shaft (pars 2-144 or 2-146). b. Replace pillow block bearing (pars 2-145).

Table 2-4. **Troubleshooting—Continued**

Malfunction	Probable causes	Corrective action
	<p>c. Damaged worn splines.</p>	<p>c. Replace propeller shaft (pars 2-144 or 2-146), drive axle (pars 2-148 or 2-149) or stub axle (pars 2-150).</p>
<p>DIFFERENTIALS AND DRIVE COMPONENTS</p>		
<p>32. Differential noisy.</p>	<p>a. Insufficient lubricant. b. Differential worn or damaged. c. Incorrect lubricant.</p>	<p>a. Fill to proper level (IA 9-23 20-242-12). b. Replace defective differential (pars 2-151, 2-153, or 2-154). c. Drain differential and fill with proper lubricant (IA) 9-2320-242-12).</p>
<p>33. Vehicle will not move.</p>	<p>a. Differential worn or damaged. b. Clutch inoperative. c. Transmission / transfer not in gear. d. Drive axle, stub axle, or propeller shaft broken; U-joint defective.</p>	<p>a. Replace defective differential (pars 2-151, 2-153, or 2-154). b. Refer to direct and general support maintenance. c. Place transmission / transfer in proper gear range. d. Replace or repair axle shaft and joint assembly (pare 2-1481. Repair or replace U-joints (para 2-144).</p>
<p>34. Differential leaks.</p>	<p>a. Lubricant level too high. b. Drain plug loose or damaged. c. Gaskets or seal leaks. d. Output shaft seal damaged or worn.</p>	<p>a. Drain to proper level (LO 9-2320-242-12). b. Tighten or replace plug. c. Refer to direct and general support maintenance. d. Refer to direct and general support maintenance.</p>
<p>35. Excessive backlash (play).</p>	<p>Differential worn or damaged.</p> <p style="text-align: center;">PARKING BRAKE</p>	<p>Replace defective differential (pars 2-151, 2-153, or 2-154).</p>
<p>36. Parking brake does not hold.</p>	<p>a. Brakes improperly adjusted. b. Brake lining worn.</p>	<p>a. Adjust brakes (para 2-158). b. Replace brake shoes (pare 2.160) also inspect drum. Replace drum if necessary (para 2-160). c. Clean brake shoes if possible or replace shoes.</p>
<p>37. Parking brake drags and overheats.</p>	<p>c. Brake shoes covered with dirt or contaminant. d. Brake linkage out of adjustment or damaged. a. Brake partially applied. b. Brake linkage improperly adjusted.</p> <p style="text-align: center;">SERVICE BRAKES</p>	<p>d. Adjust linkage (para 2-158 or replace linkage (pars 2-159). a. Release brake lever fully. b. Adjust linkage (ara 2-1581).</p>
<p>38. Service brakes fail completely.</p>	<p>a. Insufficient hydraulic fluid. b. Hydraulic lines or fittings leak. c. Master cylinder or wheel cylinder defective. d. Air in system.</p>	<p>a. Fill system with proper fluid. b. Tighten lines and fittings or replace faulty parts. c. Replace cylinder (pare 2-164 or 2-165). d. Bleed system (pare 2-161).</p>

Table 2-4. Troubleshooting-Continued

Malfunction	Probable causes	Corrective action
39. All brakes drag.	<ul style="list-style-type: none"> a. Distorted or improperly adjusted brake shoes. b. Defective master cylinder. 	<ul style="list-style-type: none"> a. Adjust or replace brake shoe as necessary (para 2-161). b. Replace master cylinder (pars 2-164).
40. Spongy pedal.	<p>Brake line restricted.</p> <ul style="list-style-type: none"> a. Air in system. Insufficient hydraulic fluid. 	<ul style="list-style-type: none"> Replace or clean affected brake line. a. Bleed brake system (part 2-161). b. Fill master cylinder with proper fluid.
41. Brake pedal action normal, but brakes respond poorly.	<ul style="list-style-type: none"> c. Leaks in hydraulic system, hoses and tubes. a. Brake shoes worn. b. Brake drums excessively scored. c. Brake shoes worn or contaminated with grease or oil. 	<ul style="list-style-type: none"> c. Inspect hydraulic system and replace faulty parts (pare 2-166). a. Replace brake shoes (pars 2-162). b. Replace brake drums (para 2-162). c. Clean brake components and replace brake shoes (pare 2-162).
42. Brake pedal can be slowly floored.	<ul style="list-style-type: none"> a. Insufficient hydraulic fluid. b. Leaks in system. c.. Master or wheel cylinder defective. 	<ul style="list-style-type: none"> a. Fill system with proper fluid. b. Tighten lines and fittings or replace faulty parts (part 2-166). c. Replace master cylinder (pares 2-164 and 2-165).
43. Brakes grab, chatter or act unevenly.	<ul style="list-style-type: none"> a. Brakes improperly adjusted. b. Brake shoes contaminated with grease. c. Brake drum warped or cracked. 	<ul style="list-style-type: none"> a. Adjust brakes (pare 2-161). b. Clean brake components and replace shoes (pars 2-162). c. Replace brake drum (part 2-162).
WHEELS AND TIRES		
44. Tire flat .	<p>Tire cut, punctured, blown out, bead broken, or valve defective.</p>	<p>Repair or replace tire (pars 2.156).</p>
45. Abnormal tire wear.	<ul style="list-style-type: none"> a. Tire pressure low. b. Wheels out of alignment. c. Improper toe-in. d. Wheels, tires, or brake drums out of balance. 	<ul style="list-style-type: none"> a. Correct tire pressure (TM 9-2320-242-10). b. Perform wheel alignment (pars 2-169). Refer to direct and general support maintenance for complete alignment. c. If wear is in tractor front or carrier rear tires, adjust toe-in (para 2-169). d. Replace as necessary.
46. Wheel wobbles.	<ul style="list-style-type: none"> a. Bearing loose or defective. b. Wheel or tire mounted improperly c. Bent wheel 	<ul style="list-style-type: none"> a. Tighten or replace bearing (pare 2-162). b. Remount properly (pars 2-156). Replace wheel (pars 2-156).
STEERING SYSTEM		
47. Steering wheel shimmies.	<ul style="list-style-type: none"> a. Incorrect tire pressure. b. Wheels out of alignment or balance. c. Wheel bearings loose or defective. d. Worn tie rod ends. 	<ul style="list-style-type: none"> a. Inflate tires to proper pressure, refer to vehicle data plate. b. Perform toe-in adjustment (para 2-169). Refer to direct and general support maintenance for complete alignment. c. Tighten or replace bearings (pare 2-162). d. Replace or repair tie rod ends (paras 2-181, 2-182 or 2-183).

Table 2-4. Troubleshooting-Continued

Malfunction	Probable causes	Corrective action
	<ul style="list-style-type: none"> e. Worn idler arm. f. Worn steering U-joint. 	<ul style="list-style-type: none"> e. Replace idler arm (pare 2-177 or 2-178). f. Replace U-joint (paras 2-184, 2-185 or 2-187).
48. Steering has backlash.	<ul style="list-style-type: none"> a. Pitman arm loose. b. Worn or defective steering gear box. 	<ul style="list-style-type: none"> a. Tighten pitman arm (para 2175 or 2-176). b. Replace steering gear box (para 2-173 or 2-174).
49. Erratic steering.	<ul style="list-style-type: none"> a. Incorrect wheel alignment. 	<ul style="list-style-type: none"> a. Adjust toe-in (pare 2-169). If condition persists, refer to direct and general support maintenance for caster and camber adjustment.
50. Pull to one side.	<ul style="list-style-type: none"> b. Loose steering linkage. c. Incorrect wheel bearing adjustment. d. Worn or damaged steering linkage. 	<ul style="list-style-type: none"> b. Tighten all loose connections. c. Adjust wheel bearings (para 2-162). d. Repair or replace faulty parts.
51. Vehicle has tendency to wander.	<ul style="list-style-type: none"> a. Incorrect tire pressure. b. Incorrect wheel alignment. c. Tires not of uniform size. d. Unequal brake adjustment e. Sagging or broken suspension front spring. 	<ul style="list-style-type: none"> a. Correct tire pressure (TM 9-2320-242-10). b. Adjust toe-in (pare 2-169). c. Install tires of uniform size. d. Adjust service brakes (para 2-161). e. Replace suspension front spring (para 2-200).
	<ul style="list-style-type: none"> a. Incorrect tire pressure. b. Loose steering linkage. c. Incorrect steering <i>gear</i> box adjustment. d. Incorrect wheel alignment. 	<ul style="list-style-type: none"> a. Correct tire pressure (TM 9-2320-242-10). b. Tighten steering linkage. c. Refer to direct and general support maintenance. d. Perform toe-in adjustment (pars 2-169). Refer to direct and general support maintenance for complete alignment.
	<ul style="list-style-type: none"> e. Idler arm worn or broken. 	<ul style="list-style-type: none"> e. Replace idler arm (pare 2-177 or 2-178).
	SPRINGS AND SHOCK ABSORBERS	
52. Spring breakage.	<ul style="list-style-type: none"> a. Extremely rough handling of vehicle <i>over</i> rough terrain. b. Lack of shock absorber control 	<ul style="list-style-type: none"> a. Reduce vehicle speed over rough terrain when possible. b. Replace shock absorber (para 2-202 or 2-203).
53. Poor recovery or slow action of shock absorbers.	<ul style="list-style-type: none"> a. Shock absorber bushing damaged. b. Loose mounting. c. Dripping or no fluid in shock absorbers. 	<ul style="list-style-type: none"> a. Replace shock absorber (para 2-202 or 2-203). b. Check shock absorber if serviceable, tighten mounting. c. Replace shock absorbers (para 2-202 or 2-203).
54. Noisy shock absorbers.	<ul style="list-style-type: none"> Worn or damaged shock absorbers. 	<ul style="list-style-type: none"> Replace shock absorbers (para 2-202 or 2-203).
55. Vehicle canted at one wheel	<ul style="list-style-type: none"> Spring spring or broken. 	<ul style="list-style-type: none"> Replace coil spring (pars 2-200) or center axle leaf spring (para 2-201).

Section VII. TROUBLESHOOTING THE ELECTRICAL SYSTEM

2-17. General

a. This section contains detailed troubleshooting information for locating and correcting malfunctions in the electrical systems of the M561 cargo truck and M792 ambulance, and Table 2-5, Electrical Troubleshooting. Each of the functional systems is treated separately, by means of:

- (1) A physical and functional description.
- (2) A brief overall system check to determine if the complete system is operating properly.
- (3) An illustration showing the location on the vehicle of the major components of the system.
- (4) A simplified circuit diagram to clarify circuits, circuit components, and disconnect points.
- (5) Step-by-step tests to diagnose trouble, using authorized test equipment.

b. This section also includes a list of electrical circuit numbers with a brief description of each, a complete M561 cargo truck vehicle circuit diagram (fig 2-46), and an M792 ambulance vehicle circuit diagram (fig 248).

Warning: Because of their higher power capabilities, 24-volt systems are more dangerous than 6 or 12-volt systems. Certain precautions must be observed before beginning any tests on the 24-volt system. Do not permit a "hot" wire to touch metal parts of the vehicle at any time. "Flash" testing by striking a hot wire against a vehicle ground will cause an arc that will completely destroy the connector on the lead. Accidental contact of metal tools between battery or starter cables and the frame of the vehicle causes a direct short circuit resulting in arcing and instant heating of the tool to red heat. This can cause serious burns on the hands and damage to tools, vehicle components, and batteries. Moreover, the overloaded battery may explode, spraying hot acid and sharp fragments over the surrounding area. The correct procedure when removing electrical equipment, harnesses, battery cables or starter cables, is to disconnect the battery ground (-) cable first. Protect the ground cable from accidental contact with the battery terminal. When the work has been completed, connect the battery ground cable last.

Note: Electrical leads on the vehicle are marked with a **circuit-numbered** metal band attached to the junction or terminal end of each lead.

2-18. System Circuits

a. To successfully troubleshoot the electrical system, analyze the entire system as follows:

- (1) Attempt to isolate the system (lights, starting, etc.) in which the malfunction occurs.
- (2) Isolate the circuit within the system that is not working.
- (3) Isolate the individual component within the circuit that is causing the trouble.

b. Question the vehicle operator to obtain the maximum number of observed symptoms. The greater the number of symptoms of trouble that can be evaluated, the easier will be the isolation of the primary cause of defect. Since the operator of the vehicle, in most instances, can describe malfunctions only in terms of unsatisfactory vehicle performance, trained personnel should be capable of analyzing the operational symptoms to determine the primary cause of the malfunction (refer to Table 2-5, Electrical Troubleshooting).

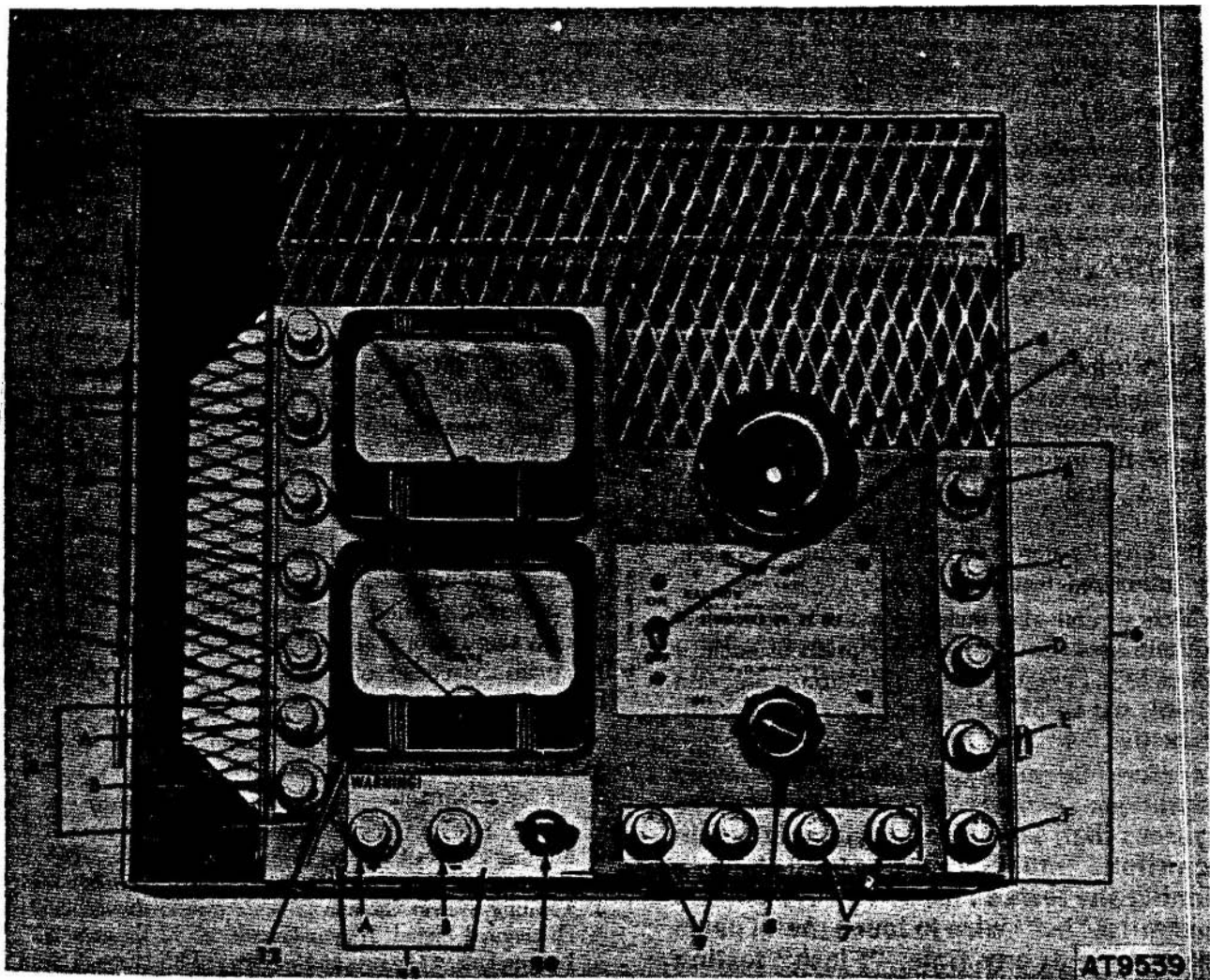
c. The functional system circuits covered in this manual are in the following sequence:

Circuit	Figure
1. Battery System Circuit	2-21
2. Starting System Circuit	2-22 and 2-23
3. Generating System Circuit	2-24 through 2-27
4. Lighting System Circuits	2-28 through 2-31
5. Directional Signal System Circuit	2-32 through 2-35
6. Instruments, Gages and Horn Systems Circuits	2-36 through 2-38
7. Bilge Pump Circuit	2-39
8. Cold Start System Circuit	2-40
9. Windshield Wipers Circuit	2-41
10. Carrier Stop Signal Circuit	2-42
11. Trailer Auxiliary Power Circuit	2-43
12. M792 Ambulance Carrier Heater Circuit	2-44
13. M792 Ambulance Surgical Light and Control Box Circuit	2-45

2-19. Test Equipment

a. *Description.*

(1) Low voltage circuit tester. Figures 2-8 through 2-11 illustrate some of the types of Low Voltage Circuit Testers (LVCT) in general use. The LVCT consists of a voltmeter, an ammeter, a fixed resistance, load bank, and field rheostat unit. They are mounted in a metal case, which also provides stowage space for the meter leads and accessories (fig 2-12) used for making all the necessary tests. Other test sets are similar and all tests described in this section can be performed equally well with these testers. Figure 2-13 shows a schematic diagram of two typical testers, to better understand how the tester components function with the circuit being tested.

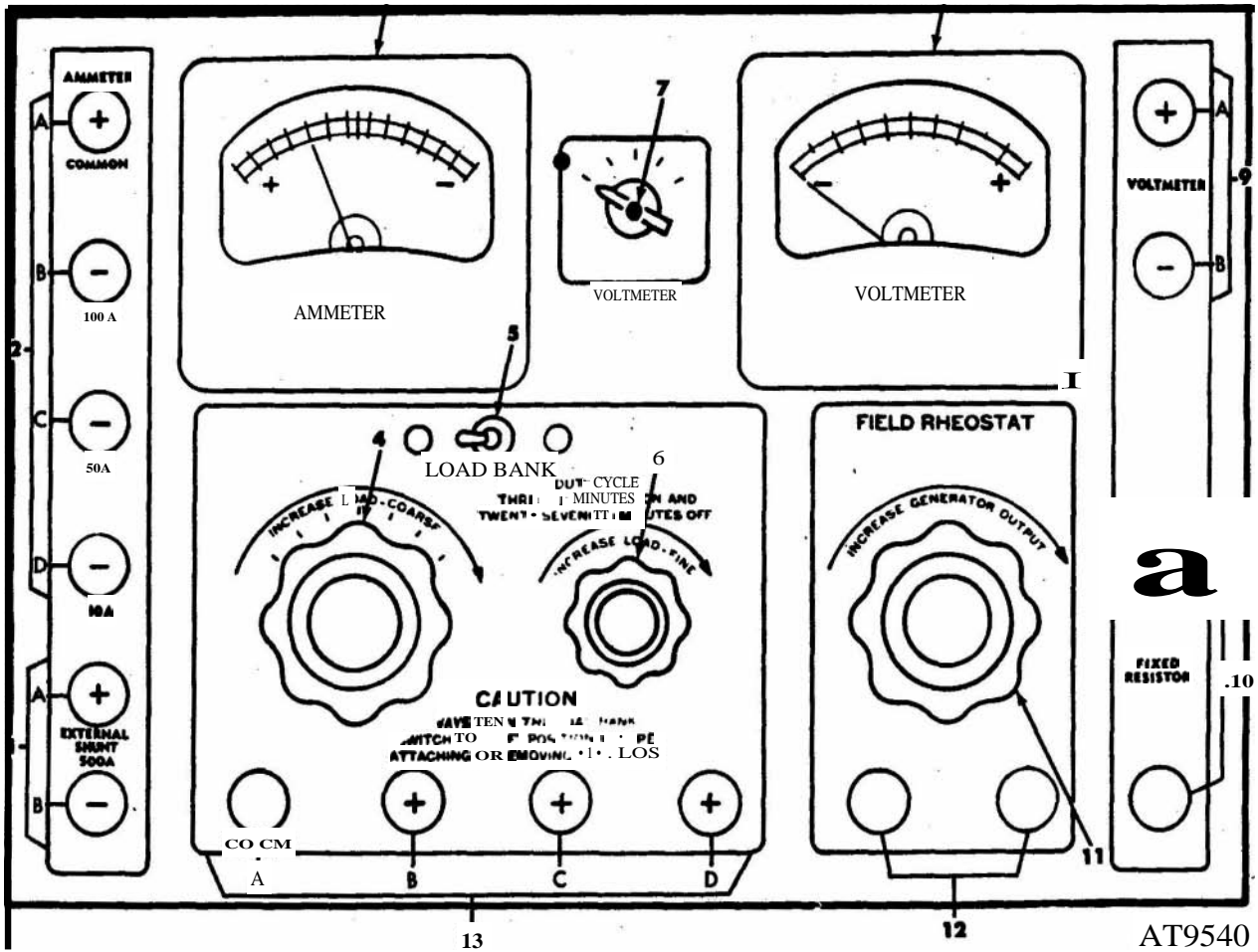


LEGEND to fig 2-8:

- 1—External shunt binding posts
 - A-Negative
 - B-Positive**
- 2—Ammeter binding posts
 - A-Positive
 - B-100 amp negative
 - C-50 amp negative
 - D-10 amp negative
- 3—Ammeter
- 4—Load bank control
- 5—Load bank switch
- 6—Load bank binding posts
 - A-Common

- B-6 volts, 5-100 A
- C-12 volts, 50-100 A
- D-12 volts, 5-50 A-24 volts, 80-100 A
- E-24 volts, 10-80 A
- F-24 volts, 5-10 A
- 7— V_4 -ohm resistor binding posts
- 8—Field rheostat control
- 9—Field rheostat binding posts
- 10—Voltmeter range selector switch
- 11—Voltmeter binding posts
 - A-Positive
 - B-Negative
- 12—Voltmeter

Figure 2-8. Low voltage circuit tester **TV-100-FSN** 4910-092-9136.

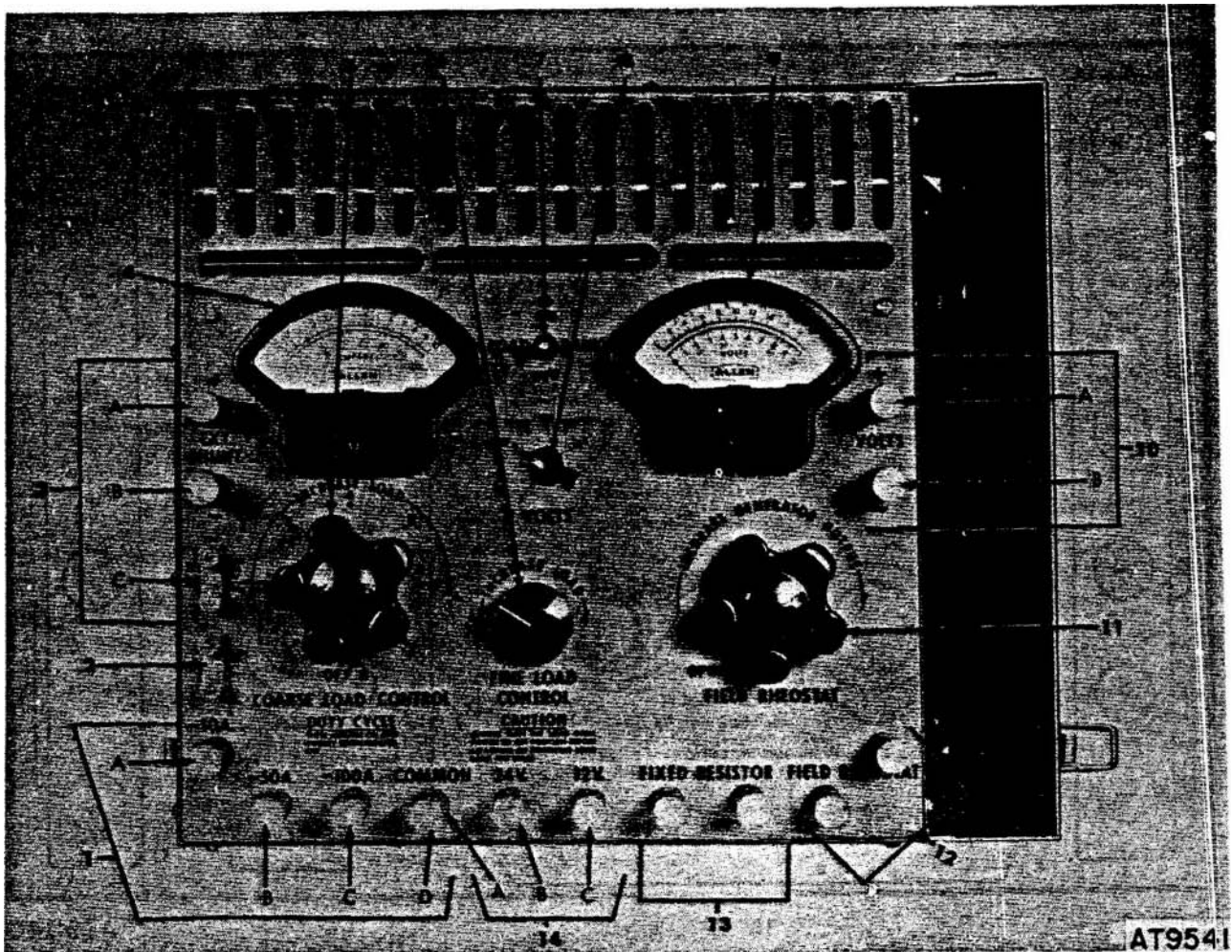


LEGEND to fig 2-9:

- 1—External shunt binding posts
A-Positive
B-Negative
- 2—Ammeter binding posts
A-Positive
B-100 amp negative
C-50 amp negative
D-10 amp negative
- 3—Ammeter
- 4—Load bank control, coarse
- 5—Load bank switch
- 6—Load bank control, fine
- 7—Voltmeter range selector switch

- 8—Voltmeter
- 9—Voltmeter bind posts
A-Positive
B-Negative
- 10— $\frac{1}{4}$ -Ohm resistor binding posts
- 11—Field rheostat control
- 12—Field rheostat binding posts
- 13—Load bank binding posts
A-Common
B-6 volts
G12 volts
D-24 volts

Figure 2-9. Low voltage circuit tester EMC 1060-FSN 4910-092-9136.



LEGEND to fig 2-10:

1—Ammeter binding posts

A-10 amp negative

B-50 amp negative

C-100 amp negative

D-Positive

2—Load bank link, 12 volt

3—External shunt binding posts

A-Positive

B-Negative

C-Disconnect link

4—Ammeter

5—Load bank control, coarse

6—Load bank control, fine

7—Load bank switch

8—Voltmeter range selector switch

9—Voltmeter

10—Voltmeter binding posts

A-Positive

B-Negative

11—Field rheostat control

12—Field rheostat binding posts

13— $\frac{1}{4}$ -ohm resistor binding posts

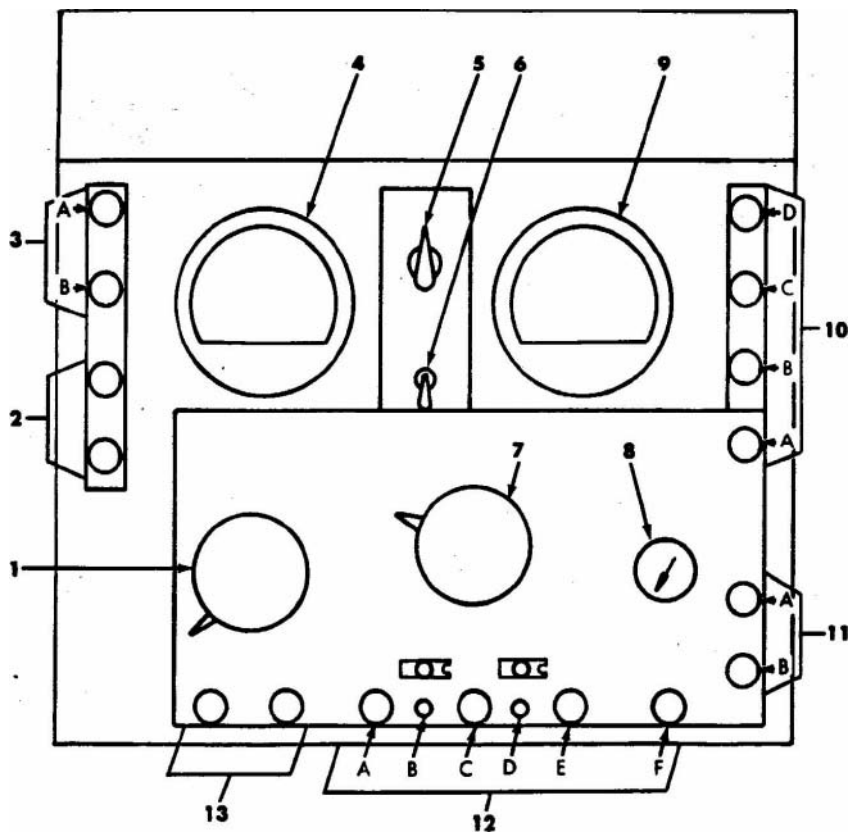
14—Load bank binding posts

A-Common

B-24 volts

C-12 volts

Figure 2-10. Low voltage circuit tester Allen **30-92-FSN** 4910-092-9136.



AT9542

LEGEND to fig 2-11:

- 1—Field rheostat control
- 2— $\frac{1}{4}$ -ohm resistor binding posts
- 3—Voltmeter binding posts
 - A-Positive
 - B-Negative
- 4—Voltmeter
- 5—Voltmeter range selector switch
- 6—Load bank switch
- 7—Load bank control, coarse
- 8—Load bank control, fine
- 9—Ammeter
- 10—Ammeter binding posts
 - A-Positive

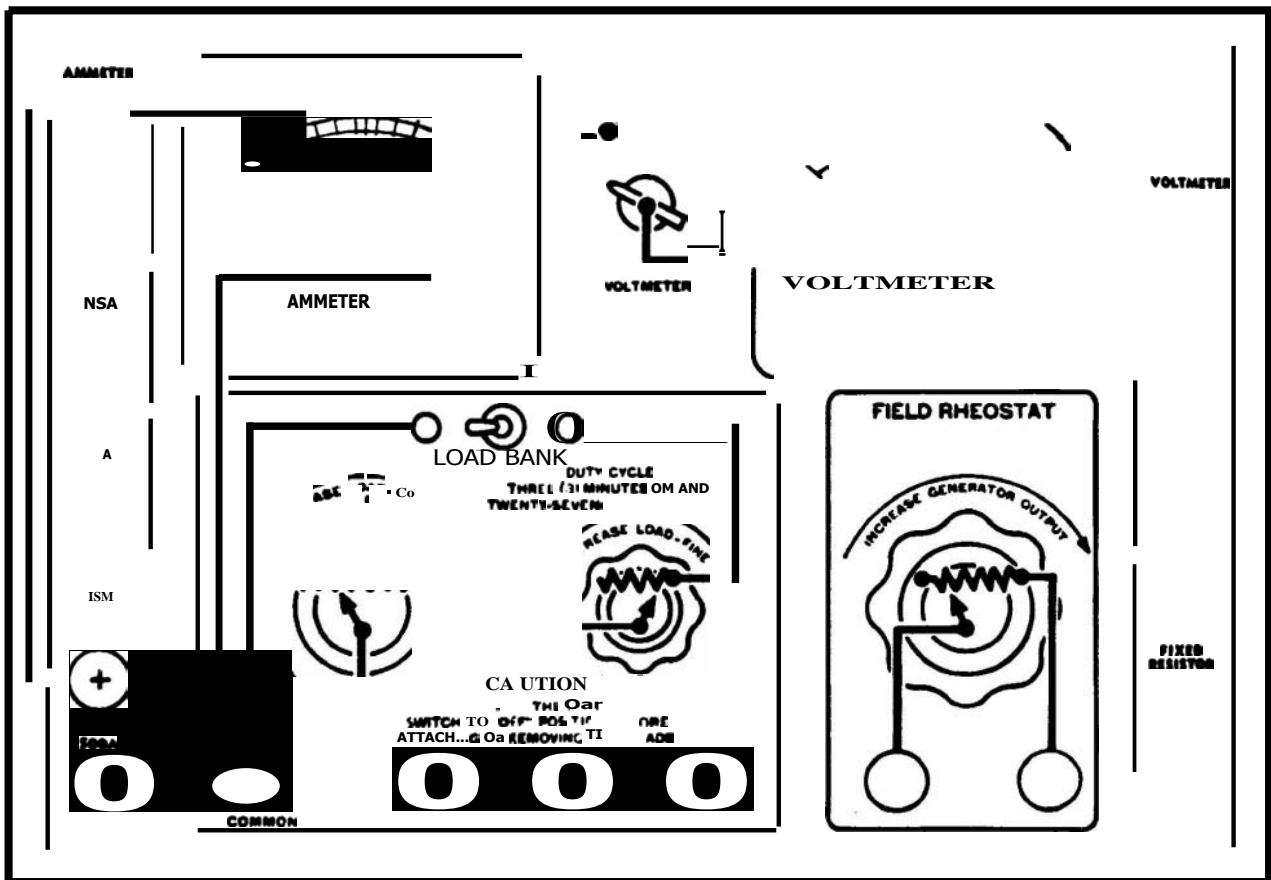
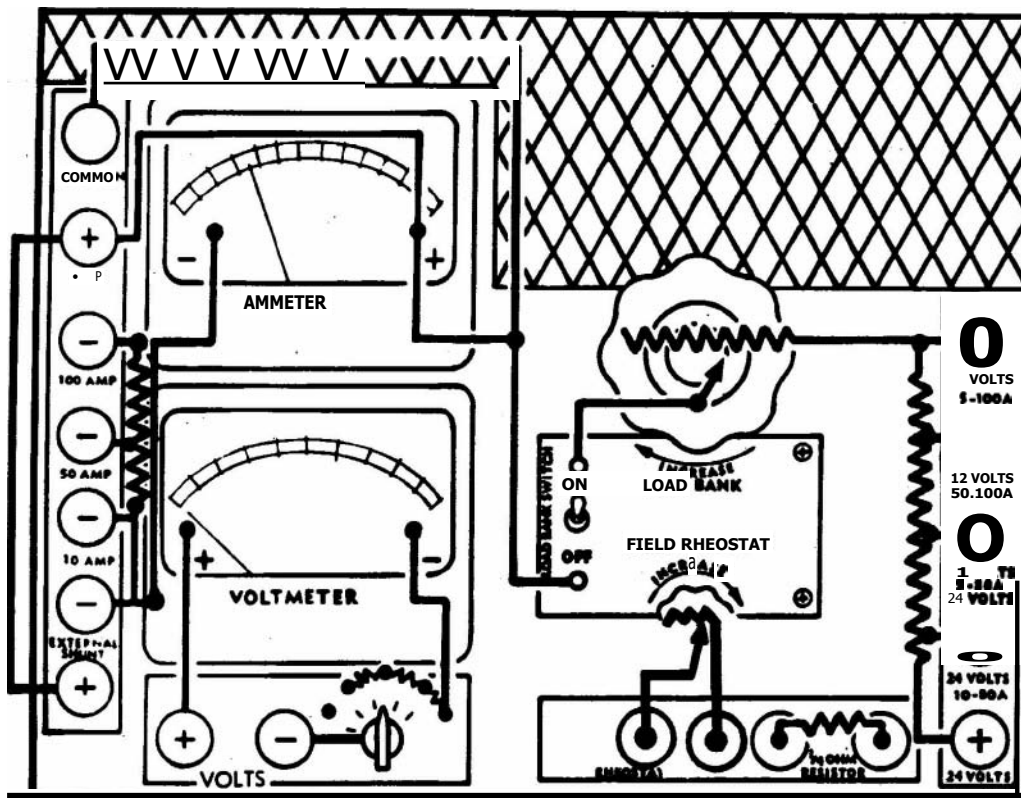
- B-100 amp negative
- C-50 amp negative
- D-10 amp negative
- 11—**External** shunt binding posts
 - A-Negative
 - B-Positive
- 12—Load bank binding posts
 - A-24 volts
 - B-12 volt link
 - C-12 volts
 - D-6 volt link
 - E-6 volts
 - F-Common**
- 13—Field rheostat binding posts

Figure 2-11. Low voltage circuit tester RAM **62F151-FSN** 4910-092-9136.



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2- 2. for use with low volta a teo



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Figure 2-13. Schematic layout of low voltage circuit testers (typical).

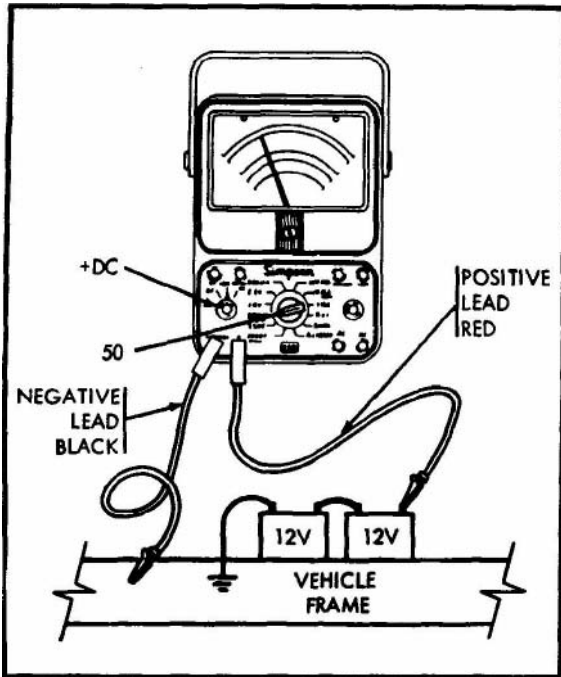


Figure 2-15. DC voltage test with **multimeter**.

DC VOLTAGE TEST

(USED TO MEASURE BATTERY OR GENERATOR VOLTAGE)

1. SET SCALE SELECTOR ON +DC.
2. SET RANGE SELECTOR SWITCH ON 50V.
3. CONNECT NEGATIVE LEAD (**BLACK**) TO VEHICLE FRAME.
4. TOUCH POSITIVE LEAD (RED) TO TERMINAL POST OF BATTERY. NEEDLE SHOULD MOVE TOWARD CENTER OF SCALE TO INDICATE VOLTAGE.

AT9545

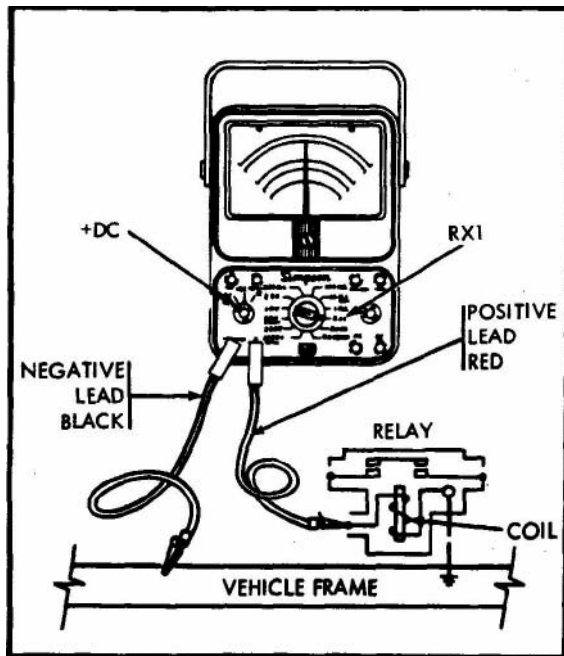


Figure 2-16. Resistance test with **multimeter**.

RESISTANCE TEST

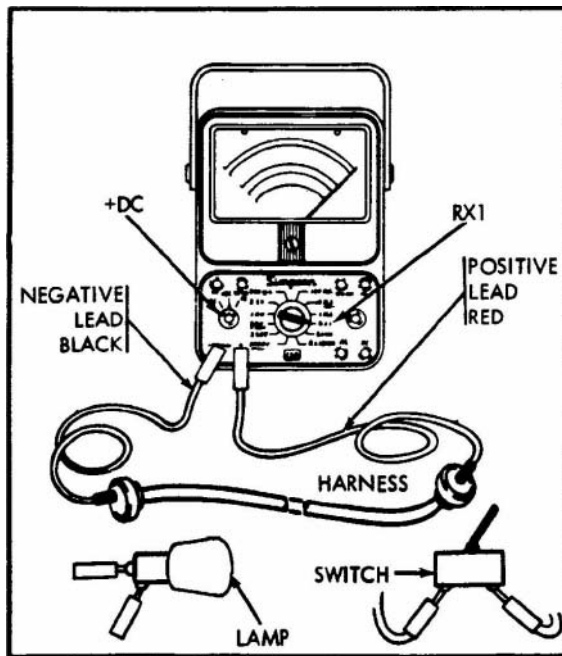
(USED TO MEASURE RESISTANCE OF COILS OR RESISTORS, AND TO LOCATE SHORT CIRCUITS)

1. SET SCALE SELECTOR SWITCH ON +DC.
2. SET RANGE SELECTOR SWITCH ON **Rx1**.
3. TOUCH METER LEADS TOGETHER AND TURN ZERO OHMS ADJUST UNTIL NEEDLE IS ON "0" OHMS.
4. MAKE SURE THERE IS NO BATTERY VOLTAGE CONNECTED TO CIRCUIT TO BE TESTED.
5. ATTACH NEGATIVE LEAD (BLACK) TO VEHICLE FRAME.
6. TOUCH POSITIVE LEAD (RED) TO TERMINAL OF COMPONENT BEING TESTED.
7. READ RESISTANCE ON METER SCALE.
8. IF METER NEEDLE DOES NOT MOVE, CIRCUIT IS OPEN.
9. IF METER NEEDLE MOVES COMPLETELY ACROSS SCALE TO "0" A SHORT CIRCUIT EXISTS, OR A HEAVY-DUTY COMPONENT WITH VERY LOW RESISTANCE.

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(USED TO TEST FOR CABLE BREAKS, LOOSE WIRES, BURNT OUT LAMPS OR OTHER ITEMS)

1. SET SCALE SELECTOR ON +DC.
2. SET RANGE SELECTOR SWITCH ON $R \times 1$.
3. BE SURE THERE IS NO BATTERY VOLTAGE CONNECTED TO CIRCUIT TO BE TESTED.
4. ATTACH NEGATIVE LEAD (BLACK) TO ONE END OF CIRCUIT.
5. TOUCH POSITIVE LEAD (RED) TO OTHER END OF CIRCUIT. NEEDLE SHOULD MOVE TO RIGHT HAND END OF SCALE.
6. IF NEEDLE DOESN'T MOVE, CIRCUIT IS OPEN, OR LAMP IS BURNT OUT, OR COMPONENT OPEN.
7. IF NEEDLE FLICKERS, OR JUMPS BACK AND FORTH, LOOSE CONNECTIONS ARE INDICATED.



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Figure 2-17. Continuity test with **multimeter**.

(3) *Other scales.* Since the multimeter is a general purpose instrument intended primarily for electronic testing, other scales and ranges are provided. These ranges are not normally used for automotive vehicle electrical troubleshooting, and are beyond the scope of this manual.

2-20. General Instructions for Use of Test Sets and Multimeter

Caution: Before proceeding with vehicle troubleshooting procedures, paragraphs 2-17 and 2-18 must be read and understood by all personnel using the test set. Incorrect connections to the test set could result in costly damage to test equipment or vehicle components.

a. Be sure of the test to be made and the procedure to be used. Follow the step-by-step procedure given for each individual test.

b. Always select a meter range higher than the expected reading. Set the tester for this range before connecting it into the circuit.

c. Be sure to read the correct row of meter scale figures which correspond to the selected range. The range selector switch or the binding post marking always shows the right-hand figure of the row to be used. For example, if the range selector is set for 50 volts, read the row of meter scale figures that ends with 50 on the right-hand end.

d. When testing with an ammeter or ammeter shunt, always connect it in series with circuit to be tested. For maximum safety, the power should be turned off when connecting or disconnecting the ammeter or ammeter shunt.

e. When testing with a voltmeter, always connect it in parallel with (across) the terminals of the component to be tested. Where the terminals are easily accessible, the power need not be turned off to make voltage tests. Where there is a possibility of touching an adjacent terminal or the vehicle **frame** when attaching the positive lead clip, the power should be off and the test lead clipped securely to the terminal to be tested before restoring power.

Caution: Never attempt to make resistance tests until all sources of power connected to the circuit or device to be tested are disconnected. The multimeter will be damaged if this procedure is **not** followed.

f. When testing with an ohmmeter, always connect it in parallel with (across) the **terminals** of the component to be tested. (If the component has only a single terminal, connect between the terminal and the frame of the component or vehicle.) In addition, the component being tested must be electrically free from the circuit. Remove all connections to the component before making any resistance or continuity tests. (One terminal of most automotive electrical components is connected to the vehicle frame. However, the component may remain mounted in the vehicle provided all other circuit connections **have been removed**.)

g. Always handle the test sets carefully. Although the test set is ruggedly built, the meter movements are delicate mechanisms and can be damaged easily by rough handling. Be sure to stow all test leads and adapters in their proper compartments after the tests have been completed.

Caution: In choosing a location for the low voltage circuit tester, at the vehicle or on the service bench, be sure to place the tester in a position that will not restrict the air flow through the bottom and top openings. Do not exceed the duty cycle of 3 minutes "ON" and 27 minutes "OFF."

2-21. Specific Instructions for Use of the Low Voltage Circuit Testers

Note: Complete detailed information on low voltage circuit testers is contained in TM 9-4910-401-12 and TM 9-4910-402.12.

a. Voltage Tests (DC).

(1) Determine exactly what is to be tested, where the test leads will be connected, and what voltage to expect.

(2) Voltage must be measured at the exact circuit point specified in Electrical Troubleshooting

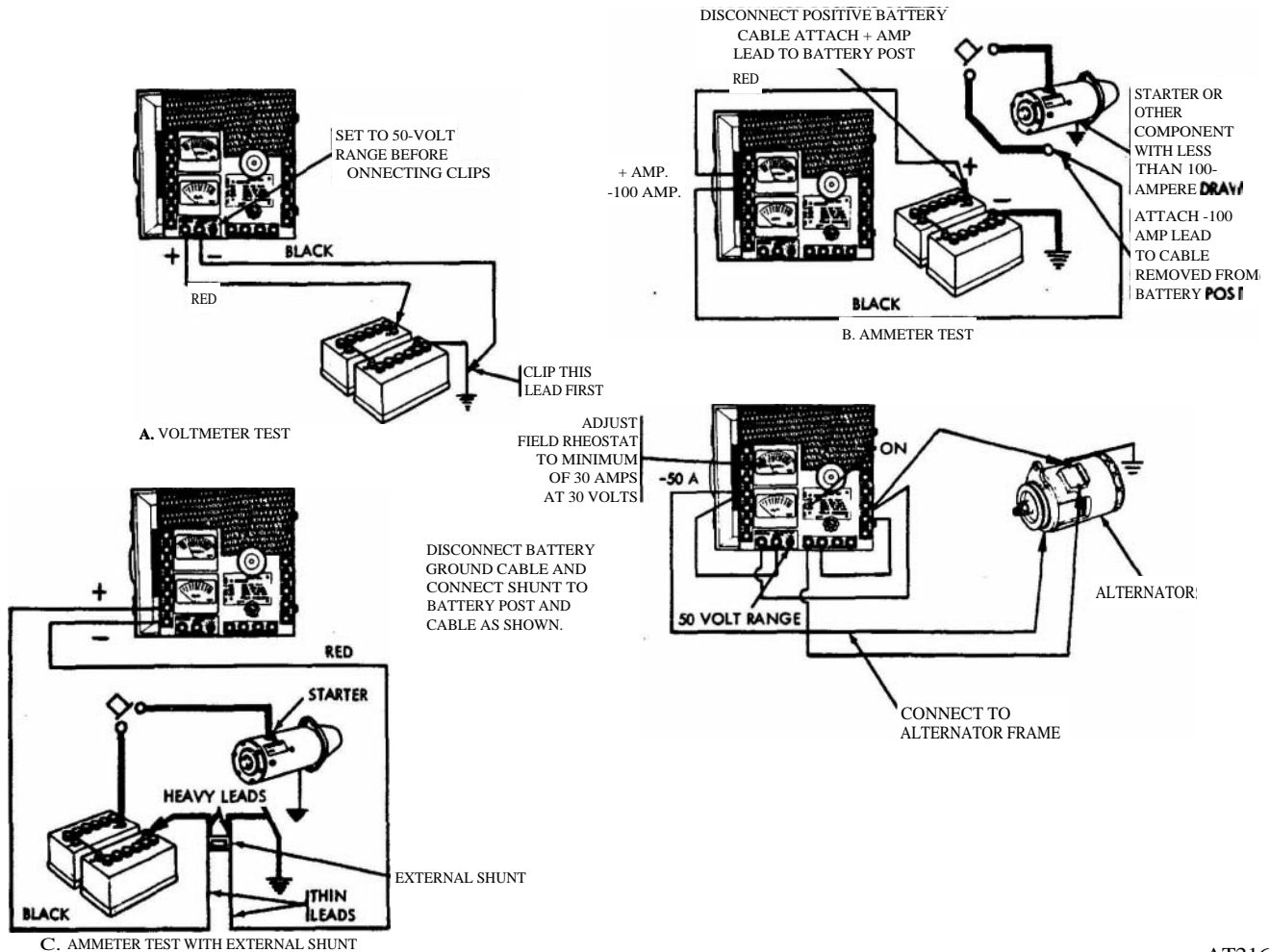
tests. **Resistance** due to poor wiring, connections, and switch contacts can cause errors if voltages are measured at points elsewhere in the circuit or on other parts of the component.

(3) Connect the voltmeter test leads (fig 2-12) to the voltmeter binding posts (11, fig 2-8). Connect the black lead to the negative (-) post (B), and the red lead ~~to the~~ positive () post (A).

(4) Set the voltage range selector switch to a range higher than the expected voltage. Determine exactly which row of figures you will read.

Caution: Step (4) above must be done before (5) below. A voltage range setting lower than the circuit voltage will damage the meter when (6) is performed.

(5) Connect the negative (black) lead first to the circuit to be tested. This will usually be the vehicle frame, or a similar ground point (fig 2-18).



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Figure 2-18. Typical arrangements of tests with low voltage circuit tester TV-100.

(6) Touch the positive (red) lead to the other circuit connection. If the ureter needle moves to the left, reverse the test leads at the circuit-not at the tester binding posts.

(7) Read the voltage carefully, facing the meter squarely. Viewing the meter from an angle will result in inaccurate readings.

b. Current Tests (DC).

(1) Determine exactly what is to be tested, where the test leads will be connected, and what amperage to expect.

(2) Amperage may be measured at any convenient point in a single circuit, since the current is always the same throughout the circuit.

(3) Connect the ammeter red test lead (fig 2-12) to the positive (+) binding post (2A, fig 2-8). Tighten the binding post securely.

(4) Select a negative binding post (2B, C or D, fig 2-8) marked with an amperage range higher than the expected amperage. Connect the ammeter black test lead (fig 2-12) to this selected binding post and tighten the binding post securely. Determine exactly which row of figures on the ammeter you will read.

Caution: Step (4) above must be done before (5) below. An amperage range lower than the circuit current will damage the meter when (6) is performed.

(5) Be sure that no power is being applied to the circuit to be tested. Separate the circuit at a convenient junction point to form two connection points. Connect the red wire to the connection point which is electrically closer to the battery positive (+I terminal. Connect the black wire to the other connection point (fig 2-18).

(6) Apply power to the circuit momentarily, observing the ammeter. The needle should move to the right. If the needle moves to the left, interchange the red and black wires at the circuit test points—not at the tester binding posts.

(7) Read the ammeter carefully, facing the meter squarely. Viewing the meter from an angle will result in inaccurate readings.

(8) Remove the power from the circuit before disconnecting the test leads.

c. Current Tests (DC) With Ammeter Shunt.

(1) When amperage exceeding 100 amperes is expected, the external shunt assembly (fig 2-12) should be used. The shunt assembly consists essentially of a power resistor which absorbs 98 of the circuit amperes and allows only 2 to be sent to the meter. Thus, if the circuit current was 200 amperes, 196 amperes would be absorbed by the shunt and 4 amperes would be indicated on the meter. The 500-ampere figures on the meter scale are used for this shunt. A 200-ampere current through the shunt will indicate a reading of 200 on the meter scale, although a current of only 4 amperes is actually flowing through the meter.

(2) Disconnect the power to the circuit to be tested. Connect the small diameter shunt leads to the shunt binding posts of the tester (1, fig 2-8); the red lead to the positive (1+) binding post (B) and the black lead to the negative (-1 binding post (A).

(3) Connect the heavy shunt leads to the circuit to be tested (fig 2-18). Make sure all connections are tight.

(4) Follow all instructions given in *b* (5), (6), (7), and (8) above.

d. Load Bank and Field Resistance Tests.

(1) Three or more sections of the tester are used for these tests: the voltmeter, ammeter, and one or more of the resistances. Use extreme caution when connecting the test leads; severe damage can be caused to the tester and the components being tested if the test setup is incorrect. Follow the individual test set up illustration for the specific test being made (refer to fig 2-18).

(2) Observe precautions in *a* and *b* above, for use of the voltmeter and ammeter.

(3) Both the LOAD BANK (4, fig 2-8) and FIELD RHEOSTAT (8, fig 2-8) knobs should be

in the extreme counterclockwise position before connecting the load bank or field rheostat to the circuit being tested.

Note: The nameplates on the LOAD BANK and FIELD RHEOSTAT controls indicate clockwise rotation is required for an increase in current. However, to accomplish this effect, the actual resistance presented to the circuit is decreased with clockwise rotation of these controls (refer to fig 2-13).

(4) Whenever resistances carry heavy currents, considerable heat is developed. To prevent heat damage to the resistors and other tester components, power should be applied to the resistors for not more than three minutes continuously. At least 27 minutes off time is required to allow the resistors to cool down sufficiently for another three-minute period of operation. Be sure there is sufficient ventilation provided for the tester. Before applying power to the circuit, have all connections in place and be ready to make the necessary adjustments and meter readings as rapidly as possible, consistent with accuracy and safety.

(5) Do not turn the LOAD BANK SWITCH (5, fig 2-8) to OFF position while power is applied to the circuits. The switch contacts will arc and burn when subjected to heavy battery currents.

2-22. Specific Instructions for Use of the Multimeter

a. Voltage Tests (DC).

(1) Determine exactly what is to be tested, where the test leads will be connected, and what voltage to expect.

(2) Voltage must be measured at the exact circuit point specified in the Electrical Troubleshooting tests. Resistance of poor wiring, connections, and switch contacts can cause errors if voltages are measured at points elsewhere in the circuit.

(3) Plug the voltmeter test leads (fig 2-14) into the multimeter jacks. Plug the black lead into the jack marked "COMMON" and the red lead into the jack marked "-F."

(4) Set the voltage range selector switch to a range higher than the expected voltage. Determine exactly which row of figures you will read.

Caution: Step (4) above must be done before (5) below. A voltage range setting lower than the circuit voltage will damage the meter when (6) is performed.

(5) Connect the negative (black) lead first to the circuit to be tested. This will usually be the chassis frame, or a similar ground point (fig 2-15).

(6) Touch the positive (red) lead to the other circuit connection. If the meter needle moves to the left, reverse the test leads at the circuit—not at the tester binding posts.

(7) Read the voltage carefully, facing the meter squarely. Viewing the meter from an angle will result in inaccurate readings.

b. Resistance Tests.

Caution: Never attempt to make resistance tests until all sources of power connected to the circuit or device to be tested are disconnected. The multimeter will be damaged if this procedure is not followed.

All electrical circuits possess some resistance. Some resistances, however, are so small and others so large they cannot be read on the same scale. When a reading is obtained, it indicates the circuit has continuity (no break or openings). The following procedure must be followed to perform resistance or continuity tests:

(1) Place the SCALE SELECTOR switch (fig 2-14) in the **+DC** position.

(2) Rotate the range selector switch to the required range to (1) R X 1 to measure resistance between 0 and 2,000 ohms and to test for continuity, (2) R X 100 to measure resistance between 0 and 200,000 ohms, and (3) R X 10,000 to measure resistance between 0 and 20 **megohms** (megohms ohms).

(3) Plug the black lead into the jack marked COMMON and the red lead into the jack marked "+." Touch the ends of the leads together and turn the ZERO OHMS knob until the pointer is at zero.

(4) Separate the ends of the test leads, and clip the leads across the portion of the circuit or component being tested (figs 2-16 and 2-17). (Either of

the leads may be clipped to the test points.)

(5) Read the ohms on the black area at the top of the scale.

Note: For range R X 1, read the figures directly; for range R X 100 multiply the reading indicated by 100. Do not add two zeros to the reading; for range R X 10,000 multiply the reading indicated by 10,000 or add four zeros to the reading.

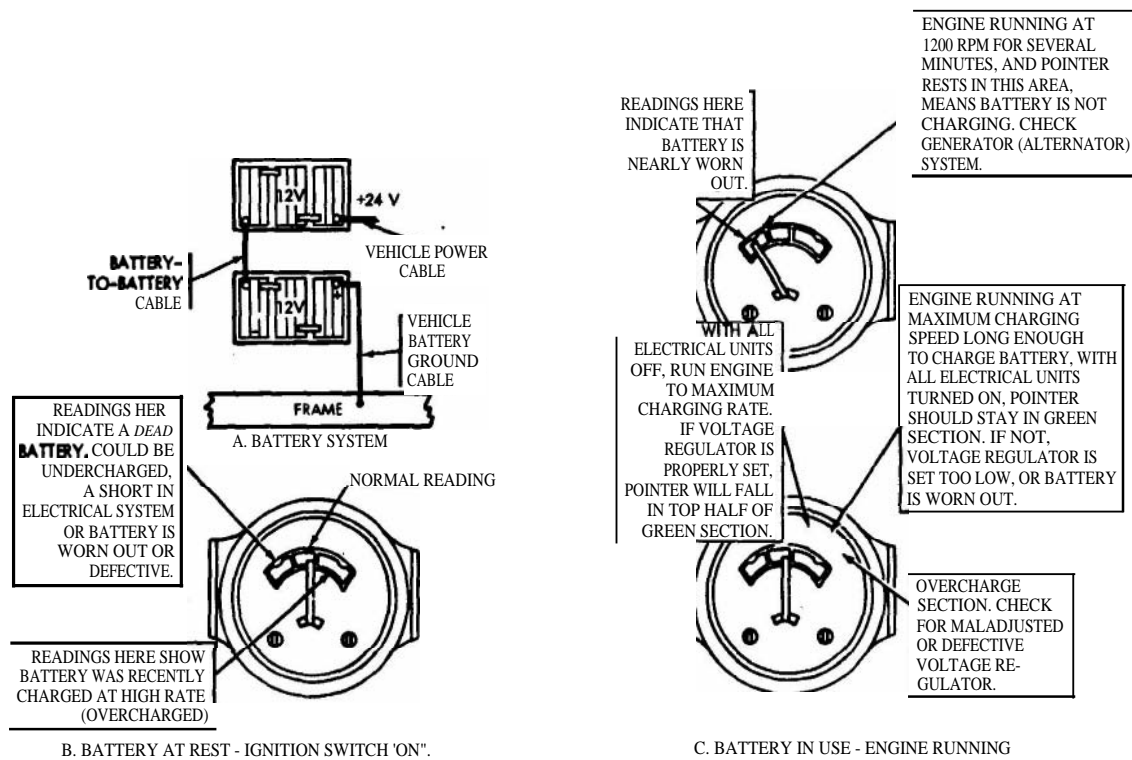
Example: A 20,000-ohm resistance should be checked on the R X 100 range scale. The reading on the scale will be 200. Adding two zeros will give 20,000 ohms.

(6) An infinite reading is an open circuit reading. There will be no movement of the multimeter pointer on the R X 1 when an open circuit exists. This usually indicates a broken connection somewhere. Infinite position on the ohmmeter range scale is marked with the **symbol ∞**.

(7) A zero reading indicates a continuous circuit with resistance too low to be measured with the multimeter. Where two cable wires, or a circuit wire and a ground connection are being checked, this usually indicates a short circuit somewhere.

2-23. Troubleshooting the Electrical System

a. Preliminary Battery Check. The vehicle battery condition should be checked prior to performing any electrical checks in the vehicle. The vehicle has two 12-volt batteries connected in series, furnishing 24 volts to the electrical system (fig 2-19) which **uses** a negative (-) ground and a positive (+) power feed to the electrical components. To test the battery condition, turn the ignition switch to ON (without starting the engine). Observe the battery indicator (fig 2-19). Start the engine, accelerate to about 1200 rpm, and again observe the battery indicator. If the indicator observations show that further tests are required, (refer to fig 2-19).



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Figure 2-19. Interpretation of battery-generator indicator gage.

b. Specific Gravity Check. A specific gravity check should be made with a hydrometer as a routine check before making further tests. Observe the following precautions when making this check;

11) Hold the hydrometer vertically, so the float does not touch the sides of the glass barrel. Be certain that the barrel is not so full of electrolyte that the float is stopped at the top. Read straight across the top of the liquid; disregard the curvature of the liquid at the edge of the glass and float.

12) The electrolyte in a cell should be at the normal level when the reading is taken. If the level

is below normal, the reading will be high. On the other hand, if the battery has been overfilled, the electrolyte will be weakened and the reading will be low.

(3) When water is added, it will tend to remain at the top of the cell and a hydrometer reading will be inaccurate. If it is necessary to add water to the battery before taking a reading, the battery should be charged for 1 or 2 hours to mix the electrolyte before the hydrometer is used. This may be done by connecting the battery to a charger or by operating the vehicle.

(4) Gravity readings may also be misleading if taken immediately after a battery has been discharged at a high rate, such as in prolonged cranking. Wait several hours before taking a specific gravity reading.

(5) When the temperature of the electrolyte is much greater or much less than 80°F, the specific gravity indication on the hydrometer will not be accurate. A temperature correction must be applied to the reading to obtain the correct specific gravity. Figure 2-20 shows the amount of temperature correction to be applied, and how to estimate the condition of the battery from the temperature-corrected specific gravity.

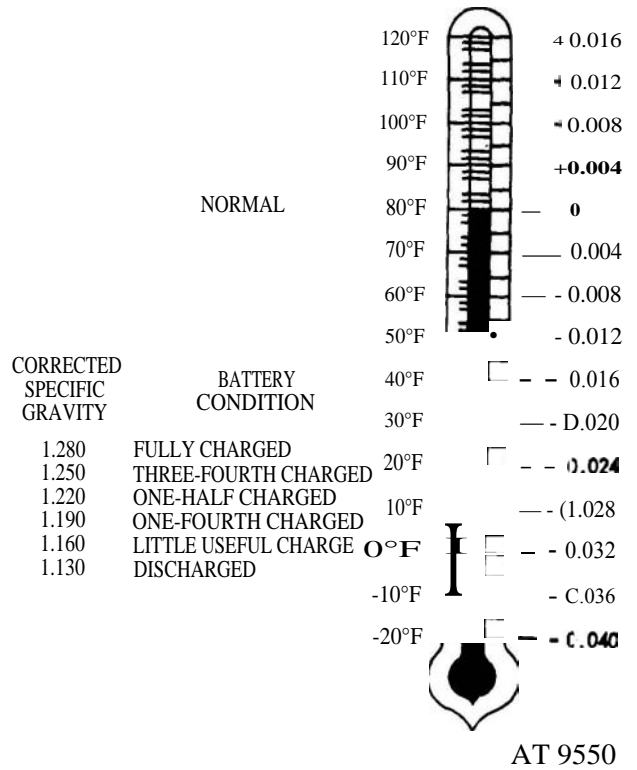


Figure 2-20. Hydrometer temperature correction chart.

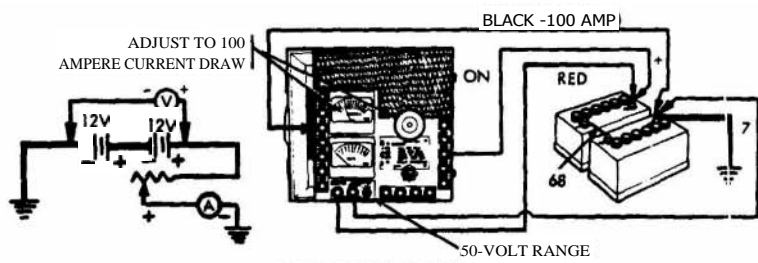
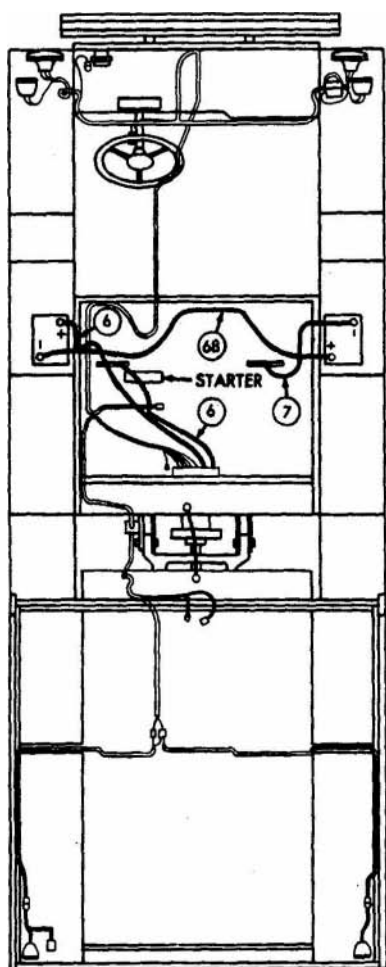
Table 2-5. Troubleshooting the Electrical System

Battery System Circuit (fig 2-21)

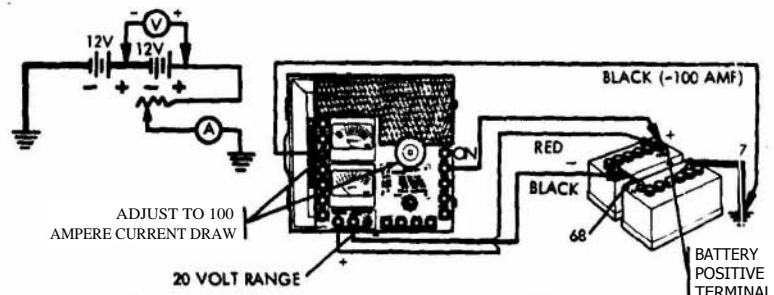
Description: Two 12-volt batteries are connected in series to provide 24 volts for the operation of all electrical equipment on the vehicle. The negative terminal of one battery is connected to the vehicle frame, and the positive terminal of the other battery is connected directly to the terminal bus bar, for distribution to other electrical systems on the vehicle.

Note: When troubleshooting electrical system, use overall schematic wiring diagram (figs 246 and 2-47) and M792 schematic wiring diagram (fig 248) for circuit references. The overall schematic is applicable to both vehicles, and the ambulance schematic (fig 2-48) is for ambulance only.

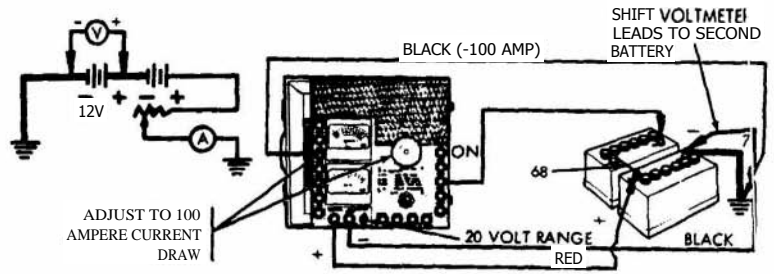
Malfunction	Circuit	Test
<p>Vehicle will not crank. All electrical systems inoperative or weak.</p>	<p>7, 68</p>	<p>Test 1. Make a visual inspection. Look for broken, cracked, or distorted battery cases. Check for loose terminals. Check for corrosion on the battery terminals, cables, battery hold-down and around battery posts. Check the cables for frayed or worn insulation. Check the electrolyte level <i>in each</i> cell. If the level is below the plates, the battery may be permanently damaged. Also look for dirt, oil or other contaminants floating in the electrolyte. Perform all required cleanup and make necessary repairs before proceeding with further tests.</p> <p>Test 2. Check <i>each cell</i> for specific gravity of <i>battery electrolyte with</i> hydrometer (para 2-23). Batteries must test 1.225, or greater, temperature corrected, and each cell must test within 25 gravity points of the others. If variation is more than 25 points, charge batteries fully, and recheck specific gravity on all cells. If 25-point variation still exists, one or both batteries are defective.</p> <p>Test 3. Test batteries under load to determine their ability to crank engine under starting conditions, and to determine maximum voltage drop with a 100-ampere load for 15 seconds. Turn load bank switch "OFF" with load bank control completely counterclockwise. Set voltmeter range selector switch to 20 volts. Connect circuit tester to batteries (fig 2-21, test 3). Turn load bank switch "ON" and rotate load bank knob clockwise, watching <i>ammeter</i> scale until 100 amperes is indicated. Voltmeter should read not less than 18 volts during test, and 24 to 26 volts before and after test. If less, perform tests 4 and 5 below to test individual batteries.</p>
<p>Slow cranking.</p>	<p>7, 68</p>	<p>Note: Tests 4 and 5 below use the same circuit tester set-up as test 3, except that the voltmeter leads are moved to test the voltage of each individual battery.</p> <p>Test 4. Test individual batteries to determine maximum voltage drop with a 100-ampere load <i>for</i> 15 seconds, <i>or</i> if each has a <i>maximum</i> variation of ± 2 volts of the other. Turn load bank switch "OFF" with load bank control completely counterclockwise. Set voltmeter range selector switch to 20 volts. Connect circuit tester to batteries (fig 241, test 4). Turn load bank switch "ON" and rotate load bank knob clockwise, watching ammeter scale until 100 amperes is indicated. Voltmeter should indicate 9 volts or more. If less than 9 volts, battery is discharged or defective. Charge battery and retest.</p>



TEST 3. BATTERY LOAD TEST



TEST 4. INDIVIDUAL BATTERY TEST



TEST 5. INDIVIDUAL BATTERY TEST (COMPANION)

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Figure 2-21. Battery system tests.

Battery System Circuit ^{Fig 2-21}—Continued

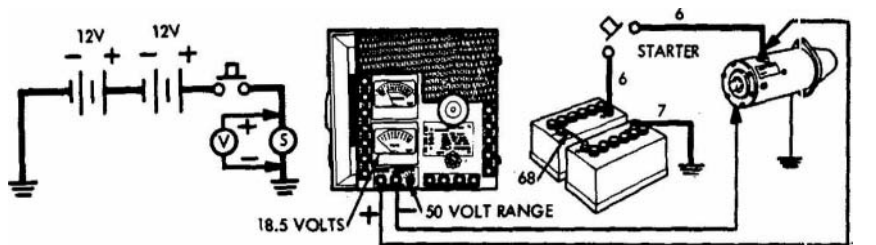
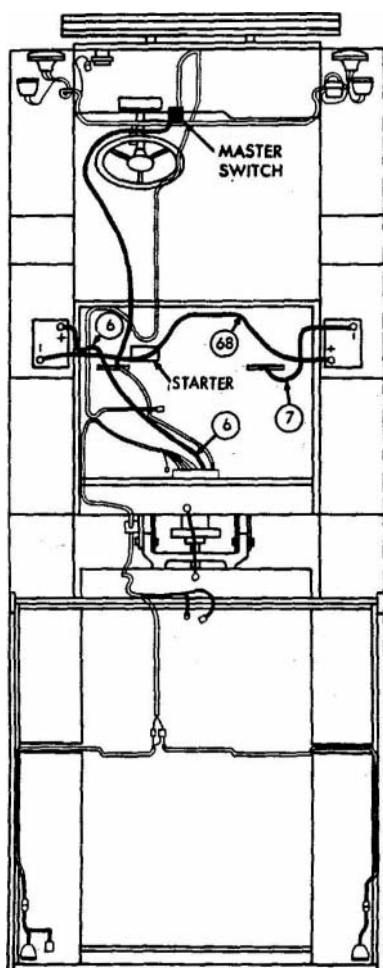
Malfunction	Circuit	Test
Slow cranking .—Continued	7, 68	Test 5. Same as test 4 above, on the other battery. Voltage should not fall below 9 volts, or be more than 2 volts higher or lower than the other battery.

Table 2-5. Troubleshooting the Electrical System—Continued

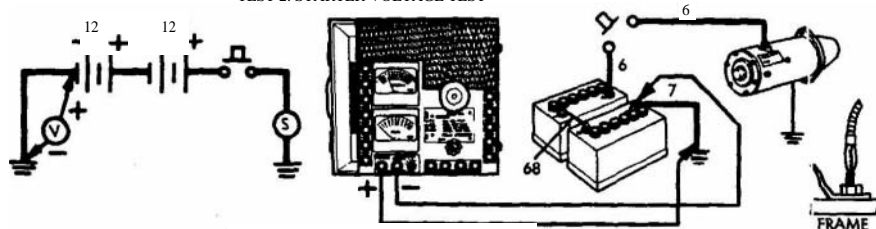
Starting System Circuit (fig 2-22)

Description: The starting system consists of the battery, starting motor assembly, starter solenoid switch, control panel push button switch and connecting cables. The starting motor is energized by pressing the starter switch. Current flows from the positive terminal of the battery, through the battery-to-solenoid switch cables, through the switch, through the switch-to-starter cable, through the starter, to the vehicle frame, and through the frame to the negative terminal of the battery. Faulty connections contribute largely to starter system failures.

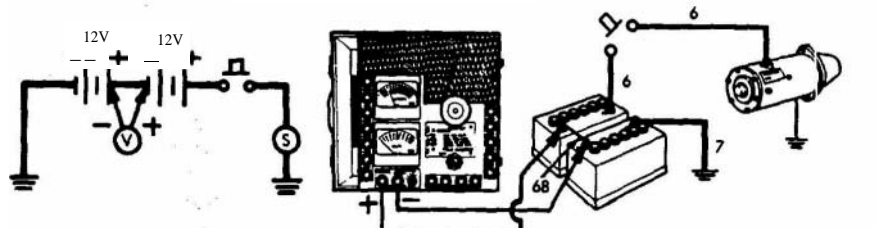
Malfunction	Circuit	Test
<p>Starter fails to crank or cranks slowly.</p>	<p>6, 7, 68</p>	<p><i>Note: Check condition of batteries as shown by battery-generator indicator. Batteries must be in good condition before making these tests (para 2-23).</i></p> <p>Test 1. Make a visual inspection. Examine the starter terminal studs, battery terminals, and the engine ground strap to be certain that no loose or dirty electrical connections exist. If the starter runs at a high rate of speed, but will not turn the engine, the starter is faulty. If this condition exists, replace the starter. If the starter does not crank at all or cranks slowly, perform the following tests:</p> <p><i>Note: All reference to ground for following tests pertains to vehicle frame.</i></p> <p>Test 2. Perform the starter voltage test. Connect low voltage circuit tester (50-volt range) between starter terminal and starter frame (fig 2-22, test 2). With the ignition switch off, depress starter switch. If reading is 18.5 volts or more, starting switch, cables and batteries are not the cause of slow cranking. Check for tight engine or defective starter. If reading is less than 18.5 volts, perform test 3 below.</p>



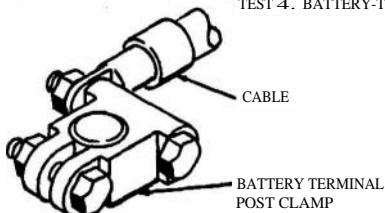
TEST 2. STARTER VOLTAGE TEST



TEST 3. BATTERY GROUND CABLE TEST



TEST 4. BATTERY-TO-BATTERY CABLE TEST



NOTE: WHEN MAKING THESE TESTS, HOLD METER PROBE FIRMLY ON BATTERY POST - NOT ON CLAMP.

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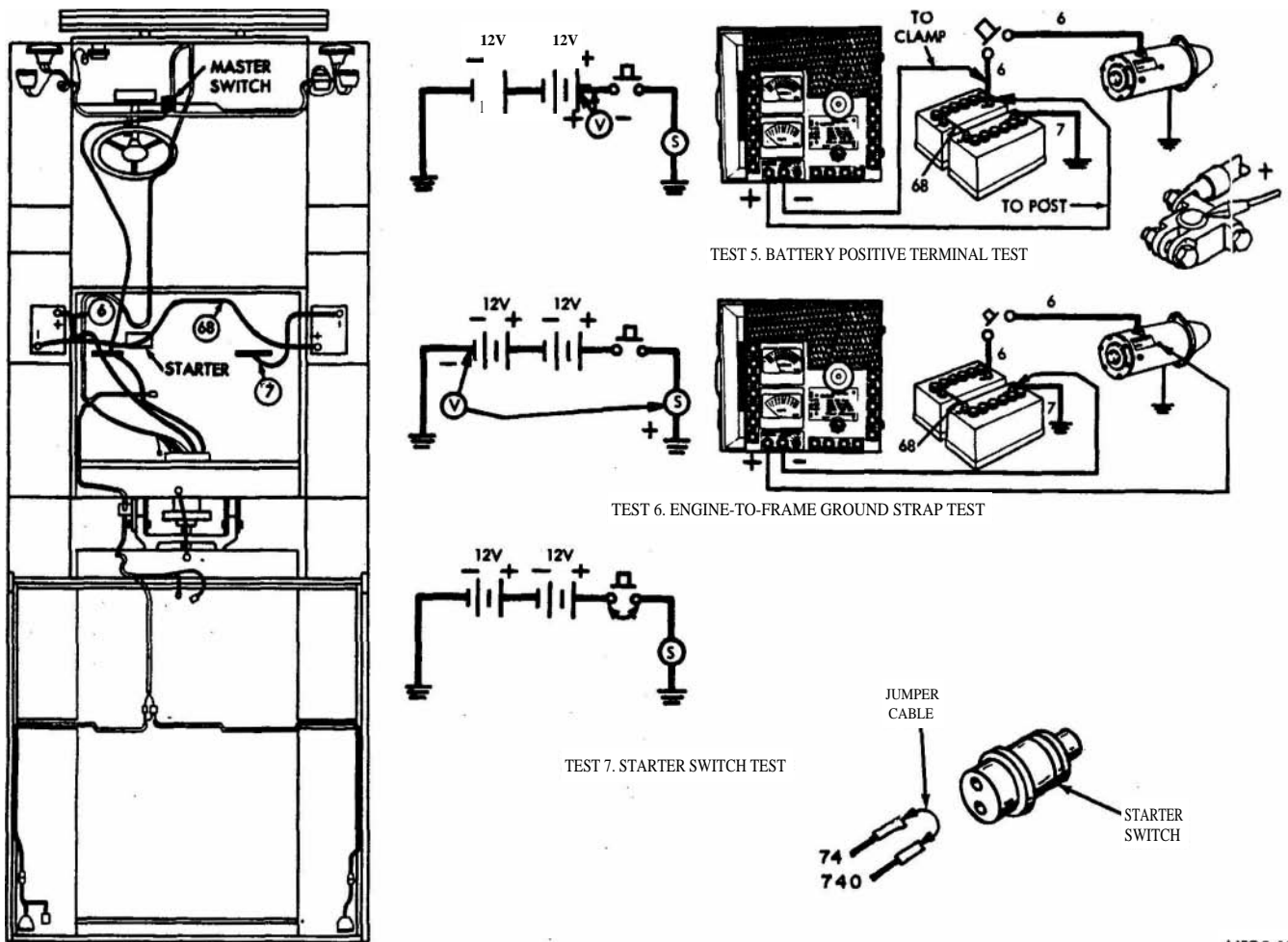
Figure 2-22. Starting system tests.

Starting System Circuit (fig 2-22) Continued		
Malfunction	Circuit.	Test
<p>Starter fails to crank or cranks slowly.—Continued</p> <p>Note: Coat all battery terminals and terminal post clamps with light grease after tests have been completed.</p>		<p>Test 3. Perform the battery ground cable test. Connect low voltage circuit tester (50-volt range) between battery ground terminal and starter frame (fig 2-22, test 3). With the ignition switch off, depress starter switch. If voltmeter shows no or low reading, switch the voltmeter range selector to a lower range until a reading is obtained or the I- volt range is reached. If reading is more than 0.1 volt, remove battery ground cable and battery terminal post clamp. Clean battery terminal post and battery terminal post clamp with wire brush. Re-install battery cable and terminal post clamp and tighten all bolts securely to assure a good electrical connection. Perform test again. If the voltage reading is still more than 0.1 volt, install a new cable, and retest. If starter still cranks slowly, perform test 4 below.</p>

Table 2-5. Troubleshooting the Electrical System—Continued

Starting System Circuit (fig 2-22)—Continued

Malfunction	Circuit	Test
Starter fails to crank or cranks slowly.—Continued	68	Test 4. Perform battery-to-battery cable test. Connect low voltage circuit tester (50-volt range) across battery-to-battery cable. Contact the actual battery posts, and not the terminal post clamp, with positive and negative test leads (fig 2-22, test 4). With the ignition switch off, depress starter switch. If voltmeter shows no or low reading, switch the voltmeter range selector to a lower range until a reading is obtained or the 1-volt range is reached. If reading is 0.1 volts or less, cable is serviceable. If reading is 0.1 or more, remove the battery-to-battery cable. Clean the battery terminal posts and the terminal post clamps on the cable with a wire brush. Re-install the cable and tighten all bolts securely to ensure a good electrical connection. Perform test again. If the voltage is still more than 0.1 volt, install a new cable, and retest. If the starter still cranks slowly, perform test 5 below.
	6, 7, 68	Test 5. Perform battery positive terminal test. Connect the low voltage circuit tester (50-volt range) between the battery positive post and its terminal post clamp (fig 2-23, test 51). With the ignition switch off, depress the starter switch. If the voltmeter shows no or low reading, switch the voltmeter range selector to a lower range until a reading is obtained or the 1-volt range is reached. If the reading is more than 0.1 volt, remove the battery-to-starter switch terminal post clamp and clean the battery terminal post and the terminal post clamp with a wire brush. Re-install the cable and tighten all bolts securely to assure a good electrical connection. Perform test again. If the voltage is still more than 0.1 volt, install a new cable and retest. If the starter still cranks slowly, perform test 6 below.



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Figure 2-23. Starting system tests.

Starting System Circuit (fig 2-22)—Continued

Malfunction
Starter fails to crank or cranks slowly.—Continued

Circuit	Test
6, 7, 68	<p>Test 6. Perform engine-to-frame ground strap test. Connect low voltage circuit tester (50-volt range) negative lead (black wire) to terminal post damp of the negative (grounded) battery terminal. Connect the positive meter lead (red wire) to the starter frame (fig 2-23, test 6). With the master switch off, depress the starter switch. If the voltmeter shows no low reading, switch the voltmeter to a lower range until a reading is obtained or the 1-volt range is reached. If the reading is more than 0.2 volts, check for loose bolts in the ground strap. If they are tight, and the reading is still more than 0.2 volts, install a new engine-to-frame ground strap, tightening bolts securely. Make sure frame surface area is clean to assure good electrical contact. Retest. If voltage is less than 0.2 volts and starter still cranks slowly, perform test 7 below.</p>

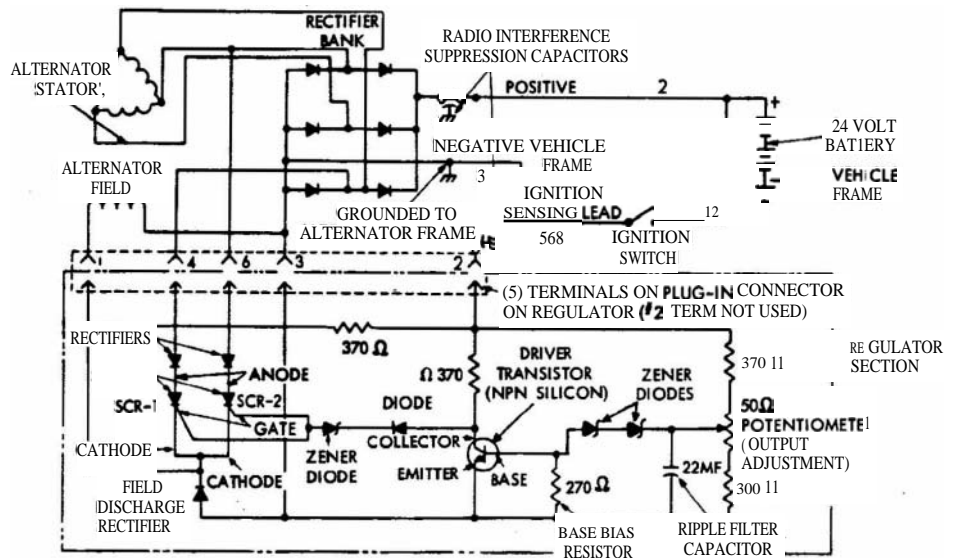
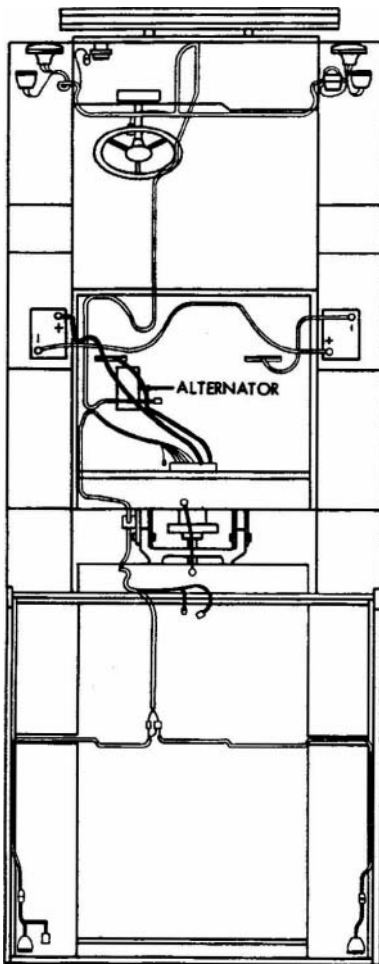
Table 2-5. Troubleshooting the Electrical System-Continued

Starting System Circuit (fig 2-22)—Continued		
Malfunction	Circuit	Test
Starter fails to crank or cranks slowly.—Continued	6, 7, 68	Test 7. Perform engine start switch test. Position master switch to OFF and remove wires 74 and 740 from rear of starter switch. Examine wire connectors for corrosion, clean if required. Connect a jumper cable across wires 74 and 740 (fig 2-23, test 7). Momentarily (15 to 20 seconds) position master switch to ON. If the starter cranks under this condition, install a new starter switch (para 2-85).
Test 7.		

Generating System Circuit (Alternator) (fig 2-24)

Description: The alternator system consists of a 60-ampere, 24-volt, negative ground alternator and internal voltage regulator and rectifier assembly. The circuit is energized by mechanical rotation of the alternator, which generates alternating current (ac). The alternating current is changed to direct current (dc) by the rectifier bank, and the output voltage is maintained at 28 ± 1 volts by the voltage regulator. This 28 volts is used to charge the vehicle battery and to assist the battery in carrying the electrical load of the vehicle.

Malfunction	Circuit	Test
		<p><i>Caution: The alternator is relatively new in military vehicles. It is very important that the following precautions are observed to prevent damage to the alternator and regulator.</i></p> <ol style="list-style-type: none"> 1. NEVER reverse the battery connections. ALWAYS check the battery connecting cables with a voltmeter before any attachments are made to be sure that the negative cable will be connected to the alternator frame and the positive cable to the alternator positive terminal. Reversal will immediately burn out the rectifiers, which cannot stand the reverse polarity.



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Figure 2-24. Alternator system wiring diagram.

Malfunction	Circuit	Test
		<p>2. Booster batteries for cold weather starting must also be properly connected. Make sure that the negative cable of the booster battery connects to the negative terminal of the vehicle battery, and the positive cable to the positive terminal. If in doubt, use a voltmeter to check—NEVER make a trial connection by "flashing" the cable.</p> <p>3. ALWAYS disconnect the battery cables before connecting a fast charger to the battery.</p> <p>4. NEVER use a fast charger for starting the engine. Use another battery or a booster made for the express purpose of starting engines.</p> <p>5. NEVER disconnect the load (batteries) while the generator system is energized and operating.</p> <p>6. NEVER ground the alternator output terminal. The internal resistance is very low and an external short circuit will overload all the regulating and generating circuits, resulting in burnout.</p>

Table 2-5. Troubleshooting the Electrical System-Continued

Generating System Circuit (Alternator) 'fig 2-24)—Continued		
Malfunction	Circuit	Test
<p>Alternator not charging.</p> <p><i>Note: Failure of the alternator usually results in discharged or overcharged batteries. If the batteries become discharged without obvious cause, the alternator may be at fault. Quite often, failure of the alternator may be anticipated by observing the battery-generator indicator. Refer to paragraph 2-23a and figure 2-19 for correct interpretation.</i></p>	<p>2, 3, 740</p>	<p>7. NEVER try to polarize an alternator. It is not necessary and could result in expensive damage.</p> <p><i>Note: Start and run engine at fast idle until normal temperature is reached</i></p> <p>Test 1. Make a visual inspection. Check belt tension (pare 2-74), bearings, loose terminals on alternator, batteries, and starter switch. Also look for frayed or broken wires, corrosion or any other visible signs of damage, deterioration, or maladjustment as listed below. Make any required repairs before proceeding with further tests.</p> <p><i>Note: Test batteries for proper charge before further testing (para 2-23).</i></p> <p>a. Check the following wires for corrosion or looseness:</p> <ol style="list-style-type: none"> (1) battery to terminal No. 6 power leads (2) terminal strip to starting motor No. 6 power leads (3) battery to hull negative ground lead No. 7 (4) alternator ground wire No. 3 (5) alternator positive wire No. 2 (6) engine to hull ground wire No. 1 (7) connections to terminal strip, MS27212-3-6 under radiator <p>Test 2. Perform alternator output test. Start the engine and run it at 1000 to 2000 rpm for 15 minutes. Connect a voltmeter (multimeter) from the alternator output terminal to the alternator ground terminal (fig 2-25, test 2A). The voltmeter should indicate 28 ± 1 volta. If the voltage reading is less than 27 volts, stop the engine and note the voltage indicated. If the voltage reading remains the same as when the engine was running, disconnect the sensing lead No. 740. Connect the voltmeter from the alternator ground terminal to the end of lead No. 740 from the master switch, as shown in test 2B. Turn on the master switch (DO NOT START THE ENGINE). The voltmeter should indicate 24 ± 1 volts. If the voltmeter indicates zero or very low volts, repair or replace wire No. 740 and retest. If 24 volts is now indicated, reconnect the sensing wire to the alternator terminal. Repeat the alternator output test (above). If the alternator still has no output, replace the alternator with a known good one. If the alternator output is greater than 28.5 volts, or less than 27.5 volts, remove the plug from the front flange of the alternator. Adjust the output control until the voltmeter indicates exactly 28 volts. If the output voltage cannot be adjusted to this voltage, replace the alternator with a known good one.</p>

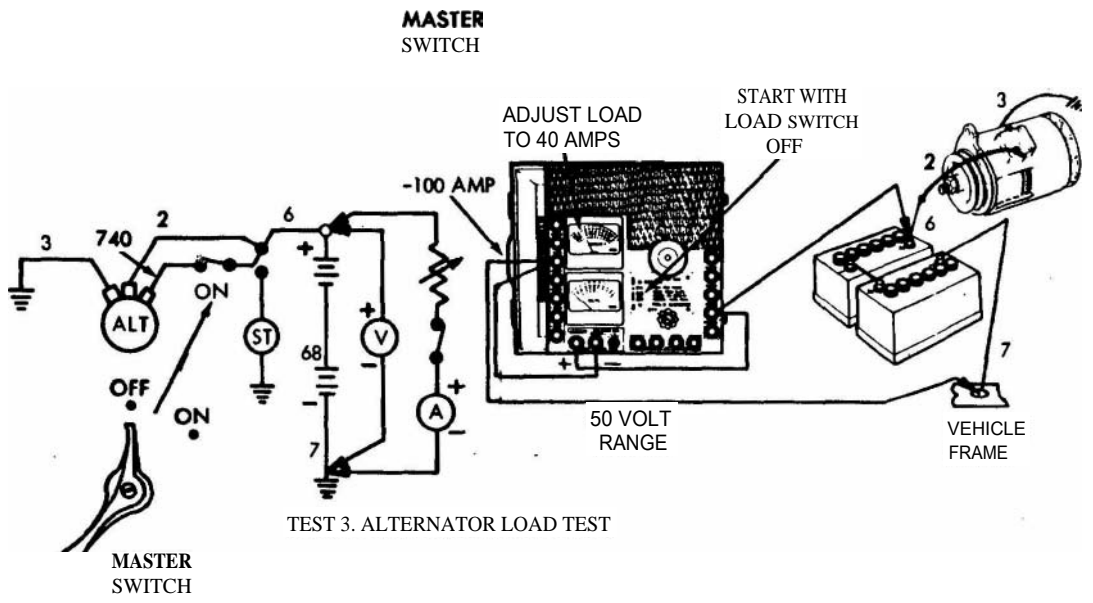
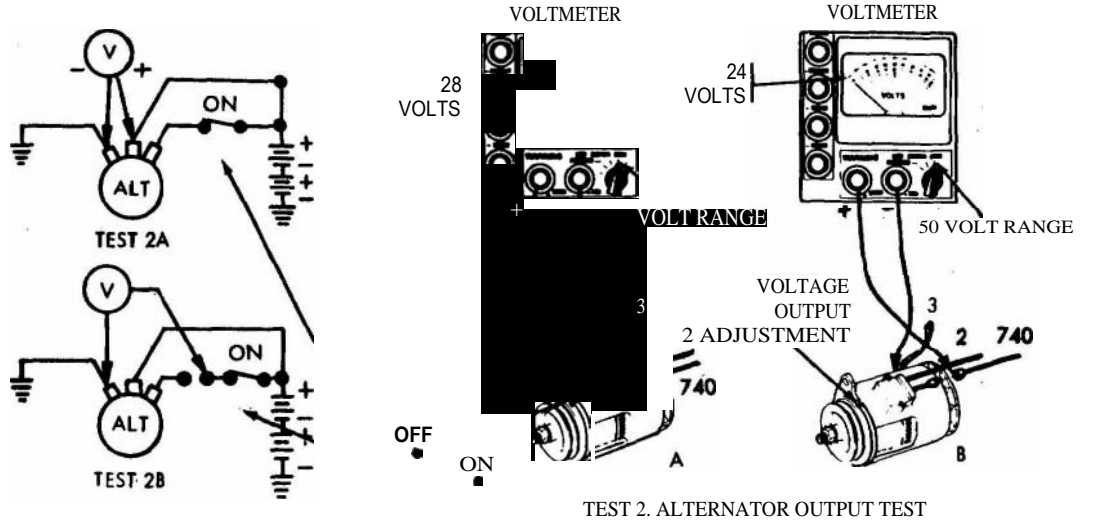
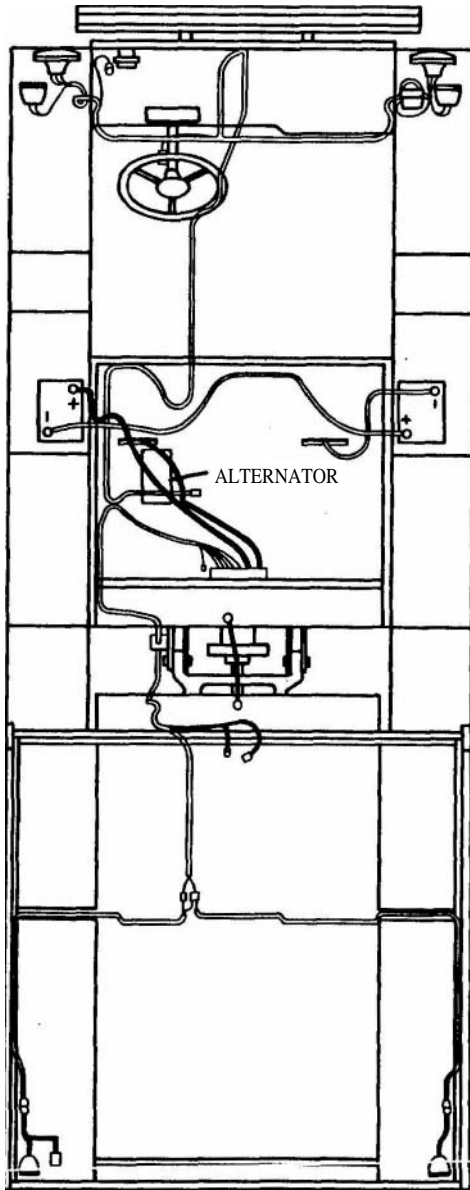
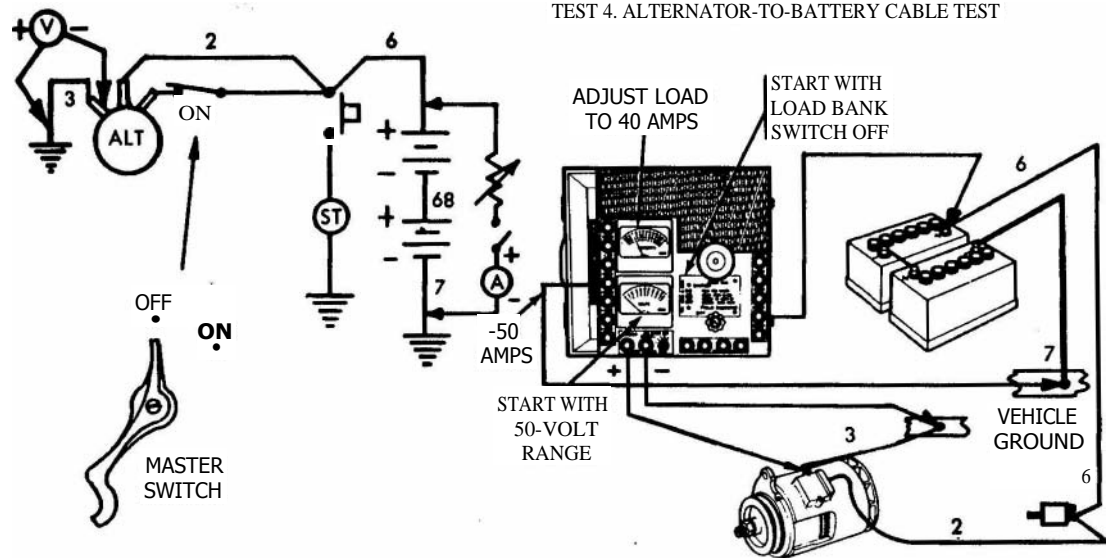
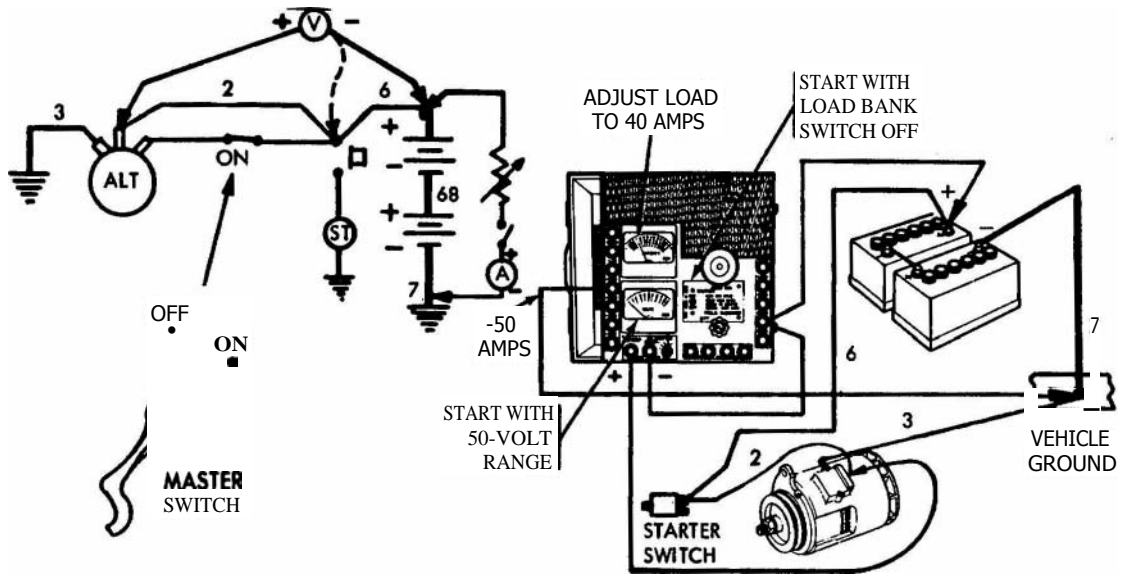
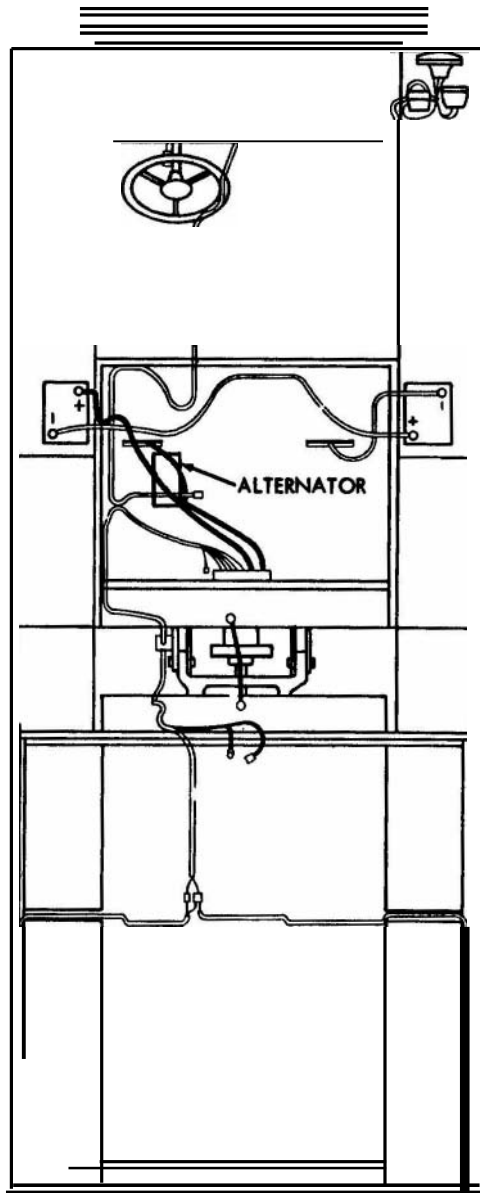


Figure 2-25. Alternator system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Generating System Circuit (Alternator) (fig 2-25)—Continued

Malfunction	Circuit	Test
Alternator not charging.	2, 3, 740	<p>Test 3. Perform alternator load test. Connect the low voltage circuit tester (fig 2-25, test 3). Be sure the voltmeter is on the 50-volt range, the ammeter on the 100-ampere range, and the load bank switch in "OFF" position. Set the coarse load control to "OFF" or minimum counterclockwise position. Start the engine and run at 1000 - 2000 rpm. Set the load bank switch to "ON" position and adjust the load control until the ammeter indicates 40 amperes. Note the voltmeter indication at this time. If the voltmeter indicates 27 volts or more, the alternator is operating satisfactorily. If the voltmeter indicates slightly less than 27 volts, remove the plug at the front of the alternator and adjust the output control to exactly 28 volts. If the voltmeter indicates less than 27 volts and cannot be raised to 28 volts, perform the cable tests.</p>
Alternator not charging.		<p>Test 4. Perform alternator-to-battery cable test. Connect the low voltage circuit tester (fig 2-26, test 4). Start the engine and run at 1000 to 2000 rpm for 15 minutes. Turn the load bank switch "ON" and adjust load bank control until 40 amperes is <i>indicated</i> on the ammeter. Connect the voltmeter from the alternator output terminal stud to the positive battery post. Adjust the voltmeter range switch until a reading is obtained or the 1-volt range <i>is</i> reached. If the meter reading exceeds 1.0 volt, turn off engine and examine all connections between the alternator and battery for loose connections, frayed wires and dirt. Clean and tighten all connections. Repeat the test. If the total voltage drop is still more than 1.0 volt, connect one voltmeter lead directly on the alternator terminal bolt, and successively touch each test point (alternator cable, starter switch, battery cable terminals). As each <i>test</i> point is touched, a small voltage drop of about 0.1 should be seen. If there is a sudden voltage jump at any connection touched, investigate the previous connection or cable. When a 1.0 volt or <i>less</i> drop had been obtained, and the alternator output is still much less than 27 volts in test 3 above, perform the alternator ground cable test.</p>

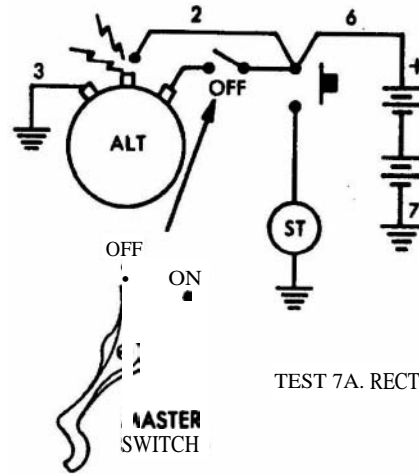
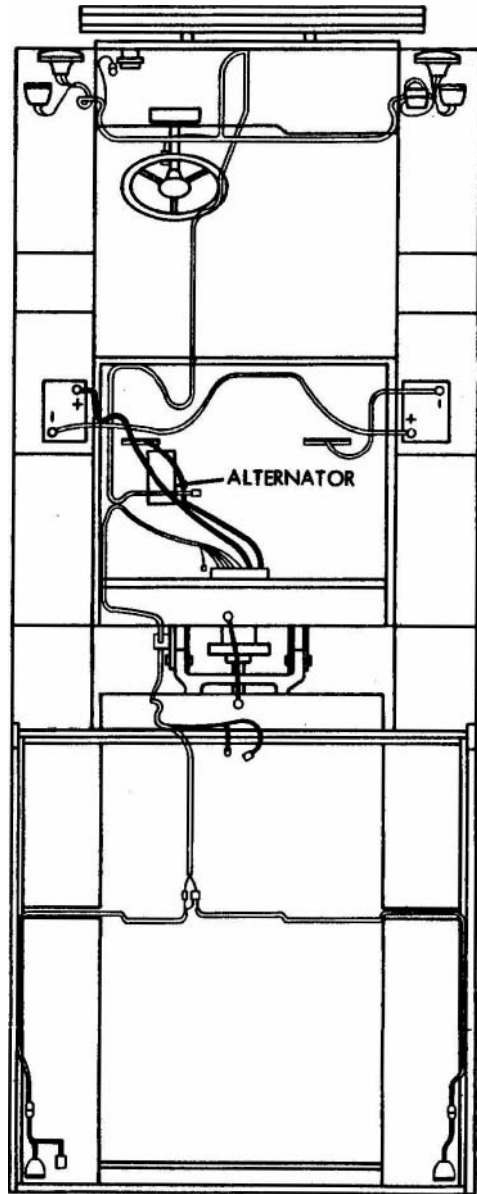


TEST 4. ALTERNATOR-TO-BATTERY CABLE TEST
TEST 5. ALTERNATOR GROUND CABLE TEST
S AT21684

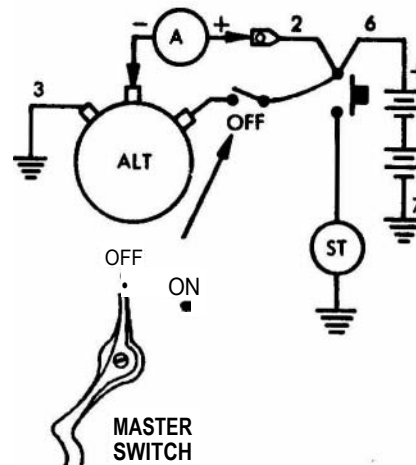
Figure 2-26. Alternator system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Generating System Circuit (Alternator) (fig 2-26)—Continued		
Malfunction	Circuit	Test
Alternator not charging.	3	Test 5. Perform alternator ground cable test. Set up equipment <i>as</i> in test 4, above. Connect the voltmeter from the negative battery terminal (scraped well) to the ground terminal on the alternator. (be sure to touch the terminal, not the cable end.) Start the engine and run at 1000 and 2000 rpm for 15 minutes. Adjust the load bank (as in test 4, above) for 40 amperes. The voltmeter should read less than 0.1 volt. If more, investigate and clean the alternator ground cable. Repeat test 3, above.
	6, 68, 7	Test 6. Battery cable test (refer to <i>tests</i> 3, 4, 5, and 6 of Starting Tests, and figs 2-22 and 2-23). When all cables have been tested and repaired (as required) repeat test 3, above. If the alternator output still cannot be adjusted to 27.5 volts, replace the alternator with a known good one.
Alternator not charging, and battery discharges even if vehicle is not in <i>use</i> .	2	Test 7. Perform the rectifier integrity test. Be sure engine and ignition switch are "OFF." Remove the cable from the alternator output terminal (fig 2-27, test 7A1). Touch the cable to the terminal in a darkened area. If there is any indication of sparking, one or more rectifiers or the radio suppression filter is defective. If no sparks appear, connect the ammeter in the line (fig 2-27, test 7B). Touch ammeter test lead to the output terminal of the alternator. There should be no indication on the meter except a small jump at the moment of connection. If there is any meter indication, the alternator has internal leakage and will discharge the battery in <i>a</i> day or two, depending on the severity of the leakage. If the meter has an indication, replace the alternator with a known good one. If the meter has no indication, reinstall the cable and tighten securely.

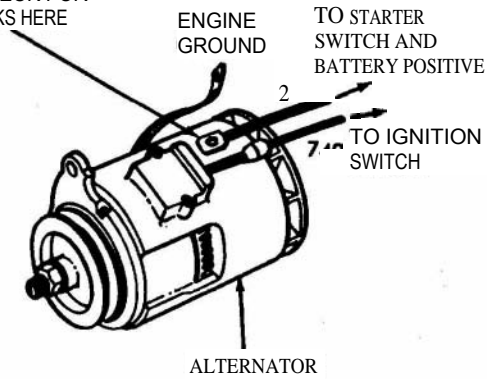


TEST 7A. RECTIFIER INTEGRITY CHECK (PRELIMINARY TEST)



TEST 7B. RECTIFIER INTEGRITY CHECK (METER TEST)

WITH ENGINE OFF
TOUCH LUG
TO TERMINAL
AND CHECK FOR
SPARKS HERE



NO METER
INDICATION

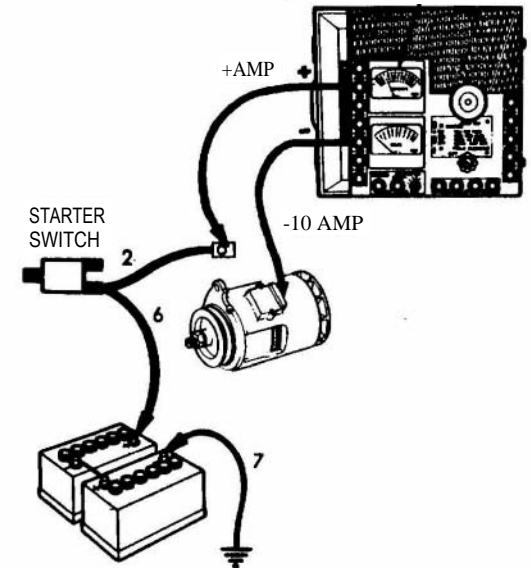


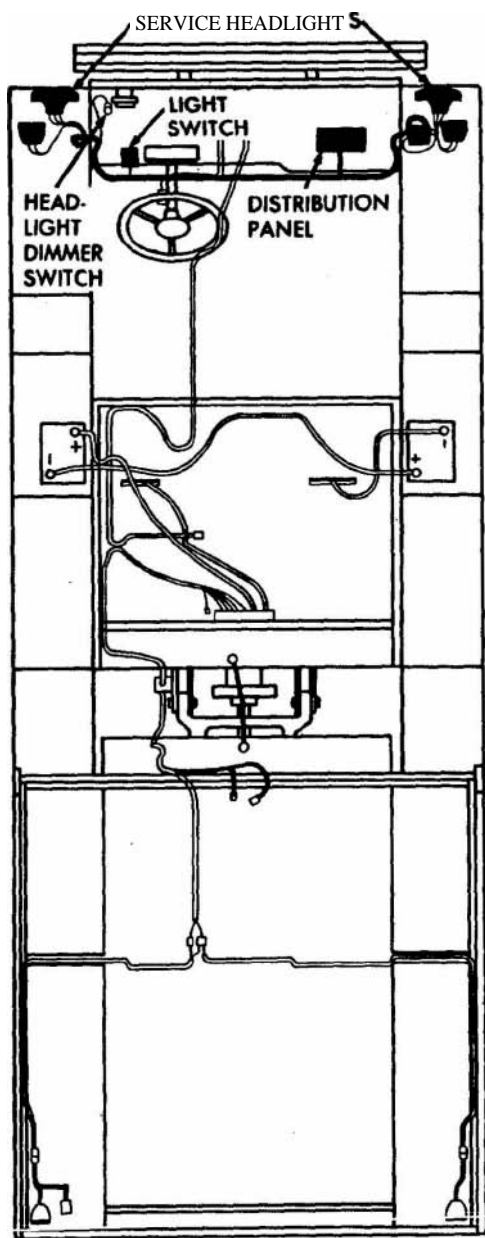
Figure 2-27. Alternator system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Lighting System Circuit (fig 2-28)

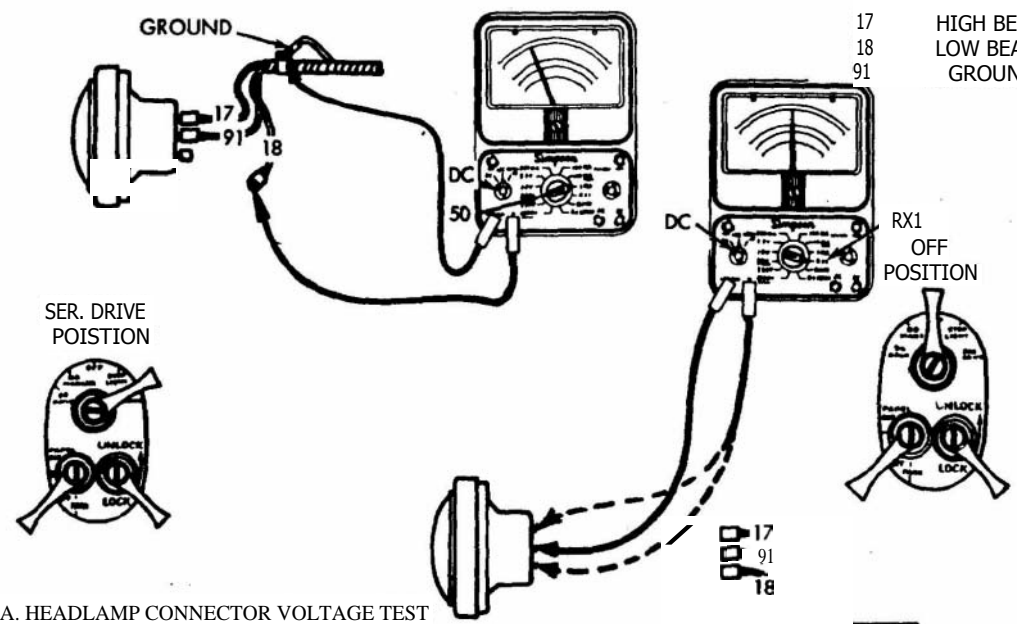
Description: Light circuits are controlled by the light switch on the instrument panel. Each light is connected to the light switch by connectors, wiring harnesses and cables; cables are identified by numbered tags near the end of each cable. A circuit breaker in the light switch protects the lighting system from overload. The lighting system is waterproofed. The light circuits are energized from the battery through circuits 2, 6, and 15. Individual or groups of lights are selected by the light switch, except the stoplamp, which is energized by a hydraulically-operated switch in the brake hydraulic system, and the directional signal system, which has an individual actuator / selector on the steering column. To test the operation of the lighting system (refer to TM 9-2320-242-10 for operating instructions for the light switch).

Malfunction	Circuit	Test
Generally unsatisfactory lighting (flickering, dim, frequent burnouts, intermittent).	2, 6, 15 17, 18, 21 22, 23, 24 91	<p><i>Note: Before attempting to troubleshoot the lighting system, refer to TM 9-2320-242-10 to become familiar with the lighting arrangement for each switch position and the nomenclature for each light.</i></p> <p>Test 1. Perform a visual inspection. Inspect connections at the light switch and each individual light. Inspect all ground connections at light assemblies. If grounds are rusty or dirty, remove ground wire, scrape metal until clean, and reconnect, tightening securely. After tightening, coat the area with grease or other rust-reducing compound. If the complaint is short lamp life, or frequent burnout of lamps, check for high generating system voltage (fig 2-25) or loose lamp housings or components that would cause excessive vibration. Before discarding a lamp that has been removed, test it in another known good light, or with an ohmmeter, to determine whether the lamp or socket is at fault.</p> <p><i>Note: The following voltage tests may be performed with either the multimeter, or the voltmeter section of the low voltage circuit tester.</i></p>
Headlight (one side) inoperative.	17, 18, 91	<p>Test 2. Perform service headlamp connector voltage test. Disconnect connector and connect voltmeter (fig 2-28, test 2A). Turn lighting switch to "SER DRIVE" position. If no voltage is indicated, operate headlamp selector switch. If 24 volts is indicated, make a resistance test of the lamp unit. If no reading is indicated, in either position of the selector switch, and the other beam of the headlight operates, the wiring harness from headlamp to selector switch is unserviceable. Turn light switch to "OFF." Connect the multimeter between lamp terminals 18 and 91 (fig 2-28, test 2B1). If the multimeter needle moves past the center of the scale, connect the leads between terminals 17 and 91, and repeat. If the needle does not move with either test, replace the lamp with a known good one. If replacement lamp unit does not light, pin connector of headlamp body may be faulty.</p>



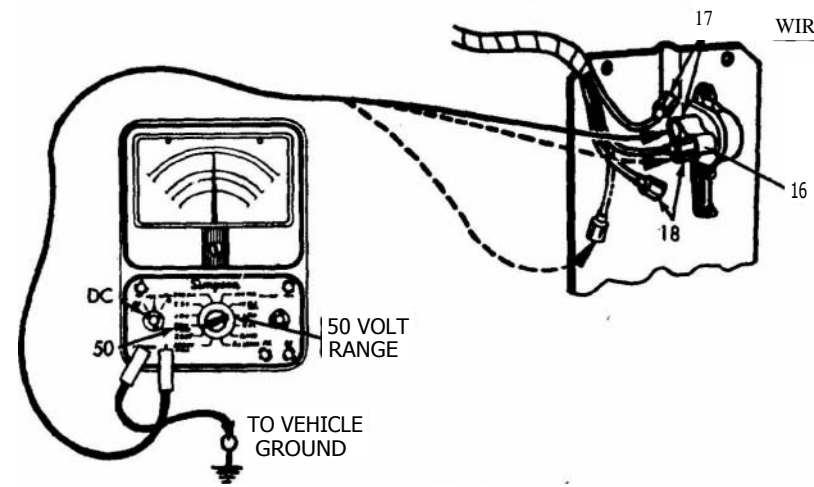
WIRE NO. CIRCUIT

- 17 HIGH BEAM
- 18 LOW BEAM
- 91 GROUND

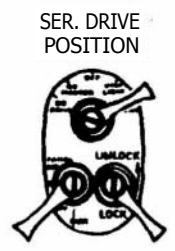


TEST 2A. HEADLAMP CONNECTOR VOLTAGE TEST

TEST 2B. HEADLAMP RESISTANCE TEST



WIRE NO.	CIRCUIT
16	LIGHT SWITCH TO DIMMER SWITCH
17	HIGH BEAM
18	LOW BEAM

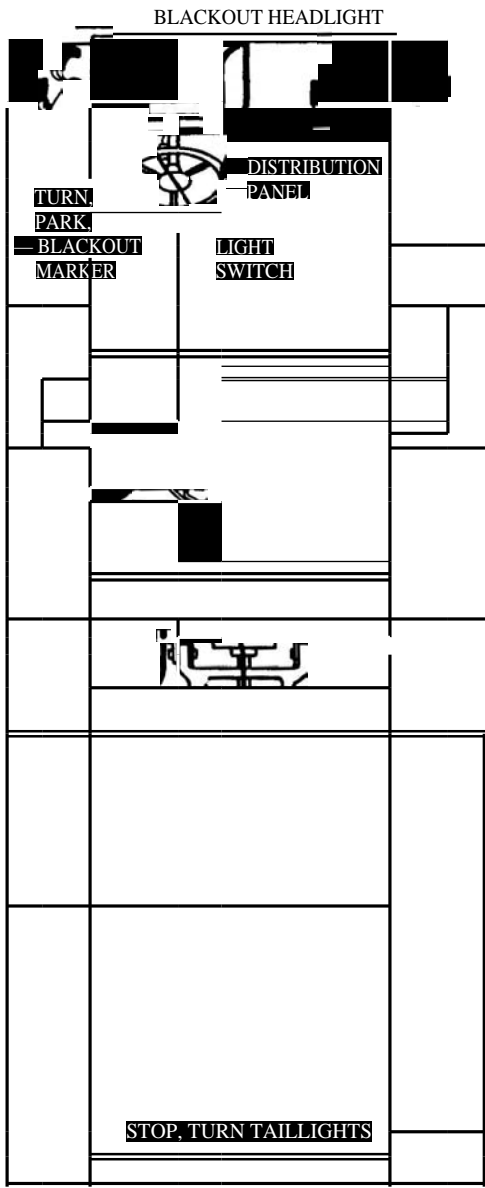


TEST 3. DIMMER SWITCH TEST

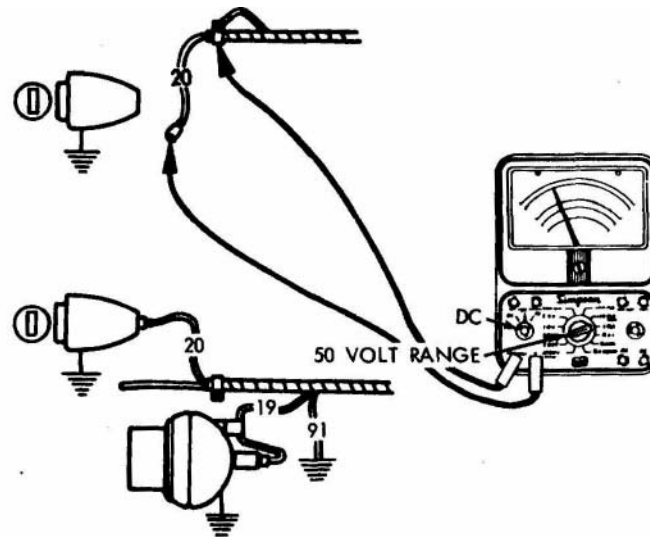
Figure 2-28. Lighting system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

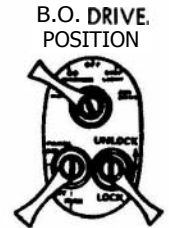
Lighting System Circuit (fig 2-28)—Continued		
Malfunction	Circuit	
Headlights (both sides) inoperative.	16, 17, 18	Test 3. Perform service headlamp voltage test (both sides). Check for voltage at connectors of both lamps as in test 2 above. If voltage is not present, disconnect No. 17 and No. 18 wires at selector switch. Connect voltmeter (fig 2-28, test 3). Check for voltage at exposed terminal No. 17 of the selector switch. If voltage is not present, actuate switch. Repeat this step for exposed terminal No. 18 of the selector switch. If 24-volt reading is indicated at No. 17 and No. 18 switch terminals, but not at headlamp connectors, wiring harness from headlamps to selector switch is unserviceable. If voltage readings are not present at No. 17 and No. 18 selector switch terminals, remove No. 16 wire and connect the positive lead of the voltmeter to the No. 16 wire (not the selector switch terminal) to see if supply voltage is present. If voltage is indicated, replace selector switch; if no voltage is indicated, perform lighting switch connector voltage test (fig 2-31, test 9) to determine if lighting harness from selector switch to lighting switch is unserviceable.
Blackout and marker lights inoperative.	19, 20 91, 491	Test 4. Perform front blackout lamp connector voltage test. Connect voltmeter (fig 2.29, test 4). Turn lighting switch to "BO DRIVE" position. If 24 to 28 volts is indicated, replace bulb; if new bulb does not light, check for corroded, dirty or defective socket and wire assembly. If no reading is indicated, perform lighting switch connector voltage test (fig 2-31, test 9) to determine if wiring harness is unserviceable.
Rear lights inoperative.	21, 22 23, 24	Test 5. Perform rear lamp connector voltage test. Connect the voltmeter (fig 2-29, test 5). Turn lighting switch to position corresponding to position of faulty rear lamp; if stoplamp, depress brake pedal. If 24 to 28 volts is indicated, replace bulb; if new bulb does not light, check for corroded, dirty or defective socket and wire assembly. If no voltage reading is indicated, perform lighting switch connector voltage test (fig 2-31, test 9) to determine if wiring harness is unserviceable.



BLACKOUT-STOPLIGHTS



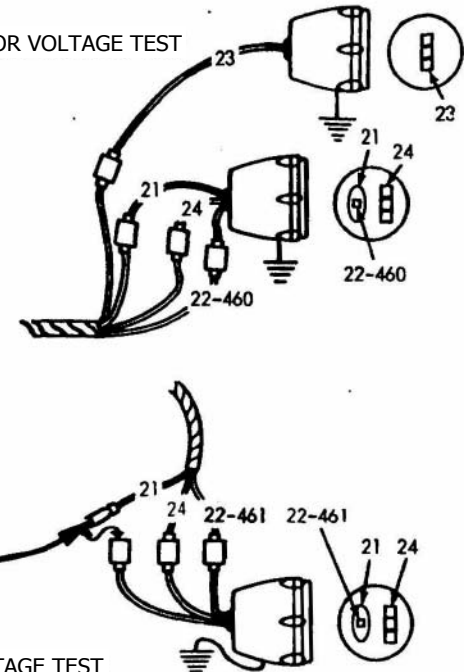
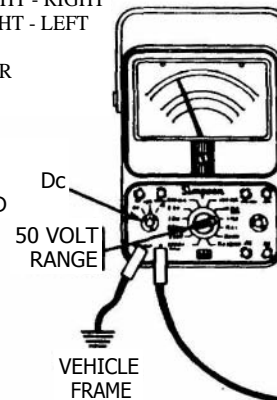
WIRE NO.	CIRCUIT
19	B.O. DRIVE
20	B.O. MARKER
91	GROUND



TEST 4. FRONT BLACKOUT LAMP CONNECTOR VOLTAGE TEST

WIRE NO.	CIRCUIT
21	SERVICE REAR LIGHT
22-460	SERVICE STOPLIGHT - RIGHT
22-461	SERVICE STOPLIGHT - LEFT
23	B.O. STOPLIGHT
24	B.O. REAR MARKER

MUST BE
IN POSITION FOR
LAMPS BEING TESTED



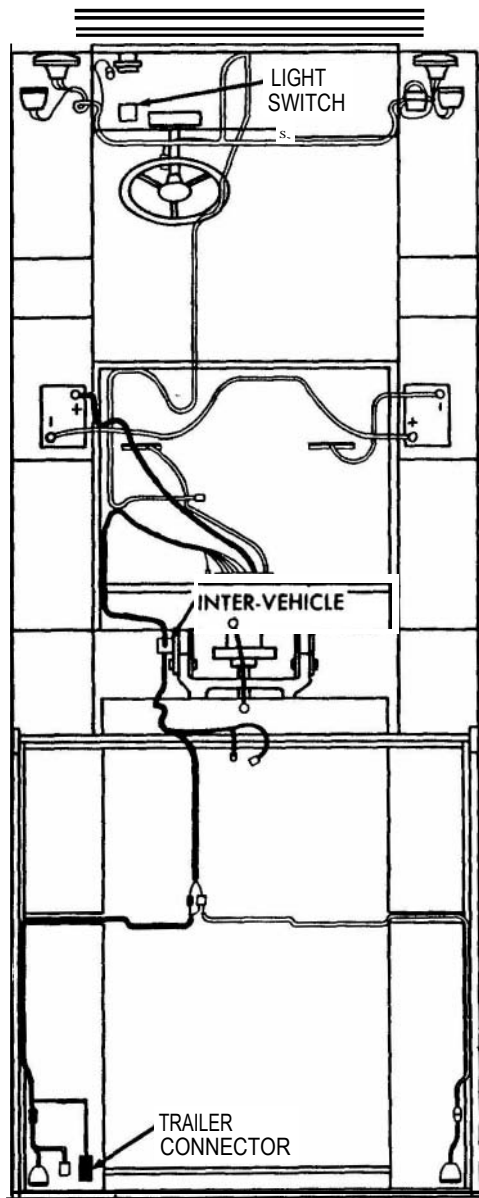
TEST 5. REAR LAMP CONNECTOR VOLTAGE TEST

Figure 2-29. Lighting system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

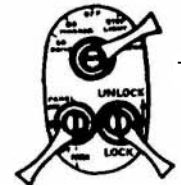
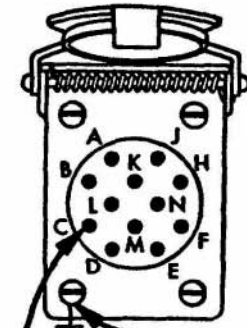
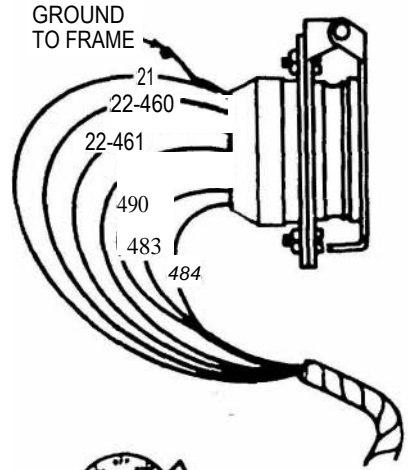
Lighting System Circuit (fig 2-29)

Malfunction	Circuit	Test
One or more trailer lights out (Trailer receptacle inoperative).	21, 22, 23 90, 483 484, 490	Test 6. Perform trailer connector voltage <i>test</i> . Turn lighting switch to position which should light inoperative trailer lamp. Connect voltmeter (fig 2.30, test 6), to appropriate connector socket of inoperative circuit. If 24 to 28 volts is indicated at correct connector socket, check the No. 90 wire ground connection. If No. 90 wire is tightly grounded, trailer electrical system is faulty. If no reading is indicated at correct connector socket, perform chassis connector voltage test 7 below.
Rear lamps inoperative (test to determine if cause of failure is lighting switch or wiring harness).	21, 22 23, 24 29	Test 7. Perform chassis harness connector voltage test. Remove rear chassis harness connectors. Connect voltmeter (fig 2-30, test 7), to appropriate connector socket for inoperative circuit. Turn light switch to position which should light faulty lamp; if stoplight is the inoperative circuit, depress brake pedal. If 24 to 28 volts in indicated check rear harness from rear chassis connector to inoperative lamp for broken or chafed wires. If no reading is indicated for blackout marker or service lamp connector terminals, perform lighting switch voltage test 9 below. If no reading for stoplight circuit terminals (brake pedal depressed and lighting switch in correct position), perform stoplight switch test 8 below.

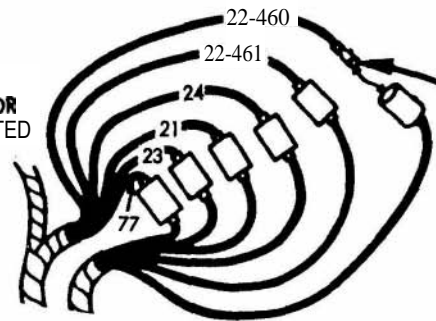


WIRE NO.	CIRCUIT (TEST 7)
21	SERVICE REAR LIGHT
22-460	SERVICE STOPLIGHT (RH)
22-461	SERVICE STOPLIGHT (LH)
23	B.O. STOPLIGHT
24	B.O. MARKER LIGHTS

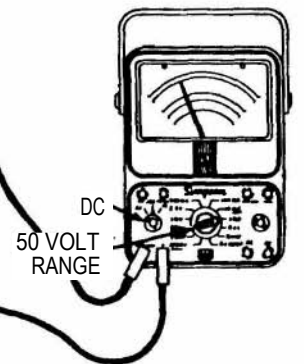
PIN	WIRE NO.	CIRCUIT (TEST 6)
A	24-484	REAR B.O. MARKER (LH)
	22-461	SERVICE STOPLIGHT (LH)
C	24-483	REAR B.O. MARKER (RH)
D	90	GROUND TO FRAME
E	21-489	SERVICE REAR LIGHT
F	23	B.O. STOPLIGHT
H	490	B.O. MARKER LIGHTS
J	22-460	SERVICE STOPLIGHT (RH)
K	37	AUX. POWER
L	90	GROUND TO FRAME
M	NONE	BRAKE
N	NONE	BRAKE



TEST 6. TRAILER CONNECTOR VOLTAGE TEST



TEST 7. CARRIER HARNESS CONNECTOR VOLTAGE TEST.



NOTE: SEE WIRE TABLE ABOVE LEFT

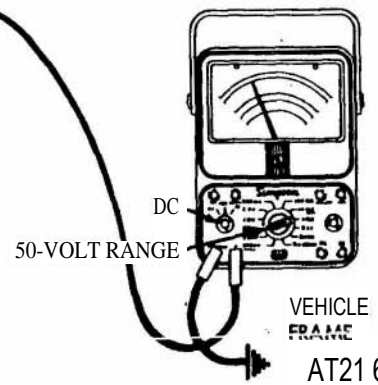


Figure 2-30. Lighting system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Lighting System Circuit (fig 2-30)

Malfunction	Circuit	Test
<p>Stoplight inoperative (stoplight switch <i>test</i>).</p>	<p>75</p>	<p>Test 8. Perform stoplight switch voltage test. Move lighting switch to "STOPLIGHT" position. Disconnect connector from the stoplight switch located under the cowl panel on the bottom of the <i>master</i> cylinder assembly. Connect voltmeter (fig 2-31, test 8). Check for voltage at one of the two No. 75 wires. If voltage is indicated, jumper that wire to one terminal of the stoplight switch. With brake pedal depressed, use positive voltmeter lead to check for voltage at exposed stoplight switch terminal. If 24 to 28 volts is indicated, stoplight switch is serviceable. If no reading is indicated, stoplight switch is faulty. If no reading is indicated at either of the two No. 75 wires, perform lighting switch connector voltage test 9 below to determine if wiring harness is broken or if lighting switch is unserviceable.</p>

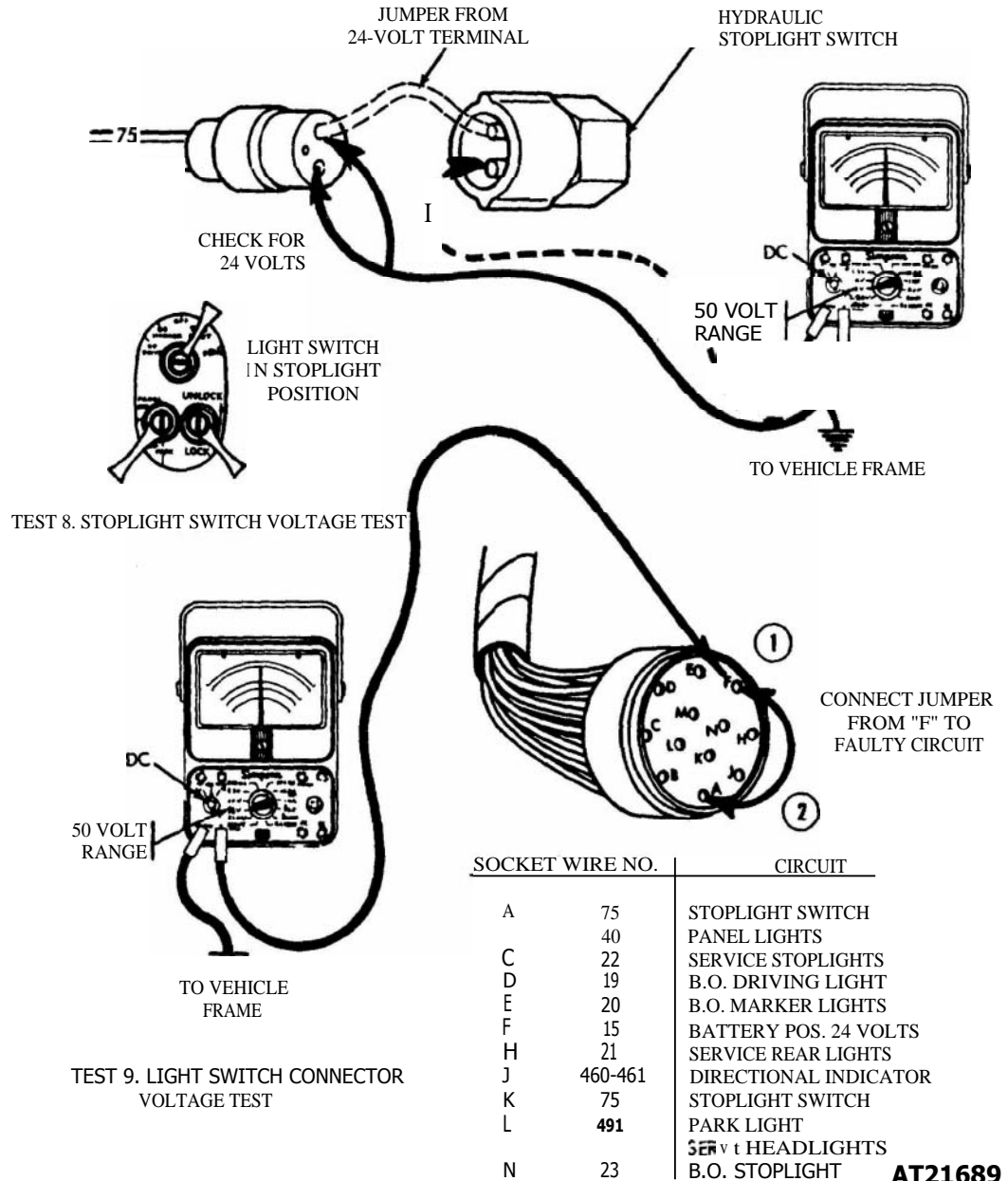
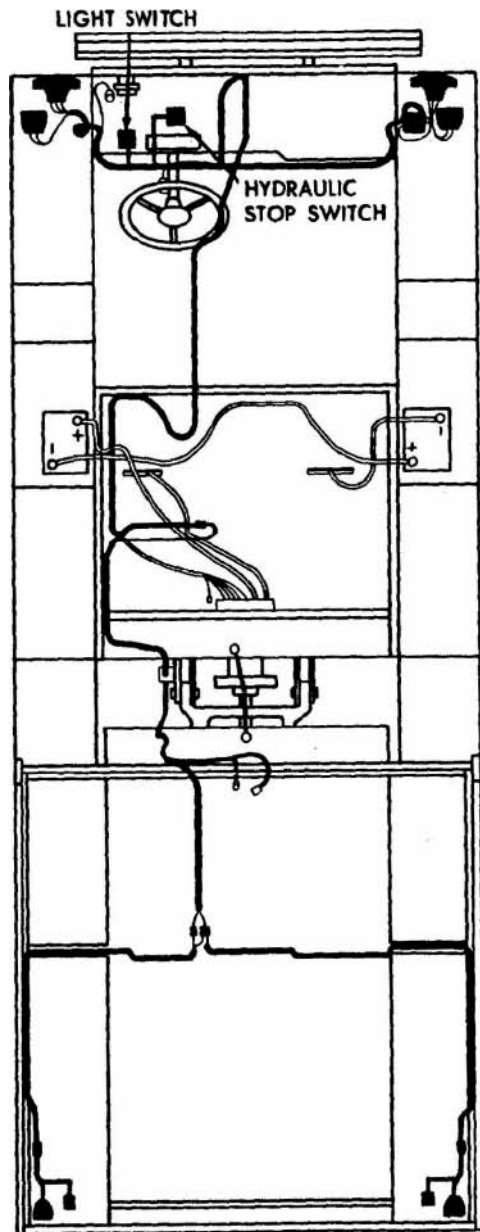


Figure 2-31. Lighting system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Lighting System Circuit (fig 2-31)—Continued

Malfunction	Circuit	Test
Lamps will not light (some lamps will not light).	15, 16, 19 20, 21, 22 23, 40, 75 460, 461	Test 9. Perform lighting switch connector voltage test. Remove lighting switch from dash panel and disconnect harness connector. Connect voltmeter between vehicle frame and socket (F) of lighting switch harness (fig 2-31, test 9). If 24 to 28 volts is not indicated, check wiring harness circuits No. 5 and 16 from starter to lighting switch for broken wires or loose connections. If 24 to 28 volts is indicated on socket (F) of the connector, connect a jumper wire from (F) socket to socket of faulty circuit. If lamps light with jumper wire connected, replace lighting switch. If some lamps do not light with jumper wire connected, check wiring harness from lighting switch to inoperative light or rear harness connector for broken wire.

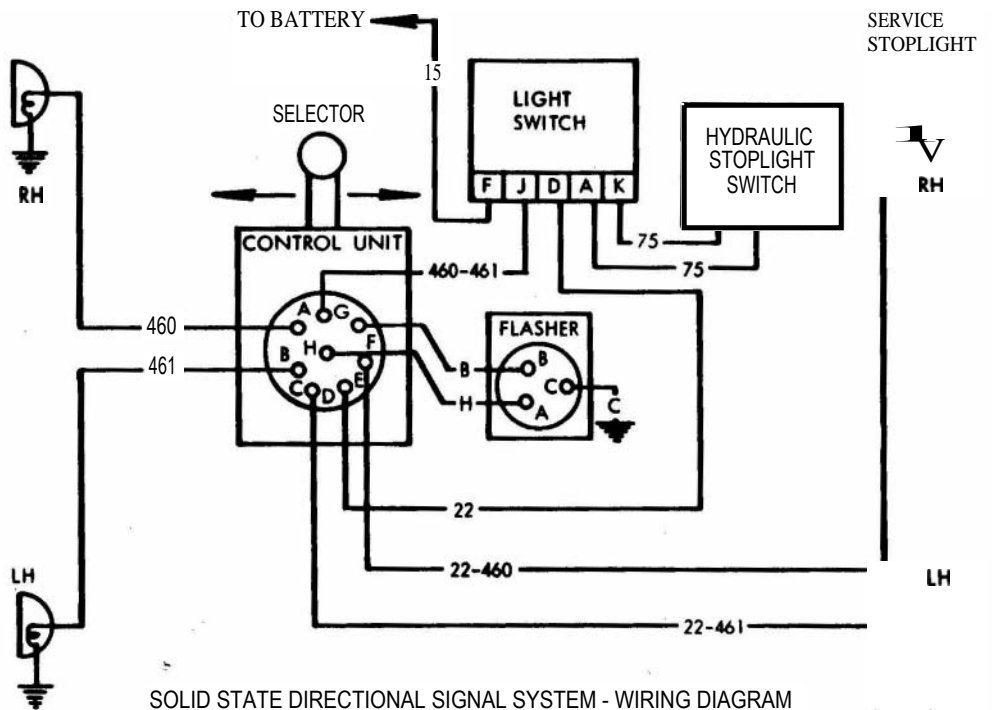
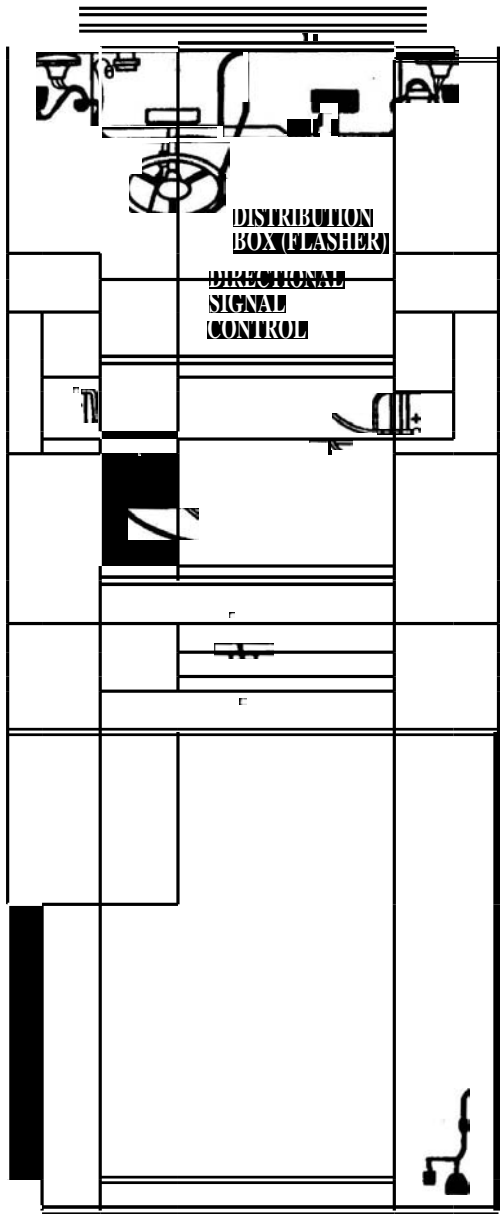
Directional Signal System Circuit (fig 2-32)

Description: Two types of directional signals are in use on these vehicles. Present Production vehicles are equipped with a mechanical system. Future production vehicles will use a solid state (transistorized) system. The mechanical system is considered obsolete and will not be covered in detail in this manual. The solid state system consists of a directional signal control assembly (mounted on the steering column), a flasher unit, connecting cables, and four lamps. The two front lamps are individual units. The rear lamps are combined with the service stoplights. The system is energized by setting the light switch to "STOPLIGHT" position, which supplies 24 volts via wire 460-461 to terminal "G" of the directional signal control unit. Moving the control unit lever to indicate a left turn connects terminal "G" to terminal "F" and supplies 24 volts to the flasher unit. At the same time, it connects the output of the flasher to the left front turn indicator light and the left rear stoplight, and activates the control unit indicator lamp. The hydraulic stoplight switch *is* also disconnected from the left rear stoplight to prevent it from overriding the flasher unit. The right rear stoplight remains connected to the hydraulic stoplight switch and operates normally when the brakes are applied. Moving the directional signal control lever to indicate a right turn causes the same action to occur on the right hand side of the vehicle. Moving ~~th~~ the directional signal control lever to "FLARE" position connects all four lights (the two front turn indicators and the two stoplight.) to the output of the flasher unit and disconnects hydraulic stoplight switch from both stoplights. An overall test of the system *is* to perform **all** functions of the directional signal control switch and observe the action of the lights as described above. Figure 2-32 shows a wiring diagram of the complete system circuit.

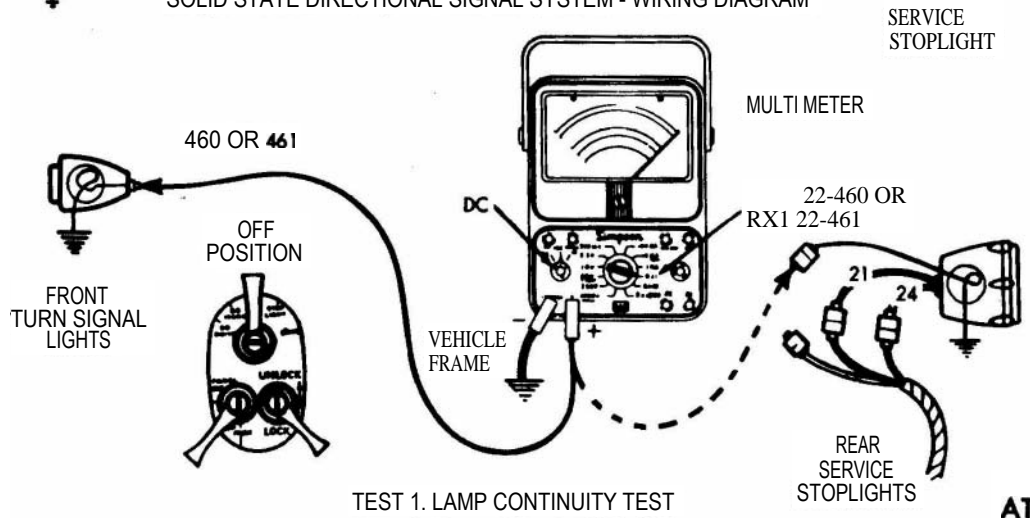
*Note: If the vehicle is equipped with a mechanical **flasher** system, troubleshooting should be limited to a lamp check (test 1, below) and visual inspection for loose connections, poor ground, or frayed cables. If defects are found which cannot be corrected by minor repair, replace both mechanical units with the solid state flasher repair kit (see TM 9-2320-242-20P). Do not make a partial replacement; replace both mechanical flasher units with the complete solid state kit.*

Table 2-5. Troubleshooting the Electrical System—Continued

Directional Signal System Circuit (fig 2-32)—Continued		
Malfunction	Circuit	Test
<p>Individual lamps do not light with directional signal control lever in any position.</p>	<p>460, 461, 22-460 22461</p>	<p>Test 1. Perform lamp continuity test. Set main light switch to "STOPLIGHT" position. Try all positions of directional signal control lever, and observe which lights do not light in any position of the lever. Have assistant depress brake pedal and observe stoplights. If stoplights light, rear lamps are operational. If stoplights do not light, or if front turn indicators do not light in any position of the control lever, turn light switch to "OFF" and disconnect connector, 460, 461, 22-460 or 22-461, as required (fig 2-32). Set up multimeter for continuity test (fig 2-17). Touch red lead to connector on light (fig 2-32, test 1). If the meter needle deflects to approximately 5 ohms, the lamp is normal and the trouble is elsewhere. If the meter does not deflect at all (infinity reading) replace lamp with a known good one, and retest. If meter still shows infinity or considerable more than 5 ohms, touch red test lead to the lamp housing, making sure to scrape through the paint to the bare metal. If the meter does not deflect completely to zero ohms, inspect the ground connection, removing the ground wire and scraping all metal surfaces bright, and reconnect. When light has been restored to 5 ohms, reconnect the connector and test the directional system again. If trouble still exists, perform wire harness tests.</p>



SOLID STATE DIRECTIONAL SIGNAL SYSTEM - WIRING DIAGRAM



TEST 1. LAMP CONTINUITY TEST

AT21690

Figure 2-32. Directional signal system tests.

Directional Signal System Circuit (fig 2-32)—Continued

Malfunction	Circuit	Test
-------------	---------	------

Individual lamps do not light with directional signal control lever in any position.

460, 461, 22460, 22461

Test 2. Perform wiring harness voltage test. Set up multimeter for dc voltage tests (fig 2-15). Disconnect connectors 460, 461, 22-460, or 22461, as required (fig 2-32). Set main light switch to "STOPLIGHT" position. Connect **multimeter** (fig 2.33, test 2). Touch red test lead to center contact of cable **connector** on wiring harness. The voltmeter needle should deflect past 24 volts at a rate of 1 to 2 per second. If meter does not deflect, or deflects much less than 24 volts, leave connector disconnected from light and perform wiring harness continuity test.

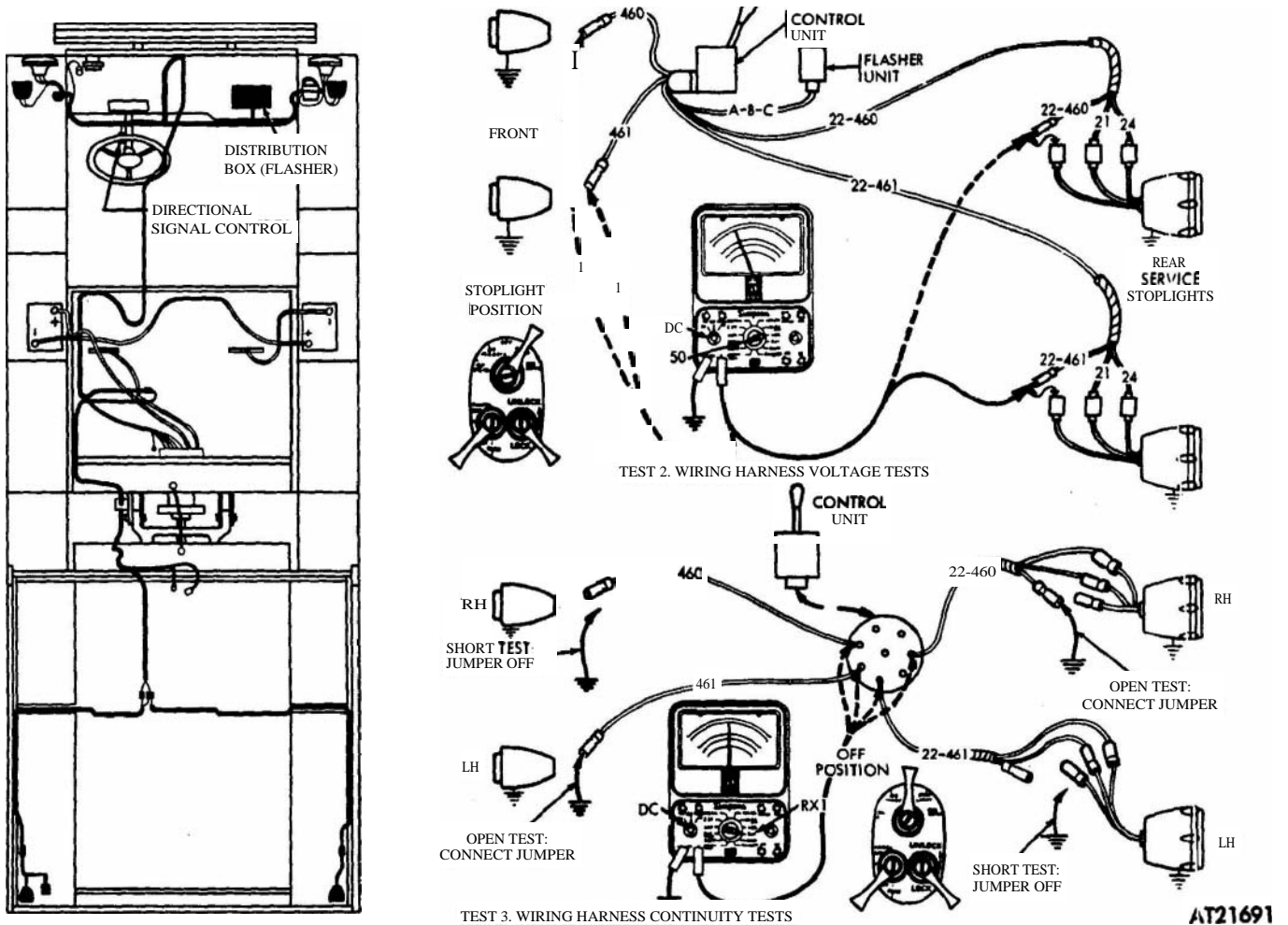


Figure 2-33. Directional signal system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Directional Signal System Circuit (fig 2-33)—Continued		
Malfunction	Circuit	Test
Individual lamps do not light with directional signal control lever in any position.	460, 461, 22-460, 22-461	<p>Test 3. Perform wiring harness continuity test. Set up multimeter for continuity test (fig 2-17). Set main light switch to "OFF." Connect the black test lead to the vehicle frame near the control unit. Remove the cable connector from the control unit. Touch the red test lead to a socket in the cable connector to correspond with the defective circuit. The meter needle should not deflect (infinite reading). If there is any deflection, the wiring harness has a short circuit, or a high resistance leakage. Inspect the harness for frayed or pinched cables, and make repairs. If infinity is indicated on the meter, connect a jumper wire from the vehicle frame to the cable connector at the light (fig 2 :33, test 3). Touch the red test lead to the appropriate socket terminal in the cable connector at the control unit. The meter needle should deflect fully, showing zero ohms. If less than full deflection, inspect the wiring harness for breaks, frayed wires, corroded connections, etc., and make necessary repairs. When all lamps and wiring harness have continuity restored, and system still does not operate, perform flasher and control unit tests.</p>
No lights operate with directional signal control lever in any position.	460, 461	<p>Test 4. Perform directional signal control unit voltage feed test. Set up the multimeter for dc voltage test (fig 2-151). Remove the cable connector from the directional signal control unit. Set the main light switch to "STOPLIGHT" position. Measure the voltage from the vehicle frame to terminal "G" of the cable connector on the wiring harness (fig 2-34, test 4). The meter needle should indicate 24 volts. If less or none, remove the cable connector from the light switch and perform a continuity test from contact "G" on the control unit end to contact "J" at the light switch end. If continuity is satisfactory, the light switch is defective. When 24 volts has been restored to contact "G" of the directional control unit cable connector, and the system still does not operate, perform the flasher cable continuity test.</p>

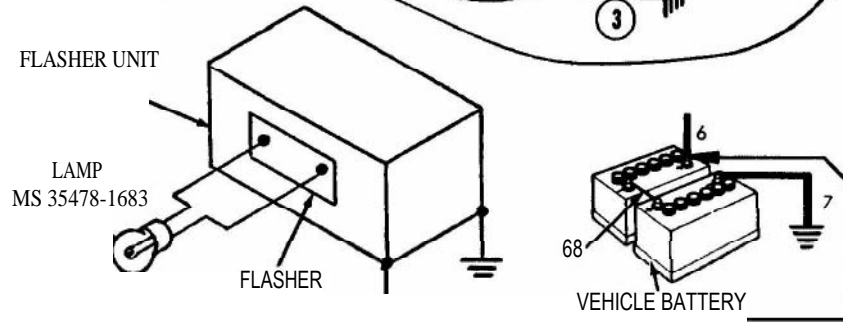
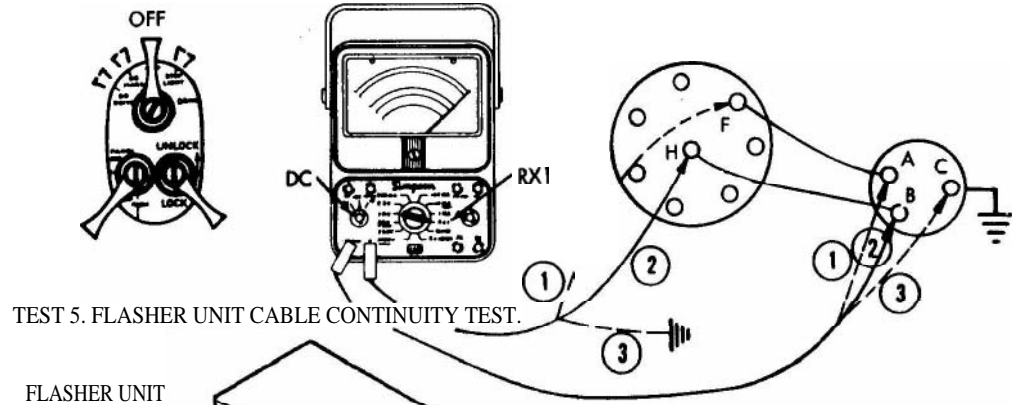
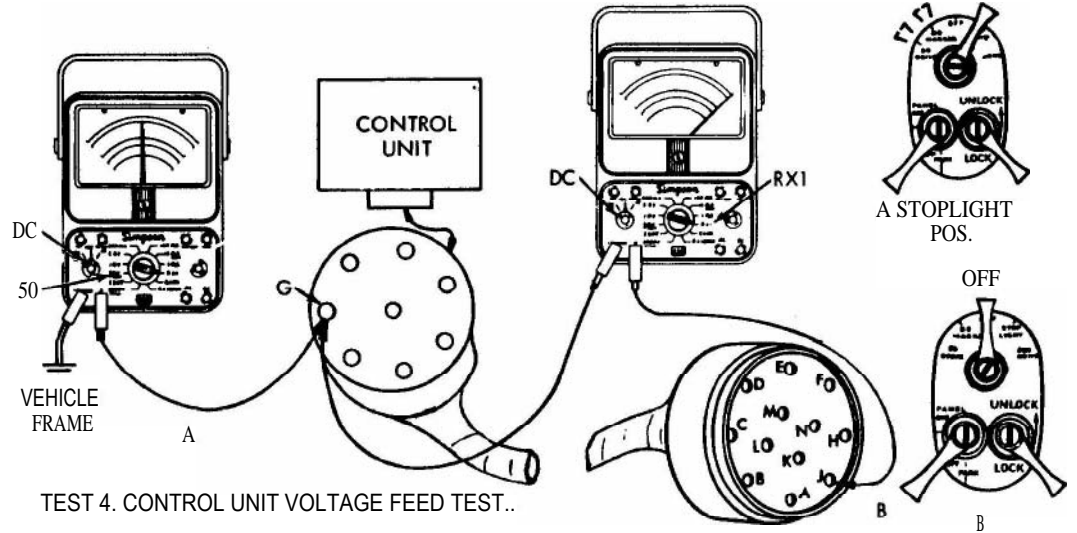
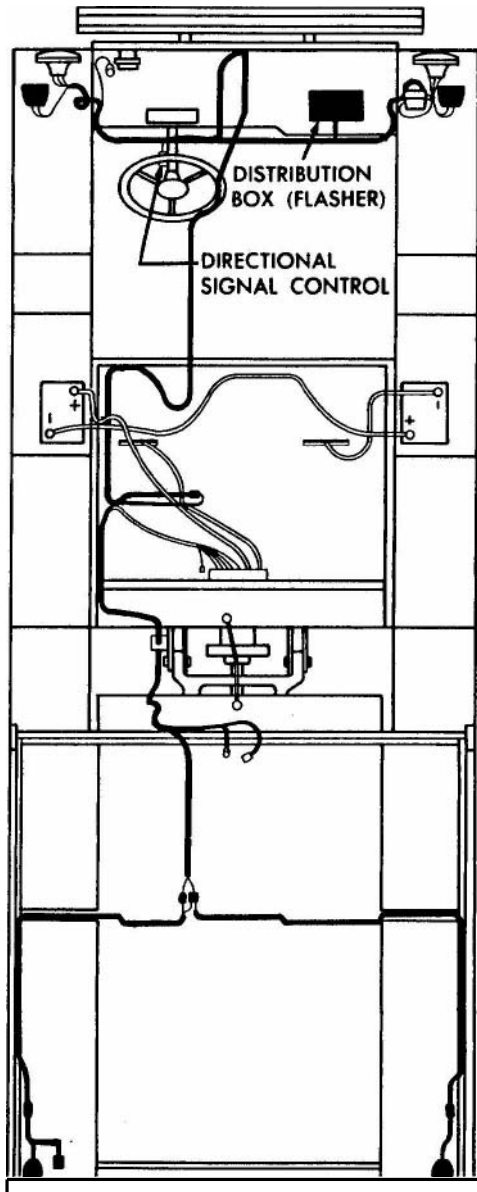
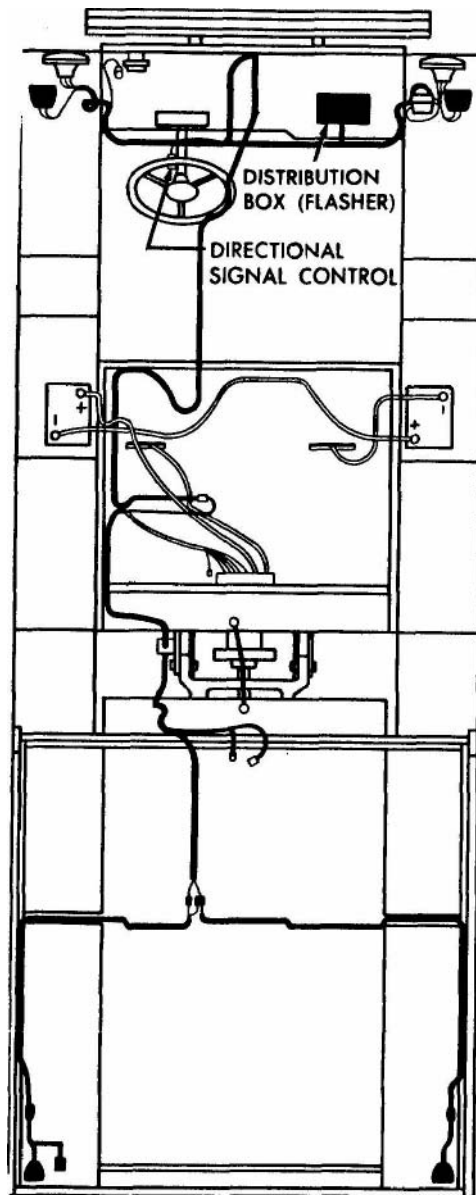


Figure 2-34. Directional signal system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Directional Signal System Circuit (fig 2-34)—Continued

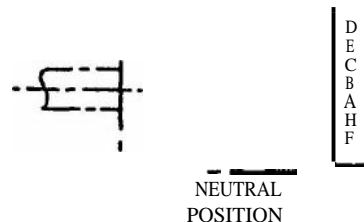
Malfunction	Circuit	Test
No lights operate with directional signal control lever in any position.	122, 123, 124, 125 126	Test 5. Flasher unit cable continuity test. Set up the multimeter for continuity (fig 2-17). Remove the cable connector from the control unit. Measure continuity between the cable wires (fig 2-34, test 5). If any wire does not have continuity, inspect and make necessary repairs. If all three wires have continuity, perform the flasher operational test.
Flashes erratically, no flash, or very slow flash.	122, 123 124, 125 126	Test 6. Perform the flasher operational test. The flasher should flash at a rate of 60 to 120 flashes per minute, at a regular rate without skipping. If it does not flash, or flashes irregularly, replace the flasher unit with a known good one. If the flasher test is satisfactory, perform control unit test.
System operates incorrectly in one or more positions of the directional signal control lever (all lights and wiring harness test satisfactory).	22, 22-460 22-461 460, 461 75	Test 7. Perform the directional signal control unit continuity test. Set up the multimeter for continuity tests (fig 2-17). Set the control lever in all three operating positions and make tests (fig 2-35, test 7). If any circuit does not test as shown in the tables, replace the control unit with a known good one.



SCHEMATIC DIAGRAM

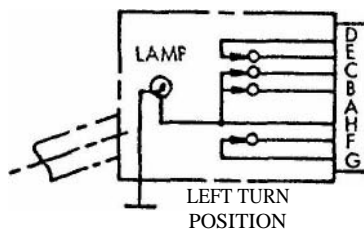
FROM PIN: _____ TO PIN: _____

INDICATION



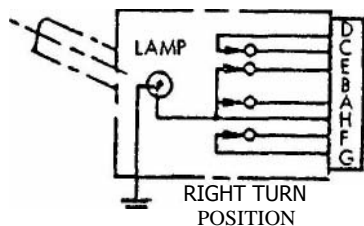
FROM PIN:	TO PIN:	INDICATION
H	A	OPEN
H	B	OPEN
H	C	OPEN
H	E	OPEN
O	C	SHORTED
D	E	SHORTED
F	G	OPEN

A. DIRECTIONAL SIGNAL CONTROL LEVER IN "NEUTRAL" POSITION



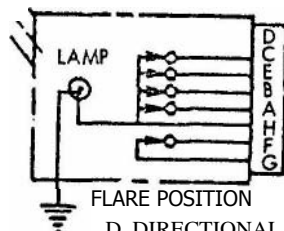
FROM PIN:	TO PIN:	INDICATION
H	B	SHORTED
H	C	SHORTED
H	A	OPEN
H	E	OPEN
F	G	SHORTED
D	E	SHORTED
D	C	OPEN

B. DIRECTIONAL SIGNAL CONTROL LEVER IN "LEFT TURN" POSITION



FROM PIN:	TO PIN:	INDICATION
F	G	SHORTED
H	A	SHORTED
H	E	SHORTED
H	B	OPEN
H	C	OPEN
D	C	SHORTED
D	E	OPEN

C. DIRECTIONAL SIGNAL CONTROL LEVER IN "RIGHT TURN" POSITION



FROM PIN:	TO PIN:	INDICATION
H	A	SHORTED
H	B	SHORTED
H	C	SHORTED
H	E	SHORTED
D	E	OPEN
D	C	OPEN
F	G	SHORTED

D. DIRECTIONAL SIGNAL CONTROL LEVER IN "FLARE" POSITION

TEST 7. DIRECTIONAL SIGNAL CONTROL UNIT CONTINUITY TESTS

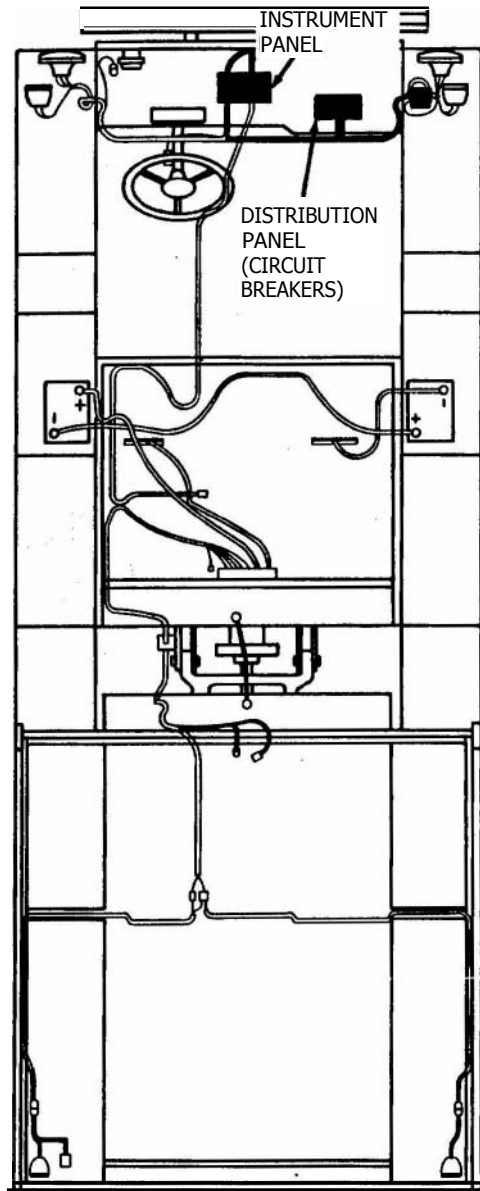
Figure 2-35. Directional signal system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

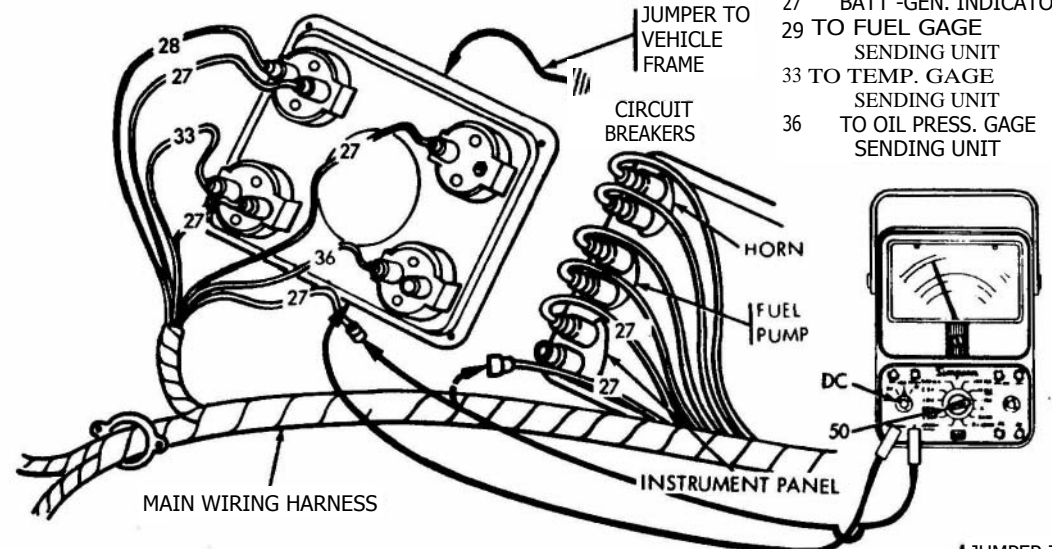
Instruments, Gages and Horn System Circuits (fig 2-36)

Description: The battery-generator indicator, fuel level gage, temperature indicator, oil pressure indicator, headlight beam indicator and panel lights are mounted in the instrument panel. The fuel level sending unit is mounted in the top of the fuel tank and activates fuel level gage. The oil pressure sending unit and fuel pump safety switch (oil pressure safety switch) are located on the oil filter mounting base. The temperature sending unit is located on the rear of the engine block. The horn switch is located in the steering wheel hub and activates the horn, mounted on the engine compartment firewall. The instrument panel is energized by turning the ignition switch to "ON" position. This energizes circuit 27 from circuits 2, 6, and 11. Circuit 27 goes through a circuit breaker and then to the instrument panel, where it supplies 24 volts battery voltage for the various instrument and gage circuits. The temperature indicator system starts at the vehicle frame, through the temperature sending unit, via circuit 33 through the temperature indicator, to circuit 27. The oil pressure system starts at the vehicle frame, through the oil pressure sending unit, via circuit 36, through the oil pressure indicator, to circuit 27. The fuel level indicator system starts at the vehicle frame, through the fuel level sending unit, via circuit 33 through the fuel level indicator, to circuit 27. The battery-generator indicator is connected from the instrument panel ground via circuit 27 to circuit 85, thus putting it directly across the 24-volt battery supply to the instrument panel. The instrument panel lamps are connected from the instrument panel ground via circuit 40 to the main light switch. The high beam indicator lamp is connected from the instrument panel ground via circuit 17 to the high beam terminal of the selector switch. The horn is energized via circuit 2, 25 through a circuit breaker, through the horn assembly, through the horn button, to the vehicle frame.

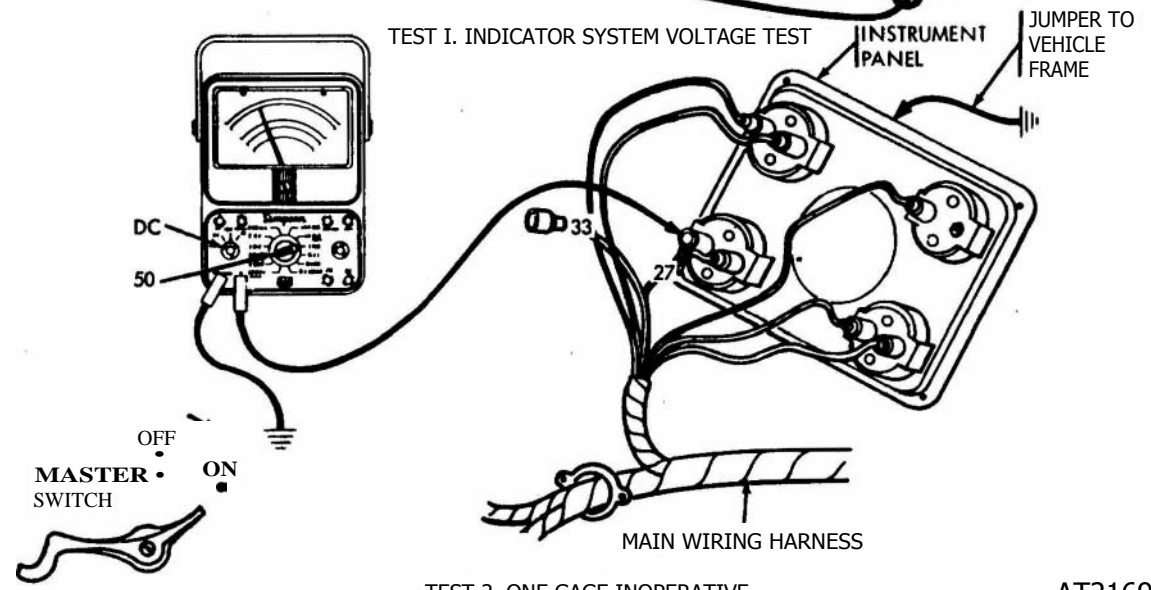
Malfunction	Circuit	Test
All gages inoperative.	27, 29 33, 36	<p><i>Note: When instrument panel is removed from dash panel, connect a jumper wire from instrument panel to vehicle frame to provide a return circuit for the indicator lights and the gage actuators.</i></p> <p>Test 1. Perform indicator system voltage test. Remove and ground instrument panel. Disconnect No. 27 wire at instrument. Turn master switch to "ON" position. Set up multimeter for voltage tests (fig 2-15) and connect voltmeter (fig 2-36, test 1). If 24 volts is not indicated, test No. 27 wire at instrument panel circuit breaker. If voltage is indicated, check for loose connection or faulty circuit breaker. If no reading is indicated at No. 27 wire to circuit breaker, remove No. 27 wire from master switch. Connect meter to exposed pin of master switch. If voltage is indicated, check wiring harness between master switch and circuit breaker for loose connection or open circuit. Repair or replace if required. If voltage is not indicated at exposed pin, remove No. 11 wire from master switch and place probe on wire. If voltage is present, replace master switch. If voltage is not present, check main wiring harness for open circuit or loose connection.</p>
One gage inoperative.	27, 29 33, 36	<p>Test 2. Perform individual gage voltage test. Remove wire and connector from inoperative gage. Set up multimeter for voltage tests (fig 2-15) and connect voltmeter negative lead to vehicle frame. Connect voltmeter positive lead to terminal of gage (fig 2-33, test 2). Turn master switch "ON" position and observe reading. If reading is 3 to 4 volts for fuel level gage and oil pressure gage circuit or 24 volts for temperature gage, perform sending unit resistance test. If no reading is indicated, check gage wire and connector for breaks or loose connections. If satisfactory, gage is faulty.</p> <p><i>Note: Test 2 is useful for troubleshooting only a completely inoperative gage. For a complete test procedure, including accuracy tests (refer to TB 9-2300-228-20).</i></p>



WIRE NO.	CIRCUIT
27	24 VOLTS FEED
27	BATT -GEN. INDICATOR
29	TO FUEL GAGE SENDING UNIT
33	TO TEMP. GAGE SENDING UNIT
36	TO OIL PRESS. GAGE SENDING UNIT



TEST I. INDICATOR SYSTEM VOLTAGE TEST



TEST 2. ONE GAGE INOPERATIVE

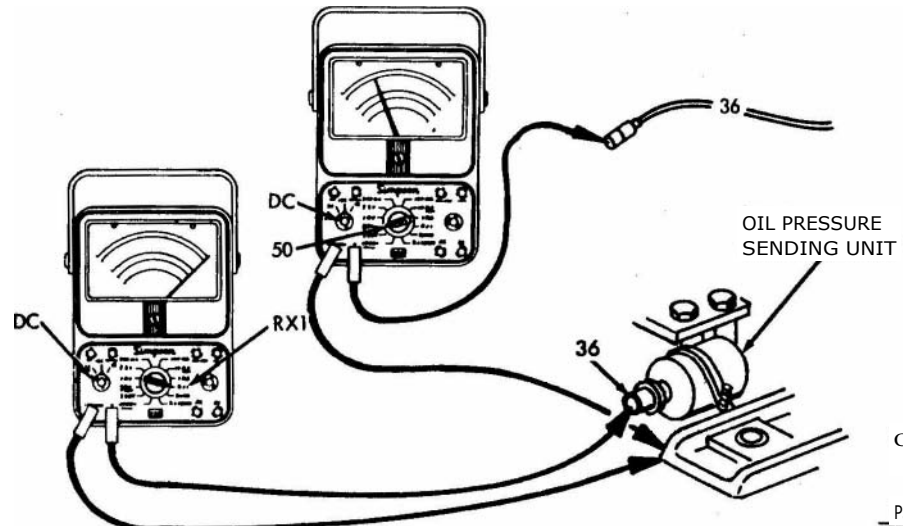
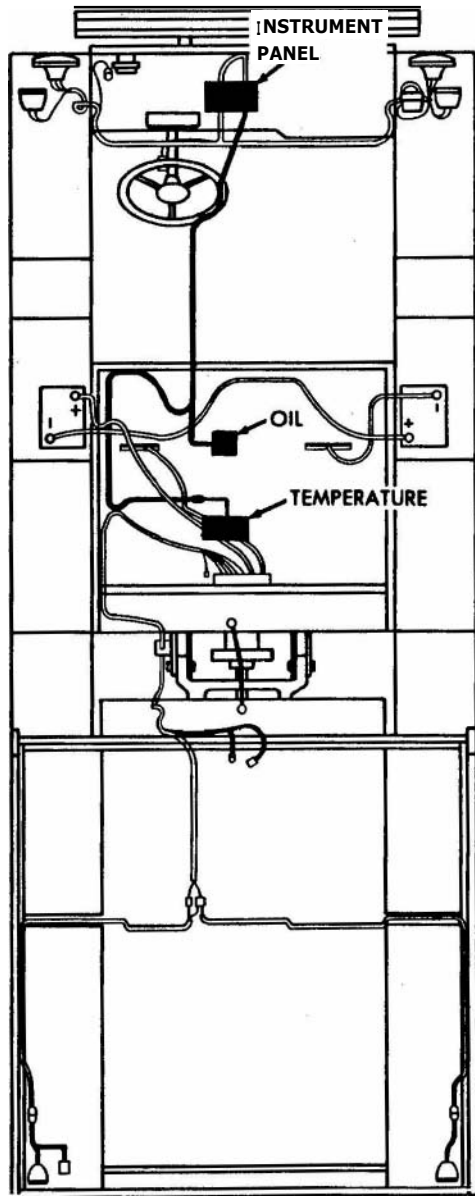
AT21694

Figure 2-36. Instruments, gages and horn system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Instruments, Gages and Horn System Circuits (fig 2-36)—Continued

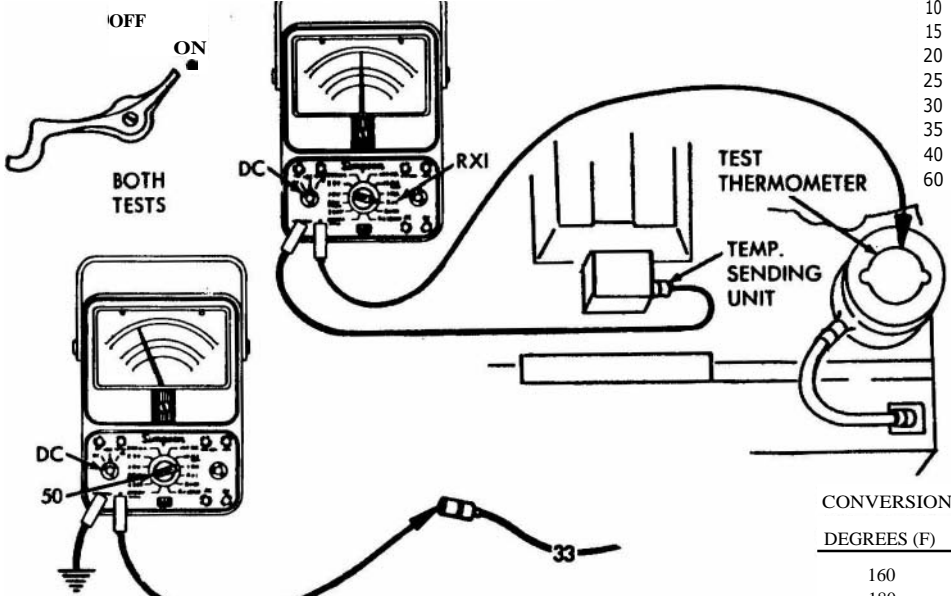
Malfunction	Circuit	Test
Oil pressure gage inoperative (sending unit test).	36	<p>Test 3. Perform oil-pressure sending-unit resistance test. Disconnect No. 36 wire from oil pressure sending unit. Set up multimeter for resistance tests (fig 2.16) and make connections (fig 2-37, test 3). Start and operate engine at high idle speed. Ohmmeter reading should be less than 1 ohm before engine is started, and rise to about 6 to 10 ohms for normal oil pressures. Refer to conversion table in test 3, for a conversion of resistance values to pressures. If sending unit has more than 1 ohm resistance with engine "OFF" or considerably different resistances than shown in the table, sending unit is faulty. If resistance agrees with table, shut off engine and connect voltmeter to wire No. 36 (fig 2-37, test 3). Turn on master switch. Voltage should read 3 to 4 volts. If less, or no voltage, check main wiring harness (wire No. 36) for open circuit or loose connection. If more, perform test 2, above, to check for faulty gags.</p>



TEST 3. OIL PRESSURE GAGE AND SENDING UNIT TEST

CONVERSION TABLE

PSI	OHMS
0	0 TO 1
10	4.5 to 6
15	6 to 8.5
20	8.5 to 11
25	11 to 13.5
30	14 to 16
35	16.5 to 18
40	19 to 20
60	28 to 31



TEST 4. TEMPERATURE GAGE AND SENDING UNIT TEST

CONVERSION TABLE

DEGREES (F)	OHMS
160	1200
180	917
240	450

Figure 2-37. Instruments, gages and horn system tests.

Table 2-5. Troubleshooting the Electrical System—Continued

Instruments, Gages and Horn System Circuits (fig 2-37)—Continued

Malfunction	Circuit	rest
Temperature gage inoperative (sending unit test).	33	<p>Test 4. Perform temperature sending unit resistance test. Remove radiator filler cap and insert a test thermometer to determine when temperature is stable. Disconnect No. 33 wire from temperature sending unit. Set up multimeter for resistance tests (fig 2-16) and make connections (fig 2-37, test 4). Refer the ohmmeter reading to the conversion table in test 4, and compare the temperature to the test thermometer reading. Stop the engine and observe the ohmmeter reading as the radiator cools. The ohms should increase as the engine cools off, to a maximum of approximately 3000 ohms, depending on adjacent air temperature. If hot resistance differs considerable, sending unit is faulty. If resistance agrees with table, connect voltmeter to No. 33 wire (fig 2-37, test 4). Turn on master switch. Voltage should read 24 volts. If much less, or no voltage, check main wiring harness (wire No. 33) for open circuit or loose connections.</p> <p><i>Caution: Be very careful when making electrical test near the fuel tank. When components are removed, cover the tank opening with tape and make electrical tests as far from this area as possible.</i></p>
Fuel level gage inoperative (sending unit test)—Continued.	29	<p>Test 5. Perform fuel level sending unit test. Remove sending unit from fuel tank. Set up multimeter for resistance tests (fig 2-16) and make connections (fig 2-38, test 5). Move sending unit float from bottom to top. An uneven increase in resistance or erratic meter needle movement indicates the fuel level sending unit is faulty. If the resistance increases smoothly from 0 to 30 ohms, the sending unit is serviceable. Set up multimeter for voltage readings (fig 2-15) and connect to No. 29 wire (fig 2-35, test 5). Turn on master switch. Voltage should read 3 to 4 volts. If less or no voltage, check main wiring harness for open circuit or loose connections. If voltage is considerably more than 4 volts, perform test 2, above, to check for faulty gage.</p>
Battery-generator indicator inoperative.	27	<p>Test 6. Perform battery-generator indicator voltage test. Set up multimeter for voltage tests (fig 2-15). Test battery for normal voltage. Remove instrument panel and connect it to the vehicle frame with a jumper wire. Disconnect No. 27 wire from indicator and connect voltmeter (fig 2-38, test 6). Turn on master switch. If 24 volts is indicated, check other indicator sending unit float from bottom to top. An uneven increase in resistance or erratic meter needle movement indicates the fuel level sending unit is faulty. If the resistance increases smoothly from 0 to 30 ohms, the sending unit is serviceable. Set up multimeter for voltage readings (fig 2-15) and connect to No. 29 wire (fig 2-35, test 5). Turn on master switch. Voltage should read 3 to 4 volts. If less or no voltage, check main wiring harness for open circuit or loose connections. If voltage is considerably more than 4 volts, perform test 2, above, to check for faulty gage.</p>

Table 2-5. Troubleshooting the Electrical System—Continued

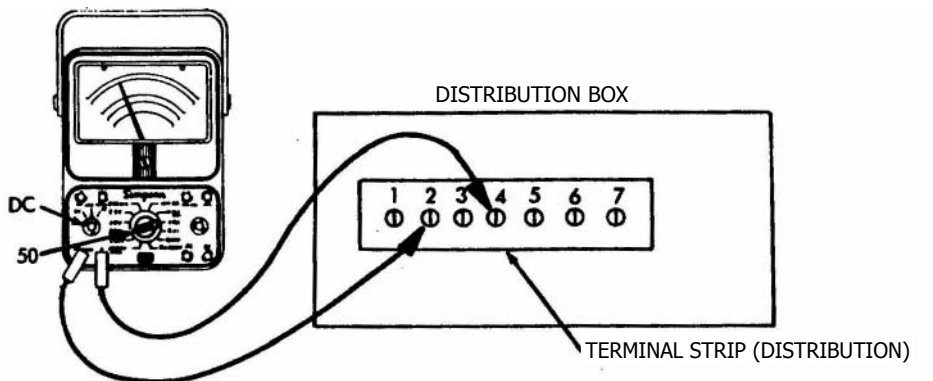
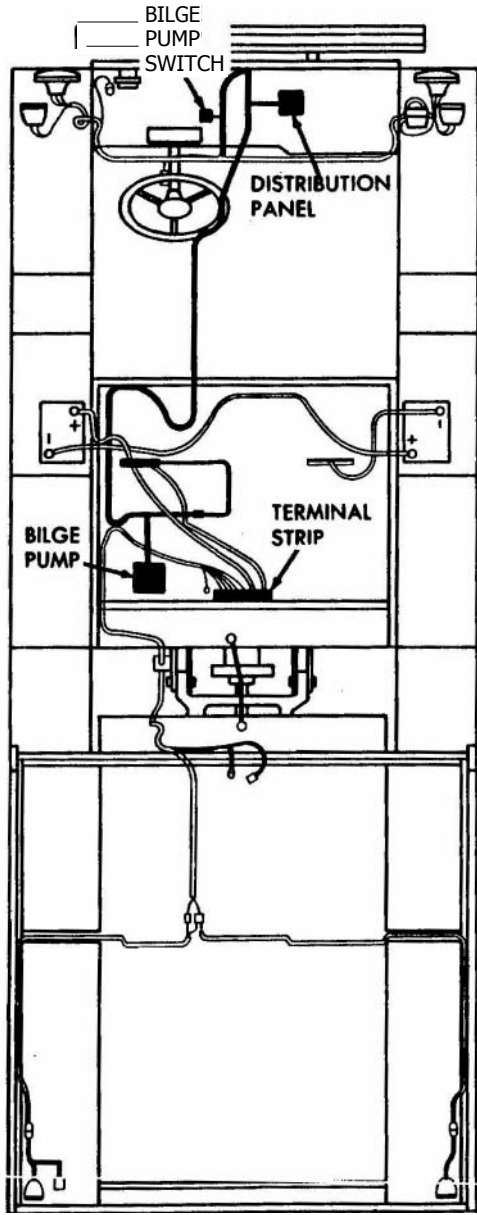
Instruments, Gages and Horn System Circuits (fig 2-37)—Continued

Malfunction	Circuit	Test
Battery-generator indicator inoperative.	27	Test 7. Perform battery-generator indicator voltage test. Set up multimeter for voltage tests (fig 2-15). Test battery for normal voltage. Remove instrument panel and connect it to the vehicle frame with a jumper wire. Disconnect No. 27 wire from indicator and connect voltmeter (fig 2-38, test 6). Turn on master switch. If 24 volts is indicated, check other indicator terminal and metal case of indicator for proper grounding to instrument panel. If grounding is satisfactory, battery-generator indicator is faulty. If No. 27 wire shows less than battery voltage, check wiring harness for loose or corroded connections or broken wires.
Horn inoperative.	25	Test 8. Perform horn circuit voltage test. Disconnect the two No. 25 wires from the horn. Set up the multimeter for voltage tests (fig 2-15) and make connections (fig 2-38, test 7). Test both No. 25 wires for voltage. One wire should read zero volts, and the other should read 24 volts. If 24 volts is indicated on one No. 25 wire at horn, connect this wire to horn and jumper other horn terminal to vehicle frame. If horn does not operate, it is faulty. If horn operates, remove jumper and connect both wires to horn. Disconnect No. 25 wire at horn button wire leading from steering gear housing. Ground No. 25 wire that goes to wiring harness; if horn operates, check horn switch assembly in the steering wheel. In the initial test, if neither one of the No. 25 wires showed 24 volts, test the No. 25 terminal at the circuit breaker board mounted in the distribution box on the dash panel. Check continuity between horn column and brush contact box on steering column. If 24 volts appears here, inspect the No. 25 wire to the horn for breaks or loose connections. If no voltage appears at the circuit breaker terminal, test the other terminal of the circuit breaker. If 24 volts is indicated, the circuit breaker is faulty. If no voltage appears at this point, check the main wiring harness for broken wires or loose connections.

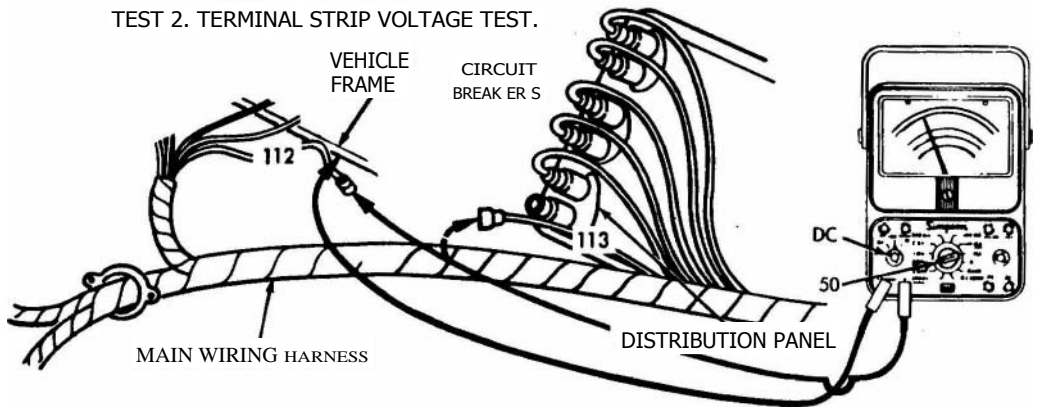
Bilge Pump Circuit (fig 2-39)

Description: The bilge pump is activated by a switch on the dash panel primarily during fording or swimming operations to pump water out of the tractor hull. Free flow rate is 54 gallons per minute. The pump should not be run dry for extended periods.

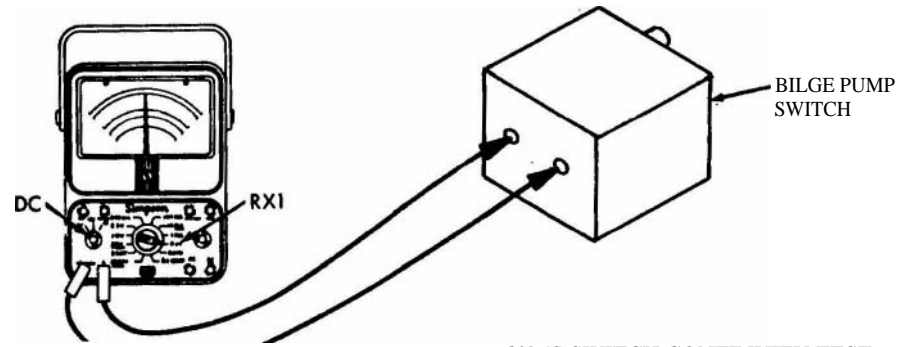
Malfunction		circuit	Test
Bilge pump inoperative.		113, 114	<p><i>Note: Reset bilge pump circuit breaker and check operation of bilge pump prior to performing troubleshooting procedure.</i></p> <p>Test 1. Check condition of batteries as shown by battery-generator indicator. Perform a visual inspection of those wires pertaining to the circuit in question (refer to para 2-23 and fig 2-21).</p> <p>Test 2. Perform voltage test. Remove access panel on cowl. Set multimeter for voltage tests (fig 2.15) and connect voltmeter (fig 2-39, test 2). If 24 volts is not indicated, check main harness and terminal strip for faulty connections or open circuits. Repair or replace as necessary. If voltage is present, proceed with test 3.</p>



TEST 2. TERMINAL STRIP VOLTAGE TEST.



TEST 3. CIRCUIT BREAKERS VOLTAGE TEST.



TEST 4. Bilge PUMP SWITCH CONTINUITY TEST. AT21697

Figure 2-39. Bilge pump circuit

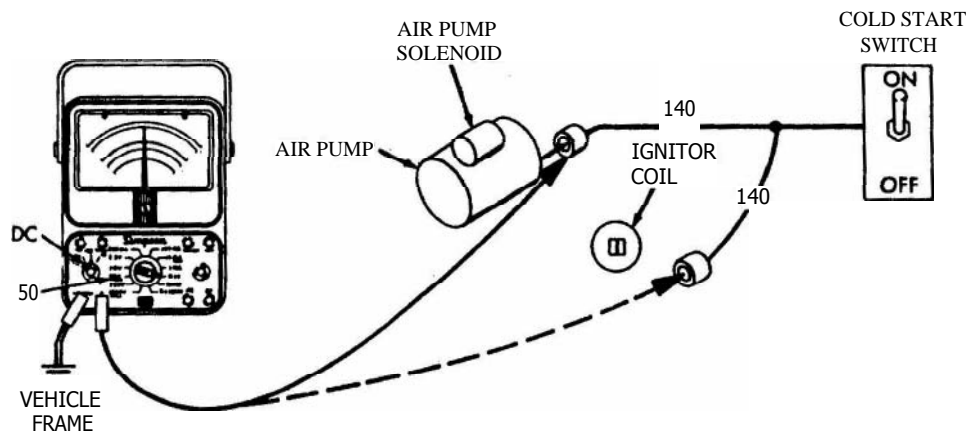
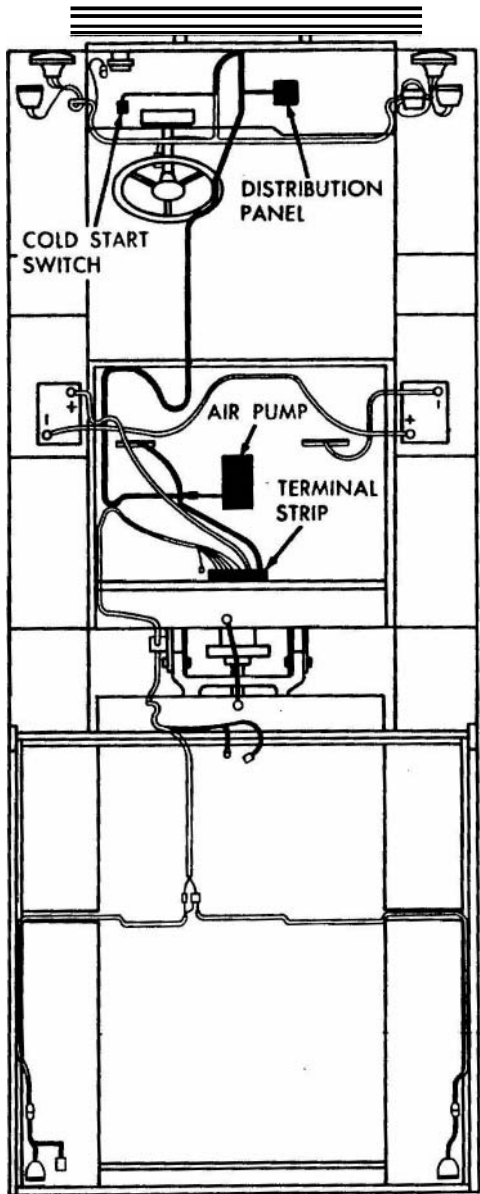
Table 2-5. Troubleshooting the Electrical System—Continued

Bilge Pump Circuit (fig 2-39)—Continued		
Malfunction	Circuit	Test
		<p>Test 3. Set voltmeter (fig 2-39, test 3). Disconnect wire 113 from bilge pump circuit breaker and check for 24 volts. If voltage is not indicated, replace circuit breaker.</p> <p>Test 4. Set multimeter to test continuity (fig 2-17). Remove wires 113 and 114 from bilge pump switch (fig 2-39, test 4). Place multimeter leads on switch contacts and observe continuity reading. If continuity is not indicated, replace switch. If continuity is indicated, replace bilge pump.</p>

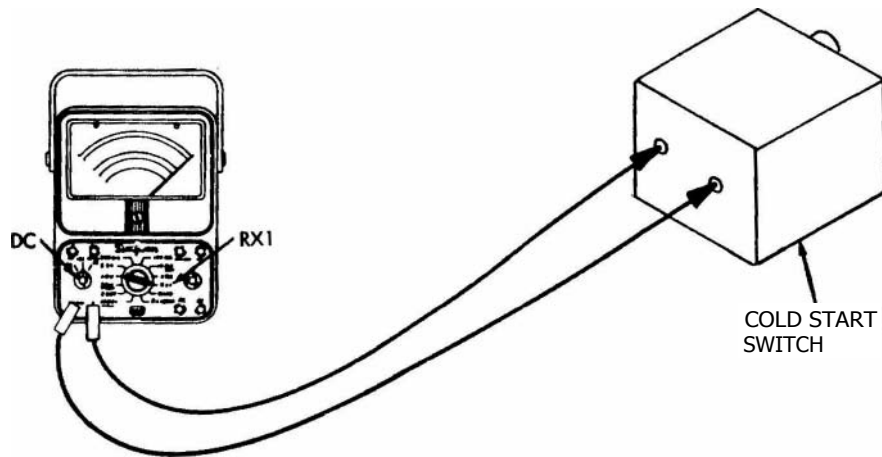
Cold Start System Circuit (fig 2-40)

Description: The cold start system is an aid for engine starting in cold weather by supplying preheated air and fuel to the combustion chamber. An electrically operated glow plug ignites the mixture.

Malfunction	Circuit	Test
Cold start system inoperative.	113, 140	<p>Note: Reset bilge pump circuit breaker and check operation of bilge pump prior to performing troubleshooting procedures.</p> <p>Test 1. Check condition of batteries as shown by battery-generator indicator. Perform a visual inspection of those wires pertaining to the circuit in question (refer to para 2-23 and fig 2-21).</p> <p>Test 2. Turn bilge pump switch to "ON." If bilge pump operates, proceed to test 3 below. If pump does not operate, replace bilge pump circuit breaker.</p> <p>Test 3. Set multimeter to test voltage as shown in figure 2-15. Turn cold start switch to "ON" and disconnect wire 140 from air pump solenoid and igniter. Check for 24 vdc from wire 140 on each ham to ground (fig 2-40, test 3). If voltage is present, replace pump, solenoid, or igniter as indicated. Report to direct support maintenance. If voltage is not present, proceed to test 4 below.</p>



TEST 3. COLD START VOLTAGE TEST.



TEST 4. COLD START SWITCH CONTINUITY TEST.

Figure 240. Cold start system circuit.

Table 2-5. Troubleshooting the Electrical System—Continued

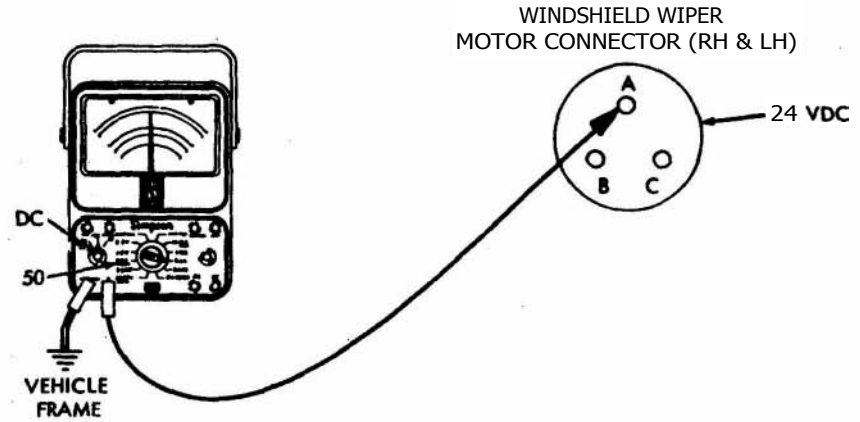
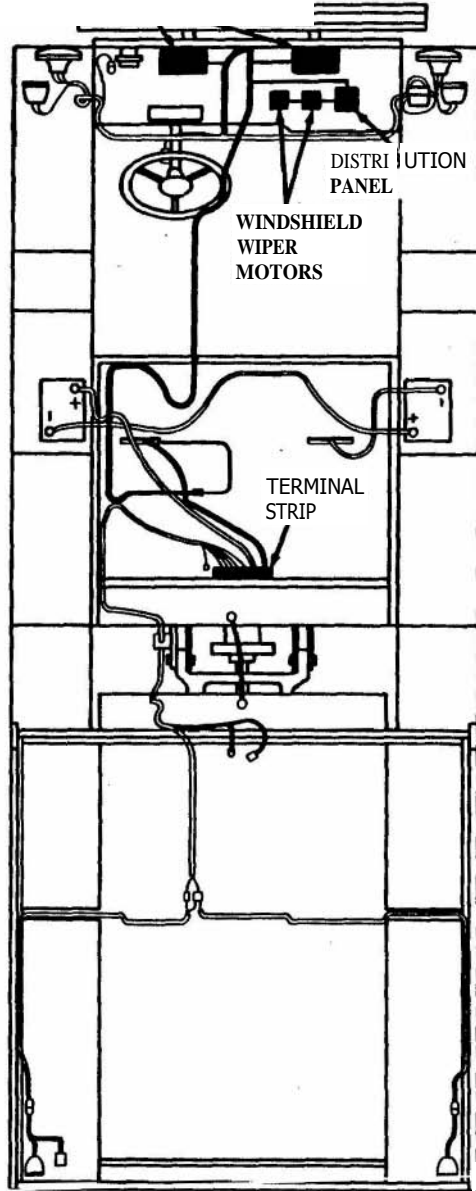
Cold Start System Circuit (fig 2-40)—Continued		
Malfunction	Circuit	Test
Cold start system inoperative. Continued		Test 4. Set multimeter <i>to</i> check continuity (fig 2-17). Disconnect wires 113 and 140 from cold start switch (fig 2-40, test4). With switch on, check continuity between switch terminals. If continuity is not established, replace switch.

Windshield Wipers Circuit (fig 2-41)

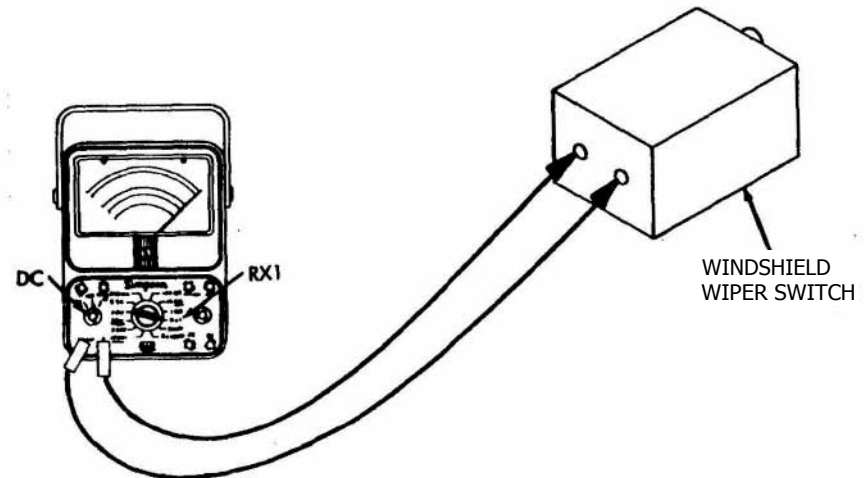
Description: Each windshield wiper is controlled by an individual motor and control switch.

Malfunction	Circuit	Test
Windshield wipers inoperative.	25, 102 103, 104	<p><i>Note: Reset horn and wiper circuit breaker and check operation prior to performing troubleshooting procedures.</i></p> <p>Test 1. Depress horn button. If horn blows, proceed <i>to</i> test 2 below. If horn does not blow, replace horn and wiper circuit breaker.</p> <p>Test 2. Set multimeter to test voltage (fig 2-15). Disconnect connectors from both windshield wiper motors and turn both wiper switches "ON." Check for 24 vdc from pins "A" on both <i>connectors to ground</i> (fig 2-41, test 2). If <i>voltage is present</i> on righthand connector and not the left, replace the right wiper motor. If voltage is present on left-hand connector, and not the right, replace the left wiper motor.</p> <p>Test 3. Set multimeter to test continuity (fig 2-17). Disconnect wires 102, 103, and 104 from wiper switches and place switches in the "ON" position. Check for continuity across switch terminals (fig 2-41, test 3). If continuity is not established, replace <i>defective switch</i>. If continuity is established, repair or replace tractor main harness.</p>

WINDSHIELD WIPER MOTORS



TEST 2. WINDSHIELD WIPER MOTORS VOLTAGE TEST.



TEST 3. WINDSHIELD WIPER SWITCHES CONTINUITY TEST.

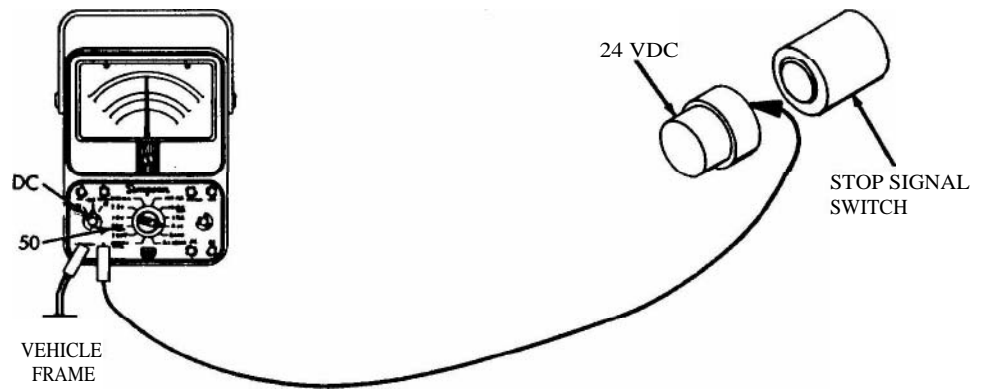
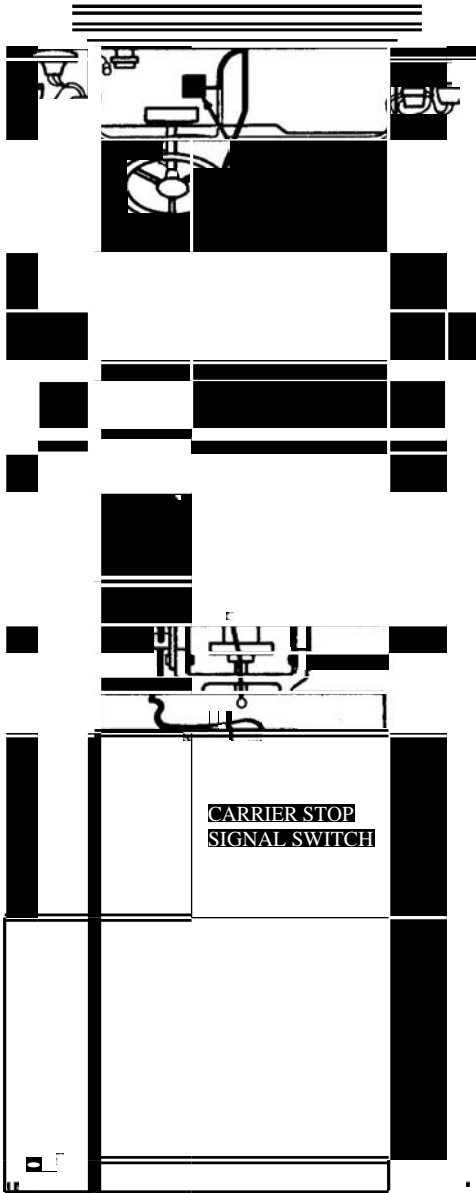
Figure 2-41. Windshield wipers circuit.

Table 2-5. Troubleshooting the Electrical System—Continued

Carrier Stop Signal Circuit (fig 2-42)

Description: The carrier stop signal is used by personnel riding in the carrier to notify the vehicle operator to stop the vehicle. A button located in the carrier actuates the carrier stop light on the dash panel.

Malfunction	Circuit	Test
Carrier stop signal inoperative.	108, 109	<p>Test 1. Press carrier signal light. If light operates, proceed to test 2 below. If light does not operate, replace lamp and / or light assembly.</p> <p>Test 2. Remove signal switch panel from the inner, forward bulkhead of the carrier (fig 2-42, test 2). Disconnect wire 109 from carrier signal switch and short the wire to ground. If signal light goes on, replace signal switch. If light does not go on, replace or repair defective tractor main harness or carrier main harness.</p>

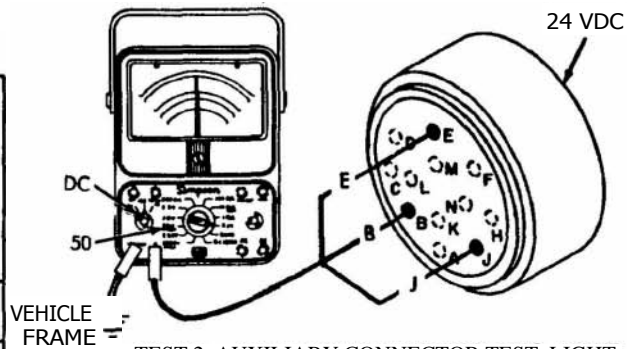
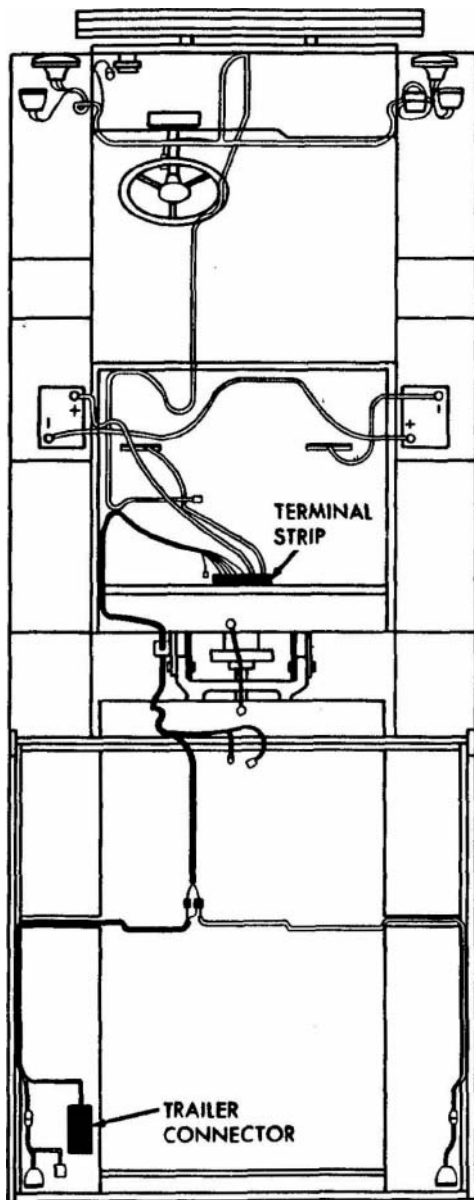


TEST 2. STOP SIGNAL SWITCH TEST.

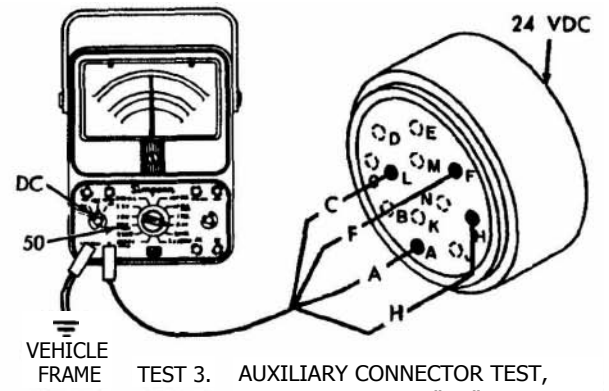
Figure 242. Carrier stop signal circuit.

Table 2-5. Troubleshooting the Electrical System—Continued

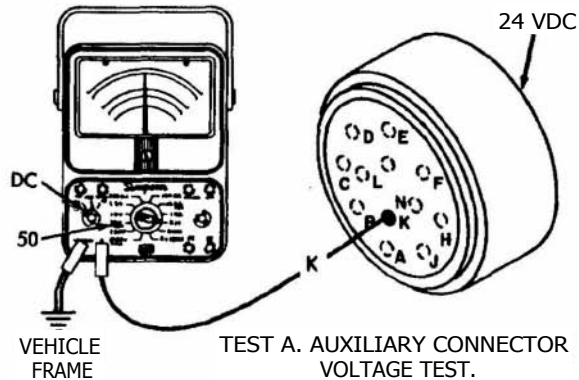
Trailer Auxiliary Power Circuit (fig 2-43)		
Malfunction	Circuit	Test
Trailer <u>auxiliary</u> power outlet inoperative.	21, 22, 23, 24, 37, 90, 460, 461 483, 484 489, 490	<p>Test 1. Actuate light switch to all positions. Observe operation of vehicle lights. If lights operate normally, proceed to test 2 below. If all lights do not function properly, troubleshoot as outlined in applicable system test section.</p> <p>Test 2. Set multimeter to test voltage (fig 2-15). Actuate main light switch to the service drive position and depress brake pedala. Check for 24 vdc from auxiliary power connector pins "E", "J", and "B" to ground (fig 243). If voltage is present, proceed to test 3 below. If voltage is not present, replace or repair carrier main harness or left carrier tail harness.</p> <p>Test 3. Actuate main light switch to the blackout marker or blackout drive position and depress brake pedal. Check for 24 vdc from auxiliary power connector pins A, C, H, and F to ground. If voltage is present, proceed to test 4 below. If voltage is not present, replace or repair carrier main harness or left carrier harness.</p>



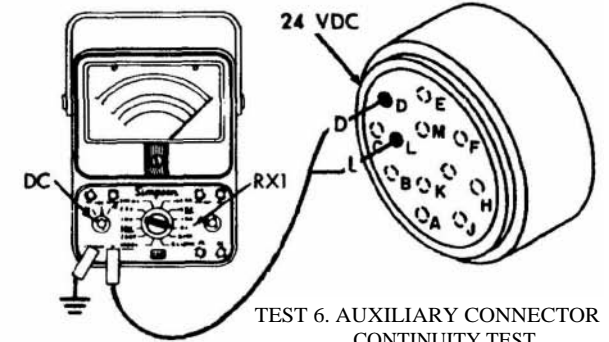
TEST 2. AUXILIARY CONNECTOR TEST, LIGHT SWITCH IN "SER DRIVE POSITION."



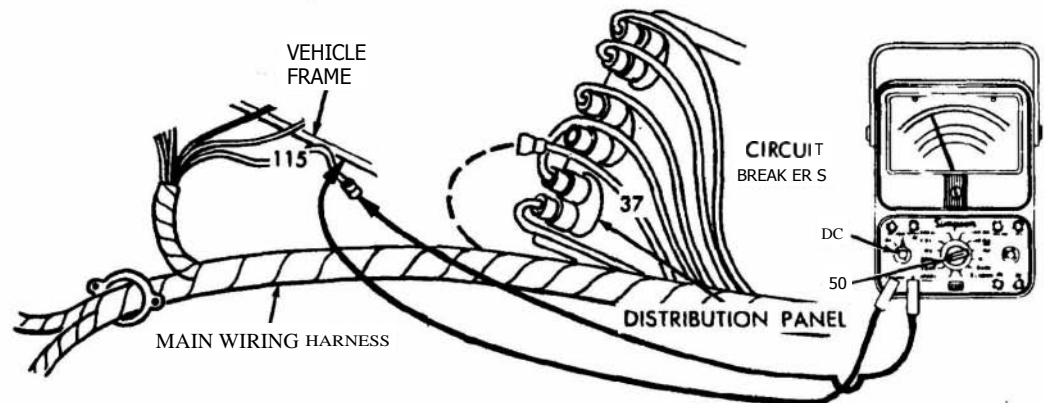
TEST 3. AUXILIARY CONNECTOR TEST, LIGHT SWITCH IN "SO" POSITION.



TEST A. AUXILIARY CONNECTOR VOLTAGE TEST.



TEST 6. AUXILIARY CONNECTOR CONTINUITY TEST.



TEST S. AUXILIARY CONNECTOR CIRCUIT BREAKER TEST.

A11700

Figure 2-43. Trailer auxiliary power circuit.

Table 2-5. Troubleshooting the Electrical System—Continued

Trailer Auxiliary Power Circuit (fig 2-43)—Continued		
Malfunction	Circuit	Test
Trailer auxiliary power outlet inoperative.—Continued		<p>Test 4. Check for 24 vdc from auxiliary power connector pin "K" to ground. If voltage is present, proceed to test 6 below. If voltage is not present proceed to test 5 below.</p> <p>Test 5. Remove distribution panel from cowl and disconnect wire 37 from auxiliary power circuit breaker. Check for 24 vdc from circuit breaker terminal to ground. If voltage is not present, replace circuit breaker. If voltage is present, replace or repair defective tractor main harness or carrier main harness.</p> <p>Test 6. Set multimeter to test continuity (fig 2-17). Check continuity from auxiliary power connector pins "D" and "L" to ground. If continuity is not established, replace or repair carrier main harness or left carrier harness.</p>
M792 Ambulance Carrier Heater Circuit System (fig 2-44)		

Description: The M792 Ambulance heater provides for warmth and comfort of patients in cold weather areas. Heater output is regulated by the Hi-Lo output switch on the control box, and provides heat settings of 14,000 BTU / hr on low, and 30,000 BTU / hr on high. The control box contains two toggle switches and an indicator lamp. The Hi-Lo switch is a double-throw switch with ON, OFF, and a momentary ON position. Protection for the heater circuit is provided by an automatic reset type circuit breaker rated at 15 amperes and connected in series with the single wire 24-volt input. The indicator light is of the press-to-test type with a brilliance blackout control feature to provide an indication of heater operation. The control box is mounted to the center post of the guard rail attached to the front bulkhead of the carrier. An overheat switch in the fuel control valve electrical system serves to break the electric circuit and shut off fuel flow in the event the temperature of the ventilating air system exceeds a safe maximum.

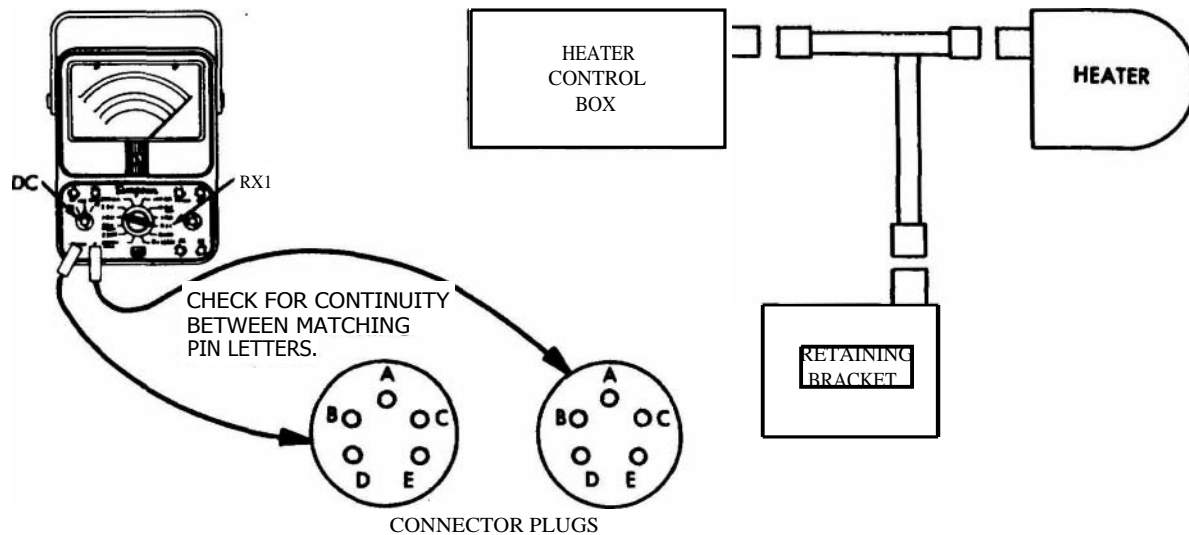
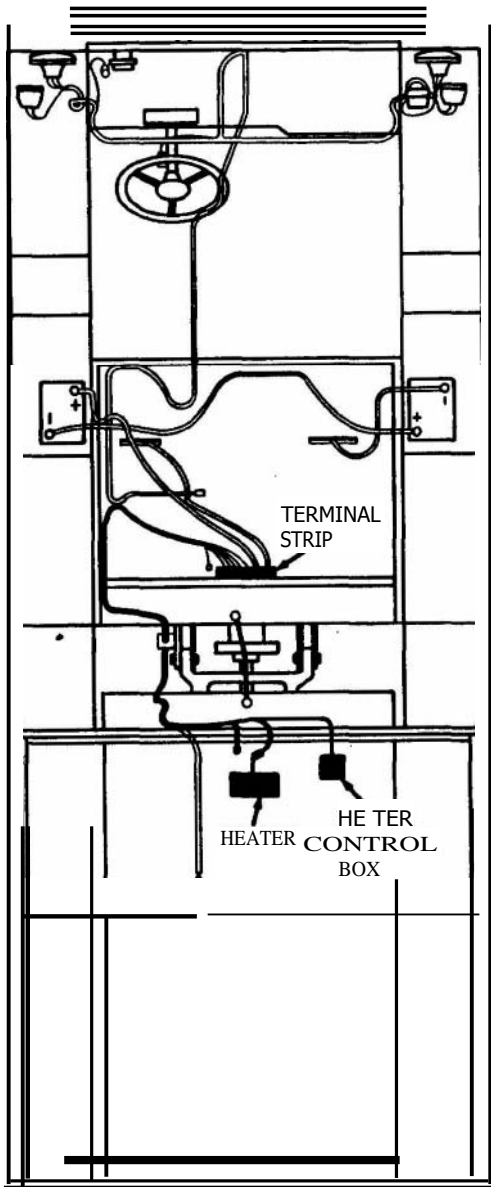
A convenience receptacle control box taps power from the receptacle in the retaining bracket and supplies power to the two convenience receptacles for use of electrical equipment in carrier. The switch-controlled surgical light provides illumination for the carrier when necessary. The light rotates in two 180-degree arcs.

The ambulance schematic (fig 2-48) is for the ambulance only, however, the overall schematic (figs 2-46 and 2-47) are applicable to both vehicles.

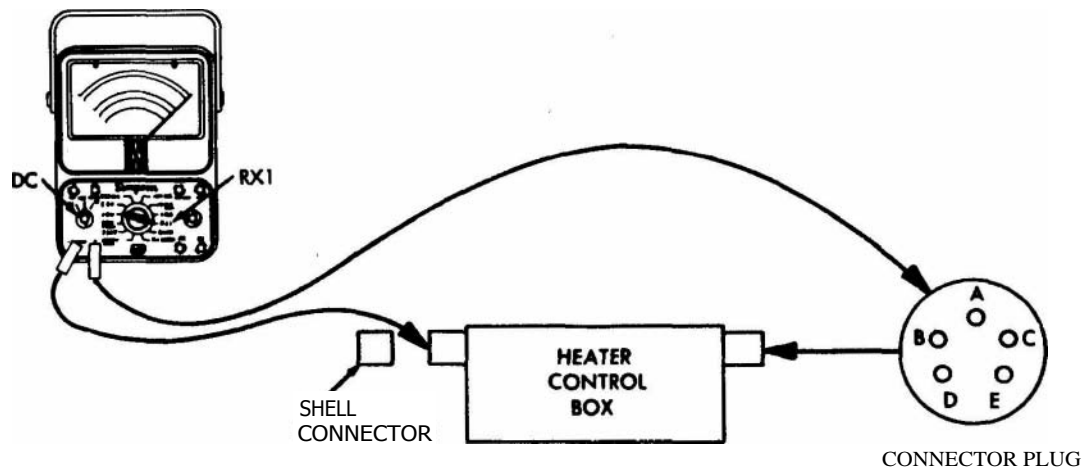
Malfunction	Circuit	Test
Heater fails to start for any reason.		<p><i>Note: Ensure that circuit breaker button and heater controls are properly set and all connections are secure prior to performing troubleshooting procedures (refer to TM 9-2320-242-10).</i></p> <p>Test L Make a visual inspection. Check for frayed or broken wires, or any other visible signs of damage or deterioration. Make any required repairs before proceeding with further troubleshooting. Check condition of batteries as shown by battery-generator indicator. Batteries must be in good condition before making these tests (para 2-231).</p>

M792 Ambulance Carrier Heater Circuit System (fig 2-44)—Continued

Malfunction	Circuit	Test
<p>Heater fails to start for any reason.—Continued</p>	<p>14, 90, 95, 120, 121, 400, 402, 403, 405, 406</p>	<p>Test 2. Disconnect heater harness connector, heater control box connector, and retaining bracket connector (fig 2-44). Set multimeter to check continuity (fig 2-17). Check continuity between harness connectors (fig 2-44, test 2). If continuity is not present, replace or repair harness. If continuity is present, proceed with test 3.</p> <p>Test 3. Disconnect shell connector and connector plug from heater control box. Set multimeter to read continuity (fig 2-17). Set heater control switch in "START" position. Check for continuity between shell connector on wire 120 - 400 and pin A on connector plug. Set heater control switch to "RUN." Check for continuity between shell connector on wire 120 - 400 and pin E on connector plug. If continuity is not present, replace heater control box. If continuity is present, replace heater assembly.</p>



TEST 2. HEATER HARNESS CONTINUITY TEST.



TEST 3. HEATER CONTROL BOX CONTINUITY TEST.

Figure 2-44. Carrier heater circuit system (M792 Ambulance.)

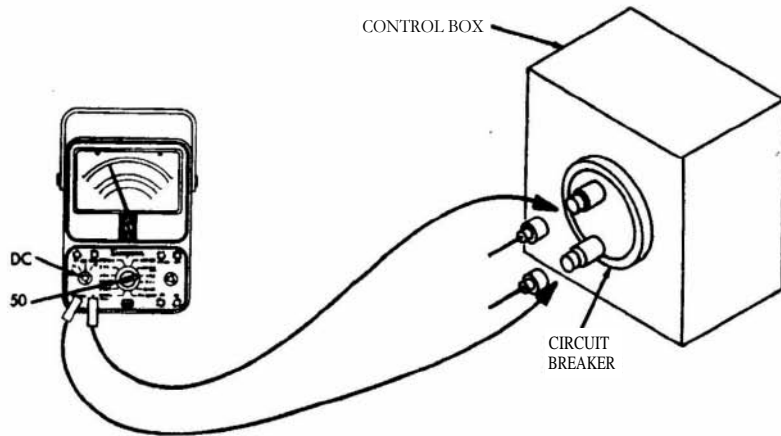
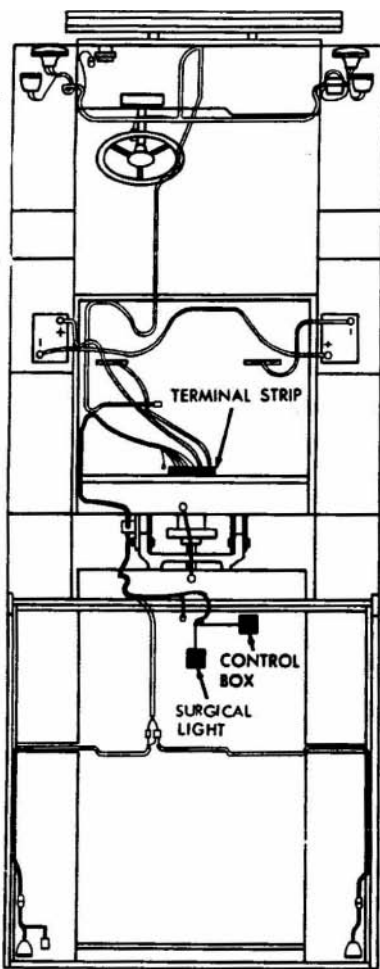
Table 2-5. Troubleshooting the Electrical System—Continued

M792 Ambulance Carrier Heater Circuit System (fig 2.14)—Continued

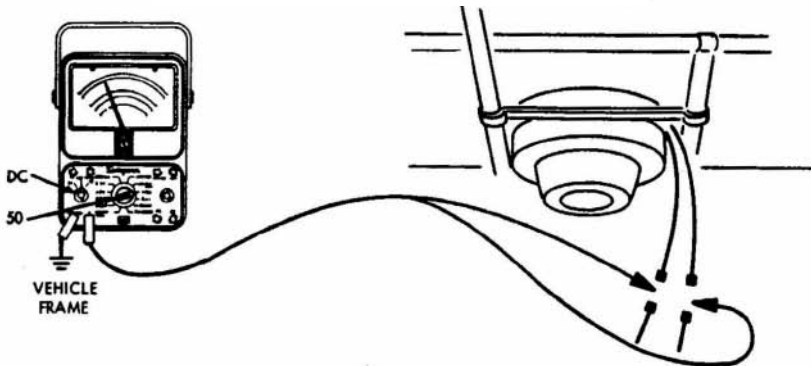
Malfunction	Circuit	Test
Indicator lamp inoperative.		Teat 4. Check to ensure proper ground connection for lamp. Replace lamp.

M792 Ambulance Surgical Light and Control Box Circuit (fig 2-45)

Malfunction	Circuit	Test
No power to control box receptacles.	37, 87, 90, 95, 120, 121	<p><i>Note: Ensure that connections are secure and circuit breaker has been reset prior to performing troubleshooting procedures.</i></p> <p>Test 1. Make a visual inspection check for frayed or broken wires or any other visible signs of damage or deterioration. Make any required repairs before proceeding with further troubleshooting. Check condition of batteries shown by battery-generator indicator. Batteries must be in good condition before making these tests (para 2-23).</p> <p>Test 2. Remove control box cover (fig 2-45). Set multimeter to test for 24 vdc (fig 2-151). Check for 24 vdc across circuit breaker wires. If voltage is not present, replace circuit breaker. If voltage is present, replace control box harness assembly.</p>



TEST 2. CONTROL BOX CIRCUIT BREAKER VOLTAGE TEST.



TEST 3. SURGICAL LIGHT HARNESS VOLTAGE TEST.

AT21702

Figure 2-45. Surgical light and control box circuit (M792 Ambulance).

Table 2-5. Troubleshooting the Electrical System—Continued

Malfunction	Circuit	Test
Surgical light inoperative.		Test 3. Set multimeter to check voltage (fig 2-15). Disconnect shell connectors from light assembly and check for 24 vdc. If voltage is not present, replace light harness. If voltage is present, replace lamp.

LEGEND to fig 2-46:

Circuit

Circuit Number	Circuit Description		
1	Engine ground to vehicle ground	95	Headlamps to ground
2	Battery to alternator (via circuit 61	97	Chassis ground
3	Alternator ground	102	Inter-vehicular ground
6	Battery (+) to starter		Windshield wiper switches to windshield wiper motors
7	Battery (-) to ground	103	Windshield wiper switch to windshield wiper motor (left)
10	Battery feed to circuit breaker terminal strip		Windshield wiper switch to windshield wiper motor (right)
12 1150, 740)	Master switch to ignition exciter - spliced to start switch and glow plug	104	Accessories circuit breaker to carrier signal light (press to test)
15	Light switch feed (from terminal strip)	108	Carrier signal switch to carrier signal light
16	Light switch to dimmer switch		Terminal strip to bilge pump circuit breaker
17	Dimmer switch to headlamps (high beam) and high beam indicator	109	Bilge pump circuit breaker to bilge pump switch and cold start switch
18	Dimmer switch to headlamps (low beam)	112	Bilge pump switch to bilge pump
19	Light switch to blackout headlamp	113	Terminal strip to auxiliary power circuit breaker
20 1483, 484)	Light switch to blackout marker lamps	114	Terminal strip to windshield wiper motors circuit breaker
21 (489)	Light switch to service tail lamps	115	Carrier auxiliary power circuits
22	Light switch to distribution box	116	
22 (460, 461)	Directional signal circuits	117	
23	Light switch to blackout stop lights	through	
24	Light switch to blackout tail lamps	120	
25 (102)	Horn push button switch to horn and windshield wiper circuit	121	M792 ambulance carrier heater fuel pump
27	Instrument circuit breaker to instrument cluster	122	Directional signal circuit
29	Fuel tank sending unit to fuel indicator (gage)	through	
33	Temperature sending unit to temperature indicator (gage)	126	
36	Oil pressure sending unit to pressure indicator (gage)	140	Cold start switch to cold start primer pump
37	Auxiliary power to trailer (connector)	150	Glow plug and master switch circuit
40	Light switch to instrument panel lamps	151	Glow plug circuit (dead-headed)
48	Radio harness (tractor)	460	Turn signal, right
68	Battery inter-connecting cable	461	Turn signal, left
73	Radio harness (tractor)	483	Blackout marker and tail lights, right
74	Start switch to starter switch	484	Blackout marker and tail lights, left
75	Stop light switch (hydraulic) circuit	489	Service clearance light (trailer)
85	Master switch to instruments circuit breaker	490	Blackout marker (trailer)
90	Trailer receptacle to ground	491	Park lights circuit
		740	Start switch (via circuit 12) to alternator

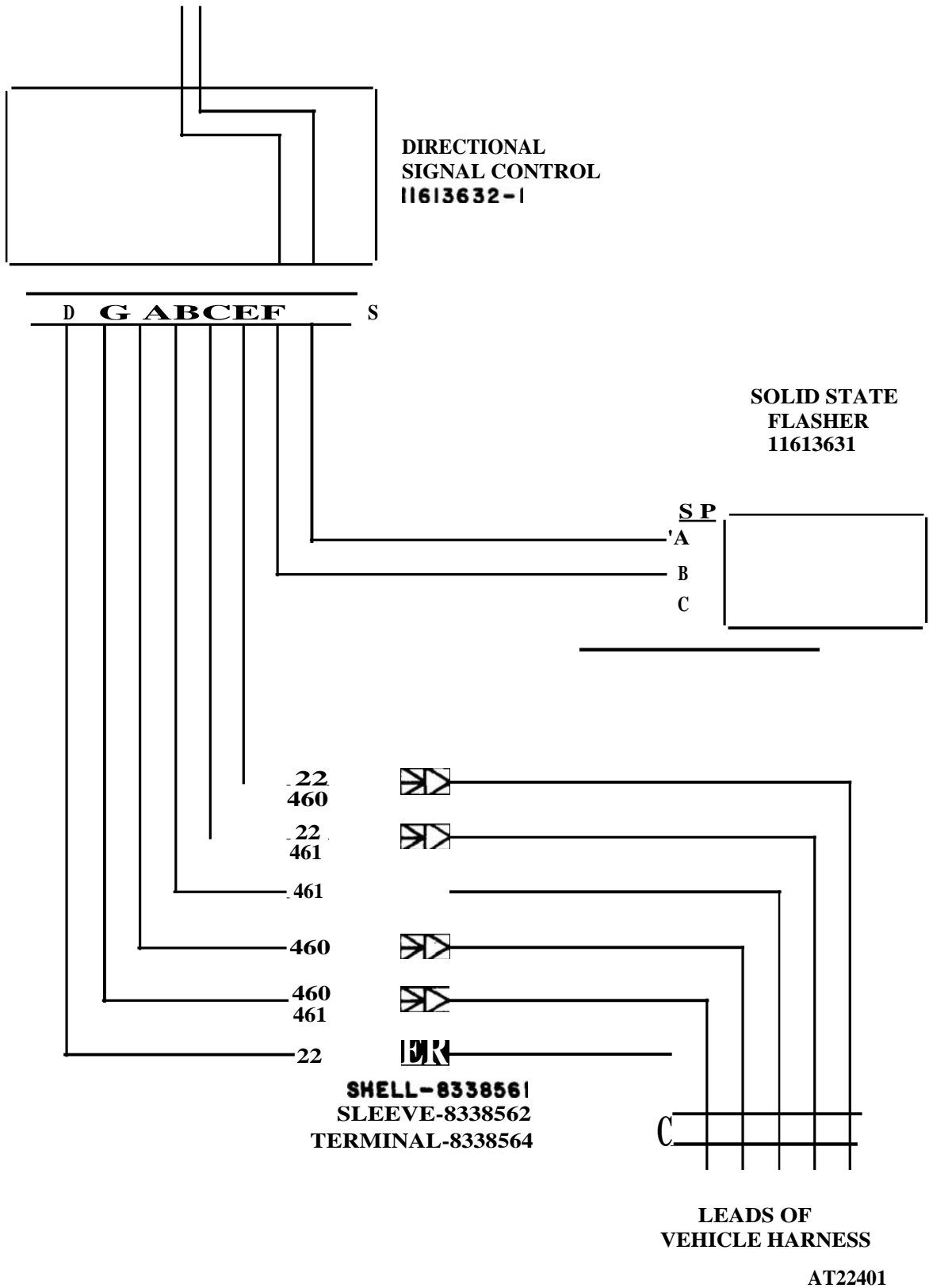
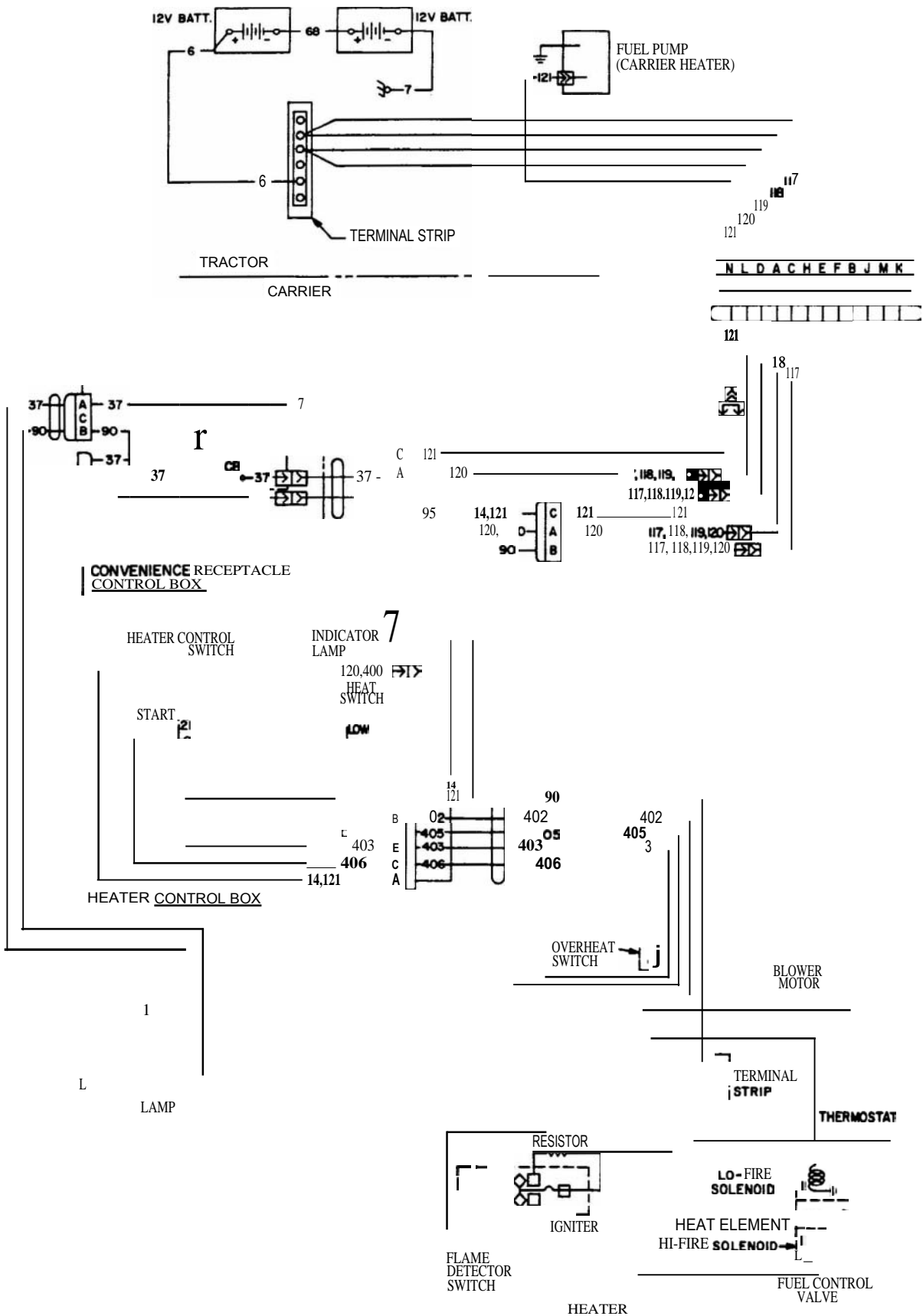


Figure 247. Directional signal schematic wiring diagram.



AT21346

Figure 248. M792 ambulance schematic wiring diagram.

LEGEND to fig 2-48:

Circuit number	Circuit Description
14	Receptacle to heater control switch
37	Power to receptacles and surgical light
87	Control box to surgical light
90	Ground wire
95	External ground wire
120	Receptacle to heater control
121	Heater fuel pump

400	Receptacle to heater control box
402	Heater control box to heater from heat switch
403	Heater control box to heater (from heater control switch)
405	Heater control box to heater (from indicator lamp)
406	Heater control box to heater (heater control switch)

Section VIII. FIELD EXPEDIENT REPAIRS

2-24. General

Organizational maintenance troubles may occur while the M561 cargo truck or M792 ambulance is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient repairs may be used in emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible and properly repaired before being placed in operation again.

2-25. Engine Heats Up

Trouble	Expedient Remedy
Thermostat defective (closed).	Remove defective thermostat (para 2-71) and operate engine without a thermostat until one is obtained.

2-26. Engine Inoperative.

Trouble	E-pedient Remedy
Air cleaner clogged..	Remove air cleaner element (para 2-61) and operate engine without air cleaner element until one is obtained.

Trouble	Expedient Remedy
Secondary fuel filter clogged.	Remove secondary fuel filter element (para 2-52) and operate engine without secondary fuel filter element until one is obtained.

2-27. Vehicle Not Mobile.

Trouble	Expedient Remedy
Flat tire.	Installation of five wheel kit (refer to TM 9-2320-242-10)

2-28. Loss of Fuel.

Trouble	Expedient Remedy
Fuel tank has holes in it.	Plug holes in fuel tank with sheet metal screws of appropriate size and sealing compound. At first opportunity have repaired tank or replaced.

Section IX. RADIO INTERFERENCE SUPPRESSION

2-29. General

Radio interference suppression is the elimination or minimizing of the electrical disturbances which interfere with radio reception, or disclose the location of the vehicle to sensitive electrical detectors. It is important that vehicles with, or without radios be properly suppressed to prevent interferences with radio reception of neighboring vehicles.

The generating system windshield wiper motors, bilge pump, carrier heater (M792 ambulance only)

and carrier heater fuel pump (M792 ambulance only) have been designed to suppress radio interference. Radio interference suppression in the generating system is effected by a choke, capacitor, filter and **rectifier** in the regulator assembly. The wiper motors, bilge pump, heater (M792 ambulance only) and heater fuel pump (M792 ambulance only) suppress radio interference by means of capacitors in the electrical leads to the motor assemblies.

2-30. Radio Interference Suppression Components

Radio interference may be corrected by replacing one or more of the following parts:

- a. *Replacement of Alternator* (Refer to para 2-78.)
- b. *Replacement of Windshield Wiper Motors.* (Refer to para 2-228.)

c. *Replacement of Bilge Pump.* (Refer to para 2-230.)

d. *M792 Ambulance Carrier Heater.*(Refer to para 2-252.)

e. *M792 Ambulance Carrier Heater Fuel Pump.* (Refer to para 2-58.)

Section X. ORGANIZATIONAL MAINTENANCE PROCEDURES

2-31. General

- a. Sections XI through XXIX provide maintenance instructions and illustrations for all items which are the responsibility of organizational maintenance personnel as allocated by the Maintenance Allocation Chart (refer to Appendix B).
- b. Where applicable for organizational

maintenance, sections contain information on inspection, testing, removal, repair, replacement and adjustment. The function of each system or unit in a section is described with relation to the entire vehicle. Any references to location will be as viewed from the driver seat looking forward. Operations not described are the responsibility of support maintenance units.

Section XI. POWER PLANT REMOVAL AND INSTALLATION

2-32. General

The power plant, consisting of the engine, radiator and shroud, clutch housing, and transmission, can be removed as a package without draining the cooling system, engine oil or transmission oil. Engine components do not have to be removed for power plant removal. The radiator and all engine accessories can be replaced without removal of the power plant assembly. Coordinate engine replacement with direct support maintenance personnel. Engine replacement must be recorded in DA Form 2408-1 in accordance with TM 38-750.

2-33. Power Plant

a. Removal.

- (1) Open engine cover and secure (refer to TM 9-2320-242-10).
- (2) Unfasten tractor canopy and fold canopy over windshield (refer to TM 9-2320-242-10).
- (3) Remove tractor seats (Refer to para 2-221).
- (4) Remove console as follows:
 - (a) Pull hand brake to "ON" position and remove knobs from shift levers.
 - (b) Loosen four quarter-turn studs securing console to tractor and remove console assembly.
- (5) Remove canopy retainer strip by removing four screws and washers (fig 2-49).

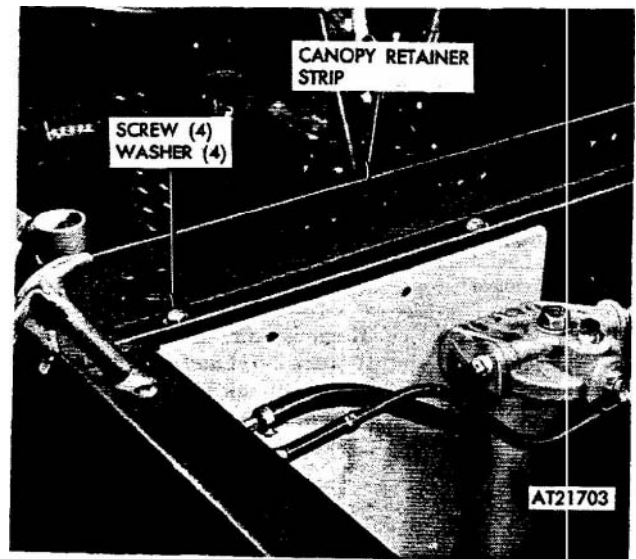


Figure 2-49. Canopy retainer strip.

- (6) Disconnect negative battery ground terminal clamp by loosening nut on clamp.
- (7) Remove exhaust header pipe and clamps by removing nuts from clamps securing header pipe to exhaust pipe and exhaust manifold outlet (fig 2-50).

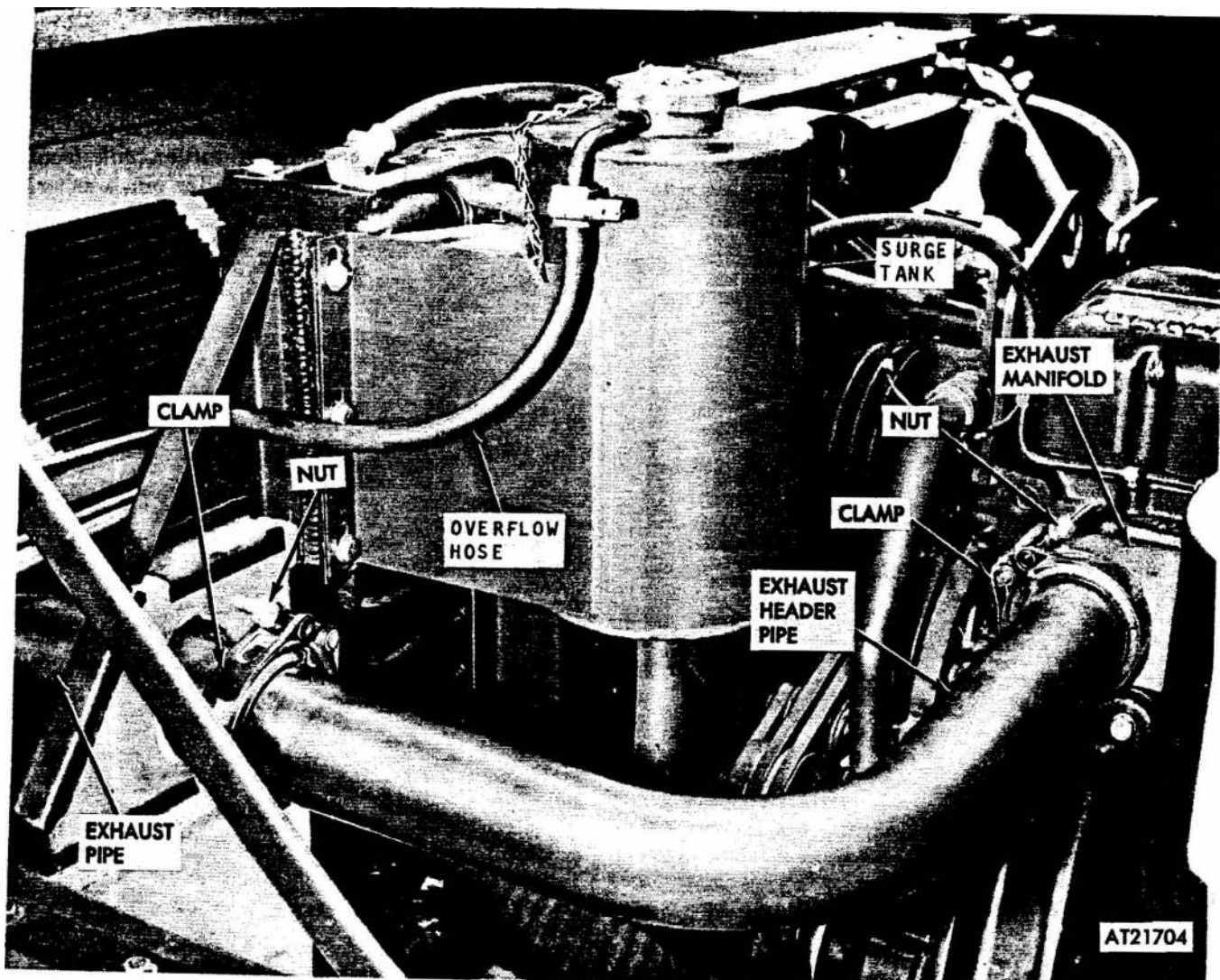


Figure 2-50. Exhaust header pipe and surge tank overflow hose.

(8) Remove surge tank overflow drain hose from tube on filler neck by loosening clamp and removing hose (fig 2-50).

(9) Disconnect air restriction indicator line from base of air cleaner housing. Remove elbow from housing and install loosely on indicator line (fig 2-51).

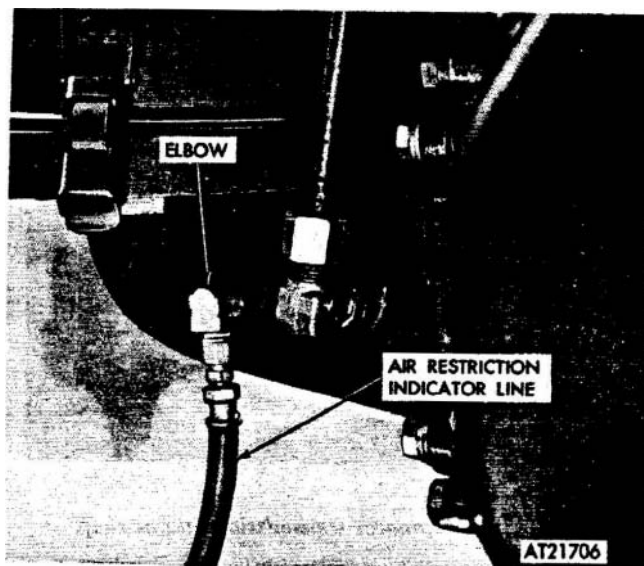


Figure 2-51. Air restriction indicator line.

Note: Place both transmission and transfer assemblies in neutral range prior to removal of linkage.

(10) Remove clutch control rod from clutch fork by removing two jam nuts and adjusting nut (fig 2-52).

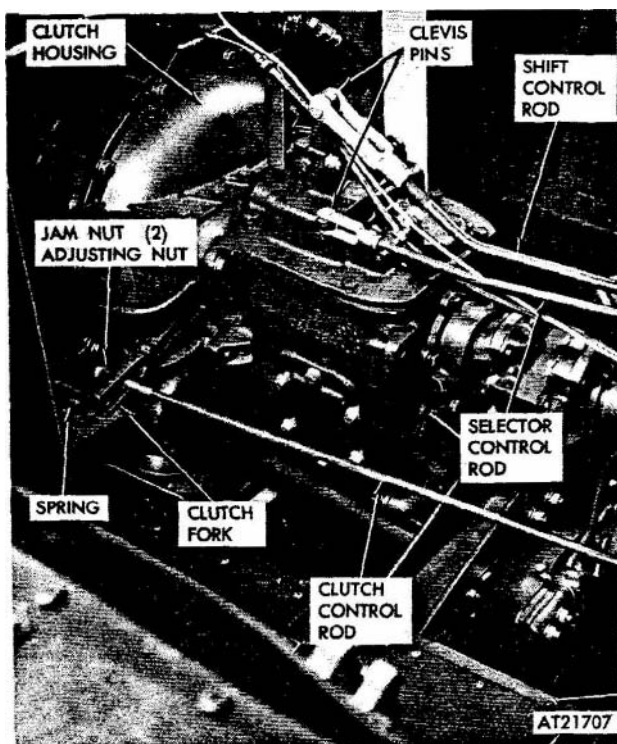


Figure 2-52. Clutch and transmission linkage.

(11) Remove transmission output flange from coupling assembly by removing four screws and lockplates (fig 2-53).

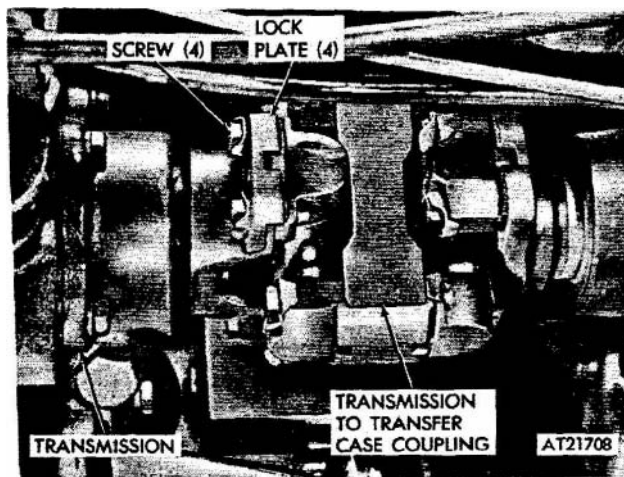


Figure 2-53. Disconnect transmission output shaft at coupling.

(12) Remove shift control rod from transmission by removing cotter pin, washer, and clevis pin (fig 2-52).

(13) Remove selector control rod from transmission by removing clip and clevis pin.

(14) Remove accelerator (throttle) cable from engine bell crank by removing cotter pin, washer, and clevis pin (fig 2-54).

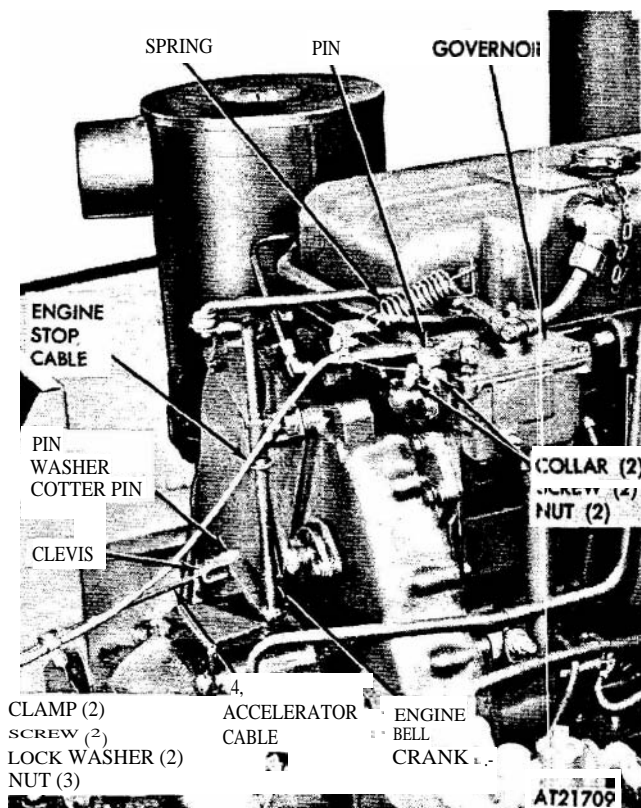


Figure 2-54. Accelerator and governor linkage.

(15) Remove engine stop cable from governor by removing locking collar and clevis pin. Remove screw and clamp securing cable to governor bracket. Remove accelerator (throttle) and engine stop cable clamps from transmission brackets by removing two screws, lock washers, and nuts. Remove cable clamp from transfer case by removing screw. Replace screw in transfer case.

(16) Remove drain tube from tee fitting in engine air box by loosening connector nut (fig 2-55). Pull up and out of retaining clip.

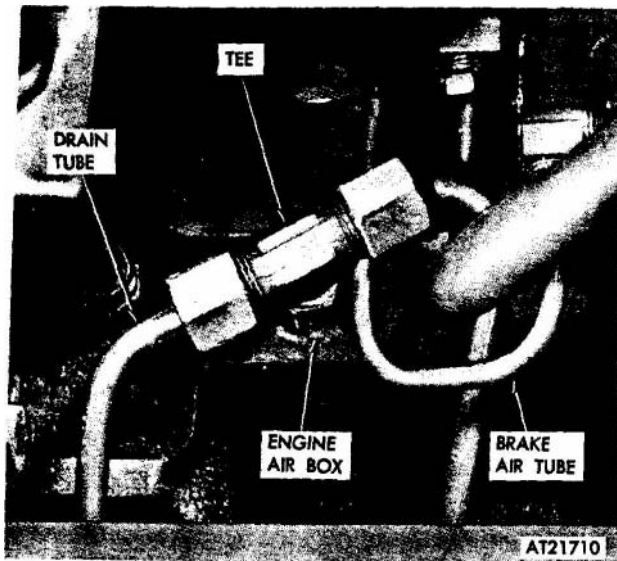


Figure 2-55. Air bar drain tube.

(17) Remove nuts, washers, and screws securing steady rest support to tractor keel and remove steady rest support and shim(s). Measure and record shim(s) thickness to aid in installation (fig 2-56).

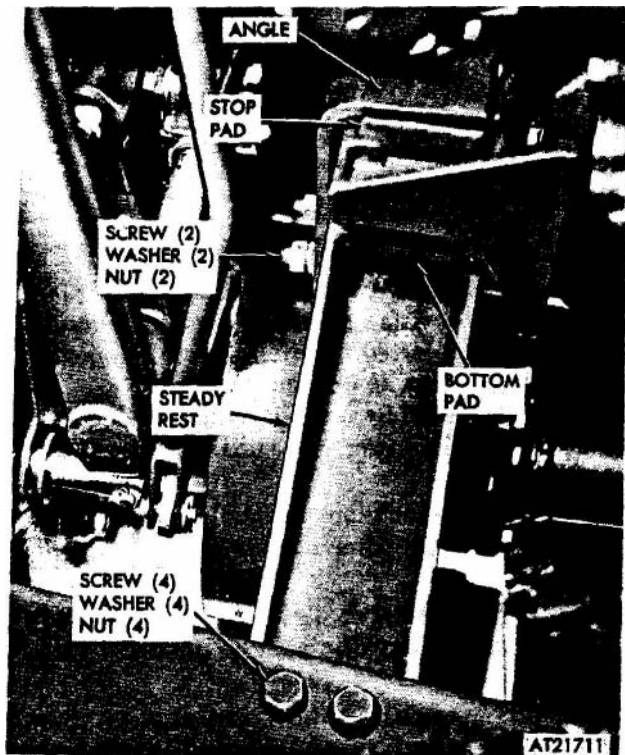


Figure 2-56. Transmission steady rest-removal and installation.

(18) Remove pads from transmission steady rest and from channel of support. Clean rest and support of grease and dirt.

(19) Remove two screws, washers, and nuts securing angle to support assembly. Remove angle.

(20) Disconnect fuel inlet line from fuel pump. Cap, using suitable sized plastic protective caps, the fuel inlet line and fuel pump inlet openings (fig 2-57).

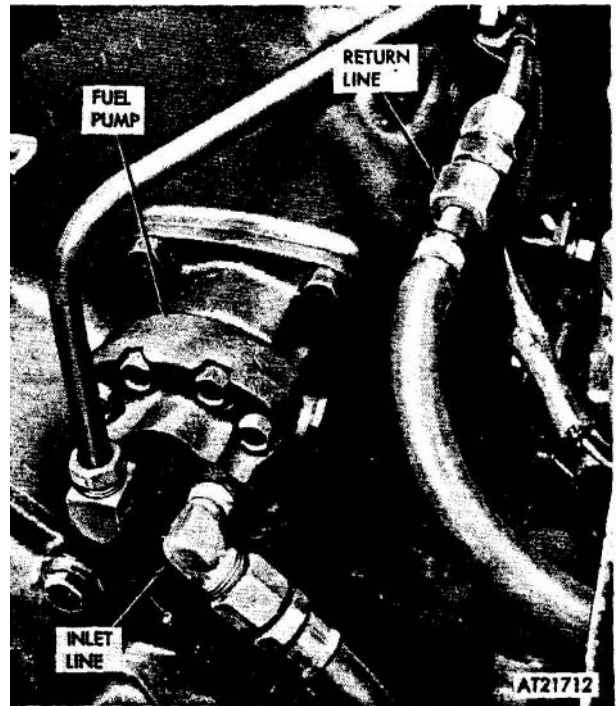


Figure 2-57. Fuel lines.

(21) Disconnect fuel return line from fitting above starter motor. Cap, using suitable sized plastic protective caps, fuel return line and fitting (fig 2-571).

(22) Disconnect tractor main harness connector from power plant assembly (fig 2-58).



Figure 2-58. Harness connector and rear engine mount.

(23) Attach lifting sling to engine lifting eyes, connect lifting sling to a suitable hoist, and apply a slight strain to power plant assembly.

(24) Remove four bolts, lock washers, and nuts securing two clutch housing (front) engine mounts to tractor hull (fig 2-59). Remove two bolts, lock washers, and nuts securing two rear engine mounts to isolators and tractor hull (fig 2-58).

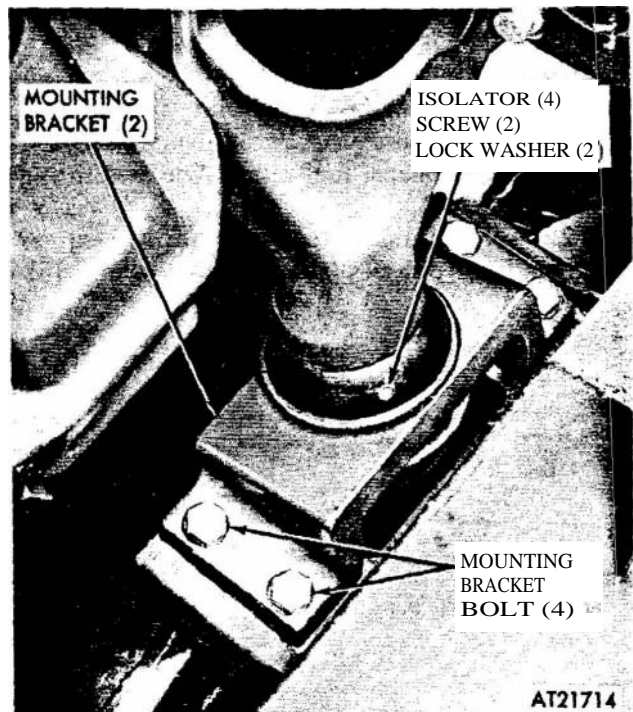


Figure 2-59. Front engine mount, typical.

(25) Hoist and carefully guide power plant assembly out of engine compartment (fig 2-60) and lower onto a suitable stand, cradle, or skid.

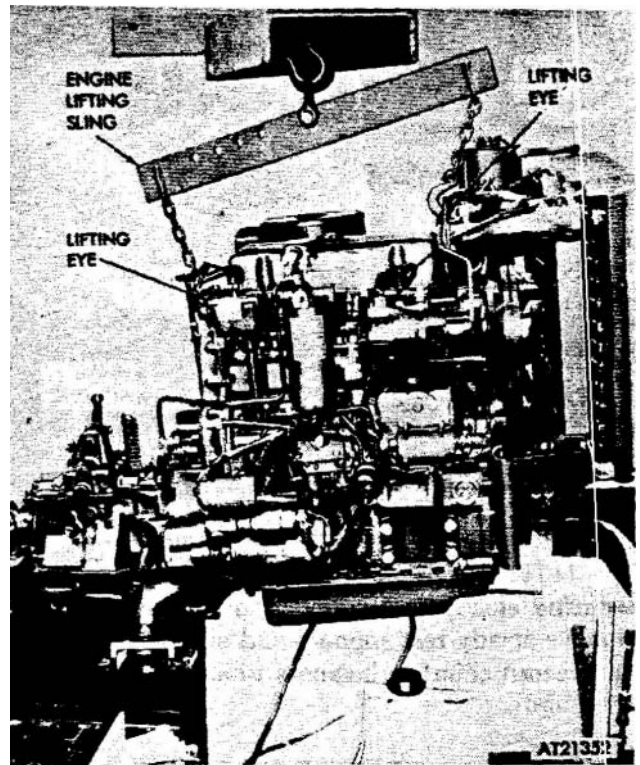


Figure 2-60. Engine lifting sling.

Warning: Observe all rigging safety precautions when hoisting power plant assembly.

(26) Remove lifting sling from power plant assembly.

b. Installation. Ensure that any parts or components removed from the power plant assembly are replaced prior to installation. Adjustments required during installation are performed at point of installation.

(1) Attach lifting sling to engine lifting eyes and connect lifting sling to a suitable hoist (fig 2-60).

(2) Hoist power plant assembly and carefully guide into engine compartment and lower on mounting brackets.

Warning: Observe all rigging safety precautions when hoisting power plant assembly.

Caution: Use care in hoisting engine so as not to damage radiator baffle and insulation.

(3) Align engine mount holes and insert the two rear mount bolts and lock washers, start nuts on bolts (fig 2-58).

(4) Insert four bolts, lock washers, and nuts into clutch housing engine mounts and tighten (fig 2-59).

(5) Relieve strain on engine and remove lifting sling.

(6) Torque the two rear mounting bolts to 55-65 **lbs-ft.**

(7) Connect tractor main electrical harness to engine harness connector (fig 2.58).

(8) Remove caps from fuel return line and fitting on power plant. Connect fuel return line (fig 2-57).

Warning: Do not allow sparks or flame near open fuel.

(9) Remove cap from fuel inlet line and plug from fuel pump inlet. Connect fuel inlet line.

(10) Position stop angle to support assembly and secure with two screws, washers, and nuts (fig 2-56).

(11) Insert top pad in transmission steady rest and bottom pad in channel receptacle of support.

(12) Insert four cap screws with washers in support mounting holes of left and right hand tractor keels.

(13) Position shim to top of each channel support and work support into position on mounting screws. Secure support assembly to tractor keels with four washers and nuts.

(14) Check clearance between pad in support channel receptacle and bottom of transmission steady rest. Clearance should be $1/16$ inch. If more than $3/32$ inch is measured at this point, remove the four mounting screws and remove shims as required. Minimum clearance is $1/32$ inch, maximum clearance is $3/32$ inch and desired clearance is $1/16$ inch (fig 2-61).

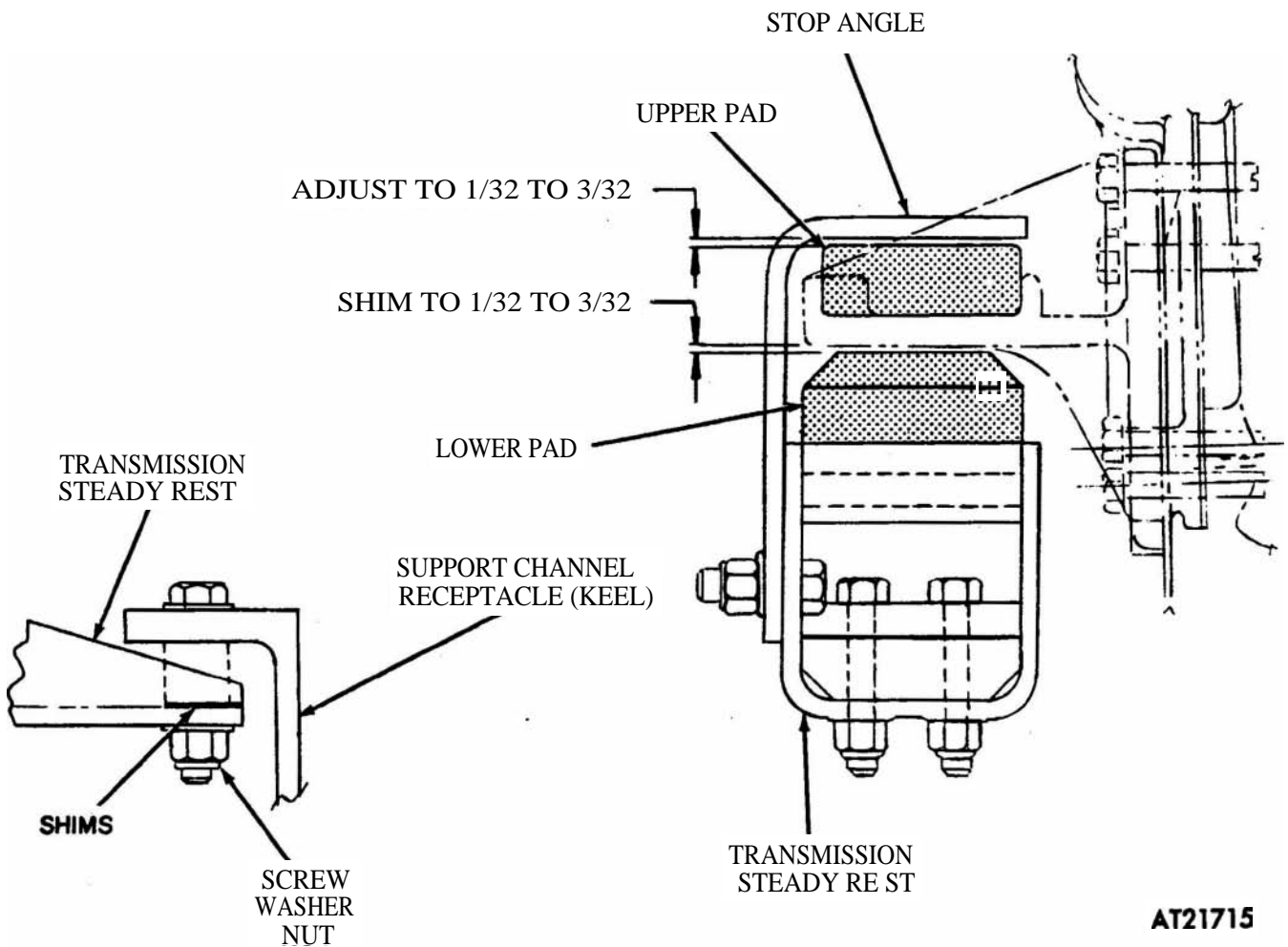


Figure 2-61. Transmission steady rest clearances.

AT21715

(15) Check clearance between transmission steady rest pad and bottom of support angle. Clearance should be 1 / 16 inch. Correct clearance may be obtained by loosening two screws securing angle to support and moving angle up or down. When 1 / 16 inch clearance is attained, secure cap screws (fig 2-61).

(16) Secure accelerator (throttle) cable to transfer case using clamp and existing screw on transfer case (fig 2-54).

(17) Secure accelerator (throttle) and engine stop cables to transmission using three clamps and two screws, lock washers, and nuts.

Note: Two clamps on forward part of transmission use the same screw.

(18) Secure engine stop linkage clamp to governor spring bracket with screw, lock washer, and nut, do not tighten screw. Connect linkage to governor and secure wire with collar. Secure collar close to end of wire.

(19) Adjust engine stop linkage (refer to para 2-66c).

(20) Install accelerator (throttle) linkage to throttle control arm (bell crank) on engine and secure with clevis pin and cotter pin.

(21) Adjust accelerator (throttle) linkage (refer to para **2-65d**).

Note: Ensure that both transmission and transfer assemblies are in neutral range **prior to** installation of linkage

(22) Loosen jam nuts on shift control rod and selector control rod. Attach shift control rod to transmission with clevis pin and clip (fig 2-52).

(23) **Attach selector control rod to transmission with clevis pin, washer, and cotter pin.**

A24) Place shift lever in neutral position. Place lever in a vertical position.

(25) Attach selector control rod to lever. Adjust clevis until clevis pin can be inserted freely. Secure clevis pin with clip and tighten jam nut.

(26) Install shift control rod to lever. Adjust clevis until clevis pin can be inserted freely. Secure clevis pin with washer and cotter pin. Tighten jam nut against clevis.

(27) Secure transmission output flange to coupling assembly with four screws and lockplates (fig 2-53).

(28) Insert clutch control rod in outboard slot of clutch fork; secure with adjustment nut and two jam nuts (fig 2-52).

(29) Push clutch fork forward against clutch bearing. Back off adjustment nut for $\frac{1}{8}$ -3 / 16-inch clearance between clutch release fork and adjustment nut. Tighten jam nuts.

(30) Check free travel of clutch pedal. Proper linkage adjustment will result in $\frac{1}{2}$ - $\frac{3}{4}$ -inch pedal free travel.

(31) Remove elbow from air restriction indicator line and install in air cleaner base. Connect air restriction indicator line to elbow (fig 2-51).

(32) Connect air line to tee at air box drain outlet (fig 2-55).

(33) Position exhaust header pipe to **exhaust pipe and manifold**. Install two clamps and alternately tighten clamps (fig 2-50).

(34) Install surge tank overflow drain hose on surge tank and tighten clamp (fig 2-50). Connect negative terminal to battery and secure by tightening clamp.

(35) Remove filler plug on secondary fuel filter and fill with fuel.

Warning: Do not allow sparks or flame near work area.

(36) Check coolant level, add coolant as necessary (refer to TB **750-651**).

(37) Check oil level, add oil as necessary (refer to LO 9-2320-242-12).

(38) Install console as follows:

(a) To reinstall the console assembly, position the console over the transmission and transfer case and carefully work the shift levers and brake handle through the console boots and retainer assembly.

(b) Tighten the four studs to secure the console to the tractor and install the shift lever knobs.

(39) Attach canopy retainer strip to tractor and secure with four screws and washers (fig 249).

(40) Install tractor seats (refer to **para 2-2211**).

(41) Install tractor canopy frame and canopy (refer to TM 9-2320-242-10).

(42) Close and secure engine cover (refer to **TM 9-2320-242-10**).

(43) Start engine and check instruments for normal conditions. Test drive vehicle to ensure engine is functioning properly (refer to TM 9-2 320-242-10).

Section XII. ENGINE ASSEMBLY

2-34. General

The engine is a Detroit Diesel 3-53 series, 3-cylinder, 2-cycle, liquid-cooled, diesel engine with a displacement of 159.3 cubic inches, a compression ratio of 21 to 1, and a maximum speed of 2800 rpm. It delivers 103 HP at 2800 RPM and 217 lbs-f t. torque at 1500 RPM.

2-35. Engine

Engine replacement should be coordinated with support maintenance personnel. Engine

replacement must be recorded on DA Form 2408-1 in accordance with TM 38-750.

a. Removal.

(1) Remove power plant assembly (refer to para 2-33a).

Note: Do not use transmission or clutch housing for support as they will be removed.

(2) Remove spring from spring bracket and clutch release fork (fig 2-62).

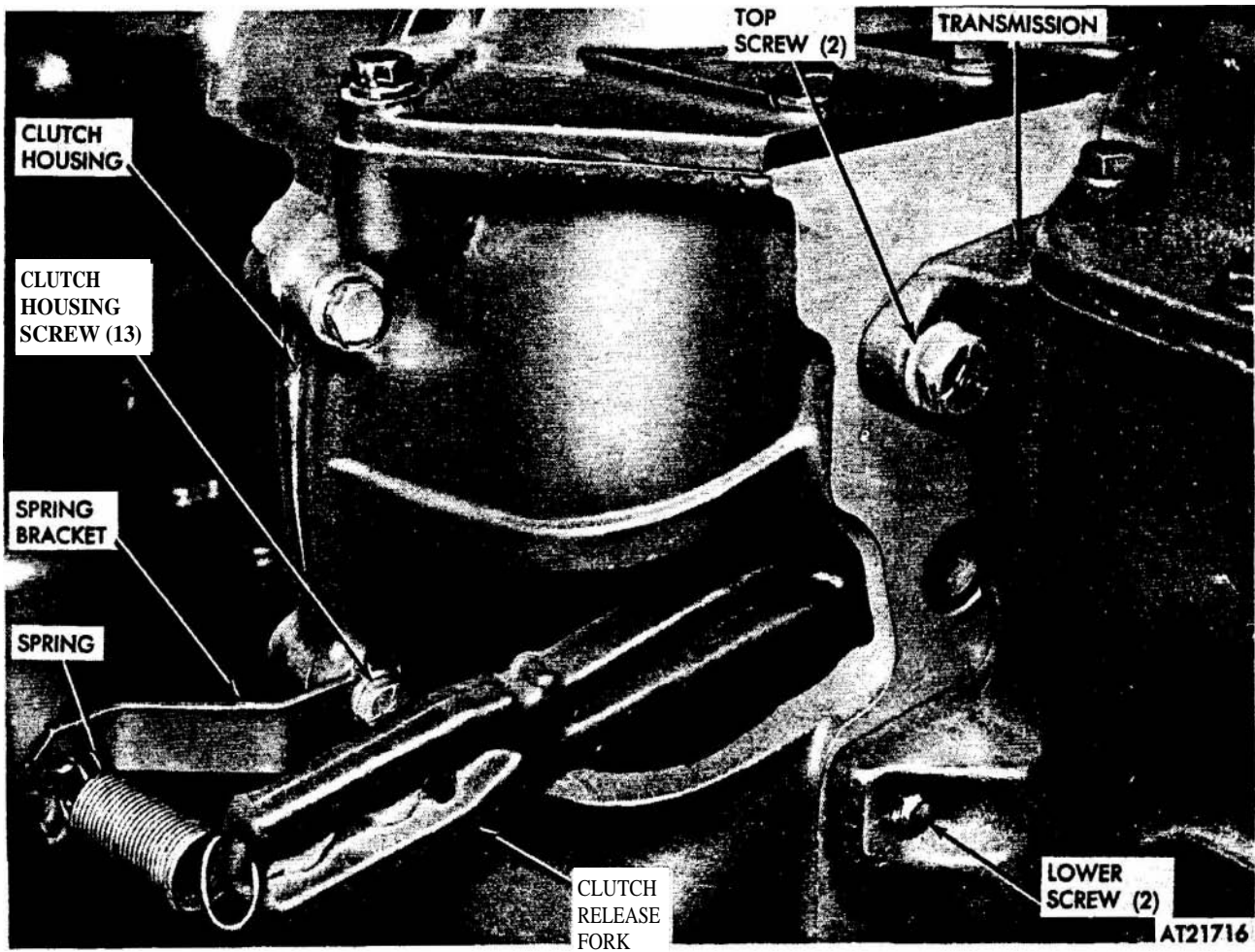


Figure 2-62. Clutch housing

(3) Attach a suitable lifting device to transmission and apply a slight strain upward. Remove two screws and lock washers securing top of transmission to clutch housing.

(4) Attach two suitable guide studs into mounting holes of screws removed in (3) above.

(5) Separate transmission from clutch housing by removing two lower screws and lock washers.

(6) Slide transmission on guide studs away from clutch housing until input shaft is clear of clutch plate spline and release bearing.

(7) Slide transmission off guide studs, hoist away from engine, remove lower steady rest pad,

and lower onto a suitable stand, cradle, or skid. Remove lifting device.

(8) Remove two front engine mount adapters and isolators by removing bolts and lock washers (fig 2-59).

(9) Separate clutch housing from engine, and remove clutch fork spring bracket by removing thirteen screws and lock washers (fig 2-62).

(10) Remove clutch release fork by hitting sharply toward front of engine and disengaging from ball stud.

(11) Remove clutch pressure plate and disc by removing six bolts and lock washers (fig 2-63).

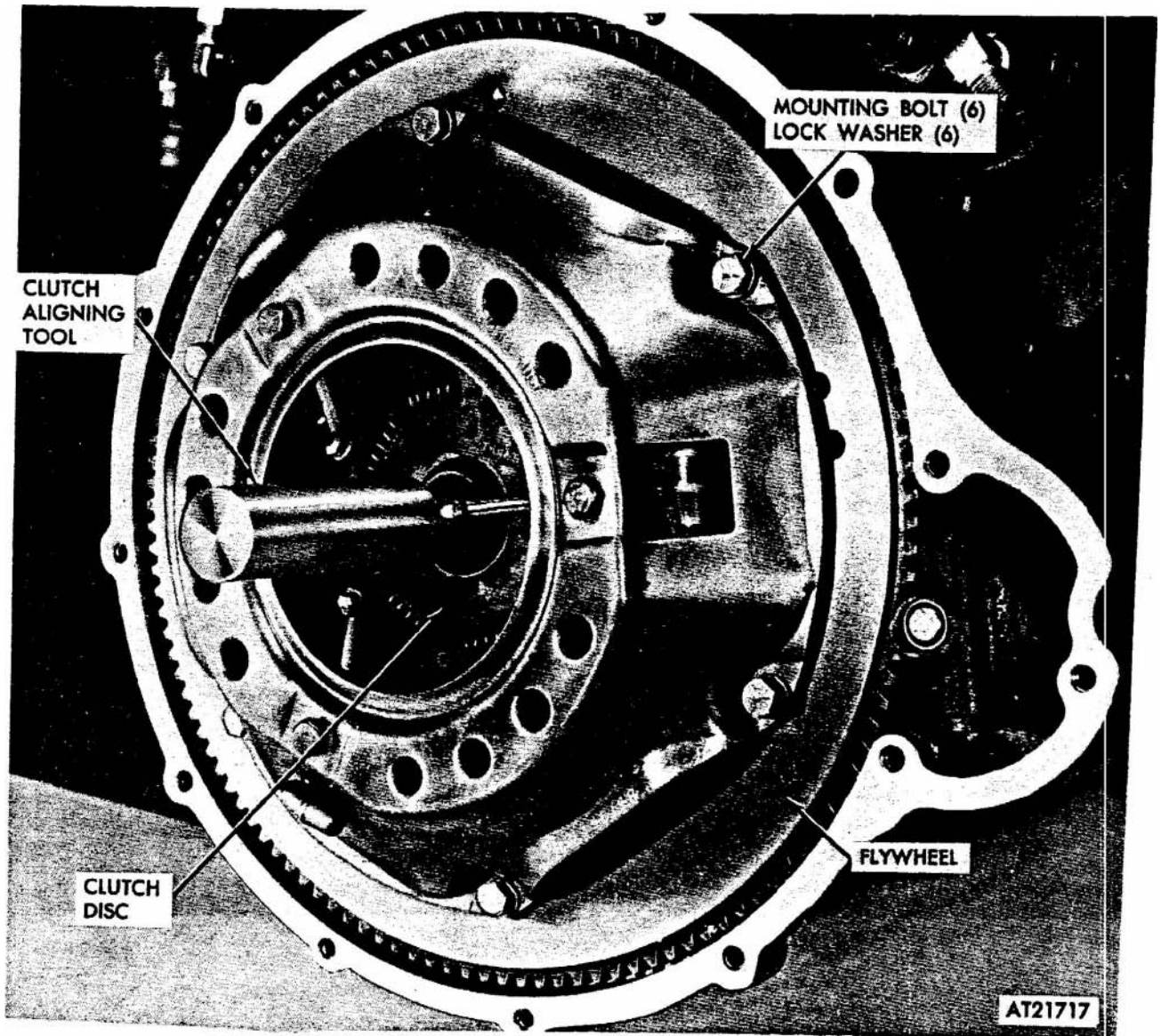


Figure 2-63. Clutch disc and pressure plate.

(12) Remove alternator drive belts by loosening the adjusting strap screw. Position

alternator toward engine to relieve tension and lift belts off alternator pulley (fig 2-64).

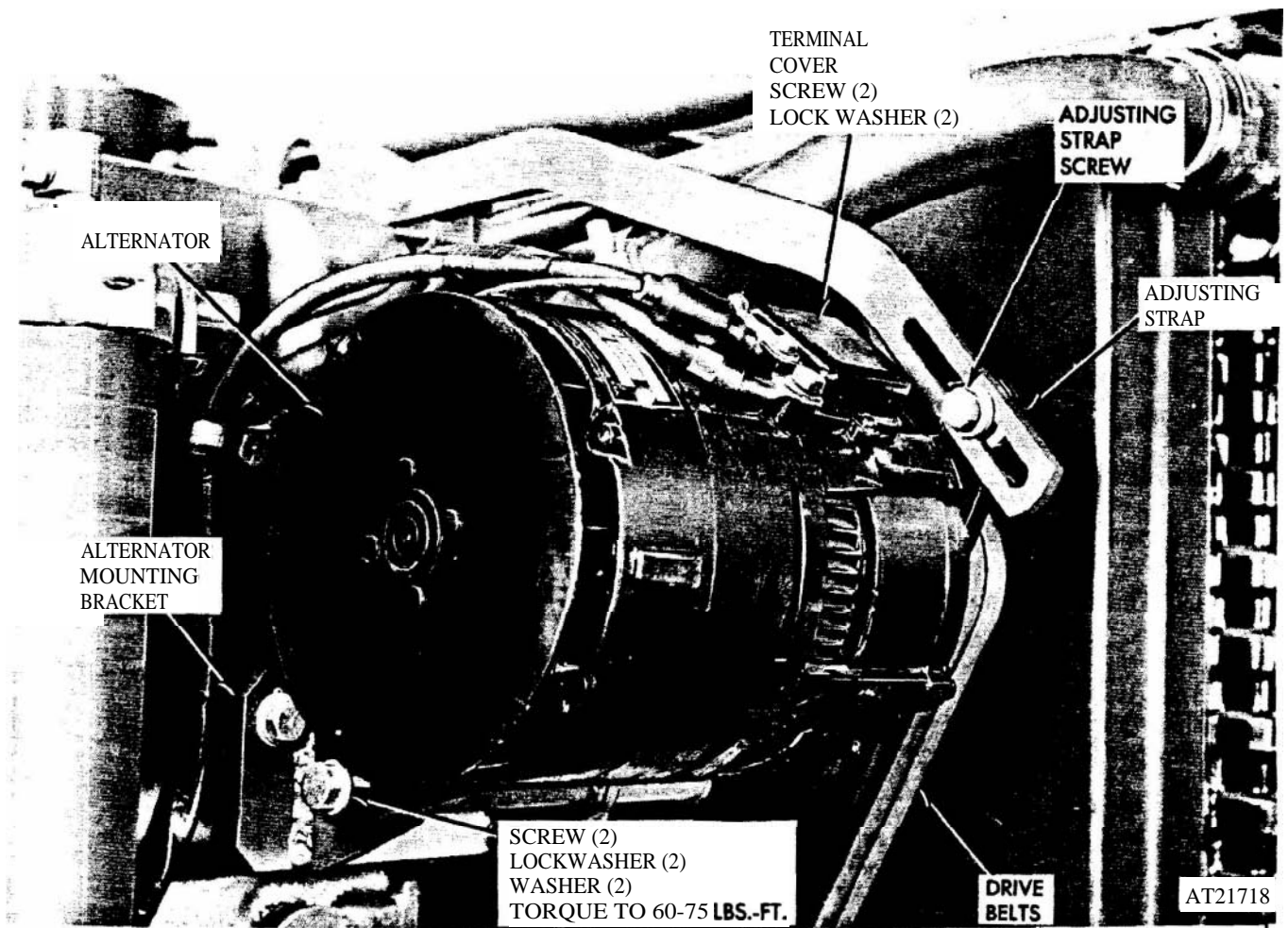


Figure 2-64. Alternator adjusting strap and belts.

(13) Remove alternator terminal cover by removing two screws and washers.

(14) Remove electrical leads from terminal posts by removing two screws, washers, and nuts.

Separate connector on remaining wire (fig 2-65). Install removed screws, washers, and nuts on alternator.

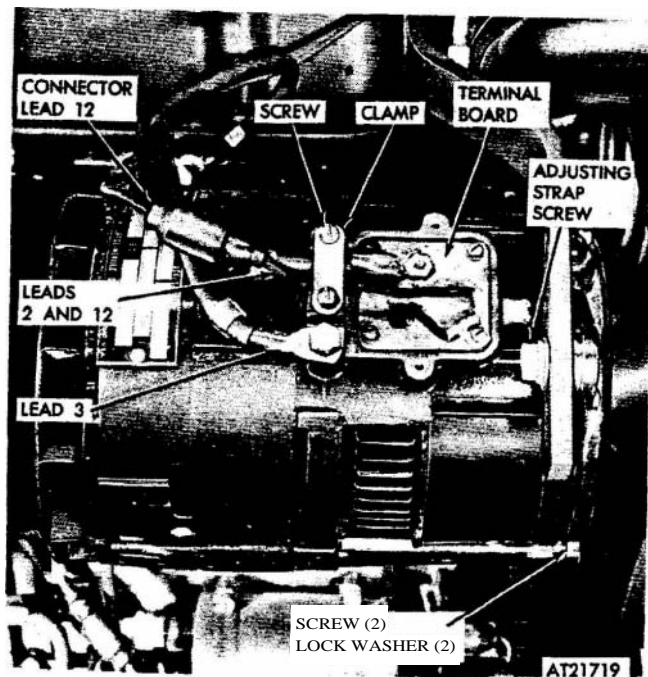


Figure 2-65. Alternator electrical connections.

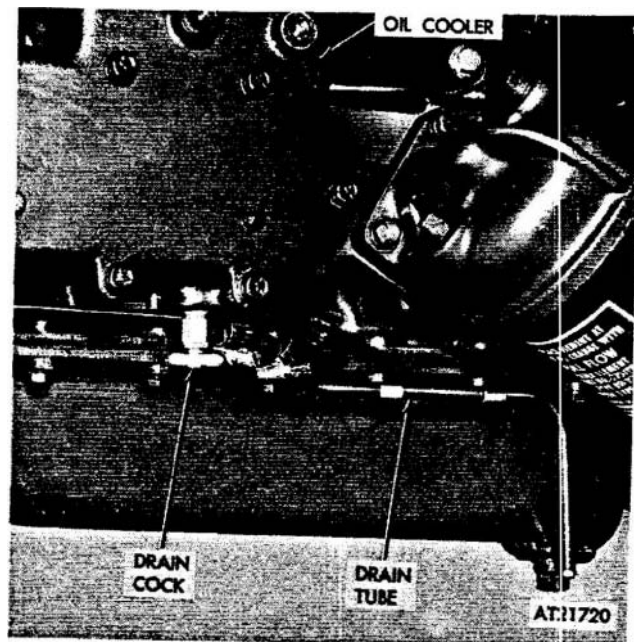


Figure 2-66. Cooling system drain.

(15) Disconnect cable harness by removing two screws, washers, and cable clamp from alternator.

(16) Remove alternator from alternator mounting bracket by supporting alternator and removing two screws, lock washers, and washers (fig 2-64).

(17) Remove alternator from engine by removing adjusting strap, screw, and lock washers.

(18) Place a suitable clean container under oil cooler draincock (fig 2-66).

(19) Drain cooling system by removing surge tank pressure cap (fig 2-67) and opening oil cooler draincock (fig 2-66).

Note: If cooling system contains anti-freeze save for reuse if solution is serviceable.

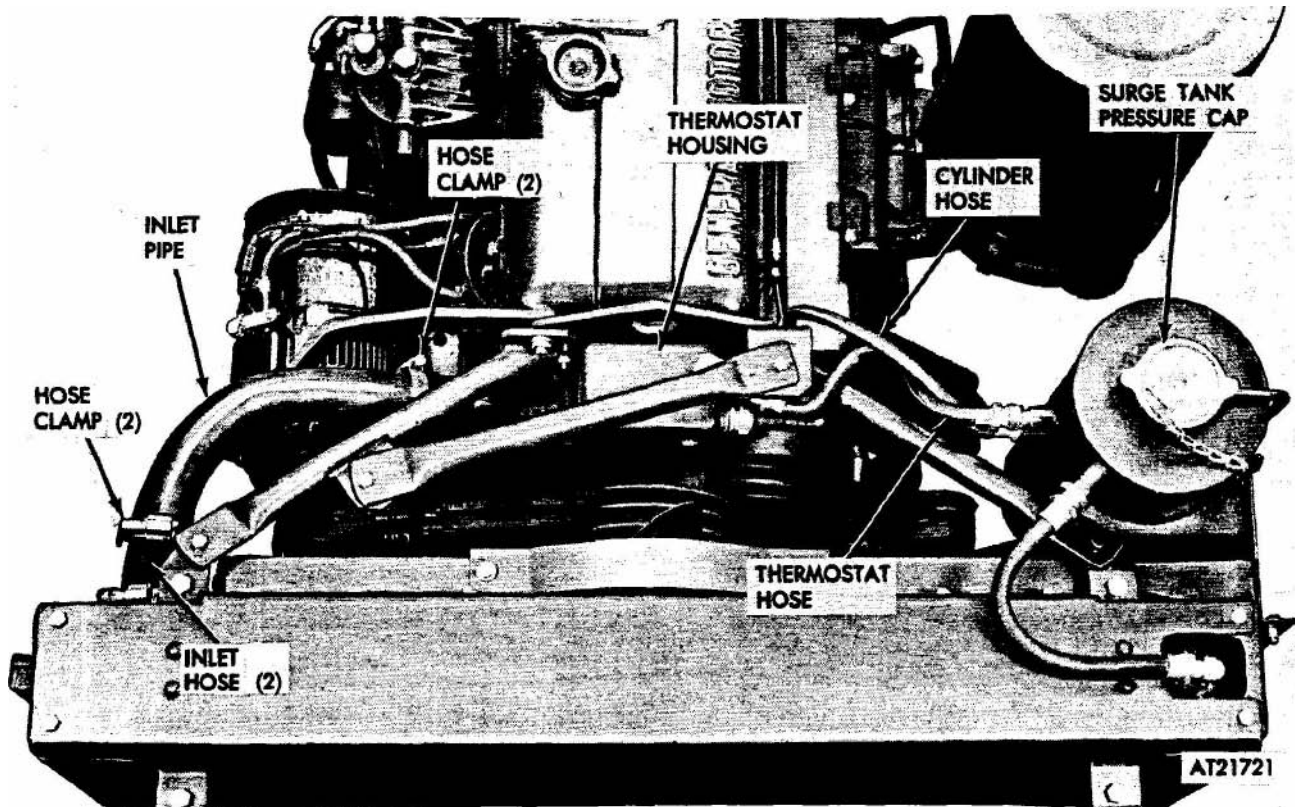


Figure 2-67. Radiator upper disconnect points.

(20) Disconnect radiator outlet hose by loosening hose clamp (fig 2-68).

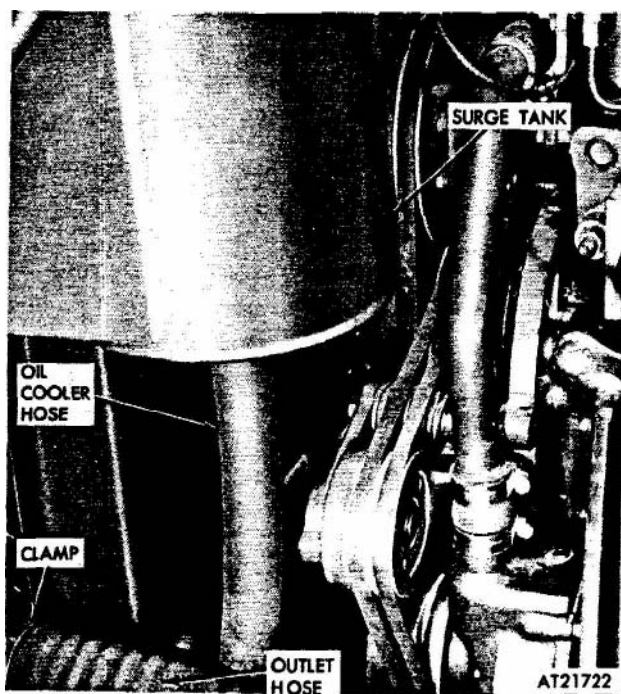


Figure 2-68. Radiator lower disconnect points.

(21) Disconnect radiator inlet hose from radiator inlet pipe by loosening hose clamps on thermostat housing and inlet pipe. Position hose and pipe upward (fig 2-67).

(22) Disconnect oil cooler hose at **bottom** of surge tank by loosening hose clamp (fig 2-68).

(23) Disconnect thermostat to surge tank hose from thermostat housing by loosening clamp (fig 2-67).

(24) Disconnect cylinder to surge tank hose assembly by loosening clamp and removing elbow (fig 2-67).

(25) Attach a suitable lifting device to radiator and surge tank assembly, and apply slight strain to cables.

(26) Remove right-and left-hand supports and strut by removing screws, nuts, and lock washers from engine (fig 2-69).

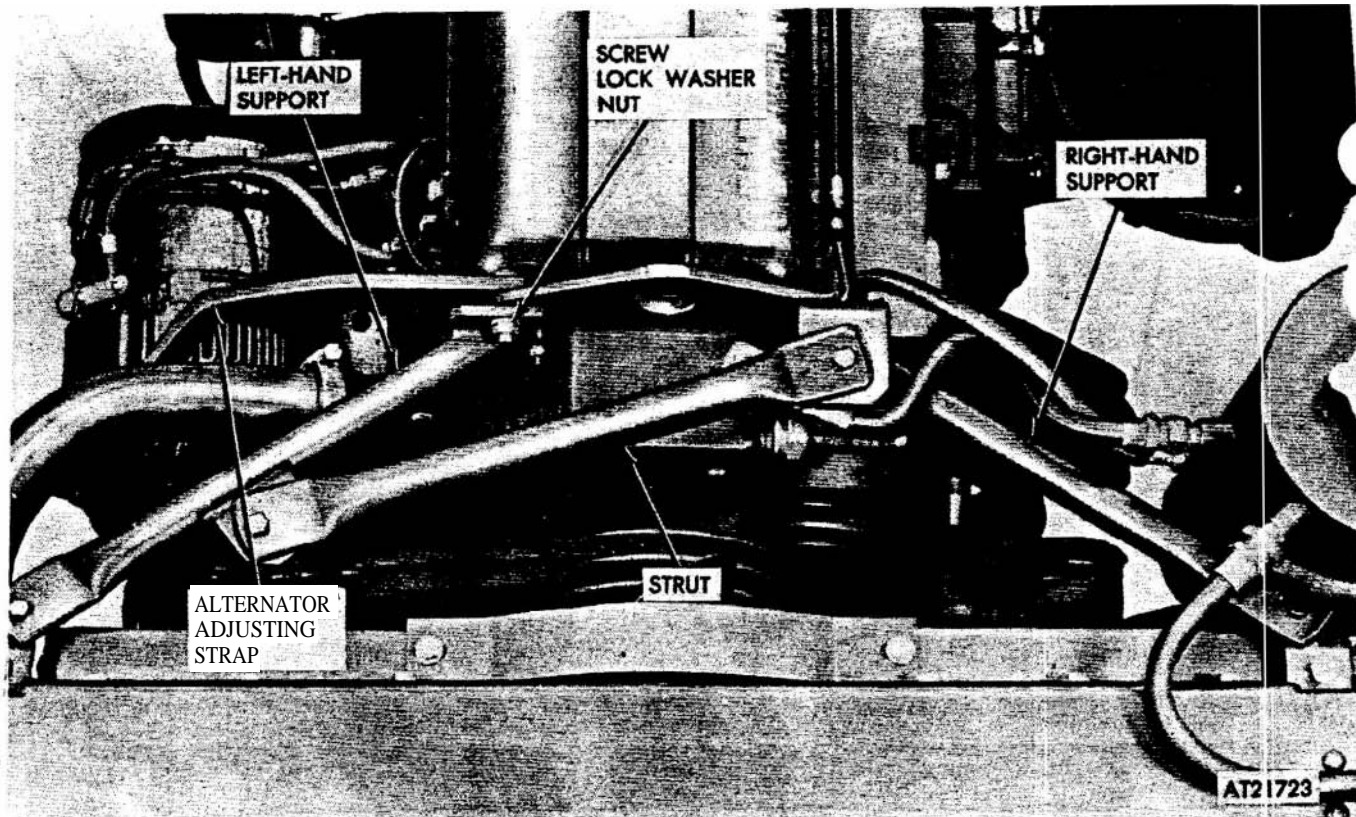


Figure 2-69. Radiator upper mounting.

(27) Pivot supports and strut toward radiator by loosening nuts at radiator end.

(28) Remove radiator, surge tank, and shroud as an assembly by removing bolts and washers from lower radiator support (fig 2-70). Hoist radiator assembly away from engine.

Warning: Observe all rigging safety precautions when hoisting radiator assembly.

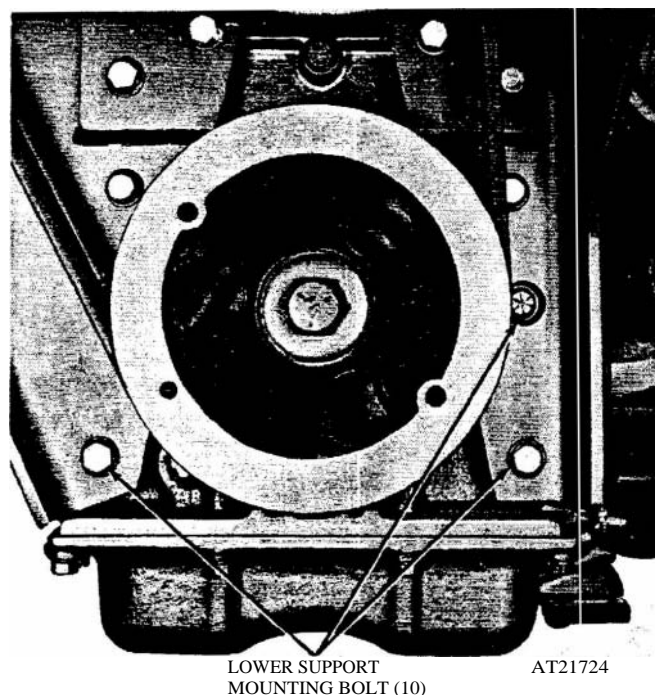


Figure 2 70. Radiator lower mounting.

(29) Remove air cleaner shell and element by releasing over-center latches. Lift shell and element off air cleaner base (fig 2-71).

Note: Keep base opening covered while shell is removed.

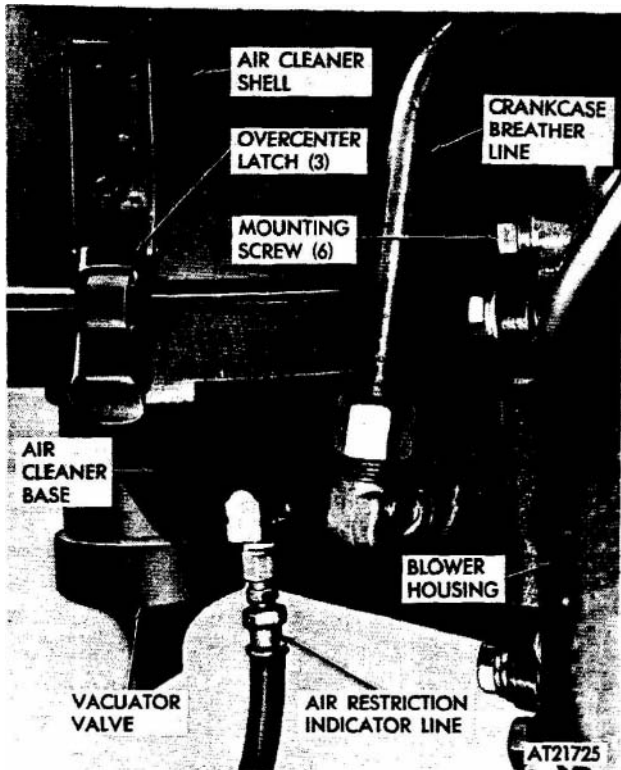


Figure 2-71. Air cleaner and blower housing

(30) Disconnect crankcase breather and air restriction indicator lines from air cleaner base by loosening fittings.

(31) Loosen top center screw securing slotted part of air cleaner base.

(32) Remove air cleaner base from blower intake by removing five screws, lock washers, and washers; slide air cleaner base down away from blower intake.

Note: Remaining screw, washer, and blower screen will be supplied with new engine.

(33) Submit engine to support maintenance personnel for repair.

b. Installation.

(1) Position blower screen over blower intake and insert top center screw. Do not tighten screw at this time.

(2) Position air cleaner base over blower screen and align slot in base with top center screw. Secure by installing five screws, lock washers, and washers; tighten all six screws (fig 2-71).

(3) Connect crankcase breather and air restriction indicator line fittings to air cleaner base.

(4) Position air cleaner shell and element to air

cleaner base, check proper seating of preformed packing, align slot in shell with boss on base, and secure by connecting the over-center latches.

(5) Attach suitable lifting device to radiator assembly and hoist into position.

Warning: Observe an rigging precautions when hoisting radiator assembly.

(6) Attach lower radiator support to engine with ten bolts and washers (fig 2-70).

(7) Attach right-hand support to engine with screw, washer, and nut. Attach left-hand support and alternator adjusting strap to engine with screw, lock washer, and nut (fig 2-69).

(8) Attach strut to engine with screw, lock washer, and nut. Tighten support and strut mounting screws on both ends.

(9) Connect cylinder to surge tank hose assembly by installing elbow, positioning hose, and tightening clamp (fig 2-69).

(10) Connect surge tank to thermostat hose to thermostat housing, position and tighten clamp (fig 2-67).

(11) Connect oil cooler hose to bottom of surge tank, position and tighten clamp (fig 2-68).

(12) Position radiator inlet hose and tube toward thermostat housing. Connect hose to thermostat housing and inlet pipe, position and tighten clamps (fig 2-67).

(13) Connect radiator outlet hose to radiator, position and tighten clamps (fig 2-68).

(14) Close draincock on bottom of oil cooler (fig 2-66).

(15) Fill cooling system for correct climatic conditions in accordance with TB 750-651, install filler cap, and check for leaks.

(16) Attach alternator to mounting bracket with two screws, lock washers, and washers, align pulleys, and torque to 60-75 lbs-ft. (fig 2-64).

Note: Alternator and fan pulleys must be aligned within 1/16 inch.

(17) Install screw and lock washer to alternator and alternator adjusting strap; tighten screw finger-tight (fig 2-64).

(18) Connect electrical leads (positive and negative) to their respective terminals and secure with two screws, washers, and nuts. Connect electrical connector (exciter). Seal terminals and connector posts with a 1/32-inch minimum coating of sealant (RTV-102).

(19) Attach alternator terminal cover and secure with two screws and washers (fig 2-64).

(20) Attach cable harness to alternator with cable clamp, two screws, and washers (fig 2-65).

(21) Position alternator toward engine and install two drive belts in their respective grooves in alternator pulley (fig 2-64).

(22) Adjust alternator (fan drive) belt tension (refer to para 2-74).

(23) Using a suitable aligning tool, position clutch disc with side marked "ENGINE" toward engine flywheel.

(24) Position pressure plate assembly against clutch disc and secure with six bolts and lock washers. Withdraw aligning tool (fig 2-63).

(25) Install clutch release fork on clutch release (throw-out) bearing and snap fork on ball stud.

(26) Position clutch housing against engine, attach clutch release fork spring bracket, and secure with 13 screws and lock washers (fig 2-62).

(27) Attach isolators to engine mount brackets and secure with two screws and lock washers. Tighten screws and torque to 55-65 **lbs-ft.** (fig 2-58).

(28) Attach lifting device to transmission and position using suitable guide studs. Carefully slide toward clutch housing until input shaft engages release bearing and spline on clutch plate (fig 2-62).

(29) Secure bottom portion of transmission with two screws and lock washers.

Note: Access to lower screws is gained through openings in clutch housing.

(30) Remove two guide studs and secure transmission to clutch housing with two screws and lock washers. Remove lifting device.

(31) Install lower steady rest pad in channels on transmission steady rest (fig 2-56).

(32) Connect spring to bracket and clutch release fork (fig 2-62).

(33) Install power plant assembly (refer to para 2-33b).

2-36. Engine Locational Terms

The fan end of the engine will be referred to as the "rear" and the flywheel end as the "front". The terms left and right respectively, refer to the engine in relation to the driver's seat.

2-37. Operations Performed With Engine in Vehicle

The majority of operations authorized for organizational maintenance personnel are to be performed with the engine installed in the vehicle. Refer to the Maintenance Allocation Chart (Appendix B) for those operations pertaining to organizational maintenance personnel. Refer to the index to locate applicable paragraphs on engine components or accessories.

2-38. Oil Filter Element

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove air cleaner (refer to para 2-60).

(3) Position a suitable container **under** oil filter, remove oil filter drain plug from filter shell, and drain oil from filter (fig 2-72). Loosen center stud to aid in draining.

(4) Remove oil filter shell from cover by loosening center stud. Remove and discard oil filter element.

(5) Remove gasket from groove in cover using a suitable tool. Discard gasket and clean groove.

Caution: Do not use a sharp instrument to remove gasket as the sealing surfaces may be scored.

(6) Remove center stud, spring, retainer, washer, and retainer gasket from filter shell by removing nut. Remove gasket from stud and discard retainer and stud gaskets.

(7) Clean shell, stud, spring, retainer, washer, nut, and drain plug with solvent and dry with a clean, lintfree cloth or compressed air. Replace defective parts as necessary.

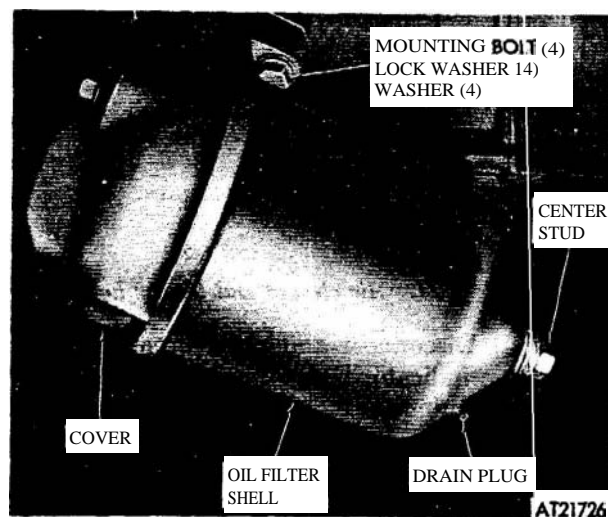


Figure 2-72. Engine oil filter.

b. Installation.

(1) Place new stud gasket on stud, insert stud through shell and install spring, retainer, washer, new retainer gasket, and secure with nut. Install drain plug and insert new filter element in shell (fig 2-72).

(2) Attach shell assembly to cover by holding new cover gasket in position and allowing shell to work gasket into cover groove while tightening center stud. Ensure that drain plug is pointing down prior to tightening center stud.

(3) Install air cleaner assembly (refer to para 2-60b).

(4) Add one additional quart of engine oil (OE) to crankcase to replace oil removed from filter (refer to LO 9-2320-242-12).

(5) Start engine and check oil filter for leaks. Stop engine. Allow approximately five minutes for oil to drain back to crankcase and check oil level.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-39. Oil Change

(1) Start engine, allow engine to run until normal operating temperature of 160°F is reached. Stop engine (refer to TM 9-2320-242-10).

Note: Engine oil change should normally be made when engine is at operating temperature.

(2) Remove crankcase access port cover from bottom of hull (fig 2-97).

(3) Place a suitable container under tractor hull and remove oil pan drain plug. Inspect drain plug for **presence** of metallic particles and chips (fig 2-73). If metallic particles and chips are found, notify support maintenance personnel for corrective action.

(4) Open and secure engine cover (refer to TM 9-2320-242-10).

(5) Replace oil filter element (refer to para 2-38).

(6) Install drain plug in oil pan (fig 2-73).

(7) Remove oil filler cap on rocker arm cover by turning **1/4-turn** counterclockwise, and add 9 quarts of oil in accordance with LO 9-2320-242-12. Replace oil filler cap.

Note: One additional quart of oil must be added to replace oil removed from filter.

(8) Check oil pan drain plug for leaks.

(9) Secure crankcase access port to bottom of hull.

(10) Close and secure engine cover (refer to TM 9-2320-242-10).

(11) Start engine and check for leaks. Stop engine. Allow approximately five minutes for oil to drain back to crankcase and check oil level.

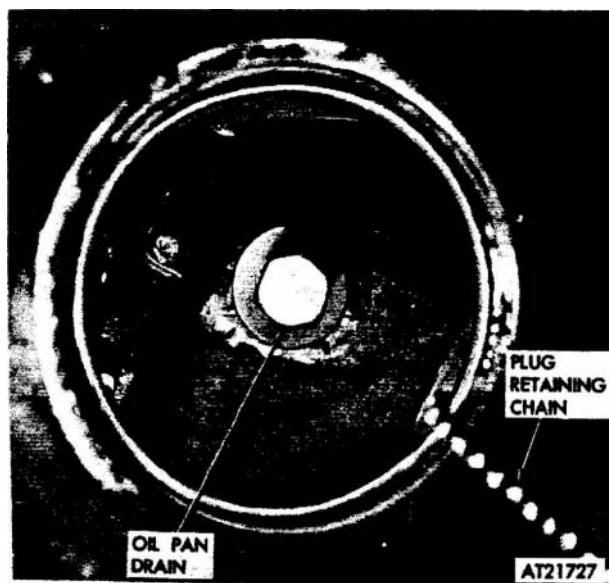


Figure 2-73. Oil pan drain.

2-40. Right Rear Engine Mounting Bracket

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Attach engine lifting sling to lifting eyes on engine (fig 2-60).

(3) Remove bolt, lock washer, and nut securing engine mounting bracket to tractor hull (fig 2-74). Loosen mounting bolt on other side.

(4) Remove exhaust header pipe (refer to para 2-68a).

(5) Connect lifting sling to a suitable hoist and apply a slight strain.

Caution: Exercise care in applying strain with hoist to avoid damage to engine components and mounts. Apply only sufficient tension to permit removal of mounting bracket.

(6) Remove engine mounting bracket from engine by removing four screws and lock washers

and loosening fifth screw located behind engine blower and cooler. Remove mounting bracket (fig 2-75).

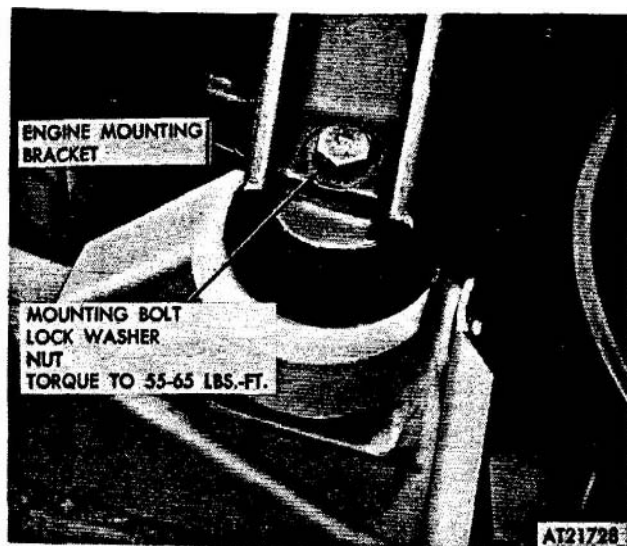


Figure 2-74.. Right rear engine mounting bolt

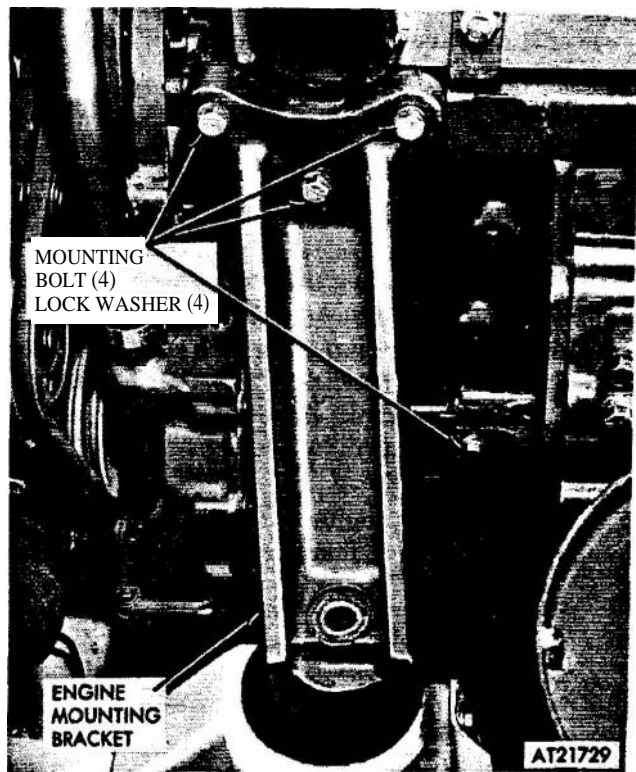


Figure 2-75. Right rear engine mounting bracket.

b. Installation.

(1) Slide slotted end of engine mounting bracket behind flatwasher on screw located behind engine blower and cooler loosened in a. (6) above (fig 2-75).

(2) Attach engine mounting bracket to Engine with four screws and lock washers. Tighten all five screws.

(3) Install mounting bolt, lock washer, and nut (fig 2-74).

(4) Relieve strain on engine and remove lifting sling.

(5) Tighten both engine mounting bolts and torque to 55-65 lbs-ft.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-41. Left Rear Engine Mounting Bracket

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Attach engine lifting sling to lifting eyes on engine (fig 2-60).

(3) Connect lifting sling to a suitable hoist and apply a slight strain on engine.

Caution: Exercise care in applying strain supporting engine with hoist to avoid damage to engine components and mounts. Apply only sufficient tension to permit removal of mounting bracket.

(4) Remove bolt, lock washer, and nut securing engine mounting bracket to tractor hull (fig 2-76). Loosen mounting bolt on other side.

(5) Remove oil pressure sending unit and harness mounting brackets from engine mount by removing attaching screws, lock washers, and washers (fig 2-77).

(6) Remove engine mounting bracket from engine by removing six screws and lock washers.

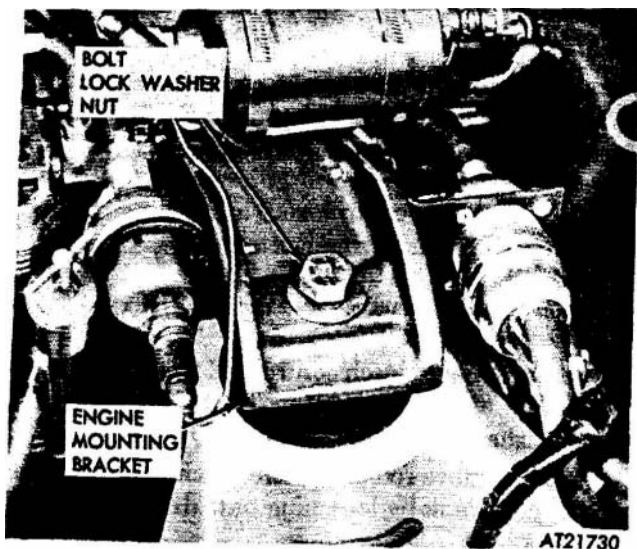


Figure 2-76. Left rear engine mounting bolt.

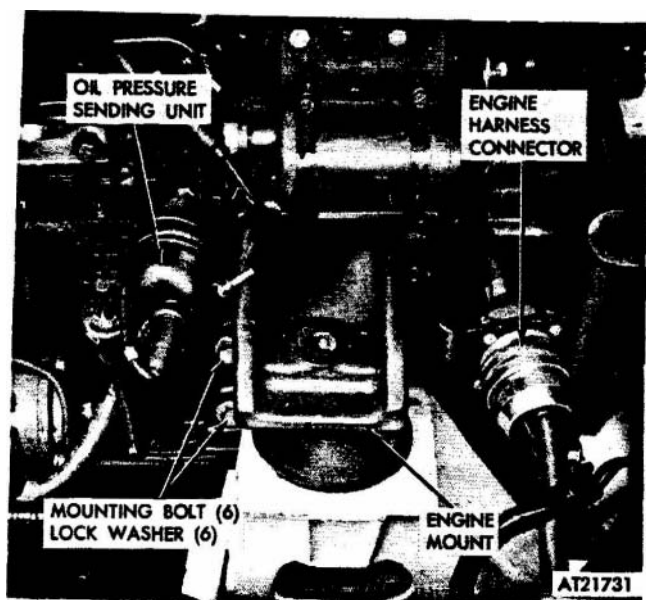


Figure 2-77. Left rear engine mount.

b. Installation.

- (1) Attach engine mounting bracket to engine using six screws and lock washers (fig 2-76).
- (2) Install mounting bolt, lock washer, and nut.
- (3) Relieve strain on engine and remove lifting sling.
- (4) Attach oil pressure sending unit and harness mounting brackets to sides of engine mount with attaching screws, lock washers, and bolts (fig 2-77).
- (5) Tighten both engine mounting bolts and torque to 55-65 **lbs.ft.**

- (6) Close and secure *engine* cover (refer to TM 9-2320-242-10).

2-42. Front Engine Mount (Left and Right)

a. Removal.

- (1) Open and secure engine cover (refer to TM 9-2320-242-10).
- (2) Unfasten tractor canopy and fold canopy over windshield (refer to TM 9-2320-242-10).
- (3) Remove tractor seats (refer to para 2-221).
- (4) Remove console (refer to **para** 2-33).
- (5) Disconnect transmission and transfer coupling by removing screws and lockplates (fig 2-53).
- (6) Attach lifting sling to lifting eyes on engine (fig 2-60).
- (7) Remove bolt from underside of mounting bracket. Loosen four bracket mounting bolts on opposite side (fig 2-59).
- (8) Connect lifting sling to suitable hoist and apply a slight strain.

Caution: Exercise care in supporting engine with hoist to engine components and mounts. Apply only sufficient tension to permit removal of mounting bracket.

- (9) Remove engine mounting bracket by removing four mounting bracket bolts, washers, and nuts (fig 2-59).

Note: Removal of left or right front engine mounting is identical. Remove bolts only on bracket to be removed.

b. Installation.

- (1) Attach mounting bracket to hull with four mounting bolts, washers, and nuts (fig 2-59).
- (2) Release strain on engine and secure bracket to leg on clutch housing with bolt. Bolt *is* inserted from underside.
- (3) Tighten all bolts on both brackets and torque to 55-65 lbs-ft.
- (4) Remove lifting sling from engine.
- (5) Connect transfer and transmission coupling and secure with screws and lock plates (fig 2-53).

Note: Installation of right and left front engine mounting brackets is **identical**.

- (6) Install console (refer to para 2-33).
- (7) Install tractor *seats* (refer to **para** 2-221).
- (8) Install tractor canopy (refer to TM 9-2320-242-10).
- (9) Close and secure engine cover (refer to TM 9-2320-242-10).

Section XIII. CLUTCH LINKAGE

2-43. General

The clutch linkage provides remote clutch control for gear shifting. Periodic adjustment of clutch linkage is necessary to compensate for wear of clutch disc and pressure plate. Clutch pedal free travel of $\frac{1}{2}$ - $\frac{3}{4}$ -inch must be maintained. Free travel is defined as the distance between the clutch pedal released position and the point when the clutch starts to disengage. If free travel is not maintained, slippage occurs between the clutch facings and causes the facings to become worn.

2-44. Clutch Linkage, Pillow Blocks, and Pedal

a. Removal and Disassembly.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove tractor seats (refer to para 2-221).

(3) Remove console (refer to para 2-33).

(4) Remove clutch pedal and flatwasher from

shaft by loosening cap screw, removing spring, and sliding clutch pedal off shaft (fig 2-78).

Note: Stop screws and nuts need not be removed unless replacement is evident

(5) Release control rod from clutch release fork by removing spring, nuts, and adjusting nut (fig 2-52).

Note: Spring bracket need not be removed unless replacement is evident.

(6) Remove clutch control rod from bell crank, located in air duct tunnel by removing cap screw, lock washer, and nut.

(7) Remove rod end from clutch control rod at end of bell crank by loosening nut. Remove rod end and nut.

(8) Remove two links by removing clevis and cotter pins (fig 2-79).

(9) Remove bell crank and two pillow blocks by removing bolts and lock washers.

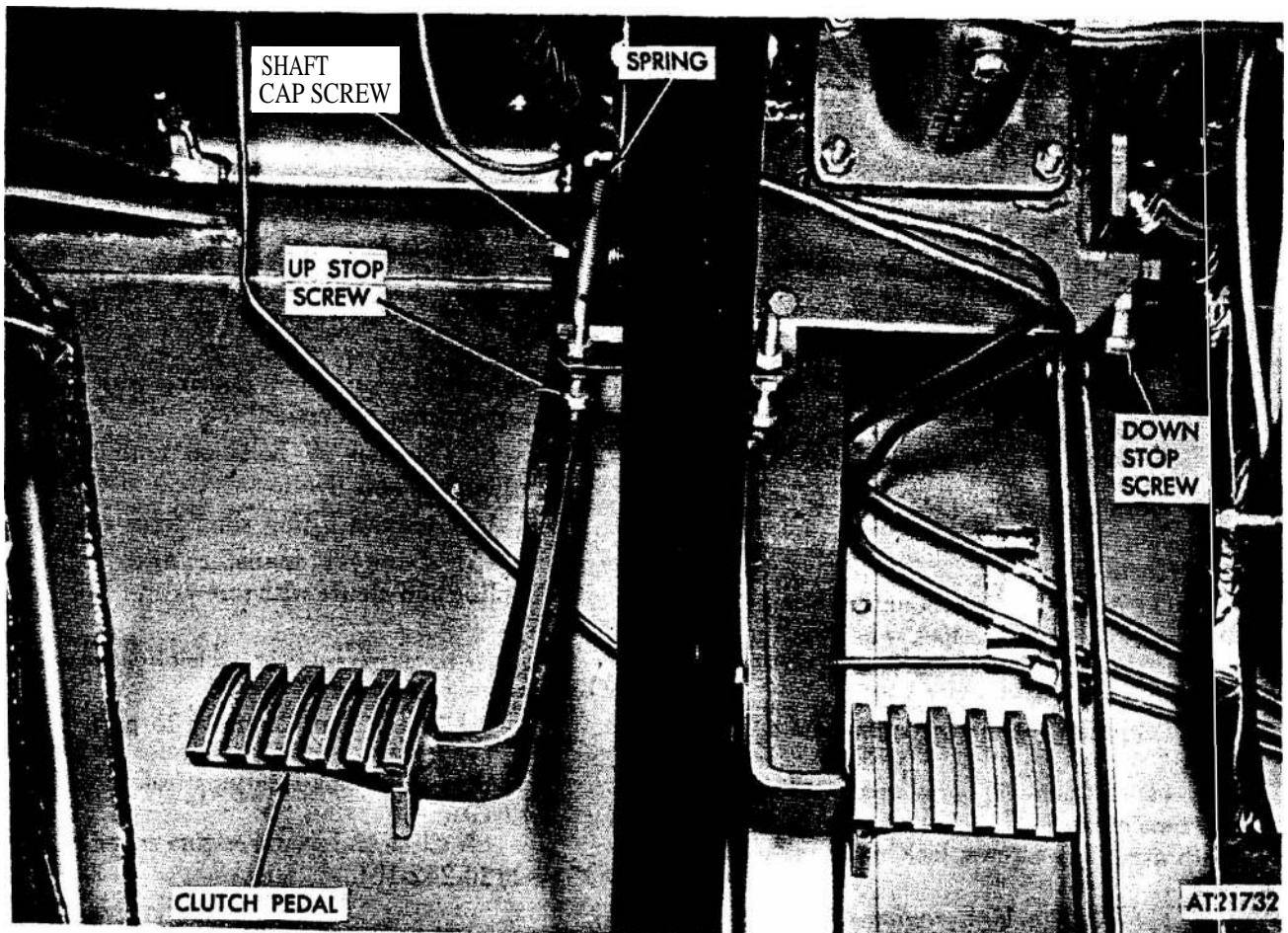


Figure 2-78. Clutch pedal.

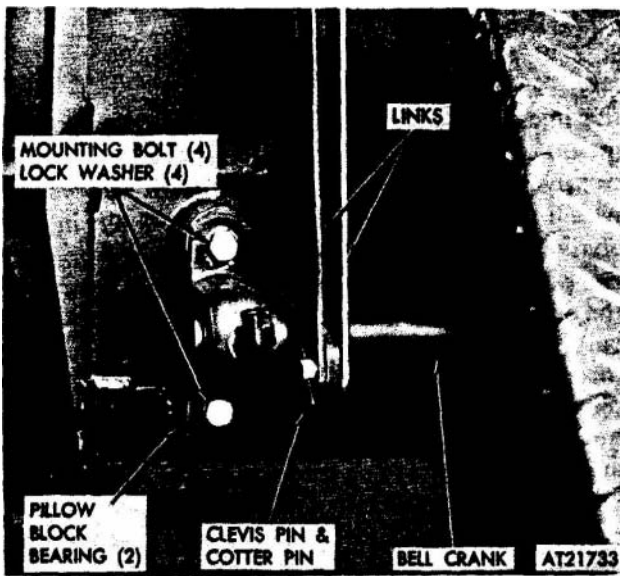


Figure 2-79. Pillow block and bell crank

b. Cleaning, Inspection, and Repair.

(1) *Cleaning.* Clean all parts in approved solvent and dry thoroughly.

(2) *Inspection.* Inspect all parts for breaks, cracks, stripped threads, and other forms of damage.

(3) *Repair.* Repair shall be accomplished by replacement of defective part (refer to TM 9-2320-242-20P).

c. Assembly and Installation.

(1) Attach one pillow block to vehicle frame with two bolts and lock washers (fig 2-79).

(2) Attach bell crank by sliding left end of bell crank into installed pillow block, install remaining pillow block on other end of bell crank, and secure pillow block to vehicle frame within the air duct tunnel with two bolts and lock washers.

(3) Attach two links to either side of tab on shaft and secure with clevis pin and cotter pin. Attach other end of links to left tab on bell crank and secure with clevis pin and cotter pin.

(4) Insert washer on end of shaft. Attach clutch pedal to shaft by sliding pedal on shaft and

securing by tightening cap screw. Attach spring to clutch pedal and vehicle frame (fig 2-78).

(5) If stop screws have been removed, insert in frame, and secure with nuts.

(6) Attach rod end to tab on bell crank with cap screw, lock washer, and nut.

(7) Thread lock nut to last thread on control rod. Thread control rod into rod end and tighten lock nut against rod end.

(8) Attach spring bracket to clutch housing with cap screw and lock washer if bracket was replaced (fig 2-52).

(9) Insert rod in slot of clutch release fork. Attach clutch return spring to clutch release fork and spring bracket.

(10) Refer to clutch linkage adjustment d below.

d. Clutch Linkage Adjustment.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove tractor seats (refer to para 2-221).

(3) Remove console (refer to para 2-33).

(4) Adjust up stop screw until a clearance of 9.08-inches exists between vehicle front wall and clutch pedal in free position (fig 2-78).

(5) Depress clutch pedal and adjust down stop screw until a clearance of $\frac{3}{4}$ -inch exists between vehicle front wall and clutch pedal.

(6) **Loosen** two jam nuts which secure adjusting nut against clutch release fork (fig 2-52).

(7) Push clutch release fork forward against clutch release bearing. Adjust adjusting nut until a clearance of $\frac{1}{16}$ -inch exists between front of adjusting nut and clutch release fork. Tighten jam nuts.

(8) Check Lee travel of clutch pedal. Proper linkage adjustment will result in $\frac{1}{2}$ - $\frac{3}{4}$ -inch pedal free travel.

(9) Install console (refer to para 2-33).

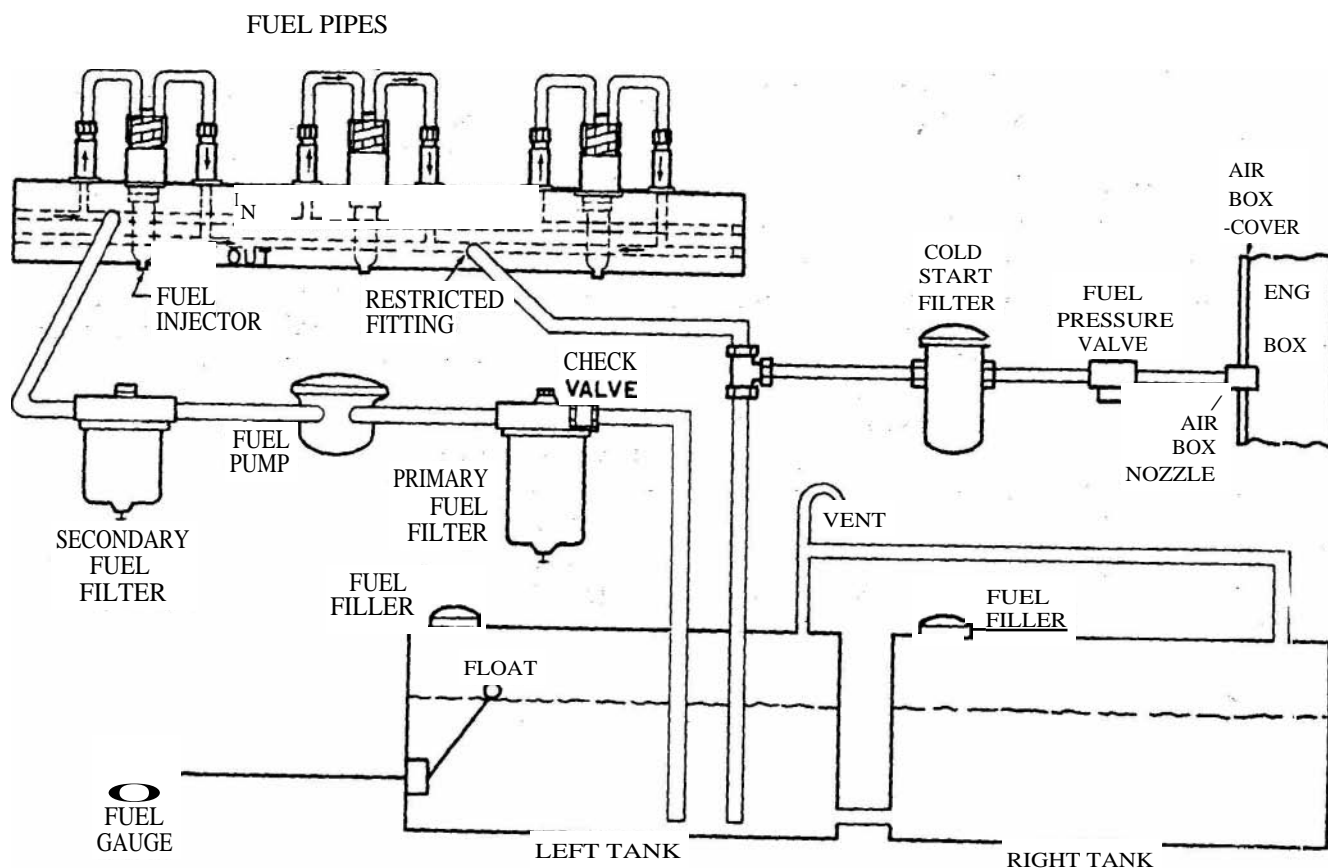
(10) Install tractor seats (refer to para 2-221).

(11) Close and secure engine cover (refer to TM 9-2320-242-10).

2-45. General

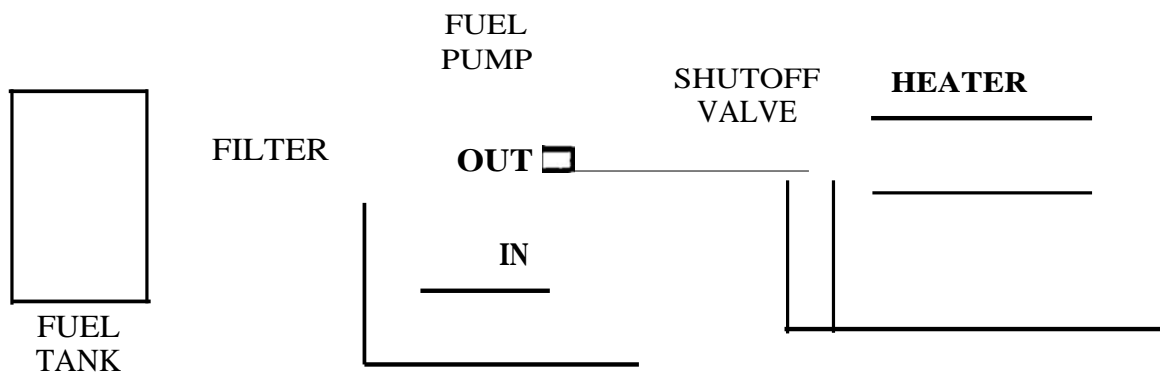
The fuel and air system provides for a proper mixture of filtered fuel and air to produce engine combustion. The forced fresh air is also used for blowing exhaust gases out of the combustion chambers. Two 20-gallon capacity fuel tanks are located above the running boards on the right and left sides of the tractor. Fuel is drawn through a closed loop of rigid tubing and hose assemblies to the engine from the left tank which contains the fuel quantity transmitter. The tanks are interconnected by a transfer line. Two replaceable-element filters (primary and secondary) remove water and contaminants from the fuel prior to reaching the injectors. A positive displacement fuel pump is mounted between the primary and secondary filters. The injectors force metered amounts of fuel directly into each engine cylinder. The injectors are mechanically controlled through the limiting-speed governor. Fuel not required for combustion cools

the injectors as it is returned to the fuel tanks by means of the return manifold and line. A cold weather starting aid is incorporated in the system which permits preheating of fuel and air in the engine air box to aid in engine starting. The cold start switch starts an air pump which forces air into the engine air box and also actuates a fuel pressure valve which permits fuel from the return line to flow through the cold start filter to the air box. Simultaneously an igniter plug fires the mixture of fuel and air in the air box. The preheated mixture is drawn from the air box into the engine cylinders to be compressed and ignited with fuel supplied by the engine injectors to start the engine. The air box drain provides for drainage of condensation, oil, and fuel residue. The overall fuel system schematic is illustrated in figure 2-80, and the fuel system schematic for the M792 ambulance carrier heater is illustrated in figure 2-81.



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Figure 2-80. Fuel system schematic.



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Figure 2-81. M792 ambulance carrier heater fuel system.

2-46. Fuel Pump

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place identification tags on fuel inlet and outlet lines and disconnect lines by loosening nuts on fittings. Cap fuel lines to prevent spillage (fig 2-82).

Warning: Do not allow sparks or open flame near open fuel system.

(3) Remove battery ground cable (negative) from battery by loosening clamp.

(4) Remove fuel pump and pump coupling fork from engine by removing three bolt and washer assemblies.

(5) Remove fuel pump coupling fork from fuel pump shaft by sliding fork off shaft.

(6) Remove and discard fuel pump-to-engine gasket.

Note: It is not necessary to remove fittings unless replacement of fittings or pump is evident



Figure 2-82. Fuel pump.

b. *Test.* Install tachometer test set to blower drive gear. Test for proper fuel pressure. Fuel pump pressure can be checked by inserting suitable fuel pressure gauge between the fuel intake manifold and the fuel tube. Pressure should register between 50 and 70 PSI at 1.800 engine RPM. If pressure is below 50 PSI or above 80 PSI replace defective pump. Remove tachometer kit.

c. *Installation.*

- (1) Slide coupling fork on fuel pump shaft.
- (2) Place gasket on fuel pump mounting flange and position fuel pump on engine.

Note: Ensure that pump coupling fork is properly engaged with drive.

- (3) Secure fuel pump to engine with three bolt and washer assemblies, tighten bolts evenly (fig 2-82).
- (4) Install fitting in fuel pump (if removed) and position correctly to accept fuel lines.
- (5) Connect inlet and outlet fuel lines to their respective fittings and secure by tightening nuts.
- (6) Start engine (refer to TM 9-2320-242-10). Check for leaks.
- (7) Stop engine; close and secure engine cover (refer to TM 9-2320-242-10).

2-47. Fuel Tank

a. *Removal.*

- (1) Park vehicle in a level position or with the front slightly higher than rear.
- (2) Remove battery box and tray (refer to para 2-80).

Note: This procedure is written for the left-hand tank. Application for **right-hand** tank is identical except for fuel level transmitter and inlet-outlet tubes.

- (3) Place a suitable clean container under fuel tank, open draincock, and allow fuel to drain (fig 2-

83). If fuel has not been contaminated, save for re-use.

Warning: Do not allow sparks or flame near work area.

- (4) Disconnect inlet-outlet fuel tube assemblies from left fuel tank adapters by loosening nuts on fittings (fig 2-84).

Note: Identify tubes to facilitate replacement.

- (5) Disconnect vent tube from tank by loosening nut on fitting.
- (6) Disconnect fuel cross-over tube from tank by loosening nut on fitting (fig 2-83).
- (7) Disconnect electrical connector from fuel level transmitter on left-hand tank (fig 2-84).
- (8) Remove tank from tractor by removing eight bolts and washers.
- (9) Repeat procedure for removing right-hand tank.

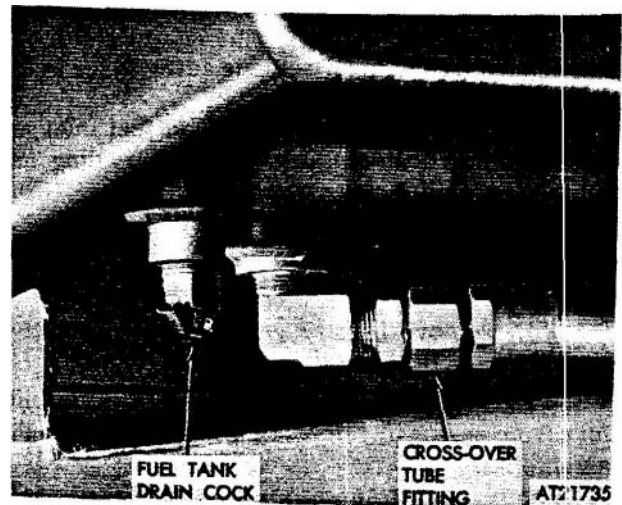
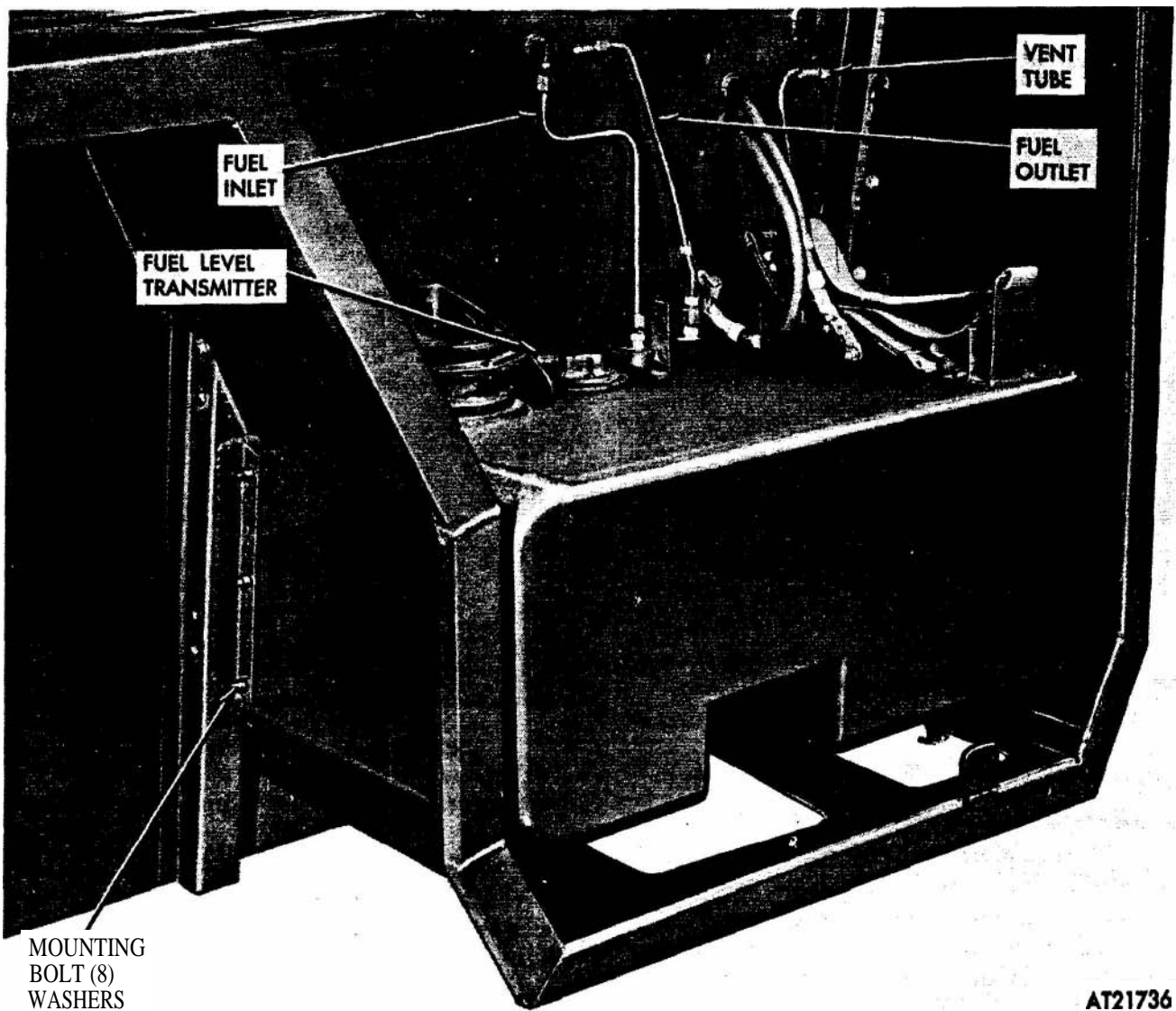


Figure 2-83. Fuel tank drain.



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Figure 2-84. Fuel tank disconnect.

b. Installation.

(1) Attach tank to tractor with eight bolts and washers (fig 2-84).

Note: This procedure is written for the left-hand tank. Application for the right-hand is identical except for fuel level transmitter and inlet-outlet tubes.

(2) Connect fuel cross-over tube to bottom adapter fitting and secure by tightening nut on fitting.

(3) Connect fuel tank vent tube and secure by tightening nut on fitting.

(4) Connect inlet-outlet tubes to proper adapter fittings on left-hand tank and secure by tightening nuts.

(5) **Connect** electrical connector to fuel level transmitter on left-hand tank.

(6) Install battery box and tray (refer to para 2-80b).

(7) Repeat procedure for right-hand tank.

(8) Refill fuel tanks (refer to TM 9-2320-242-10).

2-48. Fuel Tank Filler Neck

a. Removal.

(1) Twist filler cap counterclockwise and remove from tank (fig 2-85).

Warning: Do not allow sparks or flame near work area.

(2) Remove filler neck and gasket by removing six screws and washers. Discard gasket.

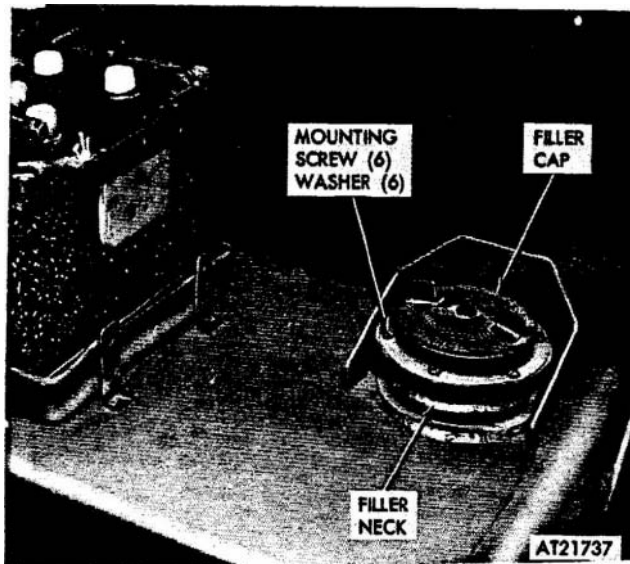


Figure 2-85. Fuel tank filler neck.

b. Installation.

(1) Install gasket and filler neck on fuel tank, secure with six screws and washers (fig 2-85).

(2) Replace filler cap and secure by twisting in place.

2-49. Primary Fuel Filter

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under fuel filter. Loosen filler plug, open draincock, and allow fuel to drain. Close draincock, install filler plug, and tighten finger-tight (fig 2-86).

Warning: Do not allow sparks or flame near work area.

(3) Disconnect inlet-outlet tubes from filter by loosening nuts on tubes. Remove two fittings from filter cover. Cap all openings.

(4) Remove fuel filter from firewall by removing two screws, lock washers, and nuts.

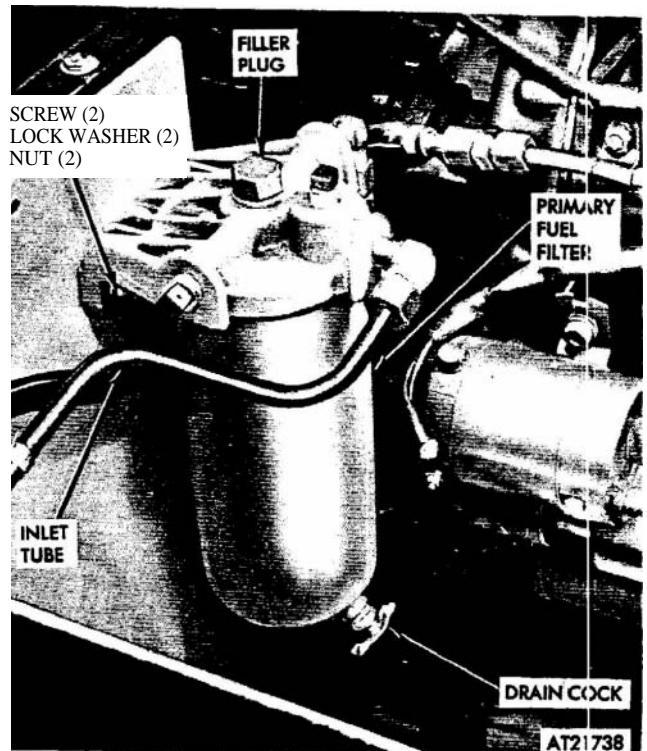


Figure 2-86. Primary fuel filter.

b. Repair. Repair consists of replacement of filter element.

c. Installation.

(1) Attach primary fuel filter assembly to firewall with two screws, lock washers, and nuts (fig 2-86).

(2) Apply thin teflon tape (MIL-T-27730A) to threads of two filter cover fittings. Install fittings to filter cover.

(3) Connect inlet-outlet tubes to fittings and secure by tightening nuts on tubes.

(4) Remove filler plug and fill filter with fuel. Install and tighten filler plug. Ensure that draincock is tight.

Warning: Do not allow sparks or flame near work area.

(5) Start engine (refer to TM 9-2320-242-10). Check primary fuel filter for leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-50. Primary Fuel Filter Element

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-101).

(2) Place a suitable container under primary fuel filter. Loosen filler plug, open draincock, and allow fuel to drain (fig 2-86).

Warning: Do not allow sparks or flame near work area.

(3) Remove shell, filter element, and gasket by supporting shell with one hand and unscrewing filter cover screw. Discard element and gasket.

(4) Clean filter shell in cleaning solvent and dry.

(5) Remove and discard cover screw gasket.

b. Installation.

(1) Insert new cover screw gasket under head of cover screw (fig 2-86).

(2) Insert filter element into shell and insert gasket in recessed rim of shell.

(3) Attach shell to cover and secure with cover screw. Ensure that cover screw and shell gaskets are in place.

(4) Remove filler plug and fill filter with fuel. Install and tighten filler plug. Ensure that draincock is tight.

Warning: Do not allow sparks or flame near work area.

(5) Start engine (refer to TM 9-2320-242-10). Check for leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-51. Secondary Fuel Filter

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under fuel filter. Loosen filler plug, open draincock, and allow fuel to drain (fig 2-87).

Warning: Do not allow sparks and flame near work area.

(3) Disconnect fuel inlet-outlet tubes from filter by loosening nuts on tubes. Remove two fittings from filter cover. Cap all openings.

(4) Remove fuel filter from engine by removing two bolts and lock washers.

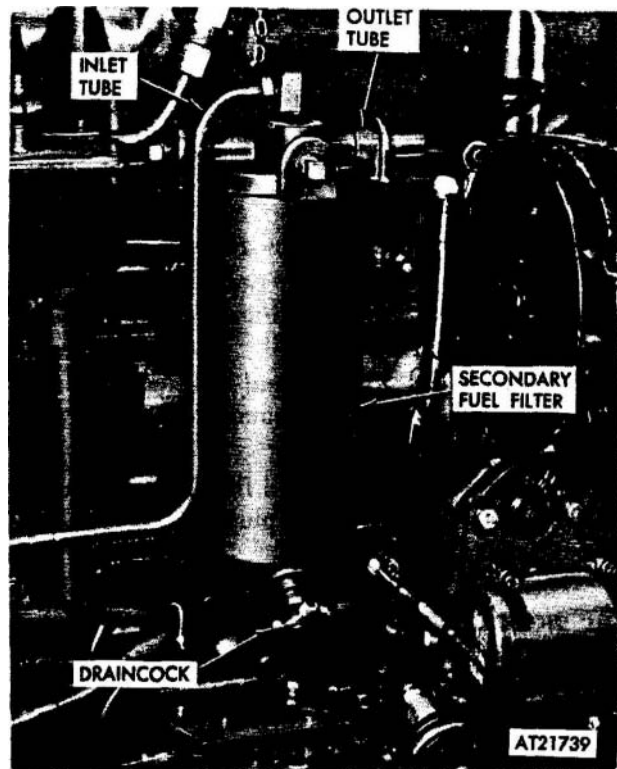


Figure 2-87. Secondary fuel filter.

b. Repair. Repair shall be accomplished by replacing defective parts.

c. Installation.

(1) Attach secondary fuel filter assembly to engine with two bolts and lock washers (fig 2-87).

(2) Apply thin teflon tape (MIL-T-27730A) to threads of two filter cover fittings. Install fittings to filter cover.

(3) Connect inlet-outlet tubes to fittings and secure by tightening nuts on tubes.

(4) Remove filler plug and fill filter with fuel. Install and tighten filler plug. Ensure that draincock is tight.

Warning: Do not allow sparks or fuel near work area.

(5) Start engine (refer to TM 9-2320-242-10). Check secondary fuel filter for leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-52. Secondary Fuel Filter Element

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under secondary fuel filter. Loosen filler plug, open draincock, allow fuel to drain (fig 2-87).

Warning: Do not allow sparks or flame near work area.

(3) Remove shell, filter element, and gasket by

supporting shell with one hand and **unscrewing** filter cover screw. Discard element and gasket.

(4) Clean filter shell in cleaning solvent and

y.

(5) **Remove** and discard cover screw gasket.

b. Installation.

(1) Insert new cover screw gasket under head of cover screw (fig 2-87).

(2) Insert filter element into shell and insert gasket in recessed rim of shell.

(3) Attach shell to cover and secure with cover screw. Ensure that cover screw and shell gaskets are in place.

(4) Remove filler plug and fill filter with fuel. Install and tighten filler plug. Ensure that draincock is tight.

Warning: Do not allow spark or flame near work area.

(5) Start engine (refer to TM 9-2320-242..10). Check for leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-53. Fuel Tank Lines and Fittings

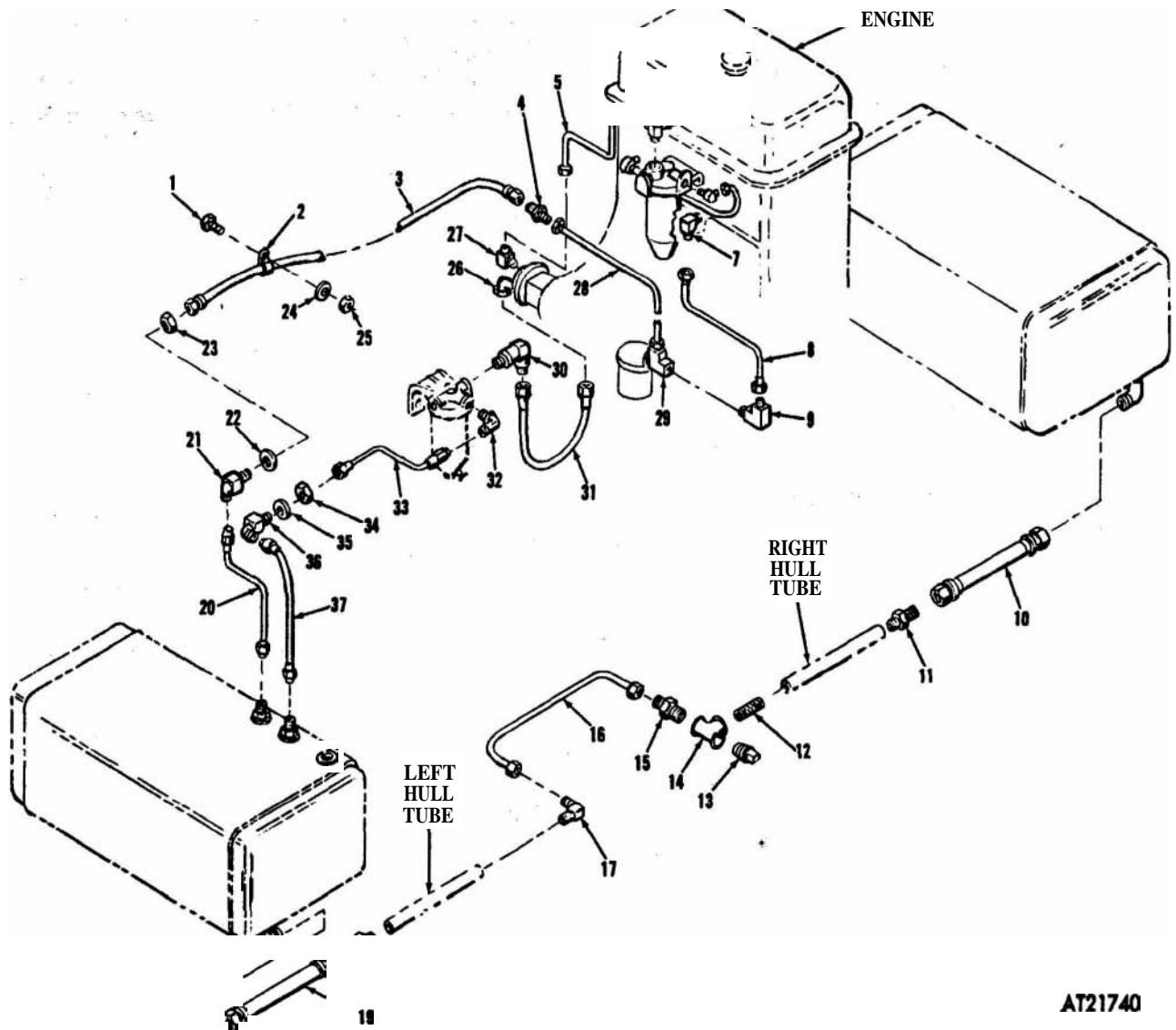
a. Removal. For replacement of a particular item, disassemble only to that point required for item removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under fuel tanks, open draincocks, and drain fuel from tanks.

Warning: Do not allow sparks or flame near work area.

(3) Disconnect clamp (2, fig 2-88) by removing screw (1), nut (25), and washer 124). Disconnect hose (3) from adapter (4) and elbow (21). Remove adapter (4) from tube (28).



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- | | |
|----------------------|-----------------------|
| 1 - Screw | 20 - Fuel tube |
| 2 - Clamp | 21 - Elbow |
| 3 - Fuel return hose | 22 - Washer |
| 4 - Adapter | 23 - Nut |
| 5 - Inlet tube | 24 - Washer |
| 6 - Elbow | 25 - Nut |
| 7 - Elbow | 26 - Elbow |
| 8 - Fuel return tube | 27 - Elbow |
| 9 - Elbow | 28 - Fuel return tube |
| 10 - Hose | 29 - Tee |
| 11 - Adapter | 30 - Elbow |
| 12 - Adapter | 31 - Hose |
| 13 - Plug | 32 - Elbow |
| 14 - Tee | 33 - Tube |
| 15 - Adapter | 34 - Nut |
| 16 - Crossover tube | 35 - Washer |
| 17 - Elbow | 36 - Elbow |
| 18 - Adapter | 37 - Tube |
| 19 - Hose | |

Figure 2-88. Fuel tank lines and fittings.

(4) Disconnect tube (5) from elbows (6 and 27). Disconnect tube (8) from elbows (7 and 9). Remove elbows.

(5) Disconnect hose (10) from fuel tank and adapter (11). Remove adapter (11) from right hull tube.

(6) Disconnect tube (16) from adapter (15) and elbow (17). Remove adapters (12 and 15), plug (13), and tee (14) from right hull tube.

(7) Disconnect hose (19) from fuel tank and adapter (18). Remove elbow (17) and adapter (18) from left hull tube.

(8) Disconnect tubes (20 and 37) from fuel tank and elbows (21 and 36). Disconnect tube (33) from elbows (32 and 36). Disconnect elbows (21 and 36) from hull by removing nuts (23 and 34) and washers (22 and 35).

(9) Disconnect tube (31) from elbows (26 and 30) and remove elbows (26, 30 and 32). Disconnect tube (28) and tee (29).

b. Installation. Coat all threads lightly with thread sealant (MIL-S-45180) prior to installation.

(1) Install elbows (26, 30, and 32, fig 2-88). Connect tube (31) to elbows (26 and 30). Install tee (29) and connect tube (28) to tee.

(2) Position elbows (21 and 36) in hull and secure with nuts (23 and 34) and washers (22 and 35). Connect tube (33) to elbows (32 and 36). Connect tubes (20 and 37) to fuel tank and elbows (21 and 36).

(3) Install elbow (17) and adapter (18) in left hull tube. Connect hose (19) to fuel tank and adapter (18).

(4) Install adapters (11 and 12) in right hull tube. Connect hose (10) to fuel tank and adapter (11).

(5) Connect tee (14) to adapter (12) and connect plug (13) and adapter (15) to tee. Connect tube (16) to adapter (15) and elbow (17).

(6) Install elbows (6, 7, 9, and 27) and connect tubes (5 and 8) to elbows.

(7) Install adapter (4) in tube (28). Connect hose (3) to adapter (4) and elbow (21). Connect clamp (2) to hose and secure with screw (11, nut (25), and washer (24).

(8) Fill fuel tanks (refer to TM 9-2320-242-10).

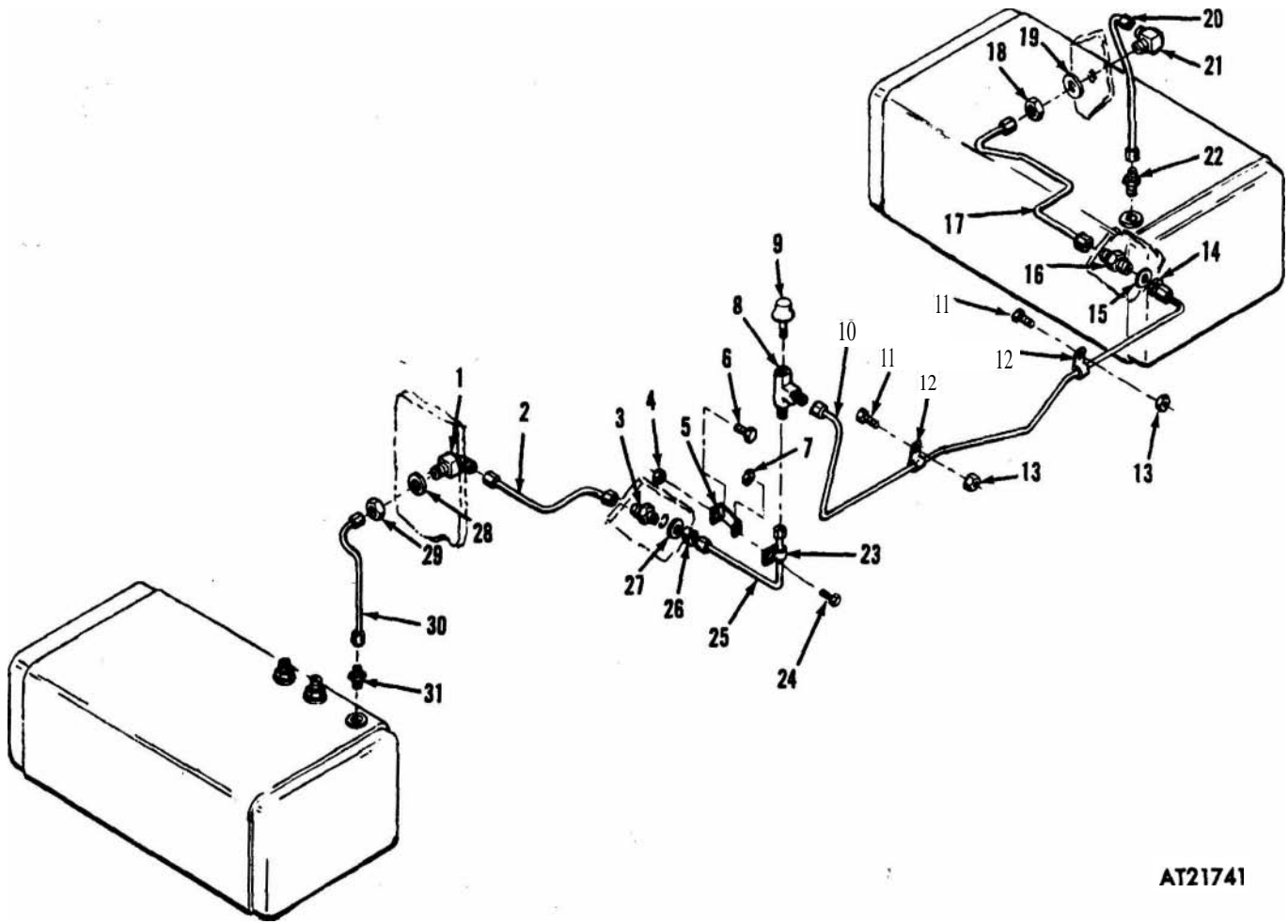
(9) Start engine (refer to TM 9-2320-242.10). Check for leaks. Stop engine.

(10) Close and secure engine cover (refer to TM 9-2320-242-10).

2-54. Fuel Tank Vent Lines and Fittings

a. Removal. For replacement of a particular item, disassemble only to that point required for item removal.

(1) Remove tube (30, fig 2-89) from elbow (1) and adapter (31) by loosening nuts on tube (30). Unscrew adapter (31) from fuel tank.



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- | | |
|-----------------|--------------|
| 1 - Elbow | 17 - Tube |
| 2 - Tube | 18 - Nut |
| 3 - Adapter | 19 - Washer |
| 4 - Nut | 20 - Tube |
| 5 - Bracket | 21 - Elbow |
| 6 - Screw | 22 - Adapter |
| 7 - Nut | 23 - Clamp |
| 8 - Tee | 24 - Screw |
| 9 - Vent cover | 25 - Tube |
| 10 - Tube | 26 - Nut |
| 11 - Screw (21) | 27 - Washer |
| 12 - Clamp | 28 - Washer |
| 13 - Nut (2) | 29 - Nut |
| 14 - Nut | 30 - Tube |
| 15 - Washer | 31 - Adapter |
| 16 - Adapter | |

Figure 2-89. Fuel tank vent lines and fittings.

(2) Remove tube (2) from elbow (1) and adapter (3) by loosening nuts on tube (2).

(3) Remove elbow (1) from bulkhead by removing nut (29) and washer (28).

(4) Remove tube (25) from adapter (3) and tee (8) by loosening nuts on tube (25) removing screw (24), nut (7) and removing clamp (23).

(5) Remove adapter (3) from bulkhead by removing nut (26) and washer (27). Remove bracket (5) from bulkhead by removing screw (6) and nut (4).

(6) Remove tee (8) from end of tube (10) by loosening nut on end of tube (10). Unscrew vent cover (9) from tee (8). Disconnect tube (10) by loosening nut at other end of tube (10). Remove tube (10) by removing two screws (11), two nuts (13), and two clamps (12).

(7) Remove tube (17) from elbow (21) and adapter (16) by loosening two nuts on tube (17). Remove tube (20) from adapter (22) and elbow (21) by loosening two nuts on tube (20).

(8) Remove adapter (16) from bulkhead by removing nut (14) and washer (15). Remove elbow (21) from bulkhead by removing nut (18) and washer (19). Unscrew adapter (22) from fuel tank.

b. Installation. Coat all threads lightly with thread sealant prior to installation.

(1) Install adapter (22, fig 2-89) into fuel tank. Install elbow (21) to bulkhead with washer (19) and nut (18). Install adapter (16) to bulkhead with washer (15) and nut (14).

(2) Attach tube (20) to adapter (22) and elbow (21), secure by tightening nuts on tube (20). Attach

tube (17) to elbow (21) and adapter (16), secure by tightening nuts on tube (17).

(3) Thread vent cover (9) into tee (8), and attach tee (8) to end of tube (10). Attach other end of tube (10) to adapter (16), secure by tightening nuts at ends of tube (10). Attach tube (10) to bulkhead with two clamps (12), two screws (11), and two nuts (13).

(4) Attach adapter (3) to bulkhead with washer (27) and nut (26). Connect tube (25) to adapter (3) and tee (8). Attach bracket (3) to bulkhead with screw (6) and nut (4). Attach tube (25) to bracket (5) with screw (24) and nut (7).

(5) Attach elbow (1) to bulkhead with washer (28) and nut (29).

(6) Attach tube (2) to adapter (3) and elbow (1) and tighten nuts to tube (2).

(7) Thread adapter (31) into fuel tank. Attach tube (30) to adapter (31) and **elbow** (1) and tighten nuts on tube (30).

2-55. M792 Ambulance Carrier Heater Fuel Lines and Fittings

a. Removal. For replacement of *a particular* item, disassemble only to that point required for item removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

Warning: Do not allow sparks or flame near work area.

(2) Remove tube assembly (1, fig 2-90) from adapter (2) and tee on fuel tank crossover line by loosening nuts on tube (1). Unscrew elbow (29) from tee on crossover line.

LEGEND for figure 2-90:

1 - Tube
2 - Adapter
3 - Fuel filter
4 - Lock washer
5 - Nut
6 - Adapter
7 - Tube
8 - Tube
9 - Nipple
10 - Tube
11 - Nut
12 - Lock washer
13 - Screw
14 - Fuel pump
15 - Reducer

16 - Adapter
17 - Adapter
18 - Elbow
19 - Coupling
20 - Inter-vehicle fuel hose
21 - Adapter
22 - Tube
23 - Valve
24 - Tube
25 - Nut
26 - Washer
27 - Washer
28 - Elbow
29 - Elbow
30 - Screw

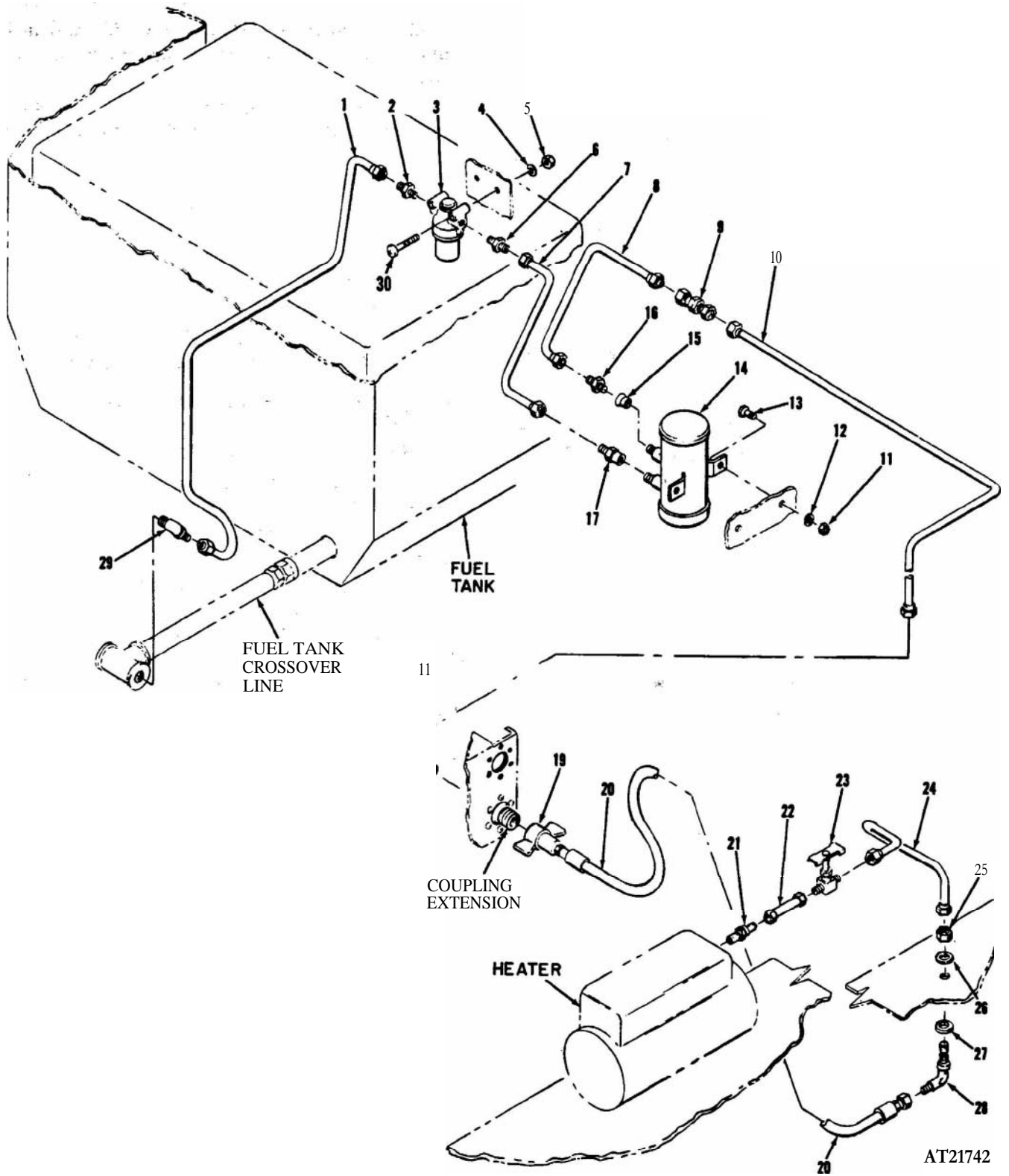


Figure 2-90. M792 ambulance carrier heater fuel lines and fittings.

(3) Remove tube (7) from adapter (6) and adapter (17) by loosening nuts on tube (7).

(4) Unscrew two adapters (2 and 6) from fuel filter (3) and adapter (17) from fuel pump (14).

(5) Remove tube (8) from adapter (16) and nipple (9) by loosening nuts on tube (8).

(6) Unscrew adapter (16) and reducer (15) from fuel pump (14). Unscrew nipple (9) from tube (10).

(7) Remove tube (10) from elbow (18) by loosening nut on end of tube (10). Unscrew elbow (18) from coupling (19).

Note: It is not necessary to remove flange unless replacement is evident

(8) Disconnect coupling (19) from inter-vehicle fuel hose (20). Remove fuel hose (20) by loosening nut on hose fitting.

(9) Remove tube (24) from elbow (28) in carrier floor and heater fuel shut-off valve (23) by loosening nuts on ends of tube (24).

(10) Remove elbow (28) from carrier floor by removing nut (25) and two washers (26 and 27).

(11) Unscrew shut-off valve (23) from tube (22) on heater assembly.

(12) Unscrew tube (22) and adapter (21) from heater assembly.

b. Installation. Coat all threads lightly with thread sealant prior to installation.

(1) Attach adapter (21, fig 2-90) and tube (22) to heater assembly. Attach shut-off valve (23) to heater tube (22).

(2) Install elbow (28) to carrier floor and

secure with nut (25) and two washers (26 and 27).

(3) Attach tube (24) to elbow (28) and fuel shut-off valve (23). Secure by tightening nuts on table.

(4) Connect coupling (19) to coupling extension. Thread elbow (18) into coupling extension.

(5) Attach tube assembly (10) to elbow (18) and tighten nut. Thread nipple (9) to other end of tube assembly (10).

(6) Attach reducer (15) and adapter (16) to fuel pump (14).

(7) Attach tube (8) to adapter (16) and nipple (9). Secure by tightening nuts on tube (8).

(8) Attach adapter (17) to fuel pump (14).

2-56. M792 Ambulance Carrier Heater fuel Filter

a. Removal.

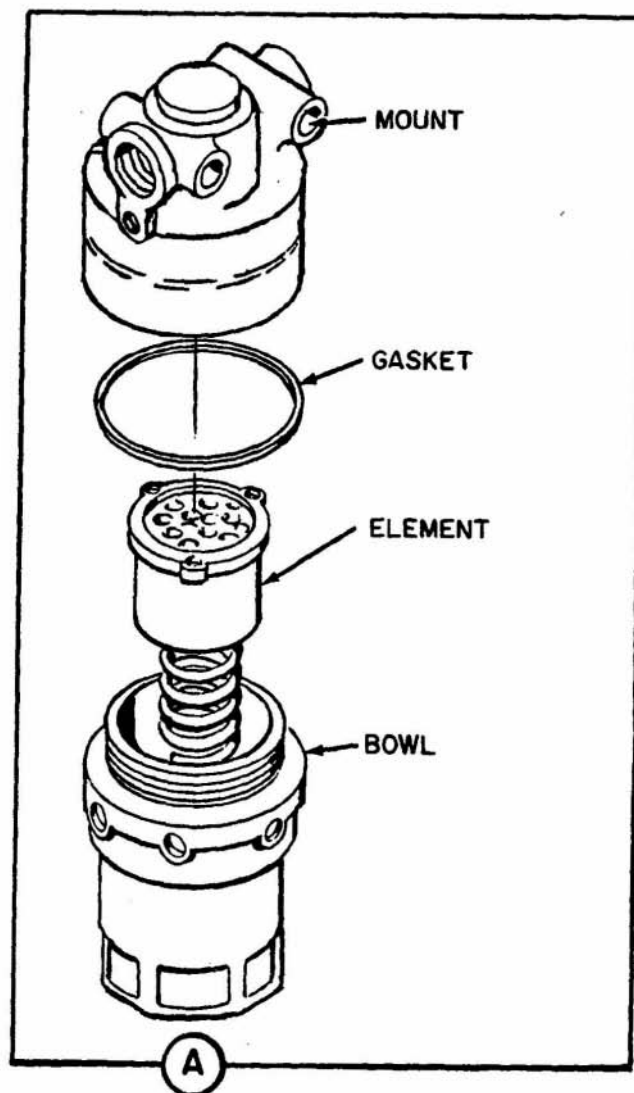
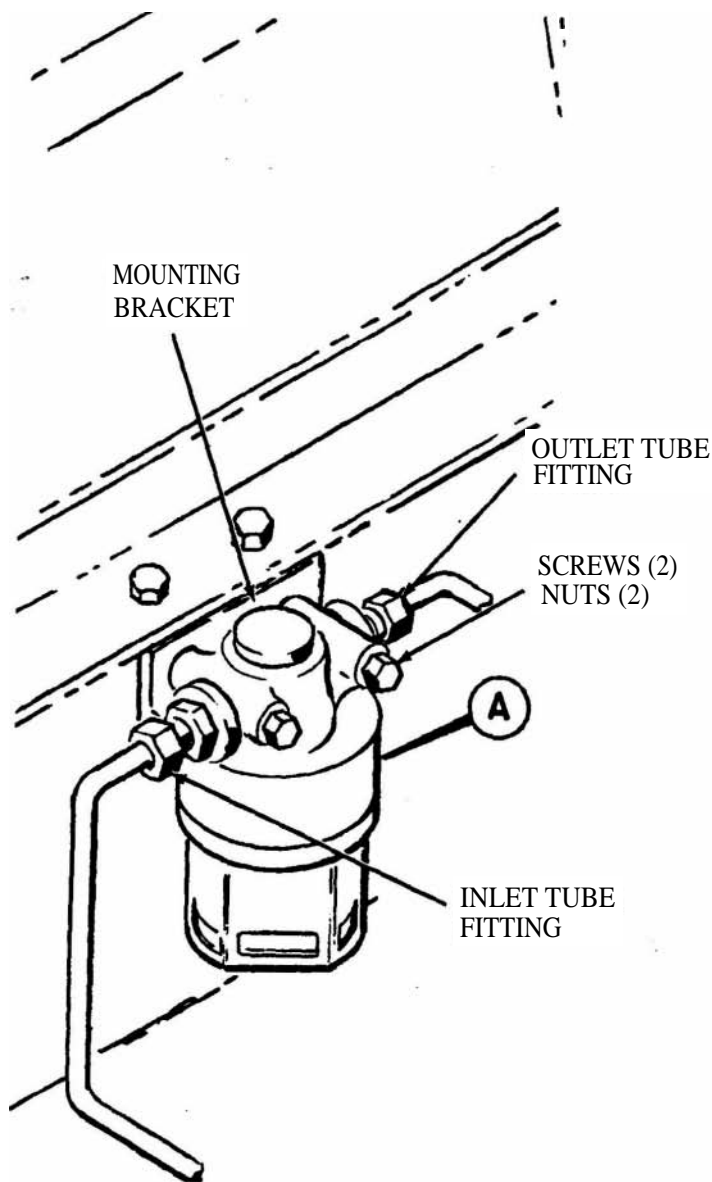
(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under heater fuel filter (fig 2-91).

(3) Disconnect inlet and outlet tubes from filter by loosening nuts on tube fittings. Unscrew two adapters from filter. Cap all openings to prevent spillage.

Warning: Do not allow sparks of flame near work area.

(4) Remove filter assembly from engine compartment wall mounting bracket by removing two screws and nuts.



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Figure 2-91. M792 ambulance carrier heater fuel filter.

b. Installation.

(1) Attach filter assembly to mounting bracket on wall of engine compartment with two screws and nuts.

(2) Attach two adaptors to inlet and outlet holes.

(3) Connect tubes to their respective fittings and tighten nuts on tube fittings.

(4) Start engine (refer to TM 9-2320-242-10). Check for leaks. Stop engine.

(5) Close and secure engine cover (refer to TM 9-2320-242-10).

2-57. M792 Ambulance Carrier Heater Fuel Filter Element

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under heater fuel filter (fig 2-91).

(3) Unscrew filter bowl from cap and remove gasket and filter element.

Warning: Do not allow sparks or flame near work area.

b. Service. Service shall be accomplished by cleaning the filter element with approved cleaning solvent. If element does not clean satisfactorily, replace with a good one.

c. Installation.

(1) Insert filter element in filter bowl, align gasket with filter body and cap, and screw filter

bowl into filter cap.

(2) Start heater (refer to TM 9-2320-242-10). Check for leaks. Stop engine.

(3) Close and secure engine cover (refer to TM 9-2320-242-10).

2-58. M792 Ambulance Carrier Heater Fuel Pump

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Place a suitable container under heater fuel pump (fig 2-92).

(3) Disconnect inlet and outlet tubes from fuel pump by loosening nuts on tube fittings. Cap all openings.

Warning: Do not allow sparks or flame near work area.

(4) Disconnect electrical connector from fuel pump.

(5) Remove cable clamp securing fuel pump wire by removing bolt on tractor frame.

(6) Remove fuel pump assembly from tractor wall by **removing two screws and nuts.**

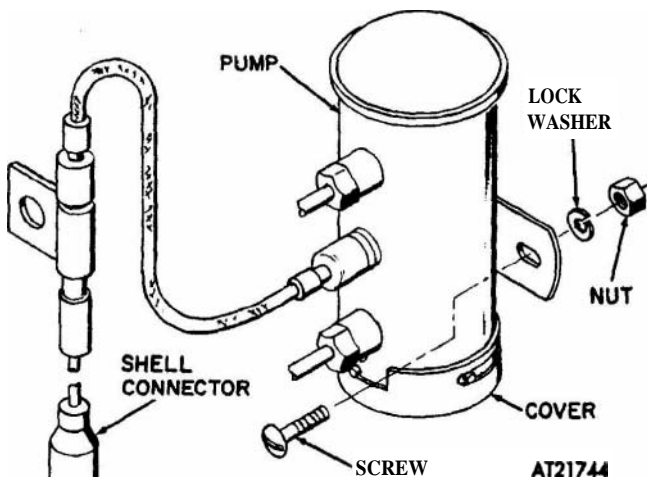


Figure 2-92. M792 ambulance carrier heater fuel pump.

b. Installation.

(1) Attach fuel pump to tractor wall with two screws and nuts.

(2) Connect inlet and outlet tubes to their respective fittings on fuel pump. Secure by

tightening nuts on tube fittings.

(3) Connect harness electrical connector to fuel pump wire connector. Secure cable to tractor with existing bolt.

(4) Start heater (refer to TM 9-2320-242-10). Check for leaks. Stop engine.

(5) Close and secure engine cover (refer to TM 9-2320-242-10).

2-59. M792 Ambulance Carrier Heater Fuel Pump Service

a. Removal.

(1) Remove fuel pump bottom cover, cover gasket, magnet, and filter element by twisting bottom cover off pump cover (fig 2-92).

Warning: Do not allow sparks or flame near work area.

b. Service.

(1) Wash parts with an approved cleaning solvent. Do not damage screen. Inspect screen for bends or torn mesh. Replace any defective parts.

(2) Clean any metallic particles from magnet.

c. Installation

(1) Install bottom cover, cover gasket, magnet, and filter element to pump cover. Secure by twisting bottom cover on pump cover.

2-60. Air Cleaner Assembly

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove air cleaner assembly (refer to para 2-35).

b. Installation.

(1) Install air cleaner assembly (refer to para 2-35).

(2) Close and secure cover (refer to TM 9-2320-242-10).

2-61. Air Cleaner Element

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove air cleaner shell and element (refer to para 2-35).

(3) Remove filter element by loosening captive wing nut at top of air cleaner shell (fig 2-93).

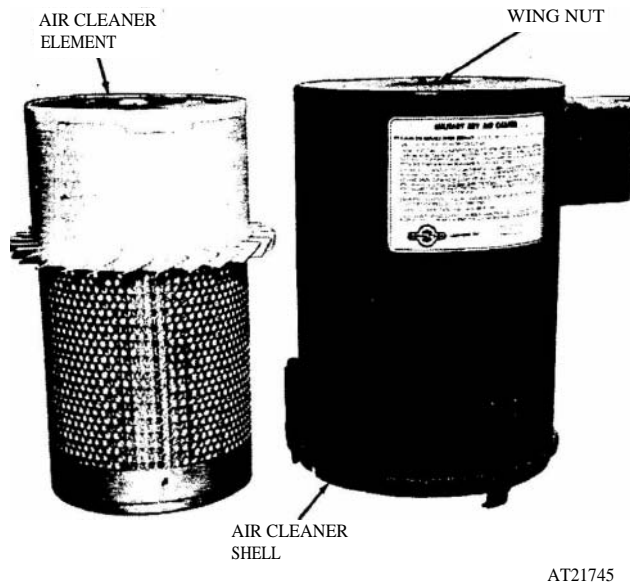


Figure 2-93. Air cleaner element replacement.

b. Installation.

11) Insert filter element in air cleaner shell and tighten wing nut.

12) Install air cleaner shell and element (refer to para 2-35).

13) Close and secure engine cover (refer to TM 9-2320-242-10).

2-62. Air Cleaner Vacuator Valve

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove vacuator valve from bottom of air cleaner by loosening clamp (fig 2-71).

b. Installation.

(1) Attach vacuator valve to air cleaner and secure by tightening clamp (fig 2-71).

(2) Close and secure engine cover (refer to TM 9-2320-242-10).

2-63. Air Cleaner Lines

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove air restriction indicator line (fig 2-93) from air cleaner base and fitting on floor-to-hose tube assembly.

(3) Remove crankcase breather tube by loosening fittings at air cleaner base and rocker arm cover. Remove hold-down clamps.

b. Installation.

(1) Attach breather tube to fittings on rocker arm cover and air cleaner base. Secure by tightening nuts. Attach hold-down clamps.

(2) Attach air restriction indicator line to fittings on air cleaner base and union on floor-to-hose tube assembly.

(3) Close and secure engine cover (refer to TM 9-2320-242-10).

2-64. Air Box Drain Tube

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove drain tube from tee fitting in engine air box by loosening connector nut. Pull tube up and out of retaining clip (fig 2-551).

(3) Disconnect brake air tube from tee fitting by loosening connector nut.

(4) Unscrew and remove tee fitting from engine block.

b. Service. Servicing the air box drain tube shall consist of cleaning the tube and tee fitting.

c. Installation.

(1) Attach tee fitting to engine block and position tee approximately 45 degrees from a horizontal position (fig 2-55).

(2) Insert drain tube through retaining clip and secure tube to lower end of tee fitting. Tighten connector nut.

(3) Attach brake air tube to upper end of tee fitting and secure by tightening connector nut.

(4) Start and operate engine (refer to TM 9-2320-242-10). Check drain tube for discharge of air. Stop engine.

(5) Close and secure engine cover (refer to TM 9-2320-242-10).

2-65. Accelerator Pedal, Throttle Spring, and Linkage

a. Removal and Disassembly. If removal of a particular item is desired, refer to the applicable step(s) for that item.

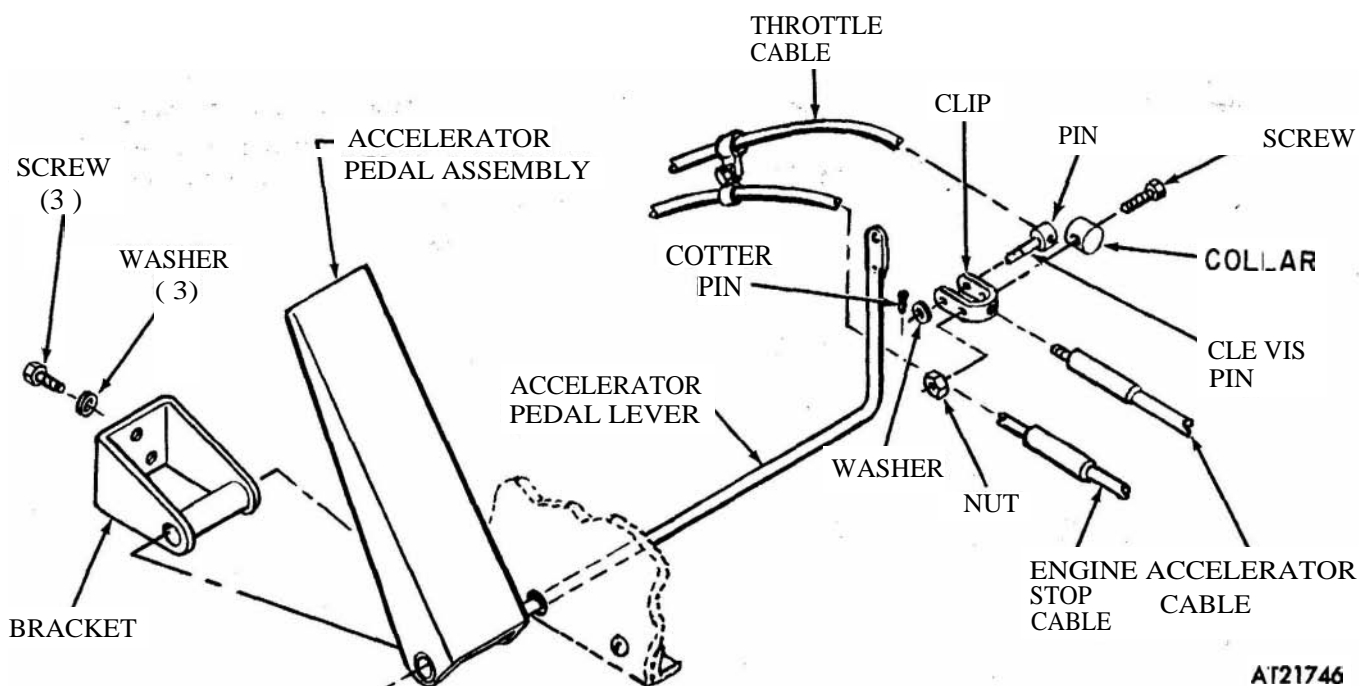
(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove tractor seats (Refer to para 2-2211).

(3) Remove console (refer to para 2-33).

(4) Remove air duct panel by removing 17 screws (refer to para 2-251).

(5) Remove accelerator (throttle cable from upper end of accelerator pedal lever by removing screw, nut, and collar (fig 2-94).



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Figure 2-94. Accelerator pedala

(6) Remove accelerator pedal assembly from accelerator pedal lever by removing cotter pin, washer, and pin. Slide accelerator pedal out of accelerator pedal assembly.

(7) Remove pedal assembly by removing three screws and washers.

(8) Remove accelerator and engine stop linkage (refer to para 2-33).

(9) Remove throttle spring from governor by unhooking spring ends (fig 2-54).

(10) Remove throttle control assembly from dash panel by removing jam nut and washer (fig 2-951).

b. Cleaning, Inspection, and Repair

(1) *Cleaning.* Clean all parts in approved solvent and dry thoroughly.

(2) *Inspection.* Inspect all parts for breaks, cracks, stripped threads, and other forms of damage.

(3) *Repair.* Repair shall be accomplished by **replacement** of defective part.

c. Assembly and Installation.

(1) Attach lower end of accelerator pedal to bracket and secure with three screws and lock washers (fig 2-94).

(2) Attach accelerator cable to upper end of accelerator pedal and secure with pin, washer, and cotter pin.

(3) Insert accelerator (throttle) cable through accelerator pedal lever pin and secure with screw, collar, and nut.

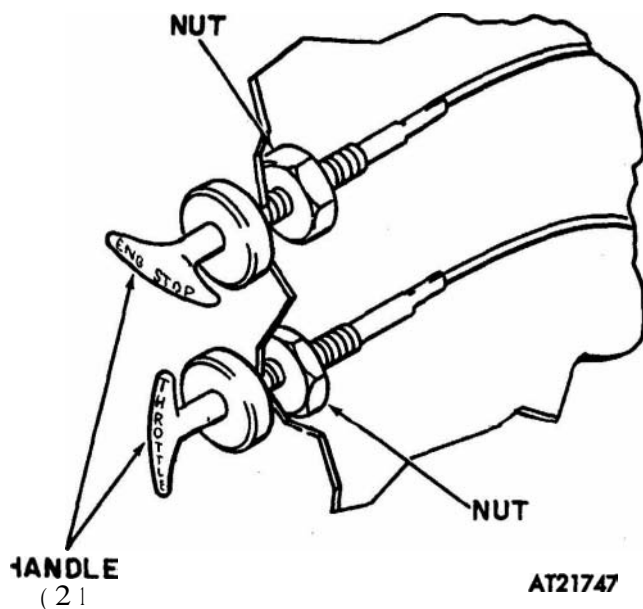
(4) Install accelerator and engine stop linkage (refer to para 2-331).

(5) Insert throttle control assembly into dash panel and secure with jam nut and washer (fig 2-951).

(6) Attach accelerator (throttle) cable and clamp to cable support angle using same screw, washer, and nut as engine stop cable clamp (fig 2-54).

(7) Hook throttle spring to bracket and governor.

(8) Refer to cable adjustment procedure below.



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Figure 2-95. Linkage controls, dash panel

d. *Adjustment.* Adjustment of accelerator linkage allows accelerator pedal to stop prior to engine lever reaching full stop,

(1) Loosen clamp at front of transmission.

(2) Position throttle control arm in idle speed position.

Note: Throttle control arm must remain in idle position until completion of adjustment.

(3) Position cable in clamp until there is no slack in cable between clamp and throttle control arm.

(4) Tighten clamp.

(S) Install console (refer to para 2-33).

(61 Install tractor seats (Refer to para 2-221).

(71 Close and secure engine cover (refer to TM 9-2320-242-10).

2-66. Engine Stop Cable

a. *Removal.*

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove tractor seats (Refer to **para 2-221**).

(3) Remove console (refer to **para 2-33**).

(4) Remove end of engine stop cable from governor stop lever by removing screw, nut, and collar. Withdraw cable from clevis pin and remove pin (fig 2-54).

(5) Remove remaining screw, nut, and collar from cable.

(6) Remove two cable clamps from front and rear of transmission by removing two screws and nuts.

(7) Remove cable from cable support angle by removing screw, washer, and nut.

(8) Remove engine stop control from dash panel by removing jam nut (fig 2-95).

b. *Installation.*

(1) Insert engine stop assembly into dash panel and secure with jam nut and washer (fig 2-95).

(2) Attach engine stop cable and clamp to cable support angle with screw, washer, and nut (fig 2-54).

(3) Attach engine stop cable and clamps to front and rear brackets on transmission with two screws, washers, and nuts.

Note: Clamp at rear bracket uses same screw securing accelerator cable clamp.

(4) Attach engine stop cable and clamp to throttle spring bracket with screw, washer, and nut.

(5) Insert collar on **engine** stop control cable and secure with screw and nut.

(6) Insert clevis pin into engine stop lever.

(7) Insert end of cable through clevis pin and secure collar to end of cable with screw and nut.

(8) Refer to engine stop cable adjustment, c below.

c. *Adjustment.*

(1) Loosen collar between engine stop lever and throttle spring bracket (fig 2.54).

(2) Loosen clamp securing engine stop cable to throttle spring bracket.

(3) Place engine stop lever in run position.

Note: Engine stop lever must remain in run position until completion of adjustment.

(4) Position cable until collar on end of cable *is* touching engine stop lever. Position other collar until flush with engine stop lever. Secure collar.

(5) Remove all cable slack between engine stop lever and clamp. Secure clamp.

(6) Install console (refer to para 2-33).

(7) Install tractor seats (Refer to **para 2-221**).

(8) Close and secure engine cover (refer to TM 9-2320-242-10).

Section XV EXHAUST SYSTEM

2-67. General

The **exhaust** system consists of an exhaust manifold, exhaust header pipe, exhaust pipe, muffler, tail pipe and tail pipe diffuser, together with a fender bracket, rubber hanger and necessary clamps, nuts, lock nuts, washers and screws. The exhaust manifold is pressed steel, the muffler is a coated **aluminum** steel and the pipes are stainless steel tubing. The exhaust system ducts hot exhaust gases from the engine cylinders through the common exhaust manifold to the muffler, where the noise level is reduced, and then vented to the atmosphere through the tail pipe.

2-68. Exhaust System

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove clamp securing exhaust header pipe to exhaust pipe by removing clamp nut (fig 2-96).

(3) Remove exhaust header pipe by removing nut from clamp securing pipe to exhaust manifold.

Remove clamps.

(4) Remove exhaust manifold and gasket by removing four nuts, two clamps, and clamp gaskets. Discard gaskets.

(5) Clean gasket surface on cylinder head.

Note: Should **scraping be necessary, do not score gasket surfaces.**

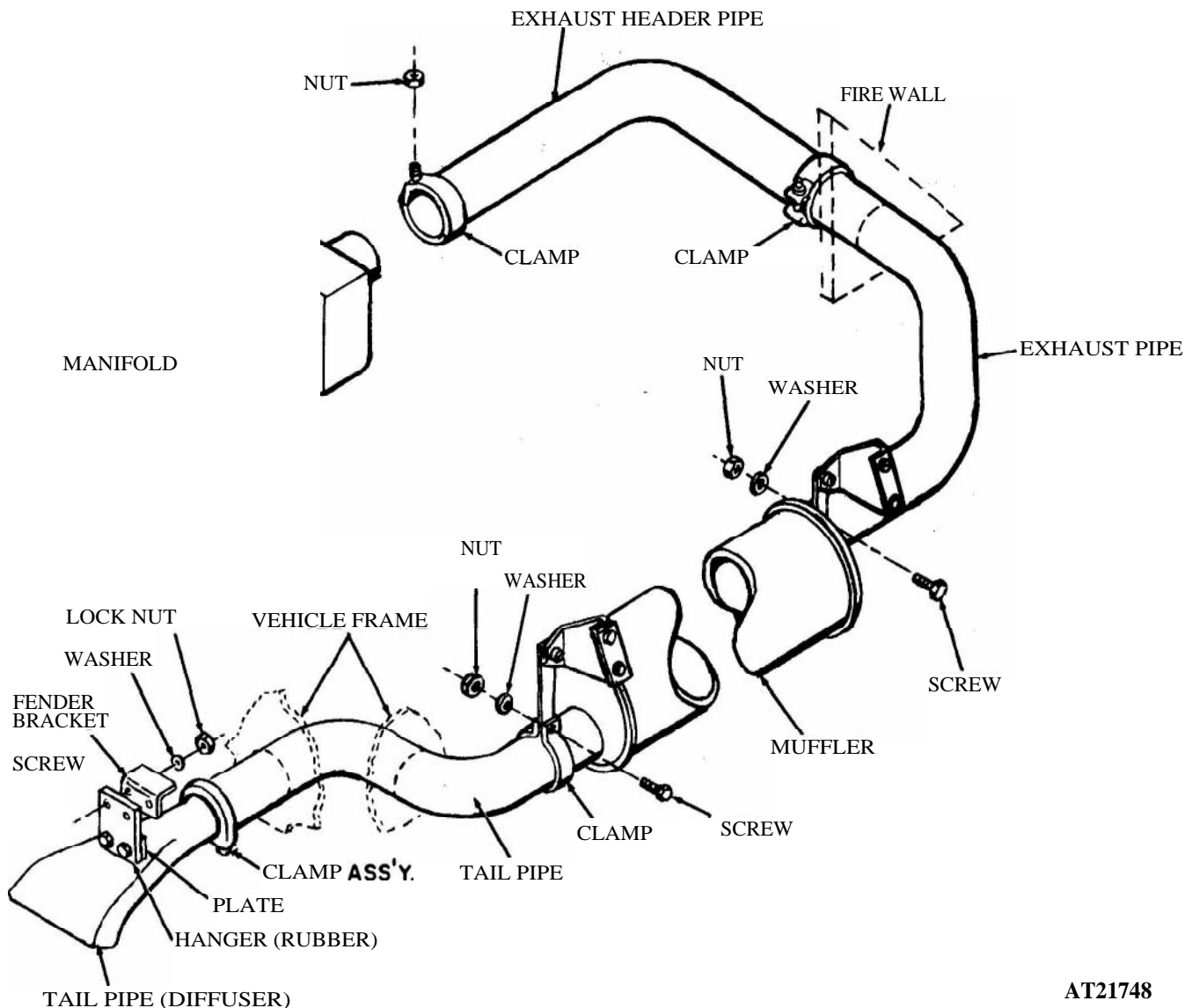
(6) Remove inlet exhaust pipe by removing two nuts and bolts from clamp securing **exhaust** pipe to muffler and hanger.

(7) Disconnect and remove lower exhaust pipe. Inspect bulkhead seal and replace if necessary.

(8) Remove muffler from inlet and outlet pipes by removing screws, lock washers, and nuts from muffler clamp holding inlet pipe to muffler and hanger.

(9) Remove inlet tail pipe from outer tail pipe by loosening nuts on clamp assembly.

(10) Remove outer tail pipe from hanger by removing screws, lock washers, and nuts.



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Figure 2-96. Exhaust system.

b. Installation.

(1) Attach outer tail pipe to hanger with screws, lock washers, and nuts (fig 2-96).

(2) Attach end of outlet tail pipe to outer tail pipe with clamp. Tighten nuts on clamp.

(3) Position muffler against outlet pipe; insert screw, lock washer, and nut in bottom of clamp; insert remaining screw through top of clamp and hanger; secure with lock washer and nut.

(4) Replace bulkhead seal if necessary. Slide inlet pipe through bulkhead seal and position against muffler.

(5) Insert screw, lock washer, and nut in bottom of clamp; insert remaining screw through top of clamp and hanger; secure with lock washer and nut.

(6) Attach exhaust manifold gasket and

exhaust manifold to mounting studs with two clamp gaskets, clamps, and four nuts. Tighten nuts and torque to 30-35 lbs-ft.

(7) Attach exhaust header pipe to exhaust pipe and exhaust manifold outlet with two clamps. Insert nuts on clamps alternately tighten nuts.

Note: Ensure that grooves in clamp are properly fit before tightening.

(8) Start engine (refer to TM 9-2320-242-10). Check exhaust system for leaks. Stop engine.

Warning: Ensure that work area is properly ventilated.

(9) Close and secure engine cover (refer to TM 9-2320-242-10).

2-69. General

The cooling system dissipates heat caused by engine combustion and maintains the engine at a proper temperature for efficient operation. The system consists of a belt driven water pump, fan, thermostat, radiator, radiator shroud, surge tank, and lubricating oil cooler. The coolant capacity of the system is 19 quarts. The thermostat, mounted in a housing directly behind the fan hub, maintains the engine temperature at 170 °F. The system is pressurized to 7 psi by a pressure-relief type filler cap. The surge tank is provided to bleed air from the system. Coolant is forced through the radiator and water jackets in the cylinder head and engine block by the water pump. The radiator is mounted vertically to the rear of the engine in the tractor engine compartment. Cooling air is drawn through the louvered openings of the engine cover and exhausted through the radiator by the engine drive cooling fan. The radiator shroud insures that air drawn by the fan is forced through the radiator. The lubricating oil cooler provides a means of cooling the lubricating oil.

2-70. Radiator Assembly**a. Removal.**

(1) Open and secure engine cover (refer to TM 9-2320-242-10), and remove surge tank pressure cap.

(2) Open hull access cover ports and place a suitable container under oil cooler draincock, or provide for adequate run-off (fig 2-97).

(3) Drain cooling system by opening oil cooler draincock (fig 2-661).

(4) Disconnect radiator outlet hose from radiator and oil cooler by loosening clamps (fig 2-68).

(5) Disconnect inlet pipe from top of radiator and thermostat housing by loosening outer clamps (fig 2-67).

Note: It is not necessary to remove hoses at both ends of pipe unless replacement is evident.

(6) Disconnect oil cooler, thermostat housing, cylinder head, and radiator hoses from surge tank by loosening nuts on fittings.

(7) Remove screw, lock washer, and nut securing surge tank and right-hand support to crossmember bracket. Remove two screws, lock washers, and nuts from other end of support (fig 2-691).

(8) Remove surge tank from right-hand baffle by removing three bolts and nuts.

(9) Remove left-hand support by removing screws, washers, and nuts securing support to crossmember bracket, engine, lifting eye, and alternator strap, and remove strut from support by removing screw, lock washer, and nut.

(10) Remove crossmember by loosening six screws securing crossmember to shroud, removing four screws, lock washers, and nuts securing top of baffles to crossmember, and four screws, lock washers, and nuts securing tabs on baffles and crossmember (fig 2-98).

(11) Remove baffles by removing four screws, lock washers, and nuts securing baffles to radiator lower support.

(12) Remove radiator from vehicle. Remove plug, and elbow and nipple from radiator. Submit radiator for disposition.

(13) Remove shroud assembly by loosening six screws securing shroud to bottom support and crossmember assembly.

Note: It is not necessary to separate shroud assembly unless replacement of parts is evident.

(14) Remove bottom support and crossmember assembly removing ten screws, washers, and nuts (fig 2-70).

Caution: Ensure that supports clear drive belts.

(15) Clean radiator shroud, inspect seals and vibration isolators for serviceability. Replace components as required.

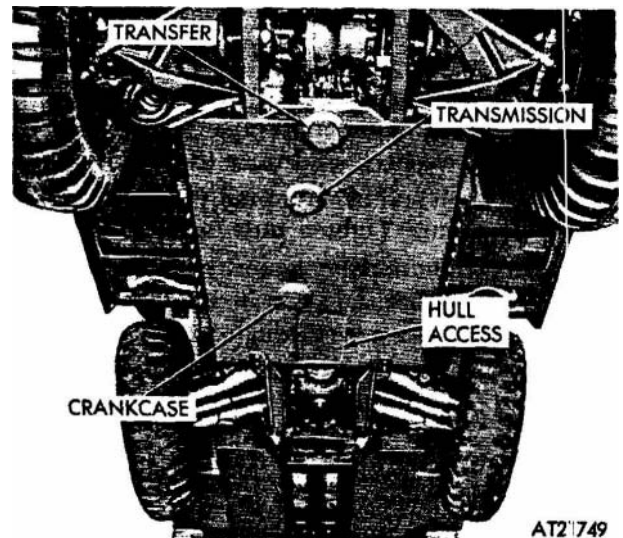


Figure 2-97. Hull drain access cover ports.

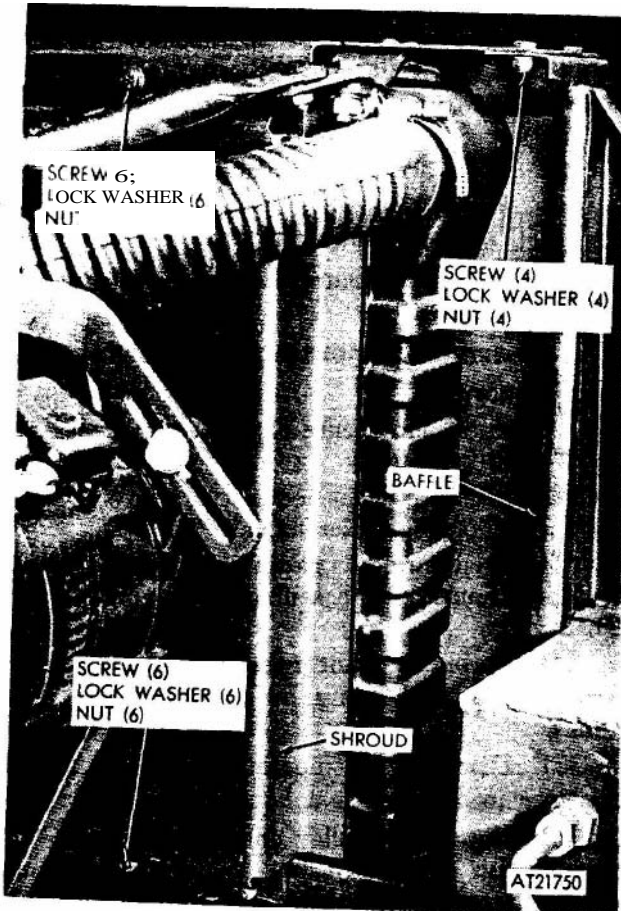


Figure 2-98. Radiator shroud.

b. Installation.

(1) Attach bottom support and crossmember assembly to engine with ten screws, washers, and nuts (fig 2-70).

Caution: Ensure that supports clear drive belts.

(2) Assemble right- and left-hand shrouds with two shroud crossmembers and four screws, lock washers, and nuts. Hand-tighten nuts.

(3) Install shroud assembly on bottom support and crossmember assembly by sliding slots in shroud behind washers and screws (fig 2-98).

(4) Wrap threads of radiator plug with teflon tape and install plug in bottom of radiator. Apply thread sealant to radiator nipple and elbow, insert in radiator and tighten.

(5) Position radiator in bottom support and crossmember assembly. Ensure that radiator is properly seated on isolators and seal on support.

(6) Attach right- and left-hand baffles to top crossmember with four screws, lock washers, and nuts, and with four screws, lock washers, and nuts securing tabs on baffles and crossmember.

(7) Position crossmember with attached baffles over radiator. Ensure that slots in shrouds are behind washers and screws.

(8) Secure crossmember and baffles to bottom supports with four screws, lock washers, and nuts.

(9) Position shroud until a clearance of 1 / 8-5 / 16-inch clearance exists between fan tips and shroud assembly. When clearance is established tighten six screws on each crossmember.

(10) Attach left-hand support to crossmember and engine with two screws, lock washers, and nuts.

(11) Attach surge tank to right-hand baffle with three bolts and nuts.

(12) Secure surge tank and right-hand support to crossmember with screw, lock washer, and nut. Secure other end with two screws, lock washers, and nuts (fig 2-69).

(13) Attach left-hand support and alternator adjusting arm to front engine lifting eye. Secure with two screws, lock washers, and nuts. Attach other end to crossmember with screw, lock washer, and nut.

(14) Attach strut to left-hand support with screw, lock washer, and nut.

(15) Check alternator belt tension (refer to para 2-74c).

(16) inspect all hoses and clamps for serviceability. Replace as necessary.

(17) Connect radiator outlet hose to bottom of radiator and oil cooler and tighten clamps (fig 2-68).

(18) Connect inlet pipe to top of radiator and thermostat housing and tighten outer clamps (fig 2-67).

(19) Connect oil cooler, thermostat housing, cylinder head, and radiator hoses to surge tank. Secure by tightening nuts on fittings.

(20) Close oil cooler **draincock** (fig 2-66).

(21) Fill cooling system with coolant for correct climatic conditions (refer to TB 750-651).

(22) Install surge tank pressure cap.

(23) Start engine, allow to reach temperature of approximately 170 degrees F, and recheck coolant (refer to TM 9-2320-242-10).

(24) Close and secure engine cover (refer to TM 9-2320-242-10).

(25) Install hull bottom drain plug (fig 2-97).

c. Cleaning and Servicing.

(1) **Cleaning.** Clean cooling system in accordance with TM 10-450.

(2) **Servicing.**

(a) Open *and* secure engine cover (refer to TM 9-2320-242-10).

(b) Open hull bottom drain plug and place a suitable container under oil cooler draincock, or provide for adequate run-off (fig 2-97).

(c) **Drain** cooling system by removing surge tank pressure cap and opening oil cooler draincock (fig 2-66).

(d) Close oil cooler draincock.

(e) Fill cooling system with proper coolant for climatic conditions in accordance with TB 750-651 and LO 9-2320-242-12.

(f) Replace surge tank pressure cap.

(g) Close and secure engine cover (refer to TM 9-2320-242-10).

(h) Install hull bottom drain plug (fig 2-97).

2-71. Thermostat and Gasket

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-101).

(2) Partially drain coolant to a level below thermostat housing (refer to para 2-70c).

(3) Remove thermostat outlet flange by removing two bolts, lock washers, and washers. Pull flange and radiator hose away from thermostat housing (fig 2-99).

(4) Remove radiator hose from outlet flange by loosening clamp and remove thermostat.

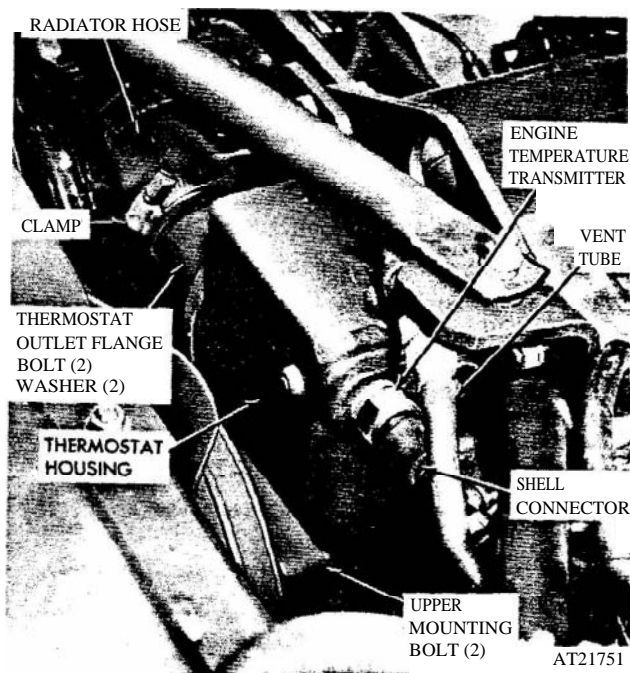


Figure 2-99. Thermostat housing.

b. Installation.

(1) Clean gasket mating surfaces.

(2) Insert thermostat in housing, attach gasket and outlet flange to thermostat housing, secure with two bolts, lock washers, and washers (fig. 2-99).

(3) Close oil cooler draincock (fig. 2-66).

(4) Fill cooling system (refer to para 2-70c) and check for leaks.

(5) Close and secure engine cover (refer to TM 9-2320-242-101).

2-72. Thermostat Housing and Gasket

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Partially drain coolant to a level below thermostat housing (refer to para 2-70c).

(3) Disconnect radiator hose from thermostat housing by loosening hose clamp (fig 2-991).

(4) Disconnect vent tube and bypass tube from thermostat housing by loosening nuts on fittings.

(5) Disconnect temperature sending unit connector from thermostat housing.

(6) Rotate fan pulley until hole in pulley is aligned with upper bracket mounting bolt on housing. Remove bolt and washer through hole in fan pulley. Repeat procedure for remaining upper bracket bolt.

(7) Loosen lower fan bracket bolts approximately two turns.

Note: Fan will pivot toward radiator when lower bolts are loosened.

(8) Remove thermostat housing, discard gasket.

b. Installation.

(1) Clean gasket mating surfaces.

(2) Attach gasket and thermostat housing to engine with two bolts and washers, installing each one through aligned holes in fan pulley.

(3) Tighten lower fan bracket bolts.

(4) Inspect all hoses and clamps for serviceability. Replace as required.

(5) Attach radiator hose to thermostat housing and secure by tightening clamp.

(6) Connect vent tube and bypass tube to thermostat housing and secure by tightening nuts on fittings.

- (7) Connect temperature sending unit electrical connector to thermostat housing.
- (8) Close oil cooler draincock.
- (9) Fill cooling system (refer to para 2-70c) and check for leaks.
- (10) Close and secure engine cover (refer to TM 9-2320-242-10).

2-73. Water Pump and Gasket

a. Removal.

- (1) Open and secure engine cover (refer to TM 9-2320-242-10).
- (2) Drain cooling system (refer to para 2-70c).
- (3) Remove exhaust header pipe upper clamp, loosen lower clamp, and move pipe aside (fig 2-50).
- (4) Depress idler pulley and remove two water pump drive belts from pulley (fig 2-100).
- (5) Remove right rear engine mount (refer to para 2-40a).
- (6) Remove bypass tube and hoses as an assembly by loosening two outer clamps on thermostat housing and water pump.

Note: It is not necessary to remove two hoses from bypass tube unless replacement is evident.

- (7) Remove water pump and gasket from oil cooler housing by removing five bolts and lock washers. Discard gasket.

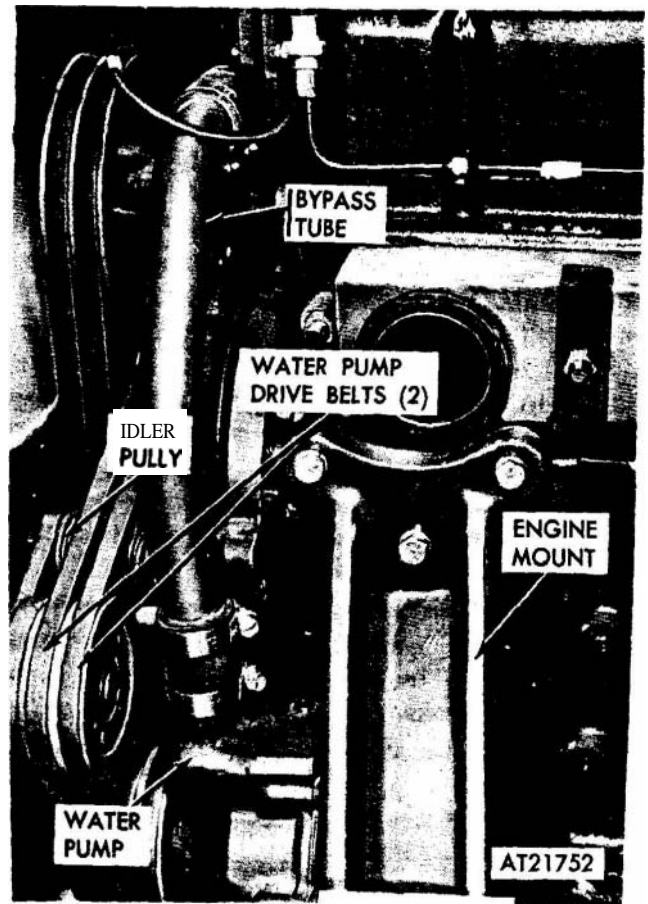


Figure 2-100. Water pump drive belts.

b. *Installation.*

- (1) Clean gasket mating surfaces.
- (2) Attach water pump and *new* gasket to oil cooler with five bolts and lock washers.
- (3) **Inspect** bypass tube hoses for serviceability. Replace *as* required (fig 2-100).
- (4) Connect bypass tube and hose assembly to thermostat housing and water pump. Secure by tightening upper and lower clamps.
- (5) Attach right rear engine mount (refer to para 2-40b).
- (6) Install water pump belts by depressing idler pulley. Ensure that belts are properly seated (fig 2-100).
- (7) Connect exhaust header pipe to manifold by installing clamp. Alternately tighten two clamps on exhaust header pipe.
- (8) Close oil cooler draincock (fig 2-66).
- (9) Fill cooling system (refer to para 2-70c), start engine (refer to TM 9-2320-242-10), and check for leaks. Stop engine.
- (10) Install hull bottom drain plug (fig 2-97).
- (11) Close and secure engine cover (refer to TM 9-2320-242-10).

2-74. Fan Drive Belts

a. *Removal.*

- (1) Open and secure engine cover (refer to TM 9-2320-242-10).
- (2) Remove top **crossmember** securing right- and left-hand shrouds by removing two screws, lock washers, and nuts (fig 2-101).
- (3) Loosen bolt on alternator adjusting strap and move alternator toward engine to relieve tension on bolts. Remove belts from fan, alternator, and crankcase pulleys (fig 2-102).
- (4) Rotate fan until a blade *is* centered in opening between the two shrouds. Lift belts over fan blade toward radiator. Repeat procedure until belts are in front of fan. Lift belts up through opening in shrouds.

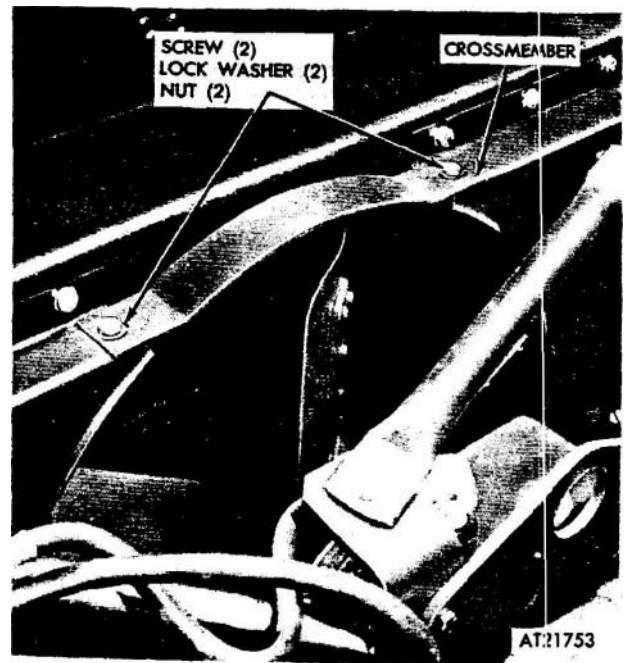


Figure 2-101. Fan drive belt access, crossmember removal.

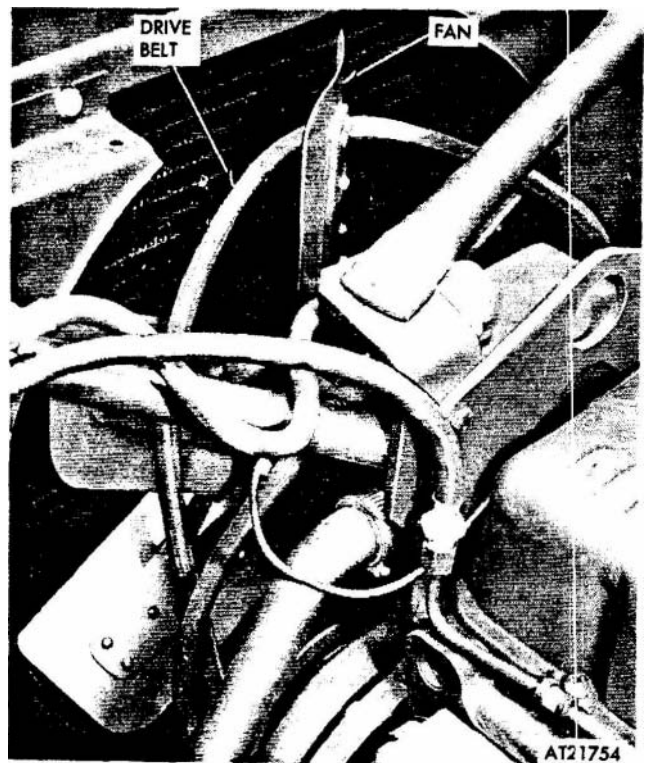


Figure 2-102. Fan drive belts.

b. Installation.

(1) Position belts in front of fan and rotate fan until a blade is centered in opening between the two shrouds. Lift belt over blade **toward** fan pulley. Repeat procedure until belts are in back of fan.

(2) Position belts in grooves of fan, alternator, and crankcase pulleys.

Note: Belts should be replaced in pairs to avoid excess wear on older belt.

(3) Attach crossmember to left-and right-hand shrouds with two screws, lock washers, and nuts (fig 2-101).

14) Refer to belt tension adjustment c below.

c. Adjustment.

(1) **Move alternator away from engine. Ensure that belts are properly seated in pulley grooves.**

(2) Position alternator to obtain belt deflection of $\frac{1}{8}$ -inch for new belt and $\frac{1}{4}$ inch for used belt at 18 to 22 pounds pressure. When correct tension is obtained, tighten screw on alternator adjusting strap and torque to 35-40 lbs-ft. (fig 2-103).

Note: Deflection is measured between fan and alternator pulleys.

(3) Close and secure engine cover (refer to TM 9-2320-242-10).

Note: New belts should be checked for correct tension after 100 miles or two hours operation. Readjust as required.

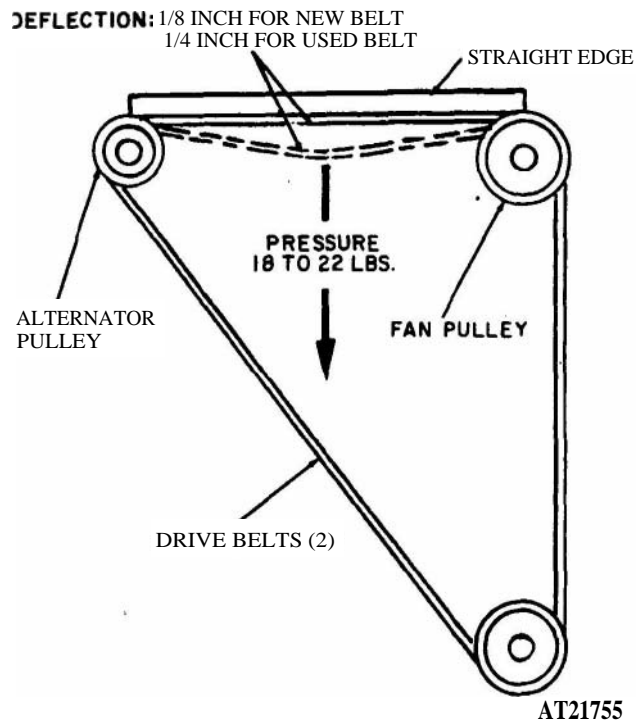


Figure 2-103. Drive belt tension adjustment.

2-75. Fan Pulley and Hub Assembly

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Partially drain coolant to a level below thermostat housing (refer to para 2-70c).

(3) Remove fan from hub assembly by removing four bolts and lock washers (fig 2-102).

Caution: Exercise care on removal of fan to prevent damage to radiator.

(4) Remove belts from fan pulley (refer to para 2-74a).

(5) Remove pulley and hub assembly from engine and thermostat housing by removing two upper bolts and two lower bolts and lock washers.

Note: Two upper screws also secure thermostat housing. Hoses and tubes will hold housing in place during pulley and hub assembly replacement.

b. Installation.

(1) Position fan pulley and hub assembly over mounting holes and insert two long bolts through pulley and hub, thermostat housing, and thermostat housing gasket. Insert two short bolts and lock washers into lower mounting holes. Alternately tighten bolts.

(2) Install two fan drive belts in grooves of fan pulley. Adjust belt tension (refer to para 2-74c).

(3) Attach fan blade to pulley and hub assembly with four bolts and lock washers.

Caution: Fan blades showing evidence of cracks should be replaced.

(4) Fill cooling system (refer to para 2-70c).

(5) Start engine (refer to TM 9-2320-242-10). Check for proper operation of belts and leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-76. Idler Pulley

a. Removal.

(1) Open and secure engine cover (refer to

TM 9-2320-242-10).

(2) Depress idler arm and remove two water pump belts from idler arm pulley (fig 2-100).

(3) Remove idler arm pulley assembly, spring, and shaft from engine by removing mounting screw, lock washer, and washer.

(4) Remove pulley from pulley shaft.

Note: If pulley assembly is replaced, pulley shaft must also be replaced.

b. Installation.

(1) Apply light coating of grease to bearing surface of pulley shaft and insert shaft in arm of idler pulley assembly.

(2) Insert bolt, lock washer, and washer in idler arm mounting hole.

(3) Insert straight end of torsion spring into hole of mounting boss on engine.

(4) Position pulley toward fan, engage hook end of spring over idler arm, and engage mounting bolt approximately three threads.

(5) Place tension on spring by pulling arm and pulley toward water bypass tube. Maintain tension on spring and tighten bolt. Slowly release idler arm.

(6) Depress idler arm and install two belts on pulley. Release idler arm slowly and ensure proper belt seating in pulley grooves.

(7) Start engine (refer to TM ~~9-2320-242-10~~). **Observe** idler arm pulley assembly and belts for proper operation. Stop engine.

(8) Close and secure engine cover (refer to TM 9-2320-242-10).

Section XVII. ELECTRICAL SYSTEM

2-77. General

a. The vehicle is equipped with a 24 volt, negative ground electrical system. Two 12-volt, 100-amp batteries, one on each tractor fuel tank, are connected in series and provide primary power. A 24-volt, 60-amp, belt driven alternator with self-contained rectifier and regulator, charges the batteries during engine operation.

b. The basic schematic of the vehicle electrical system is of standard military configuration. All light assemblies, horn, switches and distribution assemblies are standard military parts. Inter-connection of electrical components is accomplished by a multiple harness electrical system which provides the capability for replacement of harness segments.

c. A bilge pump is provided within the tractor body for use during swimming operations. The pump is controlled by a switch mounted on the control panel and is activated only during swimming operations.

d. The vehicle is provided with electrical windshield wipers with a separate motor and control switch provided for each wiper.

e. An electrically operated air heater is provided on the left-hand side of the engine to facilitate cold starting capabilities. This heater assembly consists of an electrically operated air pump, solenoid valve, high-tension coil and an air box cover which incorporates a fuel spray nozzle and igniter plug. This system is controlled by a switch located on the instrument panel.

f. A stop signal circuit is provided for use by personnel in the carrier for the vehicle operator. This circuit consists of a push button switch in the carrier which operates a stop signal light on the tractor dash panel, it is activated when personnel in the carrier want the operator to stop the vehicle.

g. Two receptacles are located in the front panel of the carrier for auxiliary power. An auxiliary power receptacle is provided on the rear of the carrier to supply power for operation of trailer lights.

Warning: Ensure that master switch is in the "OFF" position prior to performing maintenance on electrical components.

2-78. Alternator, Bracket, and Pulley

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove alternator (refer to para 2-35).

(3) Remove mounting bracket from engine by removing three screws and lock washers.

(4) Remove alternator pulley from alternator by removing nut and washer on pulley. Remove pulley from keyed shaft.

Note: Ensure that woodruff key remains in place.

b. Installation.

(1) Align keyway of alternator pulley with key on alternator shaft and slide pulley on shaft. Secure with washer and nut. Torque nut to 40-50 lbs-ft.

(2) Attach alternator mounting bracket to engine with three screws and lock washers (fig 2-64).

(3) Install alternator (refer to para 2-35).

c. *Test.* Refer to alternator circuit in Electrical troubleshooting, table 2-5.

2-79. Starting Motor

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Disconnect engine harness from main tractor harness connection to preclude the possibility of shock.

(3) Remove engine oil dipstick and extension tube by unscrewing from cylinder block (fig 2-104).

(4) Disconnect three electrical leads from starter solenoid terminals by removing nuts and washers securing leads to starter studs.

(5) Remove starter from flywheel housing by removing three mounting bolts and lock washers

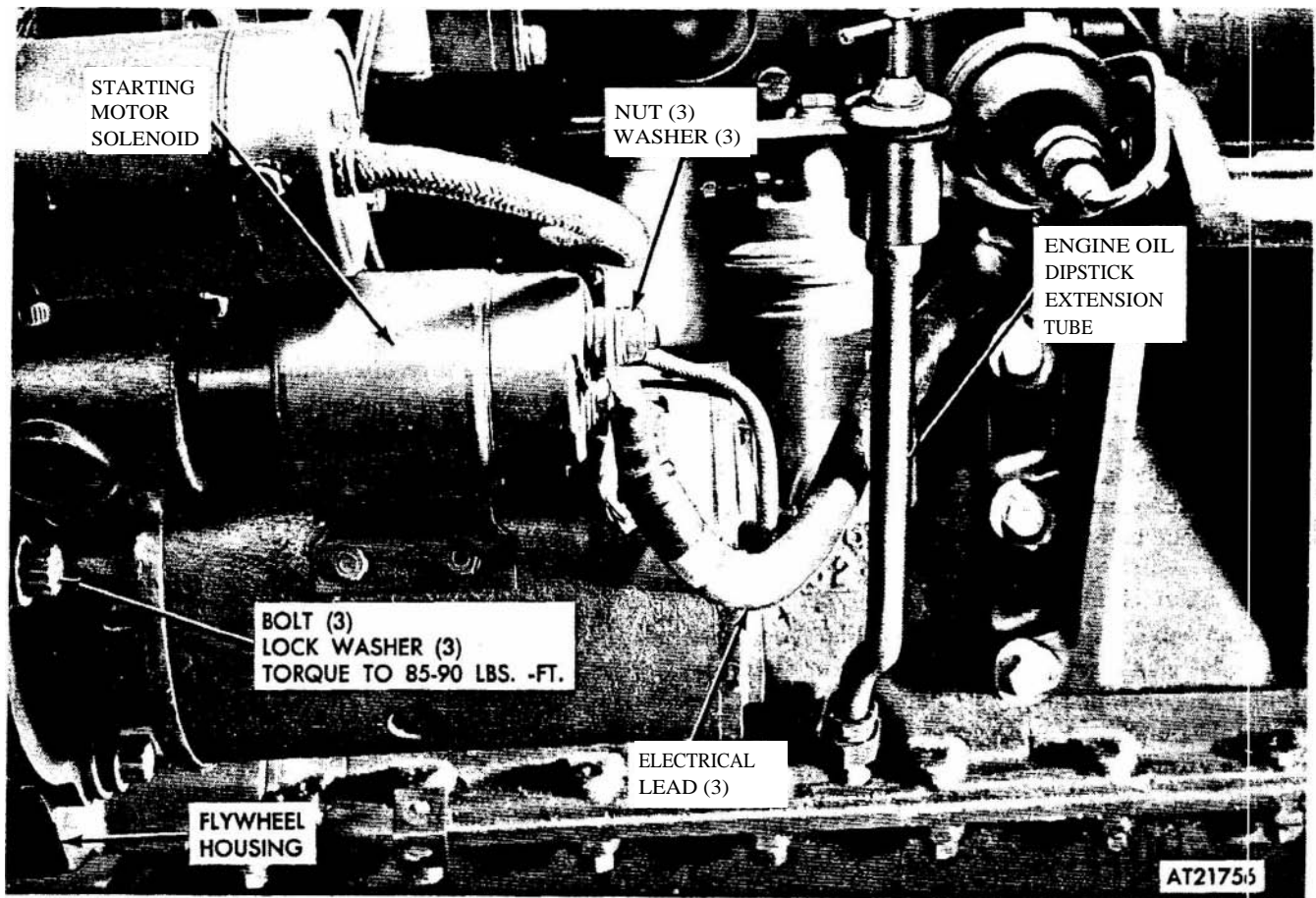


Figure 2.104. Starting motor.

b. Installation.

(1) Attach starter to flywheel housing with three bolts and lock washers. Torque bolts to 85-90 lbs-ft (fig 2-104).

(2) Connect three leads to their respective terminals and secure with nuts and washers (refer to wiring diagram, fig 2-46).

(3) Insert engine oil dipstick and extension tube in cylinder block and tighten.

(4) Connect engine harness to tractor main harness connector.

(5) Start engine (refer to TM 9-2320-242-10) to check starter operation. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-80. Battery and Cable

a. *Removal.* This procedure is identical for both right- and left-hand batteries.

(1) Remove battery box cover by disconnecting strap, and lifting box cover up and away from battery (fig 2-105).

(2) Disconnect battery ground cable by

loosening nut on battery clamp. Disconnect positive cable in the same manner (fig 2-106).

Note: Remove battery ground cable first.

(3) Remove battery retainer bracket by loosening two wing nuts and sliding bolts away from bracket. Lift bracket off battery.

(4) Remove battery from battery tray

(5) Remove cable lug from each terminal clamp by removing bolts and nuts from clamps.

(6) Open and secure engine cover (refer to TM 9-2320-242-10).

(7) Compress and remove grommets from tractor wall and pull cables through.

(8) Remove cables from their respective connections.

Note: Battery inter-connection cable is held *in* place with two clamps.

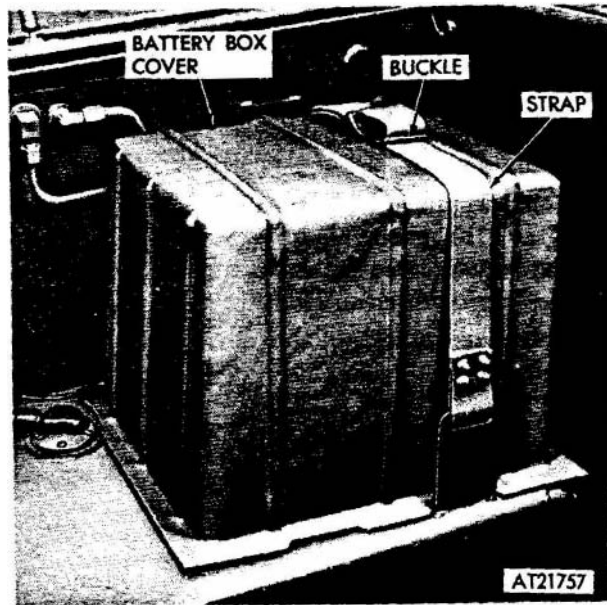


Figure 2-105. Battery box cover.

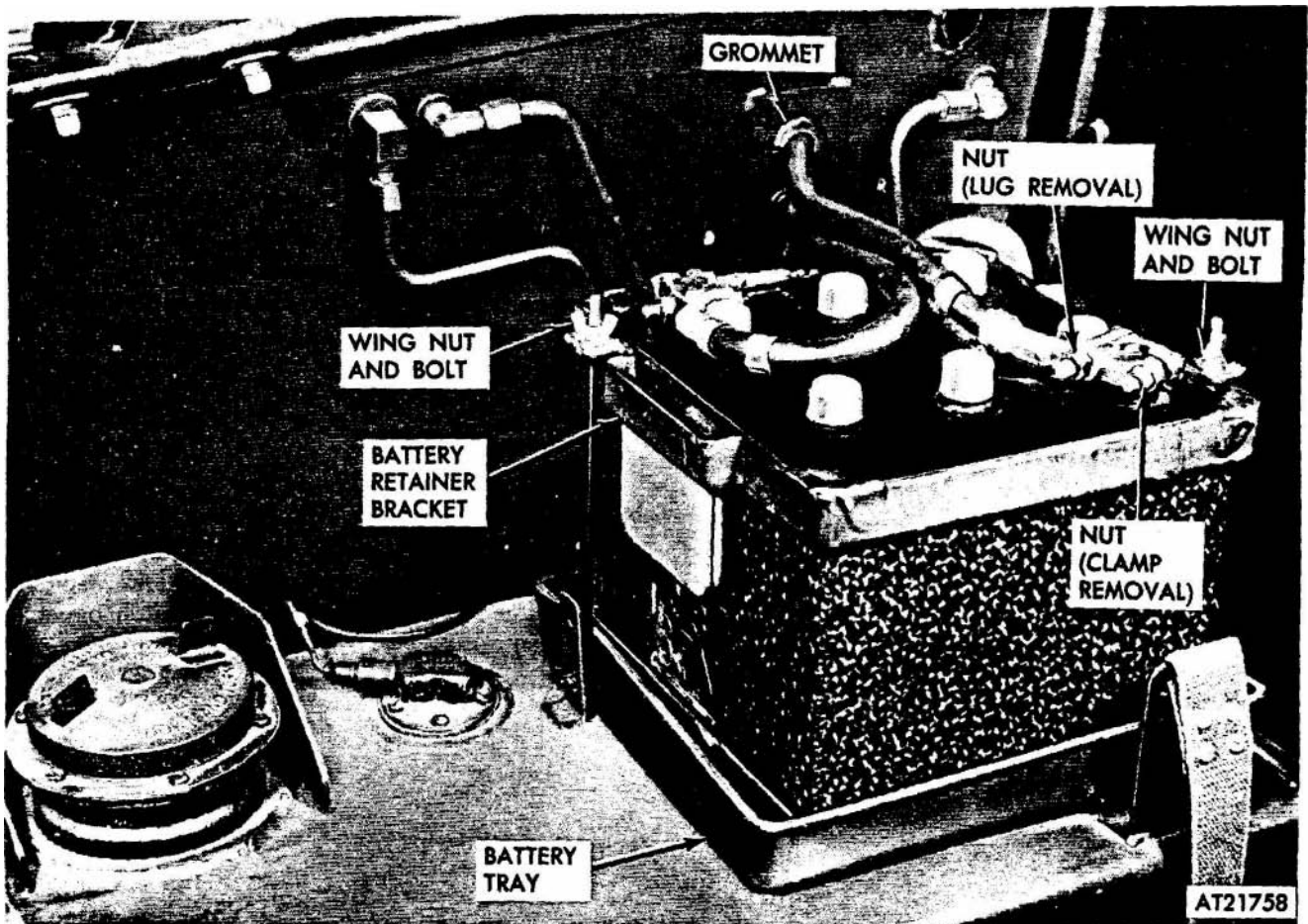


Figure 2-106. Battery, removal and installation.

b. *Cleaning.*

(1) Mix a thick solution of bicarbonate of soda and water. Since this solution may contaminate the electrolyte of the batteries, make certain that all vent caps are secure and that there are no cracks or leaks in the battery cases.

(2) Brush solution on terminals and strap connectors. Apply solution to the cable clamps. When foaming action has ceased, flush away solution with clean water and dry with clean cloth.

(3) Clean each battery tray receptacle, the box covers and retainer brackets.

c. *Installation.*

(1) Connect battery cables to ground connection, terminal strip, and positive and negative terminal on each battery (refer to wiring diagram fig 246).

(2) Pull cables through tractor wall, and insert grommets in wall (fig 2-106).

(3) Attach terminal clamps to cable lugs with bolts and nuts. Tighten nuts.

(4) Position battery in battery tray.

(5) Position battery retainer bracket over battery and secure by tightening two wing nuts. Ensure that bottom of bolts are engaged in holes.

(6) Connect battery ground cables to terminal posts and secure by tightening nuts on terminal clamps. Repeat procedure for positive cables.

(7) Place battery box cover over battery ensuring that slot in cover fits over cables. Secure with strap and buckle (fig 2-105).

(8) Close and secure engine cover (refer to TM 9-2320-242-10).

d. *Test.* (Refer to TM 9-6140-200-15.)

2-81. Light Switch

a. *Removal.*

(1) Remove connector plug from light switch assembly by reaching behind dash panel and unscrewing connector.

(2) Remove three switch levers from light switch by removing three screws (fig 2-107).

(3) Remove switch assembly from dash panel by removing four screws.

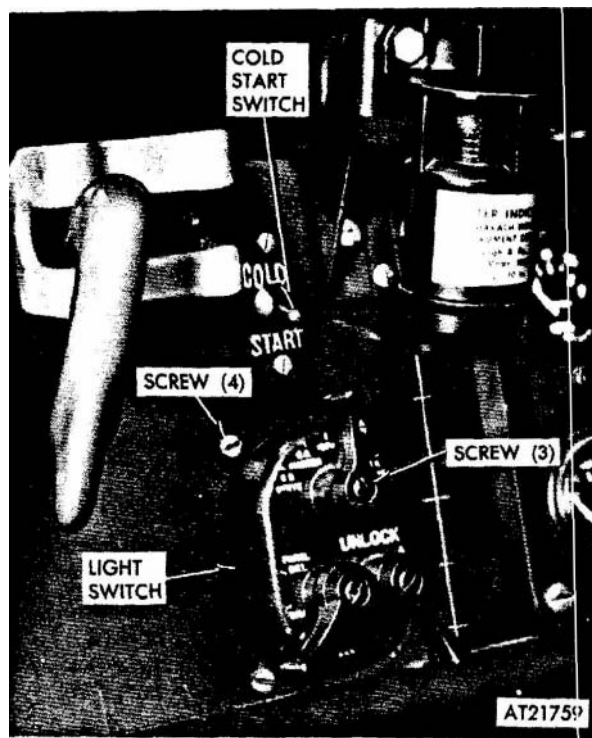


Figure 2-107. Light switch, removal and installation

b. *Installation.*

(1) Attach switch assembly to dash panel with four screws (fig 2-107).

(2) Connect connector plug to switch and tighten connector.

(3) Attach three switch levers to their respective positions and secure with three screws.

(4) Check switch assembly for proper operation.

2-82. Master Switch

a. *Removal.*

(1) Remove switch lever from master switch by removing screw and lock washer (fig 2-108).

(2) Remove master switch from switch control panel by removing hex nut and lock washer, push master switch through rear of switch panel.

(3) Disconnect two electrical leads from switch. Remove switch.

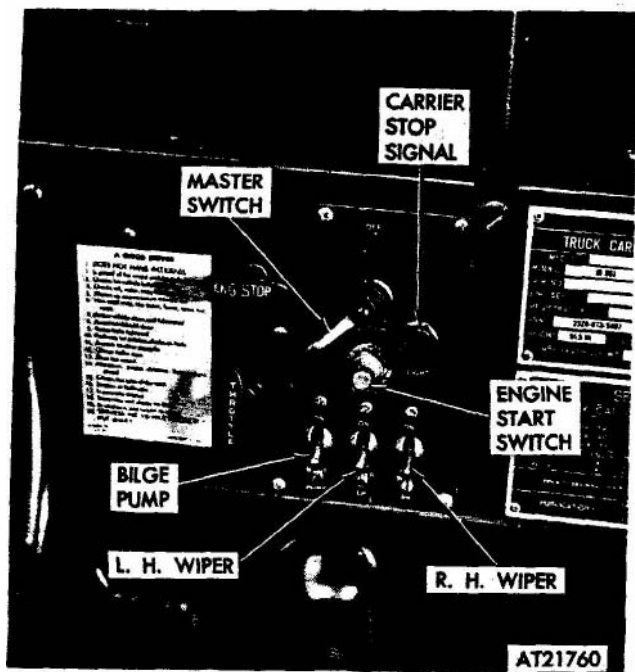


Figure 2-108. Switch panel, cowL

b. Installation.

(1) Apply a light coat of grease (**MIL-S-8660**) to rubber surfaces of male connectors. Connect leads to master switch (fig 2-108).

(2) Push master switch through from rear of switch panel and attach to panel using nut and lock washer.

(3) Attach lever to master switch with screw and lock washer (fig 2-108).

(4) Check switch operation.

2-83. Carrier Stop Signal Light Assembly

a. Removal.

(1) Unscrew press-to-test cap from stop signal light (fig 2-108).

(2) Remove nut securing top signal light assembly to switch panel and push stop light assembly **through** rear of switch panel.

(3) Unsolder leads from stop signal light assembly terminals.

b. Installation.

(1) Solder leads to their respective terminals on stop signal light assembly (refer to wiring diagram, fig 2-46).

(2) Push stop signal light assembly through from rear of switch panel and attach to panel using nut.

(3) Attach press-to-test cap.

2-84. Carrier Stop Signal Lamp Replacement

a. Removal.

(1) Unscrew press-to-test cap from stop signal light (fig 2-108).

(2) Remove lamp from stop signal light assembly.

b. Installation.

(1) Insert lamp in stop signal light.

(2) Attach press-to-test cap.

2-85. Engine Start Switch

a. Removal.

(1) Remove engine start switch from switch panel by removing nut from switch (fig 2-108).

(2) Push switch through to rear of switch panel.

(3) Remove two connectors from switch and remove switch.

b. Installation.

(1) Connect two electrical connectors to their respective terminals on engine start switch (refer to wiring diagram, fig 2-46).

(2) Insert engine start switch through switch panel and secure with nut.

(3) Check switch operation.

2-86. Bilge Pump and Windshield Wiper Switches

a. Removal.

(1) Remove defective switch from switch panel by removing two screws (fig 2-108).

(2) Push switch through switch panel and remove electrical connectors from switch. Remove switch.

b. Installation.

(1) Attach electrical connectors to their respective terminals on switch (refer to wiring diagram, fig 2-46).

(2) Insert switch through switch panel and secure with two mounting screws (fig 2-108)

(3) Check operation of switch.

2-87. High Beam Indicator and Panel Lights

a. Removal.

Note: The procedure for removing and installing the three panel lights is identical.

(1) Remove instrument panel and spacer from dash panel by removing four screws. Pull panel out a sufficient distance to permit removal of defective assembly (fig 2-109).

(2) Disconnect lead from back of defective lamp assembly.

(3) Remove defective lamp assembly by removing two screws and lock washers.

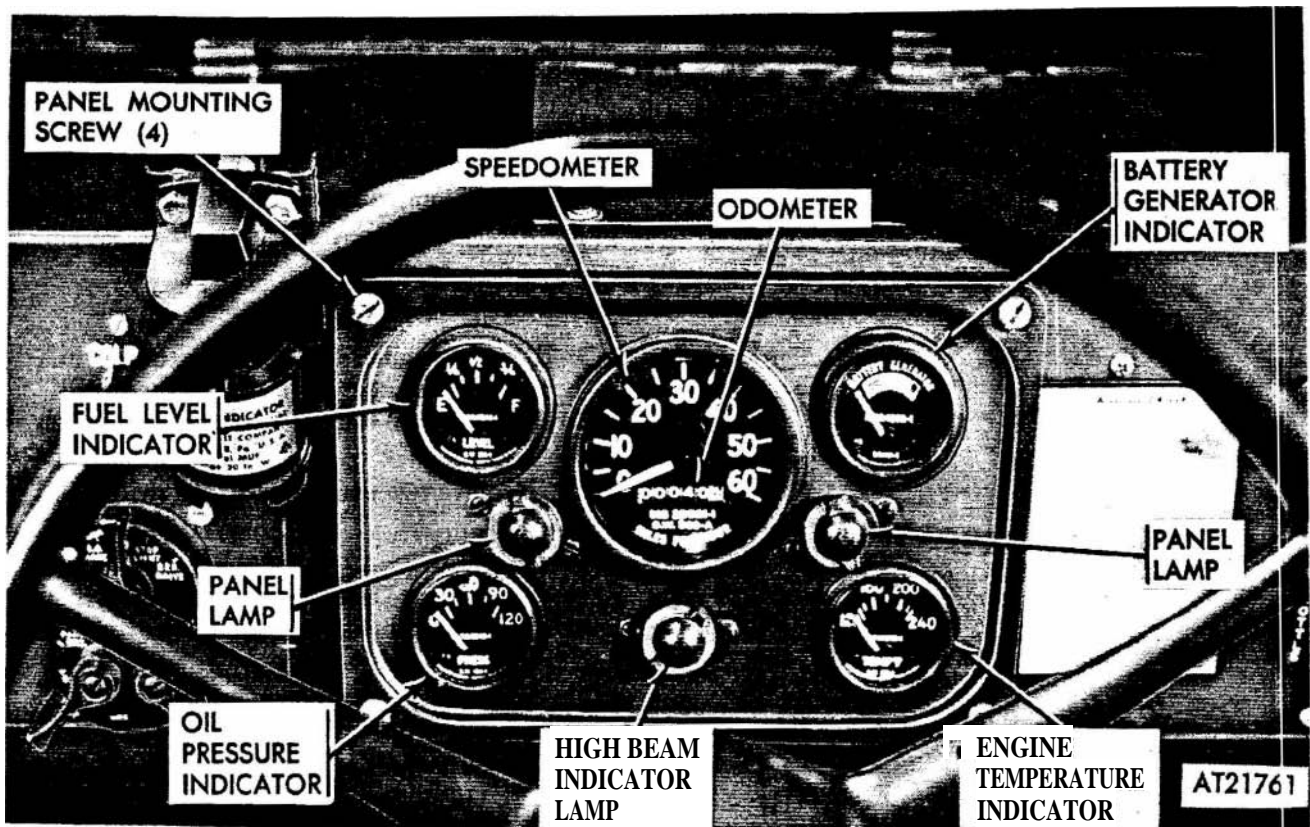


Figure 2-109. Instrument panel

b. Installation.

- (1) Attach lamp assembly to panel with two screws and lock washers (fig 2-109).
- (2) Connect lead to lamp assembly.
- (3) Turn light switch on to check lamp assembly. Turn light switch off.
- (4) Attach instrument panel and spacer to dash panel with four screws.

2-88. High Beam Indicator and Panel Lights Lamp Replacement

a. Removal.

- (1) Remove lamp by unscrewing lens cap (fig 2-109).
- (2) Remove lamp by depressing and turning lamp counterclockwise.

b. Installation.

- (1) Insert lamp in receptacle. Depress and turn lamp clockwise to engage in receptacle (fig 2-109).
- (2) Turn light switch on to check lamp. Turn light switch off.
- (3) Install lens cap.

2-89. Fuel Level Indicator

a. Removal.

- (1) Remove instrument panel assembly and spacer from dash panel by removing four mounting

screws. Pull instrument panel out a sufficient distance to permit removal of fuel level indicator (fig 2-109).

- (2) Disconnect two electrical connectors from fuel level indicator.

(3) Remove fuel level indicator and mounting bracket from instrument panel by removing two nuts and lock washers.

b. Installation.

(1) Position fuel level indicator in hole of instrument panel. Secure with mounting bracket, two nuts, and lock washers (fig 2-109).

(2) Connect two electrical connectors to fuel level indicator (refer to wiring diagram, fig 2-46).

(3) Attach panel and spacer to dash panel with four screws (fig 2-109).

2-90. Battery-Generator Indicator

a. Removal.

(1) Remove instrument panel assembly and spacer from dash panel by removing four mounting screws. Pull instrument panel out a sufficient distance to permit removal of battery-generator indicator (fig 2-109).

(2) Disconnect two electrical connectors from battery-generator indicator.

(3) Remove battery-generator indicator and mounting bracket from instrument panel by removing two nuts and lock washers.

b. *Installation.*

(1) Position battery-generator indicator in hole of instrument panel. Secure with mounting bracket, two nuts, and lock washers (fig 2-109).

(2) Connect two electrical connectors to battery-generator indicator (refer to wiring diagram, fig 2-46).

(3) Attach panel and spacer to dash panel with four screws.

2-91. Engine Temperature Indicator

a. *Removal.*

(1) Remove instrument panel assembly and spacer from dash panel by removing four mounting screws. Pull instrument panel out a sufficient distance to permit removal of engine temperature indicator (fig 2-109).

(2) Disconnect two electrical connectors from battery-generator indicator.

(3) Remove battery-generator indicator and mounting bracket from instrument panel by removing two nuts and lock washers.

b. *Installation.*

(1) Position battery-generator indicator in hole of instrument panel. Secure with mounting bracket, two nuts, and lock washers (fig 2-109).

(2) Connect two electrical connectors to *battery-generator* indicator (refer to wiring diagram, fig 2-46).

(3) Attach panel and spacer to dash panel with four screws.

2-92. Oil Pressure Indicator

a. *Removal.*

(1) Remove instrument panel assembly and spacer from dash panel by removing four mounting screws. Pull instrument panel out a sufficient distance to permit removal of oil pressure indicator (fig 2-109).

(2) Disconnect two electrical connectors from oil pressure indicator.

(3) Remove oil pressure indicator and mounting bracket from instrument panel by removing two nuts and lock washers.

b. *Installation.*

(1) Position oil pressure indicator in hole of instrument panel. Secure with mounting bracket, two nuts, and lock washers (fig 2-109).

(2) Connect two electrical connectors to oil pressure indicator (refer to wiring diagram, fig 2-46).

(3) Attach panel and spacer to dash panel with four screws.

2-93. Cold Start Switch

a. *Removal.*

(1) Remove switch from dash panel by removing two screws (fig 2-107).

(2) Push switch through dash panel and remove electrical connectors from switch. Remove switch.

b. *Installation.*

(1) Attach electrical connectors to their respective terminals on switch (refer to wiring diagram, fig 2-46).

(2) Insert switch through dash panel and secure with two mounting screws.

2-94. Circuit Breaker

a. *Removal.*

(1) Disconnect negative battery cable (refer to **para** 2-80).

Warning: Disconnect negative (-) battery cable prior to removal of circuit breakers. Do not allow battery cable to contact vehicle frame.

(2) Remove panel from dash by removing ten screws. Tilt panel outward to gain access to circuit breakers (fig 2-110).

(3) Determine circuit breaker to be replaced and disconnect electrical leads (fig 2-110).

(4) Remove circuit breaker from panel by removing two mounting screws, lock washers, and nuts.

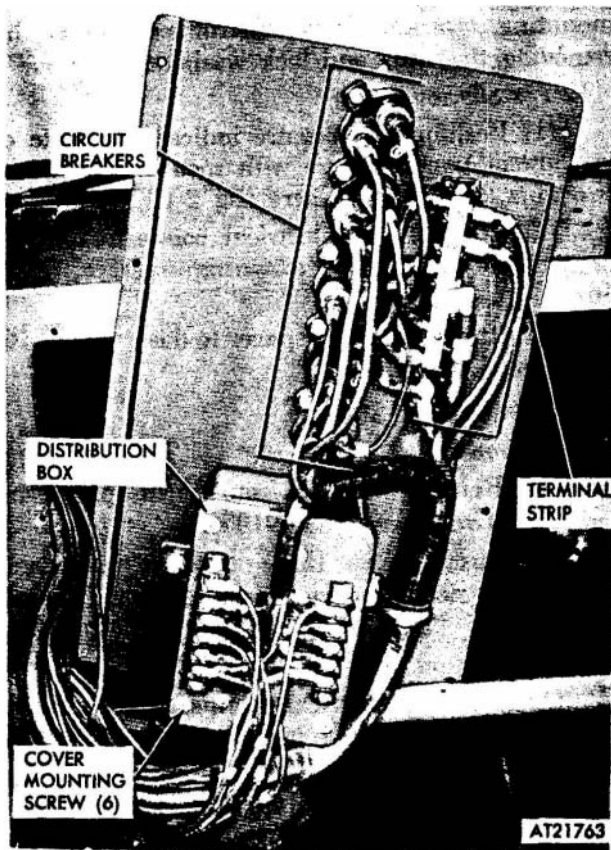


Figure 2-110. Terminal strip and circuit breakers.

b. Installation.

(1) Attach circuit breaker to panel with two mounting screws, lock washers, and nuts (fig 2-110).

(2) Attach electrical connectors to circuit breakers (refer to wiring diagram (fig 2-46).

(3) Attach panel to dash with ten mounting screws.

(4) Connect negative battery cable (refer to para 2-80b).

c. Test.

(1) Disconnect negative (-) battery cable and remove circuit breaker from panel (refer to a above).

(2) Refer to figure 2-110 for circuit breaker location and overhaul schematic wiring diagram (fig 2-46) for code letters and wire numbers.

(3) Use a multimeter set on low ohm scale, test from terminal lead (fig 2-110) to bus-bar for continuity. Replace a circuit breaker that fails to indicate continuity.

2-95. Distribution Panel and Turn Signal

a. Distribution Panel Terminal Strip.

(1) Removal.

(a) Disconnect negative battery cable (refer to para 2-80a).

Warning: Disconnect negative (-) battery cable prior to removal of circuit breakers. Do not allow battery cable to contact vehicle frame.

(b) Remove panel from dash by removing ten screws located around perimeter. Tilt panel outward to gain access to terminal strip (fig 2-110).

(c) Disconnect wires and remove bus bar from terminal strip by removing nuts and washers (fig 2-110).

Note: Identify wire terminations to facilitate replacement

(d) Remove terminal strip from panel by removing three screws and nuts.

(2) Installation.

(a) Attach terminal strip to panel with three screws and nuts (fig 2-110).

(b) Position bus bar on terminal strip. Connect wires to their respective terminals (refer to wiring diagram, fig 2-46). Secure bus bar and wires with nuts and washers.

(c) Attach panel to dash with ten mounting screws.

(d) Connect negative battery cable (refer to para 2-80b I).

b. Distribution Box.

(1) Removal.

(a) Disconnect negative battery cable (refer to **para** 2-80a).

(b) Remove distribution panel from dash by removing ten screws. Tilt panel outward to gain access to distribution box (fig 2-110).

(c) Disconnect all electrical leads from distribution box (fig 2-110) (refer to wiring diagram fig 2-46).

(d) Remove two screws, washers, and nuts securing distribution box to panel. Remove distribution box.

(2) Installation.

(a) Position distribution box on panel and secure with two screws, washers, and nuts (fig 2-110).

(b) Connect electrical leads to distribution box (refer to wiring diagram 2-46).

(c) Tilt panel inward, position distribution panel on dash and secure with ten screws.

(d) Connect negative battery cable (refer to **para** 2-80b).

c. Solid State Flasher.

(1) *Removal.*

(a) Refer to a(1)(a) and a(1)(b) above.

(b) Remove cable connector from solid state flasher receptacle (fig 2-111).

(c) Remove two screws, washers, and nuts securing solid state flasher to panel. Remove flasher assembly.

(2) *Installation.*

(a) Place mounting screw through eyelet terminal on ground lead of connector. Place washer over screw (fig 2-111).

(b) Position solid state flasher on panel and secure with two screws, washers, and nuts (fig 2-111).

Note: Connect ground lead from cable connector to mounting screw nearest receptacle.

(c) Attach cable connector to solid state flasher receptacle.

(d) Tilt panel inward, position distribution panel on dash and secure with ten screws.

(e) Connect negative battery cable (refer to para 2-80b).

d. *Solid State Turn Signal Kit.*

(1) *Removal of old parts.*

(a) Disconnect negative battery cable (refer to para 2-80a).

(b) Remove distribution box (refer to b. above).

(c) Remove directional control assembly (refer to para 2-96 a).

(d) Remove old terminals from the following six wires on vehicle wire harness indicated by wire numbers 461(L), 461-460(A), 461-22(K), 460-22(E), 460(J), and 22(B) (refer to wiring diagram fig 2-46).

Note: The wiring circuit band must remain with the wires. Letters in parenthesis correspond to terminals on distribution box.

(2) *Installation of new parts.*

(a) Replace those terminals that were removed in (1) (d) above with six connectors furnished in kit.

(b) Mount solid state flasher assembly using two screws, washers, and nuts in the location from which the distribution box was removed.

Note: Do not tighten the screw in the mounting ear nearest the flasher receptacle.

(c) Mount directional control switch supplied with kit to steering column, approximately two inches below steering wheel hub. Trim excess length off mounting band and remove burrs and sharp edges.

(d) Connect new cable to directional control assembly (refer to wiring diagram fig 4-26).

(e) Route cable along steering column and secure to column using clips removed in (1) (c) above.

Note: If cable is too long, coil wire underneath instrument panel and secure to stationary member to avoid interference with driver's foot.

(f) Connect cable connector to solid state flasher receptacle. A single lead from the connector identified as (GRD) must be attached to the mounting screw nearest the connector (fig 2-111).

(g) Connect control assembly cable leads to vehicle wiring harness, matching wire numbers (fig 2-47).

Table 2-6. *Connection Points Between Directional Control Harness and Existing Vehicle Harness.*

Control Cable Wire No. to Vehicle Harness	
461	461(L)
461-460	461-460 (A)
461-22	461-22(K)
460-22	460-22(E)
460	460(1)
22	22(B)

Note: The letters in parenthesis indicate distribution box terminal from which wire was removed.

(h) Connect negative battery cable (refer to para 2-80b).

2-96. Directional Signal Control

a. *Removal.*

(1) Remove distribution panel from dash by removing ten screws. Tilt panel outward to gain access to distribution box (fig 2-110).

(2) Disconnect directional signal control leads from distribution box (**fig 2-110**). (Refer to wiring diagram **fig 2-46**).

(3) Remove directional signal control from steering column by removing screw and nut from clamp. Remove directional signal control (**fig 2-112**)

Note: On vehicles equipped with a solid flasher, the control assembly *is* removed in the same manner **except** the cable is disconnected at the control assembly.

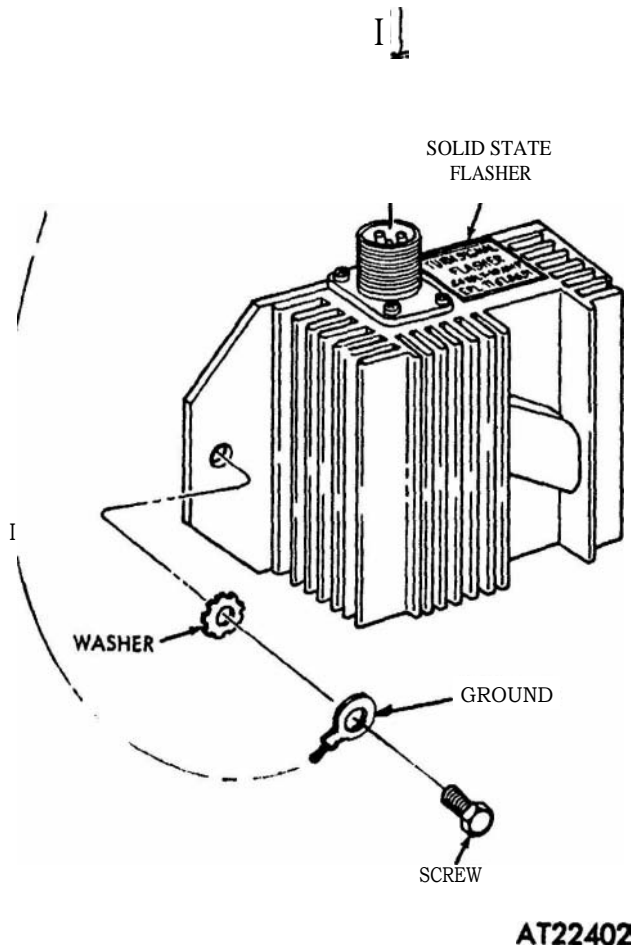
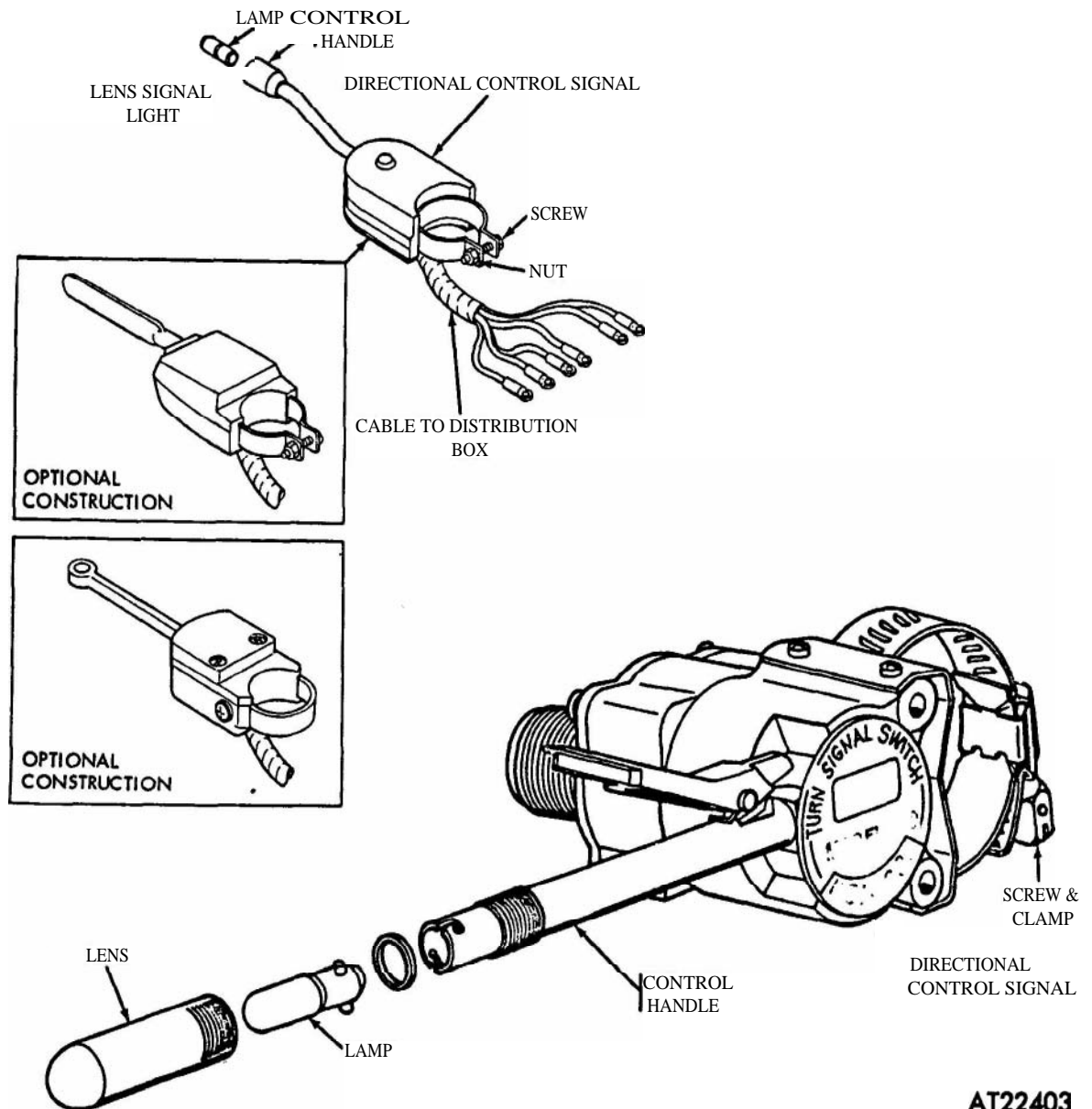


Figure 2-111. Solid State Flasher.



AT22403

Figure 2-112. Directional turn signal control assembly.

b. Installation.

(1) Attach directional signal control to steering column by positioning control and securing with clamp (fig 2-112).

(2) Connect directional signal control leads to distribution box (refer to wiring diagram fig 2-46).

(3) Tilt panel inward, position distribution panel on dash and secure with ten screws.

2-97. Directional Signal Control Lamp Replacement

Note: a. and b. below reflect the old mechanical turn signal control assembly, while c. and d. below reflect the new solid state turn signal control assembly.

a. Removal.

(1) Remove two screws from directional signal control (fig 2-112). Remove cover.

(2) Depress and turn lamp to remove.

b. Installation.

(1) Insert lamp in receptacle, depress and turn lamp to secure.

(2) Position directional signal control cover and secure with two screws.

c. Removal.

(1) Unscrew and remove pilot lens from end of control lever (fig 2-112).

(2) Push lamp in to turn, and remove lamp.

d. *Installation*

(1) Install lamp by pushing in and turning (fig 2-112).

(2) Screw pilot lens on end of control lever.

2-98. Headlight Selector Switch

a. *Removal.*

(1) Remove selector switch by removing three screws and lock washers. Slide switch from slotted frame (fig 2-113).

(2) Disconnect electrical connectors from switch.

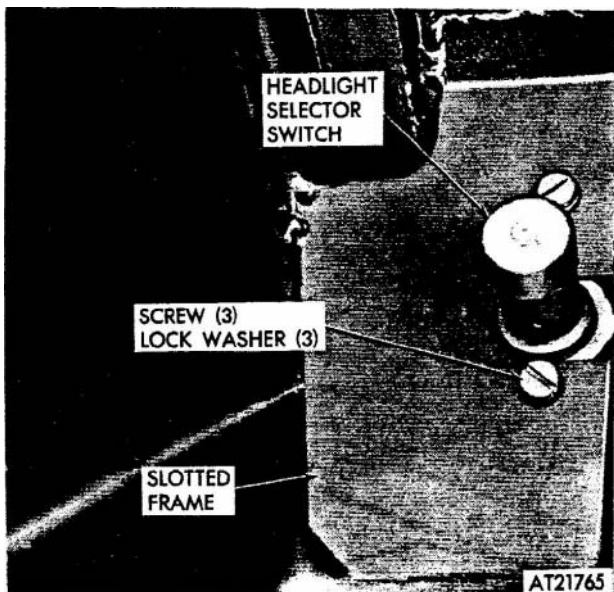


Figure 2-113. Headlight selector switch.

b. *Installation.*

(1) Connect electrical connectors to selector switch (refer to wiring diagram (fig 2-46)).

(2) Insert selector switch in slot of frame and secure with three screws and lock washers.

2-99. Hydraulic Stoplight Switch

a. *Removal.*

(1) Remove electrical connector from hydraulic switch located under cowl assembly (fig 2-114).

(2) Loosen nut on switch fitting and remove switch. Cap tee on hydraulic line.

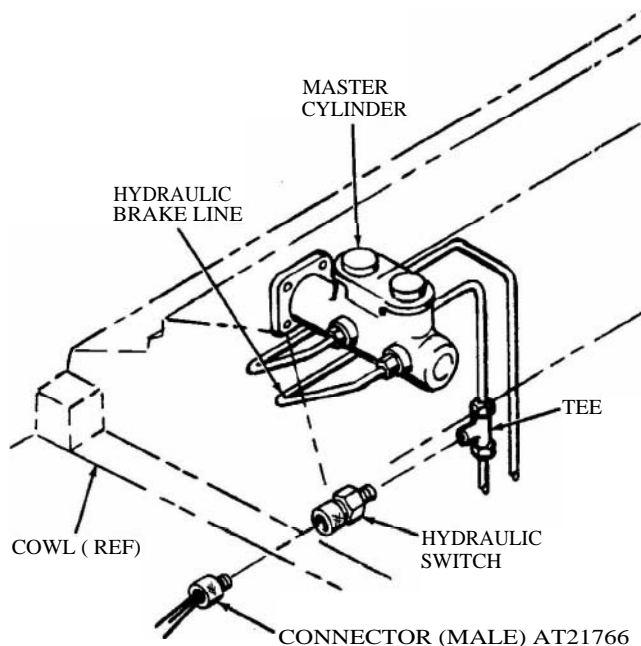


Figure 2-114. Hydraulic Stoplight Switch.

b. *Installation.*

(1) Remove cap from tee and insert hydraulic switch. Hand tighten switch (fig 2-114).

(2) Depress brake pedal until brake fluid starts to seep from switch fitting. Tighten hydraulic switch fitting.

(3) Connect electrical connector.

2-100. Turn, Park, and Blackout Marker Light

a. *Removal.*

(1) Remove mud guard on underside of fender by removing five screws and loosening three lock nuts. Slide panel away from lock nuts (fig 2-115).

(2) Disconnect three electrical connectors from light assembly (fig 2-116).

(3) Remove light assembly from mounting bracket. by removing two screws and lock washers. Remove grommet and feed wires through hole (fig 2-117).

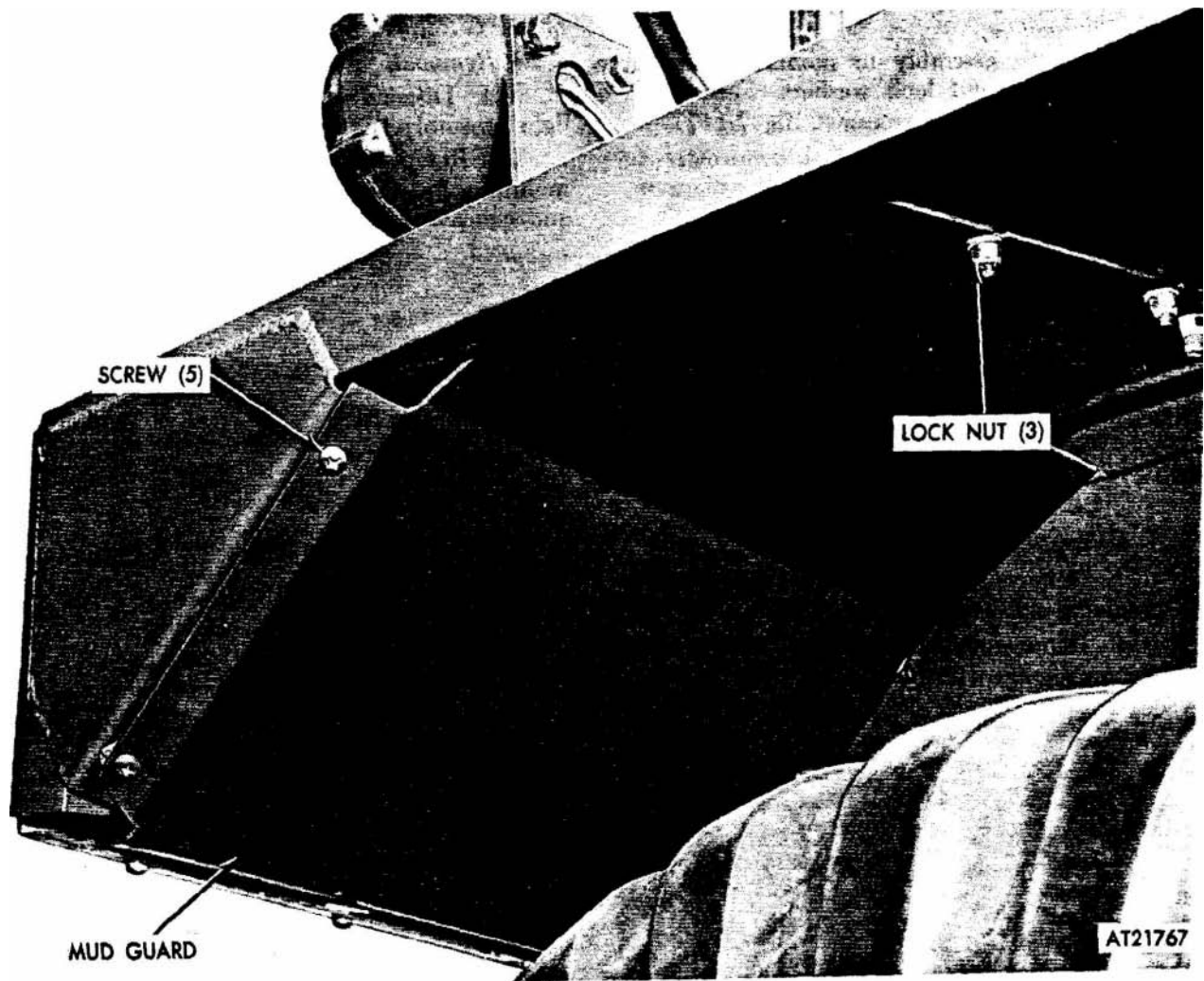
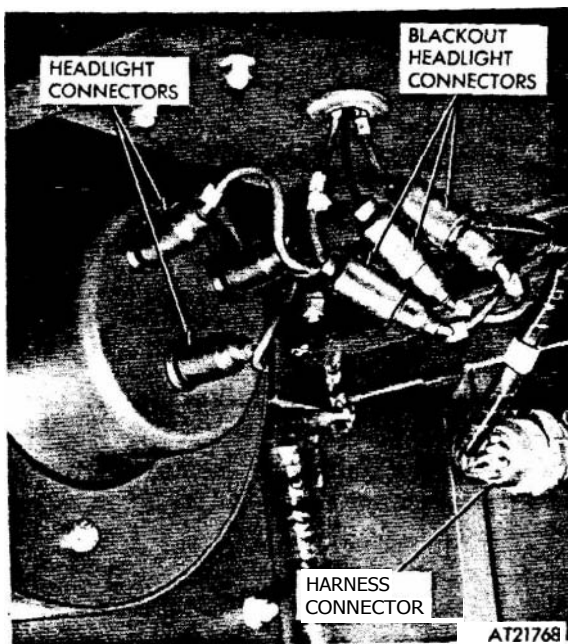


Figure 2-115. Mud guard, removal and installation.



Row 2,116. Light harness, front fender.

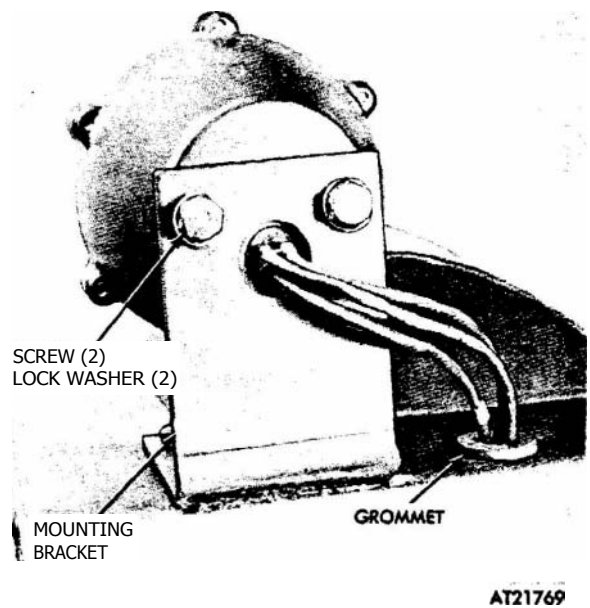


Figure 2-117. Turn, park, and blackout marker light.

b. Installation.

(1) Attach assembly to mounting bracket with two screws and lock washers. Feed wires through hole and insert grommet (fig 2-117).

(2) Connect three electrical connectors to their proper receptacles (refer to wiring diagram, fig 2-46).

(3) Attach mud guard to underside of fender by positioning slots in mud guard under three lock nuts. Insert and tighten five screws. Tighten lock nuts (fig 2-115).

Note: Removal and installation for right- and left-hand lights is identical.

2-101. Turn, Park, and Blackout Marker Lamps Replacement

a. Removal

(1) Remove light assembly cover and gasket by removing six screws (fig 2-118).

(2) Remove defective lamp(s) by depressing and turning lamp.

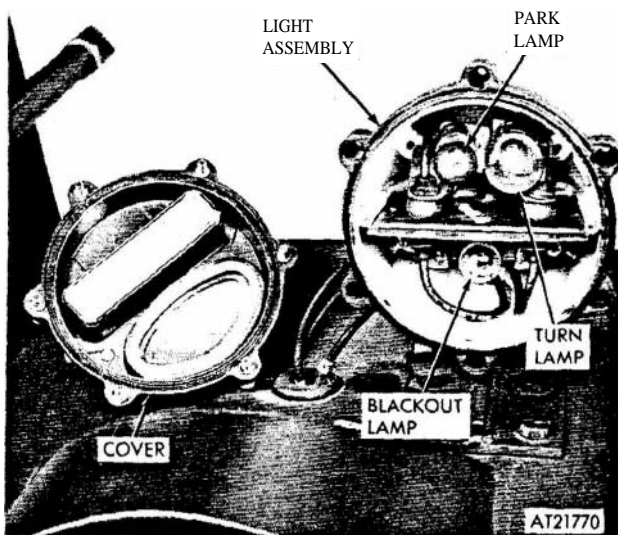


Figure 2-118. Turn, park, and blackout marker lamp replacement.

b. Installation.

(1) Insert lamp in receptacle. Depress and turn lamp to secure.

(2) Attach cover to light with screws.

Note: Check cover gasket for serviceability. Replace if necessary.

2-102. Blackout Headlight Assembly

a. Removal.

(1) Disconnect electrical connector from light assembly (fig 2-119).

(2) Remove blackout light assembly from mounting bracket by removing nut, lock washer, and concave washer located beneath light.

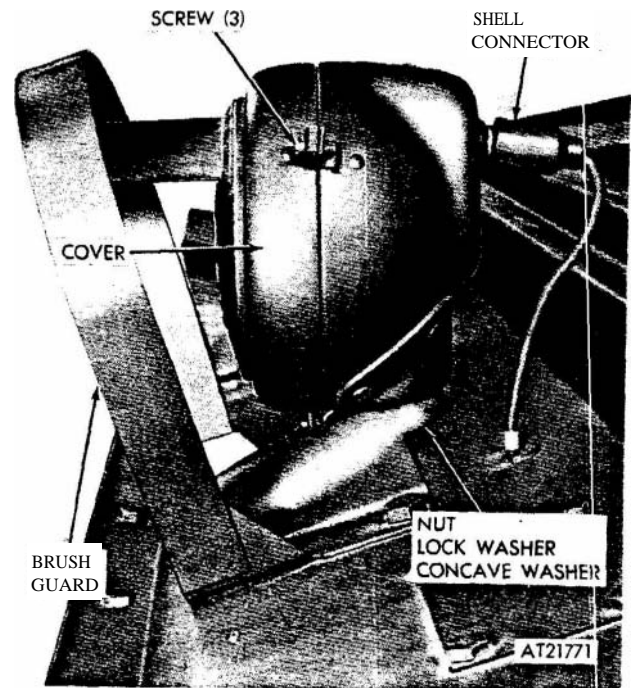


Figure 2-119. Blackout headlight and cover, removal and installation.

b. Installation.

(1) Attach blackout light assembly to mounting bracket with concave washer, lock washer, and nut.

(2) Connect electrical connector to light assembly.

2-103. Blackout Headlight Lamp Replacement

a. Removal.

(1) Remove cover assembly by removing three screws (fig 2-119).

(2) Disconnect electrical leads between lamp and light body (fig 2-120).

(3) Remove lamp by removing three retaining springs from rim of cover.



Figure 2-120. Blackout headlight lamp replacement.

b. Installation.

- (1) Insert lamp in cover and install three retaining springs in cover rim. Ensure that retaining springs are evenly spaced (fig 2-120).
- (2) Connect electrical leads between lamp and body. Secure lamp and cover with three screws (fig 2-119).
- (3) Connect electrical connector to rear of blackout light.

2-104. Headlamp Assembly

Removal and installation for left- and right- hand lights is identical.

a. Removal.

- (1) Remove one screw securing brush guard to fender. Loosen opposite screw, and move brush guard aside (fig 2-121).
- (2) Remove mud guard from fender by removing five screws and loosening three nuts located on underside of fender. Slide mud guard away from three nuts to remove (fig 2-115).
- (3) Disconnect three electrical connectors (fig 2-116).
- (4) Remove headlamp assembly from fender by removing three nuts.

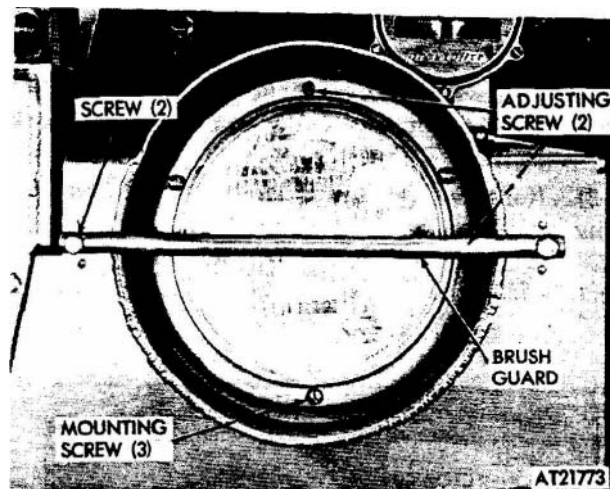


Figure 2-121. Headlight and brush guard, removal and replacement.

b. Installation.

- (1) Attach headlamp assembly to fender with three nuts.
- (2) Connect three electrical connectors to their proper receptacles (refer to wiring diagram, fig 2-46).
- (3) Adjust headlamps (c. below).
- (4) Align brush guard with fender, install screw, and **tighten** both screws (fig 2-121).
- (5) Attach mud guard to underside of fender by positioning slots in mud guard under three locknuts. Insert and tighten five screws. Tighten lock nuts (fig 2-115).

c. Adjustment. Prior to adjusting headlights, make sure that tires are properly inflated, that there is no load in the vehicle and that springs are not broken or sagging. The vehicle should be rocked sideways to permit the suspension system to level.

- (1) Position vehicle on a level surface.
- (2) Position adjustment screen (FSN 4910-240-7529) or equivalent 25 feet in front of vehicle.
- (3) Adjust the headlights in accordance with the instructions accompanying the adjustment screen. Lamp adjustment is accomplished by turning the two adjusting screws located under the headlight retaining ring (fig 2-121).

2-105. Headlight Sea led Bea m Replacement

Note: Removal and installation for left-and right-hand lights is identical.

a. *Removal.*

(1) Remove one screw securing brush guard to fender. Loosen opposite screw and move brush guard aside (fig 2-121).

(2) Remove retaining ring from lamp housing by removing three screws.

(3) Pull lamp out and remove three electrical connectors from lamp (fig 2-122).

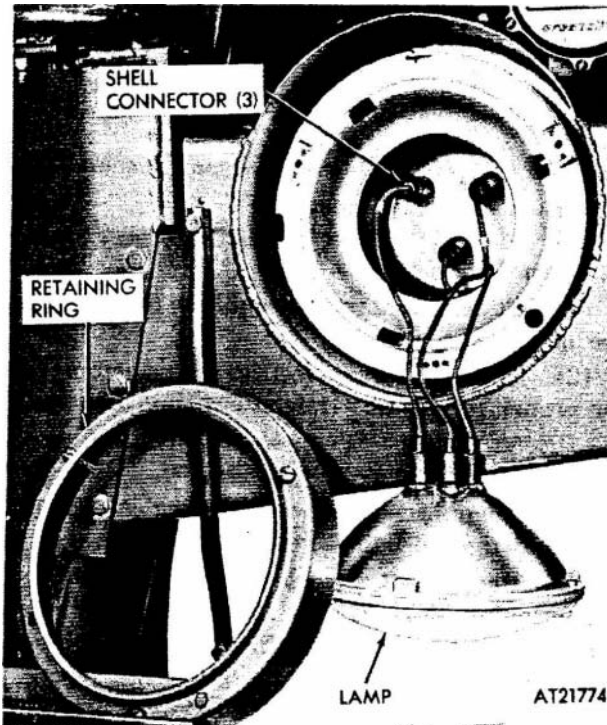


Figure 2-122. Headlight lamp replacement.

b. *Installation.*

(1) Connect three electrical connectors to their respective connectors on lamp.

(2) Align retaining ring with lamp housing and secure with three screws.

(3) Adjust headlamps (refer to para 2-104c).

(4) Align brush guard with fender, install screw, and tighten both screws (fig 2-121).

2-106. Horn

a. *Removal.*

(1) Disconnect electrical connectors from horn (fig 2-123).

(2) Remove horn from brush guard by removing two screws and washers (fig 2-124).

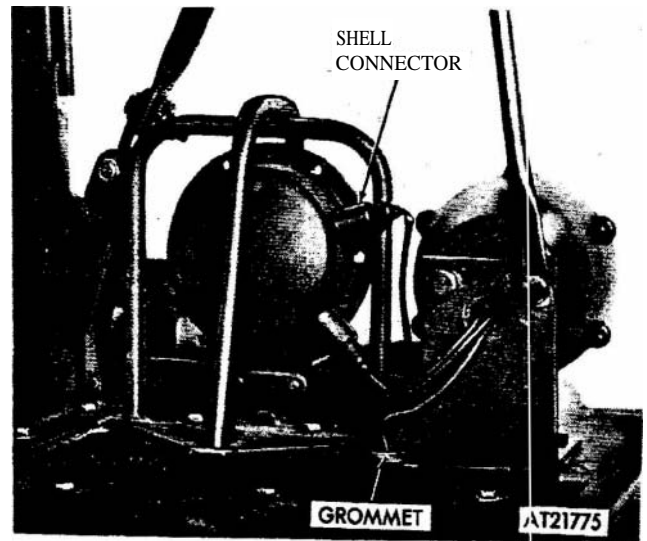


Figure 2-123. Horn electrical connections.

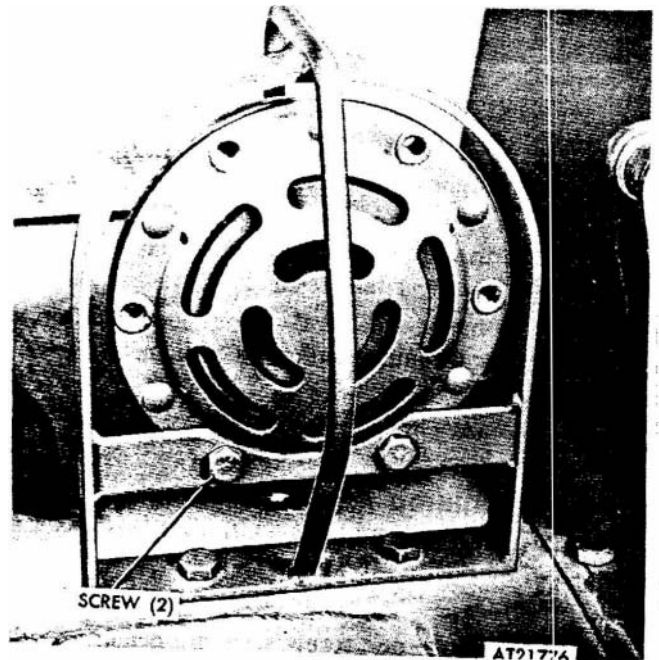


Figure 2-124. Horn, removal and installation.

b. *Installation.*

(1) Attach horn to brush guard with two screws and washers.

(2) Connect electrical connectors to their respective receptacles (refer to wiring diagram, fig 2-46).

c. *Adjustment.* The horn is adjusted for a clear, sharp tone by turning nut in center of horn, as required for tone.

2-107. Horn Button, Steering Column Contact, and Cable

a. Removal.

(1) Remove contact cover and gasket from steering column by removing four screws (fig 2-125).

12) Remove spacer and contact brush from steering column by removing two screws.

(3) Disconnect electrical lead from ring assembly on steering column. Tie a length of cord to terminal end of cable. Remove tape securing cable

to steering column.

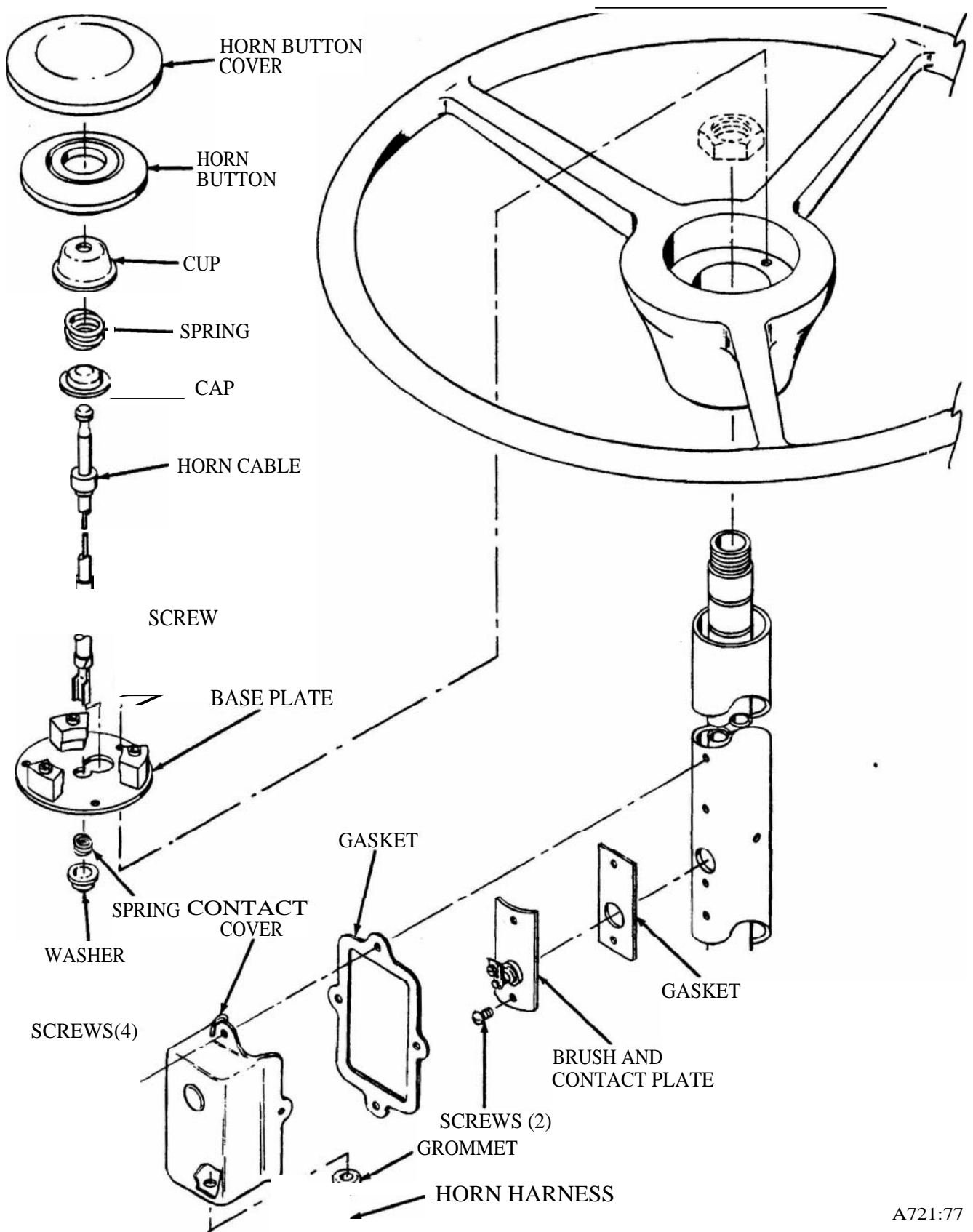
(4) Lift horn button cover off horn button.

(5) Remove horn button, cup, and spring by turning horn button one-quarter turn.

(6) Remove cap and pull horn cable out of steering column. Untie cable terminal from cord.

Note: Allow **cord to protrude from wheel and column** until completion.

(7) Remove base plate, spring, and washer from steering wheel by removing three mounting screws.



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Figure 2-125. Horn button assembly.

b. Installation.

- (1) Using repair kit, replace units of horn button assembly (refer to TM 9-2320-242-20P).
- (2) Tie terminal of horn cable to cord at steering wheel end and pull cable into steering column (fig 2-125).
- (3) Untie cord from terminal and connect terminal to ring assembly. Wrap insulating tape around steering column above ring assembly.
- (4) Attach brush contact assembly and spacer to steering column with two screws. Connect horn wire.
- (5) Attach cover and gasket to steering column with four screws.
- (6) Position cap, spring, and cup on terminal of horn cable assembly.
- (7) Attach horn button to base plate by rotating horn button one-quarter turn.
- (8) Press horn cover over button.

2-108. Fuel Level Transmitter

a. Removal.

- (1) Disconnect electrical connector from fuel level transmitter on left fuel tank (fig 2-126).
- (2) Clean dirt away from fuel level transmitter.
- (3) Remove fuel level transmitter from fuel tank by removing five screws and washers. Carefully lift fuel level transmitter through tank opening.

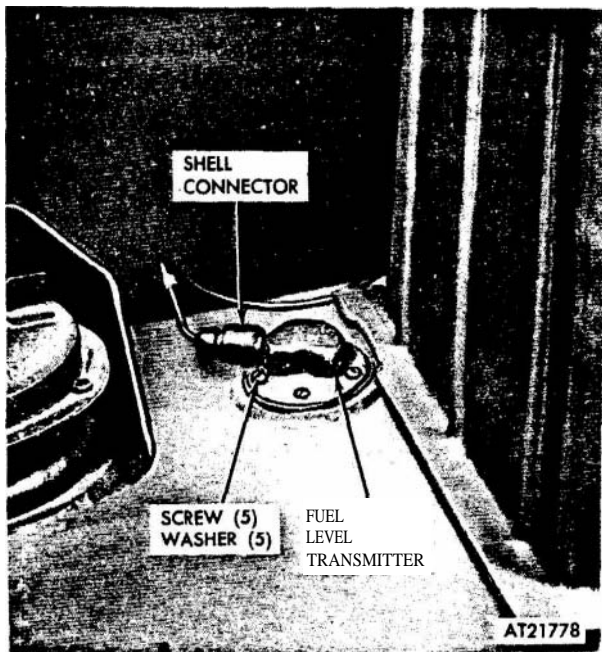


Figure 2-126. Fuel level transmitter.

b. Installation.

- (1) Align gasket with opening in fuel tank.
- (2) Carefully insert fuel level transmitter in tank opening, secure with five screws and washers.
- (3) Connect electrical connector to fuel level transmitter.

2-109. Oil Pressure Transmitter

a. Removal.

- (1) Open and secure engine cover (refer to TM 9-2320-242-10).
- (2) Disconnect electrical connector from oil pressure transmitter (fig 2-127).
- (3) Disconnect oil pressure line by loosening nut on fitting. Cap oil line.
- (4) Remove oil pressure transmitter and clamp from engine mount by removing screw, lock washer, and nut.
- (5) Remove adapter and coupling from transmitter.

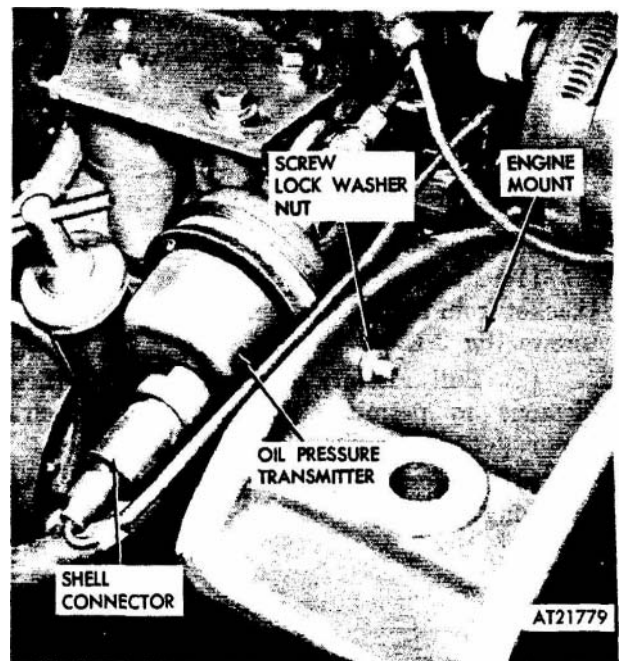


Figure 2-127. Oil pressure transmitter.

b. Installation.

- (1) Attach adapter and coupling to oil pressure transmitter (fig 2-127). Coat threads with thread sealant.
- (2) Attach clamp and transmitter to engine mount with screw, lock washer, and nut.
- (3) Connect oil pressure line to oil pressure transmitter.

(4) Connect electrical connector to oil pressure transmitter.

(5) Start engine and check for oil pressure indication (refer to TM 9-2320-242-10) and oil leaks. Stop engine.

(6) Close and secure engine cover (refer to TM 9-2320-242-10).

2-110. Engine Temperature Transmitter

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Disconnect electrical connector from temperature transmitter at thermostat housing (fig 2-99).

(3) Unscrew temperature transmitter from thermostat housing and cap opening.

b. Installation.

(1) Insert temperature transmitter in thermostat housing and tighten (fig 2-99).

(2) Connect electrical connector.

(3) Start engine and observe temperature indicator (refer to TM 9-2320-242-10), and check for leaks. Stop engine.

(4) Close and secure engine cover (refer to TM 9-2320-242-10).

2-111. Carrier Stop Signal Switch

a. Removal.

(1) Remove instruction plate and retainer bracket from carrier front panel by removing four screws (fig 2-128).

(2) Pull retainer bracket out a sufficient distance to permit disconnection of electrical connections. Disconnect electrical connectors.

(3) Remove switch from retainer bracket by removing nut.

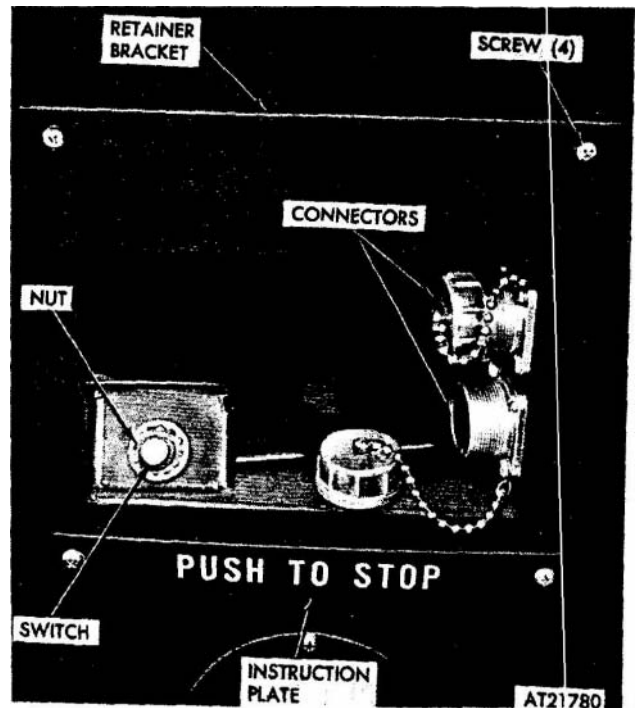


Figure 2-128. Carrier stop signal switch.

b. Installation.

(1) Connect electrical connectors to carrier stop signal switch.

(2) Insert switch in mounting hole of retainer bracket and secure with nut (fig 2-128).

Note: Switch is retained with one nut and lock washer behind retainer bracket and one nut in front.

(3) Align instruction plate with bottom holes of retainer bracket. Attach plate and bracket to carrier front panel with four screws.

2-112. Stop, Turn, and Tail Light

Note: Removal and installation for left- and right-hand lights is identical.

a. Removal.

- (1) Lower tailgate (refer to TM 9-2320-242-10).
- (2) Remove access hole cover from rear seat by removing four screws.
- (3) Reach through access hole, identify, and disconnect correct electrical connectors (fig 2-129).
- (4) Reach through access hole and remove light assembly from carrier hull by removing two screws and lock washers.
- (5) Slowly remove light assembly (fig 2-130) while working electrical connectors through mounting hole in carrier hull. Remove gasket.

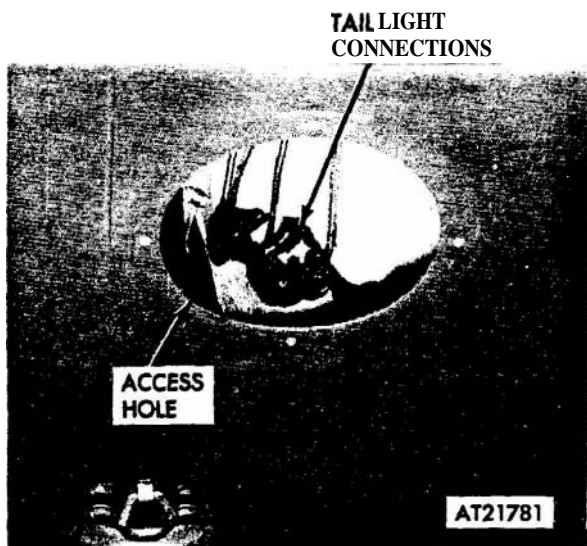


Figure 2-129. Tail light connector access hole

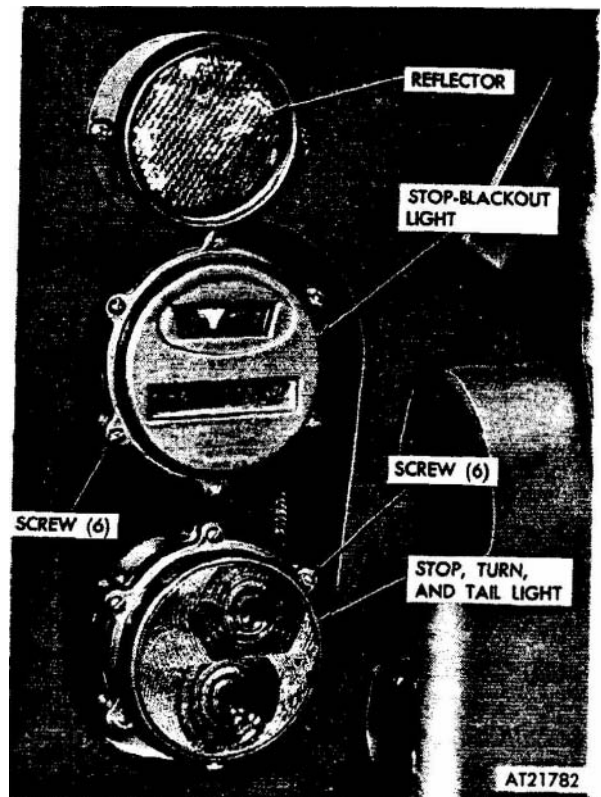


Figure 2-130. Tail light assemblies.

b. Installation.

- (1) Clean old gasket material from stop, turn, and tail light mounting hole. Position gasket in place over mounting hole.
- (2) Insert electrical connectors in mounting hole one at a time. Push light assembly firmly into mounting hole.
- (3) Reach through access hole and attach light assembly to carrier hull with two screws and lock washers.
- (4) Connect electrical connectors to their respective terminals (refer to wiring diagram, fig 2-46).
- (5) Attach access hole cover with four screws.
- (6) Raise and secure tailgate (refer to TM 9-2320-242-10).

2-113. Stop, Turn, and Tail Lamp(s) Replacement

a. Removal.

Note: Removal and installation for left-and right-hand lights is identical.

- (1) Remove lens and gasket from light body by removing six screws (fig 2-130).
- (2) Remove defective lamp by depressing and turning lamp.

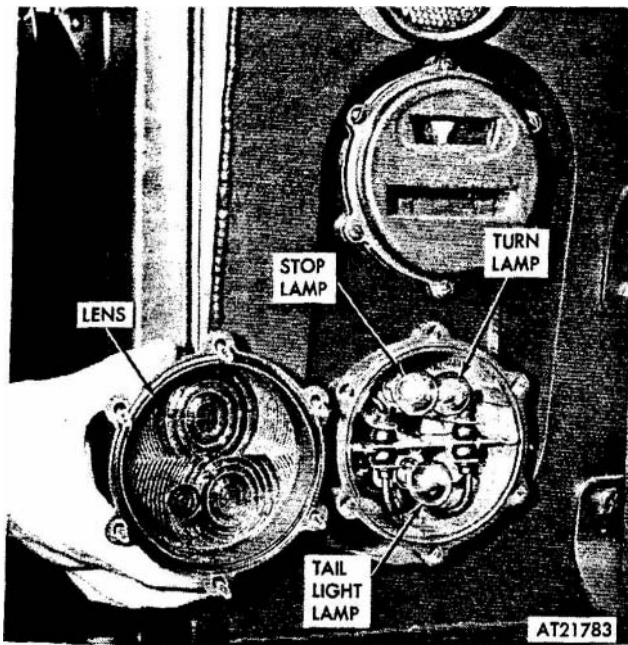


Figure 2-131. Stop, turn, and tail light lamps) replacement.

b. Installation.

111 Insert lamp in receptacle. Depress and turn lamp to secure.

121 Attach lens and gasket to light body with six screws.

Note: Inspect lens and gasket for serviceability prior to installation. Replace if necessary.

2-114. Stop-Blackout Light

a. Removal.

(1) Lower tailgate (refer to TM 9-2320-242-10).

(2) Remove access hold cover from rear seat by removing four screws.

(3) Reach through access hole, identify, and disconnect correct electrical connectors (fig 2-129).

(4) Reach through access hole and remove light assembly by removing two screws and lock washers.

(5) Slowly remove light assembly while working electrical connectors through mounting hole in carrier hull. Remove gasket (fig 2-130).

b. Installation.

(1) Clean old gasket material from stop-blackout light mounting hole. Position gasket in place over mounting hole.

(2) Insert electrical connectors in mounting hole one at a time. Push light assembly firmly into mounting hole.

(3) Reach through access hole and attach light assembly to carrier hull with two screws and lock washers.

(4) Connect electrical connectors to their respective terminals (refer to wiring diagram, fig 2-46).

(5) Attach access hole cover with four screws.

(6) Raise and secure tailgate (refer to TM 9-2320-242-10 I).

2-115. Stop-Blackout Lamp Replacement

a. Removal.

Note: Removal and installation for left- and right-hand lights is identical.

11) Remove cover assembly and gasket from light body by removing six screws (fig 2-130).

(2) Remove defective lamp by depressing and turning lamp (fig 2-132).

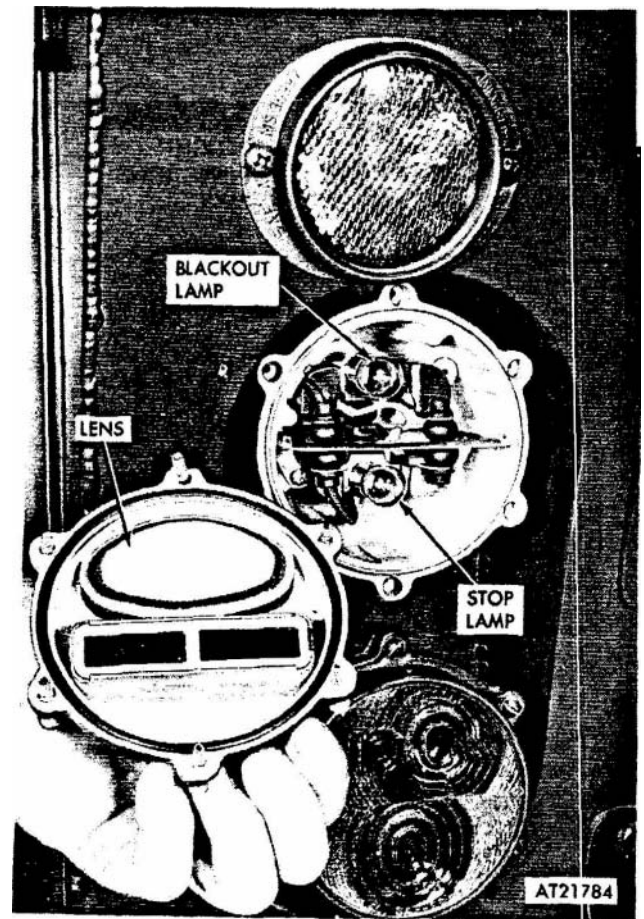


Figure 2-132. Stop-blackout lamp replacement.

b. Installation.

(1) Insert lamp in receptacle. Depress and turn lamp to secure.

(2) Attach cover and gasket to light body with six screws.

Note: Inspect lens and gasket for serviceability. Replace as required.

2-116. Tractor Front Fender Harness

a. Removal.

Note: Removal and installation for left- and right-hand harnesses is identical with the exception of the horn wires on the right-hand harness.

(1) Remove mud guard from fender by removing five screws and loosening three nuts on underside of fender. Slide mud guard away from three nuts to remove (fig 2-1151).

(2) Disconnect harness from front fender by

unscrewing coupling nut on connector (fig 2-1331).

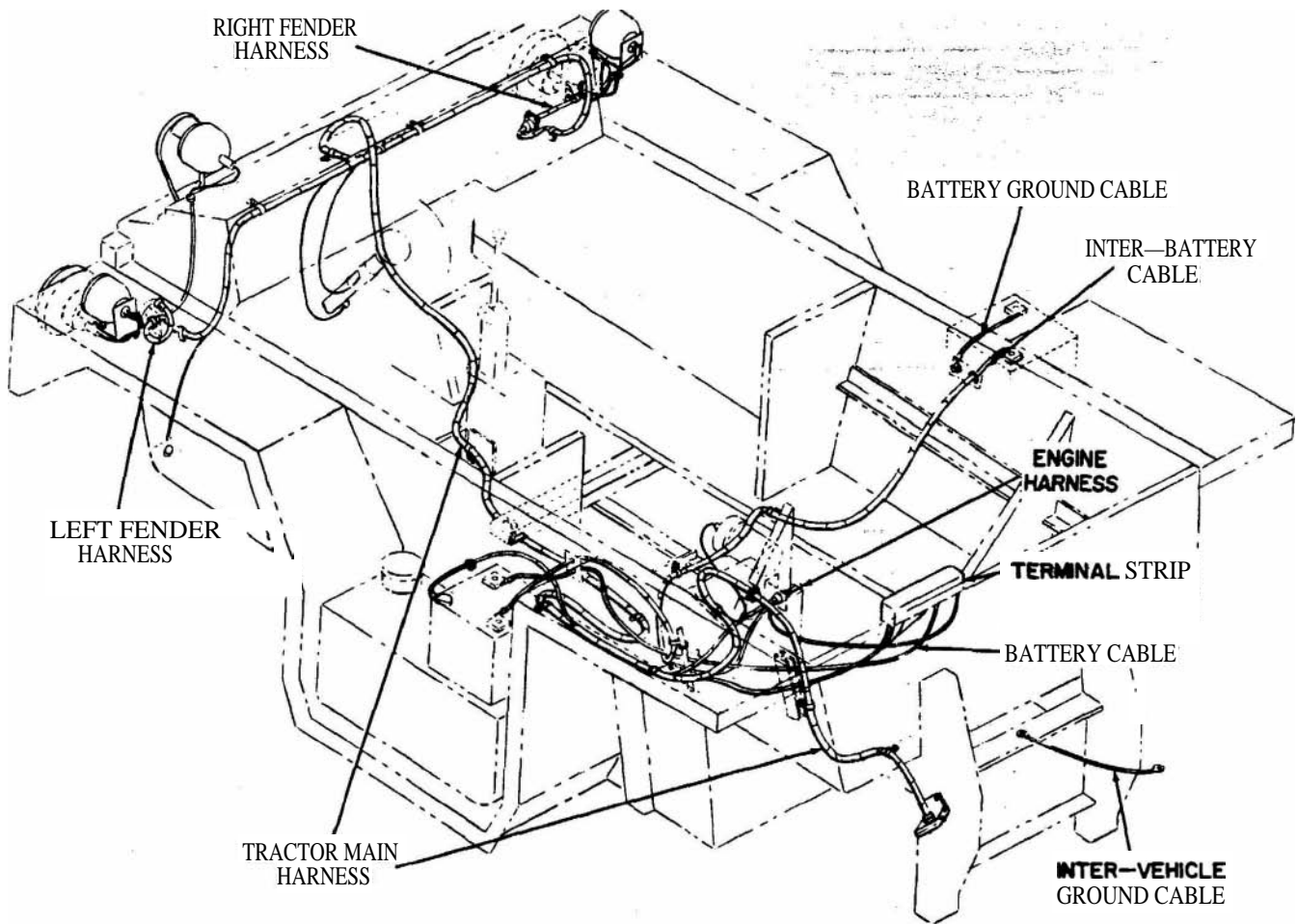
(3) Disconnect three connectors from headlamp. Pull wires through hole in fender one at a time.

(4) Disconnect three connectors from blackout, turn, and park light. Pull through hole in fender one at a time (fig 2-1161).

(5) Disconnect connectors from horn (right-hand harness **only**).

(6) Remove harness clamp from fender by removing nut, washer, and screw.

(7) Remove harness assembly by carefully removing grommet in fender.



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Figure 2-133. Tractor harness installation.

b. *Repair.* Repairs shall be made in accordance with TB ORD 650 (fig 2-134).

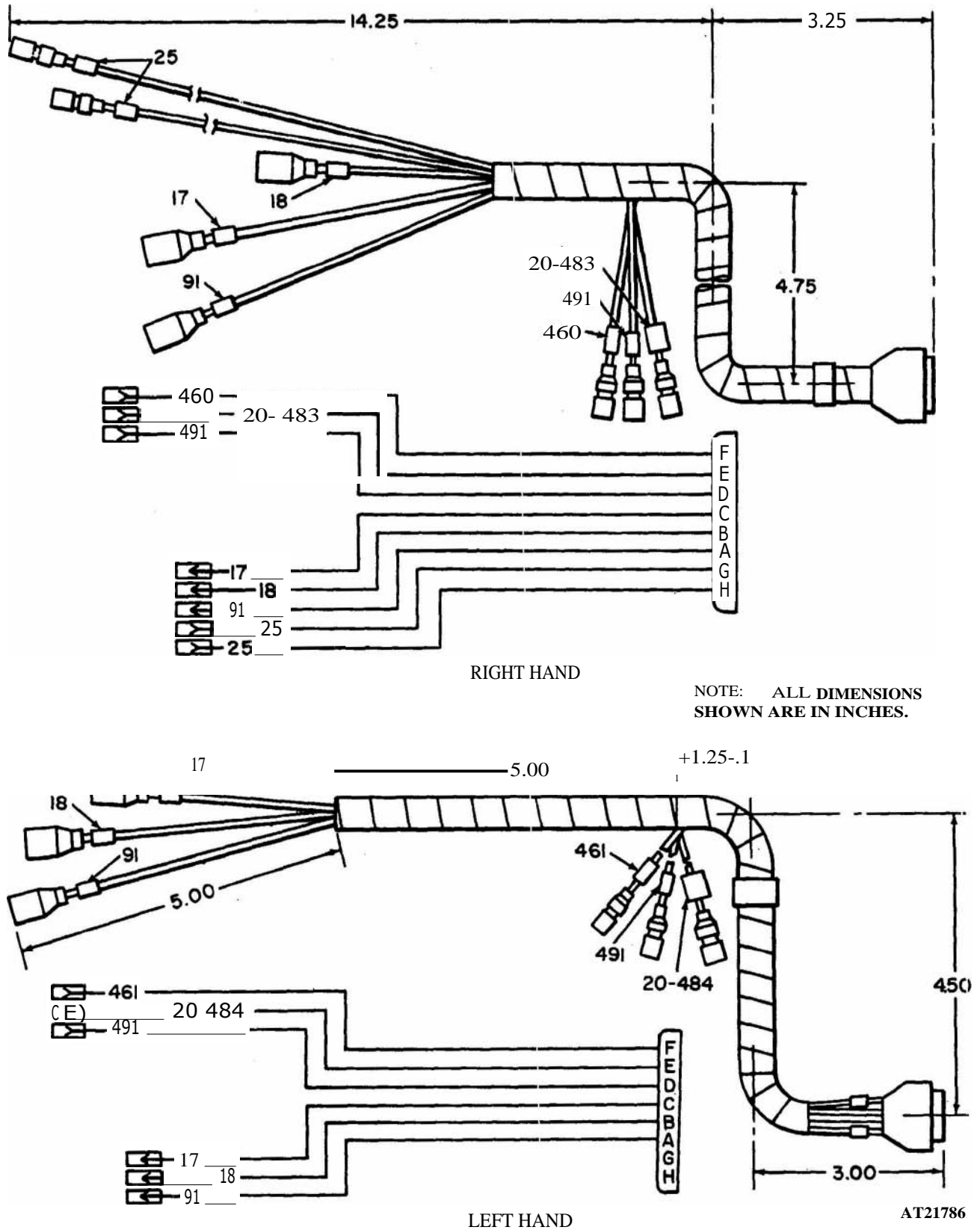


Figure 2-134. Tractor front fender harness.

c. Installation.

(1) Connect electrical connector to receptacle on front fender and tighten coupling nut on connector (fig 2-133).

(2) Insert wires, one at a time, for blackout, turn, and park light; headlamp, and horn (right-hand fender only) through hole in fender (fig 2-116).

(3) Install grommet on wires and work grommet into hole in fender.

(4) Connect wires to their respective connectors (refer to wiring diagram, fig 2-46).

(5) Attach harness assembly to fender with clamp, screw, washer, and nut. Ensure that wires have sufficient slack when clamp is tightened.

(6) Attach mud guard to underside of fender by positioning slots in mud guard under three lock nuts. Insert and tighten five screws. Tighten lock nuts (fig 2-115).

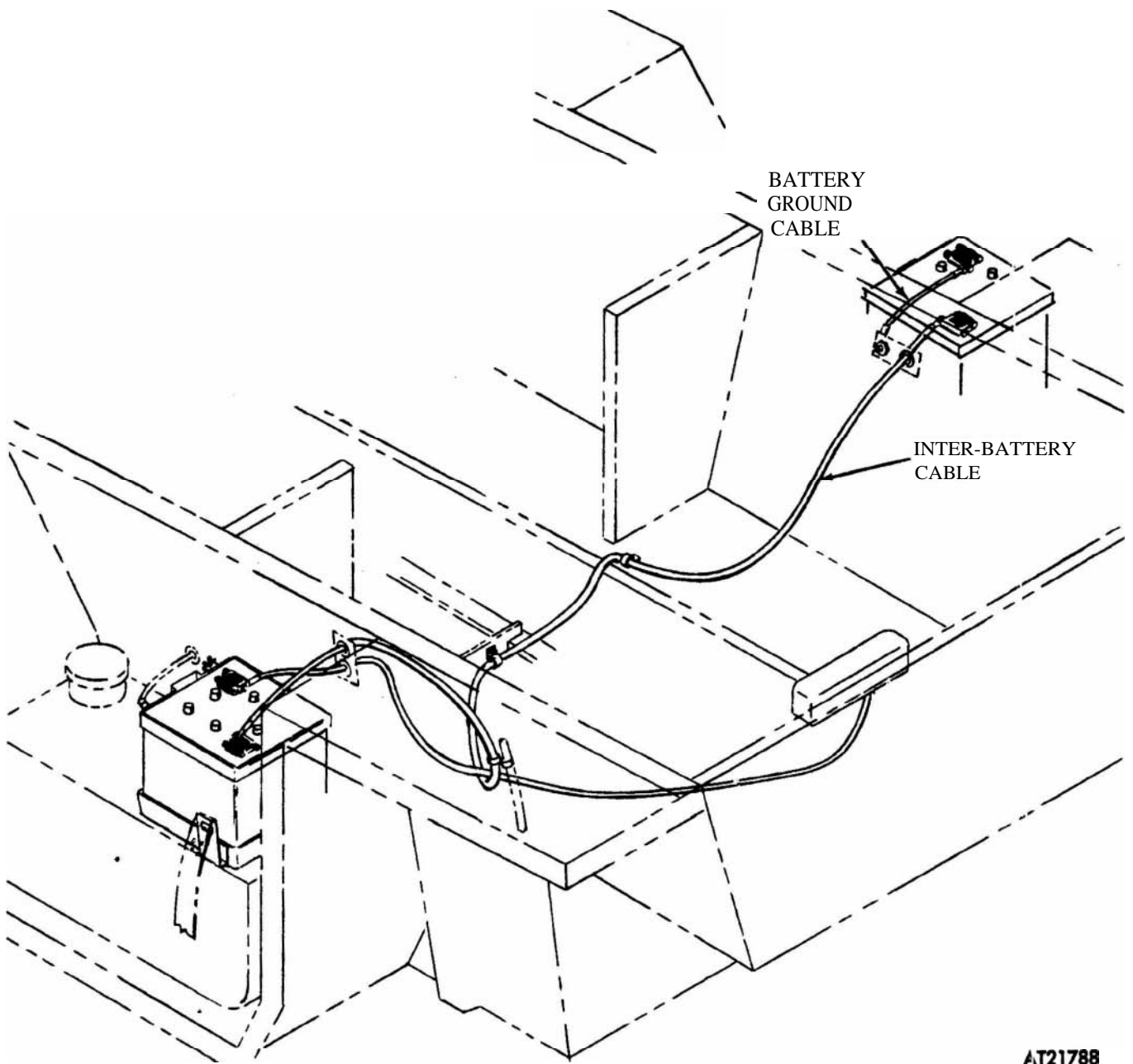
2-117. Battery Ground Cable

a. Removal.

(1) Remove battery box cover (refer to **para** 2-80a).

(2) Disconnect positive and negative cables from battery terminal clamps on battery posts by removing two nuts and bolts. Ensure that cables are positioned away from battery (fig 2-133).

(3) Remove ground cable terminal from right-hand tractor bracket by removing nut, two lock washers, and bolt (fig 2-135).



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Figure 2-135. Battery ground cable and inter-battery cable.

b. *Installation.*

(1) Clean cable mounting area on right-hand tractor bracket.

(2) Attach ground cable terminal to right-hand tractor bracket with bolt, two lock washers, and nut (fig 2435).

Note: Lock washers are installed on both sides of Bracket

(3) Attach ground cable to negative battery terminal clamp with nut and bolt.

(4) Attach positive (inter-battery) cable to positive battery terminal clamp with nut and bolt.

(5) Apply a 1 / 32-inch coating of heavy asbestos grease (GK) to cable lugs and terminals.

(6) Install battery box cover (refer to para 2-80b).

(7) Close and secure engine cover (refer to TM 9-2320-242-10).

2-118. Inter-Battery Cable

a. *Removal*

(1) Remove battery box covers (refer to para 2-80a).

(2) Open and secure engine cover (refer to TM 9-2320-242-10).

(3) Remove battery ground cable (fig 2-135) from right-hand battery terminal clamps by removing nuts and bolts.

(4) Remove inter-battery cables from right- and left-hand battery terminal clamps by removing nuts and bolts.

Note: The inter-battery cable on right-hand battery is positive, and left-hand battery is negative.

(5) Remove grommets from inter-battery cable at both ends and feed cable through holes in tractor hull.

(6) Remove three inter-battery cable clamps from tractor hull by removing screws and nuts.

(7) Pull cable from tractor hull and remove cable clamps.

b. *Installation*

(1) Install three cable clamps on inter-battery cable, position cable in tractor hull, and feed cable terminals through holes in tractor hull (fig 2-135).

(2) Slide grommets on ends of inter-battery cable and work grommets in holes in tractor hull.

(3) Attach inter-battery cable to right- and left-hand battery terminal and clamps with nuts and bolts.

Note: The inter-battery cable to right-hand battery is positive, and left-hand battery is negative.

(4) Attach one inter-battery cable clamp to bilge pump hose mounting clamp with screw and nut.

(5) Attach two clamps to tractor hull with two screws and nuts.

(6) Attach battery ground cable to right-hand battery terminal clamp with nut and bolt.

(7) Coat terminals with a 1 / 32-inch layer of heavy asbestos grease (GK).

(8) Install battery box covers (refer to para 2-80b).

(9) Close and secure engine cover (refer to TM 9-2320-242-10).

2-119. Tractor Main Harness

a. *Removal.*

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Remove tractor seats (refer to para 2-221).

(3) Remove console (refer to para 2-33).

(4) Remove battery box covers (refer to para 2-80a).

(5) Remove negative and positive terminals from left-hand battery terminal clamps by removing nuts and bolts (fig 2-133).

(6) Remove left-hand panel of air duct, located adjacent to accelerator pedal, by removing seventeen screws.

(7) Remove distribution panel from dash panel by removing ten mounting screws. Pull panel out a sufficient distance to gain access to connections (fig 2-110).

(8) Disconnect connectors from circuit breakers and remove terminals from terminal strip on distribution box. Remove cable clamp from distribution box by removing screw and nut (fig 2-110).

(9) Disconnect connector from right-hand windshield wiper motor.

(10) Remove switch plate from dash panel by removing five screws and nuts. Pull out a sufficient distance to gain access to connections. Disconnect connectors from switches, unsolder leads from carrier stop light, and remove panel and switch assembly (fig 2-108).

(11) Remove instrument panel and spacer from dash panel by removing four screws. Pull out a sufficient distance to gain access to connectors (fig 2-109).

(12) Disconnect twelve terminal leads from meters, lights, and horn.

(13) Reach through instrument panel opening and disconnect ground connection.

(14) *Disconnect* connector from left-hand windshield wiper motor.

(15) Remove light switch from dash panel (refer to para 2-81a).

(16) Remove cold start switch from dash panel (refer to para 2-93).

(17) Remove headlight selector switch (refer to para 2-98).

(18) Disconnect connector from blackout headlight, slide shell back on wire, remove washer and shell. Remove grommet from hole in cowl, and pull wire through hole.

(19) Disconnect connector from hydraulic stop switch.

(20) Remove right- and left-hand guards from underside of fenders by removing screws and loosening six nuts on undersides of fenders. Slide mud guard away from three nuts to remove.

(21) Disconnect right- and left-hand headlight harnesses from receptacle on tractor hull.

(22) Remove right- and left-hand harness receptacles and gaskets from tractor walls by removing eight screws and nuts.

(23) Remove seven clamps securing harness to underside of cowl by removing mounting screws and nuts.

(24) Remove two clamps securing harness to transmission by removing two screws and nuts. Replace hardware.

(25) Remove six clamps securing harness to interior of engine compartment by removing six screws and nuts.

(26) Disconnect fuel tank electrical connector, slide grommet off wire, and pull wire through hole in tractor hull.

(27) **Disconnect main harness engine** connector. Remove nut and screw securing ground wire.

(28) Remove terminal strip cover on rear engine compartment hull by loosening two mounting screws.

(29) Remove six leads from terminal strip by removing four nuts.

Note: Cable from battery need not be removed to complete harness removal.

(30) Remove carrier connector receptacle from rear of vehicle by removing four screws and nuts. Slide grommet nut of slot in stiffener plate and remove grommet from harness.

(31) Remove hull access cover and gasket from bottom of tractor hull by removing **eighteen** screws.

(32) Remove main harness from **tractor**.

b. Repair. Repairs shall be made in accordance with TB ORD 650 (figs 2-136 and 2-137).

c. Installation. (Refer to wiring diagram, fig 2-46.)

(1) Position tractor main harness in tractor with all leads in their relative positions (fig 2-133).

(2) Reach through hull access and connect bilge pump connector.

(3) Attach hull access cover and gasket to bottom of tractor hull with eighteen screws.

(4) Attach carrier connector receptacle to rear of vehicle with four screws and nuts. Install grommet on harness, push harness and grommet into slot in stiffener plate.

(5) Secure rear section of harness to tractor hull with three clamps, screws, and lock nuts.

(6) Connect six leads to four terminals on terminal strip in rear of engine compartment. Secure with four nuts.

Note: Ensure that battery cable is connected to terminal strip.

(7) Install terminal strip cover and secure by tightening two screws.

(8) Connect main harness connector to engine harness receptacle. Attach ground wire to connector bracket with screw and nut.

(9) Insert fuel tank lead through hole in tractor wall, install grommet on wire, and work grommet into hole. Connect wire lead to connector on fuel tank.

(10) Secure harness to left-hand section of tractor wall with three clamps, screws and lock nuts.

(11) Secure harness to left-hand side of transmission with two clamps and existing transmission hardware.

(12) Attach right- and left-hand harness receptacles and gaskets to tractor walls with eight screws and nuts. Ensure that ground wires are installed under one **screwhead**.

(13) Connect right- and left-hand headlight harness connectors to receptacles.

(14) Attach right- and left-hand mud guards to undersides of fenders by positioning slots in mud guards under three lock nuts.

(15) Insert lead for blackout headlight through hole in cowl, install grommet on wire, and position grommet in hole of cowl. Place shell on wire, and washer on pin contact. Slide shell over washer and pin. Connect to blackout headlight connector.

(16) Secure harness to left-hand **underside** of cowl with three clamps, screws, and nuts.

(17) Connect hydraulic stop switch connector.

(18) Install headlight selector switch (refer to para 2-98).

(19) Install cold start switch (refer to para 2-93).

(20) Install light switch (refer to para 2.81b).

(21) Secure harness (from air duct to cowl) to underside of cowl with five clamps, screws, and nuts (fig 2-138).

(22) Connect left- and right-hand windshield wiper connectors.

(23) Reach through instrument opening and secure ground wire to cowl with screw and nut

(24) Connect twelve leads to their respective connectors on horn, lights, and meters. Attach instrument panel and spacer to dash panel with four screws.

(25) Connect ten terminals to their respective connectors on switch panel. Solder three **leads** to respective terminals. Attach switch panel to dash panel with five screws and nuts.

(26) Connect circuit breaker **connectors** and connect terminals to terminal strip on distribution box. Attach harness to distribution box with clamp, screw, lock washer, and nut. Attach distribution panel to dash panel with ten screws.

(27) Attach left-hand air duct panel to **air** duct with seventeen screws.

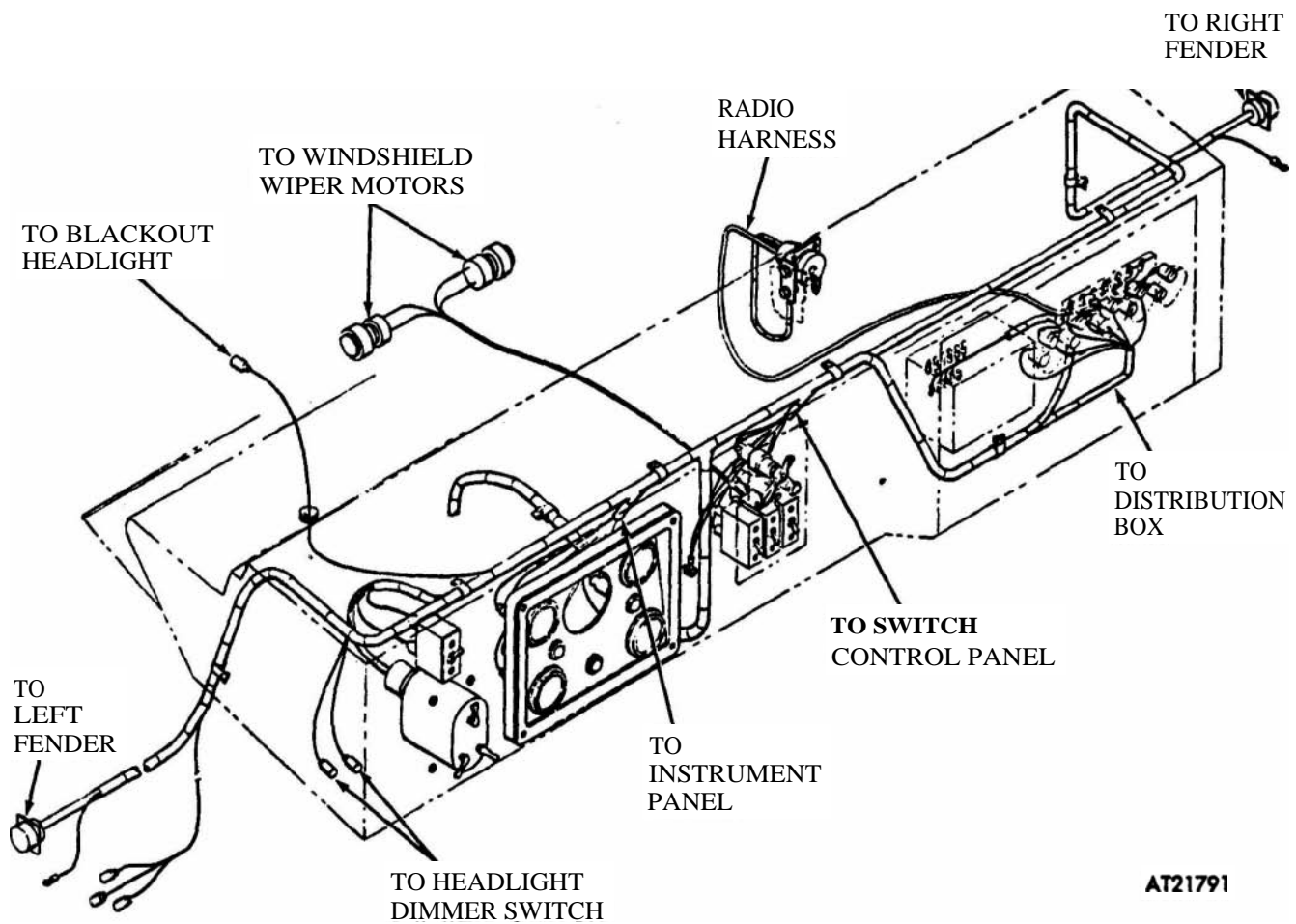
(28) Attach negative and positive terminals to left-hand battery terminal clamps with nut; and bolts. Coat battery terminals with heavy asbestos grease (GK).

(29) Install battery box covers (refer to **para 2-80b**).

(30) Install console (refer to para 2-33).

(31) Install tractor seats (refer to para 2.221).

(32) Close and secure engine cover (refer to TM 9-2320-242-10).



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Figure 2-138. Cowl harness.

2-120. Engine Harness

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Disconnect engine harness plug from receptacle by unscrewing knurled nut on plug (fig 2-133).

(3) Remove alternator terminal cover by removing two screws and washers.

(4) Disconnect leads from terminal posts by removing two screws, washers, and nuts. Separate connectors on remaining wire.

(5) Disconnect harness from alternator by removing two screws, washers, and cable clamp.

(6) Disconnect starter motor solenoid terminals by removing two nuts and washers.

(7) Remove ground wire terminal from engine block by removing bolt and washer.

(8) Disconnect oil pressure transmitter connector.

(9) Disconnect temperature transmitter connector.

(10) Disconnect cold start primer pump connector.

(11) Remove harness from engine assembly by removing clamp, screw, and lock washer.

(12) Remove engine harness receptacle from mounting bracket by removing four screws, lock washers, and nuts.

(13) Remove harness from tractor.

b. *Repairs.* Repairs shall be made in accordance with TB ORD 650 (fig 2-139).

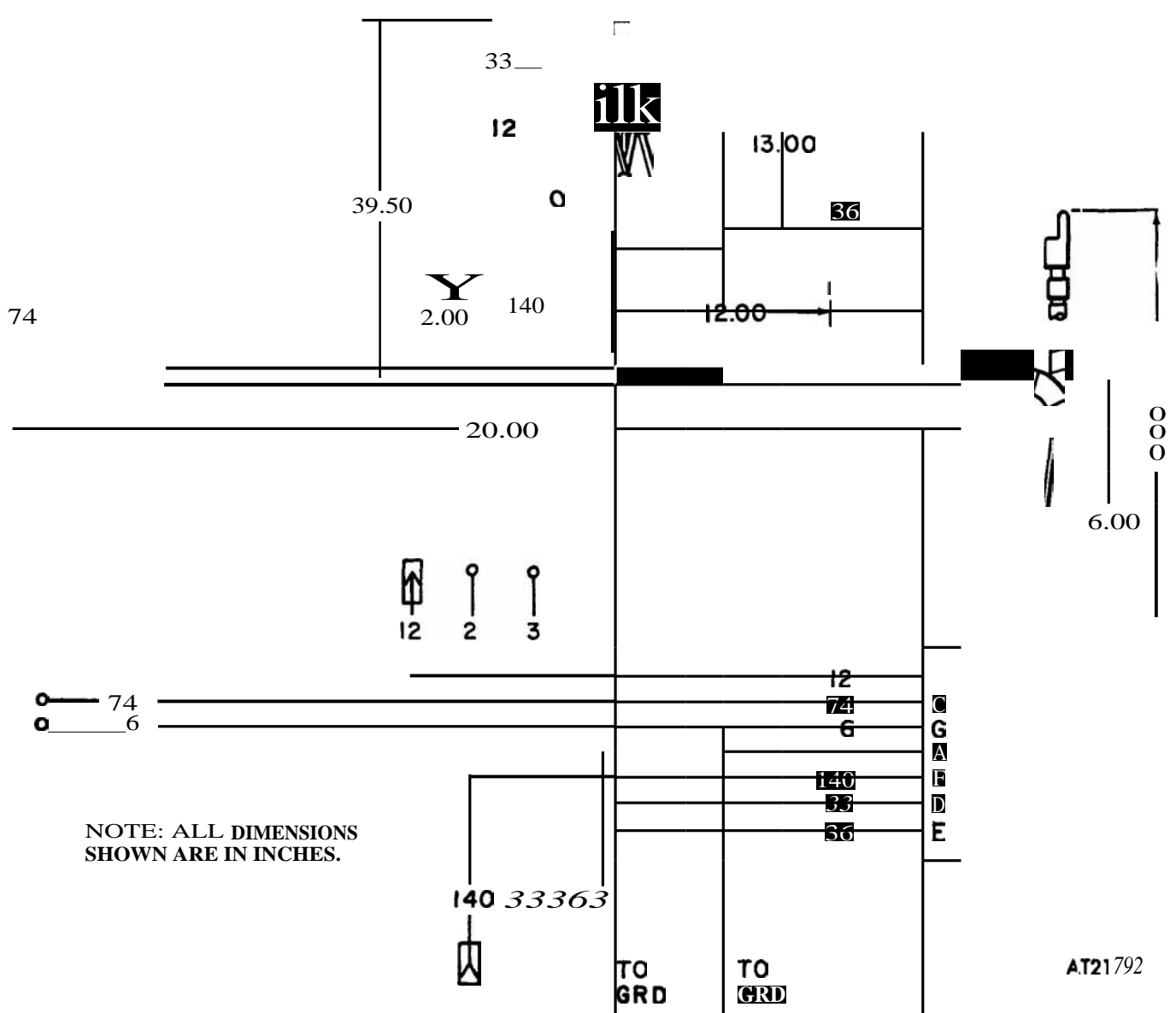


Figure 2-139. Engine harness.

c. Installation.

- (1) Position engine harness in engine compartment with leads in their relative positions (fig 2-133).
- (2) Attach engine harness receptacle to mounting bracket with four screws, lock washers, and nuts.
- (3) Connect cold start primer pump connector.
- (4) Connect temperature transmitter connector.
- (5) Connect oil pressure transmitter connector.
- (6) Attach harness to engine with clamp, lock

washer, and screw.

- (7) Attach ground wire of harness to engine block with bolt and washer.
- (8) Connect two alternator leads to alternator with two nuts and washers. Connect remaining connector. Secure harness to alternator with cable clamp, two screws and washers.
- (9) Apply a layer of waterproofing sealant (RTV-102) to alternator terminal posts.
- (10) Attach alternator terminal cover with two screws and washers.

(11) Connect starter motor solenoid connectors and secure with two nuts and washers.

(12) Connect main harness plug to engine harness *receptacle*.

(13) Close and secure engine cover (refer to TM 9-2320-242-10).

2-121. Carrier Right Rear Harness

a. Removal.

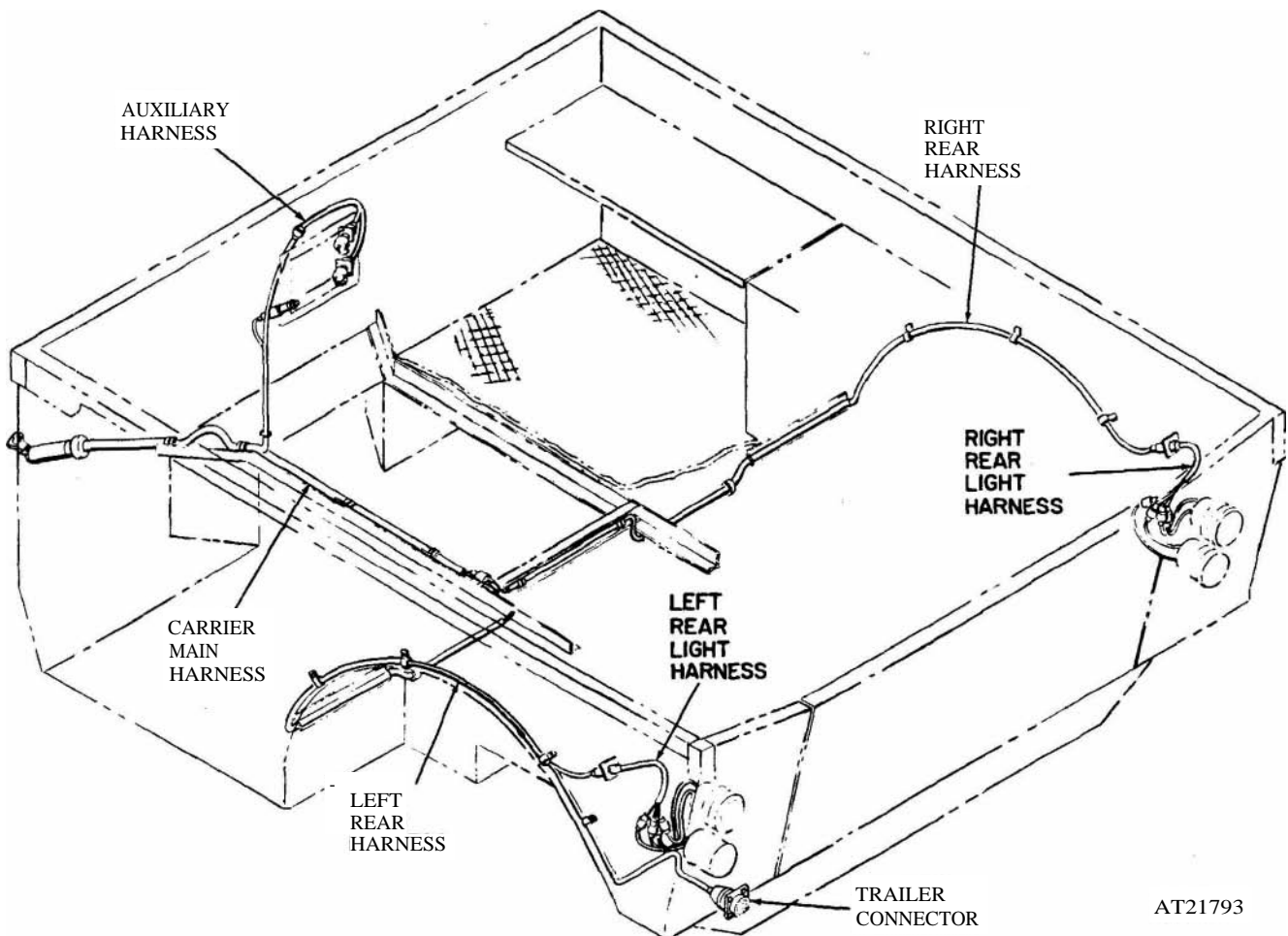
(1) Disconnect right rear carrier harness from main carrier harness (located forward of wheel well) (fig 2-140).

(2) Disconnect right rear harness from right rear tail light harness.

(3) Remove right rear harness from carrier wall (forward of wheel well) by removing two clamps, screws, and nuts.

(4) Remove right rear harness from wheel well by removing four clamps, screws, and nuts.

(5) Remove right rear harness by pulling through harness guard toward outboard side of carrier.



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Figure 2-140. Carrier harness installation.

b. *Repair.* Repairs shall be made in accordance with TB ORD 650 (fig 2-141).

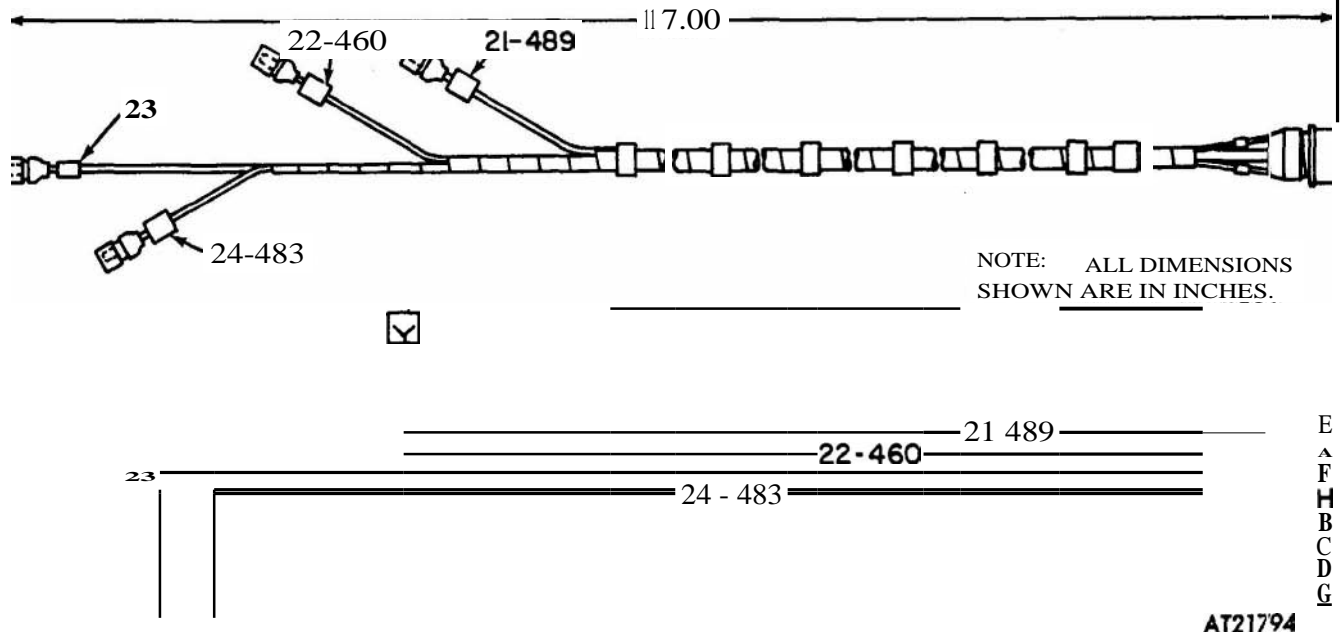


Figure 2-141. Carrier right rear harness.

c. Installation.

- (1) Thread *end* of right rear harness through harness guard (fig 2-138).
- (2) Connect ends of harness to main carrier harness and tail light harness.
- (3) Secure harness to carrier wall (forward of wheel well) with two clamps, screws, and nuts.
- (4) Secure harness along wheel well with four clamps, screws, and nuts.

2-122. Carrier Left Rear Harness

a. Removal.

- (1) Disconnect left rear carrier harness from main carrier harness (located forward of wheel

well) (fig 2-140).

- (2) Disconnect left rear harness from left rear tail light harness.
- (3) Remove carrier trailer receptacle, cover, and two ground wires by removing four screws and nuts.
- (4) Remove left rear harness from wheel well by removing four clamps, screws, and nuts.
- (5) Remove left rear harness by pulling through harness guard toward outboard side of carrier.

b. Repair. Repairs shall be made in accordance with TB ORD 650 (fig 2-142).

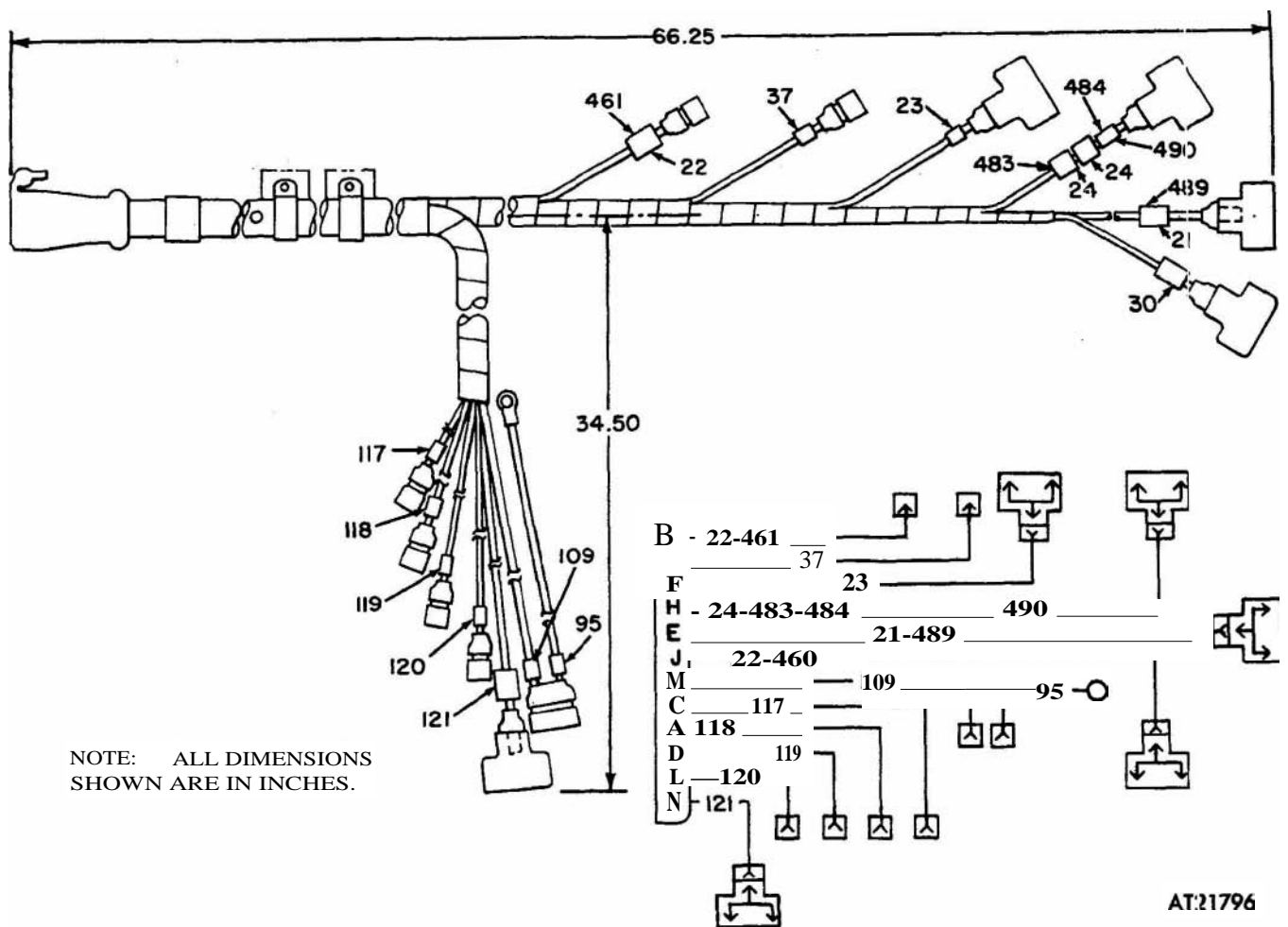


Figure 2-143. Carrier main harness.

c. Installation.

- (1) Insert carrier main harness through holes in carrier wall and insert short branch of harness through tube (fig 2-140).
- (2) Attach forward end of harness to carrier articulation yoke with two clamps, screws, and nuts.
- (3) Attach harness to underside of carrier bed with two clamps and screws.
- (4) Connect harness leads to connectors on two receptacle harnesses and carrier stop signal switch.
- (5) Attach ground wire with screw, lock washer, and nut.
- (6) Align instruction plate with bottom holes of retainer bracket and attach both items to carrier inner front panel with four screws.
- (7) Connect main harness to right and left tail light harness connectors.
- (8) Connect carrier main harness to receptacle on rear of tractor.

(9) Check carrier lights for proper operation. If satisfactory, seal bottom of tube with sealant compound.

2-124. Carrier Tail Light Harness

a. Removal.

- (1) Disconnect main carrier harness plug at tractor.
- (2) Disconnect right rear carrier harness from tail light harness receptacle (fig 2-140).
- (3) Remove access hole cover by removing four screws.
- (4) Remove receptacle and gasket by removing four screws and nuts.
- (5) Reach through access hole and disconnect four light connections.
- (6) Remove harness from carrier.

b. Repair. Repairs shall be made in accordance with TB ORD 650 (fig 2-144).

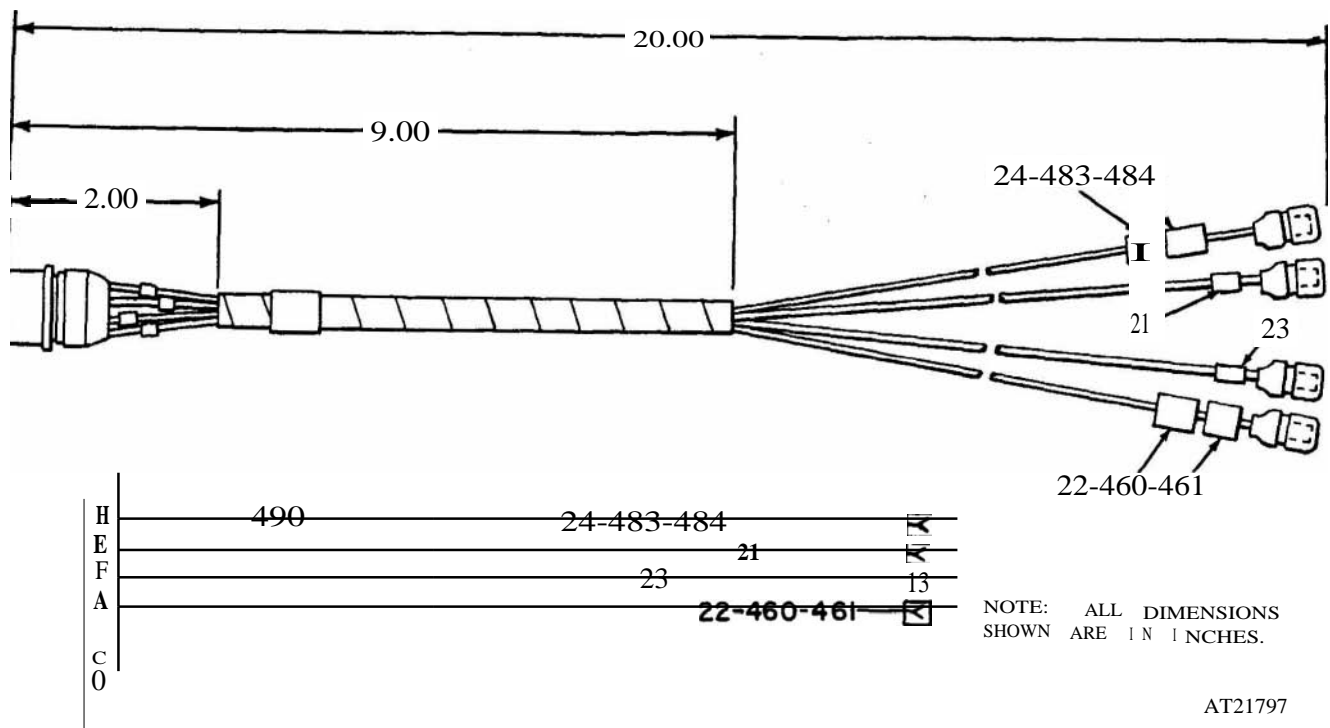


Figure 2-144. Carrier tail light harness.

c. Installation.

- (1) Attach harness receptacle and gasket to carrier with four screws and *nuts* (fig 2-140).
- (2) Connect right carrier harness to receptacle.
- (3) Connect tail light leads to their respective connectors.
- (4) Connect main carrier harness to tractor.
- (5) Attach access hole *cover* to carrier with four screws.

2-125. Carrier Auxiliary Harness

a. Removal.

- (1) Disconnect main carrier harness from

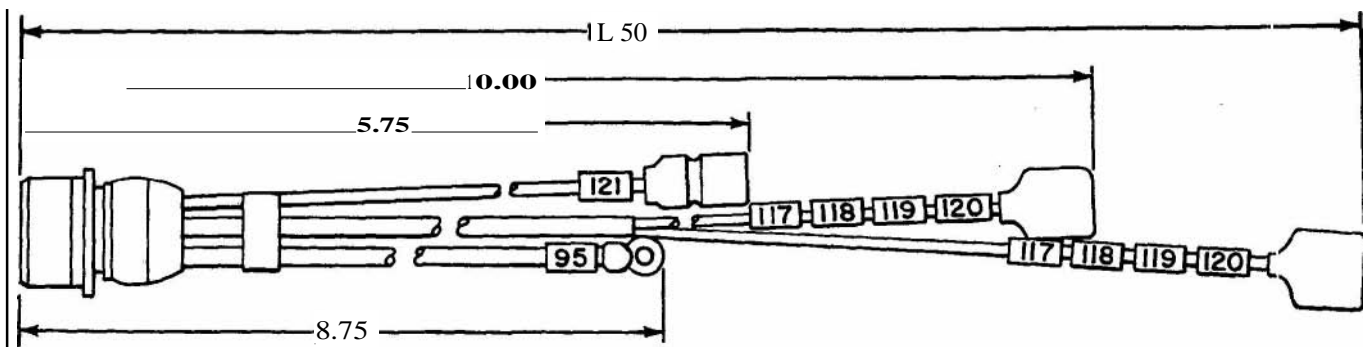
receptacle at rear of tractor (fig 2-1401).

- (2) Remove instruction plate and retainer bracket from carrier inner front panel by removing four screws. **Pull** retainer bracket out a sufficient distance to gain access to connectors.

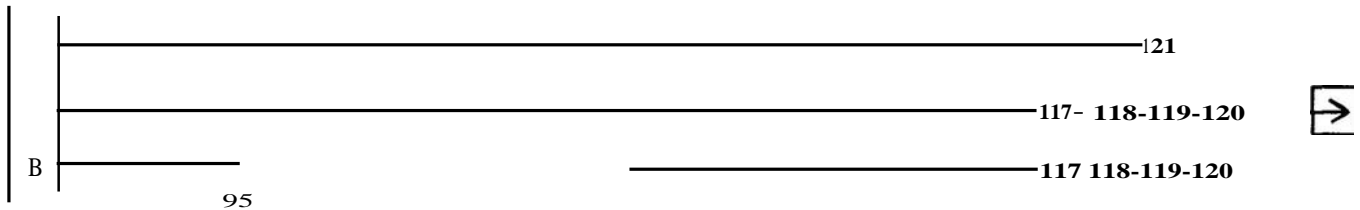
(3) Disconnect auxiliary harness connectors from main harness connectors.

- (4) Remove two receptacles, gaskets, cover chains, and nuts, and unscrewing receptacle covers.

b. Repair. Repairs shall be made in accordance with TB ORD 650 (fig 2-1451).



NOTE: ALL DIMENSIONS SHOWN ARE- IN INCHES,



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Figure 2-145. Carrier auxiliary harness.

c. Installation.

(1) Attach auxiliary receptacles, gaskets, cover chains, and ground wires to retainer bracket with eight screws and nuts.

(2) Connect main harness connectors to receptacle connectors.

(3) Align instruction plate with bottom holes of retainer bracket and attach both items to carrier inner front panel with four screws.

(4) Connect main harness connector to receptacle at rear of tractor.

2-126. M792 Ambulance Carrier Surgical Light Lamp Replacement

a. Removal.

(1) Loosen thumb screw on light assembly and pivot lamp away from fixture (fig 2-146).

(2) Loosen screw retaining lamp to lens assembly. Remove lamp.

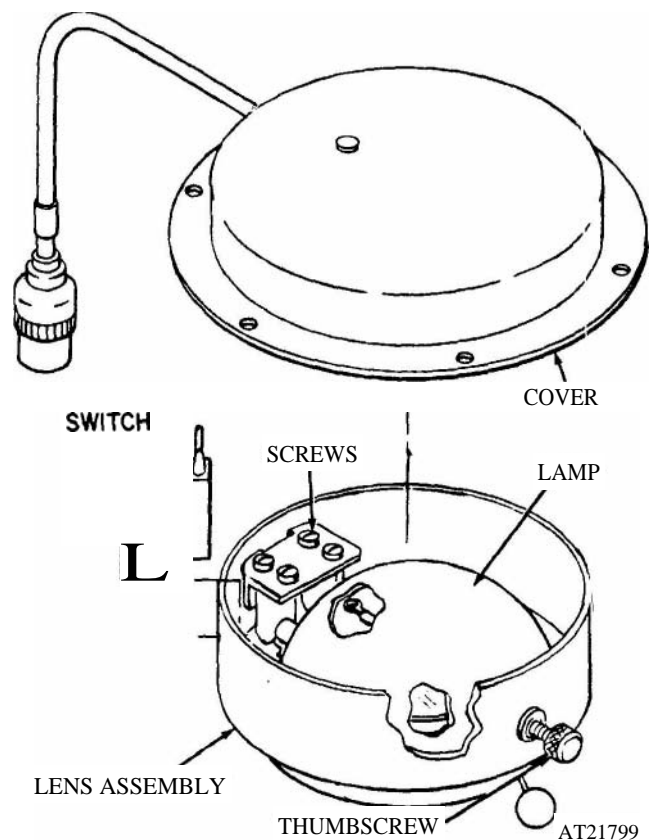


Figure 2-146. M792 ambulance carrier surgical light.

b. Installation.

(1) Install lamp in lens assembly and secure by tightening screw.

Caution: Tighten screw only enough to secure lamp.

(2) Pivot lamp and lens assembly to fixture and secure by tightening thumb screw.

2-127. M792 Ambulance Heater Control Box

a. Removal.

(1) Disconnect connector and shell connector from heater control box (fig 2-147).

(2) Remove heater control box from mounting bracket by removing two nuts and washers from studs on box.

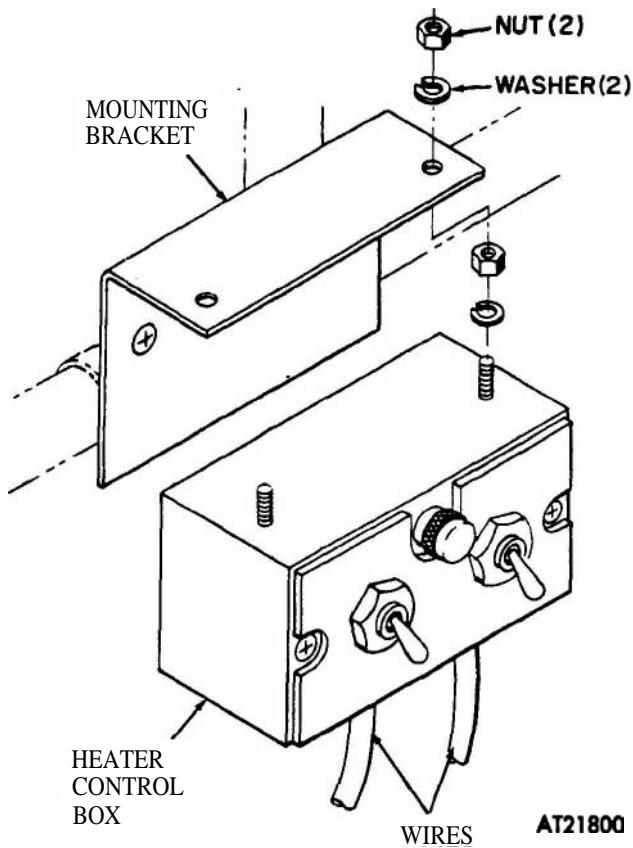


Figure 2-147. M792 ambulance heater control box.

b. Installation.

(1) Attach heater control box to mounting bracket by inserting studs on box into bracket and securing with two nuts and washers.

(2) Connect two wires to their respective terminals on heater control box.

2-128. M792 Ambulance Convenience Receptacle Control Box

a. Removal.

(1) Disconnect any wires which may be connected to the two convenience receptacles on control box (fig 2-148).

(2) Disconnect connector plug and two shell connectors from control box.

(3) Remove convenience receptacle control box from carrier wall by removing four screws.

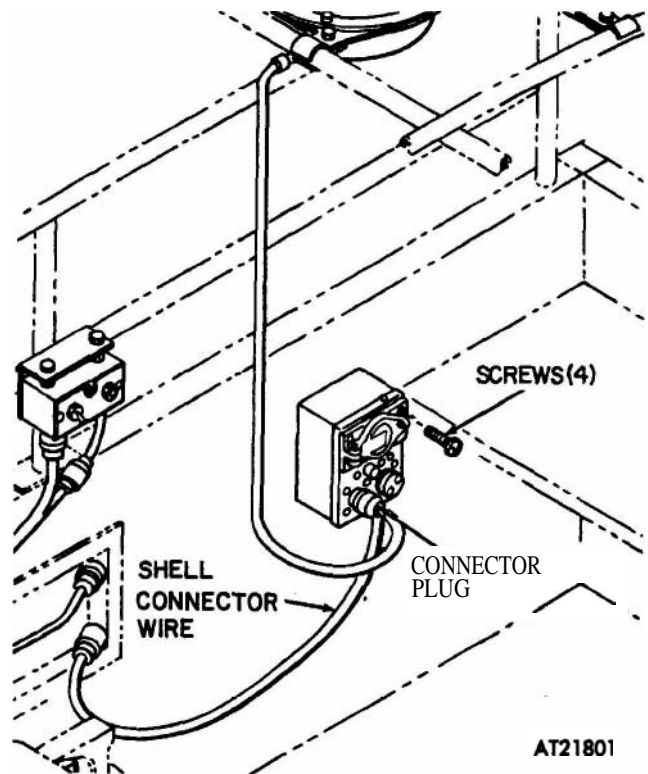


Figure 2-148. Convenience receptacle control box.

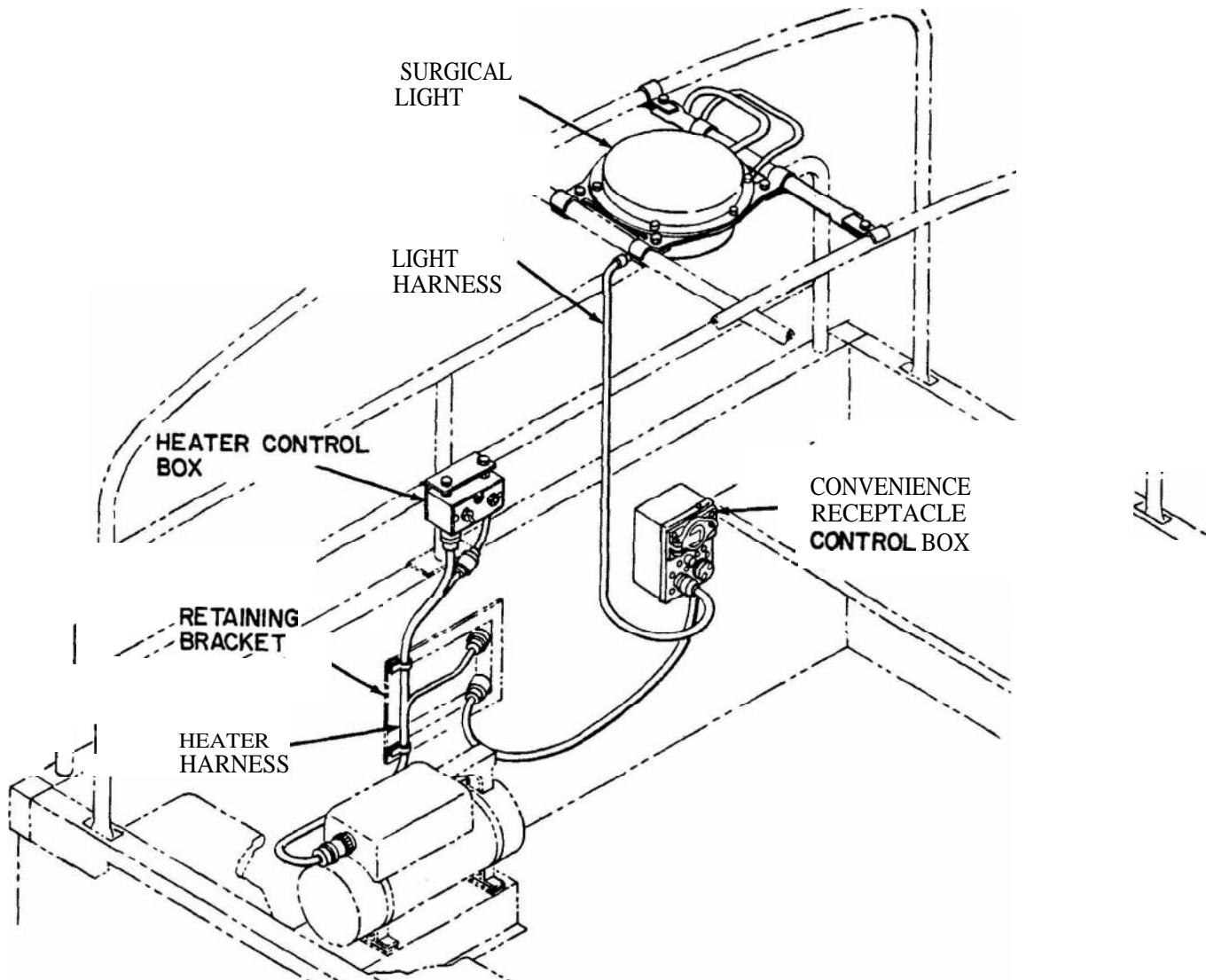
b. Installation.

- (1) Attach convenience receptacle light control box to carrier walls with four screws.
- (2) Connect two shell connectors and connector to control box.
- (3) Connect any wires which may have been connected to convenience receptacles on control box.

a. Removal.

- (1) Disconnect connectors from heater and heater control box. Disconnect shell connector from heater control box (fig 2-149).
- (2) Disconnect connector from receptacle in retainer bracket on forward carrier wall.
- (3) Remove harness assembly by removing two cable clamps and screws.

2-129. M792 Ambulance Heater Harness



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Figure 2-149. M792 ambulance carrier harness installation.

b. *Repair.* Repairs shall be made in accordance

with TB ORD 650 (fig 2-150).

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

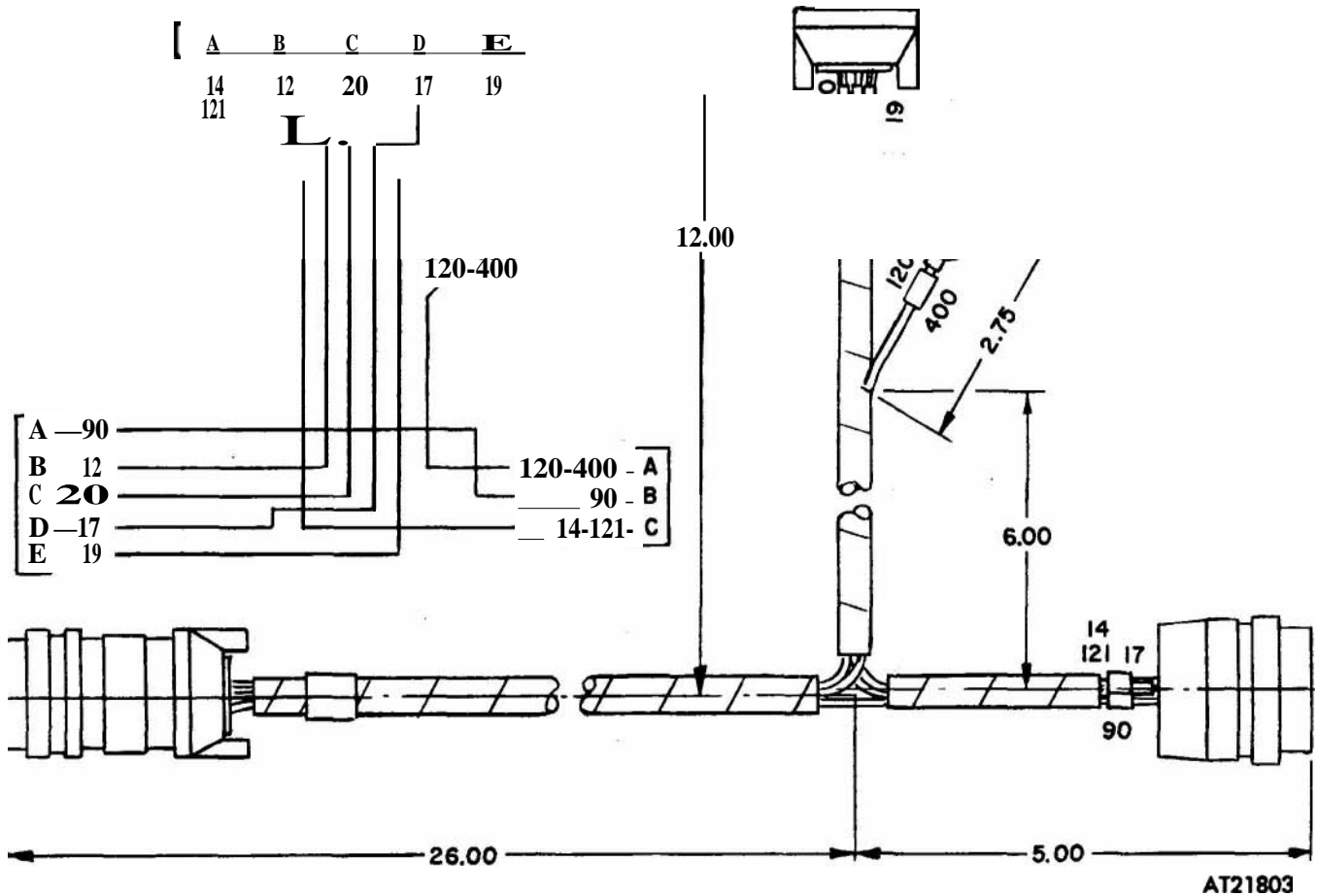


Figure 2-150. Carrier heater harness.

c. Installation.

(1) Connect shell connector to heater control box. Connect heater and heater control box connectors (refer to wiring diagram, fig 2-48).

(2) Connect harness connector to receptacle in retainer bracket on forward carrier wall.

(3) Attach harness to carrier with two cable clamps and screws.

2-130. M792 Ambulance Carrier Convenience Receptacle Harness

a. Removal.

(1) Disconnect convenience receptacle control box harness connector plug from connector in retainer bracket (fig 2-149).

(2) Disconnect two shell connectors and connector plug from convenience receptacle control box. Disconnect two shell connectors from overhead light assembly. *Remove harness assembly.*

b. Repair. Repairs shall be made in accordance with TB ORD 650 (fig 2-151).

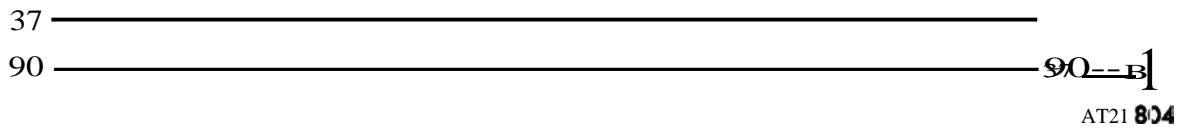
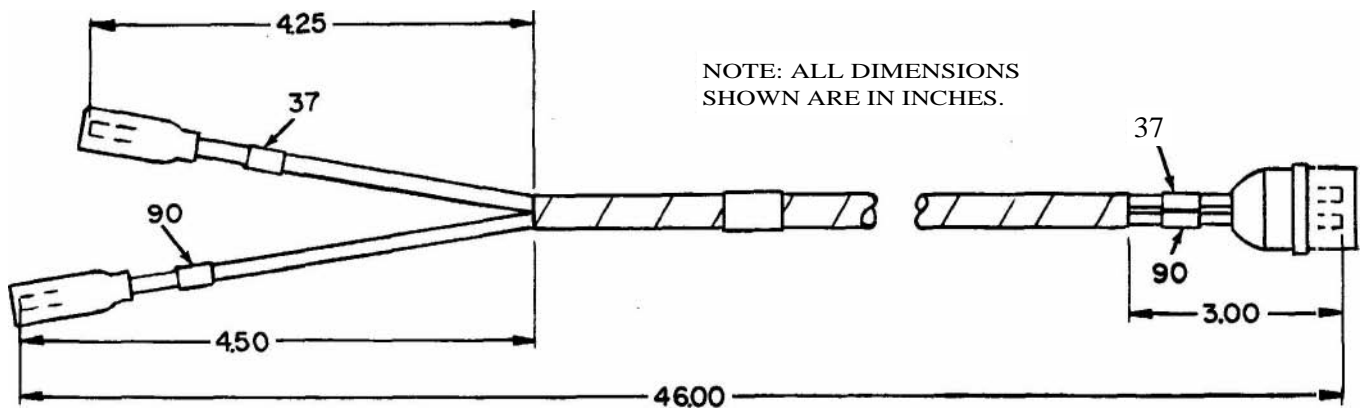


Figure 2-151. Convenience receptacle harness.

c. Installation.

(1) Connect two shell connectors on harness to overhead light assembly (fig 2-149). Connect two shell connectors and connect plug to convenience receptacle control box (refer to wiring diagram, fig. 2-48).

(2) Connect harness connector plug to proper receptacle in retainer bracket.

2-131. M792 Ambulance Carrier Surgical Light Harness

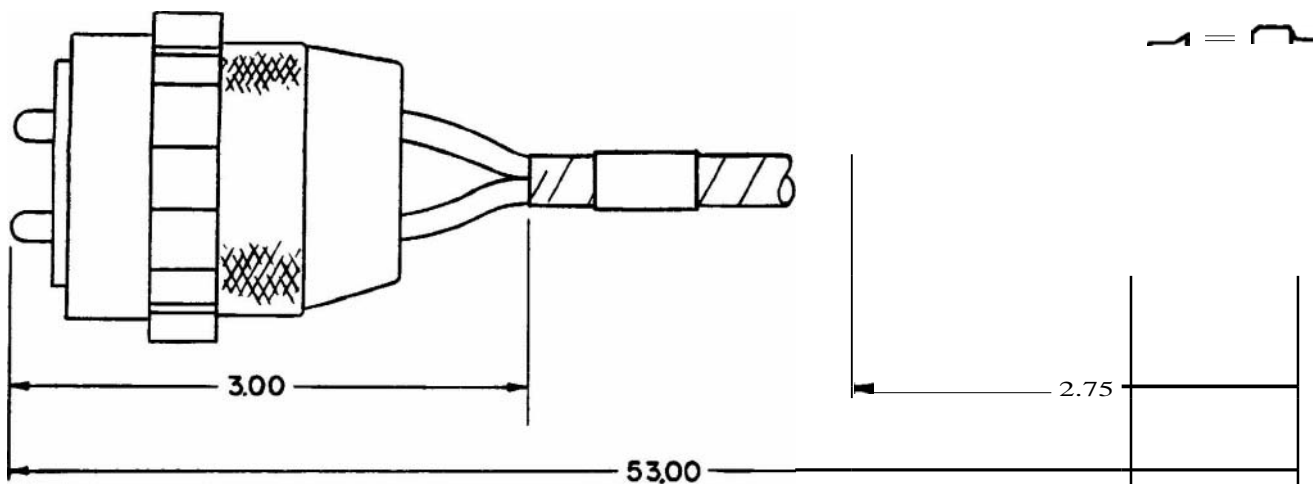
a. Removal.

(1) Disconnect surgical light harness from convenience receptacle control box (fig 2-149).

(2) Disconnect two shell connectors from surgical light.

(3) Remove ground wire from surgical light by removing screw, lock washer, and nut.

b. Repair. Repairs shall be made in accordance with TB ORD 650 (fig 2-152).



NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

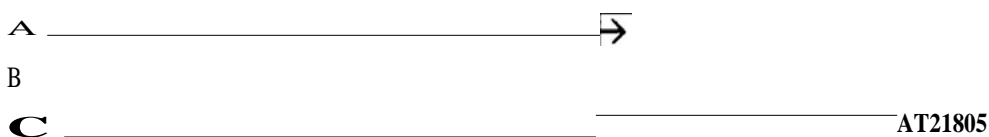


Figure 2-152. Carrier surgical light harness.

c. Installation.

- (1) Connect ground wire to surgical light with screw, lock washer and nut.
- (2) Connect two shell connectors to connectors

on light (refer to wiring diagram, fig 2-48).

- (3) Connect harness connector plug to convenience receptacle control box.

Section XVIII. TRANSMISSION

2-132. General

The transmission provides four forward and one reverse speed. It incorporates synchromesh action in second, third and fourth forward gears. All gears are helical except first and reverse.

The clutch gear is supported by a heavy-duty ball bearing. The forward end of the mainshaft is supported by a loose roller type bearing inside the clutch gear, while the rear end is supported by a ball bearing in the transmission case.

The countershaft is supported at the rear by a single row ball bearing which takes the thrust load, and by a roller bearing at the front.

2-133. Transmission Service

a. Servicing.

- (1) Remove tractor seats (refer to para 2-221).
- (2) Remove console (refer to para 2-33).

- (3) Remove fill plug and check lubricant level. The lubricant should be within one-half inch of bottom of fill plug hole.

- (4) Add lubricant as required (refer to LO 9-2320-242-12). Install fill plug.

Note: Transmission lubricant capacity is 5½ pints.

- (5) Install console (refer to para 2-33) and seats (refer to para 2-221).

b. Draining.

- (1) Remove tractor hull access plug and place a suitable container beneath transmission drain plug.
- (2) Remove transmission drain plug and allow lubricant to drain.
- (3) Install transmission drain plug and hull

access plug.

2-134. Transmission Control and Linkage

a. Removal.

(1) Remove tractor seats (refer to para 2-221).

(2) Remove console (refer to para 2-33).

(3) Remove shift control rod by removing two

cotter pins, clevis pins, and washers (fig 2-153).

(4) Remove selector rod by removing two clips and pins.

(5) Remove four bolts, lock washers, and nuts securing control assembly to transfer case and remove control assembly.

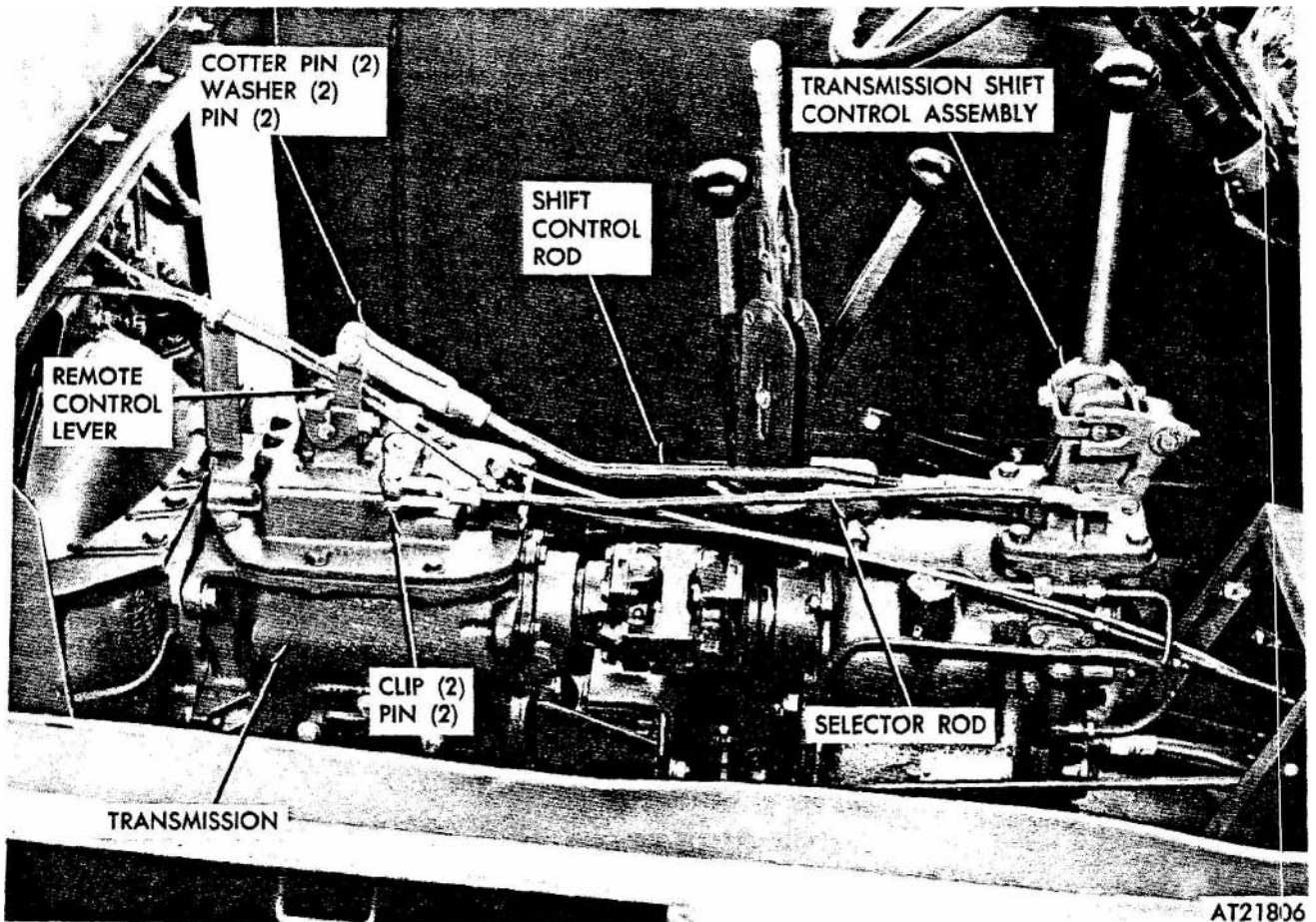


Figure 2-153. Transmission control and linkage, removal and installation.

h. Disassembly.

(1) Disassemble shift control rod assembly by loosening jam nuts securing devices. Remove devices and jam nuts.

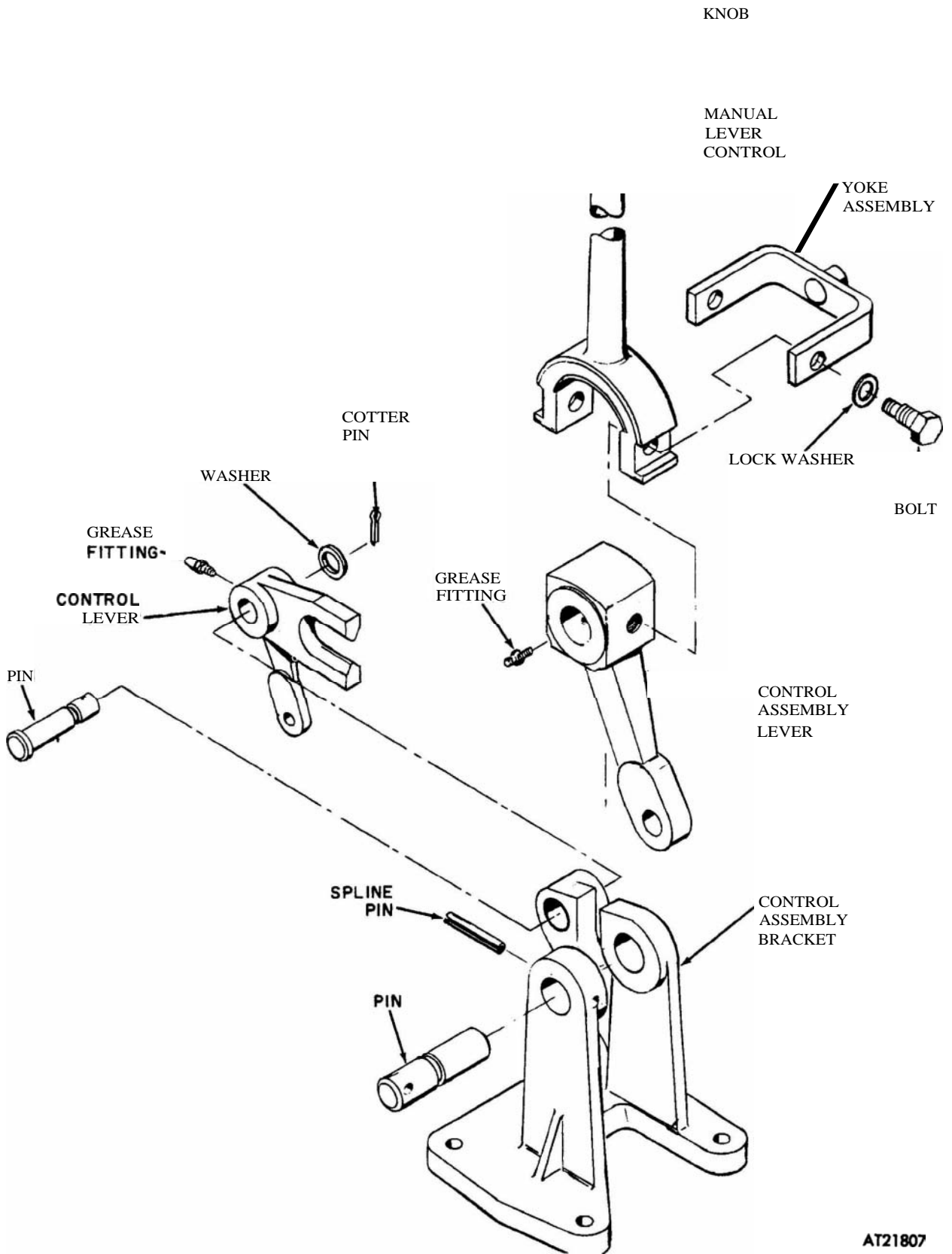
(2) Disassemble selector rod assembly by loosening jam nuts securing devices. Remove clevises and jam nuts.

(3) Disassemble the transmission shift control assembly according to the following steps (fig 2-154):

(a) Remove transmission control lever from control assembly bracket by removing cotter pin, washer, and clevis pin.

(b) Remove two bolts and lock washers securing manual control lever and yoke assembly to transmission control assembly lever. Remove yoke and control lever.

(c) Remove transmission control assembly lever by removing splined pin and pin securing lever to assembly bracket.



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Figure 2-154. Transmission control, disassembly and assembly.

c. Cleaning, Inspection and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, or other damage.
- (3) Replace grease fittings if damaged.

d. Assembly.

- (1) Position jam nut and clevis to each end of shift control rod.
- (2) Position jam nut and clevis to each end of selector rod.
- (3) Assemble the transmission shift control assembly according to the following steps:
 - (a) Position transmission control assembly lever to control assembly bracket and install pin. Secure assembly with splined pin (fig 2-154).
 - (b) Position manual control lever and yoke assembly to control assembly lever. Secure with two bolts and washers.
 - (c) Insert safety wire through heads of bolts and secure to manual control lever.
 - (d) Position transmission control lever to assembly bracket, install pin, and secure with washer and cotter pin.

e. Installation.

- (1) Position shift control assembly to transfer case and secure with bolts, lock washers, and nuts (fig 2-153).
- (2) Position selector rod to control lever on

transfer case and to remote lever on transmission. Secure with pins and clips.

(3) Position shift control rod to assembly lever on transfer case and to remote lever on transmission. Secure with pins, washers, and cotter pins.

(4) Adjust linkage (refer to f. below).

f. Adjusting.

(1) Disconnect shift control rod from transmission control assembly lever by removing cotter pin, washer and pin. Loosen jam nut from clevis (fig 2-155).

(2) Disconnect selector rod from shift control assembly by removing clip and pin. Loosen **jam nut** from clevis.

(3) **Move remote control lever (on transmission) to neutral position.** Move manual control lever (on transfer) to vertical position.

(4) Position selector rod to transmission control lever. Adjust clevis until pin can **be** inserted freely. Secure pin with clip. Tighten jam nuts to devices.

(5) Position shift control rod to transmission control assembly lever. Adjust clevis, until pin can **be** inserted freely. Secure with washer and cotter pin. Tighten jam nuts to devices.

(6) Install console (refer to para 2-33).

(7) Install tractor seats (refer to para 2-221).

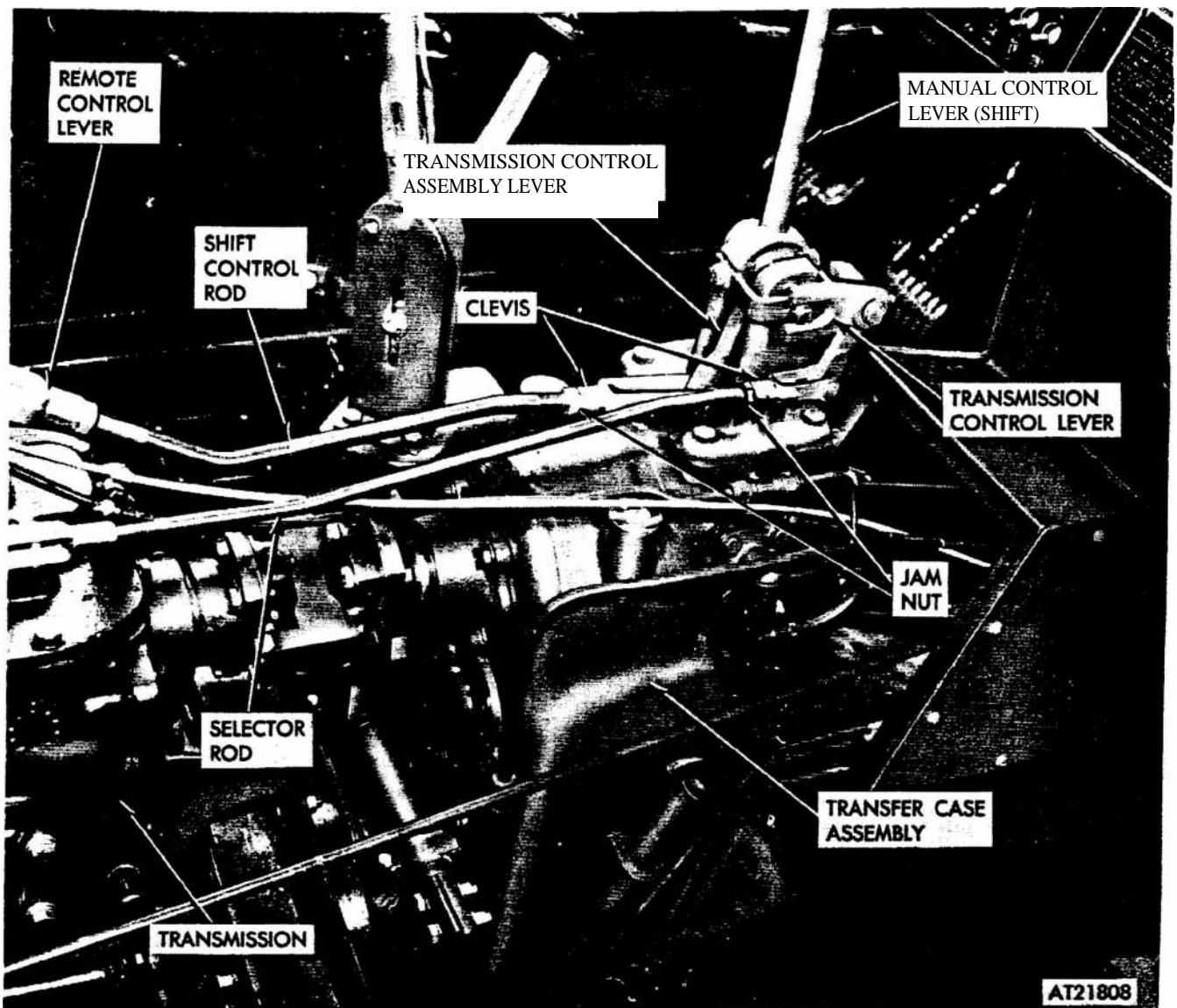


Figure 2-155. Transmission control and linkage, adjustment

2-135. Transmission Assembly

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

12) Remove tractor seats (refer to para 2-221).

13) Remove console (refer to para 2-33).

14) Remove transmission shift control and selector rods (refer to para 2-134).

15) Disconnect accelerator and engine stop cables from engine (refer to paras 2-65 and 2-66). Remove screws, washers, and nuts securing cable clamps to brackets (fig 2-156).

(6) Remove cable mounting brackets by removing screws and lock washers securing brackets to transmission.

(7) Remove coupling assembly by removing eight screws and six lockplates securing coupling assembly to transmission and transfer case (fig 2-157).

(8) Remove transmission steady rest and pads (refer to para 2-244).

(9) Install a suitable lifting device to transmission and remove two upper screws and lock washers securing transmission to clutch housing.

(10) Install two suitable guide studs into upper transmission mounting holes in clutch housing.

(11) Remove two lower screws and lock washers securing transmission to clutch housing by reaching into clutch housing through side access hole.

(12) Slide transmission on guide studs, away from engine. Slide transmission forward until input shaft is clear of clutch plate spline and throw out bearing.

(13) Lift transmission off guide pins and remove from engine. Place on suitable blocks. Remove lifting device.

(14) Remove selector remote control lever by removing screw, lock washer, and nut securing lever to transmission.

(15) Remove shift remote control lever by removing screw, lock washer, and nut securing lever to transmission.

(16) Remove steady rest bracket by removing four screws and lock washers securing bracket to transmission.

(17) Place a suitable container under drain and remove drain plug, two elbows, and nipples from transmission. Drain lubricant and install drain plug (fig 2-158).

b. Installation.

(1) Remove drain plug from transmission. Install **two nipples and two elbows** into transmission. Install drain plug into elbow (fig 2-158).

(2) Position steady rest bracket to transmission and secure with four screws and lock washers.

(3) Position shift remote control lever on shaft and secure with screw, lock washer, and nut (fig 2-156).

(4) Position selector remote control lever on shaft and secure with screw, lock washer, and nut.

(5) Install two suitable guide studs into upper mounting holes in clutch housing.

(6) Install a suitable lifting device on transmission. Lift transmission and position on

guide studs.

(7) Carefully slide transmission on guide studs towards engine. Slide transmission forward with input shaft engaging clutch plate spline and bearing pilot.

(8) Install two lower screws and lock washers securing transmission to clutch housing.

(9) Remove guide studs and install two upper screws and lock washers securing upper transmission to clutch housing. Remove lifting device.

(10) Install and adjust transmission steady rest and pads (refer to para 2-244).

(11) Position and secure coupling assembly to transfer case and transmission. Secure coupling to transmission with four screws and two **lockplates**. Secure coupling to transfer case with four screws and four lockplates. Torque screws to 24-27 lbs-ft. Bend tabs on lockplates to secure screws (fig 2-157).

(12) Position cable mounting brackets on transmission and secure with screws and lock washers (fig 2-156).

(13) Connect accelerator and engine stop cables to engine (refer to paras 2-65 and **2-66**). Position cable clamps to brackets and secure **with** screws, washers, and nuts.

(14) Install transmission shift control **and** selector rods (refer to **para** 2-134).

(15) Fill transmission with lubricant (refer to **para** 2-133 and LO 9-2320-242-12).

(16) Install console (refer to para 2-33).

(17) Install tractor seats (refer to para 2-221).

(18) Close and secure engine cover (refer to TM 9-2320-242-10).

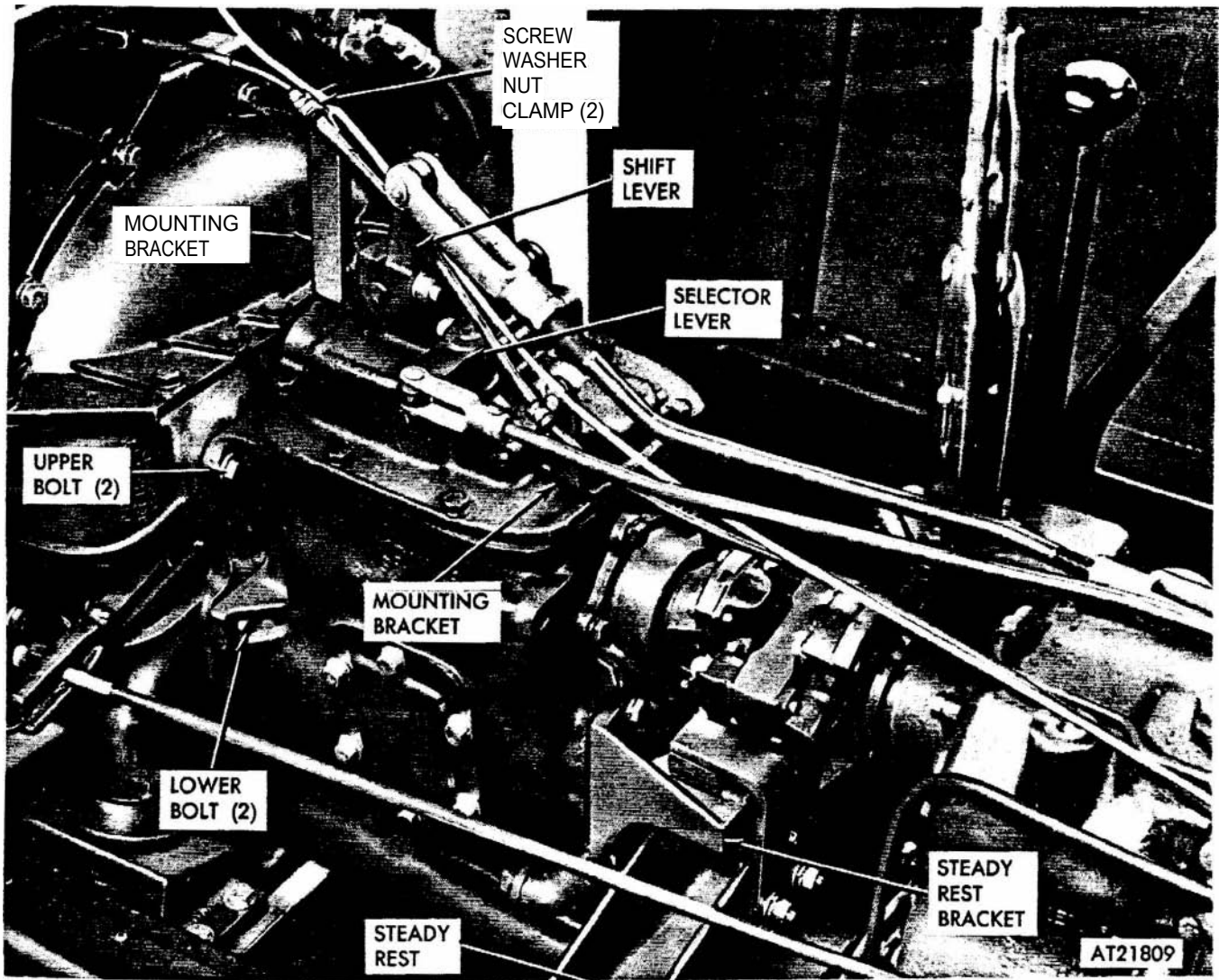


Figure 2-156. Transmission assembly, removal and installation.

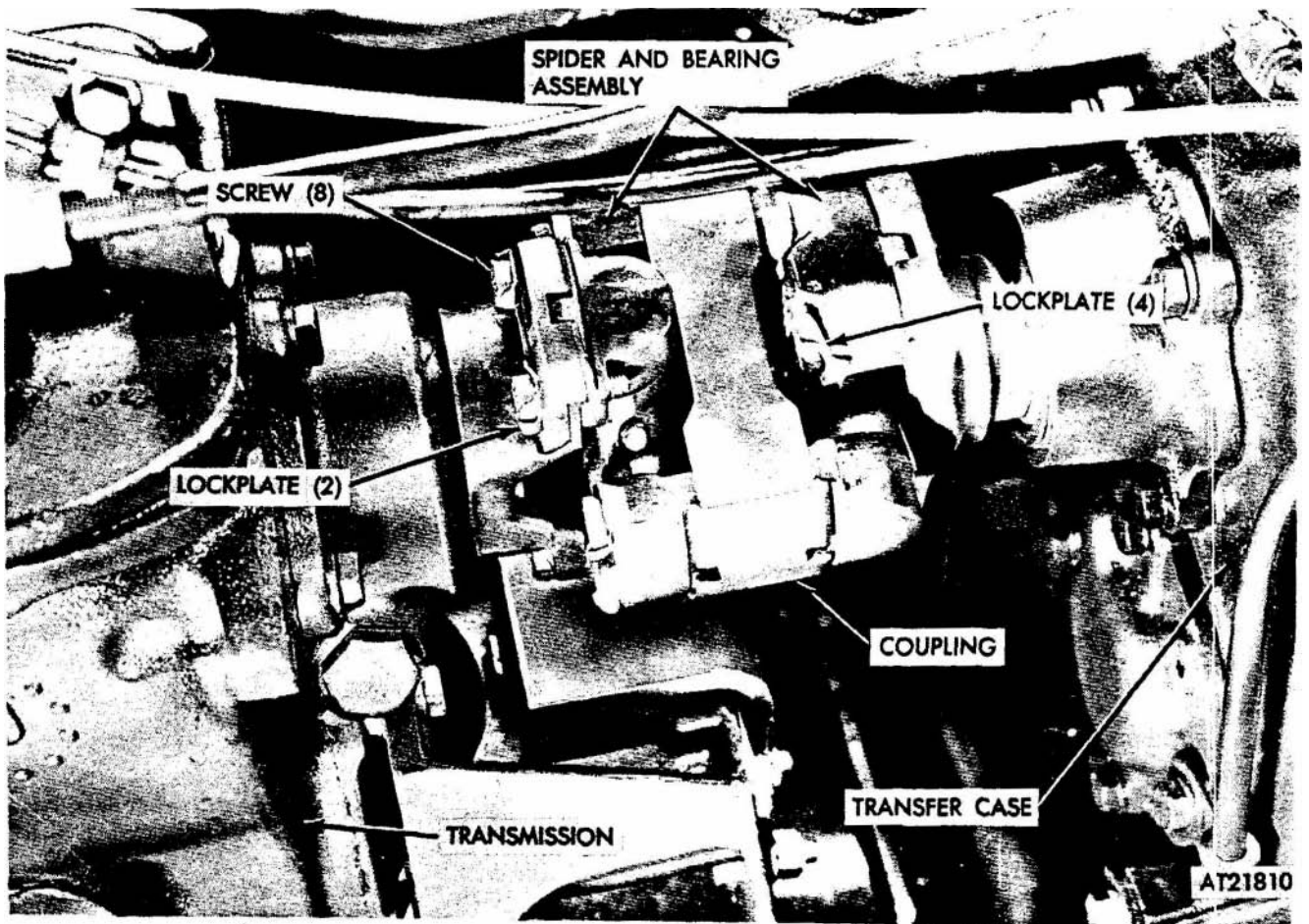


Figure 2-157. Transmission to transfer case coupling.

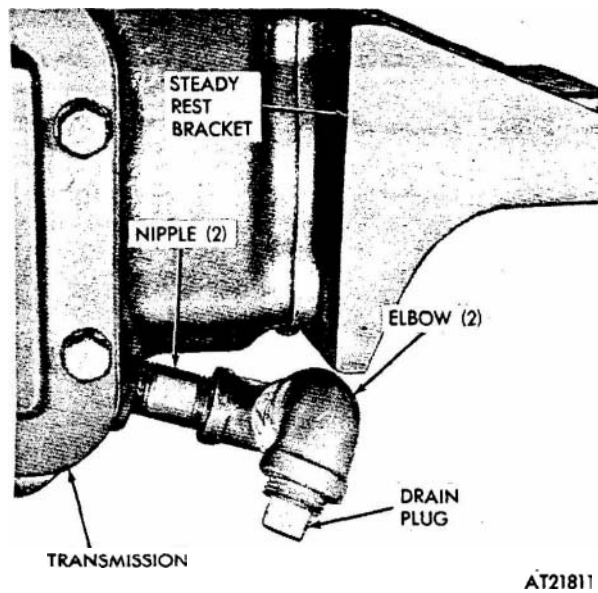


Figure 2-158. Transmission drain assembly, removal and installation.

Section XIX. TRANSFER ASSEMBLY

2-136. General

The transfer case is mounted at the output end of the transmission and transfers power from the transmission to the propeller shafts and differentials. High or low operating range can be selected, or neutral to disengage the transfer case. Two- or six-wheel drive can be selected. Two-wheel drive disengages the front and rear axles leaving the center wheels alone to drive the vehicle. The transfer assembly is equipped with a differential clutch gear and parking brake assembly which can be operated by separate shift levers. In addition, it is equipped with an oil pump and speedometer drive gear assembly. The main input and power take-off shafts are mounted on ball bearings. The idle shaft, intermediate shaft, and axle drive shaft are all mounted on roller bearings. All gears are of the helical design except for the two sliding spur gears.

2-137. Transfer Assembly Service

a. Servicing.

- (1) Remove tractor seats (refer to para 2-221).
- (2) Remove console (refer to 2-33).
- (3) Remove transfer case dip stick and check lubricant level. Add lubricant as required (refer to LO 9-2320-242-12).

Note: Transfer assembly lubricant capacity is $4\frac{1}{2}$ pints.

- (4) Install console (refer to para 2-33) and seats (refer to para 2-221).

b. Draining.

- (1) Remove tractor hull access plug and place a suitable container beneath transfer assembly drain plug (fig 2-97).
- (2) Remove transfer assembly drain plug and allow lubricant to drain.
- (3) Install transfer assembly drain plug and hull access plug.

2-138. Transfer Control and Linkage

a. Removal.

- (1) Remove console (refer to 2-33).
- (2) Remove tractor seats (refer to para 2-221).
- (3) Remove tractor hull access panel (refer to para 2-208).
- (4) Remove nut and lock washer securing link shaft assembly to center differential control lever. Remove link stud from lever and remove flat washer (fig 2-159).
- (5) Loosen clamps securing boot to tractor hull and link shaft assembly.

- (6) Remove nut and washer securing link shaft assembly to transfer gear case shaft. Remove link shaft assembly and remove flat washer from link stud (fig 2-160).

- (7) Loosen jam nuts securing rod ends to link shaft assembly. Remove rod ends, jam nuts, and boot from link shaft. Remove clamps from boot.

- (8) Remove cotter pin, two washers, and clevis pin securing transfer gear case shaft to shifter lever (fig 2-161).

- (9) Remove transfer gear case shaft by removing cotter pin, two washers, and clevis pin securing shaft to shaft linkage lever.

- (10) Remove shaft linkage lever by removing cotter pin, two washers, and clevis pin securing lever to bracket (fig 2-160).

- (11) Remove bracket by removing two nuts, washers, and bolts securing bracket to tractor hull.

- (12) Remove cotter pin, washer, and clevis pin securing transfer case lever to transfer high low shifter shaft (fig 2-162).

- (13) Remove cotter pin, washer, and clevis pin securing drive lever to transfer differential shift shaft.

- (14) Remove shaft assembly by removing four bolts and lock washers securing lever shaft assembly bearing housings to transfer case.

- (15) Remove two bolts, lock washers, and nuts securing shifter levers and plate to lever assembly shaft (fig 2-161).

- (16) Slide manual control lever assembly (transfer case lever) and two bearing housings from lever shaft assembly.

b. Installation.

- (1) Slide manual control lever assembly (transfer case lever) and two bearing housings on lever shaft assembly (fig 2-162).

Note: One bearing housing is positioned between levers.

- (2) Position shifter levers and plate to lever shaft assembly, in the same order as removed. Secure with two bolts, lock washers, and nuts (fig 2-161).

- (3) Paint contact surfaces of bearing housings with unreduced zinc chromate primer (**MIL-P-8565**).

- (4) Position lever shaft assembly on transfer case and secure with four bolts and washers (fig 2-162).

- (5) Secure lever shaft assembly (drive lever) to

transfer differential shift shaft with clevis pin, washer, and cotter pin.

(6) Secure manual control lever to transfer high tow shifter shaft with clevis pin, washer, and cotter pin.

(7) Coat contact surface of shaft linkage bracket with un-reduced zinc chromate primer (MIL-P-8565) and position bracket on tractor hull. Secure with two nuts, bolts, and lock washers (fig 2-159).

(8) Align shaft linkage lever *in* bracket and secure with clevis pin, two washers, and cotter pin.

(9) Insert transfer gear case shaft into hull and secure to shifter lever with **clevis** pin, two washers, and cotter pin.

(10) Secure transfer gear case shaft to center differential control lever with clevis pin, two washers, and cotter pin (fig 2-159).

(11) Slide boot and two clamps onto link shaft. Install jam nuts and rod ends to shaft so that center to center stud measurement of link shaft is 13.40 inches. Tighten jam nuts.

(12) Insert one end of link shaft assembly through hole in tractor and secure to shaft linkage lever with washer and nut.

(13) Place lever shaft assembly (6 wheel drive lever) to the "OUT" position. Place washer on shaft rod end stud and secure rod end to differential control lever with washer and nut.

(14) Operate six wheel drive lever to ensure proper engagement and disengagement. If adjustment is necessary (refer to *c.* below).

(15) Secure boot to tractor hull and link shaft assembly with clamps.

c. Adjusting.

(1) Remove nut and **lockwasher** securing link shaft assembly to center differential shift lever.

Remove shaft assembly link stud from lever and remove flat washer (fig 2-163).

(2) Move the two or six wheel drive lever to the "OUT" position. Loosen clamps securing boot to link shaft assembly and tractor hull.

(3) Loosen link jam nut and adjust link until a free fit is obtained to center differential lever.

(4) Tighten link jam nut.

(5) Tighten clamp securing boot to link assembly.

(6) Place flat washer on link stud and secure link shaft assembly to tractor hull. Control lever with lock washer and nut.

(7) Install tractor hull access panel (refer to para 2-208).

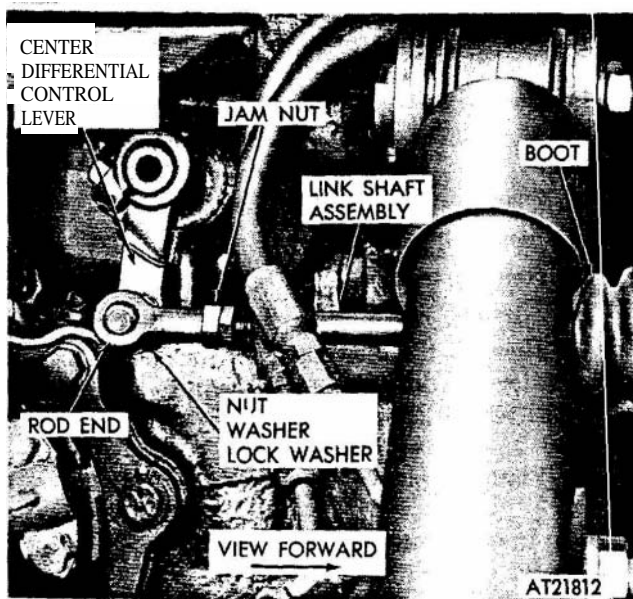


Figure 2-159. Transfer control end linkage (right side of center differential), removal and installation.

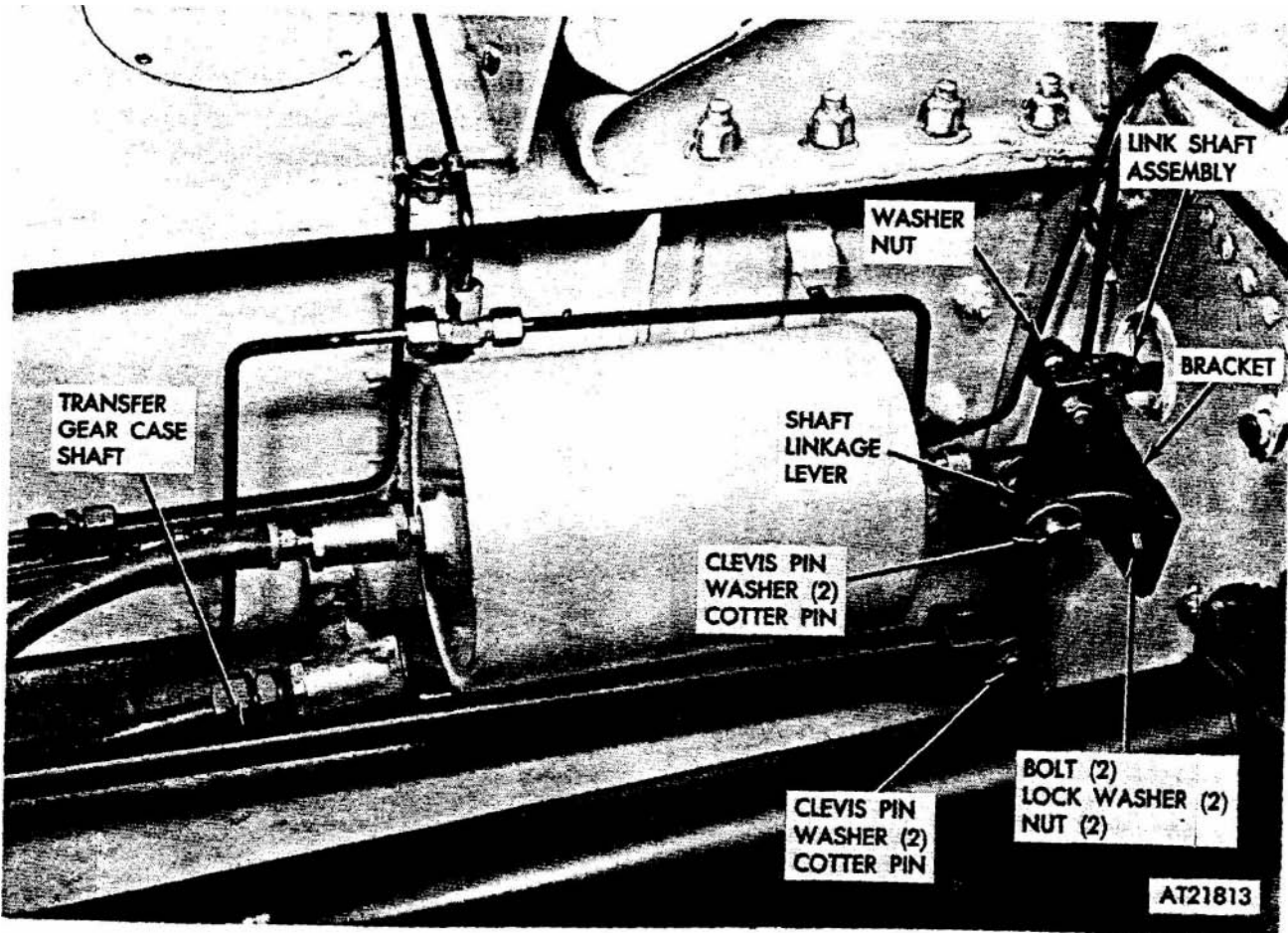


Figure 2-160. Transfer control and linkage (engine compartment), removal and installation.

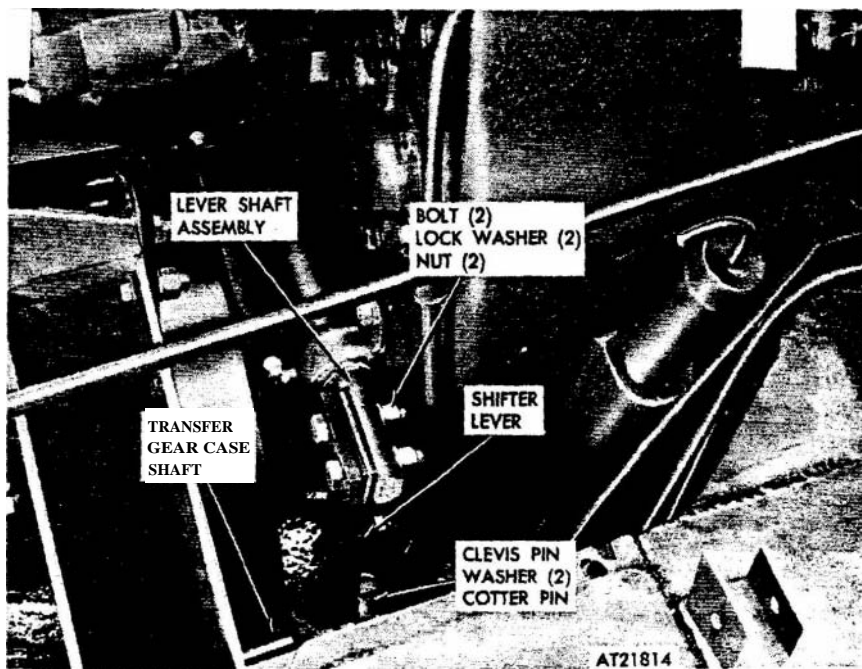


Figure 2-161. Transfer control and linkage (right side of transfer case), removal and installation.

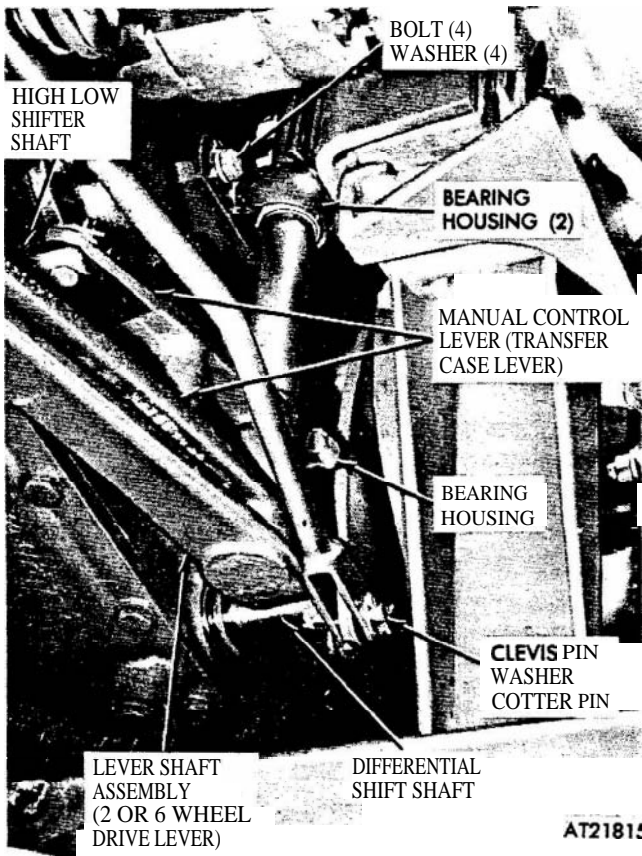


Figure 2-162. Transfer control linkage (left side of transfer case), removal and installation.

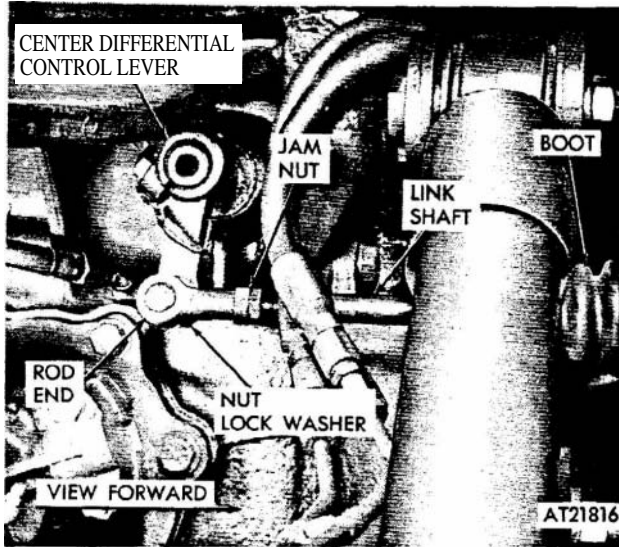


Figure 2-163. Transfer linkage adjustment.

2-139. Transfer Oil (Dipstick) Gage

a. Removal.

- (1) Remove console (refer to para 2-33).
- (2) Remove tractor seats (refer to para 2-221).
- (3) Remove transfer case dipstick (fig 2-164).

b. Installation.

- (1) Install transfer case dipstick (fig 2-164).
- (2) Install console (refer to para 2-33).
- (3) Install tractor seats (refer to para 2-221).

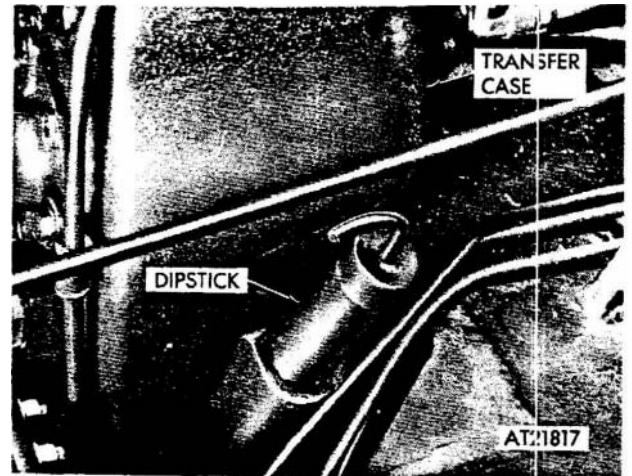


Figure 2-164. Transfer oil (dipstick) gage, removal and installation.

2-140. Transfer Assembly

a. Removal.

- (1) Remove tractor seats (refer to para 2-221).
- (2) Remove console (refer to para 2-33).
- (3) Remove transmission to transfer case coupling assembly (refer to para 2-142).
- (4) Remove transmission shift control assembly from transfer case (refer to para 2-135).
- (5) Remove parking brake lever and rod (refer to para 2-159).
- (6) If installed, remove winch P.T.O. (refer to para 3-64).
- (7) Disconnect speedometer shaft at transfer case (para 2-269).
- (8) Disconnect accelerator cable clamp from transfer case.
- (9) Drain transfer case (refer to para 2-137).
- (10) Remove transmission stop angle by removing two nuts, screws, and lock washers (fig 2-56).

(11) Remove transmission upper steady rest Pad.

(12) Remove four screws, washers, lock washers, and nuts securing steady rest support to tractor keel. Remove steady rest support, shims, and lower steady rest pad.

(13) Disconnect tractor propeller shaft at transfer case output yoke by removing four screws and lockplates (fig 2-165).

(14) Put transfer case in six wheel drive to lock gear in place.

(15) Remove six wheel drive, high and low shift control and linkage assembly (refer to para 2-138).

(16) Remove nine nuts, washers, and lock washers securing transfer case to front differential.

(17) Install suitable lifting eyes and lifting device to transfer case and pull transfer case toward rear of tractor to clear mounting studs from bulkhead and to clear the front differential input shaft.

(18) Turn transfer case slightly, so that parking brake drum clears transmission. Remove transfer case. Remove gasket from transfer case. Place on suitable blocks and remove lifting device.

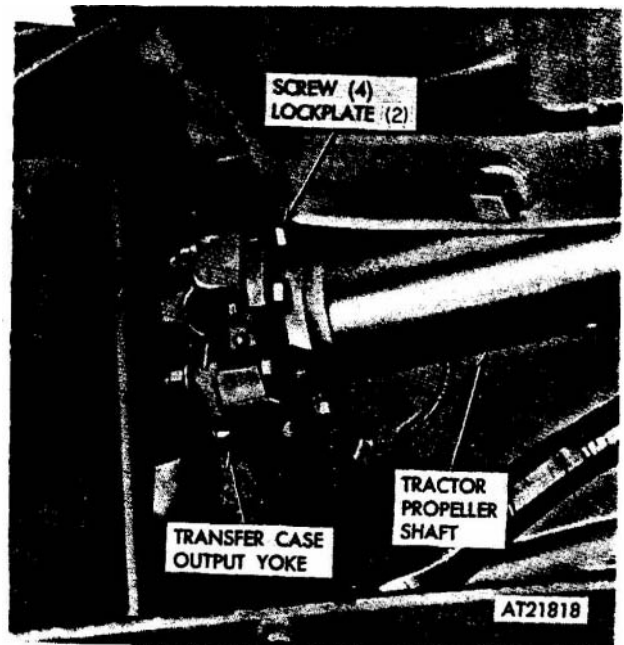


Figure 2-165. Transfer assembly (at propeller shaft), removal and installation.

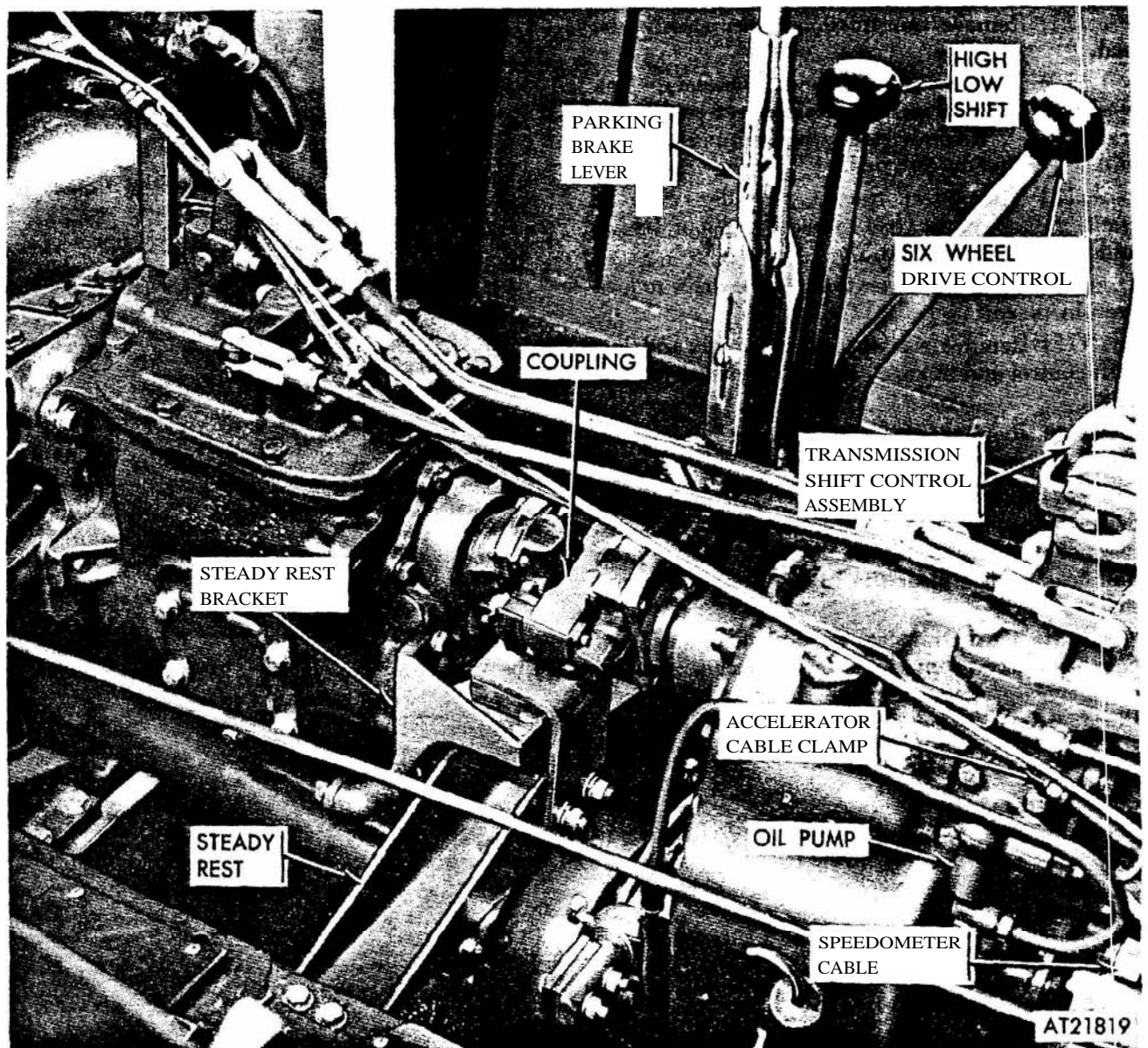


Figure 2-166. Transfer assembly, removal and installation.

b. Installation.

(1) Clean area of tractor bulkhead joining to transfer case with an approved cleaning solvent.

Note: When installing a replacement transfer case ensure oil pump has been primed. Prime lube oil pump by disconnecting lube oil tube at tee located at base of transmission shift control attaching area and filling tube with lubricant (refer to LO 9-2320-242-12).

(2) Position gasket on transfer case mounting studs.

(3) Install suitable lifting eyes and lifting device to transfer case.

(4) Turn transfer case slightly and position in tractor with six wheel drive engaged and parking brake located beneath transmission.

(5) Slide transfer case forward until studs enter mounting holes in bulkhead and front differential. Ensure that front differential input shaft engages gear in transfer case.

Note: Transfer case must be installed with six wheel drive engaged to prevent gear from dropping in transfer case.

(6) Secure transfer case to bulkhead and front differential with nine washers, lock washers, and nuts.

(7) Position and secure tractor propeller shaft to transfer case output yoke with four screws and lockplates. Torque screws to 3545 lbs-ft. Bend tabs of lock plates to secure screws (fig 2-165).

(8) Install high and low shift and six wheel drive control and linkage assembly (refer to para 2-138).

(9) Install parking brake lever and rod (refer to para 2-159).

(10) Position transmission steady rest bracket to transmission and secure with four screws and lock washers.

(11) Install and adjust steady rest (refer to **para 2-33**).

(12) Position and secure coupling assembly to

transmission and transfer case (refer to **para 2-142**).

(13) Install transmission shift control assembly on transfer case (refer to para 2-135).

(14) Install speedometer cable to transfer case (refer to para 2-269).

(15) Position and secure accelerator cable and clamp to transfer case with screw.

(16) Adjust six wheel drive linkage (refer to para 2-138).

(17) Fill transfer case with lubricating oil (refer to para 2-139).

(18) Install console (refer to para 2-33).

(19) Install tractor seats (refer to para 2-221).

(20) Road test vehicle for proper operation of six wheel drive and transfer high and low range (refer to TM 9-2320-242-10).

Section XX. COUPLINGS AND PROPELLER SHAFTS

2-141. General

a. The transmission-to-transfer coupling is a double universal joint separated by a coupling. The coupling assembly connects the transmission main output shaft to the transfer case input shaft.

b. The tractor propeller shaft is connected to the transfer case output shaft and center differential by means of two universal joints (one on each end of shaft). The shaft transmits drive force to the center differential.

c. The tractor-to-carrier coupling is a double universal joint separated by a yoke. The coupling assembly connects the center differential to the carrier propeller shaft and transmits drive force to the propeller shaft and rear differential. The coupling assembly also allows the carrier to pitch in respect to the tractor.

d. The carrier propeller shaft is a two piece, splined shaft jointed to the tractor-to-carrier coupling and to the rear differential input shaft. The propeller shaft transmits drive force to the rear differential when the transfer shift lever is engaged in six-wheel drive position. As the propeller extends rearward from the slip yoke, it passes through the center openings in the articulation joint and center bearing (pillow block). The center bearing is a doughnut shaped rubber bearing mounted in a metal case attached to the carrier body, between the two articulation joint bearings. The function of this bearing is to maintain propeller shaft alignment and to prevent the propeller shaft from rubbing on the articulation joint bearing, while allowing the

shaft limited amount of flexibility. The rear section of the propeller shaft, which is of a larger diameter, is connected to the rear differential by a single universal joint.

2-142. Coupling Assembly (Transmission-to-Transfer)

a. Removal.

(1) Remove tractor seats (refer to para 2-221).

(2) Remove console (refer to para 2-33).

(3) Remove coupling assembly (refer to para 2-138).

b. Disassembly.

(1) Disassemble coupling assembly by removing four bolts and lock plates securing spider and bearing assemblies and coupling (fig 2-167).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, worn bearings or other defects.

(3) Repair consists of replacing spider and bearings and coupling using repair kit (refer to TM 9-2320-242-20P for kits, *b.* above for disassembly and *d.* below for assembly). Replace grease fittings, if damaged.

d. Assembly.

(1) Position spider and bearing assemblies to coupling and secure with four bolts and lock plates (fig 2-167). Torque bolts to 24-30 lbs-ft. Bend tabs on lock plates to secure bolts.

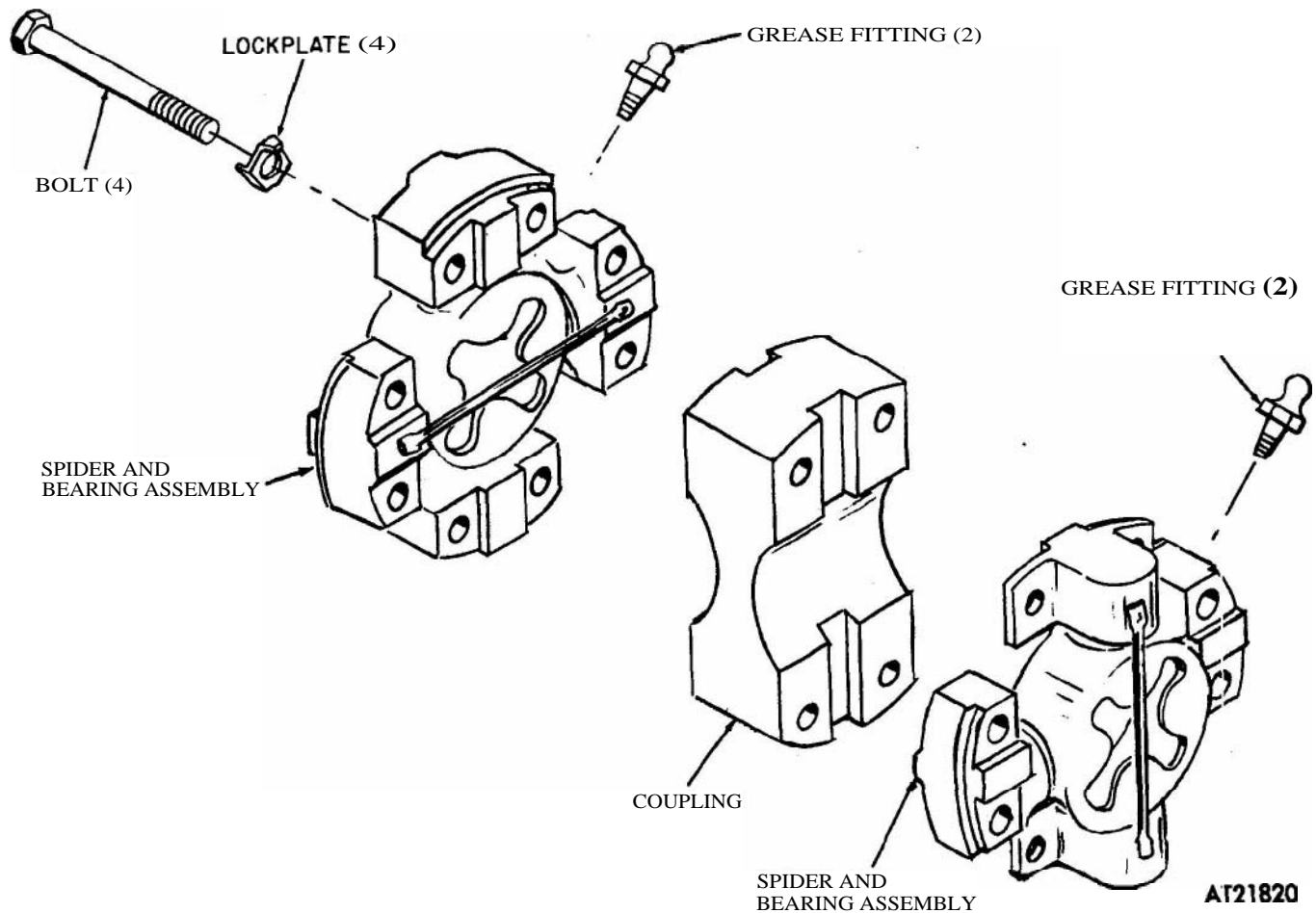


Figure 2-167. Coupling assembly (transmission-to-transfer), disassembly and assembly.

e. Installation.

- (1) Install coupling assembly (refer to para 2-138).
- (2) Service coupling assembly (refer to LO 9-2320-242.12).
- (3) Install console (refer to para 2-33).
- (4) Install tractor seats (refer to para 2-221).

2-143. Coupling Assembly (Tractor-to-Carrier)

a. Removal.

- (1) Remove eight screws and lock plates securing coupling assembly between tractor and carrier spider and bearing assemblies (fig 2-168).
- (2) Remove coupling assembly from vehicle.

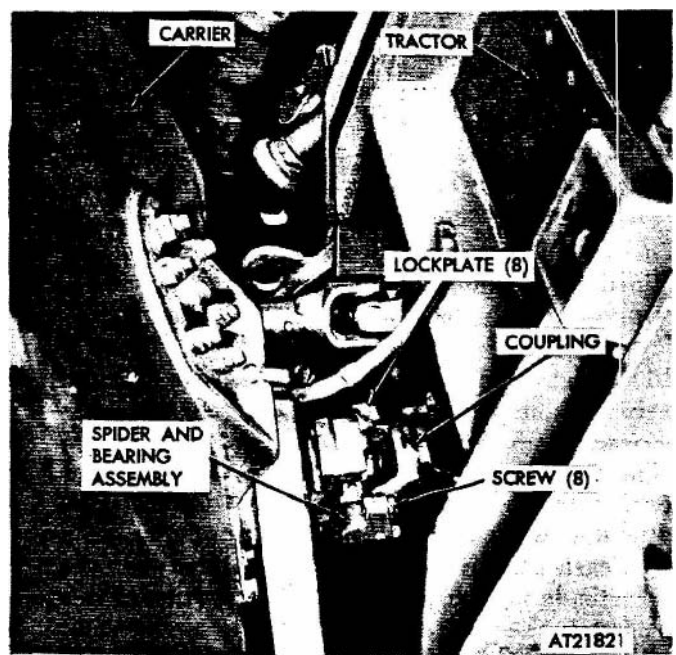


Figure 2-168. Coupling assembly (tractor-to-carrier), removal and installation.

b. Disassembly.

(1) Remove each spider and bearing assembly by removing four screws and two lock plates securing assembly to yoke (fig 2-169).

c. Cleaning, Inspection, Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

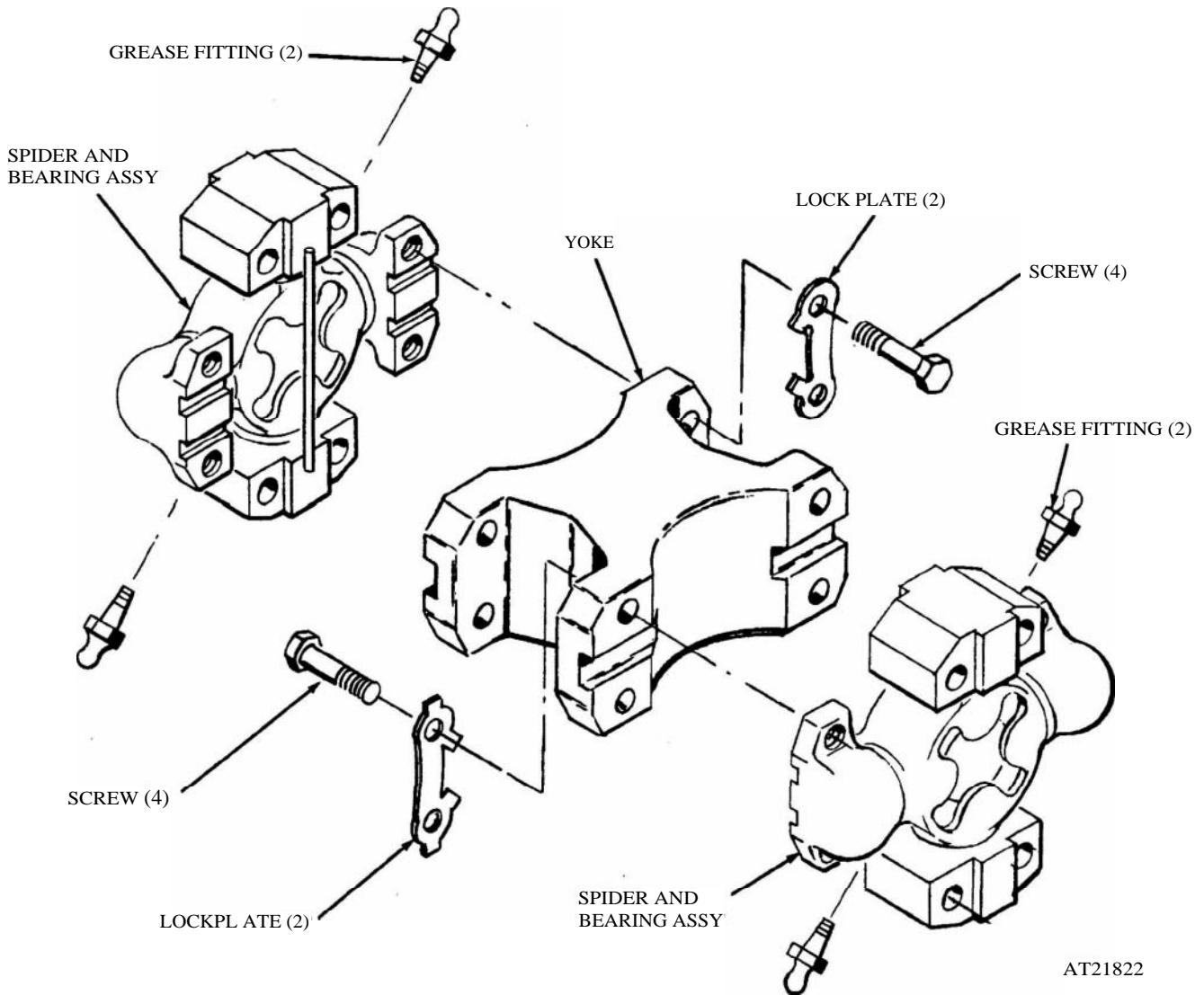
(2) Inspect all parts for cracks, breaks, worn bearings and other defects.

(3) Repair consists of replacing spider and

bearing assembly using repair kit (refer to TM 9-2320-242-20P for kits, *b.* above for disassembly and *d* below for assembly).

d. Assembly.

(1) Position each spider and bearing assembly to yoke and secure with two lock plates and four screws (fig 2-169). Torque screws to 24-27 lbs-ft. Bend tabs on lock plates to secure screws.



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Figure 2-169. Coupling assembly (tractor-to-carrier), disassembly and assembly.

e. Installation.

(1) Position coupling assembly to tractor and carrier spider and bearing assemblies (fig 2-168).

(2) Secure coupling assembly with eight screws and lock plates. Bend tabs on lock plates to secure screws.

(3) Service coupling assembly (refer to LO 9-2320-242-12).

2-144. Tractor Propeller Shaft Assembly

a. Removal.

(1) Remove tractor seats (refer to para 2-221).

(2) Remove console (refer to para 2-33).

(3) Remove tractor hull bottom access panel and gasket by removing eighteen screws (fig 2-97).

(4) Remove four screws and lock plates securing shaft assembly to transfer case yoke (fig 2-165).

(5) Remove four screws and lock plates securing shaft assembly to center differential (fig 2-170).

(6) Remove shaft assembly through hull bottom access panel.

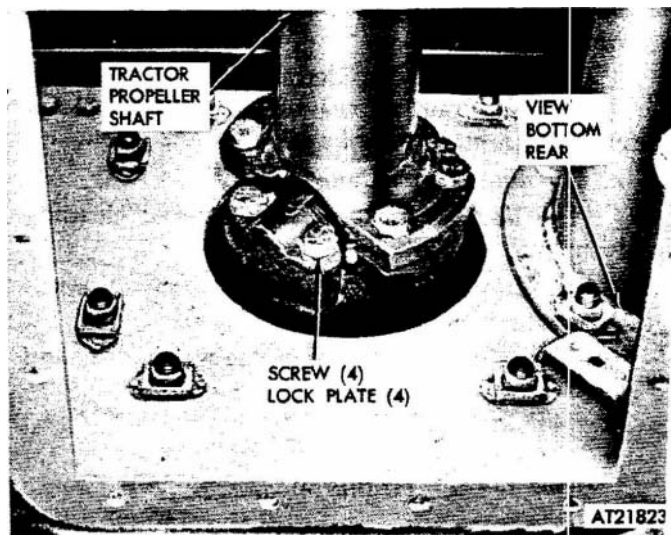
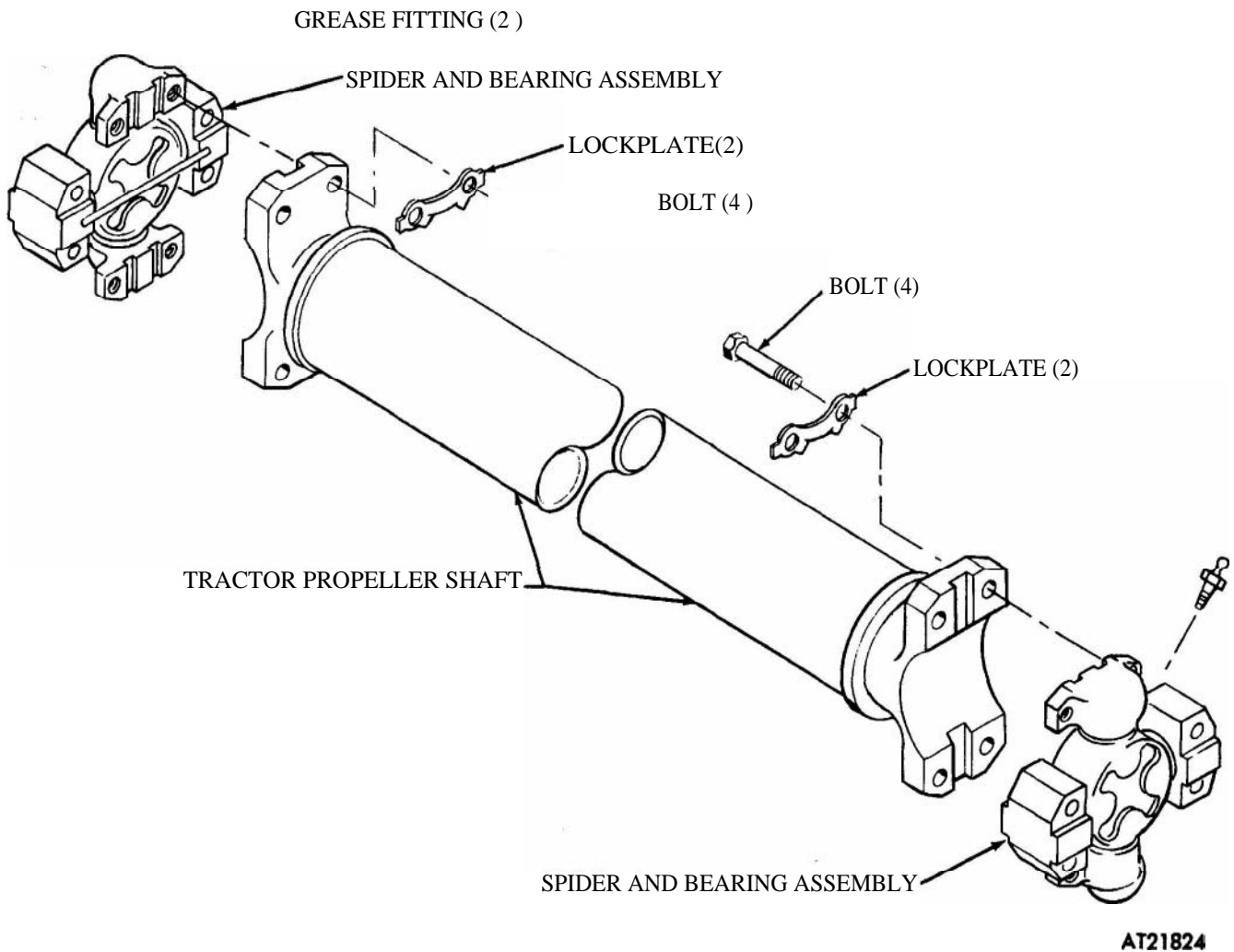


Figure 2-170. Tractor propeller shaft assembly(rear), removal and installation.

b. Disassembly. Remove front and rear spider and bearing assemblies by removing four bolts and lock plates securing each assembly to shaft (fig 2-171).



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Figure 2-171. Tractor propeller shaft, disassembly and assembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, worn bearings and other defects.

(3) Repair consists of replacing spider and bearing assembly using repair kit (refer to TM 9-2320-242-20P for kits, *b.* above for disassembly and *d.* below for assembly). If damaged, replace grease fittings.

d. Assembly. Position spider and bearing assembly (front or rear) to shaft and secure with two lock plates and four bolts (fig 2-171). Torque bolts to 34-45 lbs-ft. Bend tabs on lock plates to secure bolts.

e. Installation.

(1) Position shaft assembly to transfer case yoke and center differential.

(2) Secure shaft assembly to transfer case with

four screws and lock plates and to center differential with four screws and lock plates. Torque screws to 34-40 lbs-ft. Bend tabs on lock plates to *secure screws* (figs 2-165 and 2-170).

(3) Service shaft assembly (refer to LO 9-2320-242-12).

(4) Install tractor hull bottom *access panel* per the following steps:

(a) Position rubber on panel. Align gasket holes by inserting screws in each corner and center side holes.

(b) Position panel and gasket to tractor hull and start the six screws in the anchor nuts. Do not tighten.

(c) Install remaining screws and secure panel.

(5) Install console (refer to **para 2-33**).

(6) Install tractor seats (refer to **para 2-221**).

2-145. Center Bearing Assembly (Carrier)

a. Removal.

(1) Remove tractor-to-carrier drive coupling assembly (refer to para 2-143).

(2) Remove two bolts, spacers (if installed) and lock washers securing center bearing assembly to carrier (fig 2-172).

(3) Remove four bolts and two lock plates securing carrier propeller shaft assembly to rear differential input shaft (fig 2-173).

(4) Loosen yoke seal retainer and slide carrier propeller shaft yoke assembly forward. Remove retainer from yoke assembly and slide retainer, washers, and spline grease seal rearward on propeller shaft. Remove yoke, seal, washers, and retainer (fig 2-173).

(5) Slide propeller shaft rearward until center bearing assembly can be removed. Remove center bearing assembly.

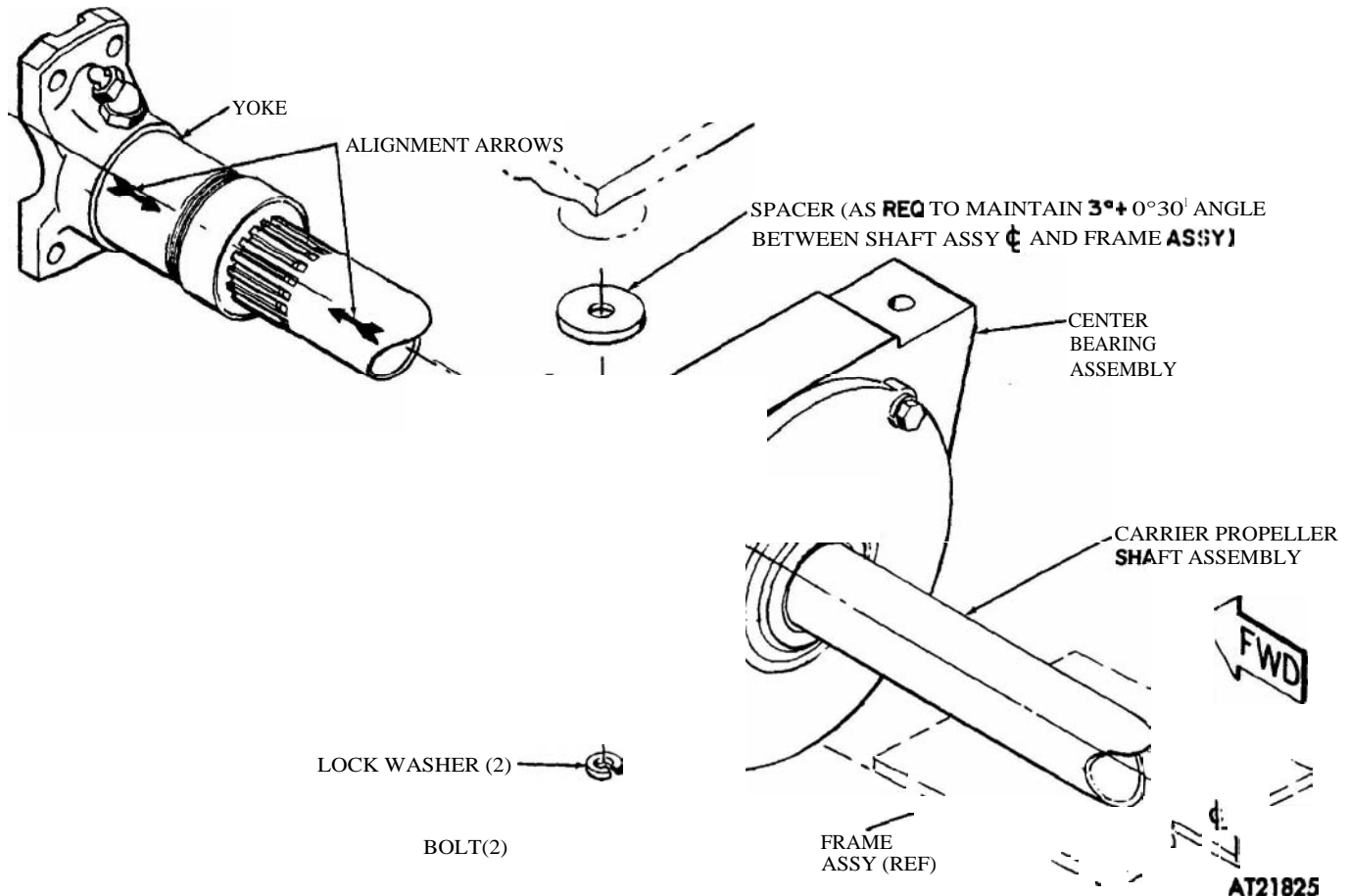
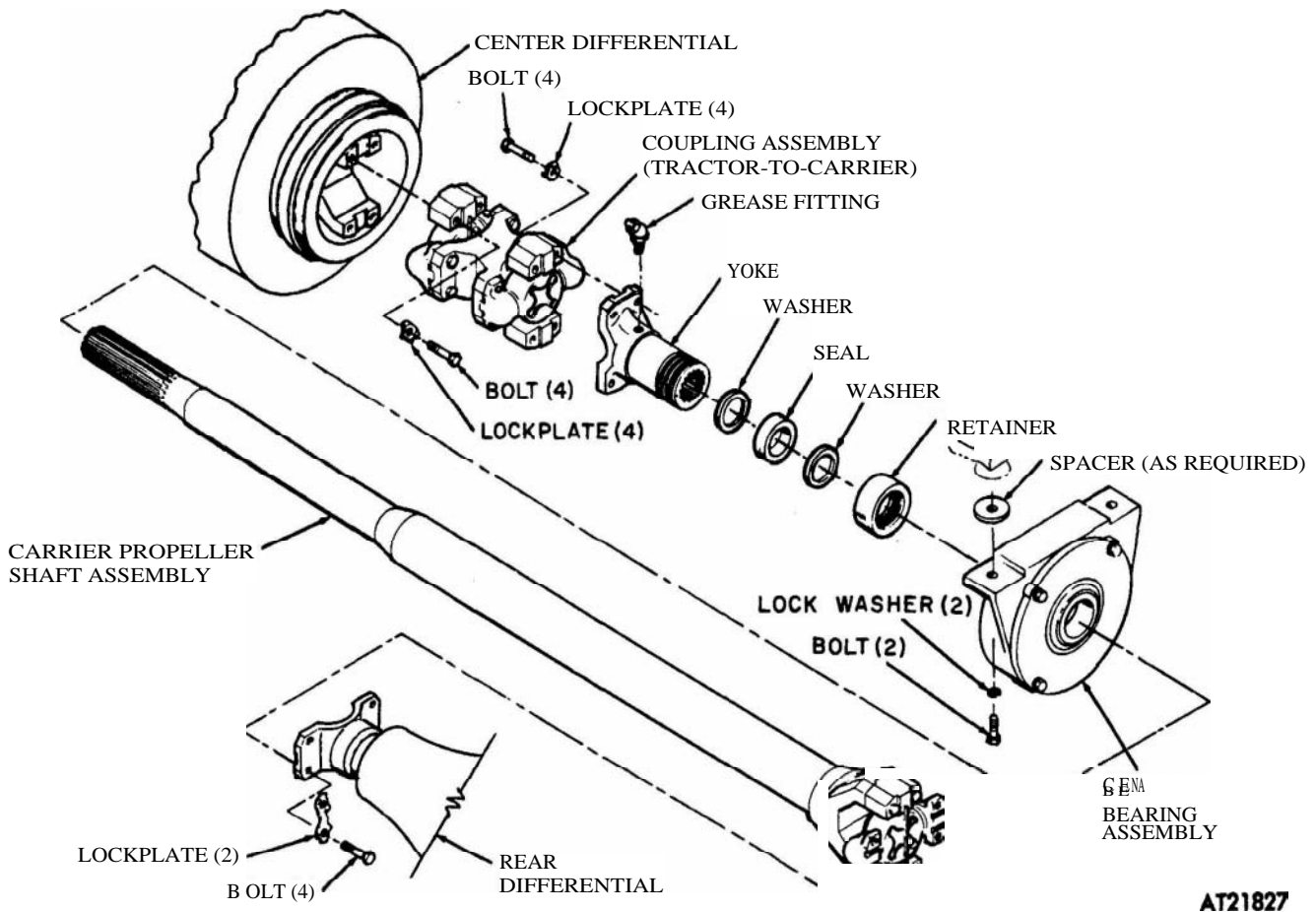


Figure 2-172. Center bearing assembly, removal and installation.

b. Disassembly.

(1) Remove four bolts and lock washers securing cover to bearing housing (fig 2-174).

(2) Remove insert and bearing from bearing housing.



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Figure 2-173. Carrier propeller shaft, removal and installation.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, worn bearing and other defects.
- (3) Repair is limited to replacing defective insert or bearing.

d. Assembly.

- (1) Position insert on bearing and install in center bearing housing (fig 2-174).
- (2) Position cover to bearing housing and secure with four screws and lock washers.

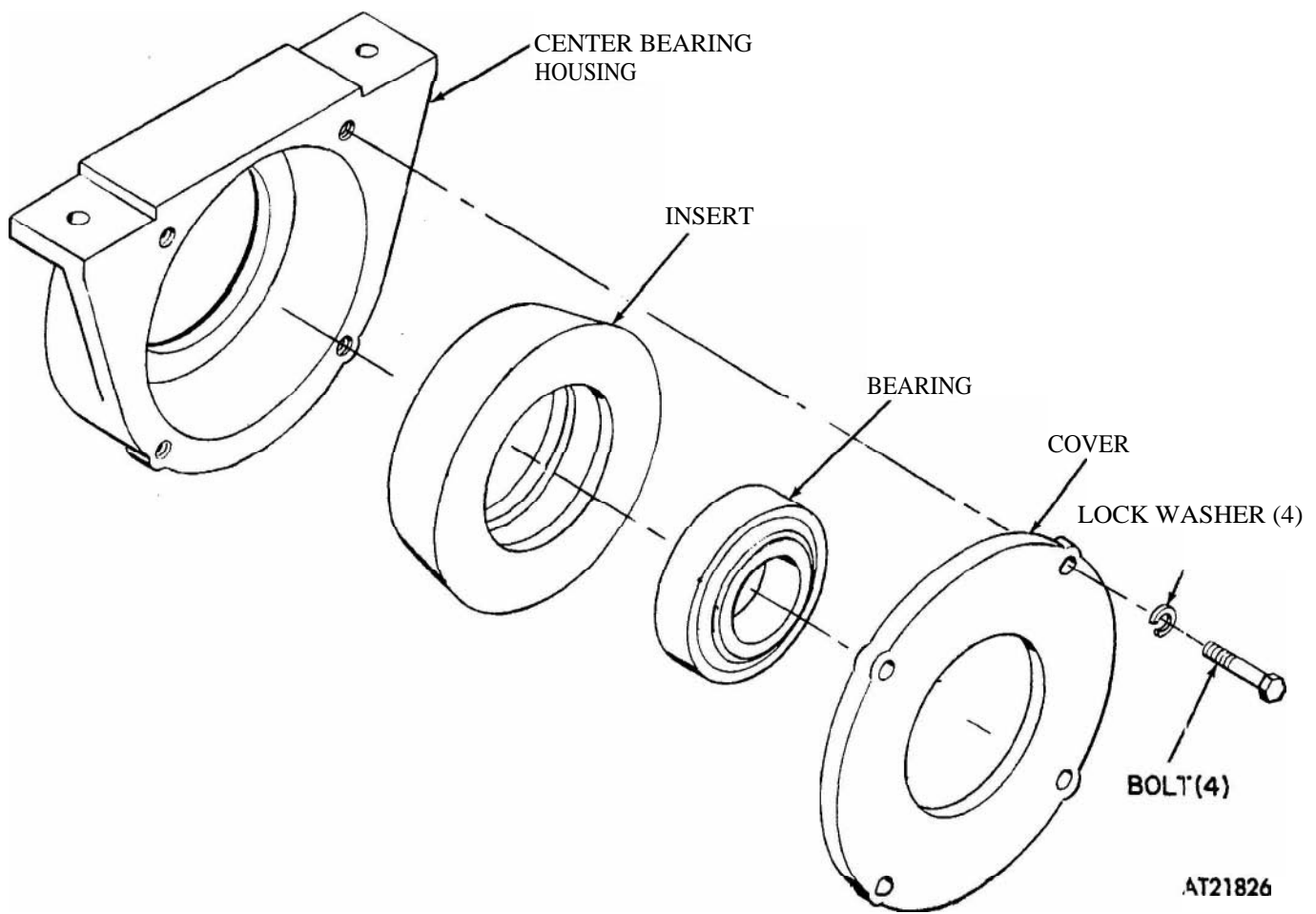


Figure 2-174. Center bearing, disassembly and assembly.

e. Installation.

- (1) Position center bearing assembly on carrier propeller shaft.
- (2) Slide propeller shaft through front yoke support bearing.
- (3) Position retainer, washer, and grease seal on propeller shaft.
- (4) Slide yoke assembly on propeller shaft splines. Make sure arrows (on yoke and shaft) are in alignment (fig 2-172). Insert washers and seal into yoke (fig 2-173). Secure retainer to shaft yoke assembly handtight.
- (5) Install tractor-to-carrier drive coupling (refer to para 2-143).
- (6) Position center bearing assembly to carrier and secure with two spacers (if removed), lock washers, and bolts.

Now: **Use** spacers (if required) to maintain a 2° 30' to 3° 30' angle from shaft assembly to frame assembly (fig 2-184).

- (7) Position carrier propeller shaft to rear differential input shaft and secure with four screws

and two lock plates. Torque screws to **24-27 lbs-ft.** Bend tabs of lock plates to secure screws.

- (8) Service center bearing assembly (refer to LO 9-2320-242-12).

2-146. Carrier Propeller Shaft

a. Removal.

- (1) Remove tractor-to-carrier drive coupling assembly (refer to para 2-1431).
- (2) Remove center bearing assembly (refer to para 2-145).
- (3) Remove four bolts and lock plates securing propeller shaft to rear differential input shaft (fig 2-173).
- (4) Loosen yoke seal retainer and slide yoke assembly forward. Remove yoke, seal, washers, and retainer from propeller shaft.
- (5) Move propeller shaft rearward and remove from carrier.
- (6) Slide center bearing from shaft.

b. Disassembly.

- (1) Remove spider and bearing assembly by removing four screws and lock plates securing

assembly to propeller shaft (fig 2-175).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, worn bearings and other defects.

(3) Repair by replacing spider and bearing

assembly using repair kit (refer to TM 9-2320 242-20P for kits, b. above for disassembly and d. below for assembly). If damaged, replace grease fitting.

d. Assembly.

(1) Position spider and bearing assembly to propeller shaft and secure with four screws and lock plates. Bend tabs of lock plates to secure screws (fig 2-175).

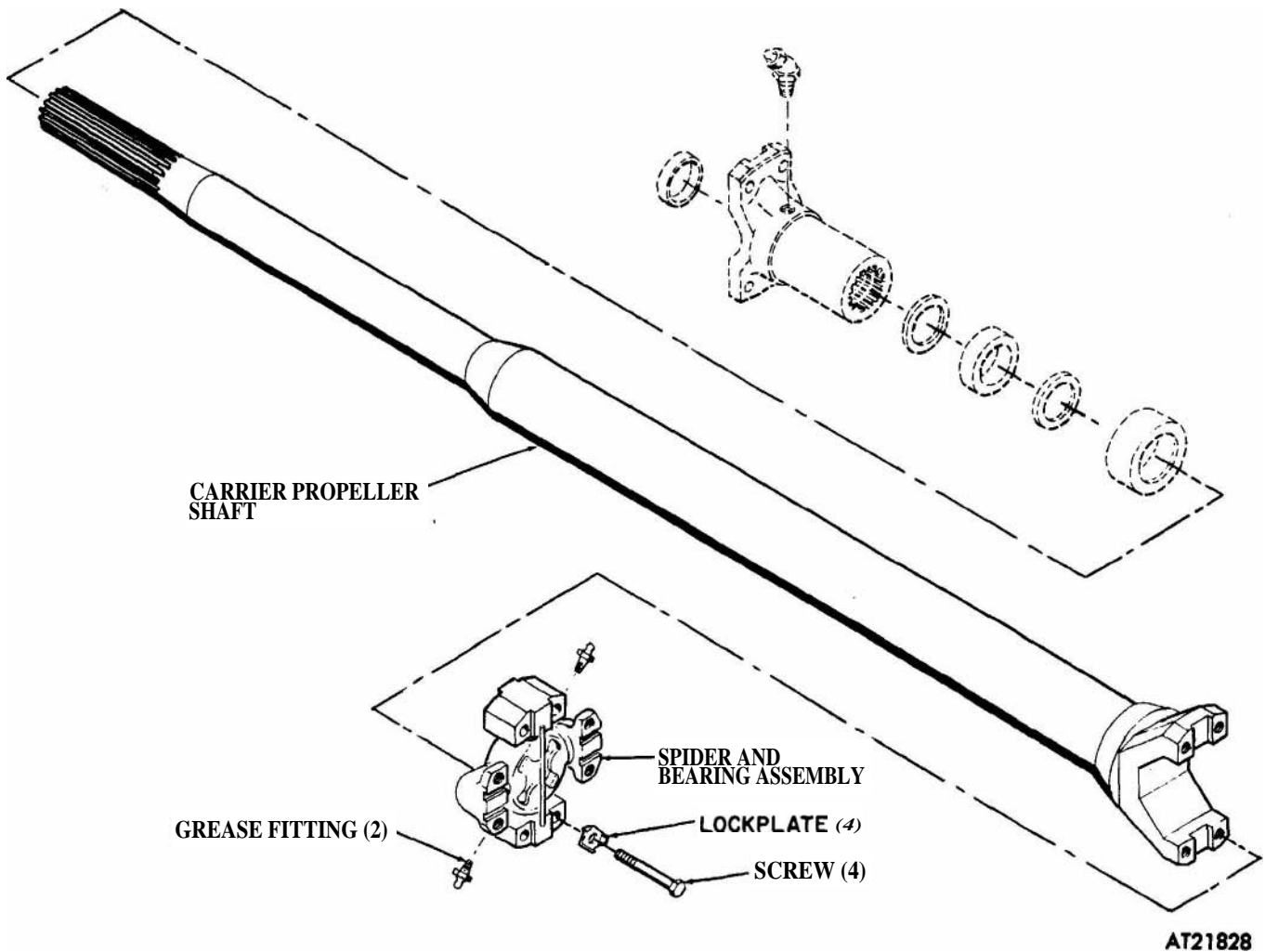


Figure 2-175. Carrier propeller shaft, disassembly and assembly.

e. Installation.

(1) Slide center bearing assembly into position on propeller shaft.

(2) Insert splined end of shaft through front yoke support bearing.

(3) Slide retainer, washer, grease seal, and washer on propeller shaft.

(4) Lubricate splines with grease (GAA) and slide yoke assembly on propeller shaft. Make sure arrows (on yoke and shaft) are in alignment. Insert washers and seal into yoke. Secure retainer hand

tight on yoke assembly.

(5) Position propeller shaft assembly to rear differential input shaft and secure with four screws and two lock plates. Torque screws 24-27 **lbs-ft.** Bend tabs of lock plates to secure screws.

(6) Position and secure center bearing assembly (refer to **para** 2-145).

(7) Install tractor-to-carrier drive coupling assembly (refer to para 2-143).

(8) Service propeller shaft assembly (refer to LO 9-2320-242-12).

Section XXI. FRONT, CENTER, AND REAR AXLE ASSEMBLIES

2-147. Genera I

a. The front, center, and rear differentials receive drive force from the engine by way of the propeller shafts and transfer case. The differentials in turn deliver drive force to the drive and stub axle assemblies. The front, center, and rear differentials provide equal torque to each set of axle assemblies. The center differential is equipped with a shift control mechanism which, when engaged, provides drive to the rear differential.

b. The center suspension (A-frame) utilizes a single transverse leaf spring. Each center wheel is mounted between the leaf spring and an independently mounted suspension arm. Two shock absorbers are utilized with each center wheel. One shock absorber is mounted between the suspension arm and the differential case bracket. The other shock absorber is mounted between the suspension arm and tractor chassis.

c. The drive axle assemblies for all six wheels are identical, therefore parts of these assemblies are interchangeable. The splined end of each axle shaft is inserted into a splined slip yoke and universal joint assembly, which connects the drive axle shaft to the differential drive flanges. The other end of each drive axle shaft is connected to a stub axle by a similar universal joint. An internally splined driving flange which bolts to the hub of each wheel, engages with the splined ends of the stub axles to transfer power from the driving axle to the hubs. The stub axles ride on roller bearings which are seated into each steering knuckle assembly.

2-148. Front and Rear Axle

a. Removal.

(1) Disconnect shock absorber from the upper suspension arm by removing its attaching hardware (fig 2-176).

(2) Compress shock absorber and move upwards to provide accessibility.

(3) Bend back tabs on lock plates, and disconnect axle assembly at the stub axle flange and differential flange by removing screws and lock plates (fig 2-177). Loosen yoke retainer, compress axle and remove.

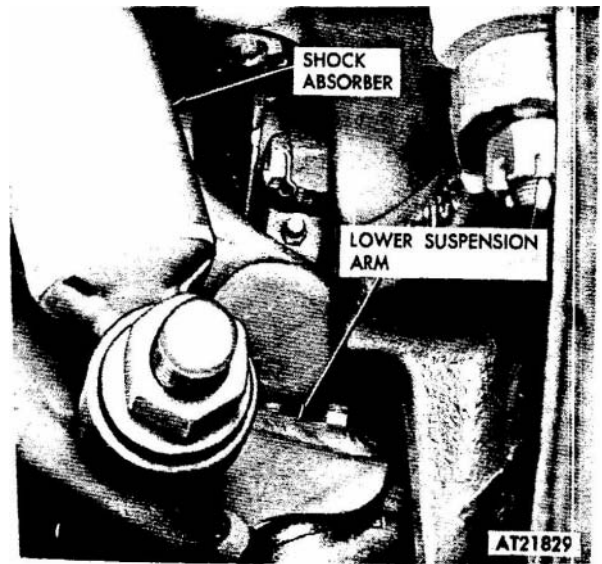


Figure 2-176. Shock absorber (at front suspension), removal and installation.

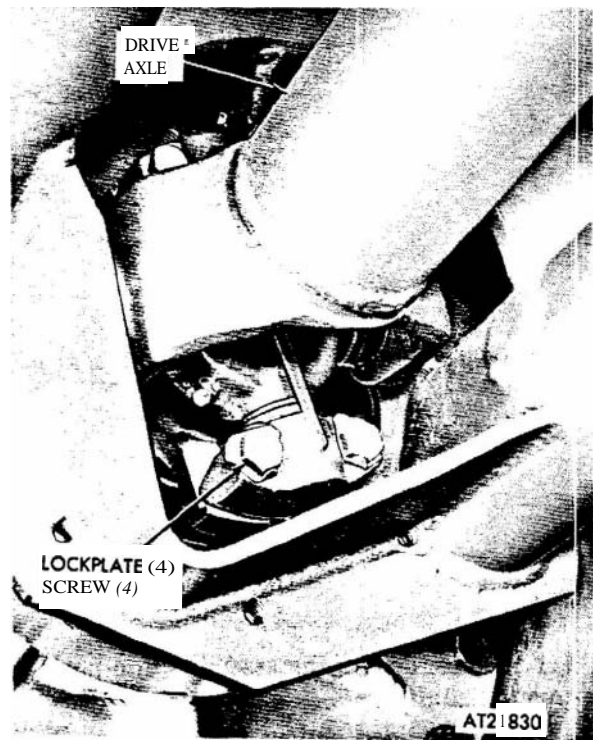


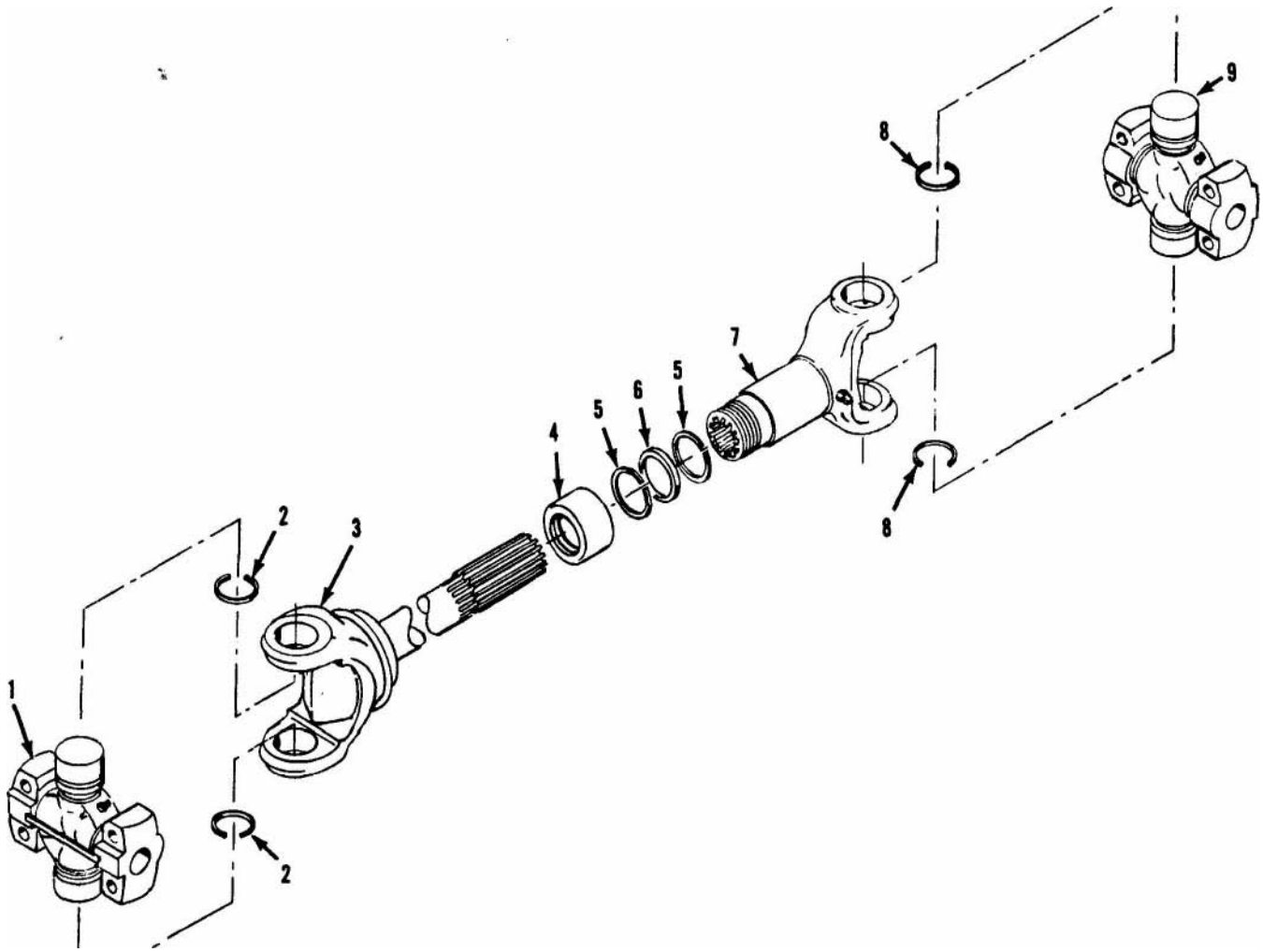
Figure 2-177. Drive axle (at center suspension), removal and installation.

b. Disassembly.

(1) Disconnect spider and bearing assemblies (1 and 9, fig 2-178) from front or rear axle assemblies by removing retaining rings (2 and 8).

Press spider and bearing assemblies from axles.

(2) Remove slip yoke retainer (4) and separate drive shaft stub assembly (3) and slip yoke (7). Extract washers (5) and seal (6).



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- 1 - Spider and bearing
- 2 - Retaining rings
- 3 - Drive shaft stub assembly
- 4 - Slip yoke retainer
- 5 - Washer

- 6 - Seal
- 7 - Slip yoke
- 8 - Retaining rings
- 9 - Spider and bearing

Figure 2-178. Drive axle, disassembly and assembly.

c. Cleaning, Inspection and Repair.

(1) Clean all parts in approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, or other damage. Inspect splines on drive shaft stub assembly (3, fig 2-178) for burrs and / or twisted splines.

(3) Repair by replacing spider and bearing assemblies and slip yoke using repair kits (refer to TM 9-2320-242-20P for kits, *b.* above for disassembly and *d.* below for assembly). Replace drive shaft stub assembly or lubricating fittings if dam aged.

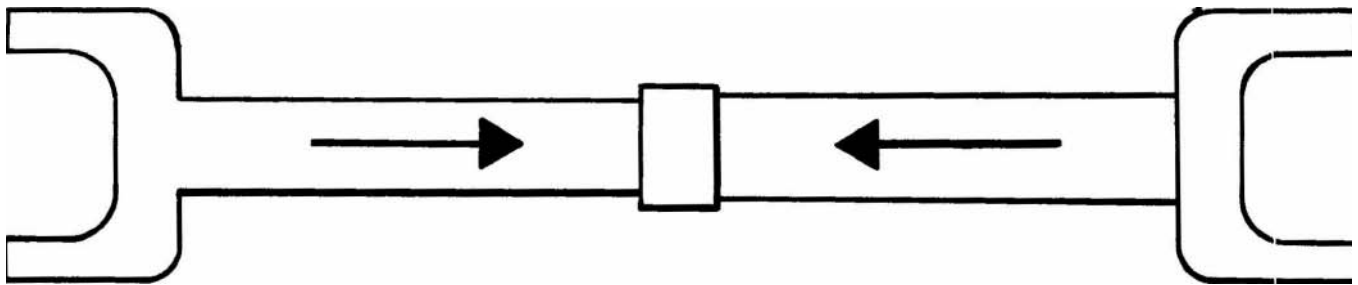
d. Assembly.

(1) Secure spider and bearing assemblies (1 and 9, fig 2-178) to drive shaft stub assembly (3) and slip yoke (7) using retaining rings (2).

(2) Position slip yoke retainer (4), washer (5), seal (6), and additional washer (5) on drive shaft stub assembly (3).

(3) Lubricate splines with grease (GAA) and install slip yoke (7) on drive shaft stub assembly (3), ensure that arrows are in alignment (fig 2-179). Tighten slip yoke retainer hand tight.

(4) Lubricate front or rear axle assembly (refer to LO 9-2320-242-12).



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Figure 2-179. Drive axle alignment.

e. Installation.

(1) Compress axle assembly and position slip yoke end against differential drive flange and secure using screws and lock plates (fig 2-177). Torque screws to 34-40 lbs-ft. Secure other end of axle assembly to the stub axle flange in the same manner and bend back tab on all lock plates.

(2) Secure lower end of shock absorber to upper suspension arm (fig 2-177).

2-149. Center Axle Assembly

a. Removal.

(1) Bend back tabs on lock plates and disconnect axle assemblies at the stub axle flange and differential flange by removing screws and lock plates (fig 2-177), compress axles and remove.

b. Disassembly.

(1) Disconnect spider and bearing assemblies (1 and 9, fig 2-178) from center axle assemblies by removing retaining rings (2) and (8). Press spider and bearing assemblies from axles.

(2) Remove slip yoke retainer (4) and separate stub assembly (3) and slip yoke (7). Extract washers (5) and seal (6).

c. Cleaning, Inspection and Repair.

(1) Clean all parts in approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, or other damage. Inspect splines or stub assembly (3, fig 2-178) for burrs and /or twisted splines.

(3) Repair by replacing spider and bearing assemblies and slip yoke seal using repair kits (refer

to TM 9-2320-242 20P for kits, *b.* above for disassembly and *d.* below for assembly). Replace stub assembly, slip yoke, or lubricating fittings if damaged.

d. Assembly.

(1) Secure spider and bearing assemblies (1 and 9, fig 2-178) to stub assembly (3) and slip yoke (7) using retaining rings (2) and (8).

(2) Position slip yoke retainer (4), washer (5), seal (6), and additional washer (5) on stub assembly.

(3) Lubricate splines with grease (GAA) and install slip yoke (7) on stub assembly and tighten slip yoke retainer hand tight.

(4) Lubricate axle assembly (refer to LO 9-2320-242-12).

e. Installation.

(1) Compress axle assembly and position slip yoke end against differential drive flange and secure using screws and lock plates (fig 2-177). Secure other end of axle assembly to the stub axle flange in the same manner. Torque screws to 35.40 lbs-ft. and bend tabs on all lock plates.

(2) Lubricate the center axle (refer to IA) 9-2320-242-12). 2-150. Stub Axles

a. Removal.

(1) Jack wheel until tire is clear of ground or floor and remove wheel and tire assembly (refer to TM 9-2320-242-10).

(2) Disconnect hydraulic and air lines from wheel spindle.

(3) Disconnect stub axle flange from drive axle universal joint by removing four screws and lock plates (fig 2-180).

(4) Support brake assembly with *a* suitable jack and remove eight nuts and lock washers securing brake assembly to steering knuckle (fig 2-180).

(5) Remove stub axle by removing screw, lock plate, and two gaskets securing stub axle to brake drum (fig 2-181).

(6) If deflector or seal are damaged replace per *b*. below.

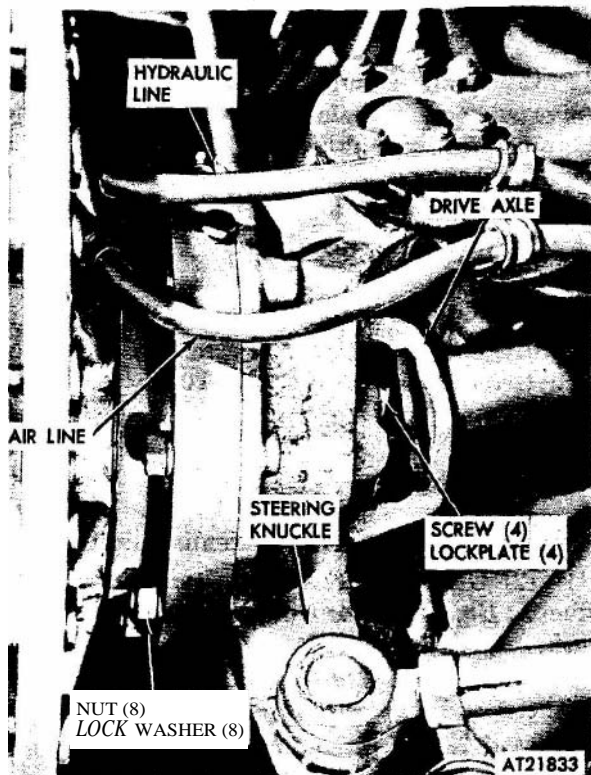


Figure 2-180. Service brake assembly (at tractor right front), **removal and** installation.

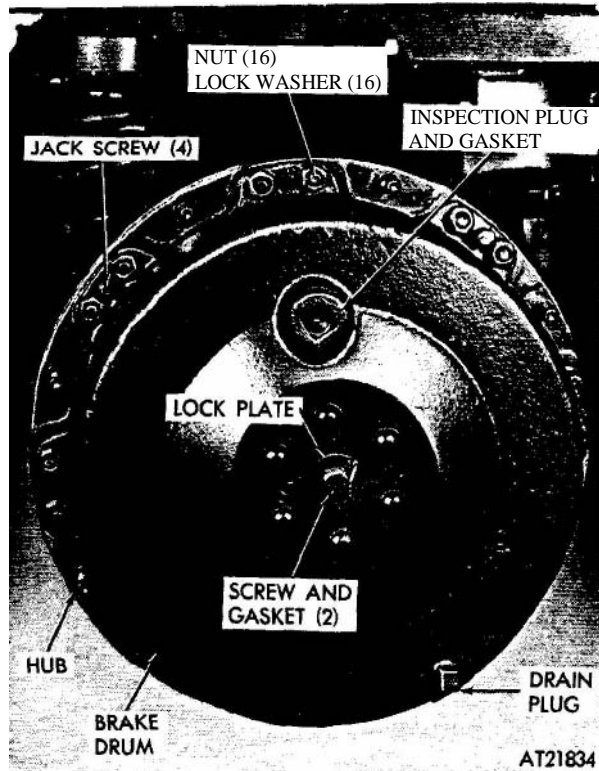


Figure 2-181. Brake drum removal and installation.

b. Disassembly.

(1) Remove deflector and seal from stub axle.

c. Assembly.

(1) Position deflector over stub axle shaft and install using tool (11660068-03) (fig 2-182). Position seal over stub axle shaft and install using tool (11660068-01) (fig 2-183).

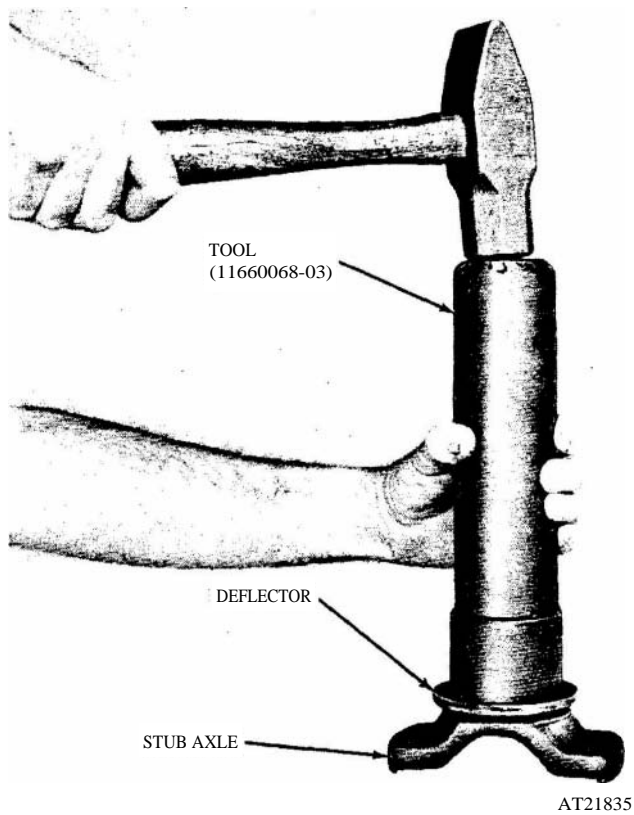


Figure 2-182. Stub axle deflector installation.

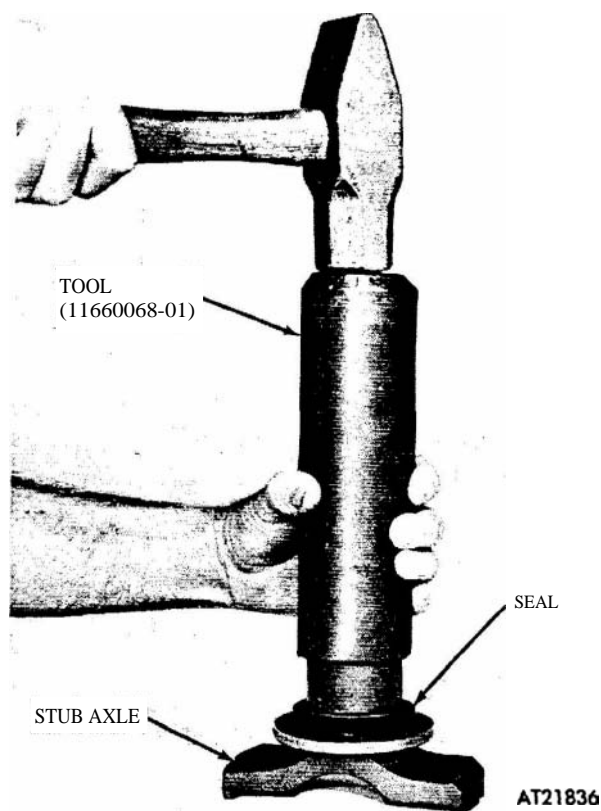


Figure 2-183. Stub axle seal installation.

d. Installation.

(1) Insert stub axle shaft through brake assembly wheel spindle. Secure center of brake drum to stub axle with gasket, lock plate, additional gasket, and screw. Torque screw 55-70 **lbs-ft.** and bend lock plate tab against screw.

(2) Support and position brake assembly on steering knuckle mounting studs. Secure brake assembly with eight nuts and lock washers (fig 2-180). Torque nuts 40-50 lbs-ft.

Note: All brake assemblies must be positioned with the hydraulic and air inlet ports in top position.

(3) Connect stub axle flange to drive axle universal joint with four screws and lock plates. Torque screws 35-40 **lbs-ft.** and secure by bending lock plate tabs against screws.

(4) Wrap teflon tape (MIL-T-27730) on male threads of hose or tube assembly and connect to adapter or spindle.

(5) Bleed brakes (refer to para 2-161b).

(6) Install wheel and tire assembly and remove jack (refer to TM 9-2320-242-10).

2-151. Front Differential

a. Removal.

(1) Place transfer case in six-wheel drive position, engaging front differential sliding clutch.

(2) Using a suitable jack, raise front end of tractor. Block front of tractor securely and remove jack.

(3) Place suitable containers beneath differential and tractor hull bottom drain plug.

(4) Remove differential fill and drain plug (fig 2-184) and drain lubricant.

(5) Drain transfer case by removing tractor hull bottom drain plug (fig 2-97) and transfer case drain plug. Re-install transfer case drain plug and hull bottom drain plug after draining is **completed**.

Note: Discard lubricant when draining is complete, old lube oil should not be reused.

(6) Disconnect front axle assemblies (refer to para 2-148).

(7) Disconnect vent line from elbow on differential (fig 2-185) and remove elbow.

(8) Place a suitable jack beneath the differential assembly and apply a slight pressure to the assembly.

(9) Disconnect differential (fig 2-186) from bulkhead and transfer case by removing nine nuts, washers, and lock washers.

(10) Disconnect differential from support brackets (fig 2-185) by removing two screws, nuts, washers and lock washers.

(11) Remove support brackets (fig 2-185) by removing two screws.

(12) Slide differential forward to clear transfer case studs and front differential sliding clutch.

(13) Lower differential on jack and slide out from under vehicle. Remove and discard gasket on transfer case.

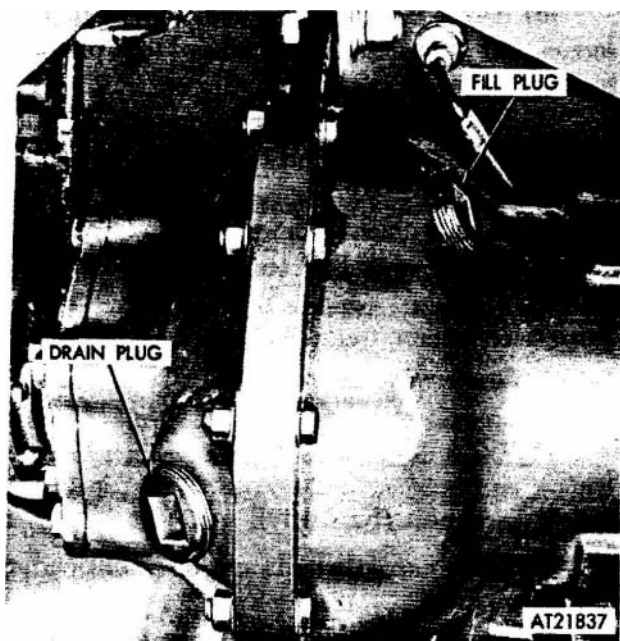


Figure 2-184. Front differential fill and drain plugs.

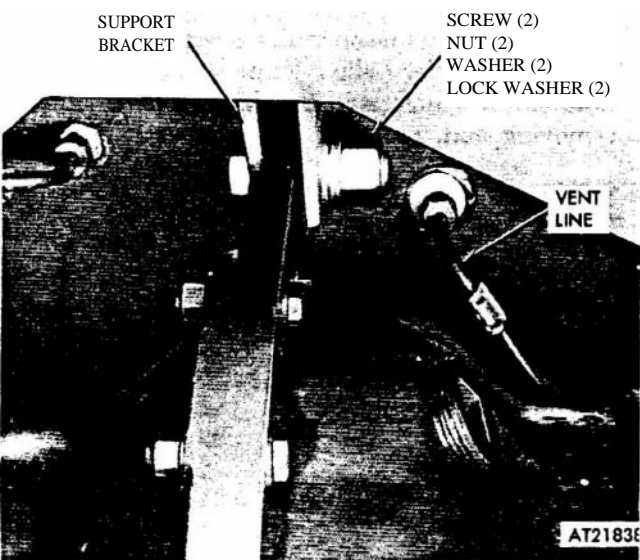


Figure 2-185. Differential to support bracket, removal and installation.

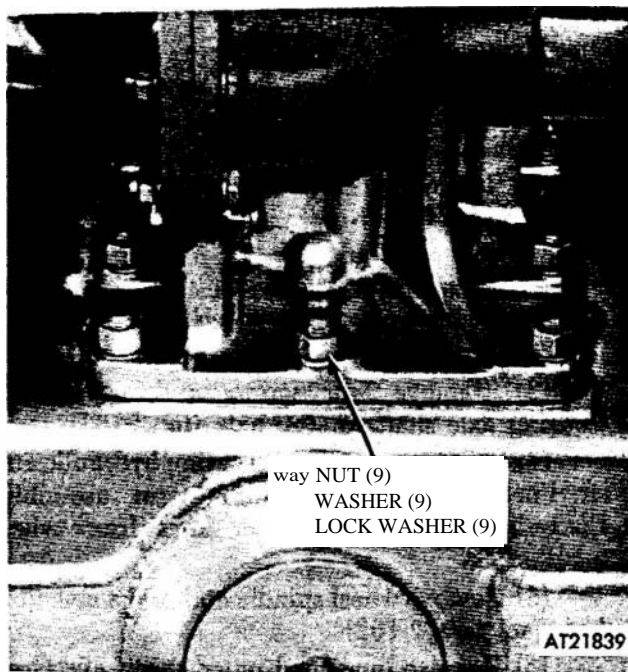


Figure 2-186. Front differential removal and installation.

b. Installation.

(1) Using a suitable jack, raise front end of tractor. Block front of tractor securely and remove jack.

(2) Clean mating surface of bulkheads and transfer case.

(3) Place front differential on a suitable jack and position under vehicle.

(4) Position new gasket on transfer case mounting studs.

(5) Raise jack and carefully slide differential rearward ensuring that input shaft engages front differential sliding clutch and mounting studs.

(6) Secure front and rear differential mounting lugs to support brackets (fig 2-185) using two screws, nuts, washers, and lock washers.

(7) Secure differential to bulkhead and transfer case (fig 2-186) using nine nuts, washers, and lock washers.

(8) Install elbow and connect vent line to elbow on differential (fig 2-185).

(9) Install front axle assemblies (refer to para 2-148).

(10) Fill transfer case and differential with lubricant (refer to LO 9-2320-242-12).

(11) Lower front end of vehicle to ground.

(12) Test drive vehicle to check operation of front differential (refer to TM 9-2320-242-10).

2-152. Center Suspension (A-Frame)

a. Removal.

(1) Jack suspension arm **assembly** at the jacking pad (refer to TM 9-2320-242-10). Block tractor body at keel.

(2) Remove wheel and tire assembly (refer to TM 9-2320-242-10).

Note: The following procedures are the same for both left- and right-hand suspension arm assemblies.

(3) Remove four screws and lock plates securing axle shaft to stub axle (fig 2-187).

(4) Remove two screws securing hydraulic and air line clamps to suspension arm assembly. Disconnect hydraulic and air lines from wheel spindle.

(5) Remove wheel spindle and brake assembly (refer to para 2-162).

(6) Remove inner and outer shock absorbers from suspension arms (refer to **para** 2-203).

(7) Remove jack from suspension arm assembly.

(8) Place a suitable support under suspension arm assembly and remove two nuts, lock washers, and screws securing suspension arm assembly to **differential**. Remove suspension arm assembly from differential and leaf spring.

(9) If damaged, remove torsilastic bushings from center differential housing with a suitable puller.

b. Installation.

(1) If removed, press torsilastic bushings into center differential housing with *a* suitable clamp.

Note: The following procedures are the same for both left- and right-hand suspension arm assemblies.

(2) Position end of leaf spring into suspension arm assembly tower. Secure suspension arm

assembly to differential mounting brackets with two screws, lock washers, and nuts. Torque nuts to 120-130 lbs-ft. (fig **2-187**).

(3) Jack suspension arm assembly and install **inner** and outer shock absorbers (refer to pars 2-203).

(4) Secure wheel spindle and brake assembly to suspension arm assembly (refer to **para** 2.162).

(5) Connect air and hydraulic lines to wheel spindle. Secure air and hydraulic lines to suspension arm assembly with clamps and screws.

(6) Secure axle shaft to stub axle with four screws and lock plates. Bend tabs of lock plates to secure screws.

(7) Bleed brake system (refer to pars 2-161b).

(8) Install wheels and tires (refer to TM 9-2320-242-10).

(9) Remove block from tractor body keelway.

(10) Remove jacks from vehicle.

(11) Operate vehicle to check for proper suspension action (refer to TM 9-2320-242-10).

2-153. Center Differential

a. Removal.

(1) Disconnect hydraulic and air lines between tractor and carrier (fig 2-188) and electrical cable quick disconnect (**fig** 2-189).

(2) Block carrier wheels and one front corner of carrier.

(3) Place a suitable jack under the opposite front corner and raise carrier until tension is removed from hitch pins.

(4) Remove screws and nuts securing hitch pins in yoke and drive out hitch pins (fig 2-190).

(5) **Scribe** a line on center steering shaft and U-joint of carrier slip jointed steering shaft. Disconnect center steering shaft from **U-joint** by removing bolt, nut, and lock washer (fig 2-191).

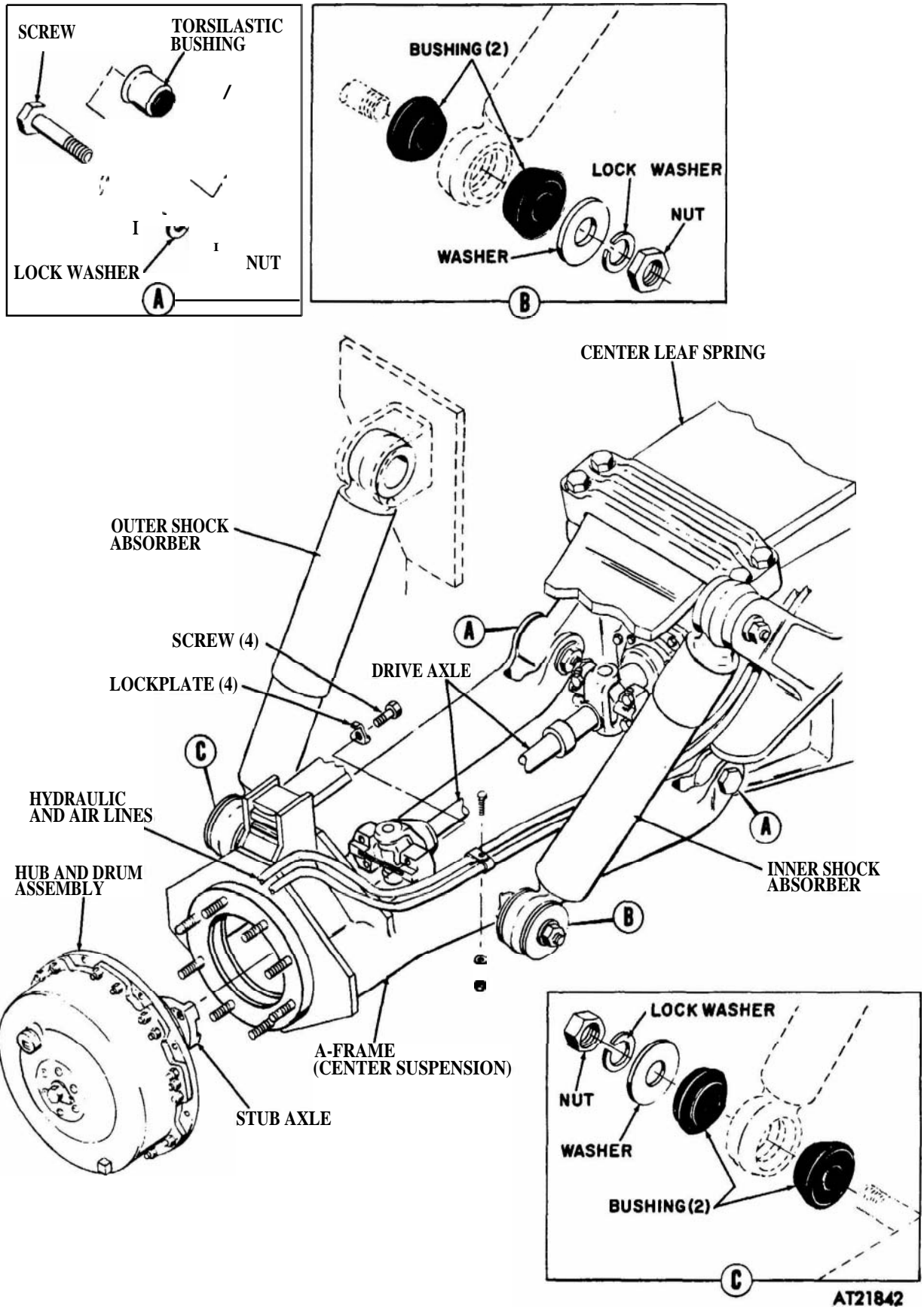


Figure 2-187. Center suspension (A frame), removal and installation.

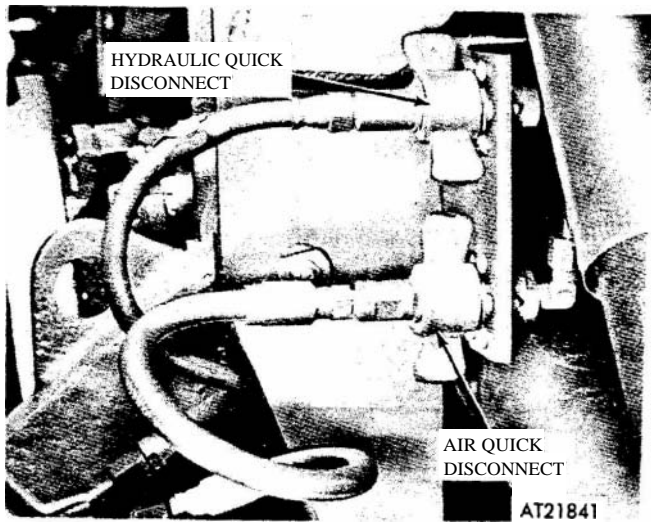


Figure 2-188. Tractor to carrier air and hydraulic quick disconnects.

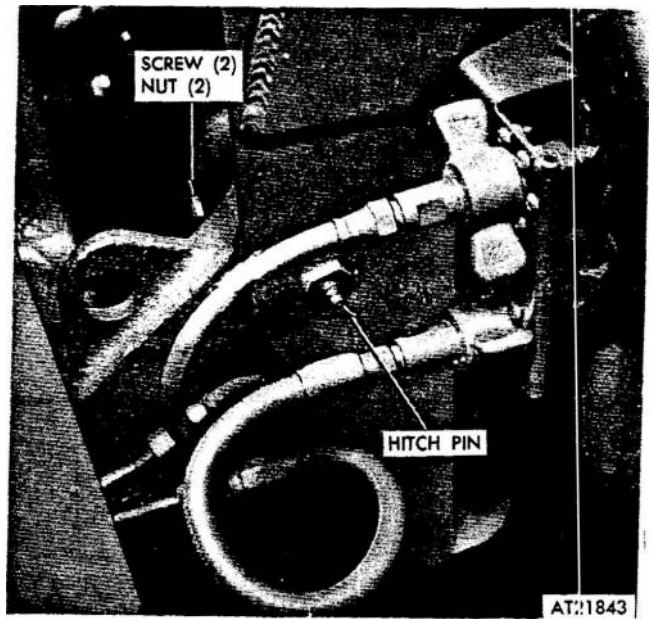


Figure 2-190. Hitch pin removal and installation.

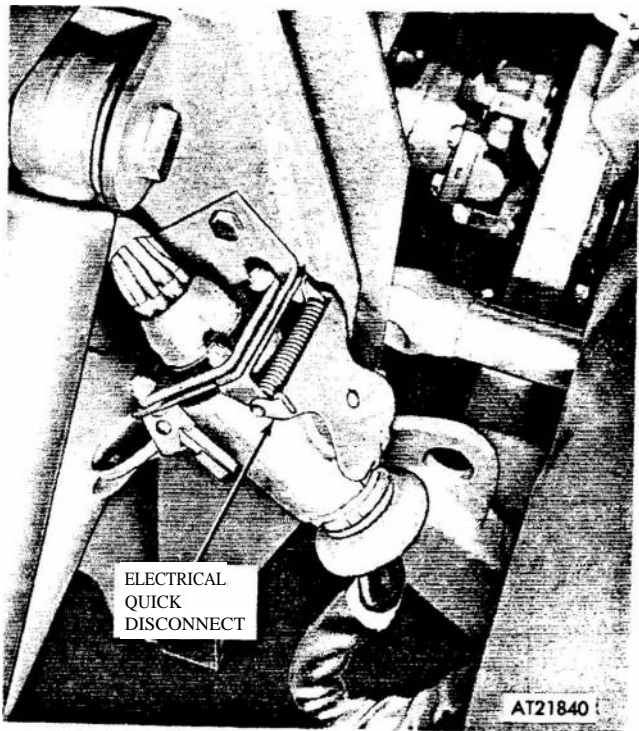


Figure 2-189. Tractor to carrier electrical quick disconnect.

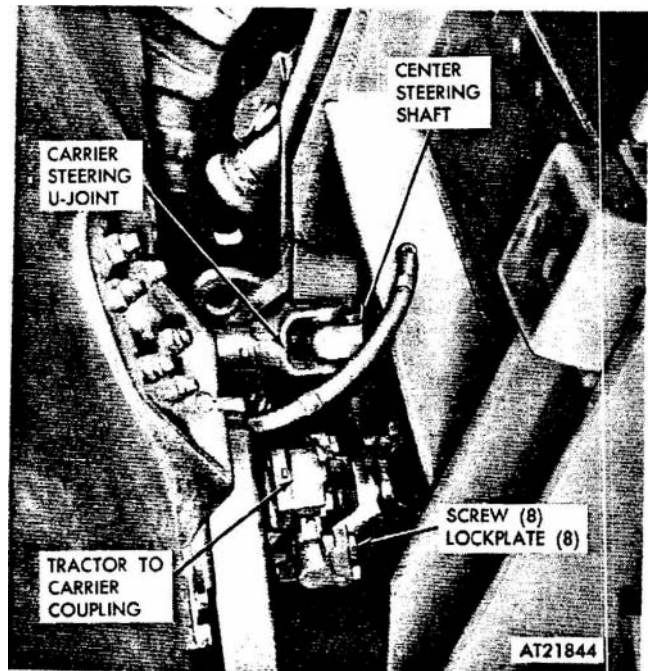


Figure 2-191. Center steering shaft to carrier steering U-joint and coupling disconnect.

(6) Remove four screws and lock washers securing coupling assembly to center differential output shaft (fig 2-191).

(7) Manually push tractor away from carrier.

(8) Disconnect center steering shaft from tractor steering yoke by removing screw, washer, and nut (fig 2-192).

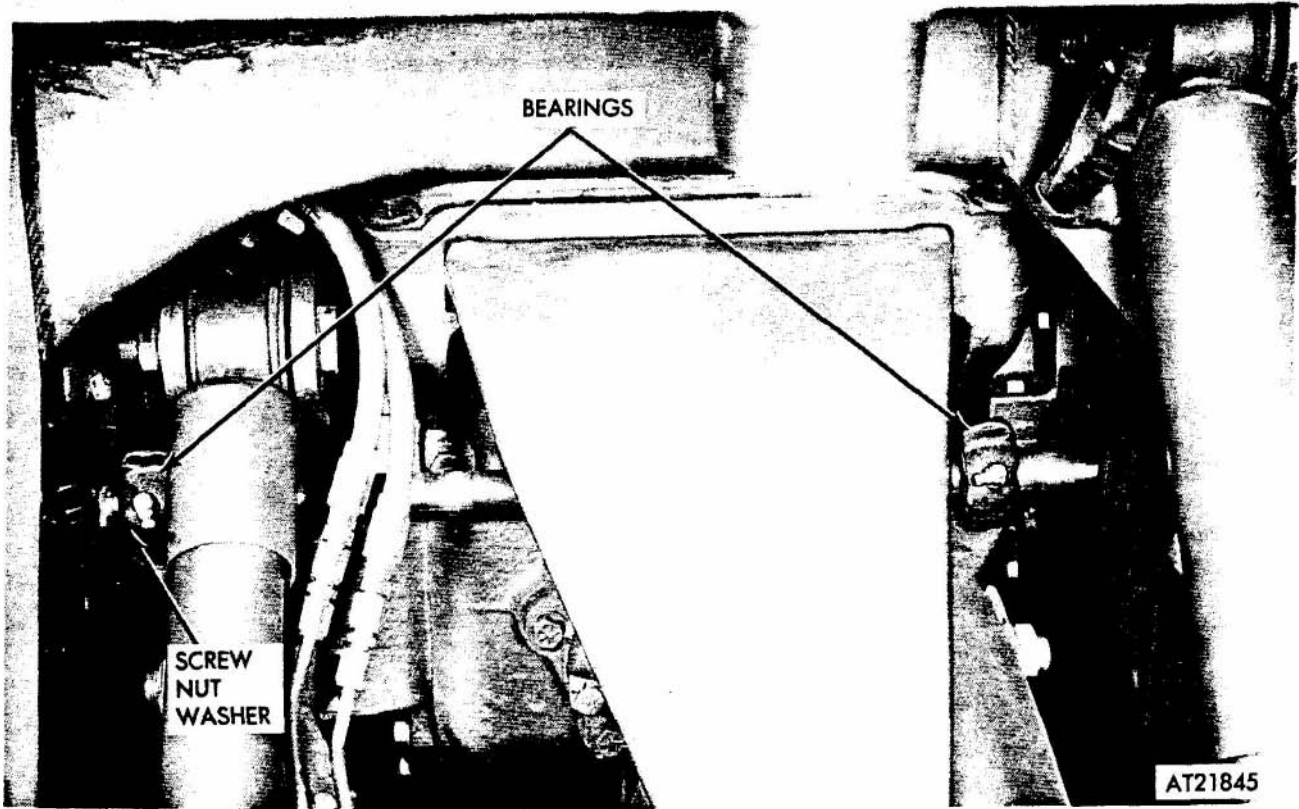


Figure 2-192. Center steering shaft and bearings, removal and installation.

(9) Disconnect center steering bearings from the center differential (fig 2-192).

(10) Place six-wheel drive lever in out position.

(11) Remove tractor hull access panel (fig 2-97).

(12) Disconnect link assembly from shaft linkage lever by removing nut and washer (fig 2-160).

(13) Disconnect link assembly from center differential linkage lever by removing nut and washer (fig 2-193). Loosen clamp securing link assembly boot to tractor hull.

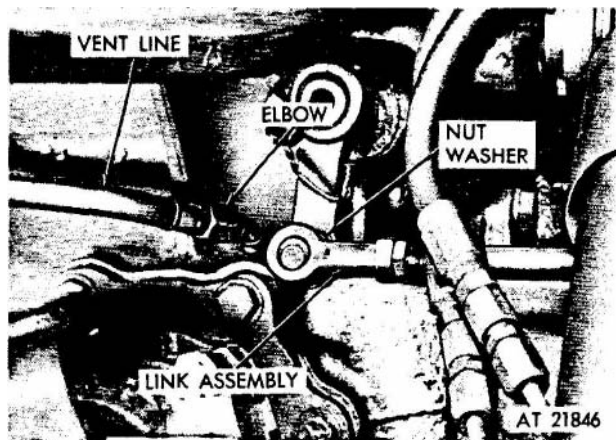


Figure 2-193. Link assembly to center differential disconnect point.

(14) Jack and block rear of tractor. Remove center differential drain plug and drain lubricant into a suitable container. Install drain plug (fig 2-194).

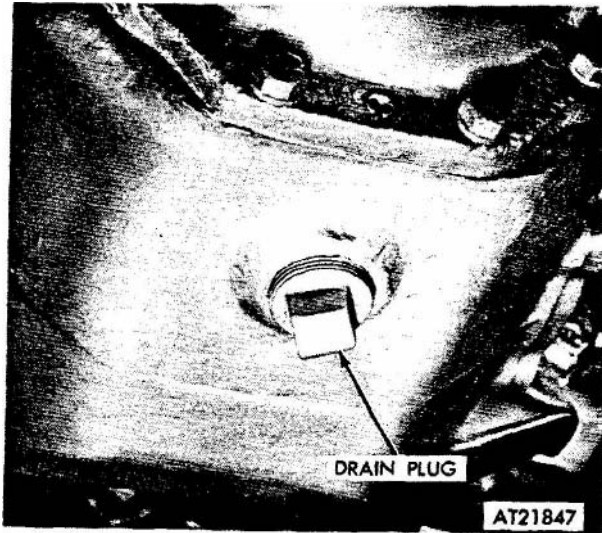


Figure 2-194. Center differential drain plug.

(15) Remove wheels and tires (refer to **para 2-156**).

(16) Disconnect left and right outer **shock** absorbers secured to tractor body **bracket** by removing nut, lock washer, washer, bushing, and pin (fig 2-195).

(17) Remove eight bolts and four nuts securing two plate assemblies to tractor hull and coupler. Remove plate assemblies (fig 2-196).

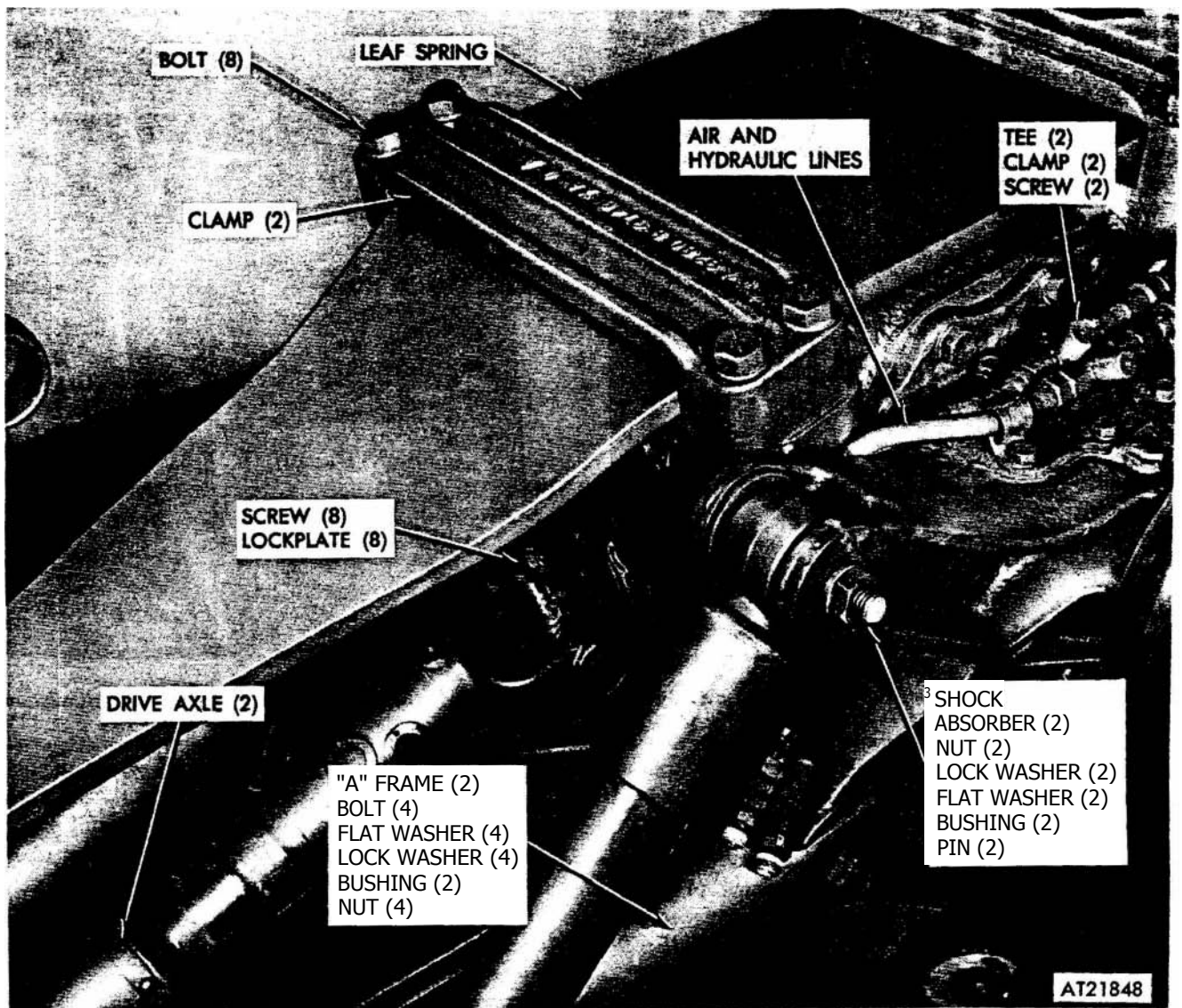


Figure 2-195. Center suspension, disassembly and assembly.

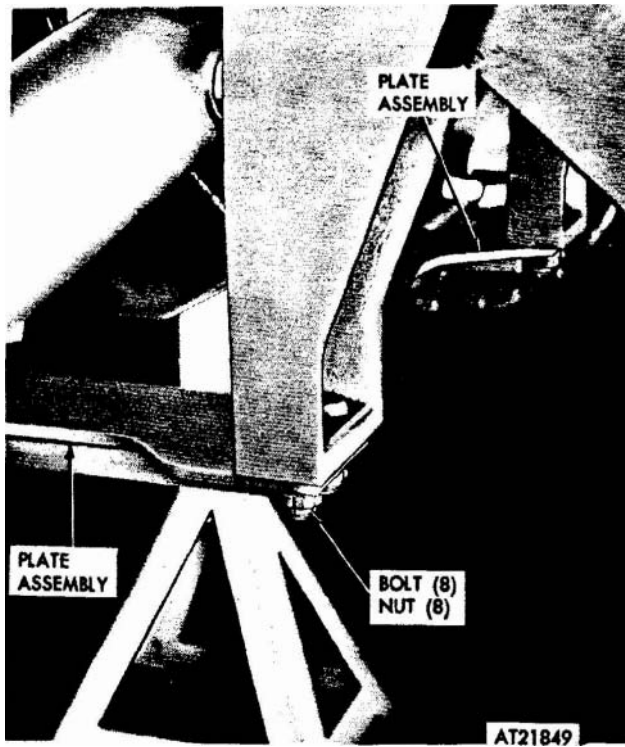


Figure 2-196. Plate assembly, removal and installation.

(18) Remove four screws and lock plates securing tractor drive shaft to yoke. Slide yoke off center differential input shaft (fig 2-170).

(19) Place a suitable jack under center differential and apply a slight upward pressure. Remove bolts, washers, and nuts securing torous support assembly halves (upper and lower) (fig 2-197).

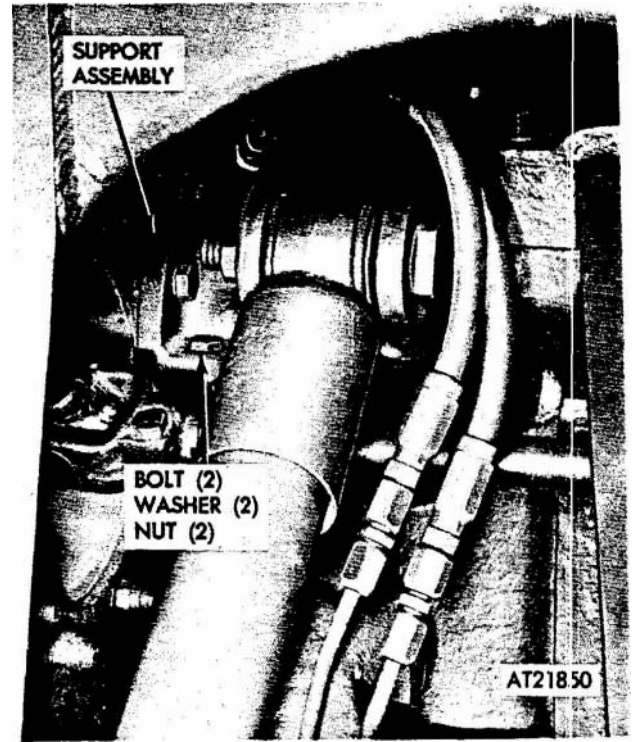


Figure 2-197. Support assembly, removal and installation.

(20) Remove bolts, washers, and nuts securing upper and lower support assemblies (front and rear) to tractor frame. Remove front and rear support assemblies. Remove front gasket and rear shims.

(21) Disconnect vent line from elbow on center differential (fig 2-193). Remove elbow from differential.

(22) Lower center suspension and differential. Remove assembly from under tractor.

(23) Disconnect air and hydraulic lines at tees on differential. Remove screws and washers securing hose clamps and tees to differential. Move hose and clamps aside and reinstall washers and screws (fig 2-195). Disconnect one side of air and hydraulic hoses from tees.

(24) Remove leaf spring clamps by removing eight screws and washers securing clamps to differential (fig 2-195).

(25) Remove two nuts, lock washers, washers, and pins securing inner shock absorbers to differential. Remove shock absorbers and bushings (fig 2-195).

(26) Remove eight screws and lock plates securing drive axle shaft **U-joints** to differential output shafts (fig 2-195).

(27) Remove four bolts, washers, lock washers, and nuts securing right and left A frames to the differential (fig 2-195). Using a suitable puller remove bushings from differential mounting lugs.

(28) Move right and left A frames and drive shafts aside. Remove leaf spring and wear pads. Remove differential from jack.

b. Installation.

(1) Install four torsolastic bushings into A frame mounting lugs on center differential assembly.

(2) Position wear pads on dowels in differential. Position leaf spring and clamps to differential and secure with eight screws and washers. Position center differential assembly on suitable jack and place between A frames and drive axles.

(3) Position right and left drive axles to differential assembly. Insert ends of leaf spring into spring towers on A frames. Secure axles with eight screws and lock plates. Bend tabs of lock plates to secure screws.

(4) Position right and left A frame arms to differential assembly and secure with four bolts, lock washers, and nuts. Torque nuts to 120-130 lbs-ft.

(5) Position right and left inner shock absorbers with bushings to differential assembly and secure with two pins, washers, lock washers, and nuts.

(6) Connect air and hydraulic hoses to tees. Remove four screws and lock washers from differential assembly. Position four hose clamps on differential and secure with screws and lock washers removed above (fig 2-195).

(7) Position center suspension assembly under rear of tractor and jack into position.

(8) Place seals into front and rear torous support grooves. Secure support assembly halves to the differential using screws, washers, nuts.

(9) Position gasket between front support and bulkhead. Align holes and secure support using screws (fig 2-197).

(10) Place three shims between rear support and coupler. Align holes and secure support using screws, washers, and nuts.

(11) Install elbow in differential housing and connect vent line to center differential (fig 2-193).

(12) Remove jack from differential.

(13) Connect air and hydraulic hoses from tractor bulkhead elbows to tees on differential housing (fig 2-198).

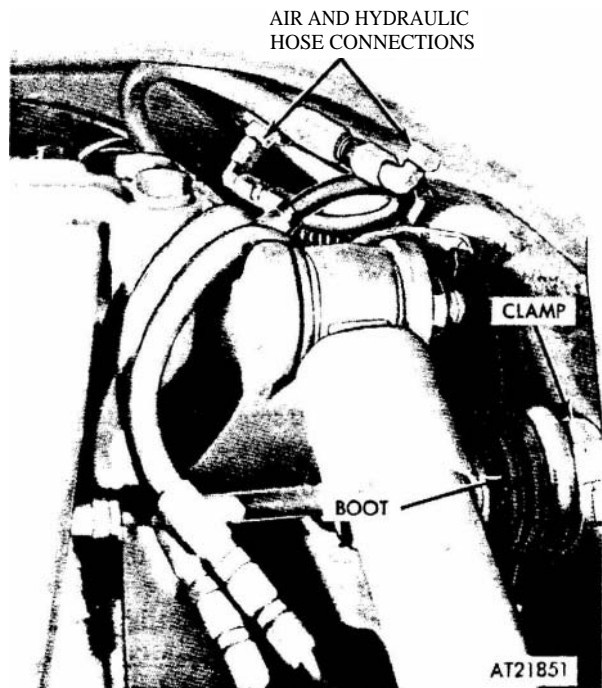


Figure 2-198. Air and hydraulic hose connections.

(14) Position right and left outer shock absorbers with bushings and washers to tractor hull brackets and secure with pins, lock washers, and nuts (fig 2-195).

(15) Connect tractor drive shaft to differential input yoke and secure with four screws and lock plates. Bend tabs on lock plates to secure screws (fig 2-170).

(16) Secure connecting link assembly to shaft linkage lever with nut and washer (fig 2-160).

(17) Position center differential shift lever to the "OUT" position and secure connecting link assembly to lever with nut and washer (fig 2-193).

(18) Operate six-wheel drive lever to ensure proper engagement and disengagement.

(19) Secure link assembly boot to tractor hull with clamp (fig 2-198).

(20) Position and secure steering pillow block assemblies to differential assembly. Secure two pillow block assemblies with two nuts and lock washers. Torque nuts to 8-12 lbs-ft.

(21) Secure steering slip joint shaft to center steering shaft with screw, lock washer, and nut. Torque nut to 15-24 lbs-ft. Slide shaft through pillow block bearings and secure to tractor steering shaft yoke with screw, lock washer, and nut (fig 2-192).

(22) Position plate assemblies to tractor hull and coupler and secure with eight screws and nuts (fig 2-196).

(23) Install wheel and tire assembly (refer to para 2-156). Remove blocks and lower tractor.

(24) Push tractor toward carrier until coupling hitch assemblies are engaged.

Note: Prior to making contact rotate center differential output yoke and steering wheel to ensure proper alignment with shafts on carrier.

(25) Raise or lower jack under carrier front corner and align the holes in tractor hitch with holes in carrier hitch yoke.

(26) Insert hitch pins through hitch assembly and secure with screws and nuts (fig 2-190).

(27) Insert center steering shaft into carrier steering shaft **U-joint** and secure using screw, nut, and washer. Torque nut to 15-25 lbs-ft. (fig 2-191).

(28) Secure tractor center differential output shaft yoke to coupling assembly with four screws and lock plates. Bend tabs of lock plates to secure screws (fig 2-191).

(29) Connect hydraulic, air, electrical cables to tractor (figs 2-187 and 2-188).

(30) Remove fill plug and fill center differential with lubricant (refer to LO 9-2320-292-12).

(31) Position and secure tractor hull access panel with 18 screws (fig 2-97).

(32) Bleed brakes (refer to para 2-161b).

(33) Test drive vehicle to check for proper operation of differential assembly.

2-154. Rear Differential

a. Removal.

(1) Place a suitable container **beneath** differential drain plug. Remove fill and drain plugs, when draining is complete replace plugs.

Note: Discard lubricant when draining is complete, old lube oil should not be reused.

(2) Using a suitable jack, raise rear of **carrier**. Block carrier securely and remove jack.

(3) Remove rear axle assemblies (refer to para 2-148).

(4) Disconnect carrier propeller shaft (1, fig 2-199) from the differential input flange by removing screws (2) and lock plates (3). Compress propeller shaft until free of input flange.

(5) Disconnect vent line (9) from elbow (8) **on** differential.

(6) Place a suitable jack **beneath** the differential assembly and apply a slight pressure on the assembly.

(7) Disconnect the differential assembly rear lugs from support brackets (13) by removing two screws (15), nuts (10), and washers (11, 12, and 14).

(8) Disconnect differential from the carrier by removing screws (4 and 20), nuts (7 and 17), and washers (5, 6, 18 and 19).

(9) Lower differential on jack and slide out from under carrier.

(10) Remove differential from jack, clean thoroughly.

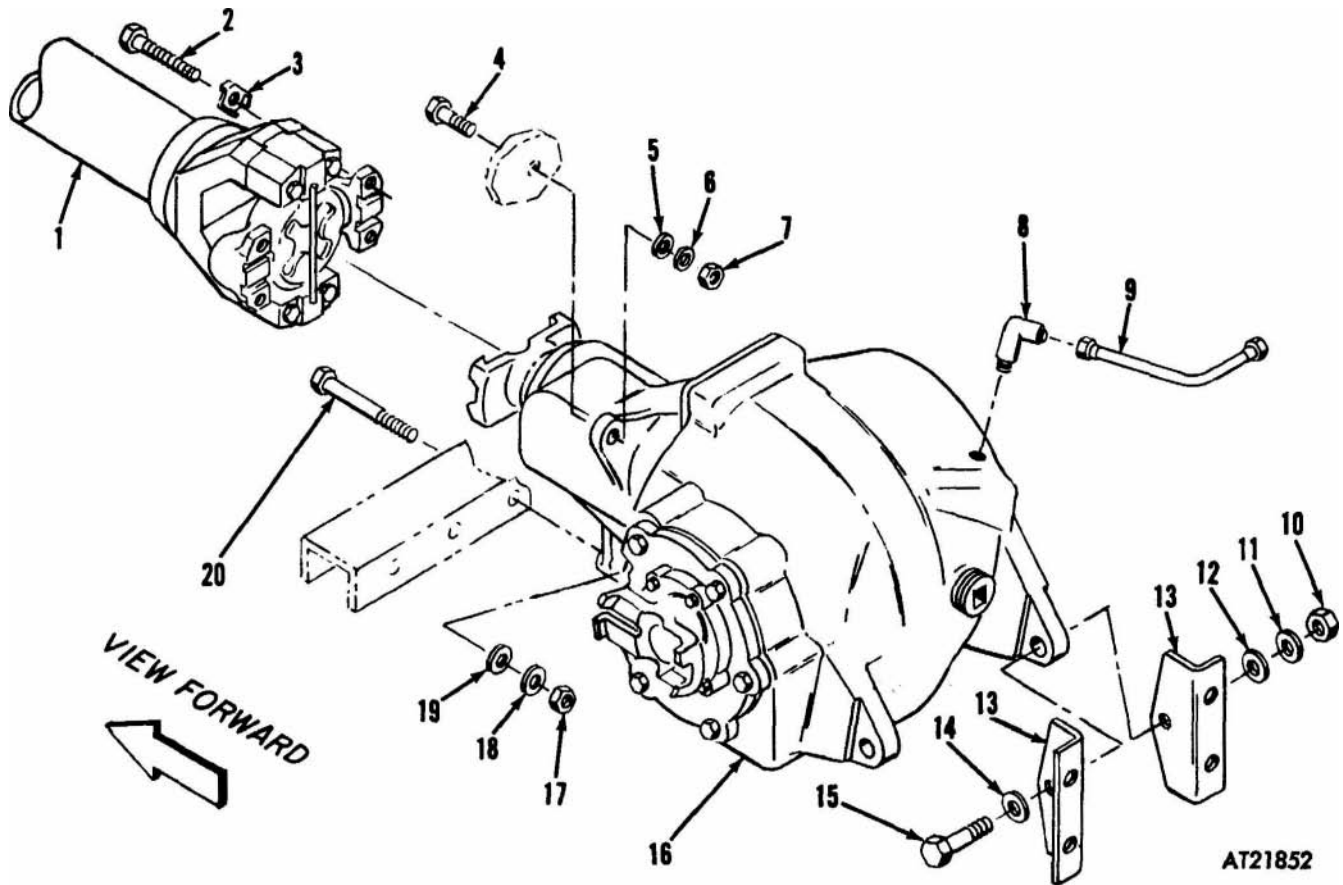


Figure 2-199. Rear differential, removal and installation.

b. Installation.

(1) Using a suitable jack raise rear of carrier. Block carrier securely and remove jack.

(2) Place differential on a suitable jack and raise assembly into position under carrier.

(3) Secure differential rear lugs to support brackets (13, fig 2-199) using screws (15), nuts (10), and washers (11, 12, and 14). Torque screws to 200-250 lbs-ft.

Note: Ensure screws (15) are installed with heads on inside of rear lugs to provide fill plug access.

(4) Connect vent line (9) to elbow (8) on differential.

(5) Remove jack and secure carrier propeller shaft (1) to differential input flange using screws (2) and lock plates (3).

(6) Install rear axle assemblies (refer to para 2-148).

(7) Remove fill plug and fill differential with lubricant (refer to LO 9-2320-242-12).

(8) Remove carrier from blocks and lower to ground.

(9) Test drive vehicle to check operation of rear differential (refer to TM 9-2320-242-10).

Section XXII. TIRES AND WHEELS

2-155. General

The vehicle is equipped with 11:00 x 18, 6 ply rated tubeless tires, mounted on steel wheels. Each wheel assembly is secured to the service brake hub by eight hold-down nuts. The tire and wheel weight is approximately 100 lbs. Tires should be inflated to 22 psi for highway travel, 18 psi for cross-country operation and 12 psi for mud, sand, and snow.

2-156. Tire and Wheel Assembly

a. Removal.

(1) Loosen eight nuts (fig 2-200) securing tire and wheel to hub.

(2) Using a suitable jack, raise suspension until it is clear of ground.

(3) Remove nuts loosened in (1) above and remove tire and wheel.

b. Disassembly.

(1) Remove valve cap and core (fig 2-200) and deflate tire.

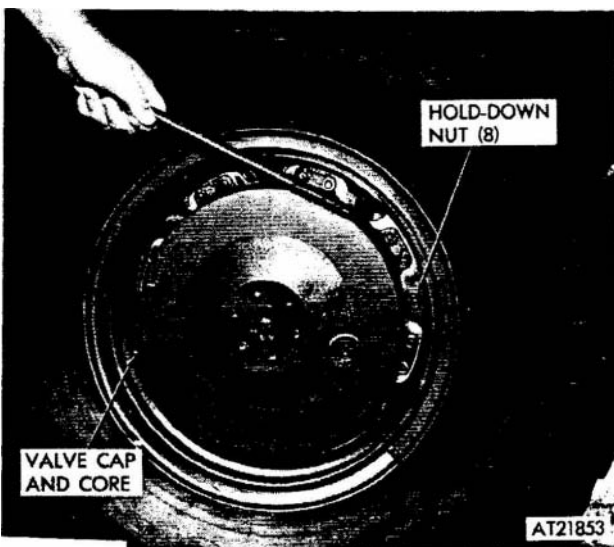


Figure 2-200. Tire and wheel, removal and installation.

(2) Loosen tire bead at locking rim. Using suitable tire tools remove locking rim and tire from wheel.

c. Repair.

(1) Valve core.

(a) Remove valve cap and using a valve core tool, remove defective valve core.

(b) Install and tighten new valve core.

(c) Inflate tire to 22 psi for highway travel, 18 psi for cross-country operation, or 12 psi for mud, sand or snow, and replace valve cap.

(2) Valve stem.

(a) Refer to *b.* above and disassemble tire and wheel.

(b) Disconnect retaining nut and remove valve stem from wheel.

(c) Insert new valve stem through wheel and secure using retaining nut.

Note: Use wrench to maintain valve stem position while securing to wheel.

(d) Refer to *d.* below and reassemble wheel and tire.

(3) Tires (maximum puncture of $\frac{3}{8}$ inch diameter). Refer to *b.* above and disassemble wheel and tire (refer to TM 9-2610-200-25 for repair of tires).

d. Assembly.

(1) Clean wheel assembly.

(2) Apply liquid soap or lubricant (**MIL-L-836A**) to tire beads.

(3) Position inner bead of wheel rim down and drop tire over wheel (fig 2-201).

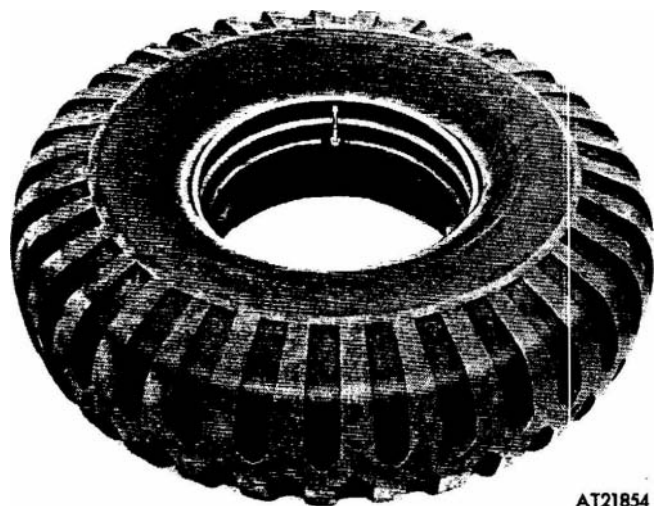


Figure 2-201. Position tire over wheel.

(4) Stand astride tire (fig 2-202) and walk around side wall until outer bead is over wheel.



Figure 2-202. Outer bead **mounting**.

(5) Position locking rim around wheel with one end under wheel rim (fig 2-203).

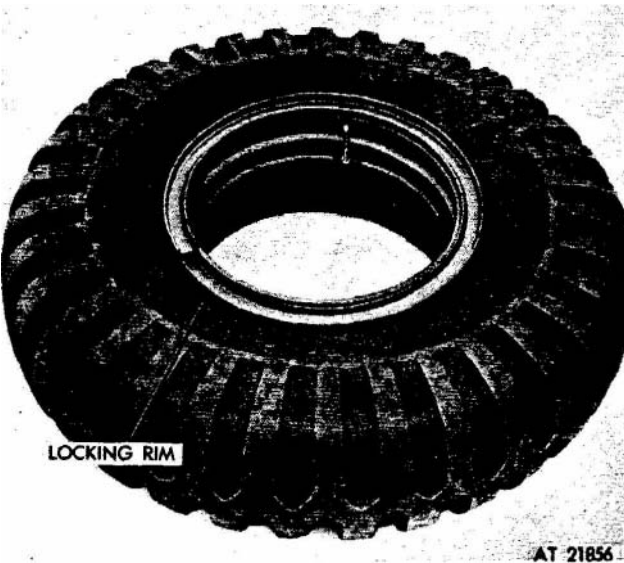


Figure 2-203. Locking rim **installation**.

(6) Using a suitable rubber mallet seat locking rim (fig 2-204).



Figure 2-204. Seating locking rim.

(7) Position a suitable bead expander strap around the circumference of the tire and tighten strap to tread.

Warning: Stand clear of locking rim during initial tire inflation.

(8) Remove valve cap and core. Inflate tire to seat beads on wheel rim. Remove bead expander strap, install valve core and inflate tire to proper pressure. Install valve cap.

e. Installation.

(1) Position tire and wheel assembly on mounting studs (fig 2-200), and secure using eight nuts.

(2) Lower wheel and remove jack. Torque wheel nuts to 80 lbs-ft.

Section XXIII. BRAKE SYSTEM

2-157. General

a. The service brake system is a conventional hydraulic brake system consisting of : a brake pedal; master cylinder with two pistons in tandem which operate a dual hydraulic system (one piston controls the front and rear wheel brakes, while the other controls the center wheel brakes) ; and a wheel cylinder in each of the six wheels to operate the brake shoes. Auxiliary equipment includes the necessary hoses, tube assemblies, and fittings to interconnect the components of the system.

b. The service brakes assemblies, at the wheels, consists of an internally expanding, drum type, brake assembly combined with spindle, stub axle, wheel bearings and seals to provide an integral unit. Construction of the assembly is such that it is sealed from external environment and is pressurized with low pressure air to preclude entrance of contaminants due to seal failure or rapid changes in external temperatures. The brake drums incorporate access plugs to permit periodic inspection without disassembly and to drain off contaminants if present within the assembly.

c. Air pressure for the service brake assemblies is obtained from the engine air box and routed to the brake assemblies through a network of lines and fittings which parallels the hydraulic line installation. An air reservoir is provided for large volume air storage during operation. The brake assemblies are pressurized at all times during engine operation. The method of coupling the air and hydraulic system between the tractor and carrier is by means of quick-disconnect fittings and flexible hose assemblies.

d. The stop light switch is a spring loaded electrical switch, installed in the vehicle's stop light circuit to warn following traffic that the vehicle is being slowed or will stop. It is mounted in the hydraulic line coming from the master cylinder to the center wheels and is operated by hydraulic pressure.

e. The parking brake assembly consists of two internal expanding brake shoes and an operating

mechanism mounted on a backing plate. The entire assembly is attached to the rear flange of the transfer case output shaft housing. Rotation of the camshaft by the parking brake lever forces the two brake shoes against the brake housing, which is bolted to the output shaft flange and in this manner prevents rotation of the output shaft and the wheels.

2-158. Parking Brake Adjustment

a. Brake Handle Adjustment.

- (1) Release parking brake and turn knurled knob on handle one-half turn clockwise.
- (2) Apply parking brake.
- (3) Repeat (1) and (2) above until *a* firm, but not stiff, pull is required to place brake in a positive brake position.

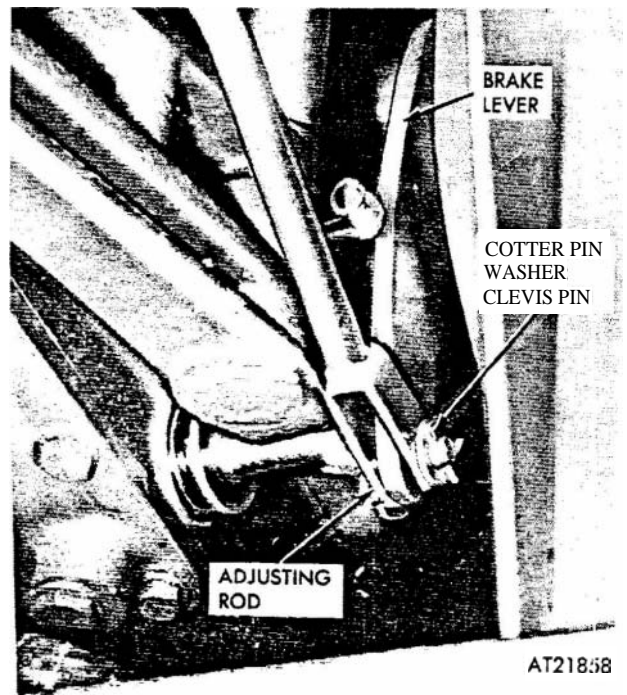


Figure 2-205. Adjusting rod connecting points.

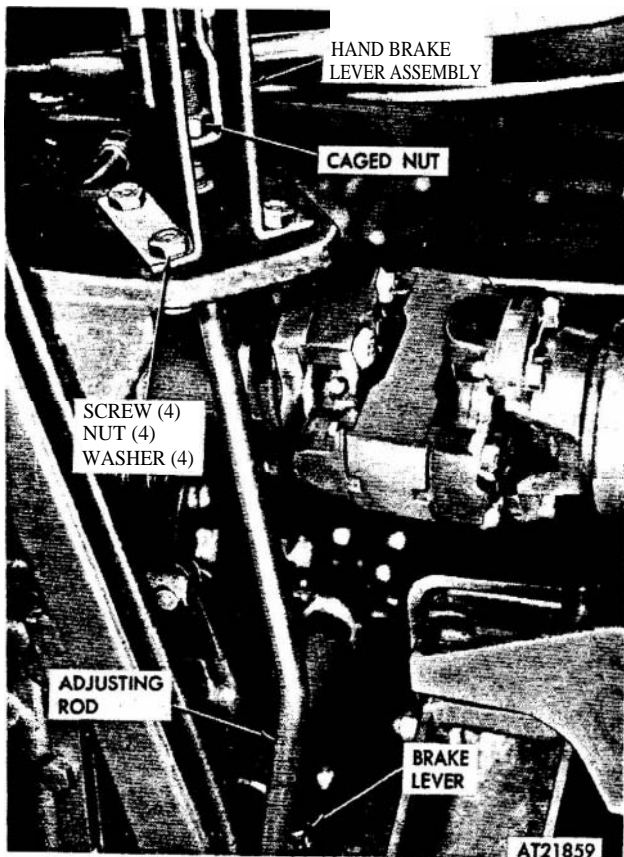


Figure 2-206. Aligning adjusting rod and brake lever.

b. Linkage Adjustment.

- (1) Release hand brake and turn knurled knob on handle counterclockwise until stop is reached.
- (2) Remove tractor seats (refer to para 2-221).
- (3) Remove console (refer to para 2-33).
- (4) Disconnect adjusting rod (fig 2-205) from brake lever by removing one cotter pin, washer, and clevis pin.
- (5) Lift up on brake lever until it just stops. Align holes in adjusting rod and brake lever by turning adjusting rod in or out of caged nut in hand brake lever assembly (fig 2-206).
- (6) Secure adjusting rod and brake lever using one clevis pin, washer, and cotter pin.

- (7) Install console (refer to para 2-33).
- (8) Install tractor seats (refer to para 2-221).

2-159. Parking Brake Lever Assembly and Linkage

a. Removal.

- (1) Perform maintenance operation prescribed in para 2-158b, steps (1),(2), and (3) above.
- (2) Disconnect hand brake lever assembly from the transfer case by removing four screws, nuts, and washers (fig 2-206).
- (3) Remove adjusting rod and caged nut from hand brake lever assembly.

b. Installation.

- (1) Assemble adjusting rod and nut to hand brake lever assembly.
- (2) Secure hand brake lever assembly to transfer case (fig 2-206) using four screws, nuts, and washers.
- (3) Perform maintenance adjustment (refer to para 2-158b).

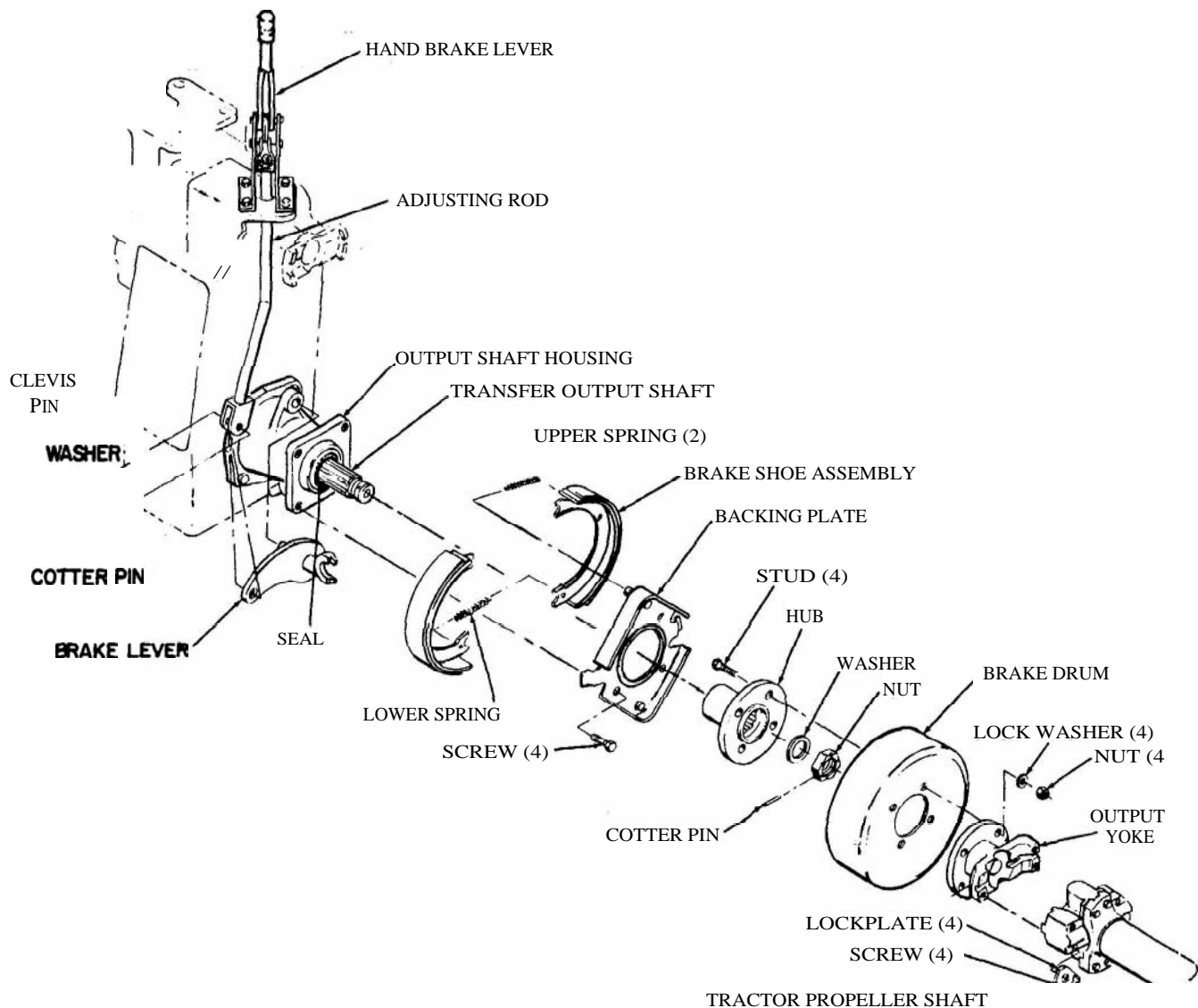
2-160. Parking Brake Drum and Shoes

a. Removal.

- (1) Remove tractor seats (refer to para 2-221).
- (2) Remove console (refer to para 2-33).
- (3) Disconnect tractor propeller shaft (fig 2-207) from the transfer output yoke by removing four screws and lock plates.
- (4) Disconnect transfer output yoke and brake drum from hub by removing four nuts and lock washers.
- (5) Disconnect hub from transfer output shaft by removing cotter pin, nut, and washer.

Caution: Do not damage seal in output shaft housing.

- (6) Disconnect brake drum assembly and remove backing plate with brake shoes from output shaft housing by removing four screws.
- (7) Disassemble brake shoes from backing plate by removing upper and lower springs.



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Figure 2-207. Parking brake, removal and installation.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, except brake shoes, in approved cleaning solvent.

Caution: Ensure that the brake shoes are free of any grease, oil or other foreign matter.

(2) Inspect all parts for cracks, breaks, or other damage. Inspect brake shoes for loose or worn lining, or missing rivets. Inspect drum for **scoring**, gouging, or signs of overheating.

(3) Replace **all** worn or damaged parts. Replace brake shoe assemblies if oil or grease soaked or worn to one-half original thickness when compared to new ones. Replace drum if it has any signs of damage.

Note: New brake linings are $\frac{1}{4}$ inch thick.

c. Installation.

(1) Position brake shoe assemblies on **backing** plate (fig 2-207) and install upper and **lower** springs.

(2) Secure backing plate to output shaft housing using four screws.

(3) Slide hub over transfer output shaft and secure using one nut and washer. Torque nut to 175-200 lbs-ft. and insert cotter pin.

(4) Position brake drum and transfer output yoke over studs in hub and secure using four nuts and washers.

(5) Secure tractor propeller shaft to transfer output yoke using four screws and lock plates, torque to 35-40 lbs-ft.

(6) Perform linkage adjustment (refer to para 2-158b).

2-161. Service Brake Adjustment

a. Adjustment.

(1) Remove inspection plug and gasket from brake drum (fig 2-181).

(2) Place transfer and transmission shift levers in neutral position, and using suitable jacks raise vehicle on both sides until tires clear ground (fig 2-208).

Warning: Position blocks under vehicle to prevent injury to personnel in the event of mechanical failure of jacks.

(3) Rotate tire and wheel until inspection hole is at 6 o'clock position and aligned with adjustment starwheel.

(4) Adjust the brake according to the following steps :

(a) Insert suitable brake adjusting tool through the inspection hole and engage the tool with the starwheel (fig 2-209).

(b) Using the tool, rotate the starwheel until **the wheel locks**. Rotate the starwheel approximately six clicks in the opposite direction. Turn the wheel and drum assembly forward and backward to insure that wheel is free.

(c) If additional brakeshoe lining to drum clearance is required, back off on the **starwheel** one click at a time until proper adjustment is obtained.

(d) Repeat (a), (b), and (c) above at all wheels.

(e) Upon completion of brake adjustment, road test the vehicle to check brake performance.

(5) Remove blocks, lower vehicle and replace gasket and plug.

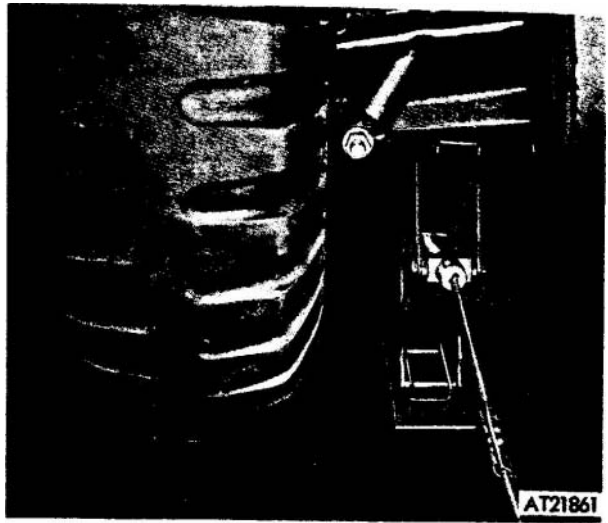


Figure 2-208. Jacking tire and wheel



Figure 2-209. Brake adjustment

b. Bleeding.

(1) Remove master cylinder access panel (fig 2-210).

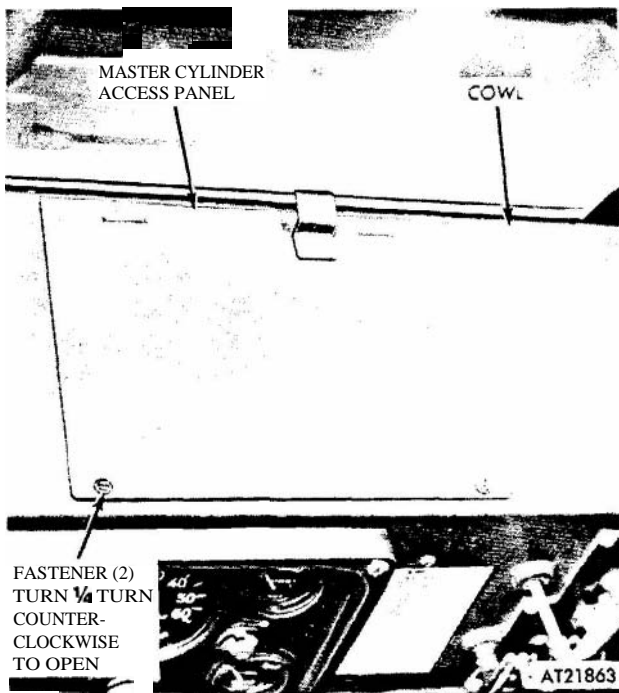


Figure 2-210. Master cylinder access panel, removal and installation.

(2) Clean top of master cylinder and pedal box area.

(3) Remove cover from master cylinder and check fluid level. Level should be $\frac{1}{4}$ inch from top of each *reservoir*. If necessary, add brake fluid (refer to LO 9-2320-242-12).

(4) Secure adapter cover (11660069-01) and gasket (11660069-02) to the master cylinder and connect a suitable filler and bleeder to the adapter (fig 2-211).



Figure 2-211. Pressure bleeding brake system.

Note: Ensure that filler and bleeder is charged with hydraulic fluid and air pressure.

(5) Remove inspection plug and gasket from brake drum.

(6) Using suitable jacks raise vehicle until tires clear ground.

Warning: Position blocks under vehicle to prevent injury to personnel in event of mechanical failure of jack.

(7) Rotate wheel and drum until inspection hole is at 12 o'clock and aligned with wheel cylinder bleed screw.

(8) Insert one end of bleeder tube (11660072) through the inspection hole and over the bleed screw. Submerge the other end of tube in a clean container containing brake fluid (fig 2-212).

(9) Using a $\frac{3}{8}$ inch drive ratchet wrench with extension and crowsfoot wrench attached, open the bleed screw and allow air to bleed off into the container (fig 2-212). Continue bleeding until no air bubbles are coming from the end of the hose.

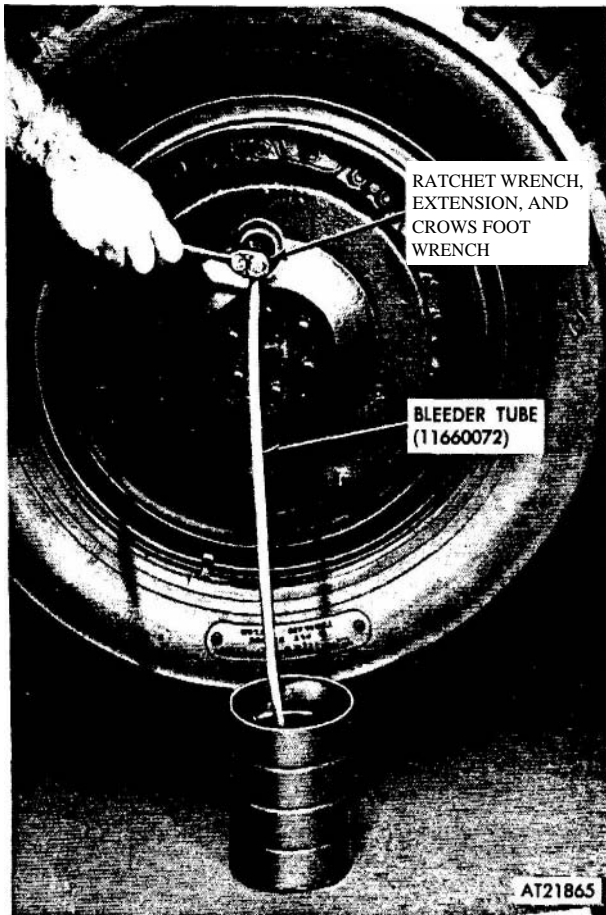


Figure 2-212. Bleeding the brakes.

(10) Tighten bleed screw, remove bleeder tube and replace inspection plug and gasket.

(11) Proceed to bleed the remaining brakes as required.

Note: Ensure the filler and bleeder is charged with hydraulic fluid and air.

(12) Remove adapter and install master cylinder cover. Secure access panel.

2-162. Service Brake Assembly

a. General. The replacement of individual components of the service brake assembly is

accomplished with the brake assembly mounted on the vehicle, but the service brake assembly may be removed and installed from the vehicle as a whole assembly.

b. Service Brake Assembly Removal.

(1) Using a suitable jack raise vehicle until tire is clear of ground (fig 2-208). Block vehicle and remove jack.

(2) Remove wheel and tire (refer to para 2-156).

Note: It is possible to remove the brake drum without removing the wheel and tire. However, in this case caution must be observed during installation of the drum to prevent damaging the splines. To facilitate installation of the drum use a bolt of the same diameter as removed but longer. Position drum to brake and insert bolt through drum and into stub axle. Rotate drum to align splines and guide drum over bolt and onto the stub axle.

(3) Disconnect air and hydraulic lines (fig 2-180) from spindle and insert plastic plugs.

(4) Disconnect the stub axle from the drive axle by removing four screws and lock plates. Remove the service brake assembly from the steering knuckle by removing eight nuts and lock washers (fig 2-180).

Note: Support the service brake assembly on a suitable jack to facilitate removal.

c. Service Brake Assembly Installation.

(1) Position the service brake and secure the stub axle to the drive axle (fig 2-180) with four lock plates and screws. Torque screws 35-40 lbs-ft. and secure screws by bending lock plate tabs against screw heads.

Note: Support the service brake assembly on a suitable jack to facilitate installation.

(2) Secure service brake assembly to steering knuckle using eight lock washers and nuts (fig 2-180).

(3) Remove plastic plugs from spindle and connect air and hydraulic lines (fig 2-180).

(4) Adjust and bleed brakes (refer to part 2-161).

(5) Install wheel and tire (refer to para 2-156).

d. Disassembly of Service Brake Assembly (on Vehicle).

(1) Remove tire and wheel (refer to para 2-156).

(2) Disconnect air and hydraulic lines (fig 2-180) from spindle and insert plastic plugs.

(3) Remove drain plug and inspection plug and gasket from drum (fig 2-181). Discard gasket.

(4) Remove nuts and lock washers securing drum to hub assembly (fig 2-181).

(5) Remove screw, gaskets, and lock plate securing center of drum to stub axle (fig 2-181). Discard lock plate.

(6) Remove drum from hub by alternately turning down on the four jacking screws. Discard "O" ring.

(7) Disconnect tube assembly from wheel cylinder and spindle (fig 2-213).

Note: Care must be exercised to prevent brake fluid from contacting brake shoes.

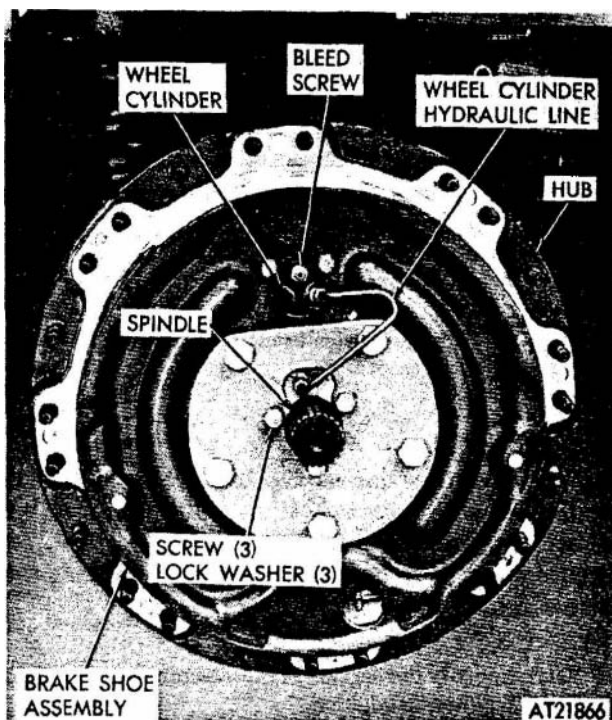


Figure 2-213. Brake shoe assembly, removal and installation.

(8) Remove brake assembly from spindle by removing three screws and lock washers (fig 2-213).

(9) Place brake assembly on bench and remove adapter and mounting plate from brake assembly by removing five cotter pins, nuts, and bolts (fig 2-214).

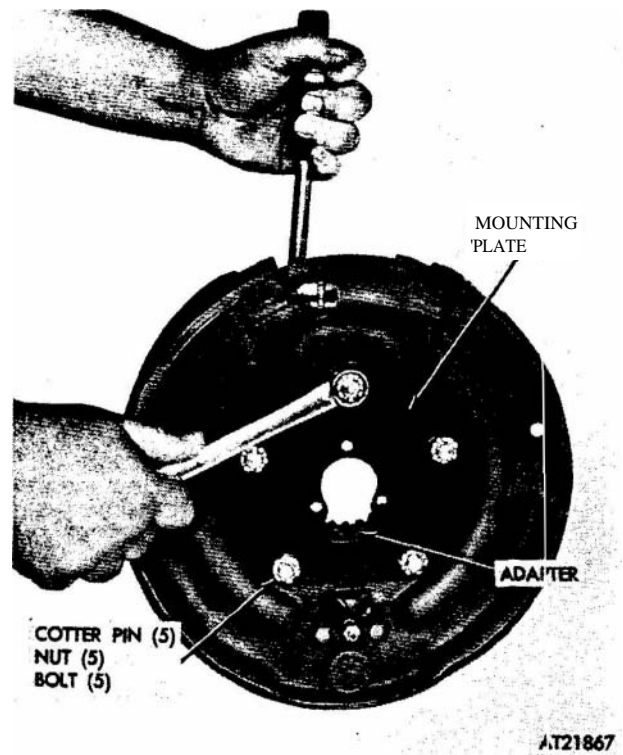


Figure 2-214. Adapter and mounting plate, removal and installation.

(10) Remove both brake return springs from brake shoes, using a suitable brake tool (fig 2-215).

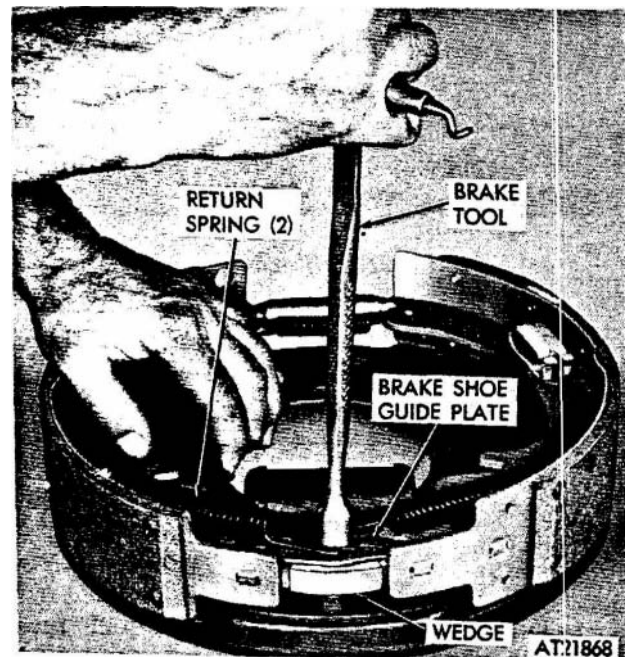


Figure 2-215. Brake return spring, removal and installation.

111) Remove brake shoe guide springs and pins (fig 2-216).

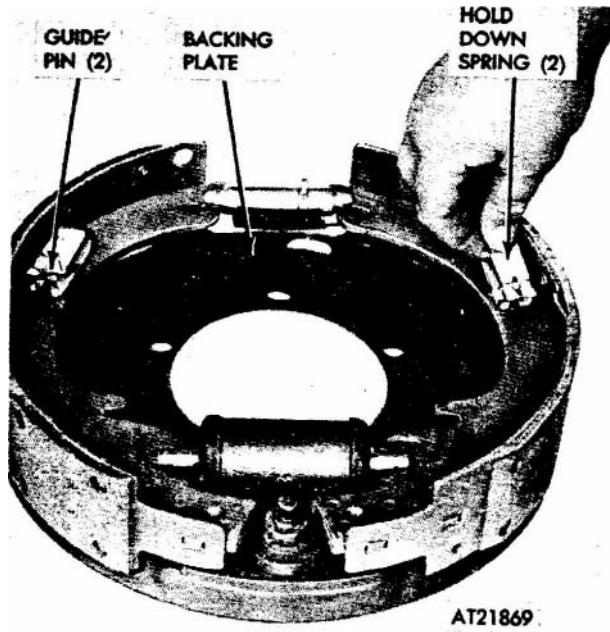


Figure 2-216. Brake shoe guide springs and pins, removal and installation.

(12) Disengage brake shoes from the wheel cylinder and remove spring, adjuster, and brake shoes. Remove guide plate and wedge from backing plate (fig 2-217).

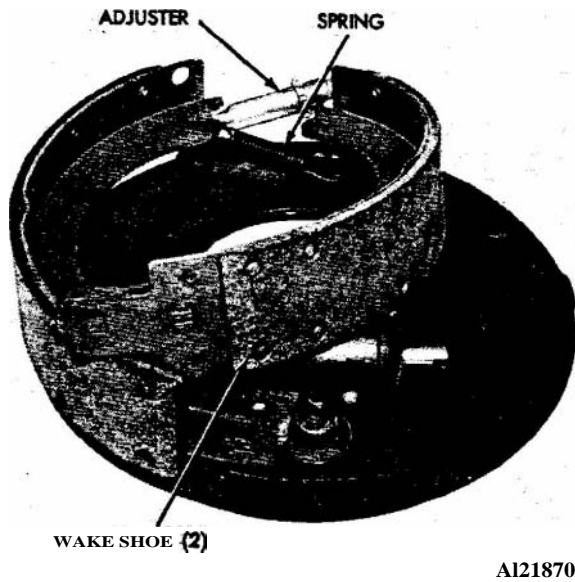


Figure 2-217. Spring, adjuster, and shoe, removal and installation.

(13) Remove wheel cylinder from backing plate by removing two screws and lock washers (fig 2-218).

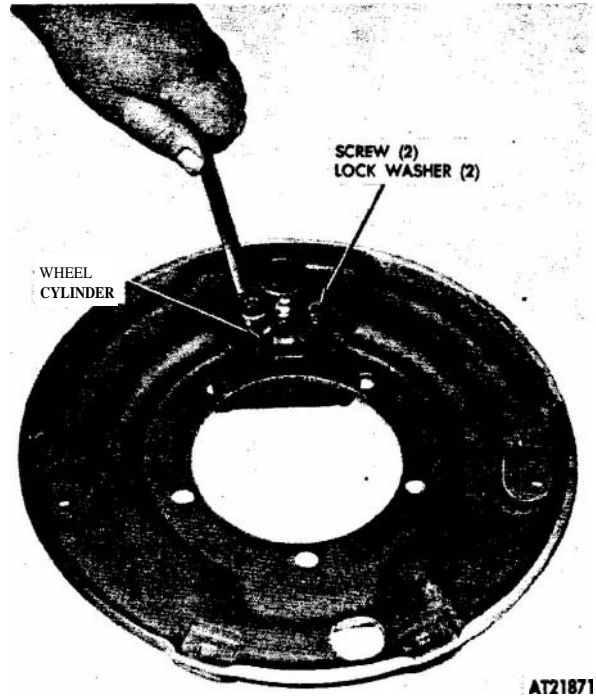


Figure 2-218. Wheel cylinder, removal and installation.

(14) Bend back tab on wheel nut lock washer (fig 2-219). Install wheel nut adapter wrench (11660067) and remove wheel nut and lock washer (fig 2-220).

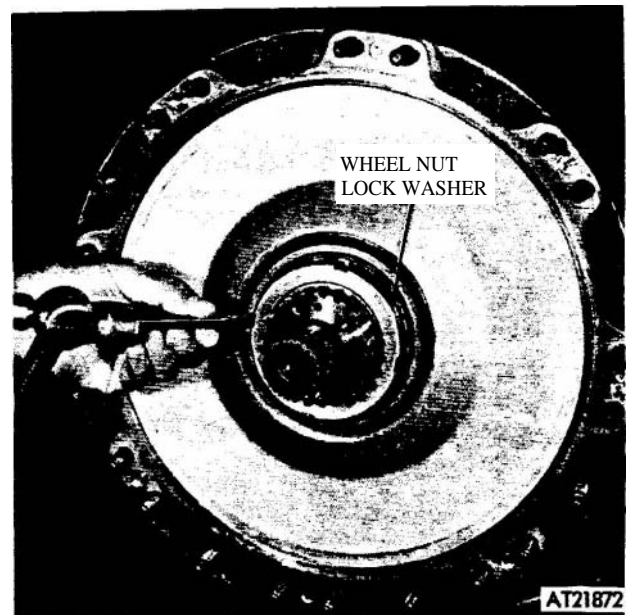


Figure 2-219. Bend tab on wheel nut lock washer.

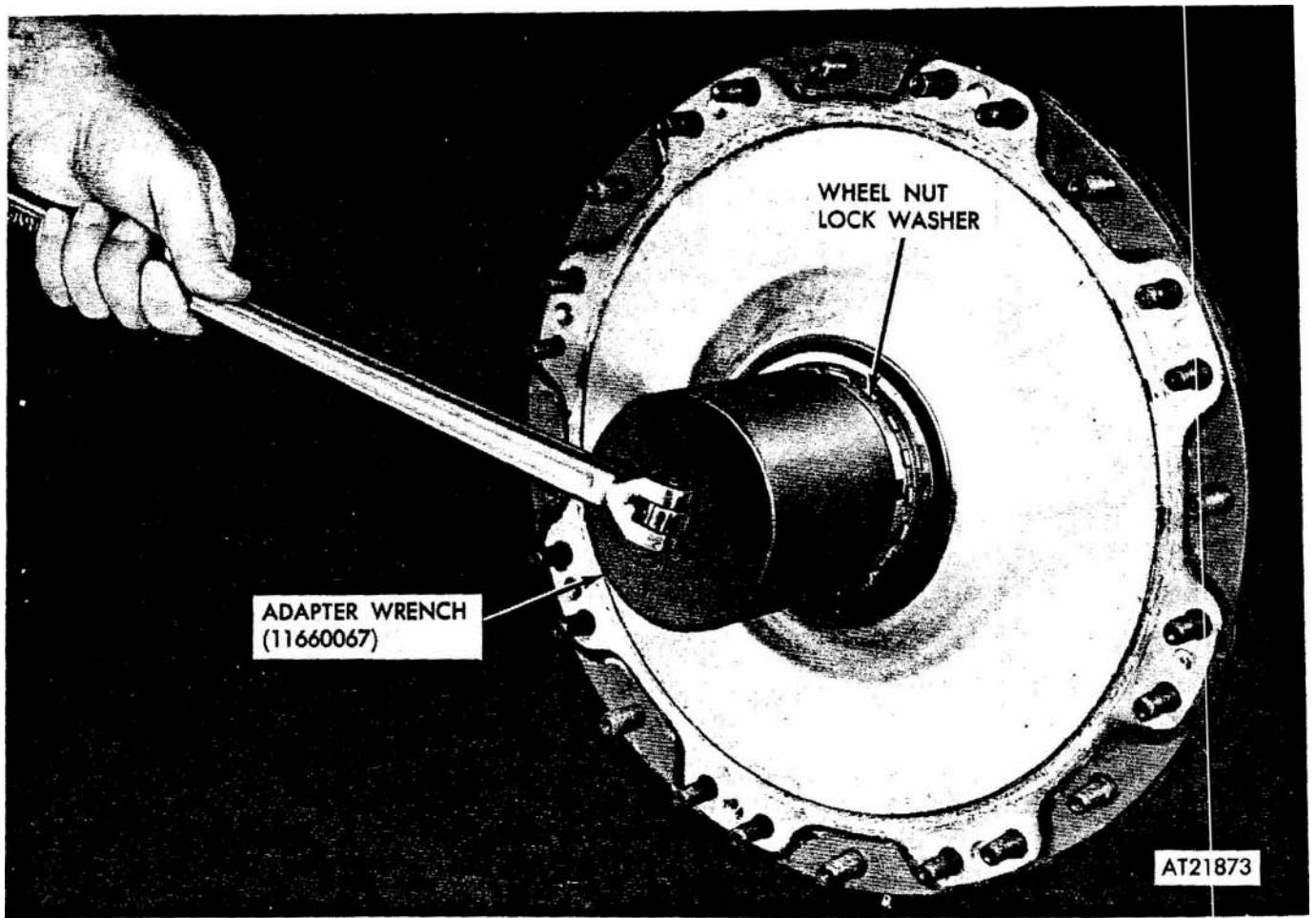


Figure 2-220. Wheel nut **removal**.

(15) Pull out on hub to loosen outer seal and spacer assembly and outer bearing (fig 2-221).



Figure 2-221. Loosening outer bearing and seal

116) Remove outer seal and spacer assembly and outer bearing from hub and spindle (fig 2-222).

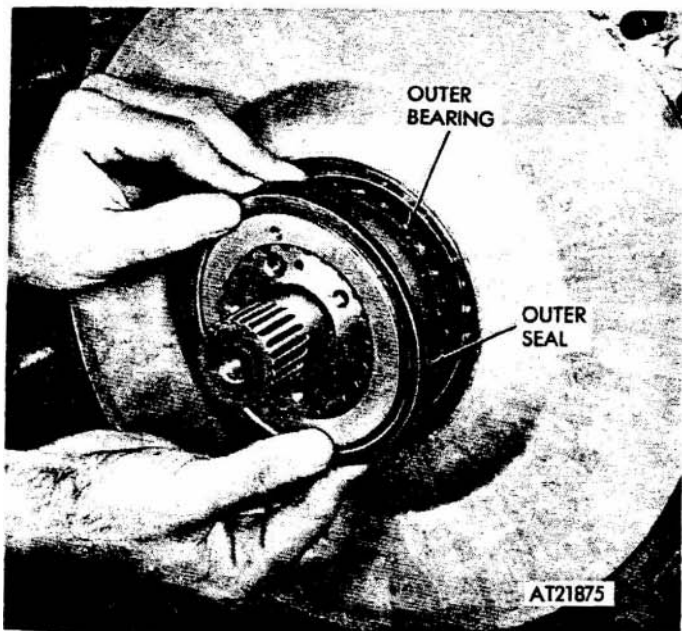


Figure 2-222. Outer bearing and seal removal.

(17) Remove hub assembly from spindle and place on suitable wooden blocks.

(18) Using a soft faced drift remove hub forward wiper ring and outer bearing cone (fig 2-223).

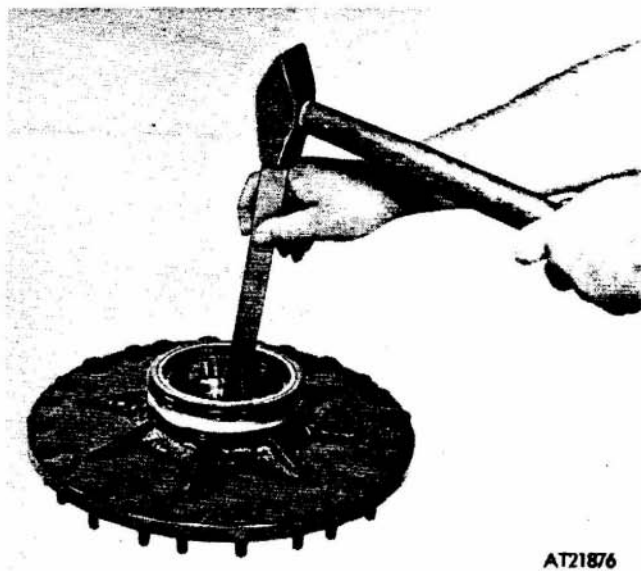


Figure 2-223. Hub forward seat wiper and bearing cone removal

(19) Turn hub over and using a soft face drift remove hub rear wiper ring and inner bearing cone (fig 2-224).

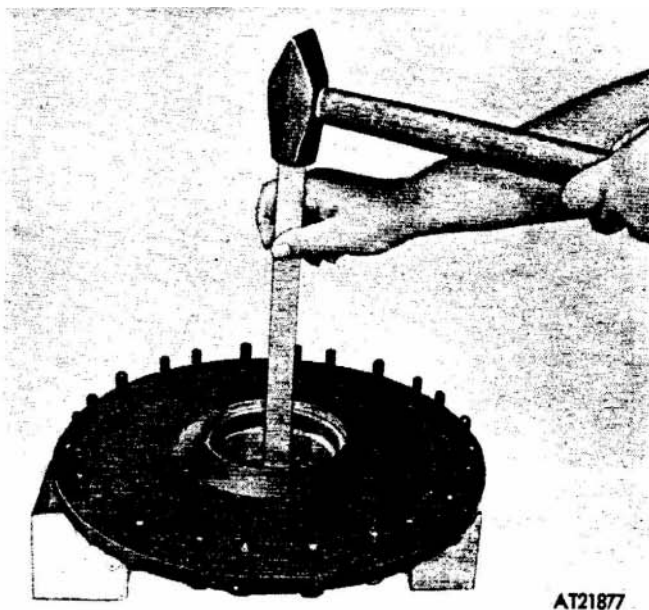


Figure 2-224. Hub rear seal wiper and bearing cone removal

(20) Using a suitable tool and a block of wood, work around hub and pry seal from hub (fig 2-225).

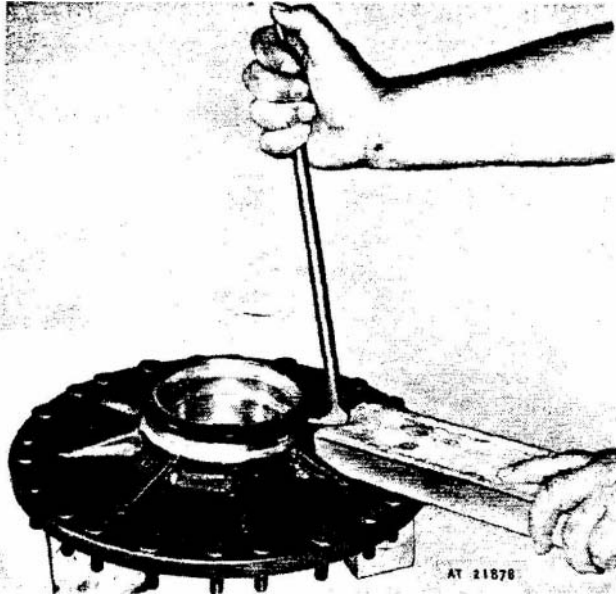


Figure 2-225. Hub seal removal.

(2U Remove inner bearing from spindle (fig 2-226).

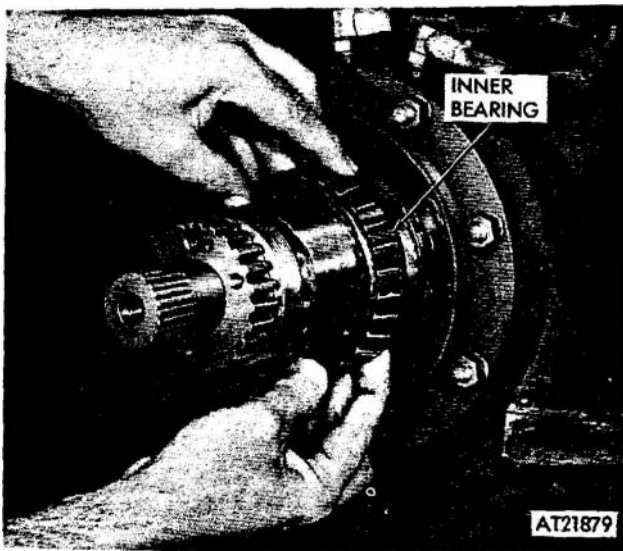


Figure 2-226. Inner bearing removal.

(22) Using a wooden block and hammer remove spindle ring by tapping it around its periphery (fig 2-227).

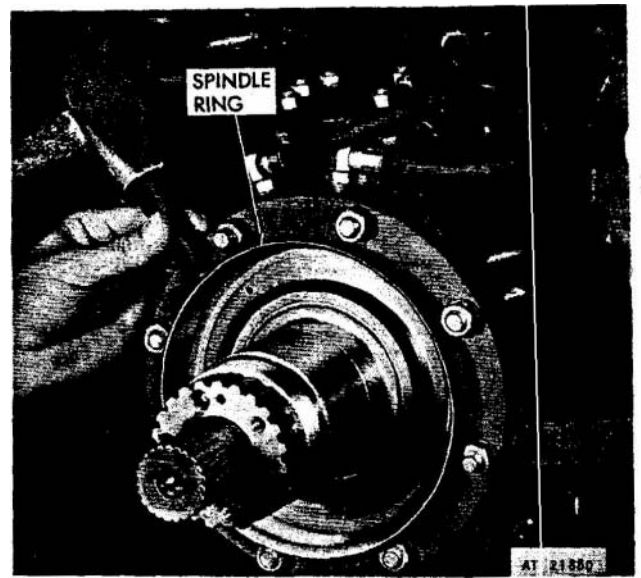


Figure 2-227. Spindle ring removal.

(23) Using a suitable tool, remove rear seal from spindle (fig 2-228).

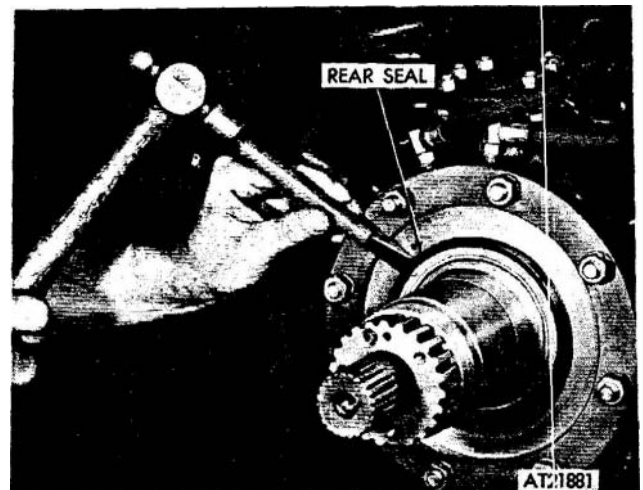


Figure 2-228. Rear seal removal.

(24) Remove spindle from steering knuckle by removing eight nuts and lock washers (fig 2-229).

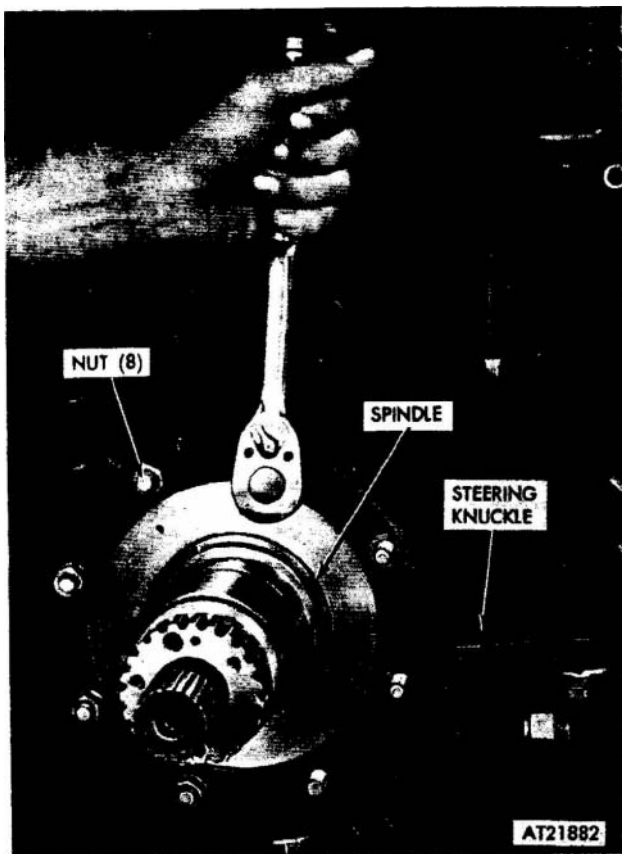


Figure 2-229. Spindle removal and installation.

(25) Using a suitable tool such as a chisel loosen seal wiper and then extract it from spindle (fig 2-230).

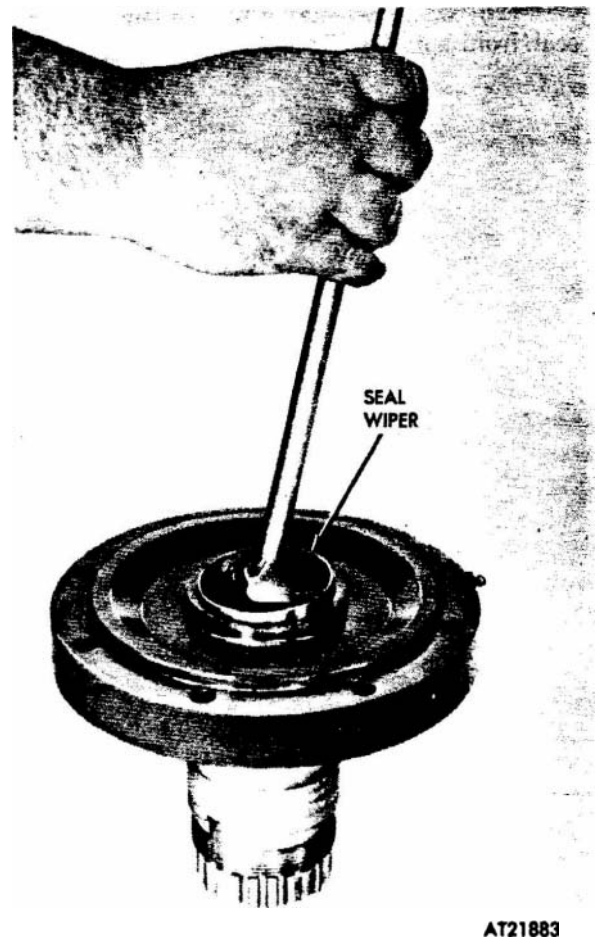


Figure 2-230. Seal wiper removal.

(26) Using a suitable tool remove input drive seal from spindle (fig 2-231).

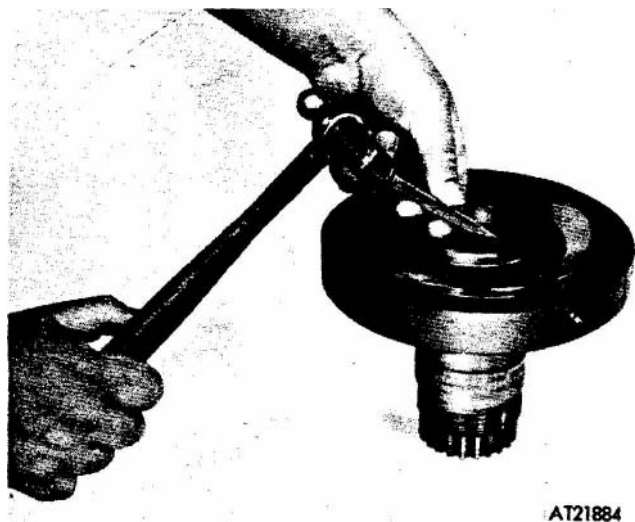


Figure 2-231, Input drive seal removal

(27) Turn spindle over and support one edge on a wooden block. Using a soft face drift tap phenolic bushing around its periphery until free of spindle (fig 2-232).

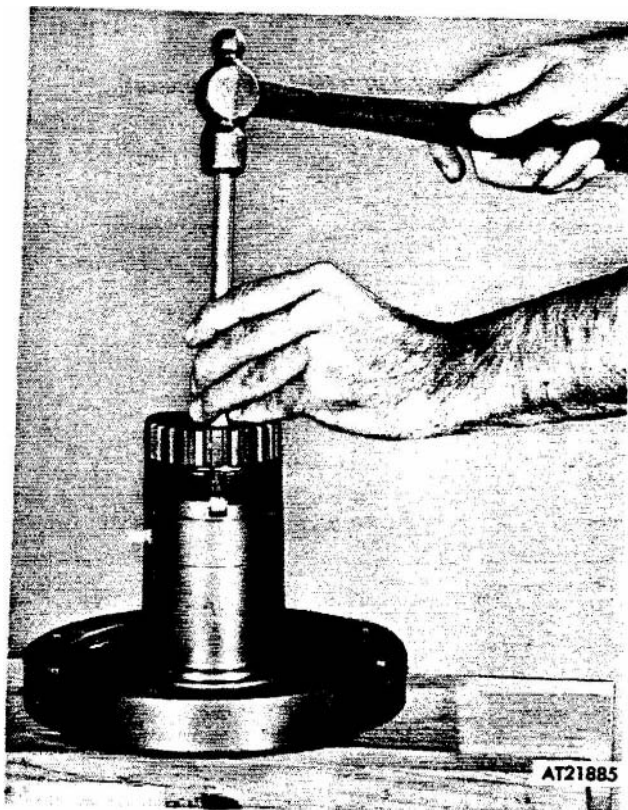


Figure 2-232. F_L bushing removal

e. Cleaning, Inspection, and Repair.

(1) Clean all parts except brake shoes in approved cleaning solvent.

Caution: Ensure that the brake shoes are free of any grease, oil, or other foreign matter.

(2) Inspect all parts for cracks, breaks, dents, rust, or other damage. Refer to TM 9-214 and inspect bearings. Inspect brake shoes for loose or worn linings, or missing rivets. Inspect drum for scoring, gouging, signs of overheating and hub for security of mounting.

(3) Replace all worn or damaged parts and all seals and packings. Replace brake shoe assemblies if lining is worn to one-half original thickness when compared to new linings. Replace drum if it has any signs of damage.

f. Assembly of Service Brake (on Vehicle).

(1) Insert spindle phenolic bushing using installer tool (11660068-04) (fig 2-233).

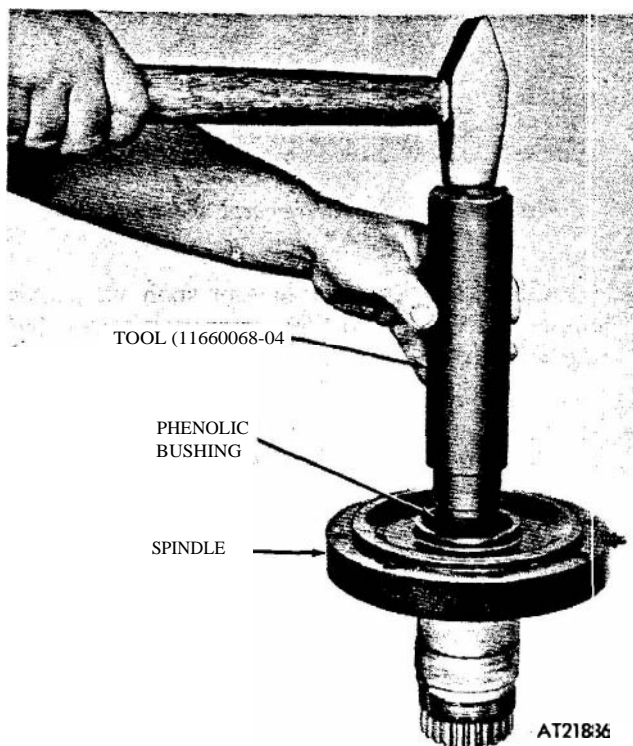


Figure 2-233. Phenolic bushing installation.

(2) Insert input drive seal into spindle using installer tool (11660068-02) (fig 2-234).

(4) Turn spindle over and insert rear seal into groove using a soft face drift and hammer (fig 2-236).

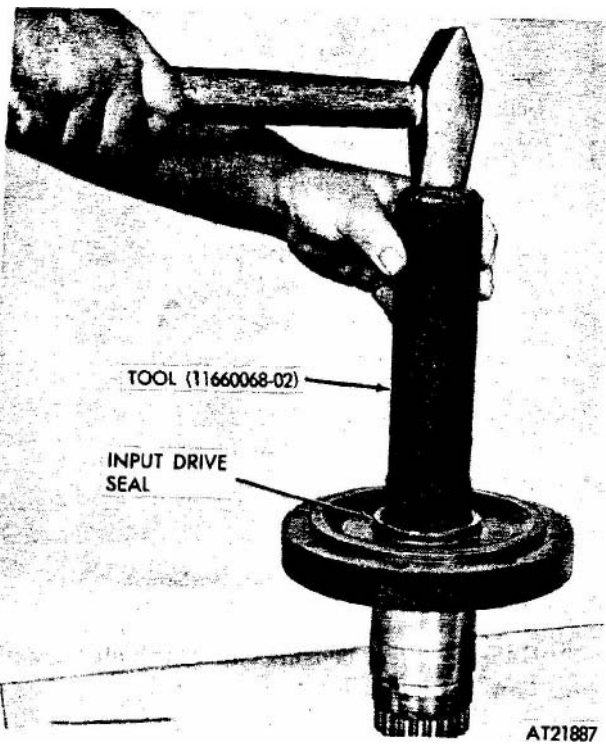


Figure 2-234. Input drive seal installation.

(3) Insert seal wiper into spindle above input drive seal using a wooden block and a hammer (fig 2-235).



Figure 2-236. Rear seal installation.

(5) Insert spindle ring into spindle using installer tool (11660070-01) (fig 2-237).

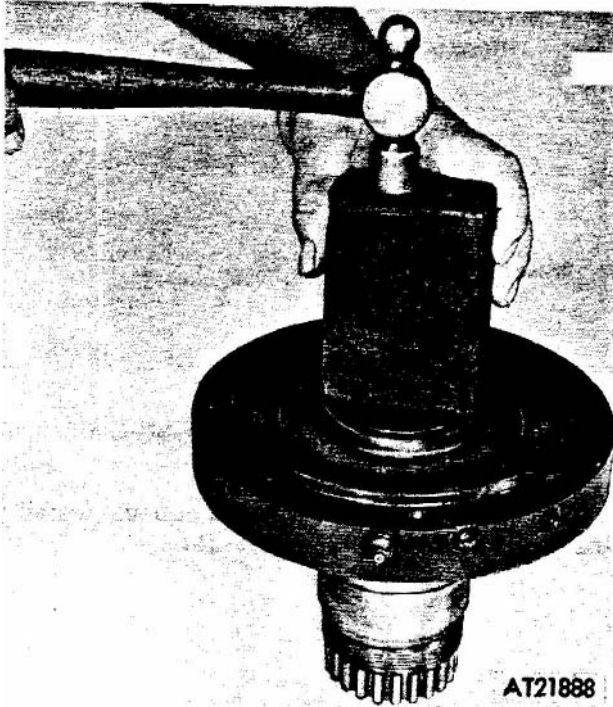


Figure 2-235. Seal wiper installation.

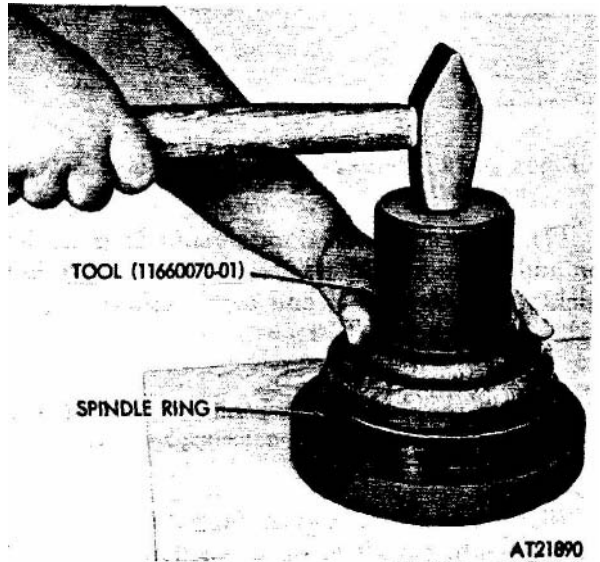


Figure 2-237. Spindle ring installation.

(6) Pack rear bearing with grease (refer to LO 9-2320-242-12). Position bearing over spindle shaft, it should slide down to its seat, if not, reposition bearing until it slides down. Seat bearing using installer tool (11660070-01) (fig 2-238).

Caution: Do not force bearing down spindle shaft. Bearing is a slip fit.

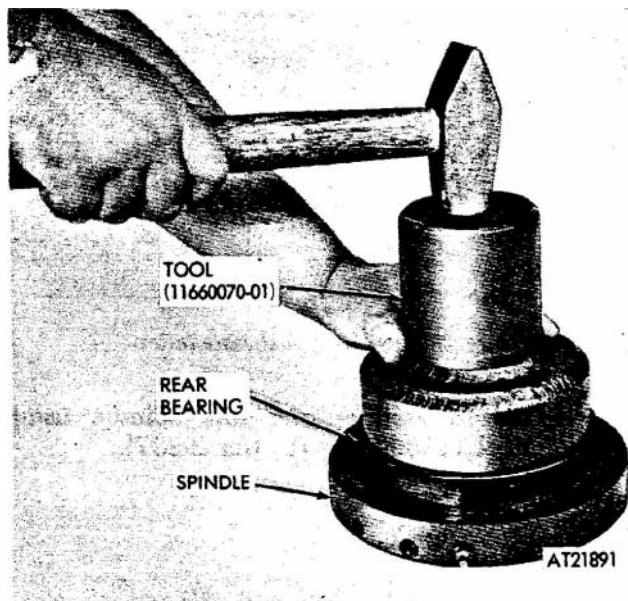


Figure 2-238. Seating rear bearing on spindle.

(7) Insert stub axle through spindle from the rear and position and secure spindle to steering knuckle with eight nuts and lock washers (fig 2-229). Torque nuts 40-50 lbs-ft.

Note: Spindle assembly must be positioned with hydraulic and air inlet ports in top position on steering knuckle.

(8) Place hub on wooden blocks and position seal over hub. Install using a wooden block and hammer (fig 2-239).

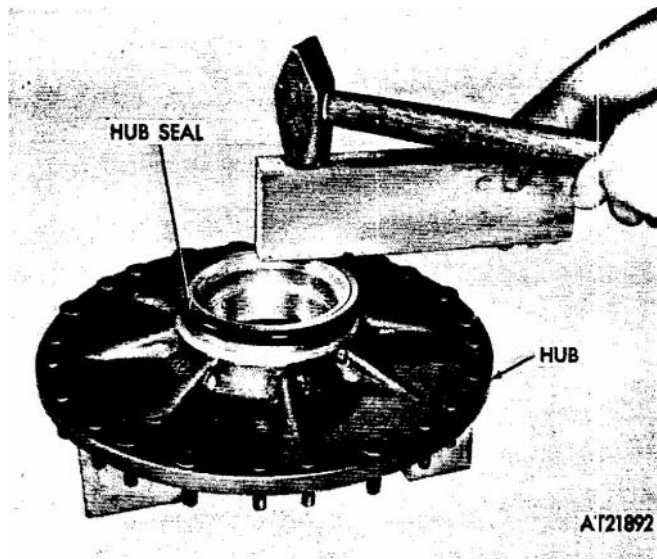


Figure 2-239. Hub seal installation.

(9) Position rear bearing cup in hub and install using tool (11660070-02) (fig 2-240).

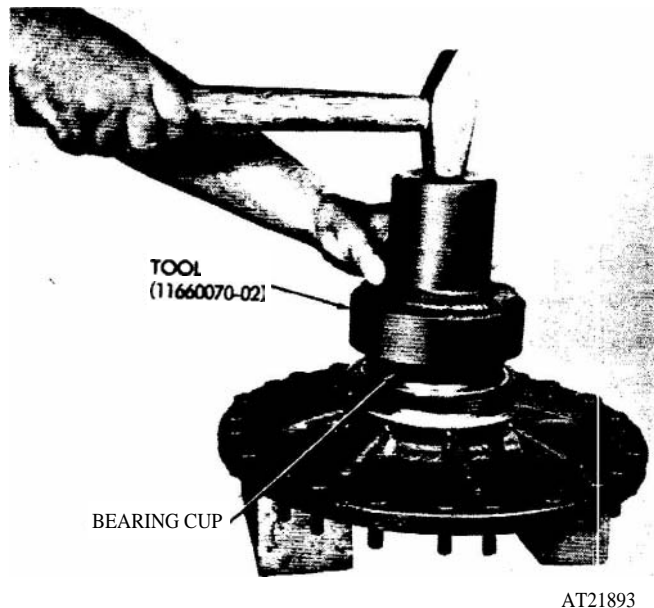


Figure 2-240. Rear bearing cup installation.

(10) Position rear seal wiper in hub and install using tool (11660070-02) (fig 2-241).

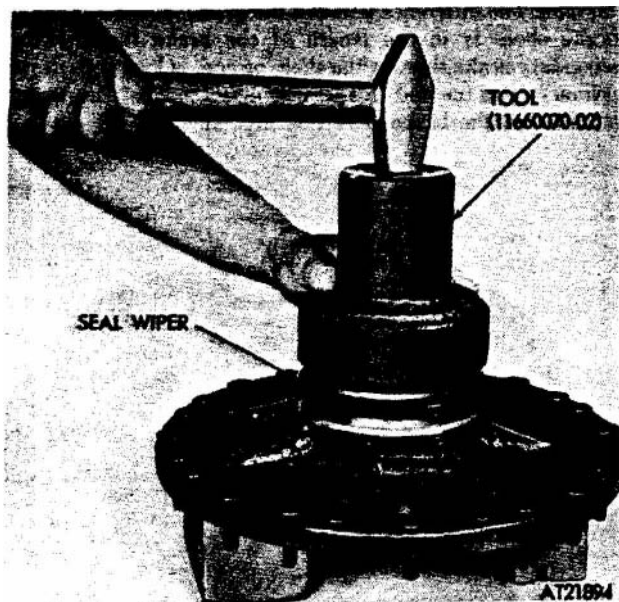


Figure 2-241. Rear seal wiper installation.

(11) Turn hub over and install forward bearing cup and seal wiper in the same manner as in 9 and 10 above.

(12) Position hub over spindle and install outer bearing (fig 2-242).

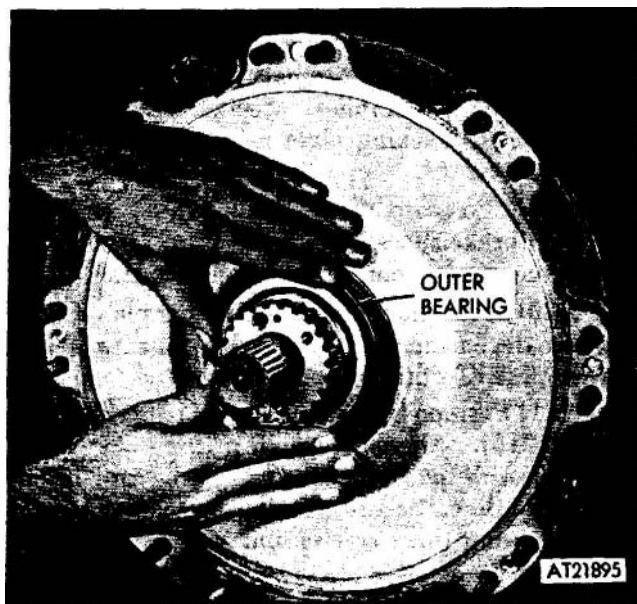


Figure 2-242. Outer bearing installation.

(13) Using a suitable drift and hammer separate outer seal and spacer (fig 2-243) and install a new seal (fig 2-244).

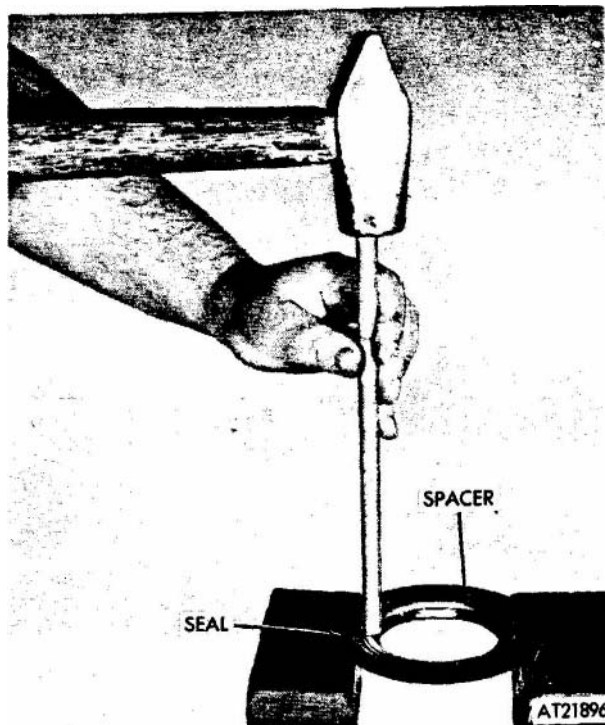


Figure 2-243. Outer seal and spacer disassembly.

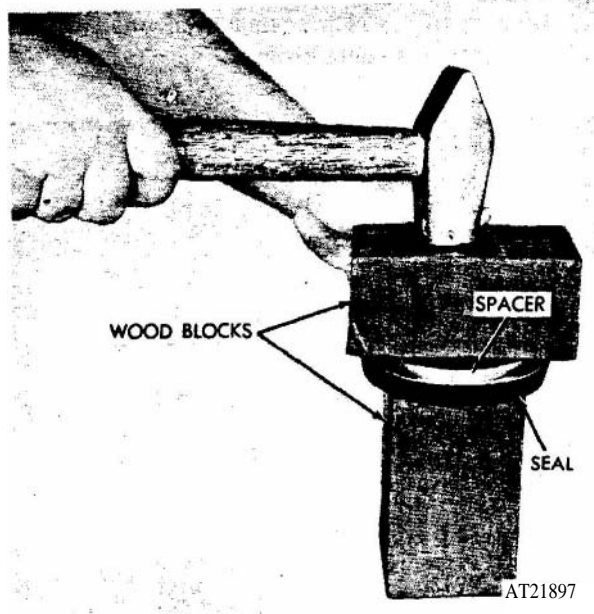


Figure 2-244. Outer seal and spacer assembly.

(11) Install outer seal and spacer (fig 2-245).

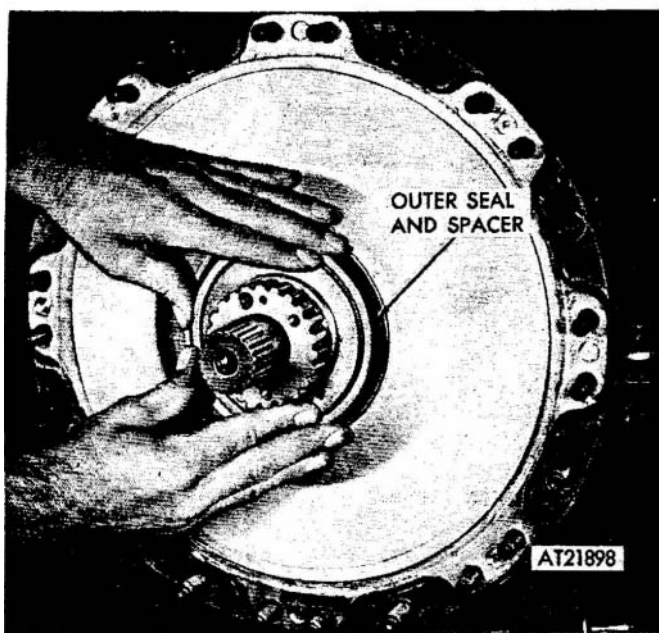


Figure 2-245. Outer seal and spacer installation.

(15) Install lock washer and wheel nut (fig 2-220)) and tighten using adapter wrench (11660067). Torque wheel nut to 80-100 lbs-ft. to seat bearing (fig 2-246) then loosen nut two tabs and bend tab into nut groove.

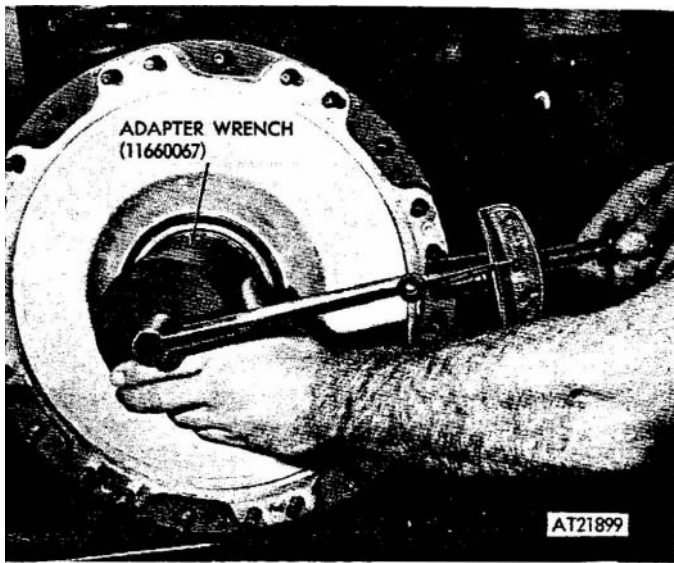
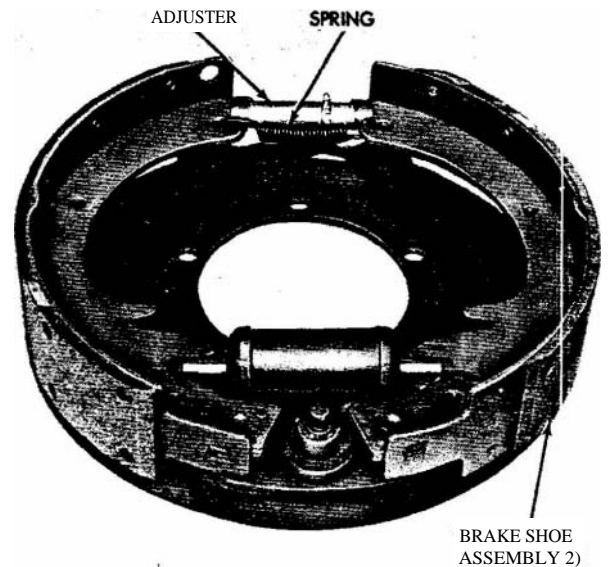


Figure 2-246. Torquing wheel nut.

(16) Secure wheel cylinder to backing plate using two screws and lock washers (fig 2-218).

(17) Assemble adjuster, spring, and brake shoe assemblies to the wheel cylinder and backing plate (fig 2-247).

Note: The difference between the primary and secondary brake shoes is in the length of the brake linings. The secondary brake shoe, at the shoe toe end, is longer than the primary. The toe end of the shoe butts against the wedge attached to the brake return springs anchor pin.



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Figure 2-247. Brake shoe assembly

(18) Insert pins through backing plate and brake shoe assemblies. Secure brake shoe assemblies to backing plate using two hold down clips (fig 2-216).

(19) Position wedge and plate over pin between brake shoes assemblies (fig 2-215). **Using** a suitable brake tool replace both return springs.

(20) Secure adapter and mounting plate (fig 2-214) to the backing plate using five bolts, nuts, and cotter pins. Torque nuts 40-80 lbs-ft.

(21) Position brake shoe assembly over spindle (fig 2-213). Align hydraulic fitting in wheel cylinder with hydraulic seat in spindle and **install** hydraulic line. Secure brake shoe assembly to spindle using three screws and lock washers.

(22) Wrap teflon tape (MIL-T-27730) to male threads on tube assembly. Connect tube to wheel cylinder and spindle (fig 2-213).

(23) Bleed brakes (refer to para 2-161b).

(24) Install new "O" ring in brake drum groove and position drum on hub.

(25) Secure drum to hub with 16 nuts and **lock** washers. Secure center of drum to stub axle with

gasket, lock plate, additional gasket and screw (fig 2-181). Torque screw 55-70 lbs-ft. and bend lock plate tab against screw.

(26) Install and torque the four jacking screws 35-40 lbs-ft. (fig 2-181).

(27) Install drain plug into drum (fig 2-181).

(28) Adjust brakes (refer to para 2-161a).

2163. Service Brake Pedal

a. Removal.

(1) Remove master cylinder access panel (fig 2-210).

(2) Remove driver seat (refer to para 2-221).

(3) Remove clutch pedal (refer to para 2-44).

(4) Remove cotter pin (fig 2-248) and **clevis** pin securing service brake pedal to the clevis. Disconnect return spring from service brake pedal.

(5) Extract shaft assembly from mounting bracket and remove service brake pedal.

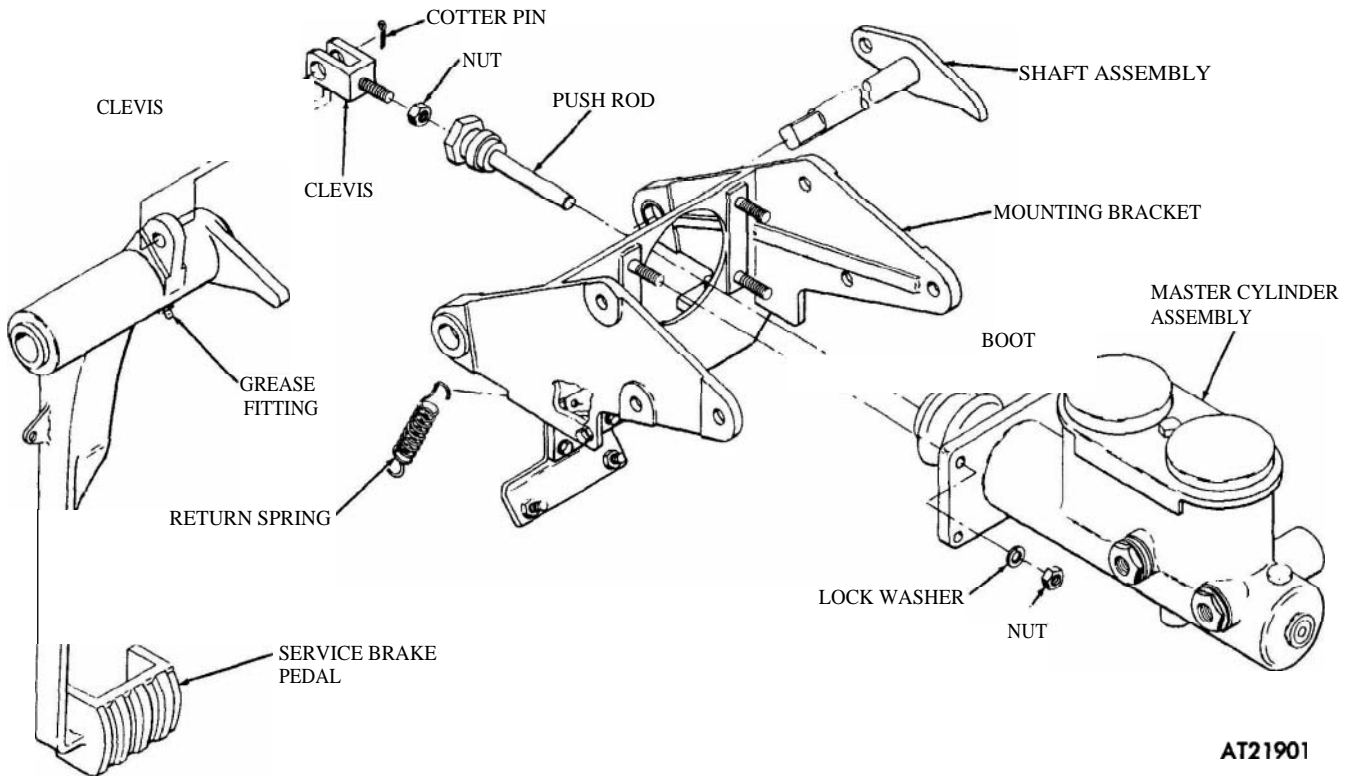


Figure 2-248. Service brake pedal and master cylinder, removal and installation.

b. Installation.

(1) Position service brake pedal (fig 2-248) within mounting bracket and insert shaft assembly.

(2) Attach service brake pedal to clevis using clevis pin and cotter pin. Reconnect return spring.

(3) Install clutch pedal (refer to para 2-44).

(4) Install driver seat (refer to para 2-221).

(5) Replace master cylinder access panel.

2-164. Master Cylinder

a. Removal.

(1) Remove master cylinder access panel (fig 2-210).

(2) Remove driver seat (refer to para 2-221).

(3) Disconnect instrument panel from cowl (fig 2109).

(4) Remove cover from master cylinder and siphon fluid from both reservoirs into a suitable container. Replace cover.

Note: Do not reuse hydraulic **fluid** due to possibility of **contamination**.

(5) Disconnect hydraulic lines from master cylinder.

(6) Disconnect master cylinder (fig 2-248) from mounting bracket by removing four nuts and lock washers. Remove end of boot from cylinder and remove master cylinder through instrument panel opening.

b. Installation.

(1) Position master cylinder to push rod and to mounting bracket. Attach end of boot to cylinder. Secure master cylinder (fig 2-248) to mounting bracket using four lock washers and nuts.

(2) Reconnect hydraulic lines to master cylinder.

(3) Remove master cylinder cover and fill both reservoirs with hydraulic fluid (refer to LO 9-2320-242-12).

(4) Bleed the brake system (refer to para 2-1616).

(5) Secure master cylinder access panel (fig 2-210) and instrument panel (fig 2-109).

(6) Install driver seat (refer to para 2-221).

2-165. Wheel Cylinder

a. Removal.

(1) Perform maintenance operation prescribed in paragraph 2-162, *d.* (1) through *d.* (8).

(2) Remove wheel cylinder from backing plate by removing two screws and lock washers (fig 2-218). Discard wheel cylinder.

b. Installation.

(1) Position and secure wheel cylinder to backing plate with two screws and lock washers (fig 2-218).

(2) Perform maintenance operation prescribed in paragraph 2-162, *d.* (21) through (28).

2-166. Service Brake System Hydraulic Hoses, Lines, and Fittings

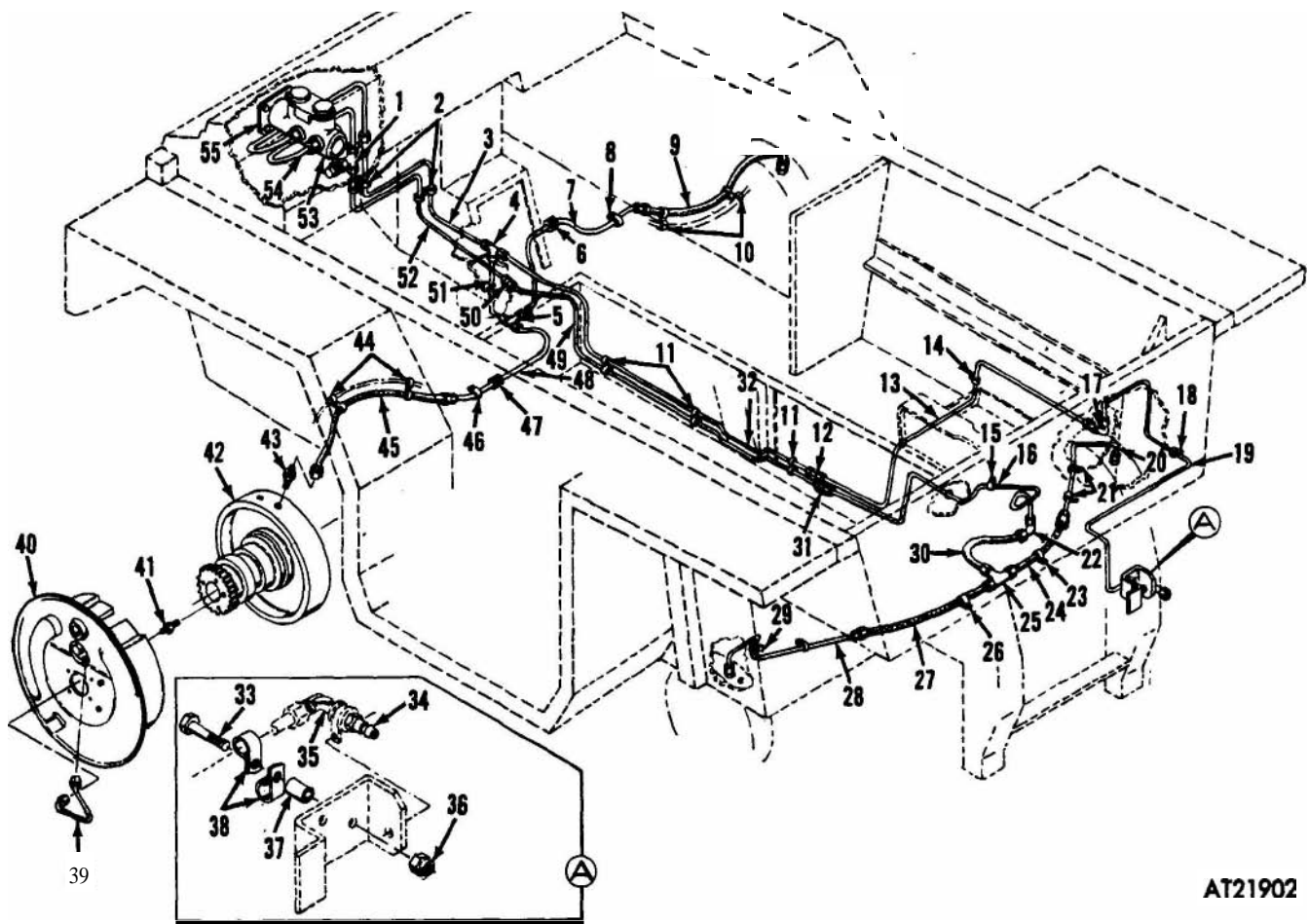
a. Removal. For replacement of a particular item, disassemble only to that point required for item removal (fig 2-249 and 2-251).

(1) Front axle.

(a) Remove wheels and tires (refer to para 2-156). Raise the front end of the tractor higher and block it.

(b) Remove hose assembly (45, fig 2-249) by removing clamps (44) and disconnecting it from tube seat (43) and tube assembly (48).

(c) Remove brake drum (refer to pars. 2-162d). Remove tube assembly (39) from brake assembly (40) and tube seats (41 and 43) from spindle (42).



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- | | | |
|----------------------|----------------------|--------------------------|
| 1 - Tee | 20 - Tube assembly | 38 - Clamp (2) |
| 2 - Clamp and screw | 21 - Clamp and screw | 39 - Tube assembly |
| 3 - Tube assembly | 22 - Elbow | 40 - Brake assembly |
| 4 - Tee | 23 - Clamp and screw | 41 - Tube seat |
| 5 - Tee | 24 - Hose assembly | 42 - Spindle |
| 6 - Rubber grommet | 25 - Tee | 43 - Tube seat |
| 7 - Tube assembly | 26 - Clamp | 44 - Clamp and screw (2) |
| 8 - Clamp and screw | 27 - Hose assembly | 45 - Hose assembly |
| 9 - Hose assembly | 28 - Tube assembly | 46 - Clamp |
| 10 - Clamp and screw | 29 - Clamp | 47 - Rubber grommet |
| 11 - Clamp and screw | 30 - Hose assembly | 48 - Tube assembly |
| 12 - Union | 31 - Coupling | 49 - Tube assembly |
| 13 - Tube assembly | 32 - Tube assembly | 50 - Coupling |
| 14 - Clamp and screw | 33 - Screw | 51 - Tube assembly |
| 15 - Clamp and screw | 34 - Coupling | 52 - Tube assembly |
| 16 - Tube assembly | 35 - Elbow | 53 - Stop light switch |
| 17 - Elbow and nut | 36 - Nut | 54 - Tube assembly |
| 18 - Clamp and screw | 37 - Spacer | 55 - Master cylinder |
| 19 - Tube assembly | | |

Figure 2-249. Tractor hydraulic lines and fittings, removal and installation.

(d) Remove tube assembly (48) by removing clamp (46) and disconnecting it from hose assembly (45) and tee (5). Extract tube assembly (17) and coupling (12). Secure tube with clamp (14).

(e) Remove hose assembly (9) by removing clamps (10) and disconnecting it from right spindle and tube assembly (7).

(f) Remove tube assembly (7) by removing clamp (8) and disconnecting it from hose assembly (9) and tee (5). Extract tube assembly (7) through hull by removing rubber grommet (6) along with tube assembly.

(2) *Center axle.*

(a) Remove wheels and tires (refer to para 2-156). Block tractor.

(b) Remove tube assembly (28, fig 249) by removing clamp (29) and disconnecting it from the left spindle and **hose** assembly (27).

(c) Remove hose assembly (27) by removing clamp (26) and disconnecting it from tube assembly (28) and tee (25).

(d) Remove tee (25) by disconnecting it from hose assemblies (24, 27, and 30).

(e) Remove hose assembly 30) by disconnecting it from tee (25) and elbow (22).

(f) Remove elbow (22) by disconnecting it from hose assembly (30) and the tractor bulkhead.

(g) Remove tube assembly (20) by removing clamps (21) and disconnecting it from right spindle and hose assembly (24).

(h) Remove hose assembly (24) by removing clamp (23) and disconnecting it from tube assembly (20) and tee (25).

(3) *Tractor body.*

(a) Remove seats (refer to para 2.221).

(b) Remove console (refer to pars 2-33).

(c) Remove master cylinder ~~access~~ panel (fig. 2-210).

(d) Remove right-hand air duct panel (fig 2-250).

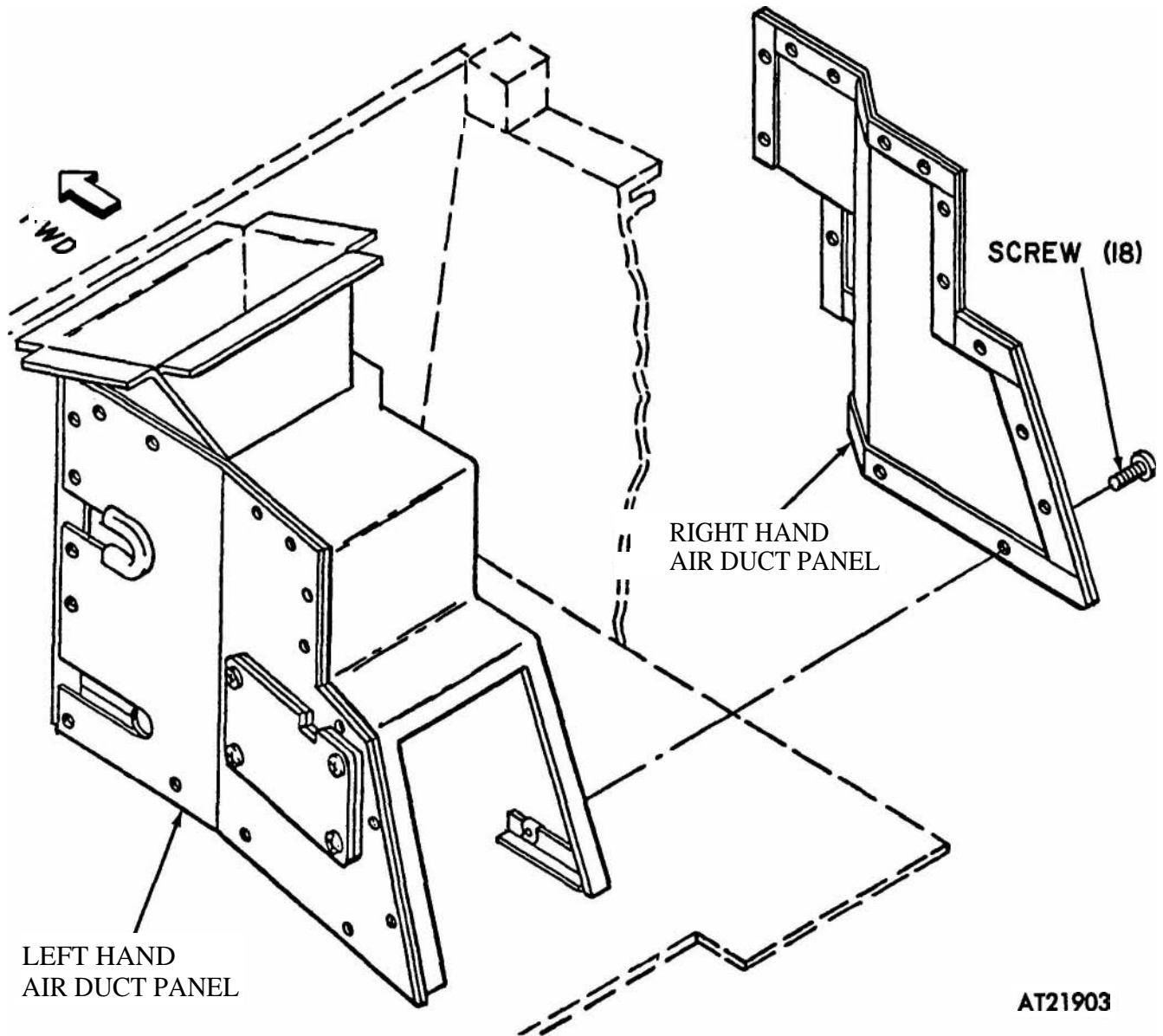


Figure 2-250. Right-hand air duct panel, removal and installation.

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(e) Remove bottom hull access panel (fig 2-97).

(f) Remove power plant (refer to para 2-33).

(g) Remove tube assembly (3, fig 2-249) by removing clamps (2) and disconnecting it from master cylinder (55) and tee (4).

(h) Disconnect electrical lead and remove stoplight switch (53) by disconnecting it from tee (1).

(i) Remove tube assembly (54) by disconnecting it from tee (1) and master cylinder (55).

(j) Remove tee (1) by disconnecting it from tube assemblies (52 and 54).

(k) Remove tee (4) by disconnecting it from tube assemblies (3, 32 and 51).

(l) Remove tube assembly (52) by disconnecting it from tee (1) and union (50).

(m) Remove union (50) by disconnecting it from tube assemblies (49 and 52).

(n) Remove tube assembly (49) by removing clamps (11) and disconnecting it from unions (31 and 50).

(o) Remove tube assembly (32) by removing clamps (11) and disconnecting it from union (12) and tee (4).

(p) Remove union (31) by disconnecting tube assemblies (16 and 49).

(q) Remove union (12) by disconnecting tube assemblies (13 and 32).

(r) Remove tube assembly (13) by removing clamp (14) and disconnecting it from elbow (17) and union (12).

(s) Remove tube assembly (16) by removing clamp (15) and disconnecting it from elbow (22) and union (31).

(t) Remove elbow (17) by disconnecting it from the tractor bulkhead and tube assembly (19).

(u) Remove tube assembly (19) by removing

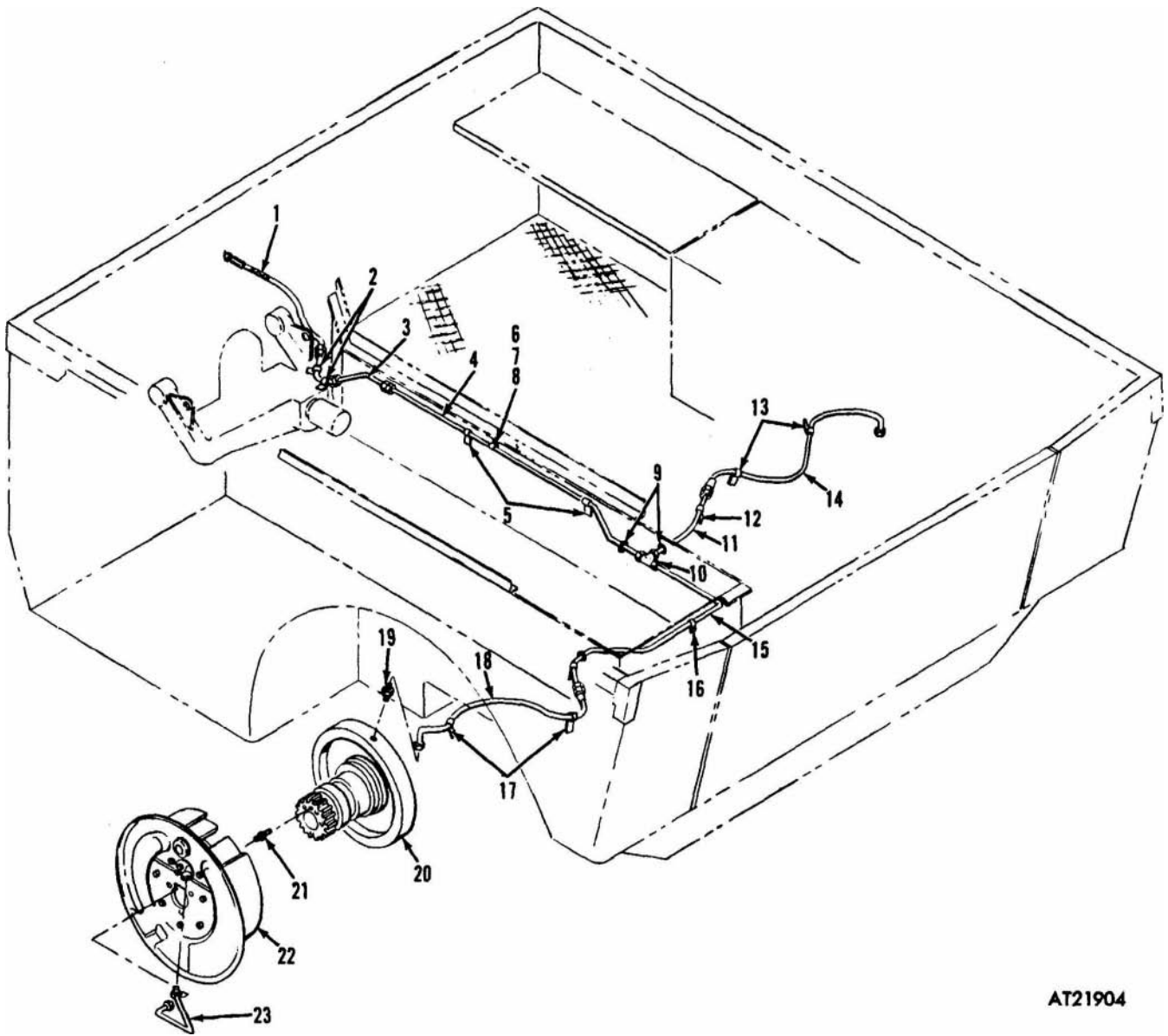
clamps (18 and 38) and disconnecting it from elbow (17) and elbow (35).

(v) Remove coupling (34) by disconnecting it from elbow (35).

(4) *Rear axle and carrier body.*

(a) Remove wheels and tires (refer to **para** 2-156). Raise carrier higher and block it.

(b) Remove hose assembly (1, fig 2-251) by opening quick disconnect and disconnecting it from tube assembly (3).



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- | | |
|------------------------|-------------------------|
| 1 - Hose assembly | 13 - Clamp 12) |
| 2 - Clamp 12) | 14 - Tube assembly |
| 3 - Tube assembly | 15 - Tube assembly |
| 4 - Tube assembly | 16 - Clamp |
| 5 - Clamp (2) | 17 - Clamp |
| 6 - Clamp | 18 - Tube assembly |
| 7 - Spacer and screw | 19 - Tube seat (2) |
| 8 - Nut | 20 - Spindle (2) |
| 9 - Rubber grommet 13) | 21 - Tube seat (2) |
| 10 - Tee | 22 - Brake assembly (2) |
| 11 - Tube assembly | 23 - Tube assembly (2) |
| 12 - Clamp | |

Figure 2-251. Carrier hydraulic lines, removal and installation.

(c) Remove tube assembly (3) by disconnecting it from hose assembly (1) and tube assembly (4).

(d) Remove tube assembly (4) by removing clamps (5 and 6) and spacer (7), and disconnecting it from tube assembly (3) and tee (10). Remove rubber grommet (9) along with tube.

(e) Remove tee (10) by disconnecting it from tube assemblies (4, 11, and 15).

(f) Remove tube assembly (11) by removing clamp (12) and disconnecting it from tee (10) and hose assembly (14). Remove rubber grommet (9) along with the tube.

(g) Remove hose assembly (14) by removing clamps (13) and disconnecting it from tube assembly (11) and right-hand brake spindle.

(h) Remove tube assembly (15) by removing clamp (16) and disconnecting it from tee (10) and hose assembly (18). Remove rubber grommet (9) along with the tube.

(i) Remove hose assembly (18) by removing clamp (17) and disconnecting it from tube assembly (15) and left-hand brake spindle (20).

(j) Remove brake drum (refer to para 2-162d). Remove tube assembly (23) from brake assembly (22) and tube seats (19 and 21) from spindle (20).

b. Installation.

11) Front axle.

(a) Insert tube assembly (7, fig 2-249) and rubber grommet (6) through hull and connect it to tee (5) and hose assembly (9). Secure tube with clamp (8).

(b) Connect hose assembly (9) to tube assembly (7) and to right-hand brake spindle. Secure hose with clamps (10).

(c) Insert tube assembly (48) and rubber grommet (47) through hull and connect it to tee (5) and hose assembly (45). Secure tube with clamp (46).

(d) Install tube seats (41 and 43) in spindle (42). Install tube assembly (39) to brake assembly (40) and tube seat (41). Install brake drum (refer to para **2-162f**).

(e) Connect hose assembly (45) to tube assembly (48) and tube seat (43). Secure hose with clamps (44).

(f) Install wheels and tires (refer to para 2-156).

(g) Bleed brake system (refer to para 2-161b).

(2) Center axle.

(a) Connect elbow (22, fig 2-249) to the tractor bulkhead and to hose assembly (30).

(b) Connect hose assembly (30) to tee (25).

(c) Connect tee (25) to hose assemblies (24 and 27). Secure hose assembly (27) with clamp (26) and hose assembly (24) with clamp (28).

(d) Connect tube assembly (28) to hose assembly (27) and brake spindle. Secure tube assembly clamps.

(e) Connect tube assembly (20) to hose assembly (24) and brake spindle. Secure tube assembly clamps (21).

(f) Install wheels and tires (refer to para 2-156).

(g) Bleed brake system (refer to para 2-161b).

(3) Tractor body.

(a) Secure coupling (34, fig 2-249) to elbow (35). Connect tube assembly (9) to elbow (35). Secure tube assembly clamps (138) to bulkhead with screw (33), nut (36) and spacer (37).

(b) Connect elbow (17) to the tractor bulkhead.

(c) Connect tube assembly (19) to elbow (17). Secure tube assembly with clamps (18).

(d) Connect tube assembly (13) to elbow (17) and coupling (12). Secure tube with clamp (14).

(e) Connect tube assembly (16) to elbow (22) and coupling (31). Secure tube with clamp (15).

(f) Connect tube assembly (32) to union (12) and tee (4).

(g) Connect tube assembly (49) to coupling (31 and 50). Secure tubes (32 and 49) with clamps (11).

(h) Connect tube assembly (51) to tees (4 and 5).

(i) Connect tube assembly (3) to tee (4) and master cylinder (55).

(j) Connect tube assembly (52) to coupling (50) and tee (1). Secure tubes (3 and 52) with clamps (2).

(k) Connect tube assembly (54) to tee (1) and master cylinder (55).

(l) Install stop light switch (53) into tee (1). Reconnect electrical leads.

(m) Install power plant (refer to para 2-33)

(n) Install bottom hull access panel (fig 2-97).

(o) Install right-hand air duct panel (fig 2-250).

(p) Install master cylinder access pan (fig 2-210).

(q) Install console (refer to para 2-33).

(r) Install seats (refer to para 2-221).

(s) Bleed brake system (refer to para 2-161).

(4) *Rear axle and carrier body.*

(a) Insert tube assembly (15, fig 2-251) and rubber grommet (9) through hull and install tee (10). Secure tube with clamp (16).

(b) Install tube seats (19 and 21, fig 2-251) in spindle (20). Connect tube assembly (23) to tube seat (21) and brake assembly (22). Install brake drum (refer to para 2-162f.).

(c) Connect tube assembly (18) to tube assembly (15) and brake spindle (20). Secure tube with clamps (17).

(d) Insert tube assembly (11) and rubber grommet (9) through hull and connect it to tee (10). Secure tube with clamp (12).

(e) Connect tube assembly (14) to tube assembly (11) and brake spindle (20). Secure tube with clamps (13).

(f) Insert tube assembly (4) and rubber grommet (9) through hull and connect it to tee

(10). Secure tube with clamps (5 and 6), spacer and screw (7) and nut (8).

(g) Connect tube assembly (3) to tube assembly (4). Secure tube with clamps (2).

(h) Connect hose assembly (1) to tube assembly (3).

(i) Install wheels and tires (refer to **para 2-156**).

(j) Bleed brake system (refer to **para 2-161b**).

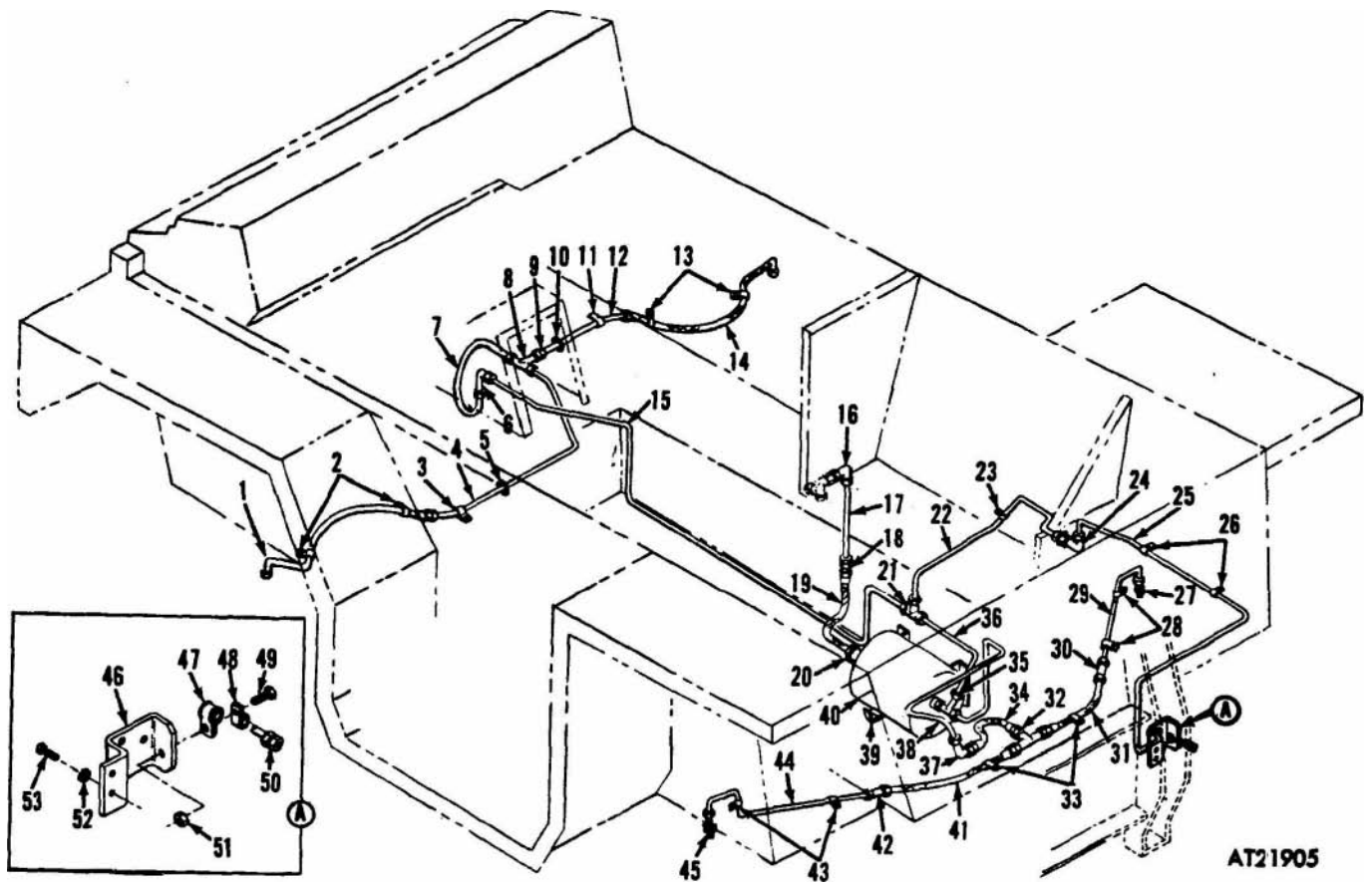
2-167. Service Brake System Air Hoses, Lines, Fittings, and Reservoir

a. *Removal.* For replacement of a particular item, disassemble only to that point required for item removal.

(1) *Front axle.*

(a) Remove wheels and tires (refer to para 2-156). Raise the front end of the tractor higher and block it.

(b) Remove hose assembly (1, fig 2-252) by removing clamps (2) and disconnecting it from tube assembly (4) and left-hand brake spindle.



- | | | |
|--------------------------|---------------------------|--------------------------|
| 1 - Hose assembly | 19 - Hose assembly | 37 - Elbow and nut |
| 2 - Clamp and screw 12) | 20 - Relief valve | 38 - Tube assembly |
| 3 - Clamp and screw | 21 - Tee | 39 - Clamp and screw |
| 4 - Tube assembly | 22 - Tube assembly | 40 - Air reservoir |
| 5 - Rubber grommet | 23 - Clamp and screw | 41 - Hose assembly |
| 6 - Elbow | 24 - Elbow and nut | 42 - Union |
| 7 - Tube assembly | 25 - Tube assembly | 43 - Clamp and screw (2) |
| 8 - Tee | 26 - Clamp and screw (2) | 44 - Tube assembly |
| 9 - Nut | 27 - Adapter | 45 - Adapter |
| 10 - Rubber grommet | 28 - Clamp and screw | 46 - Bracket |
| 11 - Clamp and screw | 29 - Tube assembly | 47 - Clamp |
| 12 - Tube assembly | 30 - Union | 48 - Clamp |
| 13 - Clamp and screw (2) | 31 - Hose assembly | 49 - Screw |
| 14 - Hose assembly | 32 - Tee | 50 - Adapter |
| 15 - Tube assembly | 33 - Clamp and screw (2) | 51 - Nut |
| 16 - Elbow | 34 - Hose assembly | 52 - Washer |
| 17 - Tube assembly | 35 - Tee | 53 - Screw |
| 18 - Adapter. | 36 - Tube assembly | |

Figure 2-252. Tractor air lines and fittings, removal and installation.

(c) Remove tube assembly (4) by removing clamp (3) and disconnecting it from hose assembly (1) and tee (8). Extract tube assembly (4) and rubber grommet (5) through the hull.

(d) Remove hose assembly (14) by removing clamps (13) and disconnecting it from tube assembly (12) and right front brake spindle.

(e) Remove tube assembly (12) by removing clamp (11) and disconnecting it from tee (8) and hose assembly (14). Extract tube assembly (12) and rubber grommet (10) through the hull.

(f) Remove tee (8) by disconnecting it from tube assemblies (4, 7, and 12).

(2) *Center axle.*

(a) Remove tube assembly (44, fig 2-252) by removing clamps (43) and disconnecting it from union (42) and the left-hand brake spindle adapter (45).

(b) Remove union (42) by disconnecting it from tube assembly (44) and hose assembly (41).

(c) Remove hose assembly (41) by removing clamp (33) and disconnecting it from tee (32) and union (42).

(d) Remove tube assembly (29) by removing clamps (28) and disconnecting it from union (30) and the right-hand brake spindle adapter (27).

(e) Remove union (30) by disconnecting it from tube assembly (29) and hose assembly (31).

(f) Remove hose assembly (31) by removing clamp (33) and disconnecting it from union (30) and tee (32).

(g) Remove tee (32) by disconnecting it from hose assemblies (31, 34 and 41).

(h) Remove hose assembly (34) by disconnecting it from tee (32) and elbow (37).

(i) Remove elbow (37) by disconnecting it from the tractor hull and hose assembly (34).

(3) *Tractor body.*

(a) Remove seats (refer to para 2-221).

(b) Remove console (refer to para 2-33).

(c) Remove right-hand air duct panel (fig 2-250).

(d) Remove bottom hull access panel (fig 2-97).

(e) Remove powerplant (refer to **para** 2-33).

(f) Remove tube assembly (7, fig 2-252) by disconnecting it from elbow (6) and tee (8).

(g) Remove elbow (6) by disconnecting it from tube assemblies (7 and 15).

(h) Remove tube assembly (15) by removing retaining clamps and disconnecting it from elbow (6) and tee (21).

(i) Remove tube assembly (22) by removing clamp (23) and disconnecting it from tee (21) and elbow (24).

(j) Remove right-hand wheel and tire (refer to para 2-156).

(k) Remove elbow (24) by disconnecting it from tube assembly (25).

(l) Remove tube assembly (25) by removing clamps (26, 47, and 48) and disconnecting it from elbow (24) and adapter (50).

(m) Remove adapter by disconnecting tube assembly (25).

(n) Remove bracket (46) by removing screws (49 and 53), nut (51) and washer (52).

(o) Remove tube assembly (38) by disconnecting it from elbow (37) and tee (35).

(p) Remove tee (35) by disconnecting it from tube assemblies (36 and 38) and air reservoir (40).

(q) Remove tube assembly (36) by disconnecting it from tees (21 and 35).

(r) Open drain cock and drain air reservoir (40).

(s) Remove relief valve (20) by disconnecting hose assembly (19) and removing it from the air reservoir (40).

(t) Remove hose assembly (19) by disconnecting it from adapter (18) and relief valve (20).

(u) Remove tube assembly (17) by disconnecting it from adapter (18) and elbow (16).

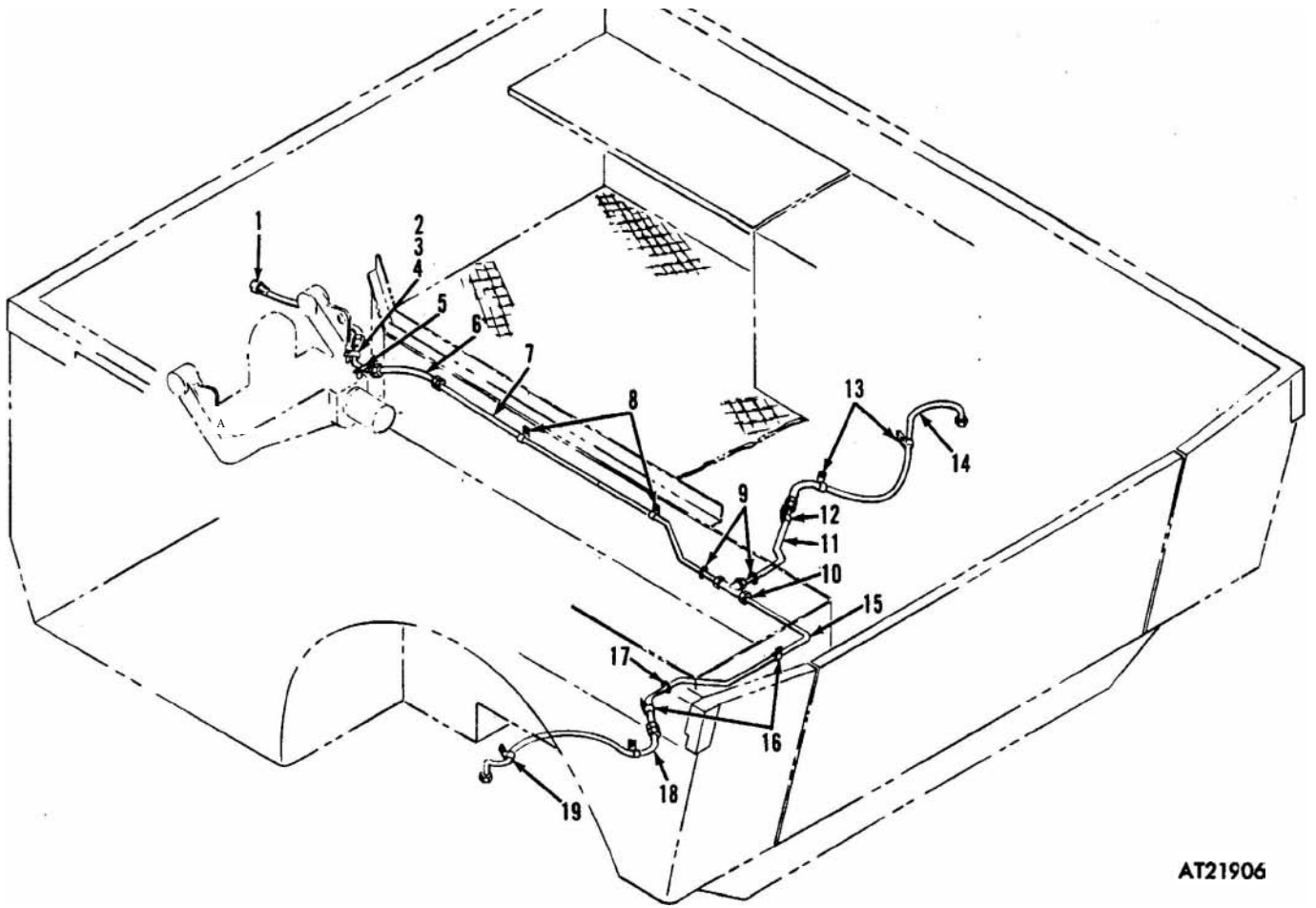
(v) Remove elbow (16) by disconnecting it from engine air box tee and tube assembly (17).

(w) Remove the air reservoir (40) by disconnecting tee (35), hose assembly (19), and four screws and nuts.

(4) *Rear axle and carrier frame.*

(a) Remove wheels and tires (refer to para 2-156). **Raise** carrier higher and block it.

(b) Remove hose assembly (18, fig 2-253) by removing clamps (19) and disconnecting it from tube assembly (15) and left-hand brake spindle.



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- | | |
|-------------------------------|--------------------------|
| 1 - Hose assembly | 11 - Tube assembly |
| 2- Clamp (2) | 12 - Clamp |
| 3 - Screw (2) | 13 - Clamp and screw (2) |
| 4 - Spacer (2) | 14 - Hose assembly |
| 5 - Tube assembly | 15 - Tube assembly |
| 6 - Tube assembly | 16 - Clamp and screw (2) |
| 7 - Tube assembly | 17 - Rubber grommet |
| 8 - Clamp and screw | 18 - Hose assembly |
| 9 - Rubber grommet (2) | 19 - Clamp and screw |
| 10 - Tee | |

Figure 2-253. Carrier air hose, lines, and fittings, removal and installation.

(c) Remove tube assembly (15) by removing clamps (16) and disconnecting it from tee (10) and hose assembly (18). Extract tube assembly and rubber grommet (17) through carrier hull.

(d) Remove hose assembly (14) by removing clamps (13) and disconnecting it from tube assembly (11) and right-hand brake spindle.

(e) Remove tube assembly (11) by removing clamp (12) and disconnecting it from tee (10) and hose assembly (14). Extract tube assembly and rubber grommet (9) through carrier hull.

(f) Remove hose assembly (1) by disconnecting it from tube assembly (5).

(g) Remove tube assembly (5) by disconnecting it from tube assembly (6).

(h) Remove tube assembly (6) by removing clamps (2), spacers (4) and disconnecting it from tube assembly (7).

(i) Remove tube assembly (7) by removing clamps (8) and disconnecting it from tube assembly (6) and tee (10). Extract tube assembly and rubber grommet (9) through carrier structure.

(j) Remove tee (10) by disconnecting tube assemblies (7, 11, and 15).

b. Installation.

(1) Front axle.

(a) Connect tee (8, fig 2-252) to tube assembly (7).

(b) Insert tube assembly (12) and rubber grommet (10) through tractor hull and connect it to tee (8). Secure tube with clamp (11).

(c) Connect hose assembly (14) to tube assembly (11) and right front brake spindle. Secure hose with clamps (13).

(d) Insert tube assembly (4) and rubber grommet (5) through tractor hull and connect it to tee (8). Secure tube with clamp (3).

(e) Connect hose assembly (1) to tube assembly (4) and left-hand brake spindle. Secure hose with clamps (2).

(f) Install wheels and tires (refer to para 2-156). Lower front end of tractor.

(2) Center axle.

(a) Connect elbow (37, fig 2-252) to the tractor hull.

(b) Connect hose assembly (34) to tee (32) and elbow (37).

(c) Connect hose assemblies (31 and 41) to tee (32). Secure hoses with clamps (33).

(d) Connect union (30) to hose assembly (31).

(e) Connect union (42) to hose assembly (41).

(f) Connect tube assembly (29) to union (30) and the right-hand brake spindle adapter (27). Secure tube with clamps (28).

(g) Connect tube assembly (44) to union (42) and left-hand brake spindle adapter (45). Secure tube with clamps (43).

(3) Tractor body.

(a) Secure the air reservoir (40, fig 2-252) to the right-hand tractor bulkhead using four screws and nuts. Connect tee (35), relief valve (20), and hose assembly (19).

(b) Connect elbow (16) to engine air box tee.

(c) Connect tube assembly (17) to hose assembly (19) and elbow (16).

(d) Connect tee (35) to air reservoir (40).

(e) Connect tube assembly (38) to tee (35) and elbow (37).

(f) Connect tube assembly (36) to tee (35).

(g) Connect tee (21) to tube assembly (36).

(h) Connect elbow (24) to the tractor bulkhead.

(i) Connect tube assembly (22) to tee (21) and elbow (24). Secure tube with clamp (23).

(j) Connect elbow (6) to tube assembly (7).

(k) Secure tube assembly (15) to elbow (6) and tee (21).

(l) Connect bracket (46) to chassis frame with screw (53), and washer (52).

(m) Connect tube assembly (25) to elbow (24) and adapter (50). Secure tube with clamps (26, 47, and 48).

(n) Install right-hand wheel and tire (refer to para 2-156).

(o) Install power plant (refer to para 2-33).

(p) Install bottom hull access panel (fig 2-97).

(q) Install right-hand air duct panel (fig 2-250).

(r) Install console (refer to para 2-33).

(s) Install seats (refer to para 2-221).

(4) Rear axle and carrier body.

(a) Insert tube assemblies (7, 11, and 15, fig 2-53) and rubber grommets (9 and 17) through carrier structure and connect them to tee (10). Secure tubes with clamps (8, 12, and 16).

(b) Connect tube assembly (6) to tube assembly (7).

(c) Connect tube assembly (5) to tube assembly (6). Secure tube with clamps (2) and spacers (4).

(d) Connect hose assembly (1) to tube assembly (5).

(e) Connect hose assembly (14) to tube assembly (11) and right-hand brake spindle. Secure tube with clamps (13).

(f) Connect hose assembly (18) to tube assembly (15) and left-hand brake spindle. Secure tube with clamps (19).

(g) Install wheels and tires (refer to **para 2-156**). Lower carrier to ground.

Section XXIV. STEERING SYSTEM

2-168. General

a. The vehicle employs a tandem Ackerman steering system affixed to the front and rear wheels and controlled from one steering wheel located in the driver's compartment. In this method of steering, the front and rear wheels are mounted on pivoted knuckles and a steering linkage is utilized to connect the knuckles together so the wheels will rotate simultaneously about their pivots. This permits the front or rear axle to remain stationary when steering and affords the desired vehicle stability and control. A front and rear steering gear box is connected by lightweight steel steering torque tubes and universal joints supported by self-aligning bearings. Front and rear wheels turn in opposite directions to reduce the turning radius and improves operator control on highway, cross-country or snow and ice covered terrain. Turning the rear wheels in direction opposite from the front is accomplished through bevel gears attached to the bottom of the front steering gear box worm gear. The front gear box bevel gear arrangement reverses the rotation of the rear gear bar. Six revolutions of the steering wheel are required to turn the steering gear from hard right to hard left or left to right. Steering stops are utilized to restrict the number of revolutions to five when the gear box is installed in the vehicle and the steering linkage attached. This is done to prevent over steering and damage to the gear box worm and sector.

b. The front steering gear box is located under the left front of the tractor, directly under the steering wheel and steering column shaft. The gear box is mounted vertically and bolted to the floor board and the forward cross member. The rear steering gear box is located in a carrier structure well, immediately forward of the rear cross-member and is mounted on its side. Rear gear box access is gained by removing an inspection plate in the floor of the carrier cargo structure.

c. Five lightweight steel tubular steering torque tubes are utilized to connect the front and rear steering gear boxes. The tubes are routed generally along the left side of the vehicle and are supported by four self-aligning bearings. One bearing is located forward of the tractor steering torque tube

tunnel and mounted to the tractor keel. Two bearings are mounted on the left side of the center differential. The fourth bearing is located in the carrier drive shaft channel and is mounted to the rear carrier hitch fitting support.

d. The vehicle employs a front and rear pitman arm which connects the front and rear steering gear boxes to the steering linkage. The internal splined ends of the front and rear pitman arms attach to the splined ends of the steering gear box output shafts. Attached to the front pitman arm, by means of tie rod ends, are the inboard end of the left front tie-rod assembly and the left end of the front intermediate rod assembly. Only the rear intermediate rod assembly is attached to the rear pitman arm.

e. The vehicle employs a front and rear idler arm. The front idler arm is located behind the front cross-member and forward of the right front wheel well. The front idler arm transmits the force from the intermediate rod to the right front tie rod. The rear idler arm is located forward of the carrier rear cross-member in the right rear corner of the carrier drive shaft channel. The rear idler arm is attached to the rear intermediate rod approximately six inches from the right end. The right rear tie rod assembly is connected to the right end of the intermediate rod.

f. The tie rod assemblies are located forward of the front wheels and behind the rear wheels. They are of tubular construction, contain a wrench gripping area in the center of the shaft, and each end is internally threaded to accept the rod ends, which can be turned in or out for adjusting toe-in. Tie rod ends are constructed as a ball and socket, which permits a swivel point between the steering knuckle and the tie rod shaft. This allows for up and downward movement of the wheels without damaging the steering components.

g. The intermediate rods are essential to connect the front and rear tie rod assemblies, completing the steering linkage from the steering gear boxes to the steering knuckle arms. The front intermediate rod is located to the front of the front wheels and the rear intermediate rod is located behind the rear wheels. The rods are of tubular construction, with a

wrench gripping area in the center of the rod for making adjustments. Each end of the rod is internally threaded to accept tie rod ends. The front intermediate rod is attached to the idler arm on one end and to the pitman arm on the opposite end. The rear intermediate rod connects directly to tie rod shafts.

h. Steering stops on the vehicle are mounted to the left and right side of the tractor keel to limit the travel of the front pitman and idler arms. Limiting front pitman and idler arm travel, automatically limits the travel of rear steering mechanism as the front and rear steering is accomplished from one steering wheel.

2-169. Wheel Alignment

a. General.

(1) Correct vehicle wheel alignment involves balancing all of the forces created by friction, **gravity**, centrifugal force and momentum while a vehicle is in motion. Proper motion balance developed by a proper alignment job will make a vehicle run smoother, have better road-holding characteristics, have better steerability and operate with more stability while running in a straight line and around curves. It also eliminates unnecessary road friction which causes abnormal tire wear.

(2) Toe-in is the amount in inches that the wheels are closer together at the extreme front of the tires than they are at the extreme rear. Toe-in balances the effect of camber on the tires. By properly adjusting camber and toe-in, the motion of the wheel is balanced between two opposing tendencies, and pull on the steering mechanism is reduced.

(3) Front wheel alignment adjustments other than toe-in must be performed by Direct support maintenance. The factors of alignment are interrelated and if one adjustment is made, other adjustments may be affected. After all alignment operations are complete, check to *determine that*

settings previously made are still within limits. Make all adjustments at curb weight. After installing new or reconditioned front end components check and adjust toe-in as outlined in b and c below, and as soon as **possible** thereafter report to support maintenance organization for complete front end wheel alignment.

b. Tractor and Carrier Toe-in Adjustment.

(1) *With the* vehicle on a flat, smooth surface, rotate steering wheel to position wheels straight forward.

Note: Straight ahead position of wheels can be checked by driving *the vehicle a short distance on a flat surface to determine steering wheel position at which vehicle follows a straight path.*

(2) Loosen lockouts on both ends of front tie rods.

(3) Place suitable wheel alignment toe-in gage between front tires. ahead of the vertical centerline of the **wheels** (fig 2-254). Position the gage so both **chains** just touch the floor. Move the *gage scale* to read zero.

(4) Push vehicle forward until gage is behind the vertical centerline of the wheels and the chains are just touching the floor.

(5) Read *gage*. Reading should be $1 / 16$ to $1 / 8$ inch.

(6) If reading is not within limits, remove gage and turn both tie rods an equal amount (either direction), and repeat steps (3) through (5) above until correct adjustment is obtained then tighten lock nuts to 90-100 lb-ft.

(7) Loosen lock nuts on both ends of carrier tie rods, and repeat **steps (3)** through (6) above to adjust toe-in on the carrier **wheels**.

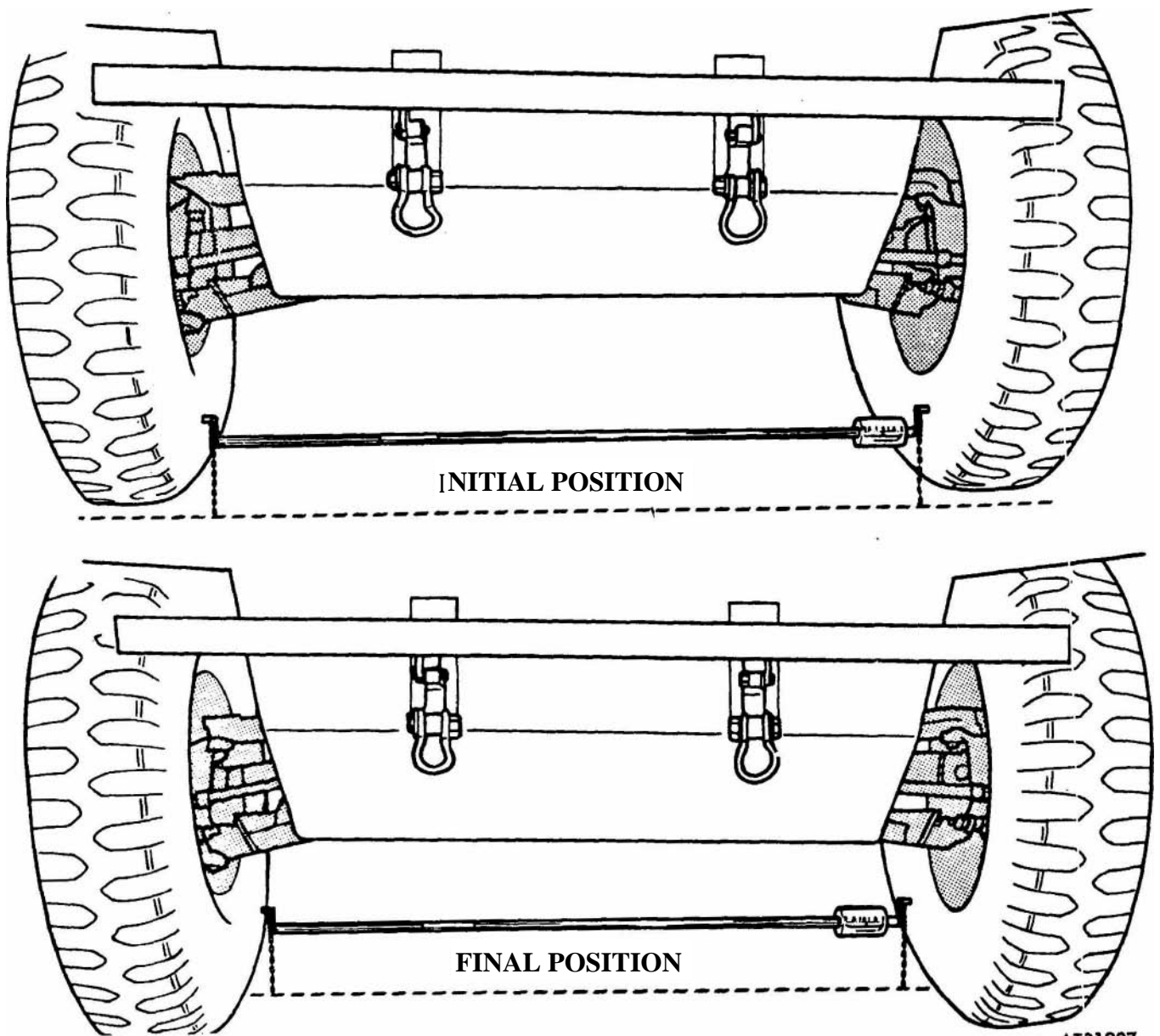


Figure 2-254. Wheel alignment.

c. Tractor and Carrier Alternate Toe-in Adjustment.

(1) With vehicle on a level surface, hoist or jack front wheels clear of ground. Center steering wheel.

(2) Scribe tire thread centerline by rotating wheel with a suitable scribe held against tire.

(3) Loosen tie rod lock nuts on both tractor and carrier.

(4) Lower front of vehicle and remove hoist or jack.

(5) Position a chalk line from the front wheel to the rear wheel along the axle center lines on the right side of the vehicle.

(6) Adjust length of front and rear tie rod until cord just contacts the side walls of the front and rear tires.

Note: This positions the front and rear wheels in a straight ahead position.

(7) Repeat (5) and (6) above on left side of vehicle.

18) With the line one inch away from left tires side walls, adjust left carrier tie rod until the tire side wall forward of the vertical center line of the axle is 1-1 / 32 inches to 1-1 / 16 inches inboard from the chalk line. Tighten tie rod lock nuts.

(9) Position a chalk line on right side of vehicle. Repeat (7) above on right rear wheel.

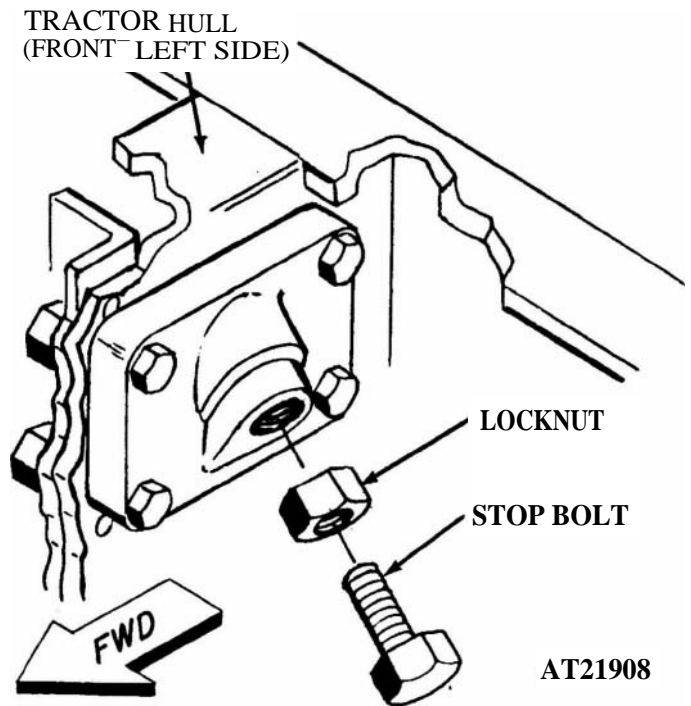
(10) Remove chalk lines. Using a suitable tape measure, measure and record distance between scribe lines on the forward periphery of the front tires. Repeat measurement on rear periphery. Measurements should be taken as close to axle as possible.

(11) Adjust front tie rods, equally, until the measurement taken at the front of the wheels is 1 / 16 to 1 / 8 inch less than the measurement taken at the rear of the wheels. Tighten tie rod lock nuts, recheck measurements.

2-170. Adjustment of Front and Rear Wheel Swing Arc

a. Loosen the pitman arm and idler arm stop bolts, using a suitable portable wheel alignment set, adjust the front wheels to turn approximately 22 degrees left and right. Tighten the lock nuts on the stop bolts (fig 2-255).

b. Carrier wheel arc is controlled by the front wheel stops. Adjust the front wheel stops as in a. above.



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Figure 2-255. Wheel swing arc stop bolt.

2-171. Steering Wheel

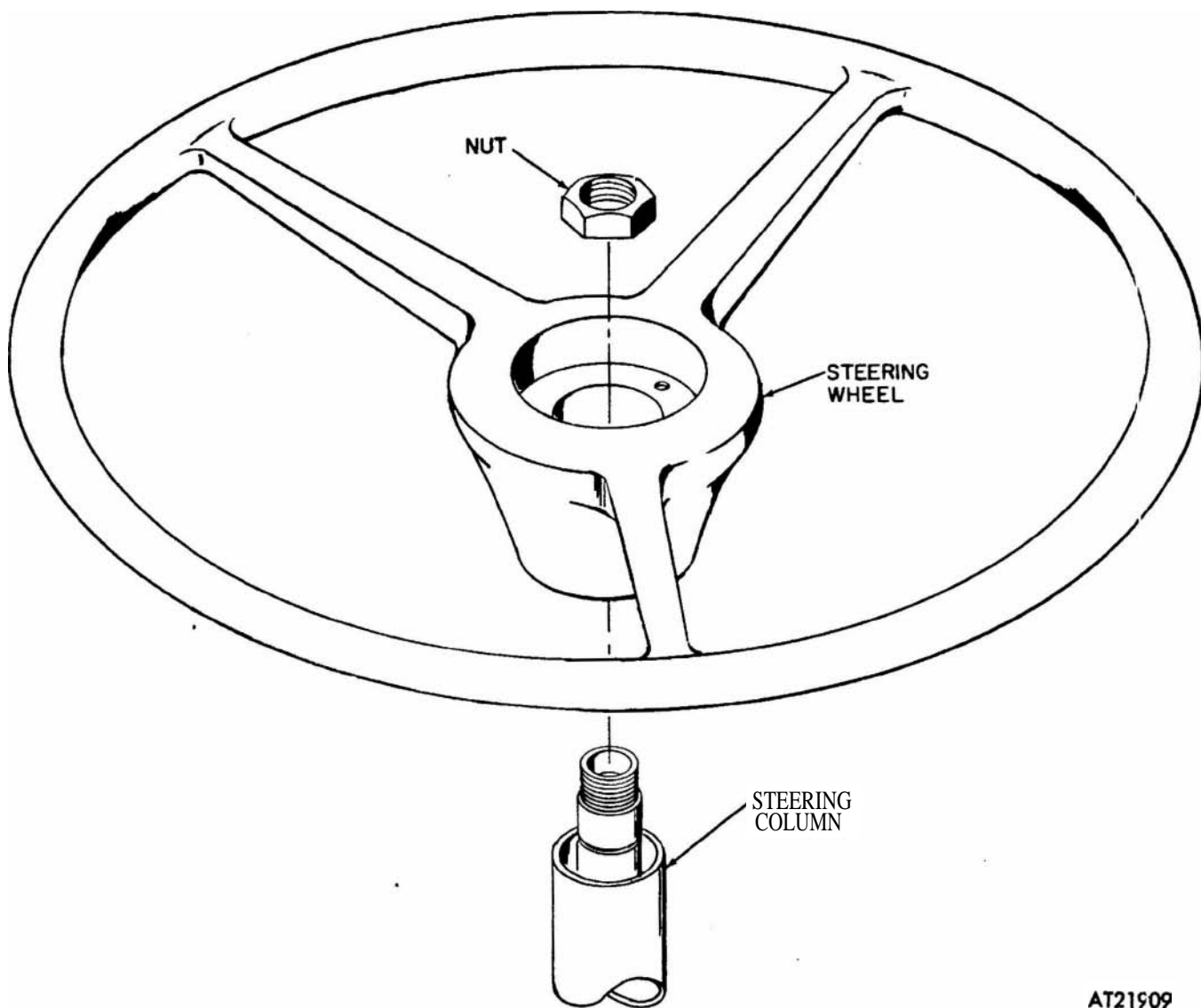
a. Removal

(1) Remove horn switch assembly (refer to para 2-107).

(2) Remove nut securing steering wheel to steering shaft (fig 2-256).

(3) Remove steering wheel with suitable puller.

Note: It may be necessary to tap on bolt head of tool with a hammer as it is turned down, to loosen tight steering wheel.



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Figure 2-256. Steering wheel, removal and installation.

b. Installation.

(1) With front wheels in the straight-ahead position, position steering wheel to steering shaft. Tap wheel gently into place and secure with nut (fig 2-256).

(2) Install horn switch (refer to para 2-107).

2-172. Steering Column

a. Removal.

(1) Remove steering wheel (refer to para 2-171 and fig 2-256).

(2) Remove screw, lock washer, and nut securing universal yoke to steering gear box input shaft (fig 2-257).

(3) Support steering column and remove two screws, bracket, and two nuts securing steering column to tractor cowl. Remove steering column assembly.

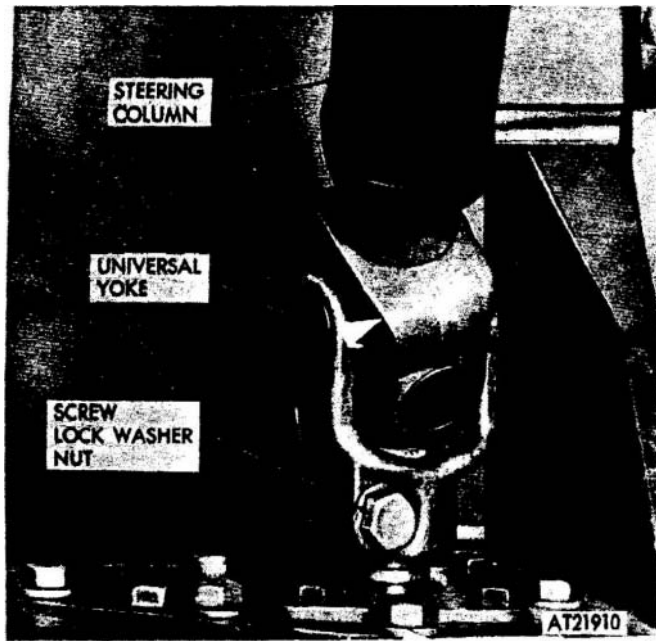


Figure 2-257. Steering column, removal and installation.

b. *Disassembly.*

(1) Remove upper spring and spacer from tube assembly (fig 2-258).

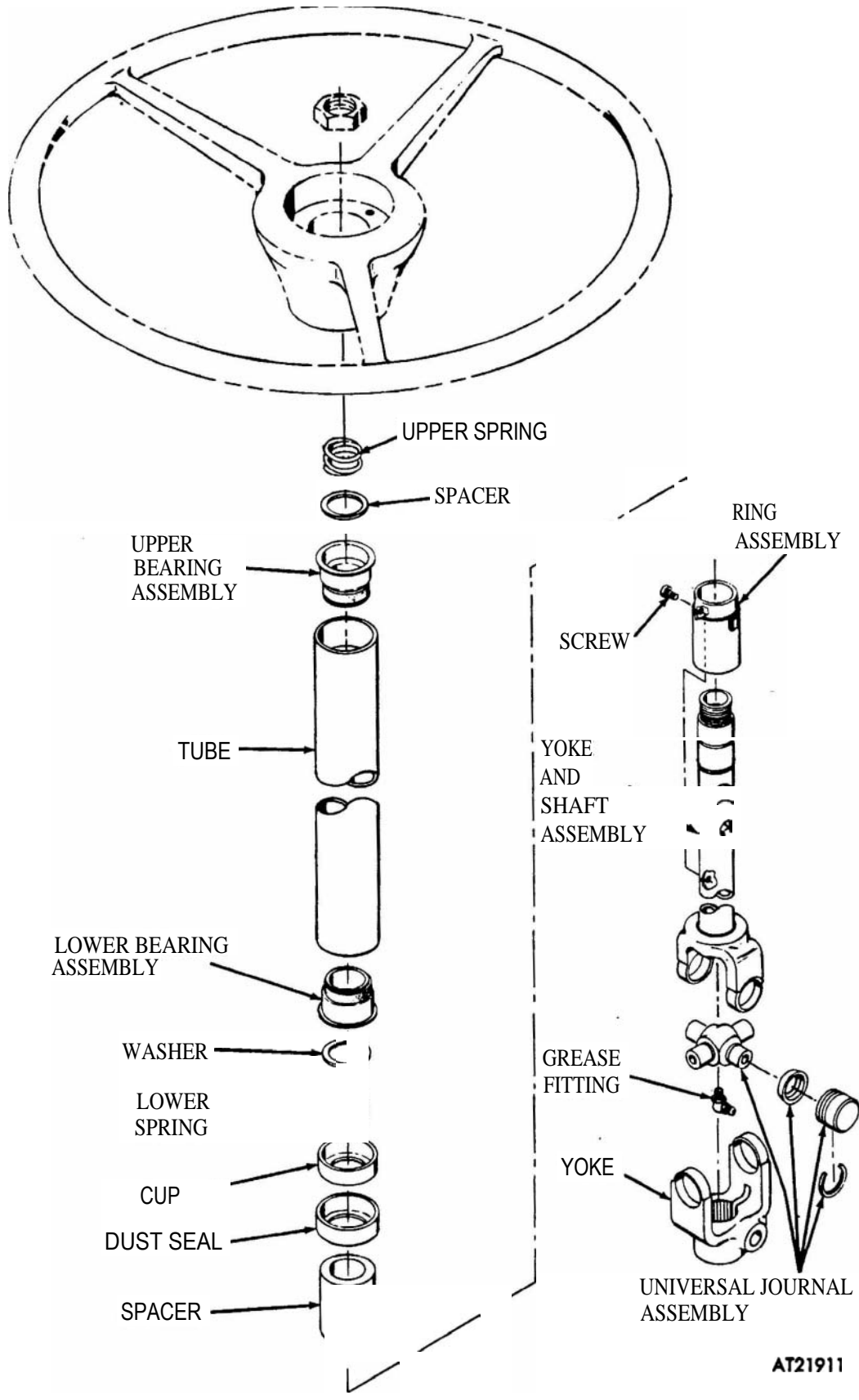
(2) Slide tube assembly from yoke and shaft assembly.

(3) Remove upper steering ball bearing from tube assembly.

(4) Remove screw securing ring assembly to yoke and shaft assembly. Slide ring from yoke and shaft assembly.

(5) Remove ball bearing spacer, spring, cup, dust seal and spacer by sliding assemblies from yoke and shaft assembly.

(6) Disassemble universal yoke and journal assemblies (refer to para 2-184 b. (3)).



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Figure 2-258. Steering column, disassembly and assembly.

c. *Cleaning, Inspection and Repair.*

1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect tube assembly for bent or dented condition. Check ball bearings, spacers, springs and other parts for wear or damage. Discard damaged or worn ball bearings. Replace grease fitting if damaged.

(3) Repair steering column ball bearings and universal joint using repair kits (refer to TM 9-2320-242-20P).

d. *Assembly.*

(1) Assemble universal yoke and journal assemblies (refer to para 2-184, d. (1) and (fig 2-258).

Note: Bearing assembly (11601585) must be assembled on end nearest the 11 /16 inch hole located on the tube assembly.

(2) Slide spacer, dust seal, cup, spring, spacer and ball bearing onto yoke and shaft assembly.

(3) Position ring assembly on yoke and shaft assembly and secure with screw.

(4) Slide tube over yoke and shaft assembly with hole in tube down.

(5) Install ball bearing, spacer, and spring.

e. *Installation.*

(1) Position steering column universal yoke on steering gear box input shaft (fig 2-257).

(2) Position steering column against tractor cowl and secure with bracket, two screws, and two nuts. Torque nuts to 45-65 lbs-ft.

(3) Secure universal yoke to gearbox input shaft with screw, lock washer, and nut. Torque nut to 15-24 lbs-ft.

(4) Install steering wheel (refer to para 2-171).

(5) Service universal joint (refer to LO 9-2320-242-12).

2-173. Tractor Steering Gear Box

a. *Removal.*

(1) Align front wheels in a straight ahead position. With steering wheel centered, chalk a line across steering wheel hub and steering column.

(2) Remove access panel by removing screws securing steering access panel (fig 2-259).

(3) Remove screw, nut, and washer securing pitman arm to steering gear shaft (fig 2-260).

(4) Remove screw, nut, and washer securing front steering shaft universal joint to steering gear shaft.

(5) Remove screw, nut, and washer securing steering column universal joint to steering gear input shaft (fig 2-262).

(6) Remove six screws, plates and lock washers securing steering gear box to tractor floor.

(7) Remove steering gear box by removing two screws, lock washers, and nuts securing steering gear to bulkhead (fig 2-261). Pull gear box down and out from floor and forward to clear pitman arm and steering torque tube.

(8) Remove and discard gasket from top of gear box.

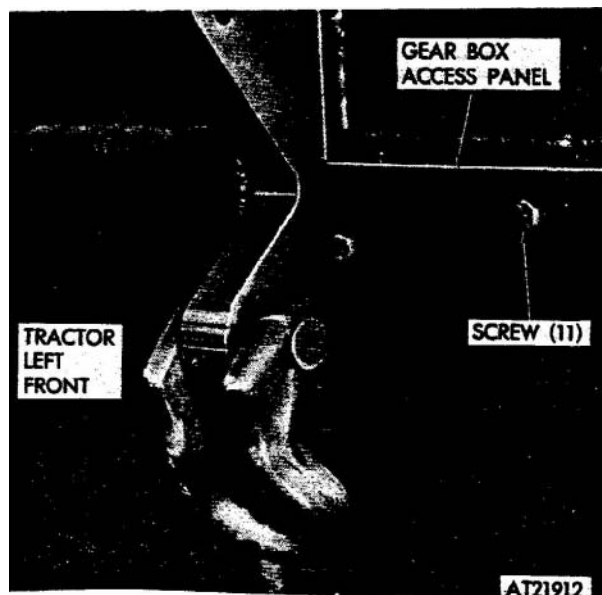


Figure 2-259. Tractor steering gear box access panel.

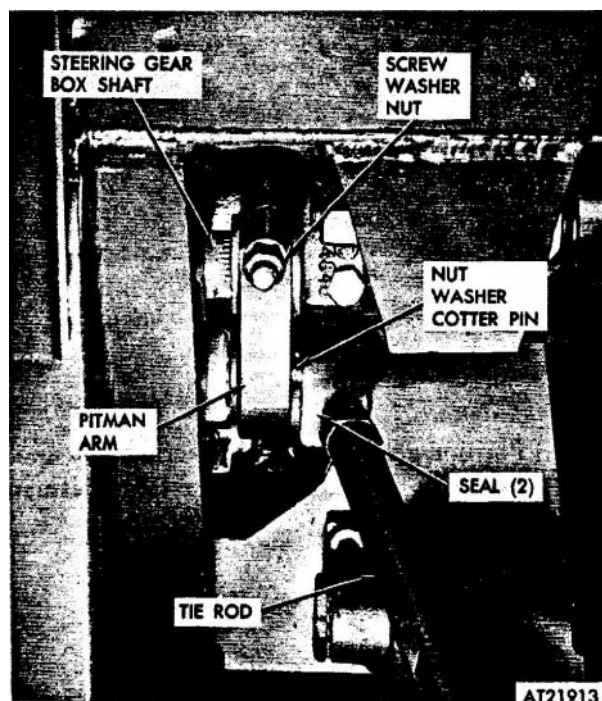


Figure 2-260. Tractor pitman arm attachment.

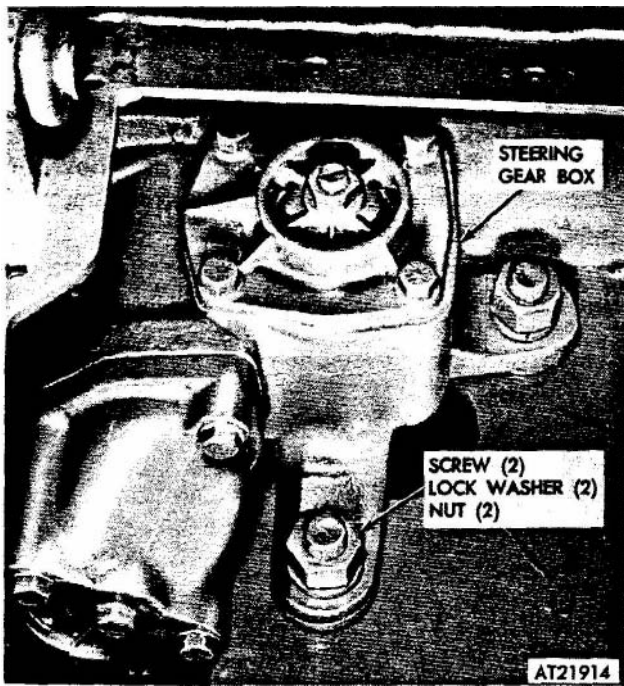


Figure 2-261. Tractor steering gear box (hull), removal and installation.

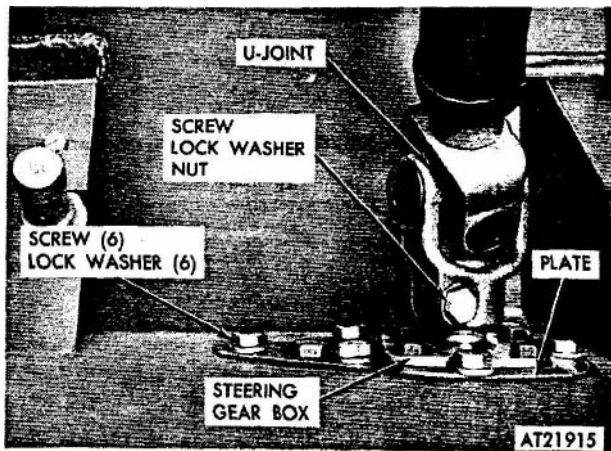


Figure 2-262. Tractor steering gear box (cab), removal and installation.

b. Installation.

- (1) Position gasket on top of steering gear box.
- (2) Position gear box to tractor floor, pitman arm, and torque tube.

(3) Secure gear box to tractor floor with six screws, six lock washers, and one plate. Torque screws to 15-24 lbs-ft. (fig 2-262).

(4) Secure gear box to bulkhead with two screws, lock washers and nuts (fig 2-261). Torque nuts to 105-145 lbs-ft.

(5) Align steering column universal joint slot with drill point in gear box cover.

(6) Secure steering column universal joint with screw, washer, and nut. Torque nut to 15-24 lbs-ft.

(7) Align pitman arm slot with groove on gear shaft and secure arm with screw, washer, and nut. Torque nut to 95-120 lbs-ft.

(8) Align steering torque tube universal joint to steering gear box and secure with screw, washer, and nut. Torque nut to 15-24 lbs-ft.

(9) Ensure that aligning marks on steering wheel hub and steering column align with wheels in a straight ahead position. Perform wheel alignment (refer to para 2-169).

(10) Service gear box (refer to LO 9-2320-242-12).

(11) Check for synchronized front-rear steering (refer to TM 9-2320-242-10).

(12) Install gear box access panel

(13) Test drive vehicle to check for proper operation of steering gear box (refer to TM 9-2320-242-10).

2-174. Carrier Steering Gear Box

a. Removal.

(1) Align steering wheel centering marks with wheels in a straight-ahead position.

(2) Remove panel by removing twenty-eight screws securing steering gear box access panel (fig 2-263).

(3) Remove screw, nut, and washer securing pitman arm to steering gear shaft (refer to para 2-176).

(4) Remove screw, nut, and washer securing steering torque tube universal joint to steering input shaft (fig 2-264).

(5) Slide steering torque tube forward to clear steering gear box.

(6) Remove three screws, nuts, washers, and lock washers securing steering gear box to carrier.

(7) Remove steering gear box by lifting steering gear box up and out of pitman arm.

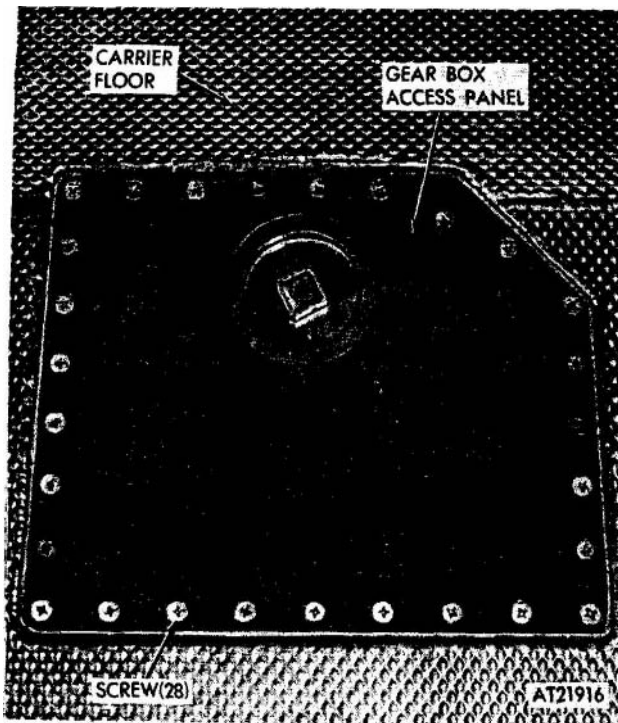


Figure 2-263. Carrier steering gear box access panel, removal and installation.

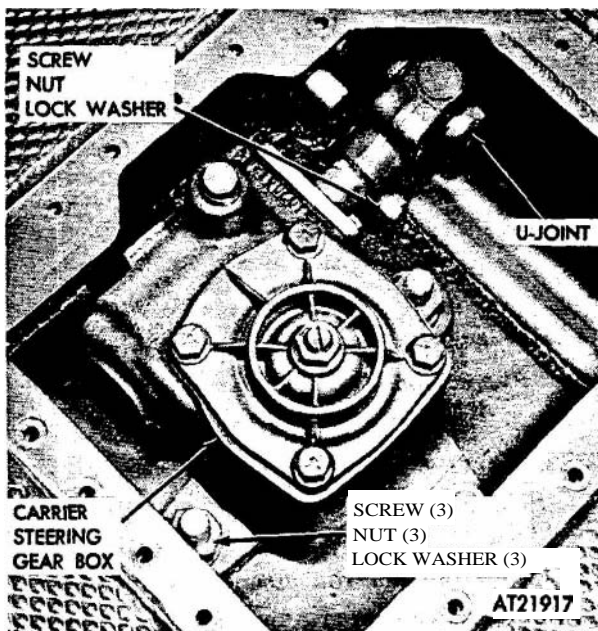


Figure 2-264. Carrier steering gear box, removal and installation.

b. Installation.

- (1) Center input shaft of steering gear box.
- (2) Position gear box to pitman arm with slot in arm aligned with groove in steering gear box shaft (fig 2-264).

(3) Secure gear box to carrier with three screws, lock washers, and nuts. Torque nuts to 70-100 **lbs-ft.**

(4) Secure pitman arm to steering gear box with screw, washer, and nut. Torque nut to 95.120 lbs-ft.

(5) Slide steering torque tube to the rear until universal joint goes onto steering gear input shaft. Secure with screw, washer, and nut. Torque nut to 15-24 lbs-ft.

(6) Ensure that aligning marks on steering wheel hub and steering column align with wheels in a straight ahead position. Report to Direct Support for wheel alignment.

(7) Service gear box (refer to LO 9-2320-242-121).

(8) Check for synchronized front-rear steering (refer to TM 9-2320-242-10 for procedure).

(9) Install access panel and secure with twenty-eight screws.

(10) Test drive vehicle to check for proper operation of steering gear box (refer to TM 9-2320-242-10 for operating instructions).

2-175. Tractor Pitman Arm

a. Removal.

(1) Remove two nuts, washers, and cotter pins securing tie rod and intermediate rod to pitman arm. Remove tie rod and intermediate rod from pitman arm, using tie rod removal tool (11595179). Remove and discard tie rod and intermediate rod seals and cotter pins (fig 2-260).

(2) Remove pitman arm by removing nut, screw, and lock washer securing pitman arm to steering gear box shaft.

b. Installation.

(1) Position pitman arm on steering gear box shaft (fig 2-260). Align slot in pitman arm with index mark on steering gear box shaft.

(2) Secure pitman arm with screw, lock washer, and nut. Torque nut to 95-120 lbs-ft.

(3) Install seals on tie rod and intermediate rod. Position tie rod and intermediate rod to pitman arm and secure with two nuts, washers and cotter pins.

(4) Test drive vehicle to check for proper steering (refer to TM 9-2320-242-10 for operating instructions). If necessary, align wheels (refer to **para** 2-169).

2-176. Carrier Pitman Arm

a. Removal.

(1) Remove nut and cotter pin securing pitman arm to *intermediate* rod assembly (fig 2-265).

(2) Remove nut, lock washer, and screw securing pitman arm to steering gear box.

(3) Remove pitman arm from steering gear shaft and intermediate rod.

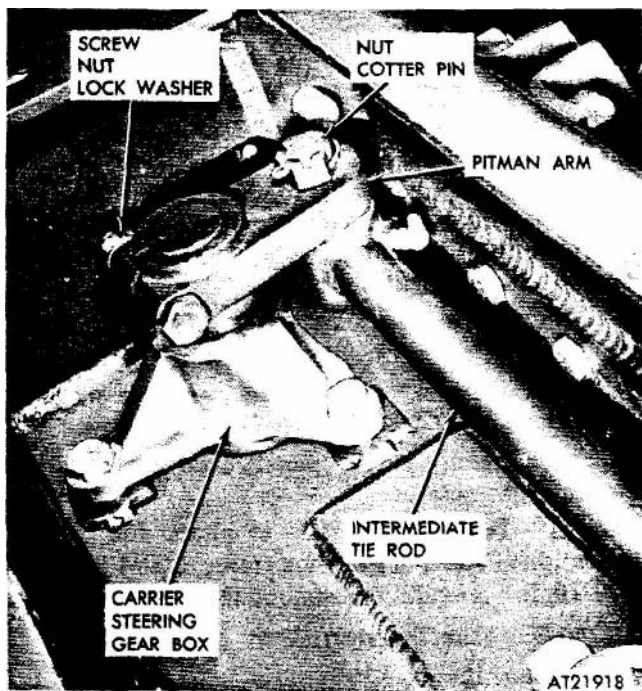


Figure 2-265. Carrier pitman arm, removal and installation.

b. Installation.

(1) Position pitman arm on steering gear box shaft. Align slot in pitman arm with index mark on steering gear box shaft (fig 2-265).

(2) Secure pitman arm with screw, lock washer, and nut. Torque nut to 95-120 lbs-ft.

(3) Install seals on tie rod and intermediate rod. Position tie rod and intermediate rod to pitman arm and secure with two nuts and cotter pins.

(4) Test drive vehicle to check proper steering (refer to TM 9-2320-242-10 for operating instructions). If necessary, align wheels (refer to para 2-169).

2-177. Tractor Idler Arm

a. Removal.

(1) Remove cotter pins, washers and nuts securing tie rod and intermediate rod to idler arm (fig 2-266).

(2) Disconnect tie rod and intermediate rod from idler arm, using tie rod removal tool (11595179). Remove and discard seals.

(3) Remove idler arm by removing nut, lock washer, and screw securing idler arm to idler housing assembly shaft.

b. Installation.

(1) Position idler arm to idler housing assembly shaft. Secure arm with screw, lock washer, and nut. Torque nut to 95-120 lbs-ft.

(2) Position seals on intermediate rod and tie rod and position to idler arm.

(3) Secure intermediate rod and tie rod to idler arm with two nuts, washers and cotter pins.

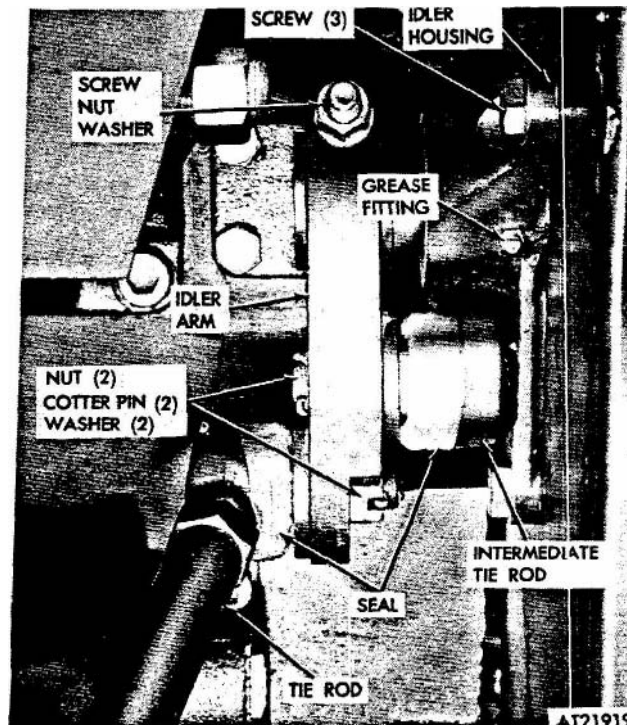


Figure 2-266. Tractor idler arm and housing, removal and installation.

2-178. Carrier Idler Arm

a. Removal.

(1) Remove cotter pin and nut securing idler arm to intermediate rod assembly (fig 2-267).

(2) Remove idler arm by removing screw, nut, and lock washer securing idler arm to idler housing assembly shaft.

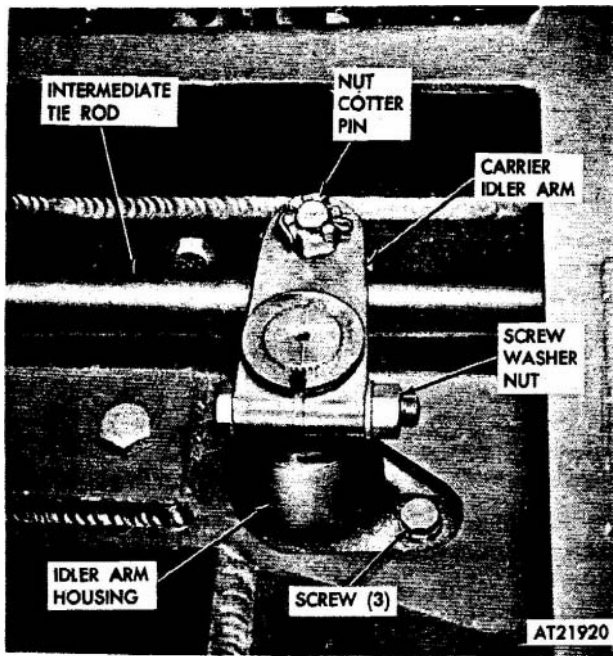


Figure 2-267. Carrier idler arm and housing, removal and installation.

b. Installation.

(1) Position idler arm to idler housing assembly shaft and intermediate rod shaft (fig 2-267).

(2) Secure idler arm to intermediate rod assembly with nut and cotter pin.

(3) Secure idler arm to idler housing shaft with bolt, lock washer, and nut. Torque nut to 95-120 lbs-ft.

2-179. Tractor Idler Housing Assembly

a. Removal.

(1) Remove cotter pins, washers and nuts securing tie rod and intermediate rod to idler arm (fig 2-266).

(2) Disconnect tie rod and intermediate rod, using removal tool (11595179). Remove seals.

(3) Remove idler arm by removing screw, nut and lock washer securing idler arm.

(4) Remove idler housing assembly by removing three screws housing to tractor frame.

b. Installation.

(1) Position idler housing assembly to mounting holes and secure with three screws. Torque screws to 45-55 lbs-ft. (fig 2-266).

Note: If damaged, remove and replace grease fitting.

(2) **Position idler** arm to idler housing

assembly shaft and secure with screw, nut, and lock washer. Torque nut to 95-120 lbs-ft.

(3) Install seals on tie rod and intermediate rod and position rods to idler arm.

(4) Secure tie rod and intermediate rod to idler arm with two nuts, washers and cotter pins.

(5) Service idler housing assembly (refer to LO 9-2320-242-12).

2-180. Carrier Idler Housing Assembly

a. Removal.

(1) Remove cotter pin and nut securing intermediate rod to idler arm (fig 2-267).

(2) Disconnect intermediate rod from idler arm.

(3) Remove idler arm by removing bolt, nut, and lock washer securing idler arm to idler housing shaft.

(4) Remove idler housing assembly by removing three screws securing housing to carrier frame.

b. Installation

(1) Position idler housing assembly to mounting holes and secure with three screws. Torque screws to 45-55 lbs-ft. (fig 2-267).

Note: If damaged, remove and replace grease fitting.

(2) Position idler arm to idler housing shaft and intermediate rod shaft.

(3) Secure idler arm to intermediate rod shaft with nut and cotter pin. Secure idler arm to idler housing shaft with screw, washer, and nut. Torque nut to 95-120 lbs-ft.

(4) Service idler housing assembly (refer to LO 9-2320-242-12).

2-181. Tractor Intermediate Tie Rod

a. Removal.

(1) Remove two cotter pins, nuts, and washers securing rod ends of intermediate rod assembly to idler and pitman arms (fig 2-268). Turn steering to a convenient position.

(2) Remove rod ends of intermediate rod assembly from idler and pitman arms using removal tool (11595179).

(3) Remove nut, lock washer, and bolt securing pitman arm to steering gear box. Remove arm from shaft.

(4) Remove nut, lock washer, and bolt securing idler arm to idler arm shaft. Remove arm from shaft.

(5) Remove intermediate rod from right-hand side of vehicle.

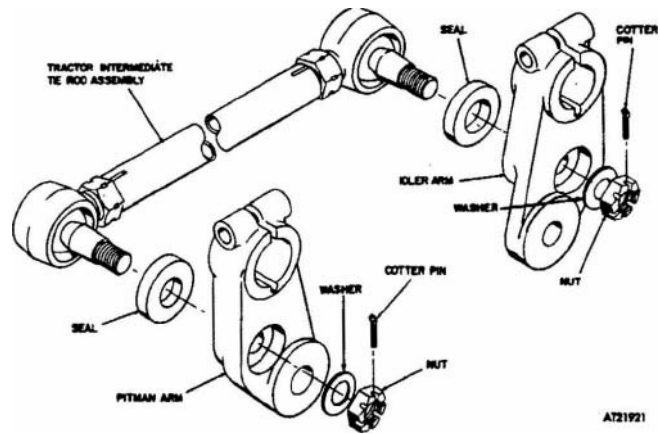


Figure 2-268. Tractor intermediate tie rod, removal and installation.

b. Disassembly.

(1) Loosen jam nuts securing rod ends to intermediate tube (fig 2-269).

(2) Remove rod ends from intermediate tube. Remove jam nuts from rod ends.

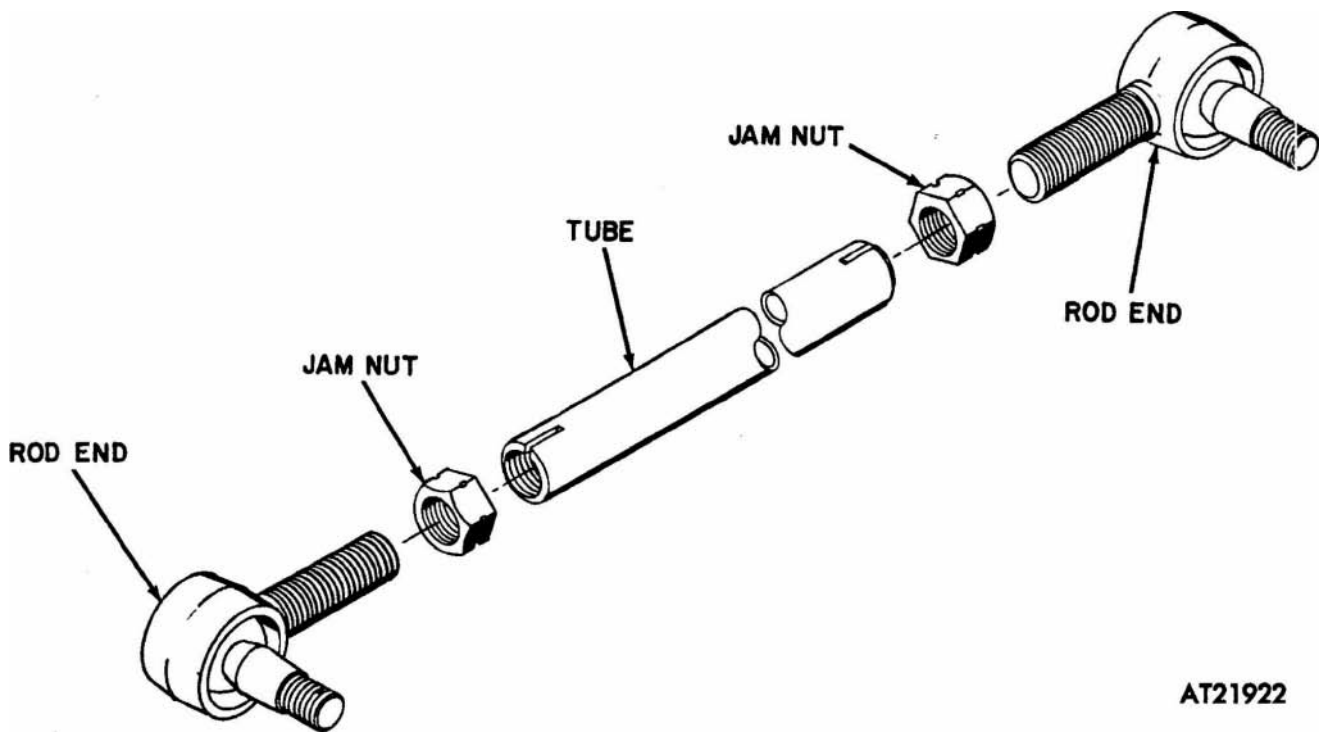


Figure 2-269. Tractor intermediate tie rod, disassembly and assembly.

c. *Clean, Inspection and Repair.*

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, dents, burrs, or other damage. Inspect rod end bearings for freedom of movement. Binding or loose bearing is cause for replacement.

(3) Repair tie rod assembly using repair kit (refer to TM 9-2320-242-20P).

d. *Assembly.*

(1) Install jam nuts on rod ends and install on intermediate tube (fig 2-269).

(2) Adjust rod ends to attain measurement of **31-3/4** inches (between centers of rod ends). Secure rod ends by torquing nuts against tube **90-100 lbs-ft.**

e. *Installation.*

(1) Check to ensure that measurement between center of rod ends is 31-3/4 inches. If necessary, loosen jam nuts securing rod ends and adjust to attain measurement. Torque nuts securing rod ends 90-100 lbs-ft.

(2) Position intermediate rod assembly in its respective location on vehicle (fig 2-268).

(3) Install idler arm on idler arm shaft and secure with screw, lock washer and nut. Torque nut to **95-120** lbs-ft.

(4) Position pitman arm on steering gear box shaft. Align slot in pitman arm with index mark on steering gear box shaft and secure with screw, washer, and nut. Torque nut to **95-120** lbs-ft.

(5) Install a seal on each of the rod ends of intermediate tie rod assembly. Secure with two nuts, washers and cotter pins.

(6) Perform wheel alignment (para 2-169).

2-182. Carrier Intermediate Tie Rod

a. *Removal.*

(1) Remove cotter pins and nuts securing **left- and right-hand** tie rod assemblies to intermediate tie rod. Disconnect tie rods from intermediate tie rod using removal tool (11595179). Discard seals (fig 2-270).

(2) Remove cotter pins, washers and nuts securing idler arm and pitman arm to intermediate rod (fig 2-271).

(3) Remove nut, lock washer, and screw securing idler arm to idler housing assembly.

(4) Remove nut, lock washer, and screw securing pitman to steering gear box output shaft.

(5) Disconnect pitman and idler arms from the intermediate tie rod assembly, idler housing and steering gear box. Remove intermediate rod assembly.

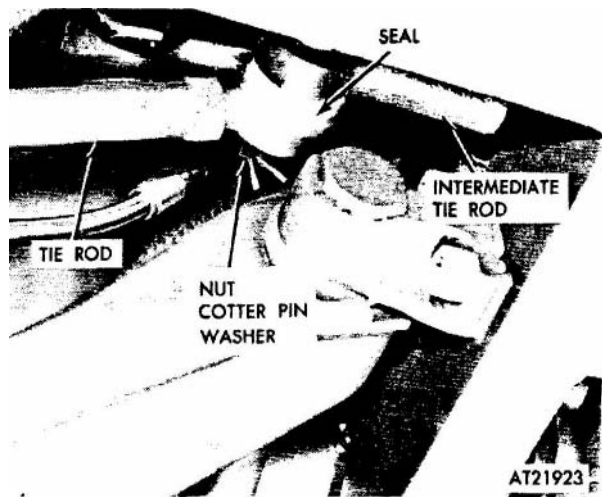


Figure 2-270. Carrier intermediate tie rod (at tie rod), removal and installation.

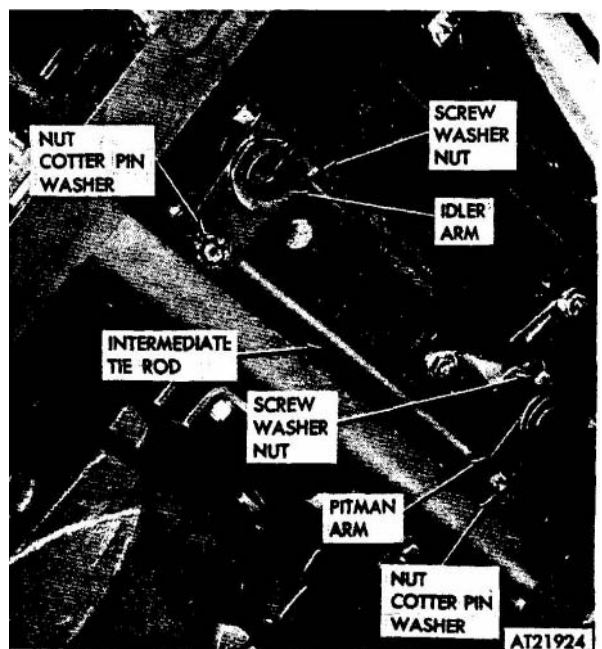


Figure 2-271. Carrier intermediate tie rod (at idler and pitman arms), removal and installation.

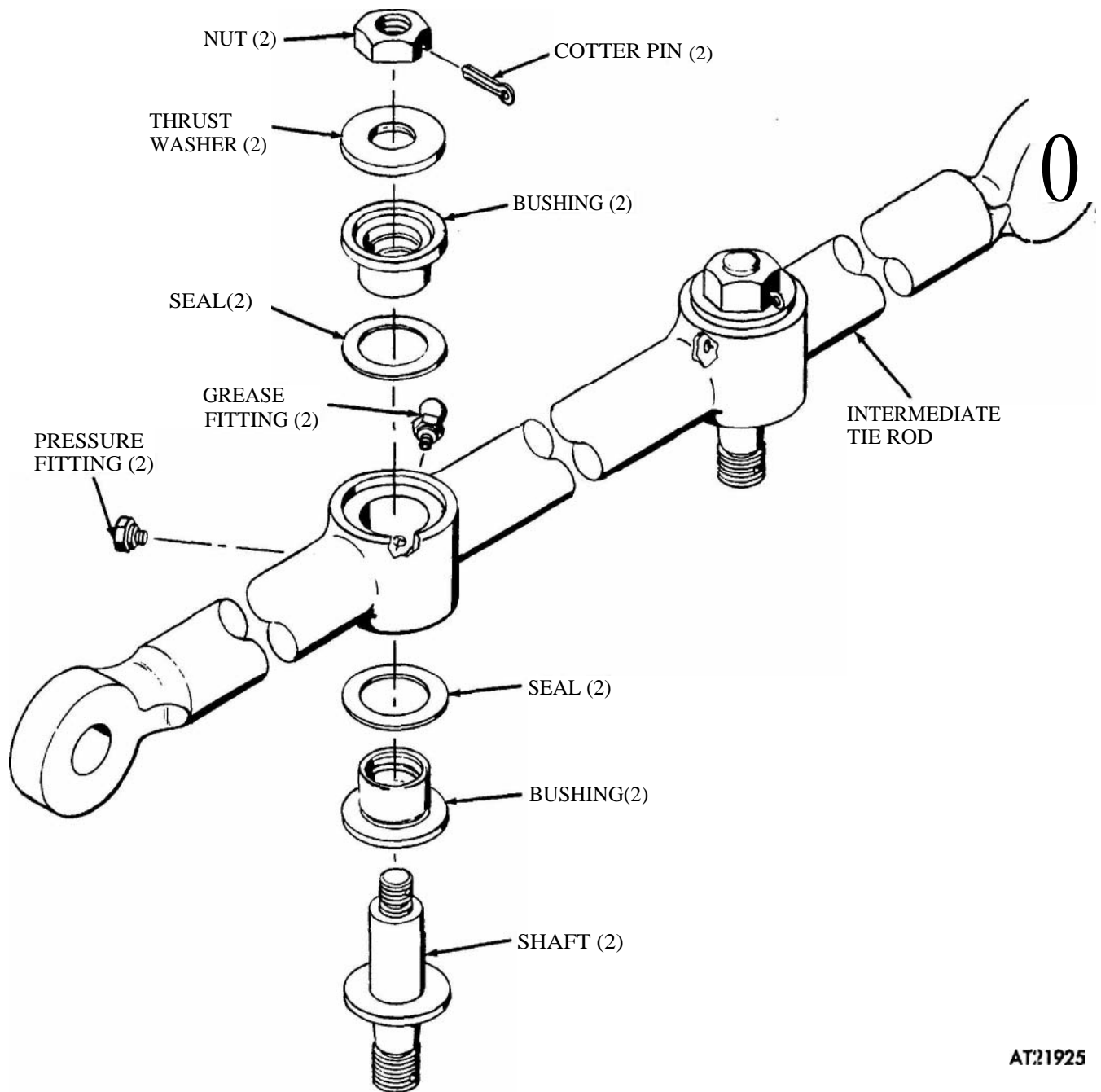
b. *Disassembly.*

(1) Clean intermediate rod in area of grease and pressure relief fittings. If damaged, remove and discard fittings (fig 2-272).

(2) Remove two cotter pins and nuts securing shafts to intermediate rod.

(3) Tap shafts out of intermediate rod and remove washers.

(4) Remove four bushings and seals from intermediate rod. Discard seals.



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Figure 2-272. Carrier intermediate tie rod, disassembly and assembly

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, dents, or other damage. Inspect shafts for excessive wear. If damaged, replace grease or pressure relief valve fitting.

(3) Repair intermediate rod assembly using repair kit (refer to TM 9-2320-242-20P).

d. Assembly.

(1) Position the four seals on intermediate rod and press four bushings into intermediate rod (fig 2-272).

(2) Insert two shafts into intermediate rod.

(3) Install four washers, nuts, and cotter pins securing shafts to intermediate rod.

(4) Install and secure two grease and pressure relief fittings in intermediate rod.

e. *Installation.*

(1) Position intermediate rod assembly in its respective location on vehicle.

(2) Position pitman and idler arms on intermediate rod assembly, idler housing, and steering gear box shafts. Secure pitman and idler arms to intermediate rod assembly with two nuts, washers and cotter pins. Secure pitman and idler arms to steering gear box and idler housing shafts with two screws, lock washers, and nuts (fig 2-271). Torque nuts to 95-120 lbs-ft.

Note: Pitman arm slot is to be installed in line with groove on steering gear box output shaft.

(3) Install two seals onto left and right tie rods. Position on intermediate rod assembly ends. Secure tie rods to intermediate rod assembly with nuts, washers and cotter pins (fig 2-270).

(4) Service intermediate tie rod assembly (refer to LO 9-2320-242-12).

(5) Perform wheel alignment (refer to para 2-169).

2-183. Tractor and Carrier Tie Rod Assemblies

a. *Removal.*

(1) Remove cotter pin, washer and nut securing tie rod end to steering knuckle (fig 2-273).

(2) Separate tie rod end from steering knuckle, using removal tool (11595179) (fig 2-274).

(3) Remove cotter pin, washer and nut securing other end of tie rod to carrier intermediate rod or from tractor pitman or idler arms and separate using removal tool (11595179) (fig 2-274).

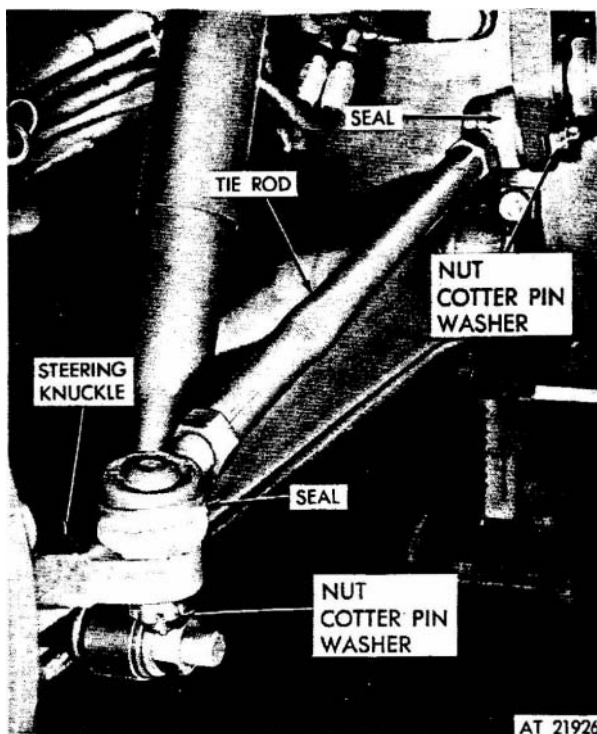


Figure 2-273. Tie rod assembly, removal and installation.

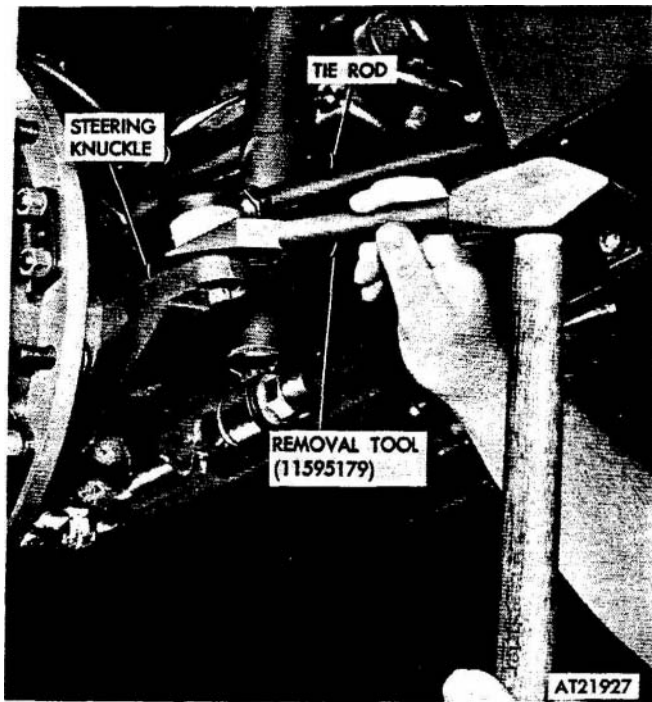


Figure 2-274. Tie rod removal tool.

b. *Disassembly.*

- (1) Loosen jam nuts securing rod ends to tie rod tube (fig 2-275).
- (2) Remove rod ends from tie rod tube. Remove jam nuts from rod ends.

c. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, dents, burrs, or other damage. Inspect rod end bearings for freedom of movement. Binding or loose bearing is cause for replacement.

- (3) Repair tie rod assembly using repair kit (refer to TM 9-2320-242-20P).

d. *Assembly.*

- (1) Install jam nuts on rod ends and install on tie rod tube (fig 2-275).

- (2) Adjust rod ends to attain measurement of $17-5/32 \pm 1/32$ inches (between centers of rod ends). Secure rod ends by tightening jam nuts against tube.

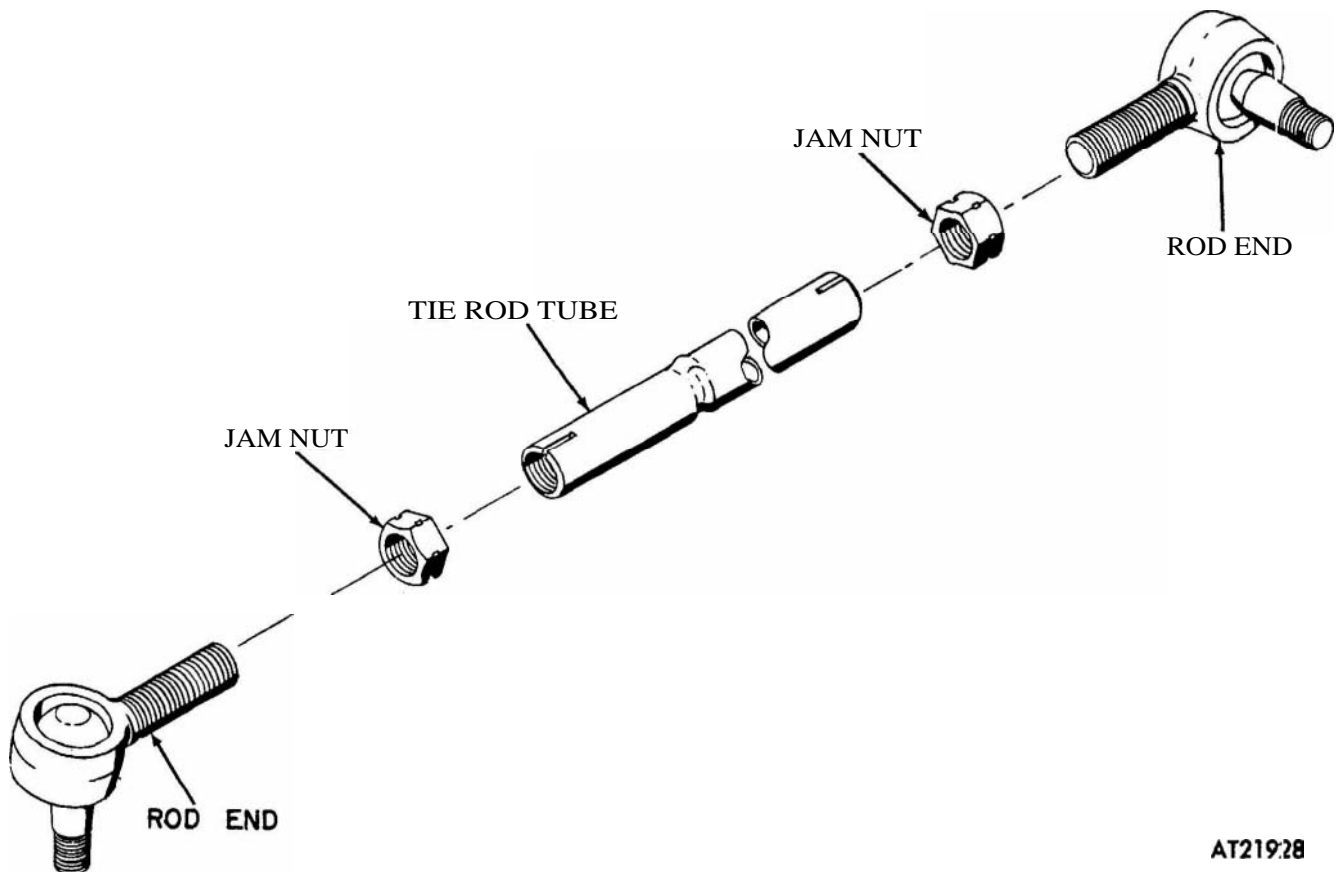


Figure 2-275. Tie rod, disassembly and assembly.

e. Installation.

(1) Check to ensure that measurement between center of rod ends is 17-5 / $32 \pm .01$ / 32 inches. If necessary, loosen jam nuts securing rod ends and adjust to attain measurement. Tighten jam nuts securing rod ends.

(2) Position seals on tie rod assembly and secure inner rod end to pitman or idler arm or carrier intermediate rod and outer rod end to steering knuckle.

(3) Secure tie rod ends with two nuts and cotter pins.

(4) Perform wheel alignment (refer to para 2-169).

2-184. Tractor Front Torque Tube, Bearing Assembly, and Universal Joints

a. Removal.

(1) Remove nut, lock washer, and screw securing universal joint to steering gear box shaft (fig 2-276).

(2) Remove nut, lock washer, and screw securing universal yoke to main tractor torque tube.

(3) Remove nut and lock washer securing bearing to mounting bracket. Disconnect bearing from bracket. Remove front torque tube assembly.

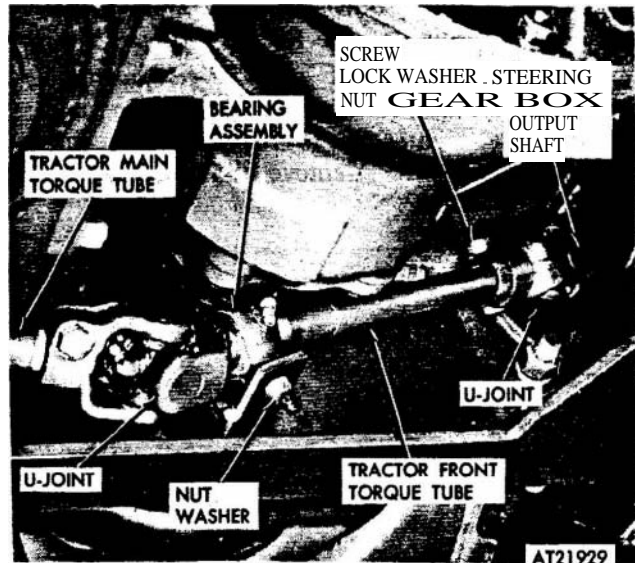


Figure 2-276. Tractor front torque tube, removal and installation.

b. Disassembly.

(1) Remove nut, lock washer, and screw securing universal yoke to steering gear box output shaft. Remove universal joint.

(2) Slide bearing from front torque tube (fig 2-277 I).

(3) Disassemble universal yoke and journal assemblies according to the following steps:

(a) Place universal joint in vise using a suitable tool (socket wrench) between bushing and one jaw of vise. **Tighten vise** to relieve retaining ring **on inside of yoke boss. Remove retaining ring.**

(b) Remove remaining retaining ring, refer to (a) above.

(c) Place yoke in vise. Press bushing from yoke, using a suitable tool.

(d) Remove remaining bushings refer to (c) above for procedure. Discard bushings.

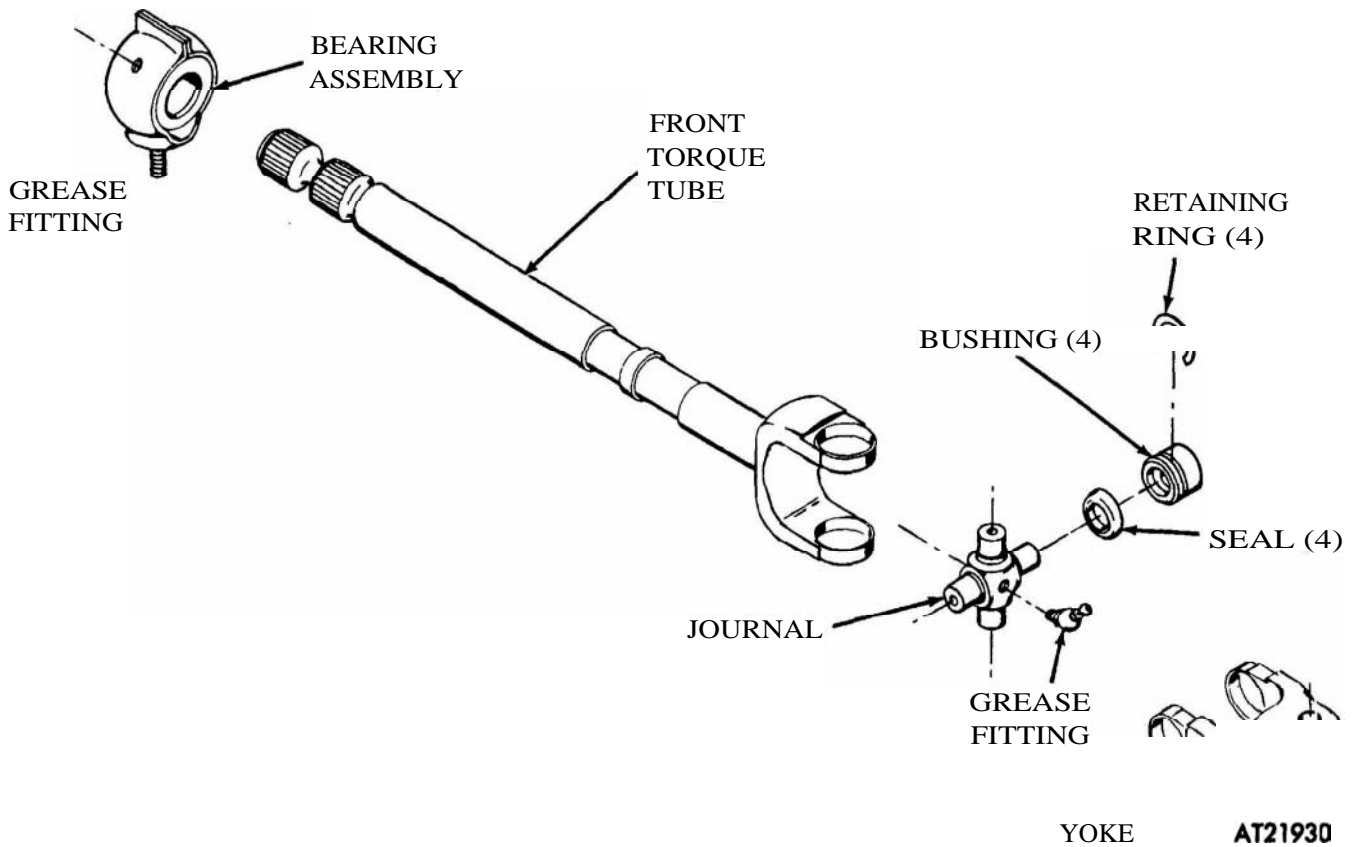


Figure 2-277. Tractor front torque tube, disassembly and assembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, dents, burrs, or other damage. Inspect bearing for freedom of movement. Binding or loose bearing is cause for replacement. Replace grease fittings if damaged.

(3) Repair front torque tube bearing, or universal joints using repair kit (refer to TM 9-2320-242-20P).

d. Assembly.

(1) If disassembly of universal joint has been accomplished comply with the following steps:

(a) Position cross of journal assembly to yoke. Place two bushings in mating yoke holes. Position **one** bearing surface of cross into mating bushing.

(b) Place yoke in vise. Position cross in line with mating bushing. Close vise until exposed faces of bushings are flush with outer edge of yoke bosses.

(c) Open vise and place a suitable tool between vise jaw and bushing. Close vise until retaining ring can be inserted into groove inside yoke boss. Install two retaining rings.

(d) Install remaining two bushings, refer to (a) and (b) above for procedure.

(e) Install two retaining rings, refer to (c) above for procedure.

(2) Service universal joints (refer to LO 9-2320-242-12).

(3) Apply a light coat of grease (GAA) to bearing and bearing location on front torque tube. Slide bearing into position on shaft.

(4) Install universal joint on front torque tube (attaching to steering gear box output shaft). Secure universal yoke to shaft with screw, nut, and lock washer. Torque nut to 15-24 lbs-ft.

e. Installation.

(1) Position front steering shaft universal yoke to main tractor steering shaft. Secure universal yoke to shaft with screw, lock washer and nut. Torque nut to 15-24 **lbs-ft.**

(2) Guide bearing mounting stud into hole in mounting bracket. Install lock washer and nut securing bearing to bracket. Torque nut to 8-12 **lbs-ft.**

(3) Install screw, nut, lock washer securing shaft universal joint and main tractor torque tube. Torque nut to 15-24 lbs-ft.

2-185. Tractor Main Torque Tube and Universal Joint

a. Removal.

(1) Remove bolt, lock washer, and nut securing main torque tube to universal yoke of front torque tube (fig 2-2781).

(2) Remove bolt, lock washer, and nut securing main torque tube universal to center shaft. Remove main torque tube.

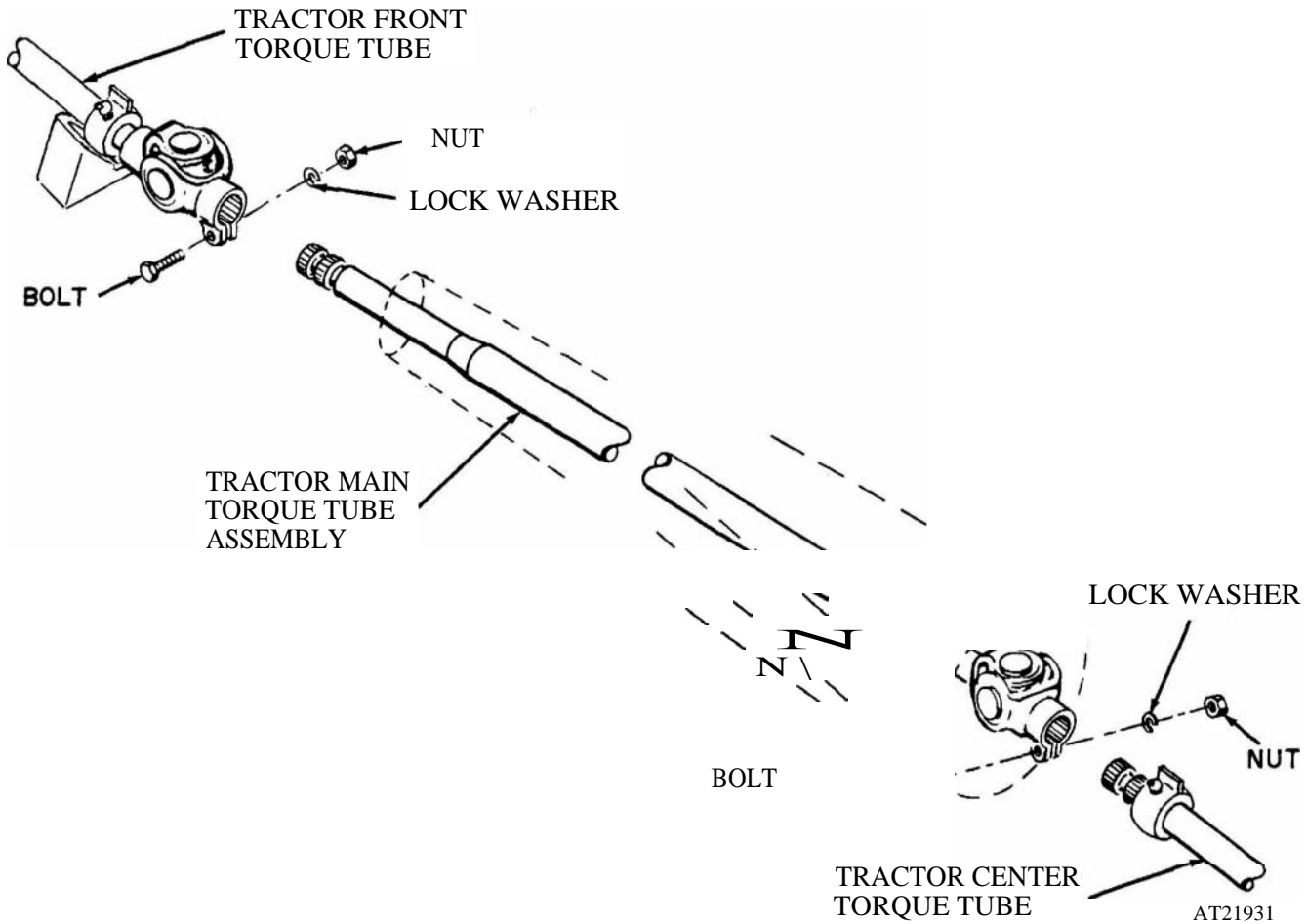


Figure 2-278. Tractor main torque tube, removal and installation.

b. Disassembly.

(1) Place universal yoke or joint in vise using a suitable tool (socket wrench) between bushing and one jaw of vise. Tighten vise to relieve retaining ring on inside of yoke boss. Remove ring (fig 2-279).

(2) Remove remaining retaining ring, refer to (1) above for procedure. Discard rings.

(3) Place yoke in vise. Press bushing from yoke, using a suitable tool.

(4) Remove remaining bushings refer to (3) above for procedure. Discard bushings.

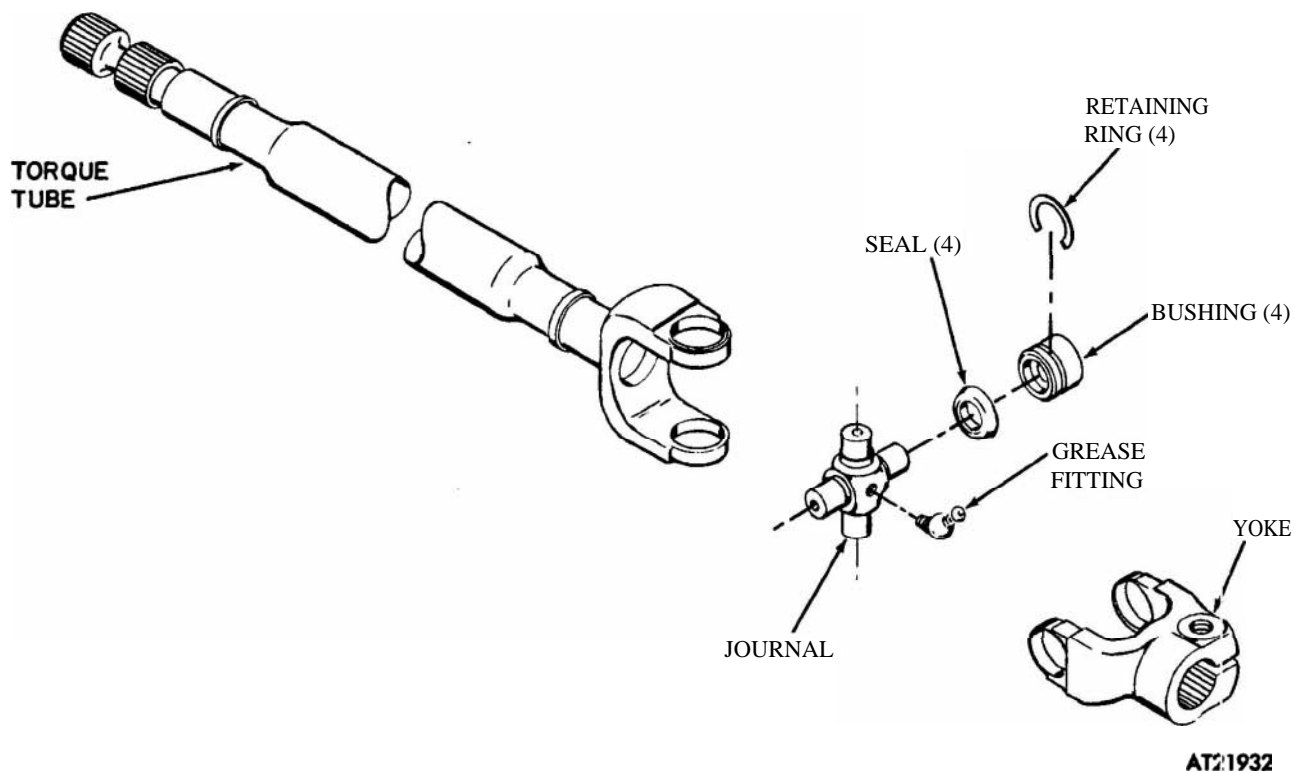


Figure 2-279. Tractor main and carrier torque tube, disassembly and assembly.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, dents, burrs, or other damage. Replace grease fittings if damaged.
- (3) Repair main torque tube and universal joint using repair kit (refer to TM 9-2320-242-20P).

d. Assembly.

- (1) Position cross of universal journal assembly to yoke. Place two bushing in mating yoke holes. Position one bearing surface of cross onto mating bushing (fig 2-279).
- (2) Place yoke in vise. Position cross in line with mating bushings. Close vise until exposed faces of bushings are flush with outer edge of yoke bosses.
- (3) Open vise and place a suitable tool between vise jaw and bushing. Close vise until retaining ring can be inserted into groove inside yoke boss. Install two retaining rings.
- (4) Install remaining two bushing, refer to (1) **above** and (2) for procedure.

- (5) Install two retaining rings, refer to (3) above for procedure.

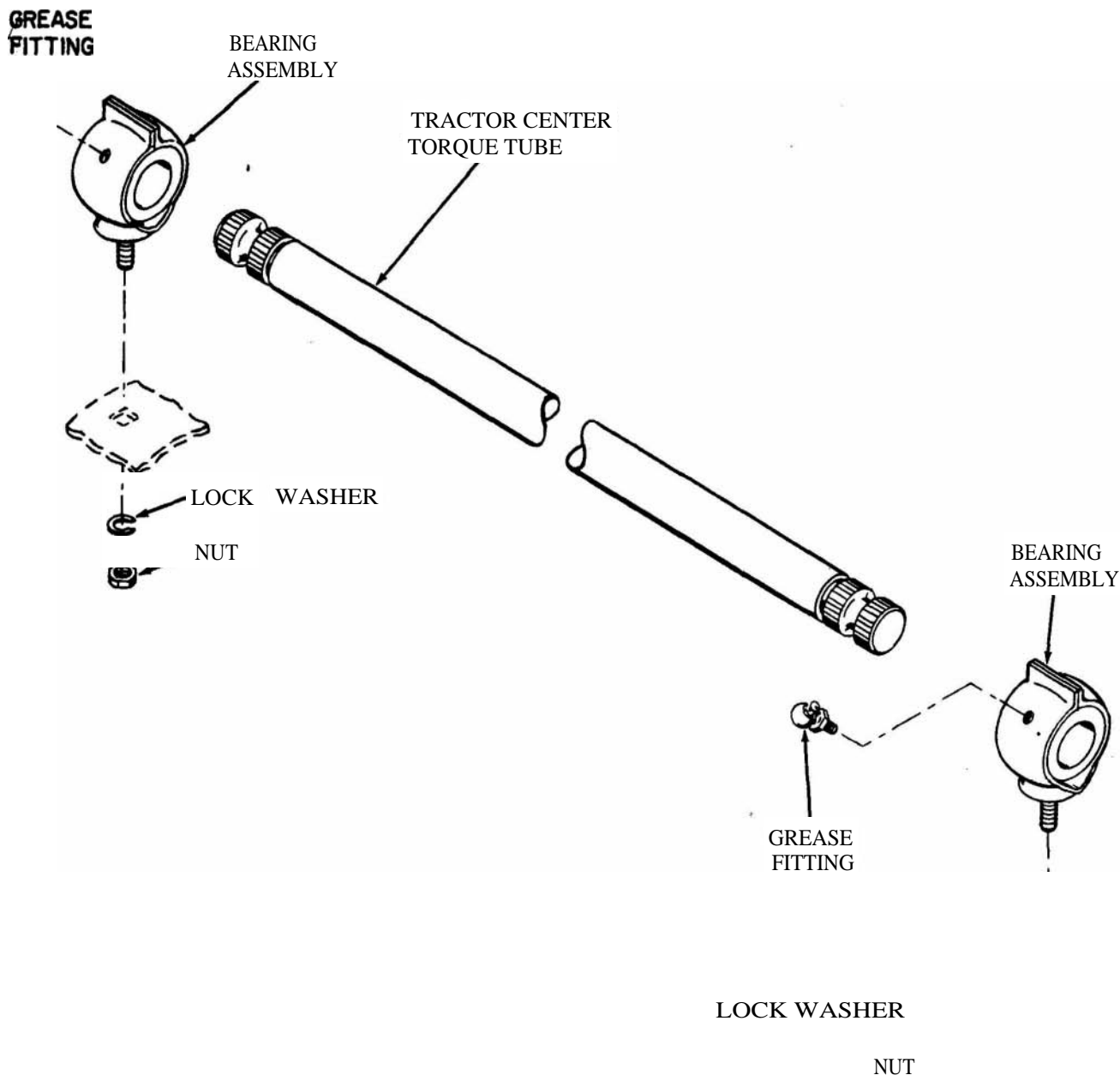
e. Installation.

- (1) Position main torque tube universal joint on center torque tube. Secure universal yoke to tube with bolt, lock washer, and nut. Torque nut to 15-24 **lbs-ft.** (fig 2-278).
- (2) Position forward end of main torque tube to universal yoke on front torque tube. Secure tube to yoke with bolt, lock washer, and nut. Torque nut to 15-24 lbs-ft.

2-186. Tractor Center Torque Tube and Bearing Assemblies

a. Removal.

- (1) Remove screw, lock washers, **nuts**, securing center torque tube to universal yokes.
- (2) Remove lock washers and nuts securing bearings to tractor center differential. Remove center torque tube assembly by compressing slip-joint steering until center torque tube is free of universal yoke (fig 2-280).
- (3) Slide bearings from center torque tube.



LOCK WASHER

NUT

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Figure 2-280. Tractor center torque tube, removal and installation.

b. Installation.

(1) Apply a light coat of grease (GAA) to bearings and bearing locations on torque tube. Slide bearings into position on torque tube.

(2) Position center torque tube on universal yokes and align bearings (pillow blocks) to tractor center differential. Secure bearings with lock washers and nuts. Torque nuts to 8-12 lbs-ft.

(3) Secure center torque tube to universal yoke with screw, lock washer, and nut. Torque nut to 15-24 lbs-ft.

2-187. Carrier Torque Tube, Universal Joints, Bearing, and Mounting Bracket

a. Removal.

(1) Remove bolt, lock washer, and nut securing universal yoke on carrier torque tube to steering gear box input shaft (fig 2-281).

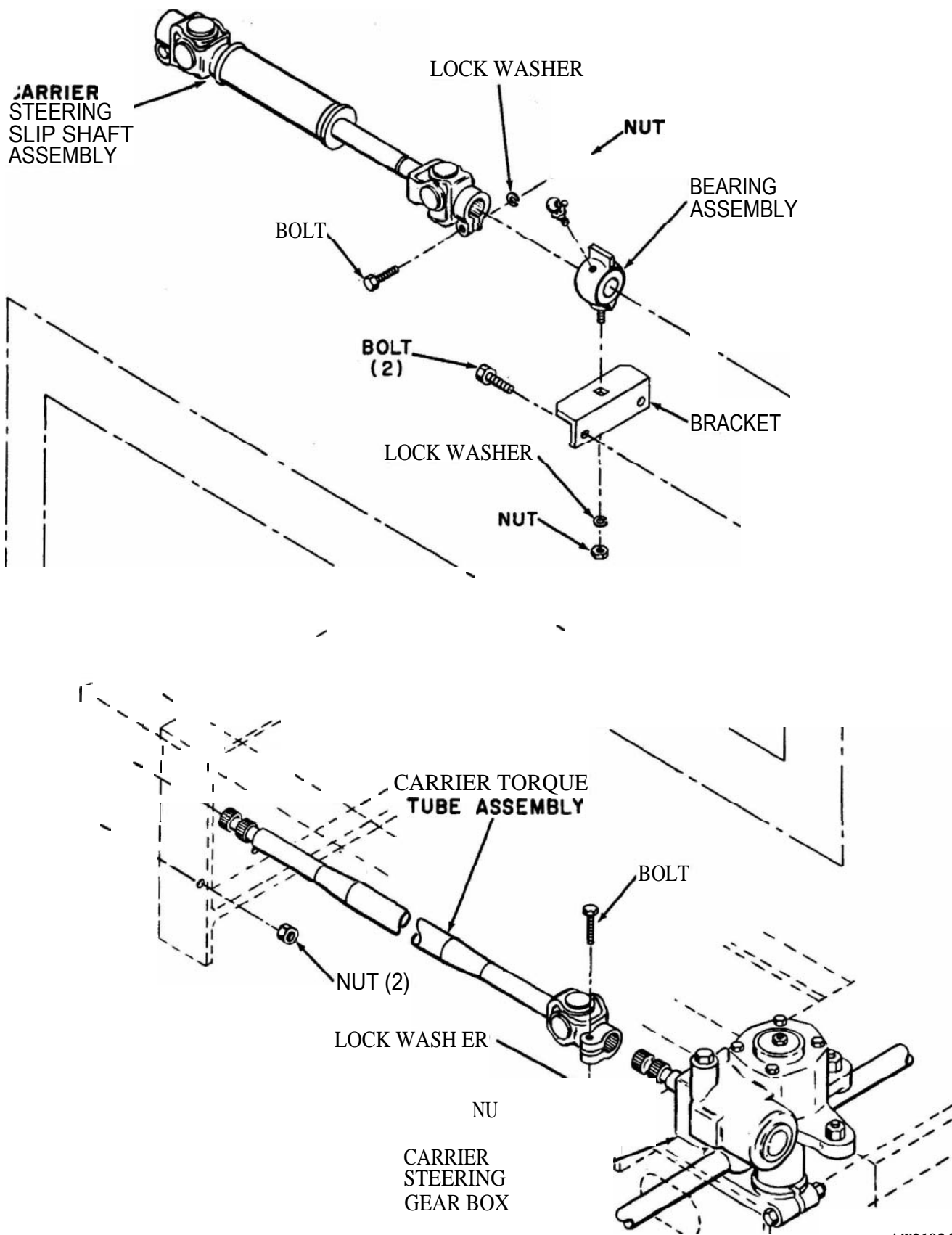
(2) Remove bolt, lock washer, and nut securing torque tube to universal yoke on slip shaft.

(3) Compress slip-joint steering shaft until yokes are free of tube ends. Remove carrier torque tube by sliding from bearing assembly.

(4) Remove nut and washer securing bearing

(pillow block) to bracket assembly. Remove bearing.

(5) remove two bolts and nuts securing bracket to carrier structure.



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Figure 2-281. Carrier torque tube, removal and installation.

Disassembly. If necessary, disassemble **universal** yoke and journal assemblies (refer to para 2-184 *b.* (3), and fig 2-2791).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, dents, burrs or other damage. Inspect bearing for freedom of movement. Binding or loose bearing is cause for replacement. Replace grease fitting if damaged.

(3) Repair assemblies using repair kit (refer to TM 9-2320-242-20P).

d. Assembly. Assemble universal yoke and journal assemblies (refer to **para** 2-1844. (1) and fig 2-279).

e. Installation.

(1) Position bracket to carrier structure. Secure bracket with two bolts and nuts. Torque nuts 14-22 lbs-ft. (fig 2-281).

(2) Position bearing to bracket and secure with lock washer and nut. Torque nut to 8-12 **lbs-ft.**

(3) Slide torque assembly into bearing assembly and position tube rear end to steering gear

box input shaft. Secure universal yoke on tube to input shaft with bolt, lock washer, and nut. Torque nut to 15-24 lbs-ft. (fig 2-281).

Note: Apply a light coat of grease (**GAA**) to bearing and bearing location on torque tube.

(4) Position universal yoke on **slip-joint** shaft assembly to forward end of torque tube, and secure with bolt, lock washer, and nut. Torque nut to 15-24 lbs-ft.

(5) **Service** universal joint (refer to LO 9-2320-242-12).

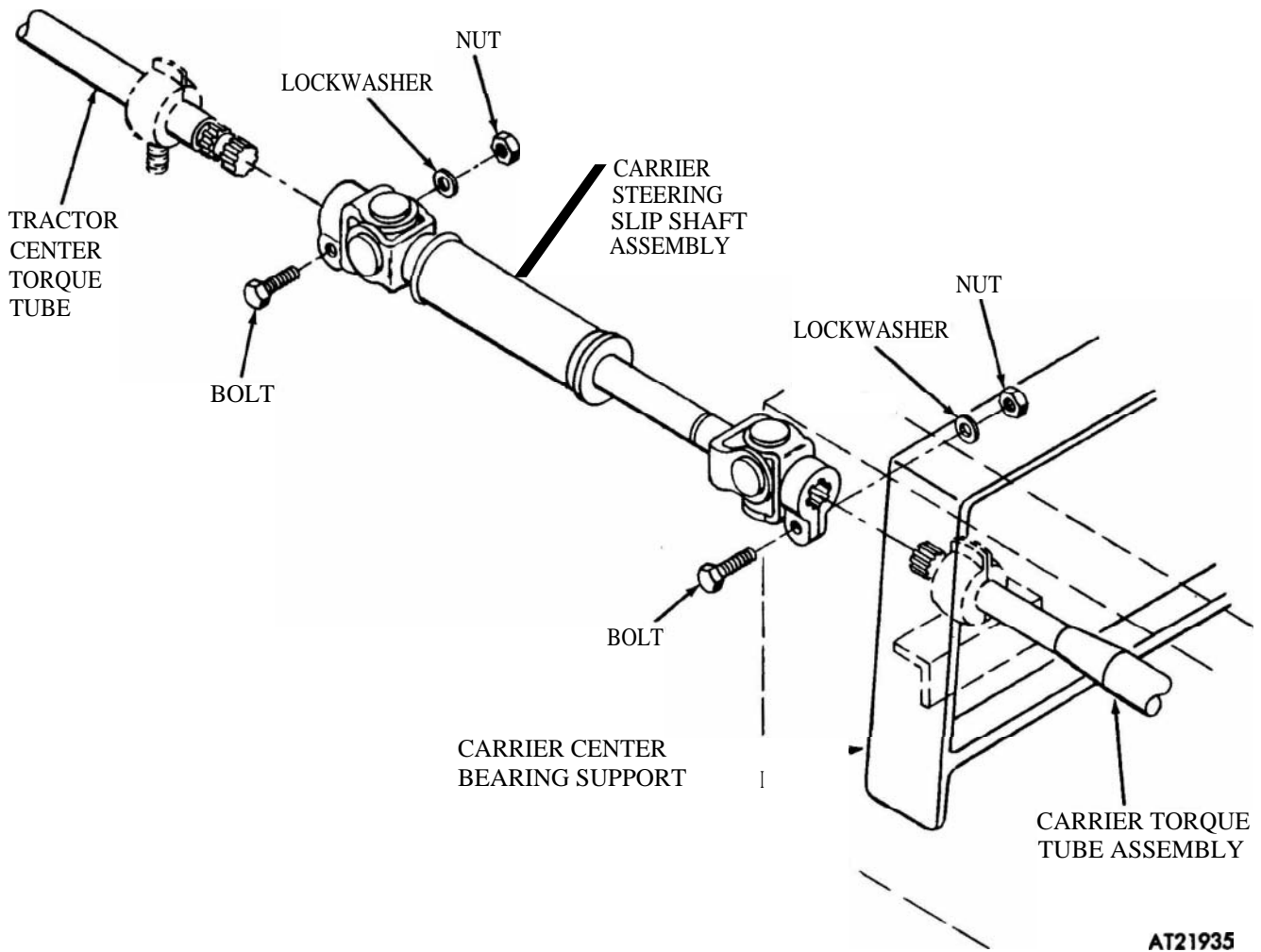
2-188. Carrier Steering Slip Shaft Assembly

a. Removal.

(1) Remove bolts, lock washer, and nut securing universal yoke on slip shaft to carrier torque tube (fig **2-282**).

(2) Remove bolts, lock washer, and nut securing universal yoke on slip shaft to center torque tube.

(3) Retract slip shaft assembly and remove.



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Figure 2-282. Carrier steering slip shaft, removal and installation.

b. Disassembly.

(1) Disassemble universal yoke and journal assemblies (refer to **para** 2-184 *b.* (3) and fig 2-2831.

(2) Disassemble **slip-joint** seal and cap

according to the following steps:

(a) Slide halves of slip-joint shaft apart.

(b) Remove dust cap with punch and small hammer. Remove and discard dust cap and seal.

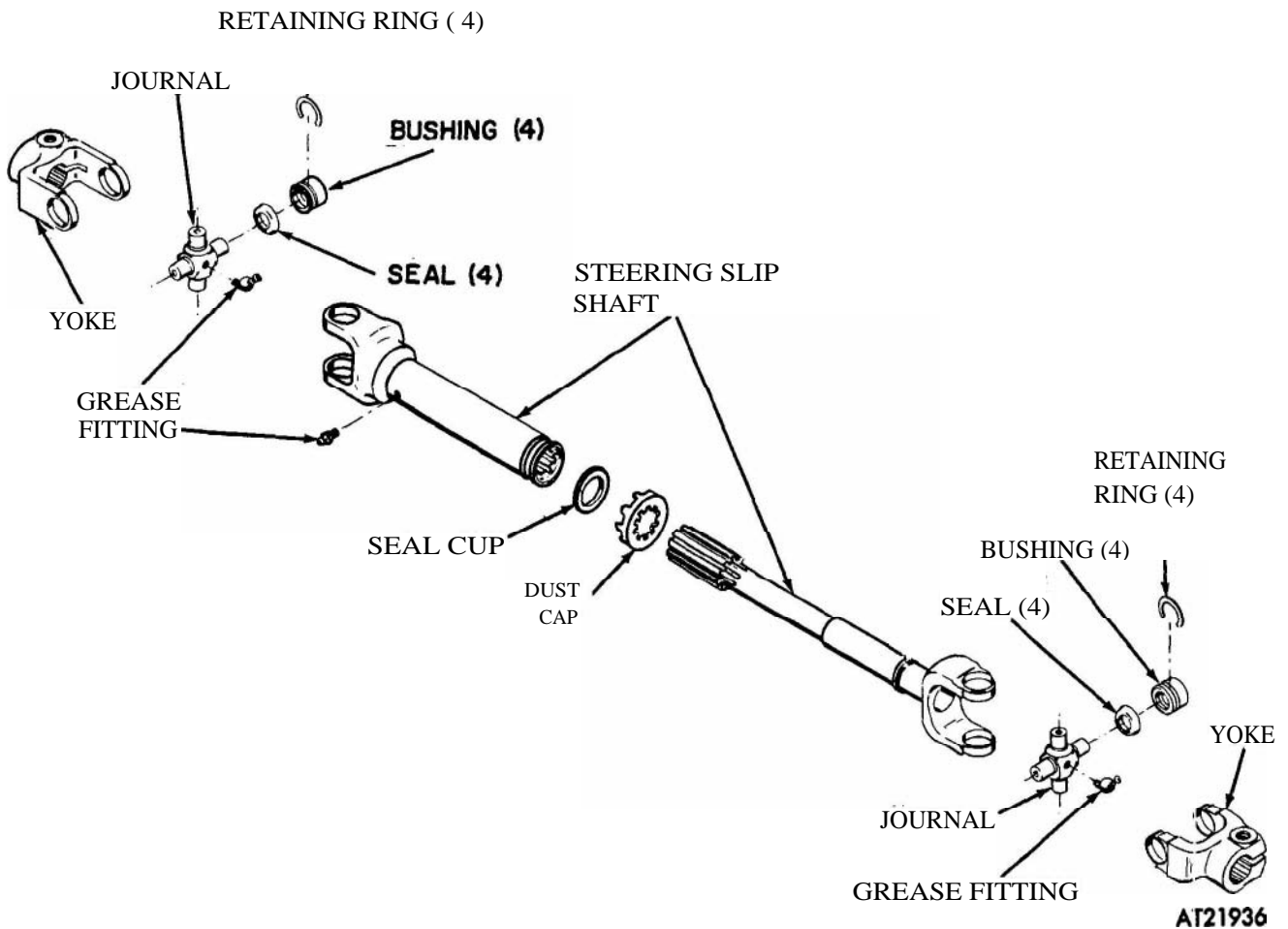


Figure 2-283. Carrier steering slip shaft, disassembly and assembly.

c. Cleaning, Inspection and Repair.

- (1) Clean all parts in an approved cleaning **solvent** and dry thoroughly.
- (2) Inspect all parts for cracks, dents, burrs, or other damage.
- (3) Repair slip shaft assembly using repair kit (refer to TM 9-2320-242-20P). Replace grease fitting if damaged.

d. Assembly.

- (1) Assemble universal yoke and journal assemblies (refer to *para* 2-184 *d.* (1) and fig 2-283).
- (2) Assemble **slip-joint** seal and cap according to the following steps:
 - (a) Position seal and dust cap on shaft.

(b) Align location marks on shafts and mate shafts.

(c) Secure dust cap with seal to shaft by tapping with a small hammer.

e. Installation.

- (1) Position forward end of slip shaft assembly to tractor center torque tube assembly (fig. 2-283).
- (2) Position rear end of slip shaft assembly to carrier torque tube assembly.
- (3) Secure steering slip shaft assembly yokes to tractor and carrier torque tube assemblies with two screws, lock washers, and nuts. Torque **nuts** to 15-24 **lbs-ft.**
- (4) Service universal joints and slip **shaft** (refer to LO 9-2320-242-12).

Section XXV. FRAME AND TOWING ATTACHMENTS

2-189. General

The frame and towing attachments consists of the front bumper, two carrier bumpers, on either side of the tailgate, four towing shackles, pintle assembly, and two tailgate bumpers. The front bumper is a one piece steel I-beam shaped bumper ; bolted to two brackets that are welded to the front frame of the tractor. The tractor bumper protects the front of the tractor from impacts. The two carrier bumpers are of a one piece, steel construction, which are bolted to the right and left of the carrier body. The carrier bumpers protect the carrier rear body from towed loads and other rear **end** impacts, on either side of the tailgate. There are a total of four towing shackles mounted on the vehicle. Two shackles are mounted to brackets, welded to the rear carrier frame below the tailgate and to the left and right of the pintle assembly. The towing shackles provide a means for towing, and / or lashing down for air, rail, highway transportation, and airdrop operations. The towing pintle assembly is a manual release type mounted to the center carrier frame below the tailgate. The pintle assembly provides an attachment point on the carrier for towing auxiliary equipment. The two tailgate bumpers are mounted to brackets, welded to the lower rear carrier frame, to the left and right of the pintle. The tailgate bumpers provide a cushion stop for the tailgate.

2-190. Front Bumper

a. Removal.

(1) Support front bumper and remove four screws and washers securing bumper to tractor (fig 2-284).

b. Installation.

(1) Position front bumper to tractor and secure with four screws and washers (fig 2-284).

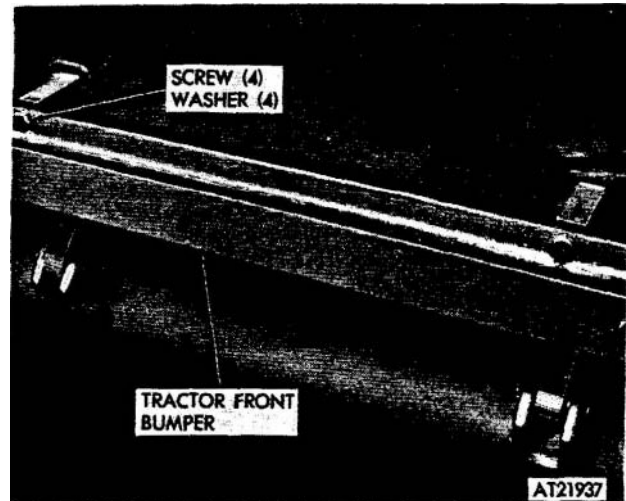


Figure 2-284. Front bumper, removal and installation.

2-191. Pintle Assembly

a. Removal.

(1) Remove cotter pin securing pintle shaft nut **and** remove nut and washer. Pull pintle assembly from carrier (fig 2-285).

(2) Remove nuts and screws securing pintle bracket to carrier and remove bracket (fig 2-286).

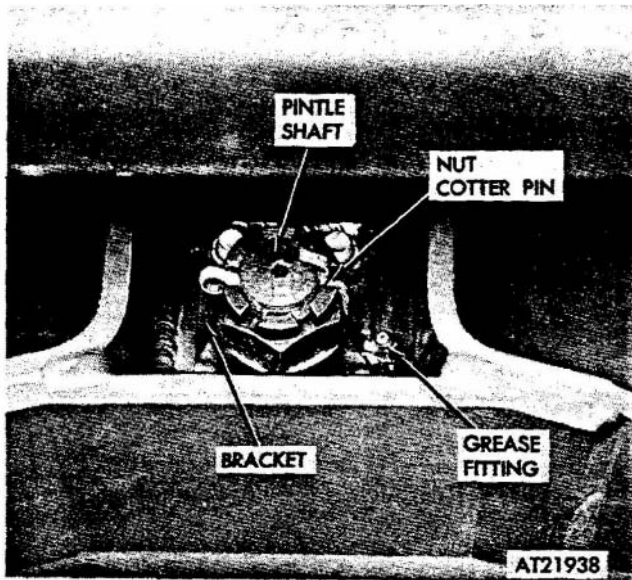


Figure 2-285. Pirate assembly (inside hull), removal and installation.

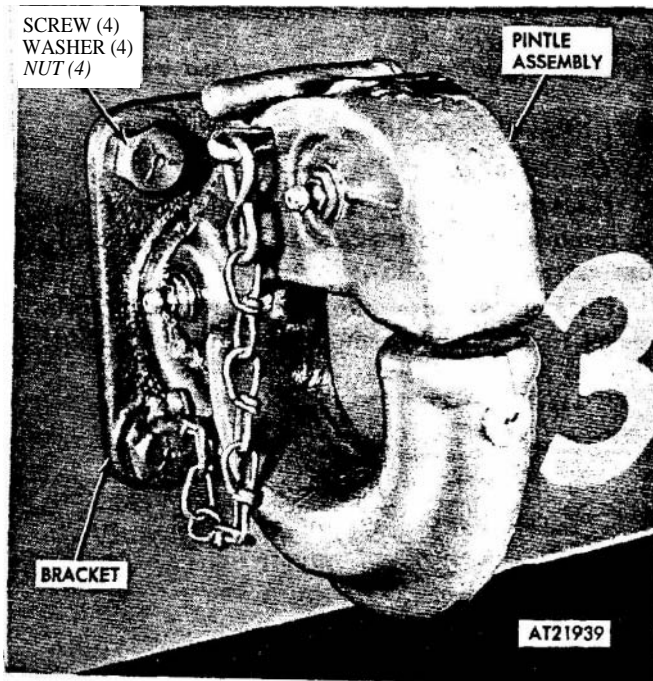


Figure 2-286. Pintle assembly (outside hull), removal and installation.

b. Installation.

(1) Clean dirt and grease from shaft hole in bracket and apply grease (GAA) to bracket bearing surface (fig 2-286).

(2) Align mounting holes of pintle bracket (without grease fitting) with mounting holes in carrier and insert four screws. Position bracket (with grease fitting) on threaded ends of bolts, with

lubrication fitting down, and start the four nuts. Tighten finger tight (figs 2-285 and 2-286).

(3) Grease pintle assembly fittings and shift (refer to LO 9-2320-242-12) and insert shaft into shaft bracket.

Note: If damaged, remove and replace grease fittings.

(4) Install washer, nut, and cotter pin securing pintle assembly to carrier. Secure bracket bobs.

(5) Service shaft bracket grease fitting (refer to LO 9-2320-242-12). Clean excess grease from fittings and assembly.

2-192. Towing Shackle

a. Removal.

(1) Remove cotter pins and clevis pins securing two shackles to front of tractor. Remove shackles (fig 2-287).

(2) Remove cotter pins and pins securing two shackles to rear of carrier. Remove shackles.



Figure 2-287. Towing shackle, removal and installation.

b. Installation.

(1) Install two shackles on trailer and secure with pins and cotter pins (fig 2-287).

(2) Install two shackles on carrier and secure with pins and cotter pins.

2-193. Carrier Bumpers

a. Removal.

(1) Remove four screws securing bumper to

carrier (fig 2-288).

(2) Remove bumper from carrier.

b. Installation.

(1) Prime mounting surfaces with unreduced zinc chromate.

(2) Position bumper over holes in carrier and secure with four screws.

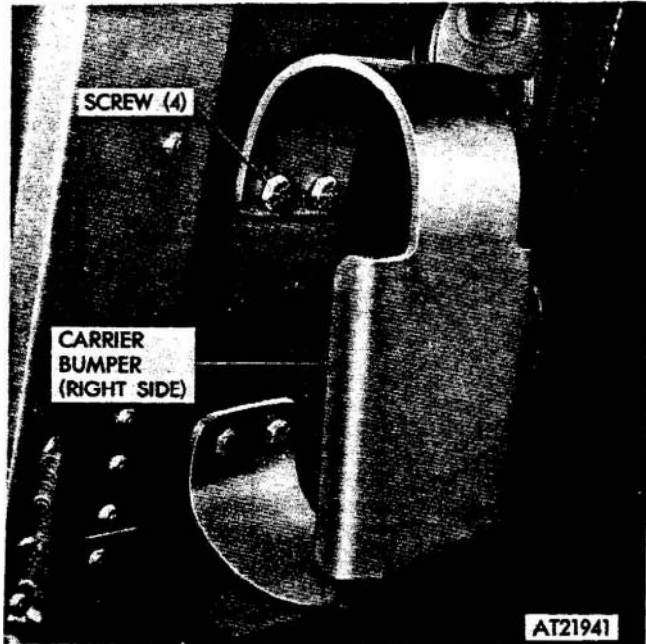


Figure 2-288. Carrier bumper, removal and installation.

2-194. Tailgate Bumpers (Stops)

a. Removal.

(1) Remove nut and washer securing bumper to bracket. Remove bumper (fig 2-289).

(2) Remove nuts and screws securing bracket to hull. Remove bracket.

b. Installation.

(1) Position bracket to hull and secure with screws and nuts (fig 2-289).

(2) Insert tailgate bumper mounting stud in hole of bracket and secure with nut and washer.

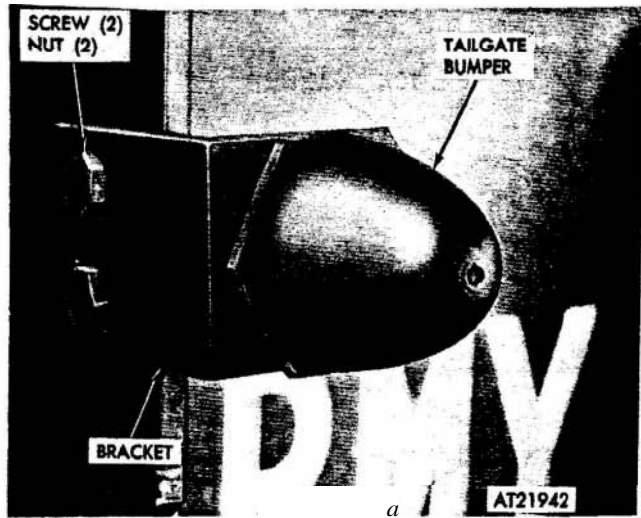


Figure 2-289. Tailgate bumpers (stops), removal and installation.

2-195. M792 Ambulance Tailgate Bumpers

a. Removal.

(1) Remove bumper by removing screw, washers and nut securing bumper to bumper bracket (fig 2-290).

(2) Remove bumper bracket by removing bolts and nuts securing bracket to rear of carrier.

b. Installation.

(1) Position and secure bumper bracket to rear of carrier with two bolts and nuts (fig 2-290).

(2) Position and secure bumper to bracket with screw, flat washer, lock washer, and nut.

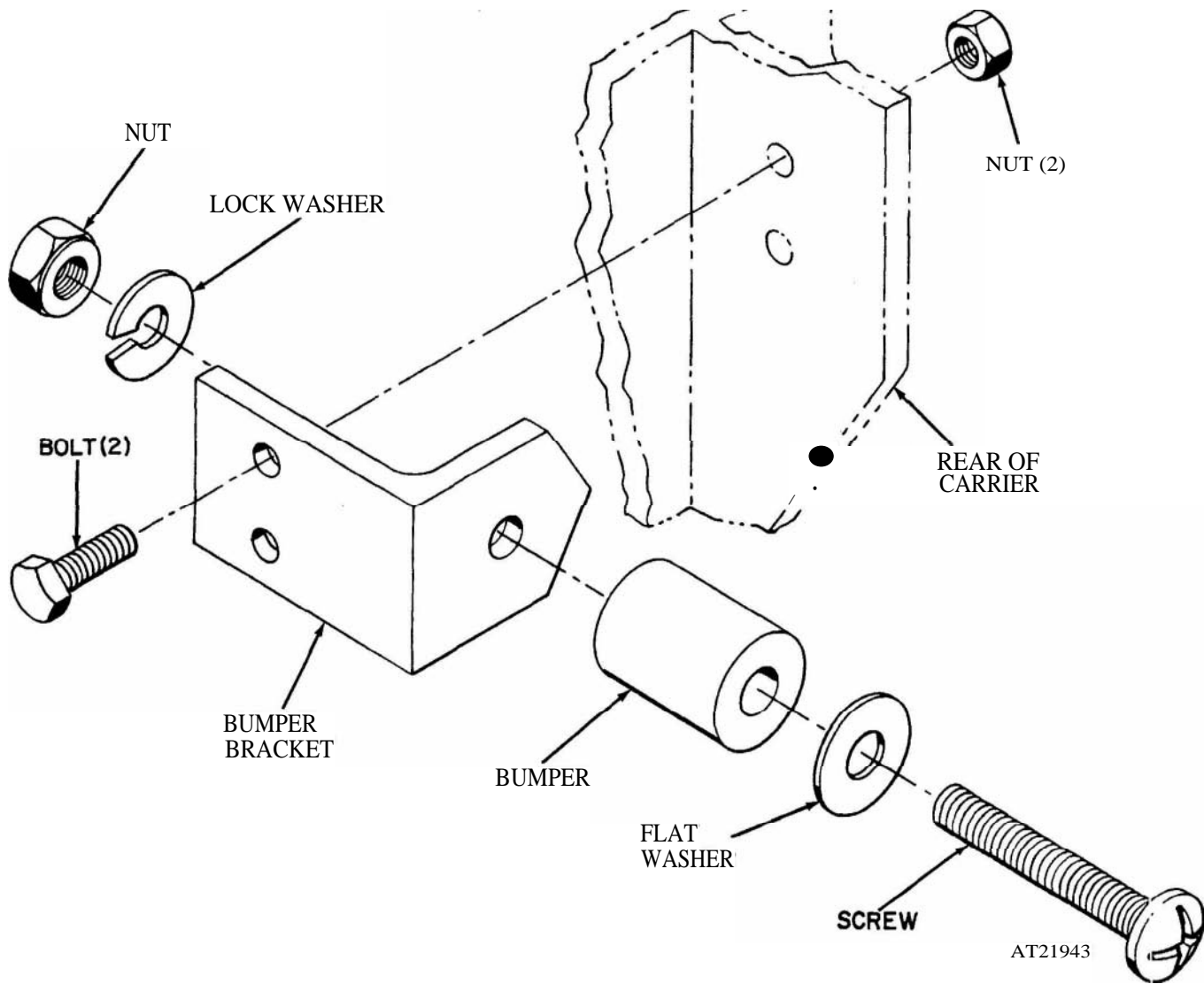


Figure 2-290. M792 ambulance tailgate bumpers, removal and installation.

Section XXVI. SUSPENSION SYSTEM

2-196. General

The main purpose of the suspension system is to support the weight of the vehicle and absorb road shocks during operation, however, it aids in riding comfort and in braking the vehicle. The suspension system consists of the front and rear independent wheel suspensions and the center independent axle suspension. A front and rear single suspension system is comprised of upper and lower suspension arms, coil spring, shock absorber, upper and lower ball joints, and a wheel steering knuckle. All front and rear suspension parts are assembled to the keel. Torsional elastic bushings are used in the lower and upper suspension arms at their point of attachment to the vehicle. The bushings reduce road shock and transmission of noise to the vehicle and eliminate the necessity for lubrication. Mounted to the **vehicle** structure immediately above the front and rear suspension arms is a compression rubber bushing, referred to as a jounce bumper. Its purpose is to limit the upward travel of the *suspension arms*, thereby *preventing arm contact* with the vehicle structure and bottoming of the shock absorber or coil spring. The center suspension assembly consists of the center differential, a transverse single leaf spring, spring stanchions, suspension arms, and shock absorbers and struts. The primary purpose of the center suspension system is to support the weight of the vehicle. The center suspension (center differential) *is* suspended on torus bearings, thereby increasing mobility by maintaining all driving wheels in constant contact with the ground. By suspending the center differential, the assembly is permitted to rotate ± 15 degrees in relation to the tractor body. Attached to the lower left and right side of the center differential are the suspension arms, shaped as an "A" frame. At the point of attachment, torsional elastic bushings are used to retard up and down movement of the "A" frame. Welded to the outboard end of the "A" frames are the spring stanchions which have removable wear pads. The spring leaf is mounted laterally on top of and secured to the center differential by two

parallel bars. The **ends** of the spring **are retained in** the spring stanchions. Shock absorbers are employed on each "A" frame. One end is attached to the "A" frame and the other end is attached to the tractor body. The shock absorbers perform a multi-purpose. They dampen road shock and limit roll of the center suspension by limiting shock absorber piston travel. Struts are also employed on each "A" frame. **One** end is attached to the "A" frame and the other end is attached to ears on the center differential. The struts also *assist in limiting* downward movement of the "A" frame.

2-197. Tractor and Carrier Steering Knuckle

a. Removal.

- (1) Jack and block vehicle.
- (2) Remove wheel and tire assembly (refer to para 2-156).
- (3) Disconnect hydraulic and air hoses from brake assembly spindle. Install protective caps on open lines and ports. Tape hoses aside.
- (4) Support brake assembly and remove eight nuts securing brake assembly spindle to steering knuckle and four screws and lock plates securing drive axle shaft to stub axle. Remove brake assembly.
- (5) Remove cotter pin and nut and remove tie rod end from steering knuckle (fig 2-291).
- (6) Disconnect shock absorber by removing nuts, washers, and stud securing lower end of shock to lower suspension ann.
- (7) Remove coil spring by prying spring out of its seat on the lower suspension arm.

Caution: When jacking carrier or tractor to relieve load on coil spring, use only approved jacking points. Structural damage or puncturing of the aluminum hull may occur if other areas are used.

- (8) Remove cotter pins and nuts from upper and lower ball joints. Remove steering knuckle by separating from ball joint assemblies. Apply pressure on a suitable pinch bar and impact knuckle with a suitable soft face mallet.

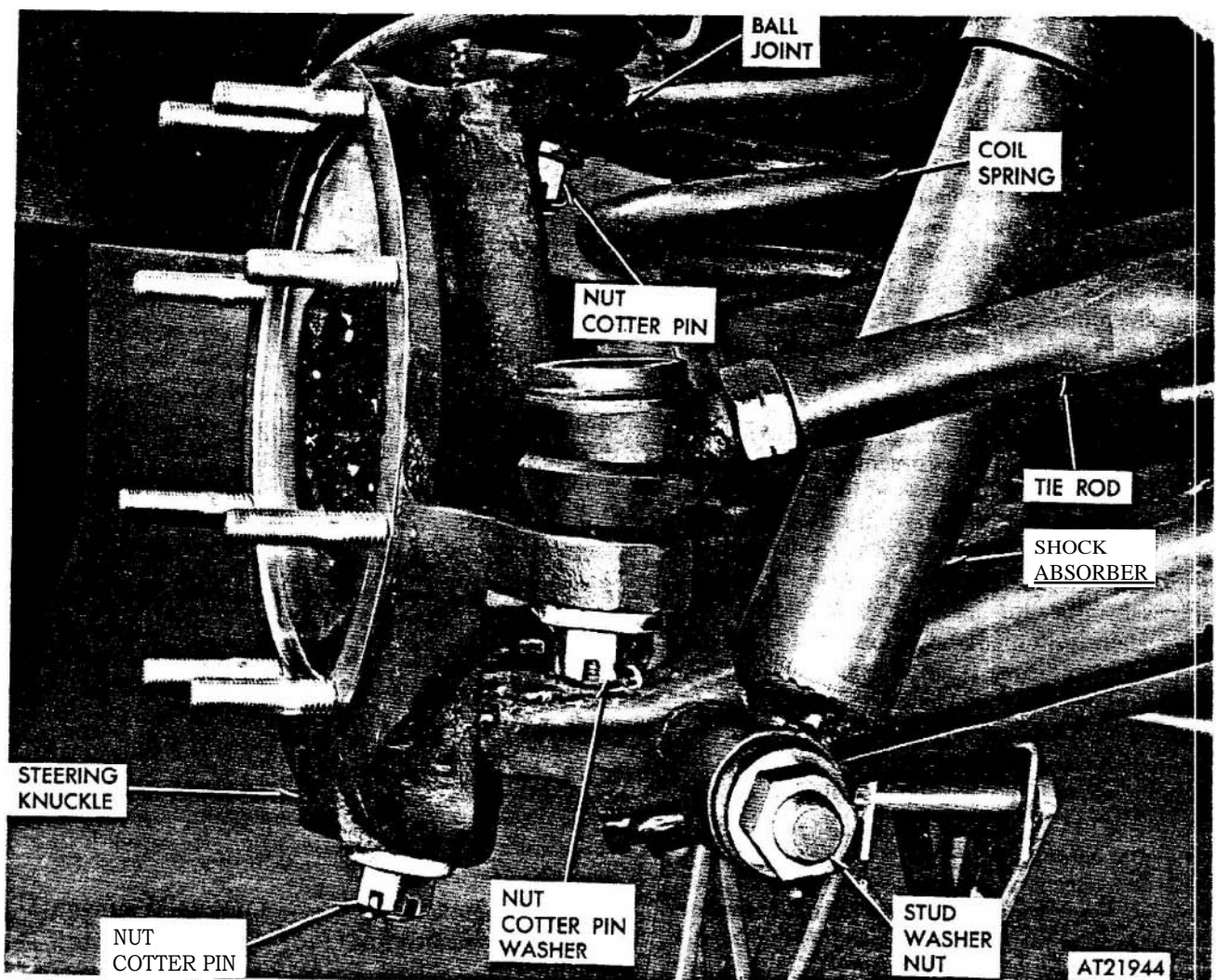


Figure 2-291. Steering knuckle removal

b. Installation.

(1) Position steering knuckle to upper ball joint stud and secure with nut and cotter pin (fig 2-292).

(2) Install coil spring, positioning spring into upper suspension arm and prying spring into its seat on the lower suspension arm.

(3) Position lower ball joint stud to steering knuckle and secure with nut and cotter pin.

(4) Position lower end of shock to lower arm assembly and secure with stud, two washers, and two nuts. Torque nuts to 105-145 lbs-ft.

(5) Position tie rod end and seal to steering knuckle and secure with nut and cotter pin.

(6) Position brake assembly spindle to steering knuckle and secure using eight nuts (refer to para 2-162).

(7) Connect hydraulic and air hoses to brake assembly spindle and bleed brakes (refer to para 2-161).

Position axle shaft assembly to stub-axle and secure with four screws and lock plates (refer to para 2-162).

(9) Install wheel and tire assembly (refer to para 2-156).

(10) Remove blocks and lower vehicle.

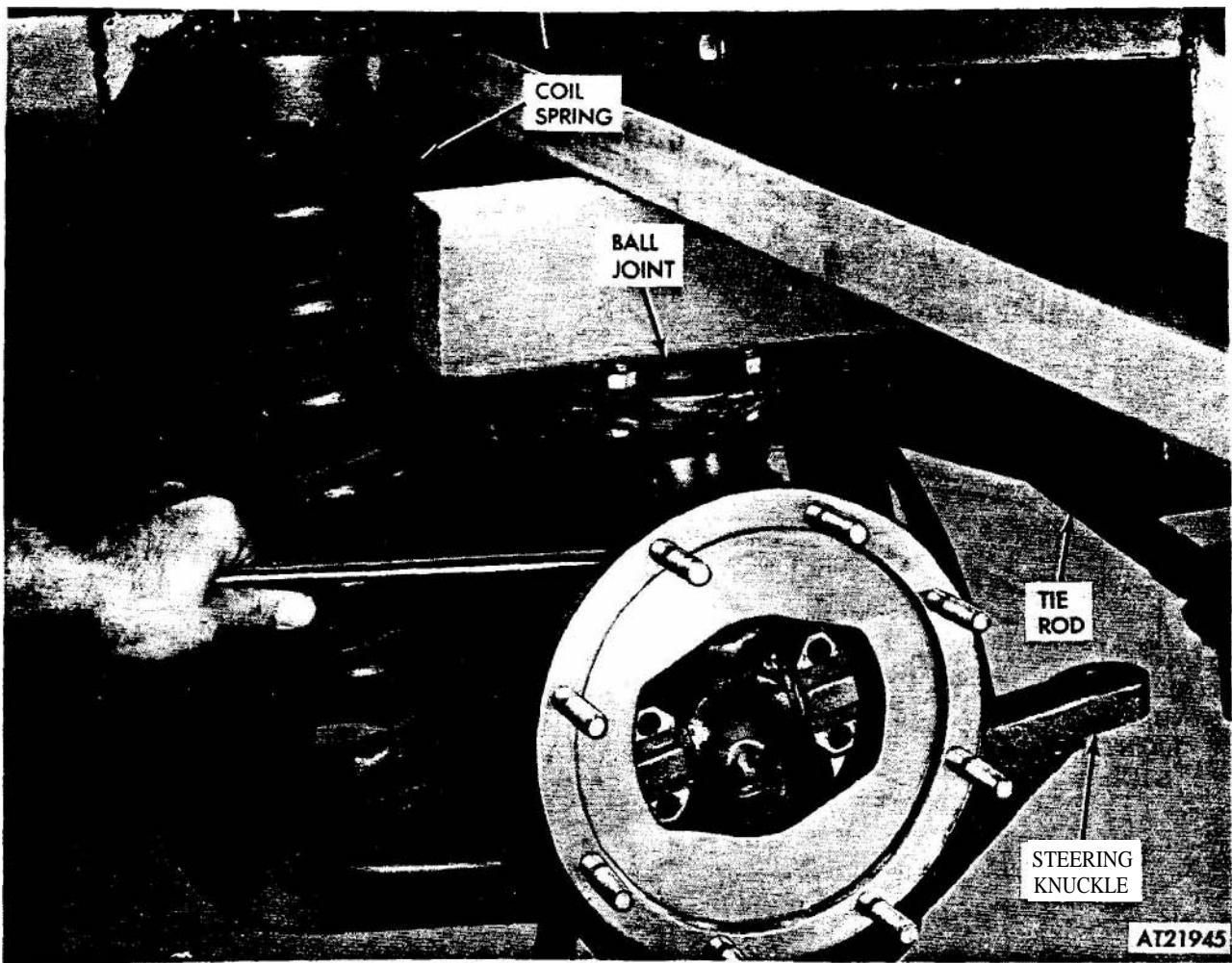


Figure 2-292. Steering knuckle installation.

2-198. Front and Rear Upper Suspension Arms

a. Removal.

(1) Jack and block vehicle.

Caution: When jacking tractor or carrier to relieve load from suspension system, use only approved jacking points. Damage or puncturing of the aluminum hull may occur if other areas are used.

(2) Remove wheel and tire assembly (refer to para 2-156).

(3) Remove screws and clamps securing hydraulic and air hoses to upper suspension arm. Install protective caps on open lines and ports. Tape hoses aside.

(4) Remove nut, washer, and screw securing

shock absorber to body and position shock aside (fig 2-293).

(5) Remove cotter pin and nut securing upper suspension arm ball joint to steering knuckle. Remove ball joint stud from knuckle.

(6) Remove coil spring from vehicle by prying spring out of its seat on the lower suspension arm. Support drum and hub assembly to near normal gross vehicle weight (GVW) position.

(7) Remove screws, lock washers, and nuts securing arm assembly to vehicle, using socket wrench (11595277) (fig 2-294). Remove upper suspension arm assembly.

!Vote: When removing nuts securing arm assembly to vehicle, break torque using a breaker bar, then remove nuts using a ratchet wrench.

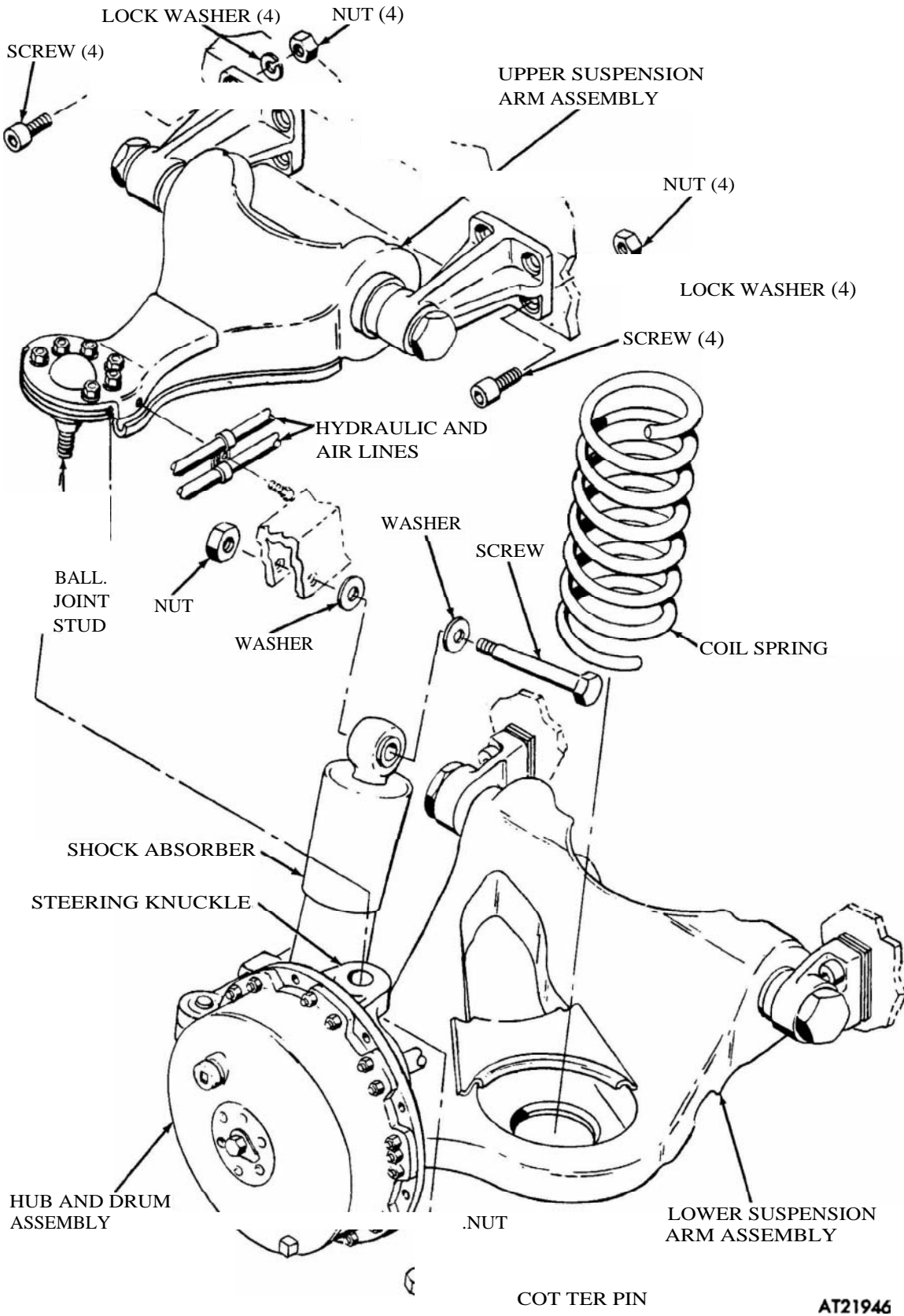


Figure 2-293. Front and rear upper suspension arm, removal and installation.

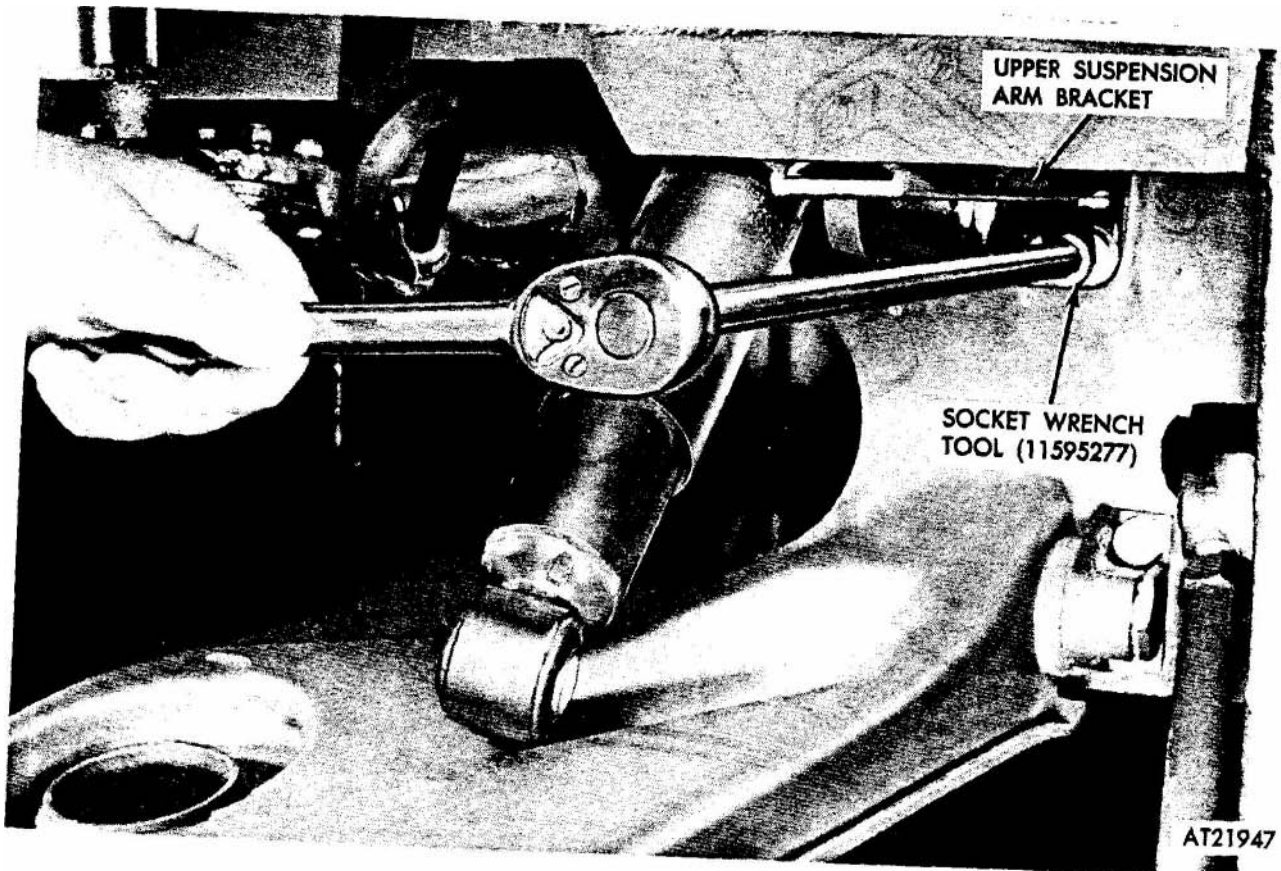
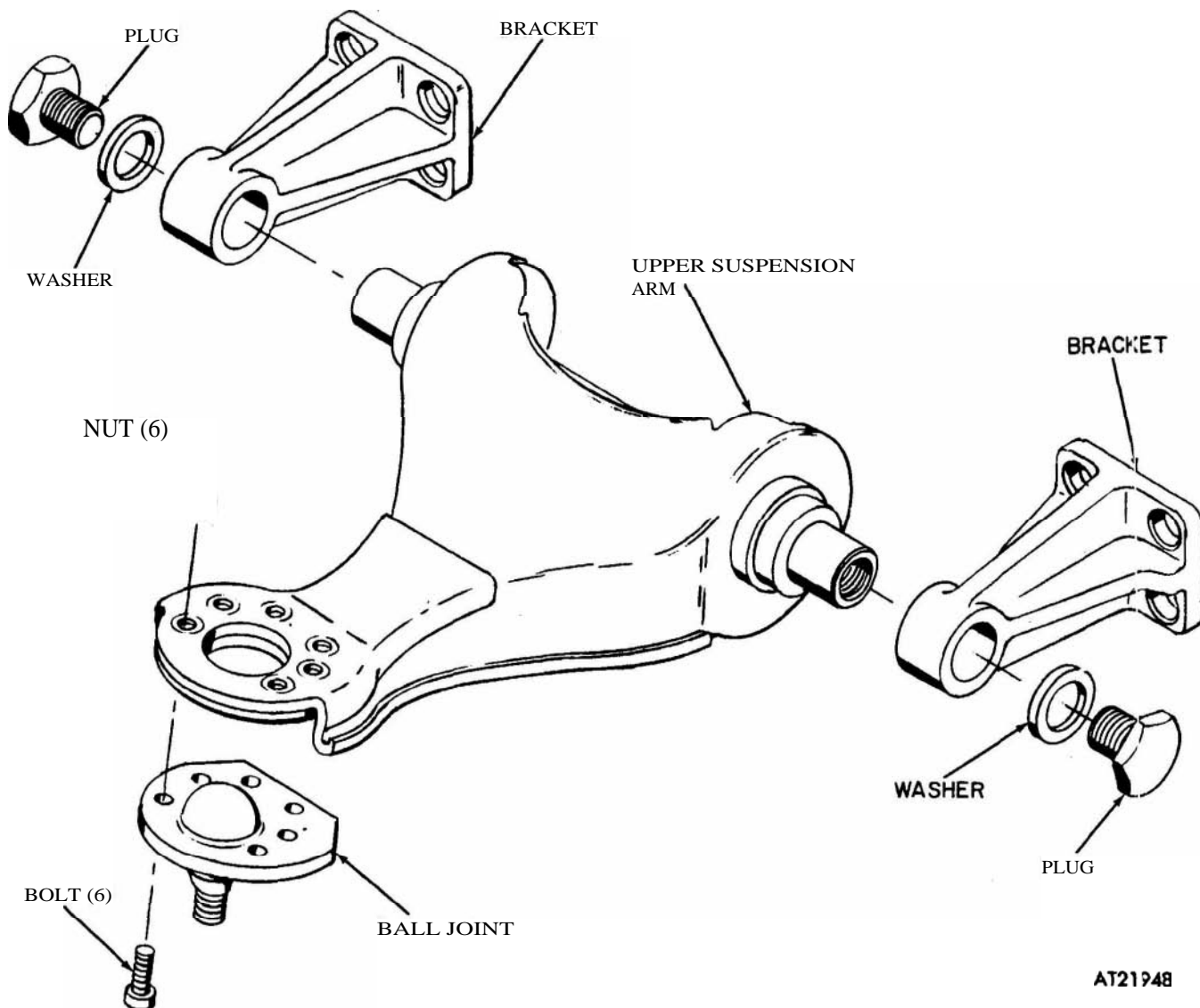


Figure 2-294. Upper suspension arm bracket removal tool

b. Disassemble

Remove plugs, washers, and brackets from upper suspension arm (fig 2-295).

12) Remove six nuts and bolts securing ball joint to upper suspension arm and remove ball joint.



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Figure 2-295. Front and rear upper suspension arm, disassembly and assembly.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect parts for cracks, breaks, dents or other damage.
- (3) If necessary, replace ball joint using repair kit (refer to TM 9-2320-242-20P).

d. Assembly.

- (1) Position ball joint assembly on upper arm by aligning six mounting bolts with holes on upper arm. Secure with six nuts (fig 2-295).
- (2) Position brackets on upper arm assembly and install two washers and plugs. Tighten plugs finger tight. Position brackets and arm assembly in a horizontal plane or traveling position and torque plugs to 92-110 lbs-ft. securing brackets to upper arm.

Note: Clamp flat surface of arm assembly to a flat surface with ball joint stud down and extending off edge of flat surface. Position mounting bracket until its lower edge is 1/4 inch from flat surface.

e. Installation.

- (1) Position upper arm assembly mounting brackets on vehicle body and install eight screws, lock washers, and nuts securing upper arm assembly to vehicle body. Torque bolts to 92-110 lbs-ft., using socket wrench (11595277).

Note: Use 2-inch bolt in the lower rear hole of the rear upper suspension arm bracket.

- (2) Install coil spring by inserting it into upper arm spring seat and prying it into position on lower arm assembly (fig 2-293).

(3) Place a jack under lower arm assembly and raise assembly sufficiently to permit installation of upper arm ball joint stud in steering knuckle.

(4) Install nut and cotter pin securing upper arm ball joint to steering knuckle.

(5) Position upper end of shock absorber against body and secure with bolt, washers, and nuts. Torque nut to **105-145 lbs-ft.**

(6) Position hydraulic and air hoses to upper arm assembly and secure with clamps and screws.

(7) Install wheel and tire assembly (refer to para 2-156).

(8) Remove blocks and lower vehicle to **ground.**

2-199. Front and Rear Lower Suspension Arms

a. Removal.

(1) Jack and block vehicle.

Caution: When jacking on tractor or carrier to relieve load from suspension system, use only approved jacking points. Distortion or puncturing of the aluminum hull may occur if other areas are used.

(2) Remove wheel and tire assembly (refer to Rua 2-1561).

(3) Remove four bolts and lock plates securing drive axle universal joint to stub axle flange. Disconnect and position drive shaft aside.

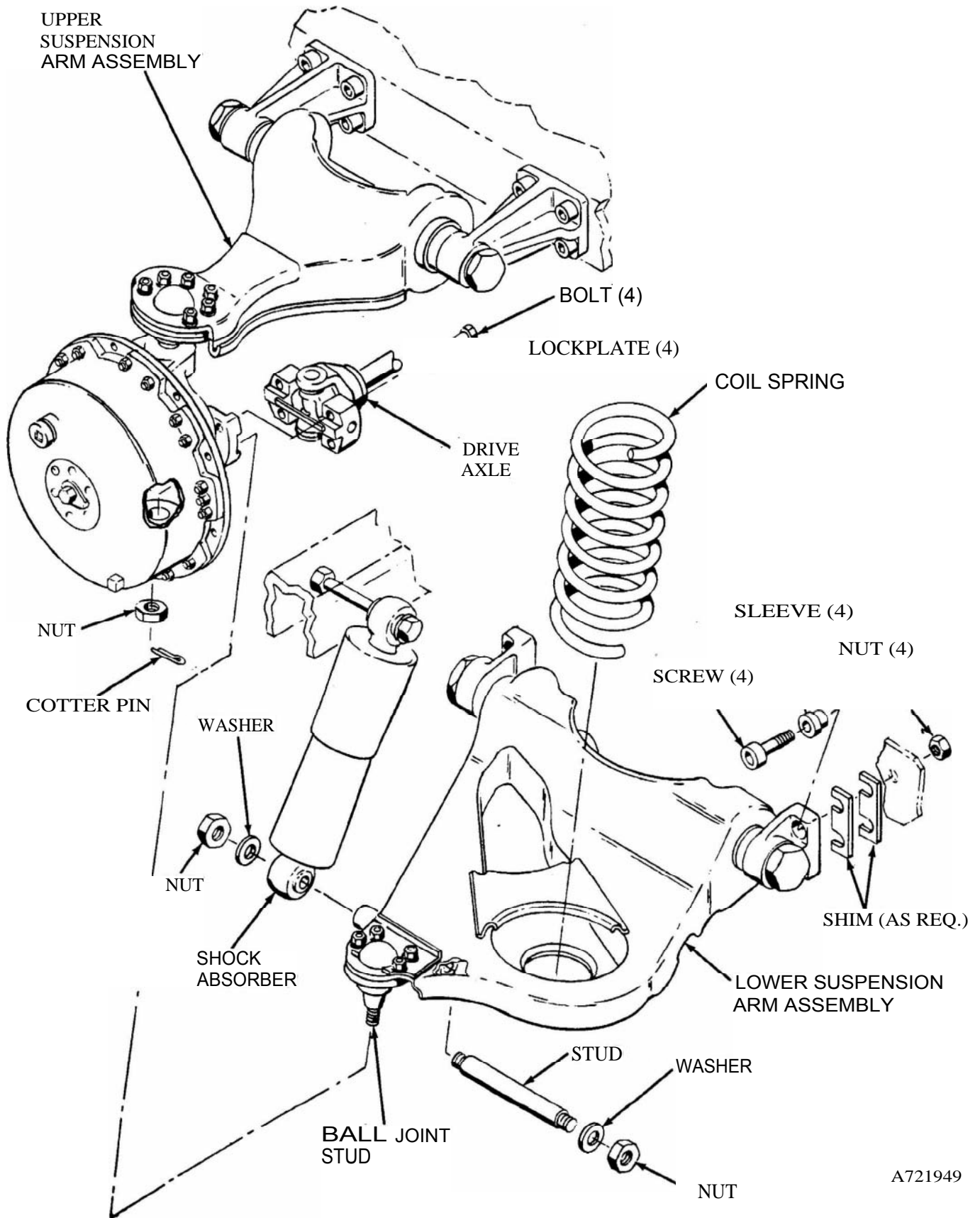
(4) Place a jack under lower **suspension** arm and raise arm sufficiently to allow ball joint removal. Remove cotter pin and nut securing lower arm ball joint to steering knuckle. Separate ball joint stud from steering knuckle (fig **2-296**).

(5) Remove nuts, stud and washers securing lower end of shock absorber to lower arm assembly and position shock absorber aside. Relieve tension on jack and lower arm assembly.

(6) Remove coil spring from vehicle.

(7) Remove screws, nuts and washers securing lower arm assembly brackets to vehicle structure, using hex bit tool (11602291) (fig 2-2971). Note position and quantity of shims behind brackets. Retain hardware with assembly. Remove lower suspension arm.

Note: When removing nuts securing arm assembly to vehicle, break torque using a breaker bar, then *remove* nuts using a ratchet wrench.



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Figure 2-296. Front and rear lower suspension arm, removal and installation.

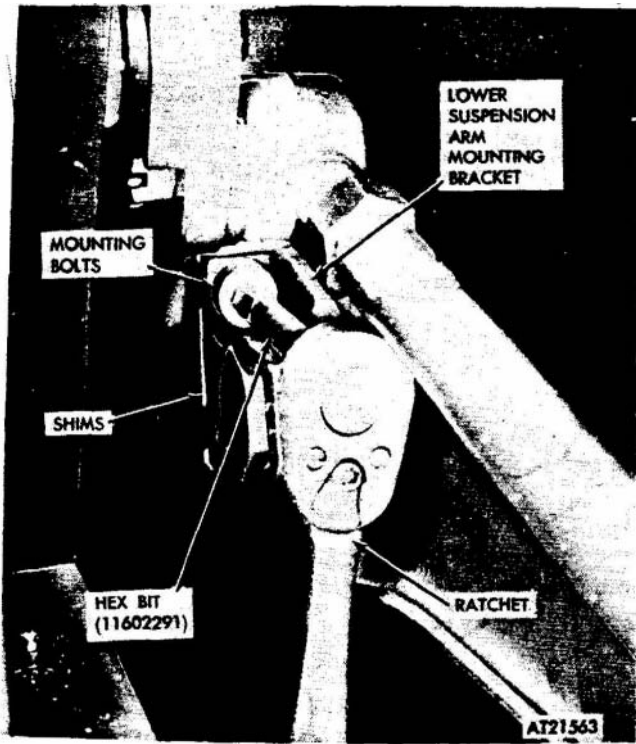


Figure 2-297. Lower suspension arm bracket removal tool

b. Disassembly.

- (1) Remove plugs, washers, one retaining key,

and brackets from lower suspension arm (fig 2-298).

- (2) Remove four nuts and bolts securing ball joint to lower suspension arm and remove ball joint.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.

- (2) Inspect all parts for cracks, breaks, dents or other damage.

- (3) If necessary, replace ball joint using repair kit (refer to TM 9-2320-242-20P).

d. Assembly.

- (1) Position ball joint assembly on lower arm by aligning four mounting bolts with holes on lower arm. Secure with four nuts (fig 2-298).

- (2) Position keyea bracket on lower arm shaft and insert key. Position opposite bracket on lower arm shaft. Install two washers and plugs. Tighten plugs finger tight. Clamp arm assembly to surface plate at flat surface immediately below plug (ball joint stud down). Position brackets so that edge rests on surface plate. Angle should measure 79 degrees plus or minus 3 degrees. Reposition bracket as necessary. Torque plugs to 92-110 lbs-ft.

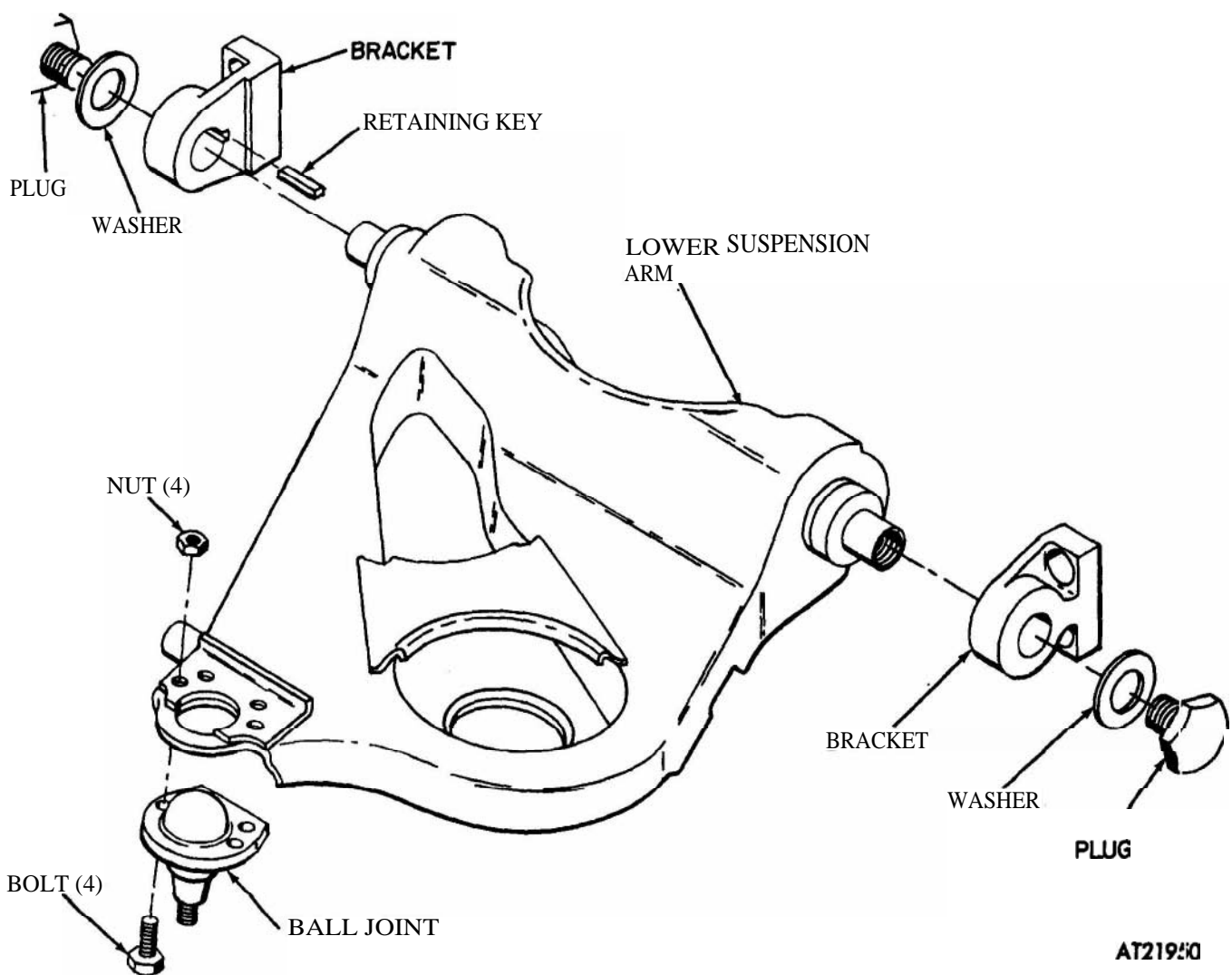


Figure 2-298. Front and rear lower suspension arm, disassembly and assembly.

e. Installation.

(1) Check brackets on lower suspension arm to ensure sleeves are in each bolt hole. Position arm assembly mounting brackets to vehicle and install four screws. Position spacer and shim(s) between vehicle and bracket. Install nuts securing arm assembly to vehicle. Torque screws to 92-110 **lbs-ft.**, using hex bit tool (11602291) (fig 2-297).

(2) Position coil spring in upper and lower arm spring seats. Place jack under lower arm assembly and raise arm assembly sufficiently to permit installation of ball joint stud in steering knuckle. Secure ball joint to steering knuckle with nut and cotter pin. Remove jack.

(3) Position lower end of shock absorber to arm assembly. Install stud, washers, and nuts and secure by torquing nuts to 105-145 lbs-ft.

(4) Secure axle shaft universal joint to stub axle shaft (refer to ^Para 2-148).

(5) Install wheel and tire (refer to para 2-1515).
 (6) Remove blocks and lower vehicle to ground.

(7) Report to Direct Support for caster and camber check and adjustment.

2-200. Tractor^r and Carrier Coil Springs

a. Removal.

(1) Jack tractor or carrier and block.

Caution: When jacking carrier or tractor to relieve load on coil spring, use only approved jacking points. Structural damage or puncturing of the aluminum hull may occur if other areas are used.

(2) Remove wheel and tire assembly (refer to **para** 2-156).

(3) Remove nuts, washers, and stud securing lower end of shock absorber (fig 2-299).

(4) With suspension arm assembly at its lowest possible position, pry spring out of its seat on lower

arm and remove spring.

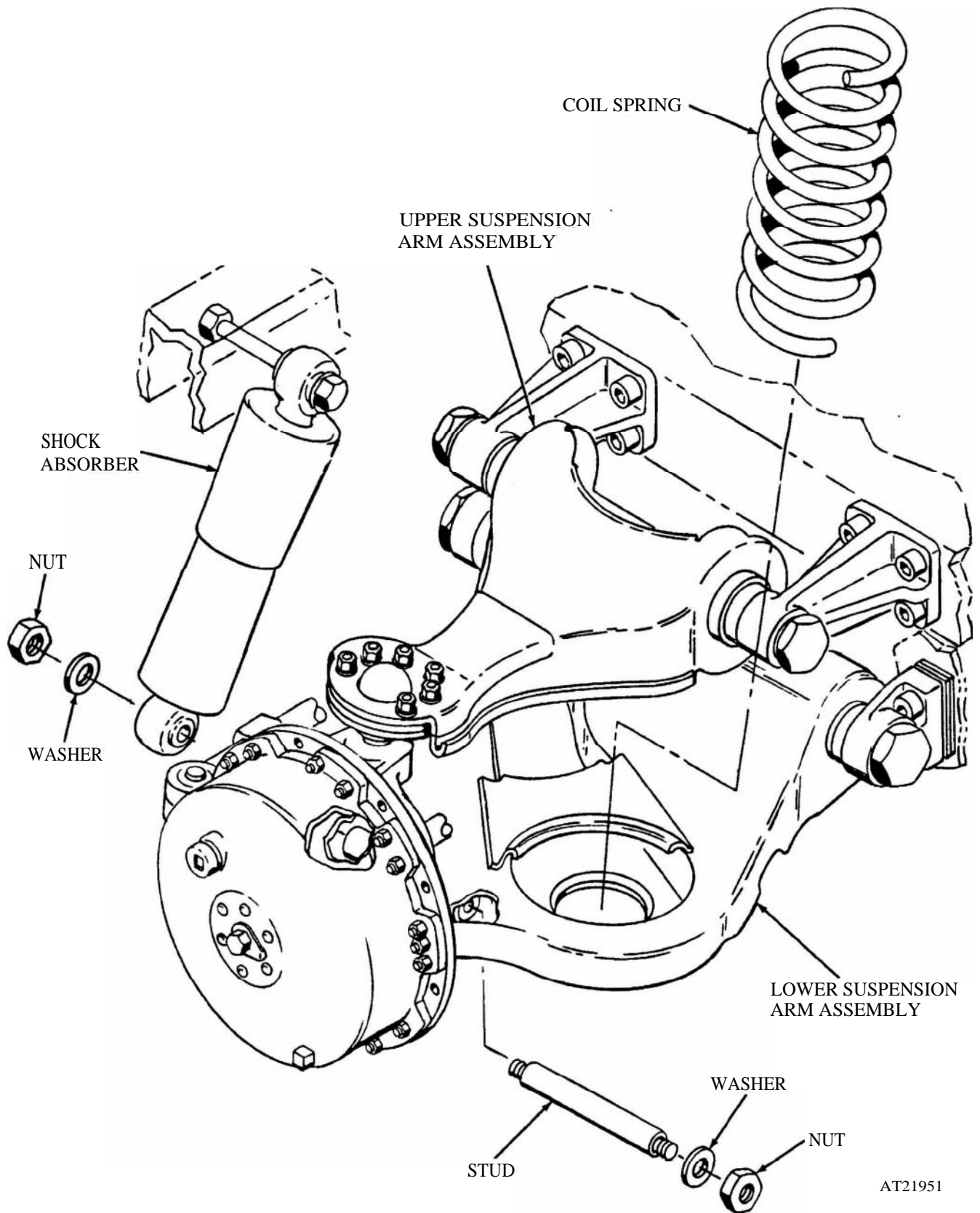


Figure 2-299. Tractor and carrier coil spring, removal and installation.

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b. Installation.

(1) With suspension arm assembly at its lowest possible position, insert spring in upper arm assembly. Pry spring into lower arm seat (fig 2-299).

Note: Coil springs are matched by spring rate and identified as such by color codes. These colors are used by the manufacturer for matching during vehicle assembly. Separate part numbers are not assigned for color coding. Disregard color code on spring for replacement purposes.

(2) Place jack under lower arm assembly and raise suspension assembly to position shock absorber to lower arm. Secure with stud, washers, and nuts. Torque nuts to 105-145 lbs-ft.

(3) Install wheel and tire assembly (refer to para 2-156).

(4) **Remove** blocks and lower vehicle to ground.

(5) Report to Direct Support for caster and camber adjustment.

2-201. Center Axle Leaf Spring

a. Removal.

(1) Jack and block rear of tractor.

Caution: When jacking tractor or carrier to relieve load on coil spring, use only approved jacking points. Structural damage or puncturing of the aluminum hull may occur if other areas are used.

(2) Remove left and right wheel and tire assembly (refer to para 2-156).

(3) Remove eight screws and lock washers securing spring brackets to differential (fig 2-300).

(4) Raise A-frame arms, using jacks, and remove nuts, lock washers, and bolts securing upper ends of outer shock absorbers.

(5) Slide leaf spring to one side until end of spring is clear of one spring tower.

(6) Lower free arm 1 to 2 inches, withdraw leaf spring from opposite spring tower and remove spring.

b. Installation.

(1) Position leaf spring on center differential (fig 2-300).

(2) Insert end of spring into spring tower on one arm.

(3) Jack opposite arm until end of spring is centered on spring tower.

(4) Shift spring (left or right) until ends are equidistant between blocks in A-frame (spring tower).

(5) Position spring brackets to pads and secure leaf spring to differential with eight screws and lock washers.

(6) Install right and left wheel and tire assemblies (refer to para 2-156).

(7) Remove blocks and jacks.

(8) Operate vehicle to check operation of spring and insure that wheels do not bottom out under normal bounce.

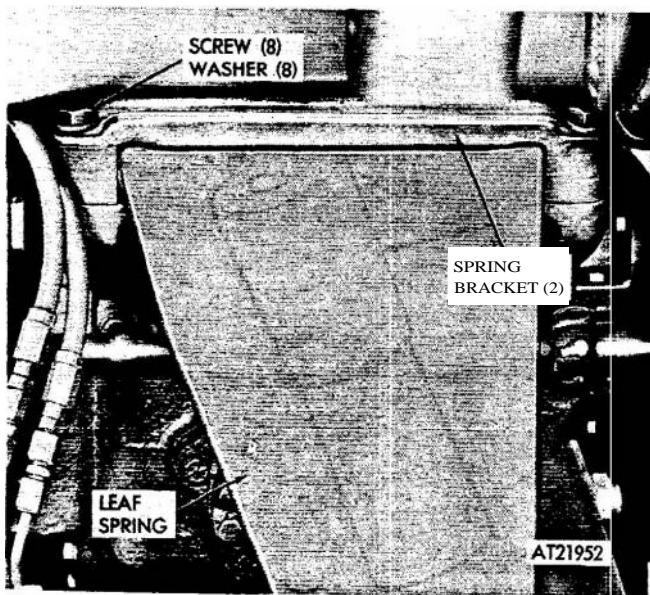


Figure 2-300. Center axle leaf spring, removal and installation.

2-202. Tractor Front and Carrier Shock Absorbers

a. Removal.

(1) Turn steering wheel to left or right as required.

(2) Remove lower stud, nuts, and washers securing shock absorbers to lower suspension arm (fig 2-301).

(3) Remove upper bolt, nut and washers securing upper end of shock absorbers to vehicle structure (fig 2-302). Remove shock absorbers.

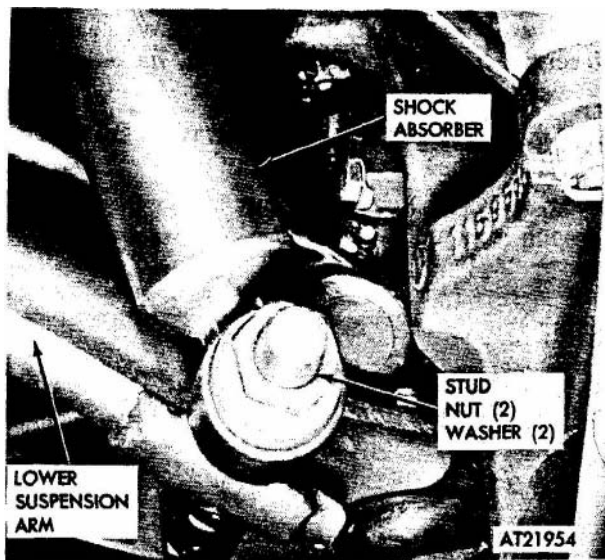


Figure 2-301. Tractor front and carrier shock absorbers (lower), removal and installation.

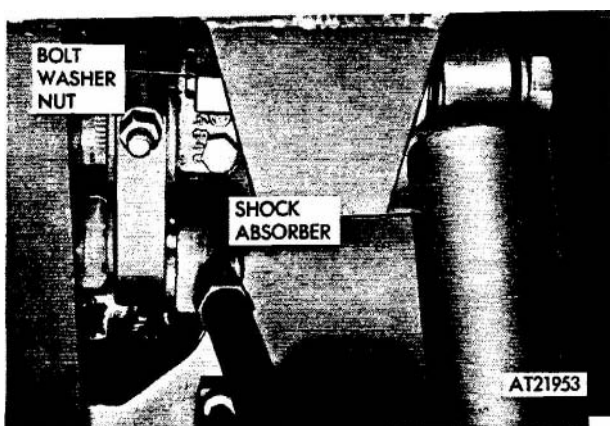


Figure 2-302. Tractor front and carrier shock absorbers (upper), removal and installation.

b. Installation.

(1) Position upper end of shock absorber to vehicle structure and secure with bolt, nut and two washers. Torque nut to 105 lbs-ft. (fig 2-302).

(2) Install lower end of shock absorber to lower suspension arm with stud, two nuts and washers. Torque nuts to 105-145 lbs-ft. (fig 2-301).

2-203. Inner and Outer Center Axle Shock Absorbers

a. Removal.

(1) Remove the outer center axle shock absorber per the following steps:

(a) Remove nut, lock washer, and flat washer securing lower end of shock absorber to mounting pin in suspension arm weldment.

(b) Remove cap screw, nut, and washer securing upper end of shock absorber to body bracket. Remove shock absorber and discard bushings (fig 2-303).

(2) Remove the inner center axle shock absorber per the following steps:

(a) Remove nut, lock washer, and flat washer securing lower end of shock absorber to mounting pin in suspension arm weldment.

(b) Remove nut and lock washer securing pin in upper end of shock absorber at differential bracket (fig 2-304).

(c) Remove pin and flat washer (note washer position) from upper end of shock absorber. Remove shock absorber and discard bushings.

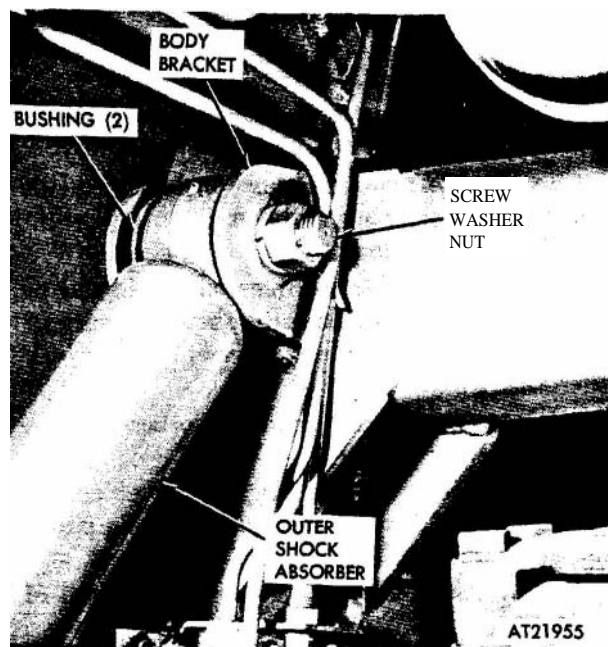


Figure 2-303. Outer center axle shock absorbers, removal and installation.

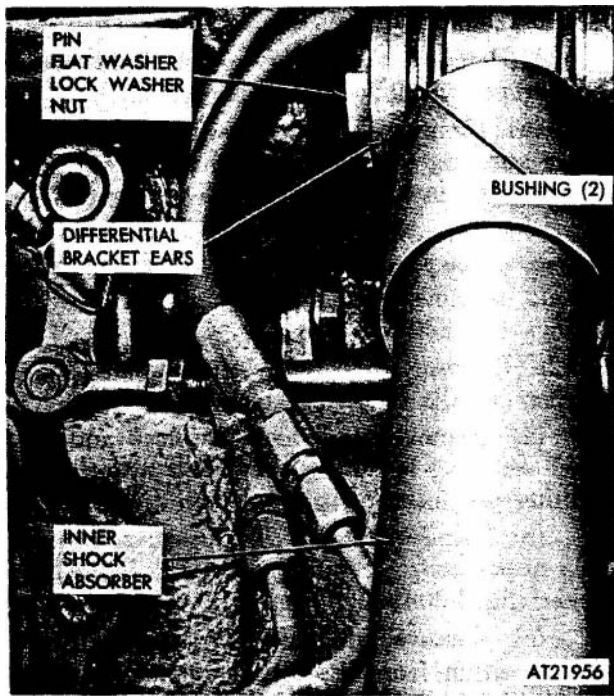


Figure 2-304. Inner center axle shock absorbers, removal and installation.

b. Installation.

(1) Install the outer shock absorber per the following steps:

(a) Position two bushings on lower end of shock absorber. Slide assembly on mounting pin in suspension arm **weldment**.

(b) Position two bushings on upper end of shock absorber. Install assembly between ears of body bracket. Secure with cap screw, nut and lock washer (fig 2-303).

(2) Install the inner shock absorber per the following steps:

(a) Position two bushings on lower end of shock absorber. Slide assembly on mounting pin in suspension arm **weldment**.

(b) Position two bushings on upper end of

shock absorber and install assembly between ears of differential bracket. Secure with pin, flat washer, lock washer, and nut (fig 2-304).

2-204. Front and Rear Suspension Bumper (Jounce) Assembly

a. Removal. Remove bumper assembly by removing two bolts, washers, lock washers, and nuts (fig 2-305).

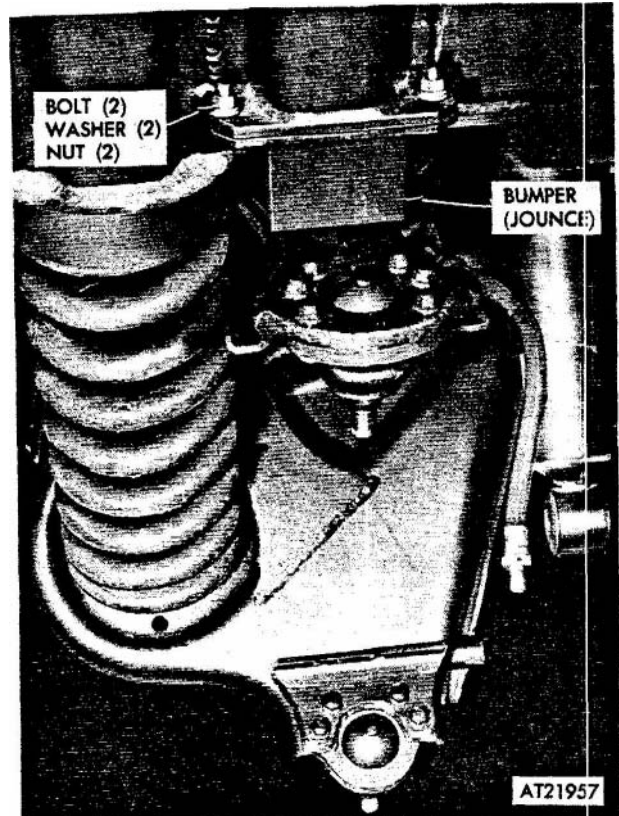


Figure 2-305. Front and rear suspension bumper assembly, removal and installation.

b. Installation. Position bumper assembly to support plate and secure with two bolts, washers, lock washers, and nuts. Torque nuts to 9-12 lbs-ft. (:fig 2-305).

Section XXVII. BODY AND ACCESSORIES

2-205. General

The tractor and carrier bodies are of welded aluminum construction. The body structures provide support for installed and mounted systems / components and special purpose kits.

2-206. Mud Guard

a. Removal.

(1) Remove screws, washers, and nuts securing mud guard to fender. Remove mud guard (fig 2-306).

(2) Remove screws, washers, and nuts securing mud guard support to fender. Remove support.



Figure 2-306. Mud guard, removal and installation.

b. Installation.

(1) Position and secure mud guard support to fender with two screws, two washers, and two nuts (fig 2-306).

(2) Position and secure mud guard to fender with three screws, washers, and nuts and to vehicle with fender mounting hardware consisting of two screws, washers, and nuts.

2-207. Tractor Right and Left Fenders

a. Removal.

(1) Remove headlight guard and headlight assembly from fender (refer to paras 2-214 and 2-104).

(2) Remove turn, park, and black-out light assembly (refer to para 2-100).

(3) Remove four screws and nuts securing light

assembly bracket to fender. Remove bracket (fig 2-307).

(4) Remove horn assembly from right-hand fender (refer to para 2-1061).

(5) Remove screws and nuts securing horn bracket to right fender.

(6) Remove tractor fender (front) electrical harness assembly and grommet (refer to para 2-116).

(7) Remove battery and battery box assembly (refer to para 2-80).

(8) Drain and remove fuel tank (refer to para 2-47).

(9) Remove screws, washers, and nuts securing tailpipe hanger to left fender.

(10) Remove screws, washers, spacer and nuts securing angle to left fender.

(11) Remove mud guard and mud guard support from fender (refer to para 2-206).

(12) Remove screws, washers, nuts and nut plates securing fender to tractor. Remove fender (figs 2-307, 2-308 and 2-3091).

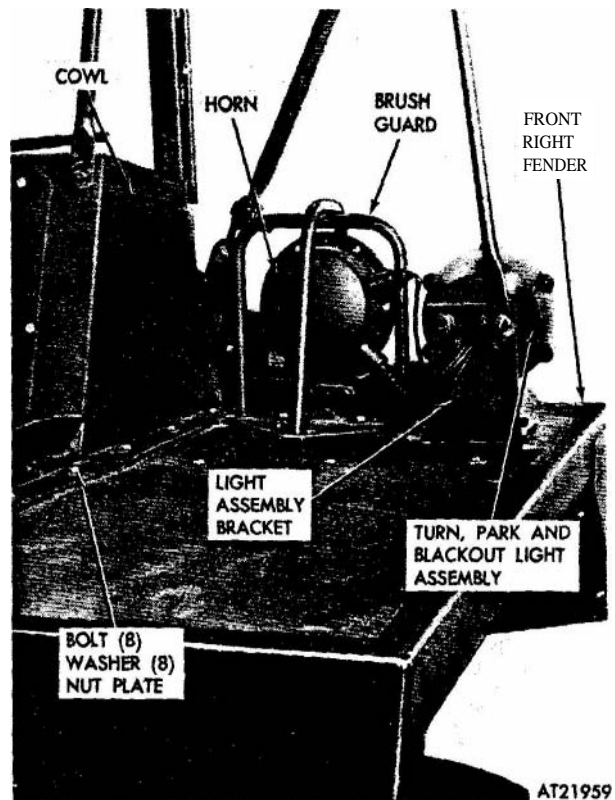


Figure 2-307. Tractor fender (front right view), removal and installation.

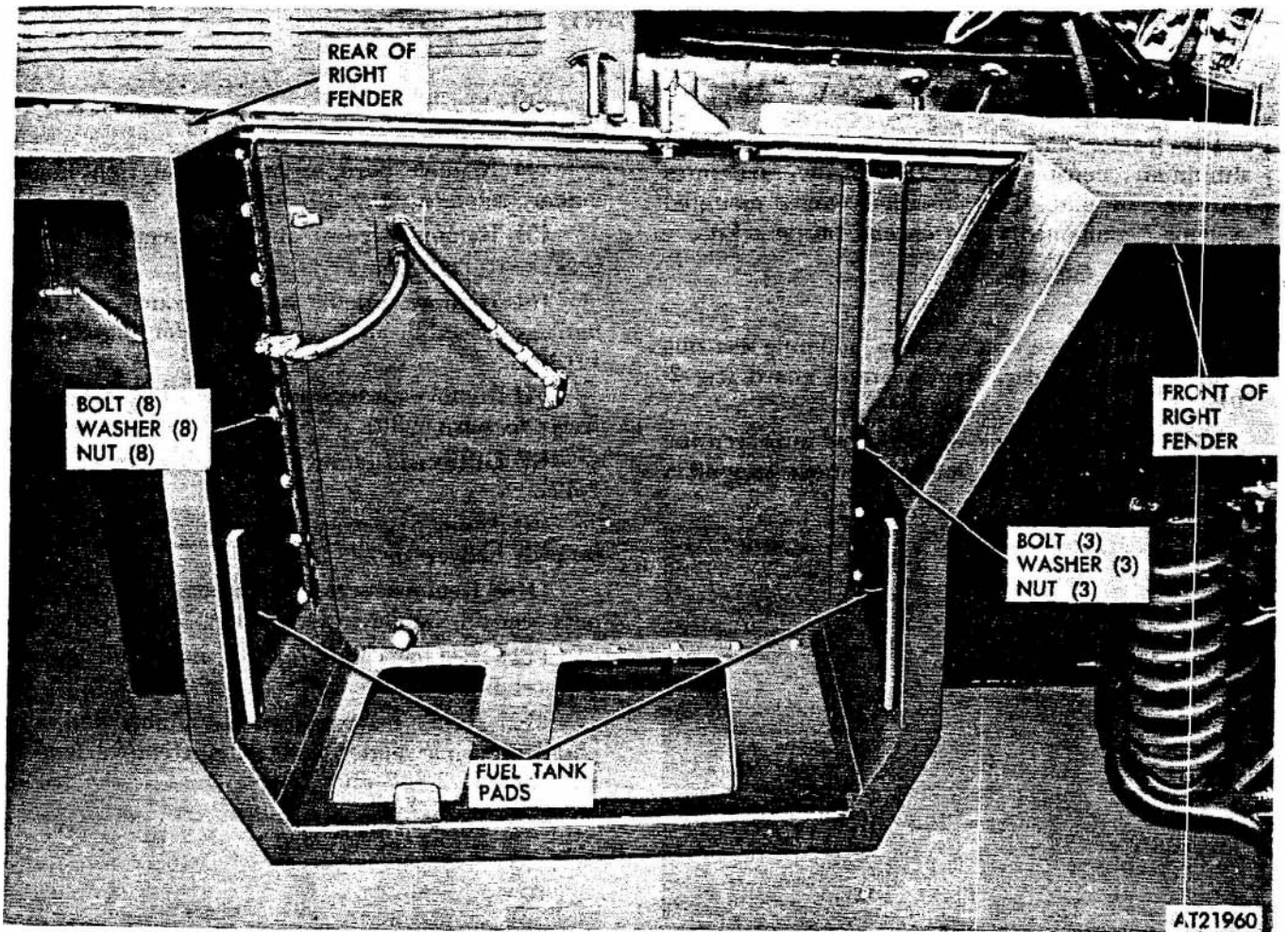


Figure 2-308. Tractor fender (center right view), removal and installation.

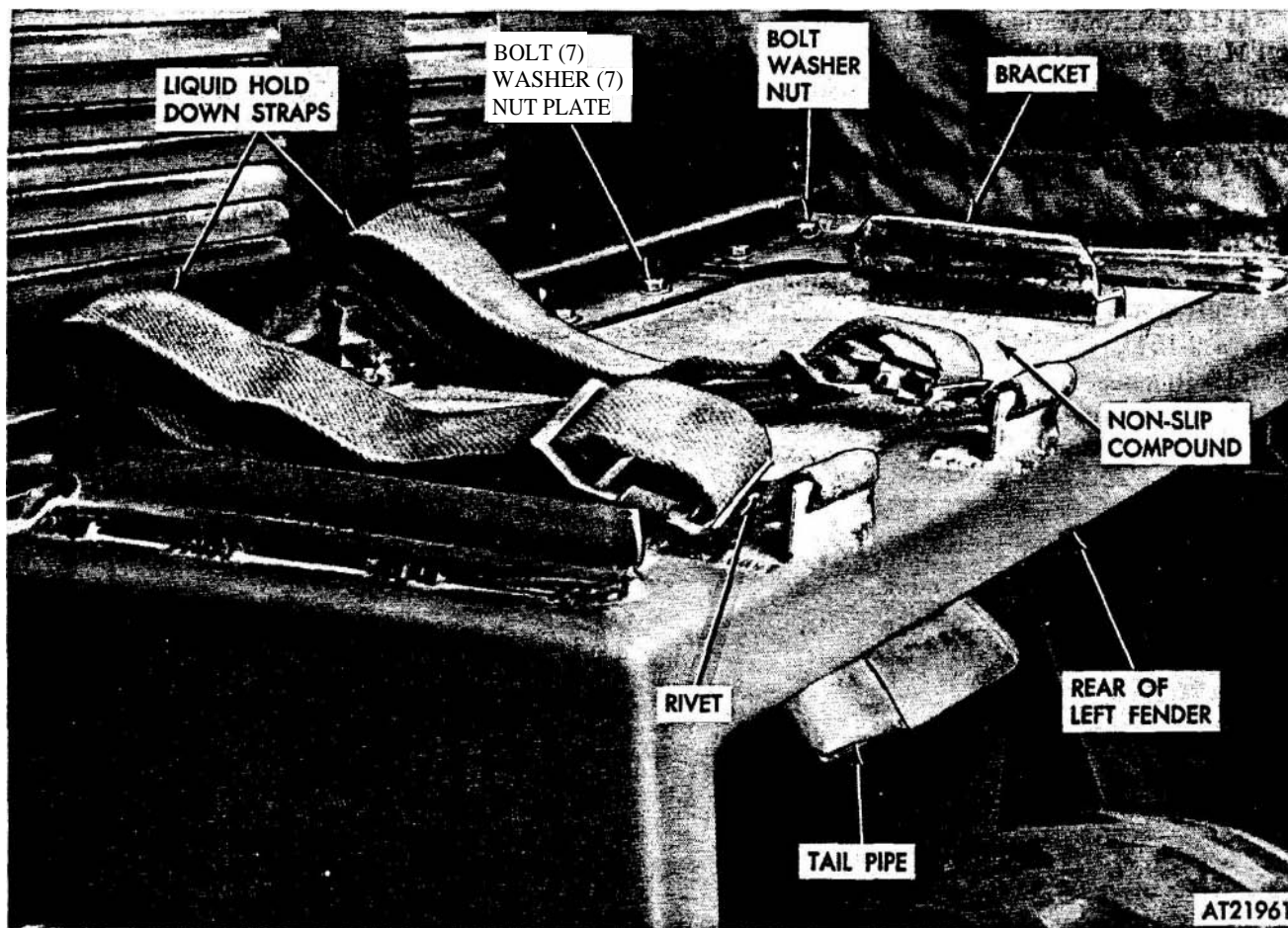


Figure 2-309. Tractor fender (rear right view), removal and installation.

b. Disassembly.

(1) Remove fuel tank pads if damaged or loose (fig 2-308).

(2) Remove liquid container hold-down straps on left fender if damaged. Drill out 16 rivets from straps, using a suitable drill. Remove straps (fig 2-309).

c. Assembly.

(1) Clean fender area with a suitable solvent. **Apply** adhesive (MIL-H-5092) to pads and bond to fender.

(2) Position two straps to brackets on left fender and secure with sixteen rivets.

d. Installation.

(1) Reapply non-slip compound (**MIL-B-23003**) to fender if needed.

(2) Position fender to vehicle, align mounting holes with small tapered punch and secure with 28 bolts, 28 washers, 13 nuts and 2 nut plates (refer to figs 2-307, 2-308 and 2-309).

(3) Install mud guard and mud guard support to fender (refer to para 2-206).

(4) Position and secure angle to fender with spacer, three screws, washers and nuts.

(5) Position and secure tailpipe hanger to left fender with two screws, washers, and *nuts*.

(6) Install fuel tank assembly (refer to para 2-47).

(7) Install battery box assembly and battery (refer to para 2-80).

(8) Insert electrical harness into fender (refer to para 2-1161).

(9) Position horn bracket and guard assembly to right-hand fender. Secure bracket with two screws and nuts. Secure guard with two nuts.

(10) Install horn assembly (refer to para 2-106).

(11) Position light assembly bracket to fender and secure with four screws and nuts.

(12) Install turn, park, and black-out light assembly (refer to **para** 2-100).

(13) Secure headlight and guard to fender (refer to paras 2-104 and 2-214).

(14) Check operation of lights and horn (refer to TM 9-2320-242-10).

2-208. Access Panels

a. Removal.

(1) Remove tractor steering gear box access panel by removing eleven screws (fig 2-310).

(2) Remove carrier steering gear box access panel (refer to para 2-174).

(3) Remove master cylinder access panel (refer to para 2-161).

(4) Remove tractor hull access panel and gasket by **removing** eighteen screws securing panel to bottom of tractor hull (fig 2-311).

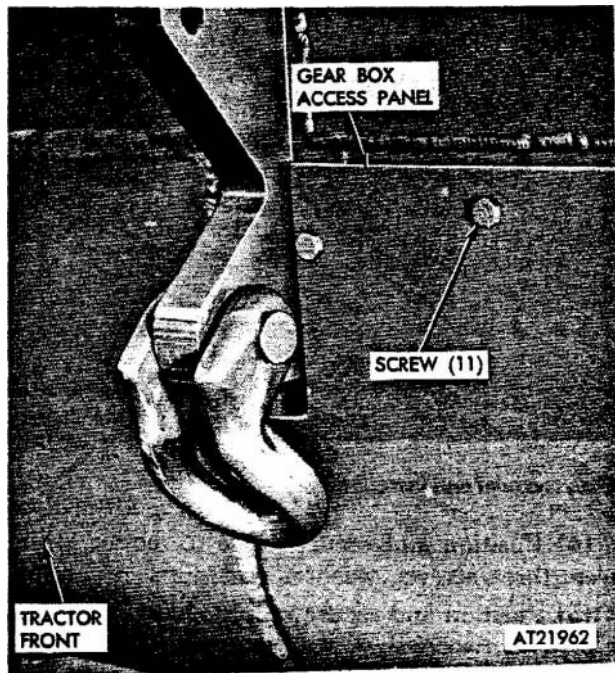


Figure 2-310. Tractor steering gear box access panel, removal and installation.

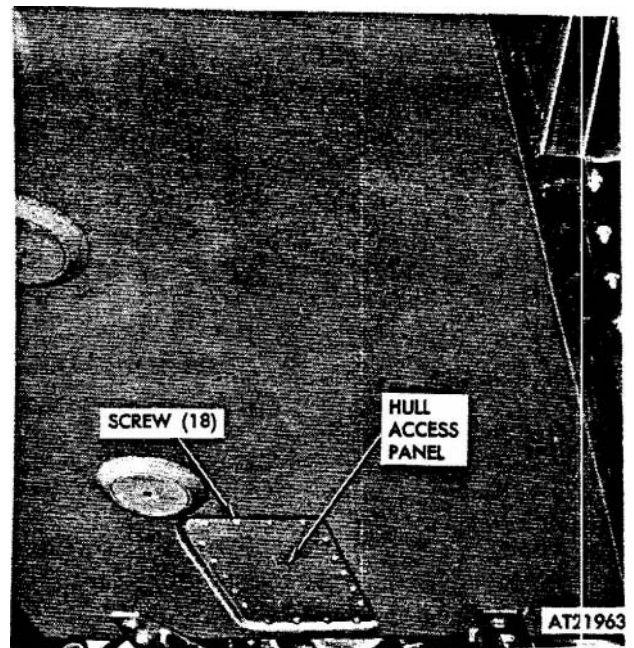


Figure 2-311. Tractor hull access panel removal and installation.

b. Installation.

(1) Install tractor hull access panel (fig 2-311) and the following steps:

(a) Position rubber gasket on panel. Align gasket holes by inserting screws in each corner and center side holes.

(b) Position panel and gasket to tractor hull and start the six screws in the anchor nuts. Do not tighten.

(c) Install remaining screws and secure panel.

(2) Install master cylinder access panel (refer to para 2-161).

(3) Install carrier steering gear access panel (refer to para 2-174).

(4) Install tractor steering gear access panel by positioning panel to structure and securing with eleven screws (fig 2-310).

2-209. Vehicle Lifting Rings

a. Removal. Remove lifting ring from stud mounting hole in vehicle (fig 2-312).

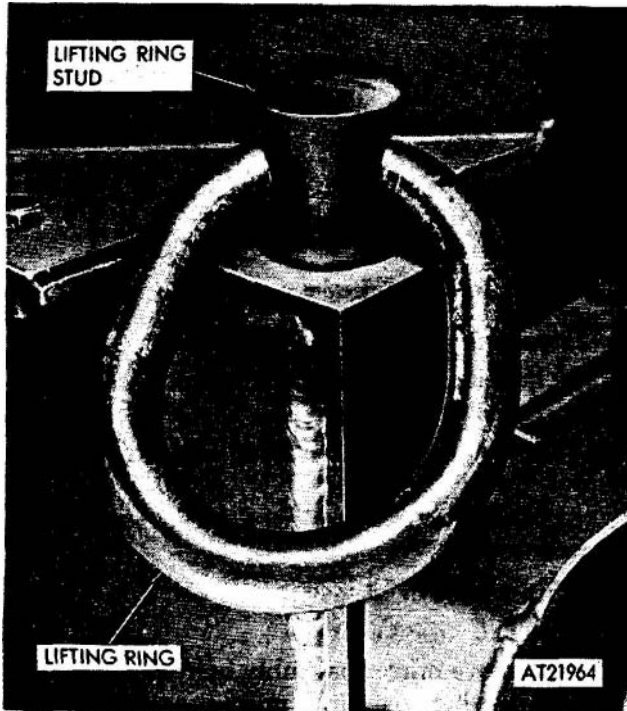


Figure 2-312. Vehicle lifting rings, removal and installation.

b. Installation. Apply anti-seize lubricant (MIL-T-5544B) to threaded portion of lifting ring stud. Install lifting ring in threaded hole of vehicle structure and tighten securely (fig 2-312).

2-210. Vehicle Tie-Down Rings

a. Removal. Remove tie-down ring from side of carrier (fig 2-313).

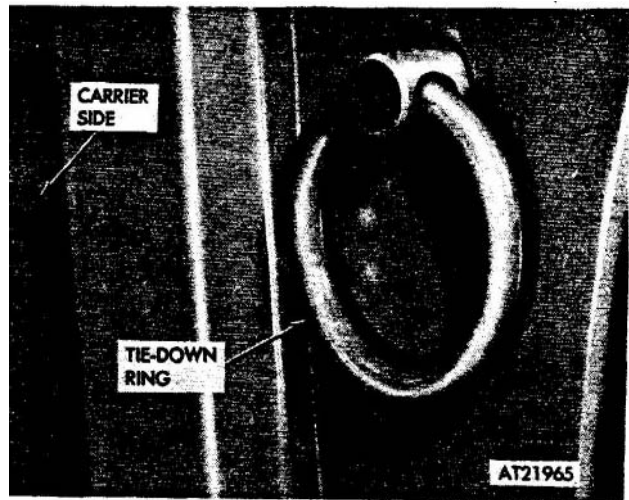


Figure 2-313. Vehicle tie-down rings, removal and installation.

b. Installation. Apply anti-seize lubricant (MIL-T-5544B) to threaded area of tie-down ring stud. Install tie-down in threaded hole of carrier structure and tighten securely (fig 2-313).

2-211. Carrier Cargo Tie-Downs

a. Removal.

(1) Remove four screws, washers, and nuts securing tie-down assembly to carrier hull. Remove tie-down assembly (fig 2-314).

(2) Clean sealant from area of tie-down assembly on hull with a suitable solvent.

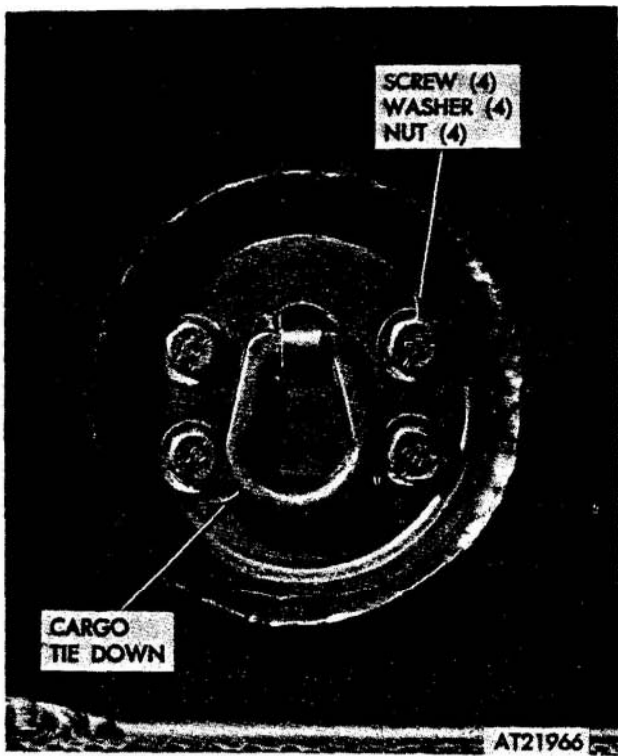


Figure 2-314. Carrier cargo tie-downs, removal and installation.

b. Installation.

- (1) Position tie-down assembly to inside of carrier hull with cutout of tie-down assembly toward bottom of the hull (fig 2-314).
- (2) Secure tie-down assembly with four screws, washers, and nuts.
- (3) Apply sealant (MIL-S-45180A, type II) to hull and nuts securing tie-down assembly.

2-212. Carrier Reflectors

a. Removal.

- (1) Remove four screws securing access plate to carrier side panel. Remove access plate.
- (2) Remove two screws and lock nuts securing reflector to carrier hull by reaching through access hole (fig 2-315).



Figure 2-315. Carrier reflectors, removal and installation.

b. Installation.

- (1) Position gasket behind reflector lens and position reflector to carrier hull (fig 2-315).
- (2) Secure reflector to carrier with two screws and lock nuts.
- (3) Position and secure access panel to carrier with four screws.

2-213. Side Mirror Assembly

a. Removal.

- (1) Remove mirror assembly by removing nut and lock washer securing mirror assembly to support arm and arm assembly (fig 2-316).
- (2) Remove arm assembly by removing bolt, washers, and nut securing arm assembly to swivel.
- (3) Remove swivel by removing screw, lock washer, and nut securing swivel to mounting bracket.
- (4) Remove bracket mounting by removing two bolts, washers, and nuts securing mounting bracket to vehicle.
- (5) Remove support arm by removing bolt and lock washer securing support arm to light bracket. Reinstall bolt and lock washer into bracket.

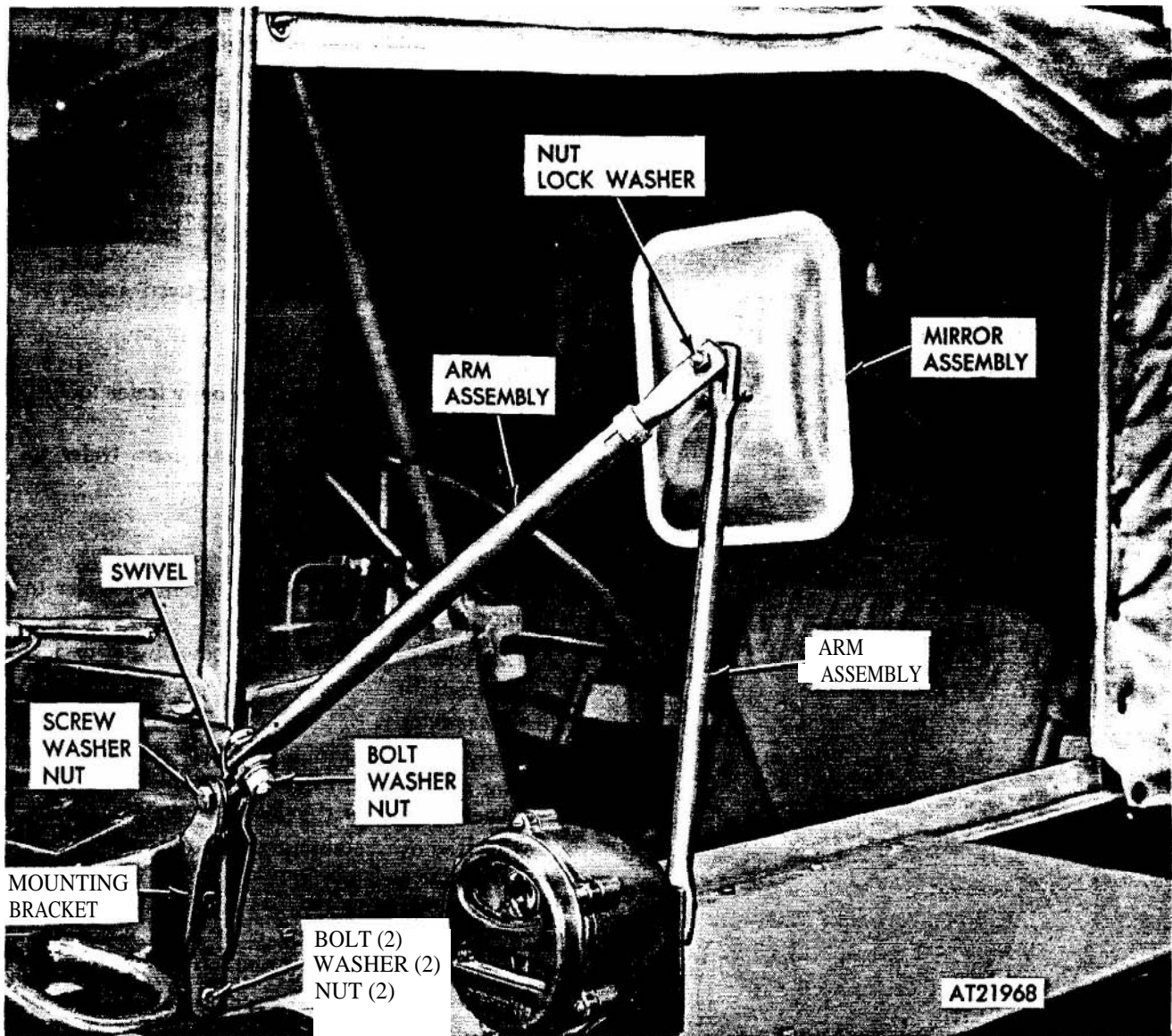


Figure 2-316. Side mirror assembly, removal and installation.

b. Installation.

- (1) Position mounting bracket to vehicle and secure with two bolts, washers, and nuts (fig 2-316).
- (2) Position swivel to mounting bracket and secure with screw, lock washer, and nut.
- (3) Position arm assembly to swivel and secure with bolt, two washers, two fiber washers, and nut.
- (4) Remove outboard bolt and lock washer from light bracket. Position support arm to bracket and secure with bolt and lock washer.
- (5) Position mirror assembly to support arm and arm assembly and secure with lock washer and nut.

2-214. Brush Guards

a. Removal.

- (1) Remove headlamp brush guard (refer to para 2-104).
- (2) Remove horn assembly (right fender only) (refer to para 2-106). Remove three screws and nuts securing horn bracket and brush guard assembly to fender. Remove bracket assembly (fig 2-317).
- (3) Remove blackout headlight assembly (refer to para 2-102). Remove four screws and nuts securing headlight brush guard to vehicle (fig 2-318 I).

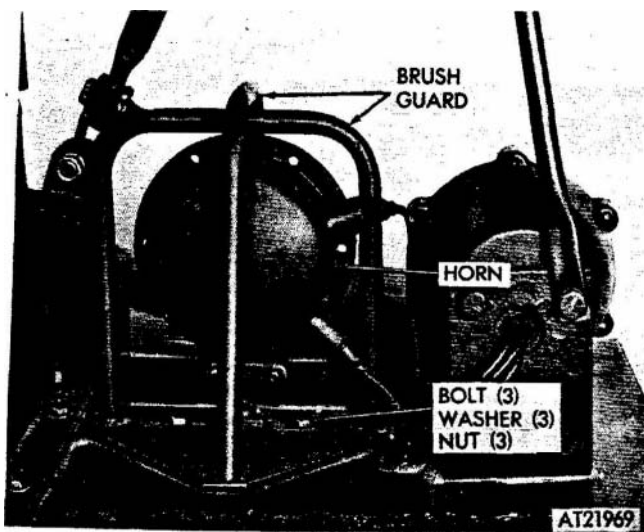


Figure 2-317. Horn brush guard, removal and installation.

b. Installation.

(1) Position blackout headlight brush guard to mounting holes on vehicle and secure with four screws and nuts (fig 2-318). Install headlight (refer to para 2-102).

(2) Position horn bracket and brush guard assembly to right fender. Secure bracket assembly with three screws and nuts (fig 2-317). Install horn (refer to para 2-106).

(3) Install headlamp brush guard (refer to para 2-104).

2-215. Tractor Canopy

a. Removal. Remove tractor canopy (refer to TM 9-2320-242-10).

b. Installation. Install tractor canopy (refer to TM 9-2320-242-10).

2-216. Tractor Canopy Bows

a. Removal.

(1) Remove tractor canopy assembly (refer to TM 9-2320-242-101).

(2) Remove tractor canopy bows (refer to TM 9-2320-242-10).

b. Disassembly.

(1) Remove retaining clips from clevis pins securing front frame assemblies to auxiliary bow. Remove front frame (fig 2-319).

(2) Remove retaining clips from clevis pins securing vertical frame supports to auxiliary bow. Remove frame supports.

(3) Remove retaining clips from clevis pins securing auxiliary bow to main frame bow. Slide bow from web straps.

(4) Slide both web straps from main frame bow.

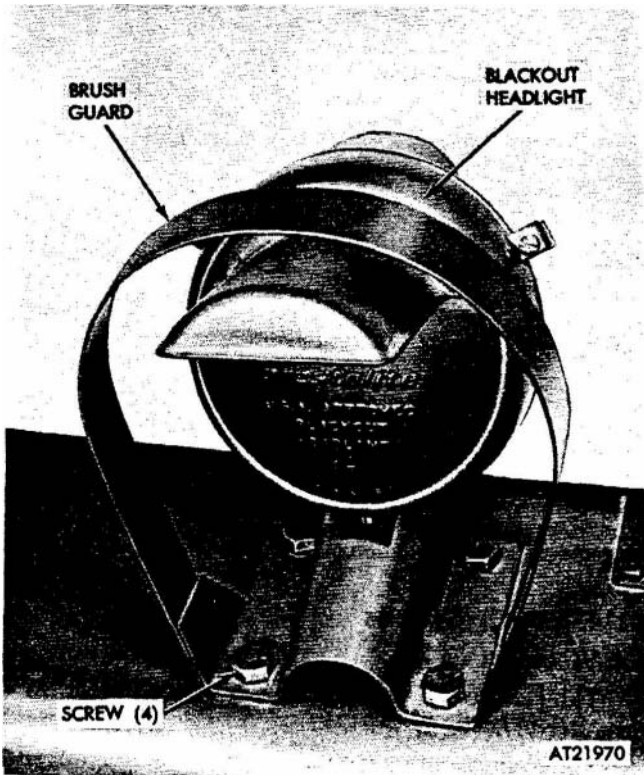


Figure 2-318. Blackout headlight brush guard, removal and installation.

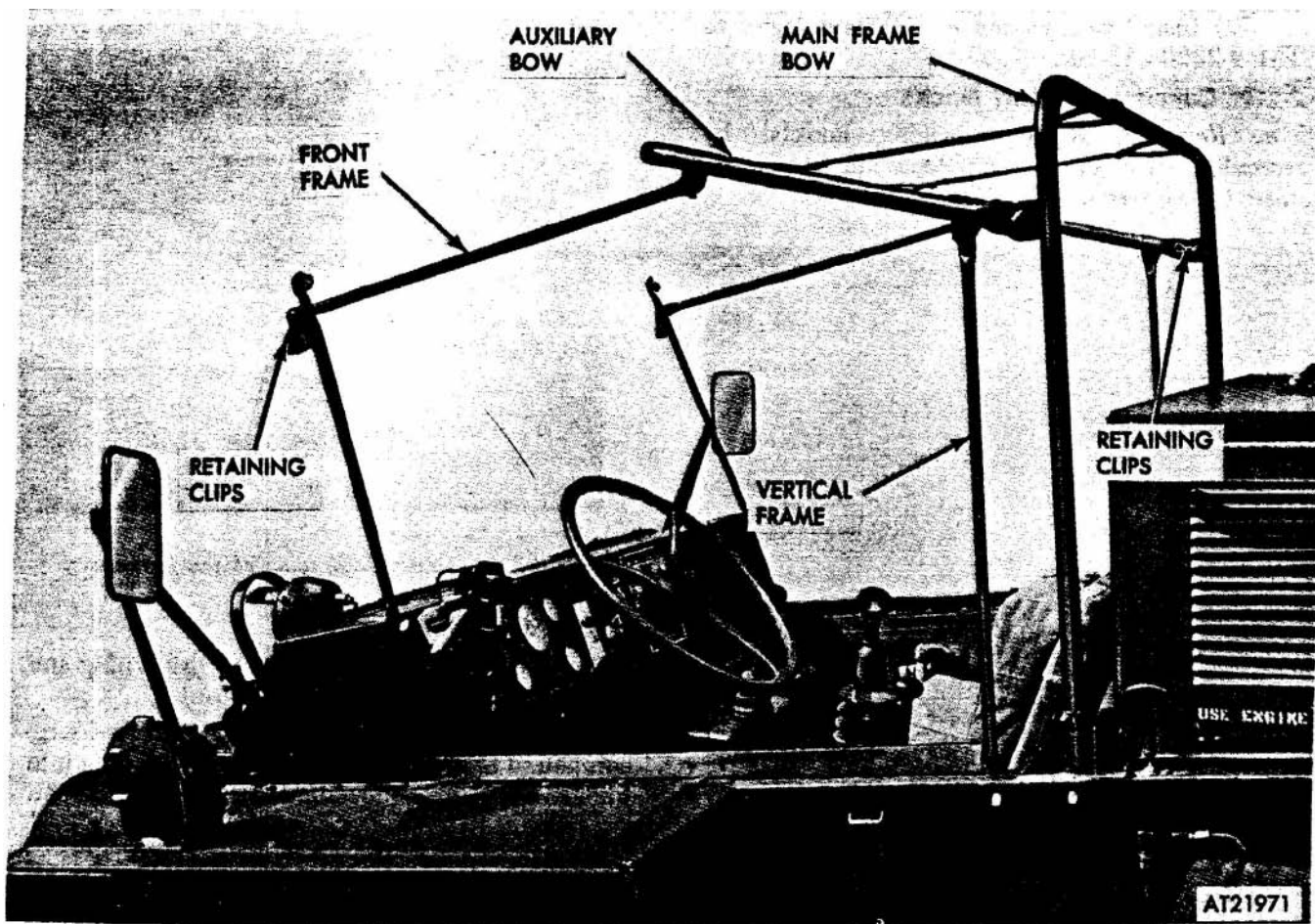


Figure 2-319. Tractor canopy bow, *disassembly and assembly*.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect main frame and auxiliary bows, vertical and forward support tubes for minor bends, cracks, and breaks.

(3) Straighten bends with a soft hammer.

d. Assembly.

(1) Slide both web straps on main frame bow (fig 2-319).

(2) Insert auxiliary bow through both web straps and secure to main frame bow with retaining clips.

(3) Position vertical frame supports to auxiliary bow and secure with retaining clips.

(4) Position front frame assemblies to auxiliary bow and secure with retaining clips.

e. Installation.

(1) Install canopy bow on tractor (refer to TM 9-2320-242-10).

(2) Install canopy assembly (refer to TM 9-2320-242-10).

2-217. Carrier Canopy

a. Removal. Remove carrier canopy (refer to TM 9-2320-242-10).

b. Installation. Install carrier canopy (refer to TM 9-2320-242-101).

2-218. Carrier Canopy Bows

a. Removal, Inspection, and Repair.

(1) Remove canopy and end curtain assembly (refer to TM 9-2320-242-10).

(2) Remove bows (refer to TM 9-2320-242-10).

(3) Inspect bows for minor bends, cracks, and dents.

(4) Straighten bends with a soft hammer.

b. Installation.

(1) Position bows (refer to TM 9-2320-242-10).

(2) Install canopy and end curtain (refer to TM 9-2320-242-10).

2-219. Carrier Lashing Hooks

a. Removal. Remove lashing hook(s) by removing two screws and lock nuts securing hook(s) to carrier sides (fig 2-320).

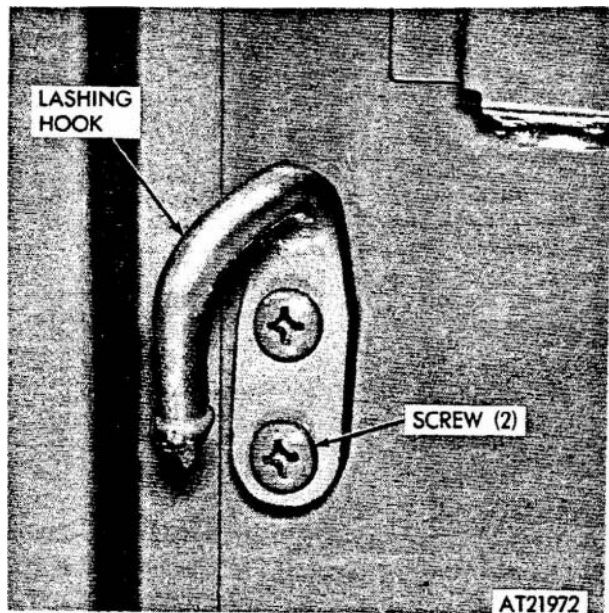


Figure 2-320. Carrier lashing hooks, removal and installation.

b. Installation. Position lashing hook(s) on carrier side(s) and secure with two screws and lock nuts (fig 2-320).

2-220. Drain Plugs

a. Removal.

(1) Remove drain plug from adapter in vehicle hull, using removal tool (11595203) (fig 2-321).

(2) Remove screw securing chain assembly to drain plug. Remove drain plug.

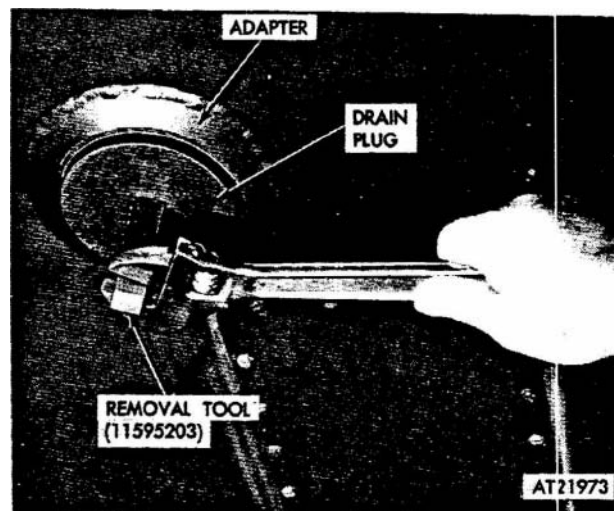


Figure 2-321. Drain plugs, removal and installation.

b. Installation.

(1) Position chain assembly to drain plug and secure with screw (fig 2-321).

(2) Coat threads of drain plug with anti-seize compound (FSN 8030-753-4953). Install plug into hull adapter, using installation tool (11595203).

2-221. Tractor Drivers Seat

a. Removal. Pull up on adjust lever of drivers seat and slide seat forward. Pull quick release pins securing the passenger seat to its mounting channel. Lift front of seat and slide forward.

b. Installation. Position drivers seat on mounting channel and install quick release pins.

2-222. Tractor Right Seat

a. Removal. Remove tractor right seat (refer to para 2-2211).

b. Installation. Install tractor right seat (refer to para 2-221).

2-223. Console

a. *Removal.* Remove console (refer to para 2-33).

b. *Installation.* Install console (refer to para 2-33).

2-224. Liquid Container Hold-down Brackets and Straps.

a. *Removal.* Remove container brackets and straps (refer to para 2-207).

b. *Installation.* Install container brackets and straps (refer to para 2-207).

2-225. Carrier Troop Seat Assembly

a. *Removal.*

(1) Raise seat to latch position and remove eight nuts and bolts from carrier and seat hinges. Pull latch release cable and remove seat (fig 2-322).

(2) Remove two cotter pins, clevis pins, and washers securing cable to latch. Remove cable.

(3) Remove four nuts, washers, and screws securing latch to seat. Remove latch.

(4) Remove nuts and screws securing latch stop to carrier. Remove latch stop.

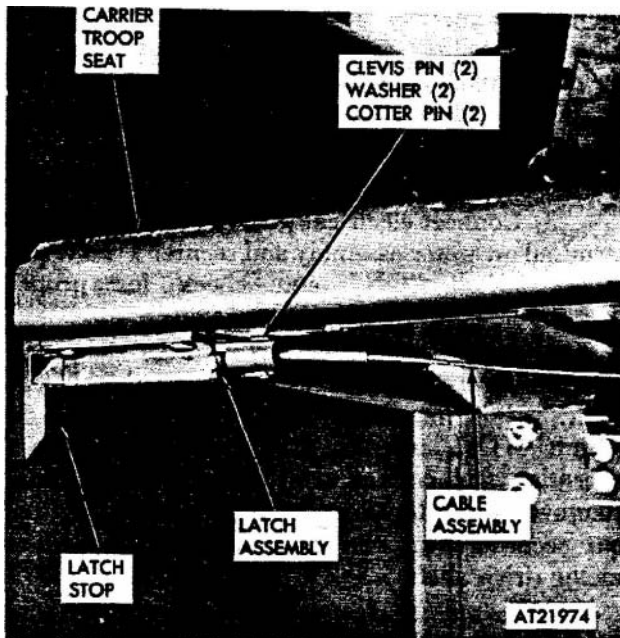


Figure 2-322. Carrier troop seat assembly, removal and installation.

b. *Installation.*

(1) Align mounting holes of stop with holes in carrier structure. Install screws and nuts securing stop to carrier (fig 2-322).

(2) Align holes of latch assembly mounting flange with holes in seat. Install four screws, washers, and nuts securing latch to seat.

(3) Position cable assembly terminals on latch assemblies. Install two clevis pins, washers, and cotter pins securing cable.

(4) Position seat assembly to carrier and engage latch assemblies. Insert eight screws through seat mounting holes in carrier structure and seat hinges. Install nuts securing seat assembly to carrier.

(5) Apply a light coat of grease to stop. Pull latch release cable and oil hinges and latches. Engage and release latches several times and check seat installation.

2-226. Windshield Wiper Blade

a. *Removal.* Remove lock nut and screw securing wiper blade to arm assembly saddle. Remove blade (fig 2-323).

b. *Installation.* Position wiper blade in arm assembly saddle by aligning mounting holes and installing screw and lock nut securing blade assembly (fig 2-323).

Caution: Exercise care in tightening screw to prevent collapsing of saddle and blade.

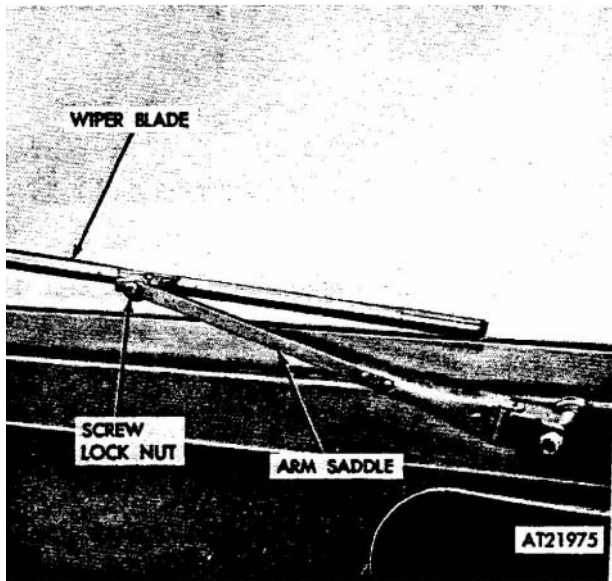


Figure 2-323. Windshield wiper blade, removal and installation.

2-227. Windshield Wiper Arm

a. *Removal.*

(1) Note position of blade for reinstallation purposes and remove nut securing arm and blade assembly to wiper motor drive shaft. Remove wiper arm and blade assembly (fig 2-324).

(2) Remove blade from arm (refer to para 2-226).

b. Installation.

- (1) Install blade on arm (refer to para 2-226).
- (2) Position blade and arm assembly on wiper motor drive shaft in same location as before removal. Install nut finger tight and turn wiper motor switch "ON." Check assembly for proper operation and correct arm assembly positioning. Remove nut and reposition arm and blade assembly if required. Tighten nut securing wiper arm and blade assembly to motor drive shaft (fig 2-324).

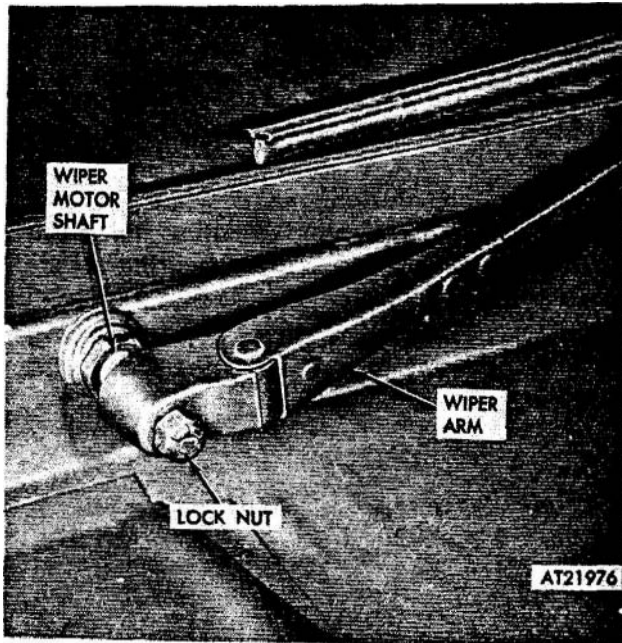


Figure 2-324. Windshield wiper arm, removal and installation.

2-228. Windshield Wiper Motor

a. Removal.

- (1) Remove arm and blade assembly (refer to para 2-227).
- (2) Remove splined driver, nut, spacer, and leather washer from shaft and shaft housing (fig 2-325). Disconnect electrical leads.
- (3) Remove nuts securing wiper motor to stabilizer bracket and remove wiper motor.

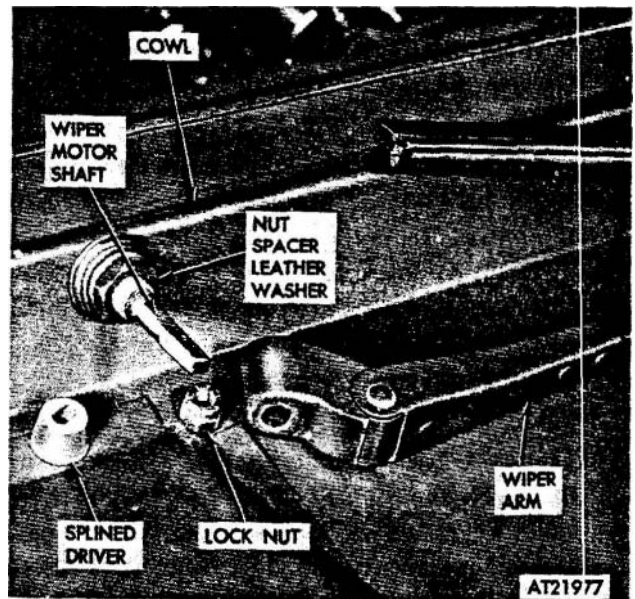


Figure 2-325. Windshield wiper motor, removal and installation.

b. Installation.

- (1) Position motor assembly by inserting drive shaft through hole in cowl and the two studs through stabilizer bracket holes. Install two nuts securing motor assembly to stabilizer bracket,
 - (2) Install leather washer, spacer, and nut: on drive shaft housing securing motor assembly to cowl. Torque nut to 28-32 lbs-ft. (fig 2-325).
 - (3) Connect electrical leads to their respective terminal on motor assembly and secure. Turn wiper motor switch "ON" and check for proper operation. Turn switch "OFF."
 - (4) Install splined driver on drive shaft and position arm and blade assembly on driver and shaft. Install nut finger tight. Turn wiper motor switch "ON" and check assembly for proper operation and correct arm assembly positioning. Remove nut and reposition as necessary. Tighten nut securing arm and blade assembly to wiper motor drive shaft.
- c. Adjustment.* Loosen screw securing stop adjustment nut at rear of wiper motor housing.

Alternately turn wiper switch on and off while adjusting nut. When switch is turned off and blades stop at desired location, tighten screw securing adjusting nut.

2-229. Bilge Pump Discharge Hose

a. Removal.

- (1) Open and secure engine cover.
- (2) Remove hull bottom access panel (refer to para 2-208).
- (3) Loosen clamp securing hose to bilge pump. Remove hose from pump (fig 2-326).
- (4) Remove screw, nut, washer and clamp securing hose to hull (fig 2-327).
- (5) Loosen clamp securing hose to hull insert. Remove hose. Remove clamps from hose.

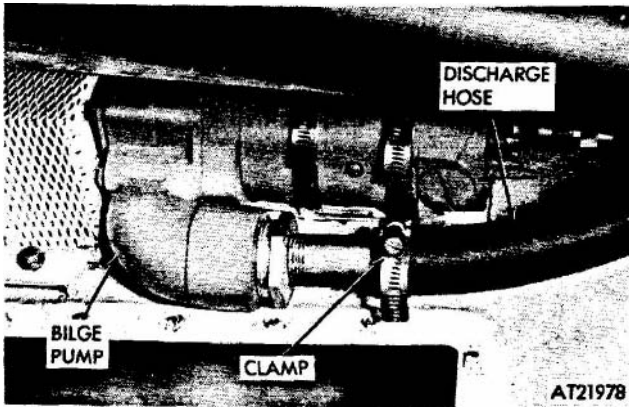


Figure 2-326. Bilge pump discharge hose (et pump), removal and installation.

b. Installation.

- (1) Position two clamps on hose one at each end and connect hose to hull insert and bilge pump. Tighten clamps (fig 2-326).
- (2) Secure hose to hull with clamp, screw, washer, and nut.
- (3) Install hull bottom access panel (refer to para 2-208).
- (4) Close and secure engine cover.

2-230. Bilge Pump

a. Servicing. Servicing of the bilge pump consists of checking the screen assembly and removing any obstructions.

b. Removal.

- (1) Remove hull bottom access panel (refer to para 2-208).
- (2) Remove hose (refer to para 2-229).
- (3) Disconnect electrical connector (fig 2-328).
- (4) Remove screw and washer securing pump assembly to bracket.
- (5) Loosen two pump assembly clamps, slide outward and remove pump from mounting bracket and screen assembly.
- (6) Remove clamps, nipple and bushing from pump.

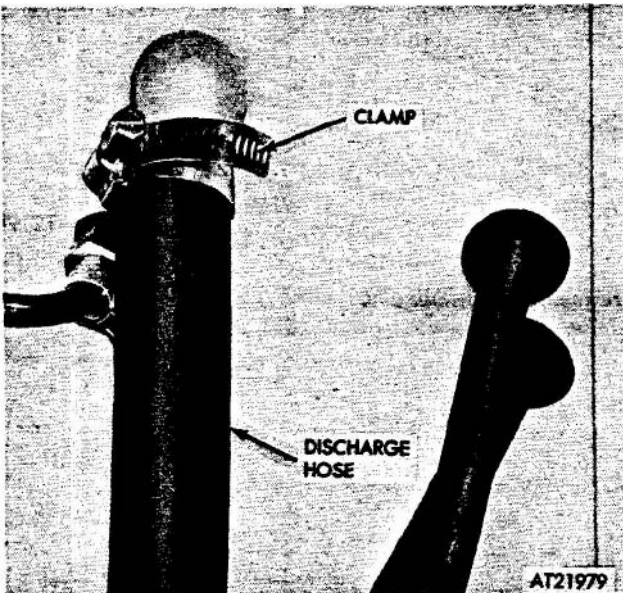
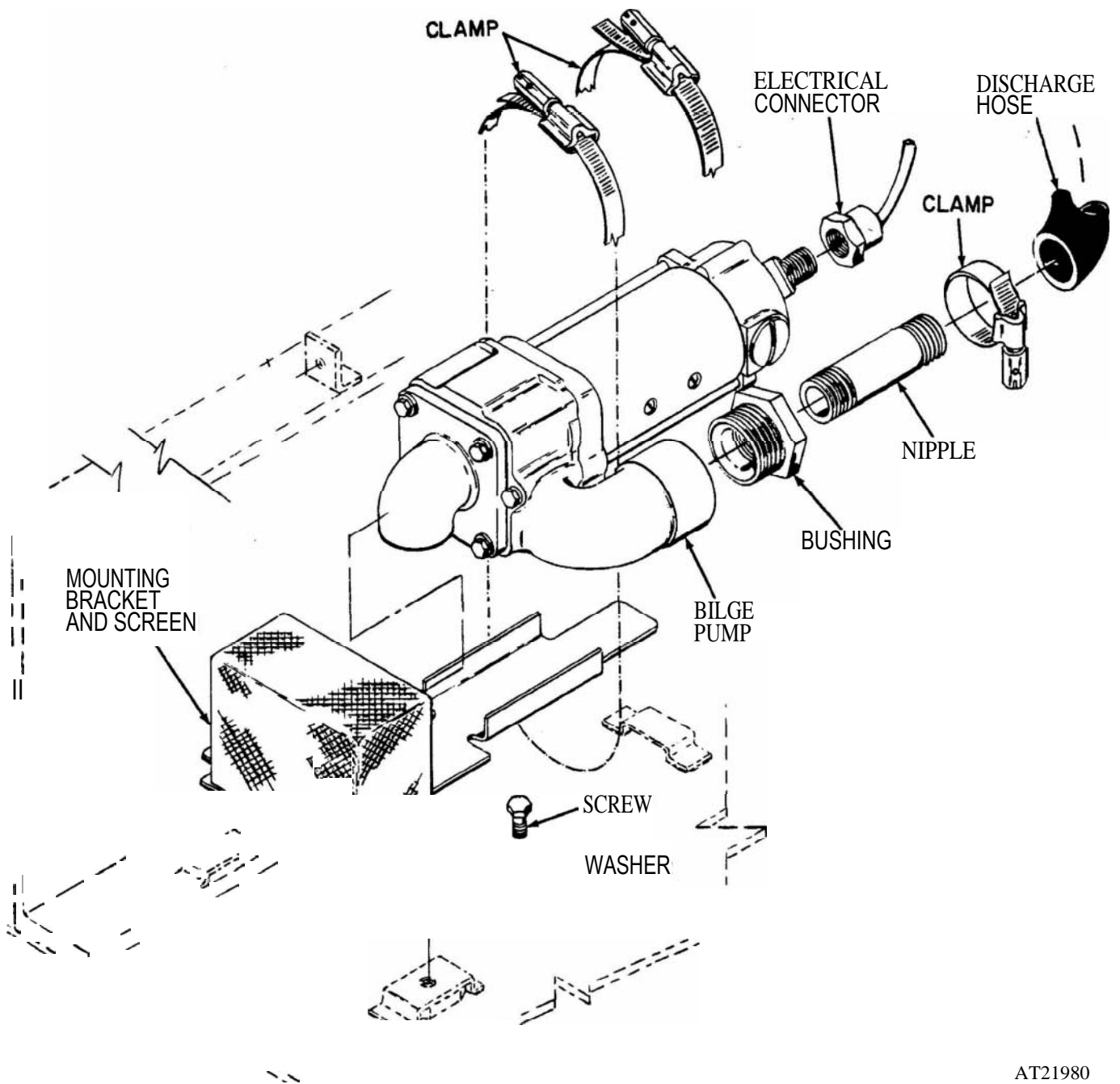


Figure 2-327. Bilge pump discharge hose (at hula), removal and installation.



AT21980

Figure 2-328. Bilge pump, removal and installation.

c. Installation.

- (1) Install bushing and nipple to pump outlet (fig 2-328).
- (2) Position two clamps on pump.
- (3) Position pump to screen and mounting bracket assembly. Position clamps on bracket and secure.
- (4) Install pump assembly and secure with screw and washer.
- (5) Connect electrical connector.
- (6) Install hose to outlet nipple and secure damp.
- (7) Secure access panel to hull (refer to **para** 2-208).

2-231. Battery Box

- a. *Removal.* Remove battery box (refer to para 2-80).

- b. *Installation.* Install battery box (refer to para 2-80).

2-232. Vehicle Data Plates

- a. *Removal.* Using a suitable screw driver, remove plate by removing screws securing plates to instrument panel (fig 2-329).

Note: If plate is being replaced by a new **plate**, record data from old plate.

- b. *Installation.*

- (1) If a new plate is being installed, stamp data contained on old plate on to blank spaces provided.
- (2) Install plate with sheet-metal screws (fig 2-329).

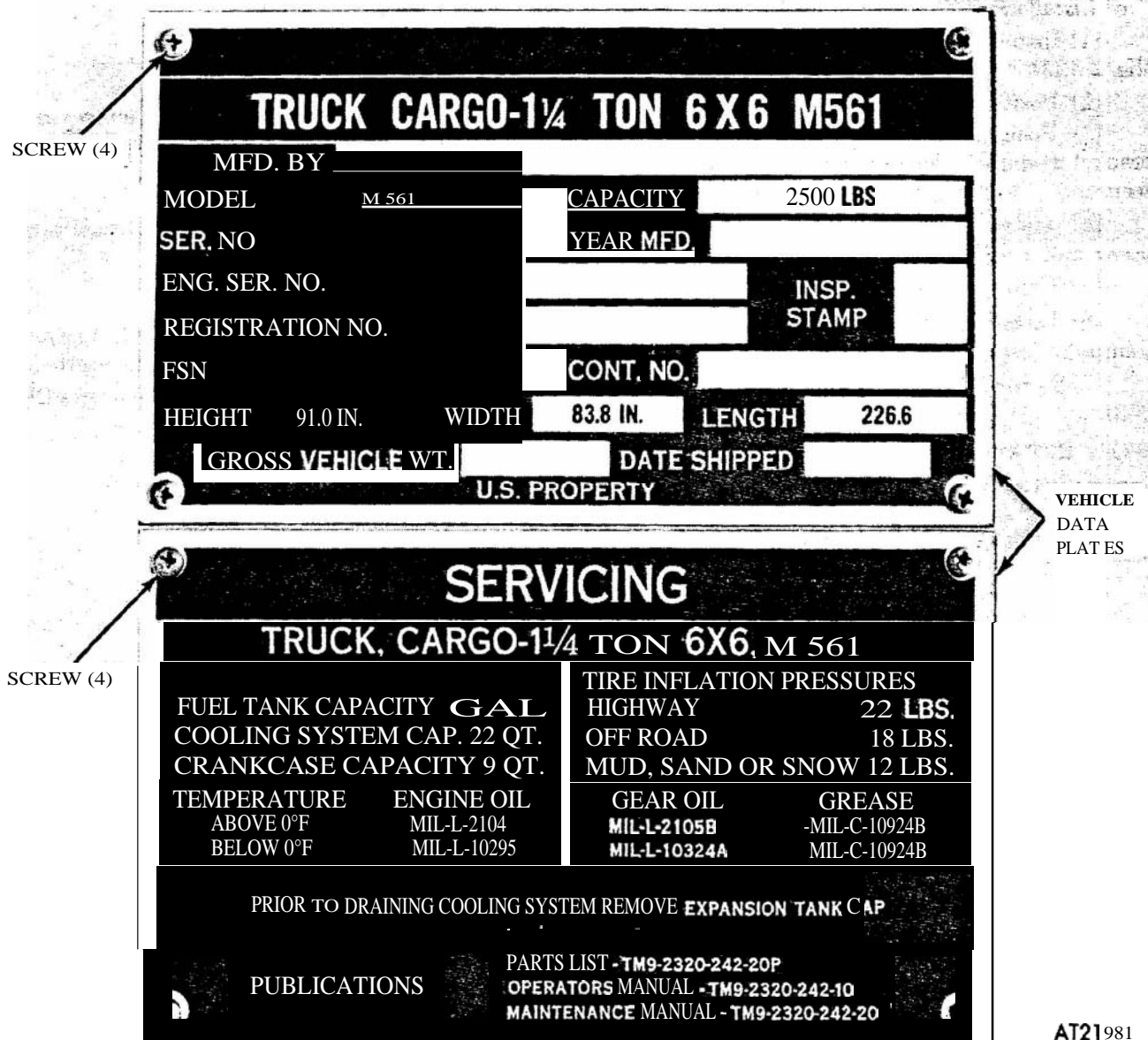


Figure 2-329. Vehicle data plates, removal and installation.

2-233. Console Instruction Plates

a. Removal.

(1) Remove console assembly from tractor (refer to para 2-33).

(2) Support inner side of console with a bucking bar. Use a 3 / 32 punch and hammer (top side) and drive rivet stems from rivets securing

instruction plate(s). Use a 1/8 inch bit and drill rivet heads to depth of head only, being careful not to drill through console and enlarge holes. Use a 1/8 inch punch and pry rivet heads off if necessary. Drive out remainder of rivet with a punch of equal diameter or slightly less than rivet (fig 2-3 30).

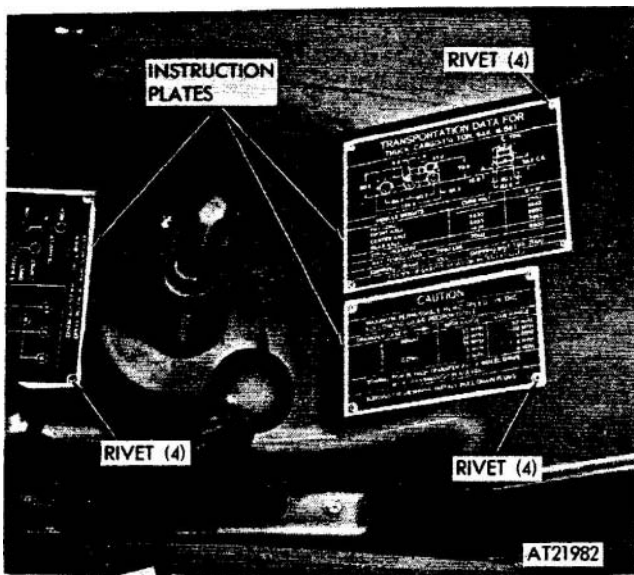


Figure 2-330. Console instruction plates, removal and installation.

b. Installation.

(1) Position instruction plate by aligning holes of plate with appropriate holes in console. Secure

plate in place with two $\frac{1}{8}$ inch screws and nuts. Insert aluminum rivets or equivalent in two holes. Hold rivets in place with tape and support console (bottom side up) on surface plate or bucking bar. Set rivets with a suitable punch and hammer. Remove nuts and screws and install remaining rivets securing plate to console (fig 2-330).

(2) Install console (refer to para 2-33).

Note: If holes in console are enlarged, a thin washer may be used under former head or increase enlarged hole to next higher rivet size.

2-234. Personnel Safety Belts and Strap

a. Removal.

(1) Remove safety strap by disconnecting strap from both eyebolts on rear of carrier seat backs (fig 2-331).

(2) Remove seat safety belts by removing two nuts and lock washers securing U-bolt to carrier. Remove U-bolt and seat belt (fig 2-332).

(3) Remove nuts from U-bolt and slide seat belt from belt.

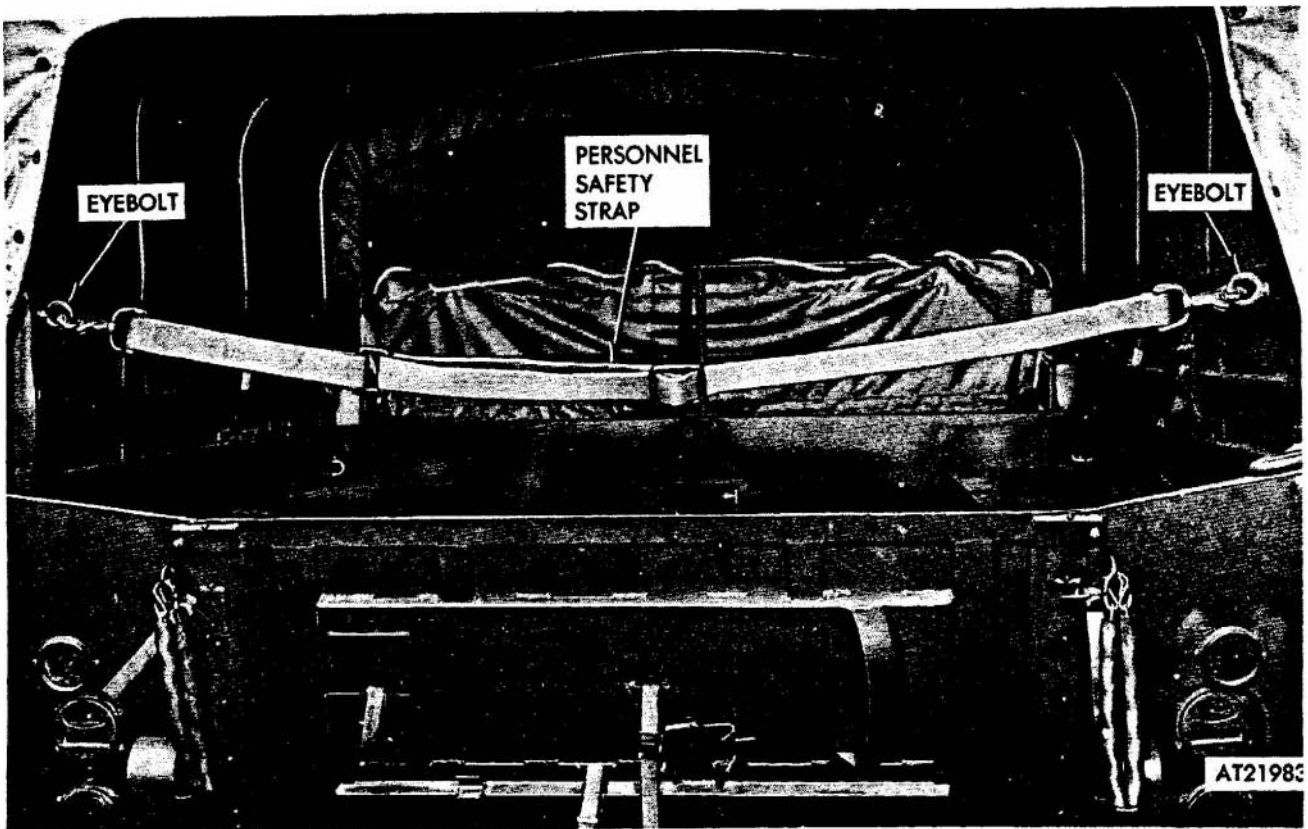


Figure 2-331. Personnel safety strap, removal and installation

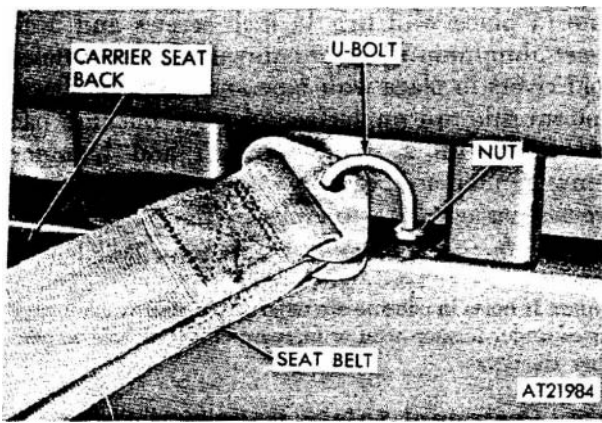


Figure 2-332. Personnel safety belts, removal and installation.

b. Installation.

(1) Slide seat belt hardware on U-bolt. Thread two nuts on U-bolt and insert into carrier mounting holes. Secure assembly with two lock washers and nuts (fig 2-332).

(2) Connect safety strap to eyebolts on rear of carrier seat backs (fig 2-331).

2-235. Carrier Seat Backs

a. Removal.

(1) Disconnect safety strap from seat back.

(2) Remove eyebolt, washer, and nut from seat back (refer to para 2-234).

(3) Lift seat back from stake pockets (fig 2-333).

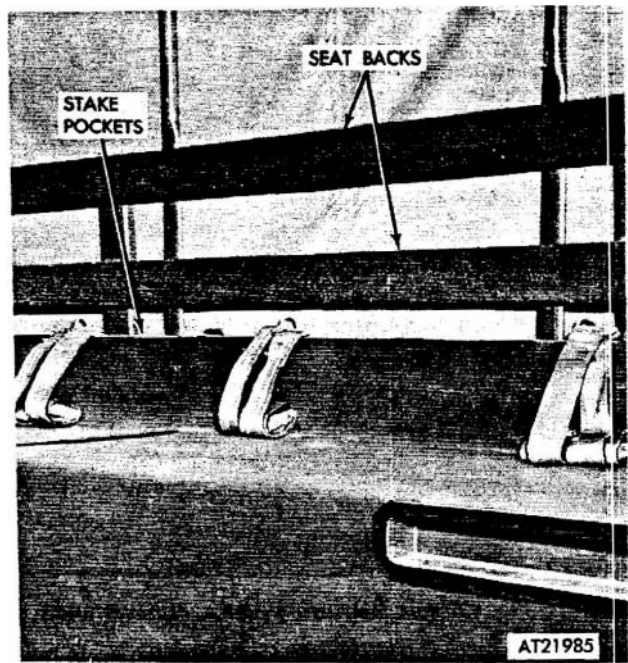


Figure 2-333. Carrier seat backs, removal and installation.

b. Installation.

(1) Install seat back on carrier with horizontal channels toward inside of carrier (fig 2-333).

(2) Position eyebolt seat back and secure with lock washer and nut (refer to para 2-234).

(3) Connect safety strap.

2-236. Vehicle Pamphlet Bag

a. Removal.

(1) Slide seat forward on adjusting rails to obtain clearance to pamphlet bag (fig 2-334).

(2) Unsnap bottom of bag from seat and lift bag from upper brackets.

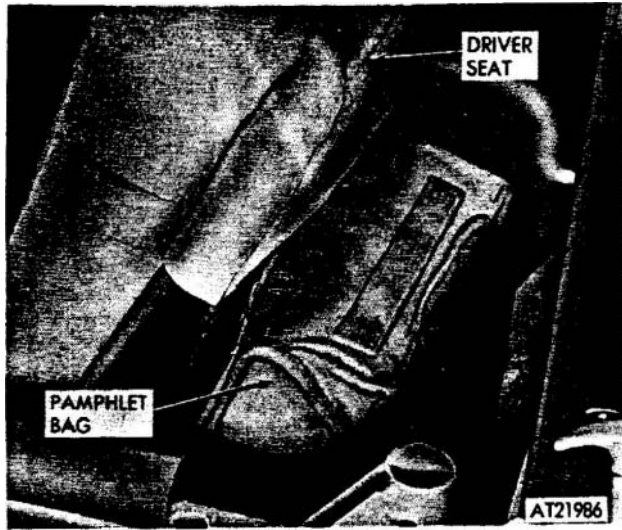


Figure 2-334. Vehicle pamphlet bag removal and installation.

b. Installation.

(1) Position top of pamphlet bag into brackets and snap lower end of bag to studs on seat shell (fig 2-334).

(2) Adjust seat as necessary.

2-237. Pioneer Tool Straps

a. Removal. Remove defective straps from pioneer tool rack (fig 2-335).

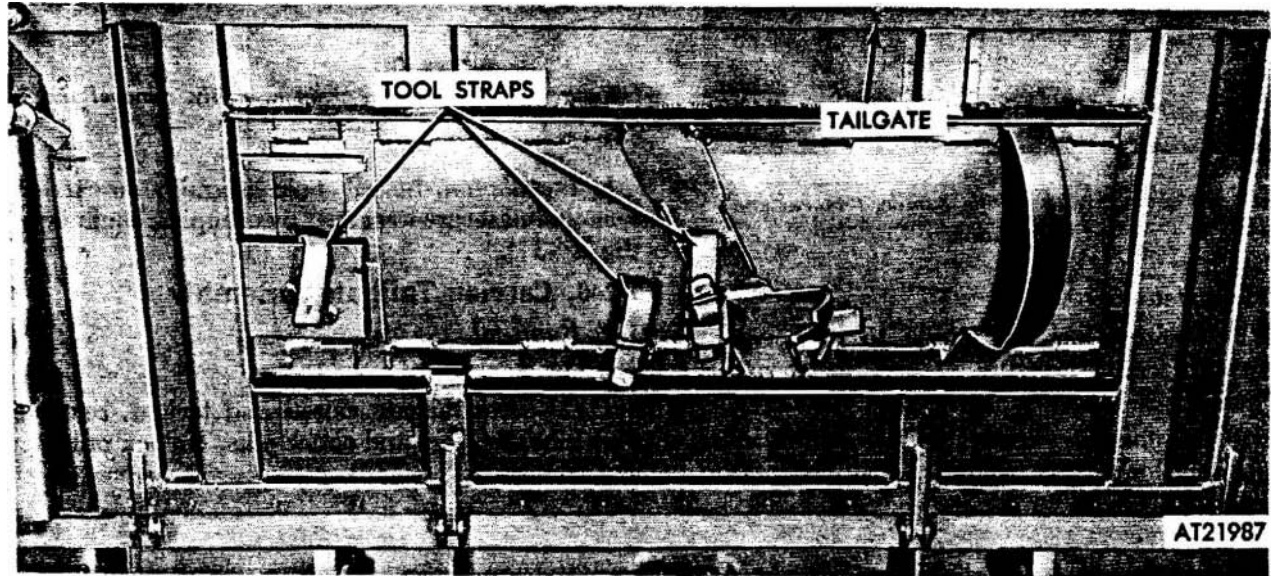


Figure 2-335. Pioneer tool straps, removal and installation.

b. Installation. Install tool strap to retaining clip on axle sheath, strap to retaining clip on cross member, and tool strap to retaining clip on lower angle of pioneer tool rack (fig 2-335).

2-238. Tailgate Locking Handle

a. Removal.

(1) Open tailgate and secure with tailgate chain.

(2) Remove screw, three flat washers, lock washer, and nut securing locking handle to carrier. Remove handle (fig 2-336).

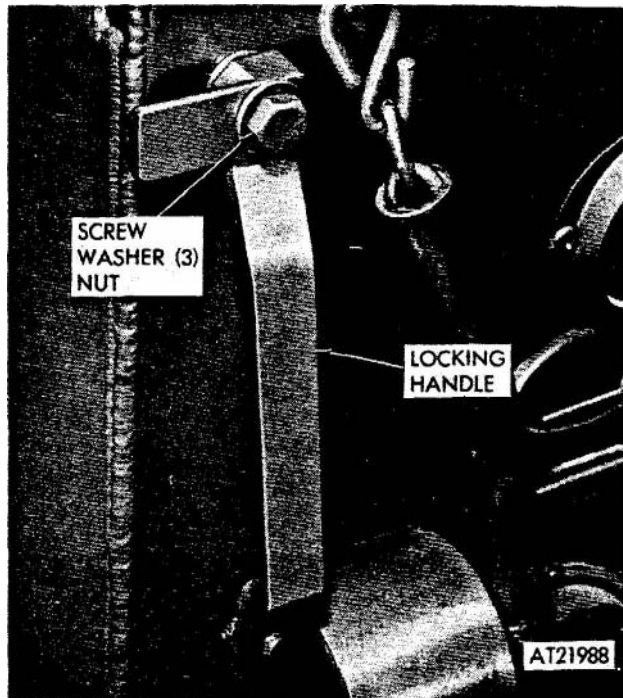


Figure 2-336. Tailgate locking handle, removal and installation.

b. Installation.

(1) Position locking handle to carrier and secure with screw, three flat washers, lock washer, and nut (fig 2-336).

(2) Lift tailgate slightly, release chains, close tailgate and lock. Stow chains. Visually check to ensure tailgate seals to carrier body.

2-239. Tailgate Chain Assemblies

a. Removal. Remove defective tailgate chain assembly by opening chain link securing chain to carrier eyebolt (fig 2-337).

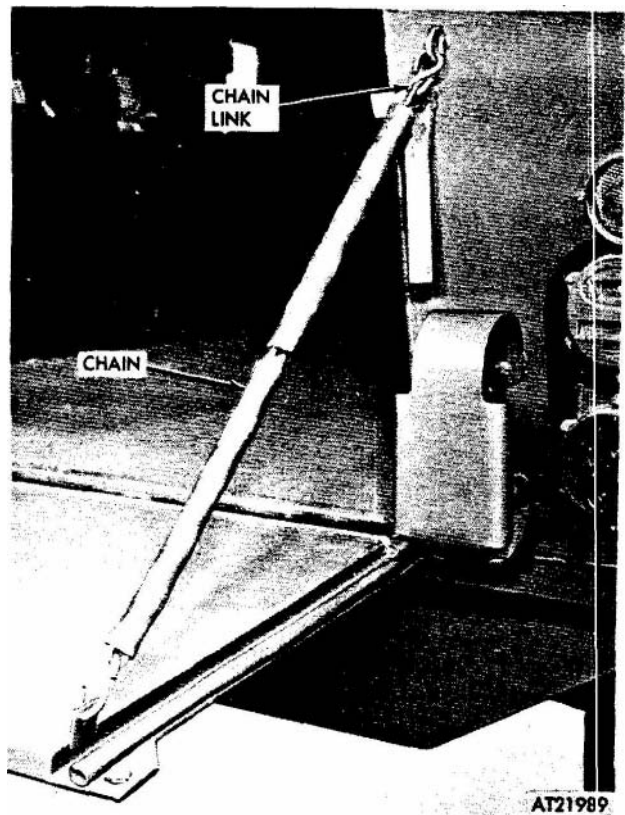


Figure 2-337. Tailgate chain assembly, removal and installation.

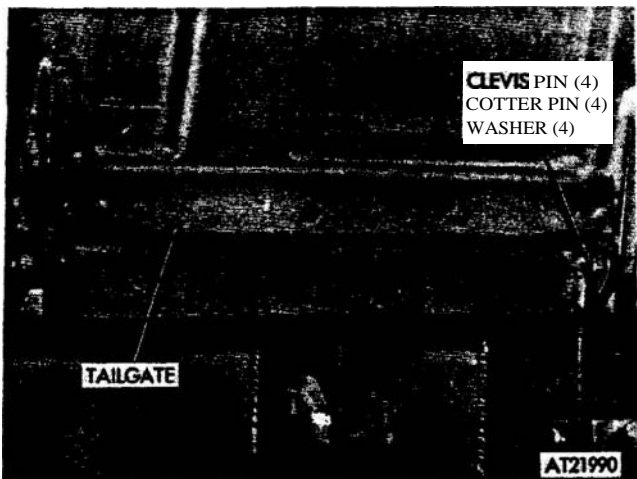
b. Installation. Install chain assembly on carrier eyebolt and secure to carrier by crimping chain link (fig 2-337).

2-240. Carrier Tailgate Assembly

a. Removal.

(1) Remove pioneer tools.

(2) With tailgate closed and locked, remove four pins, washers and cotter pins. Unlock tailgate and remove (fig 2-338).



b. Installation.

(1) Position tailgate assembly on carrier. Install four pins, washers, and cotter pins. Close and lock tailgate. Inspect to ensure proper sealing (fig 2-338).

(2) Install pioneer tools.

2-241. Tailgate Seal and Seal Retainer

a. Removal.

(1) Open tailgate and secure with tailgate chains.

(2) Remove screws and nuts securing seal and seal retainers to tailgate. Remove seal and seal retainers (fig 2-339).

Figure 2-338. Carrier tailgate assembly, removal and installation.

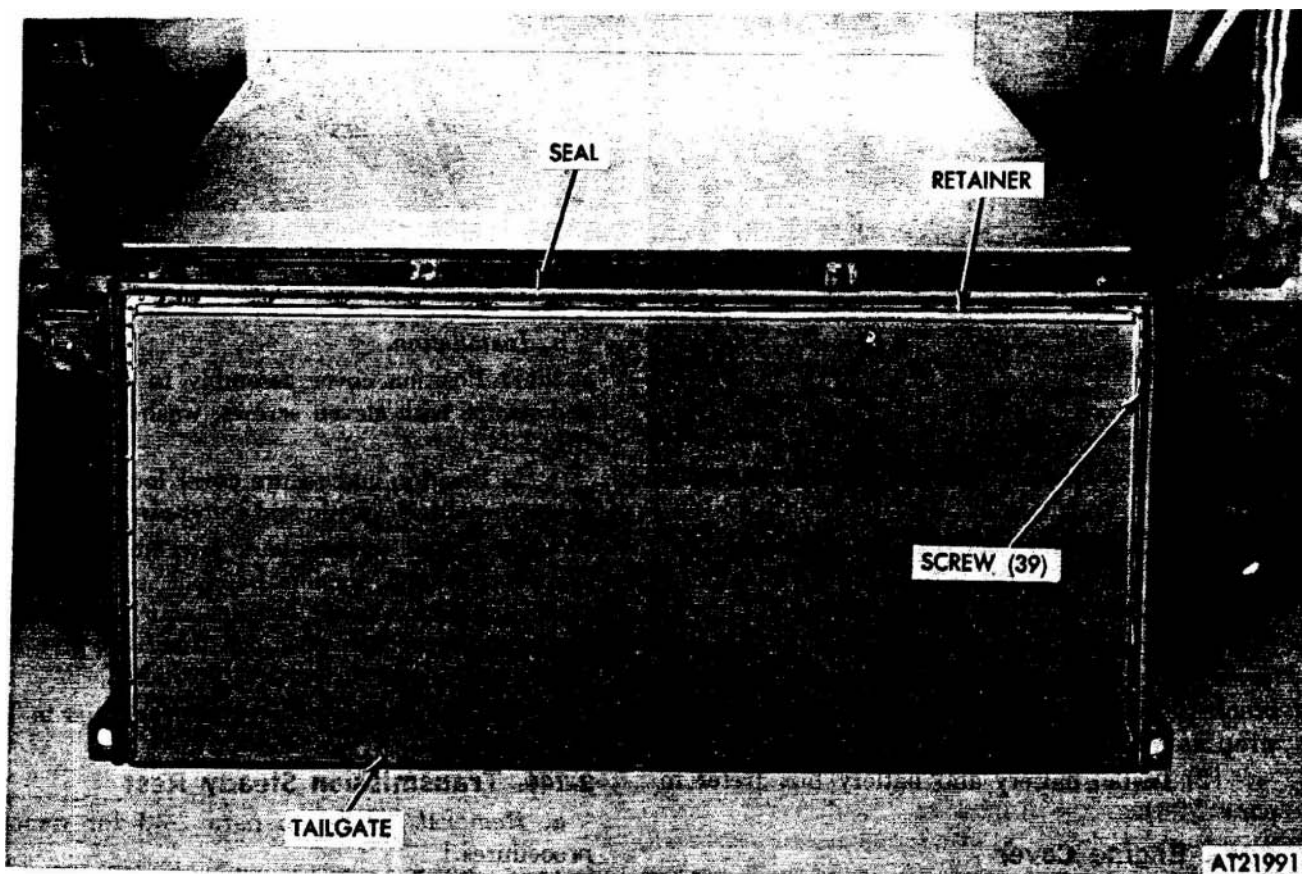


Figure 2-339. Tailgate seal and seal retainer, removal and installation.

b. Installation.

(1) Starting from right-hand side secure seal and retainer to tailgate with thirty-nine screws and nuts (fig 2-339).

(2) Close tailgate and lock. Check seal for proper seating to carrier.

2-242. Battery Box Strap Assemblies

a. Removal.

(1) Loosen strap and remove battery box and battery (refer to para 2-80).

(2) Remove rivets securing upper and / or lower strap assemblies to brackets and remove straps (fig 2-340).

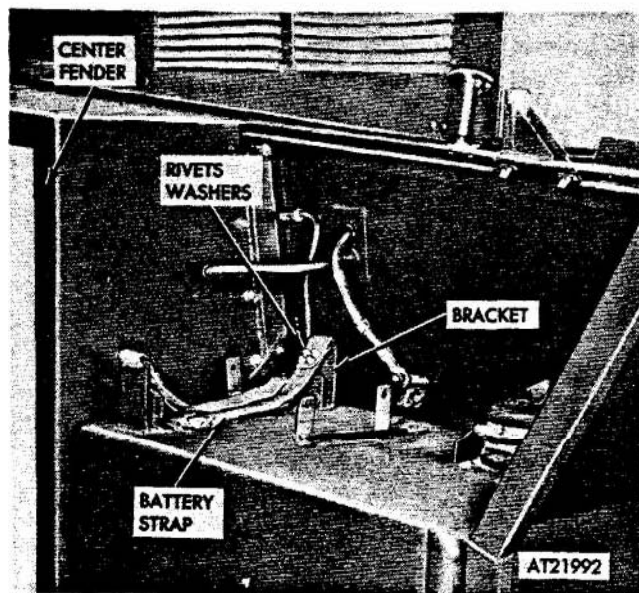


Figure 2-340. Battery box strap assemblies, removal and installation.

b. Installation.

(1) Position upper strap assembly and / or lower strap assembly through their respective brackets) and install rivets and washers securing strap assembly (fig 2-340).

(2) Install battery and battery box (refer to para 2-80).

2-243. Engine Cover

a. Removal.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

(2) Pull torsion bars out of holes in cover bracket (fig 2-341).

(3) Remove cotter pin and clevis pin securing cover locking bracket to tractor.

(4) Remove eleven nuts, washers, and screws securing engine cover assembly to tractor body. Remove cover.

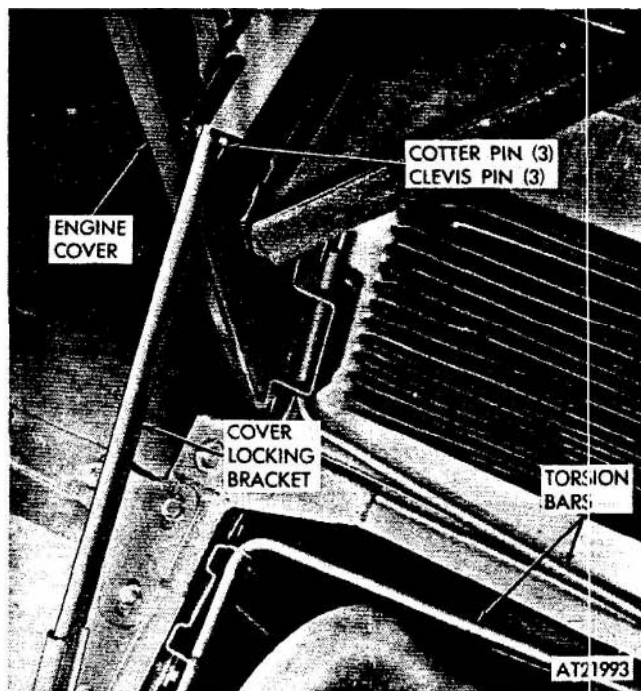


Figure 2-341. Engine cover, removal and installation.

b. Installation.

(1) Position cover assembly to tractor body and secure with eleven screws, washers, and nuts (fig 2-341).

(2) Position and secure cover locking bracket to tractor with clevis pin and cotter pin.

(3) Install torsion bars into holes in cover brackets. Adjust torsion bars, if necessary, by removing torsion cover bracket and insert **torsion** bar into one of two positions that will give zero torque with cover in vertical position.

(4) Close and secure engine cover (refer to TM 9-2320-242-10).

2-244. Transmission Steady Rest

a. Removal. (Refer to para 2-33 for removal procedures.)

b. Installation. (Refer to para 2-33 for installation procedures.)

2-245. Tractor Rear Bumper Assemblies

a. Removal. Remove quick disconnect pin, screw, and nut securing bumper to tractor I fig 2-342).

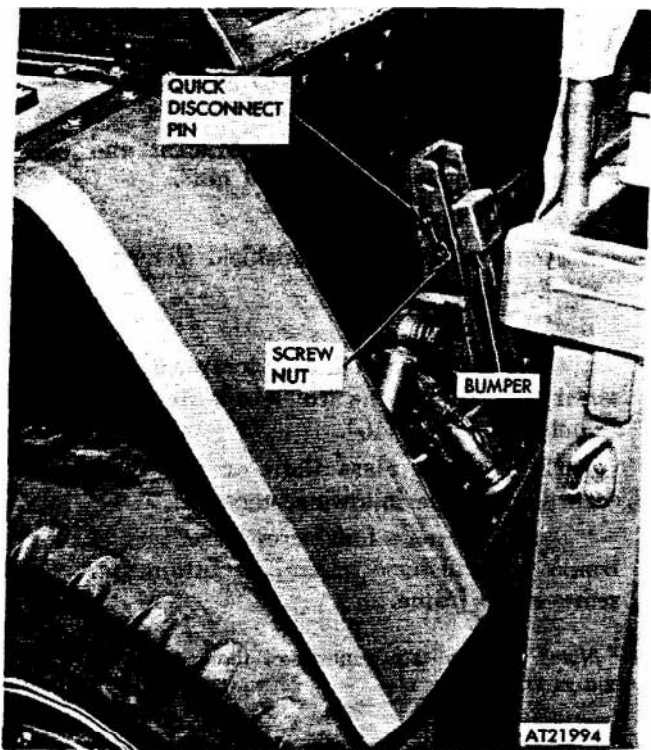


Figure 2-342. Tractor rear bumper assemblies, removal and installation.

b. *Installation.* Position and secure bumper to rear of tractor with screw, nut, and quick disconnect pin (fig 2-342).

2-246. Articulating Joint Hitch Pins

a. *Removal.* Remove hitch pin (refer to para 2-153).

b. *Installation.* Install hitch pin (refer to para 2-153).

2-247. Articulating Joint Rubber Bumpers

a. *Removal.* Remove rubber bumper by unscrewing rubber bumper from articulating joint and removing lock washer (fig 2-343).

b. *Installation.* Install lock washer on bumper stud and screw into articulating joint (fig 2-343).

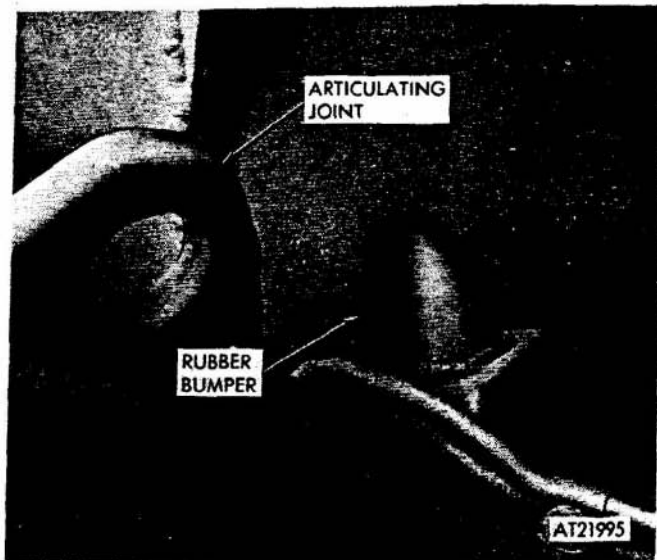


Figure 2-343. Articulating joint rubber bumper, removal and installation.

2-248. Front and Rear Carrier Curtains

a. *Removal.* Remove front and rear carrier curtains (refer to TM 9-2320-242-10).

b. *Installation.* Install front and rear carrier curtains (refer to TM 9-2320-242-10).

2-249. Rifle Mounting Brackets

a. *Removal.*

(1) Remove bracket and catch assembly by removing two screws and nuts securing assembly to tractor (figs 2-344 and 2-345).

(2) Remove either floor rifle mounting bracket by removing two screws, lock washers, and nuts securing bracket to tractor.

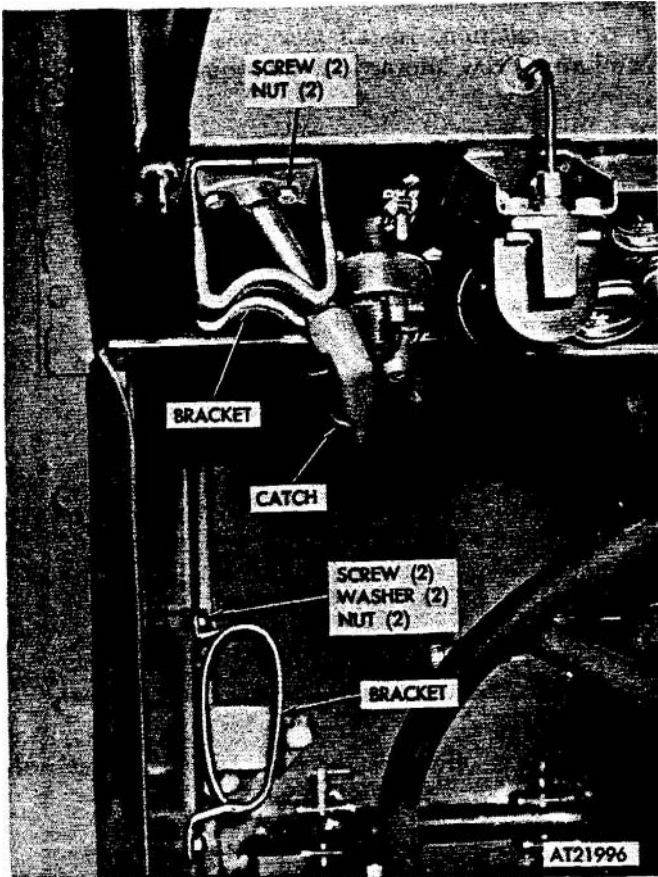


Figure 2-344. Rifle mounting brackets (driver side), removal and installation.

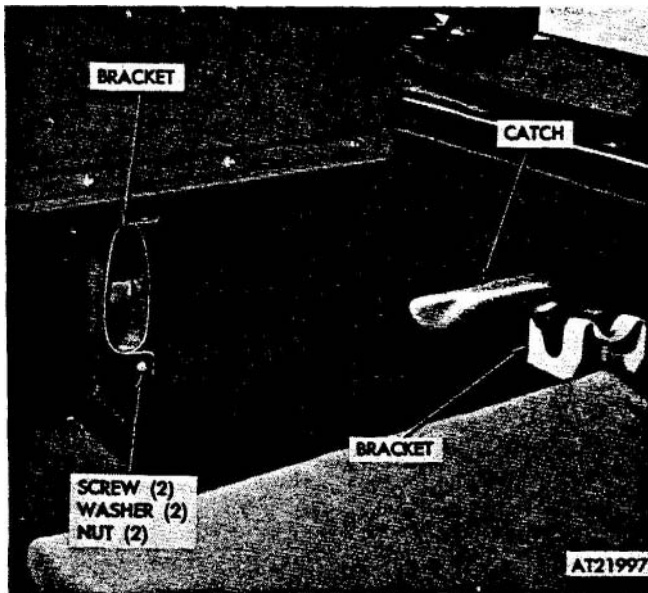


Figure 2-345. Rifle mounting brackets (passenger side), removal and installation.

b. *Installation.*

(1) Position and secure floor rifle mounting bracket with two screws, lock washers, **and** nuts (figs 2-344 and 2-345).

(2) Position and secure bracket and catch assembly with two screws and nuts.

2-250. Windshield

a. *Removal.* Remove windshield (refer to TM 9-2320-242-10).

b. *Disassembly.*

(1) Remove two thumb screws and retainers securing stanchions to windshield. Remove stanchions (fig 2-346).

(2) Remove glass (left- or right-hand side) according to the following steps:

(a) Remove four screws securing each top frame to windshield assembly bottom **frame** and remove top frame.

Note: To facilitate removal of the top screws, fold-in **bottom** frame hinge.

(b) Remove *glass and weatherstrip* from bottom frame.

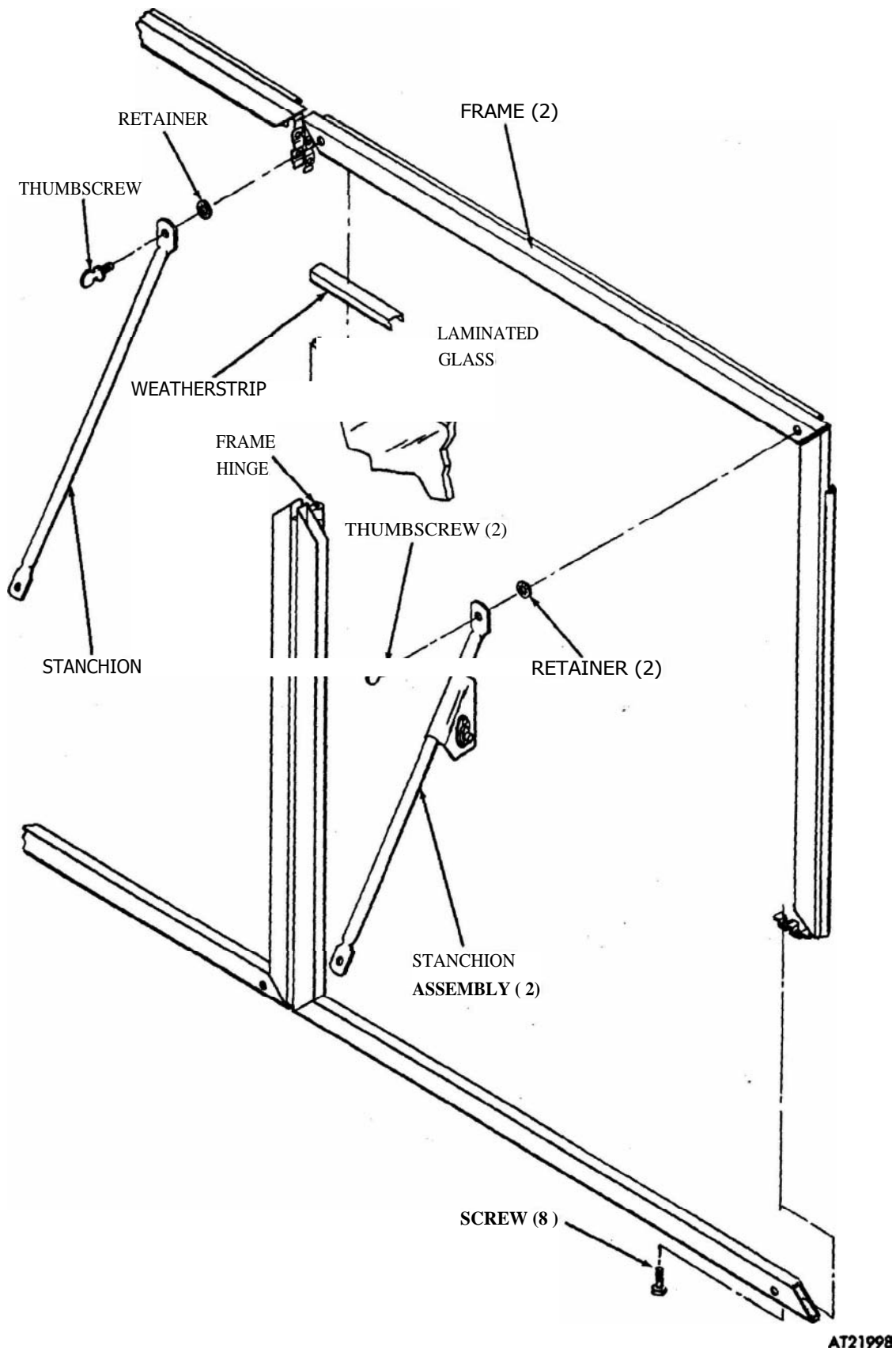


Figure 2-346. Windshield assembly and **disassembly.**

c. *Cleaning, Inspection, Repair.*

(1) Clean glass channels of all remnants of glass and weatherstrip.

(2) Inspect frame for cracks or distortions.

(3) Straighten frame or stanchion *as* required.

If repair of windshield glass is necessary, report to Direct Support for cutting of *new* glass.

d. *Assembly.*

(1) Install glass (left- or right-hand side) according to the following steps:

(a) Coat outer surface and channel of weatherstrip and frame channel with approved sealing compound (fig 2-346).

(b) Fit weatherstrip to windshield top and bottom frame channels.

(c) Slide *glass* into weatherstrip channel of

bottom frame.

(d) Trim weatherstrip as required.

(e) Position top frame on glass and bottom frame. Install four screws securing top frame to windshield assembly bottom frame.

(2) Position stanchions to frame and secure with thumb screws and retainers.

e. *Installation.* Install windshield (refer to TM 9-2320-242-10).

2-251. Tractor Air Duct Panels

a. *Removal.*

(1) Remove air duct panel (right- or left-hand) secured to air duct by removing eighteen screws (fig 2-347).

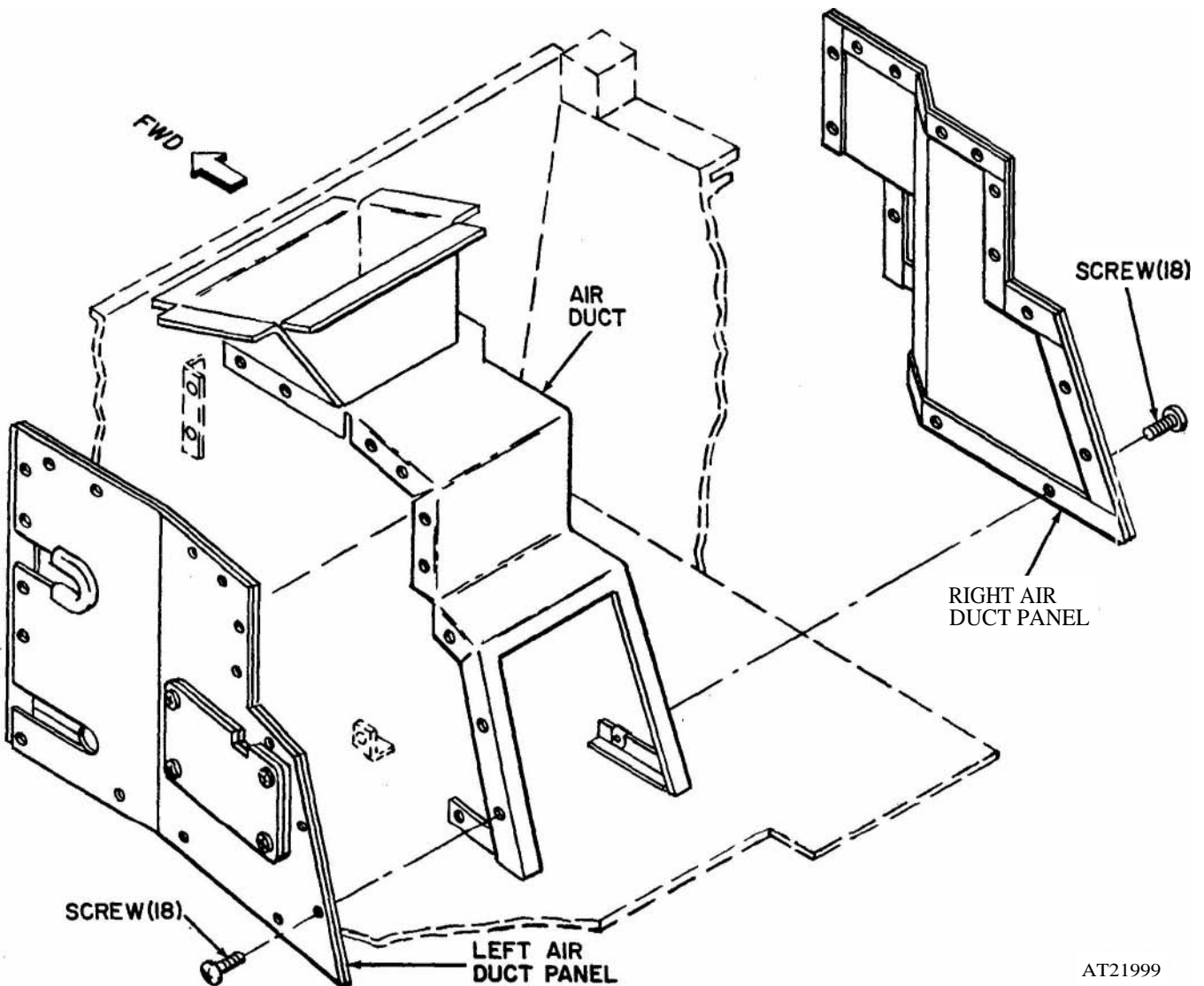


Figure 2-347. Tractor air duct **panel**, removal and installation.

b. Installation

(1) Position air duct panel (right- or left-hand) to air duct and secure with eighteen screws (fig 2-347).

2-252. M792 Ambulance Carrier Heater

a. Removal.

(1) Disconnect electrical cable assembly from carrier heater (fig 2-348).

(2) Disconnect fuel tube assembly from heater adapter. Remove adapter from heater.

(3) Remove four screws and washers securing outlet duct elbow assembly to heater (fig 2-349).

(4) Remove intake duct assembly by loosening

clamp securing duct to heater and removing three screws and washers securing duct intake assembly (fig 2-350).

(5) Remove five screws and washers securing shroud to carrier and screw and washer securing shroud to mount. Loosen clamp securing heater exhaust pipe to exhaust assembly (fig 2-351).

(6) Remove two clamps securing heater to mount assembly.

(7) Pull heater out of outlet duct and remove from mount.

(8) Loosen clamp securing exhaust pipe to heater. Remove pipe.

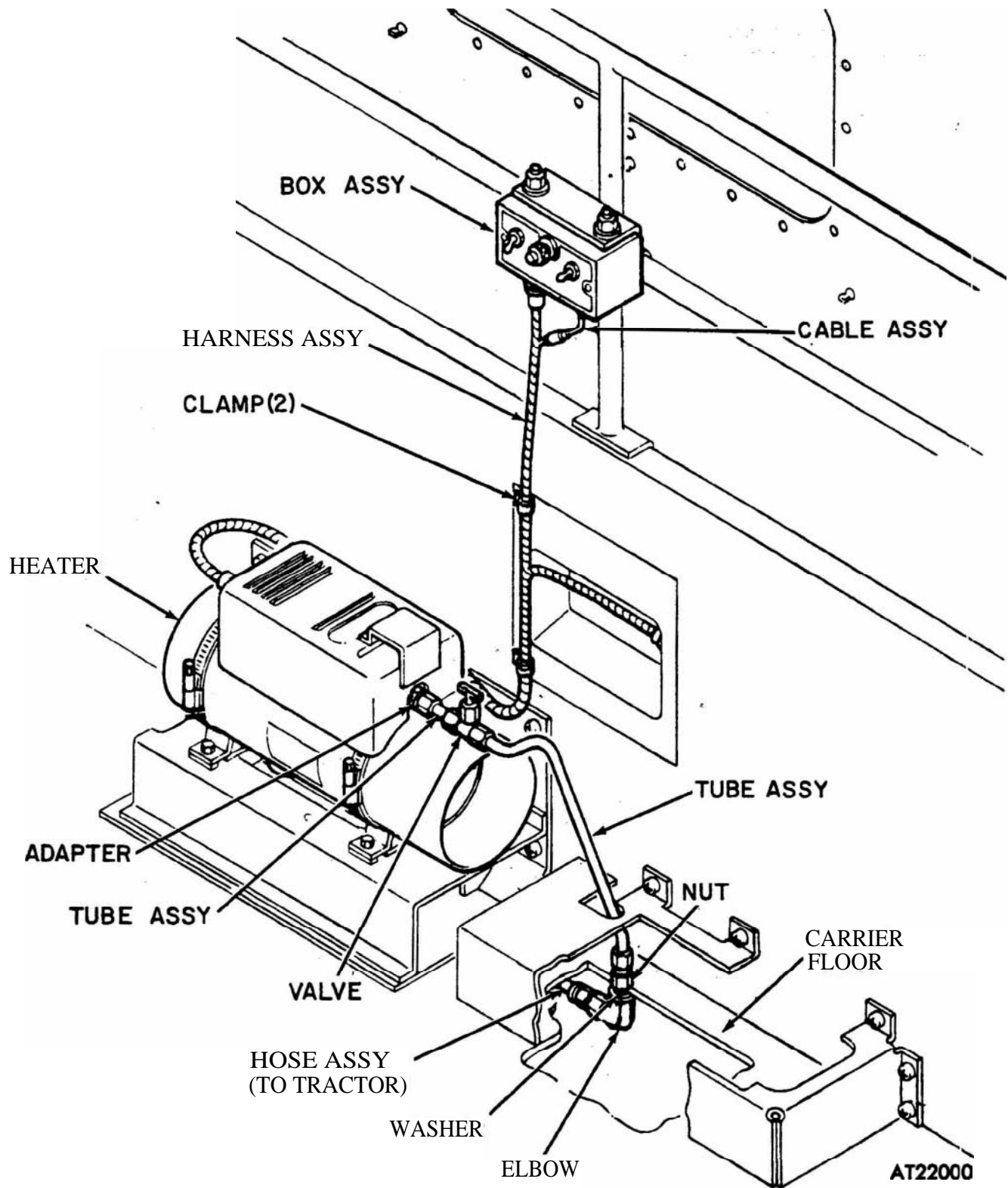


Figure 2-348. M792 ambulance heater harness assembly and fuel line installation.

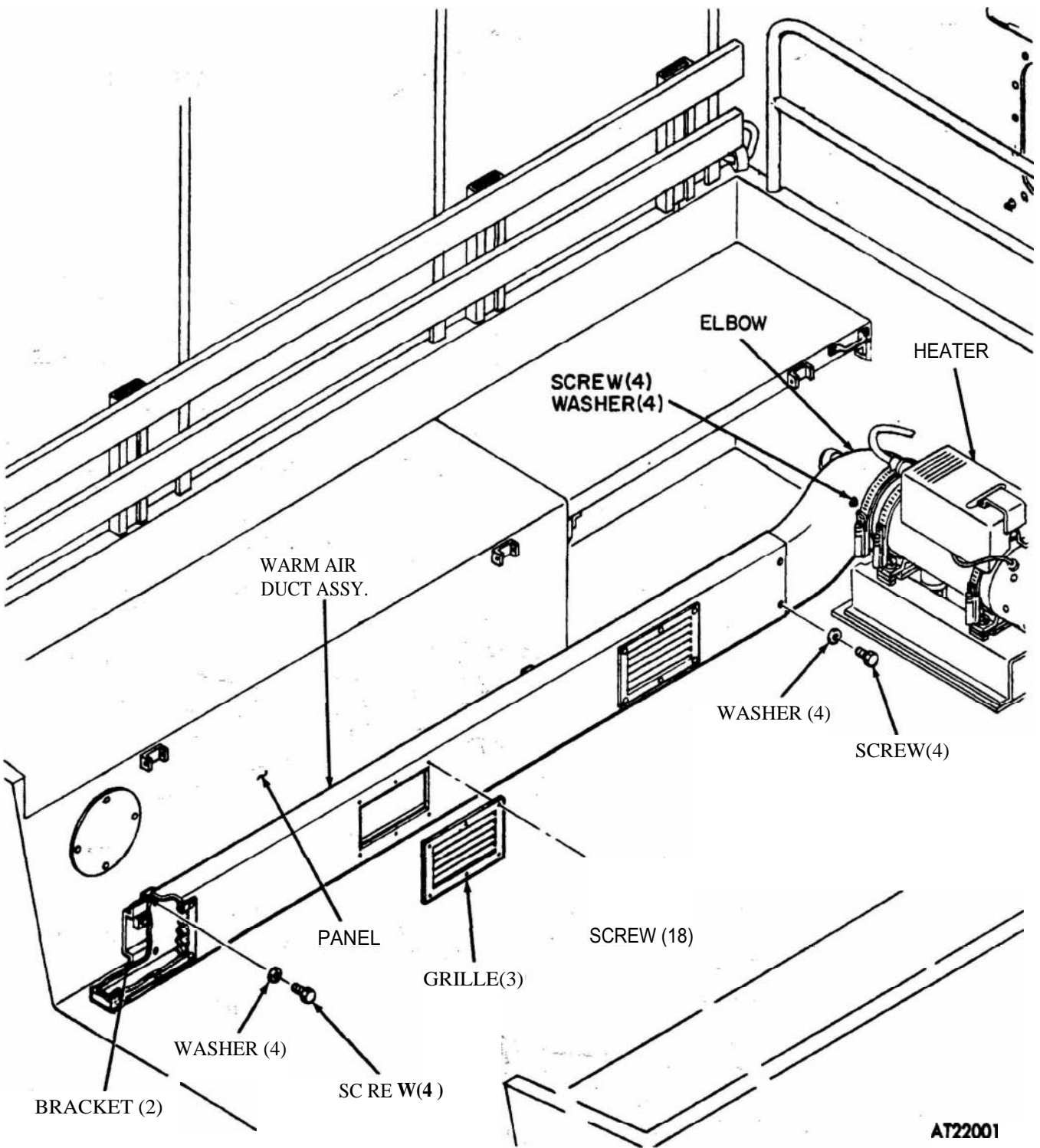
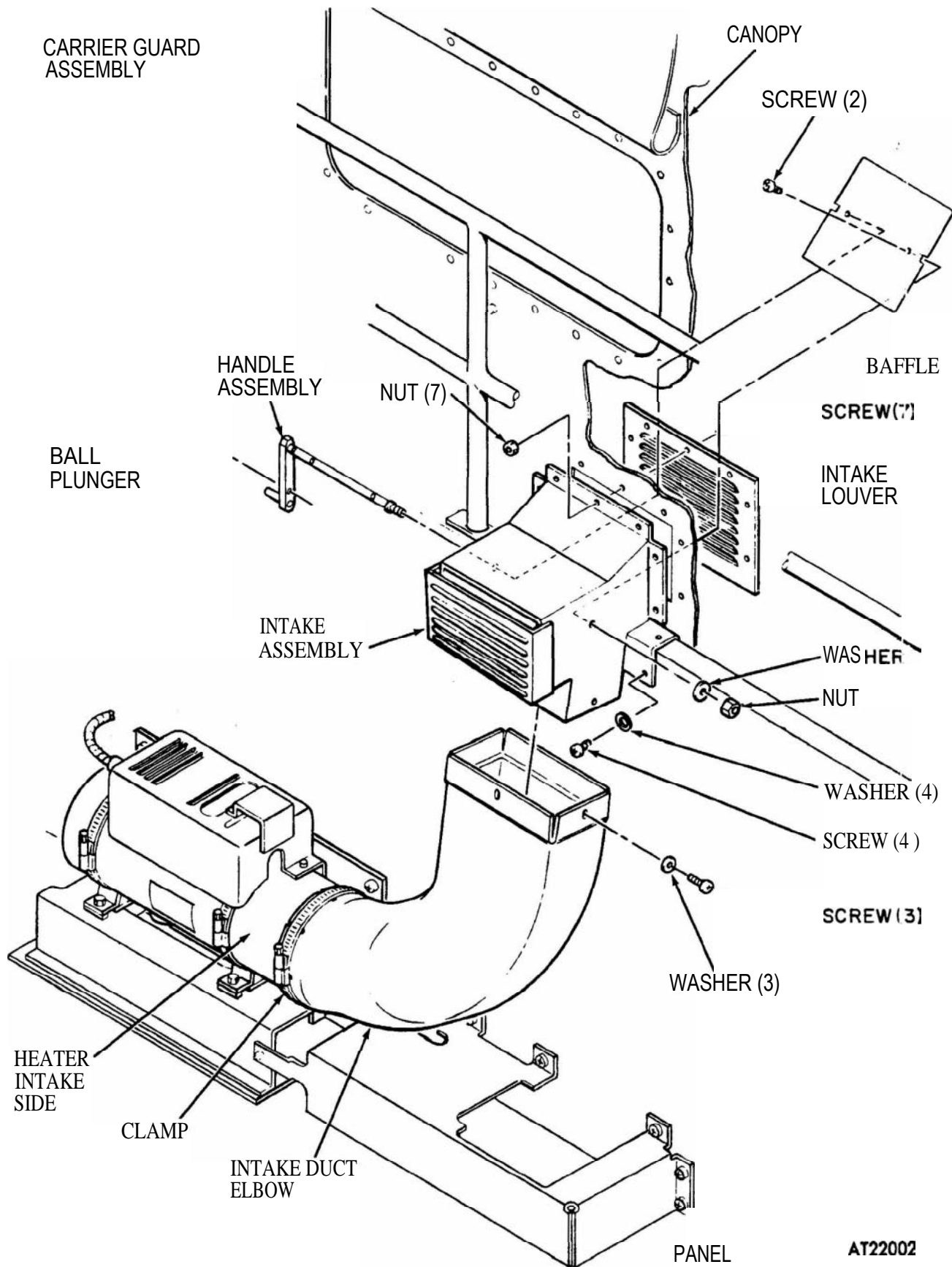
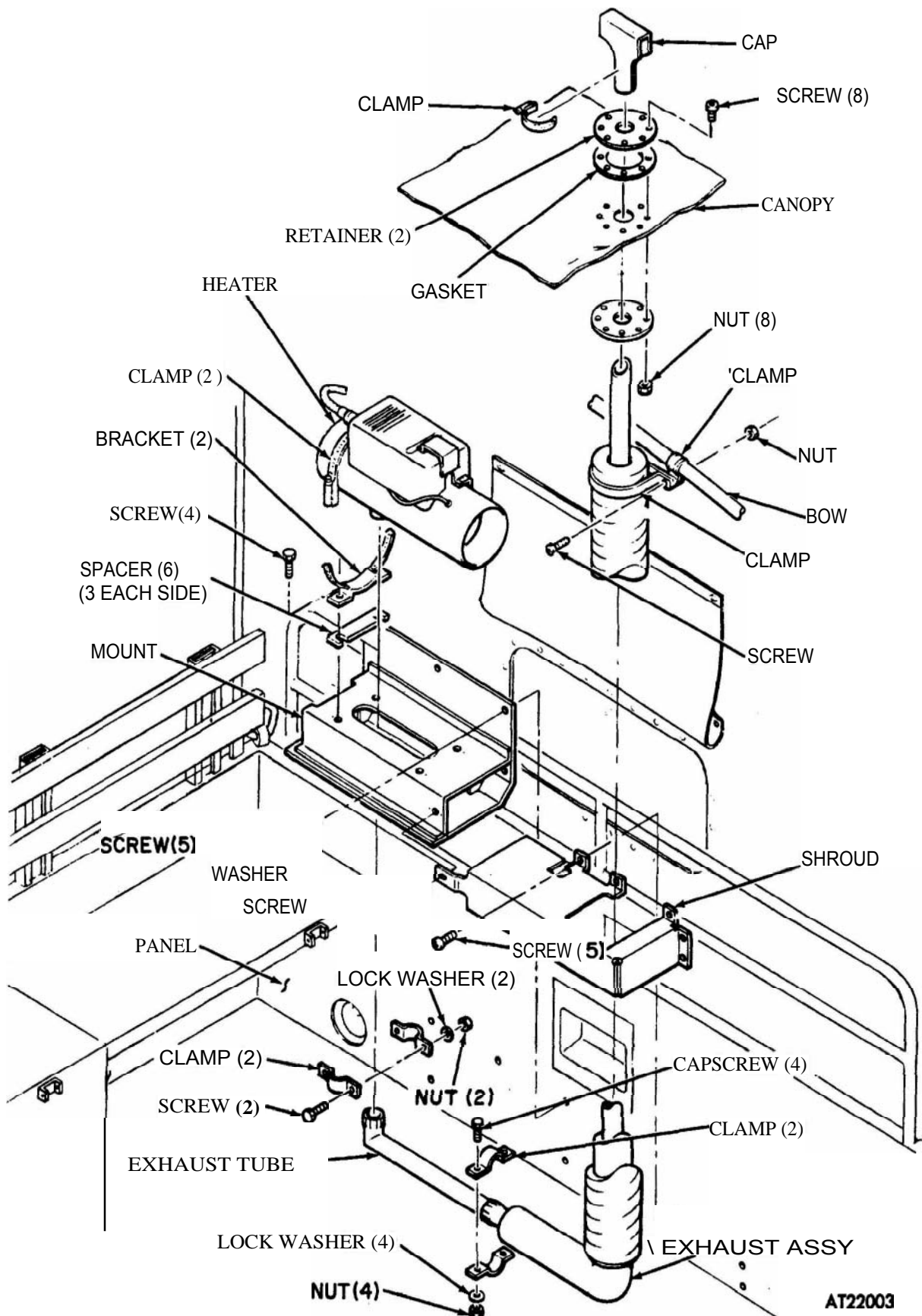


Figure 2-349. M792 ambulance heater warm air elbow and duct installation.



AT22002

Figure 2-350. M792 ambulance heater intake components, mounting detail



AT22003

Figure 2-351. M792 ambulance shroud, mount, heater, and exhaust installation.

b. Installation.

- (1) Position and secure exhaust pipe to heater with clamp, screws, lock washers and nuts (fig 2-351).
- (2) Position heater assembly on mount and into outlet duct. Secure to mount with clamps and to duct with four screws and washers.
- (3) Install inlet duct and clamp between heater and inlet assembly. Secure by tightening clamp against heater and installing three screws and washers into inlet assembly.
- (4) Position exhaust assembly to exhaust pipe and secure with clamp, screws, lock washers and nuts. Secure shroud to mount with screw and washer and to carrier with five screws and washers.
- (5) Install adapter into heater fuel inlet and connect fuel tube assembly to adapter.
- (6) Connect electrical cable to heater assembly.
- (7) Start heater and check for proper operation (refer to TM 9-2320-242-10).

2-253. M792 Ambulance Carrier Heater Inlet and Outlet Duct Assembly and Grilles

a. Removal.

- (1) Remove seven screws and nuts securing intake louver and canopy to intake assembly.
- (2) Loosen clamp securing intake duct assembly to heater. Remove four screws securing intake assembly to carrier. Remove assembled unit from carrier (fig 2-350).
- (3) Remove four screws securing intake assembly to carrier. Pull intake duct assembly down and remove from intake assembly.
- (4) Remove baffle assembly from intake assembly by removing two screws from handle. Remove ball plunger from handle. Remove handle from intake assembly by removing washer and nut.
- (5) Remove four screws and washers securing outlet duct elbow to warm air duct assembly (fig 2-349).
- (6) Remove three grilles from warm air duct assembly by removing six screws securing each grille.
- (7) Remove screws and washers through access holes provided when grilles were removed, securing warm air duct assembly to support bracket. Remove warm air duct assembly.
- (8) Remove four screws and washers securing outlet duct elbow to heater and remove.

b. Installation.

- (1) Position outlet duct elbow to heater and secure with four screws and washers (fig 2-349).
- (2) Position warm air duct assembly to outlet duct elbow and support bracket mounting **holes**. Align bracket mounting holes and duct and secure with four screws and washers.
- (3) Position three grilles and secure each with six screws. Secure warm air duct assembly to outlet duct elbow with four screws and washers.
- (4) Insert handle in intake assembly and retain with nut and washer. Position baffle to handle and secure with two screws. Install ball plunger in handle and adjust to satisfactory tension (**fig** 2-350).
- (5) Position and secure intake duct elbow to intake assembly with three screws and washers. Position assembled unit to heater and carrier and secure to heater with clamp. Align intake and carrier mounting holes and secure with four screws and washers.
- (6) Position and secure intake louver to canopy and intake assembly with seven screws and nuts.

2-254 M792 Ambulance Carrier Heater Exhaust Pipe Assembly

a. Removal.

- (1) Remove clamp securing cap to **exhaust** pipe. Remove cap assembly (fig 2-351).
- (2) Remove eight screws and nuts securing two retainers and gasket to canopy top.
- (3) Remove screw and nut securing clamps to exhaust pipe and carrier bow.
- (4) Remove five screws securing shroud to carrier and screw and washer securing shroud to mount.
- (5) Remove clamp securing exhaust assembly to exhaust tube. Remove exhaust assembly and shroud.
- (6) Remove heater assembly with exhaust tube installed (refer to para 2-252).
- (7) Remove clamp securing exhaust tube to heater. Pull exhaust tube from heater.

b. Cleaning, Inspection and Repair.

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, bumps, or other damage.
- (3) Repair exhaust tube insulation blanket by cutting tape and wrapping damaged area(s) with **fiberglass** tape or replace blanket (fig 2-352).

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

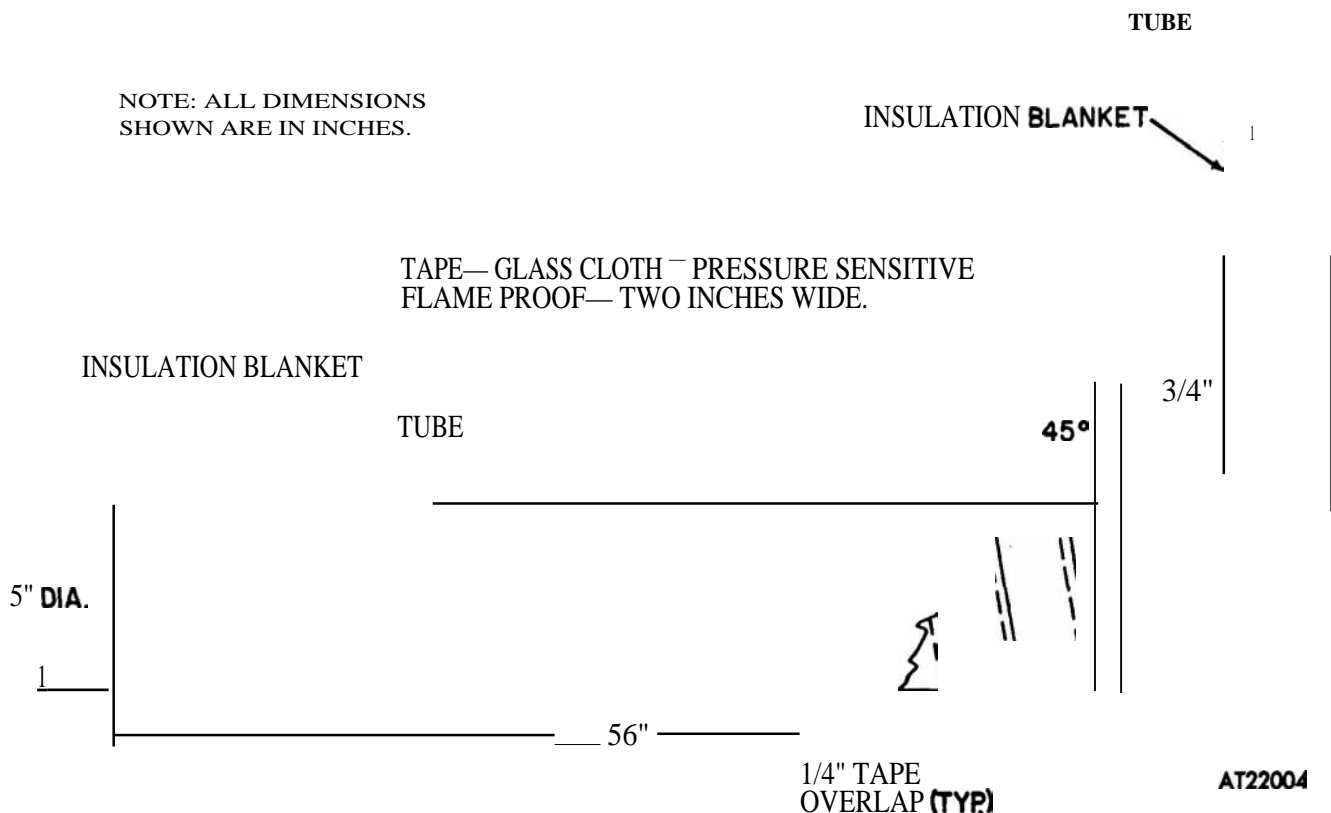


Figure 2-352. M792 ambulance exhaust tube insulation, repair and replacement.

c. Installation.

(1) Position and secure exhaust tube to heater with clamp, two screws, lock washers, and nuts (fig 2-351).

(2) Install heater and exhaust tube to mount and ducts (refer to para 2-252).

(3) Position one retainer and gasket outside canopy top and one retainer inside. Secure with eight screws and nuts.

(4) Slide shroud and clamp on exhaust assembly. Position exhaust assembly to exhaust tube and insert exhaust pipe through retainers in canopy top.

(5) Secure exhaust assembly to exhaust tube with clamp, two screws, lock washers, and nuts.

(6) Position clamp to carrier bow and to exhaust pipe clamp. Secure with screw and nut.

(7) Position and secure shroud to carrier with five screws and to mount with screw and washer.

(8) Install cap on exhaust pipe. Position cap openings 90 degrees to vehicle center line. Secure with clamp.

(9) Start heater and check for exhaust leaks (refer to TM 9-2320-242-10 for operating instructions).

2-255. M792 Ambulance Carrier Heater Mount and Shroud

a. Removal.

(1) Remove screw and washer securing shroud to mount and five screws securing shroud to carrier.

(2) Remove exhaust assembly (refer to para 2-254).

(3) Remove heater (refer to para 2-252).

(4) Remove mount assembly from carrier by removing five screws.

(5) Remove spacers and brackets from mount by removing four screws.

b. Installation.

(1) Install six spacers and two brackets to mount using four screws (fig 2-351).

(2) Position and secure mount assembly to carrier with five screws.

(3) Install heater and exhaust assembly (refer to paras 2-252 and 2-254).

(4) Position shroud to mount and secure with screw and washer. Position shroud to carrier and secure with five screws.

2-256. M792 Ambulance Carrier Canopy

a. Removal.

(1) Remove heater intake louver and intake assembly (refer to para 2-253).

(2) Remove heater cap, exhaust pipe, and retainers from canopy top (refer to para 2-254).

(3) Remove four retainers securing canopy to forward panel of carrier by removing screws, washers, and nuts (fig 2-353).

(4) Remove retainer securing canopy to left side of carrier by removing screws, washers, and nuts.

(5) Remove retainer securing canopy to right side of carrier by removing screws, washers, and nuts (fig 2-354).

(6) Remove two retainers securing canopy to aft sides of carrier.

(7) Remove canopy from carrier bows.

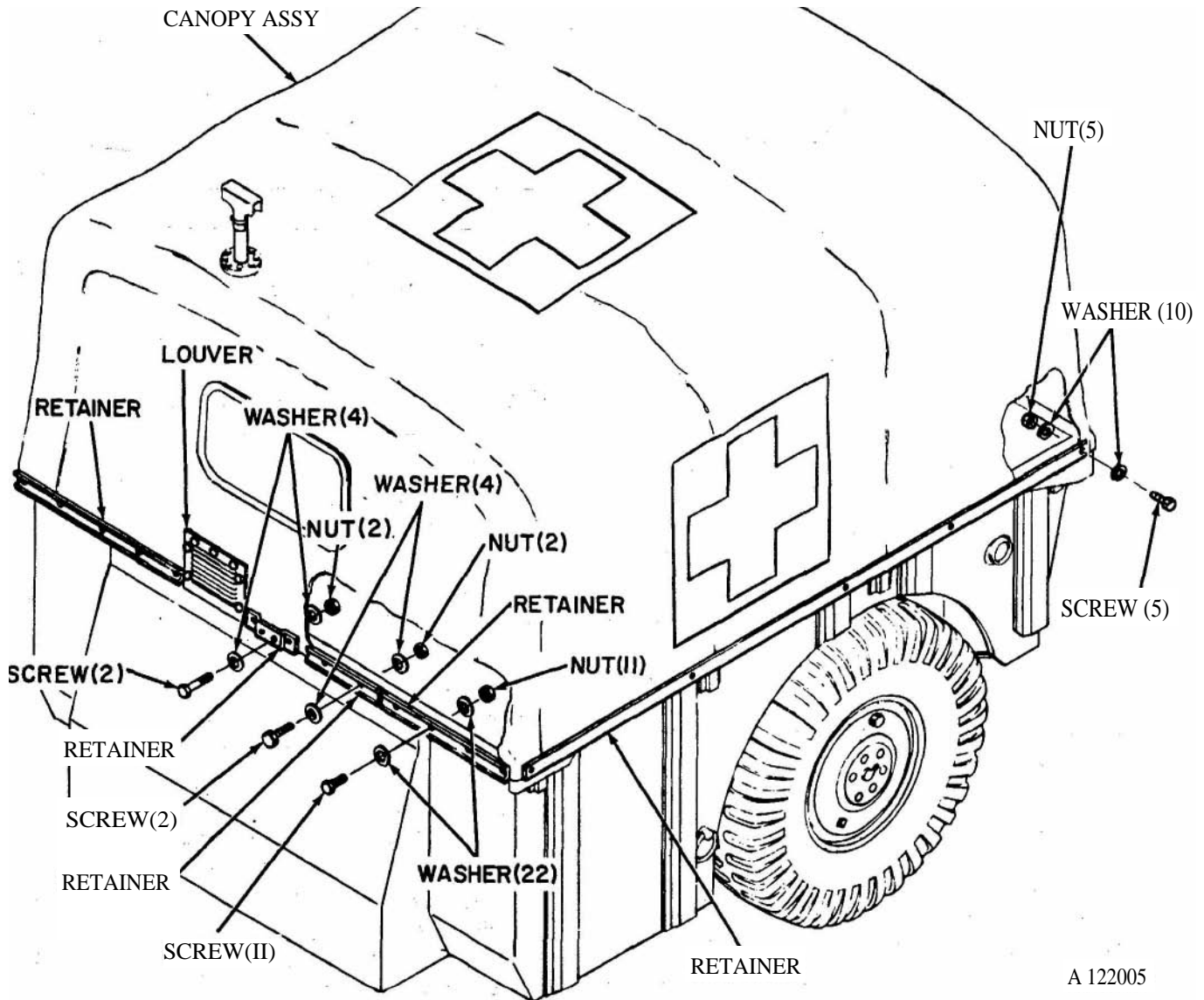
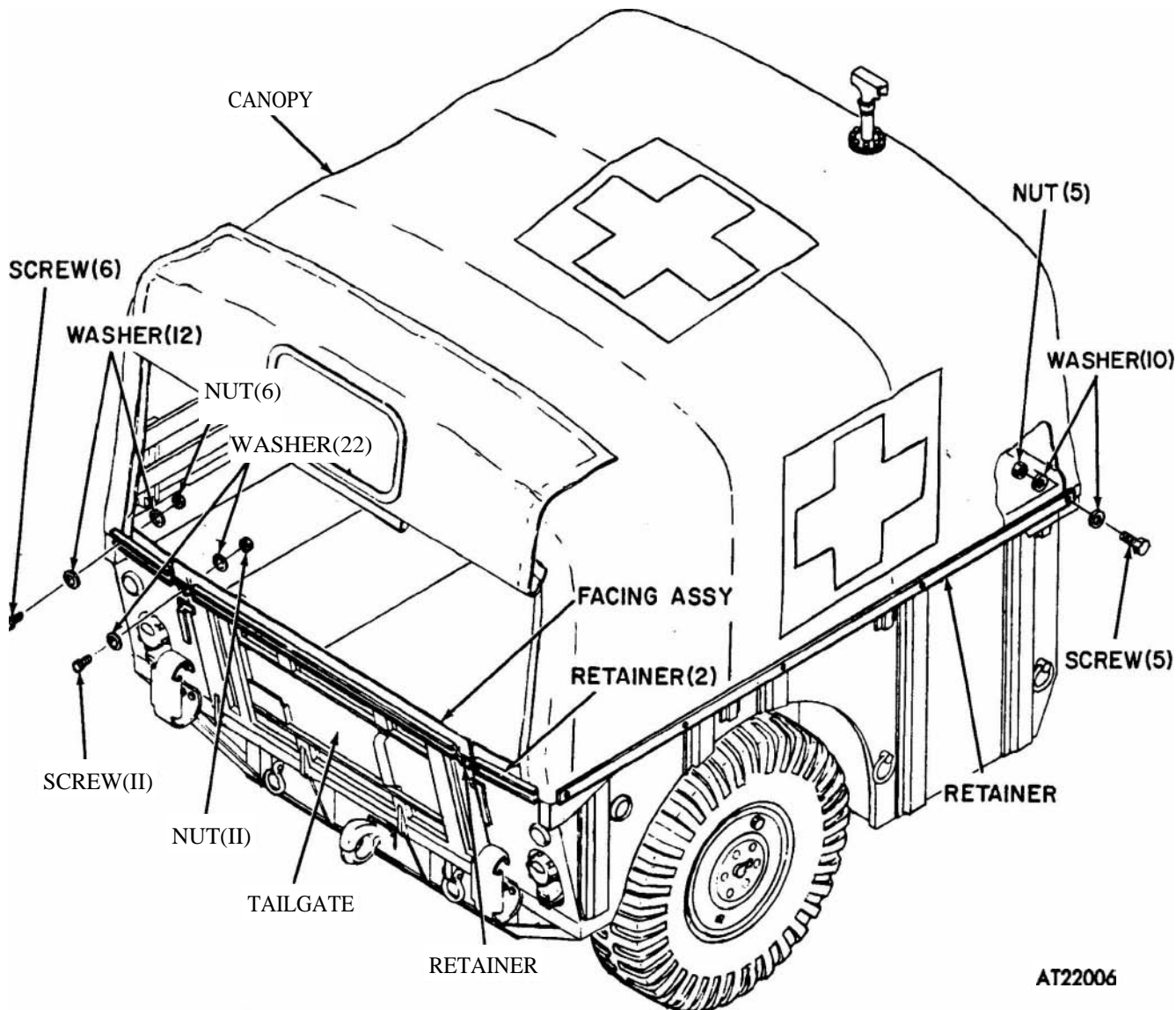


Figure 2-353. M792 ambulance canopy attachment, forward and left side of carrier.



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Figure 2-354. M792 ambulance canopy and facing assembly attachment, rear and right side of carrier.

b. Installation.

(1) Fit canopy over carrier bows.

(2) Fasten aft sides of canopy to aft carrier body with two retainers, six screws, twelve washers, and six nuts (fig 2-354).

(3) Fasten canopy to right side of carrier using one retainer, five screws, ten washers, and five nuts.

(4) Fasten canopy to forward panel of carrier using four retainers, fifteen screws, thirty washers, and fifteen screws (fig 2-353).

(5) Fasten canopy to left side of carrier using

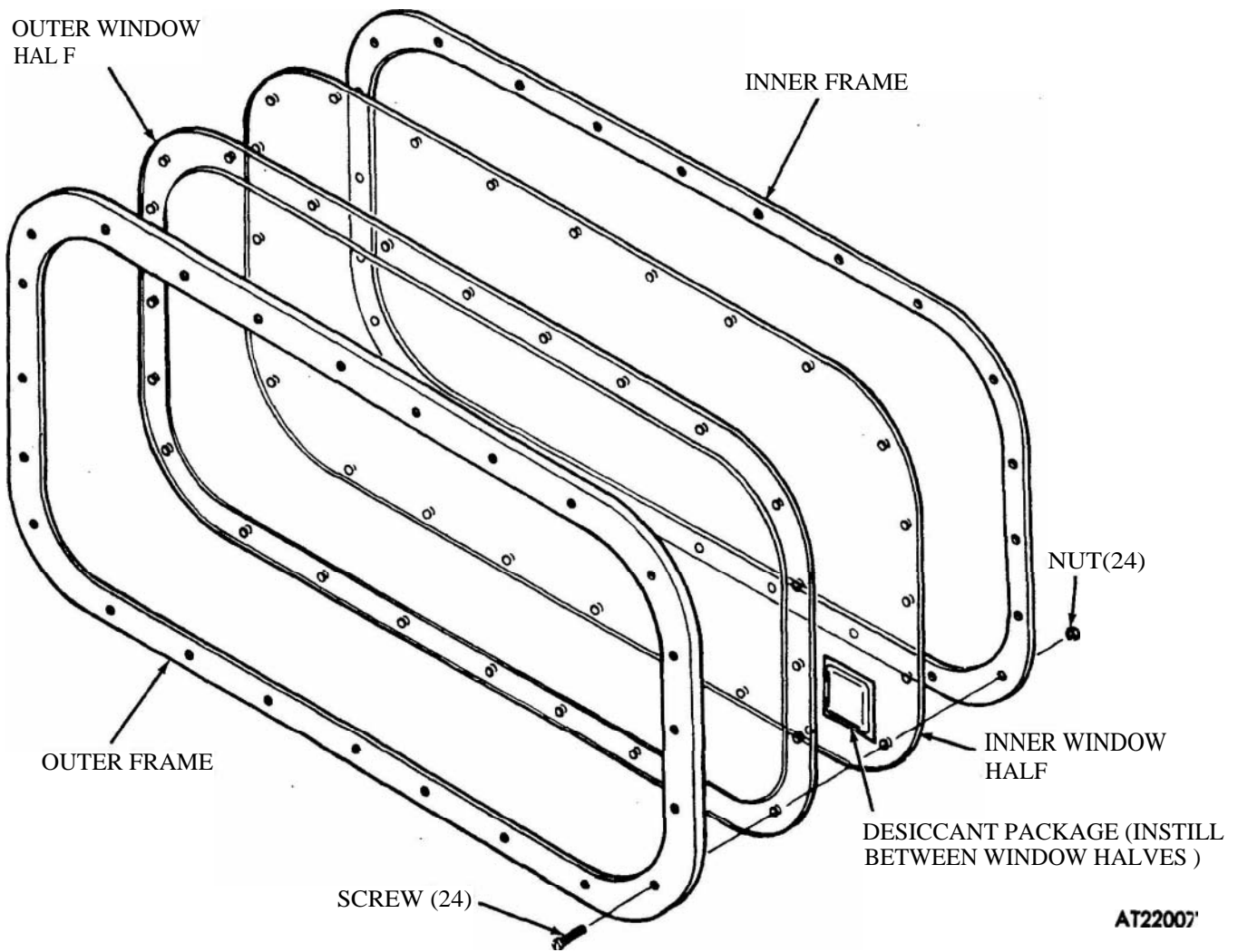
one retainer, five screws, ten washers, and five screws.

(6) Install heater retainers, exhaust pipe, and cap to carrier (refer to para 2-254).

(7) Install heater intake assembly and louver (refer to para 2-253).

2-257. M792 Ambulance Canopy Window

a. *Removal.* Remove inner and outer windows and frames secured to canopy by removing twenty-four screws and nuts (fig 2-355).



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Figure 2-355. M792 ambulance canopy window, removal and installation.

b. Installation. Position inner window and frame and outer window and frame to canopy. Secure with twenty-four screws and nuts (fig 2-355).

2-258. M792 Ambulance Tailgate Facing Assembly

a. Removal. Remove retainer and facing assembly secured to tailgate by removing screws, washers, and nuts (fig 2-354).

b. Installation. Fasten facing assembly and retainer to tailgate with eleven screws, twenty-two washers, and eleven nuts (fig 2-354).

2-259. M792 Ambulance Tailgate Step

a. Removal.

(1) Open and secure tailgate in horizontal position.

(2) Remove cotter pins, washers, and spacers securing rod. Slide rod from brackets and step and remove step (fig 2-356).

(3) Remove screws, washers, and nuts securing bracket assembly to tailgate.

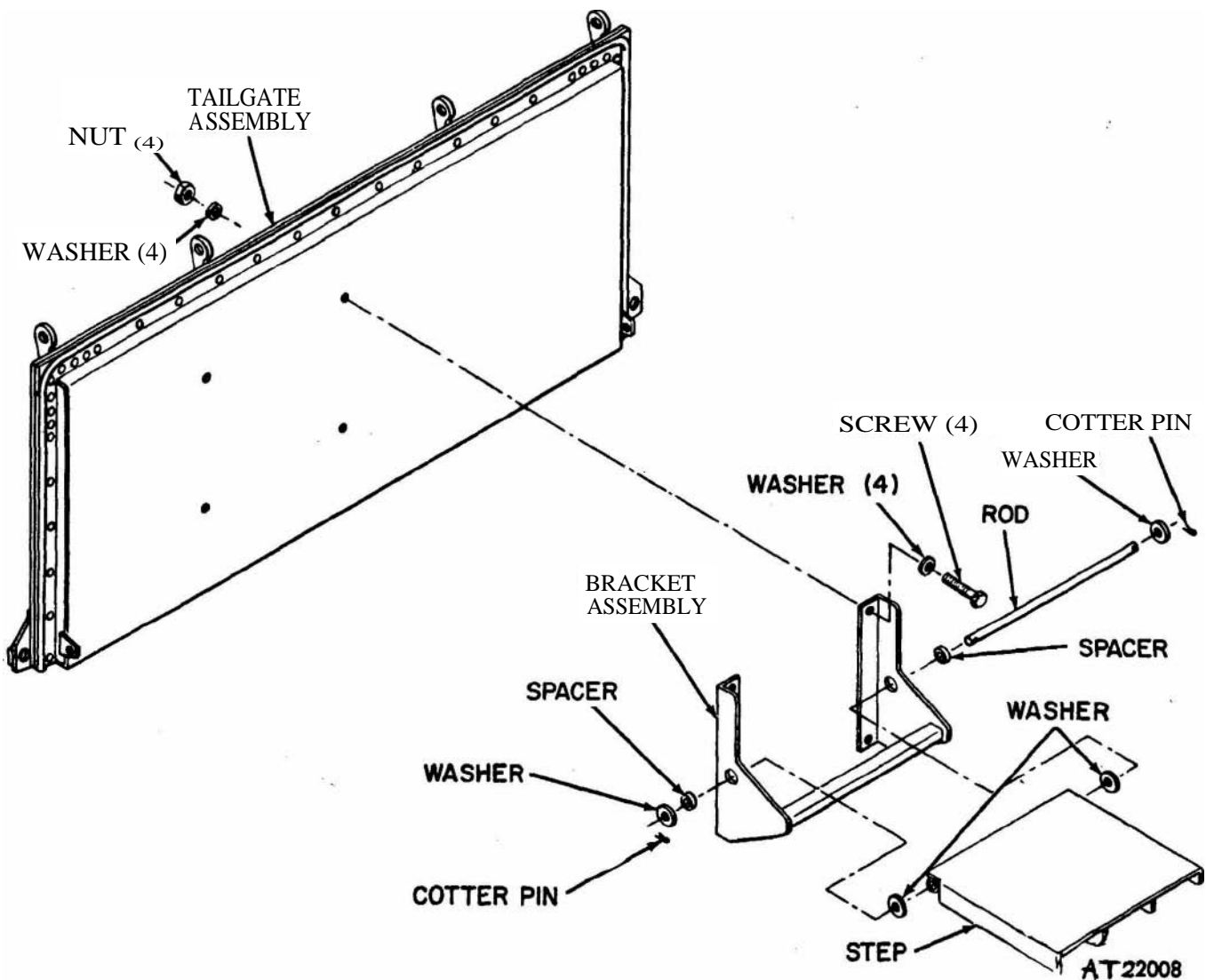


Figure 2-356. M792 ambulance tailgate step, removal and installation.

b. Installation.

(1) Position and secure step bracket assembly to tailgate with four screws, eight washers, and four nuts (fig 2-356).

(2) Position step and two washers between brackets. Slide rod through brackets and seat. Install two spacers and washers on rod. *Secure assembly with two cotter pins.*

(3) Raise tailgate and secure.

a. Removal.

(1) Remove seat assembly by removing four screws securing assembly to front carrier rail (fig 2-357).

(2) Remove U-bolts securing attendant safety belts to seat by removing securing nuts and lock washers.

(3) Remove remaining nuts from U-bolts and remove safety belts.

2-260. M792 Ambulance Attendant Seat

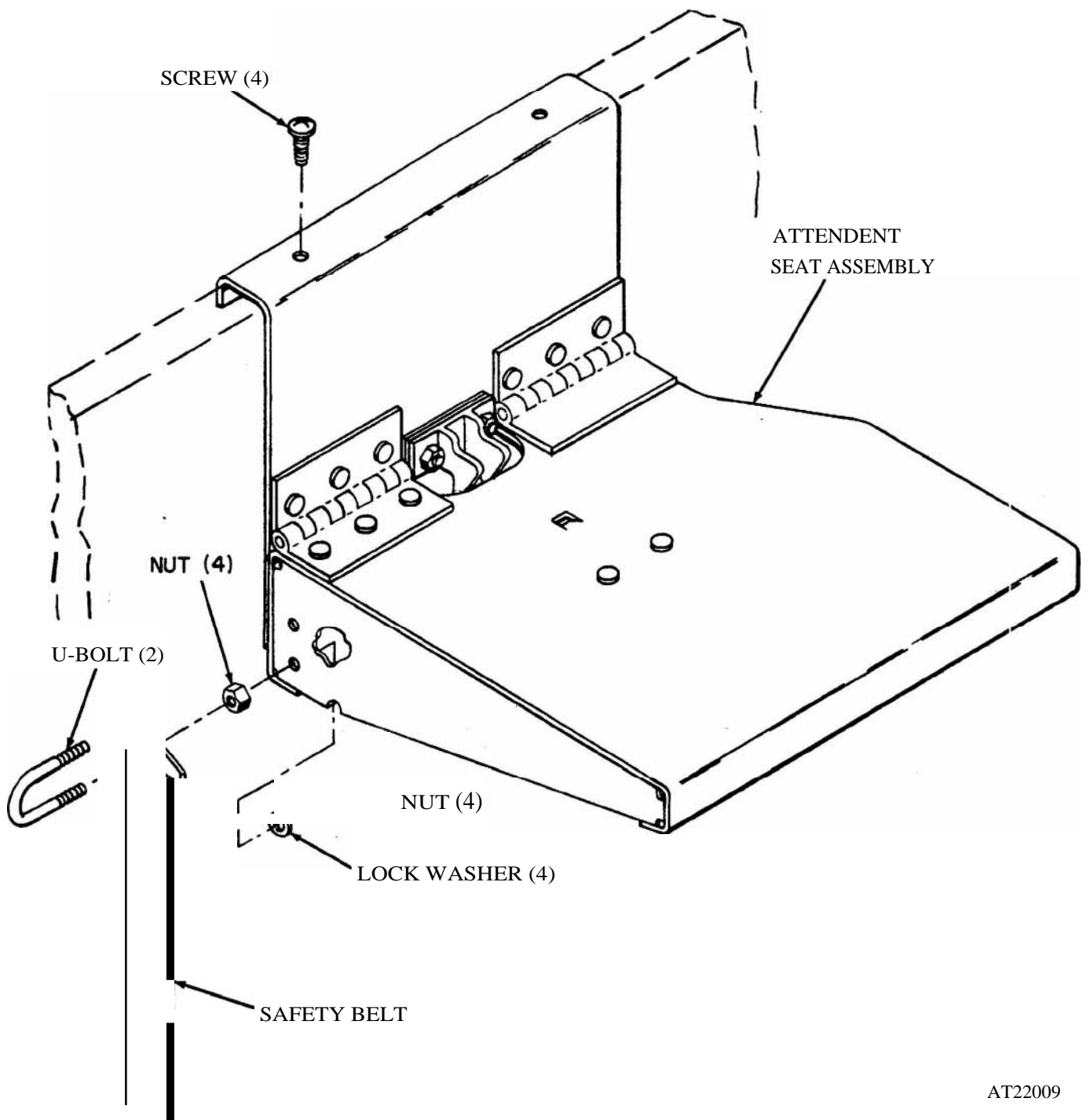


Figure 2-357. M792 ambulance attendant seat, removal and installation.

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b. Installation.

(1) Position safety belts on two U-bolts. Install two nuts on each U-bolt. Position assembly to seat and secure with two nuts and lock washers on each U-bolts (fig 2-357).

(2) Position seat assembly on left front carrier rail and secure with four screws.

2-261. M792 Ambulance Surgical Light Brackets

a. Removal.

(1) Remove light assembly (refer to **para 2-126**).

(2) Remove light plate by removing four clamps, screws, washers, and nuts (fig 2-358).

(3) Remove tubular lamp support by removing clamps, screws, washers, and nuts.

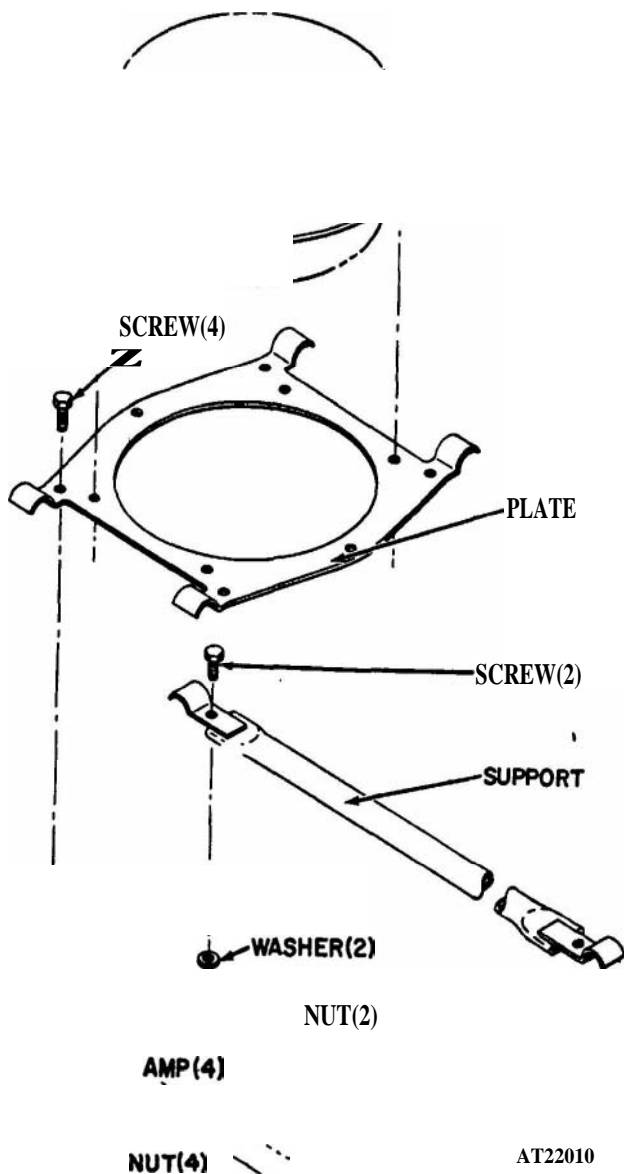


Figure 2-358. M792 ambulance surgical light brackets, removal and installation.

b. Installation.

(1) Position tubular lamp support between two bows and secure loosely with two clamps, screws, washers, and nuts (fig 2-358).

(2) Lay light plate atop and between supports and secure with four clamps, screws, washers, and nuts. Tighten clamp of tubular support attaching hardware.

(3) Install light assembly (para 2-126).

2-262. M792 Ambulance Dispenser Bracket Assembly

a. Removal. Loosen knob on bracket to open jaws formed by clamp and bracket and remove bracket assembly from carrier bow (fig 2-359).

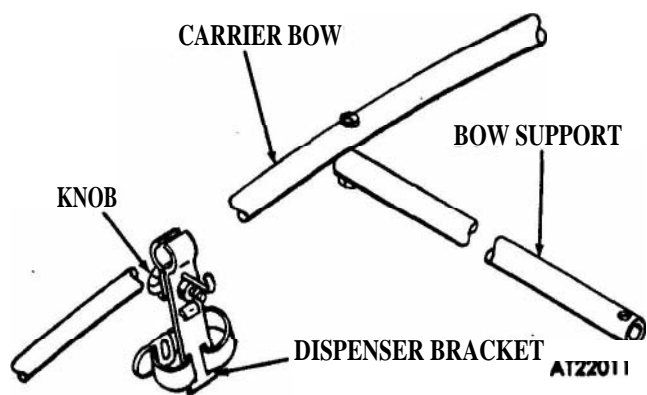
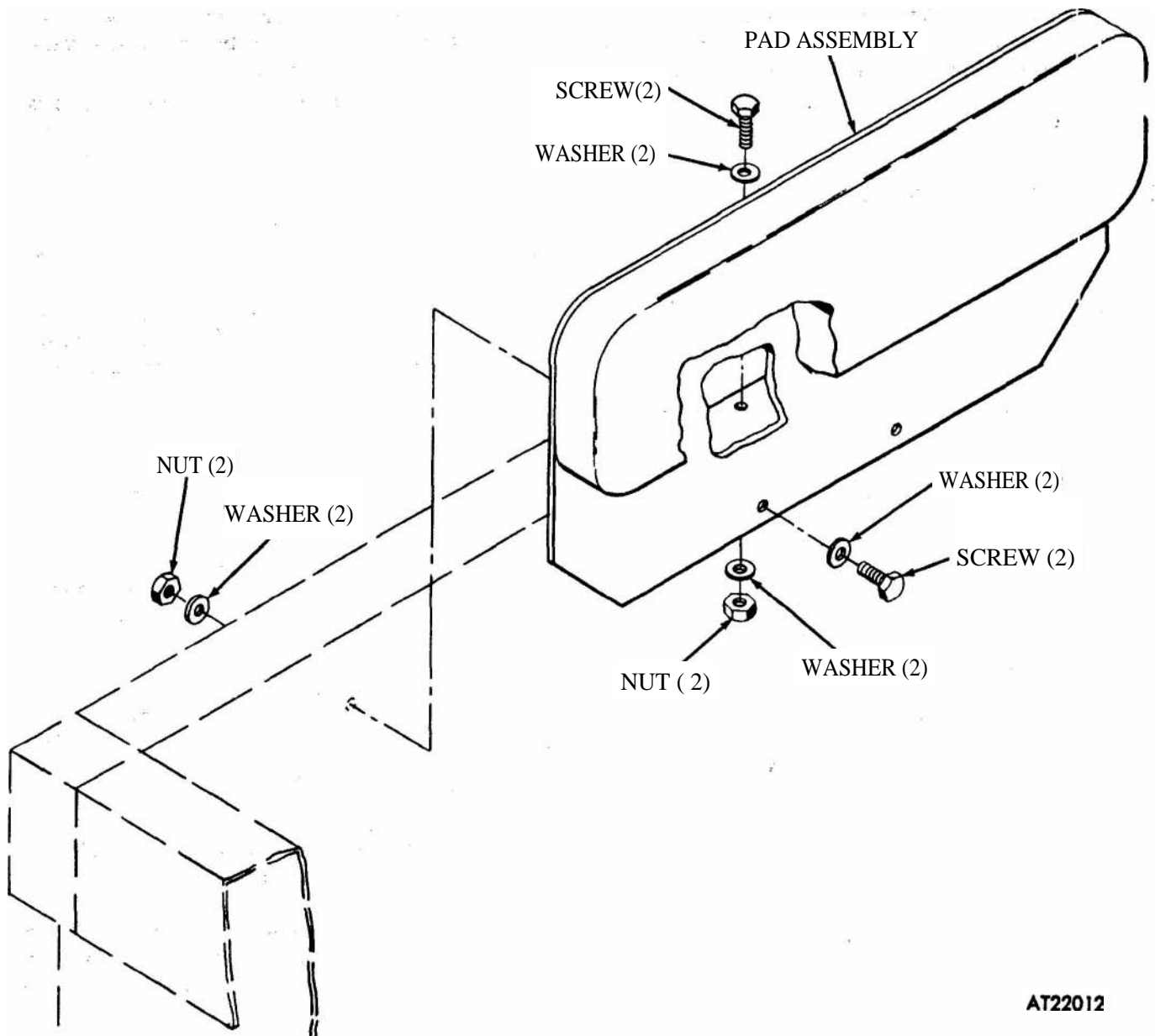


Figure 2-359. M792 ambulance dispenser bracket, removal and installation.

b. Installation. If necessary, loosen knob on bracket to open jaws and attach bracket assembly to bow. Secure by tightening knob assembly (fig 2-359).

2-263. M792 Ambulance Carrier Head Pad Assemblies

a. Removal. Remove screws, washers, and nuts securing each pad to front carrier panel and rail (fig 2-360).



AT22012

Figure 2-360. M792 ambulance pad assembly, removal and installation.

b. *Installation.* Position and secure each pad with two screws, four washers, two nuts (through front panel) and two screws, four washers, two nuts (through rail).

2-264. M792 Ambulance Carrier Bows

a. *Removal.*

(1) If installed remove cushions secured to side carrier bows.

(2) Remove carrier canopy (refer to para 2-256).

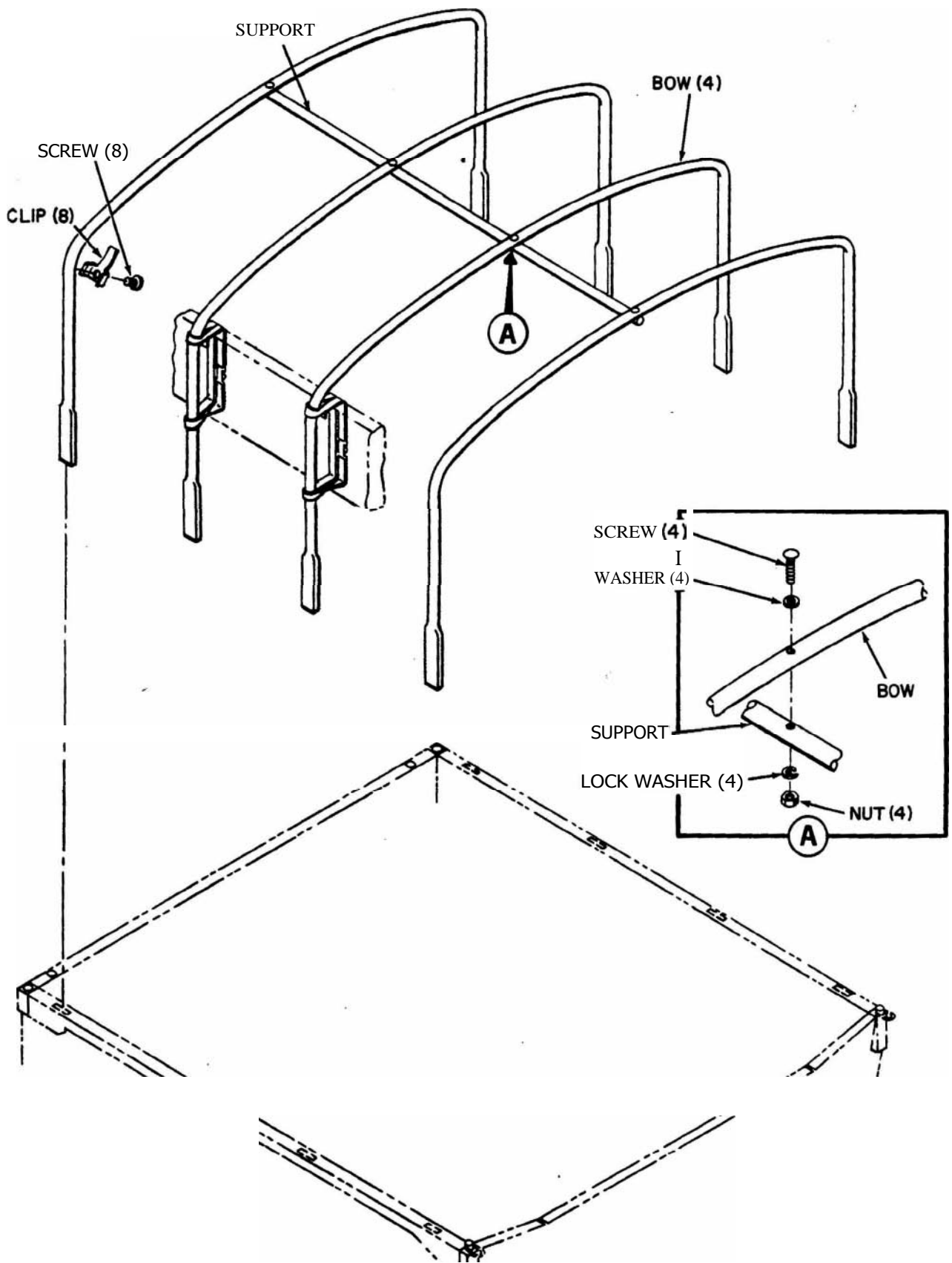
(3) Remove dispenser bracket assembly (refer to para 2-262).

(4) Remove surgical light (refer to para 2-126) and light support (refer to para 2-261).

(5) Remove support secured to top of bows by removing screws, washers, and nuts (fig 2-3611).

(6) Remove bows from carrier.

(7) Slide cushion retaining straps from bows and remove eight cushion retaining clips.



AT22013

Figure 2-361. M192 ambulance carrier bows, removal and installation.

b. *Installation.*

(1) Position and secure eight cushion retaining clips to bows. Position eight cushion retaining straps to bows.

(2) Position bows into carrier side panels (fig 2-361).

(3) Position and secure support to inner side of bows with four screws, washers, nuts, and lock washers.

(4) Position and secure light support and surgical light assembly between bows (refer to paras 2-261 and 2-126).

(5) Position and secure dispenser bracket assembly (refer to para 2-262).

(6) Install carrier canopy (refer to para 2-256).

7) Install cushions to retaining straps and clips on sides of carrier bows.

2-265. M792 Ambulance Carrier Guard Assembly

a. *Removal.*

(1) Remove two screws and washers securing retainer, canopy, and guard assembly bracket to carrier. Remove retainer (fig 2-362).

(2) Remove clamp securing surgical light harness to guard rail by removing screw and nut.

(3) Remove screws and nuts securing clamps holding heater control box and bracket to guard rail.

(4) Remove guard assembly from carrier.

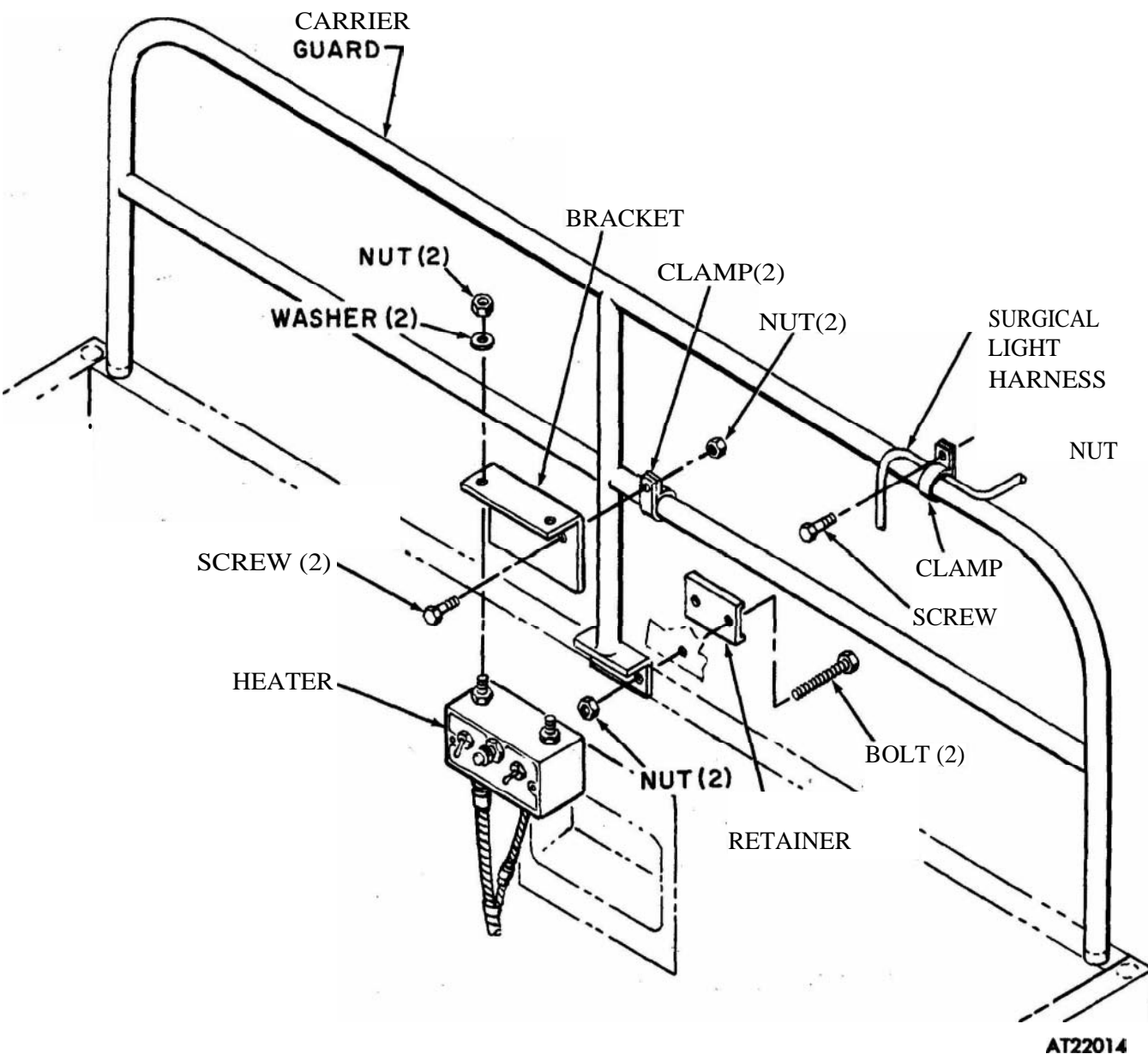


Figure 2-362. M792 ambulance carrier guard, removal and installation.

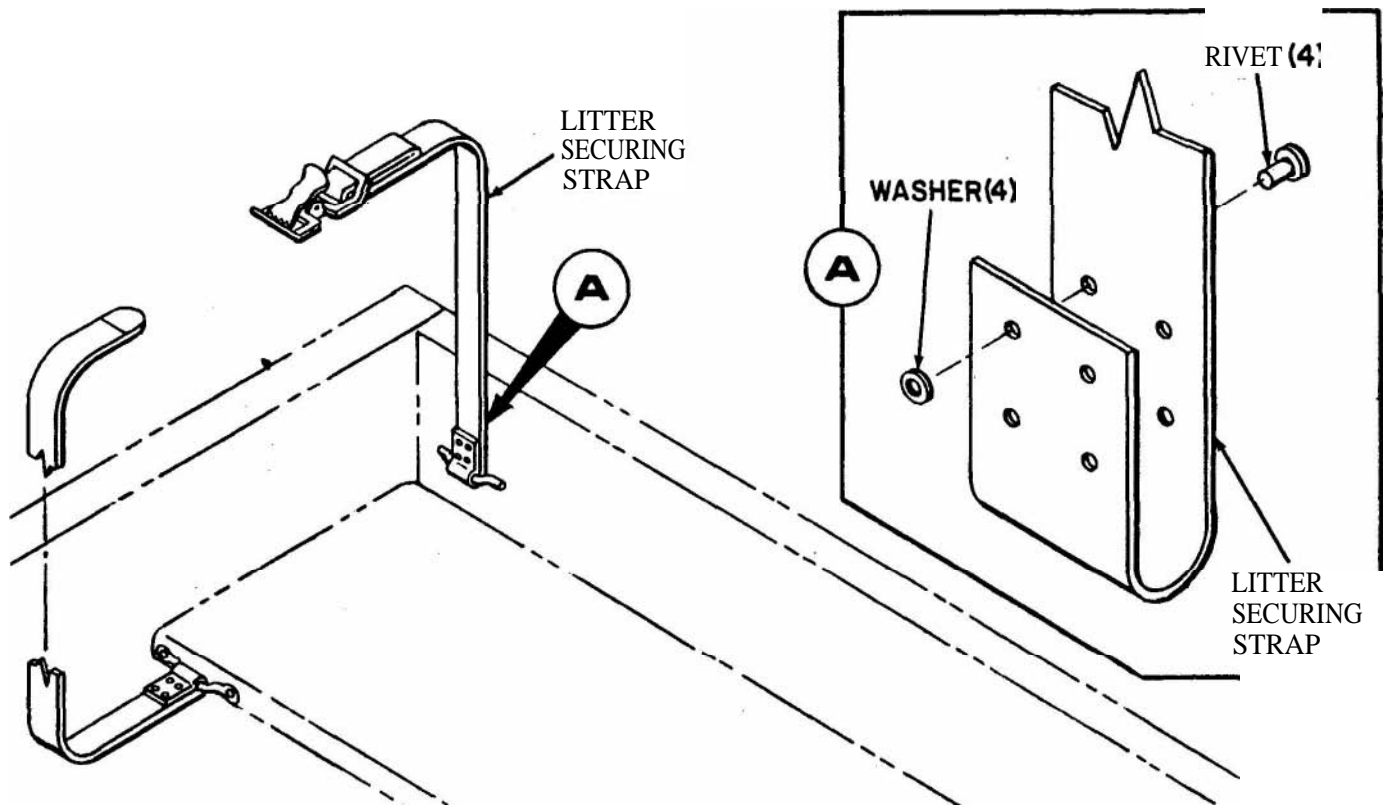
b. Installation.

- (1) Position guard assembly on front of carrier panel (fig 2-362).
- (2) Position and secure heater control box and bracket to *guard rail* with two clamps, screws and nuts.
- (3) Position clamp to surgical light harness and guard rail. Secure clamp with screw and nut.
- (4) Align mounting holes of canopy retainer, canopy, and guard assembly bracket with those of carrier panel. Secure assembly with two screws, **four washers, and** two nuts.

2-266. M792 Ambulance Litter Securing Straps

a. Removal.

- (1) Loosen straps and remove litters, if installed.
- (2) Remove rivets and washers securing upper and / or lower strap assembly to brackets and remove strap(s) (fig 2-363).



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Figure 2-363. M792 ambulance typical litter securing strap, removal and installation.

b. Installation.

(1) Position upper strap assembly and / or lower strap assembly through their respective

bracket(s) and install rivets and washers securing strap assembly (fig 2-363).

(2) Install litters and secure with straps.

2-267. General

a. *Speedometer and Odometer.* The speedometer mechanically indicates the vehicle speed in miles per hour (mph). The odometer records the accumulated miles of vehicle travel.

b. *Air Filter Indicator Gage.* The air filter indicator gage signals when air cleaner service is required. As air flow decreases due to trapped dirt, the signal band of the indicator gradually rises in the window and locks in full exposed position, indicating that the air cleaner should be serviced.

2-268. Speedometer - Odometer**a. Removal.**

(1) Remove four screws securing instrument panel to dash and pull panel outward. Disconnect shaft from speedometer 90° angle adapter. Loosen screw and remove 90° adapter (fig 2-364).

(2) Remove speedometer by removing two nuts and lock washers securing mounting clamp and speedometer to panel.

Caution: Place hand in front of speedometer to prevent gage from falling out when nuts and lock washers are removed.

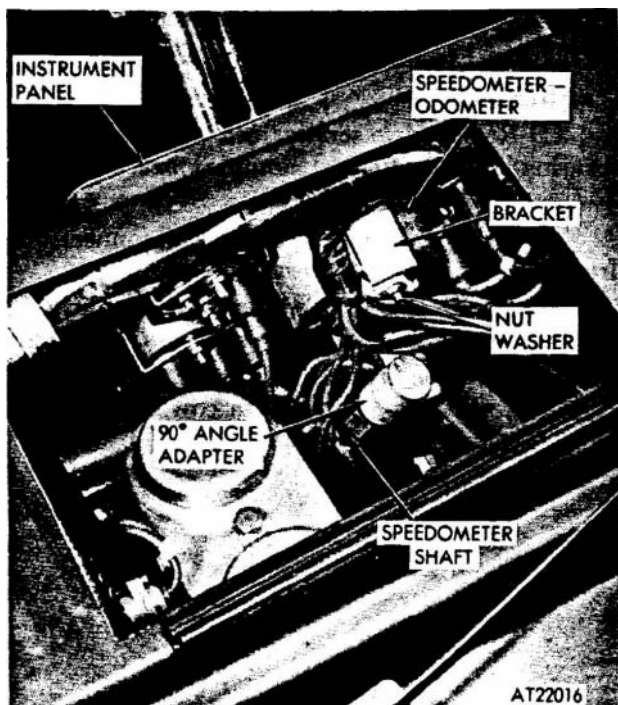


Figure 2-364. Speedometer - odometer, removal and installation.

b. Installation.

(1) If new, remove two nuts and lock washers securing mounting clamps to speedometer. Insert and position speedometer in mounting hole of panel and install mounting clamp with lock washers and nuts securing assembly to instrument panel (fig 2-364).

(2) Lightly grease input and output of 90° adapter (refer to LO 9-2320-242-12).

(3) Turn adapter to proper angle to mate shaft assembly and tighten adapter screw. Connect flexible shaft assembly to adapter and secure connector nut hand tight.

(4) Position instrument panel to dash and secure with four screws.

(5) Drive vehicle at various speeds and check speedometer operation.

2-269. Speedometer Flexible Drive Shaft**a. Removal.**

(1) Remove tractor seats (refer to para 2-221).

(2) Remove console (refer to para 2-33).

(3) Remove four screws securing instrument panel to dash and pull panel outward. Disconnect shaft from 90° angle adapter. Loosen screw and remove adapter (fig 2-364).

(4) Remove sixteen screws securing right panel to air duct. Remove panel.

(5) Remove speedometer flexible drive shaft by disconnecting shaft at transfer case (fig 2-365).

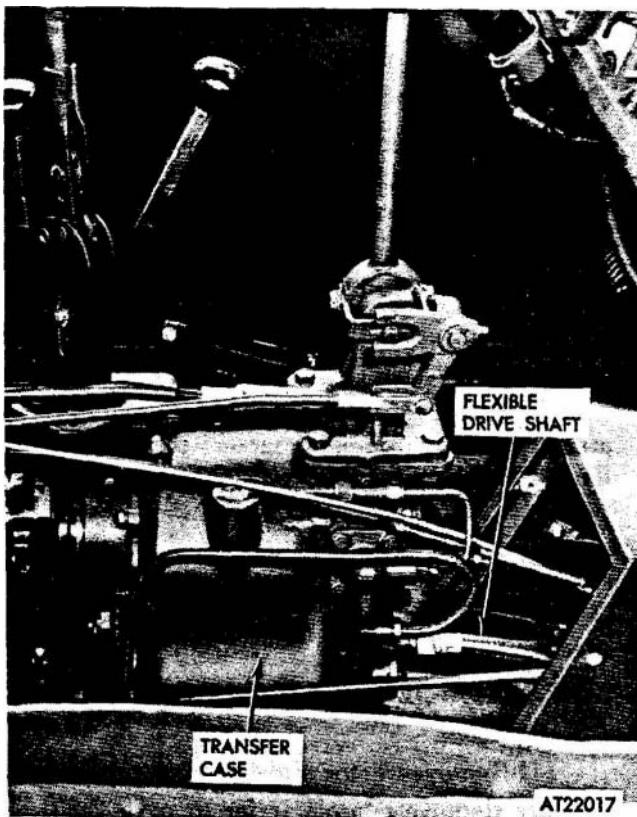


Figure 2-365. Flexible drive shaft disconnect at transfer case.

b. *Disassembly.* Grasp shaft case and pull core from shaft (fig 2-366).

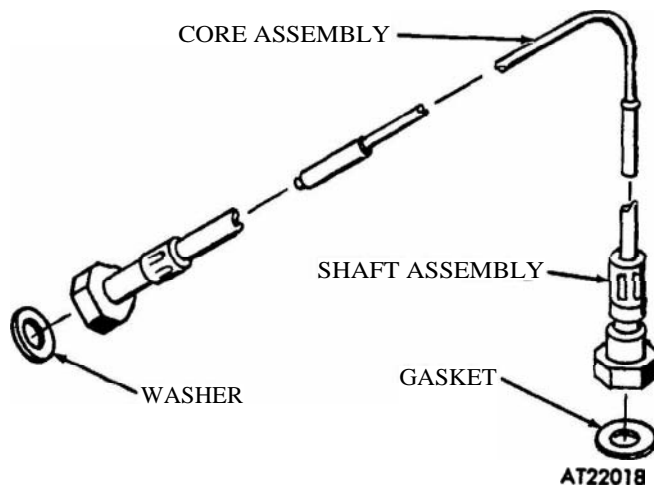


Figure 2-366. Flexible drive shaft, disassembly and assembly.

c. *Cleaning, Inspection, and Repair.*

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for dents, kinks, buns, or other damage.

(3) Repair damaged assembly by **replacing** defective parts. Replace shaft assembly washer and gasket.

d. *Assembly.* Apply a thin coat of grease to core and install into shaft (refer to LO 9-2320-242-12).

e. *Installation.*

(1) Lightly grease input and output of 90° adapter (refer to LO 9-2320-242-12). Loosen screw on adapter and install on speedometer (fig 2-364).

(2) Route shaft assembly (round core end towards transfer case) through air duct to speedometer. Position shaft assembly to eliminate sharp bends and interference with components. Connect shaft to transfer case (fig 2-365).

(3) Turn 90° adapter to proper angle to mate shaft assembly and tighten adapter screw. Connect shaft assembly to adapter and secure connector nut hand tight.

(4) Position instrument panel to dash and secure with four screws.

(5) Install console (refer to para 2-33).

(6) Install tractor seats (refer to para 2-221).

2-270. Air Cleaner Restriction Indicator

a. *Removal.*

(1) Remove two screws, lock washer, and nuts securing indicator to cowl mounting bracket (fig 2-367).

(2) Hold indicator firmly and disconnect tube from indicator tube connector fitting.

(3) Remove indicator from mounting bracket. Remove fitting from indicator.

(4) Remove mounting bracket by removing two screws securing bracket to cowl.

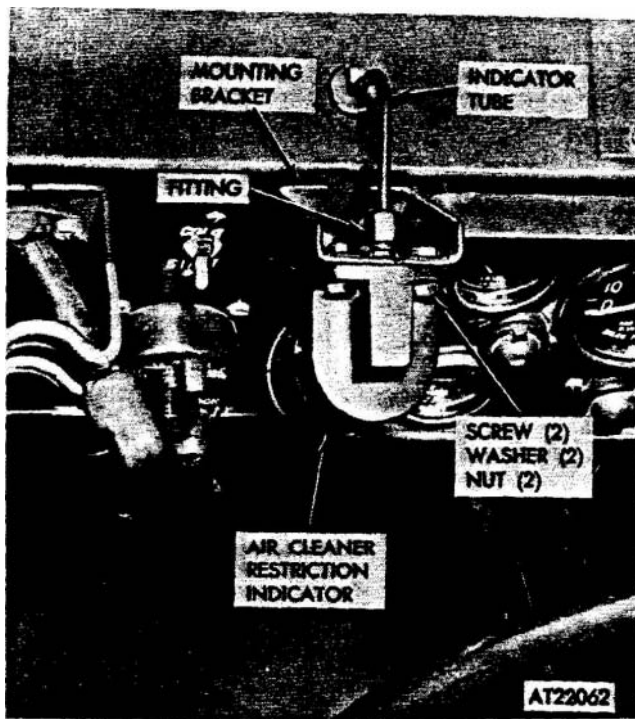


Figure 2-367. Air cleaner restriction indicator, removal and installation.

b. Instillation.

- (1) Position mounting bracket over tube and to cowl. Secure bracket to cowl with two screws (fig 2-367).
- (2) Install fitting into indicator.
- (3) Secure tube nut to indicator fitting.
- (4) Position indicator to mounting bracket and secure with two screws, lock washers, and nuts.
- (5) Test indicator (c. below).

c. *Test.* Perform an operational check of the air cleaner restriction indicator per the following steps:

- (a) Remove hose assembly to air cleaner elbow and install a suitable restrictor (manually operated valve). Connect hose assembly to restrictor.

(b) Check all fittings and lines to ensure all are properly installed.

(c) Start engine (refer to TM 9-2320-242-10).

(d) While observing indicator window, slowly operate restrictor to restrict air flow. As air flow is decreased the signal band of the indicator should gradually rise in window to the fully exposed position.

2-271. Air Cleaner - to - Air Cleaner Restriction Indicator Tubes and Fittings

a. Removal.

- (1) Remove console (refer to para 2-33).
- (2) Remove tractor seats (refer to para 2-221).
- (3) Remove right air duct panel from tractor by removing sixteen screws.
- (4) Open and secure engine cover.
- (5) Remove indicator from mounting bracket and fitting from indicator (refer to para 2-270).
- (6) Remove indicator to cowl union tube assembly by disconnecting at cowl union. Remove cowl union and, if damaged, grommet (fig 2-368).
- (7) Disconnect cowl to front bulkhead tube assembly by disconnecting at bulkhead union. Remove tube assembly and bulkhead union.
- (8) Disconnect bulkhead to floor tube assembly at floor union. Remove tube assembly by removing screws, clamps, and spacers securing tube assembly to tractor. Remove floor union.
- (9) Disconnect floor to hose assembly at hose union. Remove tube assembly by removing screws, clamps, and spacers securing tube assembly to tractor. Remove floor union.
- (10) Remove hose assembly to air cleaner by disconnecting at connector to elbow. Remove connector and elbow from air cleaner.

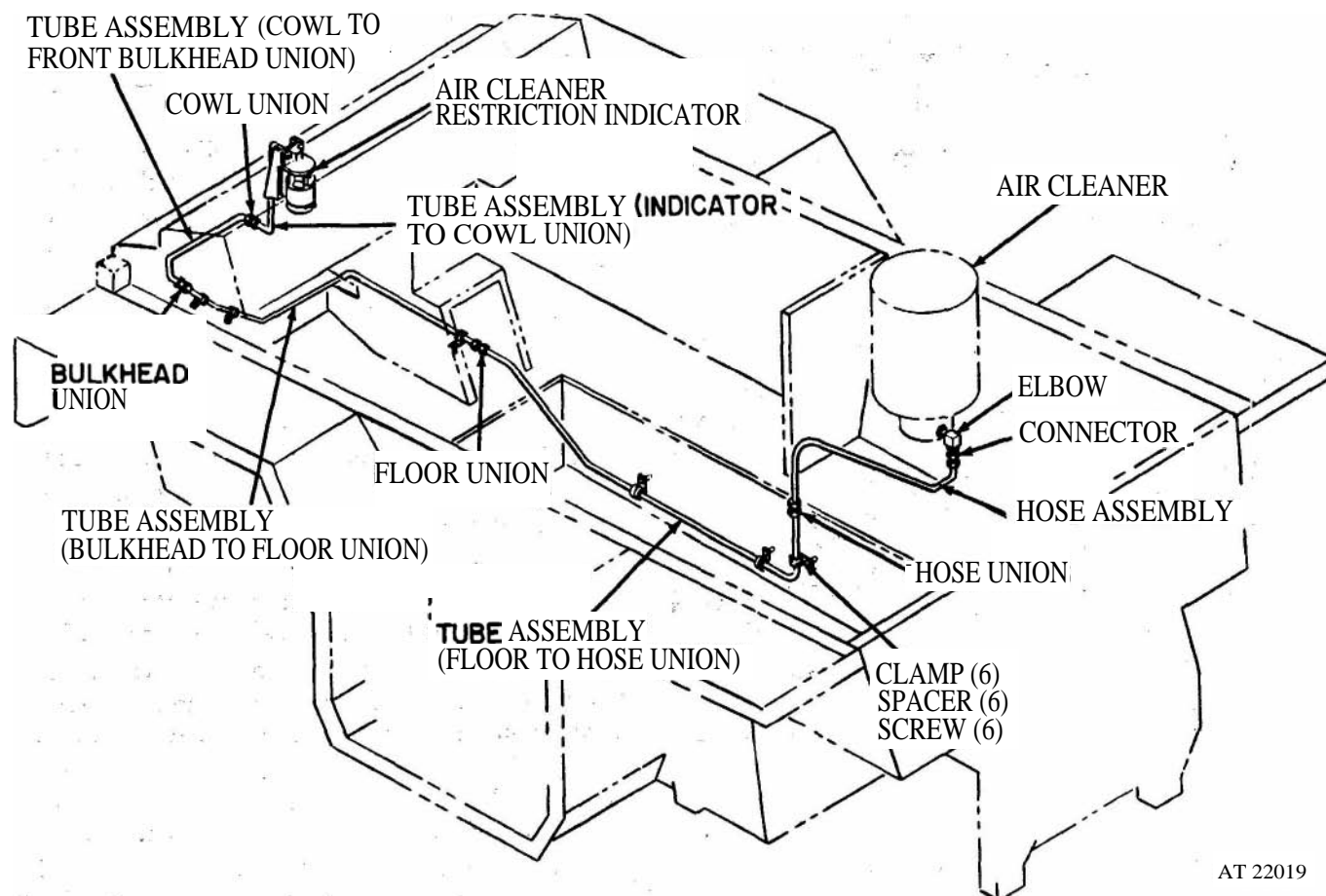


Figure 2-368. **Cleaner-to-indicator** tubes and fittings, removal and **installation**.

b. Installation.

- (1) Install elbow and connector on air cleaner base (fig 2-368).
- (2) Position and secure hose assembly to connector at elbow on air cleaner. Install union on hose assembly.
- (3) Position and secure floor tube assembly to union on hose assembly. Install union on floor tube assembly. Place three clamps on tube assembly, position spacers and secure with screws.
- (4) Position and secure bulkhead tube assembly to union on floor tube assembly. Install union on bulkhead tube assembly. Place three clamps on tube assembly, position spacers and secure with screws.
- (5) Position and secure cowl tube assembly to union on bulkhead tube assembly. Install union on cowl tube assembly.
- (6) If necessary, install grommet in cowl. Position and secure indicator tube assembly to cowl union.
- (7) Install fitting on indicator and **secure** indicator to tube assembly and mounting bracket (refer to para 2-270).
- (8) Close and secure engine cover.
- (9) Position and **secure** air duct panel with sixteen screws.
- (10) Install console (refer to para 2-33).
- (11) Install tractor seats (refer to para 2-221).

Section XXIX. AUXILIARY MATERIEL USED IN CONJUNCTION WITH THE EQUIPMENT (OVE EQUIPMENT)

2-272. General

This section contains instructions for **organizational** maintenance of auxiliary material used in conjunction with On Vehicle Equipment (OVE).

2-273. Fire Extinguisher

a. Removal. Release buckle and link assembly securing fire extinguisher to bracket located on cowl. Remove fire extinguisher (fig 2-369).

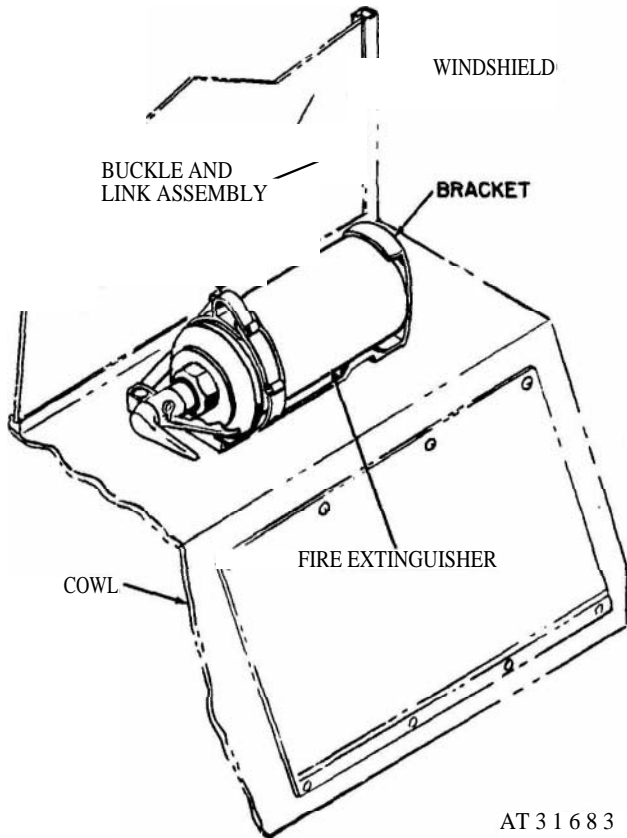


Figure 2-369. Fire extinguisher canister, removal and installation.

b. Disassembly and Assembly. Refer to TM 5-687 for maintenance procedures.

c. Installation. Position fire extinguisher on bracket and secure with buckle and link assembly (fig 2-369).

2-274. Fire Extinguisher Mounting Bracket

a. Removal.

(1) Remove fire extinguisher from bracket (fig 2-370).

(2) Remove bracket by removing nuts, washers, and bolts securing bracket to cowl.

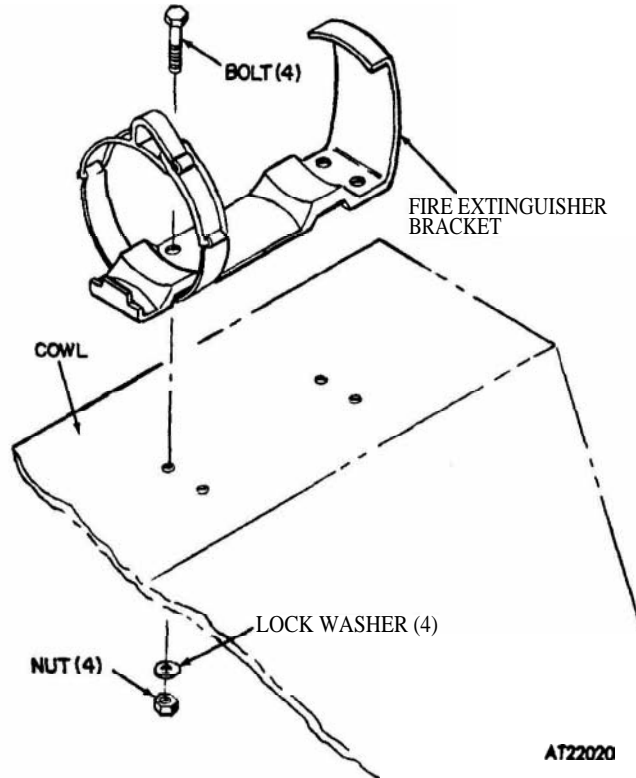


Figure 2-370. Fire extinguisher mounting bracket, removal and installation.

b. Installation.

(1) Position bracket to cowl and secure with four bolts, lock washers, and nuts (fig 2-370).

(2) Install fire extinguisher on bracket.

2-275. Tire Chain Repair

Spread out damaged tire chain assembly on suitable work area and replace damaged component (fig 2-371).

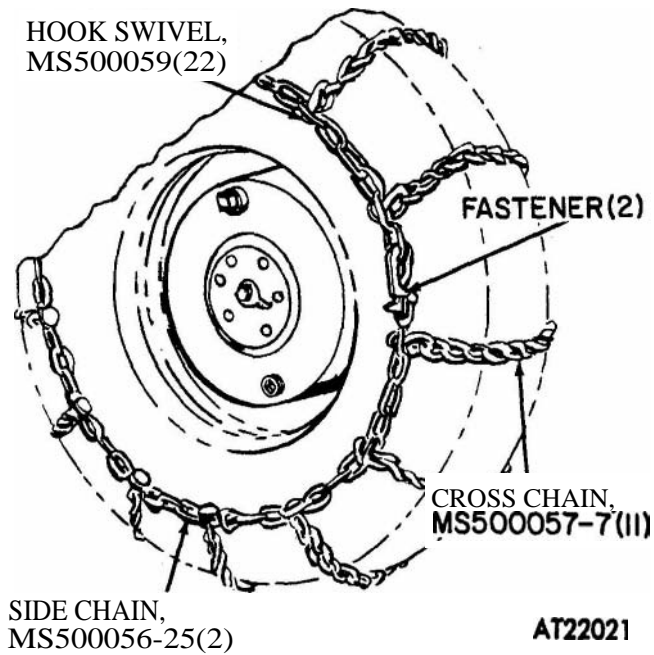


Figure 2-371. Tire chain repair.

2-276. Inter-Body Truss Kit Repair

a. Disassembly.

(1) Disassemble the horizontal truss according to the following steps:

(a) Pull quick disconnect pin attaching fitting assembly to truss assembly (fig 2-372).

(b) If damaged, replace quick disconnect pin and / or chain assembly by pulling chain pin from clevis and removing chain assembly from quick disconnect pin. Remove ring and cotter pin from chain.

(c) If damaged, press bearing from fitting assembly.

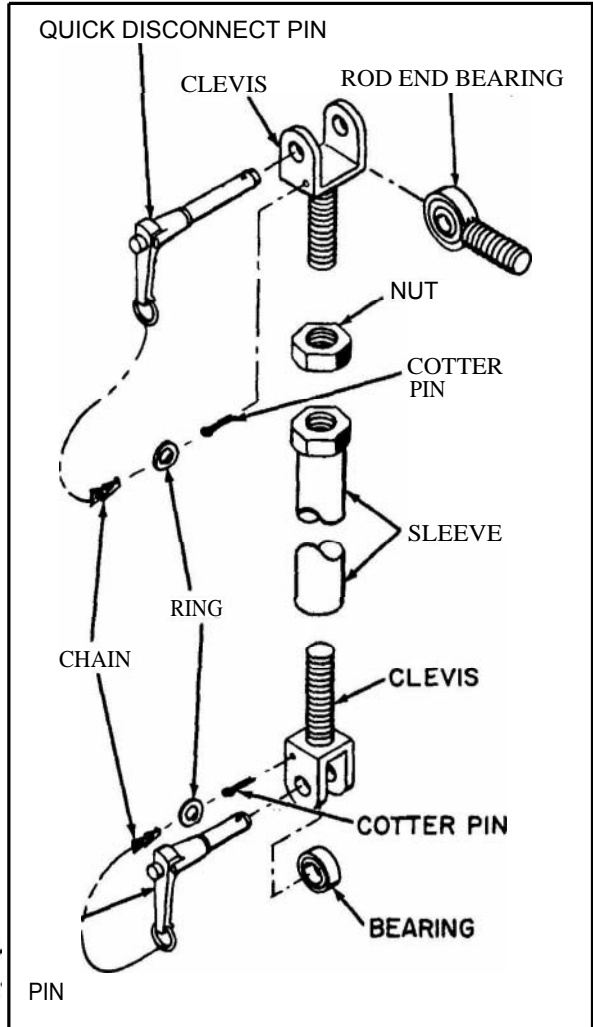
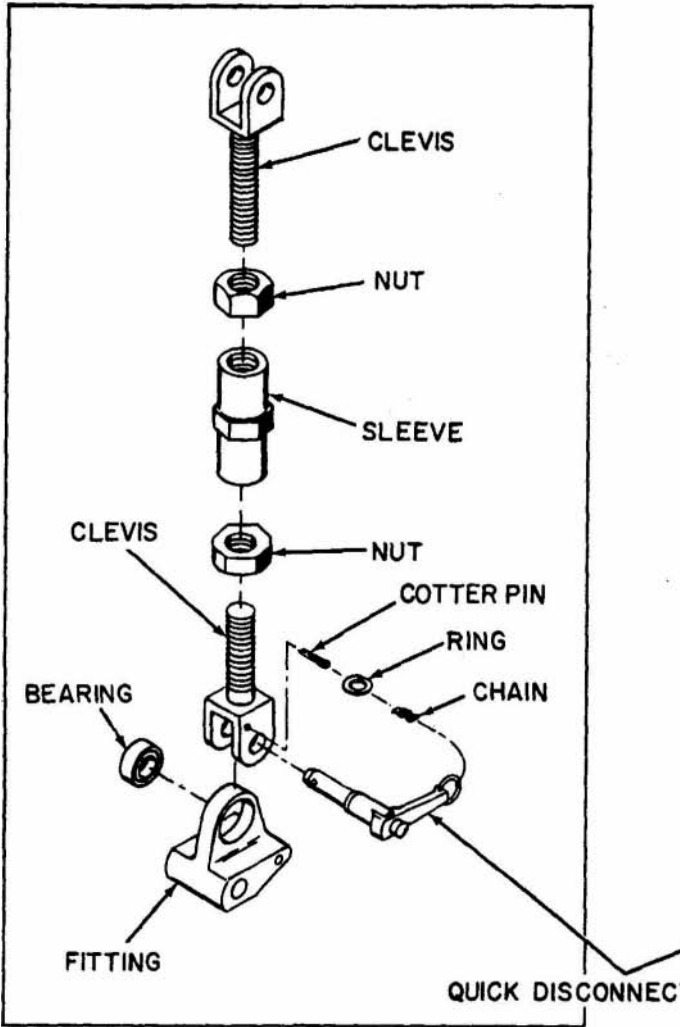
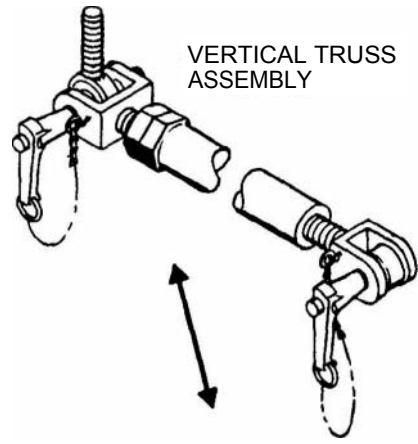
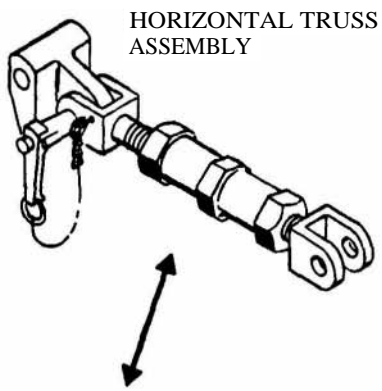
(d) Disassemble truss assembly by loosening jam nut(s) securing clevis(s) to sleeve. Remove **clevis(s)** from sleeve and jam nut(s), from clevis(s).

(2) **Disassemble the vertical truss** according to the following steps:

(a) Pull quick disconnect pins securing **bearings** to truss assembly (fig 2-372).

(b) If damaged, replace quick disconnect pin(s) and/or chain assembly(s) by pulling **chain pins** from **clevis(s)** and removing chain assembly from quick disconnect pin. Remove ring and cotter pin from chain.

(c) Disassemble truss assembly by loosening jam nut securing clevis to sleeve. Remove both **devises** from sleeve and the jam nut from one clevis.



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Figure 2-372. *Inter-body* truss kit repair.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, damaged threads, broken chains, or other damage.

(3) Replace all damaged parts.

c. Assembly.

(1) Assemble the horizontal truss according to the following steps:

(a) Install jam nuts on devises. Thread devises to sleeve. Distance between mounting holes of devises to be approximately 10-1/2 inches. Align devises and tighten jam nuts (fig 2-372).

(b) If removed, press bearing into fitting; install new cotter pin on chain ring and attach ring on chain, install chain on quick disconnect pin and install assembly to clevis.

(c) Position fitting assembly between clevis and secure with quick disconnect pin.

(2) Assemble the vertical truss according to the following steps:

(a) Install jam nut to clevis and install both

devises on sleeve. Distance between mounting holes of **clevises** to be approximately 16-1 / 2 inches. Align devises and tighten jam nut (fig 2-372).

(b) Install new cotter pins on chain rings and attach chain assemblies with quick disconnect pins to devises.

(c) Position bearings between devises and secure with quick disconnect pins. .

2-277. Intermediate Axle Brace Assembly Repair

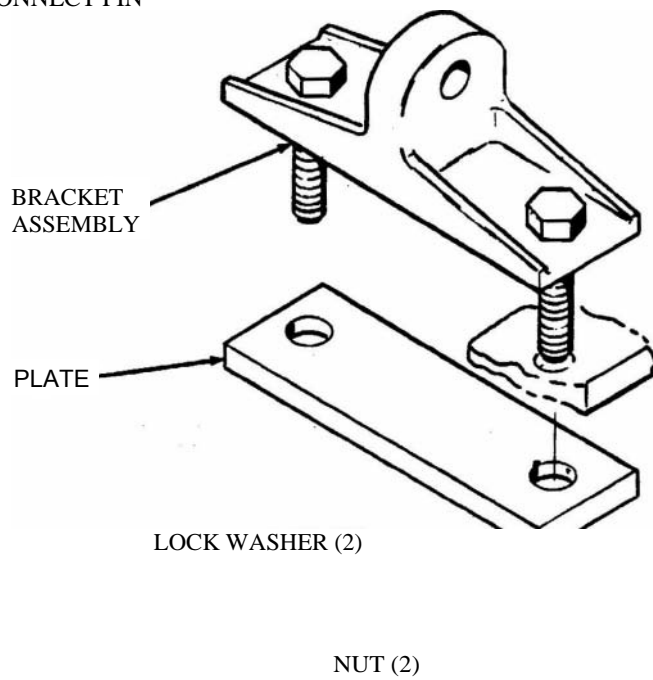
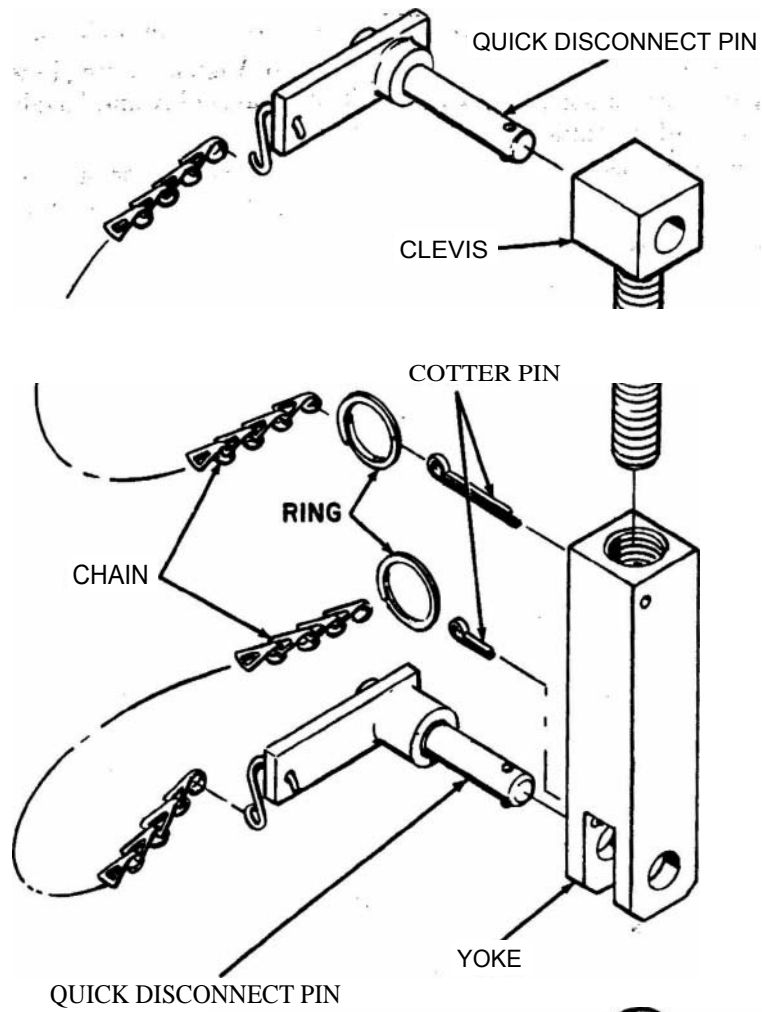
a. Disassembly.

(1) Pull quick disconnect pin securing bracket assembly to yoke (fig 2-373).

(2) Remove nuts and washers attaching plate to bracket assembly.

(3) Pull quick disconnect pin from clevis and remove clevis from yoke.

(4) If damaged, replace quick disconnect pin(s) and / or chain assembly(s) by pulling chain pin from clevis and removing chain assembly ~~from~~ quick disconnect pin. Remove ring and cotter pin from chain.



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Figure 2-373. Intermediate axle brace assembly repair.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, damaged threads, broken chains, or other damage.

(3) Replace all damaged parts.

c. Assembly.

(1) If removed, install new cotter pins and attach chain assemblies with quick disconnect pins to yoke (fig 2-373).

(2) Thread clevis into yoke and insert quick disconnect pin into clevis.

(3) Align mounting holes of plate with bolts of bracket assembly and install two lock washers, and nuts.

(4) Position ear of bracket to yoke and secure with quick disconnect pin.

CHAPTER 3

MATERIAL USED IN CONJUNCTION WITH MAJOR ITEM

Section I. GENERAL

3-1. Scope

This chapter contains the instructions necessary for the installation and organizational maintenance of the seven special purpose kits issued for installation on the cargo truck, **1¼ ton, 6 x 6, M561** and includes a description of the major units of each kit and their function relative to the components of the vehicle. The special purpose kits applicable to the M561 cargo truck consist of the 100 ampere Alternator Kit, the Slave Cable Kit, 4.2 inch Mortar Kit, 81MM Mortar Kit, 7.62MM Machine Gun Kit, the Winch Kit and the Surfing Kit. The 100 ampere Alternator Kit, the Slave Cable Kit, the Winch Kit, and the Surfing Kit, may be issued for installation in the M792 ambulance. Operational and maintenance procedures with respect to these kits are the same for both vehicles.

3-2. Maintenance Allocation

The vehicle maintenance allocation chart (Appendix B) shows the prescribed maintenance responsibilities which will apply. Any need for cleaning, lubrication, replacement or repair detected in the equipment beyond the scope of this publication is to be reported immediately to the designated authority.

3-3. Service Upon Receipt of Materiel

a. General.

(1) After receiving a new or reconditioned kit which is to be installed in a vehicle, determine that the kit has been properly prepared for service and that all the necessary parts are present. Inspect all assemblies, subassemblies and parts for proper condition and assembly. If any exterior surfaces are coated with rust-preventive compound, remove with dry-cleaning solvent or mineral spirits paint thinner.

(2) Inspect the vehicle in which the selected kit is to be installed to determine that the vehicle is fully serviceable and ready for the kit installation.

(3) Ordinary deficiencies disclosed during preliminary inspection, servicing, or during installation will be corrected by support maintenance personnel.

(4) Serious deficiencies detected in the equipment which occur under the circumstances indicated in TM 38-750 should be immediately reported in accordance with the instructions in these regulations.

b. Specific Procedures. Refer to the applicable section for specific procedures.

Section 11. 100 AMPERE ALTERNATOR KIT

3-4. General

The 100-Ampere Alternator Kit is utilized to replace the standard 60 ampere alternator furnished with the vehicle when greater output power is required from the vehicle electrical system. The kit consists of an alternator, a rectifier, a regulator, a harness for interconnection and the necessary fixtures and hardware for **mounting**. The 100 ampere alternator is mounted on the left side of

the vehicle engine by means of the same brackets that are used to mount the standard 60 ampere alternator. The rectifier and regulator are mounted together on the left wheelwell shelf next to the alternator. In the 60 ampere system, the rectifier and regulator are built into the alternator housing to provide the direct current output. The **installation** of the 100 ampere alternator kit is illustrated in figure 3-1.

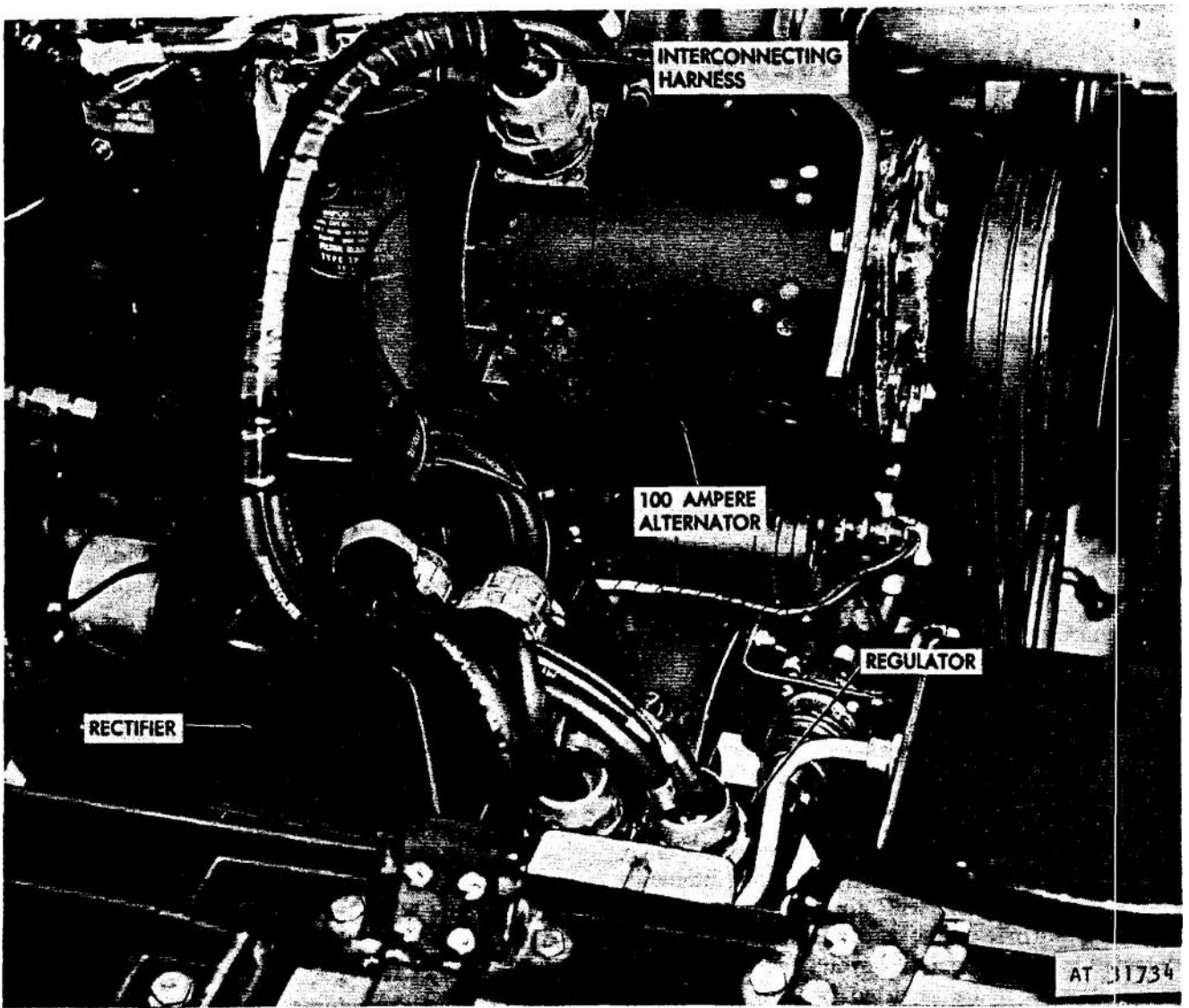


Figure 3-1. 100 Ampere alternator kit.

a. *Alternator.* The alternator (fig 3-1) is a waterproof, radio noise suppressed unit, capable of delivering 28 volts AC, three phase, at 100 amperes. It is driven by two V-belts from the crankshaft pulley on the engine and is cooled by an internal fan which is located at the rear of the alternator housing.

b. *Rectifier.* The rectifier (fig 3-2) is a full-wave

type composed of six silicon diodes connected in a configuration which converts the three phase alternating current from the alternator to direct current. The unit is waterproof and is mounted on a support bracket on the wheelwell on the left side of the vehicle (fig 3-2). Air flow through the louvers of the engine compartment provide cooling for the rectifier fins.

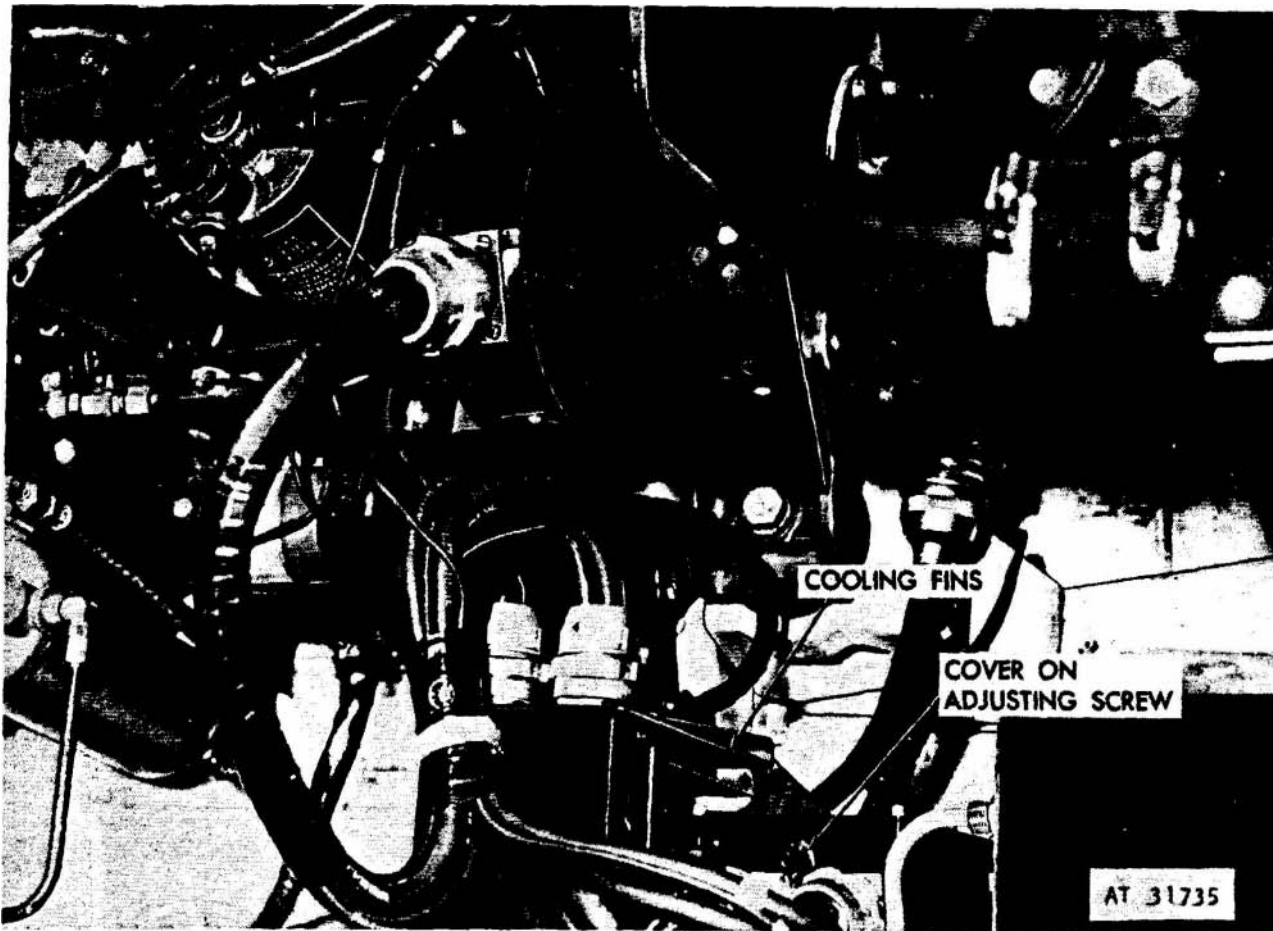


Figure 3-2. Rectifier and regulator, 100 ampere alternator kit.

c. Regulator. The regulator (fig 3-2) is a solid state hermetically sealed unit which contains a load relay that connects the generating system to the vehicle batteries when the master switch is turned on. At the same time, the fields of the alternator are connected to the batteries by the load relay for initial excitation. The regulator utilizes a carbon pile type voltage limiter to control the alternator field current thereby controlling the system output voltage. The voltage is adjusted externally by a

variable resistor located in the base of the regulator. The regulator is mounted on the same bracket which supports the rectifier unit.

d. Harness Assembly. The harness assembly (fig 3-3) is shaped and laced so as to be readily connected to the components of the 100 ampere alternator kit without further reshaping. Before installation, security of the lacing and condition of the connectors must be checked.

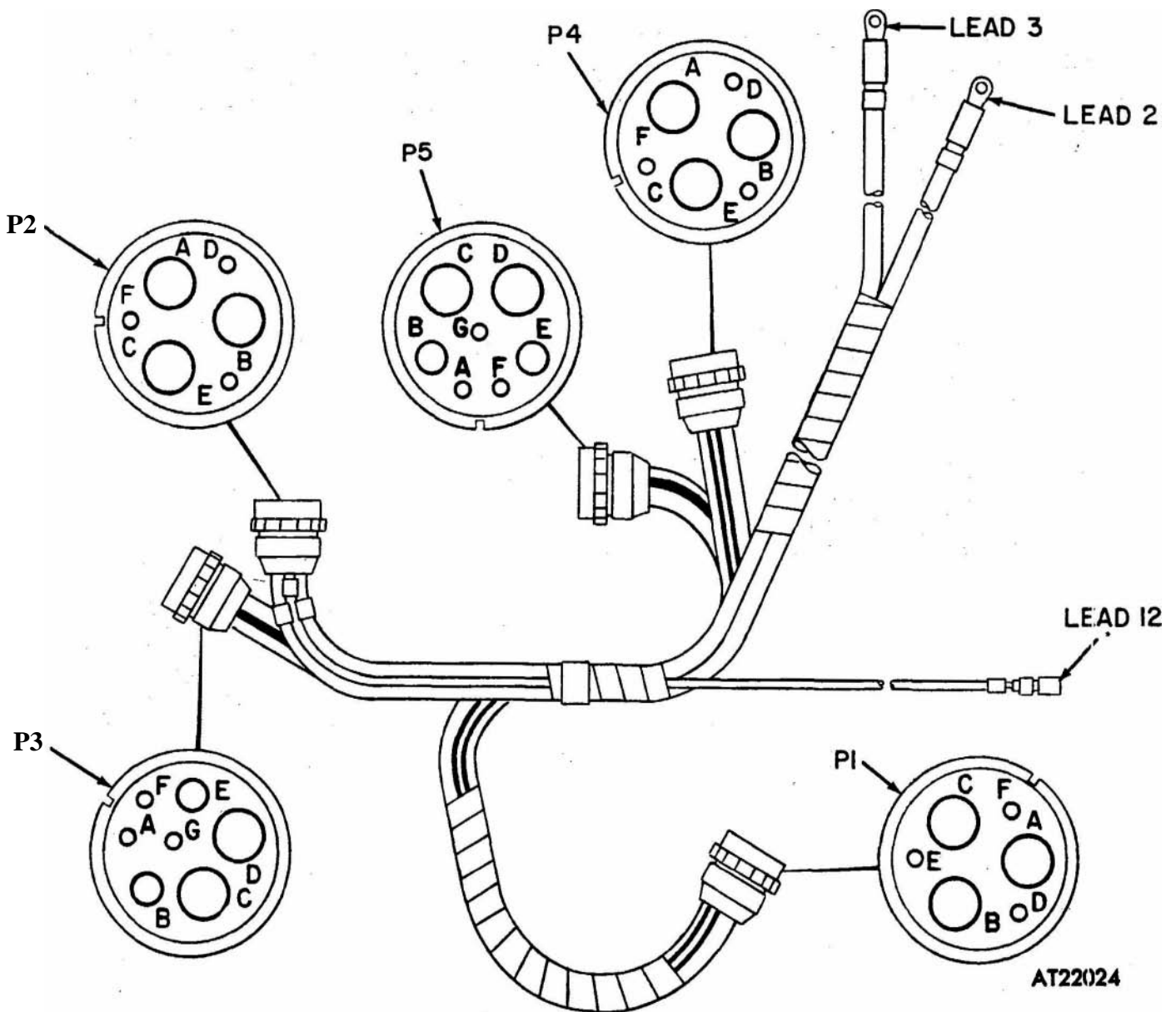


Figure 3-3. Harness assembly, 100 ampere alternator kit.

3-5. Tabulated Data

a. Alternator.

Army part number	7954720-1
Rated volts	28
Rated amperes	100
Speed range	2000 to 8000 rpm
Weight	37.7 lbs

b. Rectifier.

Army part number	10906314
Rated volts	28
Rated amperes	100
Weight	11.2 lbs

c. Regulator.

Army part number	10947439
Rated volts	28
Rated amperes	100
Weight	11.3 lbs

3-6. Kit Installation-Vehicle Not Previously Equipped

a. Removal of 60 Ampere Alternator.

(1) Open and secure engine cover (refer to TM 9-2320-242-10).

Caution: Disconnect the cable from the positive terminal of the battery on the driver's side of the vehicle to prevent accidental current drain or shorts.

(2) Remove cover from terminal board (fig 2-65) on the alternator by removing the two screws and washers securing the cover.

(3) Remove clamp securing leads 2 and 12 by removing two screws and washers from clamp.

(4) Remove nuts and washers securing leads 2 and 3. Disconnect connector in lead 12 of engine harness. Remove leads 2 and 3 from terminals.

(5) Cover end of lead 2 with tape to prevent shorting. This lead is not used with the 100 ampere alternator.

(6) Loosen alternator adjusting strap screw and move alternator toward engine to relieve tension on drive belts. Remove drive belts from alternator pulley.

(7) Support the alternator and remove two screws and lock washers securing alternator to mounting bracket.

(8) Remove alternator adjusting strap screw and lock washers and remove alternator from engine compartment.

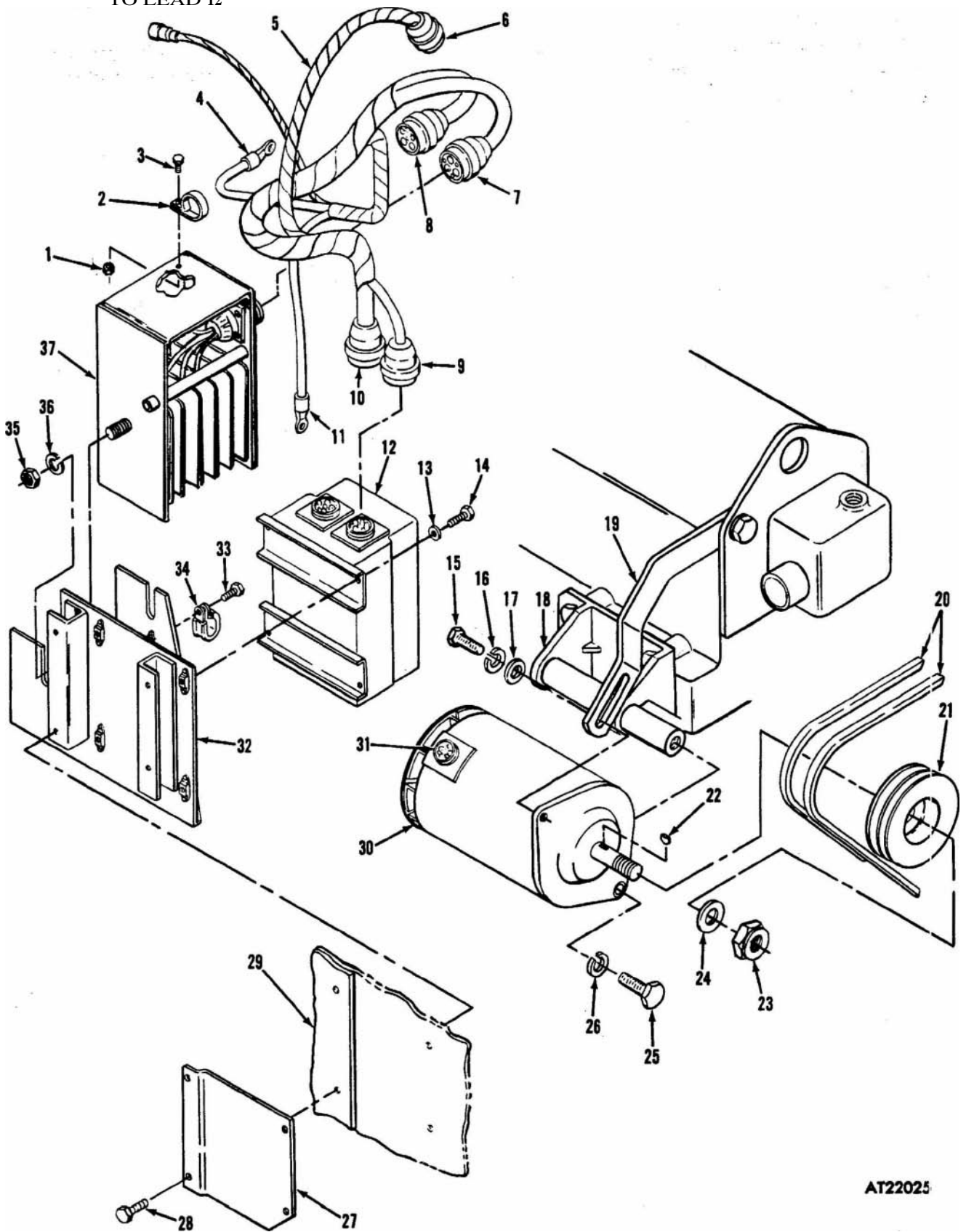
b. Installation of 100 Ampere Alternator.

(1) Remove fan shroud crossmember and fan belts (refer to para 2-74).

(2) Install two new drive belts and replace fan shroud crossmember (refer to para 2-74).

(3) Attach pulley (21, fig 3-4), to shaft of alternator (30) and secure with key (22), washer (24) and nut (23). Torque nut (23) to 70-80 lbs-ft.

TO LEAD 12



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Figure 3-4. 100 Ampere alternator kit, installation.

LEGEND to fig 3-4:

- | | |
|-------------------------|-------------------------|
| 1 - Nut | 20 - Belts |
| 2 - Clamp | 21 - Pulley |
| 3 - Screw | 22 - Key |
| 4 - Lead 131 | 23 - Nut |
| 5 - Harness assembly | 24 - Washer |
| 6 - Connector (P1) | 25 - Screw |
| 7 - Connector (P41) | 26 - Lock washer |
| 8 - Connector (P5) | 27 - Support plate |
| 9 - Connector (P2) | 28 - Screw |
| 10 - Connector (P3) | 29 - Tractor hull |
| 11 - Lead (2) | 30 - Alternator |
| 12 - Regulator assembly | 31 - Alternator connect |
| 13 - Washer | 32 - Mounting bracket |
| 14 - Screw | 33 - Screw |
| 15 - Screw | 34 - Clamp |
| 16 - Lock washer | 35 - Nut |
| 17 - Washer | 36 - Lock washer |
| 18 - Support bracket | 37 - Rectifier assembly |
| 19 - Mounting strap | |

(41) Position alternator (30) to support bracket (18) and install screw (25) and lock washer (26) finger tight. Install adjusting screw (15), lock washer (16), and washers (17) through slotted end of mounting strap (19) into alternator, leaving screw (15) finger tight.

(5) Position belts (20) over pulley (21) and crankshaft pulley. Adjust belts to a deflection of 1A inch with a pressure of 18 to 22 pounds. The deflection is to be measured half-way between the fan pulley and the alternator pulley. Torque the alternator mounting bracket screw (25) to 60-70 lbs-ft. Torque adjusting screw (15) to 35-40 lbs-ft.

c. Installation of Rectifier and Regulator.

(1) Position support plate under left rear fender of tractor so that bend in plate will butt against the welded lap beam of fender support and angled corner of the plate is $\frac{1}{4} \pm \frac{1}{16}$ of an inch from raised structure under tailpipe (fig 3-5).

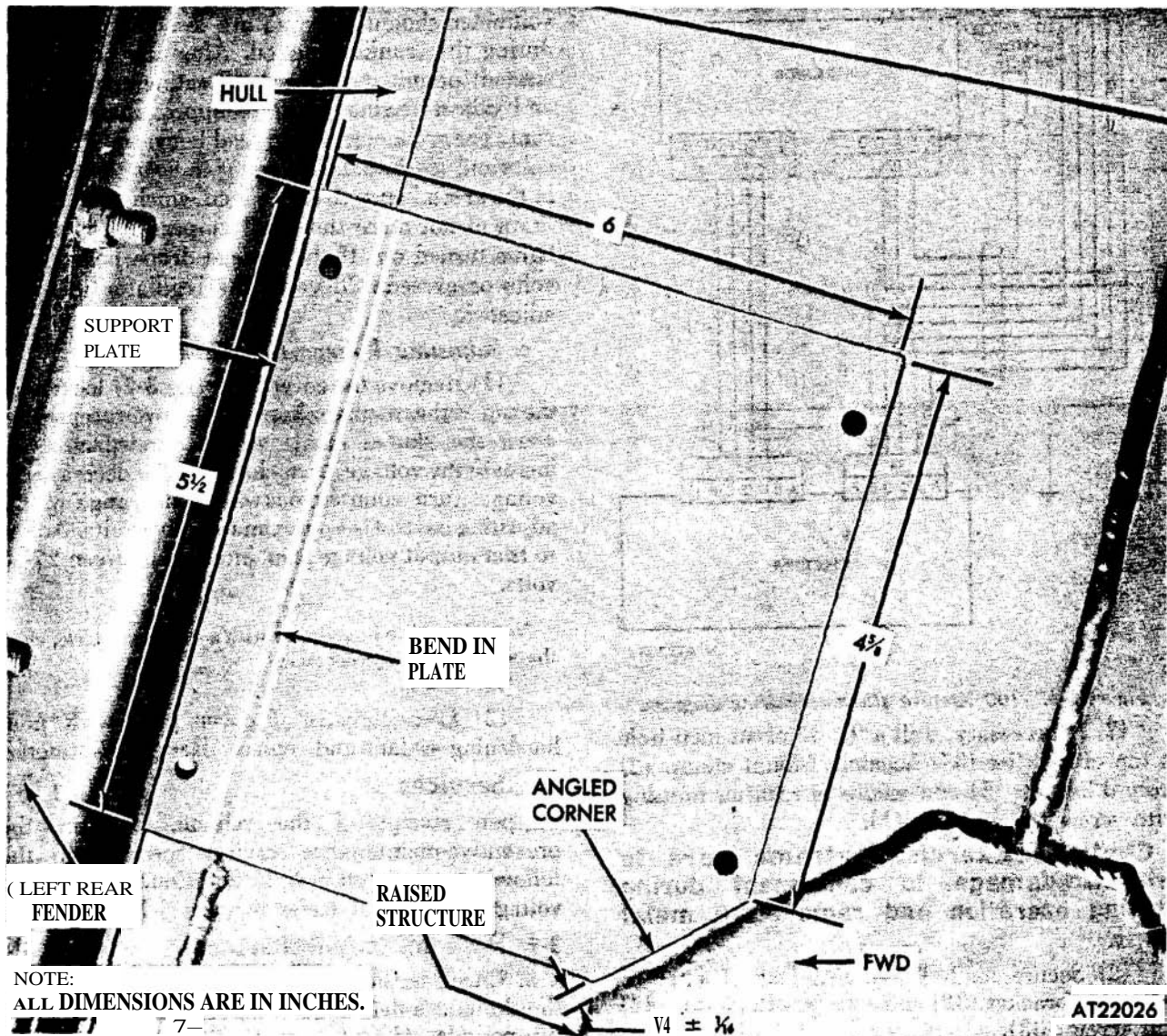


Figure 3-5. Hole drilling pattern for rectifier and regulator support plate.

(2) Drill four holes 9 / 32 of an inch diameter into hull using holes in plate as a guide.

(3) Install regulator-rectifier mounting bracket (32 fig 34) and plate (27) and secure with screws (28).

Note: Apply sealing compound conforming to Military Specification MIL-S-45180, Type II to screws (28) prior to installation to prevent water leakage.

(4) Position regulator (12) on the mounting bracket (32) and secure with screws (14) and washers (13).

(5) Position rectifier (37) on bracket (32) and secure with nut (35) and lockwasher (36).

(6) Connect harness (5) connectors and leads to the corresponding receptacles (fig 3-6).

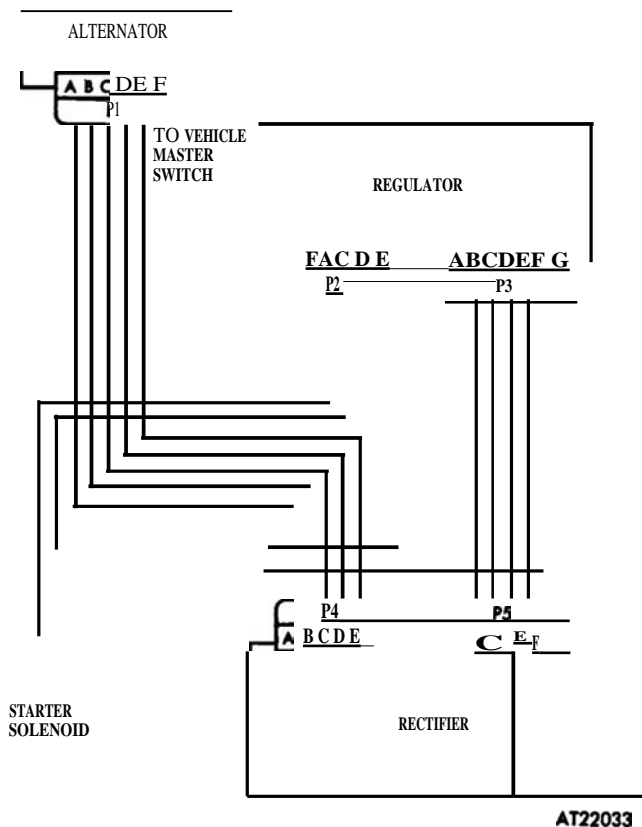


Figure 3-6. 100 Ampere alternator wiring diagram.

(7) If necessary, drill a 9 / 32 of an inch hole in top of rectifier (37) housing. Mount clamp (2) around harness (5) and secure to rectifier housing with screw (3) and nut (1).

Caution: Exercise extreme care to prevent damage to component during drilling operation and remove all metal chips.

(8) Secure lead 3 (4) and lead 2 (11) to mounting bracket (32) and secure with clamp (34) and screw (33).

(9) Reconnect positive battery lead.

3-7. Regulator Installation Check and Adjustment

a. *General.* Check batteries for charge and condition. Do not make regulator adjustments unless batteries are fully charged, all connections are free of corrosion, and cable connectors are properly secured to all terminals. Refer to TM 9-2320-242-10 for inspection and service of the vehicle batteries. Recheck all connections made during installation of the kit components.

b. *Output Voltage Check.*

(1) Connect a DC voltmeter, having a 50 volt range, to the positive terminal of the battery on the driver's side of the vehicle and to the **negative** terminal of the battery on the opposite side of the vehicle. Turn master switch on. The battery-generator indicator should move to the yellow band and the voltmeter should read between 23 and 25 volts.

(2) Crank engine with master switch on. The voltmeter should not indicate less than 20 volts during the cranking period. After the engine has started, permit it to reach operating temperature and adjust engine speed to approximately 1500 rpm. The voltmeter should read between 27.5 to 28 volts and the battery-generator indicator should be in the green band. Attach a load which will cause a drain of not more than 100 amperes with all the lights turned on. If the voltage drops below 27.5 volts or exceeds 28 volts, the regulator must be adjusted.

c. *Adjusting Voltage Regulator.*

(1) Remove the cover plug (fig 3-2) located at the top of the regulator between the two receptacles. Turn the slotted shaft with a screwdriver. To increase the voltage, turn clockwise, to decrease the voltage, turn counterclockwise. The range of the adjusting control is approximately five volts. Adjust so that output voltage is maintained between 27-28 volts.

Note: If vehicle is equipped with a slave receptacle, check the voltage at the receptacle.

(2) Coat threads of cover plug with non-hardening sealant and replace. Remove voltmeter.

3-8. Services

Upon receipt of the vehicle, perform the preventive-maintenance services specified in the following paragraph 3-9. In addition, perform the voltage output test (refer to para 3-7b, above).

3-9. Preventive Maintenance

a. Check tension of alternator drive belts. Belts should have a deflection of $\frac{1}{4}$ of an inch with 18 to 22 pounds. If not, loosen alternator adjusting screw, adjust tension, and tighten alternator

adjusting screw. Check for breaks or glazed areas. Ensure that alternator turns when engine is operating.

b. Check to see that all cable connections are tight and there are no breaks in conduits and harnesses.

c. Check alternator, regulator and rectifier mounting screws, bolts and nuts for tightness.

d. Check battery cables for security and condition. Tighten, clean, or replace as required.

e. Check rectifier for evidence of blistering, flaking of surface, and burned spots.

Caution: If necessary to clean rectifier, in order to perform proper inspection, use a soft brush or soft dry cloth. Do not scratch plates.

f. When master switch is turned on, the battery-generator indicator should move to the yellow band. Start the engine and allow it to reach operating temperature. At approximately 1500 rpm, the indicator should remain in the green band. Stop engine. Turn master switch on. If indicator is in red

band, batteries require charging. Turn master switch off. The indicator should be to the left in the red band.

3-10. Troubleshooting

a. General.

(1) Before troubleshooting, ensure that the preventive-maintenance checks of paragraph 3-9 above have been performed.

(2) Perform the checks described in paragraph 3-7.

(3) Refer to troubleshooting Table 3-1 and the procedures listed in b through e below.

b. Harness Tests - Wiring.

(1) Check each wiring harness as part of the test of each major component. Check plug connections and receptacles at the same time. If visual inspection discloses a harness that appears faulty it can be checked by performing a continuity test using a suitable multimeter.

(2) Disconnect harness and check wiring for continuity (fig 3-6).

Table 3-1. Troubleshooting —100 Ampere Alternator Kit

Malfuction	Probable causes	Corrective action
1. Low Output: less than 27.5 volts.	<ul style="list-style-type: none"> a. Loose connection. b. Loose belts. c. Defective rectifier. d. Regulator out of adjustment or defective. e. One alternator phase shorted. f. One or both batteries discharged or defective. 	<ul style="list-style-type: none"> a. Tighten connectors and cable securing bolts. b. Adjust belts (para 3-9a.). c. Replace rectifier (para 3-14). d. Adjust regulator (para 3-7) or replace (para 3-15). e. Replace alternator (para 3-13). f. Replace both batteries. <p>Caution: Do not reverse polarity of battery.</p>
2. High Output: more than 28.5 volts.	<ul style="list-style-type: none"> a. Regulator out of adjustment. b. One of both batteries low. 	<ul style="list-style-type: none"> a. Adjust regulator (para 3-7). b. Replace both batteries.
3. No output.	<ul style="list-style-type: none"> a. Broken or loose belts. b. Alternator defective. c. Defective rectifier. d. Disconnected wire. e. One or both batteries dead. f. Regulator defective. 	<ul style="list-style-type: none"> a. Adjust belts (para 3-9a.) or replace (para 3-16). b. Replace alternator (para 3-13). c. Replace rectifier (para 3-14). d. Tighten all wires and connections. e. Replace both batteries. L Replace regulator (para 3-15).
4. Battery-Generator indicator remains in red or yellow band with engine at 1500 rpm.	<ul style="list-style-type: none"> a. Regulator set too low. b. Faulty indicator. c. Faulty connections. d. Excessive current drain. System overloaded. e. Low output from generating system. f. One or both batteries low or dead. 	<ul style="list-style-type: none"> a. Adjust regulator (para 3-7). b. Connect voltmeter with 50 volt DC scale across vehicle battery. Check voltage. If between 27.5 and 28 volts, replace indicator. c. Check wiring (fig 3-6). d. Check drain at full load.
5. Noisy belt-squeal.	<ul style="list-style-type: none"> a. Glazed belts. b. Worn or cracked belts. c. Alternator shaft siezed. d. Loose belts. 	<ul style="list-style-type: none"> e. See 1. and 3. above. f. Replace both batteries. a. Replace belts (para 3-16). b. Replace belts (para 3-16). c. Replace alternator (para 3-13). d. Adjust tension of belts (para 3-9a.).
6. Battery will not hold charge.	<ul style="list-style-type: none"> a. Dead cell in one or both batteries. 	<ul style="list-style-type: none"> a. Replace batteries.

Malfunction	Probable causes	Corrective action
<p>7. Battery uses excessive amounts water.</p> <p>8. Rectifier case discolored and / or paint blistered.</p> <p>9. Excessive noise from alternator.</p>	<p>b. Slipping bolts.</p> <p>c. Voltage regulator incorrectly adjusted.</p> <p>d. Charging system operating improperly.</p> <p>a. Regulator set to a high charging rate.</p> <p>b. Leaky battery case.</p> <p>a. Foreign matter between plates causing overheating.</p> <p>b. Air flow to rectifier blocked by foreign object. Excessive voltage from alternator.</p> <p>d. Rectifier overloaded.</p> <p>Defective alternator.</p>	<p>b. Refer to 5 above.</p> <p>c. Adjust regulator (pant 3-71).</p> <p>d. Perform test (para 3-10).</p> <p>a. Adjust regulator (pant 3-71).</p> <p>b. Replace battery.</p> <p>a. Replace rectifier (para 3-141).</p> <p>b. Remove foreign object and replace rectifier (para 3-141).</p> <p>c. Check alternator (para 3-10c).</p> <p>d. See 4 d. above.</p> <p>Ch^{ck} alternator by performing test (pant 3-13 b.).</p>

(3) Check for grounds with ohmmeter set on R x 100 range. Check each harness from each pin to metal shielding. Meter should indicate infinite resistance (open circuit). Low **resistance** indicates ground (short circuit).

(4) Replace or repair harness as required (refer to paras 3-11 and 3-12).

c. *Alternator Tests.*

(1) *Alternator three phase winding.* Master switch must be off. Disconnect alternator to rectifier connector PI at alternator receptacle. Set ohmmeter on R x 100 *range* and check continuity of three phase winding across pins A and B, pins A and C, and pins B and C. Meter should indicate zero resistance (closed circuit).

(2) *Ground check.* Set ohmmeter on R x 100 range. Check from pins A, B, and C to the alternator housing individually. Meter should indicate infinite **resistance (open circuit)**.

(3) *Alternator field resistance.* Loosen alternator adjusting screw and remove tension from drive belts. Set ohmmeter to R x 1 range and check reading from pin 1) to pin E in the alternator receptacle. Turn the rotor at least five times by hand allowing rotor to stop between each turn and record each reading. If at least three out of five readings are four ohms or less, the field resistance is correct. If three out of five readings are more than four ohms, field resistance is incorrect; replace alternator. If readings are less than four ohms, adjust belts to proper tension (refer to para 3-9).

d. *Rectifier Tests.*

(1) *Reverse current resistance.* Turn off master switch and disconnect the harness assemblies at the rectifier. Set ohmmeter to the R x 100 range. Connect positive lead to pin D in the rectifier-to-voltage regulator receptacle at rectifier. Touch the

negative lead of meter to each of the three large sockets A, B, and C respectively in the rectifier to alternator receptacle. Record each reading. A variation of more than 25 ohms between **any** two readings indicates a faulty rectifier. This test checks one section of the rectifier. To check the other section repeat the test by placing the negative meter lead on pin C of the rectifier to regulator receptacle and touching the positive lead to pins A, B, and C respectively. Record the readings. The variation between any two readings should not exceed 25 ohms. Also, the variations between any two readings on both sides of the rectifier should not be more than 25 ohms.

(2) *Field circuit continuity through rectifier.* Set ohmmeter on R x 100 range and check exciter field circuit by connecting meter from small pin B to socket D and then small pin E to socket E on the rectifier receptacles. The meter should indicate continuity, but zero resistance.

(3) Replace rectifier as required (refer to para 3-14).

e. *Regulator Tests.*

(1) *Load relay.* Connect entire system **except** rectifier-to-voltage regulator harness at regulator. Set voltmeter to 50 DC volt scale. Connect meter leads to small B and E in receptacle and turn on master switch. The load relay should close with an audible click and the meter should read 27-28 **volts**.

(2) *Adjustable 5 ohm resistor.* **Disconnect** harness from the battery to voltage regulator. Set ohmmeter to R x 1 range. With engine off, check between C and D sockets of regulator to rectifier receptacle. With the adjustable control set at full clockwise position, meter should indicate 2(± 1) ohms and with adjustable control set at full counterclockwise position, meter should indicate 21±1 ohms.

(3) *Carbon pile resistance.* Connect ohmmeter between sockets C and B of regulator to rectifier receptacle. Meter should indicate approximately 1 ohm. Reconnect harness to regulator. Disconnect same harness at rectifier. Repeat tests (1) and (2) above. The results should be the same.

(4) *Line switch resistance.* Disconnect regulator-to-battery harness at voltage regulator.

Set ohmmeter on R x 100 range. Check from pin A of regulator-to-battery receptacle to socket C in regulator-to-rectifier receptacle. Meter should indicate open circuit (infinite resistance).

(5) *Jumper continuity.* Connect ohmmeter to pins A and B in regulator-to-battery receptacle. Meter should indicate continuity and zero resistance (fig 3-71).

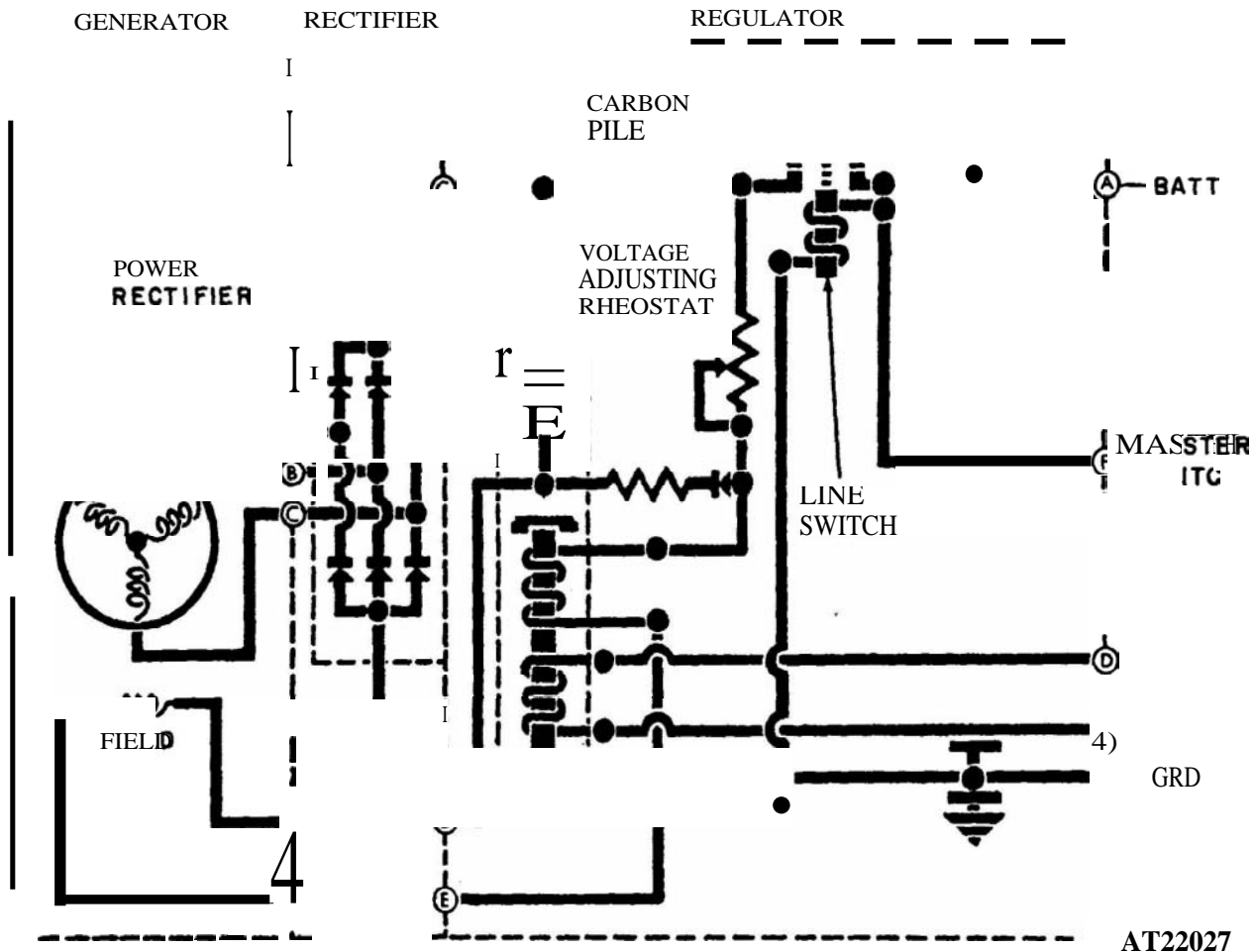


Figure 3-7. Simplified schematic diagram, 100 ampere alternator kit.

(6) *Battery cable.* Connect voltmeter from pin A of battery-to-regulator harness to ground. Meter should indicate battery voltage. Turn on master switch and check from contact F of this harness to ground. Meter should indicate battery voltage.

(7) *Battery-regulator test.* With harness connected, check regulator (refer to para 3-7 b).

(8) Adjust or replace regulator as required (refer to para 3-7 c. for regulator adjustment and para 3-15 for replacement).

Caution: The tests above require that the master switch be turned on. Since the engine stop control must be pushed in to allow the

master switch to be turned on, care must be exercised not to accidentally push the engine start switch. As a further precaution, make certain that the transmission is in N (neutral) position when checking the electrical system.

3-11. Harness Assembly, Removal and Installation

a. Removal.

(1) Make sure master switch is in OFF position.

- (2) Disconnect lead 3 (4, fig 3-4) by removing securing screw.
- (3) Disconnect lead 2 (11) from starter solenoid by removing securing hardware on solenoid.
- (4) Disconnect lead 12.
- (5) Remove screw (3), nut (1), and clamp (2) securing harness (5) to the top of the rectifier (37).
- (6) Remove screw (33) and clamp (34) securing harness (5) to regulator-rectifier bracket (32).
- (7) Disconnect connector (6) from alternator receptacle (31).
- (8) Disconnect connectors (7 and 8) from rectifier (37).
- (9) Disconnect connectors (9 and 10) from regulator (12).
- (10) Remove harness (5).

b. Installation.

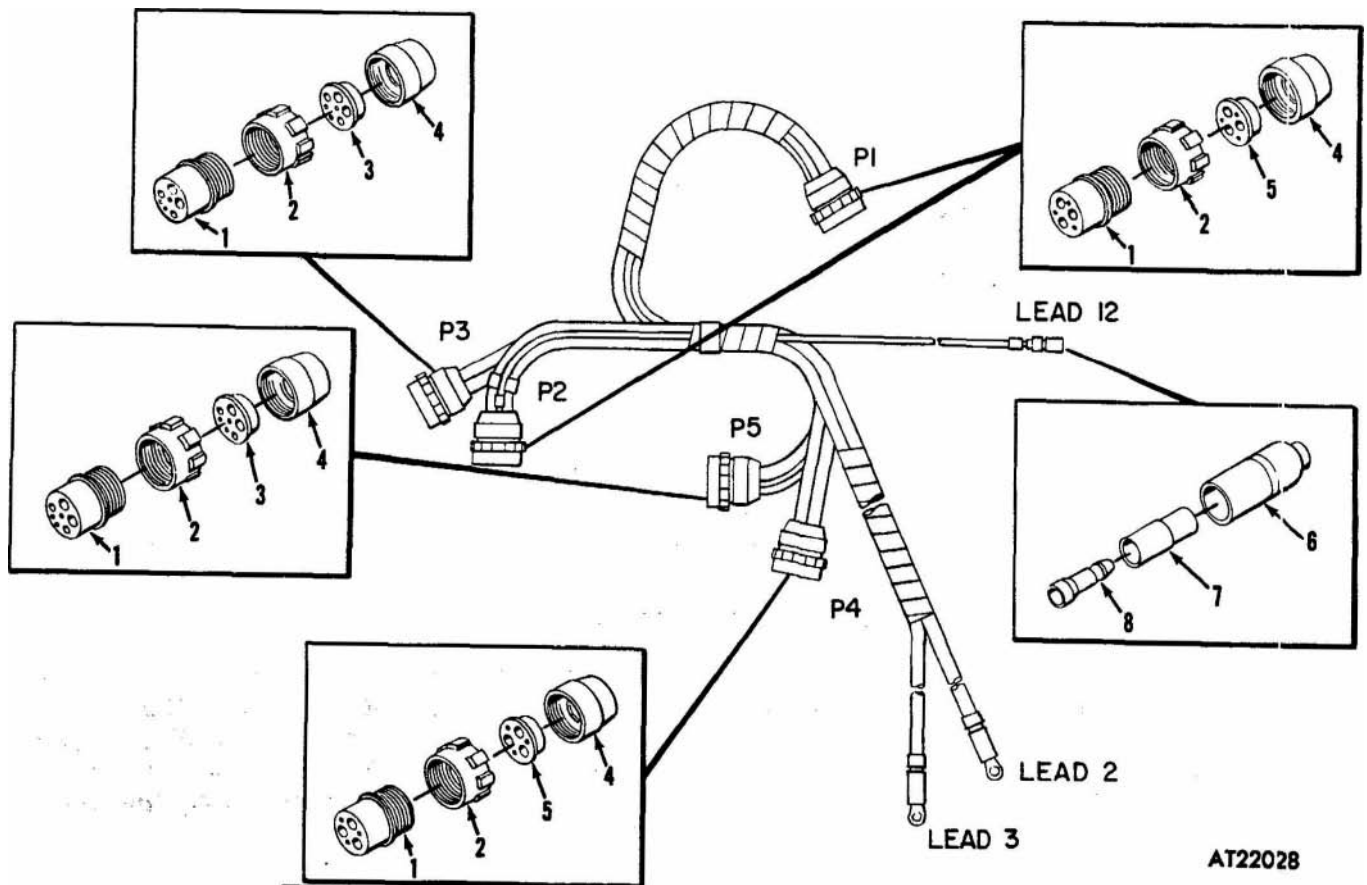
- (1) Position harness (5, fig 3-4).

- (2) Connect connectors (9 and 10) to **regulator** (12) receptacles.
- (3) Connect connectors (7 and 8) to rectifier (37) receptacles.
- (4) Connect connector (6) to alternator receptacle (31).
- (5) Connect lead 12 to engine harness.
- (6) Connect lead 2 (11) to starter solenoid.
- (7) Connect lead 3 (4) to engine harness.
- (8) Attach harness (5) to regulator / rectifier mounting bracket (32) with clamp (34) and screw (33).
- (9) Attach harness to rectifier housing (37) with clamp (2), screw (3), and nut (1).
- (10) Start engine and check for proper operation.

3-12. Harness Assembly

a. Replacement of Shell Connectors.

- (1) Remove grommet nut (4 fig 3-8), from base of electrical connector shell.



LEGEND to fig

- | | |
|-----------------|----------------------------|
| 1 - Shell body | 5 - Grommet |
| 2 - Coupling | 6 - Rubber connector shell |
| 3 - Grommet | 7 - Sleeve |
| 4 - Grommet nut | 8 - Terminal assembly |

Figure 3-8. Harness connectors, repair.

(2) Slide grommet nut (4) and coupling nut (2) back on harness.

(3) Unsolder wires at inserts in shell body (1). Remove coupling (2) and grommet nuts (4) from harness.

(4) Make sure insulation is stripped from wire approximately $\frac{1}{4}$ to $\frac{1}{2}$ of an inch and wire ends are tinned.

(5) Slide grommet nut (4) and coupling nut (2) over wire ends.

(6) Pass harness wires through appropriate holes in the grommet (3) or grommet (5).

(7) Insert wires into solder wells of pins in shell (1) and solder in place. Make certain that the areas between wires are clean and free of flux and solder after soldering.

(8) After solder connections have been made, slide grommet towards shell assembly and press into the shell body.

(9) Plug unwired pins with suitable plug.

(10) Position coupling nut (2) and secure grommet nut (4).

b. Waterproof Connector (Lead 12) Replacement.

(1) Disconnect lead 12 from mating connector in engine harness and cut it off from the wire end.

(2) Strip $\frac{1}{8}$ of an inch of insulation from the wire end.

(3) Slide new rubber connector shell (6) and sleeve (7) over stripped wire ends.

(4) Slip terminal assembly (8) over stripped wire end and crimp with a suitable crimping tool.

(5) Apply a light film of lubricant (**MIL-S-8660**) to connector shell (6) and sleeve (7) and slide over terminal (8).

c. Terminal Lugs (Leads 2 and 3) Replacement.

(1) Cut off terminal lug to be replaced from ends of leads 2 or 3.

(2) Strip approximately $\frac{1}{4}$ of an inch of insulation from wire end.

(3) Insert wire end into terminal lug and crimp with a suitable crimping tool.

3-13. Alternator Assembly Replacement

a. Removal.

(1) Disconnect connector P1 at alternator receptacle (31, fig 3-4).

(2) Loosen two screws (25), and lock washers (26) securing alternator (30) to mounting bracket (18).

(3) Support alternator (30) and remove screw (15), lock washer (16) and washer (17) from adjusting arm (19). Push alternator (30) toward

engine block and remove belts (20) from drive pulley (21).

(4) Remove two screws (25) and lock washers (26) securing alternator (30) to mounting bracket (18) and remove alternator (30).

(5) Remove nut (23) and washer (24) securing pulley (21) to alternator (30). Using a suitable puller, remove pulley (21) and woodruff key (22) from alternator shaft.

b. Installation.

(1) Attach pulley (21, fig 3-4) to shaft of alternator (30) and secure with key (22), washer (24) and nut (23). Torque nut (23) to 70-80 **lbs-ft.**

(2) Position alternator (30) to support bracket (18) and install screw (25) and washer (26) finger tight. Install adjusting screw (15), lock washer (16), and washers (23) through slotted end of mounting strap (19) into alternator, leaving screw (15) finger tight.

(3) Do not connect connector P1 to the alternator.

(4) Adjust drive belts (refer to para 3-9 a). Tighten mount screws (25).

(5) Start and run engine (refer to TM 9-2320-242-10). If alternator is noisy, remove alternator and inspect for cause of noise. If disassembly is required to correct noise, obtain another alternator. If alternator is not noisy, stop engine and connect connector P1, to the alternator.

Note: With an electrical load on the charging system it is normal for the alternator unit to whine. If at any time mechanical binding or interference is suspected because of excessive noise, perform step (2) above.

(6) Perform voltage output tests and regulator adjustment if required (refer to para 3-7).

(7) Connect connector (31) to alternator.

3-14. Rectifier Assembly Replacement

a. Removal.

(1) Disconnect connectors (7 and 8, fig 3-4) from rectifier assembly (37).

(2) Disconnect clamp (2) from rectifier assembly (37) by removing screws (3) and nut (1).

(3) Loosen nuts (35) and washers (36) on rectifier (37), remove rectifier from mounting bracket (32).

b. Installation.

(1) Position rectifier (37, fig 3-4) in mounting bracket (32) and secure with nuts (35) and washers (36).

(2) Connect two connectors (7 and 8) to the rectifier (37).

(3) Attach harness (5) to rectifier (37) and secure with clamp (2), screw (3), and nut (1).

(4) Start engine (refer to TM 9-2320-242-10). Observe battery-generator indicator for proper operation.

(5) Perform voltage output tests and regulator adjustment if required (refer to para 3-7).

3-15. Regulator Assembly Replacement

a. Removal.

(1) Disconnect connectors (9 and 10, fig 3-4) from regulator (12).

(2) Remove screws (14) and washers (13) securing regulator (12) to mounting bracket (32).

(3) Remove regulator (12) from bracket (32).

b. Installation.

(1) Position regulator (12, fig 3-4) on mounting bracket (32).

(2) Secure regulator (5) to mounting bracket (32) with screws (14) and washers (13).

(3) Connect connectors (9 and 10) to regulator (5).

(4) Start engine (refer to TM 9-2320-242-10). Observe battery-generator indicator for proper operation.

(5) Perform voltage output tests and regulator adjustment if required (refer to para 3-7).

3-16. Alternator Drive Belts

a. Removal.

(1) Loosen two screws (25, fig 3-4) securing alternator (30) to mounting bracket (18). Loosen adjusting arm screw (15) and push alternator toward engine block. Remove drive belts (20) from alternator pulley (21).

(2) Remove fan shroud crossmember and fan belts (refer to para 2-74).

b. Installation.

(1) Install fan belts and fan shroud crossmember (refer to para 2-74).

(2) Adjust belt tension and secure alternator (refer to para 3-9). Tighten mounting nuts.

Section III. SLAVE CABLE KIT

3-17. Description

a. *General.* The slave cable kit, when installed in the vehicle provides a dual purpose electrical connector that can be used to supply 24 volts direct current from the vehicle to external equipment

when the vehicle engine is running, or 24 volts direct current supplied from an external source to the vehicle batteries in case of vehicle battery failure. The kit consists of a receptacle assembly, attaching hardware, and cable securing clamps (fig 3-9).

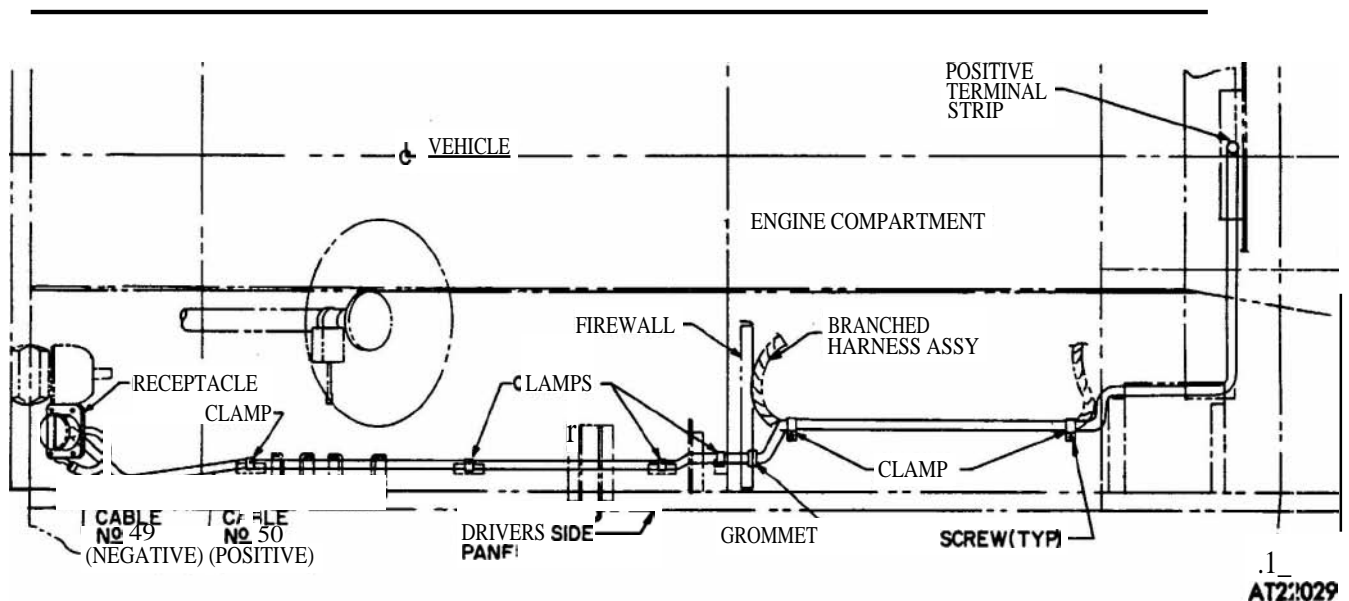


Figure 3-9. Slave cable kit, installation.

b. Slave Cable Receptacle Assembly. The receptacle assembly consists of a connector and two cable leads. The positive lead is connected to the engine compartment terminal strip and the ground lead is secured to the chassis with receptacle attaching hardware. A hole is provided at the left front cowl for mounting of the receptacle. When cable is not installed, the hole is shielded with a cover plate secured with four screws. The receptacle is provided with a captive protective cover (fig 3-10).

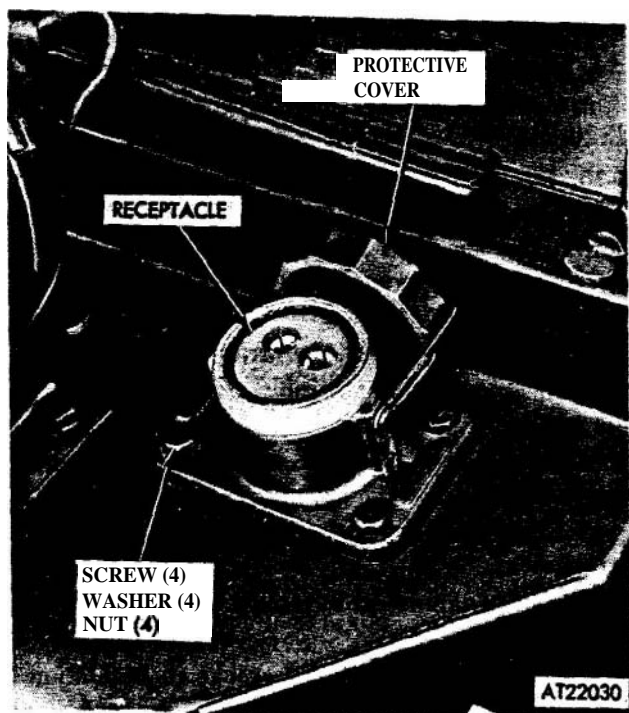


Figure 3-10. Slave cable, receptacle and protective cover.

3.18. Tabulated Data

Receptacle type	MS75058-1
Cable type	M13486 / 1-12 2GA
Cable No. 49 (negative)	15 in
Cable No. 50 (positive)	130 in

3-19. Initial Installation, Slave Cable Kit

- a. Remove driver's seat (refer to para 2-221).
- b. Open and secure engine cover (refer to TM 9-2320-242-101).
- c. Disconnect positive battery lead.
- d. Remove cover plate (fig 3-11) by removing the screws at the top of cowl, washers and nuts under cowl.

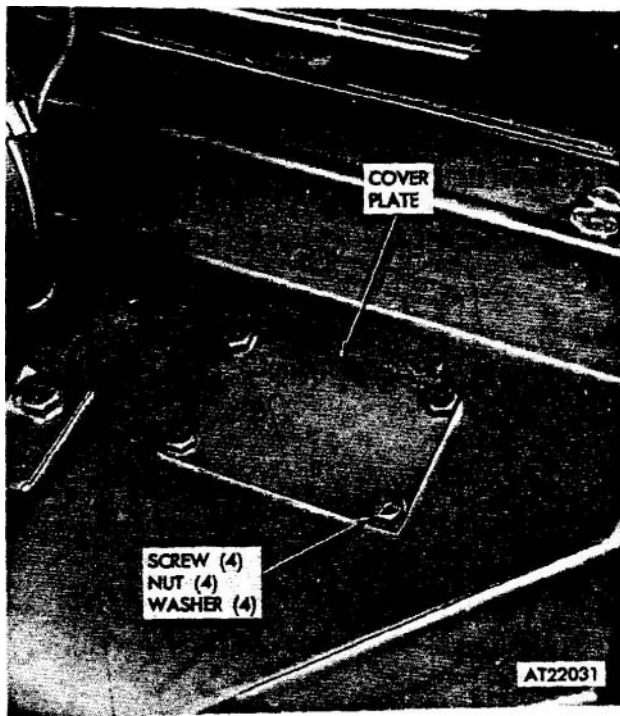
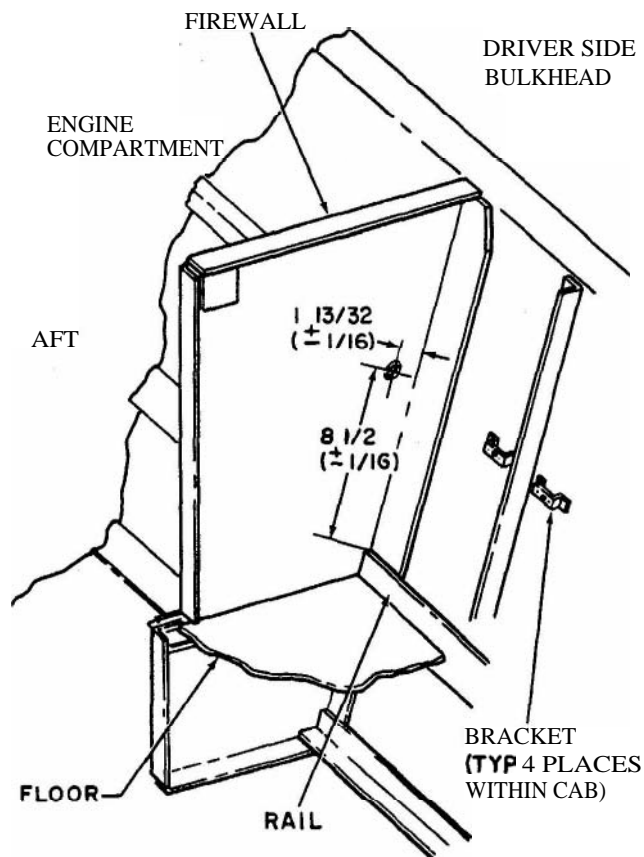


Figure 3-11. Receptacle cover plate, removal

- e. Locate and mark *a* point on engine compartment firewall $8\frac{1}{2}$ inches from the top angle of rail and $1-13/32$ inches inboard from the driver side panel (fig 3-12). Cut a 1 inch diameter hole. Remove all burrs.



NOTE: ALL DIMENSIONS ARE IN INCHES.

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Figure 3-12. Hole pattern, slave cable kit.

f. Insert cables in cowl opening and secure receptacle (fig 3-10) to cowl using three screws, nuts, and washers. Position fourth screw through receptacle and cowl and connect negative cable to 'screw. Secure cable with nut and washer.

g. Install grommet (fig 3-9) in hole drilled in firewall. Guide positive cable along the driver side panel *and* through grommet. Secure cable to the four brackets with clamps and **screws**.

h. Remove cover from terminal **board** and attach positive cable to terminal strip with existing hardware; replace cover.

i. Fasten cable to driver side panel in the engine compartment using two existing clamp fasteners securing branched harness assembly.

j. Reconnect positive battery lead.

k. Using a suitable meter, check for 24 vdc a **cross** positive and negative pins of receptacle.

l. Replace driver's seat (refer to para 2-221).

m. Close and secure engine cover (refer to TM 9-2320-242-10).

3-20. Service

Upon receipt of the vehicle, perform voltage output test specified in paragraph 3-19 k. above. Perform the preventive-maintenance *services* specified in paragraph 3-21.

3-21. Preventive Maintenance

a. Check receptacle assembly attaching hardware for security.

b. Check receptacle for accumulations of dirt and corrosion.

c. Check cable leads at receptacle for proper attachment.

d. Inspect cable lead terminals for corrosion and security.

e. Inspect cable leads for cracks *in insulation*.

3-22. Troubleshooting

Ensure that the preventive-maintenance checks of paragraph 3-21 have been performed and refer to troubleshooting table 3-2.

Table 3-2. Troubleshooting - Slave Cable Kit

Malfunction	Probable causes	Corrective action
Power not transferred from an external source to the vehicle or from the vehicle to external equipment.	<p>a. Cable disconnected.</p> <p>b. Corroded cable terminals.</p> <p>c. <i>Defective</i> cable or receptacle assembly.</p> <p>d. Defective receptacle assembly.</p>	<p>a. Reconnect cable.</p> <p>b. Disconnect cable terminals, clean and replace.</p> <p>c. Replace <i>receptacle assembly</i> (para 3-23).</p> <p>d. Replace receptacle assembly (part 3-23).</p>

3-23. Slave Cable Assembly

a. Removal.

(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Disconnect positive battery lead at battery on driver side of vehicle.

(3) Remove cover from terminal strip (fig 3-9)

in engine compartment and remove cable from positive terminal strip. Replace hardware and install cover.

(4) Remove cable from branched harness clamps in engine compartment. Secure branched harness assembly with clamps.

(5) Disconnect cable from driver side panel by removing clamps and screws. Pull cable out of engine compartment through grommet.

(6) Disconnect receptacle (fig 3-10) from cowl by removing screws at top of cowl and washers and nuts at bottom. Remove cable assembly from cowl.

(7) If vehicle is to be returned to original configuration, cover hole in cowl with cover plate

(11594763) (fig 3-11), four screws (MS90726-5), four washers (MS27183-11), and four nuts (MS51968-31. Connect positive battery cable.

Note: If receptacle assembly is to be replaced, do not connect positive battery cable until after replacement.

b. *Installation.* Install the receptacle assembly and cables as described in paragraph 3-19, 1. through m. above.

Section IV. MORTAR KIT, 4.2 INCH

3-24. General

The mortar kit, 4.2 inch, (fig 3-13) is installed in the carrier of the M561 cargo truck to provide necessary stowage and transport facilities for the 4.2 inch mortar, mortar mount, and 24 rounds of ammunition. The kit consists of a frame assembly, two ammunition rack assemblies, and brackets required to mount them. The mortar mount consists of a rotator bridge, standard, and base plate assemblies. Two straps and footman loops are also included in this kit for installing a sighting equipment chest.

a. *Frame Assembly.* The frame assembly is secured to the floor of the carrier of the M561 cargo truck by means of brackets secured through adapters substituted for the cargo tie-downs at the lower part of the carrier seats (fig 3-14). The frame serves as a rigid storage facility for the mortar, the mortar mount assembly, and base plate. Overcenter type clamps are provided on the frame to secure the base plate, mortar tube, and standard assembly during travel. Two quick disconnect pins secure the bridge assembly of the mortar mount to the frame.

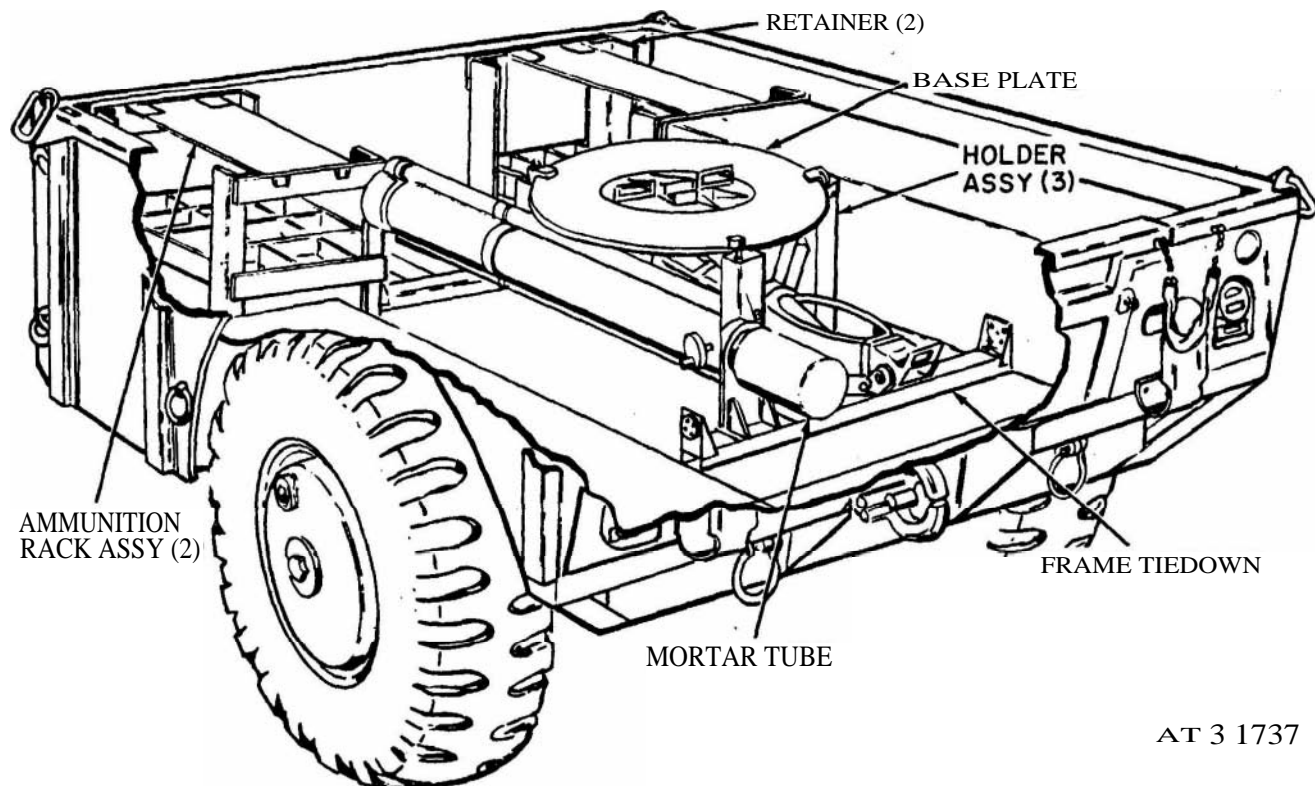


Figure 3-13. Mortar kit, 4.2 inch, installation.

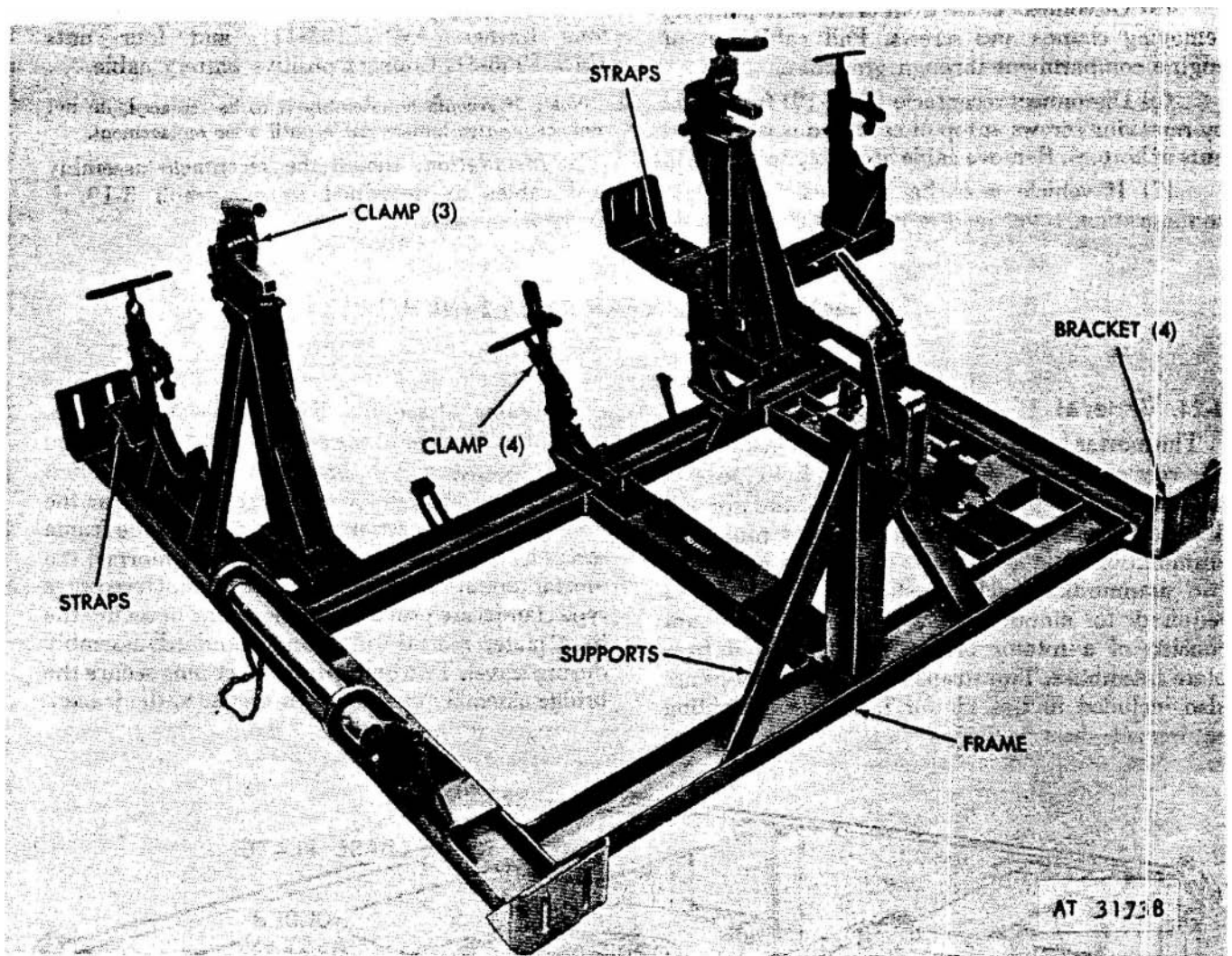


Figure 3-14. Frame assembly, mortar kit, 4.2 inch.

b. Ammunition Rack Assembly. The kit is provided with two ammunition rack assemblies, each capable of storing 12 rounds of ammunition for the mortar, 4.2 inch (fig 3-15). The rack

assemblies are secured by means of brackets and adapters used in place of the cargo tie-downs at the forward bulkheads of the carrier.

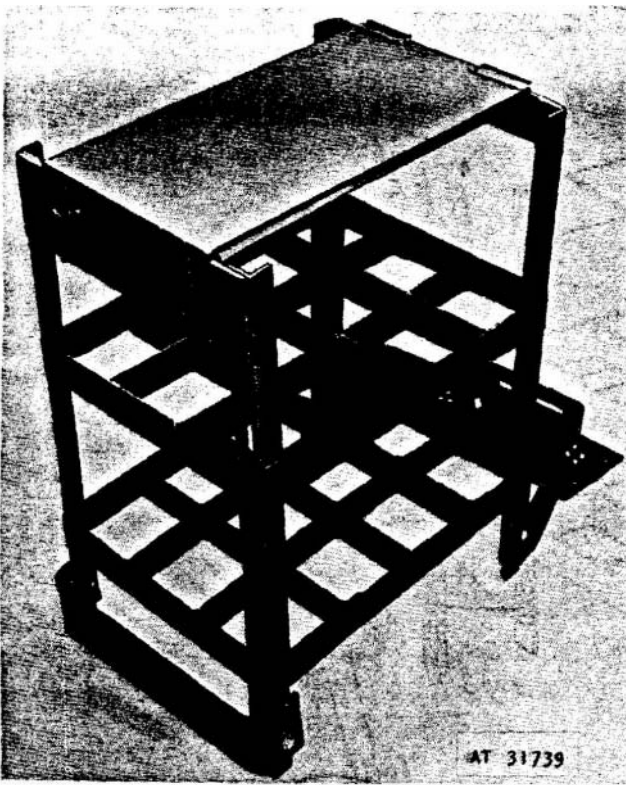


Figure 3-15. Ammunition rack assembly, mortar kit. 4.2 inch.

3-25. Tabulated Data

Ammunition rack assembly	24 rounds, 4.2 in.
Kit weight	108.55 lbs

3-26. Kit Installation

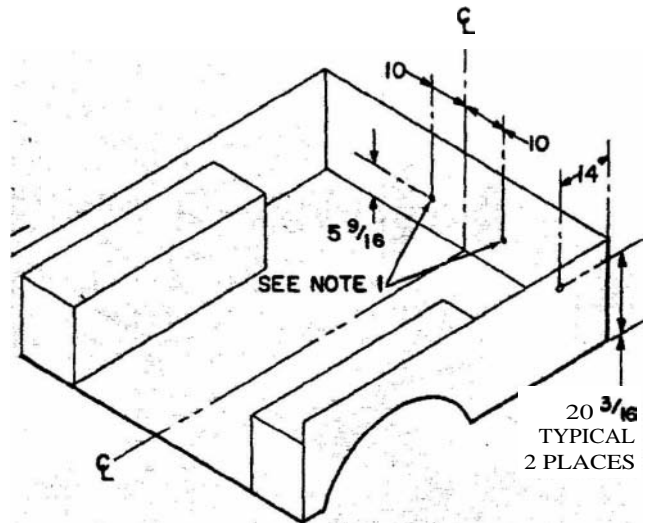
a. Preparation for Initial Installation.

- (1) Remove carrier curtains, canopy, and bows; stow in carrier (refer to TM 9-2320-242-10).
- (2) Lower carrier troop seats.
- (3) Remove cargo tie-down assemblies (refer to para 2-211). Stow in tool bag.

b. Ammunition Rack Assemblies Initial Installation.

(1) Locate and mark each side of carrier 14 inches from the front wall of the carrier and 20-3 / 16 inches from the floor of the carrier as shown in figure 3-16. Drill one hole, using a 3 / 8 inch drill bit, at each location.

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.



NOTES:

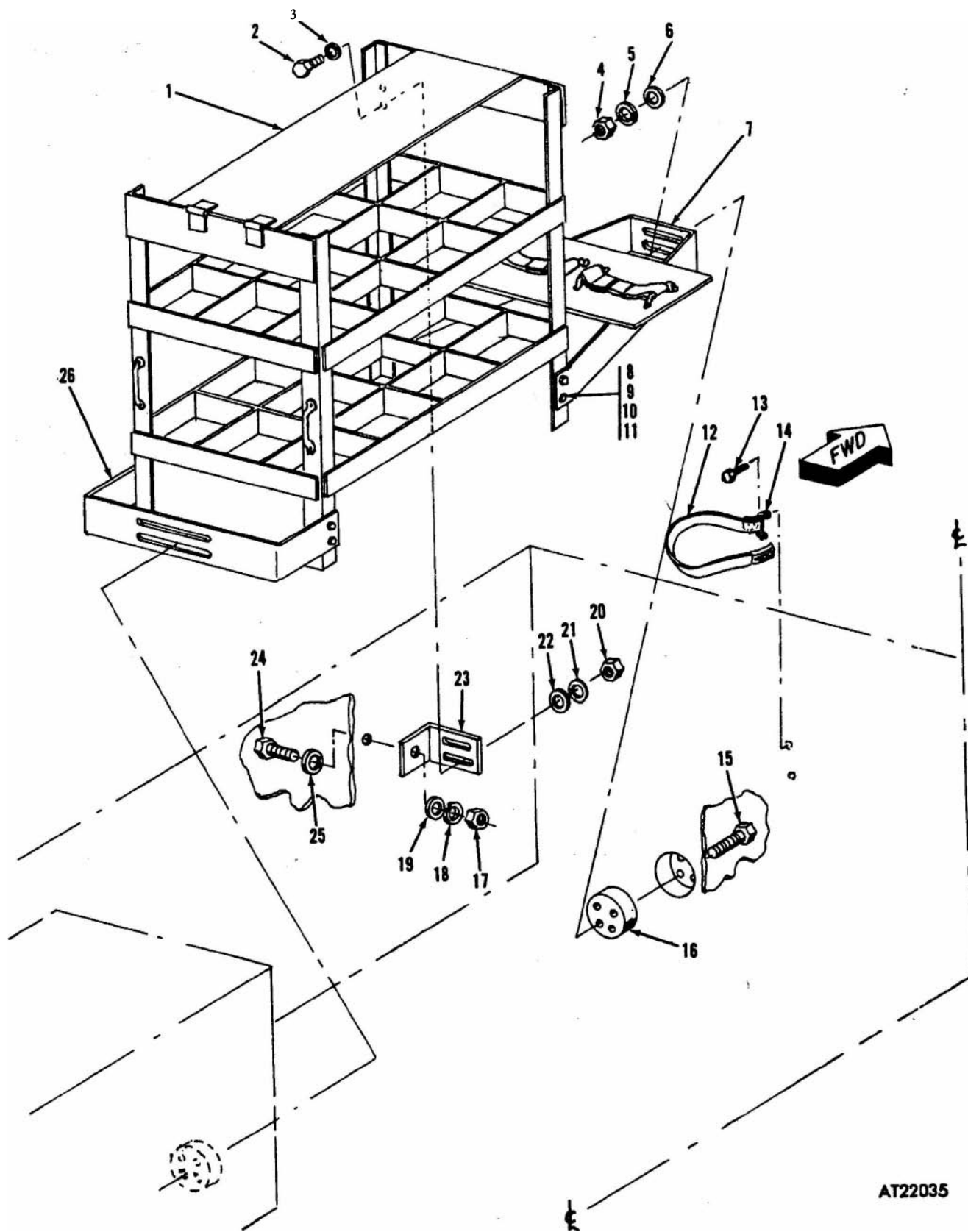
I. AFTER DRILLING BOTTOM HOLE POSITION FOOTMAN LOOP IN PROPER POSITION AND DRILL UPPER HOLE.

2. ALL DIMENSIONS ARE IN INCHES

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Figure 3-16. Carrier hole drilling pattern for ammunition rack, mortar 4.2 inch.

(2) Connect brackets (23, fig 3-17) to carrier and secure with screws (24), washers (19 and 25), lockwashers (18), and nuts (17).



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Figure 3-17. Ammunition rack, mortar, 4.2 inch, installation

LEGEND to fig 3-17:

- | | |
|---------------------------------|------------------|
| 1 - Rack (ammunition) | 15 - Screw |
| 2 - Screw | 16 - Adapter |
| 3 - washer | 17 - Nut |
| 4 - Nut | 18 - Lock washer |
| 5 - Lock washer | 19 - Washer |
| 6 - Washer | 20 - Nut |
| 7 - Bracket | 21 - Lock washer |
| 8 - Screw | 22 - Washer |
| 9 - Nut | 23 - Bracket |
| 10 - Washer | 24 - Screw |
| 11 - Lock washer | 25 - Washer |
| 12 - Strap (sighting equipment) | 26 - Bracket |
| 14 - Footman loop | |

(3) Connect brackets (7 and 26) to rack (1) and secure with screws (8), washers (10), lock washers (11), and nuts (9).

(4) Position adapters (16) in cargo tie-down positions and install racks (1).

(5) Secure rack to bulkheads with screws (15), washers (6), lock washers (5), and nuts (4). Secure racks to bracket (23) and secure with screws (2), washers (3 and 22), lock washers (21), and nuts (20).

c. Sighting Equipment Chest Securing Straps Installation.

(1) Locate and mark forward carrier panel 5-9 / 16 inches from carrier floor and 10 inches from carrier centerline (fig 3-16).

(2) Drill a hole, using a number 17 size drill, in forward carrier panel.

(3) Position lower hole of footman loop over drilled hole. Mark panel and drill another hole, using a number 17 size drill.

(4) Repeat (1) through (3) above for opposite side of carrier.

(5) Position straps (12, fig 3-17) on footman loops (14) and secure footman loops to bulkhead with screws (13).

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.

d. Frame Assembly, Initial Installation.

(1) Connect brackets (20, fig 3-18) to frame assembly (15) and secure with screws (14), washers (3 and 18), lock washers (17), and nuts (16).

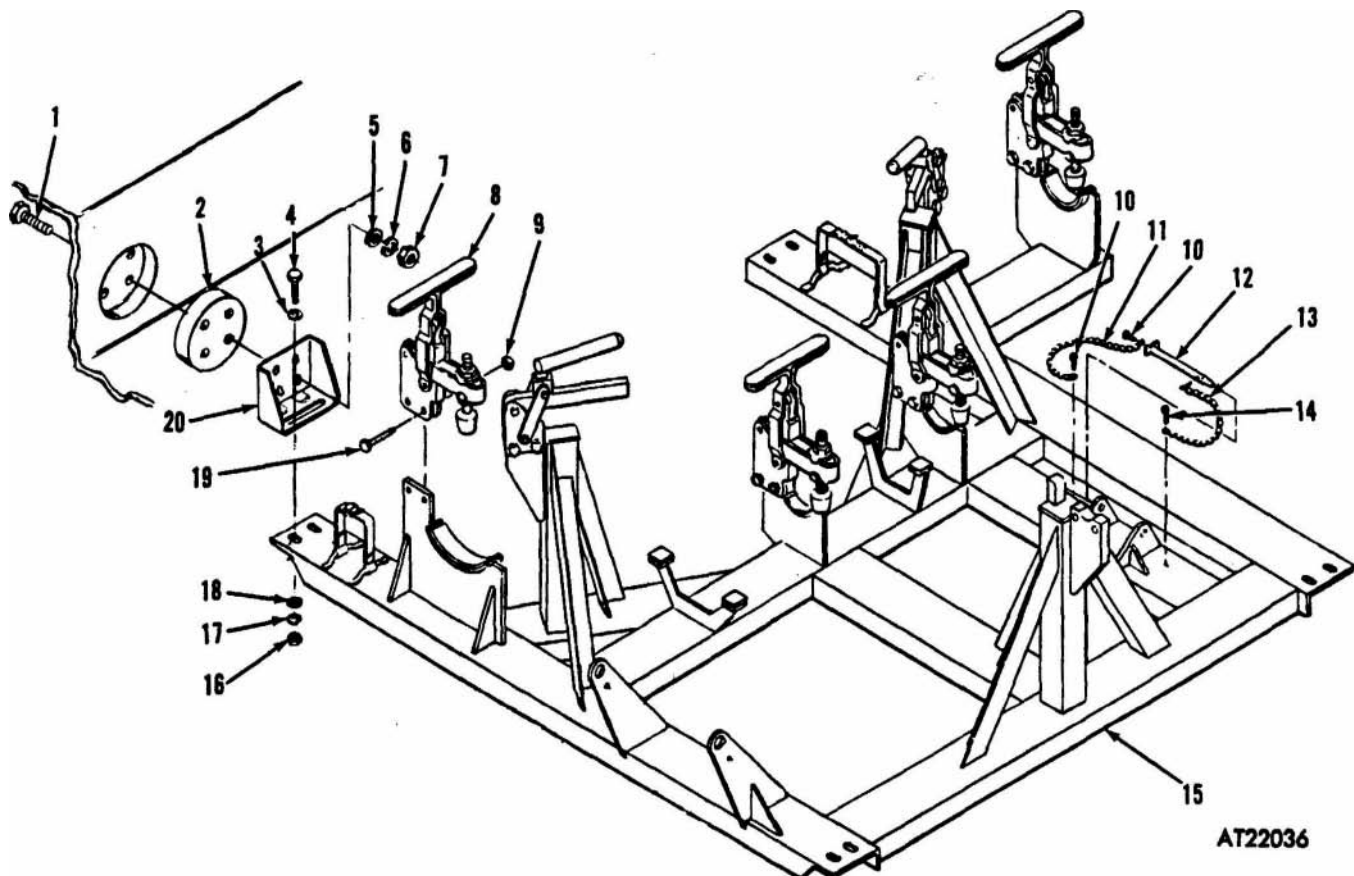


Figure 3-18. Frame assembly, installation.

LEGEND to fig 3-18:

- | | |
|-----------------|-----------------------------|
| 1 - Screw | 11 - Chain |
| 2 - Adapter | 12 - Pin |
| 3 - Washer | 13 - Pin and chain assembly |
| 4 - Screw | 14 - Screw |
| 5 - Washer | 15 - Frame assembly |
| 6 - Lock washer | 16 - Nut |
| 7 - Nut | 17 - Lock washer |
| 8 - Clamp | 18 - Washer |
| 9 - Nut | 19 - Screw |
| 10 - Screw | 20 - Bracket |

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.

(2) Connect clamps (8) to frame assembly (15) and secure with screws (19) and *nuts* (9).

(3) Connect pin and chain assembly (13) to frame assembly (15) and secure with screws (14).

(4) Secure chain (11) to pin (12) and frame assembly (15) with screws (10).

(5) Position adapters (2) in- cargo tie-down positions and install frame assembly (15).

(6) Secure frame assembly (15) to carrier with screws (1), washers (5), lock washers (6), and nuts (7).

3-27. Mortar and Mount

Install the mortar and accessory items in accordance with recommended **Ordnance** Department instructions.

3-28. Services - Vehicles Equipped with Mortar Kits, 4.2 Inch

Upon receipt of vehicle, inspect mortar and accessory items in accordance with pertinent **Ordnance** Department instruction. Perform preventive-maintenance services on frame assembly and ammunition rack assembly as specified in paragraph 3-29.

3-29. Preventive Maintenance

- a. Check for bent or broken components.
- b. Check all bolts and nuts for proper alignment and security.
- c. Check tie-down assemblies for security.
- d. Check quick-release pins for proper operation and security.
- e. Check operation and security of **holder** assemblies and screw assembly.
- f. Inspect straps for condition and security.
- g. Check for overall cleanness and corrosion.

3-30. Troubleshooting

Refer to troubleshooting table 3-3.

Table 3-3. Troubleshooting - 4.2 Inch Mortar **Kit**

Malfunction	Probable causes	Corrective action
1. Mortar components or accessories loose.	<ol style="list-style-type: none"> a. Defective holders, holder assemblies, screw assemblies or rod assemblies. b. Bent components. c. Broken components. 	<ol style="list-style-type: none"> a. Tighten or replace holder assemblies. b. Reform to original position or replace frame or rack assemblies (para 3-31, 3-33). c. Replace frame or rack assemblies (para 3-31, 3-33).
2. Mortar rounds will not <i>fit in</i> rack assembly.	Bent or distorted rack assembly.	Replace rack assembly (para 3-31).

3-31. Ammunition Rack Assemblies, Replacement

a. Removal.

(1) Disconnect rack assembly (1, fig 3-17) from brackets (23) by removing screws (2), washers (3, and 22), lock washers (21), and nuts (20).

(2) Disconnect rack assembly from bulkhead by removing screws (15), washers (6), lock washers (5), and nuts (4).

(3) Remove rack assembly (1) and adapters (16) from carrier.

b. Installation.

(1) Position adapters (16, fig 3-17) in cargo tie-down positions and install racks (1).

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.

(2) Position rack assembly in carrier secure to bulkhead with screws (15), washers (6), lock washers (5), and nuts (4).

(3) Secure rack assembly to brackets (23) with screws (2), washers (3 and 22), lock washers (21), and nuts (20).

3-32. Sighting Equipment Chest Securing Straps, Replacement

a. Removal.

Disconnect footman loops (14, fig 3-17) by

removing screws (13). Slide strap (12) off footman loops (14).

b. Installation.

Slide strap (12, fig 3-17) on footman loops (14) and secure footman loops (14) to bulkhead with screws (13).

3-33. Frame Assembly, Replacement

a. Removal.

Disconnect frame assembly (15, fig 3-18) by removing screws (1), washers (5), lock washers (6), and nut (7). Remove frame assembly (15), and adapters (2) from carrier.

b. Installation.

Position adapters (2, fig 3-18) in cargo tie-down positions and install frame assembly (15). Secure frame assembly (15) with screws (1), washers (5), lock washers (6), and nut (7).

3-34. Returning Vehicle to Original Configuration

a. Remove ammunition rack (refer to pars 3-31 a).

b. Remove sighting equipment chest securing straps (refer to para 3-32 a).

c. Remove frame assembly (refer to para 3-33 a).

d. Disconnect bracket (23, fig 3-17) from carrier by removing screws (24), washers (25 and 19), lock washers (18), and nuts (17).

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.

e. Apply waterproof sealant to screws (15) and install screws in bulkhead.

f. Install cargo tie-downs (refer to para 2-211).

g. Protective finishes which have been damaged during removal of sealants or other causes shall be reapplied. Steel surfaces should be teated before painting in accordance with TT-C-490, Type III. Aluminum surfaces should be treated in accordance with MIL-P-8585 and enamel OD per specification **TT-E-529.**

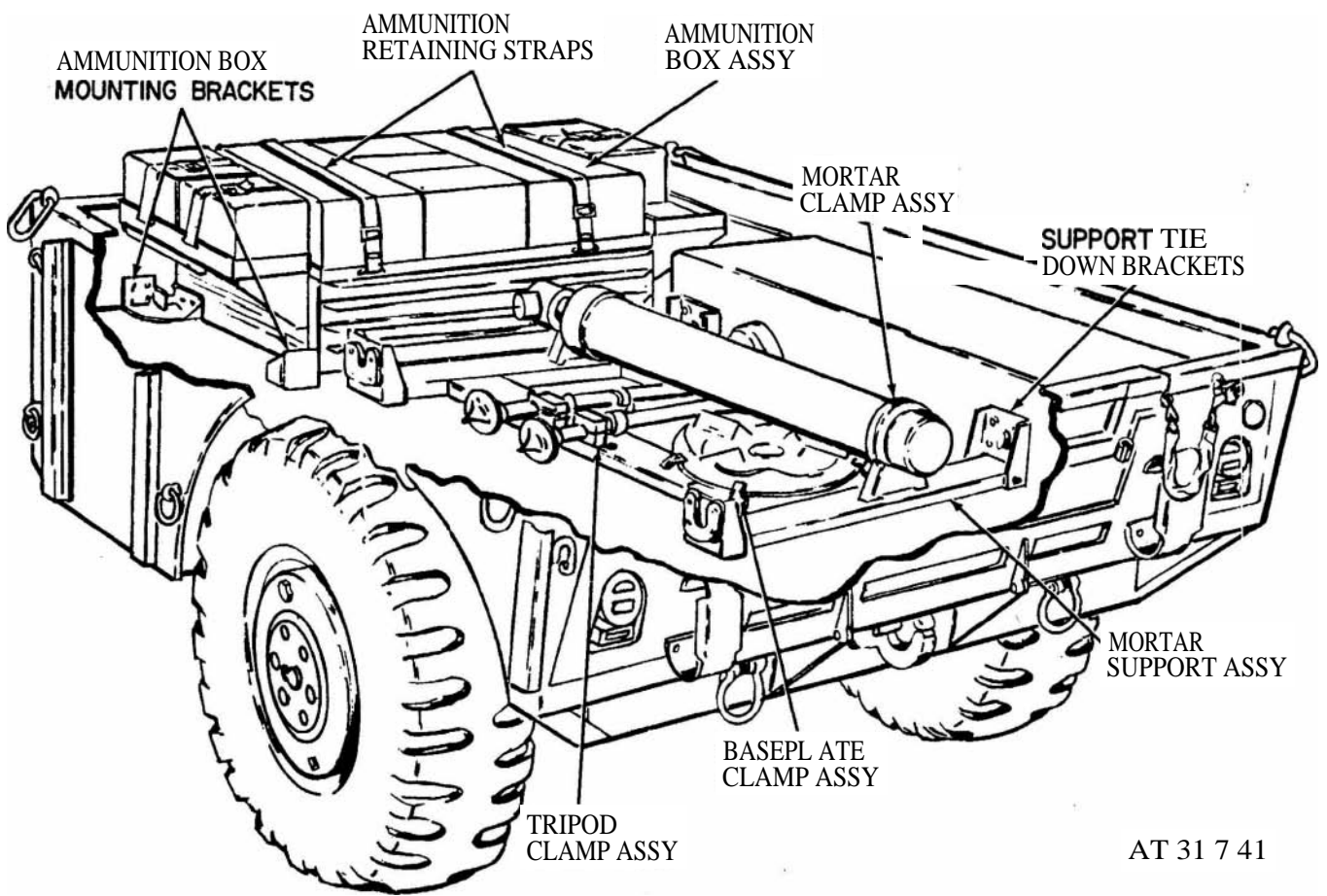
h. Install carrier canopy, curtains, and bows (refer to TM 9-2320-242-10).

Section V. MORTAR KIT, 81 MM

3-35. General

The mortar kit, 81 mm (fig 3-19) is installed in the carrier of the M561 Cargo Truck to provide stowage and transport facilities for the mortar cannon M29, mount, and base plates M23 and

M23A1, eighty mortar shells and sighting and fire control equipment. The kit consists of a frame assembly, ammunition box assembly, brackets, and attaching hardware required to secure them to the carrier.



AT 31 7 41

Figure 3-19. Mortar kit, 81 mm, *installation.*

a. *Frame Assembly.* The frame assembly (fig 3-20) is secured to the floor of the carrier of the M561 Cargo Truck by means of brackets secured through

adapters substituted for the cargo tie-downs at the lower part of the carrier seats. The frame assembly serves as a rigid support for the mortar components.

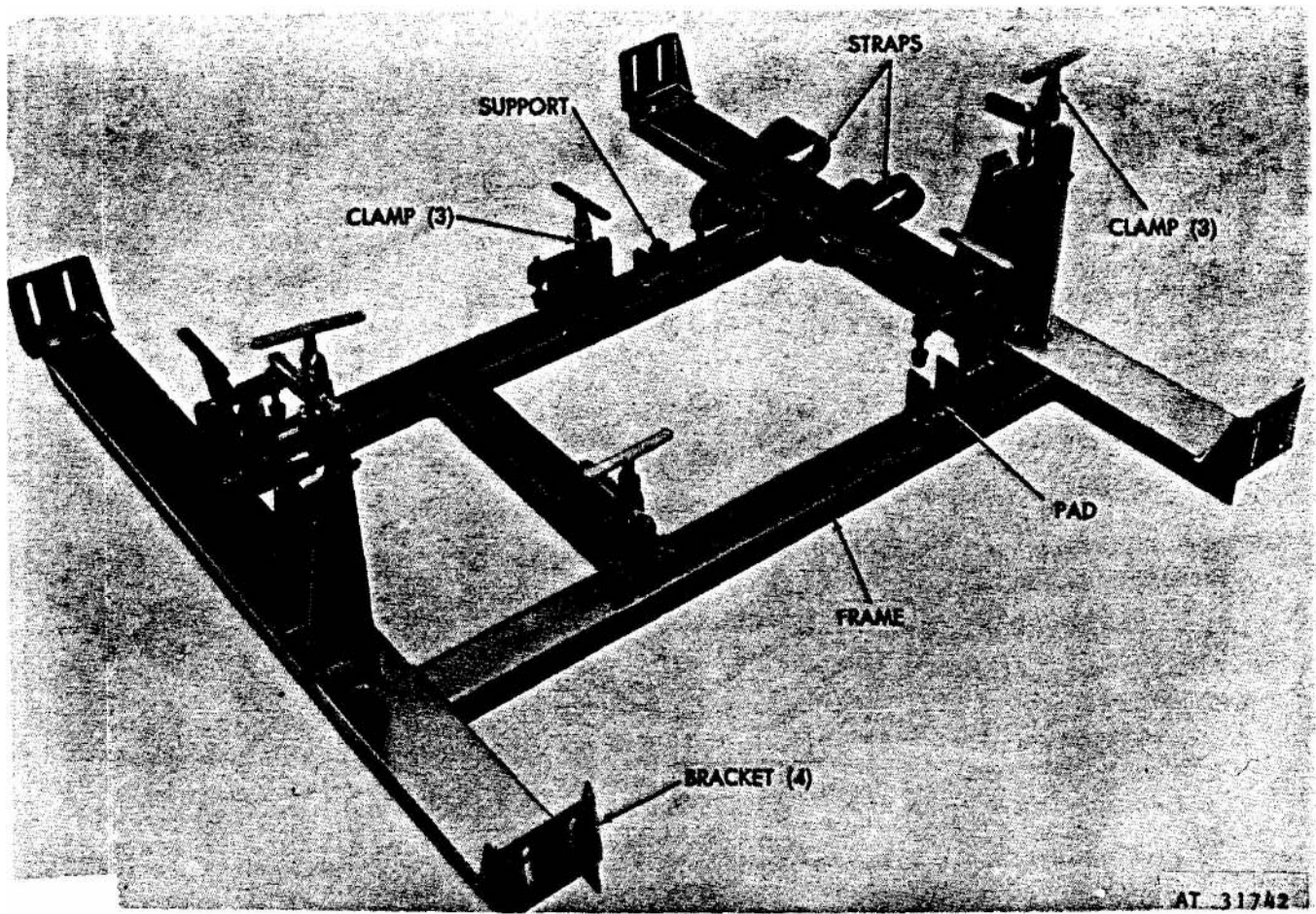


Figure 3-20. Frame assembly, mortar kit, 81 mm.

b. Ammunition Box Assembly. The ammunition box assembly (fig 3-21) is mounted by means of brackets to the carrier forward bulkhead and seat

panels and serves as a storage container for 80 rounds of ammunition for the mortar, 81 mm.

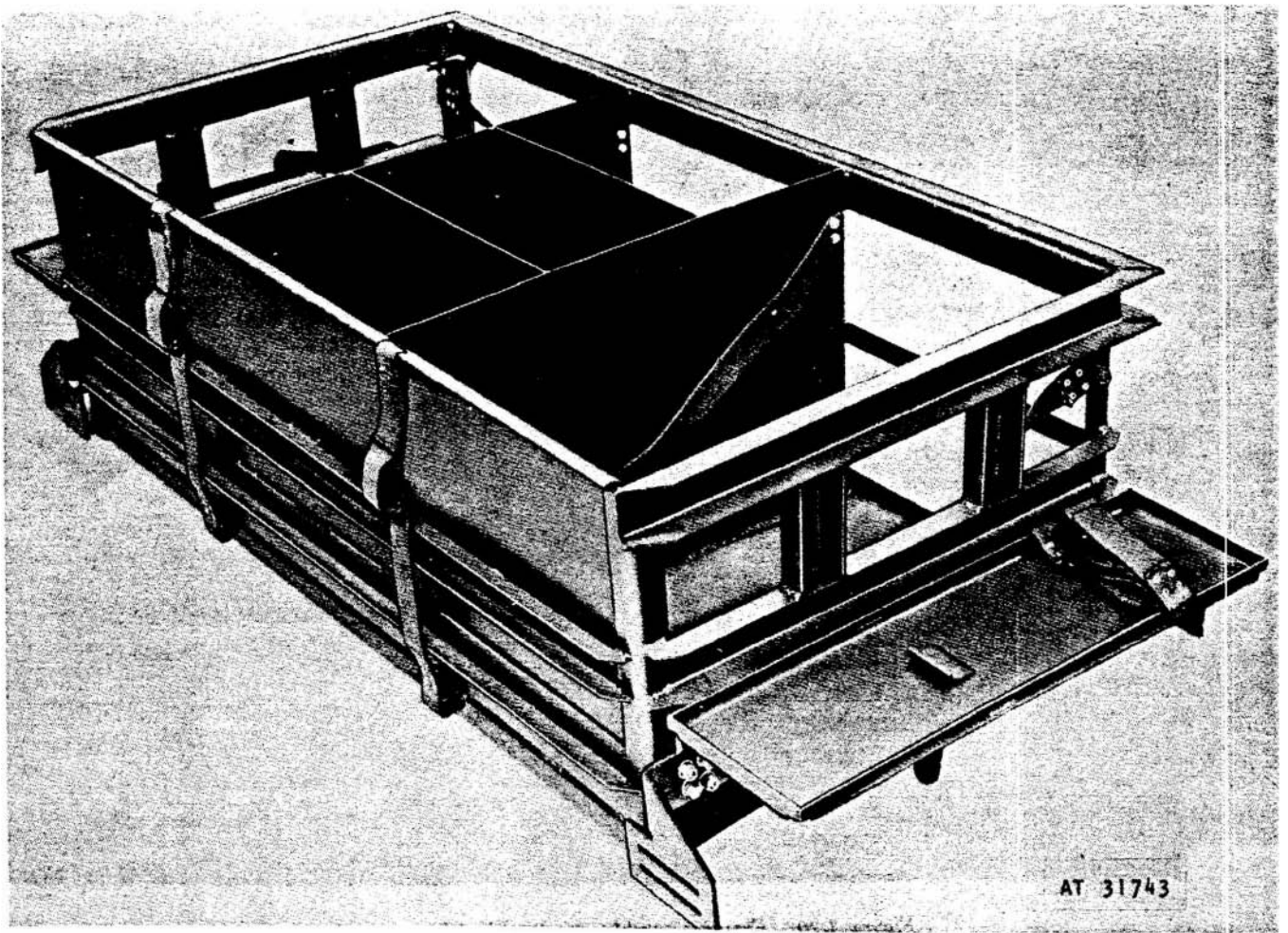


Figure 3-21. Ammunition box assembly mortar kit, 81 mm.

3-36. Tabulated Data

Kit weight 76.62 lbs.
 Ammunition box capacity 80 rounds

3-37. Kit Installation

a. Preparation for Initial Installation.

(1) Remove carrier canopy, curtains, and bows (refer to TM 9-2320-242-10).

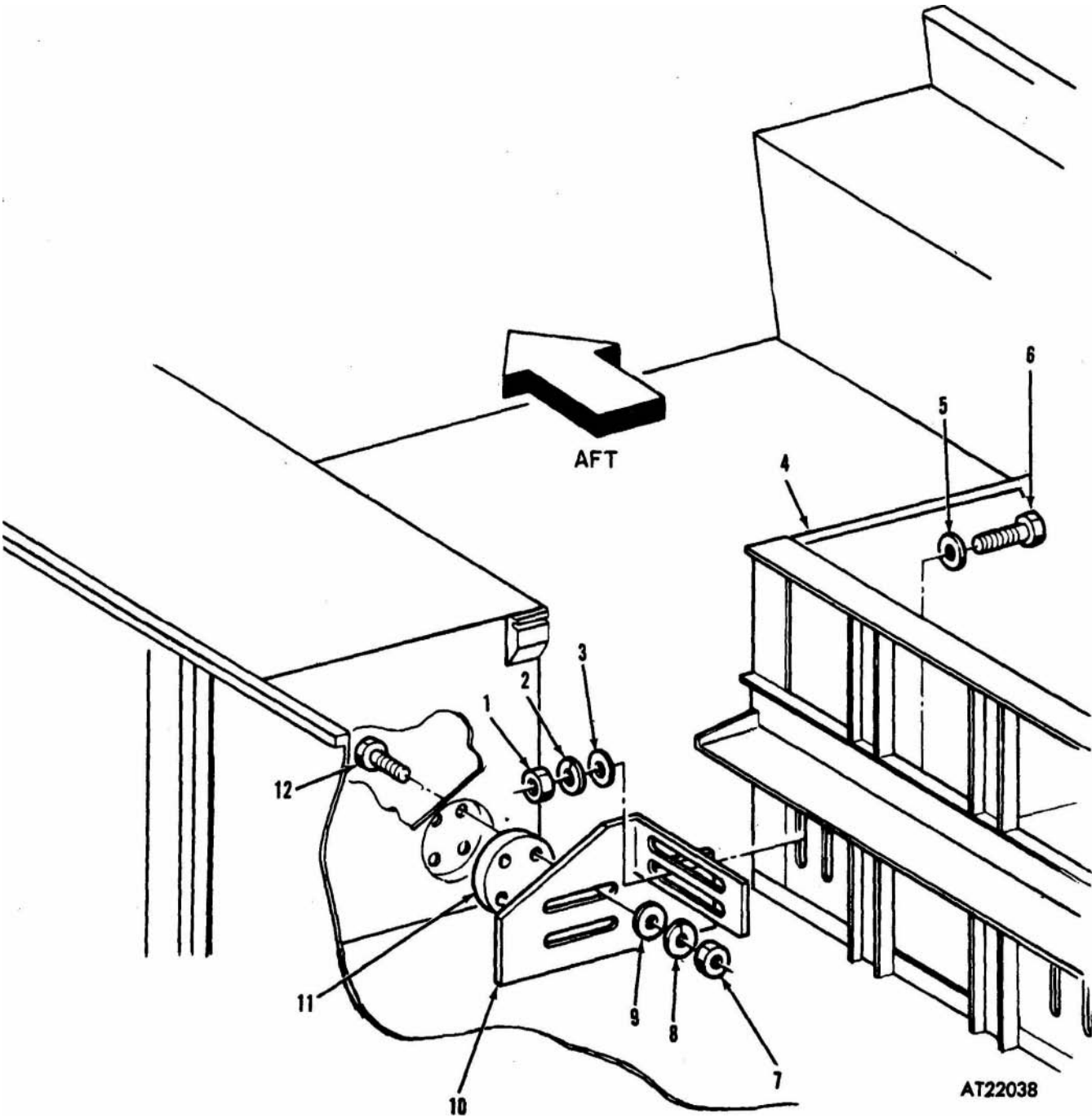
(2) Remove cargo tie-down assemblies (refer to para 2-211). Stow in tool bag.

(3) Unlatch carrier troop seats.

b. Ammunition Box Assembly, Installation.

(1) Connect brackets (10, fig 3-22) to ammunition box (4) and secure with screws (6), washers (3 and 5), lock washers (2), and nuts (1). Do not tighten screws.

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to MI hardware passing through hull.



- | | | | |
|-----------------|--------------------|-----------------|--------------|
| 1 - Nut | 4 - Ammunition box | 7 - Nut | 10 - Bracket |
| 2 - Lock washer | 5 - Washer | 8 - Lock washer | 11 - Adapter |
| 3 - Washer | 6 - Screw | 9 - Washer | 12 - Screw |

Figure 3-22. Ammunition box assembly, installation.

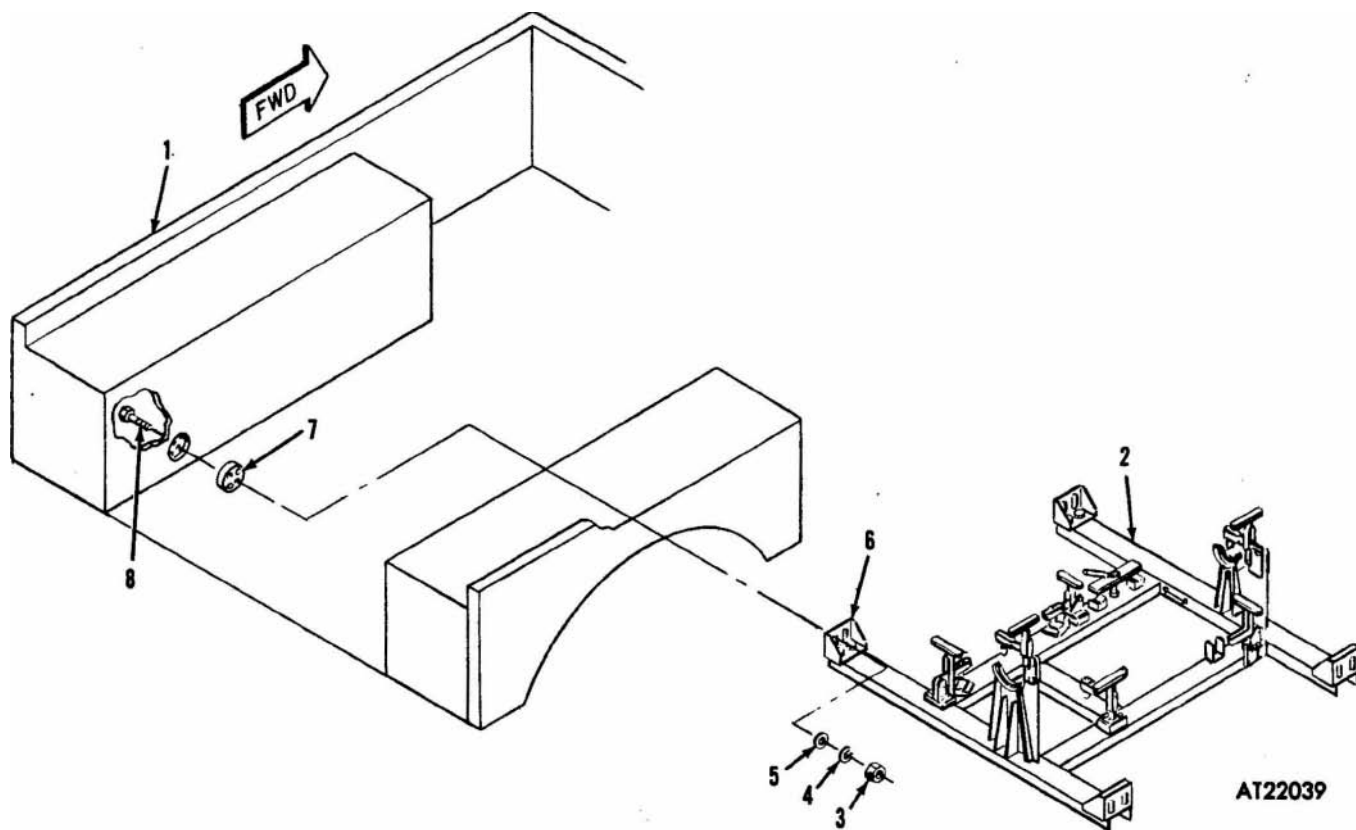
(2) Position adapters (11) in tie-down position and install ammunition box in carrier. Secure with screws (12), washers (9), lock washers (8), and nuts (7). Tighten screws (6).

c. *Frame Assembly, Installation.* Position adapter (7, fig 3-23) in tie-down positions and install **frame** in carrier. Secure frame (2) with

screws (8), washers (5), **lockwashers** (4), and nuts (3).

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant conforming to Military Specification MIL-S-34180, Type II to all hardware passing through hull.

Note: It may be necessary to loosen brackets (6) for proper alignment.



1 - Carrier
2 - Frame assembly

3 - Nut
4 - Lock washer

5 - Washer
6 - Bracket

7 - Adapter
8 - Screw

Figure 3-23. Frame assembly, installation.

3-38. 81 MM Mortar and Mount

Install the mortar, mount, and accessory items in accordance with recommended Ordnance Department instruction.

3-39. Services - Vehicles Equipped with 81 MM Mortar Kits

Upon receipt of vehicle, inspect the mortar and accessory items in accordance with the pertinent Ordnance Department instruction. Perform preventive-maintenance services on the ammunition box assembly and the base frame assembly as specified in paragraph 3-40.

3-40. Preventive Maintenance

- a. Check all bolts and nuts for alignment and security.
- b. Check for bent or broken components.
- c. Check tie-down assemblies for proper security.
- d. Check quick-release pins for proper operation and security.
- e. Check clamps and bracket assemblies for security.

- f. Check for overall cleanness and corrosion.

3-41. Troubleshooting

Refer to troubleshooting table 3-4.

3-42. Ammunition Box Assembly, Replacement

a. Removal.

(1) Loosen bracket (10, fig 3-22) and disconnect ammunition box (4), and adapters (11) by removing screws (12), washers (9), lock washers (8), and nuts (7).

(2) Remove ammunition box (4) from carrier.

b. Installation (Refer to para 3-37 b).

3-43. Frame Assembly, Replacement

a. Removal.

(1) Loosen hardware securing brackets 16, fig 3-23).

(2) Disconnect frame assembly (2) and adapters (7) from carrier (1) by removing screws (8), washers (5), lock washers (4), and nuts (3).

(3) Remove frame assembly (2) from carrier (1).

b. *Installation.* (Refer to para 3-37 c).

3-44. Returning Vehicle to Original Configuration

a. Remove ammunition box assembly (refer to para 3-42 a).

b. Remove frame assembly (refer to para 3-43 a).

Caution: To maintain water-tight integrity of the carrier, apply gasket sealant compound conforming to Military Specification MIL-S-45180, Type II to all hardware passing through hull.

c. Install cargo tie-downs (refer to para 2-211).

d. If the protective finish of the metal surface has been disturbed during removal, provide a new finish. Steel surfaces should be treated before painting in accordance with specification **TT-C-490**, Type III. Aluminum surfaces should be treated in accordance with Specification MIL-C-5541. Prime both types of surfaces in accordance with Specification MIL-P-8585 and enamel OD per Specification TT-E-529.

Table 3-4. Troubleshooting - Mortar **81MM**, Kit

Malfunction	Probable cause	Corrective action
1. Mortar accessories or components loose.	a. <i>Defective</i> tie-down brackets, clamps or quick release pins. b. Bent components. c. Broken components.	a. Tighten loose components or replace where required. b. Bend back to original position or replace. c. Replace components.
2. Mortar ammunition cannot be placed properly in box assembly.	Bent or distorted ammunition box assembly.	Replace ammunition box assembly.

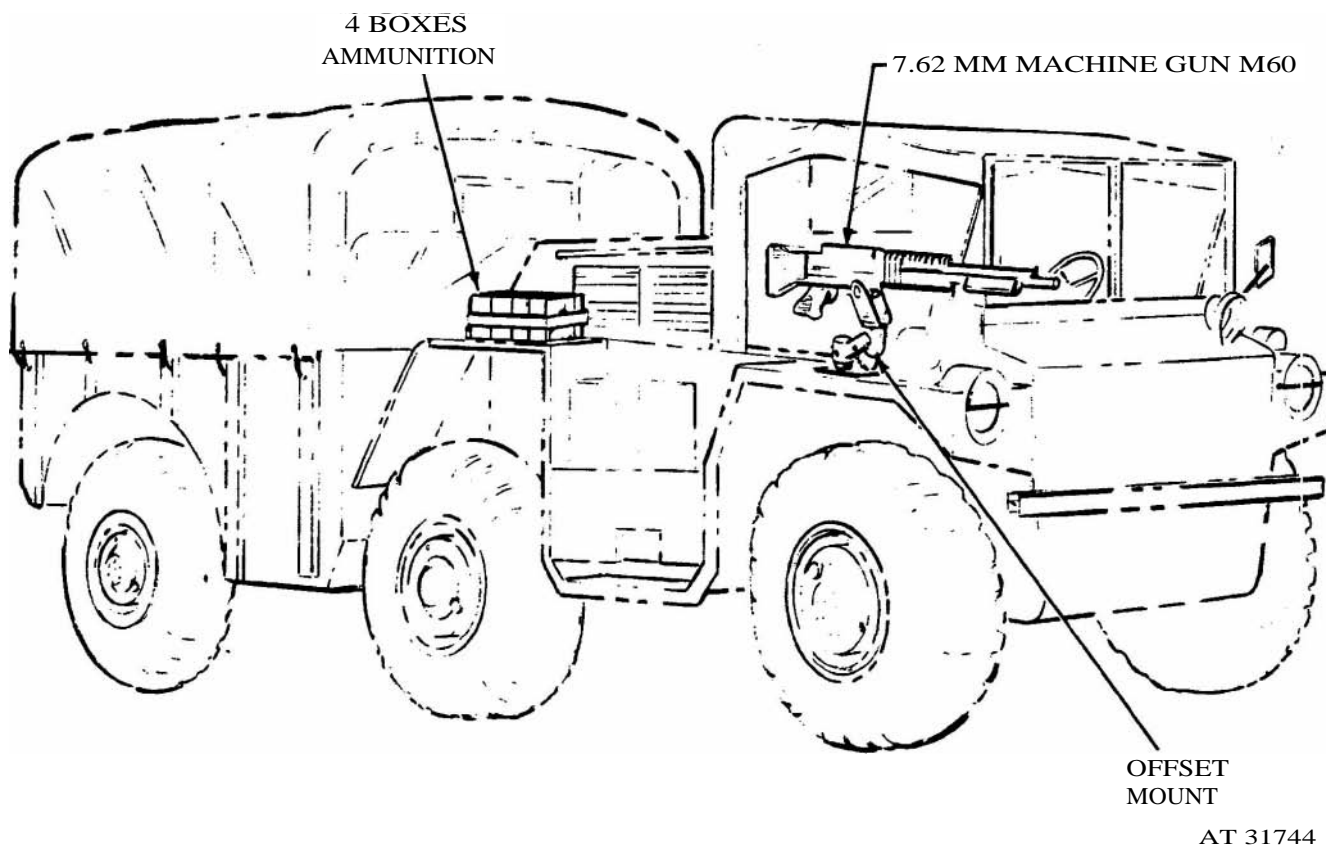
e. Install carrier canopy, curtains, and bows (refer to TM 9-2320-242-10).

Section VI. MACHINE GUN, 7.62 MM, KIT

3-45. General

The machine gun, 7.62 mm, kit (fig 3-24) provides mounting for a 7.62 mm machine gun to the right front fender of the M561 Cargo Truck. The kit consists of a gun mount assembly, an ammunition storage box rack, and two straps for

securing the spare barrel stowage bag. The *gun* mount assembly attaches to the right front fender, the ammunition storage box rack attaches to the right rear fender, and the securing straps attach to the engine compartment cover.

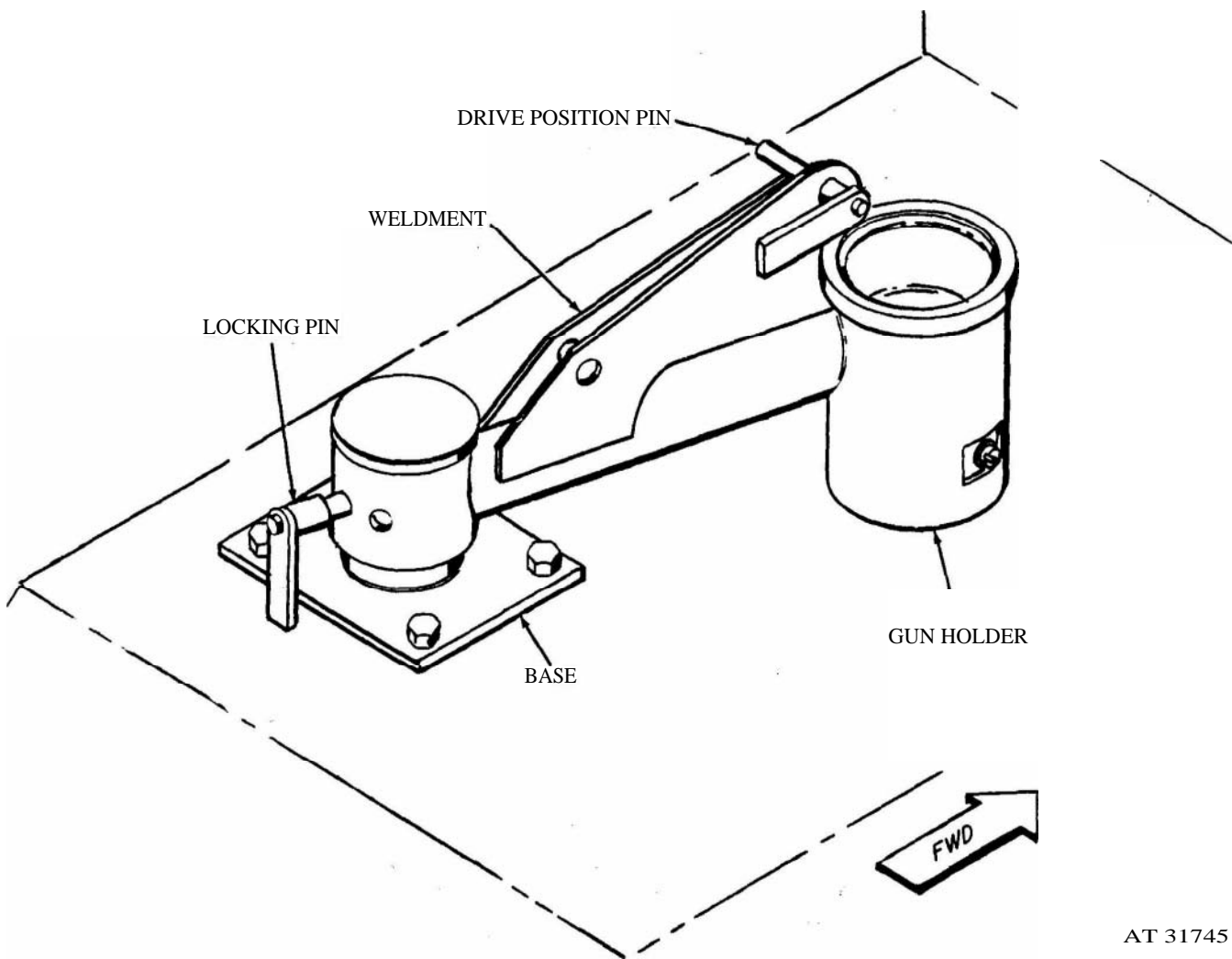


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Figure 3-24. Machine gun, 7.62 mm, kit installed

a. Gun Mount Assembly. The gun mount assembly consists of a gun mount base and a gun mount **weldment** (fig 3-25). The gun mount base is a four-by-five inch steel plate welded to a short length of steel tubing. The gun mount **weldment** comprises two short lengths of tubing which are welded to the ends of a longer length of tubing. The shorter tube slips over the tube welded to the grommet base, and the gun mount tube receives the

machine gun pivot shaft. A quick-release pin secures the mount to the base and quick-release pin secures the machine gun to the mount when the machine gun is not in use and also serves as a travel position. A stiffener plate, production-welded to the underside of the right front fender, provides reinforcement to prevent the fender from buckling from the weight of the machine gun.



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Figure 3-25. Gun mown assembly.

b. Ammunition Rack. The ammunition rack provides stowage for four ammunition storage boxes (GFE). The rack is approximately 16-5 / 16 inches long, 9 inches wide, 7-5 / 16 inches high and attaches to the right rear fender (fig 3-26). Ammunition boxes are secured to the rack with webbed straps attached to the rack and fender.



AT 3 1 7 46

Figure 3-26. Ammunition rack.

c. *Securing Straps, Spare Barrel Stowage Bag.*
 Two webbed straps secure the spare barrel stowage bag (GFE) to the engine compartment and, in turn, are secured to the cover by the four footman loops provided with the kit.

3-46. Tabulated Data

Kit weight 39 lbs.
 Height from fender of tractor to centerline of weapon (approx) 14 in

3-47. Kit Installation - Initial

a. *Gun Mount Installation.*

(1) Locate *gun mount base* around fifth bolt on right front fender as shown in figure 3-27, and drill four 11 / 32 inch diameter holes through fender and reinforcement plate.

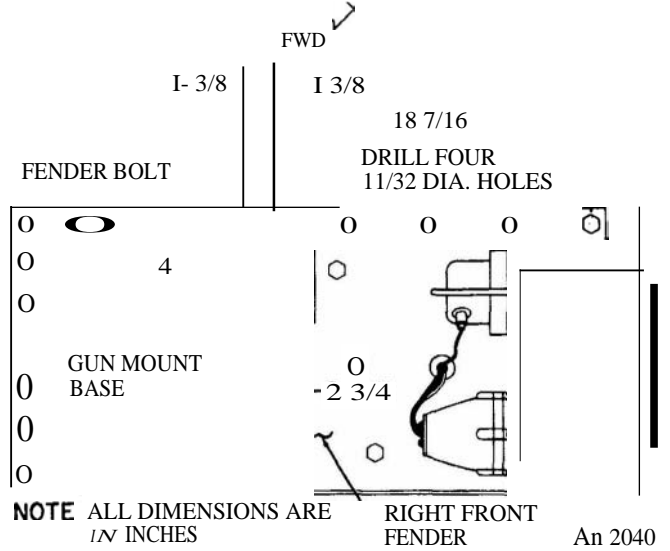
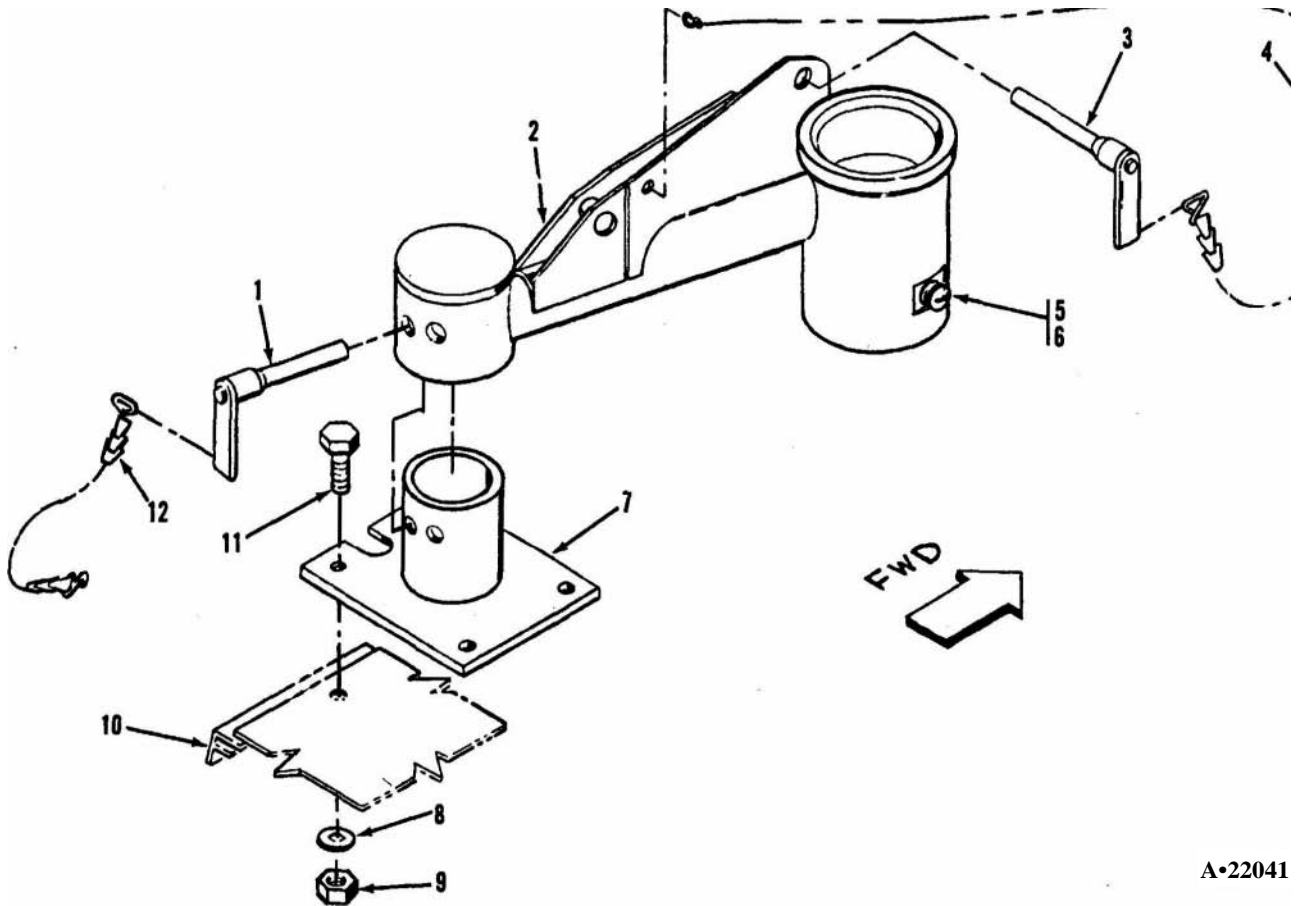


Figure 3-27. Right front fender drilling pattern.

(2) Connect base (7, fig 3-28) to right front fender (10) and secure with screws (11), washers (8), and nuts (9).



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- | | | | |
|-----------------------|------------|--------------------|-------------------------|
| 1 - Quick-release pin | 4 - Chain | 7 - Gun mount base | 10 - Right front fender |
| 2 - Gun mount | 5 - Screw | 8 - Washer | 11 - Screw |
| 3 - Quick-release pin | 6 - Washer | 9 - Nut | 12 - Chain |

Figure 3-28. Gun mount assembly, installation.

(3) Position gun mount (2) on base (7) and secure with quick-release pin (1).

(4) Connect chain (4) to gun mount (2) and insert quick-release pin (3) in mount (2).

Note: Screw (5) and washer (16) are used to secure machine gun to mount (2).

b. Ammunition Rack, Installation.

(1) Layout and mark right rear fender for hole location as shown in figure 3-29.

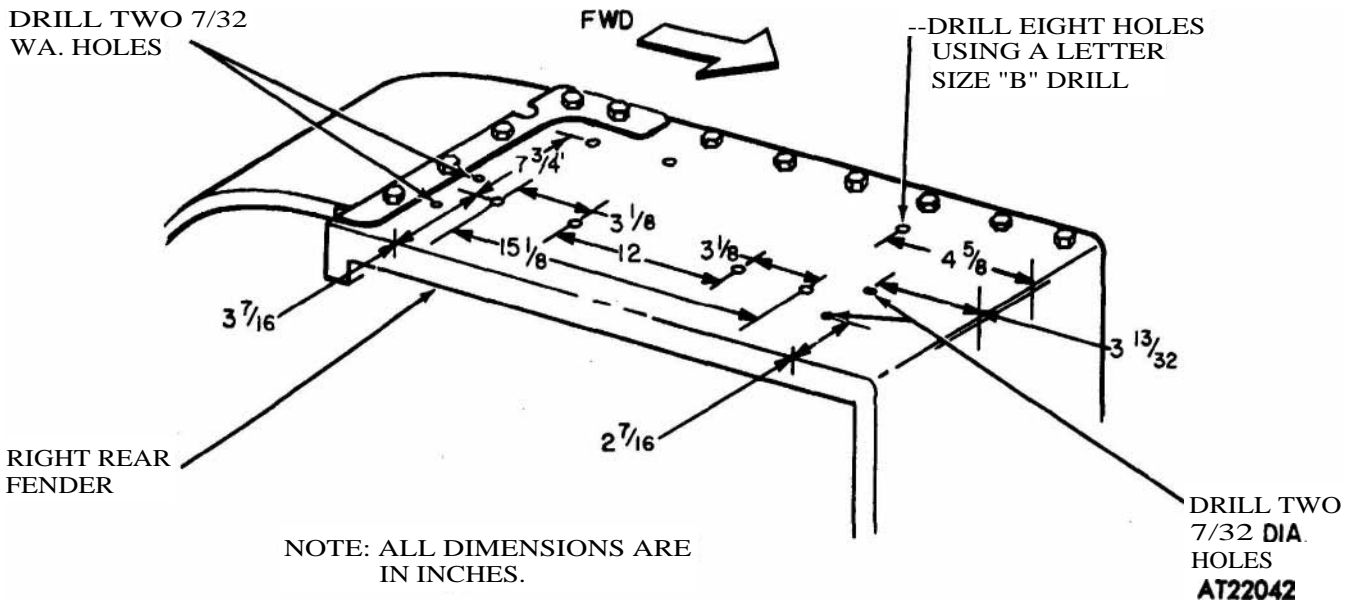


Figure 3-29. Right rear fender drilling pattern.

(2) Drill four holes 7 / 32 of an inch and eight holes, using a size B drill, as shown in figure 3-29.

right rear fender and secure with screws, washers, and nuts.

(3) Position ammunition rack (fig 3-30) on

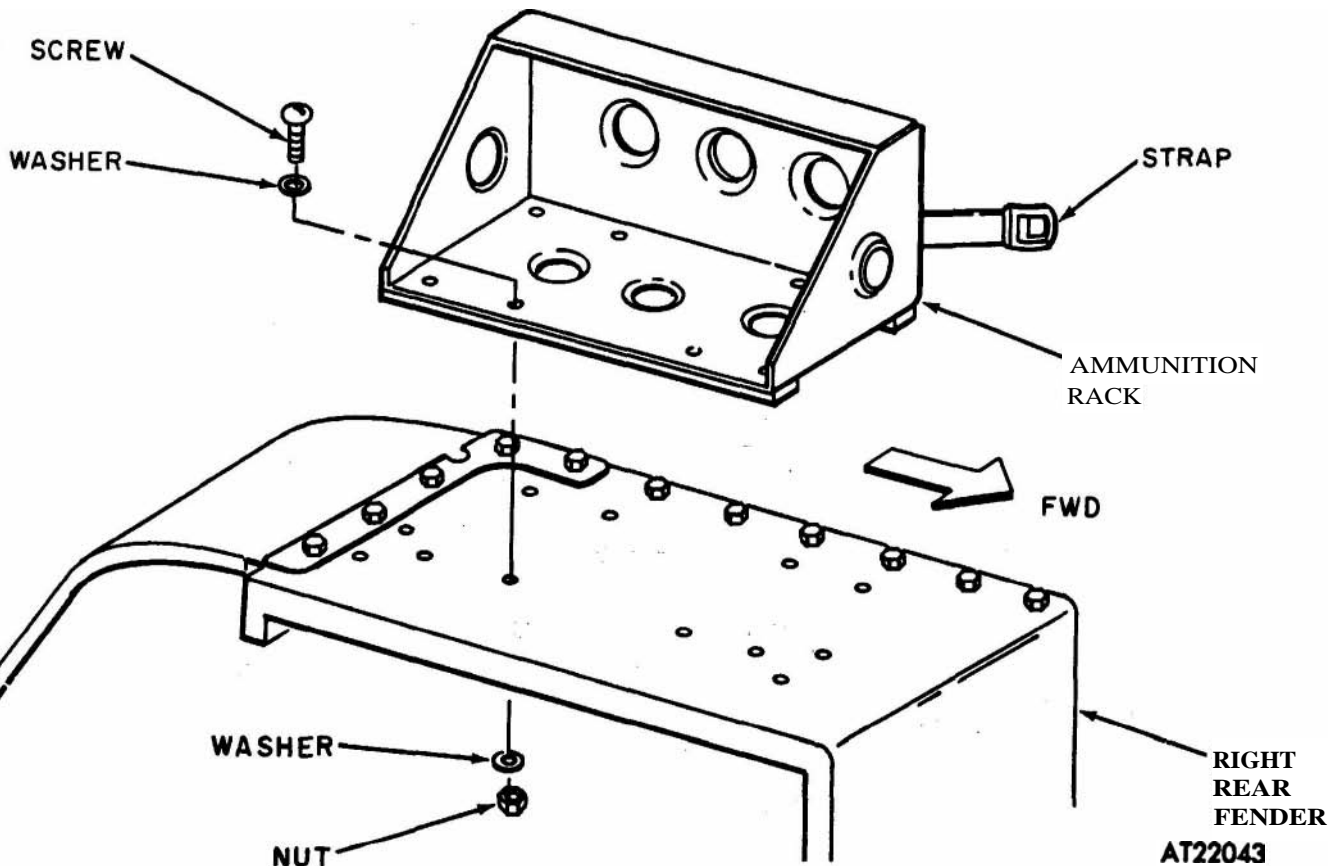


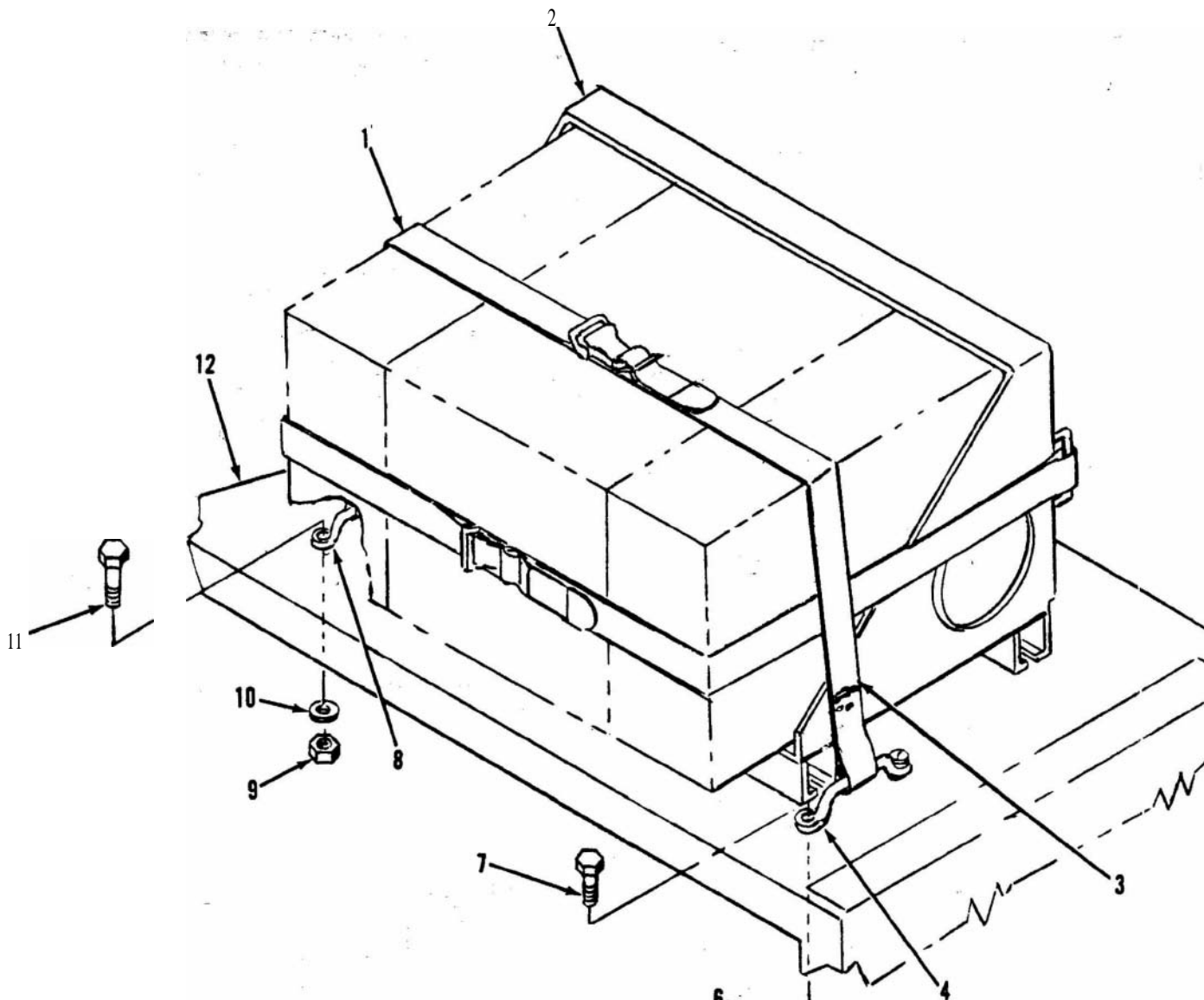
Figure 3-30. Ammunition rack, installation.

c. Ammunition Rack Securing Strap Installation.

(1) Slide strap (1, fig 3-31) on footman loop

(8) and secure footman loop to right rear fender

(12) with screws (11), washers (10), and nuts (9).



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1 - Strap
2 - Ammunition rack
3 - Strap
4 - Footman loop

5 - Nut
6 - Washer
7 - Screw
8 - Footman loop

9 - Nut
10 - Washer
11 - Screw
12 - Right rear fender

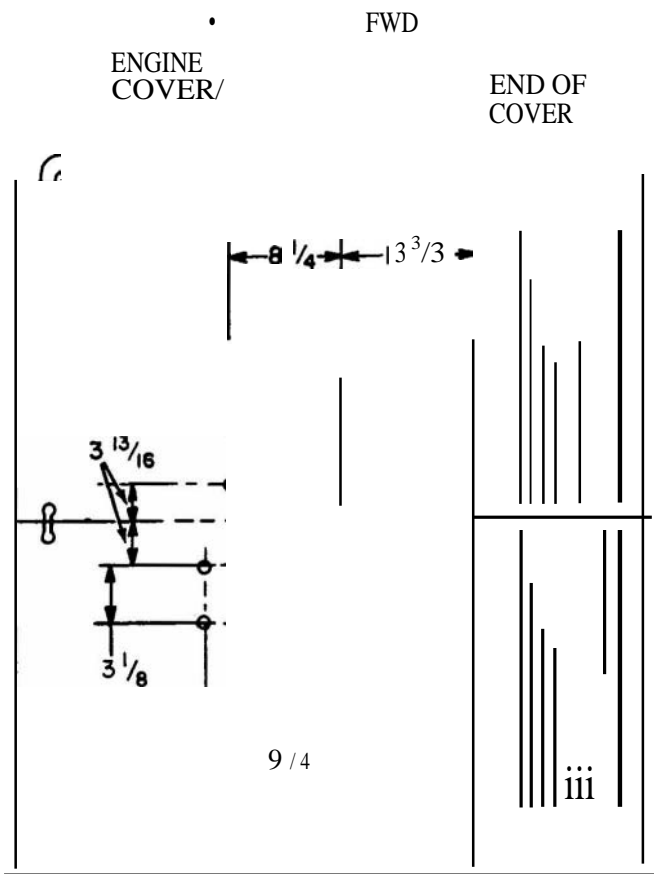
Figure 3-31. Ammunition rack securing straps, installation.

(2) Slide strap (3) on footman loop (4) and secure footman loop to right rear fender (12) with screws (7), washers (6), and nuts (5).

d. Spare Barrel Storage Bag, Installation.

(1) Disconnect windshield storage compartment from bottom of engine cover by removing five mounting screws, washers, and **nuts**.

(2) Layout and mark engine cover (fig 3-32).



NOTE:
ALL DIMENSIONS ARE
IN INCHES.

DRILL EIGHT
 $\frac{7}{32}$ DIA HOLES
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Figure 3-32. Engine cover drilling pattern.

(3) Drill eight holes $\frac{7}{32}$ of an inch.

(4) Slide straps (fig 3-33) through footman loops and secure footman loops to engine cover with screws, washers, and nuts.

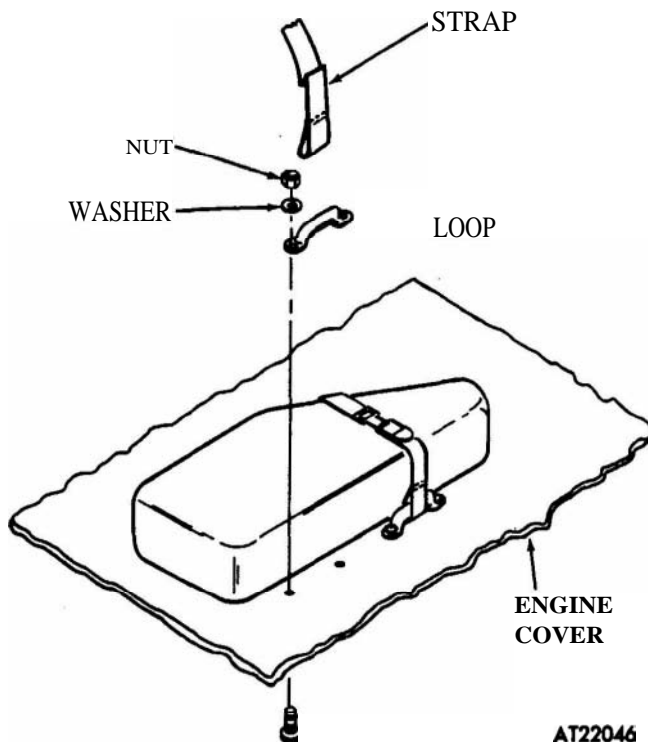


Figure 3-33. Spare barrel storage bag straps, installation.

Note: Screws are inserted from bottom of engine cover.

(5) Attach windshield storage compartment to bottom of engine cover with five mounting screws, washers, and nuts.

e. Install machine gun, 7.62 mm in gun mount assembly in accordance with pertinent Ordnance Department instruction.

3-48. Services

Upon receipt of vehicle, check machine gun and accessory items in accordance with pertinent Ordnance Department instruction. Perform preventive-maintenance services on gun mount assembly, ammunition rack, and stowage straps as specified in paragraph 3-49.

3-49. Preventive Maintenance

- Check for bent or broken components.
- Check all bolts and nuts for proper alignment and security.
- Check quick-disconnect pins for proper operation and security.
- Check for overall cleanness and corrosion.
- Rotate mount through field of fire and check for freedom of movement.

Note: Field of fire is 230 degrees with locking pin inserted in the aft hole and 88 degrees with locking pin inserted in the forward hole.

3-50. Troubleshooting

Refer to troubleshooting table 3-5.

3-51. Gun Mount Assembly - Replacement

a. Removal.

(1) Remove quick-release pin (1, fig 3-28) from gun mount (2). Remove gun mount.

(2) Disconnect base (7) from right front fender (10) by removing screws (11), washers (8), and nuts (9).

b. *Installation.* (Refer to para 3-47 a. (2) through (4)).

3-52. Ammunition Rack, Replacement

a. *Removal.* Disconnect ammunition rack (Fig 3-30) from right rear fender by removing screws, washers, and nuts.

b. *Installation.* Attach ammunition rack to right rear fender and secure with screws, washers, and nuts.

Table 3-5. Troubleshooting - 7.62 MM Machine Gun Kit

Malfunction	Probable cause	Corrective action
1. Locking pins do not align through positioning holes in base and gun mount.	Mounting assembly bent or distorted.	Replace base and/ or gun mount weldment (para 3-51).
2. Mount assembly difficult to turn.	Corrosion, foreign matter, or burrs preventin ^g freedom of movement.	Clean or remove corrosion as required, replace base and / or gun mount weldment (para 3-51).
3. Ammunition boxes do not fit ammunition rack.	Ammunition rack bent or distorted.	Reform or replace (para 3-521).

3-53. Ammunition Rack Securing Straps, Replacement

a. *Removal.* Disconnect footman loops (4 and 8, fig 3-31) from right rear fender (12) by removing screws (7 and 11), washers (6 and 10), and nuts (5 and 9). Slide straps (1 and 3) off footman loops (4 and 8).

b. *Installation.* Slide straps (1 and 3, fig 3-31) on footman loops (4 and 8) and secure footman loops to right rear fender (12) with screws (7 and 11), washers (6 and 10), and nuts (5 and 9).

3-54. Spare Barrel Stowage Bag Securing Straps, Replacement

a. *Removal.* Disconnect footman loops (fig 3-33) from engine cover by removing screws, washers, and nuts. Slide straps off footman loops.

b. *Installation.* Slide straps on footman loops and secure footman loops to engine cover with **screws**, washers, and nuts.

Note : **Screws** are inserted in bottom of engine cover.

3-55. Returning Vehicle to Original Configuration.

a. Remove ammunition rack securing straps (**refer** to para 3-43 a).

b. Remove ammunition rack (refer to para a).

c. Remove gun mount assembly (refer to par 3-51 a)

d. Remove spare barrel stowage bag securing straps (refer to para 3-52 a).

e. Plug holes left by kit removal with attaching hardware of removed parts.

Section VII. WINCH KIT

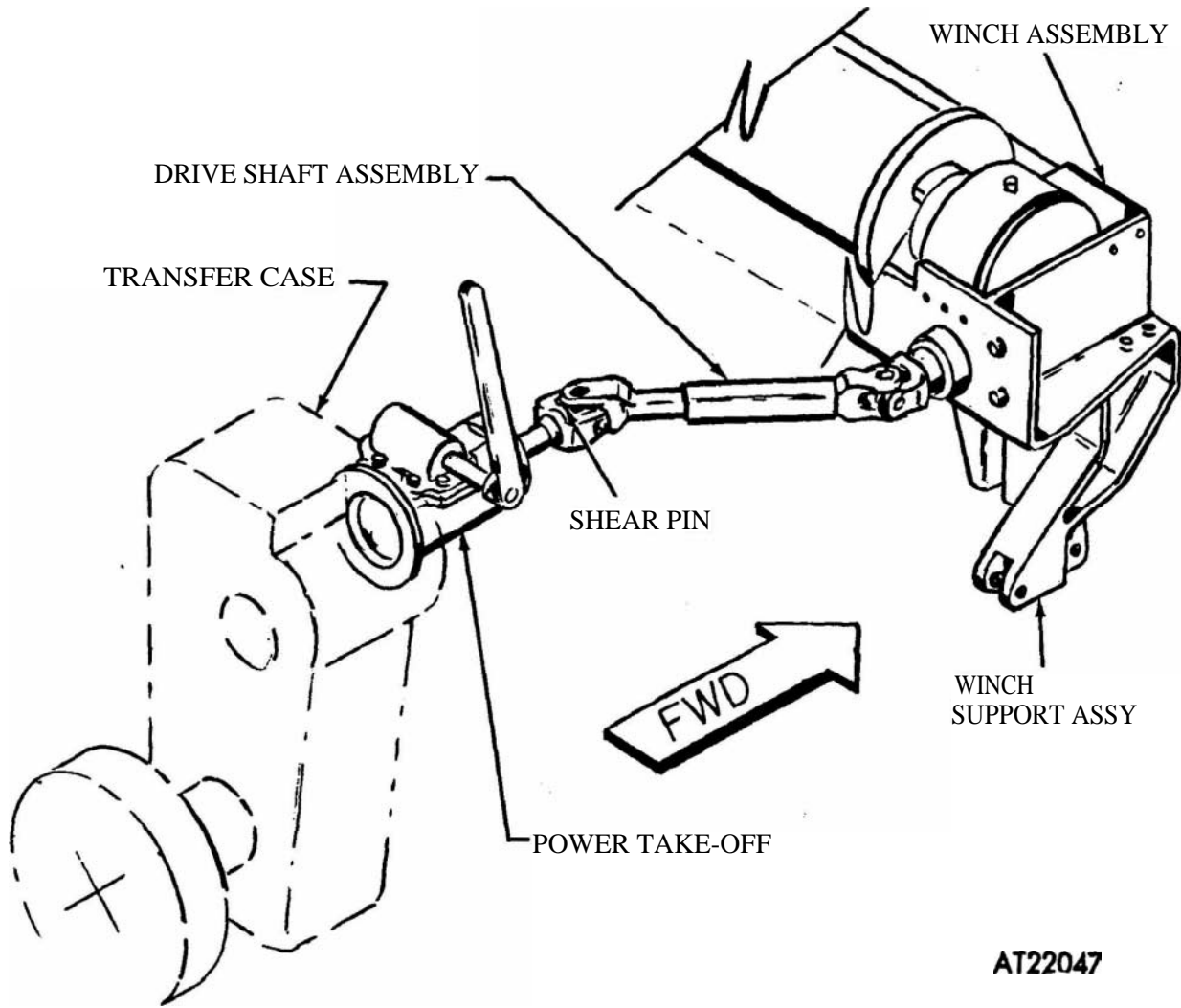
3-56. General

The winch kit (fig 3-34) is mounted to the from of the tractor and is supported by the winch support assembly. The major components of the kit are a four-ton capacity winch assembly, drive shaft assembly, and power take-off. The kit is utilized to aid in the recovery of disabled vehicles or equipment, as a prime mover of loads within its capacity, or to connect the vehicle to an anchor for its own recovery. Power for the winch assembly is supplied by the transfer assembly through the power take-off. The power take-off is connected to

the winch through a drive shaft assembly which connects the power take-off output shaft to the input worm drive shaft of the winch. To prevent overload of the winch or its components, a brass shear pin secures the shaft assembly universal joint to the power take-off. A steel pin firmly secures the other universal joint to the winch shaft. The power takeoff is engaged or disengaged by means of a lever located on the forward right hand side of the console. The control lever is provided with a safety lock which insures positive engagement. The winch clutch lever is located on the left hand side of the

winch. Its function is to engage or disengage the winch drum clutch jaw. Moving this lever away

from the drum engages the clutch; moving the lever toward the drum disengages the clutch.



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Figure 3-34. Winch kit **components.**

a. *Winch Assembly.* The winch assembly (fig 3-35) is of the drum type with a four-ton capacity incorporating a worm-gear brake capable of sustaining a load should delivery of power to the drum be interrupted. The hand operated sliding

clutch is keyed to the worm gear shaft outside of the winch drum, and must be engaged with the jaw on the side of the winch drum when the winch is operated. Disengagement of the sliding clutch permits the drum to turn on the worm gear.

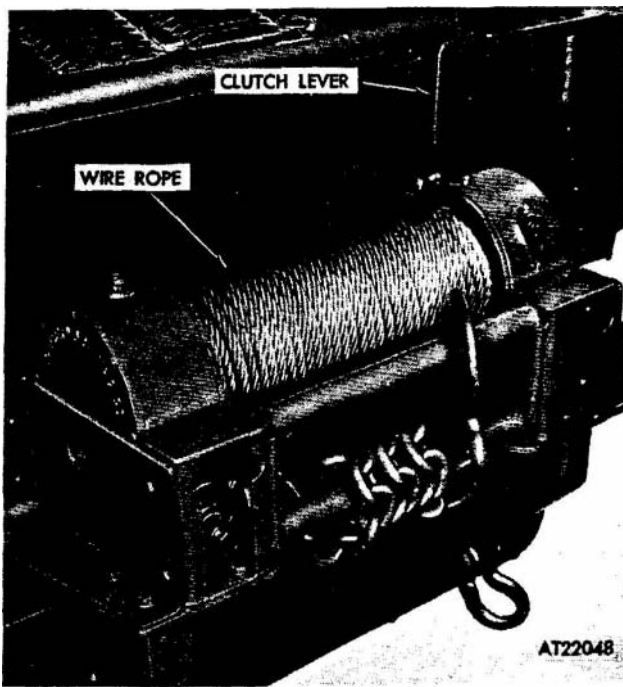


Figure 3-35. Winch assembly.

b. Winch Rope Assembly. A cable, (fig 3-35) 150 ft. long, of 7 / 16 inch diameter fibre core wire rope terminated with a short chain and hook, is stored on the drum of the winch.

c. Snatch Block Assembly. A snatch block assembly (fig 3-36) consisting of a six inch sheave and swivel hook which has a working load capacity of five tons is stowed aboard the vehicle. It is utilized in conjunction with the winch for moving heavy loads.

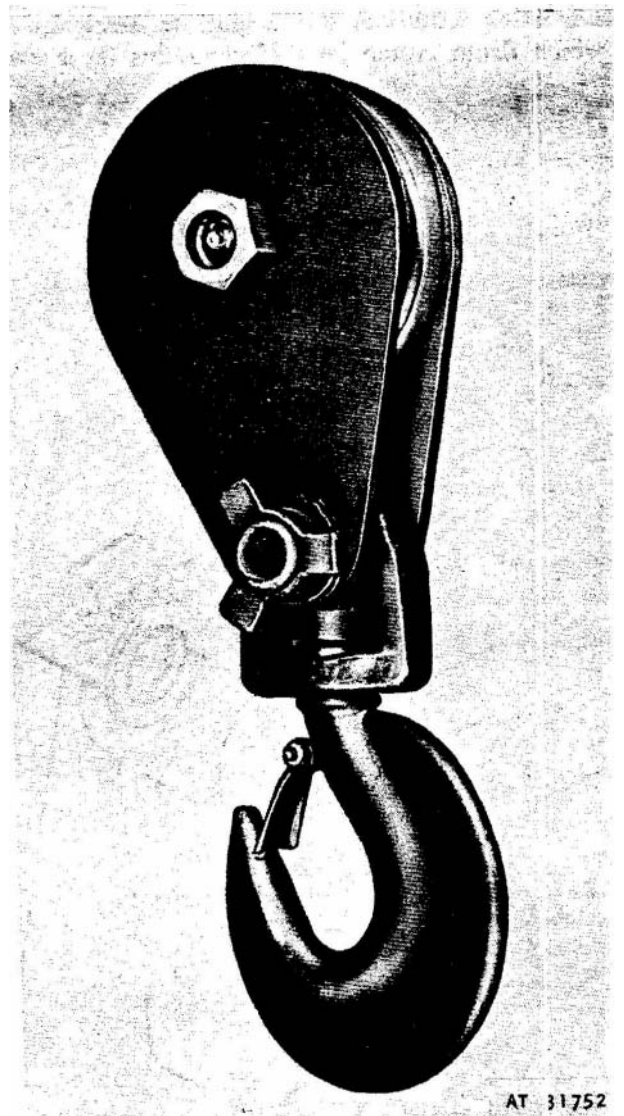


Figure 3-36. Snatch block assembly.

3-57. Tabulated Data

a. Winch.

Part number	11621129
Type	Unders lung
Drum clutch type	Sliding jaw
Capacity	8000 lbs
Brake	Automatic

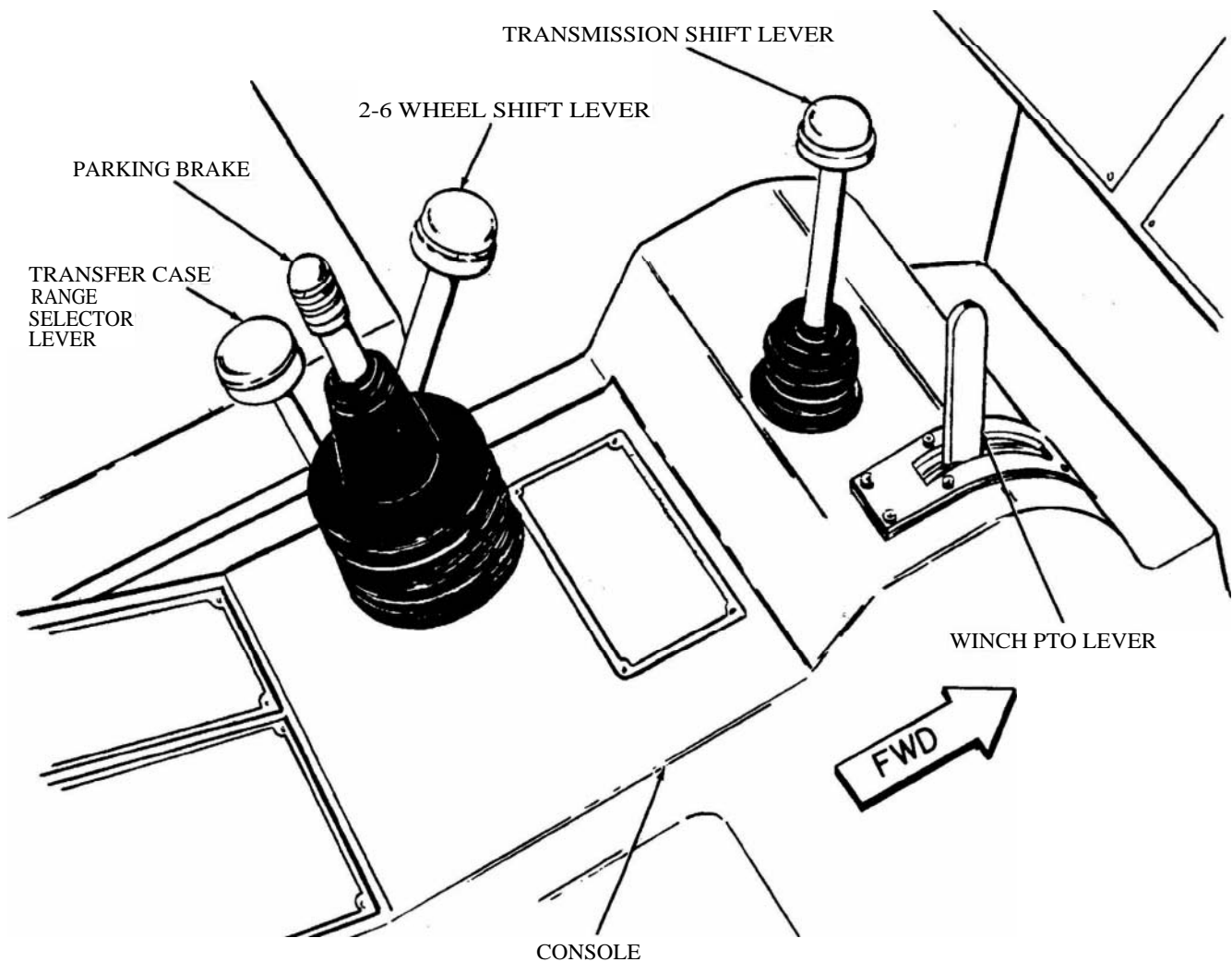
b. Power Take-Off Unit.

Part number	1162:1130
Type	Sliding gear
Lubrication	Integral with transfer case

3-58. Controls

a. *General.* The normal vehicle controls utilized in the operation of the winch are the vehicle clutch, transmission shift lever, and the hand throttle. The special controls for operation of the winch are the power take-off lever and the winch clutch lever.

b. *Power Take-Off Lever.* The power take-off lever (fig 3-37) is located forward of the transfer case lever on the right hand side of the console. It is manually operated and the power take-off is engaged by pushing the lever forward and released by pulling the lever rearward.



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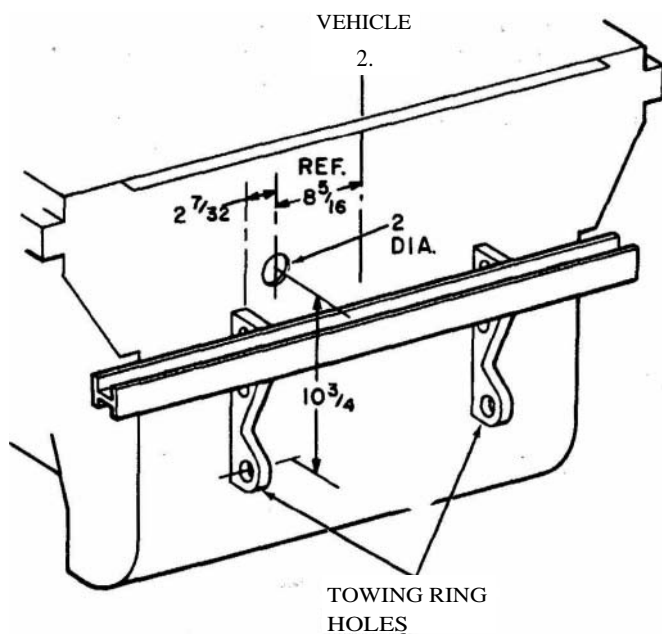
Figure 3-37. Power take-off lever.

c. *Winch Clutch Lever.* The winch clutch lever is located on the left hand side of the winch and is utilized to engage or disengage the winch drum jaw clutch (fig 3-35). The clutch is engaged by moving the lever away from the drum and disengaged by moving the lever toward the drum.

3-59. Winch Kit, Installation

a. *Winch Assembly.*

- (1) Disconnect towing shackles (fig 2-287) by removing cotter pins and clevis pins.
- (2) Layout and mark tractor hull (fig 3-38).



NOTE:

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Figure 3-38. Tractor hull drilling pattern.

- (3) Cut a 2-inch diameter hole in tractor hull.
- (4) If necessary, remove shipping straps from winch assembly.
- (5) Connect winch assembly (5, fig 3-39) to rear mounting bracket (32) and secure with screws (1) and washers (2).

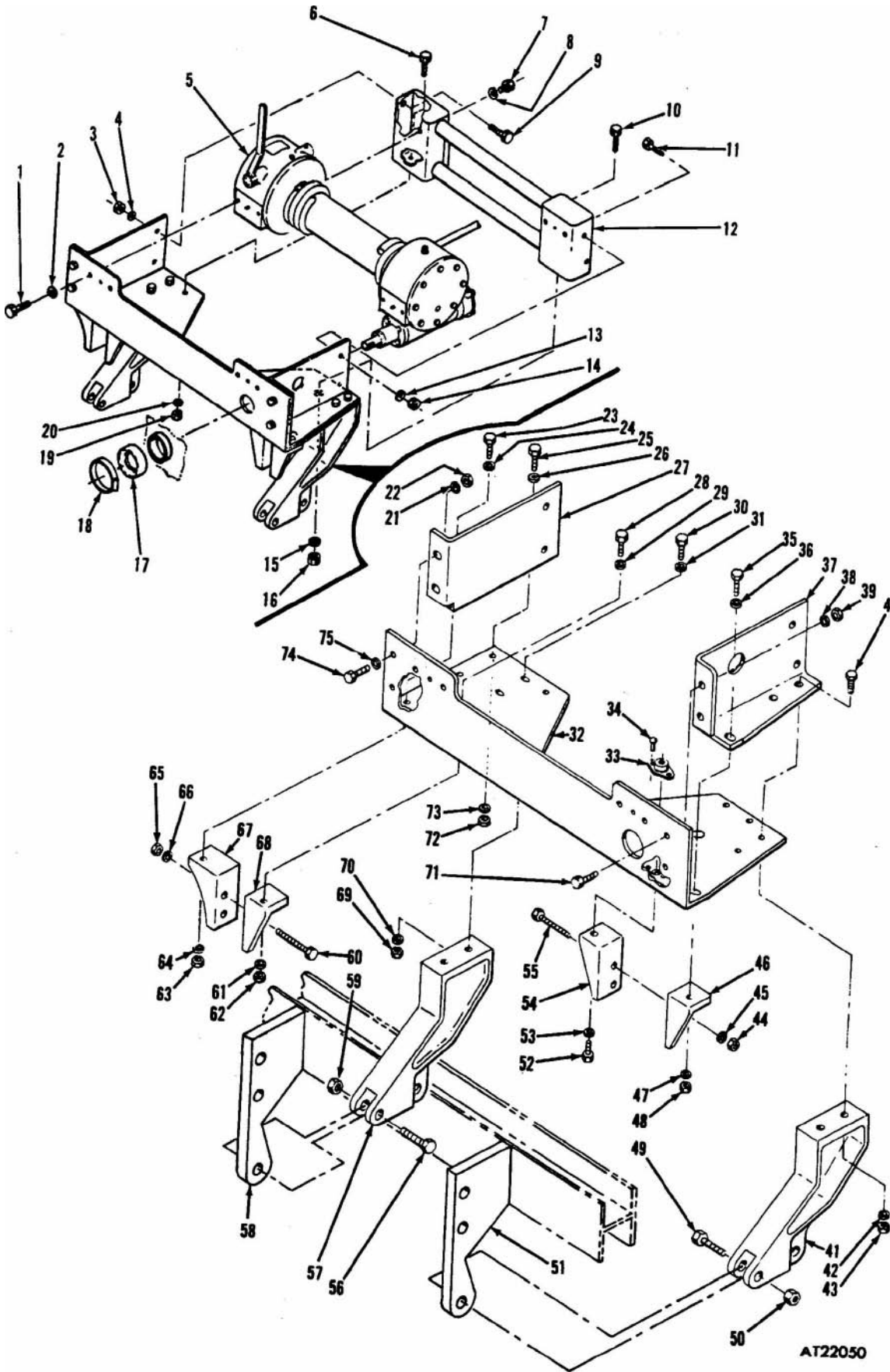


Figure 3-39. Winch kit, initial installation.

LEGEND to fig 3-39:

- | | |
|--------------------------------------|-------------------------------|
| 1 - Screw | 38 - Washer |
| 2 - Washer | 39 - Nut |
| 3 - Nut | 40 - Screw |
| 4 - Washer | 41 - Right hand bracket |
| 5 - Winch assembly | 42 - Washer |
| 6 - Screw | 43 - Nut |
| 7 - Screw | 44 - Nut |
| 8 - Washer | 45 - Washer |
| 9 - Screw | 46 - Right hand lower bracket |
| 10 - Screw | 47 - Washer |
| 11 - Screw | 48 - Nut |
| 12 - Front mounting bracket assembly | 49 - Screw |
| 13 - Washer | 50 - Nut |
| 14 - Nut | 51 - Bumper bracket |
| 15 - Washer | 52 - Screw |
| 16 - Nut | 53 - Washer |
| 17 - Seal, bulkhead | 54 - Left hand lower bracket |
| 18 - Clamp, seal to panel | 55 - Screw |
| 19 - Nut | 56 - Screw |
| 20 - Washer | 57 - Left hand bracket |
| 21 - Washer | 58 - Bumper bracket |
| 22 - Nut | 59 - Nut |
| 23 - Screw | 60 - Screw |
| 24 - Washer | 61 - Washer |
| 25 - Screw | 62 - Nut |
| 26 - Washer | 63 - Nut |
| 27 - Upper left hand bracket | 64 - Washer |
| 28 - Screw | 65 - Nut |
| 29 - Washer | 66 - Washer |
| 30 - Screw | 67 - Left hand lower bracket |
| 31 - Washer | 68 - Right hand lower bracket |
| 32 - Rear mounting bracket | 69 - Nut |
| 33 - Cinch nut | 70 - Washer |
| 34 - Rivet | 71 - Screw |
| 35 - Screw | 72 - Nut |
| 36 - Washer | 73 - Washer |
| 37 - Upper right hand bracket | 74 - Screw |
| | 75 - Washer |

(6) Connect front mounting bracket (12) to winch (5) and secure with screws (8) and washers (9).

(7) Secure front mounting bracket (12) to rear mounting bracket (32) with screws (6 and 10), washers (15 and 20), nuts (16 and 19).

(8) Position brackets (37, 41, and 46) to rear mounting bracket (32) and connect with screws (35, 40, and 71), washers (36, 38, 42, and 47), and nuts (39, 43, and 48). Do not tighten.

(9) Position brackets (27 and 67) to rear mounting bracket (32) and connect with screws (23, 25, and 74), washers (21, 24, 26, 64, 73, and 75), and nuts (22, 63, and 72). Do not tighten.

(10) Connect front support bracket (12) to brackets (27 and 37) and secure with screws (7 and 11), washers (4) and 13), and nuts (3 and 14). Tighten screws and then tighten screws in above (7) and (8).

(11) Connect bracket (54) to bottom of rear mounting bracket (32) and secure with screw (52) and washer (53).

(12) Connect brackets (57 and 68) to bottom of rear mounting bracket (32) and secure with

screws (28 and 30), washers (29, 31, 61, and 70), and nuts (62 and 69).

Note: It may be necessary to loosen hardware attaching brackets to obtain proper alignment of assembled winch and support bracket when installing on vehicle.

(13) Position assembled winch and support brackets on vehicle inserting winch input worm shaft in hole cut in tractor hull. Support assembled winch and support assembly to vehicle so that winch input worm shaft is in center of hole cut in tractor hull.

(14) Align holes in brackets (41, 46, 54, 57, 67, and 68) with holes in bumper support brackets (51 and 58) and secure brackets with screws (49, 55, 56, and 60), washers (45 and 66) and nuts (44, 50, 59, and 65). Tighten nuts and any other hardware that was loosened to obtain proper alignment.

(15) Connect towing rings to brackets (41 and 57).

(16) Remove tractor seats (refer to para 2-221).

(17) Remove the console (refer to para 2-33)-

(18) Remove panel from right side of air duct.

(19) Position and snap seal (17) over winch input worm shaft and secure seal to shaft and ring welded to interface of front tractor hull with clamp (18).

b. Power Take-off and Drive Shaft.

(1) Disconnect cover (fig 3-40) from transfer assembly by removing screws and lock washers.

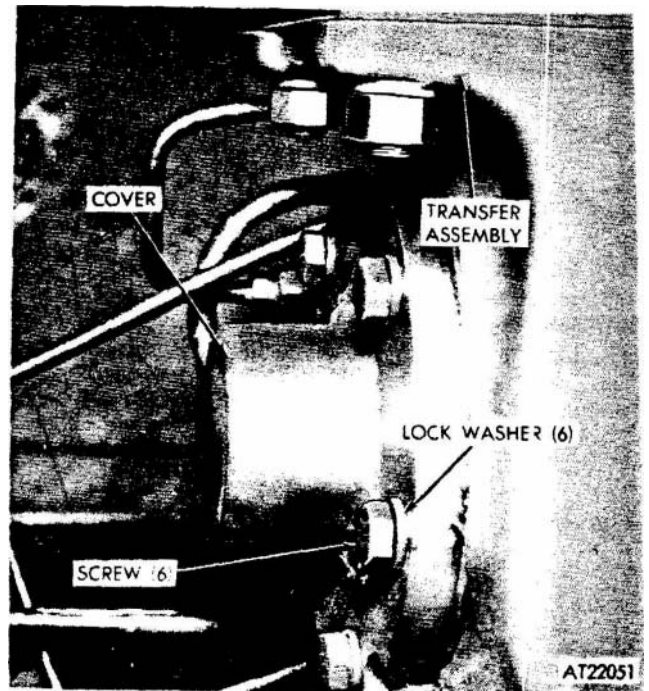
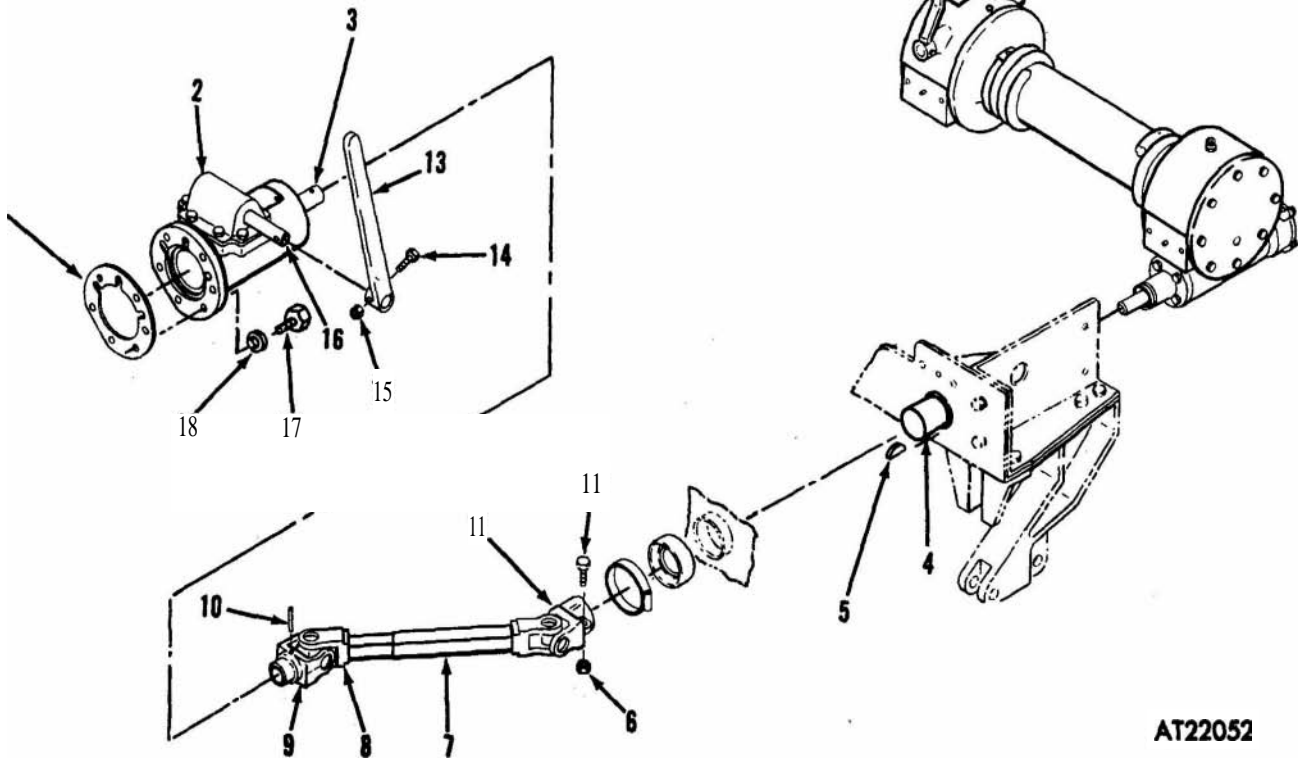


Figure 3-4D Transfer assembly power take-off cover removal

(2) Position gasket (1, fig. 3-41) and power take-off (2) to transfer case and secure with screws

(17) and washers (18).



LEGEND to fig 3-41:

- 1 - Gasket
- 2 - Power take-off assembly
- 3 - Output shaft (power take-off)
- 4 - Winch input shaft
- 5 - Key
- 6 - Nut
- 7 - Drive shaft
- 8 - Drive shaft
- 9 - Yoke

- 10 - Shear pin
- 11 - Yoke
- 12 - Screw
- 13 - Lever (power take-off)
- 14 - Screw
- 15 - Nut
- 16 - Shifter shaft (power take-off)
- 17 - Screw
- 18 - Lock washer

Figure 341. Power take-off and drive shaft assembly, installation.

(3) Slip yoke (9) of drive shaft (8) on to output shaft (3). Align holes in shaft and yoke and install shear pin (10). Wrap yoke and shear pin with a strip of **O.D.** tape to retain shear pin. Position key (5) on winch input shaft (4) and slip yoke (11) of drive shaft (7) over key (5) and winch input shaft (4). Secure yoke with screw (12) and nut (6).

(4) Position power take-off lever (13) on

shifter shaft (16) and secure with screw (14) and nut (15).

(5) Start engine (refer to TM 9-2320-242-10). Engage and disengage the power take-off and winch clutch levers to make certain that power is being applied to the winch drum. Check for oil leakage from gasket (1).

(6) Layout and mark console (fig 3-42).

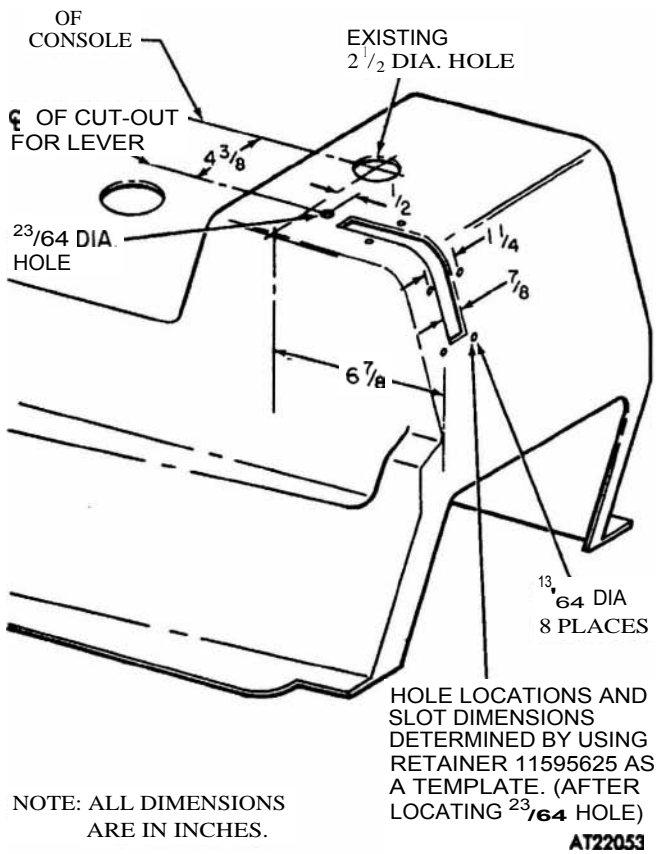
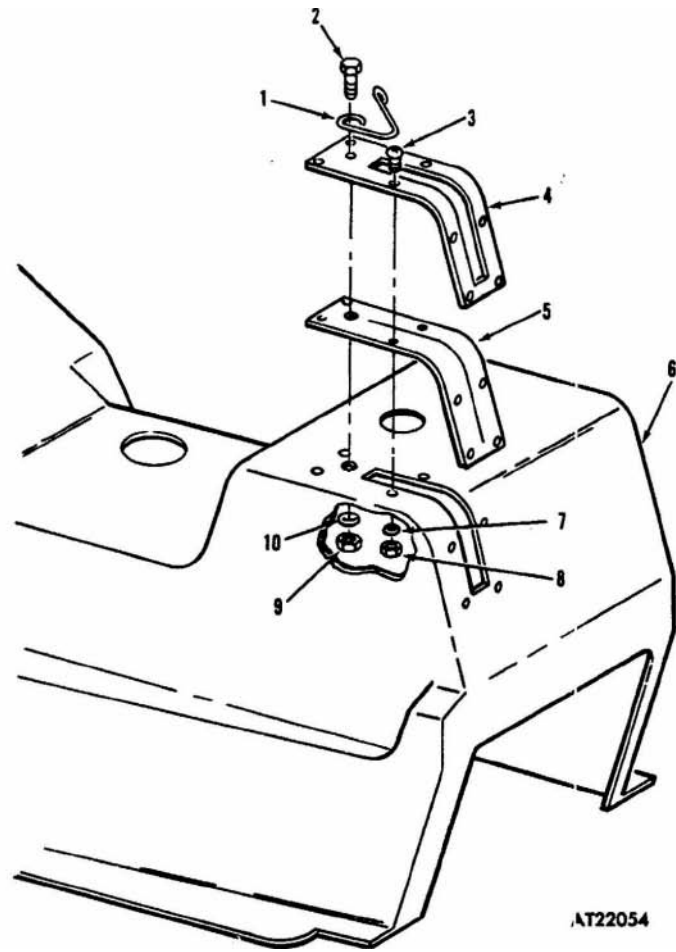


Figure 3-42. Console hole drilling pattern.

(7) Drill holes and cut slot (fig 3-42).

(8) Connect retainer plate (4, fig 3-43) and seal (5) to console (6) and secure with screws (3), washers (7), and nuts (8).



- | | |
|--------------------|-------------|
| 1 - Lever retainer | 6 - Console |
| 2 - Screw | 7 - Washer |
| 3 - Screw | 8 - Nut |
| 4 - Retainer plate | 9 - Nut |
| 5 - Seal | 10 - Washer |

Figure 343. Console power take-off lever retainer, installation.

(9) Secure lever retainer (1) to retainer plate (4) and secure with screws (2), washers (10), and nuts (9).

(10) Install console (refer to para 2-33).

(11) Install seats (refer to para 2-221).

c. Wire Rope Installation.

(1) Attach wire rope (fig 3-44) to the winch drum by inserting wire rope into hole in winch drum and tightening setscrew.

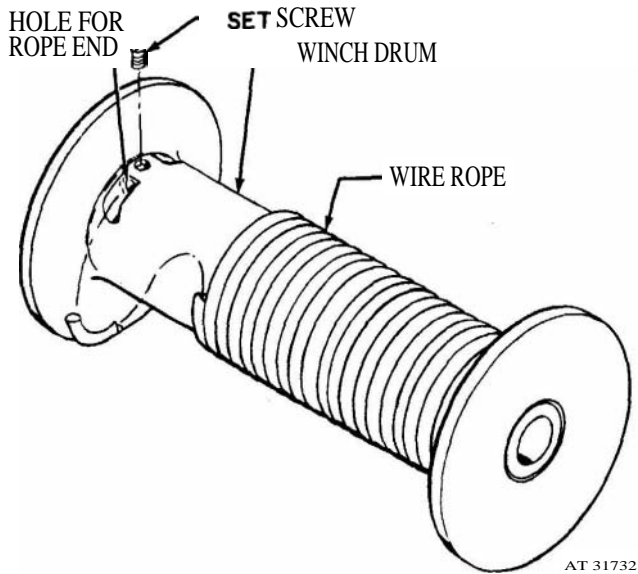


Figure 3-44. Wire rope installation.

(2) Wind wire rope on drum (refer to TM 9-2320-242-10).

3-60. Winch Brake Adjustment

Report to Direct Support for winch brake adjustment.

3-61. Services - Vehicles Equipped with Winch Kits

Upon receipt of vehicle, perform preventive-maintenance checks and services on winch assembly, power take-off assembly, drive shaft assembly, cable assembly and snatch block assembly as specified in paragraph 3-62.

3-62. Preventive Maintenance

a. Disengage winch clutch lever and unwind entire length of wire rope assembly. Clean drum and rope assembly thoroughly with preservative lubricating oil (PL SPL). Note any damage such as kinks or frayed wire and replace if necessary. Apply liberal coat of exposed gear and wire lubricant (CW) to drum and rope assembly (refer to LO 9-2320-242-12).

b. Start engine (refer to TM 9-2320-242-10), maintain tension on wire rope assembly and engage power take-off lever. Engage winch clutch lever and wind rope assembly on drum in neat even coils. Disengage levers and stop engine. Secure chain and hook to winch assembly.

c. Check for loose bolts, nuts or oil leaks of winch installation and correct as required.

d. Check oil levels and lubricate winch assembly.

e. With seats, console and air duct in tractor removed inspect the power take-off assembly. Remove shaft assembly and pull apart at **slip-joint**. Lubricate in accordance with LO 9-2320-242-12. Reinstall shaft assembly, seats, console, and air duct.

f. Inspect snatch block to ensure that swivel and pulley turn freely and check for bent or broken parts. Lubricate lubrication fitting.

3-63. Troubleshooting

Refer to troubleshooting^g table 3-6.

Table 3-6. Troubleshooting - Winch Kit

Malfunction	Probable causes	Corrective action
1. Winch fails to hold load when power is removed.	a. Automatic brake not properly adjusted. b. Controls not set properly.	a. Refer to direct support. b. Replace winch assembly (pars 3-65).
2. Winch fails to operate.	a. Controls not set properly. b. Shear pin broken. c. Power take-off assembly defective.	a. Replace winch assembly. b. Replace shear pin. c. Replace power take-off assembly.
3. Power take-off operates, but winch does not operate.	a. Shear pin broken. b. Winch clutch lever not engaged.	d. Replace winch assembly. a. Refer to 2b above. b. Refer to 2a above.
4. Power take-off fails to operate.	a. Engine transmission in neutral (N) position. b. Defective power take-off.	a. Engage transmission.
5. Power take-off assembly noisy.	c. Control lever not engaged. Transfer case lubricant too low.	b. Replace power take-off assembly. c. Refer to 2a above. Fill to proper level (refer to TM 9-2320-242-10).

Table 3-6. Troubleshooting - Winch **Kit—Continued**

Malfunction	Probable causes	Corrective action
6. Winch noisy during operation. 7. Winch overheats	Lack of lubricant. a. Brake not properly adjusted. b. Lubricant level too low. c. Defective winch component.	Lubricate (refer to L09-2320-242-12). a. Report to direct support. b. Refer to 6 above. c. Replace winch assembly.
8. Excessive noise from shaft.	a. Defective universals. b. Lack of lubricant in slip joint and universals.	a. Replace shaft assembly. b. Lubricate (refer to L09-2320-242-12).
9. Hull leaks at shaft seal	Seal not seated properly or defective.	Replace and reset seal.

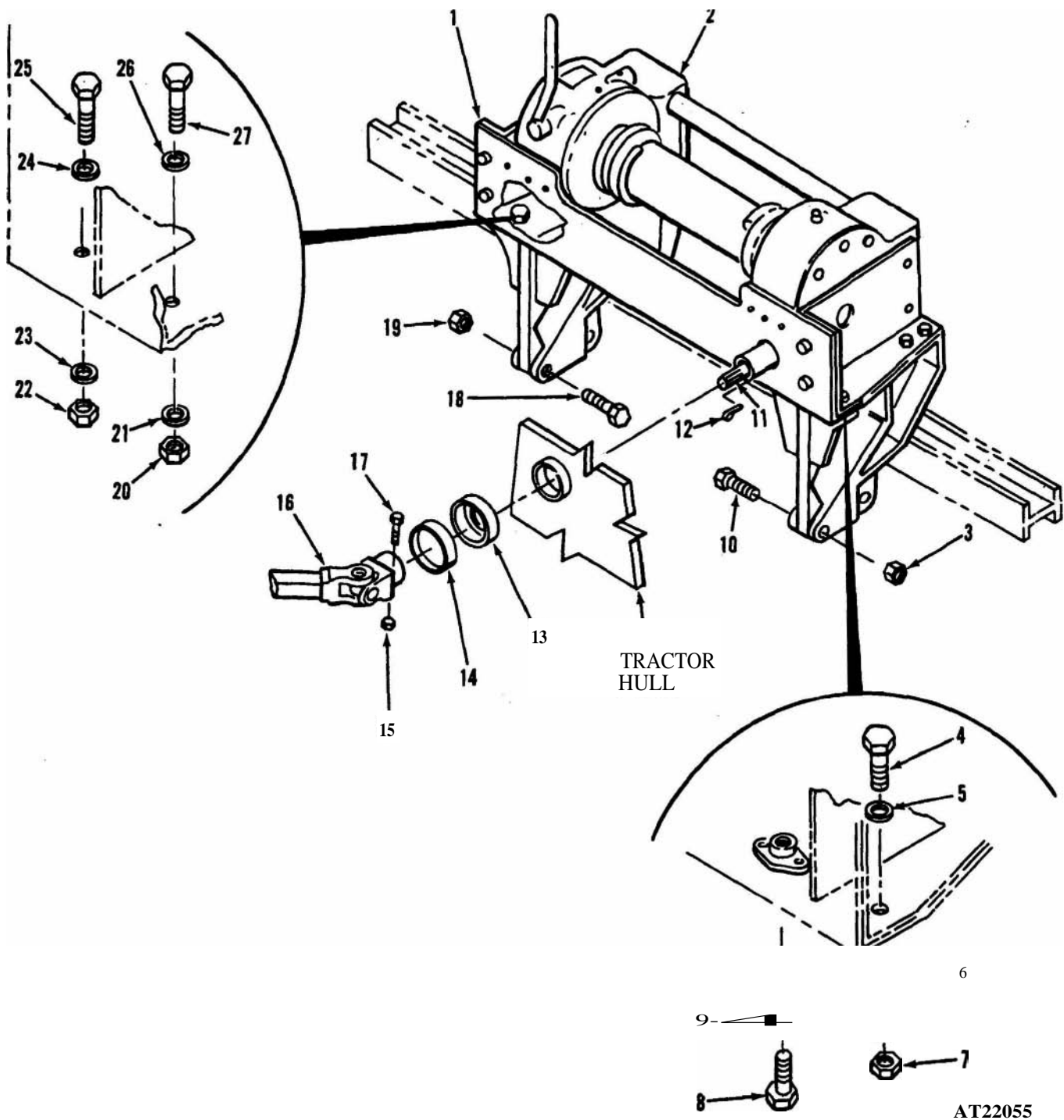
3-64. Winch Assembly - Replacement

a. Removal.

(1) Remove wire rope from winch (refer to TM 9-2320-242-10).

(2) Remove seats (refer to **para** 2-221) and console (refer to para 2-33) from tractor.

(3) **Disconnect** yoke (16 fig **3-45**) from winch input worm shaft (11) by loosening screw (17) and nut (15). Slide yoke from shaft and remove key (12).



- 1 - Support assembly
- 2 - Winch assembly
- 3 - Nut
- 4 - Screw
- 5 - Washer
- 6 - Washer
- 7 - Nut
- 8 - Screw
- 9 - Washer

- 10 - Screw
- 11 - Winch input worm shaft
- 12 - Key
- 13 - Seal
- 14 - Clamp
- 15 - Nut
- 16 - Yoke
- 17 - Screw
- 18 - Screw

- 19 - Nut
- 20 - Nut
- 21 - Washer
- 22 - Nut
- 23 - Washer
- 24 - Washer
- 25 - Screw
- 26 - Washer
- 27 - Screw

Figure 345. Winch assembly, replacement.

(4) Remove clamp (14) from seal (13) and remove seal from ring welded to tractor hull. Clean out any grease packing remaining in the ring.

Note: If winch is not to be reinstalled, obtain a seal without an opening (11595303), place on ring and secure with clamp (14).

(5) Support winch and remove screws (10 and 18) and nuts (3 and 19) from bumper support bracket.

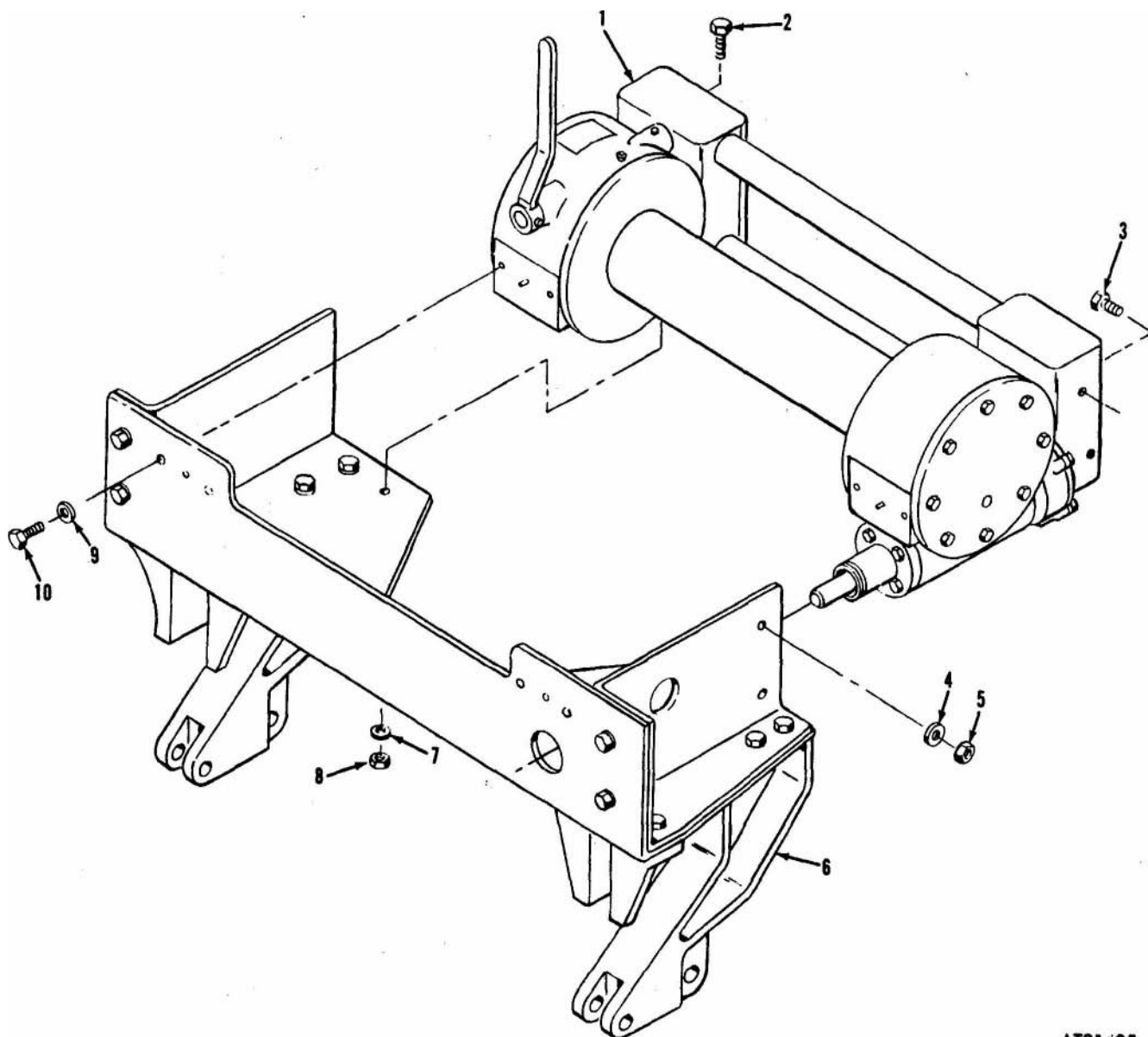
(6) Disconnect assembled support assembly (1) and winch assembly (2) from vehicle by

removing screws (4, 8, 25, and 27), washers (5, 6, 9, 21, 23, 24, and 26), and nuts (7, 20, and 22). Carefully remove assembly from winch.

(7) If necessary, remove tow rings from winch brackets and install rings on bumper brackets.

Warning: If vehicle is to be operated without winch, the power take-off drive shaft must be removed.

(8) Disconnect winch assembly (1, fig 3-46) from support assembly (6) by removing screws (2, 3, and 10), washers (4, 7, and 9), and nuts (5 and 8).



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1 - Winch assembly
2 - Screw
3 - Screw
4 - Washer

5 - Nut
6 - Support assembly
7 - Washer
8 - Nut

9 - Washer
10 - Screw

Figure 346. Winch assembly, removal

b. Installation.

(1) Position winch assembly (1, fig 3-46) into support assembly (6) and secure with screws (2, 3, and 10), washers (4, 7, and 9), and nuts (5 and 8).

(2) Position and support assembled support assembly (1) and winch assembly (2) on vehicle.

(3) Connect winch and support assembly bumper brackets and secure with screws (10 and 18, fig 3-45) and nuts (3 and 19).

(4) Secure support assembly (1) to brackets with screws (4, 8, 25, and 27), washers (5, 6, 9, 21, 23, 24, and 26), and nuts (7, 20, and 22).

(5) Position seal (13) around winch input shaft (11) and secure with clamp (14).

(6) Install key (12) in winch input shaft (11) and slide yoke (16) over shaft. Secure yoke with screw (17) and nut (15).

(7) Install seats (refer to para 2.221) and console (refer to para 2-33).

3-65. Power Take-Off Drive Shaft Assembly

a. Removal.

(1) Remove seats (refer to para 2-221) and console (refer to para 2-33).

(2) Remove shear pin (10, fig 3-41) from yoke (9) on power take-off output shaft (8). Loosen screw (12) on yoke (11).

(3) Remove shaft assembly.

b. Installation.

(1) Position shaft (8, fig 3-41) inside shaft (7).

(2) Position key (5) on winch input shaft (4) and slide yoke (11) over shaft. Secure shaft with screw (12) and nut (6).

(3) Align shear pin hole in yoke (9) and output shaft (3) and insert shear pin (10). Wrap OD tape around yoke to secure pin.

(4) Install console (refer to para 2-33).

(5) Install seats (refer to para 2-221).

3-66. Power Take-Off Assembly

a. Removal.

(1) Remove seats (refer to para 2-221) and console (refer to para 2-33).

(2) Remove power take-off lever (13, fig 3-41) from shifter shaft (16) by removing screw (14) and nut (15).

(3) Remove shear pin (10) securing yoke (9) to power take-off output shaft (3). Remove yoke from power take-off output shaft.

(4) Disconnect screws (17) and lock washers (18) and remove power take-off assembly (2) and gasket (1) from transfer case.

(5) Clean any gasket material from gasket surface of transfer case.

b. Installation.

(1) Position gasket (1, fig 3-41) and power take-off assembly (2) to transfer assembly and secure with screws (17) and washers (18).

(2) Connect yoke (9) to power take-off output shaft (3). Align shear pin holes and install shear pin (10). Wrap yoke with OD tape to secure shear pin.

(3) Install power take-off lever (13) on shifter shaft (16) and secure with screw (14) and nut (15).

(4) Start engine (refer to TM 9-2320-242-10). Engage and disengage the power take-off and winch clutch levers to check that power is being applied to winch. Check for leakage from gasket (1).

(5) Install console (refer to para 2-33).

(6) Install seats (refer to para 2-221).

3-67. Winch Wire Rope Assembly, Replacement

a. Removal.

(1) Disengage winch clutch lever and unwind wire rope assembly from winch drum.

(2) Loosen set screw (fig 3-44) securing wire rope to drum and remove wire rope assembly.

(3) Clean winch drum thoroughly and apply coat of exposed gear and wire rope lubricant (CW) to drum.

b. Installation.

(1) Insert end of wire rope in hole of drum and tighten set screw.

(2) Apply a coat of exposed gear and wire rope lubricant to wire rope assembly.

(3) Start engine and rewind wire rope (refer to TM 9-2320-242-10).

3-68. Returning Vehicle to Original Configuration

a. Remove winch (refer to para 3-64).

b. Remove power take-off drive shaft assembly (refer to para 3-65).

c. Remove power take-off (refer to para 3-66).

d. Remove towing shackles from winch support brackets and install to bumper brackets (fig 2-287) with pin and spring clip.

e. Install seal (11595303) to cover hole in tractor hull and secure seal with clamp.

f. Connect air duct panel to air duct with 18 screws.

Section VIII. SURFING KIT

3-69. General

The surfing kit is utilized to reduce the entry of water into the cab of the tractor of the vehicle during debarkation procedures from landing craft and going ashore. The kit consists of a headboard assembly, two sideboard assemblies, two angle brackets, an instruction plate and the necessary hardware for installing and stowing the assemblies (refer to TM 9-2320-242-10 for the surfing kit components in assembled relationship).

3-70. Installation

a. With the exception of the instruction plate which is installed in place of the good driver decal on the cowl of the vehicle and the angle brackets (11644711), the surfing assemblies are normally

installed by the driver and / or co-driver of the vehicle. The installation of the instruction plate and the angle brackets, and the initial stowage of the surfing assemblies on the engine cover of the vehicle is accomplished by organizational maintenance.

b. The angle brackets are utilized for **securing** the surfing components to the front of the vehicle. Install the brackets on the flange strip at the front of the vehicle (fig 3-47) using the existing nut and bolt, quantity 2 each, located farthest outboard next to the front lifting eyes. The angle **brackets** are to be positioned so that the leg with the large hole is aft of the screw head. When the surfing components are removed for stowage, the brackets are to remain installed.

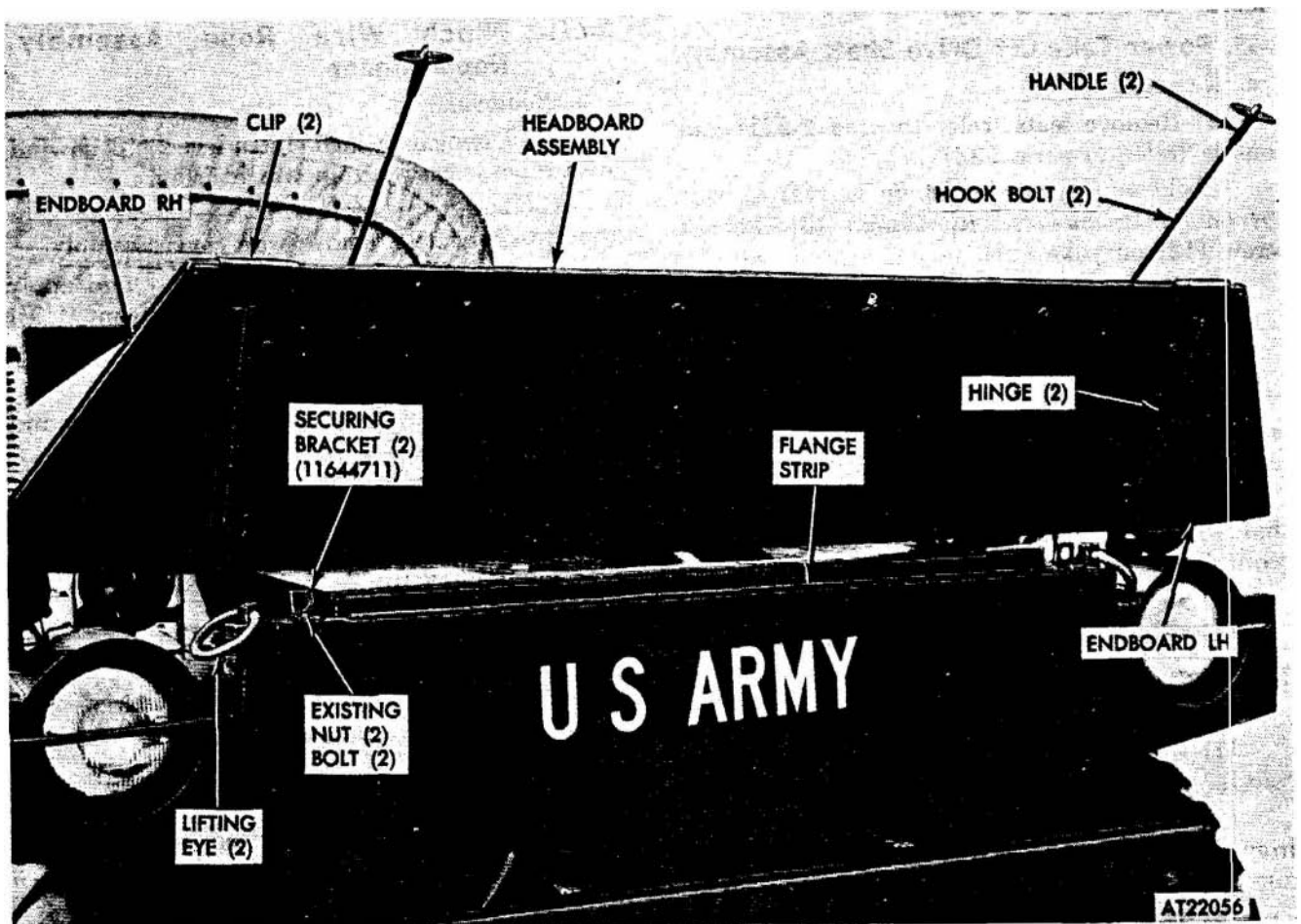


Figure 3-47. Securing brackets, locations.

c. The instruction plate will be installed in place of the good driver decal, as follows:

(1) Position the instruction plate to occupy approximately the same area *as* the good driver decal as shown on the cowl of the vehicle (fig 348).

(2) Use the instruction plate as a template to locate 4 mounting holes in the cowl panel.

(3) Drill four holes, using a number 39 drill.

(4) Install the plate using four (4) screw, MS 24621-B.

DEBARKATION INSTRUCTIONS:

START ENGINE.

PLACE WHEEL DRIVE SELECT LEVER IN "6 WHEEL" POSITION.

PLACE TRANSFER-CASE LEVER IN "LOW" POSITION.

PLACE TRANSMISSION SHIFT LEVER IN "2ND GEAR" POSITION

E TURN ON BILGE PUMP.

F DETERMINE WAVE POSITION.

G RELEASE BRAKES AND DEBARK JUST AS WAVE PASSES UNDER LANDING CRAFT'S RAMP.

H. IF VEHICLE IS COMPLETELY AFLOAT AFTER LEAVING RAMP SHIFT TRANSMISSION LEVER TO "3RD GEAR".

AS WHEELS COME INTO CONTACT WITH BOTTOM. DOWN SHIFT TRANSMISSION LEVER INTO "2ND GEAR."

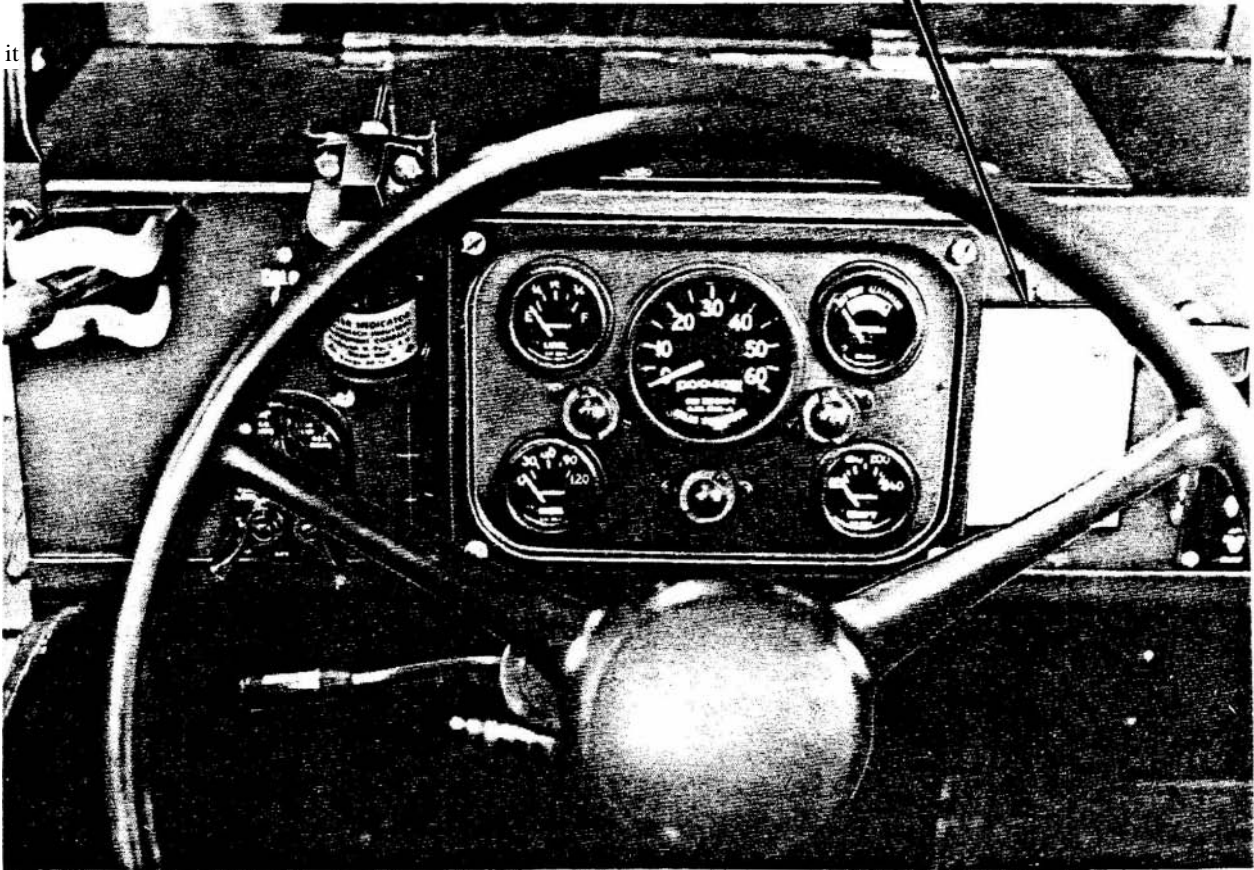
TURN OFF BILGE PUMP AFTER BILGES HAVE BEEN CLEARED OF WATER.

NOTE.

DEBARKATION INSTRUCTION PLATE ON VEHICLES OUTFITTED WITH SURFING KIT. IS INSTALLED OVER GOOD DRIVER DECAL

A GOOD DRIVER

1. DOES NOT HAVE ACCIDENTS
2. Is proud of his record and his vehicle
3. Checks his vehicle before *starting*
4. Checks oil, water, tires, battery doily.
5. Worms up engine before *moving* out.
6. Has road mop, trip ticket, forms, spore tire, took.
7. keeps vehicle clean and lubricated
- 8 Keeps windshield clean.
9. Keeps bolts tightened
10. Performs 1st echelon checks of halts.
11. Reports troubles promptly.
12. Obeys traffic signs.
13. Does not speed.
- 14 Maintains proper distance from vehicle ahead.
15. Obeys the rules of the road.
16. Smokes at halts only.
17. Is properly dressed.
- 18 Supervises and checks his load.
19. Is courteous and helpful to *others*
- 20 SERVICES HIS VEHICLE BEFORE IT IS PUT AWAY



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Figure 3-48. Good driver decal and debarkation instruction plate, location.

3-71. Stowing the Surfing Assemblies

a. The surfing kit components consist of a headboard assembly and two sideboard assemblies. The headboard assembly is made up of a headboard, a metal frame with two hookbolts, and two end boards hinged to the headboard. The two sideboard assemblies are equipped with metal lockplates at the wide end and a slotted hole at the narrow end. Two additional holes are provided for bolting the three pieces together.

b. If the surfing kit assemblies have been received as a package as shown in figures 3-49 and 3-50, secure the package to the engine cover of the vehicle by means of the straps through the slots in the headboard frame and around the engine cover rails as shown in figure 3-51. Note that the hook bolt handles face forward and that the package is placed about nine inches from the front of the engine cover. Tighten the straps securely.

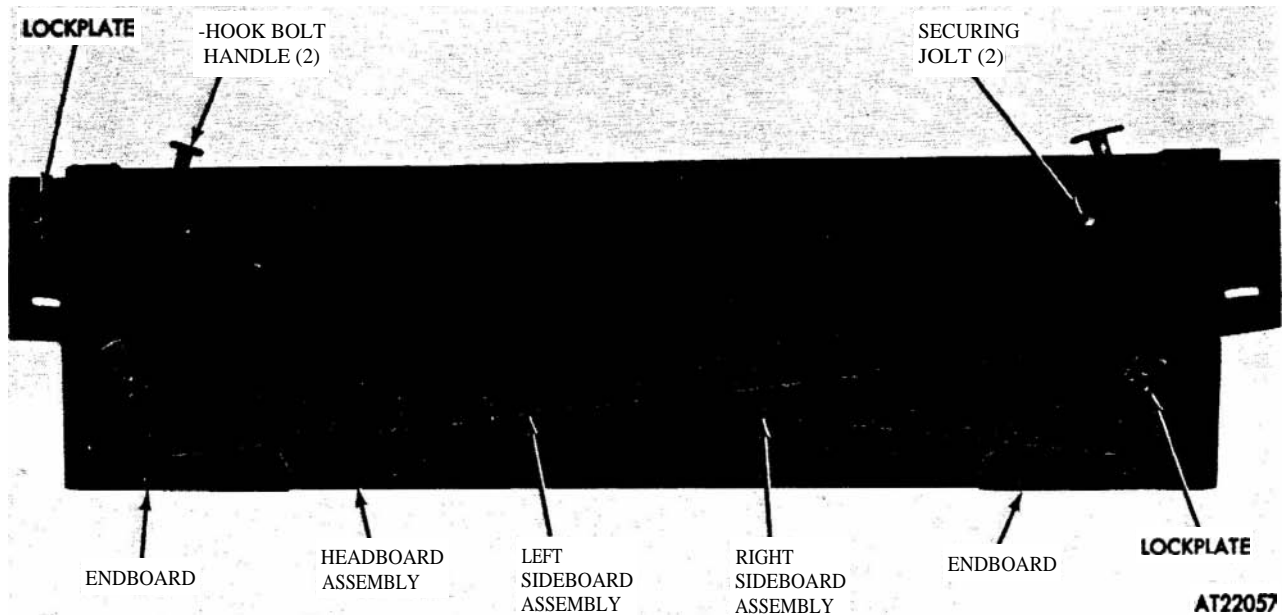


Figure 349. Surfing kit stowage package, front view.

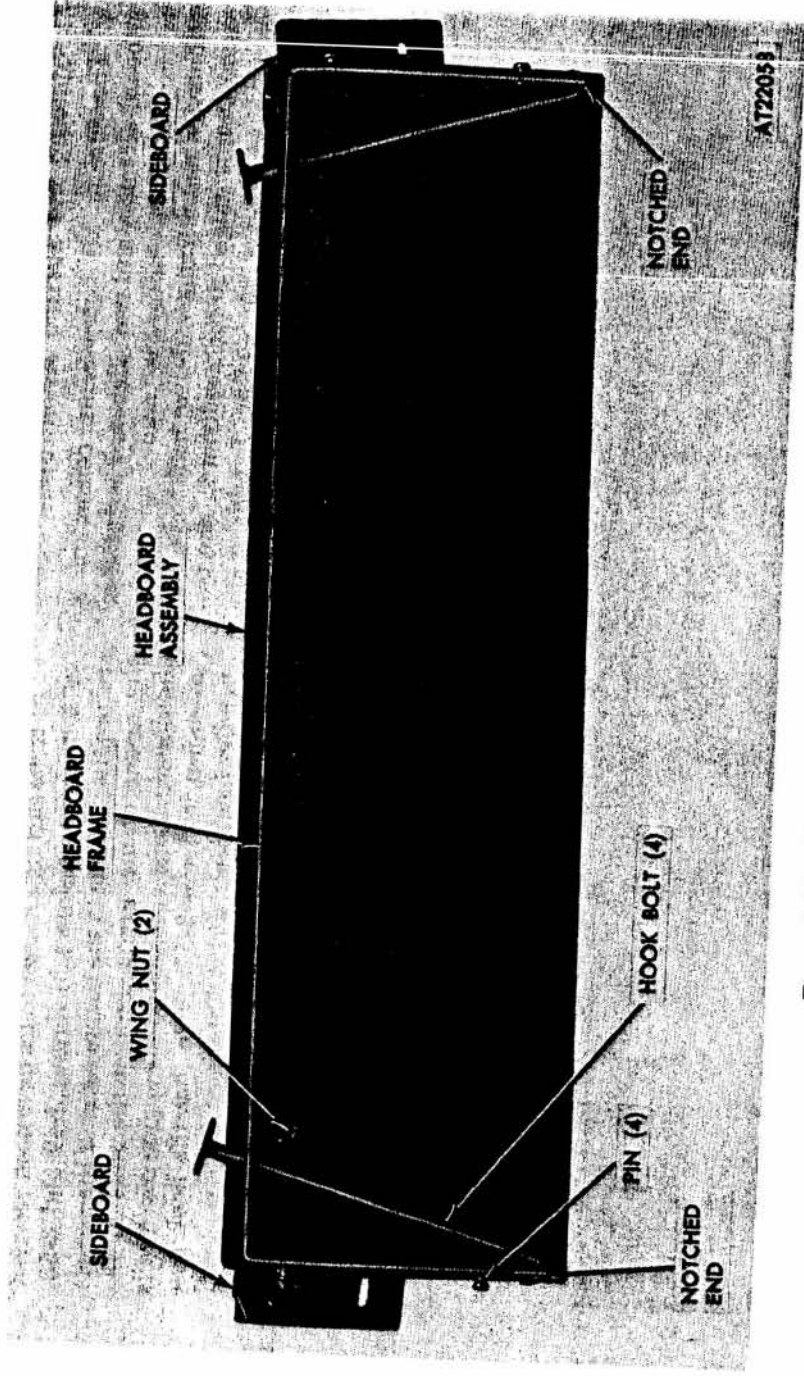
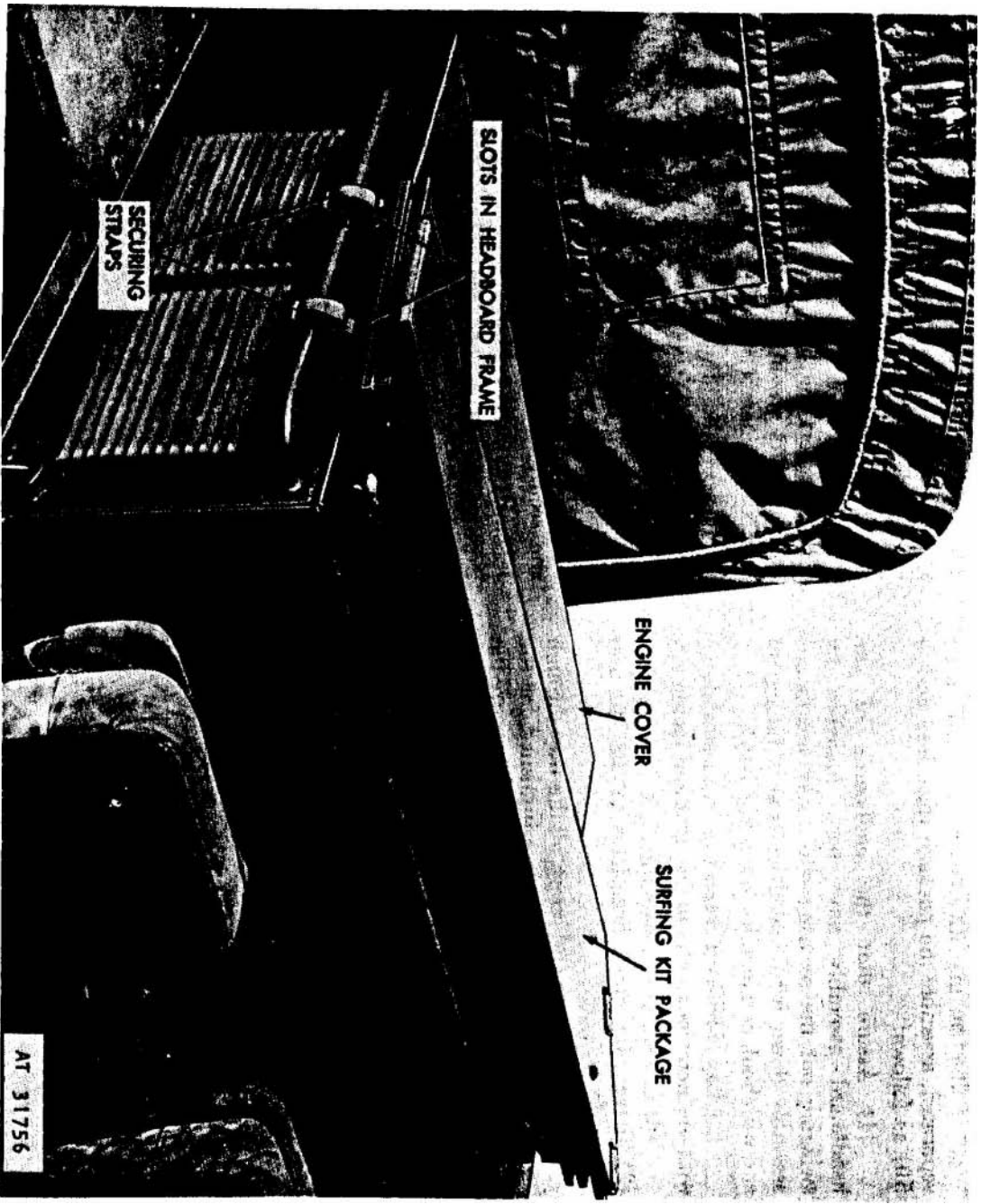


Figure 3-50. Surfing kit stowage package, rear view.



3-51. Surfing kit package st

c. If the surfing kit assemblies have been separated, assemble the package (figs 3-49 and 3-50) as follows:

(1) Assure that the endboards of the headboard assembly have been folded-in by swinging out the securing clips. Lay headboard assembly down with folded endboards facing up and with hook bolt handles at top (fig 3-49).

(2) Lay sideboard assembly, right side down with the metal lockplates to the right and facing up.

(3) Lay sideboard assembly, left side on top of (2) above with metal lockplates to the left and facing up.

(4) Align holes and insert, all the way through from top, the two bolts that are furnished for the purpose. These two bolts are also used to secure the sideboards to the canopy sockets when the surfing assemblies are installed.

(5) Take assembled piece from above (4) and lower onto headboard assembly from above (1). Push the two bolts through the two round holes of the headboard assembly, keeping straight side of

sideboard assemblies parallel and about 3 / 4 inch away from top edge of headboard assembly. Turn the boards over and screw on the two wing nuts furnished with the bolts in above (4). Tighten securely.

(6) Insert the four strap assemblies through the four slots provided in the metal frame of the headboard assembly (fig 3-51).

(7) Assure that the two hook bolts are hooked over the notches at the ends of the metal frame of the headboard assembly (fig 3-50). Check that the handles of the hook bolts are tightened to a final position parallel with the frame.

(8) Install complete package on engine cover and secure as described in b. above.

3-72. Preventive Maintenance

Refer to TM 9-2320-242-10.

3-73. Lubrication

Refer to TM 9-2320-242-10.

3-74. Troubleshooting

Refer to TM 9-2320-242-10.

CHAPTER 4

SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

4-1. General

Commanders are responsible for insuring that all vehicles issued or assigned to their command are maintained in a serviceable condition and properly cared for, and that personnel under their command comply with technical instructions. Lack of time, lack of trained personnel, or lack of proper tools may result in a unit being incapable of performing maintenance for which it is responsible. In such cases, unit commanders may, with the approval of major commanders, place vehicle that is beyond the maintenance capability of the unit in storage or return it to supply agencies. When preparing the M561 or M792 vehicle for level A, B or C (mobile) storage or for shipment, the unit commander will be responsible for processing the vehicle including all tools and equipment in such a manner so as to protect it from corrosion, deterioration and physical damage.

4-2. Shipping Instructions

a. *General.* Preservation and other protective measures taken in preparation of vehicle(s) accompanying tools and equipment for shipment must be sufficient to protect the material against deterioration and physical damage during shipment. Vehicles preserved and packaged in accordance with requirements designated Level A, B, or C (mobile) are never boxed or skidded.

b. Preparation for Shipment.

(1) Prepare the vehicle for Level A (mobile) preservation and packaging according to the following steps:

Note: Level A (mobile) are requirements to provide adequate protection to vehicle and components from corrosion, deterioration, and physical damage during shipment, handling, and varying periods of storage in excess of 90 days from date of preservation and packaging.

(a) Cleaning and drying.

1. Clean vehicle interior and exterior surfaces of all dirt, dust, grease and foreign matter.
2. Clean, sand and paint all exterior and interior surfaces which have been damaged. Materials used in repainting shall be of the same type, quality and color as the original application.
3. Inspect name, caution and data plates. Plates made of steel rust very rapidly. When found

to be in a rusty condition, clean thoroughly and coat with an application of clear lacquer. Refer to TM-9-208-1 and TM 9-213.

4. Clean and dry all surfaces to which a preservative is to be applied.

Note: Liquids under pressure shall not be directed at critical components during cleaning operations.

(b) *Matchmarking.* Matchmark all parts removed to facilitate reassembly when necessary.

(c) Disassembly.

1. Remove parts vulnerable to damage and pilferage; and projecting parts whose removal will accomplish the desired reduction in cube.

2. Preserve removed parts in accordance with applicable specifications listed in **MIL-P-116**.

3. Package and pack removed parts in accordance with requirements of MIL-P-12841.

4. Place the packed parts in a protected location on the vehicle and secure in a manner to prevent movement and damage during shipment and storage.

(d) Lubrication.

1. Lubricate chassis if vehicle has been operated in excess of 100 miles since previous lubrication.

2. Lubricate all operational mating surfaces of components such as levers, latches, latch pins, locking bars, locking pins, clevis pins, pintle pins and pedal linkage with preservative oil P-9 conforming to **VV-L-800**.

(e) Preservation and packaging.

1. Preserve and package **BIIL** (Basic Issue Items List) components and stow in carrier. Secure in a manner to prevent movement and damage during shipment.

2. Remove personnel seats (refer to para 2-221 and 2-222) from tractor and cover seats with a barrier material and tape in place.

3. Install personnel seats in tractor (refer to para 2-221 and 2-222).

4. Cover dash panel with 6 mil thick black polyethylene and secure with tape.

5. Cover horn button, as above step 4 for dash panel, of a size to cover opening around horn button, secure with tape.

6. Cover head lights, blackout, drive, and parking lights with tape.

7. Cover carrier tail lights and reflectors with tape.

(f) *Record Forms.* One copy of the Equipment Log Book, Equipment Maintenance Log, DA form 2409, with forms as required in TM 38-750, and two copies of DD form 1397 shall be provided and completed in accordance with TM 38-750. Information on forms shall include preservation accomplished and depreservation instructions. Log book with protective cover, Equipment Maintenance Log, required forms, and one copy of DD form 1397 shall be packaged in accordance with method 1C-1 of MIL-P-116, and securely attached in or on the vehicle. The other copy of DD form 1397 shall be water-proofed in accordance with MIL-STD-129 and securely attached in a conspicuous location on the exterior of the vehicle.

(g) *Transmission.* Remove transmission fill level plug and check level of lubricant, fill to operating level if necessary (refer to L09-2320-242-12). Replace fill level plug.

(h) *Differentials, transfer case, power take off, and steering gear boxes.*

1. Check transfer case lubricant (refer to L09-2320-242-12).

2. Check differentials for applicable grade of lubricant and operating level (refer to L09-2320-242-12).

3. Check steering gear boxes for applicable grade of lubricant and operating level (refer to L09-2320-242-12).

4. Coat exposed machined surfaces of propeller shaft, steering torque tube including splines, slip joints and universal joints with P-19 preservative conforming to MIL-C-16173.

5. Prepare cooling system for climate which the vehicle will be subjected to on site, enroute, and at destination.

a. For shipment or storage in areas where temperature drops below -40°F (refer to TM9-207 and TB 750-651).

b. For shipment or storage in areas where temperature drops below 32°F. Fill cooling system with mixture of (Ethylene Glycol Type) anti-freeze and water in accordance with TB 750-651.

(i) *Power plant and fuel system.*

1. Drain engine crankcase (refer to L09-2320-242-12) and fill to operating level with lubricating oil grade 10 or 30, using the appropriate seasonable grade.

2. Position vehicle to achieve maximum draining of the fuel tanks and drain tanks.

3. Fill fuel tanks completely with lubricating oil conforming to type P-10, grade 2 conforming to MIL-L-21260.

Caution: Fuel tank shall be drained and filled with the above before continuing with fuel system preservation.

4. Disconnect the return fuel line at the most convenient point and connect a transparent plastic line to the disconnected line coming from the engine. Also disconnect fuel line at heater on M792 ambulance and connect a transparent plastic line to the disconnected line.

5. Place other end of transparent finds) into recovery container(s) to collect returned diesel fuel.

6. Start engine and operate at approximately 1200 RPM until transparent fuel return line is purged of diesel fuel and the fuel system is filled with lubricating oil. On M792 ambulance, also turn heater control to ON position to run electric fuel pump to purge heater fuel system of diesel fuel.

7. Stop engine (turn heater control OFF on M792 ambulance) and remove plastic line(s). Reconnect engine fuel return line (reconnect fuel line to M792 ambulance heater) disconnected in step 4. Discard **recovered** fuel mixture.

8. Allow engine cylinder head to cool to a maximum temperature of 100°F, before performing next step. Induced air currents may be used to accelerate cooling of the engine.

9. Remove rocker arm cover and mechanically depress exhaust valves 0.035 inch.

10. Remove air cleaner assembly.

11. Remove air inlet housing from blower assembly.

12. Crank engine with starting motor for 30 seconds.

Note: Do not exceed 30 seconds.

13. Concurrently with step 12 above. Atomize spray 2 ounces of preservative oil grade 1 of MIL-L-46002 into blower assembly. Reconnect air inlet housing and air cleaner. Tape openings with tape conforming to MIL-T-43115.

14. Remove valve depressing devices.

15. Replace valve rocker arm cover.

16. Drain fuel filters and fuel tanks. Oil drained from filters and fuel tanks at this time only may be reused **provided** not more than 10 percent of the resultant fluid is diesel fuel.

17. Close and secure fuel filter(s) and fuel tank drain cocks,

18. Atomize 6 ounces of preservative oil conforming to MIL-L-46002, grade 1 into exhaust pipe opening. Cover tailpipe opening with tape conforming to MIL-T-43115.

19. Prepare a warning tag bearing the following information : **ENGINE PRESERVED; AIR CLEANER INTAKE AND EXHAUST TAILPIPE SEALED ; DO NOT CRANK ENGINE; SEALS SHALL BE REMOVED BEFORE ATTEMPTING TO START ENGINE.** Tag shall be securely attached in a conspicuous location within driver's compartment.

(j) Batteries.

1. Remove battery cables from batteries.

2. Coat cable ends with GAA lubricant, wrap in waterproof paper and secure with tape.

3. Secure cable ends to battery **holddown** equipment.

4. Cover battery terminals with plastic cups; or tape in accordance with specification PP-T-60.

5. Secure cable ends to battery holddown strap.

(k) Drive belts.

1. Do not release tension on drive belts.

2. Coat pulleys with preservative MIL-P-46093.

(1) Exhaust system. Coat unpainted surfaces of exhaust system with type P-19 preservative conforming to MIL-C-16173.

(m) Clutch.

1. Place transmission in neutral position.

2. Depress clutch a distance to remove free play and then depress 1 to $1\frac{1}{2}$ inches more. Secure pedal in depressed position using wooden block between pedal and dash, wire wooden block into position.

(n) Brake system.

1. Coat exterior, unpainted, or threaded surfaces such as cables, devises, and linkage of service and parking brake with P-19 preservative conforming to MIL-C-16173.

2. Brake system shall be filled with operational hydraulic brake fluid in accordance with L09-2320-242-12.

(o) Top, tractor and carrier.

1. Remove tractor canopy (refer to TM 9-2320-242-10).

2. Remove tractor canopy, frame assembly (refer to TM 9-2320-242-10).

3. Remove windshield wiper arms and blades (refer to **para** 2-226 and 2-227).

4. Remove carrier canopy assembly (refer to para 2-217 for M561 vehicle or para 2-256 for M792 ambulance).

5. Remove carrier canopy bows and band together with banding material (refer to para 2-218 for M561 vehicle or para 2-264 for M792 ambulance).

6. When items in steps 1, 2, and 4 are removed, canopy assemblies shall be thoroughly dried, folded or rolled in a manner to avoid creasing of plastic windows. Packaged in a bag fabricated of 6 mil thick polyethylene conforming to type II of L-P-378, Closure shall be accomplished by heat sealing. Packaged top shall be packed in a box conforming to class 2, style 4 of PPP-B-621. Box shall be identified and stowed with BIM (Basic Issue Items List) or within vehicle.

7. Remove windshield and stow in compartment in top of engine cover.

(p) M561 Cargo truck carrierbody.

1. Secure bows removed in above step (o) 5, to front of carrier, utilizing tiedown loops in carrier.

2. Apply P-19 preservative conforming to MIL-C-16173 to all unpainted surfaces on bows, stake pockets and removed hardware.

3. Remove plug from rear steering gear box cover to drain any accumulation of water in carrier. Stow and pack plug with tractor drain plugs.

4. Place dunnage approximately 2 inches thick in carrier to prevent any accumulation of water from entering packing boxes.

(q) M792 Ambulance carrier body and components.

1. Cover two head pad assemblies with 6 mil thick black polyethylene and secure with tape.

2. Coat attendant seat and litter shelves with type P-19 preservative conforming to MIL-C-16173 and place in stow position.

3. With exhaust pipe (two sections) and cap removed from heater, atomize 3 ounces of preservative oil conforming to MIL-46002, grade 1, into exhaust pipe and the cap openings. Cover exhaust pipes and the cap openings with tape. Coat metal surfaces of exhaust pipes and cap with P-19 preservative. Wrap pipes, cap, and all attaching hardware in barrier material and place in a suitable box. Box shall be identified and stowed with **BIM** or within vehicle.

4. Cover heater assembly with 6 mil thick black polyethylene and secure with tape.

5. Cover warm air duct grilles with tape.

6. Seat cushions (2), overhead light and bracket, dispenser bracket, heater louver and intake assembly, heater intake duct assembly, heater control box and harness, and the convenience receptacle control box and harnesses will be covered with barrier material, taped, and packed in a suitable box. Box shall be identified and stowed with **BIIL** or within vehicle.

7. Accomplish above steps (p) **I.** through (p) 4.

(r) *Tractor body*

I. Remove tractor body drain plugs and package with related vehicular components.

2. Cover bilge pump outlet over left hand battery with plastic plug or tape conforming to MIL-T-43115.

(s) *Miscellaneous preservation.* MI exterior, unpainted surfaces such as steering assemblies, frames, tierods, adjusting rods, springs, pintle assemblies, and surfaces exposed by disassembly shall be coated with type P-19 preservative conforming to MIL-C-16173. Exposed, unpainted, machined-metal surfaces, and threaded surfaces that require occasional turning in normal operation of the unit shall be coated with grease conforming to specification MIL-G-10924.

(t) *Winch.*

1. Remove fill level plug. Ensure gear housing contains lubricant conforming to requirements of applicable lubrication order, filled to operating level.

2. Clean winch and cable (refer to L09-2320-242-12) and coat with P-1 preservative conforming to MIL-C-16173. While cable is being rewound, any damage to applied preservative coating shall be repaired by application of additional type P-1 preservative to damaged areas.

3. Coat all exposed, unpainted metal surfaces of metal drums, chains, hooks and controls with P-1 preservative conforming to MIL-C-16173. Moving, mating parts shall be coated with grease conforming to specification MIL-G-10924.

(u) *Rubber tires.* For shipment on common carriers, inflated tires mounted on the wheels shall be inflated to 10 pounds above pressure recommended for maximum load.

(v) *Publications.* Technical publications for each vehicle shall be packaged in accordance with IC-1 of MIL-P-116, unless otherwise specified. Technical publications shall be placed in the tool box or in the lubrication order holder on the equipment.

(2) Prepare the vehicle for Level B (mobile) preservation and packaging according to all the

requirements of Level A (mobile) preservation *end* packaging, refer to above steps (1) (a) through (1) (v).

Note: Level B (Mobile) are requirements to **provide** adequate protection for domestic or oversea shipment (open deck loading excluded) and which may involve storage outside of buildings for a combined total of approximately 90 days.

(3) Prepare the vehicle for Level C (mobile) preservation and packaging to the requirements of Level A (mobile) omitting steps (1) (i), (1) (1), (1) (k), (1) (l), (1) (n), and do the following steps:

(a) *Batteries.* When dry charged batteries are furnished, battery shall be secured in place in the vehicle battery carrier. Electrolyte for dry charged batteries shall be packaged and packed in containers conforming to specification MIL-S-207.

(b) *Fuel tanks.* When draining of fuel tanks has not been specified, residual fuel may remain in the fuel tank.

Note: Level C (mobile) are requirements to provide adequate protection for immediate *use* of domestic shipments from supply source to the first receiving activity.

c. Army Shipping Documents. Refer to paragraph 4-2 b. (f) for list of documents to be shipped with vehicle.

4-3. Storage Instructions

a. *General.* Disassembly will be limited to that necessary to clean and preserve exposed surfaces. Except as otherwise noted, and to the maximum extent consistent with safe storage, the vehicle will be placed in storage in as nearly a completely assembled condition as practicable. Equipment will be installed and adjustments made so that the vehicle may be placed in service and operated with minimum of delay.

b. *Receiving Inspections.*

(1) Perform a semiannual **preventive-maintenance** service on vehicle intended for storage. This maintenance will consist of inspection, cleaning, servicing, preserving, lubrication, adjusting, and replacement of minor repair parts if required.

(2) If wet (operating condition), remove storage battery and place in covered storage, maintaining a charged condition.

(3) Mark the vehicle Level A, B, or C (mobile) Storage (on windshield, tagged, or other convenient method). Vehicle so marked will not be operated while in this category.

c. *Storage Site.*

(1) The vehicle should be stored on level ground in the most favorable location available,

preferable one which affords protection from exposure to the elements and from pilferage.

(2) Provide access to the vehicle to permit inspection, servicing, and subsequent removal from storage.

d. Inspection During Storage.

UI Visual inspection of vehicle in storage must be conducted at least once each month and immediately following hard rain, heavy snowstorm, windstorm, or other severe weather conditions. Disassembly will be performed as necessary to ascertain fully the extent of any deterioration or damage found. A record of these inspections will be maintained for each vehicle in storage, attached to the vehicle in such a manner as to protect the record from the elements.

(2) When rust or deterioration is found on any unpainted area, necessary reprocessing for storage will be immediately accomplished. Damage caused to vehicle by severe weather conditions will be promptly repaired. Deterioration or damage to on vehicle equipment (OVE) material will be repaired as necessary. Painted surfaces showing evidence of deterioration will be thoroughly cleaned, dried and repainted, using paint of the same quality and color as the original paint.

e. Removal From Storage. Refer to paragraph 5-1 through 5-3 for **deprocessing** of vehicles from storage procedures.

4-4. Packaging and Packing Basic Issue Items

Refer to paragraph 4-2, b. (e) for packaging and packing basic issue items procedures.

4-5. Marking

Provide any necessary identification and precautionary markings in accordance with instruction contained in AR 746-80.

4-6. Loading and Blocking Instructions for Rail Shipment

a. General. Loading of vehicles on cars for shipment by rail shall be in accordance with applicable requirements of Association of American Railroads.

b. Army Shipping Documents. Prepare all Army shipping documents accompanying freight in accordance with AR 725-5.

c. Shipment of Vehicle on Flat Car with Wood Floor.

(1) Loading.

(a) Prepare vehicle for shipment in accordance with paragraph 4-2. Vehicle engine and fuel system may not require preservation with lubricant, type P-10. Prepare engine and fuel

system in accordance with shipping and contractual agencies.

(b) Place vehicle(s) on flat car. Two vehicles may be shipped on a 42 foot or longer flatcar. The vehicle(s) must be evenly spaced along the length of the car and centered laterally so vehicle(s) will not form an unbalanced load.

(c) Load vehicle on flatcar with a minimum distance of 6 inches from flatcar hand brake wheel.

(d) After each vehicle has been finally spotted on flatcar, place vehicle gear shift levers (transmission and transfer) in neutral position and wire -tie. Apply vehicle hand parking brake and wire or block lever.

(2) Blocking.

(a) When vehicles are shipped by rail, every precaution must be taken to see that they are properly loaded and securely fastened and blocked to floor or flatcar.

(b) Block front and rear wheels in front and rear using wooden blocks. Blocks shall be 24 inches long, 8 inches high and 6 inches thick. They will be shaped 45 degrees on one end and 33 degrees on the other end. (fig. 4-1 I.

1. Place blocks with the 45 degree portion against front and rear of wheels.

2. *Nail* heel (33 degree portion of block) of each block to floor of flatcar with 40-D nails. Toe-nail that portion under tire to floor with 40-D nails.

(c) Install wheel side cleats (2 x 4 x 24, 8 required) and cushioning material according to the following steps:

1. **Locate** one cleat (2 x 4) on car floor, against the outside of front and rear wheels.

2. Place suitable cushioning material (waterproof paper or burlap) between tire and cleat.

3. Ensure cushioning material protrudes under cleat on floor and 4 inches above cleat at side of tire.

4. Nail cleat to floor with four 30-D nails. Place another cleat on top of lower cleat and secure with four 30-D nails, allowing nails to secure upper overlap of cushioning material.

(d) Install vehicle strapping according to the following steps:

1. Using four strands of. No. 8 gage, black annealed, wire (or wires of equivalent strength), length to suit. Twist - tie wires to form cables.

2. Pass one end of each cable through a flatcar stake pocket on opposite sides of the vehicle and form a 6 inch loop in end, winding each of the four wires tightly around the cable.

Note: The angle of tie-down shall not exceed 45 degrees.

3. Extend the loop of the cable around and up to a point above the stake pocket.

4. Pass the other end of the cable through the towing shackle of the vehicle and down through the loop at the other end of the cable.

5. Tighten the four strands of wire around the cable, forming a loop around a loop.

6. Place a bar or tightening tool between the cables and twist - tie cables to remove slack. Remove bar or tightening tool.

7. The following general rules, Section 1, of Association of American Railroads will prevail in the loading the M561 or M792 on flatcars. General rule 3, 4, 5, 9, 14, 15, 19A and 19B.

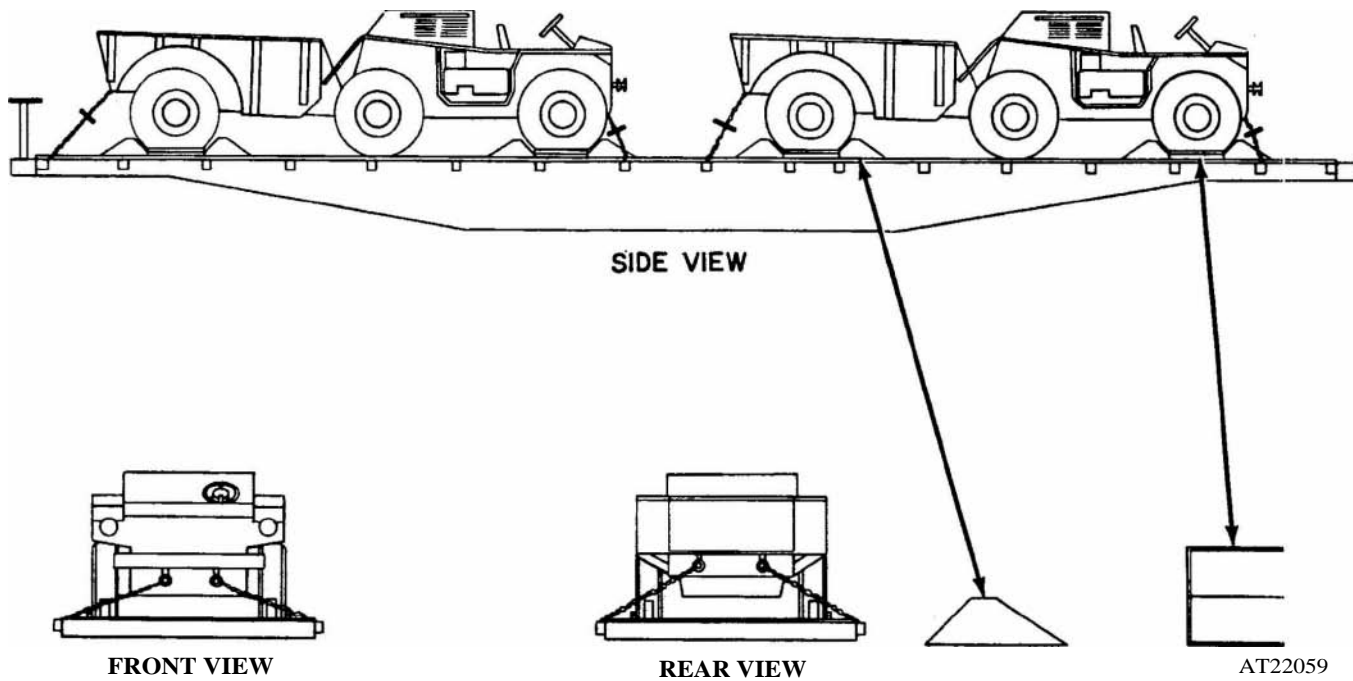


Figure 4-1. Method of blocking the M561 or M792 vehicle on wood flatcars.

d. *Shipment of Vehicle on Flat Car with Hydraulic or Similar Cars.*

(1) *Loading.* Comply with c. (1)(a) through (d) above.

(2) *Securing.*

(a) *Pass* one end of a suitable tie - down chain through one of the vehicle tie - down shackles and attach grab hook to an appropriate link of the chain (see fig. 4-2).

Note: Use a conventional tie-down chain with a minimum proof test of 8700 lbs. Each chain shall be equipped with an adjustable turn buckle with a safety lock device.

(b) *Pass* the other end of the chain through an appropriate rail car stake pocket.

(c) *Hand - tension* the chain as tight as possible and attach grab hook as above.

(d) Final tensioning of the tie-down chain shall be accomplished by utilizing the turnbuckle.

(e) The angle of tie-down shall not exceed 45 degrees. After the chains have been tensioned, they shall be hit sharply with a hammer to relieve any binding and retensioned if necessary.

(f) Grab hooks shall be secured with **wire** through the chain openings to prevent the hooks from disengaging from links to which they are attached.

Note: Load binders are not to be used in lieu of turnbuckles to tension tie-down chains.

(g) The following general rules, Section 1, of Association of American Railroads will prevail in loading M561 or M792 vehicle on metal floored flat cars. General rule : 4, 5, 19A and 19B.

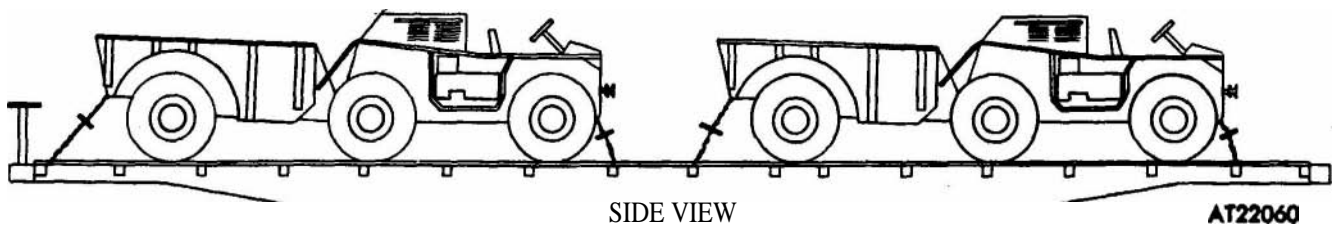


Figure 4-2. Method of securing M561 or M792 vehicle on Hydra-cushion flatcar.

e. Shipment of Vehicle on Bi-level Railcar.

(1) Loading.

(a) Prepare vehicle for shipment in accordance with paragraph 4-2. Vehicle engine and fuel system may or may not require preservation with lubricant (P-10). Prepare engine and fuel system in accordance with shipping and contractual agencies.

(b) Four vehicles may be loaded on each deck of either 85 foot, 87 foot 4 inch, or 89 foot bi-level car. Spacing between vehicles and at each end of car shall be approximately 20 or 30 inches respectively for the three cars.

Note: All vehicles must face in the same direction.

(c) Load vehicle on rail car with a minimum distance of 6 inches from railcar hand brake wheel.

(d) Position and locate tension devices and arrange tie - down chains in such a manner that vehicle can be driven on railcars without interference. Bridge plates should be lowered at this time.

(e) After each vehicle has been finally spotted on railcar, place vehicle gear shift levers (transmission and transfer) in neutral position and wire-tie. Apply vehicle hand parking brake and wire or block lever.

(2) Securing.

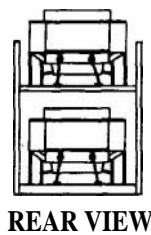
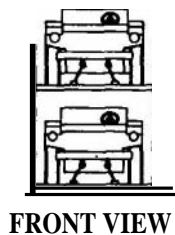
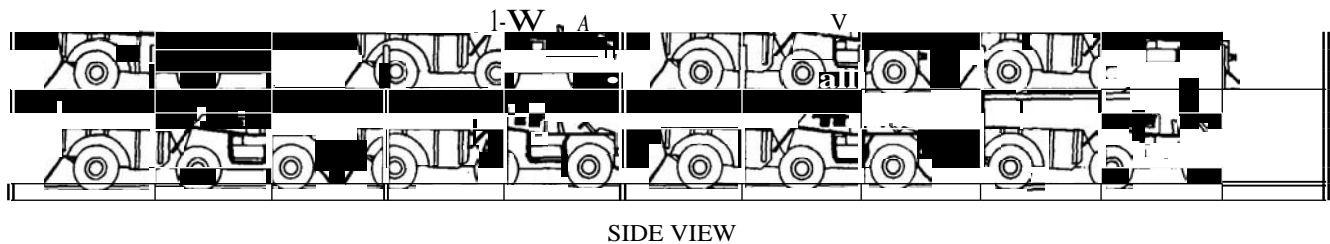
(a) Position and locate tension devices and tie-down chains per above step (d) (fig 4-3).

(b) Ensure tie-down chains are free of kinked or twisted links.

(c) Secure all open hooks with wire to prevent the hook from becoming disengaged from the chain link to which it is secured.

Note: Load binders are not to be used in lieu of turn-buckles to tension tie-down chains.

Id) The following general rules, Section 1, or Association of American Railroads will prevail in loading M561 or M792 vehicle on bi-level rail cars. General rule: 4, 5, 19A and 19B.



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Figure 4-3. Method of securing M561 or M792 vehicle on **bi-level** railcar.

4-7. Air Cargo Shipment

Refer to TM 9-2320-242-10 for preparation of vehicle for air cargo.

4-8. Preparation for Air Drop

a. Remove windshield and stow in storage rack under engine cover (refer to **TM9-2320-242-10**).

- b. Remove tractor canopy (refer to TM 9-2320-242-10).
- c. Remove tractor canopy frame assembly (refer to TM 9-2320-242-10). Stow on engine compartment.
- d. Place tractor canopy on engine cover and secure canopy and frame to handles with lashing material.
- e. Loosen mirror mounting hardware and fold mirrors to rear and lay on fenders. Secure with suitable tape. Tighten mounting hardware.
- f. Remove windshield wiper arms and blades (refer to para 2-226 and 2-227). Tape arms and blades together and tape to shifting lever.
- g. Remove carrier canopy (refer to TM 9-2320-242-10). Secure with tractor canopy on engine cover.
- h. Remove carrier bows and lay bows across front of carrier. Secure utilizing tiedown loops in carrier.
- i. Install inter-body truss according to the following steps:
 - (1) Move vehicle to firm flat ground.
 - (2) Remove two stow plugs from front of carrier body.
 - (3) Remove one quick-disconnect pin from each bump pad on rear of tractor body and rotate the pad downward (fig 4-4).

- (4) Screw eyebolts into front of carrier body.
- (5) Install aligning bearings into lugs on carrier hitch fitting.
- (6) Install the yoke fitting to the rear of **tractor** body with quick release pins.
- (7) Install the shorter truss assembly onto the yoke fitting and onto the carrier eyebolt by adjusting to fit ; then install quick release pin to secure truss to yoke fitting.
- (8) Install the longer truss assembly ~~onto~~ the carrier eyebolts and the aligning bearings on the carrier hitch fitting by adjusting the truss assembly to fit and then install the quick release pins.
- (9) Tighten all adjusting nuts.
- (10) After aerial delivery is complete, perform operations (2) thru (9) in reverse.

Caution: All truss kit hardware must be removed from bodies and bumper pad and the two plugs reinstalled for satisfactory vehicle articulation.

- j. Drive vehicle on pallet and secure per Air Force Documentation and AR705-8 and **AR705-35** (fig 4-5).

4-9. Shipment by Truck

Refer to TM 9-2320-242-10 for preparation of vehicle for shipment by truck.

Section II. DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

4-10. Destruction of Materiel

Refer to TM 9-2320-242-10 for demolition of

material to prevent enemy use.

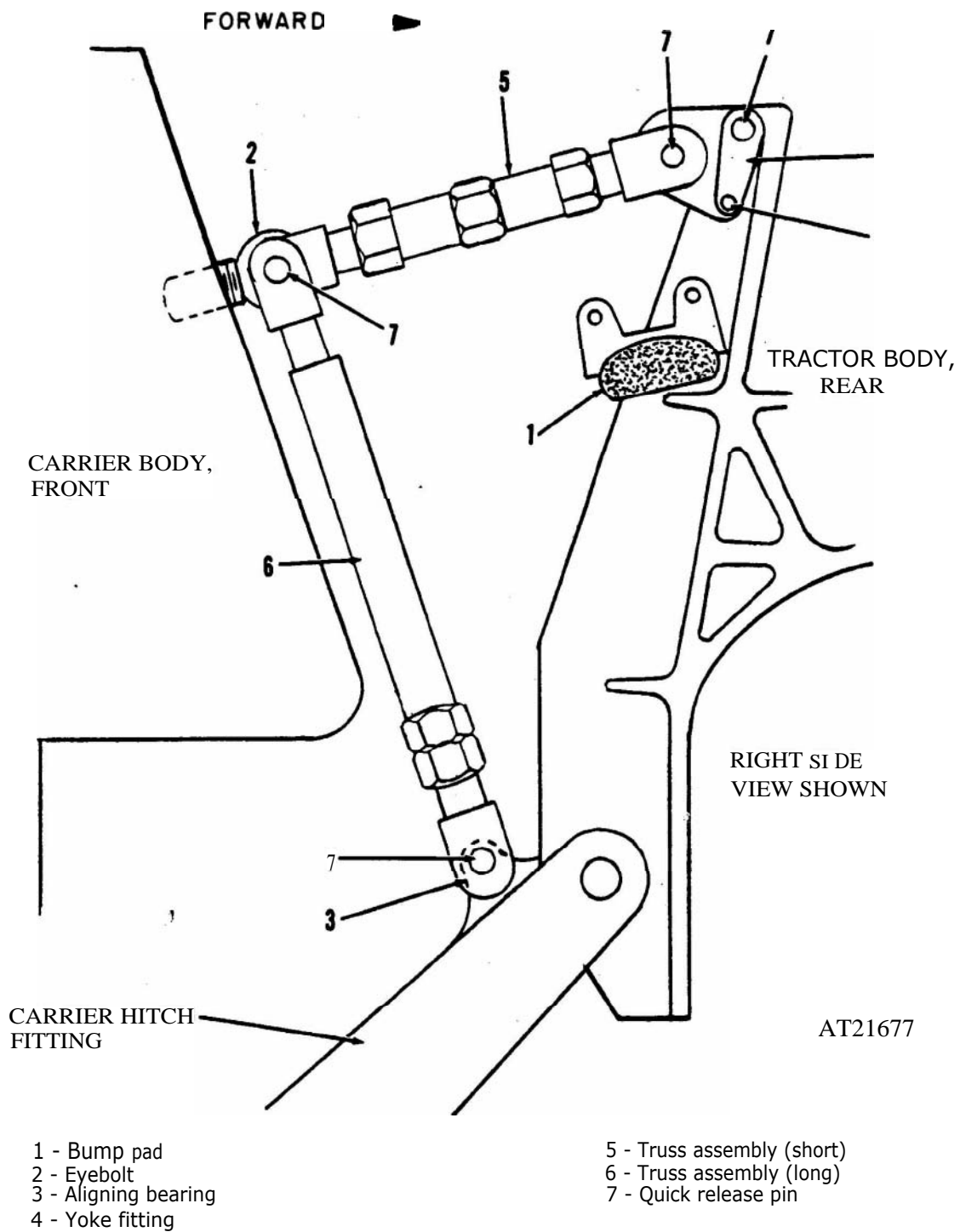
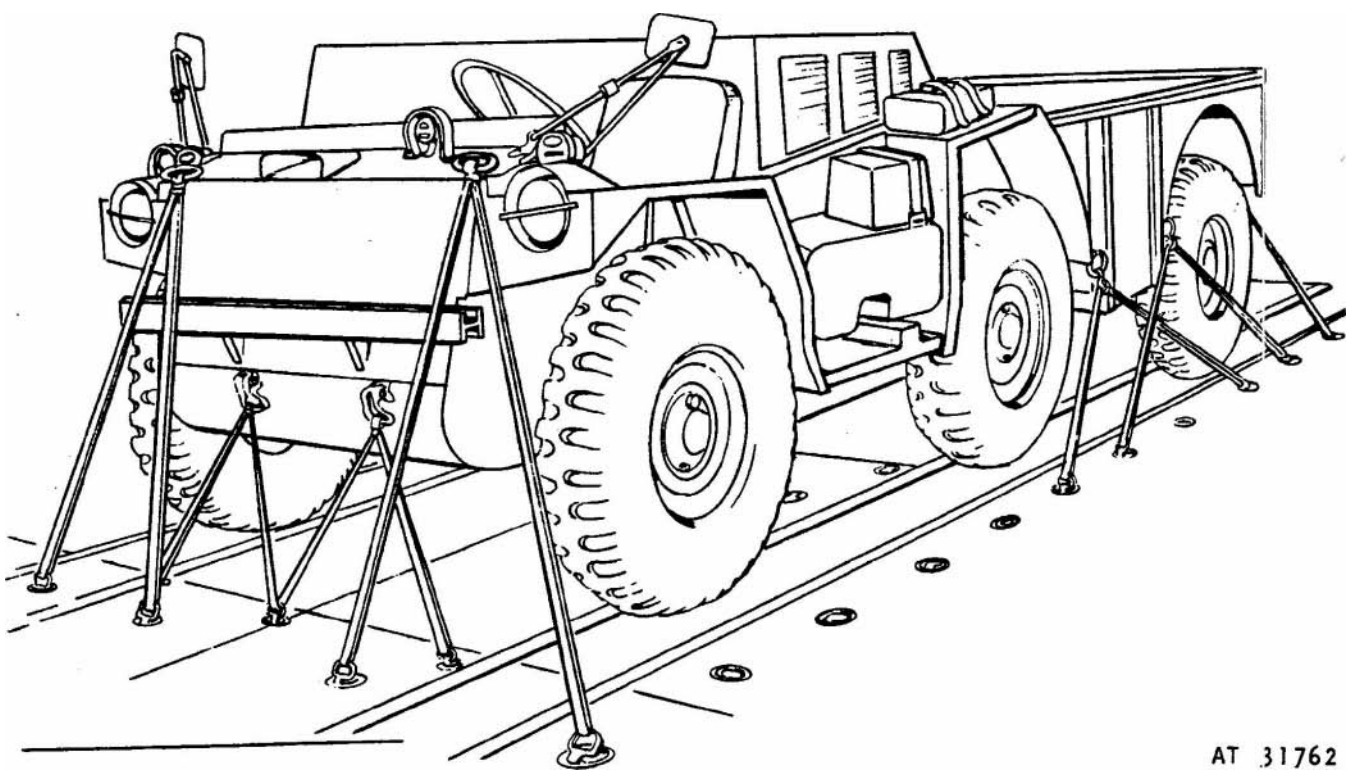


Figure 4-4. Inter-body truss installation.



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Figure 4-5. Air drop rigging **details**.

CHAPTER 5

DEPROCESSING OF VEHICLES

5-1. Deprocessing at Domestic Shipment Destination for Services

The deprocessing required before operation will appear opposite the processing accomplished. Use DD Form 1397, Processing and Deprocessing Record for Shipment, Storage and Issue of Vehicles and Spare Engines.

a. Removal of Sealing and Preserving Materials.

(1) Remove all sealing and protective materials that have been applied.

(2) Remove preservatives, as necessary, with approved cleaning solvents, *and* service as instructed in pertinent technical manuals.

(3) Unblock the clutch.

b. *Intallation of Components and Equipment Removed.* Install all removed components and equipment in normal operating position.

c. *Tires.* Inflate to prescribed pressure.

d. *Drains, Inspection Plates, and Valves.* Close drains, remove screens, and install inspection plates and gaskets.

e. Lubrication.

(1) Refer to sample record to assure that oils applied are applicable for operation **within** the current local temperature range. Unsuitable oils will be drained and **replaced** with proper grade oils.

(2) Preservative oils in lubrication systems as indicated will be kept to operating level until first oil change.

(3) Refer to L09-2320-242-12, and lubricate (oil or grease) all points regardless of interval since last lubrication. Exception : Wheel bearings and those items indicated on form.

f. *Batteries.* Change, service, or install as necessary, clean posts, and connect.

g. *Belts (Fan, Alternator, Etc.).* Tighten to proper tension.

h. Engine.

(1) Diesel engines not reprocessed within the period established in **TB9-300-2** / 1 as indicated in Reprocessing Cycle block on face of form, shall be **serviced before use**, as follows:

(a) Cooling system.

1. Remove the filler cap and fill the cooling system with clean, soft water or with a protecting solution of high boiling-point type antifreeze if the engine will be exposed to freezing temperatures. Keep the liquid level to about two

inches below the filler neck to allow for fluid expansion.

2. When using water alone in the cooling system, add rust inhibitor.

(b) Lubricating system.

1. The lubricating oil film on certain upper parts of engines which have been in storage for a considerable length of time may be inadequate for proper lubrication when the engine is first started. For this reason, it is recommended that the upper engine parts be prelubricated before starting the engine.

2. Remove the rocker cover and pour approximately two quarts of lubricating oil (of the same viscosity as that used in the engine crankcase) over the rocker arms and push rods.

3. Check the oil level in crankcase by means of the oil level dipstick at the side of the crankcase. Remove the dipstick, wipe the lower end with a clean cloth, then insert and remove the dipstick to take the level **reading**. Keep the oil level to the FULL mark on the dipstick. Use only lubricating oils, as specified in L09-2320-242-12.

(c) Fuel system.

1. Fill the fuel tank with diesel engine fuel as specified L09-2320-242-12.

2. To ensure prompt starting, fill at least that portion of the fuel system between the pump and the fuel return passage with fuel. The fuel oil filter (between the fuel pump and the injectors) on any engine that has been out of service a considerable length of time, should be primed. To prime a filter, remove the vent plug in the top of the filter cover and pour fuel slowly through the opening until the filter is full.

(2) Refer to TM 9-2320-242-10. Caution must be used in starting the engine to ensure that malfunctions such as hydrostatic lock do not occur.

5-2. Deprocessing at Overseas Shipment Destination for Service

a. In order that materiel will not be damaged due to corrosion during initial operation, thoroughly flush all surfaces that have been exposed to salt water with fresh water *as soon as practicable*. In addition, disassemble, clean, and lubricate essential operating mechanisms, in accordance with L09-2320-242-12, as soon as the tactical or logistical situation permits.

b. Perform any of the deprocessing prescribed in paragraph 5-1(a) through (h) that is applicable.

5-3. **Deprocessing in Storage Prior to Operation**

a. General. Perform any of the deprocessing prescribed in paragraph 5-1(a) through (h) that is applicable to the processed materiel.

b. Engines. If the engine is filled with preservative lubricating oil, the preservative oil will be retained until the using service places equipment

on scheduled maintenance. Install new engine oil filters where applicable.

c. Gearcases. Transfer, transmission, differentials, and steering gearcases will be filled to operating level with prescribed seasonal grade lubricant if required.

d. Lubrication. Lubricate materiel in accordance with instructions contained in **LO9-2320-242-12**.

APPENDIX A REFERENCES

A-1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this manual.

Dictionary of United States Army Terms	AR 320-5
Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings	DA Pam 108-1
Military Publication Indexes (As applicable)	DA Pam 310-series
Military Symbols	FM 21-30
Military Terms, Abbreviations, and Symbols: Authorized Abbreviations and Brevity Codes	AR 320-50
Military Training	FM 21-5
Techniques of Military Instruction	FM 21-6
Army Equipment Record Procedures	TM 38-750

A-2. Forms

The following forms pertain to this materiel. (Refer to DA Pamphlet 310-2 for index of blank forms.)

Processing and deprocessing record for shipment, storage, and issue of vehicles and spare engines.	DD1397
Recommended Changes to DA Publications	DA Form 2028
Organizational Control Record for Equipment	DA Form 2401
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Maintenance Request Register	DA Form 2405
Equipment Status and Deadline Report	DA Form 2406
Maintenance Request	DA Form 2407
Equipment Log Book Assembly — Instructions for General Equipment	DA Form 2408
Equipment Daily or Monthly Log	DA Form 2408-1
Equipment Maintenance Record (Organizational)	DA Form 2408.3
Equipment Modification Record	DA Form 2408-5
Equipment Transfer Record	DA Form 2408-7
Equipment Acceptance Record	DA Form 2408-8
Equipment Component Register	DA Form 2408-10
Accident Identification Card	DD Form 518
Equipment Maintenance Log (Consolidated)	DA Form 2409

A-3. Other Publications

The following publications contain information pertinent of major item materiel and associated equipment.

a. Camouflage

Camouflage, Basic Principles	FM 5-20
Camouflage of Vehicles	FM 5-20B

b. Decontamination

Decontamination	TM 3-220
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c. Demolition of Materiel to Prevent Enemy Use

Explosives and Demolition	FM 5-25
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A-3. Other Publications—Continued

d. General

Basic Arctic Manual	FM 31-70
Driver's Manual	TM 21-305
Driver's Selection and Training	TM 21-30D
Operation and Maintenance of Ordnance Materiel in Extreme Cold Weather (0° to -65° F)	TM 9-20 7
Lubrication of Ordnance Materiel	TM 9-273
Motor Transportation, Operations	FM 25-10
Mountain Operations	FM 70-10
Operations in the Arctic	FM 31-7 1
Use of Antifreeze Solutions in Engine Cooling System in Operating Vehicles	TB 750-65 1

e. Maintenance and Repair

Care and Maintenance of Pneumatic Tires	TM 9-1870-
Cleaning of Ordnance Materiel	TM 9-208-1
Cooling Systems: Vehicles and Powered Ground Equipment	TM 9-2858
Deepwater Forging of Ordnance Materiel	TM 9-238
Equipment Serviceability Criteria (ESC) for Truck, Cargo, 1-1 / 4 Ton, 6 x 6, M561 and Truck, Ambulance : 1-1 / 4 Ton, 6 x 6, M792	TM 9-2320-242-ESC
Inspection, Care, and Maintenance of Antifriction Bearings	TM 9-214
Lubrication Order for 1-1 / 4 Ton, 6x 6, Truck, Cargo, M561 and M792 Ambulance Truck	LO 9-2320-242-12
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Materials Including Chemicals	TM 9-247
Operator and Organizational Maintenance Manual: 6, 12, and 24 Volt Low Tension Circuit Automotive Generator and Voltage Regulator Test Set	TM 9-4910-401-12
Operator and Organizational Maintenance Manual: 6, 12, and 24 Volt Low Tension Circuit Automotive Generator and Voltage Regulator Test Set	TM 9-4910-402-12
Operator's Manual for Truck, Cargo, 1-1 / 4 Ton, 6 x 6, M561 and Truck, Ambulance: 1-1 / 4 ton, 6 x 6, M792	TM 9-2320-242-10
Ordnance Tracked and Wheeled Vehicles Hull and Chassis Wiring; Repair of Cracked or Peeled Plastic, Natural Rubber, or Synthetic Rubber-Covered Conduit Cables	TB ORD 650
Organizational Maintenance Repair Parts and Special Tool Lists for Truck, Cargo, 1-1 / 4 Ton, 6 x 6, M561 and Truck, Ambulance: 1-1 / 4 Ton, 6 x 6, M792	TM 9-2320-242-20P
Painting Instructions for Field Use	TM 9-213
Repairs and Utilities; Fire Protection Equipment and Appliances: Inspections, Operations, and Preventive Maintenance	TM 5-68 7
Sheet Metal Work; Body, Fender, and Radiator Repair	TM 10-450
Storage Batteries, Lead-Acid Type	TM 9-6140-200-15
Tactical, Transport, and Combat Vehicles: Troubleshooting for Instrument Cluster Gages, Switches, Circuit Breakers, Sending Units, and Related Wiring	TB 9-2300-228-20

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. GENERAL

B-1. Explanation

This Maintenance Allocation Chart designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of field maintenance tasks upon this end item or component will be consistent with the assigned maintenance operations which are defined as follows:

B-2. Definitions

a. *Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. *Test.* To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

c. *Service.* Operations required periodically to clean, to preserve, to change, to drain and to a&l fuel, lubricants, cooling agents and air.

d. *Adjust.* To regulate periodically to prevent malfunction and / or correct to the extent necessary to bring into proper specified operating range.

e. *Align.* To adjust two or more components of an electrical or mechanical system so that their functions are properly synchronized.

f. *Calibrate.* To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G. *Install.* To set up for use in an operational

environment, such as special purpose kits that do not come with the vehicle i.e., heater kit, machine gun kit, winch kit, etc.

h. *Replace.* To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

i. *Repair.* To restore an item to serviceable condition. This includes, but is not limited to inspection, cleaning, preserving, adjusting, removing, welding, riveting, and strengthening.

j. *Overhaul.* To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

It. *Abbreviation "SPTO".* The letters, "SPTO" are an abbreviation for "Special Tools" and is placed in column d of the Maintenance Allocation Chart. Use of these letters indicates that the special tool(s) required for the assigned category of maintenance to perform the particular function is listed in the appropriate technical manual.

L *Rebuild.* To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

Code	Explanation
C	Operator / crew
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance

SECTION II
MAINTENANCE ALLOCATION CHART
FOR

Truck, Cargo: 1¼ Ton, 6x6, M561 - Truck, Ambulance: 1¼, 6x6, M792

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION								(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		U a. Z	W	U Q	4 v	4 Z	REPLACE	R 4 a.	OVERHAUL			ILO
	<i>Group 01 Engine</i>											
0100	Powerplant Assembly			C				O				SPTO
	Engine Assembly	F	C					O	F	H		SPTO
	Mounts, Engine							O				
0101	Block and Cylinder Head	H						F	F	H		SPTO
	Sleeve Cylinder	H						H				SPTO
0102	Crankshaft and Bearings	H						H				SPTO
	Seal C / Shaft Oil							F				
	Pulley, Drive							F				
0103	Flywheel Assembly							F	H			SPTO
	Flywheel Housing							F	F			
0104	Piston, and Connecting Rod	H						H	H			SPTO
	Rings and Bearings	H						H				
0105	Valve, Exhaust	F		F				F	F			SPTO
	Guide, Valve	F						F				SPTO
	Shaft, Rocker Arm	F						F				
	Arm, Rocker	F						F				
	Seat, Exhaust Valve	F						F	F			SPTO
	Rod, Push	F						F	H			
	Gear, Timing	H						H				SPTO
	Camshaft and Bearings	H						H				SPTO
	Seal, Camshaft											
	Intake Ports			F								
0106	Pump, Oil							F	F	H		SPTO
	Cooler Assembly, Engine Oil							F				
	Filter Assembly, Engine Oil			O				O	O			
	Pan, Engine Oil							F	F			
0108	Exhaust Manifold	O						O				
	<i>Group 02 Clutch</i>											
0200	Clutch, Assy	F						F				
0202	Pedal, Controls and Linkage				O			F		O		
0202	Bearing, Clutch Release	F						F				
	Fork, Release Bearing	F						F				
	<i>Group 03 Fuel System</i>											
0301	Injector, Fuel	F						F	H			SPTO
	Lines and Fittings							F				
	Lever, Rack Control				F			F				
0302	Pump, Fuel		O					O				
0304	Element, Air Cleaner			C				O				
	Hose Assy							O				
0305	Blower, Air Intake	F	F					F	H			SPTO
	Tube, Air Box Drain			O				O				
0306	Tank, Fuel			C				O	F			
	Breather, Vent							O				
	Lines and Fittings							O				
0308	Governor, Engine Speed							F	H			
	Control & Linkage	F		F				F				
0309	Filters, Fuel			C				F	O	O		
0311	Engine Coldstart System	F						F	F			
0312	Accelerator Pedal & Linkage							O	O			
	Control Assy , Throttle				C			O				
	Cable Assy, Engine Cutoff				C			O				

Up to Primary
Filter

SECTION II
MAINTENANCE ALLOCATION CHART
FOR

Truck, Cargo: 1 1/4 Ton, 6x6, M561 - Truck, Ambulance: 1 1/4, 6x6, M792

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS		
		SECT	T	S	W	W	I	E	REPA	OVERHA	U				
1000	Group 10 Front Axle Axle Shaft & U Joint Assy			0				0	0						
1002	Slinger & Seal Stub Axle Differential Assy, Front Seals			0				0	0	F	H		SPTO		
1004	Vent Lines Fittings Suspension Arm and Ball Joints					F		0	0				SPTO	Report to Direct Support for Caster and Camber Align- ment	
1100	Knuckle, Steering Group 11 Rear Axle Axle Shaft & 'U' Joint Assy			0				0	0						
1102	Slinger and Seal, Stub Axle Differential Assembly Center and Rear			0				0	0	H	H		SPTO		
1109	Seals Vent Lines and Fittings Suspension, Arm and Ball Joints					F		F	0					Report to Direct Support for caster camber alignmen	
1201	Knuckle, Steering, Carrier Group 12 Brakes Parking Brake Assy							0	0						
1202	Service Brake Assy	0		0	0			0	0						
1204	Air Reservoir, Lines and Fittings Shoe, Service Brake Cylinder, Master Cylinder, Wheel	0		0	d			0	0	F			SPTO		
1206	Hoses, Lines, Fittings Pedal, Service Brake							0	0						
1311	Group 13 Wheels Wheel, Drum Assembly							0	0					Wheel Alignment Performed at D: Ref: GR-1004 & 1104	
1311	Hub Bearings & Cups, Hub Inner & Outer	0		0				0	0				SPTO		
1313	Seal, Wiper Drum Assembly Valve, Pneumatic Tire	D						0	0	F			SPTO		
1401	Group 14 Steering Column, Steering Tie Rods Amy, Tractor & Carrier Torque Tube & Bearing Amy, Steering	C		C				0	0				SPTO		
1407	Idler Arm Amy, Tractor & Carrier Pitman Ann, Tractor & Carrier Steering Gear Box, Tactor 8 Carrier			0	F			0	0	F					

**SECTION II
MAINTENANCE ALLOCATION CHART**

FOR

Truck, Cargo: 1 1/4 Ton, 6x6, M561 - Truck, Ambulance: 1 1/4, 6x6, M792

(1) GROUP NUMBER	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS				
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD			
	<i>Group 15 Frame & Towing Attachments</i>																
1501	Bumper, Front & Rear								O								
1503	Pintle, towing Yoke, Articulation Joint, Assy			O					O								
	<i>Group 16 Spring & Shock Absorbers</i>																
1601	Springs, Coil, Tractor & Carrier					F			O								Report to Direct Support for Cuter Cumber Ad-moment
	<i>Spring Leaf, Center</i>																
1604	Shock Absorber & Struts								O								
	<i>Group 18 Body, Cab, Hood & Hull</i>																
1801	Tractor, Body, Cab, Hull Fenders and Mud Guards Cover, Engine (Hood) Console Windshield Assembly								O								Cut glass to size at DS
	<i>Panels, Access, Tractor & Carrier</i>																
1806	Seats, Tractor								O								
	<i>Cushion, Seat & Back Rest</i>								O								
1808	Brackets, Tie Downs, Straps, Stowage								O								
1810	Body/Hull & Frame								O								
	<i>Tailgate Seal, Tailgate Seats, Troop Latch, Troop Seat</i>								O								
	<i>Group 20 Winch and Power Take Off</i>								O								
	<i>Group 22 Body Chassis or Hull and Accessory Items</i>																
2201	Canopy and Curtains, Cab, Carrier Bows, Tractor & Carrier								O								
2202	Motor, W / Shield Wiper Arm and Blades Mirrors & Reflectors Heater Assy, Ambulance	O							O								
2205	Pump, Bilge								O								
	<i>Hose and Screen, Bilge Pump</i>								O								
2210	Plates, Vehicle Data								O								
	<i>Group 33 Special Purpose Kits Winterization Kits</i>																
3303	Personnel Heater (-25° F) Kit Ducting, Tubes & Lines, 125° F Heater Heater Assy, (-25° F) Control Box 1-25 a F)			O				O	O								

APPENDIX C

TORQUE REQUIREMENTS

C-1. Special Torque Values

The following items listed in Table C-1 are special torque requirements. They are torques of attaching hardware which are used for critical attachment and / or alignment of vehicle components. All the special torque items are listed in their appropriate sections throughout the manual and listed in this section for the convenience of the user.

Table C-1. Special Torque Requirements

operation	Torque
Engine to mount, bolt	55 to 65 lbs-ft.
Alternator mounting bracket, screws	60 to 75 lbs-ft.
Exhaust manifold to engine mounting stud, nut	30 to 35 lbs-ft.
Alternator adjusting strap, screw	35 to 40 lbs-ft.
Alternator pulley to alternator shaft, nut	40 to 50 lbs-ft.
Starter to flywheel housing, bolt	85 to 90 lbs-ft.
Transmission to transfer coupling, screws	24 to 27 lbs-ft.
Tractor propeller shaft assembly to transfer case yoke and center differential yoke, screw	35 to 45 lbs-ft.
Spider and bearing assemblies to transmission to transfer coupling, screw	24 to 30 lbs-ft.
Spider and bearing assemblies to tractor to carrier coupling, screw	24 to 30 lbs-ft.
Spider and bearing assemblies to tractor propeller shaft, screw	35 to 45 lbs-ft.
Carrier propeller shaft assembly to rear differential yoke, screw	24 to 27 lbs-ft.
Front-center-rear axle assemblies to stub shaft, screws	35 to 40 lbs-ft.
Right and left suspension arms to center differential, <i>nuts</i>	120 to 130 lbs-ft.
Center steering shaft bearings (pillow blocks) center differential	8 to 12 lbs-ft.
All steering universal joints to shafts, nut	15 to 24 lbs-ft.
Rear differential lugs to support bracket, screw	200 to 250 lbs-ft.
Wheel to hub, nut	80 lbs-ft.
Steering column bracket to cowl, nut	45 to 65 lbs-ft.
Tractor steering gearbox to tractor floor, screw	15 to 24 lbs-ft.
Tractor steering gearbox to bulkhead, nut	105 to 145 lbs-ft.
Tractor and carrier pitman arm to steering gearbox shaft, nut	95 to 120 lbs-ft.
Carrier steering gearbox to carrier, nut	70 to 100 lbs-ft.
Tractor and carrier idler arm to idler housing, nut	95 to 120 lbs-ft.
Tractor and carrier idler housing to vehicle, screw	45 to 55 lbs-ft.
Rod end to intermediate tie rod, nut	90 to 100 lbs-ft.
Carrier steering shaft bearing (pillow block) to bracket, nut	8 to 12 lbs-ft.
Carrier steering shaft bearing (pillow block) bracket to body, nut	14 to 22 lbs-ft.
Upper and lower suspension arm to bracket, plug	92 to 110 lbs-ft.
Upper and lower suspension arm bracket to vehicle, bolt	92 to 110 lbs-ft.
Shock absorber to body or lower suspension arm, nut	105 to 145 lbs-ft.
Suspension bumper (jounce) to body, nut	9 to 12 lbs-ft.
Windshield wiper motor shaft to cowl, nut	28 to 32 lbs-ft.

C-2. Standard Torque Values

Table C-2 provides standard torque values for specific size and grade of bolts and screws utilized as attaching hardware for components and parts. If specific torque values are not specified in the appropriate component paragraphs, attaching hardware should be tightened to the torque values of table C-2.

Table C-2. Standard Torque Data

Bolt or screw size	Threads per inch	Diameter (inch)	SAE grade 2* torque		SAE grade 5** torque		SAE grade 7+ torque		SAE grade 8++ torque	
			-Wet		Wet		Dry	Wet		Wet
4	40	0.1120	5	4	8	6	11	8	12	9
4	48	0.1120	6	5	9	7	12	9	13	10
6	32	0.1380	10	8	16	12	20	15	23	17
6	40	0.1380	12	9	18	13	22	17	25	19
8	32	0.1640	19	14	30	22	36	27	41	31
8	36	0.1640	20	15	31	23	38	29	43	32
10	24	0.1900	27	21	43	32	52	39	60	45
10	32	0.1900	31	23	49	36	60	45	68	51
1/2	20	0.2500	66	49	96	75	120	96	144	108
1/2	28	0.2500	76	56	120	86	144	108	168	120
5/16	18	0.3125	11	8	17	13	21	16	25	18
5/16	24	0.3125	12	9	19	14	24	18	25	20
3/8	16	0.3750	20	15	30	23	40	30	45	35
3/8	24	0.3750	23	17	35	25	45	30	50	35
7/16	14	0.4375	30	24	50	35	60	45	70	55
7/16	20	0.4375	35	25	55	40	70	50	80	60
1/2	13	0.500	50	35	75	55	95	70	110	80
1/2	20	0.500	55	40	90	65	100	80	120	90
9/16	12	0.5625	65	50	110	80	135	100	150	110
9/16	18	0.5625	75	55	120	90	150	110	170	130
	11									
5/8	11	0.6250	90	70	150	110	190	140	220	170
5/8	18	0.6250	100	80	180	130	210	160	240	180
3/4	10	0.7500	160	120	260	200	320	240	380	280
1/4	16	0.7500	180	140	300	220	360	280	420	320
7/8	9	0.8750	140	110	400	300	520	400	600	460
7/8	14	0.8750	155	120	440	320	580	440	660	500
1	8	1.0000	220	160	580	440	800	600	900	680
1	12	1.0000	240	170	640	480	860	660	1000	740
1 1/4	7	1.1250	300	220	800	600	1120	840	1280	960
1 1/8	12	1.1250	340	260	880	660	1260	940	1440	1080
1 1/4	7	1.2500	420	320	1120	840	1580	1100	1820	1360
1 1/4	12	1.2500	460	360	1240	920	1760	1320	2000	1500
1 3/8	6	1.3750	560	420	1460	1100	2080	1560	2380	1780
1 3/8	12	1.3750	640	460	1680	1260	2380	1780	2720	2040
1 1/2	6	1.50000	740	560	1940	1460	2780	2080	3160	2360
1 1/2	12	1.5000	840	620	2200	1640	3100	2320	3560	2660

* Head marking - none

** Head marking -

+Head marking -

++ Head marking -

APPENDIX D TIME STANDARDS

D-1. General Maintenance

The following table lists the number of man-hours required to perform the indicated maintenance and repair for the truck, cargo: 1-1 /4 ton, 6 x 6, M561; and truck, ambulance : 1-1 / 4 ton, 6 x 6, M792. The man-hours include all operations to accomplish the task. Components are listed under the appropriate functional index. The times listed are for normal conditions and should not establish rigid standards. Under adverse conditions, the operations will take longer, however, under ideal conditions with skilled mechanics, most of the operations can be accomplished within the time specified.

Table D-1. Time Standards

Maintenance and Operation	Man-hours
01 ENGINE	
0100 POWER PLANT	
(to replace)	2.4
Engine assembly	
(to replace)	3.5
Engine mounts	
(to replace front and rear)	3.0
0106 ENGINE OIL FILTER	
(to replace)	0.5
(to repair)	1.4
0108 EXHAUST MANIFOLD	
(to replace)	0.2
02 CLUTCH	
0202 PEDAL, CONTROLS, AND LINKAGE	
(to adjust)	0.2
(to replace)	0.6
(to repair)	0.9
03 FUEL SYSTEM	
0302 FUEL PUMP	
(to replace)	0.4
Fuel pump, carrier heater (M792 ambulance)	
(to replace)	0.2
0304 AIR CLEANER	
Air cleaner assembly	
(to replace)	0.4
Air cleaner element	
(to replace)	0.1
Hose and clamps	
(to replace)	0.2
0305 BLOWER	
Air box drain tube	
(to replace)	0.2
0306 TANKS, LINES, FITTING AND HEADERS	
Fuel tank	
(to replace)	0.7
Fuel filler cap	
(to replace)	0.1
Lines and fittings	
(to replace)	0.9
0309 FUEL FILTERS	
Primary fuel filter	
(to replace)	0.3
(to repair)	0.1

Table D-1. Time Standards—Continued

Maintenance and Operation	Man-hours
Secondary fuel filter	
Ito replace	
(to repair)	0.2
Fuel filter, carrier heater (M792 ambulance)	0.3
(to replace)	0.2
0312 ACCELERATOR, THROTTLE, OR CHOKE CONTROLS	
Accelerator pedal and linkage	
(to adjust)	0.1
(to replace)	0.5
(to repair)	0.3
Hand throttle cable assembly	
(to adjust)	0.1
(to replace)	0.4
04 EXHAUST SYSTEM	
0401 MUFFLER AND PIPES	
Muffler clamp assembly	
(to replace)	0.2
Muffler	
(to replace)	0.3
Exhaust manifold	
(to replace)	0.4
Exhaust header pipe	
(to replace)	0.2
Exhaust pipe	
(to replace)	0.2
Tail pipe, inner and outer	
(to replace)	0.4
05 COOLING SYSTEM	
0501 RADIATOR	
Vibration isolators	
(to replace)	1.4
Radiator	
(to replace)	1.4
Surge tank	
(to replace)	0.7
Support brace	
(to replace)	0.4
0502 COWLING, DEFLECTORS, AIR DUCTS, AND SHROUDS	
Radiator shroud	
(to replace)	0.6
0503 WATER MANIFOLD, HEADERS, THERMOSTATS, AND HOUSING GASKET	
Thermostat housing gaskets	
(to replace)	0.7
Thermostat housing	
Ito replace)	0.5
Houses and clamps	
(to replace)	0.3
Thermostat	
(to replace)	0.3
0504 WATER PUMP	
Water pump	
(to replace)	0.9
0505 FAN ASSEMBLY	
Fan drive belt	
Ito replace)	0.3
(to adjust)	0.1
Fan pulley and hub assembly	
(to replace)	0.6
Idler pulley assembly	
(to replace)	0.3

Table D-1. Time **Standards—Continued**

Maintenance and Operation	
06 ELECTRICAL SYSTEM	
0601 ALTERNATOR	
Alternator (60-ampere)	
(to test)	0.5
(to replace)	0.6
Mounting bracket	
(to replace)	0.3
Drive pulley	
(to replace)	0.2
0603 STARTING MOTOR	
Starting motor	
(to replace)	0.7
0606 ENGINE SAFETY CONTROLS	
Circuit breaker	
(to replace)	0.2
0607 INSTRUMENT OR ENGINE CONTROL PANEL	
Master switch	
(to replace)	0.2
High beam indicator light	
(to replace)	0.1
High beam indicator lamp	
(to replace)	0.1
Instrument panel light	
(to replace)	0.1
Stoplight indicator light	
(to replace)	0.2
Engine starting switch	
(to replace)	0.1
Windshield wiper switch	
(to replace)	0.1
Bilge pump switch	
(to replace)	0.1
Fuel level indicator gage	
(to replace)	0.2
Battery-generated indicator gage	
(to replace)	0.2
Oil pressure gage	
(to replace)	0.2
Coolant temperature gage	
(to replace)	0.3
Convenience receptacle control box (M792 ambulance)	
(to replace)	0.2
Heater control box (M792 ambulance)	
(to replace)	0.2
0608 MISCELLANEOUS ITEMS	
Main light switch	
(to replace)	0.2
Turn signal control switch	
(to replace)	0.1
Beam selector (dimmer)switch	
(to replace)	0.1
Stop light switch (hydraulic)	
(to replace)	0.2
Turn signal distribution box	
(to replace)	0.3
Carrier stop signal switch	
(to replace)	0.2

Maintenance and Operation	Men-hours
0609 LIGHTS	
Turn, park, blackout marker light (to replace assembly)	0.2
(to replace lamps)	0.1
Headlight (to replace assembly)	0.2
(to replace lamp)	0.1
Blackout headlight (to replace assembly)	0.2
(to replace lamp)	0.2
Carrier overhead light (M792 ambulance) (to replace)	0.2
(to replace lamp)	0.1
0610 SENDING UNITS AND WARNING SWITCHES	
Coolant temperature sending unit (to test)	0.2
(to replace)	0.3
Engine oil pressure sending unit (to test)	0.2
(to replace)	0.2
Fuel level sending unit (to test)	0.2
(to replace)	0.3
0611 HORN	
Horn (to replace)	0.1
(to adjust)	0.1
Horn button (to replace)	0.2
Steering column contact (to replace)	0.2
Horn wire (to replace)	0.6
0612 BATTERIES, STORAGE	
Battery (to test)	0.4
(to replace)	0.5
Inter battery cable (to replace)	0.5
Battery ground cable (to replace)	0.3
Battery hold-down bracket (to replace)	0.1
0613 HULL OR CHASSIS WIRING HARNESS	
Carrier wiring harness (to repair)	0.9
(to replace)	0.7
Engine compartment harness (to repair)	0.9
(to replace)	0.8
Tractor wiring harness (to repair)	0.9
(to replace)	4.1
Tractor-to-carrier cable (to replace)	0.1
Tractor front fender harness (to repair)	0.9
(to replace)	0.5
Carrier right rear harness (to repair)	0.9
(to replace)	0.5

Table 1)-1. Time Standards- -Continued

Maintenance and (oeration	Man-hours
0613 HULL OR CHASSIS WIRING HARNESS—Continued	
Carrier left rear harness	
(to repair)	0.9
(to replace)	0.5
Carrier tail harness	
(to repair)	0.5
(to replace)	0.2
Auxiliary harness	
(to repair)	0.5
(to replace)	0.4
Convenience receptacle harness (M792 ambulance)	
(to repair)	0.5
(to replace)	0.2
Heater harness (M792 ambulance)	
(to repair)	0.5
(to replace)	0.2
Carrier overhead light harness (M792 ambulance)	
(to repair)	0.5
(to replace)	0.2
07 TRANSMISSION	
0701 TRANSMISSION ASSEMBLY	
Transmission	
(to replace)	2.5
0704 TRANSMISSION TOP COVER ASSEMBLY	
Controls and linkage	
(to adjust)	0.2
(to replace)	0.6
08 TRANSFER ASSEMBLY	
0801 TRANSFER ASSEMBLY	
Transfer assembly	
(to replace)	4.0
Transfer oil (dipstick) gage	
(to replace)	0.2
0803 GEARSHIFT AND CONTROLS	
Controls and linkage	
(to replace)	1.0
(to adjust)	0.1
09 PROPELLER AND PROPELLER SHAFTS	
0900 PROPELLER SHAFTS	
Transmission-to transfer coupling	
(to replace)	0.5
(to repair)	0.2
Tractor-to-carrier coupling	
(to replace)	0.4
(to repair)	0.4
Tractor propeller shaft and joints	
(to replace)	0.8
(to repair)	1.2
Carrier propeller shaft and joints	
(to replace)	0.7
(to repair)	1.5
Carrier center bearing assembly	
(to replace)	3.0
Propeller shaft and U-joints	
(to replace)	1.1
(to repair)	1.1

Table D-1. Time Standards-Continued

Maintenance and Operation	Man-hours
10 FRONT AXLE	
1000 FRONT AXLE ASSEMBLY	
Axle shaft and U-joint assembly	
(to replace)	0.5
(to repair)	0.6
Stub axle and seal	
(to replace)	0.5
Stub axle bearing	
(to replace)	0.3
1002 DIFFERENTIAL	
Front differential assembly	
(to replace)	4.0
1004 STEERING AND SUSPENSION MECHANISM, TRACTOR	
Upper suspension arm, front and rear	
(to replace)	3.4
(to repair)	2.5
Lower suspension arm, front and rear	
(to replace)	1.3
(to repair)	1.1
Steering knuckle	
(to replace)	1.5
11 REAR AXLE	
1100 REAR AXLE ASSEMBLY	
Axle shaft and U-joint assembly	
(to replace)	0.5
(to repair)	0.6
Stub axle and seal	
(to replace)	0.3
Stub axle bearing	
(to replace)	0.3
1102 DIFFERENTIAL	
Tractor rear differential assembly	
(to replace)	3.0
Carrier differential assembly	
(to replace)	1.0
1104 STEERING AND SUSPENSION MECHANISM	
Carrier upper suspension arm	
(to replace)	2.0
(to repair)	1.2
Carrier lower suspension arm	
(to replace)	1.6
(to repair)	2.0
Carrier steering knuckle	
(to replace)	1.9
Tractor rear A-frame suspension arm	
(to replace)	1.3
(to repair)	1.0
12 BRAKES	
1201 HAND BRAKES	
Parking brake shoe	
(to replace)	0.7
Parking brake drum	
(to replace)	0.3
Parking brake lever assembly	
(to replace)	0.6
Parking brake linkage	
(to replace)	0.2
1202 SERVICE BRAKES	
Brake shoe	
(to inspect)	0.2
(to adjust)	0.4
(to replace)	2.1

Table D-1. Time Standards-Continued

Maintenance and Operation	Man-hours
1202 SERVICE BRAKES-Continued	
Air reservoir, lines and fittings (to replace)	0.7
(to repair)	0.7
1204 HYDRAULIC BRAKE SYSTEM	
Master cylinder (to replace)	1.2
Wheel cylinder (to replace)	3.2
Hoses and flexible lines (to replace)	4.5
1206 MECHANICAL BRAKE SYSTEM	
Service brake pedal (to replace)	0.5
13 WHEELS	
1311 WHEEL ASSEMBLY	
Inner and outer bearings and cups, and hub (to inspect)	0.3
(to replace)	2.7
Wiper seal (to replace)	2.3
Drum assembly (to replace)	0.5
Wheel cylinder (to replace)	1.5
Hub (to replace)	1.7
Pneumatic valve (to replace)	0.5
Valve core (to replace)	0.1
Wheel and tire (to replace)	0.3
1313 TIRES	
Tires (to install)	0.3
(to replace)	0.3
(to repair)	1.1
14 STEERING	
1401 STEERING ASSEMBLY	
Steering wheel (to replace)	0.9
Steering column (to replace)	0.9
(to repair)	1.5
Pitman arm, front (to replace)	0.4
Pitman arm, rear (to replace)	0.4
Tractor intermediate tie rod (to adjust for toe-in)	0.5
(to replace)	0.8
(to repair)	0.8
Tractor -tie rod assembly (to adjust)	0.5
(to replace)	0.6
(to repair by replacing outer angle rod end)	0.5
(to repair by replacing inner straight rod end)	0.5
Carrier tie rod assembly (to adjust)	0.5
(to replace)	0.6
(to repair by replacing outer angle rod end)	0.5
(to repair by replacing inner straight rod end)	0.5

Table D-1. Time Standards—Continued

Maintenance and Operation	Man-hours
Carrier intermediate tie rod (to replace)	0.5
Steering torque tube assembly (to replace)	1.0
(to repair)	1.3
Torque tube bearing (to replace)	0.5
Tractor idler arm assembly (to replace)	0.2
(to repair) by replacing stop adjustingscrew	0.3
Carrier idler arm assembly (to replace)	0.2
Pitman arm (to replace)	0.3
1407 STEERING GEAR ASSEMBLY	
Tractor steering gear box (to replace)	1.3
Carrier steering gear box (to replace)	1.1
15 FRAME, TOWING ATTACHMENTS, AND DRAWBARS	
1501 FRAME ASSEMBLY	
Front bumper (to replace)	0.2
(to repair)	0.3
Rear bumper (carrier) (to replace)	0.1
1503 PINTLES AND TOWING ATTACHMENTS	
Pintle (to replace)	0.3
(to repair)	0.2
Towing shackle (to replace)	0.1
Tailgate bumper (M792 ambulance) (to replace)	0.1
16 SPRINGS AND SHOCK ABSORBERS	
1601 SPRINGS	
Tractor coil springs (to replace)	0.6
Carrier coil springs (to replace)	0.6
Tractor rear leaf spring (to replace)	1.5
1604 SHOCK ABSORBERS	
Tractor shock absorbers (to replace)	0.3
Carrier shock absorbers (to replace)	0.3
Tractor snubbers (jounce bumpers) (to replace)	0.2
Carrier snubbers (jounce bumpers) (to replace)	0.2

Table D-1. Time Standards—Continued

Maintenance and Operation	Man-hours
18 BODY, CAB, HOOD, AND HULL	
1801 BODY, CAB, HOOD AND HULL ASSEMBLIES	
Fenders (to replace)	2.0
Brush guards (to replace headlight brush guard)	0.1
(to replace horn brush guard)	0.2
(to replace blackout headlight brush guard)	0.1
Tractor hull drain plug (to replace)	0.3
Engine cover (to replace)	0.7
Mud guard, rear tractor fender (to replace)	0.4
Mud guard, front tractor fender (to replace)	0.3
Access panels (to replace tractor steering gear box access panel)	0.2
(to replace carrier steering gear box access panel)	0.2
(to replace master cylinder access panel)	0.1
(to replace tractor hull access panel)	0.3
1801 BODY, CAB, HOOD AND HULL ASSEMBLIES—Continued	
Vehicle lifting rings (to replace)	0.1
Vehicle tie-down rings (to replace)	0.1
Carrier cargo tie-downs (to replace)	0.2
Console (to replace)	0.2
Tailgate bumpers (stops) (to replace)	0.1
Windshield assembly (to replace)	0.3
Carrier lashing hooks (to replace)	0.1
1806 UPHOLSTERY SEATS AND CARPETS	
Tractor driver seat (to replace)	0.1
Tractor right seat (to replace)	0.1
Attendant's seat (M792 ambulance) (to replace)	0.1
1808 STOWAGE RACKS, BOXES, AND STRAPS	
Tie-down straps (to replace)	0.2
1808 STOWAGE RACKS, BOXES, AND STRAPS—Continued	
Liquid container hold-down bracket (to replace)	0.2
Battery box (to replace)	0.1
Personnel safety belts and straps (to replace)	0.2
Battery box strap assemblies (to replace)	0.4
Straps and brackets (M792 ambulance) (to replace)	0.2
Litter securing straps (M792 ambulance) (to replace)	0.5

Maintenance and Operation	Man-hours
1810 CARGO BODY	
Tailgate seal (to replace)	0.4
Troop seat latch (to replace)	0.1
Troop seat assembly (to replace)	0.2
Carrier seat backs (to replace)	0.2
Pioneer tool straps (to replace)	0.2
1810 CARGO BODY—Continued	
Tailgate locking handle (to replace)	0.1
Tailgate chain assemblies (to replace)	0.1
Tailgate assembly (to replace)	0.2
Tailgate step (M792 ambulance) (to replace)	0.5
Troop seats (M792 ambulance) (to replace)	0.3
Tailgate facing (to replace)	0.3
22 BODY CHASSIS OR HULL, AND ACCESSORY ITEMS	
2201 CANVAS, RUBBER, OR PLASTIC ITEMS	
Tractor canopy (to replace)	0.2
Carrier canopy (to replace)	0.8
Tractor canopy bows (to replace)	0.3
Carrier canopy bows (to replace)	0.4
(to clean and repair)	0.4
Front carrier curtain (to replace)	0.2
Rear carrier curtain (to replace)	0.2
Carrier canopy (M792 ambulance) (to replace)	0.8
Carrier bows (M792 ambulance) (to replace)	0.5
Carrier guard (M792 ambulance) (to replace)	0.4
Carrier head pad (M792 ambulance) (to replace)	0.2
Dispenser bracket (M792 ambulance) (to replace)	0.1
Overhead light bracket (M792 ambulance) (to replace)	0.2
Canopy windows (M792 ambulance) (to replace)	0.3
2202 ACCESSORY ITEMS	
Windshield wiper motors (to replace)	0.5
Windshield wiper arms (to replace)	0.2
Windshield wiper blades (to replace)	0.1

Table D-1. Time Standards—Continued

Maintenance and Operation	Man-hours
2202 ACCESSORY ITEMS-Continued	
Side mirror assembly (to replace)	0.2
Carrier reflectors (to replace)	0.2
Heater assembly (M792 ambulance) (to replace)	0.4
Heater ducts (M792 ambulance) (to replace)	0.5
Heater exhaust pipe (M792 ambulance) (to replace)	0.5
Heater exhaust pipe (M792 ambulance) (to repair)	0.6
Heater mount and shroud (to replace)	0.2
2205 BILGE PUMPS	
Bilge pump (to replace)	0.7
Bilge pump discharge hose (to replace)	0.3
2210 DATA PLATES	
Vehicle data plates (to replace)	0.2
Console instruction plates (to replace)	0.5
33 KITS	
3307 POWER SOURCE KIT (100 AMP)	
(initial installation)	0.9
(to replace)	0.7
Alternator (100 amp) (to test)	0.9
(to replace)	0.7
Rectifier (to test)	0.5
(to replace)	0.2
Regulator (to test)	0.3
(to adjust)	0.2
(to replace)	0.4
Harness (100 amp alternator) (to replace)	0.4
(to repair)	0.5
3307 SLAVE CABLE KIT (initial installation)	0.5
(to replace)	0.3
(to repair)	0.6
3307 WINCH KIT (initial installation)	1.4
(to replace)	.7
Winch assembly (to adjust)	0.1
(to replace)	0.7
Winch power take-off (to replace)	0.5
Power takeoff control (to replace)	0.4
Winch drive shaft (to replace)	0.5
(to repair by replacing shear pin)	0.2
3307 MACHINE GUN MOUNTING KIT (7.62mm) (initial installation)	1.4
(to replace)	1.0
3307 MORTAR KIT (81 mm) (initial installation)	0.8
(to replace)	0.3

Table D-1. Time Standards—Continued

Maintenance and Operation	Man-hours
3307 MORTAR KIT (4.2 inch) (initial installation)	3.2
(to replace)	2.1
47 GAGES (NON-ELECTRICAL)	
4701 INSTRUMENTS (SPEED AND DISTANCE)	
Speedometerodometer (to replace)	0.3
Speedometer shaft assembly (to replace)	0.5
(to <i>repair</i>)	0.7
4702 GAGES, MOUNTINGS, LINES AND FITTINGS	
Air filter restriction indicator (to teat)	0.3
(to replace)	0.1
Indicator bracket (to replace)	0.1
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