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DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

TM 9-819

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TO-19-75AA-74

B

2½-TON 6 x 6 CARGO TRUCK M34, M35 AND M36; CHASSIS TRUCK M44, M45 AND M46; CRANE TRUCK M108; DUMP TRUCK M47 AND M59; GASOLINE TANK TRUCK M49; SHOP VAN TRUCK M109 TRACTOR TRUCK M48; WATER TANK TRUCK M50

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JANUARY 1952

RESTRICTED
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TM 9-819—TO 19-75AA-74

This manual supersedes TM 9-819, 20 June 1950; including C1, 17 July 1951; C2, 10 August 1951; and TB 9-819-1, 11 June 1951.

2½-TON 6 x 6 CARGO TRUCK M34, M35 AND M36; CHASSIS TRUCK M44, M45 AND M46; CRANE TRUCK M108; DUMP TRUCK M47 AND M59; GASOLINE TANK TRUCK M49; SHOP VAN TRUCK M109 TRACTOR TRUCK M48; WATER TANK TRUCK M50

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DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON, 25, D. C., *4 January 1952*

TM 9-819/TO 19-75AA-74 is published for the information and guidance of all concerned.

[AG 451.2 (17 Dec 51)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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Chief of Staff, United States Army

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

HOYT S. VANDENBERG
Chief of Staff, United States Air Force

OFFICIAL:
K. E. THIEBAUD
Colonel, USAF
Air Adjutant General

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This manual supersedes TM 9–819, 20 June 1950; including C1, 17 July 1951; C2, 10 August 1951; and TB 9–819–1, 11 June 1951.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for information and guidance of the personnel to whom this matériel is issued. They contain information on the operation and organizational maintenance of the matériel as well as descriptions of major units and their functions in relation to other components of the matériel.

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

c. This manual differs from TM 9–819, dated 20 June 1950, as follows:

(1) Adds information on—2½-ton 6 x 6 cargo trucks M35 and M36; chassis trucks M44, M45, and M46; crane truck M108; dump trucks M47 and M59; gasoline tank truck M49; shop van truck M109; tractor truck M48; water tank truck M50.

(2) Revises information on 2½-ton 6 x 6 cargo truck M34.

d. In general, the prescribed organizational maintenance responsibilities will apply as reflected in the allocation of tools and spare parts in the appropriate columns of the current ORD 7 supply catalog pertaining to this vehicle and in accordance with the extent of disassembly prescribed in this manual for the purpose of cleaning, lubricating, or replacing authorized spare parts. In all cases where the nature of repair, modification, or adjustment is beyond the scope or facilities of the using organization, the supporting ordnance mantenance unit should be informed in order that trained personnel with suitable tools and equipment may be provided or other proper instructions issued.

Note. The replacement of certain assemblies, that are normally ordnance maintenance operations, may be performed in an emergency by the using organization, when approval for performing these replacements is obtained from the supporting ordnance officer. A replacement assembly, any tools needed for the operation which are not carried by the using organization, any necessary special instructions regarding associated accessories, etc., may be obtained from the supporting ordnance maintenance unit.

2. Forms, Records, and Reports

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

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

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

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

Note. Do not report all failures that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made in the event that exceptionally costly equipment is involved. See also SR 700–45–5 and printed instructions on DA AGO Form 468.

Section II. DESCRIPTION AND DATA

3. Description

a. General. This manual is written specifically for the 2½-ton 6 x 6 cargo trucks M34 (figs. 1 through 3) and M36 (figs. 4 through 6) and dump trucks M47 (figs. 7 through 9) and M59. The cargo truck M35; chassis trucks M44, M45, and M46; crane truck M108; gasoline tank truck M49; shop van truck M109; tractor truck M48; and the water tank truck M50 are not specifically covered, but engines, power trains, chassis, etc are similar to models covered. With exception of bodies, these trucks are similar. The power plants, cabs, axles, brake

Figure 1. Left front view of 3/4 truck.

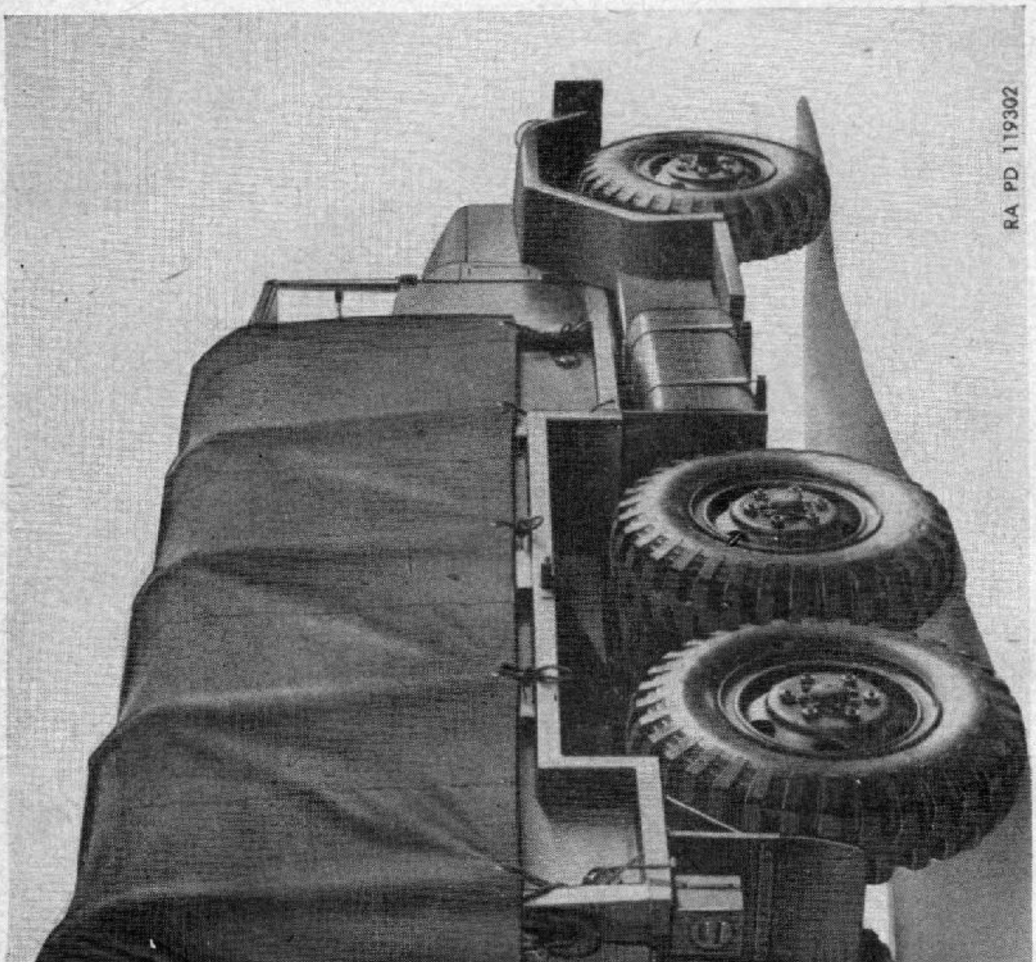

Figure 2. Right rear view of M34 truck.

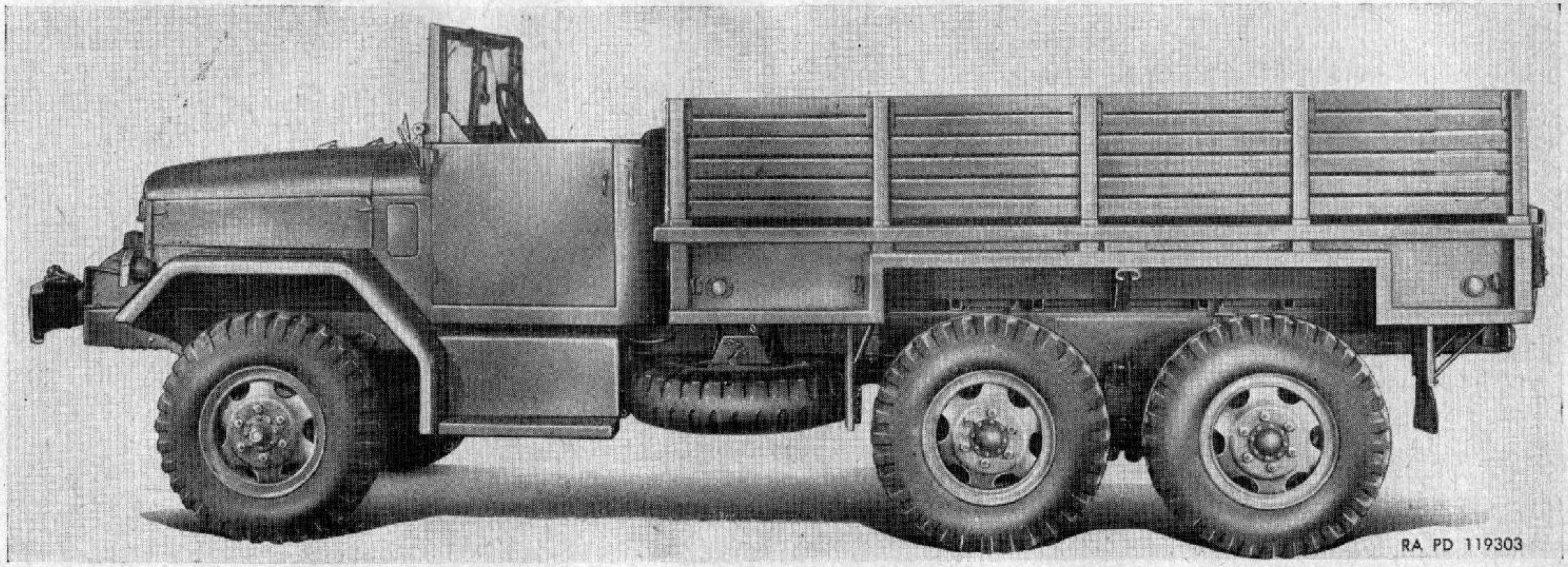

Figure 3. Side view of M34 truck.

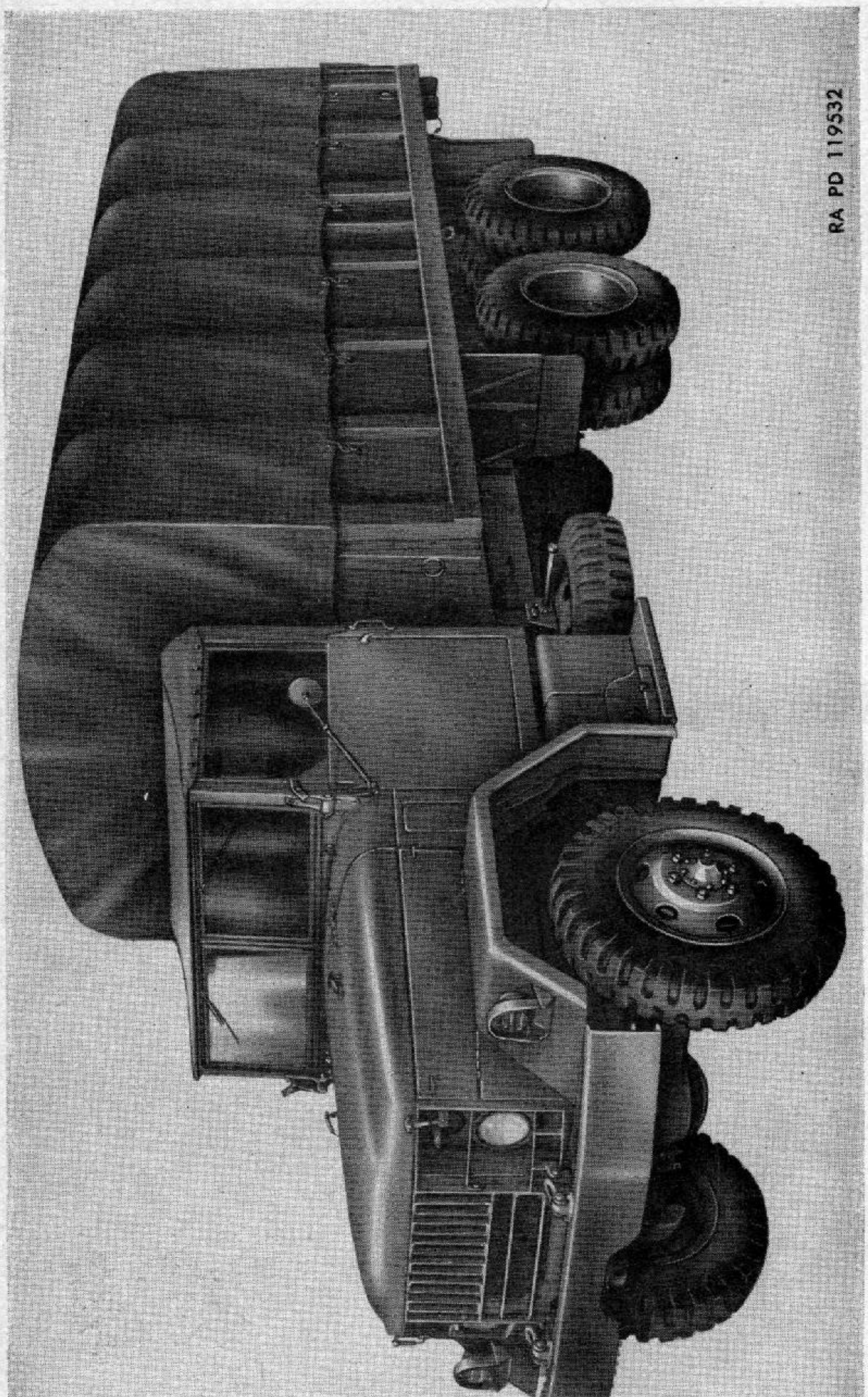

Figure 4. Left front view of M36 truck.

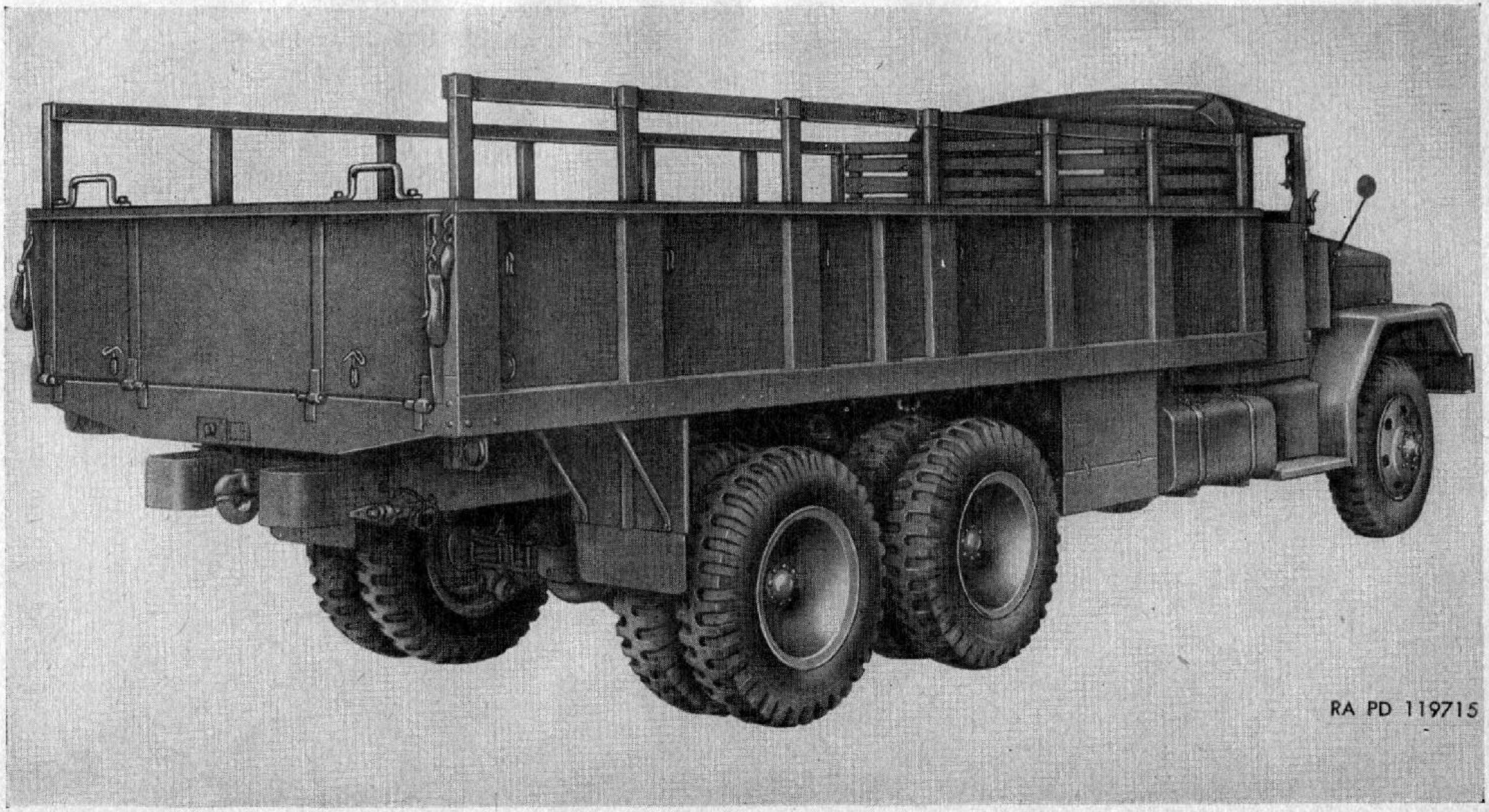

Figure 5. Right rear view of M36 truck.

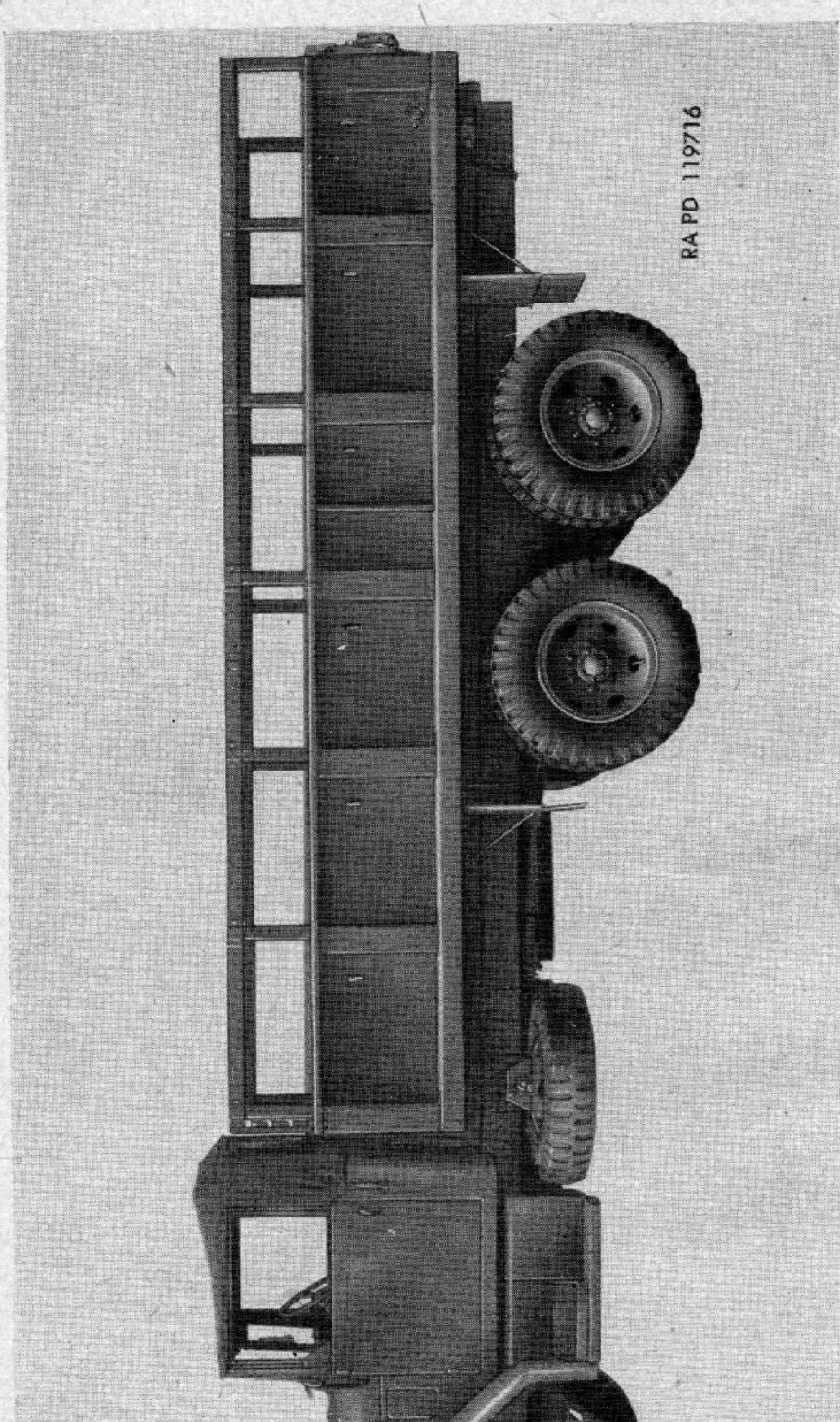

Figure 6. Side view of M36 truck.

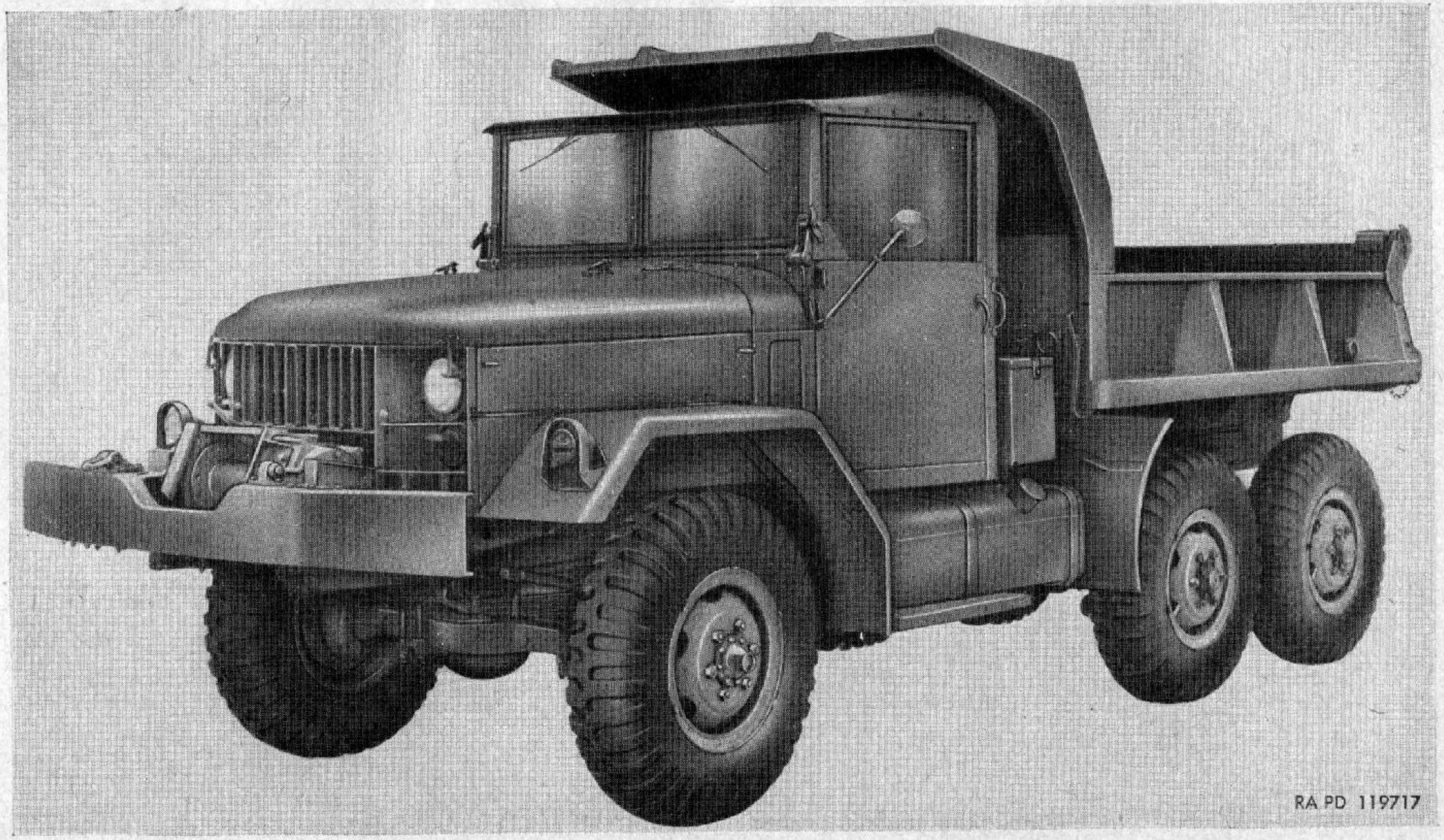

Figure 7. Left front view of M47 truck.

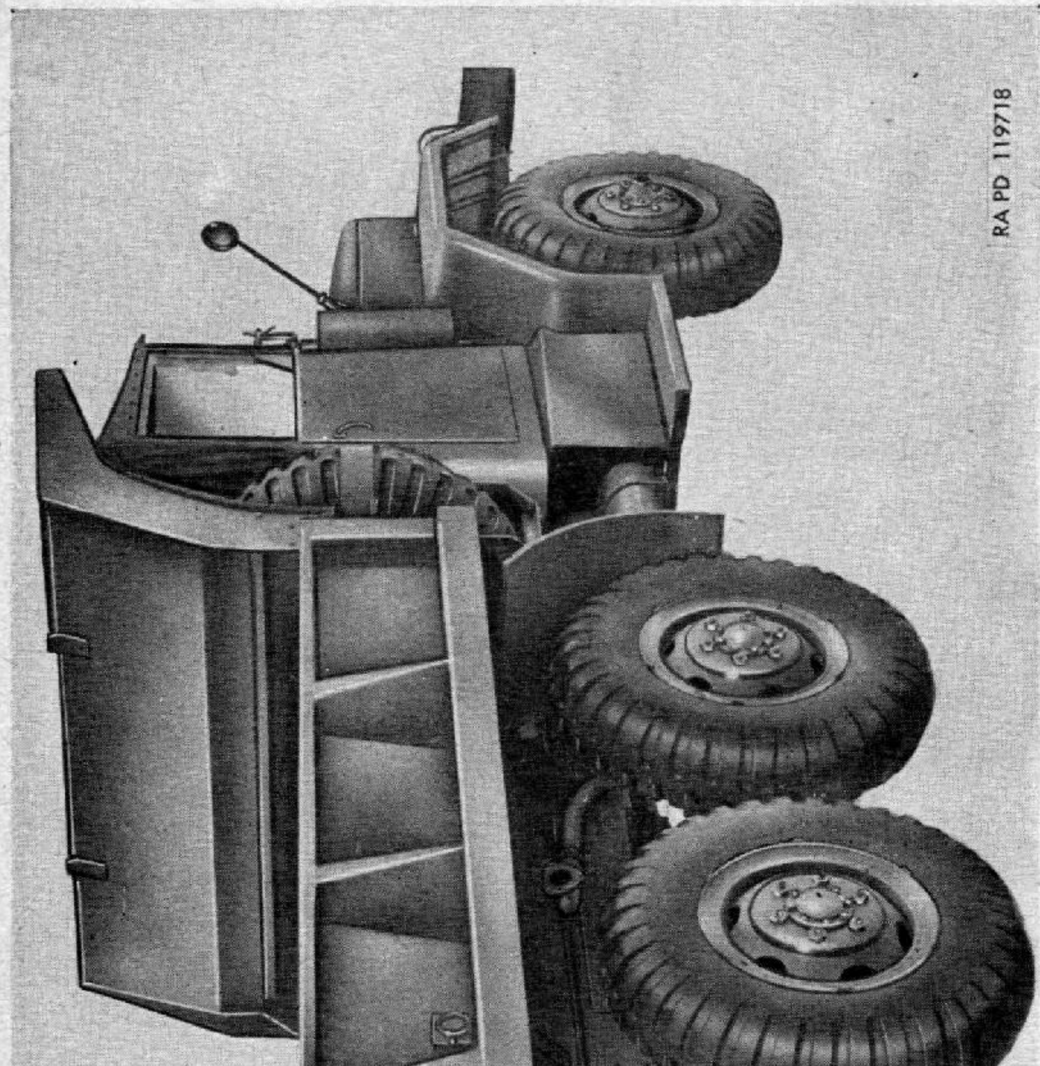

Figure 8. Right rear view of M47 truck.

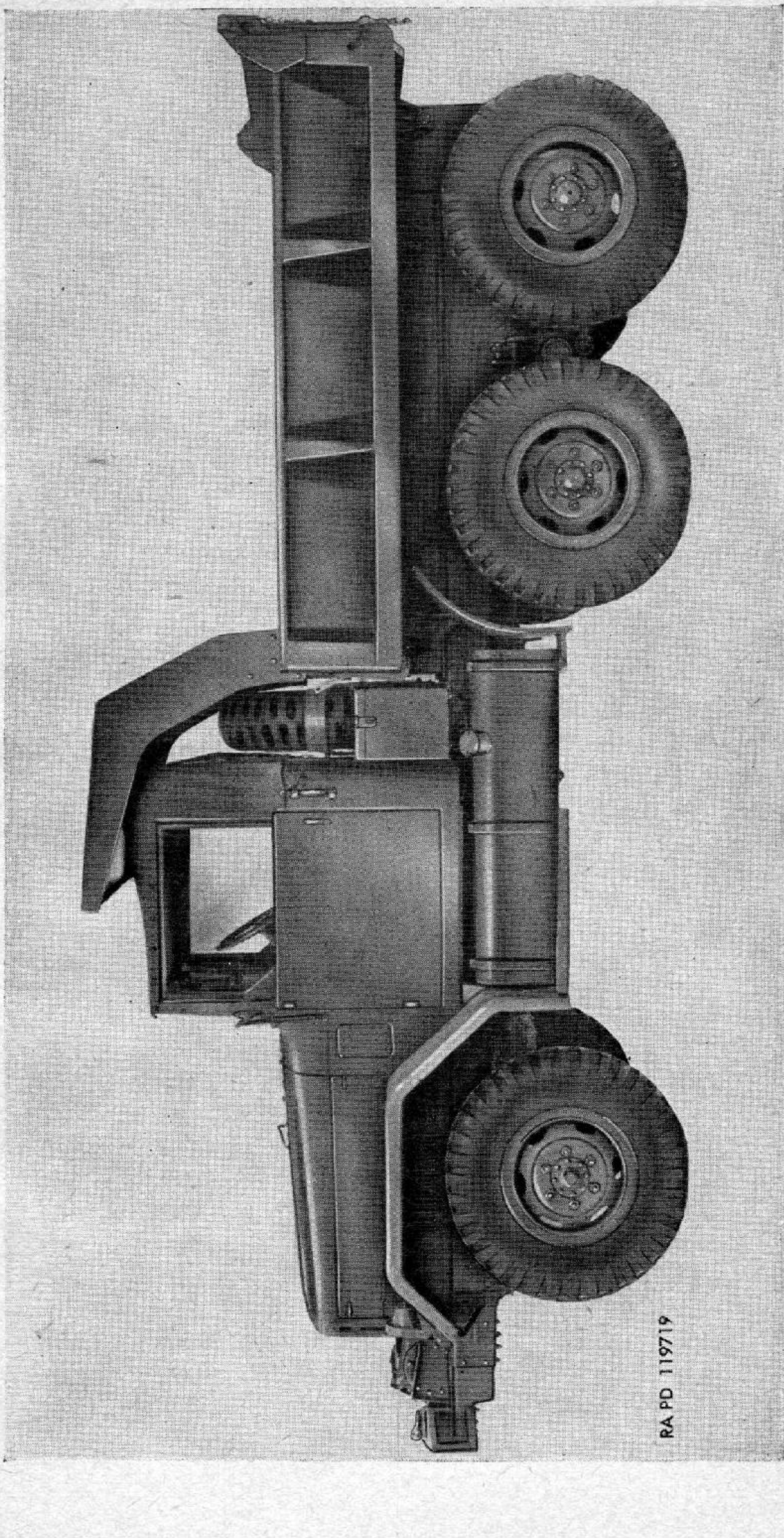

Figure 9. Side view of M47 truck.

systems, electrical systems, and compressed air systems, are identical. Frame lengths and wheels vary. All trucks are equipped with one driving front axle and two driving rear axles. Provision is made for towing other vehicles.

b. TRUCK NOMENCLATURE. In this publication the use of the term "LEFT" and "RIGHT" and "FRONT" and "REAR" is with respect to the driver sitting in the seat. "LEFT" indicates to the left of the driver. "RIGHT" indicates to the right of the driver. "FRONT" indicates the radiator end and "REAR" indicates the end opposite the radiator.

4. Power Train

Power is supplied by a Reo model OA 331, gasoline-type, six-cylinder, four-cycle, water-cooled engine, with overhead valves and removable wet-sleeve cylinders. Accessories such as generator, starter, distributor, oil filter, carburetor, clutch, etc., are mounted on the engine. The transmission, mounted on the rear of the engine, has five speeds forward and one reverse. A two-speed transfer, located behind the transmission, provides a differential speed to front and rear axles through conventional propeller shafts. Clutch is single dry-plate type, attached to flywheel. All three axles are bevel drive, top mounted, double reduction, single speed. The front-axle steering knuckles incorporate universal joints for driving the front wheels. Suspension of axles from chassis frame is with semi-elliptical springs with torque rod connections used at rear axles.

5. Differences Between Models

a. BODIES.

(1) *M34* (fig. 3). The M34 has a 12-foot steel body with removable wood cargo racks at front and sides. Lower portion of cargo racks can be swung downward to form troop seats. Top bows are provided to support paulin cover.

(2) *M36* (fig. 6). The M36 is equipped with a 17-foot steel body with sides 14 inches high. Removable wood cargo racks are mounted on the steel body at front end and sides. Lower portion of side cargo racks can be swung downward to form troop seats. The top slat serves as back rest when seats are used for troops. Troop seats on each side are in two sections. Bows are provided to support paulin cover.

(3) *M47* (fig. 9) and *M59*. A hydraulic lift, 2½-yard, end dump steel body is mounted on a sub-frame attached to truck frame. Sockets are provided in sides for installation of top bows and paulin cover.

b. WINCH (fig. 132). Some trucks of each of above models are equipped with a front mounted, worm drive, jaw clutch, drum winch. Winch is mounted on support brackets attached to frame-side-rail extensions. Winch is driven through a universal joint drive shaft from a power-take-off mounted on transmission. Front bumper, on winch equipped trucks, is inverted to provide wire rope clearance to winch drum.

c. HEADLIGHTS. Headlights on winch equipped trucks are at top of mounting panels (fig. 123). On trucks without winches, headlight mounting panels are inverted and lights are at bottom of panels.

d. WHEELBASE AND WHEELS. There are three basic wheelbases. The only other differences are in the use of single or dual tires.

(1) M34—12-foot cargo body, 154 in WB, 11:00 x 20 single tires (M44 chassis).

(2) M35—12-foot cargo body, 154 in WB, 9:00 x 20 dual tires (M45 chassis).

(3) M36—17-foot cargo body, 190 in WB, 9:00 x 20 dual tires (M46 chassis).

(4) M47—2½-yard dump body, 142 in WB, 11:00 x 20 single tires.

(5) M59—2½-yard dump body, 142 in WB, 9:00 x 20 dual tires.

e. PROPELLER SHAFTS (fig. 92). With the exception of forward-rear shaft on M36, propeller shafts on all models are two-joint shafts. The forward-rear shaft of M36 is a three-joint shaft. The center joint is supported in an antifriction bearing (fig. 93) attached to truck frame.

f. HORNS.

(1) *Model M34.* Early models of the M34 were equipped with electric horns mounted on rear side of right-hand headlight panel. Beginning with truck serial number 94895 all M34 trucks are equipped with air horns. The air horn is bracket mounted on inner section of right fender, opposite air compressor (fig. 138).

(2) *Models M36, M47, and M59.* Air horns are standard equipment on all M36, M47, and M59 trucks.

g. TRANSFER.

(1) *Model M34.* Two types of transfers, "single sprag" and "double sprag" will be found on model M34 trucks. All M34 trucks serial numbers 90484 and below, were equipped with "single sprag" transfers; serial numbers 90485 and up are equipped with "double sprag" transfers. The outward appearance of both transfers is the same and they can be identified, without disassembly, by the reverse-shift linkage only. For "single sprag" transfers, the reverse-shift-lever rod extends through the reverse-shift-rod lever and springs

are installed on rod on each side of lever (fig. 90). For "double sprag" transfers, the reverse-sift-lever rod is an inclosed assembly, attached to reverse-shift-rod lever with a pin, and is closed at forward end with a rubber boot (fig. 91). Transfers complete with reverse linkage are interchangeable.

(2) *Models M36, M47, and M59.* All M36, M47, and M59 trucks are equipped with "double sprag" transfers.

6. Name, Caution, and Instruction Plates

a. Truck Name Plate. This plate is mounted on the instrument panel to the right of the instrument cluster (J, fig. 14). Data for truck, serial number, and maximum-towed-load information are furnished.

b. Servicing and Publication Data Plate. This plate, located at right end of instrument panel (L, fig. 14), furnishes shipping information, TM numbers of technical publications, and SNL number of the parts catalog to use with the truck.

c. Instruction Data Plate. The instruction data plate (fig. 10), located at left end of instrument panel (D, fig. 14), includes draining instructions for the cooling system, gearshift diagrams and instructions (figs. 17 and 19), and maximum allowable truck speeds in various shift positions (figs. 18 and 20).

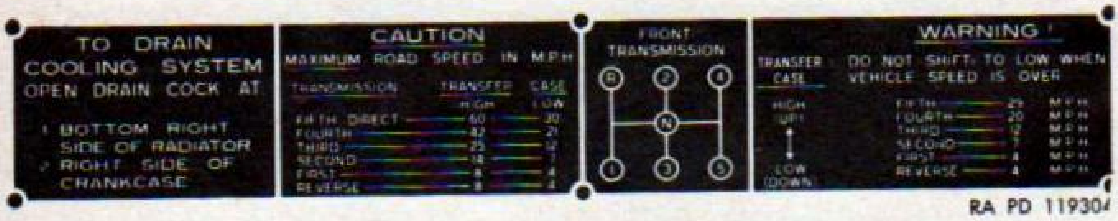

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Figure 10. Instruction data plate.

d. Crankcase Ventilation Shut-off Data Plate. This plate is located to right of instrument cluster and gives instructions for operating the crankcase-ventilation-shut-off valve on entering and leaving deep water (U, fig. 14).

e. Low-Air-Pressure Warning Data Plate. This plate, located at left end of instrument panel, includes low-air-pressure warning and tire-inflation data (AA, fig. 14). If truck is equipped with a winch (par. 5*b*), power-take-off and winch operation data is substituted for tire inflation data on this plate.

f. Responsible Agency Data Plate. This plate, located to right of instrument cluster (P, fig. 14), supplies information regarding the agency responsible for procurement and depot maintenance.

g. Engine Serial Number Plate. This plate, located on the left side of the engine crankcase in front of the distributor and behind the bayonet-type engine oil-level gage (fig. 45), gives the engine serial number.

h. Transmission Name Plate. This plate is located on the left side of the transmission. Data on model number, serial number, and low-gear ratio are furnished.

i. Distributor Name Plate. This plate, located on the left side of distributor, gives data on voltage, type, and model number.

j. Generator Name Plate. The generator name plate includes data on ordnance part number, manufacturer's model number, serial number, type operating speed range, rated amperage, and voltage.

k. Starter Name Plate. This plate, located on left side of starter, gives data on voltage, direction of rotation, ordnance part number, manufacturer's model number, and serial number.

l. Generator-Regulator Name Plate. This plate is located on top of the generator regulator. Data on voltage, amperage, ordnance part number, and manufacturer's model number are furnished.

m. Winch Name Plate. This plate, located on top of winch-worm-gear housing, gives winch model number and serial number.

n. Power-take-off Name Plate. This plate, located on upper surface of power-take-off housing, gives power-take-off model number and serial number.

o. Compressor Name Plate. This plate is located on the side of compressor crankcase and gives the manufacturer's serial number, piece number, and type.

p. Dump Body Control Lever Instruction Plate (fig. 21). This plate, located on left-door-pillar post, gives instructions for operation of the dump body on the M47 truck.

7. Tabulated Data

a. General Data.

	M34	*M36*	*M47*	*M59*
Length over-all w/winch	$274\frac{3}{4}$ in	336 in	$248\frac{5}{8}$ in	$248\frac{5}{8}$ in
Length over-all w/o winch	$261\frac{1}{4}$ in	$322\frac{1}{2}$ in	$235\frac{1}{8}$ in	$235\frac{1}{8}$ in
Width over-all	88 in	96 in	85 in	93 in
Height over-all (empty)	107 in	$124\frac{1}{2}$ in	104 in	$101\frac{5}{16}$ in
Wheelbase	154 in	190 in	142 in	142 in
Loading height (empty)	$43\frac{1}{2}$ in	$50\frac{7}{8}$ in	56 in	$55\frac{1}{8}$ in
Pintle height (empty)	$34\frac{3}{4}$ in	$35\frac{1}{2}$ in	$36\frac{5}{8}$ in	$34\frac{5}{8}$ in
Pintle height (loaded)	$33\frac{3}{4}$ in	$33\frac{3}{4}$ in	$34\frac{7}{8}$ in	$33\frac{7}{16}$ in
Ground clearance	14 in	$12\frac{11}{16}$ in	$13\frac{11}{16}$ in	$12\frac{11}{16}$ in
Weight, wet, 50 gal fuel, oil, water, w/o personnel, w/o winch:				
Net	11, 775 lb	14, 225 lb	13, 190 lb	13, 780 lb
Payload (cross country)	5, 000 lb	-----------	5, 000 lb	5, 000 lb
Payload (highway rating)	10, 000 lb	10, 000 lb	-----------	-----------
Gross	16, 775–21, 775 lb	24, 225 lb	18, 190 lb	18, 780 lb

b. Engine—Same on All Models.

Model	Reo OA 331
Cylinders (in line)	6
Electrical system	24 volt
Number batteries	two 12 volt

c. Capacities—Same on All Models.

Fuel tank	50 gal
Cooling system	22 qt
Crankcase (refill)	9 qt
Transmission	8½ pt
Transfer	7 qt
Differentials (each)	7 qt
Winch gear case	3½ pt
Winch end frame	½ pt
Power hoist including reserve tank—M47 only	5 gal
Power hoist oil	seasonal engine oil

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATÉRIEL

8. Purpose

a. When a new or reconditioned vehicle is first received by the using organization, it is necessary for the organizational mechanics to determine whether the truck has been properly prepared for service by the supplying organization and is in condition to perform any mission to which it may be assigned when placed in service. For this purpose, inspect all assemblies, subassemblies, and accessories to be sure they are properly assembled, secure, clean, and correctly adjusted and/or lubricated. Check all tools and equipment (sec. 1, ch. 3) to be sure every item is present, in good condition, clean and properly mounted or stowed (figs. 11 and 12).

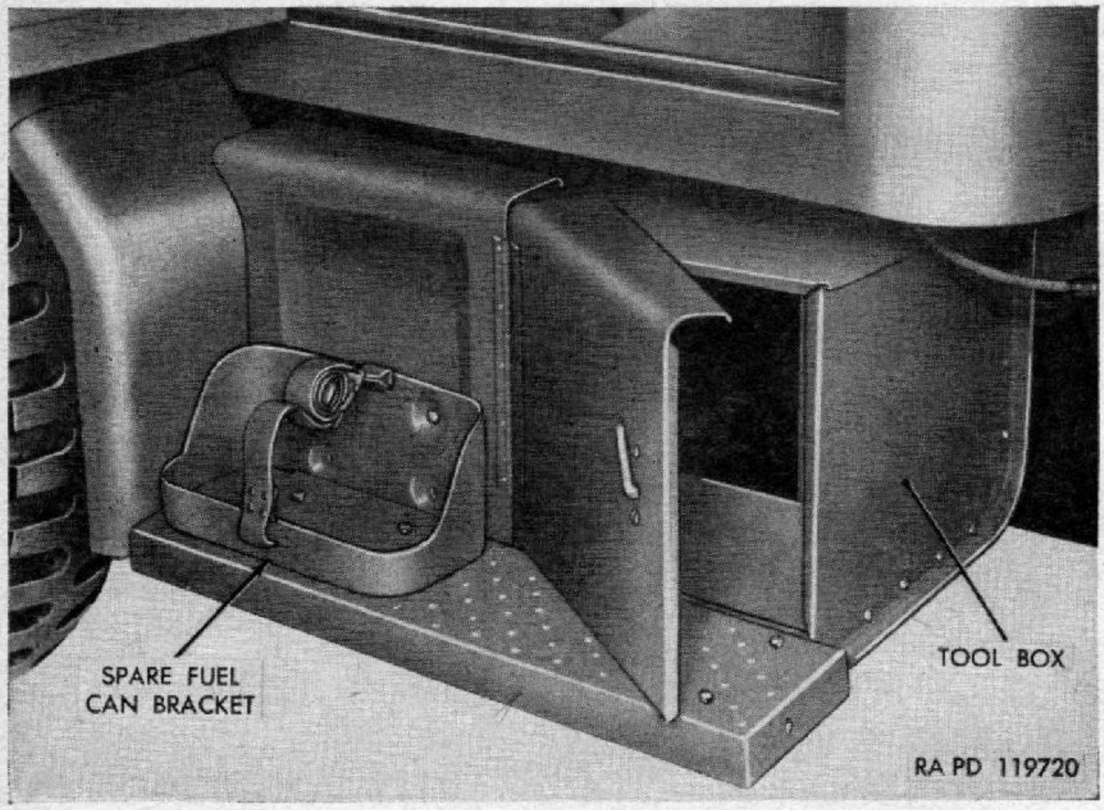


Figure 11. Tool box—M34 and M36 trucks.

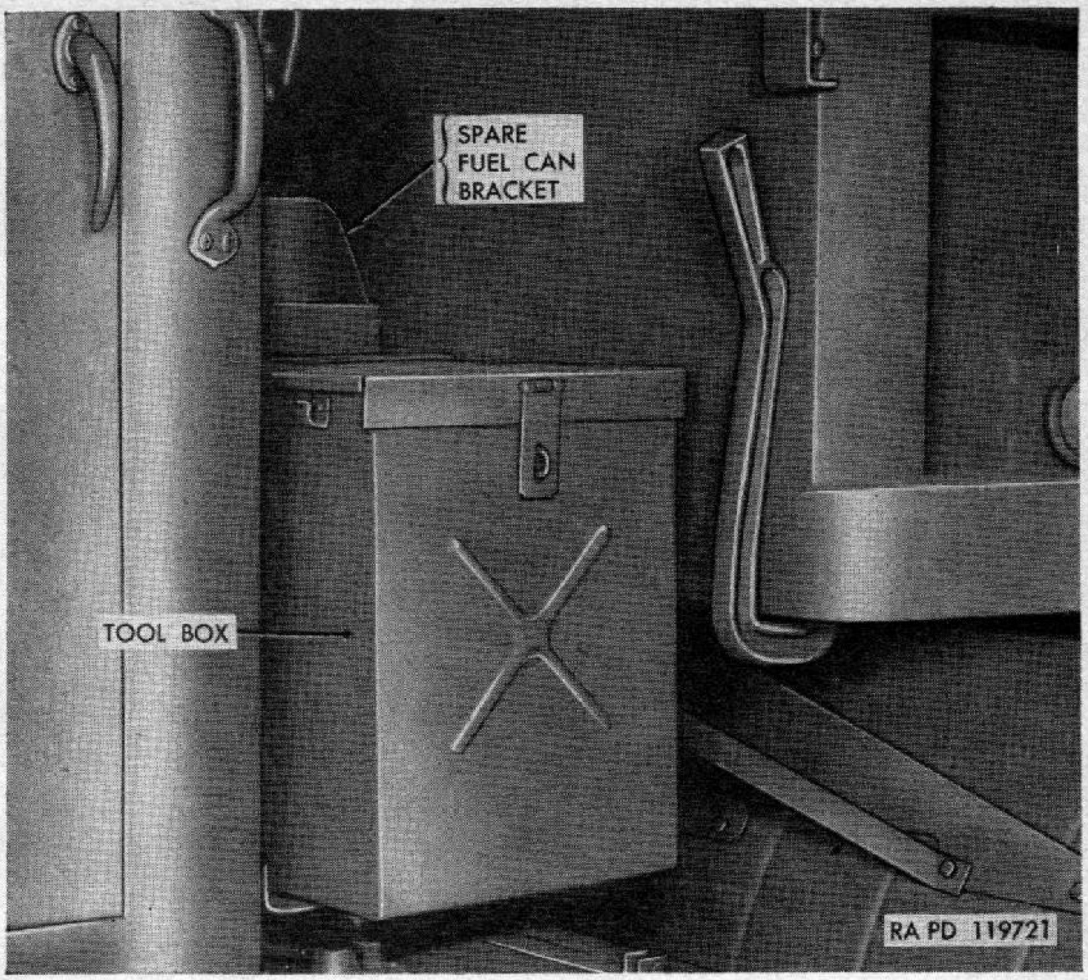


Figure 12. Tool box—M47 truck.

b. In addition, perform a "run-in" of at least 50 miles on all new or reconditioned trucks, and a sufficient number of miles on used vehicles to completely check their operation, according to procedures in paragraph 10 herein.

c. Whenever practicable, the operator will assist in the performance of these services.

9. Preliminary Service

Perform the Commander's "C" (6,000-mile or 6-month) preventive-maintenance service, with the following variations:

a. Line out the other services on the work-sheet (DA AGO Form 461) and write in "New (or Rebuilt) Vehicle Reception."

b. Before starting engine, tighten cylinder-head nuts (par. 91*b*(8)).

c. Item 27. Perform this item before starting the road test. If a processing tag on the engine or vehicle states that the engine contains preservative oil that is suitable for 500 miles of operation, and of the correct seasonal viscosity, check the level but do not change the oil; otherwise change the oil. Lubricate all points, regardless of interval, except as noted in *f* below. Check the levels of the lubricant in all gear cases. If the gear lubricant is known to be of the correct seasonal grade, do not change it; otherwise change it.

d. PERFORMANCE.

Allowable speed (mph):	Transmission gear					
Models M34 and M47	*1st*	*2d*	*3d*	*4th*	*5th*	*Reverse*
Transfer—high range	8	14	25	42	60	8
Transfer—low range	4	7	12	21	30	4
Model M36—high range	7	13	23	40	58	7
—low range	3	6	11	20	29	3

Cruising speed—all models	35 to 50 mph
Engine horsepower (bhp) gross at 3,400 rpm	146 hp
Fuel consumption (loaded) 35 to 50 mph	7 to 5 mpg
Cruising range (loaded) 35 to 40 mph	350 miles
Maximum towed load (cross country)	6,000 lb
Maximum towed load (prepared roads)	10,000 lb
Maximum fording depth (top of wave)	78 in
Winch capacity	10,000 lb

Approach angle:	*M34*	*M36*	*M47*	*M59*
With winch	40°	40°	40°	39°
Without winch	48°	47°	48°	47°
Departure angle	41°30′	27°	76°	75°
Turning circle (diameter):				
With winch (right or left)	71 ft	90 ft	67 ft	67 ft
Without winch (right or left)	69 ft	88 ft	65 ft	65 ft

e. DETAILED DATA REFERENCES. Additional tabular data pertaining to individual components are contained in the following paragraphs:

Batteries and lighting system	173
Compressed air system	213
Engine	88
Fuel system	106
Starting and charging system	130
Transmission and power-take-off	134
Winch	186

d. When engine has been thoroughly warmed up to operating temperature, recheck the tightness of the cylinder-head nuts (par. 91*b* (22)).

e. Item 35. Inspect breaker points; dressing should not be necessary.

f. Item 39. Look at wheel bearings. If lubrication appears to be adequate, do not clean and repack. Do not adjust brakes unless necessary.

10. Run-in Procedures

a. BREAK-IN. Refer to section III this chapter for necessary operating instructions. After the preliminary service has been performed, the break-in period (500 miles) may be accomplished in normal service of the vehicle under the supervision of a competent driver.

Caution: Do not use excessive speeds, skip speeds in shifting gears, accelerate rapidly, or in any way load the engine or power train to capacity during the break-in period.

If the vehicle was driven to the using organization, include the mileage traveled in the break-in mileage.

b. SERVICE AFTER 500 MILES. After 500 miles of vehicle operation, perform the Commander's "B" (1,000-mile) preventive-maintenance service, with the following variations:

(1) Line out the other services on the work sheet (DA AGO 461) and write in "New (or Rebuilt) Vehicle 500-Mile Service."

(2) Change the engine oil.

c. SERVICE AFTER 1,000 MILES

(1) When the vehicle has been driven 1,000 miles, it will be placed on the regular preventive-maintenance schedule and will be given the first regular Commander's "B" (1,000-mile) preventive-maintenance service.

(2) On all new trucks a throttle stop is incorporated in governor housing on carburetor (fig. 13) to limit speed of engines until end of run-in period (1,000 miles). At conclusion of run-in test, remove throttle stop as follows:

(*a*) Break locking wire in housing cover screws and remove cover.

(*b*) Remove top center housing mounting screw and lock washer, and lift out throttle stop.

(*c*) Install top center screw and washer. Install cover, secure, and install locking wire.

11. Correction of Deficiencies

a. Ordinary deficiencies disclosed during the preliminary inspection and servicing or during the break-in period will be corrected in the usual way; that is, by the using organization or a higher maintenance echelon.

b. Serious deficiencies, which appear to involve unsatisfactory design or material, will be reported on DA AGO Form 468. The commander of the using organization will submit the completed form to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM, or chief of appropriate technical service for other than ordnance equipment.

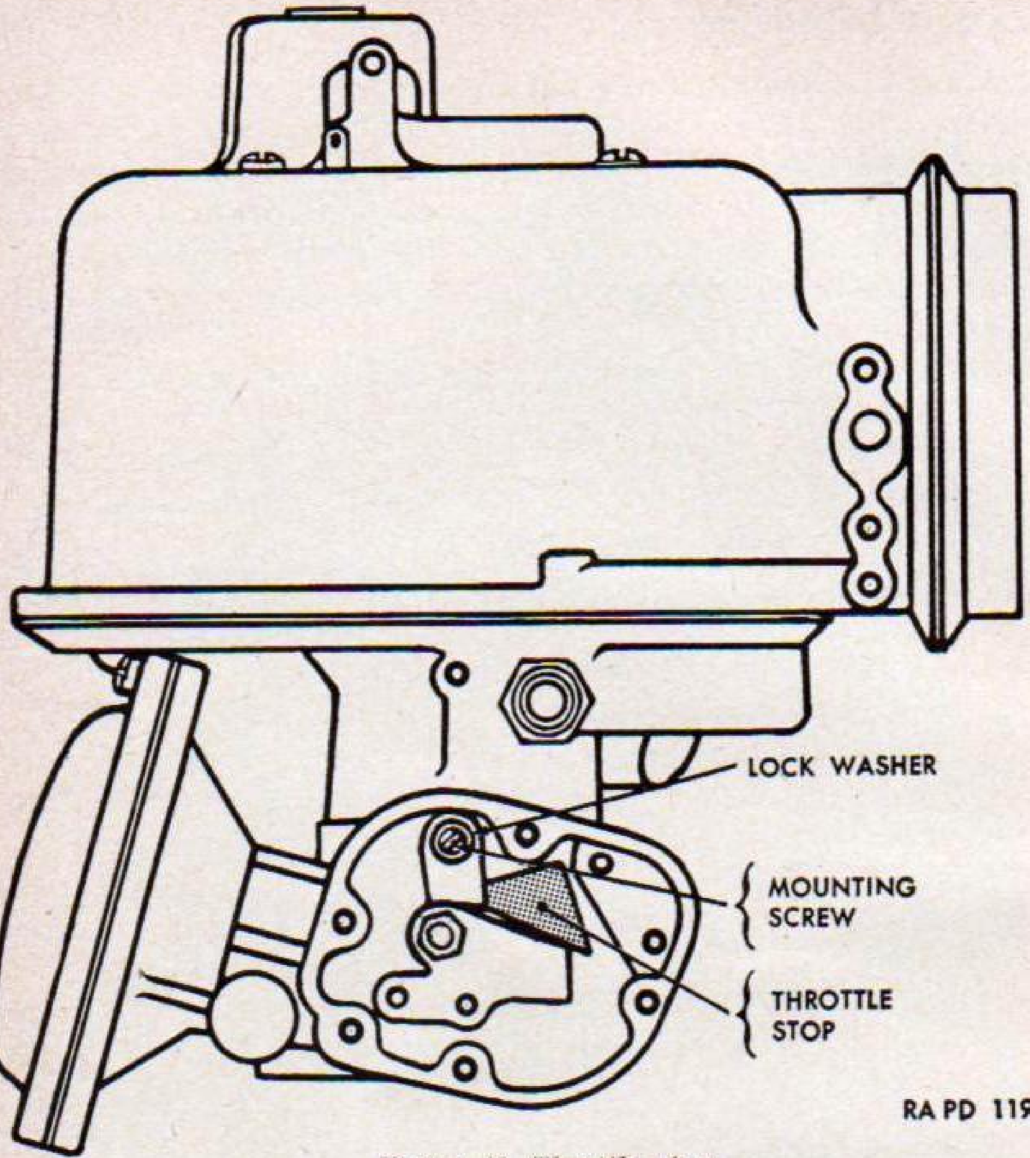


Figure 13. Throttle stop.

Section II. CONTROLS AND INSTRUMENTS

12. General

This section describes, locates, illustrates, and furnishes information pertaining to the various controls and instruments provided for the proper operation of these trucks. For the use of these controls in the operation of the truck, refer to section III below.

13. Air Pressure Gage

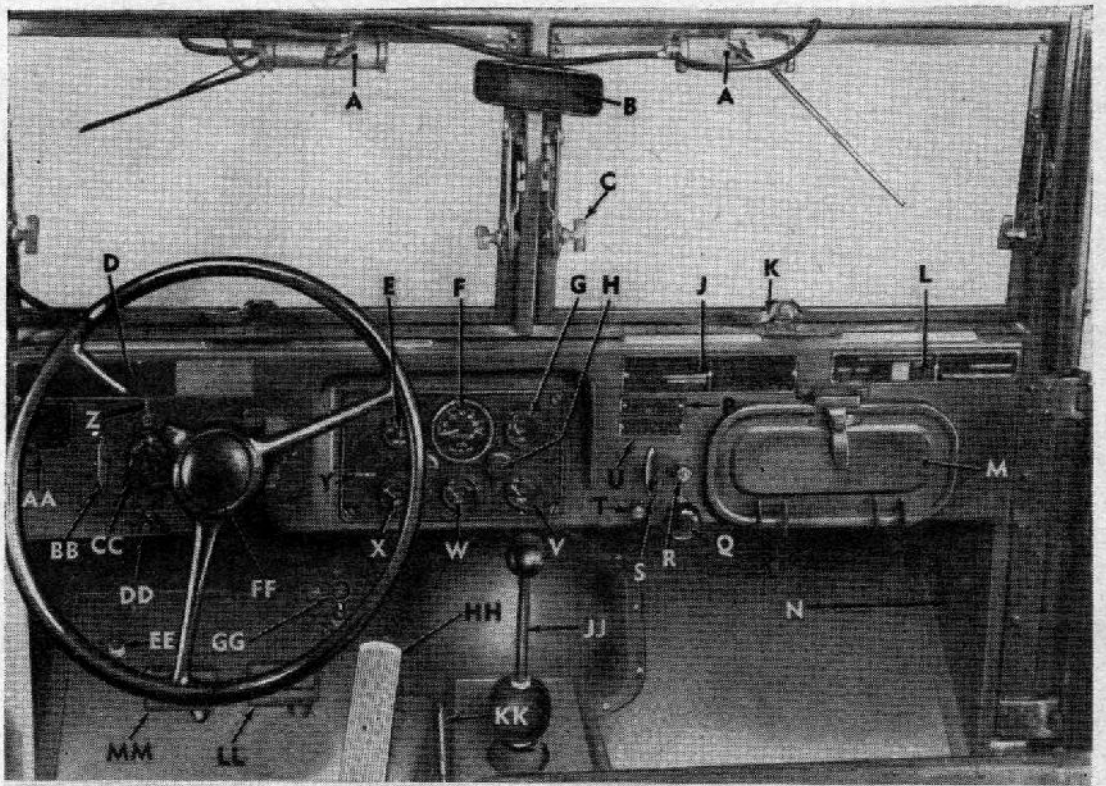
The air pressure gage, located in the center and near the bottom of the instrument cluster (W, fig. 14), indicates the air pressure in the compressed air system. Normal range is 100 to 105 psi.

14. Ammeter

The ammeter, located in the upper-left corner of the instrument cluster (E, fig. 14), indicates charging activity of the generating circuit. Ammeter should show charge reading when engine is first started.

15. Choke Control

The choke-control knob is located on the instrument panel to the right of instrument cluster (T, fig. 14). When knob is pulled out, carburetor choke-valve plate closes. Return spring on choke linkage returns choke-valve plate to open position when knob is pushed in. The choke control is used when starting and operating a cold engine.



A—WINDSHIELD WIPER MOTOR
B—REAR VIEW MIRROR
C—CLAMPING SCREW
D—INSTRUCTION DATA PLATE
E—AMMETER
F—SPEEDOMETER
G—FUEL GAGE
H—INSTRUMENT CLUSTER LIGHT
J—TRUCK NAME PLATE
K—WINDSHIELD LOCKING HANDLE
L—SERVICING AND PUBLICATION DATA PLATE
M—INSTRUMENT PANEL COMPARTMENT
N—COWL VENTILATOR
P—RESPONSIBLE AGENCY DATA PLATE
Q—PRIMER PUMP CONTROL KNOB
R—AUXILIARY POWER RECEPTACLE
S—CRANKCASE VENTILATION SHUT-OFF VALVE KNOB
T—CHOKE CONTROL KNOB
U—CRANKCASE VENTILATION SHUT-OFF DATA PLATE
V—OIL PRESSURE GAGE
W—AIR PRESSURE GAGE
X—COOLANT TEMPERATURE GAGE
Y—HIGH BEAM INDICATOR
Z—IGNITION SWITCH
AA—LOW AIR PRESSURE WARNING DATA PLATE
BB—THROTTLE CONTROL KNOB
CC—LIGHT SWITCH
DD—WINDSHIELD WIPER REGULATOR VALVE
EE—DIMMER SWITCH
FF—HORN BUTTON
GG—STARTER PEDAL
HH—ACCELERATOR PEDAL
JJ—TRANSMISSION GEARSHIFT LEVER
KK—TRANSFER GEARSHIFT LEVER
LL—SERVICE BRAKE PEDAL
MM—CLUTCH PEDAL

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Figure 14. Instruments and controls.

16. Fuel Gage

The fuel gage, located in the upper-right corner of the instrument cluster (G, fig. 14), is an electrical unit and indicates level of gasoline in the fuel tank. It registers only after ignition switch is turned to "ON" position.

17. Hand Primer Pump

The hand-primer-pump control knob is located on the instrument panel to the driver's right (Q, fig. 14). Pulling the knob out and forcing it in again pumps a stream of fuel directly into the intake manifold for priming. This will facilitate starting when low temperatures make starting difficult.

18. Throttle Control

The throttle-control knob is located on the instrument panel to the left of light switch (BB, fig. 14). This knob is linked to carburetor and may be used instead of accelerator to increase engine speed. The throttle control is generally used while starting engine or operating winch.

Note. Refer to paragraph 47 for use of throttle control when operating winch.

19. Ignition Switch

The lever-type ignition switch is mounted on the instrument panel to the driver's left, and above light switch (Z, fig. 14). Lever must be turned clockwise to "ON" position before engine can be started.

20. Light Switch
(CC, fig. 14 and fig. 15)

a. Description. The light switch is mounted in the instrument panel at the left of steering column. This switch provides selective control of the various lighting circuits by means of two switches, main switch and auxiliary switch. A mechanical lock limits free movement of main switch.

(1) *Main switch.* The main switch is located at the top and has five positions; "BO DRIVE," "BO MARKER," "OFF," "STOP LIGHT," and "SER DRIVE." In the "OFF" position all lighting circuits are inoperative, and the switch lever can be moved only to "BO MARKER" without a release of mechanical lock lever.

(2) *Auxiliary switch.* The auxiliary switch is below and to the left of main switch and has four positions: "PARK," "OFF," first up position, and "HEAD." All positions are marked

with exception of first up. Movement of this switch lever is not restricted by the mechanical lock but the circuits under its control are dependent on position of main switch lever.

(3) *Mechanical lock.* The mechanical lock is located below and to the right of main switch. This lock must be released before main switch can be moved from "OFF" position to "STOP LIGHT" position, and before main switch is moved from "BO MARKER" to "BO DRIVE." To release main switch from this lock, turn mechanical lock lever up (counterclockwise) and hold as main switch lever is moved.

b. Operation.

(1) *Off position.* When the main-switch lever is in "OFF" position, all circuits, both blackout and service, are open and all lights are off.

(2) *Blackout-marker position.* When main-switch lever is turned to the left to "BO MARKER" position, circuits for blackout marker lights, blackout stop light and blackout tail lights are energized. The auxiliary-switch lever can be turned up for off, dim, or bright instrument-cluster lights.

(3) *Blackout-drive position.* When main-switch lever is turned farther to the left to "BO DRIVE" position, the circuit for blackout head light is energized, as well as circuits for blackout marker, blackout stop, and blackout tail lights ((2) above). The auxiliary-switch lever can be turned up for off, dim, or bright instrument-cluster lights.

(4) *Stop-light position.* The mechanical-switch lever must be held in raised position before main-switch lever can be turned to "STOP LIGHT" position from "OFF" position. When main-switch lever is turned to the right to "STOP LIGHT" position, the circuit for service stop light is energized for operation during daylight hours. The auxiliary-switch lever can be turned up for off, dim, or bright instrument-cluster lights.

(5) *Service-drive position.* The mechanical-switch lever must be held in raised position before main-switch lever can be turned to "SER DRIVE" position from "OFF" position. The main-switch lever may be turned farther to the right from "STOP LIGHT" position to "SER DRIVE" position without operating mechanical-switch lever. With main-switch lever in "SER DRIVE" position, the circuit for service tail light is energized, as well as circuit for service stop light ((4) above). The auxiliary-switch lever can be turned down for parking lights with dim instrument-cluster lights, or up for service head lights with off, dim, or bright instrument-cluster lights.

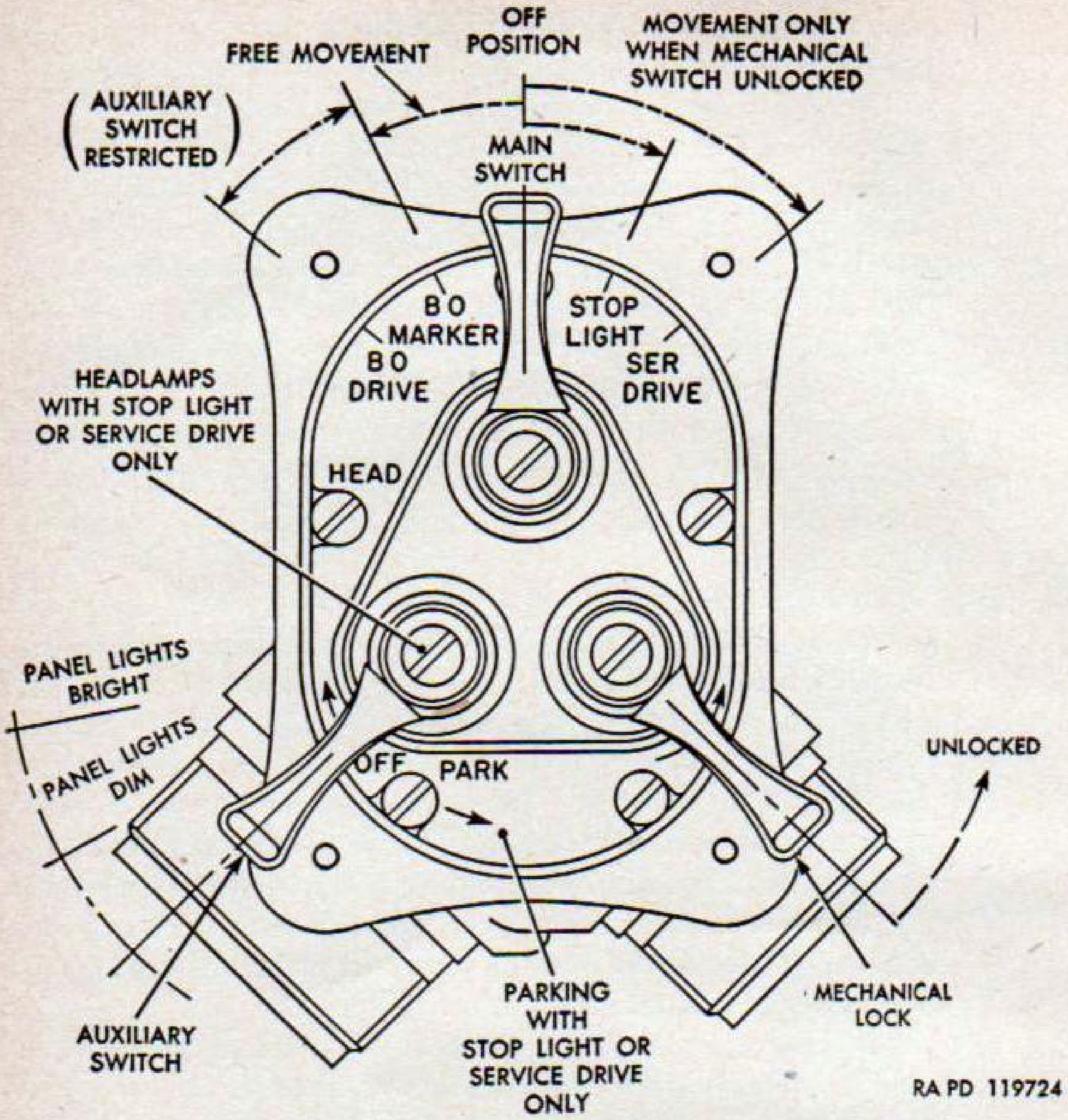


Figure 15. Light switch.

21. Oil Pressure Gage

The oil pressure gage, located in the lower right-hand corner of the instrument cluster (V, fig. 14), indicates oil pressure when engine is running. Normal pressure with engine idling is 30 to 40 psi. Pressure readings may fluctuate as engine speed increases or decreases but a sudden drop or an erratic fluctuation of pressure indicates trouble. Stop engine and determine cause.

22. Speedometer

The speedometer, located in the center and near the top of the instrument cluster (F, fig. 14), indicates the road speed of the truck in miles per hour and records total mileage.

23. Coolant Temperature Gage

The temperature gage, located in the lower-left corner of the instrument cluster (X, fig. 14), registers the temperature of the solution in the cooling system. Normal range is 160° to 180° F.

24. Crankcase-Ventilation-Shut-Off Valve

Crankcase-ventilation-shut-off valve knob is located on instrument panel to the right of instrument cluster (S, fig. 14). When knob is pulled out, all ventilation lines of crankcase are closed. It is used only when entering water for fording and must be pushed in immediately upon leaving water.

25. Steering Wheel

Trucks are steered in conventional automotive manner. Steering gear, operated by steering wheel (fig. 14), transmits movement to the front wheels through pitman arm, drag link, steering arm, and tie rod (fig. 114).

26. Horn Button

The horn button is located in center of steering wheel (FF, fig. 14) and is depressed to sound horn.

27. Accelerator Pedal

The accelerator pedal, linked to carburetor, is convenient to driver's right foot (HH, fig. 14). Depressing the pedal will accelerate engine to any desired speed up to governed speed. Engine operates at set idling speed when pedal is completely released.

28. Clutch Pedal

The clutch pedal, convenient to driver's left foot (MM, fig. 14), engages and disengages clutch from flywheel. Pedal is depressed to disengage clutch and permit shifting of transmission gears.

29. Dimmer Switch

This is a foot-operated switch, accessible to driver's left foot (EE, fig. 14), and is used to control the upper and lower head light beams. Main-light-switch lever must be in "SER DRIVE" position and auxiliary-light-switch lever turned up (fig. 15) before this switch is operative. Use of this switch permits driver to "dim" lights when meeting other vehicles or to turn on "bright" lights when needed. A signal light, located on the left side of instrument cluster, indicates when high beam or "bright" lights are on.

30. Hand Brake Lever

The hand brake lever, located to the left of the driver's seat (fig. 16), is used to operate inner and outer brake shoes on a brake drum mounted on propeller shaft at rear of transfer. The lever is pulled up and is held in position by a spring pawl to apply brakes. Pawl is disengaged and lever dropped to release brakes. This brake is used to hold truck when parked.

31. Service-Brake Pedal

The service-brake pedal, convenient to driver's right foot (LL, fig. 14), controls application and release of air-hydraulic-operated brakes at each wheel. Pedal is depressed to apply brakes.

32. Starter Pedal

The engine starter is actuated by a pedal located forward of accelerator pedal (GG, fig. 14). Initial movement of pedal engages starter pinion with flywheel. Further movement completes electrical circuit from battery to starter, causing starter armature to rotate to crank engine.

33. Transmission Gearshift Lever

This lever, accessible to driver's right hand (JJ, fig. 14 and fig. 16), is used to select the various gear ratios or speeds provided in transmission. The use of this lever is explained in paragraph 42.

34. Transfer Gearshift Lever

This lever, accessible to driver's right hand KK, fig. 14 and fig. 16), is used to shift transfer into "HIGH" or "LOW" range to engage axles or into "NEUTRAL" to disengage axles. Shifting instructions are outlined in paragraph 42.

35. Power-Take-Off Shifting Lever

This lever, located to the left and behind the transmission gearshift lever (fig 16), is used to control engagement of winch. The use of this lever is explained in paragraph 47.

36. Windshield Wiper Controls

The windshield wiper regulator valve for the air-operated windshield wipers is located on the instrument panel to the driver's left (DD, fig. 14). Valve adjusting knob is rotated counterclockwise to

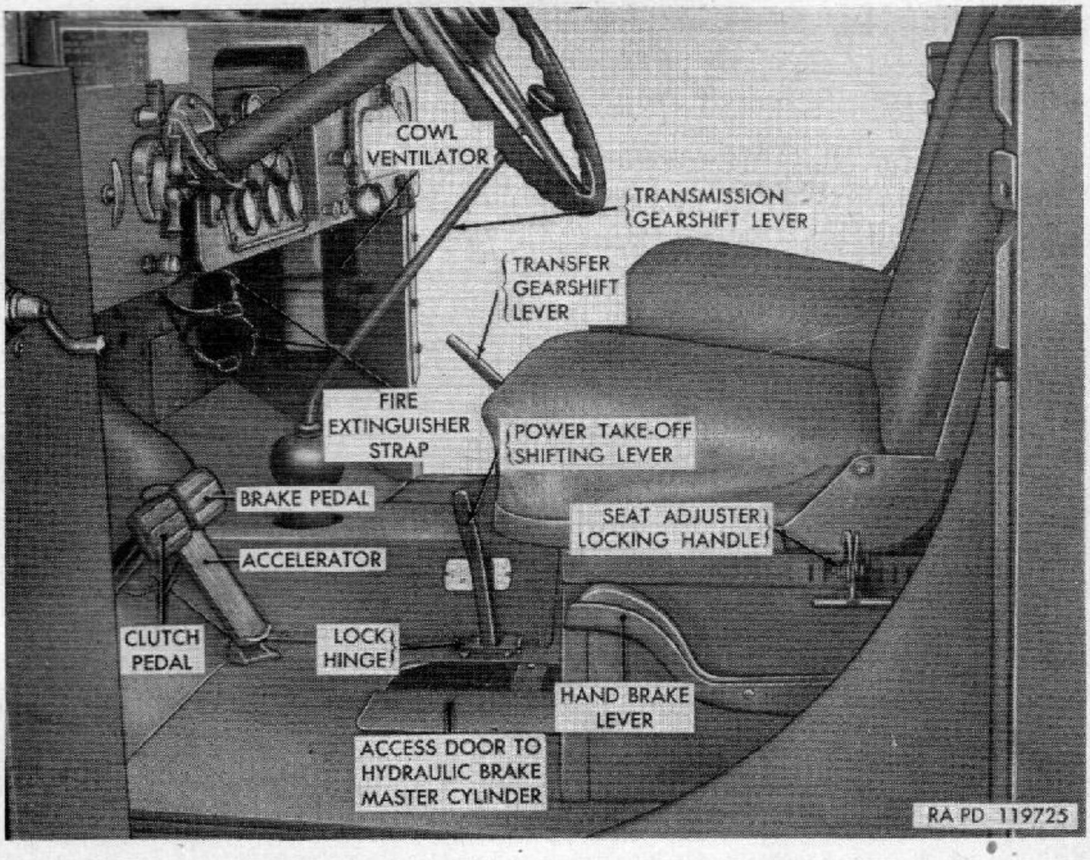


Figure 16. Driver's compartment.

start wipers and rotated clockwise to stop wipers. Each windshield wiper, mounted at top of windshield frame, is provided with a handle for manual operation of the wiper blade.

37. Dump Body Control Lever (M47 and M59 Only)

The dump body is raised and lowered by a control lever at the left and to the rear of the driver's seat (fig. 21). Lever is held in its upper, or vertical position by a safety lock on lever. First downward movement of lever engages power-take-off. Movement of lever from its central position downward will raise body. Movement from central position upward will lower body.

38. End Gate Hand Lever (M47 and M59 Only)

Body end gate is locked in closed position, or is released, by a lever mounted on left forward corner of body (fig. 24).

39. Driver's Seat

The driver's seat is adjustable forward or backward. To adjust seat position, lift up on adjuster locking handle located on seat frame to driver's left (fig. 16), and slide seat forward or back. Release handle to lock seat in desired position.

Section III. OPERATION UNDER USUAL CONDITIONS

40. General

This section contains instructions for the mechanical steps necessary to operate the 2½-ton 6 x 6 cargo truck M34 (fig. 3), and M36 (fig. 6), and the dump truck M47 (fig. 9) and M59 under conditions of moderate temperatures and humidity. For operation under unusual conditions, refer to section V below.

41. Starting the Engine

a. Before attempting to start the engine, the driver must become familiar with the purpose and location of the various instruments and controls, described in section II above.

NOTE. Perform the before operation services outlined in paragraph 65 in conjunction with starting and warming up engine.

b. Make sure transmission gear shift lever and power-take-off shift lever are in "NEUTRAL" positions.

c. Pull choke-control knob out. In warm weather, or when engine is warm, use choke sparingly.

Note. If the atmospheric temperature is below 10° F., it may be necessary to use primer pump. To operate primer pump, pull out knob and force it in. Care must be exercised to avoid flooding the engine. Normally three strokes are required, but the driver must learn from personal experience with his truck how best to use the primer pump effectively.

d. Turn ignition-switch lever to "ON" position.

e. Depress clutch pedal to disengage clutch and hold pedal down while engine is started.

f. Step on starter pedal to start engine. Release as soon as engine starts.

Note. Starter should not be operated continuously for more than 30 seconds. If engine fails to start within 30 seconds, wait 10 to 15 seconds before trying again. If engine does not start after reasonable time, determine cause and correct (par. 68). If necessary, engine may be started by towing (par. 45).

g. Release clutch pedal.

h. Push choke-control knob in to a point at which engine operates without misfiring. As engine warms up, push choke-control knob in all the way.

i. Engine should be permitted to idle through a short warm-up period whenever conditions permit. This warm-up period allows time for the driver to observe the ammeter, oil pressure, and temperature gages, and check performance of engine before the truck is placed in motion. The ammeter should show charge reading with lamps and accessories turned off. If ammeter does not show charge with engine running at fast idle, check as outlined in paragraph 73. Stop engine and investigate cause if oil pressure gage does not show pressure within 30 seconds after engine starts. Normal engine-operating-temperature range is 160° to 180° F. As a general rule, engine speed equivalent to truck road speed of five mph should bring temperature to 160° F. or above. If temperature rises quickly to 210° F. or more, or if temperature stays below 160° F., stop engine and determine cause of overheating or overcooling (par. 72).

42. Operating the Truck

a. DRIVING THE TRUCK. The purpose and use of the transmission and transfer must be understood by the driver before any attempt is made to operate the truck. The truck cannot be moved until transfer gearshift lever is in "HIGH" or "LOW" range (fig. 19). The transmission gear shift lever positions do not in any way affect the selection of or shifting into "HIGH" or "LOW" ranges in the transfer. The transfer provides additional gear ratios for traversing difficult terrain. Make sure winch is locked for traveling (par. 47), and all equipment and tools are properly stowed (par. 54). Do not put truck in motion until low-air-pressure-warning buzzer is silent.

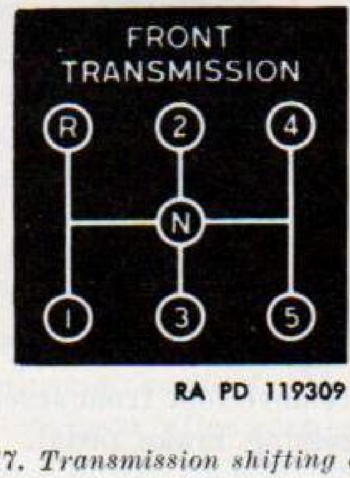
Caution: Do not exceed maximum road speeds (fig. 18).

(1) Depress clutch pedal and move transfer gearshift lever to "HIGH" range (fig. 19). Release clutch pedal.

(2) Depress clutch pedal and move transmission gearshift lever to "FIRST SPEED FORWARD" (fig. 17). Keep clutch pedal depressed.

(3) Release hand brake.

(4) Depress accelerator pedal to increase engine speed slightly. Release clutch pedal slowly and further depress accelerator pedal to prevent the engine from stalling as the truck starts to move.



RA PD 119309

Figure 17. Transmission shifting diagram.

(5) Notice road speed caution plate (fig. 18), depress clutch pedal, and move transmission gearshift lever to next speed as truck speed approaches figure given on caution plate.

CAUTION

MAXIMUM ROAD SPEED IN M.P.H

TRANSMISSION	TRANSFER CASE HIGH	TRANSFER CASE LOW
FIFTH DIRECT	60	30
FOURTH	42	21
THIRD	25	12
SECOND	14	7
FIRST	8	4
REVERSE	8	4

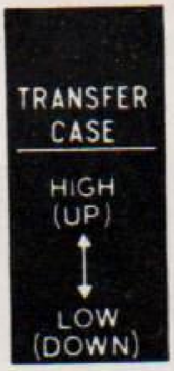
RA PD 119310

Figure 18. Road speed caution data.

(6) When necessary to shift transmission to a lower gear, depress the clutch pedal quickly, shift to the next lower gear, increase engine speed, and release clutch pedal slowly.

(7) When necessary to shift transfer to "LOW" range (fig. 19), speed of the truck must be reduced below the maximum speed of gear into which shift will be made (fig. 20). Depress clutch pedal and move transfer gearshift lever to "LOW" range. Release clutch and accelerate to desired road speed. The transfer may be shifted from "LOW" to "HIGH" range regardless of truck speed, but be sure to synchronize engine speed with truck speed before releasing clutch pedal.

Note. While driving the truck, perform the during operation service outlined in paragraph 65.



RA PD 119311

Figure 19. Transfer shifting diagram.

b. Stopping the Truck.

(1) To stop truck, remove foot from accelerator pedal and apply brakes by depressing brake pedal. Do not "pump" brake

pedal, but apply even pressure. This will permit engine to assist in checking speed.

RA PD 119312

Figure 20. Transfer shifting warning data.

(2) When truck speed has been reduced to engine idling speed, depress clutch pedal and move transmission gearshift lever to "NEUTRAL" (fig. 17).

(3) When truck has come to complete stop, apply hand brake.

Note. During halts, perform the at halt services, as outlined in paragraph 65.

c. Reversing the Truck. Truck must be brought to a complete stop before shifting into "REVERSE."

(1) Stop truck. Depress clutch pedal and move transmission gearshift lever to "REVERSE" position (fig. 17). (Transfer-shift lever may be in either "HIGH" or "LOW" range.)

(2) Release clutch pedal and accelerate engine.

(3) It is mandatory that drivers shift fully into transmission first gear after each use of reverse gear on M34 trucks, bearing a serial number below 90485. Explanation of this need is indicated in the following paragraph.

(*a*) The 2½-ton 6 x 6 trucks M34 below serial number 90485 were equipped with a single-sprag-type-overrunning clutch in the transfer. Later production M34 trucks were equipped with a double-sprag type. In the single-sprag type, the overrunning clutch feature does not function when the transmission is in reverse gear. Instead, the front and rear wheels are mechanically coupled as ends of a solid drive line through the propeller shafts and gear trains. In order to disengage this "locked" system and revert to the overrunning feature in forward speeds, it is necessary to shift fully into first gear after coming out of reverse gear through neutral. If the transmission is not shifted into first gear after each use of reverse gear, the power train system will remain "locked up" causing excessive tire scuffing and wear, hard steering and difficulty in handling the vehicle in forward speeds. This shifting requirement does not apply to vehicles having serial number 90485 and above.

(*b*) As an added precaution, a warning decalcomania will be applied to the instrument panel in the area below and to the right of the cooling system drain instruction plate. The required decalcomania is identified as CAUTION DECAL stock number G742–7410885 and is available at Rossford Ordnance Depot. It reads

Caution: Always shift transmission into first gear after each use of reverse gear.

43. Stopping the Engine

Engine is stopped by turning ignition-switch lever to "OFF" position.

Note. At end of day's operation, perform after operation services as outlined in paragraph 65.

44. Driving Precautions

Note. Perform the prescribed during operation, at halt, and after operation services as outlined in paragraph 65.

a. MAXIMUM ROAD SPEEDS. Instruction data plate (figs. 10 and 18) gives maximum speeds at which truck may be safely operated in various transmission gear ratios and transfer "HIGH" and "LOW" ranges. Do not exceed maximum road speeds. Shift transmission to next higher gear when speed of truck approaches maximum road speed of gear being used.

b. DESCENDING STEEP GRADES. When descending steep grades, do not allow truck to exceed maximum speed for gear ratios being used. Select a gear ratio that will keep truck speed below the maximum road speed for the gear ratio selected. In general, it is advisable to use same gear ratio descending as would be used in ascending the same grade. Use brakes several times during descent, to reduce speed of truck. Transfer may be shifted from "LOW" to "HIGH" range regardless of truck speed but be sure to synchronize engine speed with truck speed before releasing clutch pedal.

c. ASCENDING STEEP GRADES. When ascending steep grades, always shift into a lower gear before engine begins to labor. The transfer "LOW" range increases the number of speeds provided by the transmission.

Caution: When shifting transfer from "HIGH" to "LOW" range, truck speed must be reduced below the maximum speed of gear into which shift will be made (fig. 20). Make sure engine speed is synchronized with truck speed before clutch pedal is released.

45. Towing the Truck

a. Towing or Pushing. Before moving the truck by towing or pushing, the transfer must be shifted into neutral with the transmission shifted into the gear corresponding with direction of vehicle motion, except that transmission neutral position may also be used for forward motion.

Caution: M34 trucks, below serial number 90485, equipped with a single sprag transfer will not be towed backward unless propeller shaft is disconnected at front-axle companion flange, see paragraph 140.

b. Towing to Start. Engine may be started by towing truck with another vehicle in the following manner:

(1) Tow chain or line should be of sufficient length to permit maneuverability of both vehicles.

(2) In towed truck, hold throttle control knob out one-half to three-fourths inch. Pull choke-control knob out part way if engine is not warmed up. Shift transmission to "FIFTH SPEED FORWARD" (fig. 17). Shift transfer to "HIGH" (fig. 19).

(3) Turn ignition-switch lever to "ON" position.

(4) While being towed for the first 100 feet, hold clutch in disengaged position. When towed-truck speed reaches approximately 10 mph, slowly engage clutch.

(5) Disengage clutch immediately after engine starts.

c. Towing Damaged Trucks. Particular care must be exercised when towing damaged trucks to make certain that no additional damage occurs while truck is being towed.

(1) *Towing truck with all wheels on ground.*

(*a*) *Transfer undamaged.* If transfer on truck to be towed is not damaged, shift transmission to "FIFTH SPEED FORWARD" and transfer into "NEUTRAL" position. In this position, driving gears are revolving in transfer, and gears will cause enough lubricant splash to provide lubrication for bearings.

(*b*) *Transfer damaged.*

1. M36, M47, and M59 trucks. If transfer is damaged, propeller shafts should be disconnected at front axle companion flange and forward rear axle companion flange (par. 140). Secure shafts to frame. Place bolts and nuts in instrument panel compartment.

2. M34 trucks. On M34 trucks, serial number 90485 and up, proceed as in *1* above. Early shipments of M34 trucks, serial number 90484 and below, were equipped with transfers having a single sprag overrunning clutch which permitted a slightly slower drive to front axle when in forward speeds. When in reverse, this clutch did not function, and front and rear axle drives were locked together. As gear ratio to front axle was slightly slower than that to rear axle, front wheels dragged and set up heavy torsional strain in all propeller shafts. On overhaul, all transfers will be equipped with double sprag units to replace the single sprag units. However, on all M34 trucks, serial number 90484 and below, which are not *known* to have been corrected, it is mandatory to observe the following:

Warning: Always raise one front wheel and one wheel on each rear axle clear of ground to relieve torsional strain before disconnecting propeller shafts. Failure to observe this may result in personal injury.

(2) *Towing truck with front wheels off ground.* Whenever truck is to be towed with front wheels off ground, truck must be supported in such a manner that wheels of both rear axles contact ground. Disconnect propeller shafts at forward-rear axle (note ***Warning*** in (*b*)*2* above). Secure end of shafts to frame. Place bolts and nuts in instrument panel compartment.

(3) *Towing truck with rear wheels off ground.* Truck should be towed backward only after other methods have been proven unsatisfactory. Disconnect propeller shaft at front-axle companion flange (note ***Warning*** in (*b*) *2* above). Secure shaft to frame. Place nuts and bolts in instrument panel compartment.

Section IV. OPERATION OF MATÉRIEL USED IN CONJUNCTION WITH MAJOR ITEM

46. Operating the M47 and M59 Dump Body

a. DESCRIPTION. The all steel 2½-yard dump body (fig. 158) and hydraulic hoist assembly is mounted in a sub-frame which is mounted on truck chassis. Power for operation is obtained from a gear type pump (fig. 159) driven through a drive shaft from the power-take-off mounted on transmission (fig. 87). Control of body operation is by a lever (fig. 21) at the rear and to the left of driver's seat. The spare wheel (fig. 150) is carried in vertical position at rear of cab on right side. Tool box (fig. 12) is mounted at rear of cab on left side. Body end gate is arranged to pivot at top for normal work (fig. 25), but can be lowered from top to horizontal position in line with floor of body (fig. 26). End gate is held in horizontal position by chains. End gate is held in closed position by linkage operated by a hand lever mounted at front left corner of body (fig. 24). Linkage is self-locking when lever is up against body and end gate is held closed by latches connected to linkage.

b. OPERATION.

(1) *General.* The dump body pivots on two hinge pins, fixed in body hinges and turns in bearings in subframe when in dumping position, and rests on subframe when lowered. The body is raised by a hydraulic hoist cylinder mounted on a transverse base shaft which is pivoted in subframe near the front. The piston rod is secured in a crosshead, the ends of which are pivoted in lever arms mounted on pin bearings attached to the bottom of body. The free ends of lever arms are equipped with rollers which engage curved roller ramps on inner sides of subframe. The resulting compound motion raises the body. Hydraulic hoist pump and control valve (fig. 159) are mounted below forward end of subframe. The front cross member of subframe is a box section and serves as a reserve tank for hydraulic fluid.

(2) *Body control box.* A dump body control lever in the rear and at left of driver's seat (fig. 21) operates a shift control lever extending downward through cab floor which is connected by a control box rod to a control box (fig. 160) at front of hydraulic hoist control valve. This control box contains two cams (fig. 162), both of which are operated by the shift control lever connected to control lever in cab. The contour of these cams is such as to permit separate and predetermined positions of the cams in relation to position of control lever in cab. A lever mounted on extended end of forward cam shaft is connected to power-take-off shifting rod (fig. 161). A lever on rear cam shaft operates hoist control valve, controlling body movement.

(3) *Operation.* The dump body control lever in cab has four definite positions as shown in figure 21. In first position (A), body is down and power-take-off is disengaged. As control lever is moved to next position (B), the forward arm in control box is engaged and shift linkage engages power-take-off. To raise body, control lever is moved forward, past position (C), to position (D). This movement engages rear cam in control box, lifts control valve piston, and raises

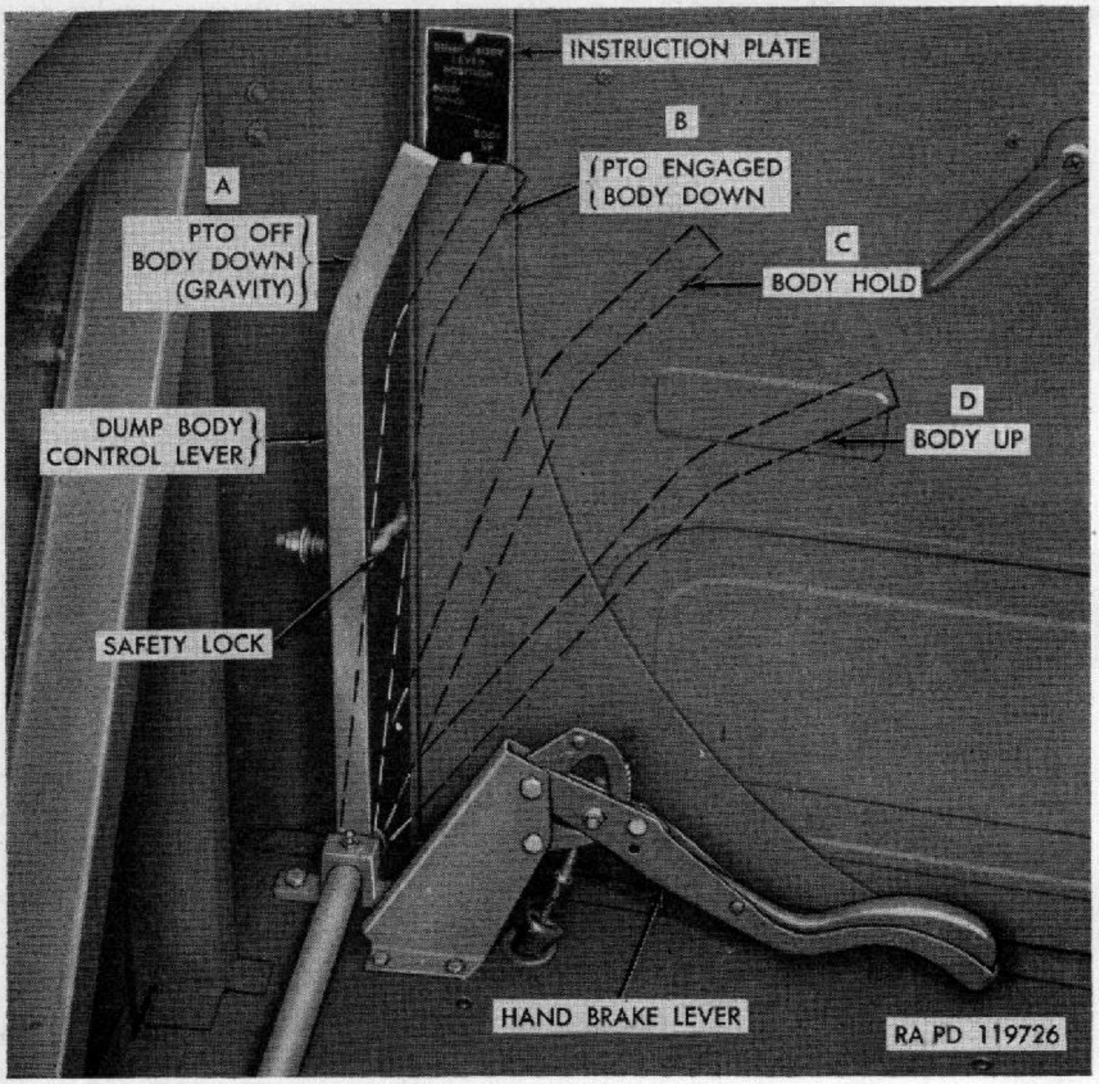


Figure 21. Dump body control lever—driver's seat removed.

body. Lift is stopped and body held at any point by returning control lever to (C). Body is lowered by moving control lever from (C) to (B); it may be stopped and held in any position by returning lever to (C). With lever at (B) or (D), body movement is automatically checked at either up or down position at the limit of travel. Position safety lock on lever to prevent accidental engagement of dump mechanism when not using.

(4) *Safety braces.* Safety braces, attached to sides of subframe will always be used if body is to be left in raised position (fig. 22) for an extended time.

Warning: Safety braces must always be used if repairs or adjustments are to be made under body while it is raised. To use safety braces, raise body to full height by power, raise braces and leave body in raised position. Do not use power to lower body to braces.

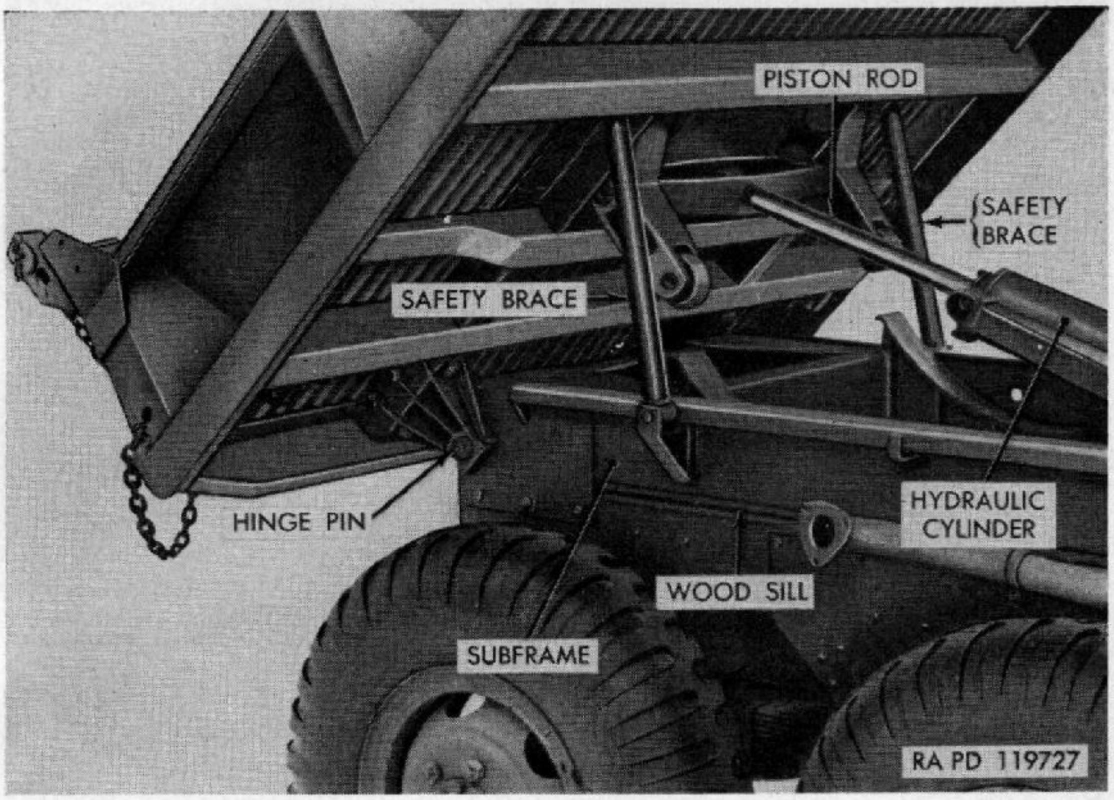


Figure 22. Safety braces.

(5) *End gate* (fig. 23).

(*a*) The end gate is normally pivoted at top and is secured in this position by lock pins through end gate upper latches. End gate is held in closed position by lower latches which are controlled by a hand lever on front left corner of body (fig. 24).

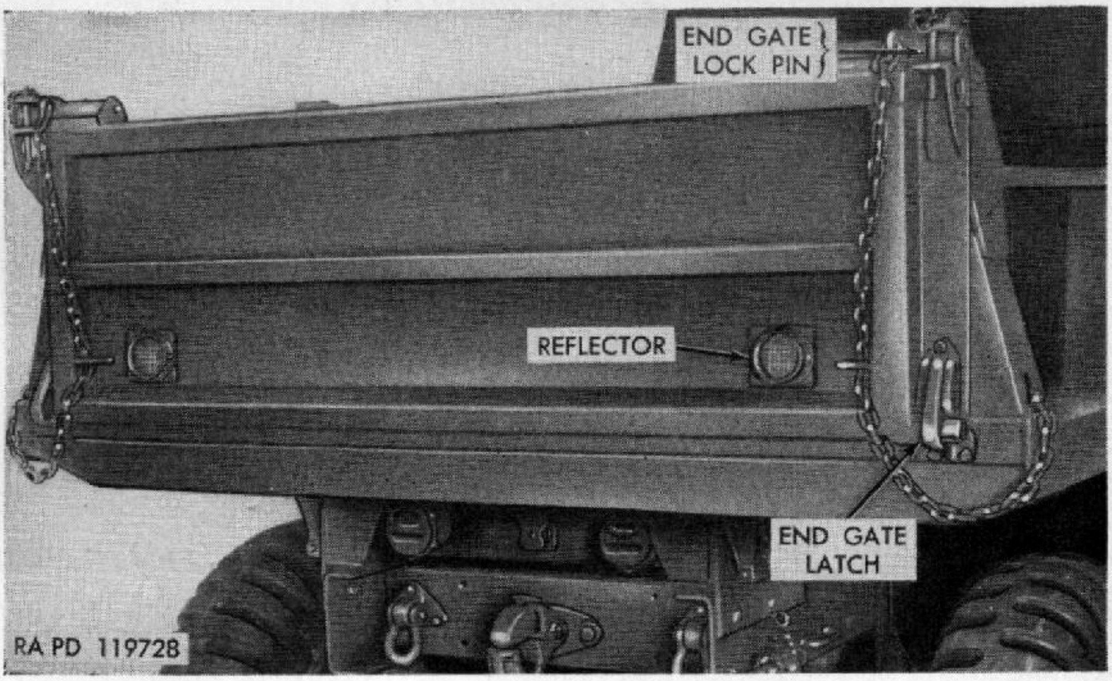


Figure 23. Dump body end gate.

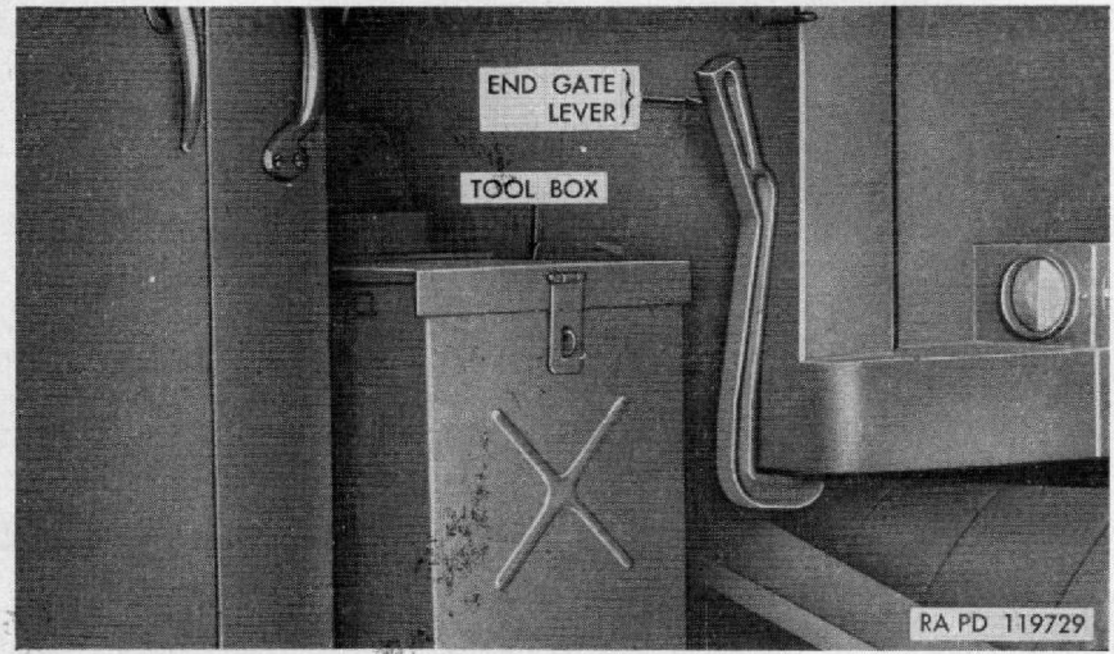


Figure 24. End gate hand lever.

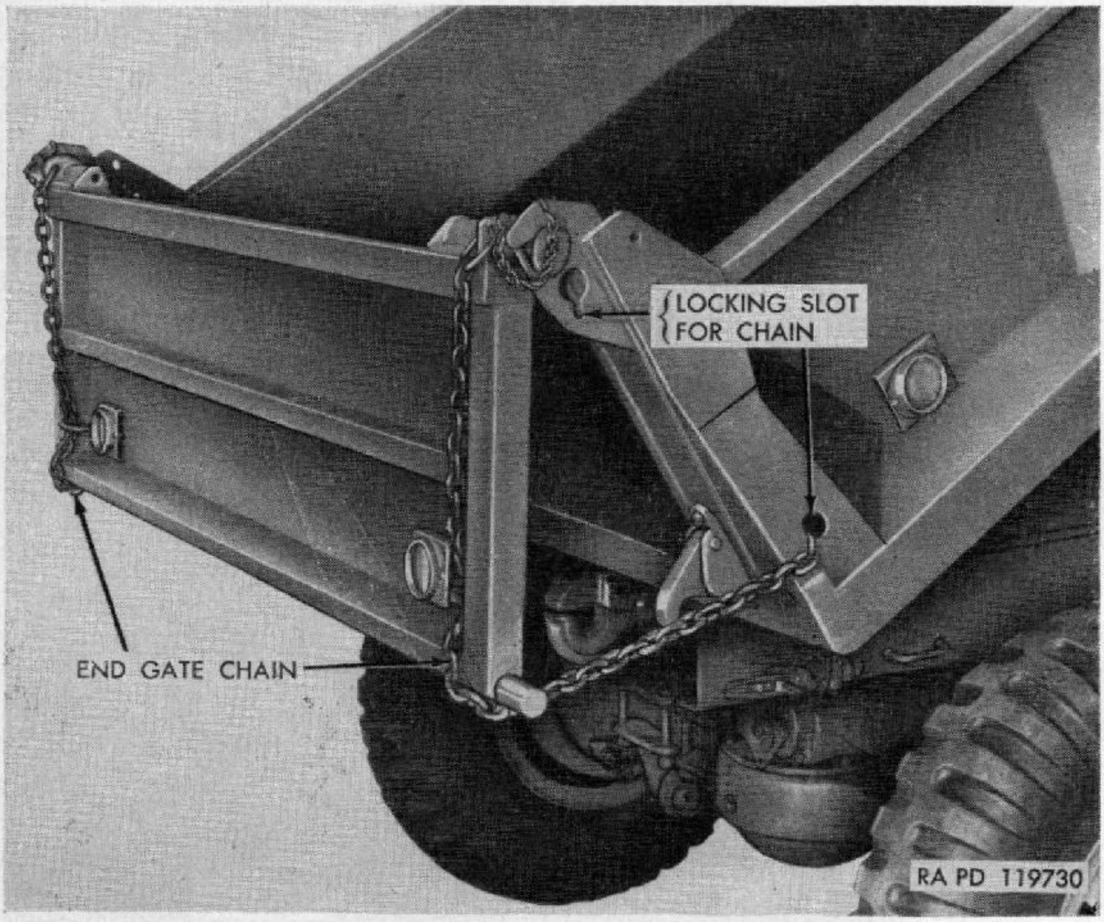


Figure 25. End gate open for dump.

(*b*) To release end gate for dumping, pull hand lever forward and down. This releases lower latches and allows gate to swing outward as body lifts. Distance end gate swings open is controlled by adjustment of chains in locking slots (fig. 25).

(*c*) If desired, material longer than body may be carried by keeping lower latches closed and removing lock pins from upper latches. Gate is then supported in horizontal position by the chains (fig. 26).

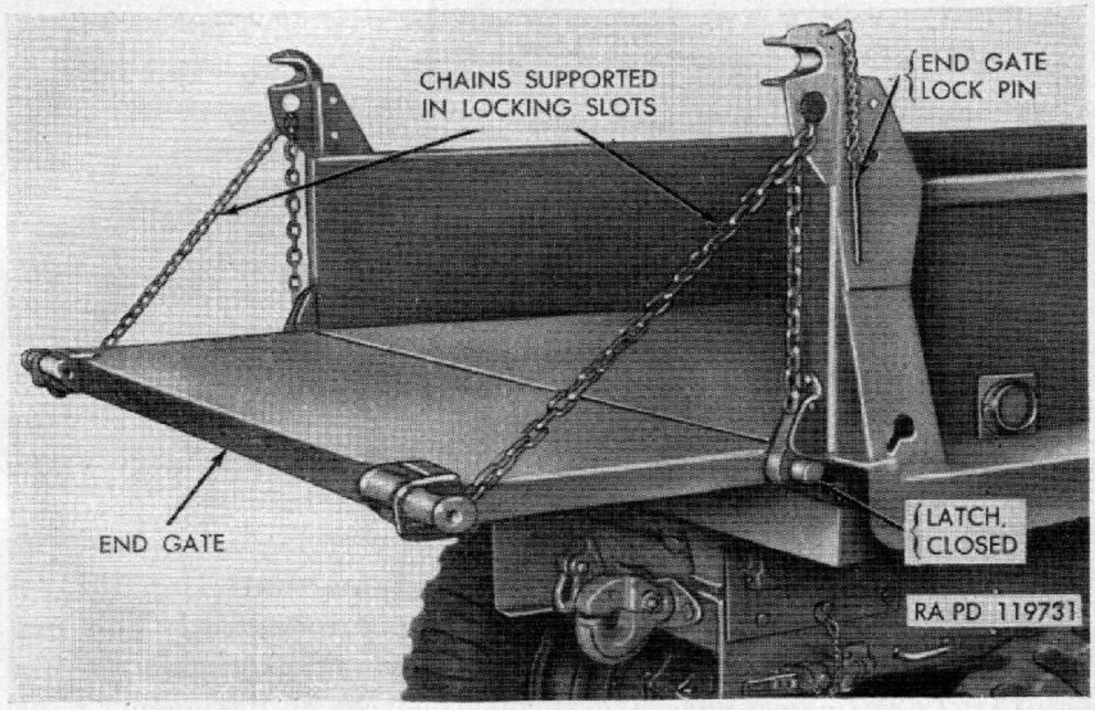


Figure 26. End gate horizontal.

47. Winch

a. DESCRIPTION. Some trucks of all models have a worm drive, jaw-clutch drum winch mounted at the front. Winch is mounted on support brackets attached to frame-side-rail extensions (fig. 132). Power for operation of winch is obtained through a drive shaft (fig. 92) extending from power-take-off front out-put shaft to winch worm shaft. The power-take-off has "HIGH," "LOW," and "REVERSE" speeds with "NEUTRAL" points between (fig. 27).

b. CONTROLS.

(1) *Power-take-off shifting lever.* Engaging and shifting the power-take-off for operation of the winch is accomplished by means of a shifting lever located in cab to left and behind the transmission gearshift lever (fig. 16). The power-take-off shifting lever has three operating and two neutral positions, in following order from front toward rear of cab:

"HIGH," "NEUTRAL," "LOW," "NEUTRAL," and "REVERSE" (fig. 27). A shifting lever lock hinge (fig. 16), adjacent to the power-take-off shifting lever, is notched to hold power-take-off in neutral. This hinge should always be down when winch is not in use.

Figure 27. Power-take-off shifting diagram.

(2) *Clutch control lever.* A hand operated lever, located on right end of winch, is used to engage and disengage winch drum (fig. 132).

(3) *Drum-lock-poppet knob.* A poppet knob, located on winch-end frame above center of drum shaft (fig. 132), is used to lock drum when winch is not operating. This prevents rope from unwinding from drum when truck is moving.

(4) *Throttle lock-out.* The throttle control, on instrument panel (BB, fig. 14), is arranged to hold in its pulled out position in order to maintain proper engine speed when operating winch. The control rod is notched throughout its length and is engaged by a spring latch when knob is in vertical position. To release, turn knob to horizontal.

(5) *Engine speed.* Engine speed must be carefully adjusted when using power-take-off. It is advisable not to run engine above a fast idle which is approximately 1,100 rpm. There is no tachometer on these trucks, consequently the above speed must be a matter of judgment. Throttle control is notched to hold in pulled out position ((4) above). Determine number of notches throttle must be pulled out, knowing that normal idle speed is 450 rpm.

c. OPERATION.

(1) *Unwinding wire rope.*

(*a*) Move clutch control lever (fig. 132) as far as it will go toward winch drum to disengage jaw clutch.

(*b*) Pull out drum-lock-poppet knob (fig. 132) and rotate knob a quarter turn to hold in locked-out position.

(*c*) Make sure power-take-off shifting lever is in "NEUTRAL" position (fig. 27).

(*d*) Pull on end of wire rope until required length has been unreeled. A drag brake on the drum flange will keep drum from spinning and rope unwinding too rapidly. Take care not to kink rope.

Note. The winch has most power with all rope off the drum. Unwind as much rope as possible from winch drum before starting to pull.

(2) *Lifting load.*

(*a*) Move control lever (fig. 132) outward and away from winch drum to engage jaw clutch.

(*b*) Position hand throttle in lock-out position *b*(4) and (5) above). This maintains correct engine speed for winch operation.

Caution: Always use throttle lock-out position when operating winch to provide correct engine speed. Operating the winch faster will result in excessive strains and probable failure of parts.

(*c*) Start truck engine, depress clutch pedal, and move power-take-off shifting lever to "LOW" for heavy load or to "HIGH" for light load (fig. 27). If in doubt, use "LOW." Release truck clutch pedal.

(3) *Stopping winch.* Depress truck clutch pedal and shift power-take-off to "NEUTRAL" (fig. 27). Release clutch pedal.

(4) *Lowering load or unreeling slack rope.* Depress clutch pedal and shift power-take-off to "REVERSE" (fig. 27). Release clutch pedal.

Note. When unreeling slack wire rope under power, it is necessary to maintain a manual tension on the rope to keep coils tight or drum and prevent crossing due to loosening.

(5) *Winding wire rope.*

(*a*) Place a load on the rope. If no load is available, attach rope to an anchor or tree.

(*b*) Depress clutch pedal and shift power-take-off to "LOW" (fig. 27). Release clutch pedal. The winch will pull the truck forward, thus winding rope on drum. A very light pressure on the truck brake pedal by the operator, while winding ropes, will insure a tight and neat wind.

Note. Make sure first layer of rope goes on drum in order and that each additional layer starts back across drum properly. If necessary, the rope can be hammered or pushed in place with a block of wood to insure the first layer being closely wrapped.

Caution: Always wear gloves when handling wire rope. Never let rope run through the hands. Broken wires can cause painful injuries.

d. Locking Winch for Traveling.

(1) Make sure power-take-off shifting lever is in "NEUTRAL" and held by lock hinge (fig. 16).

(2) Move clutch control lever (fig. 132) toward winch drum to disengage jaw clutch.

(3) Pull out drum-lock-poppet knob (fig. 132) and rotate a quarter turn; then release and allow plunger to engage nearest hold in drum flange.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

48. General Conditions

a. In addition to the operating procedures described for usual conditions, special instructions of technical nature for operating and servicing these trucks under unusual conditions are contained or referred to herein. In addition to the normal preventive maintenance service, special care in cleaning and lubrication must be observed where extremes of temperature, humidity, and terrain conditions are present or anticipated. Proper cleaning, lubrication, storage and handling of fuels and lubricants not only insure proper operation and functioning, but also guard against excessive wear of the working parts and deterioration of the matériel.

b. TM 21–300 contains very important instruction on driver selection, training, and supervision and TM 21–305 prescribes special driving instructions for operating wheeled vehicles under unusual conditions.

Caution: It is imperative that the approved practices and precautions be followed. A detailed study of these TM's is essential for use of this matériel under unusual conditions.

c. Refer to paragraphs 58 through 61 for lubrication under unusual conditions; to table II for preventive maintenance checks; and to section XXXIV, chapter 3, for maintenance procedures.

d. When chronic failure of matériel results from subjection to extreme conditions, report of the condition should be made on DA AGO Form 468.

49. Extreme-Cold Weather Conditions

a. General Problems.

(1) Extensive preparation is necessary of matériel scheduled for operation in extreme-cold weather. Generally, extreme cold

will cause lubricants to thicken or congeal, freeze batteries, or prevent them from furnishing sufficient current for cold-weather starting, crack insulation and cause electrical short circuits, prevent fuels from vaporizing and properly combining with air to form a combustible mixture for starting, and will cause the various construction materials to become hard, brittle, and easily damaged or broken.

(2) The cooling system should be prepared and protected for temperatures below +32° F. in accordance with instruction given in TM 9–2855 on draining and cleaning the system and the selection, application, and checking of antifreeze compounds to suit the anticipated conditions.

(3) Tm 9–2855 also describes the method of correcting specific gravity readings for batteries exposed to extreme cold.

(4) For description of operations in extreme cold, refer to FM 70–15 as well as to TM 9–2855.

Caution: It is imperative that the approved practices and precautions be followed. TM 9–2855 contains information which is applicable to these trucks as well as to all other vehicles. It must be considered an essential part of this manual, not merely an explanatory supplement to it.

b. WINTERIZATION EQUIPMENT. Information on winterization equipment used for operation in extreme-cold weather 0° to −65° F. is contained in SB 9–16.

c. FUELS, LUBRICANTS, AND ANTIFREEZE COMPOUNDS (STORAGE, HANDLING, AND USE).

(1) The operation of equipment at arctic temperatures will depend to a great extent upon the condition of the fuels, lubricants, and antifreeze compounds used in the equipment. Immediate effects of careless storage and handling or improper use of these materials are not always apparent, but any deviation from proper procedures may cause trouble at the least expected time.

(2) In arctic operations, contamination with moisture is a source of many difficulties. Moisture can be the result of snow getting into the product, condensation due to "breathing" of a partially filled container, or moisture condensed from warm air in a partially filled container when a product is brought outdoors from room temperature. Other impurities will also contaminate fuels and lubricants so their usefulness is impaired.

(3) Refer to TM 9–2855 for detailed instruction on storage, handling, and use.

50. Extreme-Cold Weather Operation

a. General.

(1) The driver must always be on the alert for indications of the effect of cold weather on the vehicle.

(2) The driver must be very cautious when placing the vehicle in motion after a shutdown. Congealed lubricants may cause failure of parts. Tires frozen to the ground or frozen to the shape of the flat spot while under-inflated must be considered. One or more brake shoes may be frozen fast and require preheating to avoid damage to the mating surfaces. After warming up the engine thoroughly, place transmission in first gear and drive vehicle slowly about 100 yards, being careful not to stall the engine. This should heat gears and tires to a point where normal operation can be expected.

(3) Constantly note instrument readings. If instrument reading consistently deviates from normal, stop the vehicle and investigate the cause. A special engine thermostat provided in the arctic winterization kit opens at 180° F., and at this temperature the engine will give best results. If temperature gage reading consistently exceeds 200° F., adjust flap on radiator winterfront cover to admit more air.

b. At Halt or Parking.

(1) When halted for short shutdown periods, the vehicle should be parked in a sheltered spot out of the wind. If no shelter is available, park so that the vehicle engines does not face into the wind. For long shutdown periods, if high dry ground is not available, prepare a footing of planks or brush. Chock in place if necessary.

(2) When preparing a vehicle for shutdown period, place control levers in the neutral position to prevent them from possible freezing in an engaged position. Freezing may occur when water is present due to condensation.

(3) Clean all parts of the vehicle of snow, ice, and mud as soon as possible after operation. Refer to table II for detailed after-operation procedures. If the winter front and side covers are not installed, be sure to protect all parts of the engine and engine accessories against entrance of loose, drifting snow during the halt. Snow flurries penetrating the engine compartment may melt, and later freeze belts and carburetor levers. Cover and shield the vehicle but keep the ends of the canvas paulins off the ground to prevent them from freezing to the ground.

(4) If no power plant heater is present, the battery should be removed and stored in a warm place.

(5) Refuel immediately in order to reduce condensation in the fuel tanks. Prior to refueling, open fuel tank drains and drain off any accumulated water.

(6) Immediately after engine "shut-down," start the power plant heater and check to be sure it operates effectively. The heater should avoid the necessity of removing the battery to warm storage, and is designed to operate unattended during overnight stops. Instructions for operation of winterization equipment is contained in pamphlet packed with kit.

(7) Correct tire inflation pressure is prescribed in paragraph 52*b*.

51. Extreme-Hot Weather Operation

a. General. Continuous operation of the vehicle at high speeds, or long hard pulls in lower gear positions on steep grades, or in soft terrain may cause the vehicle to register overheating. Avoid the continuous use of the lower gear ratios whenever possible. Continuously watch the temperature and halt the vehicle for a cooling-off period whenever necessary and the tactical situation permits. Frequently inspect and service the cooling unit, oil filter, and air cleaner. If the engine temperature consistently rises above 200° F., look for dust, sand, or insects or radiator fins and blow out any accumulation with compressed air or water under pressure. Flush cooling system if necessary.

b. At Halt or Parking.

(1) Do not park the vehicles in the sun for long periods, as the heat and sunlight will shorten the life of the tires. If possible, park vehicle under cover to protect it from sun, sand, and dust.

(2) Cover inactive vehicles with paulins if no other suitable shelter is available. When entire vehicle cannot be covered, protect window glass against sand etching, and protect engine compartment against entry of sand.

(3) Correct tire inflation pressure is prescribed in paragraph 52*b*.

(4) Vehicles inactive for long periods in hot humid weather are subject to rapid rusting and accumulation of fungi growth. Make frequent inspections and clean and lubricate to prevent excessive deterioration.

52. Operation on Unusual Terrain

a. General.

(1) Vehicle operation on snow or ice and in deep mud requires the use of tire chains. Chains must be installed in pairs

(front and rear) to prevent power-train damage and wear. Select a gear ratio low enough to move vehicle steadily without imposing undue driving strain on engine and power train. However, racing of the engine for extended periods must be avoided.

Note. Avoid excessive clutch slippage.

(2) The driver at all times must know the position in which the front wheels are steered, as the vehicle may travel straight ahead even though the wheels are cramped right or left. A piece of string tied to the front portion of the steering wheel rim in "straight-ahead" position will indicate to the driver whether the front wheels are "ploughing." This ploughing action may cause the vehicle to stall, or suddenly veer to right or left.

(3) If one or more wheels become mired and others spin, it may be necessary for the vehicle to be winched or towed by a companion vehicle, or to jack up the wheel which is mired and insert planking or matting beneath it. Do not jam sticks or stones under a spinning wheel, as this only forms an effective block and will wear the tire tread unnecessarily.

(4) Operation in sand requires daily cleaning of air cleaners and fuel and oil filters. Engine vents and other exposed vents should be covered with cloth.

(5) At high altitudes, coolant in vehicles boils at proportionately lower points than 212° F., thus it will be necessary to keep a close watch on the engine temperature during the summer months.

b. Recommended Tire Pressures. Standard inflation pressure for highway driving is 50 psi; for cross-country driving, 35 psi; for driving in sand, 15 psi. Pressure in all tires must be equal. When checking tire pressure, do not reduce pressure if tires are hot.

c. After-Operation Procedures. Clean all parts of the vehicle of snow, ice, mud, dust, and sand as soon as possible after operation. Particular care should be taken to remove collections of ice, snow, and mud from the radiator fins, engine compartment, steering knuckles and arms, air cleaner, and electrical connections.

Caution: Carefully remove accumulations of ice, caked mud, etc., from under fenders and where accumulated.

53. Fording Operation

a. General. The engine, transmission, transfer, and electrical equipment except batteries on vehicles described in this manual are thoroughly waterproofed. When standard intake and exhaust extensions are attached to the air cleaner and exhaust pipe, and when battery terminals are waterproofed, water ot the depth of 78 inches to top of wave may be entered without other preliminary preparation.

b. NORMAL FORDING. Fording water up to maximum depth of 78 inches is based on the standard vehicle as manufactured, when equipped with intake and exhaust extensions, and battery terminals are waterproofed with asbestos grease. Without these extensions, but with battery terminals waterproofed, water which will not cover end of exhaust pipe may be entered without preparation. Observe the following precautions:

(1) Do not exceed known fording depth of vehicle.

(2) Check approach angle and departure angle. Note that angles vary considerably with type of body (par. 7*d*).

(3) Engine must be operating at maximum efficiency before entering water.

(4) Pull out crankcase ventilation shut-off-valve knob.

(5) Shift transmission gearing into low range and speed up engine to overcome possibility of a "stall" when cold water chills engine. Enter the water slowly. Should engine stall while submerged, it may be started in the usual manner (par. 41).

(6) All normal fording should be at speeds of 3 to 4 mph to avoid forming a "bow-wave." Use clutch in normal manner. Clutch bell housing is sealed and is slightly pressurized when crankcase ventilation shut-off-valve knob (fig. 14) is pulled out for fording. Do not loosen fan belts as this will stop coolant circulation in engine and generator charging. Drive carefully after leaving water as breaks may be unreliable until linings are dry. Applying the brakes a few times will help to dry linings after dry land has been reached.

(7) If accidental complete submersion occurs, the vehicle will be salvaged, temporary preservation applied as outlined in paragraph 60, and then sent to ordnance maintenance unit as soon as possible for permanent maintenance.

c. DEEP-WATER FORDING. Refer to TM 9–2853 for general information, description, and methods of use of deep-water fording kits.

d. AFTER FORDING OPERATION. Push in crankcase ventilation shut-off-valve knob. Refer to paragraph 60 for maintenance after fording.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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

54. Parts, Tools, and Equipment

a. GENERAL. Tools, equipment, and spare parts are issued to the using organization for maintaining the matériel. Tools and equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored in the chest and/or roll provided for them.

b. SPARE PARTS. Spare parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, providing such operations are within the scope of organizational maintenance functions. Spare parts, tools, and equipment supplied for the trucks are listed in Department of the Army Supply Catalog ORD 7 SNL G–742, which is the authority for requisitioning replacements.

c. COMMON TOOLS AND EQUIPMENT. Standard and commonly used tools and equipment having general application to this matériel are listed for issue by the ORD 7 catalog and by T/A and T/O&E.

55. Special Tools and Equipment

Certain tools and equipment specially designed for organizational maintenance, repair, and general use with the matériel are listed in table I for information only. This list is not to be used for requisitioning replacements.

Section II. LUBRICATION AND PAINTING

56. Lubrication Order

Lubrication Order 9–819 prescribes cleaning and lubricating procedures as to locations, intervals, and proper materials for these trucks. The order is issued with the truck and is to be carried with it at all times. In the event the truck is received without a lubrication order, the using organization shall immediately requisition

Table I. Special Tools and Equipment for Organizational Maintenance

Item	Identifying No.	References		Use
		Fig.	Par.	
ADAPTER, puller, steering wheel	41–A–18–251	28, 119	171	Used with PULLER 41–P–2954 for removing steering wheel.
REMOVER and REPLACER, bearing cup, thd 1¼ in 12NF–2, OD 4.540 in thkns 1$^{11}/_{32}$ in.	41–R–2374–630	28, 131	185	Used with SCREW 41–S–1047–330 for removing and installing wheel bearing cups.
SCREW, remover and replacer, thd 1¼–12NF–2, lgh 9 in.	41–S–1047–330	28, 131	185	Used with REMOVER and REPLACER 41–R–2374–630 for removing wheel bearing cups.
SLING, lifting	41–S–3829–750	28, 40	91	Removing and installing cylinder head.
SLING, lifting	7950121	28, 52	97	Removing and installing power plant.
WRENCH, air compressor pulley, hook spanner	7950404	28, 142	214	Adjusting air-compressor-drive belt tension.
WRENCH, spark plug conduit nut	41–W–3297–760	28, 77	68, 129	Removing and installing spark plug cables.
WRENCH, wheel bearing nut, dble end tubular, oct, w/pilot, size of opng $3/_{16}$ in, lgh 6¼ in.	41–W–3825–62	28, 128	185	Removing, installing, and/or adjusting wheel bearings.

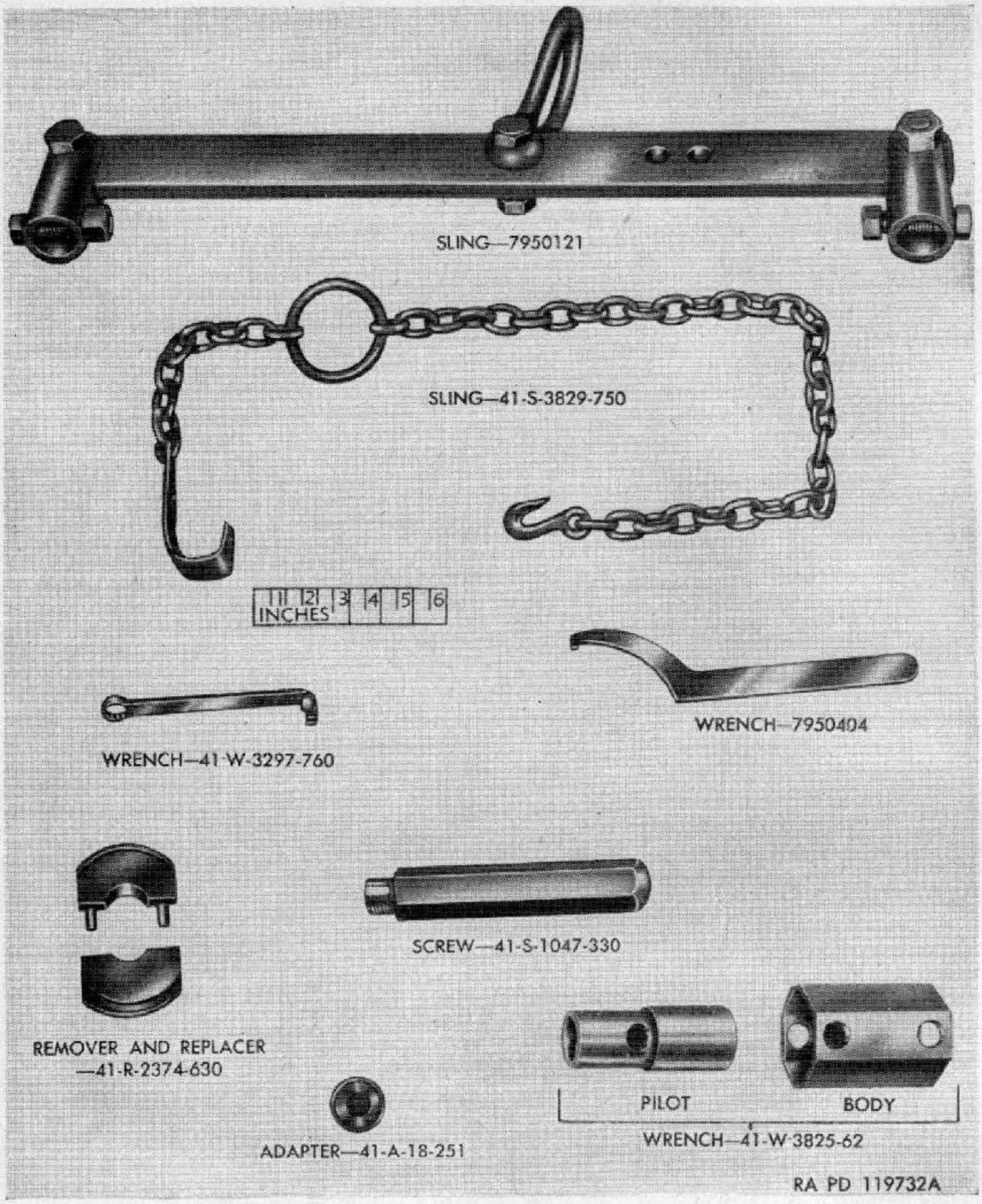


Figure 28. Special tools and equipment.

one. See SR 310–20–4 for lubrication order of current date. Lubrication which is to be performed by ordnance maintenance personnel is listed on the lubrication order in the notes. See lubrication chart in figures 29 and 30.

57. General Lubrication Instructions

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

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

c. Lubrication Equipment. Each truck is supplied with lubrication equipment adequate for its maintenance. This equipment will be cleaned both before and after use. Lubricating guns will be operated carefully, and in such a manner as to insure proper distribution of the lubricant.

d. Points of Application.

(1) Lubricating fittings and oiler points are shown in figures 31 through 36 and are referenced to the lubrication order. Wipe these devices and the surrounding surfaces clean before the lubricant is applied.

(2) A ¾-inch red circle should be painted around all lubricating fittings and oil holes.

e. Reports and Records.

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

(2) Maintain a record of lubrication of the truck on DA AGO Form 461.

58. Lubrication Under Unusual Conditions

a. Unusual Conditions. Reduce service intervals specified on the lubrication order, i. e., lubricate more frequently, to compensate for abnormal or extreme conditions, such as high or low temperatures, prolonged periods of high speed operations, continued operation in sand or dust, immersion in water, or exposure to moisture. Any one of these operations or conditions may cause contamination and quickly destroy the protective qualities of the lubricants. Intervals may be extended during inactive periods commensurate with adequate preservation.

b. Changing Grade of Lubricants. Lubricants are prescribed in the "Key" in accordance with three temperature ranges; above +32° F., +40° F. to —10° F., and from 0° to −65 F. Change the grade of lubricants whenever weather forecast data indicate that air temperatures will be consistently in the next higher or lower temperature range or when sluggish starting caused by lubricant thickening occurs. No change in grade will be made when a temporary rise in temperature is encountered.

c. Maintaining Proper Lubricant Levels. Lubricant levels must be observed closely and necessary steps taken to replenish in order to maintain proper levels at all times.

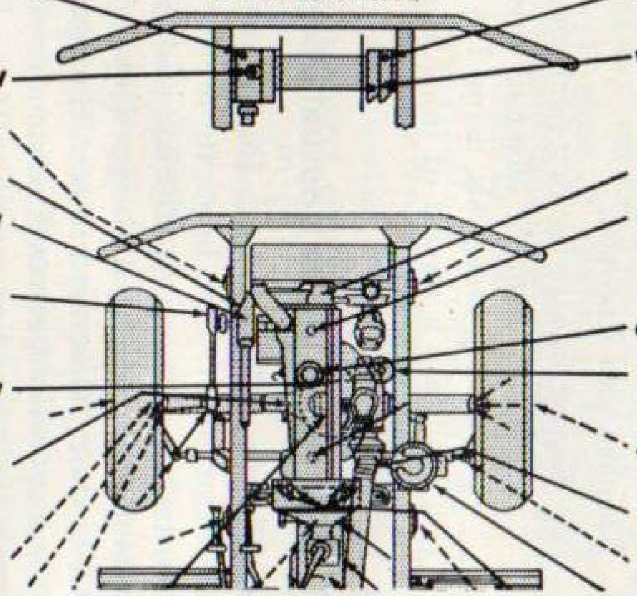
LUBRICATION CHART

TRUCK, 2½-TON, 6x6, CARGO, M34, M36, M47

References: TM 9-819; ORD 7 SNL G-742

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

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



	Lubricant • Interval
F, fig 31	**Winch Worm Housing Drain** A (Drain and refill. Cap. 3½ pt.)
D, fig 31	**Winch Worm Housing Fill and Level** GO W (Check level)
U, fig 33	**Spring Shackle** GAA 1
fig 33	**Steering Gear Drain** A (Drain and refill. Cap. 1 pt.)
S, fig 33	**Steering Gear Fill and Level** GO W (Check level)
T, fig 33	**Steering Drag Link** GAA 1 (Front and rear)
CC, fig 34	**Front Axle Differential Fill and Level** GO W (Check level)
L, fig 32	**Crankcase Level** D (Check level)
Q, fig 32	**Universal Joint and Steering Knuckle Bearings** GAA 1

Interval • Lubricant	
A **Winch End Bearing Frame** (Drain and refill. Cap. ½ pt.)	E, fig 31
W GO **Winch End Bearing Frame Fill and Level** (Check level)	C, fig 31
1 GAA **Water Pump**	P, fig 32
6 **Crankcase Drain** (Front and rear) (Drain and refill. Cap. 9 qt. including oil filter) (See note 2)	AA, fig 34
OE **Crankcase Fill**	K, fig 32
1 **OIL FILTER (drain sediment)** (See note 3)	M, fig 32
A GAA **Front Wheel Bearings** (See note 7)	J, fig 31
1 GAA **Universal Joint**	Y, fig 34
1 GAA **Tie Rod Ends**	V, fig 33

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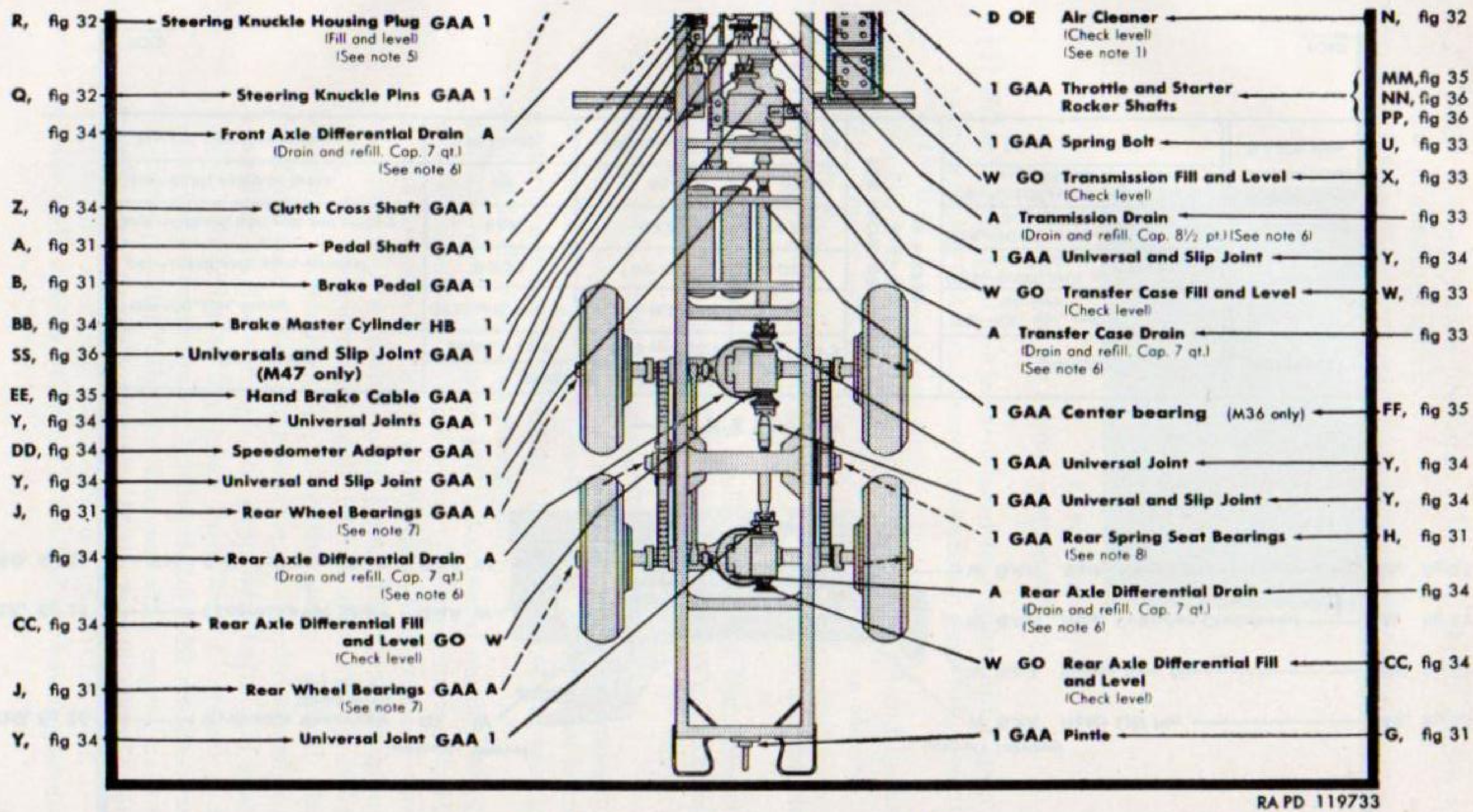
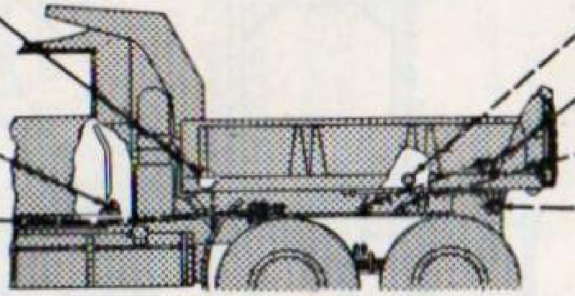


Figure 29. Lubrication chart M34, M36, and M47 front side.



—KEY—

LUBRICANTS	EXPECTED TEMPERATURES			FOR ARCTIC OPERATION refer to TM 9-2855	LUBRICANTS	INTERVALS
	above +32°F	+40°F to −10°F	0°F to −65°F			
OE—OIL, lubr, engine	OE 30 or N.S. 9250	OE 10 or N.S. 9110	OES		OES—OIL, lubr, engine, sub-zero	D-Daily
GO—LUBRICANT, gear, universal	GO 90	GO 75	GOS		GOS—LUBRICANT, gear, universal, sub-zero	W-Weekly M-Monthly
GAA—GREASE, lubr, auto and artillery	GAA	GAA	GAA		HBA—FLUID, hydraulic brake, arctic	S-Semiannually
HB—FLUID, hydraulic brake	HB	HB	HBA		CW—LUBRICANT, chain, exposed gear and wire rope	A-Annually 1-1,000 Miles
PL—OIL, lubr, preservative	PL (Med)	PL (Special)	PL (Special)			6-6,000 Miles

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—NOTES—

1. AIR CLEANERS AND BREATHERS—(Oil bath type). Daily, replenish to bead level with OE, crankcase grade. Every 1,000 miles, clean oil reservoir and refill with OE as above. For desert or extremely dusty operation, disassemble, clean all parts and refill once every operating day or more frequently if required.

2. CRANKCASE—Drain every 6,000 miles or semiannually. Drain only after operation. Refill to FULL mark on gage. For proper operation on heavy duty oils, engine thermostat must be functioning properly to maintain engine coolant temperature at +140°F minimum. Run engine a few minutes and recheck oil level. CAUTION: Be sure pressure gage indicates oil is circulating.

3. OIL FILTER—Every 1,000 miles, remove plug in bottom of case and drain sediment. Every 6,000 miles, or semiannually, while crankcase is being drained, remove, clean and inspect element, clean inside of case and install element.

4. DISTRIBUTOR—Semiannually, wipe breaker cam lightly with GAA and lubricate breaker arm pivot and wick under rotor with 1 to 2 drops of PL.

5. GEAR CASES—Drain every 12,000 miles or annually. Drain only after operation. Fill to plug level before operation. Clean vents weekly and after operation in water or mud.

6. FRONT WHEEL UNIVERSAL JOINTS AND STEERING KNUCKLE BEARINGS—Remove plug on lower side of universal joint housing, apply lubricant to top steering knuckle bearing grease fitting until lubricant reaches level of plug opening. Replace plug. Do not disassemble constant velocity universal joints.

7. WHEEL BEARINGS—Every 12,000 miles or annually, remove, clean, dry, and repack. While wheels are removed, coat brake anchor pins lightly with GAA.

8. REAR SPRING SEAT BEARINGS—Every 6,000 miles remove bearing cones, clean, dry, inspect, and coat rollers with GAA.

9. HYDRAULIC RESERVOIR—Remove filler plug and screen and fill reservoir with OE to top mark on gage. Raise and lower body several times and recheck oil level. Replace plug. Semiannually, drain and refill.

10. WINCH CABLE—After each operation, clean and oil with used crankcase oil or OE. Weekly, if cable has not been used, coat outer coils. Monthly, unwind entire cable, clean and oil. Semiannually, if cable is not generally used, unwind entire cable and soak, by means of a brush, with PL (Special). Wipe off excess and coat cable with CW. Coat winch drum also with CW before rewinding cable on drum.

11. OIL CAN POINTS—Monthly or every 1,000 miles, lubricate carburetor linkage, clutch and brake pedal linkage and hand brake pivot points with PL.

12. DO NOT LUBRICATE—Springs, clutch release bearing, generator, starter, or shock absorbers.

13. LUBRICATED AT TIME OF DISASSEMBLY BY ORDNANCE PERSONNEL—Clutch pilot bearing, clutch release bearing carrier, and speedometer flexible shaft.

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Figure 30. Lubrication chart M34, M36, and M47 back side.

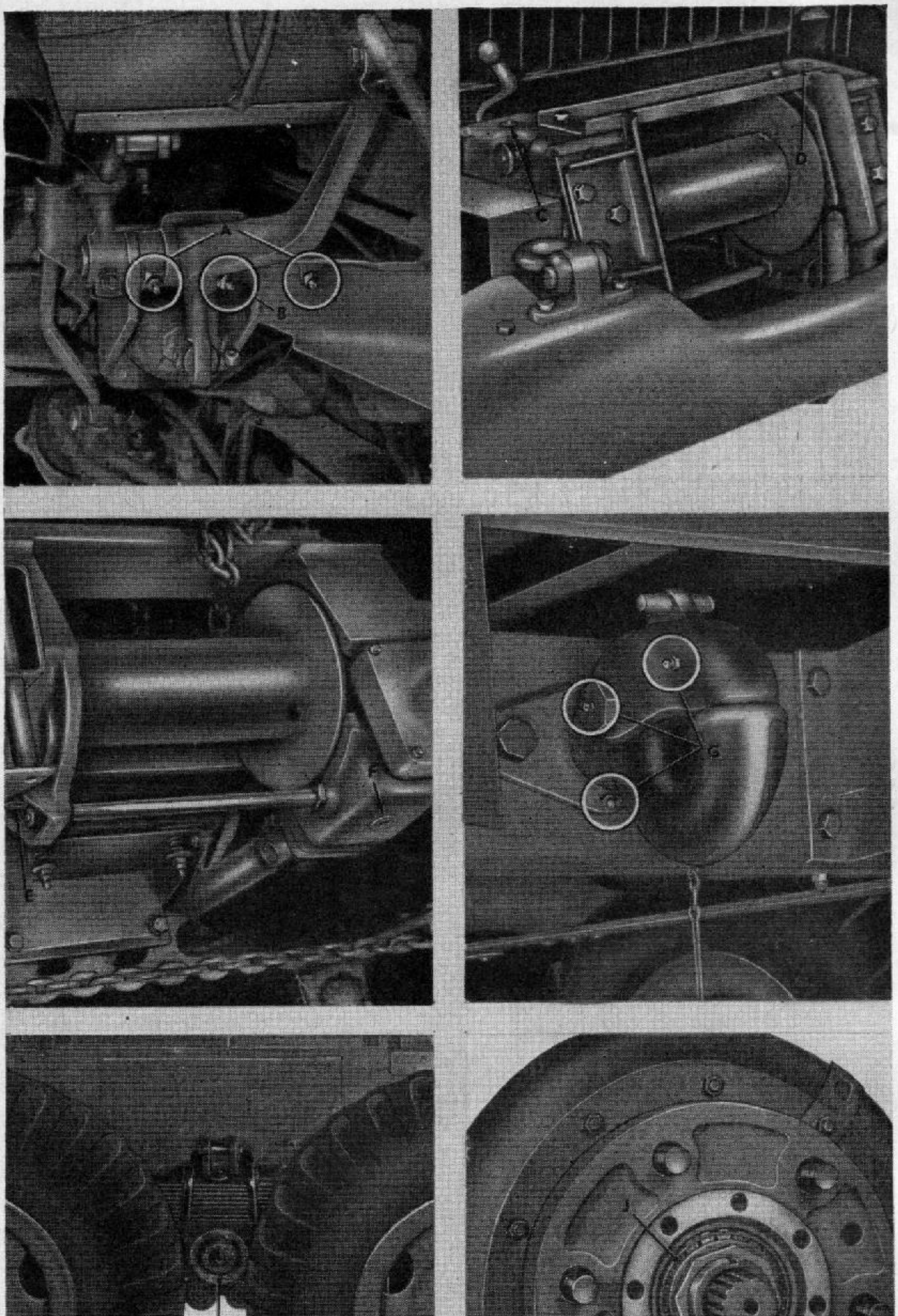

Figure 31. Localized lubrication points (points A through J).

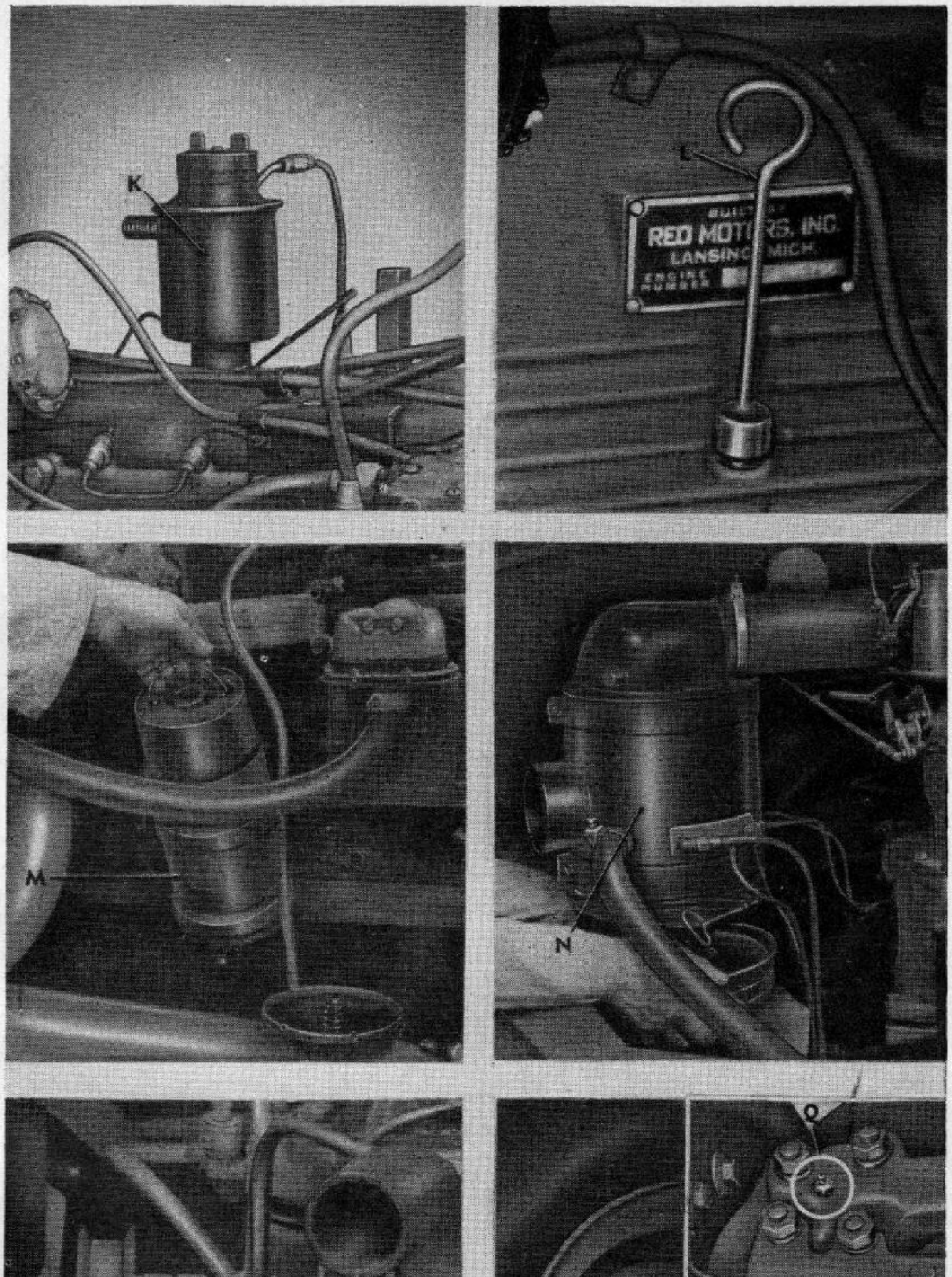

Figure 32. Localized lubrication points (points K through R).

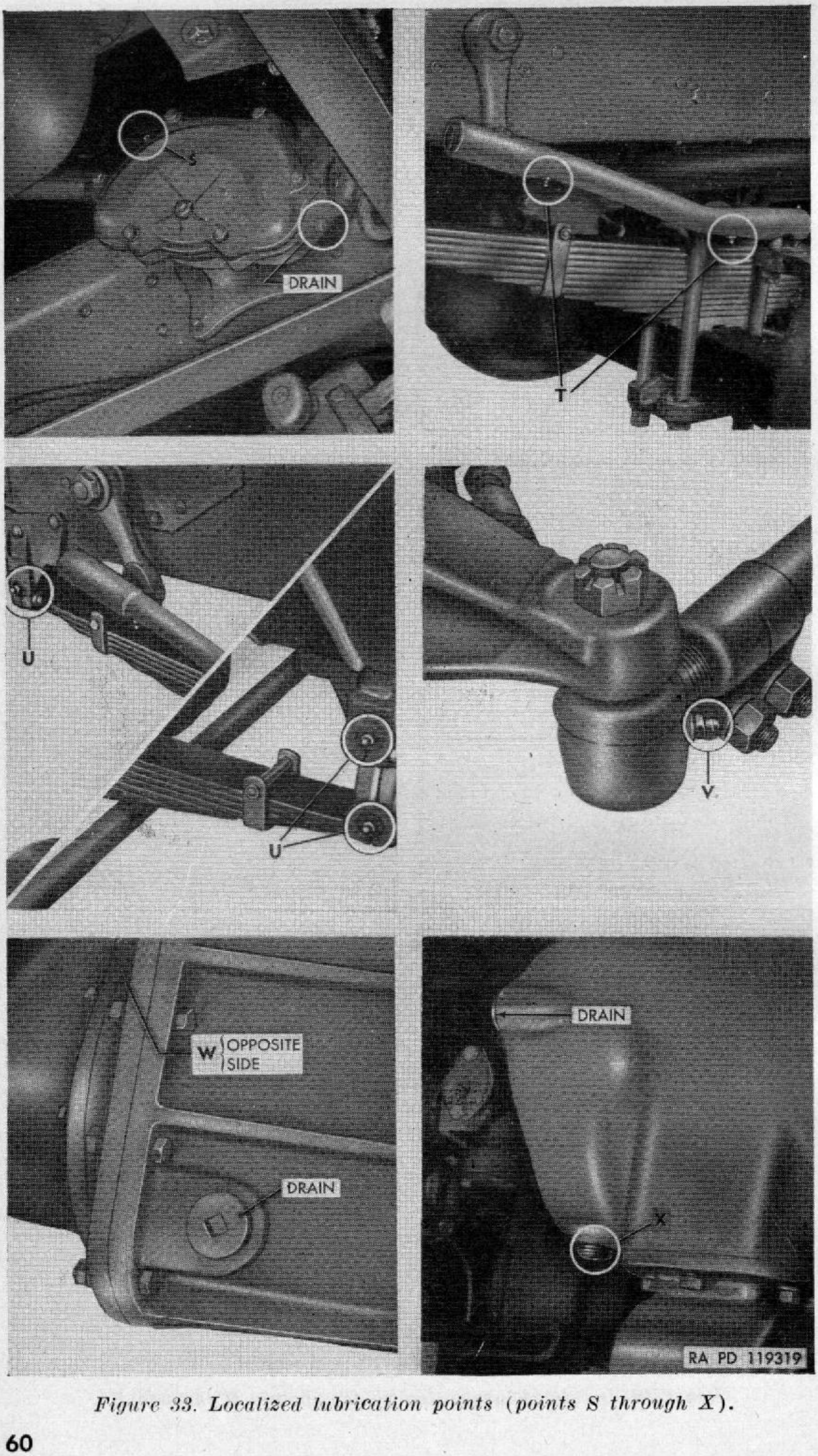

Figure 33. Localized lubrication points (points S through X).

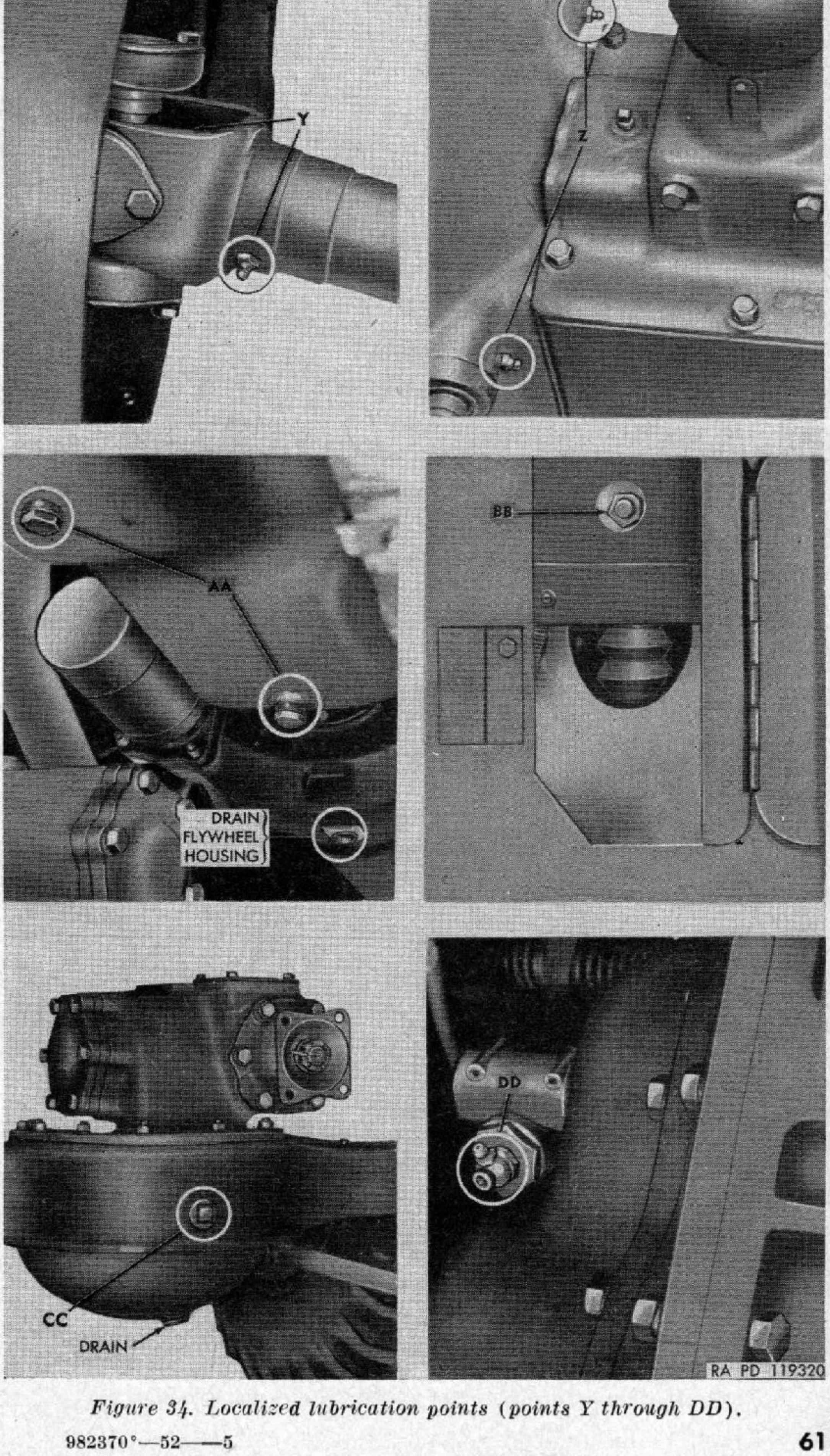

Figure 34. Localized lubrication points (points Y through DD).

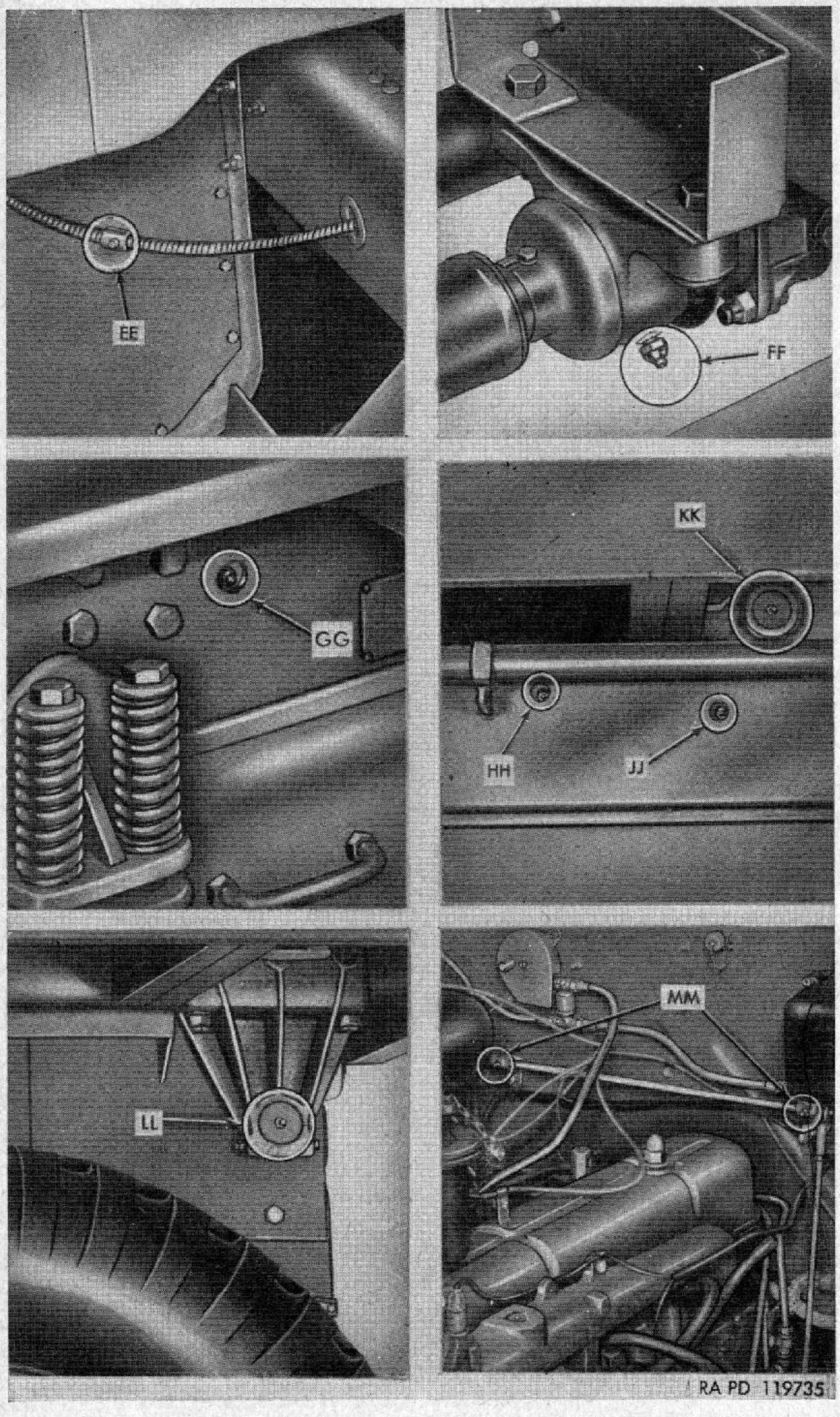

Figure 35. Localized lubrication points (points EE through MM).

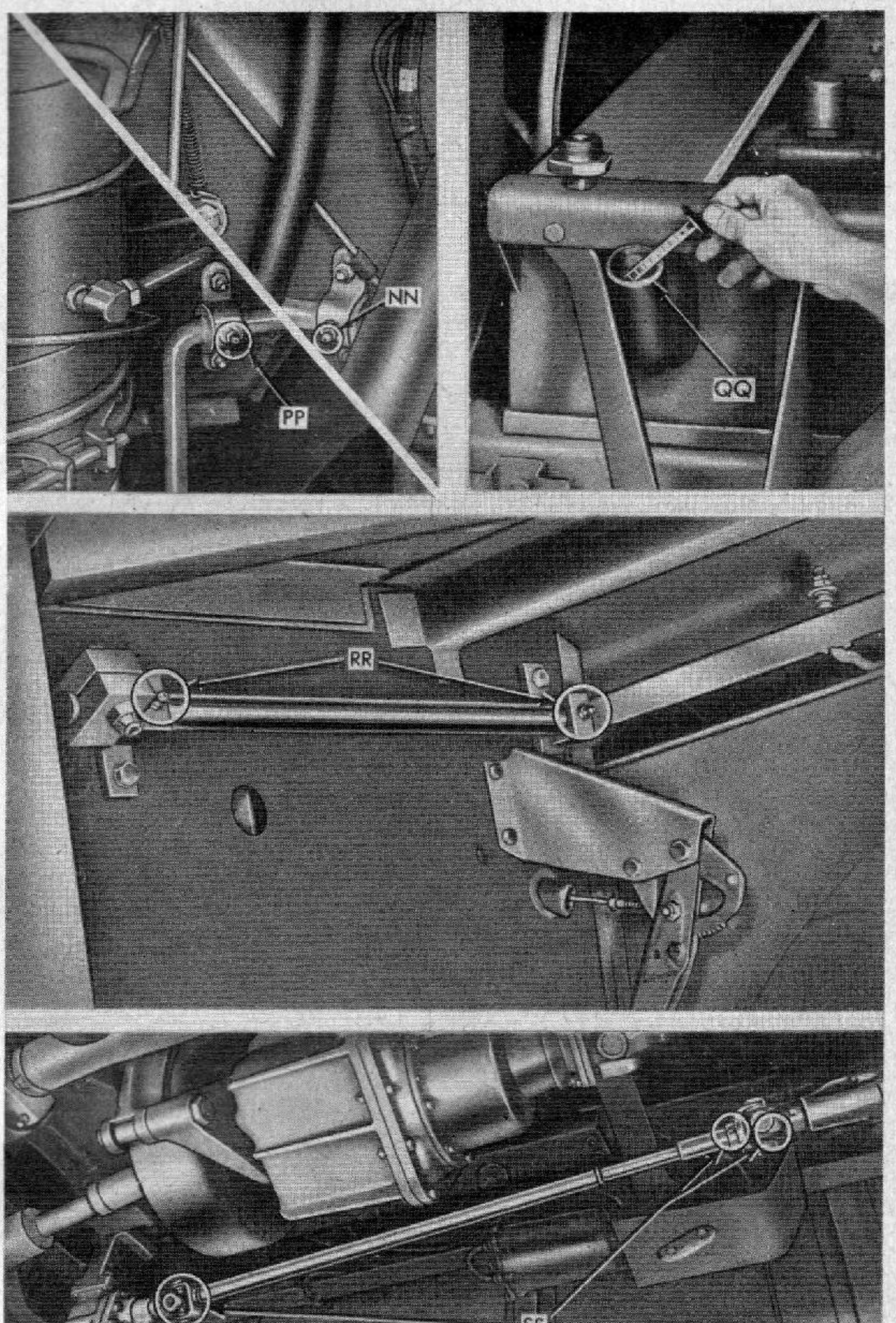

Figure 36. Localized lubrication points (points NN through SS).

59. Lubrication for Continuing Operation Below 0° F.

Refer to TM 9–2855 for instructions on necessary special preliminary lubrication of the vehicle, and to SB 9–16 for information on winterization kits.

60. Lubrication After Fording Operations

a. After any fording operation, in water 12 inches or over, lubricate all chassis points to cleanse bearings of water or grit as well as any other points required in accordance with paragraph 247 which covers maintenance after fording.

b. If the vehicle has been in deep water for a considerable length of time or was submerged beyond its fording capabilities, precautions must be taken as soon as practicable to avoid damage to the engine and other vehicle components as follows:

(1) Perform a complete lubrication service (par. 57).

(2) Inspect engine crankcase oil. If water or sludge is found, drain the oil and flush the engine with preservative engine oil PE–30. Before putting in new oil, drain the oil filter and install a new filter element (par. 94).

Note. If preservative engine oil is not available, engine lubricating oil OE–30 may be used.

(3) Operation in bodies of salt water enhances the rapid growth of rust and corrosion, especially on unpainted surfaces. It is most important to remove all traces of salt water and salt deposits from every part of the vehicle. For assemblies which have to be disassembled, dried, and relubricated, perform these operations as soon as the situation permits. Wheel bearings must be disassembled and repacked after each submersion. Regardless of the temporary measures taken, the vehicle must be delivered as soon as practicable to the ordnance maintenance unit.

61. Lubrication After Operation Under Dusty or Sandy Conditions

After operation under dusty or sandy conditions, clean and inspect all points of lubrication for fouled lubricants and relubricate as necessary.

Note. A lubricant which is fouled by dust and sand makes an abrasive mixture that causes rapid wear of parts.

62. Painting

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

Section III. PREVENTIVE MAINTENANCE SERVICES

63. General

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

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

(1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits. The term "good condition" is explained further by the following: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.

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

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

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

64. Cleaning

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

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

(2) A solution of one part grease-cleaning compound to four parts of dry-cleaning solvent or volatile mineral spirits may be used for dissolving grease and oil from engine blocks,

chassis, and other parts. After cleaning, use cold water to rinse off any solution which remains.

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

(4) Before installing new parts, remove any preservative materials, such as rust-preventive compound, protective grease, etc.; prepare parts as required (oil seals, etc.); and for those parts requiring lubrication, apply the lubricant prescribed in the lubrication order (par. 57).

b. General Precautions in Cleaning.

(1) Dry-cleaning solvent and volatile mineral spirits are inflammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are used. Use only in well-ventilated places.

(2) These cleaners evaporate quickly and have a drying effect on the skin. If used without gloves, they may cause cracks in the skin, and, in the case of some individuals, a mild irritation or inflammation.

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

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

65. Preventive Maintenance by Operator or Leader

a. Purpose. To insure efficient operation, it is necessary that the truck be systematically inspected at intervals every day it is operated and also weekly, so defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance services will be performed at these designated intervals. Any defects or unsatisfactory operating characteristics beyond the scope of the operator to correct must be reported at the earliest opportunity to the designated individual in authority.

b. Services. Operators and leader preventive maintenance services are listed in table II. Every organization must thoroughly school its personnel in performing the maintenance procedures for these trucks as set forth in this manual.

Intervals					Procedure
Operator's				Leader's "A" (weekly)	
Before operation	During operation	At halt	After operation		
					USUAL CONDITIONS
					Caution: Place all tags describing condition of truck in the driver's compartment in a conspicuous location so they will not be overlooked.
e X	----	X	X	X	*Fuel, oil, and water.* Check the amount of fuel in tank and note any indication of leaks. Add fuel if necessary (par. 113). Check the oil level and add oil if necessary (par. 93). Check coolant level in the cooling system (par. 121) and note any leaks.
					Caution: If it is necessary to add water to the radiator while the engine is overheated, run the engine at idling speed (450 rpm) and slowly add the water.
X	----	----	----	X	*Tires.* Gage tires for correct pressure (par. 184).
		X	X	X	Remove penetrating objects such as nails or glass. Remove stones from between duals. Note any apparent loss of air, unusual wear, or missing valve caps.
X	----	X	X	X	*Leaks, general.* Look under the truck and in engine compartment for any indication of fuel, oil, coolant, gear-oil, water or brake-fluid leaks.
X	----	----	----	----	*Vehicle tools and equipment.* Check Department of the Army Supply Catalog ORD 7 SNL G–742 to see that all tools and equipment issued with and carried on the vehicle are present and in serviceable condition. Inspect publications, lubrication order, Standard Form 91, and DA AGO Form 614. Visually inspect the fire extinguisher.
				X	See that fire extinguisher is charged. The charge may be determined by shaking extinguisher.
X	----	----	X	X	Operate lights, horn (if tactical situation permits), and windshield wipers. Visually inspect mirrors, reflectors, body, towing connections, doors, paulin, tools, etc.
X	X	----	----	----	*Instruments* (fig. 14). Observe from normal readings during warm-up and during operation of truck.
					Caution: If oil pressure is zero or excessively low, shut off engine immediately and investigate cause.
	X	----	----	----	*General operations.* Be alert for any unusual noises or improper operation of steering, clutch, brakes, or gear shifting.

Intervals					Procedur
Operator's					
Before operation	During operation	At halt	After operation	Leader's "A" (weekly)	
		X	X	X	*Operating faults.* Investigate and correct or report any faults noted during operation.
X	----	X	X	X	*Springs and suspensions.* Look at springs, suspensions, shock absorbers, and torque rods to see if they have been damaged.
			X	X	*Air-brake reservoir.* Drain water (par. 216).
			X	X	*Lubricate.* Lubricate daily or weekly items specified on lubrication order (par. 56).
			X	X	*Clean.* Clean glass vision devices and inside of vehicle. Wipe off exterior of vehicle.
				X	Wash truck, clean engine, and engine compartment.
				X	*Batteries* (figs. 121 and 122). Clean, check water level (par. 174), inspect terminals for corrosion, tightness, and coating of grease.
				X	*Assemblies and belts.* Inspect assemblies such as carburetor, generator, regulator, compressor air-brake reservoir, starter, and water pump for looseness of connections or mountings. Check adjustment of fan and drive belts. Belts should deflect ½ inch (par. 122).
				X	*Electrical wiring.* Inspect, visually, electrical wiring, conduits, and shielding.
				X	*Axle, transmission, and transfer ventilating valves.* Inspect for clogging.
					UNUSUAL CONDITIONS
					Preventive maintenance services for usual conditions will apply, with emphasis on servicing by the operator to combat the effect of unusual conditions of extreme cold, extreme heat, unusual terrain, and fording. The special services described below are required to assure optimum results under unusual conditions.
					Extreme Cold (pars. 49 and 50 and TM 9–2855)
			X	----	*Cooling and fuel systems.* Refuel and add denatured alcohol as required.
				X	Drain fuel tank and clean sump to remove condensation and sludge; refuel tank.
X	----	----	X	X	Check level and specific gravity of radiator coolant, if using ethylene glycol and add ethylene glycol and/or water if needed.

Intervals					Procedure
Operator's				Leader's "A" (weekly)	
Before operation	During operation	At halt	After operation		
					Note. If using arctic antifreeze compound, make a warning tag and place it on or near the radiator filler neck. The tag should read: THIS COOLING SYSTEM IS FILLED WITH ARCTIC ANTIFREEZE COMPOUND.
					Caution: DO NOT ADD WATER OR ETHYLENE GLYCOL—TYPE ANTIFREEZE. USE ARCTIC ANTIFREEZE COMPOUND ONLY.
				X	*Lubricants.* Check and, if necessary, change lubricants and special oils (par. 58).
				X	Check gear cases for collections of sludge and water and clean out if necessary and refill. *Note.* It is necessary to have lubricant warm and fluid for draining and refilling.
		X	X		*Control levers.* Position levers in neutral position.
X		X			*Tires.* Check for tires frozen to ground or for frozen flat spots.
X				X	Check for availability and serviceability of tire chains.
X				X	Check for proper pressure (par. 184).
				X	*Battery.* Check electrolyte level (par. 174).
			X		Remove battery and store in warm place, if vehicle is not equipped with power plant heater.
X			X	X	*Clean.* Clean snow, ice, and mud from all parts of vehicle.
X					*Brakes.* Check for frozen brake shoes.
	X				*Operating observations.* Check for the feel of stiffness of lubricant in the final drives and suspension components. This will be indicated by unusual power demand when putting vehicle in motion. Listen for signs of malfunctions and inspect immediately to determine causes.
X				X	*Winterization equipment* (par. 49). Check personnel heater and windshield defrosters (if available) for proper operation.
			X		Fill power plant heater fuel tank.
			X	X	Check all winterization equipment for secure installation and proper functioning.
			X		Check winter-front cover, broad blankets, under chassis blanket, hard-top closure, etc, for security and proper adjustment.
					Extreme Heat (par. 51)
X		X		X	*Cooling and fuel systems.* Check air cleaner, fuel and oil filters, and radiator fins and clean as often as necessary to keep them in good condition.

Table II. Operator's and Leader's "A" Preventive-Maintenance Services—Con.

Intervals					Procedure
Operator's				Leader's "A" (weekly)	
Before operation	During operation	At halt	After operation		
X	----	----	----	X	*Battery.* Check electrolyte level (par. 174).
			X	----	Remove battery and store in cool place, if necessary to park for extended period.
	X	X	----	----	*Tires.* Shield tires, if possible, from direct rays of the sun.
X	----	----	----	X	Check for proper pressure (par. 184).
					Unusual Terrain (par. 52)
			X	----	*Lubrication.* Check for fouled lubricants and lubricate as necessary (par. 58).
X	----	----	----	X	*Tires.* Check for proper pressure (par. 184).
X	----	----	----	X	Check for availability and serviceability of tire chains.
X	----	----	----	X	*Cooling and fuel systems.* Check air cleaner, fuel and oil filters, and radiator fins and clean as often as necessary to keep them in good condition. ***Caution:*** Under extremely dusty conditions or blowing sand, it will be necessary to service the air cleaner several times daily during operation to prevent entry of dust or sand into the engine. Failure to do this may wear out engine parts in a short time.
X	----	----	X	X	*Clean.* Clean all parts of vehicle of snow, ice, mud, dust, and sand.
				X	Check for any sand-blasted surface and touch-up paint as required.
X	----	----	X	----	*Vents.* Check engine vents and other exposed vents and keep them covered with cloth to prevent entry of dust, sand or drifting snow.
					Fording Operations (par. 53)
X	----	----	----	----	*Fording limits.* Check vehicle fording limits. See paragraph 53 for operation precautions.
X	----	----	X	----	*Tires.* Check for proper pressure (par. 184).
X	----	----	----	X	Check tire chains. Install if necessary.
X	----	----	----	----	*Battery.* Check vent caps for tightness.
			X	----	Check for seepage of water into battery. Check charge as soon as practicable and add electrolyte and charge if necessary.
			X	----	*Clean.* Remove water and sludge from all parts of the vehicle. If fording through salt water, wash with fresh water.
			X	----	*Engine and transmission.* Check for evidence of water or grit and replace oil if necessary. If engine oil must be replaced, flush before adding new oil.

Intervals					Procedure
Operator's				Leader's "A" (weekly)	
Before operation	During operation	At halt	After operation		
			X	----	*Cooling and fuel systems.* Check air cleaner, oil and fuel filters, and clean or replace if necessary. Drain any accumulation of water or sludge from fuel tank.
			X	----	*Lubrication.* Lubricate as specified in paragraph 60.
			X	----	*Brake system.* Check for proper operation (par. 42).

66. Preventive Maintenance by Organizational Mechanics

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

b. OPERATOR PARTICIPATION. The operators should accompany their trucks and assist the mechanics while periodic organizational preventive maintenance services are performed. Ordinarily, the operator should present the truck for a scheduled preventive maintenance service in a reasonably clean condition.

c. SPECIAL SERVICES. These are indicated by the item numbers in the columns which show the interval at which the services are to be performed, and show that the parts or assemblies are to receive certain mandatory services. For example, an item number in one or both columns opposite a *Tighten* procedure means that the actual tightening of the object must be performed. The special services are as follows:

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

(2) *Clean.* Clean the unit as outlined in paragraph 64 to remove old lubricant, dirt, and other foreign material.

(3) *Special lubrication.* This applies either to lubrication operations that do not appear on the truck lubrication order, or to items that do appear but which should be performed in

connection with the maintenance operations if parts have to be disassembled for inspection or service.

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

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

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

e. Work Sheet. The numbers of the preventive maintenance procedures that follow are identical with those outlined on DA AGO Form 461. Certain items on the work sheet that do not apply to these trucks are not included in the procedures in this manual. In general, the sequence of items on the work sheet is followed, but in some instances there is deviation for conservation of the mechanic's time and effort.

f. Procedures. Table III lists the services to be performed by the organizational maintenance mechanic or maintenance crew at the designated intervals. Each page of the table has two columns at its left edge corresponding to Commander's "C" (6,000-mile or 6 month) and Commander's "B" (1,000-mile) respectively. Very often it will be found that a particular procedure does not apply to both scheduled intervals. In order to determine which procedure to follow, look down the column corresponding to the maintenance procedure, and wherever an item number appears, perform the operations indicated opposite the number.

Intervals		Procedure
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	
		INSPECTION AND ROAD TEST
		BEFORE OPERATION: *Fuel, oil, water, antifreeze, tires, instruments, leaks, general visual inspection of truck and equipment.* Perform the *before operation* service (par. 65).
1	1	*Dash instruments, switches, and gages—oil pressure, ammeter, speedometer, temperature, fuel, air pressure, ignition switches, and other controls.* Note generator output on the ammeter immediately after starting engine, before generator regulator has reduced the charging rate. Observe all instruments for normal readings (pars. 14, 21, 22, and 23). Notice if the ignition switch operates freely and makes positive contact, and check other controls for normal operation.
2	2	*Horns, mirrors, and windshield wipers.* Sound horn to see if signal is normal (if tactical situation permits). Test windshield wipers for satisfactory operations. Examine mirrors and reflectors.
3	3	*Engine—idle, acceleration, power, noise, governed speed.* In warming up the engine, observe if it starts easily and if action of choke (par. 15) and hand throttle are satisfactory. Notice if idling speed is 450 rpm (par. 108). Listen for any unusual noises at idle and higher speeds. *Note.* Perform item 6 during the warm-up period. When operating the vehicle, notice if it has normal power and acceleration in each speed. Listen for any unusual noises when the engine is under load. Speed up the vehicle, on a level stretch, to see if it will reach, but not exceed, the specified governed speed (fig. 18).
4	4	*Steering—free play, bind, wander, shimmy, side pull, column and wheel.* With the vehicle moving straight ahead, steering wheel free play should not exceed 1 inch. See if there is any tendency to wander, shimmy, or pull to the side. Turn the steering wheel through its entire range and note any bind. Examine steering column and wheel.
5	5	*Clutch—free travel, drag, noise, chatter, grab, slip.* See if clutch pedal has specified free travel (1¼ to 1½ inches) and if action of pedal return spring is satisfactory (par. 103). Note whether clutch disengages completely or has a tendency to drag. Observe smoothness of engagement and tendency to chatter, grab, or slip and any unusual noise. With transmission in neutral, depress and release clutch pedal, listening for defective release bearing.

Intervals		Procedure
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	
6	6	*Air pressure—build up, governor, cut off, and low-pressure buzzer.* During the warm-up period, run the engine at fast idle (about 1,000 rpm) and observe if the air pressure builds up to 100 psi in 10 minutes (minimum rate) and if the governor cuts off the compressor when air pressure is between 100 and 105 psi. Operate the brake to reduce air pressure and observe if the governor cuts in the compressor when air pressure is 65 psi. Reduce the pressure sufficiently to see if the low-pressure buzzer is operating. Inspect for leaks in the air-brake system by stopping the engine when the air pressure is at a maximum and noticing if there is any appreciable drop on the air-pressure gage within one minute. If any pressure drop occurs during this check, test the compressed air system for leaks by the soapsuds method (par. 213). Examine air compressor (fig. 140) to see that it is in good condition, properly alined with its drive pulleys, and secure.
7	7	*Brakes—(foot and hand) braking effect, feel, side pull, noise, chatter pedal travel.* See if brake pedal has specified free travel (par 152) and if action of return spring is satisfactory. Observe if pedal goes too close to floor. Make several stops noting side pull, noise, chatter, or any other unusual conditions. Observe if ratchet and pawl of hand brake holds and if the lever requires more than three-quarters travel for full application. Stop the vehicle on an incline and apply the brake to see if it holds the vehicle or if application of the brake at a speed of 10 mph stops the vehicle within a reasonable distance.
8	8	*Generator, starter and switch—action, noise, speed.* Notice if the starter switch requires only normal pressure (par. 21), and if the starter engages smoothly without unusual noise and turns the engine with adequate cranking speed. Examine generator brushes and clean commutator with 2/0 flintpaper. Note if generator (fig. 82), starter (fig. 79), starter linkage, retracting spring, generator regulator are in good condition and watertight. The generator regulator must be replaced (par. 133) if ammeter shows a high charging rate with fully charged batteries, low or no charging rate with low batteries, or if burned resistances, windings or contacts, or burned relay contact points are found in the regulator.
9	9	*Transmission and transfer—lever action, declutching, vibration, noise.* Shift transmission and transfer into all speeds (figs. 17 and 19), observing any unusual stiffness of the shift levers, tendency to slip out of speed, unusual noise, or excessive vibration. Excessive vibration of the shifting levers may indicate loose mountings.

Intervals		Procedure
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	
10	10	*Unusual noises—attachments, cab, body and wheels, power train.* At all times during the road test, be alert for unusual or excessive noises that may indicate looseness, defects, or deficient lubrication in these components.
11	11	*Lamps—head, tail, body, blackout marker, stop, panel, and blackout.* During stops in the road test, test the operation of these exterior and interior lights and light switches (par. 20). Notice if head lights appear to be properly aimed (par. 175). Note condition of lights and safety reflectors.
		AFTER ROAD TEST
25	25	*Temperatures—brake drums, hubs, axles, transmission, differentials.* Immediately after the road test, feel these units cautiously. An overheated wheel hub and brake drum indicates an improperly adjusted, defective, or dry wheel bearing (par. 84) or a dragging brake (par. 80). An abnormally cool condition indicates an inoperative brake (par. 80). An overheated gear case indicates internal maladjustment, damage, or lack of lubrication.
25	......	Inspect propeller shafts (par. 139). Tighten universal-joint assembly and flange units.
26	26	*Leaks—engine oil, fuel, water, axles, housings, transmission, transfer and all other components carrying fluids, oil, or grease.* Make general observations in the engine compartment and underneath the truck for oil, water, fuel, and exhaust leaks. Look at spark-plug, manifold, and cylinder-head gaskets. ***Caution:*** Do not tighten the cylinder head or manifold unless there is evidence of looseness or leakage. If cylinder head requires tightening, use a torque-indicating wrench and tighten in the sequence (fig. 42) and to 100 lb-ft torque. When a new cylinder-head gasket is installed tighten three times as follows: first, upon installation; second, after engine is warmed up; third, after completing final road test and adjust valve clearances (par. 90) to 0.015 inch with engine hot after final tightening of cylinder head bolts.
		Lubrication—lubricate truck in accordance with lubrication order. Inspect truck for proper lubrication.
27	27	Lubricate vehicle in accordance with lubrication order (par. 56). Coordinate with inspection and disassembly operations to avoid duplication.

Intervals		Procedure
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	
27	27	During lubrication inspect tires for unusual wear, penetrating objects, and proper matching. Observe if all valve stems are in good condition and in correct position. All wheel nuts, rims, and side rings (par. 182) should be in good condition and secure. With wheels in a straight ahead position, and using a toe-in gage determine whether the front wheel toe-in is within $\frac{1}{16}$–$\frac{3}{16}$ inch limits (par. 142). See that wheel turning stops are present and secure (fig. 114).
27	------	Rotate and match tires according to tread design and degree of wear. See TM 31–200 for acceptable limits in matching tires. Tighten axle shaft drive flange bolts.
28	28	*Batteries—specific gravity.* Make hydrometer test of electrolyt in each cell and record specific gravity (par. 174) in spac provided on DA AGO Form 461. Inspect battery cases for cracks and leaks. Inspect cables, terminals, bolts, posts, and hold down frame.
29	------	*Batteries* (figs. 121 and 122). Clean top of battery, coat terminals lightly with grease, repaint battery box if corroded. Look to see if battery requires water. *Note.* If distilled or approved water is not available, clean water, preferably rain water, may be used (par. 174).
30	------	*Compression.* It is preferable to make compression test with engine at operating temperature. With all spark plugs out, insert the compression gage in a spark-plug hole and, with the throttle wide open, rotate the engine at cranking speed until the maximum compression is indicated. Be sure battery is fully charged. Do not crank engine more than is necessary to obtain maximum reading. Record the reading in the space provided on the back of work sheet, DA AGO Form 461. Repeat this process for each cylinder. Normal compression is from 120 to 130 psi. Variation up to 10 pounds between cylinders is not ordinarily detectable in performance. If pressure in a cylinder is appreciably below normal, pour sufficient engine oil on the piston head to prevent loss of compression temporarily, and recheck. *Note.* Be sure no oil gets on valves. Low compression brought up to normal by oil sealing, indicates piston, ring, or cylinder-sleeve wear or damage. Low compression, not brought up to normal by this method, indicates valve or cylinder-head gasket leakage.
31	------	*Breathers and ventilating system.* Inspect crankcase breather, air cleaner, valves, and lines (fig. 148). Inspect air compressor air strainer (fig. 143) and air-compressor governor air strainer (fig. 144).

Intervals		Procedure
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	
31	------	Clean and service crankcase breather (par. 95), air cleaner (par. 107), air compressor air strainer (par. 214) and air-compressor governor air strainer (par. 215).
32	------	*Radiator—core, shell, hose, cap and gasket, overflow tube, coolant lever cock.* Inspect these items, noticing particularly if the radiator core is clogged with foreign matter or if fins are bent. Test the operation of pressure cap. Observe coolant level and examine coolant for contamination. In cold weather, test coolant with a hydrometer to see if it contains sufficient antifreeze.
32	------	If need is indicated, drain radiator and block, clean, flush refill, and add inhibitor, unless antifreeze, which contains inhibitor, is used. Tighten radiator mountings (fig. 64) and hose clamps (par. 125).
33	------	*Water pump, fan, drive belts, and pulleys.* Inspect pulleys and fan for alinement and belts for tension (par. 122). Notice if water-pump packing gland is leaking.
34	------	*Valve mechanism—clearance, cover gaskets.* Gage valve clearance (par. 90), unloader valve clearance (par. 214) and look for broken or weak valve springs if need is indicated by engine performance, low compression, or tappet noise. If clearance is found insufficient, adjust, and recheck compression. Inspect rocker arm cover gasket.
35	------	*Spark plugs—clean and adjust, distributor, cap, rotor, points, shaft, advance units, coil and wiring, ignition timing.* Remove and inspect spark plugs (par. 129). Inspect distributor cap, rotor, and breaker points. Test distributor shaft for looseness by hand feel. Test ignition coil and distributor capacitor with instructions accompanying test instrument. Using neon timing light, observe if ignition timing is correct (par. 127) and if spark advances automatically as engine is accelerated.
35	------	Clean spark plugs and adjust gaps (par. 129). Dress distributor breaker points and adjust gap (par. 128). If points are badly pitted, replace both points and capacitor.
36	------	*Manifold and heat control.* Inspect these items (fig. 43). Look particularly for signs of leakage at the manifold gaskets. Check seasonal adjustment of the heat control valve (par. 111).
37	37	*Carburetor, choke, throttle, linkage, and fuel lines.* Inspect these items, noticing particularly if the shafts and linkage (par. 109) operate freely and are not excessively worn. Observe if the choke valve opens fully when the control is released and if the throttle valve opens fully when the accelerator is fully depressed.

Intervals		
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	Procedure
37	------	Make a vacuum test by running the engine at normal idling speed (450 rpm). The vacuum gage should read between 18 and 21 inches of mercury and the pointer should be steady. A needle reading fluctuating between 10 and 15 inches of mercury may indicate a defective cylinder head gasket or valve. An extremely low reading indicates a leak in the carburetor spacer or gaskets. Accelerate and decelerate the engine quickly. If the gage indicator fails to drop to approximately 2 inches as the throttle is opened, and fails to recoil to at least 24 inches as throttle is closed, this may be an indication of diluted oil, poor piston ring sealing, or abnormal restriction in the carburetor, air cleaner, or exhaust. *Note.* The above readings apply to sea level. There will be approximately a 1 inch drop for each 1,000 feet of altitude. Adjust carburetor idle mixture (par. 108) and test fuel-pump pressure (par. 112). Drain water and sediment from fuel tank (par. 113) if there is evidence of contamination, using a container to catch the drainings. If need was indicated in the road test, adjust the governed speed at this time, using a tachometer (par. 110).
38	------	*Exhaust pipes, tail pipe, and muffler (par. 116).* Inspect; listen for excessive or unusual noises and look for exhaust leak.
38	------	Tighten mountings.
39	------	*Brake shoes—linings, links, guides, anchors, supports, cylinders, and hose.* Inspect brake hoses and test linkage for freedom of action. Drain water from air reservoirs (par. 216). Examine master cylinder (fig. 103) and air-hydraulic cylinder (fig. 104). Remove wheels and hubs and examine brake shoes, linings, anchors, return springs, and cylinders. Clean and inspect brake drums and wheel bearings (par. 185).
39	------	Wheel bearings will be disassembled, cleaned and repacked in *every second* 6,000-mile inspection or *annually*. If the wheel bearings are due for repacking, remove wheels and hubs and make observations of the brake internal components as in the preceding paragraph. Clean the anchor pins and tighten the anchor pin nuts. If the wheel bearings are not due for repacking, inspect the internal brake components. Adjust brakes (par. 149). If wheels have not been disassembled from brake drums, tighten wheel stud nuts.
40	------	*Cab and passenger body—doors, hardware, glass, top and frame, curtain and fasteners, seats, upholstery, trim, and paint.* Inspect these items, paying particular attention to cab and body mountings; include springs. Test operation of doors, windows windshield, ventilators, hood hinges and catches. Observe

Intervals		
Commander's "C" (6,000-mile or 6-month)	Commander's "B" (1,000-mile)	Procedure
		seat mountings and upholstery. Make a general inspection of body including glass, panels, tops, spare wheel carrier, fenders, running boards, tailgate, chains, stakes, bows, paulins, curtains, and brush guards. Examine condition of paint and legibility of markings and identification and caution plates.
40	------	Tighten cab and body mounting bolts. Loosen the steering-column clamp before tightening cab mounting bolts and tighten afterwards. Tighten spring U bolts and leaf clips.
41	------	*Fifth wheels—bed plate and hold-down bolts.* Inspect these items. Test operation of king-pin lock.
41	------	Tighten all assembly and mounting bolts.
42	------	*Front bumper, rear bumperettes, pintle winch.* Inspect these items; include lifting shackles. Test operation of pintle and notice if the lock pin is attached with a chain.
44	------	*Winch—power take-off.* Inspect power take-off, and shear pin (fig. 133). Examine wire rope. Test operation of winch (par. 47).
44	------	Clean and oil winch wire rope in accordance with lubrication order (par. 56).
		MODIFICATIONS AND FINAL ROAD TEST
		Make a final road test rechecking items 1 through 11 inclusive. Recheck the transmission, transfer, and all axles to see that lubricant is not leaking. Pay special attention to any items that have been repaired or adjusted.
		Note. Correct or report all deficiencies found during final road test.
		Inspect the truck to determine that all modification work orders have been completed. Be sure that all modifications and major assembly replacements made during this service are entered on DA AGO Form 478.
		UNUSUAL CONDITIONS
		Maintenance operations and road tests as prescribed under usual conditions will apply equally well under unusual conditions for all occasions except in extreme cold weather. Intervals are necessarily shortened in extreme cold weather servicing and maintenance. Vehicles subjected to salt water immersion or complete submersion are evacuated to ordnance maintenance unit as soon as possible after the exposure (pars. 244 to 248).

Section IV. TROUBLE SHOOTING

67. Scope

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

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

68. Engine

a. ENGINE WILL NOT TURN.

(1) *Starter inoperative.* Refer to paragraph 74.

(2) *Incorrect oil viscosity.* Inspect oil. If improper grade, drain crankcase, and refill with correct grade of oil (par. 56).

(3) *Mechanical seizure of parts.* If engine cannot be turned, notify ordnance maintenance personnel.

b. ENGINE TURNS BUT WILL NOT START.

(1) *Faulty ignition system.* Remove one of the spark-plug cables (fig. 77) and hold cable terminal 3/8 inch from cylinder head while cranking engine with starter. If a spark does not jump the gap between the terminal and cylinder, the ignition system is inoperative. Refer to paragraph 73.

(2) *Faulty fuel system.* Remove fuel inlet line from the carburetor and, with the ignition switch off, turn the engine with the starter. If free flow of fuel is not evident, fuel is not reaching carburetor. Refer to paragraph 70.

(3) *Carburetor choke inoperative.* Remove air-cleaner-to-carburetor line from carburetor (par. 107). Inspect choke valve for proper operation. Adjust choke valve, if necessary.

(4) *Improper valve adjustment.* Check intake- and exhaust-valve clearances and adjust as required (par. 90).

(5) *Leak at manifold heat-control valve assembly or carburetor gaskets.* Pour a small quantity of oil onto edges of manifold heat-control valve assembly and carburetor gaskets. Crank engine with starter. A sucking sound will be heard if gasket leaks. Replace the manifold-heat-control-valve gasket (par. 111) or carburetor gasket (par. 108).

(6) *Faulty battery.* Test batteries for charge and voltage (par. 174). Replace or recharge batteries, as required.

(7) *Loose or corroded battery terminals or ground cable (7).* Clean and tighten terminal and ground cable (7) connections (figs. 121 and 122).

c. ENGINE DOES NOT DEVELOP FULL POWER.

(1) *Faulty ignition.* Refer to paragraph 73.

(2) *Oil temperature too high.* Improper grade or insufficient oil may cause excessive temperatures. Drain and refill with correct grade to the proper level (par. 56).

(3) *Engine overheats.* Check cooling system (par. 72).

(4) *Improper valve adjustment.* Check valve clearances and adjust as required (par. 90).

(5) *Incorrect timing.* Check ignition timing and adjust as required (par. 127).

(6) *Sticking valves.* Remove rocker-arm cover (par. 90) and apply penetrating oil or kerosene to valve stems. If valves still are not free, notify ordnance maintenance personnel.

(7) *Improper grade of fuel.* Use fuel having a minimum octane rating of 72.

(8) *Preignition.* With engine temperature at normal operating range (160° to 180° F.), rapidly accelerate vehicle in high gear. If preignition or spark knock is present, a pinging sound will be heard during at least a portion of the accelerating period. The intensity of the pinging can be increased by covering the radiator and causing engine to operate at excessively high temperatures. If correct grade of fuel is being used and the ignition system (par. 73) is functioning satisfactorily, the spark plugs may be of improper heat range or may be defective. Replace spark plugs (par. 129). If spark plug replacement does not correct condition, notify ordnance maintenance personnel.

(9) *Leak at manifold heat-control valve assembly or carburetor gaskets.* Refer to *b*(5) above.

(10) *Faulty governor.* If governor cuts off below the governed engine speed of 3,400 rpm, notify ordnance maintenance personnel.

(11) *Faulty compression.* Test compression (item 30, table III). Compression should not vary more than 10 psi between cylinders. If it does, notify ordnance maintenance personnel.

(12) *Brakes dragging.* Adjust brakes (par. 149).

d. Engine Misfires at Idling Speeds.

(1) *Faulty ignition system.* Refer to paragraph 73.

(2) *Low of uneven engine-cylinder compression.* Refer to *c*(11) above.

(3) *Defective spark plugs.* Check for spark plug not firing properly by feeling each spark plug. Alternate hands, if necessary, to get a good check. A cooler plug indicates that it is not firing properly. Stop engine and disconnect spark-plug cable with spark plug conduit nut wrench 41–W–3297–760 (fig. 77). Start engine and hold spark-plug cable against engine block. If noticeable difference in engine performance results, the spark plug is operating. If no difference is noted, replace spark plug (par. 129). Test each spark plug in this same manner.

(4) *Weak or broken valve springs.* Remove rocker-arm cover (par. 90) and inspect springs. If weak or broken springs are found, notify ordnance maintenance personnel.

(5) *Improper valve adjustment.* Check and adjust valve clearance (par. 90).

(6) *Defective valves.* Check engine vacuum with a vacuum gage (item 37, table III, par. 66). Erratic readings at constant engine speed are indicative of defective valves or valve operation. Notify ordnance maintenance personnel.

(7) *Manifold heat-control valve-gasket leaks.* Refer to *b* (5) above.

(8) *Leaking cylinder-head gasket.* Tighten cylinder-head cap screws in proper sequence (fig. 42) from 100 lb-ft torque. If leaks persist, replace cylinder-head gasket (par. 91).

e. Engine Misfires at High Speed.

(1) *Faulty ignition circuit.* Refer to paragraph 73.

(2) *Incorrect valve adjustment.* Check and adjust clearance (par. 90) (fig. 39).

(3) *Weak or broken valve springs.* Refer to *d*(4) above.

(4) *Leaking cylinder-head gasket.* Proceed as in *d*(8) above.

(5) *Defective fuel pump.* Test pump (par. 112). Replace pump, if necessary (par. 112).

(6) *Worn distributor shaft.* Replace distributor (par. 128).

f. Engine Overheats.

(1) *Faulty cooling system.* Refer to paragraph 72.

(2) *Late ignition timing.* Check ignition timing (par. 127) and make necessary adjustments.

(3) *Lean fuel-air mixture.* Adjust carburetor (par. 108). Inspect engine for leaks at manifold heat-control valve assembly and carburetor gaskets. Refer to *b*(5) above.

g. Excessive Oil Consumption.

(1) *Leaks.* Inspect engine, engine compartment, and ground under engine for oil leaks. Tighten any leaking connections, repair or replace broken lines, or notify ordnance maintenance personnel.

(2) *Engine overheats.* Refer to *f* above.

(3) *Low or uneven engine cylinder compression.* Proceed as in *d*(2) above.

(4) *Oil level too high.* Maintain oil at proper level (par. 93).

(5) *Improper grade and viscosity of oil.* Drain and refill crankcase with oil as specified on lubrication order (par. 56), for prevailing atmospheric temperatures.

(6) *Excessive speeds.* Avoid unnecessary and excessive speeds.

(7) *Excessive low-gear driving.* Operate truck in proper gear for desired speed and terrain conditions (par. 42).

69. Clutch

a. Clutch Drags.

(1) *Excessive pedal clearance.* Idle engine, depress clutch pedal to fully released position, and allow time for clutch to stop. Shift transmission into first or reverse gear. If the shift cannot be made without a severe clashing of gears, or if after engagement of the gears there is a jumping or creeping movement of the truck with the clutch fully released, the clutch is dragging. Adjust clutch linkage (par. 103).

(2) *Warped or cracked clutch driven disk.* Replace clutch (par. 105).

(3) *Defective clutch.* Replace clutch (par. 105).

b. Clutch Slips.

(1) *Insufficient pedal free travel.* Adjust clutch linkage (par. 103).

(2) *Defective clutch.* Replace clutch (par. 105).

(3) *Worn driven-disk facings.* Replace clutch-driven disk (par-105).

c. Clutch Chatters.

(1) *Oil or grease on clutch-driven-disk facings.* Clean or replace clutch driven disk (par. 105).

(2) *Improper connections.* Inspect transmission mounting, propeller shafts, universal joints, and engine mounting for loose connections. Tighten as required.

70. Fuel System

a. FUEL DOES NOT REACH CARBURETOR.

(1) *Lack of fuel.* Check fuel gage on instrument panel (6, fig. 14), with ignition switch turned on, and also check fuel level in fuel tank to be sure there is sufficient fuel in tank and that gage is operative.

(2) *Inoperative fuel pump.* Disconnect fuel line from inlet side of carburetor. Crank engine with starter. If fuel does not flow freely, check fuel pump (*b*(2) below). Clean fuel line between fuel tank and fuel pump.

b. FUEL DOES NOT REACH CYLINDERS.

(1) *Throttle not opening.* Adjust throttle linkage (par. 109).

(2) *Low fuel pressure.* Refer to *e* below.

(3) *Carburetor jets clogged.* Replace carburetor (par. 108).

(4) *Clogged fuel-tank ventilation system* (fig. 148). Disconnect and clean fuel-tank ventilation system.

(5) *Clogged fuel tank filter.* Notify ordnance maintenance personnel. Fuel tank filter may be cleaned temporarily by applying air pressure to fuel line connection at top of fuel tank. Disconnect fuel line and remove fuel-tank filler cap and apply air pressure.

c. EXCESSIVE FUEL CONSUMPTION.

(1) *Fuel leaks.* Examine all components of fuel system for leaks. Tighten or replace as required.

(2) *Improper carburetor adjustment.* Adjust carburetor (par. 108).

(3) *Worn carburetor components.* Replace carburetor (par. 108).

(4) *Worn engine parts.* Refer to item 30, table III, for compression and item 37, table III, for vacuum tests.

d. ENGINE IDLES TOO FAST.

(1) *Improper carburetor adjustments.* Adjust throttle-adjusting screw and idle-mixture-adjusting needle valves (fig. 55) (item 37, table III).

(2) *Improper linkage adjustments.* Adjust linkage (par. 109).

e. LOW FUEL PRESSURE.

(1) *Air leaks at fuel lines or fuel pump.* Inspect and correct leaks as necessary.

(2) *Defective fuel pump.* Disconnect outlet fuel line from fuel pump and install pressure gage on outlet side of pump. Crank engine with starter. Fuel-pump pressure should be between 4 and 5 psi. If less than 4 psi, replace fuel pump (par. 112).

(3) *Clogged fuel lines.* Clean fuel lines between fuel tank and pump and between pump and carburetor.

f. ENGINE FALTERS ON ACCELERATION. Clogged fuel lines or clogged or worn carburetor parts will cause faltering. Clean or replace fuel lines (par. 114) or replace carburetor as necessary (par. 108).

71. Exhaust System

a. EXCESSIVE NOISE. Excessively noisy operation is caused by leaking manifold gasket or broken manifold, muffler or tail pipe. Inspect and replace as required.

b. ODOR OF EXHAUST FUMES IN DRIVER'S COMPARTMENT. Leaky gaskets or broken exhaust manifold, muffler or tail pipe will allow excessive fumes to reach driver's compartment. Inspect and replace as required.

Caution: Replace defective parts as soon as possible.

72. Cooling System

a. OVERHEATING.

(1) *Lack of water in system.* Replenish water. Add antifreeze solution, if required (par. 49).

(2) *Loose drive belts.* Adjust belts (par. 122).

(3) *Defective thermostat.* Remove and test thermostat; replace if defective (par. 124).

(4) *Coolant leaks.* Inspect cooling system for leaks. Replace hose (par. 125), water pump (par. 123), or radiator (par. 121), if leaking. Tighten all connections.

(5) *Clogged radiator fins.* Clean core and straighten bent fins (par. 121).

(6) *Clogged cooling system.* Clean system, as outlined in paragraph 121.

b. OVERCOOLING. If thermostat remains open, the system will operate at too low a temperature in cold weather. Test and replace thermostat if necessary (par. 124).

73. Ignition System

a. NO SPARK, AMMETER READING ZERO.

(1) *Ignition switch off.* Turn ignition-switch lever (Z, fig. 14) clock to "ON" position.

(2) *Defective positive feed circuit.* Disconnect cable 11 at rear of ignition switch. Insert positive lead of a voltmeter into socket contact of cable 11 and connect negative lead of voltmeter to a convenient ground. Reading should be 24 volts. If no voltage is present, inspect cable 11 from ignition switch

to circuit breaker, cable 10 from circuit breakers to regulator, and cable 4 from regulator to battery positive terminal. Replace as necessary. Check battery. If cables and battery are in satisfactory condition, replace generator regulator (par. 133).

(3) *Defective ignition switch.* If voltage in (2) above is correct, reconnect cable 11 connector and disconnect cable 12 connector at rear of ignition switch. With ignition switch on, measure voltage at female terminal of cable 12. Reading should be 24 volts. If voltage is not present, replace ignition switch (par. 205).

(4) *Defective ignition coil.* If correct voltage is present in step (3) above, reconnect connector 12 and remove distributor cap. Check voltage at each terminal of ignition coil.

Note. Be sure breaker points are open in making this test.

If voltage is present at one terminal but not the other, replace ignition coil (par. 128).

(5) *Defective distributor.* If voltage is present in both terminals in step (4) above, trouble lies in the distributor. Inspect breaker points (fig. 72). If burned or pitted, replace points (par. 128). Adjust point opening (par. 128).

b. No Spark, Ammeter Reading Normal (2 to 4 amps).

(1) *Defective distributor cap.* Remove distributor cap and inspect for cracks or carbonized paths indicating current leaks. Inspect all carbon tips in cap. Replace cap if necessary (par. 128).

(2) *Defective distributor rotor.* Inspect distributor rotor. Replace (par. 128) if necessary.

(3) *Defective spark plug cables.* Check each spark plug cable (fig. 69) by disconnecting it from the spark plug and holding terminal three-eighths inch from cylinder head while cranking engine with starter. Replace any cables not producing a good spark.

c. Weak Spark.

(1) *Defective distributor points.* Examine breaker points for defects. If burned or pitted, replace points (par. 128). Adjust point opening (par. 128)

(2) *Defective distributor cap.* Refer to *b* (1) above.

(3) *Defective distributor capacitor.* Test distributor capacitor with capacitor tester and replace (par. 128), if necessary.

(4) *Loose electrical connections.* Clean and tighten all electrical connections in ignition system.

(5) *Defective rotor.* Examine rotor and clean rotor contact point. Replace rotor (par. 128), if necessary.

(6) *Defective ignition coil.* Test coil *a* (4) above. Replace coil (par. 128).

d. Engine Backfires.

(1) *Crossed spark plug cables.* Check cables to be sure that they are connected in proper firing sequenc (1–5–3–6–2–4).

(2) *Poor ignition timing.* Check ignition timing (par. 127).

(3) *Damaged distributor cap.* Refer to *b*(1) above.

e. Engine Misfires at High Speed Under Load.

(1) *Incorrect spark plug gap.* Adjust gap (par. 129). Replace plugs, if necessary (par. 129).

(2) *Incorrect distributor point gap.* Adjust breaker point gap (par. 128) (fig. 72). Replace breaker points if necessary (par. 128).

(3) *Defective ignition coil.* Replace coil (par. 128).

(4) *Defective distributor capacitor.* Test distributor capacitor with capacitor tester. Replace if necessary (par. 128).

(5) *Worn distributor shaft.* Turn distributor shaft with the fingers. If play is excessive, replace distributor (par. 128).

74. Starting and Charging System

a. Starter Fails To Operate.

(1) *Loose terminals.* Clean and tighten terminals on starter, starter switch, and battery.

(2) *Defective starter.* Connect positive lead of voltmeter to terminal on starter housing and negative lead to a convenient ground. Pull starter lever to close starter switch. If voltmeter reading is 24 volts when switch is closed, starter is defective. Replace starter (par. 131).

(3) *Defective starter switch.* If voltage in (2) above is zero, move voltmeter positive lead to terminal on top of starter switch. If reading is 24 volts, switch is defective. Replace starter switch (par. 131).

(4) *Damaged cable.* If voltage is less than 24 volts in (3) above, move voltmeter positive lead to positive battery terminal. Pull starter lever to close starter switch. If reading is 24 volts when switch is closed, replace cable from battery to starter.

(5) *Defective battery.* If voltage in (4) above is less than 24 volts, battery is defective or needs charging. Check battery level and specific gravity (par. 174). Recharge or replace battery as required (par. 174).

b. Starter Is Noisy.

(1) *Loose starter mounting.* Tighten starter mounting stud nuts (fig. 79).

(2) *Defective drive assembly.* If starter drive assembly has too much play or is damaged, replace starter (par. 131).

(3) *Worn commutator or bushings.* Replace starter (par. 131).

(4) *Lack of starter lubrication.* Replace starter (par. 131).

c. STARTER IS SLUGGISH AND WILL NOT ATTAIN FULL CRANKING SPEED.

(1) *Discharged battery.* Check battery level and specific gravity (par. 174). Clean and tighten all connections. Recharge or replace battery, irf necessary (par. 174).

(2) *Loose or dirty terminals.* Clean and tighten all terminals from battery to starter.

(3) *Defective cable.* Connect positive lead of voltmeter to terminal on top of starter switch. Pull starter lever to close starter switch. If voltage drops when switch is closed, replace cable from battery to starter.

(4) *Defective starter.* If brushes are sticking, commutator is worn or armature is rubbing field coils, replace starter (par. 131).

d. BATTERY NOT BEING CHARGED.

(1) *Loose or dirty terminals.* Clean and tighten all terminals from battery through regulator to generator.

(2) *Defective cables.* Check cable from battery to regulator and from regulator to generator. Replace if damaged.

Caution: After replacing either of these cables, polarize the generator (par. 132) or regulator may be damaged.

(3) *Defective regulator.* If there is a low or no charging rate with low batteries, and generator is functioning, replace regulator (par. 133).

(4) *Defective generator.*

(*a*) *No generator output.* If there is no output from the generator, remove plug (fig. 82) and check for sticking or worn out brushes, gummed or burned commutator, or other causes of poor contact between the commutator and the brushes. If any of these conditions are found, replace generator (par. 132).

(*b*) *Unsteady or low output.* Check for loose drive belts (fig. 65) and adjust (par. 122). Check for sticking brushes, out-of-round or rough commutator, or high mica on the commutator. If these conditions are found, replace generator (par. 132).

75. Transmission and Power-Take-Off
(figs. 86 and 87)

a. EXCESSIVE NOISE.

(1) *Insufficient lubricant.* Add lubricant of proper viscosity (par. 56), to one-half inch below level of plug, when cold (X, fig. 33).

(2) *Lubricant of incorrect viscosity.* Drain and refill with lubricant of correct viscosity (par. 56).

(3) *Gears or bearings broken, worn, or loose on shafts.* Replace the transmission (par. 135) if the problem is not one of lubrication, and excessive noise is heard with truck standing still, engine running, and transmission in neutral.

(4) *Power-take-off* (fig. 87). Noise in the power-take-off will reflect through the transmission. Check for loose mounting nuts and tighten if necessary. If power-take-off gears are excessively worn, replace power-take-off (par. 136).

b. HARD SHIFTING. If clashing of gears is encountered when attempting to shift from neutral into low gear, the clutch is not fully releasing. Adjust clutch-pedal free travel (par. 103), or replace clutch (par. 105).

c. GEAR SLIPPING.

(1) *Weak or broken shift puppet springs.* Refer to higher authority.

(2) *Excessively worn gears.* Replace transmission assembly (par. 135).

(3) *Bent shifting fork.* Refer to higher authority.

d. LUBRICANT LEAKAGE.

(1) *Loose drain plugs.* Tighten.

(2) *Defective gaskets.* Notify ordnance maintenance personnel.

76. Transfer
(fig. 89)

a. HARD SHIFTING. Clean and lubricate linkage (figs. 90 and 91).

b. SLIPS OUT OF GEAR.

(1) *Gears do not fully engage.* Adjust control linkage (par. 138).

(2) *Weak or broken shift puppet spring.* Replace transfer (par 138).

c. LUBRICANT LEAKAGE.

(1) *Loose drain plugs.* Tighten.

(2) *Damaged gaskets or oil seals.* Notify ordnance maintenance personnel.

77. Propeller Shafts

(fig. 92)

a. Excessive Noise or Vibration.

(1) *Lack of lubrication.* Lubricate all universal joints (par. 56).

(2) *Worn universal-joint parts or sprung propeller shaft.* Replace propeller shaft (par. 140).

b. Lubricant Leakage. If caused by damaged oil seals, replace propeller shaft (par. 140).

78. Front Axle

(fig. 94)

a. Hard steering.

(1) *Tires underinflated.* Check air pressure, using an accurate gage, and inflate tires (par. 184).

(2) *Front axle shifted.* Check distance from front-spring eye to some point on axle. Compare this measurement with like measurement on opposite side. If measurements do not agree, loosen spring "U" bolts, relocate axle, and retighten spring "U" bolts.

(3) *Lack of lubrication.* Lubricate front-axle steering knuckle, tie-rod ends, and drag-link ends (par. 56).

(4) *Improper toe-in.* Check toe-in of front wheels (par. 142). If not within one-sixteenth to three-sixteenths inch limits, refer to paragraph 142.

(5) *Bind in steering knuckle.* Raise front wheels from ground and disconnect drag link at front axle. Turn wheels and tie rod from side to side. If bind is found, disconnect one end of tie rod from steering knuckle. Test each wheel, turning from side to side. If bind persists and lubrication does not free steering knuckle, replace axle assembly (par. 144).

(6) *Tight steering gear.* With drag link disconnected at front axle, revolve steering gear from one extreme to the other. If bind or rough spots are encountered, notify ordnance maintenance personnel.

(7) *Excessive caster.* Checking of front-axle caster requires special equipment. Notify ordnance maintenance personnel.

b. Shimmy.

(1) *Excessive looseness in front axle.* Raise front wheels from ground, move wheels from side to side and up and down, and note any looseness. If excessive, replace axle (par. 144).

(2) *Front axle shifted.* Refer to *a*(2) above.

(3) *Excessive caster.* Refer to *a*(7) above.

(4) *Insufficient front-wheel toe-in.* Refer to *a*(4) above.

c. WANDERING.

(1) *Axle shifted.* Refer to *a*(2) above.

(2) *Tires unequally inflated.* Check air pressure, using an accurate gage, and inflate tires (par. 184).

(3) *Front-wheel bearings out of adjustment.* Adjust front-wheel bearings (par. 185).

(4) *Improper toe-in.* Refer to *a*(4) above.

(5) *Tight steering gear.* Localize trouble to steering gear by disconnecting drag link (*a*(5) above). Adjust (par. 168). If this does not correct condition, notify ordnance maintenance personnel.

79. Rear Axles

(fig. 98)

a. CONTINUOUS AXLE NOISE.

(1) *Tires improperly inflated or tread worn unevenly.* If axle noise is caused by tires, the noise will disappear when the truck is driven over soft, unfinished road surface. Inflate tires equally and properly (par. 184).

(2) *Wheel bearings worn, out of adjustment, or in need of lubrication.* If noise persists, check wheel bearings for wear, lubrication, and adjustment (par. 185).

(3) *Insufficient lubricant.* Add lubricant (par. 185).

b. AXLE NOISE ON DRIVE ONLY OR ON COAST ONLY.

(1) *Wheel bearings worn, out of adjustment, or in need of lubrication.* If noise persists, check wheel bearings for wear, lubrication and adjustment (par. 185).

(2) *Pinion and ring gear out of adjustment or worn excessively.* Replace rear axle assembly (par. 147).

c. EXCESSIVE BACKLASH IN AXLE DRIVING PARTS.

(1) *Axle flange cap screws or nuts loose.* Tighten nuts.

(2) *Ring gear and pinion out of adjustment or worn excessively.* Replace axle assembly (par. 147).

80. Brakes

a. PEDAL GOES TO FLOOR BOARD.

(1) *Normal wear of linings.* When linings become worn, it is necessary to set shoes in closer to brake drums. Adjust brakes (par. 149).

(2) *Brakes improperly adjusted.* Adjust brake shoes (par. 149).

(3) *Brake-fluid leak.* Inspect underneath chassis for signs of fluid leaks at master cylinder, wheel cylinders, and brake lines. Correct the leaks, and refill master cylinder (par. 150).

(4) *Air in system.* Air in the brake system will cause a springy or rubbery action of the pedal. Bleed hydraulic system (par. 150).

(5) *Pedal improperly adjusted.* Brake pedal should have approximately one-fourth to one-half inch free travel before pressure stroke starts. Additional free motion reduces the active travel of the master cylinder piston, which in turn limits the amount of working fluid to be expelled from the master cylinder. Adjust the brake-pedal travel (par. 152).

(6) *No fluid in supply tank.* Refill master-cylinder supply tank and bleed hydraulic system (par. 150).

b. ALL BRAKES DRAG.

(1) *Mineral oil in system.* The introduction of mineral oil into the hydraulic brake system will cause the cups to swell, and retard or prevent their action. Clean the system of deleterious oil, and refill with hydraulic brake fluid (par. 150). If this remedy is not effective, report to ordnance maintenance personnel, as the system will have to be reconditioned and all cylinder cups replaced.

(2) *Brake pedal improperly adjusted.* Brake pedal must have approximately one-fourth to one-half inch free travel before pressure stroke starts, otherwise the master-cylinder relief port will be closed, pressure in the system will gradually build up, and all brakes will drag. Adjust brake-pedal free travel (par. 152).

c. ONE WHEEL DRAGS.

(1) *Brake shoes improperly adjusted.* Adjust brake-shoe-to-brake-drum clearance (par. 149).

(2) *Brake shoes seizing on anchor pins.* Lubricate brake-shoe bearing surface on anchor pins (fig. 107).

(3) *Weak brake-shoe return spring.* A weak or broken shoe return spring will prevent brake shoes from being retracted. Replace spring (par. 154) (fig. 105).

(4) *Loose wheel bearings.* Adjust wheel bearings (par. 185).

d. TRUCK PULLS TO ONE SIDE.

(1) *Grease-soaked linings.* Replace brake shoes (par. 156).

(2) *Improperly adjusted brake shoes.* Adjust brakes (par. 149).

(3) *Tires improperly inflated.* Correct the tire inflation (par. 184).

e. SPRINGY, SPONGY PEDAL.

(1) *Brake shoes improperly adjusted.* Adjust shoes (par. 149).

(2) *Air in system.* Bleed hydraulic system (par. 150).

f. SEVERE BRAKING ACTION FROM LIGHT PEDAL PRESSURE.

(1) *Improperly adjusted brake shoes.* Adjust brake-shoe-to-brake-drum clearance (par. 149).

(2) *Loose brake backing plate.* Notify ordnance maintenance personnel.

(3) *Grease-soaked lining.* Replace brake shoes (par. 156).

g. WEAK BRAKING ACTION FROM HEAVY PEDAL PRESSURE.

(1) *Improper brake-shoe adjustment.* Adjust brake shoes (par. 149).

(2) *Improper brake lining.* Replace brake shoes (par. 156).

(3) *Oil on linings.* Replace brake shoes (par. 156).

h. INSUFFICIENT AIR PRESSURE FOR AIR-HYDRAULIC BRAKE CYLINDER.

(1) *Reservoir drain cocks open.* Close drain cocks (figs. 145 and 146).

(2) *Compressed-air leakage.* Check all air lines and fittings for leaks. Correct the leaks (par. 213).

(3) *Slipping compressor drive belt.* Adjust belt (par. 214).

(4) *Governor out of adjustment.* Replace governor (par. 215).

(5) *Defective compressor.* Replace compressor (par. 214).

i. POWER BRAKE APPLICATION SLOW.

(1) *Low air pressure.* Refer to *h* above.

(2) *Excessive leakage with brakes applied.* Refer to *h* (1) and (2) above.

(3) *Restricted air line.* Remove and clean.

j. POWER BRAKE RELEASES TOO SLOWLY.

(1) *Hydraulic-brake system not functioning properly.* Refer to *b* above.

(2) *Leak in check valve.* Replace air-hydraulic cylinder (par. 153).

81. Springs and Shock Absorbers

(figs. 114 and 115)

a. INSUFFICIENT FLEXIBILITY.

(1) *Insufficient spring-pin lubrication.* Lubricate spring pins and shackle pins (par. 56), making sure grease goes all the way around pins.

(2) *Frozen spring shackles.* Free-up (par. 162) and lubricate (par. 56) shackles.

(3) *Shock absorbers inoperative.* Disconnect shock-absorber links and test shock-absorber action. If inoperative, replace unit (par. 166).

b. EXCESSIVE FLEXIBILITY.

(1) *Overlubrication.* Refer to paragraph 56. Clean excess grease from sides of springs.

(2) *Shock absorbers inoperative.* Disconnect shock-absorber links, and test operation. If little or no resistance is felt, replace unit (par. 166).

(3) *Broken spring leaves.* Examine springs for broken leaves and, if found, replace defective springs (pars. 162 and 163).

c. Excessive Noise.

(1) *Worn spring pins or shackle bolts.* Use pry bar to test for wear of pins or bolts. Replace as necessary (pars. 162 and 163).

(2) *Worn or broken shock-absorber links.* Inspect shock-absorber links for wear, damage, or looseness. Replace shock absorber if defective (par. 166).

d. Spring-Leaf Failures.

(1) *Spring-leaf failures at spring eye.* Failures at this point are generally caused by tight spring shackles or frozen spring pins. Free-up (par. 162) and lubricate (par. 56) shackles, or replace spring (pars. 162 and 163).

(2) *Spring-leaf failures at center section of spring.* Breakage of spring leaves at the center-bolt section are generally caused by loose spring **U**-bolts. Replace spring, and tighten **U**-bolts securely (pars. 162 and 163).

(3) *Grabbing brakes.* Grabbing brakes result in extreme twist or strain on springs. Adjust brakes (par. 149).

82. Steering Gear

(fig. 116)

a. General. Many complaints of steering difficulty are falsely charged to the steering gear assembly. In order, therefore, to isolate the steering gear from balance of front axle and connections, the drag link should be disconnected from pitman arm (fig. 114) at gear housing assembly. This will permit unobstructed diagnosis of the unit. In general, steering complaints rightfully traceable to steering gear are as indicated below.

b. Hard Steering.

(1) *Lack of lubricant.* Lubricate as instructed in paragraph 56.

(2) *Tight steering gear.* Revolve steering wheel from one extreme to the other. If tightness is felt, adjust steering gear (par. 168).

(3) *Damaged bearings, cam, or lever.* If rough spots, bumps, or noise are encountered while revolving steering gear, internal damage is indicated. Refer to ordnance maintenance personnel.

(4) *Steering column misalined.* Loosen steering-column clamp at top of steering-gear housing, and loosen bracket at instrument panel. Aline column, and retighten.

c. WANDER OR WEAVING.

(1) *Tight adjustment in straight-ahead position.* If gear is tight in mid-position or straight ahead, adjust steering gear (par. 168).

(2) *Steering-drag-link ends loose.* Inspect drag-link ends for proper adjustment. Readjust if necessary (par. 172).

(3) *Steering-gear parts worn or incorrectly adjusted.* Refer to ordnance maintenance personnel.

d. OIL LEAKS.

(1) *Defective oil seal in housing.* Refer to ordnance maintenance personnel.

(2) *Loose cover or gasket.* Tighten cover, or refer to ordnance maintenance personnel.

83. Battery and Lighting System

a. DISCHARGED BATTERY. Refer to paragraph 174.

b. LIGHTS DO NOT LIGHT.

(1) *Burned-out lamps.* Replace defective lamps.

(2) *Broken cable.* Examine all light cables for damage. Repair or replace as required.

(3) *Defective light switch.* Refer to paragraph 87.

c. FREQUENT LAMP FAILURES.

(1) *Poor battery ground connection.* Clean and tighten battery ground cable (7) connection (figs. 121 and 122).

(2) *Regulator out of adjustment.* Replace generator regulator (par. 133).

d. INSUFFICIENT LIGHT.

(1) *Poor battery ground connection.* Clean and tighten battery ground cable (7) connection (figs. 121 and 122).

(2) *Loose terminals.* Tighten all terminals from battery to light.

(3) *Discharged battery.* Recharge or replace battery (par. 174).

84. Wheels, Tires, and Hubs

a. WHEEL WOBBLES.

(1) *Loose on hub.* Tighten wheel nuts (par. 183).

(2) *Bent wheel.* Replace wheel (par. 183).

(3) *Wheel bearings out of adjustment or damaged.* Adjust wheel bearings (par. 185) or replace bearings, if necessary.

(4) *Wheel out of balance.* Remount tire correctly (par. 184).

b. EXCESSIVE OR UNEVEN TIRE WEAR.

(1) *Unequal pressure in tires.* Inflate tires equally and properly (par. 184) using an accurate gage.

(2) *Improper front-wheel alinement.* Check front-wheel alinement (fig. 95) and correct (par. 142).

(3) *Bent wheel.* Replace wheel (par. 183).

(4) *Damaged wheel bearings.* Replace wheel bearings (par. 185).

85. Winch

a. Winch Fails to Operate.

(1) *Drum clutch not engaged.* Operate drum-clutch lever as described in paragraph 47.

(2) *Shear-pin failure.* If drive shaft revolves and winch worm shaft is stationary, check for cause of shear-pin failure and replace shear pin (par. 189).

b. Winch Fails to Operate Properly.

(1) *Fails to sustain load.* Adjust automatic brake (par. 187) or replace brake assembly, if necessary (par. 188).

(2) *Excessive heat at brake case.* Adjust automatic brake (par. 187).

(3) *Drum spins too fast when unwinding wire rope by hand.* Adjust drag brake (par. 187).

(4) *Noisy operation.* Lubricate as instructed in paragraph 56.

86. Radio Interference Suppression

a. Ignition System.

(1) *Defective spark plug cables.* Examine tinned-copper braid on each spark plug cable. If damaged, replace cable.

(2) *Defective spark plug suppressors.* Start engine with spark plugs removed one at a time. If radio interference is appreciably reduced when any spark plug is removed, spark plug suppressor is faulty. Replace spark plug (par. 129).

(3) *Defective distributor filter system.* Visually inspect feed-through capacitor located in primary lead in connector receptacle tower, resistor, and coil capacitor for loose cable connections or terminals (fig. 71). If defective, replace (par. 195).

b. Starting and Charging Circuit.

(1) *Defective starter capacitor* (fig. 80). If excessive radio interference occurs when starter is operating, starter capacitor is at fault. Replace starter capacitor (par. 196).

(2) *Defective generator regulator capacitors.* Disconnect generator-to-regulator cable at generator. Start engine. If radio interference disappears, regulator capacitors are faulty. Replace regulator (par. 133).

(3) *Defective generator capacitors.* Disconnect generator-to-regulator cable at generator. Start engine. If radio interference continues, generator capacitor is faulty. Replace generator (par. 132).

c. Defective Bond Straps. Inspect two bond straps at bottom of radiator, one at rear of engine, and one on transmission. Replace if faulty (par. 197).

87. Instrument Cluster, Gages, Switches, Circuit Breakers, and Sending Units

a. General. This paragraph provides trouble-shooting information on electrical components such as gages, switches, circuit breakers, and sending units. In checking components in the instrument cluster, first remove the instrument cluster (par. 202) and check all cables for visible damage. Make sure all connectors are secure. Then proceed to check the electrical components (*b* to *k below*).

Caution: Make sure battery ground cable (7) (figs. 121 and 122) is disconnected in all tests in which an ohmmeter is used or meter may be ruined.

b. Gages. To check any of the gages mounted in the instrument cluster, first disconnect battery ground cable (7) (figs. 121 and 122) at battery. Remove the instrument cluster (par. 202) and disconnect the two connectors at the rear of the gage to be checked. Contact ohmmeter test prods to the two terminals at the rear of the gage. The ohmmeter reading should be as follows:

Fuel gage	300 ohms
Oil pressure gage	300 ohms
Air pressure gage	300 ohms
Ammeter	.05 ohms
Temperature gage	400 ohms

If a gage resistance reading is incorrect, replace gage (par. 203).

c. Ignition Switch. The ignition switch (fig. 14) can be checked either by gaining access to the rear of the switch behind the instrument panel or by removing the switch (par. 205). In either case, be sure battery ground cable (figs. 121 and 122) is diconnected. Disconnect all four cable connectors at the rear of the switch. Put one ohmmeter test prod to receptacle of cable 11 (male terminal) on rear of switch and the other test prod to each of the other receptacles (female terminals) in turn. In each case, the ohmmeter reading should be infinite with the switch in the "OFF" position and zero with the switch in the "ON" position. If reading is incorrect, replace ignition switch (par. 205).

d. Light Switch (fig. 15). Remove battery ground cable (7) (figs. 121 and 122). Remove light switch (par. 206). Insert one ohmmeter test prod into pin F of the large connector receptacle on the switch and the other test prod into each of the pins listed in table IV below.

Note. In this table, L–B means large connector receptacle, pin B; S–F means small connector receptacle, pin F.

Table IV. Ohmmeter Testing of Light Switch

Lights	Test prod at	Circuit	Ohmmeter reading
Service head lights	L–M	16	Zero with main switch in "SER DRIVE" position and auxiliary switch in "HEAD" position; infinite in all other positions.
BO driving light	L–D	19	Zero with main switch in "BO DRIVE" position; infinite in all others.
BO marker lights	L–E	20, 24	Zero with main switch in "BO MARKER" position; infinite in all others.
Trailer BO marker lights	S–C		
Service tail light	L–H	21	Zero with main switch in "SER DRIVE" position; infinite in all others.
Trailer tail light	S–E		
Service stop light	L–C	22	Connect a jumper wire from L–K to L–A. Zero reading with main light in "STOP LIGHT" or "SER DRIVE" positions; infinite in all others.
Trailer stop light	S–B		
BO stop light	L–N	23	Connect a jumper wire from L–K to L–A. Zero reading with main switch in "BO DRIVE" or "BO MARKER" positions; infinite in all others.
Trailer BO stop light	S–F		
Panel lamp	L–B	40	Zero with auxiliary switch in "PANEL LIGHTS—BRIGHT" position; ohms with auxiliary switch in "PANEL LIGHTS—DIM" position; infinite in all others.

If reading in any position is incorrect, replace light switch (par. 206).

e. DIMMER SWITCH (fig. 14).

(1) To check operation of dimmer switch and connecting cables, disconnect cables 17 and 18 at one of the head lamps.

Caution: Do not let male terminal of cable 17 touch any grounded portion of the vehicle.

(2) Turn on ignition switch.

(3) Set light switch main lever to "SER DRIVE" position and light switch auxiliary lever to "HEAD" position.

(4) Connect a voltmeter positive lead to the male terminal of cable 17 and the negative lead to a convenient ground. The voltmeter reading should be 24 volts with the dimmer switch in "HI" position and zero with dimmer switch in "LO" position.

(5) Connect a voltmeter positive lead to the female terminal of cable 18 and the negative lead to ground. The voltmeter reading should be 24 volts with the dimmer switch in "LO" position and zero with the dimmer switch in "HI" position.

(6) If reading is incorrect, replace dimmer switch (par. 207).

f. HORN AND HORN BUTTON.

(1) *Horn.* Disconnect battery ground cable (7) (figs. 121 and 122). Disconnect two cables at horn. Contact ohmmeter test prods to two terminals on horn. Reading should be 4.4 ohms. If incorrect, replace horn (par. 208).

(2) *Horn button* (fig. 14). Disconnect battery ground cable (7) (figs. 121 and 122). Disconnect two cables at horn. Contact one ohmmeter test prod to cable from horn switch (this is the cable with the female terminal) and the other test prod to a convenient ground. With the horn button depressed, the reading should be zero. With the horn button not depressed, the reading should be infinite. If reading is incorrect, replace horn button (par. 208).

g. STOP-LIGHT SWITCH. Disconnect battery ground cable. Disconnect large connector on light switch on instrument panel. Connect ohmmeter test prods to pins "K" and "A" on cable connector plug. Reading should be zero with brake pedal depressed; infinite with brake pedal not depressed. If incorrect, replace stop-light switch (par. 209).

h. AIR PRESSURE WARNING BUZZER. Disconnect battery ground cable. Disconnect cable connector at buzzer. Contact one ohmmeter test prod to terminal on buzzer and other test prod to ground. Reading should be 65 ohms. If incorrect, replace buzzer (par. 210).

i. LOW AIR PRESSURE WARNING SWITCH. Open both drain cocks on compressed air reservoirs. Turn on ignition switch. If buzzer does not sound, either the buzzer or the low air pressure warning switch or the attaching cables are faulty. Check buzzer (*h* above). If buzzer checks properly, fault may be in switch. To check switch, disconnect two connectors at switch on cab side of dash panel. Connect ohmmeter test prods across switch. With the air pressure below 65 psi, the reading should be zero. If incorrect, replace switch (par. 212).

j. CIRCUIT BREAKERS. To test any circuit breaker, first disconnect battery ground cable. Disconnect two connectors at circuit breaker.

Contact ohmmeter test prods to two terminals on circuit breaker. Reading should be zero. If incorrect, replace circuit breaker (par. 211).

k. Sending Units.

(1) *General.* All sending units can be tested from the rear of the instrument cluster. To check these sending units, disconnect the battery ground cable (7) and remove the instrument cluster (par. 200). Proceed according to (2) through (5) below.

(2) *Fuel tank sending unit.* Disconnect cable 28 leading from fuel gage to fuel tank sending unit. Connect one ohmmeter test prod to cable terminal and other test prod to ground. Reading should be zero for empty fuel tank; 15 ohms for half-full fuel tank; and 30 ohms for full fuel tank. If incorrect, replace fuel tank sending unit (par. 212).

(3) *Oil pressure sending unit.* Disconnect cable 36 leading from oil pressure gage to oil pressure sending unit. Connect one ohmmeter test prod to cable terminal and the other test prod to ground. The reading should be zero for zero pressure up to 10 ohms for 40 psi. If incorrect, replace oil pressure sending unit (par. 212).

(4) *Air pressure gage.* Disconnect cable 300 leading from air pressure gage to air pressure sending unit. Connect one ohmmeter test prod to cable terminal and the other test prod to ground. The reading should be zero for zero pressure to 16 oms for 65 psi. If incorrect, replace air pressure gage (par. 212).

(5) *Temperature gage.* Disconnect cable 33 leading from temperature gage to temperature sending unit. Connect one ohmmeter test prod to cable terminal and the other test prod to ground. The reading should be 18 ohms for 180° F. to 24 ohms for 220° F. If incorrect, replace temperature gage (par. 212).

Section V. ENGINE DESCRIPTION AND MAINTENANCE IN TRUCK

88. Description and Data

a. Description.

(1) *Engine.* These trucks are powered by a gasoline-type, six-cylinder, four-cycle, water-cooled engine (figs. 37 and 38), with overhead valves, and removable-wet-sleeve cylinders. The radiator, engine, transmission, and clutch are considered

as one unit (power plant) for removal and installation (sec. VI below).

(2) *Intake and exhaust manifolds.* Both intake and exhaust manifolds are on the right side of cylinder head (fig. 38). The intake manifold is cast integral with cylinder head and is provided with mounting pads for the exhaust manifold. A manifold-heat-control valve assembly, mounted over an opening in the exhaust manifold (fig. 43) provides a direct

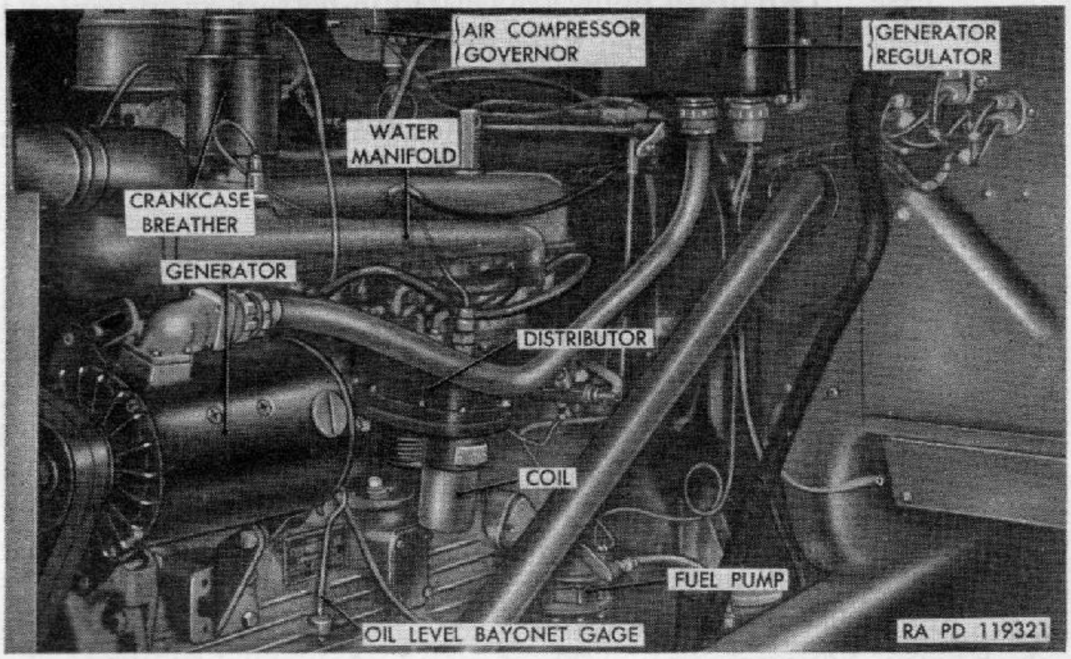

Figure 37. Left side of engine—installed.

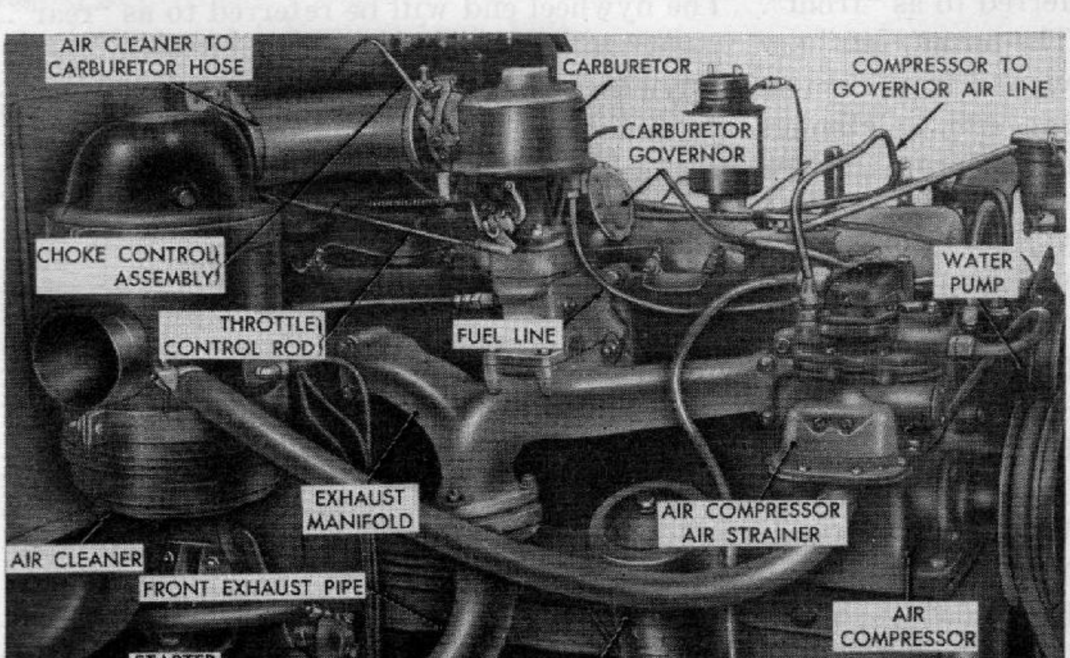

Figure 38. Right side of engine—installed.

passage from the carburetor to the intake-manifold passage. The lower portion of manifold heat-control valve assembly is open to the exhaust gases. A manually-adjusted valve gives optional control over the exhaust heat admitted to the intake passage (par. 111).

(3) *Oil pan.* The oil pan is a pressed-steel unit, flanged to conform to the crankcase outlines. Flange gaskets at the sides, and oil seals at the ends, provide oil-tight joints with crankcase. Two drain plugs are located in bottom of oil pan and both must be removed when draining.

Note. As oil pan gasket replacement is not practical without a major disassembly of the engine, the oil pan will not be removed while the power plant is in the truck.

(4) *Oil filter.* A replaceable-element oil filter is mounted on the right side of the engine (fig. 38). Band clamps around filter secure it to a bracket mounting on side of crankcase. A portion of the engine oil is continuously passed through filtering element and returned to crankcase.

(5) *Crankcase breather.* The crankcase breather, mounted on top of rocker-arm cover, is essentially an oil-bath air cleaner (fig. 48). A filtering element, attached to the breather cover, extends to oil-bath reservoir. The breather also serves as an oil filler for engine oil to the crankcase and oil pan. Cover and filler cap are watertight.

b. ENGINE NOMENCLATURE. The fan end of the engine will be referred to as "front". The flywheel end will be referred to as "rear". The terms "left" and "right" as used with reference to engine, are as viewed from the rear or flywheel end and looking toward the front or fan end. Cylinders are numbered from the front. Viewing the engine from the front, crankshaft rotates in a clockwise direction.

c. TABULATED DATA.

Make	Reo
Model	OA331
Type	6 cyl overhead valves
Bore (sleeve)	4⅛-in
Stroke	4⅛-in
Piston displacement	331 cu in
Compression ratio	6.73 : 1
Maximum governed speed (no load)	3,600 rpm
Maximum engine speed (full load)	3,400 rpm
Engine weight (without accessories)	871 lb
Crankshaft rotation (viewed from fan, front end)	clockwise
Firing order	1-5-3-6-2-4
Valve clearance, intake and exhaust (hot)	0.015 in

89. Maintenance Operations

All organizational maintenance operations on the engine and engine accessories can be performed with engine installed in truck. These maintenance operations, with a reference to the pertinent paragraph for detailed instructions, are listed below:

a. Air Cleaner. Service or replace (par. 107).

b. Carburetor. Adjust or replace (par. 108).

c. Compression Test. Perform item 21, table III.

d. Compressor. Adjust or replace (par. 214).

e. Compressor Air Strainer. Service (par. 214).

f. Compressor Governor. Replace (par. 215).

g. Compressor-Governor Air Strainer. Service or replace (par. 215).

h. Crankcase. Service (par. 94).

i. Crankcase Breather. Service or replace (par. 95).

j. Cylinder-Head and/or Gasket. Replace (par. 91).

k. Distributor. Adjust or replace (par. 128).

l. Distributor Breaker Points. Adjust or replace (par. 128).

m. Distributor Capacitor. Replace (par. 128).

n. Drive Belts. Adjust or replace (pars. 122 and 214).

o. Fan Assembly. Replace (par. 122).

p. Fuel Lines and Connectors. Repair or replace (par. 114).

q. Fuel Pump. Test or replace (par. 112).

r. Gaskets (Manifold Heat-Control Valve Assembly, and Exhaust Manifold). Replace (pars. 92 and 111).

s. Generator. Replace (par. 132).

t. Generator Regulator. Replace (par. 133).

u. Ignition Coil. Replace (par. 128).

v. Ignition Wiring. Inspect, replace if necessary (pars. 128 and 129).

w. Manifold (Exhaust) and Manifold Heat-Control Valve Assembly. Replace (pars. 92 and 111).

x. Manifold Heat-Control Valve Assembly. Adjust (par. 111).

y. Oil Filter. Service or replace (par. 94).

z. Oil-Pan Assembly. Service (par. 93).

aa. Radiator Assembly. Service, clean, or replace (par. 121).

ab. Radiator Hose. Replace (par. 125).

ac. Spark Plugs. Clean, adjust, or replace (par. 129).

ad. Starter. Replace (par. 131).

ae. Thermostat. Replace (par. 124).

af. Vacuum Test. Perform item 42, table III.

ag. Valves. Adjust (par. 90) or time (par. 127).

ah. Water Pump. Replace (par. 123).

90. Valve Clearance Adjustment

(fig. 39)

a. Preliminary. Start engine (par. 41) and run until normal operating temperature (160° to 180° F.) is reached.

Note. Keep engine running at idling speed while adjustments are made.

b. Remove Valve-Rocker-Arm Cover. Stop engine. Disconnect control wire from shut-off valve (fig. 48) at rear of breather. Remove two valve-rocker-arm-cover retaining nuts. Remove washers and gaskets and remove rocker-arm cover. Remove and discard rocker-arm-cover gasket.

c. Check and Adjust Valve Clearance. Start engine (par. 41). With engine at normal operating temperature and idling, insert 0.015-inch feeler gage between rocker arm and valve stem at each valve. Using a wrench and screwdriver, loosen valve-adjusting-screw jam nut, and tighten or loosen valve-adjusting screw until proper clearance is obtained (fig. 39). Hold screw in adjusted position, tighten jam nut, and again check clearance. Use same procedure to adjust all valves to 0.015-inch clearance.

d. Install Valve-Rocker-Arm Cover. Stop engine. Install valve-rocker-arm cover with new gasket. Install two annular gaskets, and washers. Install retaining nuts and tighten securely. Check for oil

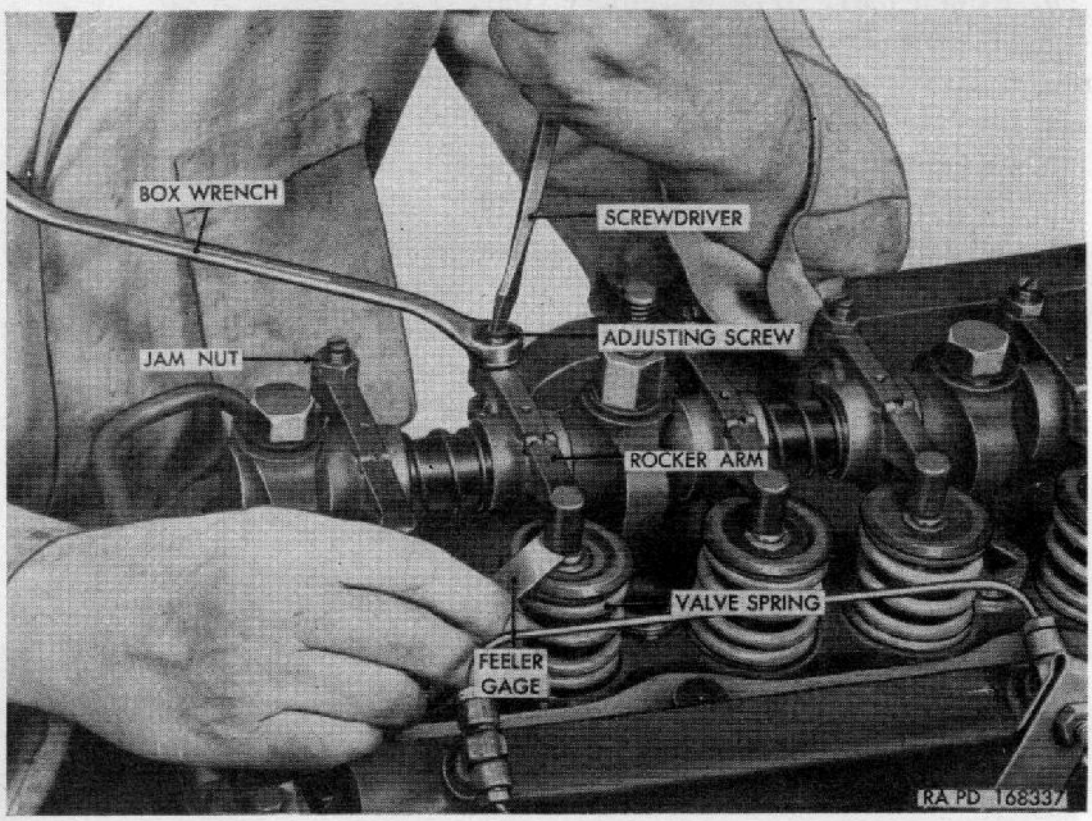

Figure 39. Valve clearance adjustment.

leakage at gasket. Connect control wire to shut-off valve (fig. 48) at rear of breather.

91. Cylinder Head and Gasket Replacement

a. Removal.

(1) Drain cooling system (par. 121). Loosen both clamps on radiator-inlet hose and remove hose.

(2) Disconnect thermostat bypass line at water manifold and pull it clear.

(3) Disconnect temperature-gage cable from temperature sending unit on water manifold (fig. 49).

(4) Disconnect distributor primary cable at distributor (fig. 69). Remove harness clip from water manifold and place harness over top of generator regulator (fig. 37).

(5) Disconnect spark-plug cables at spark plugs (par. 129 *a*).

(6) Disconnect compressor-to-governor air line (fig. 38) at governor (fig. 37).

(7) Remove valve-rocker-arm cover (par. 90).

(8) Remove cap screws from radiator-stay-rod bracket at cylinder head and turn rod to clear. Detach two air lines, and fuel line from bracket.

(9) Disconnect compressor-to-governor air line at compressor (fig. 38) and remove line.

(10) Disconnect fuel line from front of carburetor (figs. 37 and 38), two carburetor governor lines from left side of carburetor (par. 110). Pull lines clear. Disconnect shut-off-valve-control wire from manifold heat control shut-off valve at carburetor.

(11) Disconnect throttle control rod and choke control assembly at carburetor (fig. 38).

(12) Disconnect air cleaner-to-carburetor hose by loosening hose clamp at carburetor (fig. 38). Pull hose clear.

(13) Disconnect primer pump-injection line (fig. 50) from fitting at rear of cylinder head.

(14) Remove three bolts and nuts from exhaust-pipe flange at exhaust manifold (fig. 38).

(15) Remove 14 cylinder-head bolts and washers (fig. 41).

(16) Lift off valve-rocker arm assemblies.

(17) Install cylinder-head lifting sling 41–S–3829–750 (fig. 40). Slide clamp on water manifold to front as far as it will go. Hook chain around exhaust-manifold and carburetor adapter tightly to avoid damage to carburetor governor assembly and primer line when lifting cylinder head. Lift cylinder head

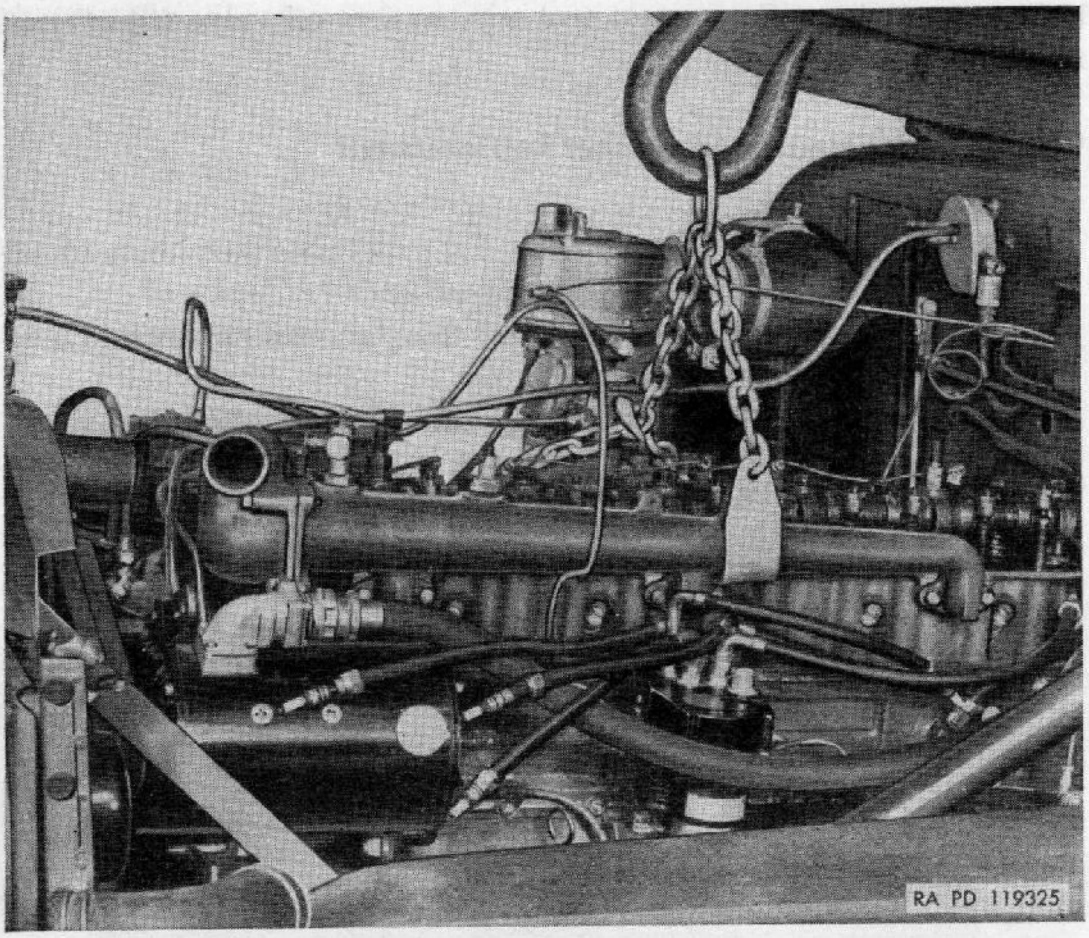

Figure 40. Removing cylinder head using sling 41–S–3829–750.

straight up from crankcase. Check to see that all lines and cables are clear as the cylinder head is being lifted. Remove and discard cylinder-head and exhaust-pipe gaskets.

b. Installation.

(1) Clean gasket surface of cylinder head and crankcase thoroughly.

(2) Install new cylinder-head gasket on crankcase making sure side of gasket marked "THIS SIDE DOWN" is placed next to crankcase. This is necessary in order to aline water-passage holes in gasket with passages in crankcase and head.

(3) Place new exhaust-pipe gasket over end of exhaust pipe and push down to collar.

(4) Check to be sure that all lines, cables, and parts are installed on the cylinder head that were connected to and removed with it from the engine. If any components of the cylinder head were removed and installed, check to make sure all installations were accomplished correctly.

(5) Install cylinder-head lifting sling 41–S–3829–750 (*a* (16) above) (fig. 40). Raise cylinder head high enough to clear; then carefully lower cylinder head into place.

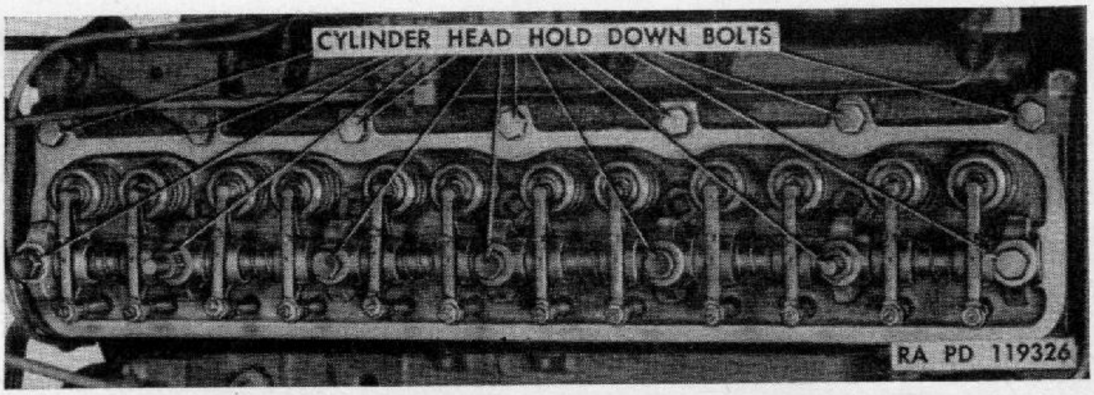

Figure 41. Cylinder head with valve rocker arm cover removed.

(6) Place valve-rocker arm assemblies on cylinder head. Space rocker arms on shafts so as to center over valve stems and push rods.

(7) Install two long (special) cylinder-head bolts (7 and 9) and washers in second hole from each end through rocker-arm shafts. Do not tighten. Install five medium length bolts and washers in remaining holes through rocker-arm-shaft supports. Do not tighten. Install two special short bolts in second hole from ends (8 and 10) and five short bolts in remaining holes (fig. 42). Do not tighten.

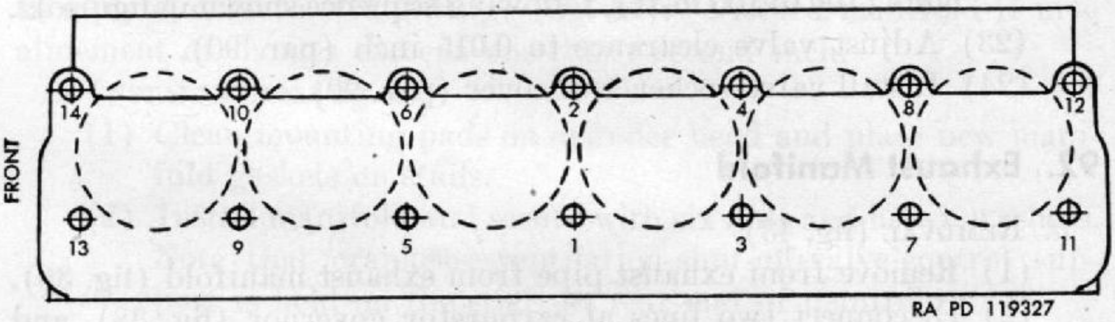

Figure 42. Torque tightening sequence.

(8) Cylinder-head bolts must be tightened evenly and in a definte sequence to prevent distortion of cylinder head. Using a torque wrench, start at bolt number 1 (fig. 42) and tighten all bolts in numerical order from 100 to 105 lb-ft torque.

(9) Connect primer-pump-injection line at rear of cylinder head (fig. 50).

(10) Connect air cleaner-to-carburetor hose at carburetor (fig. 38).

(11) Connect throttle control rod and choke control assembly at carburetor (fig. 38).

(12) Connect fuel line to front of carburetor (fig. 38), two carburetor governor lines to governor assembly, and secure to stay-rod bracket. Connect control wire to manifold heat control shut-off valve at carburetor.

(13) Install and connect compressor-to-governor air line at compressor and governor (figs. 37 and 38).

(14) Connect radiator-stay-rod bracket on cylinder head.

(15) Install three bolts to connect exhaust-pipe flange to exhaust manifold (fig. 38).

(16) Connect spark-plug cables to spark-plugs (par. 129 *d*).

(17) Connect distributor primary cable at distributor (fig. 69). Install harness clip to water manifold.

(18) Connect temperature-gage cable to temperature-gage sending unit on water manifold (fig. 49).

(19) Connect thermostat bypass line at water manifold.

(20) Install radiator inlet hose.

(21) Fill cooling system (par. 121). Adjust intake valve clearance to 0.016 inch and exhaust valve to 0.018 inch with engine cold as described for 0.015-inch adjustment (par. 90) for engine at normal operating temperature. Because the valves will expand as the engine temperature rises, these settings will approximate a 0.015-inch setting at normal operating conditions. Start engine (par. 41) and run until normal operating temperature is reached (160° to 180° F.).

(22) After engine is warmed up, check tightness of cylinder-head bolts (100 to 105 lb-ft), following sequence shown in figure 42.

(23) Adjust valve clearance to 0.015 inch (par. 90).

(24) Install valve-rocker-arm cover (par. 90).

92. Exhaust Manifold

a. Removal (fig. 43).

(1) Remove front exhaust pipe from exhaust manifold (fig. 38).

(2) Disconnect two lines at carburetor governor (fig. 38), and fuel line at carburetor (fig. 56).

(3) Disconnect and remove choke control assembly (fig. 50) from carburetor (fig. 38).

(4) Disconnect throttle control rod (fig. 50) from carburetor-throttle lever.

(5) Disconnect shut-off-valve control wire and ventilation line from shut-off valve at rear of manfold heat-control valve assembly (fig. 43).

(6) Disconnect ventilation line from elbow in front of air cleaner (fig. 54) and pull to side to clear manifold.

(7) Remove two cap screws and two clamps from manifold heat-control valve flange.

(8) Remove six nuts holding exhaust manifold to cylinder head and pull manifold, with attached assemblies, from cylinder head (fig. 43).

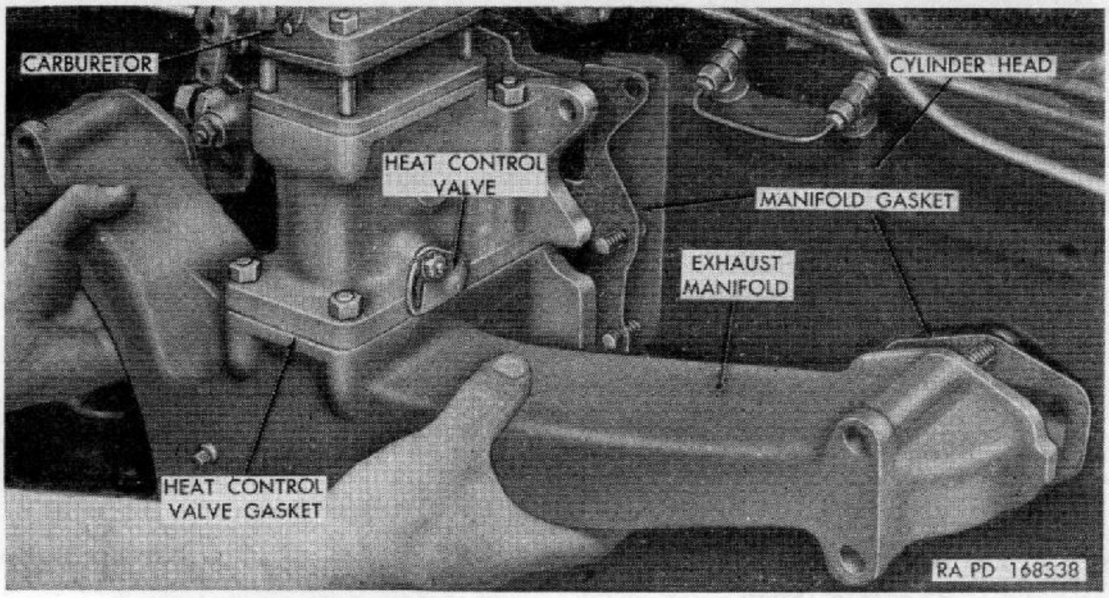

Figure 43. Removing exhaust manifold.

(9) Remove four nuts from studs holding manifold heat-control valve assembly to exhaust manifold and lift valve assembly and carburetor from manifold (fig. 43).

b. INSPECTION. Inspect exhaust manifold for cracks and remove any carbon deposits. Check alinement of mounting flanges on a surface plate, or with straightedge (fig. 44). Discard manifold if misalinement of flanges exceeds one-thirty-second inch.

c. INSTALLATION (fig. 43).

(1) Clean mounting pads on cylinder head and place new manifold gaskets on studs.

(2) Install manifold and secure with six nuts and heavy washers. Note that crankcase-ventilation-shut-off-valve-control support is held on the studs at rear end of manifold.

(3) Connect ventilation line to elbow in side of air cleaner (fig. 54).

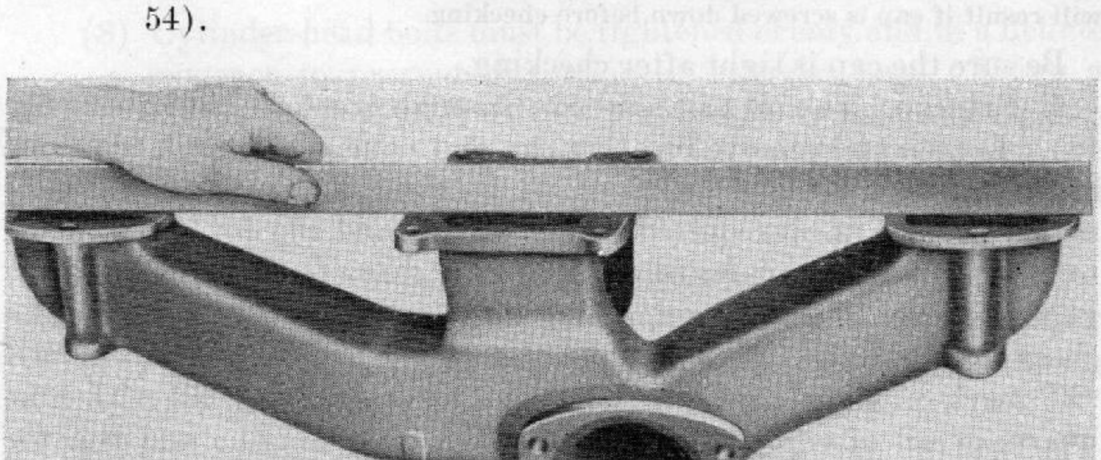

Figure 44. Checking exhaust-manifold flanges.

(4) Place new gasket on exhaust manifold, and install carburetor, carburetor spacer, and heat-control valve, as a group. Secure with nuts on the manifold studs.

(5) Install clamps holding manifold flange and heat-control-valve-housing flange; secure with nuts.

(6) Install two cap screws in the upper holes of heat-control-valve housing.

(7) Connect fuel line to carburetor (fig. 56).

(8) Clamp the crankcase ventilation control assembly in its support bracket and secure the control wire to the shut-off-valve-lever.

(9) Connect the crankcase ventilation line to the shut-off valve.

(10) Connect the choke control (fig. 50) to carburetor (fig. 38).

(11) Connect the throttle control rod (fig. 50) to carburetor-throttle lever.

(12) Connect two lines to carburetor governor (fig. 56).

(13) Start engine (par. 41) and run until normal operating temperature is reached and check tightness of all gasket joints.

93. Oil Pan

a. CHECKING OIL LEVEL. Check oil level frequently. An engine bayonet-type-oil-level gage is located in lower portion of crankcase between generator and distributor (fig. 45).

Note. The space between "L" and "F" marks on gage represents approximately three quarts of oil.

The gage is fitted with a waterproof screw cap. The cap must not be screwed down to check oil level.

Note. Be sure to check oil level with cap unscrewed. A false oil level reading will result if cap is screwed down before checking.

Be sure the cap is tight after checking.

b. FILLING. The oil pan is filled through crankcase breather (fig. 48). Loosen and remove breather cap and pour oil through center of breather. For replenishment of oil between oil changes, add estimated amount of oil required. Start engine and run for two minutes to allow time for transfer of oil from rear sump to front sump where gage is located. Stop engine and wait one or two minutes before checking oil level. Check level (*a* above) and repeat procedure until "F" mark on gage is reached. To refill after draining, fill with nine quarts of oil of correct grade (par. 57). Start engine and run for two minutes to allow time for transfer of oil to front sump where gage is located. Stop engine and wait one to two minutes before checking oil level.

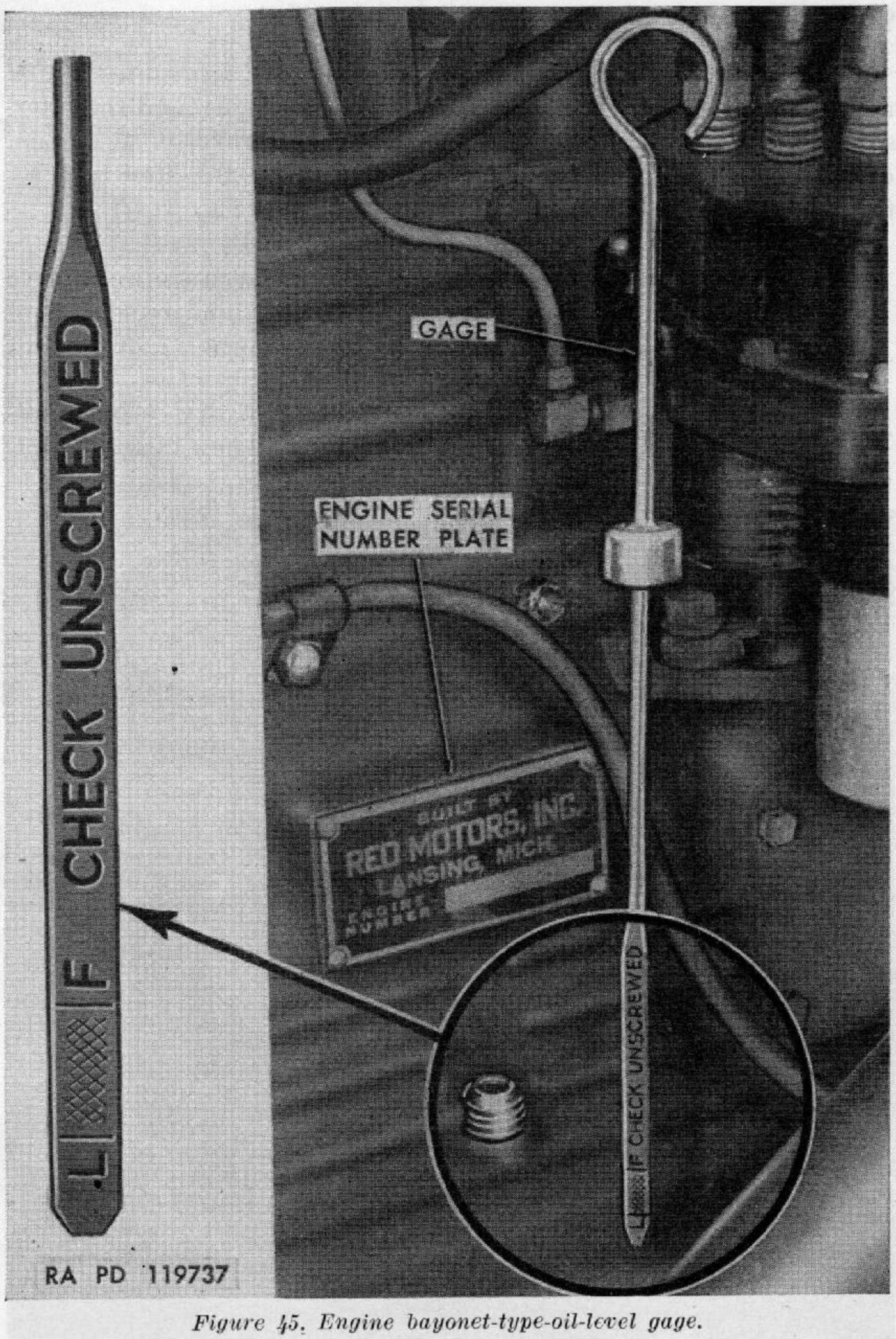

Figure 45. Engine bayonet-type-oil-level gage.

c. REPLACEMENT. As oil-pan-gasket replacement requires a major disassembly, the oil pan will *not* be removed while power plant is in the truck.

94. Oil Filter

a. Description. A replaceable-element oil filter is mounted on the right-hand side of engine (fig. 46). Band clamps, around the filter, secure it to a bracket mounting on the side of the crankcase. A portion of the engine oil is continuously passed through the filter and returned to the oil pan.

b. Oil-Filter-Element Replacement (fig. 47).

(1) Remove drain plug at bottom of filter and drain oil. Remove bolt from center of cover, lift off cover, and remove compression spring from center of filter element. Lift element from filter body and discard.

(2) Clean inside of filter body and cover with dry-cleaning solvent or volatile mineral spirits and install new filter element.

Figure 46. Oil filter mounting.

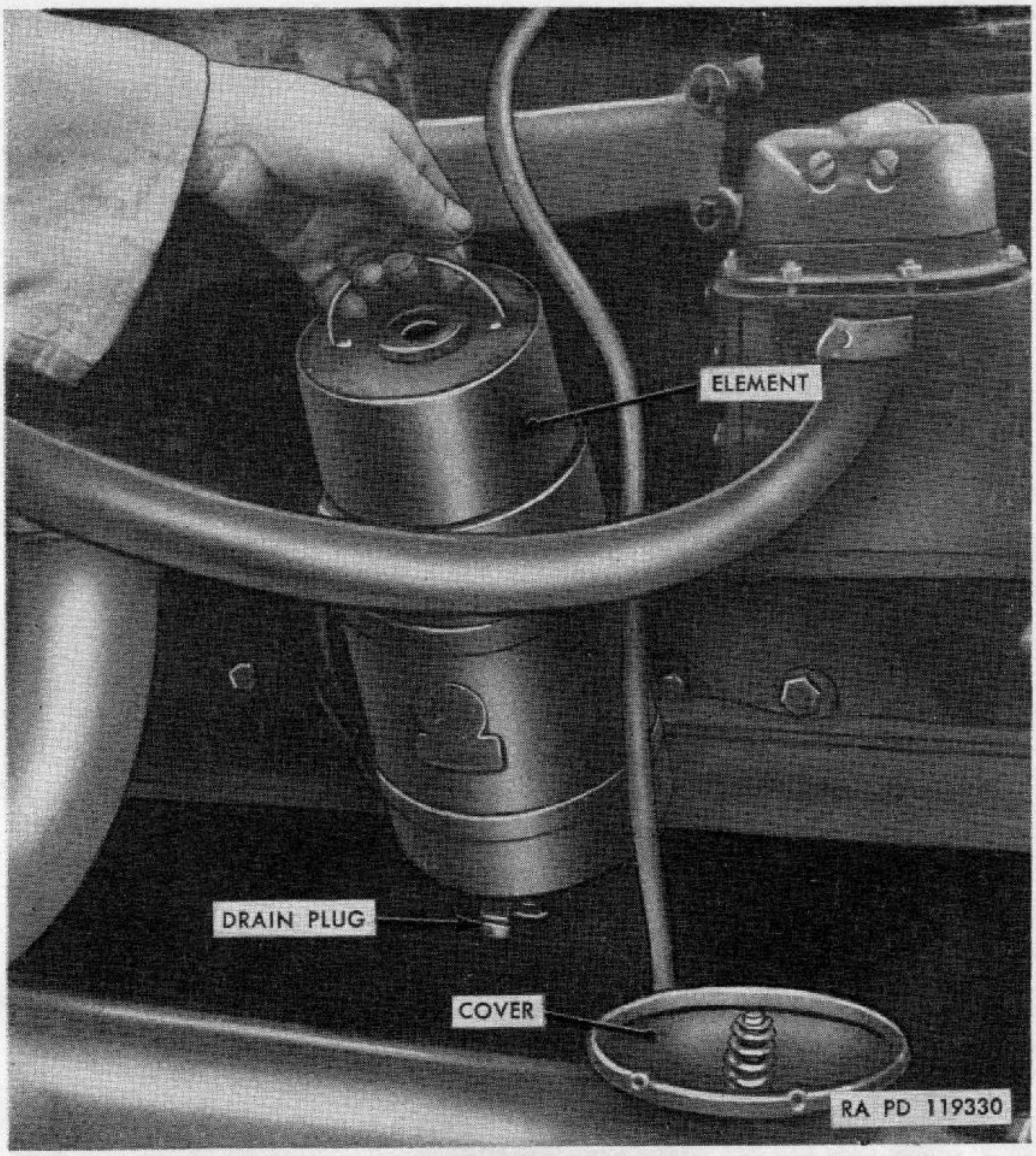

Figure 47. Removing oil-filter element.

(3) Install drain plug. Place spring in top of filter element and install cover with new gasket. Secure cover with bolt.

c. OIL-FILTER REMOVAL.

(1) Disconnect the oil-filter inlet and outlet lines from filter.

(2) Loosen nuts on two bracket tightening screws holding filter to mounting bracket. Loosen two bracket mounting screws on one side (fig. 46). Remove filter.

d. INSTALLATION.

(1) Position filter assembly in mounting bracket. Tighten bracket tightening screws and then tighten bracket mounting screws (fig. 46).

(2) Connect oil-filter inlet and outlet lines to filter.

95. Crankcase Breather
(fig. 48)

a. Removal. At every crankcase-oil change, the crankcase breather will be removed and cleaned.

(1) Remove four screws holding breather to body and lift cover and attached element from breather.

(2) Disconnect control wire from shut-off valve at rear of breather.

(3) The breather body is secured to the rocker-arm cover by a central screw. Back off this crew and remove breather body.

b. Cleaning. Wash all parts in dry-cleaning solvent or volatile mineral spirits.

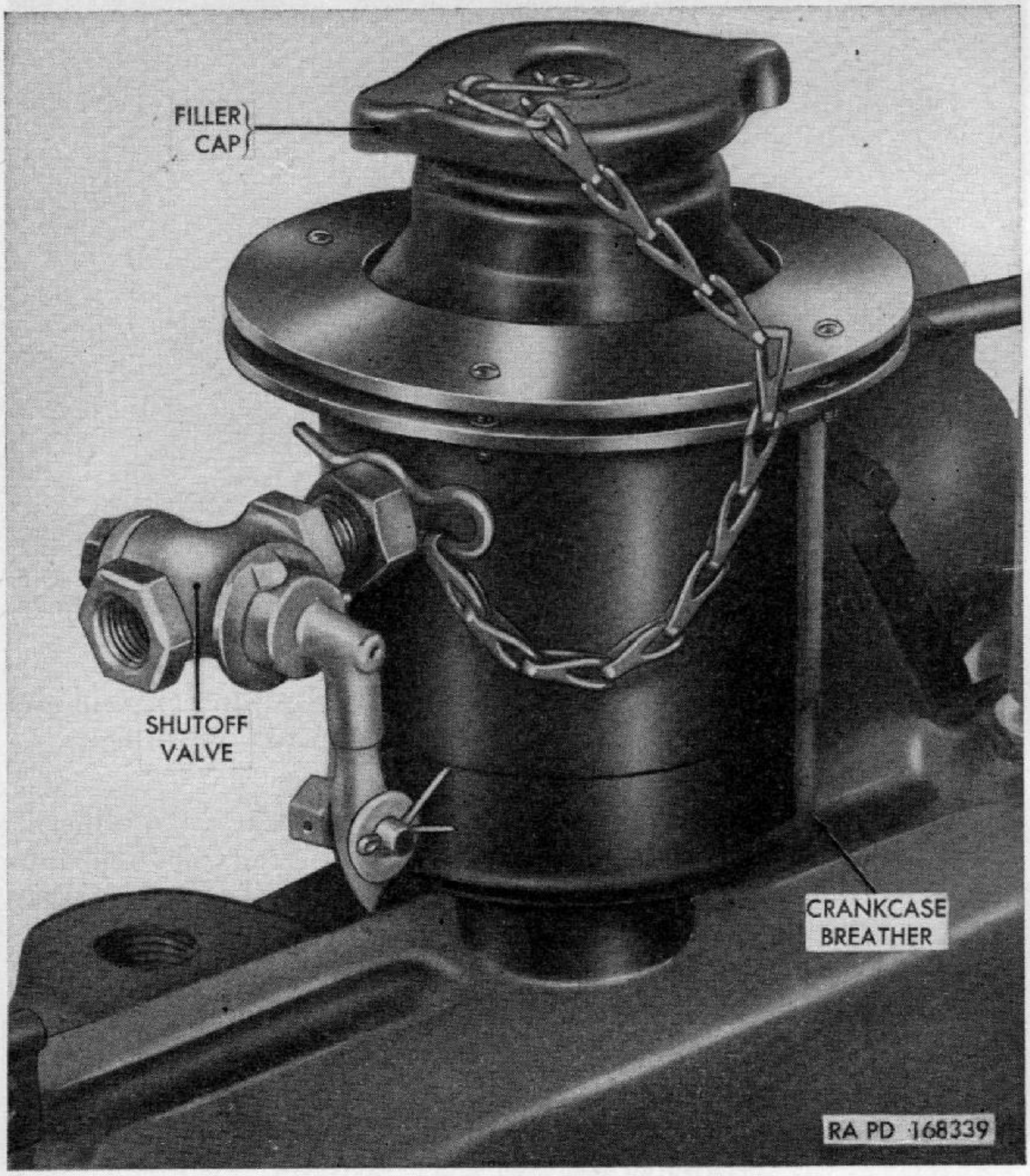

Figure 48. Crankcase breather.

c. INSTALLATION.

(1) Place the breather body in position on the valve-rocker-arm cover, with shut-off valve pointing directly to the rear.

(2) Insert the center holding screw and tighten securely.

(3) Connect control wire to shut-off valve at rear of breather.

(4) Fill the breather-body reservoir with engine oil (par. 56) to the level indicated.

(5) Dip the element in engine oil, install element, and secure breather cover with four screws.

Section VI. POWER PLANT REMOVAL AND INSTALLATION

96. Coordination with Ordnance Maintenance Unit

Replacement of the power plant with a new or rebuilt power plant is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

97. Removal

a. DESCRIPTION. The power plant, consisting of radiator, engine, engine accessories, clutch, and transmission, is removed as a unit. Removal of the power plant is best accomplished by two men, but one mechanic may perform all disconnect operations. Removal or replacement of clutch or transmission can be accomplished without removal of power plant but it will be generally found that replacement of these components will be facilitated if power plant is removed.

b. ACCESSIBILITY. The disconnect points in engine compartment (figs. 49 and 50) are readily accessible when the hood is raised to its extreme height and the left and right engine-compartment side panels are lowered.

c. PRELIMINARY INSTRUCTIONS. Release hold-down catches at each side and safety catch in center of front end of hood. Raise hood until it is supported by windshield frame and lock in raised position by means of left windshield-hood catch and hood-top-panel hook attached to cowl (fig. 153). Release handles at each end of left and right engine-compartment side panels and lower side panels until they rest on fenders. Open both compressed-air-reservoir drain cocks and leave open (figs. 145 and 146).

d. DISCONNECT POINTS WITH WINCH INSTALLED.

(1) *Remove brush guard.* Remove two bolts and nuts at bottom of brush guard from brush guard-to-frame brackets, one on

each side. Loosen two bolts at brush-guard braces, one on each side of radiator. Remove four nuts on outside vertical member of brush guard, two on each side, and remove brush guard.

(2) *Disconnect winch drive shaft.* Loosen socket-head set screw in top collar. Loosen set screw in drive shaft yoke on power-take-off output shaft four or five turns, and push yoke off power-take-off shaft. Wire or tie key in power-take-off shaft to prevent loss.

(3) *Disconnect power-take-off shift linkage.* Disconnect power-take-off shift linkage at power-take-off shifter shaft by pulling quick-disconnect pin part way out of yoke (figs. 87 and 88).

e. Disconnect Points without Winch Installed. Loosen two brush guard-to-frame-bracket bolts at bottom of brush guard, one on each side of radiator. Remove four nuts on outside vertical member of brush guard, two on each side, and swing brush guard to front and down to bumper.

f. Disconnect Points on M47 and M59.

(1) Steps *d* or *e* above apply to M47 and M59.

(2) Disconnect pump drive shaft, and the power-take-off shift rod.

g. Disconnect Points at Front of Engine. Remove radiator upper shield. Loosen two bolts holding radiator-upper shield to head light support bracket, one on each side, and remove radiator upper shield by pulling toward front.

Note. Radiator-upper shield has been eliminated on some trucks.

h. Remove Tunnel and Toeboard. Remove screws holding removable tunnel and toeboard to cab floor and cowl. Remove tunnel and toeboard.

i. Disconnect Points on Left Side of Engine (fig. 49).

(1) *Electrical connections.* Disengage conduit nut at generator with standard conduit-nut wrench 41–W–329–900 (fig. 83). Pull generator-to-regulator harness from generator and lay over steering column. Disconnect distributor primary cable from distributor (fig. 69), and the temperature-gage cable (fig. 49) from sending unit on water manifold, and place harness over top of regulator. Disconnect engine-to-dash-panel-bond strap from rear of engine (fig. 51).

(2) *Fuel lines.* Disconnect primer-pump-inlet line (fig. 49) at fuel-pump intake fitting. Disconnect main fuel line at fitting in front of engine rear support.

j. Disconnect Points on Right Side of Engine (fig. 50).

Caution: Make sure that air pressure is completely exhausted (*c* above) before performing (1) below.

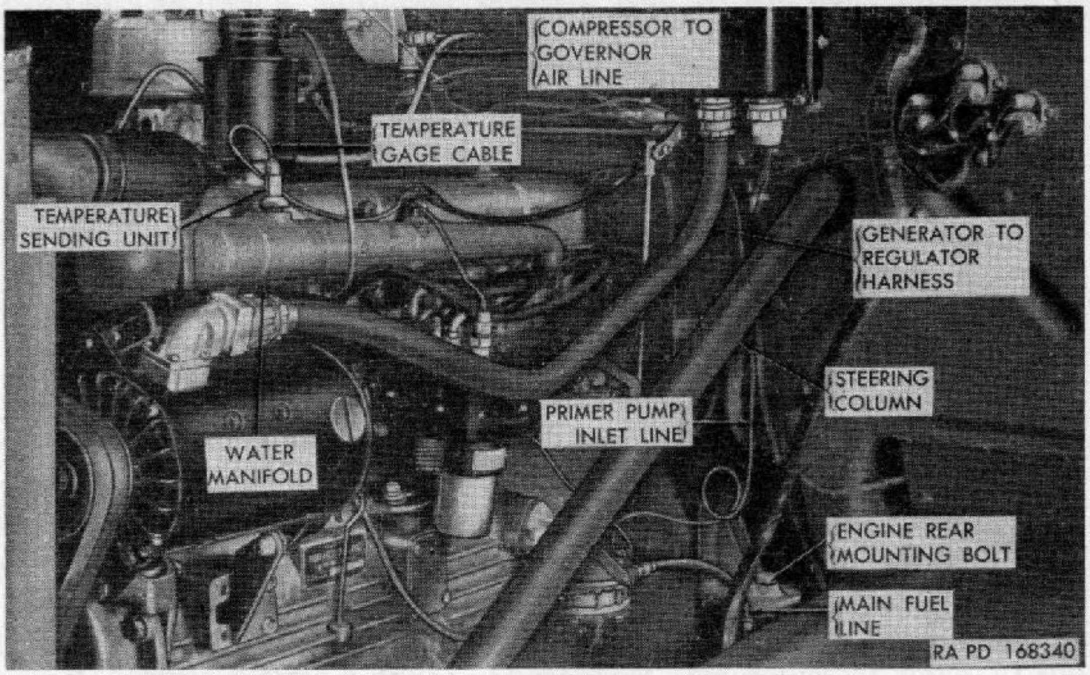

Figure 49. Disconnect points on left side of engine.

(1) *Pressure-air lines.* Disconnect compressor-to-governor air line from governor (fig. 49), and the compressor-to-reservoir line (fig. 50) at top rear of air compressor.

(2) *Air cleaner-to-compressor hose.* Loosen hose clamp and disconnect air cleaner-to-compressor hose at compressor air strainer.

(3) *Air cleaner-to-carburetor hose.* Disconnect air cleaner-to-carburetor hose at carburetor (fig. 38).

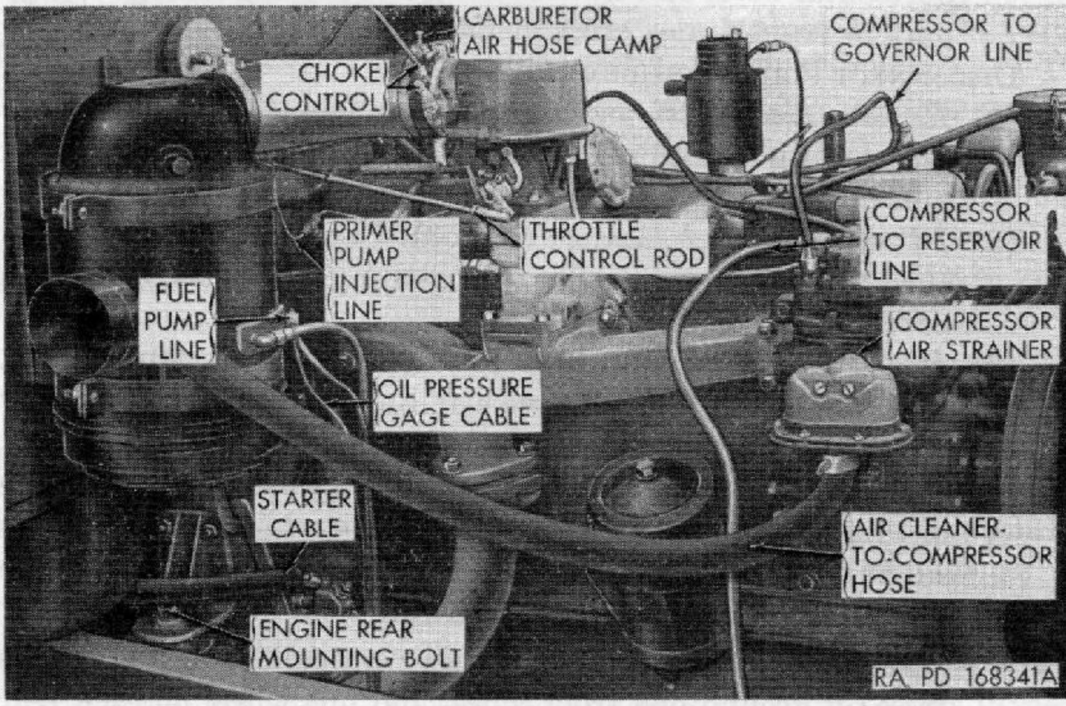

Figure 50. Disconnect points on right side of engine.

(4) *Oil-pressure-gage cable.* Disconnect oil-pressure-gage cable from sending unit on side of crankcase near rear of engine (fig. 50).

(5) *Starter cable.* Disconnect battery ground cable (7) at battery (figs. 121 and 122). Disconnect battery-to-starter cable at starter.

Caution: Be sure that battery ground cable (7) is disconnected before disconnecting starter cable.

(6) *Carburetor controls.* Remove lock nut and disconnect throttle control rod at throttle lever (fig. 55). Thread nut back on bolt to prevent loss. Disconnect choke control assembly at carburetor (fig. 55).

(7) *Disconnect ventilation lines.* Disconnect fuel pump, fuel tank, distributor, and hydraulic master cylinder ventilation lines from air cleaner (fig. 54). Disconnect control wire from shut-off valve at rear of crankcase breather (fig. 48).

(8) *Disconnect primer-pump-injection line.* Disconnect primer-pump-injection line (fig. 50) from fitting at rear of cylinder head.

k. DISCONNECT POINTS UNDER TRUCK (fig. 51).

(1) *Disconnect exhaust pipe.* Loosen three bolts at flanges between front and rear exhaust pipes. Turn flange and separate pipes. Remove and discard gasket.

(2) *Remove engine rear-mounting bolts.* Remove two engine rear-mounting bolts and nuts, one on each side (fig. 49).

(3) *Remove radiator- and engine-support bolts.* Remove two horizontal bolts and nuts holding radiator- and engine-support to front frame cross member (fig. 64).

l. DISCONNECT POINTS INSIDE OF CAB.

(1) *Remove transmission gearshift lever* (fig. 14). Lift rubber grommet on transmission gearshift lever and remove bolt and nut. Remove lever.

(2) *Disconnect clutch linkage* (fig. 53). Disconnect clutch linkage at clutch throw-out shaft by pulling quick-disconnect pin part way out of yoke.

(3) *Disconnect transfer-reverse-shift linkage* (figs. 90 and 91). Disconnect transfer reverse-shift linkage at transmission by pulling quick-disconnect pin part way out of yoke.

(4) *Disconnect transmission-to-transfer propeller shaft.* Before disconnecting any propeller shaft, ascertain if transfer is single sprag or double sprag. See figures 90 and 91. If single sprag, observe the following warning:

Warning: Before disconnecting propeller shafts, always raise off ground one front wheel and one wheel on each rear

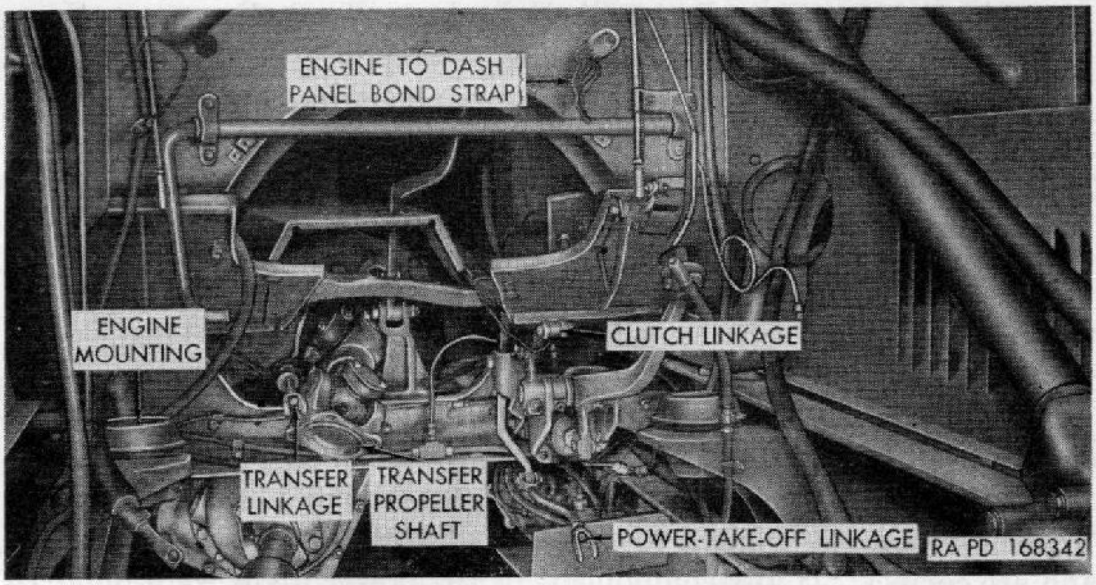

Figure 51. Disconnect points inside cab and under truck.

axle to relieve torsional strains. Failure to observe this warning may result in personal injury.

Remove four bolts and nuts from companion flanges at transmission end of shaft.

m. REMOVE POWER PLANT (fig. 52).

(1) *Install engine-and-transmission lifting sling.* Attach engine-and-transmission lifting sling 7950121 to hoist. Center hoist over power plant and attach lifting sling to lifting eyes.

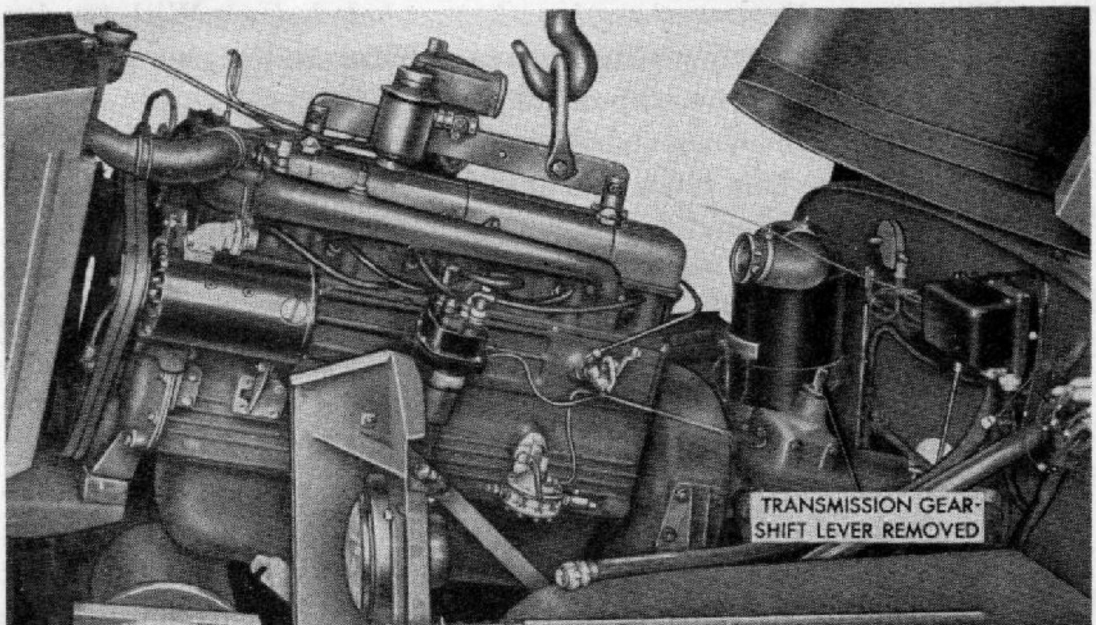

Figure 52. Removing power plant using lifting sling 7950121.

(2) *Hoist power plant.* Check to be sure all disconnects have been accomplished. Carefully lift power plant, using a series of short lifts, until radiator and engine support will clear. Continue to raise power plant slowly, and at same time pull power toward front (fig. 52). Check to see that all accessories and lines are clear as power plant is being moved upward and forward.

98. Installation

a. Preliminary Instructions. Prior to installation, check to be sure that all lines, cables, and parts are installed on power plant that were connected to and removed with it from the truck. If maintenance work was done on engine, be sure all adjustments affected are made and are correct. If any components of the power plant were removed and installed, check all connections and related parts to be sure that installations were accomplished correctly.

b. Procedure.

(1) *Install engine-and-transmission lifting sling* (fig. 52). Attach lifting sling 7950121 to lifting eyes.

(2) *Lift power plant into truck.* Hoist power plant to clear obstructions and center over truck. Lower and push power plant into engine compartment by series of short drops. Make sure that clearance is ample at all times. Do not rest power plant solidly on supports until (3) and (4) below are accomplished.

(3) *Aline radiator-and-engine support-bolt holes.* With tension on engine-lifting sling, aline radiator-and-engine support-bolt holes and insert bolts (fig. 64).

(4) *Aline engine-rear-mounting-bolt holes.* Aline engine-rear-mounting-bolt holes and insert bolts (fig. 49). Completely lower plant and tighten two radiator-and-engine support-bolts and two engine-rear-mounting bolts. Remove engine-lifting sling.

c. Connect Points on Right Side of Engine (fig. 50).

(1) *Connect compressor-to-reservoir line.* Connect compressor-to-reservoir line at top rear of air compressor (fig. 50).

(2) *Connect air cleaner-to-compressor hose.* Connect air cleaner-to-compressor hose at compressor air strainer (fig. 50).

(3) *Connect throttle control rod.* Remove safety nut from bolt in end of throttle control rod and insert bolt through throttle lever (fig. 55). Install nut and tighten.

(4) *Connect choke-control assembly.* Connect choke-control assembly at carburetor (fig. 55) and tighten set screws.

(5) *Connect air cleaner-to-carburetor hose.* Connect air cleaner-to-carburetor hose at carburetor (fig. 38).

(6) *Connect primer-pump-injection line.* Connect primer-pump-injection line to fitting at rear of cylinder head (fig. 50).

(7) *Connect pump ventilation lines.* Connect fuel pump, fuel tank, distributor, and hydraulic master cylinder ventilation lines at air cleaner (fig. 54). Connect control wire to shut-off valve at rear of crankcase breather (fig. 48).

(8) *Connect compressor-to-governor air line.* Connect compressor-to-governor air line (fig. 49) at governor.

(9) *Connect oil-pressure-gage cable.* Connect oil-pressure-gage cable (fig. 50) to sending unit at rear of engine.

(10) *Connect starter cable.* Connect battery-to-starter cable at starter.

Caution: Make sure battery ground cable (figs. 121 and 122) is disconnected from battery before connecting starter cable.

d. CONNECT POINTS ON LEFT SIDE OF ENGINE (fig. 49).

(1) *Connect main fuel line.* Connect flexible fuel line at fitting in front of rear engine support.

(2) *Connect primer-pump-inlet line.* Connect primer-pump-inlet line (fig. 49) at fuel-pump intake fitting.

(3) *Install engine-to-dash-panel-bond strap.* Install engine-to-dash-panel-bond strap at rear of engine (fig. 51).

(4) *Connect distributor primary cable.* Connect distributor primary cable at distributor (fig. 69). Install harness clamp to water manifold.

(5) *Connect temperature-gage cable.* Connect temperature-gage cable to temperature-gage sending unit on water manifold (fig. 49).

(6) *Connect generator-to-regulator harness.* Connect generator-to-regulator harness at generator using conduit-nut wrench 41–W–3249–900 (fig. 85).

e. CONNECT POINTS INSIDE CAB.

(1) *Connect transfer reverse-shift linkage* (figs. 90 and 91). Connect transfer reverse-shift linkage to transfer-reverse-shift lever on transmission by alining holes and pushing quick-disconnect pin in place.

(2) *Connect transmission-to-transfer propeller shaft.* Insert four bolts through holes in transmission companion flange and propeller-shaft companion flange and tighten.

(3) *Connect clutch linkage* (fig. 53). Connect clutch linkage at clutch throw-out shaft by alining holes and pushing quick-

disconnect pin in place. Check clutch pedal free travel (par. 103).

(4) *Install toeboard and tunnel.* Install removable toeboard and tunnel by inserting and tightening screws holding these items to cab and cowl.

(5) *Install transmission gearshift lever* (fig. 14). Insert transmission gearshift lever through rubber grommet. Lift rubber grommet and insert bolt and nut and tighten.

f. CONNECT POINTS UNDER TRUCK (fig. 51).

(1) *Connect exhaust pipe.* Install new gasket between flanges of front and rear exhaust pipes. Turn flange and tighten three bolts.

(2) *Close compressed-air-reservoir drain cocks.* Close both compressed-air-reservoir drain cocks (figs. 145 and 146).

g. CONNECT POINTS WITHOUT WINCH INSTALLED. Raise and push guard into position, making sure brush-guard braces engage the two bolts, one on each side of radiator. Tighten brush-guard-brace bolts. Install and tighten four nuts on outside vertical member of brush guard, two on each side. Tighten two brush-guard-to-frame-bracket bolts at bottom of brush guard, one on each side. Install radiator upper shield by inserting slots under heads of bolts at each side of radiator at top and tightening bolts.

h. CONNECT POINTS WITH WINCH INSTALLED.

(1) *Install brush guard.* Install brush guard by alining with holes in brush-guard-to-frame brackets. Insert two bolts, one on each side, and tighten. Make sure brush-guard braces engage the two bolts, one on each side of radiator, and tighten. Install and tighten four nuts on outside vertical member of brush guard, two on each side.

(2) *Install radiator-upper shield.* Install radiator-upper shield by inserting slots under heads of bolts at each side of radiator at top and tightening bolts.

Note. Radiator-upper shield has been eliminated on some trucks.

(3) *Connect winch drive shaft.* Connect winch drive shaft at power-take-off.

(4) *Connect power-take-off shift linkage* (figs 87 and 88). Connect power-take-off shift linkage at power-take-off shifter shaft by alining holes and pushing quick-disconnect pin in place.

i. CONNECTIONS ON M47 AND M59. Connect pump drive shaft to power-take-off, and connect shift rod to power-take-off.

j. CONNECT BATTERY GROUND CABLE (7) AND CHECK ENGINE OPERATION. Connect battery ground cable (7) at battery (figs. 121 and

122). Start engine (par. 41) and check operation to be sure it is in good running condition and that controls function properly.

k. Close Engine-Compartment Side Panels. Raise left and right engine-compartment side panels and secure by turning handles at each end.

l. Close Hood. Release hood-top-panel hook and lower hood. Latch in closed position with catches on each side of front end.

m. Record of Replacement. Make a record of the replacement on WD AGO Form 478, MWO and Major Unit Assembly Replacement Records and Organization Equipment File.

Section VII. ENGINE REMOVAL AND INSTALLATION

99. Coordination With Ordnance Maintenance Unit

Replacement of the engine with a new or rebuilt engine is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

100. Removal

a. General. Removal or replacement of the engine requires removal of the power plant.

b. Remove Power Plant. Refer to paragraph 97.

c. Remove Transmission. Refer to paragraph 135.

d. Remove Clutch. Refer to paragraph 105.

e. Remove Radiator (fig. 63). Drain cooling system (par. 121). Loosen clamp on radiator inlet and outlet hoses at radiator and pull both hoses free. Disconnect radiator stay rod from bracket at cylinder head. Disconnect two bond straps at bottom of radiator, one on each side. Remove two nuts, washers, and springs from radiator-and-engine support (fig. 64). Lift off radiator.

101. Installation

a. General. All cables, connections, parts, and accessories which were removed from the truck with the engine being replaced, and which were not furnished with the replacement engine, must be removed from engine being replaced and installed on the replacement engine before installation into the truck.

b. Install Radiator. Place radiator on radiator and engine support. Install springs, washers, and nuts on studs (fig. 64). Tighten nuts evenly and securely but do not tighten enough to completely compress springs. Connect two bond straps at bottom of radiator, one on each side. Connect radiator stay rod to bracket on top of cylinder head. Connect inlet and outlet hoses at radiator. Fill cooling system (par. 121).

c. INSTALL CLUTCH. Refer to paragraph 105.

d. INSTALL TRANSMISSION. Refer to paragraph 135.

e. INSTALL POWER PLANT. Refer to paragraph 98.

f. RECORD OF REPLACEMENT. Make a record of the replacement on WD AGO Form 478.

Section VIII. CLUTCH

102. Description

The clutch consists of two separate assemblies—the clutch disk assembly and the clutch cover-and-pressure-plate assembly. The driven disk transfers engine power from flywheel to transmission. The clutch cover-and-pressure plate provide attachment or release of the driven disk to the flywheel. The clutch is always in "engaged" position unless purposely "disengaged" by the driver.

103. Adjustment

a. ADJUSTMENT CHECK. The clutch pedal must have a movement or free travel of at least 1¼ inch before the clutch starts to disengage. Since this check is very sensitive, the free travel of the pedal must be checked with hand on clutch pedal and not with foot.

b. ADJUSTMENT (fig. 53). If clutch-pedal free travel is less than 1¼ inch, loosen lock nut at adjustable yoke on clutch control rod assembly, pull out quick detachable pin, and turn yoke to give proper clutch-pedal free travel. After adjustment is made, push in quick detachable pin and tighten lock nut firmly.

104. Controls and Linkage

(fig. 53)

a. GENERAL. Clutch pedal is connected to clutch throw-out shaft in clutch housing through the linkage (fig. 53).

b. REMOVAL (fig. 53). Disconnect clutch-pedal return spring. Loosen lock nut at adjustable yoke on clutch control rod assembly. Disconnect control rod assembly at clutch throw-out shaft by pulling pin part way out of yoke. Disconnect control rod assembly from clutch control lever by removing safety nut and bolt and remove assembly. Remove clutch pedal from pedal lever. Loosen clamp bolt in clutch-pedal lever and pull lever off clutch-and-brake-lever shaft. Loosen clamp bolt in clutch control lever and remove lever.

c. INSTALLATION (fig. 53). Place key in clutch-and-brake-lever shaft and push clutch-pedal lever on shaft. Tighten clamp bolt. Raise end of lever through toeboard and install clutch pedal. Place key in inner end of shaft, install clutch control lever and tighten clamp bolt. Position clutch control rod assembly on control lever and secure with bolt and safety nut. Connect other end at clutch throw-out shaft by alining holes and pushing quick-disconnect pin in place. Connect clutch-pedal return spring. Adjust clutch-pedal free travel (par. 103).

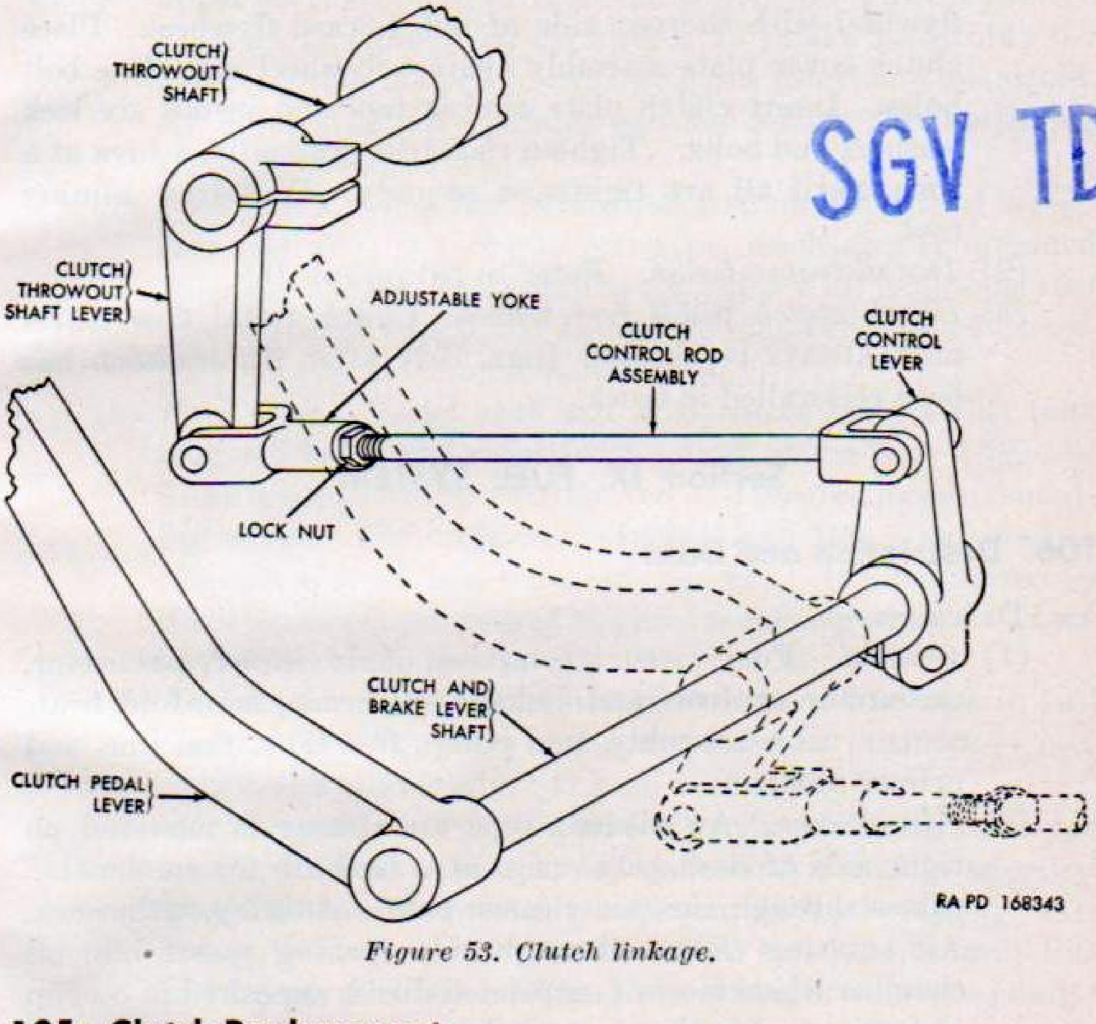

Figure 53. Clutch linkage.

105. Clutch Replacement

a. COORDINATION WITH ORDNANCE MAINTENANCE UNIT. Replacement of the clutch with a new or rebuilt clutch is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

b. Removal. Removal or replacement of the clutch requires the prior removal of transmission.

(1) *Remove transmission.* Refer to paragraph 135.

(2) *Remove clutch.* The clutch release bearing assembly is accessible when the transmission has been removed. Remove six bolts and lock washers holding clutch cover plate assembly to flywheel and remove cover plate assembly. Remove clutch driven disk assembly.

c. Installation.

(1) *Install clutch.* Place clutch driven disk assembly against flywheel with shortest side of hub toward flywheel. Place clutch cover plate assembly against flywheel and aline bolt holes. Insert clutch-plate alining tool and install six lock washers and bolts. Tighten each bolt gradually, a turn at a time, until all are tightened securely. Withdraw alining tool.

(2) *Install transmission.* Refer to paragraph 135.

(3) *Check clutch pedal free travel.* Clutch pedal free travel must always be checked (par. 103) after transmission has been reinstalled in truck.

Section IX. FUEL SYSTEM

106. Description and Data

a. Description.

(1) *General.* Fuel system is composed of air cleaner, carburetor, carburetor controls and linkage, governor, manifold heat-control valve assembly, fuel pump, fuel tank, fuel line, and primer pump.

(2) *Air cleaner.* An oil-bath-type air cleaner is mounted on right side of dash panel (fig. 54). All air for combustion passes through this air cleaner before entering carburetor. Air entering cleaner through side opening passes into oil chamber where most of suspended dirt is deposited in oil cup at bottom. Air then passes through an oil-saturated mesh and out to carburetor. Ventilation lines from fuel pump, distributor, crankcase, fuel tank, master cylinder, and air hydraulic cylinder are connected to air cleaner.

(3) *Carburetor.* A double-venturi, down-draft carburetor (fig. 56) is mounted on manifold heat-control valve assembly. This carburetor, with its governor control, is designed to maintain proper fuel mixture under all operating conditions.

(4) *Carburetor controls and linkage* (fig. 55). Carburetor controls consist of choke control assembly, throttle control, and accelerator pedal and linkage.

(5) *Carburetor governor.* Carburetor governor consists of two assemblies; a diaphragm-operated unit connected to throttle valve, and a governor-valve unit mounted on front of timing gear cover (fig. 57).

(6) *Manifold heat-control valve.* A manifold heat-control valve assembly (fig. 43) is mounted on exhaust manifold. The upper portion of this valve assembly provides a direct passage for fuel mixture from carburetor to intake manifold; the lower portion is open to exhaust gases in exhaust manifold. An adjustable valve permits seasonal setting for preheating fuel intake (par. 111).

(7) *Fuel pump.* The fuel pump, mounted on left side of crankcase (fig. 59), is a diaphragm type, mechanically operated from camshaft. The pump is equipped with hand-operated priming lever which may be used to pump fuel into carburetor whenever carburetor bowl is empty.

(8) *Fuel tank.* Model M34 and M36 trucks have a fuel tank mounted below the right-front corner of the body (fig. 60). Tank is supported by two brackets and secured by two mounting straps. Fuel tank on model M47 and M59 is mounted on left side of truck below the cab (fig. 61). It is supported by three brackets and secured by three mounting straps. Tanks are vented to air cleaner (fig. 54).

(9) *Fuel lines.* A metal fuel line extends from fuel tank to fuel pump. This line is covered with protective loom where necessary, and is secured in position with clips.

(10) *Primer pump.* Primer pump is a cylinder-and-piston-type pump, mounted on instrument panel and manually operated from cab by the primer pump control knob (Q, fig. 14). Pump draws fuel through a line from fuel-pump supply line and injects fuel into a fitting at rear-right side of cylinder head.

b. DATA.

Air cleaner:

Make -- Donaldson

Model number ---------------------------------- 9 "E"

Carburetor:

Make -- Holley

Model number ---------------------------------- 885FFG

Carburetor governor:

Make -- Holley

Model number ---------------------------------- 1174

Carburetor controls:

Make ---------- Delco-Remy

Fuel pump:

Make ---------- AC

Model number ---------- Series BF

Fuel tank:

Make ---------- Michiana Products Corp.

Model number:

M34 and M36 ---------- {D49–8687, 9633}

M47 and M59 ---------- D9530

Primer pump:

Make ---------- Dole Valve

Model number ---------- Reo 652–H2

107. Air Cleaner

(fig. 54)

a. SERVICING. To renew oil bath, support oil cup and loosen thumb screw on cup clamp to release cup. Lower cup to clean air cleaner; lift out and empty. Clean cup with dry-cleaning solvent or volatile mineral spirits and refill with engine oil to level indicated. Install cup and tighten clamp.

b. REMOVAL.

(1) Support oil cup and loosen thumb screw in cup clamp until cup can be removed from cleaner.

(2) Detach air cleaner-to-carburetor hose, air cleaner-to-compressor hose, and ventilation lines.

(3) Remove screws from mounting bands and spread bands to permit removal of air cleaner.

c. INSTALLATION.

(1) Place air-cleaner body in position within mounting bands; position it so that air intake port on side faces outward at right angles to truck side. Install clamping screws and tighten.

(2) Slip air-cleaner-to-carburetor hose on air-cleaner outlet and tighten hose clamp.

(3) Connect ventilation lines. Two lines connect to one fitting, crankcase, and fuel tank. One line from master cylinder and hydraulic cylinder to side elbow, and one line distributor to top of air cleaner (fig. 148). Connect air cleaner-to-compressor hose and tighten hose clamp.

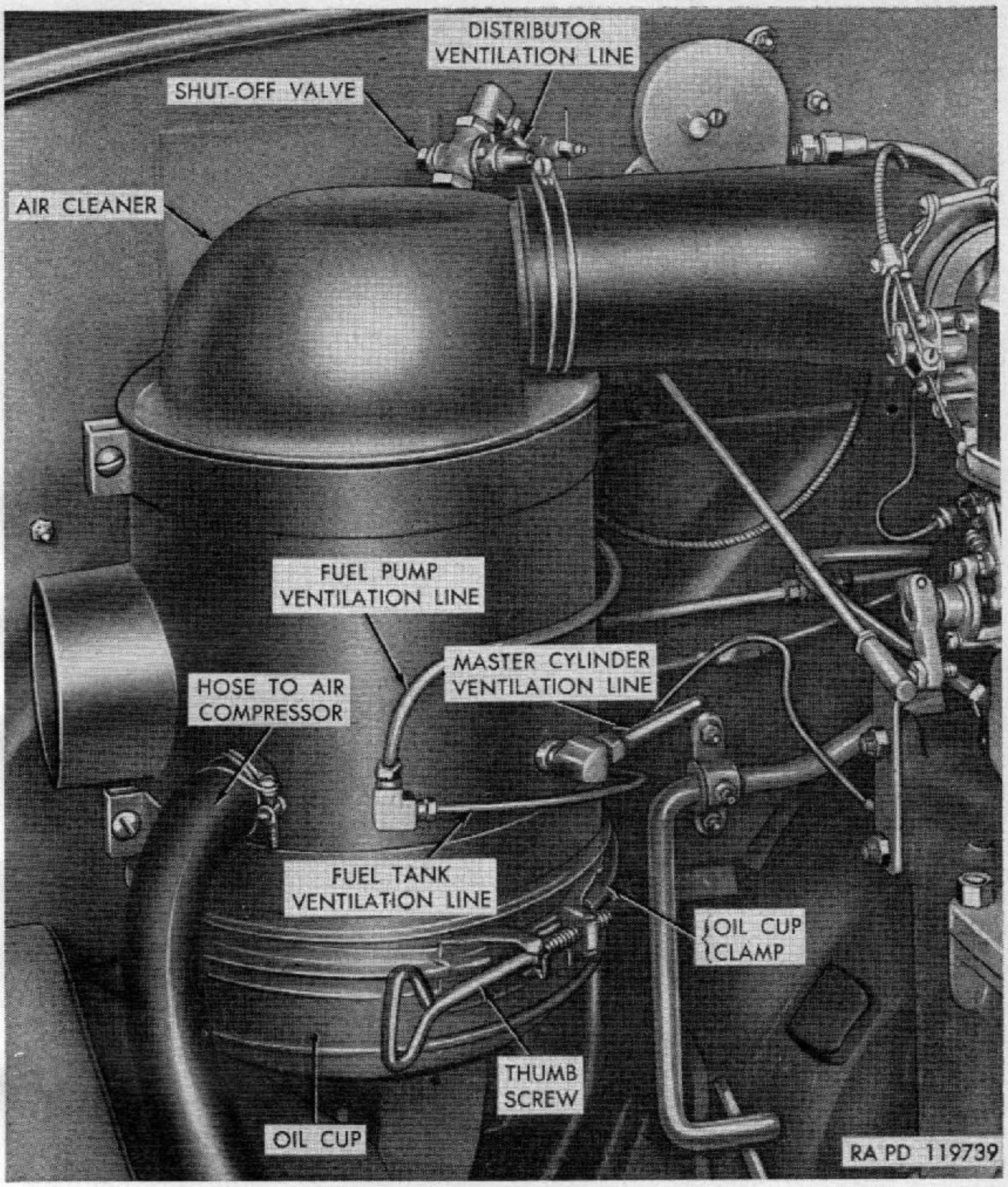

Figure 54. Servicing air cleaner.

(4) Fill air-cleaner cup with engine oil to level indicated. Position it under air cleaner, and raise to contact with air-cleaner body. Support cup and tighten clamp.

108. Carburetor

a. ADJUSTMENT (fig. 55).

(1) The idle adjustment should be set for highest and steadiest vacuum reading or the smoothest running and maximum idle speed. When the engine is at normal operating temperature, set idle speed at about 450 rpm by adjusting throttle adjusting screw.

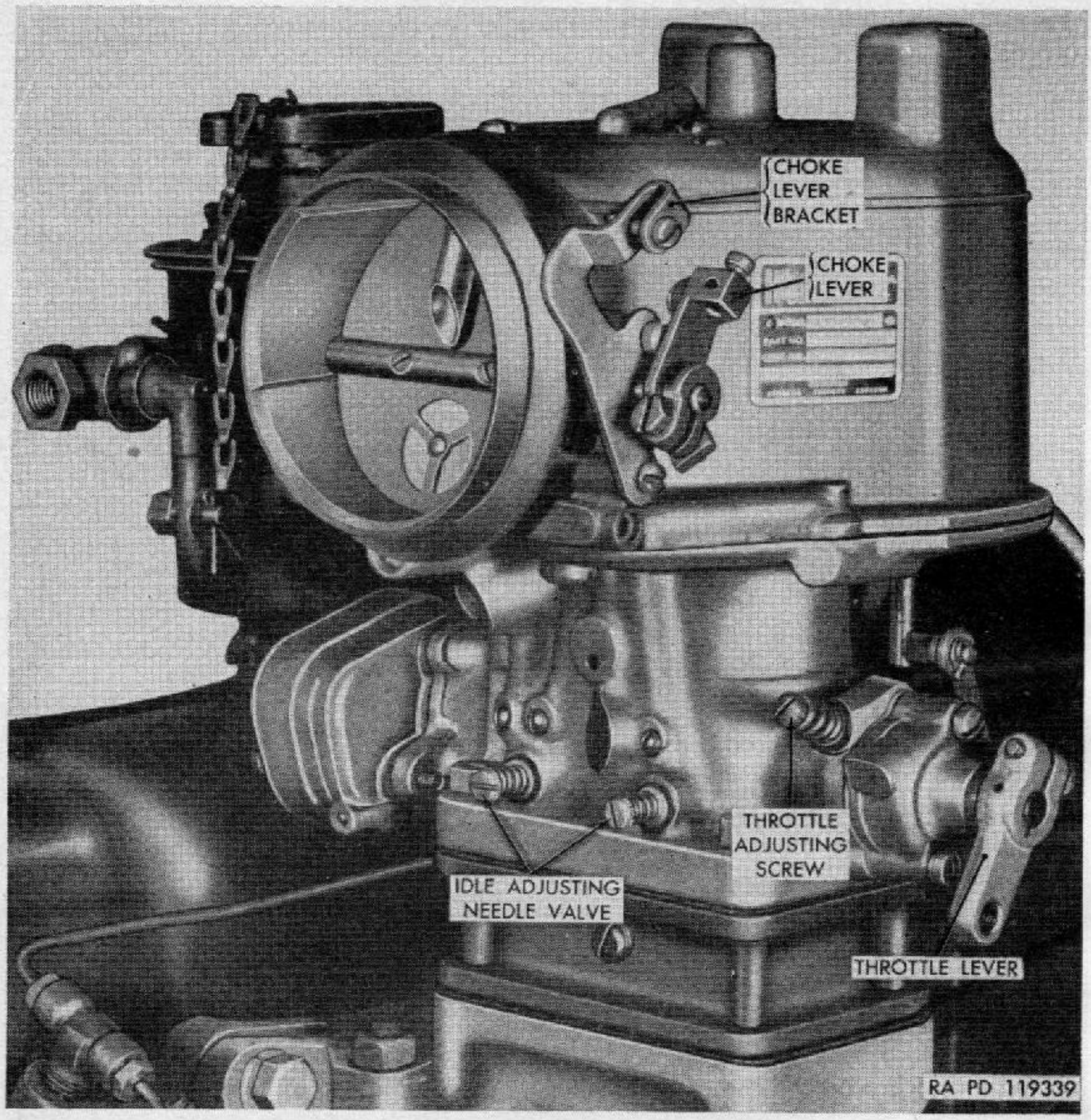

Figure 55. Carburetor idle adjustments.

(2) To obtain a proper mixture, turn one carburetor-idle-adjusting needle valve clockwise until engine revolutions per minute drops off. Then turn needle valve counterclockwise, counting the turns until engine revolutions per minute drops off again. Midway between these two points the needle valve should be set to give the proper mixture.

(3) Repeat the process on other needle valve. It may be necessary to repeat adjustment of both needle valves to get a proper mixture.

b. Removal (fig. 56).

(1) Loosen hose clamp holding air cleaner-to-carburetor hose to carburetor, until hose can be separated from carburetor.

(2) Disconnect throttle control rod from carburetor throttle lever, and choke control assembly from carburetor (fig. 55).

(3) Disconnect fuel supply line at carburetor, and the air supply line and air bleeder line (fig. 57) at carburetor.

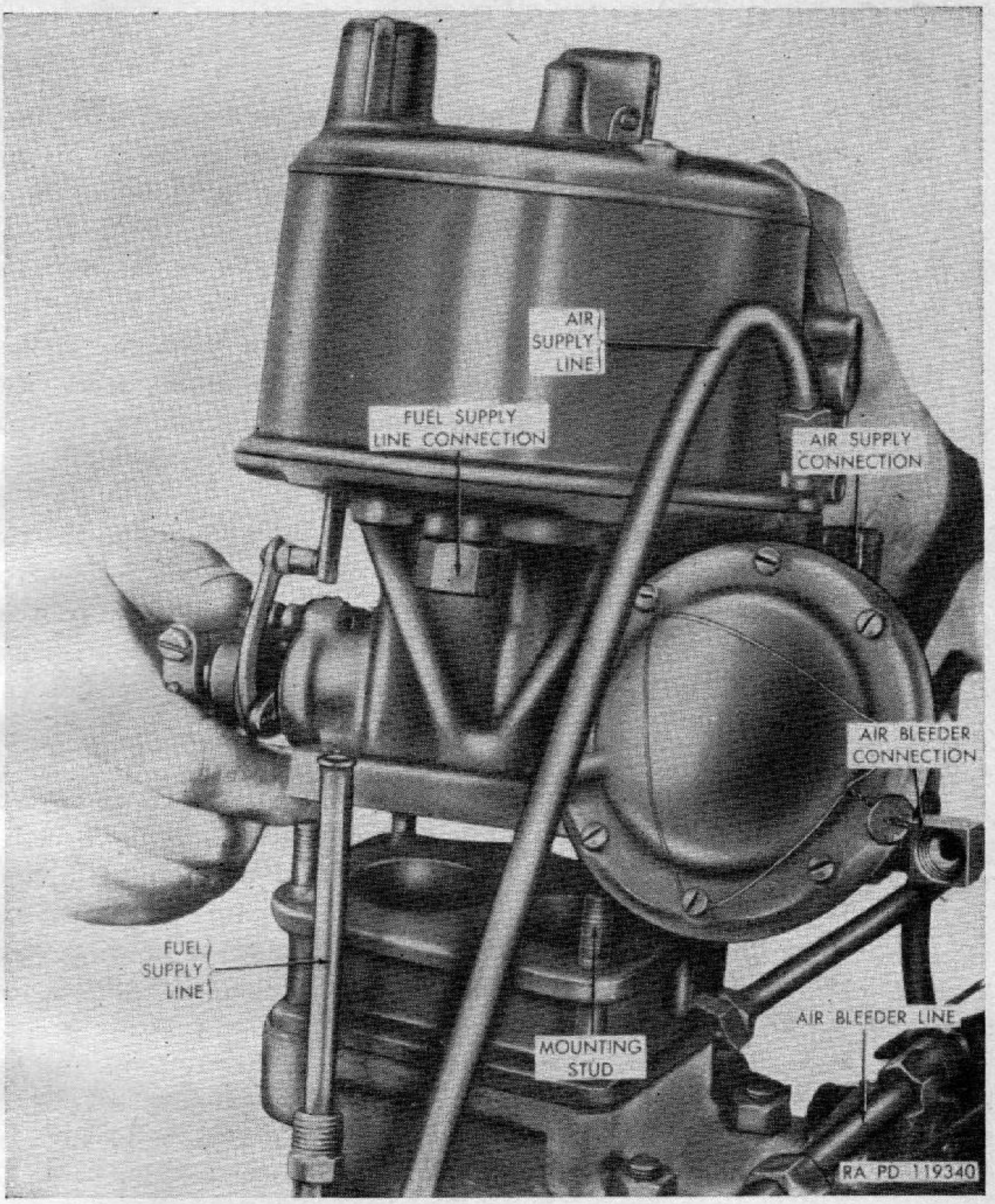

Figure 56. Removing carburetor

(4) Remove nuts from studs through carburetor base. Remove carburetor and discard gasket.

c. INSTALLATION (fig. 56).

(1) Place a new gasket on carburetor mounting, install carburetor and secure with nuts.

(2) Connect carburetor air cleaner-to-carburetor hose at carburetor and tighten hose clamp.

(3) Connect air supply line and air bleeder line to carburetor governor (fig. 57), and fuel supply line to carburetor.

(4) Install choke control assembly (fig. 55), and connect throttle control rod to throttle lever.

109. Carburetor Controls and Linkage

(*a*) Choke.

(1) *Adjustment.* Choke control is in proper adjustment when choke-valve plate is wide open with control knob on instrument panel (T, fig. 14) pushed in. To adjust, loosen clamping screw in choke-valve-plate lever (fig. 55). With choke-control knob pushed in, tighten clamp screw on control wire when choke-valve plate is fully open.

(2) *Removal.* Loosen clamp screws in choke lever and choke-lever bracket (fig. 55) and pull control assembly free. Remove nut, on inside of instrument panel, holding control assembly to panel, and pull choke control assembly out through panel.

(3) *Installation.* Insert choke control assembly through instrument panel and install nut and lock washer holding control ment panel an dinstall nut and lock washer holding control trol knob is horizontal, and tighten nut. Pass control assembly through dash panel and secure to choke-lever bracket and choke lever (fig. 55).

b. Throttle Control.

(1) *Adjustment.* Throttle control assembly is in proper adjustment if throttle return spring returns carburetor-throttle-operating-shaft lever to idling position when throttle control knob (BB, fig. 14) on instrument panel is pushed in. To adjust assembly, loosen locking connector holding control wire to carburetor-control link. See that carburetor throttle lever (fig. 55) is in idle position and tighten locking connection against the clip attached to carburetor link.

(2) *Removal.* Removal locking connector holding control to carburetor control link. Loosen safety nut clamping assembly in special bolt and pull assembly from dash panel. Remove nut and lock washer holding throttle knob to instrument panel and pull assembly out.

(3) *Installation.* Insert control assembly through instrument panel and install lock washer and nut holding assembly to panel. Position knob with lettering vertical and tighten assembly. Insert free end of assembly in special bolt in dash panel and tighten safety nut. Adjust locking connection as in (1) above.

110. Engine Governor

a. General. The engine governor is a mechanism to limit engine speed to a maximum specified limit. The governor consists of two assemblies, carburetor governor mounted on left side of carburetor (fig. 56), and a governor valve mounted on timing cover (fig. 57). This valve is connected to carburetor governor by two air lines. To prevent unauthorized tampering with governor, locking wires are installed and sealed at all vital points: adjusting screw on valve, nut at each end of bleeder line, governor cover screws, and diaphragm cover screws. Normal allocation permits breaking of seals by third echelon only, and this will be observed for all governor adjustment and replacement. However, normal removal of carburetor, replacement of cylinder head, or cylinder head gasket, removal of exhaust manifold, or the heat valve requires breaking of seal on bleeder line nut at carburetor. Removal of throttle stop at end of run-in period (par. 11 *o*) requires breaking of seal on carburetor governor cover screws. These two seals may be broken and replaced by organizational mechanics when authorized.

b. Adjustment. No adjustment is permitted. The necessity for adjustment may be discovered by the use of a tachometer. On early models of the M34 truck, engine speed was checked by a mechanical tachometer. To use this instructment remove tachometer-drive-opening cover on left side of crankcase below distributor, insert the tachometer adapter and secure (fig. 58). A recently developed electrical tachometer 18–T–231 is now being used for this purpose. To use, the small plug in distributor cover (fig. 69) is removed, a distributor primary adapter 17–A–1375–50 is installed in cover, one terminal of tachometer is connected to adapter to make contact at coil terminal, and the other terminal is grounded. Check engine speed with throttle

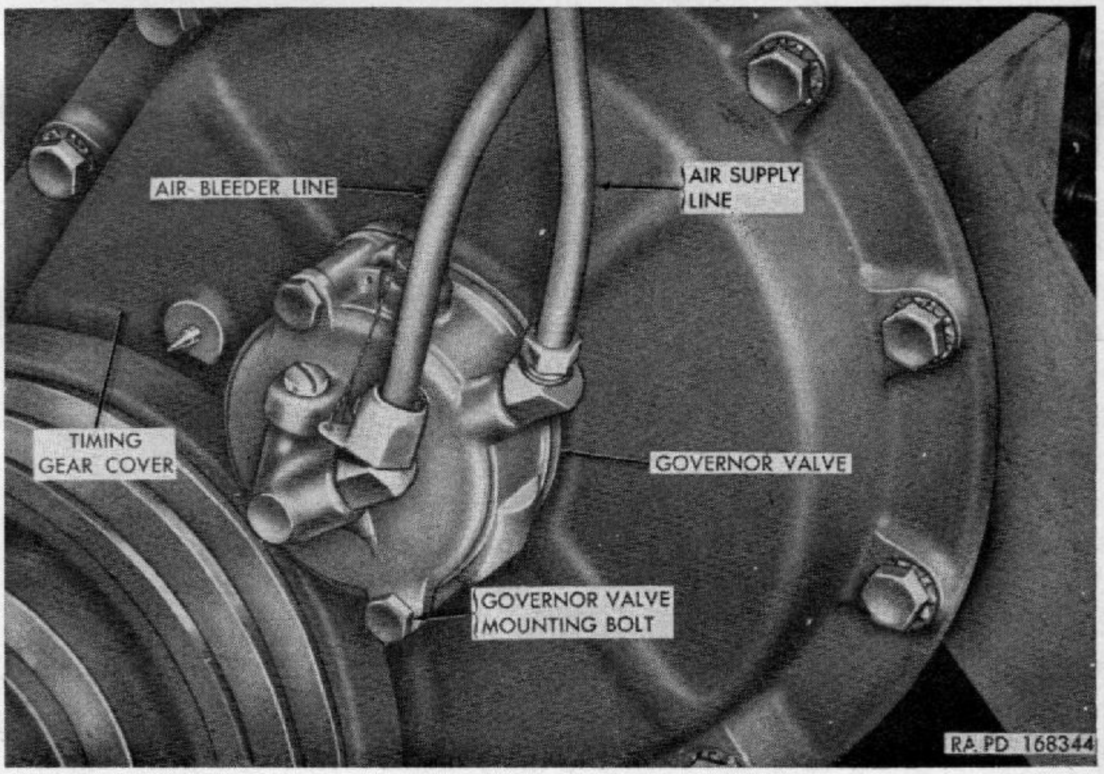

Figure 57. Carburetor governor valve.

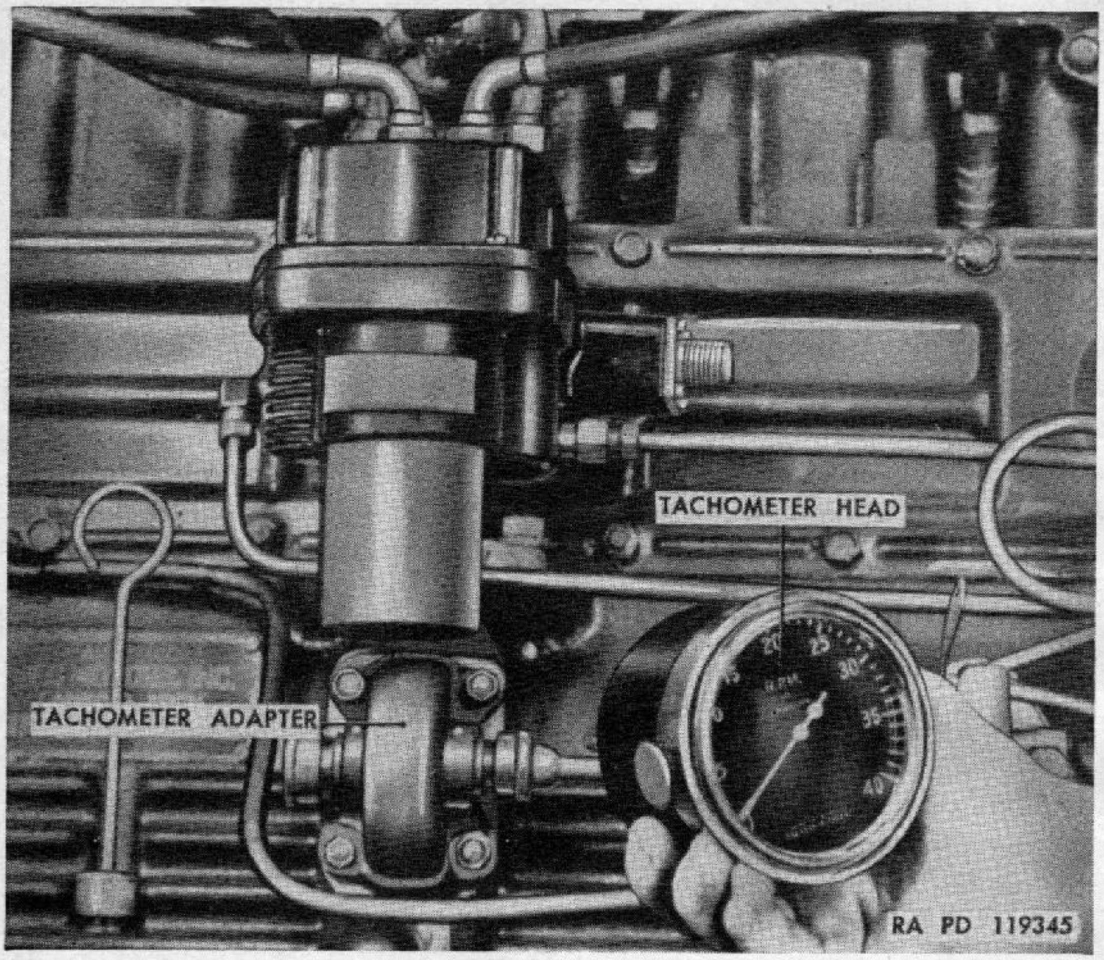

Figure 58. Using tachometer to check engine revolutions per minute.

open. If the governed speed is not 3,550 to 3,600 rpm (no load), refer adjustment of governor valve to higher echelon.

111. Manifold Heat-Control Valve

a. General. The manifold heat-control valve (fig. 43) has two extreme positions—on and off. A medium setting is obtained by moving the sector midway between the two extreme positions. When sector is moved downward, the valve is closed. Loosen lock nut and move sector to obtain desired setting of valve. Tighten lock nut after adjusting.

b. Summer Operation. When atmospheric temperature is consistently above 60° F., adjust valve to off position by moving sector down.

c. Winter Operation. When atmospheric temperature is consistently below 30° F., adjust valve to on position by moving sector up.

d. Spring and Fall Operation. For atmospheric temperature of between 30° and 60° F., adjust valve to medium position by positioning sector midway between the two extreme positions.

Note. Medium position may be used for heavy loads, high speeds, or extensive use of low-speed gears when atmospheric temperature is below 30° F.

It is not necessary to change adjustment every time temperature or operating conditions change. Valve should be set for average conditions consistent with atmospheric temperature.

e. Gasket Replacement.

(1) *Removal.* Remove carburetor (par. 108). Disconnect shut-off-valve control wire and ventilation line from shut-off valve at rear of manifold heat-control valve assembly. Remove two cap screws at top of heat-control valve flange. Remove two nuts and clamps from bottom of flange. Remove four nuts from studs holding valve assembly to exhaust manifold. Lift valve assembly from manifold and discard gasket.

(2) *Installation.* Place valve assembly on exhaust manifold using new gasket. Secure with four nuts on the manifold studs. Install clamps holding exhaust-manifold and heat-control valve flanges and secure with nuts. Install two cap screws in upper holes of heat-control valve flange. Install carburetor (par. 108).

112. Fuel Pump

(fig. 59)

a. Testing. Condition of the fuel pump can be determined by two tests—pressure and capacity. These tests should be made before replacing the fuel pump. Capacity test is made only if pressure is within specification.

(1) *Pressure test.* Disconnect fuel pump-to-carburetor line (fig. 59) at fuel pump and install pressure gage on outlet side of fuel pump. Fuel-pump pressure should be between 4 and 5 psi with the engine operating at 1,600 to 1,800 rpm. If pressure is within specification, proceed with capacity test.

(2) *Capacity test.* Disconnect fuel pump-to-carburetor line (fig. 59) at carburetor and attach a suitable bleeder hose to fuel-pump line. With outlet of bleeder hose at carburetor level or slightly higher, flow of fuel should be at least one pint in 45 seconds of operation of engine at idling speed (450 rpm).

b. Removal (fig. 59). Disconnect main fuel supply line, fuel-pump ventilation line, and fuel pump-to-carburetor line at fuel pump. Remove two cap screws holding fuel pump to engine. Remove fuel pump and discard gasket.

c. Installation (fig. 59). Place pump on engine, using a new gasket. Install two cap screws. Connect main fuel line, fuel pump ventilation line, and fuel pump-to-carburetor line at fuel pump.

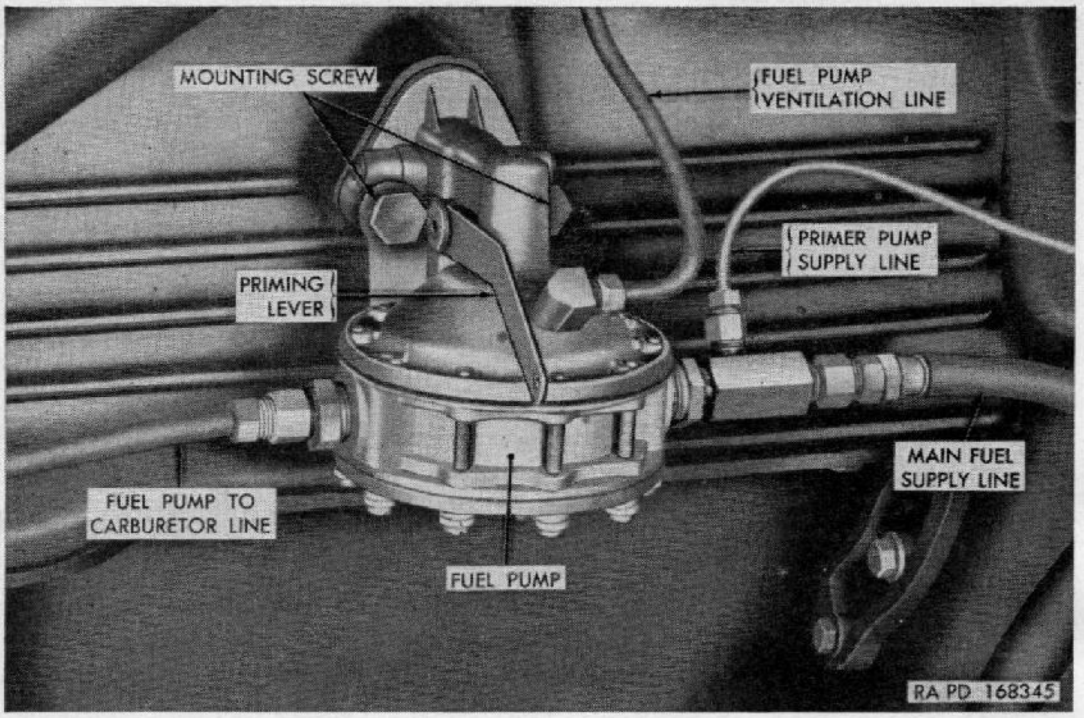

Figure 59. Fuel pump—installed.

113. Fuel Tank

(figs. 60 and 61)

a. Filling. Wipe off dirt around filler opening and cap and *slowly* remove fuel tank filler cap.

Warning: Pressure built up in the fuel tank exposes personnel to a shower of gasoline from the filler pipe neck, with the danger of possible bodily injury or fire hazard, or both, from the pressurized gasoline when the fuel tank filler pipe cap is removed. Therefore, the filler cap should be turned slowly and carefully, removing it only partially at first to relieve pressure build-up before the cap is entirely removed. Be sure that the hose nozzle or container is clean and that the nozzle or container contacts the filler neck to carry off static electricity.

Fill tank until level is approximately two inches below top of filler neck.

Caution: Do not fill tank completely to the top of the filler neck because space for expansion must be provided. Leave at least two inches of space below the top of the filler neck. Inspect filler pipe cap gasket to be sure it provides a tight seal.

Install fuel tank filler pipe cap.

b. Warning Decalcomania on Cap. Late production vehicles are equipped with fuel tank filler pipe caps with decalcomanias reading "PRESSURIZED, OPEN SLOWLY." These decalcomanias are available for issue through regular supply channels under Ordnance

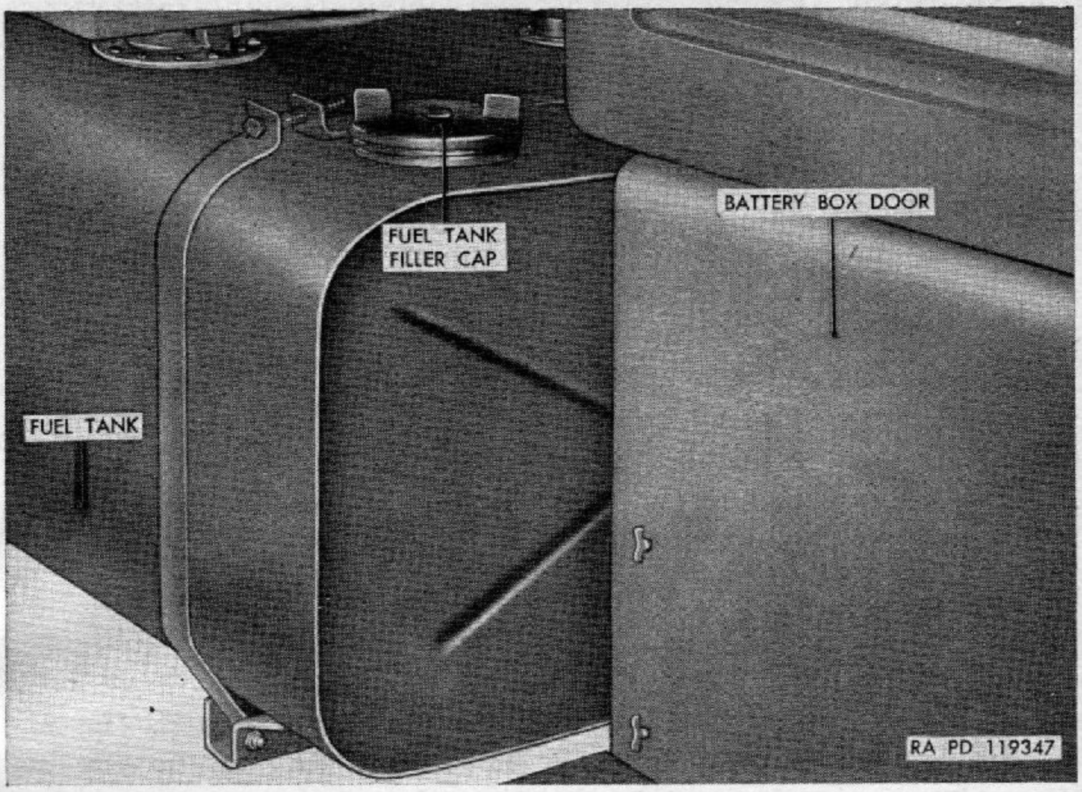

Figure 60. Fuel tank—installed—M34 and M36.

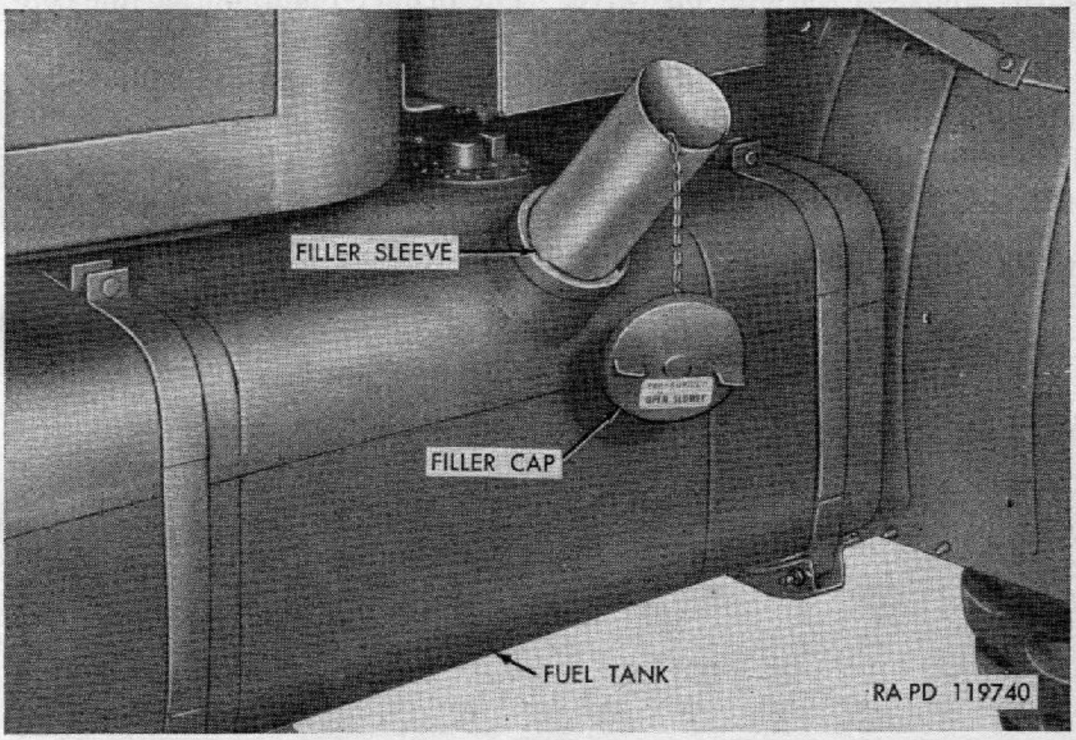

Fig 61. Fuel tank—installed—M47 and M59.

Stock No. G742–7368616, Ordnance Part No. 7368616. Requisition decalcomanias and apply them to all caps that are not marked.

Note. Later production vehicles will be equipped with a new type fuel tank filler neck with a two-step action similar to the pressurized radiator cap. This will provide a means of relieving built-up pressure when the cap is being removed.

c. Draining. Provide suitable clean containers with a total capacity of 50 gallons. Position container under drain opening in bottom of fuel tank and remove drain plug. After draining, install drain plug.

d. Removal. Drain fuel tank (*b* above). Loosen nuts at bottom end of holding straps. Disconnect fuel-gage-sending-unit cable, fuel supply line, and ventilation line from top of fuel tank (fig. 62). Remove bolts at top of holding straps, swing holding straps down, and remove tank.

e. Installation. Position fuel tank on supports. Place holding straps in position and secure with bolts and safety nuts at top, one in each strap. Connect fuel-gage-sending unit cable, main fuel line, and ventilation line at top of fuel tank (fig. 62). Tighten safety nuts at bottom end of holding straps.

114. Fuel Lines

(fig. 62)

a. Fuel lines are provided to supply fuel from fuel pump to the carburetor. A primer pump (par. 17) is installed with the necessary fuel lines. The primer-pump inlet line is connected to the fuel-tank fuel outlet line near the shut-off valve. The primer-pump outlet line connects to injection line at right rear of cylinder head.

b. When replacing any lines or fittings, coat all threaded elbow and tee connections with liquid-type gasket cement before installation. Be certain all connections are tight. Make sure all lines are securely mounted with clips where provided.

115. Primer Pump

a. Removal. Disconnect inlet- and outlet-fuel lines from primer-pump body. Unscrew packing nut from pump body and pull plunger

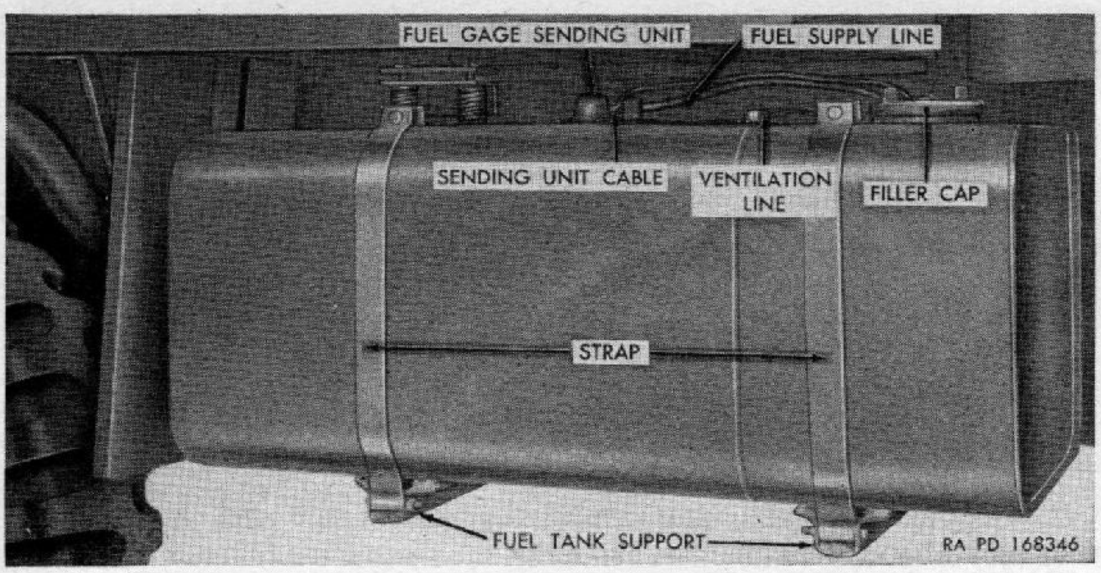

Figure 62. Fuel tank lines.

from pump. Remove lock nut from primer body and withdraw primer body from mounting bracket.

b. Installation. Install rear lock nut on primer body. Insert primer body through mounting-bracket hole and install front lock nut. Connect the two primer fuel lines. Insert plunger into body, being careful not to cut or curl the washer. Tighten plunger-packing nut.

Section X. EXHAUST SYSTEM

116. Description

The exhaust system consists of four sections; front exhaust pipe, rear exhaust pipe, muffler, and tail pipe. The front exhaust pipe is jointed to exhaust manifold with a flange joint, is fitted with a gasket, and is secured with three bolts to exhaust manifold. The rear exhaust pipe is jointed to front exhaust pipe with a flanged joint and copper-asbestos gasket. One "U" bolt clamp secures rear pipe to muffler. The muffler is secured to support bracket by one clamp. The tail pipe is secured to muffler by one "U" bolt clamp and is secured to frame side member by means of a support bracket.

117. Exhaust Pipes

a. Removal. To remove front exhaust pipe, remove three bolts holding it to exhaust manifold (fig. 38). Loosen three bolts at flanges between front and rear exhaust pipe. Turn flange and separate pipes. Remove front exhaust pipe. Remove and discard gaskets.

b. Installation.

(1) Place new gasket on upper flange of front exhaust pipe, position on exhaust manifold, and secure with three bolts.

(2) Place a new gasket between flanges of front exhaust pipe and rear exhaust pipe; turn flange and tighten three bolts.

118. Muffler

a. Removal. Muffler is removed from tail pipe after rear exhaust pipe is removed. Loosen muffler from exhaust pipe, remove clamp holding muffler to support, and pull muffler from exhaust pipe.

b. Installation. Slip muffler end opening over exhaust pipe and install supporting clamp to bracket. Install "U" bolt clamp to secure exhaust pipe to muffler.

119. Tail Pipe

a. Removal. Loosen **U**-bolt clamp holding tail pipe to muffler. Remove support bracket, and pull pipe from muffler.

b. Installation. Insert end of tail pipe into muffler and install support bracket. Tighten **U**-bolt clamp at muffler.

Section XI. COOLING SYSTEM

120. Description

a. GENERAL. The sealed-type cooling system consists of the following: radiator, fan, drive belts, thermostat, water pump, temperature gage, pressure-type filler cap, thermostat bypass line, and the lines, hoses, and fittings connecting the radiator to the engine and water pump. Water is drawn from bottom of radiator by action of water pump and is circulated through engine and returned through upper connection to radiator. Air, drawn through radiator core by fan and by motion of truck, cools water to maintain correct engine operating temperature. To drain cooling system, open coolant-level cock (fig. 63), remove radiator cap, open radiator drain cock, and drain cock on right side of engine toward rear.

b. RADIATOR. The radiator consists of a fin-and-tube type core, upper and lower tanks, drain cock, coolant-level cock, pressure-type filler cap, and overflow tube (fig. 63). Radiator is mounted in a vertical position at front of engine and is removed with the power plant (par. 97). Radiator may be replaced while engine is in the truck.

c. FAN AND DRIVE BELT. A five-blade fan, mounted on fan-and-water-pump-pulley hub, is driven by two V belts from crankshaft pulley. The same belts also drive water pump and generator (fig. 65).

d. WATER PUMP. A centrifugal-type water pump is mounted at the front of the engine (fig. 66). The water pump forces the coolant through water passages in engine, radiator, and connections.

e. THERMOSTAT. A bellows-type thermostat (fig. 68), mounted in end of water manifold, contains a restriction valve, sensitive to temperature, which opens gradually as engine temperature increases. The valve in the thermostat starts to open at approximately 160° F. and is fully opened at approximately 185° F. When the temperature of coolant in engine is below 160° F., the valve remains closed, eliminating flow of coolant through radiator. A bypass around thermostat permits circulation of coolant through the engine water passages until normal operating temperature is reached. The thermostat then is open and permits full circulation of coolant.

121. Radiator

(fig. 63)

a. PREVENTIVE CLEANING. In order to efficiently clean cooling system of rust, scale, or sludge, use a cleaner, followed by a neutralizer to stop action of cleaner. Federal stock number 51–C–1568–500 provides cleaner and neutralizer enough to clean a cooling system of a

4-gallon capacity. Neutralizing, and flushing after neutralizing, is very important as cleaner contains a strong acid which, if not completely removed, will attack the parts of the cooling system. Also, precautions should be taken not to spill any cleaning compound on skin, clothing, or truck paint.

Caution: Do not pour cold water into cooling system when engine temperature is above 200° F. Also cold water poured into cooling system, regardless of engine temperature, will close thermostat and not allow engine water jackets and passages to completely fill. Whenever filling system with cold water, always run engine until normal operating temperature is reached (thermostat opens), then add water until coolant reaches level cock (fig. 63).

(1) *Drain system.* Run engine at fast idle until normal engine operating temperature is reached (at least 165° F.) to stir up any loose rust, scale, etc. Stop engine. Remove radiator filler cap, open radiator and cylinder-block drain cocks, and allow cooling system to drain.

(2) *Clean system.* Close radiator and cylinder-block drain cocks. Place a clean container under overflow tube to catch any overflow, which may be needed to maintain proper level in the radiator. Be sure temperature of engine is below 200° F. Pour cleaning compound (one container to every 4 gallons of cooling system capacity) into radiator; then fill system with water. Install pressure-type cap on radiator. Start engine and run it at fast idle to heat solution to at least 180° F. Use a cardboard to cover radiator if necessary, but do not allow coolant to boil. Continue to run engine at least 30 minutes. Stop engine, open coolant-level cock, remove radiator cap, open radiator and cylinder-block drain cocks, and allow system to drain completely.

(3) *Neutralize system.* Close radiator and cylinder-block drain cocks. Pour neutralizer (one container to every 4 gallons of cooling system capacity) into radiator; then fill system with water, close coolant-level cock, and install radiator cap. Start engine and run it at fast idle, using radiator cover as necessary, to heat solution to at least 180° F. Continue to run engine at least 10 minutes. Open coolant-level cock, remove radiator cap, open radiator and cylinder-block drain cocks, and allow system to drain completely.

(4) *Flush system.* Close radiator and cylinder-block drain cocks. Fill system with clean fresh water (soft if possible); then close coolant-level cock and install radiator cap. Start engine and run it at a fast idle, using radiator cover as necessary, to bring engine operating temperature to at least

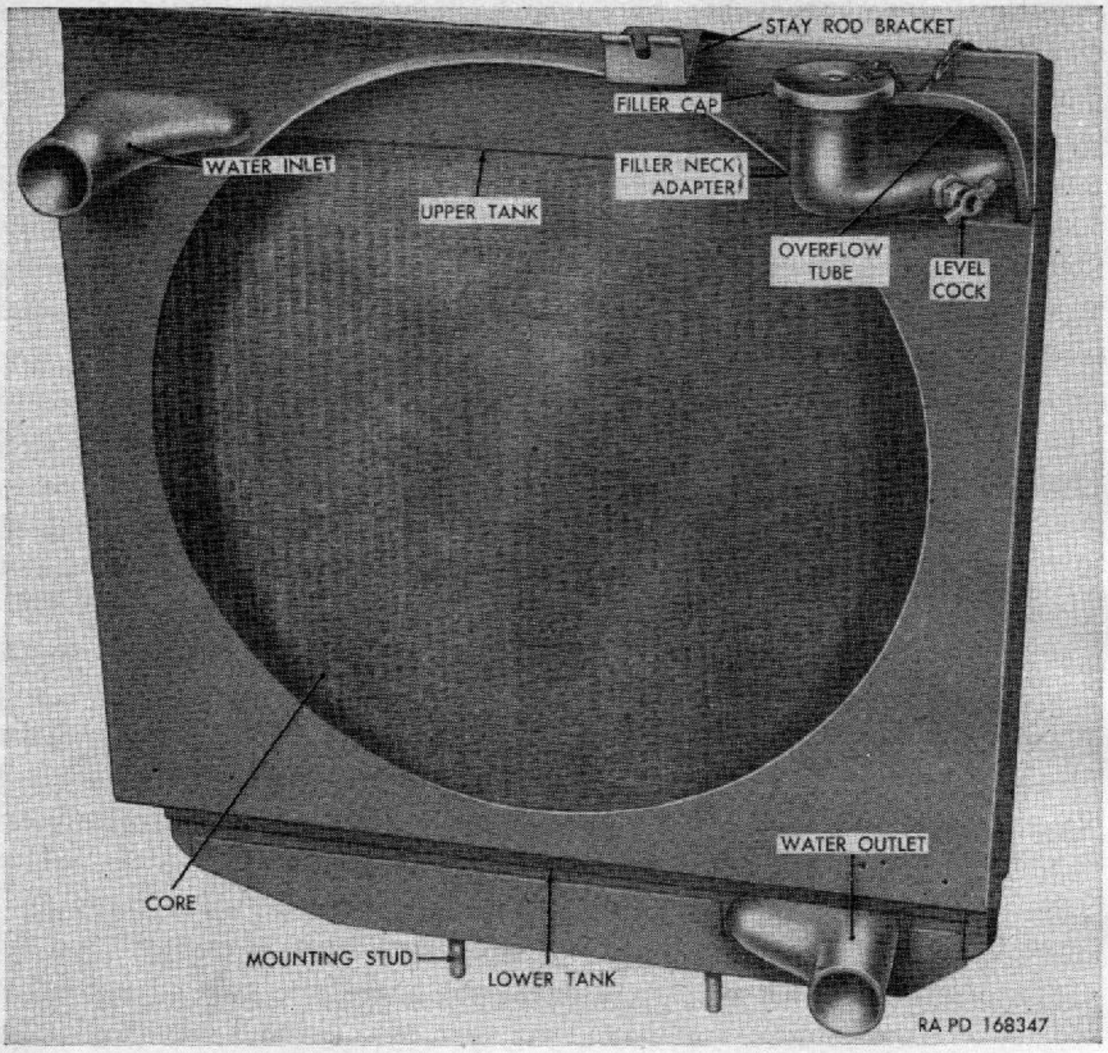

Figure 63. Radiator—rear view.

180° F. Continue to run engine for at least 5 minutes. Open coolant-level cock, remove radiator cap, open radiator and cylinder-block drain cocks, and allow system to drain. If water is discolored to any extent, repeat this flushing operation.

Caution: Do not flush system by inserting a hose in the radiator with the engine running and the drain cocks open. This procedure will close thermostat and stop circulation of coolant through the engine.

(5) *Clean radiator, cap, overflow tube, and drain cocks.* Clean by spraying a stream of water (hot if possible) through the holes in the valve cage while moving the pressure valve up and down with a blunt wooden instrument or a pencil. Clean out overflow pipe with a stream of water. Clean out dirt, trash, and insects imbedded in the air passages of the radiator, using compressed air or a stream of water; but do not use steam.

Caution: Do not hold air or water hose too close to the radiator or use too great pressure as damage to radiator may result. Clean out any stoppage in drain cocks with a soft wire.

(6) *Fill system.* Close radiator and cylinder-block drain cocks; then fill system to suit climatic conditions as follows: if above 32° F., almost fill the system with clean fresh water (soft if possible) and a corrosion inhibitor; then fill with water until coolant is evident at level cock (fig. 63). If there is a possibility that climate below 32° F. will be encountered, fill system about one-third full; add antifreeze enough for the lowest expected temperature (par 49); then fill until coolant is evident at level cock. Close coolant-level cock, install radiator cap, start engine, and run it at a fast idle until temperature gage shows normal operating temperature; then stop engine and check coolant level, adding water as necessary.

(7) *Air suction and exhaust-gas leakage.* Air circulating the cooling system, as well as exhaust gas leaking into system, causes rapid corrosion and rust formation which will eventually clog system and cause overheating and loss of coolant. The air may be drawn into system due to low liquid level in radiator, leaky water pump, or loose fitting connections. Exhaust gas may be blown into cooling system past cylinder head gasket or through cracks in cylinder head and block.

(*a*) *Air-suction test.* Bring level of coolant to level cock (fig. 63) of radiator. Drain out three pints of coolant to prevent overflow during test. Be sure radiator cap is in good condition and will make an air-tight seal. Attach a length of rubber tubing to end of overflow tube. This connection must be air tight. Run engine until temperature gage stops rising and remains stationary. Without changing engine speed, put end of rubber tube in bottle of water. Be sure there are no kinks or sharp bends in tube to restrict air flow. Watch for bubbles in water. Bubbles indicate that air is entering the cooling system. Correct condition by tightening cylinder-head bolts (par. 91) (fig. 42), water-pump mounting bolts (par. 123) (fig. 66), hose clamps and all fittings. Replace all hose if cracked, swollen, or deteriorated in any way.

(*b*) *Gas leakage test.* Start test with engine cold. Remove thermostat (par. 124) (fig. 68), reinstall thermostat housing without thermostat or water outlet hose, and add water to level of housing outlet. Start engine, accelerate several times and watch for bubbles in housing. Appearance of bubbles, or the sudden rise of liquid when accelerating, is evidence of leakage of exhaust gases into cooling system. Make test quickly before coolant reaches boiling point, as steam will give misleading results. Correct condition by replacing cylinder head gasket (par. 91) and repeat test. If leaks are still evident, it indicates a cracked cylinder head or cylinder sleeve. Report to higher authority. Install thermostat (par. 124) and connect radiator hose. Fill radiator. Install and adjust fan drive belts (par. 122).

(8) *Rust preventives.* The cooling system must be free of rust and scale to maintain efficiency of the system. Use of inhibitors or rust preventives reduces or prevents corrosion of metals and prevents formation of scale. Inhibitors are not cleaners and do not remove rust or scale already formed. Treating the cooling system with an inhibitor consists of adding an inhibitor to coolant. The inhibitor should be renewed periodically and especially if the system has been cleaned or flushed.

(*b*) Removal.

(1) *Remove brush guard.* Refer to paragraph 97.

(2) *Remove radiator.* Drain cooling system (*a* above). Loosen clamp on radiator inlet and outlet hose at radiator (fig. 63) and pull both hoses free. Disconnect radiator-stay rod from bracket at cylinder head. Disconnect two bond straps (fig. 64) at bottom of radiator, one on each side. Remove

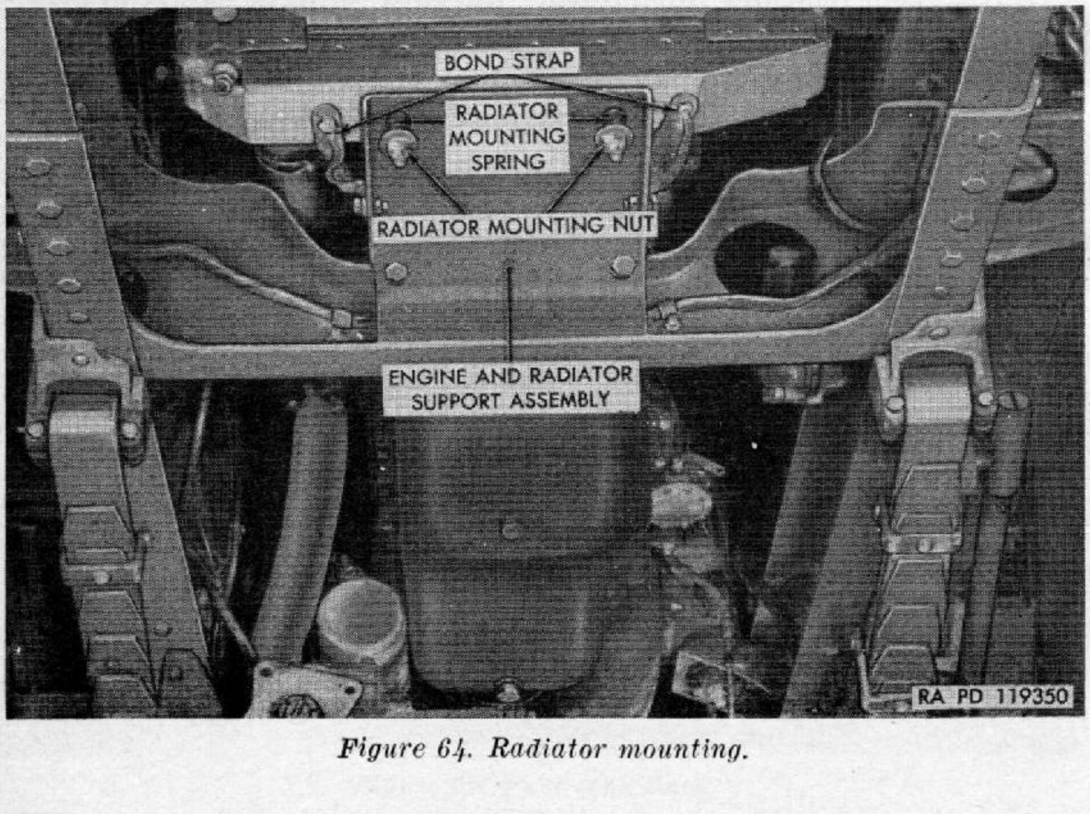

Figure 64. Radiator mounting.

two nuts, washers, and springs from radiator-and-engine support. Lift off radiator.

c. Installation (fig. 64).

(1) *Install radiator.* Place radiator on radiator-and-engine support with mounting studs (fig. 63) through holes in support. Install springs, washers, and nuts. Tighten nuts evenly and securely but do not tighten enough to completely compress springs. Connect two bond straps at bottom of radiator, one on each side. Connect radiator-stay rod to bracket on top of cylinder head. Connect inlet and outlet hose at radiator. Fill cooling system.

(2) *Install brush guard.* Refer to paragraph 97.

122. Fan and Drive Belts

a. Fan.

(1) *Removal.* Tilt brush guard (par. 97). Drain cooling system (par. 121). Loosen clamp on radiator inlet hose at top of radiator and pull hose free. Disconnect radiator-stay rod from bracket on cylinder head and tilt radiator forward. Flexibility of the radiator mounting springs will allow radiator to tilt forward approximately 6 to 8 inches. Remove six cap screws and washers holding fan to water-pump-drive-pulley hub, remove fan, and fan-to-pulley adapter.

(2) *Installation.* Position fan adapter on fan-and-water-pump-pulley hub and place fan on adapter with straight edge of blades toward radiator and curved edges toward engine. Install six cap screws (fan-and-water-pump-pulley hub) and tighten securely. Push radiator into position and connect radiator-stay rod to bracket at cylinder head. Install radiator-inlet hose and tighten clamp. Close drain cocks and fill cooling system (par. 121) to level cock (fig. 63). Push brush guard into position and tighten (par. 97).

b. Drive Belts (fig. 65).

(1) *Adjustments.* Loosen two generator-to-mounting-bracket-bolt nuts. Loosen generator-to-adjusting-arm cap screw and move generator toward or away from engine, as necessary, to obtain correct belt tension. A light pressure on belts at a point midway between generator-and-water-pump pulleys must cause a ½-inch deflection (fig. 65). Tighten generator-to-adjusting-arm cap screw and then tighten two generator-to-mounting-bracket-bolt nuts.

(2) *Removal.* Loosen two generator-to-mounting-bracket-bolt nuts. Loosen generator-to-adjusting-arm cap screw and

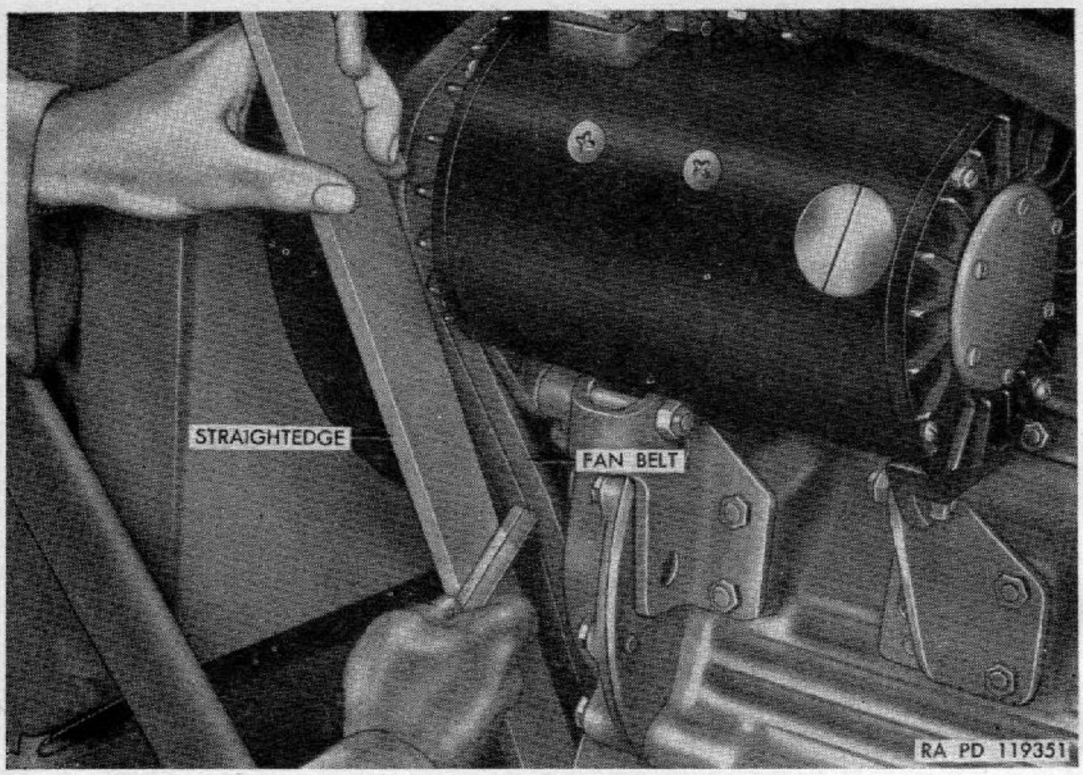

Figure 65. Generator, fan, and water pump belt adjustment.

move generator toward engine as far as it will go. Remove outer belt first by removing from generator, water pump, and crankshaft pulleys and lifting over fan. Remove inner belt in same manner.

(3) *Installation.* Place inner belt over fan and then over crankshaft, water pump, and generator pulleys. Install outer belt in same manner. Adjust belts and tighten generator ((1) above).

123. Water Pump

(fig. 66)

a. General. Replacement of the water pump is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, providing authority for performing this replacement is obtained from the appropriate commander. Puller 41–P–2958–78 needed for removal of water pump, is not carried in the using organization but may be obtained from the supporting maintenance unit.

b. Removal. Remove fan (par. 122). Pull off fan-to-pulley adapter. Remove drive belts (par. 122). Disconnect thermostat-bypass line and air-compressor-water inlet line from top of water-pump housing and pull clear. Remove fan-and-water-pump pulley with puller 41–P–2958–78 (fig. 67). Remove key and pull off two bearing retainers. Disconnect radiator-outlet hose at water pump. Remove five water-pump-to-cylinder-block cap screws and lock washers (fig. 66) and remove pump. Discard gasket.

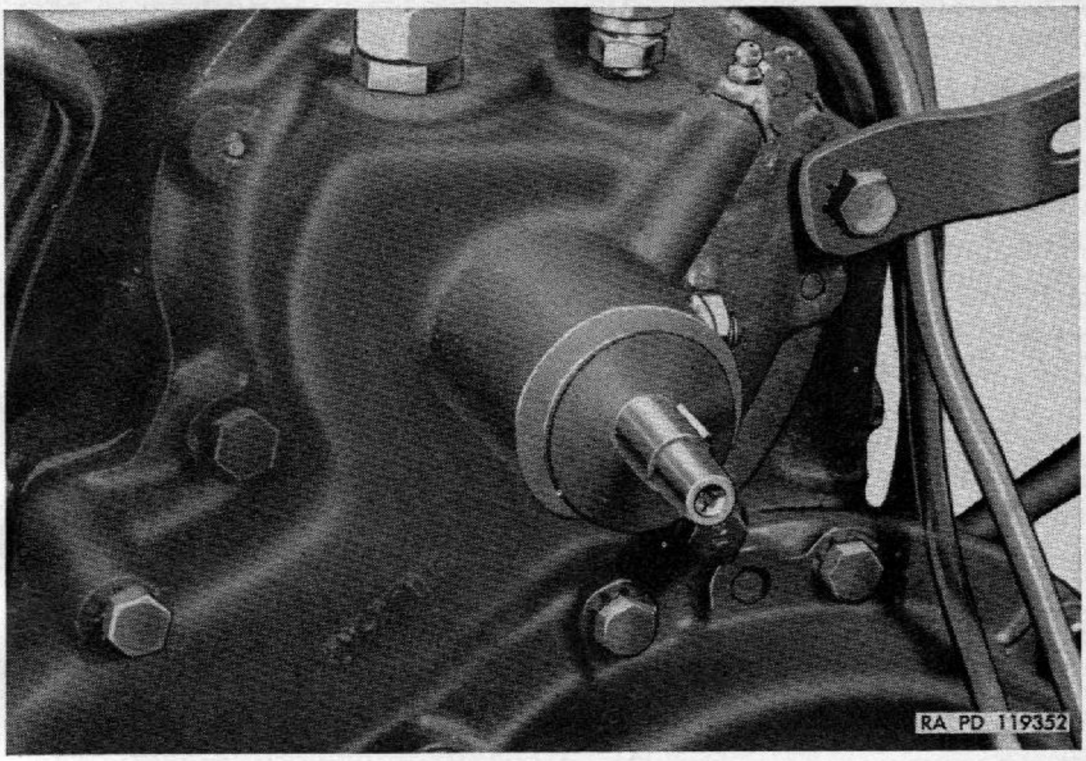

Figure 66. Water pump mounting.

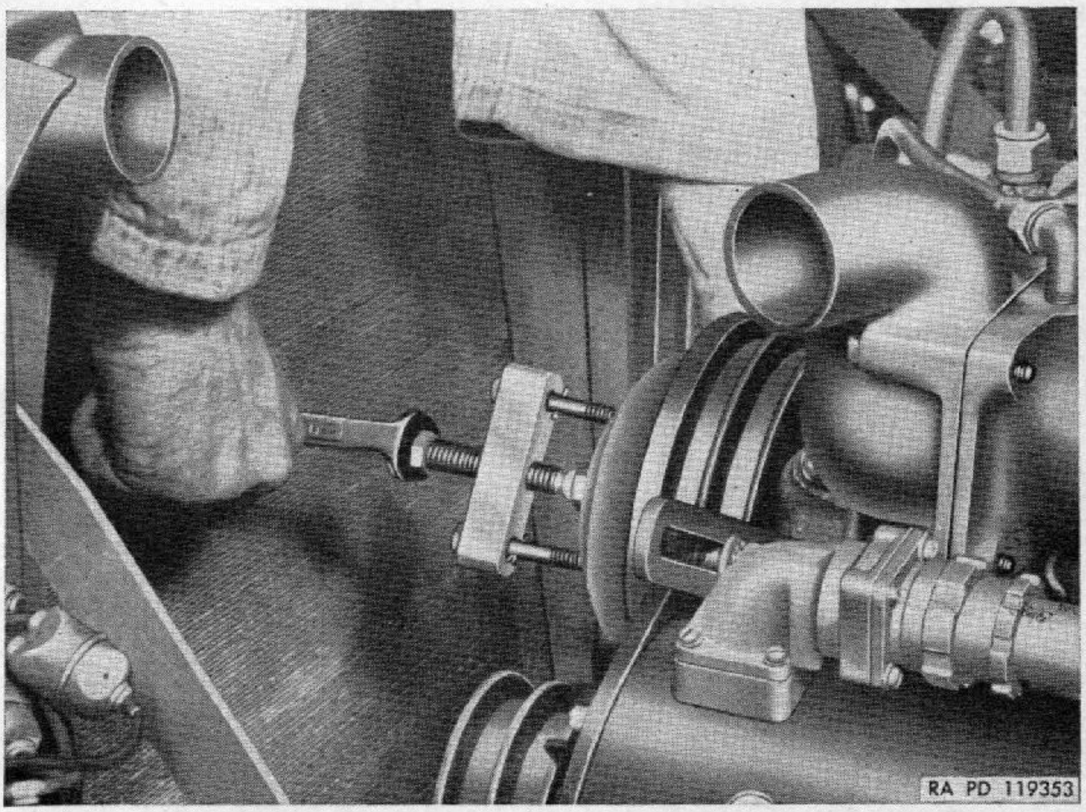

Figure 67. Removing fan-and-water-pump pulley with puller 41-P-2958-78.

c. Installation. Install two bearing retainers with concave surfaces facing each other and insert key in shaft. Place water pump in position on cylinder block with new gasket. Be sure pump is in correct position to aline with radiator outlet hose. Install five water-pump-to-cylinder-block cap screws and lock washers (fig. 66). Install key and install fan-and-water-pump pulley. Install special washer and safety nut, and tighten. Install drive belts (par. 122). Connect radiator outlet hose at water pump. Connect thermostat-bypass line and air-compressor-water inlet line to top of water pump housing. Place fan-to-pulley adapter in place on pulley hub and install fan (par. 122).

124. Thermostat

a. Removal. Open coolant-level cock (fig. 63), remove radiator cap, and open radiator-drain cock. Loosen both radiator-inlet-hose clamps and remove hose. Remove four cap screws and lock washers holding thermostat housing to water manifold. Remove housing and discard gasket. Pull thermostat out from end of water manifold (fig. 68).

b. Installation. Place thermostat in position in end of water manifold (fig. 68). Position thermostat housing, with new gasket, on water manifold and install four lock washers and cap screws. Install radiator inlet hose and tighten clamps. Close radiator drain cock and fill radiator. Close coolant-lever cock.

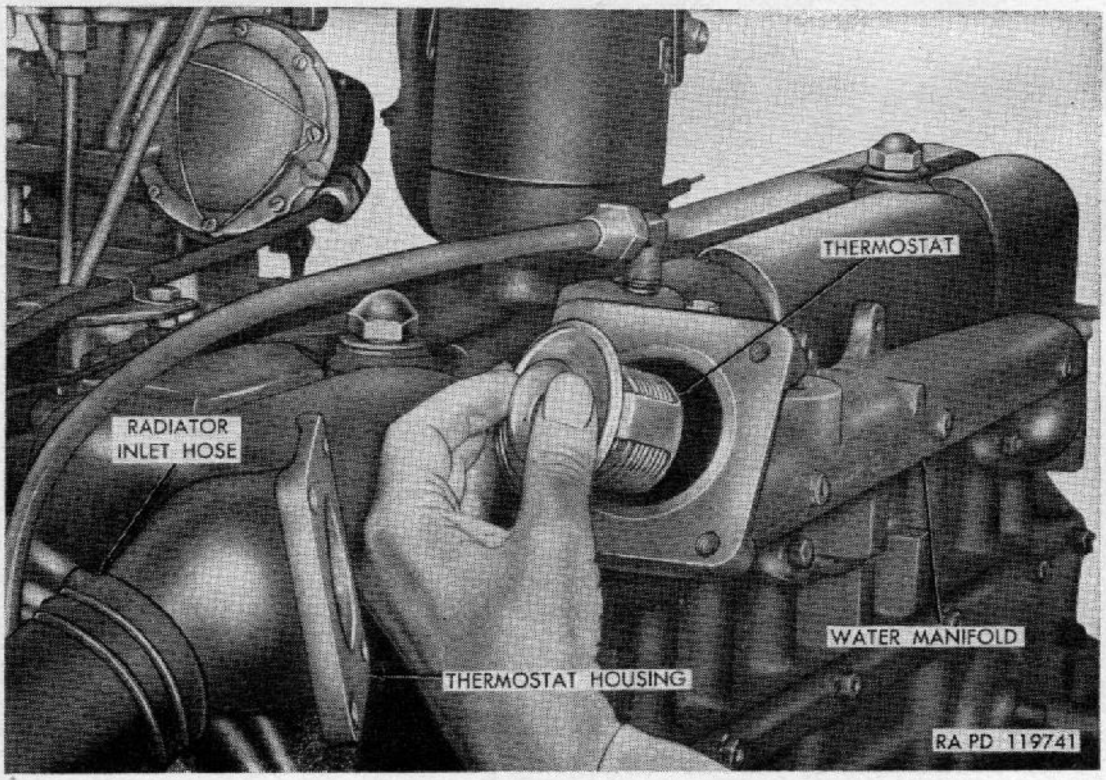

Figure 68. Removing thermostat.

125. Hose and Fittings

a. Hose connections are provided at radiator inlet and at radiator outlet. A thermostat-bypass line extends from water pump to water manifold. There are two compressor-water lines, one from water pump to air compressor and the other from air compressor to crankcase.

b. The cooling system must be drained before hose or water lines are replaced. When replacing hose, make sure clamps are tightened securely. Drain air-compressor-cylinder head before replacing air-compressor-water lines. When replacing lines or fittings, coat all threaded-elbow and tee connections with liquid-type gasket cement before installation. Be certain all connections are tight.

Section XII. IGNITION SYSTEM

126. Description and Data

a. DESCRIPTION (fig. 69).

(1) GENERAL. The ignition system produces and delivers high voltage surges to spark plugs at timed intervals. The system comprises ignition coil, distributor, spark plugs, and connecting cables.

(2) *Distributor and ignition coil assembly.* The distributor and ignition coil assembly is a device to convert low-voltage current to high voltage by interrupting the current at timed intervals and deliver resulting high-voltage surges to spark plugs in correct sequence. Provision also is made to automatically vary the timing of surges in relation to piston position as necessary for efficient operation of engine.

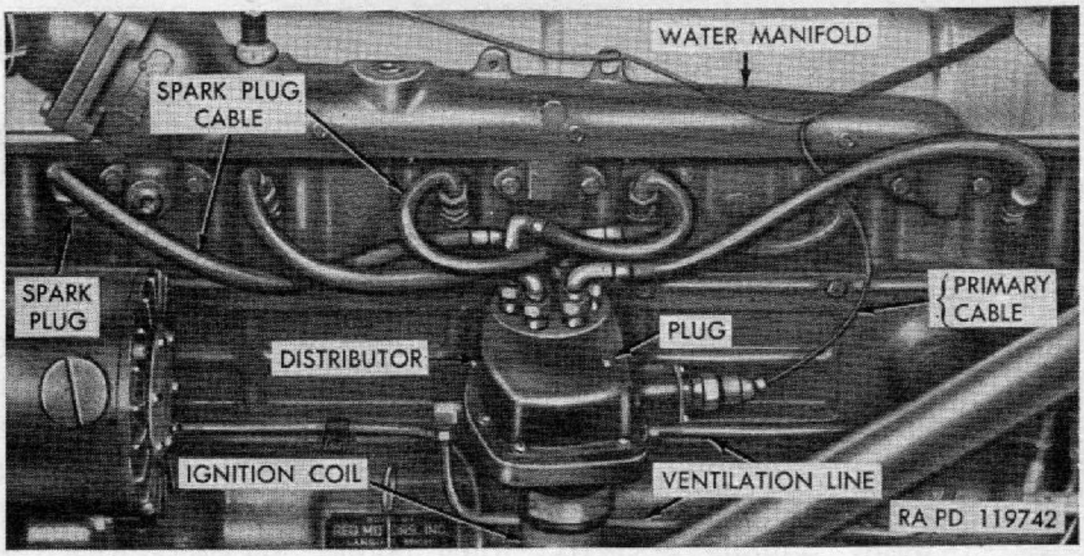

Figure 69. Ignition system.

(3) *Spark plugs.* The spark plug consists of a central electrode insulated from a metal shell threaded to fit into an opening in combustion chamber. Center electrode extends into combustion chamber where it is separated by a small gap from ground electrode integral with shell. High-tension surges, delivered to outer end of center electrode, jump the gap and produce ignition sparks.

b. TABULATED DATA.

Distributor:

Make	Delco-Remy
Model	1111556
Rotation, viewing drive end	counterclockwise
Breaker point pressure	17–21 oz
Breaker point opening	0.022 in
Voltage	24

127. Ignition Timing

a. GENERAL. Ignition timing requires adjusting distributor mechanism so that it will deliver high-tension surges to spark plugs in proper relation to piston position.

b. CHECKING AND CORRECTING TIMING.

(1) Efficient operation of engine requires delivery of a spark in combustion chamber when piston is four degrees before top dead center on compression stroke. Timing is checked by means of a timing pointer, set in timing gear cover, and degree marks scribed on outer rim of crankshaft vibration damper (fig. 70).

(2) Disconnect spark plug cable from number one spark plug (fig. 77) and establish electrical connection between plug and one terminal of timing light by an adapter or a short piece of insulated wire. One end of wire is cut square and inserted into spark plug to make contact with electrode. Timing-light terminal is clipped to other end of wire and to spring in end of spark plug cable. If adapter is used, screw adapter on spark plug and connect spark plug cable to adapter. Connect one terminal of timing light to adapter. Clip the other terminal of timing light to a good ground, such as the fuel line.

(3) Apply chalk to the mark on the crankshaft vibration damper to permit easy observation. Then, with engine running at idle (450 rpm), direct beam of timing light down at timing pointer (fig. 70). The relation of timing marks on rotating damper with timing pointer can be seen by flashes of timing light. Timing is correct when pointer registers with the four-degree mark when light flashes.

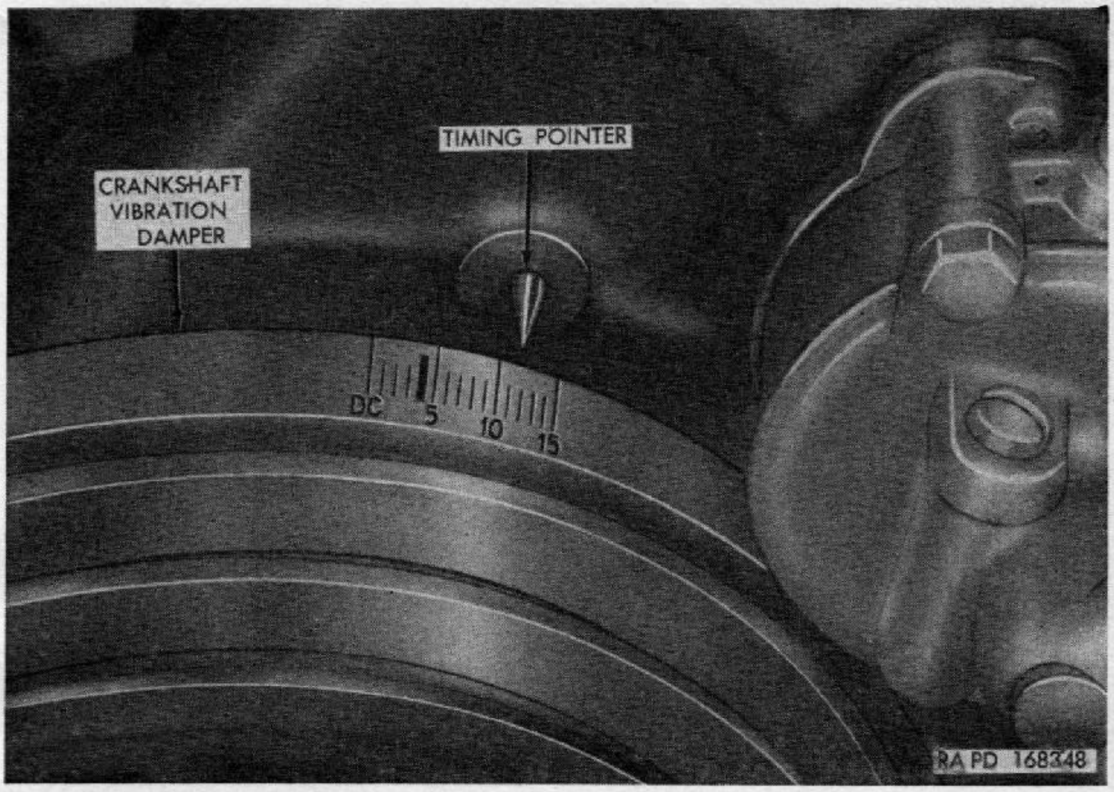

Figure 70. Timing pointer and marks.

(4) To correct timing, loosen mounting clamps holding distributor to crankcase and rotate distributor slightly. Clockwise rotation will advance spark and counterclockwise rotation will retard it. Tighten clamps when timing is adjusted.

128. Distributor and Ignition Coil Assembly

a. DISTRIBUTOR (fig. 71).

(1) *Setting breaker point gap* (fig. 72).

(*a*) Remove eight screws holding distributor cover, lift cover and discard gasket. Lift rotor from distributor. Turn engine in small increments, by closing starting switch momentarily, and notice position of breaker cam when engine stops. Continue this until engine stops with high point of cam holding breaker lever at maximum gap.

(*b*) Check the gap with a 0.022-inch feeler gage (fig. 72). To adjust gap, loosen stationary bracket screw near end of stationary contact bracket and turn adjusting screw (fig. 71) to obtain correct setting. Tighten stationary bracket screw.

(2) *Movable-point-breaker lever.*

(*a*) *Movable-point-breaker-lever-spring tension* (fig. 73). Check movable-point-breaker-lever-spring tension with

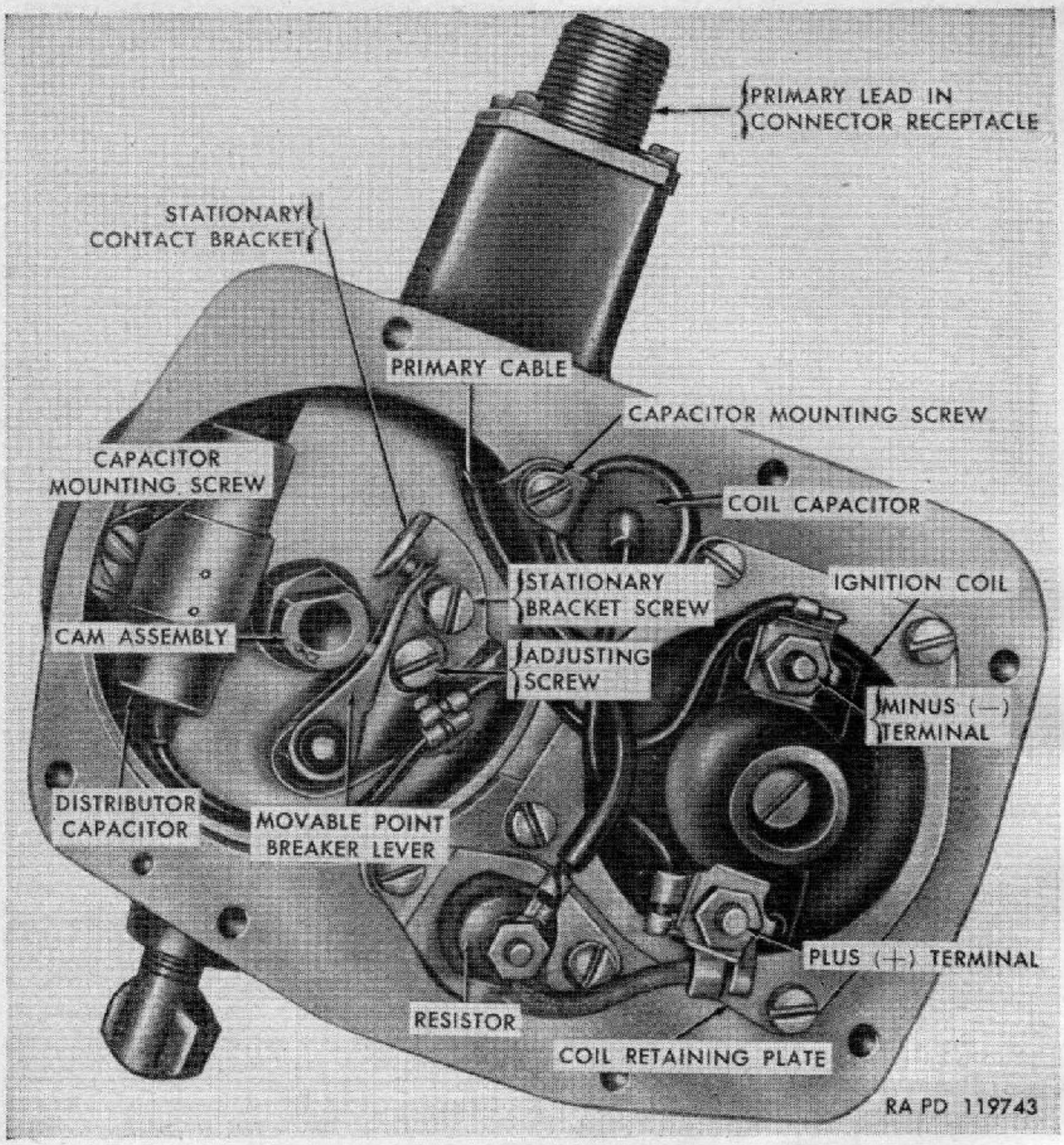

Figure 71. Distributor with cover removed.

tension gage 41–G–105. It is important that pull on gage to open gap be from 17 to 21 ounces. Replace lever assembly if not within limits.

(*b*) *Removal.* Disconnect two cables from stationary contact bracket. Lift movable-point-breaker lever (fig. 71) from pivot pin.

(*c*) *Installation.* Put two drops engine oil on pivot pin and place movable-point-breaker lever on pin. Spring must be inside lug of stationary contact bracket. Place two cable terminals in position and insert terminal screw. Install nut and tighten. Be sure to press lever spring down so notch makes good contact with terminal screw while tightening nut.

(3) *Breaker plate capacitor.*

(*a*) *Removal.* Disconnect capacitor cable from connection on stationary bracket support and remove capacitor mounting screw (fig. 71) and lock washer.

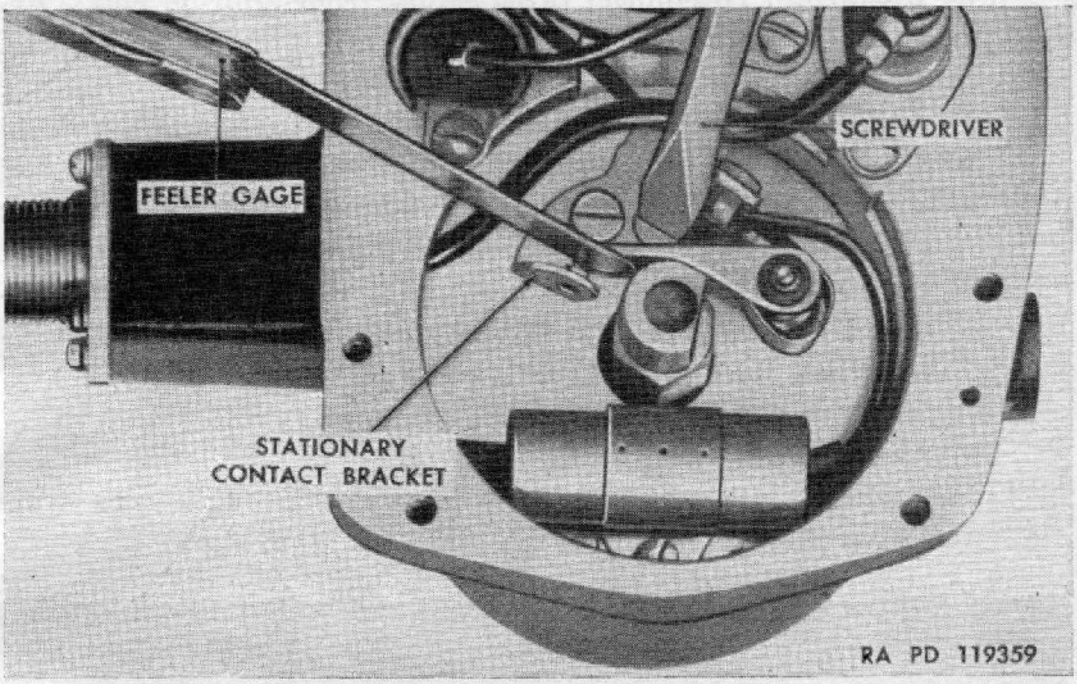

Figure 72. Setting distributor breaker point gap.

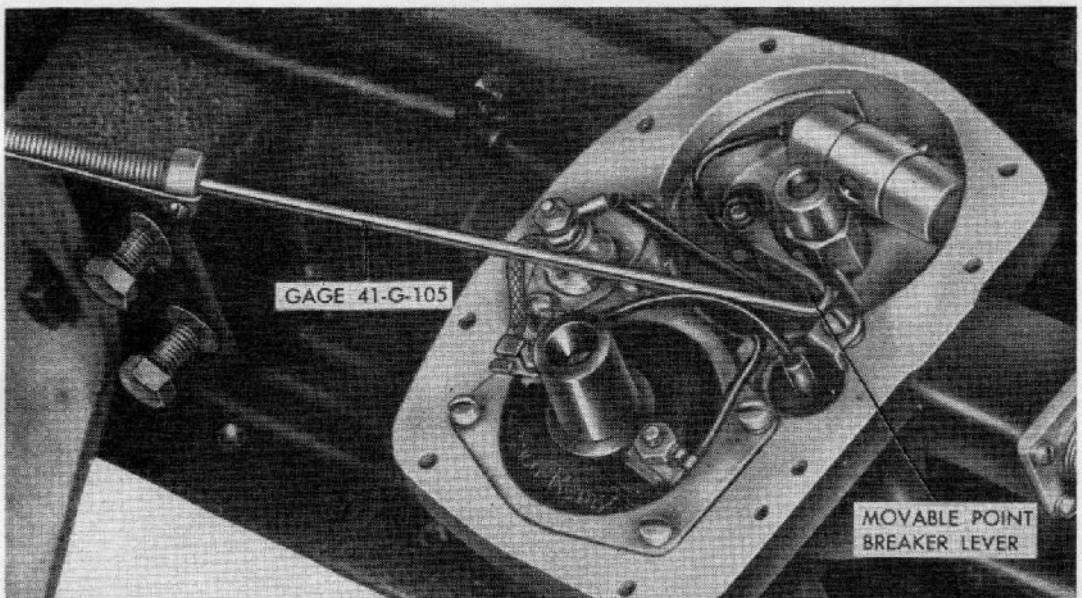

Figure 73. Checking distributor-breaker-lever-spring tension.

(*b*) *Installation.* Place capacitor in position and install capacitor mounting screw and lock washer. Connect capacitor cable to connection on stationary bracket support.

b. Ignition Coil (fig. 74).

(1) *Removal.* Disconnect three cables from ignition coil. Remove four screws from ignition coil retaining plate (fig. 71), remove plate, and lift out coil (fig. 74).

(2) *Installation.* Place a new ignition coil gasket in recess in distributor housing and install ignition coil. Note that coil must be placed with the plus (+) terminal near the resistor (fig. 71). Install clamp plate and secure with four screws. Connect resistor cable and capacitor cable to plus (+) terminal. Connect cable from stationary bracket to minus (−) terminal. Install cover with a new gasket.

c. Distributor and Ignition Coil Assembly.

(1) *Removal* (fig. 69).

(*a*) Disconnect primary cable, and spark-plug cables from distributor.

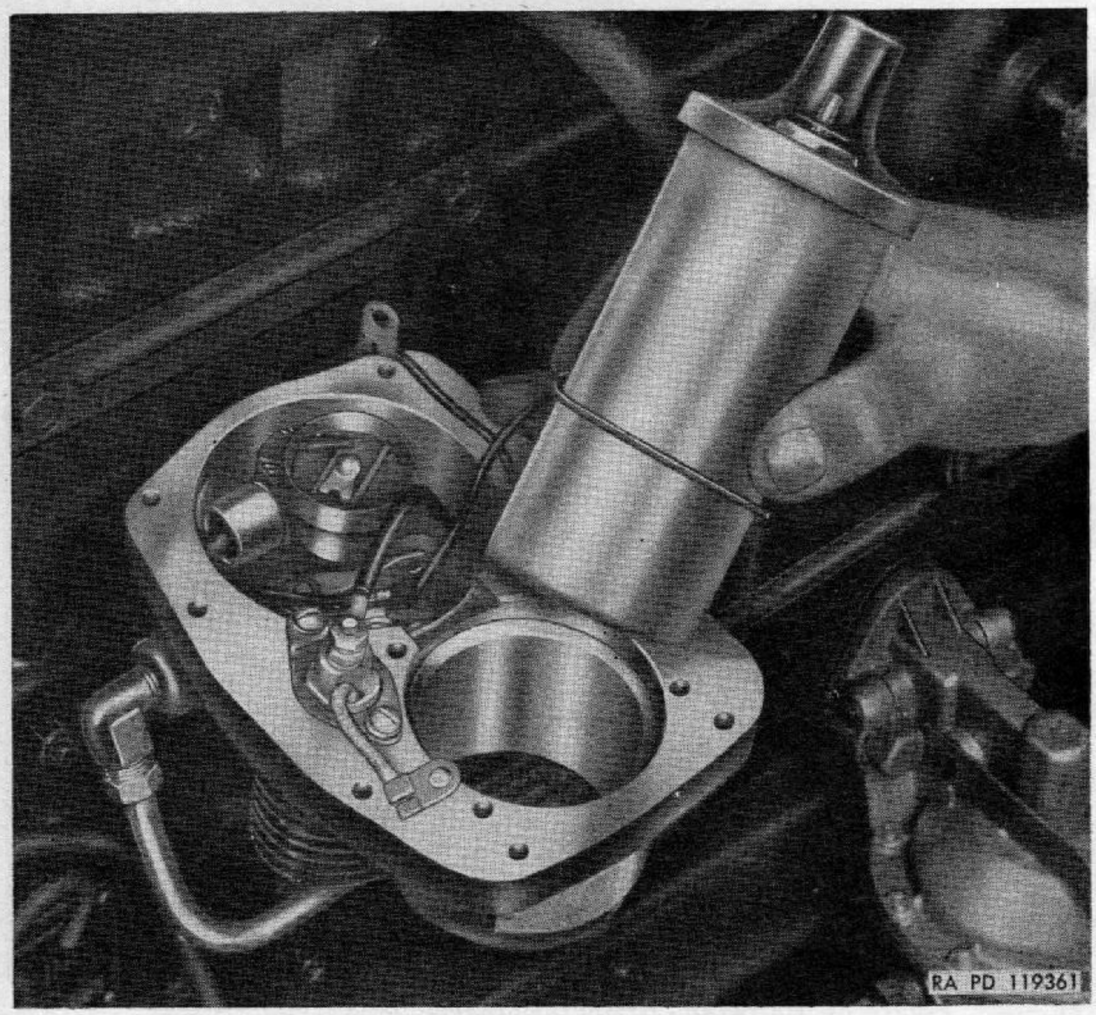

Figure 74. Replacing ignition coil.

(*b*) Disconnect ventilation lines from fittings on sides of distributor.

(*c*) Remove mounting clamps holding distributor to crankcases and lift out distributor.

(2) *Installation* (fig. 69).

(*a*) Turn engine over by small increments with starter until four degree timing mark stops in line with timing pointer (fig. 70).

(*b*) Remove cover and rotor from distributor and turn drive shaft until lobe of cam, trailing flat on cam assembly, opens breaker point. Place a straightedge against this flat and turn shaft until straightedge will cross edge of distributor housing between scribed marks (fig. 75).

(*c*) Place distributor in position and engage coupling with driving coupling on oil pump shaft. Install two mounting clamps and tighten.

(*d*) Place rotor on distributor cam. Install distributor cover with new gasket. Connect primary cable, and ventilation line. Connect spark-plug cables to distributor cover connections. Note firing order as marked on cover (fig. 76) and be sure cables are connected in proper order.

129. Spark Plugs

a. REMOVAL. Remove nut on spark-plug cable conduit with spark-plug cable conduit nut wrench 41–W–3297–760 (fig. 77) and pull cable

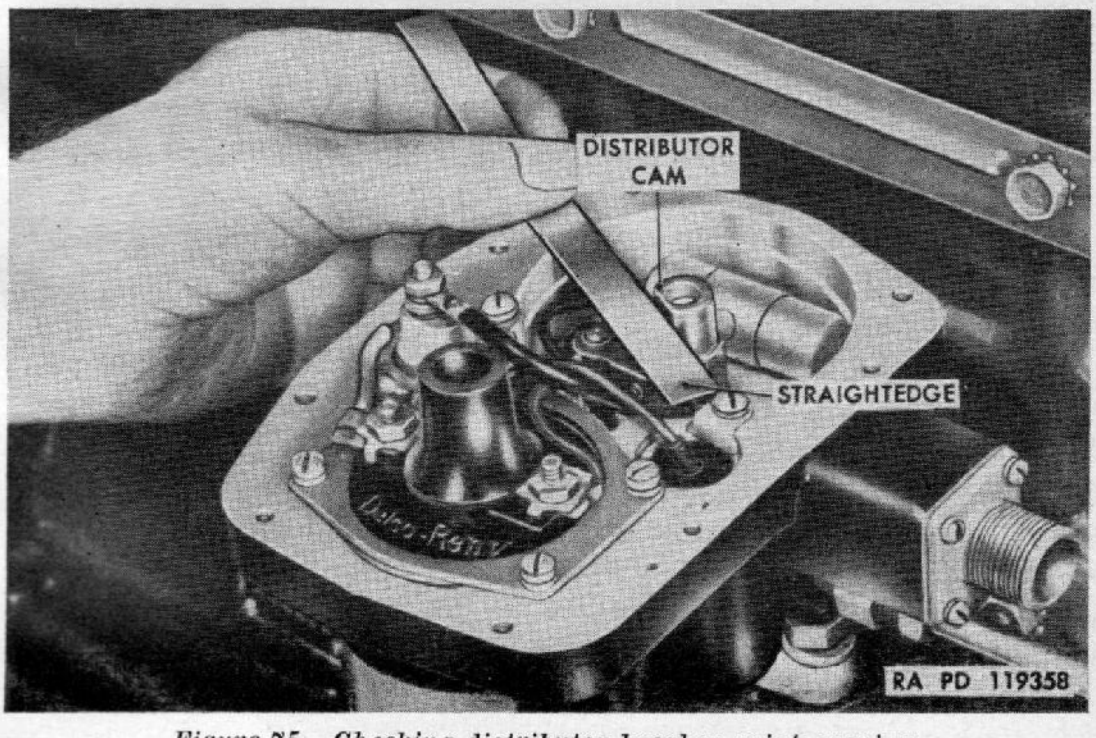

Figure 75. Checking distributor breaker point opening.

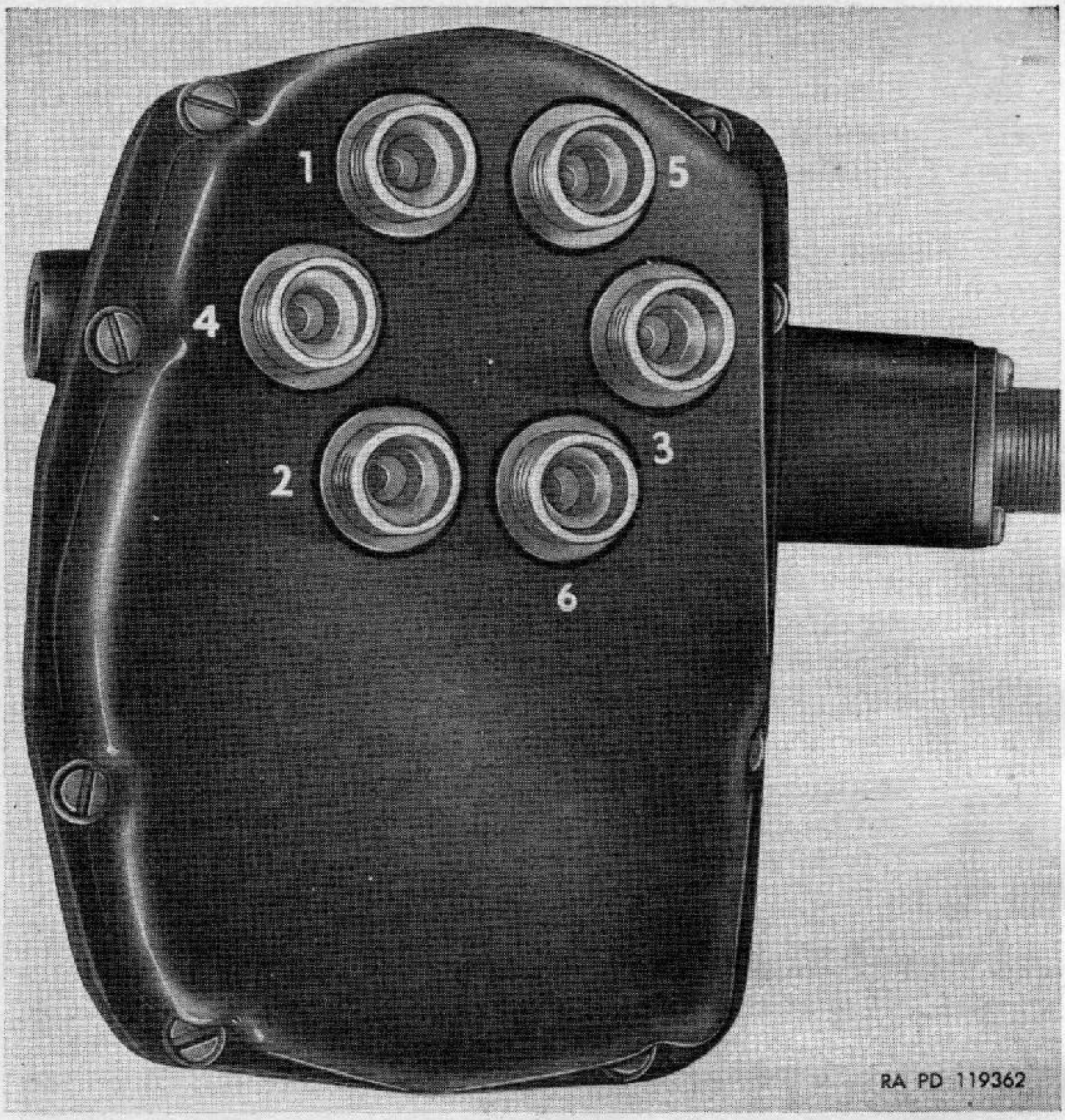

Figure 76. Distributor cover.

from spark plug. Use spark-plug wrench or deep-socket wrench to remove spark plug (fig. 78).

b. CLEANING. Clean spark plugs with standard spark-plug cleaning equipment. If points are excessively burned, new spark plugs should be installed.

c. ADJUSTMENT. Using a round feeler gage, check for proper gap between electrodes. Adjust gap to 0.030 inch by bending side electrode only.

d. INSTALLATION. Place a new gasket on spark plug and start plug into cylinder head. Tighten plug against gasket, using a deep-socket or spark-plug wrench (fig. 78). Install spark-plug cable, using spark-plug cable conduit nut wrench 41–W–3297–760 to tighten nut on cable conduit (fig. 77).

Figure 77. Using spark-plug cable conduit nut wrench 41–W–3297–760.

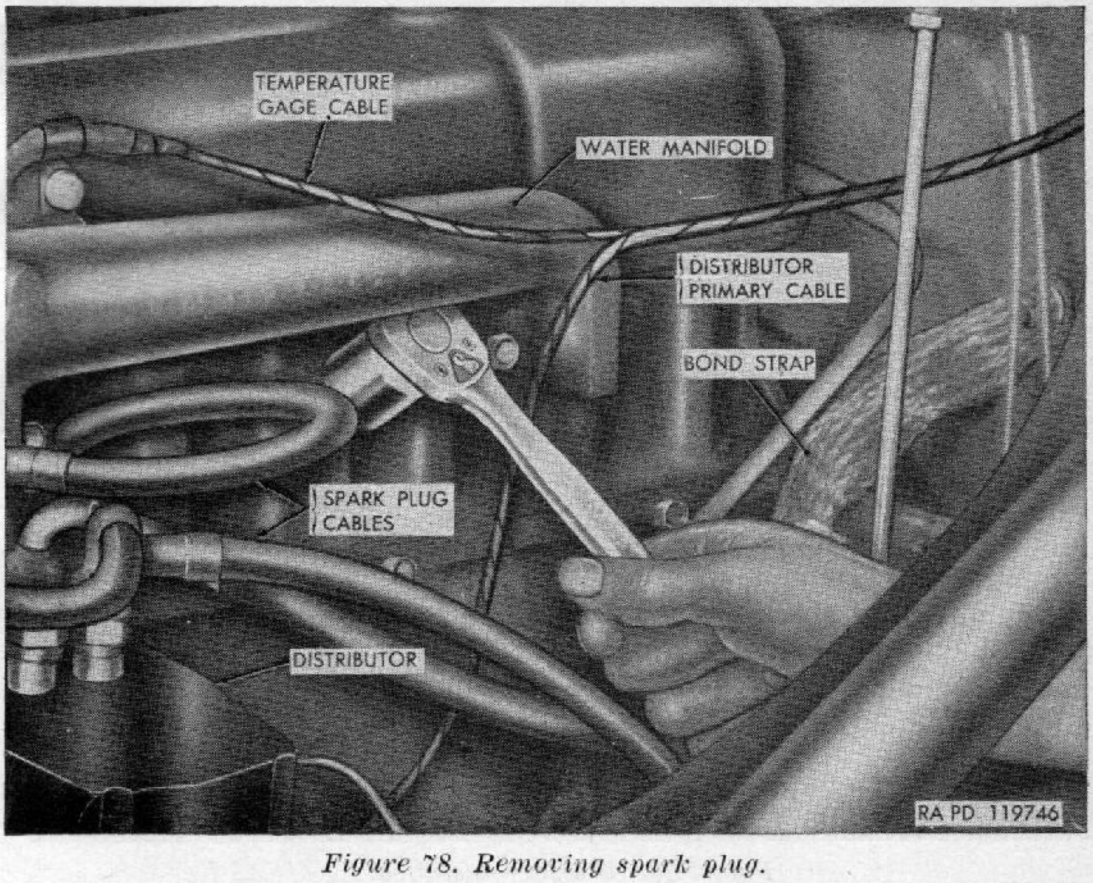

Figure 78. Removing spark plug.

Section XIII. STARTING AND CHARGING SYSTEM

130. Description and Data

a. DESCRIPTION.

(1) *General.* The starting and charging system consists of the starter, generator, and generator regulator. When the starter switch (fig. 80) mounted on the starter is closed, starter draws electric current directly from the batteries. The purpose of generator and generator regulator is to keep batteries fully charged and to furnish current for ignition and lighting system when speed of engine permits.

(2) *Starter.* The watertight starter is a four-pole, four-brush unit with three field coils connected in series and one in shunt. The starter is mounted on the right side of engine (fig. 79) and is equipped with an overrunning clutch which is manually shifted into engagement with flywheel to crank engine.

(3) *Generator.* The watertight generator is a four-pole, four-brush, shunt unit. Generator is mounted on left side of engine (fig. 82) and is driven by belts from the crankshaft.

Figure 79. Starter—installed.

(4) *Generator regulator.* The watertight generator regulator contains three units, a voltage regulator, a current regulator, and a cut-out relay. The regulator is mounted in the rear of engine compartment on front side of dash panel near steering column. Two types of regulators have been used. Figure 84 shows regulator used on M34 trucks, serial numbers 90000–100609, and 101061–101077. Figure 85 shows regulator used on M34 trucks, serial numbers 100610–101060 and serial number 101078 up. It is also used on all model M36, M47, and M59 trucks.

b. TABULATED DATA.

Starter:

Make	Delco-Remy
Model	1108575
Drive pinion rotation, viewing drive end	clockwise
Voltage	24

Generator:

Make	Delco-Remy
Model	1117486
Armature rotation, viewing drive end	clockwise
Voltage	24

Generator regulator:

Make	Delco-Remy
Model	1118546 or 1118606
Type	vibrating
Voltage	24

131. Starter

a. INSPECTION AND CLEANING (fig. 80). Remove commutator-end cover by releasing two cover clips from pins in starter housing and sliding cover off. Inspect commutator for dirty condition, roughness, high spots, and high mica. If commutator is dirty, clean with grade 2/0 flintpaper only and blow out dust with compressed air. If the commutator is rough, out-of-round, or has high mica, starter must be replaced.

b. REMOVAL. Disconnect battery-ground cable (7) at batteries (figs. 121 and 122). Disconnect starter cable at starter switch (fig. 80).

Caution: Be sure battery-ground cable (7) is disconnected before disconnecting starter cable.

Remove three safety nuts holding starter (fig. 79) to flywheel housing. Pull starter straight away from housing to remove. Discard gasket.

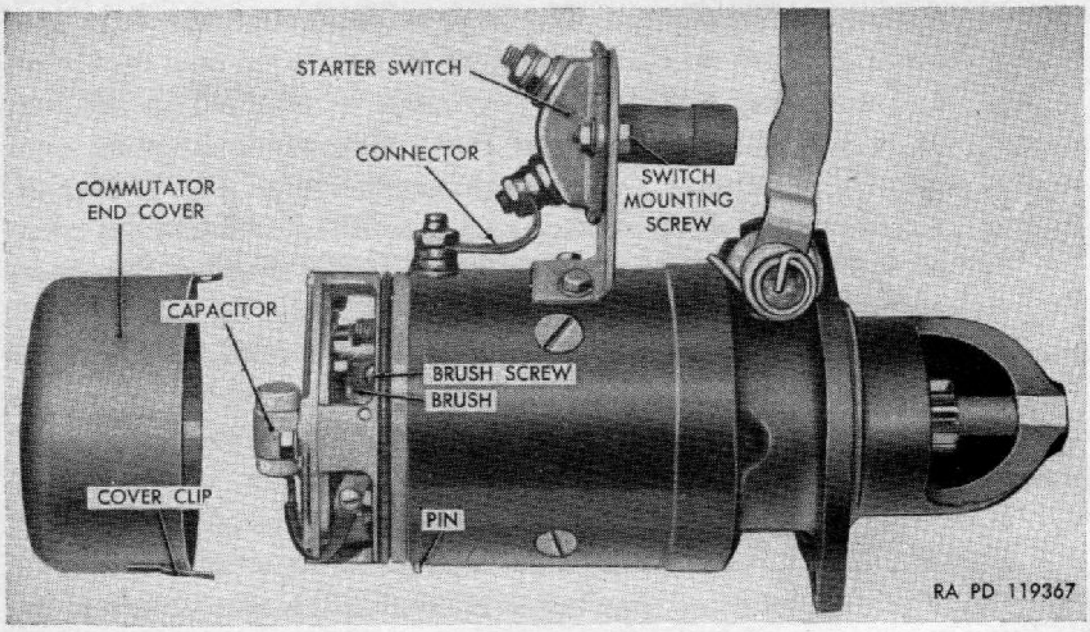

Figure 80. Starter with cover removed.

c. Brush Replacement. Replace brushes when they are worn to five-sixteenth inch, measured on stamped side.

(1) *Remove Brushes.* Remove starter (*b* above). Remove commutator-end cover (fig. 80). Remove brush terminal screw and lock washer and pull brush out of brush holder. All four brushes are removed in same manner.

(2) *Install Brushes.* Pry brush spring up with screwdriver and install new brush in holder. Allow spring to snap down against brush and position itself. Fasten brush terminal to starter frame with screw and lock washer. All four brushes are installed in same manner. Make sure "O" ring gasket is in position and slide cover carefully into position so holes in cover clips engage pins in starter housing (fig. 80). Install starter (*d* below).

d. Installation. Place starter in position on mounting studs with a new gasket. Be sure switch is up. Secure with three safety nuts (fig. 79). Connect starter cable to starter-switch terminal (fig. 80). Connect battery-ground cable (7) at batteries (figs. 121 and 122).

e. Switch Replacement (fig. 80).

(1) *Removal.* Remove ground cable (7) from batteries (figs. 121 and 122). Disconnect starter cable at starter switch (fig. 80). Remove switch-to-terminal connector from starter switch. Remove two switch mounting screws, washers, and nuts.

(2) *Installation.* Position switch on mounting bracket and secure with two switch mounting screws, washers, and nuts. Attach connector to starter switch and tighten nut. Wrap

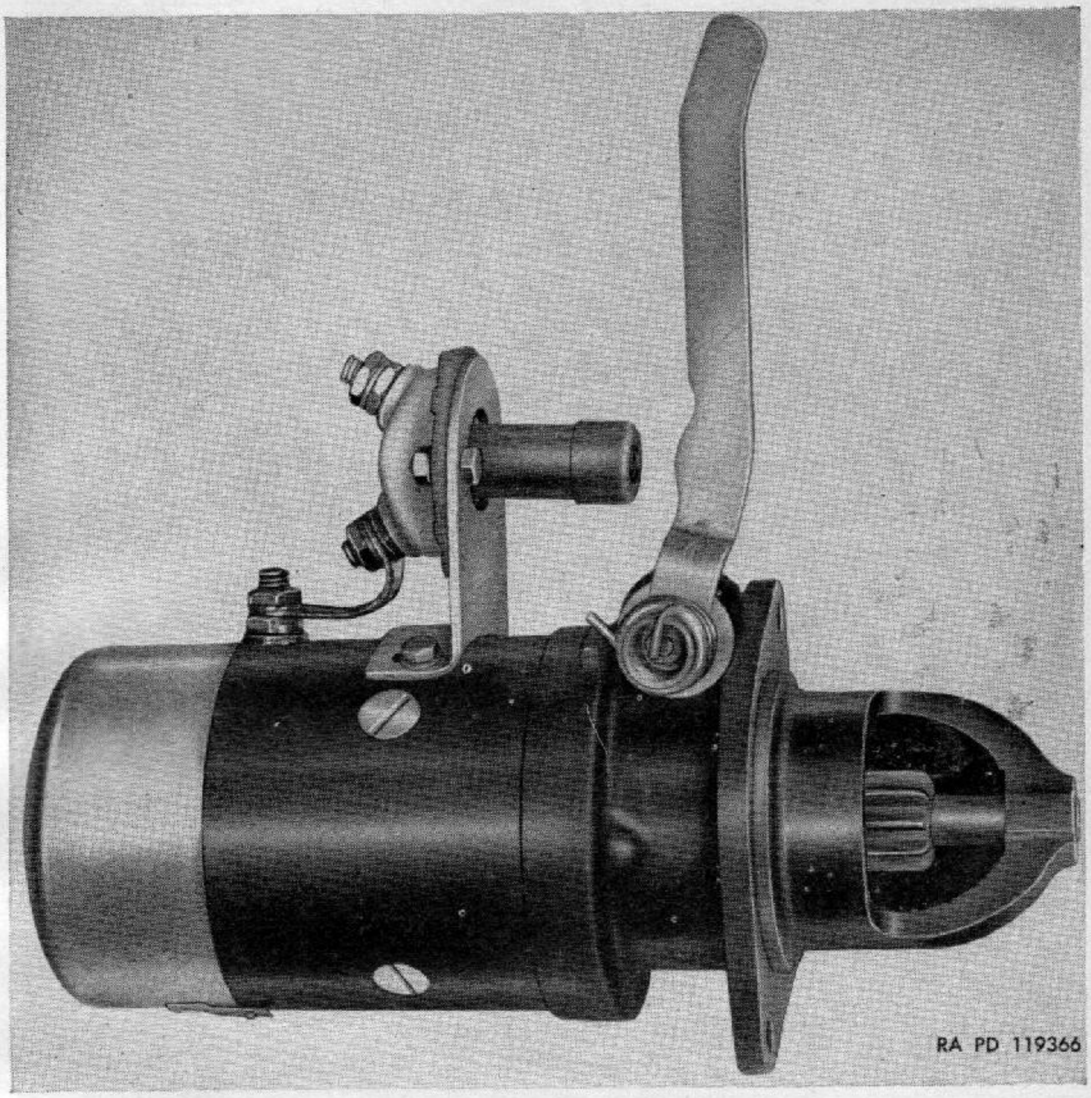

Figure 81. General view of starter.

connector and terminals with ½-inch-wide-cotton tape and paint with synthetic paint (glyptal). Connect starter cable to switch terminal (fig. 80). Connect battery ground cable (7) at batteries (figs. 121 and 122).

132. Generator

a. Inspection (fig. 82). Remove generator-inspection plug and inspect commutator. If commutator is rough, out-of-round, burned, or has high mica, generator must be replaced.

Caution: When replacing inspection plug, make sure gasket is seated properly to prevent leakage.

b. Removal. Loosen nut on generator-to-regulator harness at generator with wrench 41–W–3249–900 (fig. 83) and pull cable from generator. Remove two mounting bracket bolt nuts. Remove generator-to-adjusting-arm cap screw and move generator toward engine as far as it will go. Remove drive belts from generator pulley. Remove two mounting bracket bolts and remove generator.

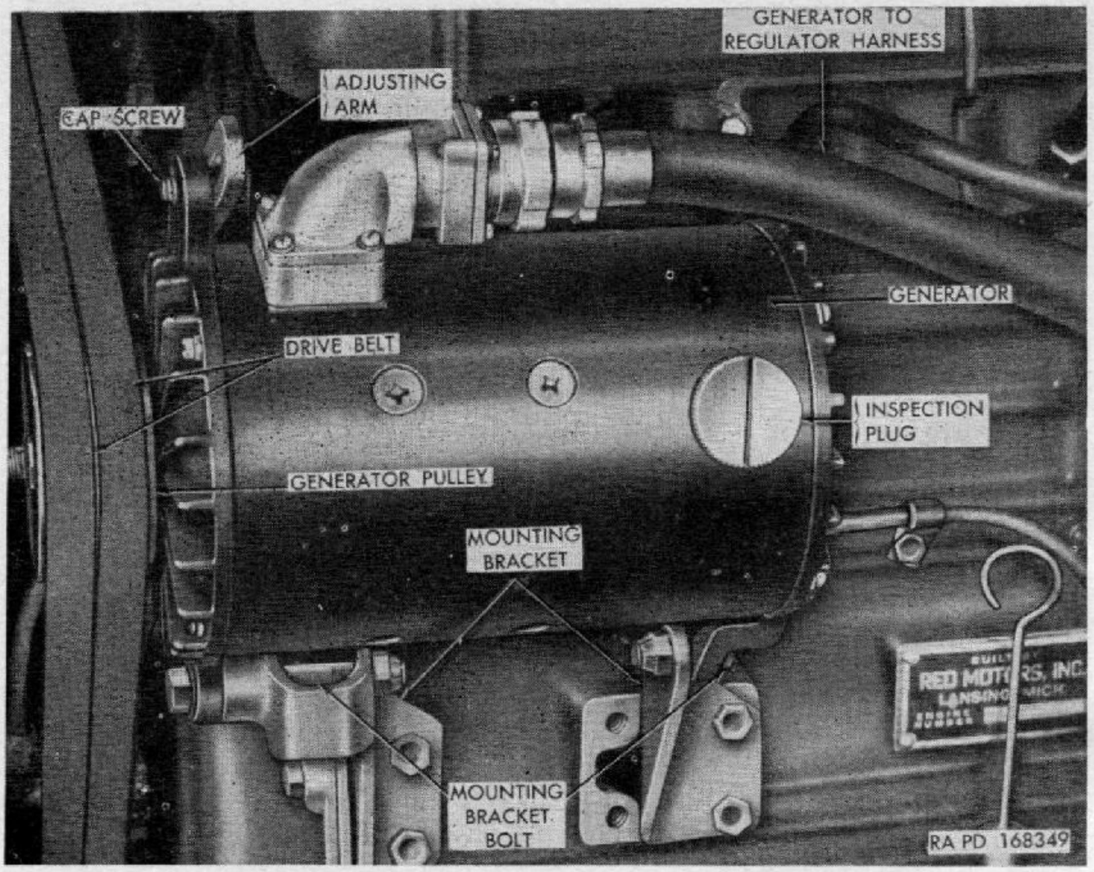

Figure 82. Generator—installed.

c. INSTALLATION (fig. 82). Lower generator into place and install two mounting bracket bolts (one at each end) attaching generator to mounting bracket. Install two nuts but do not tighten. Place drive belts over generator pulley. Install generator-to-adjusting-arm cap screw. Adjust drive belts (par. 122) and tighten nuts on mounting bolts. Polarize generator (*d* below).

d. POLARIZATION. When a new or rebuilt generator or regulator has been installed, or generator-to-regulator harness has been disconnected for any reason, generator must be polarized after unit is installed and *before engine is started.* Disconnect generator-to-regulator harness at generator (fig. 83). Disconnect chassis wiring harness at regulator (leave generator-to-regulator harness connected to regulator). Use a jumper wire to *momentarily* connect field terminal "B" at generator and battery terminal "A" at regulator (fig. 136). Remove jumper wire. Connect chassis wiring harness at regulator and generator-to-regulator harness at generator and tighten with wrench 41–W–3249–900 (fig. 83).

133. Generator Regulator

(figs. 84 and 85)

a. TESTING. Because of the totally enclosed construction of the charging system components, and the watertight-wiring harness and

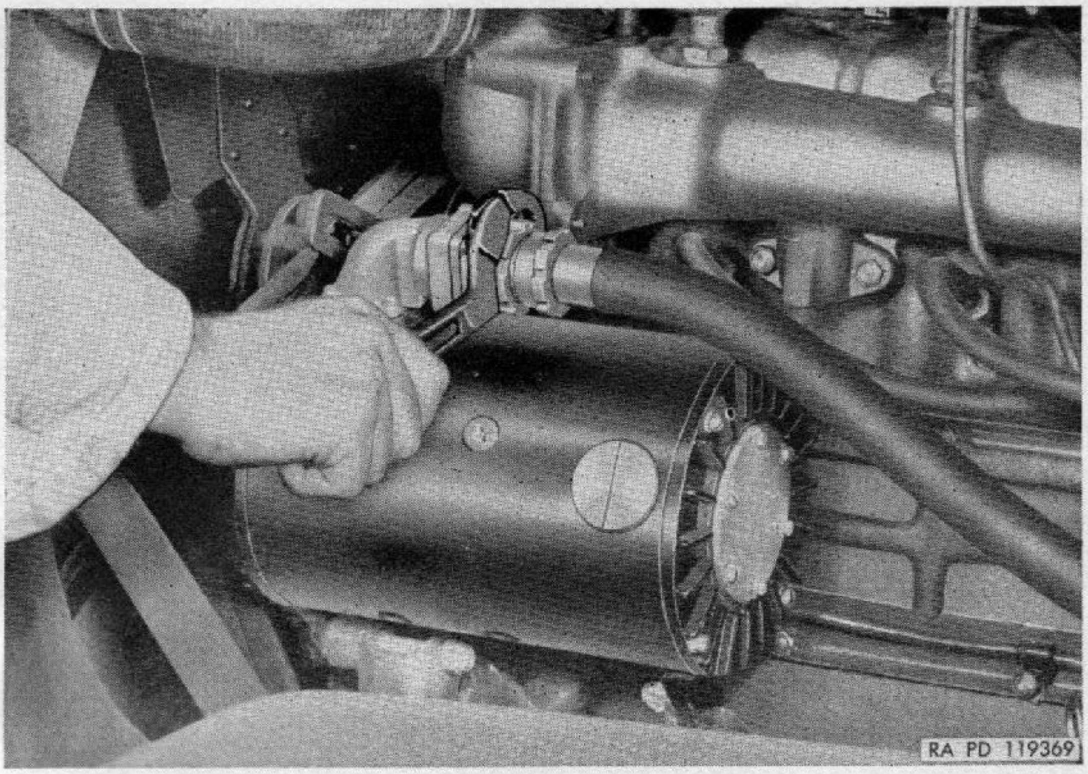

Figure 83. Disconnecting generator harness using wrench 41-W-3249-900.

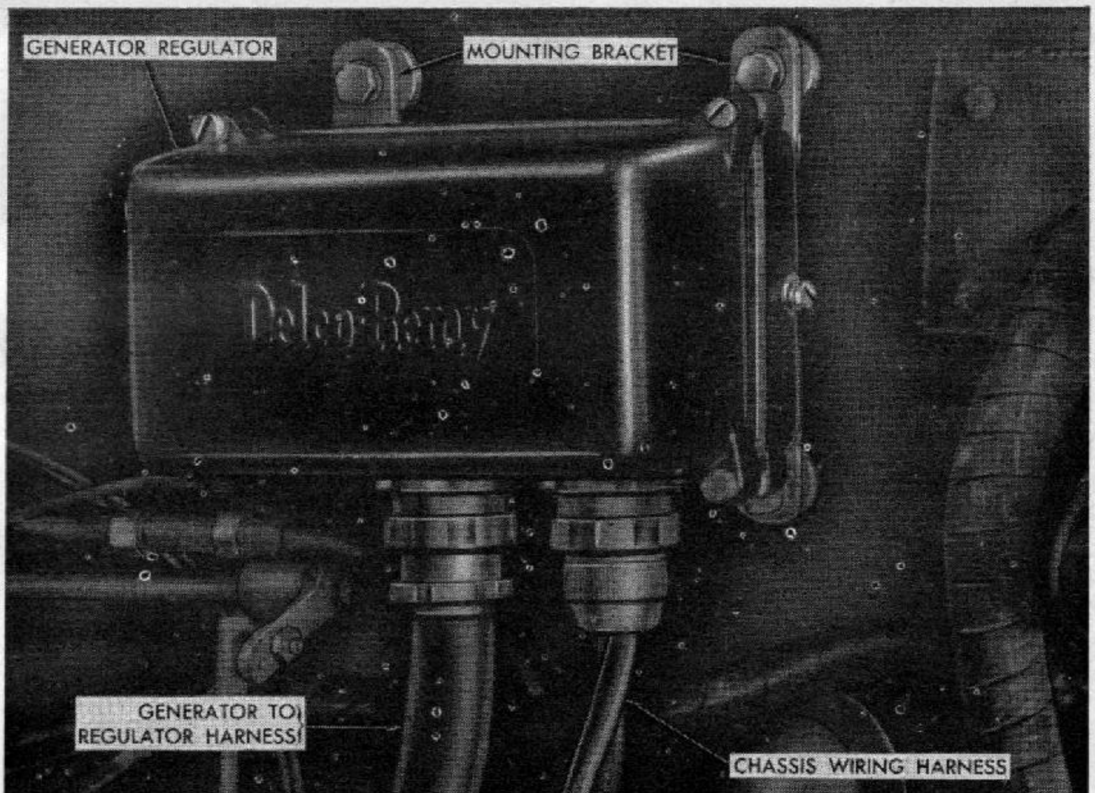

Figure 84. Generator regulator—M34 trucks, serial 90000–100609 and 101061–101077.

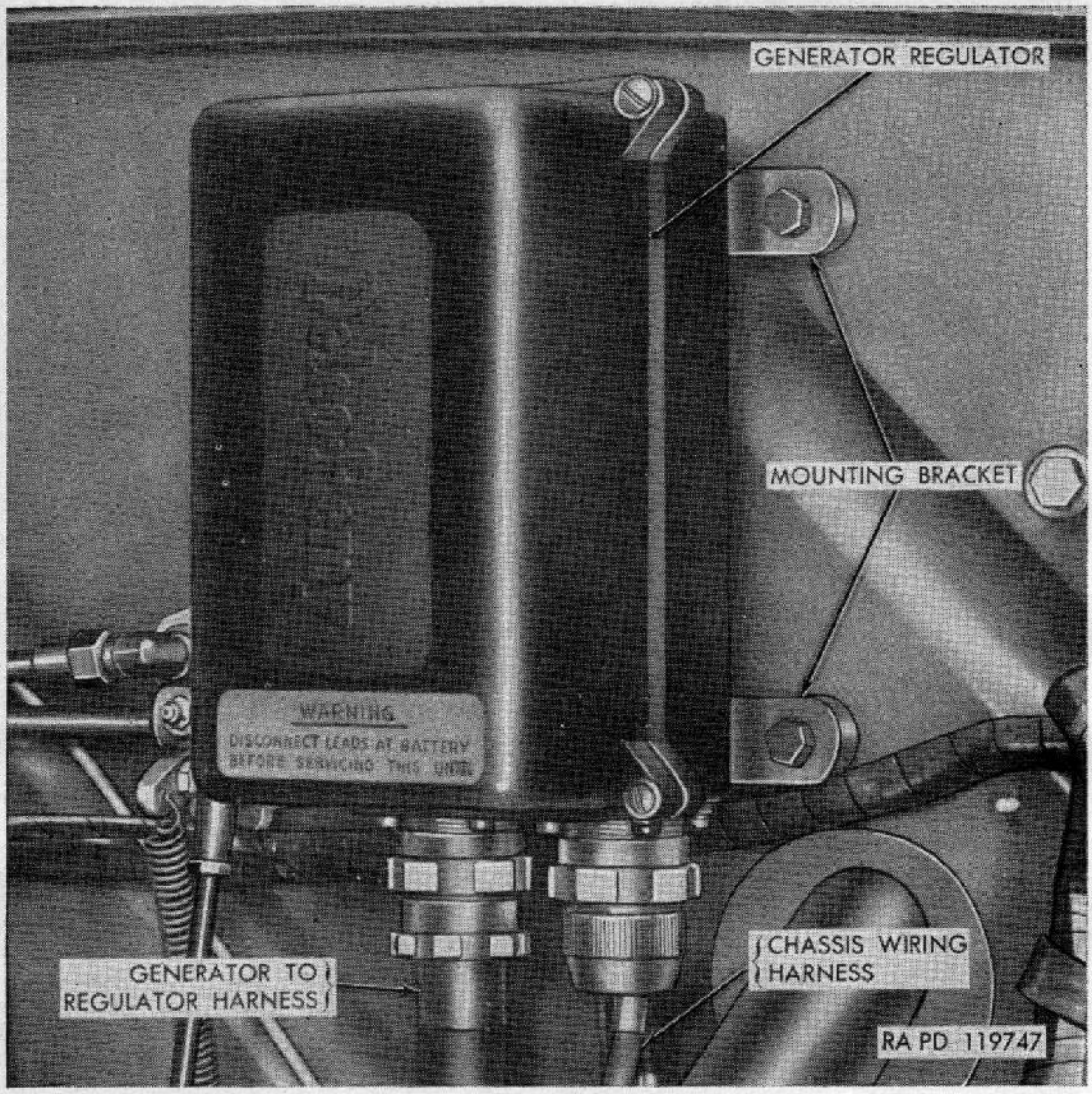

Figure 85. Generator regulator—all M36 and M47 trucks and M34 trucks—serial 100610–101060 and 101078 up.

fittings used, normal methods of testing the generator regulator are not applicable. The regulator must be replaced if ammeter shows a high charging rate with fully charged batteries, low or no charging rate with low batteries, or if burned resistance, windings or contacts, or burned relay contact points are found in the regulator.

b. Removal. Loosen nut on generator-to-regulator harness at regulator with wrench 41–W–3249–900 and pull cable from regulator. Disconnect chassis wiring harness at regulator in the same manner. Remove four cap screws attaching regulator to mounting bracket and remove regulator.

c. Installation. Position regulator on mounting bracket with conduit openings down. Secure with four cap screws. Connect generator-to-generator harness at regulator and tighten nut with wrench 41–W–3249–900. Connect chassis wiring harness at regulator in the same manner. Polarize generator (par. 132*d*).

Section XIV. TRANSMISSION AND POWER-TAKE-OFF

134. Description and Data

a. DESCRIPTION.

(1) *Transmission.* The transmission assembly (fig. 86) is a manually shifted, selective gear type with five speeds forward and one reverse. The transmission assembly is mounted to and supported by engine-clutch-and-flywheel housing. Gear shifting is by a conventional gearshift lever.

(2) *Power-take-off.*

(*a*) *Models M34 and M36* (fig. 87). The power-take-off is a two speed and reverse unit mounted on left side of transmission. It is used to supply power to front mounted winch. Power-take-off shifting lever (fig. 16) extends through cab floor at left of transmission.

(*b*) *Model M47 and M59.* A double power-take-off is mounted on left side of transmission, the forward output shaft is a two-speed and reverse drive to the winch. Shifting lever control is the same as in (*a*) above. The rear output shaft drives the hydraulic pump for the dump mechanism and is controlled by a separate lever (par. 37).

b. TABULATED DATA.

Transmission:

Make	Spicer
Model	3052
Type	synchromesh
Ratio	reverse 7.36 to 1.00
	first 7.55 to 1.00
	second 4.18 to 1.00
	third 2.45 to 1.00
	fourth 1.45 to 1.00
	fifth 1.00 to 1.00

Power-take-off:

For trucks M34 and M36

Make	Spicer
Model	WN7

For trucks M47 and M59:

Make	Spicer
Model	WND7

135. Transmission Replacement

a. COORDINATION WITH ORDNANCE MAINTENANCE UNIT. Replacement of the transmission (fig. 86) with a new or rebuilt unit is normally an ordnance maintenance operation, but may be performed in

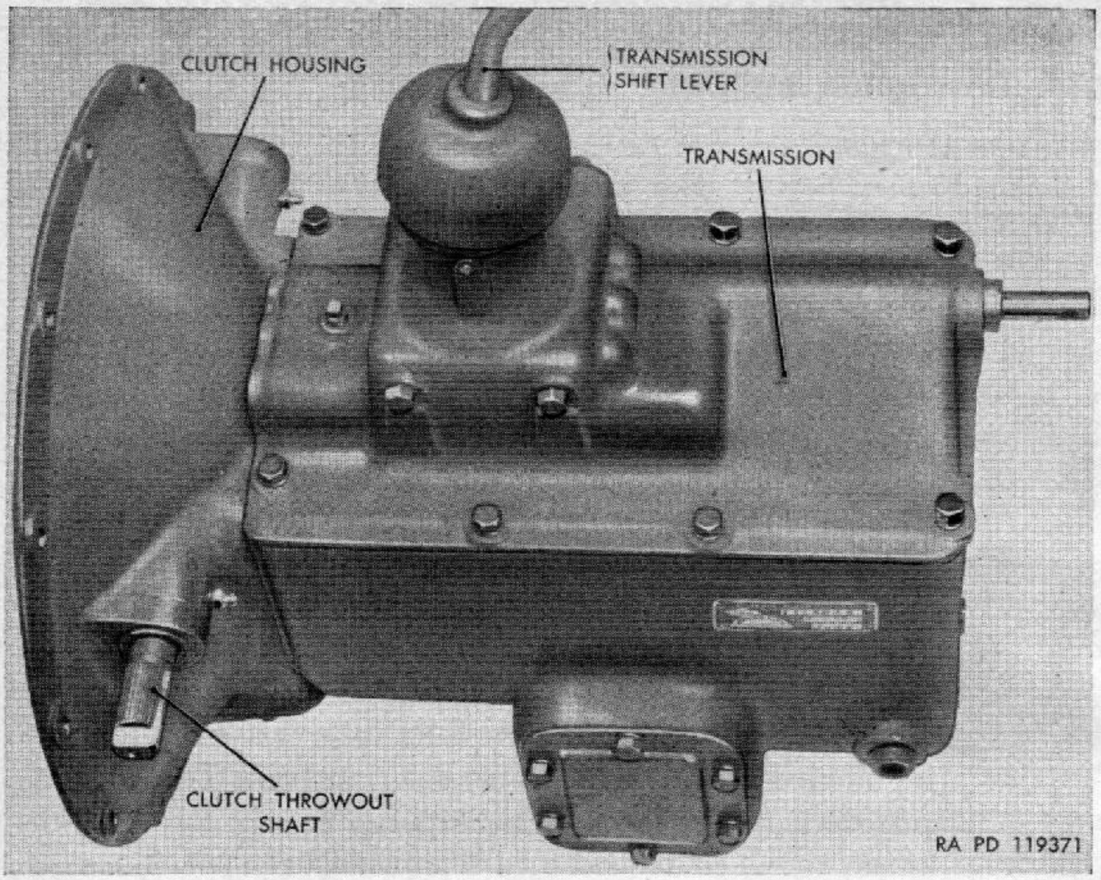

Figure 86. Transmission assembly.

an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

b. REMOVAL. Removal or replacement of transmission can be accomplished without removal of the power plant but it will be generally found that replacement of the transmission is facilitated if power plant is removed.

(1) *Remove power plant.* Refer to paragraph 97.

(2) *Remove transmission* (fig. 86). Support transmission and remove 12 cap screws holding transmission to flywheel housing. Pull transmission straight out from engine until clutch pilot bearing clears bearing in crankshaft. Clutch pilot must not take any unsupported weight of transmission. Remove and discard gasket.

c. INSTALLATION (fig. 86). Fill crankshaft cavity behind clutch pilot bearing not over 50 percent of volume with grease (GAA). Also lightly coat inside of bearing with same grease. Place a new gasket on flywheel housing, support transmission, and carefully aline clutch pilot with pilot bearing in crankshaft. Enter clutch pilot in pilot bearing and push transmission into place. Guard against allowing any unsupported weight falling on clutch pilot. If splines do not enter clutch member easily, shift transmission into low gear position and turn output shaft by hand until splines enter. Install 12 cap screws and tighten securely.

d. Record of Replacement. Record the replacement on DA AGO Form 478, MWO and Major Unit Assembly Replacement Record and Organizational Equipment File.

e. Transmission Cover Assembly Replacement.

(1) *Removal.* Place transmission in neutral and remove eight cap screws holding cover. Lift cover assembly straight up and discard gasket.

(2) *Installation.*

(*a*) Arrange all gears and synchronizers on input shaft in neutral position. Place new gasket on transmission.

(*b*) Arrange all shifter shafts in cover in neutral position.

(*c*) Set cover assembly on transmission and see that all shifter forks engage collars in gears and synchronizers. Secure cover with eight cap screws.

136. Power-Take-Off Replacement

a. Removal. The power-take-off assembly is accessible from under truck and can be removed while power plant is installed. Two types of power-take-offs are used, the single output shaft type for winch drive as used on M34 and M36 trucks (fig. 87), and the double output

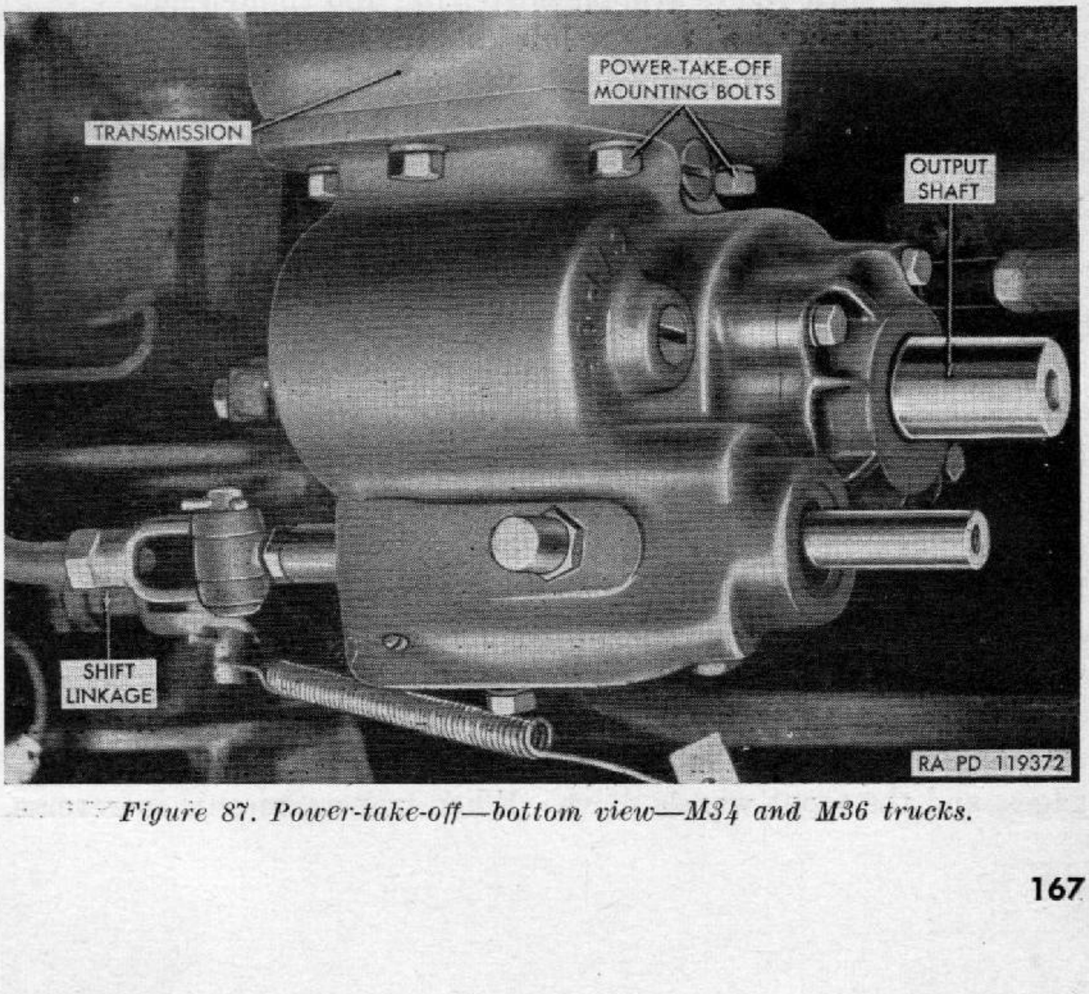

Figure 87. Power-take-off—bottom view—M34 and M36 trucks.

shaft type for drive to both winch at front and oil pump at rear as used on M47 and M59 trucks. Removal of both types is similar.

(1) Drain transmission. Disconnect shift linkage from power-take-off shifter shaft (fig. 88). Loosen socket-head set screw in stop collar. Loosen set screw holding drive shaft yoke in place on front output shaft and slip yoke from shaft. For the double drive power-take-off, the above disconnects are repeated at the rear.

(2) Remove six power-take-off mounting bolts and lock washers holding the assembly to transmission and remove assembly.

(3) If power-take-off is not replaced immediately, install a cover to prevent entrance of dirt into transmission.

b. INSTALLATION.

(1) *Power-take-off.* Place a new gasket on transmission and install power-take-off. Secure with six power-take-off mounting bolts and lock washers.

(2) *Trucks M34 and M36.* Aline keyway in drive shaft yoke with key in front output shaft, install drive shaft, and tighten set screw. Position stop collar three-fourths-inch ahead of rear universal joint and lock securely in place with set screw. Connect shift linkage to shifter shaft (fig. 88).

(3) *Truck M47 and M59.* Perform operations as in (2) above. Aline keyway in rear drive shaft yoke with key in rear output shaft, install drive shaft and tighten set screw. Connect rear shift rod to arm on shifter rod and tighten nut.

(4) *Fill transmission.* See lubrication order (par. 56).

c. RECORD OF REPLACEMENT. Record the replacement on DA AGO Form 478, MVO and Major Unit Assembly Replacement Record and Organizational Equipment File.

Section XV. TRANSFER

137. Description

a. MODEL M34, SERIAL NUMBERS 90484 AND BELOW. The transfer is a two-speed unit driven by transmission and distributes power to front and rear axles through propeller shafts. The transfer is located immediately back of transmission and is mounted on two transfer supports (fig. 89). Driver's control is by transfer gearshift lever (fig. 16) in cab. Transfer gearing is designed to drive front axle at lower revolutions per minute than rear axles. An overrunning sprag clutch on drive to front axle automatically eliminates delivery of power to front axle during normal operation forward and front wheels run freely. When rear wheels slip, the overrunning clutch engages, and the front wheels drive. When transmission is in reverse,

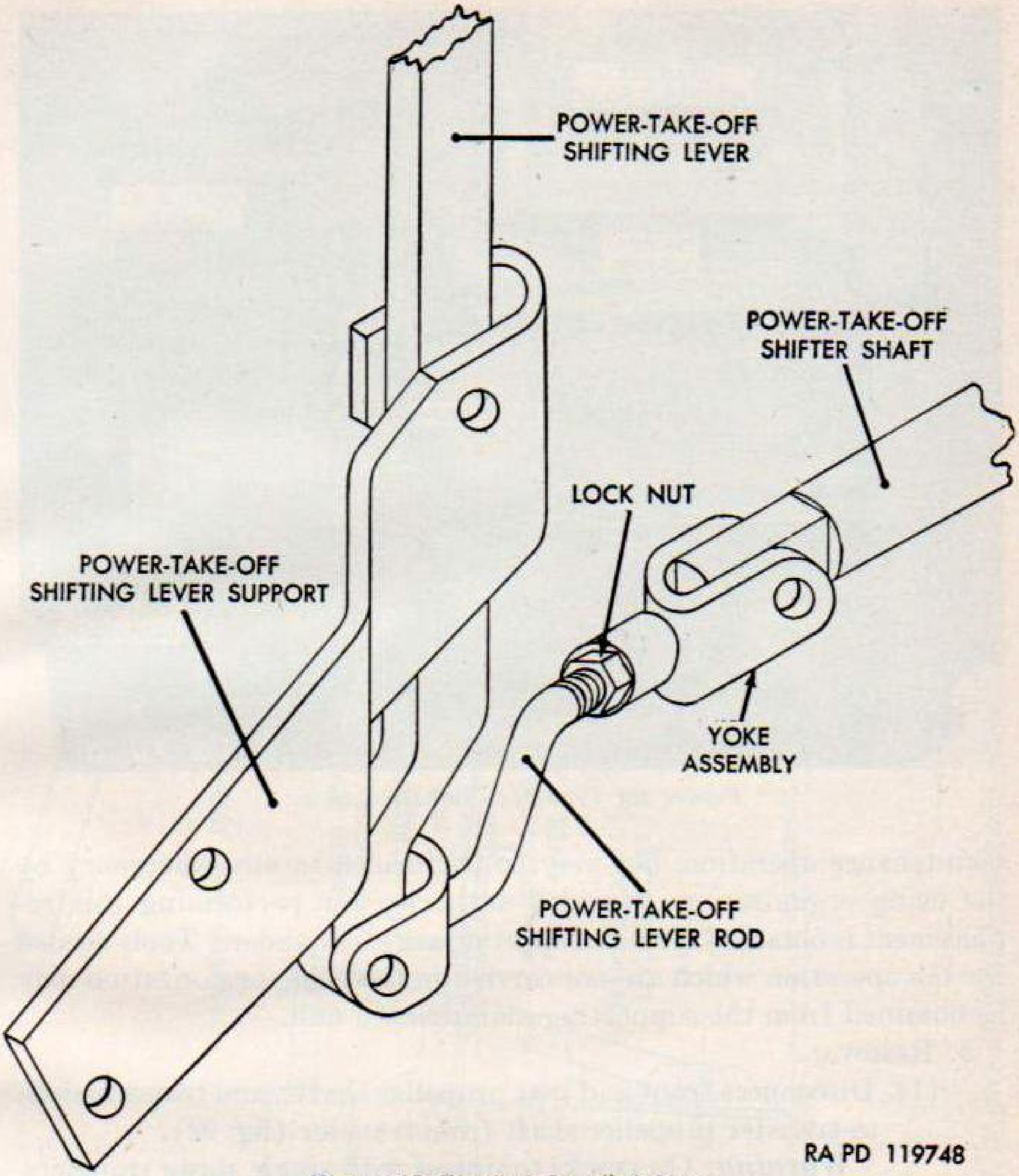

Figure 88. Power-take-off linkage.

the overrunning clutch is locked and power is delivered to both front and rear axles. This unit is known as a "single-sprag" transfer.

b. Model M34, Serial Numbers 90485 and Over, and All Models M36, M47, and M49. Above models are equipped with a transfer similar to that described in *a* above except that the single sprag clutch is replaced with a double sprag. This double sprag clutch permits independent action of front and rear wheels when in reverse as well as forward.

138. Transfer Replacement

a. Coordination with Ordnance Maintenance Unit. Replacement of the transfer with a new or rebuilt unit is normally an ordnance

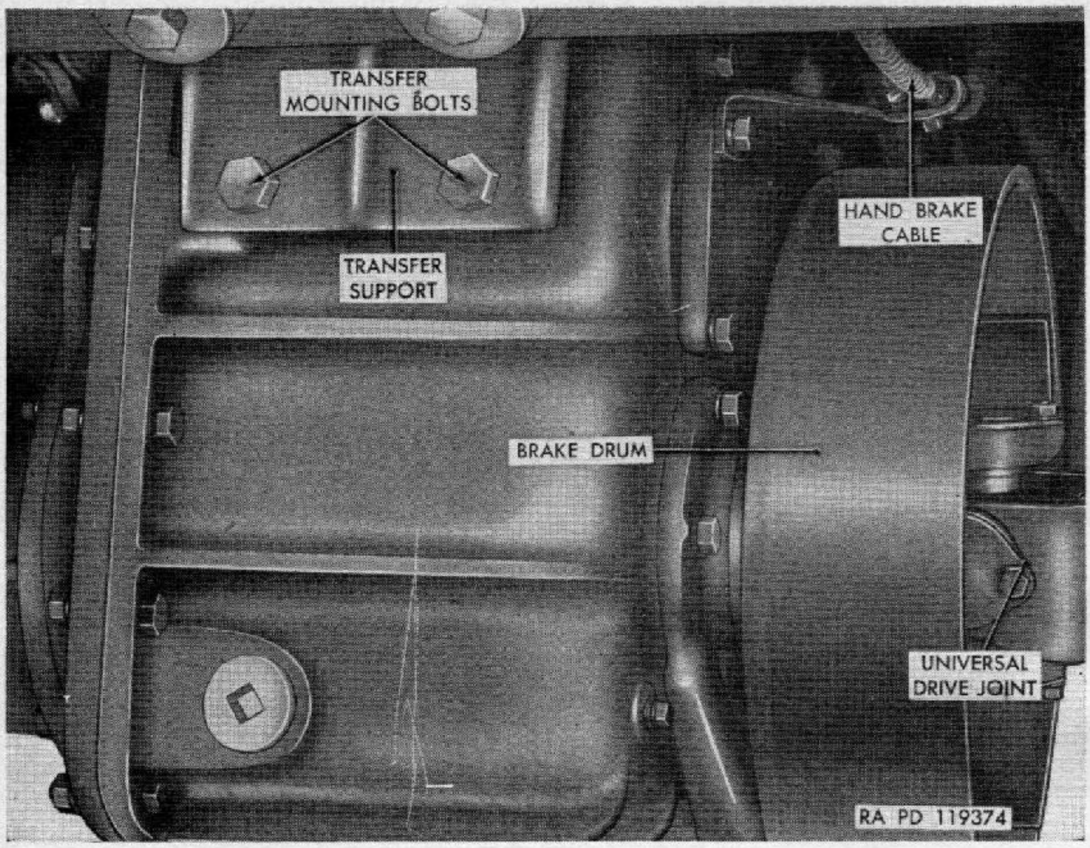

Figure 89. Transfer—installed view.

maintenance operation, but may be performed in any emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

b. REMOVAL.

(1) Disconnect front and rear propeller shafts, and transmission-to-transfer propeller shaft from transfer (fig. 92).

Warning: On trucks equipped with single sprag transfers, always raise one wheel on each of the three axles clear of the ground, to relieve torsional strain, before disconnecting propeller shafts. Failure to observe this warning may result in personal injury.

The type of transfer may be identified by the difference in the reverse-shift linkage (fig. 90 and 91). See also paragraph 5.

(2) Disconnect and remove hand-brake cable assembly from hand-brake-shoe lever (fig. 113), and from bracket on transfer.

(3) Disconnect transfer shift linkage from transfer shifter shaft, and transfer reverse shift lever rod assembly from transfer-reverse-shift-rod lever. Loosen cap screw and remove trans-

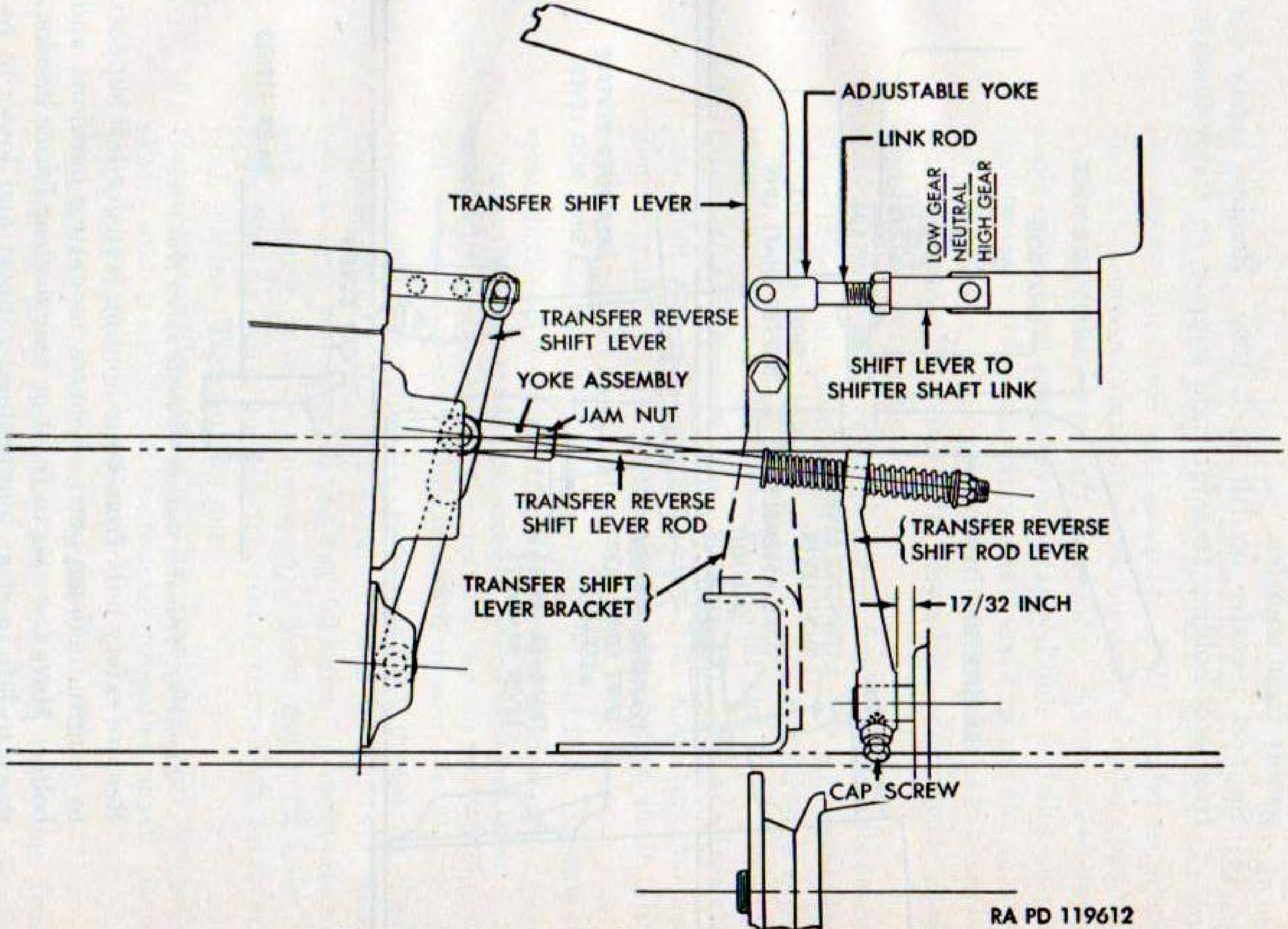

Figure 90. Transfer linkage—single sprag transfer.

fer-reverse-shift-rod lever from transfer-reverse-shift shaft (figs. 90 or 91).

(4) Disconnect and remove speedometer-flexible-shaft assembly from angle drive-joint assembly, and remove drive joint assembly from transfer.

(5) Support transfer on lift 41-L-1360. Remove safety nut from bolt holding transfer-right support to frame bracket.

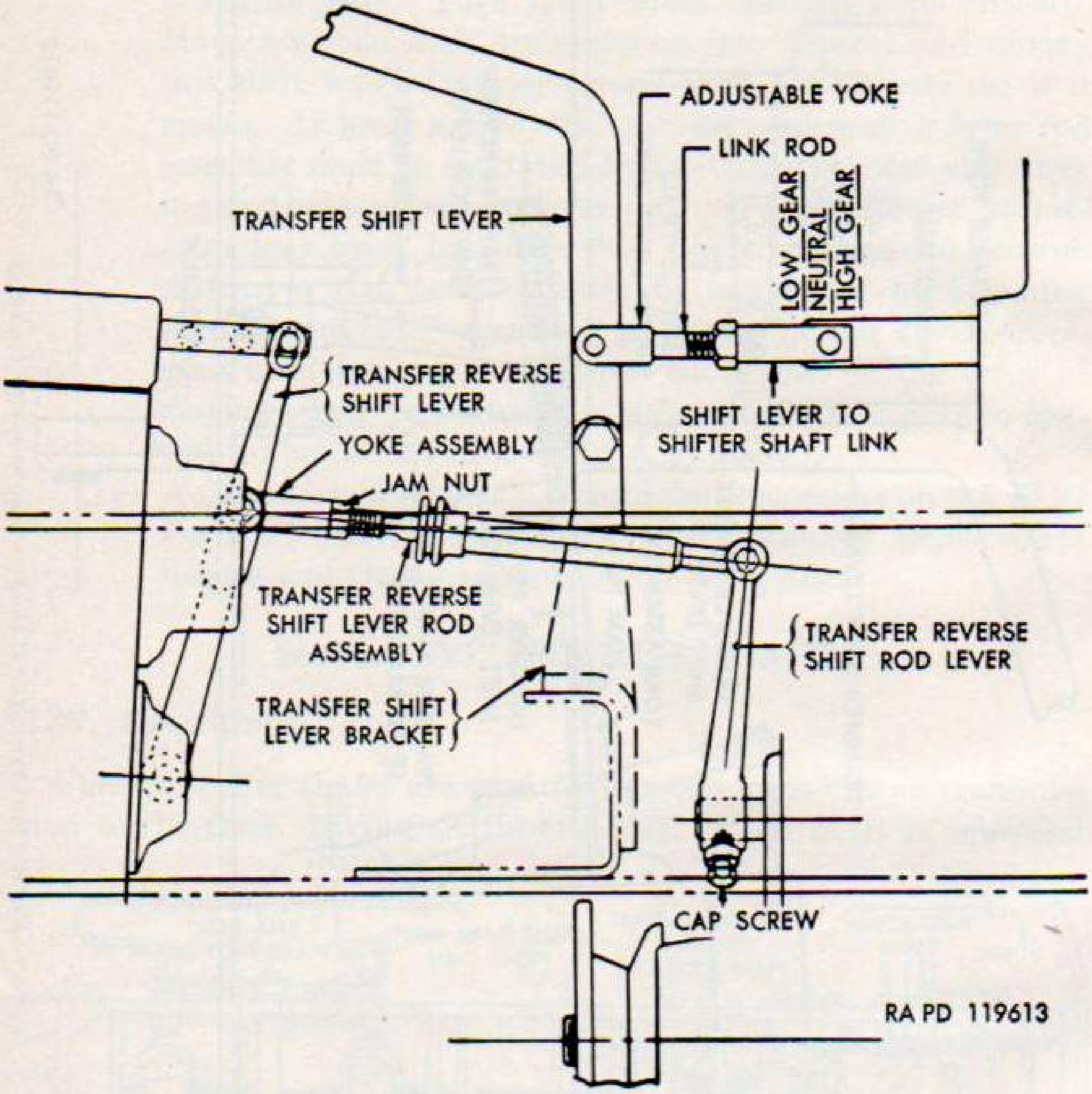

Figure 91. Transfer linkage—double sprag transfer.

Remove safety nuts from bolts holding transfer-left support to longitudinal support. Remove mounting cushions and bolts. Move transfer to front or rear to clear frame bracket, move to left to clear longitudinal support and lower to remove. Remove cushions from frame bracket and longitudinal support.

c. INSTALLATION.

(1) *Install transfer.* Place one mounting cushion in hole in frame bracket with metal side up and two in holes in longi-

tudinal support with metal sides up. Place transfer in position with supports resting on cushions and aline holes. Install $\frac{1}{2}$ x 3-inch bolt through transfer-right support, cushion, and frame bracket. Place cushion over bolt and insert cushion in hole in bracket. Install safety nut but do not tighten. Insert $\frac{1}{2}$ x 4-inch bolts through transfer-left support, cushion, and longitudinal support. Install safety nuts and tighten all three nuts securely. Fill transfer to proper level with correct lubricant. See lubrication order (par. 56).

(2) *Connect speedometer-shaft assembly.* Screw speedometer angle-drive-joint assembly into tapped hole in front-output-shaft cover making sure drive-shaft end engages slot in driving-gear lock. Aline key in end of flexible-shaft assembly with keyway in drive-joint assembly and insert shaft. Tighten connecting nut.

(3) *Connect hand-brake cable.* Position hand-brake cable assembly on bracket at transfer and secure with "U" bolt and safety nuts. Insert threaded end of cable assembly through eye in brake-shoe lever and secure with special nut.

(4) *Connect shift linkage* (figs. 90 and 91). Place adjustable yoke, link rod, and shift-lever-to-shifter-shaft link, in position on transfer-shift lever and transfer-shifter shaft, aline holes, and install bolts and safety nuts.

(5) *Connect reverse-shift linkage* (figs. 90 and 91). Install reverse-shift-rod lever on transfer-reverse-shift shaft.

Note. On single-sprag-unit, linkage reverse-shift-rod lever is installed with offset end away from transfer (fig. 90); on double sprag-unit, linkage offset end of lever is toward transfer (fig. 91).

Install cap screw making sure it enters detent in shaft. Tighten lever bolt. Place transmission in neutral. Move reverse-shift-rod lever all the way forward. Loosen jam nut and unscrew yoke on reverse shift lever rod until holes in yoke line up with hole in transfer-reverse-shift lever and push pin in. Tighten jam nut.

(6) *Connect propeller shafts.* Aline front and rear propeller shafts and transmission-to-transfer-propeller shaft, install bolts, and tighten securely.

(7) *Check linkage adjustment* (fig. 91).

(*a*) With all parts assembled and installed, raise one front wheel clear of ground. Shift transmission into reverse. Turn front wheel backwards. Then try to turn it forward. The wheel should be locked against forward rotation but free to turn backwards.

(*b*) Place transmission in neutral. Turn front wheel forward. Then try to turn it backwards. The wheel should be locked against backward rotation but free to turn forward.

(c) If both of these checks show linkage adjustment to be satisfactory, lower wheel and disregard (8) below. If adjustment is not correct, refer to (8) below.

(8) *Adjust linkage* (fig. 91). If check of linkage adjustment ((7) above) indicated need for adjustment, shift transmission into first gear. Turn front wheel one-half turn forward. Have someone shift transmission into neutral and during this shift watch transfer-reverse-shift-rod lever to see if it moves. If lever moved, the transfer-reverse-shift-lever rod assembly must be shortened by loosening jam nut and turning rod into yoke. If lever did not move, proper adjustment may exist, but more than likely the transfer-reverse-shift-lever rod assembly must be lengthened by loosening jam nut and turning rod out of yoke. Repeat above procedure until lever does not move but is just on the verge of moving when transmission is shifted from first gear to neutral. Then check adjustment ((7) above).

(9) *Record of replacement.* Record the repacement on DA AGO Form 478, MWO and Major Unit Assembly Replacement Record and Organizational Equipment File.

Section XVI. PROPELLER SHAFTS

139. Description

Four propeller shafts are used to transmit power from transmission to the three driving shafts (fig. 92). Each shaft is equipped

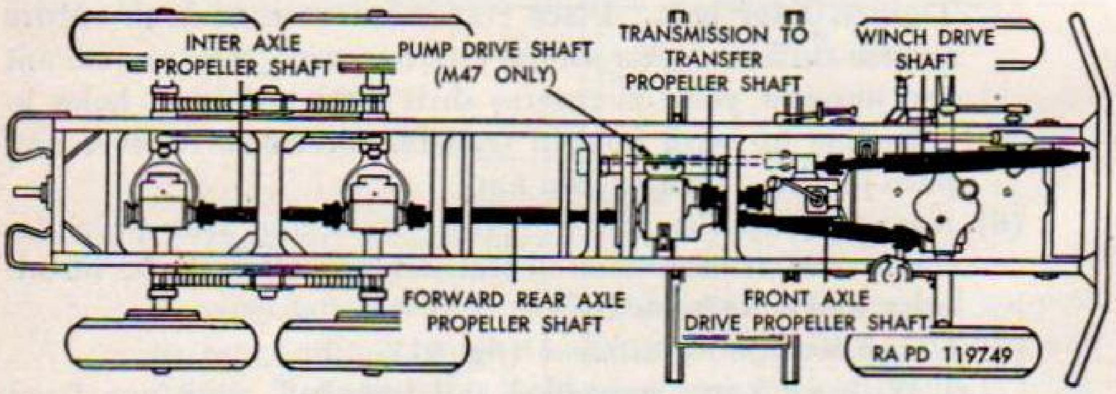

Figure 92. Propeller shaft locations.

with two universal joint assemblies and a slip joint. On model M36, the forward rear axle shaft is a three joint shaft; a center bearing near mid-point of shaft being attached to truck frame (fig. 93).

140. Propeller Shaft Replacement

a. General.

(1) Model M34 trucks, serial number 90484 and below, are equipped with "single sprag" transfers which, on occasion, set up torsional strain in the propeller shafts. These single sprag transfers are identical in outward appearance with the double sprag transfers used on later models but can be identified by differences in the reverse shift linkage (figs. 90 and 91). Check serial number of truck or identify the transfer before proceeding with removal.

Warning: Before disconnecting the propeller shafts, always raise one wheel on each of the three axles clear of the ground to relieve torsional strain. Failure to observe this warning may result in personal injury.

(2) Models M34, serial number 90485 and up, and all trucks, M36, M47, and M59 are equipped with "double sprag" transfers, and the above warning can be disregarded.

b. Removal.

(1) Make sure that arrow marks stamped on shaft, and sleeve yoke at slip joint are visible; if not, mark both members so they can be reassembled in same relative position.

(2) All shafts, except the forward rear axle shaft on model M36, are removed by disconnecting the companion flanges. On model M36, remove the rear section of shaft first, disconnect companion flange from transfer, and detach center bearing by removing two bolts holding bearing to mounting bracket on cross member (fig. 93).

c. Installation. Make sure arrows or marks made before removal are in same relative positions. Position shafts with slip joints nearest input ends. Install companion flange bolts and secure with safety nuts. Raise center bearing (fig. 93) to bracket and secure with two bolts.

Section XVII. FRONT AXLE

141. Description

(fig. 94)

The front axle is bevel drive, top mounted, double reduction, single speed type. It consists essentially of the housing, differential and pinion assembly, axle-shaft and universal joint assemblies, and steering-knuckle assemblies. Power is transmitted from differential to wheels through the axle shaft and universal joint assemblies. The universal joints permit delivery of power to wheels when truck is turned to right or left. An overrunning clutch, on drive to front axle,

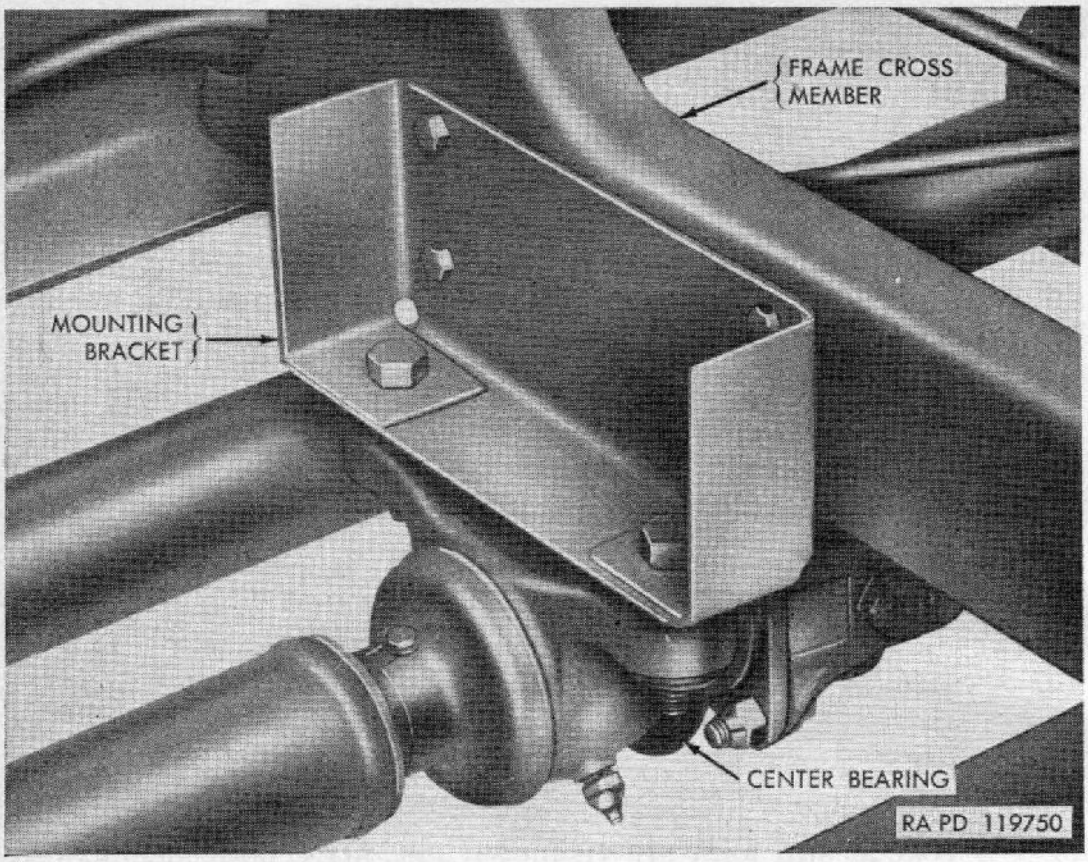

Figure 93. Center bearing—forward rear axle propeller shaft—M36.

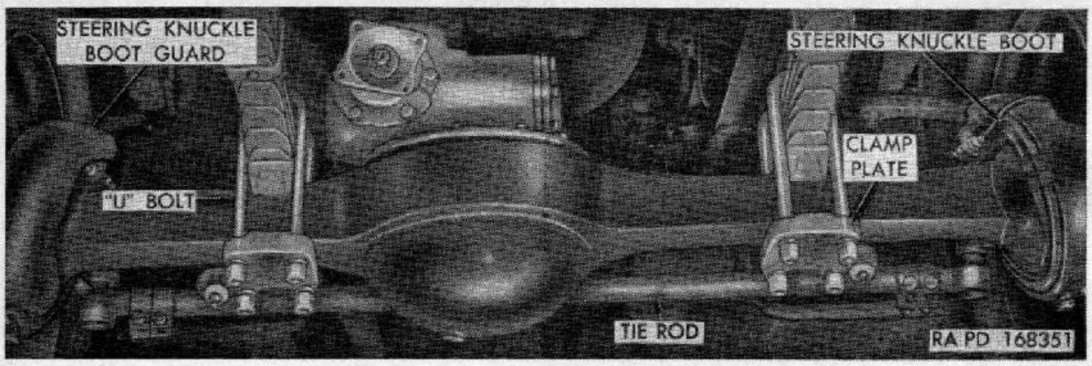

Figure 94. Front axle installation.

located in transfer, automatically eliminates delivery of power to front axle during normal operation (par. 137).

142. Front-Wheel Alinement
(fig. 95)

a. General. Front-wheel alinement has a major effect on steering from a standpoint of control, ease of steering, and safety. Front-wheel misalinement is a major cause of premature and uneven tire wear. The factors involved in the front-wheel alinement are caster, camber, turning angle, and toe-in.

(1) *Caster.* Front-axle caster (angle C to D) is the inclination of the center line through the upper-and-lower-steering-knuckle sleeves toward the rear of the truck. Caster angle is established by design and will be changed only by the shifting of the front axle on the springs or by the distortion of the chassis frame or springs. There is no adjustment for caster.

(2) *Camber.* Front-wheel camber (B minus A) is the outward inclination of the wheels as viewed from the front of the truck, that is, the wheels are farther apart at the top than

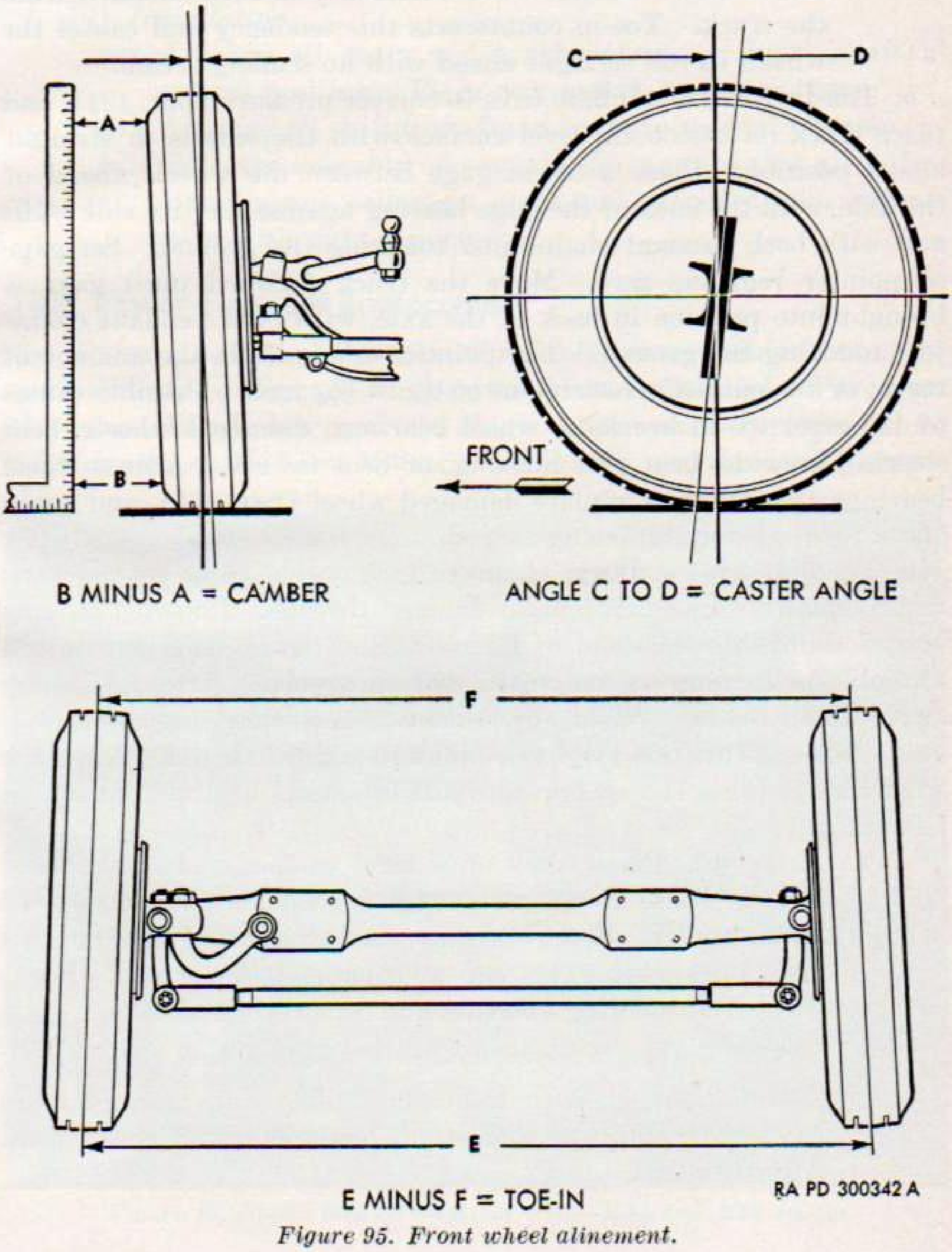

Figure 95. Front wheel alinement.

at the bottom. There is no adjustment for camber; however, loose wheel bearings, worn knuckle-sleeve bearings, bent steering knuckle, or bent axle housing will affect camber.

(3) *Turning angle.* Front-wheel turning angle is the maximum angle through which the wheels may be turned from the straight-ahead position. This angle is limited by turning stops that are welded after adjustment.

(4) *Toe-in.* Front-wheel toe-in (E minus F) is the amount by which the wheels are closer together at the front than at the rear, with the wheels in a straight-ahead position. Camber causes both wheels to have a tendency to turn outward from the truck. Toe-in counteracts this tendency and causes the wheels to roll straight ahead with no scuffing action.

b. TOE-IN CHECK. Inflate tires to correct pressure (par. 184), and place truck on a smooth, level surface with the wheels in straight ahead position. Place a toe-in gage between the wheels ahead of the axle, with the ends of the gage bearing against the tire side walls and with both pendant chains just touching the ground. Set gage so pointer registers zero. Move the truck forward until gage is brought into position in back of the axle, with both pendant chains just touching the ground. The pointer will indicate the amount of toe-in or toe-out. Correct toe-in is $\frac{1}{16}$ to $\frac{3}{16}$ inch. Possible causes of incorrect toe-in are loose wheel bearings, damaged wheels, bent steering knuckle, bent axle housing, or bent tie rod. Adjust wheel bearings (par. 185) or replace damaged wheel (par. 183), and again check toe-in, before replacing tie rod.

c. TIE-ROD ADJUSTMENT. Remove tack welds from tie-rod ends with hammer, using care not to damage threads. Loosen two nuts at end clamps on each end of tie rod. Shorten or lengthen tie rod assembly by turning tie rod with a stillson wrench. After adjusting, again check toe-in. When adjustment is correct, tighten and end-clamp bolts. Tack weld end assemblies to ends of tie rod. Also tack weld clamps to tie rod on opposite side of clamp opening and slot in tie rod.

(1) *Removal.* Place truck on a level surface and apply hand brake. Raise front axle enough to take weight of truck off front wheels. Remove cotter pin and nut from tie-rod-end assemblies (fig. 114), one at each end of tie rod. Force studs from steering knuckles and remove tie rod.

Note. Use care to prevent damage to threads on studs.

(2) *Installation.* Push tie-rod-end assembly studs through holes in steering knuckles and secure with nuts and cotter pins. Adjust tie rod.

143. Driving Universal Joint Replacement

a. Removal.

(1) *Remove hub and drum assembly.* Refer to paragraph 185.

(2) *Remove steering spindle assembly.* Remove 12 nuts and lock washers from studs in steering-knuckle outer flange and remove brake-drum oil slinger. Remove brake-flange plate assembly, and support so as to eliminate disconnecting brake line. Slide steering spindle assembly from end of axle shaft.

(3) *Remove axle-shaft and universal-joint assembly.* Withdraw axle-shaft and universal-joint assembly from steering knuckle and axle housing by pulling straight out.

(4) *Remove steering arm assembly.* Remove two nuts and lock washers holding steering arm (fig. 114) and steering knuckle-boot guard (fig. 94) to steering knuckle (fig. 114). Remove two cap screws and lock washers holding boot guard to steering knuckle and remove boot guard. Remove other two nuts and lock washers holding steering arm to steering knuckle. Tap steering arm lightly with soft hammer to loosen four steering knuckle stud sleeves. Remove steering arm assembly and four sleeves.

Caution: Do not remove steering knuckle upper and lower sleeves (fig. 96) for any reason. These sleeves are not interchangeable.

If sleeves are damaged or defective, report condition to ordnance maintenance personnel.

b. Cleaning and Inspection.

(1) *Cleaning.* Thoroughly wash axle shaft and universal joint in dry-cleaning solvent or volatile mineral spirits to remove all old lubricant; also wash inside of steering knuckle and housing outer end.

(2) Inspection. Inspect balls and races for grooved, scratched, or pitted condition. To determine if excessive play or backlash exists in the universal joint, place assembly in vise in a vertical position with outer shaft up, and with vise jaws gripping inner shaft just below the universal joint. Use soft metal or wood protectors in jaws of vise. Firmly push down on outer shaft so that it rests on intermediate ball, and at the same time, attempt to twist the joint in both directions. If any play or backlash is evident, report to ordnance maintenance personnel. Inspect axle housing for excessive wear or damage. Examine axle-shaft splines for nicks, cracks, or other damage. Check shafts for twisted or bent condition. If either the inner or outer shaft is damaged or excessively

worn, install a complete new axle-shaft and universal-joint assembly.

(3) *Special lubrication.* Spread new lubricant well into universal joint until it fills all space between balls and universal joint yokes. Also spread lubricant on surfaces which contact spacers and bushing type bearing in steering spindle. See lubrication order (par. 56).

c. INSTALLATION.

(1) *Install steering arm assembly* (fig. 114). Place steering arm assembly with four steering arm stud sleeves in position on steering-knuckle studs. Install two rear nuts and lock washers. Position steering knuckle-boot guard (fig. 94) over studs at top and aline holes at bottom. Install cap screws and lock washers at bottom and nuts and lock washers at top and tighten.

(2) *Install axle-shaft and universal-joint assembly.* Using care not to damage oil seal in housing outer end, insert axle-shaft and universal-joint assembly into axle housing, guiding splined end of inner shaft into splined differential-side gear.

(3) *Install steering spindle assembly.* Position steering spindle assembly on steering-knuckle studs. Milled slot in threaded end of spindle must be at top. Place brake-flange plate assembly, and brake-drum oil slinger on steering-knuckle studs, and install 12 nuts and lock washers.

(4) *Install hub and drum assembly.* Install hub and drum assembly wheel bearing and adjust wheel bearings (par. 185).

(5) *Lubricate.* Lubricate steering knuckle and universal joint (par. 56).

d. STEERING-KNUCKLE BOOT REPLACEMENT (fig. 96).

(1) *Removal.* Remove four cap screws securing steering knuckle boot guard (fig. 94), and remove guard. Cut boot from axle. Loosen outer, and inner clamp rings, and detach remainder of boot.

(2) *Installation.*

(*a*) Replacement boots are molded in one piece with a closed zipper sewed in place. Boots are furnished as a kit and include a tube of sealer.

(*b*) Cut boot along center line of zipper keys and open zipper.

(*c*) Put boot over axle with zipper on side toward center of axle and close zipper. Bend boot to open joint and liberally apply sealer. Close joint, press edges down smoothly, and allow sealer to set 3 to 5 minutes.

(*d*) Aline word "TOP" with center of upper knuckle pin and work small diameter of boot, with zipper next to axle, over

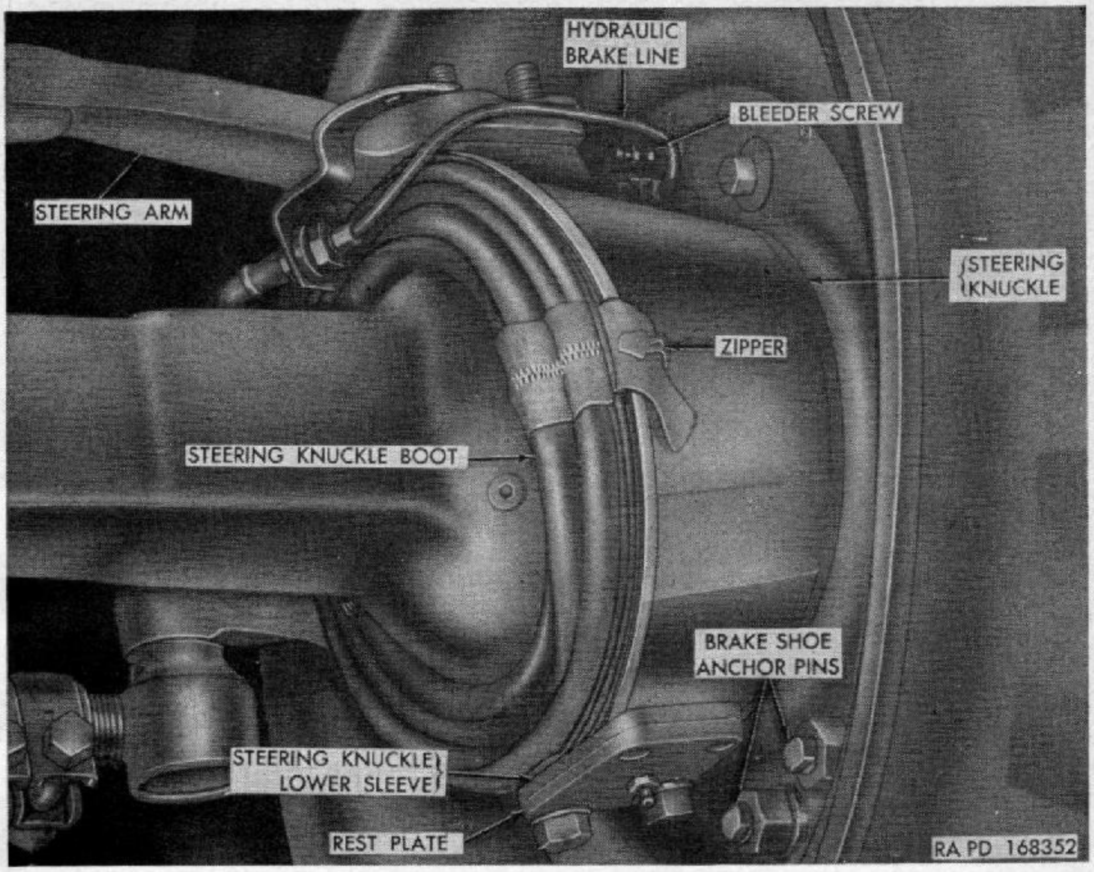

Figure 96. Steering knuckle boot.

groove in axle. Apply sealer to inner end of zipper to clamp groove, install clamp assembly, and tighten screw.

(*e*) Pull boot over inner clamp and work edge over steering knuckle groove. Be sure boot is not twisted. Apply sealer to outer end of zipper, install clamp assembly, and tighten screw.

(*f*) Lock zipper with fine wire near edge of boot and cut off excess zipper.

(*g*) Position steering knuckle boot guard (fig. 94) and secure with four cap screws and lock washers.

144. Front Axle Replacement

a. Coordination With Ordnance Maintenance Unit. Replacement of the front axle with a new or rebuilt unit is normally an ordnance maintance operation, but may be performed in an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

b. Removal.

(1) *Position truck.* Place truck on a level surface and apply hand brake to prevent truck from rolling. Place a dolly jack

under differential housing and raise front end of trunk high enough to permit withdrawing axle assembly. Place blocks under frame-side rails at rear of front-spring-hanger brackets. Lower jack until entire front and weight rests on blocks. Leave jack raised high enough to support axle assembly.

(2) *Remove wheels.* Remove wheel-stud nuts and remove wheel and tire assembly from each side (par. 183).

(3) *Disconnect propeller shaft.* Disconnect propeller shaft at differential (see ***Warning*** par. 140). Tie propeller shaft up to prevent universal joint from becoming damaged or filled

(4) *Disconnect drag link.* Disconnect drag link at steering arm with dirt.
(par. 172).

(5) *Disconnect brake lines.* Remove brake-line brackets from boot guards and from axle housing. Disconnect brake lines from wheel cylinders at rear of brake flange plate.

(6) *Remove axle.* Remove nut, washer, and grommet from lower end of shock absorbers. Remove nuts and lock washers from U-bolts and remove both clamp plate, "U" bolts, and "U" bolt saddles (fig. 114). Lower jack until axle assembly clears. Remove spring seats from axle. Pull axle assembly from under truck making sure hydraulic-brake lines are not damaged.

c. Installation.

(1) *Position axle assembly.* Place axle assembly on dolly jack and move into position under truck. Place spring seats on axle. Raise axle assembly into position against springs, being certain spring-center-bolt heads enter alinement holes in axle spring seats. Place "U" bolt saddles on springs and install "U" bolts (fig. 114). Install clamp plates and install lock washers and nuts on "U" bolts. Tighten from 170 to 180 lb-ft torque. See that grommets are in place on studs at lower end of shock absorbers. Collapse absorbers and insert studs in clamp plates. Install grommets, washers, and nuts and tighten securely.

(2) *Connect brake lines.* Connect brake lines to wheel cylinders at rear of brake flange plate. Install cap screws and bolts connecting brake-line brackets to boot guards and axle housing.

(3) *Connect propeller shaft.* Connect propeller shaft at differential (par. 140).

(4) *Connect drag link.* Refer to paragraph 172 for instructions on installing and adjusting drag link at axle steering arm.

(5) *Install wheels.* Install wheel and tire assemblies on hubs; install wheel-stud nuts and tighten from 400 to 450 lb-ft torque (par. 183).

(6) *Remove blocks and dolly jack.* Raise front of truck with dolly jack and remove blocks from under frame side rails. Lower jack and withdraw from under truck. Check all nuts on spring mounting bolts for tightness with full weight of truck resting on springs.

(7) *Bleed brakes.* Bleed front-wheel brakes (par. 150).

(8) *Lubricate.* Check lubrication of complete axle assembly and propeller-shaft-universal joints, as instructed in paragraph 56.

(9) *Record of replacement.* Record the replacement on DA AGO Form 478, MWO and Major Unit Assembly Replacement Record and Organizational Equipment File.

Section XVIII. REAR AXLES

145. Description

Both rear axles are bevel drive, top mounted, double reduction, single speed type. Differential and carrier are mounted as an assembly in housing. Forward-rear and rear-rear axles are mounted in tandem with torque rods on each side interconnecting the axles. Power is transmitted from transfer by a propeller shaft to forward-rear-axle differential assembly and from forward-rear axle to rear-rear-axle differential assembly by another propeller shaft (fig. 92). Driving force is transmitted from axles to chassis frame by six torque rods attached to spring-seat-cross-shaft brackets at frame. Three of the torque rods are attached to each axle (fig. 115) and take all the driving and braking load.

146. Axle Shaft Replacement
(fig. 97)

a. Removal. Axle shafts are full floating type with flanges forged at the outer ends. The axle shafts transmit the driving force from the differential to the wheels. Flanges are attached to the hubs by cap screws and the inner ends of the shafts are splined to the differential-side gears. Remove eight cap screws and lock washers attaching drive flange to hub. Withdraw shaft from hub by pulling on flange (fig. 97). Remove and discard gasket.

b. Installation. Make sure axle shaft is clean. Slide gasket over end of axle shaft and hold in place on drive flange. Insert splined end of shaft through hub and guide splines into differential-side gear.

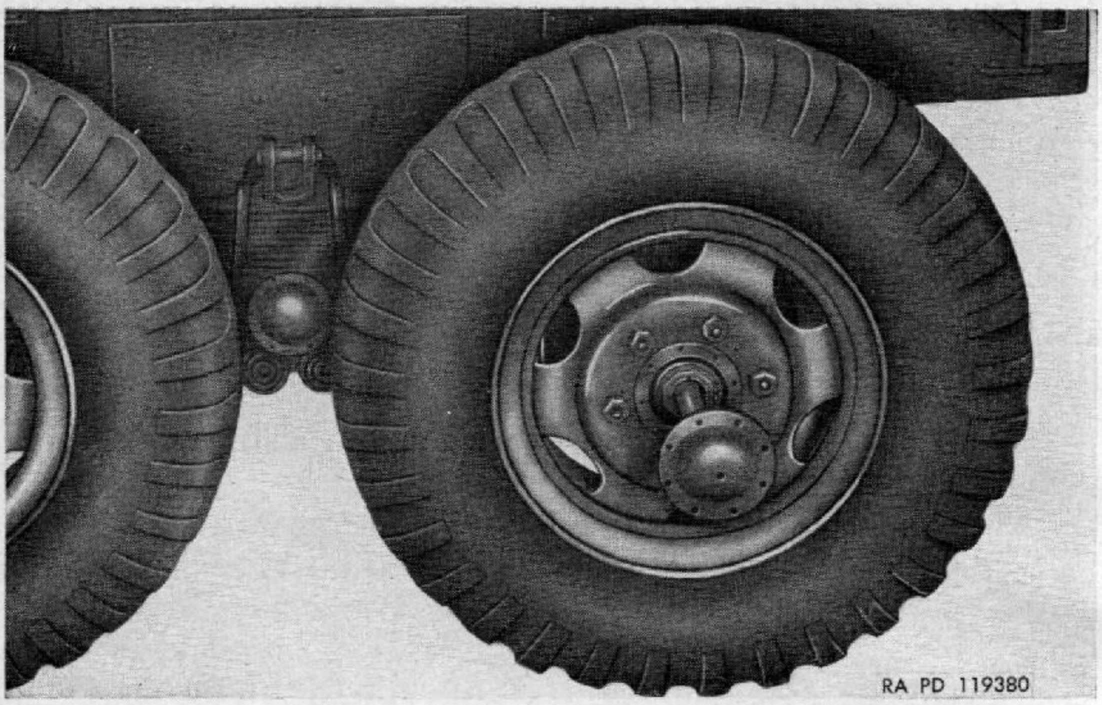

Figure 97. Rear axle shaft replacement.

Aline holes in flange and hub and install eight cap screws with lock washers. Tighten cap screws alternately from 70 to 80 lb-ft torque.

147. Rear Axle Replacement

a. Coordination With Ordnance Maintenance Unit. Replacement of the rear axle with a new or rebuilt unit is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, provided authority for performing this replacement is obtained from the appropriate commander. Tools needed for the operation which are not carried in the using organization may be obtained from the supporting maintenance unit.

b. Removal (fig. 98).

(1) *Position truck.* Place truck on a level surface and block front wheels. Place a jack under each cross-shaft-torque-rod bracket and raise rear end of truck. Place a dolly jack under axle to be removed and raise high enough to support unit.

(2) *Remove wheels.* Remove wheel-stud nuts and remove wheel and tire assembly from each side (par. 183).

(3) *Disconnect brake lines.* Remove brake-line brackets from axle housing and disconnect brake lines from wheel cylinders at rear of brake flange plates.

(4) *Disconnect propeller shaft.* Disconnect propeller shaft at differential (see ***Warning*** par. 140).

(5) *Disconnect torque rods.* Disconnect torque rods as directed in paragraph 165.

(6) *Remove axle.* With axle resting on dolly jack, move to front or rear as necessary until spring ends are free of guide brackets on axle housing and withdraw axle assembly from under truck.

c. Installation (fig. 98).

(1) *Position axle assembly.* Place axle assembly on dolly jack and move axle toward front or rear of truck as necessary, guiding spring ends into guide brackets on axle housing.

(2) *Connect torque rods.* Aline torque-rod ends with holes in torque-rod brackets. Connect torque rods as directed in paragraph 165.

(3) *Connect propeller shaft.* Connect propeller shaft at differential (par. 140).

(4) *Connect brake lines.* Connect brake lines to wheel cylinders at rear of brake flange plates. Install cap screws connecting brake-line brackets to axle housing.

(5) *Bleed brakes.* Bleed rear-wheel brakes (par. 150).

(6) *Install wheels.* Install wheel and tire assemblies on hubs, install wheel-stud nuts and tighten from 400 to 450 lb-ft torque (par. 183). Remove jack from under truck.

(7) *Lubricate.* Lubricate axle assembly and propeller-shaft universal joints, as directed in paragraph 56.

(8) *Record of replacement.* Record the replacement on DA AGO Form 478, MWO and Major Unit Assembly Replacement Record and Organizational Equipment File.

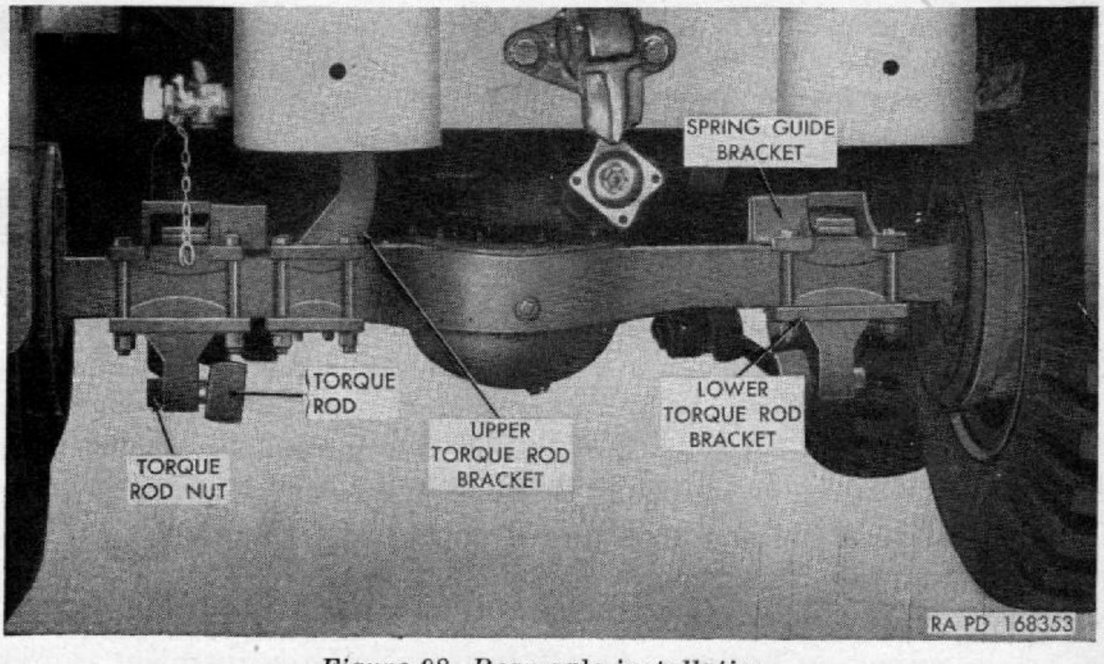

Figure 98. Rear axle installation.

Section XIX. BRAKE SYSTEM

148. Description

a. SERVICE-BRAKE SYSTEM. The service-brake system is an air assisted hydraulic system comprising a master cylinder, an air-hydraulic cylinder, individual hydraulic-wheel cylinders, and necessary lines for hydraulic fluid.

b. MASTER CYLINDER. The master cylinder (fig. 103) contains hydraulic fluid, acted upon by a piston operated by action of brake-pedal linkage. Normal pressure on brake pedal is transmitted by fluid to air-hydraulic brake cylinder which automatically increases fluid pressure to wheel cylinders in direct ratio to foot pressure applied to brake pedal.

c. AIR-HYDRAULIC CYLINDER. The air-hydraulic cylinder (fig. 104) embodies an air cylinder and a hydraulic cylinder in tandem, each fitted with a piston with a common piston rod between. The air piston is of greater diameter than the hydraulic piston. This difference in areas of the two pistons gives a resultant hydraulic pressure much greater than the air pressure admitted to air cylinder. Automatic valves, actuated by fluid pressure from master cylinder, control the air admitted to air cylinder. Thus the fluid pressure in brake lines is always in a direct ratio to foot pressure on brake pedal. An air line from air-hydraulic cylinder leads to a trailer coupling (fig. 147) at rear of truck.

d. HAND BRAKE. The hand brake consists of a brake drum mounted on rear-output shaft of transfer (fig. 112), and inner and outer brake shoes operated by a hand-brake-shoe lever (fig. 113). A cable, attached to hand-brake-shoe lever, runs through a protective casing to hand-brake lever at left of driver's seat (fig. 16).

149. Service Brake Adjustment

a. ADJUSTMENT TESTS.

(1) Adjustments of the brake system to compensate for normal wear are confined to adjustments at the brake shoes. Adjustment of master-cylinder push rod is necessary only to obtain proper brake-pedal free travel (par. 152).

(2) Brake adjustment to compensate for lining wear is made by turning cam only and is termed "minor adjustment." Following rebuild or when new linings are installed, each brake shoe must be adjusted to center brake-shoe arc in relation to drum. This involves turning both anchor pins and cams and is termed "major adjustment."

(3) Always check wheel-bearing adjustment (par. 185) before adjusting brakes. A satisfactory brake adjustment cannot

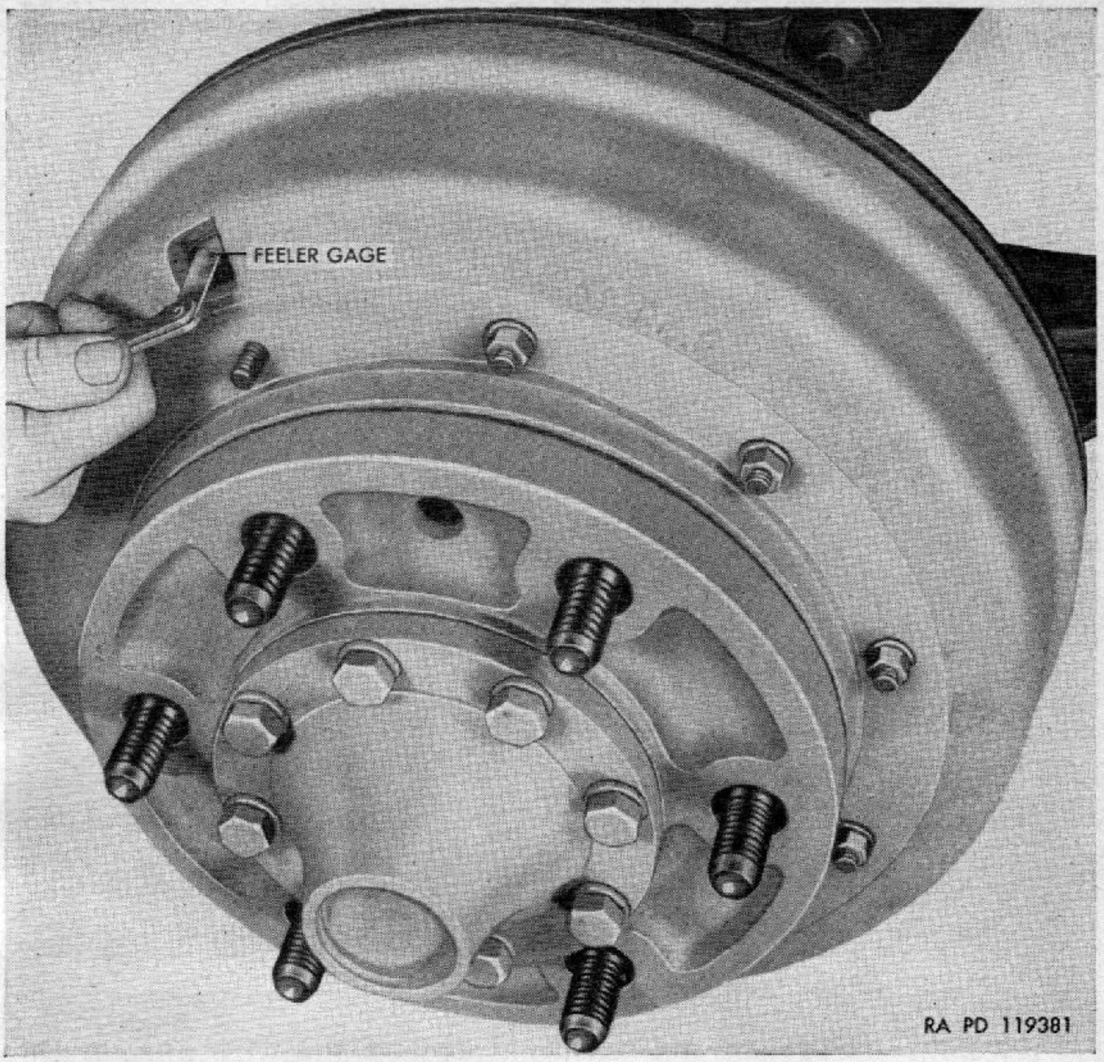

Figure 99. Checking brake lining clearance.

be obtained unless wheel bearings are in proper adjustment. Brake lining clearance (fig. 99) can be checked without removing brake drum (*c* (2) below). Do not adjust brakes when drums are hot.

b. Minor Adjustment. Adjust brakes by turning front-shoe adjusting cam clockwise (fig. 100), to bring lining into contact with drum, until brake drags slightly when wheel is turned by hand. Back off adjusting cam just enough to allow wheel to rotate freely. Repeat this procedure at rear-shoe adjusting cam, turning cam counterclockwise (fig. 100). Make both adjustments at each wheel as uniform as possible.

c. Major Adjustment.

(1) Remove wheel (par. 183).

(2) Remove inspection cover on front of brake drum (fig. 99). Rotate drum until opening is 1½ inches from bottom end of forward brake shoe. Insert 0.010-inch feeler gage between drum and bottom end of shoe. Loosen lock nut on anchor

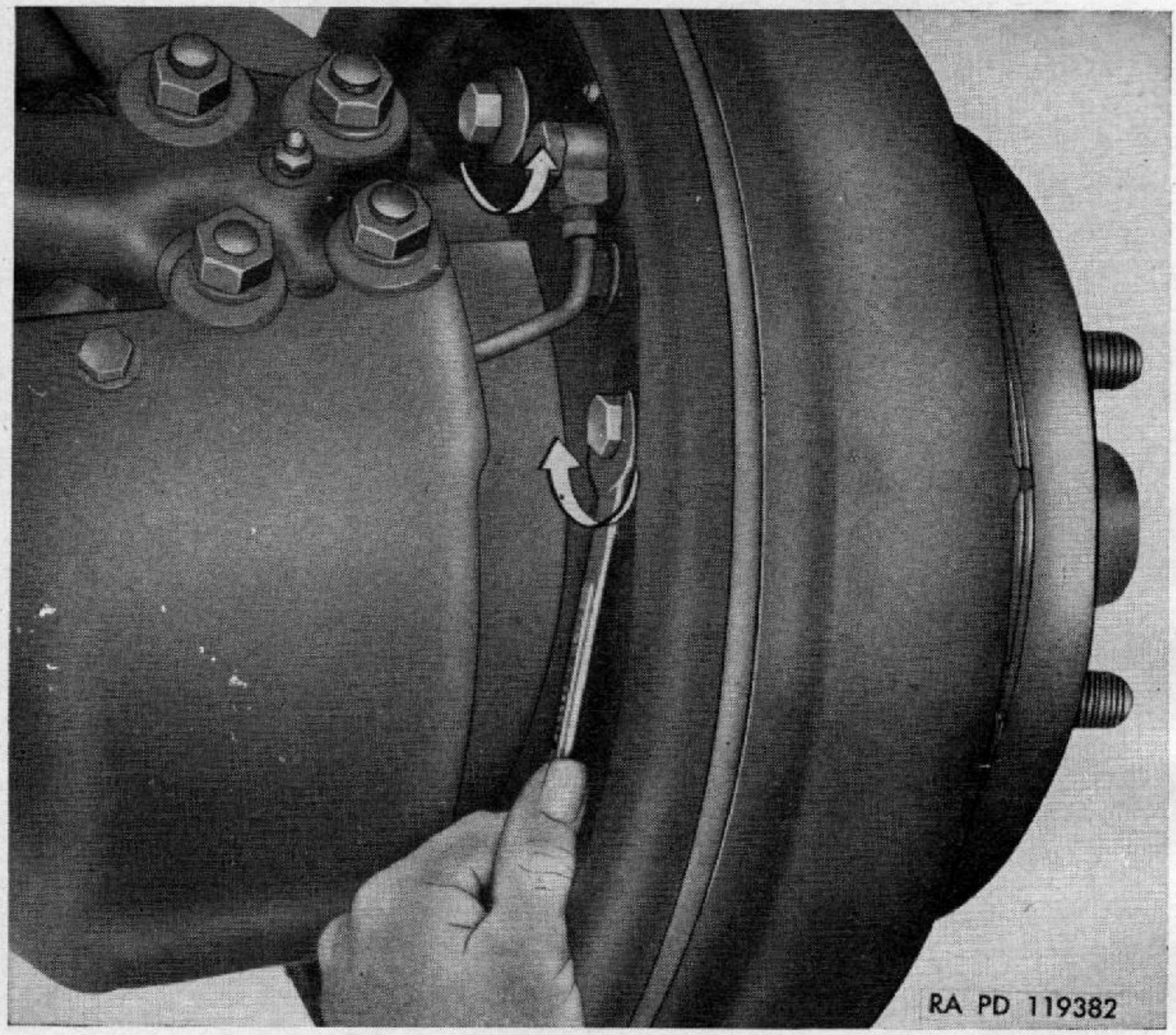

Figure 100. Adjusting brake lining clearance.

pin. Hold lock nut with one wrench and turn anchor pin clockwise (fig. 110) with a second wrench until 0.010-inch clearance is obtained.

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

(4) Repeat steps (2) and (3) above on rear-brake shoe and tighten anchor-pin-lock nuts and check clearances again.

(5) Install inspection cover on brake drum and install wheel (par. 183).

150. Service Brake System Bleeding

a. The hydraulic lines must be bled to expel the air which may have entered the lines if any of the hydraulic-line connections have been broken or disconnected. The need of bleeding system is generally indicated by a springy, spongy pedal action.

b. System can be bled manually or with a pressure tank. When the manual system is used, two persons are needed; one to maintain a constant supply of fluid in master-cylinder reservoir and to pump brake pedal, the other to accomplish bleeding operations at air-hydraulic brake cylinder and wheel cylinders. If a conventional pressure tank is used, connect tank to master cylinder, maintaining a constant supply of fluid in the reservoir, and sufficient air pressure to force fluid through lines to expel air at the bleeding points.

(1) If pressure tank is used, connect tank hose with proper size adapter to the master-cylinder-filler-cap aperture. The pressure tank should contain between 10 to 20 psi air pressure and sufficient fluid to maintain constant fluid level in master cylinder.

(2) The air-hydraulic cylinder must be bled before bleeding wheel cylinders. Clean bleeder screw at air-hydraulic cylinder (fig. 104) and wheel cylinders (fig. 101). Attach bleeder hose to air-hydraulic cylinder bleeder screw, and place other end in a glass jar or bottle so that the end is submerged in hydraulic brake fluid. While pumping brake

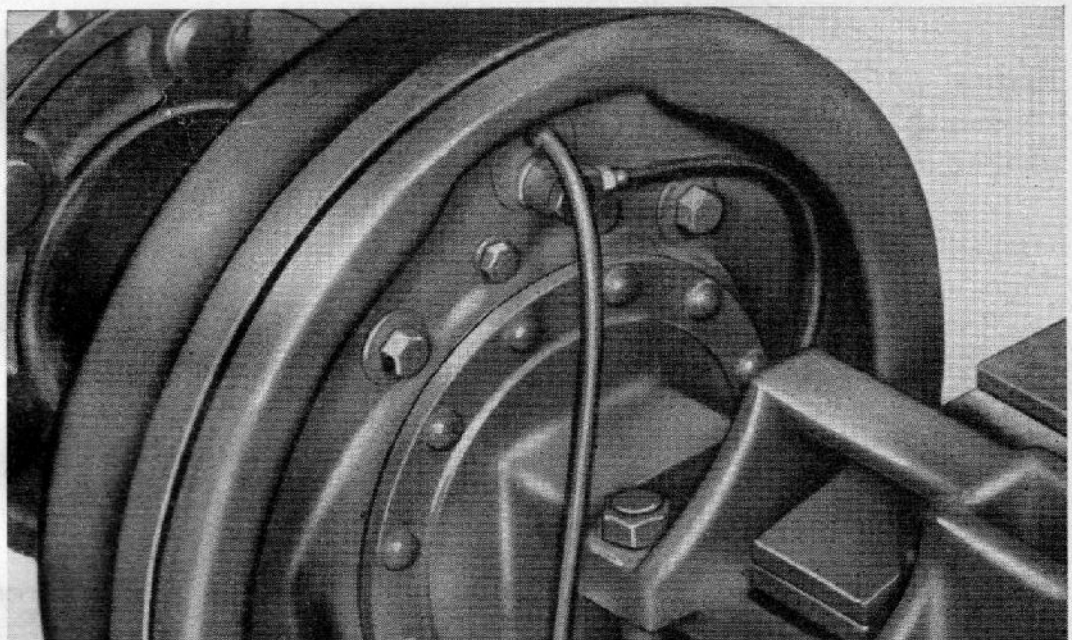

Figure 101. Bleeding wheel cylinder.

pedal, or with the use of pressure tank, open bleeder screw three-quarters turn counterclockwise. Close bleeder screw firmly as soon as fluid flows out of tube in a solid stream without air bubbles. Remove bleeder hose.

(3) Repeat bleeder operation on each wheel cylinder, replenishing brake fluid in master cylinder if manual system is used, before each wheel is bled.

151. Service Brake Pedal and Linkage

(fig. 102)

The brake pedal, mounted on a cross shaft with clutch pedal, is linked to master-cylinder by a master cylinder push rod. The rod is adjusted at the right end yoke to give correct brake-pedal free travel (par. 152).

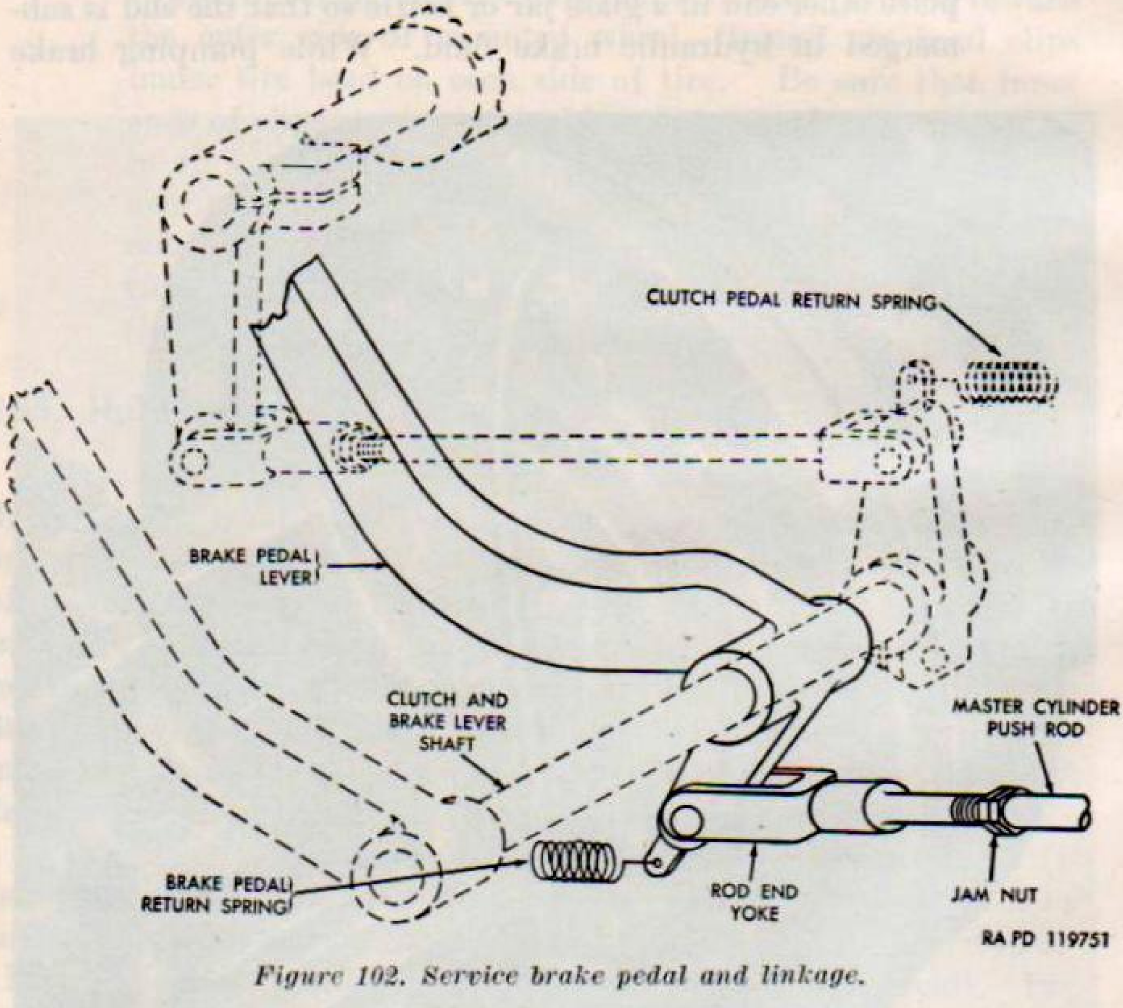

Figure 102. Service brake pedal and linkage.

152. Service Brake Master Cylinder

(fig. 103)

a. Adjustment. Check brake-pedal free travel. Free travel should be not less than one-fourth and not more than one-half inch.

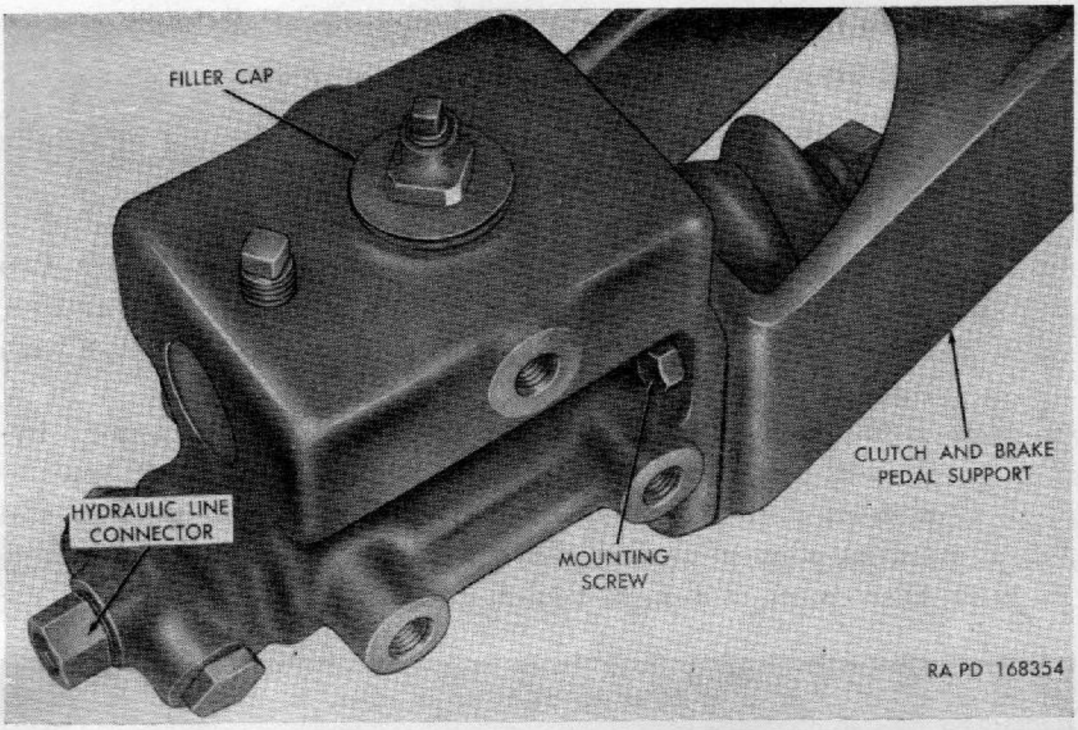

Figure 103. Master cylinder.

Adjust free travel to those limits by adjusting master-cylinder push rod (fig. 102). Loosen jam nut, remove clevis pin from brake pedal lever, and turn yoke to obtain desired setting. Connect yoke to pedal lever and tighten jam nut.

b. REMOVAL. Disconnect ventilation line at top (fig. 148), and hydraulic line at rear of master cylinder. Remove two cap screws holding power-take-off-shift-lever bracket to side of cylinder. Remove clevis pin connecting rod end yoke to brake pedal lever (fig. 102). Remove four mounting screws holding master cylinder to clutch-and-brake-pedal support and remove master cylinder (fig. 103).

c. INSTALLATION.

(1) Place master cylinder (fig. 103) in position and install mounting screws holding cylinder to clutch-and-brake-pedal support. Install two cap screws holding power-take-off-shift-lever bracket to side of master cylinder. Install clevis pin through brake pedal lever and rod end yoke (fig. 102). Adjust brake-pedal free travel (*a* above).

(2) Connect hydraulic line at rear of master cylinder.

(3) Remove filler cap, and fill the master cylinder reservoir to within one-half inch of top. Bleed brake system (par. 151). Reinstall filler cap, using new gasket when necessary, and connect ventilation line.

153. Air-Hydraulic Cylinder
(fig. 104)

a. ADJUSTMENT. No adjustments are provided for air-hydraulic cylinder.

b. REMOVAL.

(1) Open compressed-air-reservoir drain cocks. Remove two bolts securing metal shield at lower side of cylinder and remove shield. Figure 104 shows cylinder as installed with shield removed.

(2) Disconnect master-cylinder-to-air-hydraulic-cylinder hydraulic line, brake line from air-hydraulic cylinder, ventilation line, air-reservoir-to-air-hydraulic-cylinder air line, and trailer-connection-to-air-hydraulic-cylinder air line.

(3) Disconnect stop-light-switch connection.

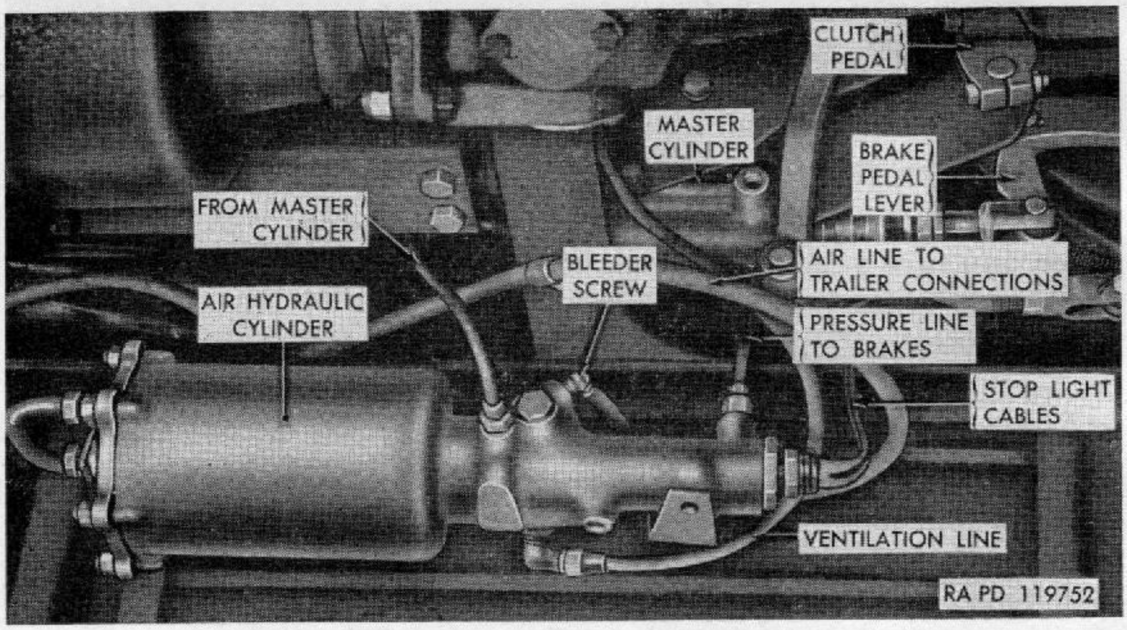

Figure 104. Air-hydraulic cylinder—installed view.

(4) Support assembly and remove bolt at rear from shell cover, and remove air-hydraulic cylinder.

c. INSTALLATION.

(1) Support slave cylinder on front bracket and install bolt through support bracket into center of shell cover.

(2) Connect stop-light switch, master-cylinder-to-air-hydraulic-cylinder hydraulic line, brake line from air-hydraulic cylinder, ventilation line, air-reservoir-to-air-hydraulic-cylinder air line, and trailer-connection-to-air-hydraulic-cylinder air line.

(3) Place air-hydraulic-cylinder shield in position and install one bolt through shield and support bracket into slave

cylinder. Secure shield with rear bolt. Close compressed-air-reservoir drain cocks. Bleed brake system (par 150).

154. Service Brake Wheel Cylinders

(fig. 105)

a. REMOVAL.

(1) *Remove hub and drum assembly.* Refer to paragraph 185.

(2) *Disconnect hydraulic line.* Disconnect hydraulic brake line from wheel cylinder at rear of brake flange plate.

(3) *Remove wheel cylinder.* Install clamp 41–C–1835 over ends of wheel cylinder (fig. 105). Remove return spring with pliers 41–P–1579 fig. 105). Remove two cap screws and lock washers holding wheel cylinder to flange plate and remove cover and wheel cylinder.

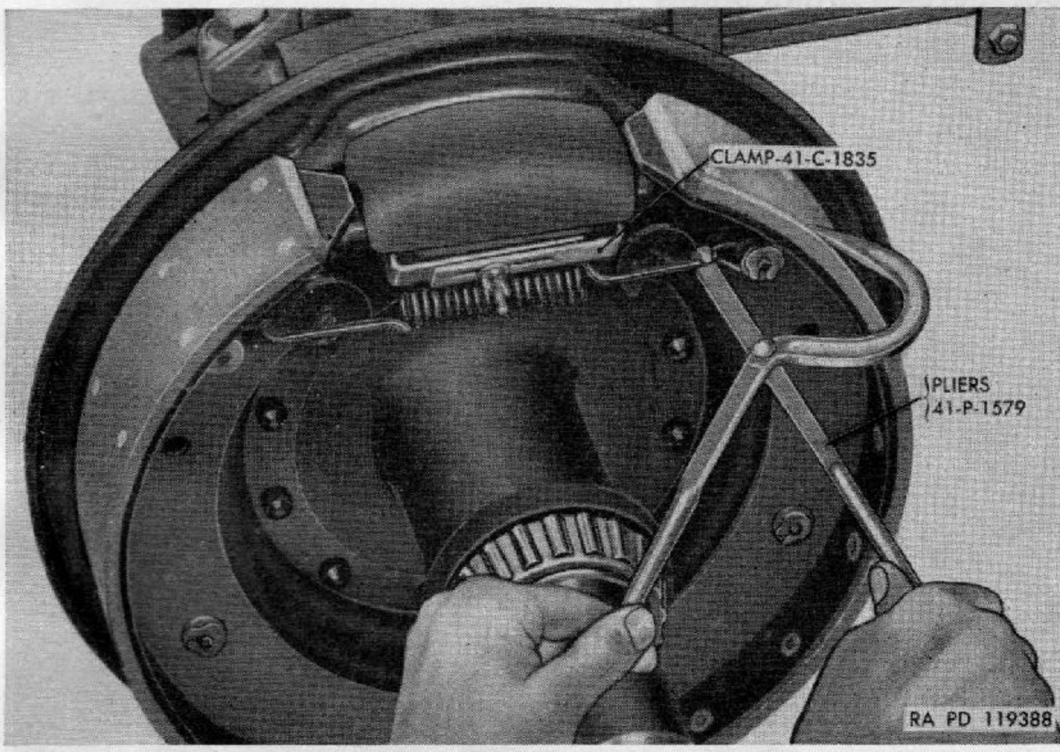

Figure 105. Return spring—removal or installation.

b. INSTALLATION.

(1) *Install wheel cylinder.* Place clamp 41–C–1835 over ends of wheel cylinder (fig. 105). Position cover and wheel cylinder on flange plate and install two lock washers and cap screws. Tighten cap screws securely. Position brake shoes at wheel cylinder. Install return spring with pliers 41–P–1579 (fig. 105). Remove clamp.

(2) *Connect hydraulic line.* Connect hydraulic brake line to wheel cylinder at rear of brake flange plate.

(3) *Install hub and drum assembly.* Install hub and drum assembly and adjust wheel bearings (par. 185).

(4) *Bleed brakes.* Bleed brake system (par. 150).

(5) *Adjust brakes.* Perform minor brake adjustment (par. 149).

155. Service Brake Drums

a. REMOVAL. Raise truck, remove six wheel-stud nuts and remove wheel and tire assembly (par. 183). Remove 10 nuts and lock washers holding brake drum to hub. Pry drum loose and pull drum off studs (fig. 106).

b. INSTALLATION. Place drum over studs on hub (fig. 106). Install 10 lock washers and nuts; tighten nuts evenly and securely. Install wheel and tire assembly on hub, install nuts, and tighten from 400 to 450 lb-ft torque (par. 183). Lower truck.

156. Service Brake Shoes

a. REMOVAL.

(1) *Remove wheel.* Raise wheel to be serviced. Remove six wheel-stud nuts and remove wheel (par. 183).

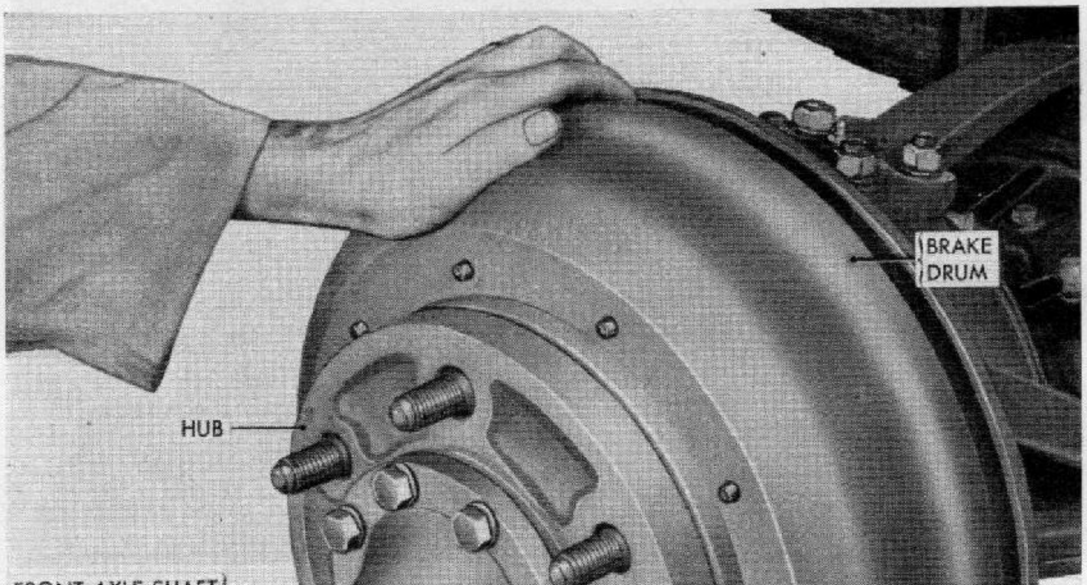

Figure 106. Brake drum removal.

(2) *Remove drive flange.* Remove eight cap screws holding drive flange to hub and remove drive flange. Discard gasket.

(3) *Remove hub and drum assembly.* Remove hub and drum assembly (par. 185).

(4) *Disconnect shoes* (fig. 107). Install clamp 41–C–1835 over ends of wheel cylinder (fig. 105). Remove "C" washers from guide pins with pliers (fig. 108). Remove washer from guide pin. Some brake installations have a form of cotter pin and others have "C" washers. Remove "C" washers from anchor pins, using a ¾-inch open-end wrench and hammer (fig. 109). Remove washer from anchor pin. It is not necessary to remove the anchor pins.

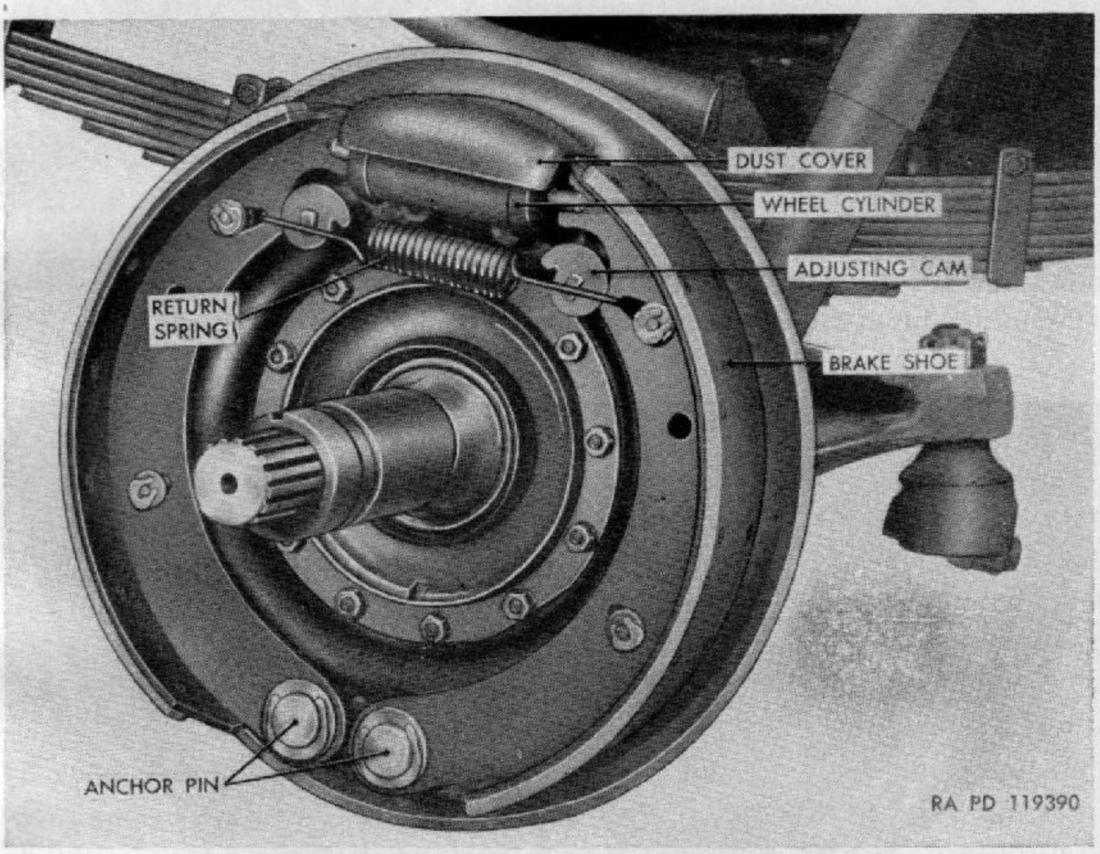

Figure 107. Brake assembly.

(5) *Remove shoes.* Remove return spring with pliers 41–P–1579 (fig. 105). Pull each shoe away from wheel cylinder and pull shoes straight out.

b. INSTALLATION.

(1) *Install shoes.* Install a flat washer over each guide pin and position brake shoes over anchor pins and guide pins. Make certain upper ends of brake shoes engage wheel cylinder properly. Install return spring with pliers 41–P–1579 (fig. 105). Remove clamp 41–C–1835 from wheel cylinders.

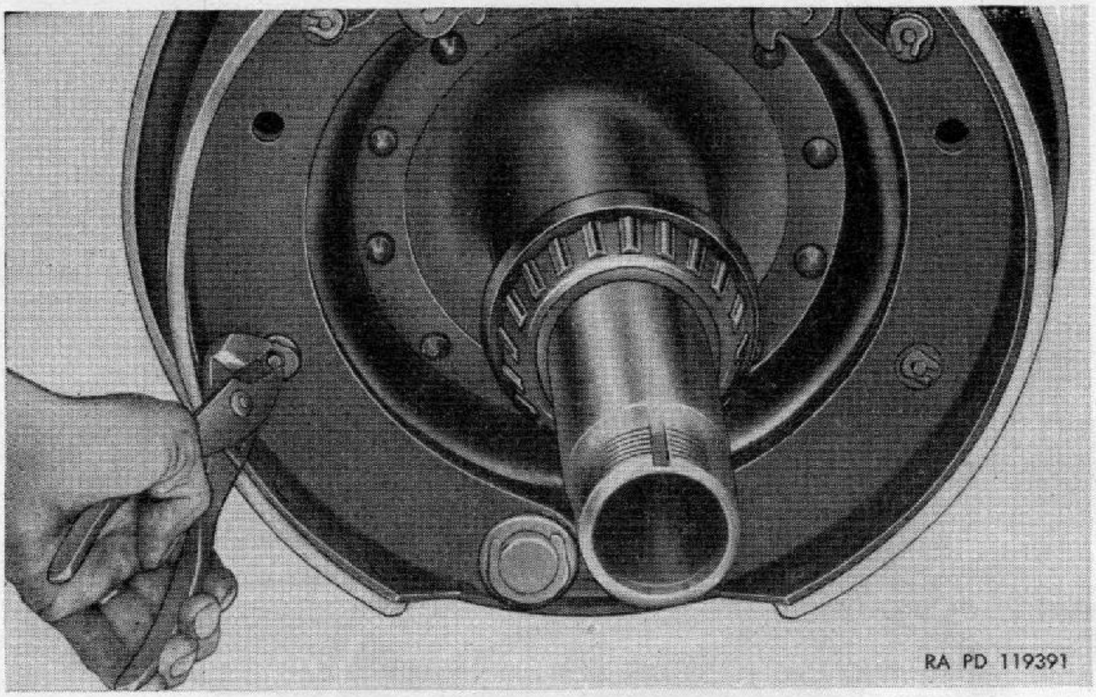

Figure 108. Removing guide pin retainers.

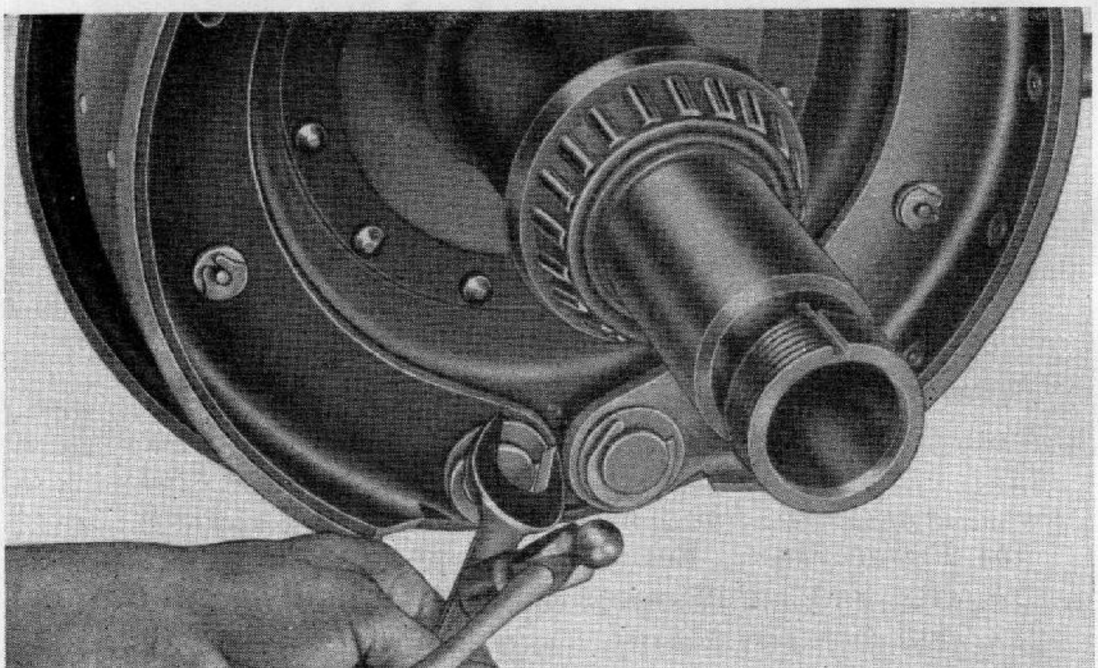

Figure 109. Removing anchor pin "C" washers.

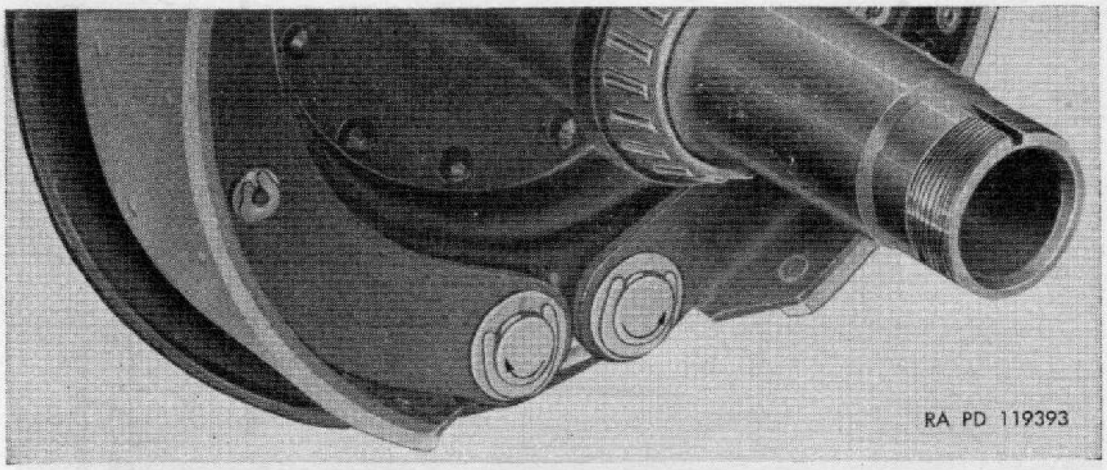

Figure 110. Anchor pin adjustment.

(2) *Connect shoes.* Install "C" washers on guide pins, making certain that guide pins are locked securely. Install flat washers over anchor pins and install "C" washers. Turn anchor pins in direction indicated in figure 110 until marks on pins are toward each other.

(3) *Install hub and drum assembly.* Install hub and drum assembly and adjust wheel bearings (par. 183).

(4) *Adjust brakes.* Perform major brake adjustment (par. 149).

157. Service-Brake Hydraulic Lines

(fig. 111)

a. All hydraulic lines are metal tubing and all fittings are inverted flared tube type. Lines are securely anchored to truck frame and axles to prevent vibration. Flexible lines, supported by suitable brackets, are used for all axles, and wheel-cylinder connections (fig. 114).

b. When replacing hydraulic lines, do not use guess work. Make correct calculations as to length, how many bends, and their locations. Ends must be square; use a tubing cutter. Ream ends to remove all burs. Make all bends with a bending fixture. Make preliminary check for length before flaring ends. Do not install lines which are too short or too long; cut and bend to fit. Make flares carefully and blow out lines with compressed air before installation. Tighten connections securely. After installation, check for leaks and bleed hydraulic brake system (par. 150).

158. Hand-Brake Lever and Linkage

(fig. 113)

a. The hand-brake linkage must be adjusted when hand-brake-lever reserve travel is less than one-half of ratchet range. To adjust, block

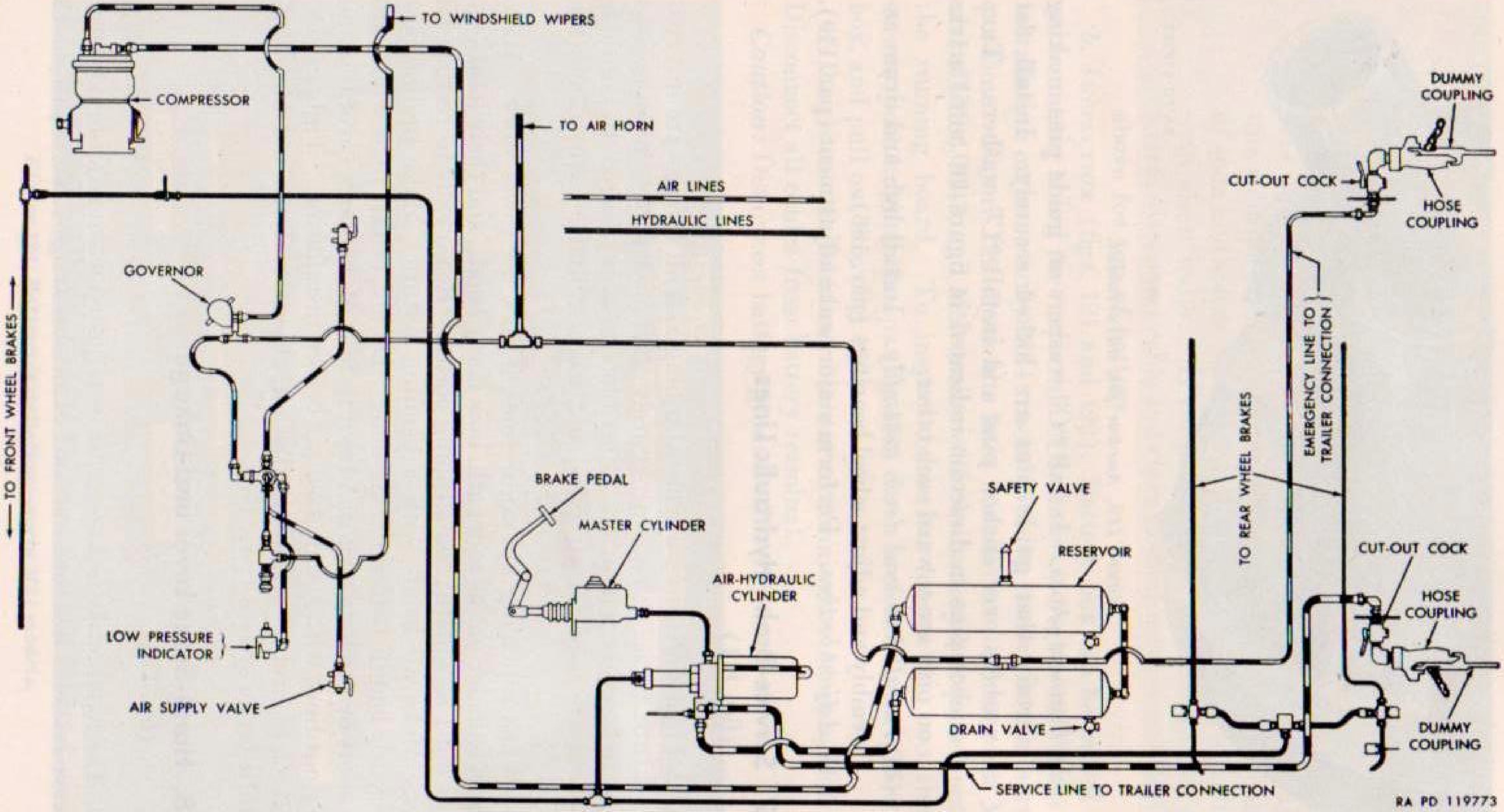

Figure 111. Air-hydraulic-brake-line diagram.

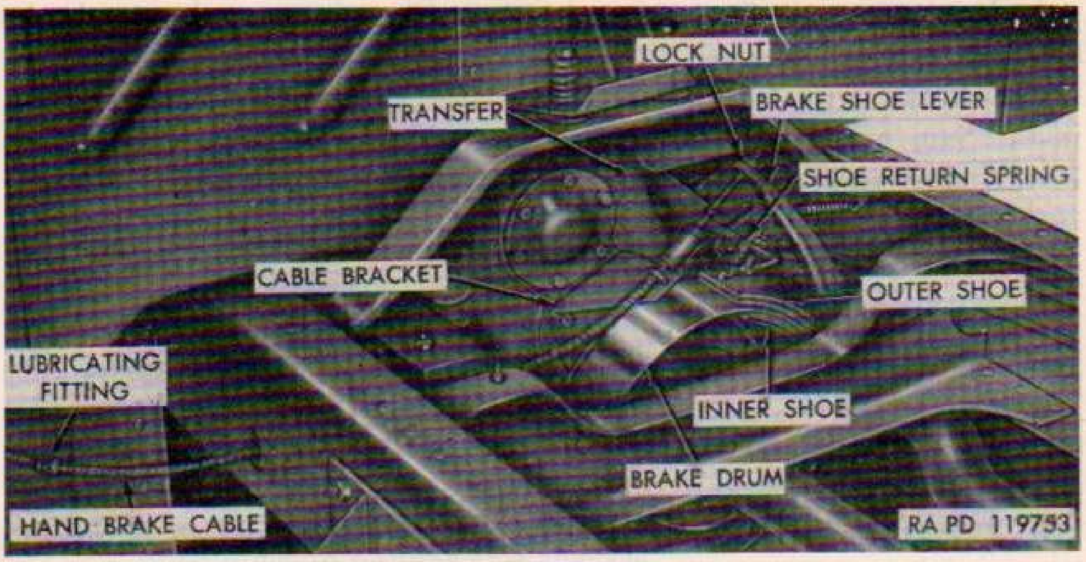

Figure 112. Hand brake.

wheel to keep truck from moving. Release hand-brake lever (fig. 16). Loosen lock nut and jam nut on cable at hand-brake-shoe lever and/or hand-brake lever. Take up slack in cable by turning lock nut. Tighten jam nut firmly. Remove blocks from wheel.

b. Hand-brake linkage is removed by removing lock nut from each end of cable and pulling cable from hand-brake lever and hand-shoe lever. Release cable from bracket and support clips and pull free.

159. Hand-Brake Shoes

a. Removal (figs. 112 and 113). Disconnect and remove shoe return spring, and disconnect hand-brake cable from brake-shoe lever. Remove jam nut from shoe anchor pin at lower end of brake-shoe lever and unscrew anchor pin from transfer. Slide shoe assembly from brake drum. To remove brake shoes, remove washers from ends of shoe lever pins and slide shoes from pins.

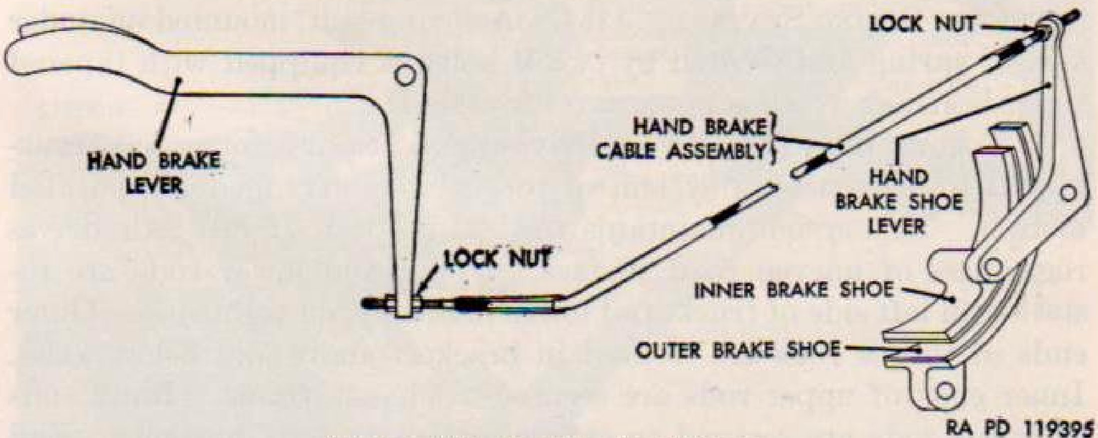

Figure 113. Hand-brake linkage.

b. INSTALLATION (figs. 112 and 113). Place inner and outer brake shoes on brake-shoe-lever pins and secure with washers. Slip assembly on brake drum and secure to transfer with shoe anchor pin and install jam nut. Connect hand-brake cable to brake-shoe lever and install shoe return spring. Adjust linkage (par. 158).

160. Hand-Brake Drum

a. REMOVAL (fig. 112). Remove hand-brake shoes (par. 159). Disconnect propeller shaft companion flanges at rear of transfer (see ***Warning,*** par. 140). Remove cotter pin and nut from end of transfer output shaft. Remove companion flange and drum assembly from shaft. Remove nuts and lock washers holding drum to flange.

b. INSTALLATION (fig. 112). Position drum on flange bolts and secure with nuts and lock washers. Press companion flange and drum assembly on transfer output shaft and secure with nut and cotter pin. Connect propeller shaft companion flange and install hand-brake shoes (par. 159).

Section XX. SPRINGS AND SHOCK ABSORBERS

161. Description

a. FRONT SPRINGS (fig. 114). Front springs are semielliptic type, assembled with a bolt through center of leaves, and leaves alined with four leaf clips. Springs are mounted on a seat resting on axle and are secured by two **U** bolts, seated in a saddle and passing through a clamp plate under axle. The front spring is pivoted in a hanger at front end and shackled to a hanger at rear end.

b. REAR SPRINGS (fig. 115). The rear springs are inverted semielliptic type with slipper type ends. Spring leaves are held together with center bolt and leaves are alined with four leaf clips. Ends of spring rest on axle housing and are free to slide in guide brackets.

c. REAR SPRING SEATS (fig. 115). A spring-seat, mounted on under side of spring and secured by two **U** bolts, is equipped with tapered roller bearings which support seat cross shaft.

d. TORQUE RODS (fig. 115). Driving and braking forces are transmitted to chassis by a system of torque rods arranged for parallel motion. This system maintains vertical position of rear-axle drives regardless of uneven road surface. Upper and lower rods are installed on left side of truck, and lower rods only, on right side. Outer ends of torque rods are secured in brackets above and below axles. Inner ends of upper rods are secured to chassis frame. Inner ends of lower rods are secured to spring-seat-cross-shaft brackets. End balls with tapered mounting pins are installed in the ends of the rods.

162. Front Springs
(fig. 114)

a. REMOVAL.

(1) Raise frame to free spring of load.

(2) Release cap screw holding mounting pins in hanger and shackle. Remove pins.

(3) Remove nut and grommet, anchoring shock absorber to clamp plate, and remove nuts and washers from spring **U** bolts.

(4) Remove clamp plate, **U** bolts, and **U**-bolt saddle.

(5) Lift spring off seat and remove.

b. INSTALLATION.

(1) Set spring in position on spring seat, alining spring eyes with holes in hanger and shackle.

(2) Place **U**-bolt saddle on spring and place **U** bolts in position.

(3) Place clamp plate under axle and over **U** bolts. Be sure that anchor lug for shock absorber is at rear of axle. Install washers and nuts on **U** bolts and tighten securely.

(4) Place shock absorber in position and secure with grommet and nut.

(5) Insert mounting pins through hanger and shackle and tighten cap screws.

(6) Remove jack from frame.

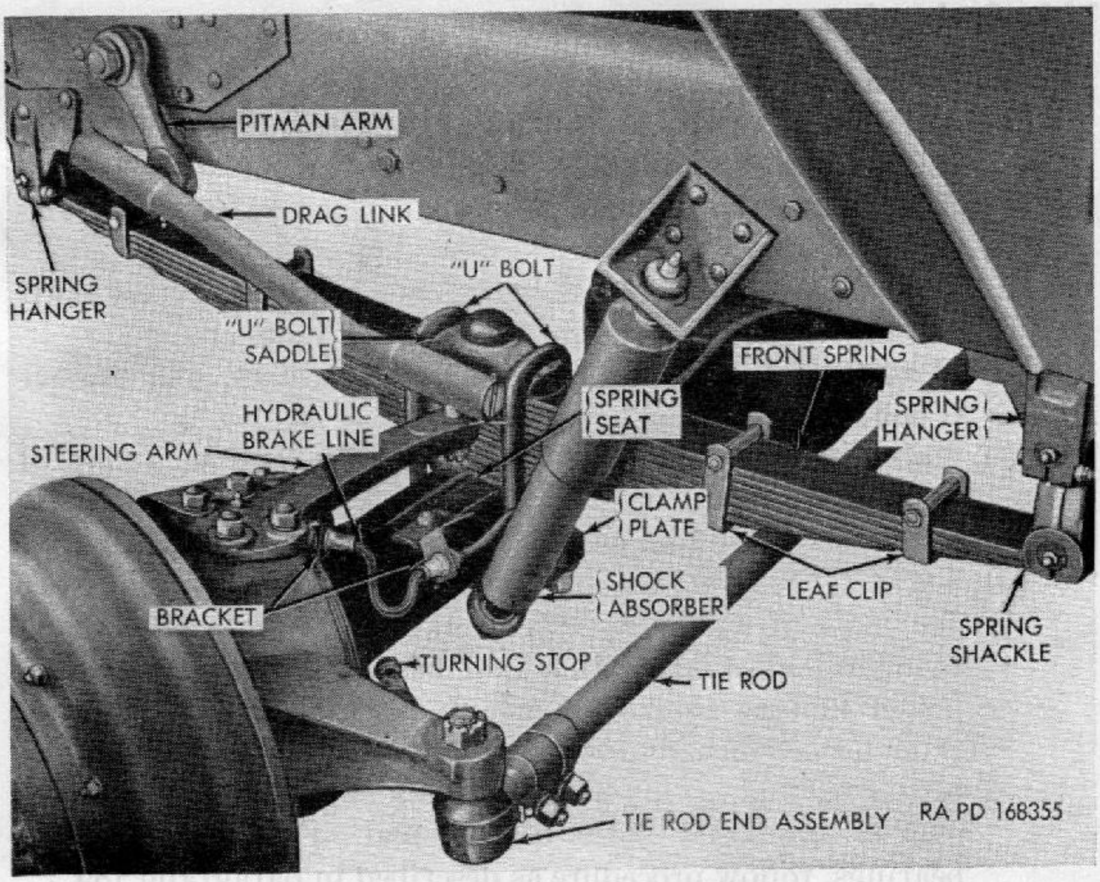

Figure 114. Front spring installation.

163. Rear Springs

(fig. 115)

a. Removal.

(1) Raise chassis frame to free spring of all load.

(2) Put blocks under spring seat to prevent seat and torque rod assembly from dropping when **U** bolts are removed. Loosen clamp bolts through spring seat.

(3) Remove nuts and washers from **U** bolts, remove **U** bolts, and spring saddle.

(4) Slip spring out of guide bracket on either axle and remove spring.

b. Installation.

(1) Slip one end of spring through guide bracket on either axle, then insert other end in its guide bracket and adjust to even extension over axles.

(2) Place saddle in position on spring and place **U** bolts in position.

(3) Raise spring seat, enter **U** bolts in seat, and raise seat to spring.

(4) Install washers and nuts on **U** bolts and tighten securely. Tighten clamp bolts in spring seats.

164. Spring Seats

a. Bearing Adjustment.

(1) *Remove rear wheels.* Spring-seat-bearing adjustment requires removal of both rear wheels (par. 183).

(2) *Remove bearing cap.* Remove six cap screws from cap and remove cap.

(3) *Support spring-seat-cross shaft.* Set jack under cross shaft and take up enough weight to hold jack in position.

(4) *Remove* **U** *bolts.* Remove nuts and washers, and remove **U** bolts.

(5) *Raise spring.* Place jacks under spring one each side of spring seat) and lift spring clear of seat to permit some rotation of seat around cross shaft.

(6) *Check bearing adjustment.* Push and pull on spring seat to determine if end play is present, and rotate seat back and forth to determine condition of bearings. End play is adjusted as described in paragraph 185 except that inner nut is not backed off after reaching the point where the spring seat begins to bind. This will provide a slight increase in drag over that imposed by the bearing seal. For replacement of bearings, follow procedure as described in paragraph 185.

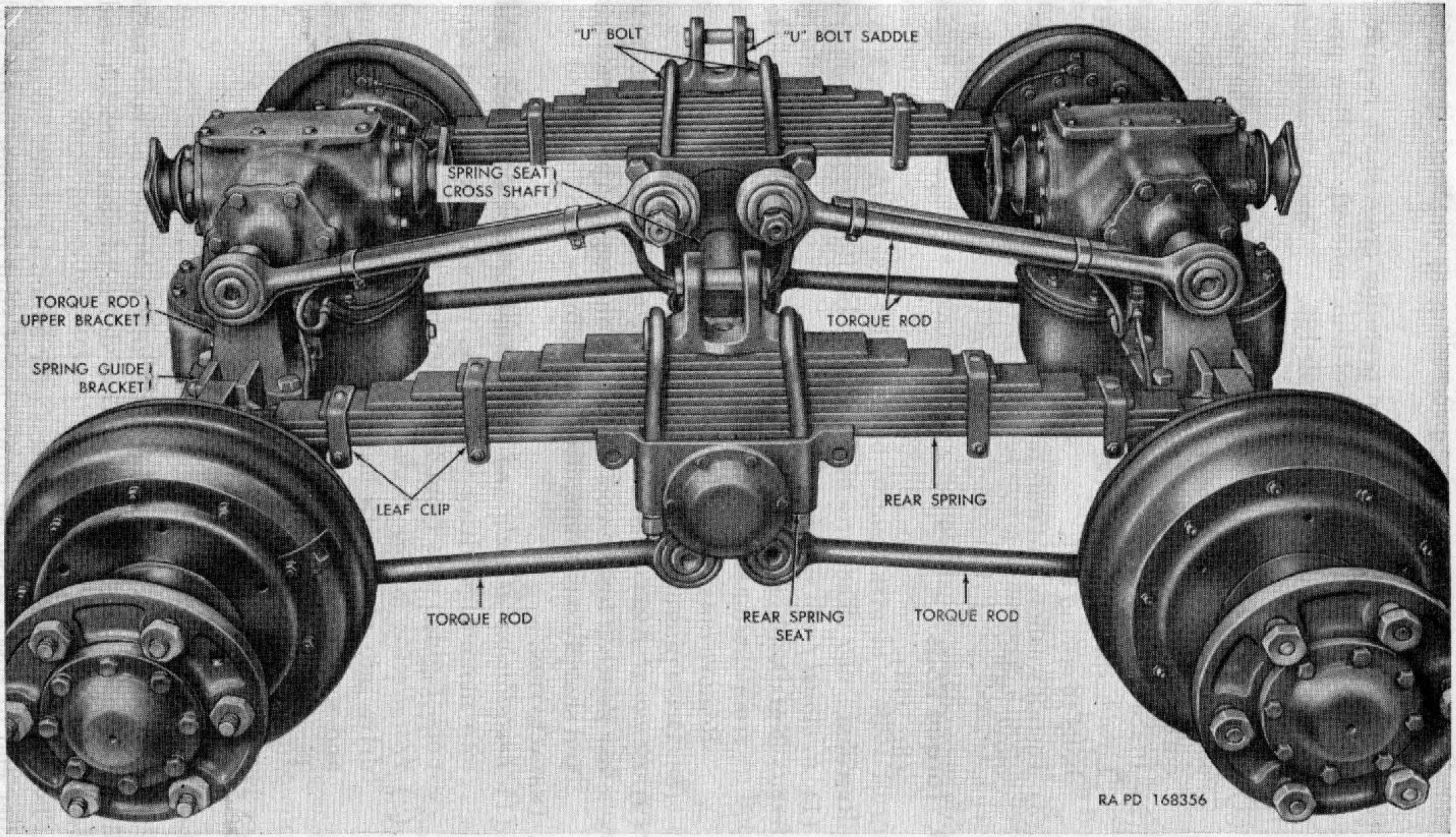

Figure 115. Rear springs and torque rods.

b. Removal.

(1) Remove spring seats by proceeding as outlined in *a* (1) through (5) above.

(2) Removal of spring seat from trunnion cross shaft requires the same procedure as for wheel-hub removal. Follow procedure as described in paragraph 185.

c. Installation.

(1) Installation of spring seat on trunnion cross shaft is the same as installation of wheel hub on axle. Follow procedure as outlined in paragraph 185.

(2) Place **U** bolts over spring and seat them in saddle grooves. Lower spring with jacks to normal position and enter **U** bolts in spring seat.

(3) Install washers and nuts on **U** bolts and tighten securely. Remove jacks.

165. Torque Rods

(fig. 115)

a. Removal.

(1) *Removal from side frame.*

(*a*) Nuts holding torque-rod ends to side frame are accessible from the outside of frame through holes in side member. Remove nuts with a deep socket.

(*b*) Drive pins out with a drift and heavy hammer.

(2) *Removal from axle and cross-shaft brackets.* Insert pry bar between torque-rod end and mounting. Apply pressure and sharply strike mounting over pin.

b. Installation.

(1) *Installation at axle and cross-shaft brackets.* Insert pins into mountings, drive into place, install lock washers and nuts. Tighten nuts from 350 to 400 lb-ft torque.

(2) *Installation in side frame.* Insert pins into mountings and drive into place with heavy hammer. Install lock washers and nuts through holes in frame and tighten with socket. Tighten nuts from 350 to 400 lb-ft torque.

166. Shock Absorbers

(fig. 114)

a. Removal. Remove mounting nuts and grommets at both ends of shock absorber. Press upper section down to clear bracket and remove shock absorber.

b. Installation. Place grommets over mounting studs. With the smaller end of shock absorber down, insert stud in clamp plate, and install grommet and nut. Collapse assembly until upper stud can be inserted in bracket; then install grommet and nut. Tighten both nuts.

Section XXI. STEERING GEAR

167. Description

a. GENERAL. The steering linkage comprises the steering gear assembly, steering wheel, horn button, pitman arm, and drag link.

b. STEERING GEAR ASSEMBLY (fig. 116). The steering gear assembly is a helical cam and lever type. A pitman arm shaft, mounted at right angles to axis of cam on steering gear shaft carries a lever in which is mounted two tapered roller bearings. Studs, mounted in these bearings, have cone-shaped ends which engage the machined helix of the cam. The above assembly is enclosed in a cast housing which is bolted to side frame of truck. The steering gear shaft is enclosed in a jacket which is joined to the housing with a flanged cover. The assembly is watertight.

c. PITMAN ARM (fig. 118). The pitman arm is a steel forging, broached to fit the splined end of pitman arm shaft. It is held on shaft by a hex nut.

d. STEERING WHEEL. A three-spoke-steering wheel is mounted on end of steering gear shaft and secured by a hex nut. The horn button assembly is mounted in center of wheel.

e. DRAG LINK (fig. 120). The drag link assembly consists of a tubular member connecting pitman arm to steering arm on front axle. Spring-loaded ball seats in each end of link are adjustable and engage stud balls in pitman arm and in steering arm in axle.

168. Steering Gear Adjustment

a. END PLAY ADJUSTMENT (fig. 116).

(1) Disconnect drag link from pitman arm (par. 170). Loosen jacket bracket clamp on instrument panel. Loosen backlash adjusting screw (fig. 117).

(2) Grip steering wheel lightly with thumb and forefinger and turn wheel. Wheel should turn freely with just a preceptible drag. If no resistance is evident, housing-upper-cover shims must be removed.

(3) To remove shims, disconnect horn cable near lower end of steering gear. Remove four cap screws holding steering gear jacket and upper cover to steering gear housing assembly. With jacket bracket clamp on instrument panel loosened, pull wheel and jacket assembly away from gear housing to expose adjusting shims. Be careful not to pull jacket far enough to break horn cable. Shims are of 0.002-, 0.003-, and 0.010-

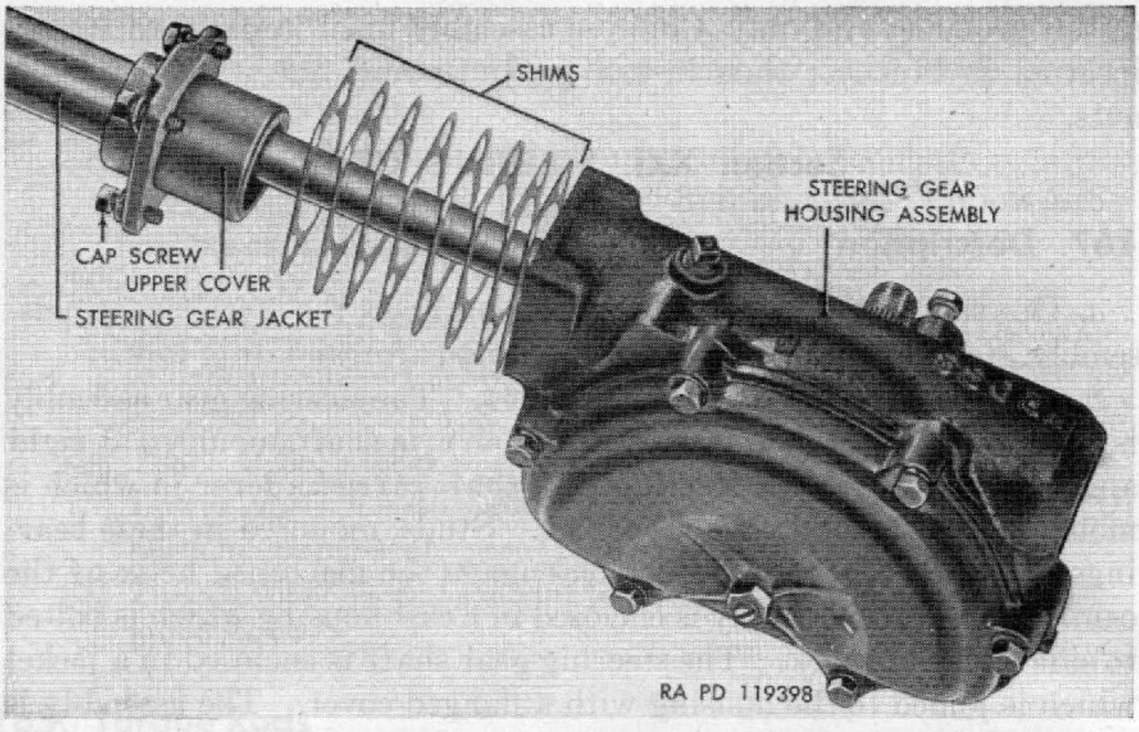

Figure 116. Steering gear end-play adjustment.

inch thickness. Clip and remove a thin shim, assemble jacket and housing, and test wheel ((2) above). Repeat the process until proper adjustment is obtained.

(4) Tighten jacket-column clamp on instrument panel.

b. BACKLASH ADJUSTMENT (fig. 117).

(1) Disconnect drag link from pitman arm (par. 172).

(2) Turn steering wheel clockwise as far as possible; then rotate wheel counterclockwise as far as possible and count number of turns. Turn wheel one-half total number of turns. Steering gear is now in midposition.

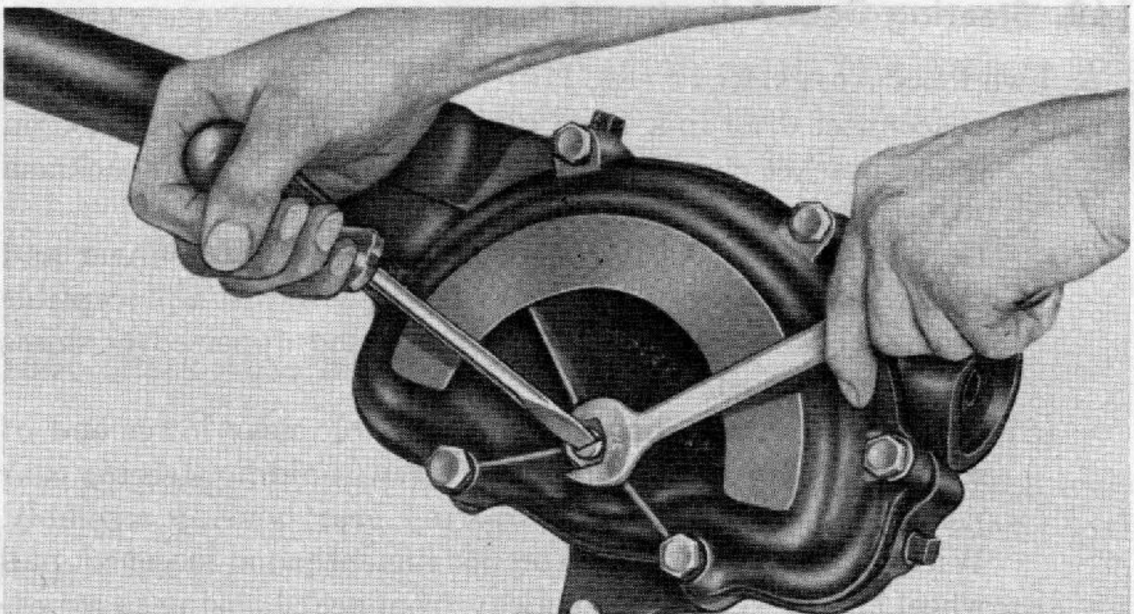

Figure 117. Steering-gear backlash adjustment.

(3) Loosen lock nut and turn adjusting screw until a slight drag is felt at this midposition when turning steering wheel slowly from one extreme position to other.

(4) Tighten lock nut.

(5) Connect drag-link to pitman arm.

169. Steering-Column Alinement

Check steering-column alinement by loosening jacket bracket clamp on instrument panel. If steering column moves to a new position, tighten clamp in that position.

170. Pitman Arm

a. REMOVAL (fig. 118).

(1) Disconnect drag link from pitman arm (par. 172).

(2) Remove nut and washer holding pitman arm in position. Pull pitman arm from shaft with puller 41–P–2952.

b. INSTALLATION.

(1) With the front wheels straight ahead, set steering wheel in mid-position (par. 168).

(2) Place pitman arm on splined shaft with arm straight downward.

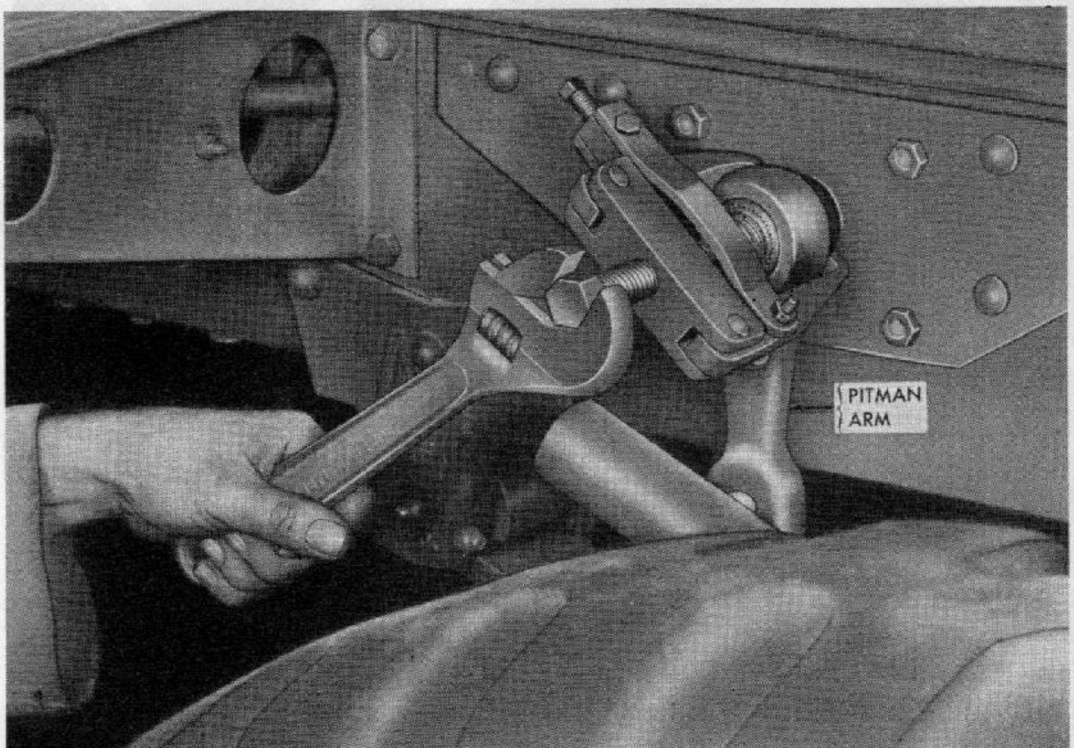

Figure 118. Removing pitman arm with puller 41–P–2952.

(3) Push or tap pitman arm into position on shaft until nut can be engaged on threads. Install washer and nut, and tighten.

171. Steering Wheel

a. Removal (fig. 119).

(1) Detach horn button. Disconnect horn cable and remove horn switch assembly from steering wheel.

(2) Place adapter 41–A–18–251 on end of steering gear shaft. Install puller 41–P–2954 with hooks engaging puller ring, and pull wheel.

b. Installation (fig. 119).

(1) Place steering wheel on steering gear shaft and tap into position until hex nut can be engaged with threads. Tighten nut.

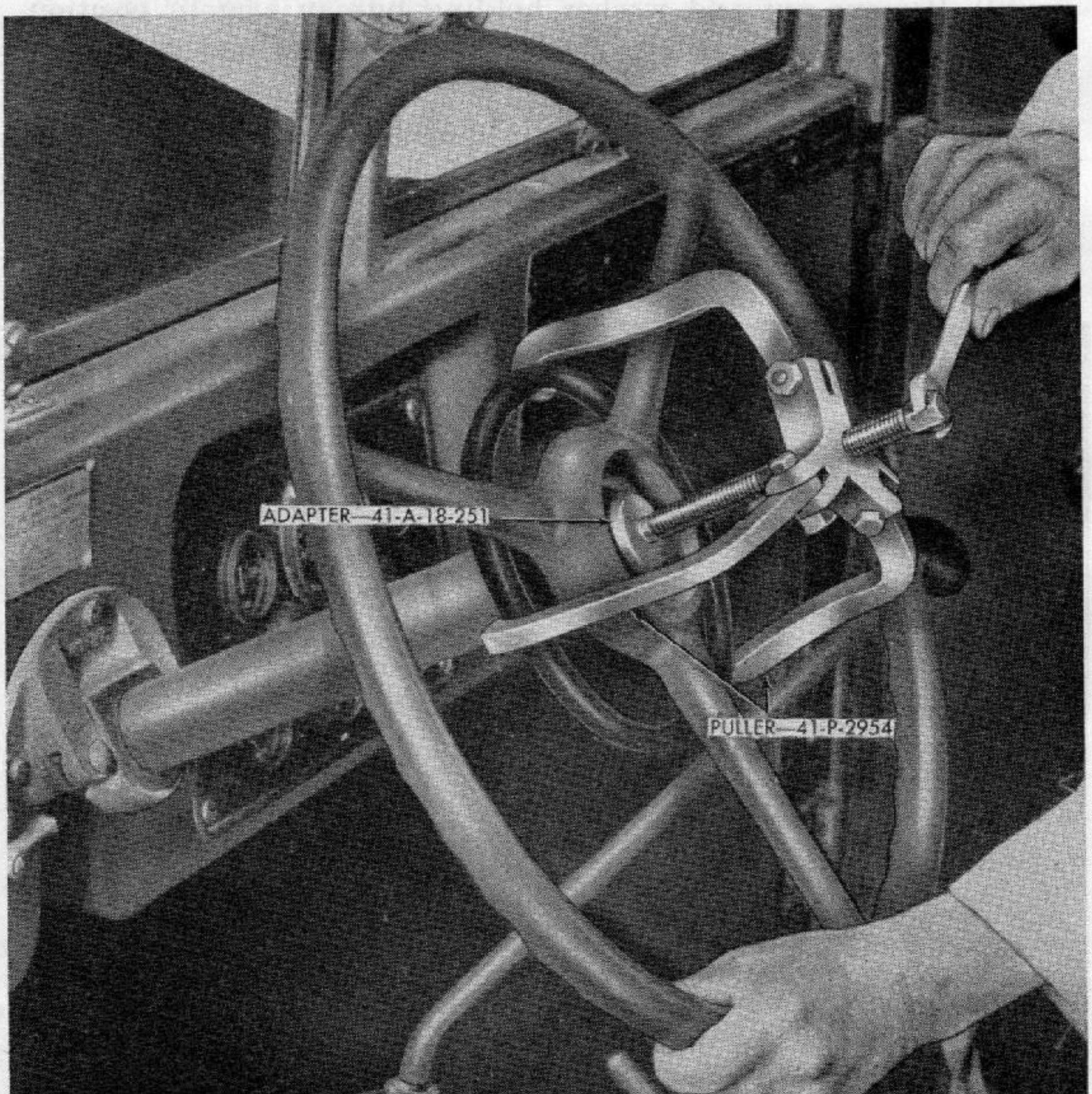

Figure 119. Removing steering wheel with puller 41–P–2954 and adapter 41–A–18–521.

(2) Install horn switch in steering-wheel recess, connect cable, and install horn button.

172. Drag Link
(fig. 120)

a. ADJUSTMENT. Be sure ball seats are thoroughly lubricated before making adjustment. Remove cotter pin and screw adjusting plug in tight; then back screw out one-half turn, or less, until new cotter pin can be installed. Repeat adjustment at other end.

b. REMOVAL. Remove cotter pin from both ends of drag link, and back out adjusting plugs as far as possible without removing them. Turn steering wheel in both directions, to loosen stud balls in seats, and pull drag link from pitman arm and steering arm.

c. INSTALLATION.

(1) Note that stud-ball opening is closer to end of drag link at steering-arm end than at pitman-arm end, and that order of installation of parts is different for each end. Check order of parts shown in figure 120.

(2) Connect drag link to steering arm. With inner ball seat in position (notch in ball seat toward opening), place drag link over steering-arm ball, and install outer ball seat and adjusting plug.

(3) Turn steering wheel to extreme left, and turn front wheels to left against stop screws. Hold drag link to pitman arm. Pitman-arm ball should be one-half inch ahead of drag-link-ball-seat position. Turn steering wheel and front wheels, to right, to their limits. Pitman-arm ball should be one-half inch behind drag-link ball seat.

(4) If overall travel of pitman arm is less than one-half inch each way, check for following conditions:

(*a*) Pitman arm bent or out of position on shaft.

(*b*) Bent drag link.

(*c*) Front axle out of position.

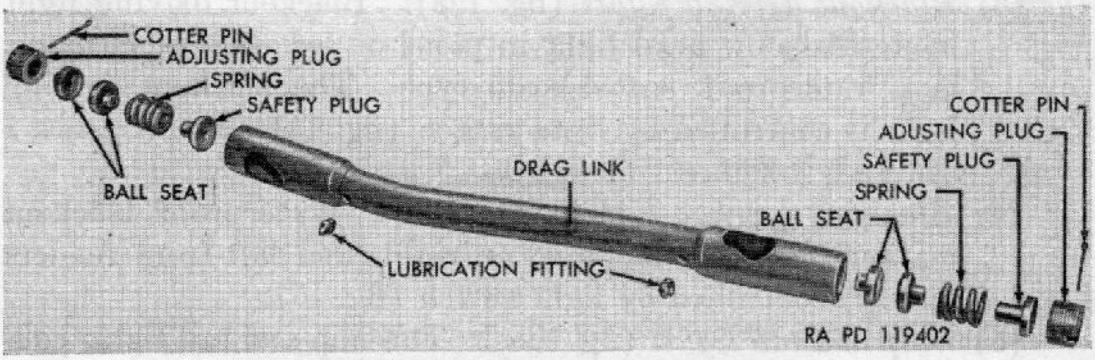

Figure 120. Drag link—exploded view.

(*d*) Steering knuckle stop screws out of position or missing.

(*e*) Correct or replace damaged part and adjust drag link as in *a* above.

Section XXII. BATTERIES AND LIGHTING SYSTEM

173. Description and Data

a. DESCRIPTION.

(1) *Batteries and cables* (figs. 121 and 122). Two 12-volt, lead-acid-type batteries, connected in series, supply 24-volt electrical current for the truck. Batteries are located in a compartment on right side of truck, between running board and cab door. These batteries are submersible type with special vent plugs which prevent entrance of water into cells when battery is submerged. Terminals are waterproofed by packing with heavy asbestos grease at time of preparation for fording operations (par. 53). Two arrangements of batteries and compartments have been used. A few early M34 models were equipped as shown in figure 121. Later models M34, and all M36, M47, and M59 are equipped as shown in figure 122. Waterproof cables and harness assemblies are used for all battery connections.

(2) *Head lights* (fig. 123). Service head lights and blackout driving lights are mounted in panels at each side of radiator. On trucks equipped with winch, head lights are at top of panel and blackout lights below. On trucks without winch, the mounting panels are reversed and blackout lights are at the top, head lights in lower portion of panels. Head lights are waterproof, double filament, sealed-beam type. Upper and lower light beams are selected by a foot-operated dimmer switch (fig. 14).

Caution: If lamp units are equipped wtih plastic lenses use care to prevent harmful solvents from coming into contact with them.

(3) *Blackout driving lights* (fig. 123). Blackout driving light mounted below head light in panel on left side of radiator, is a waterproof, sealed-beam type. The blackout driving light is controlled by light switch (fig. 15) and furnishes a diffused, low-intensity light.

(4) *Blackout marker lights* (fig. 123). Waterproof blackout marker lights are mounted on right- and left-front fenders and are controlled by light switch (fig. 15).

(5) *Stop and tail lights* (fig. 125). The stop and tail lights consist of two waterproof units—right-hand and left-hand as-

semblies. The right-hand light incorporates a blackout stop lamp in upper portion, and a blackout tail lamp in lower portion. The left-hand light incorporates a combination stop and tail lamp in the upper portion, and a blackout tail lamp in the lower portion. On cargo trucks M34 and M36, they are mounted under outer rear corners of body. On dump trucks M47 and M59 they are mounted on rear cross member of body sub-frame.

(6) *Trailer-coupling receptacle* (fig. 126). A 12-pin trailer-coupling receptacle is mounted at rear of truck behind left splash shield on M34 and M36. On M47 and M59, it is mounted on the rear cross member of sub-frame. This receptacle provides means of connecting stop and tail lights on trailers with those on truck.

(7) *Slave-battery receptacle* (fig. 127). The slave-battery receptacle is installed at right-rear corner of cab body. The receptacle is wired in parallel with batteries. It is used to charge the batteries from an external source or to connect additional electrical power from an external source to operate electrical components.

(8) *Radio receptacle* (fig. 127). The radio receptacle is located on cab rear panel behind the assistant driver's seat, and provides power connection for radio.

b. BATTERY TABULATED DATA.

Make	Delco-Remy
Model	6TN23
Voltage	12
Plates per cell	23
Capacity	20 hr rate—100 amp hr
Number of batteries used	2

174. Batteries and Cables

a. SERVICING.

(1) *Specific-gravity test.* Specific-gravity testing of the battery electrolyte (battery fluid) determines the state of charge in each battery cell. Use a hydrometer and thermometer and correct hydrometer reading for temperature. A corrected specific-gravity reading of 1.285 in each cell indicates a fully-charged battery. A specific-gravity reading 1.225 or less in each cell indicates that battery must be recharged or replaced.

(2) *Voltage test.* Because of the sealed construction of the submersible type batteries used in this truck, cell-voltage tests cannot be made.

(3) *Adding water.* The water in the electrolyte solution will evaporate at high temperatures or with excessive charging rates. Inspect the electrolyte level and add distilled or clean water, when necessary, to bring electrolyte level to three-fourths inch above the separators.

(4) *Cleaning.* The top of battery must be kept clean. Tighten vent plugs and clean battery with a brush dipped in an alkaline solution such as ammonia or a solution of bicarbonate of soda and water. After foaming stops, flush top of battery with clean water. If terminals and cable clamps are corroded, disconnect cable and clean in same manner as described above for top of battery.

b. INSPECTION (figs. 121 and 122). Battery box can be pulled out onto running board for inspection of batteries. Figure 121 shows the installation on some early M34 trucks with the battery box in normal position. Figure 122 shows the later installation used on most M34 and all M36, M47, and M59 trucks with the battery box pulled out on the running board. To inspect batteries, loosen the two thumb screws, push holding clamps (fig. 121) down to clear bottom of battery box, and pull out box (fig. 122).

c. REMOVAL. Pull battery box out on running board as in *b* above. Disconnect all cables from battery terminal.

Caution: Disconnect battery ground cable (7) first.

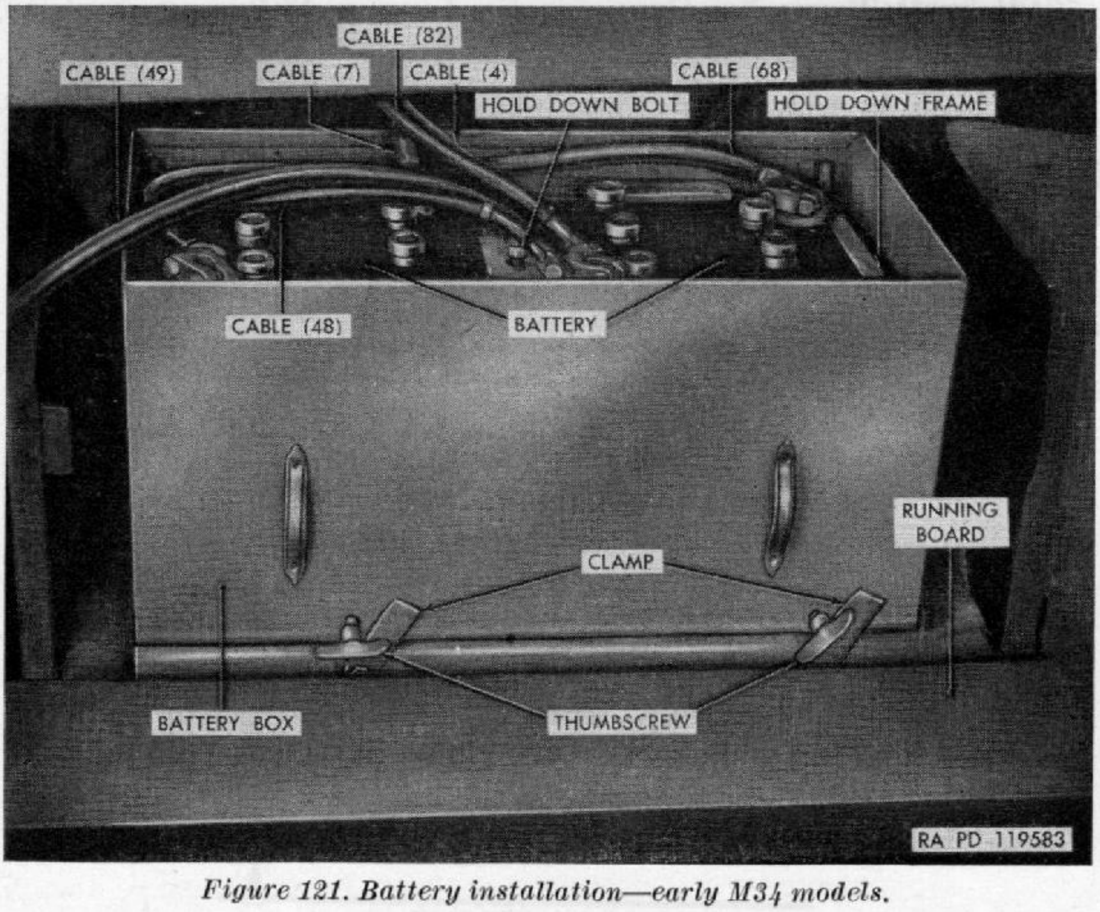

Figure 121. Battery installation—early M34 models.

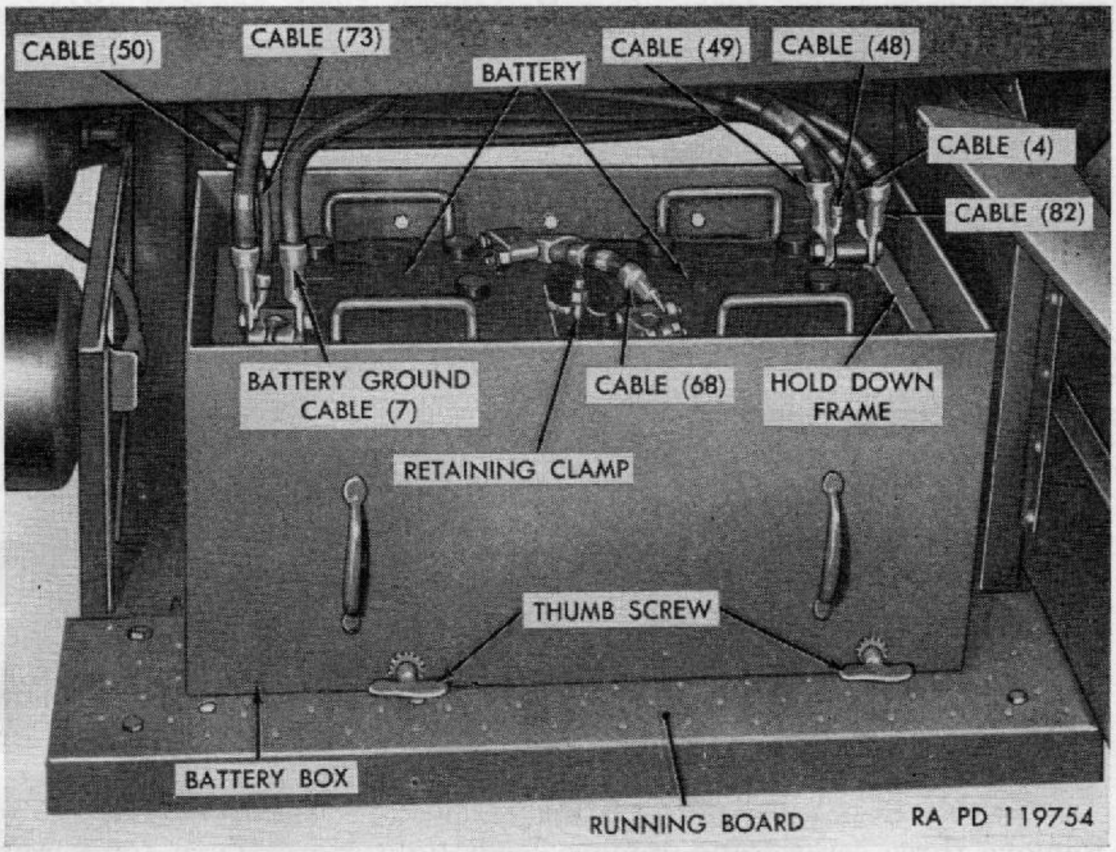

Figure 122. Battery installation—Late M34, all M36, M47 and M59 models.

Loosen battery retaining clamp bolts and remove battery hold-down frame (figs. 121 and 122). Lift batteries from box.

d. Installation. Position batteries in box. Note that in early installations positive terminals were at front of box (fig. 121), while in later installations the negative terminals are at front (fig. 122). Position hold-down frame and install retaining clamp bolts.

Caution: Connect battery ground cable (7) last.

On early installations, cable (7) is connected to negative terminal of rear battery, interconnection cable (68) between positive terminal of rear battery to negative terminal of front battery, and cables (4, 48, 49, and 82) to positive terminal of front battery (fig. 121). In the later installations, cables (7, 50, and 73 when used) are connected to negative terminal of rear battery. Cable (68) is connected between positive terminal of rear battery and negative terminal of front battery. Cables (4, 48, 49, and 82 when used) are connected to positive terminal of front battery (fig. 122). Push battery box back into compartment, arise clamps to engage thumb screws, and tighten screws.

175. Head Lights

a. Adjustment (fig. 123). To reduce head light glare and prevent blinding of operators of oncoming vehicles, head lights must be adjusted as outlined below. The head light beam direction is changed by two lamp-unit focusing screws, one at top and one on the side.

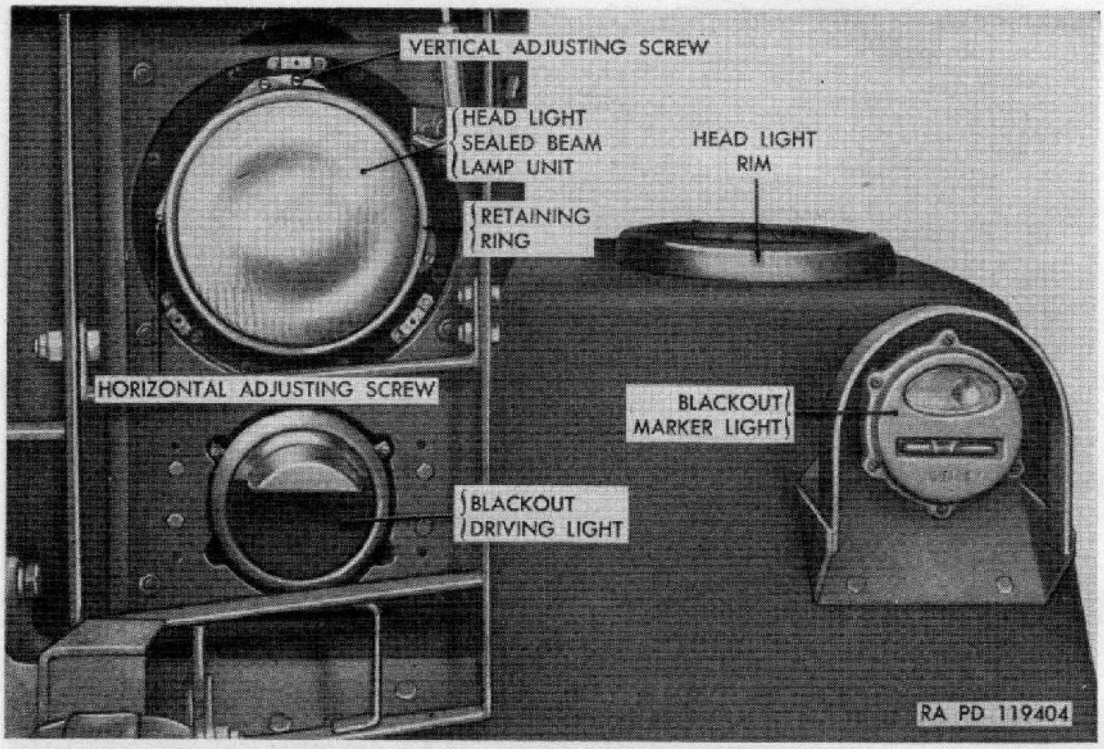

Figure 123. Headlight and blackout driving light.

Remove three screws and remove head light rim. Turn top screw to change direction of beam vertically, and turn side screw to change direction horizontally.

b. PROCEDURE (fig. 124).

(1) Place unloaded vehicle on a smooth, level surface so that head lights are 25 feet away from a vertical wall or other vertical surface. Center line of vehicle must be at right angles to vertical surface.

(2) Measure height of head light center from floor and mark a horizontal line (X–X) at this height on vertical surface.

(3) Mark line (A–A) one-twelfth of distance between line (X–X) and floor, below line (X–X).

(4) Draw vertical lines (B–B) and (C–C) directly in front of each head light.

(5) Turn on head lights at light switch and select high beam with dimmer switch.

(6) Cover one head light while adjusting other. Aim head light so that center of hot spot registers with intersecting lines (A–A) and (B–B), or (A–A) and (C–C) respectively.

(7) After each light is aimed separately, check both lights simultaneously for conformity to line (A–A).

(8) Install head light rim and tighten screws.

c. SEALED-BEAM LAMP UNIT REPLACEMENT.

(1) Remove three screws attaching head light rim and remove rim. Remove three screws attaching retaining ring to head

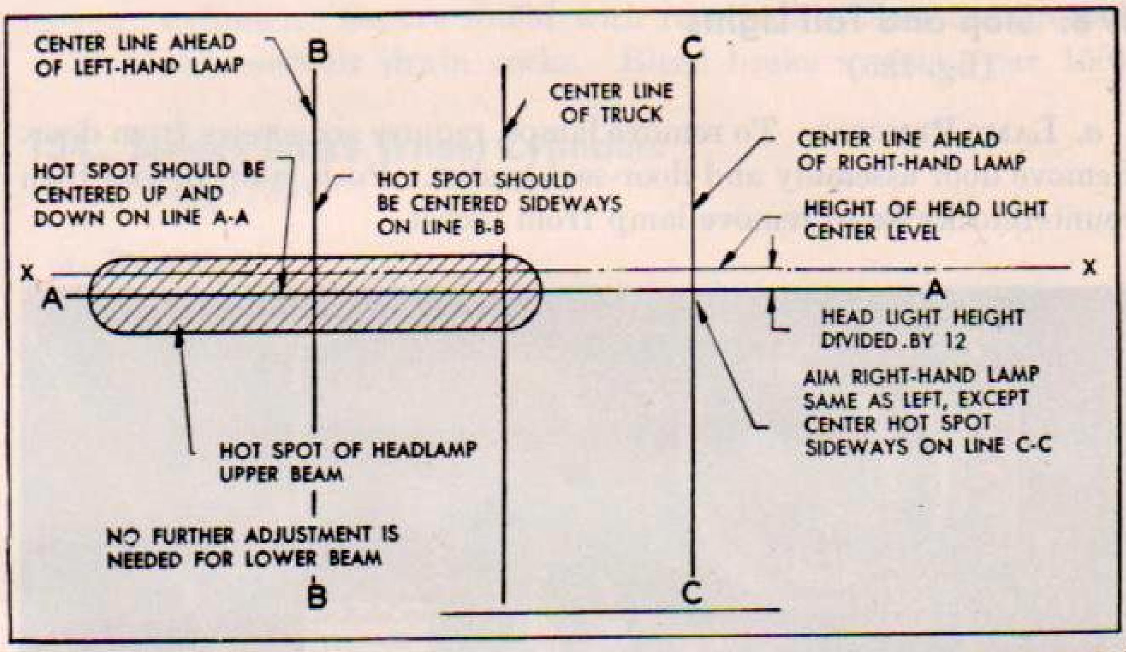

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Figure 124. Headlight adjustment diagram.

light body and remove retaining ring. Pull sealed-beam lamp unit from head light body and disconnect cables at connectors.

(2) Connect cables at connectors in head light body. Position sealed-beam lamp unit in body and install retaining ring. Secure with three screws. Install door and fasten with three screws.

176. Blackout Driving Light
(fig. 123)

a. To remove sealed-beam lamp unit, remove three door-retaining screws and remove door. Pull sealed-beam lamp unit forward, remove connectors from clips, and disconnect cables at connectors.

b. To install sealed-beam lamp unit, connect cables at connectors and position connectors in clips. Position sealed-beam lamp unit in body. Install door and secure it with three retaining screws.

177. Blackout Marker Light
(fig. 123)

a. Lamp Removal. Remove six screws from door and remove door assembly and gasket. Push lamp in and turn counterclockwise to remove from socket.

b. Lamp Installation. Push lamp in socket and turn clockwise to lock. Turn light switch on and test lamp. Install door-seal-gasket, and door assembly. Secure door with six screws. Tighten securely.

178. Stop and Tail Lights

(fig. 125)

a. Lamp Removal. To remove lamps, remove six screws from door. Remove door assembly and door-seal gasket. Push lamp in and turn counterclockwise to remove lamp from socket.

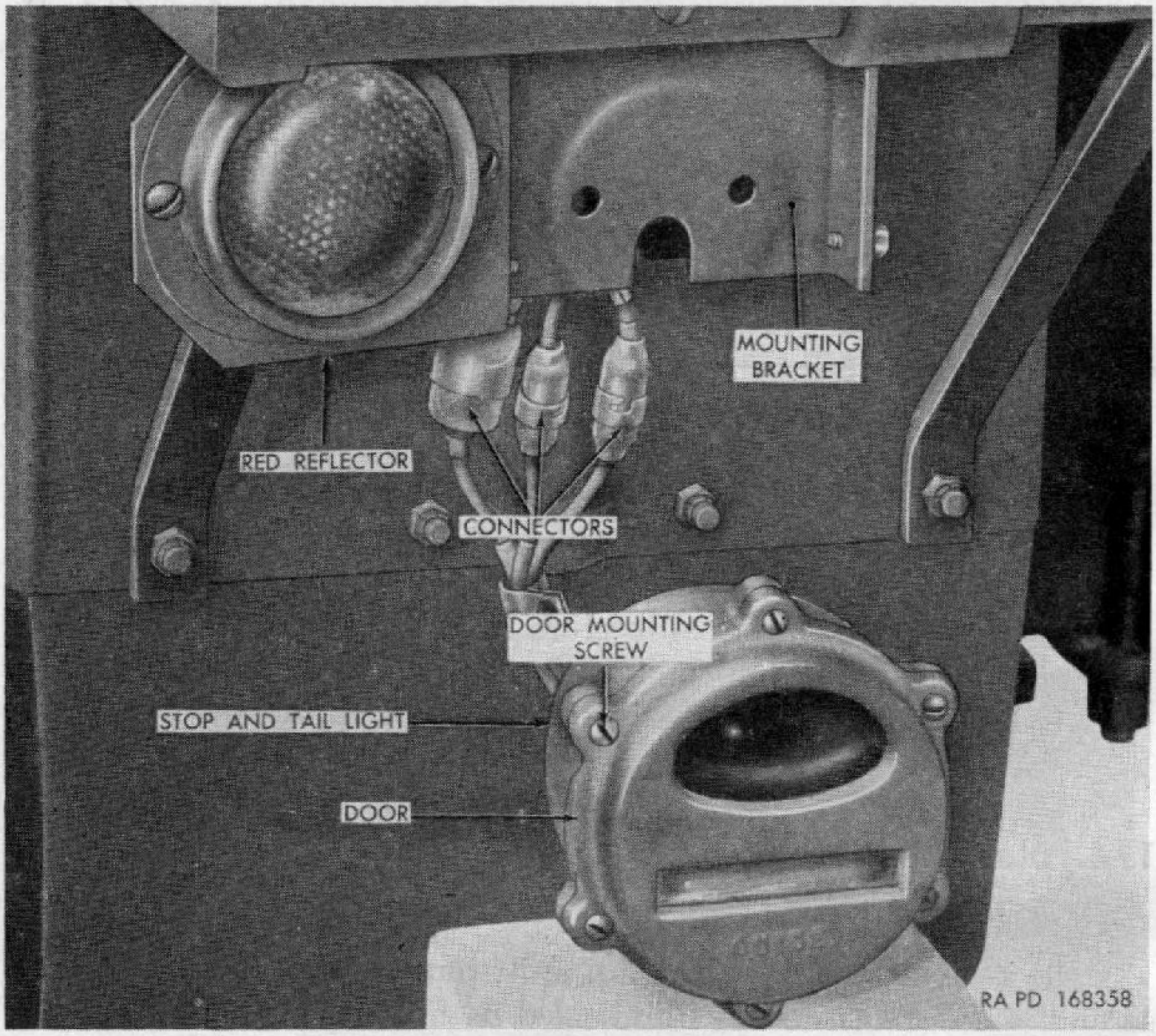


Figure 125. Stop and tail lights.

b. Lamp Installation. Insert lamp in socket and turn clockwise to lock. Test lamp by turning on light switch. Install door-seal gasket and door assembly. Install six door screws and tighten securely.

179. Trailer Electric Coupling Receptacle

(fig. 126)

a. Removal. Remove three nuts, lock washers, and bolts attaching trailer coupling receptacle to bracket. Disconnect cables at connectors behind trailer receptacle.

Note. Tag cables to facilitate installation.

Push trailer receptacle to rear and remove.

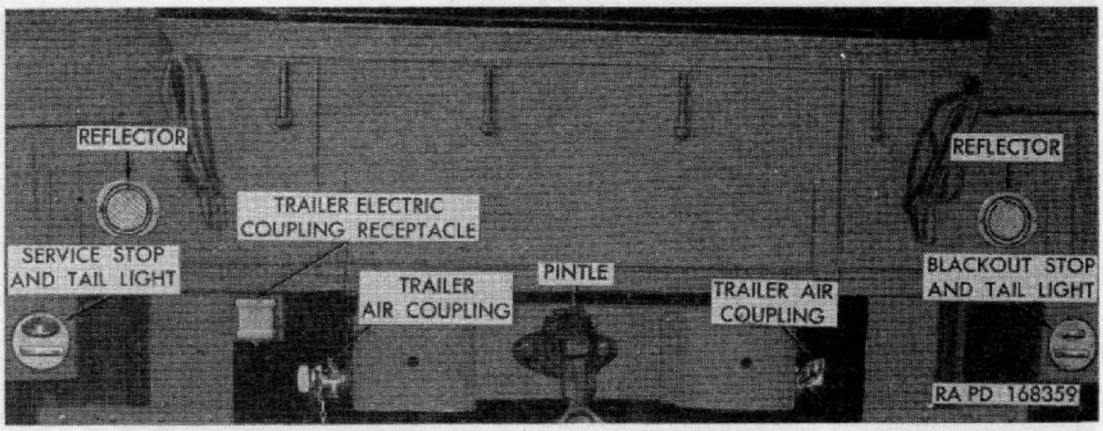


Figure 126. Trailer connections.

b. INSTALLATION. Connect cables at connectors behind trailer receptacle. Position trailer receptacle on bracket and secure with four bolts, lock washers, and nuts.

180. Slave Battery Receptacle

(fig. 127)

a. REMOVAL. Disconnect cables at batteries. Remove four cap screws from receptacle flange. Remove receptacle.

b. INSTALLATION. Position receptacle, install four cap screws, and tighten firmly. Connect cables at batteries.

181. Radio Receptacle

(fig. 127)

a. REMOVAL. Disconnect cables at batteries. Remove four nuts, lock washers, and bolts attaching radio receptacle to bracket. Remove receptacle.

b. INSTALLATION. Position receptacle on bracket and secure with four bolts, lock washers, and nuts. Connect cables at batteries.

Section XXIII. WHEELS, TIRES, AND HUBS

182. Description

a. WHEELS.

(1) The offset disk type wheels are mounted to hubs on six studs. Wheels are completely interchangeable as to location. Wheel nuts, however, are not interchangeable as to sides of truck. Hub studs on right-side have right-hand threads, studs on left-side have left-hand threads.

(2) Model M34 is equipped with single wheels only. Dual wheels cannot be installed. Model M36 is equipped with dual

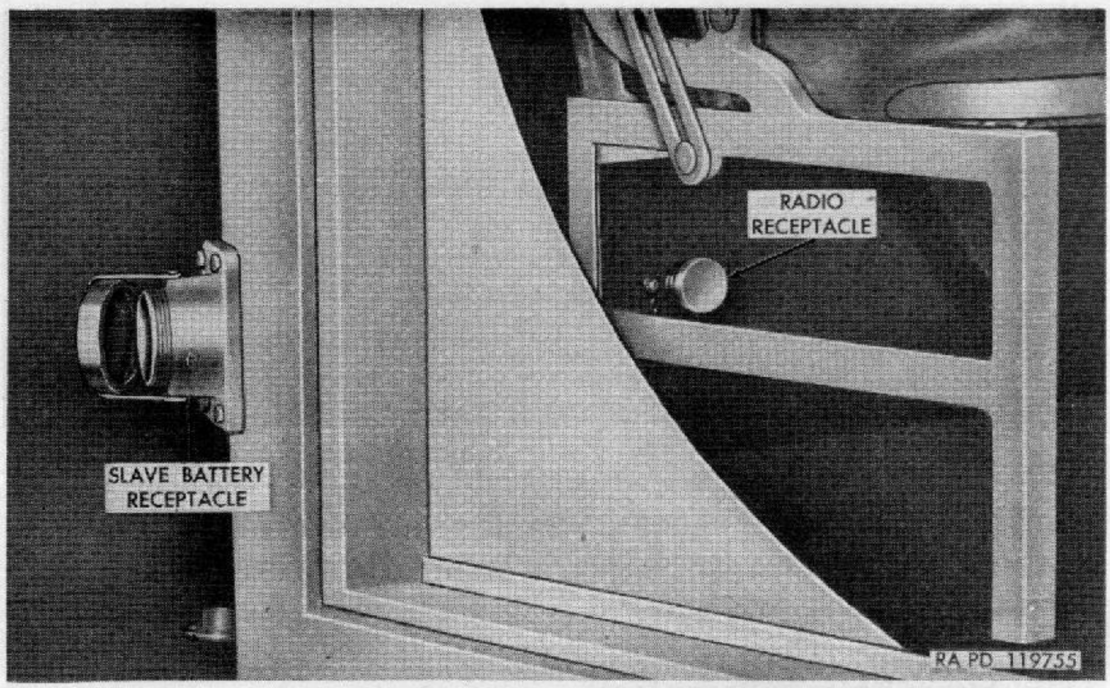


Figure 127. Slave battery receptacle.

wheels. Models M47 and M59 are normally equipped with single wheels but dual wheels can be installed on rear axles.

b. Tires and Rims.

(1) *Model M34.*

(*a*) Model M34 trucks, serial number 94906 and below, tires are equipped with hinge type beadlock. Tires were secured with a side ring bolted to wheel disk.

(*b*) Model M34 trucks, serial number 94907 and above, are equipped with rims on which the tires are secured with a side ring which is sprung into place and interlocks with rim. Six bead clips, installed on each side between tire and rim, are used to prevent displacement of tire when partially deflated, or when traversing sand, snow, or mud.

(2) *Models M36, M47, and M59.* Rims on all these models are the same as described in (*b*) above.

c. Hubs and Bearings. All hubs are mounted on opposed tapered roller bearings. Each hub is secured on its axle with adjusting nuts, and an adjusting-nut lock. All hubs have an inner oil seal, and rear hubs have an outer oil seal.

183. Wheels

a. Removal.

(1) *Single wheels.* Loosen wheel-stud nuts, jack up truck, remove nuts and remove wheel.

Caution: Do not loosen stud nuts on bolted side rings.

(2) *Dual wheels.* Loosen wheel-stud nuts, jack up truck, remove nuts, and remove outside wheel. Remove special square-head cap nuts holding inner wheel to hub and remove wheel.

b. INSTALLATION.

(1) *Single wheels.* Install wheel on hub and secure with wheel-stud nuts. Tighten opposite nuts alternately with wrench furnished with truck. Remove jack and tighten nuts from 400 to 450 lb-ft torque.

(2) *Dual wheels.* Install inner wheel on hub and secure with special square-head cap nuts. Tighten opposite nuts alternately. Be sure all nuts are tight before installing outer wheel. Position outer wheel on the cap nuts and secure wheel with wheel-stud nuts. Tighten opposite nuts alternately. Lower wheel to ground and tighten nuts from 400 to 450 lb-ft torque.

184. Tires and Rims

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

b. TIRE REMOVAL.

(1) *Tires with hinged beadlock.* Remove wheel (par. 183), and deflate tire completely. Remove side-ring stud nuts and remove side ring.

Caution: Do not attempt to remove side-ring stud nuts until tire has been completey deflated.

Use tire irons to dislodge bead of tire from rim. Remove tire, tube, and beadlock from rim. Install valve core and inflate tube enough to spread tire beads. Pry up on beadlock at a point about eight inches from hinge. Collapse beadlock and turn 90° to remove from casing. Deflate tube and remove.

(2) *Tires with bead clips.* Remove wheel (par. 183) and completely deflate tube by removing valve core. Insert pry bar in slot of side ring near split and pry end of ring out over edge of rim and remove ring from wheel with tire irons. Remove tire, 12 bead clips, flap, and tube.

c. TIRE INSTALLATION.

(1) *Tires with hinged beadlock.* Install tube in casing and inflate enough to hold in place. With beadlock collapsed, insert valve stem through hole in beadlock. Install beadlock inside of casing and press part way through tire. Inflate tube enough to spread tire beads. Turn beadlock and

work into position between tire beads. Deflate tube completely. Hold one end of beadlock with foot, and pull other end up with both hands until hinge snaps into place. Center beadlock so edges are below beads of tires at all points. Install tire and beadlock assembly on wheel rim with valve stem pointing outward. Be sure lug on beadlock engages valve-stem stem in wheel rim. Install side ringe and tighten stud nuts alternately.

Caution: These side-ring stud nuts must be tightened before inflating tire. Inflate tire and install wheel (par. 183). Tighten wheel-stud nuts and remove jack.

(2) *Tires with bead clips.* Install tube in tire so that valve stem is in line with balancing mark on tire. Install tire flap and inflate tube sufficiently to prevent it from falling out, or from being pinched during mounting. Place tire on wheel and insert valve stem with stem pointing toward the outer side of mounted wheel. Install six bead clips under tire bead on each side of tire. Be sure that inner ends of clips engage inner sides of tire bead. Arrange clips in approximately even spaces. Place one end of side ring over edge of rim and force entire ring over rim and under outer ends of clips. Use tire irons or soft hammer to seat ring. Be sure that ring is seated in rim groove. Inflate tire in accordance with *a* above, and install wheel (par. 183).

185. Hubs and Bearings

a. Hub Removal. Remove wheel (par. 183*a*). Remove axle shaft drive flange (front, par. 143; and rear par. 146). Straighten bent-over portions of adjusting-nut lock. Remove outer nut with wrench 41–W–3748–75 (fig. 128). Remove adjusting-nut lock; then remove inner nut with same wrench. Remove outer-bearing oil seal and oil seal wiper ring (rear axles only), outer bearing cone, and hub and drum assembly (fig. 129). Remove 10 nuts and lock washers attaching brake drum to hub assembly. Pry brake drum loose and pull drum off bolts. Remove bearing cups if necessary (*f* below).

b. Hub Installation. Install inner and outer bearing cups (*f* below). Install brake drum on hub and secure with 10 lock washers and nuts. Clean and lubricate hub and bearing cones as described in *e* below. Install inner oil seal and retainer on steering knuckle. Install inner bearing cone (fig. 130). Position hub and drum assembly over inner bearing cone. Insert outer bearing cone (fig. 129). On rear axles only, insert oil seal wiper ring and new oil seal with flat side out. Install inner nut. Install wheel and adjust bearings (*c* below). Install new adjusting-nut lock. Install outer nut and bend

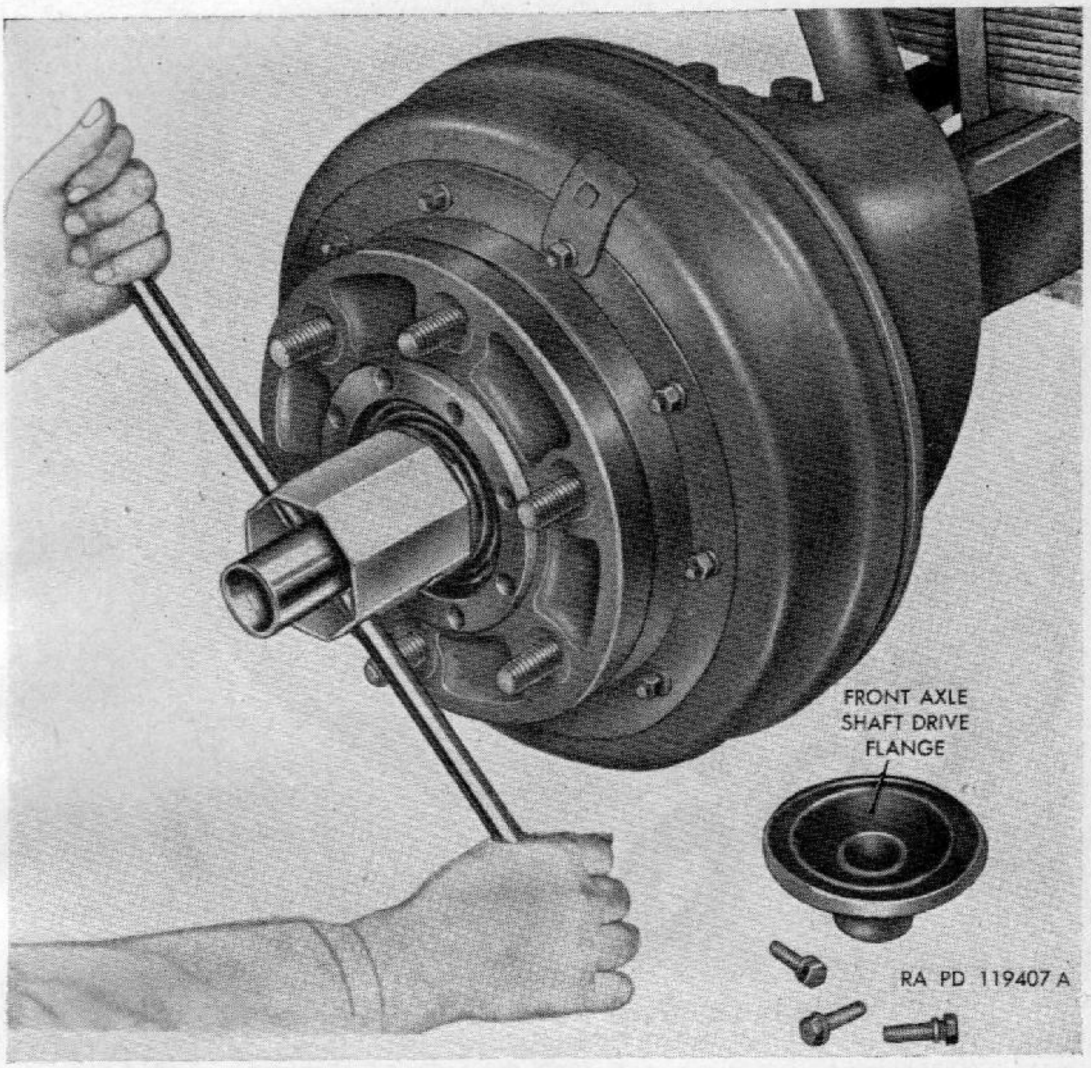


Figure 128. Adjusting wheel bearings using wrench 41–W–3748–75.

one tong of adjusting nut lock over flat on inner nut and one over flat on outer nut. Install drive flange (front, par. 143*c*; and rear, par. 146*b*).

c. Wheel Bearing Adjustment (fig. 128).

(1) *Check adjustment.* Jack up wheel to be checked until tire clears ground. Grasp tire at top and pull back and forth, or use a bar under tire. If bearings are correctly adjusted, movement of brake drum in relation to top edge of brake flange plate will be just perceptible, with wheel turning freely. If movement is excessive, adjustment is required as explained in (2) below.

(2) *Adjust wheel bearing.* With wheel jacked up, remove drive flange (front, par. 143*a*; and rear, par. 146*a*). Straighten bent-over portions of the adjusting-nut lock. Remove outer nut with wrench 41–W–3748–75 (fig. 128). Remove adjusting-nut lock. While turning wheel, tighten inner nut until wheel binds. Back off nut about one-eighth turn; then check

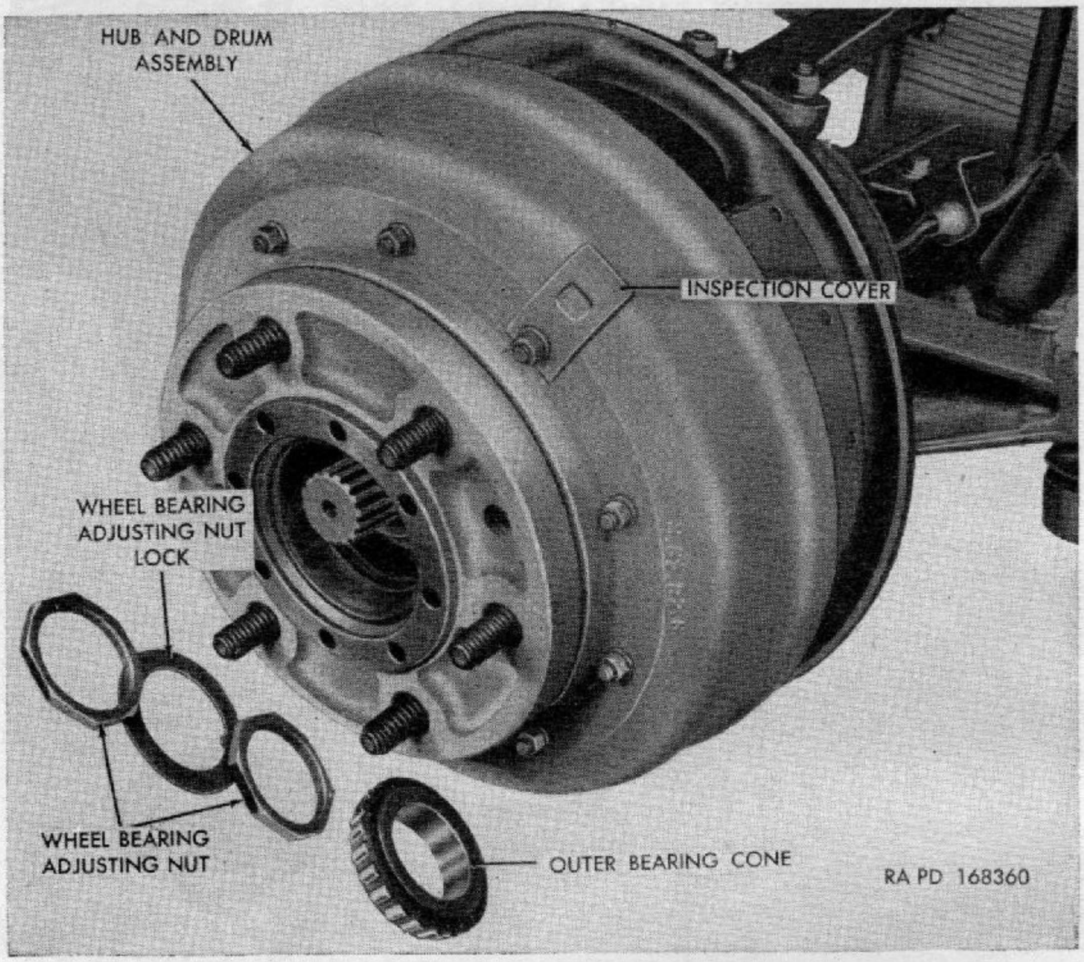


Figure 129. Outer wheel bearing—removal.

adjustment. Install new adjusting-nut lock and outer nut. Using water pump pliers, bend one tong of adjusting-nut lock over flat on inner nut and one over flat on outer nut. Check adjustment.

Caution: Do not use hammer and punch to lock adjusting nut on rear axles. The use of water pump pliers will prevent damaging outer-oil seal.

Install drive flange (front, par. 143*c*; and rear, par. 146 *b*).

d. Wheel Bearing Removal. Remove wheel (par. 183). Remove drive flange (front, par. 143; and rear, par. 146). Straighten bent-over portions of adjusting-nut lock. Remove outer nut, adjusting-nut lock, and inner nut (fig. 128). Remove outer-bearing oil seal and oil seal wiper ring (rear axles only), outer-bearing cone, and hub and drum assembly (fig. 129). Remove inner-bearing cone (fig. 130).

e. Wheel Bearing Installation.

(1) *Clean and lubricate.* Immerse bearing cones in dry-cleaning solvent or volatile mineral spirits. Clean with brush to remove old lubricant. Blow dry with compressed air. Inspect for defects and wear. Using lubricants specified in

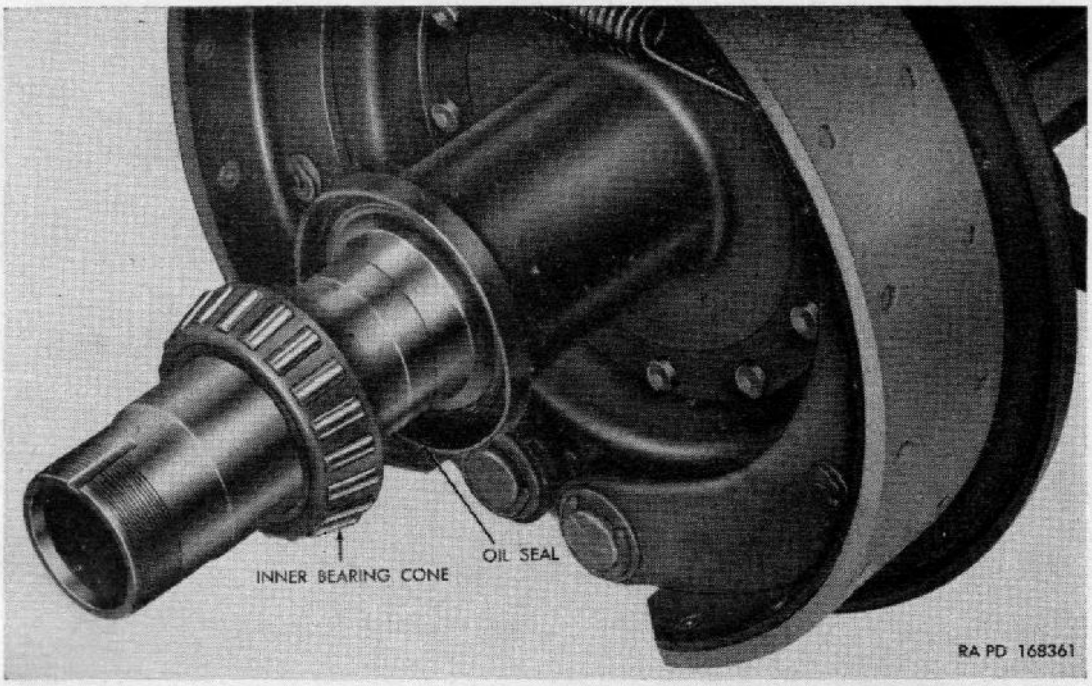


Figure 130. Inner wheel bearing—removal or installation.

paragraph 56, completely fill spaces around rollers and above and beneath cone. Thoroughly wash hub with dry-cleaning solvent or volatile mineral spirits to remove old lubricant. Inspect condition of bearing cups and replace (*f* below) if worn, distorted, or scored. Apply a thin coating (not over $\frac{1}{16}$ inch thick) of bearing lubricant to inside surface of hub, outside surface of spindle, and inner surface of drive flange. Do not pack or fill hub with lubricant as this may result in leakage.

(2) *Install bearing.* Install inner-bearing cone (fig. 130). Coat inner bearing cage and fill space between inner bearing and oil seal with lubricant. Position hub and drum assembly over inner bearing. Insert outer-bearing cone (fig. 129). On rear axles only, install oil seal wiper ring and oil seal with flat side out. Install inner nut and adjust bearings (*c* above). Install adjusting-nut lock and outer nut. Install drive flange (front, par. 143*c*; and rear, par. 146*b*) and wheel.

f. Wheel Bearing Cup Replacement (fig. 131).

(1) *Removal.* Remove hub (*a* above). Install remover and replacer 41–R–2374–630 and screw 41–S–1047–330 in bearing cup. The remover and replacer is first pushed together and placed in position in bearing cup. Spread the two parts and insert screw. Drive out bearing cup with hammer. Turn hub over and remove other bearing cup from opposite side of hub in same manner.

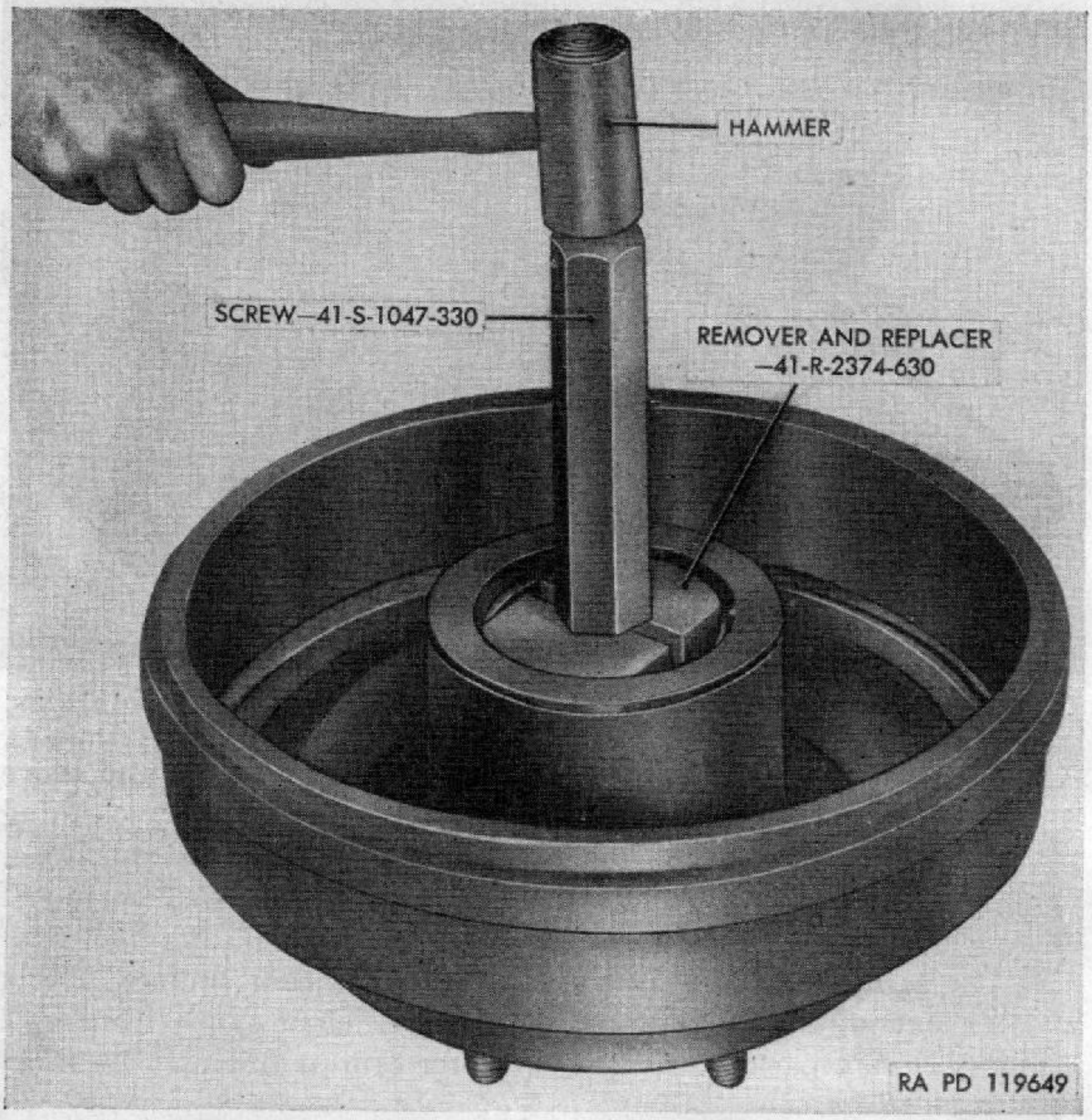


Figure 131. Installing inner bearing cup using remover and replacer 41–R–2374–630, and screw 41–S–1047–330.

(2) *Installation.* Position bearing cup in hub and install remover and replacer 41–R–2374–630 and screw 41–S–1047–330 in bearing cup (fig. 131). Drive bearing cup into place with hammer. Turn hub over and install other bearing cup in same manner. Install hub (*b* above).

Section XXIV. WINCH

186. Description and Data

a. Description. The horizontal drum winch is mounted at front of truck between radiator and bumper on support brackets attached to frame-side-rail extensions (fig. 132). The clutch control lever is located at the top of the end-bearing frame. Power for operating the winch is supplied by the truck engine through a universal joint drive shaft connected to the power-take-off. The drive shaft is connected

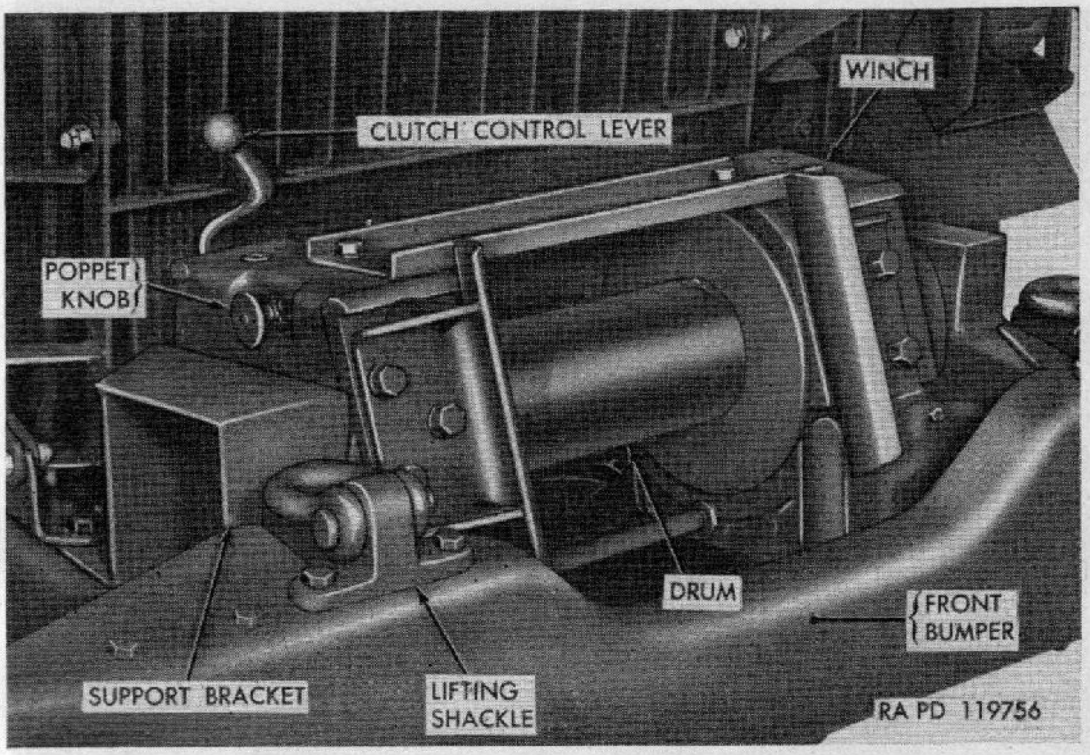


Figure 132. Winch installation.

to the winch-drive worm by a shear pin (fig. 133). This shear pin is installed to protect the chassis frame and wire rope.

b. TABULATED DATA.

Make	Gar Wood
Model	CA 514
Type	horizontal drum
Drive	propeller shaft from power-take-off
Capacity	10,000 lb
Wire rope	200 ft long, ½ in dia

187. Adjustment

a. DRAG BRAKE (fig. 134).

(1) *Test.* Normally, the drag brake will not require adjustment, but adjustment can be checked by pulling cable off drum with winch clutch disengaged. If drum continues to turn when pull stops, adjust in accordance with (2) below.

(2) *Adjustment.* The drag brake is tightened, to prevent drum from spinning when pulling off wire rope by hand, by turning adjusting screw clockwise (fig. 134). Test adjustment in accordance with *a*(1) above.

b. AUTOMATIC BRAKE (fig. 135).

(1) *Test.* With truck parked at top of a steep grade, start pulling another vehicle up the incline, using winch only. When vehicle is part way up decline, shift power-take-off into neu-

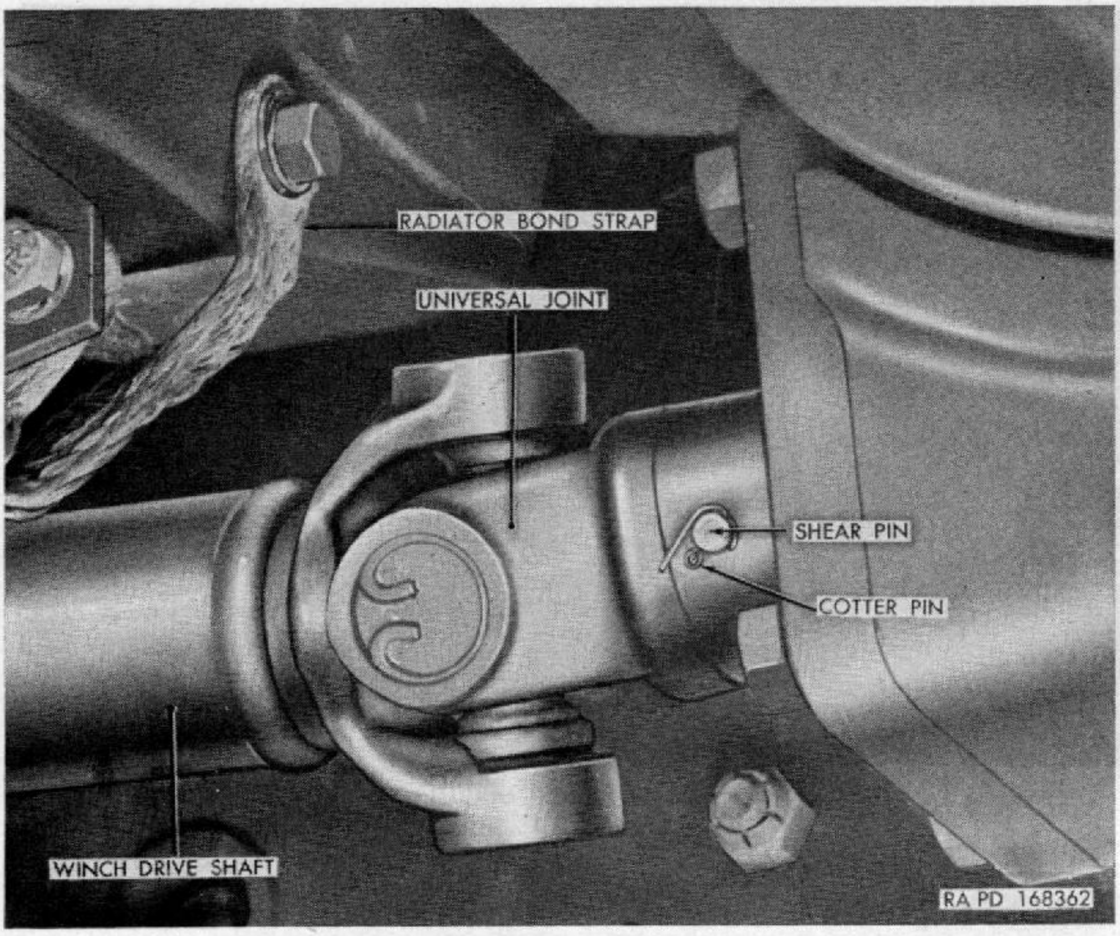


Figure 133. Winch drive shaft and shear pin.

tral. If vehicle being pulled rolls backward, adjust automatic brake in accordance with (2) below.

(2) *Adjustment.* Increase tension on brake spring by turning the adjusting screw on underside of brake case (fig. 135). Tighten one-half turn and test. Do not tighten more than one-half turn before testing.

Caution: If, after adjustment and testing for several minutes, hand cannot be held on brake case cover because of heat, loosen adjusting schew one-half turn and test. Even when correctly adjusted, brake may become warm but should not be too hot to allow the hand to be held on brake case.

188. Automatic Brake

a. Removal. Remove six screws and lock washers attaching cover to brake case, and remove cover and gasket. Loosen adjusting screw on underside of brake case (fig. 135). Remove screw, washer, gasket, and spring. Pull brake band from brake disk.

b. Installation. Position brake band on brake disk with opening in band away from winch drum. Place washer and gasket on adjusting screw and start screw into brake case. Install spring between case and band and push screw through lower end of band. Using pry bar,

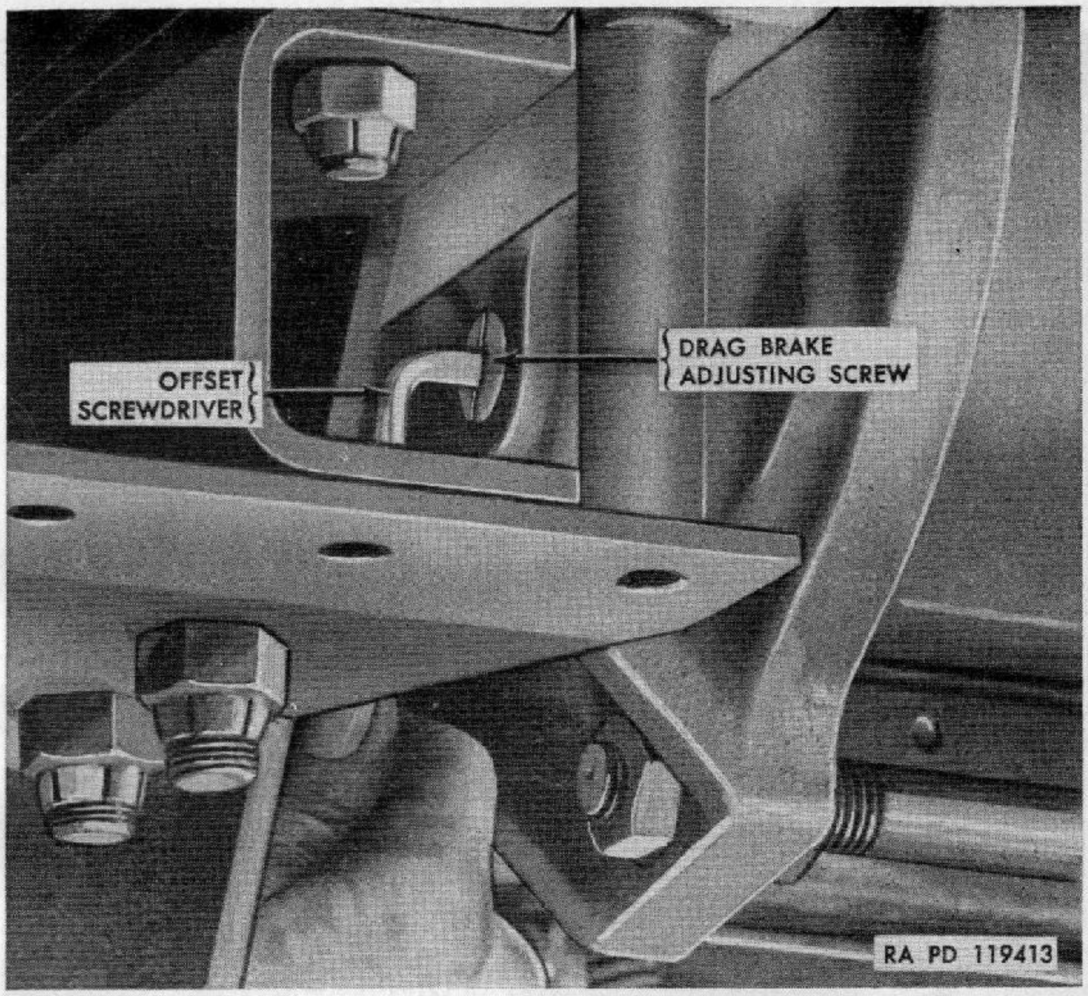


Figure 134. Winch drag brake adjustment.

force upper end of band down so nut will engage threads on adjusting screw. Position cover on case with new gasket and install six screws and lock washers. Tighten securely. Adjust automatic brake in accordance with paragraph 187*b*.

189. Winch Drive Shaft

a. Description. The winch is driven from power-take-off by a tubular-type drive shaft with two universal joint assemblies. The front universal joint is connected to winch-drive worm by a shear pin (fig. 133). The rear universal joint is attached to the power-take-off output shaft by a key and set screw. A slip joint is provided at the rear universal joint, with a stop collar positioned on drive shaft three-fourths inch ahead of rear universal joint.

b. Shear Pin Replacement. When shear pin fails, slide universal joint along the winch-drive worm to expose shear-pin hole. Remove broken parts of shear pin. Slide universal joint back into position and insert new pin. Install cotter pins in shear-pin ends (fig. 133).

Caution: Never substitute other rivets, bolts, or pins for the standard shear pin.

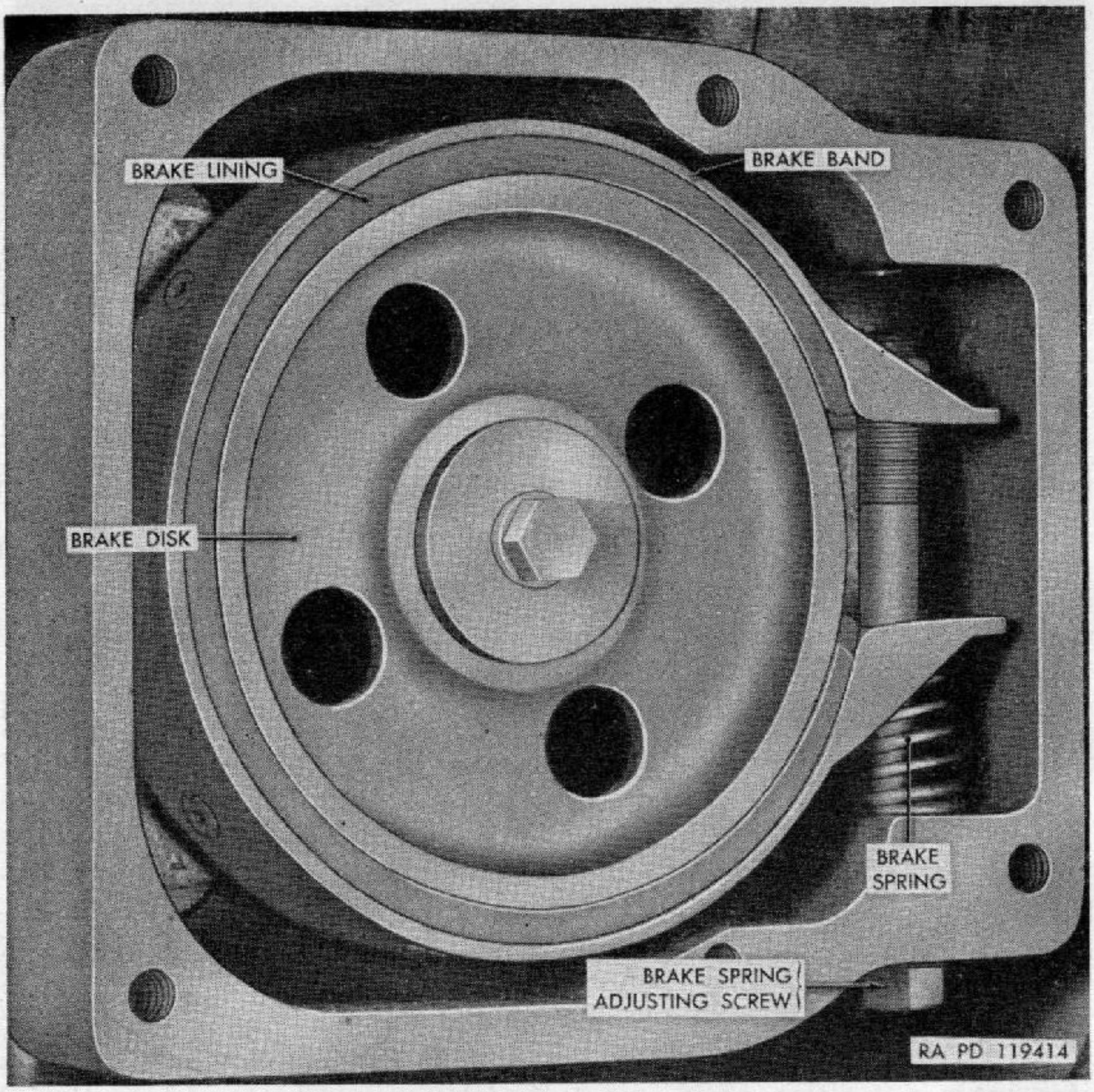


Figure 135. Winch automatic brake.

c. DRIVE SHAFT REMOVAL. Remove cotter pin from shear pin at winch-drive worm end. Remove shear pin and loosen set screw in stop collar. Slide universal joint free of drive worm. Loosen set screw at power-take-off output shaft and pull drive shaft from power-take-off shaft. Tie or wire key in shaft to prevent loss.

d. DRIVE SHAFT INSTALLATION. Install key if missing, slide drive shaft on power-take-off output shaft, and tighten set screw. Place other end of drive shaft on winch-drive worm, aline holes, and install shear pin. Install cotter pins in shear-pin ends. Position stop collar three-fourth inch ahead of rear universal joint and lock in place with set screw.

190. Winch Removal

a. Attach chain-fall or other hoisting equipment to winch to support weight.

b. Remove cotter pin from shear pin (fig. 133). Remove shear pin and loosen set screw in stop collar. Slide universal joint free of winch-drive worm.

c. Remove six winch-to-support-bracket cap screws and lock washers from each end of winch. Raise winch to clear bumper and pull forward from truck.

191. Winch Installation

a. Attach chain-fall or other hoisting equipment to winch and raise winch to clear bumper. Lower into place and aline mounting holes, and install shear pin. Install cotten pins in ends of shear pin ers and cap screws in each end of winch and tighten securely.

b. Slide drive-shaft universal joint on which-drive worm, aline holes, and install shear pin. Install cotter pins in ends of hear pin (fig. 133). Position stop collar three-fourth inch ahead of rear universal joint and lock in place with set screw.

192. Wire Rope Replacement

a. REMOVAL. Move clutch control level (fig. 132) as far as it will go toward winch drum to disengage jaw clutch and pull out poppet knob (fig. 132) and turn to hold it in out position. Make sure power-take-off shifting lever is in "NEUTRAL" position. Pull wire rope from drum, loosen set screw, and disengage rope.

Caution: Always wear gloves when handling wire rope. Never let rope run through hands. Broken strands can cause painful injuries.

b. INSTALLATION. Insert rope in drum and secure with set screw. New rope must be wound under load. Attach end of rope to an anchor or a tree and with power-take-off in low, allow winch to pull truck forward.

Note. Make sure that first layer goes on drum with all coils tight and close together. If coils tend to separate, drive them together with a block of wood. See that each additional layer starts back across drum evenly.

Section XXV. RADIO INTERFERENCE SUPPRESSION

193. Purpose

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

b. Suppression in this truck is accomplished by the use of resistor suppressors and capacitors. In addition, metal parts in the vicinity of the engine are formed into a shield by use of braided bond straps and toothed washers, confining electrical disturbances so they cannot disturb receiving equipment. Wiring that may carry interfering surges to a point where interference will affect radio reception is shielded.

194. Description

a. IGNITION SYSTEM.

(1) *Spark plugs* (fig. 69). Each spark plug is shielded integrally and contains a radio interference suppression resistor.

(2) *Distributor* (fig. 69). The distributor primary cable is connected to the distributor coil through a feed-through capacitor which is an integral 0.25 microfarad, 400-volt radio filter suppression capacitor.

(3) *Spark plug cables* (fig. 69). High-tension cables to the spark plugs are individually shielded by a metallic conduit terminating in appropriate fittings.

b. STARTING AND CHARGING SYSTEMS.

(1) *Generator* (fig. 82). An 0.09- to 0.15-microfarad, 400-volt bypass capacitor, connected from generator output cable to ground, is located within the generator unit.

(2) *Generator-regulator* (figs. 84 and 85). Two capacitors are located within the generator-regulator.

(*a*) An 0.002-microfarad, 100-volt bypass capacitor is connected from field terminal "B" to ground.

(*b*) An 0.1-microfarad, 100-volt capacitor is connected on current regulator.

(3) *Starter* (fig. 79). An 0.40- to 0.60-microfarad, 250-volt bypass capacitor, connected from starter electrical cable to ground, is located within the starter unit.

195. Ignition System

a. DESCRIPTION AND DATA.

(1) *Spark plug suppressors.* Each spark plug is integrally shielded and contains a 10,000-ohm built-in resistor.

(2) *Distributor filter.* The distributor filter consists of a primary cable feed-through capacitor and a resistor and coil capacitor located inside the distributor housing. The feed-through capacitor is an 0.25-microfarad, 400-volt capacitor located within the waterproof connector receptacle on the distributor housing. One terminal on the feed-through ca-

pacitor serves as the male terminal of the primary lead-in connector receptacle (fig. 71). The other terminal is connected to the resistor terminal. The coil capacitor and resistor are connected to a terminal on the coil.

(3) *Spark plug cables.* High-tension cables to the spark plugs are individually shielded by tinned-copper braid with a rubber coating (fig. 77).

b. MAINTENANCE.

(1) *Spark plug suppressors.* Spark plug suppressors are built in the spark plugs and are not replaceable. If interference is coming from spark plugs, replace plugs (par. 129).

(2) *Distributor feed-through capacitor.*

(*a*) *Removal.* Disconnect primary cable from connector plug at distributor. Remove four screws and lock washers from distributor connector receptacle and remove receptacle and gasket. Disconnect capacitor cable from resistor terminal (fig. 71) and pull out capacitor.

(*b*) *Installation.* Insert filter into connector housing. Pull filter cable through into distributor interior and secure to resistor terminal (fig. 71). Install gasket and connector receptacle on receptacle housing and secure with four screws and lock washers. Connect primary cable connector plug.

(3) *Spark plug cables.* Spark plug cables are replaced by loosening conduit nut on each end of cable (fig. 77), removing old cable and installing replacement. Be sure the proper cable is installed and nuts tightened.

196. Starting and Charging System

a. DESCRIPTION AND DATA.

(1) *Generator capacitor.* An 0.09- to 0.15-microfarad, 400-volt capacitor, connected from output cable to ground, is enclosed within the generator housing.

(2) *Generator-regulator capacitors.* Two 100-volt capacitors, 0.002 and 0.1 microfarads, are mounted inside the generator-regulator housing.

(3) *Starter capacitor.* A 0.40- to 0.60-microfarad, 250-volt capacitor, connected from starter electrical cable to ground, is mounted on starter body inside commutator end cover.

b. MAINTENANCE.

(1) *Generator capacitor.* Since generator capacitor is contained within the generator housing, replacement of capacitor requires replacement of generator unit (par. 132).

(2) *Generator-regulator capacitors.* Generator-regulator capacitors are contained within the generator-regulator housing; replacement of capacitors requires replacement of generator-regulator unit (par. 133).

(3) *Starter capacitor.*

(*a*) *Removal.* Release two commutator-end-cover clips from pins in starter housing (fig. 80) and remove commutator end cover. Remove capacitor cable from terminal. Release capacitor mounting bracket screw and remove capacitor.

(*b*) *Installation.* Position capacitor mounting bracket to commutator head (fig. 80) and secure with mounting screw. Connect capacitor cable to terminal. Position commutator-end cover and secure cover clips to pins in starter housing.

197. Fasteners and Bond Straps

Two bond straps are located at bottom of radiator (fig. 64), one at rear of engine (fig. 51), and one on transmission. The two bond straps at bottom of radiator, one on each side, are between radiator and radiator and engine support. The one at rear of engine is between left side of engine and dash panel. The one on transmission is between transmission and flywheel housing.

Note. Be sure that all straps are in good condition and tightly secured to a ground terminal.

Section XXVI. WIRING CIRCUITS AND HARNESSES

198. Description

The chassis harness is a complete waterproof assembly made up of numerous sub assemblies. In addition to assembled harness, numerous separate cable assemblies are installed. Harness ends terminate in a connector-receptacle pin or socket, a connector plug pin or socket, or a cable terminal. All connectors are provided with rings, or rubber sealing gaskets or grommets to make connection waterproof.

199. Circuit Identification

The different circuits can be readily identified from wiring diagram (fig. 136). All harness terminals and the separate cables are plainly marked with circuit numbers.

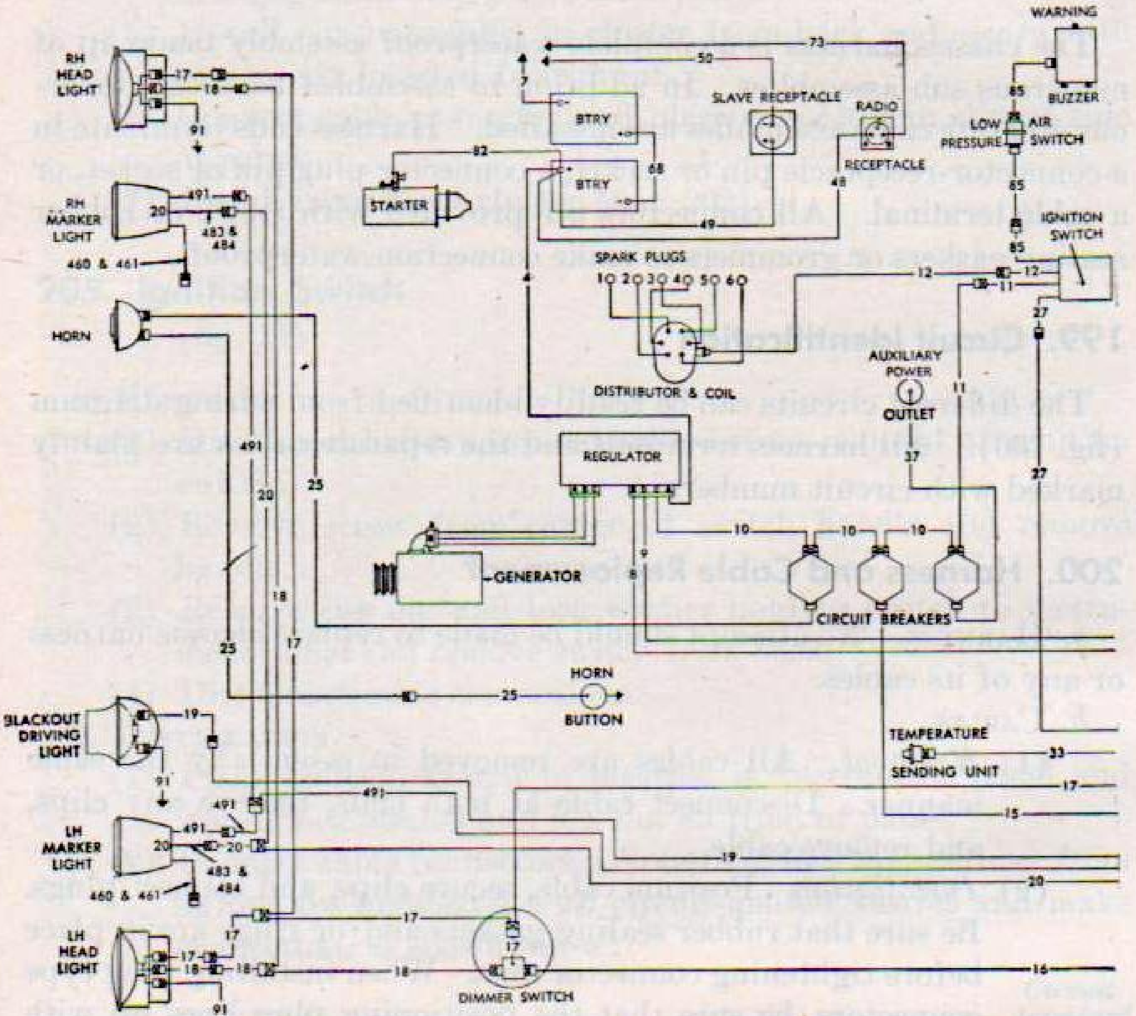
200. Harness and Cable Replacement

a. HARNESS. No attempt should be made to replace chassis harness or any of its cables.

b. CABLES.

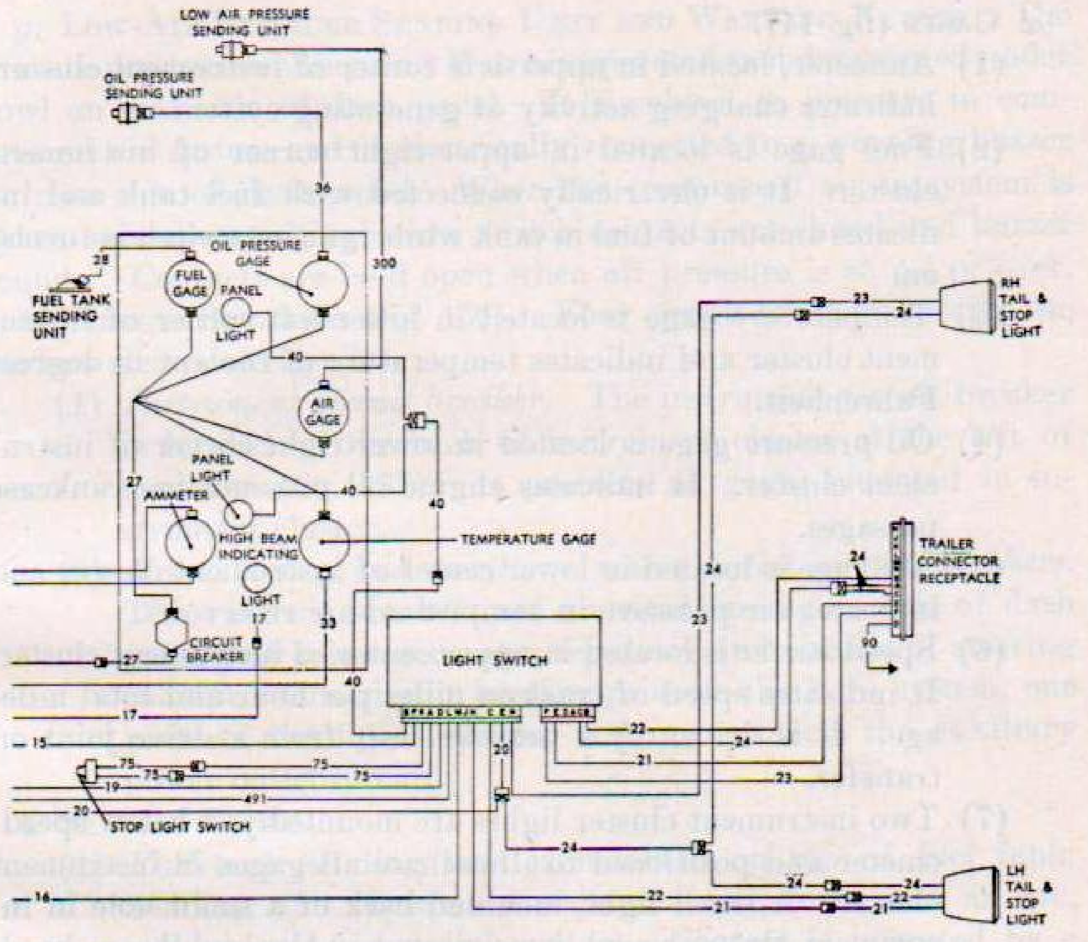
(1) *Removal.* All cables are removed in essentially the same manner. Disconnect cable at both ends, remove any clips, and remove cable.

(2) *Installation.* Position cable, secure clips, and connect plugs. Be sure that rubber sealing gaskets and/or rings are in place before tightening connector nuts. When installing plug type connectors, be sure that the positioning plug lines up with groove. Do not force plugs; if properly alined, they will enter easily. Rubber grommets and bushings must be in proper position before attempting to assemble a connector.



CIRCUIT NO.	DESCRIPTION
4	BATTERY TO GENERATOR 'A' TERMINAL
7	BATTERY GROUND
8	SHUNT TO AMMETER POSITIVE
9	SHUNT TO AMMETER NEGATIVE
10	GENERATOR REGULATOR TO CIRCUIT BREAKER
11	IGNITION SWITCH TO CIRCUIT BREAKER
12	IGNITION SWITCH TO IGNITION COIL
15	LIGHT SWITCH TO CIRCUIT BREAKER
16	LIGHT SWITCH TO DIMMER SWITCH
17	DIMMER SWITCH TO HEADLIGHT UPPER BEAM AND INDICATOR
18	DIMMER SWITCH TO HEADLIGHT LOWER BEAM
19	LIGHT SWITCH TO BLACKOUT DRIVING LIGHT
20	LIGHT SWITCH TO BLACKOUT MARKER LIGHT
21	LIGHT SWITCH TO SERVICE TAIL LIGHT AND TRAILER COUPLING
22	LIGHT SWITCH TO SERVICE STOP LIGHT
23	LIGHT SWITCH TO BLACKOUT STOP LIGHT
24	LIGHT SWITCH TO BLACKOUT TAIL LIGHTS
25	HORN TO HORN BUTTON AND CIRCUIT BREAKER
27	IGNITION SWITCH TO INSTRUMENTS
28	FUEL TANK SENDING UNIT TO FUEL GAGE

Figure 136. Wiring diagram.



CIRCUIT NO.	DESCRIPTION
33	TEMPERATURE SENDING UNIT TO TEMPERATURE GAGE
36	OIL PRESSURE SENDING UNIT TO OIL PRESSURE GAGE
37	AUXILIARY POWER RECEPTACLE TO CIRCUIT BREAKER
40	LIGHT SWITCH TO INSTRUMENT PANEL LIGHTS
48	BATTERY TO RADIO RECEPTACLE
49	BATTERY TO SLAVE RECEPTACLE POSITIVE
50	SLAVE RECEPTACLE NEGATIVE TO GROUND
68	BATTERY INTERCONNECTING CABLE
73	RADIO RECEPTACLE TO GROUND
75	STOP LIGHT SWITCH TO LIGHT SWITCH
82	BATTERY TO STARTER
85	IGNITION SWITCH TO LOW AIR PRESSURE SWITCH AND BUZZER
90	TRAILER COUPLING TO GROUND
91	HEADLIGHT TO GROUND
300	LOW AIR PRESSURE SENDING UNIT TO AIR PRESSURE GAGE
460	SERVICE TURN INDICATOR, RIGHT
461	SERVICE TURN INDICATOR, LEFT
483	BLACKOUT TURN INDICATOR, RIGHT
484	BLACKOUT TURN INDICATOR, LEFT
491	MARKER LIGHT INTERCONNECTING CABLE

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Figure 136.—Continued.

Section XXVII. INSTRUMENT CLUSTER, GAGES, SWITCHES, CIRCUIT BREAKERS, AND SENDING UNITS

201. Description

a. GAGES (fig. 14).

(1) Ammeter, located in upper-left corner of instrument cluster, indicates charging activity of generating system.

(2) Fuel gage is located in upper-right corner of instrument cluster. It is electrically connected with fuel tank and indicates amount of fuel in tank while ignition switch is turned on.

(3) Temperature gage is located in lower-left corner of instrument cluster and indicates temperature of coolant in degrees Fahrenheit.

(4) Oil pressure gage is located in lower-right corner of instrument cluster. It indicates engine oil pressure in crankcase passages.

(5) Air gage is located in lower center of instrument cluster and indicates air pressure in compressed-air reservoirs.

(6) Speedometer is located in upper center of instrument cluster. It indicates speed of truck in miles per hour and total mileage. It is driven by a flexible shaft from a drive joint on transfer.

(7) Two instrument cluster lights are mounted just below speedometer and positioned to illuminate all gages in instrument cluster. A small light, mounted back of a small hole in instrument-cluster panel, is connected in the high-beam headlight circuit and lights only when driving lights are turned on.

b. IGNITION SWITCH (fig. 14). Ignition switch is mounted on instrument panel above the light switch. Handle must be turned clockwise to "ON" position before engine can be started.

c. LIGHT SWITCH (fig. 15). The light switch is flush mounted in instrument panel at the left of steering column. It provides selective control of the lighting circuits.

d. DIMMER SWITCH (fig. 14). Dimmer switch is foot operated and is located to the left and above clutch pedal. It is effective only when auxiliary switch is in head light position.

e. HORN AND BUTTON. On model M34 trucks, serial number 94894 and below, an electric horn was installed in right head light panel. On model M34 trucks, serial number 94895 and up, and on models M36 and M47, an air horn controlled by a solenoid is mounted on inner section of right fender. Both types of horns are controlled by a button in center of steering wheel.

f. STOP-LIGHT SWITCH. Stop-light switch is mounted in slave cylinder of air-hydraulic cylinder. It is operated by initial pressure from master cylinder and switch remains closed until all pressure is relieved.

g. LOW-AIR-PRESSURE SENDING UNIT AND WARNING BUZZER. The low-air-pressure sending unit is an air operated switch mounted under cowl on rear side of dash panel. It is subject to pressure in compressed air system and is electrically connected to a warning buzzer on rear side of dash panel. When the compressed air in system is below safe operating pressure, switch contacts are closed and buzzer sounds. Contacts are held open when air pressure is 65 psi or over.

h. CIRCUIT BREAKERS (fig. 136). Four circuit breakers protect the various electrical circuits.

(1) *Instrument circuit breaker.* The instrument circuit breaker is located on the back of instrument cluster at the left of ammeter (fig. 137). It protects all gages mounted in instrument cluster.

(2) *Horn, lights, and auxiliary power outlet circuit breakers.* Three circuit breakers are mounted on engine side of dash panel just below generator-regulator and outside of steering column. One circuit breaker protects the horn system, one protects the lights system, and one protects the auxiliary power outlet circuit.

i. SENDING UNITS.

(1) Fuel-tank sending unit is mounted on top of fuel tank. Sending unit contains a resistance coil, formed in an arc, and swept by a radial contact. Contact is operated by a float mounted within tank. Varying resistance, due to movement of contact, actuates fuel gage on instrument panel.

(2) Engine-water-temperature sending unit is mounted in engine manifold near outlet to radiator. Unit is electrically connected to temperature gage in instrument cluster.

(3) Engine-oil-pressure sending unit is mounted in a threaded opening which extends to engine oil passage in lower-right side of crankcase. Unit contains a coil, the resistance of which varies with engine oil pressure. The unit is electrically connected to oil-pressure gage in instrument cluster.

(4) Air-pressure-gage sending unit is mounted on dash panel. Function of unit is similar to engine-oil-pressure sending unit (3) above.

202. Instrument Cluster

a. REMOVAL. Instrument cluster (fig. 14) is held in position in instrument panel by four quick-disconnect type mounting studs located in each corner (fig. 137). Release these studs and pull instrument cluster out of instrument panel (fig. 137).

b. INSTALLATION. Raise instrument cluster and place in position in instrument panel. Engage four mounting studs and tighten.

203. Instrument Replacement

(fig. 137)

a. GENERAL. Air-pressure gage, ammeter, fuel gage, oil-pressure gage, and temperature gage are all removed and installed in the same manner.

b. REMOVAL.

(1) Remove instrument cluster (par. 202).

(2) Disconnect two electrical connectors from instrument.

(3) Remove two nuts and lock washers at back of instrument and remove instrument.

c. INSTALLATION.

(1) Place instrument in cluster panel from front. Enter mounting studs in bracket and install lock washers and nuts.

(2) Make two electrical connections.

(3) Install instrument panel (par. 202).

d. SPEEDOMETER.

(1) *Removal.*

(*a*) Remove instrument cluster (par. 202).

(*b*) Disconnect flexible shaft from speedometer.

(*c*) Remove two mounting nuts and lock washers and remove speedometer from front of instrument cluster.

(2) *Installation.*

(*a*) Place speedometer in position and install mounting nuts and lock washers.

(*b*) Connect flexible shaft.

(*c*) Install instrument cluster (par. 202).

(3) *Flexible shaft removal.* Disconnect flexible shaft from angle-drive joint on transfer, and from speedometer. Disconnect clips and remove flexible shaft assembly.

(4) *Flexible shaft installation.*

(*a*) Note that ends of flexible shaft are different. End attached to angle-drive joint has a small projecting shaft with key. Place shaft in truck frame in original location. Aline key in shaft with keyway in drive joint and insert shaft. Tighten connecting nut on drive joint.

(*b*) Pass speedometer end of shaft through dash panel. Insert square end of shaft into speedometer and tighten connecting nut. Fasten clips to secure flexible shaft to chassis.

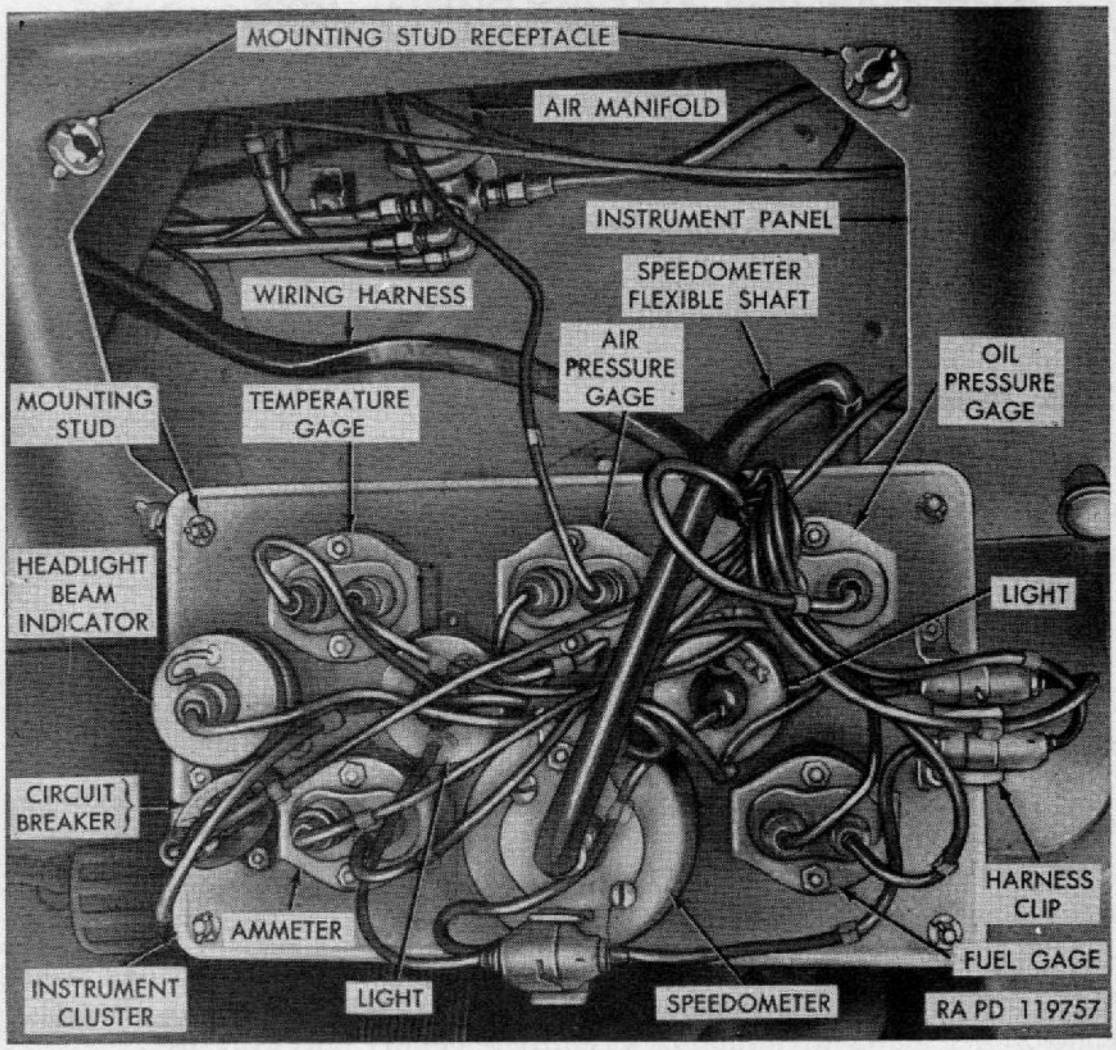

Figure 137. Instrument replacement.

204. Instrument Cluster Lights and Head Light Beam Indicator

(fig. 14)

a. Removal.

(1) Remove instrument cluster from instrument panel (par. 202).

(2) Disconnect electrical connection from back of instrument cluster light.

(3) Remove two screws from front of cluster and remove light from back.

b. Installation.

(1) Insert instrument cluster light from back of cluster and fasten to cluster with two screws inserted from front.

(2) Install electrical connection on back of light and install instrument cluster (par. 202).

c. Lamp Replacement.

(1) Remove light (*a* above).

(2) Press body and cover assembly together, turn body counterclockwise, and separate assembly.

(3) Press on lamp and remove from bayonet socket.
(4) Install replacement lamp, install cover on body, and turn to engage retaining pin in cover slots.
(5) Install lamp assembly in cluster from back and secure with two screws inserted from front.
(6) Connect cable connector and place connector in clip at side of panel.
(7) Install instrument cluster (par. 202).

205. Ignition Switch
(fig. 14)

a. REMOVAL.
(1) Disconnect battery ground cable before removal of ignition switch.
(2) Remove screw from center of switch handle and remove handle.
(3) Remove hex nut and lock washer holding switch to instrument panel and remove switch from back.
(4) Disconnect cable connections.

b. INSTALLATION.
(1) Place ignition switch in position in instrument panel and install lock washer and hex nut on front of panel.
(2) Connect cable connectors. Note that four connections from switch are numbered with circuit-marker sleeves and make connections as shown below:

Terminal No.	*Circuit*	*Circuit terminal mark*
1	Battery	11
2	Instruments	27
3	Low-air-pressure warning	85
4	Distributor coil primary	12

(3) Install switch handle and secure with screw.
(4) Connect battery ground cable.

c. TESTING. Disconnect all terminals. Connect one terminal of test light or buzzer to battery cable and test continuity to all terminals.

206. Light Switch
(fig. 15)

a. REMOVAL.
(1) Remove plug connectors from both receptacles on back of light switch.
(2) Remove four screws holding switch to instrument panel and remove switch through opening.

b. INSTALLATION.

(1) Place switch in instrument panel from front, with receptacles down, and install holding screws.

(2) Connect plug connectors to receptacles.

c. TESTING. Test light switch by setting control levers in all positions and checking lamps. Refer to paragraph 19 for combination of settings.

207. Dimmer Switch

(fig. 14)

a. REMOVAL.

(1) Remove two mounting screws from toeboard and remove switch.

(2) Disconnect three cable connectors.

b. INSTALLATION.

(1) Place dimmer switch in position on toeboard and install two mounting screws.

(2) Make three cable connections. Refer to wiring diagram (fig. 136).

c. TESTING. With auxiliary light switch in head light position, operate switch button and check lights.

208. Horn Button and Horn

a. HORN BUTTON.

(1) *Removal.* Horn button is mounted in center of steering wheel. To remove, press down on button and turn counterclockwise to disengage from steering wheel.

(2) *Installation.* Place horn button in recess in steering wheel, press down and turn clockwise until engaged.

b. HORN.

(1) *M34, serial 94894 and under.* These trucks were equipped with electric horns which are mounted in right head light panel.

(*a*) *Removal.* Disconnect electrical connectors. Remove two cap screws and lock washers holding horn mounting bracket to panel and remove horn.

(*b*) *Installation.* Position horn against back of head light panel and install two cap screws and lock washers through panel into mounting bracket. Connect electrical connectors.

(2) *M34, serial 94895 and up, M36 and M47.* These trucks are equipped with air horns mounted on inner section of right fender (fig. 138).

(a) *Removal.* Disconnect cable at solenoid connector. Disconnect air line from horn. Remove two mounting bolts holding horn to mounting bracket and remove horn.

(b) *Installation.* Place horn in position and secure it to mounting bracket with two mounting bolts and safety nuts. Connect cable at solenoid connector and place connector in clip on end of solenoid. Connect air line.

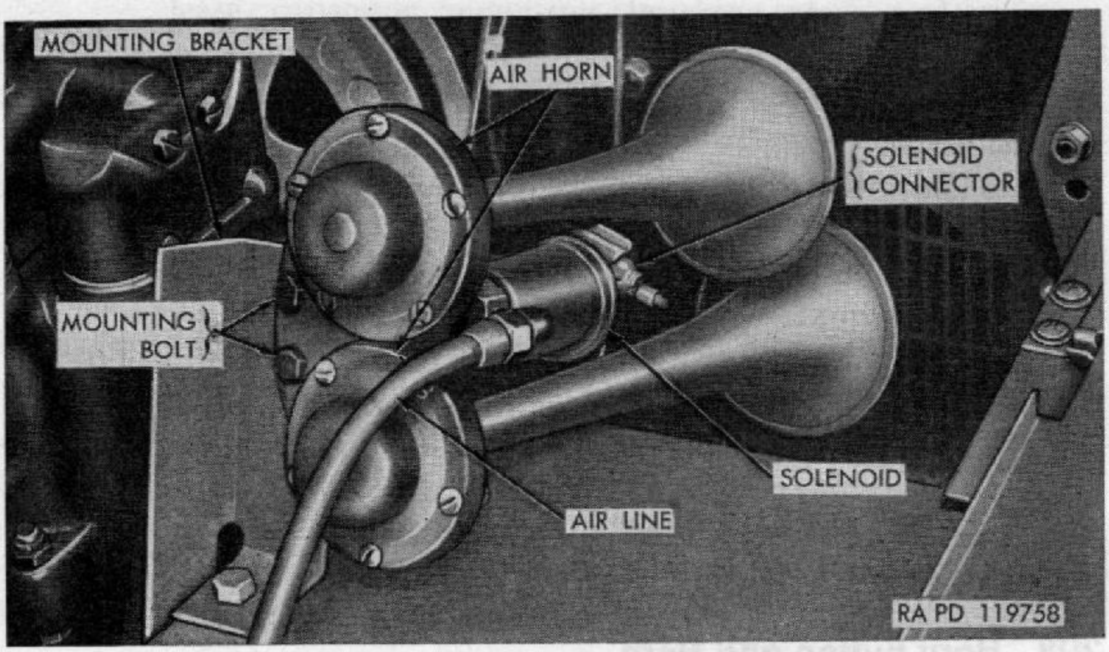

Figure 138. Air horn installation.

209. Stop Light Switch

a. Removal. Disconnect two terminal connectors and unscrew switch from air-hydraulic cylinder.

b. Installation.

(1) Install switch in air-hydraulic cylinder and screw in tight. Make two terminal connections.

(2) Bleed hydraulic system (par. 150).

c. Testing. With light switch set to stop light, depress brake pedal and check stop lights.

210. Low-Air-Pressure Warning Buzzer

a. Removal. Disconnect terminal connections at buzzer, remove mounting screws, and remove buzzer.

b. Installation. Place buzzer on dash panel and install mounting screws. Connect terminal from low-air-pressure-warning-buzzer sending unit.

211. Circuit Breakers

a. Removal. Disconnect two terminal connectors, remove two mounting screws, and remove breaker.

b. Installation. Install circuit breaker with two mounting screws and connect two terminal connectors.

c. Testing. Turn on switch controlling circuit breaker to be tested; then operate a unit protected by the circuit breaker. If unit operates circuit breaker is in good condition.

212. Sending Units

a. Location. Engine-water-temperature sending unit is mounted in engine water manifold near outlet end. Engine-oil-pressure sending unit is mounted on lower right-side of engine crankcase near the rear. Air-pressure-gage sending unit (fig. 139) is mounted in air manifold (fig. 137) under cowl on rear side of dash panel. Fuel tank sending unit is mounted in fuel tank.

b. Removal.

(1) Temperatures, oil-pressure, and air-pressure sending units have pipe thread connections. Disconnect terminal connection and unscrew unit from mounting.

(2) Fuel tank sending unit is flange mounted. Remove mounting screws and lift assembly from tank. Discard gasket.

c. Installation.

(1) Temperature, oil-pressure, and air-pressure sending units have pipe thread connections. Screw into mountings and connect terminals.

(2) Fuel tank sending unit is mounted on fuel tank. Place a new gasket on mounting pad, insert operating mechanism in tank and secure with mounting screws.

Section XXVIII. COMPRESSED AIR SYSTEM

213. Description and Data

a. Description (fig. 139).

(1) *Compressor.* The air compressor is a two-cylinder, single acting type, mounted on right side of engine, and is belt driven (fig. 140). Cylinder head is water cooled, coolant being circulated through it from the engine cooling system. An unloading mechanism in cylinder head automatically unloads compression stroke when air pressure reaches a predetermined maximum.

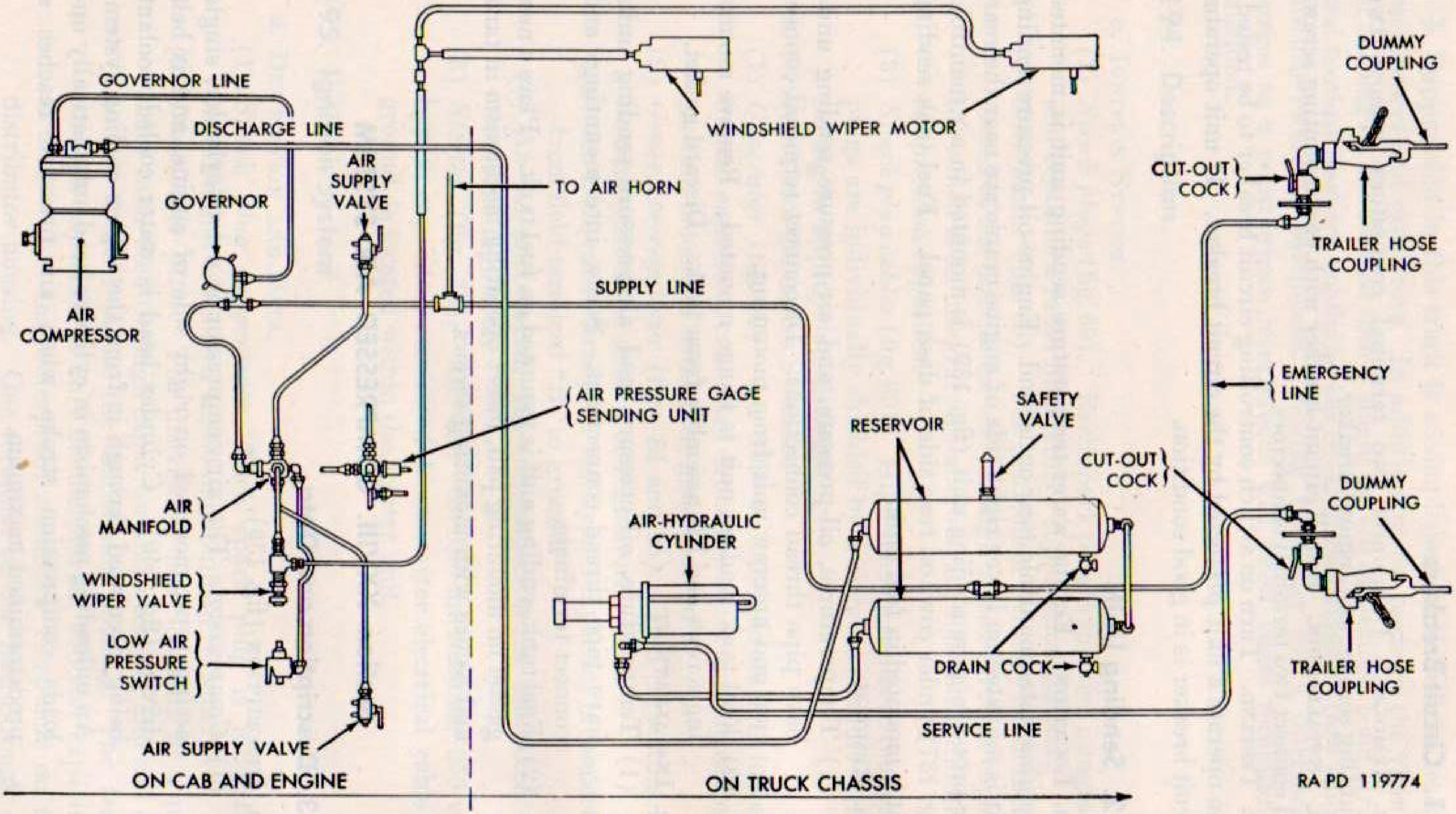

Figure 139. Compressed-air piping diagram.

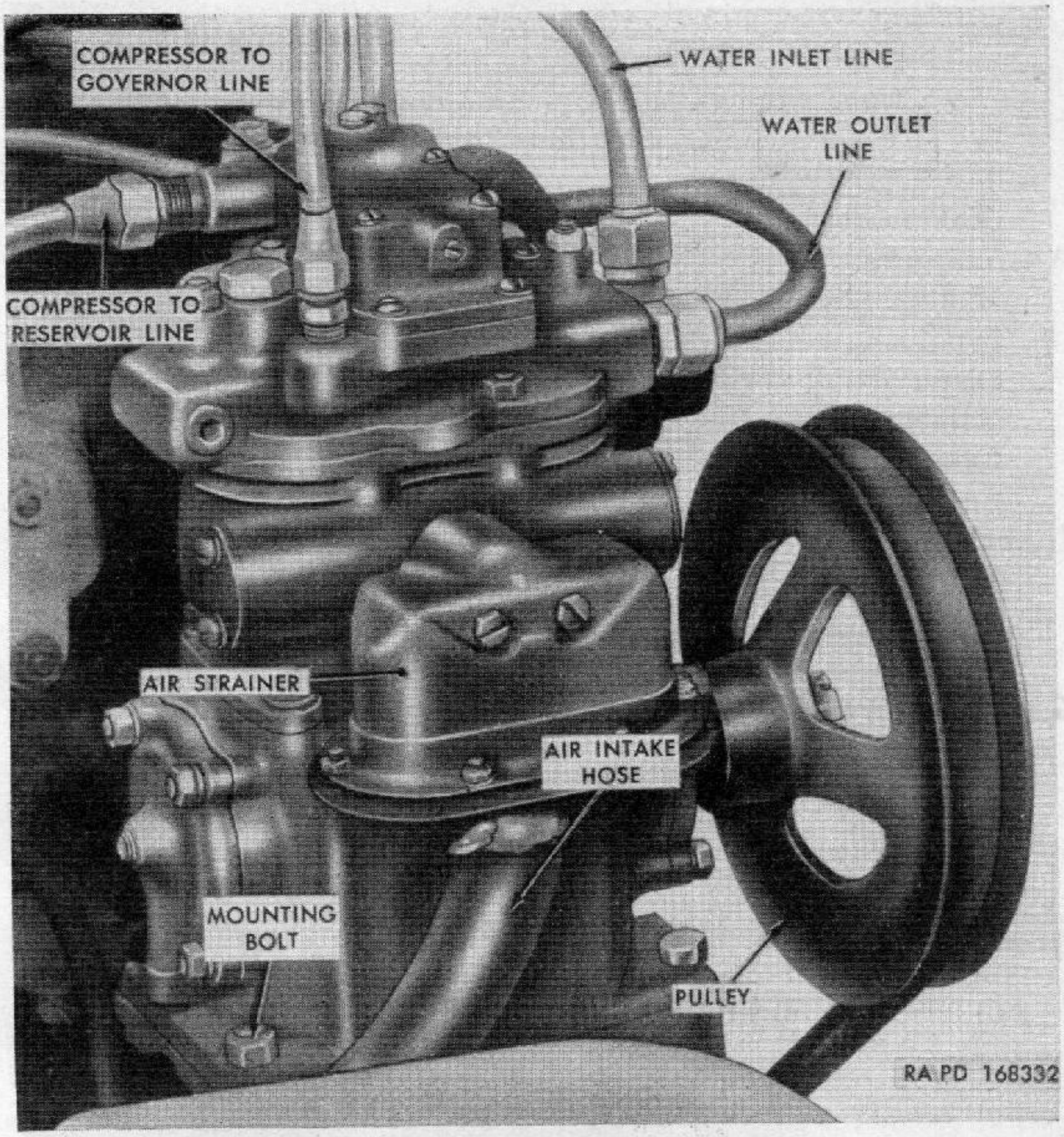

Figure 140. Air-compressor.

(2) *Governor.* Governor is a fully-enclosed bourdon type (fig. 144). It is connected in an air line between air reservoirs and compressor. When pressure in reservoirs reaches maximum, a governor valve admits air under pressure to diaphram in cylinder head which opens unloader valves and stops compression.

(3) *Reservoirs.* Reservoirs are steel drums, suspended in the chassis to the rear of transfer (figs. 145 and 146). Reservoirs function is to maintain an adequate supply of compressed air at all times truck is in operation.

(4) *Air-leakage tests.* For leakage tests of components of compressed air system, refer to TM/9–1827A. Leakage at connections of air lines is tested by soap-suds method. Coat connection with soap-suds. Leakage in excess of a 3-inch soap

bubble in 1 minute, when system is charged to 100 psi, is not permissible. Tighten connection or replace it.

Caution: Fittings for metal tubing can be ruined by excessive tightening. Pull nuts up no more than sufficient to stop leakage.

b. Tabulated Data.

Air-compressor:	
Make	Bendix-Westinghouse
Type	2–UE–7¼–VW
Displacement per minute at 1,250 rpm	7¼ cu ft
Number of cylinders	2
Lubrication	engine-lubricated
Cooling	engine coolant
Governor:	
Make	Bendix-Westinghouse
Type	0–1 waterproof

214. Compressor

a. Unloader Valve Clearance Adjustment (fig. 141).

(1) Remove unloader-valve cover from cylinder head and discard gasket.

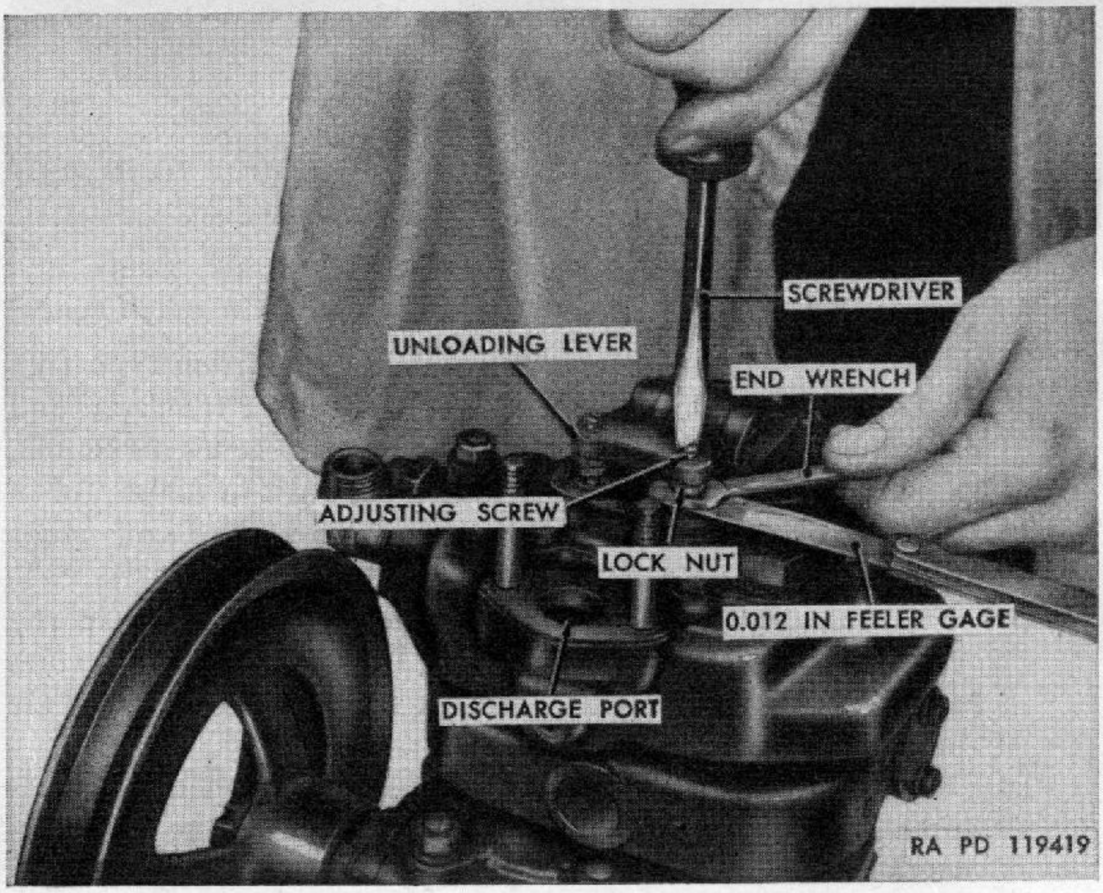

Figure 141. Adjusting air-compressor unloader valves.

(2) Check clearance of unloader valves. Clearance should be 0.010 to 0.015 inch. If not within these limits, loosen lock nuts on adjusting screws. Turn screws until clearance is 0.012 inch. Tighten lock nuts.

(3) Install unloader-valve cover with a new gasket.

b. Drive Belt Adjustment (fig. 142).

(1) Check compressor drive belt. Belt should have not more than ½-inch deflection midway between pulleys. Adjust if necessary ((2) below).

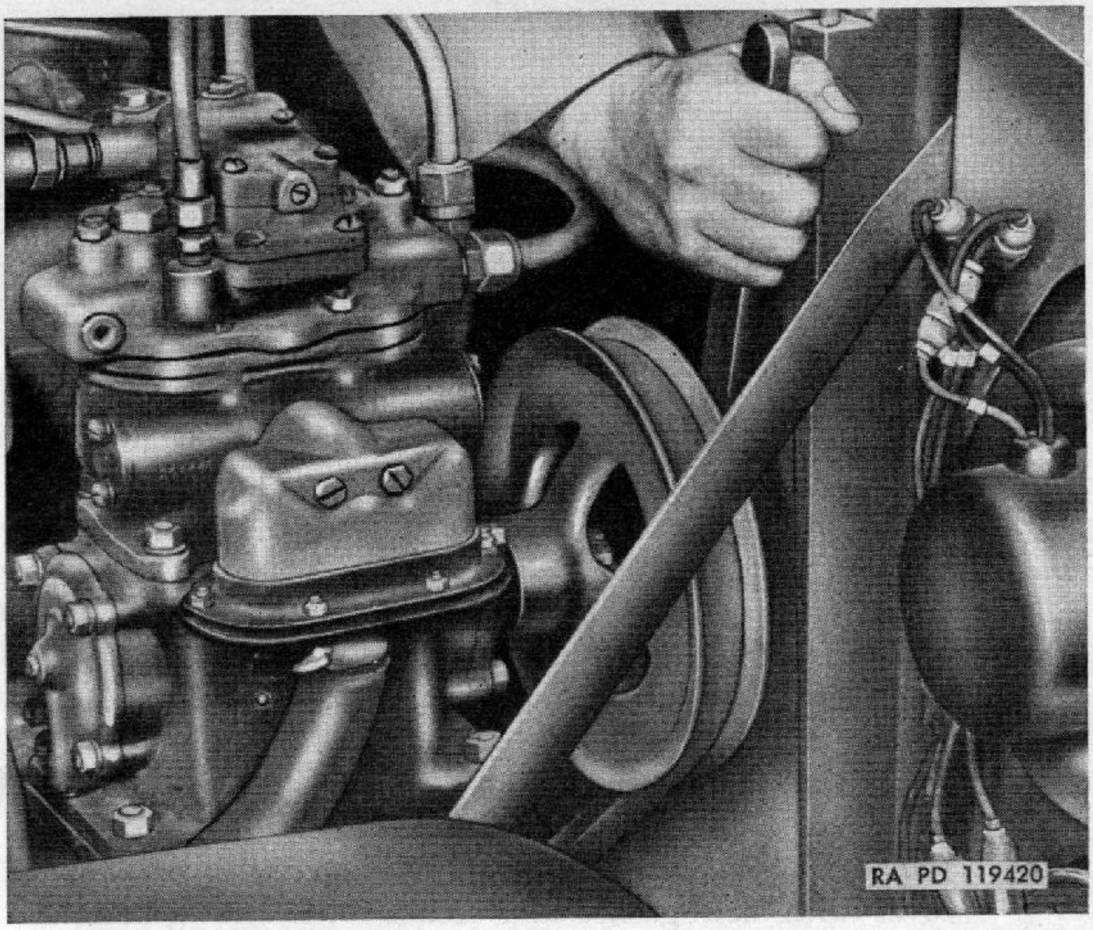

Figure 142. Adjusting air-compressor drive belt with wrench 41–W–3250–510.

(2) Compressor pulley is made with adjustable outer flange. To adjust compressor belt, loosen set screw in hub of inner flange. Using wrench 41–W–3250–510, turn flange in or out on threaded hub until desired belt tension is obtained. Turn flange in to tighten belt.

(3) Turn flange until set screw alines with a groove cut in threaded hub and tighten set screw.

c. Air Strainer (fig. 143).

(1) To clean air strainer, loosen hose clamp and detach air intake hose from strainer cover. Remove two cap screws and copper washer holding strainer to compressor and remove air inlet gasket and strainer.

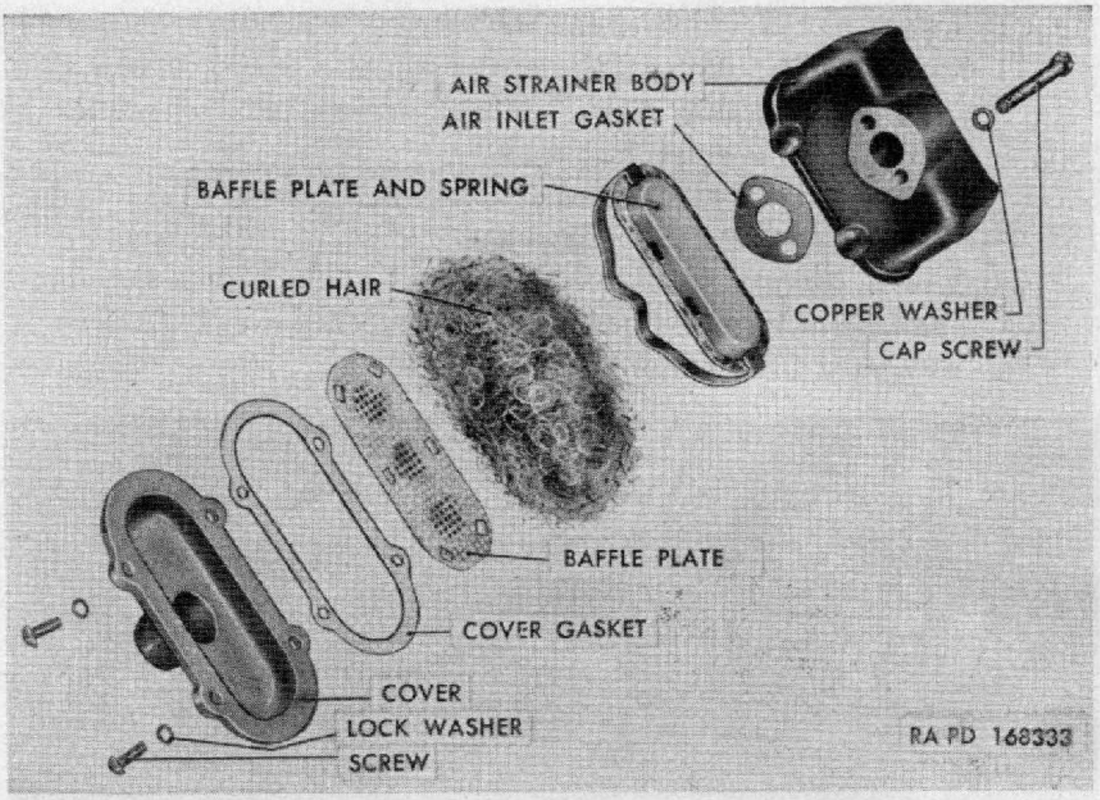

Figure 143. Air-compressor air strainer—exploded view.

(2) Remove screws holding cover to strainer body and remove cover and gasket.

(3) Lift out baffle plate, curled hair, baffle plate and, spring. Wash curled hair thoroughly in dry-cleaning solvent or volatile mineral spirits.

(4) Saturate curled hair with engine oil and squeeze out excess oil.

(5) Place baffle plate in body with screen side toward open end. Set spring on baffle plate and place curled hair on spring. Install baffle plate with screen side next to hair. Install cover with new gasket and secure with screws and lock washers.

(6) Install air strainer assembly, with new gasket, on compressor and secure with cap screws and copper washers.

(7) Connect air hose to strainer and tighen clamp.

d. AIR-COMPRESSOR (fig. 140).

(1) *Removal.*

(*a*) Detach compressor-to-reservoir line, compressor-to-governor line, and water inlet and outlet lines from compressor. Loosen hose clamp and detach air intake hose from air strainer.

(*b*) Remove four mounting bolts from compressor base, remove drive belt, lift compressor off mounting bracket and discard gasket.

(2) *Installation.*

(*a*) Place a new gasket on mounting bracket and aline all holes carefully. Set compressor on mounting bracket and place drive belt on pulley. Install mounting bolts and tighten securely.

(*b*) Connect compressor-to-reservoir line, compressor-to-governor line, and water inlet and outlet lines.

(*c*) Connect air hose to air strainer and tighten hose clamp.

e. CYLINDER HEAD GASKET REPLACEMENT. Disconnect compressor-to-reservoir line, compressor-to-governor line, and water inlet and outlet lines at compressor (fig. 140). Remove nuts and washer holding compressor cylinder head to cylinder block; remove head and discard gasket. Clean mating surfaces of head and block thoroughly, place new gasket on block, and install head. Secure with nuts and washer. Connect compressor-to-reservoir line, compressor-to-governor line, and water inlet and outlet lines.

215. Compressor Governor

(fig. 144)

a. AIR STRAINER.

(1) Disconnect air lines from bottom of governor. Remove cap nut from strainer body.

(2) Pull out strainer screen cup, strainer screen, and lamb's wool.

(3) Wash all parts in dry-cleaning solvent or volatile mineral spirits.

(4) Saturate lamb's wool with engine oil, squeeze out excess oil, and place in strainer screen.

(5) Insert strainer screen, and strainer screen cup in strainer body, and install cap nut. Connect air lines at bottom of governor.

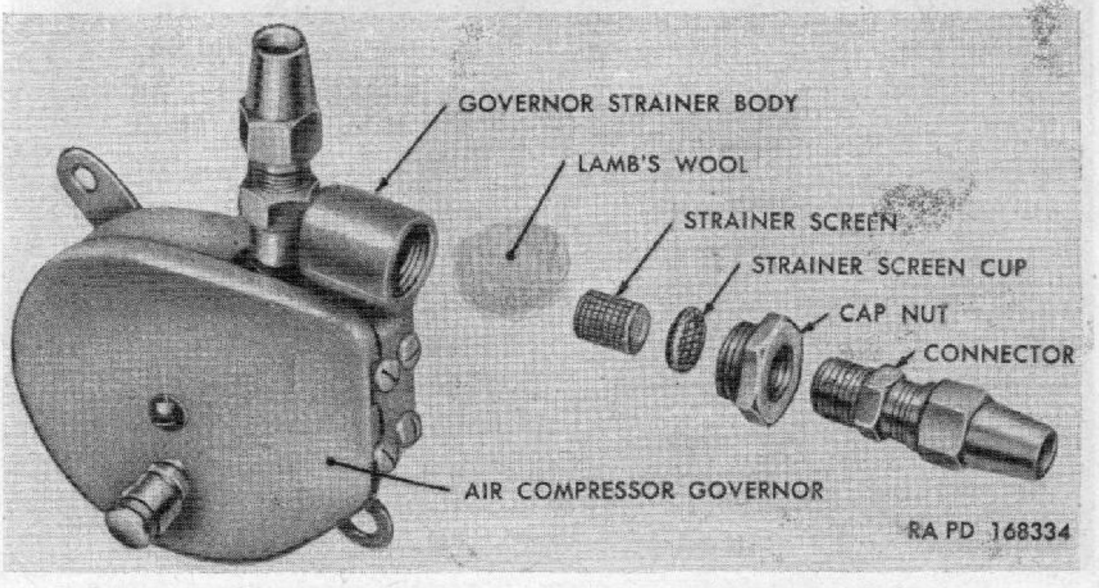

Figure 144. Air-compressor governor air strainer—exploded view.

b. REMOVAL. Disconnect air lines from governor. Remove mounting screws and remove governor.

c. INSTALLATION. Place governor in position and install mounting screws. Connect air lines to governor.

Note. Replace air-compressor-to-governor line (fig. 139) yearly, or after every 25,000 miles.

216. Reservoirs
(figs. 145 and 146)

a. DRAINING. Open drain cocks on bottom of reservoirs until any accumulated water is drained out. Close drain cocks.

b. REMOVAL. Open drain cocks to relieve pressure. Disconnect air lines. Remove safety nuts from "U" bolts and remove reservoirs.

c. INSTALLATION. Support reservoirs in place and install "U" bolts and safety nuts. Connect air lines.

217. Safety Valve

a. REMOVAL. Unscrew safety valve from top of reservoir (figs. 145 and 146).

b. INSTALLATION. Screw safety valve into reservoir.

Figure 145. Air reservoir installation—M34 and M36.

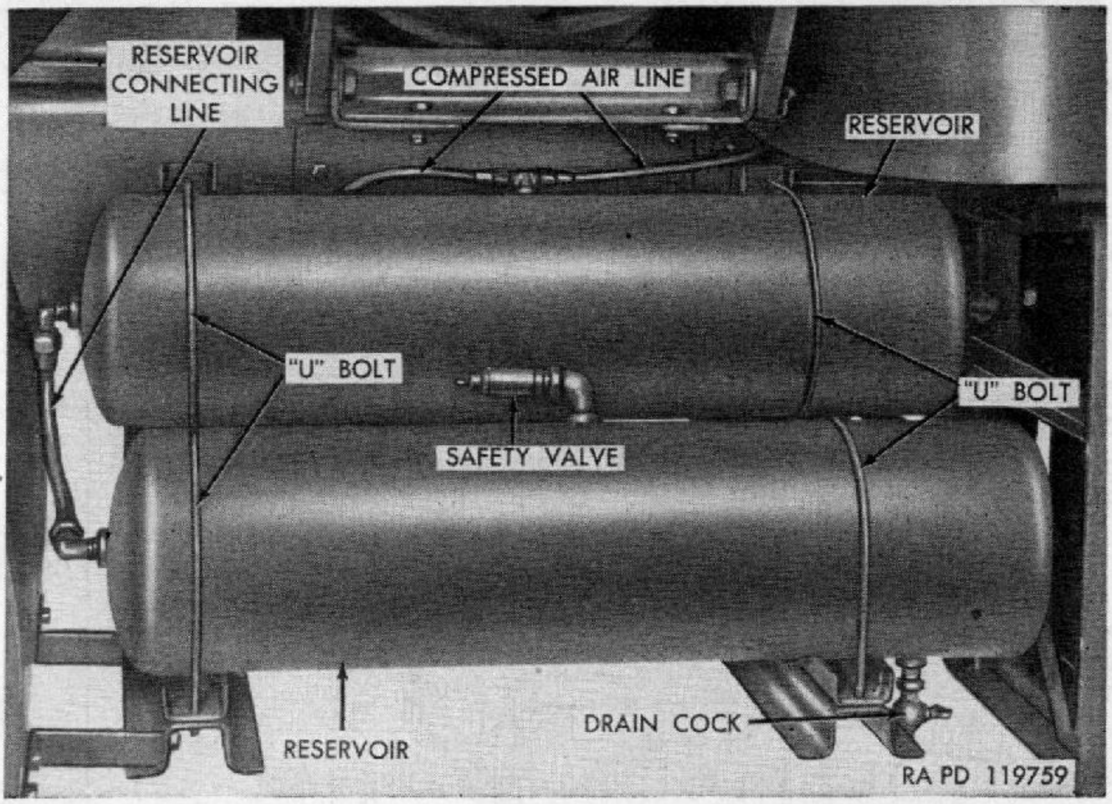

Figure 146. Air reservoir installation—M47 and M59.

218. Air Supply Valves and Trailer Couplings

a. An air supply valve is installed in each side of cab on dash panel. Hose for tire inflation are stowed under driver's seat.

b. Hose couplings for compressed air service to trailer are installed on each side of chassis at the rear. Air lines to couplings are closed by cut-out cocks, and hose couplings are sealed by dummy couplings when trailer is not attached (fig. 147).

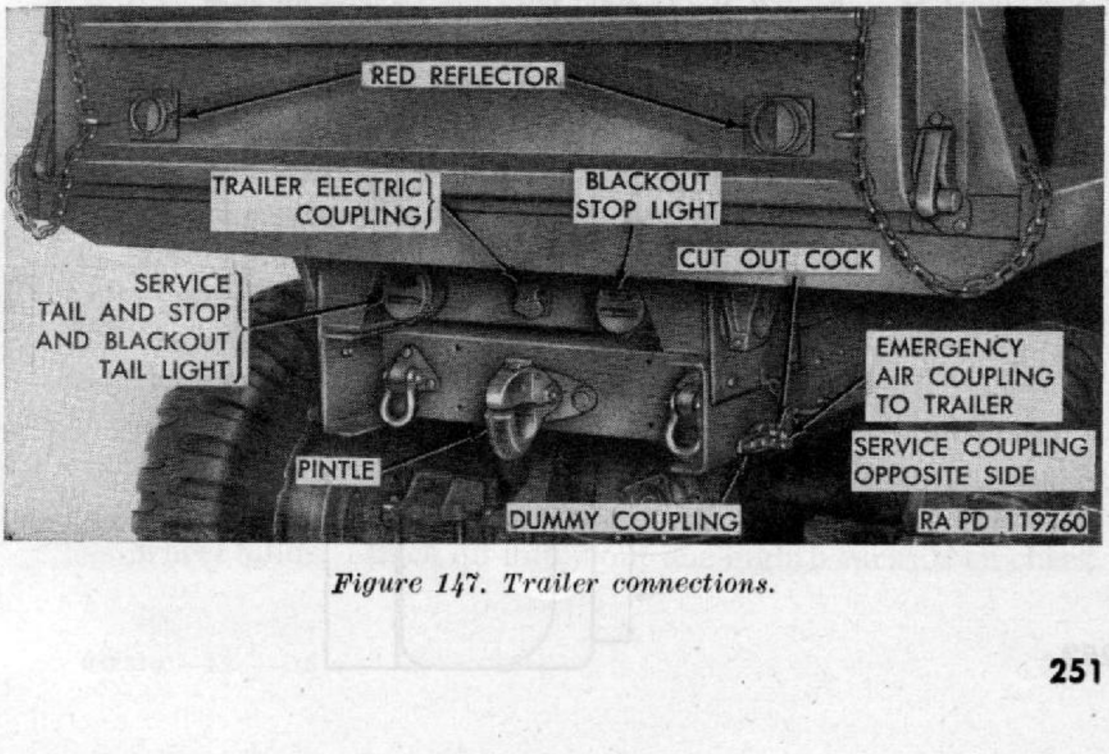

Figure 147. Trailer connections.

Section XXIX. VENTILATION SYSTEM

219. Description
(fig. 148)

a. General. The ventilation system is designed to permit operation of the engine, and various components of the truck while sub-

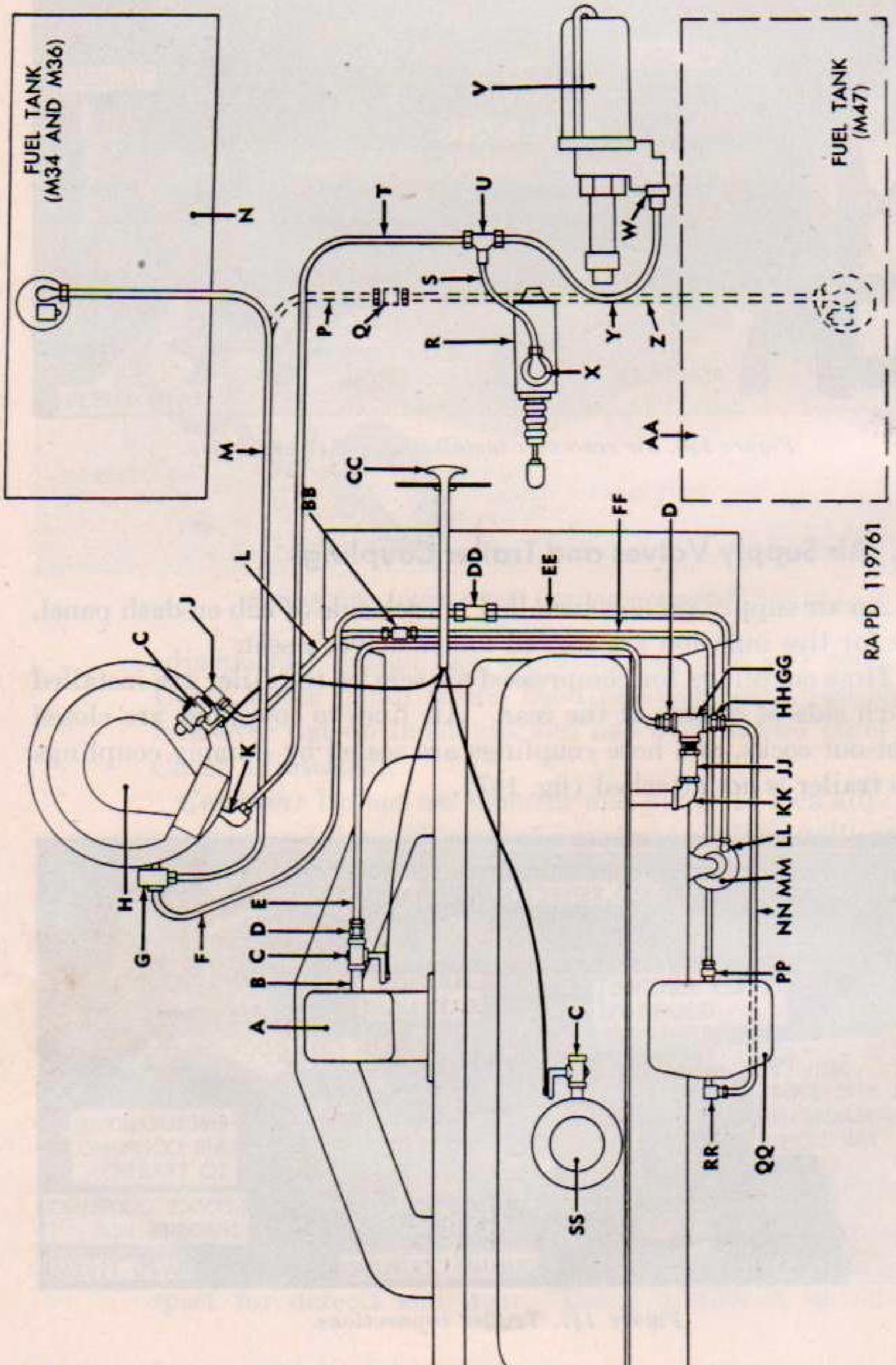

Figure 148. Ventilation system.

merged. All major components are sealed to exclude water. Certain components, however, which contain lubricants or fuel, must be protected against variation in internal pressure due to heat, or to a change in volume of contents. This protection is accomplished by ventilation lines of metal tubing, with flared ends and inverted fittings, between the component and the air cleaner.

b. ENGINE AND DISTRIBUTOR. During normal operation, air enters crankcase breather through a normally open shut-off valve, and is drawn from lower portion of crankcase by a line entering intake vacuum system through a normally open shut-off valve at the heat control valve. A crankcase ventilating valve, installed in this line near the crankcase, limits vacuum in crankcase to between 14.5 and 10.5 inches of mercury (approximately 7 and 5 psi). The side outlet of a tee is installed in end of this ventilating valve. A line from front of distributor joins crankcase at this tee. A line from rear side of distributor body enters upper portion of air cleaner through a normally open shut-off valve. Distributor is thus subject to intake vacuum at all normal times. The three shut-off valves are controlled by a crankcase ventilation shut-off valve knob on instrument panel (fig. 14). When entering water, this control knob is pulled out to close the three valves. This closure seals crankcase and utilizes ordinary leakage past pistons to build up some pressure in crankcase and prevent possible leakage past crankcase gaskets.

A—HEAT CONTROL VALVE
B—PIPE NIPPLE
C—SHUT-OFF VALVE
D—CONNECTOR
E—CRANKCASE VENTILATION LINE
F—AIR CLEANER TO UNION LINE
G—SPECIAL ELBOW
H—AIR CLEANER
J—ELBOW
K—ELBOW
L—AIR CLEANER TO UNION LINE
M—AIR CLEANER TO FUEL TANK LINE
N—FUEL TANK (M34 AND M36)
P—AIR CLEANER TO UNION LINE—M47 AND M59
Q—UNION—M47 AND M59
R—MASTER CYLINDER
S—TEE TO MASTER CYLINDER LINE
T—AIR CLEANER TO TEE LINE
U—TEE
V—AIR-HYDRAULIC CYLINDER
W—ELBOW
X—ELBOW
Y—AIR-HYDRAULIC CYLINDER TO TEE LINE
Z—UNION TO FUEL TANK LINE—M47 AND M59
AA—FUEL TANK—M47 AND M59
BB—UNION
CC—SHUT-OFF VALVE KNOB
DD—UNION
EE—UNION TO FUEL PUMP LINE
FF—UNION TO DISTRIBUTOR LINE
GG—TEE
HH—CONNECTOR
JJ—CRANKCASE VENTILATING VALVE
KK—STREET ELBOW
LL—ELBOW
MM—FUEL PUMP
NN—DISTRIBUTOR TO TEE LINE
PP—CONNECTOR
QQ—DISTRIBUTOR
RR—ELBOW
SS—CRANKCASE BREATHER

Figure 148.—Continued.

c. Master Cylinder and Air-Hydraulic Cylinder. Lines from master cylinder and air-hydraulic cylinder join in a tee and continue to an elbow in side of air cleaner. Thus hydraulic brake fluid in cylinders is alway under atmospheric pressure.

d. Fuel Pump. A ventilation line from fuel pump enters air cleaner through a special elbow in the side.

e. Fuel Tank. A ventilation line from outlet fitting on tank enters air cleaner through a special elbow in the side. The tank outlet is provided with a relief valve which permits a pressure build-up of from 3½ to 4½ psi before venting to air cleaner. This valve also prevents development of a vacuum in tank by permitting free air entrance from air cleaner to compensate for volume of fuel consumed.

220. Replacement of Lines

a. General. A ventilation line which has been kinked or dented sufficiently to interfere with free passage of air, must be replaced. If the seriousness of the damage is in doubt, disconnect both ends of line and blow through it.

b. Removal. All lines are removed by disconnecting the ends and removing supporting clips. Do not misplace or lose clips. All must be installed in original positions.

c. Installation.

(1) Replacement lines of correct length and necessary bends, with connection fittings, are available for requisition. Secure connection fittings and install supporting clips. Be sure clips are installed as in original installation. Improper securing of lines can permit vibration and cause severe interference with radio reception.

(2) If replacement lines must be made from standard tubing, the following steps must be observed:

(*a*) Make careful measurements as to length, how many bends and their locations.

(*b*) Ends must be square; use tubing cutter. If cutter is not available, file ends square.

(*c*) Ream ends to remove burs.

(*d*) Make bends with bending tool.

(*e*) Blow out line with compressed air before installation.

Caution: Do not tighten connections excessively. Ventilation lines are subject only to atmospheric pressure and need only to be watertight. Excessive tightening can ruin fittings and make removal difficult.

Section XXX. FRAME AND ASSOCIATED PARTS

221. Description

The frame side members are pressed-steel channels to which gussets, brackets, reinforcements, cross members, and other various brackets and supports are riveted. The front bumper, running board brackets, fuel tank support brackets, spare wheel carrier, lifting shackles pintle, and rear bumperettes are bolted.

222. Front Bumper

a. Removal. Remove safety nuts and cap screws holding bumper to frame and remove bumper.

b. Installation. Position bumper on frame and install cap screws and safety nuts and tighten securely.

Note. If truck is equipped with winch, bumper must be installed with the center depression up to clear winch.

223. Bumperettes

Bumperettes are attached to rear corners of frame. They are secured by four cap screws in side channel and two in rear cross member. Cap screws are secured with safety nuts.

224. Lifting Shackles

Lifting shackles are located within rear bumperettes and lifting-shackle brackets are attached to rear cross member with three cap screws and safety nuts.

225. Running Boards

a. Removal. Remove four screws holding running board to running-board hangers. Remove screw, plain washer, and rubber washers attaching rear end of front fender to running board and remove board.

b. Installation. Position running board on hangers and install four screws. Install plain washer and rubber washers holding board to hangers and install screw attaching front fender to end of running board.

Caution: Fender-to-running-board screw must be relatively loose to allow a slight movement between fender and running board and preserve shock absorbing feature of rubber washers.

226. Spare Wheel Carrier

a. MODEL M34 AND M36.

(1) *Description* (fig. 149). The spare wheel carrier is mounted on left-side of frame, below front corner of body. The wheel is suspended in horizontal position below the carrier. Carrier frame is equipped with a hand windlass, and 1/4-inch wire rope with pickup plate for wheel support. Ratchet on windlass shaft engages locking pawl for safety in raising or lowering wheels.

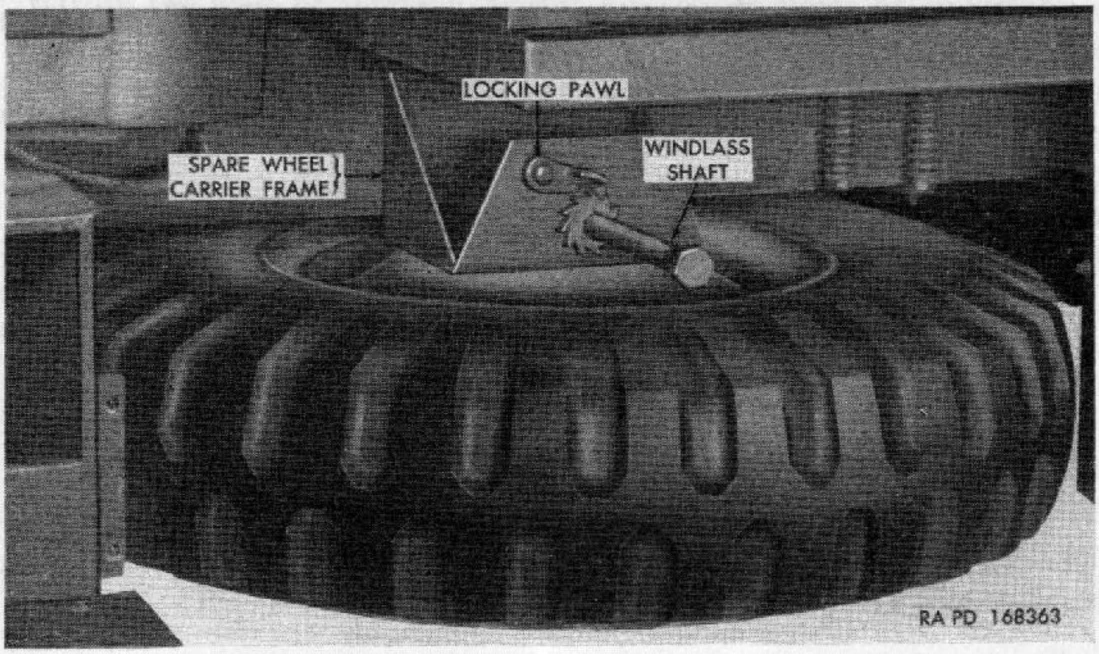

Figure 149. Spare wheel carrier—M34 and M36.

(2) *Operation.*

(*a*) To lower spare wheel, loosen cap nuts holding wheel to carrier frame, turn wheel until nuts will clear carrier frame. With wheel-nut wrench on shaft, loosen and disengage pawl and lower wheel to ground. Detach pickup plate from wheel disk.

(*b*) To raise wheel, unwind wire rope and push pickup plate through wheel disk. Insert pickup plate studs through stud holes in wheel. With wheel-nut wrench, raise wheel to carrier frame, aline studs with holes in carrier frame, and install cap nuts. Tighten nuts securely.

b. REMOVAL AND INSTALLATION.

(1) To remove spare wheel carrier, remove four screws and safety nuts which hold carrier frame to side of truck frame.

(2) To install carrier, position on truck frame and install four screws. Install safety nuts and tighten.

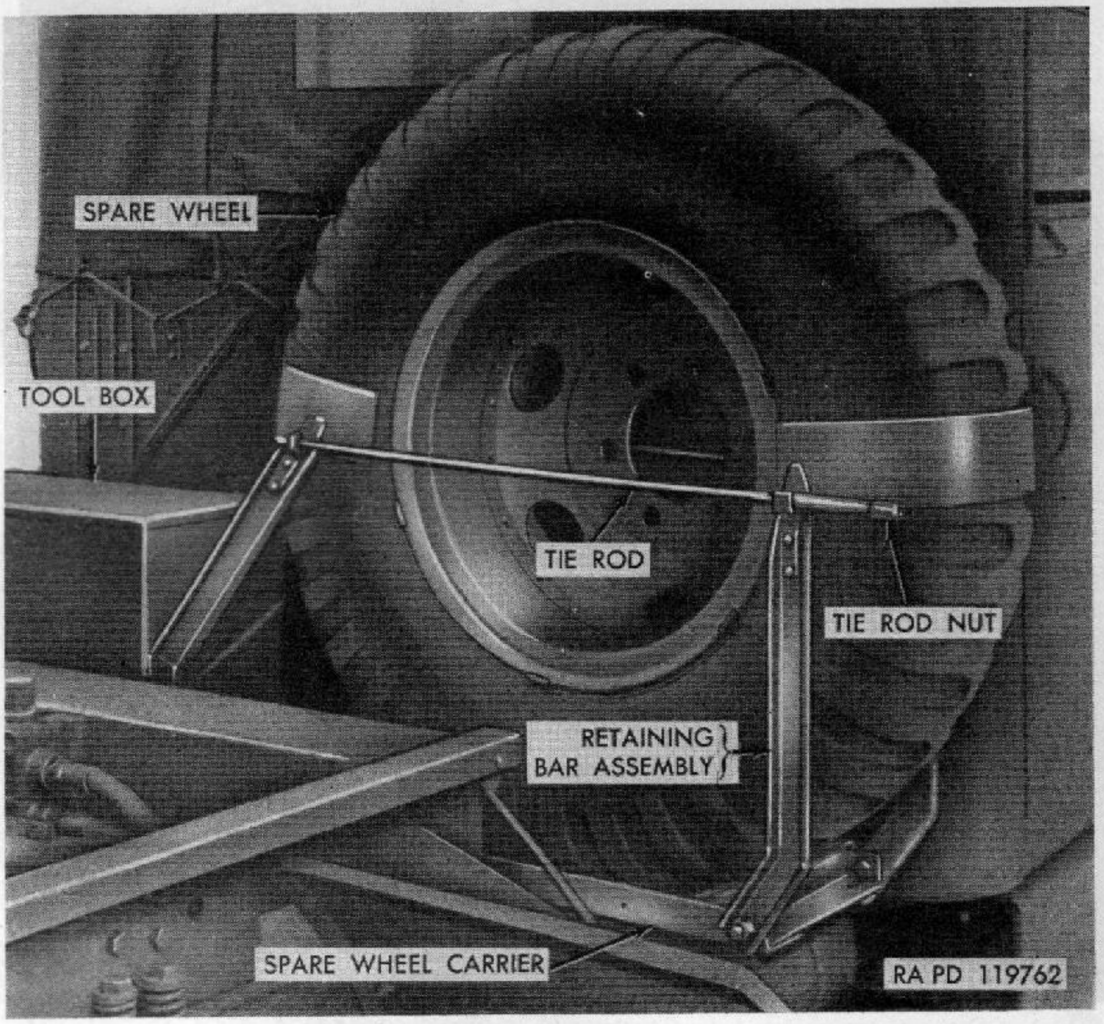

Figure 150. Spare wheel carrier with wheel—M47 and M59.

c. MODEL M47 (figs. 150 and 151).

(1) *Description.* The spare wheel is carried at rear of cab on right side. An inner support and an outer support, with top conforming to tire contour, are rigidly mounted on frame. A retaining bar assembly, pivoted at bottom, is held against tire by two tie rods. These rods pass through lugs on inner and outer bar assemblies. A hook formed on inner end of tie rod prevents removal. Tie rod nuts on outer ends of rods are tightened to hold spare wheel in place.

(2) *Operation.*

(*a*) To remove spare wheel, loosen tie rod nuts on ends of tie rods and lift tie rods from supporting lugs. Swing outer retaining bar assembly down, pull wheel out and lower to

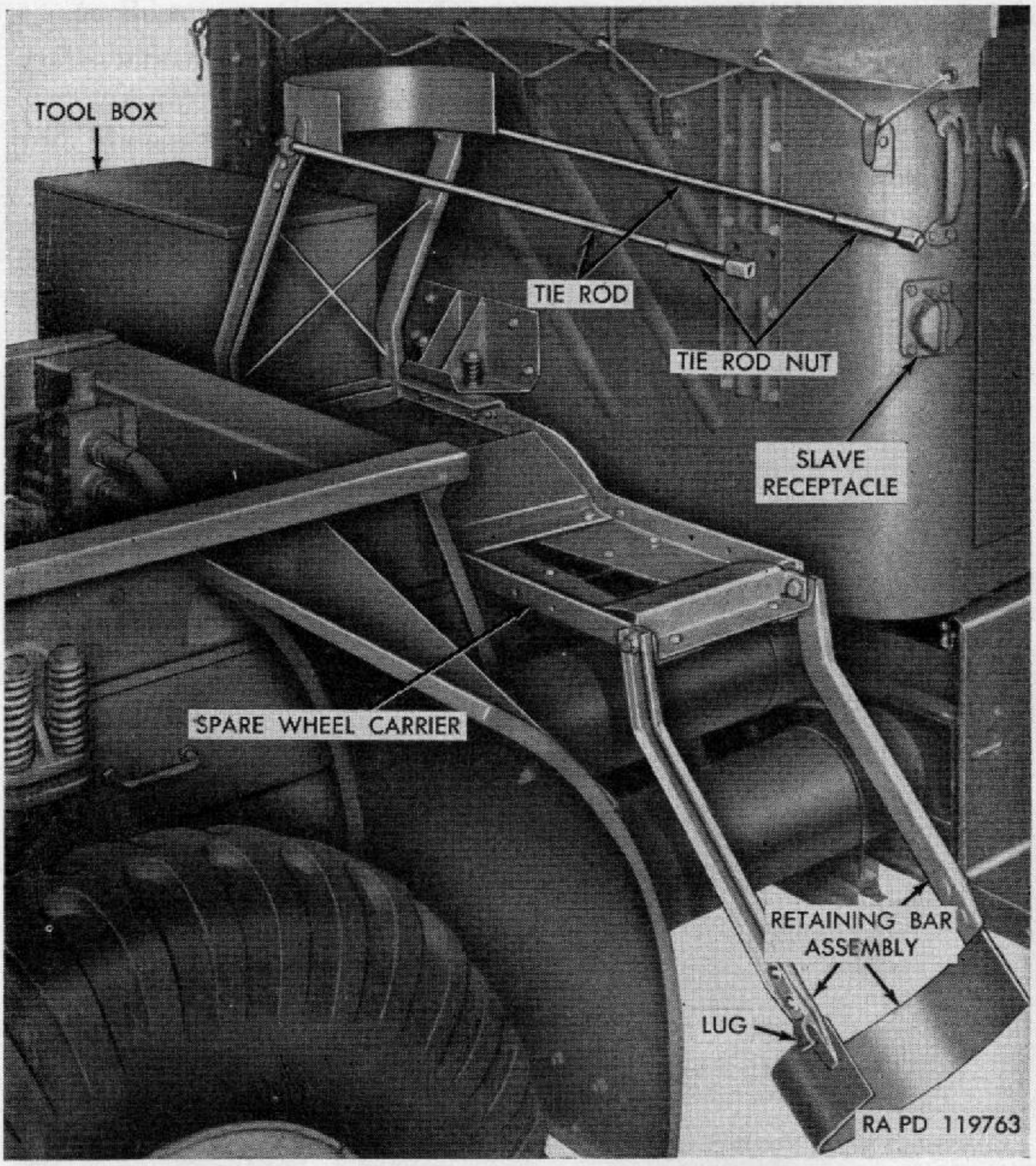

Figure 151. Spare wheel carrier—wheel removed—M47 and M59.

ground. Use care when removing wheel. Wheel is heavy and can cause personal injury.

(*b*) To mount spare wheel, swing outer retaining bar assembly down. Lift wheel and push it in against inner bar assembly. Raise outer bar assembly, place tie rods in supporting lugs and tighten tie rod nuts.

227. Pintle

a. Removal. Remove cotter pin, nut, and washer from end of pintle hook and withdraw hook. Remove safety nuts from bolts holding inner and outer brackets to rear cross member, and remove brackets.

b. Installation. Position outer bracket, with grease fitting at bottom, on rear cross member and insert bolts. Place inner bracket on bolts and insert pintle hook to aline brackets. Install safety nuts on bolts and tighten securely. Install washer and nut on pintle hook and tighten nut to remove end play and yet let hook turn freely in bearings.

Section XXXI. HOOD, SIDE PANELS, AND FENDERS

228. Hood

a. Description. The one-piece, reinforced, hood top panel is attached to cowl with two hood top panel hinges (fig. 153). Hood is fastened in closed position at front end by two hold-down catches and a safety catch. The hood may be raised against windshield frame and locked in place by means of the left windshield catch (fig. 154) and hood-top-panel hook (fig. 153).

b. Removal. Remove safety nuts, plain washers, and screws holding top panel hinges to cowl and remove hood top panel.

c. Installation. Set hood top panel in position and install screws in hinges. Install plain washers on screws and secure with safety nuts.

229. Side Panels

a. Description. Hinged hood side panels at each side of engine compartment above fender can be lowered or removed to give easier access to engine.

b. Removal. Hood side panels are hinged to fenders. To remove, raise retainer holding front pin in place, raise front of panel to clear hinge and pull forward to release rear pin.

c. Installation. Enter rear hinge pin in hinge and push panel into place. Aline front hinge, lift retainer, insert pin in hinge, and drop retainer to hold pin.

230. Fenders

a. Description. One-piece front fenders are mounted on front fender supports attached to frame and bolted to cab and running board. Blackout marker lights are mounted on front end of fenders.

b. Removal.

(1) Remove bolt holding head light bracket to frame and remove ground connection.

(2) Remove nuts from four bolts holding marker-light support to fender and remove marker-light-connector protector. Place nuts back on bolts. Remove harness clips and connect cables at connectors.

(3) Remove head-light-mounting-bracket-brace bolt and four bolts holding fender to cab.

(4) Remove three bolts holding front of fender to front fender support.

(5) Support fender, remove fender-to-running-board screw, rubber washers, and plain washer and remove fender.

c. Installation.

(1) Support fender on front fender support, and install screw and plain washer holding fender to running board. Use rubber washer under head of bolt, and between fender and running board.

Caution: Fender-to-running-board bolt must be relatively loose to allow a slight movement between fender and running board and to preserve shock absorbing feature of rubber washers.

(2) Check condition of antisqueak strip between fender and side of cab. Replace if necessary.

(3) Install three bolts holding fender to front fender support.

(4) Install four bolts holding fender to cab, and install headlight-mounting-bracket-brace bolt. Connect cables at connectors and install harness clips.

(5) Connect marker light connections, and install connector protector. Tighten bolts securely.

(6) Install bolt holding head light bracket to frame and secure ground connection.

Section XXXII. CAB AND ASSOCIATED PARTS

231. General

The cab is a metal, open top structure enclosing driver's compartment. Weather protection is provided by a cab paulin, windshield, and doors with glass windows. Two windshield wipers, operated by compressed air, are mounted at top of windshield frame. A cowl ventilator is installed on each side of cab forward of door.

232. Cab Paulin and Supports

a. Description. Cab top paulin is secured to top of windshield frame, supported by removable pillar posts and top bows, and is lashed in place on rear of cab.

b. Removal. Release lashing rope from side handles and from hooks at rear of cab. Release paulin from fastener studs in side-roof rails and slip paulin from chanels in pillar posts. Throw paulin over windshield and pull paulin edge from channel in windshield (fig. 152). Disengage side-roof rails from windshield, and fold in and down to pillar posts. Lift out posts and bow assemblies. Remove cross bars from bows (fig. 153).

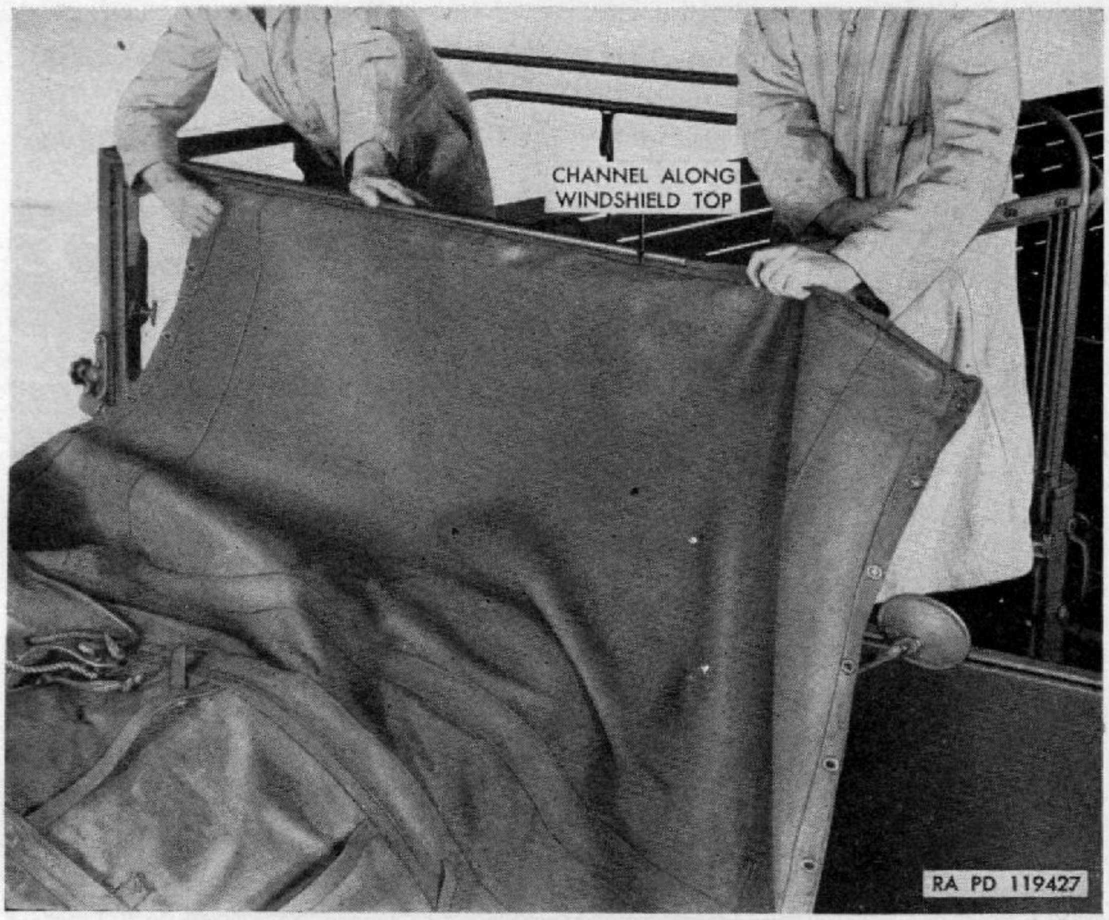

Figure 152. Removing or installing cab paulin.

c. Stowage. Strap cross bars together with the attached straps and stow them with post and bow assemblies behind seats. Fold cab paulin and stow back of seats. Do not fold or stow paulin if it is wet.

d. Installation (figs. 152 and 153). Install cross bars in bows; bar with straps attached is installed in rear position. Install pillar posts in sockets. Raise side-roof rails and engage them in slots at top corners of windshield. Spread paulin on hood and slide front edge into channel at top of windshield frame. Throw paulin back over supports and slide sides into channels in pillar posts. Fasten paulin at upper corners of windshield and secure fastener studs in side roof rails. Engage lashing rope on hooks at back of cab and tie ends in handles at sides of cab.

233. Windshield

a. Description. The windshield is made with two independent sections assembled in a metal frame. Sections are hinged at top and can be swung out at bottom as desired. Friction locks hold sections in adjusted position. A locking handle at bottom of each section locks it closed. The outer frame is pivoted at bottom and can be folded forward and locked on hood (fig. 154).

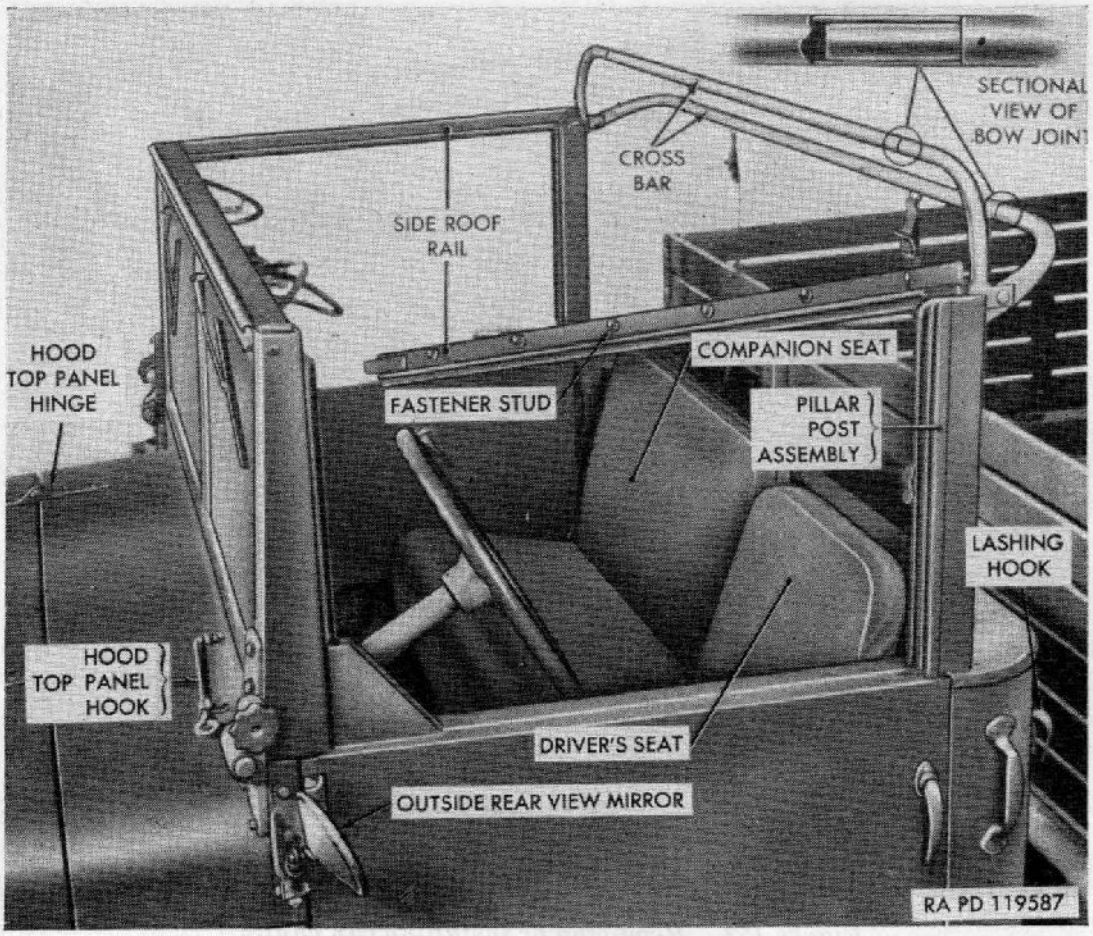

Figure 153. Cab top frame.

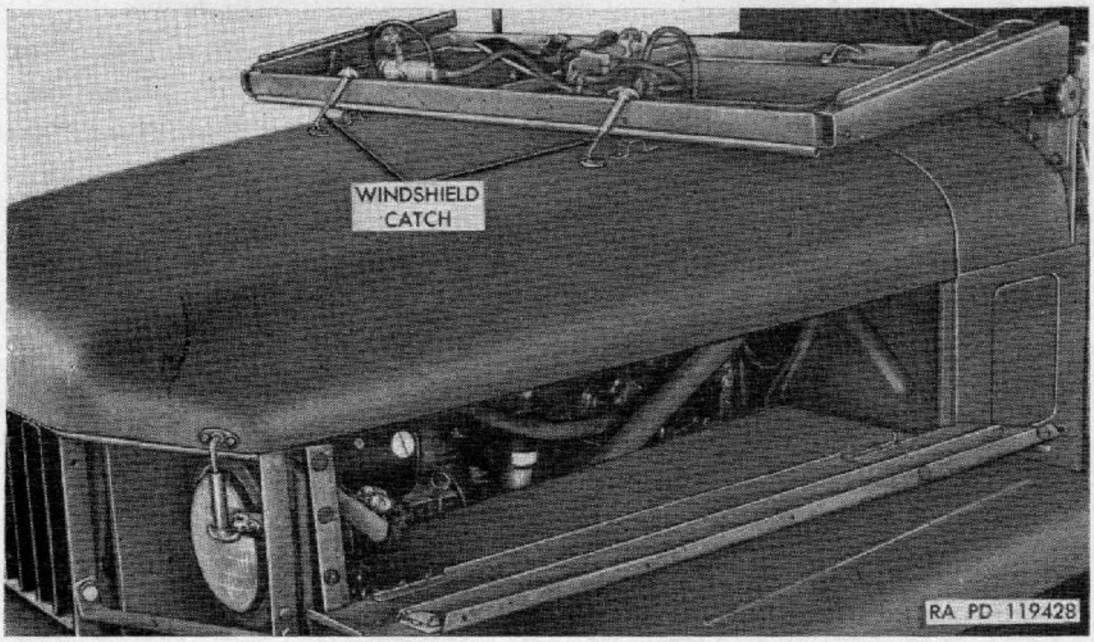

Figure 154. Windshield folded on hood.

b. REPLACEMENT. To remove windshield, disconnect hose to windshield wiper motor and remove hinge bolts holding outer frame hinges to cab. To install, set replacement in position and install hinge bolts. Connect hose to windshield wiper motor.

234. Windshield Wipers

a. REMOVAL. Remove nut holding wiper arm to wiper motor shaft and remove arm and blade assembly. Remove screws and lock washers holding wiper motor to windshield frame, disconnect hose and remove wiper motor.

b. INSTALLATION. Insert wiper motor shaft through windshield frame and secure with two screws and lock washers. Install wiper arm and blade assembly on shaft and secure with nut. Connect wiper motor hose.

235. Cab Doors

a. REMOVAL. Remove cotter pin and remove door check from anchor. Support door, drive out hinge pins and remove door.

b. INSTALLATION. Set door in position and install hinge pins. Attach door check to anchor and secure with cotter pin.

c. ADJUSTMENT. If replacement door does not aline correctly with cab side, loosen screws holding hinge to door and adjust door to cab. Tighten hinge screws.

236. Cab Seats

a. DRIVER'S SEAT (fig. 153). The driver's seat is mounted on a fully enclosed base which is anchored to cab floor. Seat and back cushions are supported in a frame assembly which is mounted on base. Seat is adjustable forward and backward, and is held in position by a spring latch adjuster which engages slots in left side of base (fig. 155). Seat is pivoted and can be raised to give access to storage compartment in base.

b. COMPANION SEAT (fig. 153). Companion seat is supported on a welded frame, the right-side of which is anchored to cab floor; left side of frame is attached to upper portion of driver's-seat base. Seat cushion can be tilted up against back cushion, and back can be laid forward on seat.

c. SEAT REPACEMENT.

(1) *Seat cushions, removal.*

(*a*) *Driver's seat.* Remove two hinge bolts and nuts holding seat to upper frame and remove seat. Remove four safety nuts holding upper frame to base, release adjuster locking handle, and remove frame and back cushion. Seat pads are removed by releasing draw strings and removing covers.

(*b*) *Companion seat.* Remove two cotter pins and pivot pins holding seat frame to back rest frame. Tilt seat and detach seat cushion link from bottom of seat and remove seat. Remove screws attaching back rest to slotted link and leg; remove back. Release cover draw strings; remove pads from seat and back cushions.

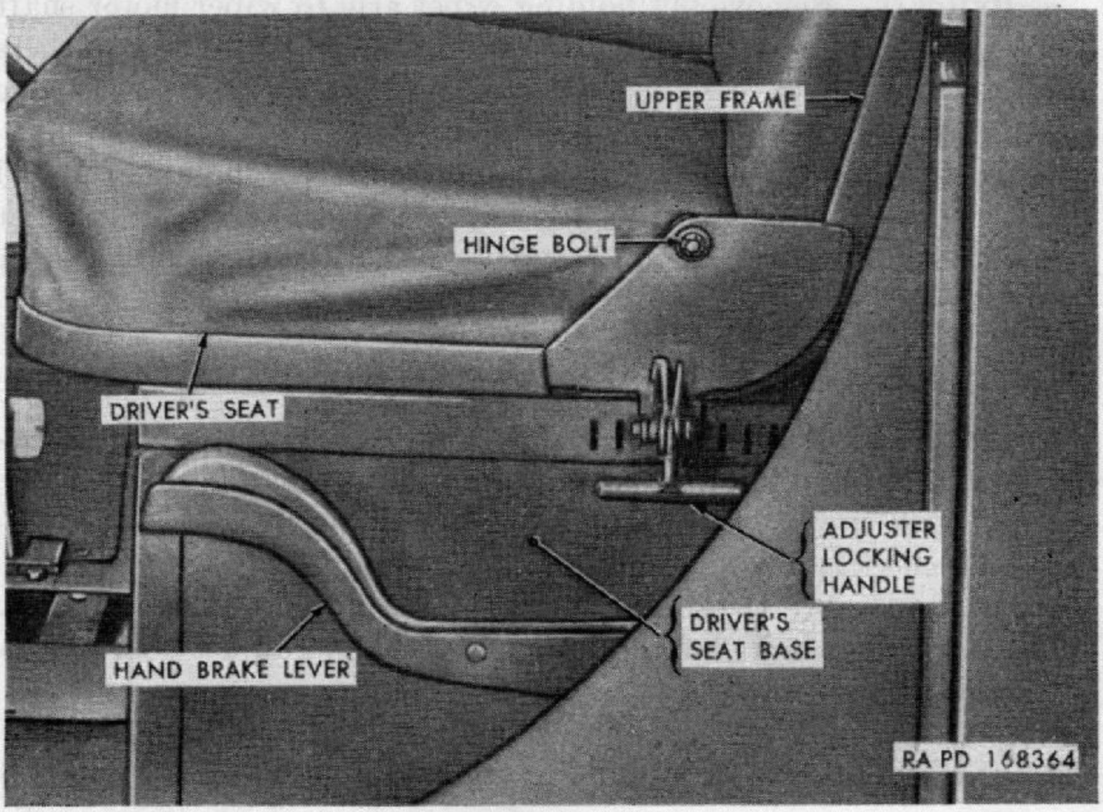

Figure 155. Driver's seat adjustment.

(2) *Seat cushions, installation.*

(*a*) *Driver's seat.* Position pads on seat and upper frame; install seat covers. Draw covers tight and secure draw strings. Set upper frame assembly on base and install two washers and safety nut on each stud. Do not tighten nuts to interfere with free movement of frame on base. Place seat on frame and install hinge bolts.

(*b*) *Companion seat.* Install pads in seat and back cushions; secure draw strings. Insert screws through back rest to slotted link; tighten screws. Install seat and seat cushion link. Install pivot pins and cotter pins holding seat frame to back rest frame.

(3) *Seat frame and base.*

(*a*) To remove companion seat frame, remove two screws holding frame to cab floor, two screws holding frame to driver's-seat base, and remove frame.

(*b*) To install frame, set frame in position and install screws holding frame to base; secure frame to floor with two screws.

(*c*) To remove driver's-seat base, remove bolts holding base to floor.

(*d*) To install driver's-seat base, position base and install bolts holding it to cab floor.

Section XXXIII. BODIES M34, M36, M47 AND M59

237. M34 Body

a. DESCRIPTION (figs. 3 and 156). The M34 truck is provided with a 12-foot, open-top, steel body. An end gate, hinged at bottom, provides a step for entering body when gate is lowered. Gate is raised and locked for travel. Sockets in sides and front of body permit installation of cargo racks. Tubes in side racks provide sockets to accommodate bows for support of top paulin. The lower portion of side racks is hinged at bottom and can be lowered for troop seats.

b. END GATE REPLACEMENT.

(1) *Removal.* Lower end gate and remove cotter pins and washers from hinge shafts. Support gate and remove hinge shafts. Support gate and remove hinge shafts.

(2) *Installation.* Support end gate in position and insert shafts in hinges. Install a washer on each end of shaft and secure with cotter pins.

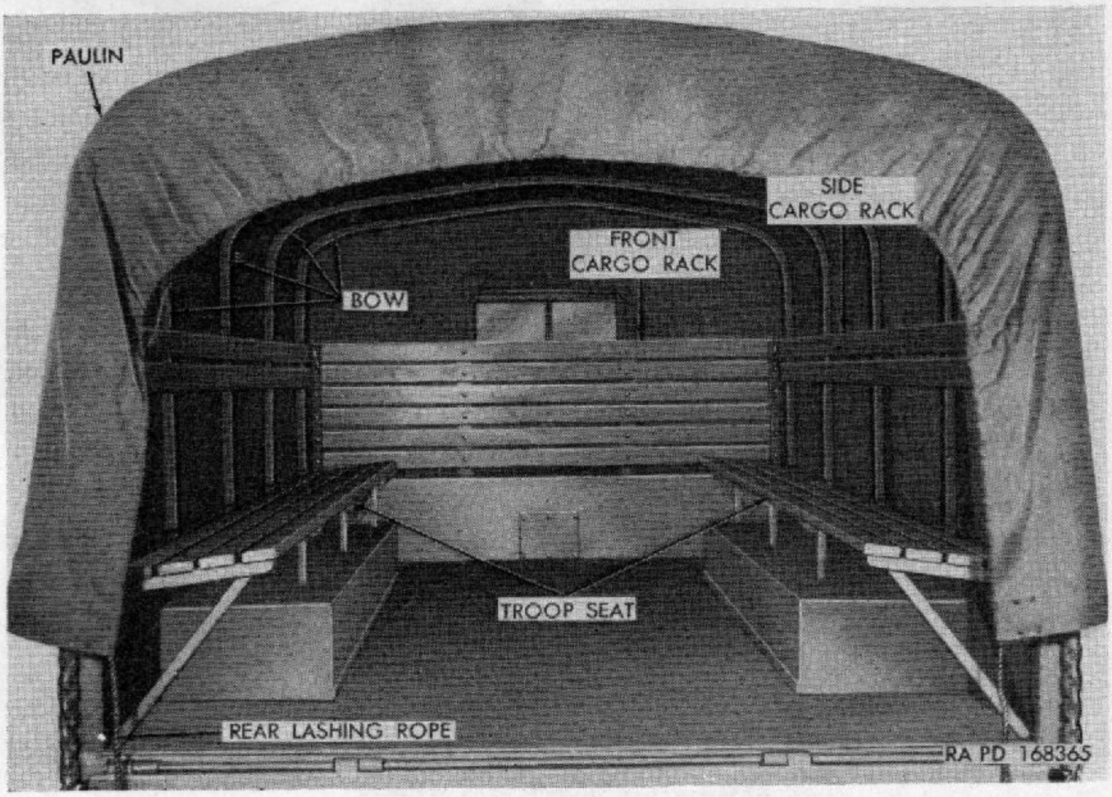

Figure 156. Troop seats—M34.

c. TROOP SEAT REPLACEMENT AND/OR REPAIR. Repairs for troop seats or cargo racks are not normally available but may be requisitioned by second echelon when needed. Repairs are limited to replacement of damaged parts.

d. PAULIN.

(1) *Removal.* Untie all paulin lashing ropes from lashing hooks. (Front and rear curtains may or may not be removed at this time.) Make first fold of top paulin on each side lengthwise until lower edge of paulin is even with top buckles. Make second fold lengthwise on both sides until both folds meet. Bring one folded side over the other fold. At each end make an equal fold toward the center. Make another equal end fold until folded paulin is supported only by center bow.

(2) *Stowing.* Do not fold or stow paulin when wet.

(3) *Installation.* Install front and rear curtains. Place folded paulin across center bow. Locate end marked "front" and position paulin so this end will be at front of body. Unfold paulin and pull tight with front and rear lashing ropes. Secure paulin with end and side lashing ropes.

(4) *Raising sides for ventilation.* Untie all paulin-lashing ropes. Fold paulin under, three folds on each side. Fasten paulin in place using straps on bows and buckles on paulin. Tie front and rear lashing ropes to lashing hooks at each end of body.

e. CURTAINS.

(1) *Removal.* If top paulin is not removed, loosen paulin front and rear draw ropes. Untie front and rear curtain lashing ropes. Unwind curtain lashing ropes from front and rear bows and remove curtains. Tie front and rear paulin draw ropes.

(2) *Stowing.* Do not fold or stow curtains when wet.

(3) *Installation.* Place curtains in position on front and rear bows. Make certain center of lashing rope is in center eyelet of curtain. Wind lashing rope, alternately around bow and through eyelets in curtain, and tie ends of rope to lashing hooks. Tie front and rear paulin draw ropes.

(4) *Ventilation.* Both front and rear curtains are equipped with openings for ventilations. The flaps covering these openings may be opened.

f. TROOP SEATS (fig. 156).

(1) *Removal.* Troop seats are removed with side cargo racks or can be removed separately. To remove side cargo racks,

lift straight up to free ends of stakes from sockets at side of body. To remove troop seats only, remove cotter pins and hinge pins from five hinges attaching each seat to rack stakes. Release seat clamps, disengage hinges, and remove troop seats.

(2) *Installation.* If troop seats were removed with side cargo racks, engage rack stakes in sockets and push down on rack. To install troop seats only, position troop seats on side-rack-hinge brackets and aline hinge holes. Install hinge pin and cotter pin in five hinges of each troop seat. Seats may be folded up against rack and fastened in place with seat clamps.

238. M36 Body

a. Description (figs. 4 and 157). The M36 body is a 17 foot, open top, flat bed steel body. An end gate, hinged at bottom, provides steps for entering when gate is lowered. Gate is raised and locked for travel. Removable wood cargo racks are mounted on the steel body at front end and sides. Tubes in side racks provide sockets to accommodate bows for support of top paulin. The lower portion of the side racks may be used as troop seats. These seats are in two sections on each side. When top paulin is used, front and rear ends are closed by paulin curtains supported on end bows.

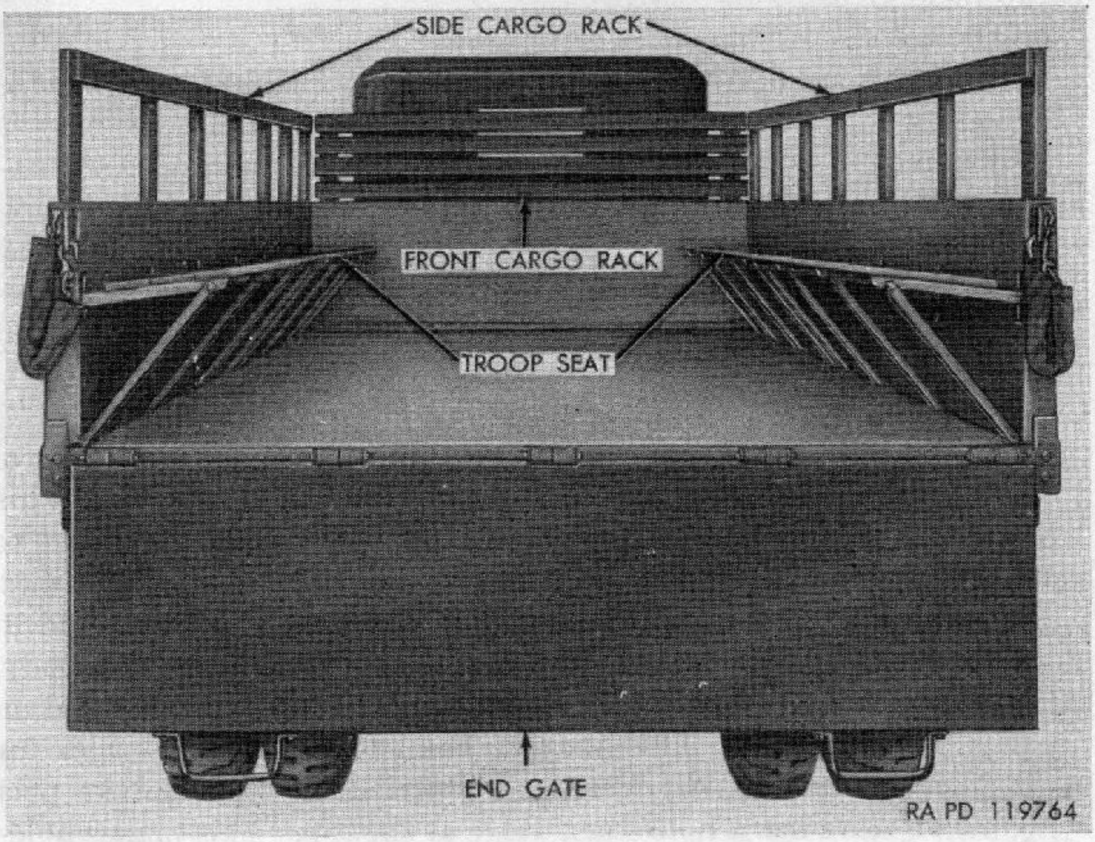

Figure 157. Troop seats—M36.

b. End Gate Replacement. Replacement of end gate is same as for M34 (par. 237).

c. Troop Seat Replacement and/or Repair. Repairs for troop seats are not normally available to second echelon but may be requisitioned when needed. Repairs are limited to replacement of damaged parts.

d. Paulin. Same as for M34 (par. 237).

e. Curtains. Same as for M34 (par. 237).

f. Troop Seats. (fig. 157).

(1) *Removal.* If seats are in position (fig. 157), detach from sides and remove; if used for cargo rack, lift side rack assembly from sockets and remove.

(2) *Installation.* If troop seats were removed with side cargo racks, engage rack stakes in sockets and push down on rack. To install troop seats only, attach seats to sides.

239. M47 and M59 Dump Body

a. General. The M47 and M59 dump body and hydraulic hoist assembly (figs. 7 and 158) is mounted on a subframe which is mounted on truck chassis. Front cross member of subframe is fitted as a reservoir for hydraulic fluid. Troop seats, bows, and paulin are not furnished but sockets in top of body sides are provided for installation of cargo racks if use is indicated.

b. Hydraulic Equipment.

(1) *Cylinder* (fig. 158). A double acting hydraulic cylinder is mounted in forward part of subframe. Cylinder base is mounted on a shaft held in bearings on inner sides of subframe. Piston rod is connected to a crosshead which is pivoted in a roller arm at each end. Arms are supported by bearing pins on bottom of body. Free ends of arms are equipped with rollers which engage curved ramps attached to sides of subframe. Heavy high pressure hose connect cylinder ports to control valve.

(2) *Control valve and pump* (fig. 159). A spool type control valve is mounted on rear side of front cross member. This valve has a central piston which reverses flow of fluid to hydraulic cylinder by a vertical movement of 1¼ inches. In its central position, cylinder is cut off and body held in position. Movement of valve spool above center lowers body, movement below center raises it. An adapter is mounted on side of valve. This adapter has two separate passages for hydraulic liquid. Passage connected to upper intake port of valve has a nonreturn valve at the top. This makes holding of dump body possible when control lever in cab is in

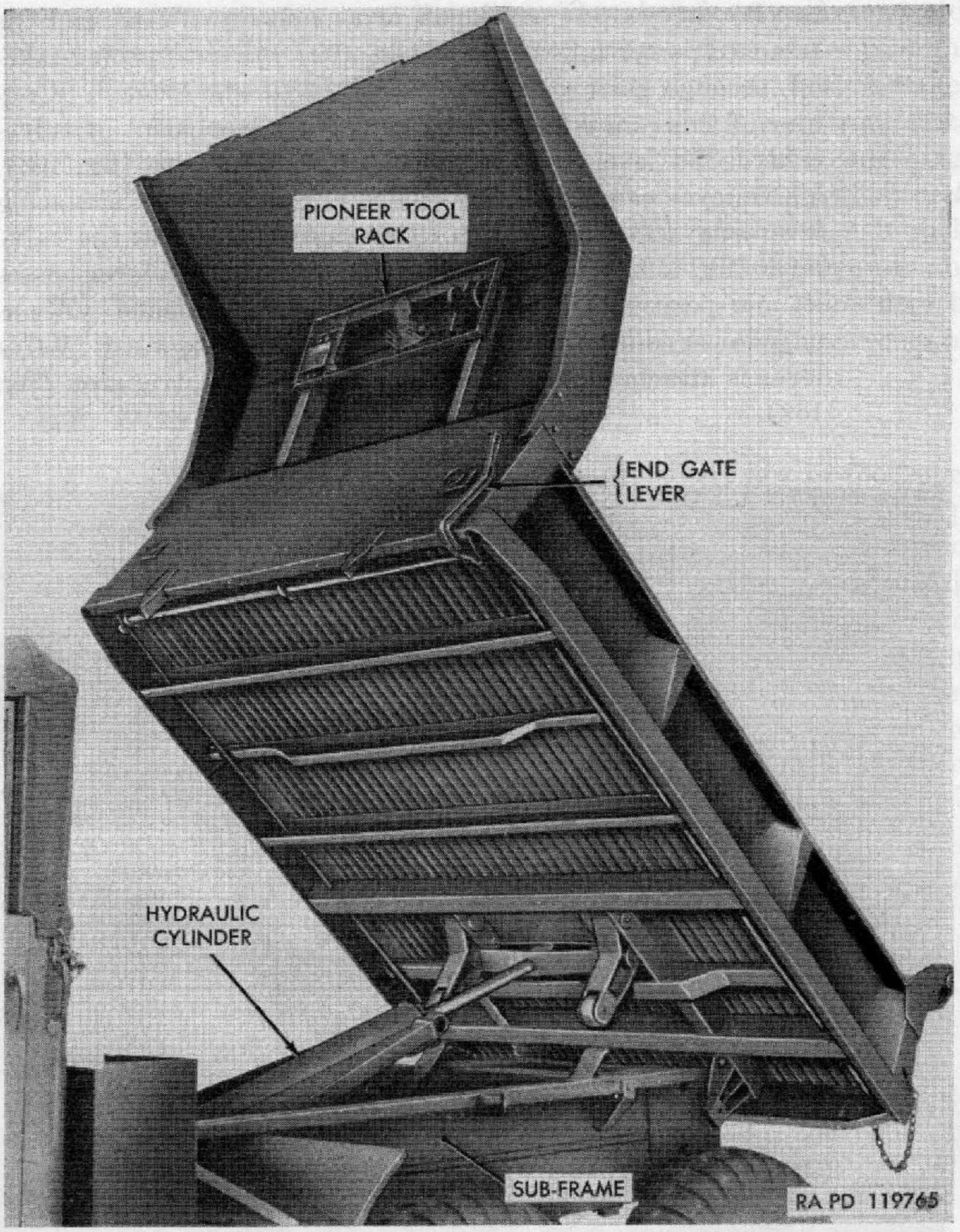

Figure 158. Dump body raised.

position (C, of fig. 21). A spacer mounted on lower end of adapter continues the two passages to pump. A gear type pump is mounted on lower face of adapter and is driven by a shaft connected to the power-take-off.

(3) *Control box.* The control valve is operated by a control box (fig. 160) mounted on under side of front cross member of subframe. A control box rod extends from valve-control-rod lever (fig. 162) to shift control lever extending through floor of cab (fig. 161). Movement of handle in cab (fig. 21)

to (B) throws power-take-off lever cam downward and the attached power-take-off lever (fig. 162) will shift power-take-off, through shift shaft rod (fig. 161) to engagement. Contour of this cam is such that any further movement of valve-control-rod lever will not affect position of cam (fig. 163). Valve lever cam (fig. 162) is also engaged by the actuating lever (fig. 163). Contour of this cam is such that the valve lever (fig. 159) is not moved until driver's control lever passes its mid-position (C, of fig. 21). Further movement will engage lower contour of cam and lift valve lever upward. Valve lever is attached to extended valve spool by a trunnion (fig. 159).

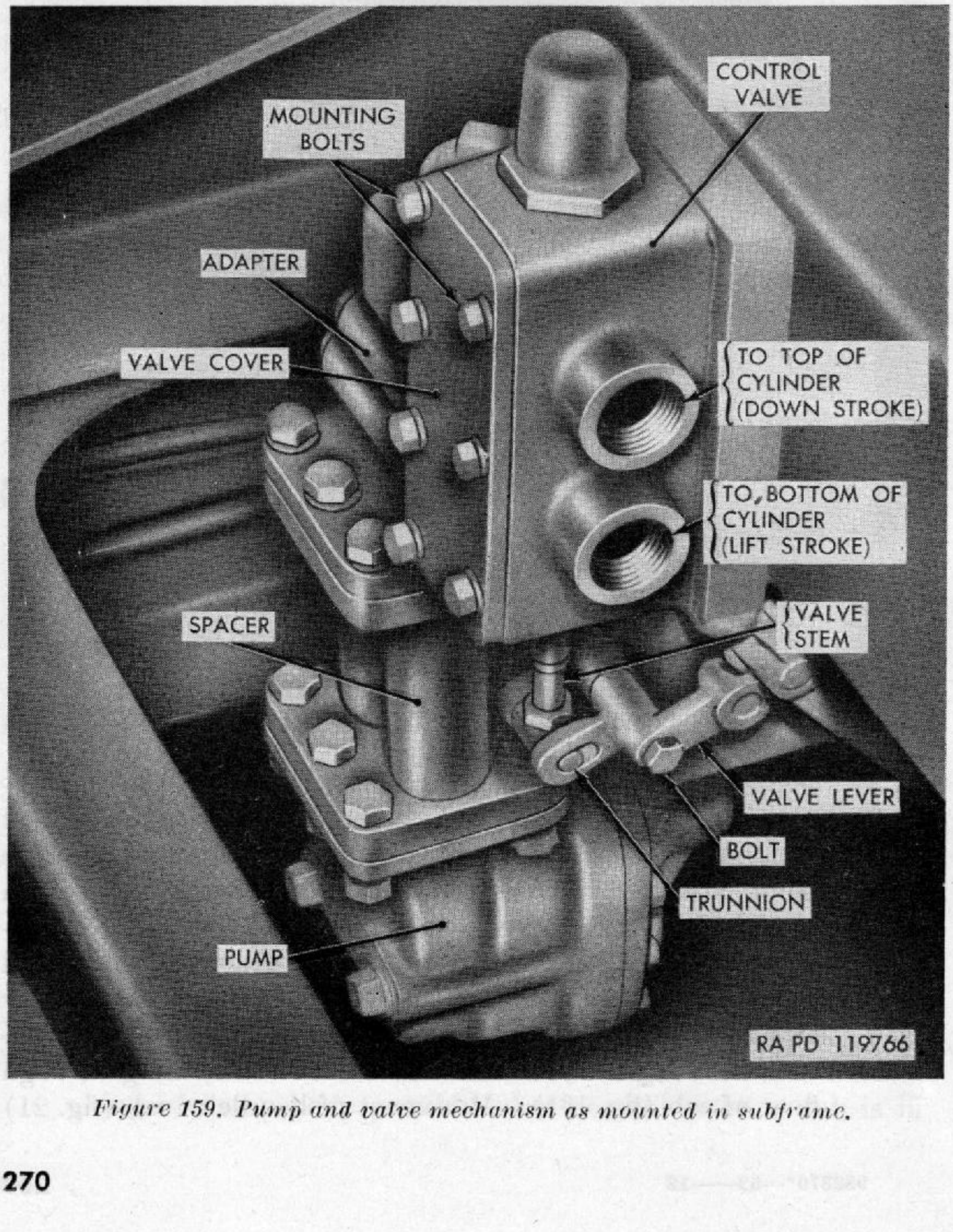

Figure 159. Pump and valve mechanism as mounted in subframe.

240. Maintenance

a. GENERAL. Maintenance of dump truck body consists of keeping linkage properly adjusted and tight, removal and replacement of components which are allocated to second echelon, repair of control box, and lubrication as specified on the lubrication order (par. 56).

b. REPLACEMENT OF PUMP AND CONTROL VALVE GROUP (figs. 159 and 160).

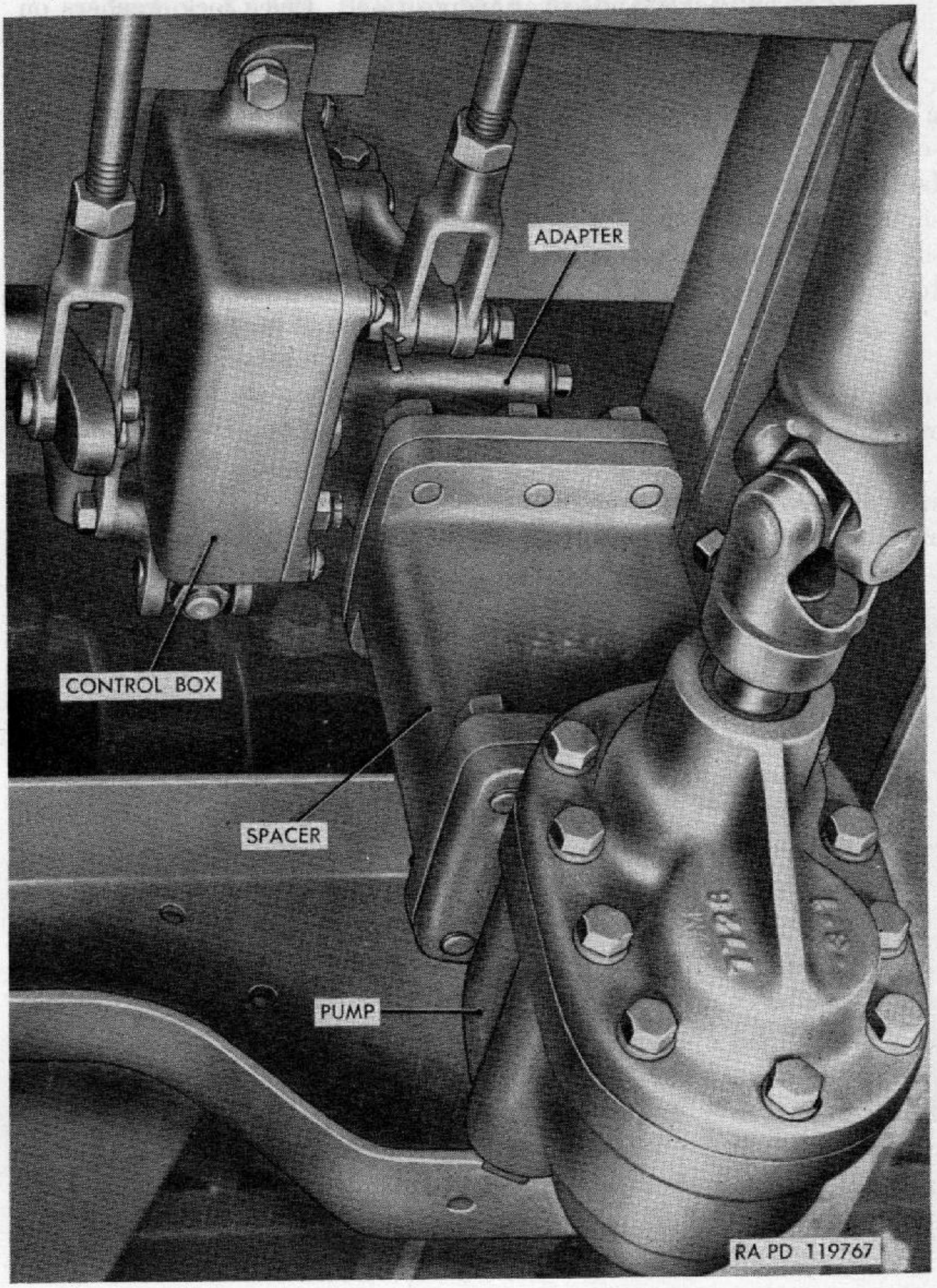

Figure 160. Pump and control box viewed from below.

(1) *Removal.* Disconnect drive shaft from pump. Remove safety nut from valve-lever bolt holding halves of valve lever (fig. 162) together. Separate lever sufficiently to disengage trunnion on end of valve spool. Disconnect two hose lines at valve. Remove seven mounting bolts from control valve, remove group and discard gaskets. Pump, spacer, adapter, and control valve can then be separated if desired.

(2) *Installation.* If the assembled group is installed, place valve cover gasket and cover in position. Place lock washers on all bolts and insert them to hold cover in place. Place gasket over extended ends of bolts and tighten bolts. Group can be assembled individually, if desired, by attaching valve first. To connect pump adapter to valve body, it is necessary to insert the two longest of eight attaching bolts and lock washers into adapter before positioning it. Position gasket and screw in bolts. Insert the four short bolts with lock washers and the remaining two and tighten all bots securely. Note that spacer is attached to adapter with cap screws and lock washers. Place gasket and secure. Pump is attached to lower end of spacer with six cap screws and lock washers. Position gasket and secure. Position valve spool trunnion, insert valve lever bolt and tighten.

c. REPLACEMENT OF CONTROL BOX.

(1) *Removal.* Disconnect shift shaft rod from power-take-off lever, and valve control rod lever from control box rod (fig. 161). Remove safety nut from valve lever bolt holding halves of valve lever (fig. 16) together and separate lever until trunnion on valve spool can be freed. Remove three cap screws from lugs at upper portion of control box and remove box.

(2) *Installation.* Place control box in position and attach to subframe with three cap screws and lock washers. With control lever in cab in "OFF" position and valve-control-rod lever pulled forward, check, and adjust linkage to both levers (fig. 161). Insert clevis pins and secure with cotter pins. Position valve spool trunnion, insert valve lever bolt and tighten safety nut.

241. Repair of Control Box

a. DISSASSEMBLY (fig. 162). Remove safety nut from valve lever bolt holding halves of valve lever. Loosen clamp bolts and remove valve control rod lever, and power-take-off lever. Remove four screws and lock washers from box cover. Remove cover and discard gasket. Lift out power-take-off-lever cam, actuating lever, and valve-lever cam. Remove rollers from actuating lever. Do not re-

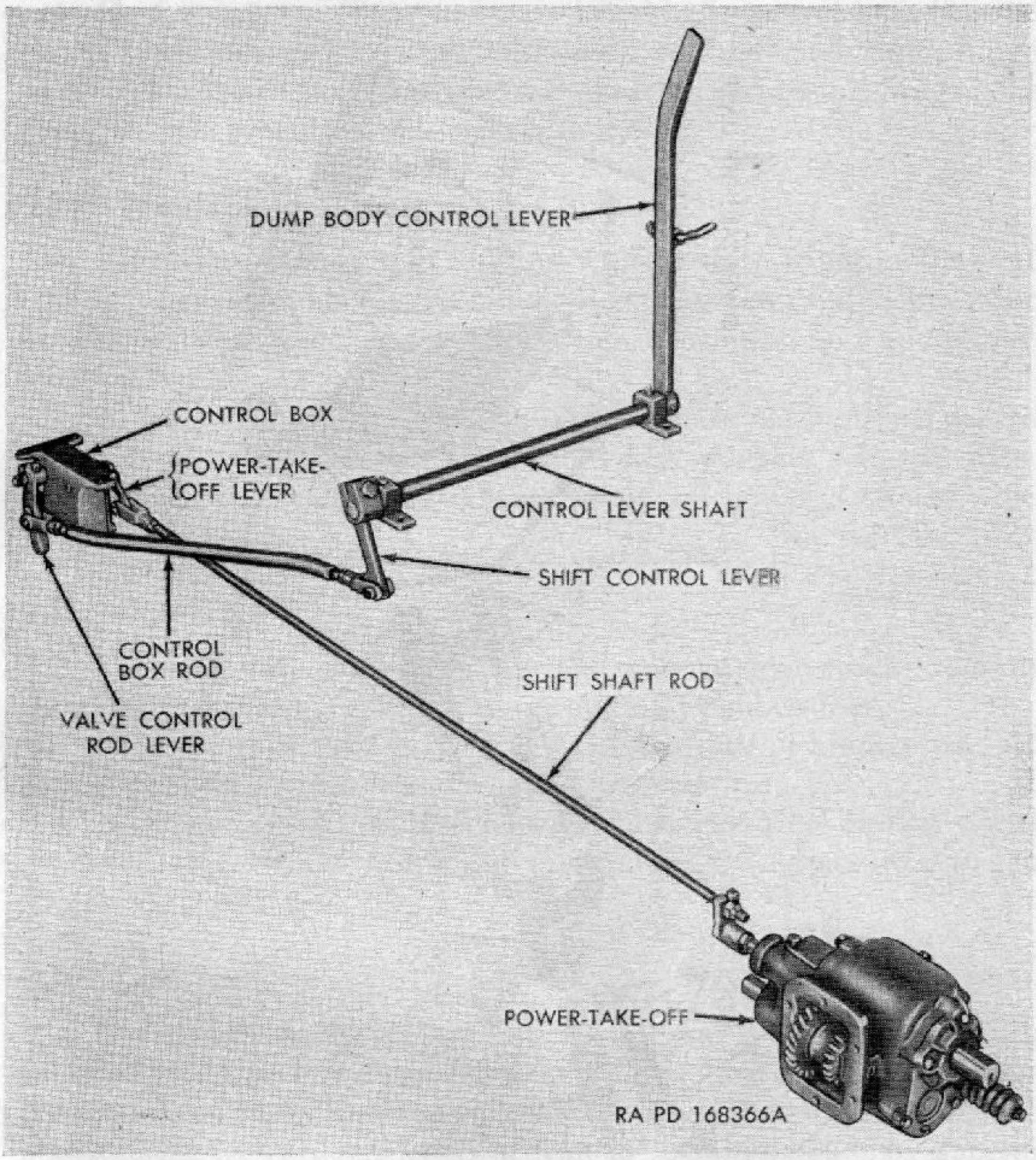

Figure 161. Arrangement of control linkage.

move shafts from cams unless shaft or cam must be replaced. Punch mark both shaft and cam before removal to aid in assembly.

b. CLEANING. Wash all parts with dry-cleaning solvent or volatile mineral spirits.

c. REPAIR. Repairs consist of replacing parts which are worn or damaged.

d. ASSEMBLY.

(1) *General.* Considerable care is necessary in assembling the serrated shafts and cams. If parts were marked before disassembly, be sure that marks aline on assembly. If a new cam is to be installed, mark new cam as near as possible to the old one. On new shafts, place mark in same relation to keyway as on old shaft.

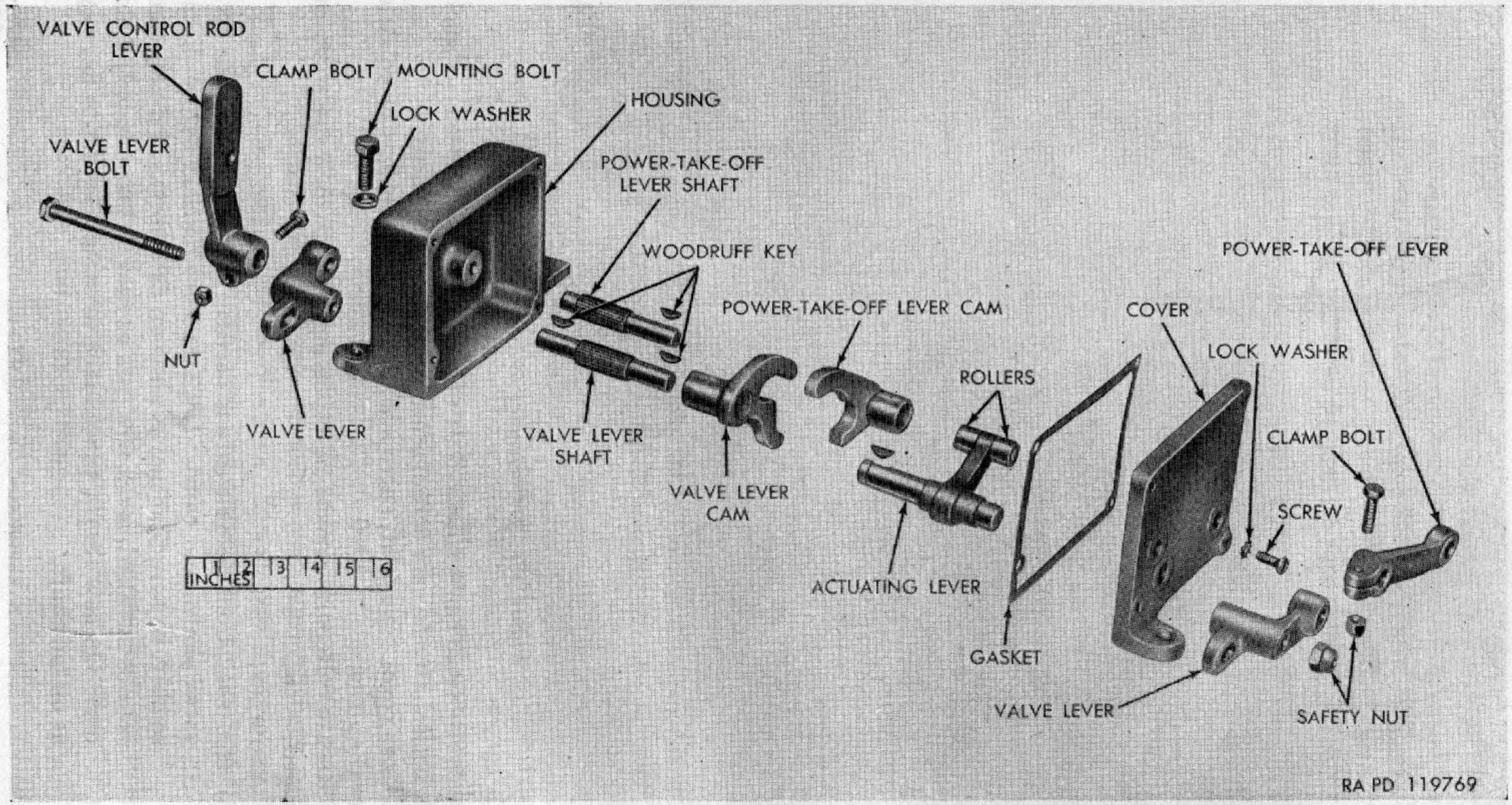

Figure 162. Control box—exploded view.

(2) *Cams and shafts.*

(*a*) Assemble power-take-off-lever cam and shaft. Long end of shaft must extend from hub side of cam. Place short end of shaft in bore in housing. Install rollers on actuating lever and insert long end of shaft in bearing in housing. If cam and shaft were not marked, arrange them so the three centers are in line as in figure 163. To check shaft position, note position of keyway when centers are in line. Then move actuating lever until roller contacts long arc of cam. Keyway should then be the same distance on opposite side from vertical center line as in first position.

(*b*) Assemble valve lever cam and shaft and install in housing (fig. 164). Actuating lever shaft has two keyways. Insert Woodruff key and install valve-control-rod lever so that lever will extend below bottom of box when assembled. After valve-control-rod lever is installed, check to see if upper shafts and roller pin can be alined. The extended tip of power-take-off cam may interfere with hub of valve cam. File tip of cam until alinement is secured. To check position of shaft in valve lever cam, note that keyways must move equidistant above and below a horizontal center line when roller cam is in extreme positions.

(*c*) Fill housing with grease (GAA) and install cover with a new gasket. Install four screws and lock washers and tighten.

(*d*) Install power-take-off lever over key in power-take-off lever shaft. Position lever with offset away from box and hub even with end of shaft. Tighten clamp bolt. Place Woodruff key in each end of valve-lever shaft and install valve levers. Insert valve lever bolt and tighten safety nut finger tight.

242. Hydraulic Reservoir

The front cross member of subframe is used as a reservoir. It is fitted with a filler neck on left side and a drain plug in bottom. Filler neck is fitted with a filler plug, and accommodates a bayonet type gage to indicate oil level. A cylindrical filter screen, fitted in filler neck can be lifted out with fingers when gage is removed. Dump body must be raised slightly to afford access to filler neck. Liquid level in tank should always be maintained at top mark on gage (fig. 165). Seasonal engine oil is used for hydraulic fluid.

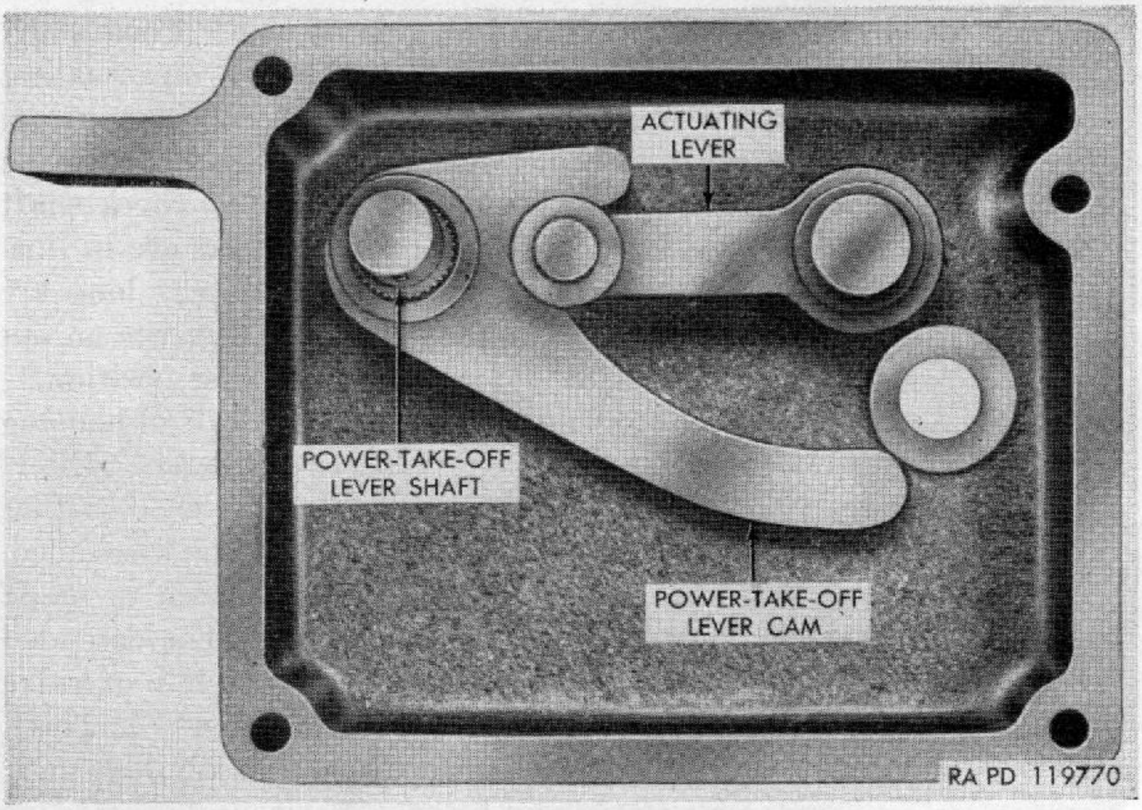

Figure 163. First assembly—control box.

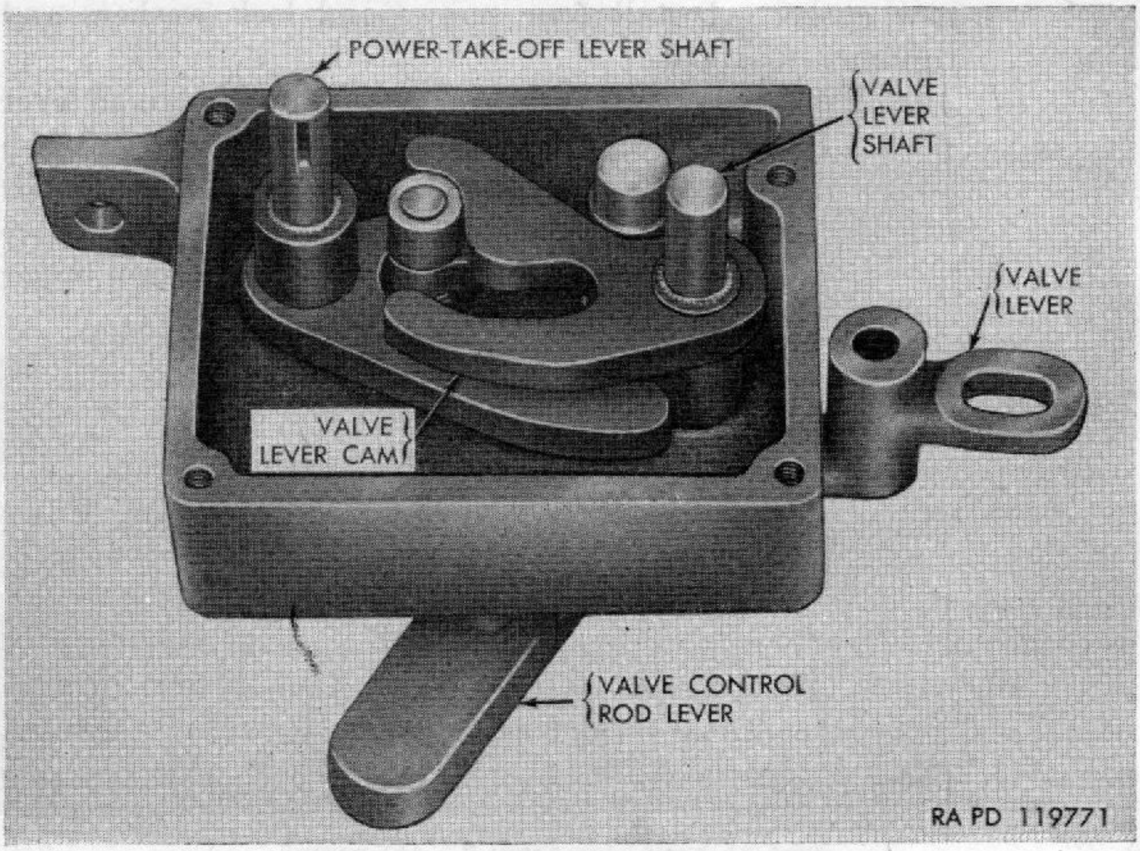

Figure 164. Control box assembled without cover.

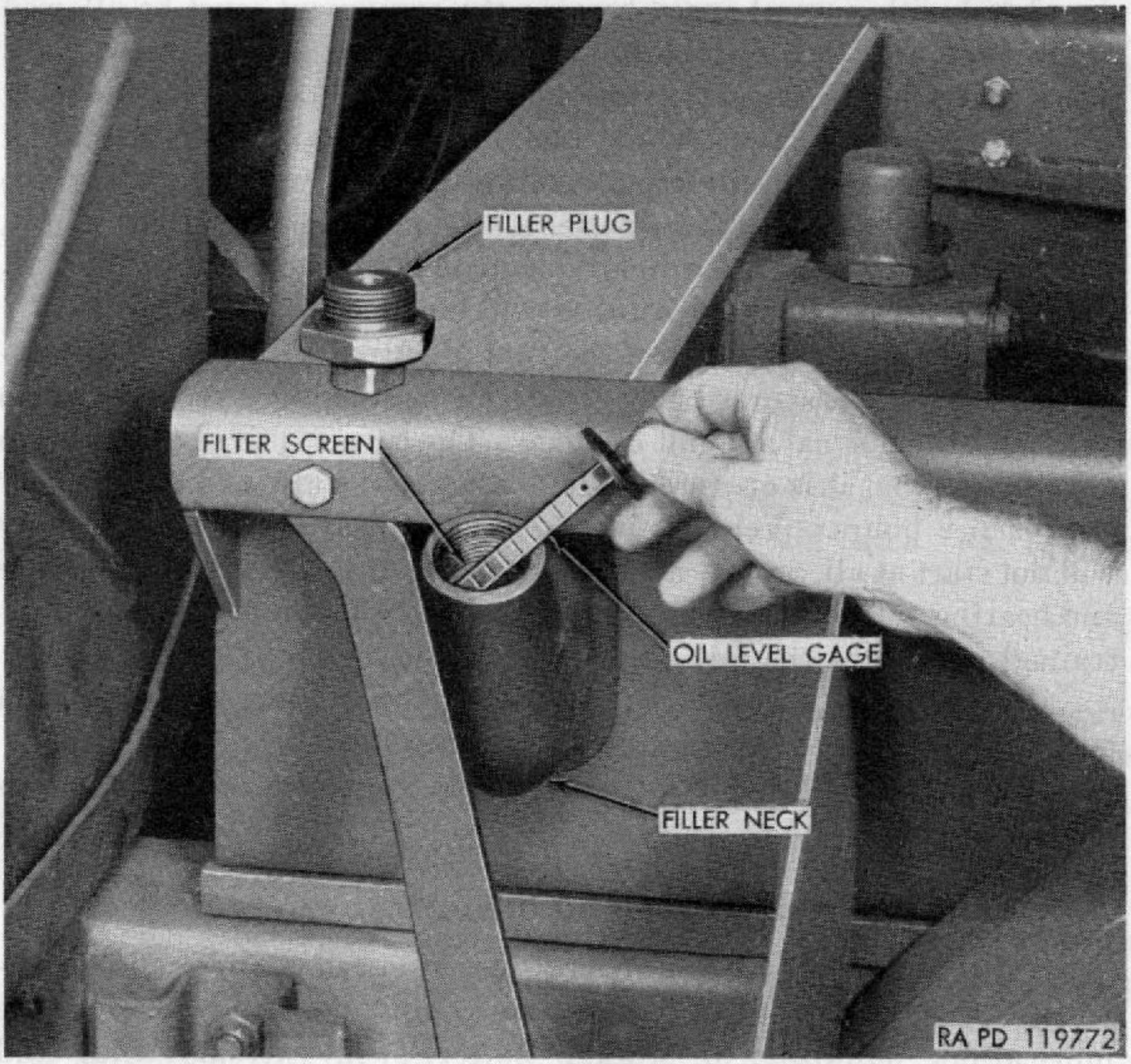

Figure 165. Reservoir tank filler neck and oil level gage.

243. End Gage Replacement

(fig. 23)

a. Removal. Remove free ends of chains from locking slots and release lower hatches holding gate in closed position. Support gage, remove lock pins holding top of end gate in upper latches, and remove end gate.

b. Installation. Lift end gate position in upper latches. Insert retaining pins. Close gate and secure latches. Insert free ends of chains in locking slots.

Section XXXIV. MAINTENANCE UNDER UNUSUAL CONDITIONS

244. Extreme-Cold Weather Maintenance Problems

a. The importance of maintenance must be impressed on all concerned, with special emphasis on organizational (preventive) maintenance. Maintenance of mechanical equipment in extreme cold is exceptionally difficult in the field. Even shop maintenance cannot be completed with normal speed because the equipment must be allowed to thaw out and warm up before the mechanic can make satisfactory repairs. In the field, maintenance must be undertaken under the most difficult conditions. Bare hands stick to cold metal. Fuel on contact with the hands results in super-cooling due to evaporation, and the hands can be painfully frozen in a matter of minutes. Engine oils, except subzero grade, are unpourable at temperatures below −40° F. Ordinary greases become as solid as cold butter.

b. These difficulties increase the time required to perform maintenance. At temperatures below −40° F., maintenance requires up to five times the normal amount of time. The time required to warm up a vehicle so that it is operable at temperatures as low as −50° F. may approach 2 hours. Vehicles in poor mechanical condition probably will not start at all, or only after many hours of laborious maintenance and heating. Complete winterization, diligent maintenance, and well-trained crews are the key to efficient arctic-winter operations.

c. Refer to TM 9–2855 and TB ORD 193 for general information on extreme-cold weather maintenance procedures.

d. Refer to SB 9–16 for information on winterization kit for this vehicle.

245. Extreme-Cold Weather Maintenance

Refer to TM 9–2855 for a general discussion of maintenance problems, the application of antifreeze compounds and arctic type lubrication, handling of storage batteries in extreme cold, and dewinterization procedure.

246. Extreme-Hot Weather Maintenance

a. Cooling System. Thoroughly clean and flush the cooling system (par. 121) at frequent intervals and keep system filled to level of the level cock with clean water when operating in extremly high temperatures. Formation of scale and rust in the cooling system occurs more often during operation in extremely high temperatures, therefore, corrosion inhibitor compound should always be added to the cooling liquid. Avoid the use of water that contains alkali or other substances which may cause scale and rust formations. Use soft water whenever possible.

b. Batteries.

(1) *Electrolyte level.* In torrid zones, check level of electrolyte in cells daily and replenish, if necessary, with pure distilled water. If this is not available, rain or drinking water may be used. However, continuous use of water with high mineral content will eventually cause damage to batteries and should be avoided.

(2) *Specific gravity.* Batteries operating in torrid climates should have a weaker electrolyte than for temperate climates. Instead of 1.280 specific gravity as issued, the electrolyte (sulphuric acid, sp gr 1.280) should be diluted to 1,200 to 1.240 specific gravity (TM 9–2857). This is the correct reading for a fully-charged battery. This procedure will prolong the life of the negative plates and separators. Under this condition, a discharged battery should be recharged at about 1.160 specific gravity.

(3) *Self-discharge.* A battery will self-discharge at a greater rate at high temperatures if standing for long periods. This must be considered when operating in torrid zones. If necessary to park for several days, remove batteries and store in a cool place.

Note. Do not store acid-type storage batteries near stocks of tires, as the acid fumes have a harmful effect on rubber.

c. Chassis and Body.

(1) In hot, dry climates, a careful watch must be kept for evidence of the presence of moths and termites.

(2) In hot, damp climates, corrosive action will occur on all parts of the vehicle and will be accelerated during the rainy season. Evidence will appear in the form of rust and paint blisters on metal surfaces and mildew, mold, or fungus growth on fabrics, leather, and glass.

(3) Protect exterior surfaces from corrosion by touch-up painting and keep a film of engine lubricating oil (OE–10) on unfinished exposed metal surfaces. Cables and terminals should be protected by ignition insulation compound.

(4) Make frequent inspections of idle, inactive vehicles. Remove corrosion from exterior metal surfaces with abrasive paper or cloth and apply a protective coating of paint, oil, or suitable rust preventive.

247. Maintenance After Fording

a. General. Although the vehicle unit housings are sealed to prevent the free flow of water into the housings, it must be realized that, due to the necessary design of these assemblies, some water may enter, especially during submersion. The following services should be accomplished on all vehicles which have been exposed to some depth of water or completely submerged, especially in salt water. Precautions should be taken as soon as practicable to halt deterioration and avoid damage before the vehicle is driven extensively in regular service.

b. Body and Chassis. Drain and clean out body, engine and tool compartment. Clean all exposed surfaces and touch up paint where necessary. Coat unpainted metal parts with engine lubricating oil (OE–10). Lubricate the chassis thoroughly as directed in the lubrication order. Do more than the usual lubrication job, making sure the lubricant is forced into each lubrication point to force out any water present.

c. Engine, Transmission Transfer Case and Axles. Check the lubricant in the engine, transmission, and final drives. Should there be evidence that water has entered, drain, flush, and refill with the correct lubricant. Remove and clean engine and transmission oil filters.

d. Wheels and Brakes. Remove the front wheels and flush out the knuckle housings with a half-and-half mixture of oil (OE–10) and dry-cleaning solvent or volatile mineral spirits. Refill to filler plug level with correct lubricant. Remove rear wheels. Wash all wheel bearings thoroughly with dry-cleaning solvent or volatile mineral spirits, after which repack, assemble, and adjust. While the wheels are removed, dry out brake linings and clean rust and scum from brake drum face. Check brake system for presence of water.

e. Batteries. Check the batteries for quantity and specific gravity of electrolyte to be sure no water entered through the vent caps. This is of special importance should the vehicle have been submerged in salt water.

f. Steering Gear. Remove and disassemble steering gear. If the lubricant is contaminated, clean the housing thoroughly with a half-and-half mixture of oil (OE–10) and dry-cleaning solvent or volatile mineral spirits. Assemble, refill with correct grade of lubricant, and adjust (par. 168).

g. Electrical Connections. Check all electrical connections for corrosion, particularly the bayonet-type connectors.

h. Fuel System. Drain fuel tanks of any accumulated water, clean fuel filter and lines as necessary. If water is found in the air cleaner, clean and refill with oil.

i. Distributor. Remove the distributor cap and check to see if any water has entered the distributor. If water is present, drain, clean, and lubricate the distributor as required.

j. Condensation. Although most units are sealed, the sudden cooling of the warm interior air upon submersion may cause condensation of moisture within the cases or instruments. A period of exposure to warm air after fording should eliminate this condition. Cases which can be opened may be uncovered and dried.

k. Aluminum or Magnesium Parts. If vehicle remains in salt water for any appreciable length of time, aluminum or magnesium parts which were exposed to the water will probably be unfit for further use and must be replaced.

l. Deep-Water Fording. Refer to TM 9-2853 for deep-water fording kit information.

248. Maintenance After Operation on Unusual Terrain

a. Mud. Thorough cleaning and lubrication of all parts affected must be accomplished as soon as possible after operation in mud, particularly when a sea of liquid mud has been traversed. Clean radiator fins and interior of engine compartment. Repack wheel bearings if necessary, clean, oil, and stow tire chains in vehicle.

b. Sand or Dust. Clean engine and engine compartment. Touch up all painted surfaces damaged by sandblasting. Lubricate completely to force out lubricants contaminated by sand or dust. Air cleaners, fuel and oil filters must be cleaned at least daily. Engine grilles and other exposed vents should be covered with cloth for protection against entry of sand or dust.

CHAPTER 4

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

Section I. SHIPMENT AND LIMITED STORAGE

249. Domestic Shipping Instructions

a. PREPARATION FOR SHIPMENT IN ZONE OF INTERIOR. When shipping the 2½-ton, 6 x 6 cargo truck M34 (REO) interstate or within the zone of interior, except directly to ports of embarkation, the officer in charge of preparing the shipment will be responsible for furnishing vehicles to the carriers for transport in a serviceable condition, properly cleaned, preserved, painted, and lubricated as prescribed in SB 9–4.

Note. For loading and blocking instructions of vehicles on freight cars, refer to paragraphs 251 and 252.

b. PREPARATION FOR SHIPMENT TO PORTS.

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

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

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

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

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

e. DEEP-WATER FORDING. If during the course of shipment, operations embrace deep-water fording, prepare vehicles in accordance with TM 9–2853.

250. Limited Storage Instructions

a. General.

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

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

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

b. Receiving Inspections.

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

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

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

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

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

d. Removal from Limited Storage.

(1) If the vehicles are not shipped or issued upon expiration of the limited storage period, they may either be processed for

another limited storage period or be further treated for stand-by storage (vehicles inactivated for periods in excess of 90 days up to 3 years) by ordnance maintenance personnel.

(2) If vehicles to be shipped will reach their destination within the scope of the limited storage period, they need not be reprocessed upon removal from storage unless inspection reveals it to be necessary according to anticipated in-transit weather conditions.

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

(3) Deprocess vehicles when it has been ascertained that they are to be placed into immediate service. Remove all rust preventive compounds and thoroughly lubricate as prescribed in section II, chapter 3. Inspect and service vehicles as prescribed in section I, chapter 2.

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

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

251. Loading the 2½-Ton 6X6 Cargo Truck M34 (REO) for Rail Shipment

a. Preparation.

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

Note. If matériel is equipped with steel tool boxes, remove all padlocks and keys to prevent pilferage in transit. Secure lids of steel tool boxes by wiring the hasp to prevent damage. Preserve padlocks and keys with presevative engine oil (grade I) and wrap in greaseproof barrier-material for domestic shipment. For oversea shipment, seal in a waterproof-greaseproof wrapping or bag. Locate all wrapped padlocks and keys in the shipping container with the accessories or OVM.

(2) Prepare all vehicles for rail shipment in accordance with paragraph 249*a*. In addition, take the following precautions:

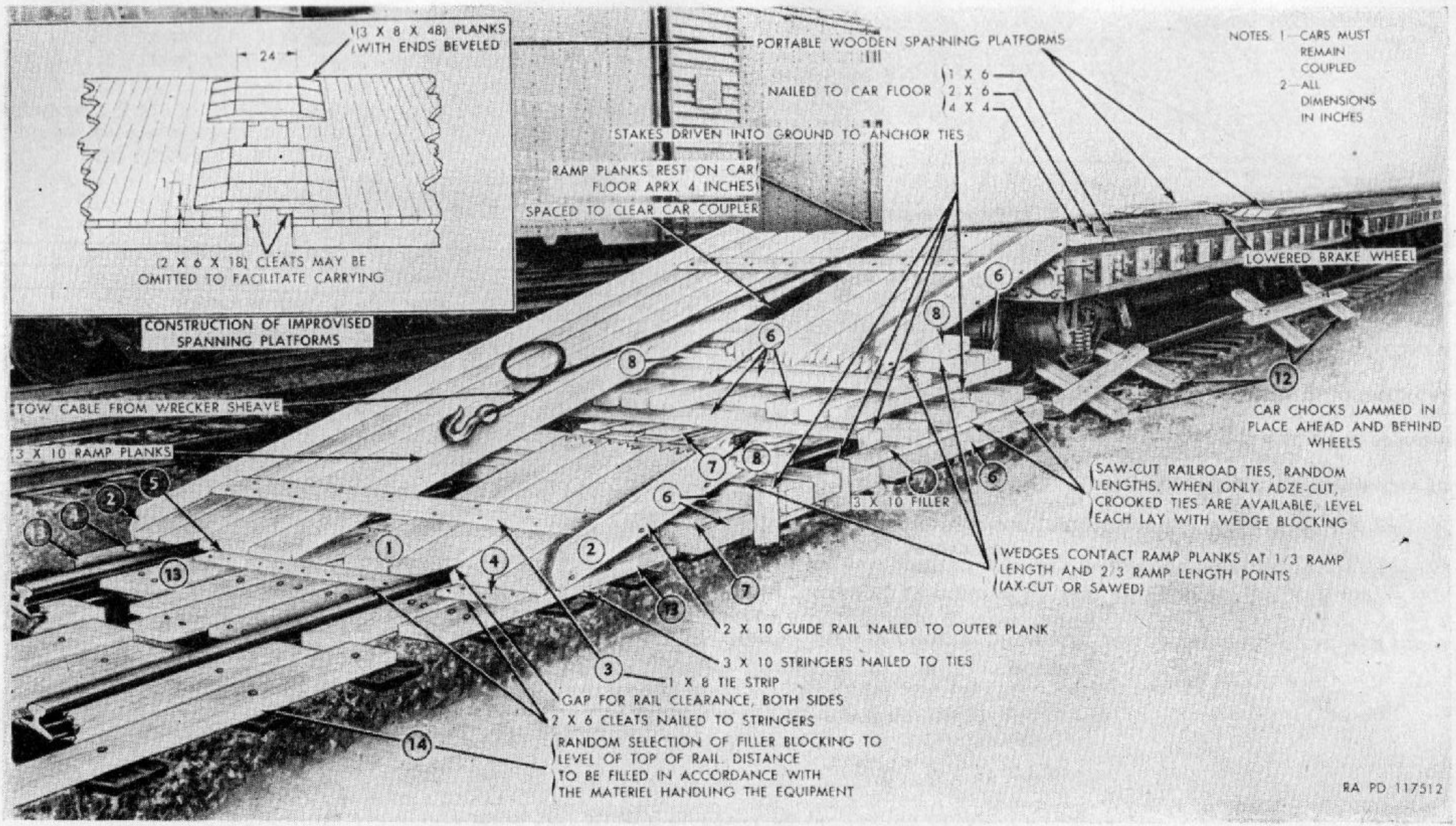

Figure 166. Construction of improvised loading ramp and spanning platforms.

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

NOTES:

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

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

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

RA PD 117513

Figure 167. Bill of materials for improvised loading ramp.

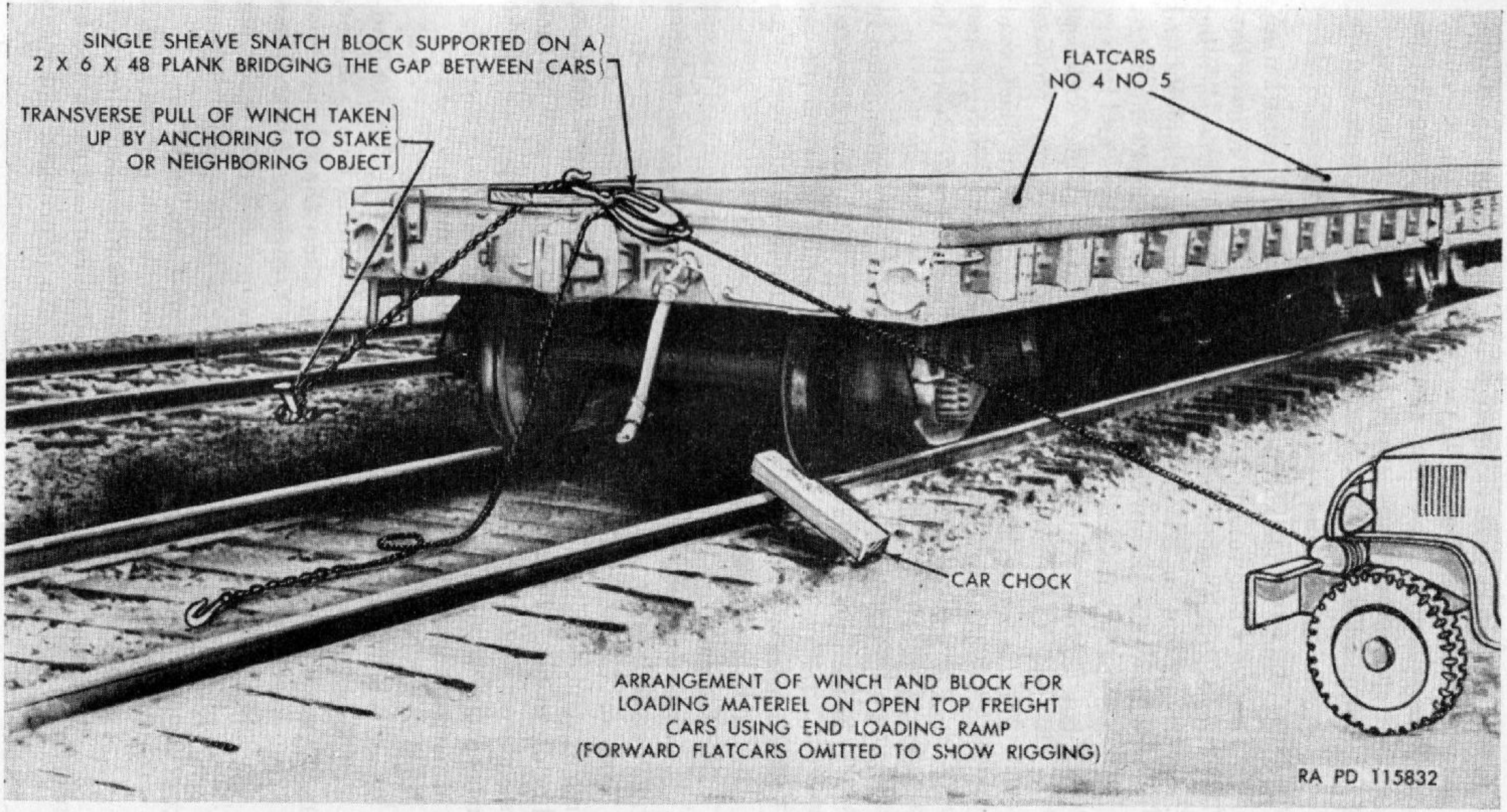

Figure 168. Method of powering the towing cable.

(*a*) If vehicle is to be shipped within the continental United States, *except* directly to ports of embarkation, disconnect the battery cables from battery. Clean if necessary and wrap cable terminals and battery posts with nonhygroscopic adhesive tape. Secure terminals away from battery.

Note. Not required for drive-away movement.

(*b*) If vehicle is to be shipped directly to ports of embarkation, *except* when vehicle is to be combat loaded, remove batteries, plug vents and clean with an alkali-type cleaning compound or a solution of trisodium-phosphate diluted with water. Rinse with *cool* water and remove vent plugs. Scrape or wire brush and clean cable terminals and battery box (holder) with above cleaning solution. Rinse with *cool* water. Coat cable terminals with No. 2 general purpose lubricating grease. Paint battery boxes with black acid resisting paint. Battery will be shipped wet charged and boxed in accordance with TM 9–2857 and secured in vehicle with OVM.

(*c*) Apply the truck hand brake and place the transmission in neutral position after the vehicle has been finally spotted on the freight car. The vehicles must be loaded on the car in such a manner as to prevent the car from carrying an unbalanced load.

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

b. TYPE OF CARS. Instructions contained herein pertain to the loading of vehicles in gondola cars (an open top car having fixed sides, fixed or drop ends, and solid bottom), and flatcars (cars with wooden floors laid over sills and without sides and ends but equipped with stake pockets).

c. METHOD OF LOADING VEHICLES ON FREIGHT CARS.

(1) *Flatcar loading.*

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

(*b*) When unboxed vehicles must be loaded from ground level, a ramp may be improvised ((3) below) by borrowing railroad ties normally found stacked in railroad yards and by procuring necessary planking. An improvised end ramp is shown in place in figure 166. The bill of materials for constructing this ramp is shown in figure 167.

Note. Railroad ties alone, stacked without deck planking and not securely anchored, provide a very unstable ramp and must be rearranged upon each successive use. The torque action of the wheels of self-propelled vehicles will tend to collect and collapse a simple stack of railroad ties and should, therefore, not be attempted except under conditions of extreme emergency.

(*c*) To accomplish loading, the vehicle is towed onto the improvised apron at base of ramp and unhitched. Using a cable laid along the center line of the flatcar, attached to the vehicle, the vehicle is pivoted to point towards the ramp. A chock behind one wheel of the vehicle will prevent undesirable rearward travel and assist pivoting.

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

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

Note. The snatch block fastening chain must be lashed to an adjacent solidly fixed object or stake to offset the cross pull of the powered winch (fig. 168).

(*e*) After the first vehicle is loaded on the flatcar, additional vehicles may be similarly hauled aboard by passing the towing cable beneath the loaded vehicle. When a train of flatcars is being loaded, steel or wooden spanning platforms or bridges are used to cover the gap between cars. Flatcar brake wheels must first be lowered to floor level to permit passage. A pair of improvised spanning platforms are shown in figure 166. These spanning platforms are moved along the train by hand as the vehicle advances.

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

(2) *Gondola car loading.*

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

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

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

(3) *Loading ramp.*

(*a*) A ramp for end-loading of vehicles on open top freight cars may be improvised when no permanent ramps or hoisting facilities are available. A ramp suitable for the loading of most ordnance items is shown in figure 166. For loading the 2½-ton 6 x 6 cargo truck, the width of the ramp may be reduced to two double-plank runways, each cleated together. Length of planking must be determined with consideration to underchassis clearance, in order to clear the hump at the upper end of the ramp.

Caution: Personnel guiding the vehicle up the ramp must exercise care when working close to the edges of the ramp planking.

(*b*) The car bearing the ramp must be securely blocked against rolling, particularly when the car brakes are not applied as in train loading. Successive cars must remain coupled and be additionally chocked at several points along the train when ground towing of vehicles aboard the train is being effected.

(*c*) Whenever the freight cars are not on an isolated track or blocked siding, each end approach to the train must be posted with a blue flag or light to advise that men are at work and that the siding may not be entered beyond those points.

(*d*) Upon completion of the loading operation, the ramp planks and bridging devices should be loaded on the train for use in unloading operations. Random sizes of timbers used in building the approach apron up to rail level should be included. All materials should be securely fastened to the car floors, after vehicles are blocked in place, and entered upon the bill of lading (B/L). Railroad ties borrowed for the operation should not be forwarded to the unloading point unless specifically required and only with the consent of the owner.

d. LOADING RULES. For general loading rules pertaining to rail shipment of ordnance vehicles, refer to TB 9–OSSC–G.

Warning: The height and width of vehicles when prepared for rail transportation must not exceed the limitations indicated by the loading table as prescribed in AR 700–105, section II. Whenever possible, local transportation officers must be consulted about the limitations of the particular railroad lines to be used for the movement to avoid delays, danger, or damage to equipment.

252. Blocking the 20½-Ton 6 x 6 Cargo Truck M34 (REO) for Rail Shipment

a. GENERAL. All blocking instructions specified herein are minimum and are in accordance with the Association of American Railroads "Rules Governing the Loading of Commodities on Open Top Cars." Additional blocking may be added as required at the discretion of the officer in charge. Double-headed nails may be used if available, except in the lower piece of two-piece cleats. All item reference letters given below refer to the details and locations as shown in figure 169.

Note. Any loading methods or instructions developed by any source which appear in conflict with this publication or existing loading rules of the carriers, must be submitted to the Chief of Ordnance, Washington 25, D. C., for approval.

b. BRAKE WHEEL CLEARANCE "A." Load trucks on flatcars with a minimum clearance of at least 4 inches below and 6 inches above, behind, and to each side of the brake wheel (fig. 169). Increase clearance as much as is consistent with proper location of load.

Note. Vehicles should be laterally spotted on flatcar so that wheels are centrally positioned between stake pockets in order that wheel strapping "G" (*h* below) provides uniform cross-wiring.

c. CHOCK BLOCKS "B" (6 x 8 x 21 IN, EIGHT REQUIRED PER TRUCK). Locate the 45-degree face of blocks against the front and rear of front wheels, in front of intermediate wheels, and in back of rear wheels. Blocks are to be positioned in such a manner as to allow flush application of wheel side cleats "D" (*e* below) when nailed to chock blocks. Nail heel of blocks to car floor with three fortypenny nails and toenail both sides of blocks to car floor with two fortypenny nails each.

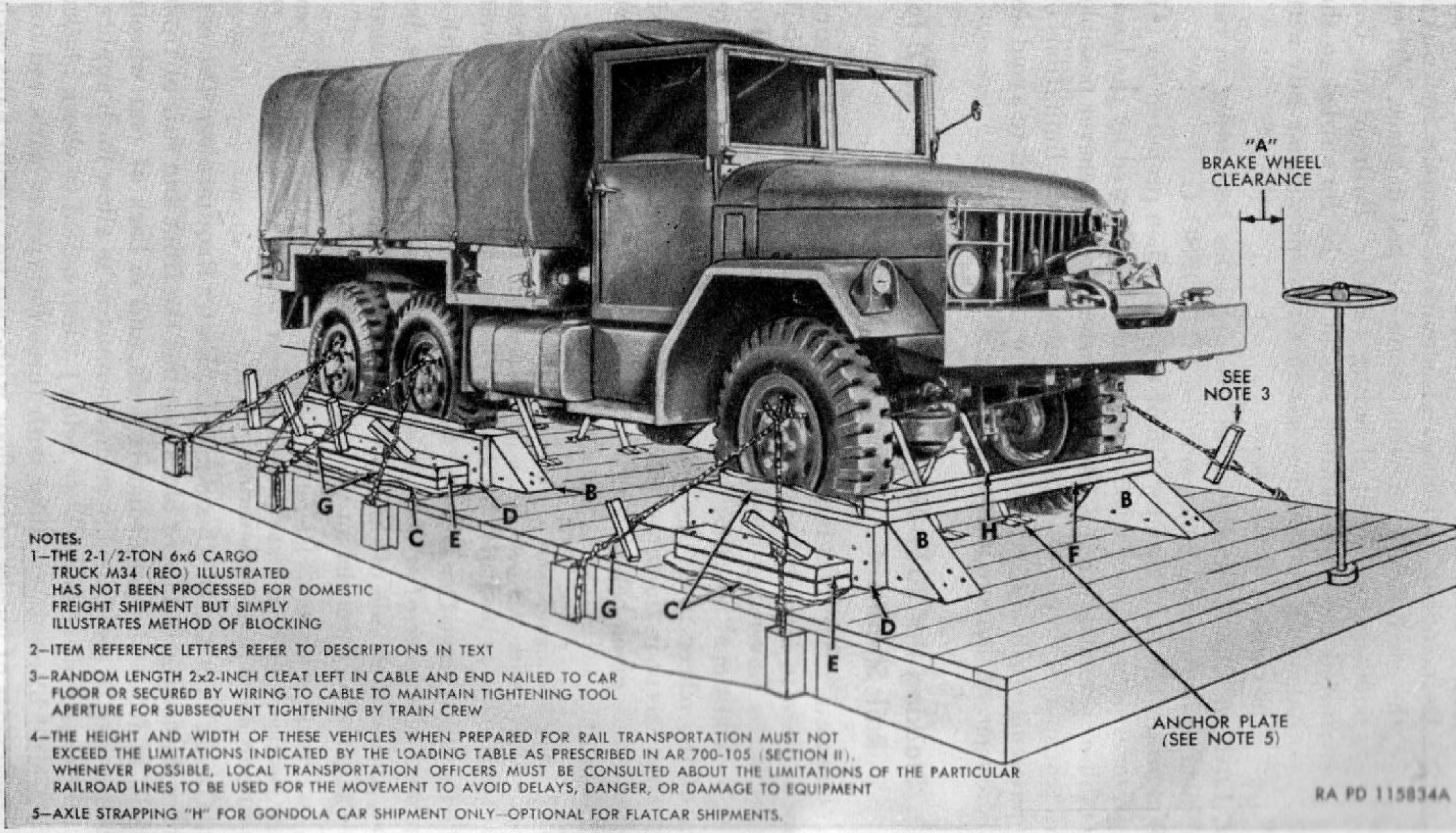

Figure 169. Method of blocking the 2½-ton 6 x 6 cargo truck M34 (REO) for rail shipment.

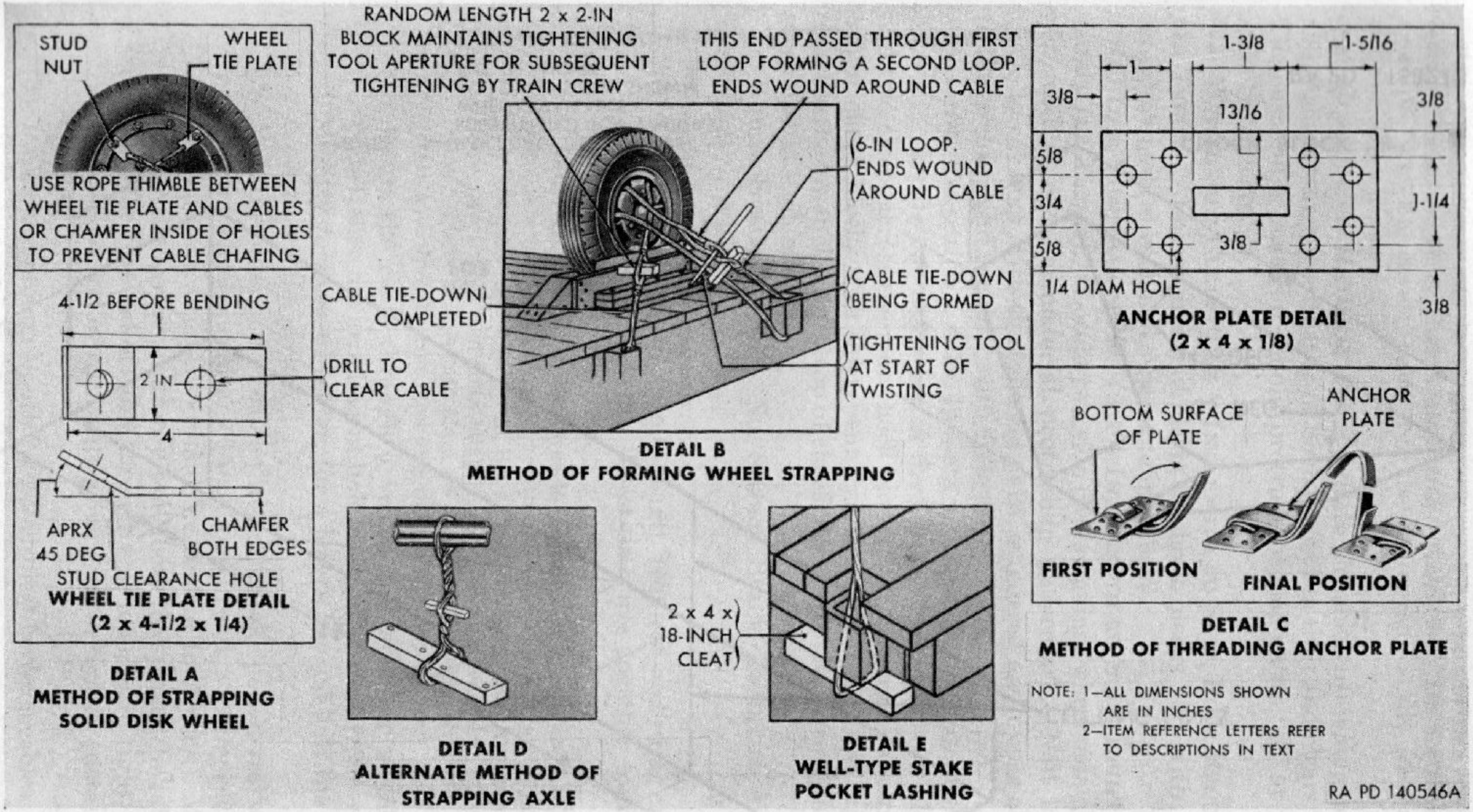

Figure 170. Method of blocking the 20½-ton 6 x 6 cargo truck M135 (REO) for rail shipment—blocking details.

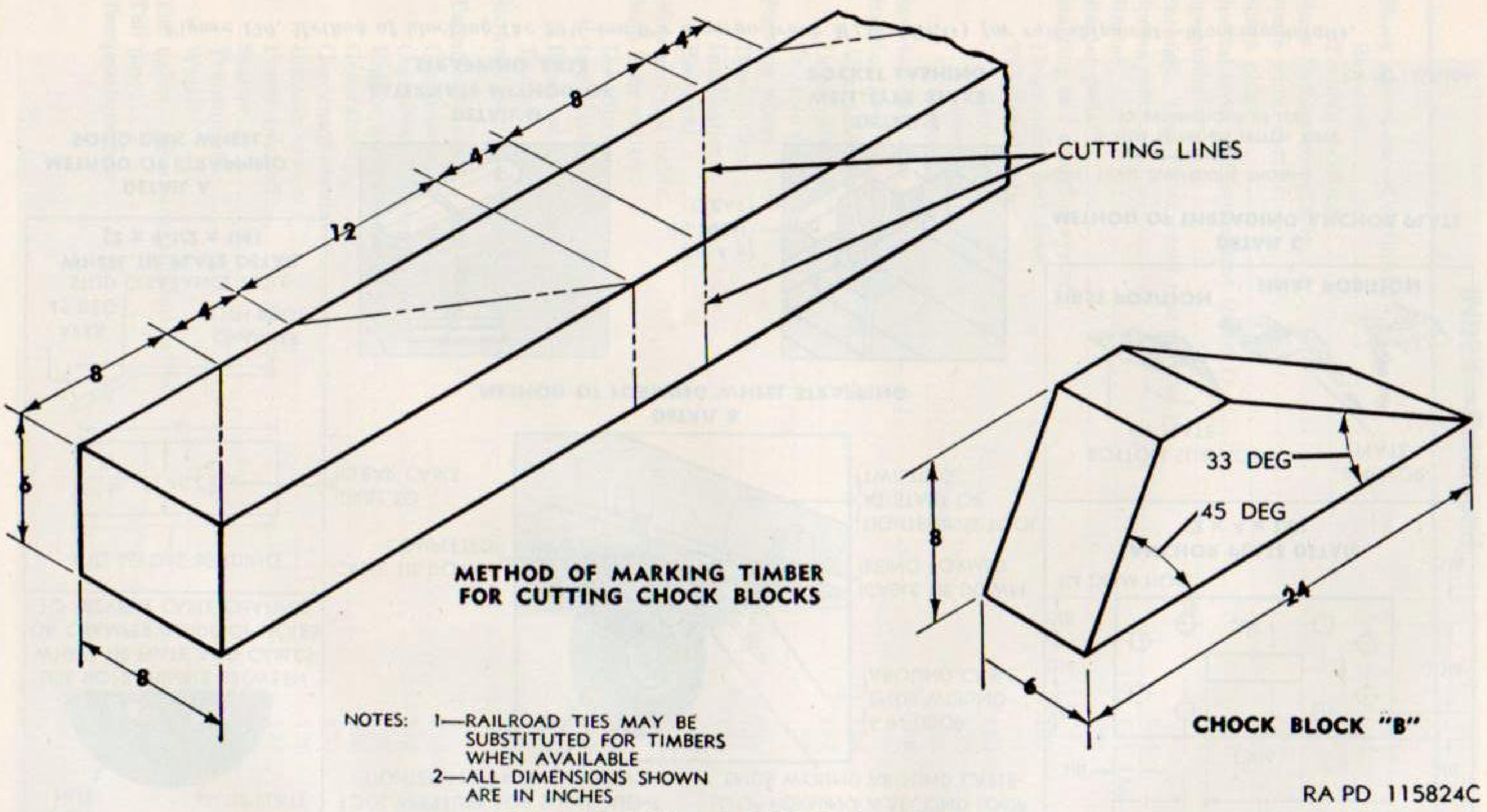

Figure 171. Cutting chock blocks from timbers.

Note. Filler cleats may be used between chock blocks and side cleats to centrally locate the chock block against tires. These cleats are not shown in figure 169. Chock blocks may be cut from timbers (or railroad ties, when available) as shown in figure 171.

d. CUSHIONING MATERIAL "C." Locate suitable cushioning material, such as waterproof paper or burlap between tires and cleats "D." The cushioning material should protrude beyond cleats "E" at floor and above cleats "D."

e. WHEEL SIDE CLEATS (2 x 8 IN LENGTH TO SUIT, FOUR REQUIRED PER TRUCK). Locate and nail cleats to chock blocks "B" with four tenpenny nails at each end. See note in *c* above.

f. FLOOR SIDE CLEATS "E" (2 x 4 IN, LENGTH TO SUIT, EIGHT REQUIRED PER TRUCK). Locate two side cleats against wheel side cleats "D" with cushioning material protruding underneath. Nail lower cleats to car floor with thirtypenny nails, staggered and upper cleats to lower cleats and car floor with fortypenny nails, staggered.

g. CROSS CLEATS (2 x 4 IN LENGTH TO SUIT, FOUR REQUIRED PER TRUCK). Locate two cleats across the top of the front chock blocks and two cleats across the rear chock blocks. Nail lower cleats to the top of chock blocks with thirtypenny nails at each end. Nail upper cleats to the lower cleats and top of chock blocks with fortypenny nails, staggered at each end.

h. WHEEL STRAPPING "G" (NO. 8 GAGE BLACK ANNEALED WIRE, LENGTH TO SUIT).

Note. For flatcar strapping only.

(1) Cut four lengths of wire to length required according to location of stake pockets. Twist-tie wires together to form a single cable.

Note. If perforated disk wheels (ventilating type) are used, insert cable through an upper ventilating hole then out an adjoining hole (figs. 169 and 170, detail B). If solid disk wheels are used, remove two upper stud nuts slightly forward and rearward of wheel center. Place a wheel tie plate on each stud for strapping (fig. 170, detail A). Install stud nuts and tighten securely.

(2) Insert the cable through a ventilating hole (or wheel tie plate), then out an adjacent hole at upper part of front wheel slightly *forward* of center, for a length beyond half the distance to a stake pocket.

(3) Pass the other end of cable through a stake pocket rearward of front wheel and form a 6-inch loop in end, winding each of the four wires tightly around the cable a few turns. Make certain the loop is positioned well above the span of the cables.

(4) Pass the free end of cable through this loop, hand tight, and again wind end of each wire around cable *tightly* (detail B, fig. 170).

(5) Position a random length 2 x 2-inch cleat between cables.

(6) Insert end of a tightening tool at approximate center of cables and twist-tie cables just taut enough to remove all slack, retaining cleat in its position between cables.

(7) Form another cable and pass end through a ventilating hole (or wheel tie plate) then out an adjacent hole at upper part of front wheel slightly rearward of center crossing initial cable.

(8) Pass other end of cable through a stake pocket *forward* of front wheel and complete and twist-tie as described above.

(9) Repeat above operations for all the other wheels.

Note. During transit, cables will be checked for looseness and retightened if necessary by train personnel.

(10) Cables are passed through stake pockets so that the cable loop lies against the car frame. A short stake driven into each stake pocket will protect the cable loop from chafing and loosening. (These stakes are omitted in figure 169.) If flatcars are received where flooring is flush against the top of the well-type stake pockets, a loop of cable is passed through the stake pocket, and a short cleat about 2 x 4 x 18 inches is inserted in the loop below the stake pocket. Subsequent tightening of the cable will cause it to draw the wooden cleat securely against the bottom of stake pocket (detail E, fig. 170).

i. AXLE STRAPPING "H." (For gondola cars *only*—optional for flatcar strapping.) Locate two pieces of $1\frac{1}{4}$ x 0.035-inch hot-rolled steel strapping over each axle close to wheels. Coil strapping around steel anchor plates as shown in detail C, figure 170. Secure by nailing anchor plates to car floor with not less than six twentypenny nails (double-headed nails preferred). As an alternate method of securing axles, form and substitute a cable (consisting of four strands of No. 8 gage black annealed wire or wires of equivalent strength) at each location for steel strapping "H." Pass cables over axle and around wooden cleats (2 x 4 x 18 in.). Locate cleats lengthwise of car and nail to car floor with thirtypenny nails in each cleat. Join both ends of cable together, as prescribed in *h* above, and twist taut with tightening tool just taut enough to take up slack (detail D, fig. 170).

Section II. DESTRUCTION OF MATÉRIEL TO PREVENT ENEMY USE

253. General

a. Destruction of the $2\frac{1}{2}$-ton, 6 x 6, cargo trucks, when subject to capture or abandonment in the combat zone, will be undertaken by the using arm only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the army commander.

b. The information which follows is for guidance only. Certain of the procedures outlined require the use of explosives and incendiary grenades which normally may not be authorized items for the vehicle. The issue of these and related materials, and the conditions under which destruction will be effected, are command decisions in each case, according to the tactical situation. Of the several means of destruction, those most generally applicable are—

Mechanical	Requires axe, pick mattock, sledge, crowbar, or similar implement.
Burning	Requires gasoline, oil, incendiary grenades, or other inflammables.
Demolition	Requires suitable explosives or ammunition.
Gunfire	Includes artillery, machine guns, rifles using rifle grenades, and launchers using antitank rockets. Under some circumstances hand grenades may be used.

In general, destruction of essential parts, followed by burning will usually be sufficient to render the 2½-ton, 6 x 6, cargo truck useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the truck must be so badly damaged that it cannot be restored to a usable condition in the combat zone either by repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the matériel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of time and personnel prevents destruction of all parts, priority is given to the destruction of those parts most difficult to replace. Equally important, the same essential parts must be destroyed on all like matériel so that the enemy cannot construct one complete unit from several damaged ones.

d. If destruction is directed, due consideration should be given to—

(1) Selection of a point of destruction that will cause greatest obstruction to enemy movement and also prevent hazard to friendly troops from fragments or ricocheting projectiles which may occur incidental to the destruction.

(2) Observance of appropriate safety precautions.

254. Destruction of the 2½-Ton 6 x 6 Cargo Trucks M34, M36, and M47

a. METHOD NO. 1—DESTRUCTION BY BURNING.

(1) Remove and empty portable fire extinguisher.

(2) Puncture the fuel tank as near the bottom as possible, collecting gasoline for use as outlined in (6) below.

(3) Using an axe, pick mattock, sledge, or other heavy implement, smash all vital elements such as distributor, carburetor, generator, ignition coil, fuel pump, spark plugs, air cleaner, lights, instruments, and controls. If time permits, and a sufficiently heavy implement is available, smash the engine cylinder block and head, crankcase, and transmission control tower.

(4) Slash tires. If tires are inflated, exercise care to prevent injury should the tire blow out while being slashed. Whenever practicable, it is usually preferable to deflate tires before slashing.

(5) Explosive ammunition, if present in the vehicle or available nearby should be removed from packing or other protective material. Place ammunition in and about the vehicle so that it will be fully exposed to the fire and in such locations that the greatest damage will result from its detonation. Remove any safety devices from ammunition.

(6) Pour gasoline and oil in and over the entire vehicle. Ignite and take cover. If gasoline and oil are not available, use incendiary grenades.

Caution: Cover must be taken without delay since an early explosion of the explosive ammunition may be caused by the fire. Due consideration should be given to the highly inflammable nature of gasoline and its vapor. Carelessness in its use may result in painful burns.

Elapsed time: about 6 minutes.

b. METHOD NO. 2—DESTRUCTION BY DEMOLITION.

(1) Remove and empty portable fire extinguisher.

(2) Puncture fuel tank.

(3) Prepare two 2-pound charges of EXPLOSIVE, TNT (two 1-lb blocks or equivalent per charge together with the necessary detonating cord). Set the charges as follows:

(*a*) The *first* on *top* of the transmission case housing.

(*b*) The *second* as low on the *left* side of the engine as possible.

(4) Connect the *two* charges for simultaneous detonation with detonating cord.

(5) Provide for dual priming to minimize the possibility of a misfire. For priming, either a nonelectric blasting cap crimped to at least 5 feet of safety fuse (safety fuse burns at the rate of 1 ft in 30 to 45 sec; test before using) or an electric blasting cap and firing wire may be used. If a nonelectric blasting cap and safety fuse are used, the fuse should be

sufficiently long and so positioned that it may be ignited from the outside of the vehicle since gasoline, which is draining from the fuel tank, may be exploded by the burning fuse. Safety fuse, which contains black powder, and nonelectric blasting caps must be protected from moisture at all times. The safety fuse may be ignited by a fuse lighter or a match; the electric blasting cap requires a blasting machine or equivalent source of electricity.

Caution: Keep the blasting caps, detonating cord, and safety fuse separated from the charges until required for use.

Note. For the successful execution of methods of destruction involving the use of demolition materials, all personnel concerned will be thoroughly familiar with the pertinent provisions of FM 5-25. Training and careful planning are essential.

(6) Destroy the tires by placing an incendiary grenade under each tire exercising care to prevent early ignition of gasoline or its vapor by the burning grenades. The detonation of the explosive charges should be delayed until the incendiary fires are well started. This will prevent the fires from being extinguished by the blast when the charges are detonated.

(7) Detonate the charges. If primed with nonelectric blasting cap and safety fuse, ignite and take cover. If primed with electric blasting cap, take cover before firing the charges.

Caution: Cover must be taken without delay since an early explosion of the charges may be caused by the incendiary fires.

Elapsed time: about 6 minutes.

c. METHOD NO. 3—DESTRUCTION BY GUNFIRE.

(1) Remove and empty portable fire extinguisher.

(2) Puncture fuel tank.

(3) Destroy the tires as outlined in *a*(4) or *b*(6), above.

(4) Destroy the vehicle by gunfire using artillery, machine guns, rifles using rifle grenades, or launchers using antitank rockets. Fire on the vehicle aiming at the engine, axles, and wheels. Although one well-placed direct hit may destroy the vehicle, several hits are usually required for complete destruction unless an intense fire is started, in which case the vehicle may be considered destroyed.

Caution: Firing artillery at ranges of 500 yards or less should be from cover. Firing rifle grenades or antitank rockets should be from cover.

Elapsed time: about 6 minutes.

APPENDIX

REFERENCES

1. Publication Indexes

The following publication indexes and lists of current issue should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to matériel, covered in this manual.

Index of Administrative Publications (Army Regulations, Special Regulations, Joint Army-Air Force Adjustment Regulations, General Orders, Bulletins, Circulars, Commercial Traffic Bulletins, Joint Procurement Circulars, Department of the Army Pamphlets, and ASF Manuals) ---------- SR 310-20-5

Index of Army Motion Pictures and Film Strips--- SR 110-1-1

Index of Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy-Air Force Publications, and Combined Communications, Board Publications) -------------- SR 310-20-3

Index of Blank Forms and Army Personnel Classification Tests-- SR 310-20-6

Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment-------------------------- SR 310-20-4

Introduction and Index (supply catalogs) ------------- ORD 1

Military Training Aids------------------------------ FM 21-8

2. Supply Catalogs

The following Department of the Army Supply Catalogs pertain to this matériel:

a. Destruction to Prevent Enemy Use.

Land Mines and Fuzes, Demolition Matériel, and Ammunition for Simulated Artillery and Grenade Fire----- ORD 11 SNL R-7 *b.* Maintenance and Repair.

Antifriction Bearings and Related Items___ ORD 5 SNL H–12

Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials_______ ORD 3 SNL K–1

Electrical Fittings_________________________ ORD 5 SNL H–4

Items of Soldering, Metallizing, Brazing, and Welding Materials: Gases and Related Items__________________ ORD 3 SNL K–2

Lubricating Equipment, Accessories and Related Dispensers __________________________ORD (*) SNL K–3

Major Items of Automotive and Semi-Automotive Vehicles (Including Bicycles)_______________________ ORD 3 SNL G–1

Miscellaneous Hardware____________________ ORD 5 SNL H–2

Oil Seals_________________________________ ORD 5 SNL H–13

Ordnance Maintenance Sets__________________ ORD 6 SNL N–21

Pipe and Hose Fittings_____________________ ORD 5 SNL H–6

Standard Hardware_________________________ ORD 5 SNL H–1

Tool-Sets (Special), Motor Vehicles____ORD 6 SNL G–27, Sec 1

c. Vehicle.

Truck, 2½-Ton, 6 x 6, Cargo, M34__________ORD (*) SNL G–742

3. Forms

The following forms pertain to this matériel:

Standard Forms 91, Operator's Report of Motor Vehicle Accident.

Standard Form 91A, Transcript of Operator's Report of Vehicle Accident.

Standard Form 93, Report of Investigating Officer.

Standard Form 94, Statement of Witness.

DA Form 30B, Report of Claims Officer.

DA AGO Form 9–3, Processing Record for Storage and Shipment.

DA AGO Form 9–4, Vehicle Storage and Servicing Record.

DA AGO Form 9–68, Spot Check Inspection Report for Wheeled and Half-Track Vehicles.

DA AGO Form 9–75, Daily Dispatching Record of Motor Vehicles.

DA AGO Form 348, Driver Qualification Record.

DA AGO Form 460, Preventive Maintenance Roster.

DA AGO Form 461, Preventive Maintenance Service and Inspection for Wheeled and Half-Track Vehicles.

DA AGO Form 461–5, Limited Technical Inspection.

DA AGO Form 468, Unsatisfactory Equipment Report.

*See ORD 1, Introduction and Index, for published catalogs of the Ordnance section of the Department of the Army Supply Catalog.

DA AGO Form 478, Modification Work Order and Major Unit Assembly Replacement Record and Organizational Equipment File.
DA AGO Form 811, Work Request and Job Order.
DA AGO Form 811–1, Work Request and Hand Receipt.
DD Form 6, Report of Damaged or Improper Shipment.
DD Form 110, Vehicle and Equipment Operational Record.
DD Form 313, U. S. Government Operator's Permit.
DD Form 317, Preventive Maintenance Service Due (Sticker).

4. Other Publications

The following explanatory publications contain information pertinent to this matériel and associated equipment:

a. Ammunition.

Explosives and Demolition .... FM 5–25
Range Regulations for Firing Ammunition for Training, Target Practice, and Combat .... SR 385–310–1

b. Camouflage.

Camouflage .... TM 5–267
Camouflage, Basic Principles .... FM 5–20
Camouflage of Vehicles .... FM 5–20B

c. Decontamination.

Decontamination .... TM 3–220
Defense Against Chemical Attack .... FM 21–40

d. General.

Cooling Systems: Vehicles and Powered Ground Equipment .... TM 9–2858
Driver Selection, Training, and Supervision, Wheeled Vehicles .... TM 21–300
Driver's Manual .... TM 21–305
General Supply: Winterization Equipment for Automotive Matériel .... SB 9–16
Instruction Guide: Operation and Maintenance of Ordnance Matériel in Extreme Cold (0° to −65° F.) .... TM 9–2855
Motor Transport .... FM 25–10
Mountain Operations .... FM 70–10
Operations in Snow and Extreme Cold .... FM 70–15
Precautions in Handling Gasoline .... AR 850–20
Principles of Automotive Vehicles .... TM 9–2700
Storage Batteries-Lead-Acid Type .... TM 9–2857
Spark Plugs .... TB ORD 313
Supplies and Equipment: Motor Vehicles .... AR 700–105
Supplies and Equipment: Unsatisfactory Equipment Report .... SR 700–45–5

e. Maintenance and Repair.

Cleaning, Preservation, Sealing, and Related Materials Issued for Ordnance Matériel ---- TM 9-850

Instruction Guide: Care and Maintenance of Ball and Roller Bearings ---- TM 37-265

Lubrication ---- TM 9-2835

Maintenance and Care of Hand Tools ---- TM 9-867

Maintenance and Care of Pneumatic Tires and Rubber Treads ---- TM 31-200

Modification of Ordnance Matériel ---- SB 9-38

Motor Vehicle Inspection and Preventive Maintenance Services ---- TM 37-2810

Painting Instructions for Field Use ---- TM 9-2851

Parts Reclamation from Tactical and Administrative Vehicles ---- SR 750-130-10

Preparation of Ordnance Matériel for Deep Water Fording ---- TM 9-2853

Preventive Maintenance of Electric Motors and Generators ---- TM 55-405

f. Shipment.

Army Shipping Document ---- TM 38-705

Instruction Guide: Ordnance Packaging and Shipping (Posts, Camps, and Stations) ---- TM 9-2854

Marking and Packing of Supplies and Equipment: Marking of Oversea Supply ---- SR 746-30-5

Ordnance Storage and Shipment Chart—Group G ---- TB 9-OSSC-G

Preparation of Unboxed Ordnance Matériel for Shipment ---- SB 9-4

Protection of Ordnance Matériel in Open Storage ---- SB 9-47

Shipment of Supplies and Equipment: Report of Damaged or Improper Shipment ---- SR 745-45-5

Stevedoring ---- TM 55-310

Storage, Inspection, and Issue of Unboxed Serviceable Motor Vehicles; Preparation of Unserviceable Vehicles for Storage; and Deprocessing of Matériel Prior to Operation ---- SB 9-63

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RESTRICTED—Security Information

DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

C 1, TM 9-819
TO 19-75AA-74

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

2½-TON 6 X 6 CARGO TRUCK M34, M35, AND M36; CHASSIS TRUCK M44, M45, AND M46; CRANE TRUCK M108; DUMP TRUCK M47 AND M59; GASOLINE TANK TRUCK M49; SHOP VAN TRUCK M109; TRACTOR TRUCK M48; WATER TANK TRUCK M50

C 1, TM 9-819
TO 19-75AA-74

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *28 October 1952*

TM 9-819/TO 19-75AA-74, 4 January 1952, is changed as follows:

46. Operating the M47 and M59 Dump Body

* * * * * * *

b. Operation.

(1) *General.* The dump body * * * for hydraulic fluid. **Check the hydraulic fluid level (par. 242) before operation. To insure that pressure has been relieved in the reserve tank, before removing the filler plug (fig. 165) operate the pump with the dump body control lever in the (B) position (fig. 21), for one minute.**

Note. **Check the hydraulic fluid level with vehicle on level ground before operating, to insure accurate reading on the oil level gage (fig. 165).**

Raise and lower the body two or three times before checking the oil.

Caution: **Always operate the pump with the control lever in the (B) position (fig. 21), for at least one minute before removing the filler plug. (This is extremely important as it relieves any pressure which may have been built up in the reserve tank and eliminates the danger of oil being forcibly ejected when the filler plug is removed.) The oil level mark on the oil level gage should be between the second and third mark from the bottom of the oil level gage (fig. 165).**

* * * * * * *

[AG 451.2 (6 Oct 52)]

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BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE

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WM. E. BERGIN
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The Adjutant General

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Chief of Staff, United States Army

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19-64

DEPARTMENT OF THE ARMY TECHNICAL MANUAL — TM 9-819 C 2

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER — TO 19-75AA-74

2½-TON 6 x 6 CARGO TRUCKS M34, M35, AND M36; CHASSIS TRUCKS M44, M45, AND M46; CRANE TRUCK M108; DUMP TRUCKS M47 and M59; GASOLINE TANK TRUCK M49; SHOP VAN TRUCK M109; TRACTOR TRUCK M48; WATER TANK TRUCK M50

CHANGES No. 2

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., 8 April 1953.

TM 9-819/TO 19-75AA-74, 4 January 1952, is changed as follows:

The classification of this publication is changed from RESTRICTED—Security Information to UNCLASSIFIED.

164. Spring Seats

(Superseded)

a. Using jacks, raise rear axles until rear wheels are clear of ground and remove wheels. Substitute blocking for jacks.

b. Remove six cap screws from spring-seat bearing cap and remove bearing cap and gasket.

c. Set jacks under cross shaft and take up enough weight to hold jacks in position.

d. Remove nuts, washers, and "U" bolts from spring seat. Place blocking under cross shaft.

e. Place jacks under spring, one each side of spring seat, and raise spring clear of seat to permit some rotation of spring seat around cross shaft.

f. Straighten bent-over portion of nut lock. (Lock nut only. Lip on adjusting nut may be straightened after nut lock is removed.)

g. Remove (outer) lock nut with wrench 41-W-3748-75.

h. Remove nut lock.

i. With adjusting nut and washer in place, tighten adjusting nut to 60 to 75 pounds-feet. Back off one-quarter turn.

j. Install nut lock and lock nut, and tighten lock nut to 100 to 150 pounds-feet.

k. Lock the bearing adjusting and lock nuts by bending the edge of the nut lock, one portion on the flat of the lock nut and one directly opposite on the flat of the adjusting nut.

[AG 451.2 (20 Feb. 53)]

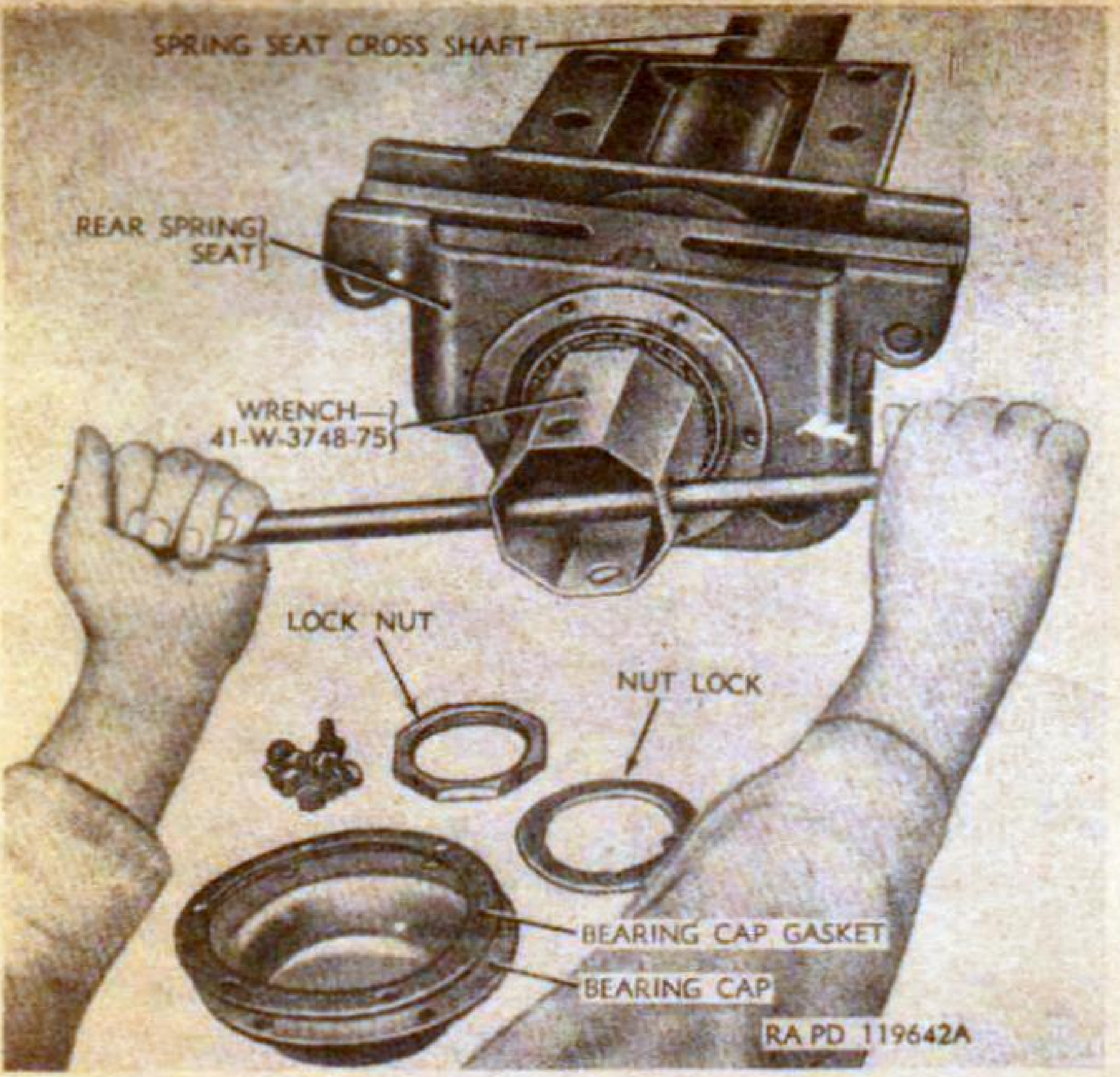

Figure 115.1. Tightening inner adjusting nut.

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