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TM 9-806

WAR DEPARTMENT TECHNICAL MANUAL

OBSOLETE

1½-Ton 4x2 Truck
(Ford)

WAR DEPARTMENT *14 FEBRUARY 1944*

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*This Technical Manual supersedes pertinent information from TB 850-1, 1 Jan. 42. It also contains operating and organizational maintenance instructions from TM 10-1347, maintenance manual for Ford Truck, 1½-ton, 4x2, dated 1 Mar. 43. Together with TM 9-1806A and TM 9-1806B this Technical Manual supersedes TM 10-1347.

WAR DEPARTMENT
Washington 25, D. C., 14 February 1944

TM 9-806, 1½-ton 4 x 2 Truck (Ford), is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION: X.

(For explanation of symbols, see FM 21-6.)

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PART ONE — VEHICLE OPERATION INSTRUCTIONS

Section I

INTRODUCTION

1. SCOPE.*

a. This Technical Manual is published for the information and guidance of the using arm personnel charged with the operation and maintenance of this materiel.

b. In addition to a description of the 1½-ton 4 x 2 Truck (Ford), this manual contains technical information required for the identification, use, and care of the materiel. This manual is divided into two parts. Part One, section I through section VII, contains vehicle operating instructions. Part Two, section VIII through section XXIX, contains vehicle maintenance instructions for using arm personnel charged with responsibility of doing maintenance work within their jurisdiction. Section XXX gives instructions for shipment and temporary storage.

c. In all cases where the nature of the repair, modifications, or adjustment is beyond the scope or facilities of the unit, the higher echelon of maintenance should be informed so that trained personnel with suitable tools and equipment may be provided, or proper instructions issued.

Section II

DESCRIPTION AND TABULATED DATA

2. DESCRIPTION.

a. The 1½-ton 4 x 2 Truck (Ford Model G8T) consists basically of a commercial, two wheel drive truck chassis. It is powered with a military type Ford 6-cylinder engine mounted in the forward end of the frame. The transmission has four forward speeds and one speed in reverse. The rear axle is of the full floating type equipped

*To provide operating instructions with the vehicle, this Technical Manual has been published in advance of complete technical review. Any errors or omissions will be corrected by changes, or if extensive, by an early revision.

1½-TON 4 x 2 TRUCK (FORD)

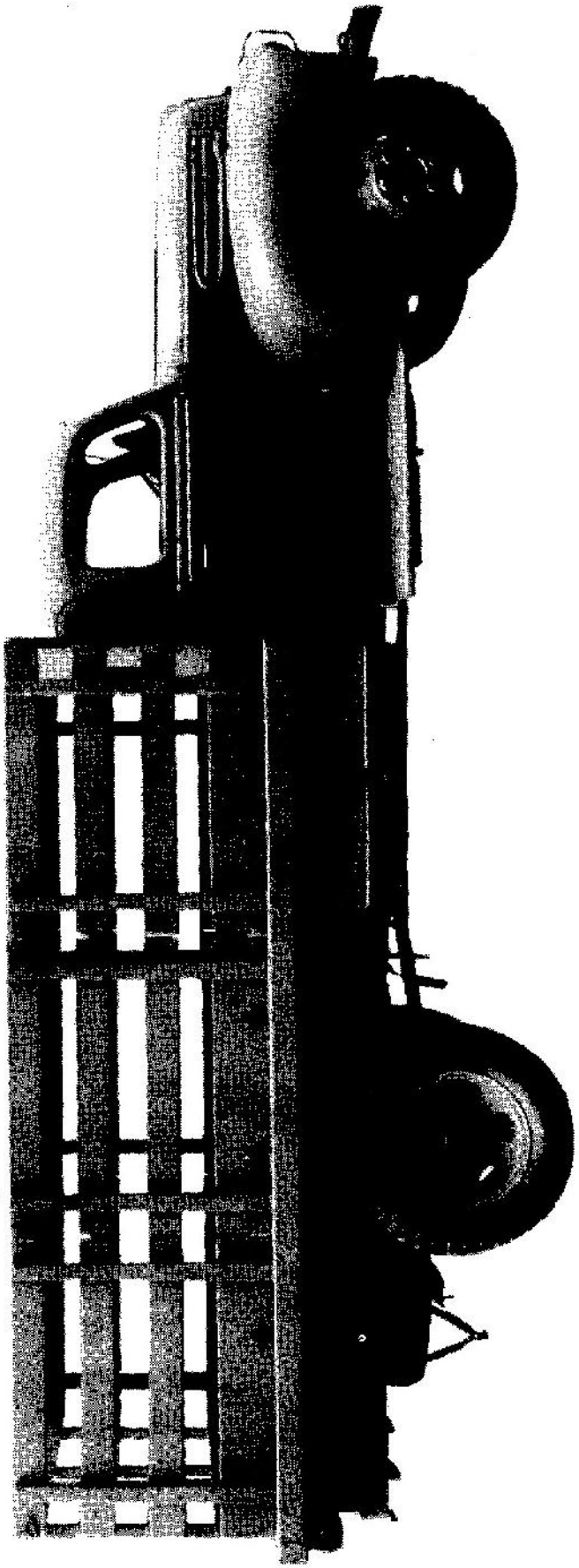

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Figure 1 — 1½-ton 4 x 2 Truck — Right Side View

DESCRIPTION AND TABULATED DATA

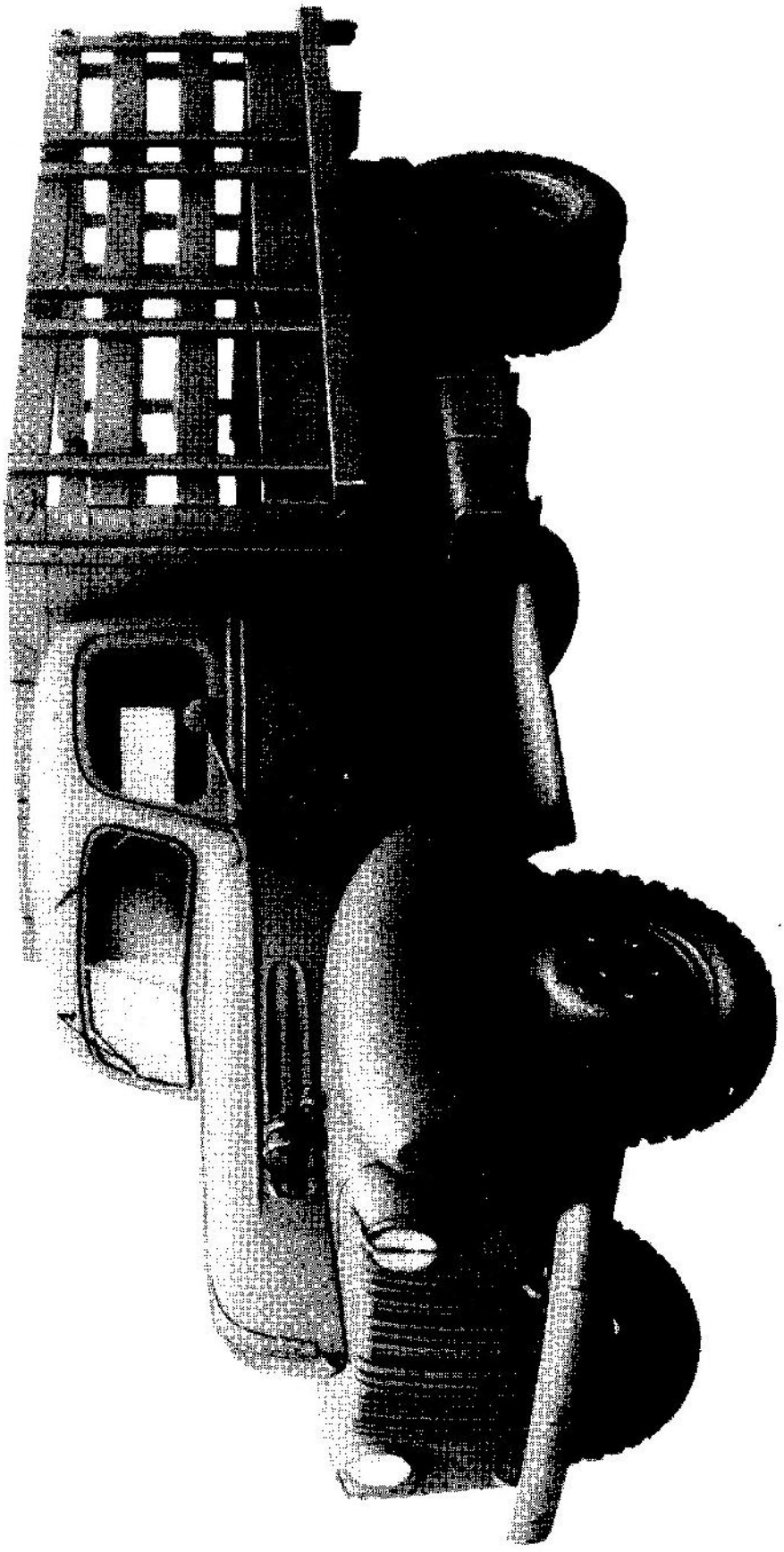

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Figure 2 — 1½-ton 4 x 2 Truck — Three-quarter Front View

with dual wheels and tires. The driver's cab is a conventional truck cab equipped with safety glass in doors and windshield. The instruments are located in the instrument panel directly in front of the driver's seat (fig. 3).

3. DISTINCTIVE FEATURES.

a. The 1½-ton 4 x 2 Truck (Ford Model G8T) can be identified from previous models by the military type Ford 6-cylinder engine with which this truck is equipped. This engine has a vertical mounted distributor and is provided with a timing pin on the front cover. This book applies to all G8T 4 x 2 1½-ton trucks, equipped with the military type 6-cylinder engine described above, regardless of body types, but does not apply to Ford trucks equipped with the 8-cylinder engine or the 6-cylinder engine having the horizontally mounted distributor.

4. DATA.

a. General.

Ford truck	4 x 2 1½-ton
Model	G8T
Wheel base	158 in.
Tread:	
Front	57.5 in.
Rear	67.0 in.
Tires (front and rear)	7.50 x 20, 8 ply
Length of body (inside)	140.5 in.
Width of body (inside)	82.06 in.
Width (outside of fender to outside of fender)	72.42 in.
Length, over-all	256.60 in.
Width, over-all	90.06 in.
Height, over-all (to top of stakes):	
Loaded	85.68 in.
No load	87.98 in.
Axle clearance:	
Front	12.3 in.
Rear	9.74 in.

b. Performance.

Governed speeds:	
High gear	45 mph
3rd gear	26.6 mph
2nd gear	14.6 mph
Low gear	7.0 mph
Reverse	5.75 mph
Minimum turning radius (right)	32 ft
(left)	32 ft

Towing facilities:	
Front	Two tow hooks
Rear	Pintle hook
Maximum draw bar pull	46.76 lb
Maximum grade ascending ability (in high gear)	2.51 percent
Maximum allowable engine speed	3,400 rpm
Miles per gallon (at 40 mph)	8.7 miles
Cruising range (at 40 mph)	426 miles

c. Capacities.

Fuel tank (standard)	19 gal
Fuel tank (auxiliary)	30 gal
Engine crankcase (less filter absorption)	5 qt
Cooling system	16 qt
Transmission	5 pt
Rear axle	5 pt
Oil bath cleaner	Fill to indicated level
Tire pressure:	
Front	55 lb
Rear	55 lb

Section III

CONTROLS AND OPERATIONS

5. DRIVING CONTROLS.

a. Brake Pedal. Two-shoe hydraulic brakes are provided at each of the four wheels and are operated by a conventional foot pedal. The pressure applied to the pedal is amplified through a hydrovac booster system. The pressure applied to the shoes, while much higher than that applied to the pedal, is, however, increased or decreased as the pedal pressure is increased or decreased, allowing smooth control for whatever kind of stop is desired.

b. Hand Brake Lever (fig. 3). The hand brake lever is mounted to the right of the gear shift lever directly below the instrument panel. Always be sure the hand brake lever is released before attempting to move the vehicle.

1½-TON 4x2 TRUCK (FORD)

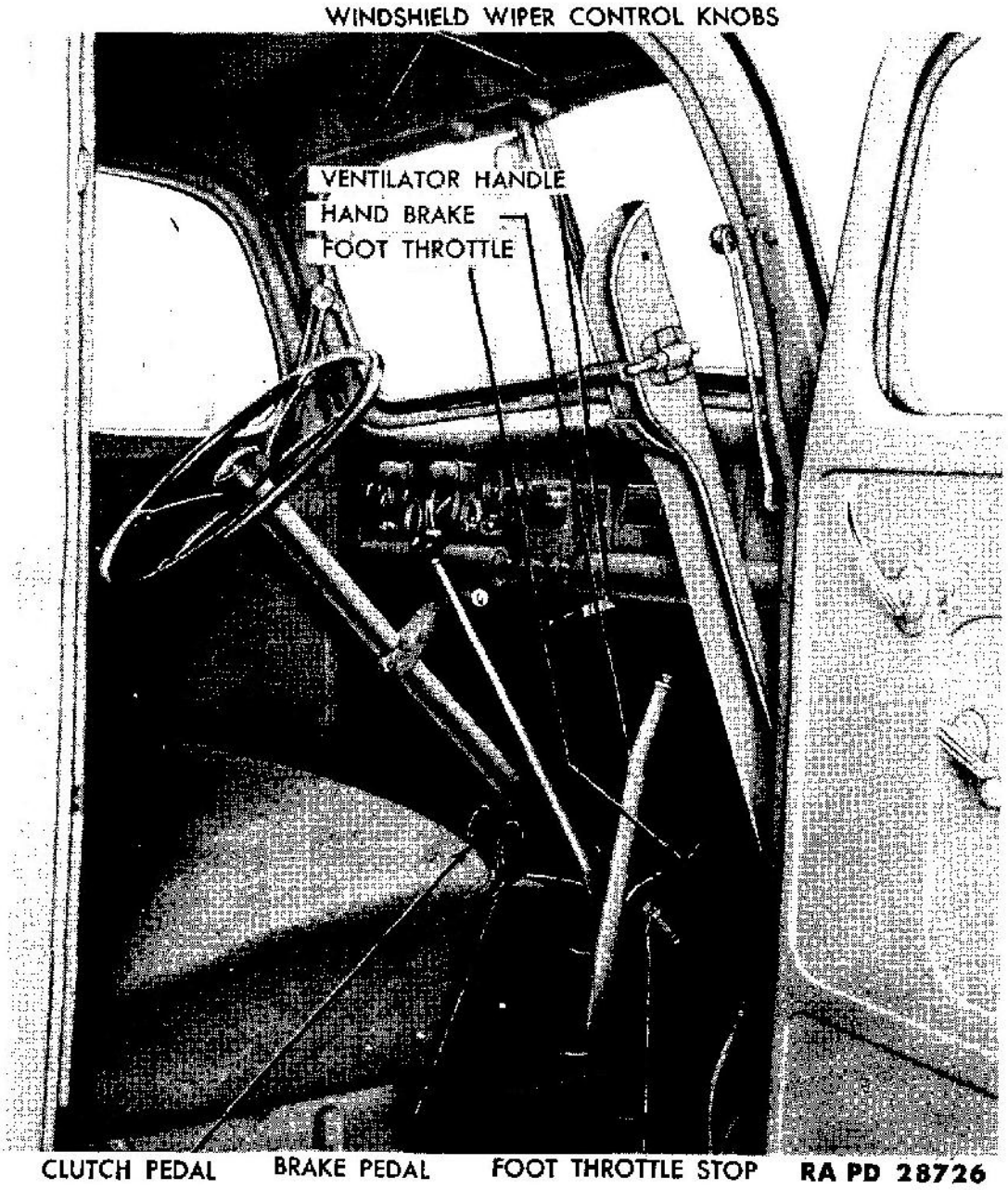


Figure 3 — Driver's Compartment

c. Throttle Controls. The foot throttle is located to the right of the steering column convenient to the driver's right foot. A foot rest is provided to the right of the foot throttle (fig. 3) to steady the foot while driving. The hand throttle button is located on the instrument panel directly below the ignition switch. Pulling this button out opens the carburetor throttle and increases the engine speed. During cold weather the throttle button should be pulled out approximately ¼ inch so that the engine will idle somewhat faster until it is entirely warmed up. The hand throttle can also be used when it is desired to run the engine at constant speed.

18. Preventive Maintenance by Driver or Operator

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

b. SERVICES. Driver's or operator's preventive maintenance services are listed in table I. Every organization must thoroughly school its personnel in performing the maintenance procedures for this vehicle as set forth in this manual.

Table I. (Added) *Driver's or Operator's Preventive Maintenance Services*

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS
					Caution. Place all tags describing condition of vehicle in the driver's compartment in a conspicuous location so that they will not be overlooked.
X		X	X	X	*Fuel, oil, water.* Check fuel, oil, and water levels. Look for leaks in engine compartment. Check spare containers for contents.
X				X	*Tires.* Gage tires for correct pressure (55 psi).
		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 vehicle for indication of fuel, engine oil, gear oil, water, or brake fluid leaks.
X					*Vehicle equipment.* Visually inspect fire extinguishers and vehicle publications, including necessary forms.
				X	See that fire extinguishers are charged.
X			X	X	Operate lights, horn or siren (if tactical situation permits), and windshield wipers. Visually inspect mirrors, reflectors, etc.
X			X	X	Visually inspect body, towing connections, doors, paulins, tools, etc.
				X	Check for any tampering or damage that may have occurred since last inspection.
X	X				*Instruments.* Observe for normal readings during warm-up and during operation of vehicle.
					Caution. If oil gage registers zero or excessively low shut off engine immediately and investigate cause.

1½-TON 4x2 TRUCK (FORD)

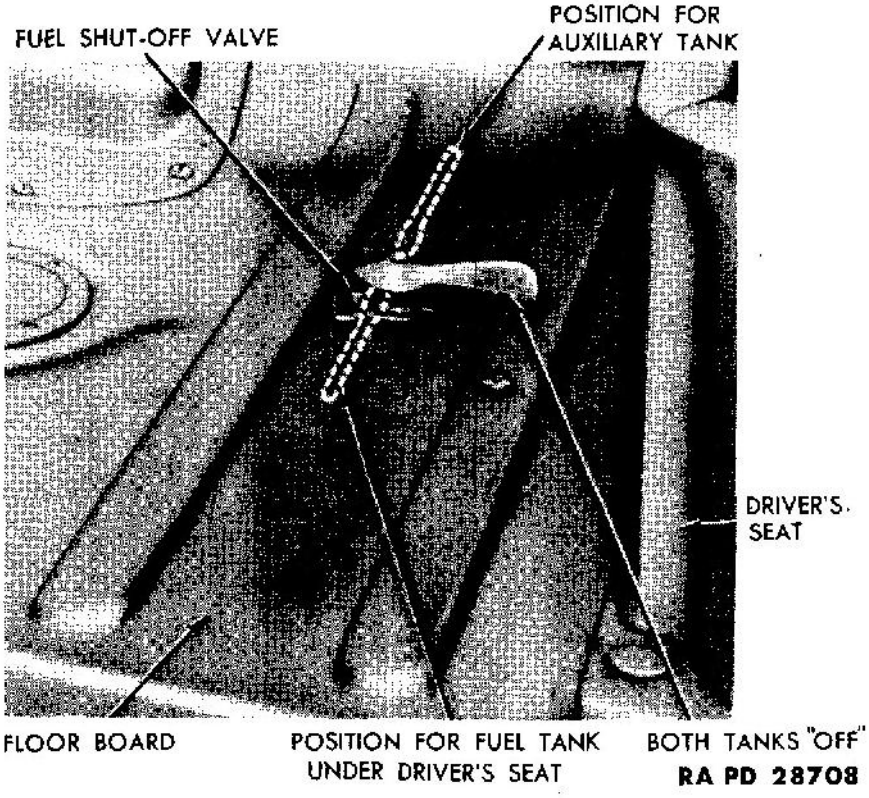


Figure 5 — Fuel Shut-off Valve

ated by the left foot to change to either the upper or lower beam in the headlights. The upper beam is used for maximum illumination. The lower beam is used when approaching on-coming vehicles.

i. **Windshield Wipers.** The vehicle is equipped with two vacuum operated wipers. The wipers are controlled by individual push-pull knobs located over each windshield glass (fig. 3). To operate the wiper, pull control knob outward. Speed of operation is regulated by the distance of travel of the control knob.

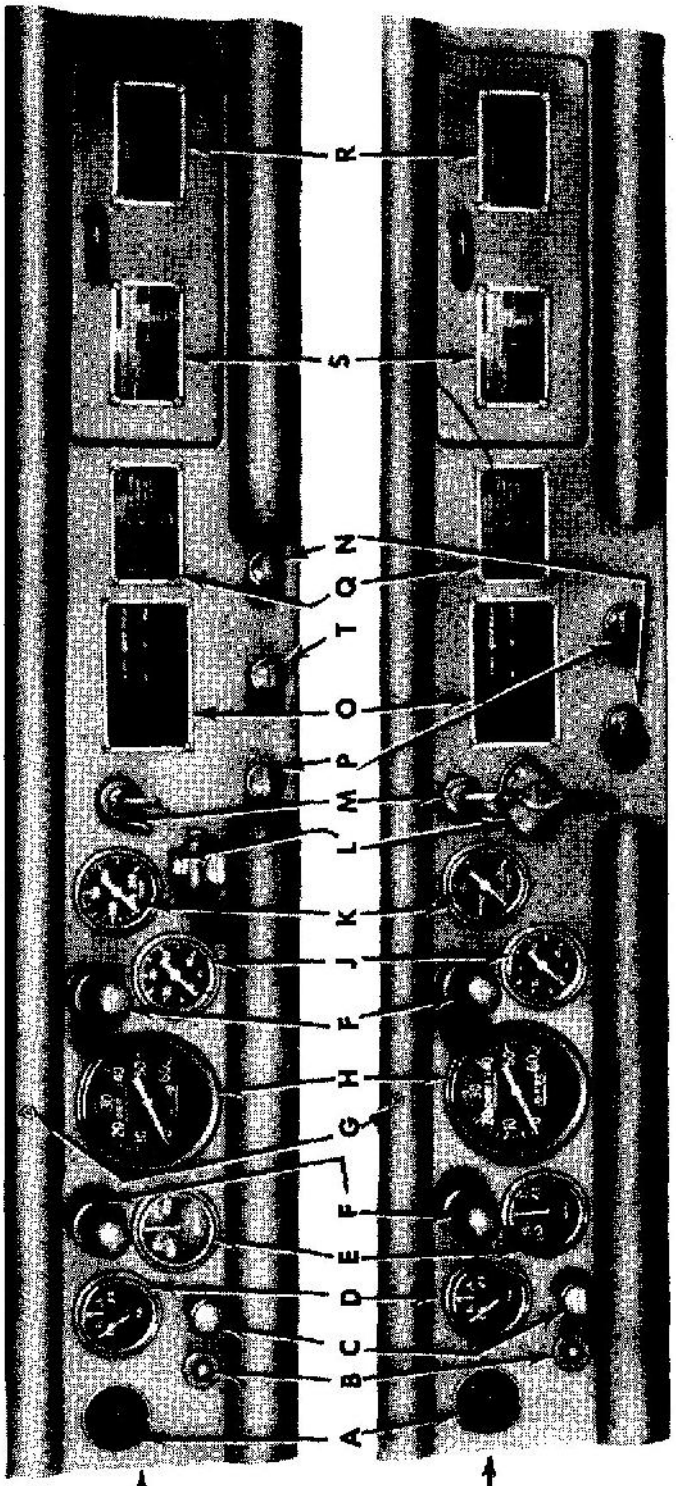
6. INSTRUMENTS.

a. **Ammeter** (fig. 6). The ammeter is provided with a range of from 40-ampere discharge to 40-ampere charge. If, during normal operation, when little current is being used, the ammeter consistently indicates discharge, the generating system is at fault. Notify ordnance maintenance personnel to avoid burning out the generator.

b. **Instrument Panel Lights and Switch** (fig. 6). Two instrument panel lights are provided on the instrument panel and are turned on or off by a switch knob located on the instrument panel to the right of the starter button. The light switch must be in the second position in order to turn the panel lights on.

c. **Headlight Beam Indicator** (fig. 6). The headlight beam indi-

CONTROLS AND OPERATIONS



A—FUEL TANK SELECTOR SWITCH
B—STARTER BUTTON
C—PANEL LIGHT SWITCH
D—FUEL GAGE
E—AMMETER
F—PANEL LIGHTS
G—HEADLIGHT BEAM INDICATOR
H—SPEEDOMETER
J—OIL PRESSURE GAGE
K—WATER TEMPERATURE GAGE
L—HEADLIGHT SWITCH
M—IGNITION SWITCH
N—CHOKE BUTTON
O—NOMENCLATURE PLATE
P—HAND THROTTLE BUTTON
Q—FUEL SHUT-OFF INSTRUCTION PLATE
R—GEAR SHIFT INSTRUCTION PLATE
S—CAUTION PLATE
T—B. O. DRIVE SWITCH

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Figure 6 — Instrument Panel

cator, located on the instrument panel directly above the speedometer, consists of a small red light which is turned on when the headlights are switched to the upper beam. When approaching an on-coming vehicle, switch to the lower beam (red light "OFF") by pressing down on the beam control switch as described in subparagraph i.

d. **Fuel Level Indicating Gage and Tank Selector Switch** (fig. 6). The fuel tank selector switch has three positions. With the switch in the "OFF" position, the fuel level indicating gage will read "E" (empty). To check the level in the standard fuel tank under the driver's seat, turn the selector switch to "R". To check the fuel level in the auxiliary fuel tank on the left side of the vehicle, turn the selector switch to "L". The indicating gage and tank selector switch operate only when the ignition switch is on.

e. **Starter Button** (fig. 6). The starter button is located on the left side of the instrument panel. When the starter button is pushed "IN", the circuit is completed through the starter relay and the starting motor circuit and causes the starter motor to crank the engine.

f. **Oil Pressure Indicating Gage** (fig. 6). The oil pressure indicating gage is located on the instrument panel to the right of the speedometer and indicates the engine oil pressure. At normal operating temperature, with the engine running at approximately 2,000 revolutions per minute, the pressure should be approximately 30 pounds. The oil pressure will be reduced as the engine speed is decreased. If, during operation, the oil pressure drops off slowly, it may be due to a change in the viscosity of the oil. Check the engine temperature.

g. **Water Temperature Gage** (fig. 6). The water temperature gage is located on the instrument panel to the right of the oil pressure gage and is calibrated from 100° to 260°F. Under normal operation, the reading on the gage should be 185°F or slightly higher, depending on the atmospheric temperature.

h. **Ignition Switch** (fig. 6). The ignition switch is located on the instrument panel to the right of the water temperature gage. Turning the ignition switch to the left turns the ignition on. When the lever is pointed downward, the ignition is off.

i. **Speedometer** (fig. 6). The speedometer is located on the left side of the instrument panel and is equipped with a trip mileage "reset" located on the back of the instrument.

7. LIGHT SWITCHES.

a. **Headlight Switch, Early Type** (fig. 6). On early production vehicles, the knob on the instrument panel marked "LIGHTS" controls the service lights and the blackout driving lights. A spring

operated safety button prevents the knob from being accidentally pulled out beyond the blackout position. To release the safety button, push the button with the thumb, at the same time continuing the outward pull on the knob with the first and second fingers. The switch has three positions (besides off) controlling the lights as follows:

Light Switch Position	Light Operating	Location
Blackout 1st position	Blackout marker lights	Top of right and left fender
	Blackout taillights	Lower section of right and left taillights
	Blackout stop light (when foot brake pedal is pressed)	Upper section of right-hand taillight
Service 2nd position	Service headlights and service taillight	Right and left headlights upper section of left-hand taillight
	Service stop light (when foot brake pedal is pressed)	Upper section of left-hand taillight
Stop light 3rd position	Service stop light	Upper section of left-hand taillight

b. Blackout Driving Light Switch (fig. 6). The blackout driving light switch is located on the instrument panel to the right of the hand throttle button and is used to supply illumination for driving when the service driving lights might reveal the position of the vehicle. With the switch marked "LIGHTS" pulled out in first position, pull out the switch marked "B.O. DRIVE" (blackout drive) (fig. 6) to turn on the blackout driving light. The marker lights, taillights and stop light will also be on with the switches in this position.

c. Headlight Switch, Late Type (fig. 6). On late production vehicles, a rotary type switch is provided which includes the blackout driving light control. The switch is provided with a safety button to prevent the switch being turned accidentally to other than blackout position. To release the safety button, push it in with the thumb and at the same time turn the switch. The switch has four positions (besides off) controlling the lights as marked on the switch.

8. USE OF INSTRUMENTS AND CONTROLS IN OPERATION OF VEHICLE.

a. Starting the Engine.

(1) PRELIMINARY INSTRUCTIONS. Before attempting to start the engine, familiarize yourself with all of the various instruments and

controls (par. 5, 6, and 7). Make sure that the function of each control is thoroughly understood and the significance of the readings on the various instruments is appreciated. Perform "Before-operation Service" (par. 17). Be sure the gearshift lever is in neutral position (fig. 4).

(2) WARM WEATHER STARTING. Turn the ignition switch to "ON" position. Depress the clutch pedal. Still holding the clutch pedal down, press the starter button. If the engine is hot and does not start properly, hold the throttle open while the engine is being cranked. Hold the clutch pedal down until the engine starts. If the engine fails to start, refer to paragraph 32. If the temperature is below freezing, use the procedure outlined in subparagraph (3) below.

(3) COLD WEATHER STARTING. When the temperature is below freezing, use the following procedure to start the engine. Turn the ignition switch to the "ON" position. Pull the choke button out to the stop. Hold the clutch pedal down and press the starter button. As the engine starts, two or three quick strokes of the foot throttle will assist in keeping the engine running. Push the choke in gradually as far as possible without disturbing the running of the engine. As soon as the engine is warmed up, push the choke all the way in. Avoid racing the engine while it is cold. If the engine fails to start, refer to paragraph 32.

b. Operation of Vehicle.

(1) PRELIMINARY INSTRUCTIONS. If the foregoing instructions have been followed, with the engine at idling speed and all instruments showing normal readings, the driver may now operate the vehicle.

(2) SETTING THE VEHICLE IN MOTION. Release the hand-brake lever. Fully depress the clutch pedal so the clutch will be completely disengaged. Move the transmission gearshift lever to the left and forward into first gear position (fig. 4). Depress accelerator pedal to speed up the engine slightly. As the engine speed increases, gradually and smoothly engage the clutch. As the clutch engages and the vehicle starts to move, increase the pressure on the foot throttle so the engine will pick up the load.

(3) CHANGING TO HIGHER GEARS. At a speed of approximately six miles per hour, depress the clutch pedal and at the same time release the pressure on the foot throttle. Move the transmission gear shift lever out of the first gear position into neutral and from there into the second gear position (to the left and backward, fig. 4). After this shift is completed, engage the clutch without any hesitancy and at the same time press down on the foot throttle. After the vehicle has attained a speed of approximately 12 miles per hour, follow the same procedure as outlined above to shift the gearshift lever into the third gear position (fig. 4). After attaining a speed of approximately

26 miles per hour in third gear, release the pressure on the foot-throttle pedal, depress the clutch pedal and shift the gearshift lever into fourth gear position. Engage the clutch, do not drive with the foot resting on the clutch pedal as this will cause premature wear of the clutch facings and clutch throw-out bearing.

(4) BACKING THE VEHICLE. The vehicle must be brought to a complete stop before the transmission can be shifted into reverse gear. To operate in reverse, disengage the clutch, move the gearshift lever to the right-hand position with sufficient pressure to compress the reverse lock spring and then pull backward (fig. 4). Speed up the engine slightly by putting a light pressure on the foot throttle. Engage the clutch and at the same time exert slightly more pressure on the foot throttle so that the engine will pick up the load smoothly.

(5) NEGOTIATING TURNS. It is better to go into a turn slowly, increasing the speed during the turn, rather than to enter the turn too fast and have to apply the brakes during the turn. The driver should anticipate each turn as far as possible.

(6) OPERATION ON HARD PULLS. Never "lug" the engine at wide open throttle below one-third of the maximum speed allowable for whatever gear ratio is being used. Shift to a lower gear.

(7) USE OF GAGES ON THE INSTRUMENT PANEL. The driver must be familiar with all of the gages and must note their readings frequently during operation of the vehicle. The temperature gage and the oil pressure gage give the most satisfactory indications of the performance of the engine. When the indications of these instruments appear to be irregular, stop the engine and determine the cause. Check oil pressure and temperature frequently.

(8) STOPPING THE VEHICLE. Remove the foot from the foot throttle. Except in emergency stops, this should be done some distance before reaching the point where the vehicle is to stop so the compression of the engine will slow down the vehicle. Apply the brakes by pressing down on brake pedal. When the speed has been reduced to approximately seven miles per hour, disengage the clutch and move transmission gearshift lever into the neutral position, maintaining pressure on brake pedal until the vehicle stops. Apply the hand brake.

(9) STOPPING THE ENGINE. After completing a run, the engine must be allowed to operate at idling speed for two minutes to assure a gradual and uniform cooling of the valves and various other engine parts. Turn the ignition switch to "OFF" position.

9. TOWING THE VEHICLE.

a. Towing To Start Vehicle. A towing hook is mounted on each corner of the front of the vehicle. Press the clutch pedal down and shift the gear shift lever into fourth gear position. Turn the ignition

switch "ON". With the clutch pedal held down, allow the vehicle to be towed at a moderate speed, and engage the clutch pedal gradually. If the engines does not start, refer to paragraph 32.

b. Towing a Disabled Vehicle. Attach either a tow bar or cable to the towing hooks on the disabled vehicle. Place the gearshift lever in neutral and tow the vehicle.

Section IV

OPERATION UNDER UNUSUAL CONDITIONS

10. COLD WEATHER OPERATION.

a. Purpose. Operation of automotive equipment at sub-zero temperatures presents problems that demand special precautions and extra careful servicing from both operation and maintenance personnel, if poor performance and total functional failure are to be avoided.

b. Gasoline. Winter grade of gasoline is designed to reduce cold weather starting difficulties; therefore the winter grade motor fuel should be used in cold weather operation.

c. Storage and Handling of Gasoline. Due to condensation of moisture from the air, water will accumulate in tanks, drums, and containers. At low temperatures, this water will form ice crystals that will clog fuel lines and carburetor jets unless the following precautions are taken:

(1) Strain the fuel through filter paper, or any other type of strainer that will prevent the passage of water. CAUTION: *Gasoline flowing over a surface generates static electricity that will result in a spark, unless means are provided to ground the electricity. Always provide a metallic contact between the container and the tank, to assure an effective ground.*

(2) Keep tank full, if possible. The more fuel there is in the tank, the smaller will be the volume of air from which moisture can be condensed.

(3) Add ½ pint of denatured alcohol, grade 3, to the fuel tank each time it is filled. This will reduce the hazard of ice formation in the fuel.

(4) Be sure that all containers are thoroughly clean and free from rust before storing fuel in them.

(5) If possible, after filling or moving a container, allow the fuel to settle before filling fuel tank from it.

(6) Keep all closures of containers tight to prevent snow, ice, dirt, and other foreign matter from entering.

(7) Wipe all snow or ice from dispensing equipment and from around fuel tank filler cap before removing cap to refuel vehicle.

d. Lubrication.

(1) TRANSMISSION AND DIFFERENTIAL.

(a) Universal gear lubricant, SAE 80, where specified in War Department Lubrication Guide (fig. 7) is suitable for use at temperatures as low as –20° F. If consistent temperatures below 0° F is anticipated, drain the gear cases while warm and refill with grade 75 universal gear lubricant, which is suitable for operation at all temperatures below +32° F. If grade 75 universal gear lubricant is not available, SAE 80 universal gear lubricant diluted with the fuel used by the engine, in the proportion of one part fuel to six parts universal gear lubricant, may be used. Dilute make-up oil in the same proportion before it is added to gear cases.

(b) After engine has been warmed up, engage clutch and maintain engine speed at fast idle for 5 minutes, or until gears can be engaged. Put transmission in low (first) gear, and drive vehicle for 100 yards, being careful not to stall engine. This will heat gear lubricants to the point where normal operation can be expected.

(2) CHASSIS POINTS. Lubricate chassis points with general purpose grease, No. 0.

(3) HYDROVAC CYLINDERS. Lubricate hydrovac cylinders with hydraulic oil above –20° F, and special recoil oil, or light shock absorber fluid below –20° F.

(4) STEERING GEAR HOUSING. Drain housing, if possible, or use suction gun to remove as much lubricant as possible. Refill with universal gear lubricant, Grade 75, or, if not available, SAE 80 universal gear lubricant diluted with fuel used in the engine, in the proportion of one part fuel to six parts SAE 80 universal gear lubricant. Dilute make-up oil in the same proportion before it is added to the housing.

(5) OILCAN POINTS. For oilcan points where engine oil is prescribed for above 0° F, use light lubricating, preservative oil.

e. Protection of Cooling Systems.

(1) USE ANTIFREEZE COMPOUND. Protect the system with antifreeze compound (ethylene-glycol type) for operation below +32°F. The following instructions apply to use of new antifreeze compound.

(2) CLEAN COOLING SYSTEM. Before adding antifreeze com-

pound, clean the cooling system, and completely free it from rust. If the cooling system has been cleaned recently, it may be necessary only to drain, refill with clean water, and again drain. Otherwise the system will be cleaned with cleaning compound.

(3) REPAIR LEAKS. Inspect all hoses and replace if deteriorated. Inspect all hose clamps, plugs, and pet cocks and tighten if necessary. Repair all radiator leaks before adding antifreeze compound. Correct all leakage of exhaust gas or air into the cooling system.

(4) ADD ANTIFREEZE COMPOUND. When the cooling system is clean and tight, fill the system with water to about one-third capacity. Then add antifreeze compound, using the proportion of antifreeze compound to the cooling system capacity indicated in paragraph 73. Protect the system to at least 10° F below the lowest temperature expected to be experienced during the winter season.

(5) WARM THE ENGINE. After adding antifreeze compound, fill with water to slightly below the filler neck; then start and warm the engine to normal operating temperature.

(6) TEST STRENGTH OF SOLUTION. Stop the engine and check the solution with a hydrometer, adding antifreeze compound if required (par. 73).

(7) INSPECT WEEKLY. In service, inspect the coolant weekly for strength and color. If rusty, drain and clean cooling system thoroughly and add new solution of the required strength.

(8) CAUTIONS.

(a) Antifreeze compound is the only antifreeze material authorized for ordnance materiel.

(b) It is essential that antifreeze solutions be kept clean. Use only containers and water that are free from dirt, rust, and oil.

(c) Use an accurate hydrometer. To test a hydrometer, use one part antifreeze compound to two parts water. This solution will produce a hydrometer reading of 0° F.

(d) Do not spill antifreeze compound on painted surfaces.

f. Electrical Systems.

(1) GENERATOR AND CRANKING MOTOR. Check the brushes, commutators, and bearings. See that the commutators are clean. The large surges of current which occur when starting a cold engine require good contact between brushes and commutators.

(2) WIRING. Check, clean, and tighten all connections, especially the battery terminals. Care should be taken that no short circuits are present.

(3) COIL. Check coil for proper functioning by noting quality of spark.

(4) DISTRIBUTOR. Clean thoroughly, and clean or replace points.

Check the points frequently. In cold weather, slightly pitted points may prevent engine from starting.

(5) SPARK PLUGS. Clean and adjust or replace, if necessary. If it is difficult to make the engine fire, reduce the gap to 0.005 inch less than that recommended for normal operation (par. 88). This will make ignition more effective at reduced voltages likely to prevail.

(6) TIMING. Check carefully. Care should be taken that the spark is not unduly advanced nor retarded.

(7) BATTERY.

(a) The efficiency of batteries decreases sharply with decreasing temperatures, and becomes practically nil at –40° F. Do not try to start the engine with the battery when it has been chilled to temperatures below –30° F until battery has been heated, unless a warm slave battery is available. See that the battery is always fully charged, with the hydrometer reading between 1.275 and 1.300. A fully charged battery will not freeze at temperatures likely to be encountered even in Arctic climates, but a fully discharged battery will freeze and rupture at +5° F.

(b) Do not add water to a battery when it has been exposed to sub-zero temperatures unless the battery is to be charged immediately. If water is added and the battery not put on charge, the layer of water will stay at the top and freeze before it has a chance to mix with the acid.

(8) LIGHTS. Inspect the lights carefully. Check for short circuits and presence of moisture around sockets.

(9) ICE. Before every start, see that the spark plugs, wiring, or other electrical equipment are free from ice.

g. Starting and Operating Engine.

(1) INSPECT STARTER MECHANISM. Be sure that no heavy grease or dirt has been left on the starter throw-out mechanism. Heavy grease or dirt is liable to keep the gears from being meshed, or cause them to remain in mesh after the engine starts running. The latter will ruin the starter and necessitate repairs.

(2) USE OF CHOKE. A full choke is necessary to secure the rich air-fuel mixture required for cold weather starting. Check the butterfly valve to see that it closes all the way and otherwise functions properly.

(3) CARBURETOR AND FUEL PUMP. The carburetor, which will give no appreciable trouble at normal temperatures, is liable not to operate satisfactorily at low temperatures. Be sure the fuel pump has no leaky valves or diaphragm as this will prevent the fuel pump from delivering the amount of fuel required to start the engine at low temperatures when turning speeds are reduced to 30 to 60 revolutions per minute.

(4) AIR CLEANERS. At temperatures below 0° F do not use oil in air cleaners. The oil will congeal and prevent the easy flow of air. Wash screens in dry-cleaning solvent, dry, and replace. Ice and frost formations on the air cleaner screens can cause an abnormally high intake vacuum in the carburetor air horn hose, resulting in collapse.

(5) FUEL SYSTEM. Remove and clean sediment bulb, strainers, etc., daily. Also drain fuel tank sump daily to remove water and dirt.

h. Chassis.

(1) BRAKE BANDS. Brake bands, particularly on new vehicles, have a tendency to bind when they are very cold. Always have a blow torch handy to warm up these parts, if they bind prior to moving, or attempting to move, the vehicle. Parking the vehicle with the brake released will eliminate most of the binding. Precaution must be taken, under these circumstances, to block the wheels or otherwise prevent movement of the vehicle.

(2) EFFECT OF LOW TEMPERATURES ON METALS. Inspect the vehicle frequently. Shock resistance of metals, or resistance against breaking, is greatly reduced at extremely low temperatures. Operation of vehicles on hard, frozen ground causes strain and jolting which will result in screws breaking, or nuts jarring loose.

(3) SPEEDOMETER CABLE. Disconnect the oil-lubricated speedometer cable at the drive end when operating the vehicle at temperatures of –30° F and below. The cable will often fail to work properly at these temperatures, and sometimes will break, due to the excessive drag caused by the high viscosity of the oil with which it is lubricated.

11. OPERATION AT HIGH TEMPERATURE.

a. When starting a hot engine, hold the throttle open while the engine is being cranked. When operating at high temperatures, observe the engine temperature gage frequently and add water to the cooling system as often as may be required to prevent overheating. The viscosity of the various oils used decreases at higher temperature. Be sure oils are being used with sufficient body to match the temperature. Engine oil thinned out by high temperature is used up more rapidly. Check the engine oil level frequently.

12. OPERATION AT HIGH ALTITUDES.

a. High altitudes result in lowering of compression due to lowered atmospheric pressure and a corresponding lowering of the developed horsepower. Due to rarefied atmosphere a smaller quantity of air is taken into each cylinder while the quantity of fuel remains practically the same as at sea level. This results in the fuel air mixture being too rich. This can only be remedied by reducing the size of the various carburetor jets if the vehicle is to be operated continu-

ally at high altitudes. Generally speaking, elevations up to 5,000 feet present no particular problems and can be considered as normal.

13. OPERATION IN SAND.

a. Desert operation and operations under extreme sand road conditions may necessitate cleaning the air cleaner as often as every two hours. When operating in sand, avoid sudden sharp turns as the sand may pile up and stall the vehicle.

14. OPERATION ON SLIPPERY TERRAIN.

a. For operating the vehicle in mountainous terrain, in mud, or over ice and snow, it is important that the vehicle be operated at reasonable speeds to reduce the possibility of sidewise skids. Even at reasonable speed, side skids are possible and the best means of recovery is to turn in the direction of the skid.

15. OPERATION UNDER DUSTY CONDITIONS.

a. When operating under extremely dusty conditions, it may be necessary to clean the carburetor air cleaner (fig. 24) (par. 65) and the crankcase breather on the oil filler pipe (fig. 10) (par. 53) as often as every two hours. If the air cleaner is kept clean and the oil level is maintained, little damage to the engine will result. On the other hand, if the air cleaner runs dry, it is possible to wear out an engine in one hour or less.

Section V

FIRST ECHELON PREVENTIVE MAINTENANCE SERVICE

16. PURPOSE.

a. To insure mechanical efficiency, it is necessary that the vehicle be systematically inspected at intervals each day it is operated, and weekly, so that defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance service will be performed at these designated intervals. The services set forth in this section are those performed by driver or crew before operation, during operation, at halt, and after operation and weekly.

b. Driver preventive maintenance services are listed on the back of "Drivers Trip Ticket and Preventive Maintenance Service Record" W.D. Form No. 48, to cover vehicles of all types and models. Items peculiar to specific vehicles, but not listed on W.D. Form No. 48, are covered in manual procedures under the items with which they are related. Certain items listed on the form that do not pertain to the vehicle involved are eliminated from the procedures as written in this manual. Every organization must school each driver thoroughly in performing the maintenance procedures set forth in manuals whether they are listed specifically on W.D. Form No. 48 or not.

c. The items listed on W.D. Form No. 48 that apply to this vehicle are expanded in this manual to provide specific procedures for accomplishment of the inspections and services. These services are arranged to facilitate inspection and conserve the time of the driver, and are not necessarily in the same numerical order as shown on W.D. Form No. 48. The item numbers, however, are identical with those shown on that form.

d. The general inspection of each item applies also to each supporting member and connections, and generally includes a check to see whether or not the item is in good condition, correctly assembled, secure, or excessively worn.

e. The inspection for "good condition" is usually an external visual inspection to determine whether or not 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.

f. The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether or not it is in its normal assembled position in the vehicle.

g. The inspection of a unit to determine if it is "secure" is usually an external visual examination, a wrench, hand-feel, or a pry-bar check for looseness. Such an inspection should include any brackets, lock washers, lock nuts, locking wires, or cotter pins used in assembly.

h. "Excessively worn" will be understood to mean worn close-to, or beyond, serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

i. Any defects or unsatisfactory operating characteristics beyond the scope of first echelon to correct must be reported at the earliest opportunity to the designated individual in authority.

17. BEFORE-OPERATION SERVICE.

a. This inspection schedule is designed primarily as a check to

see that the vehicle has not been damaged, tampered with, or sabotaged since the After-operation Service was performed. Various combat conditions may have rendered the vehicle unsafe for operation, and it is the duty of the driver to determine whether or not the vehicle is in condition to carry out any mission to which it may be assigned. This operation will not be entirely omitted, even in extreme tactical situations.

b. Procedures. Before-operation Service consists of inspecting items listed below, according to the procedure described, and correcting or reporting any deficiencies. Upon completion of the service, results should be reported promptly to the designated individual in authority.

(1) ITEM 1, TAMPERING AND DAMAGE. Look for any injury to vehicles, its accessories or equipment, caused by tampering or sabotage, collision, falling debris, or shell fire, since parking. Look into engine compartment for evidence of above conditions, and for loosened or damaged engine, accessories or drive belts, loose fuel, oil or coolant lines, or disconnected control linkage.

(2) ITEM 2, FIRE EXTINGUISHER. See that it is securely mounted, not damaged, and look for evidence of opened operating valve or leakage.

(3) ITEM 3, FUEL, ENGINE OIL, AND COOLANT SUPPLY. Check amount of fuel in tank. Check crankcase oil level on dip stick. Check coolant level. If necessary, add fuel to complete mission or to operate vehicle to next scheduled fueling point. Add engine oil and coolant as needed to bring to correct level. Any appreciable drop in levels since After-operation Service should be investigated, and cause corrected or reported. During freezing weather, when antifreeze solution is in use, if any appreciable addition of water is needed, antifreeze value should be tested by Second Echelon, and added if necessary. Be sure spare fuel, oil, and water cans are full and securely mounted.

(4) ITEM 4, ACCESSORIES AND DRIVES. Examine units, such as carburetor, generator, starting motor, fan, and air cleaner for looseness, damage or leaks. Be sure drive belt is in good condition and that adjustment is satisfactory. Belt should have ½- to ¾-inch finger-pressure deflection.

(5) ITEM 6, LEAKS, GENERAL. Inspect ground under vehicle and inside of engine compartment for indications of fuel, engine oil, coolant, brake fluid and gear oil leaks. Pay particular attention to fuel tanks and lines, crankcase and oil filters, radiator, water pump, water lines and connections, hydraulic system, and all gear cases. Trace any leaks found to their source, and correct, or report, them.

(6) ITEM 7, ENGINE WARM-UP. Start engine and note any tendency toward hard starting. Observe action of starting motor, par-

ticularly if it had adequate cranking speed and engages and disengages without unusual noise when in operation. Set hand throttle to idle engine at 400 to 500 revolutions per minute and proceed with following Before-operation Service. NOTE: *If oil pressure is not evident in 30 seconds, stop engine and investigate.*

(7) ITEM 8, CHOKE. As engine is being started, check operation of choke. As engine warms up reset choke as required for engine to run smoothly and to prevent over choking and oil dilution.

(8) ITEM 9, INSTRUMENTS.

(a) Oil Gage. Pressure at normal operating engine speed, 30 pounds.

(b) Ammeter. With battery fully charged and all lights and accessories turned off, ammeter should show a slight positive (+) charge with engine at fast idle. A high charge reading may be indicated immediately after starting, until generator restores to battery current used in starting. High charge may be indicated for some time if battery charge is low or electric load heavy.

(c) Engine Temperature Gage. Reading should increase gradually during warm-up period to normal operating range, 155° F. to 185° F. Maximum safe temperature 200° F. NOTE: *Do not move vehicle until engine temperature reaches 135° F.*

(d) Fuel Gage. Turn fuel gage selector switch to both positions and observe if gage registers approximate amount of fuel in each tank. Ordinarily tanks will have been filled at After-operation Service and gage should register "FULL".

(9) ITEM 10, HORN AND WINDSHIELD WIPERS. If tactical situation permits, test horn for proper operation and tone. Test wipers to see that they operate, and observe whether or not the blades contact glass evenly and arms travel through full stroke. Inspect for damage.

(10) ITEM 11, GLASS AND REAR VISION MIRROR. Clean all glass and inspect for damage. Aim rear vision mirror properly and see that it is secure.

(11) ITEM 12, LAMPS (LIGHTS) AND REFLECTORS. See that all lamps and warning reflectors are clean. Examine them for looseness or damage. If tactical situation permits, open and close switches and observe if lamps respond properly. Include stop and blackout lights.

(12) ITEM 13, WHEEL AND FLANGE NUTS. See that all wheel mounting, and axle flange nuts are present and secure.

(13) ITEM 14, TIRES. Pressure 55 pounds (maximum) cool. Inspect tires for damage, and remove any embedded objects from treads, carcass, and between duals.

(14) ITEM 15, SPRINGS AND SUSPENSIONS. Inspect springs and

shock absorbers to see that they are secure and not damaged and that all assembly and mounting nuts and screws are tight. Examine shocks for leaks.

(15) ITEM 16, STEERING LINKAGE. Inspect gear case for excessive lubricant leaks and all rods and joints for looseness and damage.

(16) ITEM 17, FENDERS AND BUMPERS. Inspect for looseness or damage.

(17) ITEM 18, TOWING CONNECTIONS. Inspect for looseness or damage. Examine pintle to be sure it operates freely and locks securely.

(18) ITEM 19, BODY, LOAD, AND PAULIN. Inspect body for looseness and damage. Examine cargo for damage, sabotage, and shifting. Load should be properly distributed. Tarpaulin should be in good condition and all ropes should be lashed securely to body hooks.

(19) ITEM 20, DECONTAMINATOR. Be sure it is present, fully charged and secure.

(20) ITEM 21, TOOLS AND EQUIPMENT. Be sure all items are present, serviceable, and properly mounted, or stowed.

(21) ITEM 22, ENGINE OPERATION. Before vehicle is put in motion, be sure engine has reached operating temperature and idles smoothly. Accelerate and decelerate and listen for any unusual noise. Note any unsatisfactory operating characteristics or excessive exhaust smoke.

(22) ITEM 23, DRIVER'S PERMIT AND FORM 26. Driver must have his operator's permit on his person. Check to see that vehicle manual, Lubrication Guide, Form No. 26 (accident report), and Form No. 478 (MWO and Major Unit assembly replacement record), are present, legible, and properly stowed.

(23) ITEM 25, DURING-OPERATION CHECK. The During-operation Service and observations start immediately the vehicle is put in motion.

18. DURING-OPERATION SERVICE.

a. While vehicle is in motion, listen for such sounds as rattles, knocks, squeals, or hums that may indicate trouble. Look for indications of trouble in cooling system and smoke from any part of the vehicle. Be on the alert to detect any odor of overheated components or units such as generator, brakes or clutch, fuel vapor from a leak in fuel system, exhaust gas, or other signs of trouble. Any time the brakes are used, gear shifted, or vehicle turned, consider this a test and notice any unsatisfactory or unusual performance. Watch the instruments constantly. Notice promptly unusual instrument indication that may possibly signify trouble in system to which that instrument pertains.

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b. Procedures. During-operation Service consists of observing items listed below according to the procedures following each item, and investigating any indications of serious trouble. Notice minor deficiencies to be corrected or reported at earliest opportunity, usually next schedule halt.

(1) ITEM 27, FOOT AND HAND BRAKES. Foot brakes should stop vehicle smoothly and effectively with normal pedal pressure and return to off position immediately pedal is released. Pedal should have ½-inch free travel before meeting resistance and should clear floor board by two inches when fully applied. Hand brake should hold vehicle on reasonable incline, leaving at least ⅓ ratchet travel in reserve, and should latch securely in applied position.

(2) ITEM 28, CLUTCH. Clutch should not grab, chatter, or squeal during engagement, or slip when fully engaged under load. Pedal should have 1½- to 1¾-inch free travel before meeting resistance.

(3) ITEM 29, TRANSMISSION. Gears should shift smoothly and quietly, and not creep out of mesh during operation.

(4) ITEM 31, ENGINE AND CONTROLS. The driver must be on the alert for deficiencies in engine performance, such as lack of usual power, misfiring or stalling, unusual noise, indications of overheating or excessive exhaust smoke. Observe if engine responds to all controls and if controls are in proper adjustment, and not excessively loose or binding. If radio noise in a set in a nearby vehicle is reported, driver will cooperate with radio personnel to determine if the interference is coming from his vehicle.

(5) ITEM 32, INSTRUMENTS. Observe readings of all instruments, frequently during operation, to be sure units to which they pertain are functioning satisfactorily.

(a) Oil Pressure Gage. Reading should show normal operating pressure, about 30 pounds.

(b) Ammeter. During operation with all lamps and accessories turned off the ammeter should indicate a positive (+) charge at operating speed or with a fully charged battery and the regulator unit cut in the ammeter may register zero. Investigate or report excessive negative (−) readings.

(c) Temperature Gage. Normal operating temperature 185° F, maximum safe operating temperature 210° F.

(d) Fuel Gage. Reading should continue to indicate approximate amount of fuel in each tank with selector switch in relative position.

(e) Speedometer. Pointer should indicate vehicle speed and odometer should register accumulating mileage.

(6) ITEM 33, STEERING GEAR. Note any indication of looseness

or binding, pull to one side, wandering, shimmy, wheel tramp, or unusual noise.

(7) ITEM 33, RUNNING GEAR. Be on the alert for any unusual operating characteristics or noise from wheels, axles, or suspension units that might indicate looseness or damage, or under-inflated tires.

(8) ITEM 35, BODY. Note any noise or abnormal condition that might indicate shifting; loose top, tarpaulin or curtains; loose or damaged doors, hardware, floor, inspection plates, or mounted body attachments.

19. AT-HALT SERVICE.

a. At-halt Service may be regarded as the minimum of maintenance procedures, and should be performed under all tactical conditions even though more extensive maintenance services must be slighted, or omitted altogether.

b. At-halt Service consists of investigating any deficiencies noted during operation, inspecting items listed below, according to the procedures following the items, and correcting any deficiencies found. Deficiencies not corrected should be reported promptly to the designated individual in authority.

(1) ITEM 38, FUEL, OIL, AND WATER SUPPLY.

(a) Check the fuel supply to see that it is adequate to operate the vehicle to the next refueling point. When refueling, use safety precautions for grounding static electricity, and allow space for expansion in filler neck. Filler-cap vents must be open. Radiator pressure cap valves must be free, and cap must be replaced securely. Check the crankcase oil level and, if necessary, add oil to proper level.

(b) Remove radiator filler cap being careful of steam, especially if a pressure cap is used, and check coolant to see that it is at proper level; replenish as necessary. Do not fill to overflowing but leave sufficient space for expansion. If engine is hot, fill slowly while engine is running at a fast idle.

(2) ITEM 39, TEMPERATURES: HUBS, BRAKE DRUMS, TRANSMISSION, AND REAR AXLE. Place hand cautiously on each brake drum and wheel hub to see if it is abnormally hot. Inspect transmission and rear axle housing for overheating and note any excessive lubricant leaks.

(3) ITEM 40, REAR AXLE VENT. Wipe clean and inspect vent for damage or clogging. Vent must be kept open.

(4) ITEM 41, PROPELLER SHAFTS. Inspect drive shafts and universal joints for looseness, damage, and excessive lubricant leaks at universal joints or coupling shaft center support. Remove any foreign matter wound around shafts or joints.

(5) ITEM 42, SPRINGS AND SUSPENSIONS. Inspect springs for

broken or shifted leaves, damaged or loose U-bolts, eye bolts, shackles, rebound chips or shock absorber bodies and linkage, or excessive shock absorber fluid leaks.

(6) ITEM 43, STEERING LINKAGE. Examine all steering control mechanism, arms and linkage frictional joints for looseness or damage. Investigate any unusual condition noted during operation.

(7) ITEM 44, WHEEL AND FLANGE NUTS. See that all wheel mounting and axle flange nuts are present and secure.

(8) ITEM 45, TIRES. Inspect all tires for under inflation or damage. Remove embedded objects in treads, or carcasses, and from between duals. See that spare is inflated and secure in carrier.

(9) ITEM 46, LEAKS, GENERAL. Look under vehicle and within engine compartment for indications of fuel, oil, or coolant leaks. Trace those found to their source and correct or report them.

(10) ITEM 47, ACCESSORIES AND BELT. Examine all accessory units for looseness and damage. Be sure generator and fan drive belt tension adjustment provides ½-inch finger-pressure deflection. NOTE: *If radio interference is reported from a nearby radio equipped vehicle, during operation of this engine, carefully examine all wiring and radio noise suppression devices in engine compartment for loose connections or mountings, particularly suppressors at spark plugs and distributors.*

(11) ITEM 48, AIR CLEANER. If operating under extremely dusty or sandy conditions, inspect the air cleaner and breather cap to see that they are in condition to deliver clean air properly. Service if necessary.

(12) ITEM 49, FENDERS AND BUMPERS. Inspect front bumper and fenders and rear splash guards for looseness or damage.

(13) ITEM 50, TOWING CONNECTIONS. Inspect front tow hooks and rear pintle hook to be sure they are in good condition, securely mounted and, if in use, that they are properly connected.

(14) ITEM 51, BODY, LOAD, AND PAULIN. Inspect for indications of cab, body, or load shifting, and be sure tarpaulin is secure.

(15) ITEM 52, GLASS. Clean all door, windshield, mirror, light, and warning reflector glass, and inspect for damage.

20. AFTER-OPERATION AND WEEKLY SERVICE.

a. After-operation Service is particularly important, because at this time the driver inspects his vehicle to detect any deficiencies that may have developed, and corrects those he is permitted to handle. He should report promptly to the designated individual in authority the results of his inspection. If this schedule is performed thoroughly, the vehicle should be ready to roll again on a moment's notice. The Before-operation Service, with a few exceptions, is then necessary only

to ascertain whether or not the vehicle is in the same condition in which it was left upon completion of the After-operation Service. The After-operation Service should never be entirely omitted even in extreme tactical situations, but, if necessary, may be reduced to the bare fundamental services outlined for the At-halt Service.

b. Procedures. When performing the After-operation Service the driver must remember and consider any irregularities noticed during the day in the Before-operation, During-operation, and At-halt Services. The After-operation Service consists of inspection and servicing the following items. Those items of the After-operation Service that are marked by an asterisk (*) require additional Weekly Service, the procedures for which are indicated in subparagraph *(b)* of each applicable item.

(1) ITEM 55, ENGINE OPERATION. Test engine for satisfactory performance and smooth idle. Accelerate and decelerate, and note any tendency to miss or back fire. Listen for any unusual noise or vibration that may indicate worn or inadequately lubricated parts, loose mountings, incorrect fuel mixture, or faulty ignition. Note any unusual exhaust smoke. Investigate and correct or report any deficiencies noted during operation.

(2) ITEM 56, INSTRUMENTS. Check all instruments to be sure that all are operating properly and continue to register or indicate correct performance of the units to which they pertain. If engine is at, or beyond, normal temperature, allow it to cool off for four or five minutes before stopping.

(3) ITEM 54, FUEL, OIL, AND WATER SUPPLY. Fill fuel tanks (see whether or not fuel gage indicates full). Check crankcase oil and add as necessary to bring to correct level. Check coolant level and add as necessary to bring to correct level. NOTE: *Do not overfill fuel tanks or radiator. Allow room for expansion.* In freezing weather, if any appreciable amount of coolant is necessary, have antifreeze value checked, and add sufficient amount of antifreeze to protect cooling system against freezing. Do not add coolant while engine is too hot. Fill all spare fuel, oil, and water cans if supply has been used.

(4) ITEM 57, HORN AND WINDSHIELD WIPERS. Inspect to see that these items are secure and not damaged. If tactical conditions permit, test horn for proper operation and tone.

(5) ITEM 58, GLASS AND REAR VISION MIRROR. Clean and inspect for damage and see that mountings are secure.

(6) ITEM 59, LAMPS (LIGHTS) AND REFLECTORS. Inspect lamps for looseness or damage. If tactical situation permits, test all lamps and switches for proper operation. Clean lenses.

(7) ITEM 60, FIRE EXTINGUISHER. Inspect for looseness or damage and full charge. If extinguisher has been in use or valves opened, report for refill or exchange.

(8) ITEM 61, DECONTAMINATOR. Inspect for looseness or damage and full charge. If used, report for refill or exchange.

(9) ITEM 62, *BATTERY.

(a) Inspect battery to see that it is clean, secure, and not leaking or damaged. See that cell caps are fingertight.

(b) Weekly. Clean dirt from top of battery. Tighten terminals if loose. If terminal connections or posts are corroded, clean thoroughly and apply thin coating of grease. Remove cell caps and check level of electrolyte. Add water if necessary to top of filler hole. CAUTION: *Be sure air vent holes are not clogged.* Battery carrier should be secure, clean, free of rust, and well painted. If hold-downs are loose, tighten cautiously so as not to damage battery. Report any defects.

(10) ITEM 63, ACCESSORIES AND BELT. Inspect units such as carburetor, generator, cranking motor, fan, water pump, distributor, regulator unit, and oil filter for looseness, damage or leaks. Check condition and adjustment of drive belt. Should have ½- to ¾-inch finger-pressure deflection. Investigate and correct, or report, any deficiencies of accessory units or drives noted during operation.

(11) ITEM 64, ELECTRICAL WIRING. Inspect all ignition wiring for looseness or damage, wipe off excessive grease or moisture. Also make an inspection of all accessible low voltage wiring and connections, for looseness or damage, and be sure all wiring is supported, so that it will not chafe against other vehicle parts. Examine suppressors at spark plugs and distributor for scorch or other damage.

(12) ITEM 65, *AIR CLEANER AND BREATHER CAP.

(a) Inspect for looseness or damage. Examine oil in reservoirs for correct level and excessive dirt. When operating in sandy or dusty conditions, clean and service air cleaner and breather cap as often as necessary.

(b) Weekly. Remove cleaner reservoirs and elements, wash in dry-cleaning solvent, refill reservoirs with clean oil, and reinstall securely. Be sure that all gaskets seal properly, and that joints and connections are secure.

(13) ITEM 66, *FUEL FILTER.

(a) Inspect for looseness, damage and fuel leaks.

(b) Weekly. Remove sediment bowl drain plug and drain off all accumulated dirt and water. If draining of fuel pump sediment bowl shows excessive dirt or water, remove and clean element in dry-cleaning solvent.

(14) ITEM 67, ENGINE CONTROLS. Examine all engine operating control linkage for looseness, damage, excessive wear, and adequate lubrication.

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(15) ITEM 68, *TIRES.

(a) Examine all tires including spares for damage and excessive wear. Remove all embedded foreign matter, such as nails, glass or stones from treads and carcasses and from between duals. Check for low pressures and proper position of valve stem and presence of valve caps. Inflate to correct pressure as needed (55 pounds maximum, cool).

(b) Weekly. Replace badly worn or otherwise unserviceable tires. Serviceable tires, which show abnormal wear, should be relocated to other wheels to even wear. Apparent mechanical deficiencies causing such wear should be reported for attention by higher echelon.

(16) ITEM 69, SPRINGS AND SUSPENSIONS. Inspect for looseness or damage, abnormal spring sag, shifted spring leaves, and shock absorber leakage. Investigate any noise or unusual condition noted during operation.

(17) ITEM 70, STEERING LINKAGE. Inspect for looseness or damage. Examine steering gear case and frictional joints for excessive lubricant leakage, or lack of lubrication. Investigate any unusual operating condition noted during operation.

(18) ITEM 71, PROPELLER SHAFTS AND CENTER BEARING. Inspect all drive shafts and universal joints and coupling shaft center support for looseness or damage and excessive oil leaks. Remove any foreign material wound around shafts or joints.

(19) ITEM 72, *AXLE VENT.

(a) See that rear axle housing vent is present, in good condition and clean. Note any indication of excessive lubricant leakage from vent.

(b) Weekly. Remove vent and clean out passage. Reinstall securely.

(20) ITEM 73, LEAKS, GENERAL. Look in engine compartment and under vehicle for indications of fuel, engine oil, coolant, brake fluid or gear oil leaks. Trace any leaks found to source, and correct or report them.

(21) ITEM 74, GEAR OIL LEVELS. Check gear oil level in transmission, differential and steering gear housing. Report if low. Correct level of transmission and differential is from lower edge of filler hole to ½ inch below when cool.

(22) ITEM 76, FENDERS AND BUMPERS. Inspect front fenders and bumper and rear splash guards for looseness or damage.

(23) ITEM 77, TOWING CONNECTIONS. Inspect front tow hooks and rear pintle hook to see that they are in good condition and securely mounted. If in use, be sure they are connected properly, that pintle latch is locked, and pin in place.

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(24) ITEM 78, BODY, LOAD, AND PAULIN. Inspect cab and body for damage, loose mountings or attachments, signs of shifting of body or load, and be sure tarpaulin, if used, is in good condition and securely lashed to body hooks.

(25) ITEM 82, *TIGHTEN.

(a) Tighten any mounting, or external assembly nuts or screws, where inspection of vehicle has indicated the necessity.

(b) Weekly. Tighten wheel mounting and axle flange nuts and cap screws, spring U-bolts, eye bolts, shackles and rebound clips; universal joint companion flange, engine mountings, steering arms, towing connections, or other mounting or assembly nuts or screws, that inspection, or experience, indicates to be necessary on a weekly or mileage basis.

(26) ITEM 83, *LUBRICATE AS NEEDED.

(a) Lubricate all items such as shackles, hinges, latches, control linkage friction joints, or any point where inspection has indicated oil-can or hand-greasing to be needed.

(b) Weekly. Lubricate all points of the vehicle indicated on the Lubrication Guide as needed lubrication on a weekly or a mileage basis.

(27) ITEM 84, *CLEAN ENGINE AND VEHICLE.

(a) Clean dirt and grease or oil drippings from inside cab, and from engine compartment and exterior of engine. Wipe off excess dirt and grease from entire vehicle.

(b) Weekly. Wash vehicle when possible. If not possible, wipe off thoroughly. Inspect paint or camouflage pattern for rust or for bright spots which might cause light reflections. See that vehicle markings are legible unless covered for tactical reasons. CAUTION: *If vehicle is driven into water for washing, care must be taken to see that water or dirt does not get into wheel bearings, grease cases, or brakes, or on electrical units or wiring.*

(28) ITEM 85, *TOOLS AND EQUIPMENT.

(a) Check vehicle stowage and tool lists to see that all items are present. Inspect items to see that they are in good condition and properly mounted or stowed.

(b) Weekly. Clean all tools and equipment of rust or dirt, and apply preservative where necessary when possible. See that tools with cutting edges are sharp and properly protected, and that all items are securely mounted or stowed.

Section VI

LUBRICATION

21. LUBRICATION GUIDE.

a. War Department Lubrication Guide No. 532 (figs. 7 and 8) prescribes lubrication maintenance for this truck.

b. A Lubrication Guide is placed on, or is issued with, each vehicle and is to be carried with it at all times. In the event a vehicle is received without a Guide, the using arms should immediately requisition a replacement from the Commanding Officer, Fort Wayne Ordnance Depot, Detroit 32, Michigan.

c. Lubrication instructions on the Guide are binding on all echelons of maintenance and there should be no deviations, except as indicated in subpargraph d below.

d. Service intervals specified on the Guide are for normal operating conditions. Reduce these intervals under extreme conditions such as prolonged operation in sand or dust, or immersion in water, either one of which may quickly destroy the protective qualities of the lubricant.

e. Lubricants are prescribed in the "Key" in accordance with three temperature ranges; above +32° F, +32° F to 0°F, and below 0° F. Determine the time to change grades of lubricants by maintaining a close check on operation of the vehicle during the approach to change-over periods, especially during initial action. Sluggish starting is an indication of thickened lubricants, and the signal to change to grades prescribed for the next lower temperature range. Ordinarily it will be necessary to change grades of lubricants *only when air temperatures are consistently in the next higher or lower range,* unless malfunctioning occurs sooner due to lubricants being too thin or too heavy.

22. DETAILED LUBRICATION INSTRUCTIONS.

a. Lubrication Equipment.

(1) Each vehicle is supplied with lubrication equipment adequate to maintain the materiel. This equipment will be cleaned both before, and after use.

(2) Operate lubrication guns carefully and in such manner as to insure a proper distribution of the lubricant.

b. Points of Application.

(1) Lubrication fittings, grease cups, oilers and oilholes are readily indentifiable on the vehicle. Be sure to wipe clean such lubricators and the surrounding surface before lubricant is applied.

(2) Where relief valves are provided, apply new lubricant until

1½-TON 4x2 TRUCK (FORD)

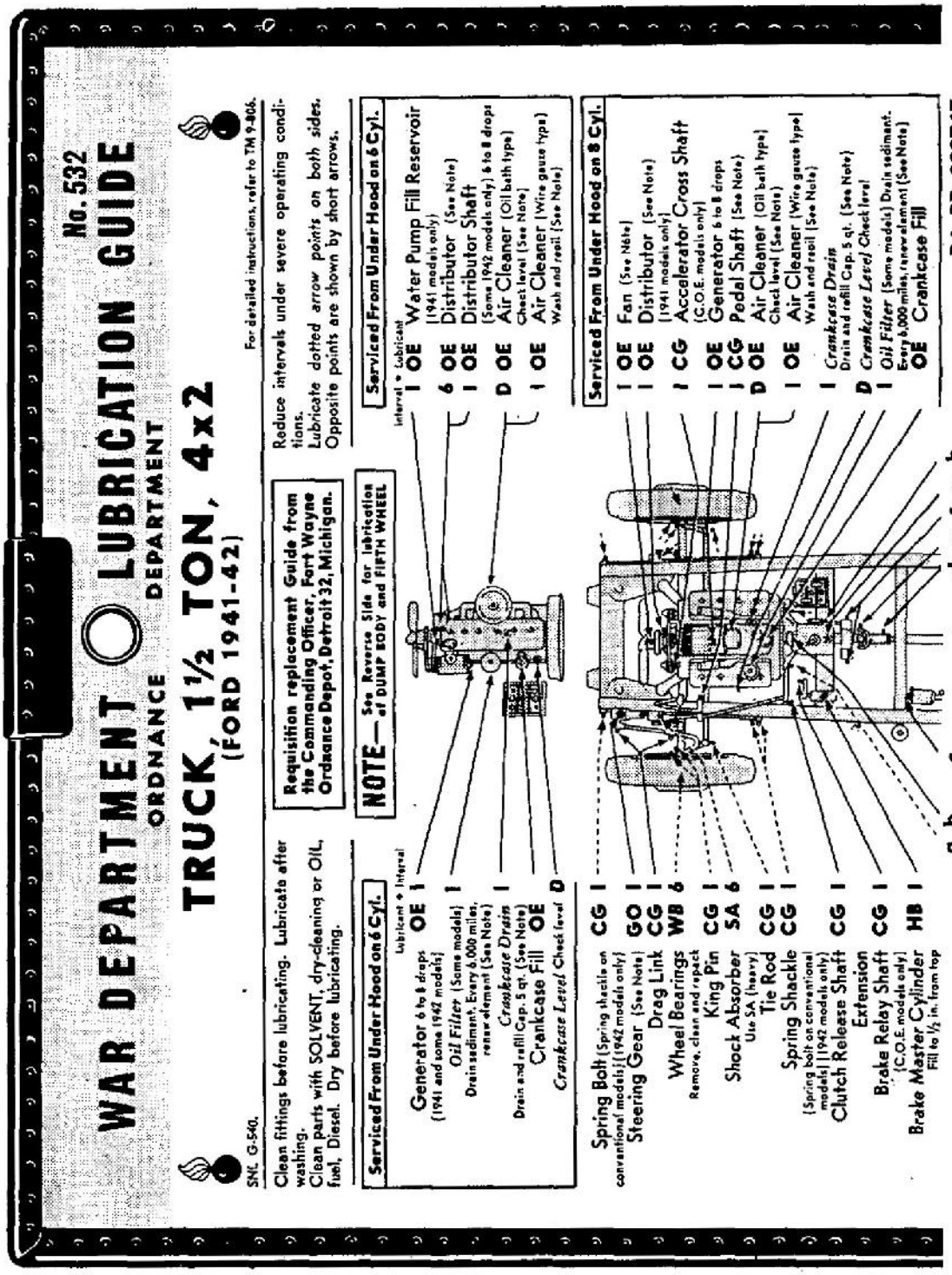
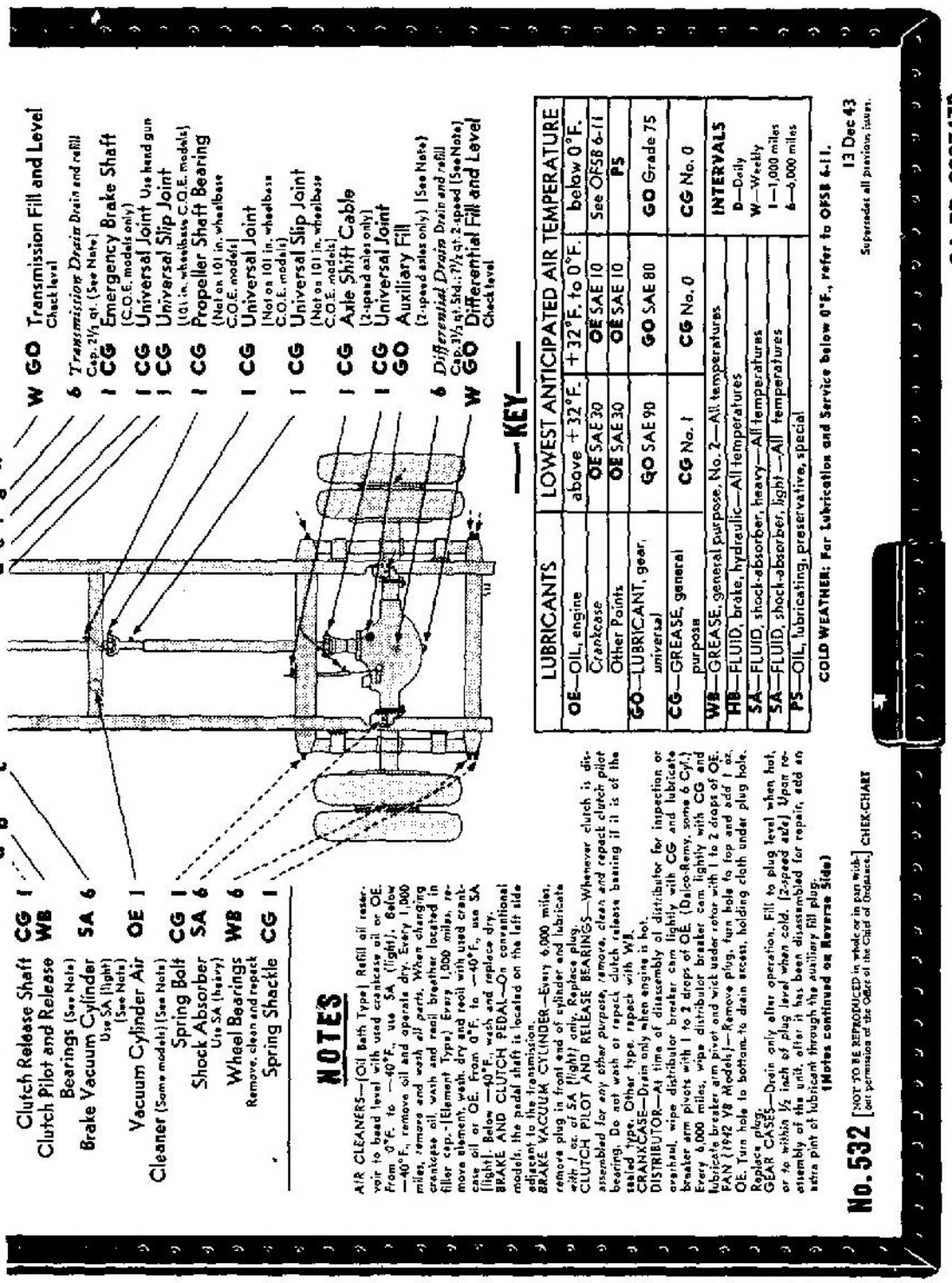


Figure 7 — Lubrication

LUBRICATION



1½-TON 4x2 TRUCK (FORD)

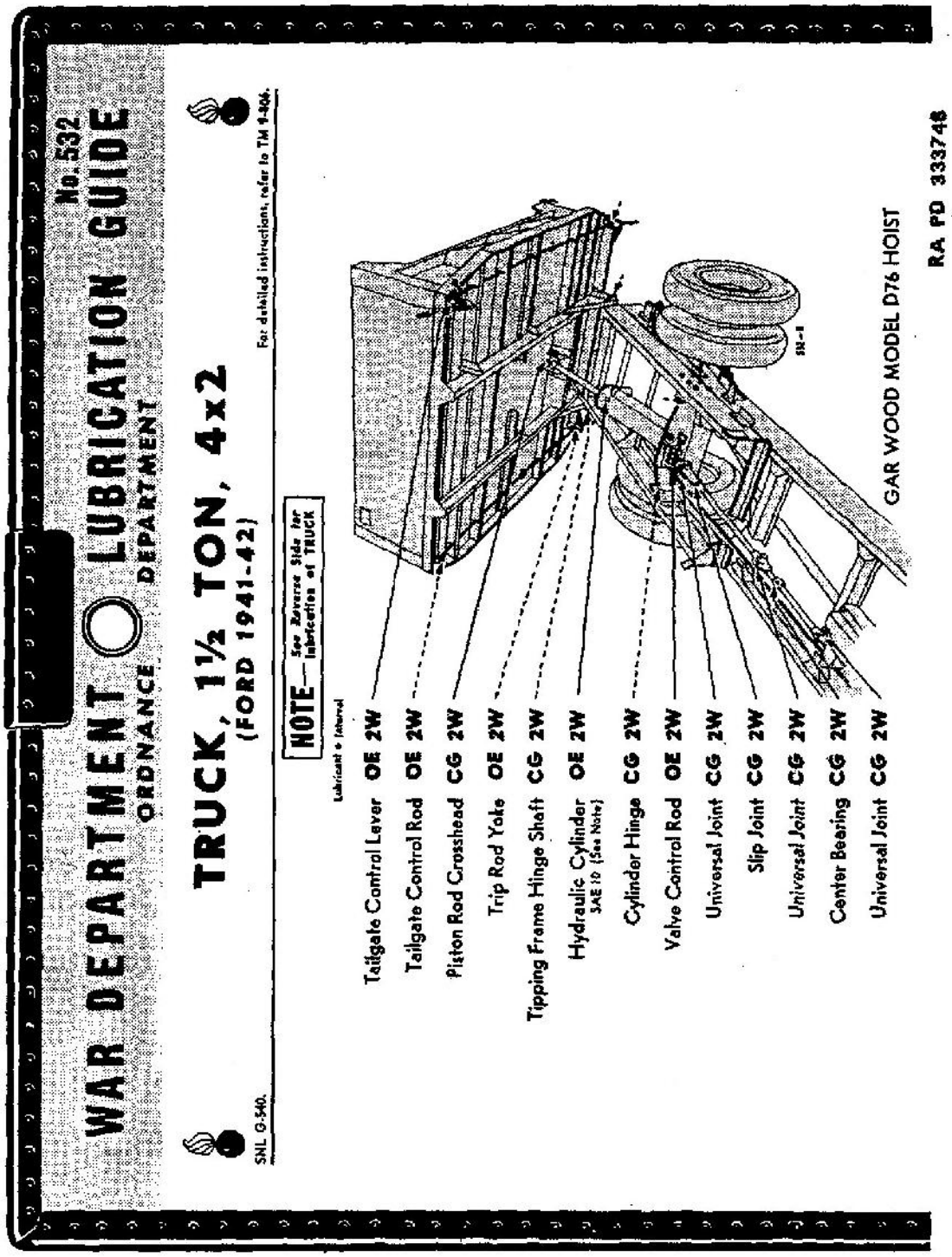
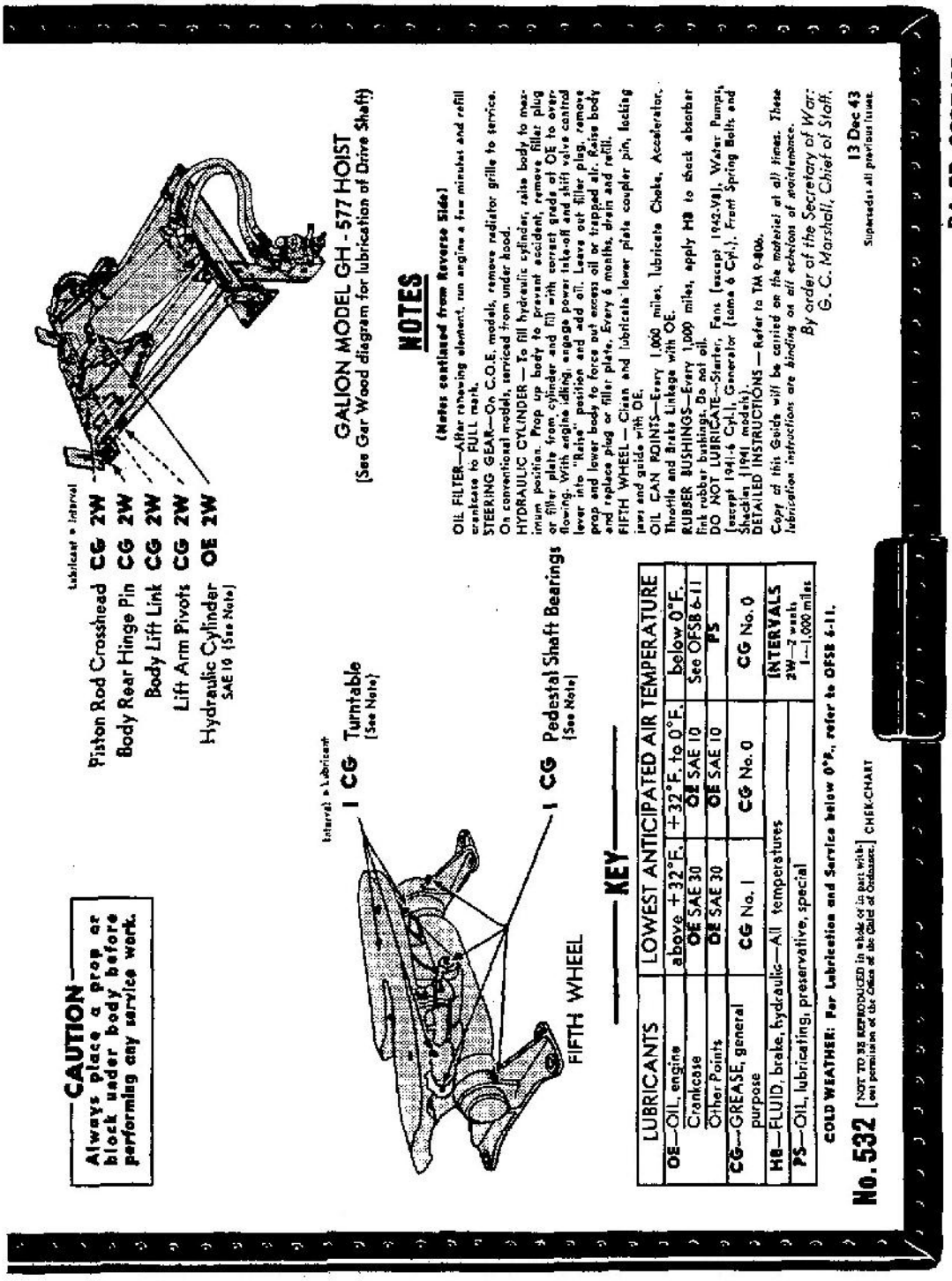


Figure 8 — Lubrication Guide



Body and Fifth Wheel

the old lubricant is forced from the vent. Exceptions are specified in notes on the lubrication guide.

c. Cleaning. Use SOLVENT, dry-cleaning, or OIL, fuel, Diesel, to clean, or wash all parts. Use of gasoline for this purpose is prohibited. After washing, dry parts thoroughly before applying lubricant.

d. Lubrication Notes on Individual Units and Parts. The following instructions supplement those notes on the Lubrication Guide which pertain to lubrication and service of individual units and parts.

(1) AIR CLEANERS.

(a) Oil Bath Type. Daily, check level and refill oil reservoir to bead level with used crankcase oil or OIL, engine, SAE 30 above +32° F or SAE 10 from +32° F to 0° F. From 0° F to –40° F, use FLUID, shock-absorber, light. Below –40° F, remove oil and operate dry. Every 1,000 miles, daily, under extreme dust conditions, remove, wash all parts and refill.

(b) Element Type. Every 1,000 miles, wash element, dry, and reoil with used crankcase oil or OIL, engine, SAE 30 above +32° F or SAE 10 from +32° F to 0° F. From 0° F to –40° F, use FLUID, shock-absorber, light. Below –40° F, wash and replace dry.

(2) BREATHERS AND VENTS.

(a) Breathers. Every 1,000 miles, remove breather located in filler cap, wash thoroughly and reoil with used crankcase oil or OIL, engine, SAE 30 above +32° F or SAE 10 from +32° F to 0° F. From 0° F to –40° F, use FLUID shock-absorber, light. Below –40° F, wash and replace dry.

(b) Vents. Vents will be kept clean at all times. Inspect each time oil is checked and each time truck is operated under extremely dirty or muddy conditions.

(3) BRAKE AND CLUTCH PEDAL. On conventional models, the pedal shaft is located on the left side adjacent to the transmission. Lubricate with GREASE, general purpose, No. 1 above +32° F and No. 0 below +32° F every 1,000 miles.

(4) BRAKE VACUUM CYLINDER. Every 6,000 miles, remove plug in front end of cylinder and lubricate with 1 oz. of FLUID, shock-absorber, light, only. Replace plug.

(5) CLUTCH PILOT AND RELEASE BEARINGS. Whenever clutch is disassembled for any other purpose, remove, clean and repack clutch pilot bearing. Do not wash or repack clutch release bearing if it is of the sealed type. Other type, repack with GREASE, general purpose, No. 2.

(6) CRANKCASE. Daily, check level and refill to "FULL" mark with OIL, engine, SAE 30 above +32° F to 0° F. Below 0° F, refer

to OFSB 6-11. Every 1,000 miles, remove drain plug from bottom of crankcase and completely drain case. Drain only when engine is hot. After thoroughly draining, replace drain plug and refill crankcase to "FULL" mark on gage with correct lubricant to meet temperature requirements. Run engine a few minutes and recheck oil level. Be sure pressure gage indicates oil is circulating.

(7) DISTRIBUTOR.

(a) Types Other Than Delco-Remy. At time of disassembly of distributor for inspection or overhaul, wipe distributor breaker cam lightly with GREASE, general purpose, No. 1 above +32° F and No. 0 below +32° F and lubricate breaker arm pivots with 1 to 2 drops of OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F or OIL, lubricating, preservative, special, below 0° F.

(b) Delco-Remy Distributor on Some 6-cylinder Models. Every 6,000 miles, wipe distributor breaker cam lightly with GREASE, general purpose, No. 1 above +32° F or No. 0° below +32° F and lubricate breaker arm pivot and wick under rotor with 1 to 2 drops of OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F or OIL, lubricating, preservative, special, below 0° F.

(8) FAN (1942 V8 MODELS). Remove plug, turn hole to top and add 1 oz. OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F and OIL, lubricating, preservative, special, below 0° F. Turn hole to bottom to drain excess, holding cloth under plug hole. Replace plug.

(9) FIFTH WHEEL (TRACTOR MODELS). Every 1,000 miles, lubricate pedestal shaft bearings and table through fittings. Clean and lubricate lower plate coupler pin, locking jaws and guide with OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F and OIL, lubricating, preservative, special, below 0° F.

(10) GEAR CASES. Weekly, check level with truck on level ground, and if necessary add lubricant to within ½ inch of plug level when cold, or to plug level when hot. Every 6,000 miles, drain and refill. Drain only after operation when gear lubricant is warm. Refill with LUBRICANT, gear, universal, SAE 90 above +32° F, SAE 80 from +32° F to 0° F or Grade 75 below 0° F. Upon reassembly of the two-speed axle unit, after it has been disassembled for repair, add an extra pint of lubricant through the auxiliary fill plug on top of the carrier.

(11) HYDRAULIC CYLINDER. To fill hydraulic cylinder, raise body to maximum position. Prop up body to prevent accident, remove filler plug or filler plate from cylinder and fill with correct grade of OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F and OIL, lubricating, preservative, special, below 0° F, to overflowing. With engine idling, engage power take-off and shift valve

control lever into "RAISE" position and add oil. Leave out filler plug, remove prop and lower body to force out excess oil or trapped air. Raise body and replace plug or filler plate. Every 6 months, drain and refill.

(12) OIL FILTER. Every 1,000 miles, remove drain plug from oil filter to drain sediment. Every 6,000 miles, or more often if filter becomes clogged, drain filter, clean inside of case, and install new element. After renewing element, run engine a few minutes, recheck crankcase oil level and fill to "FULL" mark with the correct grade of OIL, engine.

(13) STEERING GEAR. On C.O.E. models, remove radiator grille to service. On conventional models, service from under hood.

(14) UNIVERSAL JOINTS AND SLIP JOINTS.

(a) Dump Body Hoist. Apply GREASE, general purpose, No. 1 above +32° F and No. 0 below +32° F to joint until lubricant appears at cross, and to slip joint, until lubricant is forced from end of slip joint.

(b) Truck. Apply GREASE, general purpose, No. 1 above 32° F and No. 0 below +32° F to joint, until it appears at cross, and to slip joint, until lubricant is forced from vent at universal joint end of spline.

(15) WHEEL BEARINGS. Remove bearing cone assemblies from hub. Wash bearings, cones, spindle and inside of hub and dry thoroughly. Do not use compressed air. Inspect bearing races and replace if damaged. Wet the spindle and inside of hub and hub cap with GREASE, general purpose, No. 2 to a maximum thickness of $\frac{1}{16}$ inch only to retard rust. Lubricate bearings with GREASE, general purpose, No. 2 with a packer, or by hand, kneading lubricant into all spaces in the bearing. Use extreme care to protect the bearings from dirt, and immediately reassemble and replace wheel. Do not fill hub or hub cap. The lubricant in the bearing is sufficient to provide lubrication until the next service period. Any excess might result in leakage into the drum. Adjust bearings in accordance with instructions in paragraph 127.

(16) OILCAN POINTS. Every 1,000 miles, lubricate choke, accelerator, throttle and brake linkage with OIL, engine, SAE 30 above +32° F, SAE 10 from +32° F to 0° F or OIL, lubricating, preservative, special, below 0° F.

(17) RUBBER BUSHINGS. Every 1,000 miles, apply FLUID, brake, hydraulic, to shock absorber link rubber bushings. Do not oil.

(18) POINTS NOT TO BE LUBRICATED. The cranking motor, fans (except 1942 V8), water pumps (except 1941, 6-cyl.), generator (some 6-cyl.), front spring bolts and shackles (1941 models) should not be lubricated.

(19) REPORTS AND RECORDS.

(a) Reports. Report unsatisfactory performance of materiel to the Ordnance Officer responsible for maintenance.

(b) Records. A record of lubrication may be maintained in the Duty Roster (W.D., AGO Form No. 6).

Section VII

TOOLS AND EQUIPMENT STOWAGE ON VEHICLE

23. TOOLS.

Nomenclature	Federal Stock Number	Where Carried
Crank, engine starting		Tool box, right side of vehicle
Extension, engine starting crank		Tool box, right side of vehicle
Hammer, machinist's ball-peen, 16-oz	41-H-523	Tool box, right side of vehicle
Handle, spark plug wrench		Tool box, right side of vehicle
Handle, spark plug wrench		Tool box, right side of vehicle
Handle, wheel nut wrench		Tool box, right side of vehicle
Pliers, combination, slip joint, 6-in.	41-P-1650	Tool box, right side of vehicle
Screwdriver, common, 6-in.	41-S-1104	Tool box, right side of vehicle
Wrench, adjustable, automobile type, 11-in.	41-W-448	Tool box, right side of vehicle
Wrench, adjustable, crescent type, 8-in.	41-W-486	Tool box, right side of vehicle
Wrench, engineer's, open-end, $\frac{3}{8}$- x $\frac{7}{16}$-in.	41-W-991	Tool box, right side of vehicle
Wrench, engineer's, open-end, $\frac{1}{2}$- x $\frac{19}{32}$-in.	41-W-1003	Tool box, right side of vehicle

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Nomenclature	Federal Stock Number	Where Carried
Wrench, engineer's, open-end, 9/16- x 11/16-in.	41-W-1005-5	Tool box, right side of vehicle
Wrench, engineer's, open-end, 5/8- x 25/32-in.	41-W-1008-10	Tool box, right side of vehicle
Wrench, engineer's, open-end, 3/4- x 7/8-in.	41-W-1012-5	Tool box, right side of vehicle
Wrench, socket, spark plug		Tool box, right side of vehicle
Wrench, socket, spark plug		Tool box, right side of vehicle
Wrench, spark plug and cylinder head nut		Tool box, right side of vehicle
Wrench, wheel bearing nut		Tool box, right side of vehicle
Wrench, wheel stud nut		Tool box, right side of vehicle

24. SPARE PARTS.

a. Standard Kit.

Nomenclature	Where Carried
Bulb, 3-cp single contact	Under cowl inside cab
Belt, fan	Under cowl inside cab
Kit, cotter pin (in container)	Under cowl inside cab
Kit, tire stem valve (contains 5 B-1724 valves)	Under cowl inside cab
Kit, tire valve cap assembly (contains 5 GPW-1720 caps)	Under cowl inside cab
Lower unit assembly, blackout rear lamp	Under cowl inside cab
Plug assembly, spark (with gasket)	Under cowl inside cab
Tape, friction (¾-in. x 8-oz roll)	Under cowl inside cab
Upper service unit assembly, blackout	Under cowl inside cab
Upper stop unit, blackout lamp	Under cowl inside cab
Wire, iron, annealed (22-gage x ¼-lb spool or coil)	Under cowl inside cab

b. Amtorg Kit (as Supplied to U.S.S.R. Only).

Belt, fan and generator
Brush, commutator, main (2)
Bulb, all glass
Cold patch, 4- x 5-in.
Condenser assembly
Diaphragm, fuel pump and pull rod assembly
Gaskets, set of carburetor

TOOLS AND EQUIPMENT STOWAGE ON VEHICLE

Nomenclature	Where Carried
Gaskets, set of fuel pump	
Kit, tire repair	
Rubber tubing, 6-in. O.D.	
Spark plug assembly (optional with 01A-12405A) (6)	
Tape, ¾ friction, 8-oz rolls	
Trouble lamp with battery clips	
Tube assembly (7.50 x 20) heavy-duty (required in G8T-18296 Amtorg Kit)	
Unit assembly, rear lamp lower (2)	
Unit assembly, rear lamp service (2)	
Unit assembly, rear lamp stop	
Wire, annealed (22 gage 4-oz coil)	

25. EQUIPMENT.

Bag, tool.	Tool box, right side of vehicle
Chains, tire 7.50 x 20, Type TD	Tool box, right side of vehicle
Container assembly, spare parts kit	Under cowl in cab
Extinguisher, fire (1-qt size)	On seat riser
Gage, tire pressure	Tool box, right side of vehicle
Gun, chassis lubricating (pressure type)	Tool box, right side of vehicle
Handle, jack	Tool box, right side of vehicle
Handle, jack (tire tool)	Tool box, right side of vehicle
Holder and bracket assembly, fire extinguisher	On R.H. side of seat riser
Holder assembly, oilcan	Engine compartment on dash
Holder assembly, universal rifle	Inside cab, R.H. side
Jack, hydraulic, 3-ton	Tool box, right side of vehicle
Pump, tire, hand	Tool box, right side of vehicle
Support, spare parts kit container, lower	Under cowl in cab
Support, spare parts kit container support	Under cowl in cab
Support, spare parts kit container, upper	Under cowl in cab

PART TWO — VEHICLE MAINTENANCE INSTRUCTIONS

Section VIII

NEW VEHICLE RUN-IN TEST

26. INTRODUCTION.

a. Purpose. When a new or reconditioned vehicle is first received at the using organization, it is necessary for second echelon personnel to determine whether or not the vehicle will operate satisfactorily when placed in service. For this purpose, inspect all accessories, subassemblies, assemblies, tools, and equipment to see that they are in place and correctly adjusted. In addition, they will perform a run-in test of at least 50 miles as described in AR 850-15, paragraph 25, table III, according to procedures in paragraph 27 below.

b. Correction of Deficiencies. Deficiencies disclosed during the course of the run-in test will be treated as follows:

(1) Correct any deficiencies within the scope of the maintenance echelon of the using organization before the vehicle is placed in service.

(2) Refer deficiencies beyond the scope of the maintenance echelon of the using organization to a higher echelon for correction.

(3) Bring deficiencies of serious nature to the attention of the supplying organization.

27. RUN-IN TEST PROCEDURES.

a. Preliminary Service.

(1) FIRE EXTINGUISHER. See that portable extinguisher is present and in good condition. Test it momentarily for proper operation, and mount it securely.

(2) FUEL, OIL, AND WATER. Fill fuel tanks. Check crankcase oil and coolant supply, add oil and coolant as necessary to bring to correct levels. Allow room for expansion in fuel tanks and radiator. During freezing weather, test value of antifreeze and add as necessary to protect cooling system against freezing. CAUTION: *If there is a tag attached to filler cap or steering wheel concerning engine oil in crankcase, follow instructions on tag before driving the vehicle.*

(3) FUEL FILTER. Inspect fuel filter for leaks, damage and secure mountings and connections. Drain filter sediment bowl. If any appreciable amount of water or dirt is present, remove bowl, and clean bowl and element in dry-cleaning solvent. Also drain accumulated water or dirt from bottom of fuel tank. Drain only until fuel runs clean.

(4) BATTERY. Make hydrometer and voltage test of battery, and add clean water to bring electrolyte 3/8 inch above plates.

(5) AIR CLEANER AND BREATHER CAP. Examine carburetor and crankcase ventilator breather cap to see if they are in good condition and secure. Remove elements from both units, and wash thoroughly in dry-cleaning solvent. Fill reservoirs to bead level with fresh oil, and reinstall securely. Be sure all gaskets are in good condition, and that ducts and air horn connections are tight.

(6) ACCESSORIES AND BELT. See that accessories such as carburetor, generator, regulator, cranking motor, distributor, water pump, fan, and oil filter, are securely mounted. Make sure that fan, and generator drive belt is in good condition, and adjusted to have 1/2- to 3/4-inch finger-pressure deflection.

(7) ELECTRICAL WIRING. Examine all accessible wiring and conduits to see if they are in good condition, securely connected, and properly supported.

(8) TIRES. See that all tires, including spare, are properly inflated to 55 pounds cool; that stems are in correct position; all valve caps present and fingertight. Inspect for damage and remove objects lodged in treads and carcasses and between duals.

(9) WHEEL AND FLANGE NUTS. See that all wheel mounting and axle flange nuts are present and secure.

(10) FENDERS AND BUMPER. Examine front fenders and front bumper and rear splash guards for looseness and damage.

(11) TOWING CONNECTIONS. Inspect all towing shackles, and pintle hook, for looseness or damage. See that pintle, connecting mechanism operates properly, and latches securely.

(12) BODY AND TARPAULIN. See that all cab and body mountings are secure. Inspect attachments, hardware, glass, seats, doors, stakes and sockets, to see if they are in good condition and properly and securely installed or mounted. See that cargo body top bows, tarpaulin and end curtains are secure and not damaged; that tarpaulin and curtains (when in use) are correctly lashed to body hooks.

(13) LUBRICATE. Perform a complete lubrication of the vehicle, covering all intervals, according to the instructions on the Lubrication Guide, paragraph 21, except gear cases, wheel bearings, and other units lubricated or serviced in items 1 to 12. Check all gear case oil levels, and add as necessary to bring to correct level. Change only if condi-

tion of oil indicates the necessity, or if gear oil is not of proper grade for existing atmospheric temperature. NOTE: *Perform items (14) to (17) during lubrication.*

(14) SPRINGS AND SUSPENSIONS. Inspect front and rear springs and "shocks" to see that they are in good condition, correctly assembled, secure, and that bushings and shackle pins are not excessively loose, or damaged.

(15) STEERING LINKAGE. See that all steering arms, rods and connections are in good condition and secure; and that gear case is securely mounted and not leaking excessively.

(16) PROPELLER SHAFTS. Inspect shaft, centerbearing, and universal joints to see if they are in good condition, correctly assembled, alined, secure, and not leaking excessively.

(17) AXLE AND TRANSFER VENTS. See that rear axle housing vent is present, in good condition, and not clogged.

(18) CHOKE. Examine choke to be sure it opens and closes fully in response to operation of choke button.

(19) ENGINE WARM-UP. Start engine and note if cranking motor action is satisfactory, and engine has any tendency toward hard starting. Set hand throttle to run engine at fast idle during warm-up. During warm-up, reset choke button so engine will run smoothly, and to prevent overchoking and oil dilution.

(20) INSTRUMENTS.

(a) *Oil Pressure Gage.* Immediately after engine starts, observe if oil pressure is satisfactory. Normal hot pressure at running speeds is approximately 30 pounds, at idle 10 to 15 pounds. Stop engine if pressure is not indicated in 30 seconds.

(b) *Ammeter.* Ammeter should show slight positive (+) charge. High charge may be indicated until generator restores to battery, current used in starting.

(c) *Temperature Gage.* Engine temperature should rise gradually during warm-up period to normal operating range. 155° F to 185° F.

(d) *Fuel Gage.* With selector switch in relative position, gage should register "FULL," if tanks have been filled.

(21) ENGINE CONTROLS. Observe if engine responds properly to controls and if controls operate without excessive looseness or binding.

(22) HORN AND WINDSHIELD WIPERS. See that these items are in good condition and secure. If tactical situation permits, test horn for proper operation and tone. See if wiper arms will operate through their full range and that blade contacts glass evenly and firmly.

(23) GLASS AND REAR VIEW MIRRORS. Clean all body glass and

mirrors and inspect for looseness and damage. Adjust rear view mirrors for correct vision.

(24) LAMPS (LIGHTS) AND REFLECTORS. Clean lenses and inspect all units for looseness and damage. If tactical situation permits, open and close all light switches to see if lamps respond properly.

(25) LEAKS, GENERAL. Look under vehicle, and within engine compartment, for indications of fuel, oil, coolant, and brake fluid leaks. Trace any leaks found to source, and correct, or report, them to designated authority.

(26) TOOLS AND EQUIPMENT. Check tools and On Vehicle Stowage Lists, paragraphs 23 to 25, to be sure all items are present, and see that they are serviceable and properly mounted or stowed.

b. Run-in Test. Perform the following procedures (1) to (11) inclusive during the road test of the vehicle. On vehicles which have been driven 50 miles or more in the course of delivery from the supplying to the using organization, reduce the length of the road test to the least mileage necessary to make observations listed below. CAUTION: *Continuous operation of the vehicle at speeds approaching the maximums, indicated on the caution plate, should be avoided during the test.*

(1) DASH INSTRUMENTS AND GAGES. Do not move vehicle until engine temperature reaches 135° F. Maximum safe operating temperature is 200° F. Observe readings of ammeter, oil, temperature, and fuel gages, to be sure they are indicating the proper function of the units to which they pertain. Also see that speedometer registers the vehicle speed and that odometer registers accumulating mileage.

(2) BRAKES: FOOT AND HAND. Test service brakes to see if they stop vehicle effectively, without side pull, chatter, or squealing, and observe if pedal has ¼-inch free travel before meeting resistance, and 2-inch toeboard clearance when applied. Parking brake should hold vehicle on reasonable incline, with ⅓ reserve lever travel available. Observe if hydrovac-brake booster operates properly to assist service brake application. CAUTION: *Avoid long application of brakes until shoes become evenly seated to drums.*

(3) CLUTCH. Observe if clutch operates smoothly without grab, chatter or squeal on engagement, or slippage (under load) when fully engaged. See that pedal has 1½-inch free travel before meeting resistance. CAUTION: *Do not ride clutch pedal at any time, and do not engage and disengage new clutch severely or unnecessarily until driven and driving disks have become properly worn in.*

(4) TRANSMISSION. Gear shift mechanism should operate easily and smoothly, gears should operate without unusual noise, and not slip out of mesh.

(5) STEERING. Observe steering action for binding or looseness,

and note any excessive pull to one side, wander, shimmy, or wheel tramp. See that column, bracket, and wheel are secure.

(6) ENGINE. Be on the alert for any abnormal engine operating characteristics or unusual noise, such as lack of pulling power or acceleration; backfiring, misfiring, stalling, overheating, or excessive exhaust smoke. Observe if engine responds properly to all controls.

(7) UNUSUAL NOISE. Be on the alert throughout road test for any unusual noise from body and attachments, running gear, suspensions, or wheels, that might indicate looseness, damage, wear, inadequate lubrication, or under-inflated tires.

(8) HALT VEHICLE AT 10-MILE INTERVALS FOR SERVICES (9) TO (11), BELOW.

(9) BRAKE BOOSTER OPERATION. Listen at the hydrovac air cleaner for air movement, as the brake pedal is applied and released several times, as a quick test to determine if system is operating.

(10) TEMPERATURES. Cautiously hand-feel each brake drum and wheel hub for abnormal temperatures. Examine transmission, transfer case, and differential housings for indications of overheating and excessive lubricant leaks at seals, gaskets, or vents. **NOTE:** *Transfer case temperatures are normally higher than other gear cases.*

(11) LEAKS. With engine running, and fuel, engine oil, and cooling systems under pressure, look within engine compartment and under vehicle for indications of leaks.

c. Vehicle Publications and Reports.

(1) PUBLICATIONS. See that vehicle Technical Manuals, Lubrication Guide, Standard Form No. 26 (Drivers Report-Accident, Motor Transportation and W.D., AGO Form No. 478 (MWO and Major Unit Assembly Replacement Record), are in the vehicle, legible, and properly stowed. NOTE: U.S.A. registration number and vehicle nomenclature must be filled in on Form No. 478 for new vehicles.

(2) REPORTS. Upon completion of the run-in test, correct or report any deficiencies noted. Report general conditions of the vehicle to designated individual in authority.

Section IX

SECOND ECHELON PREVENTIVE MAINTENANCE

28. SECOND ECHELON PREVENTIVE MAINTENANCE.

a. Regular scheduled maintenance inspection and services are a

preventive maintenance function of the using arms, and are the responsibility of commanders of operating organizations.

(1) FREQUENCY. The frequencies of the preventive maintenance services outlined herein are considered a minimum requirement for normal operation of vehicles. Under unusual operating conditions such as extreme temperatures, dusty or sandy terrain, it may be necessary to perform certain maintenance services more frequently.

(2) FIRST ECHELON PARTICIPATION. The drivers should accompany their vehicles and assist the mechanics while periodic second echelon preventive maintenance services are performed. Ordinarily the driver should present the vehicle for a scheduled preventive maintenance service in a reasonably clean condition; that is, it should be dry and not caked with mud or grease to such an extent that inspection and servicing will be seriously hampered. However, the vehicle should not be washed or wiped thoroughly clean, since certain types of defects, such as cracks, leaks, and loose or shifted parts or assemblies are more evident if the surfaces are slightly soiled or dusty.

(3) If instructions other than those contained in the general procedures in step (4) or the specific procedures in step (5) which follows, are required for the correct performance of a preventive maintenance service or for correction of a deficiency, other sections of the vehicle Operator's Manual pertaining to the item involved, or a designated individual in authority, should be consulted.

(4) GENERAL PROCEDURES. These general procedures are basic instructions which are to be followed when performing the services on the items listed in the specific procedures. NOTE: *The second echelon personnel must be thoroughly trained in these procedures so that they will apply them automatically.*

(a) When new or overhauled subassemblies are installed to correct deficiencies, care should be taken to see that they are clean, correctly installed, properly lubricated and adjusted.

(b) When installing new lubricant retainer seals, a coating of the lubricant should be wiped over the sealing surface of the lip of the seal. When the new seal is a leather seal, it should be soaked in SAE 10 engine oil (warm if practicable) for at least 30 minutes. Then, the leather lip should be worked carefully by hand before installing the seal. The lip must not be scratched or marred.

(c) The general inspection of each item applies also to any supporting member or connection, and usually includes a check to see whether or not the item is in good condition, correctly assembled, secure, or excessively worn. The mechanics must be thoroughly trained in the following explanations of these terms.

1. The inspection for "good condition" is usually an external visual inspection to determine whether or not 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.

2. The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether or not it is in its normal assembled position in the vehicle.

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

4. "Excessively worn" will be understood to mean worn close to, or beyond, serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

(d) Special Services. These are indicated by repeating 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 include:

1. *Adjust.* Make all necessary adjustments in accordance with the pertinent section of the vehicle Operator Manual, special bulletins, or other current directives.

2. *Clean.* Clean units of the vehicle with dry-cleaning solvent to remove excess lubricant, dirt, and other foreign material. After the parts are cleaned, rinse them in clean fluid and dry them thoroughly. Take care to keep the parts clean until reassembled, and be certain to keep cleaning fluid away from rubber or other material which it will damage. Clean the protective grease coating from new parts as this material is not generally a good lubricant.

3. *Special Lubrication.* This applies either to lubrication operations that do not appear on the vehicle lubrication chart and to items that do appear on such charts but 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 or cartridge.

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 torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to

include the correct installation of lock washers, lock nuts, and cotter pins provided to secure the tightening.

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

(f) The numbers of the preventive maintenance procedures that follow are identical with those outlined on W.D. AGO Form No. 461, which is the "Preventive Maintenance Service Work Sheet for Wheeled and Half-Track Vehicles". Certain items on the work sheet that do not pertain to this vehicle are not included in the procedures in this manual. In general, the numerical sequence of items on the work sheet is followed in the manual procedures, but in some instances there is deviation for conservation of the mechanic's time and effort.

(5) SPECIFIC PROCEDURES. The procedures for performing each item in the 1,000-mile (monthly) and 6,000-mile (six-month) maintenance procedures are described in the following chart. Each page of the chart has two columns at its left edge corresponding to the 6,000-mile and 1,000 mile maintenance respectively. Very often it will be found that particular procedure does not apply to both scheduled maintenances. In order to determine which procedure to follow, look down the column corresponding to the maintenance due, and wherever an item number appears perform the operations indicated opposite the number.

6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		ROAD TEST
		NOTE: When the tactical situation does not permit a full road test, perform those items which require little, or no movement of the vehicle. When a road test is possible, it should be for, preferably 5 miles, and not over 10 miles.
1	1	*Before-operation Service.* Perform the Before-operation Service as described in paragraph 17.
3	3	*Dash Instrument and Gages.* *Oil Pressure Gage.* Oil pressure should be 30 pounds minimum at 2,000 revolutions per minute, 10 to 15 pounds at normal idling speed. CAUTION: Stop *engine if oil pressure is too low for safe engine operation at any speed.*

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		Ammeter. Ammeter should show a positive (+) charge for short period after starting engine, until generator restores to batteries current used in starting. Time will depend on condition of charge of batteries and electrical load carried. With batteries fully charged and regulator unit cut in, ammeter may show zero or only slight charge. Stop engine and investigate discharge (–) readings with engine running and lights and accessories turned off. *Engine Temperature Gage.* Reading should increase gradually during warm-up to normal operating temperature, 155° F to 185° F. *Fuel Gage.* Should register approximate amount of fuel in each tank at all times, with selector switch in relative position.
4	4	*Horns, Mirror, and Windshield Wipers.* If tactical situation permits, test horns for proper operation and tone. Examine rear vision mirror and wipers to see that they are in good condition, secure, and that wiper blades contact glass evenly and operate through their full range without indications of loose wiper motor mountings. Adjust mirror for correct rear vision.
5	5	*Brakes (Service and Parking, Braking Effect, Fuel, Side Pull, Noise, Chatter, Pedal Travel).* Operate brakes at various speeds during road test. *Service Brakes.* Apply foot pedal sufficiently to stop vehicle in minimum distance and observe its effectiveness, any pull to one side, unusual noise or chatter. Pedal should depress with little effort, and should return to off position when released, and have ¼-inch free travel before meeting resistance. *Parking Brake.* Stop vehicle on reasonable incline; apply parking brake and observe if it holds vehicle effectively; that lever has at least ⅓ travel in reserve, and that ratchet and pawl latch the applied brake securely.
6	6	*Clutch (Free Travel, Drag, Noise, Chatter, Grab, Slip).* Pedal free travel should be 1½ inches before meeting resistance. Test clutch for drag when shifting into low gear. Clutch should stop transmission entirely and shift

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		should be made without clashing. Note any unusual noise when pedal is depressed which may indicate defective or dry release bearing. With transmission in gear, note any tendency to chatter or grab when clutch is engaged, or slippage when fully engaged under load.
7	7	*Transmission (Lever Action, Vibration, Noise).* Lever should move into each gear range position easily and quietly. Note any vibration that may indicate loose mountings, or noise that may indicate damaged, excessively worn, or inadequately lubricated parts.
8	8	*Steering (Free Play, Bind, Wander, Shimmy, Side Pull, Column and Wheel).* With vehicle in motion move steering wheel fully in both directions and observe whether or not there is any indication of looseness or binding. See that steering column and wheel are in good condition and secure. Note any tendency to wander, shimmy, or pull to one side.
9	9	*Engine (Idle, Acceleration, Power, Noise, and Governed Speed).* Observe engine operating characteristics as follows: *Idle.* Engine should idle smoothly and not stall while shifting gears. *Unusual Noises.* Listen for knocks and rattles as the engine is accelerated, and decelerated, and while it is under both light and heavy loads. *Acceleration and Power.* Operate the engine at various speeds in all gear ratios, noting whether or not the vehicle has normal pulling power. Note any tendency to stall while shifting. A slight ping during fast acceleration is normal. Continued or heavy ping may indicate early timing, heavy accumulation of carbon. *Governed Speed.* With the vehicle in a low gear, slowly depress the accelerator to the toeboard and by observing the speedometer reading, see if the vehicle reaches, but does not exceed, the governed speed specified on the caution plate.
10	10	*Unusual Noises (Attachments, Cab, Body, and Wheels).* Be on the alert during road test for any noise that may indicate loose or damaged attachments mounted on vehicle, loose cab or body mountings, floor plates, doors,

6,000 Mile Maint. (six-month)	..,000 Mile Maint. (mon-thly)	
		windshield or hardware. Listen particularly for indications of loose wheel mountings.
11	11	*Brake Booster Operation.* Whenever brakes are applied, observe if the hydrovac unit assists in the application satisfactorily. Listen at hydrovac air cleaner unit for air movement, indicating unit is operating.
13	13	*Temperatures (Brake Drums, Hubs, Axle and Transmission).* Place hand cautiously on all brake drums and wheel hubs to see if they are abnormally hot. Inspect axle housing and transmission for indications of overheating.
14	14	*Leaks (Engine Oil, Water, Fuel).* Look in engine compartment, and under vehicle for indications of engine oil, coolant, brake fluid or fuel leaks. Trace those found to their source and correct, or report them.
		MAINTENANCE OPERATIONS
		(Raise Vehicle, Block Safely)
16	16	*Gear Oil Level and Leaks.* Remove filler plugs in rear axle and transmission and check lubricant levels. Proper level is from lower edge of filler hole to ½ inch below when hot. Allow sufficient time for foaming to subside before checking levels. Note condition of lubricant. If an oil change is due in any of these units or condition of lubricant indicates an oil change is necessary, drain and refill units with fresh specified oil. Note any indications of excessive lubricant leaks at oil seals or gaskets.
17	17	*Unusual Noises (Engine, Belt, Accessories, Transmission, Shafts and Joints, Axle and Wheel Bearings).* With engine running, observe as follows: *Engine, Belt, and Accessories.* Accelerate and decelerate the engine momentarily and listen for any unusual noise in these units that might indicate damaged, loose, or excessively worn engine parts, drive belt, or accessories. Also be sure to locate and correct or report any unusual engine noise heard during the road test. *Transmission, Propeller Shafts and Universal Joints, Axle and Wheel Bearings.* With the transmission in an intermediate gear, operate these units at a constant, moderate speed by use of the hand throttle, and listen

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		for any unusual noise that might indicate damaged, loose or excessively worn unit parts. Also observe the propeller shafts and wheels for vibrations and run-out, and for vibrations in the other units which may indicate looseness or unbalance. Also be sure to locate and correct, or report, any noise noted during road test.
18	18	*Cylinder Head and Gasket.* Look for cracks, or indications of oil, coolant, or compression leaks around studs, cap screws and gasket. CAUTION: *Cylinder head should not be tightened unless there is definite evidence of leaks. If tightening is necessary, use torque indicating wrench, and tighten head nuts in the proper sequence and to 50 foot-pounds tension.* Tighten cylinder head to dash bond strap.
19		*Valve Mechanism (Cover Gaskets).* Inspect valve covers to make sure they are tight and gaskets not leaking.
	20	*Spark Plugs (Gaps, Deposits).* Without removal, wipe off plugs and examine insulators for damage or indications of compression leaks.
20		Remove all plugs and examine to see that they are in good condition. Pay particular attention to broken insulators, excessive carbon or oxide deposits, and to electrodes burned thin. Clean plugs thoroughly. If plug cleaner is not available, install new or reconditioned plugs. NOTE: *Do not install plugs until item 21 has been performed.* Set plug gaps to 0.025 inch by bending only grounded electrodes.
21		*Compression Test.* Test compression with all spark plugs removed. Compression pressure at cranking speed is normally 117 pounds. There should not be more than 10-pounds variation between cylinders. Record compression pressures on space provided on back of work sheet, Form No. 461.
22	22	*Battery (Cables, Hold-downs, Carrier, Record Gravity, and Voltage).* Inspect battery case for cracks and leaks. Clean top of battery. Inspect cables, terminals, bolts, posts, straps and hold-downs for good condition. Test specific gravity and voltage and record on W.D. AGO

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		Form No. 461. Specific gravity readings below 1.225 indicate battery should be recharged or replaced. Electrolyte level should be ⅜ inch above top of plates.
22		Perform high-rate discharge test according to "conditional" test instructions which accompany the testing instrument, and record voltage on W.D. AGO Form 261. Cell variation should not be more than 30 percent. NOTE: *Specific gravity must be above 1.225 to make this test.*
22	22	Bring electrolyte to proper level by adding distilled or clean water. Clean entire battery and carrier. Repaint carrier if corroded. Clean battery cable terminals, terminal bolts and nuts, and battery posts, and grease lightly. Inspect bolts for serviceability. Tighten terminals and hold-downs carefully to avoid damage to battery.
23	23	*Crankcase (Leaks, Oil Level).* With engine idling, examine crankcase, valve covers, timing-gear cover, and clutch housing for oil leaks. Stop engine and after oil has drained into crankcase, check to see if it is up to proper level. If an oil change is due, or condition of oil indicates the necessity, drain crankcase and refill to correct level with fresh specified oil. NOTE: *Do not start engine again until item 24 has been performed.*
24	24	*Oil Filter and Lines.* Inspect oil filter and external engine oil lines to see that they are in good condition, secure, and not leaking. Remove filter body drain plug and run off contents. Remove filter element and inspect for excessive accumulated dirt or sludge. If a filter element change is due, or condition of oil indicates the necessity, replace filter element, being sure gaskets are in place and tighten cover and drain plug securely.
25	25	*Radiator (Core, Shell, Mountings, Hose, Cap and Gasket, Antifreeze Record, Overflow Pipe).* Inspect all applicable items to see that they are in good condition, secure, and not leaking. Be sure overflow pipe is not kinked or clogged. Examine condition of coolant to see whether or not it is so contaminated that cooling system should be cleaned. If cleaning is necessary, proceed only according to current directions covering proper procedure and recommended cleaner, neutralizer and inhi-

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		bitor materials. Clean all insects, dirt or grease deposits from core air passages and inspect for bent cooling fins. CAUTION: *Use only a suitably shaped piece of wood or blunt instrument to straighten fins.* If antifreeze is in use, test its protective valve and record in space provided on back of work sheet W.D. AGO Form No. 461.
		Tighten. Carefully tighten all loose radiator mountings, connections, and hose clamps. Tighten also, radio noise suppression bond straps, particularly where internal-external to lock washers are used for bonding.
26	26	*Water Pump and Fan.* Inspect pump to see that it is in good condition, secure and not leaking. Examine shaft for end play or bearing looseness. Inspect fan to see if it is in good condition and that blades and hub are secure. Loosen drive belts and examine fan and hub for bearing wear. Leave drive belts loose until adjustment is made (item 29).
		Tighten. Carefully tighten water pump, fan assembly, and mounting nuts.
27	27	*Generator, Cranking Motor, and Switch.* Inspect generator, cranking motor, and cranking motor switch to see that they are in good condition and securely mounted. See that wiring and radio noise suppression condensers mountings (and connections) are clean and secure.
27		Remove generator and cranking motor inspection cover and examine commutators and brushes to see that they are in good condition; that brushes are free in brush holders and have sufficient spring tension to hold them in proper contact with commutators; and that brush connecting wires are secure and not chafing.
27		*Clean.* Blow out commutator end of generator and cranking motor with compressed air. If commutators are dirty, clean only with 00 sand paper (do not use emery) placed over end of suitably sized piece of wood, and again blow out with air.
27		*Tighten.* Carefully tighten cranking motor mounting bolts securely.
29	29	*Drive Belt and Pulleys.* Observe drive belt for evidence of fraying condition, excessive wear, and deterioration. Inspect all drive pulleys and hubs to see that they are in good condition and securely mounted.

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		Adjust. Set adjustment so drive belt has ½- to ¾-inch finger-pressure deflection.
31	31	*Distributor (Cap, Rotor, Points, Shaft, Advance Units).* Observe whether or not distributor body and external attachments are in good condition and secure. Examine other parts as follows: *Cap, Rotor, and Points.* Clean dirt from cap and remove. Inspect cap, rotor and breaker plate to see that they are in good condition, secure and serviceably clean. Pay particular attention to cracks in cap and rotor, corrosion of terminals and connections, and to burned rotor bar or contact points. See that points are well aligned and adjusted to 0.020 inch, when wide open. If inside of distributor is dirty, remove assembly, clean in dry-cleaning solvent, dry thoroughly with compressed air and lubricate its friction parts very lightly. When cleaning remove wick and lubrication cup, clean them, reoil and replace after cleaning distributor. If breaker points are pitted, burned or worn to an unserviceable degree, replace. If burned, replace condenser as this may be the cause. When cleaning points, use fine file or 00 sandpaper (never use emery) and blow out filings with compressed air. *Shaft.* Test shaft by hand-feel for excessive wear in shaft or bushings. *Centrifugal Advance.* Install rotor on shaft and test distributor governor by finger force for normal range of movement permitted by mechanism. Note whether or not it returns to original position when released without hang up or binding.
31	31	*Special Lubrication.* Lubricate cam surfaces, breaker arm pin, and wick according to lubrication guide instructions.
31		*Adjust.* Set breaker point gap to 0.020 inch when wide open.
32	32	*Coils and Wiring.* Inspect coil, ignition wiring including shielding or conduits and radio noise suppression condenser on coil and suppression at spark plugs and distributor, to see that they are in good condition, clean, securely connected and properly mounted. Inspect all

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		low voltage wiring in engine compartment in a like manner.
33	33	*Manifolds and Gaskets.* Inspect for looseness, damage or exhaust leaks at gaskets. Examine for evidence of cracks or sand holes usually indicated by carbon streaks.
33		*Tighten.* Carefully tighten all manifold assembly and mounting nuts securely.
34	34	*Air Cleaner.* Inspect carburetor air cleaner to see that it is in good condition, securely mounted, connected, and not leaking. Remove reservoir and element, clean in dry-cleaning solvent, dry, fill reservoir to proper level with clean engine oil, and reassemble.
35	35	*Breather Cap.* Inspect crankcase breather cap to see if it is in good condition, secure and not leaking. Remove oil reservoir and element, wash clean in dry-cleaning solvent, refill reservoir with fresh engine oil and reassemble securely.
36	36	*Carburetor (Choke, Throttle, Linkage, and Governor).* See that they are in good condition, correctly assembled, and securely installed; that the carburetor does not leak; that the control linkage, including the choke and throttle shaft, is not excessively worn; that the choke valve opens fully when the control is in its released position; that the throttle valve opens fully when the accelerator is fully depressed; and that the governor is secure and properly sealed.
37	37	*Fuel Filter and Lines.* Examine filter to see that it is in good condition, securely mounted, connected and not leaking. Examine connecting lines for damage and leaks. *Clean.* Close fuel shut-off and remove filter sediment bowl and element. Wash clean in dry-cleaning solvent, and reassemble securely, being sure gaskets are in place. CAUTION: *If element cannot be cleaned by washing, replace the unit. Do not scrape element to clean.* Turn on fuel supply and recheck for leaks.
38	38	*Fuel Pump (Pressure and Capacity).* Inspect pump to see that it is in good condition, securely mounted and not leaking. Remove pump sediment bowl and wash

6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		bowl and screen in dry-cleaning solvent. Be sure gasket is in place and serviceable when bowl is reinstalled.
38		Attach a test gage to pressure side of fuel pump and after starting engine in item 39 see that pressure is satisfactory. It should be 3½-pounds minimum, 4½-pounds maximum.
39	39	*Cranking Motor (Action, Noise, Speed).* Start the engine, observing whether or not the general action of the cranking motor is satisfactory, particularly whether or not it engages and operates properly without excessive noise and has adequate cranking speed; and whether or not the engine starts readily. Also, as soon as the engine starts, note whether or not the pressure gage and ammeter indications are satisfactory.
40	40	*Leaks (Engine Oil, Fuel, and Water).* With the engine running, recheck all points of oil, fuel and cooling system for leaks. Trace those found to their sources, and correct or report them.
41		*Ignition Timing.* Set ignition timing according to specifications and instructions, paragraph 60.
42	42	*Engine Idle and Vacuum Test.* Inspect as follows: *Adjust.* Connect a vacuum gage to the intake manifold at wiper connection, adjust the engine to its normal idle speed by means of the throttle stop screw, and then adjust the idle-mixture adjusting needle until the vacuum gage indicates a steady maximum reading. If this latter adjustment changes the idle speed appreciably, reset the idle speed and mixture until both are satisfactory. If the two adjustments are made simultaneously, time will be saved. *Vacuum Test.* With the engine running at normal idling speed, the vacuum gage should read about 18 to 21 inches and the pointer should be steady. A badly fluctuating needle, between 10 and 15 inches, may indicate a defective cylinder head gasket or valve. An extremely low reading may indicate a leak in the intake manifold or gasket. Accelerate and decelerate the engine quickly. If the gage indicator fails to drop to approximately two inches as the throttle is opened, and then fails to recoil to at least 24 inches as the throttle

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		is closed, it 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.*
43	43	*Regulator Unit (Connections, Voltage, Current and Cut-out).* Inspect regulator unit to see that it is in good condition, securely mounted and connected, and clean. See that radio noise suppression condensers are securely connected and mounted.
43		*Test.* Connect the low voltage circuit tester and observe whether or not the voltage regulator, current regulator, and cut-out control the generator out-put properly. Follow the instructions in the vehicle manual, or those which accompany the test instrument. Replace if test shows faulty operation. CAUTION: *This test should be made only after the regulator unit has reached normal operating temperature.*
47	47	*Tires and Rims (Valve Stems and Caps, Condition, Direction, Matching, Spare Carrier).* Inspect as follows: *Valve Stems and Caps.* Observe whether or not all valve stems are in good condition and in correct position, and that all valve caps are present and installed securely. Do not tighten with pliers. *Condition.* Examine all tires for cuts, bruises, breaks, and blisters. Remove embedded glass, nails, and stones. Look for irregular tread wear, watching for any sign of flat spots, cupping, feather edges and one-sided wear. Remove tires worn thin at center of tread (or other unserviceable tires) and exchange for new or retreaded tires. Any mechanical deficiencies causing such conditions should be determined, and corrected, or reported. The wheel positions of tires with irregular wear should be changed to even up the wear. Front tires, worn irregular, should be moved to rear-wheel positions. *Direction.* Directional tires and non-directional tires should not be installed on the same vehicle. Directional tires on rear wheels should be mounted so that the "V" of the chevron will point down when viewed from the front. Directional tires on all front wheels will ordi-

6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		narily be mounted so that the "V" of the chevrons will point up when viewed from the front. *Matching.* With the tires properly inflated, inspect them to see that they are matched according to overall circumference and type of tread. *Spare-tire Carriers.* See whether or not spare-tire carriers are in good condition and secure. *Rims.* All rims and their lock rings or flanges should be in good condition and secure. *Tighten.* All wheel rim flange or lug nuts should be tightened securely.
47		*Serve.* With the tires properly inflated, to 55 pounds (cool), measure the overall circumference of all tires including spares. Select the tires to be mounted on duals of driving axle, so that they will not have differences in overall circumference exceeding ¾ inch. Mount all dual tires with the larger tire outside. The valve stems should be opposite each other; the one on the inner wheel should point out and the one on the outer wheel should point in. NOTE: *The spares must be matched properly and mounted for use on one of the road wheels at intervals not exceeding ninety days. A convenient time to do this is during these maintenance services.* CAUTION: *After performing the tire-matching service, do not reinstall the wheels until the wheel-bearing services are completed.*
48		*Rear Brakes (Drums, Supports, Cylinders, Cams).* Remove rear wheels and inspect and service as follows: On 6,000-mile maintenance, several wheel bearing and brake items up to 52 are group services and overlap. Perform in best order for economy of time and orderly reassembly. *Drums and Supports.* Clean dirt and grease from drums and supports (dust shields) keeping dry-cleaning solvent away from linings. Examine drums and supports to see that they are in good condition, securely mounted and if drums are excessively worn or scored. *Wheel Cylinders.* Observe whether or not they are in good condition and securely mounted. Pay particular attention for deterioration of rubber end covers. Examine for fluid leaks. If leaks are evident, replace wheel cylinder.

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		Cams. See that cams, and brake shoe surface they contact, are not excessively worn; that cams turn freely in their bushings, and that bushings are not worn. *Tighten.* Tighten brake support cap screws and hub to drum nuts, securely.
	49	*Rear Brake Shoes (Linings, Anchors, Springs).* Examine linings through inspection holes to see whether or not they are so worn rivet heads may contact drums within next 1,000 miles of operation. If vehicle has been operated in deep water, mud or loose sand, remove right rear wheel and examine lining for damage. If this lining must be replaced, remove all wheels, check their brakes and service as necessary, being sure to clean, lubricate and adjust all removed wheel bearings as described in item 52 below for 6,000 mile service.
49		*Adjust.* Adjust shoes by minor method if necessary.
49		With rear wheels removed check linings to see that they are in good condition, tightly secured to brake shoes, in good wearing contact with drums, free of dirt or lubricant and not excessively worn. Also see that shoes are in good condition, properly secured to anchors, guides and retracting springs and that springs have sufficient tension to return shoes properly to released position. Thickness of lining at most worn point should be enough for at least 1,000 miles of service before rivet heads are likely to contact drums. *Clean.* Carefully clean all dirt and grease from linings with wire brush, cloth, or compressed air. *Adjust.* After subsequent related items up to and including 60 are completed, adjust shoes by minor method. If new linings have been installed, adjust by major method described in paragraph 131 b.
52	52	*Rear Wheels (Bearings, Seals, Drive Flanges, and Nuts).* Inspect and service as follows: *Wheels.* Inspect wheels to see that they are in good condition and secure. *Bearings and Seals.* Check for looseness of wheel bearing adjustment. Revolve wheels and listen for evidence of dry or damaged bearings. Inspect around flanges and brake supports for lubricant leaks.

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		Drive Flanges and Nuts. Note whether or not they are in good condition and whether or not nuts are tightened securely.
52		*Clean.* Disassemble rear wheel bearings and oil seals. Clean thoroughly in dry-cleaning solvent and examine bearing cups and cones to see that they are in good condition; if machined surfaces they contact are in good condition and that there is no excessive wear.
		Special Lubrication. When all of the related items are to the point where the wheel bearings are to be reinstalled, lubricate the bearings as follows: take care to have all parts clean and dry, the hands clean, and use clean lubricant; the inside of the wheel hub, and hub cap or hub flange, and outside of spindle or axle must be coated to a thickness of $\frac{1}{16}$ inch minimum with lubricant to retard rusting; bearing shall be either machine packed, or hand packed, by kneading lubricant into all spaces in the bearings; coat the cups or outer races and the lips of the oil seals with lubricants and install new lubricant retainer seals, if necessary. CAUTION: *Do not pack the large cavity in the wheel hubs between the wheel bearings with lubricant. To do so is to cause leakage past the seals.*
52		*Adjust.* After lubricating the wheel bearings, reassemble the hub and drum assemblies into place and adjust the wheel bearings correctly according to vehicle manual instructions (par. 127 **a**, 2 and **b**, 2).
53	53	*Front Brakes (Hose, Drums, Supports, Cylinders, Cams).* Inspect front brake hose and drums to see that they are in good condition, that hose is properly supported, securely connected and not chafing or leaking. Remove front wheels and inspect and service as follows:
		Drums and Supports. Clean and inspect in same manner as in item 48.
		Cylinders. Inspect in same manner as in item 48.
		Cams. Inspect in same manner as in item 48.
	54	*Front Brake Shoes (Linings, Anchors, Springs).* Inspect in same manner as in item 49.
		Adjust. Follow the minor method of adjusting, if necessary.

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
54		With front wheels removed inspect shoes, linings, anchors and springs in same manner as in item 49 for 6,000-mile service.
		Clean. Clean in same manner as in item 49.
54	54	*Adjust.* Follow procedure outlined in item 49 after subsequent related items to 60 inclusive are completed.
55		*Steering Knuckles.* Clean and examine knuckles (spindles) to see that they are in good condition, adequately lubricated, and not excessively worn. Pay particular attention for wear of spindle bolts, or bearings, and for loose or damaged spindle arms. Inspect machined surfaces that carry wheel bearings for excessive wear or damage.
56	56	*Front Springs (Clips, Leaves, U-bolts, Eye Bolts, Hangers, and Shackles).* See that they are in good condition, correctly assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. This may be an indication of a sheared center bolt. Note whether or not the deflection of both springs is normal and approximately the same. Test the hangers and bolts for excessive wear by means of a pry bar.
		Tighten. Tighten all spring U-bolts securely and uniformly.
57	57	*Steering (Arms, Tie Rods, Drag-link, Seals, Pitman Arm, Gear, Column, and Wheel).* See that these items are in good condition, correctly and securely assembled and mounted, whether or not the steering gear case is leaking lubricant and that the lubricant is at the proper level. Pay particular attention to the Pitman arm to see that it is securely mounted and not bent out of its normal shape. Also observe whether or not the steering system is in good adjustment.
57		*Tighten.* Tighten the Pitman arm shaft nut securely. Also tighten the steering gear case assembly and mounting nuts or screws, taking care not to disturb the adjusting screws and lock nuts. CAUTION: *Loosen the steering column bracket when tightening the steering case mounting nuts, so as not to distort the column.*

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
58	58	*Front Shock Absorbers and Links.* See that bodies are in good condition, secure to frame and not leaking, that links are secure and not damaged and if rubber bushings are hard or cracked apply brake fluid to exposed surfaces.
58		*Serve.* Fill shock absorber bodies with specified fluid. Work arm several times and add more fluid. Repeat operation until all air is expelled and reservoir is full. Then disconnect link and observe if action is normal. When arm is moved by hand there should be resistance both ways.
60	60	*Front Wheels (Bearings, Seals, Flanges, and Nuts).* Inspect front wheels, bearings, seals, drive flanges and nuts in same manner as in item 52 for similar rear wheel items.
60		*Clean.* Disassemble, clean and inspect the front wheel bearings and oil seals in same manner as described in item 52.
60		*Special Lubrication.* Apply in same manner as described in item 52.
60		*Adjust.* When front wheels are reinstalled, adjust bearings according to instructions in paragraph 127 a (2).
61	61	*Front Axle (Alinement).* Note whether or not axle is sprung or bent, or is properly alined and securely mounted. If it appears to be out of line measure the distance from the front spring eye bolt to corresponding points on the axle. This distance should be the same on each side.
63	63	*Engine (Mountings, Ground Strap, Side Panel).* They should be in good condition and securely mounted and connected. Be sure to examine both front and rear engine mountings. Examine also radio noise suppression bond strap at rear engine mounting, and bond strap between timing case cover and frame. Examine rubber-type mountings to see that rubbers are not separating from their metal backings. If the mounting bolts are loose, tighten them properly, taking care not to overtighten any rubber spacer type or spring-type mountings. Remove oil or grease from rubber type mountings.
64	64	*Hand Brake (Ratchet and Pawl, Linkage, Drum, and Lining).* Examine to see that ratchet and pawl and

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		linkage are in good condition, secure and not excessively worn; that drum is not scored or oily; and that lining is not oil soaked or worn too thin.
64		*Adjust.* Set clearance between brake drum and lining to 0.010 inch when brake lever is released.
65	65	*Clutch Pedal (Free Travel, Linkage, Return Spring).* Check pedal free travel. Should be 1½ inch to 1¾ inch before meeting resistance. Examine to see that pedal is securely mounted to shaft, that clutch operating linkage is in good condition, secure and not excessively worn at friction joints. See that return spring has proper tension to bring pedal to correct released position.
65		*Adjust.* Set clutch pedal free travel 1½ inch to 1¾ inch, and lock adjustment securely.
66	66	*Brake Pedal (Free Travel, Linkage, Return Spring).* Pedal should have about ½-inch free travel before meeting resistance, and should clear floor board by about 2½ inches when fully applied. Pedal should operate easily. Inspect all linkage to see that it is in good condition, securely connected and not excessively worn at friction joints. Be sure return spring has tension to bring pedal to correct released position.
67	67	*Brake Master Cylinder (Fluid Level, Leaks, and Switch).* Inspect master cylinder to see that it is in good condition; securely mounted and connected; that it does not leak; that boot is properly installed and not damaged and that stop light switch is securely mounted and connected.
67		*Serve.* Remove filler plug and add fluid to correct level. Do not fill master cylinder to overflowing.
68	68	*Brake Booster, Hydrovac (Air Cleaner, Hose, Cylinder).* Inspect for fluid leaks and see that unit is correctly assembled and securely mounted.
68	68	*Clean and Serve.* Remove air cleaner element under seat. Clean in dry-cleaning solvent and dry. Saturate element with clean engine oil, drain off excess and reinstall.
68		*Special Lubrication.* Remove pipe plug from front of cylinder and plug in atmospheric inlet fitting and inject ½ ounce of oil, hydraulic, at each of these two points.

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6,000 Mile Maint. (six-month)	2,000 Mile Maint. (monthly)	
71	71	*Transmission (Mountings, Seals, Linkage).* Note whether or not transmission case is in good condition, securely mounted and inspect for lubricant leaks at seals and gaskets. Examine control linkage and shift mechanism for damage or excessive wear.
73	73	*Propeller Shafts (Joints, Seals, Flanges).* See that these items are in good condition, correctly and securely assembled and mounted; that the universal joints are properly alined with each other and are not excessively worn; that the slip joint is free, not excessively worn and well lubricated; and that the seals on the universa joints and slip joint do not leak.
73		*Tighten.* Tighten all universal joint assemblies and companion flange bolts securely.
74	74	*Center Bearing.* Examine propeller shaft center bearing to see that it is in good condition, securely mounted, not leaking lubricant or excessively worn.
74		*Rear Axle (Pinion End Play, Seals, Vent, and Alinement).* If axle appears to be out of line, measure distance from spring eye bolt to center of axle spring pad on each side. Distance should be equal. Inspect axle housing to see that it is in good condition and not leaking. Examine pinion shaft for excessive end play and seal for leaks.
		Clean. Clean axle housing vent passage.
77	77	*Rear Springs (Clips, Leaves, U-bolts, Eye Bolts, Hangers and Shackles).* Inspect and tighten in same manner as in item 56.
78	78	*Rear Shock Absorbers and Links.* Inspect in same manner as in item 58.
78		*Serve.* Service and make operating check in same manner as in item 58.
79	79	*Cab and Body Mountings.* Inspect all cab and cargo body mountings and floor to frame bond strap to see that they are all present, in good condition and secured.
		Tighten. Tighten cab spring loaded mountings until snug, but do not fully compress springs. CAUTION: *Loosen steering column bracket mountings before locating cab and tightening cab mounting bolts, then retighten steering column bracket. Tighten all loose cargo body mountings securely.*

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
80	80	*Frame (Side and Cross Members).* Inspect frame, brackets, side rails, and cross members to see that they are in good condition, secure, and correctly alined. If the frame is out of line, report the condition.
81	81	*Wiring, Conduits, and Grommets.* Observe these items underneath the vehicle, to see that they are in good condition, properly supported, connected, and secure.
82	82	*Fuel Tanks, Fittings, and Lines.* Inspect both fuel tanks to see that they are in good condition and securely mounted. Examine filler caps for defective gaskets and plugged vents. See that filler necks are in good condition and that caps fit securely.
82		Remove fuel tank drain plugs and drain off any accumulated dirt or water. Drain only until fuel runs clear and take all necessary precautions against fire.
83	83	*Brake Lines (Fittings and Hose).* Examine all lines and fittings and brake fluid hose under vehicle to see that they are in good condition, securely connected, and supported so lines or hose will not chafe against other vehicle parts.
84	84	*Exhaust Pipes and Muffler.* Examine the exhaust pipe to see that it is securely attached to the exhaust manifold, that the gasket or packing does not show visible evidence of leakage, and that the other end is clamped securely to the muffler. Inspect the muffler to see that it is in good condition and securely mounted. Check the tail pipe to see that it is securely clamped to the muffler, properly supported, and unobstructed at its outer end. See that the drain holes in the muffler are at lowest point and not clogged.
85	85	*Vehicle Lubrication.* *Lubricate.* Lubricate all points of the vehicle and any gun mounts in accordance with instructions in the vehicle manual, Lubrication Guide (par. 22), and current lubrication bulletins or directives. Use only clean lubricant. Keep all lubricant containers and dispensers covered except when withdrawing lubricant. Lubrication of items on the "Preventive Maintenance Service and Technical Inspection Work Sheet" that are marked with an L (Special Lubrication Symbol) should be omitted on this

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		"Vehicle Lubrication" service with the exception of the external lubrication cup of the distributor. This will avoid duplication and, in some cases, overlubrication. If lubrication fittings, flexible lines, vents or plugs, are found missing or damaged, they should be replaced immediately. Open any clogged lubrication passages until lubricant is properly delivered.
		Wipe off excess lubricant that may drip onto brakes, rubber parts, or detract from the vehicle's appearance.
		LOWER VEHICLE TO GROUND
86	86	*Toe-in and Turning Stops.* With front wheels on ground and in straight ahead position use the toe-in gage to determine whether or not adjustment is as specified. Should be $\frac{1}{16}$ inch. See that wheel turning stops are present and secure. Turn front wheels fully in both directions and see whether or not turn is limited by stops. In this position, note whether or not tires clear all parts of vehicle.
91	91	*Lights (Head, Tail, Body, Stop, and Blackout).* Operate all switches and note whether or not lamps respond. Include stop and blackout lights. See whether or not foot switch controls head lamp beams properly and that beams are aimed so that they do not blind oncoming traffic. Examine all lights to see that they are in good condition and securely mounted, and that neither the lenses are dirty nor the reflectors discolored.
91		*Adjust.* Adjust lamp unit beams.
92	92	*Safety Reflectors.* See that they are all present, in good condition, clean, and secure.
93	93	*Front Bumper, Tow Hooks, Brush Guards, and Grill.* See that they are in good condition, secure, and that radiator grill is not obstructed.
94	94	*Hood and Fasteners.* Inspect hood to see that it is in good condition and that fasteners operate properly and hold hood securely, and that hood to dash bond strap is securely connected.
95	95	*Front Fenders and Running Boards.* Examine fenders and running boards to see that they are in good condition and securely mounted.

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6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
96	96	*Cab (Doors, Hardware, Glass, Seat and Trim, Floor Boards, Ventilator, Map Compartment).* Inspect these items to see that they are in good condition and secure; that ventilator door and windshield hardware operates properly; that doors are alined in their openings; engage the bumpers and strikers and latch properly in closed position.
98	98	*Circuit Breakers.* Observe whether or not they are in good condition, clean, dry and securely connected and mounted.
99	99	*Rear Splash Guards.* See that they are in good condition and securely mounted.
100	100	*Body (Floor, Skid Strips, Stakes, Sockets).* Examine cargo body to be sure above items are in good condition, properly mounted and secure. Include tool compartment.
101	101	*Rear Bumpers and Pintle Hook.* Inspect rear bumper for looseness or damage. Examine pintle to see that it is in good condition and securely mounted to frame. Test pintle and latch to see that they operate properly; are adequately lubricated; and that lock pin is present and securely attached by chain. Pay particular attention to broken spring or worn draw bar.
103	103	*Paint and Markings.* Examine the paint of entire vehicle to see that it is in good condition, paying particular attention to any bright spots in finish that might cause glare or reflection. Inspect vehicle markings and identification for legibility. Include identification plates and their mountings if furnished.
104	104	*Radio Bonding (Filters, Suppressors, Condensers, and Shielding).* See that all units, not covered in the foregoing specific procedures, are in good condition and securely mounted or connected. Be sure all additional bond straps and shake-proof lock washers listed in par. 138, are inspected for looseness or damage and see that contact surfaces are clean. NOTE: If objectionable radio noise has been reported; make tests in accordance with par. 138. If cleaning and tightening of mountings and connections, and replacement of defective radio noise suppression units does not eliminate the trouble, the radio

6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
		operator will report the condition to the designated individual in authority.
		TOOLS AND EQUIPMENT
131	131	*Tools (Vehicle and Pioneer).* Inspect all the standard vehicle and Pioneer tools to see that they are all present (see on Vehicle Stowage List, par. 144-146), in good condition, clean, and properly stowed or securely mounted. Also examine the tools which have cutting edges to see that they are sharp. Any tools mounted on the outside of the vehicle which have bright or polished surfaces, should be painted or otherwise treated to prevent rust, glare, or reflection.
132	132	*Fire Extinguisher.* See that they are in good condition, securely mounted, and fully charged. The charge may be determined on gas-type extinguishers by weighing with a scale, and on liquid type by shaking. Also be sure the nozzles are free from corrosion.
133	133	*Decontaminator.* Note whether or not it is in good condition, securely mounted and fully charged. Make the latter check by removing the filler plug. **NOTE:** *The solution must be replaced every three months as it deteriorates.*
134	134	*First Aid Kit (if Specified).* See that it is in good condition, and that all of its items are present and properly packed. Report any deficiencies immediately.
135	135	*Publications and Form No. 26.* The vehicle and equipment manuals, Lubrication Guide and Standard Form No. 26 (Accident Report Form) and W.D. AGO. Form No. 475 Major unit replacement record, should be present, legible, and properly stowed.
136	136	*Traction Devices (Chains).* Examine tire chains to be sure they are in good condition, clean (if not in use) not excessively worn, protected against rust, and properly mounted or stowed.
137	137	*Tow (Chains, Cables, Rope, Snatch Blocks).* See that the provided towing devices are in good condition, clean and properly stowed. Tow chains or cables should be properly protected against rust when not in use. If snatch blocks are furnished, check to see that they operate freely.

ORGANIZATION TOOLS AND EQUIPMENT, AND RECORD OF MODIFICATIONS

6,000 Mile Maint. (six-month)	1,000 Mile Maint. (monthly)	
139	139	*Fuel and Water Cans and Brackets.* Observe whether or not they are in good condition, secure; and that the caps fit tightly and are secured to the can with a chain; and whether or not the cans are leaking.
141	141	*Modifications (MWO's) Completed.* Inspect the vehicle to determine whether or not all Modification Work Orders have been completed, and enter all modification and major unit assembly replacement made at time of this service on Form 478.
142	142	*Final Road Test.* Make a final road test rechecking item 2 to 16 inclusive, and also be sure to recheck the transmission, and axle to see that the lubricant is at the correct level and not leaking. Confine this road test to the minimum distance necessary to make satisfactory observations. NOTE: *Correct or report all deficiencies found during final road test to the designated authority.*

Section X

ORGANIZATION TOOLS AND EQUIPMENT, AND RECORD OF MODIFICATIONS

29. ORGANIZATION TOOLS AND EQUIPMENT.

a. Standard Tools and Equipment. All standard tools and equipment available to second echelon are listed in SNL N-19 and in the Organizational Spare Parts and Equipment List of SNL G-540.

b. Special Tools. The maintenance operations described in this manual do not require the use of special tools.

30. RECORD OF MODIFICATIONS.

a. Description. Every vehicle is supplied with a copy of AGO Form No. 478 which provides a means of keeping a record of each MWO (FSMWO) completed or major unit assembly replaced. This form includes spaces for the vehicle name and U. S. A. Registration Number, instructions for use, and information pertinent to the work accomplished. It is very important that the form be used as directed

and that it remain with the vehicle until the vehicle is removed from service.

b. Instructions for Use. Personnel performing modifications or major unit assembly replacements must record clearly on the form a description of the work completed and must initial the form in the columns provided. When each modification is completed, record the date, hours and/or mileage, and MWO number. When major unit assemblies, such as engines, transmissions, transfer cases, are replaced, record the date, hours and/or mileage and nomenclature of the unit assembly. Minor repairs and minor parts and accessory replacements need not be recorded.

c. Early Modifications. Upon receipt by a third or fourth echelon repair facility of a vehicle for modification or repair, maintenance personnel will record the MWO numbers of modification applied prior to the date of AGO Form No. 478.

Section XI

TROUBLE SHOOTING

31. INTRODUCTION.

a. This section contains trouble shooting information and tests which can help determine the causes of some of the troubles that may develop in vehicles used under average climatic conditions. For locating the system at fault or conducting tests of the various systems, make all tests in the order given under each symptom.

TROUBLE SHOOTING

32. ENGINE.

a. Engine Will not Crank. Check starting system (par. 34). Remove the spark plugs and attempt to crank the engine with the starting crank to check for accumulation of water in the cylinders (hydrostatic lock). If the engine can be turned with the spark plugs removed and could not be turned with the spark plugs in place, this will indicate a water leak into the cylinders. If the engine cannot be cranked by hand with the spark plugs removed, it will indicate a reciprocating part in the engine has seized. In either case, notify higher authority.

b. Engine Cranks but Will not Start.

(1) PROCEDURE IF ENGINE IS WET. Wipe all moisture from the distributor cap and spark plugs.

(2) PROCEDURE IF ENGINE IS HOT. Open the hand throttle and crank the engine with the throttle open until the engine starts.

(3) CRANKING SPEED SLOW. See paragraph 34.

(4) CHECK FUEL SYSTEM. Open the fuel shut-off valve (fig. 6). Remove the outlet line at the fuel pump and with the ignition switch in "OFF" position, crank the engine with the starter. If a free flow of fuel is not evident, fuel is not reaching the carburetor. See paragraph 38.

(5) CHECK IGNITION SYSTEM. Turn the ignition switch "ON." Remove a wire from a spark plug and hold the wire terminal ¼ inch from the cylinder head. Crank the engine. If a spark does not jump the gap, the ignition system is at fault (par. 33).

c. Engine Backfires but Will not Start. If the engine is wet, remove the distributor cap and dry it with a clean cloth. Dry the spark plugs. If the engine is dry, follow the ignition test procedure outlined in paragraph b (5) above.

d. Engine Does not Develop Full Power. If the engine does not develop full power, follow the tune-up procedure (par. 47).

e. Engine Misfires. If the engine misfires, follow the tune-up procedure (par. 47).

f. Engine Runs Unevenly and Black Smoke is Emitted from Exhaust. Refer to paragraph 38 b.

g. Engine Runs Unevenly and Backfires Through Carburetor. If the engine is cold, the carburetor may need further choking until warmed up. If the trouble still exists after the engine is warmed up, make sure that the spark plug wires are each in their correct socket in the distributor cap. If this does not correct the trouble, the fuel mixture is too lean. Refer to paragraph 38 c.

h. Engine Overheating. Check for low water in the cooling system and refill with coolant if required. Adjust the fan belt if loose

(par. 76 c). If the air flow through the radiator is restricted, clean radiator fins and air passages. Check the ignition timing and retime if required (par. 60). If the engine continues to overheat, replace the thermostat (par. 77).

i. **Excessive Oil Consumption.** Examine the oil in the engine and if the viscosity of the oil is found to be low, refill with specified grade (fig. 8). Inspect the engine for external oil leaks at oil lines and oil pan. Tighten all loose connections and replace oil pan gasket if required (par. 51). If the engine continues to use excessive oil after making the above inspection or replacements, it may be assumed that the pistons or piston rings or the intake valve guides are worn or damaged, in which case notify higher authority.

j. **Low Oil Pressure** (par. 39).

33. IGNITION SYSTEM.

a. **No Spark Delivered at Any of the Spark Plugs.**

(1) TEST LOW VOLTAGE CIRCUIT FROM BATTERY TO COIL (fig. 18). Check the battery (par. 94). Remove the primary wire, running from the dash to the coil, from the terminal on the coil. Connect a six volt test lamp between the free end of this wire and a good ground. Turn the ignition switch on. If the test lamp lights, the low voltage circuit (primary circuit) is complete from the battery to the coil, which includes the ignition switch, coil and connecting wires. If the test lamp does not light, make contact across the terminals of the ignition switch with a jumper wire. If the test lamp now lights, the switch is faulty and must be replaced (par. 57). If, from the above test, the primary circuit is found complete from the battery to the coil, proceed with subparagraph (2) below.

(2) TEST DISTRIBUTOR, COIL, AND HIGH TENSION CIRCUITS. Remove the distributor cap and examine the condition of the distributor points and adjust or replace them if required (par. 59 d). Examine the distributor cap and rotor. If carbon tracks are observed, clean these parts thoroughly. If cracks are found, replace the cap or rotor. Turn the ignition switch on and crank the engine with the starting motor. If there is no spark at any of the spark plug wires, replace the ignition condenser or the ignition coil (par. 58) whichever is at fault.

b. **No Spark or Unsatisfactory Spark Obtained at Some Spark Plug Wires and a Satisfactory Spark at Other Wires.** Remove any accumulation of moisture on the distributor cap, spark plug wires, coil or spark plugs, by wiping them thoroughly with clean cloth. If the trouble is not due to moisture, remove the distributor cap (par. 59) and examine the cap and rotor. If carbon tracks are observed, clean these parts thoroughly. If cracks are found, replace the cap or rotor.

Examine all spark plug wires and replace any wires with chafed or faulty insulation. Make sure all spark plug wires and high tension wires are securely inserted in their terminals.

c. Intermittent Spark at Each Spark Plug Wire. Examine the breaker points. Check and, if necessary, adjust the breaker points as outlined in paragraph 59 **d**. If the points are burnt, they must be replaced (par. 59 **d** (2)). If the points are not at fault, tighten all terminals in the low voltage (primary) circuits. Check low voltage (primary) circuit (subpar. **a** (1)). If a weak spark is now still obtained from all the spark plug wires, the condenser or ignition coil is at fault. If replacing the condenser fails to correct the trouble, replace the ignition coil (par. 58).

34. STARTING SYSTEM.

a. Engine Fails To Turn Over When the Starter Button Is Pressed.

(1) TEST BATTERY. Test state of charge of the battery (par. 28, item 22). If the battery is low in charge, it must be recharged or replaced (par. 94 **b**). Make certain the battery terminals are clean and tight. Remove one of the cables from the starting motor relay (fig. 40) and contact the free end of the cable against the terminal on the other side of the relay. If the starting motor fails to crank the engine, replace the starting motor (par. 95). If the starting motor cranks the engine during the above test, proceed with test in subparagraph (2) below.

(2) TEST STARTER BUTTON AND STARTER BUTTON WIRE. Reattach the cable on the starting motor relay. Use a screwdriver and ground the terminal on the relay to which the small black wire (starter button wire) is attached. If the relay clicks and the starting motor cranks the engine, the trouble is with the starter button or starter button wire (black wire). Replace the starter button (par. 83) or the wire, whichever is at fault. If the starter button or wire is not at fault, proceed with the test in subparagraph (3) below.

(3) TEST STARTING MOTOR RELAY. Press the manual button at the bottom of the starting motor relay. If the starting motor now cranks the engine, the relay is at fault and must be replaced (par. 96).

35. BATTERY AND GENERATING SYSTEM.

a. Battery.

(1) BATTERY RUNS DOWN. Excessive use of electrical accessories must be avoided when the generator is not operating. Be sure that the ignition or light switches are not left on when the vehicle is not in use. Replace the discharged battery with one fully charged (par. 94) and connect the cable to the negative battery post. Turn all switches off. Contact the positive battery cable against the positive post of the

battery. If a flash is seen, this test indicates there is a grounded or shorted wire in one of the electric circuits. Test the cutout points in the generator circuit (subpar. b (2) (b) below) and test the ignition circuit (par. 33), the starting circuit (par. 34), and light and horn circuits (par. 36 and 37) for grounded or shorted wires.

(2) BATTERY USES EXCESSIVE WATER. Test the generating system (subpar. b below).

b. Generating System.

(1) AMMETER DOES NOT SHOW CHARGE. If the ammeter fails to show a charge, turn on all lights and observe if a discharge is shown. If no discharge is observed, connect a new ammeter to the leads in the instrument panel. If a reading is observed, the ammeter is faulty and must be replaced (par. 84). If no reading is observed, proceed with the next test.

(2) GENERATOR DOES NOT CHARGE BATTERY.

(a) Test Generator. Check all wires for loose connections, frayed insulation and high resistance in connections and replace or repair any faults. Remove the armature and battery wire from the "ARM" and "BAT" terminals of the regulator and connect an ammeter between them. Remove the field wire from the "FIELD" terminal on the regulator. Start the engine and while operating at idle speed, touch the free end of the field wire to the armature wire. Increase the speed, noting the charging rate. Do not increase the charge above 40 amperes. If the generator charge increases as the engine is speeded up, the generator is operating normally. Reconnect the wires. If the generator charge does not increase, the generator is at fault. Replace the generator (par. 92).

(b) Test Generator Regulator. Start the engine and run it at approximately 800 revolutions per minute and observe the ammeter on the instrument panel. If no charging rate is indicated, connect the terminal marked "BAT" and the terminal marked "ARM" together with a jumper wire and watch the ammeter. If a reading is obtained, the cutout unit in the regulator is at fault. Replace the regulator (par. 93). If no reading is obtained, connect the battery and field terminal together with the jumper wire. If a reading is now obtained, the generator regulator is at fault. Replace the regulator (par. 93).

(c) Low Charging Rate When the Battery Is Low in Charge. Operate the engine at a generator speed of 2,500 to 3,000 revolutions per minute. If the charging rate increases to maximum charging rate (40 amperes) then gradually decreases as the battery becomes charged, the generating system is functioning normally. If the charging rate does not increase to maximum, the generator regulator is at fault and must be replaced (par. 93).

(d) High Charging Rate When Battery Is Fully Charged. Operate the engine at a generator speed of 2,500 to 3,000 revolutions per minute. If, after the generator has replaced the current used in starting and the battery is known to be fully charged, the ammeter still shows a charging rate in excess of 15 amperes, it can be assumed that the voltage setting of the regulator is too high. Replace the generator regulator (par. 93). NOTE: *If the battery gases freely and uses water excessively, this also is an indication of too high a charging rate.*

36. LIGHTING SYSTEM.

a. No Lights Will Light and All Electrical Units Are Inoperative.

(1) PRELIMINARY TEST. Test the state of charge of the battery. If the battery is discharged, replace it (par. 94). Clean and tighten the battery terminals securely. If the lights still fail to light, proceed with test (2) below.

(2) TEST LIGHT SWITCH CIRCUIT BREAKER. Test the circuit breaker (fig. 33) by contacting a jumper wire across its terminals. If the lights now light, the circuit breaker is at fault. Replace the circuit breaker (par. 79). If the circuit breaker fails to stay in contact (kick out) check the circuits for grounded or shorted wires (subpar. d below). If the lights still fail to light, proceed with test (3) below.

(3) TEST MAIN FEED WIRE. The main feed wire extends from the light switch circuit breaker (fig. 42) through the ammeter to the terminal on the starting motor relay. Contact one lead of a test lamp to the terminal on the light switch circuit breaker to which the feed wire is attached. Contact the other lead to the ground. If test lamp does not light, the feed wire is at fault. Examine the terminals of this wire and tighten all the connections. If test lamp lights, it may be assumed the light switch is at fault. Replace the light switch (par. 79).

b. Individual Lights Do not Light. Replace any lamps burned out (par. 97). If this does not correct the trouble, check for loose connections at the lights and tighten any connections found loose. Replace any damaged wires to the individual unit giving trouble. If the lamp still does not light, replace the light switch.

c. One or More Lamps Burn Out Repeatedly. Most lamp failures are due to vibration when the vehicles are operated over rough terrain. Clean and tighten all connections, including the battery cable connections. If, after the generator has replaced the current used in starting and the battery is known to be fully charged, the ammeter still shows a charging rate in excess of 15 amperes, it can be assumed that the voltage setting of the regulator is too high. Replace the generator regulator (par. 93).

d. Short Circuit or Grounded Wires (Light Switch Circuit Breaker Kicks Out). Pull the light switch out to first position. If the

circuit breaker kicks out, it indicates that the short circuit or grounded wire is in the blackout marker light or the blackout taillight wires. If the circuit breaker kicks out when the foot brake pedal is depressed, the shorted or grounded wire is in the blackout stop light wire. Pull the light switch out to its second position. If the circuit breaker kicks out, it indicates the shorted or grounded wire is in the circuit to the service headlights, or in the service taillight wires. If the circuit breaker kicks out when the foot brake pedal is depressed, the short or ground is in the service stop light wires. Pull the light switch in third position and depress the foot brake pedal. If the circuit breaker kicks out, it indicates the shorted or grounded wire is in the service stop light circuit. Refer to lights and horn circuit (figs. 41 and 42) for color of wires in the circuit at fault and replace or repair the damaged wires.

37. HORN.

a. Horn Will not Sound. Remove the horn button and ground the horn wire with a screwdriver. If the horn sounds, the button is not making proper ground. Repair or replace the button. Inspect the bullet type connection under the hood (fig. 65). If this connection is satisfactory, connect a jumper wire across the terminals of the horn circuit breaker (fig. 42). If the horn sounds now, the circuit breaker is at fault and must be replaced. If horn does not sound, replace the horn.

b. Horn Sounds Continuously. Remove the horn button and see that the button or wire is not grounded. If horn continues to sound, check for ground in horn wire at bottom of steering gear.

38. FUEL SYSTEM.

a. Fuel Is not Reaching the Carburetor. Check to see if the fuel shut-off valve (fig. 6) is open and a sufficient fuel supply is in the tank. Clean the fuel filter (par. 67). Remove the fuel line from the fuel tank shut-off valve and drain any accumulation of water and sediment from the fuel tank. Remove the outlet pipe from the fuel pump and with the ignition switch off, crank the engine with the starter. If a free flow of fuel is not evident, the fuel is not reaching the carburetor. Replace the fuel pump (par. 66). If the fuel pump test is satisfactory, replace the carburetor (par. 63).

b. Engine Runs Unevenly and Black Smoke Is Emitted from Exhaust. Check the fuel pump pressure (par. 28, item 38). If the pressure is found too high, replace the pump (par. 66). If the fuel pump pressure is found satisfactory, replace the carburetor (par. 63).

c. Fuel Mixture Too Lean. Remove any restrictions to the free flow of the fuel. Check fuel pump pressure (par. 28, item 38). If

the pressure is too low, replace the fuel pump (par. 66). If this does not correct the condition, replace the carburetor (par. 63).

39. ENGINE OIL SYSTEM.

a. Low or No Oil Pressure. Check the oil supply in the engine and replenish, if required, with specified grade (fig. 7). If the oil in the engine has become over diluted, it must be replaced with the grade specified at the same time cleaning the oil screen which is part of the drain plug. If the oil pressure is still unsatisfactory, notify higher authority.

b. Excessive Oil Consumption. Follow procedure outlined in paragraph 32 i.

40. COOLING SYSTEM.

a. Instructions. Difficulties in the cooling system are usually reflected in loss of coolant from the system and in overheating. When overheating is evident and the cooling system test and the inspection procedure (subpar. b through d) fail to locate the cause, a complete engine tune-up, as outlined in paragraph 47, is recommended.

b. Engine Overheating. Refer to paragraph 32 h.

c. Engine Runs Too Cold. Replace thermostat (par. 77).

d. Loss of Coolant. Inspect all hose and hose connections and tighten or replace hose. Inspect for leakage at the drain cock (fig. 30) and tighten or replace if required. Replace the cylinder head gasket (par. 48) if leakage is observed between the cylinder head and the cylinder block. Inspect the water pump for leaks and replace the pump if it is leaking (par. 75). With the engine at normal operating temperature, loosen the filler cap by turning the cap counterclockwise to the first notch and listen for pressure escaping from the radiator. If the pressure escaping is audible, the filler cap is functioning properly. If no pressure is heard escaping, the filler cap or gasket is at fault. Replace the gasket and repeat the test. If a new gasket fails to correct the condition, replace the filler cap. Clean the exterior of the radiator core, removing all dirt, grease and insects. Inspect the radiator core for leaks. If found leaking, replace the radiator core (par. 74). If the cooling system still loses coolant, drain the oil from the engine oil pan (par. 51) and observe if there is water in the oil. If an abnormal amount of water is found in the oil, notify higher authority. Remove all spark plugs and with the ignition switch "off", crank the engine with the cranking motor and observe if water is evident at the spark plug holes. If water is evident, replace cylinder head gasket (par. 48).

1½-TON 4x2 TRUCK (FORD)

41. CLUTCH AND TRANSMISSION.

a. Clutch Drags.

(1) TEST FOR CLUTCH DRAG. Idle the engine at approximately 800 revolutions per minute. Push the clutch pedal to the fully released position and allow time for the clutch to stop. Shift the transmission in first or reverse gear. If the shift cannot be made without a severe clash of the gears, or, if after the engagement of the gears, there is a jumping or grabbing movement of the vehicle when the clutch is still fully released, proceed with subparagraph (2) below.

(2) ADJUST CLUTCH PEDAL. Adjust pedal clearance (par. 100). If the clutch still drags after the correct pedal clearance is obtained, the clutch is at fault and the clutch disk and/or pressure plate must be replaced (par. 101).

b. Clutch Slips. Adjust the clutch pedal clearance (par. 100). If the clutch continues to slip after the proper pedal clearance is obtained, replace the clutch disk and/or pressure plate (par. 101).

c. Transmission Lubricant Leakage. Check for loose drain plug and tighten plug if required. If leak is at the oil seals or gaskets, notify higher authority.

d. Hard Shifting (severe Gear Clash). If the clutch is dragging, refer to subparagraph (1) above. If this does not correct the trouble, free up any binding of the gear shift lever. If the condition still exists, it can be assumed the transmission is at fault. Notify higher authority.

42. PROPELLER AND COUPLING SHAFTS.

a. Backlash or Vibration. Tighten the nuts on the universal joint U-bolts. Examine universal joint trunnion bearings and if found worn or damaged, notify higher authority. Check for looseness of bolts at universal joint flange at transmission and tighten the bolts if required.

43. STEERING.

a. Preliminary Instructions. Troubles with the steering usually consist of, hard steering, vehicle pulls to one side, jerky steering, wander, shimmy or wheel tramp. Steering troubles are often caused by combination of maladjustments or damaged parts which are closely related to each other, therefore, follow the definite procedure given in subparagraph b below and check the entire system.

b. Correction Procedure. Inflate the tires to 55 pounds. Lubricate the steering gear and steering connections (par. 22). Inspect the Pitman arm, drag link, and tie rod. If any parts are found bent or damaged, replace the part (pars. 123 and 111). Adjust toe-in (par. 111 b). Inspect for loose wheel bearings and adjust if required (par. 127 a (2) and b (2)). Adjust end play in sector shaft (par. 122).

Inspect spring clips and spring tie bolts and tighten if loose or replace them if broken. If an abnormal steering condition still exists, notify higher authority.

44. BRAKES.

a. Service Brakes.

(1) BRAKE PEDAL TRAVEL EXCESSIVE. Adjust brake (par. 131 b (1) and (2)).

(2) BRAKE PEDAL ACTION SPONGY. If the brake pedal action is spongy, bleed the brake system (par. 136).

(3) BRAKE ACTION HARD. Test the hydrovac power system (subpar. (4) below). If the hydrovac fails to function after performing the operations described in the test procedure, the hydrovac cylinder assembly is at fault and must be replaced (par. 133). If the brake action is still hard, follow procedure in subparagraph (5) below).

(4) HYDROVAC POWER SYSTEM INOPERATIVE. To test the action of the hydrovac power system, hold the brake pedal down at a constant pressure, then start the engine and note if there is a further downward movement of the brake pedal immediately as the engine starts. If a further downward movement is observed, the hydrovac power system is functioning. If no movement is observed, check for leaks at the vacuum lines, hose, and hose connections, and tighten connections or replace damaged hose if required. If the unit still fails to function, replace the hydrovac cylinder assembly (par. 133).

(5) INEFFICIENT BRAKES. Test the hydrovac power system (subpar. (4) above). Adjust brakes (par. 133 b (1) and (2)). If the brakes are still unsatisfactory, remove the wheels (par. 129) and inspect the condition of the brake shoe linings. If they are worn excessively or found to be greasy, replace the brake shoes (par. 131 c). If they are found greasy, replace the grease seals (par. 127 a and b). Examine the brake drums for scored condition or excessive wear and replace any drums found not to be in a serviceable condition. If the brakes are still unsatisfactory, replace the master cylinder (par. 134).

(6) UNEVEN BRAKES. Inflate the tires to correct pressure (par. 125). Remove the wheels and drums and inspect for grease on the brake shoe linings. Shoes found with grease on the linings must be replaced (par. 131 c). If the brake shoes and linings are found to be in good condition, it can be assumed that the wheel slave cylinder at the brake giving trouble is at fault and must be replaced (par. 135 b and c).

(7) NO FREE MOVEMENT AT BRAKE PEDAL. Adjust the clevis rod at the master cylinder (par. 131 b (1)) and remove the filler plug from the master cylinder and run a fine wire through the vent hole (fig. 78) to make sure the vent is not clogged.

b. Hand Brake.

(1) INEFFICIENT HAND BRAKE. If the hand brake does not hold the vehicle, adjust the hand brake (par. 131 b (2)). If adjusting the brake fails to correct the condition, inspect the brake band lining and drum and replace the brake band if the lining is found worn or greasy (par. 108 a (2) and b (3)). Replace the brake drum if it is scored or worn excessively (par. 129).

45. RADIO SUPPRESSION SYSTEM.

a. Preliminary Instructions. When radio interference is experienced, the vehicle should be moved to an open space away from high tension power lines, machinery which cause electrical disturbances, buildings, and other radio equipped vehicles, before attempting to make tests for determining the cause of intereference.

b. Radio Reception Satisfactory When Vehicle Is not in Motion and Becomes Noisy When Engine Is Started.

(1) PRELIMINARY TESTS. Remove the fan belt (par. 76 d). Start the engine. If radio interference has been reduced or eliminated, it indicates that the generating system is causing interference. See subparagraph (3) below, covering tests for radio interference caused by the generating system. If the interference is still present, it indicates the ignition system is causing interference. Install the fan belt (par. 76 d) and test the ignition system for radio interference (subpar. (2) below).

(2) TEST IGNITION SYSTEM FOR INTERFERENCE. Replace the ignition radio condenser (fig. 37). Start the engine. If interference is still present, replace the suppressor in the high tension wire running from the coil to the distributor. Start the engine. If interference is still present, replace the suppressor in each spark plug wire individually, starting the engine between each replacement.

(3) TEST GENERATING SYSTEM FOR INTERFERENCE. Replace the condenser at the generator regulator (fig. 39) and run the engine at a speed of approximately 1,000 revolutions per minute. If the generator regulator condenser is not at fault, test all units in the generating system for good ground. To make this test, use a jumper wire with handles containing prods which will penetrate through painted surfaces. Run the engine at a speed where the interference is at its maximum and contact the jumper wire between a good ground and the generator housing and generator regulator housing. If interference has been improved or eliminated by any of these tests, see if bonding straps are in good condition and have a good ground contact on the units which bonding straps are used. Replace the internal-external toothed lock washers on units grounded by this type of washer (par. 138 d).

c. Radio Interference When Vehicle Is in Motion and no Interference Under Other Conditions. The most probable cause for interference will be poor ground contact in some unit or component part of the vehicle due to vibration in the vehicle under operating conditions.

Section XII

ENGINE — DATA, MAINTENANCE, AND ADJUSTMENTS IN VEHICLE

46. DESCRIPTION AND DATA.

a. Description. The truck is powered with a 90-horsepower Ford 6-cylinder L-head engine. The cylinder block and crankcase are cast integral with full length water jackets. The engine is liquid cooled with thermostatic control.

b. Data.

Make	Ford
Type	6-cylinder L-head
Horsepower	90 at 3,300 rpm
Numbers of cylinders	6
Bore	3.3 in.
Stroke	4.4 in.
Piston displacement	226 cu in.
Torque	180 ft-lb at 1,200 rpm
Compression ratio	6.7 to 1
Compression pressure	165 lb at 2,000 rpm
Firing order	1-5-3-6-2-4
Weight with transmission and accessories	680 lb

47. TUNE-UP.

a. Tune-up Procedure. The starting system, including the battery, must be in a satisfactory condition (par. 94) before proceeding with the engine tune-up.

1½-TON 4x2 TRUCK (FORD)

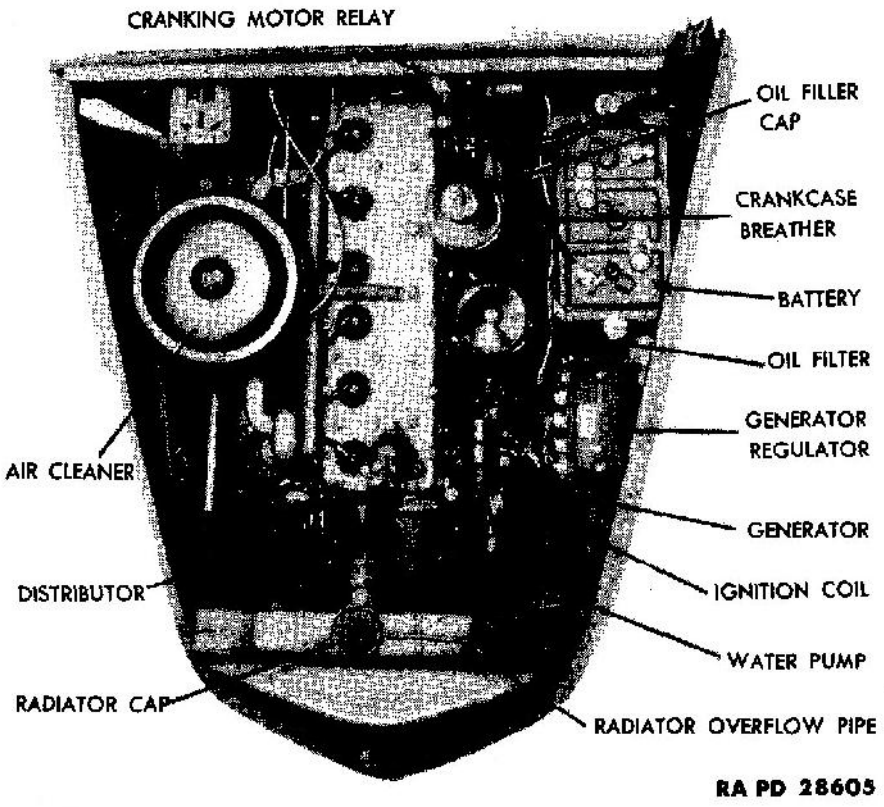

Figure 9 — Engine Compartment From Above

(1) SPARK PLUGS. Remove all spark plugs, clean (sand blast), and set the gaps at 0.025 of an inch. Replace any plugs which are unfit for further use. Make compression test before installing the plugs in the engine.

(2) TEST COMPRESSION. Open the trottle to assure a full charge of air in the cylinders. To hold the throttle open, place a small block or spacer between the thottle adjusting screw and the stop on the carburetor. Use a standard compression gage. Crank the engine several revolutions with the cranking motor until the reading on the compression gage no longer increases. Repeat the test for all cylinders. The normal compression at cranking speed is from 106 to 125 pounds (at sea level). Notify higher authority if any cylinders show compression under 105 pounds. Cylinders showing compression above 125 pounds indicate an excessive accumulation of carbon which must be removed. Reinstall the spark plugs.

(3) DISTRIBUTOR BREAKER POINTS AND IGNITION WIRES. Remove the distributor cap (par. 59 b). Examine the breaker points, check gap, reset if necessary. If the breaker points are burnt or pitted, replace them and check the timing of the distributor (par. 60). Start the engine and remove the wire from the spark plug of No. 1 cylinder and hold wire approximately ¼ inch from the cylinder head. If the spark jumps this gap regularly, the wire is not shorted. Make

ENGINE – DATA, MAINTENANCE, AND ADJUSTMENTS IN VEHICLE

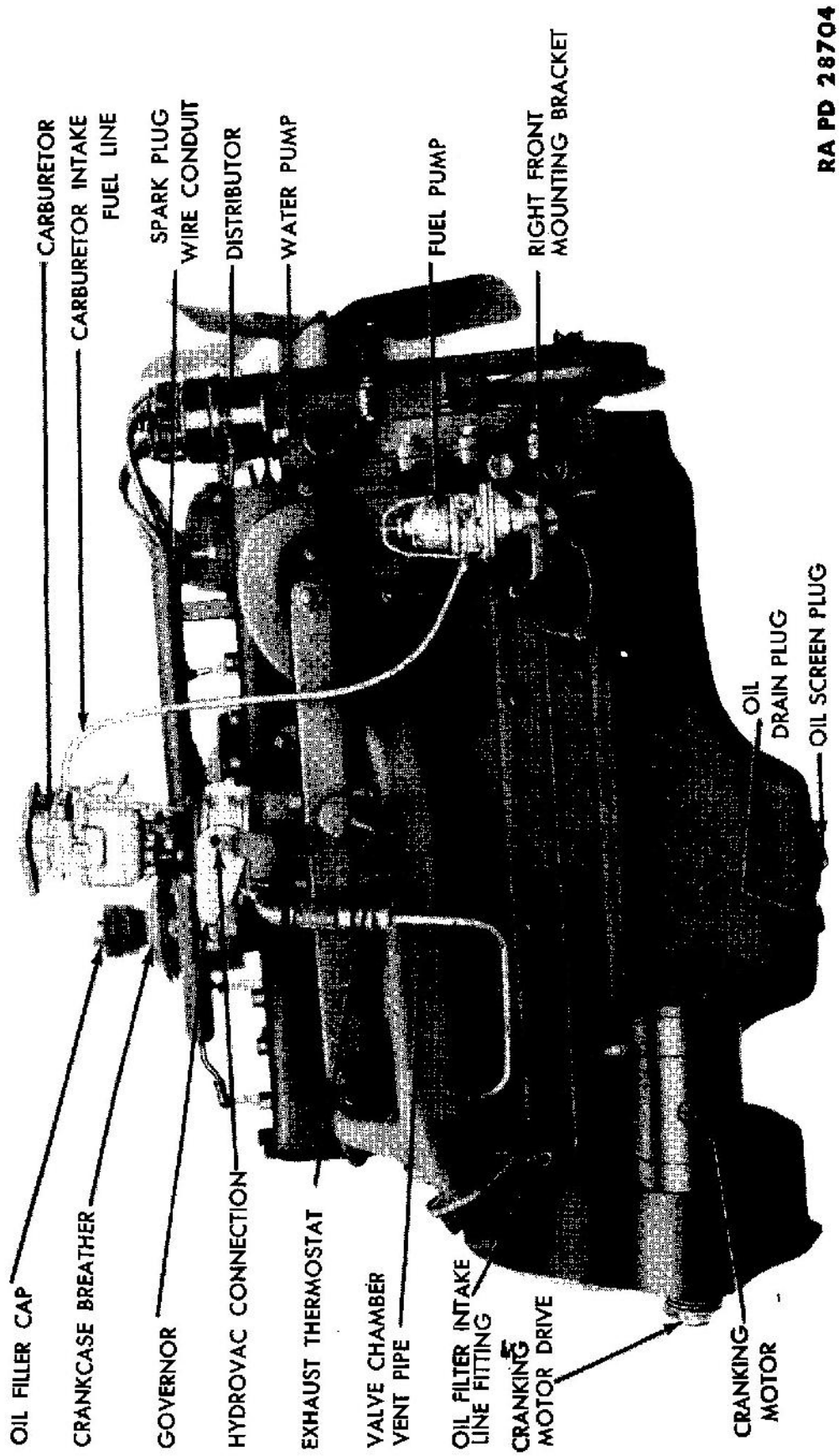

Figure 10 – Engine – Right Side View

1½-TON 4×2 TRUCK (FORD)

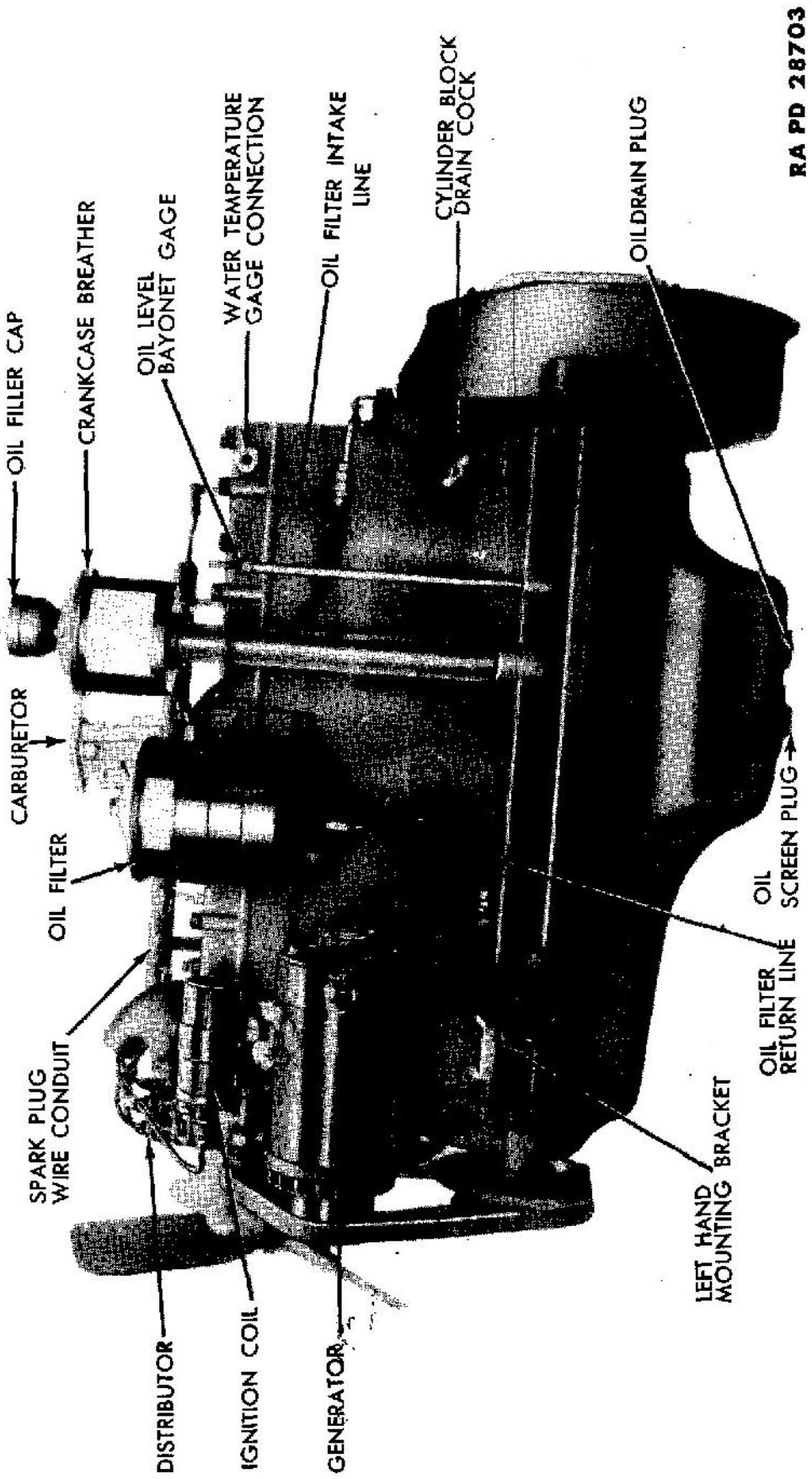

Figure 11 — Engine — Left Side View

this test on all of the spark plug wires. If a satisfactory spark is obtained from all six wires, the entire ignition system is satisfactory. If a satisfactory spark is obtained from any one wire, the coil, condensers and the distributor rotor are serviceable, and the trouble lies in the wires from which no spark or an unsatisfactory spark was obtained or the distributor cap is shorted. If a satisfactory spark is not obtained from any of the spark plug wires, the trouble lies in either the rotor, the distributor cap, the high tension wire running from the distributor cap to the coil, the coil, or the condenser.

(4) TEST FUEL PUMP VACUUM. Remove and clean the fuel pump sediment bowl (par. 28, item 37) and screen. Install bowl, using a new sediment bowl gasket. Disconnect the fuel pump inlet pipe (fig. 25). Start the engine and run at idle speed. Normal fuel pump vacuum is 10 inches. Should the fuel pump show less than 10 inches of vacuum, replace the pump (par. 66 b).

(5) TEST FUEL PUMP PRESSURE. Disconnect the fuel pump outlet line at the fuel pump. Start the engine and run at idle speed. Normal fuel pump pressure is from 3.5 to 4.5 pounds. If correct readings are not obtained, replace the fuel pump (par. 66 b).

(6) CLEAN FUEL FILTER AND AIR CLEANERS. Close the fuel shut off valve at each tank and remove the center stud (fig. 26) at the top of the fuel filter, and remove the filter bowl. Clean the bowl and wash the filter element (par. 28, item 37). Install the filter element and bowl. Clean the air cleaner as outlined in paragraph 28, item 34.

(7) CYLINDER HEADS AND BATTERY. Tighten cylinder heads if necessary. Clean and tighten the battery connection.

(8) ADJUST CARBURETOR AND TEST ENGINE. Start the engine and warm it up to normal operating temperature (150° to 185° F). Set the idle speed adjustment (fig. 23) so the idling speed of the engine will be approximately 500 revolutions per minute. Manipulate the idle fuel adjusting screw (fig. 23) from ½ to 1¼ turns open until the engine idles smoothly. Road test the engine.

48. CYLINDER HEAD GASKET REPLACEMENT.

a. Removal. Drain the cooling system (par. 72 d). Remove the cylinder head nut which holds the crankcase breather bracket and remove the breather. Remove the two cap screws which hold the ignition coil (fig. 11) to the cylinder head and remove the coil. Remove the water temperature gage engine unit (fig. 11) from the cylinder head. Remove the ground strap from rear of cylinder head. Remove the two cap screws which hold the spark plug wire conduit to the cylinder head. Remove the spark plug wires from the spark plugs and remove the conduit. Remove the hose and pipe running

1½-TON 4x2 TRUCK (FORD)

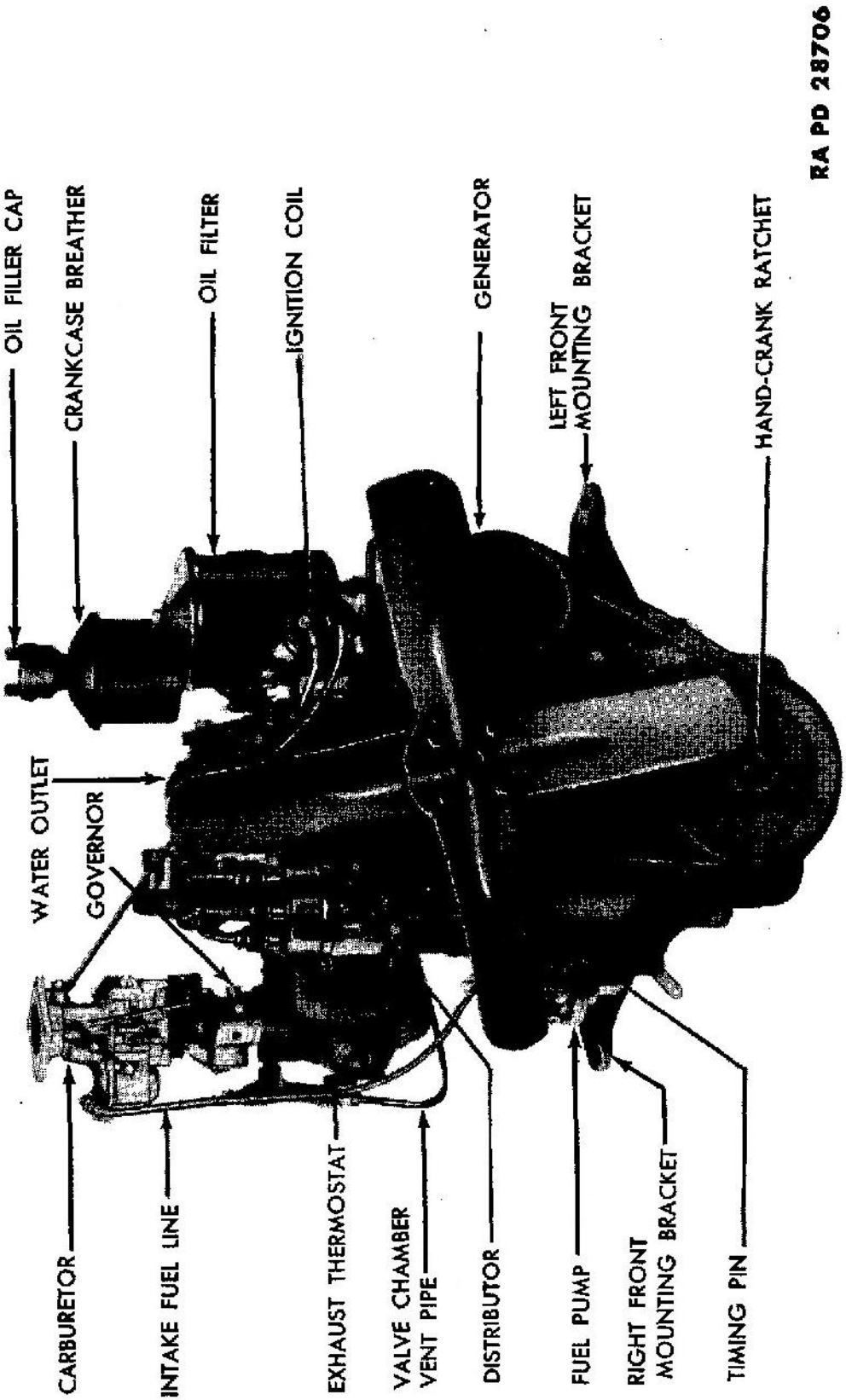

Figure 12 — Engine — Front View

ENGINE — DATA, MAINTENANCE, AND ADJUSTMENTS IN VEHICLE

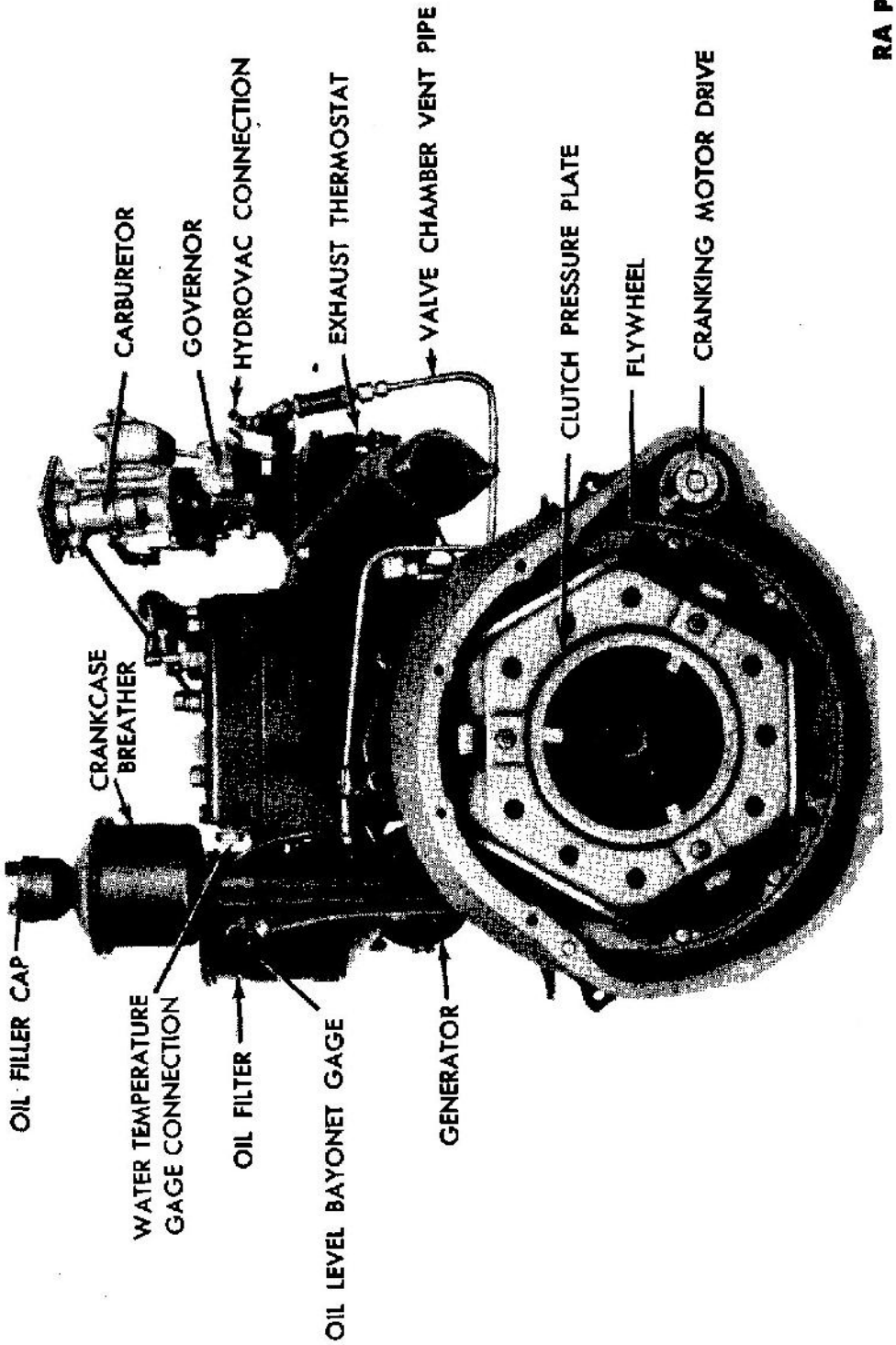

Figure 13 — Engine — Rear View

from the thermostat to the radiator. Remove the cylinder head nuts. Remove the cylinder head and the cylinder head gasket.

b. Installation. Install a new gasket on the cylinder block and install the cylinder head. Install the cylinder head nuts and tighten to 50 foot-pounds with a torsion wrench. Install the two cap screws to secure the ignition coil to the cylinder head. Install the cylinder head nut to secure the crank case breather bracket. Install the water temperature gage unit in the rear of the cylinder head. Install the ground strap on the rear of the cylinder head. Install the two cap screws to secure the spark plug wire conduit and connect spark plug wires to spark plugs. Install hose and pipe from thermostat to radiator. NOTE: *Cylinder head nuts must always be retightened after the engine has been run and the gasket has taken a set.*

49. INTAKE AND EXHAUST MANIFOLDS.

a. Description. The exhaust and intake manifolds (fig. 10) are attached to each other with two bolts and two holding studs. A heater valve controlled by a bi-metal thermostat is built into the exhaust manifold and is used to direct exhaust gases around the central portion of the intake manifold during the warm-up period of the engine. When the engine reaches normal operating temperature, the thermostat closes the heater valve, which prevents circulation of the exhaust gases around the intake manifold. It is important that the heater valve functions correctly, in order to prevent undue crankcase dilution during the engine warm-up period. It is also important that the heater valve closes when the engine reaches normal operating temperature, in order to prevent loss of engine power. If the heater valve does not function as described above, replace the exhaust manifold as an assembly.

b. Remove Intake and Exhaust Manifolds. Remove all nuts and lockwashers from the exhaust manifold holding studs. Lift off manifolds and gasket.

c. Separate Intake Manifold From Exhaust Manifold. Remove the nuts from the two bolts and the two studs which hold the exhaust manifold to the intake manifold. Remove the bolts. Slide the exhaust manifold off the intake manifold (fig. 10).

d. Assemble Intake Manifold to Exhaust Manifold. Position the exhaust to intake manifold gasket, and slide exhaust manifold over the intake manifold (fig. 10). Fasten the exhaust manifold to the intake manifold by installing the two bolts and nuts on the two studs. The nuts are to be tightened only slightly until manifolds are installed on the block, at which time they should be made tight.

e. Install Intake and Exhaust Manifolds. Clean the area on the engine block where the manifold gasket is to be installed. Place a

new manifold gasket on the manifold studs. Place manifold assembly in position on the cylinder block and install the washers and nuts on the manifold studs. Tighten the nuts which secure the manifolds to each other.

50. ENGINE MOUNTINGS.

a. Description. The engine front supports consist of a bracket bolted on each side of the engine crankcase at the front. The support brackets are insulated from the frame cross member by rubber pads. The engine rear support is located at the rear of the transmission and mounted on the frame cross member. The support is insulated from the cross member by a rubber pad.

b. Engine Support Replacement.

(1) FRONT SUPPORT REPLACEMENT. Jack up front of the engine enough to remove any weight from the supports. (Place a block of wood between the jack and bottom of oil pan before attempting to raise the engine.) Remove the bolt which goes through rubber pad at each end of the mounting bracket. To remove either bracket, remove the lock wire and three cap screws which secure the bracket to the engine crankcase. To install the front supports, reverse the sequence of the steps of the removal procedure.

(2) REAR SUPPORT REPLACEMENT (fig. 14). Jack up rear of engine enough to remove any weight from the support. (Place a block of wood between the jack and engine before attempting to raise the engine.) Remove the two bolts which hold the transmission bracket to the support. Remove the six nuts which secure the retainer to the crossmember. Remove the bracket. To install, reverse the sequence of the steps of the removal procedure.

51. OIL PAN.

a. Removal. The oil pan can be removed or installed while the engine is in the vehicle. To remove the oil pan, remove the drain plug and drain the oil. Remove the cap screws which secure the engine pan to the frame and remove the pan. Remove the starting motor (par. 95 b). Remove the cap screws which secure the oil pan to the crankcase and to the flywheel housing. Remove the oil pan.

b. Installation. Clean the gasket surfaces of both the oil pan and the cylinder block and cover gasket surface on the cylinder block with a thin film of grease. This will help to hold the gaskets in place while the oil pan is being installed. Install a new crankshaft packing in the groove in the oil pan. This packing should be soaked in oil for 30 minutes before using. Using three studs or headless pan bolts as guides will help in positioning the oil pan correctly, reducing the danger of moving the gaskets out of position as the pan is set in place. In-

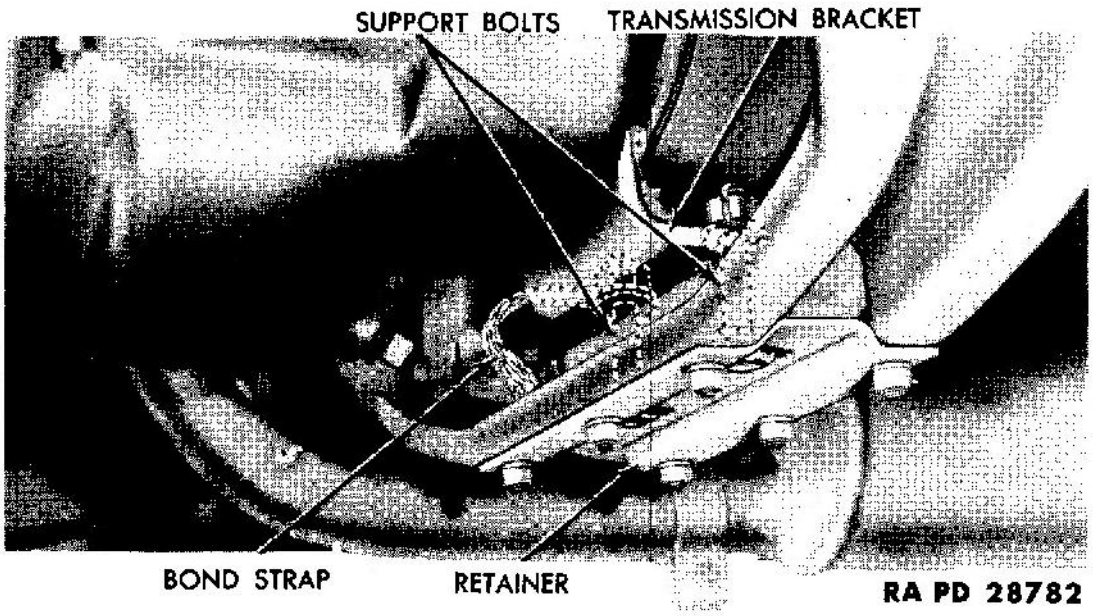

Figure 14 — Engine Rear Support

stall the oil pan cap screws and tighten, making sure that the oil pan seats perfectly all the way around. Install the drain plug and screen assembly after cleaning the screen.

52. OIL FILTER (fig. 11).

a. Description. The oil filter mounted on the left side of the cylinder block is of the replaceable cartridge type. The filler intake line on the side of the filter body is connected to the main oil line by means of a fitting on the right rear side of the cylinder block. The oil return line at the bottom of the filter is connected to a fitting at the left front side of the cylinder block.

b. Service. Remove the nut in the center of the cover and remove the cover and gasket. Remove the filter element. Remove the drain plug and drain out the sludge. Install new filter element. Install the drain plug, cover gasket and cover. Start engine and check cover for leaks.

c. Oil Filter Replacement. To remove filter, disconnect the intake line at the fitting on the right rear side of the cylinder block. Disconnect the oil return line at the fitting located at the left front side of the cylinder block. Remove the two cap screws which secure the filter to the cylinder head. To install, reverse the sequence of the steps of the removal procedure.

53. CRANKCASE BREATHER (fig. 11).

a. Description. The crankcase breather is of the oil bath type containing a filtering element and engine oil. Oil is added to the engine by removing filler cap only.

b. Service. Remove the filler cap and the screw in the filler pipe which secures the cleaner assembly. Remove cleaner assembly and clean and refill the sump with engine oil (crankcase grade) to the indicated oil level. Install the cleaner assembly and filler cap.

c. Crankcase Breather Replacement. To remove the crankcase breather, remove the cylinder head nut which secures the breather bracket and remove the breather assembly. To install, reverse the removal procedure.

Section XIII

ENGINE REMOVAL AND INSTALLATION

54. REMOVAL.

a. Drain Cooling System. Open the drain cock at the bottom of the radiator (fig. 30), and the drain cock on the left side of the engine (fig. 11). Both drain cocks must be opened to drain completely the cooling system.

b. Drain Engine Oil. Remove drain plug in the oil pan (fig. 10) and drain the engine oil.

c. Remove Hood. Raise the hood and remove the lock wire and the two cap screws from the hood hinges on each side of the hood (fig. 15). Disconnect the bond strap at the center of cowl at the cowl. Remove the bolt from the support arm on each side of the hood. Remove the hood.

d. Remove Radiator. Loosen the clamps on the hose running from the radiator to the water pump and remove the hose. Loosen the clamps on the hose running from the radiator to the water outlet on engine and remove the hose. Remove the fan (par. 76 **b**). Remove the three cap screws on each side of the radiator which hold the radiator to the support bracket. Remove the radiator.

e. Remove Air Cleaner, Carburetor Controls, Fuel and Vacuum Lines. Remove the wing nuts on the top center of the air cleaner. Remove the air cleaner. Disconnect the intake fuel line at the fuel pump. Disconnect the carburetor throttle and choke rods at the carburetor. Disconnect the hydrovac vacuum hose at the intake manifold (fig. 10). Disconnect the windshield wiper vacuum line from the intake manifold. Disconnect the oil pressure gage line at the connection at the right rear of the engine (fig. 10).

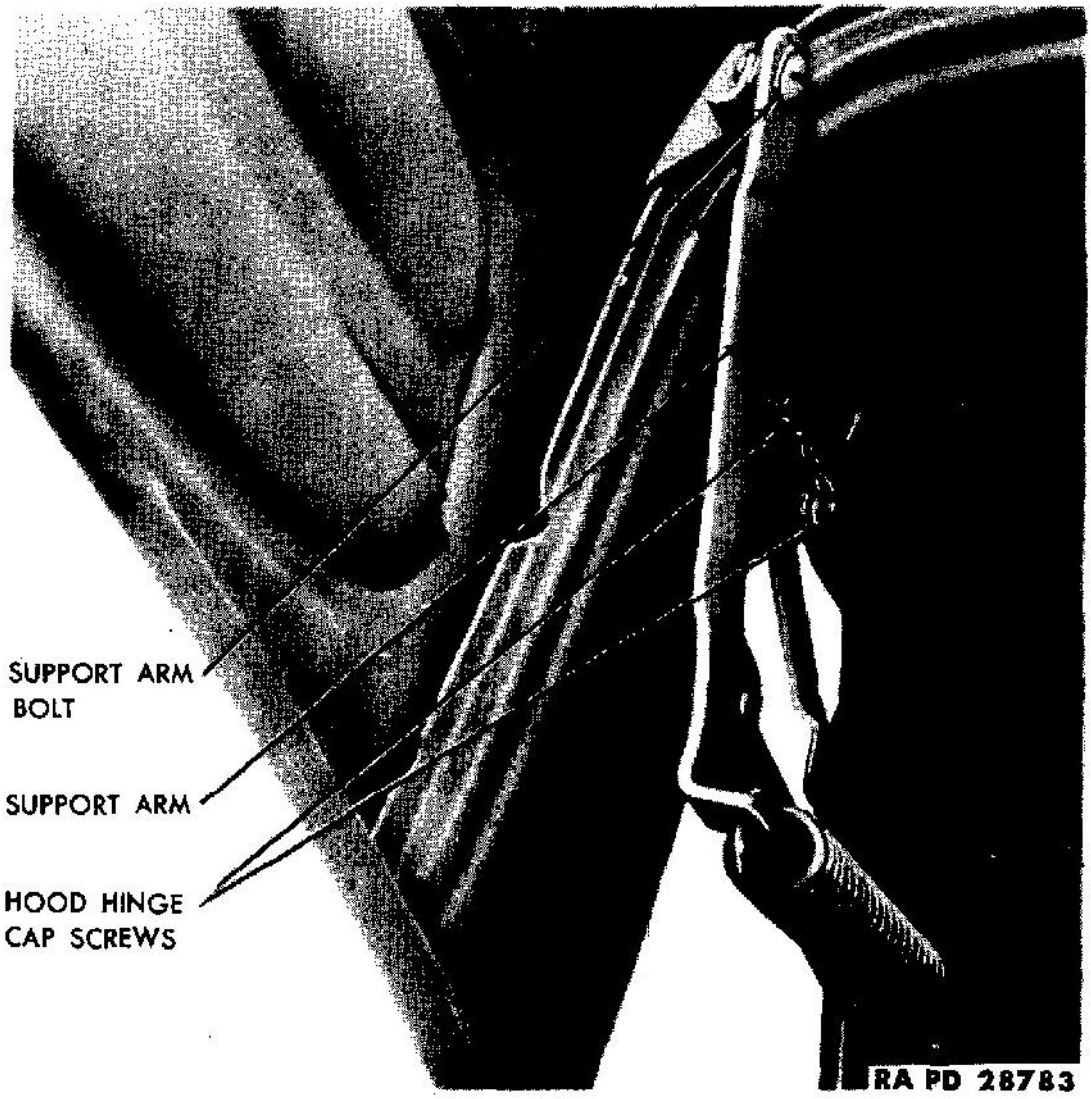

Figure 15 — Hood Hinges

f. Disconnect Temperature Gage and Electrical Equipment. Disconnect the heavy cable running from the starter relay to the cranking motor at the cranking motor. Disconnect and remove the battery ground cable running from the battery terminal to the oil filter bracket. Disconnect the two wires and the conduit bond strap from the generator. Remove the water temperature gage engine unit (fig. 11) from the cylinder head. Disconnect the ignition primary wire from the distributor. Disconnect the bond strap at rear of cylinder head. Disconnect the bond strap at the cap screw at the bottom of the timing gear cover.

g. Remove Transmission Housing Cap Screws. Remove the transmission housing cap screws which secure the transmission housing to the flywheel housing (fig. 53).

h. Disconnect Exhaust Pipe Flanges. Remove the two bolts which secure the exhaust pipe flange to the exhaust manifold flange.

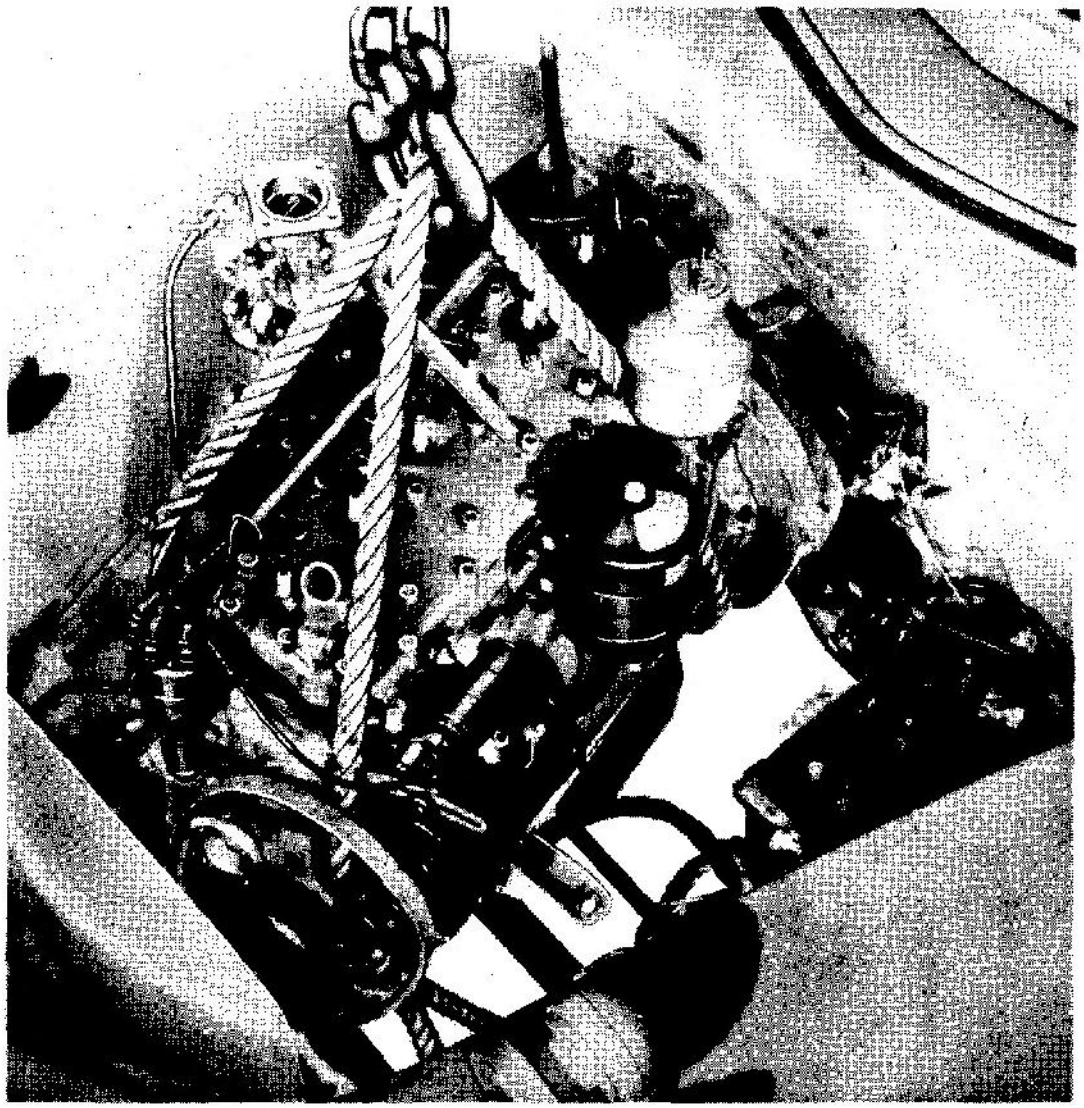

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Figure 16 — Removing Engine

i. Disconnect Engine Front Mounts. Remove the bolt which secures each engine front mount to the cross member.

j. Remove Engine From Engine Compartment (fig. 16). Using a rope sling and a hoist, raise the engine slightly and swing front of the engine from side to side. This will loosen the clutch disk on the clutch shaft and permit the engine to be pulled forward. Rock the engine and pull forward until the clutch disk is entirely free from the clutch shaft. Remove the engine from the engine compartment.

55. INSTALLATION.

a. Place Engine in Engine Compartment (fig. 16). Using a rope sling and a hoist, lower the engine into the engine compartment.

b. Line Up Clutch With Clutch Shaft. Raise or lower engine to line up the clutch disk with clutch shaft. Place the gear shift lever

in first speed and pull the truck forward slightly. This will cause the clutch shaft to turn until the splines are lined up. Push the engine back until the flywheel housing is flush with the transmission housing.

c. **Install Transmission Housing Cap Screws** (fig. 53). Install all of the transmission housing cap screws before actually tightening any of them. Then alternating from one side of the housing to the other, tighten until all the cap screws are tight.

d. **Connect Engine Front Mounts.** Place the upper and lower insulators in place and install the bolt in each engine front mount to secure the mounts to the frame cross member.

e. **Connect Exhaust Pipe Flanges.** Using a new gasket between the exhaust pipe flanges, connect the exhaust pipe flange to the exhaust manifold flange with two bolts.

f. **Connect Temperature Gage and Electrical Equipment.** Connect the ignition primary wire to the coil. Install the water temperature gage engine unit (fig. 11) to the cylinder head. Connect the two wires which run from the generator regulator to the generator, connecting the yellow wire with the black tracer to the armature connection and the black wire with the yellow tracer to the field connection. Connect the shield treminal to the generator ground post. Install the battery ground cable running from the battery terminal to the oil filter bracket. Connect the heavy cable which runs from the starter relay to the cranking motor. Connect the bonding strap running from the dash to the cylinder head. Connect the bonding strap running from the frame underneath the horn to the cap screw at the bottom of the timing gear cover.

g. **Install Air Cleaner, Carburetor Controls, and the Fuel, Oil Pressure Gage, and Vacuum Lines.** Connect the oil pressure gage line to the connection at the right rear of the crankcase. Connect the windshield vacuum line to the intake manifold. Connect the hydrovac vacuum hose to the intake manifold connection (fig. 10). Connect the throttle rod and the choke wire to the carburetor. Make sure that the choke valve is fully open when the choke button is all the way in. If the choke valve is not fully open, adjust the choke lever on the choke control wire (par. 63 e). Connect the fuel line to the fuel pump. Install the carburetor air cleaner.

h. **Install Radiator.** Place the radiator in position in the support bracket and install the three cap screws on each side of the radiator to secure it to the bracket. Install the hose running from the radiator to the water pump and from the radiator to the water outlet on the engine. Install the fan (par. 76 b).

i. **Install Hood.** Place the hood in position and install the two cap

screws in the hinges on each side of the hood and lock them with wire. Install the bolt in the support arm on each side of the hood (fig. 15). Connect the bonding strap running from the hood to the cowl.

j. Oil and Water. Install the oil drain plug in the oil pan (fig. 10) and fill the engine with the required amount of the specified oil. Close the radiator and the cylinder block drain cocks and fill the radiator with coolant.

k. Adjustments and Tests After Engine Installation. Adjust the clutch (par. 100). Check the ignition timing and adjust it if necessary (par. 60). Start the engine (par. 8 a) and check for water and oil leaks. Run the engine until it reaches normal operation temperature (150° F to 185° F). Adjust the carburetor (par. 63 b) and road test the vehicle.

Section XIV

IGNITION SYSTEM

56. DESCRIPTION AND DATA.

a. Description. The ignition system consists of the battery, ignition switch, distributor, ignition coil, spark plugs and the necessary connecting wires (fig. 18).

b. Data.

Rotation of distributor	Clockwise
Firing order	1-5-3-6-2-4
Breaker arm spring tension	20 to 24 oz
Breaker point spacing	0.020 in.
Ignition coil voltage (primary)	6 volts
Spark plug spacing	0.025 in.

57. IGNITION SWITCH.

a. Description. The ignition switch is located on the instrument panel (fig. 6). In addition to completing the ignition circuit, this switch in the "ON" position completes the fuel level gage circuit.

1½-TON 4x2 TRUCK (FORD)

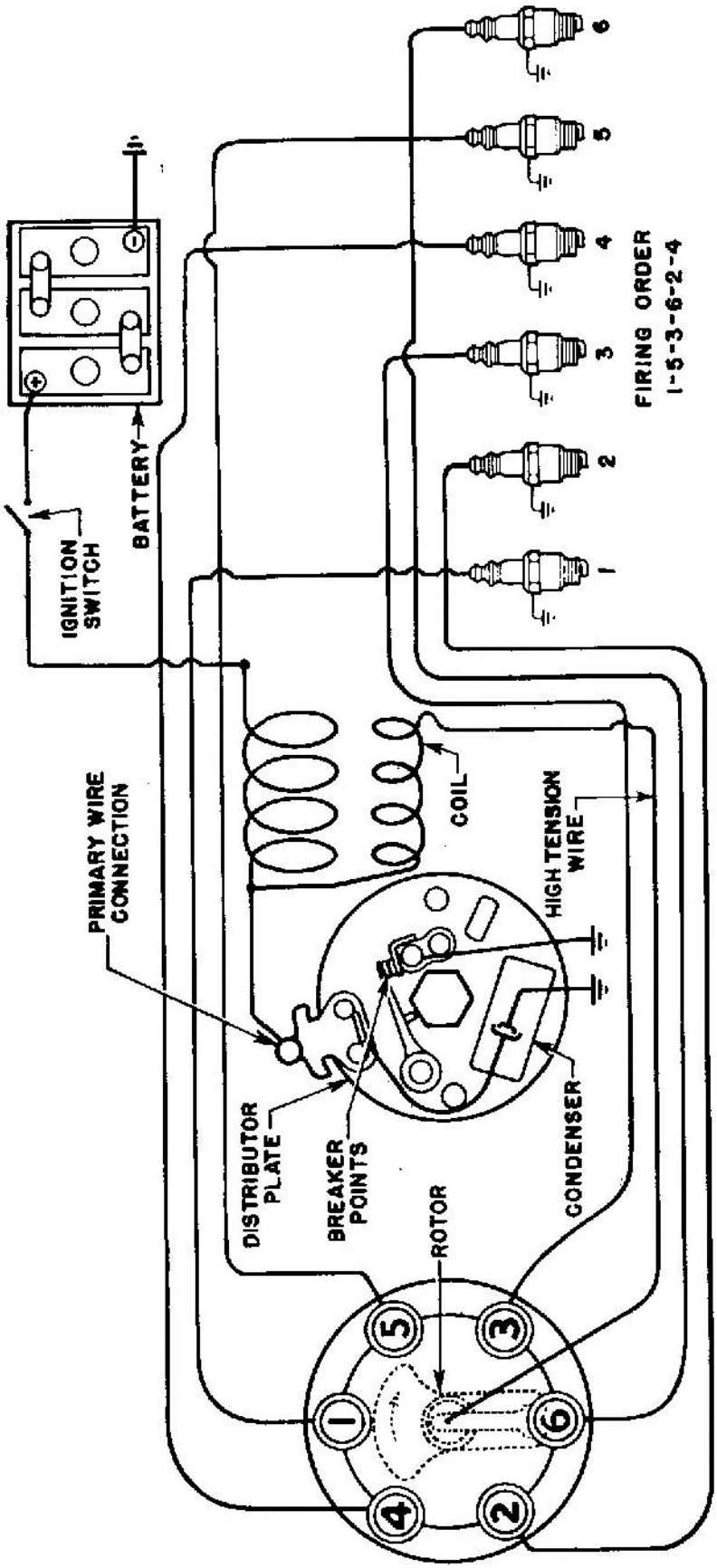

Figure 17 — Ignition Wiring Diagram

IGNITION SYSTEM

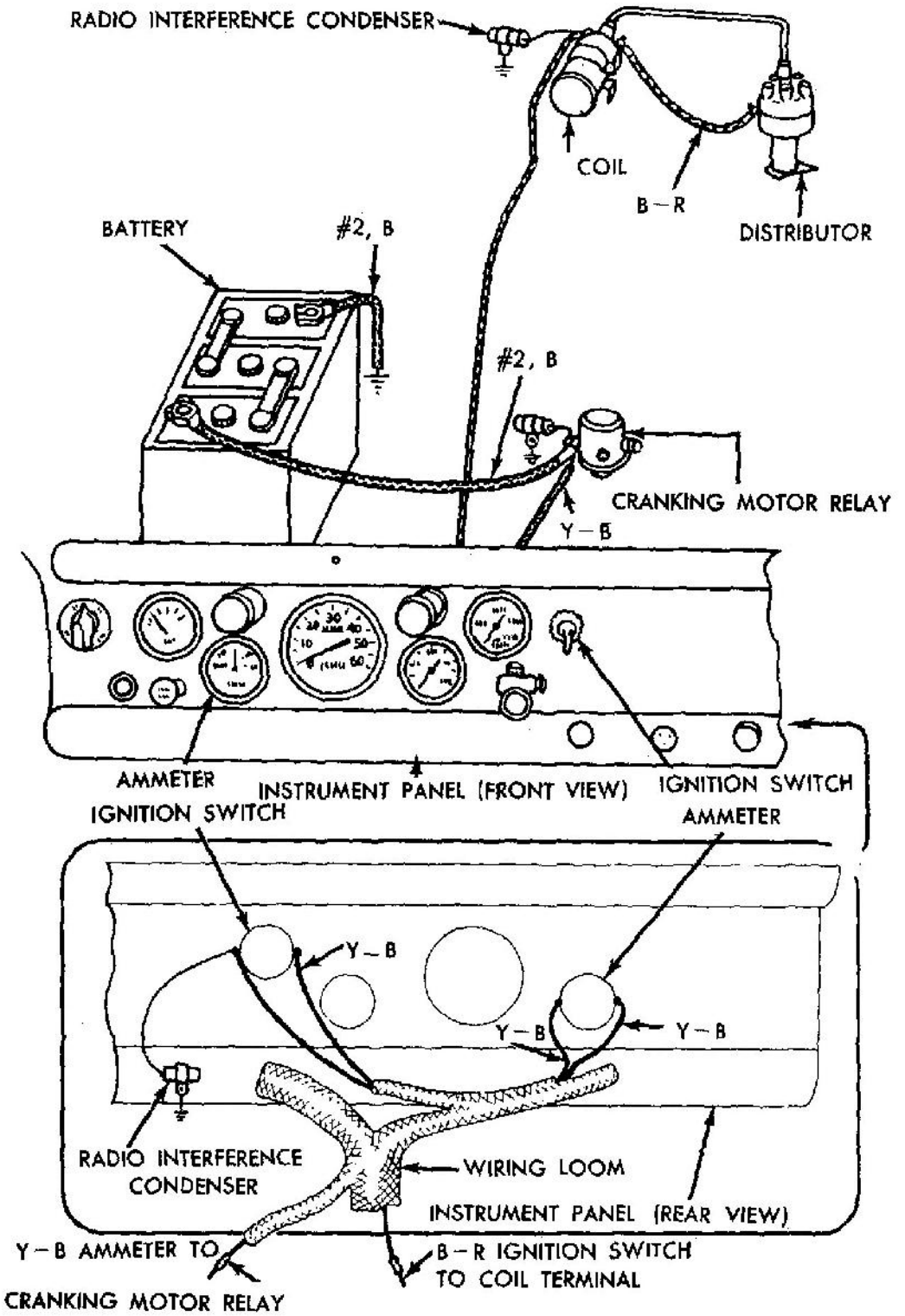

Figure 18 — Ignition Circuit

1½-TON 4x2 TRUCK (FORD)

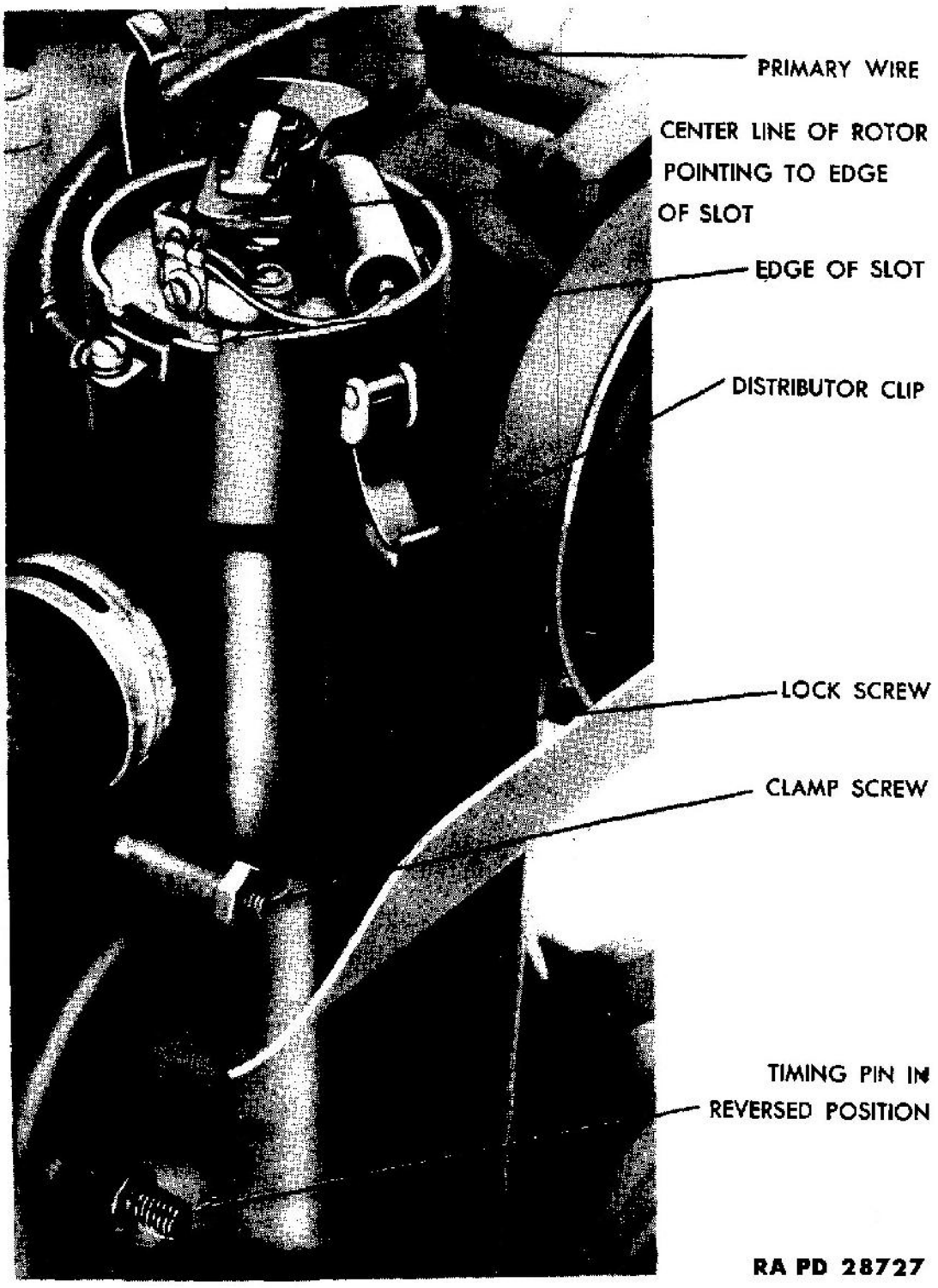

Figure 19 — Distributor With Cap Removed, and Timing Pin

b. Replacement. Remove the knurled nut which holds the ignition switch to the instrument panel. Pull the switch out of the panel and down as far as the wires will permit. Remove the wires from the two switch connections. To install the ignition switch, reverse the sequence of the steps in the removal procedure.

58. IGNITION COIL.

a. Description (fig. 11). The ignition coil is mounted on the cylinder head at the left front. The coil is a conventional six volt automotive-type ignition coil.

b. Replacement. Disconnect the high tension and the primary wires from the coil. Remove the two screws from the coil bracket and remove the coil. To install, reverse the sequence of the steps in the removal procedure.

59. DISTRIBUTOR.

a. Description (fig. 19). The distributor is mounted on the left front of the engine and is driven by gears on the ends of the camshaft and the distributor shaft. See paragraph 56 **b** for data.

b. Removal. Disconnect the primary wire at the distributor. Unsnap the two clips which hold the distributor cap and remove the cap. Remove the hold-down screw and loosen the clamp screw on the timing arm. Lift the distributor to remove it from the engine.

c. Installation. Turn engine to timing position (par. 60). Install the distributor on the engine with the rotor pointing to the edge of the slot in the distributor body (fig. 19). This will place the rotor under No. 1 contact in the distributor cap. Time the ignition (par. 60). Tighten the clamp screw on the timing arm (fig. 19). Install the distributor cap. Connect the primary wire to the distributor (fig. 19).

d. Breaker Points.

(1) ADJUSTMENT. Unsnap the two clips which hold the distributor cap and remove the cap. Turn the engine until the breaker arm is on the high point of the cam, loosen the stationary point lock screw (fig. 20). Turn the eccentric adjusting screw (fig. 20) to the right or left until the gap between the points measure 0.020 inch. Tighten the lock screw and recheck the gap.

(2) REPLACEMENT. Remove the breaker arm screw (fig. 20) and lift off the breaker arm. Remove the lock screw from the stationary breaker point and remove the point. To install, place the breaker arm on the pin and install the lock screw through the bracket and in the center of the slot in the breaker arm spring. Place the stationary breaker point in position and install the lock screw. Adjust the points (subpar. (1) above).

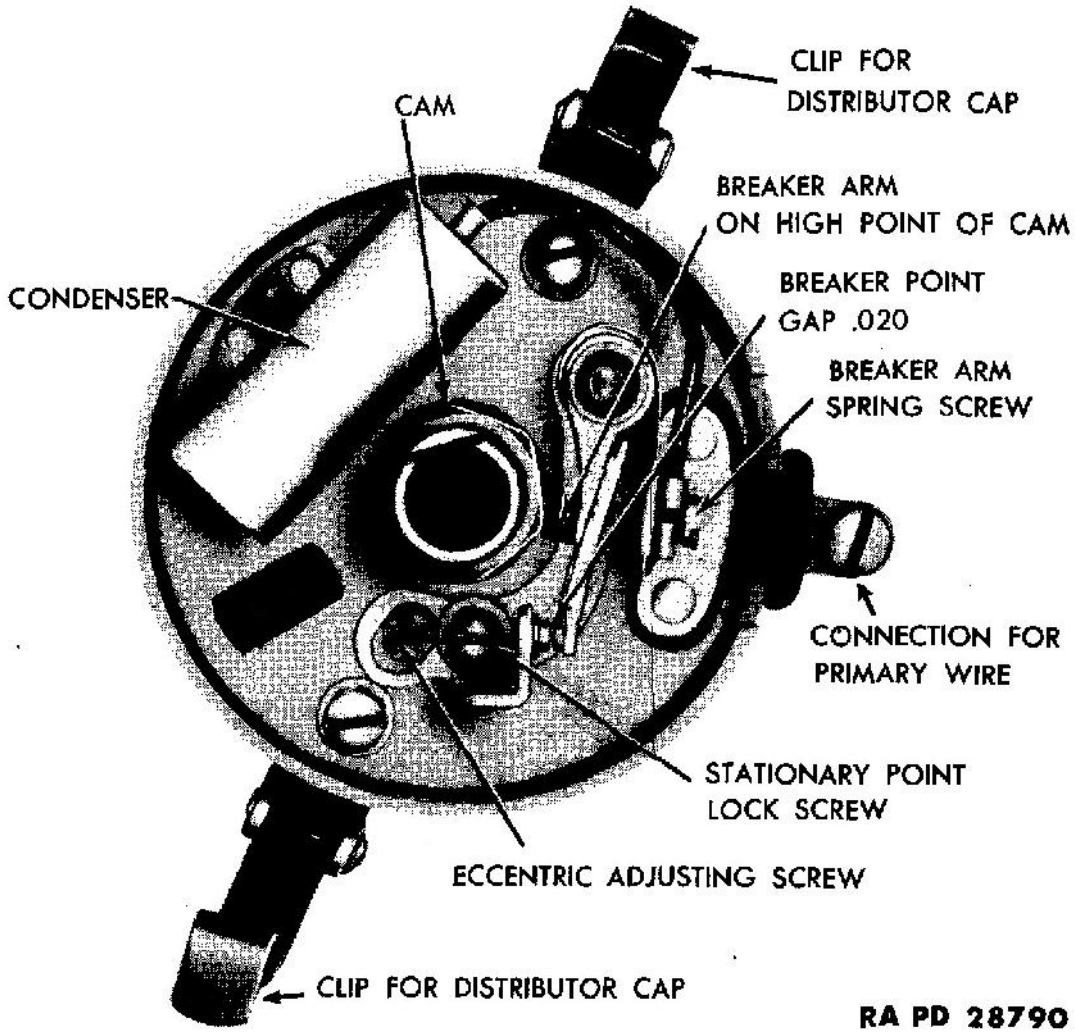

Figure 20 — Distributor Breaker Points

60. IGNITION TIMING (fig. 19).

a. Remove the spark plugs. Remove the timing pin from the cylinder front cover, reverse the pin and put it back in the hole in the cover. While applying hand pressure on the pin, turn the engine until the pin enters the indentation provided in the camshaft gear. No. 1 piston will then be on top dead center on the compression stroke. Remove the distributor cap. See that the lock screw is fastened in the center of the slot in the timing arm. This slot provides a means of advancing or retarding the timing. Loosen the clamp screw on the timing arm. Turn the distributor body until the breaker arm is on the high point of the cam. Adjust the points (par. 59 d (1)). Turn the distributor body until the breaker points just start to open with the rotor pointing to the edge of the slot in the distributor body. Tighten the clamp screw on the timing arm. Install the timing pin and distributor cap. Install the spark plugs.

61. SPARK PLUGS AND WIRES.

a. Spark Plugs. The spark plugs are Champion H9 automotive type. The spark plugs can be effectively cleaned only with a sand blast cleaner. After cleaning, always reset the gap to 0.025 inch. Never bend the center electrode when setting the gap. Always use the correct wrench when removing or installing spark plugs to avoid the wrench slipping and breaking the porcelains. Keep the exterior surfaces of the porcelains clean to avoid possibility of shortening in damp weather.

b. High Tension Wires. The spark plug wires and distributor to coil wire are the high tension automotive type. To replace the spark plug wires, disconnect the wires from the spark plugs, remove the wires from the distributor cap and pull them out of the conduit. To install, reverse the sequence of the steps of the removal procedure. To replace the coil wire, pull the wire out of the distributor terminal and the coil terminal and install a new wire.

Section XV

FUEL AND AIR INTAKE, AND EXHAUST SYSTEMS

62. DESCRIPTION.

a. The fuel system (fig. 21) consists of a 19-gallon tank, located under the driver's seat and a 30-gallon auxiliary tank located on the outside of the frame, on the left-hand side, to the rear of the cab, a fuel filter, fuel pump, carburetor and connecting fuel lines. The air intake system consists of the air cleaner assembly mounted on top of the carburetor. The exhaust system consists of the exhaust pipe and the muffler.

1½-TON 4 x 2 TRUCK (FORD)

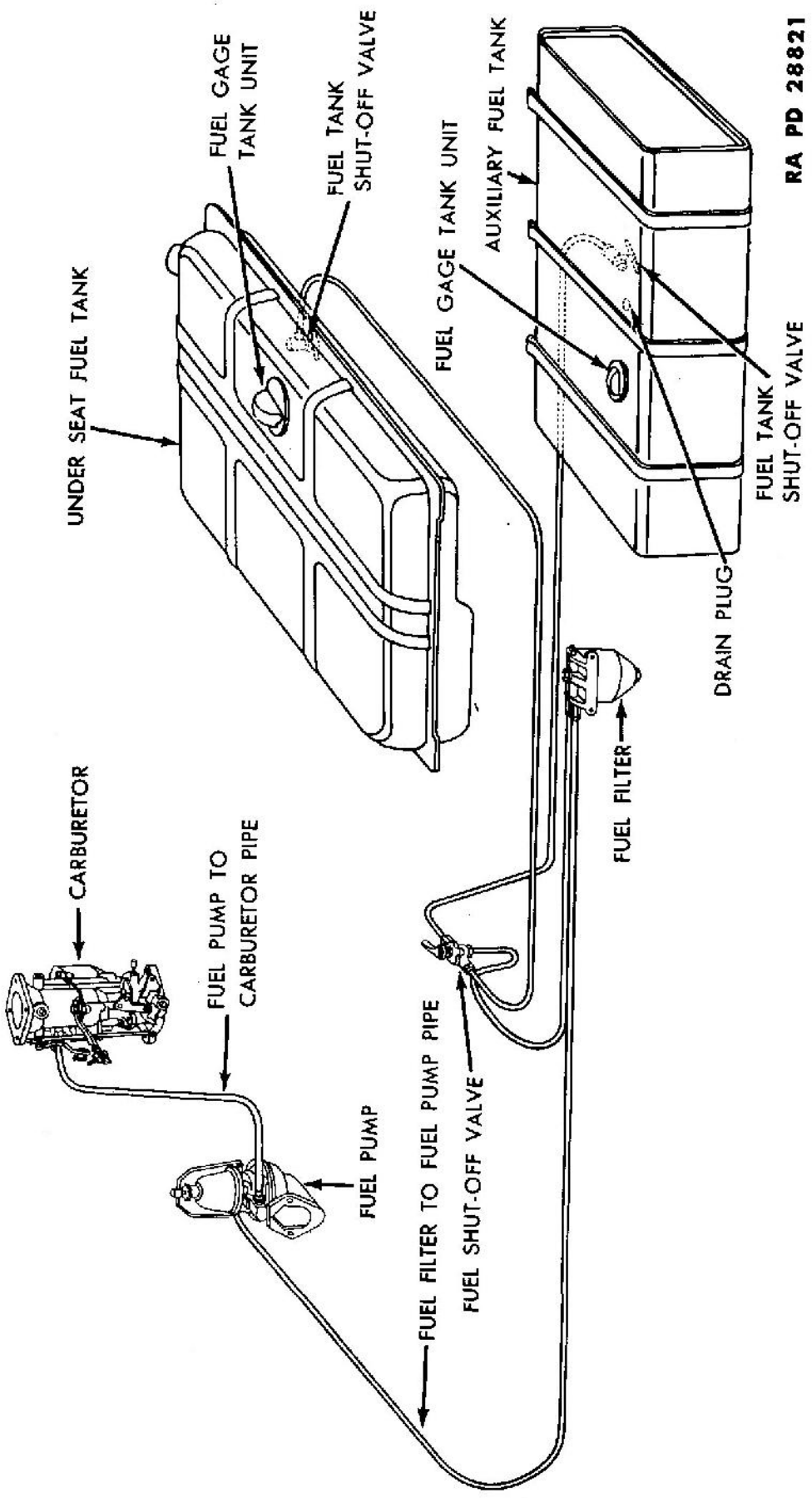

Figure 21 — Fuel System

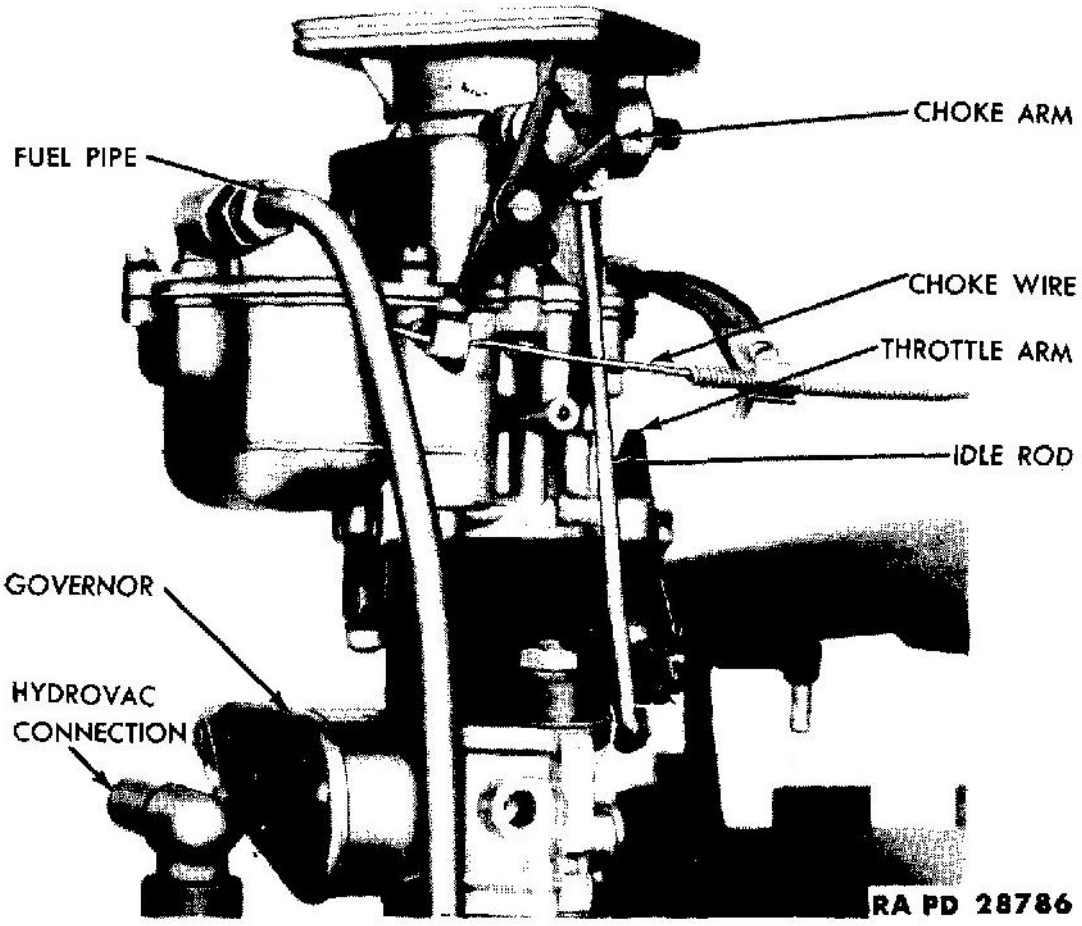

Figure 22 — Carburetor — Front Side

63. CARBURETOR.

a. Description. The carburetor (figs. 22 and 23) is a single barrel down-draft unit.

b. Idle Fuel Adjustment. Make the initial fuel adjustment with the engine stopped. Turn the idle fuel adjusting screw (fig. 23) in until it is seated lightly, then turn it out approximately one turn. Start the engine and run it at idle speed until it reaches normal operating temperature. Set the idling speed (subpar. c below) at approximately 400 revolutions per minute. Turn the idle fuel adjusting screw out, or in, a little at a time, until a setting is reached where the engine idles smoothly.

c. Idle Speed Adjustment. Start the engine and run it at idle speed until it reaches normal operating temperature. Adjust the idle speed adjusting screw (fig. 23) until the engine speed is approximately 400 revolutions per minute.

d. Removal. Remove the center wing nut from the air cleaner and remove the cleaner. Remove the cylinder head nut which holds the carburetor brace, remove the nut from the carburetor which holds the

1½-TON 4x2 TRUCK (FORD)

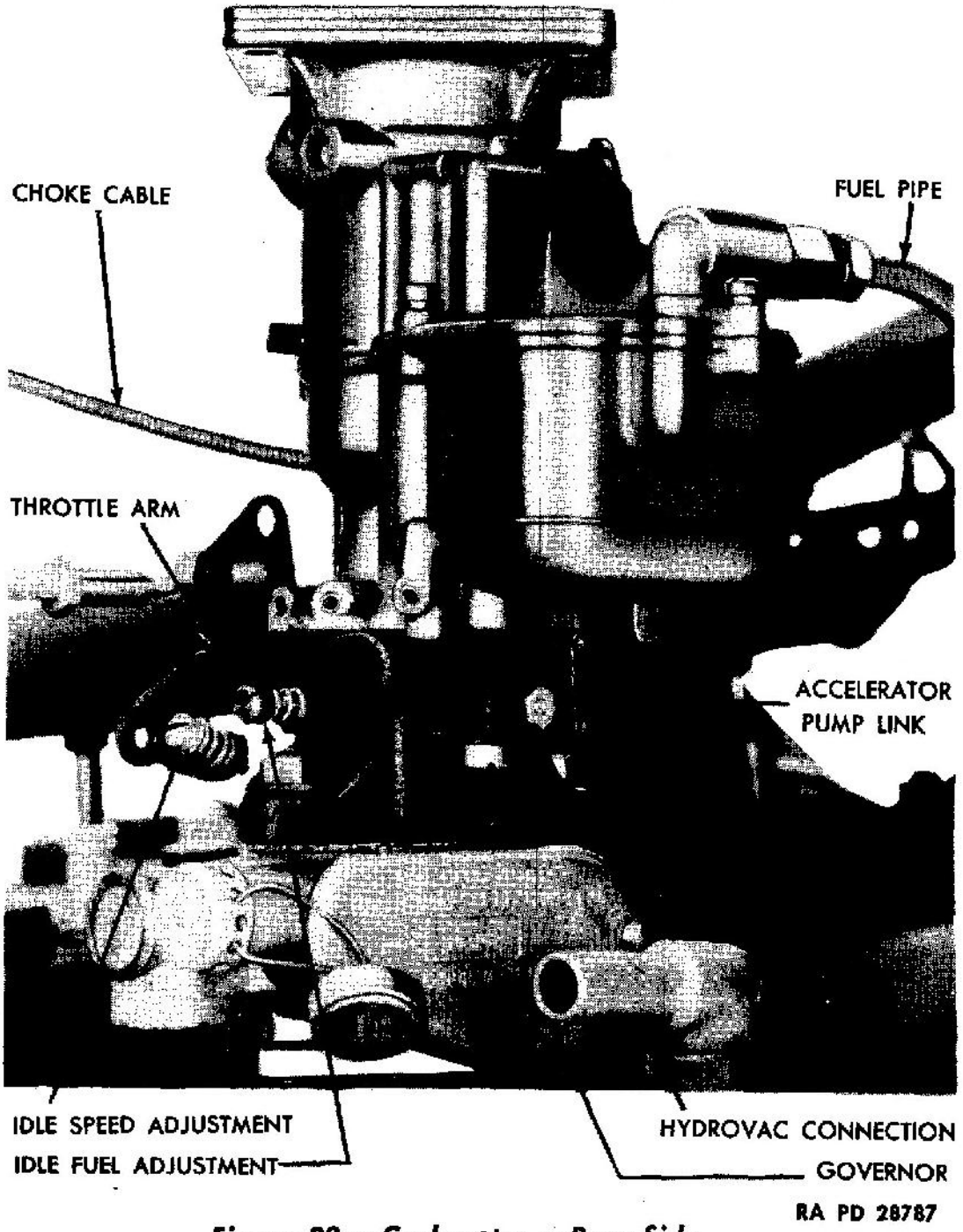

Figure 23 — Carburetor — Rear Side

brace to the carburetor (fig. 12) and remove the brace. Disconnect the fuel line at the carburetor. Disconnect the choke control wire from the carburetor. Disconnect the throttle rod at the carburetor. Remove the two nuts which hold the carburetor to the intake manifold and remove the carburetor.

e. **Installation.** Place the carburetor with the gasket in position on the intake manifold and install the two nuts to secure the carburetor to the manifold. Connect the throttle rod. Connect the choke control wire (fig. 12), making sure the choke valve is wide open when

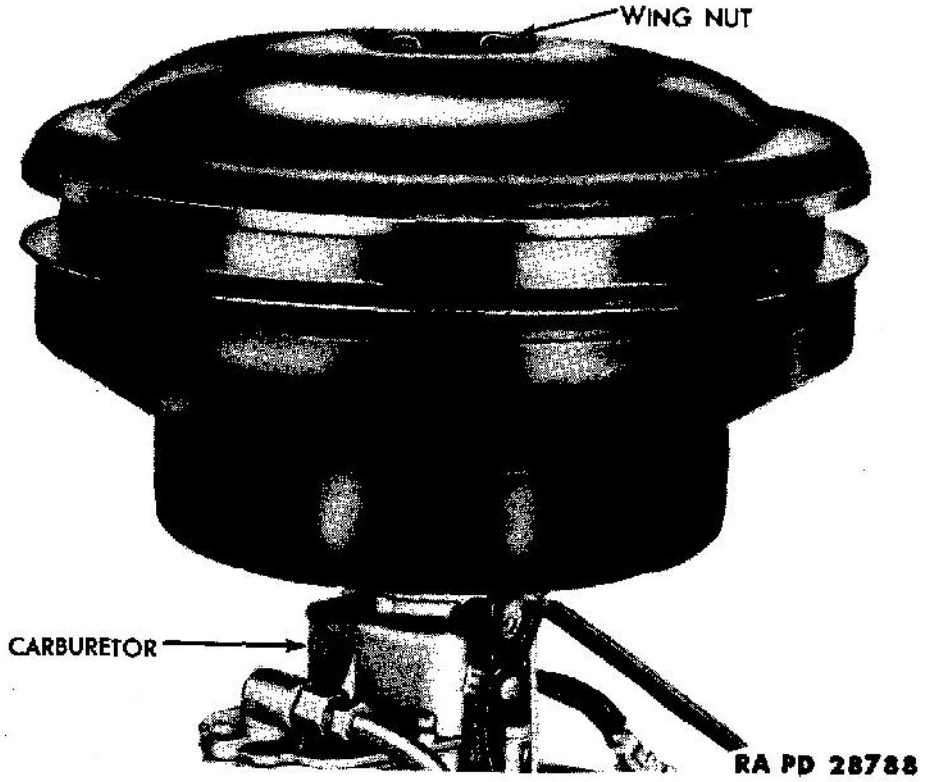

Figure 24 — Air Cleaner

the choke button is pushed all the way in. Connect the fuel line to the carburetor. Place the carburetor brace in position from the carburetor to the cylinder head stud. Install the nuts to secure the brace. Install the air cleaner. Adjust the idle fuel adjusting screws (subpar. b above). Set the idle speed adjustment (subpar. c above).

64. GOVERNOR (figs. 22 and 23).

a. Description. The governor is used to limit the speed of the engine. The governor is located between the intake manifold and the carburetor and limits the intake of the fuel air mixture from the carburetor. All maintenance on the governor must be referred to ordnance maintenance personnel.

b. Governor Replacement. Remove the carburetor (par. 63 d). Lift the governor off the mounting studs and remove the governor. To install, reverse the sequence of the steps of the removal procedure, using new gaskets.

65. AIR CLEANER (fig. 24).

a. Description. The air cleaner is of the oil bath type and is located on the top of the carburetor.

b. Servicing. Remove the wing nut from the air cleaner and lift the air cleaner from the carburetor. Lift the cleaning element from

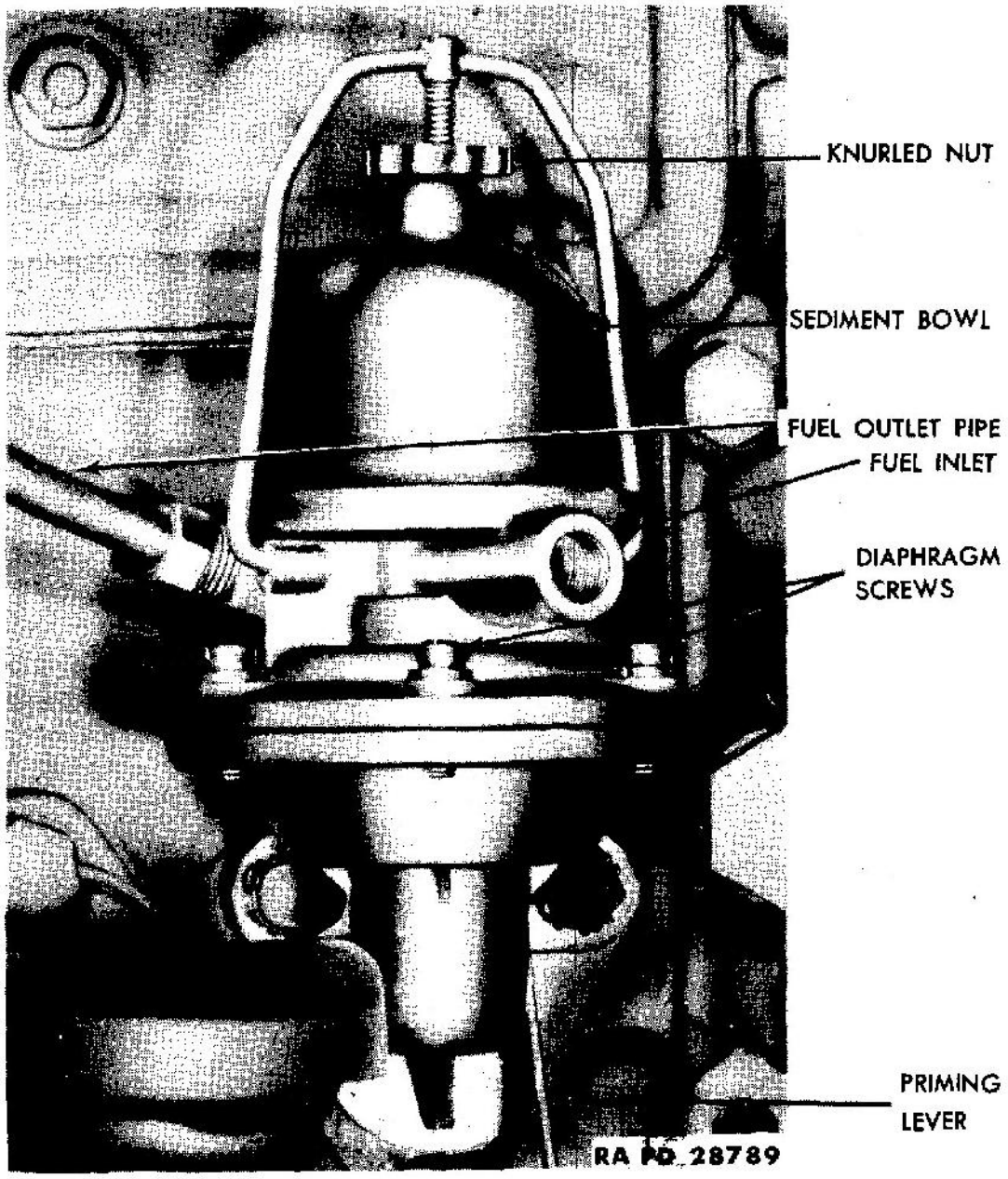

Figure 25 — Fuel Pump

the sump and clean the sump with dry-cleaning solvent and refill with engine oil to the oil level mark. Place the cleaning element in position on the sump and install the cleaner on the carburetor and secure it with the wing nut.

66. FUEL PUMP (fig. 25).

a. Description. The fuel pump is mounted on the right front side of the crankcase. The fuel pump rocker arm is actuated by an eccentric on the camshaft. The fuel pump maintains a pressure of 3.5 to 4.5 pounds. A priming lever on the fuel pump is used for priming the carburetor manually when necessary. Moving the lever up and

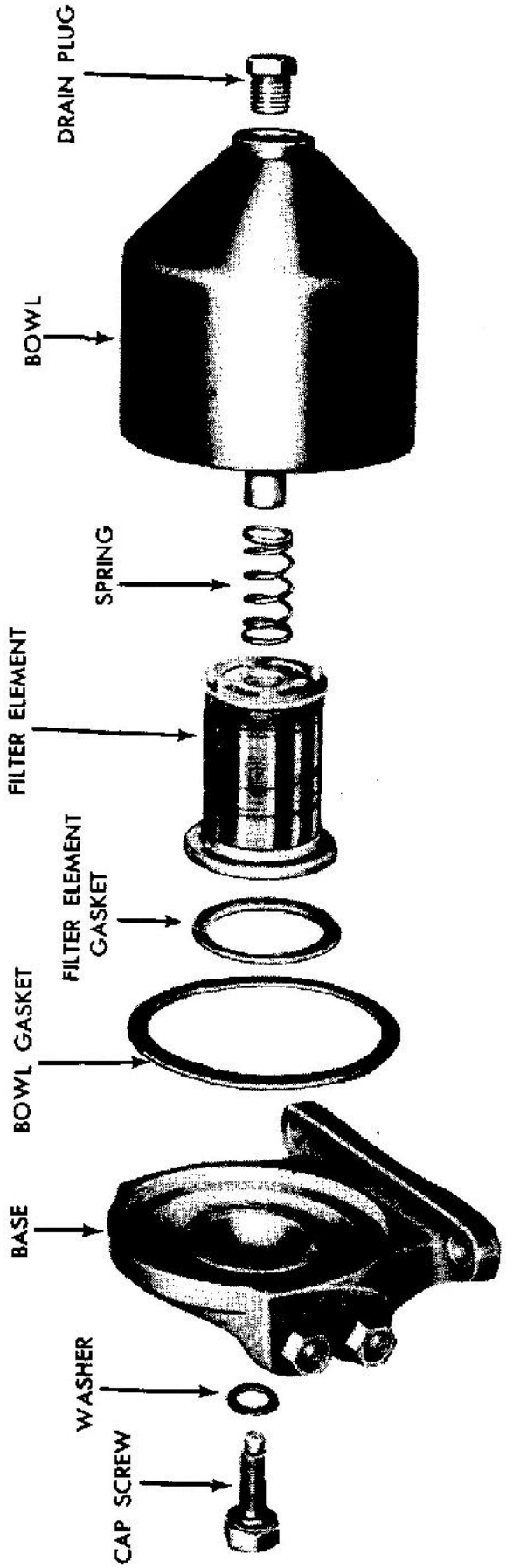

Figure 26 — Fuel Filter — Disassembled

down operates the fuel pump diaphragm and pumps the fuel to the carburetor bowl.

b. Replacement. Close the fuel shut-off valve (fig. 6). Disconnect the two fuel lines from the pump. Remove the two cap screws which hold the pump to the crankcase and remove the pump. To install, reverse the sequence of the steps in the removal procedure.

67. FUEL FILTER (fig. 26).

a. Description. The fuel filter consists of a stack type disk element and a metal filter bowl. The filter is located on the frame left side member, between the auxiliary fuel tank and the left-hand running board (fig. 28). This filtering element consists of a large number of disks, stacked together.

b. Servicing. To drain the filter, close the fuel shut-off valve (fig. 5). Remove the drain plug at the bottom of the filter bowl to remove accumulated dirt and water. If excessive water is noted, drain the fuel tanks also (par. 68 **b** and **d**). To clean or replace the filter element, remove the center stud at the top of the filter. Clean the bowl and wash the filter element in fuel oil, kerosene or dry-cleaning solvent. Do not scrape or scrub the disks. Do not attempt to disassemble the filter element. Replace the element if it cannot be cleaned satisfactorily. Before installing the element, inspect filter bowl gasket and replace it if necessary.

c. Replacement. Close both fuel tank shut-off valves (fig. 21). Disconnect the two fuel lines from the filter. Remove the two cap screws which hold the filter to the frame side member and remove the filter. To install, reverse the sequence of the steps of the removal procedure.

68. FUEL TANKS.

a. Description. An under seat fuel tank (fig. 27), having a capacity of 19 gallons, is located under the driver's seat. An auxiliary fuel tank (fig. 28) is located on the outside of the frame on the left side member, to the rear of the cab and has a capacity of 30 gallons

b. Under Seat Tank Removal (fig. 27). Close the tank shut-off valve at the bottom of the tank. Disconnect the fuel line at the shut-off valve. Open the shut-off valve and drain the tank. Remove the two screws which hold the seat cushion hinge on each side and remove the seat cushion. Remove the three screws which hold the fuel gage tank unit cover. Remove the cover and disconnect the wire from the tank unit. Disconnect the hose clamp which holds the filter pipe to the tank. Pull the filler pipe away from the tank. Remove the two tank mounting bolts from the tank bracket on the right side and the one mounting bolt from the tank on the left side. Remove the tank.

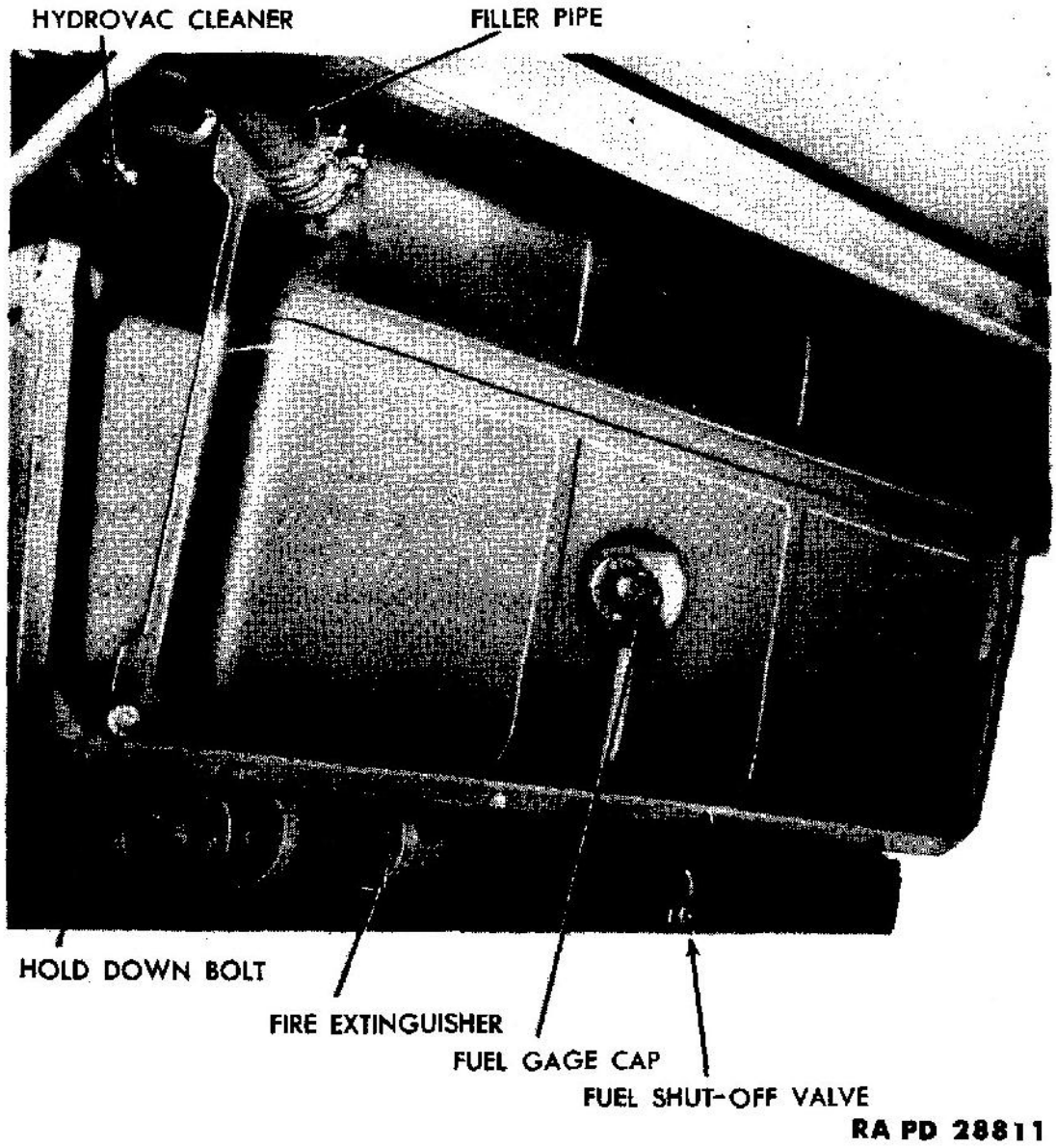

Figure 27 — Under Seat Fuel Tank

c. Under Seat Tank Installation. Place the tank in position, and install the one mounting bolt and spring on the left side, and the two mounting bolts on the right side. Connect the filler pipe hose to the tank and tighten the clamp. Connect the wire to the tank gage unit. Install the three screws in the fuel gage tank unit cover. Connect the fuel line to the tank at the shut-off valve. Open the shut-off valve. Install the two screws in the seat cushion arm on each side of the seat cushion.

d. Auxiliary Tank Removal. Close the tank shut-off valve at the bottom of the tank and remove fuel line connection at the shut-off valve. Remove the drain plug from the bottom of the tank and drain the tank. Remove the three screws from the fuel gage tank unit cover, and remove the cover. Disconnect the wire from the fuel gage tank

1½-TON 4x2 TRUCK (FORD)

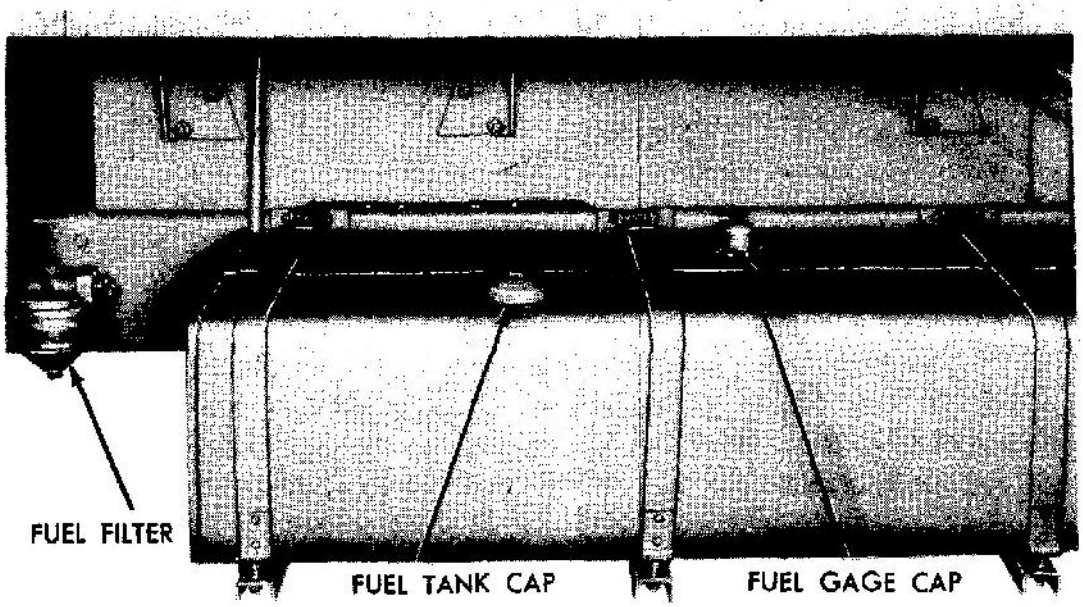

Figure 28 — Auxiliary Fuel Tank

unit. Remove the three nuts from the three tank hold-down strap bolts. Remove the tank.

e. Auxiliary Tank Installation. Place the tank in position and place the tank straps over the tank, and the tank strap bolts through the holding bracket. Install the nuts on the hold-down strap bolts. Connect the wire to the fuel gage tank unit. Install the three screws to secure the tank gage unit cover. Install the drain plug in the bottom of the tank. Connect the fuel line at the shut-off valve. Open the shut-off valve.

69. FUEL LINES (fig. 21).

a. Description. The fuel lines consist of a line from each fuel tank to the shut-off valve, a line from the shut-off valve to the fuel filter and from the fuel filter to the fuel pump and from the fuel pump to the carburetor. These lines are of standard tubing, equipped with fittings which make any of the lines readily removable. When installing new lines, make sure the contour of the new lines is the same as the original contour of the lines replaced. Tighten the fittings firmly.

70. EXHAUST PIPE (fig. 29).

a. Description. The muffler exhaust inlet pipe is a steel tube with a connector flange at one end and is welded to the muffler at the other end. The muffler outlet pipe is a steel tube with a slip connection held by a clamp to the muffler. This pipe is fastened by brackets to the right side member of the frame.

b. Muffler and Inlet Pipe Assembly Replacement. To remove the

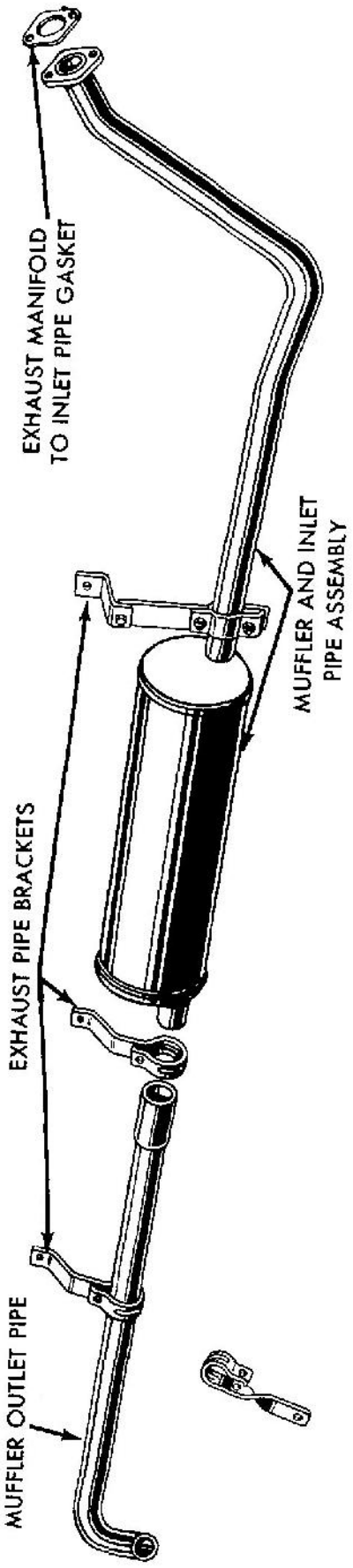

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Figure 29 — Exhaust System

inlet exhaust pipe, it is necessary to remove the muffler as an assembly as the muffler inlet pipe is welded to the muffler. Remove the two bolts which connect the muffler inlet pipe flange and the exhaust manifold flange. Remove the two bolts from the muffler pipe bracket clamp at the front of the muffler (fig. 29). Remove the bolt from each of the three outlet pipe brackets which hold them to the frame. Remove the muffler and pipe assembly. To install the inlet exhaust pipe, reverse the sequence of the steps of the removal procedure, replacing the gasket between the exhaust pipe flanges if damaged.

c. Muffler Outlet Pipe Replacement. To remove the outlet exhaust pipe, remove the bolt from each of the three outlet pipe brackets which hold them to the frame. Remove the bolt from the clamp at the rear of the muffler. Remove the outlet pipe from the muffler. To install, reverse the sequence of the steps of the removal procedure.

71. MUFFLER (fig. 29).

a. Description. The muffler is located under the frame right side member below the driver's seat. The muffler is the reverse flow type, with a front and rear expansion chamber connected by a series of plain and slotted tubes. These tubes reverse the flow of the exhaust gases several times as they pass through the muffler. This results in maximum silencing of the exhaust with a minimum of back pressure.

b. Replacement. Remove the two bolts which connect the muffler inlet pipe flange and the intake manifold flange. Remove the two bolts from the muffler pipe bracket clamp at the front of the muffler (fig. 29). Remove the bolt from each of the three outlet pipe brackets which hold them to the frame. Remove the muffler and pipe assembly. To install, reverse the sequence of the steps of the removal procedure, replacing the gasket between exhaust pipe flanges if it is damaged.

Section XVI

COOLING SYSTEM

COOLING SYSTEM

72. GENERAL DESCRIPTION.

a. Description. The engine is cooled by liquid circulated through the engine block and radiator by a centrifugal water pump. The circulation of the cooling system is controlled by a thermostat (par. 77). The radiator is located in the front of the engine compartment. The liquid in the radiator is cooled by a fan which draws air through the radiator fins.

b. Cooling System Seal. The entire cooling system is sealed by a pressure filler cap (fig. 30). The system, when warm, builds up a pressure which results in raising the boiling point of the coolant, thus reducing the loss of water or antifreeze. The filler cap gasket may be lost when filling the system. Loss or damage of this gasket prevents a proper seal and will cause loss of coolant.

c. Capacity. The capacity of the cooling system is 16 quarts.

d. Drains. A drain cock is provided at the lower right corner of the radiator (fig. 30). A drain cock is also provided on the left side of the engine (fig. 11). To completely drain the cooling system, both the radiator and engine block drain cocks must be open.

e. Inhibiter. To control rusting of iron in the cooling system, a soluble oil rust inhibiter must be used. It is important when the cooling system is refilled with fresh water after draining (especially when antifreeze is not being used) that a soluble oil inhibiter be added to the water.

73. ANTIFREEZE.

a. General Instructions. Use only antifreeze solution (ethylene-glycol type). Fresh solution is green or blue in color. If inspection shows the antifreeze solution in the vehicle has become brown or rusty tinted, it should be replaced with fresh solution. Use an accurate hydrometer for testing the strength of the solution. To test a hydrometer for accuracy, make a solution of one part antifreeze compound and two parts water. This solution should give a reading on the hydrometer of protection to 0° F.

b. Guide for Preparing Fresh Antifreeze Solution. The following table shows the amount of antifreeze compound to be used for preparing 16 quarts of solution (capacity of cooling system).

Protection To	Pints
+10 F	8
0 F	10
– 10 F	12
– 20 F	15
– 30 F	16
– 40 F	18

1½-TON 4x2 TRUCK (FORD)

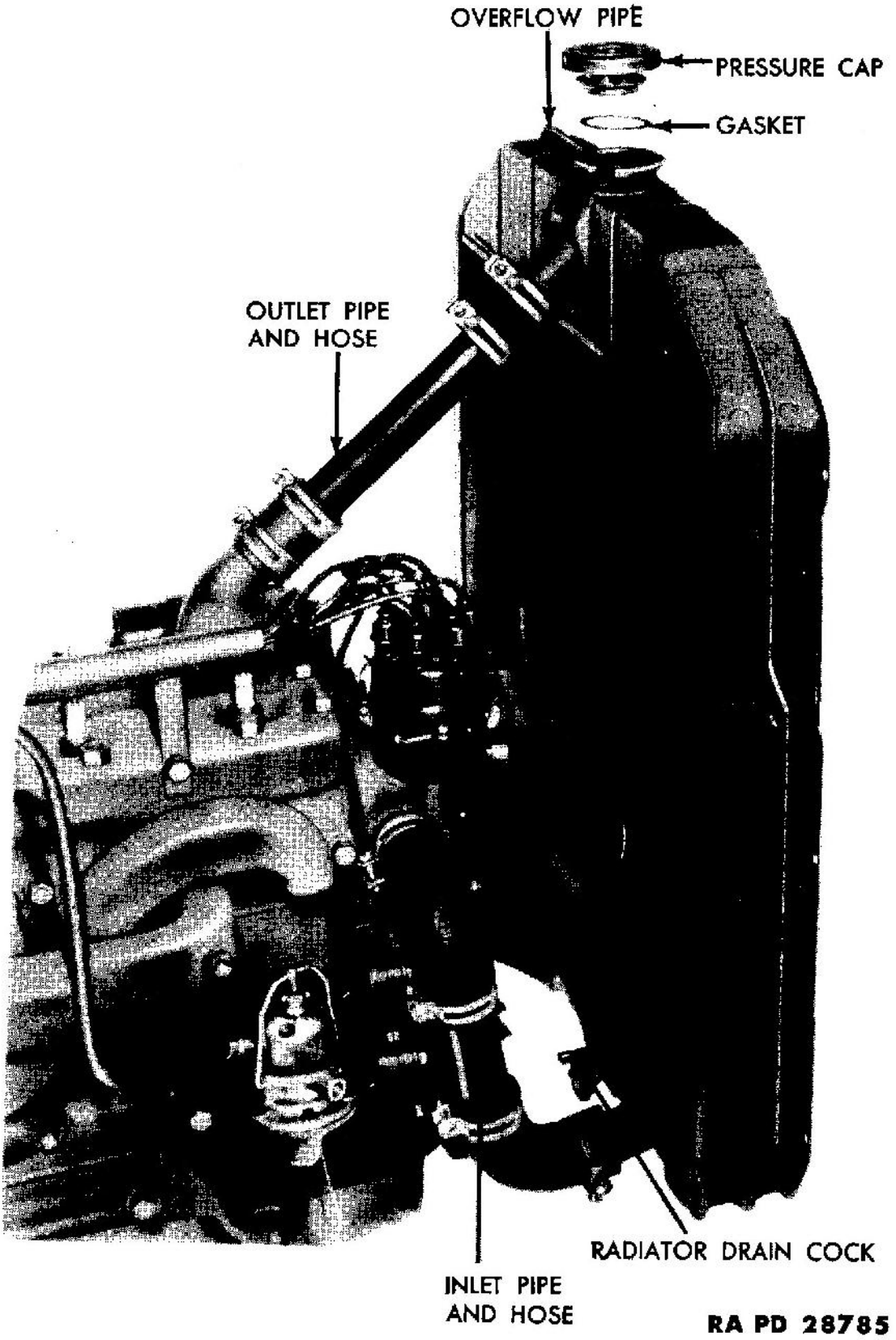


Figure 30 — Radiator and Pressure Cap

c. Putting Fresh Solution in Vehicle. First add some water in the radiator. Then add the required amount of Ethylene Glycol and fill with water to slightly below the filler neck. Start the engine and warm the solution. Use additional solution if required to maintain the proper level. Check the strength of the solution with a hydrometer, and strengthen if necessary. Do not add rust inhibiter to freshly prepared antifreeze solutions.

d. Guide for Strengthening Solution.

	Pints of Antifreeze Compound Required for Desired Protection					
	+10	0	–10	–20	–30	–40
+20 F	4	6	9	11	12	14
+10 F		4	6	8	10	12
0 F			3	5	6	9
– 10 F				3	5	6
– 20 F					3	4
– 30 F						3

e. Strengthening Solution. Add the specified quantity of antifreeze compound required for the desired protection. See guide (subpar. **d** above). Start the engine and warm the solution. Use additional solution if required to maintain the proper level. Check the strength of the solution with an accurate hydrometer.

74. RADIATOR AND HOSE.

a. Description. The radiator is of the fin and tube type.

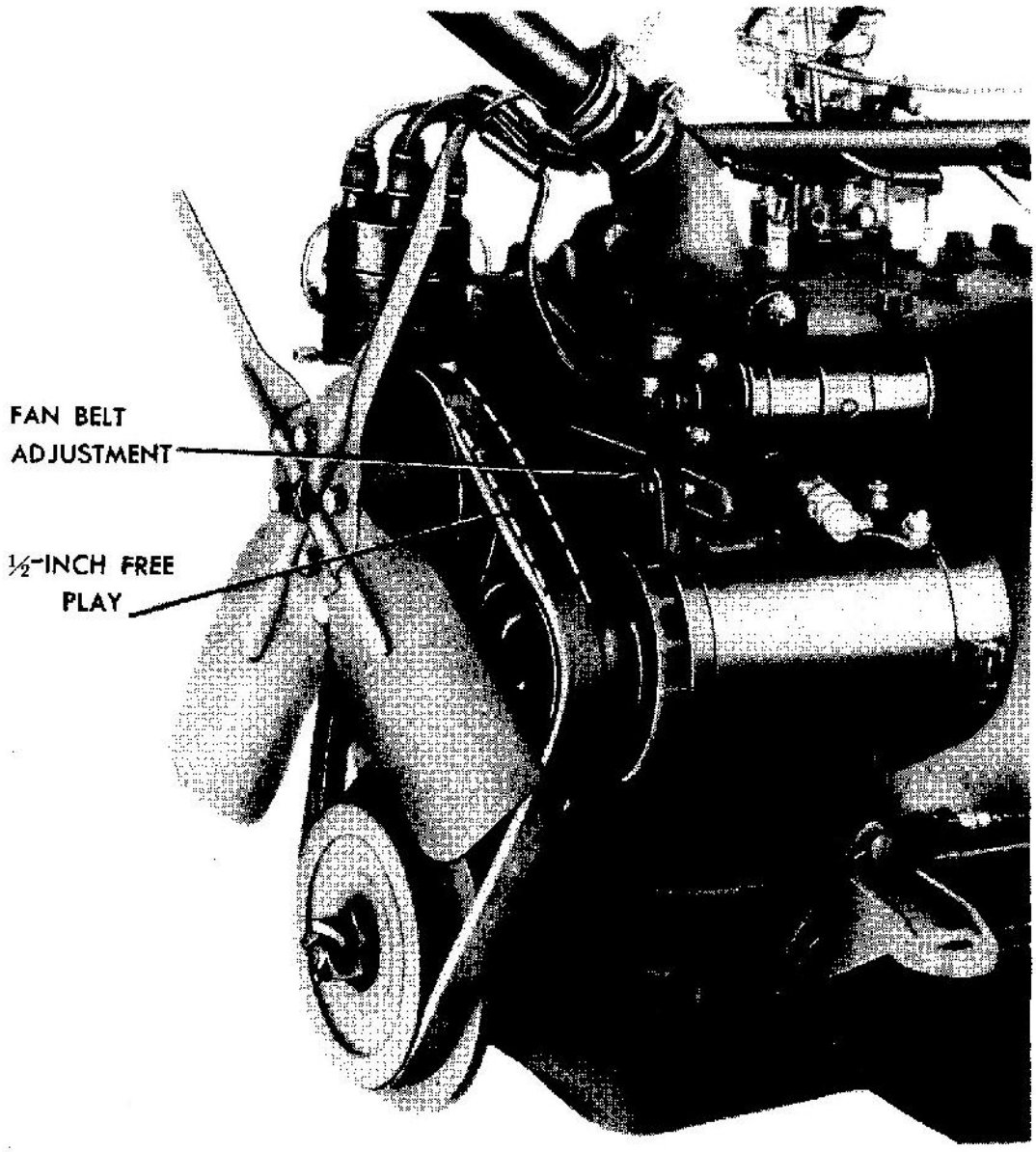
b. Removal. Raise the hood. Open the radiator drain cock (fig. 30) and drain the radiator. Remove the fan (par. 76 **b**). Loosen the clamps on the hose and pipe running from the radiator to the water pump. Remove the hose and pipe. Loosen the clamps on the hose and pipe running from the radiator to the water outlet connection on the engine and remove the hose and pipe. Remove the three cap screws on each side of the radiator which hold the radiator to the support bracket. Remove the radiator. To install the radiator, reverse the sequence of the steps of the removal procedure.

c. Hose. Rubber hose is used at various water connections on the engine. All hose connections are held on with clamps and are easily removed.

75. WATER PUMP (fig. 10).

a. Description. The water pump is a prelubricated centrifugal type, located on the front of the engine block and is driven by the

1½-TON 4x2 TRUCK (FORD)



RA PD 28784

Figure 31 — Fan Belt Adjustment Location

fan belt. The water pump shaft is supported on a sealed, double ball bearing and no additional lubricant is required during the life of the unit.

b. Removal. Drain the radiator (par. 72 d). Remove the fan belt (par. 76 d). Remove fan (par. 76 b). Remove distributor (par. 59 b). Remove the two cap screws from the top of the pump and the nut from the stud at the bottom of the pump. Remove the pump.

c. Installation. Replace the pump to cylinder block gasket with a new gasket. Place the pump in position over the stud at the bottom of the pump. Install the two cap screws, placing the generator bracket under the cap screw nearest the generator. Install the nut on the stud at the bottom of the pump. Install the distributor (par.

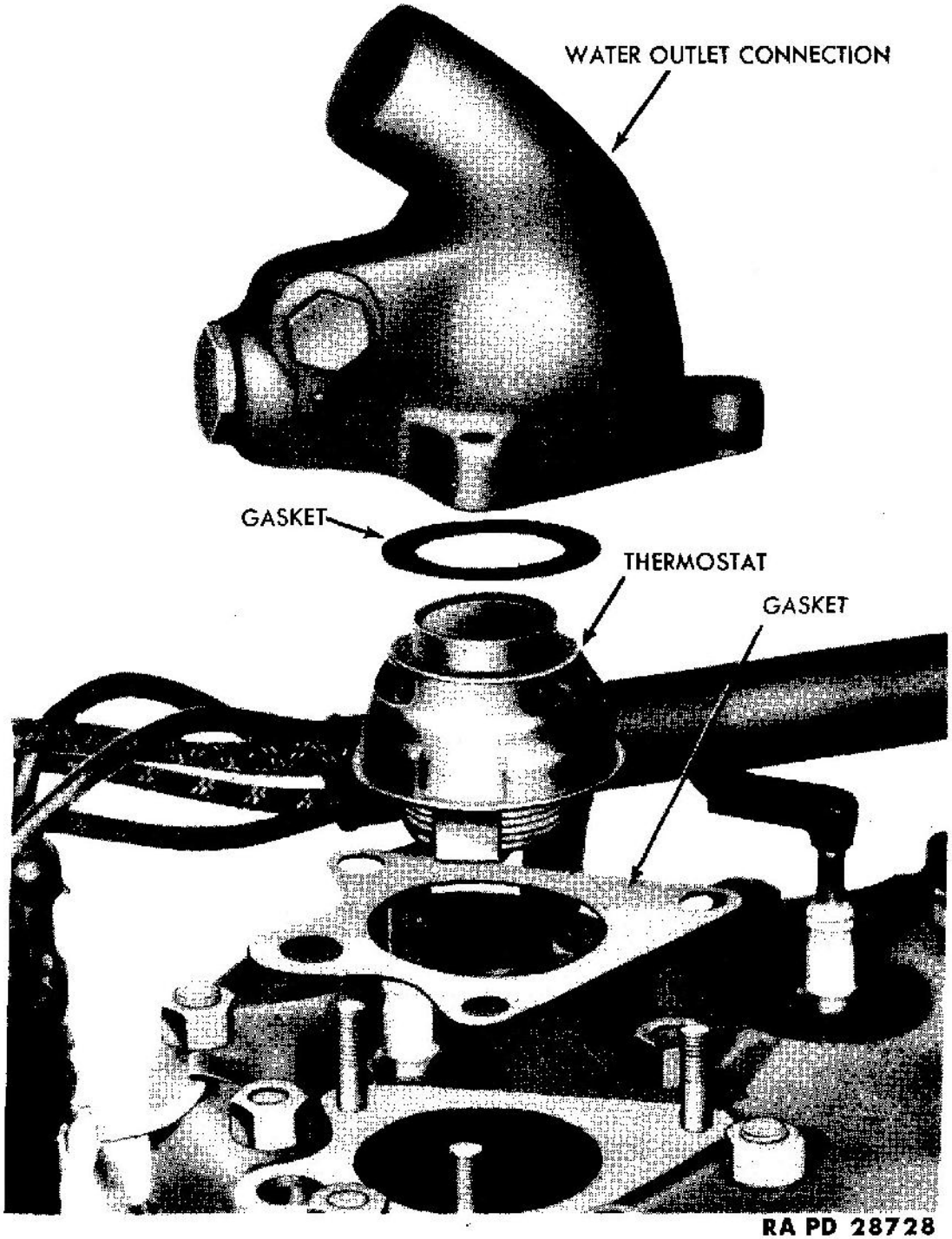


Figure 32 — Thermostat — Disassembled

59 c). Install the fan (par. 76 b). Install the fan belt and adjust (par. 76 d). Refill radiator with coolant.

76. FAN AND FAN BELT (fig. 31).

a. Description. A four blade 18-inch diameter fan is mounted on the end of the water pump shaft. The fan is driven by a V-belt from a pulley on the crankshaft. The same belt also drives the generator.

b. Fan Replacement. To remove the fan, remove the four cap screws which hold the fan blades to the pulley and remove the fan blades. To install the fan, reverse the sequence of the steps of the removal procedure.

c. Fan Belt Adjustment. The belt tension is controlled by the position of the generator on its bracket. To adjust the belt, loosen the cap screw in the slotted bracket on top of the generator (fig. 31), and move the generator away from the cylinder block to tighten the belt. The belt should be adjusted so that ½-inch movement is possible between the generator pulley and the fan pulley. Tighten the generator bracket cap screw after the belt has been properly adjusted.

d. Fan Belt Replacement. To remove the fan belt, loosen the cap screw in the slot in the generator bracket and move the generator toward the cylinder block as far as possible. Remove the belt. To install the belt, place the belt over the crankshaft pulley, fan pulley and generator pulley. Adjust the belt (par. 76 c).

77. THERMOSTAT (fig. 32).

a. Description. The thermostat, located in the cylinder head below the outlet connection, is of the bypass bellows type and is non-adjustable. This thermostat prevents the circulation of water in the radiator until the engine reaches normal operating temperature. The thermostat starts to open at from 150 to 155° F, and is fully open at 185° F.

b. Removal. Drain the cooling system (par. 72 d). Loosen the hose clamps from the hose and pipe running from the water outlet connection to the radiator and remove the hose and pipe. Remove the three nuts which secure the water outlet connection to the cylinder head. Remove the outlet connection and lift out the thermostat.

c. Installation. Install a new gasket over the outlet connection studs. Place the thermostat in position and install the outlet connection over the three studs and install the nuts on the studs. Install the hose and pipe running from outlet connection to the radiator and tighten the clamps. Refill cooling system.

Section XVII

INSTRUMENT PANEL AND INSTRUMENTS

78. INSTRUMENT PANEL (fig. 6).

a. The instrument panel, located in the front of the cab, is welded to the side panels of the cab and is not removable.

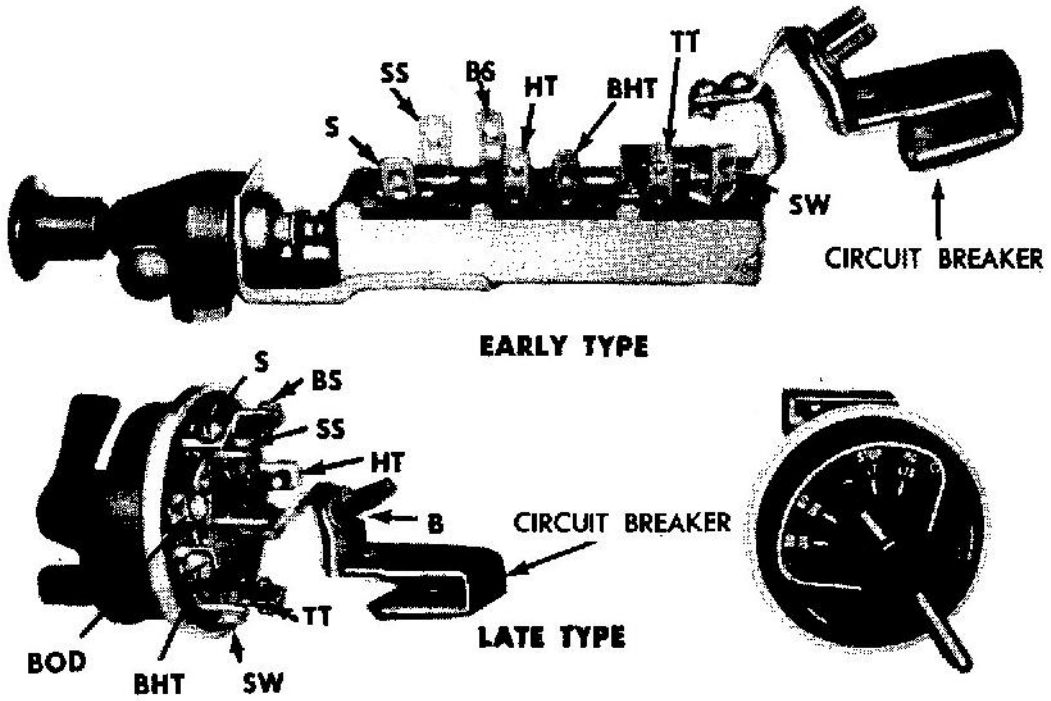
79. HEADLIGHT SWITCH (fig. 33).

a. Description. On early production vehicles, the headlight switch is the push-pull type and is located in the center of the instrument panel. The operation of the switch is covered in paragraph 7. On late production vehicles the headlight switch is the rotary type. The operation of this switch is covered in paragraph 7 **c**.

b. Removal (Early Type Switch). Pull the switch button all the way out by pressing the spring button on the side of the switch. Remove the button from the switch by loosening the small lock screw and unscrewing the button. Remove the nut from the top of the switch housing and pull the housing off the switch shaft. Remove the nut which holds the switch to the instrument panel and pull the switch out of the rear side of the panel and down as far as the wires will permit. Disconnect the wires from the switch terminals, noting wire colors (fig. 33).

c. Installation (Early Type Switch). Connect the wires to the headlight switch terminals (see fig. 33 for wire color). Place the light switch shaft through the hole in the instrument panel from rear and install the nut which holds the switch to the instrument panel. Install the switch housing on the switch shaft and install the lock screw in the housing. Install the switch button and tighten the switch button lock screw.

1½-TON 4x2 TRUCK (FORD)



KEY TO TERMINALS AND WIRE COLORS

S—B. O. SERVICE STOP LIGHT—GREEN
SS—STOP LIGHT TO BLACKOUT SWITCH—GREEN-RED TRACER
BS—B. O. STOP LIGHT—GREEN-BLACK TRACER
HT—SERVICE TAILLIGHTS—BLACK
BHT—B. O. TAILLIGHT—YELLOW-BLACK TRACER
TT—TRAILER SOCKET—BLACK-WHITE CROSS TRACER
SW—B. O. SWITCH TO STOPLIGHT SWITCH—YELLOW—RED CROSS TRACER
B—FEED WIRE FROM AMMETER—YELLOW-RED TRACER
BOD—B. O. DRIVE LIGHT—WHITE

RA PD 28827

Figure 33 — Headlight Switch

d. Removal (Late Type Switch). Remove the screw from the switch lever and remove the lever. Remove the nut from the switch shaft in the center of the switch which holds the switch to the instrument panel. Remove name plate from the shaft and safety button and pull the switch out of the rear side of the panel. Disconnect the wires from the switch terminals, noting wire colors (fig. 33).

e. Installation (Late Type Switch). Connect the wires to the headlight switch terminals (see fig. 33 for wire color). Place the light switch shaft and safety button through the two holes in the instrument panel from the rear. Place the name plate over the shaft and safety button and install the nut which holds the switch to the instrument panel. Install the screw in the switch lever to secure it to the switch shaft.

INSTRUMENT PANEL AND INSTRUMENTS

80. BLACKOUT DRIVE LIGHT SWITCH (fig. 6).

a. Description. The use of the blackout drive switch is described in paragraph 7 b.

b. Replacement. Remove the lock screw from the switch knob and unscrew the knob from the shaft. Remove the nut which holds the switch to the instrument panel, pull the switch out of the rear of the panel and down as far as the wires will permit. Remove the two wires from the switch, noting the wire colors. To install the switch, reverse the sequence of the steps of the removal procedure.

81. INSTRUMENT PANEL LIGHTS (fig. 6).

a. Description. The instrument panel is illuminated by two light bulbs, one on each side of the speedometer. These lights are turned on and off with a switch located to the right of the starter button.

b. Replacement. The lamp is part of the shield assembly and it cannot be replaced without the shield. The shield assembly is held on the instrument panel by pronged fittings. To remove the shield from the panel, move up and down until the prongs are released. Disconnect the wire from the instrument panel light switch. To install the lamps, reverse the sequence of the steps of the removal procedure.

82. INSTRUMENT PANEL LIGHT SWITCH (fig. 6).

a. The instrument panel lights are turned on and off by the instrument panel light switch located to the right of the starter button. To replace the switch, loosen the lock screw in the switch knob and unscrew the knob from the switch shaft. Remove the nut which holds the switch to the instrument panel. Pull the switch out of the rear of the panel and down as far as the wires will permit. Disconnect the two wires. To install the switch, reverse the sequence of the steps of the removal procedure.

83. STARTER BUTTON (fig. 6).

a. Description. The starter button is located on the left side of the instrument panel. Operation of the starter button is covered in paragraph 6 e.

b. Replacement. Press the two springs on each side of the starter button, on the rear side of the panel, and pull the button out from the front side of the panel. Disconnect the wire from the slip connection on the starter button. To install the starter button, connect the wire and push the starter button through the front of the panel into place.

84. AMMETER (fig. 6).

a. Description. An ammeter, having a range of from 50 amperes

discharge to 50 amperes charge, is located to the left of the speedometer on the instrument panel. The operation of the ammeter is covered in paragraph 6 a.

b. Replacement. Remove the two nuts from the U-clamp at the rear side of the panel which hold the ammeter to the instrument panel. Pull the ammeter out of the front side of the panel. Disconnect the two wires from the ammeter. To install the ammeter, attach the two wires. Insert the ammeter in the instrument panel and install the two nuts on the U-clamp which hold the ammeter to the panel.

85. FUEL GAGE (fig. 6).

a. Description. The fuel gage consists of three units, the gage on the instrument panel and the unit in each fuel tank. The operation of the fuel gage is covered in paragraph 6 d. The fuel gage circuit is shown in figure 34.

b. Fuel Gage Panel Unit Replacement (fig. 6). Remove the two nuts from the U-clamp which hold the gage to the panel and remove the gage from the front of the panel. Disconnect the two wires attached to the gage. To install the gage, connect the two wires and place gage in position in the panel and install the two nuts on the U-clamp to secure the gage to the panel.

c. Fuel Gage Tank Unit (Either Tank) Replacement. Remove the screws that hold the fuel gage tank unit cap (fig. 27) and remove cap. Disconnect the wire attached to the gage. Remove the screws which hold the fuel gage unit to the tank and lift the unit out of the tank. To install, reverse the sequence of the steps of the removal procedure, replacing gasket if damaged.

86. FUEL TANK SELECTOR SWITCH (fig. 6).

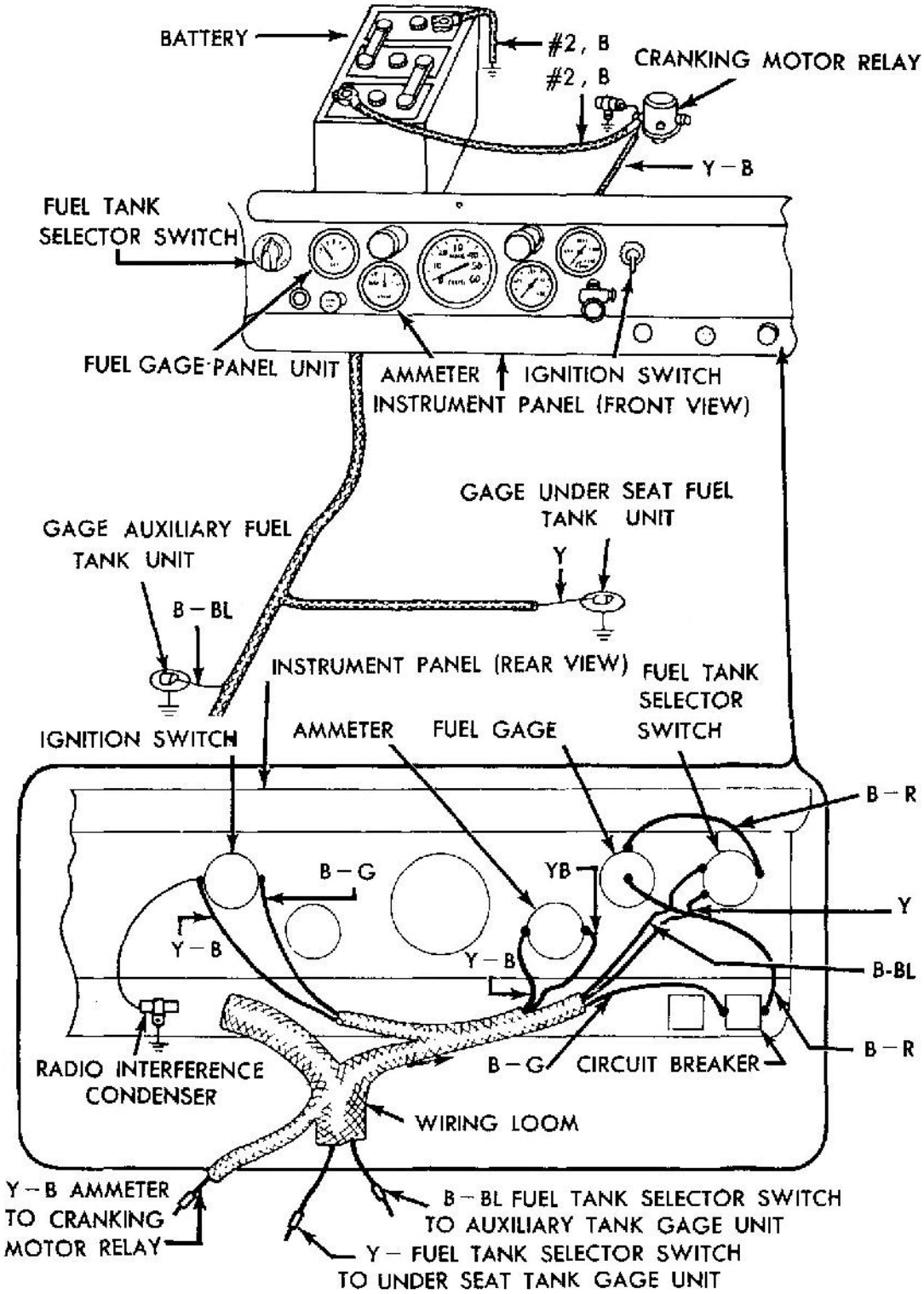
a. Description. The operation of the fuel tank selector switch is covered in paragraph 6 d.

b. Replacement. Loosen the small lock screw in the selector switch control knob and remove the knob from the shaft. Remove the nut from the front of the switch and remove the switch from the rear of the panel. Disconnect the wires from the switch. To install the switch, reverse the sequence of the steps of the removal procedure.

87. OIL PRESSURE GAGE (fig. 6).

a. Description. The oil pressure gage is of the Bourden tube type and is located to the right of the speedometer. The operation of the gage is covered in paragraph 6 f.

INSTRUMENT PANEL AND INSTRUMENTS



— KEY TO ABBREVIATIONS —

B—BLACK
B-G—BLACK AND GREEN
B-BL—BLACK WITH BLUE TRACER
B-R—BLACK AND RED
Y—YELLOW
Y-B—YELLOW WITH BLACK TRACER
#2 WIRE SIZE

RA PD 28805

Figure 34 — Fuel Gage Circuit

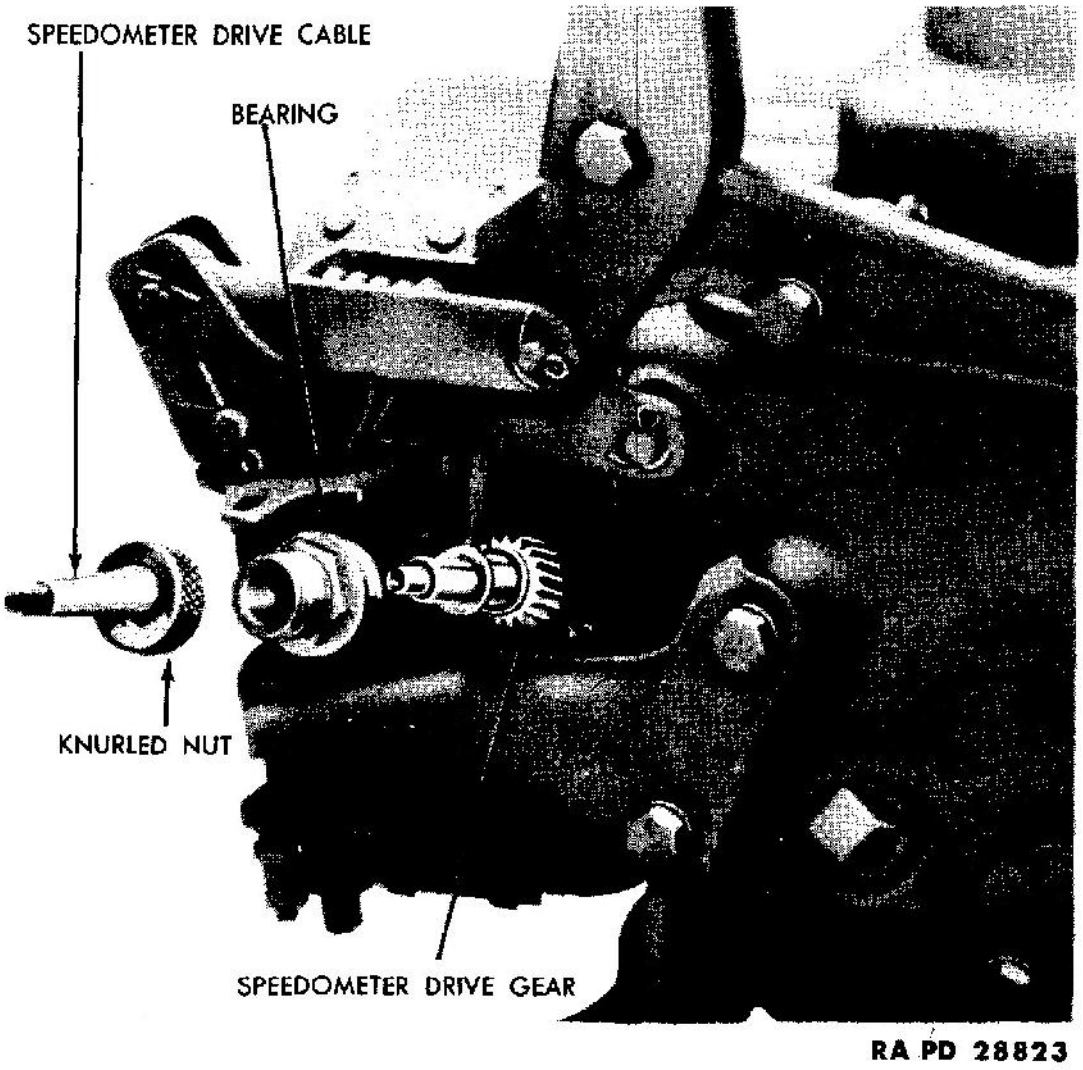


Figure 35 — Speedometer Drive Gear

b. Replacement. Disconnect the oil line from the gage. Remove the two nuts from the U-clamp which hold the oil gage to the instrument panel and pull the gage out from the front of the panel. To install the gage, reverse the sequence of the steps of the removal procedure.

88. WATER TEMPERATURE GAGE (fig. 6).

a. Description. The water temperature gage is of the Bourden tube type and consists of a thermometer bulb in the cylinder head and a shielded tube connected to the indicator gage on the instrument panel. The operation of this gage is covered in paragraph 6 g.

b. Removal. Drain the cooling system enough so that the coolant level is below the cylinder head. Unscrew the nut which holds the thermometer bulb in the cylinder head. Remove the two nuts from

the U-clamp which hold the gage to the instrument panel. Pull the shielded tube through the dash. Remove the gage and tube from the front of the panel.

c. Installation. Insert the thermometer bulb and tube through the hole in the instrument panel and through the dash and connect the bulb to the fitting in the cylinder head. Place the gage in position on the instrument panel and install the two nuts on the U-clamp to secure the gage to the instrument panel.

89. IGNITION SWITCH (fig. 6).

a. Description. The ignition switch is located to the right of the temperature gage. The operation of the ignition switch is covered in paragraph 6 **h**.

b. Replacement. Remove the knurled nut from the front of the switch and pull the switch through the rear of the panel and down as far as the wires will permit. Disconnect the wires. To install the switch, reverse the sequence of the steps of the removal procedure.

90. SPEEDOMETER (fig. 6).

a. Description. The speedometer is located on the left side of the instrument panel and is equipped with a trip mileage reset on the back of the instrument. The speedometer consists of three units, the head, the drive cable and the drive gear. The speedometer drive gear is located on the right side of the transmission.

b. Speedometer Head Replacement. Disconnect the speedometer cable from the speedometer. Remove the two wing nuts from the U-clamp which hold the speedometer to the instrument panel. Remove the speedometer head. To install the speedometer head, reverse the sequence of the steps of the removal procedure.

c. Speedometer Drive Cable Replacement. Disconnect the speedometer drive cable from the speedometer. Pull the cable through the dash. Disconnect the clip holding the drive cable to the transmission. Disconnect the drive cable at the transmission. Remove the cable. To install the cable, reverse the sequence of the steps of the removal procedure.

d. Speedometer Drive Gear Replacement (fig. 35). Disconnect the speedometer cable at the transmission. Unscrew the bearing which holds the drive gear in place. Remove the drive gear. To install, reverse the sequence of the steps of the removal procedure.

1½-TON 4x2 TRUCK (FORD)

Section XVIII

ELECTRICAL SYSTEM

91. DESCRIPTION.

a. The vehicle uses a 6-volt electrical system. The electrical system consists of the generating circuit (fig. 38), the cranking motor circuit (fig. 40), the ignition circuit (fig. 18), the fuel gage circuit (fig. 34), and the lights and horn circuits (fig. 41). A drawing of the complete electrical system (fig. 36) shows the location of the various units and wiring as viewed from the front of the vehicle. The drawings for the various individual circuits indicate the use, size and color of the wires.

92. GENERATOR (fig. 37).

a. **Description.** The generator rating is 7 volts and 40 amperes and its capacity is 275 watts. The generator output is controlled by a regulator mounted on the left side of the engine compartment (fig. 39). The generator is driven by a V-belt as shown in figure 37.

b. **Removal.** Disconnect the ground cable from the battery. Disconnect the wires from the generator armature and field posts. Disconnect the shield wire from the ground post. Remove the bolts from the generator brackets at the bottom of the generator and the cap screw from the slotted bracket on top of the generator. Remove the generator.

c. **Installation.** Place the generator in position, and install the two bolts in the two brackets at the bottom of the generator. Install the cap screw in the slotted bracket on the top of the generator. Move the generator out, away from the cylinder block, to tighten the fan belt (par. 76 c). Tighten the cap screw in the slotted bracket. Install the wires on the armature and field posts. Connect the shield wire to the ground post. Connect the ground cable to battery.

ELECTRICAL SYSTEM

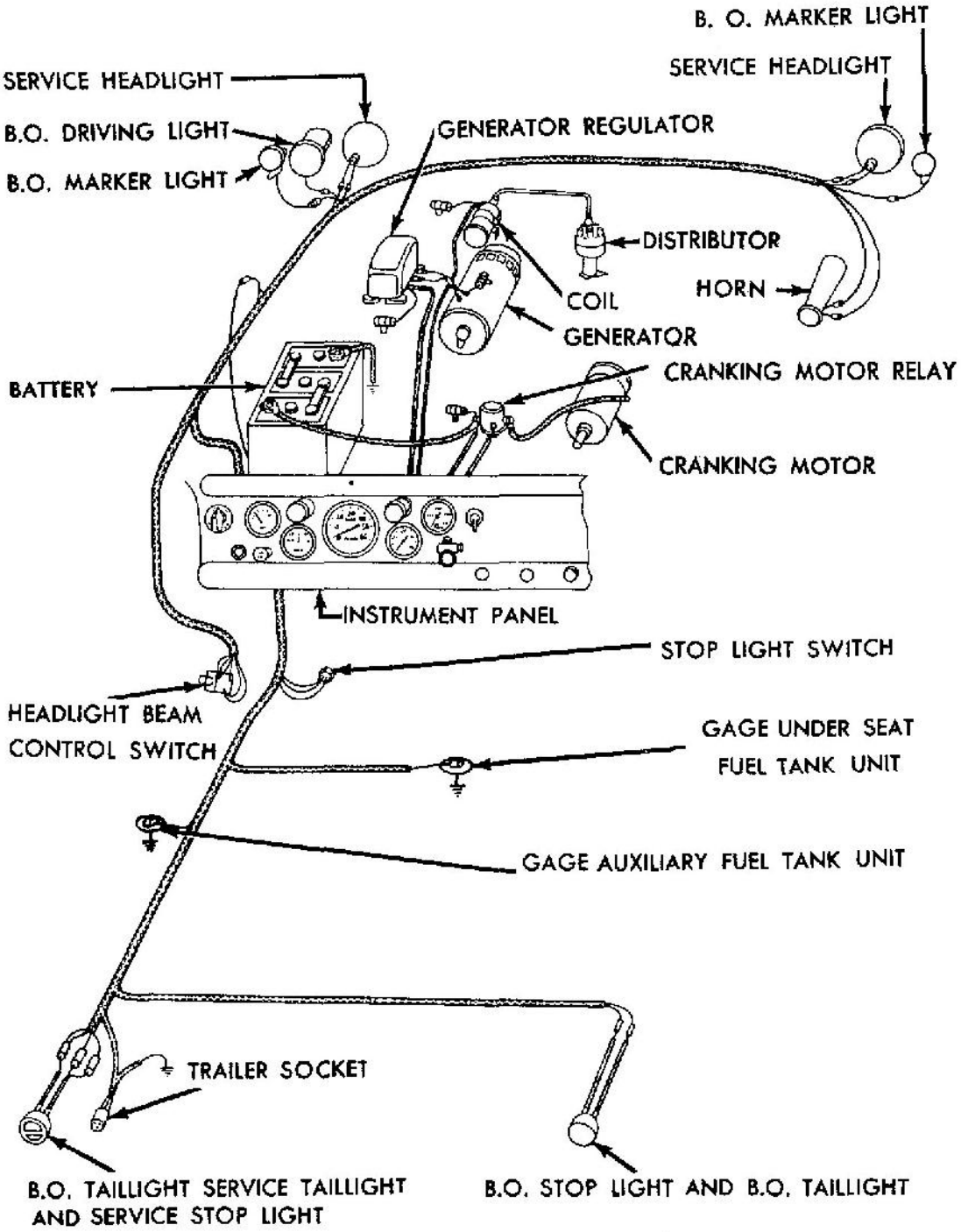


Figure 36 — Electrical System

1½-TON 4x2 TRUCK (FORD)

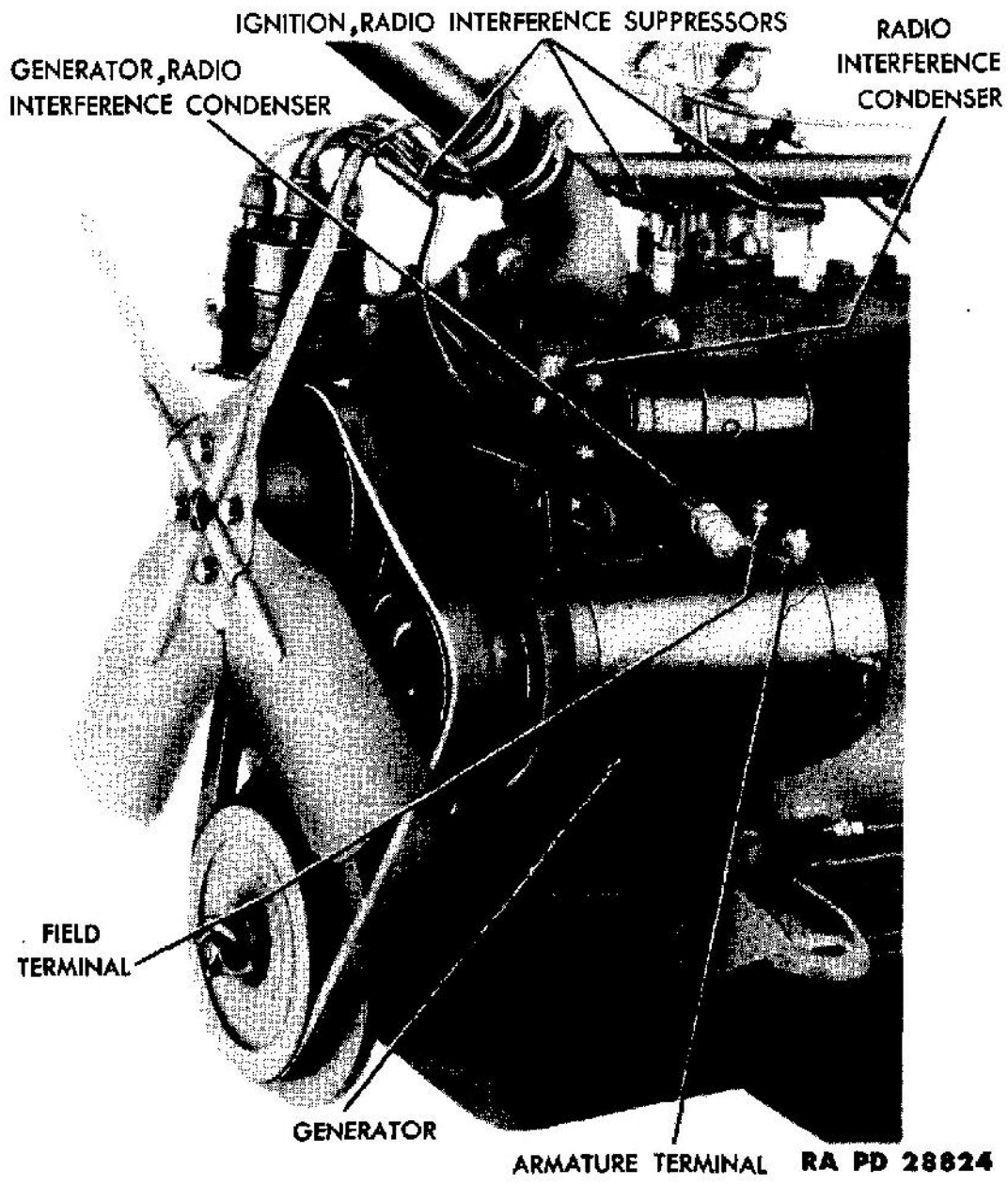


Figure 37 — Generator

93. GENERATOR REGULATOR (fig. 39).

a. Description. The generator regulator, mounted on the left side of the engine compartment, includes a voltage regulator unit, current limitator unit, and a cutout unit.

(1) VOLTAGE REGULATOR UNIT. The voltage regulator unit maintains the output of the generator at a constant voltage of 7 to 7.3 volts (at 70° F ambient), depending on the state of charge of the battery and the electrical load.

(2) CURRENT LIMITATOR. The current limitator unit limits the maximum output of the generator to 40 amperes to prevent an overload of the generator.

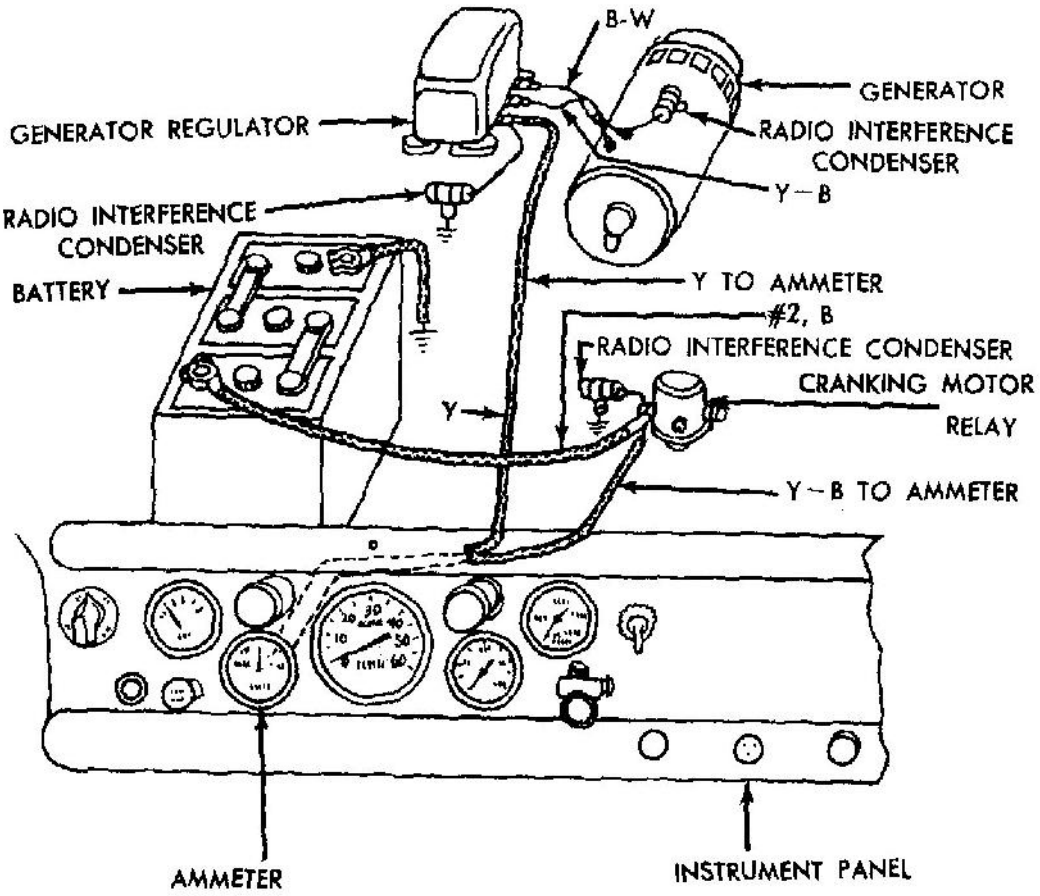


Figure 38 — Generating Circuit

(3) CUT-OUT UNIT. The cut-out unit prevents the battery from discharging when the generator is at rest, or when it is not developing normal voltage by automatically disconnecting the generator from the battery when the generator voltage is less than the battery voltage. If the generator regulator case is not properly grounded to the hull, the cut-out will not close and the generator cannot charge the battery.

b. Replacement. Disconnect the battery ground cable. Disconnect all wires from the generator regulator, noting wire colors (fig. 38). Remove the four bolts which secure the regulator to the bracket in the engine compartment and remove the regulator. To install the regulator, reverse the sequence of the steps of the removal procedure.

1½-TON 4x2 TRUCK (FORD)

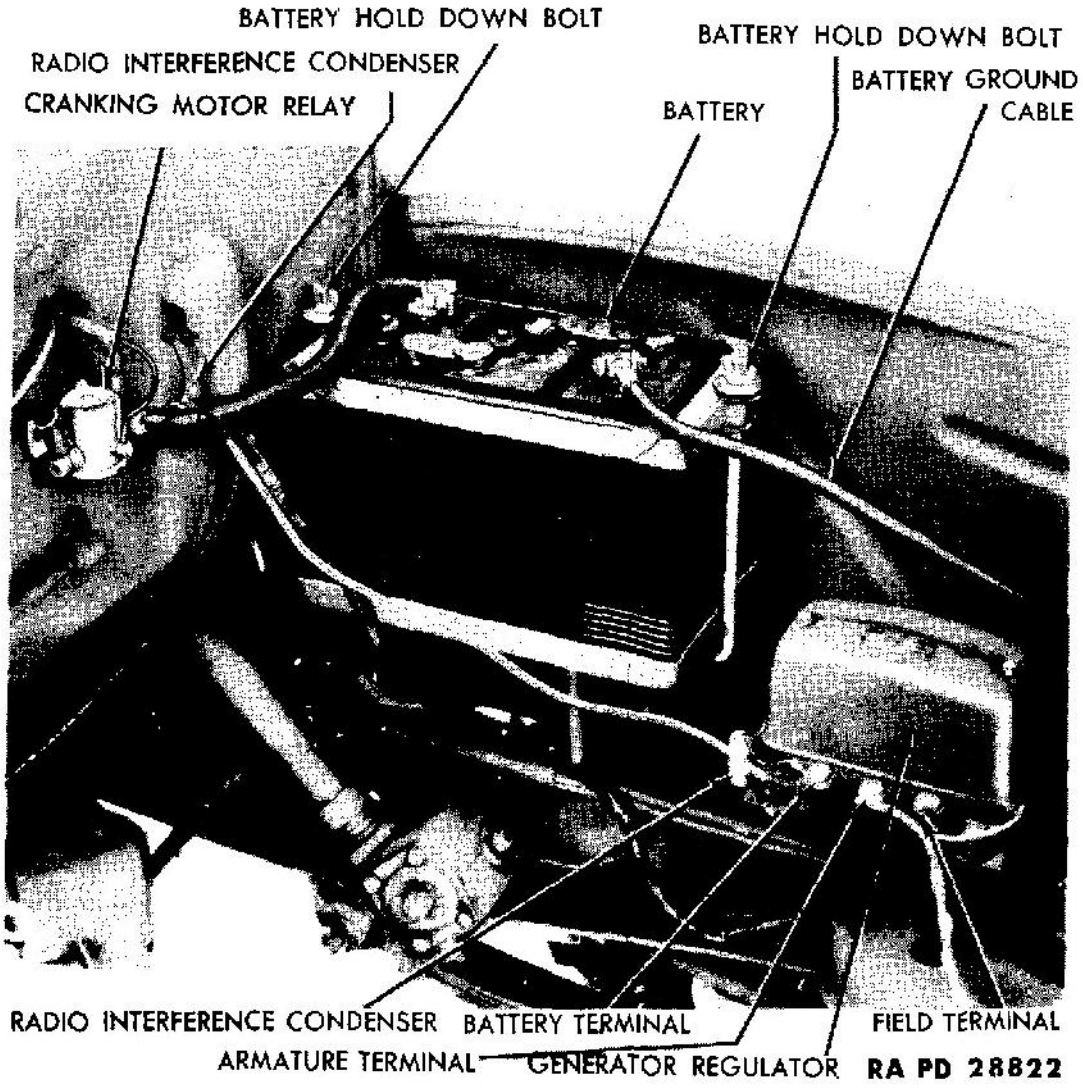


Figure 39 — Battery, Generator Regulator, and Cranking Motor Relay

94. BATTERY (fig. 39).

a. Description. The battery is a 6-volt type with 19 plates in each cell and its capacity is 150 ampere hours. The battery is located in the engine compartment on the left side of the engine and is readily accessible for servicing.

b. Replacement. Disconnect the battery cables (fig. 39) at the battery. Remove the wing nuts and rubber washers on the hold-down bolts, remove the bolts. Remove the hold-down frame. Remove the battery. To install the battery, place the battery in the bracket so that the negative post is forward. Install the hold-down frame. Install the hold-down bolts in the frame. Install the rubber washers and wing nuts on the bolts. Connect the battery cables to the battery.

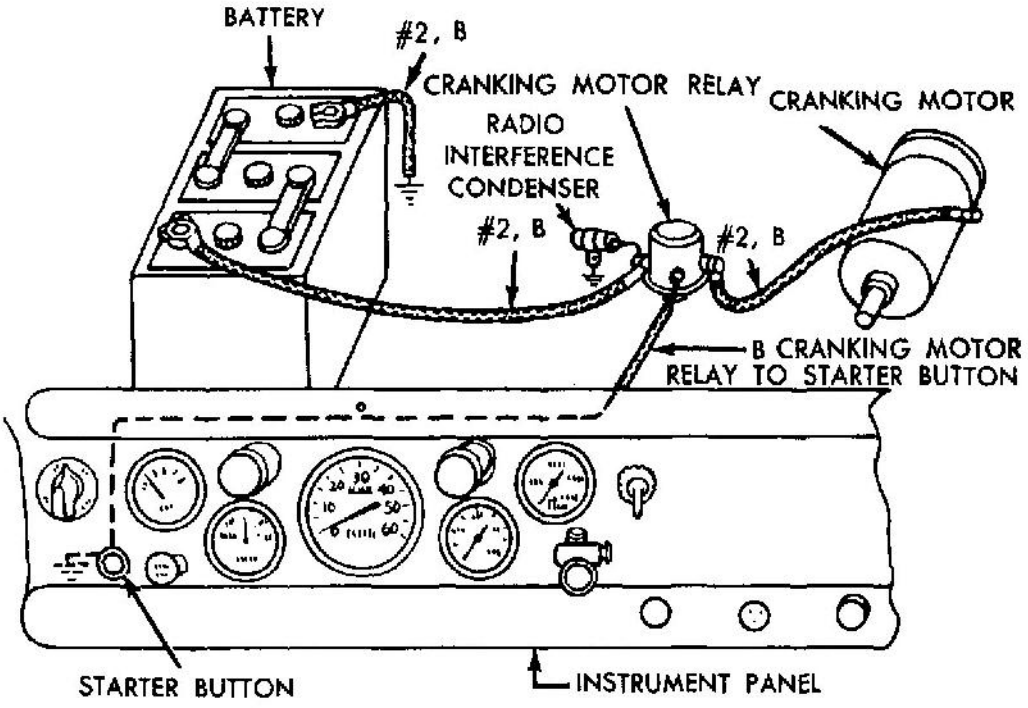


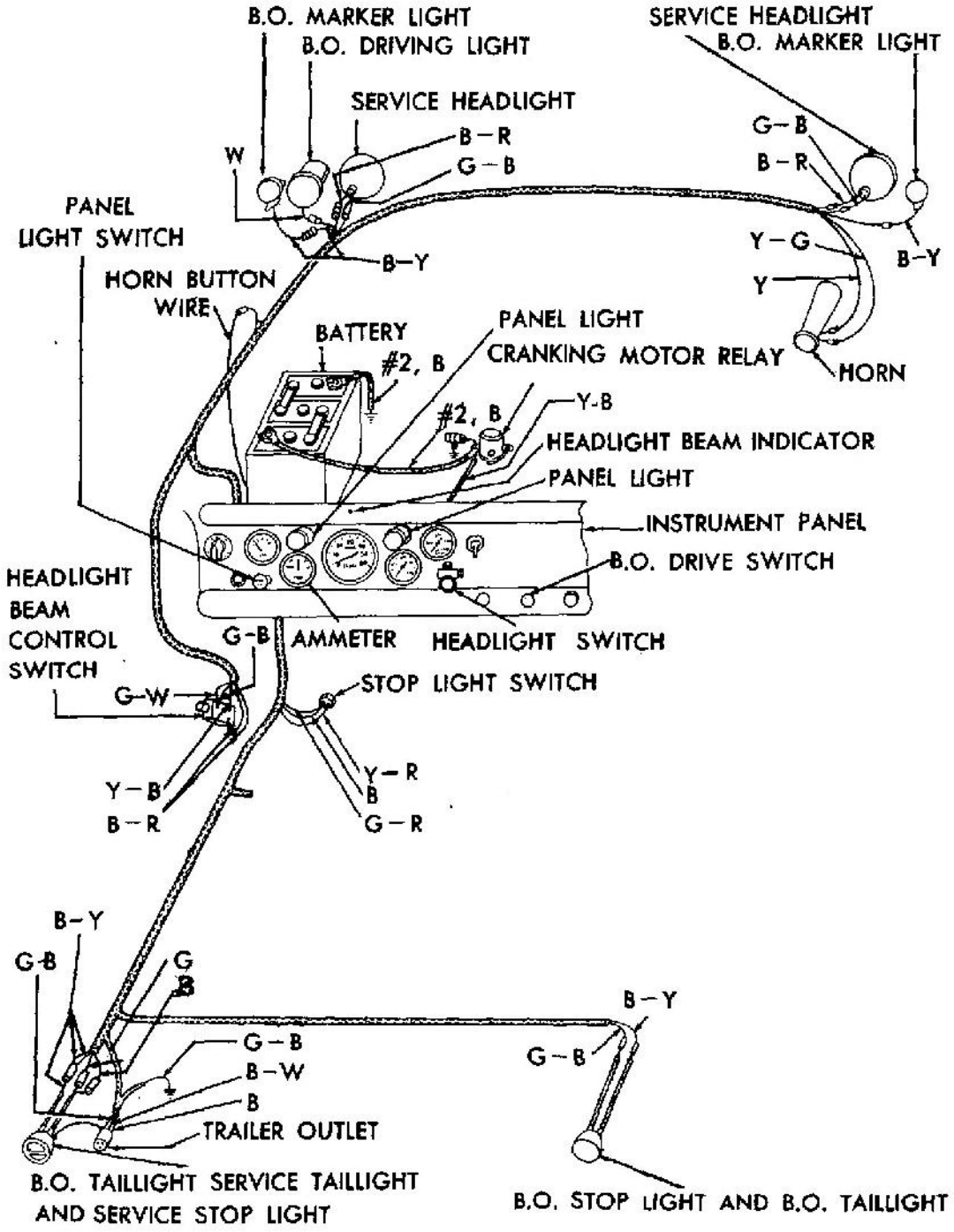
Figure 40 — Cranking Motor Circuit

95. CRANKING MOTOR (fig. 10).

a. Description. The cranking motor is a 6-volt type mounted on the right side of the flywheel housing and its power is transmitted to the engine by an automatic drive. A relay (fig. 39) closes the electrical circuit to the cranking motor when the starter button on the instrument panel is pressed. Rotation of the cranking motor shaft causes the pinion of the automotive drive to mesh with the gear on the flywheel. After the engine starts and the speed of the flywheel exceeds that of the cranking motor, the pinion releases from the flywheel automatically. The starting motor bearings do not require lubricating.

b. Replacement. Disconnect the cable from the cranking motor. Remove the two bolts which hold the cranking motor to the flywheel housing and remove the cranking motor. To install the motor, place the cranking motor in position against the flywheel housing and install the two bolts to secure the motor to the flywheel housing. Connect the cranking motor cable to the cranking motor.

1½-TON 4x2 TRUCK (FORD)



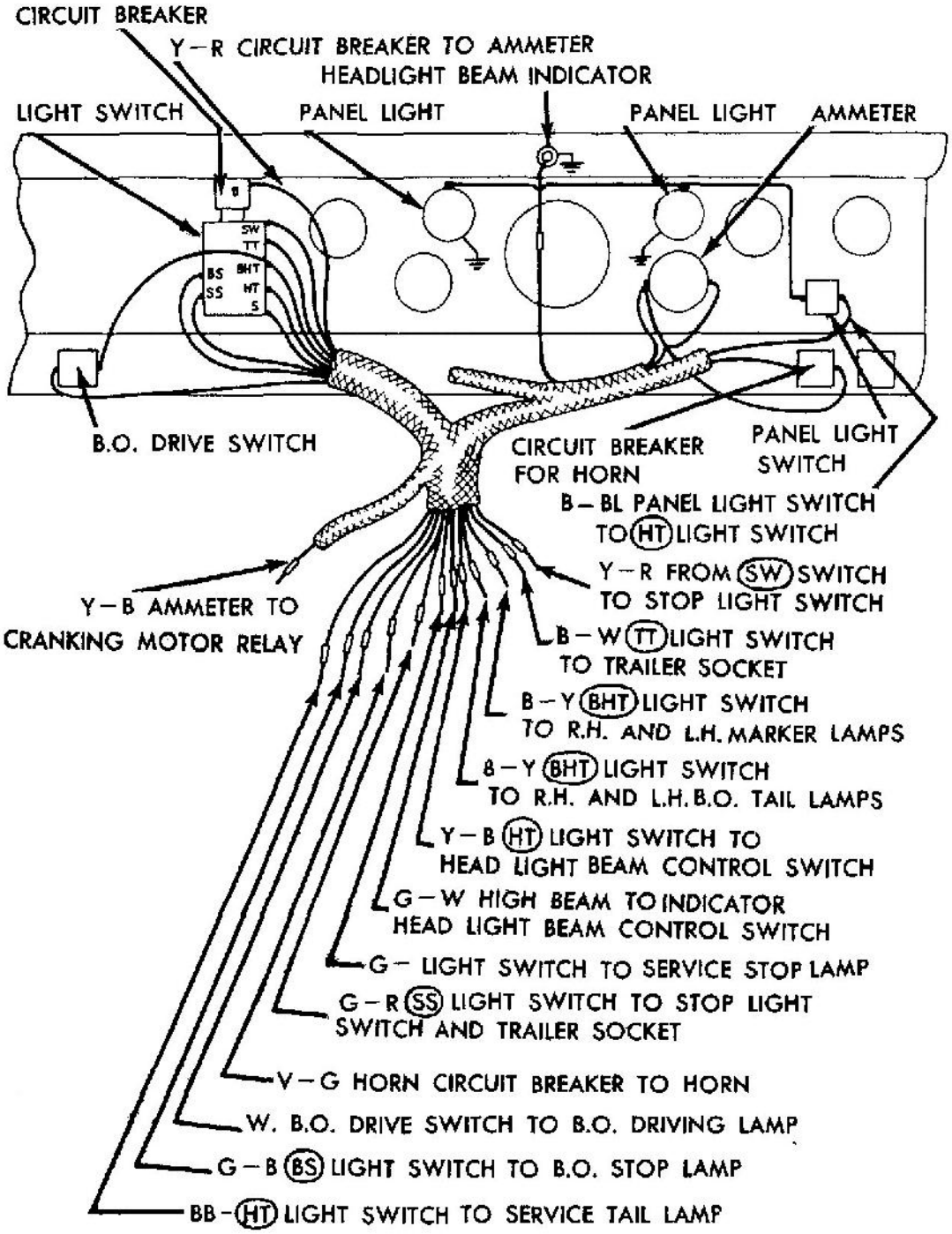
—KEY TO ABBREVIATIONS—

B—BLACK	G-W—GREEN WITH WHITE TRACER
B-G—BLACK AND GREEN	W—WHITE
B-R—BLACK AND RED	T—YELLOW
B-W—BLACK WITH WHITE TRACER	Y-B—YELLOW WITH BLACK TRACER
B-Y—BLACK WITH YELLOW TRACER	Y-G—YELLOW WITH GREEN TRACER
G-B—GREEN WITH BLACK TRACER	Y-R—YELLOW WITH RED TRACER
G-R—GREEN WITH RED TRACER	#2 WIRE SIZE

RA PD 28809

Figure 41 — Lights and Horn Circuit

ELECTRICAL SYSTEM



KEY TO ABBREVIATIONS

B—BLACK
B-BL—BLACK WITH BLUE TRACER
B-W—BLACK WITH WHITE TRACER
B-Y—BLACK WITH YELLOW TRACER
G—GREEN
G-B—GREEN WITH BLACK TRACER
G-R—GREEN WITH RED TRACER
G-W—GREEN WITH WHITE TRACER
Y-B—YELLOW WITH BLACK TRACER
Y-G—YELLOW WITH GREEN TRACER
Y-R—YELLOW WITH RED TRACER
W—WHITE
(S)(HT) ETC., TERMINALS AT LIGHT SWITCH

RA PD 28810

Figure 42 — Instrument Panel Connections for Lights and Horn Circuit

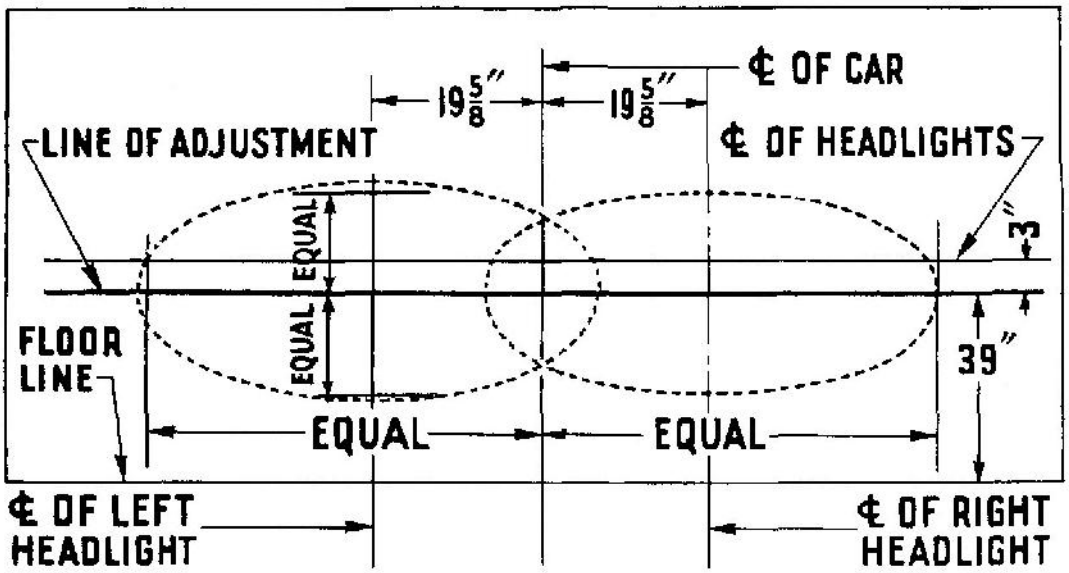


Figure 43 — Headlight Alinement Diagram

96. CRANKING MOTOR RELAY (fig. 39).

a. Description. The circuit from the battery to the cranking motor requires heavy cables due to the large amount of current used. In order to avoid the running of heavy cables up to the instrument panel, a relay is installed in the cranking motor circuit (fig. 40). This relay closes magnetically and completes the circuit from the battery to the cranking motor when the starter button on the instrument panel is pressed. The relay is mounted in the engine compartment, on the dash to the rear of the engine cylinder head.

b. Replacement. Disconnect the battery ground cable. Disconnect the cables and wires which are attached to the relay. Remove the two screws which hold the starting relay to the dash and remove the relay. To install the relay, reverse the sequence of the steps of the removal procedure.

97. LIGHTS (figs. 41 and 42).

a. General. The vehicle is equipped with headlights, blackout lights, blackout driving lights, blackout taillight, service taillight, and stop lights. Figure 41 shows the circuits to the various lights, including the wiring to the socket provided for plugging in trailer lights (stop and tail). This illustration likewise shows the location of all switches in the light circuits. The use of the light switch controlling the various light circuits is covered in paragraph 7.

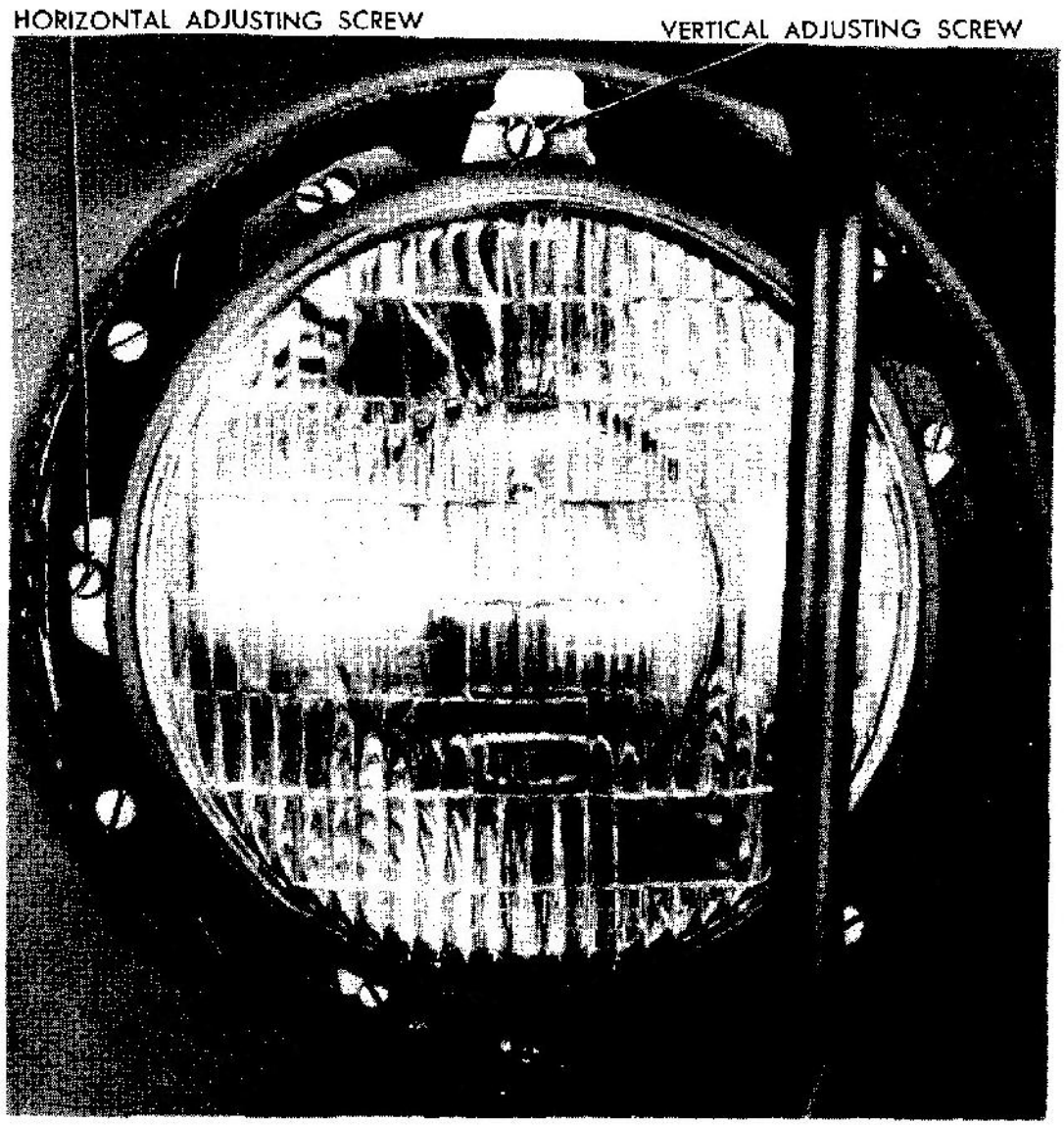


Figure 44 — Headlight Adjustment Screws

b. Headlights.

(1) DESCRIPTION. The headlights are of the 7-inch sealed beam type, having an upper and lower filament to furnish either a high or a low beam of light to suit the driving conditions. These filaments are selected by a foot switch located on the toeboard (par. 5 **h**).

(2) ALINEMENT. With the vehicle empty and the tires inflated to the recommended pressure, position the vehicle on a level surface 25 feet from a wall or screen. Turn the upper beam of the headlights on. Adjust the lights so that the centers of the two beams of light extend straight forward with a drop of three inches in 25 feet as shown in figure 43. To tilt the headlight up or down, remove the headlight rim, and move the vertical adjusting screw (fig. 44) located at top of the headlight, in or out. The side movement of the beam is accom-

1½-TON 4x2 TRUCK (FORD)

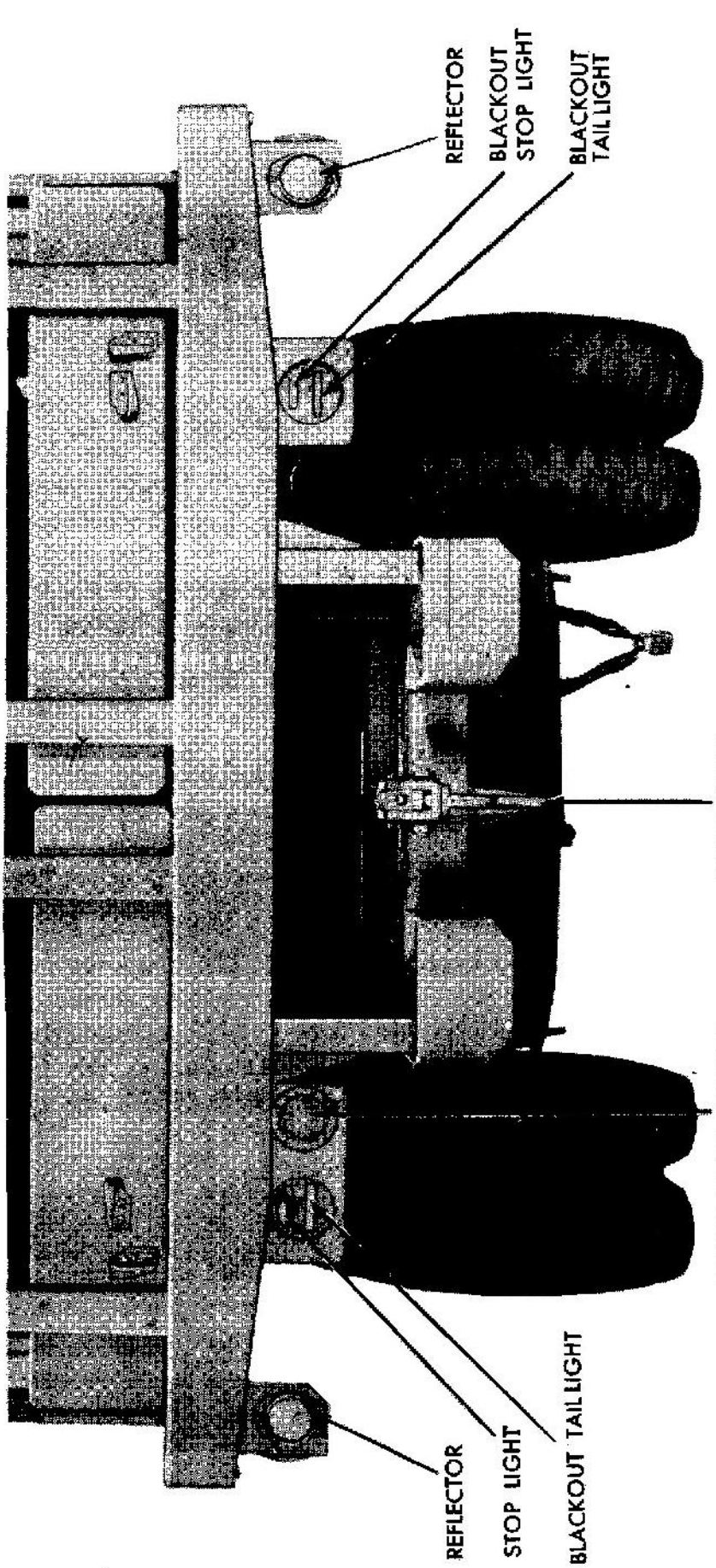


Figure 45 — Taillights, Reflectors, and Trailer Light Socket

plished by adjusting the horizontal adjusting screw located at the side of the headlight.

(3) HEAD LAMP REPLACEMENT. Remove the screw at the bottom of the headlight and lift the rim up from the top clip to remove the rim. Loosen the three screws in the retainer ring, and turn the ring to the left to remove it. Disconnect the headlight wire at the plug connection and remove the lamp. To install the lamp, connect the plug connection to the headlight wire. Place the head lamp in position in the housing. Place the retainer ring in position and turn it to the right to lock it in place. Tighten the three retainer ring screws. Aline headlights as outlined in paragraph (2) above.

c. Blackout Driving Light (fig. 41).

(1) DESCRIPTION. The blackout headlight, located on the left front fender, provides a thin flat beam of light that cannot be seen from high above, yet provides enough illumination to bypass obstacles. The lamp is of the sealed beam type with only a narrow strip of the lens exposed and has a hood at the top. The lamp is six volt having a maximum candlepower of 25 to 50.

(2) BLACKOUT LAMP REPLACEMENT. To remove the blackout lamp, remove the screw at the bottom of the light which attaches the frame to the blackout light body. Remove the outer rim. Disconnect the ground wire from the side of the lamp and the wire from the center of the lamp. With a screwdriver, unhook the three wire retainers and remove the lamp. To install the lamp, reverse the sequence of the steps of the removal procedure.

d. Blackout Marker Lights (fig. 41). The blackout marker lights, located on the right and left front fenders, use a single-contact six-volt, bayonet-base, three-candlepower lamp. To replace the blackout marker lamp, remove the screw which attaches the lens frame to the body of the lamp and remove the frame. Press the lamp in and turn it counterclockwise and pull the lamp out of the socket. To install the lamp, reverse the sequence of the removal procedure.

e. Taillights (fig. 45).

(1) DESCRIPTION. A taillight is mounted in the rear at each side of the vehicle. Each light consists of two sealed cartridge units, having pinless type lamp bases. The two sealed units for each light are held in place by a frame attached to the metal housing of the light with two screws. The left taillight assembly has three filaments. The service and service stop light filaments are in the upper cartridge and the blackout taillight filament is in the lower one. The right tail lamp-unit has two filaments. The blackout stop light is in the upper cartridge and the blackout taillight is in the lower one.

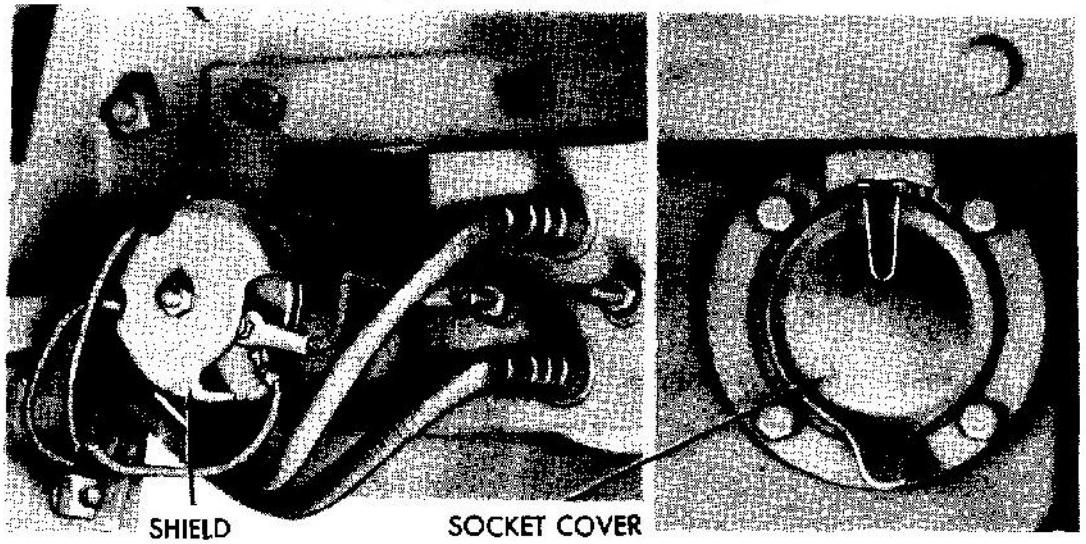


Figure 46 — Trailer Light Socket

(2) SEALED LAMP-UNIT REPLACEMENT. Remove the two screws attaching the lens frame to the body of the taillight. Remove the frame and pull the sealed lamp-units straight out from the socket. To install the lamps, reverse the sequence of the steps of the removal procedure.

f. Trailer Light Socket. The trailer light socket and wiring for the trailer tail and stop lights is shown in figure 46. To remove the socket, remove the nut which secures the shield to the socket body and remove the shield (fig. 46). Disconnect the four wires from the socket body, noting wire color and size. Remove the four bolts which secure the socket body to the bracket. Remove the socket. To install, reverse the sequence of the steps of the removal procedure.

98. WIRING HARNESSES AND WIRES.

a. Most of the wires are enclosed in braided conduits forming a wiring harness. Bullet type connectors are provided in some sections of the wiring to make them more accessible for the replacement of portions of the wiring or individual units. When replacement of one or more wires is required, it will be necessary to replace the entire wiring harness or braided conduit containing the wire.

Section XIX

CLUTCH

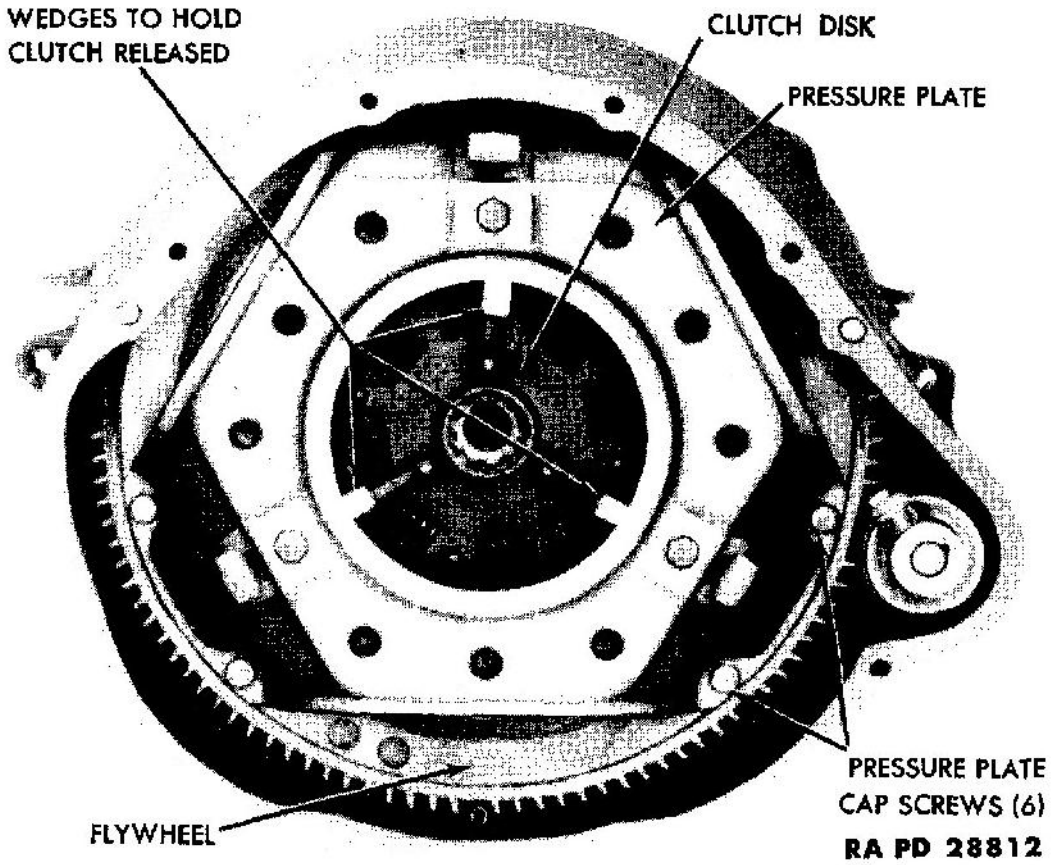


Figure 47 — Clutch — Rear View

99. DESCRIPTION AND DATA.

a. Description. The engine is equipped with a semi-centrifugal dry-type single plate clutch (fig. 47) controlled through direct linkage. The clutch pressure plate is adjusted and the release levers locked at the factory. No adjustment is required other than to maintain the correct clearance between the release fork and the release bearing as outlined in paragraph 100.

b. Data.

Pilot bearing (type)	Ball
Release bearing (type)	Ball
Pedal free travel	1½ in.

100. ADJUSTMENT.

a. Disconnect the clevis from the clutch equlizer lever on the left-hand side of the clutch housing (fig. 50). Adjust the length of the pedal rod by turning the clevis until the clutch pedal has 1½-inch free travel at the pedal pad. Install the clevis and cotter pin.

1½-TON 4x2 TRUCK (FORD)

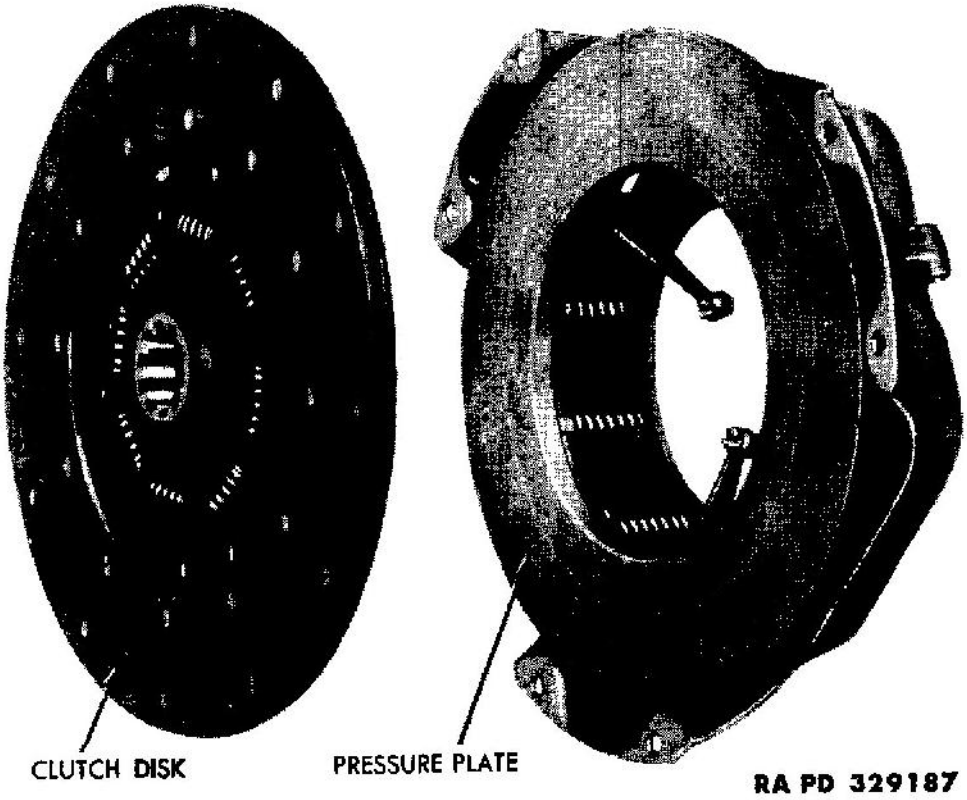


Figure 48 — Clutch Disk and Pressure Plate

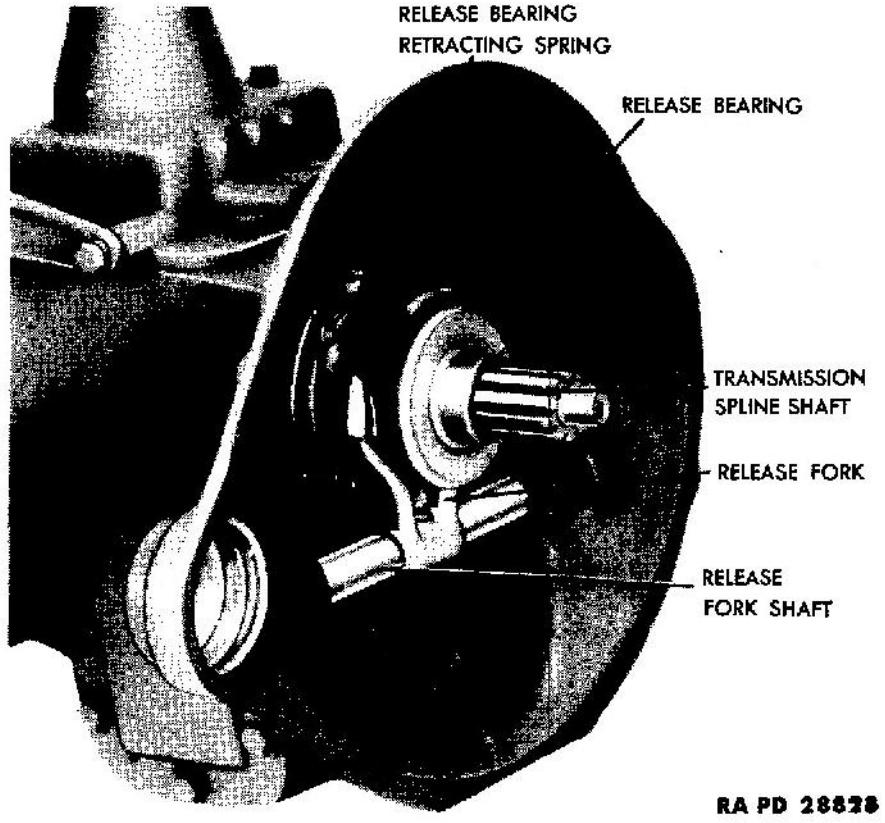


Figure 49 — Clutch Release Bearing

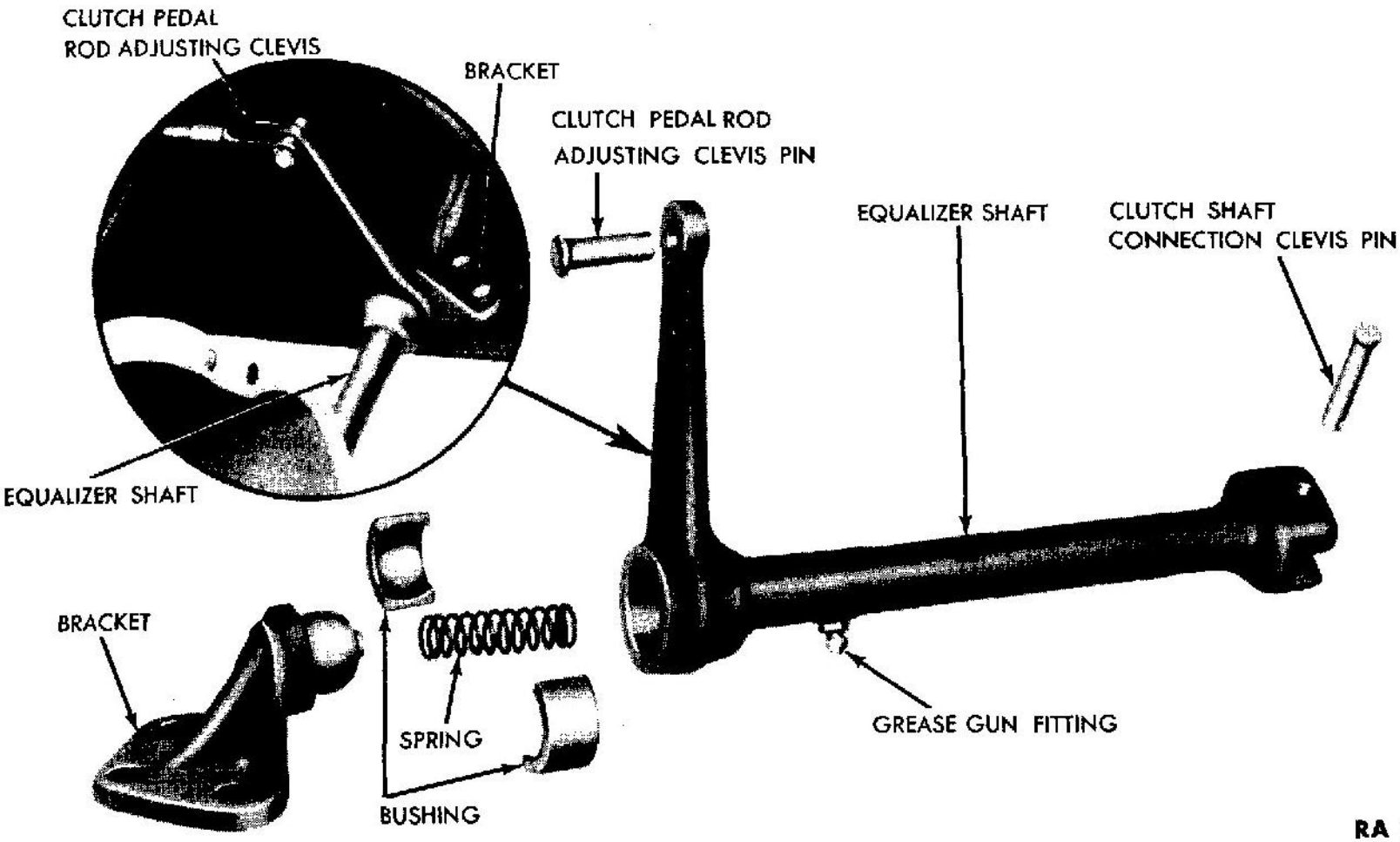


Figure 50 — Clutch Release Equalizer Shaft — Disassembled

1½-TON 4x2 TRUCK (FORD)

101. CLUTCH DISK AND PRESSURE PLATE.

a. Description. The clutch is a dry-type single plate clutch composed of two major units, the pressure plate and the driven plate or disk (fig. 48). The driven plate or disk has friction facings riveted to both sides.

b. Removal. Remove the transmission from the vehicle (par. 108 a). Release the clutch by installing three wedges between the clutch fingers and the pressure plate housing, as shown in figure 47. Remove the six cap screws holding the pressure plate to the flywheel and remove the pressure plate and disk.

c. Installation. Lubricate the clutch pilot bearing. Use a clutch disk pilot to hold the disk in alinement and install the six cap screws to secure the pressure plate to the flywheel. Remove the three wedges and the clutch disk pilot. Install the transmission (par. 108 b).

102. CLUTCH PILOT BEARING REPLACEMENT.

a. Remove the clutch (par. 101 b). Pull the pilot bearing out of the flywheel with a standard bearing puller. To install the pilot bearing, lubricate it and drive it in place in the flywheel with a clutch pilot bearing driver. Install the clutch as outlined in paragraph 101 c. Install the transmission (par. 108 b). Adjust the clutch pedal (par. 100).

103. CLUTCH RELEASE BEARING REPLACEMENT (fig. 49).

a. Remove the transmission (par. 101 a). Disconnect the retracting spring from the bearing hub and pull the bearing and hub off the clutch shaft. Press the bearing off the hub. To install the bearing, press it on the bearing hub. Install the bearing and hub on the clutch shaft and connect the retracting spring. Install the transmission (par. 108 b). Adjust the clutch pedal (par. 100).

104. RELEASE EQUALIZER SHAFT REPLACEMENT.

a. Remove the pin which connects the equalizer shaft to the clutch shaft. Remove the pin from the clevis at the equalizer shaft lever. Slide the equalizer shaft off the clutch shaft and pull the equalizer shaft off the bracket (fig. 50). To install the equalizer shaft, install the spring in the equalizer shaft and, holding the two halves of the split bronze bushing, slide the shaft over the ball on the bracket. Line up the slot in the other end of the equalizer shaft with the clutch shaft, and install the clevis pin and cotter pin. Adjust the clutch pedal (par. 100).

Section XX

PROPELLER AND COUPLING SHAFTS

105. PROPELLER AND COUPLING SHAFTS (fig. 51).

a. Description. The power line to the rear axle consists of a coupling shaft and a propeller shaft connected in tandem. The coupling shaft is connected to the transmission by a universal joint which is bolted to the hand brake drum and universal joint companion flange. The rear end of the coupling shaft is supported by a support bearing bolted to the frame cross member. The propeller shaft is connected to the coupling shaft by a universal joint. The rear end of the propeller shaft is attached to the rear axle pinion shaft by a universal joint.

b. Coupling Shaft Replacement (fig. 51). Remove the four nuts and lock washers from the four bolts which attach the front universal joint to the coupling flange. Remove the two U-clamps from the universal joint directly back of the coupling shaft support. Remove the two nuts from the bolts which hold the coupling shaft support to the frame cross member and remove the coupling shaft and support. Remove the coupling shaft support bearing from the coupling shaft (par. 106). To install the coupling shaft install the support bearing on the coupling shaft (par. 106). Place the universal joint at the forward end of the coupling shaft on the companion flange and the hand brake drum and install the nuts on the four bolts already in place. Attach the coupling shaft support bearing to the cross member with the two bolts, nuts and lock washers. Install the U-clamps on the universal joint at the rear of the coupling shaft support bearing.

c. Propeller Shaft Replacement (fig. 51). Remove the U-clamps from the front and rear universal joints and remove the propeller shaft. To install the propeller shaft, connect the front and rear universal joints by installing the two U-clamps on each joint.

106. COUPLING SHAFT SUPPORT BEARING REPLACEMENT.

a. Removal (fig. 51). Remove the two U-clamps from the universal joint directly back of the coupling shaft support bearing. Remove the two nuts from the bolts which hold the support bearing to the cross

1½-TON 4x2 TRUCK (FORD)

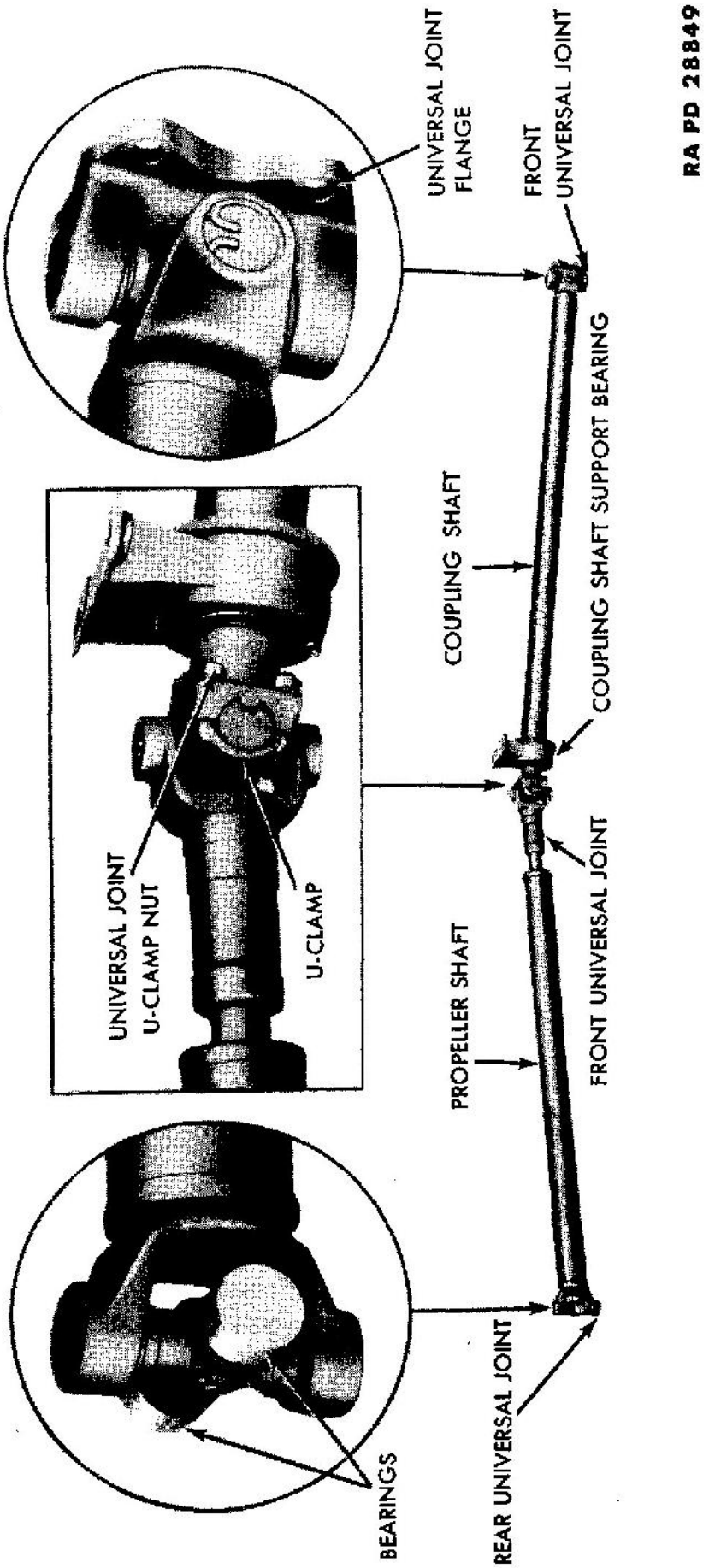


Figure 51 — Propeller and Coupling Shafts and Support Bearing

member. Remove the nut which holds the universal joint flange to the propeller shaft. Drive the flange off the propeller shaft spline. Remove the support bearing.

b. Installation. Slide the support bearing on the coupling shaft. Install the universal joint flange on the coupling shaft spline. Install the nut to secure the flange to the coupling shaft. Attach the coupling shaft support bearing to the cross member (par. 105 **b**). Install the two U-clamps to connect the universal joint at the rear of the coupling shaft support bearing.

Section XXI

TRANSMISSION

107. DESCRIPTION.

a. The transmission (figs. 54 and 55) is of the standard selective-sliding-gear type, with four speeds forward and one reverse. The gearshift lever is mounted on top of the transmission.

108. REPLACEMENT.

a. Removal.

(1) PRELIMINARY WORK. Remove the seat cushion (par. 138 **b**). Remove the cap screws which secure the transmission cover to the floor (fig. 52). Remove the cover. Place a jack under the rear of the engine at the flywheel housing, using a block of wood between the flywheel housing and the jack. Raise the jack until the engine is supported by the jack. Remove the coupling shaft support bearing (par. 106). Remove the nuts from the four bolts which attach the front universal joint to the hand brake drum. Remove the coupling shaft.

(2) REMOVE HAND BRAKE ASSEMBLY. Remove the two cap screws which secure the hand brake lever sector to the transmission (fig. 54). Remove the two cap screws from the brake adjusting screw bracket (fig. 54). Disconnect the hand-brake link from the transmission (fig. 54). Disconnect the anchor adjusting screw from the brake band (fig. 55). Remove the brake band assembly and band brake lever. Remove the nut which holds the universal joint flange to the transmission main shaft. Remove the universal joint flange and the brake drum.

(3) REMOVE TRANSMISSION CONNECTIONS. Remove the clutch equalizer shaft (par. 104). Disconnect the speedometer shaft from the transmission. Remove the two bolts from the engine rear support

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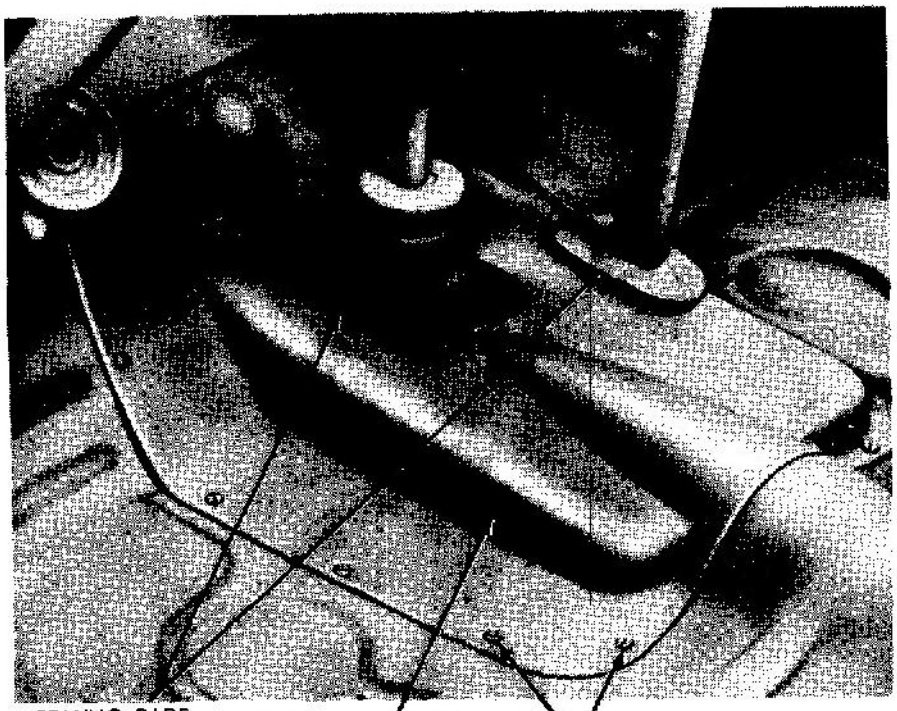

Figure 52 — Transmission Cover

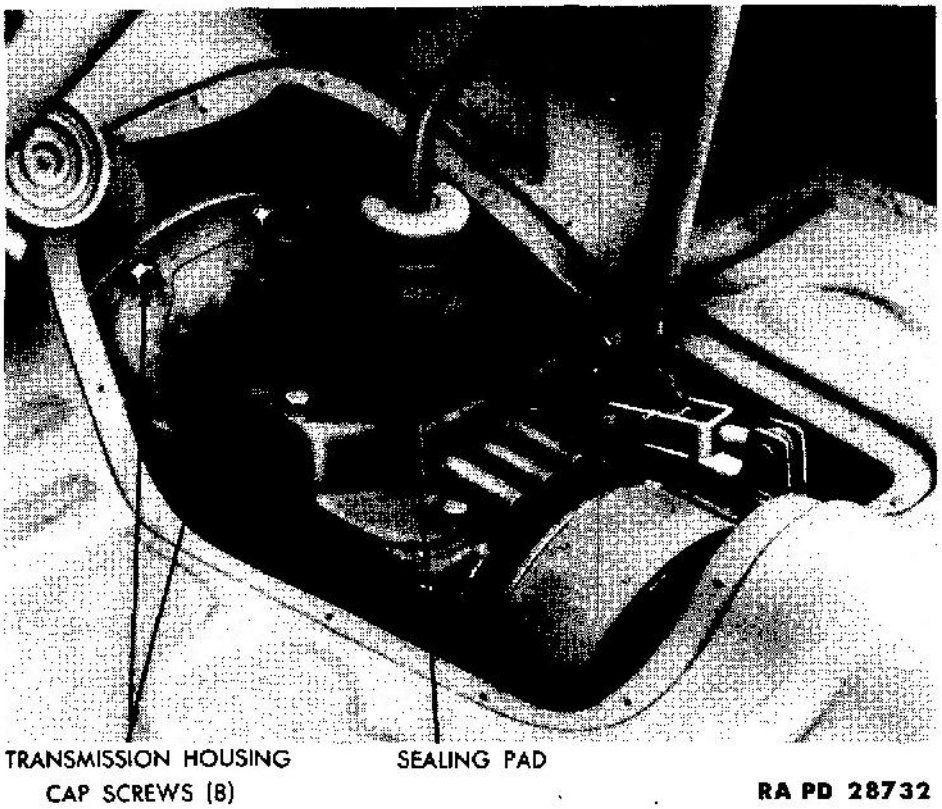

Figure 53 — Transmission Housing Cap Screws

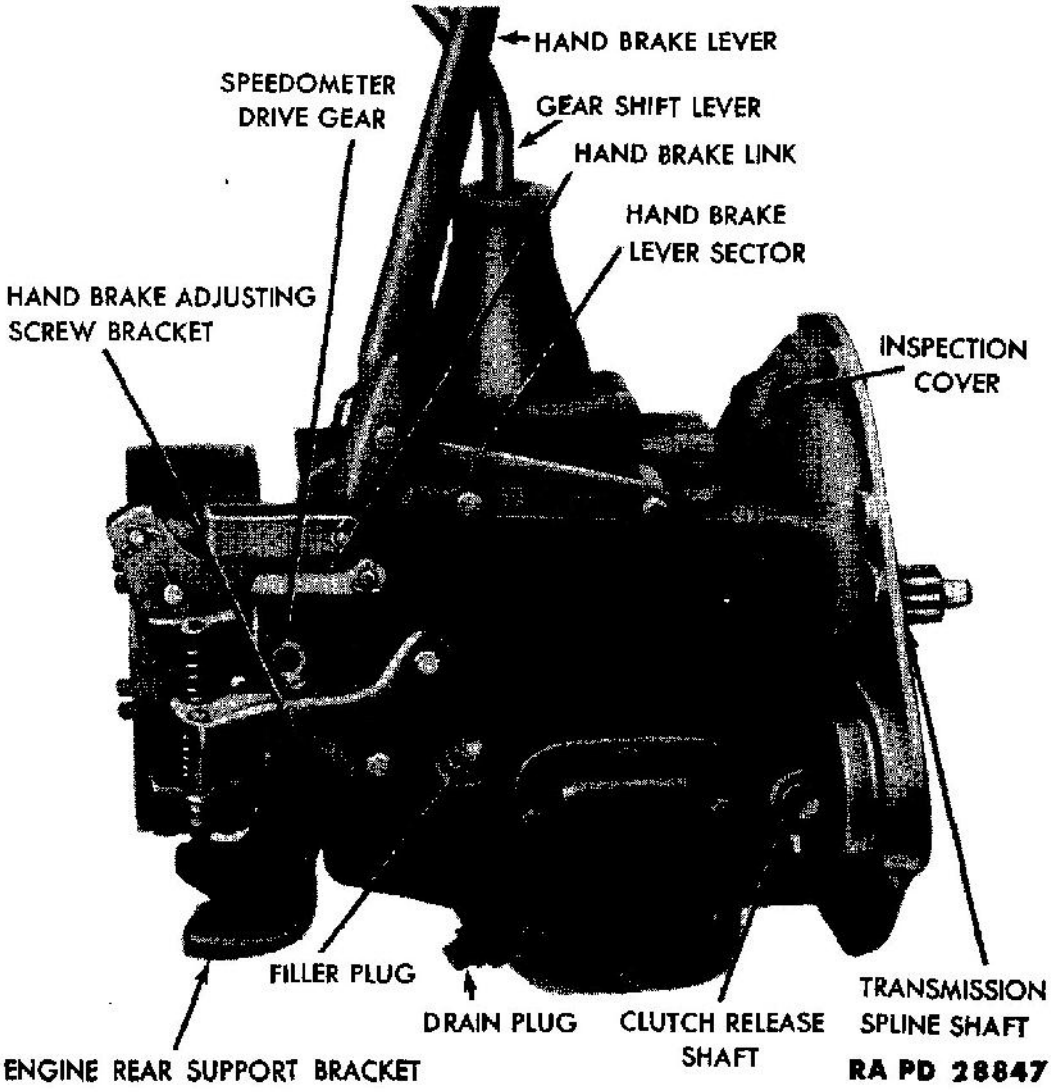

Figure 54 — Transmission — Right Side

(fig. 14). Remove the transmission cap screws from the flywheel housing (fig. 53). Pull the transmission back until the transmission spline shaft is clear of the clutch. Remove the transmission through the opening in the floor.

b. Installation.

(1) CONNECT TRANSMISSION TO CLUTCH. Install the transmission through the opening in the floor. Put the transmission in gear. Place a jack under the transmission with a piece of wood between the jack and the transmission. Raise the jack to line up the transmission spline shaft with the clutch disk spline. Rock the transmission slightly from side to side to enter the clutch spline. Slide the transmission forward until the clutch housing is flush with the flywheel housing. Remove the jack from under the transmission.

1½-TON 4x2 TRUCK (FORD)

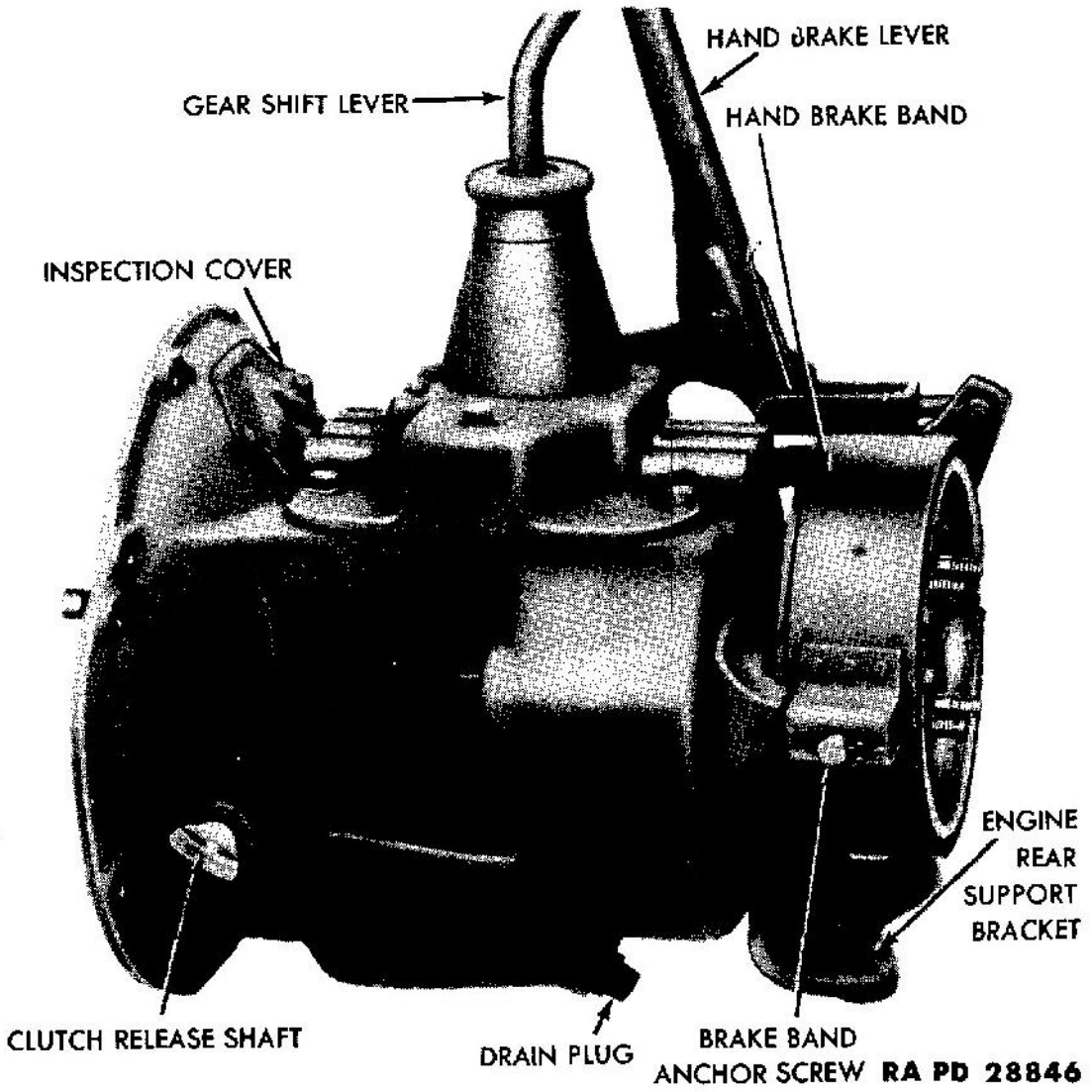

Figure 55 — Transmission — Left Side

(2) INSTALL TRANSMISSION CONNECTIONS. Install the cap screws in the flywheel housing, tightening each cap screw a little at a time, until all are tight. Install the two bolts in the engine rear support. Connect the speedometer shaft. Install the clutch equalizer shaft (par. 104).

(3) INSTALL HAND BRAKE ASSEMBLY. Install the universal joint flange and the brake drum on the transmission main shaft. Install the nut on the end of the transmission main shaft to secure the universal joint flange and brake drum to the shaft. Install the brake shoe assembly. Install the anchor screw in the brake band. Install the support arm running from the brake band to the transmission. Install the two cap screws to secure the hand brake support to the transmission. Install the two cap screws to secure the hand brake lever bracket to the transmission. Adjust hand brake (par. 132 b).

(4) FINAL WORK. Install the four bolts to attach the front universal joint to the hand brake drum. Install the coupling shaft support bearing (par. 106). See that the gearshift lever housing and the hand brake lever pads are in place so that they can seal the openings in the transmission cover when it is installed. Replace the gasket on the transmission cover if necessary. Secure the transmission cover to the floor with cap screws. Install the seat cushion. Remove the jack from the flywheel housing.

Section XXII

FRONT AXLE

109. DESCRIPTION.

a. The front axle is a steel forging of the I-beam type with spindles secured by spindle bolts at each end (fig. 56). The weight of the vehicle on the axle is supported by a spindle bolt thrust bearing (fig. 58) at each end of the axle.

110. REPLACEMENT.

a. **Removal.** Raise the front of the vehicle. Remove the front wheels and drums (par. 127 a (1)). Disconnect the hydraulic brake hose from the bracket (fig. 71) on the frame at each brake (par. 137 a). Remove the four bolts which hold the brake plate to each spindle. Remove the baffle and brake plate assembly from each spindle. Remove the nuts from the two U-bolts which secure the springs to the axle at each front spring. Remove the axle assembly (fig. 57) from the vehicle. Remove the tie rod (par. 111). Remove the spindle assemblies from each end of the axle (par. 112).

b. **Installation.** Install the spindle assemblies on each end of the axle (par. 112). Install the tie rod (par. 111). Place the axle in position under the front springs with the spindle arms and tie rod toward the rear of the vehicle. Place the axle caster wedges between the front axle and each spring with the thick edge of the wedges toward the rear of the vehicle. Place the spring U-bolts in position over the bumper brackets. Place the shock absorber brackets in posi-

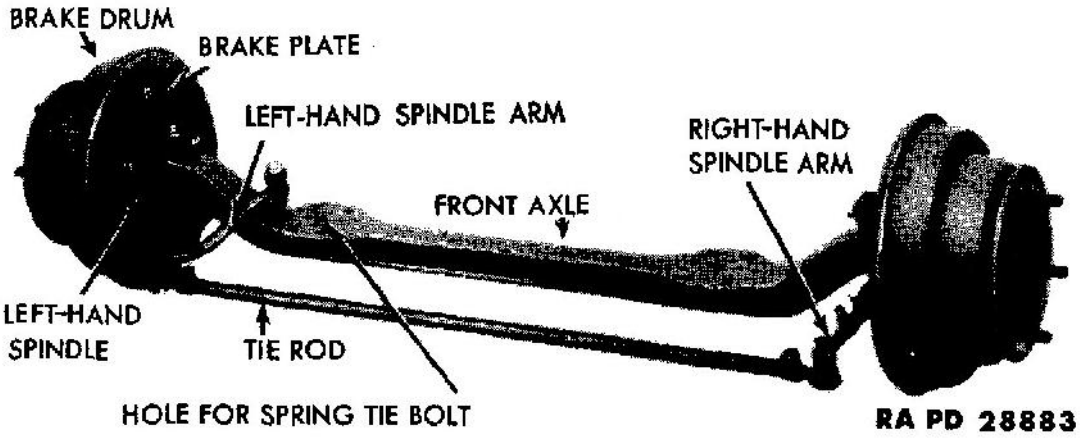

Figure 56 — Front Axle Hub and Drum Assemblies

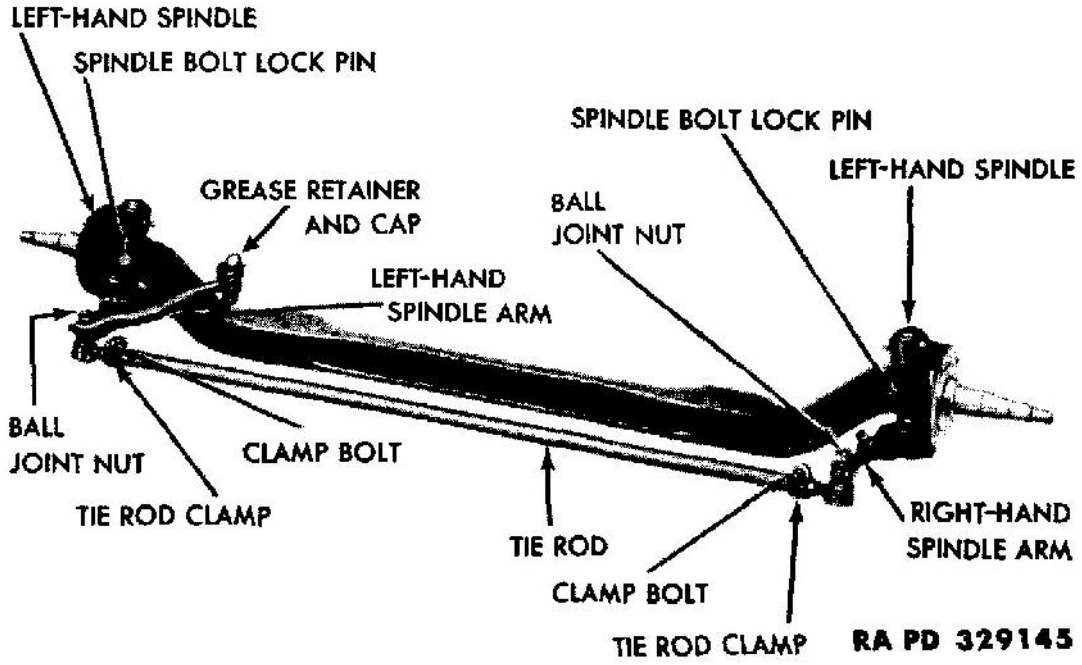

Figure 57 — Front Axle, Spindles, and Tie Rod Assemblies

tion on the front U-bolts. Make sure the spring tie bolts are centered in the holes provided in the axle. Install the nuts on the spring U-bolts to secure the axle to the front springs. Place the brake plate assemblies in position on the spindles. Place the baffles in position on the brake plates. Install the four bolts in each brake plate to secure the brake plates to the spindles. Connect the hydraulic brake hose to the bracket on the frame at each brake (par. 137 a). Bleed the front brakes (par. 136 b). Install the front wheels and drums (par. 127 a (2)). Lower the front of the vehicle.

111. TIE ROD (fig. 57).

a. Replacement. Remove the nut from the ball joint assembly at

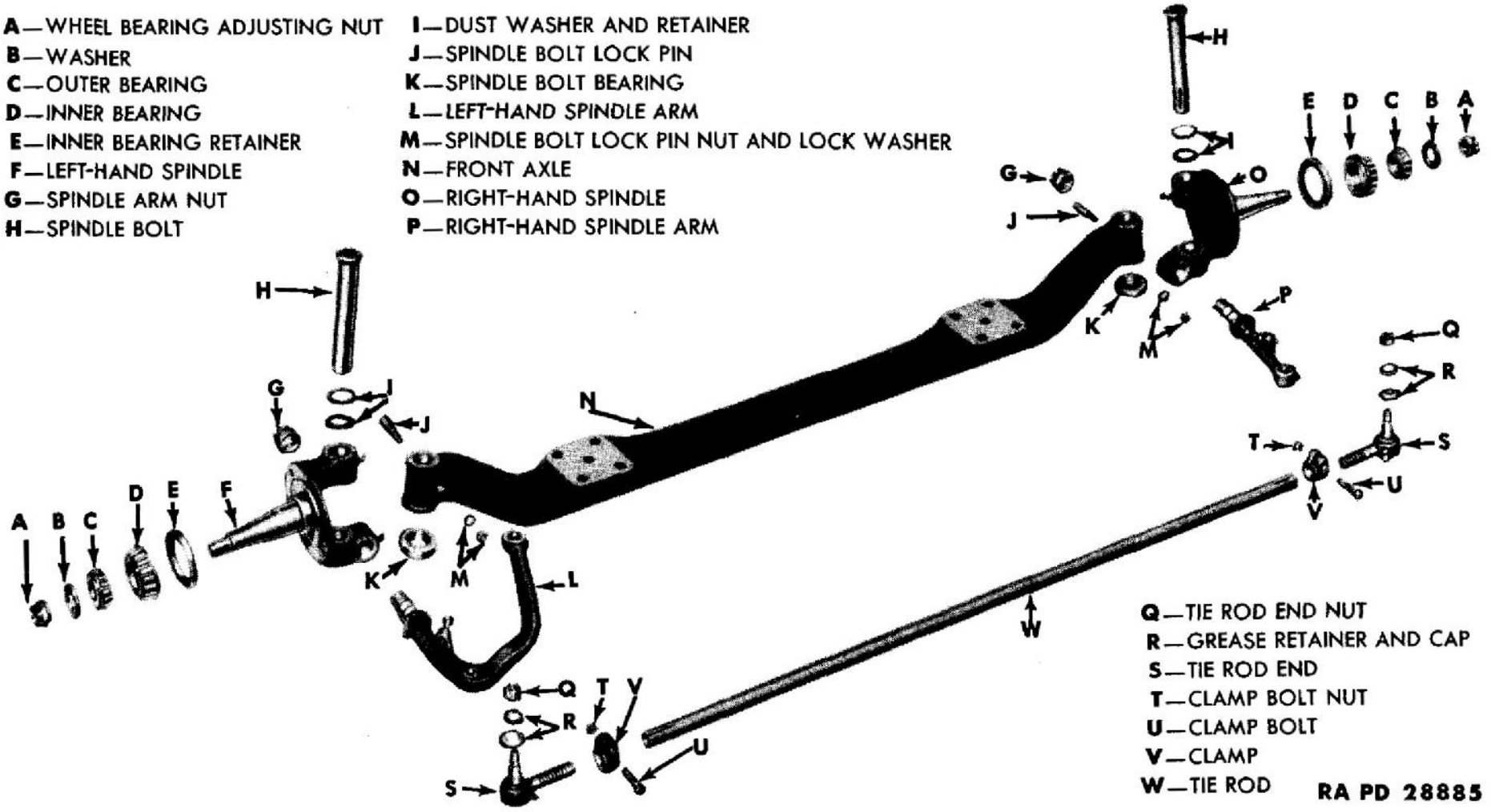

Figure 58 — Front Axle, Spindles, and Tie Rod — Disassembled

each spindle and using a wedge, drive the tapered ball joint assembly from each spindle arm. To install the tie rod, place a new dust seal and dust cover on each ball joint assembly and place them in position in each spindle arm. Install the nuts and secure with cotter pins. Adjust the tie rod length as outlined in subparagraph b below.

b. **Adjustment** (Toe-in). Usually the toe-in of the front wheels will not change except for some mishap that bends either one, or both, of the spindle arms, or the tie rod. The toe-in of the front wheels is correct when, after the vehicle has been pulled forward to take up any looseness, the distance between the front of the wheels is $\frac{1}{16}$ inch less than the distance between the rear of the wheels. This setting is obtained by adjusting the length of the tie rod. To adjust the tie rod length, loosen the clamp nut (fig. 57) at each end of the rod, and turn the rod until $\frac{1}{16}$ inch toe-in is obtained. Tighten the clamp nuts, and install cotter pins.

112. STEERING SPINDLE REPLACEMENT.

a. **Removal.** Remove the wheel and drum assembly from the spindle (par. 127 a (1)). Remove the brake plate assembly (par. 110 a). Remove the nut which secures the spindle arm to the spindle and drive the arm out of the spindle (fig. 58). Remove the nut from the spindle bolt lock pin (fig. 58) and drive out the pin. Remove the spindle bolt either by driving out or using a suitable puller. Remove the spindle.

b. **Installation.** Place the spindle in position on the axle as shown in figure 57 with the thrust bearing (fig. 58) between the bottom of the axle and the spindle. Install the spindle bolt and secure it in place with the lock pin. Install the lock washer and nut on the lock pin. Install the spindle arm on the spindle and secure it with a lock washer, nut and cotter pin. Install the brake plate assembly (par. 110 b). Install the wheel and drum assembly (par. 127 a (2)).

Section XXIII

REAR AXLE

113. DESCRIPTION.

a. The rear axle (fig. 59) is a full floating type with spiral bevel drive gear and a straddle mounted drive pinion. The axle ratio is 6.67 to one.

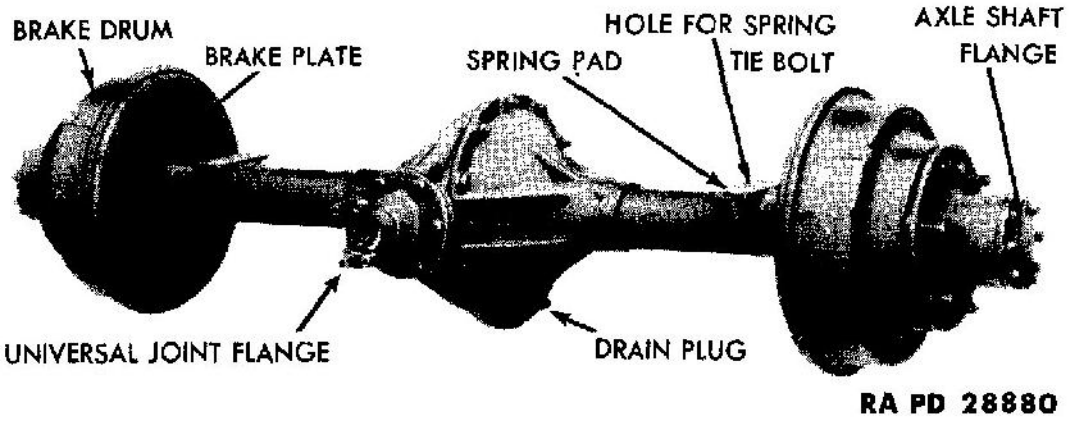

Figure 59 — Rear Axle, Hub, and Drum Assemblies

114. REPLACEMENT.

a. Removal. Raise the rear of the frame. Remove the axle shaft (par. 115). Remove the wheel and drum assemblies (par. 127 b (1)). Disconnect the hydraulic brake line at each rear brake plate (fig. 71). Remove the six bolts which hold the brake plates to the axle housing. Remove the baffles and brake plate assemblies from the axle. Remove the two nuts from each shock absorber bracket to the axle U-bolt and remove the U-bolt from each shock absorber bracket. Pull the shock absorber arm and bracket out of the way. Place a roller jack under the axle. Remove the two U-clamps from the rear universal joint to disconnect it from the propeller shaft. Remove the nuts from each of the rear spring U-bolts and drive the U-bolts up so that they are free from the axle. Lower the axle and remove it from the vehicle.

b. Installation. Place the axle in position under the vehicle with a roller jack, making sure that each rear spring tie bolt is entered in the hole in the spring seat (fig. 59) on the axle housing. Drive each rear spring U-bolt into position and install the rear spring seat cap (fig. 63) on the U-bolts at each spring. Install the nuts on the U-bolts to secure the axle to the rear springs. Pull the shock absorber arm and bracket into position on the axle and install the nuts on the U-bolts to secure the shock absorber bracket to the axle. Place the brake plate assemblies in position on the axle housing. Place the baffles in position on the brake plates and install the six bolts in each brake plate. Connect the hydraulic brake line to the connection at each rear brake plate (fig. 71). Bleed the rear brakes (par. 136 b). Install the wheel and drum assemblies (par. 127 b). Install the axle shafts (par. 115). Install the two U-clamps on the rear universal joint to connect it to the propeller shaft. Remove the roller jack from under the axle and lower the vehicle.

1½-TON 4x2 TRUCK (FORD)

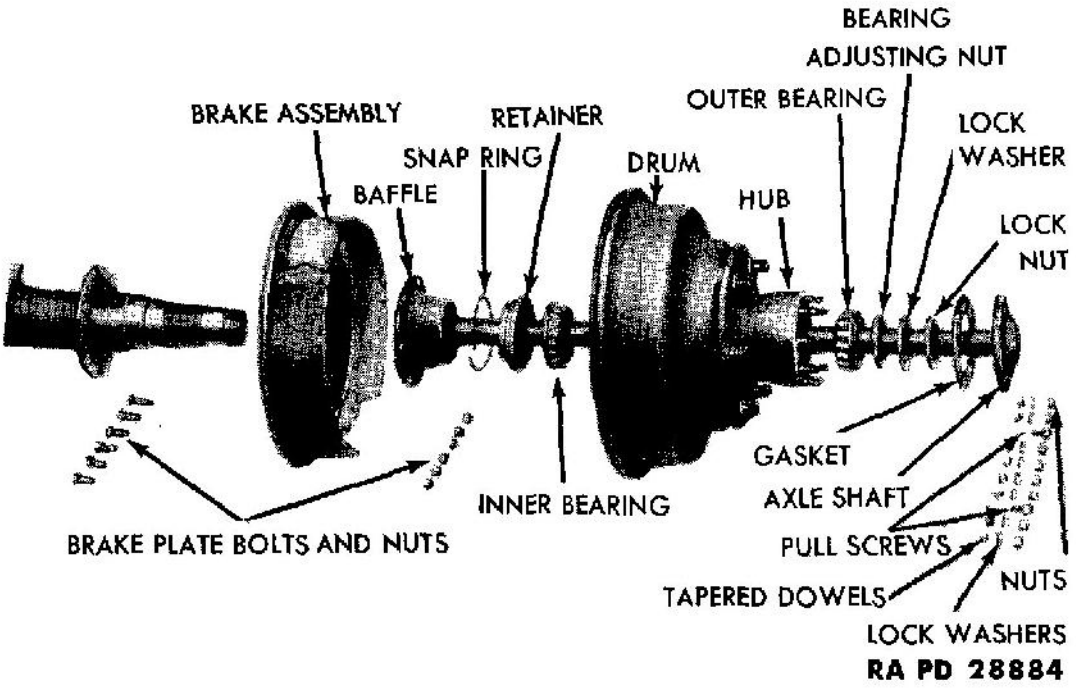

Figure 60 — Rear Axle Shaft and Brake Assembly — Disassembled

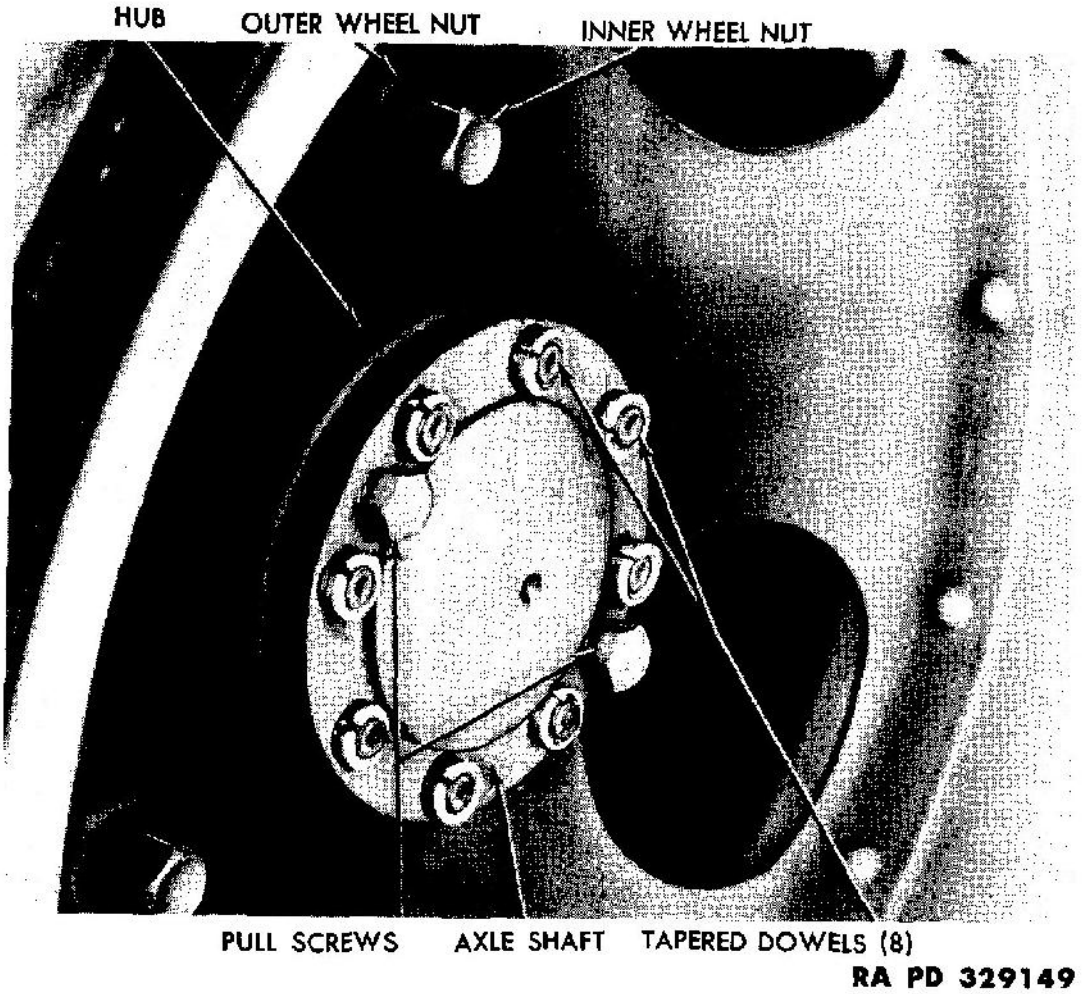

Figure 61 — Axle Shaft Installed

SPRINGS AND SHOCK ABSORBERS

115. AXLE SHAFT REPLACEMENT.

a. Remove the eight nuts and lock washers which hold the axle shaft flange to the hub. Screw in the two pull screws (fig. 61) to pull the axle shaft flange away from the hub. Strike the center of the axle shaft flange with a soft hammer to loosen the eight tapered dowels. Pull the axle shaft from the axle. To install the axle shaft, back off the pull screws and place a new gasket on the axle shaft flange. Insert the axle shaft into the axle and install the tapered dowels and lock washers on the studs on the hub. Install the axle shaft flange nuts, tightening each one a little at a time until all are tight. Tighten the pull screws just enough to prevent them from coming loose.

Section XXIV

SPRINGS AND SHOCK ABSORBERS

116. DESCRIPTION (figs. 62, 63, and 64).

a. The front and rear springs are of the semi-elliptical type. The front springs are equipped with a shackle at the front end and the rear springs are equipped with a shackle at the rear end. Each of the front and rear main springs has 12 leaves. An auxiliary spring is provided on the top of each rear spring. Four hydraulic shock absorbers are provided, one for each main spring (fig. 64).

117. SHACKLE AND BOLT REPLACEMENT.

a. **Front Spring Shackle Replacement** (fig. 62). Raise the front of the frame until the weight is removed from the spring. Remove the nuts from the two shackle bolts. Drive the upper bolt out of the shackle. Drive the lower bolt out of the shackle and front spring eye and remove the bolt and shackle bars. To install the shackle, place the outer shackle bar in position with the groove toward the outside and drive the upper shackle bolt through the bracket, making sure the flat side of the head of the bolt is lined up with the groove in the shackle bar. Drive the lower shackle bolt through the shackle and spring eye, making sure that the flat on the head is lined up with the groove in the shackle bar. Assemble the inner shackle bar on the shackle bolts and install the nuts, draw them up tight, then back off each nut two castellations and install the cotter pin.

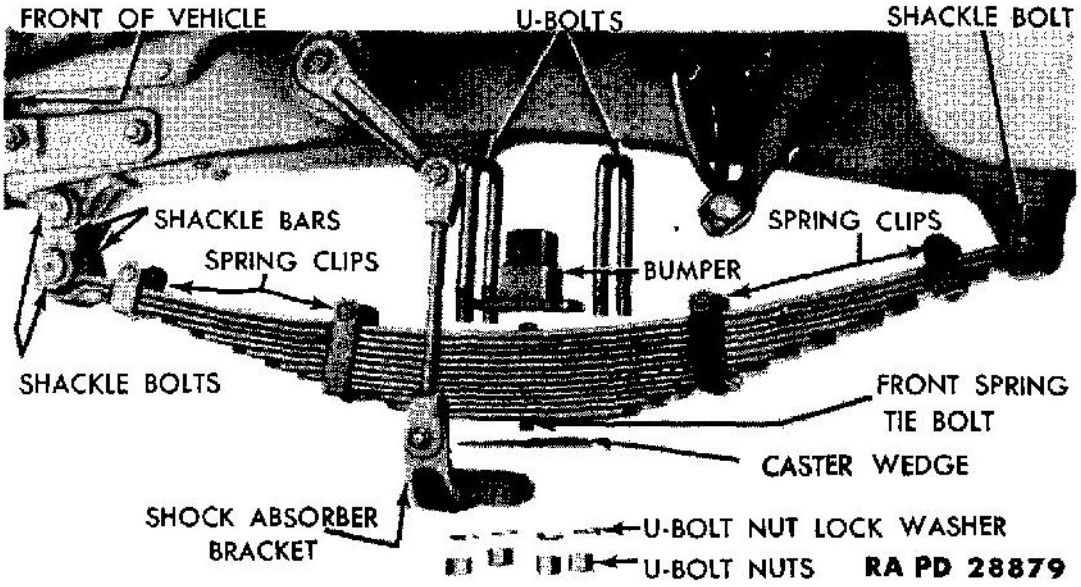

Figure 62 — Front Spring Assembly

b. Rear Spring Shackle Replacement (fig. 63). Raise the rear of the frame until the weight is removed from the spring. Remove the nuts and lock washers from the two shackle bolt lock pins and drive the pins out of the shackle and bracket, using a brass drift. Remove the grease gun fittings from the center of the shackle bolts and with a suitable puller, pull the bolts out of the shackle and spring eye. To install the shackle, place it in position in the bracket and over the spring eye. Drive the shackle bolts in place, making sure that the grooves in the bolts line up with the holes for the lock pins. Drive the lock pins in place and secure them with lock washers and nuts. Install the grease gun fittings in the shackle bolts.

118. FRONT SPRING REPLACEMENT.

a. Removal (fig. 62). Raise the front of the frame. Remove the nut from the lower shackle bolt and drive the bolt out of the shackle and spring eye. Remove the nut from the shackle bolt which secures the rear end of the spring to the bracket and drive the bolt out of the bracket and spring eye. Remove the nuts from the two U-bolts which secure the spring to the axle. Remove the spring.

b. Installation (fig. 62). Place the spring in position and line up the spring eye with the spring shackle. Drive the shackle bolt through the shackle and spring eye and install the nut on the bolt, draw it up tight, then back it off two castellations and install cotter pin. Line up the spring eye at the rear of the spring with the bracket and drive the shackle bolt through the bracket and spring eye. Install the nut on the shackle bolt, draw it up tight, then back it off two castellations and install the cotter pin. Place the axle caster wedges between the front axle and the spring with the thick edge of the wedge toward the rear of the vehicle. Place the spring U-bolts in position over the bumper

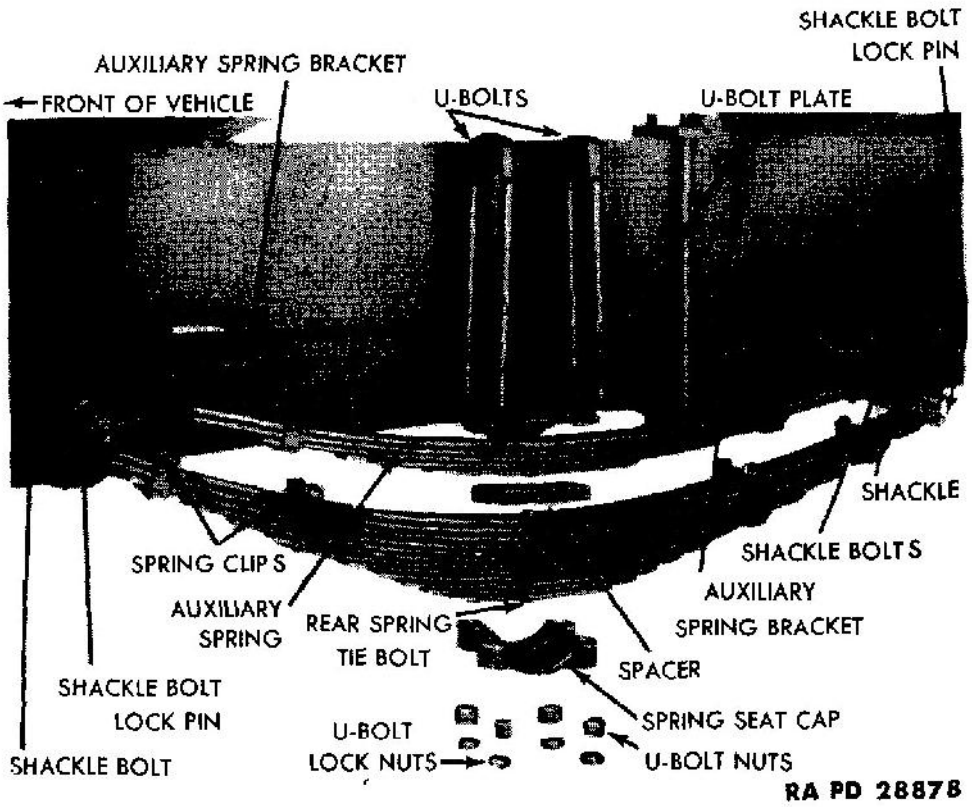

Figure 63 — Rear Spring Assembly

bracket and through the holes in the front axle. Place the shock absorber bracket in position on the front U-bolt. Make sure the spring tie bolt is entered in the hole provided in the axle. Install the lock washers and nuts on the U-bolts to secure the front spring to the axle.

119. REAR SPRING REPLACEMENT.

a. Removal (fig. 63). Remove the nuts from the two U-bolts which secure the rear spring to the rear axle. Drive the U-bolts up until they are free of the spring. Remove the auxiliary spring and spring pad. Remove the nut from the lock pin which secures the lower shackle bolt to the shackle. Drive out the lock pin, using a brass drift. Remove the grease gun fitting from the shackle bolt and remove the shackle bolt with a suitable puller. Remove the shackle bolt from the bracket and spring and spring eye at the front of the spring in the same manner as outlined above.

b. Installation (fig. 63). Place the spring in position on the axle, making sure the spring tie bolt is entered in the hole provided in the axle (fig. 59). Line up the spring eye with the spring shackle and drive the shackle bolt through the shackle and spring eye, making sure the groove in the shackle bolt lines up with the hole for the lock pin in the shackle. Drive the lock pin into the shackle and secure it with a lock washer and nut. Line up the spring eye at the front of the spring with the bracket and install the shackle bolt as outlined above. Install

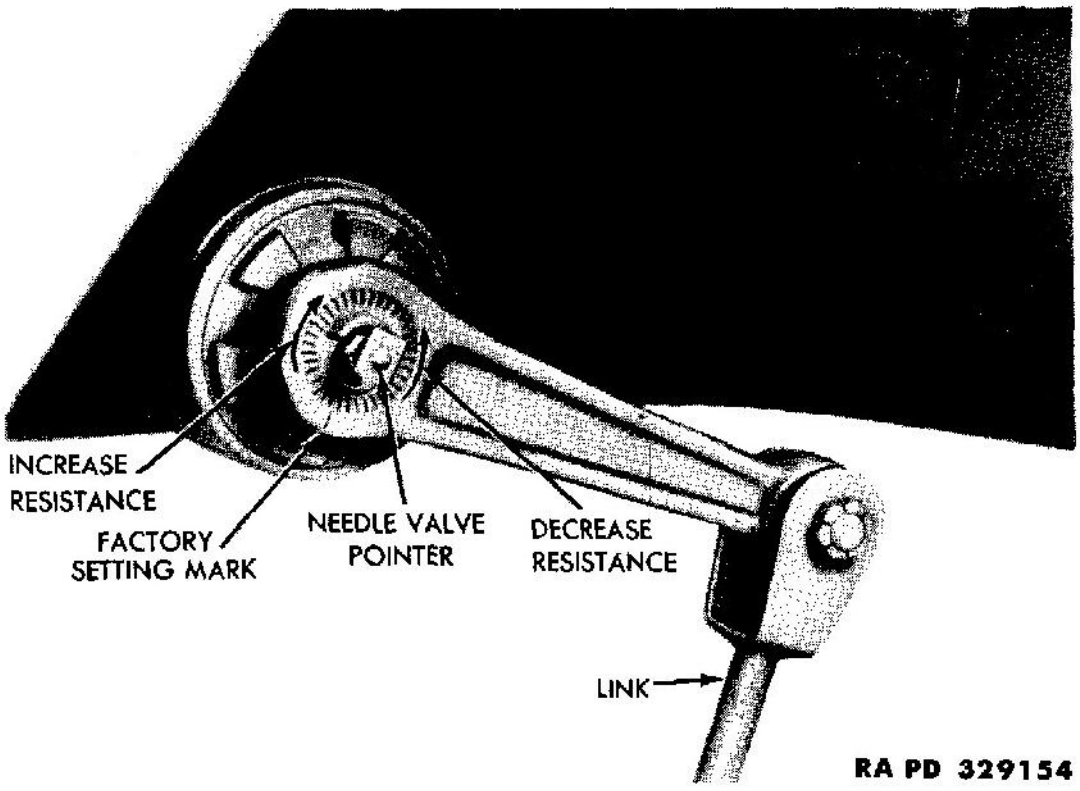

Figure 64 — Shock Absorber

the grease gun fittings in the shackle bolts. Place a spacer and the auxiliary spring on top of the main spring (fig. 63). Drive the U-bolts into position over the spring assembly and axle, and install the seat cap on the U-bolts. Install the nuts on the U-bolts to secure the spring to the rear axle.

120. SHOCK ABSORBERS AND LINKAGE.

a. Adjustment (fig. 64). A factory setting mark is provided on the shock absorber arm which indicates the correct adjustment for the average operating conditions. To increase the resistance, turn the needle valve pointer clockwise. To decrease the resistance, turn the needle valve pointer counterclockwise. This adjustment is very sensitive and, therefore, the needle valve pointer should not be moved more than one or two serrations at a time.

b. Replacement (fig. 64). Remove the nut from the bolt at the upper end of the shock absorber link and drive the bolt out of the link and shock absorber arm. Remove the two bolts which secure the shock absorber to the frame. Remove the shock absorber assembly. To install the shock absorber, place it in position on the frame and install the two bolts to secure it to the frame. Line up the link with the hole in the arm and install the bolt through the shock absorber link and the arm. Install the nut on the bolt, this nut is of the type which requires no cotter pin.

Section XXV
STEERING GEAR

121. DESCRIPTION.

a. The steering gear is a Gemmer model 335 and is of the worm and roller type having a reduction ratio of 18.4 to 1. The steering wheel is of the three spoke type, 18 inches in diameter.

122. SECTOR SHAFT END PLAY ADJUSTMENT (fig. 65).

a. Turn the steering wheel so that the front wheels are in the straight ahead position. Raise the front of the vehicle until the weight is removed from the front wheels. Remove the sector shaft thrust screw lock nut and lock washer. Turn the sector shaft thrust screw clockwise with a screwdriver until it is tight, then back it off approximately ⅛ turn. Install the lock washer. If the lock washer does not fit into place, turn the adusting screw back slightly. Do not tighten the adjusting screw in order to make the lock washer fit. Install the adjusting screw lock nut.

123. DRAG LINK REPLACEMENT.

a. **Removal.** Remove the cotter pin and unscrew the drag link plug at the rear end of the drag link (fig. 66) and unscrew the drag link plug. Turn the steering wheel so that the pitman arm moves toward the rear of the vehicle and remove the ball seat and the drag link from the pitman arm ball. Remove the cotter pin and unscrew the drag link plug at the forward end of the drag link. Pull the drag link back and remove the ball seat and the drag link from the spindle arm ball.

b. **Installation.** Install a new drag link grease retainer and cap on the steering arm and pitman arm ball if the old ones are worn or damaged. Install the drag link on the spindle arm ball. Install the ball seat. Screw in the drag link plug until a slight drag is noticeable and install the cotter pin. Follow the same procedure to install the rear end of the drag link on the pitman arm ball.

124. STEERING WHEEL REPLACEMENT.

a. Disconnect the horn wire at the bullet connection (fig. 65). Remove the horn button by pressing down and turning it counterclockwise. Remove the horn button spring and horn wire assembly from the steering tube. Remove the steering wheel nut and remove the steering wheel with a suitable puller. To install the steering wheel, place it in position over the key in the steering shaft and install the steering wheel nut. Install the horn wire assembly in the steering

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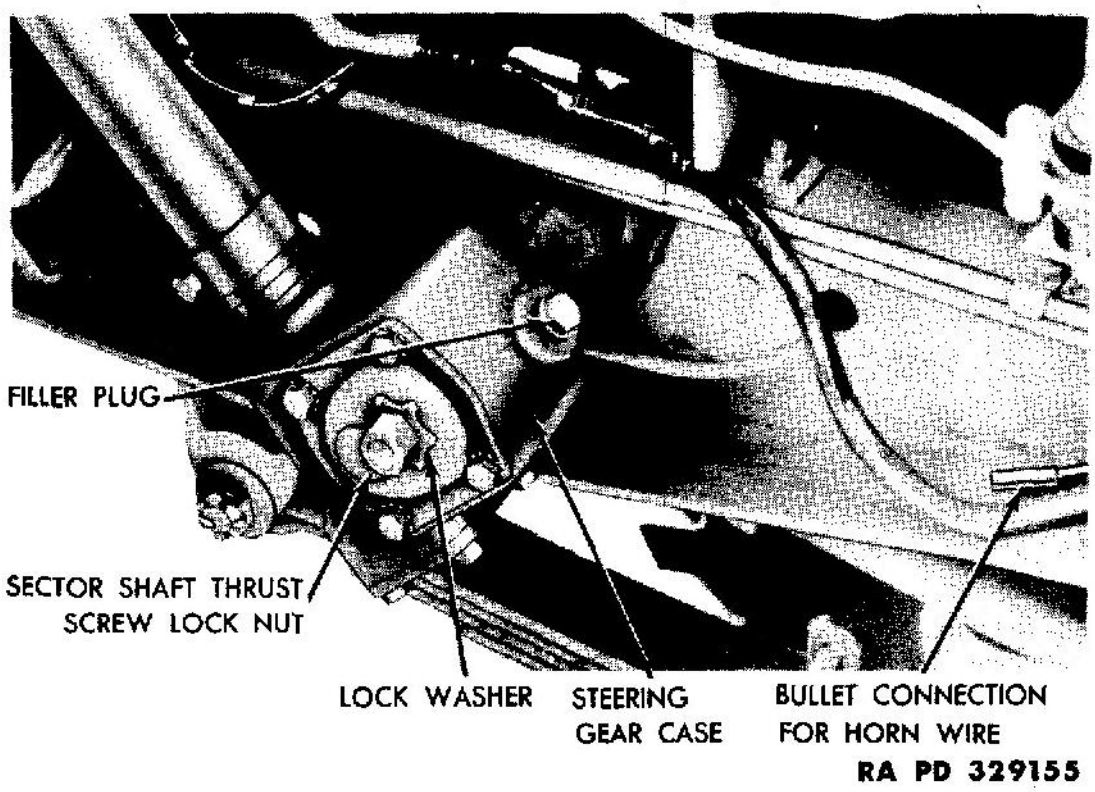

Figure 65 — Steering Gear Case

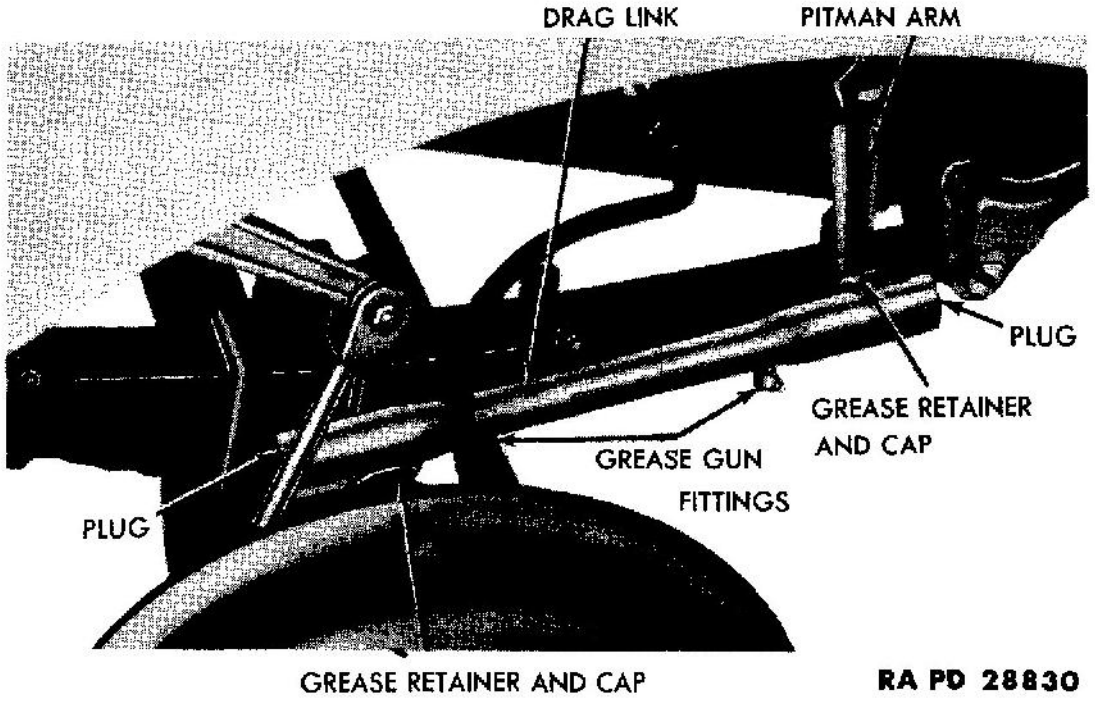

Figure 66 — Drag Link

tube. Place the horn button spring and the horn button in the steering wheel, press the button down and turn it clockwise to secure it to the steering wheel. Connect the lower end of the horn wire at the bullet connection (fig. 65).

Section XXVI

WHEELS AND TIRES, HUBS AND DRUMS

125. DESCRIPTION.

a. The wheels are 20 inches diameter with 7-inch rims and are held to the hub with six bolts. The wheel to hub nuts on the right side of the vehicle have right-hand threads and the nuts on the left side of the vehicle have left-hand threads. Dual wheels are provided on the rear axle. Both front and rear tires are 7.50 x 20, 8-ply. The correct tire pressure is 55 pounds for both front and rear tires.

126. WHEEL REPLACEMENT.

a. **Removal.** Apply the hand brake. Block one of the wheels to prevent the vehicle from moving. Raise the axle until the wheel is clear of the ground. Remove the six nuts holding the wheel to the hub. Remove the wheel and tire assembly from the hub. Remove the tire from the wheel (par. 128 a).

b. **Installation.** See that the countersunk holes in the wheel for the taper on the wheel nuts, and the face of the wheel and hub flange where they bear together, and the surface of the dual rear wheels where the two wheels come in contact are clean and free from dirt. Install the tire on the wheel (par. 128 b). Install the wheel on the hub bolts and secure it with the six wheel nuts. When installing dual wheels, the inner wheel must be mounted and the nuts tightened before the outer wheel is installed. At the end of the first 100 miles after installation, jack up the axles and retighten all wheel nuts. When tightening nuts on the dual wheels, the outer wheel nuts must be backed off at least two full turns before tightening the inner wheel nuts.

127. WHEEL BEARING REPLACEMENT.

a. **Front Wheel Bearings** (figs. 67).

(1) REMOVAL. Raise the front of the vehicle until the wheel is clear of the ground. Remove the hub cap. Remove the cotter pin, wheel bearing adjusting nut, and washer. Pull the wheel outward until the outer roller bearing is near the end of the spindle. Push the wheel back on and remove the outer bearing. Pull the wheel assem-

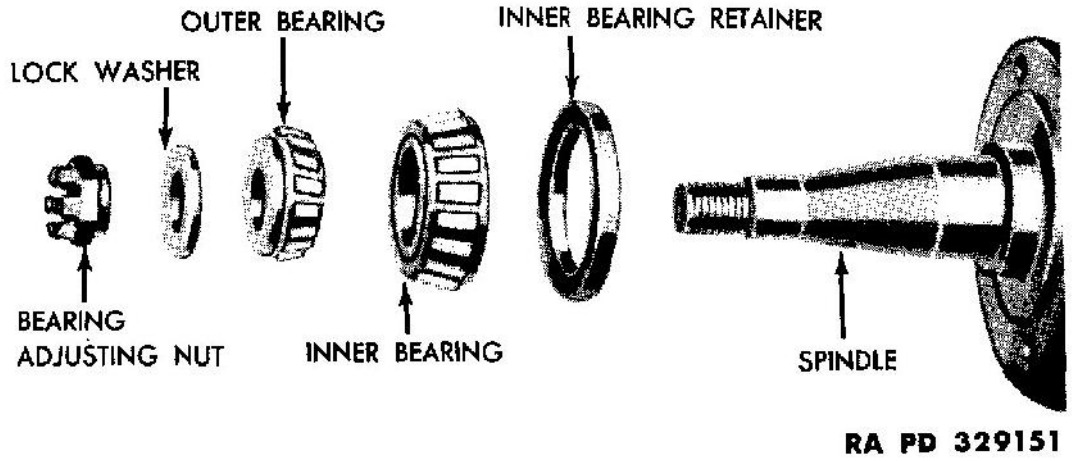

Figure 67 — Front Wheel Bearings and Spindle

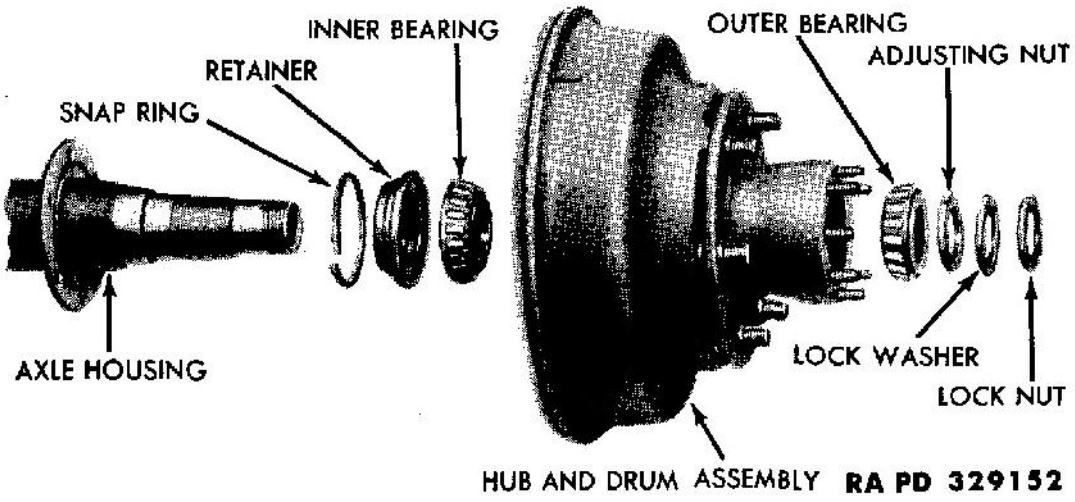

Figure 68 — Rear Wheel Bearings and Hub — Disassembled

bly, including the inner bearing, off the spindle. Drive the inner bearing and grease retainer out of the wheel hub.

(2) INSTALLATION. Pack the inner wheel bearing with grease and place it in the hub. Drive the retainer in the hub, using a new retainer if the old one is worn or damaged. Place the wheel on the spindle. Pack the outer wheel bearing with grease and place it on the spindle and install the washer. Install the bearing adjusting nut and draw it up tight, then back it off approximately ⅛ turn. Install the cotter pin. Install the hub cap.

b. Rear Wheel Bearings (figs. 68).

(1) REMOVAL. Raise the rear of the vehicle until the wheel is clear of the ground. Remove the axle shaft (par. 115). Remove the bearing lock nut, lock washer, and the adjusting nut. Pull the wheel and hub assembly from the axle. Pry up one end of the inner bearing

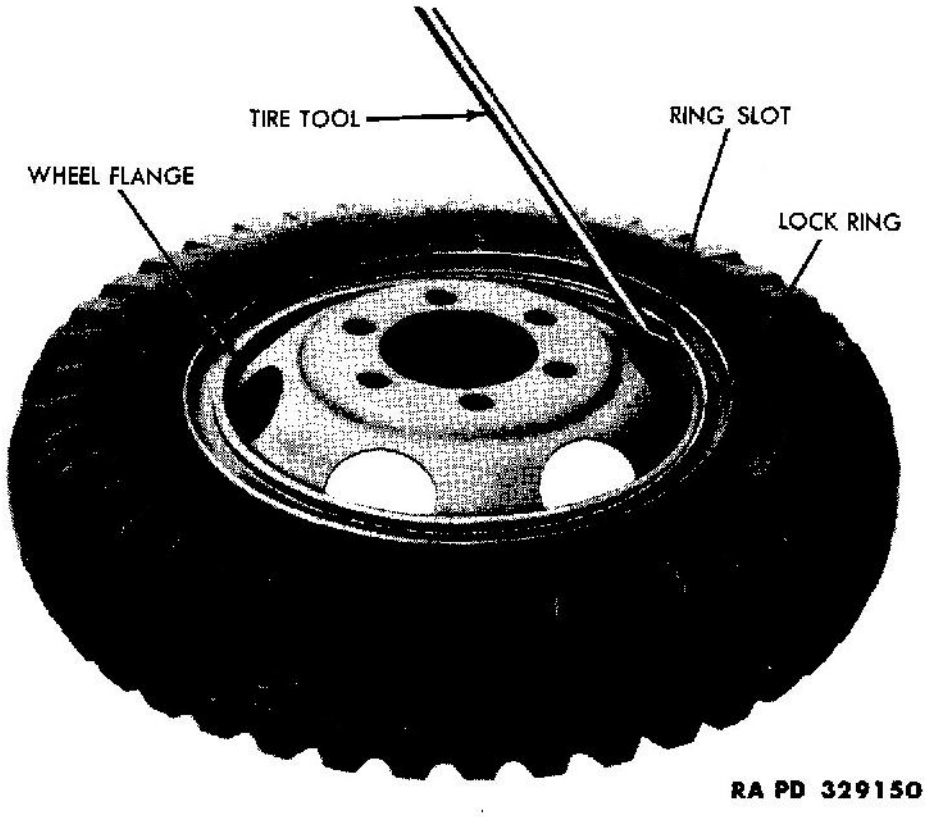

Figure 69 — Removing Tire Lock Ring

retainer snap ring with a screwdriver and remove it from the hub. Remove the inner bearing grease retainer and the inner bearing.

(2) INSTALLATION. Pack the inner bearing with grease and place it in the wheel hub. Install the retainer, using a new one if the old one is worn or damaged. Install the retainer snap ring. Place the wheel and drum assembly on the axle. Pack the outer wheel bearing with grease and place it on the axle housing. Install the bearing adjusting nut and draw it up tight, then back it off approximately ⅛ turn. Install the bearing lock washer, making sure the washer fits over the dowel on the adjusting nut. Install the bearing lock nut and draw it up tight. Install the axle shaft (par. 115).

128. TIRE REPLACEMENT.

a. Removal. Remove the wheel from the hub (par. 126). Let the air out of the tire by removing the valve core. It is very important that all the air is let out of the tire to prevent the possibility of the rim flying off during the removal procedure. Place the combination jack handle and tire tool which is furnished with the vehicle in the slot in the ring as shown in figure 69. Press down on the side of the lock ring directly across the wheel from the ring slot, and pry upward with the tire tool. Continue prying on the lock ring until the ring is forced over

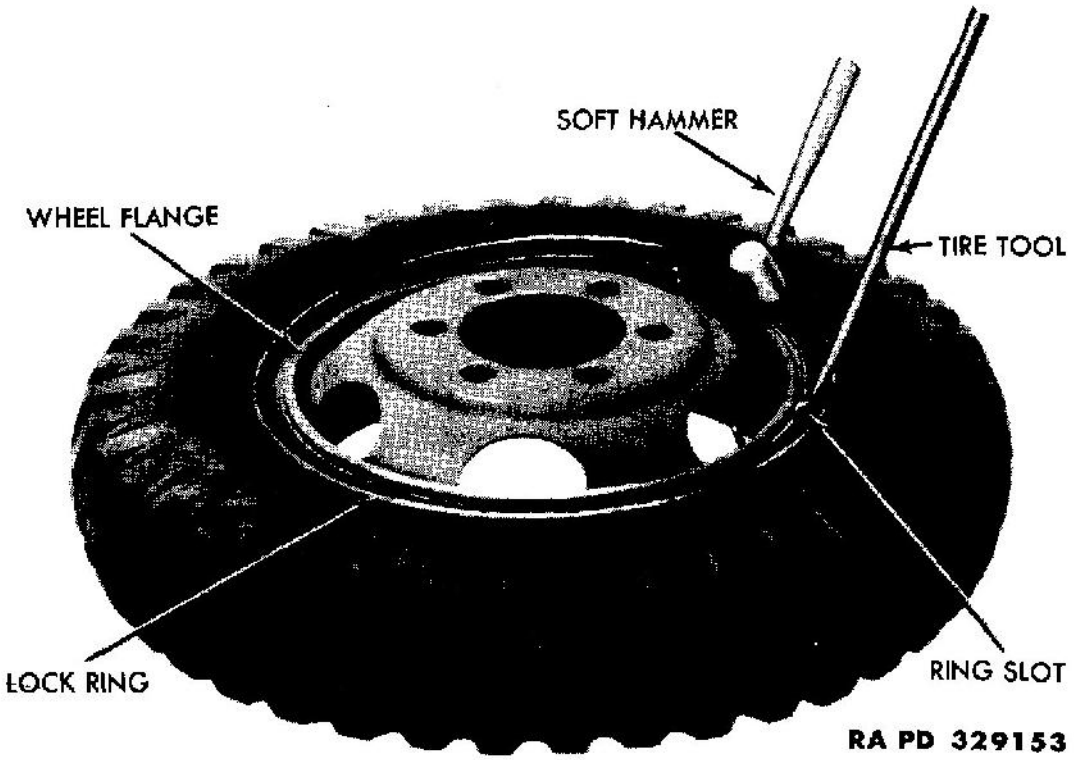

Figure 70 — Installing Tire Lock Ring

the wheel flange. Loosen the opposite side of the tire from the wheel and remove the tire and tube from the wheel.

b. Installation. Place the inner tube in the tire casing so that the red spot on the tire casing will be 180 degrees or directly across the wheel from the valve stem. Apply the tire and tube to the wheel and place the lock ring in position on the wheel flange. Press down on the side of the lock ring directly across the wheel from the lock ring slot. Pry on the lock ring and at the same time strike the lock ring with a soft hammer, as shown in figure 70, until the ring is forced over the wheel flange. Make certain that the lock ring has passed completely over the outside diameter of the wheel flange and into the groove of the flange before inflating the tire. Inflate the tire, a little at a time, until the lock ring is securely seated against the flange of the wheel. When the lock ring is securely seated, inflate the tire to 55 pounds. CAUTION: *When inflating the tire, do not stand in front of the lock ring.*

129. HUB AND DRUM REPLACEMENT.

a. Front Hub and Drum Assembly Replacement. Remove the wheel from the hub (par. 126 a). Remove the hub and drum assembly from the axle, following the same procedure as outlined for the removal of the front wheel bearing (par. 127 a (1)). To install the

hub, follow the procedure outlined in paragraph 127 a (2) and install the wheel on the hub (par. 126 b).

b. Rear Hub and Drum Assembly Replacement. Remove the wheels from the hub (par. 126 a). Remove the hub from the axle, following the same procedure as outlined for the removal of the rear wheel bearings (par. 127 b (1)). To install the hub, follow the procedure outlined in paragraph 127 b (2) and install the wheel on the hub (par. 126 b).

Section XXVII

BRAKES

130. DESCRIPTION AND DATA.

a. Description.

(1) SERVICE BRAKES. The entire hydraulic service brake system is shown in figure 71. A hydraulically operated, two-shoe, internal-expanding service brake is provided at each of the four wheels. The pressure applied to the brake pedal is amplified by means of a hydrovac power cylinder. The two shoes in each wheel brake assembly are actuated by a wheel slave cylinder.

(2) HAND BRAKE. The entire hand brake system is shown in figure 72. The hand brake is of the external-contracting type and operates on a drum on the transmission main shaft at the rear of the transmission. The hand brake is actuated by a hand lever.

b. Data.

(1) SERVICE BRAKE.

Adjustment	Anchor bolts and cams
Thickness of lining:	
Front brake shoes	0.268 in.
Rear brake shoes	0.312 in.

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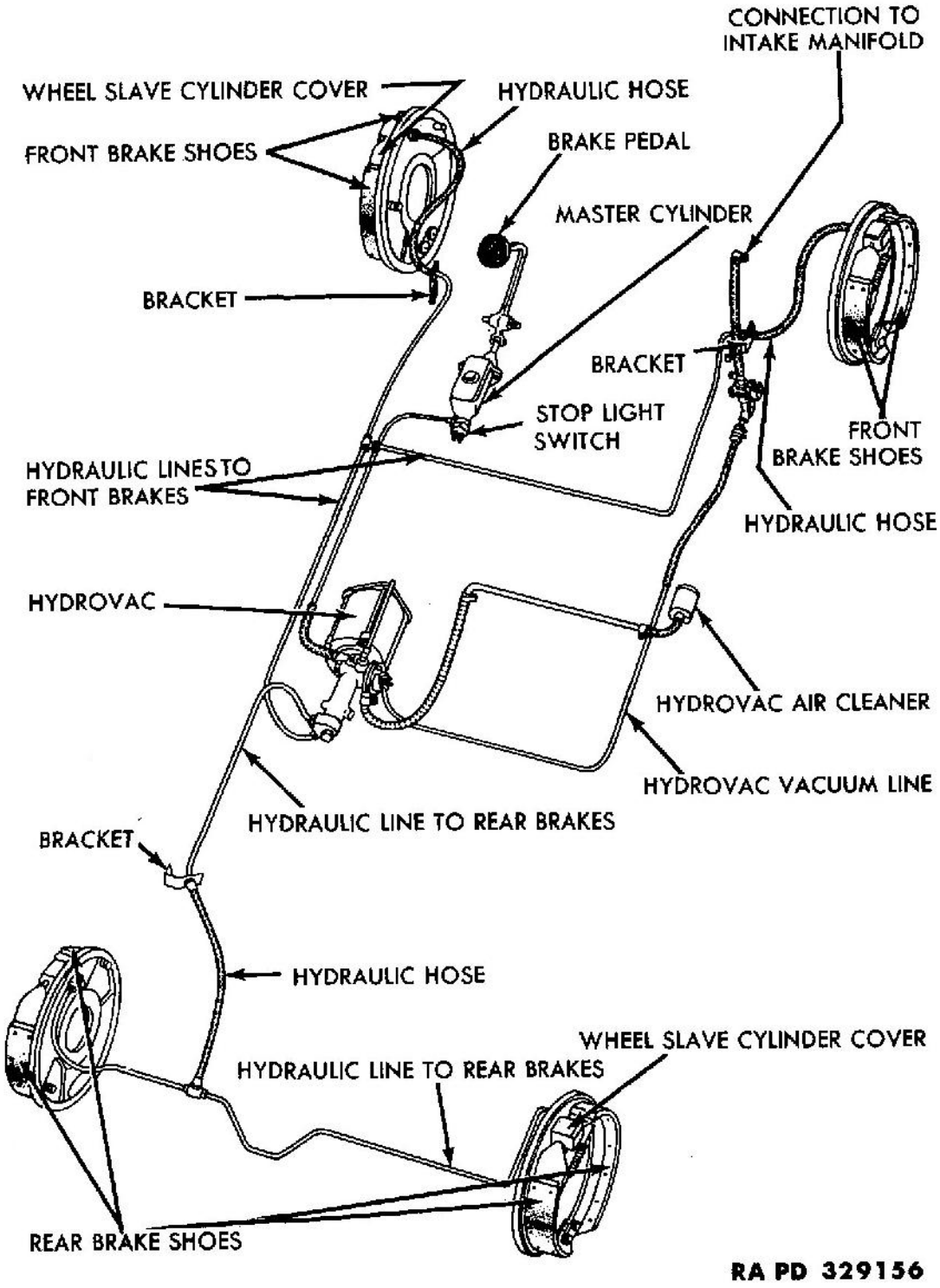

Figure 71 — Hydraulic Service Brake System

Length of lining per shoe:

Front brake shoes	Primary	15.53 in.
	Secondary	10.78 in.
Rear brake shoes	Primary	16.67 in.
	Secondary	11.57 in.
Total brake lining area		303 sq in.

Diameter of brake drums:

Front	14 in.
Rear	15 in.

Diameter of wheel slave cylinders:

Front	1⅜ in.
Rear	1½ in.

(2) HAND BRAKE.

Diameter of brake drum	7 13/16 in.
Lining thickness	0.250 in.
Lining length	24.6 in.
Lining width	2.5 in.
Total hand brake lining area	123.12 sq in.

131. SERVICE BRAKES.

a. Service Brake Controls. Service brakes are hydraulically controlled. The hydraulic controls include the master cylinder hydraulic lines and hose, hydrovac power cylinder, and a slave cylinder at each wheel.

b. Service Brake Adjustment.

(1) PEDAL FREE PLAY ADJUSTMENT (fig. 78). The brake pedal must have ¼-inch free movement, measured at the pedal pad, before the brake pedal rod contacts the master cylinder piston. Remove the clevis pin from the brake pedal clevis to disconnect the rod at the master cylinder. Loosen the lock nut on the rod and turn the rod until ¼-inch play is obtained at the pedal pad. Install the clevis pin in the brake pedal clevis and rod to the master cylinder. Tighten the lock nut on the rod to the master cylinder.

(2) SHOE ADJUSTMENT (fig. 74). Do not attempt to adjust the brakes while the drums are hot. Jack up all four wheels. Adjust the pedal free play as outlined in subparagraph (1) above if required. Loosen the lock nut on each anchor bolt. With from 20- to 35-pounds pressure being applied to the brake pedal, turn one anchor bolt in the direction shown by the arrows in figure 74 until the brake shoe contacts the drum. Remove the pressure from the brake pedal and back off the anchor bolt slightly, until the wheel turns freely. Tighten the

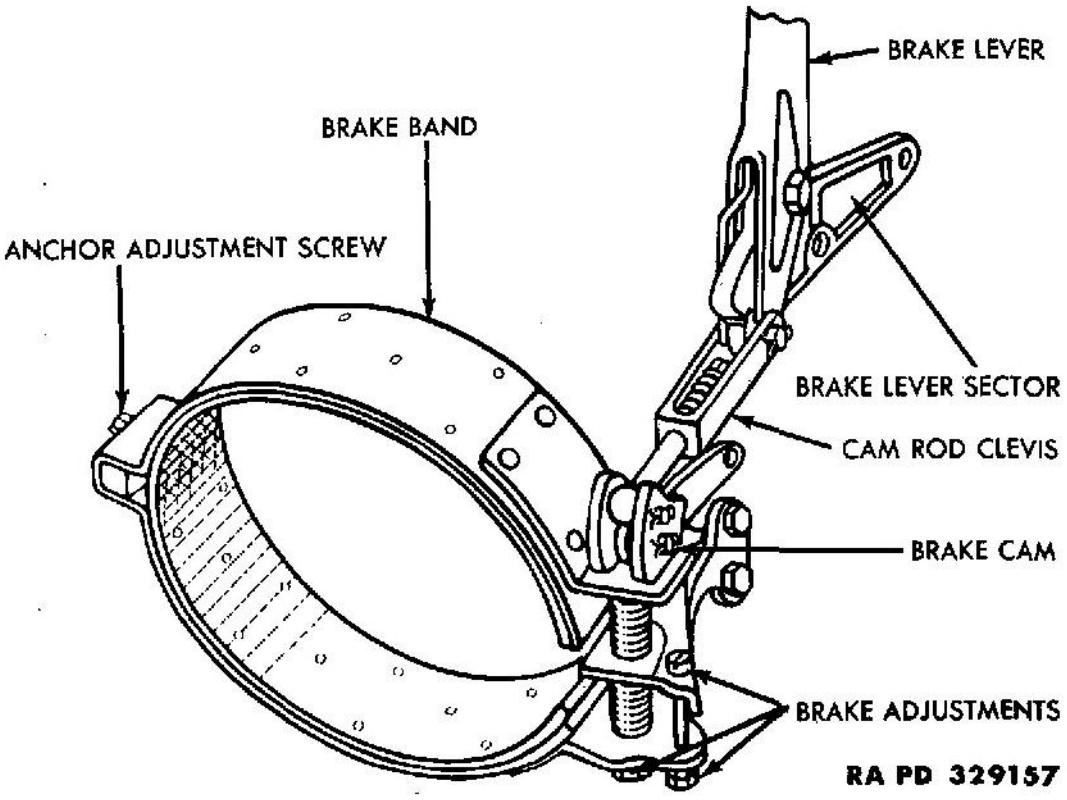

Figure 72 — Hand Brake System

lock nut on the anchor bolt, holding the bolt while the lock nut is being tightened to prevent any change in the setting. Repeat this operation at each anchor bolt, applying pressure to the pedal during the adjustment of each and removing the pressure when backing the adjustment off. Lock each anchor bolt as soon as its adjustment is established. Turn one of the cams in the direction indicated by the arrows in figure 74 until the shoe comes in contact with the drum, then back off the adjustment until the wheel rotates freely in either direction. Repeat the above procedure at both cams on each wheel.

c. Brake Shoe Replacement.

(1) REMOVAL (fig. 73). Remove the wheel and drum assembly (par. 127). Remove the lock nuts and washers from the anchor bolts. Remove the anchor bolts, eccentric washers and plate. Pull the shoes out of the brake shoe retainers and push the lower ends of the shoes together so that they overlap. Remove the shoes from the slave cylinder and disconnect the retracting spring.

(2) INSTALLATION (figs. 73 and 74). Place the brake shoes together and connect the retracting spring between the shoes. Enter the shoes in the brake shoe retainers and also in the guide at each end of the slave cylinder. Line up the holes in the lower ends of the shoes with the anchor bolt holes in the brake plate. Place the anchor bolts through the anchor bolt plate and install the eccentric washers on the

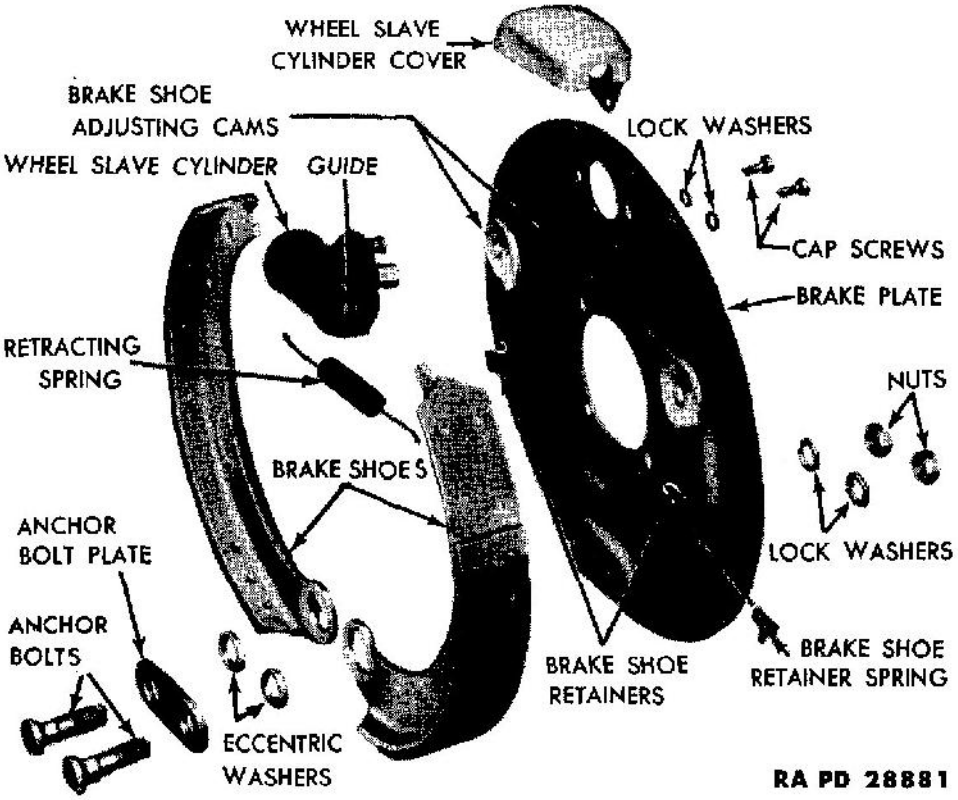

Figure 73 — Service Brake — Disassembled

anchor bolts. Push the anchor bolts through the anchor bolt holes in the brake plate until the eccentric washers are against the brake shoes. Turn each anchor bolt until the eccentric washer enters the hole in each brake shoe. Install the lock washers and nuts loosely on the anchor bolts. Turn the anchor bolts so that the punch marks face toward each other as shown in figure 74. Install the wheel and drum assembly (par. 127 a (2)). Adjust the brake shoes (subpar. b above).

132. HAND BRAKE.

a. Hand Brake Controls. The hand brake controls consist of a hand brake lever (fig. 72), hand brake lever sector, cam and connecting linkage.

b. Hand Brake Adjustment (fig. 75). Set the hand brake in the fully released position. Make sure the flat portion of the cam is resting on the ear of the brake band, as shown in figure 75. If the cam does not rest flat, remove the clevis pin from the upper part of the cam and adjust the clevis rod until the flat portion of the cam is resting on the ear of the brake band. Install the clevis pin. Remove the lock wire from the anchor adjusting screw and turn the screw clockwise until a clearance of 0.010 inch is established between the brake band and the drum at the anchor screw. Install the lock wire in the anchor screw. Loosen the lock nut on the adjusting screw for the upper por-

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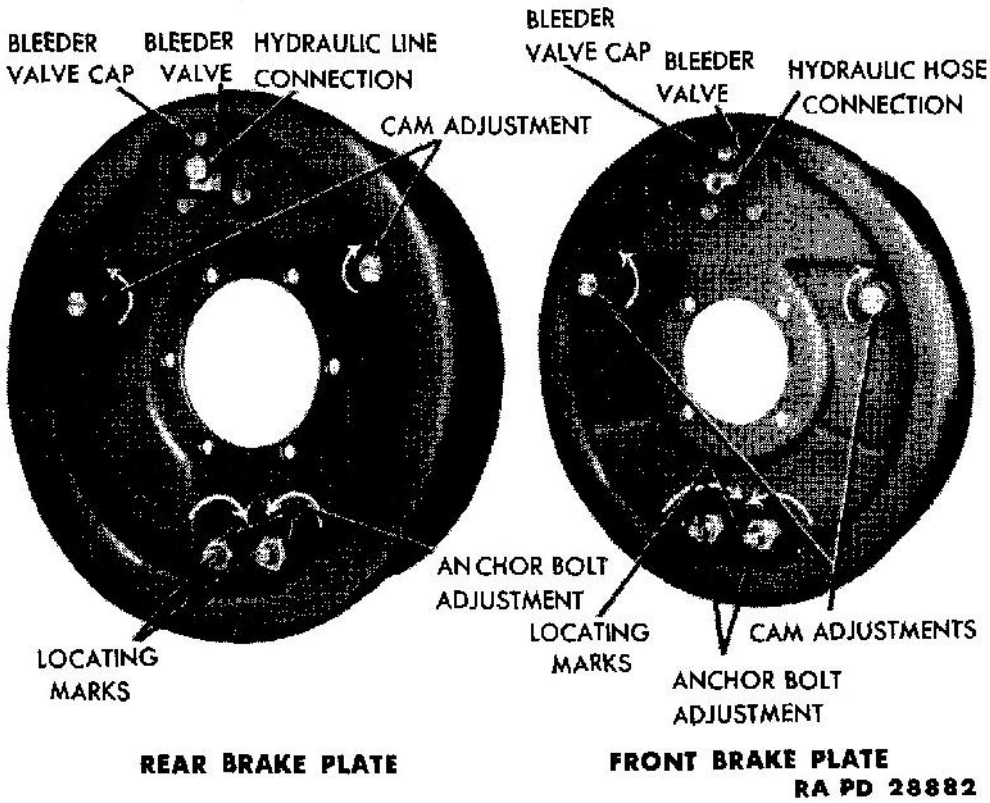

Figure 74 — Front and Rear Brake Plates

tion of the brake band and adjust the screw to establish a 0.010-inch clearance for the upper portion of the brake band. Tighten the lock nut. Tighten the adjusting nut for the lower portion of the brake band until a clearance of 0.010 inch is established for the lower portion of the brake band.

133. HYDROVAC.

a. Description (fig. 76). The hydrovac is a power cylinder located on the inside of the frame left side member at the rear of the cab. This power cylinder uses the vacuum of the engine to step up or amplify the pressure manually applied to the brake pedal. This reduces the manual effort required to apply the brakes.

b. Removal (fig. 76). Loosen the clamp on the hydrovac air cleaner hose connection and remove the hose from the hydrovac. Loosen the clamp on the hydrovac vacuum hose connection and remove the hose from the hydrovac. Disconnect the front and rear brake hydraulic lines, and the brake master cylinder hydraulic line, from the hydrovac. Remove the four nuts, lock washers and bolts that secure the hydrovac bracket to the frame. Remove the hydrovac and bracket assembly.

c. Installation. Place the hydrovac and brake assembly in position and secure it to the frame with four bolts, lock washers, and nuts.

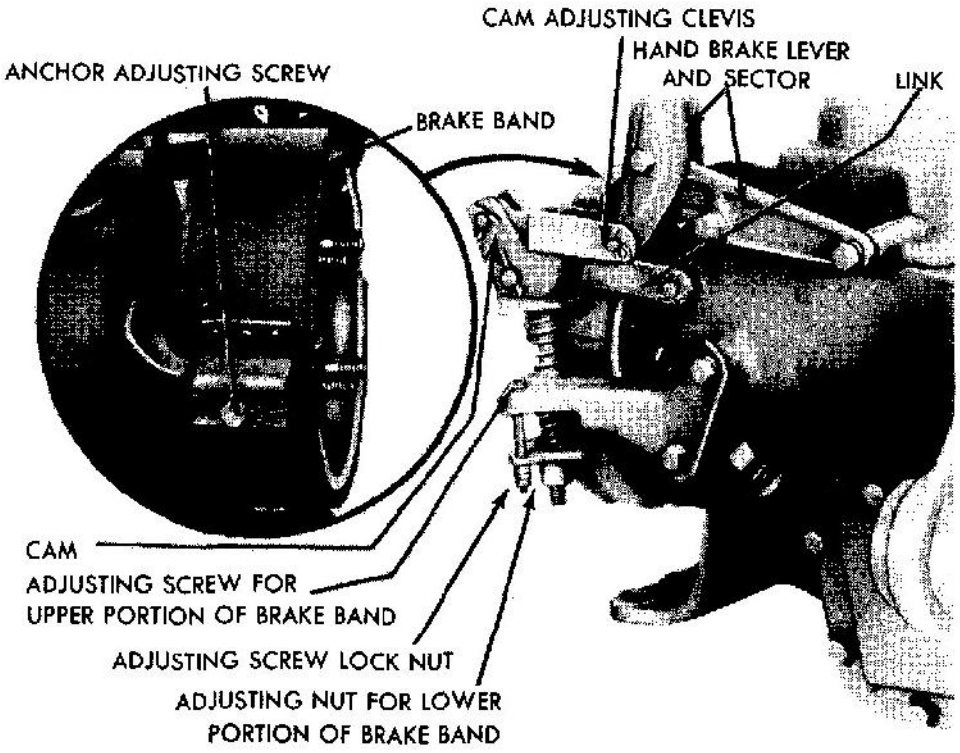

Figure 75 — Hand Brake Adjustment

Connect the front and rear brake hydraulic lines and the brake master cylinder line to the hydrovac. Install the vacuum hose on the hydrovac and tighten the clamp. Install the air cleaner hose on the hydrovac and tighten the clamp. Bleed the brake system as outlined in paragraph 136.

d. Hydrovac Air Cleaner.

(1) DESCRIPTION (fig. 77). The hydrovac air cleaner is located under the driver's seat to the right of the fuel tank and is connected to the hydrovac by a hose.

(2) REPLACEMENT AND CLEANING (fig. 77). To remove the air cleaner, raise the back and cushion of the seat and block the seat cushion in the raised position. Remove the screw from the center of the air cleaner. Remove the air cleaner assembly from the fitting and remove the screen and cleaner element from the cleaner housing. Wash all the parts in dry-cleaning solvent. To install the air cleaner, place the cleaner element and screen in the cleaner housing. Place the cleaner assembly over the fitting and secure it with the screw at the center of the cleaner.

134. MASTER CYLINDER.

a. Description (fig. 78). The master cylinder is located on the left side of the frame cross member to the rear of the transmission.

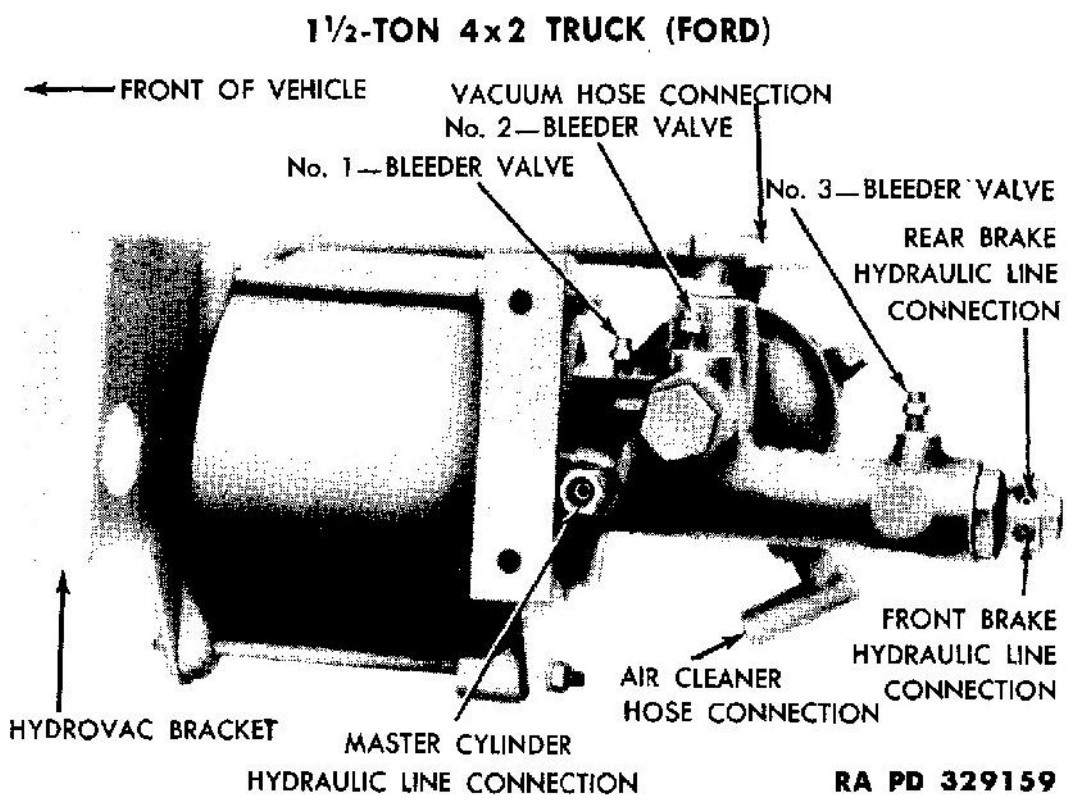

Figure 76 — Hydrovac

The master cylinder is actuated by the foot-brake pedal and provides movement of the hydraulic fluid to the hydrovac power cylinder.

b. Removal (fig. 78). Remove the brake pedal return spring from the brake pedal clevis pin. Remove the brake pedal clevis pin from the brake pedal. Disconnect the stop light switch wires at the bullet connections on the stop light switch. Disconnect the hydraulic brake line from the master cylinder. Remove the three nuts, lock washers and bolts that secure the master cylinder to the cross member bracket, and remove the master cylinder.

c. Installation. Place the brake master cylinder in position on the cross member bracket and secure it to the bracket with the three bolts, lock washers and nuts. Connect the hydraulic brake line to the master cylinder. Connect the stop light switch wires to the stop light switch at the bullet connections. Line up the brake pedal rod in the master cylinder with the brake pedal clevis and install the clevis pin. Adjust the pedal rod to obtain ¼-inch free travel of the brake pedal (par. 131 **b** (1)). Secure the clevis pin with a cotter pin. Connect the brake pedal return spring to the clevis pin. Bleed the hydraulic system (par. 136).

135. WHEEL SLAVE CYLINDERS.

a. Description (fig. 79). A slave cylinder is provided at each wheel brake. The slave cylinders operate the brake shoes when hydraulic pressure from the master cylinder is applied to them.

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Figure 77 — Hydrovac Air Cleaner

b. Removal (fig. 73). Remove the wheel and drum assembly (par. 127). Remove the brake shoe retracting spring and pull the shoes away from the slave cylinder. Disconnect the hydraulic line from the slave cylinder (par. 137). Remove the two cap screws which hold the slave cylinder to the brake plate and remove the slave cylinder and cover.

c. Installation (fig. 73). Place the slave cylinder and cover in position on the brake plate and secure them with the two cap screws and lock washers. Connect the hydraulic line to the slave cylinder. Pull the brake shoes up to the slave cylinder and see that they are entered in the guide at each end of the slave cylinder. Connect the retracting spring to the brake shoes. Install the wheel and drum assembly. Bleed the slave cylinder (par. 136 b).

136. BLEEDING THE HYDRAULIC BRAKE SYSTEM.

a. Bleed the Hydrovac (fig. 76). Remove the filler plug from the master cylinder reservoir (fig. 78) and fill the cylinder with hydraulic fluid. The hydrovac unit must be bled at the three bleeder valves in the order shown by the numerals in figure 76. Remove the first hydrovac bleeder valve dust cap (fig. 76 No. 1) and attach a bleeder tube to the bleeder valve. Place the end of the bleeder tube in a clear glass jar containing some hydraulic fluid. Open the bleeder valve about ¾ of a turn. Pump the brake pedal slowly, some fluid or air will come out with each stroke. NOTE: *Keep the master cylinder filled with brake fluid while pumping the brake pedal.* Continue to pump the pedal until no more bubbles come out of the bleeder tube. When, with each stroke, only fluid comes out of the bleeder tube, close the bleeder valve. Refill the master cylinder (fig. 76) and repeat the above operation on the other two hydrovac bleeder valves.

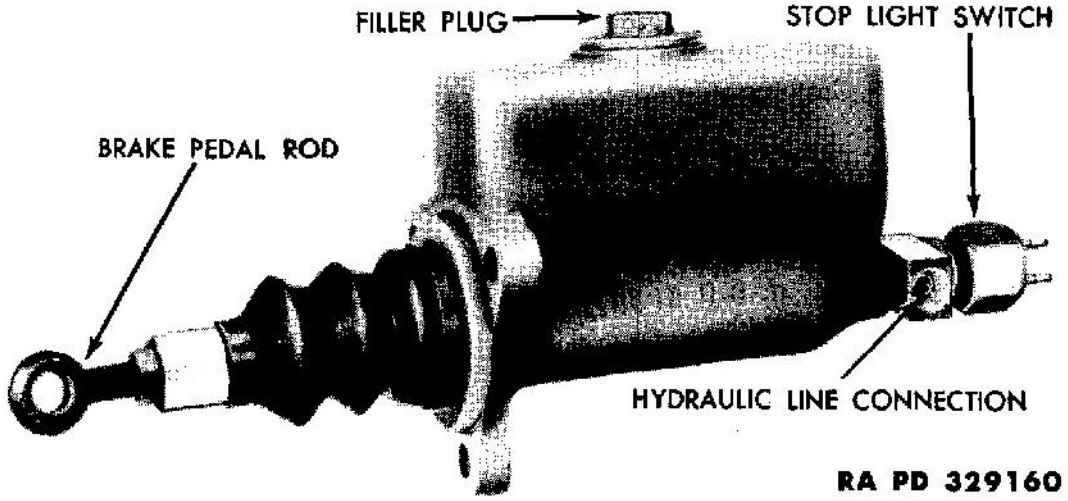


Figure 78 — Master Cylinder

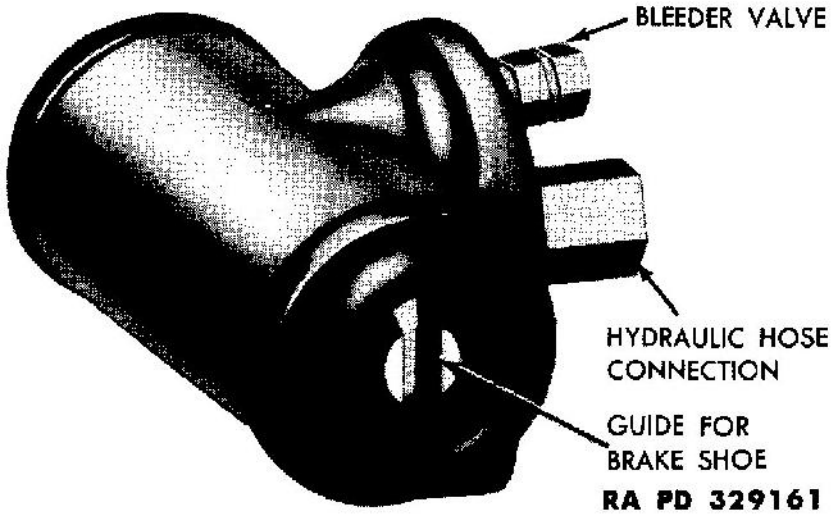


Figure 79 — Wheel Slave Cylinder

b. **Bleed the Wheel Slave Cylinders.** Remove the filler plug from the cylinder reservoir (fig. 78) and fill the cylinder with hydraulic fluid. Remove the wheel slave cylinder bleeder valve dust cap (fig. 74) and attach a bleeder tube to the wheel slave cylinder bleeder valve. Place the end of the bleeder tube in a clear glass jar containing some hydraulic fluid. Open the bleeder valve about ¾ of a turn. Pump the brake pedal slowly, some fluid or air will come out with each stroke. NOTE: *Keep the master cylinder filled with brake fluid while pumping the brake pedal.* Continue to pump the pedal until no more bubbles come out of the bleeder tube. When, with each stroke, only fluid comes out of the bleeder tube, close the bleeder valve. Refill the master cylinder (fig. 78) and repeat the above operation on the three other wheel slave cylinders.

137. HYDRAULIC HOSE REPLACEMENT.

a. Front Brake Hose Replacement (fig. 71). To remove the front brake hose, disconnect the hydraulic brake line from the hydraulic hose at the bracket. Remove the lock nut and washer which hold the hydraulic hose to the bracket and remove the hose from the bracket. Unscrew the hose from the slave cylinder connection. To install the front brake hose, connect the hydraulic hose to the slave cylinder. Place the other end of the hydraulic hose through the bracket and secure it to the bracket with the lock washer and nut. Connect the hydraulic line to the hose. Bleed the slave cylinder (par. 136 b).

b. Rear Brake Hose Replacement (fig. 71). To remove the rear brake hose, disconnect the hydraulic brake line from the hydraulic hose at the bracket. Remove the lock nut and washer which hold the hydraulic hose to the bracket and remove the hose from the bracket. Unscrew the hose from the rear brake line connection. To install the rear brake hose, connect the hose to the rear brake line connection. Place the hose through the bracket and secure it to the bracket with the lock washer and nut. Connect the hydraulic line to the hose. Bleed the two rear wheel slave cylinders (par. 136 b).

Section XXVIII

RADIO SUPPRESSION SYSTEM

138. RADIO SUPPRESSION SYSTEM.

a. General. Radio interference is an unwanted electrical current that is produced in a motor vehicle by the ignition circuit and intermittent sparking of the various electrical components. This interference is carried on the wires in addition to the normal current in the functional circuit, and interferes with, or prevents, radio reception. Radio reception in other vehicles in the same vicinity can also be affected by faulty interference suppression. In order to prevent radio interference, resistor type suppressors, condensers, bonding and shielding are required. Trouble shooting suggestions and procedures for radio interference are covered in paragraph 45.

b. Resistor Type Suppressors.

(1) DESCRIPTION. Resistor type suppressors are placed in ignition high tension wires that connect to each spark plug, and in the high tension wire from the distributor to the ignition coil (fig. 37). The

suppressors are used to prevent the radiation of the high tension current which occurs from the spark jumping the gap in the spark plugs and the gap between the distributor rotor and distributor cap. Any one of these suppressors that are damaged or defective will definitely affect the operation of the radio and may affect engine performance.

(2) REPLACEMENT. Remove a suppressor by unscrewing it from the wire. When screwing a suppressor on a wire, care must be used to prevent stripping the screw from the wire due to overtightening.

c. Suppression Condensers.

(1) DESCRIPTION. Condensers are used to bypass to the ground the interference in a circuit caused by the making and breaking (interruptions) of the various electrical units in that circuit. A 0.25-microfarad condenser is connected to the terminal marked "ARM" (armature) on the generator (fig. 37). A 0.25-microfarad condenser is connected to the terminal marked "BAT" (battery) of the generator regulator (fig. 39). A 0.25-microfarad condenser is connected to the ignition switch terminal (fig. 34). A 0.25-microfarad condenser is connected to the terminal of the starting motor relay (fig. 39). A 0.10-microfarad ignition condenser (fig. 37) is used to absorb electrical surges in the primary circuit due to the opening and closing of the distributor points. This condenser is attached to the ignition coil terminal, switch side.

(2) REPLACEMENT. To replace any of the condensers, disconnect the condenser lead wire from the terminal to which it is attached and take out the screw from the bracket on the condenser and remove the condenser. To install the condenser, use a new internal-external toothed (IET) lock washer (subpar. d (1) below) between the condenser bracket and the mounting surface, and secure the condenser to the mounting surface with an internal-external toothed (IET) lock washer under the head of the attaching screw. Attach the condenser lead wire to the terminal from which it was removed. The same procedure applies for replacing all condensers throughout the circuit.

d. Bonding.

(1) DESCRIPTION. Bonding is a method used to secure a good ground contact for the various units and parts of the vehicle, and is very important in the suppression of radio interference. Two types of bonding are used. Units which have flexible mountings such as the engine, hood and body are grounded by the use of bonding straps. Units or parts which are rigidly mounted are grounded by the use of internal toothed (IT) and internal-external toothed (IET) lock washers. Internal toothed and internal-external toothed lock washers are designed with teeth which will penetrate through painted surfaces

and contact bare metal when tightened, thus providing and maintaining a good ground. The internal teeth also act as lock washers. This type of washer is used on condenser brackets and generator-regulator mounting brackets. They are also used throughout the vehicle on screws and nuts securing component parts of the vehicle together, thus providing a good ground for parts which might otherwise act as an antenna and pick up and radiate interference.

(2) TOOTHED WASHER INSTALLATION. Internal toothed and internal-external toothed-type lock washers are used on the generator-regulator mounting brackets and at each bonding strap (subpar. (3) below) and throughout the vehicle on screws and nuts, which secure component parts of the vehicle together.

(3) BONDING STRAP INSTALLATION. Units using bonding straps for securing a ground must be free from paint and corrosion at the point where the straps are attached. Place a toothed lock washer between the ground straps and the surface to which they are attached, also under the head of the attaching screws. The same procedure applies for attaching each end of the strap.

(4) BONDING STRAP LOCATIONS.

(a) Engine Bonding Straps. One engine bonding strap is located at the right front corner of the engine and runs from the frame underneath the horn to a cap screw at the bottom of the timing gear cover. A second bonding strap at the rear of the engine runs from the cylinder head nut to the dash (fig. 9). A third bonding strap at the engine rear support runs from the frame crossmember to the support bolt (fig. 14).

(b) Body and Hood Bonding Straps. The body bonding strap is located underneath the floor, to the rear of the fuel shut-off valve, and runs from the frame side member to the floor. The hood bonding strap is located at the center rear of the hood and runs from the hood to the dash.

e. Shielding. The generator to regulator wires are shielded with metal braid that terminates with a pigtail and terminal at each end. The pigtail at the generator is grounded with a generator ground screw through the use of an internal-external toothed (IET) lock washer to generator. The pigtail at the regulator is grounded to the regulator ground screw in the same manner.

1½-TON 4x2 TRUCK (FORD)

Section XXIX

FRAME AND CAB EQUIPMENT

139. SEAT CUSHIONS.

a. Adjustment. The seat cushion location is established by the position of the seat hinge on the seat riser. The riser is provided with three hinge screw holes, whereas the hinge is provided with but two screw holes. To locate the seat cushion in the forward position, connect the seat hinge to the two forward holes in the seat riser. To locate the seat cushion in the back position, connect the seat hinge to the two rear holes in the seat riser. The bottom of the seat back likewise has two positions established by the position of a hinged seat back support running across the cab approximately six inches above the bottom of the seat back. When this support is turned on its hinges toward the front of the cab, the seat back will be held in the forward position. When this support is folded back on its hinges, the seat back will go back to its rearmost position.

b. Replacement.

(1) BACK CUSHION. Raise the back to a horizontal position and remove the two screws from each cushion hinge at the rear of the cab. To install the back cushion, place it in position and secure the hinges to the rear of the cab with two screws in each hinge.

(2) SEAT CUSHION. To remove the seat cushion, remove the two screws from the cushion hinges at the seat riser. To install the seat cushion, place it in either its forward, or rear position, as desired, and install the two screws in each cushion hinge.

140. WINDSHIELD REPLACEMENT (fig. 80).

a. Removal. Unhook the wiper blade from each windshield wiper arm. Loosen the windshield wiper arm clamp nut on each windshield wiper shaft. Move the wiper arms up, out of the way of the windshield, and tighten the clamp nut on each arm. Loosen the windshield adjusting arm thumb screw nut on each side of the windshield. Open the windshield about 10 inches and place a block between the

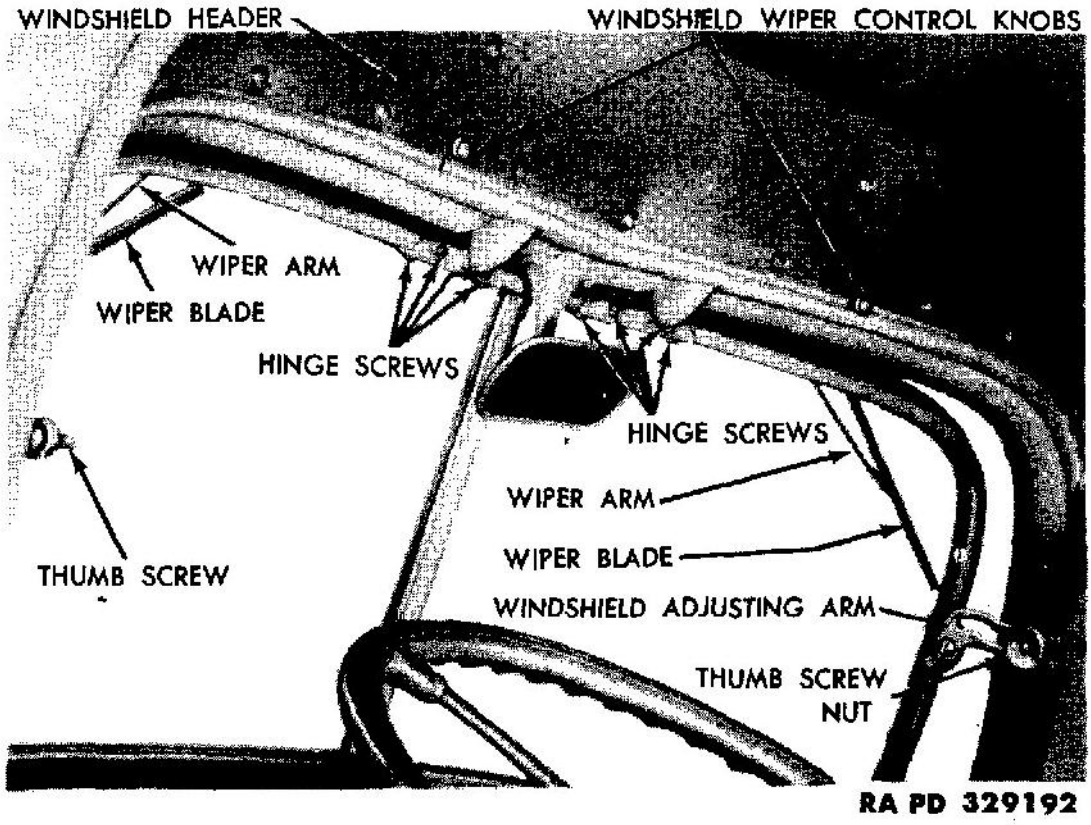


Figure 80 — Windshield Hinges

cowl and the bottom of the windshield. Remove the screws which hold the windshield adjusting arms to the windshield and slide the arms back through the thumb screw nuts. Remove three screws from each hinge at the top of the windshield and loosen the remaining screw in each hinge. Hold the windshield and remove the remaining screw at each hinge and remove the windshield.

b. Installation. Hold the windshield in position and place a block between the bottom of the windshield and the cowl to hold the windshield open. Aline the holes in each hinge with the tapping blocks in the windshield frame. Start all the screws in the hinges and alternately tighten each screw a little at a time until all the screws are tight. Place the adjusting arms in position on each side of the windshield and install the screw in each arm to secure it to the windshield. Loosen the clamp nut on each windshield wiper arm and place the arm in position and tighten the nut. Hook the windshield wiper blade on each windshield wiper arm. Loosen the clamp nut and adjust the arm so that the blade does not strike the windshield frame.

141. WINDSHIELD WIPERS.

a. Description. Two vacuum-operated windshield wipers are provided at the top of the right and left sections of the windshield. Tubing running between the intake manifold fitting and the wiper motors provides the vacuum at each windshield wiper motor.

1½-TON 4x2 TRUCK (FORD)

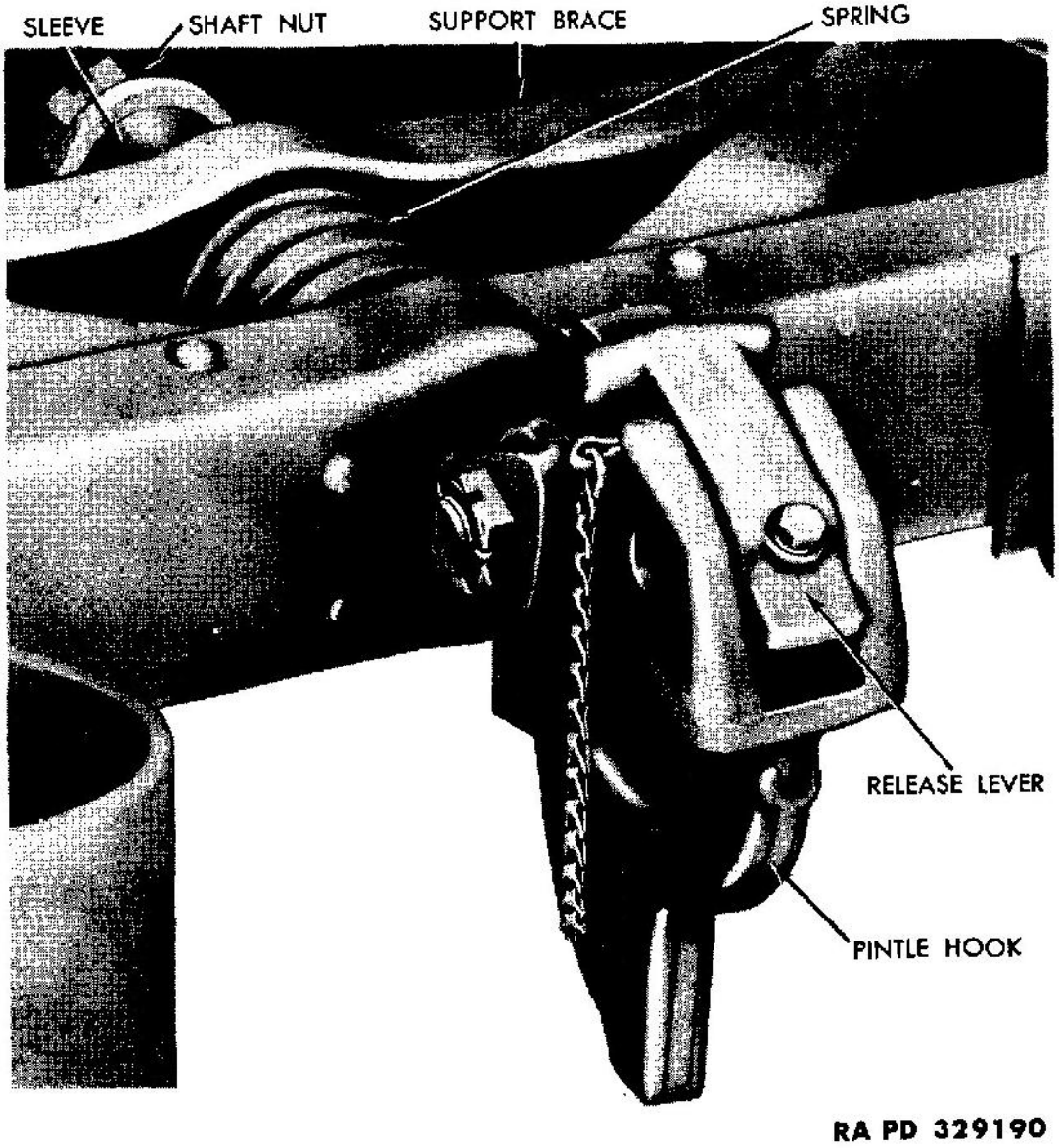
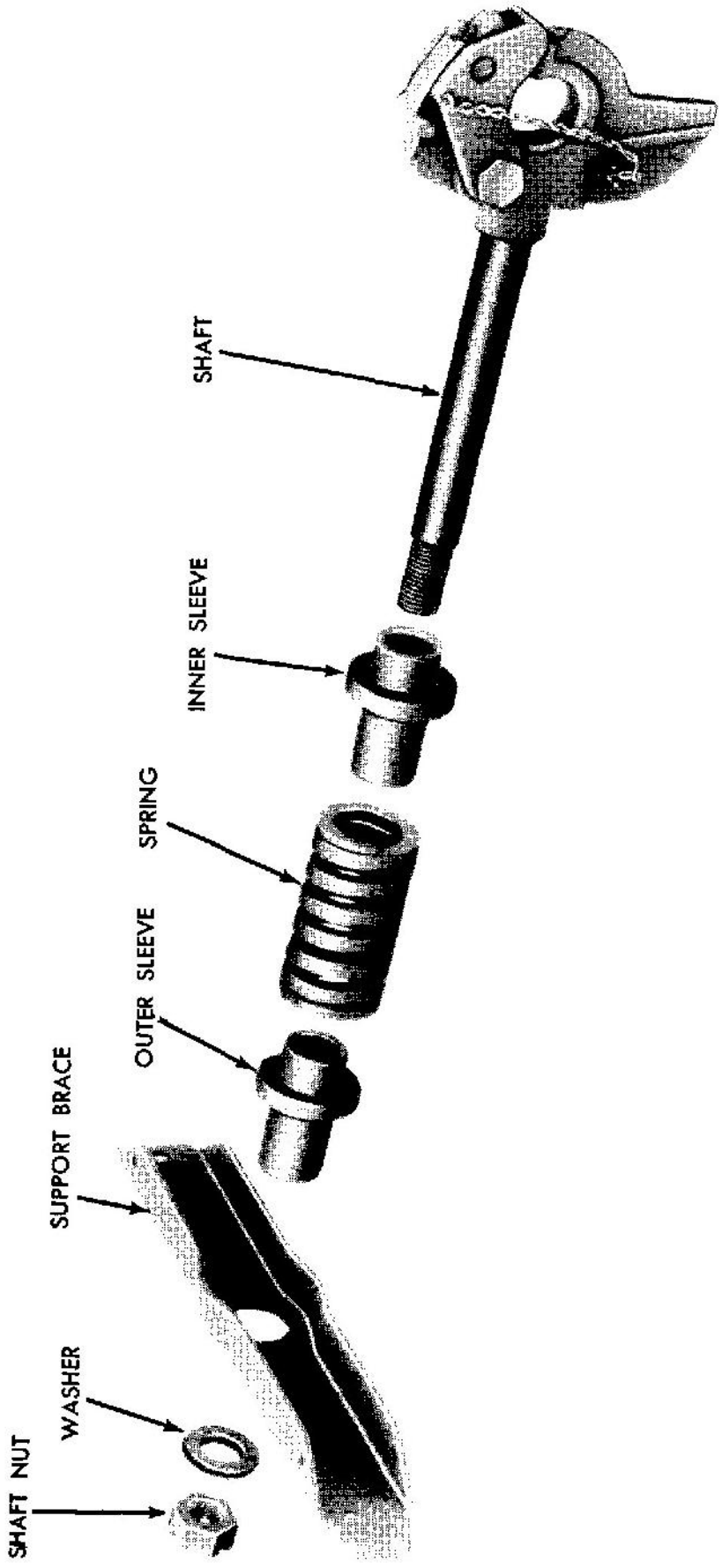


Figure 81 — Pintle Hook

b. Removal. Unhook the wiper blade from the windshield wiper arm. Remove the clamp nut, which secures the wiper arm to the windshield wiper shaft, and remove the arm. Remove the nut, at the front side of the windshield, which secures the wiper motor to the roof of the cab. Remove the outer mounting spacer and washer. Remove the screws from the windshield header (fig. 80) on the inside of the cab and remove the header. Remove the vacuum hose from the wiper motor, and remove the motor.

c. Installation. Attach the windshield hose to the wiper motor. Place the wiper motor shaft through the hole above the windshield and holding the wiper in place, install the washer, outer spacer and nut on the wiper shaft. Assemble the wiper arm on the end of the wiper motor shaft and secure it with the clamp nut. Hook the wiper blade on the wiper arm. Loosen the clamp nut and adjust the arm



RA PD 329201

Figure 82 — Pintle Hook — Disassembled

so that the blade does not strike the windshield frame. Place the header in position and install the screws to secure it.

142. PINTLE HOOK REPLACEMENT (figs. 81 and 82).

a. Removal. Remove the eight nuts and lock washers from the bolts that hold the support brace to the frame. Tighten the pintle shaft nut until all spring pressure is removed from the support brace. Remove the eight bolts from the support brace. Remove the pintle shaft nut and washer from the pintle shaft. Remove the pintle support brace from the frame. Slide the pintle hook spring and sleeves from the pintle shaft. Pull the shaft out through the rear crossmember.

b. Installation. Place the pintle shaft in position through the rear crossmember and slide the pintle spring rear sleeve, pintle spring and pintle spring front sleeve on the pintle shaft (fig. 82). Place the pintle support brace over the shaft against the sleeve shoulder. Install the flat washer and pintle shaft nut on the shaft, drawing up the nut to compress the spring so that the pintle support brace bolt holes can be lined up with the holes in the frame. Install the eight bolts, lock washers and nuts to secure the support brace to the frame. Back off the pintle shaft nut until there is only a slight tension on the pintle shaft spring. Install the cotter pin in the pintle shaft nut.

143. RUNNING BOARD REPLACEMENT.

a. Removal. Remove the three bolts that hold the upper part of the running board to the frame side member. Remove the two carriage bolts and the one hexagon head bolt that hold the running board to the fender. Remove the four nuts and lock washers from the carriage bolts that hold the running board to the running board bracket. Raise the outside edge of the running board and slide the four carriage bolts out of the slots into the holes in the running board and remove the bolts. Remove the running board from the vehicle.

b. Installation. Place the running board in position and raise the outer edge of the running board far enough to slide the carriage bolts up into the holes and over into the slots in the running board. Line up the bolts with the holes in the running board brackets and install the bolts through the bracket. Place the lock washers on the bolts and start the nuts on the bolts. Do not tighten the nuts until all the other bolts are in position. Install the three bolts which secure the running board to the frame. Install the two carriage bolts and the one hexagon bolt that hold the running board to the fender. When all the bolts are in position, tighten the nuts.

144. FENDER REPLACEMENT (figs. 83 and 84).

a. Removal.

(1) REMOVE BLACKOUT LIGHTS FROM FENDER. Disconnect the

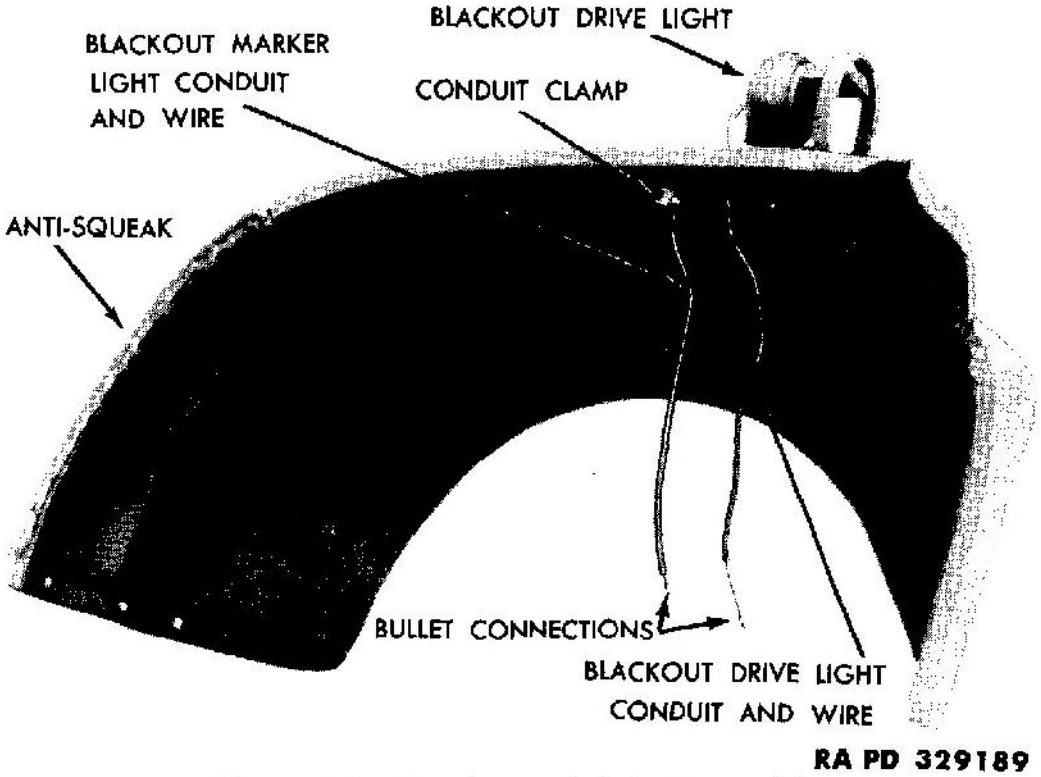


Figure 83 — Fender and Light Assembly

blackout marker light and the blackout drive light wires at the bullet connections in the engine compartment. Loosen the clip in the engine compartment which holds the light wire conduits to the apron and pull both the blackout and blackout marker conduits and wires through the apron. Loosen the nut which holds the blackout marker light conduit clamp at the top of the apron, underneath the fender (fig. 83), and pull the clamp free. Remove the three bolts that hold the blackout drive light to the fender (left fender only) and remove the blackout drive light from the fender. Pull the conduit off the blackout marker light wire. Remove the nut, lock washer, and flat washer from the blackout marker light shaft and remove the light from the fender.

(2) Remove Fender Bolts and Cap Screws. Remove the two carriage bolts and the one hexagon head bolt that hold the fender to the running board. Remove the nut, outer flat washer, spring and inner flat washer from the bolt (fig. 84) which holds the fender to the cowl bracket. Remove the three carriage bolts and one hexagon head bolt which hold the top of the fender to the apron. Remove the six cap screws which hold the radiator grille top deflector to the radiator grille assembly, and remove the deflector. Remove the two bolts and one cap screw that hold the fender to the radiator support bracket (fig. 83). Remove the six bolts that hold the fender to the radiator grille assembly. Pull the fender up at the rear end and remove the fender.

1½-TON 4x2 TRUCK (FORD)

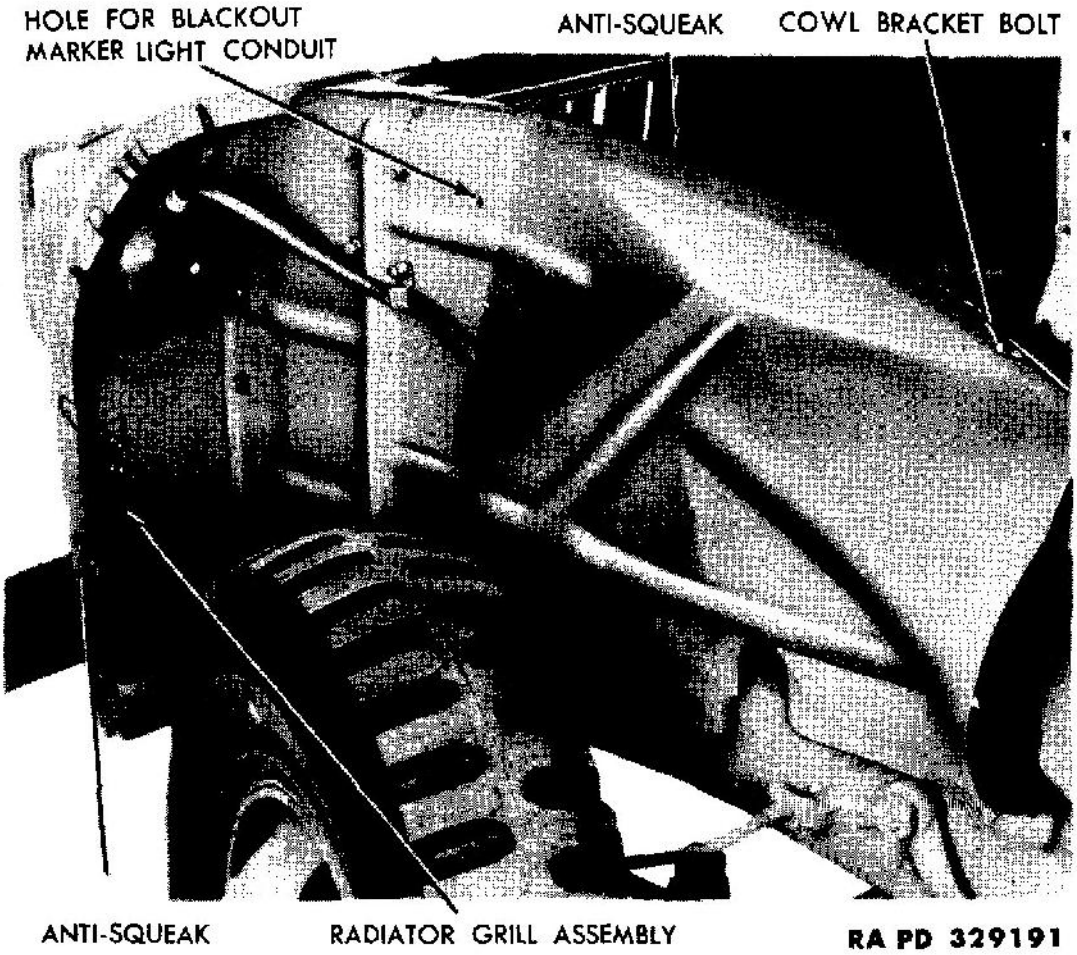


Figure 84 — Fender Apron

b. Installation.

(1) INSTALL FENDER BOLTS. Examine the anti-squeak on the fender apron and if it is worn or damaged, install a new anti-squeak (fig. 84). Place the fender in position and enter the cowl bracket bolt, at the bracket, through the fender apron and the fender (fig. 84). Install the inner washer, spring, outer washer, and nut on the bolt, just starting the nut on the bolt. If the anti-squeak used between the fender and the radiator grille assembly (fig. 84) is worn or damaged, install a new anti-squeak. Enter the two bolts, through the underneath part of the top front corner, of the fender, and the bracket, just ahead of the top of the radiator support. Place the flat washers and lock washers on the bolts and start the nuts. Enter the six bolts through the fender and radiator grille assembly, and place a flat washer, lock washer, and nut on each of the six bolts, just starting the nuts on each bolt. Enter the three carriage bolts through the top flange of the fender and the top of the apron, and enter the hexagon bolt in the front hole. Place a flat washer and lock washer on each bolt, and start the nut on each bolt. Enter the two carriage bolts and one hexagon head bolt through the rear part of the fender and the front of the running board. Install a flat washer, lock washer, and nut on each bolt and tighten the nuts. Tighten the nut on the cowl bracket bolt (fig. 84) until the cotter pin can be entered in the

bolt on the outside of the nut. Tighten the nuts on all the other fender bolts.

(2) INSTALL RADIATOR GRILLE TOP DEFLECTOR. Place the radiator grille top deflector in place on top of the radiator grille assembly, and install the six cap screws. Install the remaining cap screw through the top of the fender.

(3) INSTALL BLACKOUT LIGHTS. Place the blackout drive light in position on the fender and install the three bolts to secure it to the fender. Place the blackout marker light in position on the fender and install the flat washer, lock washer, and nut on the blackout marker light shaft to secure the light to the fender. Install the conduit over the blackout marker light wire. Pull this conduit and wire through the hole at the top of the apron and into the engine compartment. Pull the blackout drive light wire and conduit through the grommet in the apron and into the engine compartment. Loosen the nut on the apron to fender bolt at the top of the apron (underneath the fender) and slide the blackout marker conduit clamp (fig. 83) under the flat washer at the fender bolt, tighten the apron to the fender bolt nut. Connect the blackout drive and blackout marker light wires to the bullet connections in the engine compartment. Place the blackout drive and blackout marker wire conduits under the clip in the engine compartment and tighten the clip.

Section XXX

SHIPMENT AND TEMPORARY STORAGE

145. GENERAL INSTRUCTIONS.

a. Preparation for domestic shipment of the vehicle is the same as preparation for temporary storage or bivouac. Preparation for shipment by rail includes instructions for loading and unloading the vehicle, blocking necessary to secure the vehicle on freight cars, number of vehicles per freight car, clearance, weight, and other information necessary to properly prepare the vehicle for rail shipment. For more detailed information and for preparation for indefinite storage refer to AR 850-18.

1½-TON 4x2 TRUCK (FORD)

146. PREPARATION FOR TEMPORARY STORAGE OR DOMESTIC SHIPMENT.

a. Vehicles to be prepared for temporary storage or domestic shipment are those ready for immediate service, but not used for less than thirty days. If vehicles are to be indefinitely stored after shipment by rail, they will be prepared for such storage at their destination.

b. If the vehicles are to be temporarily stored or bivouacked, take the following precautions:

(1) LUBRICATION. Lubricate the vehicle completely (par. 22).

(2) COOLING SYSTEM. If freezing temperature may normally be expected during the limited storage or shipment period, test the coolant with a hydrometer and add the proper quantity of antifreeze to afford protection from freezing at the lowest temperature anticipated during the storage or shipping period. Completely inspect the cooling system for leaks.

(3) BATTERY. Check battery and terminals for corrosion and, if necessary, clean and thoroughly service battery (par. 28 item 22).

(4) TIRES. Clean, inspect, and properly inflate all tires. Replace with serviceable tires, tires requiring retreading, or repairing. Do not store vehicles on floors, cinders, or other surfaces which are soaked with oil or grease. Wash off immediately any oil, grease, gasoline, or kerosene which comes in contact with the tires, under any circumstances.

(5) ROAD TEST. The preparation for limited storage will include a road test, of at least 5 miles, after the battery, cooling system, lubrication, and tire service, to check on general condition of the vehicle. Correct any defects noted in the vehicle operation, before the vehicle is stored, or note on a tag attached to the steering wheel, stating the repairs needed, or describing the condition present. A written report of these items will then be made to the officer in charge.

(6) FUEL IN TANKS. It is not necessary to remove the fuel from the tanks for shipment within the United States, nor to label the tanks under Interstate Commerce Commission Regulations. Leave fuel in the tanks except when storing in locations where Fire Ordinances or other local regulations require removal of all gasoline before storage.

(7) EXTERIOR OF VEHICLE. Remove rust appearing on any part of the vehicle with sandpaper. Repaint painted surfaces whenever necessary to protect wood or metal. Coat exposed polished metal surfaces susceptible to rust, such as winch cables, chains, and in the case of track laying vehicles, metal tracks, with medium grade preventive lubricating oil. Close firmly all cab doors, windows, and wind-

shields. Vehicles equipped with open-type cabs with collapsible tops will have the tops raised, all curtains in place, and the windshield closed. Make sure paulins and window curtains are in place and firmly secured. Leave rubber mats, such as floor mats, where provided, flat on the floor. Equipment such as Pioneer and truck tools, tire chains, and fire extinguishers will remain in place in the vehicle.

(8) INSPECTION. Make a systematic inspection just before shipment, or temporary storage, to insure all above steps have been covered and that the vehicle is ready for operation on call. Make a list of all missing or damaged items and attach it to the steering wheel. Refer to "Before-operation Service" (par. 17).

(9) ENGINE. To prepare the engine for storage, remove the air cleaner from the carburetor. Start the engine and set the throttle to run the engine at a fast idle, pour one pint of medium grade preservative lubricating oil, Ordnance Department Specification AXS-674, of the latest issue in effect, into the carburetor throat, being careful not to choke the engine. Turn off the ignition switch, as quickly as possible, after the oil has been poured into the carburetor. With the engine switch off, open the throttle wide and turn the engine five complete revolutions by means of the cranking motor. If the engine cannot be turned by the cranking motor with the switch off, turn it by hand, or disconnect the high-tension lead and ground it before turning the engine by means of the cranking motor. Then reinstall the air cleaner.

(10) BRAKES. Release brakes and chock the wheels or tracks.

c. Inspections in Limited Storage.

(1) Vehicles in limited storage will be inspected weekly for conditions of tires and battery. If water is added, when freezing weather is anticipated, recharge the battery with a portable charger or remove the battery for charging. Do not attempt to charge the battery by running the engine.

147. LOADING AND BLOCKING FOR RAIL SHIPMENT.

a. Preparation. In addition to the preparation described in paragraph 2, when Ordnance vehicles are prepared for domestic shipment, the following preparations and precautions will be taken:

(1) EXTERIOR. Cover the body of the vehicle with a canvas cover supplied as an accessory.

(2) TIRES. Inflate pneumatic tires from 5 to 10 pounds above normal pressure.

(3) BATTERY. Disconnect the battery to prevent its discharge by vandalism or accident. This may be accomplished by disconnecting the positive lead, taping the end of the lead, and tying it back away from the battery.

(4) BRAKES. The brakes must be applied and the transmission placed in low gear after the vehicle has been placed in position with a brake wheel clearance of at least 6 inches (fig. 85 "A"). The vehicle will be located on the car in such a manner as to prevent the car from carrying an unbalanced load.

(5) All cars containing Ordnance vehicles must be placarded "DO NOT HUMP".

(6) Ordnance vehicles may be shipped on flat cars, end door box cars, side door box cars, or drop end gondola cars, whichever type car is the most convenient.

b. Facilities for Loading. Whenever possible, load and unload vehicles from open cars under their own power, using permanent end ramps and spanning platforms. Movement from one flat car to another along the length of the train is made possible by cross-over plates or spanning platforms. If no permanent end ramp is available, an improvised ramp can be made from railroad ties. Vehicles may be loaded in gondola cars without drop ends by using a crane. In case of shipment in side-door cars, use a dolly-type jack to wrap the vehicles into position within the car.

c. Securing Vehicles. In securing or blocking a vehicle, three motions, lengthwise, sidewise, and bouncing, must be prevented. There are two approved methods of blocking the vehicles on freight cars, as described below. When blocking dual wheels, all blocking will be located against the outside wheel of the dual.

(1) METHOD 1 (fig. 85). Locate eight blocks "B", one to the front, and one to the rear, of each wheel. Nail the heel of each block to the car floor using five 40-penny nails to each block. That portion of the block under the tread will be toenailed to the car floor with two 40-penny nails to each block. Locate two blocks "D" against the outside face of each wheel. Nail the lower block to the car floor with three 40-penny nails, and the top block to the lower block with three 40-penny nails. Pass four strands, two wrappings, of No. 8 gage, black annealed wire "C" through the holes in the wheels, and then through the stake pockets. Tighten the wires enough to remove slack. When a box car is used, this strapping must be applied in a similar fashion and attached to the floor by the use of blocking or anchor plates. This strapping is not required when gondola cars are used.

(2) METHOD 2 (fig. 85). Place four blocks "G", one to the front, and one to the rear of each set of wheels. These blocks are to be at least 8 inches wider than the over-all width of the vehicle at the car floor. Using sixteen blocks "F", locate two, against blocks "G" to the front of each wheel, and two against blocks "G" to the rear of each

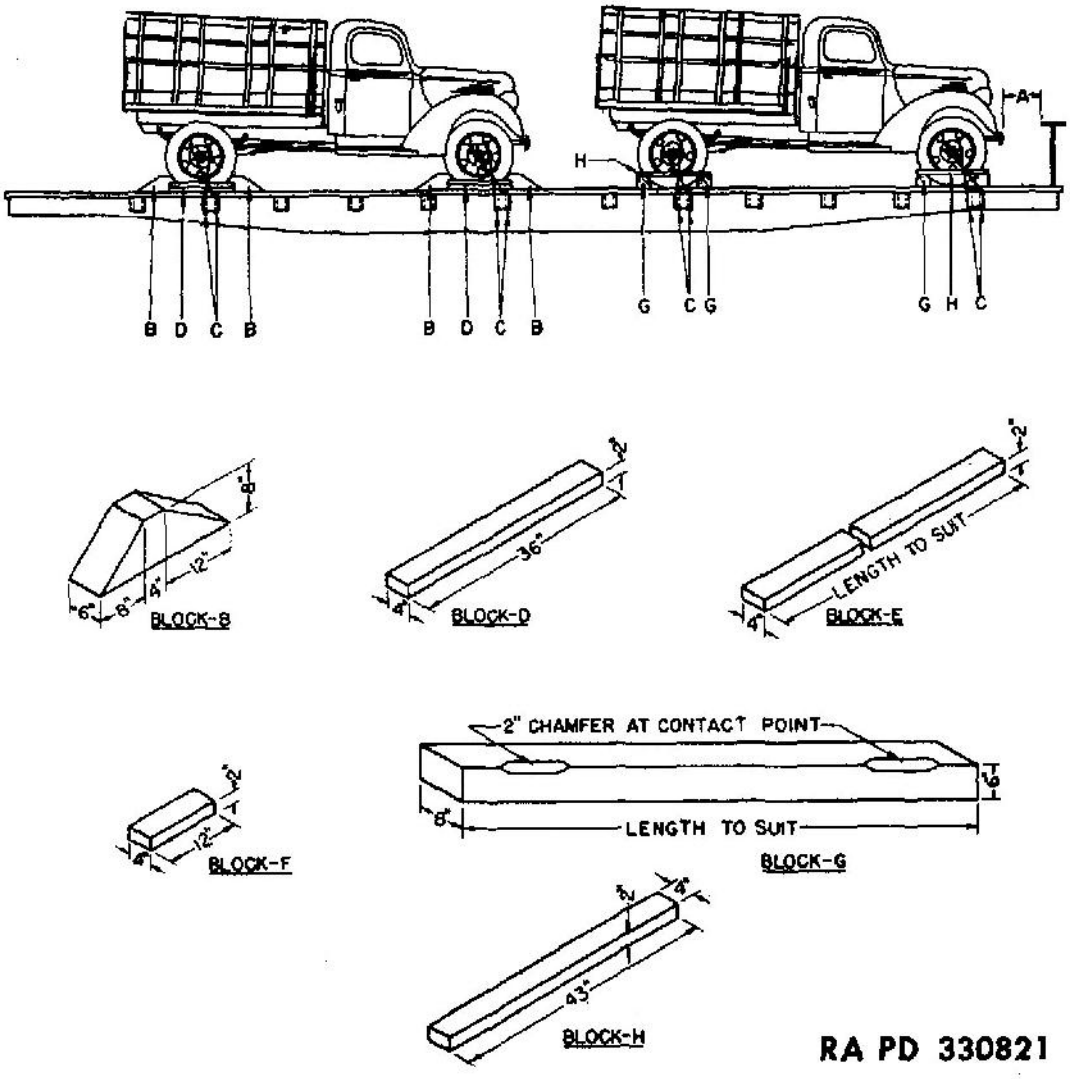


Figure 85 — Blocking Requirements for Securing Wheeled Vehicles on Railroad Cars

wheel. Pass four strands, two wrappings, of No. 8 gage, black annealed wire "C" through the holes in the wheels, and secure as described in method 1 above.

d. Shipping data.

Length over-all	256.60 in.
Width over-all	90.06 in.
Height	87.98 in.
Shipping weight	7,070 lb
Approximate floor area	161 sq ft
Approximate volume	1,176 cu ft
Bearing pressure (lb per sq ft)	44

REFERENCES

PUBLICATIONS INDEXES.

The following publications indexes should be consulted frequently for latest changes or revisions of references given in this section and for new publications relating to materiel covered in this manual:

a. Introduction to Ordnance Catalog (explains SNL system) ..... ASF Cat. ORD 1 IOC

b. Ordnance publications for Supply Index (index to SNL's) ..... ASF Cat. ORD 2 OPSI

c. Index to Ordnance Publications (listing FM's, TM's, TC's, and TB's of interest to ordnance personnel, OPSR, MWO's, BSD, S of SR's, OSSC's, and OFSB's, and includes Alphabetical List of Major Items with Publications Pertaining Thereto) ..... OFSB 1-1

d. List of Publications for Training (listing MR's, MTP's T/BA's, T/A's, FM's, TM's, and TR's, concerning training) ..... FM 21-6

e. List of training films, film strips, and film bulletins (listing TF's, FS's, and FB's, by serial number and subject) ..... FM 21-7

f. Military Training Aids (listing Graphic Training Aids, Models, Devices, and Displays) ..... FM 21-8

STANDARD NOMENCLATURE LISTS.

TRUCK, 1½-ton, 4 x 2 (2dt) (Ford) ..... SNL 6-540

Cleaning, preserving and lubrication materials, recoil fluids, special oils, and miscellaneous related items SNL K-1

Interchangeability chart of ordnance maintenance tools .....

Interchangeability chart of organizational tools for ordnance vehicles ..... SNL G-19

REFERENCES

Soldering, brazing and welding materials, gases and related items	SNL K-2
Tools sets — motor transport	SNL N-19

EXPLANATORY PUBLICATIONS.

Fundamental Principles.

Automotive electricity	TM 10-580
Automotive lubrication	TM 10-540
Basic Maintenance Manual	TM 38-250
Electrical fundamentals	TM 1-455
Military motor vehicles	AR 850-15
Motor vehicle inspections and preventive maintenance services	TM 9-2810
Precautions in handling gasoline	AR 850-20
Standard Military Motor Vehicles	TM 9-2800

Maintenance and Repair.

Cleaning, preserving, lubricating and welding materials and similar items issued by the Ordnance Department	TM 9-850
Cold weather lubrication and service of combat vehicles and automotive materiel	OFSB 6-11
Maintenance and care of pneumatic tires and rubber treads	TM 31-200
Ordnance maintenance: Engine and engine accessories for 1½-ton 4 x 2 truck (Ford)	TM 9-1806A
Ordnance maintenance: Power train and chassis for 1½-ton 4 x 2 truck (Ford)	TM 9-1806B
Ordnance maintenance: Fuel pumps	TM 9-1828A
Tune-up and adjustment	TM 10-530

1½-TON 4x2 TRUCK (FORD)

REFERENCES

Protection of Materiel.

Camouflage	FM 5-20
Chemical decontamination, materials and equipment	TM 3-220
Decontamination of armored force vehicles	FM 17-59
Defense against chemical attack	FM 21-40
Explosives and demolitions	FM 5-25

Storage and Shipment.

Ordnance storage and shipment chart, group G—Major items	OSSC-G
Registration of motor vehicles	AR-850-10
Rules governing the loading of mechanized and motorized army equipment, also major caliber guns, for the United States Army and Navy, on open top equipment published by Operations and Maintenance Department of Association of American Railroads	
Storage of motor vehicle equipment	AR 850-18

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TECHNICAL MANUAL

1½-TON 4X2 TRUCK (FORD)

CHANGES No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *28 March 1951*

TM 9–806, 14 February 1944, is changed as follows:

1. Scope

* * * * * * *

b. In addition to * * * of the matériel. This manual is divided into three parts. Part One, section I through section VI, contains vehicle operating instructions. Part Two, section VIII through section XXIX.1, contains vehicle maintenance instructions for using arm personnel charged with responsibility of doing maintenance work within their jurisdiction. **Part Three, sections XXXI and XXXII,** gives instructions for shipment and limited storage **and destruction to prevent enemy use of vehicle. The appendix contains a list of references including supply catalogs, forms, technical manuals, and other publications applicable to the matériel.**

c. In all cases * * * proper instructions issued.

Note. (Added) The replacement of certain assemblies, that is, engine, clutch, transmission, front axle, and rear axle is normally an ordnance maintenance operation, but may be performed in an emergency by the using organization, provided authority for performing these replacements is obtained from the responsible commander. A replacement assembly, any tools needed for the operation which are not carried by the using organization, and any necessary special instructions may be obtained from the supporting ordnance maintenance unit.

1.1. Forms, Records, and Reports
(Added)

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.

*This change supersedes those portions of TB ORD 196, 2 January 1943; TB ORD 247, 29 January 1945; and TB ORD 342, 8 July 1946, pertaining to the matériel contained herein.

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 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 using DA AGO Form 468, Unsatisfactory Equipment Report as prescribed in SR 700–45–5, to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM. Such suggestions are encouraged in order that other organizations may benefit.

8. Use of Instruments and Controls in Operation of Vehicle

* * * * * * *

b. OPERATION OF VEHICLE.

* * * * * * *

(6) (Superseded) *Changing to lower gears (double clutching).* Shift gears to a low speed before the engine begins to labor or the vehicle begins to lose momentum. Use the double-clutch method to engage lower gear ratios. Disengage the clutch by depressing the clutch pedal, simultaneously releasing the accelerator pedal. Move gearshift lever (fig. 4) to its neutral position. Engage clutch and depress accelerator pedal at the same time. When the engine speed and the desired gearshift speed are about the same (synchronized), disengage the clutch and shift to the desired gear speed. Engage the clutch and depress the accelerator pedal to attain synchronization of engine and gear speeds.

Caution: Do not attempt to shift the transmission into gear until the gear speed has been synchronized with the engine speed.

* * * * * * *

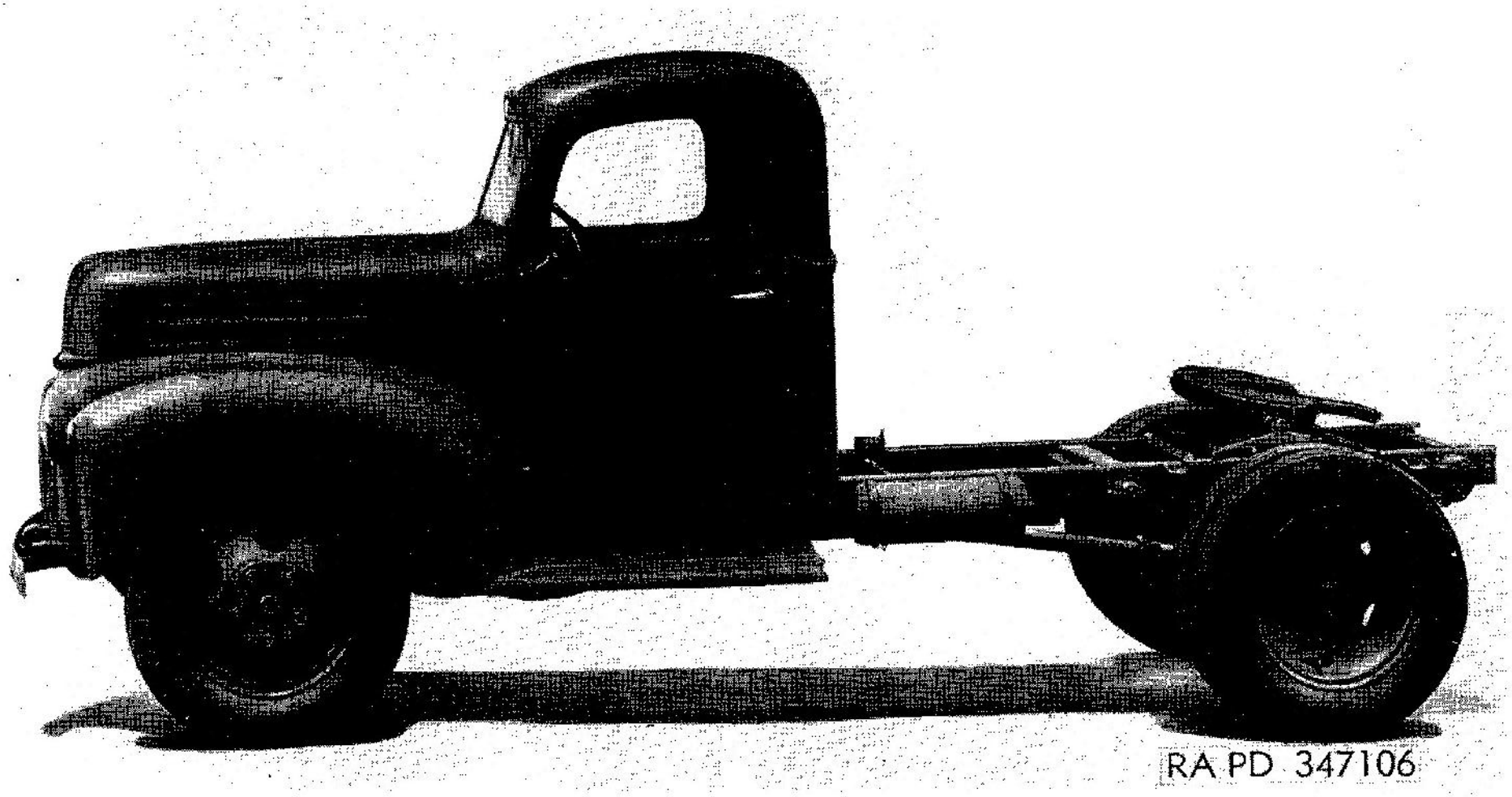


Figure 2.1. (Added) *1½-Ton 4 x 2 tractor truck—left side view.*

Section IV. OPERATION UNDER UNUSUAL CONDITIONS
(Superseded)

10. General Conditions

a. In addition to the operating procedures described for usual conditions, special instructions of a technical nature for operating and servicing this vehicle 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, and 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 instructions 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 technical manuals is essential for use of this matériel under unusual conditions.

c. Refer to paragraph 22.1 for lubrication under unusual conditions, to tables I and II for preventive maintenance checks and to section XXIX.1 for maintenance procedures under unusual conditions.

d. When chronic failure of matériel results from subjection to extreme conditions, report of the condition should be made on DA AGO Form 468 (par. 1.1).

11. Extreme-Cold Weather Conditions

a. GENERAL PROBLEMS.

(1) Extensive preparation of matériel scheduled for operation in extreme-cold weather is necessary. 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 fuel 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) For description of operations in extreme cold, refer to FM 70–15 and TM 9–2855.

Caution: It is imperative that the approved practices and precautions be followed. TM 9–2855 contains information which is specifically applicable to this vehicle 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 TM 9–2855.

c. FUELS, LUBRICANTS, AND ANTIFREEZE COMPOUNDS (STORAGE, HANDLING, AND USE). 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. Refer to TM 9–2855 for detailed instructions.

12. 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 underinflated must be considered. One or more brake shoes may be frozen fast and require preheating to avoid damage to the clutch 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) Continually note instrument readings. If temperature gage reading consistently exceeds normal temperature, stop the vehicle and investigate the cause.

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 does not

face into the wind. For long shutdown periods, if high ground is not available, effort should be made to prepare a footing of planks or brush. Chock in place if necessary.

(2) When preparing a vehicle for shutdown periods, place transmission lever in the neutral position to prevent it 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 I for detailed after-operation procedure. If the winter front and side covers are not available or 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 enter the crankcase filler vent, etc. 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 prevent condensation in the fuel tanks.

13. Operation in Extreme-hot Weather Conditions

a. GENERAL. Continuous operation of the vehicle at high speed or long hard pulls in low gear positions on steep grades or in soft terrain may cause the vehicle to register overheating. Avoid the continuous use of low 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 cooling unit, oil filter, and air cleaner. If the engine temperature consistently rises above 200° F, look for dust, sand, or insects in 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 vehicle in the sun for long periods, as the heat and sunlight will shorten the life of the tires. If possible, place vehicle under cover to protect it from sun, sand, and dust.

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

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

14. Operation on Unusual Terrain

a. GENERAL.

(1) Vehicle operation on snow or ice or in deep mud requires the use of tire chains. Tire 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 and 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) Operators must at all times know the position in which the front wheels are steering, 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 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 temperatures during the summer months.

(6) Correct tire pressure to 55 psi for all conditions.

b. 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 core, engine compart-

ments, steering knuckles and arms, brake cylinder boots and hoses, oil filters, air cleaners, and electrical connections.

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

15. Fording Operations

a. GENERAL. In fording, vehicles may be subjected to water varying in depth from only a few inches to an amount sufficient to completely submerge the vehicle. Factors to be considered are spray splashing precautions, normal fording capabilities, deep-water fording using fording kits, and accidental complete submersion.

b. NORMAL FORDING. Fording of bodies of water up to maximum vehicle fording depth of 25 inches is based on the standard vehicle with special protection provided for critical units, but without deep-water fording kit. Observe the following precautions:

(1) Do not exceed the known fording limits of the vehicle.

(2) The engine must be operated at maximum efficiency before attempting to ford.

(3) Shift gears into low range. Speed up engine to overcome the possibility of a "stall" when the cold water chills the engine. Enter the water slowly. If engine stalls while fording, it may be started in the usual manner.

(4) All normal fording should be at speeds of from 3 to 4 mph to avoid forming a "bow wave." Avoid using the clutch if possible because frequent use while submerged may cause the clutch to slip. If the ford is deep enough for the spinning fan blades to catch water, loosen the fan belt before crossing, to prevent the blades from throwing water over the electrical units. The brakes will usually be "lost" but in some cases may "grab" after emergence. Applying the brakes a few times will help dry out the brake linings after dry land has been reached.

(5) If accidental complete submersion occurs, the vehicle will be salvaged or temporary preservation applied as outlined in paragraph 22.3 and then sent to the ordnance maintenance unit as soon as possible for necessary permanent maintenance.

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

d. AFTER-FORDING OPERATIONS. Immediately after vehicle emerges from the water, if tactical situation permits, remove water from compartments, check engine oil level, and check for presence of water in crankcase. Heat generated by driving will evaporate or force out most water which has entered at various points. Also, any *small* amount of water which has entered the crankcase either through leakage or due to condensation will usually be dissipated by the ventilating system. Refer to paragraph 144.4 for maintenance operations after fording.

Section V. PREVENTIVE MAINTENANCE BY DRIVER OR OPERATOR
(Superseded)

16. General

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

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

(1) 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 burred, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, and not deteriorated.

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

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

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

17. Cleaning

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

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

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

(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 compounds, protective grease, etc.; prepare parts as required (oil seals, etc.); and for those parts requiring lubrication, apply the lubricant prescribed in the lubrication order.

b. GENERAL PRECAUTIONS IN CLEANING.

(1) Dry-cleaning solvent and volatile mineral spirits paint thinner are inflammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are used. 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 paint thinner, 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.

18. Preventive Maintenance by Driver or Operator

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

b. SERVICES. Driver's or operator's preventive maintenance services are listed in table I. Every organization must thoroughly school its personnel in performing the maintenance procedures for this vehicle as set forth in this manual.

Table I. (Added) *Driver's or Operator's Preventive Maintenance Services*

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS
					Caution. Place all tags describing condition of vehicle in the driver's compartment in a conspicuous location so that they will not be overlooked.
X		X	X	X	*Fuel, oil, water.* Check fuel, oil, and water levels. Look for leaks in engine compartment. Check spare containers for contents.
X				X	*Tires.* Gage tires for correct pressure (55 psi).
		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 vehicle for indication of fuel, engine oil, gear oil, water, or brake fluid leaks.
X					*Vehicle equipment.* Visually inspect fire extinguishers and vehicle publications, including necessary forms.
				X	See that fire extinguishers are charged.
X			X	X	Operate lights, horn or siren (if tactical situation permits), and windshield wipers. Visually inspect mirrors, reflectors, etc.
X			X	X	Visually inspect body, towing connections, doors, paulins, tools, etc.
				X	Check for any tampering or damage that may have occurred since last inspection.
X	X				*Instruments.* Observe for normal readings during warm-up and during operation of vehicle.
					Caution. If oil gage registers zero or excessively low shut off engine immediately and investigate cause.

Table I. (Added) *Driver's or Operator's Preventive Maintenance Services*—Continued

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS—Continued
	X				*General operations.* Be alert for any unusual noises or improper operation of steering, clutch, brakes, or gear shifting.
		X	X	X	*Operating faults.* Investigate and correct or report any faults noted during operation.
		X	X	X	*Springs and suspensions.* Look at springs, suspensions, shock absorbers, and torque rods to see if they have been damaged.
			X		*Fuel filters.* Check all fuel filters for leaks.
				X	Remove the drain plug or sediment bowl and remove all water and sediment from the filter.
			X	X	*Lubricate.* Lubricate daily and weekly items specified on lubrication order.
			X	X	*Clean.* Clean glass and inside of vehicle. Wipe off exterior of vehicle.
				X	Wash vehicle, clean engine, and engine compartment.
				X	*Battery.* Clean, check water level, and inspect terminals for tightness and coating of grease.
				X	*Assemblies and belts.* Inspect assemblies such as carburetor, generator, starter, and water pump, for looseness of mountings or connections. Press drive belts to determine if tension is correct.
				X	*Electrical wiring.* Inspect, visually, electrical wiring, harnesses, and shielding.
				X	*Axle and transfer vents.* 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. 11, 12, 22.2 and 144.2 and TM 9-2855)
			X		*Cooling and fuel systems.* Refuel and add denatured alcohol as required.
				X	Drain fuel tank and fuel tank sump to remove condensation; refuel tank.
X					Check level and specific gravity of radiator coolant. Add ethylene glycol and/or water if needed.
					Note. If system carries 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 ANY OTHER TYPE OF ANTIFREEZE.

Table I. (Added) *Driver's or Operator's Preventive Maintenance Services*—Continued

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					UNUSUAL CONDITIONS—Continued
					EXTREME COLD—Continued
		X	X		*Transmission lever.* Position lever 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					Check for proper pressure.
				X	*Battery.* Check for proper charge.
			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.
					Winterization equipment (if available).
X					Check personnel heater and windshield defrosters for proper operation.
			X		Fill power plant heater fuel tank and check unit for proper functioning.
				X	Check all winterization equipment for secure installation and proper functioning.
X			X		Check winterfront cover, hood blankets, underchassis blankets, hard top enclosure, etc., for security and proper adjustment.
					EXTREME HEAT (pars. 13 and 144.3)
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.
X					*Battery.* Check electrolyte level.
				X	Check for proper charge.
			X		If necessary to park for extended periods, remove battery and store in cool place.
		X	X		*Tires.* Shield tires, if possible, from direct rays of the sun.
X				X	Check for proper pressure.
					UNUSUAL TERRAIN (pars. 14 and 144.5)
			X		*Lubrication.* Check for fouled lubricants and lubricate as necessary (par. 22.4).
X				X	*Tires.* Check for proper pressure.
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.

Table I. (Added) *Driver's or Operator's Preventive Maintenance Services*—Continued

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					UNUSUAL CONDITIONS—Continued
					UNUSUAL TERRAIN—Continued
X			X	X	*Clean.* Clean all parts of vehicle of snow, ice, mud, dust, and sand.
				X	Check for any sand-blasted surfaces and touch-up paint as required.
X			X		*Vents.* Check engine vents and other exposed vents and keep them covered with cloth.
					FORDING OPERATIONS (pars. 15, 22.3, and 144.4)
X					*Fording limits.* Check vehicle fording limits. Loosen fan belt if required. See paragraph 15 for operation precautions.
X			X		*Tires.* Check for proper pressure.
X				X	Check for availabi ity and serviceability of tire chains. Install if necessary.
			X		*Clean.* Remove water and sludge from all parts of vehicle and wash with fresh water.
X					*Battery.* Check vent caps for tightness.
			X		Check electrolyte for contamination.
			X		*Cooling and fuel systems.* Check air cleaner, oil and fuel filters, and clean or replace if necessary.
			X		*Lubrication.* Lubricate as specified in paragraph 22.3

Section VI. LUBRICATION AND PAINTING
(Superseded)

21. Lubrication Order

The lubrication order (figs. 7 and 8) prescribes cleaning and lubricating procedures as to locations, intervals, and proper materials for this vehicle. This order is issued with each vehicle and is to be carried with it at all times. In the event the vehicle is received without a copy, the using organization shall immediately requisition 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.

22. General Lubrication Instructions

a. USUAL CONDITIONS. Service intervals specified on the lubrication order are for normal operation and where moderate temperature, humidity, and atmospheric conditions prevail.

b. LUBRICATION EQUIPMENT. Each vehicle is supplied with lubrication equipment adequate for its maintenance. Clean this equipment both before and after use. Operate the lubricating guns carefully and in such a manner as to insure a proper distribution of the lubricant.

c. POINTS OF APPLICATION.

(1) Lubricating fittings, grease cups, oilers, and oilholes are shown in figures 8.1 through 8.4 and are referenced to the lubrication order. Wipe these devices and the surrounding surfaces clean before and after lubricant is applied.

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

(3) To lubricate wheel bearings, thoroughly wash out old lubricant with dry-cleaning solvent or volatile mineral spirits paint thinner and allow the bearing to dry. Compressed air must not be used on bearings. Carefully coat each roller with lubricant. Do not merely smear the outside. Great care must be exercised that dirt, grit, lint, or other contaminants are not introduced into the bearings. If the bearings are not to be installed immediately, wrap them in clean oilproof paper to protect them from dirt.

Note. Before installing repacked bearings, grease retainers should be checked and replaced if necessary. Particular attention should be given to the leather insert to make sure that there are no frayed edges, breaks, or splits and that it is not worn thin. Coat the spindle and inside of the hub with a thin layer of grease (not over 1/16 inch) to prevent rusting.

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

d. REPORTS AND RECORDS.

(1) Report unsatisfactory performance of prescribed petroleum fuels, lubricants, and preserving materials, using DA AGO Form 468, Unsatisfactory Equipment Report.

(2) Maintain a record of lubrication of the vehicle on DA AGO Form 461, Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-Track Vehicles.

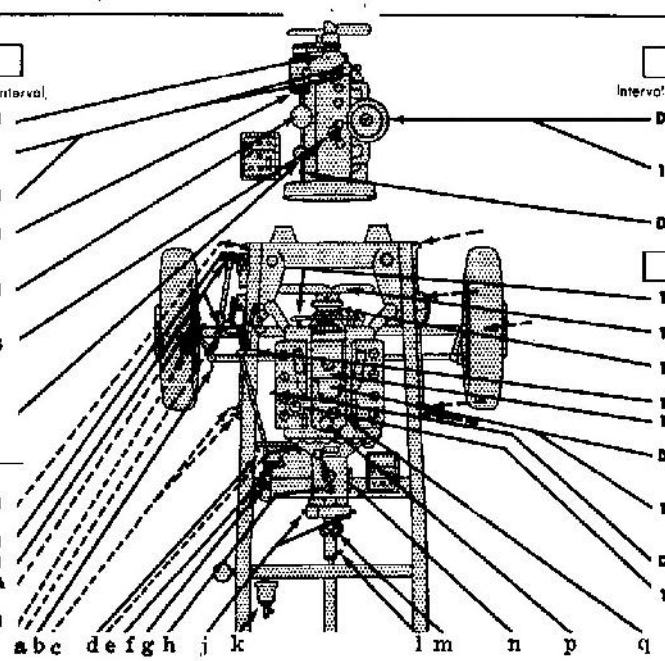
LUBRICATION ORDER

TRUCK, 1½-TON, 4 x 2 (2DT) (FORD 6 and 8 CYL.)

References: TM 9-806; Ord 7 SNL G-540.

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, point, volatile mineral spirits (TPM) or SOLVENT, dry cleaning (SD). Dry before lubricating. Lubricate dotted arrow points on both sides of the equipment.



6 Cylinder

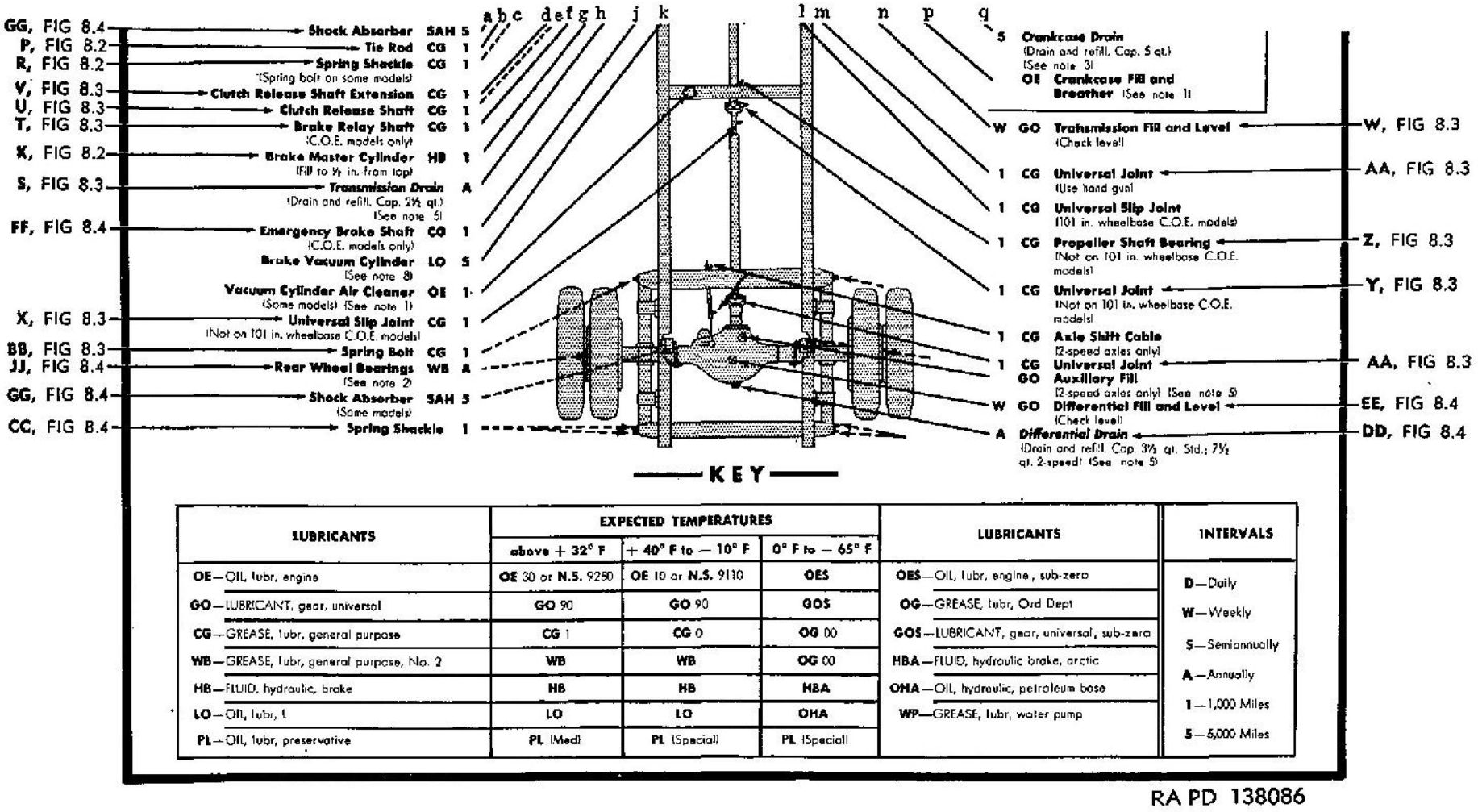
	Lubricant	Interval
Water Pump Fill Reservoir (Some models)	PL	1
B, FIG 8.1 → **Distributor** (See note 4)		
A, FIG 8.1 → **Distributor Shaft** (6 to 8 drops) (Some models)	PL	1
J, FIG 8.2 → **Generator** (6 to 8 drops) (Some models)	PL	1
E, FIG 8.1 → ***Oil Filter*** (Some models) (Drain sediment) (See note 6)		1
L, FIG 8.2 → ***Crankcase Drain*** (Drain and refill. Cap. 5 qt.) (See note 3)		5
C, FIG 8.1 → **Crankcase Fill and Breather** (See note 1)	OE	
M, FIG 8.2 → **Spring Bolt** (Spring shackle on some models)	CG	1
F, FIG 8.1 → **Steering Gear**	GO	1
Q, FIG 8.2 → **Drag Link**	CG	1
HH, FIG 8.4 → **Front Wheel Bearings** (See note 2)	WB	A
N, FIG 8.2 → **King Pin**	CG	1

6 Cylinder

Interval	Lubricant	
D	OE	**Air Cleaner** (Oil bath type) (Check level) (See note 1) → H, FIG 8.1
1	OE	**Air Cleaner** (Mesh type) (Wash and recoil) (See note 1) → G, FIG 8.1
D		***Crankcase Level*** (Check level) → D, FIG 8.1

8 Cylinder

1	CG	**Accelerator Cross Shaft** (C.O.E. models only)
1	OE	**Fan** (See note 7)
1	PL	**Distributor Shaft** (See note 4)
1	CG	**Pedal Shaft**
1	PL	**Generator** (6 to 8 drops)
D	OE	**Air Cleaner** (Oil bath type) (Check level) (See note 1)
1	OE	**Air Cleaner** (Mesh type) (Wash and recoil) (See note 1)
D		***Crankcase Level*** (Check level)
1		***Oil Filter*** (Some models) (Drain sediment) (See note 6)



LUBRICANTS	EXPECTED TEMPERATURES			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 90	GOS	OG—GREASE, lubr, Ord Dept	W—Weekly
CG—GREASE, lubr, general purpose	CG 1	CG 0	OG 00	GOS—LUBRICANT, gear, universal, sub-zero	S—Semiannually
WB—GREASE, lubr, general purpose, No. 2	WB	WB	OG 00	HBA—FLUID, hydraulic brake, arctic	A—Annually
HB—FLUID, hydraulic, brake	HB	HB	HBA	OHA—OIL, hydraulic, petroleum base	1—1,000 Miles
LO—OIL, lubr, t	LO	LO	OHA	WP—GREASE, lubr, water pump	5—5,000 Miles
PL—OIL, lubr, preservative	PL (Med)	PL (Special)	PL (Special)		

RA PD 138086

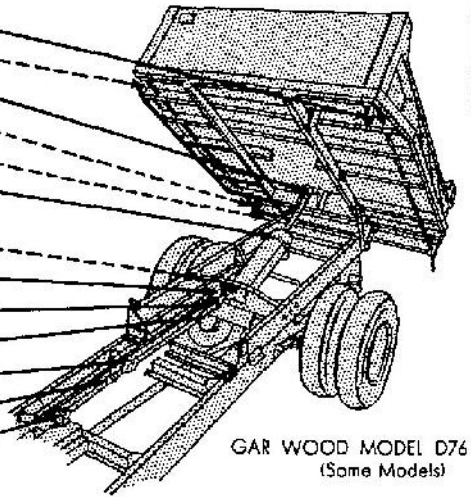
Figure 7. (Superseded) *Lubrication Order—Truck, 1½-ton, 4 x 2 (front).*

Lubricant • Interval

Tailgate Control Lever	**PL**	**W**
Tailgate Control Rod	**PL**	**W**
Piston Rod Crosshead	**CG**	**W**
Trip Rod Yoke	**PL**	**W**
Tipping Frame Hinge Shaft	**CG**	**W**
Hydraulic Cylinder (Check level) (See note 9)	**OE**	**W**
Cylinder Hinge	**CG**	**W**
Valve Control Rod	**PL**	**W**
Universal Joint	**CG**	**W**
Slip Joint	**CG**	**W**
Universal Joint	**CG**	**W**
Center Bearing	**CG**	**W**
Universal Joint	**CG**	**W**

CAUTION

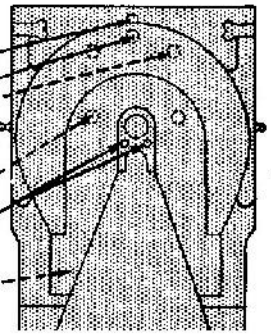
Always place a prop or block *under* body *before performing* any service work.



GAR WOOD MODEL D76 HOIST
(Same Models)

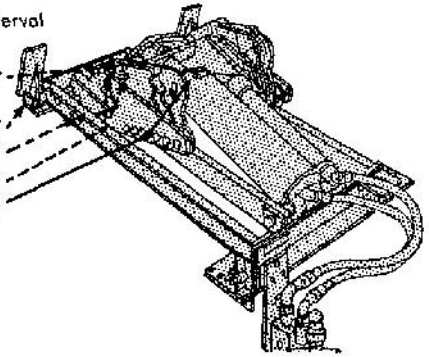
Lubricant • Interval

Lock Plunger	**PL**	**W**
Lock Plunger Shaft and Latch	**PL**	**W**
Base	**CG**	**W**
Support Brackets	**CG**	**W**
Jaw Pins	**CG**	**W**
Jaws	**PL**	**W**
Base Ramps (Clean and coat)	**CG**	**W**



Lubricant • Interval

Piston Rod Crosshead	**CG**	**W**
Body Rear Hinge Pin	**CG**	**W**
Lift Arms Pivots	**CG**	**W**
Body Lift Links	**CG**	**W**
Hydraulic Cylinder (Check level) (See note 9)	**OE**	**W**



Pick-up Ramps CG W

(Clean and coat)

FIFTH WHEEL (Some Models)

GALION MODEL GH-577 HOIST (Some Models)
(See Gar Wood diagram for lubrication of Drive Shaft)

NOTES

1. AIR CLEANER—(Oil bath type) After every 8 hours of operation replenish to bead level with OE crankcase grade. Every 1,000 miles, disassemble, wash all parts and refill with OE as above. For desert or similar sandy soil operation, disassemble, wash all parts, and refill with OE as above every 4 hours or more frequently if required. (Mesh type) For normal operation, wash and recil, at indicated intervals with OE as above. For desert or similar sandy soil operation, disassemble, wash all parts, and recil every 100 miles.
2. WHEEL BEARINGS—Remove, clean and repack. Above 0° F, lubricate every 12,000 miles or annually. Below 0° F, lubricate every 6,000 miles or semiannually.
3. CRANKCASE—Drain every 5,000 miles or semiannually. For proper operation on heavy duty oils, engine thermostats must be functioning properly to maintain engine coolant temperature at +140° F minimum. Refill to full mark on gage. Run engine a few minutes and recheck oil level. CAUTION: be sure pressure gage indicates oil is circulating.
4. DISTRIBUTOR—(6 Cylinder late models). Semiannually, coat distributor breaker cam lightly with CG 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 and after draining. (2-speed axle) Upon reassembly of the unit, after it has been disassembled for repair, add extra pint of lubricant through the auxiliary fill plug.
6. OIL FILTER—Every 5,000 miles, or semiannually while crankcase is being drained, remove element, clean inside of case and install new element.
7. FAN—(Some V8 models)—Remove plug, turn hole to top center and add 1 oz. OE. Turn hole to bottom to drain excess, holding cloth under plug hole, replace plug.
8. BRAKE VACUUM CYLINDER—Every 5,000 miles or semiannually remove plug in front of cylinder and lubricate with 1 oz. of LO, replace plug.
9. HYDRAULIC HOIST CYLINDER—Semiannually, drain and refill. To fill cylinder, raise body to maximum position. Prop up body to prevent accident, remove filler plug or filler plate from cylinder and fill with OE to overflowing. Use OHA below 0° F. With engine idling, engage power take-off and shift valve control lever into "Raise" position and add oil. Leave out fill plug, remove prop and lower body to force out excess oil or trapped air. Raise body and replace plug or filler plate.
10. OIL CAN POINTS—Every 1,000 miles, lubricate accelerator, and brake linkage with PL.
11. DO NOT LUBRICATE—Starter, fan (except 1942-V8), water pumps (except 1941-6 cyl.), generator (some 6 cyl.), front spring bolts and shackles (1941 models).
12. LUBRICATED AT TIME OF DISASSEMBLY BY ORDNANCE PERSONNEL—Starter, water pumps, generator, (Some models), clutch pilot bearing.

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Figure 8. (Superseded) *Lubrication Order—Truck, 1½-ton, 4 x 2 (back).*

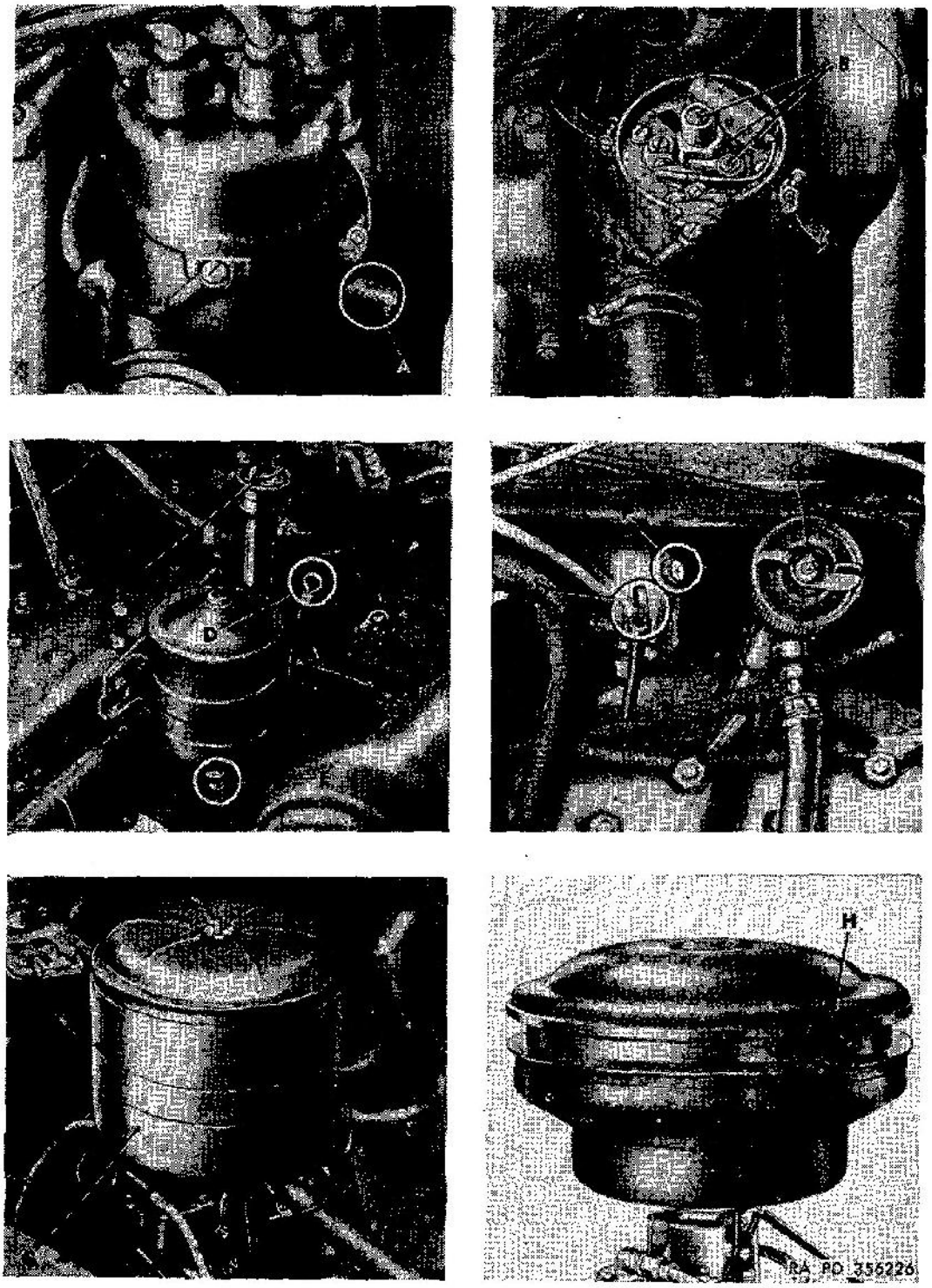


Figure 8.1. (Added) *Localized lubrication points (points A through H).*

22.1. 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 operation, continued operation in sand or dust, immersion in water, or exposure

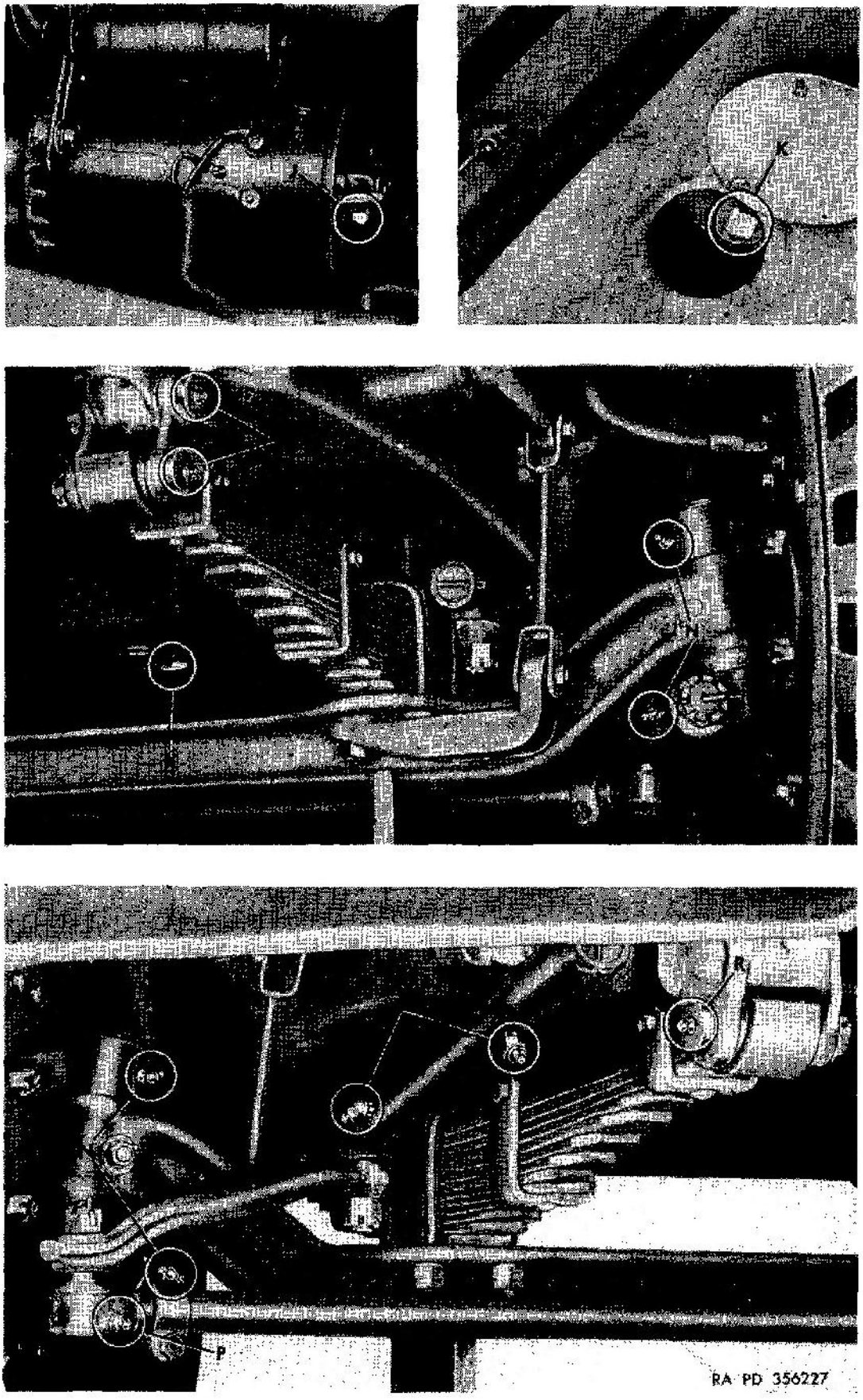


Figure 8.2. (Added) *Localized lubrication points (points J through R).*

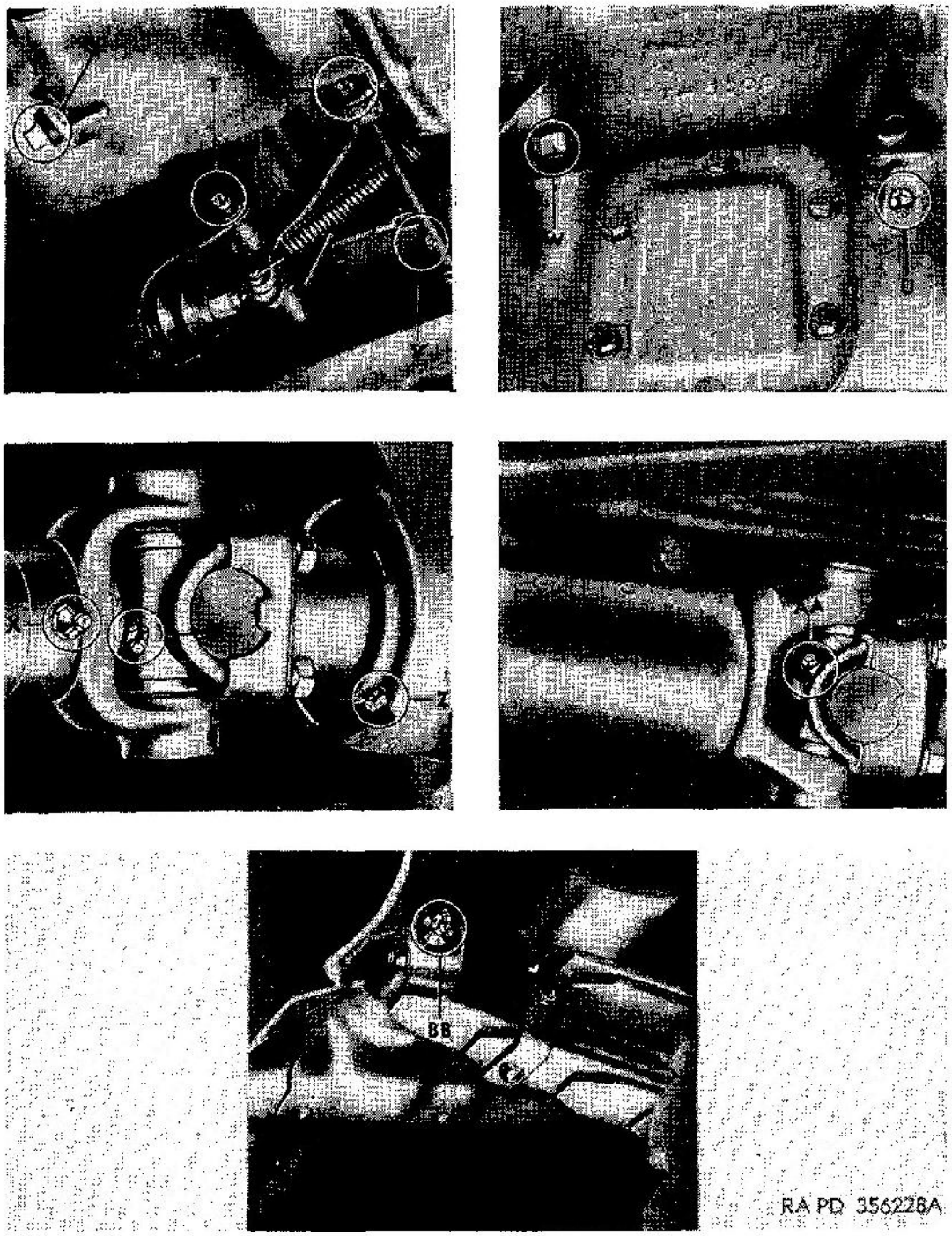


Figure 8.3. (Added) *Localized lubrication points (points S through BB).*

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; namely, above + 32° F, from + 40° to —10° F, and from 0° down to — 65° F. Change the grade of lubricants whenever weather forecast data indicate that air temperatures will be consistently in the

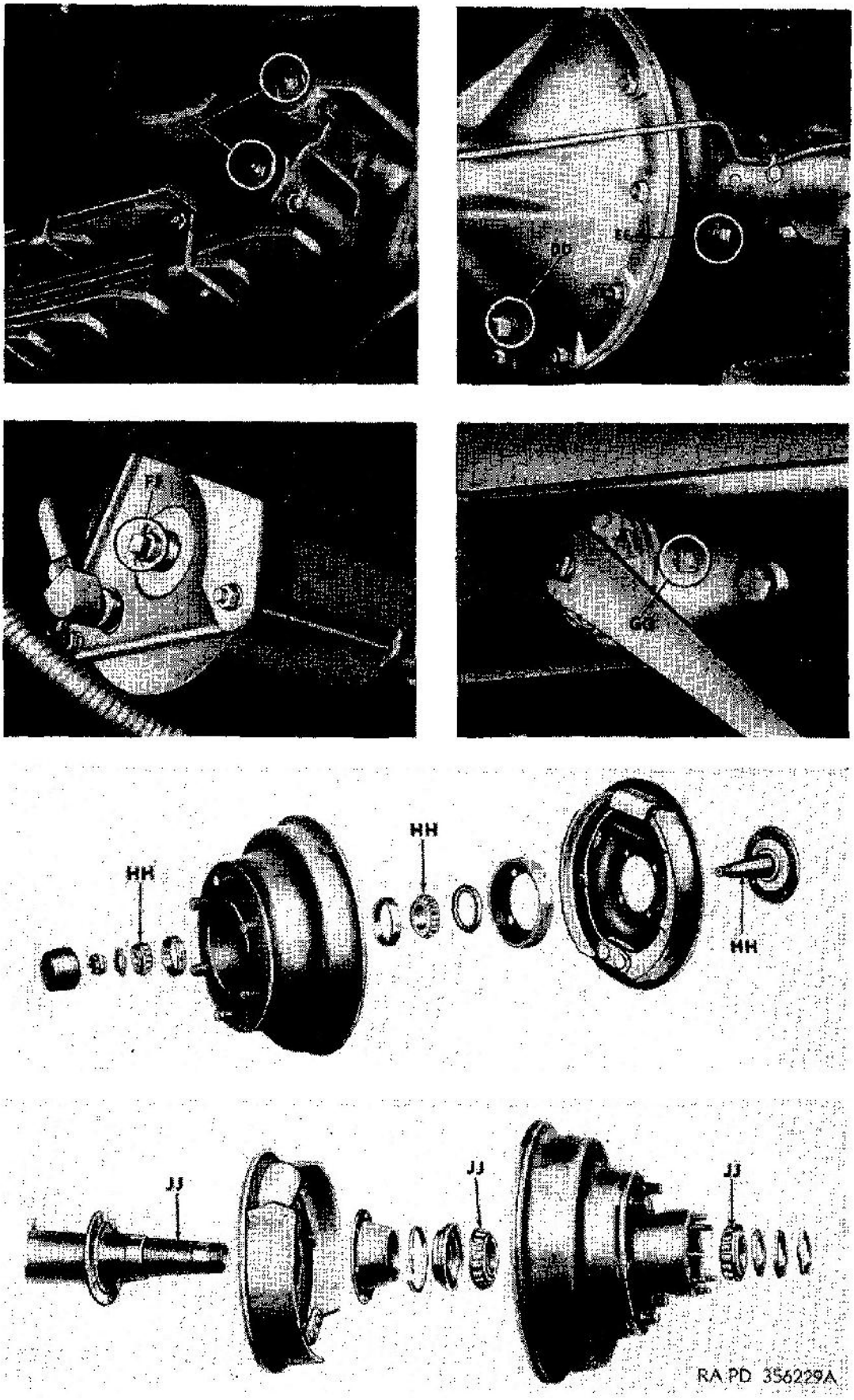


Figure 8.4. (Added) *Localized lubrication points (points CC through JJ).*

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.

22.2. Lubrication for Continued Operation below 0°F

Refer to TM 9–2855 for instruction on necessary special preliminary lubrication of the vehicle.

22.3. 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 144.4, which covers maintenance operations 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 (pars. 21 and 22).

(2) Inspect engine crankcase oil. If water or sludge is found, drain the oil (par. 51) 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. 52).

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.

22.4. 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.

22.5. 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 VII.
(Rescinded)

Note. For information on parts, special tools, and equipment for organizational maintenance refer to section X.

27. Run-in Test Procedures

a. PRELIMINARY SERVICE.

* * * * * * *

(5) *Air cleaner and breather.* Examine carburetor **air cleaner** and crankcase ventilator breather to see if they are in good condition and secure. Remove elements from both units, and wash thoroughly in dry-cleaning solvent or **volatile mineral spirits paint thinner. Refill reservoirs in accordance with lubrication order.** Be sure all * * * connections are tight.

* * * * * * *

c. VEHICLE PUBLICATIONS AND REPORTS.

(1) *Publications.* (Superseded) Check that vehicle technical manuals, lubrication orders, and Standard Form 91, Operator's Report of Motor Vehicle Accident, are in the vehicle, legible, and properly stowed.

* * * * * * *

28. Second Echelon Preventive Maintenance

a. Regular scheduled maintenance * * * of operating organizations.

* * * * * * *

(5) *Specific procedures.* The procedures for performing each item in the 1,000-miles **or 60 days** and 6,000 miles **or 6 months** maintenance procedures are described in **table II.** Each page of the **table** has two columns at its left edge corresponding to the 6,000 miles **or 6 months** and 1,000 miles **or 60 days** maintenance respectively. Very often it * * * opposite the number.

Table II. Organizational Mechanic (or Maintenance Crew) Preventive Maintenance Services

Intervals		Procedure
6,000 miles or 6 months[1,2]	1,000 miles or 60 days[1,2]	
		ROAD TEST **The driver of a vehicle is often unaware of defects in his vehicle which have developed gradually and to which he has become accustomed. The fact that many drivers lack the ability to detect the developing causes of vehicle failures makes it desirable for the mechanic to road test the vehicle as part of the periodic preventive maintenance services. Before and during this road test, any repairs or adjustments necessary to insure safe operation should be made. The appropriate paragraph in the following service procedures should be consulted. If a defect found on the road test does not require immediate correction, note it on the check sheet. The defect can be corrected later during the service. Make provisions for securing necessary replacement parts or units.** *Note.* When the tactical situation does not permit a full road test, perform those items (3, 4, 5, 6, 9, 10, 11, and 14) which require little or no movement of the vehicle. When a road * * * over 10 miles.
1	1	*Before-operation service.* (Superseded) Perform the before-operation services as outline in table I, paragraph 18, as a check to determine whether the vehicle is in a satisfactory condition to make the road test safely and that it is adequately supplied with fuel, engine oil, and coolant.
3	3	*Dash instruments and gages.*
*	*	* * * * * *
		(Added) *Speedometer and odometer.* Watch the speedometer for proper operation, excessive fluctuation, and note unusual noises that might indicate worn or damaged gears or cable. Note whether the odometer is registering the accumulated mileage satisfactorily.
*	*	* * * * * *
		MAINTENANCE OPERATIONS (*Raise Vehicle—Block Safely*) ***Caution:*** (Added) Use necessary precautions to block the vehicle so that it may be operated safely in gear at reasonable speeds. If facilities are not available for adequately and safely jacking up and blocking vehicle, omit the services which follow that require running the engine in gear.
*	*	* * * * * *
17	17	*Unusual noises (engine, belt, accessories, transmission, shafts and joints, axle and wheel bearings).* With engine running, observe as follows:
*	*	* * * * * *

[1] The chart which appears in TM 9-806, 14 February 1944 (pp. 53-75, incl.), will be changed so that the "6,000 mile maint (six-month)" and "1,000 mile maint (monthly)" columns will read "6,000 miles or 6 months" and "1,000 miles or 60 days," as above.
[2] Whichever occurs first.

Table II. Organizational Mechanic (or Maintenance Crew) Preventive Maintenance Services—Continued

Intervals		Procedure
6,000 miles or 6 months[1,2]	1,000 miles or 60 days[1,2]	
		MAINTENANCE OPERATIONS—Continued
		Transmission, propeller shafts and universal joints, axle and wheel bearings. With the transmission * * * looseness or unbalance. **The drive wheels should rotate at approximately the same speed. Slow-running wheels may indicate tight brakes or wheel bearings. In such a case, move the gear shift lever to neutral, spin the wheel by hand, and check for drag.** Also be sure * * * during road test.
*	*	* * * * * *
	20	*Spark plugs (gaps, deposits).* Without removal, wipe * * * of compression leaks.
20		Remove all plugs * * * only grounded electrodes. **Reinstall the plugs, using new gaskets and taking care not to overtighten them. Overtightening may cause distortion and damage.**
*	*	* * * * * *
22	22	*Battery (cables, hold-downs, carrier, record gravity, and voltage).* Inspect battery case * * * top of plates.
22		Perform high-rate discharge test according to "conditional" test instructions which accompany the testing instrument, and record voltage on DA AGO Form 461. Cell variation should * * * *make this test.*
*	*	* * * * * *
34	34	*Air cleaner.* Inspect carburetor air * * *, and not leaking. Remove reservoir and element, clean in dry-cleaning solvent **or volatile mineral spirits paint thinner,** dry, fill reservoir to proper level **in accordance with lubrication order,** and reassemble.
35	35	*Breather.* Inspect crankcase breather to see if it is in good condition, secure and not leaking. Remove oil reservoir and element, wash clean in dry-cleaning solvent **or volatile mineral spirits paint thinner,** refill reservoir **in accordance with lubrication order,** and reassemble securely.
*	*	* * * * * *
41	41	*Ignition timing.* Set ignition timing * * * and instructions, paragraph 60.
*	*	* * * * * *
71	71	*Transmission (mountings, seals, linkage).* Note whether or * * * or excessive wear.

[1] **The chart which appears in TM 9-806, 14 February 1944 (pp. 53-75, incl.), will be changed so that the "6,000 mile maint (six-month)" and "1,000 mile maint (monthly)" columns will read "6,000 miles or 6 months" and "1,000 miles or 60 days," as above.**

[2] **Whichever occurs first.**

Table II. Organizational Mechanic (or Maintenance Crew) Preventive Maintenance Services—Continued

Intervals		Procedure
6,000 miles or 6 months[1,2]	1,000 miles or 60 days[1,2]	
		MAINTENANCE OPERATIONS—Continued
71		(Added) *Tighten.* Tighten all transmission mounting bolts, external assembly bolts, and cap screws securely.
*	*	* * * * * *
75	**75**	*Rear axle (pinion end play, seals, vent, and alinement).* If axle appears * * * seal for leaks.
*	*	* * * * * *
88	**88**	(Added) *Fifth wheel (bed plate and bolts).* Observe the fifth-wheel rocker plate and bed plate to see that they are in good condition, securely assembled, and mounted. Examine the king pin lock to see that it operates properly, locks securely, and that the king pin is not excessively worn. *Tighten.* Tighten all assembly and mounting bolts. *Special lubrication.* See lubrication order for instructions. ***Caution:*** When the trailer is not attached, the fifth wheel should be covered to prevent accumulation of dirt.
*	*	* * * * * *
96	**96**	*Cab (doors, hardware, glass, seat and trim, floor boards, ventilator, map compartment).* Inspect these items * * * in closed position. *Note.* (Added) Glass, even if cracked or if laminated layers are separated, need not be replaced as unserviceable unless its condition constitutes a safety hazard or obstructs the vision of driver or crew.
*	*	* * * * * *
100	**100**	*Body* **(panels, tailgate and chains,** *floor, skid strips, stakes, sockets,* **bows, tops, paulins, troop seats, and stowage compartments).** Examine cargo body * * *. Include tool compartment.
*	*	* * * * * *
		TOOLS AND EQUIPMENT
*	*	* * * * * *
135	**135**	*Publications and* **Standard** *Form* **91.** The vehicle and equipment manuals, lubrication **order,** and Standard Form **91, Operator's Report of Motor Vehicle Accident,** should be present, legible, and properly stowed.
*	*	* * * * * *
141	**141**	*Modifications (MWO's) completed.* (Superseded) Check DA AGO Form 478 to determine whether all modification work orders have been completed. A list of current modification work orders is contained in SR 310–20–4. Enter any modification or major unit assembly replacements made during this service on DA AGO Form 478.
*	*	* * * * * *

[1] **The chart which appears in TM 9–806, 14 February 1944 (pp. 53–75, incl.), will be changed so that the "6,000 mile maint (six-month)" and "1,000 mile maint (monthly)" columns will read "6,000 miles or 6 months" and "1,000 miles or 60 days," as above.**

[2] **Whichever occurs first.**

Table II. Organizational Mechanic (or Maintenance Crew) Preventive Maintenance Services—Continued

Intervals		Procedure
6,000 miles or 6 months[1 2]	1,000 miles or 60 days[1 2]	
		UNUSUAL CONDITIONS (Added) Maintenance operations and road tests as prescribed under usual conditions will apply equally under unusual conditions for operation under all conditions except extreme-cold weather. Intervals are necessarily shortened in extreme-cold weather servicing and maintenance. Vehicles subjected to salt-water immersion or complete submersion should be evacuated to an ordnance maintenance unit as soon as possible after the exposure.

[1] The chart which appears in TM 9-806, 14 February 1944 (pp. 53-75, incl.), will be changed so that the "6,000 mile maint (six-month)" and "1,000 mile maint (monthly)" columns will read "6,000 miles or 6 months" and "1,000 miles or 60 days," as above.

[2] Whichever occurs first.

Section X. PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR ORGANIZATIONAL MAINTENANCE
(Superseded)

29. 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.

30. Parts

Spare parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, provided such operations are within the scope of organizational maintenance functions. Spare parts, tools, and equipment supplied for the 1½-ton 4 x 2 truck (Ford) are listed in Department of the Army Supply Catalog ORD 7 SNL G-540 which is the authority for requisitioning replacements.

30.1. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this matériel are authorized for issue by the ORD 7 catalog and by T/A and T/O & E.

30.2. Special Tools and Equipment

The maintenance operations described in this manual do not require the use of special tools.

52. Oil Filter
(fig. 11)

* * * * * * *

b. SERVICE. Remove the nut * * * out the sludge. **After removing the wrapper of the new filter element and before using the element in the vehicle, thoroughly remove any wax coating that may be present with a clean cloth and dry-cleaning solvent or volatile mineral spirits paint thinner. Unless the wax coating is completely removed, it will be dissolved by the passage of oil through the element and be carried into oil lines where it will cause clogging.** Install new filter * * * cover for leaks.

* * * * * * *

54. Removal

Note. (Added) Before removal of engine, refer to paragraph 1*c* for information on coordination with an ordnance maintenance unit.

* * * * * * *

61. Spark Plugs and Wires

a. SPARK PLUGS. The spark plugs * * * sand blast cleaner. **After cleaning, examine the plugs for cracked insulation. Ascertain if plugs require too much cleaning to remove encrustments or have been cleaned too often. Such plugs should be discarded.** Always reset the gap to 0.025 inch. Never bend the * * * breaking the porcelains. Keep the exterior surfaces of the porcelains clean to avoid possibility of **shorting** in damp weather.

Note. (Added) When spark plugs are installed, install seat gasket on each plug, using new gaskets when available.

* * * * * * *

73. Rescinded

97. Lights
(figs. 41 and 42)

* * * * * * *

b. HEADLIGHTS.

* * * * * * *

(2) (Superseded) *Aiming adjustment procedure* (fig. 43).

(*a*) Place unloaded truck on a smooth horizontal surface so

that headlights are 25 feet away from a vertical wall or other vertical surface. The center line of the truck must be at right angles to the vertical surface.

(*b*) Measure the height of the headlight center from the floor, and mark a horizontal line at this height on the vertical surface (line X – X, fig. 43).

(*c*) Mark line A — A, below X — X, at one-twelfth the distance between line X — X and the floor.

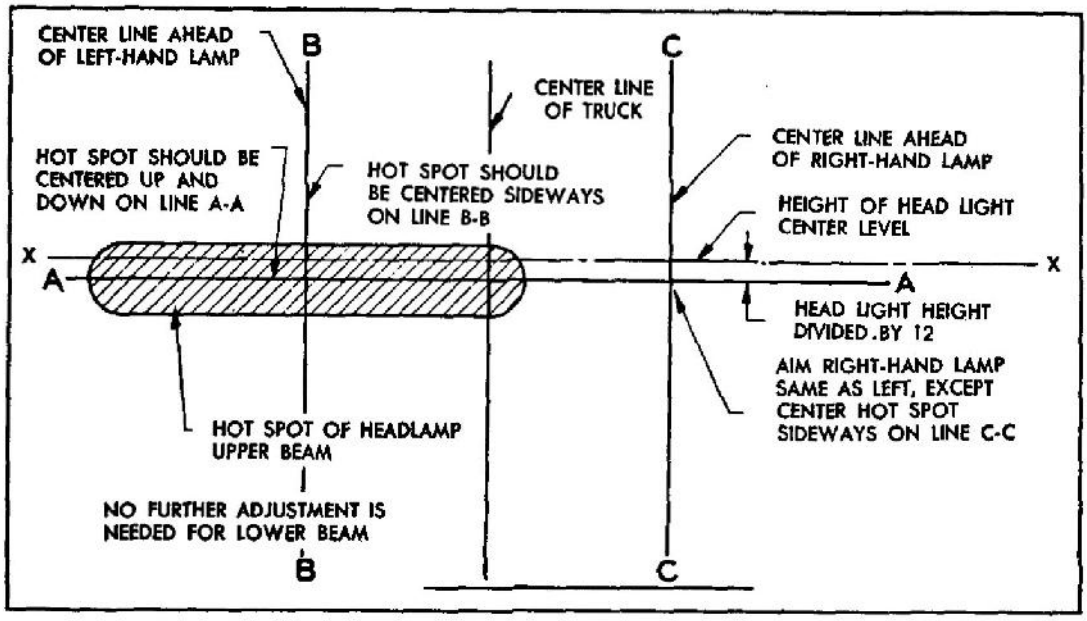
(*d*) Draw vertical lines B — B and C — C directly in front of each headlight.

(*e*) Turn on headlights at main light switch and select high beam with dimmer switch. It is not necessary to make adjustment on low beam.

(*f*) Loosen headlight mounting bolt nut on each headlight. Cover one headlight and aim the other so that the center of the zone of greatest intensity (hot spot) is centered at the intersection of lines A — A and B — B or A — A and C — C, depending on which headlight is being aimed. Tighten the headlight mounting bolt nut securely, making sure adjustment is not disturbed. Aim the other headlight in the same manner.

(*g*) After each headlight is aimed separately, check both headlights simultaneously for conformity to line A—A.

* * * * * * *



RA PD 344344

Figure 43. (Superseded) *Headlight aiming.*

101. Clutch disk and pressure plate

* * * * * * *

b. REMOVAL.

Note. Before removal of clutch assembly, refer to paragraph 1*c* for information on coordination with an ordnance maintenance unit.

Remove the transmission * * * plate and disk.

* * * * * * *

108. Replacement

Note. (Added) Before removal of transmission, refer to paragraph 1*c* for information on coordination with an ordnance maintenance unit.

* * * * * * *

110. Replacement

Note. (Added) Before removal of front axle, refer to paragraph 1*c* for information on coordination with an ordnance maintenance unit.

* * * * * * *

114. Replacement

Note. (Added) Before removal of rear axle, refer to paragraph 1*c* for information on coordination with an ordnance maintenance unit.

* * * * * * *

142.1. Fifth Wheel Replacement
(Added)

a. REMOVAL. Remove the bolts, nuts, and lock washers which secure the subbase of the fifth wheel to the chassis of the vehicle. Remove subbase and wheel as an assembly.

b. INSTALLATION. Position fifth wheel assembly on the chassis of the vehicle. Install the mounting bolts, nuts, and lock washers which secure the subbase of the fifth wheel to the chassis of the vehicle.

144.1. Identification Plates
(Added)

Steel identification plates found to be in a corroded condition will be thoroughly cleaned and heavily coated with applications of clear lacquer.

Section XXIX.1. MAINTENANCE UNDER UNUSUAL CONDITIONS
(Added)

144.2. 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.

144.3. Extreme-Hot Weather Maintenance

a. COOLING SYSTEM. Thoroughly clean and flush the cooling system (par. 72) at frequent intervals and keep system filled to within a few inches of the overflow pipe with clean water when operating in extremely 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 the battery 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 with pure distilled water, as specified in TM 9–2857, to readings of 1.200 to 1.240 specific gravity. 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 if left standing for long periods at high temperatures. This must be taken into consideration when operating in torrid zones. If necessary to park for several days, remove battery and store in a cool place.

Note. Do not store acid-type storage batteries near stacks of tires, as the acid fumes have a deleterious 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 on all parts of the the vehicle will occur and will be accelerated in areas of high humidity and during the rainy season. Evidences will appear in the form of rust and paint blisters on

metal surfaces, and mildew or fungi mold on fabrics, leather, and unpainted surfaces.

(3) Protect all exposed exterior painted surfaces from the atmosphere by touch-up painting and protect unfinished exposed metal surfaces by a film of engine lubricating oil (OE–10). Cables and terminals will be protected by ignition-insulation compound.

(4) Make frequent inspections of idle, inactive vehicles. Remove corrosion from exterior surfaces with abrasive paper or cloth and apply a protective coating of paint, oil, or suitable rust preventive.

144.4. Maintenance After Fording

a. GENERAL. Although all of the vehicle unit housings are vented to atmospheric pressure with the exception of the steering gear and front axle spindles, and seals are provided which 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. It is advisable, therefore, that the following service be accomplished on all vehicles which have been exposed to some depth of water or completely submerged, especially in salt water, and precautions taken as soon as practicable to halt deterioration and avoid damage before the vehicle is driven extensively in regular road service.

b. CLEANING AND LUBRICATION.

(1) *Body and chassis.* Drain and clean out body, engine, and tool compartment; clean all exposed unpainted parts and coat with a film of engine lubricating oil (OE–10). Cables and terminals will be protected by ignition insulation compound. In the case of assemblies which have to be disassembled for cleaning, perform these operations as soon as the situation permits or refer to ordnance maintenance unit. Lubricate the chassis thoroughly as directed in the lubrication order. Do more than the *usual* lubrication job, making sure that lubricant is generously forced into each bearing to force out any water present. Wheels will be removed for bearing cleaning and repacking in every case.

(2) *Transmission and axles.* Check the lubricant in the transmission and both axle housings. Should there be evidence that water has entered, drain the housings and flush them thoroughly with a half-and-half mixture of oil (OE–10) and dry-cleaning solvent or volatile mineral

spirits paint thinner. Locate and remedy the cause of the leak. Refill to filler plug level with the correct grade of lubricant.

(3) *Wheels and brakes.*

(*a*) 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 paint thinner. Refill to filler plug level with the correct lubricant. Remove rear wheels. Wash all wheel bearings thoroughly with dry-cleaning solvent or volatile mineral spirits paint thinner, after which repack, assemble, and adjust them as outlined in paragraph 127.

(*b*) With wheels removed, dry out brake linings and clean rust and scum from brake drum face. Check wheel brake cylinders for water in brake fluid. Check brake master cylinder similarly. Refill system as required.

(4) *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 paint thinner. Assemble, refill with correct grade of lubricant, and adjust (pars. 122 and 123).

(5) *Engine crankcase and oil filter.* Drain and clean oil filter if necessary. Inspect crankcase for presence of water. If water or sludge is found, drain, flush, and refill with correct lubricant.

(6) *Engine valve chamber.* Clean out engine valve chamber.

c. BATTERY. Check the battery 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. Add electrolyte and charge if necessary.

d. DISTRIBUTOR. Remove the distributor cap and check to determine if any water has entered the distributor. If any water is present remove the distributor for cleaning (par. 59).

e. ELECTRICAL CONNECTIONS. Check all electrical connections for corrosion, particularly the bayonet-type connectors used in the various circuits.

f. CARBURETOR BOWL, FUEL STRAINER, ETC. Clean carburetor bowl, fuel strainer, pump, filter, tank, and lines as found necessary after inspection. If water is found in the air cleaner, clean and change the oil.

g. ALUMINUM OR MAGNESIUM PARTS. If vehicle remains in salt water for any appreciable length of time, aluminum or mag-

nesium parts which were exposed to the water will probably be unfit for further use and must be replaced.

h. CONDENSATION. Although most units are sealed and vented, the sudden cooling of the warm interior air upon submersion may cause condensation, with resultant collection of moisture within the cases or instruments. A period of exposure to warm air after fording should eliminate this fault. Cases which can be opened may be uncovered and dried.

144.5. 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 out radiator fins and interior of engine compartment. Repack wheel bearings if necessary. Clean, oil, and stow chains in vehicle.

b. SAND OR DUST. Replace badly "frosted" windshield and door glasses. Repaint surfaces blasted by sand. Clean engine compartment. Lubricate vehicle completely to force out lubricants contaminated by sand, salt or dust. Air cleaners and fuel and oil filters must be cleaned at least daily. Engine and other exposed vents should be covered with cloth.

Section XXX.
(Rescinded)

PART THREE
(Added)

SHIPMENT AND LIMITED STORAGE AND DESTRUCTION TO PREVENT ENEMY USE

Section XXXI. SHIPMENT AND LIMITED STORAGE

148. Domestic Shipping Instructions

a. PREPARATION FOR SHIPMENT IN ZONE OF INTERIOR. When shipping the 1½-ton 4 x 2 truck (Ford) interstate or within the continental United States, except directly to port 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, lubricated, etc., as prescribed in SB 9–4.

Note. For loading and blocking instructions of vehicles on freight cars, refer to paragraphs 150 and 151.

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 matériel 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.

149. 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.

(2) When vehicles are inactivated, they are to be placed 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 IX. 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, place vehicles in a limited storage status and attach tags to the vehicles 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, vehicles 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 reached 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 used vehicles that are to be reissued to troops within the continental limits of the United States will be inspected prior to shipment or issue in accordance with TB ORD 385.

(3) Deprocess vehicles when it has been ascertained that they are to be placed into immediate service. Remove all rust-preventive compounds as prescribed in section V and thoroughly lubricate as prescribed in section VI. Inspect and service vehicles as prescribed in section IX.

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

e. STORAGE SITE. The preferred 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.

150. Loading the 1½-Ton 4x2 Truck (Ford) 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.

(2) Prepare all vehicles for rail shipment in accordance with paragraph 148*a*. In addition, take the following precautions:

(*a*) Disconnect the truck battery to prevent its discharge by vandalism or accident. This is accomplished by disconnecting the positive lead, taping the end, and tying it back away from the battery.

(*b*) 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.

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

b. TYPES OF CARS. Instructions contained herein pertain to the loading of vehicles in boxcars (cars equipped with side or side

and end doors), gondola cars (open top cars having fixed sides, fixed or drop ends, and solid bottom), and flatcars (cars with wooden floors laid over sills and without sides or 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, and 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 ((4) below) by borrowing railroad ties normally found stacked in railroad yards and by procuring necessary planking. An end ramp is shown in place in figure 86.

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 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 liable 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. 88).

(*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 place in figure 86. 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 cars without false flooring and hoisting facilities are not to be used for shipments of unboxed vehicles.

(*b*) Drop-end gondola cars may be loaded exactly as described for flatcars ((1) above). Height of fixed sides is immaterial. 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) *Boxcar loading.*

(*a*) End-door boxcars are spotted with the door end toward the ramp and loaded as described for flatcars ((1) above) except that loading must be accomplished by pushing the vehicle or towing by cable and block

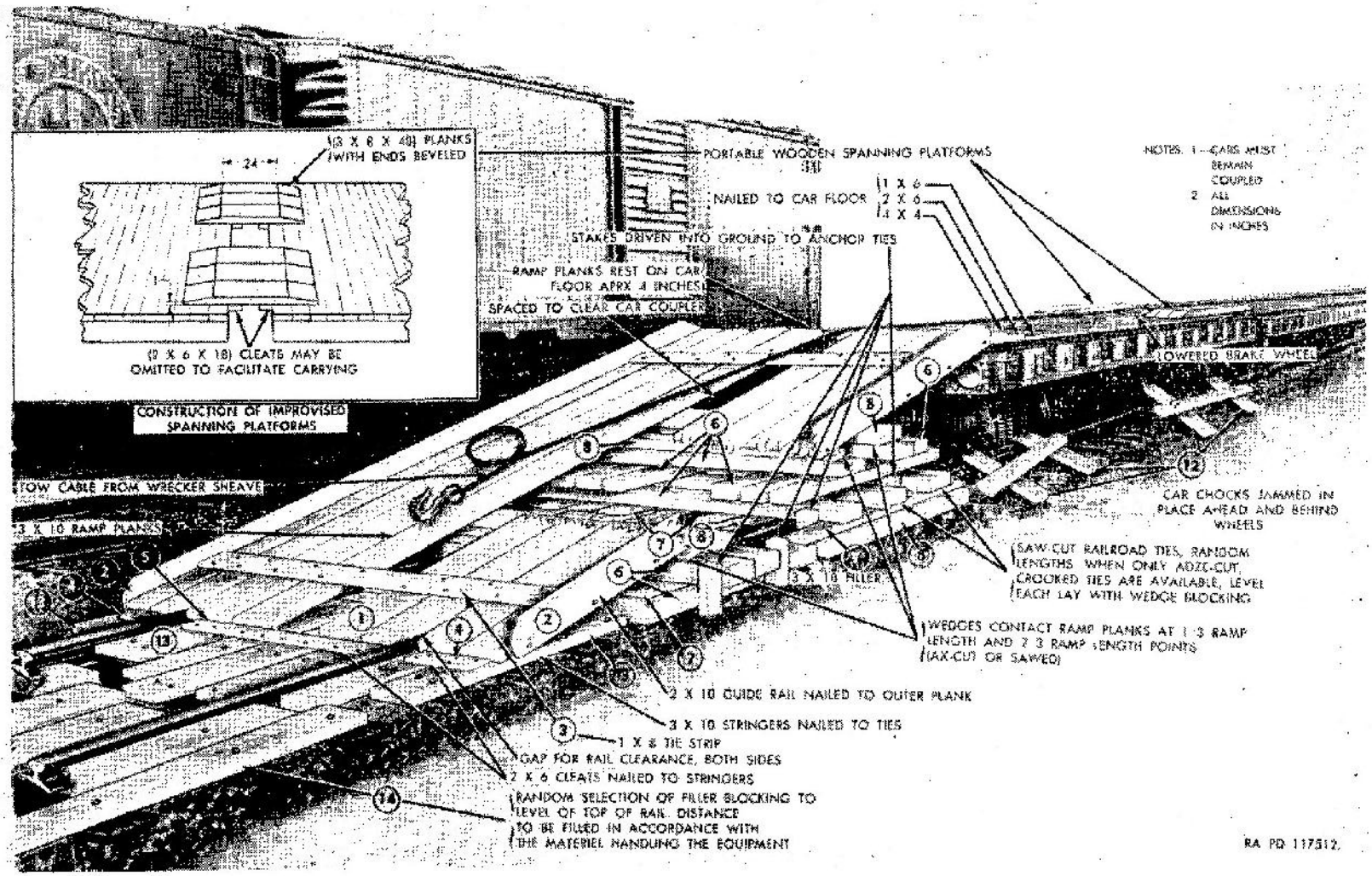


Figure 86. (Added) *Construction of improvised loading ramp and spanning platforms.*

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 OR 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.

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Figure 87. (Added) *Bill of materials for loading ramp.*

through the side door (fig. 88). When the height of the vehicle to be loaded is close to the inside height limits of the boxcar, it will be necessary to first load the vehicle on an adjacent flatcar. The two end doors must be opened *before* the flatcar is coupled to the door end of the boxcar.

Note. When ordering end-door boxcars, it must be remembered that some automobile boxcars may be received with an overhead built-in rack which affects inside height calculations. Specify inside height required. Keep open end doors clear of traffic on adjacent tracks.

(*b*) Side-door boxcars are provided with either single or double rolling doors at each side and must be loaded from a platform of about the same level as the boxcar floor or from an adjacent flatcar. Automobile cars of this type have large side door openings and present less difficulty in loading. However, ordinary boxcars may require the use of roller automobile jacks to maneuver the vehicle into place. Steel plates or spanning platforms must be used to bridge the gap between platform and car.

Note. In emergencies when no roller jack is available, the vehicles may be moved sideways by means of an ordinary jack canted against the axle from the floor. Wetting both floor of the car and bridging will reduce the friction of the tires.

(4) *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 86. For loading the 1½-ton 4 x 2 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 upper end of 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.

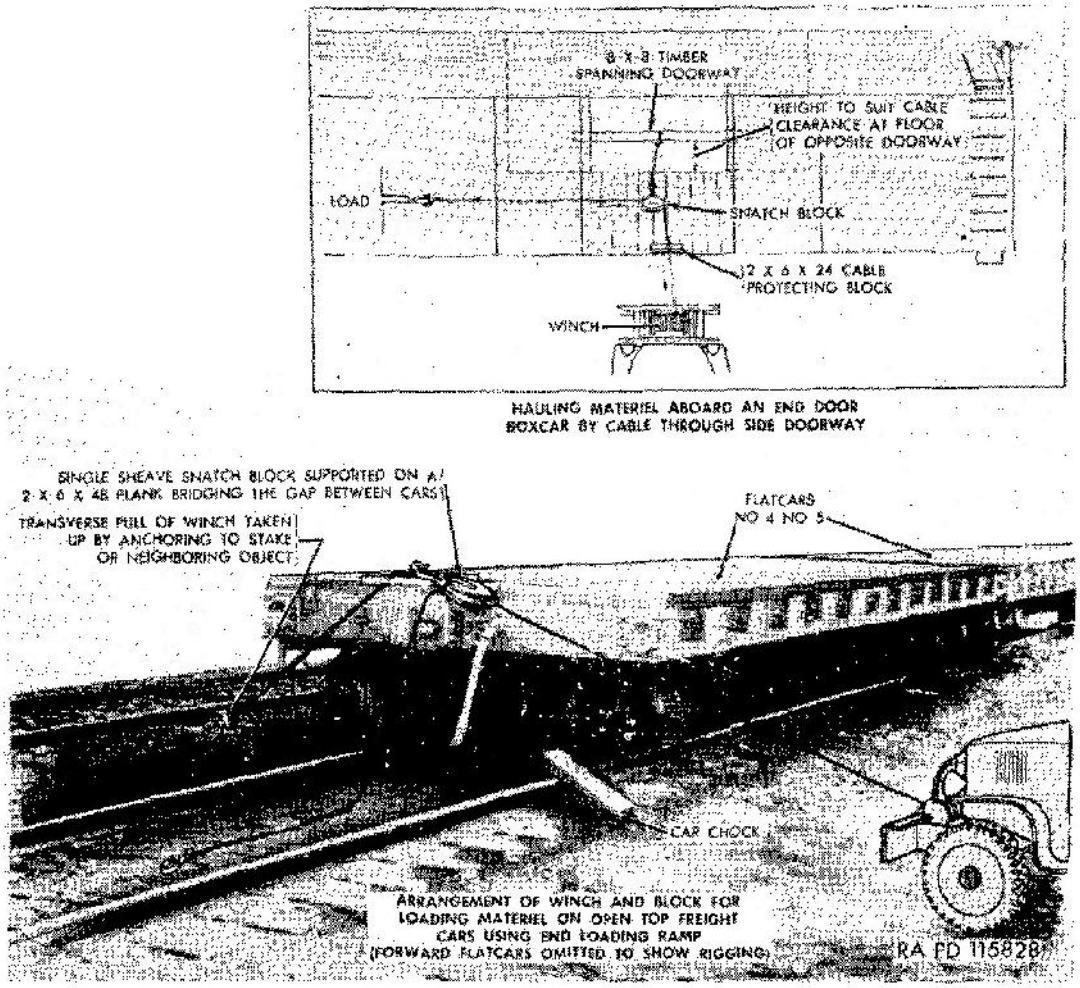

Figure 88. (Added) *Method of powering the towing cable.*

(*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.

151. Blocking the 1½-Ton 4x2 Truck (Ford) 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 89.

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. 89). Increase clearance as much as is consistent with proper location of load.

Note. Vehicle 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 24 INCHES, 12 REQUIRED PER TRUCK). Locate the 45-degree face of blocks against the front and rear of each wheel. Blocks are to be positioned in such a manner as to allow flush application of wheel side cleats "D" (*e* below) when nailed to chock blocks. Nail heel of blocks to car floor with three fortypenny nails and toenail both sides of blocks to car floor with two fortypenny nails each.

Note. Chock blocks may be cut from timbers (or railroad ties, when available) as shown in figure 90.

d. CUSHIONING MATERIAL "C." Locate suitable cushioning material, such as waterproof paper, burlap, etc, between tires and cleats "D." The cushioning material should protrude beyond cleats "E" at floor and above cleats "D".

e. WHEEL SIDE CLEATS "D" (1 x 8 x 43 INCHES, FOUR REQUIRED PER TRUCK). Locate and nail cleats "D" to chock blocks "B" with four tenpenny nails at each end.

f. FLOOR SIDE CLEATS "E" (2 x 4 x 36 INCHES, EIGHT REQUIRED PER TRUCK). Locate two floor side cleats against each wheel side cleat "D" with cushioning material protruding underneath cleats. Nail lower cleats to car floor with four thirtypenny nails and upper cleat to the lower cleat and car floor with four thirtypenny nails.

g. CROSS CLEATS "F" (2 x 4 INCHES, 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 two thirtypenny nails at each end. Nail upper cleats to the lower cleats and top of chock blocks with two fortypenny nails, staggered at each end.

h. WHEEL STRAPPING "G" (NO. 8 GAGE BLACK ANNEALED WIRE, LENGTH TO SUIT).

Note. For gondola or boxcar loading, wheel strapping will not be required.

(1) *Front wheels.* Form a cable by twist-tying four strands of wire together. Pass cable through ventilating hole in upper part of front wheel slightly *forward* of center and out through adjacent ventilating hole. Pass the other end of the cable through a stake pocket *rearward* of front wheel. Form a 6-inch loop in the end by winding each of the four wires tightly around the cable a few turns. Position the loop midway between the wheel and stake pocket. Pass the free end of the cable through the loop, hand tighten, and again wind the ends of the wires around their cable tightly to form another loop. Place a random length 2 x 2-inch cleat between cables. Insert a tightening tool at center of cable and twist just taut enough to remove all slack. Withdraw tightening tool, leaving cleat in cable to maintain an aperture for tightening cable during transit. Form another cable and pass through ventilating hole at upper part of front wheel slightly *rearward* of center and out through adjacent ventilating hole, crossing initial cable. Pass other end of cable through a stake pocket *forward* of front wheel. Complete and twist-tie as described above. Repeat above operations for the other front wheel.

(2) *Rear wheels.* Each outside rear wheel will be cross-cabled to stake pocket as prescribed for the front wheel ((1) above) (fig. 89).

Note. Cables are passed through stake pockets in such a manner that the cable loop lays against the car frame. A short stake driven into the stake pocket will protect the cable loop from chafing and loosening. (This stake is omitted in fig. 89.) When flatcars which are provided with well-type stake pockets are received, a loop of the strapping cable is passed through

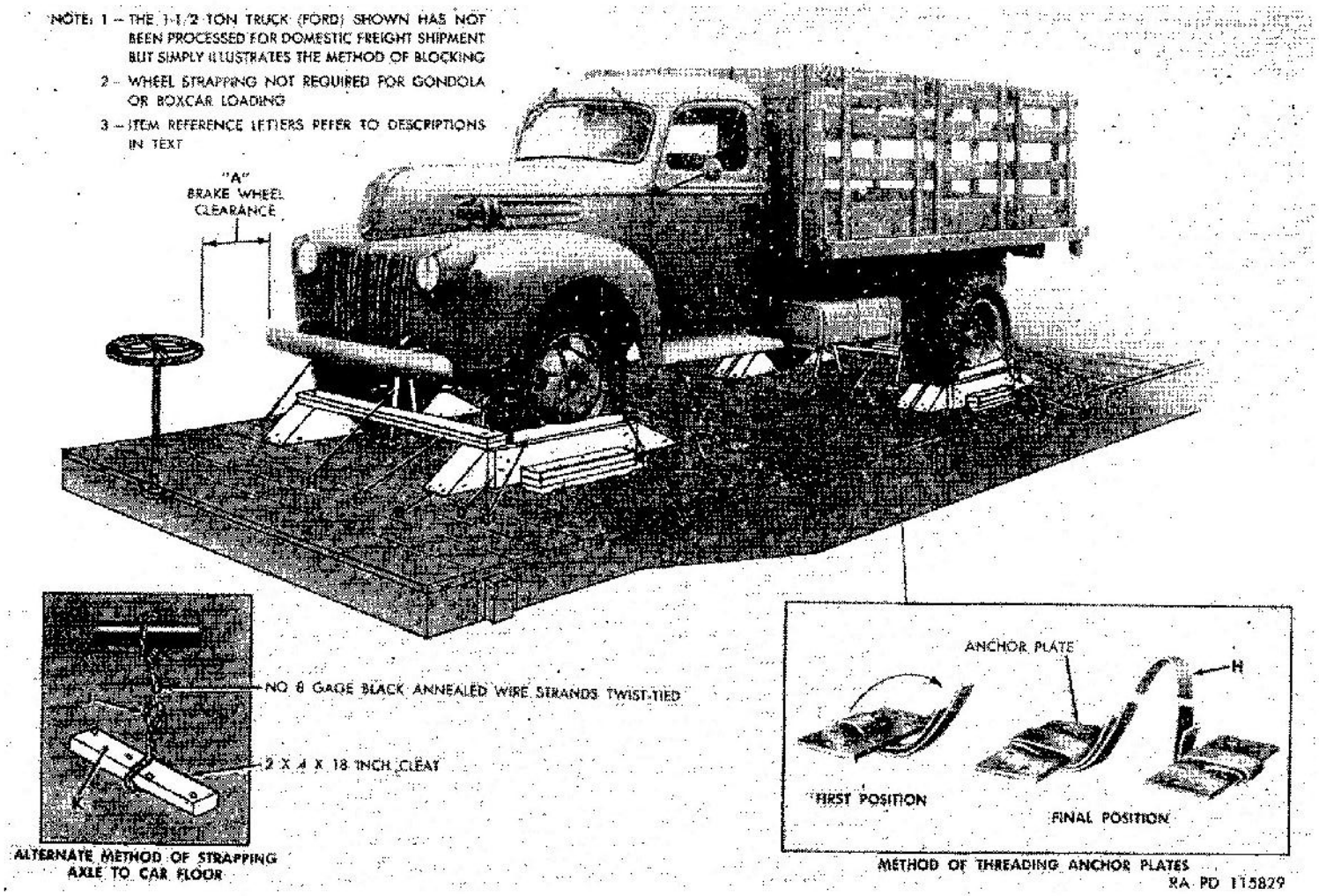

Figure 89. (Added) *Method of blocking 1½-Ton 4 x 2 (Ford) for rail shipment.*

the stake pocket and a short piece of wood, about 2 x 4 x 18 inches, is inserted in the loop below the stake pocket. Subsequent tightening of the strapping will cause the cable to draw the wooden block securely against the bottom of the stake pocket.

i. AXLE STRAPPING "H". Locate two pieces of 1¼ x 0.035-inch hot-rolled steel strapping over each axle close to brakes. Coil strapping around steel anchor plates as shown in figure 89. Secure by nailing anchor plates to car floor with not less than six twenty-penny nails (double-headed nails preferred). As an alternate method of securing axles, form and substitute a cable "J," consisting of four strands of No. 8 gage black annealed wire or wires of equivalent strength, at each location for steel strapping "H." Pass cables over axle and around wooden cleats "K" (2 x 4 x 18 inches). Locate cleats lengthwise of car and nail to car floor with four thirtypenny nails in each cleat. As in *h*(1) above, join both ends of cable together, twist, and tighten with rod or bolt just taut enough to take up slack (fig. 89 inset).

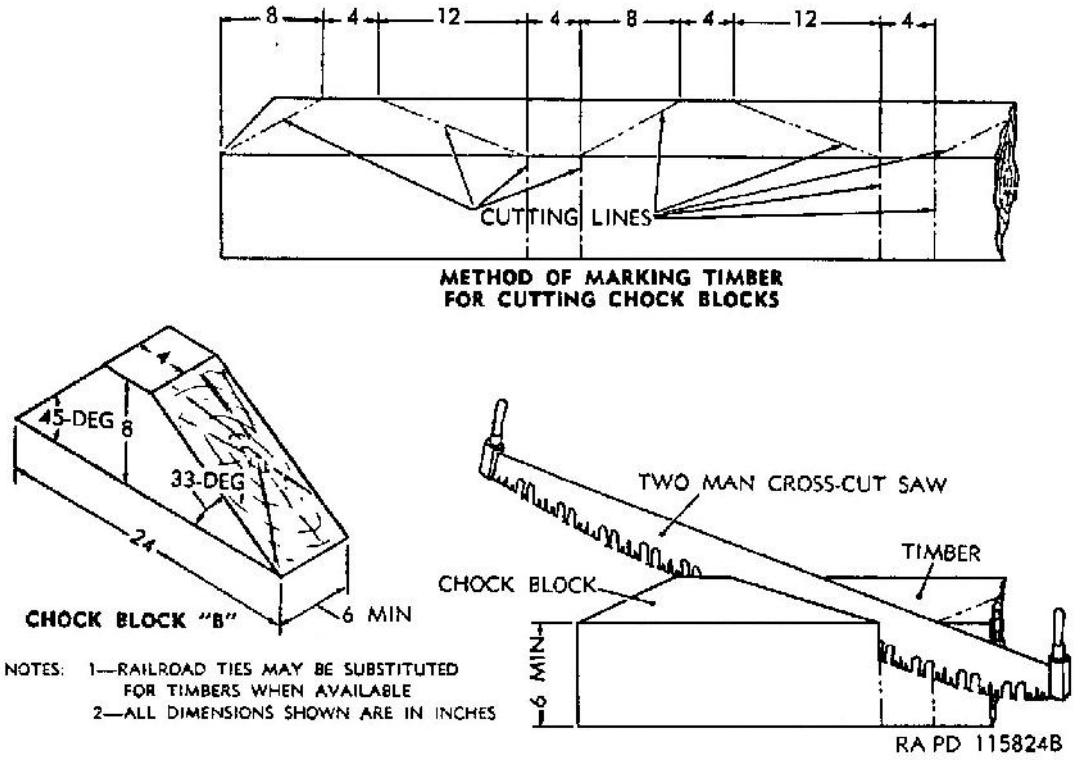

Figure 90. (Added) *Cutting chock blocks from timbers.*

Section XXXII. DESTRUCTION OF MATÉRIEL TO PREVENT ENEMY USE

152. General

a. Destruction of the vehicle and equipment, 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 ax, 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 usually will be sufficient to render the matériel useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the matériel must be so badly damaged that it cannot be restored to a usable condition in the combat zone either by repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the matériel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of time and personnel 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.

153. Destruction of the 1½-Ton 4x2 Truck (Ford).

a. METHOD NO. 1—BY BURNING.

(1) Remove and empty portable fire extinguishers.

(2) Puncture fuel tanks as near the bottom as possible, collecting gasoline for use as outlined in (5) below.

(3) Using an ax, pick mattock, sledge, or other heavy implement, smash all vital elements such as radiator, distributor, carburetor, generator, ignition coil, fuel pump, battery, 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.

(4) Slash tires. Exercise care to prevent injury from inflated tires blowing out while being slashed. Whenever practicable, it is usually preferable to deflate tires before slashing.

(5) Pour gasoline and oil over the wheels, brakes, and electrical wiring and then ignite. If gasoline and oil are not available, use incendiary grenades. If gasoline, oil, and incendiary grenades are available, a combination of them may be used. Elapsed time: about 6 minutes.

Caution: Due consideration should be given to the highly inflammable nature of gasoline and its vapor. Carelessness may result in painful burns.

b. METHOD NO. 2—WITH DEMOLITION MATERIALS.

(1) Remove and empty portable fire extinguishers.

(2) Puncture fuel tanks.

(3) Prepare two 2-pound charges of explosive (two 1-lb blocks of TNT or equivalent per charge). Set one charge on top of the clutch housing and the other on the right side of the engine, as low as possible. Connect the two charges for simultaneous detonation with detonating cord. 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 one foot in 30 to 45 seconds; test before using) or an electric blasting cap and firing wire may be used. The safety fuse, which contains black powder, and blasting caps must be protected from moisture at all times. The safety fuse may be ignited by a fuse lighter or a match; the electric blasting cap requires a blasting machine or equivalent source of electricity.

Caution: 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.

(4) Destroy the tires by placing an incendiary grenade under each tire. The detonation of the explosive charges should be delayed until the incendiary fires are well started. This will prevent the fires from being extinguished by the blast when the charges are detonated.

(5) 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. Elapsed time: about 6 minutes.

c. METHOD NO. 3—BY GUNFIRE.

(1) Remove and empty portable fire extinguishers.

(2) Puncture fuel tanks.

(3) Destroy the tires as in method No. 1 or 2 above.

(4) Destroy the vehicle by gunfire using artillery and machine guns, by rifles using rifle grenades, or by launchers using antitank rockets. Fire on the vehicle, aiming at the engine, axles, wheels, and body. 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. Elapsed time: about 6 minutes.

Caution: Firing at ranges of 500 yards or less should be from cover.

REFERENCES
(Rescinded)

APPENDIX
(Added)

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 ..... SR 310–20–5
Index of Army Motion Pictures and Film Strips ..... SR 110–1–1
Index of Army Training 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, Tables of Equipment, and Tables of Basic Allowances. SR 310–20–4
Introduction and Index (supply catalogs) ..... ORD 1
Military Training Aids ..... FM 21–8

2. Supply Catalogs

The following catalogs of the Department of the Army Supply Catalog pertain to this matériel:

a. DESTRUCTION TO PREVENT ENEMY USE.

Land Mines and Fuzes, Demolition Material, and Ammunition for Simulated Artillery and Grenade Fire. ORD 11 SNL R–7

b. MAINTENANCE AND REPAIR.

Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials. ORD 3 SNL K–1
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
Tool-Sets (Common), Specialists' and Organizational.	ORD 6 SNL G–27, Sec. 2

c. VEHICLE.

Truck, 1½-Ton, 4 x 2 (Ford)	ORD (*) SNL G–540

3. Forms

Standard Form 91, Operator's Report of Motor Vehicle Accident.
Standard Form 91A, Transcript of Operator's Report of Motor Vehicle Accident.
Standard Form 93, Report of Investigating Officer.
Standard Form 94, Statement of Witness.
DA Form 30b, Report of Claims Officer.
DA AGO Form 9–3, Processing Record for Storage and Shipment.
DA AGO Form 9–4, Vehicular Storage and Servicing Record.
DA AGO Form 9–68, Spot Check Inspection Report for Wheeled and Half-Track Vehicles.
DA AGO Form 9–74, Motor Vehicle Operator's Permit.
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, Work Sheet for Wheeled and Half-Track Vehicles—Preventive Maintenance Service and Technical Inspection.
DA AGO Form 461–5, Limited Technical Inspection.
DA AGO Form 468, Unsatisfactory Equipment Report.
DA AGO Form 478, MWO 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 317, Preventive Maintenance Service Due (Sticker).

4. Other Publications

The following publications contain information pertinent to this matériel and associated equipment:

a. CAMOUFLAGE.

Camouflage	TM 5–267
Camouflage, Basic Principles	FM 5–20
Camouflage of Vehicles	FM 5–20B

*See ORD 1, Introduction and Index, for published catalogs of the ordnance section of the Department of the Army Supply Catalog.

b. DECONTAMINATION.

Decontamination	TM 3-220
Decontamination of Armored Force Vehicles	FM 17–59
Defense Against Chemical Attack	FM 21–40

c. DESTRUCTION TO PREVENT ENEMY USE.

Explosives and Demolitions	FM 5–25

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
Instruction Guide: Operation and Maintenance of Ordnance Matériel in Extreme Cold (0° to —65° F).	TM 9–2855
Motor Transport	FM 25–10
Motor Vehicles	AR 700–105
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
Spark Plugs	TB ORD 313
Storage Batteries—Lead-Acid Type	TM 9–2857
Supplies and Equipment—General: Unsatisfactory Equipment Report.	SR 700–45–5

e. MAINTENANCE AND REPAIR.

Basic Maintenance Manual	TM 38–650
Cleaning, Preserving, Sealing, and Related Materials Issued for Ordnance Matériel.	TM 9–850
Hand, Measuring, and Power Tools	TM 10–590
Lubrication Order	LO 9–806
Maintenance and Care of Hand Tools	TM 9–867
Maintenance and Care of Pneumatic Tires and Rubber Treads.	TM 31–200
Motor Vehicle Inspection and Preventive Maintenance Services.	TM 37–2810
Painting Instructions for Field Use	TM 9–2851
Preparation of Ordnance Matériel for Deep-Water Fording.	TM 9–2853

f. SHIPMENT AND LIMITED STORAGE.

Army Marking Directive	TM 38–414
Army Shipping Document	TM 38–705
Instruction Guide: Ordnance Packaging and Shipping (Posts, Camps, and Stations).	TM 9–2854

Ordnance Storage and Shipment Chart—Group G....TB 9–OSSC–G
Preparation of Unboxed Ordnance Matériel for Shipment....SB 9–4
Protection of Ordnance General Supplies in Open Storage. TB ORD 379
Shipment of Supplies and Equipment: Report of Damaged or Improper Shipment. SR 745–45–5
Standards for Oversea Shipment and Domestic Issue of Ordnance Matériel Other Than Ammunition and Army Aircraft. TB ORD 385
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

[AG 300.7 (28 Feb 51)]

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