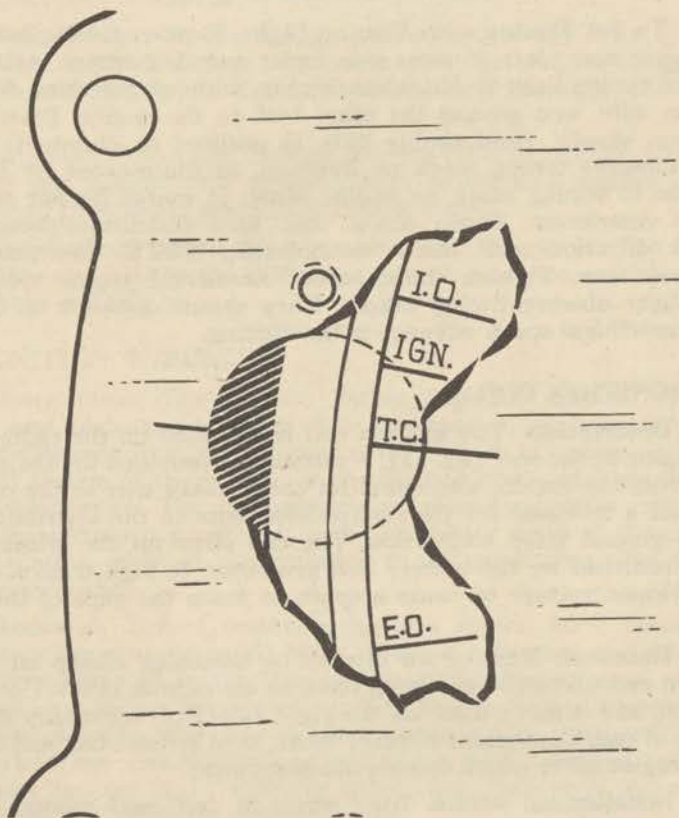


IGNITION SYSTEM



RA PD 305193

Figure 33—Timing Marks (Flywheel)

support plate, and the cable in good condition. Refer to paragraph 62 c for tests. Test condenser on a condenser tester, if available.

(2) **REMOVAL.** Slip off distributor cap clips and remove cap. Lift off rotor. Remove screw holding condenser to support plate. Remove screw in lead and remove condenser.

(3) **INSTALLATION.** Position condenser on plate and attach with screw. Attach lead. **NOTE:** Determine if distributor points have been disturbed. Install rotor and cap.

65. IGNITION TIMING.

a. **To Set Timing without Timing Light.** Remove timing hole cover on engine rear plate at right side under cranking motor. Remove distributor cap. Crank engine to No. 1 cylinder firing stroke (distributor rotor toward lower front corner of distributor). Set flywheel with ignition mark (fig. 33) in center of timing hole. Turn distributor housing so that breaker points are just opening, and tighten screw holding distributor to engine. Install timing hole cover.

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b. To Set Timing with Timing Light. Remove timing hole cover on engine rear plate at right side under cranking motor. Attach one lead of timing light to No. 1 spark plug, without removing the high-tension wire, and ground the other lead to the engine. Start engine and run slowly. Hold timing light in position to illuminate timing hole. Observe timing mark on flywheel, as illuminated by light, in relation to timing mark on engine plate. If marks do not coincide, loosen distributor clamp screw, and turn distributor housing in proper direction until marks do coincide. **NOTE:** *Use mirror for a better view.* Tighten clamp screw. Accelerate engine speed, and with light observe timing marks. They should separate to indicate that centrifugal spark advance is functioning.

66. IGNITION COIL.

a. Description. The ignition coil is mounted on the right side of the engine at the rear (fig. 21). A terminal is provided for the primary wire from the switch, a terminal for the primary wire to the distributor, and a terminal for the high-tension wire to the distributor cap, and a ground strap connection. The coil steps up the primary current, furnished by the battery and generator, to high-tension current of sufficient voltage to cause a spark to jump the gaps of the spark plugs.

b. Removal. Remove air cleaner by loosening clamp on flexible tube to carburetor; loosen wing nuts on air cleaner bracket at center of dash, and remove those on the right side. Pull secondary wire out of top of coil. Disconnect primary wires, then remove coil and bracket from engine, after which remove the bond strap.

c. Installation. Attach bond strap to coil, and mount coil on engine with bond strap on coil bracket front stud, and tighten securely. Attach primary wires, and push secondary wire into top of coil. Install air cleaner, and tighten hose clamp.

67. SPARK PLUGS.

a. Description. Spark plugs (fig. 22) are located in the top of the cylinder head at the left side. The plugs are of the one-piece type. A copper-silver alloy gasket is used on each plug for heat transfer to the cylinder head, and to prevent leakage of compression. Push-on type wire terminals are used with radio filters at each plug. A spark plug insulator cap is fitted on each plug to protect the plugs from water and dirt. No shielding is used on the plugs.

b. Adjustment. To adjust the gap, bend the side electrode only, and gage the plug with a round thickness gage to a gap of 0.030 inch.

c. Removal. To avoid breakage of the porcelain, remove the plugs with the socket wrench and handle furnished in the vehicle tool equipment.

d. Installation. Install new plug gaskets if available. Tighten spark plugs snug so that gasket will compress.

IGNITION SYSTEM

68. IGNITION SWITCH.

a. **Description.** On the earlier production, a key-type ignition switch was used which has been superseded by an interchangeable lever-type switch (fig. 5). Turn the switch lever clockwise for "ON" position.

b. **Removal.** Disconnect battery positive cable at battery. Unscrew retaining nut against face of instrument panel, and remove switch from panel. Disconnect wires and remove switch.

c. **Installation.** Install the wires on proper terminals, then fit the switch into the hole in the instrument panel, screw on retaining nut, and tighten securely.

69. IGNITION WIRING.

a. **Description.** The ignition wiring (fig. 30) consists of low-tension and high-tension wires. The low-tension, or primary wires, carry the current from the ignition switch, which is connected to the electrical system of the vehicle, to the ignition coil, and from the coil to the distributor. The high-tension or secondary wires carry the high-voltage current generated in the secondary wires of the coil, to the distributor, where it is distributed to the spark plugs. No shielding harness is used.

b. **Removal.** Before removing ignition switch wire, disconnect the battery negative (ground) cable. It is not necessary to disconnect the battery cable to replace the coil-to-distributor primary wire or the secondary wires. Disconnect wires at terminals, and remove wire or harness, opening wire clips on the harness in which the switch wire is a part. When removing secondary wires mark terminal tower in distributor cap for No. 1 cylinder spark plug. Pull wires out of distributor cap and off spark plug terminals.

c. **Installation.** To install primary wires, run wire or harness through clips, and attach terminals securely. Install secondary wires, for spark plugs, through support bracket. Push terminals down well into the proper distributor towers (fig. 32). Push rubber secondary wire tip down in place on distributor towers. Push terminals down on proper spark plugs. Refer to firing order (par. 62 b).

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Section XVI

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS

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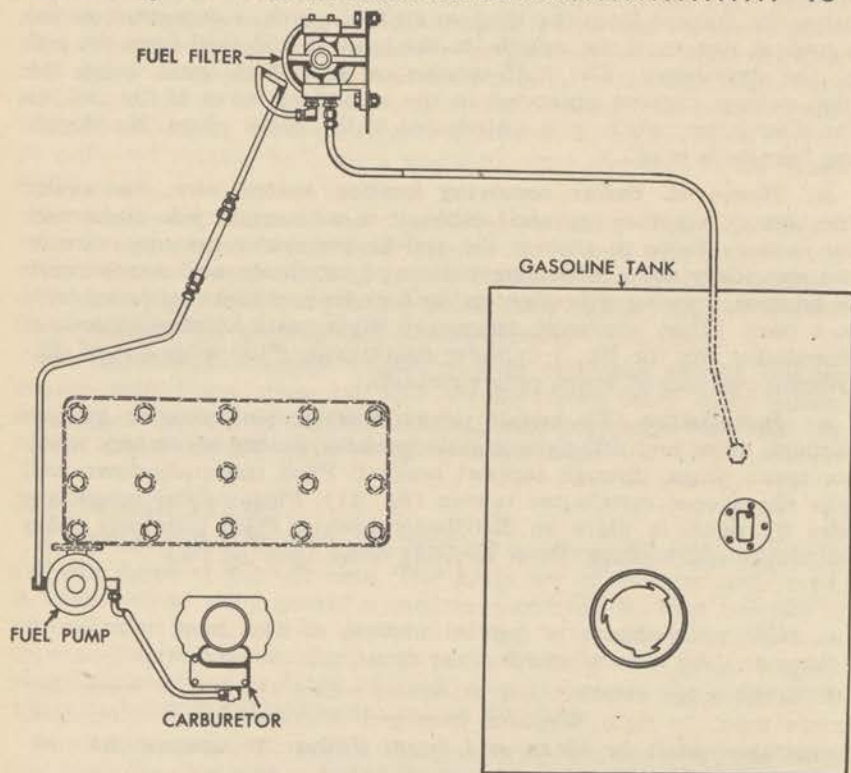


Figure 34—Fuel System

RA PD 305196

70. DESCRIPTION AND DATA.

a. **Description.** The fuel system (fig. 34) consists of the fuel tank, fuel lines, fuel strainer, fuel pump, carburetor, and air cleaner. In

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS

addition to these units an electric-type fuel gage is mounted on the instrument panel, and is connected by one wire to a fuel tank unit.

b. Data.

Carburetor	Carter WO-539S
Air cleaner	Oakes 613300
Fuel pump	AC 1538312
Fuel pump static pressure	4.5 lb at 1,800 rpm
Fuel tank capacity	15 gal
Fuel strainer	Type T-2; AC1595848
Fuel gage	Electric actuation

c. **Operation.** Fuel in the tank is drawn through the fuel strainer by the action of a pump mounted on the forward left side of the engine. The pump also forces the fuel into the carburetor bowl until the flow is shut off by the carburetor float valve. In the carburetor, the fuel is proportioned and mixed with air drawn through the carburetor, from the oil-bath type air cleaner, by the action of the engine pistons. The fuel system must be inspected and cleaned periodically (par. 16). Tighten connections which show signs of leakage, and replace kinked or damaged lines.

71. MAINTENANCE.

a. The carburetor requires attention only to the idle adjustment. Fuel lines and vacuum connections must be tight. All mounting screws must be tight. Choke and throttle control clamp screws must be tight. Exterior of carburetor must be kept clean. All linkage must be lubricated at regular intervals, and be free to operate.

b. The air cleaner requires periodic check of correct oil level and condition of oil. Element must be kept clean and free from dirt. Mounting screws and clamps must be tight.

c. The fuel pump requires periodic cleaning of screen. Mounting screws and fuel line connections must be tight. Failure to function properly requires replacement of unit.

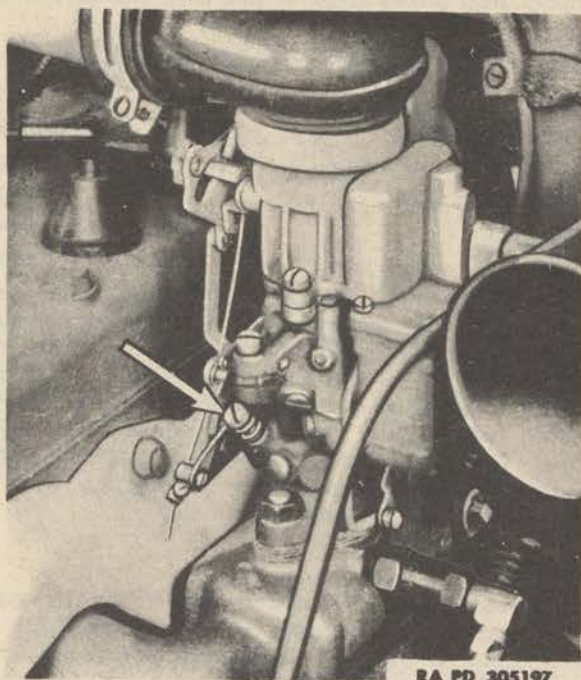
d. Drain fuel tank periodically to remove dirt and water. All connections and mounting bolts must be tight. Filler cap must be kept clean, and gasket checked for seat. Filler neck screen must be cleaned at regular intervals.

e. Clean fuel strainer at regular intervals. Gasket must be replaced if damaged. All connections and mounting bolts must be tight.

f. Fuel gage requires no attention other than that mounting screws must be tight. Replace damaged or frayed wires. Electrical connections must be clean and tight. Failure to operate requires replacement of unit.

72. CARBURETOR.

a. **Description.** The carburetor (fig. 35) is of the conventional downdraft, plain-tube type, with a throttle operated accelerator pump and economizer device. The carburetor is a precision instru-

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
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ment which delivers the proper fuel and air mixture for all speeds and operating requirements of the engine.

b. Adjustment. The idle adjustment screw indicated in figure 35 is the only service adjustment provided on the carburetor. To obtain the approximate correct setting, turn the adjustment screw to the right and all the way in, but do not jam the screw against the seat; then, back out adjustment screw between one and two turns. To make the final adjustment, warm up the engine, and adjust the screw until the engine runs smoothly. Set the throttle stop screw so the engine will idle at 600 revolutions per minute (vehicle speed, 8 mph). Replace carburetor if it requires other attention.

c. Removal. Loosen clamp on air horn and flexible air hose, and remove air horn. Remove throttle and choke control wires. Disconnect throttle control rod at throttle lever. Disconnect fuel line at carburetor. Remove carburetor flange nuts and retracting spring clip, and lift off carburetor.

d. Installation. Inspect condition of gaskets between carburetor and manifold, and install new gaskets, if required. Install carburetor retracting spring clip, and carburetor flange nuts. Tighten nuts evenly. Connect throttle control rod, and throttle and choke wires. Install carburetor air horn, and tighten clamp screws. Adjust carburetor (subpar. b above).

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS

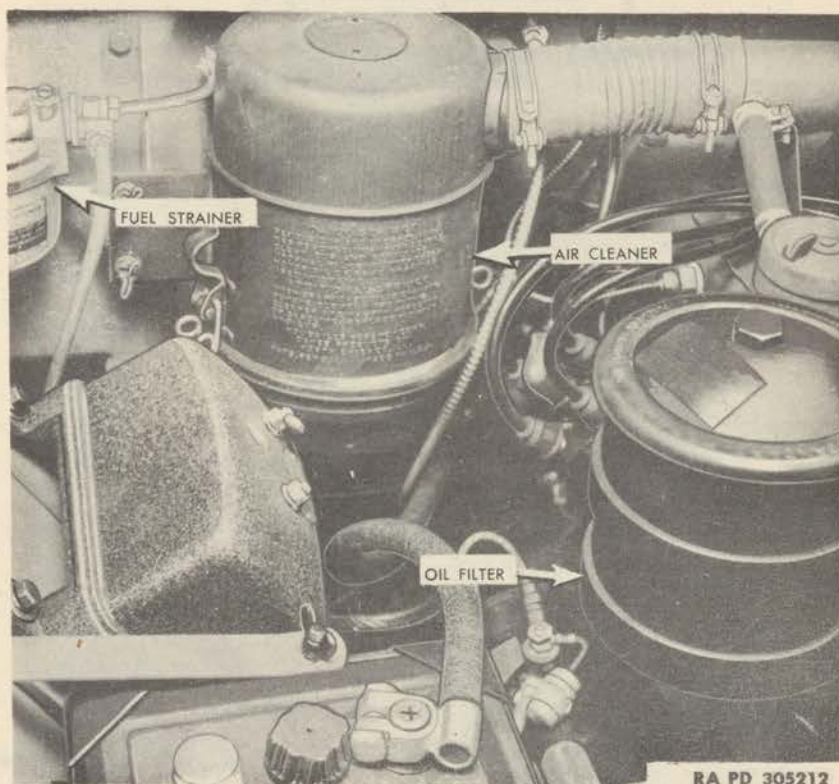


Figure 36—Air Cleaner and Oil Filter

73. AIR CLEANER.

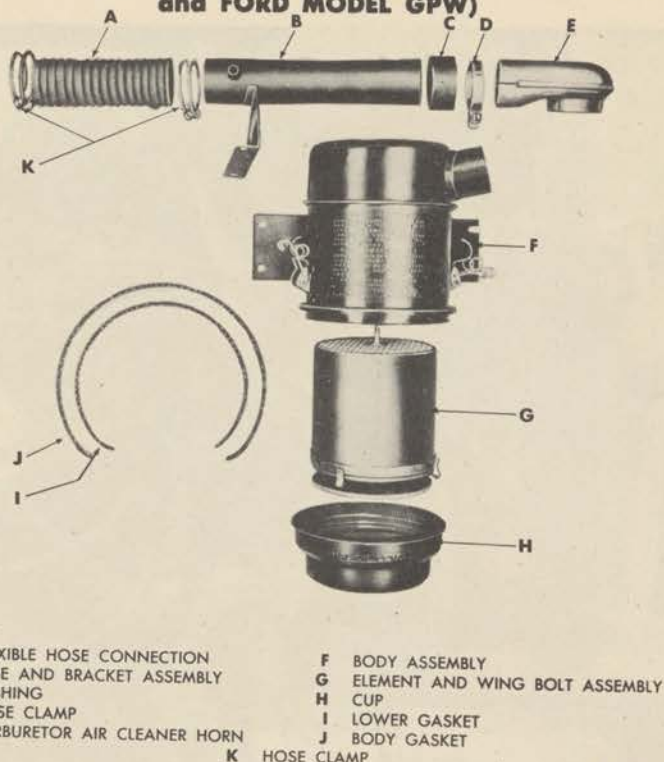
a. **Description.** The air cleaner (fig. 36) is of the oil-bath type, and mounted on the right-front side of the dash. Air enters through louvers in the dash side of the unit, passes down and across the surface of the oil, up through the filtering element, then to the carburetor. For servicing of air cleaner refer to subparagraph d below.

b. **Removal of Oil Cup.** Hold one hand under cup and spring loose the two retaining clamps. Remove cup, clean, and refill to indicated oil level.

c. **Installation.** Place cup in position on bottom of cleaner, push up into place, and lock with the retaining clamps.

d. **Removal and Servicing of Air Cleaner.** Loosen the hose clamp and two wing nuts at the center of the dash. Remove two wing nuts on right side of dash, and lift out cleaner assembly. Unfasten the two clamps holding oil cup in place, and remove cup (fig. 37). Unscrew element wing bolt in bottom center of cleaner, and pull out cleaner element. Plunge the element up and down in dry-cleaning solvent to wash out any dirt, then dry with compressed air.

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- | | |
|-------------------------------|----------------------------------|
| A FLEXIBLE HOSE CONNECTION | F BODY ASSEMBLY |
| B TUBE AND BRACKET ASSEMBLY | G ELEMENT AND WING BOLT ASSEMBLY |
| C BUSHING | H CUP |
| D HOSE CLAMP | I LOWER GASKET |
| E CARBURETOR AIR CLEANER HORN | J BODY GASKET |
| K HOSE CLAMP | |

RA PD 305281

Figure 37—Air Cleaner, Disassembled

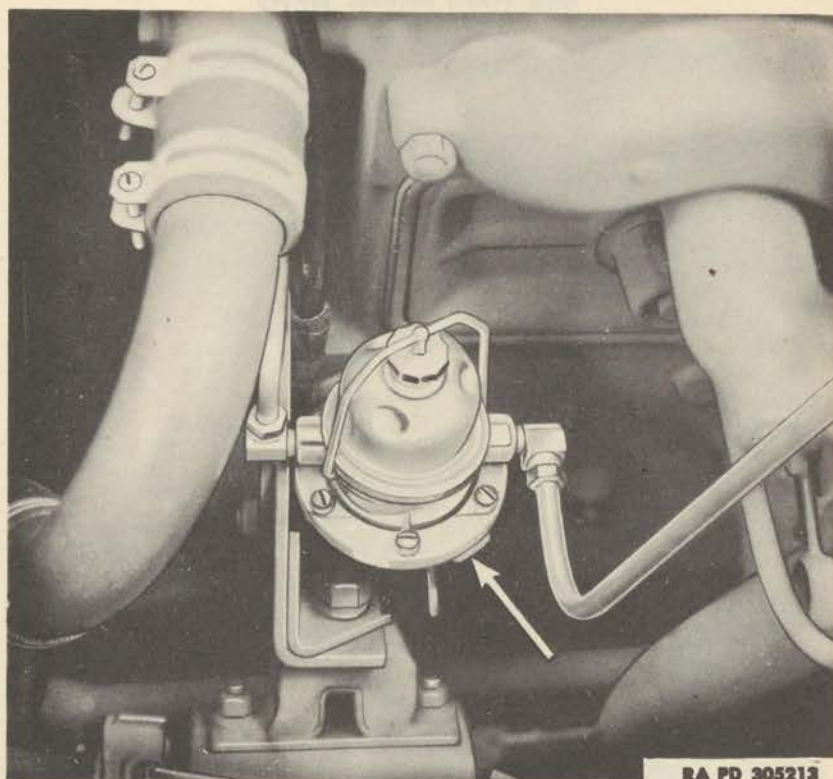
e. Installation. Install the element in cleaner housing, and secure in place with retaining bolt. Clean and refill oil cup to indicated level, and clamp into place on cleaner. Mount cleaner on dash, install and tighten mounting nuts, and tighten air hose clamp in place.

74. FUEL PUMP.

a. Description. The fuel pump (fig. 38) located on the forward, left side of the engine is a diaphragm type, operated by a lever against an eccentric on the engine camshaft. The pump is equipped with a hand lever on the rear side which can be used to operate the pump for priming the carburetor bowl. Lever must be placed down for camshaft to operate pump. A filter screen is incorporated in the fuel bowl, and should be cleaned periodically (subpar. **b** below).

b. To Clean Screen. Unscrew knurled nut on bowl clamp, swing clamp aside and lift off bowl. Clean screen with dry-cleaning solvent and small brush. Dry with compressed air. Blow out fuel chamber lightly with compressed air and install screen in place. Install new bowl gasket or turn over old one if serviceable. Install bowl, place bail clamp in position and tighten securely.

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS



RA PD 305213

Figure 38—Fuel Pump

c. Removal. Remove the inlet and outlet lines, remove two screws holding pump to side of engine and remove pump.

d. Installation. Install pump in place on crankcase and tighten securely with two screws. Inspect gasket and replace if unserviceable. Attach inlet and outlet lines and tighten. Prime pump by operating priming lever, start engine, and check connections for leaks.

75. FUEL TANK.

a. Description. The fuel tank (fig. 39) is located under the driver's seat. An extension filler neck can be pulled up to facilitate filling the tank from a container. After removing the filler cap, pull up on the filler extension, and turn to the right to lock it in place. To remove the filler extension from the tank turn it to the left and pull up.

b. Removal. Drain fuel by removing drain plug in left side of tank. Remove bolts in seat rear flange and front legs, then lift out seat. Remove filler cap. Disconnect fuel gage wire and remove fuel

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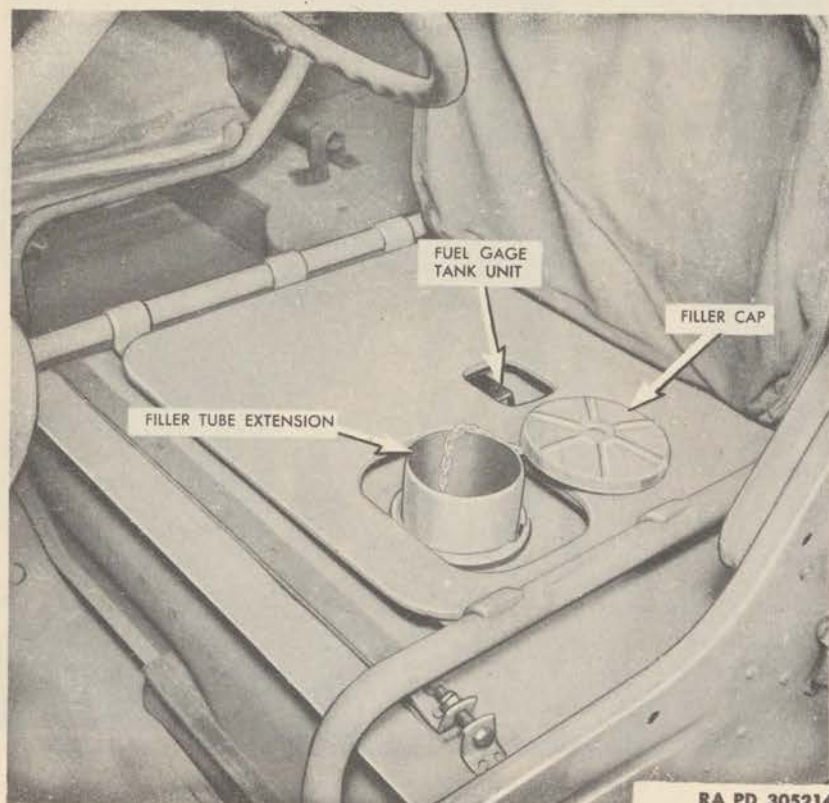


Figure 39—Fuel Tank

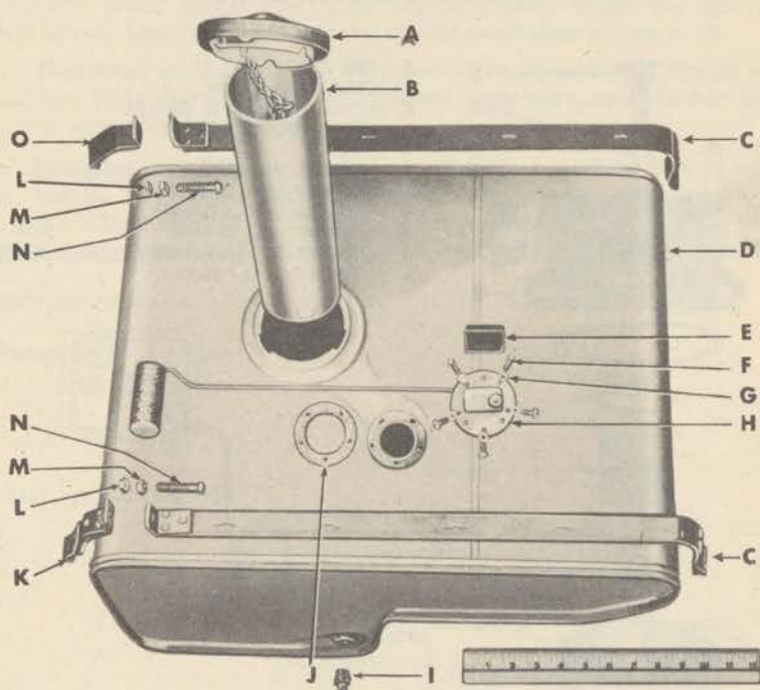
gage unit by taking out five screws. Disconnect fuel line from tank, under vehicle. Remove bolt holding tank to wheel housing, remove bolts in tank straps, and lift out tank.

c. **Installation.** Clean out fuel tank sump in body, and install tank in place. Attach tank straps and bolts, also bolt holding tank to wheel housing. Connect fuel line to tank. Install fuel gage in tank, and attach wire to gage. Set seat in position and secure in place with bolts in front legs and seat flange. Fill tank, install cap and check tank and connections for leaks.

76. FUEL STRAINER.

a. **Description.** The fuel strainer (fig. 41) has a disk-type (laminated) element, and a settling bowl for dirt and water. It is located between the fuel tank and the pump, and is mounted on the right-front side of the dash. Service this unit in accordance with preventive maintenance procedure (par. 16).

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS



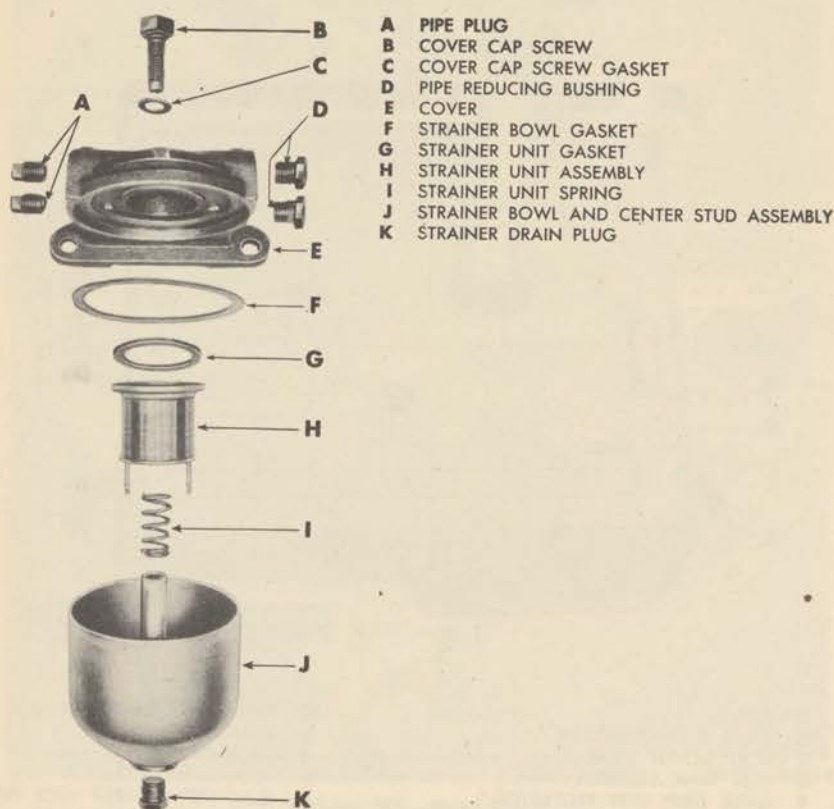
- | | | | |
|---|-------------------------------|---|--------------------------|
| A | CAP | H | GAGE TANK UNIT ASSEMBLY |
| B | FILLER TUBE EXTENSION | I | DRAIN PLUG |
| C | HOLD DOWN STRAP | J | GAGE GASKET |
| D | FUEL TANK ASSEMBLY | K | HOLD DOWN CLAMP |
| E | GAGE TANK UNIT PROTECTOR | L | HOLD DOWN STRAP LOCK NUT |
| F | GAGE TO TANK SCREW | M | HOLD DOWN STRAP NUT |
| G | GAGE TO TANK SCREW LOCKWASHER | N | STRAP CLAMP SCREW |
| O | STRAP CLAMP | | |

RA PD 334756

Figure 40—Fuel Tank, Disassembled

b. To Clean Strainer. Remove drain plug and allow strainer to drain into a container. **NOTE:** *Do not allow fuel to drain onto cranking motor.* Unscrew cover bolt and remove strainer bowl and element. Do not damage bowl gasket. Remove element from bowl, and clean thoroughly in dry-cleaning solvent. Be sure all dirt particles are removed from between disks of the element. Blow element dry with compressed air, but do not use extreme pressure. Wash strainer bowl, and dry with clean cloth. Install element spring and element in bowl. Check condition of element gasket, bowl gasket and cover bolt gasket, and replace, if damaged. Install gaskets in position, and assemble bowl to cover. Install cover bolt and gasket, and tighten securely. Install drain plug. Start engine, run a few minutes, stop engine, and check for leaks.

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RA PD 305282

Figure 41—Fuel Strainer, Disassembled

c. Removal. Disconnect inlet and outlet lines from strainer (fig. 36). Open glove compartment door, and remove mounting bolt nuts, then remove strainer.

d. Installation. Place mounting bolts in strainer bracket, and reinstall on dash. Install nuts on bolts through glove compartment. Attach inlet and outlet lines to strainer. Start engine, run a few minutes, stop engine, and check for leaks.

77. FUEL GAGE.

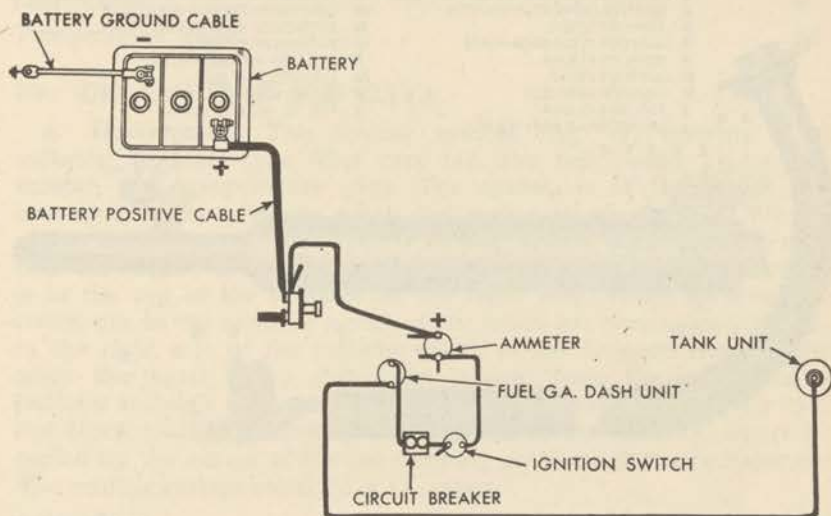
a. Description. The fuel gage consists of an electrical indicating unit located in the instrument panel, and a tank unit in the fuel tank, for actuating the instrument panel unit. A float in the tank operates a rheostat, which governs the current flowing through the

FUEL AND AIR INTAKE AND EXHAUST SYSTEMS

instrument panel gage. The gage registers only while the ignition switch is on. The fuel gage wiring circuit is shown in figure 42.

b. Removal of Tank Unit. Remove bolts in seat rear flange and front legs. Take out seat. Disconnect fuel gage wire, and remove tank unit, by unscrewing five screws.

c. Installation of Tank Unit. Inspect gasket, and replace if damaged. Install tank unit, and secure with five screws. Attach wire to fuel gage. Check operation of gage by turning ignition switch to "ON" position; gage must register amount of fuel in tank. Turn off ignition



RA PD 305198

Figure 42—Fuel Gage Wiring Circuit

switch. Install seat, and secure in place with bolts in front legs and seat rear flange.

d. Removal of Fuel Gage (Instrument Panel). Disconnect positive terminal cable at battery. Remove wires on back of gage, and two retaining nuts on the retaining bracket. Remove bracket and take gage out through front of panel.

e. Installation of Fuel Gage (Instrument Panel). Place gage in panel, and install retaining clamp and nuts. Position gage correctly, and tighten retaining clamp nuts. Attach wires (wire to tank unit is attached to left terminal; wire from circuit breaker attaches to right-hand terminal). Clean terminal, and install positive cable on battery.

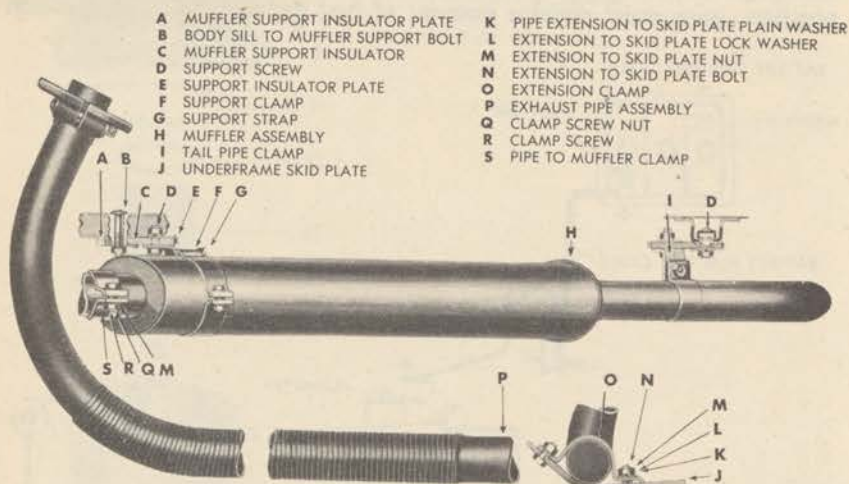
78. EXHAUST SYSTEM.

a. Description. The exhaust system (fig. 43) consists of the exhaust pipe which, for maximum road clearance, passes under the vehicle to the muffler located under the right side of the body. A

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flexible section of the exhaust pipe permits movement of the engine in the frame. The muffler is mounted on brackets with fabric inserts.

b. Removal of Exhaust Pipe. Remove three bolts in exhaust pipe shield at right frame member and remove shield. Remove two exhaust pipe clamp bolts in skid plate under transmission. Loosen clamp on exhaust pipe, at front end of muffler. Remove bolt and



RA PD 305257

Figure 43—Exhaust System

screw in exhaust pipe flange at exhaust manifold. Drop front end of exhaust pipe, and remove from the left side of vehicle. Discard gasket.

c. Installation of Exhaust Pipe. Install pipe in position, and insert rear end in muffler. Install exhaust pipe manifold flange gasket, and attach pipe to manifold with screw and nut, and tighten evenly. Attach clamp at muffler, and attach exhaust pipe shield with three bolts.

d. Removal of Muffler. To remove the muffler, loosen exhaust pipe clamp. Remove muffler front support bolt and tail pipe support bolt. Remove muffler assembly, after which, remove muffler strap and tail pipe clamp.

e. Installation of Muffler. Loosely install tail pipe clamp and support clamp on muffler. Place muffler on exhaust pipe. Install bolt through tail pipe clamp and flexible mounting. Tighten tail pipe clamp bolt. Install bolt in muffler support and flexible mounting. Tighten muffler strap bolt and exhaust pipe clamp.

Section XVII

COOLING SYSTEM

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79. DESCRIPTION AND DATA.

a. **Description.** The cooling system (fig. 44) consists of the radiator, pressure-type filler cap, fan, fan belt, water pump, thermostat, and temperature gage. The system is of the sealed type, operating under pressure when the engine is warmed up. When in proper condition, the units of the cooling system automatically maintain the engine at the proper operating temperature. The filler pipe is in the top of the radiator at the right side. There are two drain cocks, one in the radiator outlet at the lower left corner, and the other in the right side of the cylinder block at the forward end. In operation the water pump draws the coolant from the bottom of the radiator through the hose connection, and forces it through the cylinder block, past the thermostat, and back to the radiator, where it is cooled by the action of the fan drawing air through the radiator core. The cooling system capacity is 11 quarts.

b. **Data.**

Cooling system

Capacity 11 qt

Radiator

Type Fin and tube

Filler cap Pressure type

Water pump

Type Centrifugal

Drive Fan belt

Bearings Prelubricated ball

Fan belt

Type Vee

Length 44 $\frac{1}{8}$ in.

Width 1 $\frac{1}{16}$ in.

Angle of Vee 42 deg

Fan

Blades 4

Diameter 15 in.

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Thermostat

Opens 145° to 155°F

Fully open 170°F

Temperature gage type Capillary

80. MAINTENANCE.

a. The cooling system must be inspected in accordance with preventive maintenance procedures (pars. 13 and 16). When draining the cooling system refer to caution plate on the instrument panel (fig. 7). General maintenance of the cooling system consists of the following procedures.

(1) Keep sufficient coolant in the system. Use clean water to which must be added the specified rust inhibitor; at temperatures below 32°F, add proper quantity of antifreeze solution (par. 7).

(2) Drain, flush, and refill system whenever inspection reveals any accumulation of rust or scale. Clean system seasonally as well as before and after using antifreeze solution.

(3) If engine overheats due to lack of coolant in the system, do not add cold water immediately. Let engine cool so that radiator does not boil, start engine, and add water slowly to prevent damage to cylinder block and head.

(4) Do not overfill radiator. Fill radiator to bottom of baffle visible through the radiator filler hole.

(5) Keep cylinder head, water pump, hose clamps, and connections leakproof. Replace deteriorated or leaky hose.

(6) Adjust fan belt and replace as required.

(7) Test periodically for air suction and exhaust gas leaking into system (subpars. c and d below).

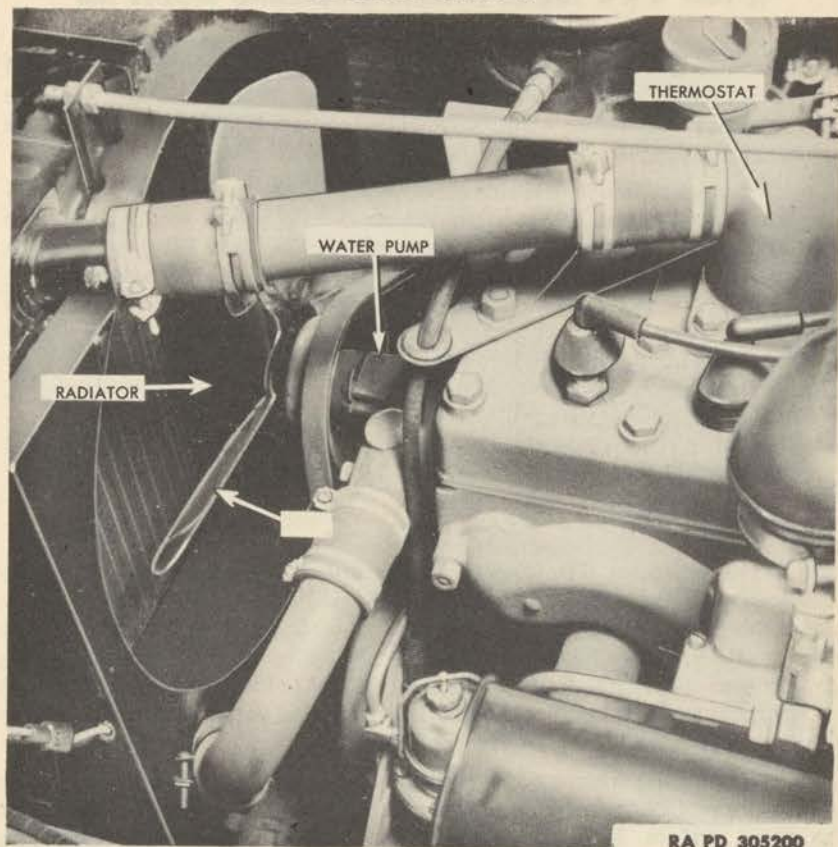
b. Draining and Refilling System.

(1) Drain the cooling system, when required, by opening the drain cocks at the lower left corner of the radiator, and at the right front corner of the cylinder block. Loosen the pressure-type radiator cap to break any vacuum which might prevent proper draining. If solution is to be saved, catch it in a clean container. If system is not to be refilled immediately, attach a tag to the steering wheel, warning personnel about the system being drained.

(2) Refill the cooling system by first closing the two drain cocks tightly. Use clean water available, preferably soft water (water with low alkali content or other substances that promote rust and scale). Fill system through radiator filler pipe until level is up to lower edge of baffle visible through filler hole. Install radiator cap, and turn clockwise to tighten. Start engine and warm up. Check coolant level in radiator, and add more if required.

c. **Air Suction Test.** The air suction test is used to determine if air is entering the coolant, possibly due to low coolant level in the radiator, leaky water pump, or loose hose connections. To make test,

COOLING SYSTEM



RA PD 305200

Figure 44—Cooling System

fill system to bottom edge of baffle in top of radiator. Replace pressure type cap with plain cap, and tighten securely (airtight). Attach length of rubber tubing to lower end of overflow pipe (this connection must be airtight). Run engine, with transmission in neutral, at a moderate speed until warmed up. Place tubing in glass container of water, and without changing engine speed, watch for bubbles in water. Continuous appearance of bubbles indicates that air is entering coolant. The cause will be one of the above, and must be corrected.

d. **Exhaust Gas Leakage Test.** The exhaust gas leakage test is used to determine if gas is entering the coolant, possibly due to leaky cylinder block, cylinder head, or gasket. **NOTE:** *Make this test with engine cold.* Remove fan belt. Open radiator drain cock until coolant is below cylinder head water outlet. **NOTE:** *Determine by loosening three screws holding outlet to head.* Remove water outlet, and fill cylinder head with coolant until level is up to top of head. With

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transmission in neutral, start engine, "gun" it several times, and watch for bubbles in water. Appearance of bubbles indicates leakage from one of the above conditions, which must be corrected. Replace leaky gasket; report other causes to higher authority.

e. Cleaning and Flushing Procedure. This procedure is used to clean out loose rust. Run engine at moderate speed to stir up loose rust. Drain cooling system. Close drain cocks, and fill system with specified cleaning compound. Install radiator cap. Operate engine as directed for prescribed solution. Stop engine and completely drain system by opening both drain cocks. To flush system close drain cocks, fill system with water, run engine until warmed up again, or run water through system, then completely drain. Close drain cocks, refill system, and add inhibitor corrosion compound to prevent formation of rust and scale. Inhibitor compound must be renewed periodically to be effective.

81. RADIATOR.

a. Description. The radiator assembly (fig. 44) consists of the fin-and-tube type core with a coolant tank at the top, and a sediment tank at the bottom. It is located in the conventional place at the front of the vehicle. A pressure-type filler cap maintains up to 4 3/4-pound pressure to give better engine efficiency, and prevent evaporation of the coolant. When the engine is warm, release pressure by turning cap slightly before removal.

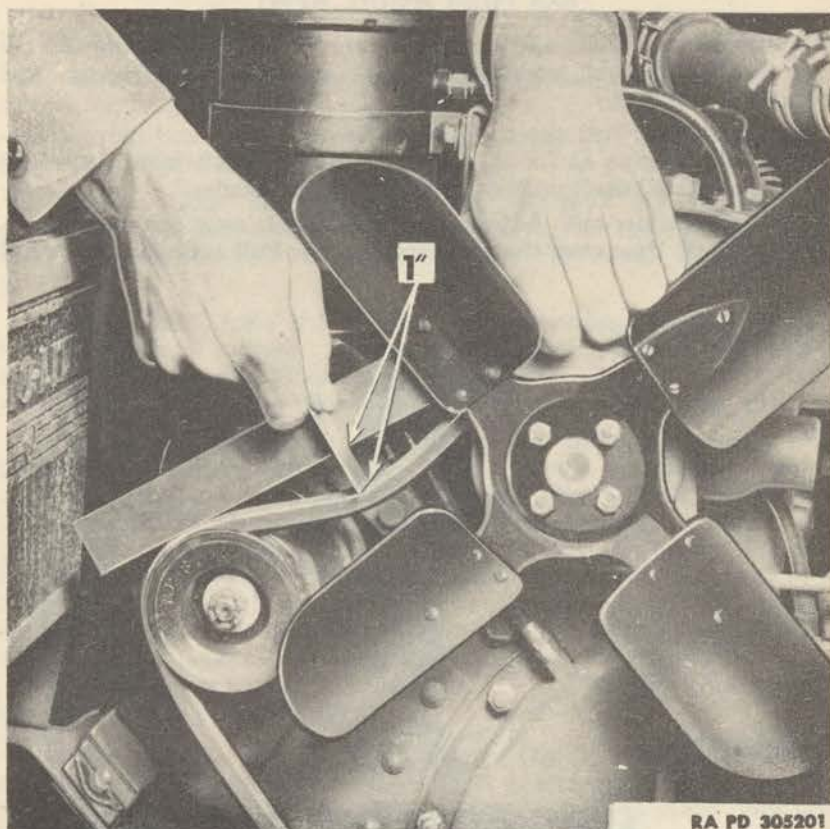
b. Removal. Remove the radiator filler cap. Open the drain cock on bottom of radiator outlet and right front corner of cylinder block to drain system. Remove radiator stay rod nut at front end. Loosen hose clamp on upper hose at front end. Loosen hose connection at water pump. Remove two radiator hold-down nuts and lift off radiator, then remove drain cock and pads.

c. Installation. Install drain cock and place pads on bracket; set radiator in place. NOTE: *A light coating of grease in hose connections will facilitate assembly.* Install stay rod and tighten lock nut. Tighten upper and lower hose clamps. Install hold-down nuts and bond strap. Close radiator drain cock and cylinder block drain cock. Fill radiator, install cap, and check system for leaks. Start engine, check coolant level after engine is warmed up, and fill, if needed, to proper level.

82. WATER PUMP.

a. Description. The water pump (fig. 44) is of the centrifugal-impeller type and is located in the front end of the cylinder block. A double-row ball bearing is integral with the shaft, and is packed with lubricant when it is made. No lubrication attention is required. A packless self-sealing gland is used to prevent water leakage, and requires no attention. The water pump with the generator and fan is driven by a belt from the engine crankshaft fan pulley.

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RA PD 305201

Figure 45—Fan Belt Deflection

b. Removal. Open the radiator drain cock in outlet pipe at lower left corner of radiator, and also drain cock in right side of cylinder block at forward end. Remove radiator filler cap. Pull up on handle of generator brace to loosen fan belt, and slip off belt. Loosen pump hose clamp and remove hose. Remove fan blade screws. Remove screws holding water pump in cylinder block, and remove water pump.

c. Installation. Check condition of pump to cylinder block gasket. Replace if damaged. Install pump in cylinder block, and tighten with screws. Install fan and screws. Install fan belt, and pull out generator until brace drops into position. Attach hose connection. Fill radiator, install cap, and check system for leaks. Start engine and check radiator coolant level after engine is warmed up.

83. FAN BELT.

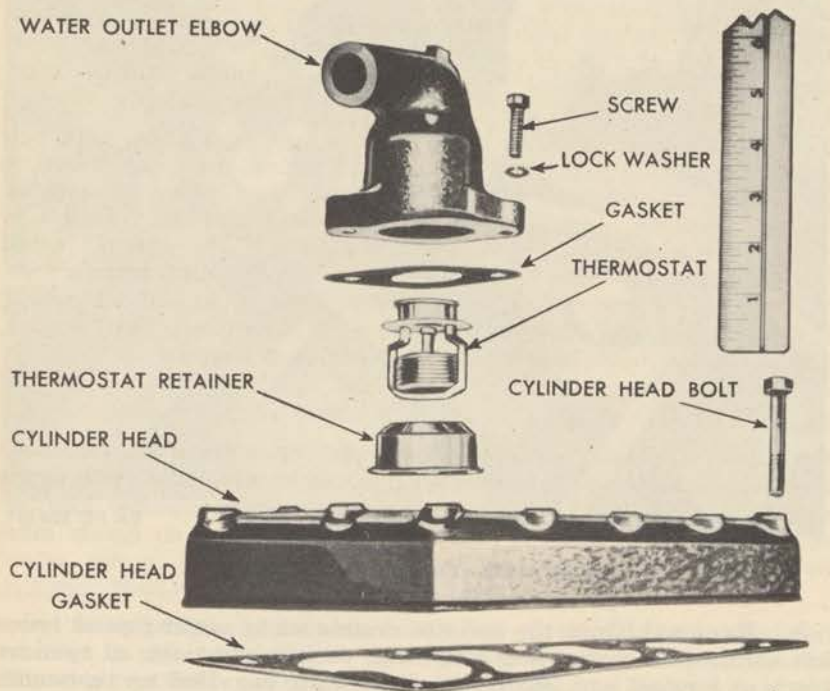
a. Description. The fan belt (fig. 45) is of the V-type and drives the fan, water pump, and generator. Proper adjustment is necessary

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
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for efficient operation and maximum life of belt. Do not adjust the belt extremely tight, causing excessive wear on water pump and generator bearings.

b. Removal. Pull up on generator brace handle, and move generator toward engine as far as it will go. Remove belt from generator, pump, and crankshaft pulleys, and lift over fan blades.

c. Installation and Adjustment. Place belt over fan and crankshaft pulleys, then over the generator pulley. Pull generator out until



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Figure 46—Thermostat, Disassembled

generator brace locks in position. To adjust fan belt tension, loosen generator brace nut, and move generator until fan belt has about one-inch deflection midway between fan and generator pulleys (fig. 45), then tighten nut.

84. FAN.

a. Description. A four-blade, 15-inch fan (fig. 44) draws air through the radiator core. It is mounted on the front end of the water pump shaft and is driven from the crankshaft by the same belt which drives the generator.

COOLING SYSTEM

b. Removal. Remove four screws holding fan on fan pulley, and lift fan out of shroud.

c. Installation. Place fan in position on fan pulley, install four screws, and tighten securely.

85. THERMOSTAT.

a. Description. The thermostat (fig. 44) is of the bellows-type, and located in the water outlet elbow on top of the cylinder head. It is designed to open between 140°F and 155°F, and is fully open at 170°F.

b. Removal. Drain the cooling system by opening drain cock at lower left side of radiator. Loosen hose clamp at cylinder head water outlet elbow; remove three screws, and lift off elbow. Pull out thermostat retaining ring in elbow, and take out thermostat (fig. 46).

c. Installation. Place thermostat in water outlet elbow with bellows down, so that coolant can reach bellows, to cause valve to operate. Install retaining ring with flanged edge against thermostat. Check condition of gasket and cylinder head surface. Install new gasket if necessary. Insert outlet elbow in hose connection. Install outlet elbow on cylinder head, and tighten in place with three screws. Tighten hose connection. Close radiator drain cock, and fill cooling system, giving due attention to antifreeze, if required. Start engine, and check for leaky connections after engine is warmed up.

86. TEMPERATURE GAGE.

a. Description. The temperature gage (fig. 5) is of the Bourdon-type with a capillary tube connecting it to an expansion bulb in the right side of the cylinder head. The entire system is sealed into one assembly; if any difficulty is experienced, the whole assembly must be replaced.

b. Removal. Drain the cooling system by opening drain cock under left side of radiator. Remove engine unit in right side of cylinder head by unscrewing retaining nut in reducing bushing. Remove two nuts holding retaining bracket on back of gage. Remove grommet around tube through dash and draw out gage assembly, tube, and engine unit through hole in panel.

c. Installation. Insert engine unit through hole in panel, mounting bracket, and dash. Position gage correctly, install mounting bracket and nuts; tighten securely. Insert grommet in dash. Install engine unit, and tighten retaining nut. Fill cooling system, and check for leaks.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

Section XVIII

STARTING SYSTEM

	Paragraph
Description and data	87
Maintenance	88
Cranking motor	89
Starting switch	90

87. DESCRIPTION AND DATA.

a. **Description.** The starting system (fig. 47) is a 6-volt system. It consists of the starting switch, cranking motor, and the cables through which they are connected to the battery of the electrical system. When the starting switch is pressed with the right foot, the battery current energizes the cranking motor, causing the armature to turn. This results in the inertia-type cranking motor gear engaging the teeth on the outer circumference of the flywheel. When the engine starts, the gear is automatically thrown out of engagement with the flywheel teeth.

b. Data.

System voltage	6
Cranking motor	
Normal engine cranking speed	185 rpm
Make and model	Auto-Lite MZ-4113
Bearings	3
Brushes	4
Brush spring tension	42 to 53 oz
Drive (direct)	R.H. outboard Bendix
Starting switch	
Make and model	Auto-Lite SW-4015

88. MAINTENANCE.

a. The cranking motor requires lubrication only at the forward end. Check tightness of mounting screws. Wire terminals must be in good condition, clean, and tight. As part of the starting system, check the battery condition periodically. Clean the cranking motor drive periodically (par. 89).

89. CRANKING MOTOR.

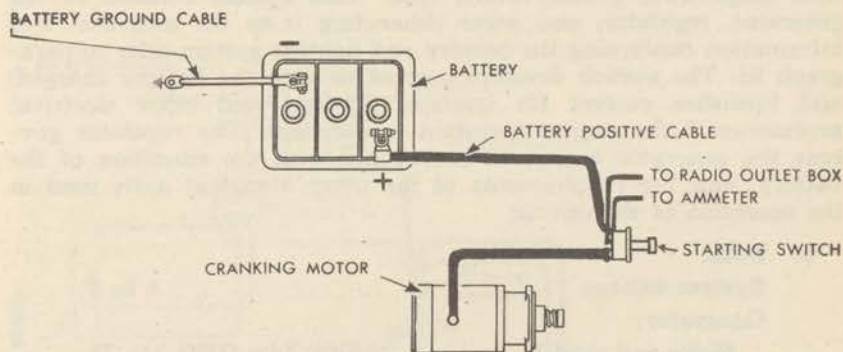
a. **Description.** The cranking motor is a 6-volt, four-brush type, located at the right-rear side of the engine. The drive is transmitted to the engine from an inertia-type gear to the teeth on a removable ring gear on the circumference of the flywheel. Rotation of the cranking motor shaft causes the pinion of the cranking motor drive

STARTING SYSTEM

to advance and mesh with the gear on the flywheel. After the engine starts, and the speed of the flywheel exceeds that of the cranking motor, the flywheel disengages the pinion automatically. A removable cover at the front end of the cranking motor permits inspection of the brushes and commutator.

b. Removal. Remove cable from motor. Remove screw from front support bracket, and remove two attaching screws at flywheel. Remove cranking motor. Remove front bracket.

c. Installation. Clean cranking motor gear. *Do not oil drive.* Install front bracket and place cranking motor in position on engine. Insert attaching screws, also bracket screw, and tighten securely. Attach cable.



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Figure 47—Starting System Circuit

90. STARTING SWITCH.

a. Description. The starting switch is a push-button type operated with the right foot, and located to the right of the accelerator treadle on the toeboard (fig. 5). Press the button to close the switch and cause the cranking motor to operate.

b. Removal. Remove battery cable at negative post of battery. Remove air cleaner (par. 73). Remove cable terminal nuts on switch, and remove cables and wires. Remove two screws holding switch to toeboard, and remove switch from underneath.

c. Installation. Remove cable terminal nuts, place switch in position under toeboard, and tighten in place with two screws. Attach cables and wires. **NOTE:** *Battery positive cable and wires to radio outlet box, filter, and ammeter are attached to top terminal.* Install air cleaner (par. 73), and connect battery cable to negative post on battery.

1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB and FORD MODEL GPW)

Section XIX

GENERATING SYSTEM

	Paragraph
Description and data	91
Maintenance	92
Generator	93
Regulator	94

91. DESCRIPTION AND DATA.

a. **Description.** The generating system (fig. 49) is a 6-volt system, single-wire, ground-return type. This system consists of the generator, regulator, and wires connecting it to the ammeter. For information concerning the battery and lighting system refer to paragraph 95. The system develops current to keep the battery charged, and furnishes current for ignition, lighting, and other electrical accessories if the engine operation is sufficient. The regulator governs the generator output in accordance with the condition of the battery, and the requirements of the other electrical units used in the operation of the vehicle.

b. Data.

System voltage 6 to 8

Generator:

Make and model Auto-Lite GEG-5101D

Ground polarity Negative

Controlled output 40 amps

Rotation (drive end) Clockwise

Control Current voltage regulator

Brushes 2

Output 8.0 amps; 7.6 volts; 955 rpm

40.0 amps; 7.6 volts; 1460 rpm

40.0 amps; 8.0 volts; 1465 rpm

Regulator:

Make and model Auto-Lite VRY-4203 A

Type Current voltage

Volts 6

Amperes 40

Ground polarity Negative

92. MAINTENANCE.

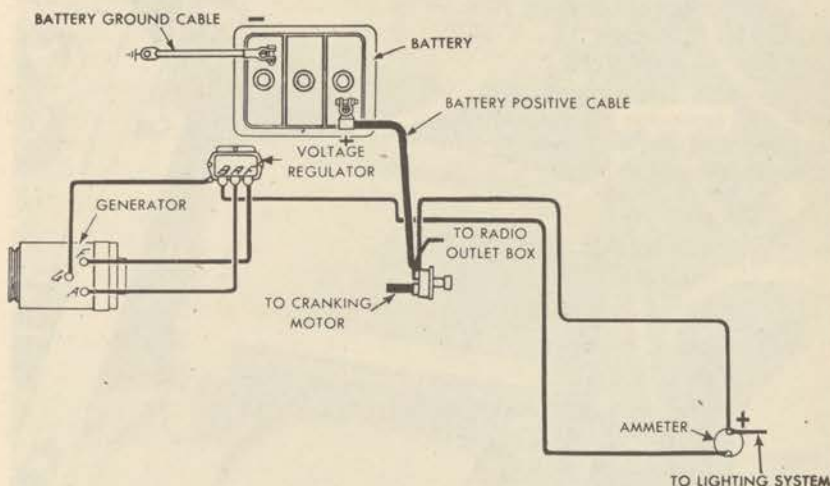
a. The generator requires attention to lubrication of those generators provided with oilers. Properly adjust the drive belt. Check mounting screws and bracket attached to engine. Generator brace must be in position. Wire terminals must be in good condition, clean,

GENERATING SYSTEM

and tight. External connecting wires with damaged or cracked insulation must be replaced. Bond straps must be cleaned and securely tightened. If trouble is experienced with the generator, report to higher authority.

93. GENERATOR.

a. **Description.** The generator is located on the right side of the engine at the forward end (fig. 49). It is a 6-8 volt, shunt-wound, two-brush unit rotating clockwise as viewed from the drive pulley end. It has a controlled output of 40 amperes, and is air-cooled by a fan built into the drive pulley. Air is drawn in at the back of the generator, and discharged at the fan.



RA PD 305208

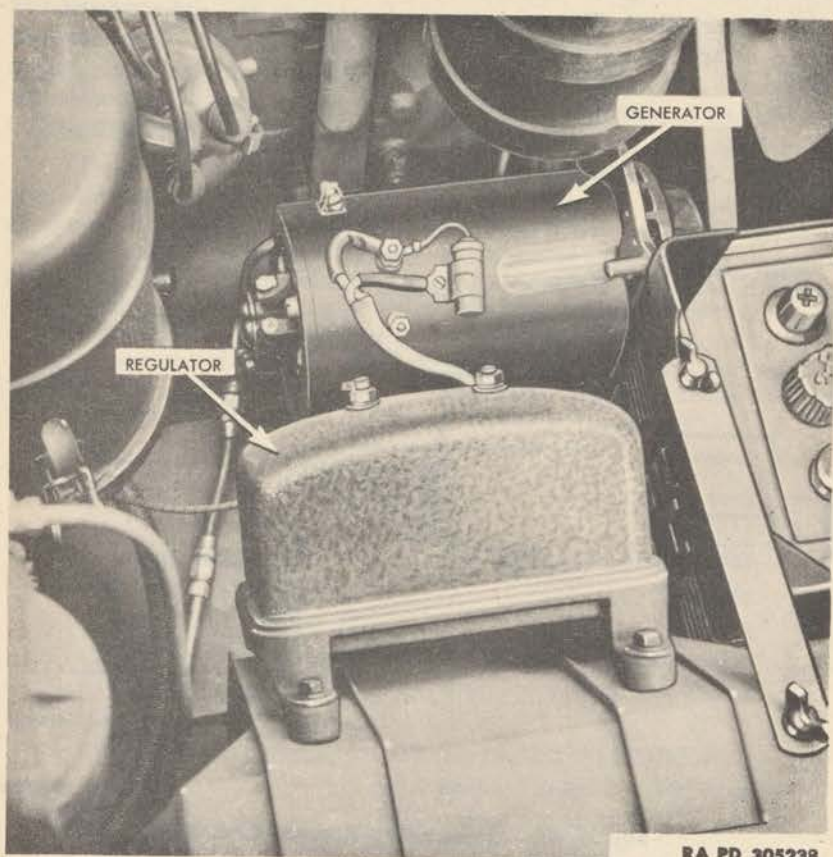
Figure 48—Generating System Circuit

b. **Removal.** Remove generator brace spring (fig. 10) and slip fan belt off pulley. Disconnect wires at generator; remove radio filter and ground strap. Remove two generator support bolts and remove generator.

c. **Installation.** Place generator in position, and install a drift or pin through front hole as a pilot. Install flat washer and bushing at rear support, and install bolt through hole. Remove drift, and install washer and bolt in front hole. Install generator brace spring. Install fan belt, and adjust if necessary (par. 83). Attach wires, filter, and ground strap. Start engine and check charging rate on ammeter in instrument panel (fig. 5).

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)****94. REGULATOR.**

a. **Description.** The regulator (fig. 49) automatically governs the output of the generator in accordance with the condition of the battery and the current requirements in the operation of the vehicle, thus, when the battery is low the output is increased, and as the



RA PD 305238

Figure 49—Generator and Regulator

battery becomes fully charged the generator develops less current to avoid overcharging. The regulator is mounted inside the splasher of the right front fender. It is a precision instrument, sealed at the factory, and no attempt should be made to adjust it. The regulator consists of three separate units: the cut-out or circuit breaker, the voltage regulator, and the current regulator. The circuit breaker automatically closes the circuit between the generator and the battery when the generator voltage rises above that of the battery, and opens the circuit when the generator current falls below that of the battery.

GENERATING SYSTEM

The voltage regulator governs the generator so that it will not develop more voltage than the value for which the voltage regulator is set. The current regulator controls the generator current (amperage) output so that it will develop enough to keep the battery charged (providing the engine is run sufficiently), and also prevent damage to the generator due to an overload.

b. Removal. Remove battery cable at battery negative post. Remove wires from regulator terminals. Mark wires to assure correct installation. Remove bond strap, and remove four bolts holding regulator to fender.

c. Installation. Place regulator in position on fender, and tighten securely with four bolts. Install bond strap. Connect wires to proper terminals. Install battery cable on post, and tighten securely. Start engine and check charging rate of ammeter in instrument panel.

1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB and FORD MODEL GPW)

Section XX

BATTERY AND LIGHTING SYSTEM

	Paragraph
Description and data	95
Maintenance	96
Battery	97
Wiring system	98
Headlights	99
Blackout headlights	100
Blackout driving light	101
Taillights and stop lights	102
Instrument panel lights	103
Blackout (main) light switch	104
Panel and blackout driving light switches	105
Trailer connection	106

95. DESCRIPTION AND DATA.

a. **Description.** The lighting system (fig. 50) functions on 6 volts supplied by a three-cell storage battery. The system consists of two service headlights, two blackout headlights, one blackout driving light, service and blackout stop and taillights, two instrument panel lights, and operating switches and battery. The entire lighting system is controlled by the blackout (main) light switch on the instrument panel. When the blackout light switch is set in the proper operating position, other light switches such as blackout driving light, instrument panel, stop lights and dimmers, are controlled by the respective switches. The lighting system is protected by a thermal-type fuse on the back of the blackout switch.

b. Data.

Battery:

Make and model	Auto-Lite-TS-2-15 Willard SW-2-119
Volts	6
Plates per cell	15
Capacity (ampere hours)	116
Length	10 in.
Width	7 in.
Height	8 ⁵ / ₁₆ in.
Ground terminal	Negative

Wiring system:

Volts	6
Wiring identification reference	Fig. 50

BATTERY AND LIGHTING SYSTEM

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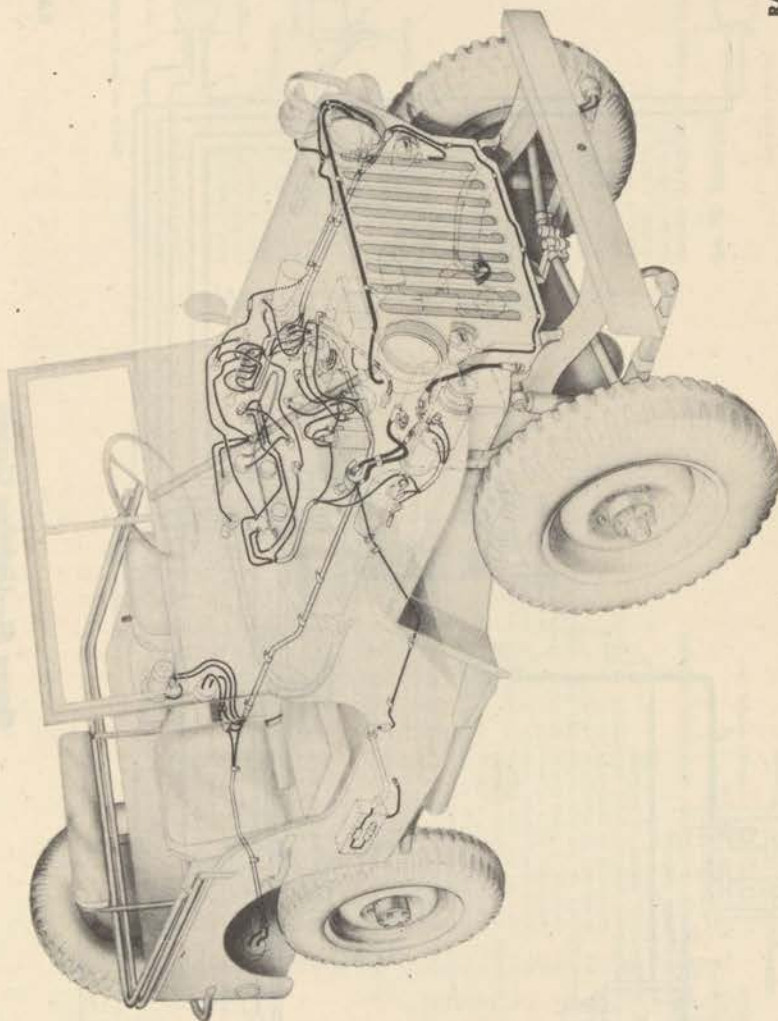


Figure 50—Wiring System—Phantom View

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

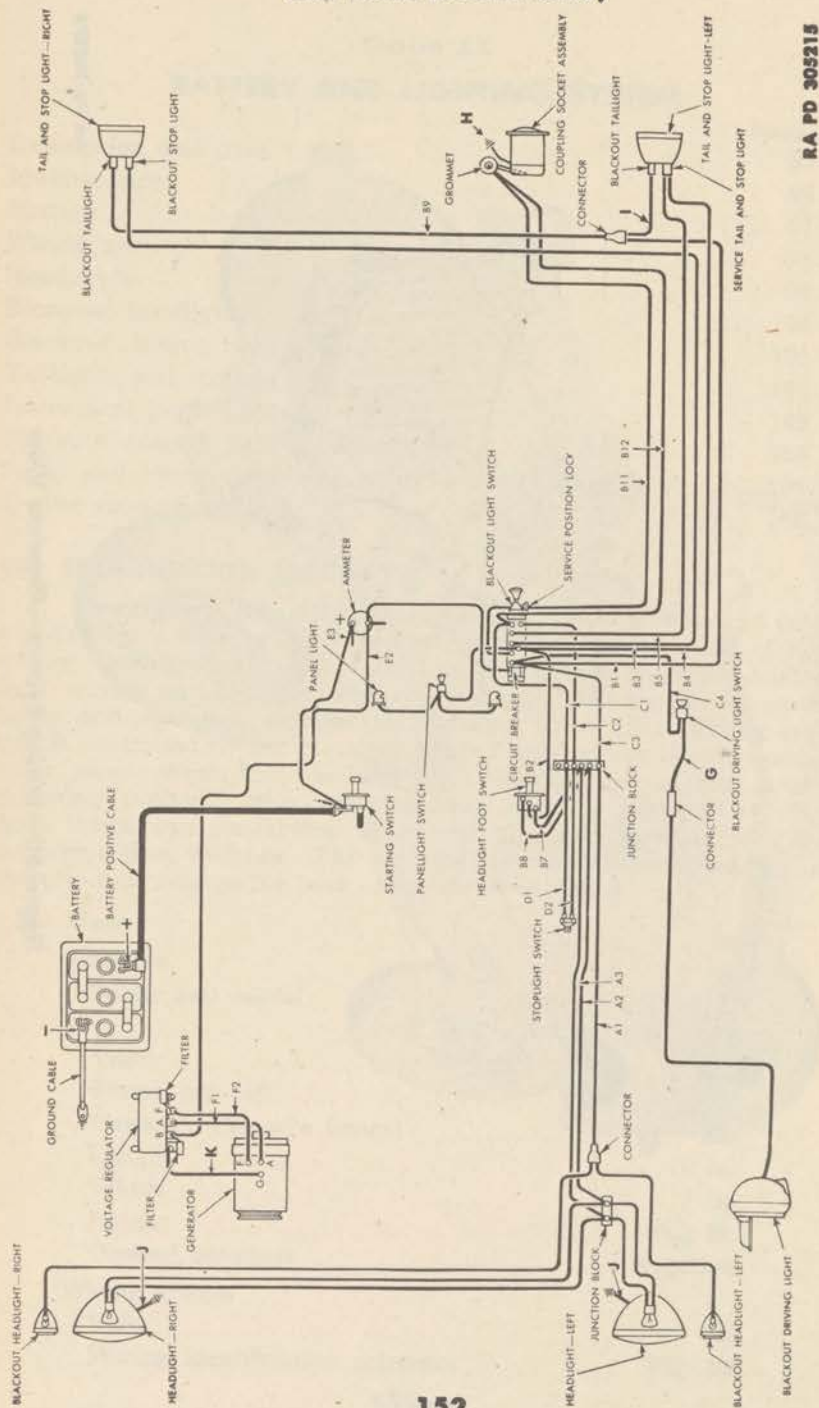


Figure 51—Lighting Circuits

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BATTERY AND LIGHTING SYSTEM

A—HEADLIGHT WIRING HARNESS				
A-1	BLACKOUT HEADLIGHT JUNCTION BLOCK TO JUNCTION BLOCK (UPPER BEAM)			
A-2	HEADLIGHT JUNCTION BLOCK TO JUNCTION BLOCK (UPPER BEAM)			
A-3	HEADLIGHT JUNCTION BLOCK TO JUNCTION BLOCK (LOWER BEAM)			
B—BODY WIRING HARNESS—LONG				
B-1	LIGHT SWITCH TERMINAL "B H T" TO BLACKOUT TAIL CONNECTION			
B-2	LIGHT SWITCH TERMINAL "H T" TO FOOT DIMMER SWITCH CENTER TERMINAL			
B-3	LIGHT SWITCH TERMINAL "S" TO BLACKOUT STOPLIGHT			
B-4	LIGHT SWITCH TERMINAL "H T" TO SERVICE TAILLIGHT			
B-5	LIGHT SWITCH TERMINAL "S" TO SERVICE STOPLIGHT			
B-6	HORN CIRCUIT BREAKER TO HORN			
B-7	JUNCTION BLOCK TO FOOT DIMMER SWITCH (LOWER BEAM)			
B-8	JUNCTION BLOCK TO FOOT DIMMER SWITCH (UPPER BEAM)			
B-9	CONNECTOR TO BLACKOUT TAILLIGHT			
B-11	LIGHT SWITCH TERMINAL "T" TO COUPLING SOCKET TERMINAL "T L"			
B-12	LIGHT SWITCH TERMINAL "S S" TO COUPLING SOCKET TERMINAL "S L"			
C—BODY WIRING HARNESS—LEFT SIDE—SHORT				
C-1	JUNCTION BLOCK TO LIGHT SWITCH TERMINAL "S S"			
C-2	JUNCTION BLOCK TO LIGHT SWITCH TERMINAL "S W"			
C-3	JUNCTION BLOCK TO LIGHT SWITCH TERMINAL "B H T"			
C-4	BLACKOUT LIGHT SWITCH TO LIGHT SWITCH TERMINAL "B H T"			
D—CHASSIS WIRING HARNESS—LEFT				
D-1	STOPLIGHT SWITCH TO JUNCTION BLOCK			
D-2	STOPLIGHT SWITCH TO JUNCTION BLOCK			
E—BODY WIRING HARNESS—RIGHT				
E-1	COIL TO IGNITION SWITCH TO GASOLINE GAGE CIRCUIT BREAKER			
E-2	VOLTAGE REGULATOR TERMINAL "B H T" TO AMMETER			
E-3	STARTING SWITCH TO AMMETER			
E-4	AMMETER TO HORN CIRCUIT BREAKER			
F—GENERATOR TO VOLTAGE REGULATOR AND FILTER HARNESS				
F-1	GENERATOR TO REGULATOR ARMATURE			
F-2	GENERATOR TO REGULATOR FIELD			
G—BLACKOUT DRIVING LIGHT CONNECTOR TO SWITCH				
H—COUPLING SOCKET TO GROUND				
I—CONNECTOR TO BLACKOUT TAILLIGHT				
J—HEADLIGHT GROUND				
K—GENERATOR TO VOLTAGE REGULATOR—GROUND				
		GAGE	COLOR	
		14	YELLOW—2 BLACK TR.	
		14	RED—3 WHITE TR.	
		14	BLACK—2 WHITE TR.	
		14	YELLOW—2 BLACK TR.	
		12	BLUE—3 WHITE TR.	
		14	WHITE—2 BLACK TR.	
		14	BLUE—2 WHITE TR.	
		14	RED—2 WHITE TR.	
		14	BLACK—2 RED TR.	
		14	BLACK—2 WHITE TR.	
		12	RED—3 WHITE TR.	
		14	YELLOW—2 BLACK TR.	
		14	RED—2 BLACK TR.	
		14	RED—2 WHITE TR.	
		14	GREEN—2 BLACK TR.	
		14	YELLOW—2 BLACK TR.	
		14	BLACK—2 WHITE TR.	
		14	RED—2 WHITE TR.	
		14	GREEN—2 BLACK TR.	
		14	BLACK—2 WHITE TR.	
		12	RED—3 WHITE TR.	
		14	GREEN—2 BLACK TR.	
		14	BLACK—2 WHITE TR.	
		14	BLACK—2 WHITE TR.	
		14	YELLOW—2 WHITE TR.	
		12	BLACK—3 WHITE TR.	
		12	BLACK—2 RED TR.	
		12	RED—3 WHITE TR.	
		14	GREEN—2 BLACK TR.	
		14	BLACK—2 WHITE TR.	
		14	BLACK—2 WHITE TR.	
		14	YELLOW—2 WHITE TR.	
		12	BLACK—3 WHITE TR.	
		12	FLEXIBLE BRAIDED STRAP	

RA PD 305215B

Legend for Figure 51—Lighting Circuits

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

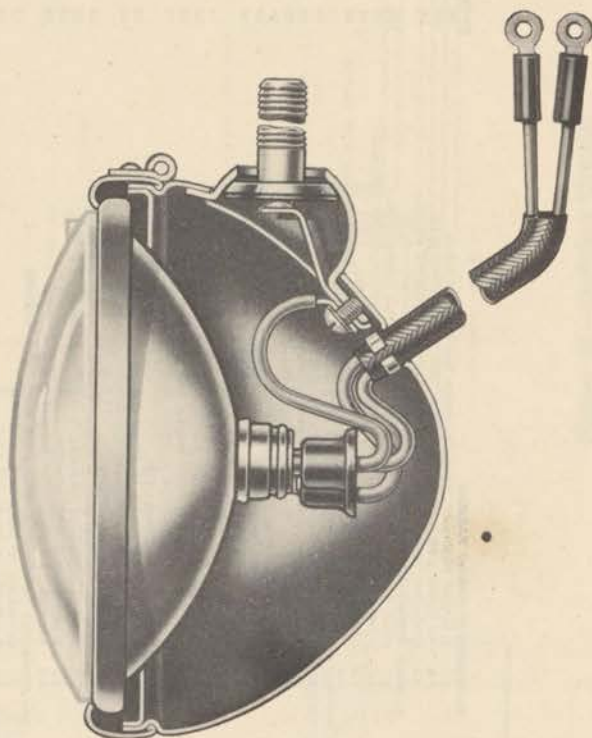
Lamps:

Headlights	Sealed unit
Blackout headlights	Mazda No. 1245
Blackout driving light	Sealed unit
Taillights and stop lights	Sealed unit
Instrument lights	Mazda No. 51

Trailer connections:

Make	Wagner
Socket model	No. 3604
Plug model	No. 3544

**Figure 52—
Headlight**



RA PD 305216

96. MAINTENANCE.

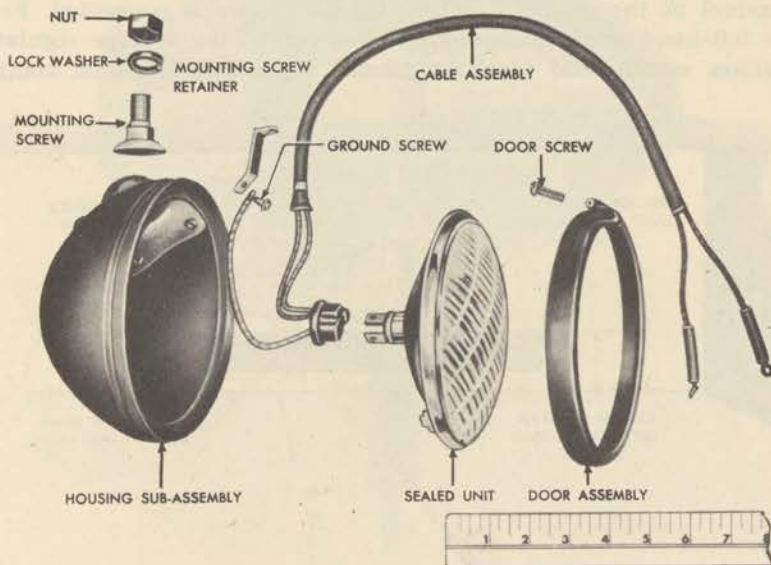
a. The battery requires periodic checking of the proper level of electrolyte. Battery case must be kept clean. All vent plugs must be tight and breather holes kept open. Keep battery terminals and posts clean and securely tightened. Clean battery carrier when corroded. Tighten battery hold-down clamps. All light mounting screws and

BATTERY AND LIGHTING SYSTEM

nuts must be kept clean and tight. Light lenses and reflectors must be kept clean and securely fastened. Headlights must be aimed properly. All loose and dirty electrical connections must be cleaned and tightened. All damaged or frayed wires must be replaced. Bond straps must be clean and securely tightened.

97. BATTERY.

a. **Description.** The battery (fig. 36) is a 6-volt, 116-ampere-hour storage battery consisting of three side-by-side cells of 15 plates each. The battery is located under the hood at the right side,



RA PD 305217

Figure 53—Headlight, Disassembled

and has the negative (small) post grounded. In normal temperatures the battery should be recharged when the specific gravity reads 1.175 or lower, and is fully charged when the specific gravity is 1.275 to 1.285.

b. **Removal.** Loosen bolts in cable terminals, and remove terminals from battery. Loosen two nuts holding frame on battery, and remove hold-down frame. Lift out battery.

c. **Installation.** Place battery in position with positive post to rear. Place hold-down frame in position, and tighten securely with nuts. Clean cable terminals, if necessary; grease and install on bat-

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

tery posts. Check level and specific gravity of electrolyte in battery. Electrolyte level must be $\frac{1}{2}$ inch above plates, and specific gravity must be 1.275 to 1.285 at 80°F.

98. WIRING SYSTEM.

a. **Description.** The entire vehicle wiring system is shown in figure 50, and the circuits of the lighting system are shown in figure 51. A single-wire system is used, and the negative terminal of the battery is grounded. A single cable connects the battery positive post to the upper terminal of the starting switch, to which are also attached wires running to the radio outlet box, filter, and right-hand terminal of the ammeter, where the horn wire is connected. From the left-hand ammeter terminal wires run to the voltage regulator, ignition switch, and blackout (main) light switch, which controls

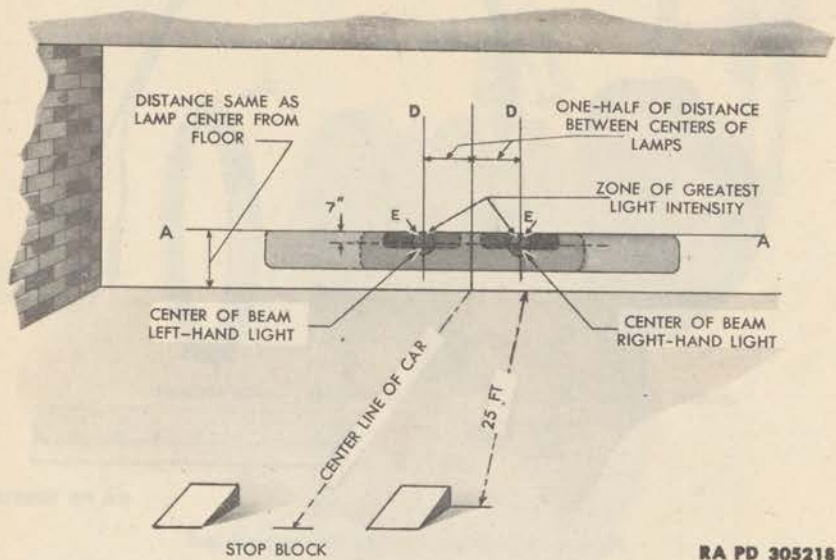


Figure 54—Headlight Aiming Chart

all lights in the lighting system. The wiring system consists of the harnesses and wires which are identified by colors and tracers as shown in figure 50, and described in the accompanying legend.

b. **Removal.** When necessary to renew wires in the wiring system, remove grounded (negative) cable at battery. Note location of wires; disconnect wires at terminals; loosen clips along harness, and remove wires.

c. **Installation.** When installing wires and harnesses see that all connections are correctly located and secure. Double-check location and tightness of connections; install retaining clips along wires.

BATTERY AND LIGHTING SYSTEM**99. HEADLIGHTS.**

a. **Description.** Two headlights (fig. 52) are mounted at the front of the vehicle and are protected by the radiator guard. Each headlight is mounted on a hinged bracket. By loosening the wing nut, the light can be swung over and used as a trouble light in the engine compartment. The headlights are of the double filament sealed beam-unit type consisting of reflector, lamp, and lens, which can be

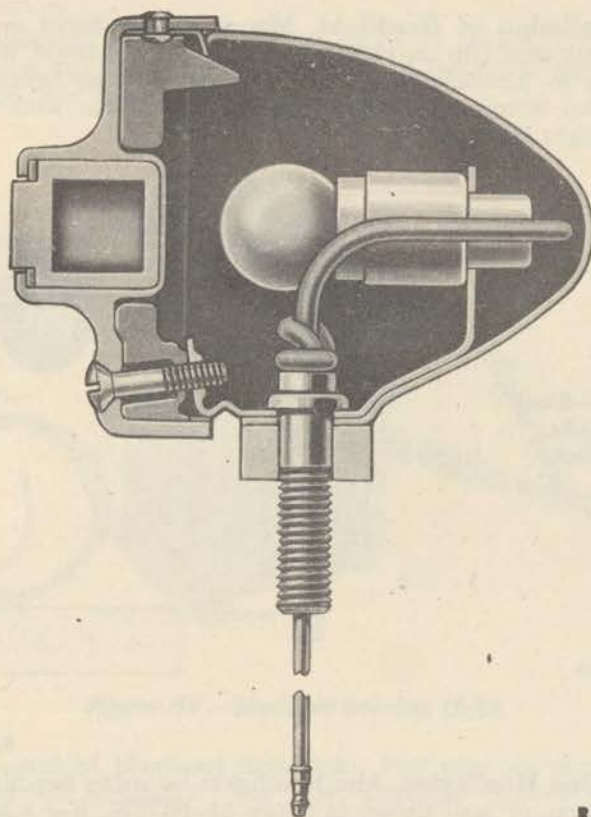


Figure 55—Blackout Headlight

replaced only as a unit (Mazda No. 2400). The headlights light when the blackout lighting switch is in service position. The upper and lower beams are controlled by the foot-operated dimmer switch. The lower beam filament is positioned slightly to one side of the focal point deflecting the beam slightly to illuminate the right side of the road.

b. **Removal of Sealed Beam-unit.** Remove door clamp screw and remove door (fig. 53). Remove sealed beam assembly, and pull connector from back of unit.

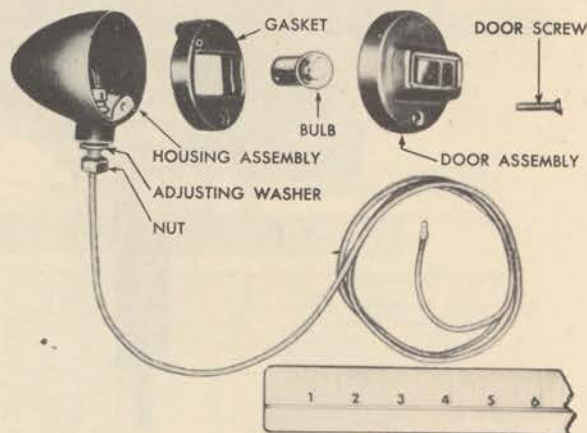
**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

c. **Installation of Sealed Beam-unit.** Attach connector to back of unit. Place unit in position in headlight housing. Install door, and secure in place with screw.

d. **Removal of Headlight.** Disconnect headlight wires at junction block on left fender splash under hood. Remove clip on radiator grille (two on right headlight wire). Remove nut on headlight. Loosen headlight support wing nut, raise support, and remove headlight.

e. **Installation of Headlight.** Mount the headlight on the support. Install wire clip on grille (two on right headlight wire). Connect wires to junction block (red wire on bottom terminal; black wire on top terminal). Lower support, and fasten with wing nut. Aim headlight (subpar. f below).

Figure 56—Black-out Headlight, Disassembled



RA PD 305220

f. **Aiming Headlights.** Aim headlights by using headlight aimer, aiming screen, or wall shown in figure 54. **NOTE:** Use a light background with black center line for centering vehicle on screen. Mark two vertical lines on each side of center line equal to the distance between headlight centers. Mark screen 7 inches less than the height of centers of headlights. Inflate all tires to recommended pressure (par. 3). Set vehicle so headlights are 25 feet away from screen and center line of vehicle is in line with center line of screen. To determine center line of vehicle, stand at rear and sight through windshield down across cowl and hood. Turn on headlight upper beam, cover one headlight, and observe location of upper beam on screen. Adjust headlight so that center of bright light area is on intersection of vertical and horizontal lines. Tighten headlight mounting nut. Cover headlight just aimed, and adjust other in same manner.

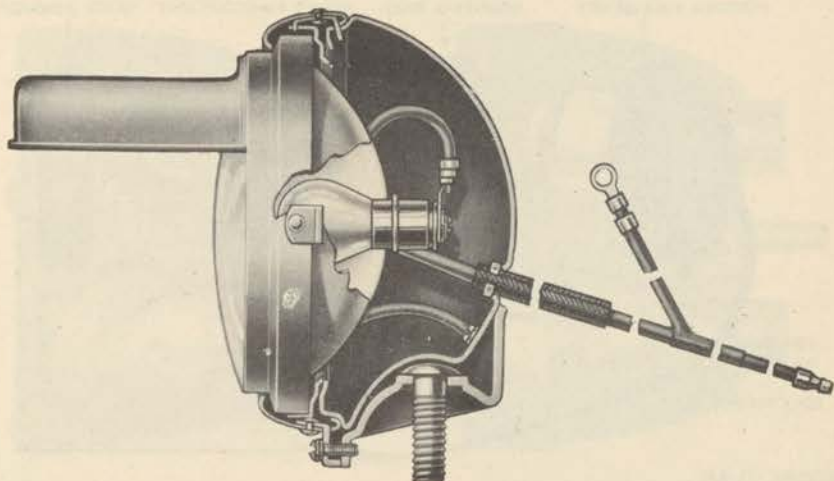
BATTERY AND LIGHTING SYSTEM

100. BLACKOUT HEADLIGHTS.

a. **Description.** There are two blackout headlights (fig. 55) with lens which permit only horizontal rays to pass through. These headlights are illuminated only when the blackout (main) light switch is in blackout position. Mazda No. 1245 lamps are used.

b. **Removal of Lamp.** Remove door screw in lower side of rim and remove door by pulling out on lower side (fig. 56). **NOTE:** *The door and lens are in one unit.* Push in on lamp, turn lamp to left and remove.

c. **Installation of Lamp.** Insert lamp in socket, push in and turn lamp to right. Replace door gasket, if damaged. Replace door and tighten door screw.



RA PD 305221

Figure 57—Blackout Driving Light

d. **Removal of Blackout Headlight.** Pull wire out of connection just behind left headlight. (For right headlight remove three clips across bottom of grille.) Remove mounting nut by reaching in from the rear and lift out headlight.

e. **Installation of Blackout Headlight.** Put light in position and tighten in place with mounting nut. (Attach three clips for right headlight.) Attach wire in connector.

101. BLACKOUT DRIVING LIGHT.

a. **Description.** The blackout driving light (fig. 57) is a hooded light having a sealed unit which throws a horizontal diffused beam to illuminate any vertical object. This light is mounted on the left front fender, and is controlled by a push-pull type switch (marked "B.O. DRIVE") in the instrument panel. The blackout driving light

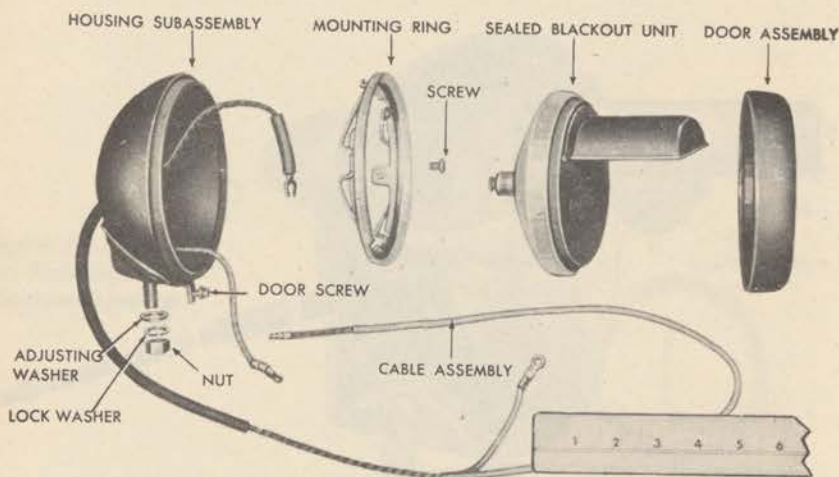
1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB and FORD MODEL GPW)

can be illuminated only when the blackout (main) light switch is in blackout position.

b. Removal of Sealed Unit. Remove screw at bottom of light door (fig. 58). Pull bottom of door forward and up to remove. Disconnect socket wire, and remove door by releasing mounting ring.

c. Installation of Sealed Unit. Place sealed unit in door, and install unit mounting ring. Attach wire connection. Install door on housing, and tighten retaining screw.

d. Removal of Blackout Driving Light. Pull wire out of connector at dash. Remove three wire clips, and pull wire through fender. Remove mounting nut on bottom of light, and lift off light.



RA PD 305222

Figure 58—Blackout Driving Light, Disassembled

e. Installation of Blackout Driving Light. Install light on bracket and tighten nut; run wire through fender and splasher; attach three clips, and push wire into connector at dash.

f. Adjustment. The light is aimed with vehicle on a level surface and loaded. Hold a 4-foot wood stick on floor close to the light, and mark stick where bright spot appears. Move stick 10 feet ahead of light; bright spot should be 2.1 inches lower than mark.

102. TAILLIGHTS AND STOP LIGHTS.

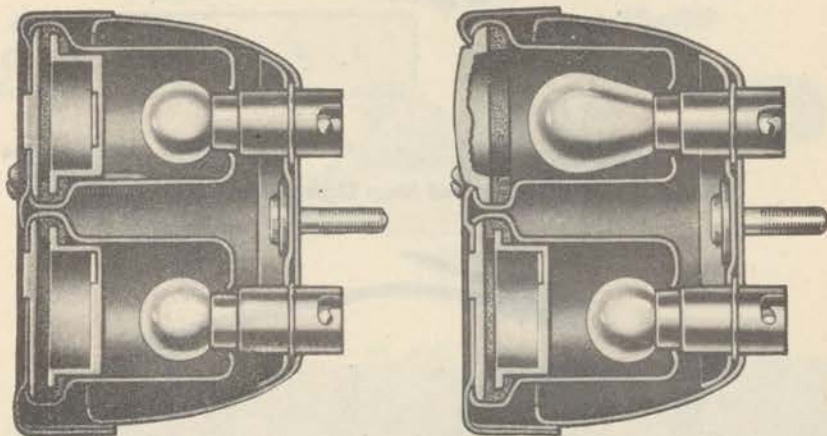
a. Description. Two combination taillights and stop lights (fig. 59) are located in the rear panel of the body. Each light consists of two separate units in a housing. The left-hand light contains a combination service tail and stop light unit in the upper part, and a blackout taillight in the lower part. The upper unit consists of

BATTERY AND LIGHTING SYSTEM

the taillight lens, gasket, reflector, and a 21-3-candlepower lamp. The lower unit consists of blackout lens, gasket, reflector, and 3-candlepower lamp. The right-hand light contains a blackout stop light unit in the upper part, and a blackout taillight in the lower part. The upper unit consists of the blackout stop light lens, gasket, reflector, and 3-candlepower lamp. The lower unit is the same as the lower unit in the left light. When a lamp burns out, the unit must be replaced. These lights are controlled by the blackout (main) light switch.

b. Removal of Light Unit. Remove two screws in light door, and remove door (fig. 60). Pull each unit straight out of socket.

c. Installation of Light Unit. Be sure that unit is correct type, and push into socket. Install light door and screws.



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Figure 59—Taillights and Stop Lights

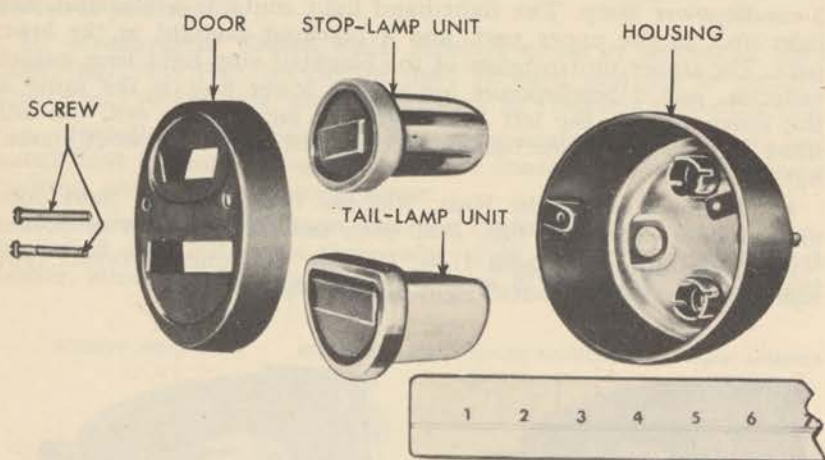
d. Removal of Light. Reach up under body and disconnect wire connector; push in on connector, turn counterclockwise and pull connector out of socket. Remove two nuts holding light to bracket, and remove light.

e. Installation of Light. Place light in position and secure with nuts. Attach connectors. Double contact connector goes in upper socket of left light. Turn on blackout (main) light switch to blackout position to see if right blackout taillight (lower unit) lights; if not, interchange connectors in sockets.

103. INSTRUMENT PANEL LIGHTS.

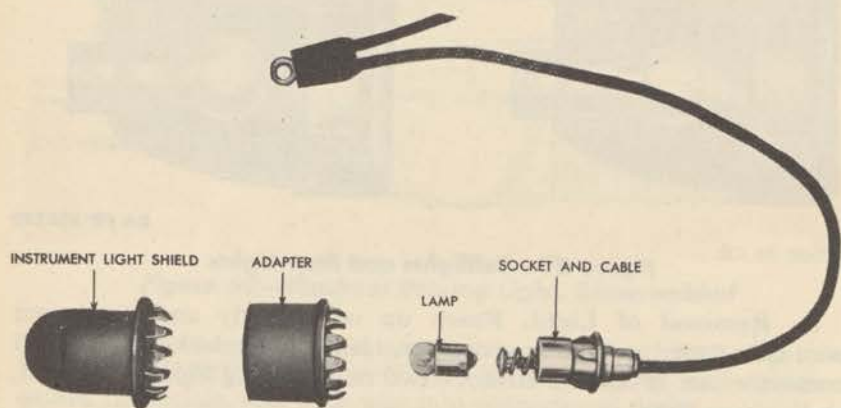
a. Description. There are two instrument panel lights (fig. 5) located above instruments and on the outside of the instrument panel. They are controlled by the panel light switch when the blackout (main) light switch is in service position.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**



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Figure 60—Taillights and Stop Lights, Disassembled



RA PD 305225

Figure 61—Instrument Light, Disassembled

b. Removal of Lamp. Pry off shield by using a sharp tool behind flange (fig. 61). Pull light socket out of shield; press in on lamp, turn lamp counterclockwise, and remove.

c. Installation of Lamp. Put lamp in socket, push lamp in, and turn clockwise. Push socket into shield, and push shield into instrument lamp adapter.

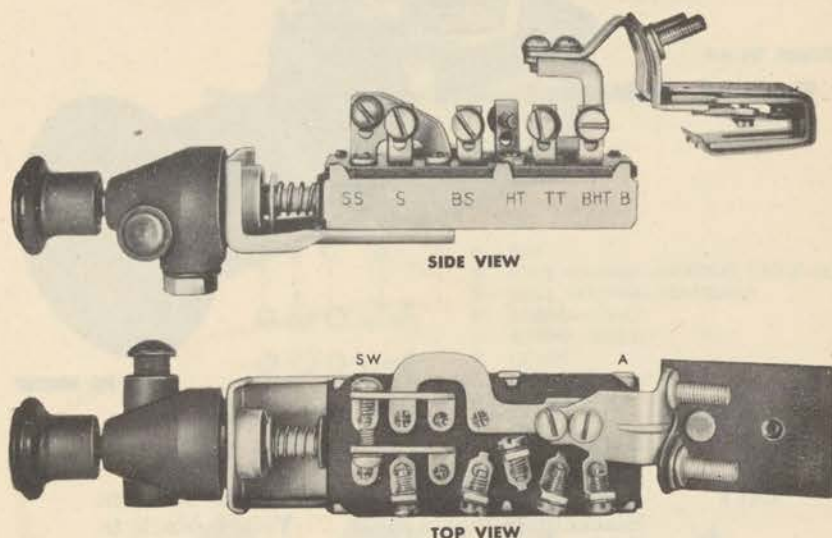
BATTERY AND LIGHTING SYSTEM

d. **Removal of Instrument Light.** Disconnect wire on back of light switch, and dismantle as outlined in subparagraph b above. Remove wire and sockets for both lamps under instrument panel.

e. **Installation of Instrument Light.** Attach wire terminal to panel light switch, and place sockets through holes in instrument panel. Assemble light as outlined in subparagraph c above.

104. BLACKOUT (MAIN) LIGHT SWITCH.

a. **Description.** The blackout light switch is a push-pull type (fig. 62), mounted in the instrument panel to the left of the steering gear (fig. 5). The switch controls all the lights, and has four positions (fig. 9). With the knob all the way in, all lights are off. Pull knob out to first (blackout) position to illuminate blackout headlights,



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Figure 62—Blackout (Main) Light Switch

blackout taillights, and establish connection so blackout stop light will function when foot brake is applied. Press lockout control button, and pull switch knob out to second (service) position to illuminate service headlights and taillight, and to establish connections so service stop light will function when foot brake is applied. Pull knob out to third (service stop light) position, when vehicle is operated during daylight, to cause stop light only to function when foot brake is applied. A thermal-type fuse is mounted on the back of the switch having a bimetal spring, which causes a set of contact points to open and close, if a short circuit occurs in the lighting system.

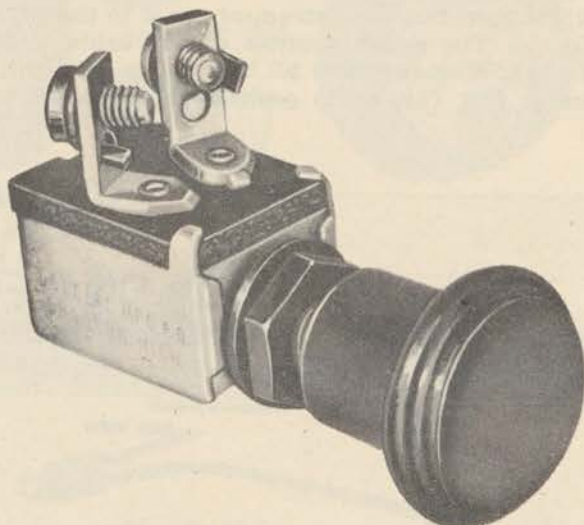
b. **Removal.** Disconnect ground cable at negative post of battery. Loosen set screw in switch knob and unscrew knob. Loosen

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

hexagon head screw at side of switch bushing on front of panel; press lockout control button, and pull off bushing. Remove mounting nut, and take switch out from under panel. Remove wire terminal screws. As wires are removed, mark them for identification.

c. **Installation.** Attach wires to proper terminals. **NOTE:** *Switch terminals are marked for easy identification.* Wires are to be attached as outlined below:

**Figure 63—Light
Switch**



RA PD 305227

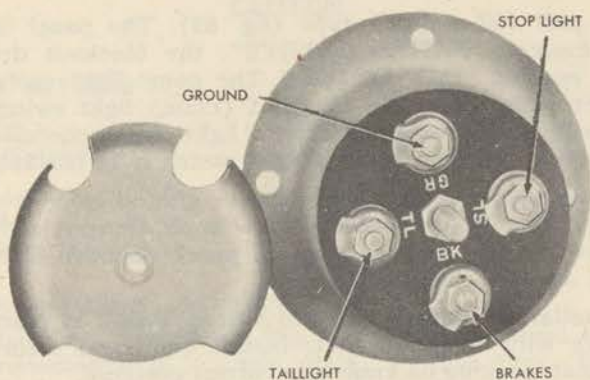
Terminal	Circuit	Wire Color
A	Extra	Not used
B	Ammeter	Red-white tr.
BHT	Blackout headlights	Yellow-black tr.
	Blackout taillights	Yellow-black tr.
	Blackout driving light	Black-white tr.
BS	Blackout stop light	White-black tr.
HT	Service headlight	Blue-white tr.
	Service taillight	Blue-white tr.
	Panel lights	Blue-white tr.
S	Service stop light	Red-white tr.
SS	Blackout driving light	Red-white tr.
	Trailer coupling socket	Red-black tr.
SW	Stop light	Green-black tr.
TT	Trailer coupling socket	Green-black tr.

Install switch in panel and secure in place with mounting nut. Install bushings and tighten screw. Install knob and tighten set screw. Attach ground cable to battery.

105. PANEL AND BLACKOUT DRIVING LIGHT SWITCHES.

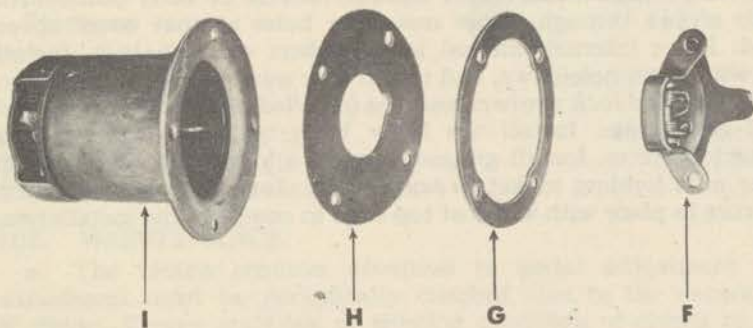
a. **Description.** The panel and blackout driving light switches

BATTERY AND LIGHTING SYSTEM



RA PD 305228

Figure 64—Trailer Socket Terminals



RA PD 305276

Figure 65—Trailer Socket, Disassembled

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

are push-pull (off-and-on) type (fig. 63). The panel light switch knob is marked "PANEL LIGHTS"; the blackout driving light switch is marked "B.O. DRIVE." The panel light switch controls these lights only when the blackout (main) light switch is in the service position. The blackout driving light switch controls that light only when the blackout (main) light switch is in blackout position.

b. Removal. As a precaution remove ground cable from battery. Loosen set screw in knob and unscrew knob. Remove mounting nut, and remove switch from in back of panel. Remove screws in wire terminals, and disconnect wires.

c. Installation: Attach wires to switch, install in place in panel, and secure with mounting nut. Install knob and secure with set screw so that marking on knob is in correct position.

106. TRAILER CONNECTION.

a. Description. The trailer connection is a socket located in the body rear panel at the left side (fig. 2). The blackout (main) light switch controls the current to socket and trailer lights.

b. Removal. Remove equipment from left rear tool compartment. Remove screw at top edge of protecting cover, and remove cover. Remove four bolts holding socket in body panel. Pull out socket, and remove cover over the terminals. Remove wires, noting their proper place.

c. Installation. Attach wires to terminals. *NOTE: Attach green wire to terminal "TL"; attach red wire to terminal "SL"; attach small terminal of black wire to terminal "GR."* Install cover over terminals. To install socket in body, install the two long mounting screws in socket cover hinge. Place dust shield retainer ring over screws, followed by the dust shield with slot in center opening, opposite the hinge. Place cover against outside of body panel with the two screws through upper mounting holes so that cover opens upward. Place internal-external lock washers on each bolt. Install socket with drain hole down, and install lock washers and nuts loosely. *NOTE: Toothed lock washers must be installed as directed for a good ground connection.* Install the lower bolts with the lock washers in correct position. Install ground wire on a lower bolt, and tighten all four nuts holding socket in body panel. Install protecting cover, and secure in place with screw at top edge to complete the installation.

Section XXI

CLUTCH

	Paragraph
Description and data	107
Maintenance	108
Pedal adjustment	109
Removal	110
Installation	111
Clutch release bearing	112

107. DESCRIPTION AND DATA.

a. **Description.** The clutch (fig. 66) located between the engine and the transmission is a single plate, dry-disk type. The clutch consists principally of two units, the clutch driven plate which has a spring-center vibration neutralizer, and the clutch pressure plate unit, which is bolted to the flywheel. The controlled pressure of the driven plate against the flywheel provides a means of engaging and disengaging the engine power to the transmission. A ball-type release bearing operates three clutch release levers to control the clutch. The release bearing is controlled by a rod and cable to the clutch pedal. This type clutch has only one service adjustment. This adjustment is for the foot pedal, and regulates the amount of free pedal travel. As the clutch facings wear, adjust the free pedal travel to three-quarters of an inch (fig. 68).

b. **Data.**

Type	Dry single plate
Torque capacity driven plate	132 foot-pounds
Make	Borg and Beck No. 11123
Size	7 $\frac{7}{8}$ in.
Facings	1 woven and 1 molded
Diameter	5 $\frac{1}{8}$ in. inside, 7 $\frac{7}{8}$ in. outside
Thickness	$\frac{1}{8}$ in. (0.125)
Pressure plate:	
Make	Atwood No. TP-2B-7-1
Number of springs	3
Clutch release bearing type	Prelubricated ball
Clutch shaft bushing (in flywheel) size	I.D. 0.628 in.
Clutch pedal adjustment (free play)	$\frac{3}{4}$ in.

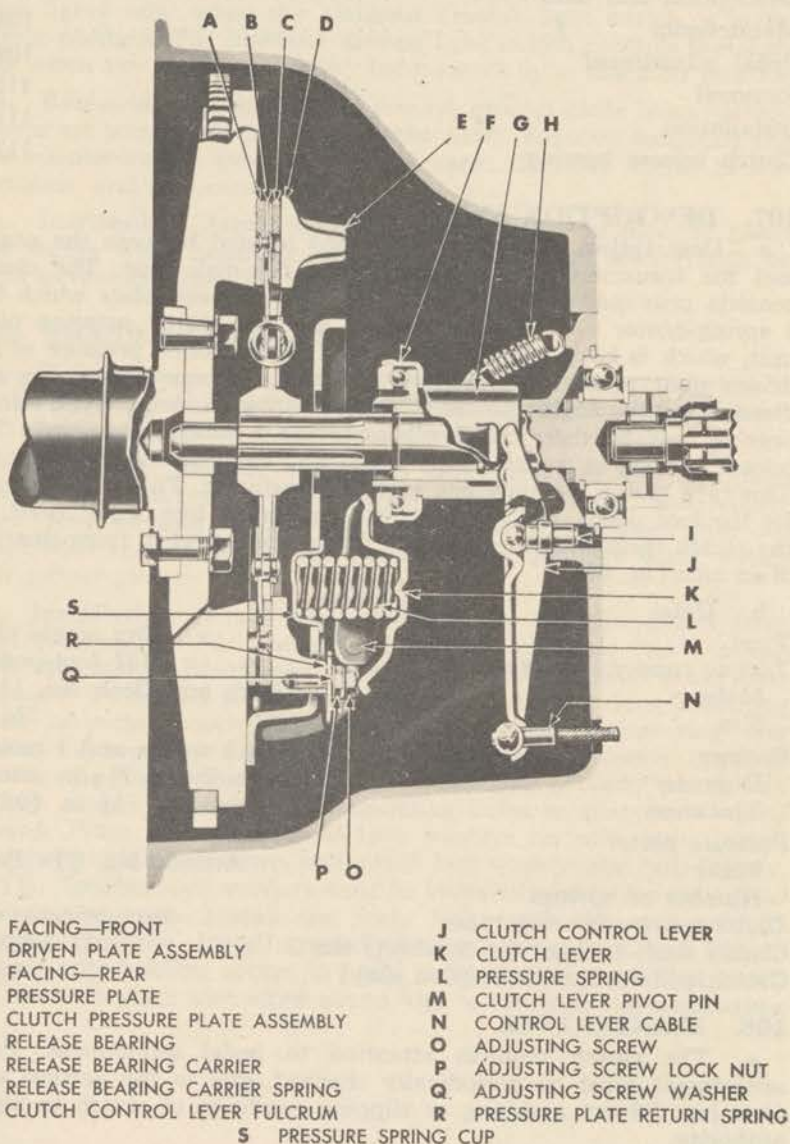
108. MAINTENANCE.

a. The clutch requires attention to pedal adjustment. Pedal adjustment must be periodically checked, due to the natural wear of lining. Report grabbing or slipping condition of clutch to higher authority.

109. PEDAL ADJUSTMENT.

a. **Adjust Pedal.** Loosen clutch control cable adjusting yoke lock nut (figs. 67 and 68). Using a wrench, unscrew cable until clutch pedal has $\frac{3}{4}$ inch free play. Tighten lock nut.

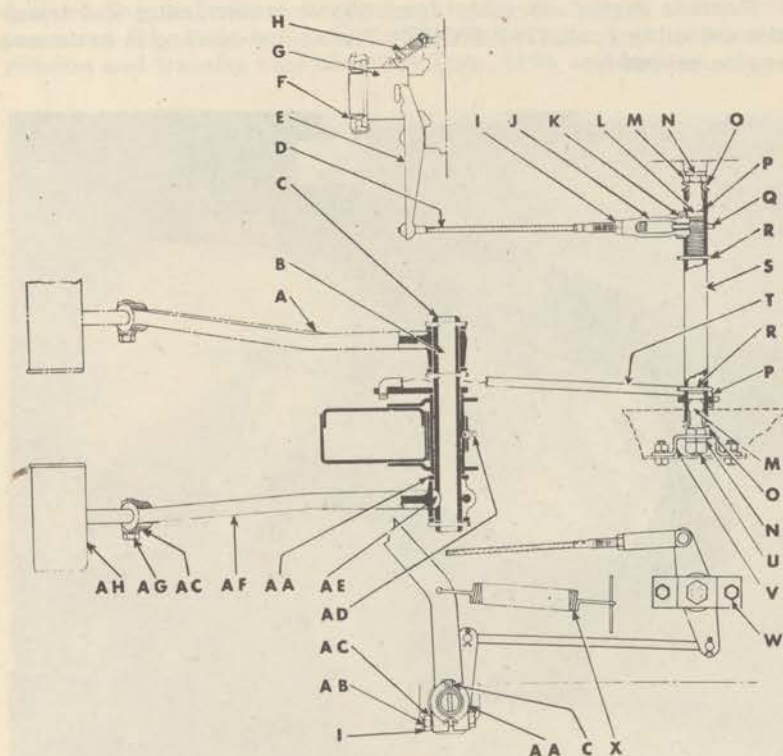
1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)



RA PD 305274

Figure 66—Clutch—Sectional View

CLUTCH



- | | | | |
|---|--------------------------------|----|--------------------------------------|
| A | BRAKE PEDAL | Q | SPRING |
| B | PEDAL SHAFT ASSEMBLY | R | TUBE SPRING COTTER PIN |
| C | PEDAL SHAFT COTTER PIN | S | LEVER AND TUBE ASSEMBLY |
| D | LEVER CABLE | T | PEDAL ROD |
| E | LEVER | U | BALL STUD NUT |
| F | RELEASE BEARING | V | FRAME BRACKET |
| G | RELEASE BEARING CARRIER | W | FRAME BRACKET SCREW |
| H | RELEASE BEARING CARRIER SPRING | X | PEDAL RETRACTING SPRING |
| I | LEVER CABLE YOKE END LOCK NUT | AA | PEDAL SHAFT WASHER |
| J | LEVER CABLE YOKE END | AB | PEDAL CLAMP BOLT |
| K | LEVER CABLE CLEVIS PIN | AC | PEDAL CLAMP BOLT LOCK WASHER |
| L | TUBE WASHER | AD | PEDAL SHAFT HYDRAULIC GREASE FITTING |
| M | BALL STUD | AE | PEDAL TO SHAFT KEY |
| N | BALL STUD LOCK WASHER | AF | PEDAL |
| O | TUBE DUST WASHER | AG | PEDAL CLAMP BOLT |
| P | TUBE FELT WASHER | AH | PEDAL PAD |

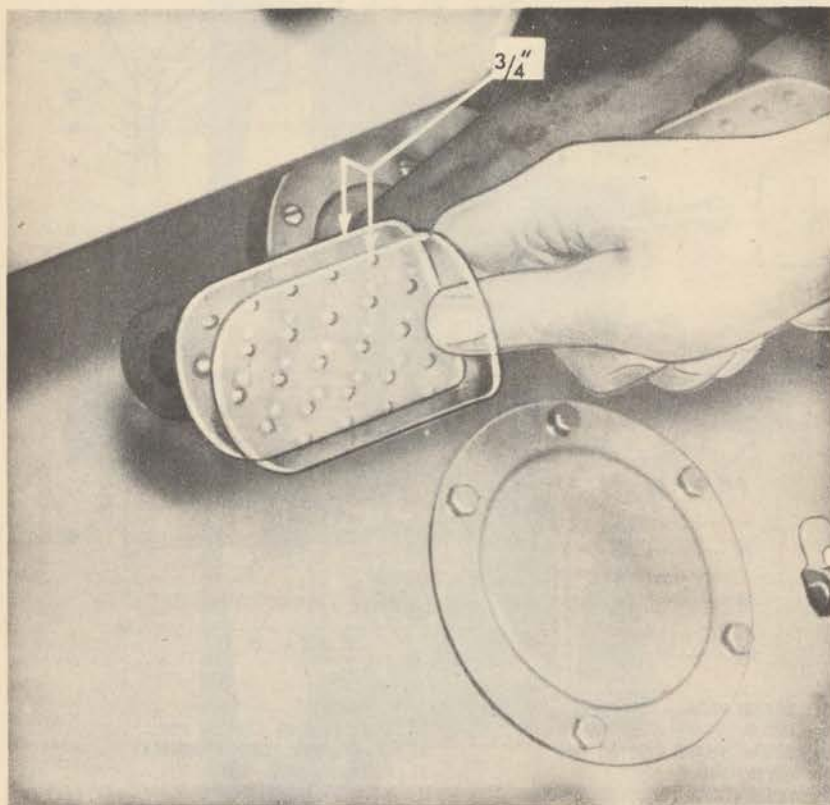
RA PD 305286

Figure 67—Clutch Control

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

110. REMOVAL.

a. Remove engine assembly (par. 60) or transmission and transfer case assembly (par. 115). *NOTE: The easiest method is to remove the engine assembly.*



RA PD 305239

Figure 68—Clutch Pedal Free Travel

b. Mark clutch pressure plate and flywheel to assure correct position when installing. Loosen evenly and remove screws holding pressure plate to flywheel. Remove pressure plate; remove driven plate.

111. INSTALLATION.

a. Clean flywheel and clutch. Install small amount of light grease in clutch shaft flywheel bushing. Install driven plate against flywheel with short end of hub toward flywheel. Install clutch pressure plate loosely with screws. Use a clutch shaft or clutch pilot arbor to aline driven plate, and tighten clutch pressure plate screws evenly. Remove pilot and check adjustment of clutch fingers (fig.

CLUTCH

69), which should be $\frac{27}{32}$ inch. To adjust clutch fingers, loosen lock nut on adjusting screws, and turn screws until measurements from face of fingers (release bearing contacts) to face of clutch bracket measures $\frac{27}{32}$ inch; set lock nuts. Install engine (par. 61), or transmission and transfer case assembly (par. 116), as required.

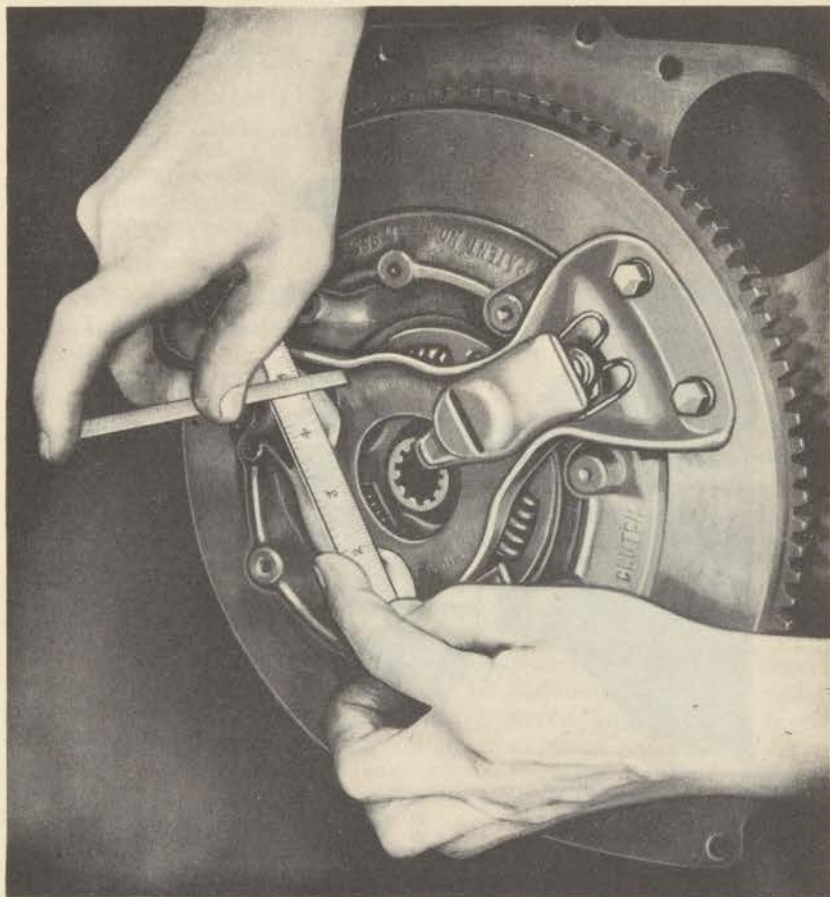


Figure 69—Clutch Finger Adjustment

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112. CLUTCH RELEASE BEARING.

a. **Removal.** Follow procedure outlined in paragraph 60 for removing engine. After release bearing can be reached, unhook release bearing carrier spring, and pull off bearing and carrier (fig. 66). Press carrier out of bearing.

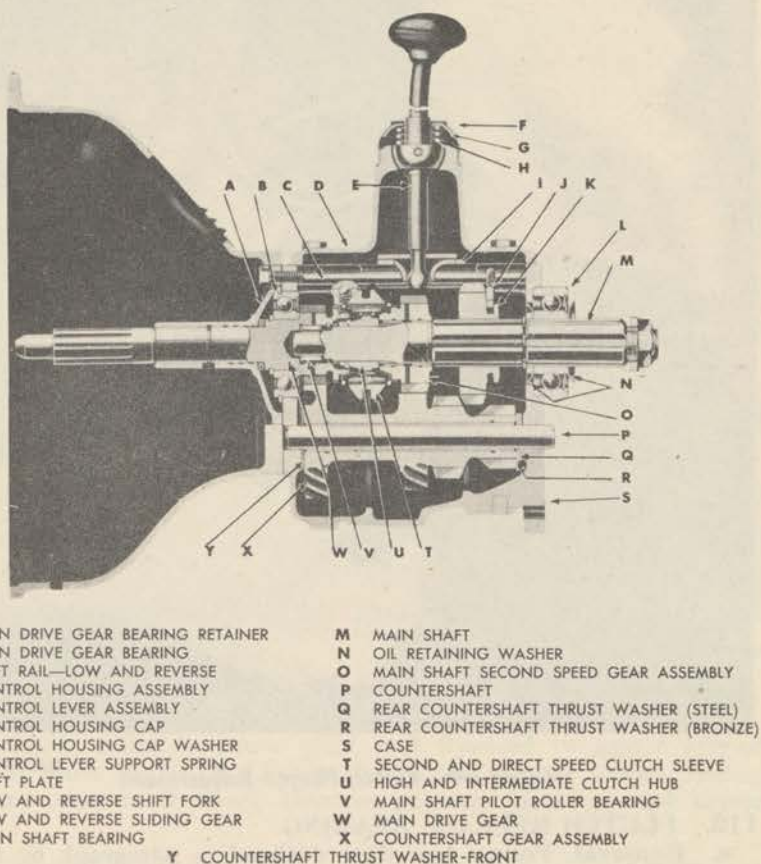
b. **Installation.** Press carrier into bearing. Slip bearing and carrier onto transmission bearing retainer, install release lever on fulcrum, and hook spring to bearing carrier. Follow the procedure outlined in paragraph 61 for completion of assembly.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

Section XXII

TRANSMISSION

	Paragraph
Description and data	113
Maintenance	114
Removal	115
Installation	116



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Figure 70—Transmission—Sectional View

113. DESCRIPTION AND DATA.

a. **Description.** The transmission (fig. 70) is a selective, 3-speed, synchromesh type with synchronized second and high speed gears.

TRANSMISSION

It is located in the power plant unit with the engine, clutch, and transfer case. Third speed is a direct drive through the transmission; all other speeds are through gears of various sizes to obtain the necessary gear reduction. The gears are shifted by a lever extending out of the top of the transmission, and through the floor at the right of the driver. For shifting instructions, refer to paragraph 5 e.

b. Data.

Make and model	Warner T-84-J
Type	Synchromesh
Speeds	3 forward—1 reverse
Ratios:	
Low (1st)	2.665 to 1
Intermediate (2nd)	1.564 to 1
High (3rd)	1 to 1
Reverse	3.554
Lubricant capacity	$\frac{3}{4}$ qt
Lubricant grade reference	par. 18

114. MAINTENANCE.

a. The transmission requires periodic checking of lubrication level. Mounting screws must be tight. Gearshift ball cap must be removed and cleaned as required. Keep all bond straps clean and securely tightened. Vent hole in transmission control housing must be kept clean at all times. Report transmission gear noise to higher authority.

115. REMOVAL.

a. Raise hood and fasten to windshield to prevent accidental closing. Open drain cock at bottom of radiator and drain cooling system. Remove radiator upper hose. Unscrew balls on shift levers. Remove bolts around transmission cover on floor, and remove cover. Remove transmission shift lever by unscrewing retainer collar at top of shift housing. Remove transfer case shift lever pin set screw. Remove lubricator in right end of shift shaft. Drive out shaft and remove levers. Place jack under engine oil pan. Remove exhaust pipe guard. Remove exhaust pipe clamp on skid plate. Remove skid plate. Remove bolts in front and rear propeller shaft universal joint flanges at transfer case end, and tie propeller shafts up to frame. Disconnect speedometer cable at transfer case. Remove transfer case support (snubber) bolt at cross member (fig. 73). Remove clevis pin in lower end of hand brake cable, and remove hand brake retracting spring. Remove clevis pin in clutch release cable yoke at cross tube lever. Disconnect engine stay cable at cross member. Remove bonding strap on transfer case and transmission. Unhook clutch pedal pull-back spring. Remove nuts on engine rear support insulator studs in cross member. Place a second jack under the transmission. Remove frame to cross member bolts at each end, and remove cross member. Place rope around the transmission. Push transmission to

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

right, and remove clutch release lever tube from ball joint on transfer case. Remove four bolts holding transmission to bell housing. Remove two screws in inspection cover. Remove core and clutch release fork. Hold weight of assembly with rope, and remove jack from under transmission. Slide transmission assembly back until clutch shaft clears bell housing, lowering jack under engine just enough so that transmission will clear floor pan. Remove assembly from under vehicle.

b. **Remove Transmission from Transfer Case.** Clean outside of units. Drain lubricant from transmission and transfer case. Remove screws holding rear cover on transfer case, and remove cover and gasket. Remove cotter pin, nut, and washer on rear end of transmission main shaft. Pull off main shaft gear and oil slinger.

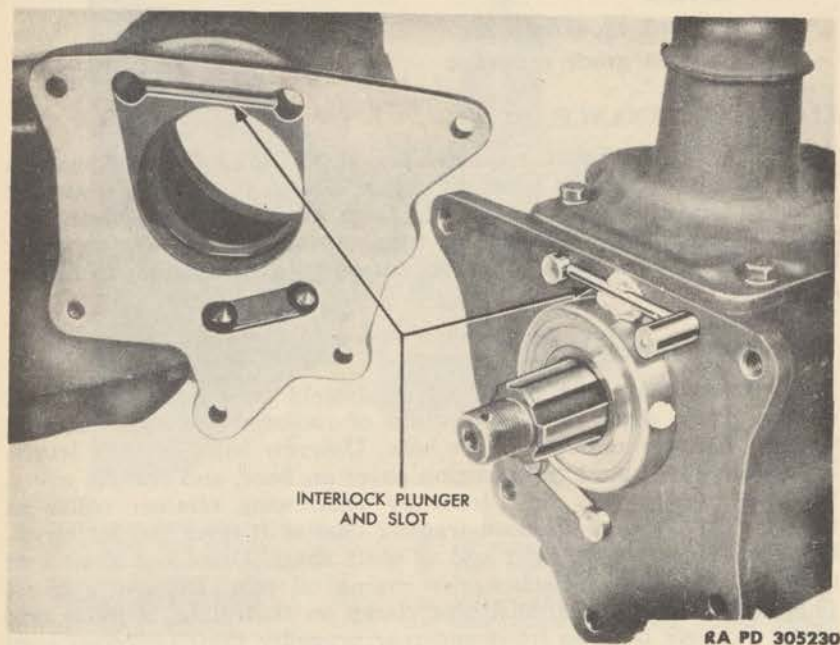


Figure 71—Gearshift Interlock Plunger

Remove four screws holding control housing on top of transmission, and remove housing. Remove shifter plate spring, and remove shifter plate. Loop piece of wire around main shaft to the rear of second speed gear, and attach wire tightly to front of transmission. Remove five screws holding transfer case to rear of transmission. Support transfer case, and tap lightly on end of transmission main shaft; at the same time draw transfer case away from transmission. **NOTE:** Do not lose transmission gearshift interlock plunger (fig. 71).

TRANSMISSION**116. INSTALLATION.**

a. **Assemble Transmission to Transfer Case.** Install transmission shift interlock plunger in position, using grease to hold it temporarily (fig. 71). Attach transfer case to transmission with five screws. Install shifter plate and spring. Install control housing on top of transmission with four screws. Using new gasket, install oil retaining washer on transmission main shaft in transfer case, with open face to rear. Install main drive gear with small power take-off gear to rear. Install washer, nut, and cotter pin. Install rear cover with screws and lock washers, using new gasket. Put lubricant in transmission and transfer case (par. 18).

b. **Install in Vehicle.** Place unit under vehicle. Place rope around transmission. Raise transmission, and insert transmission main drive gear shaft (clutch shaft) in hub of clutch plate and flywheel. Push transmission forward into position. Place jack under transmission to take the weight. Install clutch release fork on pivot ball, and install clutch release cable in end. Install transmission to bell housing bolts. Remove rope. Raise transmission with jacks. Push transmission to the right, and install clutch release tube on ball on transfer case. Install frame cross member. Remove jack under transmission. Install engine support insulator stud nuts at cross member. Place transfer case support rubber in place, and install bolt through cross member. Attach bond straps. Connect clutch release cable to lever. Connect hand brake cable and spring. Install engine stay cable and adjust so it is just taut. Install pedal pull-back spring. Adjust clutch release cable for pedal play (par. 109). Remove jack under engine. Connect speedometer cable at transfer case. Install transfer case shift levers and springs, driving shaft in from right side. Install shaft lock screw, and wire in place. Install lubricator in right end of shaft. Attach front and rear propeller shafts at transfer case. Install transmission skid plate. Install exhaust pipe clamp on skid plate. Install exhaust pipe guard. Install transmission shift lever in top of housing. Install transmission floor cover. Install gearshift lever balls. Install radiator upper hose. Fill cooling system, giving due attention to antifreeze, if required. Run engine until warm, and check coolant supply. Check cooling system for leaks. Lower hood and hook into place.

1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB and FORD MODEL GPW)

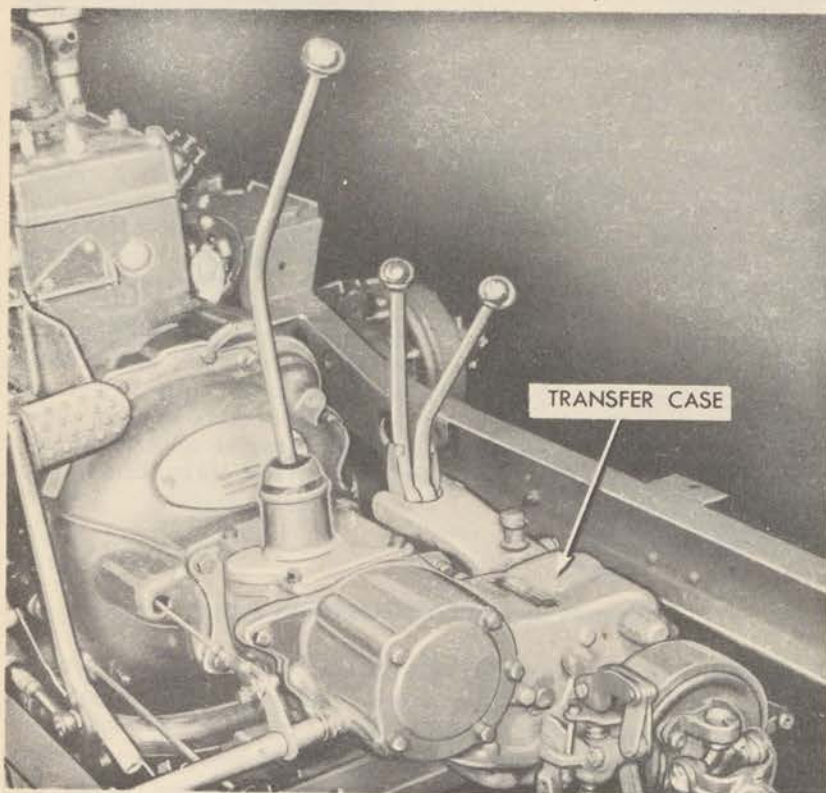
Section XXIII

TRANSFER CASE

	Paragraph
Description and data	117
Maintenance	118
Removal	119
Installation	120
Shifting levers	121

117. DESCRIPTION AND DATA.

a. **Description.** The transfer case (fig. 72) is an auxiliary gear unit attached to the rear of the transmission. The transfer case is essentially a two-speed transmission which provides an additional

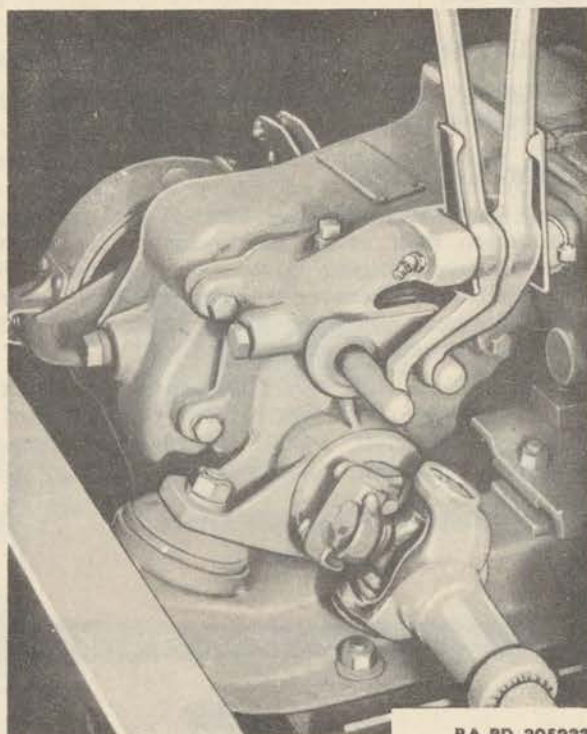


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Figure 72—Transfer Case—Rear View

TRANSFER CASE

gear reduction for any selection of the transmission gears, also a means of engaging and disengaging power to drive the front axle. The shifting mechanism (fig. 73) is operated by two levers on the top of the case. A power take-off aperture is located at the rear just behind the transmission main shaft. The speedometer drive gear is located in the output shaft housing for the drive to the rear axle, and a hand brake is located on the same housing.



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Figure 73—Transfer Case Shifting Mechanism

b. Data.

Make and model	Spicer-18
Ratio—high	1 to 1
—low	1.97 to 1
Speedometer teeth—drive gear	4
—driven gear	14
Lubricant capacity	1½ qt

118. MAINTENANCE.

a. The transfer case requires lubrication at regular intervals. All mounting bolts must be kept tight. Universal joint yoke and com-

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

panion flange nuts must be tight. Bond strap must be clean and tightened securely. Tighten drain and filler plugs. Report failure to stay in gear and noisy gears to higher authority.

119. REMOVAL.

a. Remove transmission and transfer case as an assembly as outlined in paragraph 115.

120. INSTALLATION.

a. Attach transfer case to transmission, and install in vehicle as outlined in paragraph 116.

121. SHIFTING LEVERS.

a. **Removal.** Unscrew accelerator footrest and remove 10 screws holding transmission floor cover, also remove two screws holding transfer case shift lever housing cover. Remove covers. Raise hood and secure to windshield. Remove transfer case shift lever set screw and lock wire. Unscrew hydraulic fitting from right end of shaft. Drive out shaft, and remove levers (fig. 73).

b. **Installation.** Place shift levers and springs in position. Drive in shaft. Install shaft set screw, and wire in place. Install hydraulic fitting in right end of shaft. Install transmission floor cover and accelerator footrest.

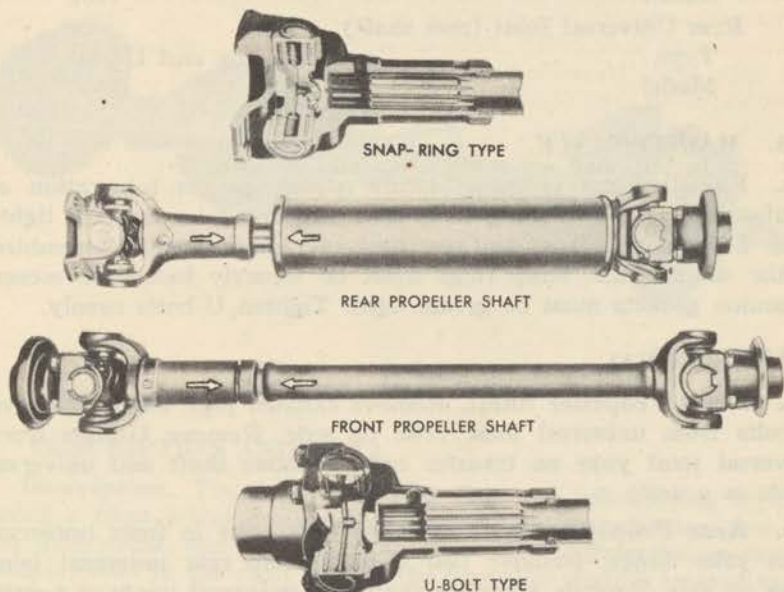
Section XXIV

PROPELLER SHAFTS AND UNIVERSAL JOINTS

	Paragraph
Description and data	122
Maintenance	123
Removal	124
Installation	125

122. DESCRIPTION AND DATA.

a. **Description.** Two propeller shafts are used, one to drive each axle. Two universal joints are used on each shaft (fig. 74). A splined slip joint is used at the rear of the front shaft, and, at the front of the rear shaft. **NOTE:** *The slip joint is marked with an arrow on the spline shaft and on the sleeve yoke, and these arrows must aline*



RA PD 305234

Figure 74—Propeller Shafts and Universal Joints

for correct assembly (fig. 74). The propeller shaft connecting the transfer case to the front axle has U-bolt type joints at both ends. The rear propeller shaft has a U-bolt type joint at the rear where it attaches to the rear axle, and a snap-ring type joint at the front end. The trunnion bearings are of the needle bearing type which are lubricated through a hydraulic fitting and an X-channel in the trunnion. Refer to lubrication instructions in paragraph 18.

**¼-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)****b. Data.****Propeller shafts**

Make Spicer

Installed length normal load-joint center to center

Front 21²⁵/₃₂ in.Rear 21⁵/₈ in.**Front Universal Joint (front shaft)**

Type Snap-ring and U-bolt

Model 1268

Rear Universal Joint (front shaft)

Type Snap-ring and U-bolt

Model 1261

Front Universal Joint (rear shaft)

Type Snap-ring

Model 1261

Rear Universal Joint (rear shaft)

Type Snap-ring and U-bolt

Model 1268

123. MAINTENANCE.

a. Propeller and universal joints require proper lubrication at regular intervals. Attaching bolts and nuts must be securely tightened. The yokes of front and rear universal joints must be assembled in the same plane. Snap rings must be securely locked in recess. Trunnion gaskets must be grease-tight. Tighten U-bolts evenly.

124. REMOVAL.

a. **Front Propeller Shaft.** Remove exhaust pipe shield. Remove U-bolts from universal joint yoke on axle. Remove U-bolts from universal joint yoke on transfer case. Remove shaft and universal joints as a unit.

b. **Rear Propeller Shaft.** Remove four bolts in front universal joint yoke flange. Remove two U-bolts from rear universal joint yoke on axle. Remove propeller shaft and universal joints as a unit.

125. INSTALLATION.

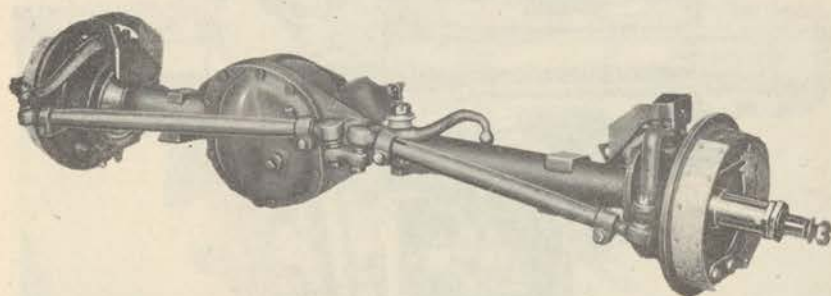
a. **Front Propeller Shaft.** Install propeller shaft and universal joint assembly in position on vehicle. Install U-bolts at axle. Install U-bolts at transfer case. *NOTE: Tighten U-bolts evenly.* Install exhaust pipe shield. Lubricate universal joints (par. 18 c).

b. **Rear Propeller Shaft.** Install propeller shaft and universal joint assembly in position. Install U-bolts in rear universal joint, and tighten evenly. Attach front universal joint flange at transfer case with four bolts. Lubricate universal joints (par. 18 c).

Section XXV

FRONT AXLE

	Paragraph
Description and data	126
Maintenance	127
Wheel bearings	128
Wheel grease retainer	129
Wheel hub	130
Brake drums	131
Steering knuckle housing oil seal	132
Steering tie rod	133
Drag link bell crank	134
Wheel alinement (toe-in)	135
Removal	136
Installation	137



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Figure 75—Front Axle

126. DESCRIPTION AND DATA.

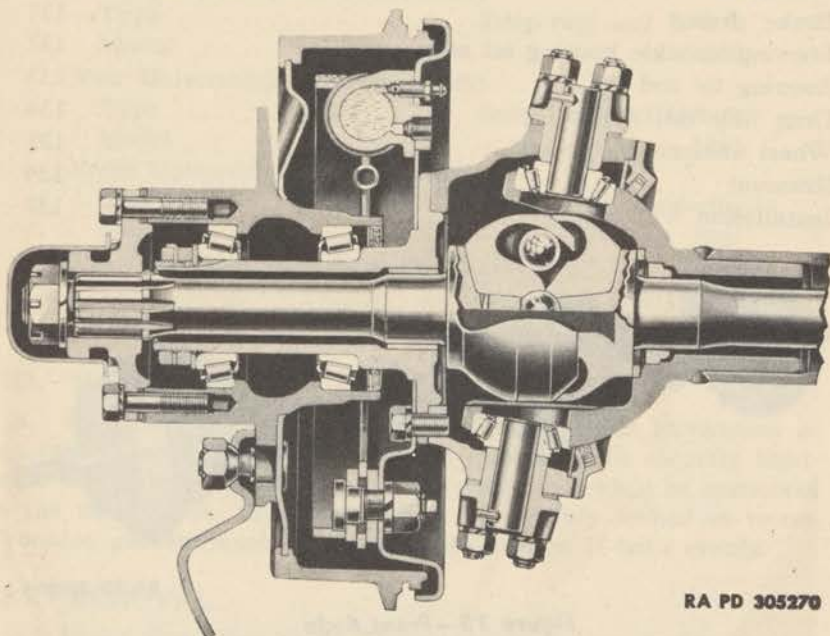
a. **Description.** The front axle (fig. 75) is a full-floating type enclosing a front wheel driving unit having a single-reduction, two-pinion differential, and hypoid drive gears. The differential carrier housing is offset to the right so that the propeller shaft is located to the right of the engine for maximum ground clearance. A cover provides easy access to the differential unit. The front wheels are driven by axle shafts, each equipped with a constant-velocity type universal joint enclosed within a steering knuckle at the outer end of the axle housing. The differential assembly is the same as used in the rear axle. Power is transmitted by a propeller shaft from the transfer case, where a shift lever permits the vehicle operator to engage or disengage the drive.

b. **Data.**

Make and model	Spicer-25
Drive gear ratio	4.88 to 1

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Drive	Hotchkiss (through springs)
Type	Full floating
Road clearance	8 ⁷ / ₁₆ in.
Differential type	2 pinion
Differential drive gears	Hypoid
Differential bearings	Tapered roller
Turning angle	26 deg



RA PD 305270

Figure 76—Front Wheel Hub

Tie rods:

Number	2
Right-hand length, center-to-center	24 ¹ / ₄ in.
Left-hand length, center-to-center	17 ¹¹ / ₃₂ in.

Steering geometry:

King pin inclination	7 ¹ / ₂ deg
Wheel camber	1 ¹ / ₂ deg
Wheel caster	3 deg
Wheel toe-in	3/64 in. to 3/32 in.

Bearings:

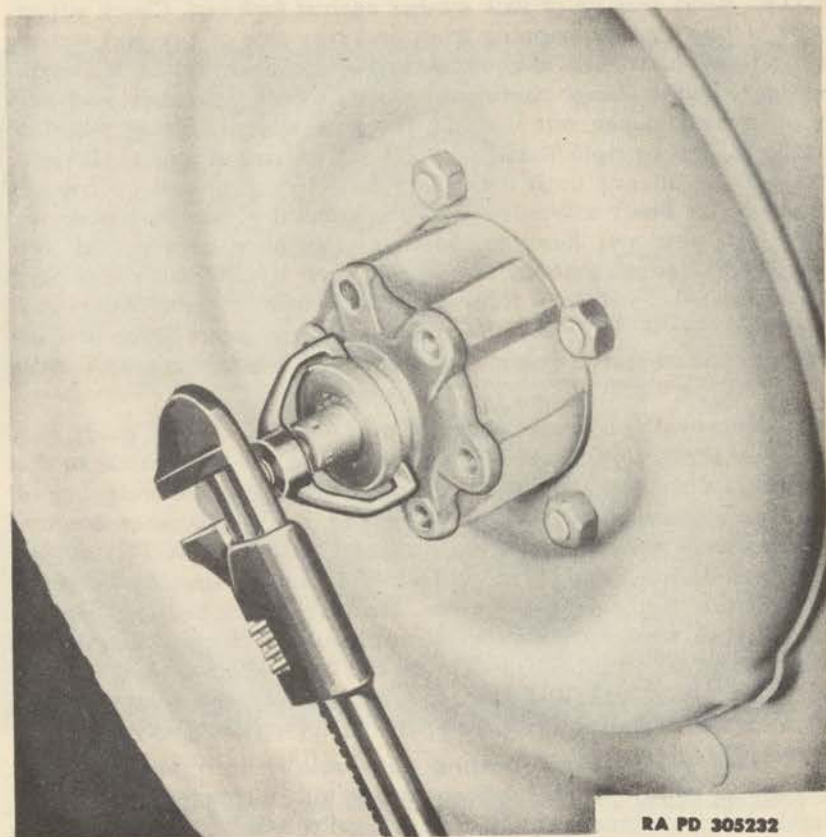
Differential side	Tapered roller
Pinion shaft	Tapered roller
Wheel hub	Tapered roller

FRONT AXLE

Steering knuckle	Tapered roller
Steering bell crank	Tapered roller
Lubricant capacity	1¼ qt

127. MAINTENANCE.

- a. Correct any lubricant leakage. Lubricate differential and steering housings, wheel bearings, and steering control as required (par.



RA PD 305232

Figure 77—Removing Driving Flange, Using Puller (41-P-2905-60)

18). Keep vent cleared of dirt. Wheel bearings must be properly adjusted (par. 128). Replace damaged brake drums and hubs, and steering control rods (par. 133). Check wheel toe-in periodically, and correct if necessary (par. 135). Keep all mounting bolts tight. Report to higher authority any caster and camber trouble, or unusual noises.

128. WHEEL BEARINGS.

- a. **Adjustment.** Raise front of vehicle so that tire clears floor. Pry off hub cap (fig. 76). Remove axle shaft nut cotter pin, nut, and

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

washer. Remove driving flange screws. With puller, pull off flange (fig. 77). **NOTE:** *Do not lose flange shims.* Bend lip of nut lock washer away from nut. Remove lock nut with box-type socket wrench (fig. 78). Remove lock washer. Spin wheel and tighten wheel bearing nut until wheel binds. Back off nut about one-sixth turn, or more if necessary, until wheel turns freely. Install lock washer and lock nut. **NOTE:** *Bend over lip of lock washer against lock nut.* Check adjustment of bearings by gripping front and rear side of tire and moving it from side to side. A slight perceptible shake should be felt in the bearings. Install flange shims and flange. Check axle shaft end play by tightening flange nut without the lock washer. Swing wheel to maximum left or right; have punch mark on end of axle shaft up or down. Back off nut until 0.050-inch thickness gage will go between hub and nut. Shaft will move in by the amount of end play when end is tapped with soft hammer. Measure clearance between nut and flange, and deduct amount from 0.050 inch to determine end play. If less than 0.015 inch or more than 0.035 inch, correct thickness of shim pack (with Rzeppa joint disregard these instructions and use 0.060-inch shim pack). Install axle shaft lock washer, nut, and cotter pin. Install new hub cap.

b. Removal. Loosen wheel stud nuts. **NOTE:** *Wheel studs have left-hand threads on left side of vehicle.* Raise front of vehicle so that tire clears floor. Remove wheel stud nuts and remove wheels. Pry off hub cap. Remove axle shaft nut cotter pin, nut, and washer. Remove driving flange screws and using puller, pull flange. **NOTE:** *Do not lose flange shims.* Bend lip of nut lock washer away from lock nut and remove nut. Remove lock washer. Remove wheel bearing nut and bearing lock washer. Shake wheel until outer bearing comes free of hub, and lift off wheel. Drive or press out inner bearing along with oil seal. Turn wheel over, and drive or press out outer bearing cup. Clean lubricant out of hub, and wash all parts in dry-cleaning solvent.

c. Installation. Press bearing cups solidly into place in hub. Spread $\frac{1}{16}$ -inch layer of lubricant inside hub to prevent rust. Thoroughly lubricate inner bearing cone and roller assembly. **NOTE:** *Pack lubricant thoroughly into bearing rollers and cage.* Install bearing in hub. Press oil seal into hub (with lip of seal toward bearing), until seal is even with end of hub. **NOTE:** *Before installation, soak seal in oil to soften leather.* Lubricate outer bearing cone and roller assembly. Install wheel on axle. Install outer bearing, lock washer, and nut. Adjust wheel bearings, and complete installation of parts (subpar. a above).

129. WHEEL GREASE RETAINER.

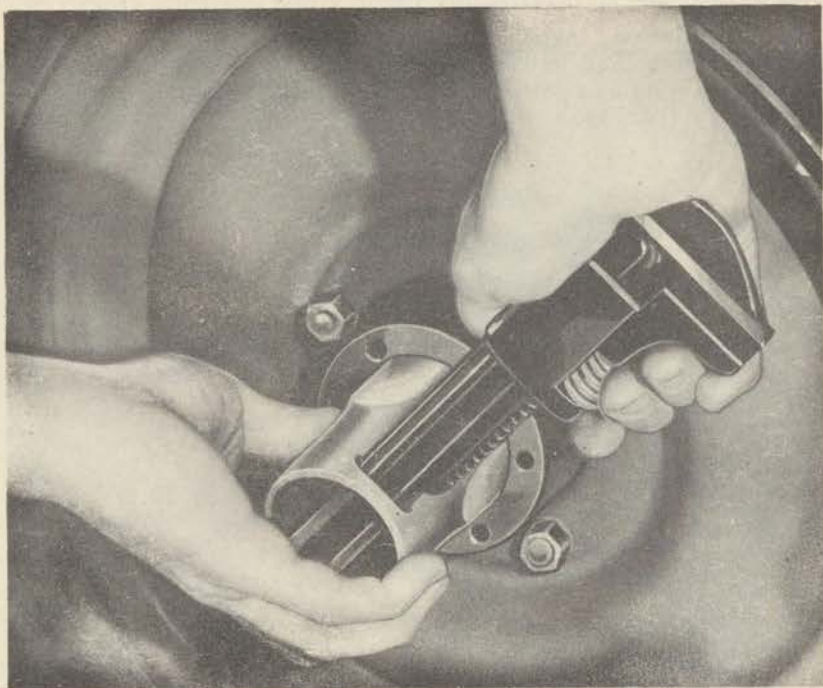
- a. Removal.** Remove retainer as outlined in paragraph 128 b.
- b. Installation.** Install retainer as outlined in paragraph 128 c.

FRONT AXLE

130. WHEEL HUB.

a. **Removal.** Remove wheel and hub (par. 128 b). Support brake drum inside at hub, and drive out studs. Remove brake drum.

b. **Installation.** Assemble brake drum on hub. Install new wheel studs. *NOTE: Left-hand thread studs are used in wheels for left side of vehicle.* Support studs and swedge shoulder over against tapered hole in hub. Install hub on axle and mount wheel (par. 128 c).



RA PD 305235

Figure 78—Removing Lock Nut, Using Wrench (41-W-3825-200)

131. BRAKE DRUMS.

a. **Removal.** Remove wheel hub and drum as outlined in paragraph 130 a.

b. **Installation.** Install drum and wheel hub as outlined in paragraph 130 b. Adjust brakes (par. 148).

132. STEERING KNUCKLE HOUSING OIL SEAL.

a. **Removal.** Raise front of vehicle. Remove screws holding oil seal in place, and remove both halves of oil seal assembly (fig. 79).

b. **Installation.** *NOTE: Before installing new oil seal smooth spherical surface of axle with aluminum oxide abrasive cloth. Grease*

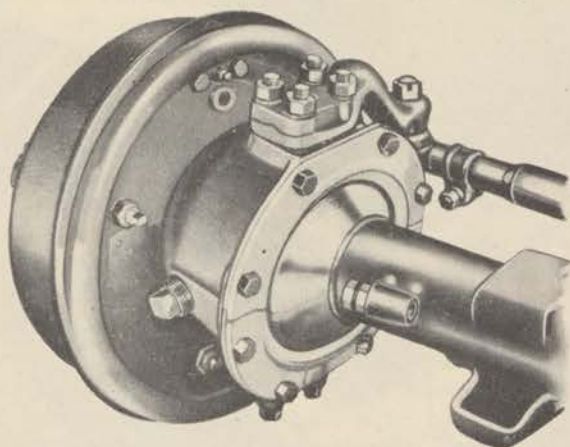
**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
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spherical surface of axle, also oil seal. Install seal in place so that ends fit snugly together, and tighten in place. Check lubricant level in steering knuckle housing, and replenish if necessary (par. 18).

133. STEERING TIE ROD.

a. Removal. Remove tie rod cotter pins and nuts from tie rod ends (fig. 75). Drive out tie rod ends from steering arms, and remove dust washers and springs.

b. Installation. Install dust washers and springs on tie rod ends. Install tie rod ends in steering knuckle arm and bell crank, and secure with nuts and cotter pins. Check wheel alinement, and adjust if necessary (par. 135).



RA PD 305240

Figure 79—Steering Knuckle Oil Seal

134. DRAG LINK BELL CRANK.

a. Removal. Remove cotter pin in front end of steering connecting rod. Remove slotted adjusting plug (ball seat). Lift rod off bell crank ball. Remove cotter pins and nuts on tie rod ends at bell crank. Drive tie rod ends out of bell crank. **NOTE: Do not lose dust washers and springs.** Remove cotter pin in bell crank stud and remove nut, dust washer, and thrust washer. Remove bell crank. Clean all parts in dry-cleaning solvent. To remove bell crank stud, remove thrust washer, and drive out tapered lock pin toward left front wheel. Drive stud up out of axle.

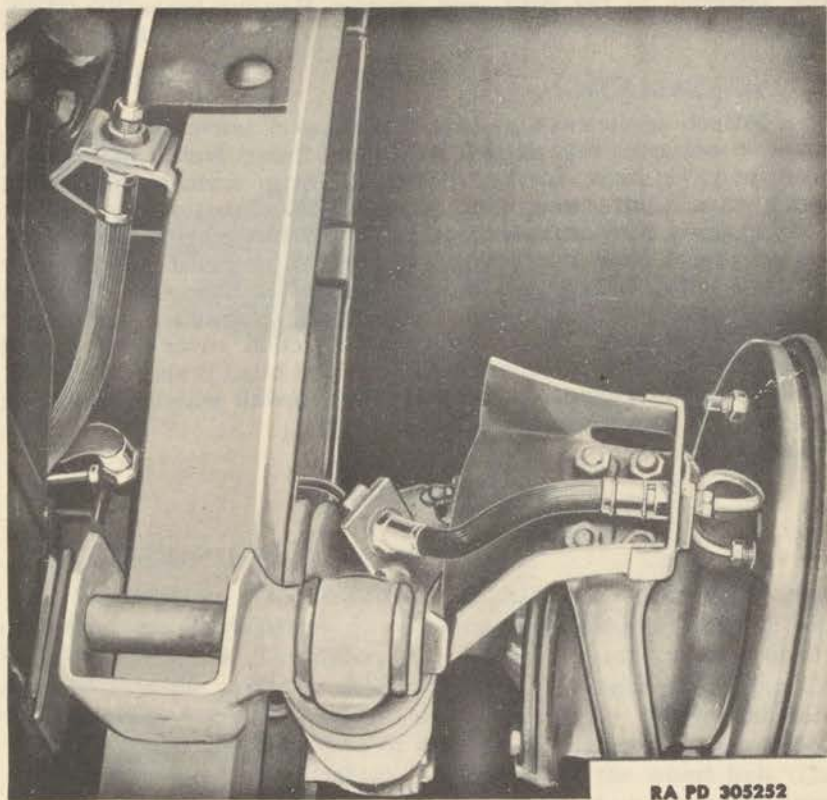
b. Installation. If bell crank has been removed, drive stud into axle so that slot will line up with tapered pin hole. Drive tapered pin into position, and stake edge of hole at large end. Install thrust washer on stud. Lubricate roller bearings, and install on stud. Install

FRONT AXLE

thrust washer, dust washer, nut, and cotter pin. Install steering connecting rod. Install tie rod ends in bell crank arm, and secure each with nut and cotter pin. Check front wheel toe-in, and adjust if necessary (par. 135).

135. WHEEL ALINEMENT (TOE-IN).

a. **Caster and Camber.** Caster is the backward tilt of the axle. Camber is the outward tilt of the wheels at the top. If these conditions require attention, notify higher authority.



RA PD 305252

Figure 80—Brake Hose

b. **Toe-in.** Wheel toe-in is the difference in distance between the front wheels at the front and at the rear of the axle. To adjust toe-in, set tie rod arm of steering bell crank at right angles to front axle. Use straightedge or line against outside of left wheels, as a guide. Adjust left tie rod so that left wheel is straight ahead. While bell crank remains at right angle to axle, check right front wheel, and adjust tie rod if necessary. Set toe-in of front wheels at $\frac{3}{64}$ inch to $\frac{3}{32}$ inch by shortening right tie rod approximately one turn.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)****136. REMOVAL.**

a. Loosen wheel stud nuts. Raise front of vehicle, and support underframe side members at rear of spring pivot brackets. Remove wheels. Disconnect brake line at front cross member (fig. 80). Remove universal joint U-bolts at front axle. Jack up front springs. Remove axle spring clip nuts and clips. Remove spring pivot bolt at rear end of right spring. Remove jacks from under springs. Disconnect steering connecting rod at bell crank. Install a jack between left spring and frame. Spread spring until axle assembly will clear. Move axle assembly to the right, and remove. Remove brake hose from axle.

137. INSTALLATION.

a. Attach brake hose at axle. Install axle assembly on springs. Remove jack from between left spring and frame. Install right spring pivot bolt. Position axle on springs. Jack up springs, and install spring clips, plates, and nuts. Remove jacks from under springs. Connect brake hose at cross member. Install dust cover on bell crank, and attach steering connecting rod. Attach propeller shaft. Draw universal joint U-bolts up evenly. Lubricate front axle universal joints, and check axle lubricant (par. 18). Adjust brakes if necessary (par. 147). Remove master cylinder inspection cover on toeboard between foot pedals. Fill master cylinder, and bleed brakes (par. 151). Replace master cylinder inspection cover. Install wheels and adjust (par. 128 a). Lower vehicle to floor.

Section XXVI

REAR AXLE

	Paragraph
Description and data	138
Maintenance	139
Axle shaft	140
Wheel bearings	141
Wheel bearing grease retainer	142
Wheel hub	143
Brake drum	144
Rear axle replacement	145



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Figure 81—Rear Axle

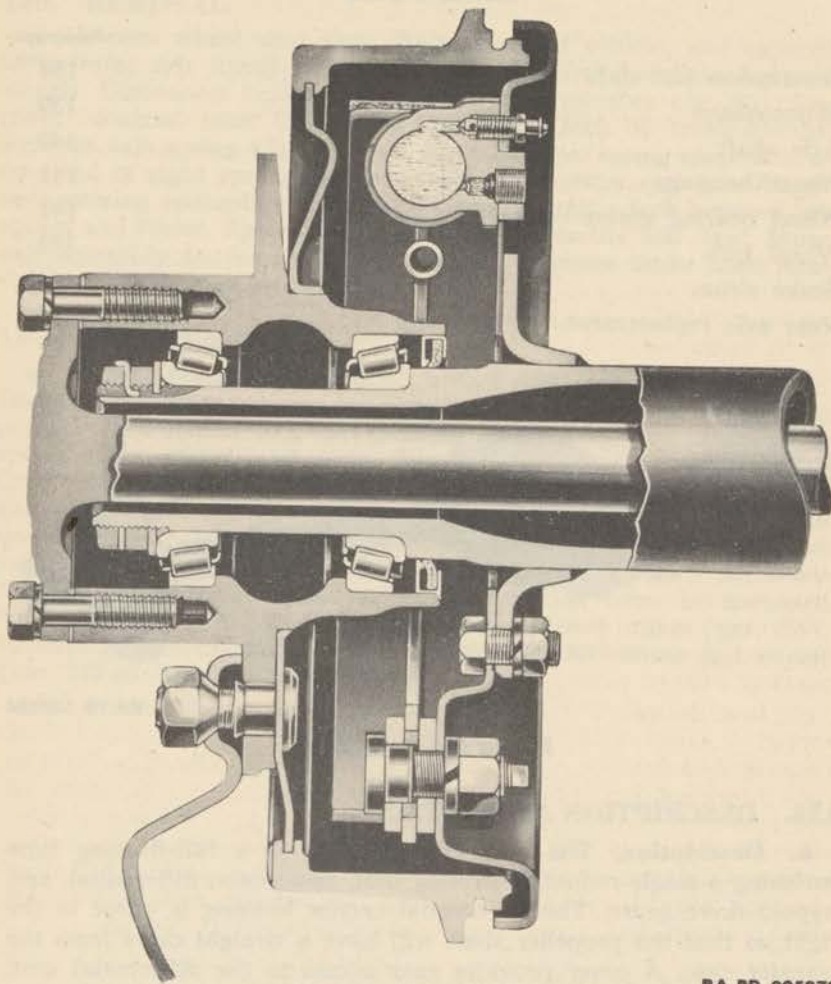
138. DESCRIPTION AND DATA.

a. **Description.** The rear axle (fig. 81) is a full-floating type enclosing a single-reduction driving unit, two-pinion differential, and hypoid-drive gears. The differential carrier housing is offset to the right so that the propeller shaft will have a straight drive from the transfer case. A cover provides easy access to the differential unit. The axle shafts are splined to fit into the differential side gears, and flanged at the outer end where they attach to the wheel hub. The wheel bearings are adjusted by two nuts threaded onto the axle tube.

b. **Data.**

Make and model	Spicer 23-2
Drive gear ratio	4.88 to 1
Drive	Hotchkiss (through springs)
Type	Full floating
Road clearance	8 $\frac{7}{16}$ in.
Differential type	Two-pinion
Differential bearings	Tapered roller

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**



RA PD 305272

Figure 82—Rear Wheel Hub

139. MAINTENANCE.

a. Correct any lubricant leakage. Lubricate differential and wheel bearings as required (par. 18). Keep vent cleared of dirt. Wheel bearings must be properly adjusted (par. 141). Replace damaged drums and hubs (par. 143). Keep all mounting bolts tight. Report unusual noise to higher authority.

140. AXLE SHAFT.

a. **Removal.** Remove six axle shaft flange screws and lock washers. Pull out axle shaft (fig. 82), and remove flange gasket.

REAR AXLE

b. Installation. Install new axle shaft flange gasket. Install axle shaft in axle housing, rotating shaft so that shaft will enter differential side gear. Take care not to damage inner oil seal in axle housing. Install axle flange screws and lock washers, and tighten securely.

141. WHEEL BEARINGS.

a. Adjustment. Place jack under axle housing, and raise wheel so that tire clears floor. Remove axle shaft (par. 140 a). Bend lip of lock washer away from lock nut, and remove nut with box-type socket wrench (fig. 78). Remove lock washer. Spin wheel, and tighten wheel bearing nut until wheel just binds. Back off nut one-sixth turn or more, if necessary, until wheel turns freely. Install lock washer and lock nut. *NOTE: Bend over lip of lock washer against lock nut.* Check adjustment by shake of wheel. Install axle shaft (par. 140 b). Lower vehicle to floor.

b. Removal. Loosen wheel stud nuts. *NOTE: Wheel studs have left-hand threads on left side of vehicle.* Raise vehicle so that tire clears floor. Remove wheel stud nuts, and remove wheels. Remove axle shaft (par. 140 a). Bend lip of lock washer away from lock nut, and remove nut with box-type socket wrench (fig. 78). Remove lock washer. Remove bearing adjusting nut and bearing lock washer. Shake wheel until outer bearing comes free of hub, and lift off wheel. Drive or press out inner bearing along with oil seal from wheel hub. Drive or press out bearing cups from hub. Clean old lubricant out of hub, and wash all parts in dry-cleaning solvent. Examine parts for excessive wear or damage, and replace if unserviceable.

c. Installation. Press bearing cups solidly into place in hub. Spread $\frac{1}{16}$ -inch layer of lubricant inside of hub to prevent rust. Thoroughly lubricate inner bearing cone and roller assembly. *NOTE: Pack lubricant into bearing cage.* Install bearing in hub. Press oil seal into hub (with lip of seal toward bearing) until seal is even with end of hub. *NOTE: Before installation, soak seal in oil to soften leather.* Lubricate outer bearing cone and roller assembly. Install wheel on axle. Install outer bearing lock washer and nut. Adjust wheel bearings, and complete installation of parts (par. 141 a).

142. WHEEL BEARING GREASE RETAINER.

- a. Removal.** Remove retainer as outlined in paragraph 141 b.
- b. Installation.** Install retainer as outlined in paragraph 141 c.

143. WHEEL HUB.

a. Removal. Remove wheel and hub as outlined in paragraph 141 b. To remove brake drum from hub, support brake drum at hub, and drive out studs.

b. Installation. Place brake drum on hub. Install new wheel studs. *NOTE: Left-hand thread studs are used in wheels on left side of vehicle.* Support studs and swedge shoulder over against tapered hole in hub. Install hub on axle and mount wheel (par. 141 c). Tighten wheel stud nuts securely. Check brake action.

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and FORD MODEL GPW)**

144. BRAKE DRUM.

- a. **Removal.** Remove wheel hub and drum as outlined in paragraph 143 a.
- b. **Installation.** Install drum and wheel hub as outlined in paragraph 143 b.

145. REAR AXLE REPLACEMENT.

- a. Loosen wheel stud nuts. Raise rear of vehicle and support underframe side member just ahead of spring pivot brackets. Remove wheels. Remove universal joint U-bolts at rear axle. Disconnect brake hose at frame cross member. Remove brake hose at axle. Place jack under each rear spring. Remove spring clip nuts, clips, and plates. Remove jacks from under springs, place between frame and spring, and spread spring. Remove axle, sliding it to left until right end clears spring, then slide to right and remove.
- b. **Installation.** Install axle assembly on springs. Remove jacks from between springs, and place under each spring. Position axle on springs. Install spring clips, plates, lock washers, and nuts. Tighten nuts securely. Remove jacks from under springs. Attach propeller shaft. Draw universal joint U-bolts up evenly. Attach brake hose at axle, then at frame cross member. Check axle lubricant. Remove master cylinder inspection cover on toeboard between foot pedals. Fill master cylinder, and bleed brakes (par. 151). Replace master cylinder inspection cover. Adjust brakes if necessary (par. 148). Install wheels. Lower vehicle to floor.

Section XXVII

BRAKES

	Paragraph
Description and data	146
Maintenance and adjustment	147
Service (foot) brakes	148
Master cylinder	149
Wheel cylinder	150
Flexible lines, hoses and connections	151
Parking (hand) brake	152

146. DESCRIPTION AND DATA.

a. **Description.** The service, or foot brake, system is of the hydraulic type with brakes in all four wheels (fig. 83). The parking, or hand brake, is cable-controlled and mounted on the rear side of the transfer case (fig. 84). The service, or foot brakes, are of the two-shoe, double-anchor type. The brake pedal, through a connection, operates a piston in the master cylinder to force brake fluid through the lines to the brake cylinders in the wheels. The fluid enters the wheel cylinders between two pistons of equal diameter, forcing them apart to apply the brake shoes against the drums. Releasing the brake pedal permits the brake fluid to flow back through the lines to the master cylinder. Adjustments are provided to compensate for wear of the brake linings. The hand brake is designed for parking the vehicle, or as an emergency brake. The hand brake lever is located at the center of the instrument panel. Pulling out on the lever draws a flexible cable through a conduit to actuate an external contracting brake band at the rear of the transfer case. the brake cable is of a predetermined length, and cannot be adjusted. When adjustment is required, the brake band lining will be worn to the point where replacement is necessary. Adjustments are provided on the brake to set the band correctly, and to limit the release action.

b. Data.

Service brakes:

Type	Four-wheel, hydraulic
Size	9 in. x 1 $\frac{3}{4}$ in.
Fluid capacity	$\frac{1}{4}$ qt

Master cylinder:

Type	Combination reservoir and cylinder
Size	1 inch

Wheel cylinders:

Type	Straight bore
Size	Front, 1 in.; rear, $\frac{3}{4}$ in.

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and FORD MODEL GPW)**

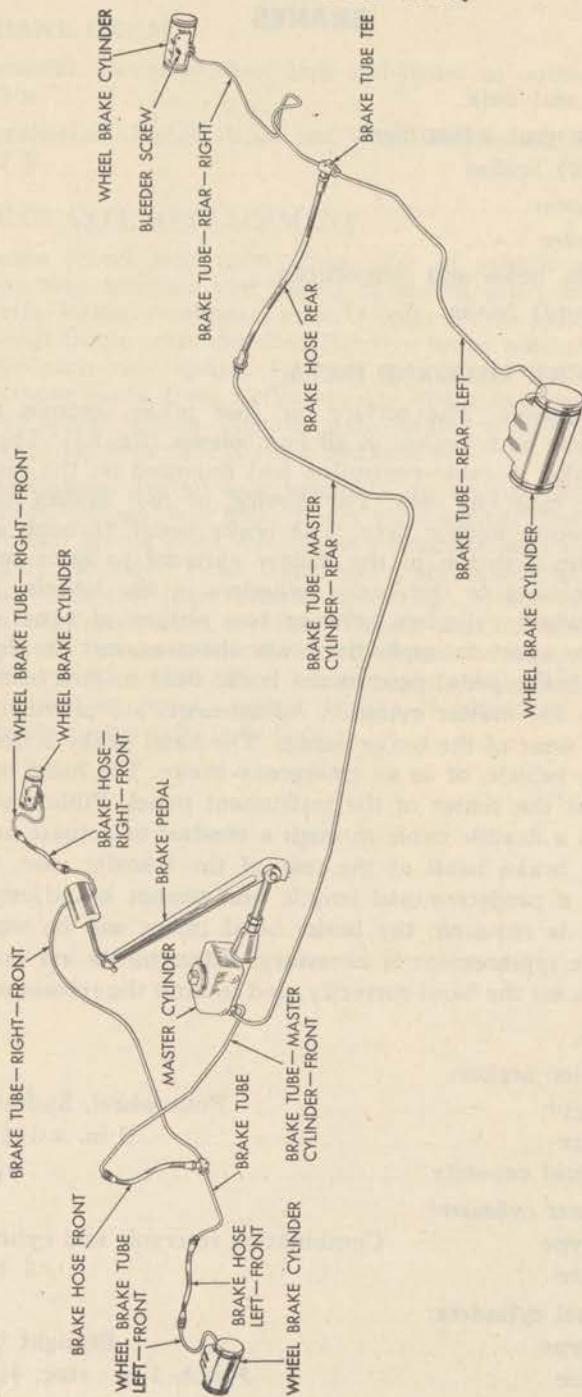
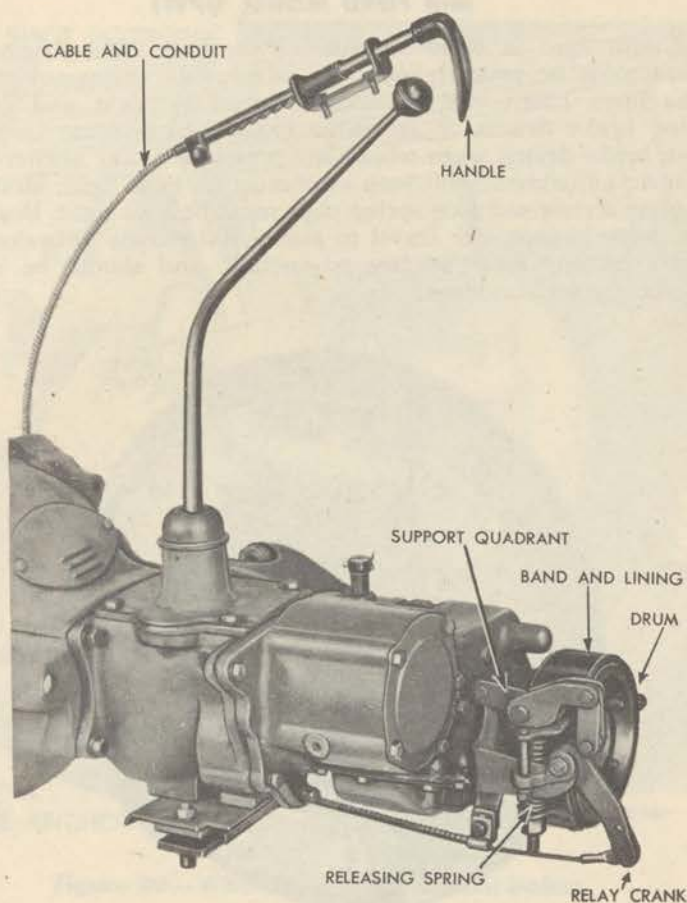


Figure 83—Service (Foot) Brake System

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BRAKES



RA PD 305256

Figure 84—Parking (Hand) Brake System

Brake shoes:

Lining length—forward shoe (moulded)	10 ⁷ / ₃₂ in.
Lining length—reverse shoe (moulded)	6 ³⁹ / ₆₄ in.
Width	1 ³ / ₄ in.
Thickness	³ / ₁₆ in.

Hand brake:

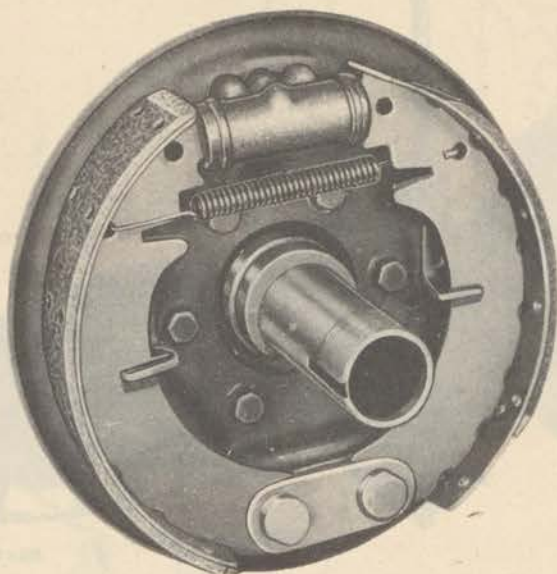
Type	Mechanical
Lining length (woven)	18 ⁹ / ₁₆ in.
Width	2 in.
Thickness	⁵ / ₃₂ in.

147. MAINTENANCE AND ADJUSTMENT.

- a. The service, or foot, brakes require periodic checking of the brake fluid supply in the master cylinder. Keep master cylinder sup-

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

plied with fluid to avoid air entering the lines. Wheel bearings and brakes must be properly adjusted to provide emergency stops. All brake lines, hoses, and connections must be tight and leakproof. Scored brake drums or saturated brake linings must be replaced. Clean brake drums when wheels are removed. Brake anchor bolt and eccentric adjustment bolt lock nuts must be kept tight. Brake backing plate screws and axle spring clips must be kept tight. Brake pedal must have $\frac{1}{2}$ -inch free travel to assure full release of brakes. Brake control linkage must be free to operate, and should be inspected periodically for condition.



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Figure 85—Wheel Brake

b. Adjustment. Adjust brake pedal free travel by lengthening or shortening brake master cylinder eyebolt so that pedal has $\frac{1}{2}$ -inch free play (par. 148). Follow procedure outlined in paragraph 148 to adjust brakes when lining has worn so that brake pedal goes almost to the toeboard. Three adjustments are provided on the hand brake (par. 152).

148. SERVICE (FOOT) BRAKES.

a. Adjustment (minor). Adjust brake pedal free play to one-half inch by lengthening or shortening brake master cylinder eyebolt. Set lock nut securely. Raise vehicle until tires clear floor. **NOTE:** Do not adjust brakes when drums are hot. Loosen eccentric lock nut on forward shoe of one brake (fig. 86). Place wrench on eccentric so

BRAKES

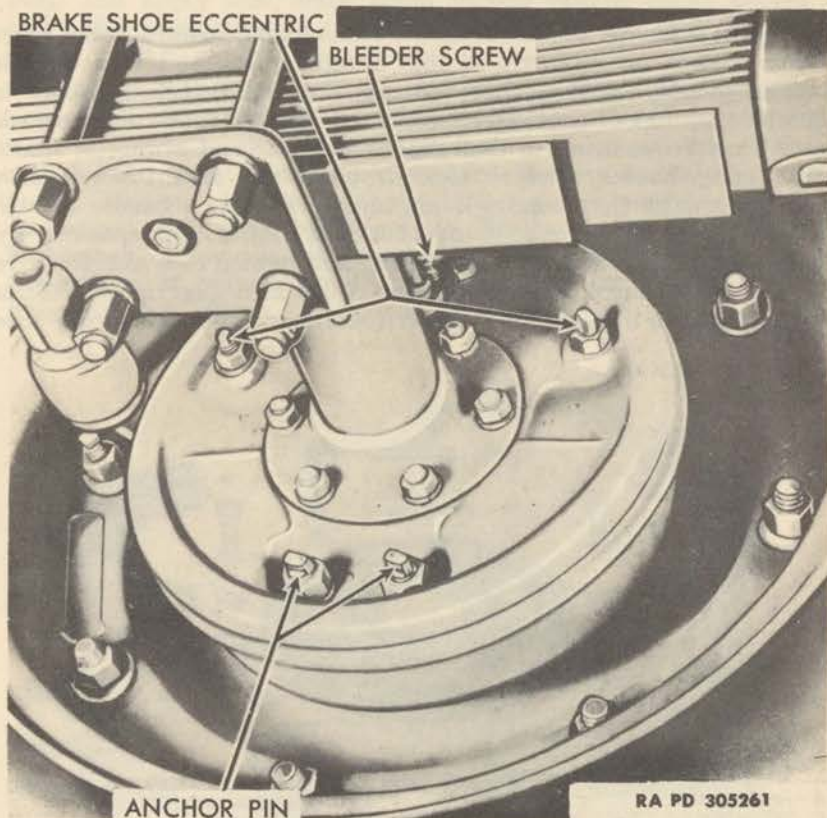


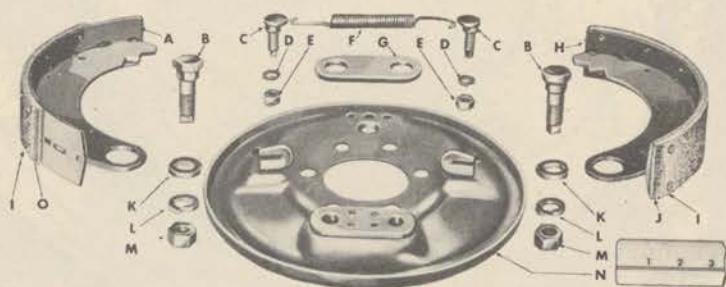
Figure 86—Wheel Brake Adjustment Points

that handle extends up. Rotate wheel, and turn wrench handle toward wheel rim, or forward, until brake drags. Turn wrench in opposite direction until wheel turns freely. Hold wrench on eccentric, and tighten lock nut. Loosen eccentric lock nut on reverse shoe. Place wrench on eccentric with handle up. Rotate wheel, and turn wrench toward wheel rim, or to the rear, until brake drags. Turn wrench in opposite direction until wheel turns freely. Hold wrench on eccentric, and tighten lock nut. Make the same adjustment on the other wheel brakes. Replenish brake fluid in master cylinder (par. 149). Lower vehicle to floor. Apply brake pedal to test brakes.

b. Adjustment (major). Adjust brake pedal free play to one-half inch by lengthening or shortening brake master cylinder eye-bolt. Set lock nut securely. Raise vehicle until tires clear floor. **NOTE:** Do not adjust brakes when drums are hot. Remove wheel stud nuts, and remove wheels from hubs. Insert 0.008-inch thickness gage through slot in brake drum, and turn drum so that gage is at upper (toe) end of forward brake lining. **NOTE:** Check clearance 1 inch

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
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from end of lining. Loosen eccentric lock nut on forward brake shoe. Place wrench on eccentric so that handle is up, and turn wrench handle toward wheel rim, or forward, until 0.008-inch clearance is obtained by feel of gage. Hold wrench on eccentric, and tighten lock nut. Turn brake drum so that gage is at upper end of reverse brake shoe lining. Loosen eccentric lock nut on reverse shoe. Place wrench on eccentric so that handle is up, and turn wrench handle toward wheel rim, or to the rear, until 0.008-inch clearance is obtained by feel of gage. Hold wrench on eccentric, and tighten lock nut. Remove 0.008-inch thickness gage, and insert 0.005-inch gage in slot. Turn brake drum so that gage is at lower (heel) end of forward brake shoe



A SHOE AND LINING ASSEMBLY—REVERSE
B ANCHOR PIN
C ECCENTRIC
D ECCENTRIC LOCK WASHER
E ECCENTRIC NUT
F RETURN SPRING
G ANCHOR PIN PLATE

H SHOE AND LINING ASSEMBLY—FORWARD
I LINING TUBULAR BRASS RIVET
J LINING—FORWARD
K ANCHOR PIN CAM
L ANCHOR PIN LOCK WASHER
M ANCHOR PIN NUT
N BACKING PLATE ASSEMBLY
O LINING—REVERSE

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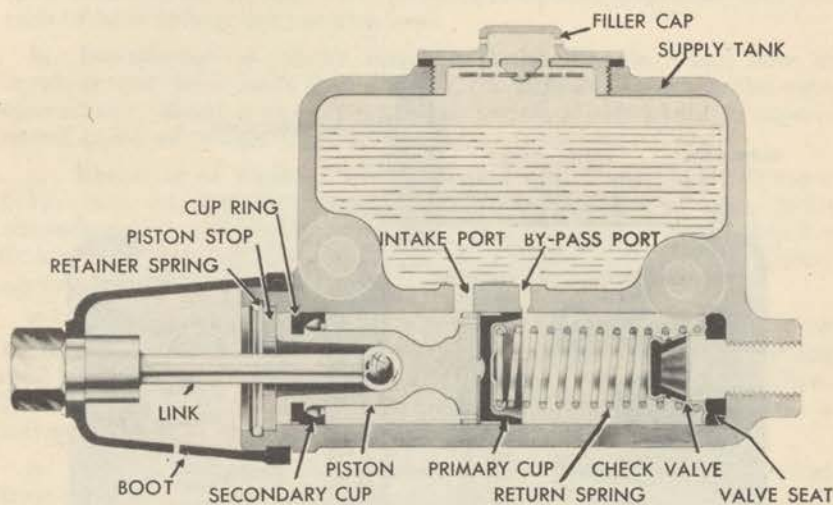
Figure 87—Wheel Brake Shoes, Disassembled

lining. Loosen lock nut on anchor pin of forward shoe. Place wrench on anchor pin with handle down, and punch marks on ends of anchor pins toward each other; turn wrench toward rim, or forward, until 0.005-inch clearance is obtained by feel of gage. Hold anchor pin and tighten lock nut. Turn brake drum so gage is at lower end of reverse brake shoe lining. Loosen anchor pin lock nut on reverse shoe. Place wrench on anchor pin with handle down, and punch mark on end of anchor pin toward other anchor pin; turn wrench handle toward rim, or to the rear, until 0.005-inch clearance is obtained by feel of gage. Hold anchor pin and tighten lock nut. Follow same procedure on the other three brakes. Check amount of fluid in master cylinder (par.

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149), and apply foot brake pedal to test brakes. Bleed brakes if soft pedal is experienced (par. 151). Install wheel. Lower vehicle to floor.

c. **Removal of Brake Shoes and Linings.** Raise vehicle. Remove wheel hubs (pars. 128 and 141). Loosen eccentric lock nuts (fig. 87). Turn eccentric so that low side is against the shoes. Install brake cylinder clamp to hold pistons in place. Remove brake shoe return spring. Remove anchor pin nuts, lock washers, anchor pins, and anchor pin plate from backing plate. Remove brake shoes. Remove brake shoe anchor pin cam. Inspect exterior of wheel brake cylinder for leakage of brake fluid. If leakage is apparent, replace cylinder assembly (par. 150).



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Figure 88—Master Cylinder

d. **Installation of Brake Shoes and Linings.** Install cam in brake shoes. Install anchor pin plate on anchor pins; install pins in brake shoes, and mount assembly on brake backing plate. **NOTE:** Forward shoe has longest lining. Install brake return spring, and remove brake cylinder clamp. Install brake anchor pin lock washers and nuts. **NOTE:** Turn brake anchor pins so that punch marks on ends are toward each other. Do not tighten anchor nuts. Install hubs (pars. 128 and 141). Make major brake adjustment (par. 149 b).

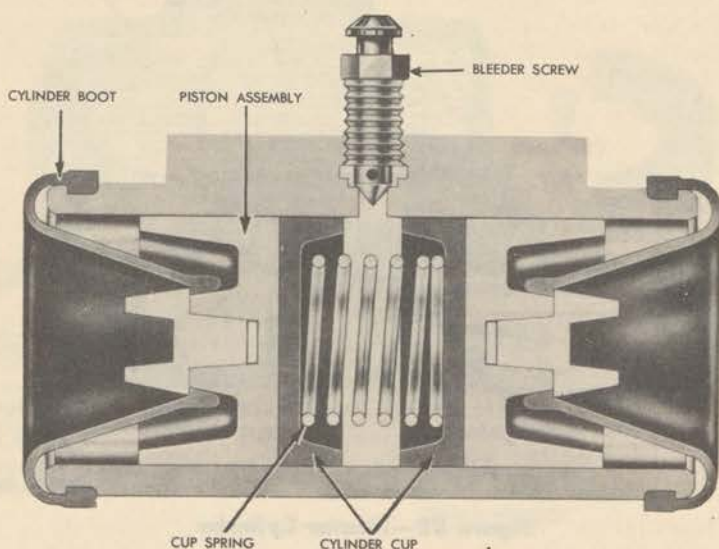
149. MASTER CYLINDER.

a. **Removal.** Raise hood and disconnect battery ground at battery terminal. Remove two bolts holding master cylinder shield and remove shield. Pull stop light switch wires out of terminal on switch. Remove stop light switch. Remove outlet fitting screw. Remove

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**

master cylinder front screw attaching cylinder to frame. Remove master cylinder rear bolt nut. Remove cotter pin holding master cylinder tie bar on pedal cross shaft. Remove master cylinder boot (fig. 88). Remove master cylinder and tie bar. Remove tie bar from master cylinder.

b. Installation. Fill master cylinder with brake fluid. Install tie bar and rear bolt on master cylinder, and install master cylinder in frame with tie bar on pedal shaft. Install cotter pin in pedal shaft. Install eyebolt link in cylinder. Install master cylinder front screw,



RA PD 305259

Figure 89—Wheel Cylinder

and tighten rear bolt. Install master cylinder boot with drain hole down. Install outlet fitting bolt. Install stop light switch. Insert stop light wires in terminals. Install master cylinder shield with two bolts. Bleed brakes (par. 151). Attach battery ground cable. Lower hood and hook.

150. WHEEL CYLINDER.

a. Removal. Raise vehicle so that tire clears floor. Remove wheel and hub (pars. 128 and 141). Remove brake shoe return spring. Spread shoes until clear of brake cylinder. Disconnect brake tube at

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backing plate. Remove two screws holding cylinder to backing plate, and remove cylinder.

b. Installation. Place cylinder in position on backing plate, and attach with two screws and lock washers. Attach brake tube. Enter brake shoes in slots of cylinder pistons (fig. 89). Install brake shoe return spring. Replace wheel and hub (pars. 128 and 141). Bleed brake (par. 151). Apply foot brake pedal to test brakes. If soft pedal is experienced, bleed all brakes. Lower vehicle to floor.

151. FLEXIBLE LINES, HOSES, AND CONNECTIONS.

a. Removal of Brake Hose at Front Wheels. Remove brake tube connections at each end. With screwdriver slip hose lock off ends of hose fitting, and remove hose.

b. Installation of Brake Hose at Front Wheels. Place hose in brackets and drive locks into place in the fittings. Attach brake tube connections. Bleed brake. Press brake pedal; if soft pedal is experienced, bleed all brakes (subpar. s below).

c. Removal of Brake Hose at Frame and Front Axle. Remove brake tube connection at frame bracket, upper end of hose. With screwdriver, remove hose spring lock from fitting at bracket. Remove fitting from bracket. Unscrew brake hose lower fitting from T-connection on axle and remove.

d. Installation of Brake Hose at Frame and Front Axle. Screw brake hose lower fitting into T-connection on axle. Insert upper fitting into bracket, and install spring lock. Attach brake tube connection. Bleed both front brakes (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

e. Removal of Rear Brake Hose. Remove brake tube connection frame cross member. With screwdriver, drive brake hose spring lock off hose fitting. Remove hose from frame. Unscrew hose fitting from T-connection on rear axle housing.

f. Installation of Rear Brake Hose. Screw brake hose into T-connection on rear axle housing. Insert hose fitting into frame, and drive spring lock into fitting. Attach tube connection. Bleed both rear brakes (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

g. Removal of Master Cylinder to Front Hose Brake Tube. Remove clip from frame. Disconnect tube from brake hose fitting (frame to axle). Disconnect tube from master cylinder connection, and remove tube.

h. Installation of Master Cylinder to Front Hose Brake Tube. Connect tube at master cylinder. Connect tube at brake hose (frame to front axle). Install tube clip at frame. Bleed front brakes (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

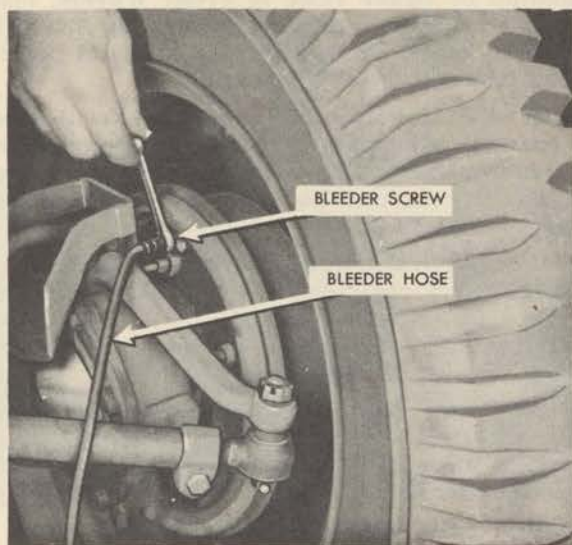
i. Removal of Master Cylinder to Rear Hose Brake Tube. Remove clip on underside of frame rear cross member. Remove clip

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on frame side member. Disconnect tube at rear brake hose. Remove master cylinder shield. Disconnect tube at master cylinder. Withdraw tube to rear of vehicle.

j. Installation of Master Cylinder to Rear Hose Brake Tube. Install tube in frame side member. Connect tube to master cylinder, and install master cylinder shield. Install tube in frame rear cross member, and attach to hose fitting. Install tube clips on frame side member and rear cross member. Bleed rear brakes (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

k. Removal of Tee to Front Hose Brake Tube—Left. Disconnect brake tube at tee connection. Disconnect tube at brake hose fitting and remove tube.



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Figure 90—Bleeding Brakes

l. Installation of Tee to Front Hose Brake Tube—Left. Connect brake tube at tee connection. Connect tube at hose fitting. Bleed left brake (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

m. Removal of Tee to Front Hose Brake Tube—Right. Remove clips and clamps on axle. Disconnect tube at tee connection. Disconnect tube at hose fitting and remove tube.

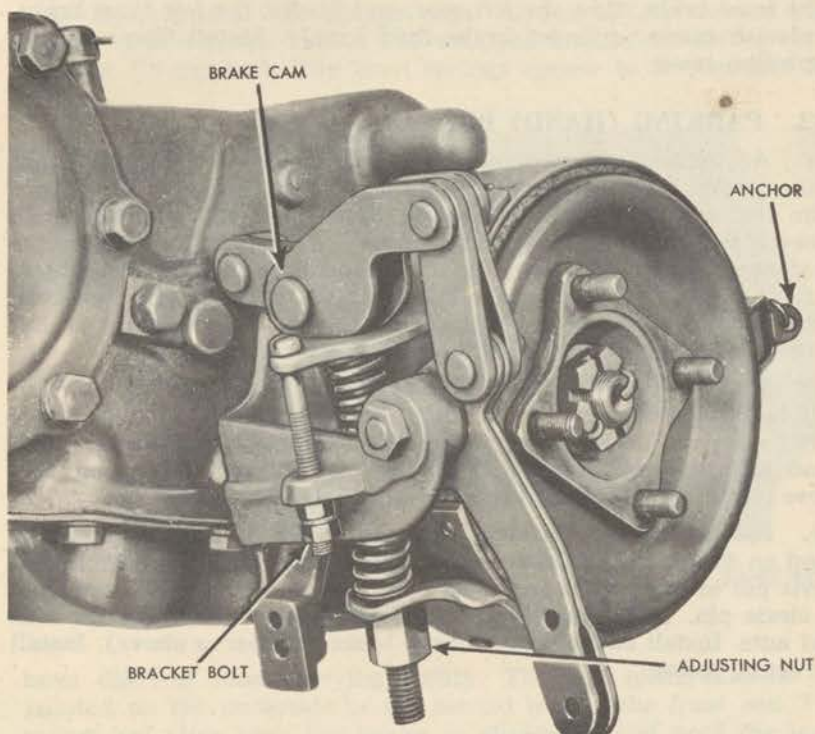
n. Installation of Tee to Front Hose Brake Tube—Right. Connect brake tube at tee connection. Connect tube at brake hose fitting. Install clips and clamps on axle. Bleed right front brake (sub-

BRAKES

par. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

o. Removal of Front Wheel Cylinder to Hose Brake Tube. Disconnect tube at brake hose. Disconnect tube at wheel cylinder and remove tube.

p. Installation of Front Wheel Cylinder to Hose Brake Tube. Attach brake to wheel cylinder. Attach tube to hose fitting. Bleed brake (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.



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Figure 91—Parking (Hand) Brake

q. Removal of Tee to Rear Brake Tube—Right. Disconnect brake tube at tee connection. Disconnect tube at wheel cylinder. Remove tube clamp on axle. Bend tube slightly and remove.

r. Installation of Tee to Rear Brake Tube. Attach brake tube to wheel cylinder. Attach tube to tee connection. Install clamp on axle. Bleed brake (subpar. s below). Press brake pedal; if soft pedal is experienced, bleed all brakes.

s. Bleeding Brakes. Remove screws holding brake master cylinder inspection cover to toeboard between foot pedals and remove

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cover. Reach through hole, and clean around master cylinder filler cap. Remove cap and fill master cylinder with brake fluid. Replace cap temporarily. Clean all bleeder connections at wheel cylinders (fig. 90). Attach bleeder hose to *right rear* wheel cylinder bleeder screw, and place end in a glass jar or bottle so that the end is submerged in brake fluid. Open bleeder screw a three-quarter turn. Press brake pedal by hand, allowing it to return slowly. Continue action until air bubbles cease to appear at end of bleeder hose. Tighten bleeder screw and remove hose. Follow the same procedure on the *right front* brake, then the *left rear*, and finally, the *left front* brake. Replenish master cylinder brake fluid supply. Install filler cap and inspection cover.

152. PARKING (HAND) BRAKE.

a. **Adjustment.** Place hand brake grip in released position. Check brake levers to see that cable is free and released. Remove lock wire from anchor adjusting screw (fig. 91). Place 0.005-inch thickness gage between band and drum at anchor screw, and adjust screw to secure clearance. Install lock wire. Tighten adjusting nut until brake band is tight around drum. Loosen bracket bolt lock nut and rear nut. Back nut off two turns and set lock nut. Loosen adjusting nut so that brake band has approximately 0.010-inch clearance on drum.

b. **Removal of Parking (Hand) Brake Band.** Remove anchor bolt lock wire. Remove anchor bolt. Remove bracket bolt. Remove cotter pin from brake cam clevis pin and remove pin. Remove brake band adjusting nut. Remove brake adjusting bolt and spring. Remove retracting spring, and remove brake band assembly.

c. **Installation of Parking (Hand) Brake Band.** Install brake band on drum. Install brake release spring and adjusting bolt. Install clevis pin in brake cam and head of adjusting bolt. Install cotter pin in clevis pin. Install brake band adjusting nut. Install bracket bolt and nuts. Install anchor bolt. Adjust brake (subpar. a above). Install retracting spring.

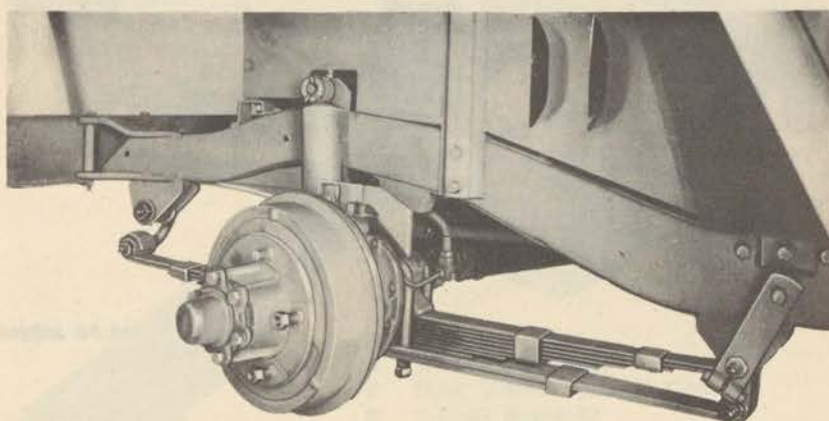
Section XXVIII

SPRINGS AND SHOCK ABSORBERS

	Paragraph
Description and data	153
Maintenance	154
Spring shackles and bolts	155
Springs	156
Shock absorbers	157

153. DESCRIPTION AND DATA.

a. **Description.** The springs (figs. 92 and 93) are of the semi-elliptic type with the second leaf wrapped around the spring eye of the first (main) leaf. The front springs appear to be identical, but

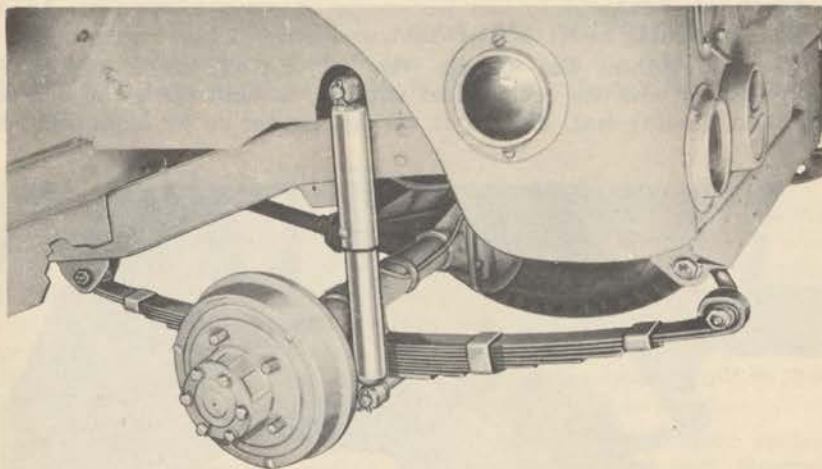


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Figure 92—Left Front Spring

have different load carrying ability. The left spring has an "L" painted on the underside of the second leaf at the front end. Four spring leaf clips keep the leaves in alinement, and hold the leaves together to take the rebound. The front spring is shackled at the front end; the rear spring is shackled at the rear end. A spring pivot bolt attaches the opposite end of the spring to the frame. The shackles are of the threaded U-bolt type with threaded bushings having right- and left-hand threads. The left-hand threaded shackle ends and bushings are used in the spring eye of the left front spring and right rear spring. Left-hand threaded shackles have a small forged boss on the lower shank of the shackle. The left-hand threaded bushings have a groove cut around the hexagon head. The left front spring is equipped with a torque reaction spring to stabilize the front axle in extremely rough service. The shock absorbers are of the hydraulic-cylinder type, direct-acting, two-way control, adjustable, and refillable.

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Figure 93—Left Rear Spring

b. Data.

Front Springs

Length—center line of eyebolts.....	36¼ in.
Width	13¼ in.
Number of leaves.....	8
Spring center bolt.....	At center
Spring eye bushed.....	Rear

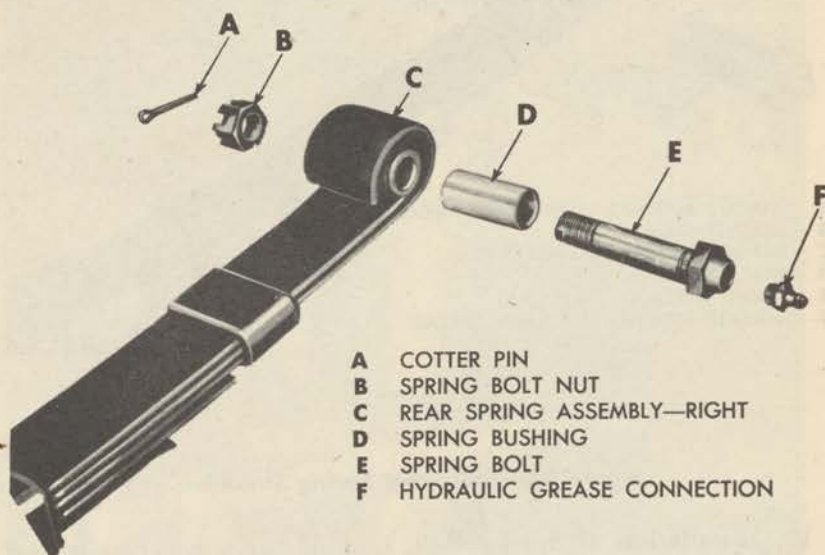
Rear Springs

Length—center line of eyes.....	42 in.
Width	13¼ in.
Number of leaves.....	9
Spring center bolt.....	At center
Spring eye bushed.....	Front

SPRINGS AND SHOCK ABSORBERS

Shock Absorbers

Type	Hydraulic
Action	Double
Length—compressed—front	10 $\frac{9}{16}$ in.
Length—compressed—rear	11 $\frac{9}{16}$ in.
Length—extended—front	16 $\frac{1}{8}$ in.
Length—extended—rear	18 $\frac{1}{8}$ in.
Adjustable	Yes
Refillable	Yes
Mountings	Rubber bushings



- A COTTER PIN
- B SPRING BOLT NUT
- C REAR SPRING ASSEMBLY—RIGHT
- D SPRING BUSHING
- E SPRING BOLT
- F HYDRAULIC GREASE CONNECTION

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Figure 94—Right Rear Spring Bolt

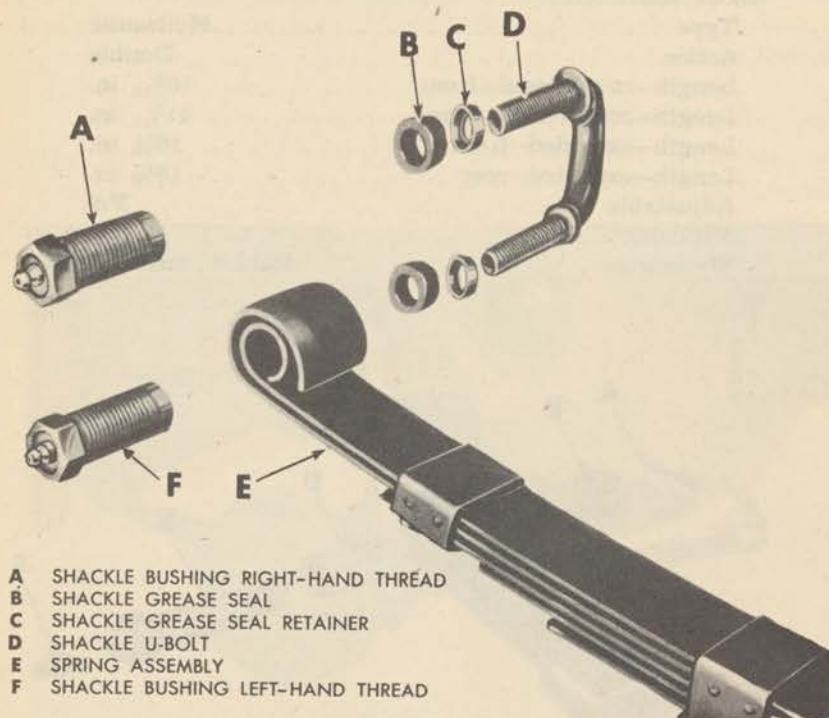
154. MAINTENANCE.

a. The springs and shock absorbers should be inspected periodically in accordance with preventive maintenance (par. 23). Lubricate springs to prevent breakage, and excessive wear of spring pivot bolts and shackles (par. 18). Spring bushings and shackles must be free to move. Adjust shock absorbers correctly (par. 157). Replace worn or damaged shock absorber mounting bushings (par. 157).

155. SPRING SHACKLES AND BOLTS.

a. **Removal of Spring Bolt.** Raise vehicle frame until tires just rest on floor. Pull cotter pin in spring pivot bolt nut. Remove nut and drive out bolt (fig. 94).

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- A SHACKLE BUSHING RIGHT-HAND THREAD
- B SHACKLE GREASE SEAL
- C SHACKLE GREASE SEAL RETAINER
- D SHACKLE U-BOLT
- E SPRING ASSEMBLY
- F SHACKLE BUSHING LEFT-HAND THREAD

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Figure 95—Left Front Spring Shackle

b. Installation of Spring Bolt. Line up holes in spring bracket and spring. Drive spring pivot bolt into place with oil groove up. Install nut and cotter pin. Lubricate with high pressure grease gun. Lower vehicle to floor.

c. Removal of Spring Shackle. Raise vehicle frame until tires just rest on floor. Remove shackle bushings (fig. 95). **NOTE:** Left-hand threaded bushings are used in spring end of shackles on left front spring and right rear spring.

d. Installation of Spring Shackle. Install shackle grease seal and retainer over threaded end, and up to the shoulder. Insert shackle through frame bracket and eye of spring, giving due attention to right- and left-hand threads. Hold shackle tightly against frame, and start upper bushing on shackle. Run in about half-way, then start lower bushing, holding shackle tightly against spring eye. Run bushing in about half-way. Then alternately tighten bushings until upper bushing is tight against frame bracket, and lower bushing hexagon

SPRINGS AND SHOCK ABSORBERS

head is about $\frac{1}{32}$ inch away from spring eye. Lubricate bushings, and try flex of shackle, which must be free. If tight, remove bushings and reinstall.

156. SPRINGS.

a. **Removal.** Remove spring shackle and pivot bolt (par. 155). Remove four axle spring clip bolt, nuts, and lock washers. Remove spring plate, or torque spring, and pivot bolt lock. Remove spring.

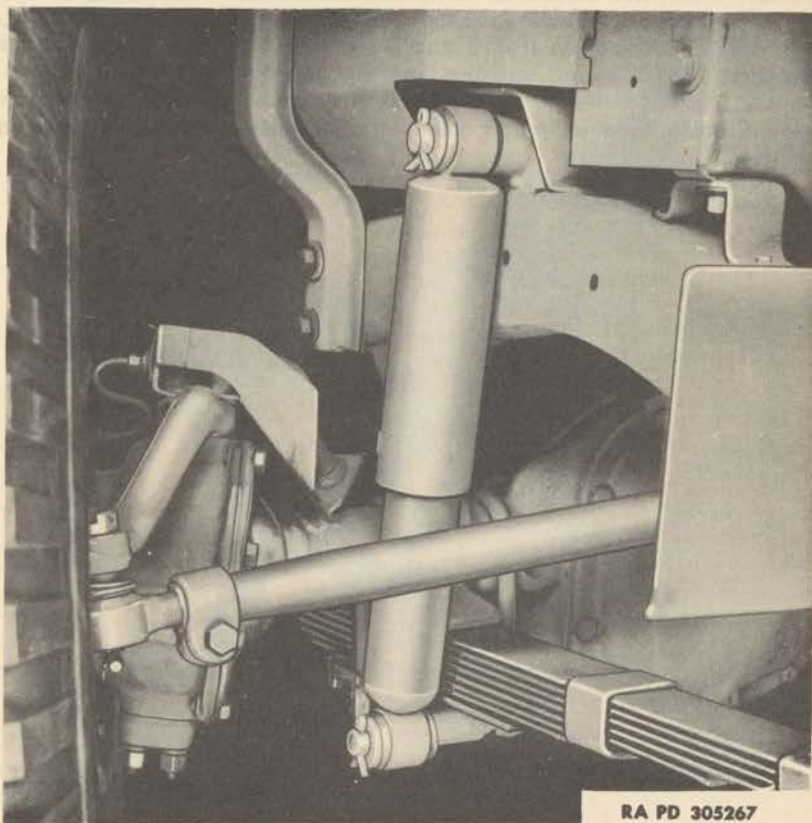


Figure 96—Shock Absorber

b. **Installation.** Install spring pivot bolt (par. 155 b). Install shackle (par. 155 d). Raise vehicle, and place center bolt in spring saddle on axle. Install axle spring clips and nuts. **NOTE:** Axle spring clip nut torque wrench reading should be 50 to 55 foot-pounds; spring pivot bolt nut, 27 to 30 foot-pounds; torque reaction spring bolt, 60 to 65 foot-pounds.

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157. SHOCK ABSORBERS.

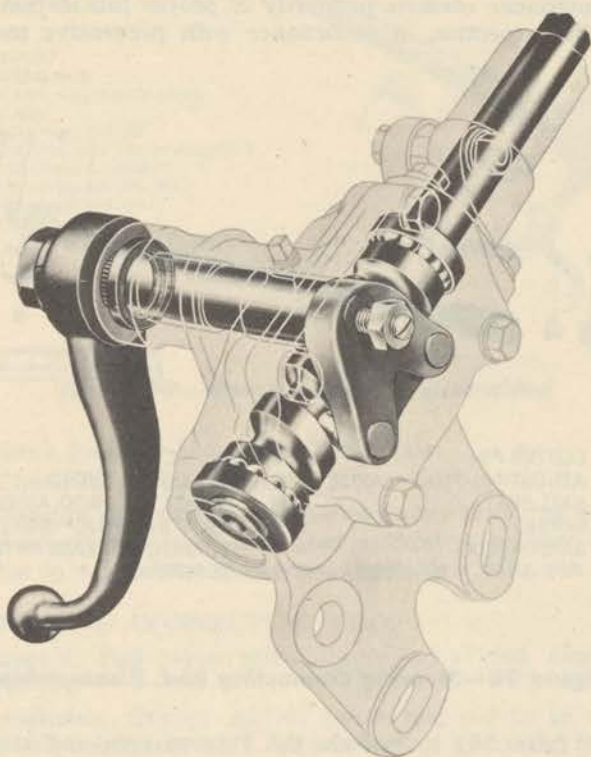
a. **Removal.** Pull cotter pins holding upper and lower washers against rubber bushing on mounting brackets. Remove washers, and pull off shock absorbers and rubber bushings (fig. 96).

b. **Installation.** Check shock absorber adjustment; compress shock absorber, and turn one end to engage adjusting keys in slots. Turn end in clockwise direction until limit of adjustment is reached, then turn end counterclockwise two turns for average adjustment. *NOTE: Turn end clockwise for firmer control, and counterclockwise for softer control, allowing faster spring action.* Install inner mounting rubber bushing on upper and lower bracket pins. Install shock absorber. Install outer bushing and flat washer. Use bushing compressor (41-C-2554-400) to compress bushing, and install cotter pin. Spread both ends of cotter pin to hold washer evenly in proper position.

Section XXIX

STEERING GEAR

	Paragraph
Description and data	158
Maintenance	159
Steering connecting rod	160
Steering wheel	161
Steering Pitman arm	162
Steering gear	163



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Figure 97—Steering Gear—Phantom View**158. DESCRIPTION AND DATA.**

a. **Description.** The steering gear (figs. 97 and 99) is of the conventional type, mounted on the left frame side member, and connected to the front axle steering ball crank by a Pitman arm and steering connecting rod (fig. 98). The steering gear is of the cam and lever type with a variable-ratio cam. The steering wheel is of the

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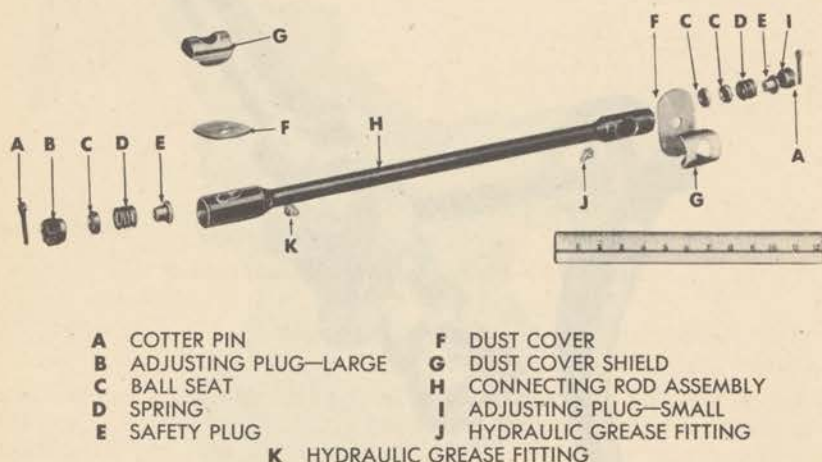
3-spoke, safety type, with 17 1/4-inch diameter. The steering connecting rod is of the adjustable, ball-and-socket type.

b. Data.

Make and model	Ross T-12
Type	Cam and twin pin lever
Ratio	Variable; 14-12-14 to 1
Wheel	3-spoke; safety type; 17 1/4 in.

159. MAINTENANCE.

a. Maintenance consists primarily of proper lubrication (par. 18) and periodic inspection in accordance with preventive maintenance



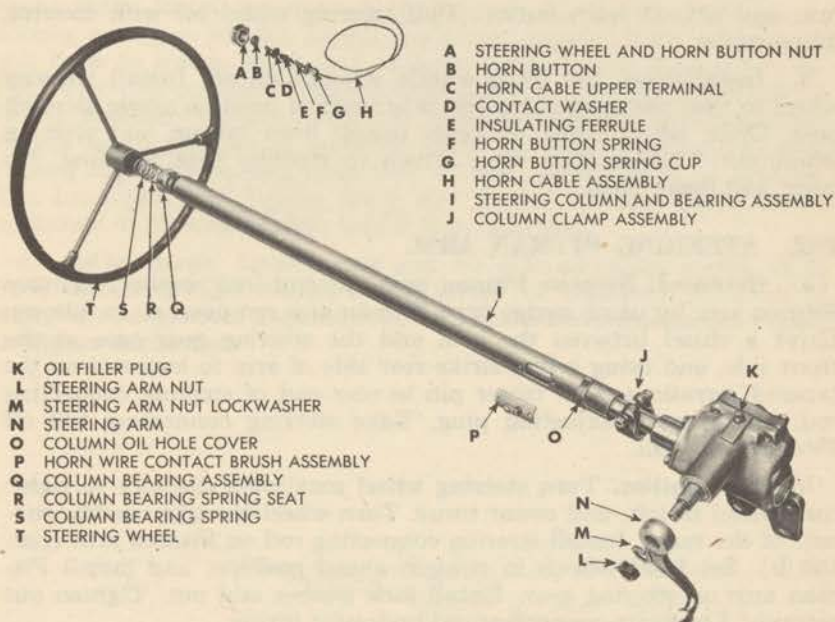
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Figure 98—Steering Connecting Rod, Disassembled

procedures (par. 23) to include the Pitman arm and steering connecting rod. A systematic inspection for steering troubles is as follows:

- (1) Equalize tire pressures and set car on level floor.
- (2) Inspect king pin and wheel bearing for looseness.
- (3) Check wheel run-out.
- (4) Check for spring sag.
- (5) Inspect brakes and shock absorbers.
- (6) Check steering assembly and connecting rod.
- (7) Check toe-in.
- (8) Check toe-out on turns.

STEERING GEAR



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Figure 99—Steering Gear, Disassembled

(9) Check tracking of front and rear axle.

(10) Check frame alinement.

b. If steering difficulty is experienced after checking and correcting the above items, report to higher authority, because the trouble may be due to wheel balance, caster, camber, or king pin inclination.

160. STEERING CONNECTING ROD.

a. **Removal.** Pull cotter pin at each end of rod. Unscrew plugs and remove rod.

b. **Installation.** Correct end of connecting rod to be attached to front axle bell crank will have the lubrication hydraulic fitting to the right. Install safety plug, spring, and ball seat in this end of rod. Install rod on bell crank ball. Install adjusting plug. Screw plug in firmly against ball, back off one-half turn, and lock with cotter pin. Insert ball seat in other end of rod. Install rod on steering Pitman arm. Install second ball seat, spring, safety plug, and adjusting plug in order. Screw plug in firmly against ball, back off one-half turn, and lock with cotter pin. Lubricate with high pressure gun.

161. STEERING WHEEL.

a. **Removal.** Raise hood, remove horn wire at steering post terminal, and tape end so it will not ground. Remove steering wheel

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nut, and lift off horn button. Pull steering wheel off with steering wheel puller.

b. Installation. Set front wheels straight ahead. Install steering wheel so that one spoke of wheel is in vertical position above steering post. Drive wheel down on post. Install horn button and steering wheel nut. Untape horn wire, attach to steering post terminal, try horn, and lower hood.

162. STEERING PITMAN ARM.

a. Removal. Remove Pitman arm nut and lock washer. Remove Pitman arm by using wedge type Pitman arm remover, or as follows: Drive a chisel between the arm and the steering gear case at the front side, and using a bar, strike rear side of arm to loosen it on the tapered serrations. Pull cotter pin in rear end of steering connecting rod, and remove adjusting plug. Take steering connecting rod off Pitman arm ball.

b. Installation. Turn steering wheel maximum distance to right; turn wheel to left, and count turns. Turn wheel to right exactly one-half of the turns. Install steering connecting rod on Pitman arm (par. 160 b). Set front wheels in straight-ahead position, and install Pitman arm on steering gear. Install lock washer and nut. Tighten nut securely. Lubricate connecting rod hydraulic fitting.

163. STEERING GEAR.

a. Removal. Raise hood and tie to windshield. Remove battery ground cable at post on battery. Release headlight bracket wing nut and tilt headlight away from fender. Remove headlight wires from junction block on fender splasher. Remove blackout headlight wire clip on fender. Remove horn from bracket. Remove headlight wires from junction block on dash. Disconnect blackout driving light wire from slip connector at dash. Remove two screws attaching horn wire contact brush assembly to steering column. Loosen steering column clamp bolt. Remove bolts attaching fender to body, frame, and radiator grille. Remove fender support bolts in frame and remove fender. Remove cotter pin from rear end of steering connecting rod, unscrew adjusting plug, and remove from Pitman arm ball. Remove steering wheel nut and horn button. Pull steering wheel with steering wheel puller. Remove steering column bracket. Remove bolts in steering column floor seal, and remove seal and retainer. Pull steering column up off tube. Remove steering column to frame bolts. Lower upper end of steering column, and lift lower end out over frame side member.

b. Installation. Check steering gear lubricant; replenish if necessary. Insert upper end of steering gear through toeboard, and position in chassis. Install steering gear to frame bolts, but do not tighten. Install steering column floor seal, retainer, and screws. Install steering column over tube, with horn contact brush opening up. Tighten steering column clamp. Install horn wire contact brush, and tighten

STEERING GEAR

screws. Attach steering column bracket, and tighten steering gear to frame bolts. Install steering wheel (par. 161 b). Install steering connecting rod (par. 160 b). Install fender and support bolts, also screws and bolts to frame, body, and radiator grille. Install blackout headlight wire clip on fender. Attach headlight wires to junction block on fender splasher. Connect blackout headlight wire at slip connector. Attach headlight wire to junction block on dash. Connect blackout driving light wire in slip connector at dash. Install horn on bracket. Tilt headlight, and tighten wing nut. Attach battery cable. Check operation of horn and lights. Lower hood and lock.

c. **Adjustment.** Loosen lock nut on side adjusting screw. With front wheels straight ahead, adjust screw for minimum backlash of studs in cam groove. Tighten lock nut. For other adjustments, report to higher authority.

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Section XXX

BODY AND FRAME

	Paragraph
Description and data	164
Maintenance	165
Instruments	166
Seats and cushions	167
Windshield wiper	168
Windshield	169
Top	170
Rifle holder	171
Shovel and ax	172
Hood	173
Radiator guard	174
Fenders	175

164. DESCRIPTION AND DATA.

a. **Description.** The body (figs. 1 to 4) is of the open type, identified by a name plate located on the instrument panel (figs. 5 and 6). There are two individual tubular frame front seats and a rear seat. The left front seat cushion can be raised to fill the fuel tank; the right front seat can be raised forward for stowage of the vehicle removable top, curtains, and windshield and light covers. The rear seat can be raised to reach the tire pump. Tools and accessories are stowed in two compartments in the rear corners of the body. The windshield is equipped with dual, hand-operated wipers, and can be opened forward or folded down on top of the hood. A fire extinguisher and an adjustable rear vision mirror are mounted on the left side of the cowl. Safety straps are provided in the entrance ways. A rifle holder is mounted on the lower panel of the windshield over the instrument panel. A strap and sheath carry a shovel and ax on the left side of the body. Hand grips on the side of the body facilitate lifting. The fuel tank sets in a sump in the floor pan under the driver's seat. The vehicle top is supported by top bows which can be folded down along the body sides to form a hand rail. A fuel can rack, trailer connection, and spare tire and wheel are mounted on the body rear panel. The chassis has five cross members; the rear intermediate cross member having a gun platform. Box-type, reinforced frame side members are used for maximum strength. Bumpers at the front and rear, and a radiator guard provide protection against damage. A pintle hook at the rear provides a means of hauling a trailed load.

b. Data.

Body type	Open	Windshield type	Folding
Driver's position	Left side	Cross members	5
Chassis frame type	Double drop		

BODY AND FRAME

165. MAINTENANCE.

a. General maintenance of the body requires periodic tightening of all loose parts, and lubrication of wearing parts. Keep the body clean and touch up bare spots to prevent rust. Keep the sump under the fuel tank free of dirt, stones, and water. Keep the sump front drain hole cover on so that dirt and water thrown by the front wheel will not enter. Keep the rear drain hole cover in the glove compartment in the instrument panel except when crossing water, when it must be installed. Water in the body can be drained by removing drain plugs in the floor at the side of the cowl. Chassis maintenance concerns primarily, proper lubrication of connecting parts (par. 18).

166. INSTRUMENTS.

a. Procedure for the removal and installation of the various panel instruments is identical, and as follows:

b. **Removal.** Remove battery ground cable at battery post as a safety precaution. Remove connecting wires or tubes. Remove two nuts holding retaining clamp in place, and remove instrument through face of instrument panel.

c. **Installation.** Install instrument in place in panel. Install retaining clamp and nuts. Attach tubes or wires.

167. SEATS AND CUSHIONS.

a. **Removal of Seat Cushions and Backs.** Remove five screws holding front seat cushion to frame at rear side, and remove cushion. Remove 10 screws holding seat back to frame, and remove seat back. Lift up back edge of rear seat cushion, remove five screws holding front edge of cushion to frame, and remove cushion. Remove five screws in top edge of seat back and two in lower edge, and remove seat back.

b. **Installation of Seat Cushions and Backs.** Place rear seat back in position, and install two lower screws. Pull edge of seat back up in place, and install five screws in top side. Place rear seat cushion in position, top side down. Install screws, and turn cushion over into place. Place front seat back in position, and install screws. Place seat cushions in position, and install screws.

c. **Removal of Front Seats.** Remove three screws holding back of driver's seat to floor. Remove screw in wheel housing holding seat. Remove two bolts holding front of seat frame to floor, and lift out seat. Remove two bolts holding right front seat bracket to floor, and lift out seat.

d. **Installation of Front Seats.** Place seat in position. Install bolts in place at front of seat. On driver's seat install screws and bolts holding seat back to floor and wheel housing.

e. **Removal of Rear Seat.** Pull up front edge of seat to fold seat. Remove bolt in tool compartment holding retainer bracket at seat

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bracket. On same side remove two bolts holding seat back bracket. Raise end of seat and lift out.

f. **Installation of Rear Seat.** Place seat in position in brackets. Install retainer bracket. Install seat back bracket and bolts.

168. WINDSHIELD WIPER.

a. **Removal.** Remove nuts holding wiper handle, and remove handles. Remove plain washer, and remove wiper blades.

b. **Installation.** Install blades and arms in place through windshield frame. Install plain washers, handles, and nuts.

169. WINDSHIELD.

a. **Removal.** Unhook windshield clamps on instrument panel (fig. 5). Remove wing screws at sides of cowl, and lift off windshield.

b. **Installation.** Place windshield in position, and install wing screws at sides of cowl. Clamp windshield to instrument panel.

170. TOP.

a. **Installation.** Loosen the two wing screws at the pivot brackets (fig. 4). Slide tubular bows back out of front bracket. Install front ends in rear brackets, and tighten winged screws. Allow front bow to drop down over seats. Remove top from under right front seat. Attach top to fasteners at top of windshield. Stretch top over bow and down to body back panel. Place straps in metal loops, and attach to body panel; stretch top, and buckle straps. Raise front bow into position at bow flaps, and snap flaps around bow. The curtains are attached in the conventional way with snap fasteners.

b. **Removal.** Remove curtains by releasing snap fasteners. Unsnap bow flaps, and lower front bow on front seat. Unbuckle top straps at body rear panel. Unsnap top at top of windshield, and remove. Fold top and stow under right front seat. Loosen wing screws in top rear brackets. Fold front bow against rear bow. Raise bows out of rear brackets, and insert lower ends in front brackets. Tighten rear bracket screws.

171. RIFLE HOLDER.

a. **Removal.** Swing the rifle bumper to the right, at the right end of holder, and remove rifle. Remove two bolts holding rifle holder to windshield lower panel, and remove holder (fig. 5).

b. **Installation.** Place rifle holder in position on windshield panel with butt end to the left, insert bolts, and tighten securely. Swing rifle bumper to the right. With barrel up, insert butt end of rifle in holder at the left. Push rifle up against spring pressure, and turn bumper to left under rifle.

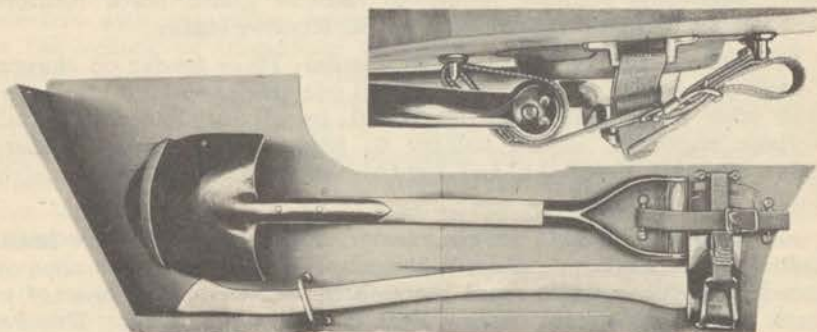
BODY AND FRAME

172. SHOVEL AND AX.

- a. **Removal.** Release straps and remove shovel or ax individually.
- b. **Installation.** Turn bit, or blade, of ax up. Insert handle in front clamp. Insert blade in sheath. Pull up clamp under ax head, and strap in place. Turn face of shovel against cowl and place in strap on cowl side. Wrap fabric strap, through handle, over grip, between grip and side of body, through loop, over outside of grip, and buckle. *NOTE: This will hold the shovel forward in the strap on the cowl side (fig. 100).*

173. HOOD.

- a. **Removal.** Unhook hood and raise against windshield. Remove screws in hinge at cowl, and disconnect bond strap.



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Figure 100—Shovel and Ax Mounting

- b. **Installation.** Place hood in position and install hinge screws in cowl, but do not tighten. *NOTE: Install bonded screws last as follows:* Install flat washer on screw. Install screw through bond strap. Install flat washer. Install washer between hinge and hood. Install screw through hinge, and tighten to cowl. Lower hood for alignment. Raise hood and tighten screws. Lower hood and hook down both sides.

174. RADIATOR GUARD.

- a. **Removal.** Raise hood. Remove headlight hinge bolts. Remove headlight wire clips on guard. Remove blackout headlight wire clip on left front fender. Remove wires from slip connector at left front fender. Remove fender to guard bolts. Remove guard from chassis. Remove blackout headlight wires, clips, and loom. Remove rubber shield at headlight. Remove blackout headlight nut and washer, and remove both light and wire assemblies.

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b. Installation. Install both blackout headlight, spacer, and wire assemblies on guard. Install washer and nut. Install shield over wire. Install loom on wire. Install wire clips on loom and clips on guard. Install frame bolts in guard. Install guard on chassis. Install fender to guard bolts loosely. Install guard to frame bolt nuts. Tighten fender to guard bolts. Install headlight hinge bolts. Install headlight wire clips on guard. Install blackout headlight wire clip on fender. Connect wires to slip connector. Check operation of lights. Lower hood and lock down.

175. FENDERS.

a. Removal of Right Front Fender. Raise hood. Loosen wing nut on headlight bracket, and tilt light up. Remove battery to front fender strap. Remove battery ground cable at battery post. Remove voltage regulator bolts. Remove fuel line clip to fender. Remove hood catch assembly. Remove fender to radiator guard bolts. Remove fender bolts in support, body, and frame. Remove fender.

b. Installation of Right Front Fender. Place fender on chassis. Install one fender to body bolt. Install one fender to guard bolt. Install other fender bolts and tighten all. Install fuel line clip. Install voltage regulator. Install battery to fender strap. Install battery cable. Position headlight, and tighten wing nut. Install hood catch. Lower hood and lock.

c. Removal of Left Front Fender. Raise hood. Remove headlight bracket wing nut, and tilt lamp up. Remove two wire clips on splashers. Remove wires from junction block, and slip connector at dash. Remove blackout driving light clip on top of fender. Remove three bolts in blackout driving light bracket. Remove blackout driving light wire grommet and clips from fender. Remove junction block on fender. Remove blackout headlight wire clip. Remove hood catch. Remove fender shield to frame bolt. Remove bolts between fender and guard support, body, and frame. Remove fender.

d. Installation of Left Front Fender. Place fender on chassis. Install guard upper bolt. Install all fender bolts loosely. Install blackout headlight wire clip (front) on fender. Install junction block to fender. Install blackout driving light wire through fender and splashers. Install three bolts in blackout driving light bracket and fender. Install blackout headlight wire clip on fender. Install wire grommet in fender. Install two wire clips to fender splashers. Connect wires to junction block at dash and slip connector. Install hood catch. Place headlight in position, and secure with wing nut. Check operation of lights. Lower hood and lock down.

Section XXXI

RADIO INTERFERENCE SUPPRESSION SYSTEM

	Paragraph
Description	176
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Tests	178
Maintenance, removal, and replacement	179

176. DESCRIPTION.

a. **Description.** Radio noise suppression is the elimination, or minimizing, of electrical disturbances which interfere with radio reception, or disclose the location of the vehicle to sensitive electrical detectors. Electrical disturbances or radio frequency waves may originate as static discharges between adjoining parts of the vehicle, or may be given off by the electrical systems during operation of the vehicle. These waves are actually radiated as disturbing signals that interfere with any radio receiving apparatus that may be operating in the vehicle or immediate vicinity. Each disturbance (at plugs, breaker points, generator brushes, or elsewhere) creates a surge of electricity, which produces interfering radio waves. Their origin can generally be determined by the nature of the noise heard in the receiver. Radio interference suppression, therefore, involves the suppression of these waves at their sources, or confining them within an area where they cannot be picked up by the antenna of a radio-equipped vehicle. Suppression is accomplished by the use of resistor-suppressors, and condensers. In addition, the hood and other metal parts in the vicinity of the engine are made to form a shield by the use of internal-external toothed lock washers and bond straps; thus, the hood and side panels form a box within which radio frequency waves are confined to prevent their acting on the antenna of receiving equipment. Wiring that may carry interfering surges to a point where interference will affect radio reception, is shielded. In attaching condensers and bond straps, the lock washers must be placed between the parts to be grounded, and tinned spots must be cleaned, but not painted. This is necessary to obtain good connections between the component parts, and to permit electrical energy to dissipate without causing electrical disturbances. The suppression components have no effect on engine performance as long as they are maintained in good condition. The sources of electrical noise interference may be basically divided into three groups: the ignition system, including coil, distributor, and spark plugs; the generator system, including generator and regulator; and the wiring.

177. DATA.

a. **Ignition** (both high-tension and primary-circuit suppression).

(1) High-tension suppression is of the resistor-suppressor type and consists of:

(a) Coil to distributor high-tension wire at distributor, resistance 10,000 ohms.

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(b) Spark plug high-tension wire at spark plugs, resistance 10,000 ohms.

(2) Primary circuit suppression is of the capacitive-filter type and consists of:

(a) Ignition coil terminal (+) to cylinder block, capacity 0.10 microfarad.

(b) Ignition switch terminal (lower) to instrument panel, capacity 0.01 microfarad.

b. Charging Circuits (includes generator, regulator, ammeter, and battery).

(1) Generator suppression is of the capacitive-filter type and consists of generator armature terminal (A) to ground on generator, capacity 0.10 microfarad.

(2) Regulator suppression is of the capacitive-filter type and consists of:

(a) Regulator field terminal (F) to ground, capacity 0.01 microfarad.

(b) Regulator field terminal (B) to ground, capacity 0.25 microfarad.

c. Miscellaneous Circuits (including radio box and starting circuits).

(1) Radio terminal box suppression is of the capacitive-filter type and consists of:

(a) Radio box terminal to ground, capacity 0.50 microfarad.

(b) Starting switch battery terminal to floor, capacity 0.50 microfarad.

d. Bonding.

(1) BOND STRAPS (ground straps) (figs. 101 and 102). Bond straps are installed from:

(a) Hood to dash, right side (D).

(b) Hood to dash, left side (I).

(c) Cylinder head stud to dash (H).

(d) Cables (hand brake, speedometer, heat indicator) to dash (E).

(e) Generator mounting bolt to cranking motor bracket to engine support bracket (A).

(f) Generator to regulator wire shield to ground on generator and regulator (B).

(g) Front engine bracket to frame, left side (J).

(h) Hood ground to grille, left side (L).

(i) Hood ground to grille, right side (N).

(j) Radio terminal box to ground wire (F).

(2) TOOTHED LOCK WASHERS (figs. 101 and 102). Toothed lock washers are supplied from:

RADIO INTERFERENCE SUPPRESSION SYSTEM

- (a) Radiator to frame, right side (O).
- (b) Radiator to frame, left side (K).
- (c) Body bracket ground to frame, right side (S).
- (d) Body bracket ground to frame, left side (R).
- (e) Fender splashers ground to frame, right side (U).
- (f) Fender splashers ground to frame, left side (T).
- (g) Air cleaner mounting (C).
- (h) Body hold-down bolts (G).
- (i) Radiator grille to cross member (M).
- (j) Fender to cowl, left side (P).
- (k) Fender to cowl, right side (Q).

178. TESTS.

a. **General.** Electrical disturbances which cause radio interference are loose bonds, loose toothed lock washers, broken or cracked resistor-suppressors, loose connections, or faulty filters. Following are tests which can be made to determine the cause of interference. The radio equipment in the vehicle may be used as a test instrument to localize troubles, and to determine when faulty parts or conditions have been eliminated or corrected. If the vehicle has no radio equipment, utilize a radio-equipped vehicle placed about 10 feet from the vehicle under test. Here the cooperation of the radio operator is required. Determine the circuits causing the noise by checking as follows:

(1) Operate engine while listening to radio. A regular clicking which varies with engine speed, and ceases the instant the ignition is shut off, is caused by the ignition circuit.

(2) An irregular clicking which continues a few seconds after the ignition is shut off, is caused by the regulator.

(3) A whining noise which varies with engine speed, and continues a few seconds after the ignition is shut off, is caused by the generator.

b. Noise Caused by Ignition Circuit.

(1) Make certain ignition system is functioning properly (section XV). Improper plug gaps, late timing, poor adjustment of breaker points, and damaged or worn distributor, will affect the suppression system.

(2) Inspect resistor-suppressors in spark plug leads. Replace any that are scorched, cracked, or otherwise faulty. Be sure wires are screwed in tightly.

(3) Inspect resistor-suppressor at distributor. Replace if necessary.

(4) Inspect and tighten all bonds in engine compartment.

(5) Inspect capacitive-type filters in primary circuit at ignition coil and ignition switch. Make certain mounting bolts are tight. Replace filter and test for noise.

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c. Noise Caused by Regulator.

- (1) Check all connections to regulator.
- (2) Check capacitive-type filter mounting bolts for tightness and correct placement of lock washers.
- (3) Check regulator mounting bolts for tightness and correct placement of lock washers.
- (4) Test for noise.
- (5) If noise is still present, replace battery circuit filter attached to regulator (B) terminal. Test for noise.
- (6) Replace field circuit filter attached to regulator (F) terminal. Test for noise.
- (7) Replace armature circuit filter attached to generator (A) terminal.
- (8) Test for noise.

d. Noise Caused by Generator.

- (1) Check to make certain there is no excessive sparking at brushes. Correct if necessary.
- (2) Inspect filter mounting, and check placement of lock washers. Tighten.
- (3) Inspect ground strap.
- (4) Replace filter.
- (5) Test for noise.

e. Noise Caused by Miscellaneous Circuits (radio box and starting switch).

- (1) Inspect mounting of filter attached to circuit. Tighten and test.
- (2) Replace filter.
- (3) Test for noise.

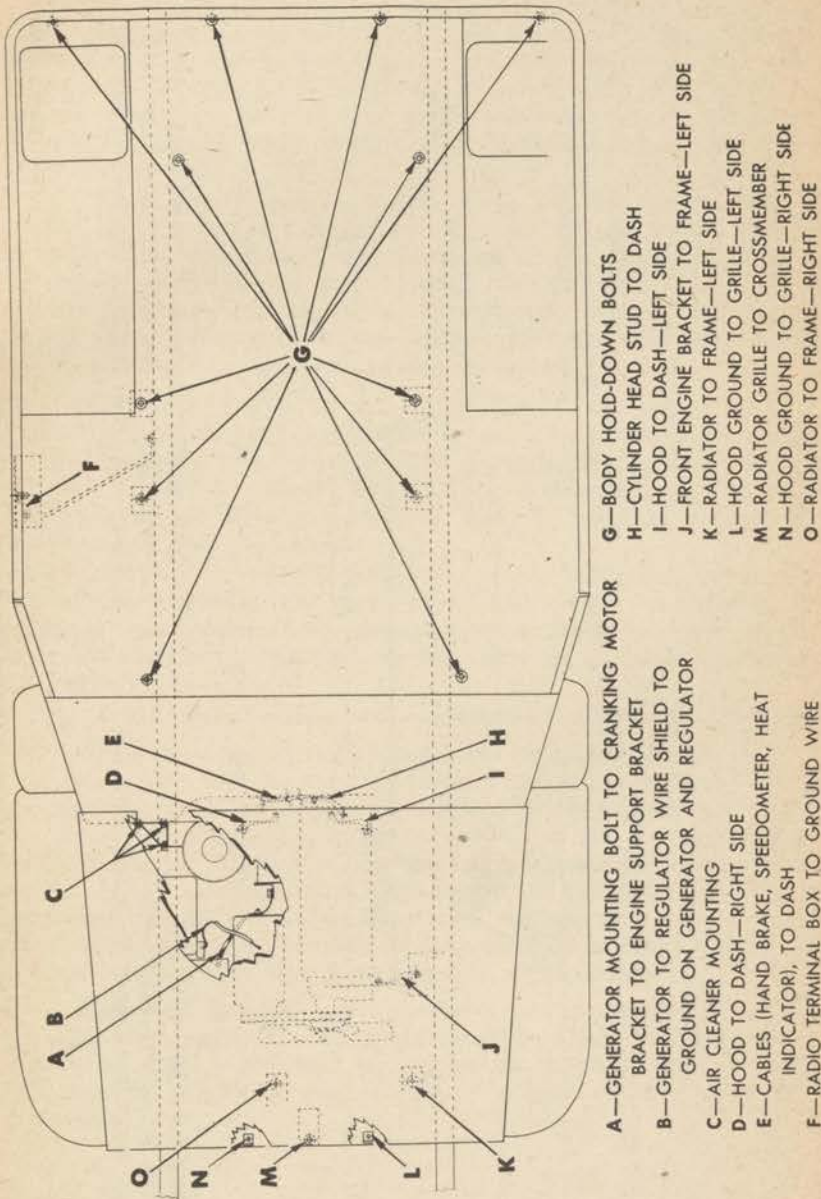
f. Noise Observed While Vehicle Is in Motion, but Not When Stopped.

- (1) Inspect and tighten all body bonds (par. 177 d (1) above and figs. 101 and 102).
- (2) Inspect and tighten all points where toothed lock washers are used (par. 177 d (2) above and figs. 101 and 102).
- (3) Test for noise.

179. MAINTENANCE.

a. General. General maintenance of the radio suppression system (par. 23 a (5), item 104) must be made in connection with preventive maintenance items, particularly in regard to spark plugs, distributor and wires, late ignition timing, generator brushes, loose switch contacts, and discharged battery causing high generator charging rate.

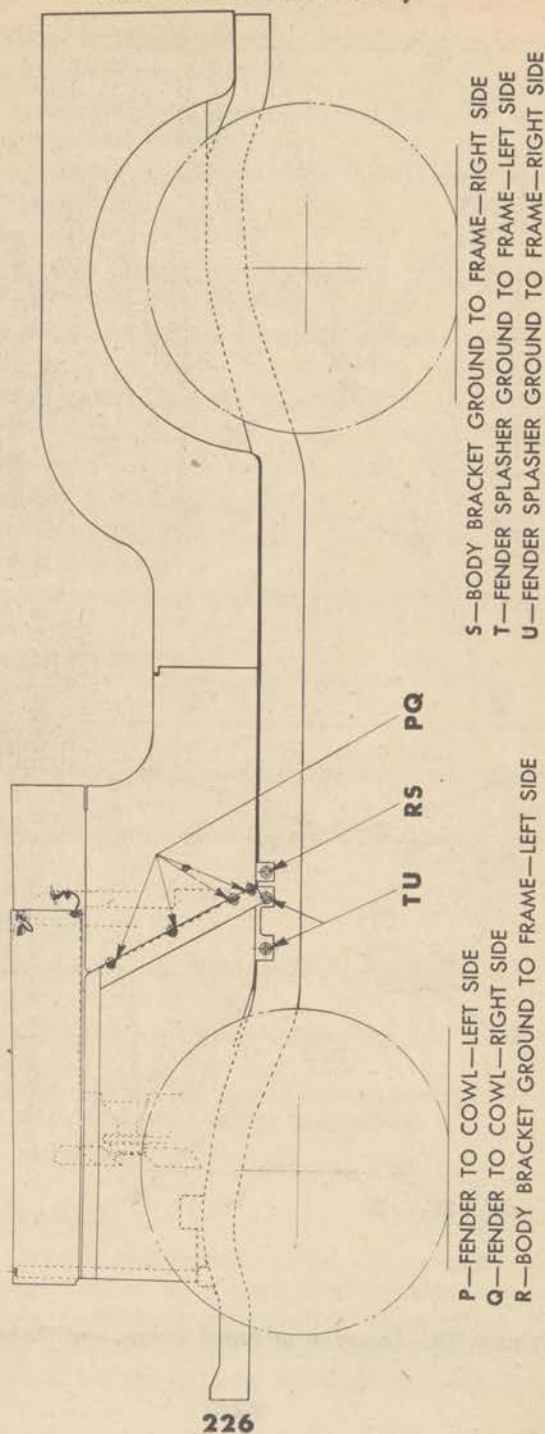
RADIO INTERFERENCE SUPPRESSION SYSTEM



RA PD 305295

Figure 101—Location of Bond Straps and Fastenings (I)

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)**



RA PD 334758

Figure 102—Location of Bond Straps and Fastenings (2)

RADIO INTERFERENCE SUPPRESSION SYSTEM

b. Ignition Circuits.

(1) Resistor-suppressors, of which there are five (one at each spark plug and one at the distributor), consist of a high resistance element in an insulated housing. Inspect each suppressor for cracked or broken housing. Each suppressor must be threaded tightly into end of spark plug wire so that screw enters strands of cable. Wire terminals must be tight, well pushed down into place, and free of corrosion or dirt.

(2) Capacitive-filters, of which there are two in the ignition circuit, are located at the ignition coil and ignition switch. Replace if faulty by disconnecting wire at terminal, removing mounting nut or screw, and removing filter. Install coil filter with toothed lock washer between filter bracket and mounting nut. Install ignition switch filter with toothed lock washer between filter bracket and panel; also between bracket and mounting nut.

c. Charging Circuit.

(1) A capacitive-filter is mounted on the generator, and attached to the armature (A) terminal. The mounting screw must be tight with the internal-external toothed lock washer between the filter bracket and the generator housing, and the external toothed lock washer under the screw head.

(2) Two capacitive-filters are used on the regulator; one between the battery terminal and ground, the other between the field coil terminal and ground. The mounting screw must be tight with the internal-external toothed lock washer between the filter bracket and the regulator base.

(3) For battery removal and replacement, refer to paragraph 97.

d. **Miscellaneous Circuits** (radio box and starting circuits). The capacitive-filter used in the radio box between the terminal and the ground wire must be tight with the lock washer under the head of the mounting screw. The capacitive-filter in the starting circuit is mounted on the bottom of the starting switch with the connection on the "live" terminal. The filter bracket is located under the left mounting bolt with an internal-external toothed lock washer between the bolt head and the bracket, and an internal-external toothed lock washer between the nut and the rear side of the dash.

e. **Bonding.** Bonding points indicated in paragraph 117 d must be clean and tight. Tinned spots must be clean but not painted. Where bonding is obtained by use of an internal-external toothed lock washer, the lock washer must be between the parts to be grounded.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
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	Paragraph
General instructions	180
Preparation for temporary storage or domestic shipment	181
Loading and blocking for rail shipment	182

180. 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.

181. 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 30 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. 18).

(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 anti-freeze compound 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. 97).

(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

SHIPMENT AND TEMPORARY STORAGE

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 VEHICLES.** Remove rust appearing on any part of the vehicle with flint paper. 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 rust-preventive lubricating oil. Close firmly all cab doors, windows, and windshields. 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, in an unrolled position on the floor; not rolled or curled up. 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. 13).

(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 1 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.

c. Inspections in Limited Storage. 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.

**1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB
and FORD MODEL GPW)****182. LOADING AND BLOCKING FOR RAIL SHIPMENT.**

a. **Preparation.** In addition to the preparation described in paragraph 181, 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. 101 "A"). The vehicles 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 warp 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. 101). 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" around the bumper support bracket at the front of the vehicle, and then through a stake pocket on the railroad car. Perform the same operation at the rear of the vehicle, passing the

SHIPMENT AND TEMPORARY STORAGE

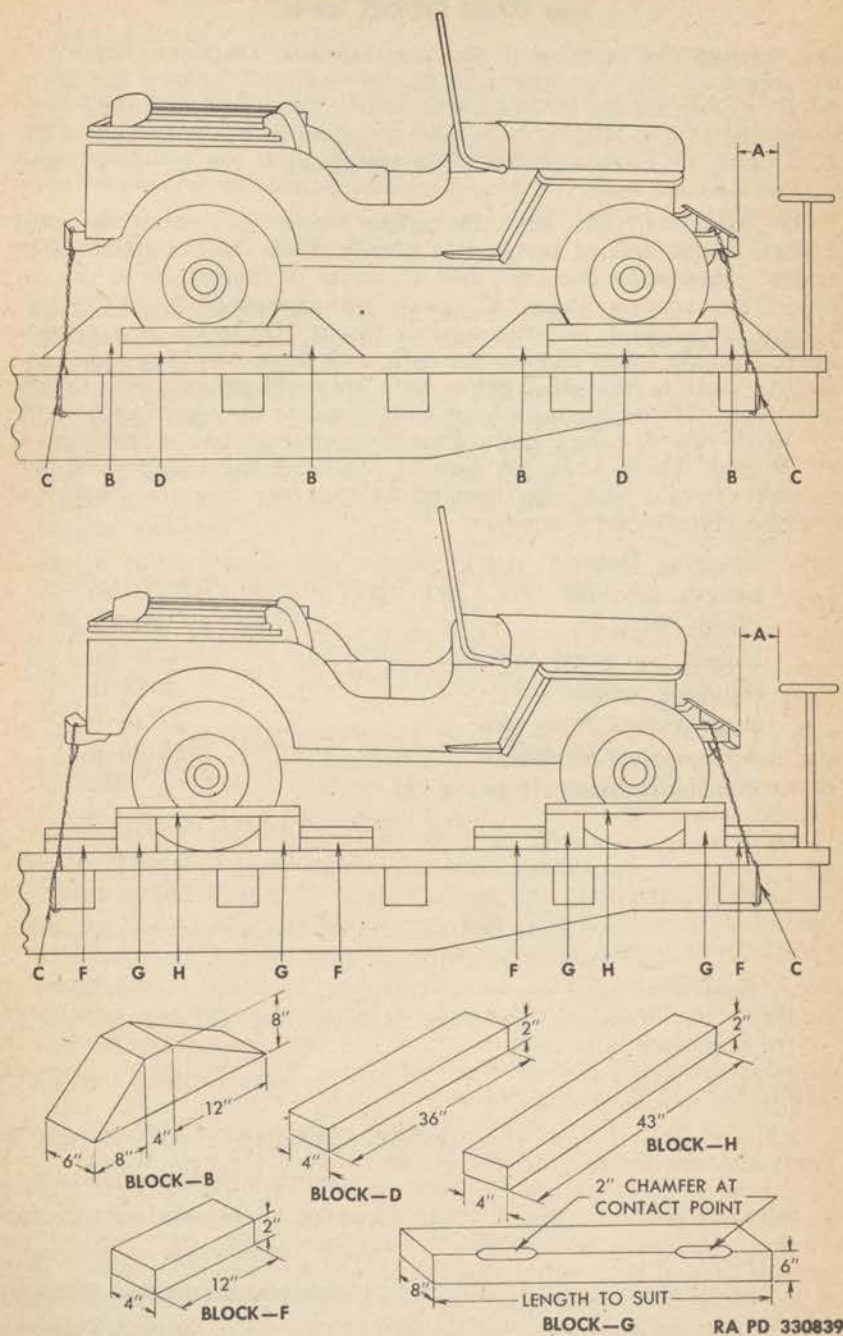


Figure 103—Blocking Requirements for Securing Wheeled Vehicles on Railroad Cars

1/4-TON 4 x 4 TRUCK (WILLYS-OVERLAND MODEL MB and FORD MODEL GPW)

wire through the opening in the rear bumper. Duplicate these two operations on the opposite side of the vehicle. 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. 101). 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 wheel. Nail the lower cleat to the floor with three 40-penny nails, and the top cleat to the cleat below with three 40-penny nails. Locate four cleats "H" on the outside of each wheel to the top of each block "G" with two 40-penny nails. Pass four strands, two wrappings, of No. 8 gage, black annealed wire "C" around the bumper support bracket (front), and also opening in the rear bumper (rear), as described in Method 1 above.

d. Shipping Data.

Length, over-all	132.25 in.
Width, over-all	62 in.
Height, top down	32 in.
Shipping weight	2453 lb
Approximate floor area	57 sq ft
Approximate volume	152 cu ft
Bearing pressure (lb per sq ft)	4½

REFERENCES

PUBLICATIONS INDEXES.

The following publications indexes should be consulted frequently for latest changes to, or revisions of the publications given in this list of references and for new publications relating to materiel covered in this Manual:

Introduction to Ordnance Catalog (explains SNL system)	ASF Cat. ORD-1 IOC
Ordnance publications for supply index (index to SNL's)	ASF Cat. ORD-2 OPSI
Index to Ordnance publications (lists FM's, TM's, TC's, and TB's of interest to Ordnance personnel, MWO's, OPSR's, RSD, S of SR's, OSSC's, and OFSB's. Includes alphabetical listing of Ordnance major items with publications pertaining thereto)	OFSB 1-1
List of publications for training (lists MR's, MTP's, T/BA's, T/A's, FM's, TM's, and TR's, concerning training)	FM 21-6
List of training films, film strips, and film bulletins (lists TF's, FS's, and FB's by serial number and subject)	FM 21-7
Military training aids (lists graphic training aids, models, devices, and displays)	FM 21-8

STANDARD NOMENCLATURE LISTS.

Truck $\frac{1}{4}$ -ton, 4 x 4, command reconnaissance (Ford and Willys)	SNL G-503
Cleaning, preserving and lubrication materials, recoil fluids, special oils, and miscellaneous related items	SNL K-1
Soldering, brazing and welding materials, gases and related items	SNL K-2
Tool 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
Driver's manual	TM 10-460
Driver selection and training	TM 21-300
Electrical fundamentals	TM 1-455

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Military motor vehicles	AR 850-15
Motor vehicle inspections and preventive maintenance service	TM 9-2810
Precautions in handling gasoline	AR 850-20
Standard Military Motor Vehicles	TM 9-2800
The internal combustion engine	TM 10-570

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 ¼-ton 4 x 4 truck (Ford and Willys)	TM 9-1803A
Ordnance Maintenance: Power train, chassis, and body for ¼-ton 4 x 4 truck (Ford and Willys)	TM 9-1803B
Ordnance Maintenance: Electrical equipment (Auto-Lite)	TM 9-1825B
Ordnance Maintenance: Hydraulic brake system (Wagner)	TM 9-1827C
Ordnance Maintenance: Carburetors (Carter)	TM 9-1826A
Ordnance Maintenance: Fuel pumps	TM 9-1828A
Tune-up and adjustment	TM 10-530

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
Desert operations	FM 31-25
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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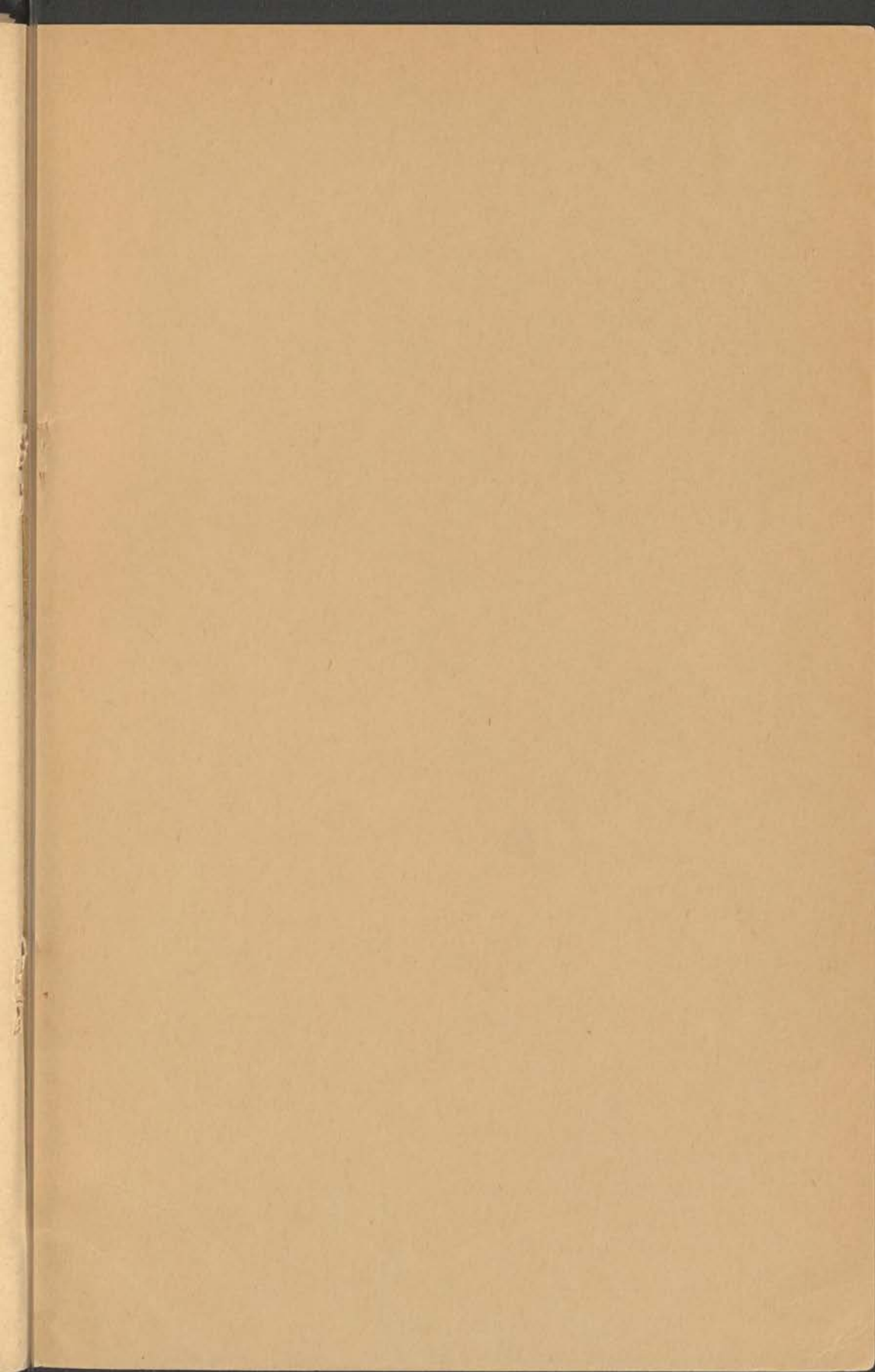
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