RESTRICTED

TM 9-819A

DEPARTMENT OF THE ARMY TECHNICA

2 1/2-TON
6 x 6 TRUCK M135

DEPARTMENT OF THE ARMY • JULY 1951

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DEPARTMENT OF THE ARMY TECHNICAL MANUAL
TM 9-819A

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6 x 6 TRUCK M135

DEPARTMENT OF THE ARMY • *JULY 1951*

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TM 9-819A is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF THE ARMY:

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For explanation of distribution formula, see SR 310-90-1.

CONTENTS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

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

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

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

2. Forms, Records, and Reports

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

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

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

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

Section II. DESCRIPTION AND DATA

3. Description

a. GENERAL. The truck described in this manual is designated as 2½-Ton 6 x 6 Cargo Truck, M135. The vehicle is equipped with one driving front axle and two driving rear axles, with six driving wheels. A conventionally mounted soft-top cab is used on all vehicles, with a metal cargo type body mounted on frame independent of cab (figs. 1, 2, 3, and 4). Truck may be used to transport cargo or personnel, and is equipped with towing shackles and pintle at rear, to tow other vehicles.

b. POWER PLANT. Power is supplied by a GMC type 302, gasoline, six-cylinder in-line, valve-in-head engine, conventionally four-point mounted. Engine assembly and mounted accessories are accessible after alligator type hood is raised (fig. 11).

c. TRANSMISSION. A special GM Hydra-Matic transmission, mounted directly to engine, has four automatic forward speeds and one reverse in each of two ranges, high and low. Speed changes are automatic in both ranges after driver manually places control lever in selected range positions.

d. TRANSFER. A single speed transfer, mounted to rear of transmission, transmits power through conventional propeller shafts to front and rear driving axles. Transfer mechanism provides automatic engagement and disengagement of front driving axle, permitting front axle to run free except when required for tractive effort. A manually operated lever permits transfer to be placed in neutral or driving position. A power-take-off opening is provided on left side of transfer for mounting a power-take-off.

e. FRONT AXLE AND SUSPENSION.

(1) The front driving axle is full-floating, hypoid, single reduction type, having a banjo type housing. The differential carrier assembly is interchangeable with rear

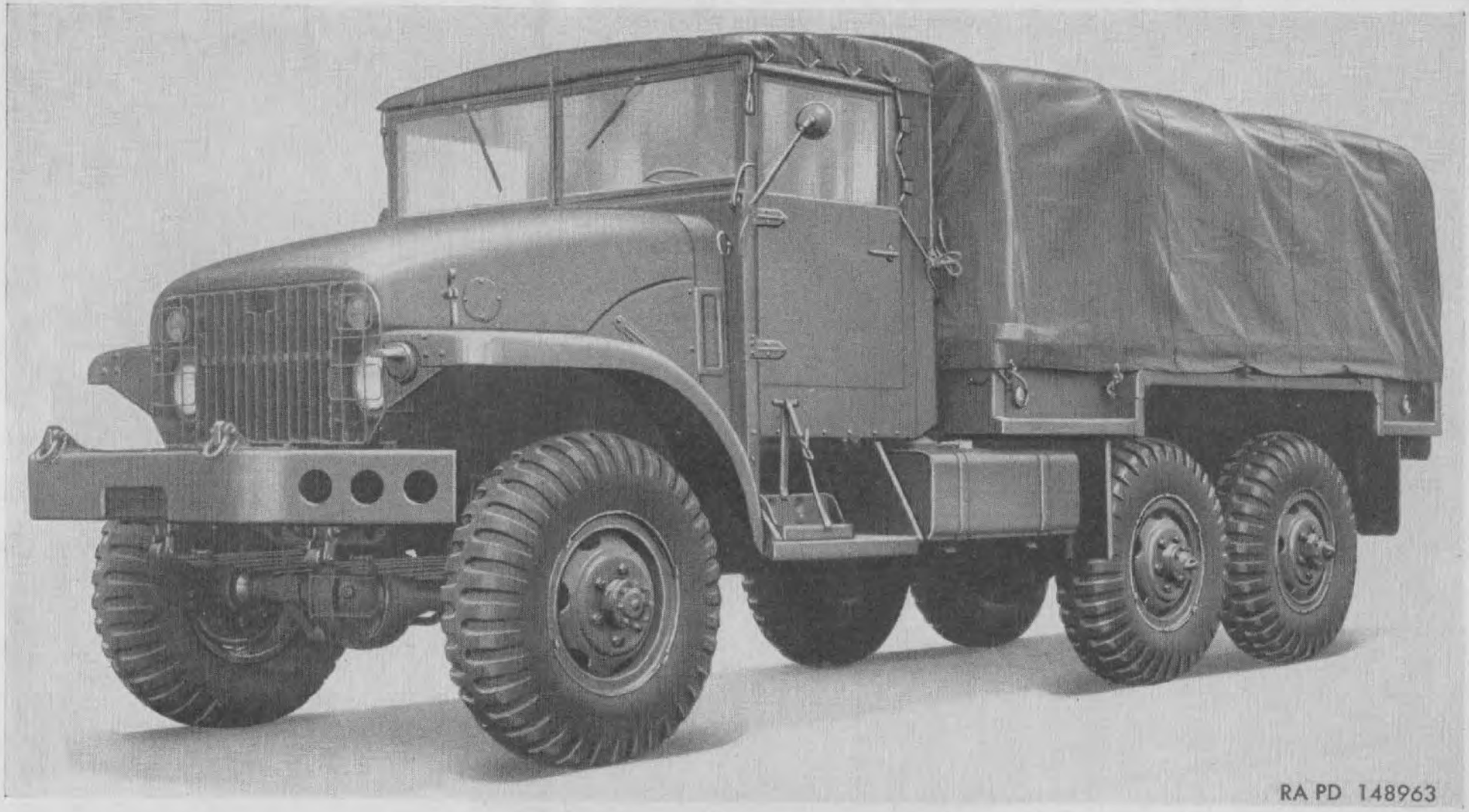


Figure 1. Left front view of vehicle w/o winch.

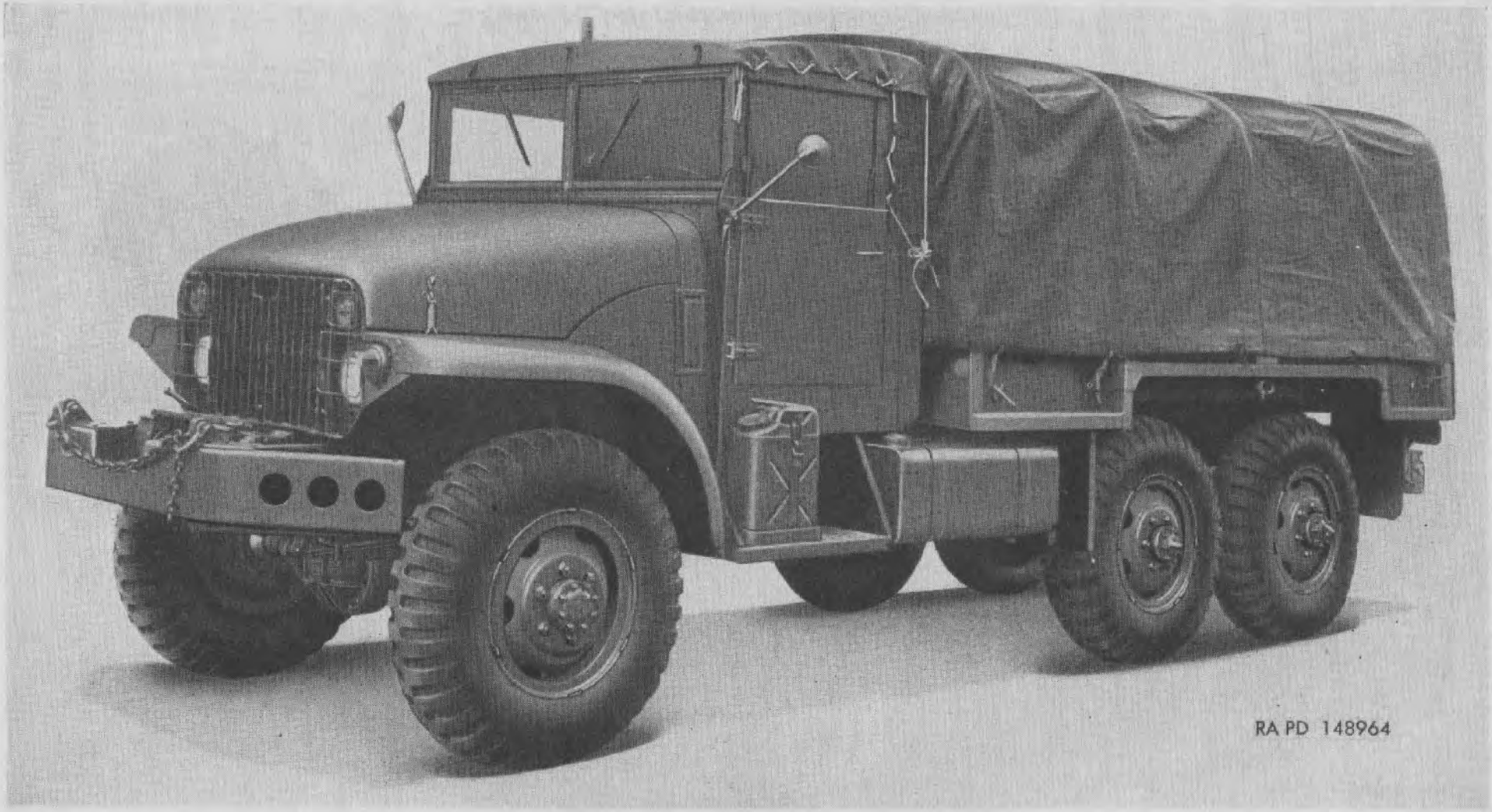


Figure 2. Left front view of vehicle w/winch.

Figure 3. Right rear view of vehicle w/o winch.

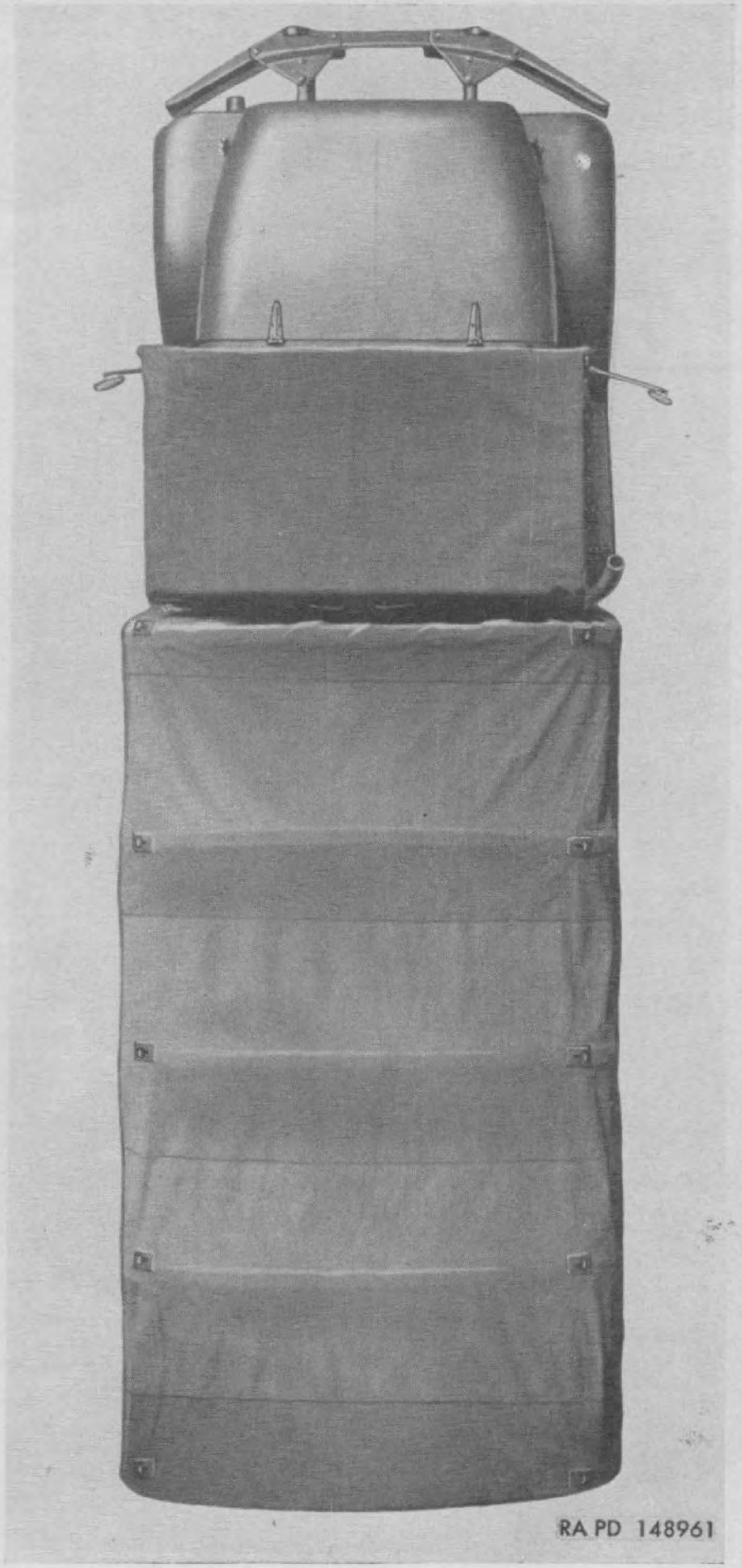


Figure 4. Top view of vehicle w/o winch.

axle differential carrier assemblies. The axle assembly incorporates constant velocity universal joints at steering knuckles which permit steering of the vehicle in conventional manner.

(2) Front axle suspension consists of semi-elliptic type springs, shackled at both ends, and mounted to axle housing with U bolts. Front springs carry only lateral and vertical loads. Three torque rods, two lower and one upper, transmit driving and braking forces to frame and hold axle in position under vehicle.

f. REAR AXLES AND SUSPENSION.

(1) Both driving rear axles are full-floating, hypoid, single reduction type with banjo type housings and are driven from transfer by conventional propeller shafts. Differential carrier assemblies are interchangeable between the two rear axles and with the front axle differential carrier assembly.

(2) Rear spring suspension consists of an articulated main spring assembly and a fixed secondary spring on each side. Both springs are inverted semi-elliptic type with slipper type ends. The main articulated springs are mounted with U bolts on trunnion housings which in turn are mounted on opposed tapered roller bearings. The secondary springs are mounted rigidly with U bolts on frame directly above main springs. Ends of both springs contact brackets on each axle housing. Torque rods, three to each axle, transmit driving and braking forces to frame the hold axles in position under vehicle.

g. BRAKE SYSTEM.

(1) Service brakes are air-actuated hydraulic type, operating brake shoes at all wheels. Air-actuated power cylinder transmits hydraulic pressure to dual wheel cylinders at each wheel. Air compressor, mounted to engine and driven by a belt from chankshaft pulley, supplies compressed air for the system as well as to trailer service connections. Two air storage tanks are provided. Service brakes are actuated with a brake pedal.

(2) A contracting band type parking brake assembly is mounted on output shaft at rear of transfer. A latch type parking brake lever, to right of driver, operates brake through rods and linkage for emergency stops or to hold vehicle while parking.

h. CAB AND BODY.

(1) The three-man cab consists of a metal open top enclosure around driver's compartment. Metal cab doors, equipped with glass windows, are hinged to cab structure on each side. Windows can be raised and lowered with conventional regulator mechanism. The two windshield sections can be positioned for ventilation, or the entire window frame can be lowered to a horizontal position over hood. Canvas top and back curtain, lashed in position to cab structure, can be positioned or removed to provide ventilation or accessibility.

(2) The steel cargo body, mounted to frame in back of cab, is equipped with front and side cargo racks which include bow sockets. Top paulin and end curtain can be installed over removable bows and lashed to body structure. Hinged troop seats, incorporated in side cargo racks, are provided. Hinged tail gate incorporates a hinged step for use when entering or leaving body when tail gate is lowered.

i. PROVISIONS FOR SPECIAL EQUIPMENT. Some provisions have been made in the standard vehicle design to permit ready installation of such winterization and fording equipment that may be furnished. Installation and use of such equipment are described in other directives.

4. Differences Between Models.

Some of the 2½-Ton, 6 x 6 Cargo Trucks, M135 are equipped with a front-mounted, worm-geared, jaw-clutch, drum winch, mounted on support brackets attached to frame side rails (fig. 2). This equipment and necessary changes of weights and dimensions are designated on vehicle identification plate (fig. 5). A power-take-off for winch operation, mounted on left side of transfer, drives winch through propeller shafts and universal joints. When winch is not included, power-take-off, drive lines, and power-take-off control linkage are omitted. Without winch, the front bumper is mounted with cable guide slot down.

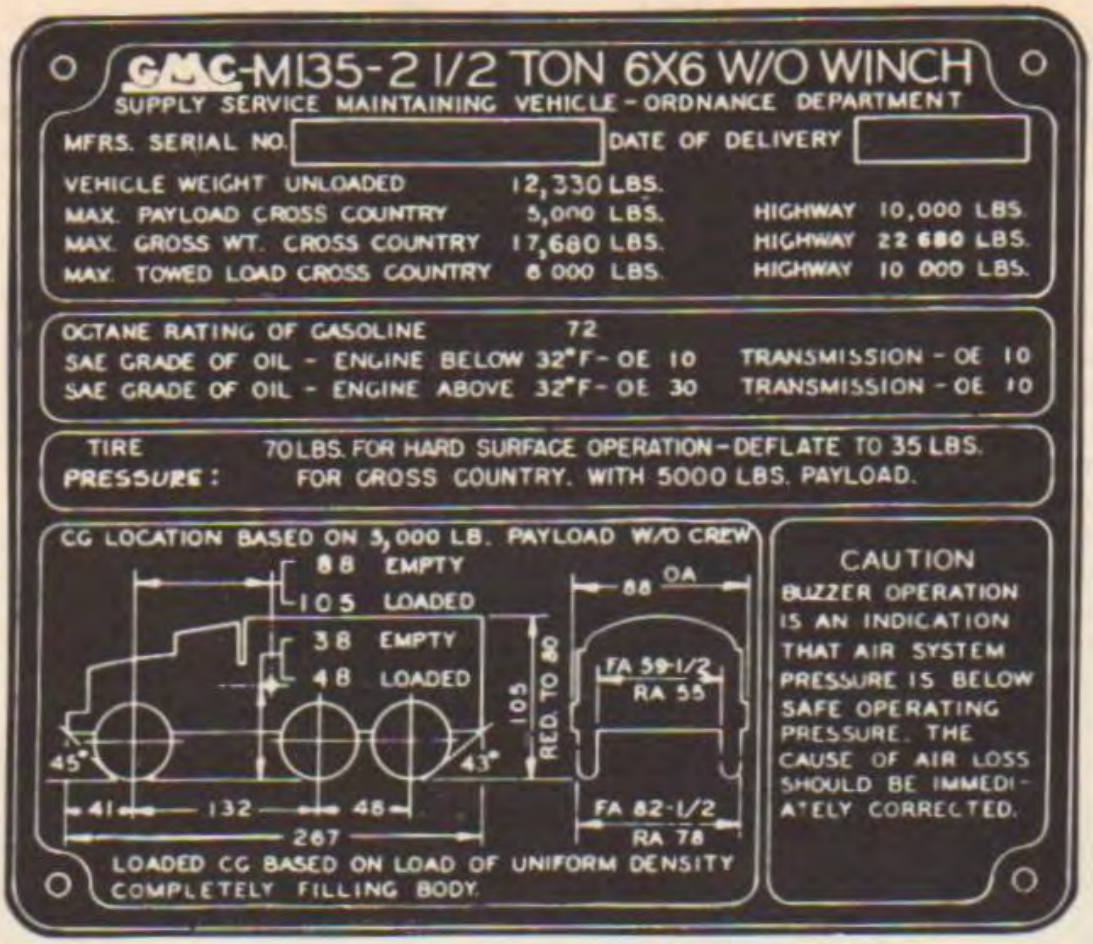


Figure 5. Vehicle identification plates (w/ and w/o winch).

5. Name, Caution, and Instruction Plates

Table I. Name, Caution, and Instruction Plates

Plate	Location	Figure
Vehicle identification	On instrument panel	8
Publication	On instrument panel	8
Transmission instruction	On instruction plate panel	8
Winch instruction	On instruction plate panel	8
Draining instruction	On instrument panel	8
Engine serial number	Right-hand side of engine crankcase	7
Transmission name	Right-hand side of transmission case	
Distributor name	On distributor body.	
Generator name	On generator field frame.	
Starter name	In starter field frame.	
Generator-regulator name	On regulator base.	
Winch name	On top of winch assembly.	
Carburetor name	On carburetor body.	
Air compressor name	On air compressor crankcase.	

a. VEHICLE IDENTIFICATION PLATE. Identification or trunk name plate is mounted on instrument panel to right of map compartment (fig. 8). Plate includes vehicle serial number, shipment date, load capacities, dimensional data, and other pertinent vehicular information.

b. PUBLICATION PLATE (fig. 6). This plate is mounted directly under the vehicle identification and draining instruction plates to the right of the map compartment (fig. 8). The plate includes references to ORD 9 SNL G-749, TM 9-1819AA, TM 9-1819AB, and TM 9-1819AC. *Do not requisition these four publications since they are not yet available; when published, they will be distributed automatically to personnel concerned and listed in the appropriate indexes.*

Figure 6. Publication plate.

c. TRANSMISSION INSTRUCTION PLATE (fig. 12). Plate is mounted on instruction plate panel in front of steering wheel (fig. 8). This plate includes brief instructions on the operation of transmission and transfer.

d. WINCH INSTRUCTION PLATE (fig. 17). Plate is mounted on instruction plate panel in front of steering wheel (fig. 8). This plate includes brief instructions on the use of the winch.

e. DRAINING INSTRUCTION PLATE (fig. 68). Plate is mounted to the right of map compartment directly under the vehicle identification plate (fig. 8). This plate contains brief instructions on draining the engine cooling system.

f. ENGINE SERIAL NUMBER (fig. 7). Manufacturer's engine serial number is stamped on plate mounted on boss on crankcase at right front of engine, directly behind generator.

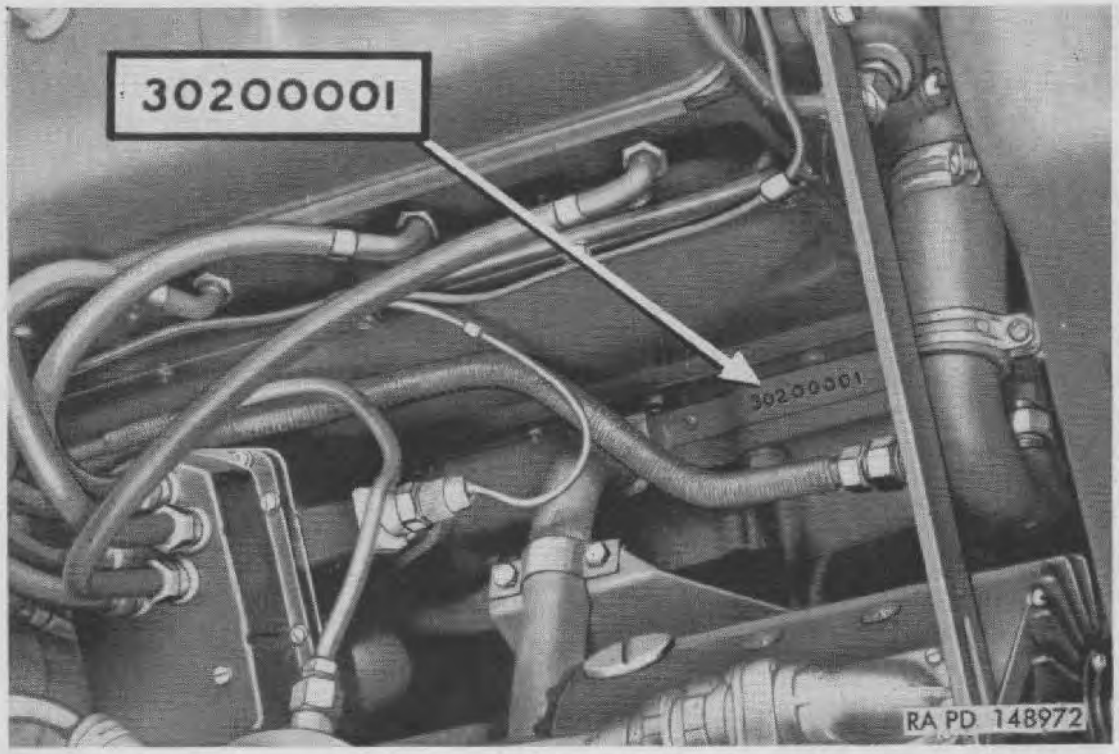


Figure 7. Location of engine serial number.

g. TRANSMISSION NAME PLATE. Transmission name plate is located on right-hand side of transmission case.

h. DISTRIBUTOR NAME PLATE. Plate, located on end of distributor body, includes manufacturer's model number and voltage data.

i. GENERATOR NAME PLATE. Plate, located on side of generator, includes ordnance number, manufacturer's model number, voltage, amperage, and serial number.

j. STARTER NAME PLATE. Plate, located on left side of starter, includes voltage, direction of rotation, ordnance part number, manufacturer's model number, and serial number.

k. GENERATOR-REGULATOR NAME PLATE. Plate, located on right-hand side of regulator, includes model number, ordnance number, voltage, and amperage.

l. WINCH NAME PLATE. Plate, located on top of winch assembly (fig. 186), identifies winch assembly by manufacturer's model and serial numbers.

m. CARBURETOR NAME PLATE. Small plate on engine side of carburetor body, includes manufacturer's model and part numbers.

n. AIR COMPRESSOR NAME PLATE. Plate on left side of air compressor crankcase includes manufacturer's model and serial numbers.

6. Tabulated Data

a. VEHICLE WEIGHT DATA.

Vehicle weight (unloaded):	
W/winch	12,740 lb.
W/o winch	12,330 lb.
Maximum payload (w/ or w/o winch):	
Highway operation	10,000 lb.
Cross-country operation	5,000 lb.
Maximum gross weight (including personnel):	
Highway operation:	
W/winch	23,090 lb.
W/o winch	22,680 lb.
Cross-country operation:	
W/winch	18,090 lb.
W/o winch	17,680 lb.
Maximum towed load (w/ or w/o winch):	
Highway operation	10,000 lb.
Cross-country operation	6,000 lb.

b. DIMENSIONAL DATA.

Maximum overall length	267 in.
Maximum overall width	88 in.
Maximum height:	
Overall	105 in.
Lowest reducible	80 in.
Tire tread (track):	
Front	71 in.
Rear	66½ in.
Width at outside of tires:	
Front	82½ in.
Rear	78 in.
Width at inside of tires:	
Front	59½ in.
Rear	55 in.
Wheelbase (front axle to rear spring seat centerline)	156 in.
Front of vehicle to front axle centerline	41 in.
Front axle to forward rear axle centerline	132 in.
Forward rear axle to rear rear axle centerline	48 in.
Rear rear axle centerline to rear of vehicle	46 in.
Shipping cubic (at lowest reducible height)	1,140 cu. ft.

Body dimensions:

Length (inside)	147 in.
Width (inside):	
Between sides	80 in.
Between wheelhouses	48½ in.
Height (inside):	
Floor to paulin bows	60 in.
Floor to top of seats	16¾ in.
Floor to top of side racks	36½ in.

c. OPERATIONAL DATA.

Angle of approach	45°
Angle of departure	43°
Ground clearance at axles	12½ in.
Minimum turning radius (right or left turn)	35 ft.
Maximum fording depth (without fording equipment)	60 in.
Tire size	11.00/20
Tire pressure:	
Hard surface operation	70 lb.
Cross-country operation (with 5,000 lb. payload)	35 lb.

d. PERFORMANCE DATA.

Maximum permissible speed:	
HIGH RANGE	
F–1	58 mph.
F–2	58 mph.
LOW RANGE	
F–1	15 mph.
F–2	15 mph.
R (reverse)	
HIGH RANGE	12 mph.
LOW RANGE	3 mph.
Maximum grade	60 percent
Engine horsepower (SAE)	38.4
Winch capacity	10,000 lbs.

e. CAPACITIES.

Fuel tank	56 gal.
Cooling system	22 qt.
Crankcase (refill)	11 qt.
Air cleaner	2 qt.
Transmission	15 qt. (aprx)
Transfer:	
W/ power-take-off	7½ pt.
W/o power-take-off	6½ pt.
Differentials:	
Front	15½ pt.
Forward rear	13½ pt.
Rear rear	11½ pt.
Steering gear housing	1½ pt.
Winch:	
Worm housing	1¼ pt.
End bearing frame housing	1 pt.

f. DETAILED DATA REFERENCES. For additional detailed tabulated data pertaining to individual components and systems, refer to the index.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATÉRIEL

7. Purpose

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

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

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

8. Correction of Deficiencies

Deficiencies disclosed during the course of the "run-in" will be treated as follows:

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

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

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

9. Preliminary Service

a. FIRE EXTINGUISHER. See that extinguisher is present (fig. 8) and fully charged.

b. FUEL, OIL, AND WATER. Check coolant level (par. 126*a*), and value of antifreeze (par. 292). Open coolant level cock (fig. 67) and fill only to this level. Fill fuel tank to correct level (par. 116*b*). Check engine oil level (par. 59*b*).

Caution: If there is a tag attached to the oil filler cap concerning the contents of crankcase, follow instructions on the tag before starting engine, when item *s* below, is reached.

Note. Do not check transmission oil level until after engine is started as instructed in item *s* below.

c. BATTERIES. Make hydrometer test and add water if necessary (par. 141 *b* and *c*). Check terminal connections. Replace waterproofing on battery terminals if necessary (par. 141*a*.)

d. COMPRESSED AIR TANKS. Drain air tanks (fig. 136). Close drain cock.

e. AIR CLEANER AND CRANKCASE BREATHER. Inspect Carburetor air cleaner for proper oil level (par. 59*e*). Inspect crankcase breather for oil level (par. 59*d*). Service as necessary.

f. ACCESSORIES AND BELTS. Examine all accessories for security of mounting. Check adjustment of drive belts (pars. 129 and 229).

g. ELECTRICAL WIRING. Examine all accessible wiring for chafing, cracking, and looseness of connections.

h. TIRES. Gage all tires, including spare (par. 240*a*). Remove all objects lodged in treads. Examine all tires for damage. See that all valve caps are present and finger tight.

i. WHEEL AND FLANGE NUTS. Check all wheel nuts for tightness (par. 239*b*). Check axle shaft flange nuts for tightness (pars. 198 and 205).

j. FENDERS AND BUMPERS. Examine fenders and bumpers for condition and security.

k. TOWING CONNECTIONS. Inspect towing shackles and pintle for looseness and damage. Inspect trailer service and emergency air connections.

l. BODY AND CAB. Inspect cab top and curtains, and body paulin for damage and presence of lashing ropes.

m. GLASS AND REAR-VIEW MIRROR. Clean windshield and other glass. Clean and focus rear-view mirrors.

n. LUBRICATE. Lubricate according to lubrication order (par. 57). Perform services *o* through *r* during lubrication.

o. SPRINGS AND SUSPENSION. Inspect front and rear springs for sag, broken or shifted leaves, loose rebound clips, U bolts, and shackles. Check shock absorbers and links, torque rods, and rear spring seats for looseness or damage. Check shock absorbers and rear spring seats for leakage.

p. STEERING LINKAGE. Inspect steering linkage for loose or damaged parts.

q. PROPELLER SHAFTS AND PILLOW BLOCK. Check propeller shafts for loose mounting and connections (par. 213). Check pillow block mounting stud nuts for looseness (par. 215).

r. UNIT VENTS. Axle housings, brake power cylinder, master cylinder, fuel tank, transfer, and transmission are vented through lines connected to vent gallery on right side of frame. Check vent connections at units and at vent gallery.

s. ENGINE WARM-UP. Start engine (par. 37*a*). Run at idle for 3 to 5 minutes, then check transmission oil (par. 59*f*). Warm up engine (par. 38).

t. CHOKE. Observe operation of choke and adjust linkage if necessary (par. 113*b*).

u. INSTRUMENTS. Observe action of battery charge indicator (par. 38*d*), oil pressure gage (par. 38*c*), temperature gage (par. 38*b*), and air pressure gage (par. 38*e*) during warm-up. Fuel gage should register level of fuel in tank (par. 32).

v. ENGINE CONTROLS. Note whether engine responds to accelerator pedal and hand throttle.

w. HORN AND WINDSHIELD WIPERS. Test horn (par. 26), and operation of windshield wiper blades (par. 272).

x. LAMPS, LIGHTS, AND REFLECTORS. Observe if all lights operate correctly with main light switch in proper positions (par. 42).

y. LEAKS. Inspect under hood and beneath truck for indications of fuel, oil, and coolant leaks.

z. TOOLS AND EQUIPMENT. See that all tools and equipment are present, in good condition, and properly stowed or mounted.

10. Run-In Test

a. GENERAL. Refer to section III of this chapter for operating instructions. During the road test of the vehicle, the following procedures will be consulted and performed. Services *j* to *m* below will be performed at 10-mile intervals with the vehicle halted.

b. AIR PRESSURE. Observe whether the brake air pressure builds up at a normal rate to the specified maximum limits and then cuts off (par. 31).

c. DASH INSTRUMENTS AND GAGES. Observe all instruments frequently, noting whether they operate within the prescribed limits, temperatures, and pressures. Refer to section II of this chapter.

d. HORN AND WINDSHIELD WIPERS. See that they operate properly.

e. BRAKES, FOOT AND PARKING. Foot brakes should stop vehicle smoothly without side pull within reasonable distance with approximately one-third reserve pedal travel. Parking brake should hold vehicle on reasonable incline, with over one-third reserve ratchet travel.

f. TRANSMISSION AND TRANSFER. Shift mechanism must operate smoothly.

g. STEERING. Note any excessive pulling to either side, wandering, or shimmy.

h. ENGINE. Engine must respond to controls and have maximum pulling power without unusual noises, stalling, misfiring, overheating, or unusual exhaust smoke.

i. UNUSUAL NOISES. Be on the alert continually for unusual noises that would indicate looseness of parts, damaged or malfunctioning units in the power train, cab, body, or wheels.

Note. Halt vehicle at 10-mile intervals for services *j* to *m* below.

j. BRAKE POWER CYLINDER OPERATION. Check operation of brake power cylinder by making a brake application, observing the amount of physical pressure required to depress pedal. If pedal pushes down hard, power cylinder is not functioning properly or air pressure is low.

k. AIR PRESSURE SYSTEM LEAKS. With the air pressure at a maximum (100 psi) and the brakes applied, stop the engine. There should not be a noticeable drop in pressure within one minute.

l. TEMPERATURES. Cautiously hand-feel each brake drum and wheel hub for abnormal temperatures. Examine transfer, transmission, and differential housings for overheating and oil leaks.

m. LEAKS. With engine running, and fuel, engine oil, and cooling systems under operating pressures, look within engine compartment and under vehicle for leaks.

n. PUBLICATIONS AND REPORTS.

(1) *Publications.* See that vehicle technical manual (TM 9-819A), lubrication order, Standard Form No. 91

(Operator's Report of Motor Vehicle Accident) and DA AGO Form 478 (MWO and Major Unit Assembly Replacement Record and Organization Equipment File) are in the truck, legible, and properly stowed.

Note. For new trucks, Department of the Army registration number and truck nomenclature must be filled in on DA AGO Form 478.

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

Section II. CONTROLS AND INSTRUMENTS

11. General

a. This section describes, locates, illustrates, and furnishes the driver with sufficient information pertaining to the various controls and instruments provided for the proper operation of the vehicle.

b. All pedal and hand lever controls, instruments, gages, and switches are grouped in the driver's compartment (figs. 8 and 9) and are readily accessible to the driver for the operation of the vehicle. The major graduations, letters, figures, and pointer tips on instruments and gages grouped in instrument cluster (fig. 10) are coated with luminous paint.

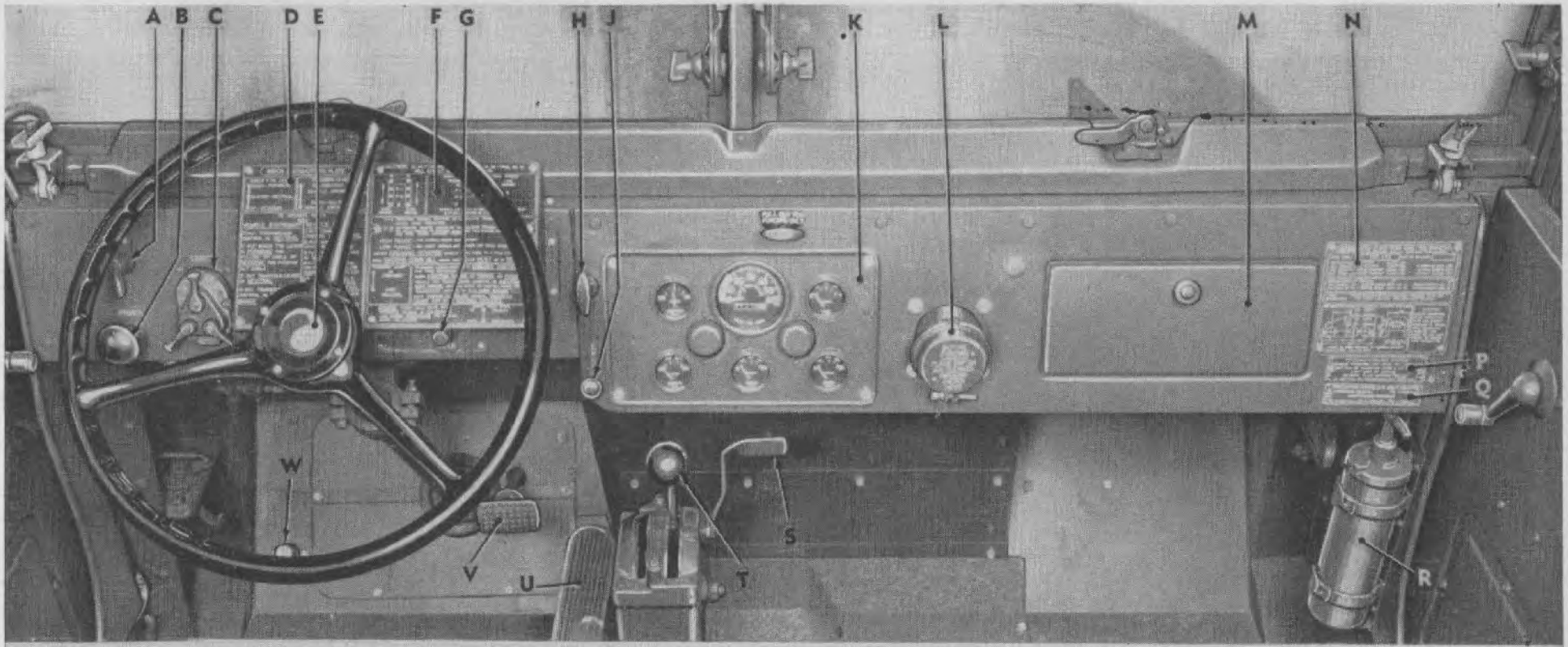
Note. There is no clutch pedal.

12. Service Brake Pedal

The brake pedal is located on floor, accessible to driver's right foot (fig. 8), and is used to control service brakes at all wheels. Brakes are applied by depressing pedal. Degree of brake application is in direct proportion to the amount of physical effort applied to the pedal (par. 41).

13. Accelerator Pedal

Treadle type accelerator pedal is located on cab floor just to right of brake pedal (figs. 8 and 9). Engine is accelerated from idling speed to governed speed in varying degrees, depending upon pressure applied to pedal. When foot pressure is released, pedal will return to engine idling position.



A—IGNITION SWITCH
B—PRIMER PUMP KNOB
C—MAIN LIGHT SWITCH
D—WINCH INSTRUCTION PLATE
E—HORN BUTTON
F—TRANSMISSION INSTRUCTION PLATE
G—WINDSHIELD WIPER CONTROL KNOB
H—THROTTLE CONTROL HANDLE
J—CHOKE CONTROL KNOB
K—INSTRUMENT CLUSTER
L—AIR INTAKE (WITH FORDING)
M—MAP COMPARTMENT
N—VEHICLE IDENTIFICATION PLATE
P—DRAINING INSTRUCTION PLATE
Q—PUBLICATION PLATE
R—FIRE EXTINGUISHER
S—STARTER SWITCH LEVER
T—TRANSMISSION CONTROL LEVER
U—ACCELERATOR PEDAL
V—BRAKE PEDAL
W—HEAD LIGHT DIMMER SWITCH
RA PD 148942

Figure 8. Instrument panel in driver's compartment.

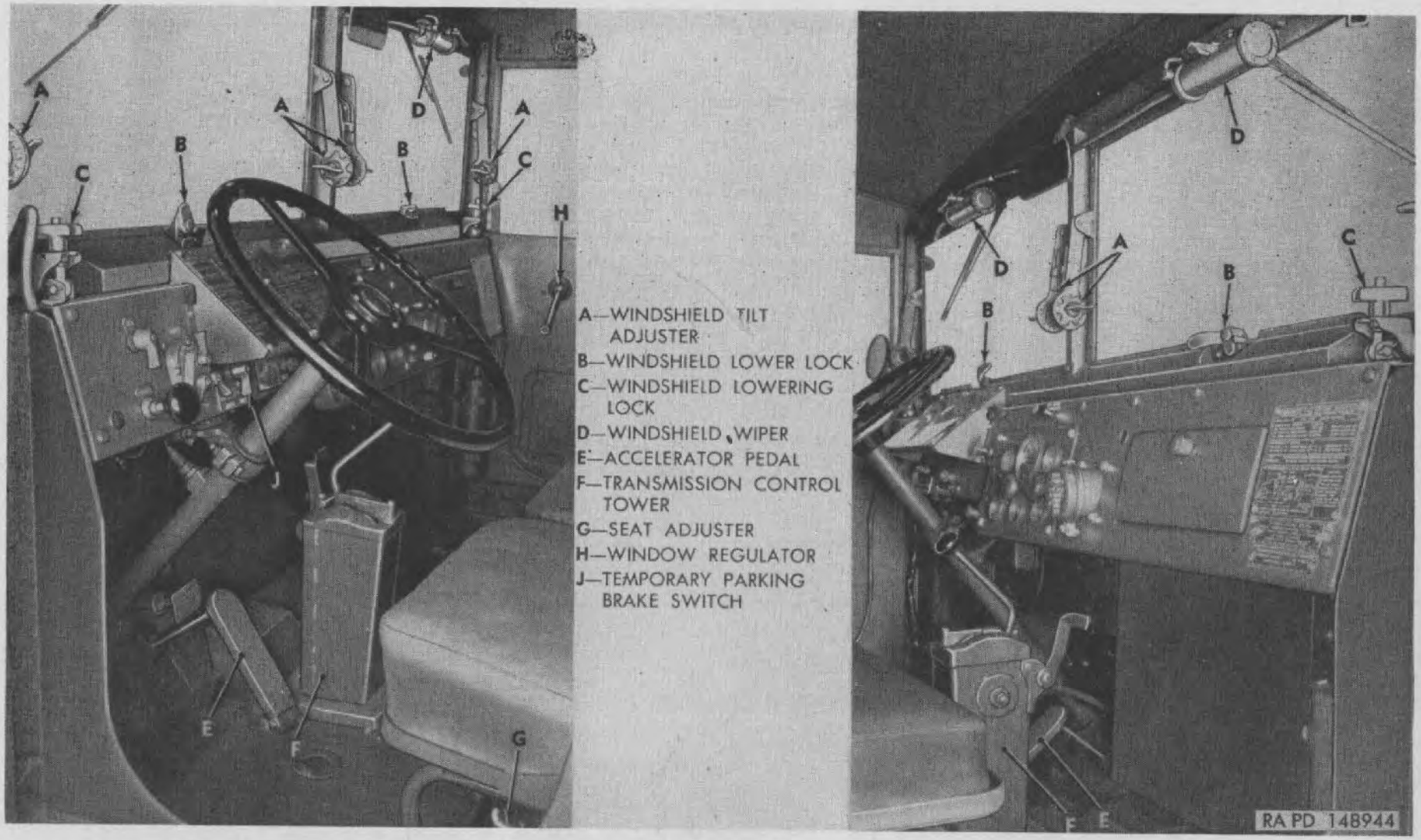


Figure 9. Left and right views into driver's compartment.

14. Parking Brake

a. PARKING BRAKE LEVER. Hand-operated lever is located to the right of driver between driver's and codriver's seat, near floor. A band type brake, mounted at rear of transfer, is applied by pulling up on lever which is held in any desired position by a pawl and sector device. Brake is released by squeezing release handle against lever, and lowering lever to floor. Brake is normally used to hold vehicle when parked.

b. TEMPORARY PARKING BRAKE SWITCH. Temporary parking brake switch, located on instrument panel under instruction plate panel at left of steering column (fig. 9), controls circuit to solenoid valve connected into master cylinder outlet hydraulic line. Plate under switch lever is marked ON, OFF, and TEMPORARY PARKING BRAKE ONLY. Operation of switch is described in paragraph 41*b* (2).

Caution: This parking brake is for emergency use only in the event of failure of the hand-operated parking brake, and should not be depended upon to hold the vehicle for extended periods. Hand-operated parking brake must be adjusted or repaired at the earliest possible opportunity, or the condition must be reported to ordnance maintenance personnel. Switch should remain in OFF position except when temporary parking brake is being used.

15. Transmission Control Lever

Control lever is located on control tower, to the right and slightly ahead of driver (fig. 8). The control lever operates in adequately marked shift pattern slots (fig. 13). Lever must be manually positioned in accordance with desired range and conditions as explained in paragraph 40.

16. Transfer Lever

Hand operated lever is under and slightly to the right of driver's seat near floor. Lever is operated up and down in a slot and is used to position transfer into neutral and driving positions. Plate on lever indicates positioning of lever in accordance to transmission instruction plate (fig. 12). Proper use of lever is explained in paragraph 39.

17. Power-Take-Off Lever

When winch is used, power-take-off control lever is located adjacent to the transfer lever. This lever is manually positioned to operate winch and is placed in various positions according to

marked plate on handle and winch instruction plate (fig. 17). Operation of lever in conjunction with winch operation is explained in paragraph 45.

18. Ignition Switch

Lever-type ignition switch is located on instrument panel to driver's left (fig. 8). Lever must be turned to left to complete ignition circuit before engine can be started. When ignition circuit is completed, temperature gage, oil pressure gage, air pressure gage, and fuel level gage circuits are energized, permitting reading of the values on those gages.

19. Throttle Control Handle

The throttle control handle is located on instrument panel at the left of the instrument cluster (fig. 8). Throttle handle can be pulled out in varying degrees to accelerate engine from idle to governed speed. Handle is automatically locked in accelerating positions, and can be unlocked and pushed back after handle is turned one-quarter turn to right or left. This control is generally used to set throttle to desired starting and warming-up speed, and to obtain sustained speeds when operating auxiliary units.

20. Choke Control

Choke control knob is located on instrument panel just to left of instrument panel cluster (fig. 8). Choke control button is connected with carburetor choke valve which is closed proportionally to degree button is pulled out. Control is used when starting and operating a cold engine. Control button must be pushed in after engine is started and operating correctly.

21. Primer Pump

Primer pump knob is located on instrument panel at left-hand end (fig. 8). Pulling the knob out and pushing it in again, in a pumping action, pumps a stream of fuel directly into the intake manifold. The primer is used to facilitate engine starting during cold weather (par. 37).

22. Windshield Wiper Control

Wiper control knob is located on instrument panel at right of steering column, below the instruction plate panel (fig. 8). Turning the knob in varying degrees controls the action of the two

air-operated windshield wipers. Each wiper is also equipped with a manually operated lever.

23. Main Light Switch

The main light switch is located on instrument panel to the driver's left (fig. 8). This switch is a three-lever type with main, auxiliary, and mechanical switch levers. The levers are positioned to control all lights on the vehicle (par. 42).

24. Dimmer Switch

Foot-operated dimmer switch is located on floor board, accessible to driver's left foot (fig. 8). The switch is used to control the upper and lower beams of the service driving head lights. Use of this switch permits driver to dim lights when passing other vehicles or to turn on bright lights when needed. Dimmer switch is only operative when main light switch is positioned on SER DRIVE (par. 42).

25. High Beam Light

Light is located in instrument panel cluster and is marked HIGH BEAM directly under light (fig. 10). This light illuminates whenever upper beam of service driving light is used.

26. Horn Button

Horn button is located in center of steering wheel (fig. 8) and is depressed to sound air-horn.

27. Starter Switch Lever

Starter switch lever is mounted on transmission control tower (fig. 8). When hand lever is pulled toward driver, lever linkage engages starter switch mounted on starter field frame. The starter lever cannot be engaged until transmission control lever is shifted into neutral position.

28. Battery Charge Indicator

The indicator, marked BATT-GEN INDICATOR, is located in instrument cluster (fig. 10). Face of gage is divided into two arcs marked DISCHARGE and CHARGE. The DISCHARGE arc is colored red and the CHARGE arc is colored green. The purpose of the indicator is to indicate charging activity of the generating circuit. The indicator will generally show a charge

reading (pointer in green arc) when engine is first started, and continue to show charging activity as engine speed is increased, depending upon electrical power being used. Abnormal discharge reading (pointer in red arc) with engine running at normal speed indicates deficiency in generating system. Failure to show charge reading while using all lights may also indicate deficiency in generating system.

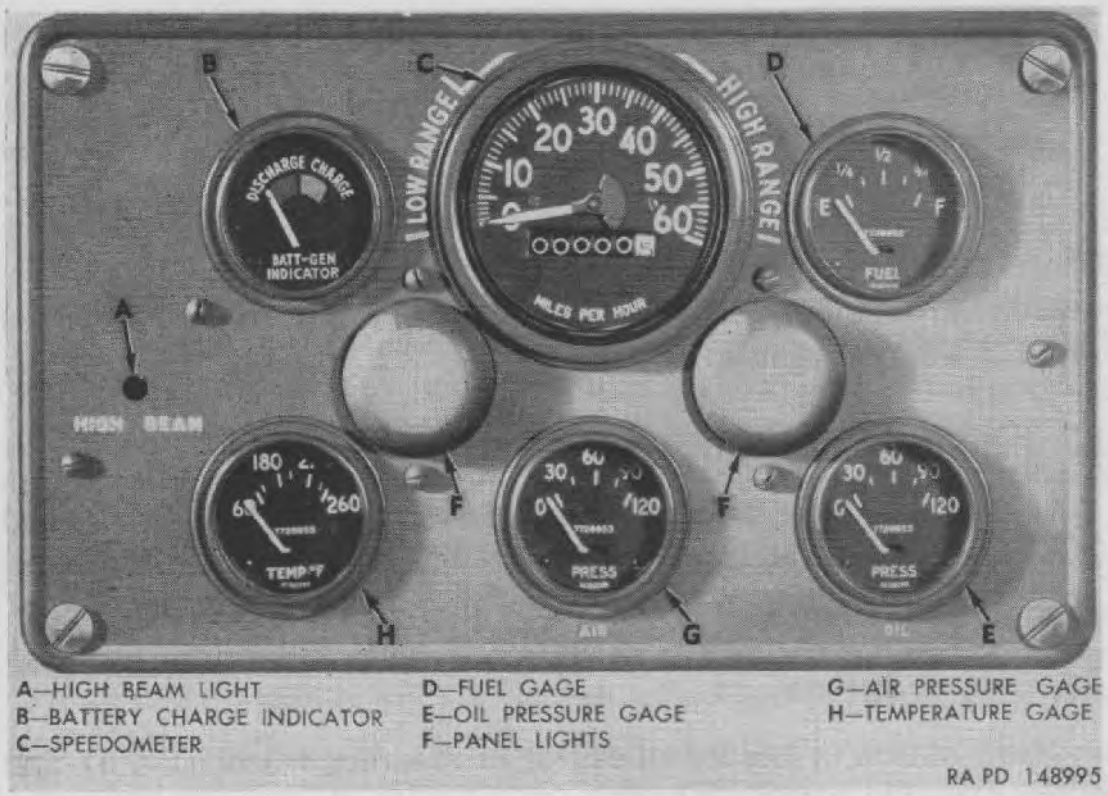


Figure 10. Instrument panel cluster.

29. Temperature Gage

Temperature gage, marked TEMP ° F, is located in instrument panel cluster, directly under battery charge indicator (fig. 10). Face of gage is marked in graduations of 40° F from 60° to 260° F. After ignition switch is turned on, gage is activated by a sending unit mounted in engine thermostat housing. Purpose of the gage is to indicate temperature of engine cooling system in degrees Fahrenheit. Operating temperatures between 160° F. and 220° F. are satisfactory for engine operation under normal operating conditions. If temperature rises sharply during warm-up or normal operation, stop engine and determine cause. Excessive low operating temperatures during normal operation also indicates faulty cooling system.

30. Oil Pressure Gage

Oil pressure gage (marked OIL on panel under gage, and marked PRESS on gage face) is located in lower right portion of instrument panel cluster (fig. 10). Gage hand is marked in graduations of 30 psi from 0 to 120 psi. After ignition switch is turned on, gage is activated during engine operation by a sending unit connected to engine oil system gallery. Purpose of gage is to indicate engine oil pressure when engine is running. When engine is started cold, oil pressure may rise sharply, then recede to normal after engine is warmed up. With engine at slow idling, pressure should be approximately five psi. Absence of oil pressure during engine operation indicates faulty oiling system or inoperative gage circuit, and engine should be immediately stopped.

31. Air Pressure Gage

Air pressure gage (marked AIR on panel under gage, and marked PRESS on gage face) is located on instrument panel cluster to the left of oil pressure gage (fig. 10). Gage face is marked in graduations of 30 psi from 0 to 120 psi. After ignition switch is turned on, gage is activated by a sending unit connected to air pressure line. Purpose of the gage is to indicate air pressure in air storage tanks. Full pressure in system is 100 psi. With engine running, air compressor governor cuts in at approximately 75 psi and compressor builds pressure up to full pressure (100 psi). Do not drive vehicle until pressure is up to 60 psi. If, during operation, air pressure buzzer sounds (when below 60 psi) vehicle should be stopped and cause of air leakage corrected.

32. Fuel Gage

Fuel gage is located in upper right portion of instrument panel cluster (fig. 10). Face of gage is marked FUEL and is graduated; E (empty); ¼; ½; ¾; F (full). Purpose of gage is to indicate level of fuel in fuel tank. Ignition switch must be turned on to show reading on gage.

Caution: Do not permit ignition switch to remain on for any length of time if fuel gage shows E (empty). Submerged type fuel pump in tank is actuated when ignition switch is on and is lubricated by fuel; therefore pump may be damaged unless tank contains some fuel.

33. Speedometer

Speedometer is located in center of instrument panel cluster (fig. 10). Speedometer indicates truck road speed in miles-per-

hour, and also records total mileage. Face of speedometer is marked in graduations of 1 mph from 0 to 60 mph. Maximum permissible road speeds in high and low transmission ranges are indicated on transmission control plate (fig. 12); these speeds are also marked on instrument cluster around circumference of speedometer (fig. 10).

34. Miscellaneous Controls

Other controls shown on figure 9, which may be used by driver during operation of truck, are explained in other paragraphs of this manual as follows:

a. DRIVER'S SEAT ADJUSTER. Refer to paragraph 273*b*.

b. WINDSHIELD ADJUSTMENTS. Refer to paragraph 271*b*.

Section III. OPERATION UNDER USUAL CONDITIONS

35. General

a. This section contains instructions for the mechanical steps necessary to operate the 2½ Ton 6 x 6 Cargo Truck M135 under conditions of moderate temperatures and humidity. For operation under unusual conditions, refer to section V of this chapter.

b. Before attempting to operate this vehicle, the driver should become familiar with important items and procedures pertaining to operation and driving of this truck which are described in other sections of this manual. These are—

(1) *Controls and instruments.* The driver must become familiar with the location and purpose of the controls and instruments as described in section II of this chapter.

(2) *Preventive maintenance by driver or operator.* The before-operation, during-operation, at-the-halt, and after-operation procedures outlined in paragraph 67 must be accomplished to obtain efficient operation.

(3) *Cab top and curtain positioning.* Procedures covering the positioning of cab top and curtains for driver protection, ventilation, or visibility are explained in paragraph 270.

(4) *Windshield positioning.* Procedures covering the positioning of windshield are explained in paragraph 271.

(5) *Seat adjustment and positioning.* Procedures covering the adjustment of driver's seat and the positioning of codriver's seat are explained in paragraph 273.

36. Positioning Hood

a. HOOD POSITIONS. The alligator type hood is retained in closed position with a conventional hood clasp on each side near front of hood. Hood can be raised to two positions.

b. FIRST RAISED POSITION. Release the hood clasp on each side of hood. Grasp nose of hood and raise to first position (fig. 11). Telescoping side supports will automatically lock and hold hood in this position. Inspection and light maintenance of engine accessories can be accomplished with hood in first raised position.

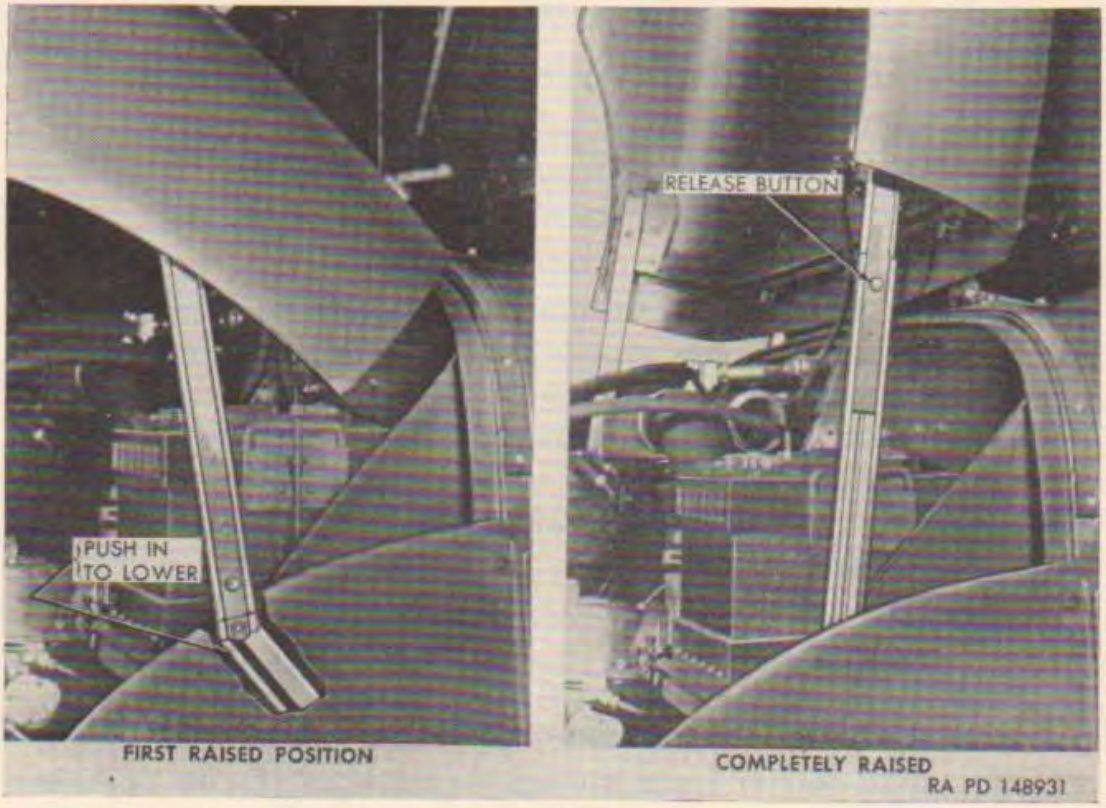


Figure 11. Positioning hood.

c. SECOND RAISED POSITION. Press release button (fig. 11) on each side support; then raise hood to a vertical position. More extensive maintenance and inspection operations can be accomplished with hood in completely raised position.

d. LOWERING HOOD. To lower hood from completely raised position, press release button on each side support; then lower hood to first raised position. To lower hood from first raised position, raise hood slightly, then slightly push lower support (fig. 11) on each side, toward cab. Hood can then be lowered to closed position.

37. Starting and Stopping Engine

a. STARTING THE ENGINE. Before starting the engine, the driver should accomplish the before-operation procedures outlined in paragraph 67.

(1) Before engine is started, position control levers as follows:

(*a*) *Transfer lever.* Place in UP-ENGAGED position (par. 39*b*).

(*b*) *Transmission control lever.* Place in N position (par. 40*c*).

(*c*) *Power-take-off lever (if used.)* Place in CENTER-NEUTRAL position (par. 45*a*).

(*d*) *Parking brake lever.* Pull up lever to fully apply brake.

(2) If engine is cold, pull out choke control knob (CHOKE). Pull out throttle-control handle (THROTTLE) about one-half inch.

(3) If vehicle has been parked in severe cold atmospheric temperature, use primer pump if necessary. Pull primer pump knob out and push in again with a pumping action. Two or three pumping operations should suffice. Do not use primer unnecessarily. During normal weather temperature conditions primer is not required to start engine.

(4) Turn ignition switch lever to on position.

Note. Low air preessure buzzer will sound after ignition switch is turned on if air pressure is below 60 psi. Buzzer will continue to sound after engine starts until pressure is built up to over 60 psi.

(5) Pull starter lever toward driver until starter operates. Transmission control lever must be in N position before starter lever can be operated. Release lever the instant engine starts.

Note. Starter should not be engaged for periods of more than 30 seconds.

After starter has been engaged without results, wait 10 to 15 seconds before using starter again. If after several attempts, engine will not start, determine the cause (par. 70*b*) and correct.

(6) After engine starts, adjust choke and hand throttle to even idling speed.

(7) Truck may be pushed or towed to start engine, if necessary (par. 43*a*).

b. STOPPING ENGINE. Engine should be permitted to idle for a few minutes before turning off ignition switch to stop engine.

38. Engine Warm-up

a. WARM-UP PERIOD. Engine should be permitted to operate through a short warm-up period whenever conditions permit. This warm-up period permits the driver to observe the gages for proper readings, and to check performance of the engine before the truck is placed under way. During warm-up period, engine should be run at normal idling speed.

Note. Engine should be run 3 to 5 minutes at idling speed before checking transmission oil level (par. 59*f*).

b. OPERATING TEMPERATURE. Operating temperatures between 160° and 220° F. are satisfactory for engine operation under normal operating conditions. Whenever conditions permit, engine temperature should attain 160° F. before vehicle is moved. If temperature rises sharply above 220° F. during warm-up or normal operation, stop engine and determine cause.

c. OIL PRESSURE. When engine is first started, oil consistency may cause a sharp rise in pressure reading. As engine warms up, pressure should recede slowly to normal (approximately 5 psi with engine idling). Pressure reading may fluctuate as engine speed decreases or increases. A sudden drop or an erratic fluctuation of pressure indicates faulty engine oiling system, and engine should be stopped and cause corrected.

d. BATTERY CHARGE INDICATOR. The indicator will generally show a charge reading when engine is started, and continue to show charging activity as engine speed is increased depending upon the electrical power being used.

e. AIR PRESSURE. When engine is started, low air pressure buzzer will sound if pressure is below 60 psi. Vehicle should not be moved until pressure is over 60 psi. Do not run engine over one-third throttle to build up air pressure during warm-up.

39. Use of Transfer

a. TRANSFER CONTROLS. Transfer is placed into neutral or driving position with a manually operated lever located slightly to right of and under driver's seat. Plate on the lever handle is marked UP-ENGAGED (transfer in driving position) and DOWN-NEUTRAL (transfer in neutral). Positions of lever are also indicated on transmission instruction plate (fig. 12). Lever operates in a slot and will lock in either up or down position.

b. USE OF LEVER. Normally, transfer lever should be placed in and remain in UP-ENGAGED (driving) position at all times including parking. However, for certain towing operations (par. 43) and winching operations (section IV of this chapter), transfer lever should be positioned as explained for such conditions.

c. FRONT AXLE ENGAGEMENT. Transfer mechanism provides automatic engagement and disengagement of front driving axle in accordance with road and load conditions. Transfer front axle engagement mechanism is manually shifted for operation in forword or reverse driving through interconnection with transmission manual shift linkage.

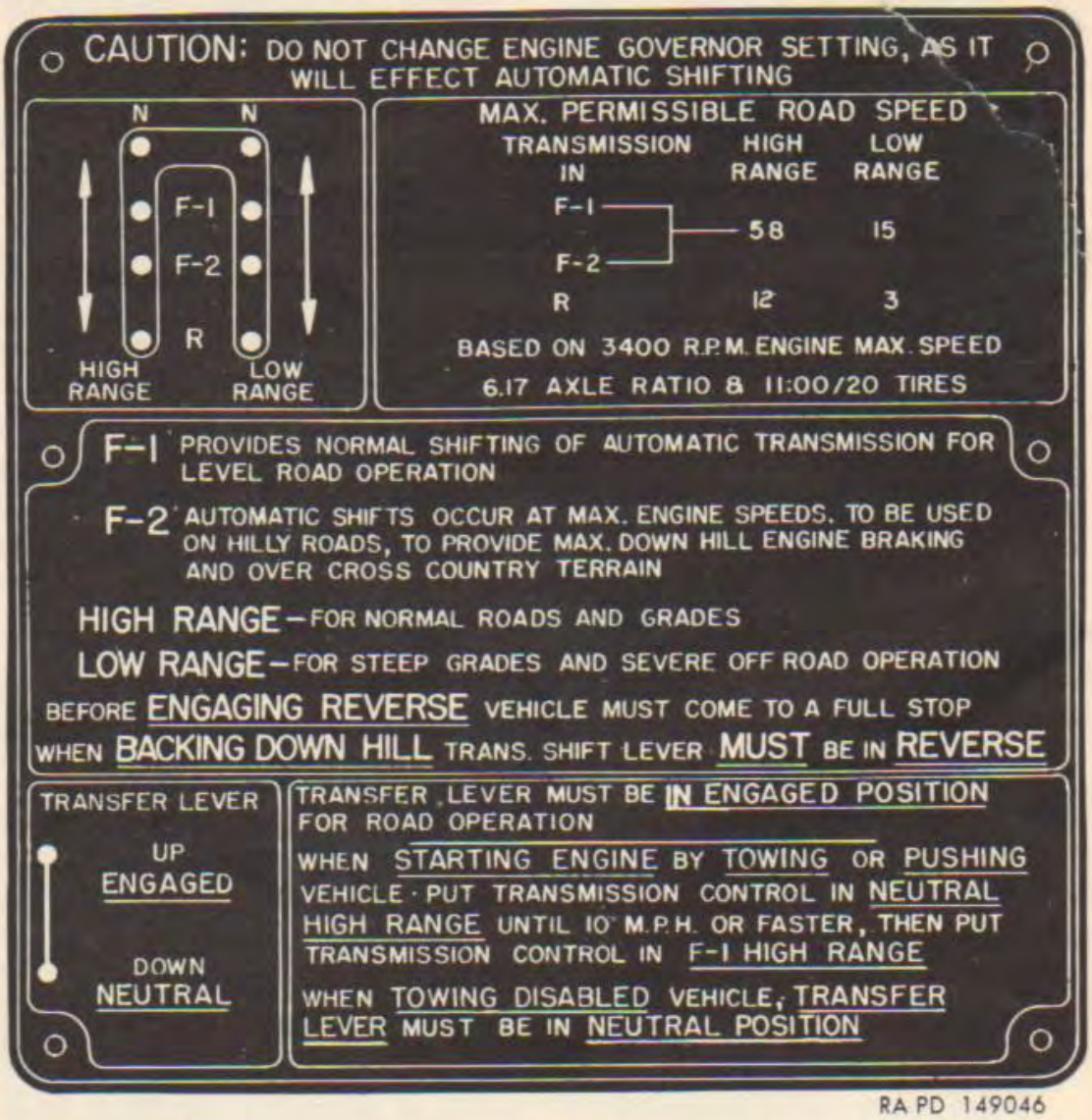


Figure 12. Transmission instruction plate.

40. Use of Transmission

a. GENERAL. Transmission is automatic and does not require a clutch pedal for operation. Transmission has four automatic

forward speeds and one reverse in each of two ranges, HIGH and LOW. The forward speeds in each range are selected automatically in accordance with performance demands required by load and road conditions. The driver manually selects control lever positions depending upon terrain conditions. When lever position is properly selected, maximum efficiency for any combination of conditions is provided.

b. SHIFT LOCK. Transmission cannot be moved out of neutral position unless throttle linkage is in idling position. If control cannot easily be moved out of neutral, do not use force. Make sure throttle and accelerator pedal are in idling position.

c. TRANSMISSION CONTROL LEVER POSITIONS. Transmission control lever, mounted on tower to right of driver, operates in a marked shift pattern slot (fig. 13). Shift positions are also indicated on transmission instruction plate (fig. 12).

(1) *Neutral.* Neutral position is marked N over LOW RANGE and HIGH RANGE slots. With lever in either neutral position, transmission is inoperative.

(2) *F–1 posttion.* Lever can be positioned in F–1 LEVEL (forward speed) position in either HIGH RANGE or LOW RANGE slot.

(3) *F–2 position.* Lever can be positioned in F–2 HILLY (forward speed) position in either HIGH RANGE or LOW RANGE slot.

(4) *Reverse.* Lever can be positioned in R reverse position in either HIGH RANGE or LOW RANGE slot.

(5) *Positioning lever.* Transmission control lever knob must be pressed downward when moving lever out of any position except N (neutral).

d. ACTION IN F–1 LEVEL POSITION. With transmission in F–1 position (in either HIGH RANGE or LOW RANGE), automatic shift patterns of the four automatic speeds vary according to throttle opening and vehicle speed. With light throttle, shifts occur at low speeds, and as throttle is opened, shifts occur at relatively higher speeds until full throttle is reached. When operating in 4th speed, a "forced downshift" to 3d speed can be obtained for maximum acceleration and power. This is accomplished by depressing accelerator to stop. Note that a slight resistance must be overcome to completely open the throttle. Transmission will automatically downshift from 4th to 3d ratio, providing vehicle speed (in HIGH RANGE) is less than 35 mph. Upshift from 3d to 4th ratio will occur whenever accelerator is released, or automatically when speed of approximately 38 mph is attained.

e. ACTION IN F–2 HILLY POSITION. With transmission in F–2 position (in either HIGH RANGE or LOW RANGE), transmission will upshift from 1st to 2d ratios when speed of engine approaches maximum governed speed. Further upshifts will not occur within normal governed speed of engine. However, transmission can be held in 3d speed by first attaining that speed in F–1 position; then shifting into F–2 position. Downshift to lower ratios will not take place until engine speed is reduced to

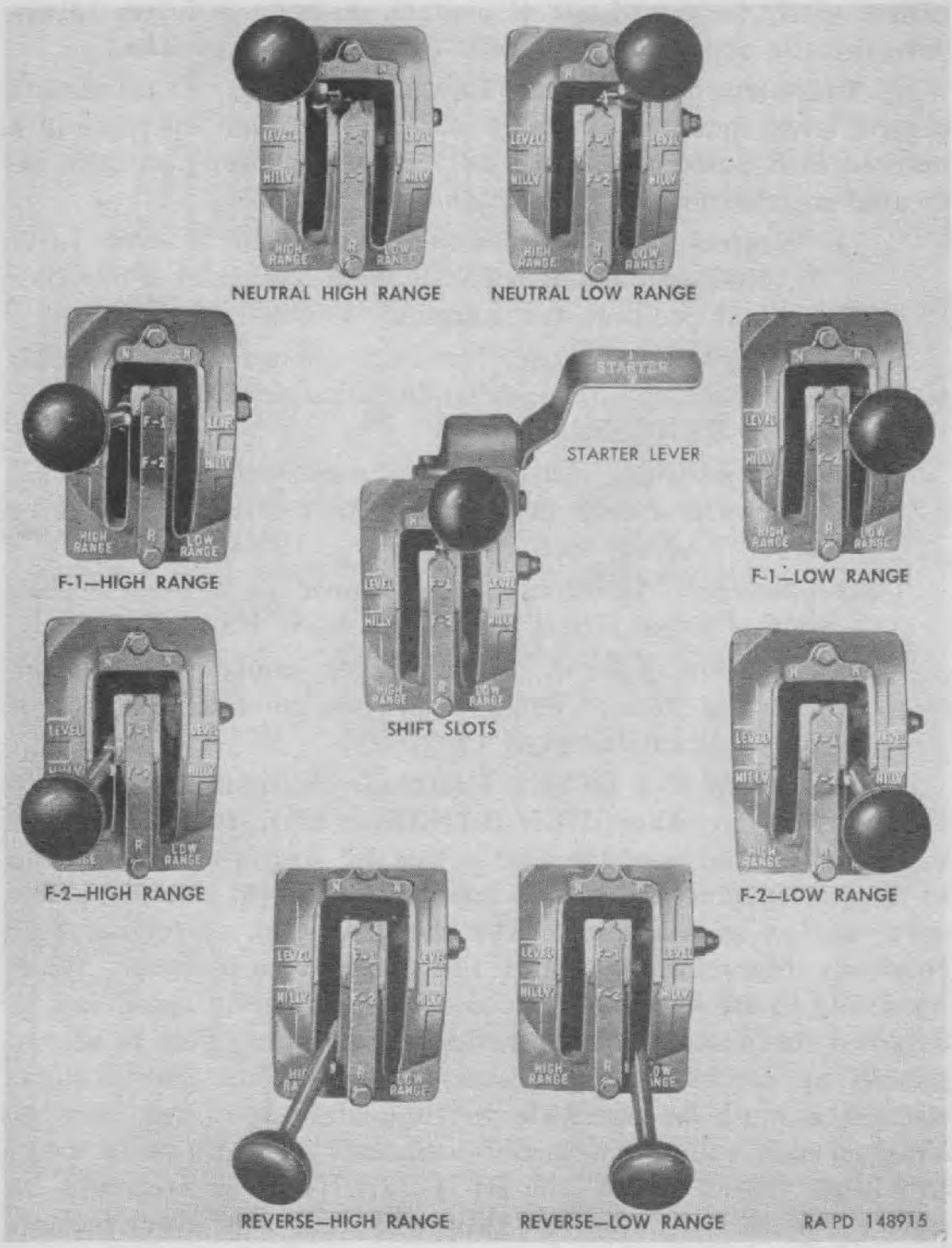


Figure 13. Transmission control lever positions.

approximately one-half governed speed. Consequently, transmission can be kept in a desired ratio over a wide range of engine speeds by proper use of accelerator. This permits proper ratios for climbing long hills and for traversing undulating terrain, and also provides maximum engine braking power when descending long or steep hills.

f. ACTION IN LOW RANGE. With transmission in LOW RANGE positions, road speed is reduced to approximately one-quarter of that obtained in equivalent HIGH RANGE positions, and pulling ability is increased accordingly. LOW RANGE positions should be used for off-the-road operation, and when load and road conditions cause vehicle speed to be reduced to 10–15 mph. Under such conditions, shift should not be made until vehicle speed is reduced accordingly.

Caution: Do not remain in LOW RANGE above 15 mph as this represents maximum speed in LOW RANGE as shown on instrument cluster (fig. 10) and transmission instruction plate (fig. 12). Faster speeds should be obtained only in HIGH RANGE.

g. NORMAL DRIVING.

(1) The driver should keep in mind that the *greater part of normal forward driving is accomplished with transmission in F–1 LEVEL, HIGH RANGE position.* Control lever should remain in this position except when parking, reversing, or when conditions necessitate driving in F–2 HILLY position, or in LOW RANGE (either in F–1 LEVEL or F–2 HILLY).

(2) With transmission in forward driving position, the truck will move forward as accelerator pedal is pressed down. Transmission is automatically shifted through range of ratios as vehicle speed increases, and will progressively downshift as road speed decreases.

(3) To stop truck for normal traffic stop, release accelerator and apply brakes as necessary. It is not necessary to move transmission lever out of driving position unless vehicle is to remain stopped for some time. To again move truck, release brakes and depress accelerator pedal.

Note. Whenever driver leaves his seat, parking brake must be applied and transmission control lever moved to N (neutral) position; otherwise just an accidental touching of accelerator pedal will move truck.

h. REVERSING.

(1) To engage reverse (R) in either HIGH RANGE or LOW RANGE, vehicle must be brought to a complete stop.

(2) While pressing down on lever knob, move lever to R in HIGH RANGE or LOW RANGE, as desired. Press down on accelerator to move truck. Release accelerator and apply brake to stop truck.

(3) To move lever from R to any other position, truck must be at a complete stop.

i. PARKING. When parking or when working on vehicle with engine running, always place transmission control lever in neutral (N) position and apply parking brake. *Transmission cannot be locked in gear to park on a steep incline.* Parking brake must be used to hold truck under such conditions.

j. COASTING. Do not coast in N (neutral) and with engine not running. If attempting to start engine by coasting, follow instructions in paragraph 43*a*. If backing down hill, always place lever in R position.

41. Use of Brakes.

a. SERVICE BRAKES.

(1) *Air pressure.* Service brake system in an air-actuated hydraulic system. Vehicle should not be moved until air pressure is at least 60 psi. Vehicle should be stopped if pressure falls below 60 psi (when buzzer sounds). Some degree of braking can be obtained without air pressure assistance; however, considerable physical effort must be applied to brake pedal. Vehicle should not be moved under these circumstances except in case of emergency.

(2) *Application.* Degree of brake application is in direct proportion to the amount of physical pressure applied to brake pedal. Gradually apply brakes as hard as speed and road conditions permit; then reduce pedal pressure gradually as speed is reduced, so that a very slight pressure is used at completion of stop. If brakes are applied lightly at beginning, and pressure increased as speed decreases, the final high pressure will produce a severe stop.

b. PARKING BRAKE.

(1) *Hand-operated parking brake.* Brake is applied by pulling up on hand lever located at right of driver. To release brake, pull up on lever, and at the same time squeeze release handle against lever. While holding release handle against lever, lower lever to floor, engaging lever in clip on floor. Brake should be used only for holding the vehicle when parked, and should not be used to stop vehicle except in case of emergency.

(2) *Temporary parking brake.* Temporary parking brake is controlled by switch on instrument panel (par, 14*b*), which controls circuit to solenoid valve connected into master cylinder outlet hydraulic line.

Caution: This parking brake is for emergency use only in the event of failure of the hand-operated parking brake, and should not be depended upon to hold the vehicle for extended periods. Hand-operated parking brake must be adjusted or repaired at the earliest possible opportunity, or the condition must be reported to ordnance maintenance personnel.

When switch is turned to ON position and service brakes applied, solenoid acts to prevent hydraulic brake fluid returning to the master cylinder, thus holding the hydraulic brakes applied. To release brakes, turn switch to OFF position. Switch may be turned ON either before or after applying the service brakes, but it must be turned ON before releasing brake pedal to hold brakes applied.

42. Use of Lights

a. MAIN LIGHT SWITCH. All lights are controlled by the three-lever main light switch (fig. 14) located on instrument panel (fig. 8).

(1) *Main switch lever.* The five-position main switch lever is located at upper part of switch with lever pointing up (fig. 14). This lever can be positioned to control all lights except instrument panel lights and parking lights. The mechanical (or locking) switch lever must be used when positioning main switch lever to BO DRIVE, or STOP LIGHT or SER DRIVE positions.

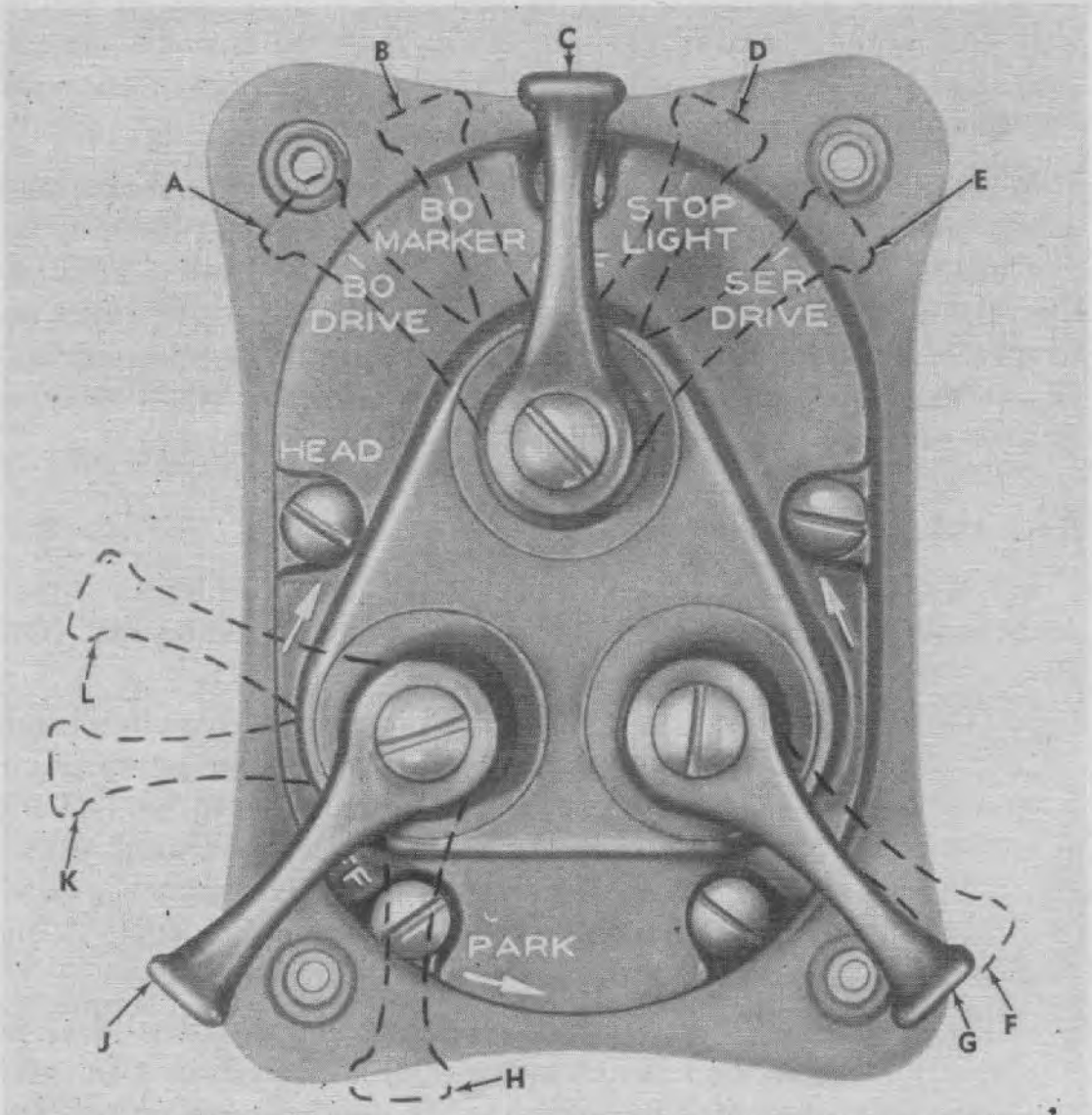
(2) *Auxiliary switch lever.* The auxiliary switch lever is located to the left and below main switch lever (fig. 14). This lever may be positioned to control parking and instrument panel lights when main switch lever is in positions as explained in *b* below.

(3) *Mechanical switch lever.* The mechanical (or locking) switch lever is located to the right and below the main switch lever (fig. 14). This lever must be held in raised position before main switch lever can be positioned to BO DRIVE, STOP LIGHT, or SER DRIVE positions.

b. OPERATION OF MAIN LIGHT SWITCH.

(1) *OFF position.* With main switch lever in OFF position, all lights are off.

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



A—MAIN SWITCH—"BO DRIVE" POSITION
B—MAIN SWITCH—"BO MARKER" POSITION
C—MAIN SWITCH—"OFF" POSITION
D—MAIN SWITCH—"STOPLIGHT" POSITION
E—MAIN SWITCH—"SER DRIVE" POSITION
F—MECHANICAL SWITCH—UNLOCKED
G—MECHANICAL SWITCH—LOCKED
H—AUXILIARY SWITCH—"PARK" POSITION
J—AUXILIARY SWITCH—"OFF" POSITION
K—AUXILIARY SWITCH—DIM PANEL LIGHTS
L—AUXILIARY SWITCH—BRIGHT PANEL LIGHTS

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Figure 14. Main light switch positions.

(3) *Blackout drive position.* When main-switch lever is turned to the left to BO DRIVE position, the circuits for blackout head light is energized, as well as circuits for blackout marker, blackout stop, and blackout tail lights. The mechanical switch must be held in unlocked position to turn main switch lever from BO MARKER to BO DRIVE. The auxiliary-switch lever can be turned up for dim or bright instrument panel lights.

(4) *Stop light position.* The mechanical switch lever must be held in a raised position while main switch lever is being placed into STOP LIGHT position. This position is used for daylight driving. Left service stop light will illuminate when brakes are applied.

(5) *Service drive position.* The mechanical switch lever must be held in raised position while main switch lever is being placed into SER DRIVE position from OFF. Main switch lever can be placed into SER DRIVE from STOP LIGHT without raising mechanical switch lever. When main switch lever is in SER DRIVE, right and left service head lights, and left service tail light are illuminated. Left service stop light will illuminate when brake is applied.

(6) *Parking position.* After main switch lever is placed into SER DRIVE, auxiliary switch lever can be positioned into PARK to illuminate right and left front parking lights and left service tail light. Instrument panel lights are dim with auxiliary lever in PARK position. With main switch lever remaining in SER DRIVE, auxiliary switch lever can be placed in OFF, or instrument panel light positions, to again illuminate service lights.

(7) *Instrument panel lighting.* With main switch lever in any position except OFF, auxiliary switch lever can be turned to left from OFF to first position for dim panel lights or to second position for bright panel lights.

c. DIMMER SWITCH. Foot-operated dimmer switch, located on floor to driver's left (fig. 8), is used to control high and low service head light beams. When the high beam is used, light on instrument panel cluster (HIGH BEAM, fig. 10) will illuminate.

d. TRAILER RECEPTACLE (fig. 15). The trailer light receptacle at left rear of frame is interconnected with mainlight switch. The main light switch positions control blackout and service lights on trailer in same manner as controlled on truck. Clip on receptacle cover holds trailer harness plug in place.

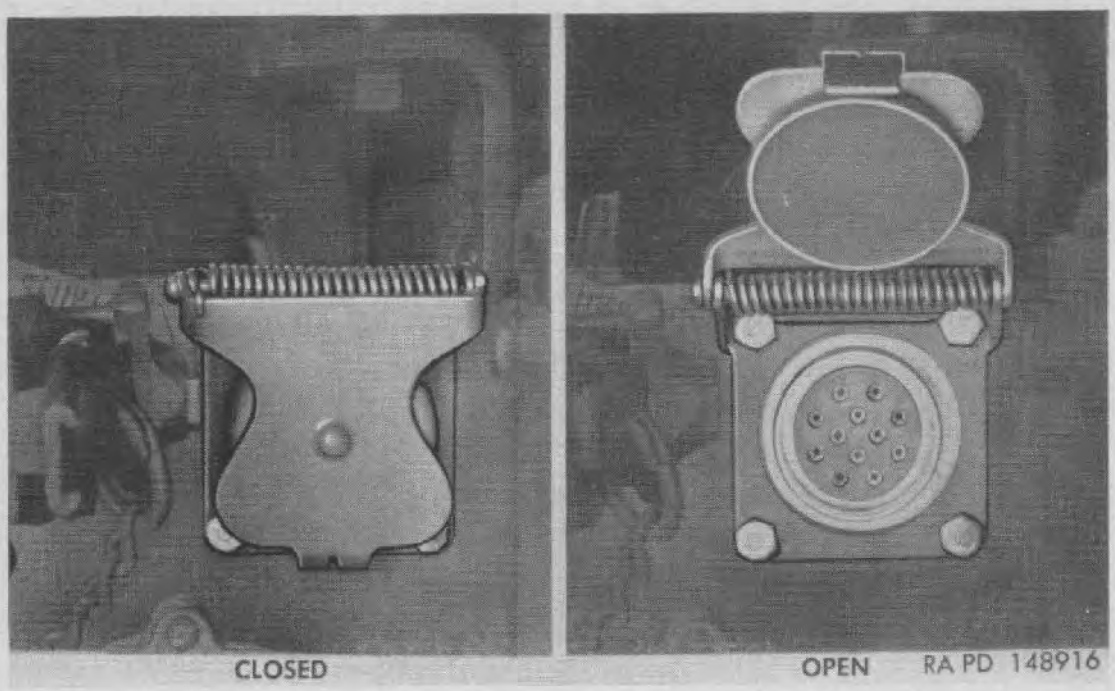

Figure 15. Trailer light receptacle.

43. Towing the Vehicle

a. TOWING TO START ENGINE. Engine can be started by pushing or towing vehicle; however, succeeding instructions must be carefully followed to avoid damage to transmission.

(1) Raise transfer lever to UP-ENGAGED position.

(2) Place transmission control lever into N HIGH RANGE (fig. 13).

(3) Use choke, throttle, and primer pump as described for normal starting of engine (par. 37*a*).

(4) Turn ignition switch to ON position. When a vehicle speed of 10-12 mph is reached, move transmission control lever into F–1 HIGH RANGE position (fig. 13).

Caution: Do not place transmission control lever into F–2 or into any LOW RANGE position.

(5) If engine fails to start within a reasonably short distance, determine cause and correct.

b. TOWING DISABLED VEHICLE. Before towing a disabled vehicle, place transmission lever into N position, and transfer lever into DOWN-NEUTRAL position in the disabled vehicle. Driver of the towing vehicle must keep in mind that brakes on the disabled vehicle may be less effective than normal, since air pressure may be reduced or depleted.

c. USE OF PINTLE (fig. 16). To open pintle, pull lock pin from upper half of pintle. Pull trigger handle rearward and at same time, pull up on upper half of pintle. To close, push upper half down against pintle hook. Latch will automatically engage. Insert chained cotter pin in hole in latch.

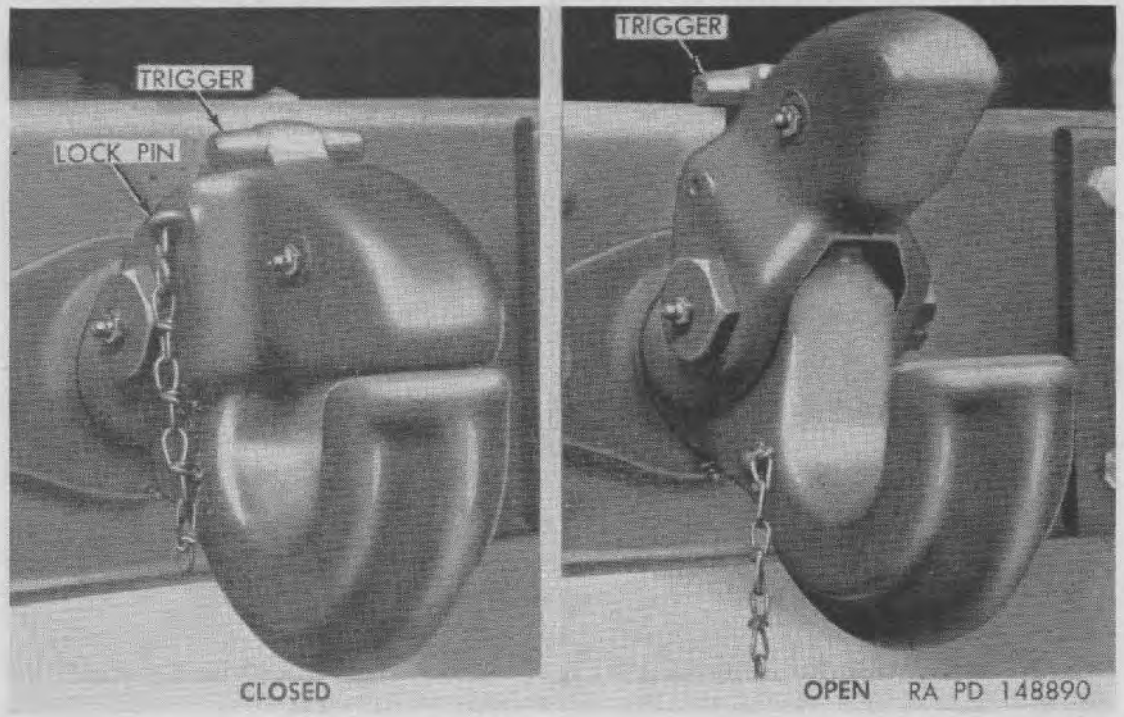

Figure 16. Pintle operating positions.

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

44. Winch Description

The winch assembly, mounted at front of some trucks, is operated by a power-take-off on tranfer through drive shafts. Winch can be used as explained in paragraph 45 below. For complete description of winch, refer to paragraph 284.

45. Winch Controls

a. POWER-TAKE-OFF LEVER. The engagement of the power-take-off which drives winch is obtained by means of a lever, located under right side of driver's seat. Lever operates up and down in a three position slot. Positions of the lever are marked on lever handle plate and are also indicated on winch instruction plate (fig. 17). These positions are—

(1) *DOWN-FORWARD.* With lever in this position, cable can be wound in on drum as when pulling load (par. 46*b*).

(2) *CENTER-NEUTRAL.* With lever in center position or NEUTRAL, winch is inoperative (except for unwinding cable at winch) (par. 46*d*).

(3) *UP-REVERSE.* With lever in this position, winch cable can be unwound under load (par. 46*c*).

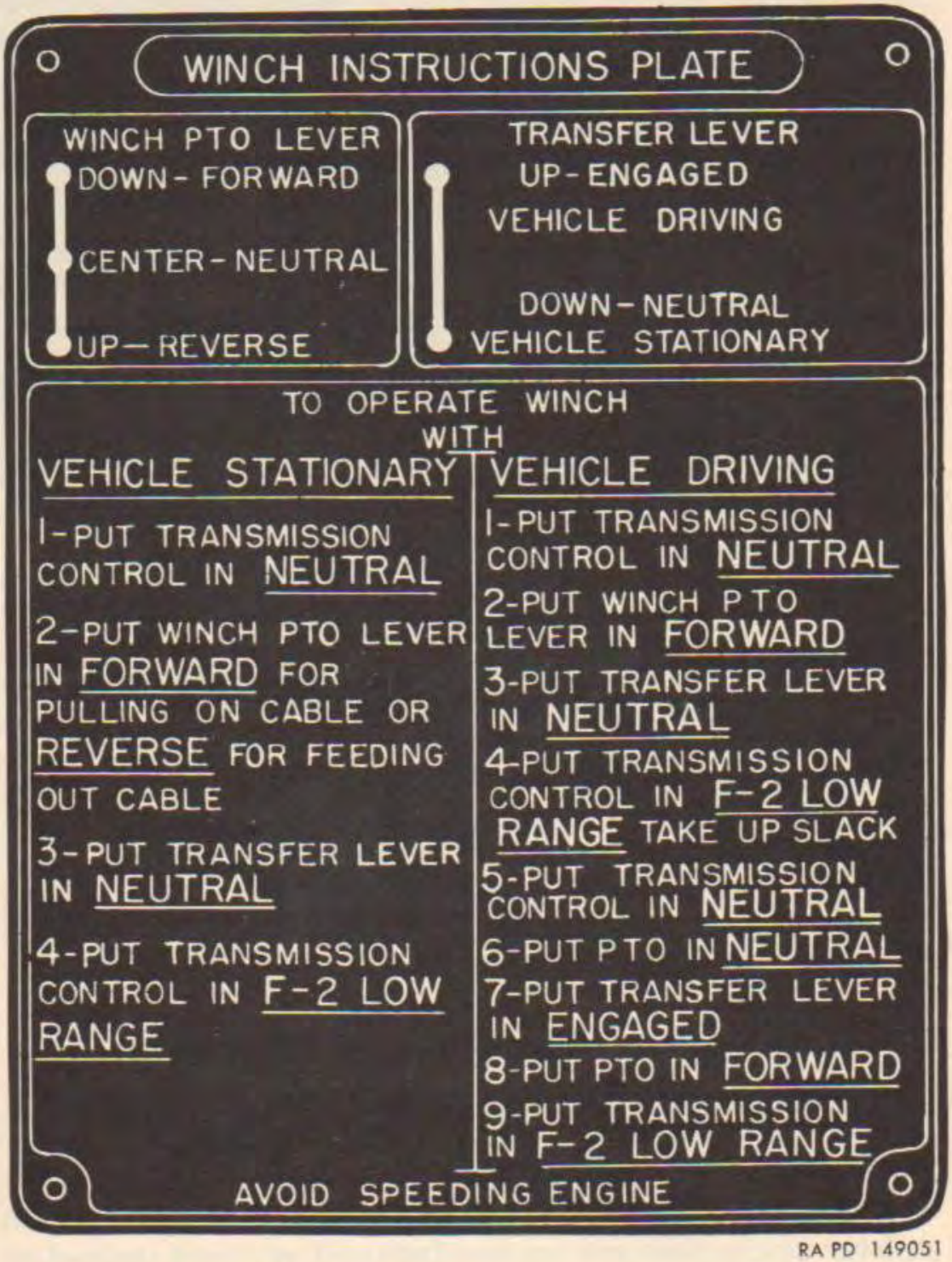

Figure 17. Winch instruction plate.

b. CONTROLS AT WINCH.

(1) *Drum clutch lever.* Hand operated lever, located at right side of winch (fig. 18), is used to engage or disengage winch drum from power-take-off drive shaft. Pulling the lever away from winch engages drum. Pushing lever in toward winch disengages drum.

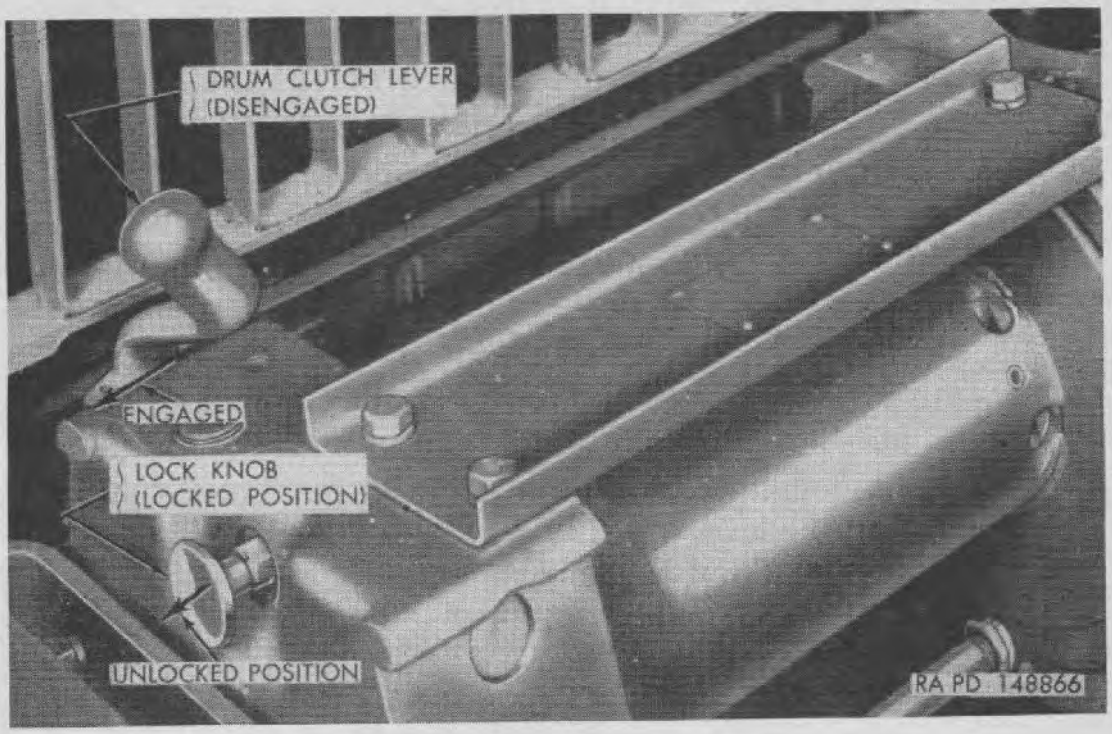

Figure 18. Controls at winch.

(2) *Lock knob.* Lock knob, on right side of winch frame (fig. 18), locks drum to prevent cable unwinding, as when under way. Knob is pulled out and turned one-quarter turn to disengage drum. To again engage drum, turn knob one-quarter turn and release. Inner end of lock engages one of several holes in drum.

(3) *Automatic controls.* An automatic safety brake in winch mechanism will sustain a load while power-take-off lever is being positioned. A drag brake will prevent drum from over-running cable when cable is being pulled from drum.

46. Winch Operation

a. VEHICLE IN MOTION (WINCH NOT IN USE).

(1) Place power-take-off lever into NEUTRAL.

(2) Push drum clutch lever at winch (fig. 18) in toward winch drum (disengaged postion). Winch will not operate with lever in this position.

(3) Make sure that lock knob (fig. 18) is in, engaging drum (locked position). Cable will not unwind with lock knob in this position.

b. PULLING LOAD (WINDING IN CABLE).

(1) *With vehicle stationary.*

(*a*) Pull out lock knob at winch (fig. 18) and rotate one-quarter turn to disengaged position (knob out).

(*b*) Pull drum clutch lever (fig. 18) outward as far as possible (away from winch drum).

(*c*) Lower transfer lever to DOWN-NEUTRAL position. Apply parking brake firmly. Move transmission control lever to N (neutral) position. Start engine.

(*d*) Lower power-take-off lever to DOWN-FORWARD position. With engine idling, move transmission control lever to F–2 LOW RANGE position.

(*e*) Use hand throttle to accelerate engine to not over one-third throttle (aprx 1,200 rpm), to pull in cable.

(*f*) Automatic brake, incorporated in winch, will hold load if engine speed is reduced to slow idle or if power-take-off lever is shifted into CENTER-NEUTRAL position.

Note. Winch delivers maximum power with first layer wound on drum. Under many conditions, this is not possible; however, pay out as much cable from drum as possible before starting to pull.

(2) *Winching out vehicle (with driving wheels assistance).*

(*a*) At winch, pull out lock knob and rotate one-quarter turn to unlocked position (fig. 18). Pull drum clutch lever outward as far as possible (away from winch drum).

(*b*) Place transmission control lever in N (neutral). Start engine.

(*c*) Place power-take-off lever in DOWN-FORWARD position.

(*d*) Place transfer lever in DOWN-NEUTRAL position.

(*e*) With engine idling, move transmission control lever to F–2 LOW RANGE position. Accelerate engine enough to take up slack in cable. Reduce engine speed to idle, move transmission control lever to N (neutral), and raise power-take-off lever to CENTER-NEUTRAL position.

(*f*) Raise transfer lever to UP-ENGAGED position, place power-take-off lever in DOWN-FORWARD position,

then move transmission control lever to F–2 LOW RANGE. With hand throttle, accelerate engine (not over one-third throttle) to pull in cable, at the same time providing driving wheels assistance. Avoid speeding the engine.

c. PAYING OUT LOAD (UNWINDING CABLE UNDER LOAD).

(1) Paying out or unwinding cable under load should be accomplished in the cab.

(2) At winch (fig. 18), pull out lock knob and rotate one-quarter turn to hold in unlocked position. Pull drum clutch lever as far as possible away from winch drum (engaged position).

(3) Place transmission control lever in N (neutral). Start engine.

(4) Place transfer lever in DOWN-NEUTRAL position. Place power-take-off lever in UP-REVERSE position.

(5) With engine idling, place transmission control lever into F–2 LOW RANGE.

(6) Accelerate engine (not over one-third throttle) to pay out cable.

Note. Cable can also be payed out with power-take-off lever in DOWN-FORWARD position by placing transmission control lever in R (reverse), either in HIGH RANGE or LOW RANGE.

d. UNWINDING CABLE AT WINCH. Push drum clutch lever in toward winch drum (disengaged position). Pull out lock knob and rotate one-quarter turn to unlocked position. Place power-take-off lever in CENTER-NEUTRAL position. Pull out necessary cable from drum. Drag brake will keep drum from spinning.

e. WINDING CABLE AFTER USE.

(1) *From cab.*

(*a*) At winch (fig. 18), pull out lock knob and rotate to unlocked position (knob out). Pull drum clutch lever outward as far as possible away from winch drum (engaged position).

(*b*) Attach end of cable to suitable anchor to provide tension on entire cable while winding in.

(*c*) Place transmission control lever in N (neutral), then start engine.

(*d*) Lower transfer lever to DOWN-NEUTRAL. Lower power-take-off lever to DOWN-FORWARD.

(*e*) With engine idling, move transmission control lever to F–2 LOW RANGE.

(*f*) Apply light pressure to brake pedal, and accelerate engine (not over one-third throttle) to wind in cable to insure a tight, neat wind.

(2) *At winch.*

(*a*) Apply tension to cable by attaching end to a moveable object heavy enough to maintain a tension. If too much tension is applied, drum clutch lever cannot be disengaged while winch drum is turning.

(*b*) At winch, push drum clutch lever as far as possible toward winch drum (disengaged position). Pull out lock knob and rotate to disengaged position (knob out).

(*c*) With transmission control lever in N (neutral), start engine.

(*d*) Lower transfer lever to DOWN-NEUTRAL. Apply parking brake firmly. Lower power-take-off lever to DOWN-FORWARD position.

(*e*) Lock hand throttle to desired speed (not over one-third throttle.

(*f*) At winch, wind in cable by means of drum clutch lever. Pull lever outward to engage winch drum. Push lever toward winch to disengage winch drum.

Note. Cable should not be rewound on drum after use without some tension on cable. Winding on first layer of cable is particularly important. Coils of cable must be tight against each other to prevent coils on next layer pressing down between preceding coils. Wind cable evenly and slowly on drum. Do not handle cable with bare hands. Use gloves or a bar to guide cable evenly on drum.

47. Fire Extinguisher

a. GENERAL. Fire extinguisher is mounted inside cab at right-hand side below instrument panel (fig. 8). Fire extinguisher is liquid type, charged with carbon tetrachloride.

b. OPERATION. Remove fire extinguisher from bracket. Turn to left to unlock, then pump handle in and out. Direct spray at source of flame. Put out one section of fire completely before attempting to extinguish another.

Caution: Action of carbon tetrachloride on flame produces a toxic gas; avoid exposure to fumes.
Refill extinguisher immediately after use.

c. REFILLING. Check quantity of liquid in fire extinguisher by locking handle, then shaking. Extinguisher must be completely full at all times. Remove plug and gasket from top of

extinguisher. Using funnel, fill extinguisher completely with carbon tetrachloride; then install gasket and plug. Do not use water or liquids other than fire extinguisher liquid. Container and funnel must be clean and free from moisture, since extinguisher liquid and water combine into a liquid highly corrosive to interior mechanism of extinguisher.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

48. General Conditions

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

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

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

c. Refer to paragraphs 60 to 63 inclusive for lubrication under unusual conditions, to table III paragraph 67 for preventive maintenance checks, and to chapter 3, section XXXV, for maintenance procedures.

d. When chronic failure of matériel results from subjection to extreme conditions, report of the condition should be made on DA AGO Form 468 (par. 2*d*).

49. Extreme-Cold Weather Conditions

a. General Problems.

(1) Extensive preparation is necessary of matériel scheduled for operation in extreme cold weather. Generally, extreme cold will cause lubricants to thicken or congeal, freeze batteries, or prevent them from furnishing sufficient current for cold weather starting, crack insulation,

and cause electrical short circuits, prevent fuels from vaporizing and properly combining with air to form a combustible mixture for starting, and will cause the various construction materials to become hard, brittle, and easily damaged or broken.

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

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

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

c. FUELS, LUBRICANTS, AND ANTIFREEZE COMPOUNDS (STORAGE, HANDLING, AND USE). The operation of equipment at arctic temperatures will depend to a great extent upon the condition of the fuels, lubricants, and antifreeze compounds used in the equipment. Immediate effects of careless storage and handling or improper use of these materials are not always apparent, but any deviation from proper procedures may cause trouble at the least expected time. Refer to SB 9–16 for detailed instructions.

50. Extreme Cold Weather Operation

a. GENERAL.

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

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

(3) Constantly note instrument readings. If temperature gage reading quickly exceeds 220° F, stop the vehicle and investigate the cause.

b. AT HALT OR PARKING.

(1) When halted for short shutdown periods, the vehicle should be parked in a sheltered spot out of the wind. If no shelter is available, it will be helpful to park so that the vehicle engine does face into the wind. For long shutdown periods, park on high ground or in most desirable position available; if high dry ground is not available, effort should be made to prepare a footing of planks or brush. Chock in place if necessary.

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

(3) Clean all parts of the vehicle of snow, ice, and mud as soon as possible after operation. Refer to table III paragraph 67 for detailed after-operation procedures. If the winter front and side covers are installed, be sure to protect all parts of the engine and engine accessories against entrance of loose, drifting snow during the halt. Cover and shield the vehicle but keep the ends of the canvas paulins off the ground to prevent them from freezing to the ground.

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

(5) Refuel immediately in order to reduce condensation in the fuel tanks.

51. Extreme Hot Weather Operation

a. GENERAL. Operate vehicle at maximum engine speed to maintain maximum air, oil, and water circulation. Continuously watch the temperature gage and halt the vehicle for a cooling-off period whenever necessary and the tactical situation permits. Do not stop engine to cool it off; run at fast idle to maintain good air, oil, and water circulation. Make frequent inspections and servicing of cooling unit, oil filter, and air cleaner. If the engine temperature consistently rises above 220° F, look for dust, sand, or insects in radiator fins and blow out any accumulation with compressed air or water under pressure. Flush cooling system if necessary.

b. AT HALT OR PARKING.

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

(2) Cover inactive vehicles with paulins if no other suitable shelter is available. Where entire vehicle cannot be covered, protect windshields, windows, and radiator against etching by sand, and protect engine compartment against entry of sand. Head vehicle into wind.

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

52. Operation on Unusual Terrain

a. GENERAL.

(1) Vehicle operation on snow or ice and in deep mud requires the use of tire chains. Chains must be installed in pairs (front and rear) to prevent power-train damage and wear. Select a transmission range, depending on terrain and grade, to permit getting vehicle in motion with minimum throttle. Avoid use of maximum throttle, as this may cause vehicle to spin and "dig-in."

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

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

(4) Operation in sand requires daily cleaning of air cleaners and fuel and oil filters.

(5) At high altitudes, coolant in vehicles boils at proportionately lower points than 212° F, thus it will be

necessary to keep a close watch on the engine temperature during the summer months.

b. AFTER-OPERATION PROCEDURES. Clean all parts of the vehicle of snow, ice, mud, dust, and sand as soon as possible after operation. Particular care should be taken to remove collections of ice, snow, and mud from the wheels, radiator core, engine components, steering knuckles and arms, brake cylinder boots and hoses, crankcase breather oil filters, air cleaners, and electrical connections.

Caution: Remove large collections of ice, caked mud, etc, from under fenders where accumulated.

53. Fording Operation

a. GENERAL. In fording, vehicles may be subjected to water varying in depth from only a few inches to depths sufficient to completely submerge the vehicle. Factors to be considered are spray-splashing precautions, normal fording capabilities, deep water fording using fording kits, and accidental complete submersion.

b. NORMAL FORDING. Fording of bodies of water up to maximum vehicle fording depth of 60 inches is based on the standard vehicle with water-proofing protection privided for critical units when manufactured but without deep water fording kit.

Caution: Fording to maximum depth (60 in) should be undertaken only for brief periods or short distances. If water over 30-inches deep is to be forded repeatedly or for extended periods, fording kit should be used.
Observe the following precautions:

(1) Do not exceed the known fording limits of the vehicles.

(2) The engine must be operating satisfactorily before attempting to ford.

(3) Shift transmission control lever into F-2 LOW RANGE. Enter the water at low engine speed. After submersion, increase engine speed. Should the engine stall while submerged, it may be started in the usual manner.

(4) All normal fording should be at speeds of from 3 to 4 mph to avoid forming a "bow wave." Brake efficiency will be decreased after emergence. Applying the brakes a few times will help dry out the brake linings after dry land has been reached.

(5) If accidental complete submersion occurs, the vehicle will be salvaged, temporary preservation applied as out-

lined in paragraph 62 and then sent to the ordnance maintenance unit as soon as possible for necessary permanent maintenance.

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

d. AFTER-FORDING OPERATION. Immediately after a vehicle emerges from the water, if the tactical situation permits, accomplish maintenance operations listed in paragraph 294.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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

54. General

Tools, equipment, and spare parts are issued to the using organization for maintaining the matériel. Tools and equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored in the chest and/or roll provided for them. Spare parts are supplied to the using organization for replacement of those parts likely to become worn, broken, or otherwise unserviceable providing such operations are within the scope of organizational maintenance functions. Spare parts, tools, and equipment supplied for the 2½-Ton 6 x 6 Cargo Truck M135 will be listed in Department of Army Supply Catalog ORD 7 SNL G-749, which is the authority for requisitioning replacements (this catalog is not yet available; see par. 5*b*).

55. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this matériel will be listed for issue by the ORD 7 catalog and by TIA and T 10 & E.

56. Special Tools and Equipment

Certain tools and equipment (fig. 19) specially designed for organizational maintenance, repair, and general use with the matériel are listed in table II for information only. This list is not to be used for requisitioning replacements.

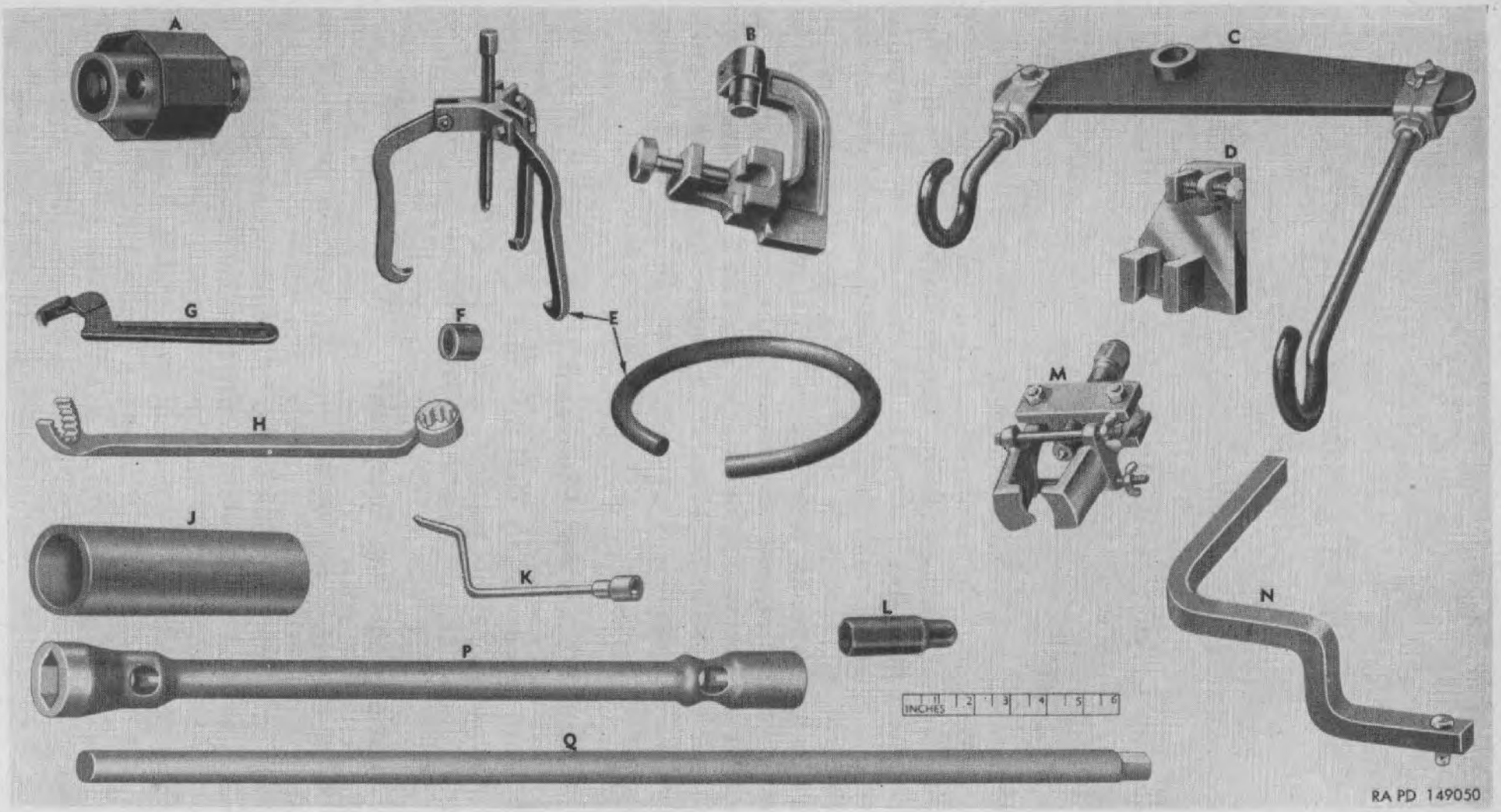

Figure 19. Special tools and equipment for organizational maintenance.

A—WRENCH—7950169

B—GAGE—7950058

C—SLING—7950170

D—TOOL—7950171

E—PULLER—41-P-2954

F—ADAPTER—7950054

G—WRENCH—41-W-3249-900

H—WRENCH—41-W-3297-760

J—REPLACER—7950063

K—TOOL—7950060

L—WRENCH—41-W-3335-30

M—PULLER—41-P-2952

N—FIXTURE—7950168

P—WRENCH—41-W-3838-40

Q—HANDLE—41-H-1541-10

Figure 19—Continued.

Table II. Special Tools and Equipment for Organizational Maintenance

Item	Identifying number	References		Use
		Fig	Par	
ADAPTER, steering wheel puller.	7950054	19, 152	251	Use with PULLER 41-P-2954.
FIXTURE, gaging, transmission throttle valve.	7950168	19, 103	178	For setting transmission throttle valve lever.
GAGE, exhaust-valve-cap clearance.	7950058	19, 32	96 *d*	For checking exhaust-valve-stem-to-rotation-cap clearance.
HANDLE, wheel brg adj and wheel stud nut wrench, diam $\frac{3}{4}$ in, lgh 30 in.	41-H-1541-10	19	239, 245	Handle used with wheel nut WRENCH 41-W-3838-40 and wheel bearing nut WRENCH.
PULLER, steering gear arm, univ type.	41-P-2952	19, 151	250	For removing pitman arm.
PULLER, steering wheel, univ type.	41-P-2954	19, 152	251	For removing steering wheel.
REPLACER, oil seal sleeve (axle).	7950063	19, 146	245	For installing oil seal sleeve on front and rear axles.
SLING, engine lifting	7950170	19, 40	100, 102, 105	For replacing power plant.
TOOL, bending	7950171	19	178	For bending transmission throttle valve lever.
TOOL, brake spring	7950060	19, 131, 132	221	For replacing brake shoe return springs.
WRENCH, spanner, hook, adj, diam of circle range $\frac{3}{4}$ to 2 in.	41-W-3249-900	19, 78	100, 102, 105, 135, 137	For disconnecting and connecting wiring harness connectors.
WRENCH, spark plug, conduit nut (hi-tension) dble end.	41-W-3297-760	19, 53, 54	109	For disconnecting and connecting spark plug cables.
WRENCH, spark plug, sgle-hd socket, hex, size of opng $\frac{27}{32}$ in.	41-W-3335-30	19, 54	109	Use with WRENCH—7083301 for replacing spark plugs.
WRENCH, wheel stud nut, dble-hd socket, hex, and sq, size of opngs hex $1\frac{1}{2}$ in, sq $\frac{13}{16}$ in, lgh $18\frac{3}{8}$ in.	41-W-3838-40	19	239	Use with HANDLE 41-H-1541-10 for removing wheel nuts.
WRENCH, wheel bearing nut	7950169	19	244, 245, 246	For replacing wheel bearing nuts.

Section II. LUBRICATION AND PAINTING

57. Lubrication Chart

The lubrication instructions in the chart illustrated in figures 20A and 20B prescribe cleaning and lubricating procedures as to locations, intervals, and proper materials for this vehicle. That lubrication which is to be performed by ordnance maintenance personnel is listed on the chart in the notes. The chart in figures 20A and 20B will be used until such time as an official lubrication order is prepared and printed; when available, the official lubrication order will be distributed automatically to personnel concerned.

58. General Lubrication Instructions

a. USUAL CONDITIONS. Service intervals specified on the lubrication chart are for normal operation and where moderate temperature and atmospheric conditions prevail.

b. LUBRICATION EQUIPMENT. Each vehicle is supplied with lubrication equipment adequate for its maintenance. Clean this equipment both before and after use. Operate the lubricating guns carefully and in such a manner as to insure a proper distribution of the lubricant.

c. POINTS OF APPLICATION.

(1) Lubricating fittings, lever, filler, and drain plugs, and other points of application are shown in figures 21 through 27 and are referenced to the lubrication order. Wipe these devices and the surrounding surfaces clean before and after lubricant is applied.

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

d. REPORTS AND RECORDS.

(1) Report unsatisfactory performance of prescribed petroleum fuels, lubricants, or preserving materials, using DA AGO Form 468, Unsatisfactory Equipment Report.

(2) Maintain a record of lubrication of the vehicle on DA AGO Form 461, Work Sheet for Wheeled and Half-Track Vehicles—Preventive Maintenance Service and Technical Inspection.

TRUCK, CARGO, 2½-TON, 6x6, M135

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

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

		Lubricant	Interval
F, Fig 21	**Winch Shaft Shear Pin** (See Note 11) (Some Models)	PL	1
G, Fig 21	**Winch Shaft Universal Joint and Slip Joint** (Some Models)	CG	1
AE, Fig 27	**Air Compressor Governor** (See Note 13)	PL	1
WW, XX, Fig 26	**Front Wheel Bearings** (See Note 8)	WB	A
X, Fig 23	**Shock Absorbers** (Check Level)	LO	A
N, Fig 22	**Crankcase Drain** (Drain and Refill—Cap. 11 qts.) (See Note 2)		S
PP, Fig 25	**Steering Gear Drain** (Drain and Refill—Cap. 1½ pts.) (See Note 5)		A
NN, Fig 25	**Steering Gear Fill and Level** (Check Level)	GO	W

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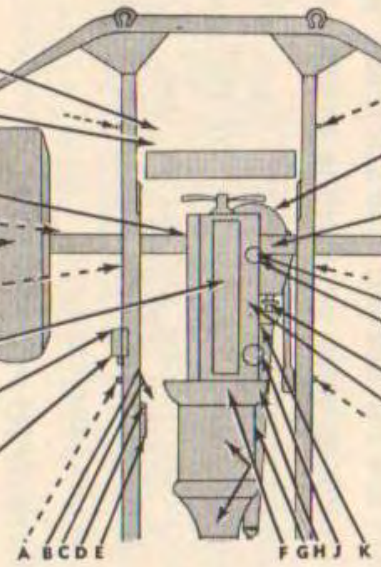

Interval	Lubricant			
1	CG	**Spring Shackle**		W, Fig 23
W	GO	**Front Axle Differential Fill and Level** (Check Level)		AA, Fig 23
A		**Front Axle Differential Drain** (Drain and Refill—Cap. 15½ pts.) (See Note 5)		BB, Fig 23
1	CG	**Universal Joint and Steering Knuckle** (Check Level) (See Note 7)		Y, Z, Fig 23
—	OE	**Crankcase Fill**		L, Fig 22
D	OE	**Crankcase Breather** (See Note 1)		M, Fig 22
1	CG	**Universal Joint**		TT, Fig 25
6		**Distributor** (See Note 4)		S, T, U, Fig 22

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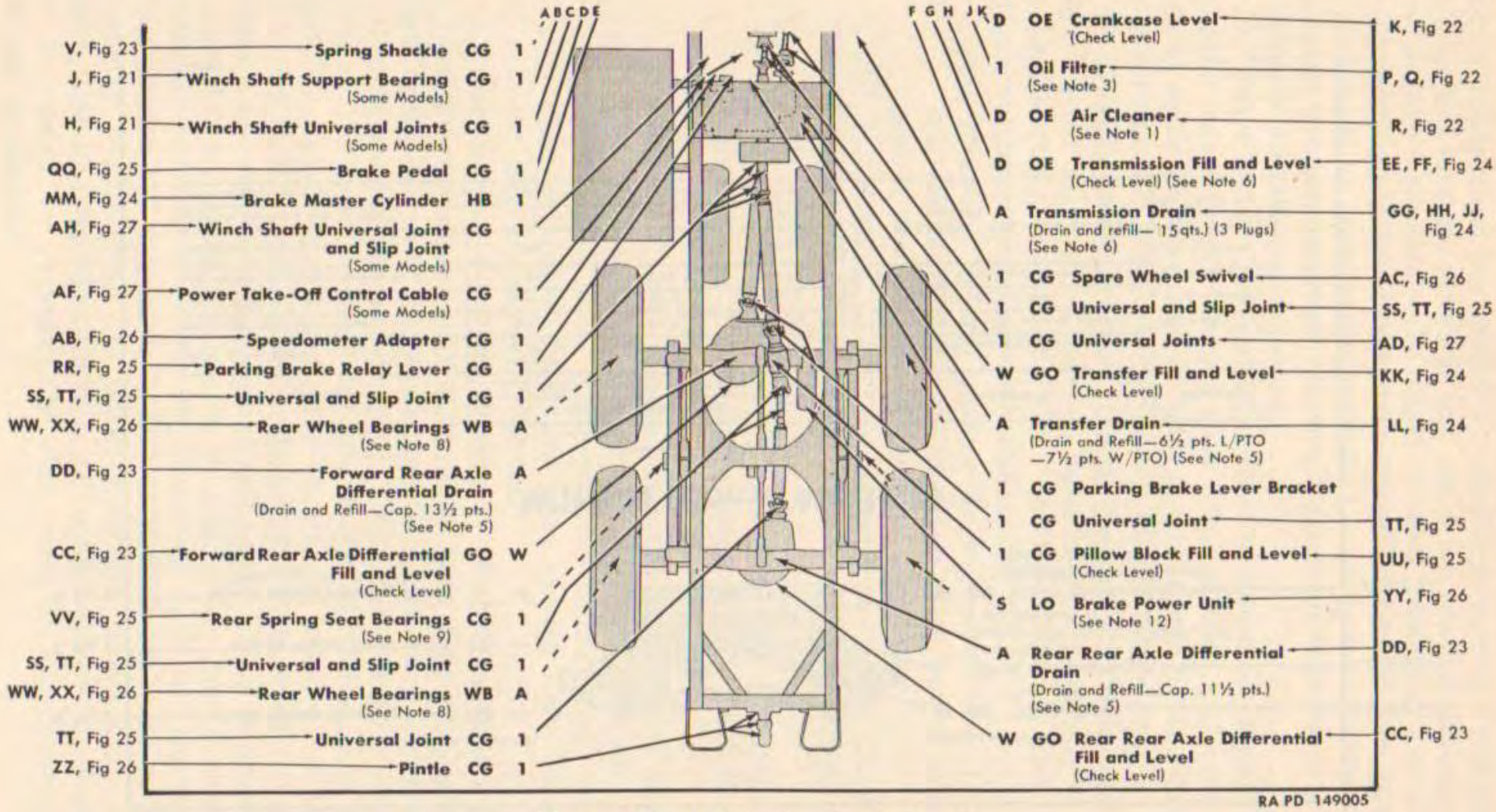


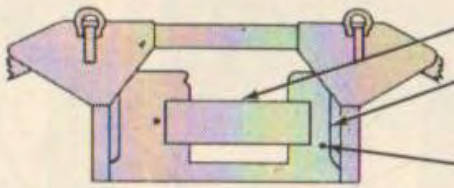
Figure 20A. Lubrication chart—front.

Lubricant • Interval

D, Fig 21 → **Winch Worm Housing Level** GO W
(Check Level)

B, Fig 21 → **Winch Worm Housing Fill** GO —

E, Fig 21 → **Winch Worm Housing Drain** A
(Drain and Refill—Cap. 1¼ pts.)
(See Note 5)



Interval • Lubricant

W OE **Winch Cable** → AG, Fig 27
(Some Models) (See Note 10)

A **Winch End Bearing Frame Housing Drain** → C, Fig 21
(Some Models) (Drain and Refill—Cap. 1 pt.) (See Note 5)

W GO **Winch End Bearing Frame Housing Fill and Level** → A, Fig 21
(Some Models) (Check Level)

WINCH (Some Models)

KEY

LUBRICANTS	EXPECTED TEMPERATURES				LUBRICANTS	INTERVALS
	Above +32° F	+40° F to −10° F	0° F to −65° F			
OE—OIL, lubr, engine	OE 30 or NS 9250	OE 10 or NS 9110	OES	For Artic Operation Refer to TM-9-2855	OES—OIL, lubr, engine, sub-zero	D—Daily
GO—LUBRICANT, gear, universal	GO 90	GO 90	GOS		GOS—LUBRICANT, gear, universal, sub-zero	W—Weekly
CG—GREASE, lubr, general purpose	CG 1	CG 0	OG 00		OG—GREASE, lubr, Ord. Dept.	S—Semi-annually
WB—GREASE, lubr, general purpose No. 2	WB	WB	OG 00		HBA—FLUID, hydraulic brake, arctic	A—Annually
HB—FLUID, hydraulic brake	HB	HB	HBA		CW—LUBRICANT, chain, exposed gear and wire rope	1—1,000 Miles 6—6,000 Miles 12—12,000 Miles
LO—OIL, lubricating, light	LO	LO	LO			
PL—OIL, lubr, preservative	PL (Med)	PL (Special)	PL (Special)			

NOTES

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

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

3. OIL FILTER—Every 1,000 miles, remove plug in bottom of shell and drain sediment. Install plug. Run engine a few minutes and check oil level. Every 6,000 miles, or semiannually while crankcase is being drained, remove element, drain and clean inside of shell and install new element.

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

5. GEAR CASES (EXCEPT TRANSMISSION)—Drain every 12,000 miles or annually. Drain only after operation. Fill to plug level before operation.

6. TRANSMISSION—Start engine and run for 3 to 5 minutes at idling speed with transmission lever in "N" (neutral) position before checking fluid level. If engine has been run previously, and is at operating temperature, level should be at "HOT FULL" mark on gage (dipstick). If engine is not at operating temperature level should be at "COLD." Replenish fluid while engine is running at idle speed and transmission lever is in "N" (neutral) position. Bring fluid level up to gage marking as above. CAUTION: DO NOT OVERFILL. Every 12,000 miles, or annually, remove flywheel housing underpan, then remove pipe plug from torus cover, also remove plug at bottom of case marked "OIL" and plug at rear of case. Reinstall plugs and flywheel housing underpan. Pour 10 quarts of oil (OE-10) into case, or when temperature of +10°F or below is expected use (OES). Start engine and operate at idle speed for 3 to 5 minutes with transmission lever in "N" neutral, then add sufficient fluid (approximately 5 quarts) to bring level up to "COLD" mark on gage.

7. FRONT AXLE UNIVERSAL JOINTS AND STEERING KNUCKLES—Remove plug on front side of steering knuckle support, apply lubricant to grease fitting in bottom of spherical surface at outer end of axle housing until lubricant reaches level of the plug opening. Replace plug. Every 12,000 miles or annually, remove, clean, dry, inspect and relubricate.

8. WHEEL BEARINGS—Every 12,000 miles or annually, remove, clean, dry and repack.

9. REAR SPRING SEAT BEARINGS—Apply lubricant through fitting until new lubricant is forced past seal at inner side of seat.

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

11. WINCH DRIVE SHAFT SHEAR PIN—Every 6,000 miles, or semiannually, remove shear pin, remove universal joint from shaft, clean, dry, and coat shaft and inside of universal joint with PL (Special) to prevent rusting.

12. BRAKE POWER UNIT—Remove pipe plug at rear of cylinder shell and fill (approximately 3 oz) to plug level with LO.

13. AIR COMPRESSOR GOVERNOR—Remove two slotted plugs at top of air compressor governor and apply 3 or 4 drops of PL. Install plugs.

14. OIL CAN POINTS—Monthly or every 1,000 miles lubricate carburetor linkage, transmission control linkage, transfer control linkage, starter control linkage, brake pedal linkage, parking brake linkage and pivot points with PL.

15. DO NOT LUBRICATE—Springs, Shock Absorber Links, and Torque Rods.

16. LUBRICATED AT TIME OF DISASSEMBLY BY ORDNANCE PERSONNEL —Starter, generator, and speedometer flexible shaft.

RA PD 149045

Figure 20B. Lubrication chart—rear.

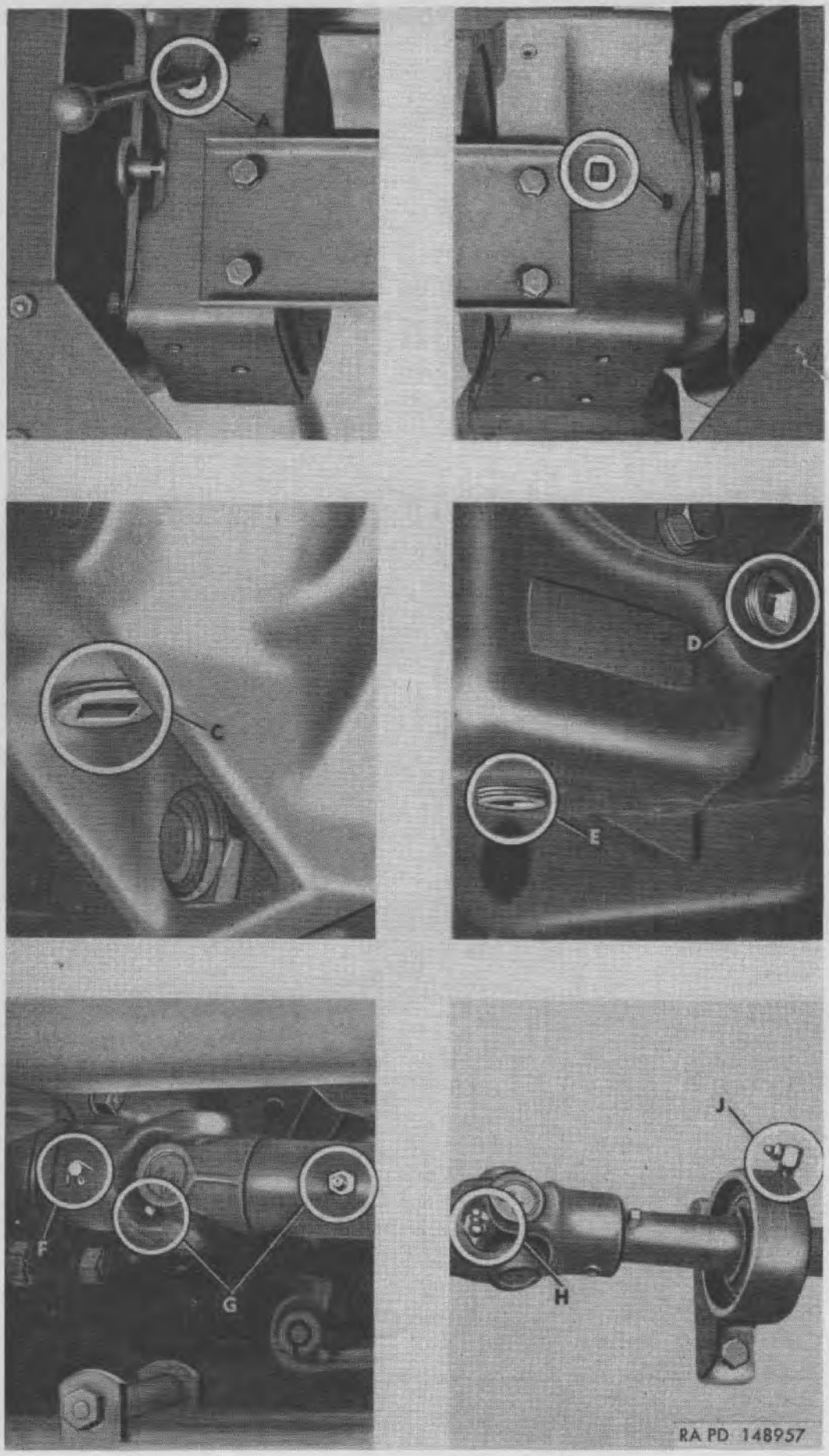

Figure 21. Localized lubrication views (points A through J).

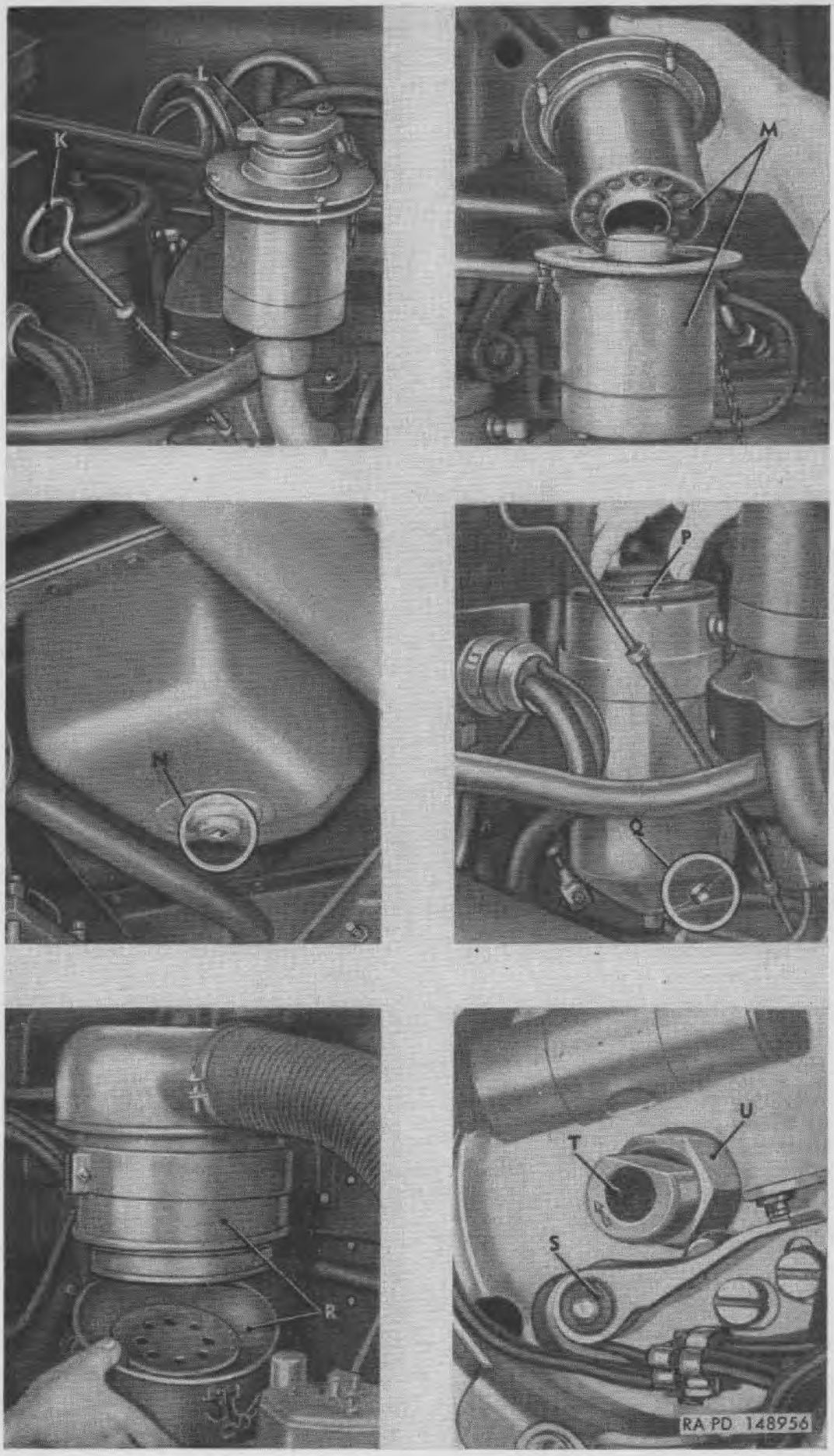

Figure 22. Localized lubrication views (points K through U).

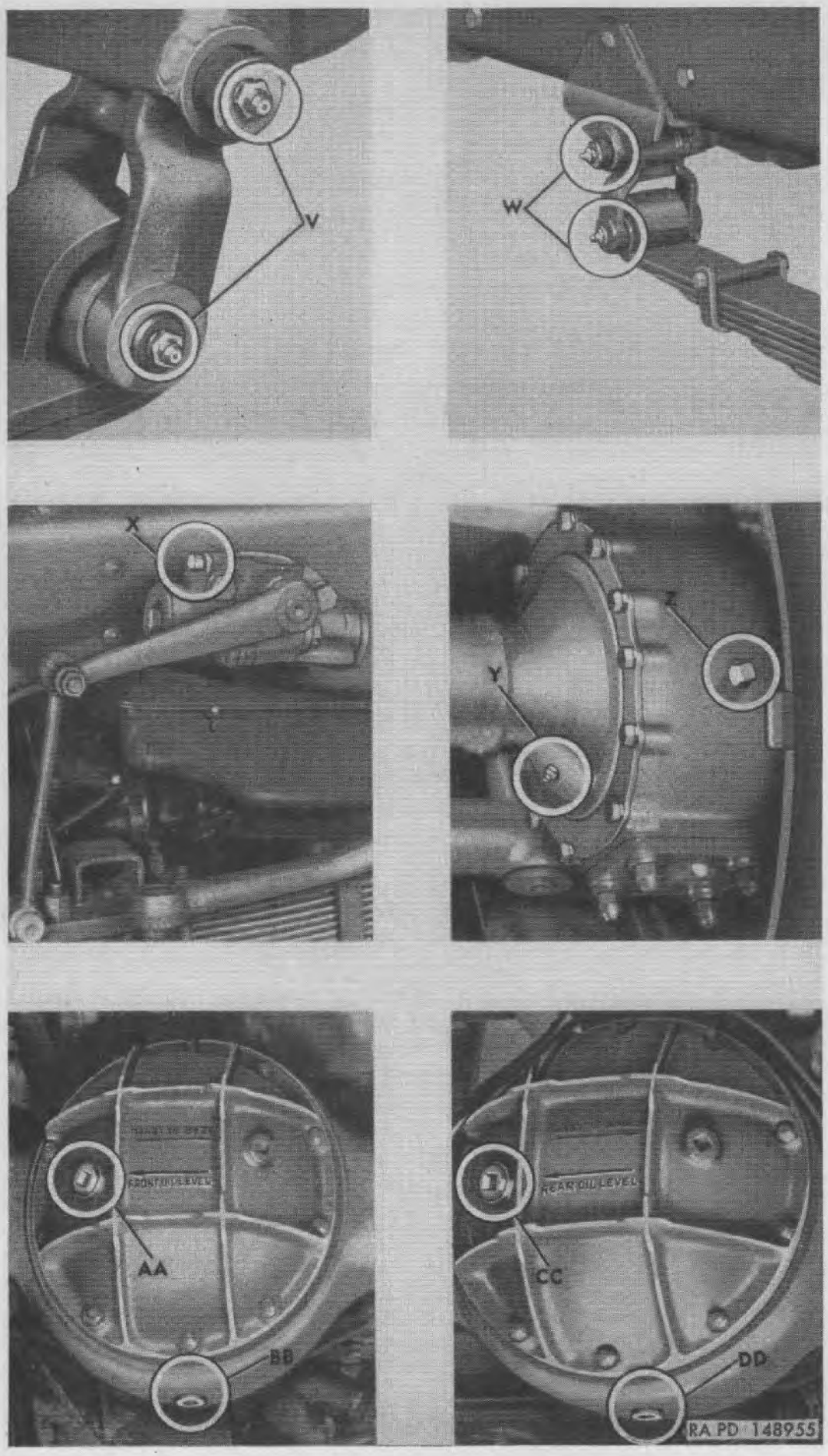

Figure 23. Localized lubrication views (points V through DD).

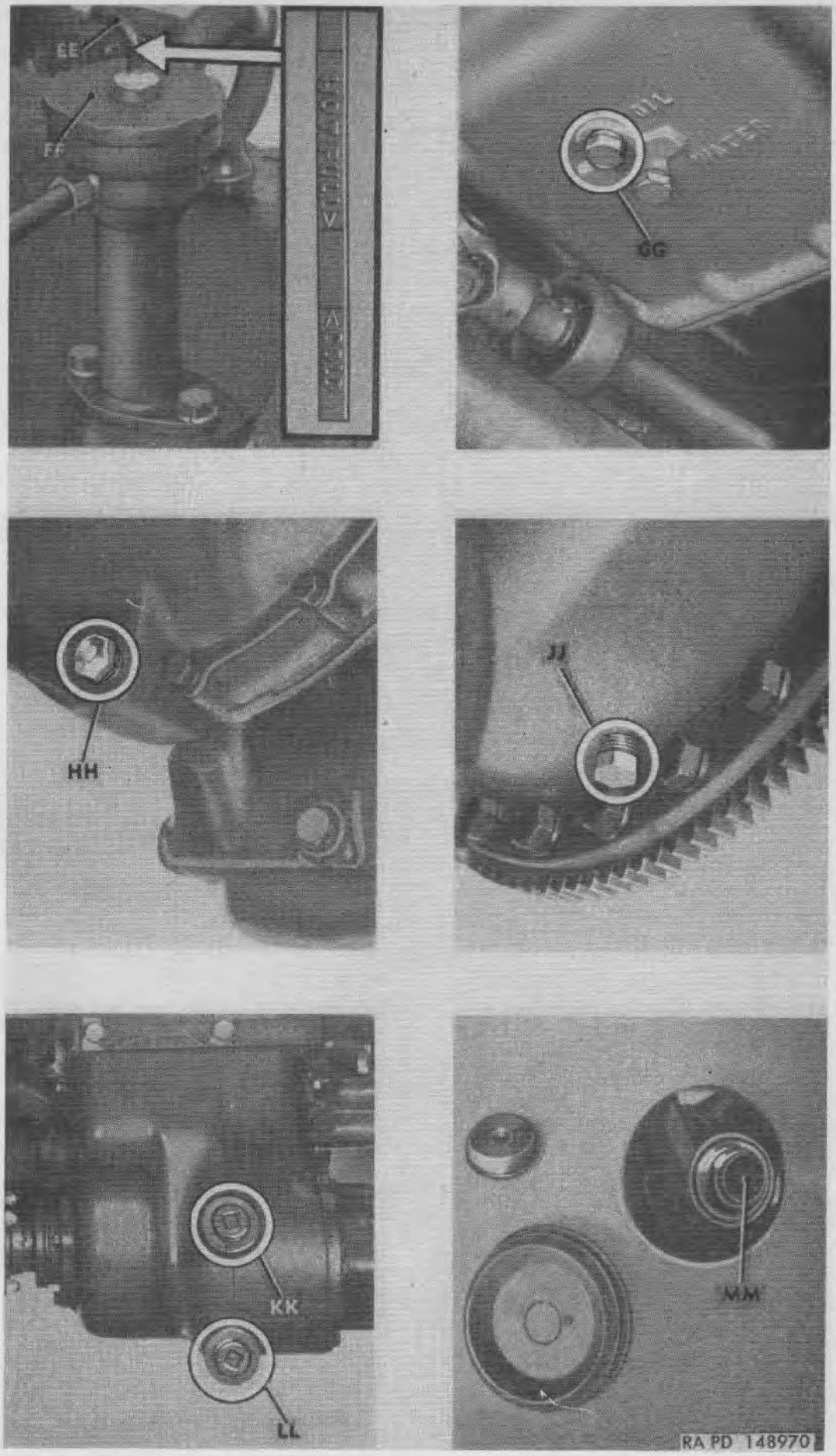

Figure 24. Localized lubrication views (points EE through MM).

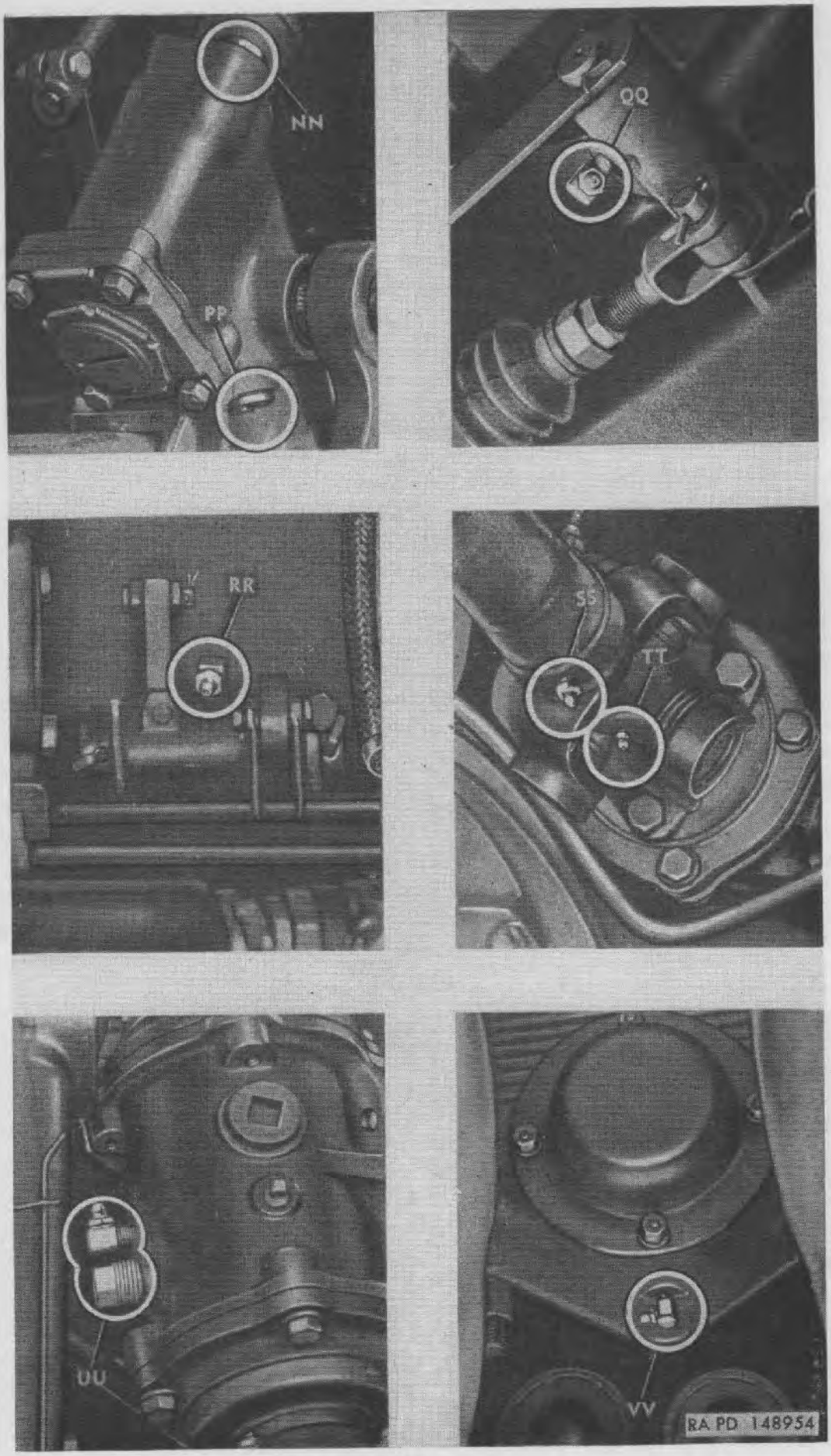

Figure 25. Localized lubrication views (points NN through VV).

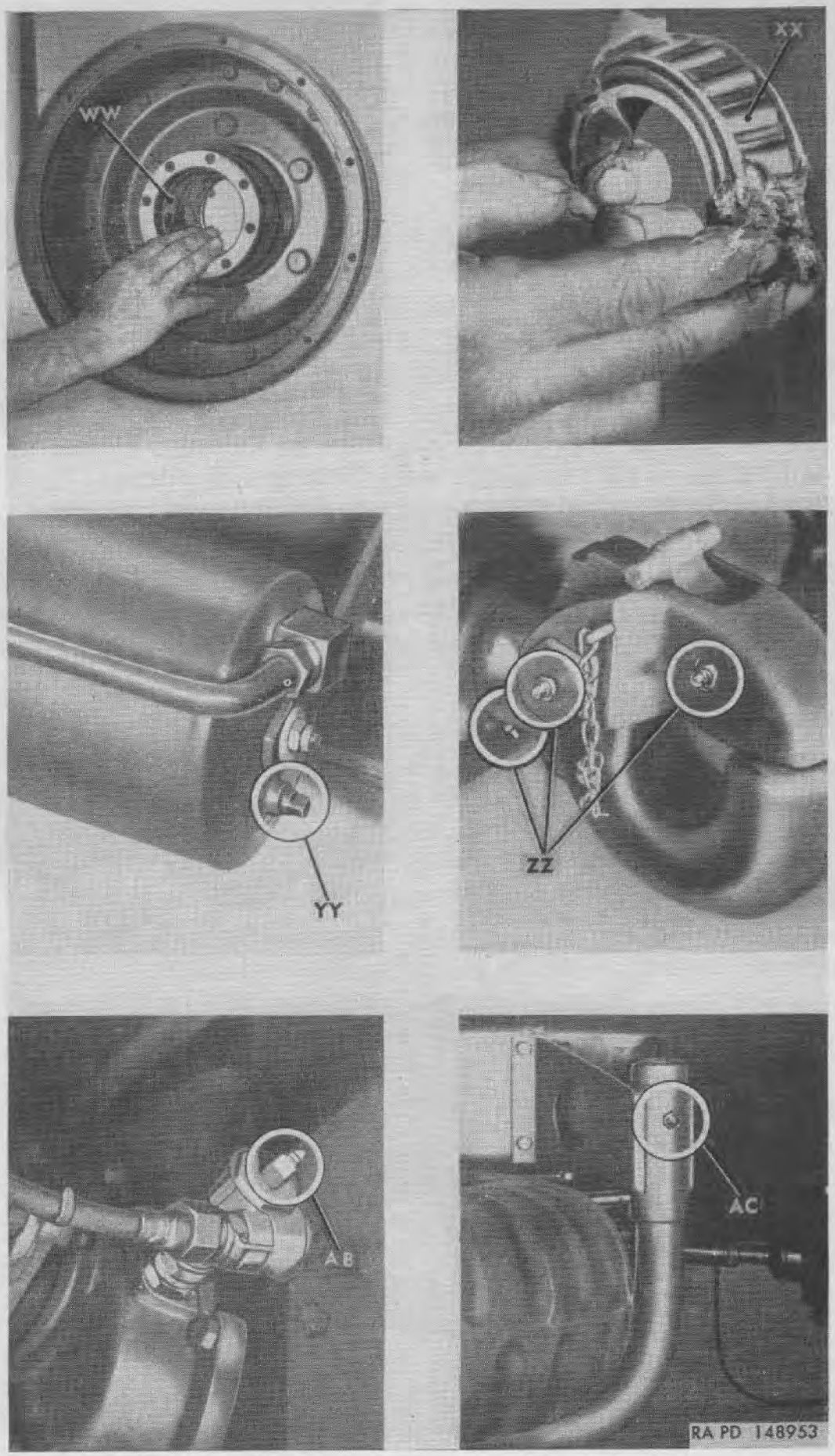

Figure 26. Localized lubrication views (points WW through AC).

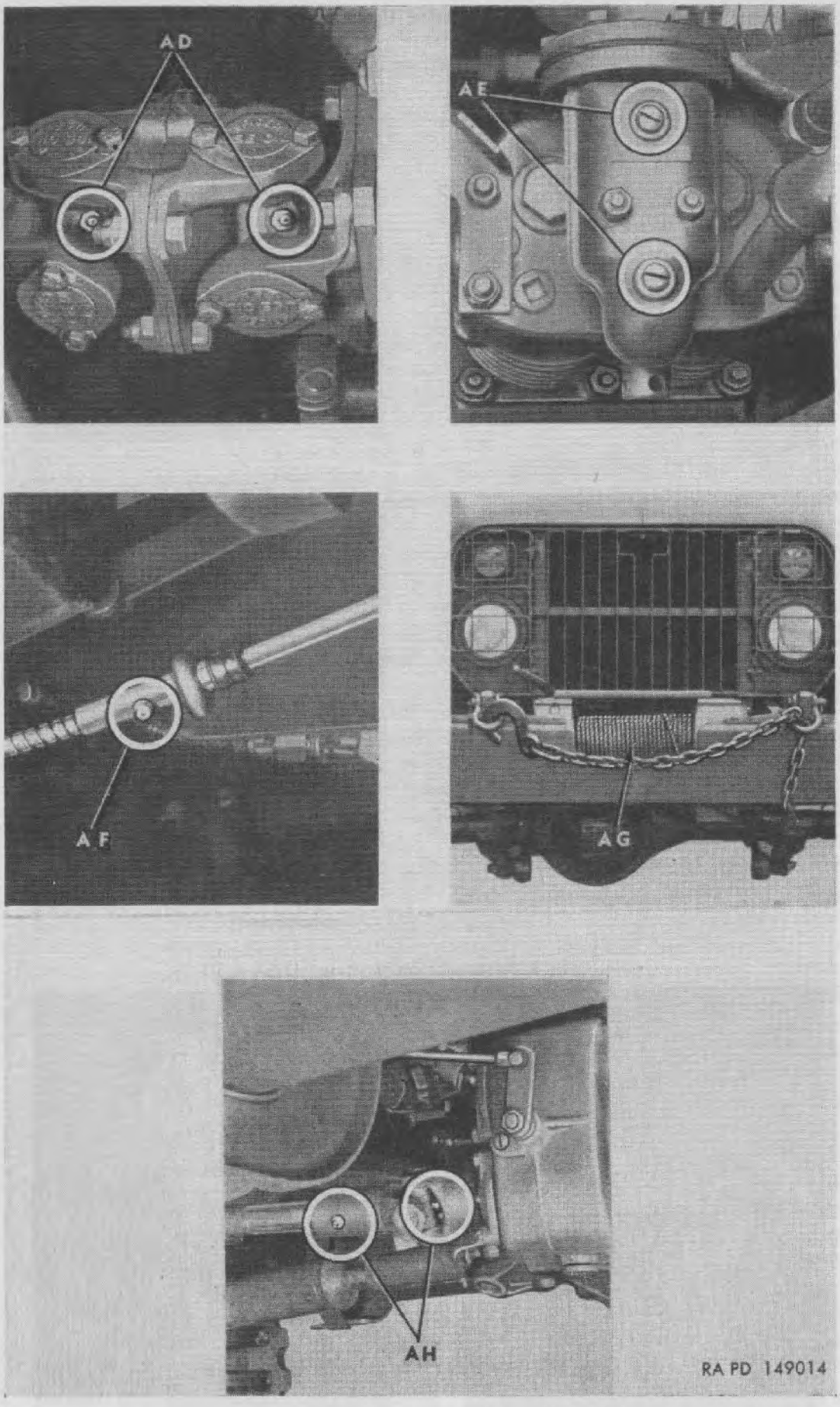

Figure 27. Localized lubrication views (points AD through AH).

59. Specific Lubrication Information

a. GENERAL. The following instruction notes are supplemental to and repeat for clarity those notes on lubrication chart (fig. 20A and 20B) which pertain to lubrication and service of individual units and parts.

b. ENGINE CRANKCASE.

(1) *Checking level.* Daily, check level in oil pan at gage (dipstick) on right-hand side of crankcase (K, fig. 22), immediately after stopping engine. Replenish to keep lubricant level to FULL mark on gage (dipstick). Oil filler cap is at top of crankcase breather assembly (L. fig. 22).

(2) *Draining and refilling.* Every 6,000 miles or semi-annually, immediately after operation, while engine is hot, remove plug from bottom of oil pan (N, fig. 22). After thoroughly draining, replace drain plug and refill crankcase to FULL mark on gage (K, fig. 22). Run engine a few minutes, recheck level, and add oil if required. Be sure oil pressure gage indicates oil is circulating.

c. OIL FILTER.

(1) *Draining filter.* Every 1,000 miles remove plug near bottom of shell and drain sediment (Q, fig. 22). Install plug. Start engine and operate for a few minutes, then stop engine and check oil level on gage. Replenish to FULL mark on gage (K, fig. 22).

(2) *Element replacement.*

(*a*) Whenever engine oil is changed, remove bolt at center of filter cover, then lift off cover. Remove and discard element (P, fig. 22).

(*b*) Remove plug at bottom of filter shell to completely drain lubricant.

(*c*) Clean inside of shell with clean rag immersed in dry-cleaning solvent or volatile-mineral-spirits paint thinner to remove all old lubricant.

(*d*) Reinstall plug tightly at bottom of filter shell. Install new element in shell; then install cover, using new cover gasket. Tighten cover bolt.

d. CRANKCASE BREATHER VENTILATOR.

(1) *Disassembly.* Every 1,000 miles, remove element from housing by loosening four screws alternately until element can be lifted from housing (M, fig. 22). Remove filler cap from element.

(2) *Cleaning.* Clean element and inside of housing, using dry-cleaning solvent or volatile-mineral-spirits paint thinner. Clean cloth, dampened in cleaner, can be used to clean housing.

(3) *Assembly.* Refill housing to OIL LEVEL mark with same grade engine oil as being used in crankcase. Install element in housing and tighten four retaining screws alternately and evenly.

e. CARBURETOR AIR CLEANER (R, fig. 22).

(1) *Disassembly.* Every 1,000 miles, remove reservoir by releasing four latches. Pull element downward to remove from body of cleaner.

(2) *Cleaning.* Pour oil from reservoir. Clean reservoir and element, using dry-cleaning solvent or volatile-mineral-spirits paint thinner, to remove all old lubricant and dirt. Permit element to dry thoroughly. Do not use compressed air on element.

(3) *Assembly.* Install element in cleaner body. Fill reservoir to OIL LEVEL mark with same grade engine oil as being used in crankcase. Install reservoir and fasten four latches.

f. TRANSMISSION.

(1) *Checking fluid level.* Dipstick gage, located in filler cap, is marked with two level marks: COLD—lower mark and HOT FULL—upper mark (EE, fig. 24). These two marks are used when checking transmission fluid level.

Note. Under normal conditions, fluid level should not lower unless leak exists; also, a level greater than HOT FULL sometimes indicates failure of internal parts.

(*a*) *Transmission cold.* When engine has not been run for an extended period, start engine and run for 3 to 5 minutes at idling speed with transmission lever N (neutral) position. With engine still idling, withdraw gage; wipe off and reinsert; then, again withdraw gage. Level reading should be at COLD mark (EE, fig. 24).

(*b*) *Transmission hot.* When engine has been run and is at operating temperature, start engine and run 3 to 5 minutes at idling speed with transmission lever in N (neutral) position. With engine still idling, withdraw gage; wipe off and reinsert; then, again withdraw gage. Level reading should be at HOT FULL mark (EE, fig. 24).

(2) *Replenishing fluid.* With engine running at idle speed and transmission lever in N (neutral) position, remove filler cap and gage (EE, and FF, fig. 24). Add sufficient oil to bring level up to gage marking (EE, fig. 24), depending upon whether unit is cold or hot ((1) above). Install cap and gage; then recheck level.

Caution: Do not overfill.

(3) *Draining.*

(*a*) *Drain torus cover.* Remove 8 cap screws and lock washers attaching underpan to flywheel housing. Turn engine by flywheel until torus cover plug is at lowest point, then remove plug (JJ, fig. 24).

(*b*) *Drain bottom pan.* Remove plug at bottom of transmission pan.

Note. This plug is indicated by mark OIL on pan adjacent to plug (GG fig. 24).

(*c*) *Drain rear case.* Remove plug at rear of case (HH, fig. 24).

(*d*) *Install plugs.* Apply thin coating of sealing compound to torus cover plug threads; then install and tighten plug. Install underpan to flywheel housing using 8 cap screws and lock washers. Tighten cap screws. Install bottom pan plug, also rear case plug, using new gaskets under each plug.

(4) *Filling.* Remove filler cap and gage; then pour 10 quarts of oil into case. Reinstall filler cap and gage. Start engine, and run at idle speed for 3 to 5 minutes, with transmission lever in N (neutral) position. Remove filler cap and add sufficient additional oil (aprx 5 quarts) to bring level up to COLD mark on gage (EE, fig. 24).

Note. The refill capacity is approximately 15 quarts, but correct level is determined by gage reading rather than quantity added.

Caution: Do not overfill.

g. WINCH DRIVE SHAFT SHEAR PIN. Apply preservative lubricating oil to winch shear pin (F, fig. 21) to prevent pin sticking. Every 6,000 miles, or semi-annually, remove shear pin (par. 285*b*), clean, and apply preservative lubricating oil to prevent rusting. Install shear pin (par. 285*c*).

h. DISTRIBUTOR. Remove distributor cover and lift rotor from shaft.

(1) *Breaker arm pivot.* Apply two or three drops of preservative lubricating oil to pivot pin (S, fig. 22).

(2) *Breaker cam.* Wipe a small quantity of general purpose grease to lobes of breaker cam (U, fig. 22).

(3) *Rotor wick.* Apply two or three drops of preservative lubricating oil to wick in end of distributor drive shaft (T, fig. 22).

(4) *Install rotor and cover.* Install distributor rotor and distributor cover.

i. AXLE DIFFERENTIALS.

(1) *Checking level.* Remove lower plug in axle housing cover. Correct plug is indicated by lettering cast in cover; front axle is marked FRONT OIL LEVEL (AA, fig. 23), while rear axle covers are marked REAR OIL LEVEL (CC, fig. 23). Add lubricant to bring level up to within ½ inch of plug opening when cold or to plug level when hot. Install and tighten level plug.

(2) *Draining and refilling.* Every 12,000 miles or annually, while unit is hot, preferably immediately after operation, remove plug at bottom of axle housing bowl (BB and DD, fig. 23) to drain lubricant. Install and tighten drain plug. Fill axle to within one-half inch of plug opening. Install and tighten filler plug. Note that lubricant capacity shown on lubrication order (par. 57) is different in each axle; this is due to mounting angles and inverted position of differential at front.

j. TRANSFER.

(1) *Checking level.* Remove filler plug (KK, fig. 24) and if necessary, add sufficient lubricant to bring level to within one-half inch of plug opening when cold or to plug level when hot. Install and tighten level plug.

(2) *Draining and refilling.* Every 12,000 miles or annually, while unit is hot, preferably immediately after operation, remove bottom plug (LL, fig. 24) in case to drain lubricant. If vehicle is equipped with power-take-off, also remove plug at bottom of power-take-off, mounted on transfer. Install and tighten drain plugs. Fill transfer to within one-half inch of plug opening (KK, fig. 24). Install and tighten filler plug.

k. STEERING GEAR.

(1) *Checking level.* Remove filler plug (NN, fig. 25) and add sufficient lubricant to bring level up to filler plug opening. Install and tighten filler plug.

(2) *Draining and refilling.* Every 12,000 miles or annually, while unit is hot, preferably immediately after

operation, remove drain plug at bottom of housing (PP, fig. 25) to drain lubricant. Install and tighten drain plug. Fill housing to level of filler plug opening. Install and tighten filler plug.

l. WHEEL BEARINGS.

(1) *Remove hubs and bearings.* Every 12,000 miles or annually, remove hubs and bearings (pars. 245 and 246).

(2) *Cleaning and inspection.* Wash bearings, cones and cups, steering knuckle or axle housing, and inside of hubs with dry-cleaning solvent or volatile-mineral-spirits paint thinner, using stiff brush to remove old lubricant. Dry parts thoroughly, but do not spin bearings when compressed air is used for drying. Inspect bearing cones and cups and replace if worn or damaged.

(3) *Lubricate and install.* Apply thin coat (approximately 1/16 inch thick) of lubricant to inside of hub (WW, fig. 26) and to front axle steering knuckle and rear axle housing, to retard rust. Lubricate bearings with a packer or by hand method (XX, fig. 26), kneading lubricant into all spaces of the bearing. The lubricant in the bearing is sufficient until the next service period. Do not fill hub, since any excess may leak onto brakes.

Caution: Cleanliness when handling bearings after they have been lubricated is extremely important; also, proper bearing adjustment is equally important to bearing life.

Install hubs and bearings and adjust (pars. 245 and 246).

m. WINCH WORM HOUSING.

(1) *Checking level.* Remove level plug at end of housing (D, fig. 21) and add sufficient lubricant through filler plug (B, fig. 21) opening at top of housing to bring lubricant level up to level plug opening. Install and tighten filler and level plugs.

(2) *Draining and refilling.* Every 12,000 miles or annually, while unit is hot, preferably immediately after operation, remove plug (E, fig. 21) at bottom of housing to drain lubricant. Reinstall and tighten drain plug. Remove level and filler plugs. Fill through filler plug opening until lubricant is up to level plug opening. Install and tighten level (D, fig. 21) and filler (B, fig. 21) plugs.

n. WINCH END-FRAME HOUSING.

(1) *Checking level.* Remove filler plug at top of housing (A, fig. 21) and check level of lubricant with rule. Proper lubricant level is 7⅝ inches below top of housing. Add lubricant to bring level up to this dimension.

(2) *Draining and refilling.* Every 12,000 miles or annually, while unit it hot, preferably immediately after operation, remove plug at bottom of housing (C, fig. 21) to drain lubricant. Install and tighten drain plug. Fill through filler plug opening (A, fig. 21) using 1 pint of lubricant. Install and tighten filler plug.

o. WINCH CABLE. After each operation, clean and oil cable (AG, fig. 27) with used crankcase oil or engine oil. Weekly, if cable has not been used, coat outer coils. Monthly, unwind entire cable, clean, and oil. Semiannually, if cable is not generally used, unwind entire cable and soak by means of a brush, using preservative lubricating oil. Wipe off excess and coat cable with wire rope lubricant. Coat winch drum also before rewinding cable on drum.

p. SHOCK ABSORBERS. Remove plug at front of housing (X, fig. 23) and check fluid level. If fluid is not up to plug level, disconnect link from arm by removing link stud nut, then remove link from arm. Fill to plug level with light lubricating oil. Pump arm up and down slowly to expel air from shock absorber. Repeat filling and pumping operations until all air is removed and fluid is at filler plug opening. Install and tighten filler plug. Connect link to arm and tighten link stud nut.

q. BRAKE POWER UNIT. Remove pipe plug at rear of unit (YY, fig. 26) and apply approximately 3 ounces of light lubricating oil, or until fluid is level with plug opening. Install and tighten pipe plug.

r. BRAKE MASTER CYLINDER. Remove floor board cover and master cylinder extension tube cap. Add hydraulic brake fluid until level of fluid is within approximately one-half inch of bottom of extension tube (MM, fig. 24). Reinstall tube cap and floor board cover.

s. FRONT AXLE UNIVERSAL JOINT AND STEERING KNUCKLE. Remove pipe plug at front of steering knuckle support (Z, fig. 23) and apply lubricant through fitting in spherical surface at outer end of axle housing (Y, fig. 23), until lubricant level is up to pipe plug opening (Z, fig. 23). Install and tighten pipe plug. Remove axle shaft and universal joint assemblies, clean, dry, and repack (par. 199) every 12,000 miles or annually.

t. PROPELLER SHAFT UNIVERSAL JOINTS AND SLIP JOINTS. Apply lubricant through fitting in each universal joint trunnion (TT, fig. 25) until lubricant appears around trunnion seals. Universal joint trunnions (AD, fig. 27) used in joints between transmission and transfer are fitted with pressure relief valves. Apply lubricant through fitting in each slip joint (SS, fig. 25) until lubricant appears at vent hole at end of shaft.

u. WINCH SHAFT UNIVERSAL JOINTS AND SLIP JOINTS. Apply lubricant through fitting in each universal joint and each slip joint (G, and H, fig. 21 and AH, fig. 27) until lubricant appears at journals and splines.

v. REAR SPRING SEAT BEARINGS. Apply lubricant through fitting at bottom of each spring seat (VV, fig. 25) until lubricant is forced past seal at inside of spring seat.

w. PILLOW BLOCK. Remove plug at side of housing near lubrication fitting (UU, fig. 25); then apply lubricant through fitting (UU, fig. 25) until level with plug opening.

60. Lubrication Under Unusual Conditions

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

Note. Operation in mud requires that spring shackle pins, propeller shaft universal joints, and slip joints be lubricated immediately before and after such operation, and every 4 hours during sustained operation under these conditions.

b. CHANGING GRADE OF LUBRICANTS. Lubricants are prescribed in the "KEY" of the lubrication order (par. 57) in accordance with three temperature ranges; above +32° F., +40° to —10° F., and from 0° to —65° F. Change the grade of lubricants whenever weather forecast data indicate that air temperatures will be consistently in the next higher or lower temperature range or when sluggish starting caused by lubricant thickening occurs. No change in grade will be made when a temporary rise in temperature is encountered.

c. MAINTAINING PROPER LUBRICANT LEVELS. Lubricant levels must be observed closely and necessary steps taken to replenish in order to maintain proper levels at all times.

61. Lubrication For Continued Operation Below 0° F.

Refer to TM 9-2855 for instructions on necessary special preliminary lubrication of the vehicle.

62. Lubrication After Fording Operations

a. After any fording operation, in water 12 inches or over, lubricate all chassis points as well as any other points required, in accordance with paragraph 294, for maintenance operations after fording.

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

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

(2) Inspect engine crankcase oil. If water or sludge is found, drain the oil and flush the engine with preservative engine oil. Before putting in new oil, drain the oil filter and install a new filter element (par. 59*c*).

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

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

63. Lubrication After Operation Under Dusty and Sandy Conditions

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

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

64. Painting

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

Section III. PREVENTIVE MAINTENANCE SERVICES

65. General

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

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

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

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

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

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

66. Cleaning

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

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

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

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

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

b. GENERAL PRECAUTIONS IN CLEANING.

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

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

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

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

67. Preventive Maintenance by Driver or Operator

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

b. SERVICES. Drivers or operators preventive maintenance services are listed in table III. Every organization must thoroughly school its personnel in performing the maintenance procedures for this vehicle as set forth in this manual.

Table III. Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS
					Caution: Place all tags describing condition of vehicle in the driver's compartment in a conspicuous location so that they will not be overlooked.
					(1) *Fuel, oil, and water.*
x		x	x	x	(*a*) *Fuel.* Check the amount of fuel in tank (par. 32) and note any indication of leaks. Add fuel if necessary (par. 116), and check the spare fuel containers.
x		x	x	x	(*b*) *Engine oil.* Check oil level and add oil if necessary (par. 59*b*).
x			x	x	(*c*) *Transmission oil.* Check transmission oil level (par. 59*f*) after engine has been started ((4) below).
x		x	x	x	(*d*) *Water.* Check coolant level in the cooling system and note any leaks. When water is added (par. 126) during period that antifreeze is in use, a hydrometer test must be made an antifreeze added, if necessary, to provide safe operation to meet lowest anticipated temperature.
					(2) *Tires.*
x		x	x	x	(*a*) All tires should be properly inflated (par. 240*a*) and spare properly secured in carrier (par. 242).
			x	x	(*b*) Remove all foreign matter such as nails, glass, or stones from tires and from between duals (if used). Examine tires for signs of low pressure, abnormal tread wear, cuts, and presence of valve caps. All tires with cuts extending to or into the cord body or worn smooth in center of tread or which show abnormal tread wear must be reported to proper authority for corrective action.
				x	(*c*) Check tires for proper matching (par. 240*c*) and irregular wear and change position as required.
x		x	x	x	(3) *Visual inspection of equipment.* Determine if lamps, reflectors, horn, fire extinguisher, mirrors, paulins, tools, etc., are in the proper place and in good operating condition.
x		x		x	(4) *Leaks, general.* With engine running, and fuel, engine oil, transmission oil, and coolant under operating pressures, check

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS—Continued under the truck and in the engine compartment for any indication of leaks. *Note.* Transmission oil level can only be checked after engine has run 3 to 5 minutes (par. 59*f*).
x	x				(5) *Instruments.* With engine running, check all instruments for normal readings (ch. 2, sec. II).
	x				(6) *Operating observations.* While the vehicle is in operation, the driver or operator should be alert for any sounds that may be a sign of trouble, such as knocks, squeaks, rattles, or hums. The instruments should be checked and any unusual reading noted which would indicate any part of the vehicle functioning improperly. Every time the brakes are used, gears shifted, or the vehicle turned, the driver or operator should instinctively consider it a test and note any unusual or unsatisfactory performance.
					(7) *Clean equipment.*
			x		(*a*) Clean dirt and trash from inside of body and cab. Clean glass and, when practical, wipe off exterior of equipment.
				x	(*b*) Wash the vehicle when possible. If not possible, wipe off thoroughly. Thoroughly clean engine and engine compartment of all excess dirt, trash, fuel, and oil drippings.
				x	(8) *Battery.* Clean and add necessary water (par. 141). Check terminal connections to see that they are securely fastened and properly coated with water-proofing material.
				x	(9) *Assemblies and belts.* Check all assemblies such as carburetor, generator, regulator, starter, and water pump for loose connections or mountings. Check adjustment for fan belt (par. 129*b*) and air compressor drive belt (par. 229*a*). If found to be improperly adjusted, report to the proper authority.

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS—Continued
				x	(10) *Electrical wiring.* Check all accessible wiring and ascertain that it is securely connected and supported, that insulation is not cracked or chafed, and that conduits and shielding are in good condition and secure. Report any unserviceable wiring.
			x	x	(11) *Tools and equipment.* Check to see that all tools and equipment are serviceable and in their proper place. Clean tools and equipment.
				x	(12) *Fuel strainer* (fig. 60). Clean fuel tank filler neck strainer.
			x	x	(13) *Compressed air tanks.* Open drain cock (fig. 136) and drain off condensation. Check to see that tank and air line connections are secure.
			x	x	(14) *Lights.* Observe if the lights operate properly (par. 42). Inspect all lenses and warning reflectors for dirt and damage; clean if necessary.
			x	x	(15) *Horn and windshield wipers.* Test horn for proper operation. Test windshield wipers to insure proper functioning and cleaning action.
				x	(16) *Towing connections.* Inspect towing shackles, pintle, and safety chains for looseness and damage. Test pintle to be sure that latching mechanism closes completely and latches securely (par. 43*c*).
				x	(17) *Springs and suspensions.* Check springs for abnormal sag, broken or shifted leaves, loose or missing rebound clips, "U" bolts, or shackles. Check shock absorbers for loose mounting, damage, or leaks. Check torque rods for distortion or looseness. Check rear spring seats for leaks.
				x	(18) *Unit vents.* Axle housings, brake power cylinder, master cylinder, fuel tank, transfer, and transmission are vented through lines connected to vent gallary on right side of frame. Check vent connections for looseness at units and at vent gallery.

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					USUAL CONDITIONS—Continued
				x	(19) *Publications.* Check to see that all appropriate publications concerning the operation and maintenance of the equipment are on hand and in good order.
			x	x	(20) *Lubrication as needed.* Lubricate in accordance with instructions contained in lubrication order (par. 57).
					UNUSUAL CONDITIONS
					Preventive maintenance services for usual conditions will apply, with emphasis on servicing by the operator to combat the effect of unusual conditions of extreme cold, extreme heat, unusual terrain, and fording. The special services described below are required to assure best results under unusual conditions.
					EXTREME COLD (pars. 291 and 292) and (TM 9–2855)
		x	x		(21) *Cooling and fuel systems.* Refuel and add denatured alcohol as required.
			x	x	(*a*) Drain fuel tank and clean sump to remove condensation and sludge; refuel tank.
			x	x	(*b*) Check level and specific gravity of radiator coolant. Add ethylene glycol and/or water if needed.
					Note. If system carries arctic antifreeze compound, make a warning tag and place it on or near the radiator filler neck. The tag should read: THIS SYSTEM IS FILLED WITH ARCTIC ANTIFREEZE COMPOUND.
					Caution: Do not add water or any other type of antifreeze.
				x	(22) *Lubricants.* Check and, if necessary, change lubricants and special oils to conform with the lubrication chart (par. 57).
				x	Check gear cases for collections of sludge and water and clean out if necessary and refill.
					Note. It is necessary to have lubricant warm and fluid for draining and refilling.

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					UNUSUAL CONDITIONS—Continued
					EXTREME COLD—Continued
		x	x		(23) *Control levers.* Position levers in neutral position.
x		x		x	(24) *Tires.* Check for tires frozen to ground or for frozen flat spots.
x				x	(*a*) Check for availability and serviceability of tire chains.
x				x	(*b*) Check for proper pressure (par. 240*a*).
x				x	(25) *Battery.* Check for proper charge and electrolyte level.
			x		Remove battery and store in warm place if vehicle is not equipped with power plant heater.
x			x	x	(26) *Clean.* Clean snow, ice, and mud from all parts of vehicle.
x					(27) *Brakes.* Check for frozen brake shoes.
x				x	(28) *Winterization equipment.* Check personnel heater and windshield defrosters (if available) for proper operation.
			x	x	(*a*) Check power plant heater unit for proper functioning.
			x	x	(*b*) Check all winterization equipment for secure installation and proper functioning.
			x		(*c*) Check radiator cover, broad blankets, under chassis blanket, hardtop closure, etc., for security and proper adjustment.
					EXTREME HEAT (par. 293)
x		x		x	(29) *Cooling and fuel system.* Check air cleaner, fuel and oil filters, and radiator fins and clean as often as necessary to keep them in good condition.
x				x	(30) *Battery.* Check electrolyte level.
				x	(*a*) Check for proper charge.
			x		(*b*) Remove battery and store in cool place if necessary to park for extended period.
x		x	x		(31) *Tires.* Shield tires, if possible, from direct rays of the sun.
x			x	x	Check for proper pressure (par. 240*a*).
					UNUSUAL TERRAIN (par. 295)
			x		(32) *Lubrication.* Check for fouled lubricants and lubricate as necessary (par. 60).

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					UNUSUAL CONDITIONS—Continued UNUSUAL TERRAIN—Continued
x				x	(33) *Tires.* Check for proper pressure (par. 240*a*). Check for availability and serviceability of tire chains.
x				x	(34) *Cooling and fuel systems.* Check air cleaner, fuel and oil filters, and radiator fins and clean as often as necessary to keep them in good condition. ***Caution:*** Under extremely dusty conditions or blowing sand, it will be necessary to service the air cleaner several times daily during operation to prevent entry of dust or sand into the engine. Failure to do this may wear out engine parts in a short time.
x			x	x	(35) *Clean.* Clean all parts of vehicle of snow, ice, mud, dust, and sand.
				x	Check for any sand-blasted surfaces and paint as required.
x			x		(36) *Vents.* Check engine vents and other exposed vents and keep them covered with cloth to prevent entry of dust, sand, or drifting snow.
					FORDING OPERATIONS (par. 53)
x					(37) *Fording limits.* Check vehicle fording limits. See paragraph 53 for operation precautions.
x			x		(38) *Tires.* Check for proper pressure (par. 240*a*).
x				x	Check for availability and serviceability of tire chains. Install if necessary.
x					(39) *Battery.* Check vent caps for tightness to prevent entrance of water.
			x		Check electrolyte for contamination and check for seepage of water into battery. Check charge as soon as practicable and add electrolyte and change if necessary.
			x		(40) *Clean.* Remove water and sludge from all parts of the vehicle. If fording through salt water, wash with fresh water.
			x		(41) *Cooling and fuel systems.* Check air cleaner, oil and fuel filters, and clean or replace if necessary.

Table III—Continued

Drivers or Operators Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					UNUSUAL CONDITIONS—Continued FORDING OPERATIONS—Continued (42) *Lubrication.* Lubricate as specified in paragraph 62.
			x		(43) *Engine and trannsmission.* Check for evidence of water or grit and replace oil if necessary. If engine oil must be replaced, flush before adding new oil.
			x		(44) *Brake system.* Check for proper operation.

68. Preventive Maintenance by Organizational Maintenance Mechanics

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

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

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

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

(2) *Clean.* Clean the unit as outlined in paragraph 66 to remove old lubricant, dirt, and other foreign material.

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

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

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

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

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

f. PROCEDURES. Table IV lists the services to be performed by the organizational mechanic or maintenance crew at the designated intervals. Each page of the table has two columns at its left edge for designated intervals of 6,000 miles or 6 months and 1,000 miles or 60 days, respectively. Very often it will be found that a particular procedure does not apply to both scheduled maintenances. In order to determine which procedure to follow, look down the column corresponding to the maintenance procedure and wherever an item number appears perform the operations indicated opposite the number.

Table IV

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ROAD TEST The driver of a vehicle is often unaware of defects in his vehicle which have developed gradually and to which he has become accustomed. The fact that many drivers lack the ability to detect the developing causes of vehicle failures makes it desirable for the mechanic to road-test the vehicle as part of the periodic preventive maintenance services. During and before this road test, any repairs or adjustments necessary to insure safe operation should be made. The appropriate paragraph in the following service procedures should be consulted. If a defect is found on the road test which does not require immediate correction, note it on the check sheet and make provisions for securing necessary replacement parts or units. The defect can be corrected later during the service. *Note.* If the tactical situation does not permit a full road test, perform items 2, 3, 4, 5, 6, 9, 10, 11, 12, and 14 which require slight or no movement of the vehicle. When a road test is possible, it should be for a distance and under conditions suitable to determine condition of vehicle.
1	1	*Before-operation service.* Perform the before-operation service as outlined in table III (par. 67) as a check to determine whether the vehicle is in a satisfactory condition to make the road test safely and that it is adequately supplied with fuel, engine oil, and coolant.
2	2	*Air pressure build-up (governor cut-off and low-pressure buzzer).* During the warm-up period (par. 38), operate the engine at fast idle (not over one-third throttle) and observe if the air pressure builds up at a normal rate to 100 psi and whether the governor then cuts off to stop compressing action. Observe if the low-pressure buzzer operates until air pressure reaches 60–65 psi and then stops as pressure is built up above the danger point.
3	3	*Instruments and gages.* Observe as follows: *Oil pressure gage.* Observe oil pressure at frequent intervals and under all conditions of engine speed to see that oil pressure is indicated. Oil pressure should be approximately 5 psi at slow idling speed. ***Caution:*** If gage indicates zero or excessively low oil pressure, stop the engine immediately and investigate the cause. *Battery charge indicator.* Observe the indicator to see that it is indicating normally. With the batteries fully charged, the reading should show charge for a short

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ROAD TEST—Continued time after starting engine and then return to slightly above zero charge with all lights and electrical accessories switched off. If battery is low, charge will be indicated for a longer period of time. Abnormal discharge reading with engine at normal operating speed indicates deficiency in the generating circuit. Failure to show a charge reading with all electrical accessories in operation may also indicate deficiency in generating circuit. Report condition. *Speedometer.* Watch the speedometer for proper operation, excessive fluctuation, and unusual noises that might indicate worn or damaged gears or cables. Note if accumulating mileage is recording satisfactorily. *Temperature gage.* Note the temperature gage and see that it indicates in the normal range. The temperature should increase gradually during warm-up period. Temperatures between 160° and 220° F. are satisfactory for normal operating conditions. Below-normal temperature after a reasonable warm-up period may indicate that thermostat is stuck open (par. 131). Temperatures above normal may indicate that the thermostat is stuck closed (par. 131), or the cooling system is clogged. *Fuel gage.* Observe whether the fuel gage indicates the approximate level of fuel in the tank.
4	4	*Horns, mirrors, and windshield wipers.* If tactical situation permits, test the horn for proper operation and tone. Examine the rear view mirror and the windshield wiper blades and arms to see that they are in good condition and secure. Observe whether the blades make good contact with the glass, and that they operate properly through their complete stroke without indication of loose motor mountings.
5	5	*Brakes, service.* Operate service brakes at varying vehicle speeds. Apply brakes sufficiently to stop vehicle in minimum distance, observing their effectiveness. Note whether the vehicle pulls to one side, observe any unusual noises, pedal travel and feel, and pull-back spring action.
5	5	*Parking brake.* Stop the vehicle on an incline; then apply the parking brake and observe, if it holds the vehicle effectively, that the application lever has over one-third of its travel in reserve, and that the ratchet and pawl latch the applied brake securely. *Note.* Parking brake should be adjusted if there is less than one-half ratchet travel reserve (par. 234).

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ROAD TEST—Continued
7	7	*Transmission.* With transmission at normal operating temperature and with engine idling, move transmission control lever through all positions in both ranges (par. 40*b*). Make sure lever snaps firmly into each position. Note if vehicle has tendency to "creep" or if engine slows down when lever is moved out of "N" (neutral) position. Cause may be due to engine idling too fast or to faulty transmission. Drive vehicle in all forward and reverse positions; make sure all proper shifts occur smoothly and that none are missed. Be on the alert for unusual noises which might indicate improper operation of transmission.
7		Road test vehicle in all driving positions. Make sure all proper shifts occur within speed ranges specified in paragraph 40. Adjust linkage, if required for correction of improper automatic shifting. When transmission shifts properly, make stall speed test described in paragraph 176, as an over-all check of power plant performance.
7	7	*Transfer.* With transmission in "N" (neutral) position, move transfer lever into "UP-ENGAGED" and "DOWN-NEUTRAL" positions. Drive vehicle with transfer lever in "UP-ENGAGED" position; then attempt to drive with lever in "DOWN-NEUTRAL" position to make sure transfer is in neutral.
7		Jack up one wheel on each axle. Run engine with transmission in both forward and reverse positions. Front wheel should revolve and in same direction as rear wheels. Failure of front wheel to turn would indicate deficiency in front axle drive clutch or in shifting linkage to drive clutch.
8	8	*Steering.* With vehicle in motion, observe for excessive wheel free play. Rotate the steering wheel fully in both directions and note any indication of binding or bumpy feel. Vehicle should show a tendency to straighten out of the turn. As the vehicle is operated at normal speeds, observe any tendency to wander, shimmy, or pull to one side. Examine the steering column and steering wheel to see that they are in good condition and secure.
9	9	*Engine.* Observe engine operating characteristics as follows: *Unusual noises.* Listen for knocks and rattles as the engine is accelerated, decelerated, and while it is under both light and heavy loads.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ROAD TEST—Continued *Acceleration and power.* Operate the engine at various speeds noting whether the vehicle has normal pulling power and acceleration. A slight ping during fast acceleration is normal. Continuing or heavy ping may indicate early timing, heavy accumulation of carbon, or low octane number fuel. *Governed speed.* With vehicle in gear, slowly depress the acclerator to the toe board, and by observing the speedometer reading, see if the vehicle reaches, but does not exceed, the governed speed specified on caution plate (fig. 12).
10	10	*Unusual noises.* Be on the alert continually for unusual noises that would indicate looseness of parts, damaged, or malfunctioning units in the power train, cab, body, or wheels.
11	11	*Air-hydraulic brake cylinder operation.* Depress brake pedal slowly and note if the cylinder can be felt assisting the movement of the pedal. Little or no assist action indicates power cylinder is not functioning correctly.
12	12	*Compressed air system leak.* With air pressure at governed maximum (100 psi) and the brakes applied, stop the engine. There should not be a noticeable drop in pressure within one minute. If any pressure drop occurs during this check, test the compressed air system for leaks by the soap suds method (par. 227*b*).
13	13	*Temperatures.* After completing the run, note as follows: *Brakes, drums, and hubs.* Hand feel all the brake drums and hubs cautiously for abnormal temperature. An overheated brake drum or hub may be an indication of a dragging brake or defective, dry, or improperly adjusted wheel bearing; and an abnormally cool brake drum is an indication of an inoperative brake. *Axles, transmission, and transfer.* Cautiously feel the axle differential and carrier, transmission, and transfer case for overheating. If any gear case is excessively hot for the distance traveled, an abnormal condition in the unit is indicated. This should be corrected or reported to proper authority.
14	14	*Leaks.* Look within the engine compartment and underneath the vehicle for engine oil, water, and fuel leaks, and determine their source.
16	16	*Gear oil leaks.* Observe axle housing, transmission, and transfer to see that they are not leaking.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		MAINTENANCE OPERATIONS
		Caution: Use necessary precaution to block the vehicle so that it may be operated safely in gear at reasonable speeds. If the facilities are not available for adequately and safely jacking up and blocking vehicle, omit the services which follow that require running the engine in gear.
17	17	*Unusual noises.*
		Engine, belts, and accessories. Accelerate and decelerate the engine momentarily and listen for any unusual noises in these units that might indicate damaged, loose, or excessively worn engine parts, drive belts, or accessories. Also be sure to locate, correct, or report any unusual engine noises heard during road test.
		ENGINE AND ACCESSORIES
18	18	*Cylinder head and gaskets.* Look for cracks or indications of oil, water, or compression leaks around studs, cap screws, and gaskets.
		Caution: Cylinder heads should not ordinarily be tightened unless there is a definite indication of looseness or leaks. If tightening is necessary, use a torque-indicating wrench and tighten in the sequence as explained in paragraph 96*e*. If necessary to tighten cylinder head bolts, adjust the valve clearance as indicated in item 19 below.
19	19	*Valve mechanism.* Check valve clearances while hot (par. 94). Rocker arms, shafts, and springs should appear in good condition, correctly assembled and secure (fig. 31). Oil should be delivered properly. Also make sure that the valve cover gaskets are in good condition.
19		*Adjust.* Adjust valve clearances as explained in paragraph 94, taking care that the lock nuts are secure when the clearances are last noted during adjustments.
	20	*Spark plugs.* Examine the spark plugs to see that their insulators are in good condition and clean, and that there is no leakage around the insulators. When operating conditions require, the spark plugs may be removed for service (par. 109).
20		*Remove.* Remove the spark plugs (par. 109) and examine for adjustment and condition, paying particular attention to broken insulators, excessive carbon deposits, and to electrodes which are burned thin. Replace unserviceable plugs. Report excessive deposits or damaged insulators, as these conditions may indicate incorrect heat range.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services.

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
20		*Clean.* Clean deposits from electrodes and insulators and again check for cracks. Install new plugs (par. 109) if there are any indications of cracks or burned insulators.
20		*Adjust.* Adjust gaps to specifications and by method described in paragraph 109. After completing item 21 below, install the plugs (par. 109).
21		*Compression test.* With all spark plugs out, make compression test as described in paragraph 93*b*. Record the readings on the space provided on back of work sheet Form 461.
22	22	*Batteries (cables, hold-downs, carrier, record gravity, and voltage).* Inspect battery case for cracks and leaks. Clean top of battery. Inspect cables, terminals, bolts, posts, straps, and hold-downs for condition and looseness. Test specific gravity (par. 141*b*) and record on DA AGO Form 461. Normal specific gravity readings below 1.215 indicate battery should be recharged or replaced. Electrolyte level should be as described in paragraph 141*c*.
22		*Test.* Perform high-rate discharge test according to instructions for test which accompany test instrument, and record voltage on DA AGO Form 461. Cell variation should not be more than 30 percent for meters reading in percentages of charge. *Note.* Normally, specific gravity must be above 1.215 to make this test.
22	22	*Clean and serve.* Bring electrolyte to proper level by adding distilled or clean water (par. 141*c*). Clean entire battery and carrier. Repair carrier if corroded. Clean battery cable terminals, terminal bolts and nuts, and battery posts. Tighten terminals and hold-downs carefully to avoid damage to battery. Make certain that terminal and cable connectors are covered with waterproofing material.
23	23	*Crankcase.* With engine idling, examine crankcase, valve cover, and timing gear cover for oil leaks. Stop the engine and after oil has drained into crankcase, see whether the oil is at the proper level (par. 59*b*).
23	23	*Note.* If an oil change is due, service crank-case according to lubrication chart (par. 57) and instructions in paragraph 59*b*. Do not start engine again until items 24, 35, and 34 are completed.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
24	24	*Oil filter and lines.* Inspect filter and external oil lines to see that they are in good condition, secure, and not leaking.
24		*Clean and serve.* Remove oil filter drain plug. Drain off any accumulated dirt and sludge. Replace element (par. 59*c*).
35	35	*Crankcase breather and filler cap.* Inspect crankcase breather and filler cap to see that they are in good condition, correctly assembled, secure, and that ventilator tubes are open.
35		*Clean and serve.* Clean and refill crankcase breather oil reservoir as explained in lubrication chart (par. 57) and in paragraph 59*d*.
35		*Clean.* Disassemble and clean crankcase ventilation valve (par. 99*c*).
34	34	*Air cleaners.* See that all gaskets, clamps, air lines, and hoses are present and in good condition. Observe condition of the cleaning element in body. Examine oil in reservoir of cleaner paying particular attention to the amount of dirt present in the oil. Also see that the oil level is satisfactory (par. 59*e*).
34	34	*Clean and serve.* Service air cleaners in accordance with instructions on lubrication order (par. 57). After servicing cleaner, note that the connecting hoses are in good condition and properly clamped to air cleaner.
27	27	*Generator, starter, and switch.* Note whether these items are in good condition, securely mounted, and whether the wiring connections are clean and secure. See that the starter linkage is in good condition and secure.
27		*Generator.* Remove the generator inspection plug and inspect commutator for dirty condition, roughness, high mica, or thrown solder. If any of these conditions are evident, generator must be replaced (par. 137).
27		*Starter.* Starter must be removed from vehicle before inspection cover can be readily removed (par. 135*a*). Remove inspection cover and see that the commutator and brushes are in good condition and not excessively worn; that the brushes are free in holders and have sufficient spring tension to hold them in contact with commutator; and that the brush connecting wires are secure and not chafing. Clean the commutator as described in paragraph 135*b*. ***Caution:*** When replacing starter inspection cover, be sure seal ring is properly installed to prevent leakage (par. 135*b*).

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
27		*Tighten.* Tighten the starter mounting studs securely (par. 135*c*).
39	39	*Starter (action, noise, and speed).* Start engine and observe whether the general action of the starter is satisfactory, particularly, whether it engages and operates properly without excessive noise and has adequate cranking speed. Note whether the engine starts readily. Also, as soon as the engine starts, note whether the oil pressure gage and battery charge indicator readings are satisfactory (pars. 30 and 28).
40	40	*Leaks.* Look in the engine compartment and under the vehicle for engine oil, fuel, and water leaks. Trace all leaks to their source and report or correct them.
31	31	*Distributor.* Observe if distributor and ignition coil housing and external attachments are in good condition, water-tight, and secure. Examine other parts of the distributor as follows:
31		*Cap, rotor, and points.* Remove cover from distributor. Inspect cover, both inside and out, rotor, and breaker plate assembly to see that they are in good condition, correctly assembled, secure, and serviceably clean. Examine closely for cracks in cap and rotor, corrosion of terminals and connections, and for burned rotor bar or contact points. Also see that points are in good condition, well alined and adjusted to 0.022 inch (par. 108*a*). If the points are pitted, burned, or worn to an unserviceable condition, install new set of points (par. 108*b*). If points are badly pitted, also replace the capacitator (condenser) (par. 108*c*), as it is probably the cause of the pitting. Install the new points so that they are well alined and engaged squarely. If points are slightly pitted or burned, face them with a contact point facer or grade 2/0 flint paper (do not use emery cloth), and remove the filings with compressed air. Adjust points after they are dressed.
31		*Shaft.* Examine shaft, feeling for looseness to determine if there is excessive wear in shaft or bearings.
31		*Centrifugal advance.* Install rotor on shaft and note if the camshaft can be rotated manually to the normal range of movement which is permitted by the centrifugal advance mechanism. Note if it returns to original position, when released, without binding or hanging up.
31		*Special lubrication.* Refer to lubrication chart (par. 57) and instructions in paragraph 59*h*.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
31		*Adjust.* Adjust distributor point gaps to 0.022 inch in accordance with paragraph 108*a*.
		Note. Do not install distributor cover until item 32 is completed.
32	32	*Coil and wiring.* Examine the coil to see that it is in good condition and securely mounted. Also make sure spring-loaded terminals on built-in cable make good contact with coil and distributor rotor. Install distributor unit cover.
		Caution: When installing cover be sure gasket is properly placed and in good condition. Replace gasket if hard or cracked. Be sure high tension couplings are properly made up. Inspect all low-voltage wires in engine compartment to see that the wires, including shielding on conduits, are in good condition, waterproof, and securely fastened on support mountings and terminals.
41	41	*Ignition timing (advance).* With engine running, check timing as described in paragraph 107.
41		*Adjust.* Adjust the ignition timing as described in paragraph 107.
43	43	*Regulator unit (connections, voltage, current, and cut-out).* Inspect generator-regulator to see that it is in good condition, watertight, secure, and undamaged.
43		*Test.* The enclosed construction of the charging system components and the wiring harness and fittings used prohibit the normal methods of test. If suitable adapters are available, connect low voltage circuit tester and observe whether the voltage regulator, current regulator, and cut-out control the generator output properly. Follow instructions which accompany test instrument. Replace regulator if test shows faulty operation (par. 138).
		Caution: This test should be made only after regulator unit has reached normal operating temperature.
25	25	*Radiator (core, shell, mountings, hose, cap, and gasket).* See that these items are in good condition, correctly assembled, securely mounted and connected, and do not leak. Note whether the core air passages are obstructed with dirt, insects, or trash, and whether the core fins are badly bent. Examine the coolant to see whether it is so contaminated with rust, oil, or other foreign matter that the cooling system should be cleaned.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
		If cleaning is necessary, clean according to instructions in paragraph 128. Refill radiator with coolant (par. 126*a*), adding specified inhibitor (par. 128*f*).
25	25	*Antifreeze.* If antifreeze is in use, determine its protective value and record in space provided on reverse side of work sheet Form 461.
25	25	*Clean.* Clean the dirt, insects, and trash from exterior of core and blow out with compressed air or with stream of water applied carefully from the rear side of core (do not use steam).
		Caution: Use only suitably shaped piece of wood or blunt instrument in straightening fins; otherwise tubes may be punctured.
25		*Tighten.* Tighten all loose radiator mountings and hose clamps.
26	26	*Water pump, fan, and shroud.* Observe water pump to see that it is in good condition, not leaking, and securely installed. Loosen drive belt and leave it loose until adjustment is made (item 29). Inspect fan blades to see whether they are in good condition and properly secured to hub. See that the fan shroud is in good condition and securely mounted.
28	28	*Air compressor.* Examine the air compressor to see that it is in good condition, properly alined to its drive pulley, and secure. See that all the compressor water, oil, and air lines within the engine compartment are in good condition and secure, and that the oil and water lines do not leak.
28	28	*Special lubrication.* Refer to lubrication chart (par. 57).
28		*Adjust.* Adjust compressor governor as described in paragraph 228*b*.
29	29	*Drive belts and pulleys.* Observe all drive belts for evidence of fraying condition, excessive wear, and deterioration. See that all drive pulleys and hubs are in good condition and securely mounted.
29	29	*Adjust.* Adjust all drive belts to specified tension (pars. 129*b* and 229*a*).
33	33	*Manifolds and heat control.* Observe the intake and exhaust manifold to see that they are in good condition, secure, and that the manifold gaskets appear to be in good condition and not leaking. Check manually-operated manifold heat control and determine if it is

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		ENGINE AND ACCESSORIES—Continued
		in good condition, secure, and that the control adjusting point is in place, and set at the correct seasonal position (fig. 63).
33		*Tighten.* Tighten all manifold assemblies, mountings, exhaust pipe, and carburetor connecting flange nuts, evenly and securely.
36	36	*Carburetor (choke, throttle, linkage, and governor).* See that these items are in good condition, correctly assembled, and securely installed; that the carburetor does not leak; that the control linkage, including choke and throttle shaft, is not excessively worn; that the choke valve opens fully when control is in its released position; that the throttle valve opens fully when the accelerator is fully depressed; and that the governor is secure and properly sealed.
		ENGINE IDLE AND VACUUM TEST
42	42	*Engine idle.* With a vacuum gage, adjust carburetor idling speed and mixture adjustments as described in paragraph 112*b*.
42	42	*Vacuum test.* Perform vacuum test with engine running at normal idling speed as described in paragraph 93*c*.
		CHASSIS, BODY, AND ATTACHMENTS
47	47	*Tires and rims.* Inspect as follows:
		Valve stems and caps. Observe whether all valve stems are in good condition and in correct position and that all valve caps are present and installed securely. Do not tighten with pliers.
		Condition. Examine all tires for cuts, bruises, breaks, and blisters. Remove embedded glass, nails, or stones from tires. All tires with cuts or injuries extending to or into the cord body and those worn smooth in center of tread must be removed and exchanged for reconditioned or new ones. Look for irregular tread wear or any signs of flat spots, cupping, feather edges, and one-sided wear. Any mechanical deficiency causing such conditions should be determined and corrected or reported. The wheel positions of tires with irregular wear should be changed to even up the wear. Front tires worn irregularly should be moved to rear wheel position.
		Matching. With the tires properly inflated (par. 240*a*), inspect them to see that they are matched according to over-all circumference (par. 240*c*) and type of tread.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		Spare tire carrier. See that the spare tire carrier is in good condition and secured properly (fig. 143).
		Rims. All rims and their lock rings should be in good condition and secure.
47	47	*Serve.* With all the tires properly inflated, measure the over-all circumference of tire, including spare (par. 240*c*). Select the tires to be mounted on the different axles so they will not have differences in over-all circumference exceeding the limit specified in paragraph 240*c* and in current directives and bulletins.
		Note. The spare must be matched properly and mounted for use on one of the road wheels at intervals not exceeding 90 days. A convenient time to do this is during these maintenance services. After performing the tire matching service, do not install wheels until wheel bearing services are completed, as well as other services which require removal of wheels.
48		*Rear brakes.* Remove the rear wheels, hubs, and drums and inspect and service the brakes as follows:
		Note. On the semiannual maintenance service, the several rear wheel bearings and brake items (48, 49, and 52) are group services and overlap. Perform these services in the best order for economy of mechanic's time and for orderly reassembly.
48		*Drum and backing plates.* Clean all dirt and grease from these parts thoroughly, keeping dry-cleaning solvent or volatile-mineral-spirits paint thinner away from the brake linings and wheel cylinder boots. Examine the drum and backing plate to see that they are in good condition, securely mounted, and not excessively worn or scored.
48		*Wheel cylinders.* Observe whether wheel cylinders are in good condition and securely mounted, paying particular attention to end covers to see that the rubber covers are not deteriorated. Look for leaks by slightly pulling the lower part of the wheel cylinder end cover away from the cylinder.
		Note. Hub and drum assembly must be removed in order to thoroughly inspect the wheel cylinders.
48		*Tighten.* Tighten drum mounting bolts (par. 222*c*).
	49	*Rear brake shoes (linings).* Forward rear wheel and drum should be removed for inspection of the brake linings. Examine the linings to see whether they are so

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		worn that the rivet heads may contact the drums within the next month of operation. If the lining inspected requires replacement, remove all wheels and drums and check their brakes, and service if necessary. This operation should also be performed if the vehicle has been operated in deep water, mud, or loose sand.
	49	*Adjust.* Adjust as described in paragraph 220.
49		*Inspect (hubs and drums removed).* Observe whether linings are in good condition, tightly secured to the brake shoes, in good wearing contact with the drum, free of lubricant or brake fluid, and not excessively worn. Also see that the brake shoes are in good condition, properly secured, and guided by the guide bolts and springs, and properly returned against their anchors by the retracting springs. The thickness of the lining above the rivet heads at the most worn section should be sufficient for at least a month of safe operation. If the linings are badly contaminated with lubricant or brake fluid, replace all linings on both brakes of that particular axle. If the linings are only slightly contaminated with lubricant or fluid, clean them thoroughly.
49		*Clean.* Clean all dirt and grease from linings with wire brush, clean cloth, or compressed air.
49		*Adjust.* After items 49, 52, 53, 54 and 60 are completed, adjust shoes as directed in paragraph 220.
52	52	*Rear wheels (bearings, seals, drive flanges, and nuts).* Inspect and service these items as follows:
52	52	*Wheels.* Inspect wheels for good condition.
52	52	*Bearings and seals.* Inspect for looseness of wheel bearing adjustment (par. 244*a*). Revolve the wheels and listen for indications of dry or damaged wheel bearings. Inspect the drive flanges and around the brake supports and drum for lubricant and brake fluid leaks.
52	52	*Axle shaft flanges and nuts.* Note whether these items are in good condition.
	52	*Tighten.* Tighten all axle shaft flange nuts securely (par. 205*c*).
52		*Clean.* Disassemble wheel bearings and oil seals (par. 246*a*). Clean thoroughly and check the rollers and cups to see that they are in good condition, and that the cups are secure. If the cups appear to be in good condition, it is not necessary to remove them from the hubs unless the bearings must be replaced, in which case new cups

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		should be installed. Also see whether the machined surfaces upon which the bearings are assembled are in good condition.
52		*Special lubrication.* When all of the related items have been performed to the point where the wheel bearings are to be reinstalled, lubricate the bearings according to instructions on lubrication chart (par. 57) and in paragraph 59*l*.
52		*Adjust.* After lubricating the wheel bearings (pars. 57 and 59*l*), reassemble the hub and drum assemblies (par. 246*e*), and adjust the wheel bearings (par. 244*b*).
		Note. Proper adjustment of the wheel bearings is vital to the life of the bearings and the lubricant retainer seal. If the bearings are adjusted so that they are loose, the lubricant retainer seals cannot seal properly for any extended period. If the bearings are adjusted too tightly, they are likely to become damaged.
50	50	*Torque rods.* Torque rods (both front and rear) must be in good condition, correctly assembled, and secure. Examine the rubber seals at each end of the torque rod. Check tightness of torque rod mounting nuts at axles and at frame brackets (pars. 256 and 262).
51	51	*Rear spring seats and bearings.* Inspect to see that spring seats are in good condition, secure, and not leaking lubricant.
51		*Adjust.* Adjust spring seat bearings as described in paragraph 261*d*.
51		*Special lubrication.* Refer to lubrication chart (par. 57) and paragraphs 59*v* for instructions.
53	53	*Front brakes.* Remove the front wheels, hubs, and drums, and inspect and service the brakes as follows:
		Note. On the 6-month maintenance service, the several front wheel and brake items (53, 54, and 60) are group services and overlap. Perform these services in the best order for economy of mechanic's time and for orderly reassembly.
53		*Drum and backing plates.* Clean and inspect in the same manner as in item 48.
53		*Wheel cylinders.* Inspect in the same manner as in item 48.
	54	*Front brake shoes (linings).* Inspect the brake lining thickness in the same manner as in item 49.
	54	*Adjust.* Adjust as described in paragraph 220.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
54		*Inspect (hubs and drums removed).* Inspect the brake linings, shoes, etc., as the similar inspection on item 49.
54		*Clean.* Clean all dust from the brake linings with a wire brush, clean cloth, or compressed air.
54		*Adjust.* After items 53, 54, 55, and 60 are completed, adjust brakes as described in paragraph 220.
55	55	*Steering knuckle (joints, bearings, and seals).* Inspect to see that the knuckle housings are in good condition. Inspect steering arms for bent condition. See that housing outer seal and seal flanges are in good condition and secure. Remove lubrication plug and examine sample of lubricant to see if it appears to be contaminated.
55		*Clean.* Remove constant velocity universal joint assembly (par. 199*b*). Wash thoroughly in dry-cleaning solvent or volatile-mineral-spirits paint thinner and without disassembly of universal joint, inspect parts to see that they are in good condition and not excessively worn (par. 199*c*). Pay particular attention to universal joint washers, balls and races, axle splines, and flanges.
55		*Special lubrication.* Refer to paragraph 199*c*(3) for special lubrication instructions.
56	56	*Front springs (clips, leaves, "U" bolts, hangers, and shackles).* See that they are in good condition, correctly assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. Note if the deflection of both springs is normal and approximately the same. Test the hangers and bolts for excessive wear by means of a pry bar.
56	56	*Tighten.* Tighten all spring "U" bolts securely and uniformly (par. 255*b*).
57	57	*Steering arms, tie rod, drag link, pitman arm, column, and wheel.* Make certain that these items are in good condition, correctly and securely assembled and mounted. Examine steering gear case for lubricant leaks and check lubricant level. Pay particular attention to the pitman arm to see that it is securely mounted and not bent out of its normal shape. Also observe whether the steering system is in good adjustment.
57		*Tighten.* Tighten the pitman arm shaft nut (par. 250*c*). Examine tie rod, drag link, and steering arms for damage, looseness, and wear. Check tightness of ball stud nuts at tie rod ends and at drag link, ends (par.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		249*c*). Check tightness of steering case mounting bolt nuts at frame (par. 253).
		Caution: Loosen bolts which attach cowl bracket to spacer (fig. 153) before tightening steering case mounting bolts at frame. This will prevent distortion of column while tightening mounting bolts. Tighten cowl bracket-to-spacer bolts after mounting bolts have been checked.
58	58	*Front shock absorbers and links.* See that the shock absorber bodies are secured to frame, that the links which connect their arms to the axle are in good condition and secure, and that there are no fluid leaks.
58		*Serve.* Fill shock absorbers with specified fluid (pars. 57 and 59*p*). After servicing shock absorbers, check action as described in paragraph 257*a*.
60	60	*Front wheel (bearings, seals, drive flanges, and nuts).* Inspect the front wheels, bearings, seals, drive flanges, and nuts in the same manner as in item 52 for similar rear wheel items.
60		*Clean.* Disassemble wheel bearings and oil seals (par. 245*a*) and clean and inspect in the same manner as described in item 52.
60		*Special lubrication.* When all of the related items have been performed to the point where the wheel bearings are to be installed, lubricate the bearings according to instructions on lubrication order (par. 57) and in paragraph 59*l*.
60		*Adjust.* After lubricating bearings, install and adjust in same manner described in item 52.
61	61	*Front axle (pinion end play, seal, vent, and alignment).* See that the axle housing is in good condition, securely assembled and mounted, and not leaking. Feel by hand to see that the pinion shaft does not have excessive end play and that its seal is not leaking. Alinement of axle can be checked as described in paragraph 264*b*(5).
61	61	*Clean.* See that vent line is in good condition, open, and securely connected.
62	62	*Front propeller shafts (joints, seals, and flanges).* See that these items are in good condition, correctly and securely assembled and mounted; that the universal joints are not excessively worn; that the slip joints are free and not excessively worn, and adequately lubricated (par. 57).

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
62		*Tighten.* Tighten all universal joint flange nuts to 33–43 pound-feet torque.
63	63	*Engine mountings.* Examine all engine power plant mountings (fig. 39) for condition and tightness.
64	64	*Parking brake (pawl and sector, linkage, drum, and lining).* Note whether the parking brake pawl and sector and linkage are in good condition and secure; whether the brake drum is in good condition and not scored or oily; and whether the brake lining is oil-soaked or worn thin.
64		*Adjust.* Adjust the clearance between the brake lining and drum (par. 234*b*). Make sure the adjusting nuts are securely locked when the adjustment is completed.
66	66	*Brake pedal (free-travel, linkage, and return spring).* Examine to see that the pedal free-travel is satisfactory (¼ to ½ inch) and that the pedal is in good condition; that the master cylinder push rod yoke is securely connected to the pedal and that the connection is not excessively worn; and that the pedal return spring returns the pedal to fully released position.
67	67	*Brake master cylinder (leaks, vent, and fluid level).* The cylinder should be in good condition and secure, the boot properly installed, and no indication of fluid leakage. See that vent line connected to filler extension is in good condition, securely connected, and open.
67	67	*Serve.* Remove dirt from and around the filler plug, remove filler plug, and fill the master cylinder reservoir to proper level (pars. 57 and 59*r*). Use only specified brake fluid. Install filler plug, using new gasket when necessary.
68	68	*Air-hydraulic power cylinder (air lines and cylinder).* See that these items are in good condition and securely assembled and mounted. Also note if brake fluid is leaking from the slave cylinder or control valve. Make sure air lines are securely connected and not leaking (par. 227*b*).
70	70	*Compressed-air tanks.* Observe whether they are in good condition and secure (fig. 136). Open drain cocks to expel moisture. Be sure to close drain cocks after draining.
71	71	*Transmission (mounting, seals, and linkage).* Note whether the transmission case is in good condition and securely mounted or whether oil is leaking from its seals

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		or gaskets. Make sure control linkage is in good condition, properly connected, and secure.
71		*Tighten.* Tighten all transmission mounting and external assembly bolts and cap screws securely.
72	72	*Transfer (mounting, linkage, seals, vent, and power-take-off).* See that transfer case and power-take-off are in good condition and securely mounted; that the control linkage is in good condition and securely connected; that the seals do not leak; and that the transfer vent line is open and securely connected.
72	72	*Tighten.* Tighten all transfer and power-take-off mounting bolts.
72		*Tighten.* Tighten all external transfer and power-take-off assembly bolts and cap screws.
73	73	*Rear propeller shafts.* Inspect in the same manner as item 62.
73		*Tighten.* Tighten the universal joint and companion flange bolt nuts to 33–43 pound-feet torque.
74	74	*Center bearing (pillow block) (seals and mounting).* Examine pillow block for any excessive end play. See that it is adequately lubricated, that its seals are not leaking, and that the mountings are secure.
74	74	*Tighten.* Tighten the center bearing mounting stud nuts to 48–64 pound-feet torque.
75	75	*Rear axles (pinion end play, seals, and vent line).* Inspect these items in same manner as described in item 61.
75	75	*Clean.* Clean rear axle vent lines in same manner as in item 61.
77	77	*Rear springs (clips, leaves, "U" bolts).* Inspect these items in the same manner as in item 56.
77	77	*Tighten.* Tighten main and secondary spring "U" bolts evenly and securely to 375–400 pound-feet torque.
79	79	*Cab and body mountings.* Note whether these mountings are all in good condition and secure. Front corner body mountings are coil spring type; these springs should be neither loose nor compressed until solid.
79	79	*Tighten.* Loosen bolts which attach steering column cowl bracket to spacer, then tighten cab mounting bolts to 25–30 pound-feet torque; shift steering column to instrument panel mounting so that no binding exists, then tighten steering column mounting bolts (par. 253*d*). Tighten body mounting bolts, except spring type front mountings, to 100–120 pound-feet torque. Tighten

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		spring type front body mounting bolts just enough to partially compress springs.
80	80	*Frame (side and cross members).* Inspect frame, brackets, side rails, and cross members to see that they are in good condition, secure, and correctly alined. If frame appears to be out of line, check alinement (par. 264) and report the condition to ordnance maintenance personnel.
81	81	*Wiring, conduits, and grommets.* Observe these items underneath the vehicle to see that they are in good condition, properly supported, connected, and secure.
82	82	*Fuel tank, fittings, and lines.* Inspect fuel tank to see that it is in good condition and securely mounted. Examine fuel tank and fuel lines for leaks. Examine fuel tank filler cap for defective gasket; make sure cap fits securely. Check fuel lines and fittings to see that they are in good condition, securely supported, and not leaking. See that vent line is in good condition, open, and securely connected.
82		*Fuel tank drain plug.* Remove the fuel tank drain plug and drain off the accumulated water and sediment. Drain only until the fuel starts to run clear. Use necessary precautions against fire.
37		*Fuel filter plates.* Remove fuel pump assembly and clean fuel filter plates (par. 117*d*).
38	38	*Fuel pump.* Test fuel pump for pressure as described in paragraph 117*e*. Replace pump if it does not produce proper pressure, being sure to test the new pump to make sure it is statisfactory.
83	83	*Brake lines (fittings and hose).* Observe brake lines, fittings, and hose underneath the vehicle and on axle housing to see that they are properly supported, securely connected, and not chafing or leaking.
84	84	*Exhaust pipes and muffler.* Examine the exhaust pipe to see that it is securely attached to the exhaust manifold, and the gasket does not show visible evidence of leakage. Examine all joints in exhaust pipe, at muffler, and in tail pipe to make sure they are secure and watertight. Make sure exhaust pipe, muffler, and tail pipe mountings are in good condition and secure. See that tail pipe is unobstructed at its upper end.
85	85	*Vehicle lubrication.* Lubricate all points of the vehicle in accordance with instructions on the lubrication chart (par. 57), specific lubrication information (par. 59), current lubrication bulletins or directives, and the following:

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		Use only clean lubricant. Keep all lubricant containers and dispensers covered except when withdrawing lubricant. Lubrication of items on the Preventive Maintenance Service and Technical Inspection Work Sheet that are marked with an L (special lubrication symbol) should be omitted on this vehicle lubrication service. This will avoid duplication and, in some cases, overlubrication. Before applying lubricant, clean the lubrication fitting or plug so that no dirt will enter with the lubricant. If lubrication fittings, flexible lines, vent lines or plugs are missing or damaged, they should be replaced immediately. Clean the hole in which the new fitting is to be installed, install the fittings, and lubricate the unit. On all unsealed bushings or joints, the lubricant should be applied until it appears at the openings. Open any clogged lubrication passages until lubricant is properly delivered. When draining oil from the engine, transmission, transfer, or axle housings, always drain the oil immediately after it has been warmed and agitated to a good drainage condition by operation of the engine or vehicle. Refill the units to the correct level with specified lubricant as soon as the draining is completed, so there will be little hazard that they may be operated without lubricant. ***Caution:*** Do not fill to overflowing. Reinstall all drain and filler plugs securely. Take care that any required gaskets are in good condition and in place on the reinstalled plugs. Wipe off excess lubricant that may drip onto brakes, rubber parts, or detract from the vehicle's appearance.
		Lower Vehicle to Ground
86	86	*Toe-in and turning stops.* With the front wheels on the ground, in a straight-ahead position, and using a toe-in gage (fig. 113), determine whether the front wheel toe-in is within 5/32 to 7/32 inch limits (par. 196). See that wheel turning stops (adjusting screws) are in place and securely tack-welded. Turn the front wheels to extreme right and left and see that the turn is limited by the stops. In this position, note whether the tires clear all parts of the vehicle. If there are any indications that the turning angle exceeds the specified limits (par. 6c),

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		such as loose wheel stops, scuffing of tires against the vehicle, or abnormal front axle universal joint wear, they should be reported for a check of the turning angle by a higher echelon.
		Caution: If toe-in adjustment is necessary, be sure the tie rod is in correct position and well secured after the adjustment is made (par. 196*b*). Toe-in must be kept within 3/32 to 7/32 inch limits to avoid unnecessarily rapid tire wear.
87	87	*Winch (clutch, brakes, drive, shear pin, and cable).* Check these items to see if they are in good condition, correctly assembled, and secure. See that the clutch moves freely to both the engaged and disengaged positions and latches securely. Examine the drag brake lining to see that it is in good condition, secure, and correctly adjusted to stop the drum (par. 286*a* and *b*). Inspect the automatic brake to see that the lining is secure, not excessively worn, and that spring and adjusting nut are properly assembled. Check the propeller shaft in the same manner as in item 62 and also see that shear pin is installed (fig. 187). The propeller shaft front yoke should slide freely on the shaft to insure the safety feature of the shear pin. Check safety collar clearance (fig. 187). Inspect cable for good condition, even winding, and note whether the cable chain and hooks are securely attached and in good condition. Also check the oil level in the worm gear case.
87	87	*Special lubrication.* See lubrication chart (par. 57) and paragraph 59*m* and *n* for instructions.
87		*Clean and serve.* Unwind cable and inspect for broken or frayed strands, flat or rusty spots, and kinks. Clean and oil in accordance with lubrication chart (par. 57) and paragraph 59*o*.
91	91	*Lamps (lights) (head, tail, stop, and blackout).* Operate the switches and note whether the lamps (lights) respond. Note whether any lamps (lights) remain on with the switches off. Be sure to include the stop lights. See that the dimmer switch controls the head light beams properly, and that they are properly aimed so as not to blind oncoming traffic. Examine all lamps (lights) to see that they are in good condition and secure; check for dirty and broken lenses, or discolored reflectors.
91		*Adjust.* Adjust aim of head light beams (par. 143*a*).
92	92	*Safety reflectors.* See that they are all present, in good condition, clean, and secure.

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
93	93	*Front bumper, lifting shackles, and brush guard.* See that these items are in good condition and secure.
94	94	*Hood (hinges and fasteners).* Observe whether the hood, hinges, fasteners, and props are in good condition, secure, and properly lubricated.
95	95	*Front fenders and running boards.* See that they are in good condition and securely mounted.
96	96	*Cab (doors, hardware, glass, paulin, curtains and fasteners, seats, trim, floor boards, ventilators, and map compartment).* Inspect these items to see that they are in good condition and secure; that the hardware and ventilators operate properly and are adequately lubricated; and whether or not the doors engage their bumpers and strikers and latch properly in the closed position. See that the doors are properly alined with their openings.
		Note. Glass, even if cracked or if laminated layers are separated, need not be replaced as unserviceable unless its condition constitutes a safety hazard or obstructs the vision of driver or crew.
98	98	*Circuit Breakers.* Observe whether these items are clean, dry, in good condition, secure, and whether any electrical connections are loose (fig. 95).
99	99	*Rear splash guards.* These items should be in good condition and secure.
100	100	*Body (panels, tail gate and chains, floor, stakes, sockets, bows, paulin, and curtains, and troop seats).* See that these items are in good condition and secure; that tail gate is properly alined and fastened securely; that paulin and end curtains, ropes, grommets, and metal hooks on body are all present, in good condition, and secure; and whether or not tail gate and troop seat hinges are adequately lubricated.
101	101	*Rear bumpers and pintle (latch, lock pin, and drawbar).* Observe whether or not these items are in good condition and secure. Test the pintle and latch to see that they operate properly, are adequately lubricated (par. 57) and whether the lock pin is attached with a chain. Pay particular attention to see that the spring is not broken and that the drawbar is not excessively worn.
103	103	*Paint and markings.* Examine the paint of the entire vehicle to see that it is in good condition, paying particular attention to any bright spots in finish that might cause glare or reflection. Inspect vehicle markings and

Table IV—Continued

Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6,000 Miles or 6 Months	1,000 Miles or 60 Days	
		CHASSIS, BODY, AND ATTACHMENTS—Continued
		identification for legibility. Include identification plates and their mountings.
104	104	*Radio interference suppression.* If objectionable radio noise from vehicle has been reported, locate source of noise (par. 78). If remedies prescribed in paragraph 78 do not eliminate the trouble, report the condition to the designated individual in authority.
		TOOLS AND EQUIPMENT
131	131	*Tools (vehicle and pioneer).* Check all the vehicle tools against ORD 7 SNL G–749 to see that they are all present. Inspect to see that tools are in good condition, clean, and properly stowed or securely mounted. Also examine the tools which have cutting edges to see that they are sharp. Any tools mounted on the outside of the vehicle which have bright or polished surfaces should be painted or otherwise treated to prevent rust, glare, or reflection.
132	132	*Fire extinguishers.* See that they are in good condition, securely mounted, and fully charged. The charge may be determined by shaking. Also be sure the nozzles are free from corrosion.
133	133	*Decontaminator.* Note whether decontaminator is in good condition, securely mounted, and fully charged. Make the latter check by removing the filler plug. *Note.* The solution must be replaced every 3 months, as it deteriorates.
134	134	*First aid kit.* See that the kit is in good condition, and that all of its items are present and properly packed. Report any deficiencies immediately.
135	135	*Publications and Standard Form 91.* The vehicle and equipment manuals, lubrication order, Standard Form 91, and DA AGO Form 478 should be present, legible, and properly stowed.
136	136	*Traction devices (chains).* Examine tire chains to be sure they are in good condition, clean, not excessively worn, protected against rust, and properly stowed.
137	137	*Tow (chains cables, rope, and block).* Inspect all provided towing devices to see that they are in good condition, clean, and properly stowed. Tow chains or cables must be properly protected against rust when not in use. If snatch blocks are furnished, check to see that they operate freely.