TM 9-1774

WAR DEPARTMENT TECHNICAL MANUAL

ORDNANCE MAINTENANCE

Snow Tractor M7 and 1-Ton Snow Trailer M19

WAR DEPARTMENT • *17 APRIL 1944*

FOR ORDNANCE PERSONNEL ONLY

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WAR DEPARTMENT
Washington 25, D. C., 17 April 1944

TM 9-1774, Ordnance Maintenance: Snow Tractor M7 and 1-ton Snow Trailer M19 (Allis-Chalmers), is published for the information and guidance of all concerned.

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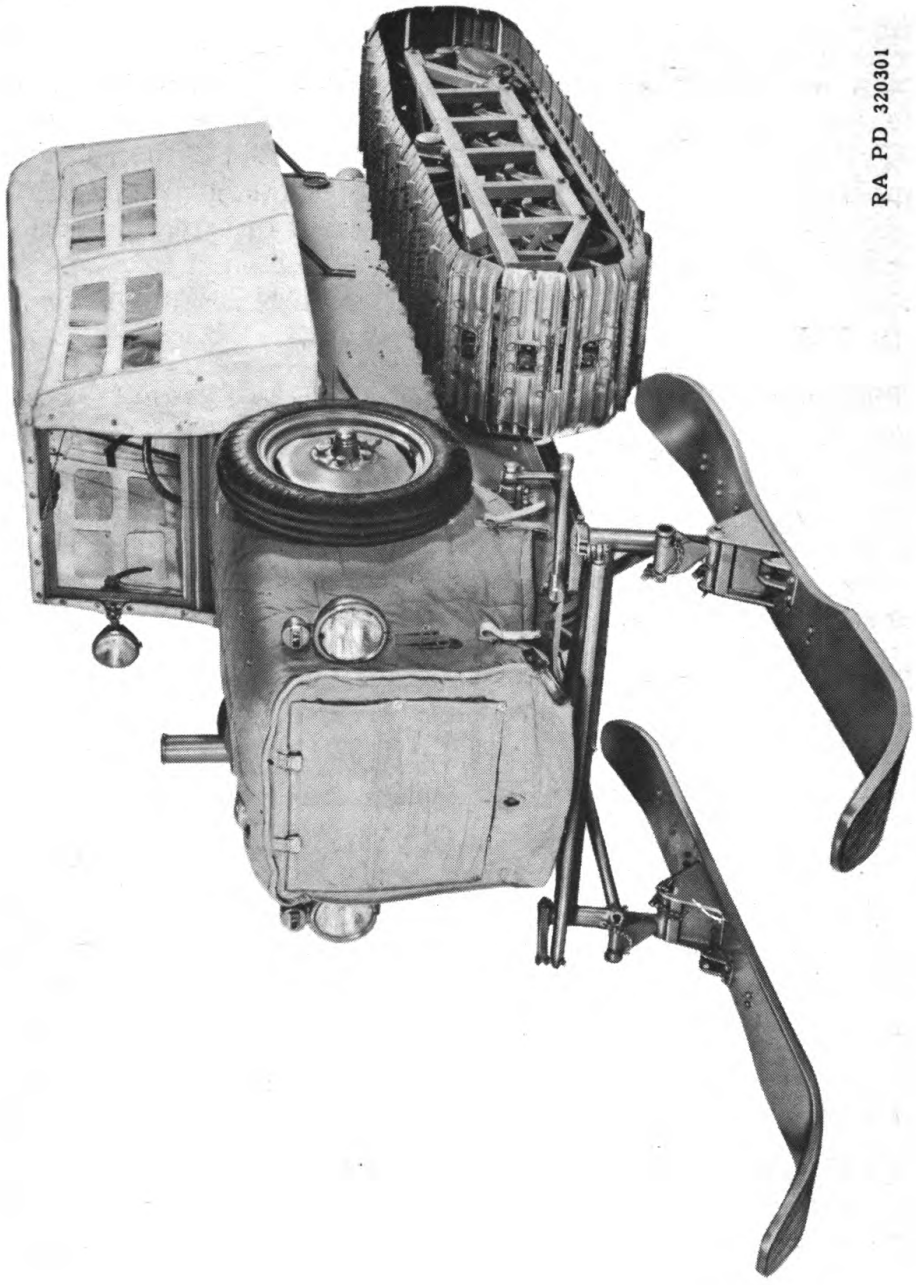
(For explanation of symbols, see FM 21-6.)

CONTENTS

CONTENTS—Contd.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)



RA PD 320301

Figure 1 — Snow Tractor M7 — Left Front View

CHAPTER 1

INTRODUCTION

1. SCOPE.

a. The instructions contained in this manual are for the information and guidance of personnel charged with the maintenance and repair of Snow Tractor M7 (Allis-Chalmers) and Snow Trailer, 1-ton M19 (Allis-Chalmers). These instructions are supplementary to field and technical manuals prepared for the using arms. This manual does not contain information which is intended primarily for the using arms, since such information is available to ordnance maintenance personnel in 100-series TM's, or FM's.

b. This manual contains a description of, and procedure for disassembly, cleaning, repair, and assembly of the auxiliary transmission, tracks, track frame and final drive assembly, steering gear, steering column, front axle, front wheel and ski assemblies, brakes, pintle, windshield wiper motor, engine preheater, and body heater. The removal and installation of all the trailer parts is covered in TM 9-774.

c. Maintenance information that is available from other TM's on standard equipment or accessories on the vehicle is not included in this manual, but is available in the following manuals:

Engine assembly	TM 9-1803A
Clutch	TM 9-1803A
Water pump	TM 9-1803A
Generator	TM 9-1825B
Engine cranking motor	TM 9-1825B
Carburetor	TM 9-1826A
Distributor	TM 9-1825B
Generator regulator	TM 9-1825B
Speedometer	TM 9-1829A
Transmission	TM 9-1803B
Propeller shaft	TM 9-1803B
Differential	TM 9-1803B

Description, removal, and installation procedures for the above components and assemblies is covered in TM 9-774.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

2. MWO AND MAJOR UNIT ASSEMBLY REPLACEMENT RECORD.

a. Description. Every vehicle is supplied with a copy of W.D., A.G.O. Form No. 478 which provides a means of keeping a record of each MWO completed or major unit assembly replaced. This form includes spaces for the vehicle name and U.S.A. registration number, instructions for use, and information pertinent to the work accomplished. It is very important that the form be used as directed and that it remain with the vehicle until the vehicle is removed from service.

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

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

CHAPTER 2

FUEL SYSTEM

3. GENERAL.

a. Description (fig. 2). The fuel system of the engine is the same as that used in the ¼-ton, 4 x 4, Command Reconnaissance Truck (Willys 1942), with the exception of the fuel tank.

4. FUEL TANK.

a. Description. The fuel tank, located under the driver's seat, has a tunnel built in the center, running from front to rear, through which the propeller shaft turns. Removal and installation procedures for the fuel tank are covered in TM 9-774.

b. Cleaning. The following methods can be used to clean the fuel tank thoroughly. The methods are listed in order of preference.

(1) First Method. Fill a 5-gallon can with heavy-duty alkaline cleaner compound. Dissolve in 50 gallons of water. Bring the solution to the boiling point in a large steam-heated vat. Remove the fuel tank from the vehicle. Remove the caps, plugs, and fuel gage sending unit; place everything except gage sending unit in the vat, and boil at least 30 minutes. This should eliminate all inflammable substances. Rinse the tank with water and dry with compressed air before testing or repairing it.

(2) Second Method. Flush the tank for 15 minutes with boiling water (admitted at the bottom of the tank through drain opening), and allow the water to overflow at the top. Then steam fuel tank 3 hours. Admit live steam at the top of the tank and allow it to escape through bottom outlet. If live steam is not available, flush with boiling water continuously for 3 or 4 hours, and dry the tank thoroughly with compressed air. This process is not positive and should be used only when it is not feasible to use the first method. NOTE: *Exercise great caution.*

(3) Third Method. Drain tank thoroughly. Pour approximately 1 gallon of carbon tetrachloride into the tank, and flush thoroughly. Allow some of the fluid to remain in the tank if repairs are to be made.

(4) Preparing Tank for Repair. Repair work must be accomplished as soon as possible after the tank has been cleaned. In no case should the tank be allowed to stand more than 30 minutes before being repaired. When repairs can be accomplished by sol-

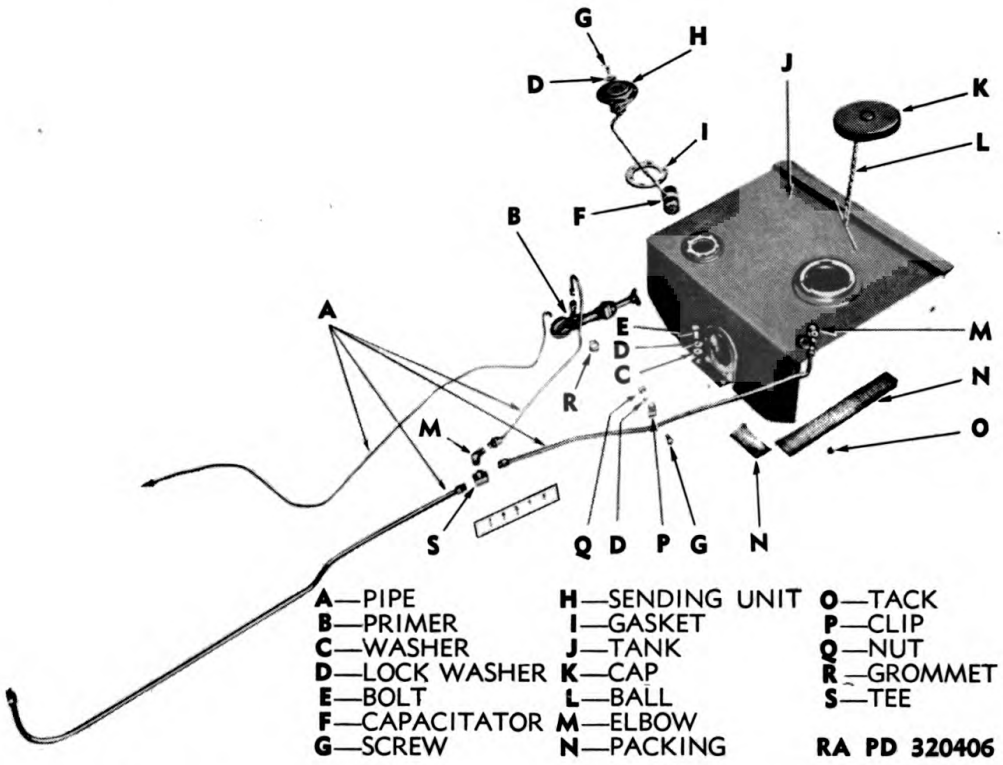


Figure 2 — Fuel Tank and Lines—Exploded View

dering, it generally will not be necessary to prepare tank as indicated above. The tank, however, must be thoroughly drained, and as a precaution it should be blown out with compressed air to remove all volatile residue. The soldering iron should not be made red hot as it may ignite any explosive mixture remaining in the tank. Care must be taken when handling fuel tank to avoid producing sparks that may ignite the volatile mixture of fuel and air. The use of power sanding machine or equipment that produces sparks should be prohibited.

c. Inspection. After first cleaning fuel tank inside and out as outlined above, use one of the following methods to test for leaks:

(1) THE WET METHOD.

(a) Plug tightly all openings except the filler neck.

(b) Dry the entire outer surface of the tank thoroughly with compressed air and a clean, dry rag.

(c) Place the tank on a bench on top of blocks so that all outer surfaces can be easily seen.

(d) Fill the tank with water.

(e) Insert the end of the air hose in the filler neck and cover the rest of the opening with the palms of the hands.

(f) Have another man apply air pressure against the water by opening the air valve for a few minutes.

(g) Examine the entire tank for moist spots and mark them, where water was forced through.

(2) THE AIR PRESSURE METHOD.

(a) Plug all openings except the fuel outlet connection.

(b) Attach the loose end of the air supply hose to the fuel outlet connection by a short threaded tube.

(c) Submerge the fuel tank in a tank of clean water, or cover the tank with soapy water.

(d) Turn on the air pressure, but not more than 7 pounds.

(e) Draw a ring around each spot on the fuel tank where bubbles appear, to indicate where the tank needs repairing. The bubbles give evidence of a leak.

d. Repair. Prepare the fuel tank for repair as outlined under subparagraph **b** (4), above. Use scraper or wire brush to thoroughly clean around leak. Tin surface around leak by using soldering iron and flux. After surface is tinned, cover hole with solder by melting solder and drawing a bubble of solder over hole. After all leaks are soldered, test tank again as explained in subparagraph **c** (1) and (2), above.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

CHAPTER 3

ELECTRICAL SYSTEM

Section I

DESCRIPTION

5. DESCRIPTION.

a. General (fig. 3). The electrical system of the vehicle includes the battery (6-v), generator, generator regulator, engine cranking motor, lights, light switches, engine cranking motor switches, windshield wiper motor, trailer outlet receptacle, and the necessary wires and cables for operation of the electrical units. Maintenance of only the windshield wiper motor is covered in this manual.

Section II

WINDSHIELD WIPER MOTOR

6. DESCRIPTION.

a. The windshield wiper motor used on this vehicle is a Dyneto (Model 1753) 6-volt, electric-motor-driven assembly, with a manual-operation lever mounted on wiper arm shaft for use in case of failure of mechanical power. The wiper blade arm travels in a 140-degree arc. A clutch (built into wiper arm shaft assembly) allows wiper to be manually operated without damage to motor, and prevents damage to motor in case of stoppage of the arm by ice or snow. The switch that controls the wiper motor is mounted on motor housing.

7. DISASSEMBLY.

a. Remove Covers (fig. 4). Remove hand-operating lever by turning squarehead screw counterclockwise and sliding lever from wiper blade arm shaft. Remove nut and lock washer from wire connecting terminal. Remove two screws from sides of motor cover and remove cover. Remove seven screws from gear housing cover, and pull cover and gaskets from shaft.

b. Remove Gears (fig. 5). Pull wiper arm shaft assembly from housing. Pull actuating quadrant and connecting rod

ELECTRICAL SYSTEM

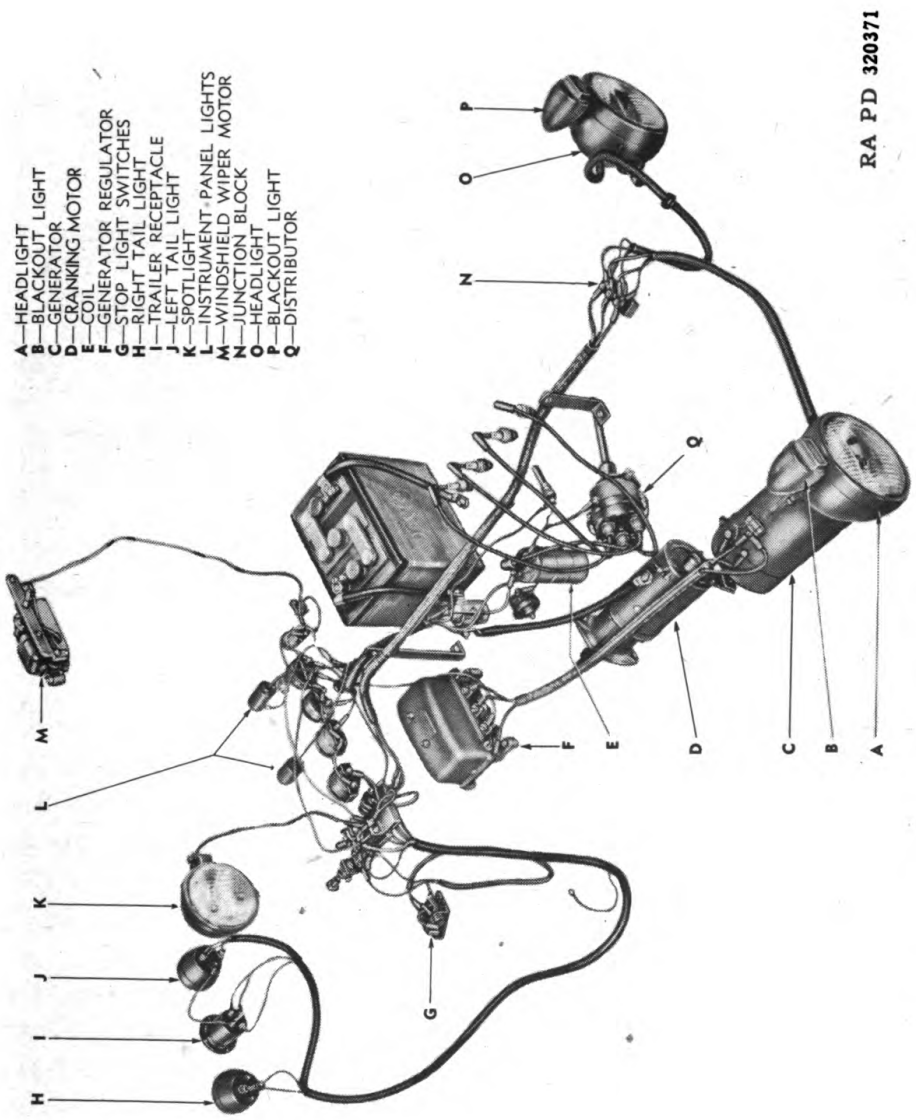


Figure 3 — Photo Wiring Diagram

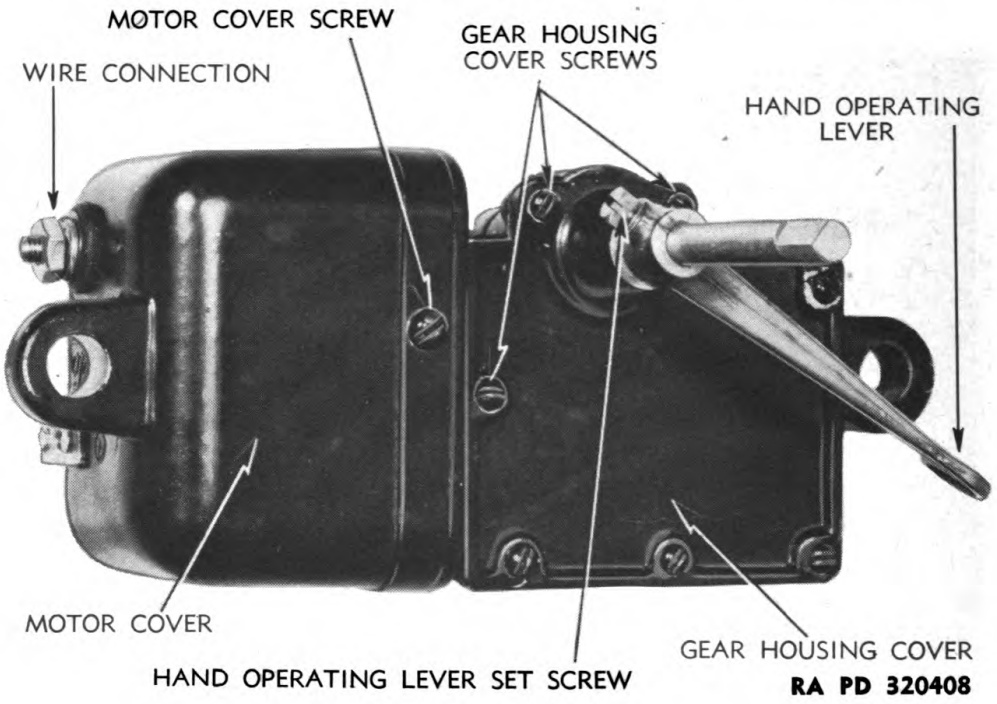


Figure 4 — Wiper Motor

from housing. Pull eccentric gear assembly from housing. Pull worm driven gear assembly from stub shaft.

c. Remove Armature (fig. 5). Unhook brush holders from pivot pins, being careful not to break pigtails, and lay up over wire connection post out of way. Pull armature from housing. NOTE: *The gears must be removed before armature can be pulled from housing.*

d. Remove Field Assembly (fig. 5). Unsolder wires from connecting terminal and field coil connections at top of field coil, and tag for identification. Remove four screws and washers from field poles, and remove field assembly.

e. Disassemble Housing. NOTE: *The switch housing is riveted to gear housing with two rivets. Switch housing also acts as cap for wiper arm shaft bearing.* To remove armature shaft bushings, first tap out expansion plug from end of outer bearing by reaching through armature bushing holes in housing and then pressing out bushings.

8. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and blow dry with compressed air. Check all parts for wear or damage and all wires for faulty insulation.

ELECTRICAL SYSTEM

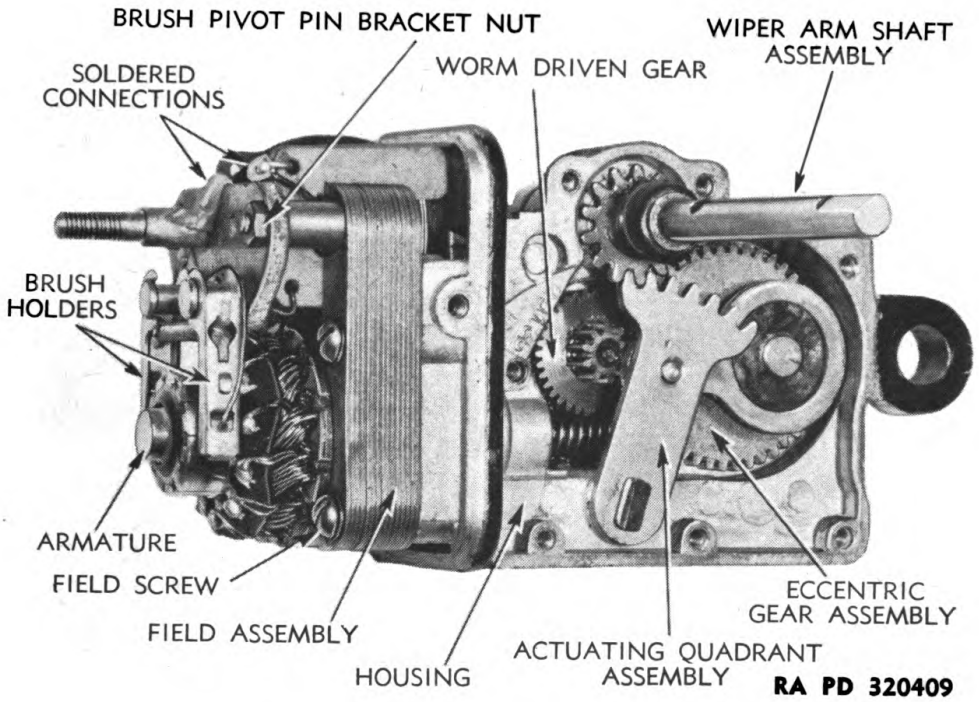


Figure 5 — Wiper Motor, Cover Removed

b. Repair. Be sure segments of commutator are not connected by accumulated particles of metal. Be sure that brushes are clean and smooth on commutator contact faces, and that brush is not so worn that brush holders will strike commutator.

9. ASSEMBLY.

a. Assemble Housing. Press armature shaft bushings into housing, leaving outer ends of bushings flush with housing bore. Tap expansion plug into place at end of outer bushing.

b. Install Field Assembly. Install assembly with four screws and washers. Solder the field coil connections to their proper connections.

c. Install Armature. With brush holders laid up out of way, insert long end of armature shaft through bushings in housing. Lower brush holders into place with upper sockets contacting pivot pins, being sure that spring is in place between brush holders, and that brush holders work freely on pivots.

d. Install Gears. Put some petrolatum in hub of worm driven gear and install on stub shaft with small gear out. Swab shaft of eccentric gear with same lubricant, and install into place in housing. Lubricate bearing surfaces of actuating quadrant and con-

necting rod, and install in housing so that connecting rod is hooked over cam on eccentric gear Lubricate wiper arm shaft and gear with vaseline and install assembly into housing so that gear engages actuating quadrant. Turn armature by hand to test for free movement of gears.

e. Install Covers. Install motor cover, and secure with two screws and one nut and lock washer. Install gear housing cover gasket and cover with seven screws. Tighten screws evenly. Install hand operating lever, with offset end of lever away from end of shaft, over wiper arm shaft, and line screw hole in lever with set screw hole in shaft. Install square-head set screw and tighten so that end of screw engages hole in shaft.

CHAPTER 4

TRANSMISSION AND AUXILIARY TRANSMISSION

Section I

DESCRIPTION AND DATA

10. DESCRIPTION OF TRANSMISSION.

a. The transmission is of the three-speed synchromesh type with synchronized second and high speed gears. The input and output shafts of transmission are equipped with ball bearings. The pilot bearing between the two shafts is a roller bearing. The countershaft gear cluster and reverse idler gear run on bushings. The clutch throw-out bearing carrier tube is an extension of the front bearing retainer. The clutch shaft is supported on the front end by a pilot bushing in the engine flywheel. The transmission is bolted to the clutch bell housing by four cap screws.

b. The connection between transmission and auxiliary transmission is such that it is advisable to remove the two assemblies as a unit. Both assemblies use the same oil supply. There are two modifications which must be made to a standard Willys MB transmission for use in the Snow Tractor M7 because of the oiling system and accessibility of shifting lever when installed in vehicle. These modifications are thoroughly explained in paragraphs 19 and 20.

11. DESCRIPTION OF AUXILIARY TRANSMISSION.

a. The auxiliary transmission is of the overdrive and underdrive type driven by the transmission output shaft. The auxiliary transmission is bolted to the rear of the transmission. Both units use the same oil supply. However, each unit has a drain plug, as both assemblies must be drained separately.

b. The auxiliary transmission case holds the transmission shifter shaft interlock plunger in place when bolted to rear of transmission case, and also is the bearing retainer for the transmission output shaft bearing.

12. DATA.

a. Transmission.

Ratio:

Low	2.665 to 1
Second	1.564 to 1
High	1 to 1
Reverse	3.554 to 1

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

b. Auxiliary Transmission.

Width of sliding gear shifter fork groove (new)	0.320 in.
Width of shifter fork (new)	0.3175 in.
Free length of shifter fork spring	3/4 in.
Outside diameter of shifter fork spring	3/8 in.
Diameter of shifter fork detent ball	3/8 in.
Ratio:	
Low	2.00 to 1
High	0.500 to 1

Section II

REMOVAL OF AUXILIARY TRANSMISSION FROM TRANSMISSION

13. PRELIMINARY INSTRUCTIONS.

a. Drain Assembly. Procure suitable pan over which to set assembly. Remove drain plug from left side of auxiliary trans-

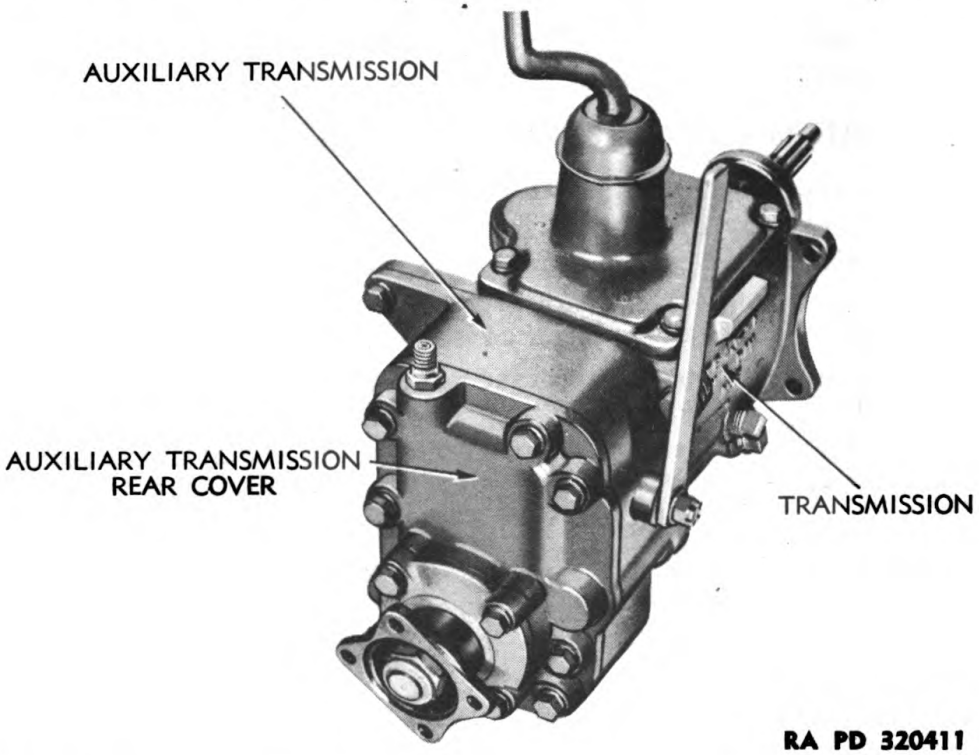


Figure 6 — Transmission and Auxiliary — Right Rear View

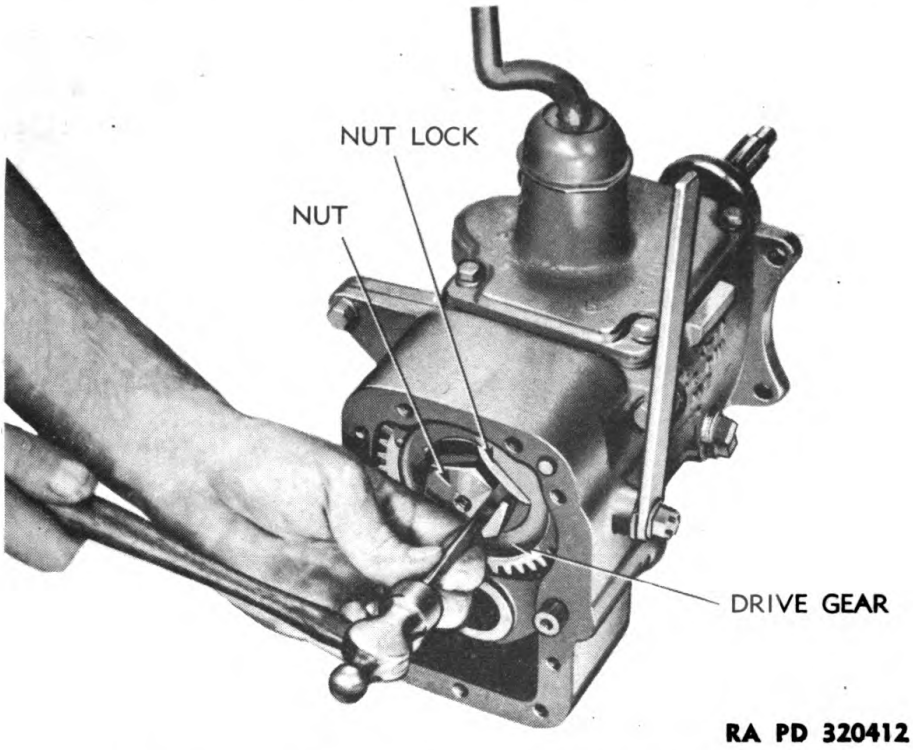


Figure 7 — Auxiliary Cover Removed

mission case and drain plug from right side of transmission case. Allow assembly to drain thoroughly.

b. Clean Exterior of Assembly. Plug all openings to interior of transmission and auxiliary transmission assembly, and remove all dirt and grease with dry-cleaning solvent or steam cleaning equipment.

14. REMOVAL.

a. Remove Auxiliary Transmission Rear Cover. Remove nine cap screws and lock washers holding rear cover to case (fig. 6). Remove rear cover assembly and output shaft by tapping rear cover from dowels. Remove gasket.

b. Remove Drive Gear. Straighten nut lock from nut on drive gear (fig. 7). Remove large nut by turning counterclockwise. A soft rod between gear teeth will prevent gear from turning while loosening nut. Nut lock will come off with nut. Remove drive gear.

c. Remove Sliding Gear. Pull out shifter fork shaft (fig. 8). This will release shifter fork, detent ball, and spring. Turn shifter fork toward top of case, and lift out sliding gear and shifter fork

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

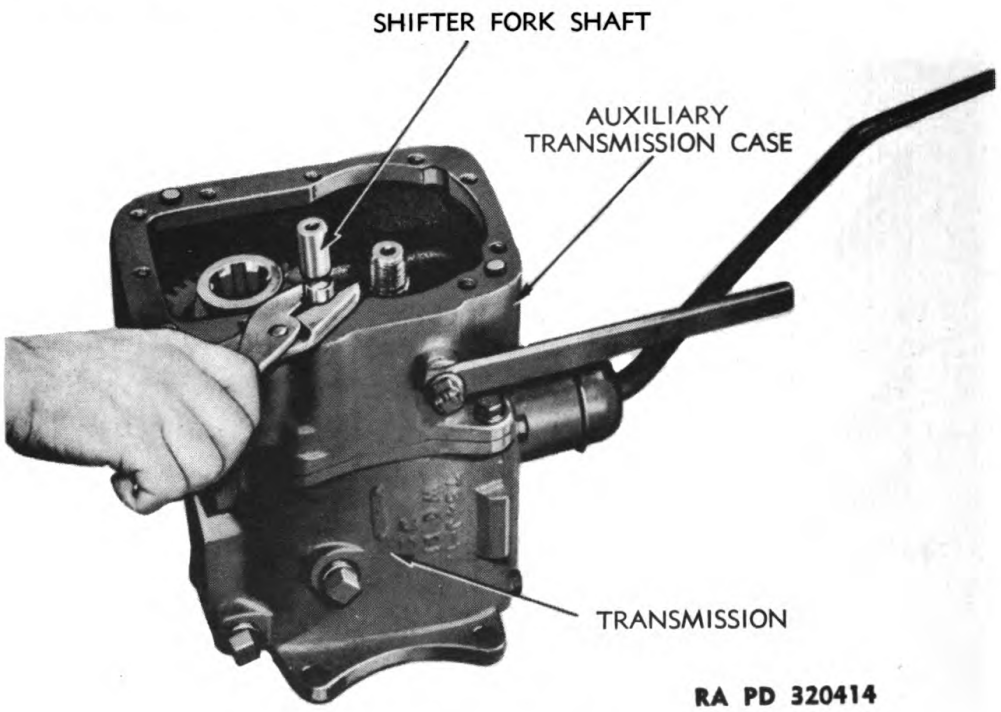


Figure 8 — Shifter Fork Shaft

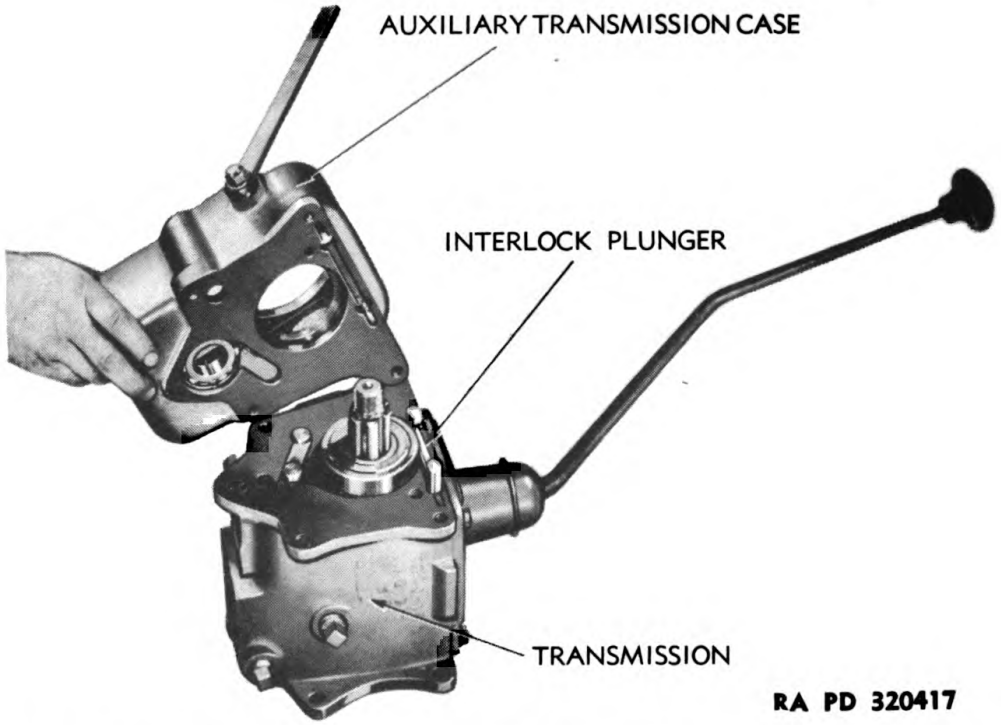


Figure 9 — Cases Separated Showing Interlock Plunger

assembly. Remove detent ball and spring from shifter fork. Remove shifter fork from gear.

d. Remove Auxiliary Transmission Case Assembly. Remove four cap screws holding auxiliary transmission case to transmission. One of these cap screws will be reached inside case. Remove auxiliary transmission case and shift lever assembly. This will also release transmission shifter shaft interlock plunger (fig. 9). Remove plunger. Remove gasket.

Section III

DISASSEMBLY, CLEANING, REPAIR, AND ASSEMBLY OF AUXILIARY TRANSMISSION

15. DISASSEMBLY.

a. Disassemble Case Assembly. Remove cotter pin and nut from shifter arm and shaft. Remove shifter lever and oil seal. Remove shifter arm and shaft assembly from inside of case. Press bearing from case (fig. 10).

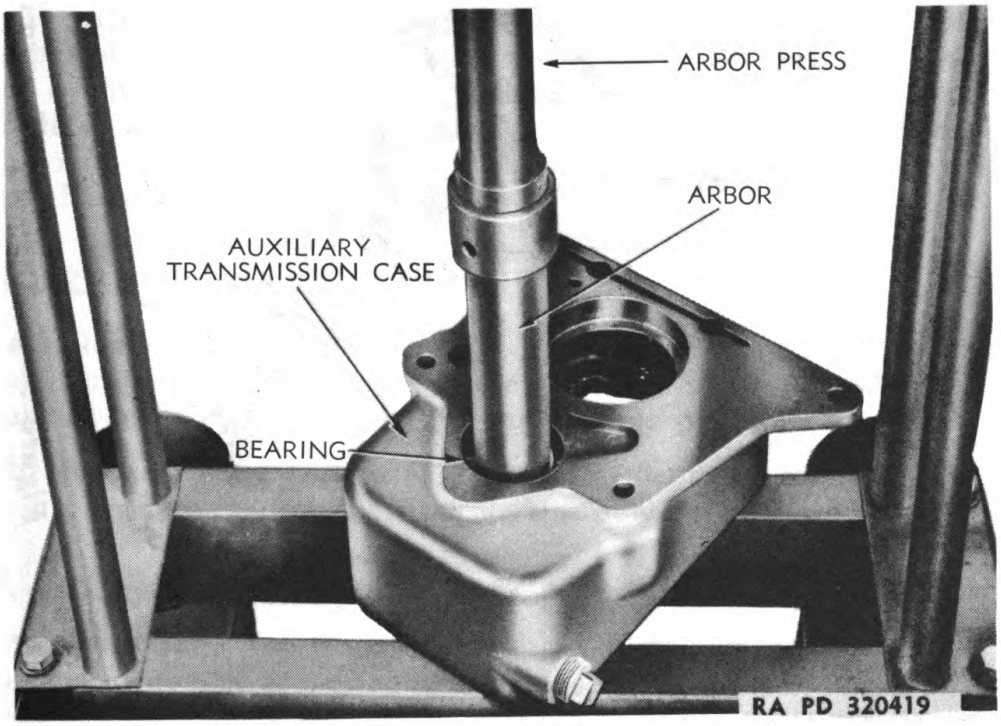


Figure 10 — Pressing Bearing From Auxiliary Transmission Case

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

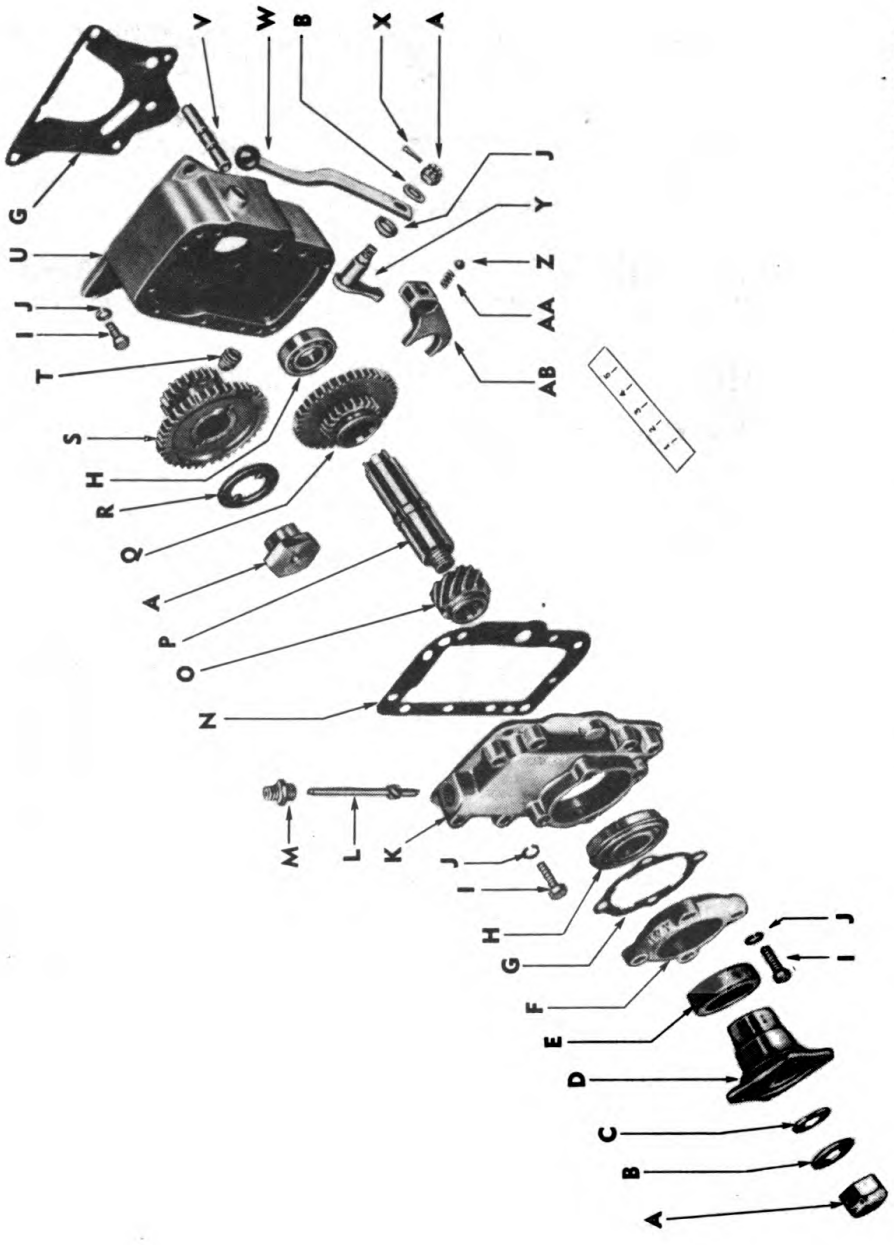


Figure 11 — Auxiliary Transmission Assembly Disassembled

TRANSMISSION AND AUXILIARY TRANSMISSION

A—NUT
B—WASHER
C—PACKING
D—FLANGE
E—OIL SEAL
F—CAP
G—GASKET
H—BEARING
I—CAP SCREW
J—LOCK WASHER
K—COVER
L—SPEEDOMETER DRIVEN GEAR
M—NIPPLE
N—GASKET
O—SPEEDOMETER DRIVE GEAR
P—DRIVE SHAFT
Q—SLIDING GEAR
R—NUT LOCK
S—DRIVE GEAR
T—PLUG
U—TRANSFER CASE
V—SHIFT SHAFT
W—LEVER
X—COTTER PIN
Y—SHIFT ARM ASSEMBLY
Z—3/8-IN. BALL BEARING
AA—SPRING
AB—SHIFTER FORK

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Legend for Figure 11 — Auxiliary Transmission Assembly Disassembled

b. Disassemble Rear Cover Assembly. Remove speedometer drive nipple by turning counterclockwise (fig. 11). Pull out speedometer drive shaft. Remove four cap screws holding bearing cap to rear of cover. Tap on splined end of shaft to remove shaft, cap, and bearing assembly. Remove cap gasket. Clamp splines of shaft in soft-jawed vise, and remove special nut by turning counterclockwise. Remove flat washer and oil seal from recess in universal joint flange. Press shaft from cap and flange (fig. 12). Turn cap over and press out oil seal (fig. 13). Press shaft from speedometer gear and bearing.

16. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent. Blow dry with compressed air. Special care should be given to cleaning bearings to see that balls are not chipped and pieces left in race.

b. Repair. Check all parts for wear or damage. Replace damaged or worn parts with new parts. Use new gaskets and oil seals.

17. ASSEMBLY.

a. Assemble Rear Cover Assembly. Install speedometer drive gear over threaded end of auxiliary transmission output shaft, with teeth of gear first, and press up against shoulder on shaft. Press output shaft rear bearing onto shaft and against gear just installed, having snap ring on bearing outer race away from gear. Install shaft, gear, and bearing through hole in cover; tap bearing into

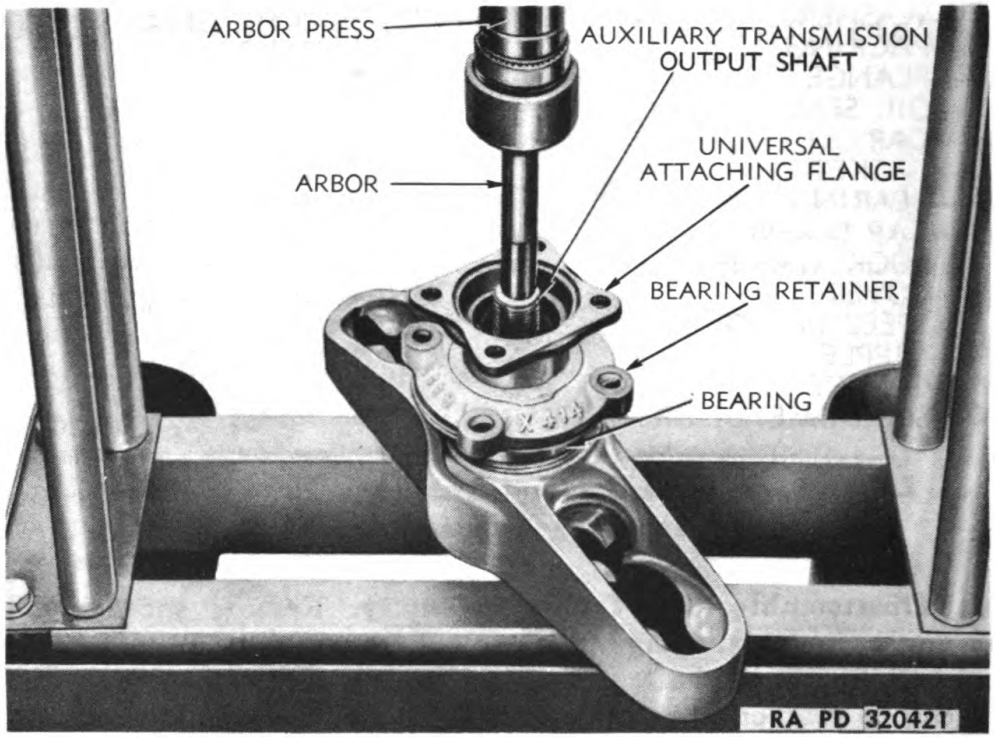


Figure 12 — Pressing Shaft From Bearing and Cap

cover until snap ring contacts bottom of counterbore in cover. Clamp splined end of shaft in soft-jawed vise, being careful not to injure splines. Install rear bearing cap and gasket over threaded end of shaft, and secure with four cap screws and lock washers. Tap oil seal into cap with lip of seal toward bearing, and leave outer edge of seal even with face of cap. Install universal joint attaching flange over shaft splines and into seal. Install seal washer, flat washer, and special nut. Tighten nut. Remove assembly from vise. Install speedometer drive shaft into hole at top of cover, with gear end first. Install speedometer drive shaft nipple.

b. Assemble Case Assembly. Press output shaft front bearing into bearing counterbore, inside auxiliary transmission case near bottom, as far as it will go. Install shifter lever arm and shaft assembly through hole, on right side of case, and from inside of case. Hold shaft in place with arm pointing down. Install seal washer. Install shifter lever, with offset at top of lever over case, onto shaft, and with lever in opposite direction to shaft arm. Install castle nut and cotter pin.

TRANSMISSION AND AUXILIARY TRANSMISSION

Section IV

INSTALLATION OF AUXILIARY TRANSMISSION TO TRANSMISSION

18. INSTALLATION.

a. Install Auxiliary Transmission Case Assembly. Install auxiliary transmission case to transmission case gasket onto rear of transmission case with cement. Install transmission shifter shaft interlock plunger between shifter shafts, and hold in place with heavy grease. Install auxiliary transmission case with four cap screws and lock washers, being very sure not to dislodge interlock plunger.

b. Install Sliding Gear. Hold sliding gear at back of auxiliary transmission case with shifter fork collar of gear away from case. Install shifter fork into gear collar from right side and with shaft hole of fork to top. Set gear and fork into auxiliary transmission case, and engage top slot of fork with lower end of shifter lever shaft arm. Install detent spring and ball into recess below shaft hole in top of fork. Start shifter fork shaft, with

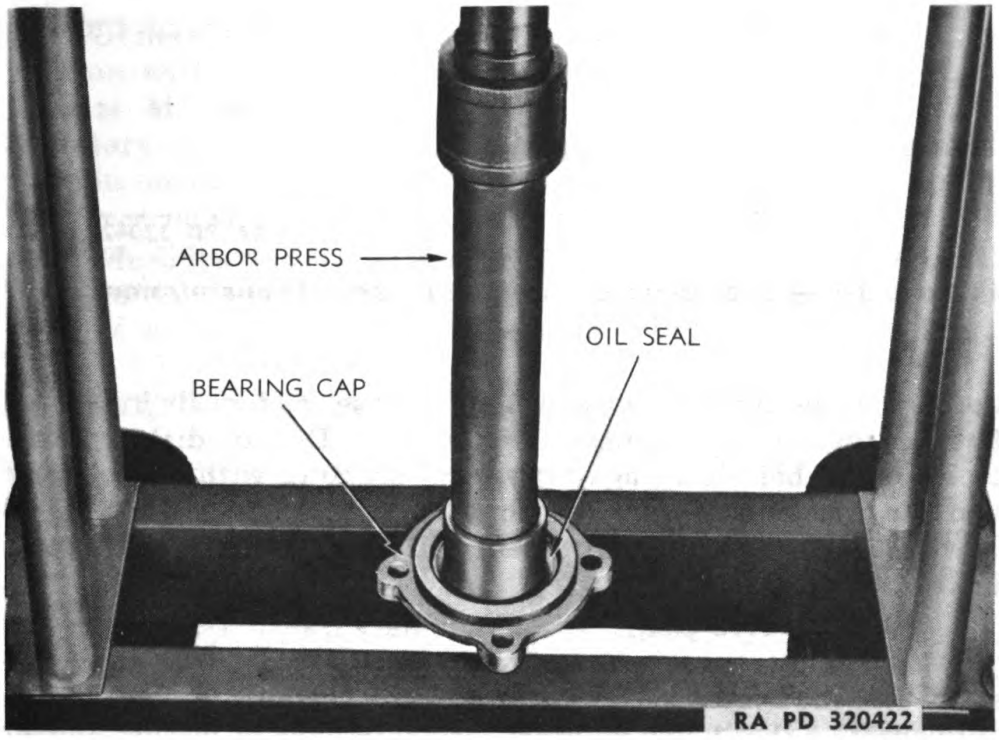


Figure 13 — Pressing Seal From Bearing Cap

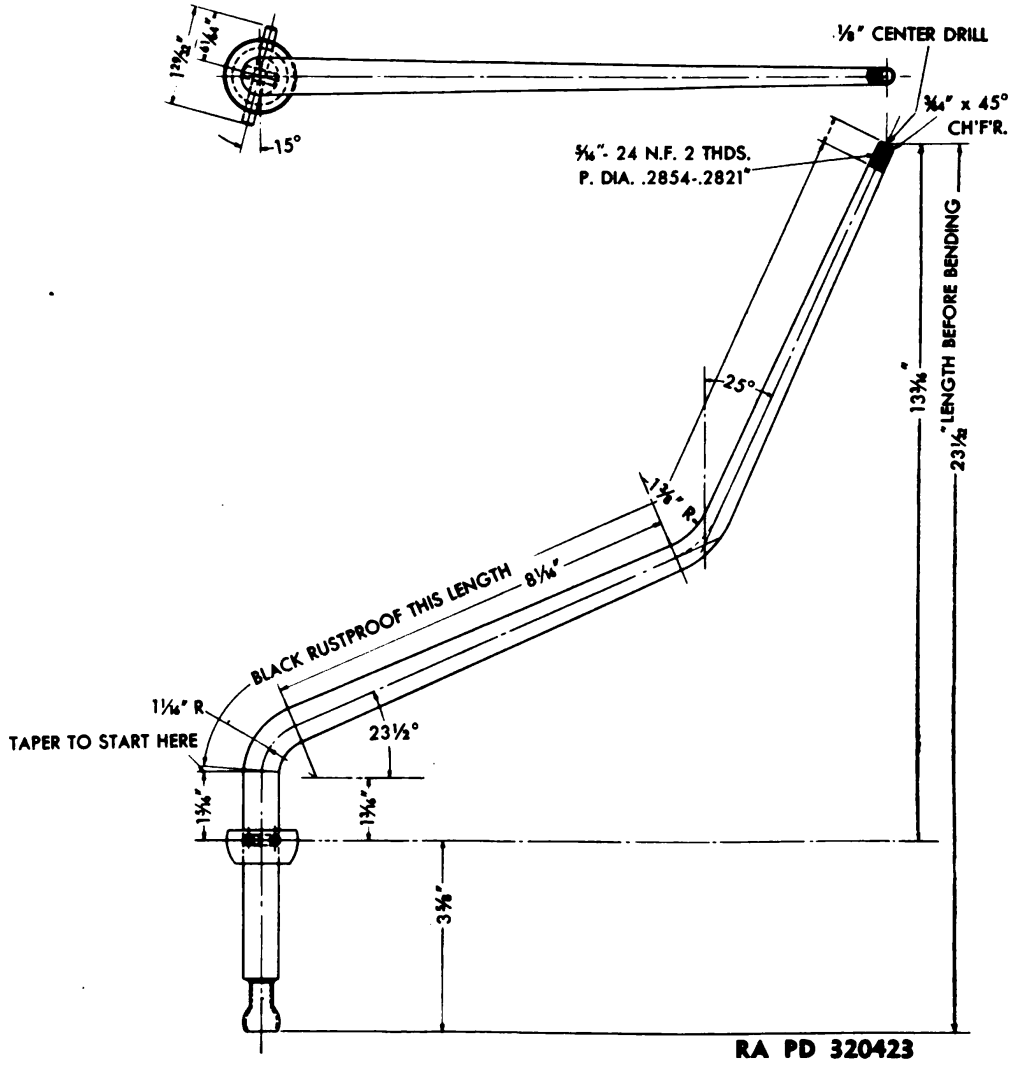


Figure 14 — Modification Diagram for Transmission Shift Lever

notches away from case, into hole in case, and push into shaft hole in fork until it touches detent ball. Do not dislodge ball. Hold detent ball down against spring pressure with screwdriver, and push shaft in so it will hold ball while screwdriver is removed. Push shaft in until detent ball engages first detent notch in shaft.

c. Install Drive Gear. Install auxiliary transmission drive gear onto transmission output shaft with small gear toward transmission. Install nut lock over special nut. Install nut and washer onto shaft so that tangs on inner circumference of washer engage slots in drive gear. Tighten nut and bend edge of nut lock against nut.

d. Install Auxiliary Transmission Rear Cover Assembly. Cement new gasket to rear of auxiliary transmission case. Install rear cover assembly by entering output shaft through splines of sliding gear and into output shaft front bearing. Install nine cap screws and lock washers to secure cover. Test for correct shifting of gears and free rolling of shafts.

e. Lubricate Assembly. Tighten drain plugs in transmission and auxiliary transmission cases. Remove filler plug from transmission case. Lay assembly on left side. Pour or pump in 1½ quarts of lubricant. See TM 9-774 for correct lubricant. Install filler plug. Set assembly upright, and check for leaks. If assembly is not to be used immediately, tape speedometer drive shaft nipple to keep out dirt until ready to install assembly.

Section V

MODIFICATION OF WILLYS MODEL MB TRANSMISSION CASE AND LEVER, FOR USE IN SNOW TRACTOR M7

19. MODIFICATION OF SHIFTING LEVER.

a. General. The shifting lever of the Willys Model MB transmission will have to be modified in order to be used in Snow Tractor M7 because of the design of tractor body. It will be necessary to follow instructions in following subparagraph **b** for this modification. If transmission is issued as an assembly the lever must be removed.

b. Modification. The lever modification details are completely outlined in figure 14 with proper dimensions. Heat lever locally to make bends.

20. MODIFICATION OF TRANSMISSION CASE.

a. General. The rear face of the Willys Model MB transmission case must be modified by the addition of two holes for circulation of transmission lubricant to and from auxiliary transmission case. Transmission must be disassembled if it is issued as an assembly, so that any chips from drilling can be removed from case before reassembling. The modification of lever and case will already be made on a transmission assembly carrying an Allis-Chalmers part number AS-213711.

b. Modification. Lay out holes as shown in figure 15, and drill to size shown.

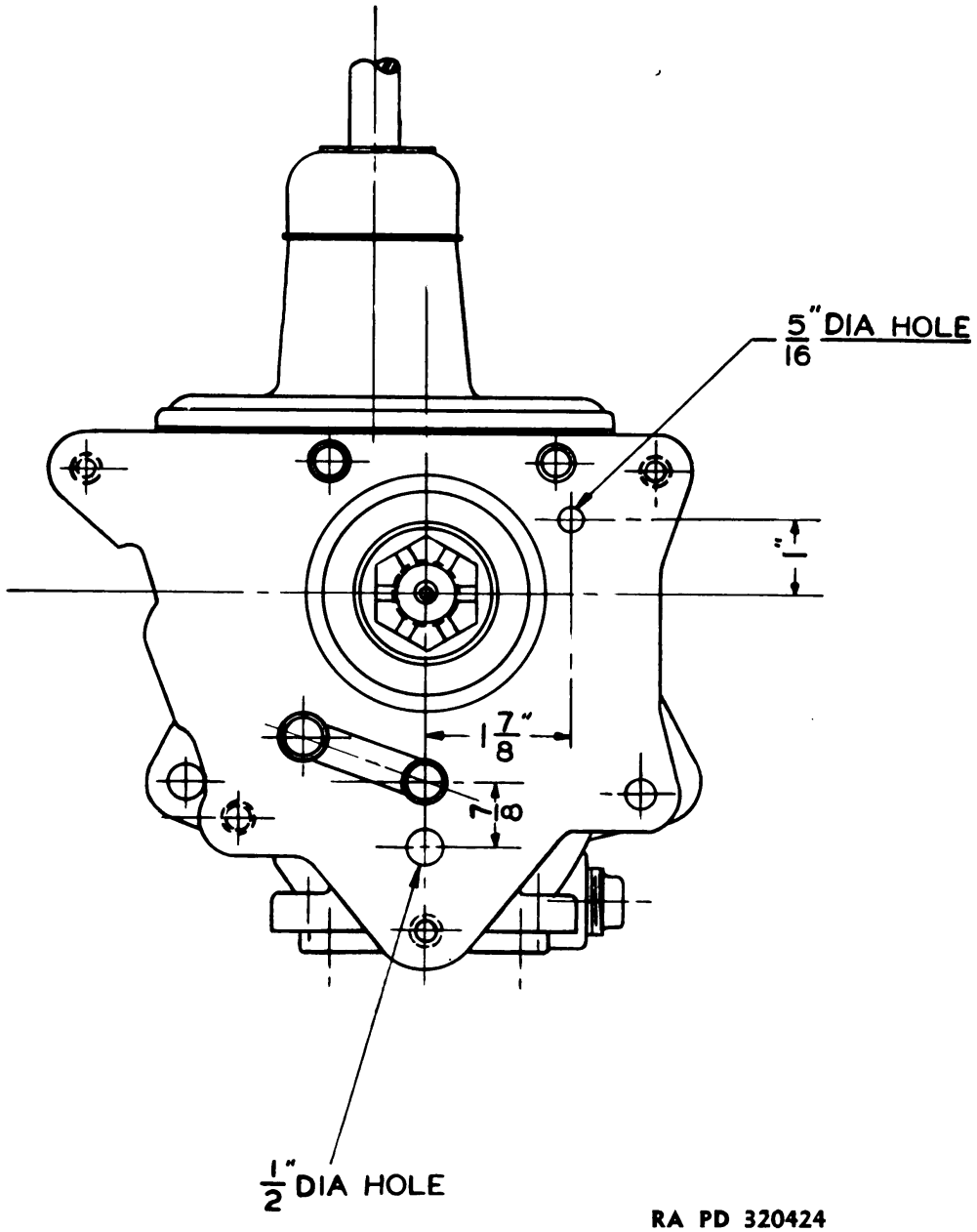


Figure 15 — Modification Diagram for Transmission Case

CHAPTER 5

STEERING GEAR, STEERING COLUMN, AND FRONT AXLE

Section I

STEERING GEAR ASSEMBLY

21. DESCRIPTION.

a. Description. The steering gear assembly is a Gemmer (Model 305) double-roller, integral-housing type with external mesh adjustment. The roller shaft turns in bushings which are pressed into the housing. The steering gear worm is supported at each end on roller bearings. Adjustment of the worm bearings is made with shims under worm cover.

b. Data.

Length of roller shaft bushings	1¼ in.
Outside diameter of roller shaft bushing	1.188 to 1.190
Inside diameter of roller shaft bushing	1.12475 to 1.12575
Outside diameter of roller shaft	1.1235 to 1.1245
Clearance (shaft to bushing)	0.00025 to 0.00225

22. DISASSEMBLY (fig. 16).

a. Clean Assembly. Remove level plug from roller shaft cover and drain lubricant. Replace level plug. Wash assembly in dry-cleaning solvent, or use steam cleaning equipment, to wash all dirt and grease from outside of assembly.

b. Remove Roller Shaft. Remove four cap screws and lock washers holding roller shaft cover to housing. Pull roller shaft cover and roller shaft away from housing enough to disengage roller shaft thrust plate from slots in end of roller shaft. Pull roller shaft assembly from housing. Clamp cover in vise, and remove lock nut and lock plate from roller shaft adjusting screw. Turn adjusting screw from cover with screwdriver in slot at end of screw. Remove roller shaft thrust plate from adjusting screw.

c. Remove Worm and Shaft Assembly. Remove four cap screws and lock washers holding worm cover to housing. Remove cover and shims. Tap on top of worm shaft with soft hammer to remove lower bearing cup and bearing. Remove worm and shaft assembly from housing. Remove upper bearing from worm. Remove worm shaft from worm by pressing shaft out toward upper end of worm.

d. Disassemble Housing. Reach through housing hole where worm was removed and tap out worm shaft oil seal with long punch. Remove roller shaft oil seal in same manner by reaching through opening where roller shaft was removed. Reach through hole where worm shaft oil seal was removed and tap upper worm bearing cup into housing to remove. Press roller shaft bushings from housing.

23. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and blow dry with compressed air. Be certain that there are no chips left in housing. Check roller bearings for cracked or scored rollers. Check roller of roller shaft to see that it rotates freely and does not bind. If roller is "seized," procure new roller shaft assembly.

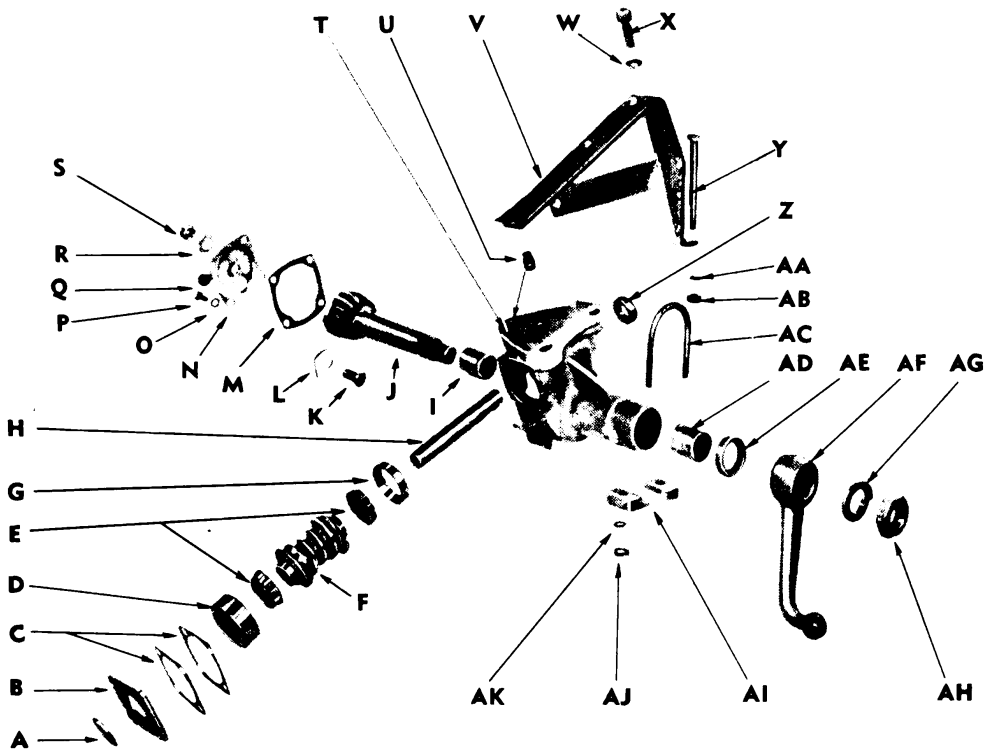
b. Repair. Obtain new oil seals as old ones will be damaged in removal. Procure new gaskets and any other parts found to be damaged or excessively worn.

24. ASSEMBLY.

a. Assemble Housing. Refer to figure 16 for correct relation of parts. Press a roller shaft bushing into each end of roller shaft hole in housing, so that outer roller shaft bushing is flush with bottom of roller shaft oil seal counterbore in housing, and inner roller shaft bushing is flush with inner end of roller shaft hole in housing. Try roller shaft for fit through above bushings. Ream to size if necessary. See paragraph 21 **b** for inside dimension of bushing. Press upper worm bearing cup into recess inside housing with smallest inside diameter toward bottom of recess by installing cup through worm cover opening in housing. Press worm shaft oil seal into housing, with lip of seal toward housing, in counterbore immediately above cup just installed. Press roller shaft oil seal into outer end of roller shaft hole, with lip of seal toward bushing.

b. Install Worm Shaft. Hold worm in left hand so that splines inside worm are toward left side. Hold worm shaft in right hand so that lateral hole through shaft is to the right. Line up splines of worm and splines of shaft as nearly as possible by eye, and start shaft into worm. Press shaft in part way, and then look into splined end of worm to see if splines of worm and shaft are still in line. Correct alinement by turning shaft, if necessary. Press shaft in so that splined end of shaft is flush with lower end of worm. Place one worm bearing over worm shaft and onto worm. Insert assembly through worm cover opening of housing with

STEERING GEAR, STEERING COLUMN, AND FRONT AXLE



A—EXPANSION PLUG
B—WORM COVER
C—WORM COVER SHIMS
D—LOWER BEARING CUP
E—WORM THRUST BEARINGS
F—WORM
G—UPPER BEARING CUP
H—WORM SHAFT
I—ROLLER SHAFT BUSHING
J—ROLLER SHAFT
K—ROLLER SHAFT ADJUSTING SCREW
L—ROLLER SHAFT THRUST PLATE
M—ROLLER SHAFT COVER GASKET
N—ROLLER SHAFT COVER
O—GEAR TOOTHED LOCK WASHER
P—CAP SCREW
Q—LEVEL PLUG
R—LOCK PLATE
S—LOCK NUT
T—HOUSING
U—FILLER PLUG
V—BRACKET
W—LOCKWASHER
X—CAP SCREW
Y—CAP SCREW
Z—OIL SEAL
AA—LOCK WASHER
AB—NUT
AC—U-BOLT
AD—ROLLER SHAFT BUSHING
AE—OIL SEAL
AF—STEERING GEAR BALL ARM
AG—LOCK WASHER
AH—NUT
AI—FILLER BLOCK
AJ—NUT
AK—LOCK WASHER

RA PD 320384

Figure 16 — Steering Gear Assembly Disassembled

shaft leading, and up through bearing cup and oil seal, being very careful not to injure oil seal in this operation. Clamp housing in vise so that bottom of worm is up. Install lower bearing onto worm. Tap lower worm bearing race into housing against bearing. Install five thick shims and two thin shims and worm cover with four cap screws and lock washers. Be sure expansion plug in cover is in place and secure.

c. Worm Bearing Adjustment. The worm cover cap screws must be tight each time bearing fit is tried. The correct adjustment is a free rolling fit with no binding and no end play in shaft. Remove or add shims under worm cover to correct adjustment. When adding shims to loosen bearings, install shims and cover, and tighten cap screws. Then tap lightly on top of worm shaft to reseat lower worm bearing cup before test is made. The worm bearings must be adjusted correctly before any adjustment is made for worm and roller mesh.

d. Install Roller Shaft Assembly. Install roller shaft adjusting screw plate onto adjusting screw. Screw adjusting screw through roller shaft cover from inside, until adjustment plate is about ½ inch from inner face of cover. Slip adjusting plate flat sides into slides at roller end of roller shaft. Cement new roller shaft cover gasket to housing. Install threaded end of roller shaft through housing, bushings and oil seal while holding adjusting plate in center of slide. The level plug hole in cover goes toward worm cover end of housing. Install four cap screws and lock washers and tighten. It may be necessary to turn adjusting screw counterclockwise with screwdriver in slot at outer end so that cover will tighten without springing, especially if new parts are installed.

e. Adjust Worm and Roller Mesh. Turn adjusting screw clockwise with screwdriver as far in as it will go to remove all end play from roller shaft. Turn screw one-quarter turn counterclockwise for running clearance. This should allow shaft to rotate freely without binding when worm shaft is turned; shaft will have no unnecessary end play. Install lock plate so that inner tang engages slot in side of adjusting screw and outer projections clear level plug hole. Install adjusting screw nut and tighten. Check roller shaft end play to see that tightening nut did not change adjustment.

f. Lubricate Assembly. Lay assembly on flat surface so that worm shaft is horizontal. Fill housing to level of plug hole in roller shaft cover with proper grade of lubricant (see TM 9-774 for specifications). Install level plug and filler plug.

Section II

STEERING COLUMN ASSEMBLY

25. DESCRIPTION.

a. The steering column assembly as covered in this section includes the steering wheel, steering wheel shaft, steering wheel shaft support bracket, and steering wheel shaft universal joint.

STEERING GEAR, STEERING COLUMN, AND FRONT AXLE

The steering wheel is prevented from turning on top of shaft by a half-moon key. The shaft support bracket is bolted to the windshield support. The universal joint is pinned to lower end of shaft. The hand throttle lever is supported by the shaft bracket. The universal joint requires no lubrication.

26. DISASSEMBLY.

a. Remove Steering Wheels. Remove acorn nut from top of steering wheel shaft by turning counterclockwise. Install gear puller so that jaws are hooked at bottom of wheel hub to pull off wheel. Remove half-moon key.

b. Remove Shaft Bracket. Pull shaft bracket from top of shaft. Loosen set screws in hand throttle lever and collar and remove lever, collar, and spring from hand throttle lever lower end. Pull hand throttle lever from steering shaft support bracket.

c. Remove Universal Joint Assembly. Drive pin from upper yoke of joint. Tap universal joint assembly from shaft by striking on yoke shoulder with soft hammer while shaft is held.

27. ASSEMBLY.

a. Install Universal Joint Assembly. Tap universal joint yoke onto lower end of steering wheel shaft, being sure that holes in yoke and shaft are in line. Taper one end of pin slightly, and drive through yoke and shaft. Peen both ends of pin.

b. Install Shaft Support Bracket. Hold steering wheel shaft support bracket with arms of bracket away from assembler and pointing up. This will bring smaller shaft hole in bracket on right side. Install hand throttle lever down through smaller hole. Install hand throttle lever spring; set collar with wide side of collar against spring, and lever arm with set screw side of arm first, onto lower end of hand throttle lever. Tighten set screw in collar and arm to hold items on shaft of throttle lever until installed, as final adjustment must be made at that time.

c. Install Steering Wheel. Tap half-moon key into place at top of steering wheel shaft. Install steering wheel on shaft so that key on shaft engages keyway in wheel hub. Install acorn nut and tighten.

Section III

FRONT AXLE ASSEMBLY

28. DESCRIPTION AND DATA.

a. Description (fig. 17). The front axle assembly consists of the front axle, steering spindle arms, and the steering spindles with the

pivot pin retaining wedges which hold wheel pivot shafts or ski pivot pins into steering spindles. The drag link and tie rod assemblies of steering system are fully covered in TM 9-774 as these assemblies are disassembled and assembled in removal and installation. The front axle assembly is of the steel-tube, welded type. Two bushings and a thrust washer on each end of axle allow for free movement of the steering spindles. The steering spindle arms are secured to top of each steering spindle by set screws and are the means of holding steering spindles in front axle. The front axle assembly is mounted on tractor by means of two pivot shafts which allow assembly to oscillate when traveling over rough ground. There are no lubrication points on front axle assembly as the steering spindle bushings are of a type which contain their own lubricant.

b. Data.

Steering spindle bushings:
- Length ..... 1 in.
- Inside diameter ..... 1.656 in.
- Outside diameter ..... 1.814 in.

Steering spindle shaft:
- Outside diameter ..... 1-11/16 in.

Steering spindle thrust washer:
- Inside diameter ..... 1-23/32 in.
- Outside diameter ..... 2¾ in.
- Thickness ..... 0.0615 in.
- Caster of axle ..... 10 deg—positive

29. DISASSEMBLY.

a. Remove Spindle Steering Arm (fig. 17). Remove cotter pin and nut holding tie rod. Loosen two steering spindle arm set screw lock nuts by turning counterclockwise. Remove two set screws by turning in same manner. Lift off steering arm. Left steering arm will be removed in same manner.

b. Remove Steering Spindle Assembly. Lift up front axle assembly until steering spindle assembly can be removed from bottom (fig. 18). Remove thrust washer from spindle. Unhook and remove pivot wedge chains from spindle. Left spindle will be removed in same manner.

c. Remove Steering Spindle Bushings. Drive old bushings from steering spindle tubes of front axle. Turn axle assembly over to remove top bushing. Left spindle bushings will be removed in the same manner.

STEERING GEAR, STEERING COLUMN, AND FRONT AXLE

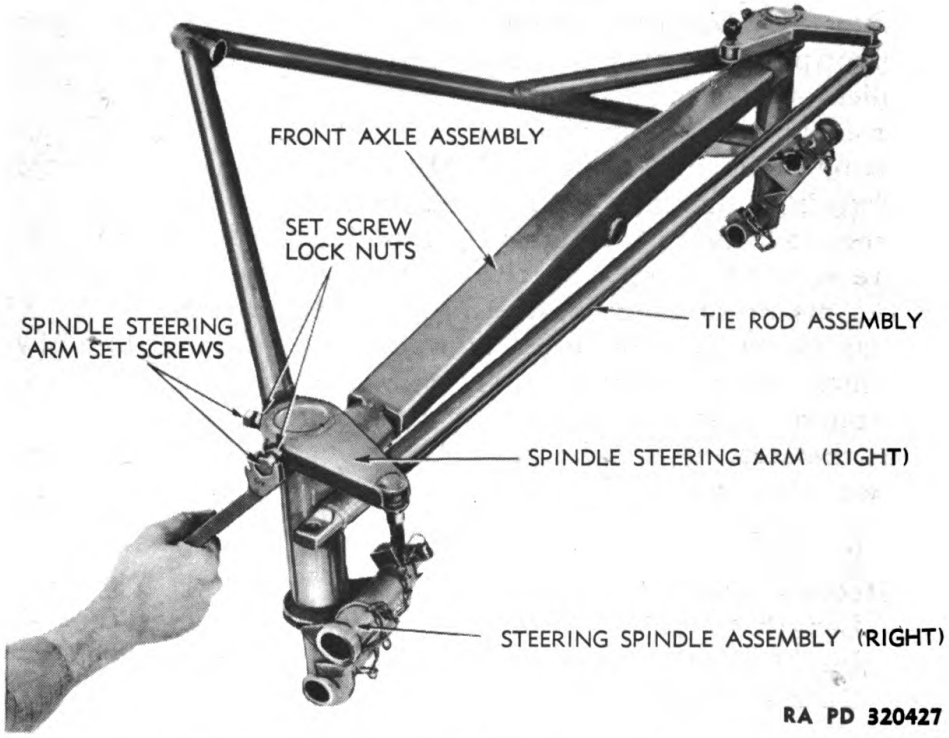


Figure 17 — Front Axle Assembly

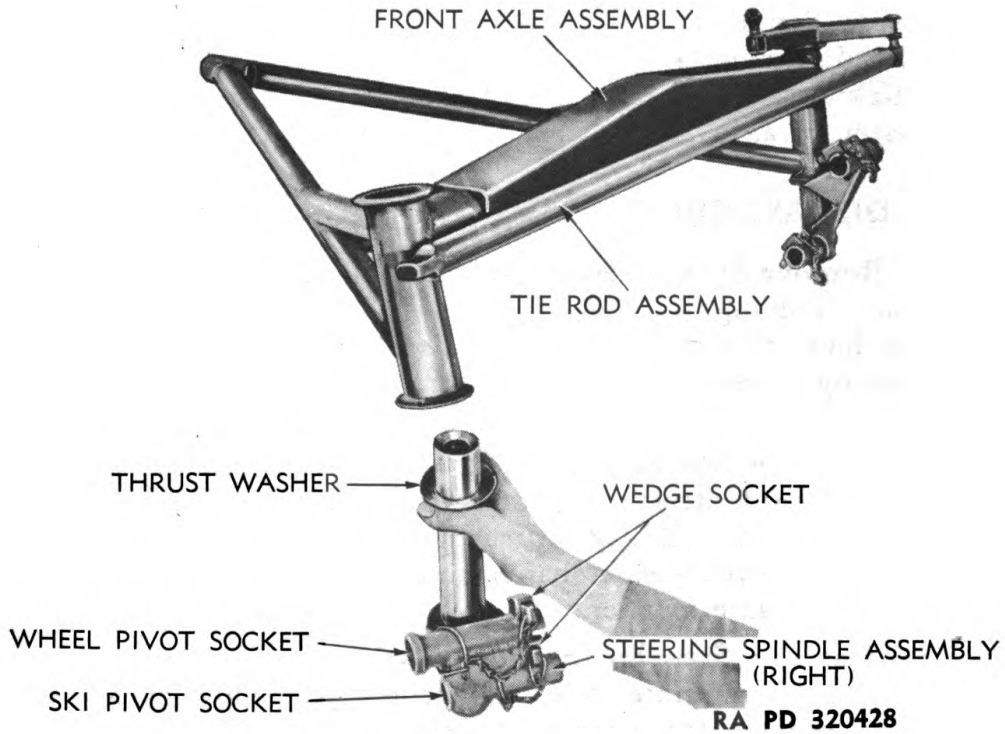


Figure 18 — Right Steering Spindle Removed

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30. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and blow dry with compressed air. Check all parts for wear or damage.

b. Repair. Procure new parts needed to replace any which were damaged or excessively worn. Press new steering spindle bushings into top and bottom of steering spindle tubes of front axle so that exposed ends of bushings are flush with end faces of tube. Try spindle shank through bushings. Ream bushings if necessary to size shown under paragraph 28 **b**. Blow out any cuttings with compressed air.

31. ASSEMBLY.

a. Install Steering Spindles. Install steering spindle thrust washer over shanks of steering spindles. Hold a steering spindle in hand with shank up, wheel pivot socket of spindle toward operator, and wedge socket to right; this will denote the right-hand spindle (fig. 18). Install spindle up through right end of axle. The left spindle can be identified in same manner, but the wedge sockets will be at left of person holding spindle.

b. Install Spindle Steering Arm. Install steering arm onto top of spindle. Line set screw holes in arm and shaft. Install and tighten set screws, being sure that lock nut is against head of set screw so that screw will bottom in tapered hole of shaft without interference from nut. Tighten lock nuts. Connect tie rod with castle nut and cotter pin. The reaming spindle arm will be installed in same manner.

c. Install Wedge Chains. Install attaching rings of wedge chains around pivot sockets, and snap ring end in loop to secure.

Section IV

WHEEL ASSEMBLY

32. DESCRIPTION.

a. The wheel assembly as covered in this section consists of the wheel (less tire), wheel hub, and wheel spindle, with necessary bearings, oil seal, and hub cap for proper mounting of wheel hub for operation, the exclusion of dirt or water, and the retaining of front wheel bearing lubricant. The front wheel contains a wheel spindle or axle because of the manner in which wheel assembly is mounted on steering spindle. With this con-

struction it is possible to use wheels or skis or both on front of vehicle for travel over bare ground, snow, or swampy places.

33. DISASSEMBLY.

a. Remove Hub Assembly (fig. 19). Remove five wheel cap screws (or nuts, as some early models were equipped with nuts), holding wheel to hub by turning counterclockwise. Drive off hub cap (early models only, drive cap can be identified because of lack of provision for wrench) or unscrew by turning counterclockwise (on later models). Remove cotter pin from nut on wheel spindle. Remove spindle nut by turning counterclockwise. Remove flat washer. Tap spindle and rear bearing assembly from hub and outer bearing with rawhide hammer so as not to damage threads.

b. Remove Bearing Cups. Tap out bearing cups by going through hub with long punch, locating notches in hub which expose back of bearing cup, by tapping punch evenly with hammer on each side of cup.

c. Remove Inner Bearing and Oil Seal (fig. 19). Press wheel spindle from inner bearing and oil seal by pressing on threaded end of spindle.

NOTE: *Oil seal will generally be damaged in this operation.*

34. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent and blow dry with compressed air. Examine all parts for excessive wear or damage.

b. Repair. Procure new oil seals. Procure any other parts for replacement of ones which were found to be worn or damaged.

35. ASSEMBLY (fig. 19).

a. Install Bearings Cups. Press inner and outer bearing cups into their respective ends of wheel hub with smallest inside diameter toward center of hub.

b. Install Wheel Spindle. Press inner wheel bearing onto threaded end of spindle with largest outside diameter toward shoulder on shaft until the bearing contacts shoulder. Pack bearing with lubricant and install spindle assembly through hub until bearing seats in cup. Support spindle in vise with threaded end up. Pack outer bearing with lubricant and install in hub. (See TM 9-774 for correct lubricant.) Install flat washer and spindle nut. Turn nut clockwise as far as it will go, and then turn

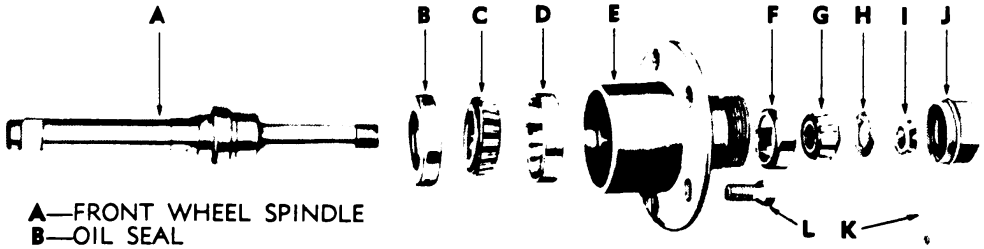

Figure 19 — Front Hub and Spindle Disassembled

counterclockwise one castellation. Install cotter pin. Install hub cap. Test for free rolling fit of bearings.

c. Install Oil Seal. Remove assembly from vise and set on bench with exposed part of spindle up. Install oil seal over shaft with projecting part of seal center away from hub. Tap seal onto shoulder of shaft and into hub until outer face of seal is flush with top of hub.

d. Install Wheel. Install wheel onto hub with five cap screws (or nuts on first machines), and tighten evenly.

Section V

SKI ASSEMBLY

36. DESCRIPTION.

a. Description. The skis are made of laminated birch with Bregwood lower face. A bracket attached to ski allows assembly to oscillate when secured to steering spindle of tractor by means of a ski pivot pin and wedge. A transport bolt bracket bolted to ski ahead of ski bracket goes over stud of transport bracket when assembly is carried on side of tractor. A steel keel is bolted to bottom of each ski to aid in steering, and to keep vehicle from side slipping on slopes. The outer side of each ski is cut away so that wheels and skis may be used simultaneously for travel over snow where frequent bare spots are encountered.

b. Data.

Thickness of ski ..... 7/8 in.
Width of ski (over-all) ..... 9 in.

STEERING GEAR, STEERING COLUMN, AND FRONT AXLE

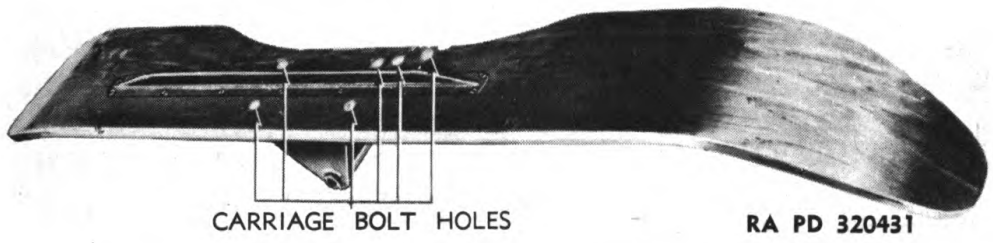

Figure 20 — Location of Carriage Bolt Holes

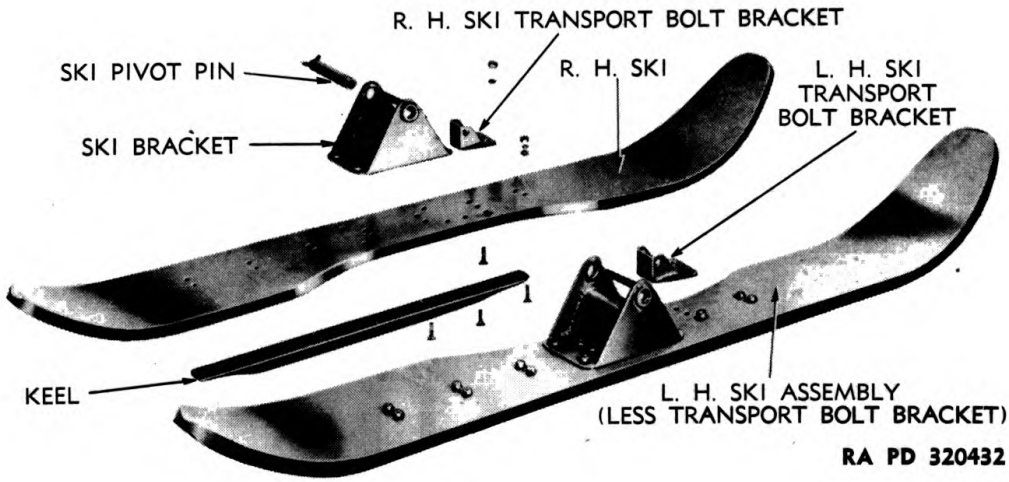

Figure 21 — Ski Assembly Disassembled

Length of ski (over-all)	70 in.
Length of flat bottom	45 in.
Length of keel	31 in.
Height of keel	1 in.
Snow contact area (flat) per ski	352 sq in.

37. DISASSEMBLY.

a. Remove Ski Brackets. Remove eight nuts and lock washers bolting ski bracket to ski. Remove bracket. Remove three nuts and lock washers holding ski transport bolt bracket to ski. Drive these bracket bolts down through ski. NOTE: *This will also remove plastic wood plugs on some of the bolts from bottom of ski.*

b. Remove Keel. Remove remaining nuts, lock washers, and flat washers holding keel to ski. Remove bolts and keel.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

38. ASSEMBLY.

a. Install Ski Brackets. Install six carriage bolts up through holes in ski (fig. 20). Turn ski on flat side, and install ski brackets with nuts and lock washers. See figure 21 for relation of parts on right and left skis, so that brackets will be installed correctly with regard to right and left ski transport brackets. The stop bar on ski brackets goes toward front of ski.

b. Install Keel. Install keel with 14 flat-head stove bolts. Install nuts, lock washers, and flat washers on bolts which do not come through brackets, and nuts and lock washers on remainder.

c. Fill Holes in Bottom of Ski. The countersunk holes in ski which contain carriage bolt heads must be filled with plastic wood flush with bottom of ski, and allowed to dry at least 12 hours before using ski.

CHAPTER 6

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

Section I

TRACK ASSEMBLY

39. DESCRIPTION AND DATA.

a. Description. The track (fig. 22) is of the steel-shoe, endless-rubber-belt type. The shoes are connected by the endless rubber belts which are reinforced with embedded steel cables. Each shoe has two cleats to improve traction. The shoes are rubber covered. The track guides and shoes are riveted to brackets on the rubber belts. The brackets are held in place by the steel cables in belts. The track guides run through guide grooves in track sprocket, rear idler, support roller, and bogie wheels. The track assembly is driven by the track sprocket.

b. Data.

Width of shoes	18 in.
Length of shoes	5¾ in.
Number of shoes per track	33
Height of cleats	¾ in.
Snow contact area of each track (center-to-center of wheels)	1,269 sq in.

40. REPAIR.

a. There is no repair which can be made to track assembly, as separate parts are not furnished. It is possible to use parts of several tracks to make one good track by installing used shoes onto used track to replace damaged shoes. This can be done by cutting bracket rivets to remove shoe and track guide. Use new rivets to assemble. The rubber belts cannot be repaired.

Section II

TRACK SPROCKET ASSEMBLY

41. DESCRIPTION AND DATA.

a. Description. The track sprocket assembly is a rubber-tired wheel having two integral hardened steel sprockets on the outer circumference which engage the driving bars of the track.

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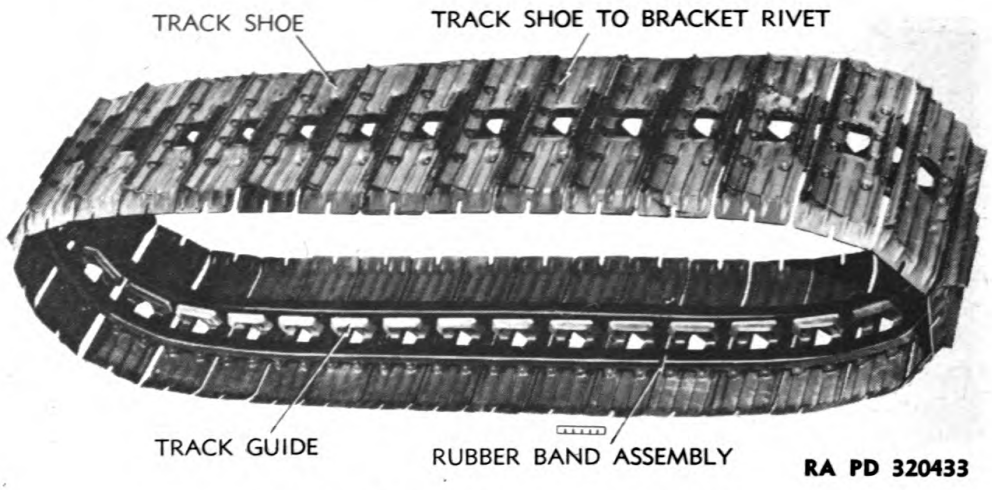

Figure 22 — Track Assembly

The track guides pass between the two sprockets when vehicle is in motion. The sprocket assembly turns on ball bearings enclosed within the wheel hub. These bearings are supported by the sprocket shaft, which is secured to track frame by adjusting brackets. The track sprocket assembly is lubricated upon assembly only. Oil seals at each end of hub retain the lubricant, and keep out water and dirt. The final drive chain driven sprocket is bolted to a flange on inner end of sprocket hub. The track sprocket hub, bearings, oil seals, spacers, and shaft are removable, but the track sprockets, wheels, tires, and rims cannot be disassembled. The sprocket shaft adjustment brackets are also the inner race for the oil seals. The sprocket shaft is tubular with the ends welded in. A shaft locating spacer and dowel are inside each adjustment bracket.

b. Data.

Diameter of wheel	17 in.
Width of rims (each)	2⅜ in.
Number of teeth (chain sprocket)	43
Pitch of teeth (chain sprocket)	¾ in.
Length of shaft	9.687 in.
Diameter of shaft	1.7713 in.
Number and type of bearings	2 ball bearings
Number and type of oil seals	2 lip seals

42. DISASSEMBLY.

a. Remove Chain Sprocket. Remove eight bolts, nuts, and lock washers holding final drive chain sprocket to track sprocket hub (fig. 23).

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

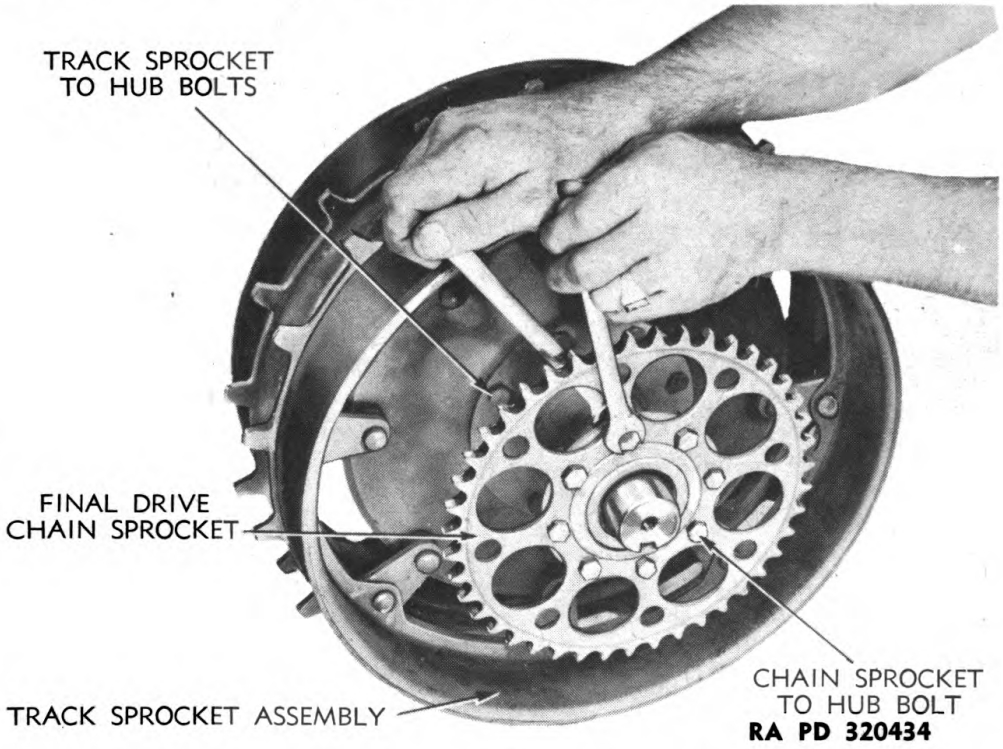

Figure 23 — Track and Chain Sprocket Assembly

b. Remove Hub From Sprocket Wheel. Remove eight bolts holding sprocket wheel assembly to hub. Clean paint from outside of hub, on end opposite to chain sprocket flange, back to wheel flange. Place piece of tubing over shaft and against end of hub from which paint was removed. NOTE: *This tube to be $\frac{1}{64}$-inch outside diameter less than outside diameter of hub so that it will pass through wheel.* Support sprocket wheel in press, with chain sprocket flange down; pressing against above tube, press hub assembly from wheel flange and wheel. This will also release eight spacers around hub inside of wheel. Remove these spacers.

c. Remove Sprocket Wheel Shaft and Bearings. Support wheel hub assembly in press. Press shaft from bearings and hub. Reach through bearing and hub with soft punch, and tap out one bearing and oil seal. Repeat for remaining bearing and oil seal.

d. Disassemble Adjusting Brackets. Tap dowel from side of bracket. Remove shaft spacer from bracket.

43. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and dry with compressed air. Carefully examine each part for damage

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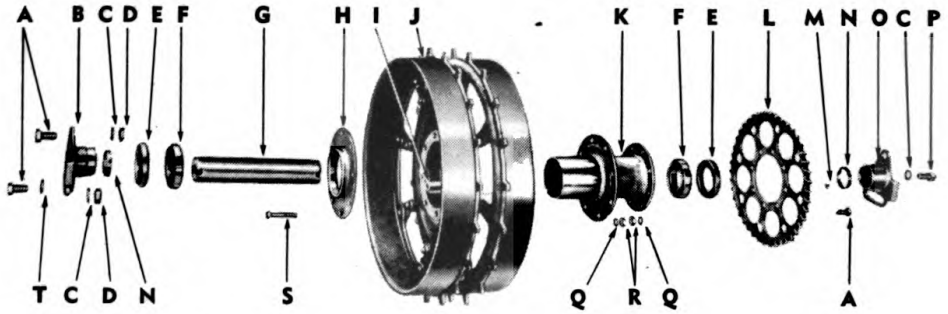


A—BOLT
B—ADJUSTING BRACKET ASSEMBLY, L. H.
C—LOCK WASHER, ½-IN.
D—NUT, ½-IN.
E—OIL SEAL
F—BALL BEARING
G—SHAFT
H—HUB FLANGE
I—WHEEL FLANGE SPACER
J—TRACK SPROCKET WHEEL ASSEMBLY
K—HUB
L—CHAIN SPROCKET
M—DOWEL
N—SPACER
O—ADJUSTING BRACKET ASSEMBLY, R. H.
P—CAP SCREW
Q—LOCK WASHER, ⅜-IN.
R—NUT, ⅜-IN.
S—WHEEL TO HUB BOLT
T—FLAT WASHER, ½-IN.

RA PD 320435

Figure 24 — Track Sprocket Assembly Disassembled

or wear. Roll shaft on a surface plate to see if it is bent. Check ball bearings for nicks or scratches.

b. Repair. The only repair to assembly will be replacement of parts such as shaft, hub, bearings, oil seals, brackets, spacers, and chain sprocket, as individual parts of track sprocket wheel itself cannot be procured. Install new oil seals each time wheel hub is disassembled.

44. ASSEMBLY (fig. 24).

a. Install Shaft and Bearings. Pack each bearing full of lubricant. (See TM 9-774 for proper grade of lubricant.) Press a bearing into each end of hub as far as it will go. Press new oil seal, with lips of seal toward bearing, until outer surface of seal is flush with end of hub. Press shaft through hub and bearings.

b. Install Hub Assembly. Install eight wheel flange spacers inside wheel, with wheel lying flat. Line hole in each spacer with bolt hole in wheel. Install eight wheel hub bolts through hub wheel flange from side toward chain sprocket flange. Hold bolts in flange and turn hub on end. Lower hub assembly into a can or similar tube which is deep enough to hold hub, and have top rim of tube contact heads of bolts. Being careful not to dislodge spacers or bolts, lower wheel assembly over hub and bolts. Install wheel flange over end of hub, and tap into position

over ends of bolts. Install eight nuts and lock washers. Remove assembly from improvised jig, and tighten bolts.

c. Install Chain Sprocket. Install chain sprocket onto hub with eight bolts, nuts, and lock washers. Install shaft spacer and shaft dowel into each adjusting bracket. Install bracket assembly on each end of shaft with cap screw and lock washer, being sure that dowel in bracket engages notch in shaft. Installation of brackets at this time is necessary to keep dirt from entering bearings until ready for use, as bracket is inner race for seal. Brackets will have to be removed for installation of sprocket wheel assembly.

Section III

FINAL DRIVE CHAIN ASSEMBLY

45. DESCRIPTION AND DATA.

a. Description. The final drive chain is of the single-roller type requiring no lubrication. It is equipped with a connector link for removal or installation of chain. The chain is also equipped with a half-link which can be removed to compensate for wear. The connector link and half-link are secured by cotter pins. The final drive chain connects the final drive sprocket with the chain sprocket on track sprocket assembly (fig. 23). The tension adjustment of the final drive chain is made by moving track sprocket shaft brackets.

b. Data.

Length of pitch ..... 3/4 in.
Width of chain ..... 1/2 in.
Length of chain (new) ..... 8 ft 4 1/2 in.

46. DISASSEMBLY.

a. Remove Connector Bars. Clamp chain in vise so that roller segments of chain at either end of bar to be removed is held securely. Drive pins of link evenly from connector bar of link to be removed. Repeat for each link to be removed.

47. ASSEMBLY.

a. Connect Chain Roller Links. Lay connector part of link on flat metal surface or anvil with pins up. Install roller link on each pin. Install connector bar over ends of pins. Upset ends of pins with round-end punch. Repeat until chain is complete.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

Section IV

FINAL DRIVE AND SUPPORT ROLLER ASSEMBLY

48. DESCRIPTION AND DATA.

a. Description. The final drive and support roller assembly as covered in this section consists of the brake drum, brake housing cover assembly, inner bearing carrier assembly, final drive chain sprockets, track support roller assembly, and outer bearing carrier, mounted on final drive shaft and held in position by a nut on outer end of final drive shaft. The assembly is bolted to the differential housing by studs through the brake housing cover, and track frame is bolted to inner and outer bearing carriers. The support roller is supported on a tubular shaft and turns on bushings. Ball bearings which carry final drive shaft are located in brake housing cover and outer bearing carrier. The inner bearing carrier oscillates on the brake housing cover, and is equipped with a bushing.

b. Data.

Chain sprocket:
- Number of teeth 20
- Pitch of teeth ..... 3/4 in.

Final drive shaft bearings:
- Number and type ..... 2 ball bearing

Support roller:
- Length of shaft ..... 6.375 in.
- Diameter of shaft ..... 1.75 in.
- Length of bushings ..... 1 in.
- Outside diameter of bushings ..... 2.1225 in.
- Inside diameter of bushings ..... 1.7535 in.
- Running clearance (bushing to shaft) ..... 0.0035 in.
- Diameter of tire ..... 8 in.
- Width of tire ..... 7/8 in.

Brake drum:
- Inside diameter of drum (new) ..... 8.010 in.

49. DISASSEMBLY.

a. Remove Outer Bearing Carrier. Drive outer bearing carrier cap from bearing carrier (fig. 25). NOTE: *Prying off cap might result in damage to cap.* Remove cotter pin from end of final drive shaft.

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

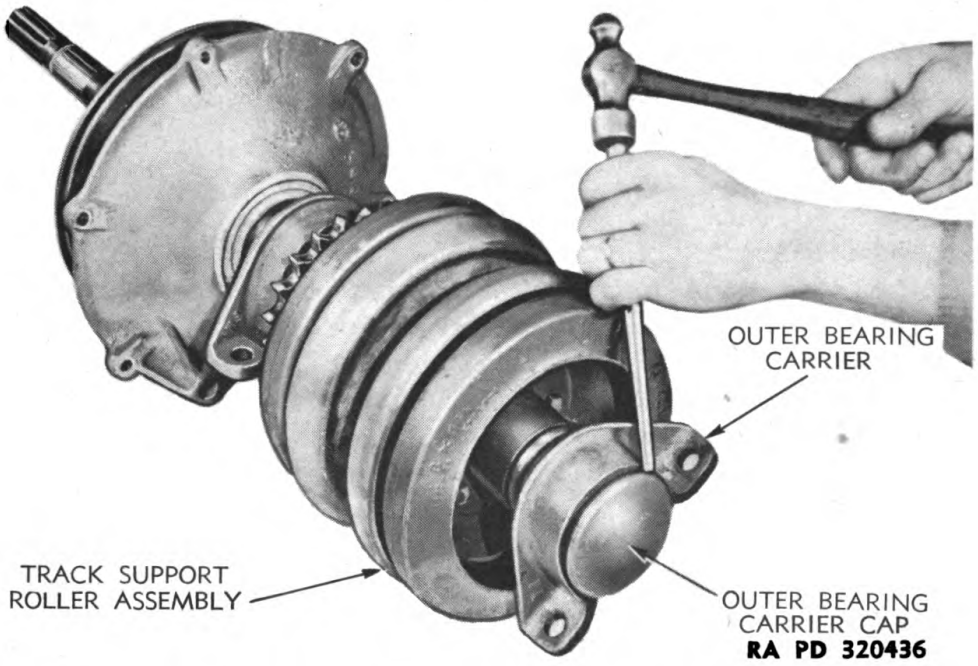


Figure 25 — Removing Outer Bearing Carrier Cap

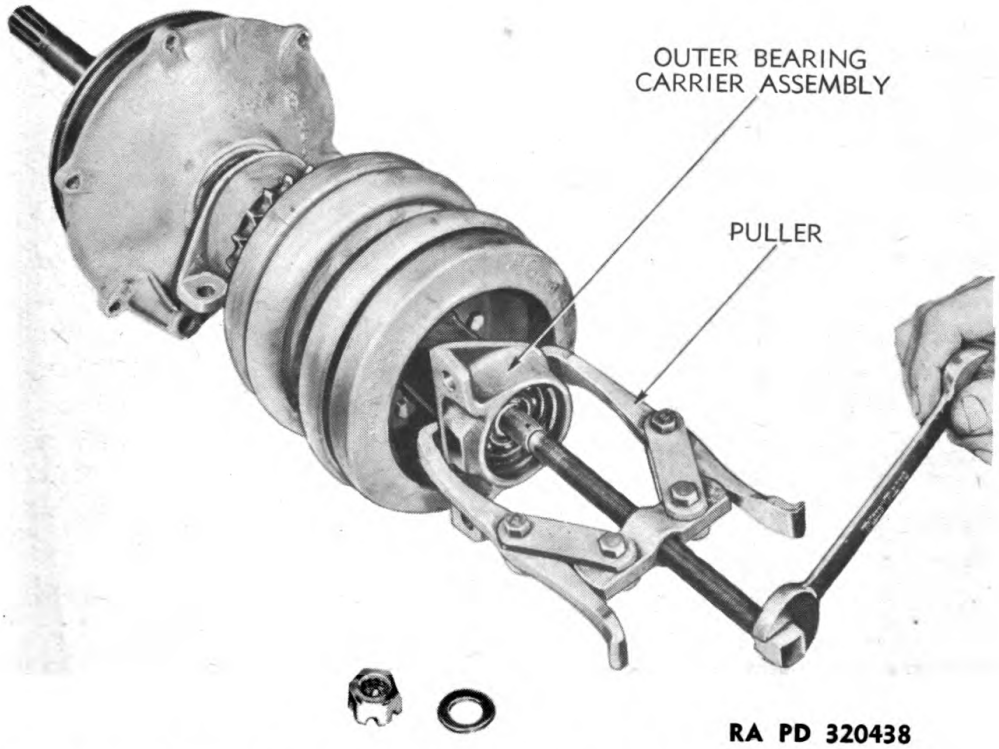


Figure 26 — Pulling Outer Bearing Carrier, Using Puller (41-P-2911)

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

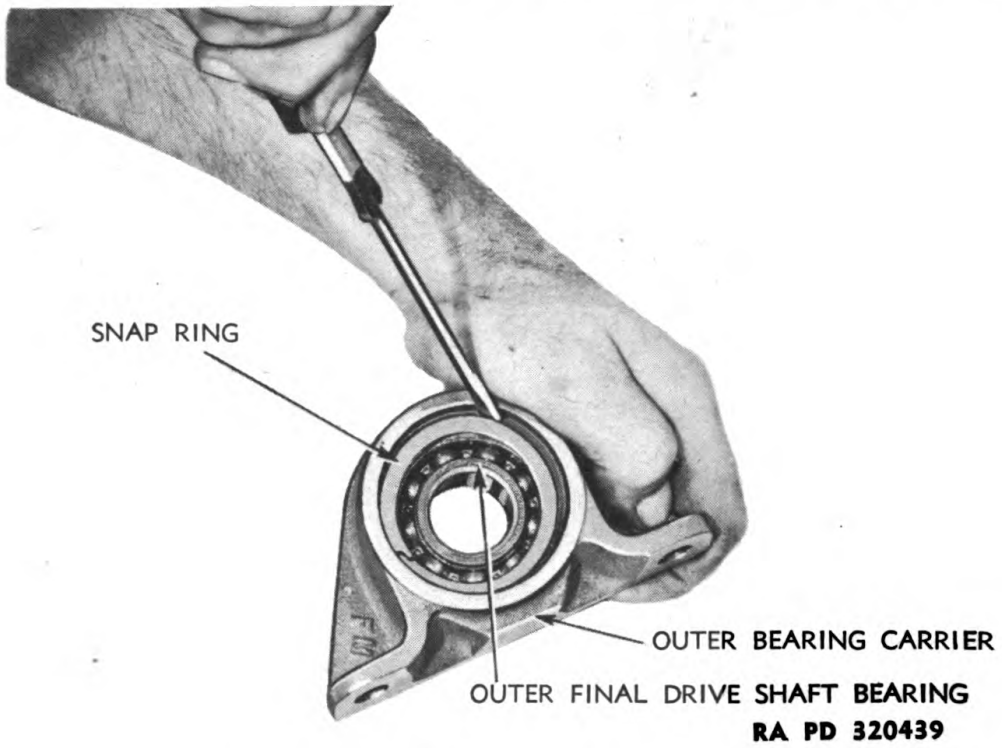


Figure 27 — Outer Bearing Carrier

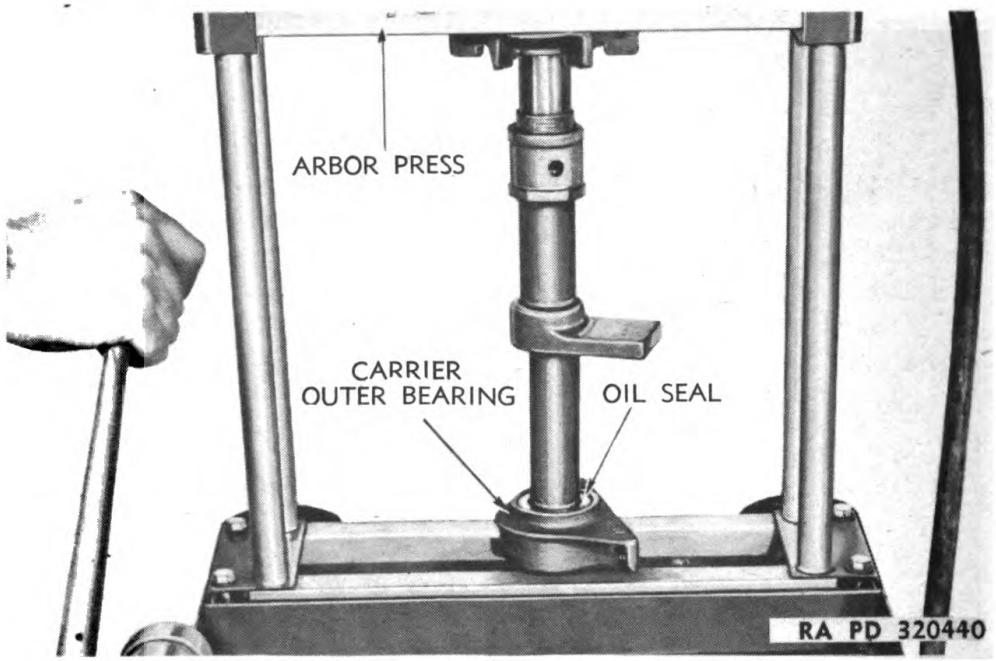


Figure 28 — Pressing Out Bearing

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

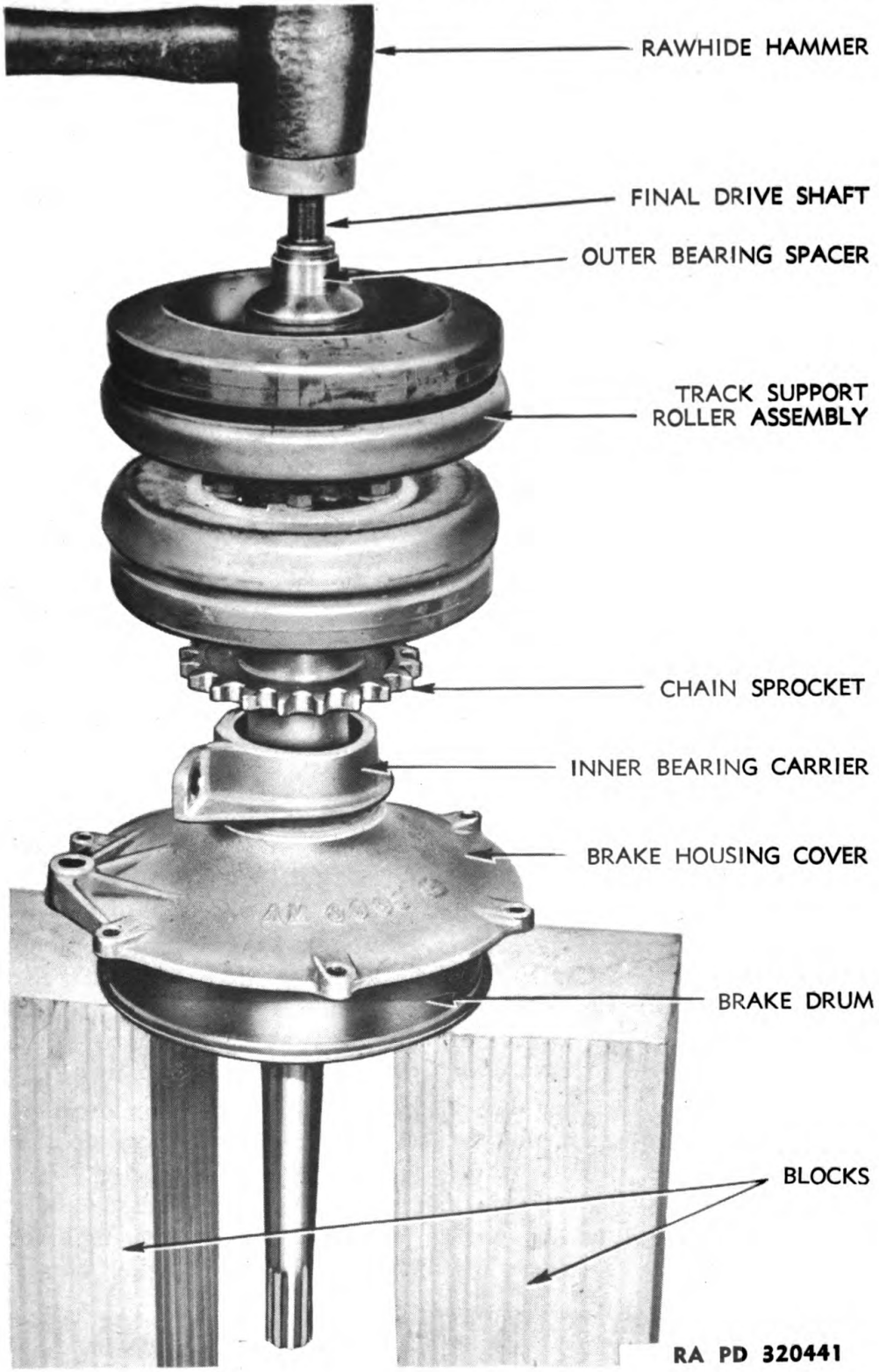


Figure 29 — Driving Final Drive Shaft From Support Roller Assembly

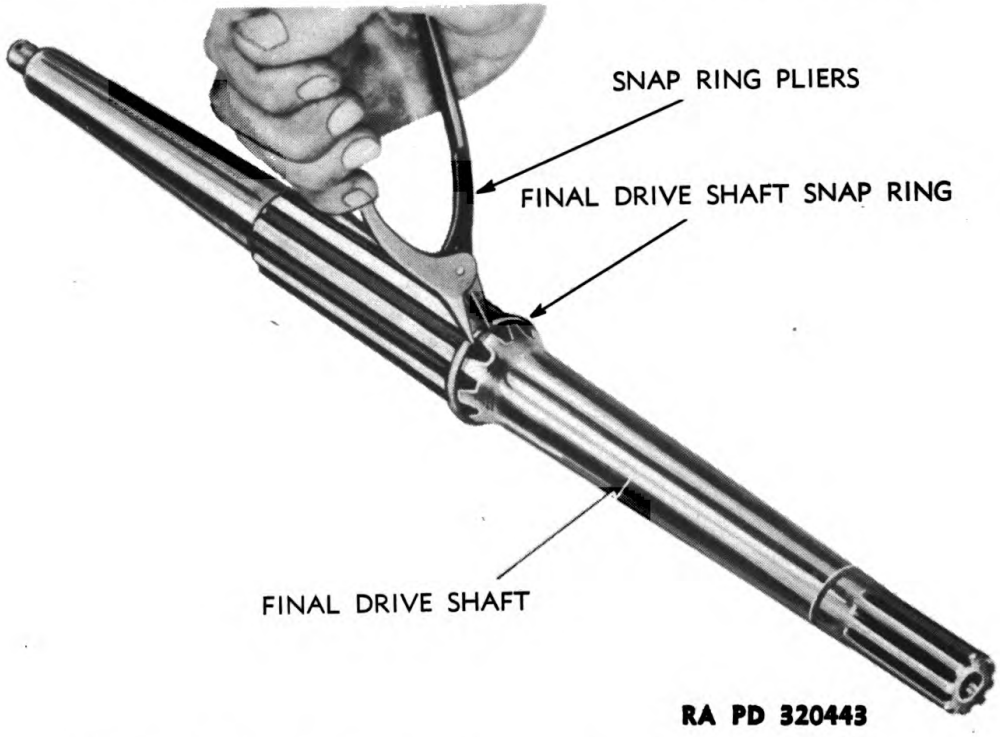


Figure 30 — Removing Snap Ring From Final Drive Shaft With Pliers (41-P-1572)

Remove nut. Install puller (41-P-2911), and pull off outer bearing carrier assembly (fig. 26). Remove snap ring from outer bearing carrier (fig. 27). Press out bearing by going through oil seal with arbor against bearing (fig. 28). Knock out oil seal.

b. Remove Final Drive Shaft. Support brake drum on blocks, and drive shaft down with rawhide hammer until support roller can be lifted off (fig. 29). Lift off drive sprocket, spacer, and inner bearing carrier. Drive shaft out of brake housing cover and brake drum. Remove snap ring from final drive shaft (fig. 30).

c. Remove Bearings From Support Roller and Brake Housing Cover. Tap outer bearing spacer from support roller shaft (fig. 31). Remove shaft and inner spacer. Tap inner spacer from shaft. Press bushings from support roller hub. Remove snap ring from brake housing cover (fig. 32). Press bearing from brake housing cover. Press bushing from inner bearing carrier.

50. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and dry with compressed air. Check parts for wear or damage. Replace with new parts where needed.

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

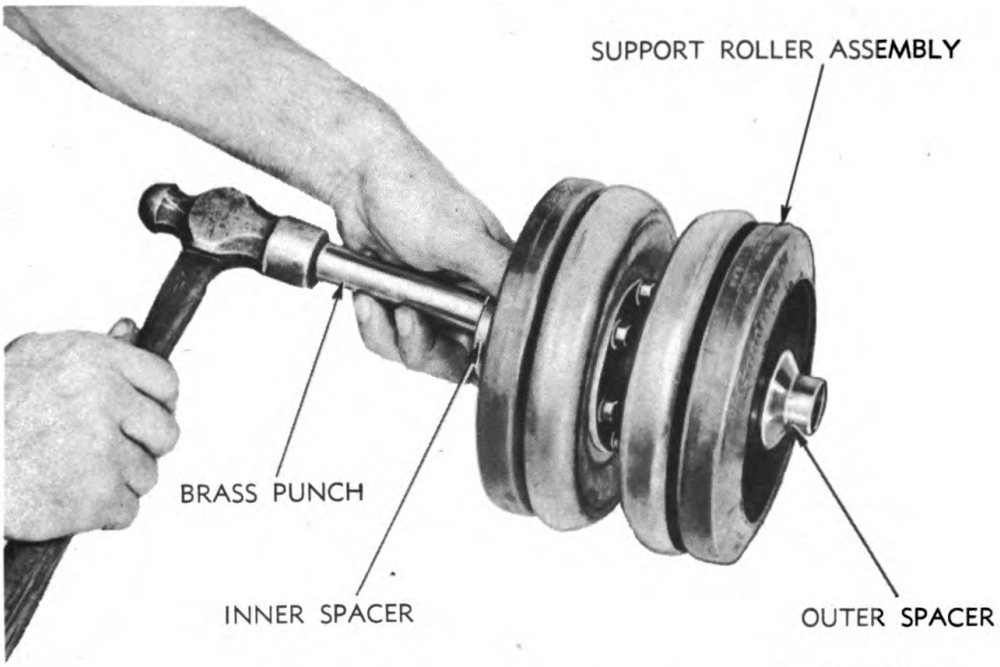


Figure 31 — Support Roller Assembly

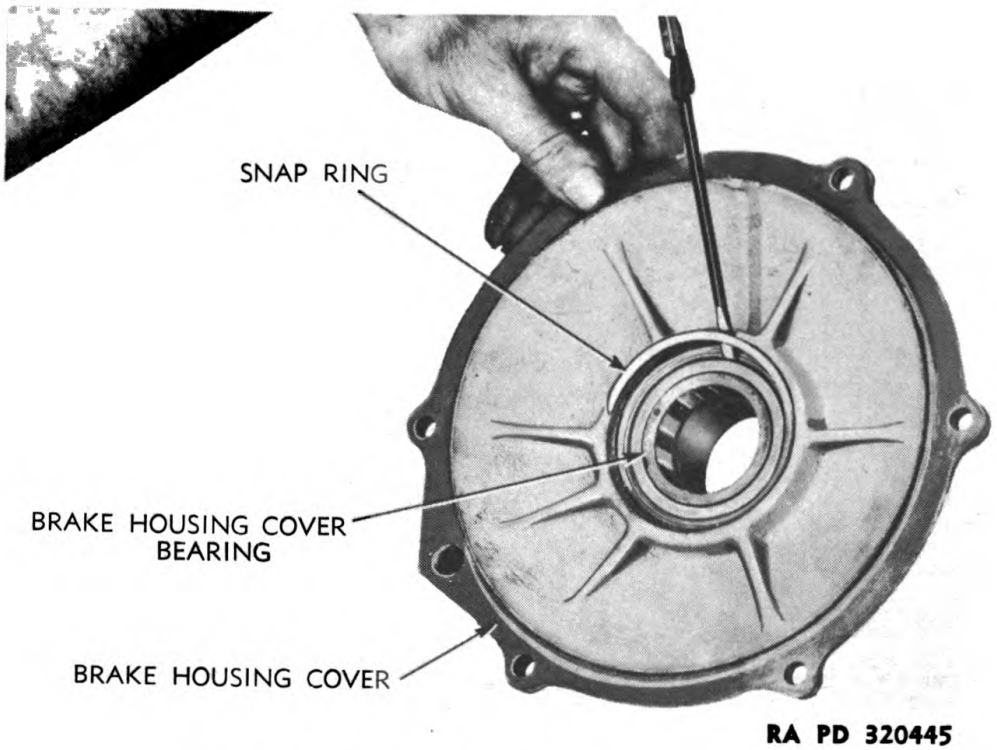


Figure 32 — Removing Snap Ring From Brake Housing Cover

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

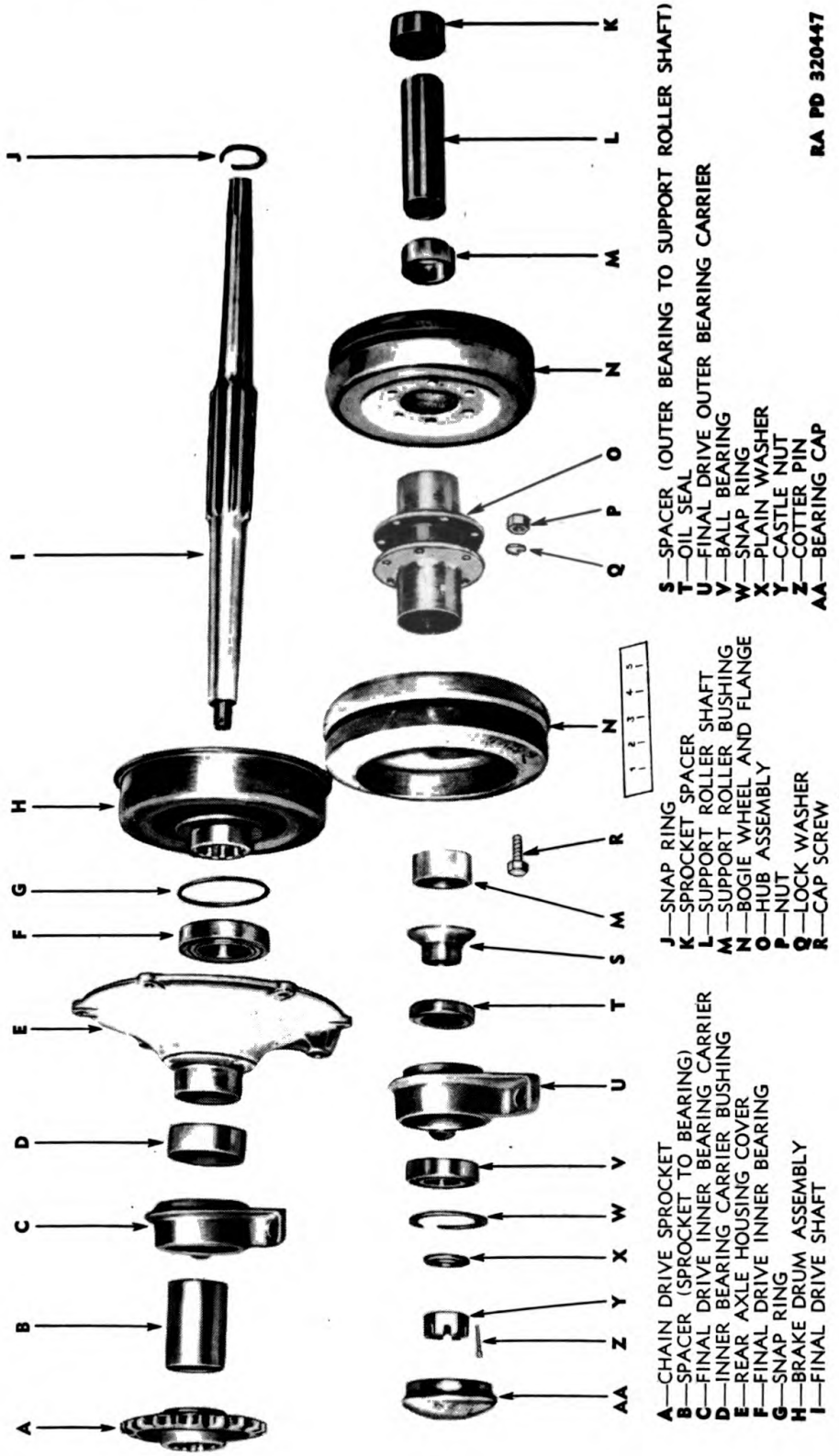


Figure 33 — Final Drive and Support Roller Assembly Disassembled

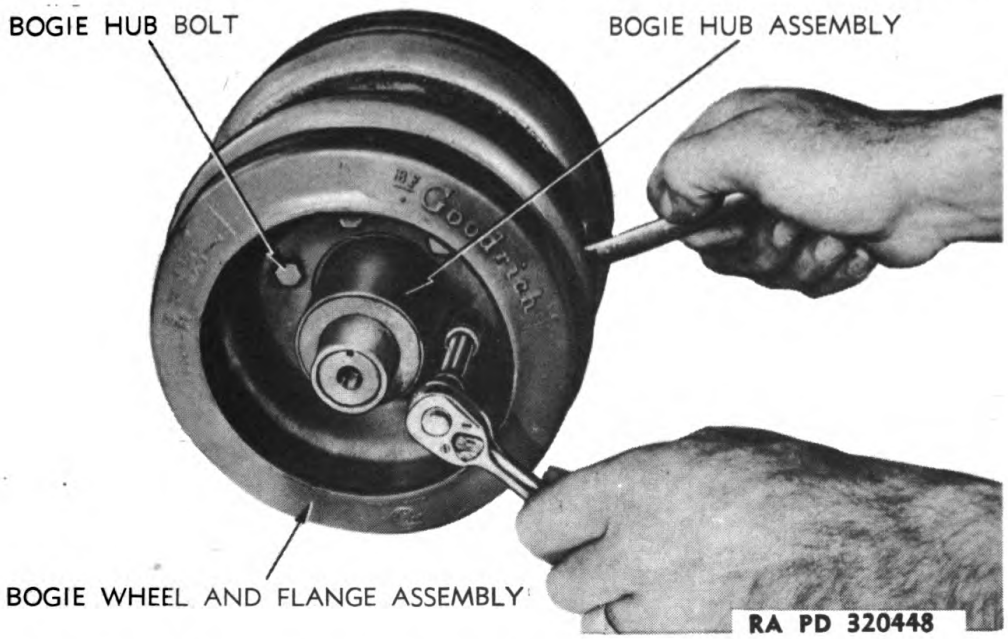


Figure 34 — Removing Bolt From Bogie Wheel and Hub

b. Repair. Install bushings in support roller hub. Install bushing in inner bearing carrier.

51. ASSEMBLY.

a. Assemble Brake Housing Cover and Outer Bearing Carrier. Refer to figure 33 for correct relation of parts while assembling. If lubricant was washed from brake housing cover bearing, which is a sealed bearing, the lubricant can be renewed by holding one end of a waterproof cloth tube around outer race of bearing and opposite end of tube around nozzle of pressure gun. Have one man slowly pump gun while another rotates inner race of bearing. Lubricant will appear at outer side of bearing when filled. Press bearing into brake housing cover. Install snap ring. Press bearing into outer bearing carrier. Install oil seal in outer bearing carrier with lip toward bearing.

b. Install Final Drive Shaft. Install snap ring on final drive shaft. Install brake drum over threaded end of shaft, with counterbored end of drum hub first. Push down until snap ring enters counterbore of drum. Install brake housing cover assembly with long end of hub away from brake drum. Install inner bearing spacer. Install inner bearing carrier with exposed end of bushing first. Install final drive chain sprocket. Install sprocket spacer onto one end of support roller shaft. Place small amount of lubricant in support roller hub. (See TM 9-774 for grade of

lubricant.) Install sprocket spacer and roller shaft assembly with spacer against sprocket. Install support roller assembly. Install outer bearing spacer with long end away from support roller shaft, and tap into place so that roller shaft enters recess in spacer. Install outer bearing carrier assembly, with seal first. Install flat washer and nut. Lighten nut and install cotter pin. Fill cavity of outer bearing carrier with lubricant. Tap bearing carrier cap into position. Check for free rolling fit of outer bearing carrier, support roller assembly, inner bearing carrier, and brake housing cover.

Section V

BOGIE WHEEL ASSEMBLY

52. DESCRIPTION AND DATA.

a. Description. There are 10 bogie wheel assemblies on vehicle. The six front bogie wheel assemblies (three on each side) have longer shafts than the four rear bogie wheel assemblies (two on each side) because of the contour of the track frame. Each bogie wheel and guide flange assembly is bolted to the bogie wheel hub. The bogie wheel hubs are equipped with ball bearings and oil seals. The bearings are supported on a tubular shaft, which is in turn bolted to the track frame. The inner end of each bogie wheel shaft is notched to accommodate a shaft stop which prevents shaft from turning. The bearings are packed with lubricant on assembly and require no further lubrication until disassembled. The bogie wheels are rubber-tired.

b. Data.

Diameter of tire	8 in.
Width of tire	1¼ in.
Length of shaft (long)	9⅜ in.
Length of shaft (short)	7½ in.
Number and type of bearings	2 ball bearings
Number and type of oil seals	2 lip seals
Diameter of shaft	1¼ in.

53. DISASSEMBLY.

a. Remove Bogie Wheels. Remove six bolts holding each bogie wheel and guide flange assembly to hub (fig. 34). Place

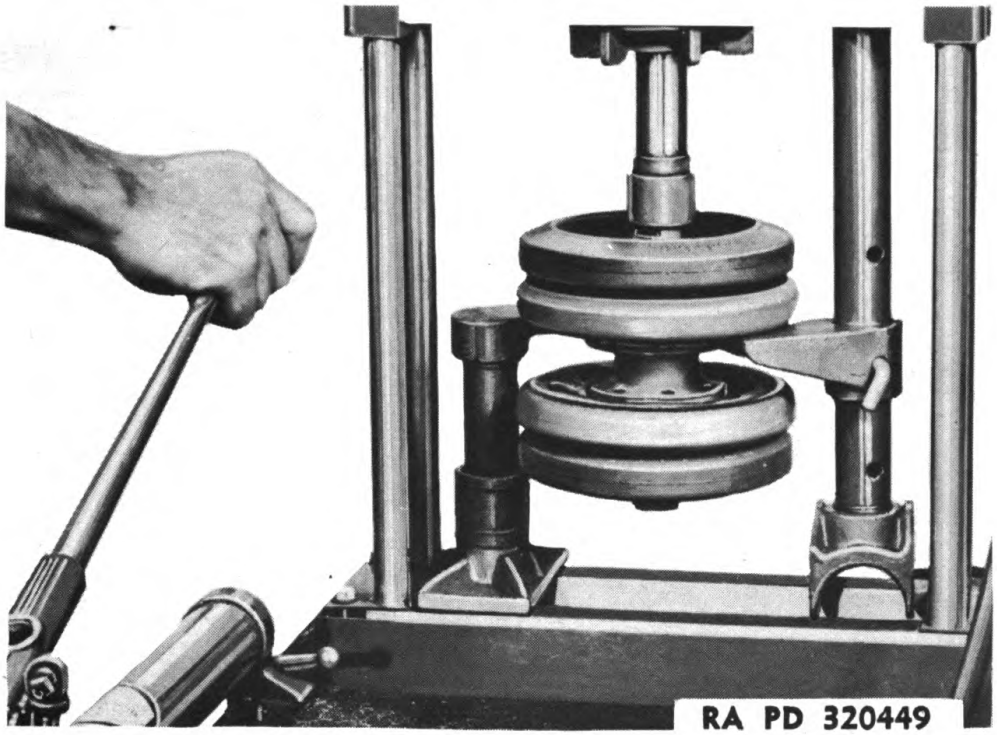


Figure 35 — Pressing Hub From Bogie Wheel

bogie wheel assembly in press, and support upper wheel. Press against outer shaft bearing spacer to push lower wheel and hub assembly from top wheel. (fig. 35). Repeat for remaining wheels.

b. Remove Bearings and Oil Seals. Support hub assembly in press, and press shaft from hub by using arbor smaller than shaft spacer (fig. 36). This will also free inside and outside bearing spacers. Reach through hub with soft punch and tap bearing and seal from hub. Remove intermediate bearing spacer. Remove remaining bearing and seal.

54. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent, and dry with compressed air. Check tires and flanges for wear or damage. Check bearings and shaft for damage or excessive wear.

b. Repair. After bearings are found to be in good condition, lay them flat on a piece of clean paper. Pack balls with lubricant. Turn bearings over and repeat for other side. Refer to TM 9-774 for proper grade of lubricant. Wrap bearings in oil paper until ready to use, to keep out dirt. Replace with new oil seals. Be sure outer seal surfaces of inner and outer bearing spacers are smooth (end where seal runs).

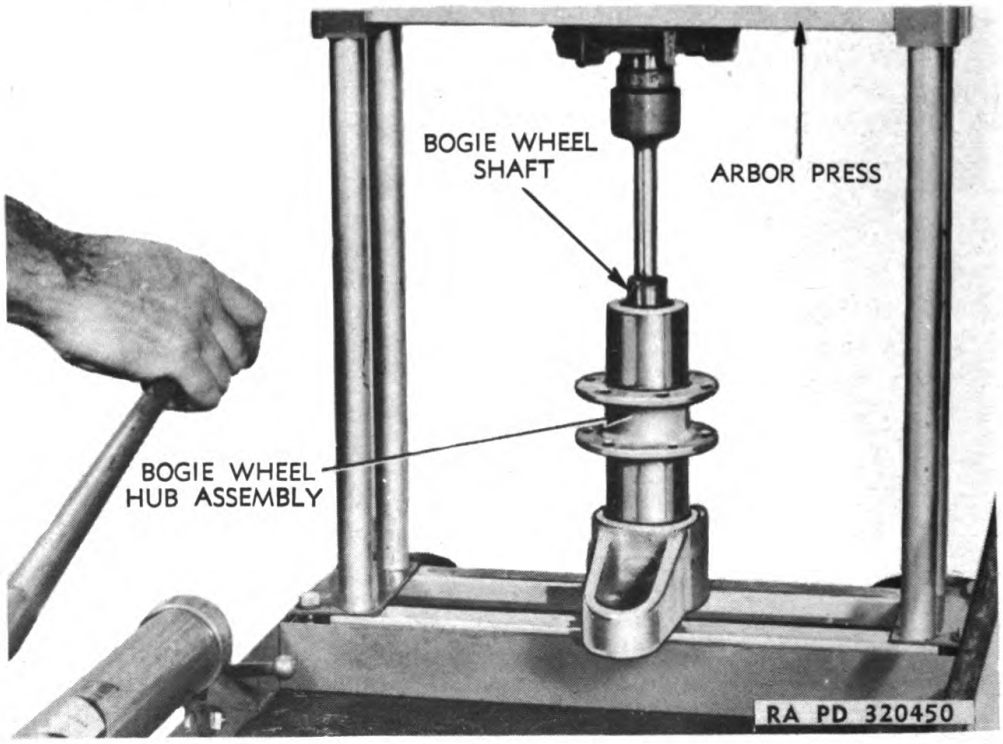
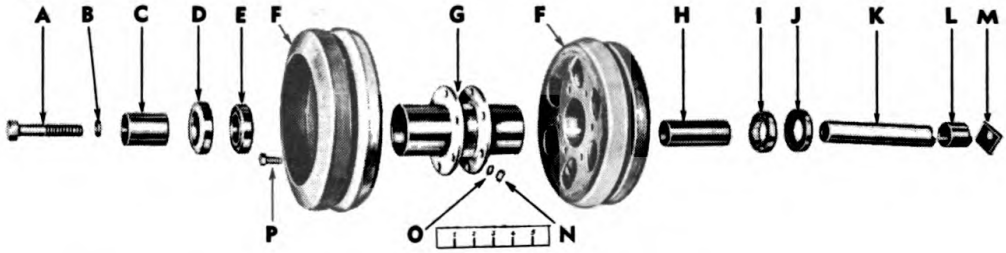


Figure 36 — Pressing Out Bogie Wheel Shaft



A—CAP SCREW
B—LOCK WASHER
C—SPACER (BEARING-TO-TRACK FRAME)
D—OIL SEAL
E—BALL BEARING
F—BOGIE WHEEL ASSEMBLY
G—HUB ASSEMBLY
H—INTERMEDIATE BEARING SPACER
I—BALL BEARING
J—OIL SEAL
K—BOGIE WHEEL SHAFT
L—SPACER (BEARING-TO-STOP WASHER)
M—STOP WASHER
N—NUT
O—LOCK WASHER
P—BOLT

RA PD 320451

Figure 37 — Bogie Wheel Assembly Disassembled

55. ASSEMBLY (fig. 37).

a. Install Bogie Wheel Shaft. Press a bearing into one end of hub. Press oil seal into same end of hub with lip of seal toward bearing. Turn hub over and install intermediate bearing spacer into hub. Press in remaining bearing and oil seal. Reach through

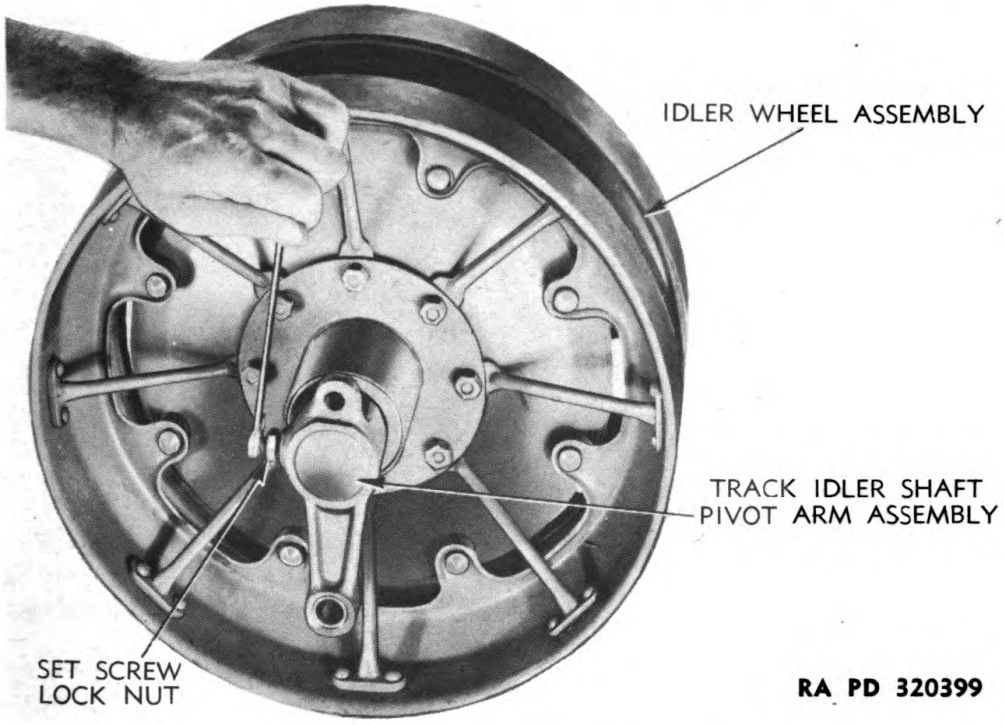


Figure 38 — Removing Idler Pivot Arm Set Screw

one bearing and line up hole in intermediate bearing spacer. Install shaft through bearings and spacer. NOTE: *If long shaft was removed from hub, same length must be installed, as outer and inner bearing spacers are different in length for long or short shafts.* Install inner and outer bearing spacers. The inner bearing spacer (notched spacer) goes on notched end of shaft.

b. Install Bogie Wheels. Install a bogie wheel and flange assembly on each end of hub with six bolts, nuts, and lock washers.

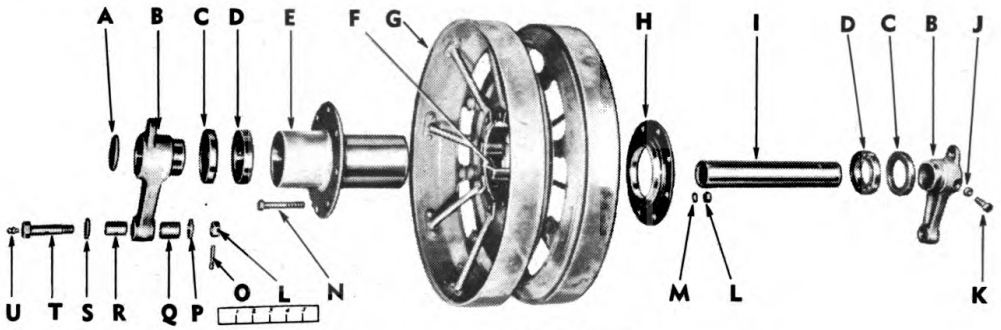
Section VI

TRACK REAR IDLER ASSEMBLY

56. DESCRIPTION AND DATA.

a. Description. The track rear idler assembly is a rubber-tired wheel and hub assembly mounted on ball bearings which are supported on a tubular shaft. An oil seal protects each bearing. The idler wheel shaft is mounted on two pivot arms, bolted to rear of track frame at upper end and secured to track release mechanism at lower end. This arrangement allows for adjustment of track tension.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)



A—EXPANSION PLUG
B—PIVOT ARM
C—OIL SEAL
D—BALL BEARING
E—IDLER WHEEL HUB
F—FLANGE SPACER
G—REAR IDLER WHEEL ASSEMBLY
H—WHEEL FLANGE
I—IDLER WHEEL SHAFT
J—JAM NUT
K—SET SCREW
L—NUT
M—LOCK WASHER
N—CAP SCREW
O—COTTER PIN
P—PIVOT PIN WASHER
Q—BUSHING
R—PIVOT PIN SPACER
S—PIVOT PIN WASHER
T—PIVOT PIN
U—LUBRICATION FITTING RA PD 320453

Figure 39 — Track Rear Idler Assembly Disassembled

b. Data.

Diameter of wheel	17 1/32 in.
Width of rim	2 3/16 in.
Length of shaft	11 1/8 in.
Diameter of shaft	1 13/16 in.
Number and type of bearings	2 ball bearings
Number and type of oil seals	2 lip seals
Outside diameter of pivot arm bushing	0.879 in.
Inside diameter of pivot arm bushing	0.754 in.
Length of pivot arm bushing	1 in.
Outside diameter of pivot bolt spacer	0.750 in.
Outside diameter of pivot bolt	0.555 in.
Length of pivot arm spacer	0.563 in.
Running clearance (bushing to spacer)	0.004 in.

57. DISASSEMBLY.

a. Remove Pivot Arms. Loosen lock nut on pivot arm set screw. Remove set screw by turning counterclockwise (fig. 38). Pull pivot arm from steering spindle.

b. Disassemble Track Idler Wheel. Follow procedure outlined under paragraph 42 **b** and **c**.

c. Disassemble Idler Pivot Arm. Press out bushing. Expansion plug will not be removed unless arm is to be replaced with a new one.

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

58. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent. Blow dry with compressed air. Check all parts for wear or damage.

b. Repair. Lubricate bearings as explained in TM 9-774.

59. ASSEMBLY.

a. Assemble Idler Pivot Arms. Press in bushings if old ones were removed. Ream bushing to 0.754-inch inside diameter.

b. Assemble Track Idler Wheel. Follow procedure outlined under paragraph 44 **a** and **b**. Refer to figure 39 for relation of parts.

c. Install Idler Pivot Arms. Install idler pivot arms so that set screw hole in each arm lines with hole in shaft and long end of arms both pointing in same direction. Install set screws and tighten. Tighten lock nuts.

Section VII

TRACK RELEASE MECHANISM

60. DESCRIPTION AND DATA.

a. Description. The track release mechanism consists of a bell crank pivoted to frame, two large coil springs (one inside the other), a small tension spring, tension spring plungers, and release spring bolt and seat assembly. The trunnion supports are attached to the track tension adjusting bolt. The tension spring plunger attaches to the lower end of idler wheel pivot arm. By maintaining correct length on track tension spring, the track is held to a tension of 500 pounds. The two large springs begin to release when track tension reaches 800 pounds per square inch, due to overload or obstructions. The spring assemblies are covered by a laced canvas boot.

b. Data.

Diameter of inner release spring (outside)	$1\frac{3}{16}$ in.
Free length of inner release spring	$7\frac{9}{16}$ in.
Diameter of outer release spring (outside)	2 in.
Free length of outer release spring	$9\frac{1}{8}$ in.
Diameter of track tension spring (outside)	$\frac{25}{32}$ in.
Free length of track tension spring	$2\frac{1}{2}$ in.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

61. DISASSEMBLY.

a. Remove Trunnion Assembly. Remove four cotter pins from trunnion support pin and trunnion block. Remove trunnion supports. Pull tension spring and plunger from end of release spring bolt.

b. Remove Release Spring Bolt. Unlace and remove spring cover. Remove cotter pin and castle nut. Remove trunnion, retainer tube assembly, inner and outer track release springs.

62. CLEANING AND REPAIR.

a. Cleaning. Wash all parts in dry-cleaning solvent. Blow dry with compressed air. Check all parts for wear or damage.

b. Repair. Measure springs to determine if they are collapsed. See data for specifications of new springs. Procure new parts to replace worn or damaged parts. Try plunger in end of track release spring bolt to see that it goes in freely.

63. ASSEMBLY (fig. 40).

a. Install Release Spring Bolt. Install inner and outer release springs onto long end of release spring bolt. Install retainer tube assembly on bolt with longer end first. Install trunnion on bolt. Install castle nut, and tighten until the distance from end of thread on bolt is 2⅝ to 2¾ inches from face of trunnion. Install cotter pin.

b. Install Trunnion Supports. There is a difference in the way the trunnion supports should be assembled for installation on right or left side of track frame. The one shown in figure 40 is the left side; that is, with the longer end of trunnion toward inside of track frame. Lay spring assembly on bench with trunnion to left hand, and with longer end of trunnion away from assembler. Determine which of the two small holes in trunnion supports are farthest from the large holes. Install on each end of trunnion with large hole up and remaining small hole toward springs. Install flat washer and cotter pin in each end of trunnion. (For right-hand side assemble in same manner but have longer end of trunnion toward assembler.) Install track tension adjusting bolt between trunnion supports, and install trunnion support pin through trunnion support, and bolt. Install flat washer and cotter pin in each end.

c. Install Plunger and Spring Cover. Place track tension spring over hollow end of release spring bolt. Lubricate plunger and install into hollow end of bolt. Install spring cover and lace securely.

TRACK, FINAL DRIVE, AND TRACK FRAME ASSEMBLY

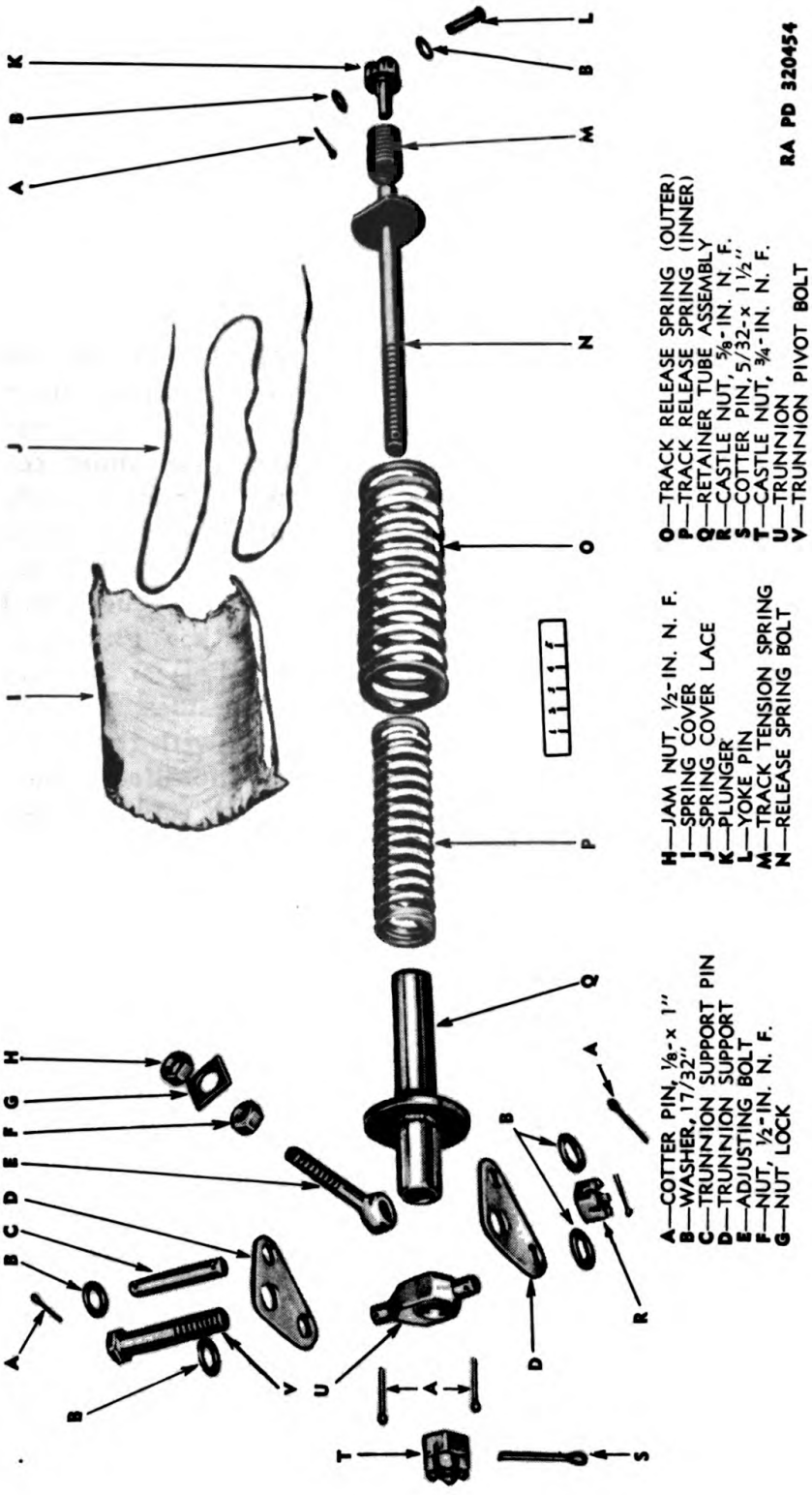


Figure 40 — Track Release Mechanism Disassembled

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

CHAPTER 7

BRAKES

Section I

BRAKE SHOES

64. DESCRIPTION AND DATA.

a. Description. The brake shoes used are of the internal expanding type with the brake lining attached to them by means of rivets. A cupped washer at each side of shoes when installed on anchor pin projects over shoulders of brake shoes to hold pivot or rear ends of shoes together. Shims under outside cup washer maintain the minimum side play of shoes on anchor pin. A shoe retracting spring is hooked between shoes at front end. The inside end of the brake shoe anchor pin is secured in housing by means of a taper pin driven laterally through anchor pin and housing boss. The shoes go in pairs; that is, one top and one bottom. To determine top and bottom shoes for left side of vehicle, lay brake shoe assemblies on bench with the offset side of lining face of shoe up and the anchor shoulder toward the right. For right side of vehicle, lay shoes in same manner but with anchor shoulder of shoes to left side. The top shoe will be away from assembler in each case (fig. 41).

b. Data.

Size of rivets (tubular)	1/8 x 5/16 in.
Length of lining (each shoe)	7 3/8 in.
Width of lining	1 1/2 in.
Thickness of lining	3/16 in.

65. RELINING OF SHOES.

a. Remove Old Lining. Using brake lining machine, press six rivets from each shoe and lining to remove lining. Clean shoes, and wire-brush lining surface of shoe to remove any rust or scale accumulations.

b. Install New Linings. When new linings are procured from stock which have the holes drilled and countersunk, install lining on each shoe with six rivets, starting in middle of lining and riveting toward ends so that lining will lay smooth on shoe and not bulge in the middle when installed. The rivets will be upset on inner side of shoe and never on the lining. Dress off high spots on face of lining on brake-lining sanding machine. Always

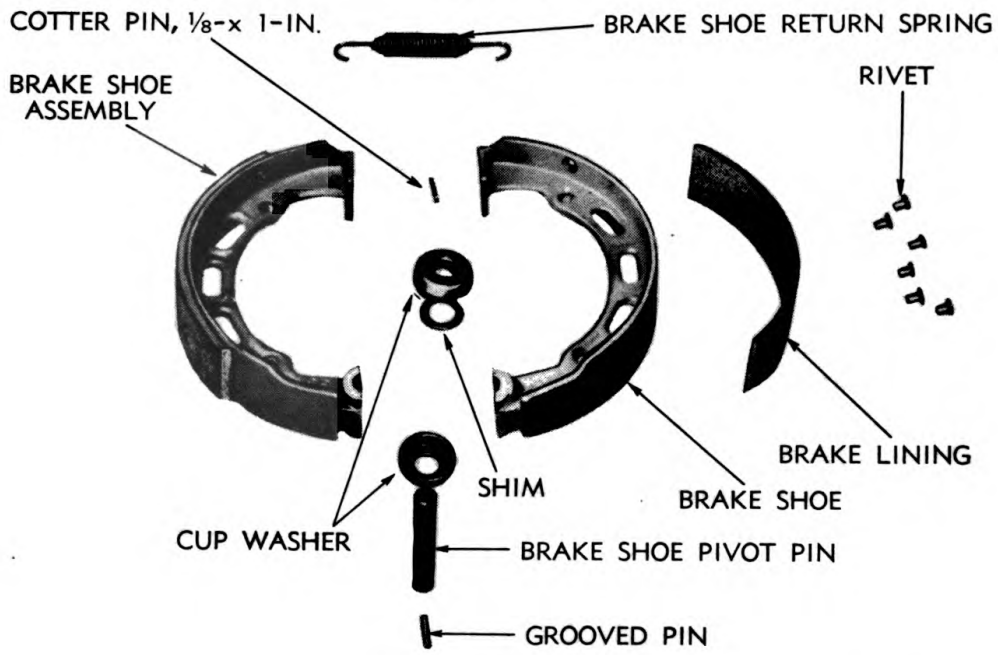


Figure 41 — Brake Disassembled

secure shoes together in pairs with wire until used, so there will be no delay caused by replacement with wrong parts.

Section II

BRAKE DRUMS

66. DESCRIPTION.

a. The brake drums are of a cast-steel type welded to the hub. The inside diameter of the drum when new is 8.010 inches. The brake drums are mounted on the final drive shaft on each side of the vehicle.

67. REPAIR.

a. Repairs to Drum. There are no repairs which can be made to brake drum because the construction of the brake-operating mechanism is such that cutting down the drums would hinder the efficient operation of the brakes. In case of any undue wear or damage, replace with new drums.

Section III

BRAKE CONTROLS

68. DESCRIPTION.

a. Description. The brake controls as outlined in this text consist of the two brake pedals, the brake rods, and the brake shoe operating shaft arms. The brake pedals are located to driver's right in front compartment of tractor. The brakes can be applied individually or simultaneously at the will of the driver. The brake shoe operating shafts are mounted through bushings in brake housings of differential, and are equipped with cams on the outer ends which expand the brake shoes. The brake rod assemblies connect the brake pedals and the brake shoe operating shaft arms which are bolted to inner ends of operating shafts.

69. SHOE OPERATING SHAFT BUSHING.

a. Description. A brake shoe operating shaft bushing is pressed into brake housing at each end of differential housing assembly. These bushings are the only bushings in the brake system.

b. Repair. Drive old bushing from brake housing with hammer and bushing driver. Drive new bushing into housing so that outer end of bushing is flush with bushing hole in housing. Try brake shoe operating shaft for free movement in bushing.

70. PEDALS AND LINKAGE.

a. Description. The brake pedals are both mounted on one cross shaft which is part of the left brake pedal assembly. The cross shaft is mounted in two brackets which are bolted to a crossmember of the frame beneath the front toeboard. The clutch pedal is also mounted on this same cross shaft. The brake rods have an adjusting yoke at their front end, which is pinned to the brake pedal arms in front and to the brake shoe operating shaft arms at the brake housings at sides of fuel tank. A return spring is hooked between brake rod brackets and brackets on frame.

b. Repair. There is no repair to be made to the brake linkage except replacement of parts as outlined in TM 9-774. The only adjustment to brakes is the rod adjustment for brake pedal play (TM 9-774).

CHAPTER 8

FRAME AND BODY COMPONENTS

Section I

PINTLE

71. DISASSEMBLY.

a. Remove Roller Housing. Remove cotter pin from one end of roller housing pivot pin. Drive pin from main frame. Remove roller housing assembly and compression spring. Press roller pin from roller housing to remove roller.

b. Remove Draft Hook. Press draft hook pin from main frame. Unhook extension spring S-link from draft hook. Remove draft hook.

c. Remove Small Roller. Press or drive small roller pin from main frame to remove small roller.

72. ASSEMBLY (fig. 42).

a. Install Small Roller. Install roller between bosses on main frame. Install pin through frame and roller and peen end of pin. Check for free rotation of roller.

b. Install Draft Hook. Install draft hook into main frame, and drive pin through frame and hook. Peen ends of pin. Check for freedom of movement of draft hook. Hook S-link of extension spring through hole in lower side of draft hook.

c. Install Roller Housing. Install roller in lower end of roller housing. Install roller pin and peen both ends. Check for freedom of rotation of roller. Install compression spring over spring boss in main frame. Install roller housing assembly into main frame so that spring boss on roller housing engages end of compression spring, and pivot hole in roller housing lines with hole in main frame. Install roller housing pivot pin, and secure with cotter pin. Check for freedom of movement of roller housing in main frame.

Section II

WINDSHIELD ASSEMBLY

73. REPLACEMENT OF GLASS.

a. Remove Windshield Glass Frame. Remove screw from upper adjusting arm at each side of frame. Bend down lip on

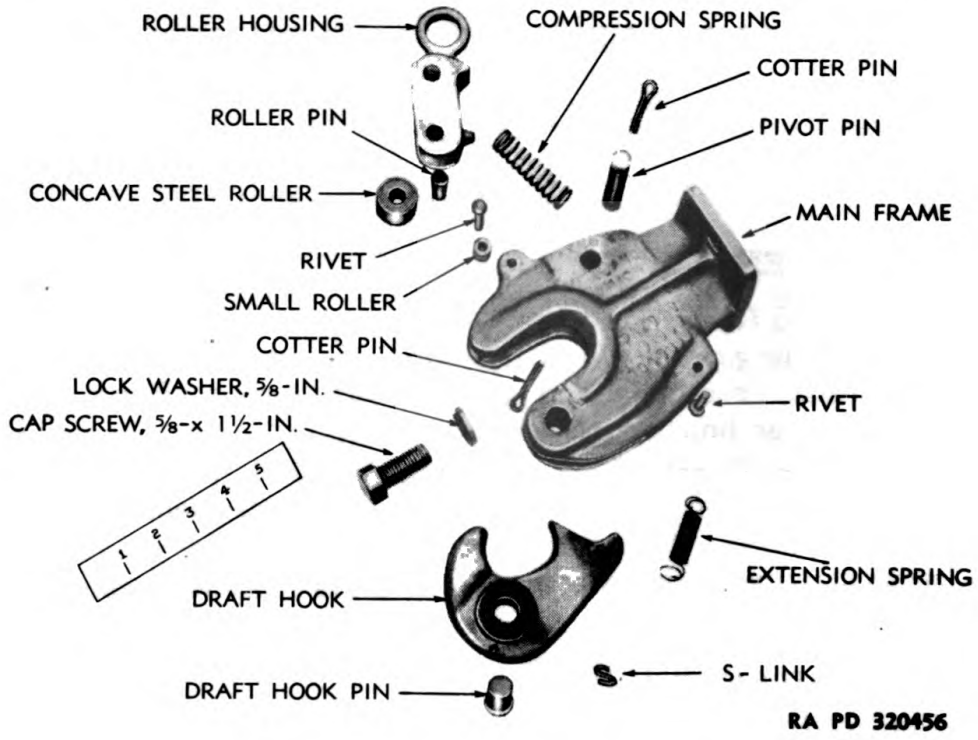


Figure 42 — Pintle Assembly Disassembled

left-hand outer end of hinge at top. Open windshield sufficiently to clear subframe assembly, and slide windshield glass frame from hinge to left.

b. Remove Windshield Glass. Remove the nuts and bolts which hold upper part of glass frame to lower section. Remove upper glass channel. Withdraw glass from frame. Remove tape packing from glass on frame.

c. Replacement of Glass. Replace new tape packing around glass. Clean channels in glass frame. Install new glass in reverse sequence to that outlined in removal (subpar. **a**) above.

74. REPLACEMENT OF WEATHER STRIPS.

a. Remove windshield glass frame assembly. Remove assembly as explained above (par. 73 **b**). Work weather strips out of glass frame outer channels. Clean channels with wire brush. Slide new weather strips into place. Replace glass frame assembly.

CHAPTER 9

ENGINE PREHEATER

Section I

DESCRIPTION

75. GENERAL.

a. The engine preheater is a device for warming the water in the cooling system when the engine will not start normally because of low temperatures. The engine preheater is also used to maintain a temperature in the cooling system when the engine is shut down and vehicle must be ready to start instantly under above conditions.

b. It is mounted at right side of engine, under vehicle hood, on wheel transport bracket assembly. The preheater is a gasoline burning unit. The cooling liquid of the engine circulates through the water coil of the heater by the thermo-syphon principle when burner is in operation. Draft for the burner is supplied by a telescopic flue which extends above engine hood.

76. FUEL CONTROL.

a. The gasoline supply from preheater fuel tank, mounted under engine hood, to the burner is controlled: first, by the shut-off valve (handle of which extends below heater to be readily accessible through tractor lower engine side plate lighting door); second, by a float valve which maintains a constant level in the heater; third, by a wick used to feed the gasoline over a dam separating the float chamber from the burner and which takes the place of a metering valve in controlling the rate at which gasoline is fed to the burner.

Section II

DISASSEMBLY

77. DISASSEMBLY.

a. Remove Water Heating Unit. Turn upper lock nut counterclockwise to remove nut, combustion chamber top plate, and

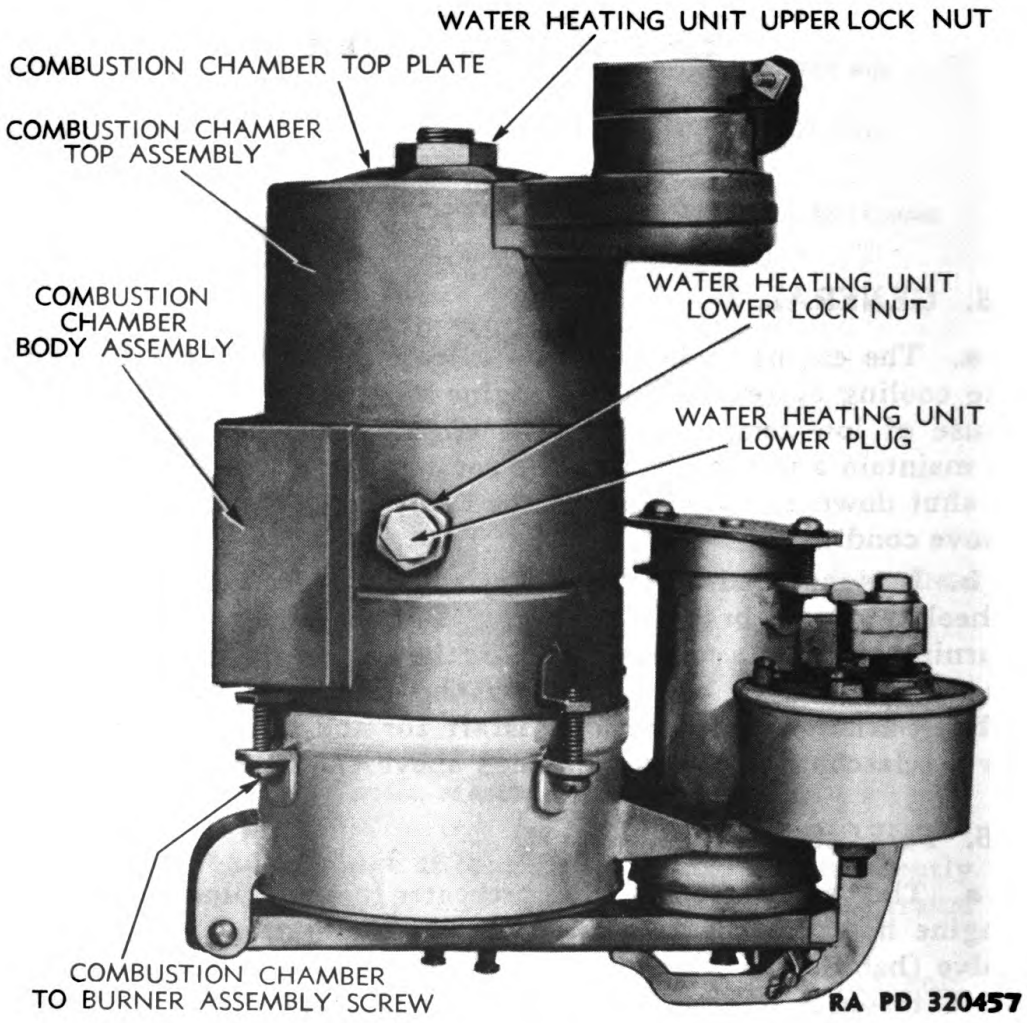


Figure 43 — Engine Preheater Assembly

combustion chamber top (fig. 43). Turn lower nut on water inlet nipple counterclockwise to remove nut and gasket. Loosen lower nut on lower plug at opposite side of water heating unit. Turn lower plug counterclockwise to remove plug, nut, and gasket. Raise side of water heating unit from which lower plug was removed out of combustion chamber body first, as shown in figure 44, and slide unit toward that side to clear nipple on opposite side.

b. Remove Combustion Chamber Body. Remove four screws and lock washer holding combustion chamber body to burner assembly (fig. 43). Pull combustion chamber body from burner assembly.

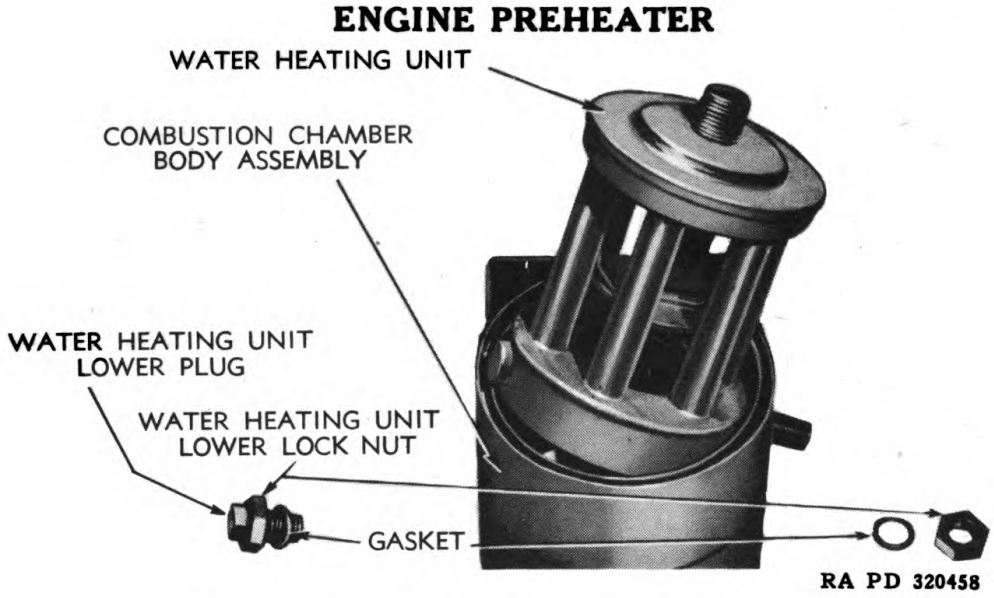


Figure 44 — Water Heater Unit Removal

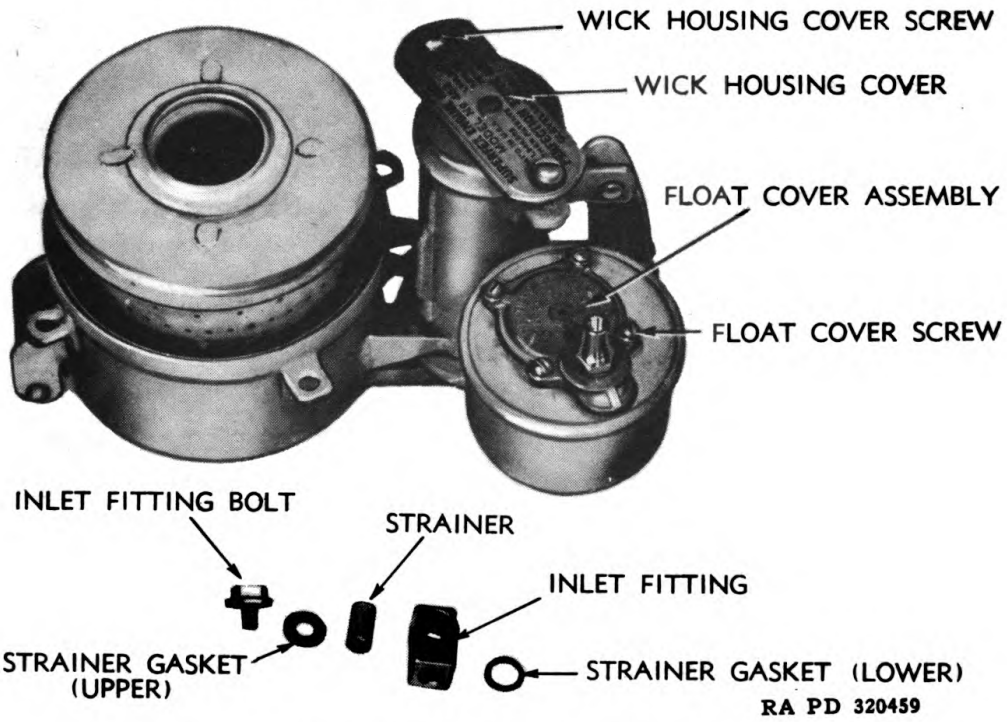


Figure 45 — Burner Assembly—Top View

c. Remove Float Valve Assembly. Remove inlet fitting bolt (fig. 45) and lift off upper strainer gasket, strainer, inlet fitting, and lower strainer gasket. Remove four screws and lock washers holding float valve assembly to burner assembly.

Lift up and maneuver float valve assembly so as not to damage float while removing assembly. Unscrew and remove float valve seat, gasket, float valve, and float valve spring. Remove two screws and cover from wick housing.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

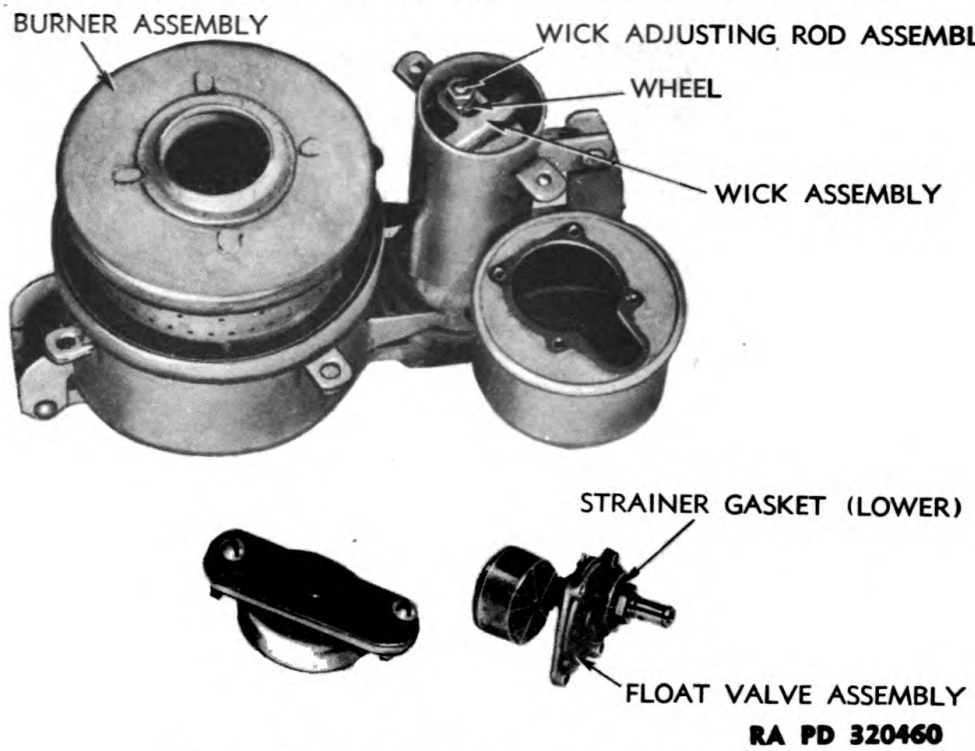


Figure 46 — Wick Assembly in Burner

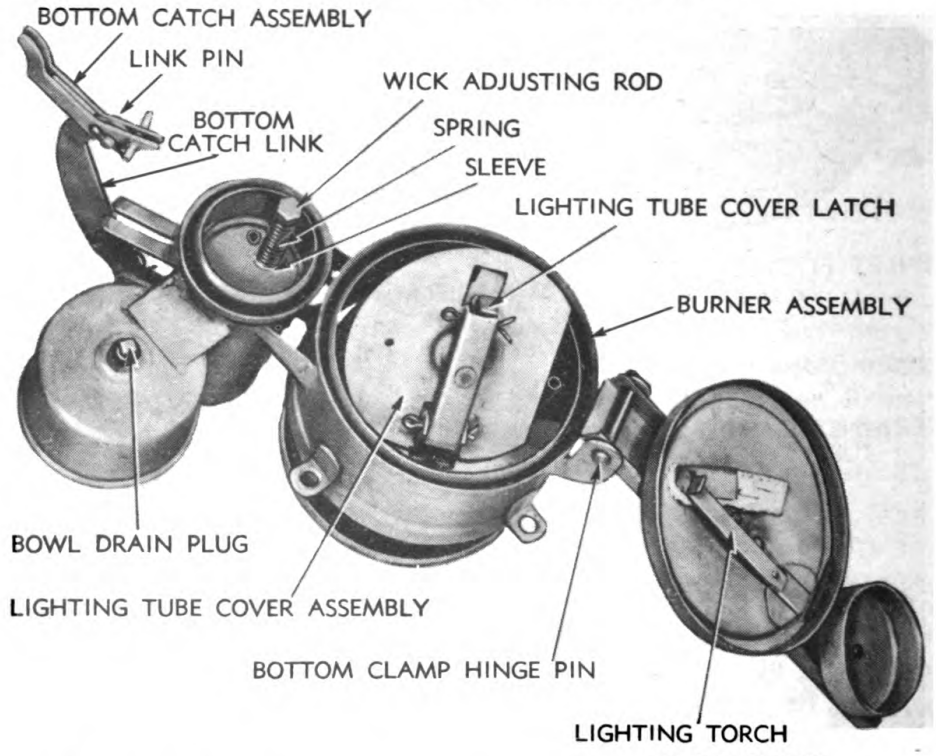


Figure 47 — Burner Assembly—Bottom View

d. Remove Wick Assembly and Operating Bolt (fig. 46). Open bottom covers of burner unit. Pull wick adjustment up against spring pressure until wick assembly can be removed from adjusting bolt sliding sleeve. Hold head of bolt, loosen lock nut over sliding sleeve from which wick was unhooked and remove lock nut, sleeve, and sleeve nut. Unscrew adjusting bolt from remaining adjusting nut, and remove nut. Remove adjusting bolt, spring, and guide from bottom of burner assembly.

e. Remove Burner Cover Assemblies (fig. 47). Remove cotter pin and pin holding bottom clamp and cover assembly to burner. Remove two cotter pins and pins holding bottom catch link to burner and bottom catch assembly to link. Remove two cotter pins holding lighting tube cover assembly to burner and catch to cover assembly. NOTE: *Remove above parts as they are released.*

Section III

CLEANING AND REPAIR

78. CLEANING.

a. Remove all soot and scale from combustion chamber, combustion chamber cover, and water heating unit with scraper or wire brush. Wash all other parts in dry-cleaning solvent. Remove old packings from recesses in top and bottom of combustion chamber body and bottom of burner assembly. Check all parts for wear or damage. Check inside of water heating unit for scale or rust.

79. REPAIR.

a. Procure new gaskets and packings to replace those damaged in removal and any part to replace those found to be damaged or excessively worn.

Section IV

ASSEMBLY

80. ASSEMBLY.

a. Install Burner Cover Assemblies (fig. 47). Install lighting tube cover over lighting tube and install cotter pin. Install lighting tube latch with straight lug down and with tapered projections under spring bar inside cover clamp and install cotter pin. Install lighting torch into pocket of burner lower cover. Install assembly to burner assembly with hinge pin and cotter pin.

Install lower cover assembly catch link, and catch with two pins and cotter pins.

b. Install Wick Assembly and Operating Bolt. Install spring and sleeve onto wick adjusting bolt, and insert assembly up through bottom of wick housing (fig. 47). Install special wick adjusting nut onto upper end of bolt, and turn bolt into nut until tangs on nut engage slide on side of wick housing. Install sleeve wheel onto hub of special nut. Screw nut onto end of wick adjusting bolt with wheel up. Install lock nut. Screw lock nut down until first thread of adjusting bolt just shows through lock nut. Turn sleeve wheel nut against lock nut and tighten. Lift the wick adjusting bolt to its highest position, place the wick so that it straddles the partition in the wick housing, and enter the U-shaped fork in the groove of the brass wheel on upper end of adjusting bolt (fig. 46). Install wick housing cover assembly with two screws and lock washers.

c. Install Float Valve Assembly. Hold float valve seat with external threaded end up, and install a strainer lower gasket over threads. Then install needle valve into seat with drilled hole end up, and insert small spring into drilled hole. Turn float cover assembly right side up, screw valve assembly into bottom of float cover, and tighten securely. Install new float cover gasket onto float bowl. Install float assembly with four screws and lock washers (fig. 45). Install strainer lower gasket, inlet fitting, strainer, strainer upper gasket, and inlet fitting bolt (fig. 45).

d. Install Water Heating Unit. Place the combustion chamber body on bench with the attaching bracket away from assembler. Start water heating unit as shown in figure 44, and set down into place. Install plug, lock nut, and gasket on left side, and lock nut and gasket on right side. Do not tighten lock nuts; just tighten plug. Install combustion chamber top so that flue connection extends opposite preheater attaching bracket. Install combustion chamber, top plate, and upper nut. Tighten the upper nut first, and then the two lower lock nuts. NOTE: *Be sure that packing is in groove at top of combustion chamber before putting combustion chamber top in place.*

e. Connect Combustion Chamber Assembly to Burner. Install packing in top groove of burner assembly. Install combustion chamber assembly onto burner assembly (fig. 43), and secure with four screws and lock washers. Tighten these screws evenly. Turn heater bottom side up, and install packing and ameripol gaskets in bottom grooves of burner where lower covers contact burner, if above gaskets were removed. See that drain plug in bottom of float bowl is tight. Cover any openings in preheater until ready for use, to keep out any dirt.

CHAPTER 10

TRAILER BODY HEATER

81. DESCRIPTION AND OPERATION.

a. Description. The Hunter model UH-5A gasoline heater consists of a metal case, fuel tank, fuel strainer, float valve, a 6-volt, direct-current electric motor driven fan and blower, mixer block, burner tube, two igniting plugs, warning lamp, a two-conductor electric cord for connecting the heater to a 6-volt direct-current source, and a flexible tubing exhaust extension for carrying the exhaust fumes away from the heater. The complete unit is approximately 10 inches wide, 16 inches high, and 15 inches deep. It weighs approximately 35 pounds, and contains a gasoline combustion heater with a heat output of 12,000 to 18,000 BTU's, depending on the speed of operation. The igniting plugs (type GP-36) are not spark plugs, but heater plugs with a resistance element which, when energized by 6 volts, glow red after about 30 seconds, and furnish the heat required for ignition of the fuel-air mixture. Two igniting plugs are used to insure starting in very cold weather, and to provide starting if one heating element should fail. Although the instruction plate states that "both switches should be turned 'UP' for 30 seconds before starting," it may be desirable to use only "IGNITION" where current draw is a vital consideration. The preheat position of heater switch energizes the second igniting plug, and is only necessary at low temperatures. The mazda lamp for the pilot light is a type-275 bayonet base miniature 6- to 8-volt mazda lamp. This lamp indicates when the resistor element in the igniting plug is energized. The fan and motor blower assembly consists of a series-wound motor driving a centrifugal blower, and an axial-discharge fan. The centrifugal blower provides air to the mixer block. The axial-discharge fan forces a stream of air across the radiating fins of the heater tube. The float valve maintains proper level of fuel below the mixer block. The fuel strainer in the tank filters the fuel to prevent fouling of the needle valve or burner head.

b. Operation.

(1) PRINCIPLE OF OPERATION. Fuel is atomized in the mixer block where a simple needle valve adjustment provides proper fuel-air mixture. This mixture flows through the burner head into the burner tube through orifices in the face of the burner head. Ignition is established by a portion of this fuel-air mixture passing through an ignition chamber in the burner head and

being ignited by an igniting plug, thus providing a small flame in the burner tube. The pilot light in the control panel indicates when the igniting plug is on. After combustion has been established in the burner tube, turn ignition off. Choking or loading of the burner tube with unburned fuel vapor before the ignition system is operating, may cause an explosion in the tube, but involves no danger. Recycling of the heater requires no delay or cooling period. To recycle the heater, simply reset the control to the "START" position where igniting plugs again provide ignition, before restarting the blower motor. Combustion air and air flow over the heat transfer surfaces are provided by the same motor, to make sure the heater cannot operate without air flow over the fins to dissipate the heat generated. CAUTION: *Operation of the heater without air flow will destroy the unit.*

(2) OPERATING INSTRUCTIONS.

(a) Be sure gasoline valve is open.

(b) Turn both switches up.

(c) After 30 seconds, turn both switches down.

(d) When heater is burning properly, turn ignition off.

(e) In extreme cold, keep both switches up for 3 minutes before starting.

(f) Avoid spilling fuel.

(g) Avoid use of stale gasoline.

(h) For best operation, needle valve (behind access door) should be opened from ½ to 1½ turns from the closed position—look for the exact adjustment stamped on heater door. CAUTION: *Do not operate heater continuously with ignition on.*

(i) If combustion fails to take place after the fan and blower motor starts, open the needle valve three or four turns to flush the jet, close completely for about ½ minute to clear the burner head and tube of any combustible mixture, stop motor for 1 minute, then open the needle valve the number of turns marked on the instruction plate, and restart the heater. CAUTION: *Do not allow the pilot light to burn after the heater starts. Switch to the "RUN" position after 1 minute.*

82. DISASSEMBLY.

a. Remove Fuel Tank. Remove rear cover by removing 10 cross-recessed sheet metal screws (fig. 50). Close fuel valve and disconnect fuel line at valve. Remove 13 fuel tank attachment screws, and lift tank from lower case.

TRAILER BODY HEATER

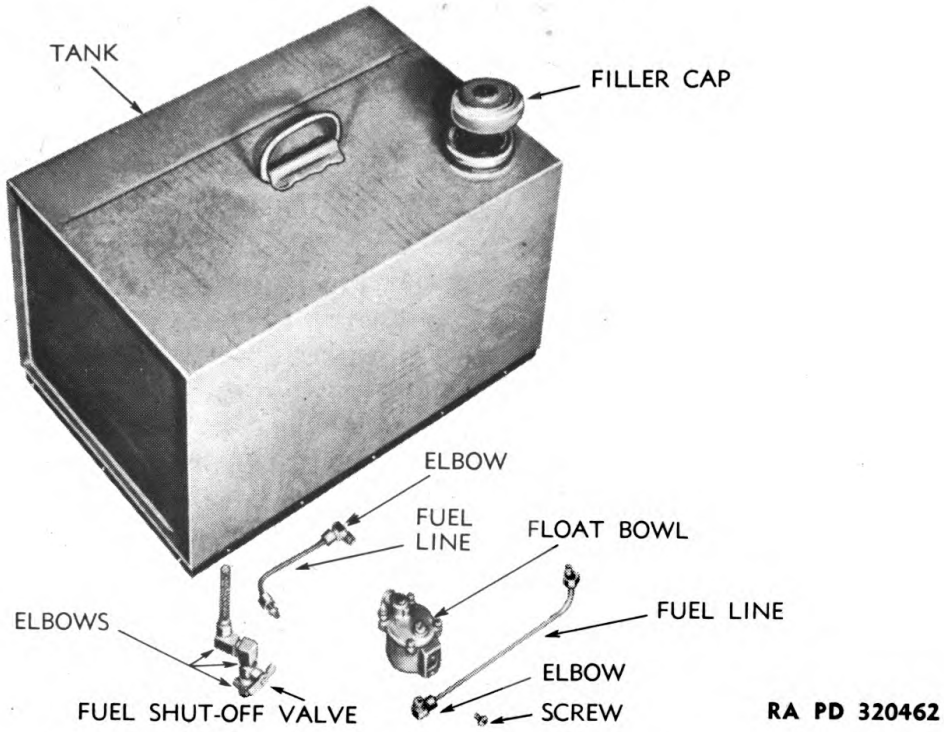


Figure 48 — Fuel Tank, Controls, and Lines, Partially Disassembled

b. Remove Float Bowl Assembly. Remove access door (with operating instructions). Disconnect fuel line at needle valve through access door opening. Remove two attachment screws, and lift float bowl and fuel line assembly from case.

c. Remove Blower Assembly. Remove hose clamp, and disconnect air hose from blower. Disconnect motor lead from top of heater switch. Remove four screws from bottom of case, and remove fan blower assembly.

d. Remove Combustion Tube Assembly. Remove locking nut and washer from exhaust outlet. (If large wrench not available, turn by means of screwdriver or chisel and hammer.) Remove two screws above screen, disconnect ignition wires, and remove combustion tube assembly. Lift unit from bottom channel.

83. CLEANING AND REPAIR.

a. Mixer Block (fig. 49). Remove hose clamp, and disconnect air hose. Remove needle valve assembly. Remove needle valve bonnet. Clean needle, and blow out needle seat. Reassemble needle valve, being sure needle is screwed out so it cannot seat

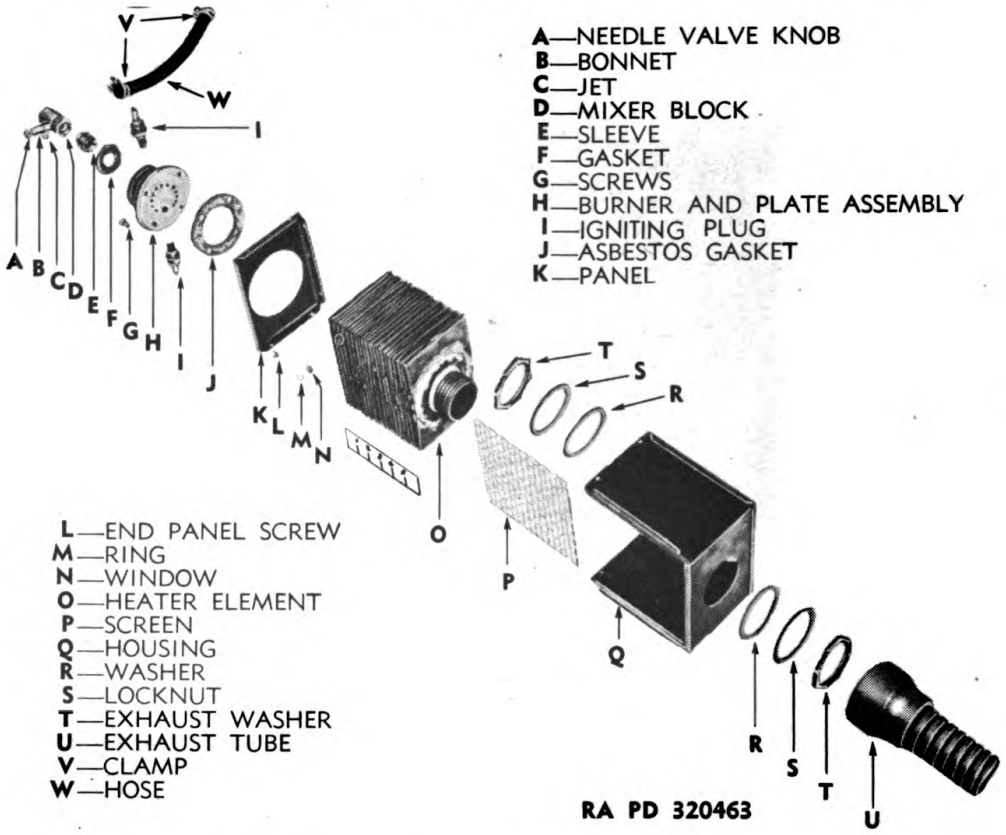


Figure 49 — Burner Assembly Partially Disassembled

before bonnet is tight. Needle must be straight and concentric with orifices when adusted after assembly.

b. Heater Tube Assembly (Combustion) (fig. 49). After motor inspection, install motor mounting plate to motor with two nuts (ground wire is connected under one of these). Install motor assembly to base mounting plate, checking with figure 51 to get correct relation of parts. Install blower fan (with open face out) onto motor shaft against mounting plate. Tighten set screw in hub so that fan clears plate. Install blower housing with three screws, so that air outlet horn is at bottom and pointed toward right hand when facing housing. Install remaining fan and tighten set screw. Check assembly to see that motor does not bind, ground wire is connected, and blower fan does not strike housing. Remove igniting plugs and inspect for good operating condition. Mark outer end of brass mixer sleeve, and remove from cast mixer block. Remove four screws, and detach cast mixer block from heater tube. Clean mixer block thoroughly inside and out, using wire to clean all ignition passages and ori-

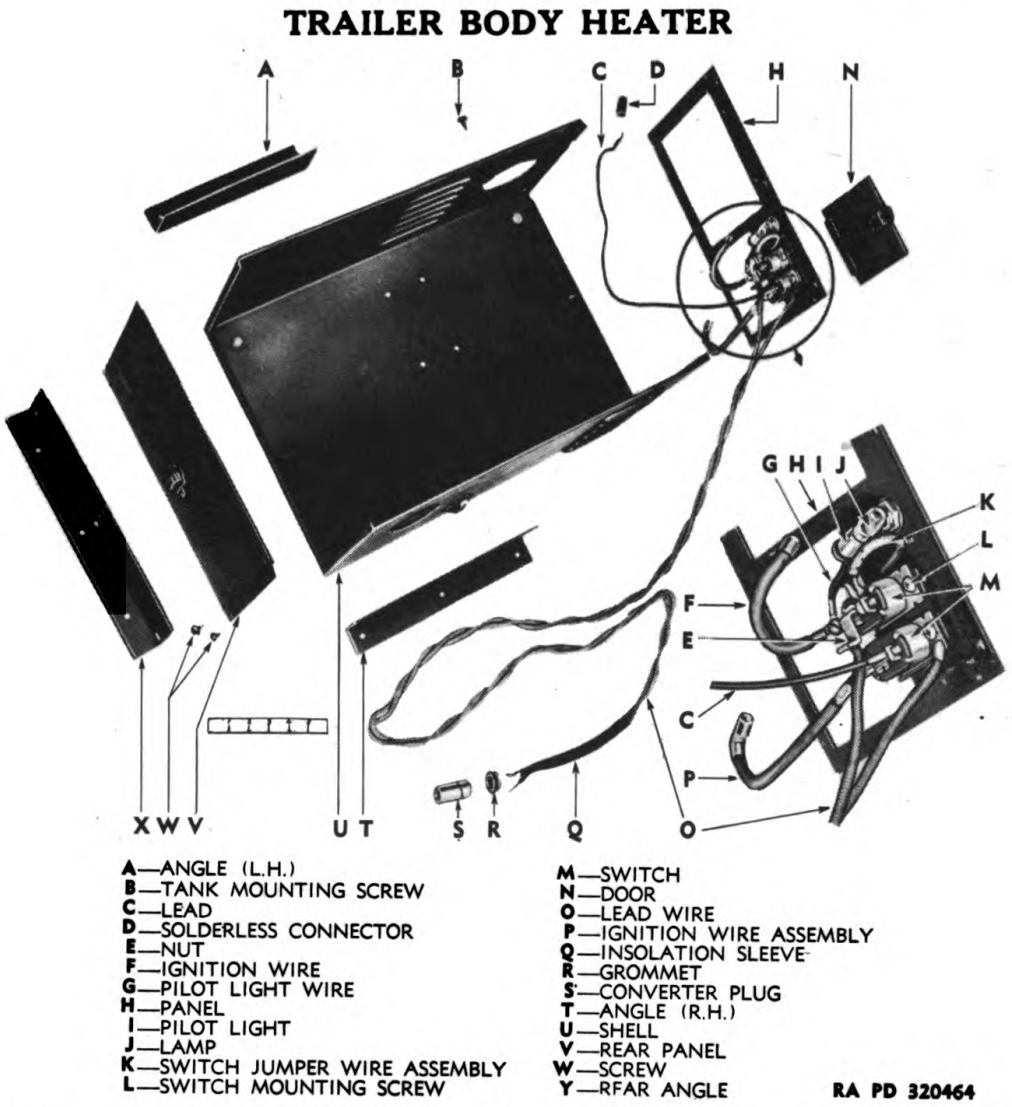


Figure 50 — Base and Control Panel Partially Disassembled

fices in burner face. Make sure burner gasket is in good condition, and reassemble burner block to burner tube, being certain ignition flame hole in face of burner block is down. Install igniting plugs and mixer sleeve with marked end out. Attach mixer block with needle valve facing out. Be sure insulating washer is in place between mixer block and mixer sleeve.

c. Fan Blower Assembly (fig. 51). Remove fan from motor shaft, using socket-head set screw wrench. Remove three screws and remove blower housing. Remove blower fan using socket-head wrench on hub. Remove three screws and relative nuts holding the back plate to mounting bracket, to remove motor from base mounting bracket. Remove triangular motor mounting plate by taking off two motor assembly nuts. Motor case can now be opened for repair or inspection.

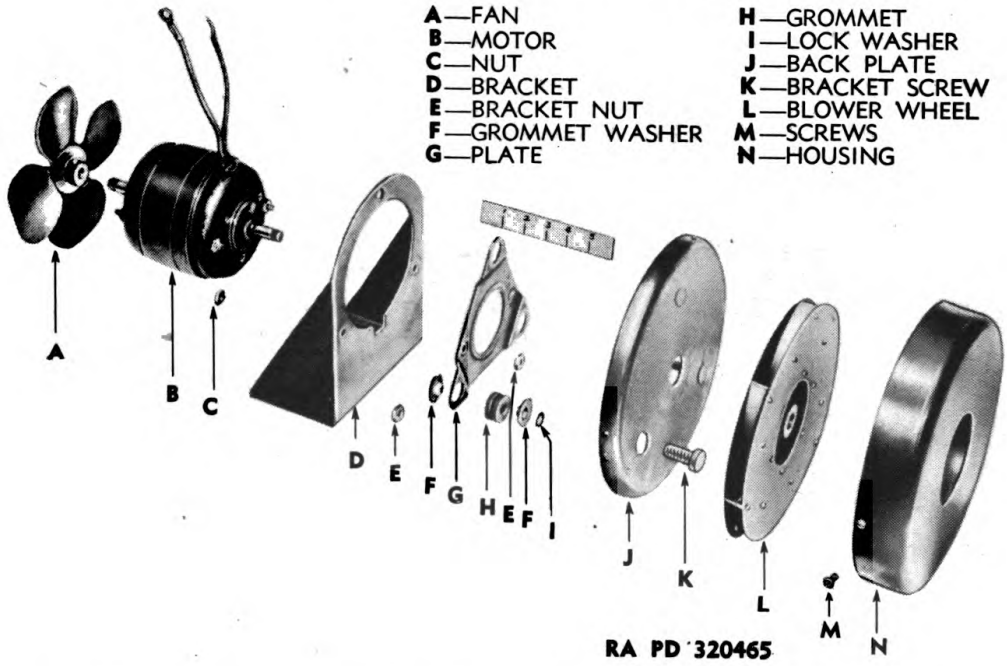


Figure 51 — Blower Assembly Partially Disassembled

d. Float Bowl Assembly (fig. 48). Remove fuel lines and blow out thoroughly. Remove four cover screws and inspect needle valve, seat and float mechanism within the bowl. Clean bowl carefully and reassemble, using new cover gasket. Reconnect fuel lines.

e. Fuel Filter (fig. 48). Remove fuel valve and strainer from bottom of fuel tank. Clean strainer thoroughly in gasoline, and be sure no gummy deposit prevents fuel passage through strainer. Check shut-off valve and reassemble to tank.

84. ASSEMBLY.

a. Install Combustion Tube Assembly. Install combustion tube assembly into heater base, being sure that pipe nut, exhaust washer, and gasket are in place on threaded pipe end of burner tube in that order inside burner tube housing (these parts can be seen through screen), so that exhaust pipe protrudes through side of heater base. Set projection at lower side of screen on tube housing into channel below screen opening in base, and install two screws above screen. Install exhaust gasket, exhaust washer, and pipe nut onto exhaust pipe and tighten. Connect ignition wires to igniting plugs.

b. Install Blower Assembly (fig. 51). Install blower assembly into heater base, and secure with four screws and lock washers

through bottom of heater base. Connect air hose to bottom of blower, and tighten hose clamp. Connect motor lead with solderless connector by twisting the two wire ends together and screwing on connector.

c. Install Float Bowl Assembly. Install float bowl assembly to inside of heater base, and secure with two screws and lock washers. Connect fuel line at bottom of needle valve by reaching through access door opening in base.

d. Install Fuel Tank (fig. 48). Position fuel tank assembly on base, and install 13 fuel tank attaching screws. Connect fuel line at shut-off valve under tank. Open fuel valve. Install rear cover with 10 cross-recessed sheet metal screws.

e. Test Heater. Test heater by filling fuel tank and operating heater as outlined under paragraph 81 **b** above.

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

CHAPTER 11

SPECIAL TOOLS

85. SPECIAL TOOLS.

a. Special tools mentioned in this Technical Manual are listed below. This list is provided for information only and is not to be used as a basis of requisition. Refer to the appropriate Standard Nomenclature List when procuring tools.

Tool	Manufacturer	Federal Stock Number
GAGE, drive pinion setting (set)	KM-J-589-S	41-G-176
LOCATOR, idler gear thrust washer	KM-J-1768	41-L-1570
REMOVER, bearing, cone (front) main shaft	KM-J-1749	41-R-2368-200
REMOVER, drive pinion flange and differential side bearing		41-R-2378-30
REMOVER, drive pinion oil seal	KM-J-1742	41-R-2378-40
REPLACER, differential side bearing cone	KM-J-1763	41-R-2391-65
TOOL, oil seal assembly, shifter shaft set	KM-J-1757	41-T-3280
TOOL, universal joint assembly and disassembly	KM-J-881-A	41-T-3379
WRENCH, tappet, double end, $^{11}/_{32}$ and $^{17}/_{32}$ in.	KM-J-4056	41-W-3575

REFERENCES

PUBLICATIONS INDEXES.

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

a. Introduction to Ordnance Catalog (explaining SNL system)..... ASF Cat. ORD 1 IOC

b. Ordnance Publications for Supply Index (index to SNL's)..... ASF Cat. ORD 2 OPSI

c. Index to Ordnance Publications (listing FM's, TM's, TC's, and TB's of interest to ordnance personnel, OPSR's, MWO's, BSD, S of SR's, OSSC's, and OFSB's; and includes Alphabetical List of Major Items with Publications Pertaining Thereto)..... OFSB 1-1

d. List of Publications for Training (listing MR's, MTP's, T/BA's, T/A's, FM's, TM's, and TR's concerning training)..... FM 21-6

e. List of Training Films, Film Strips, and Film Bulletins (listing TF's, FS's, and FB's by serial number and subject).. ..... FM 21-7

f. Military Training Aids (listing Graphic Training Aids, Models, Devices, and Displays)... FM 21-8

STANDARD NOMENCLATURE LISTS.

Cleaning, preserving and lubrication materials, recoil fluids, special oils, and miscellaneous related items..... SNL K-1

General tools, and supplies, ordnance base automotive maintenance company engine rebuild... SNL N-327

Ordnance maintenance sets..... SNL N-21

Soldering, brazing and welding materials, gases and related items..... SNL K-2

Tool-sets, for ordnance service command automotive shops..... SNL N-30

Tools, maintenance for repair of automotive vehicles ..... SNL G-27

Tool-sets, motor transport..... SNL N-19

Tractor, snow, M7 (T26E4)..... SNL G-194

Trailer, 1-ton, M19 (T48).....SNL G-195

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

EXPLANATORY PUBLICATIONS.

Fundamental Principles.

Automotive electricity	TM 10-580
Basic maintenance manual	TM 38-250
Diesel engines and fuels	TM 10-575
Electrical fundamentals	TM 1-455
Fuels, lubricants, cleaners, and preservatives	TM 9-2835
Internal combustion engine, the	TM 10-570
Machinist, the	TM 10-445
Military motor vehicles	AR 850-15
Motor vehicle inspections and preventive maintenance service	TM 9-2810
Precautions in handling gasoline	AR 850-20
Standard military motor vehicles	TM 9-2800

Operation of Materiel.

Snow tractor, M7 and 1-ton, snow trailer, M19	TM 9-774

Maintenance and Repair.

Cleaning, preserving, lubricating and welding materials and similar items issued by the Ordnance Department	TM 9-850
Cold weather lubrication and service of combat vehicles and automotive materiel	OFSB 6-11
Ordnance maintenance: Engine and engine accessories for ¼-ton, 4x4, truck (Ford and Willys)	TM 9-1803A
Ordnance maintenance: Power train, chassis, and body for ¼-ton, 4x4, truck (Ford and Willys)	TM 9-1803B

Protection of Materiel.

Camouflage	FM 5-20
Chemical decontamination, materials and equipment	TM 3-220
Decontamination of armored force vehicles	FM 17-59
Defense against chemical attack	FM 21-40
Explosives and demolitions	FM 5-25

Storage and Shipment.

Ordnance storage and shipment chart, group G —Major items	OSSC-G

REFERENCES

Registration of motor vehicles	AR 850-10
Rules governing the loading of mechanized and motorized equipment also major caliber guns, for the United States Army and Navy, on open top equipment published by Operations and Maintenance Department of Association of American Railroads.	
Storage of motor vehicle equipment	AR 850-18

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

INDEX

A

B

C

INDEX

C — Cont'd

D

E

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

INDEX

O — Cont'd

P

R

S

T

ORDNANCE MAINTENANCE — SNOW TRACTOR M7 AND 1-TON SNOW TRAILER M19 (ALLIS-CHALMERS)

T — Cont'd

U

V

W

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