

*For John Petre - from Fred Haslett*

TM 9-8034-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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ORGANIZATIONAL MAINTENANCE  
FOR

$\frac{1}{2}$  TON, 4x4  
INFANTRY LIGHT  
WEAPONS CARRIER  
M 274



HEADQUARTERS, DEPARTMENT OF THE ARMY  
JULY 1957

*This manual is correct to 12 July 1957*

TM 9-8034-20

TECHNICAL MANUAL }  
TM 9-8034-20

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 24 July 1957

## 1/2-TON, 4 x 4. INFANTRY LIGHT WEAPONS CARRIER, M 274

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## CHAPTER 1

### INTRODUCTION

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#### 1. Scope

a. This manual contains instructions for organizational maintenance of the 1/2-ton, 4 x 4, Infantry Light Weapons Carrier, M 274 as well as descriptions of major units and their functions in relation to other components of the materiel.

b. The appendix contains a list of current references, including supply manuals, forms, technical manuals, and other available publications applicable to the 1/2-Ton, 4 x 4, Infantry Light Weapons Carrier, M 274.

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

#### 2. Organizational Maintenance Allocation

In general, the prescribed organizational maintenance responsibilities will apply as reflected in the allocation of tools and spare parts in the appropriate columns of TM 9-8034-20P, and in accordance with the extent of disassembly prescribed in this manual for the purpose of cleaning, lubricating, or replacing authorized spare parts. In all cases where the nature of repair, modifica-

tion, or adjustment is beyond the scope or facilities of the using organization, the supporting ordnance maintenance unit should be informed in order that trained personnel with suitable tools and equipment may be provided or other proper instructions issued.

*Note.* The replacement of certain assemblies, that is the engine, engine starter rear rope, starter components, clutch control rear cable, clutch release bearing fork, clutch pilot bearing, clutch driven disk, clutch pressure plate, clutch release bearing, rear axle, and front axle, normally ordnance maintenance operations, may be performed in an emergency by the using organization, provided approval for performing these replacements is obtained from the supporting ordnance officer. A replacement assembly, any tools needed for the operation which are not carried by the using organization, any necessary special instructions regarding associated accessories, etc., may be obtained from the supporting ordnance maintenance unit.

#### 3. Forms, Records and Reports

Refer to TM 9-8034-10. Additional authorized forms are listed in appendix I of this manual.

#### 4. Description and Data

For description of and tabulated data applying to the Infantry Light Weapons Carrier, 1/2-Ton, 4 x 4, M 274 refer to TM 9-8034-10.

## CHAPTER 2

### SERVICE ON RECEIPT OF MATERIEL

#### 5. Purpose

a. When a new or reconditioned vehicle is first received by the using organization, the organizational mechanics must determine whether the vehicle has been properly prepared for service by the supplying unit and is in condition to perform any mission to which it may be assigned. For this purpose, inspect all assemblies, subassemblies, and accessories to be sure they are properly assembled, secure, clean, correctly adjusted, and lubricated. Check all tools and equipment (pars. 11-14) to be sure every item is present, in good condition, clean, and properly mounted or stowed.

b. In addition, perform a 'break-in' of at least 40 hours on all new or reconditioned vehicles and a sufficient number of hours on used vehicles to completely check their operation, according to procedures in paragraph 6.

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

#### 6. Preliminary Services

##### a. General Procedures.

- (1) Uncrate vehicle, remove metal strapping, plywood, tape, seals, wrapping paper, and dehydrant bags. If any exterior surfaces are coated with rust-preventive compound, remove it with mineral spirits paint thinner.
- (2) Read Processing Record for Storage and Shipment tag (DA Form 9-3) and follow all precautions checked thereon. This tag should be attached to the steering wheel, shifting levers, or ignition switch.
- (3) Crank engine by hand at least two revolutions, before turning ignition on, to test for hydrostatic lock.

*Note.* If the vehicle has been driven to the using organization, most of the procedures (1) through (3) above should have been performed.

- (4) Follow the general procedures given in TM 9-8034-10.

##### b. Specific Procedures.

- (1) Perform the "D" (6 months or 600 hours) preventive-maintenance services as outlined on DA Form 461, with variations listed in (2) through (3) below.
- (2) Line out notation at top of form "60 days or 1,000 miles—6 months or 6,000 miles" and write in "New (or rebuilt) vehicle reception."
- (3) Before starting road test, perform item 27, table III. Check processing tag (a(2) above) for engine oil and viscosity. If tag states that oil is suitable for 40 hours of operation and is of the proper viscosity for local operation, check the level, but do not change the oil. Lubricate all points, regardless of interval.
- (4) Perform item 35, table III. Inspect breaker points (par. 49).

#### 7. Break-In Procedures

a. Refer to TM 9-8034-10 for operating instructions.

b. After the preliminary service has been performed, the break-in period (40 hours) may be accomplished in normal service of the vehicle under the driver's supervision. The driver will be cautioned against excessive speeds, skipping speeds in shifting gears, rapid acceleration, or in any way loading the engine or power train to capacity during the break-in period. If the vehicle was driven to the using organization, apply travel time to break-in period.

#### 8. Service After 40 Hours

After 40 hours of vehicle operation, perform the "C" (100 hour) preventive-maintenance service, with variation listed in a and b below.



*a.* Line out notation at top of DA Form 461, "60 days or 1,000 miles—6 months or 6,000 miles," and write in "New (or rebuilt) vehicle 40-hour service."

*b.* Change the engine oil.

#### 9. Service After 100 Hours

When the vehicle has been driven 100 hours, it will be placed on the regular preventive maintenance schedule and will be given the first regular "C" (100 hour) preventive maintenance service.

#### 10. Correction of Deficiencies

*a.* Ordinary deficiencies disclosed during preliminary inspection and servicing or during break-in period will be corrected by the using organization or a higher maintenance echelon.

*b.* Serious deficiencies, which appear to involve unsatisfactory design or material, will be reported on DA Form 468 (Unsatisfactory Equipment Report). The commander of the using organization will submit the completed form (in accordance with SR 700-45-5) to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM.



## CHAPTER 3

### ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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

##### 11. General

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

##### 12. Parts

Spare parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, providing replacement of these parts is within the scope of organizational maintenance functions. Spare parts, tools, and equipment supplied for the 1/2-Ton, 4 x 4, Infantry Light Weapons Carrier, M 274 are listed in Department of the Army Supply Manual TM 9-8034-20P,

which is the authority for requisitioning replacements.

##### 13. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue to 1st echelon by TM 9-8034-10. Common tools and equipment for 2d echelon are listed in ORD 6 SNL J-7, sections 1, 2, and 3; ORD 6 SNL J-10, section 4; and are authorized for issue by TA and TOE.

##### 14. Special Tools and Equipment

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

*Table I. Special Tools and Equipment for Organizational Maintenance*

Item	Identifying No.	References		Use
		Fig	Par.	
Replacer	7010301	1, 86, 87	117b, 117d	Installing steering bellcrank bearings and seals.
Replacer	7010306	1, 69	101c	Installing wheel hub oil seal.
Handle	7010321	1, 69, 86, 87	101c, 117b, 117d	Handle for replacers 7010301 and 7010306.

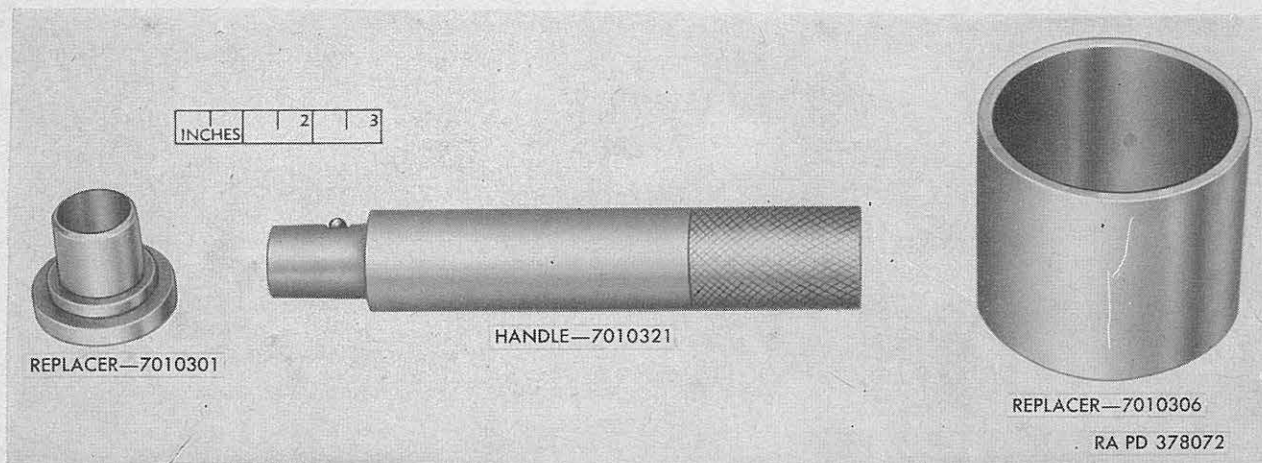


Figure 1. Special tools.

## Section II. PREVENTIVE-MAINTENANCE SERVICES

### 15. General

General information, responsibility, intervals, and general procedures for all services and inspections are contained in TM 9-8034-10.

### 16. Outline

The system of preventive-maintenance services for tactically used wheeled vehicles is outlined in table II. "C" and "D" services are designated as second echelon services.

Table II. Outline of Preventive-Maintenance Services for Tactically Used Wheeled Vehicles

Service	Intervals	Accomplished by
Hourly—monthly "C"	100 hours	Company or battery maintenance personnel
Semiannual, hourly "D"	6 months or 600 hours whichever occurs first.	Battalion maintenance personnel

### 17. General Procedures for Second Echelon

*a. Automatically Applied.* All of the general procedures given in TM 9-8034-10 will be followed. Organizational mechanics must be so thoroughly trained in these procedures that they apply them automatically at all times in the performance of their duties.

*b. First-Echelon Participation.* The driver or crew usually accompanies the vehicle and assists the organizational mechanics in the performance of second-echelon periodic services.

*c. Unwashed Vehicle.* The driver or crew should present the vehicle for a scheduled preventive-maintenance service in a reasonably clean condition; that is, it should be dry and not caked with mud to such an extent as to seriously

hamper inspection and services. However, washing of the vehicle should be avoided immediately prior to an inspection, since certain types of defects such as loose parts and oil leaks may not be evident immediately after washing.

*d. Services.* Second-echelon services are defined by and restricted to the following general procedures unless approval has been given by the supporting ordnance organization.

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



TM 9-8034-10 to remove old lubricant, dirt and other foreign material.

- (3) *Special lubrication.* This applies either to lubrication operations that do not appear on the vehicle lubrication chart or to items that do appear but which should be performed in connection with the maintenance operations if parts have to be disassembled for inspection or service.
- (4) *Serve.* This usually consists of performing special operations, such as draining and refilling units with oil, and changing or cleaning the oil filter or air cleaner.
- (5) *Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice. Use a torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lockwashers, locknuts, locking wire, or cotter pins to secure the tightened nut.

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

*f. DA Form 461.* The numbers of the specific preventive-maintenance procedures that follow are identical with those outlined on DA Form 461 (Preventive-Maintenance Service and Inspection for Wheeled and Half-Track Vehicles). Certain items on the form that do not

apply to this vehicle are not included in the procedures in this manual. In general, the sequence of items on the form is followed, but in some instances there is deviation for conservation of the mechanic's time and effort.

## 18. Hourly Monthly "C" Preventive-Maintenance Services

*a. Intervals.* The hourly monthly "C" services are performed by the organizational mechanics at the intervals given in table III. All preventive-maintenance services are performed at the prescribed intervals, insofar as practicable.

*b. Purpose.* The "C" preventive-maintenance services insure the correct adjustment, securing, and assembly of all components of the vehicle. Necessary replacements, cleaning, lubrication, and protection and parts and/or assemblies will be accomplished as required to give reasonable assurance of trouble-free operation until the next preventive-maintenance service is performed.

## 19. Semiannual Quarterly Hourly "D" Preventive-Maintenance Services

The semiannual quarterly hourly "D" preventive-maintenance services are comprehensive scheduled services performed by the organizational mechanics at the intervals given in table III.

## 20. Specific Procedures for Second Echelon

Specific procedures for performing each item in the monthly or 100 hours "C" and the 6 months or 600 hours "D" preventive-maintenance services on vehicles are given in table III. Each page of the table has columns at the left edge for designated intervals of maintenance. Very often it will be found that a particular procedure does not apply to scheduled intervals. In order to determine which procedure to follow, look down the column corresponding to the maintenance procedure and wherever an item number appears, perform the operations indicated opposite the number.



Table III. "C" and "D" Preventive-Maintenance Services

"D" (6 months or 600 hours)	"C" (monthly or 100 hours)	Procedure
		INSPECTION AND ROAD TEST
		<i>Note.</i> When the tactical situation does not permit a full road test, perform only those items that require little or no movement of the vehicle.
1	1	<i>Before operation. Fuel, oil, tires, leaks, general visual inspection of vehicle and equipment.</i> Perform the before-operation service (par. 6).
		<i>Hour meter, fuel, ignition switch, and other controls.</i> Observe all for normal readings. Notice if the ignition switch operates freely and makes positive contact, and check other controls for normal operation.
3	3	<i>Engine—idle, acceleration, power, noise, governed speed.</i> In warming up engine, observe if it starts easily and if action of choke and hand throttle are satisfactory. Note if idling speed is correct. Listen for any unusual noises at idle and higher speeds. When operating the vehicle, note if it has normal power and acceleration. Listen for any unusual noises when the engine is under load. Speed up the vehicle, on a level stretch, to see if it will reach the specified speed.
4	4	<i>Steering—free-play, bind, wander, shimmy side pull, column and wheel.</i> With the vehicle moving straight ahead, see if the steering wheel has excessive free play and if there is any tendency to wander, shimmy, or pull to the side. Turn the steering wheel through its entire range and note any bind. Examine steering column and wheel.
5	5	<i>Clutch—free travel, drag, noise, chatter, grab, slip.</i> See if clutch pedal has free travel and if action of pedal return spring is satisfactory. Note whether clutch disengages completely or has a tendency to drag. Observe smoothness of engagement and tendency to chatter, grab, or slip and any unusual noise. With transmission in neutral, depress and release clutch pedal, listening for defective release bearing.
7	7	<i>Brake—braking effect, feel, noise, chatter, pedal travel, hand control.</i> See if brake pedal has free travel and if action of return spring is satisfactory. Observe if pedal goes too close to foot rest. Make several stops noting side pull, noise, chatter, or any other unusual conditions. Observe if ratchet of handbrake holds and if the lever requires more than three-quarters travel for full application. Stop the vehicle on an incline and apply the brake to see if it holds the vehicle, or if application of the brake at a moderate speed stops the vehicle within a reasonable distance.
9	9	<i>Transmission and transfer—lever action, declutching, vibration, noise.</i> Shift transmission and transfer into all speeds, observing any unusual stiffness of the shift levers, tendency to slip out of speed, unusual noise, or excessive vibration.
10	10	<i>Unusual noises—attachments, body and wheels, power train.</i> At all times during the road test be alert for unusual or excessive noises that may indicate looseness, defects, or deficient lubrication in these components.
		AFTER ROAD TEST
25	25	<i>Temperatures—brake drum, hubs, axles, transmission, transfer.</i> Immediately after the road test, feel these units cautiously. An overheated wheel hub indicates an improperly adjusted, defective, or dry wheel bearing. An overheated gear case indicates internal maladjustment, damage, or lack of lubrication.
25	-----	<i>Inspect propeller shaft.</i> Tighten universal-joint assembly and flange unit (par. 101).
26	26	<i>Leaks—engine oil, fuel, axles, housings, transmission, and all other components carrying fluids, oil, or grease.</i> Make general observations around engine and underneath the vehicle for oil, fuel, and exhaust leaks.
		<i>Lubrication—lubricate vehicle in accordance with lubrication order.</i> Inspect vehicle for proper lubrication (LO 9-8034-10).
27	27	Lubricate vehicle in accordance with lubrication order. Coordinate with inspection and disassembly operations to avoid duplication.
27	27	During lubrication, inspect tires for unusual wear, penetrating objects, and proper matching.
27	-----	Rotate and match tires according to tread design and degree of wear. See TM 31-300 for acceptable limits in matching tires. Tighten wheel nuts (par. 99c(5)).

Table III. "C" and "D" Preventive-Maintenance Services—Continued

"D" (6 months or 600 hours)	"C" (monthly or 100 hours)	Procedure
		MAINTENANCE OPERATION
30	-----	<i>Compression.</i> Test compression in each cylinder, with throttle control all the way out and choke control all the way in, and record in space provided on DA Form 461. It is preferable to make compression test with engine at operating temperature.
31	-----	<i>Breather caps and ventilators.</i> Inspect carburetor, breather, and crankcase-ventilator, and air cleaners.
31	-----	Clean and service these items in accordance with lubrication order or instructions in vehicle technical manual.
33	-----	<i>Fan, drive belts, and pulleys.</i> Inspect pulleys and fan for alinement and belts for tension (par. 48).
34	-----	<i>Valve mechanism—clearance, cover gaskets.</i> Gage valve-tappet clearance and look for broken valve springs, low compression, or tappet noise. If clearance is found insufficient, adjust (par. 50) and recheck compression. Inspect push rod housing gaskets.
35	-----	<i>Spark plugs—clean. Adjust magneto. Cap points, and wiring, ignition timing.</i> Remove and inspect spark plugs (par. 54). Inspect magneto cap and breaker points and test operation of advance mechanisms by hand.
35	-----	Clean sparks plugs. Adjust magneto breaker points (par. 49). If points are badly pitted, replace magneto (par. 49).
37	37	<i>Carburetor, choke, throttle, linkage, fuel filter element and lines.</i> Inspect these items, noticing particularly if the parts operate freely and are not excessively worn. Observe if the choke valve opens fully when the control is released, and if the throttle valve opens fully when accelerator is fully depressed or the hand throttle all the way out.
37	-----	Make an engine vacuum test and adjust carburetor idle mixture. Test fuel-pump pressure.
37	-----	Clean the filter elements of fuel filter (par. 69); drain water and sediment from fuel tank if there is evidence of contamination, using a container to catch the drainings.
38	-----	<i>Exhaust pipe and mufflers.</i> Inspect; listen for excessive or unusual noises and look for exhaust leaks.
	38	Tighten mountings (pars. 51 and 79).
39	-----	<i>Brakeshoes—linings, links, guides, anchors, supports.</i> Adjust brake (par. 107). Examine brakedrum, shoes, lining, links, guides, anchors, supports, retractor spring, and cam (par. 106). Note particularly if contacting surfaces are glazed.
39	-----	Wheel bearings will be serviced in accordance with LO 9-8034-10.
43	-----	<i>Tow hitch.</i> Inspect tow bar. Look particularly for security of mountings (par. 127).
43	-----	Tighten assembly and mounting bolts.
		UNUSUAL CONDITIONS
43	-----	Maintenance operations and road tests as prescribed under usual conditions will apply equally well under unusual conditions for operations for all occasions except in extreme cold weather. Intervals are necessarily shortened in extreme cold weather servicing and maintenance. Vehicles subjected to salt water immersion or complete submersion are evacuated to ordnance maintenance unit as soon as possible after exposure.

## 21. Painting

Instructions for the preparation of the materiel for painting, methods of painting, and ma-

terials to be used are contained in TM 9-2851. Instructions for camouflage painting are contained in FM 5-20B. Materials for painting are listed in TM 9-8034-20P.



## Section III. TROUBLESHOOTING

### 22. Scope

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

b. This manual cannot cover all possible troubles and deficiencies that may occur under

the many conditions of operation. If a specific trouble, test, and remedy therefor are not covered herein, proceed to isolate the system in which the trouble occurs and then locate the defective component. Do not neglect use of any test instruments such as test lamp, and pressure and vacuum gages that are available (par. 13). Standard automotive theories and principles of operation apply in troubleshooting the vehicle. Question vehicle driver or operator to obtain maximum number of observed symptoms. The greater the number of symptoms of troubles that can be evaluated, the easier will be the isolation of the defect.

### 23. Engine

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Engine fails to start when cranked.	Gasoline tank empty.  Magnetos switch off or ground thermal contact defective. Over choked.  No fuel reaching cylinders.    Magnetos out of time. Defective ignition system.	Replenish fuel.  Turn magnetos switch on, or replace ground thermal contact (par. 90). Open throttle wide and crank engine. If necessary clean or replace spark plugs (par. 54). Replace fuel pump (par. 47) if found inoperative. Repair or replace fuel line (par. 46) if found plugged. Adjust or replace carburetor (par. 46) if out of adjustment or dirty. Retime magnetos (par. 49). Remove conduit and lead assembly from spark plug, hold terminal one-quarter inch from metal of engine, and crank engine. If spark does not jump between terminal and engine, system is inoperative. Replace magnetos (par. 49) and/or replace conduit and lead assys. (par. 53).
Engine fails to stop.	Magnetos switch on. Magnetos switch defective. Engine overheated.	Turn switch off. Replace switch (par. 89). Check shroud assembly and cylinder fins for dirt or damage and replace shroud (par. 52) or engine (pars. 58, 59, 60) as necessary.
Engine misfires or stalls.	Fouled spark plugs. Defective ignition system.   Magnetos points burned. Water in fuel.  Fuel lines or filter plugged.	Clean and test plugs or replace (par. 54). Check conduit and lead assemblies to see that they are not damaged or connected to wrong spark plugs. Check magnetos switch and ground thermal contact to see that they operate correctly. Replace parts as necessary (pars. 85-87). Replace magnetos (par. 49). Drain fuel tank and refill with correct fuel. Replace gasoline filter element (par. 69). Clean fuel line (par. 70).



<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Loss of power.	Valves sticking. Ignition incorrectly timed. Fouled spark plugs.  Engine overheated.  Compression low.	Notify ordnance maintenance personnel. Retime magneto (par. 49). Clean and test plugs and/or replace (par. 54). Check blower and engine shroud and cooling fins. With engine and oil warm and spark plugs removed, compression pressure should be 50-60 psi when engine is turned over with starter handle (usually three pulls are necessary). If not correct notify ordnance maintenance personnel. Notify ordnance maintenance personnel.
	Governor setting incorrect.	

## 24. Fuel System

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
No fuel at carburetor.	No fuel in tank. Gasoline filter plugged. Defective fuel pump. Fuel line defective or plugged.	Fill fuel tank. Clean gasoline filter (par. 69). Replace pump (par. 47). Remove fuel line and clean or replace as necessary (par. 70). Replace carburetor (par. 46).
Fuel in carburetor but not in cylinders.	Carburetor jets or passages plugged.	
Leak in fuel system.	Loose connections, defective lines.	Check for leak in gasoline tank or line and repair or replace parts as necessary.

## 25. Exhaust System

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Excessive noise.	Loose connections.	Tighten all connections of exhaust system (par. 79) replacing exhaust gaskets if necessary (par. 51).

## 26. Cooling System

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Engine runs too hot.	Blower belt loose. Fan damaged or not operating properly.  Engine air shroud assembly dirty or damaged.	Tighten belt (par. 48). Inspect fan and repair if damaged. Replace impeller shaft bearings if necessary (par. 48a). Clean between engine and shroud if dirt has accumulated. Replace shroud if damaged.

## 27. Starting System

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Starter cable fails to rewind.	Rewind spring broken.	Replace spring (par. 62).
Pulling starter cable fails to turn engine.	Starter cable kinked, frayed, or broken. Pawl broken or stuck.  Starter cable kinked, frayed, or broken. Pawl spring broken.	Replace cable (par. 62). Free or replace pawl as necessary (par. 62). Replace cable (par. 62). Replace spring (par. 62).

## 28. Ignition System

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Ignition faulty while engine is running.	Faulty spark plugs.  Faulty conduit and lead assemblies.  Faulty switches.	Remove plugs (par. 54), and replace as necessary. Repair or replace conduit and lead assemblies (par. 53). Replace magneto switch (par. 89) or magneto ground thermal contact (par. 89) as necessary.

*Malfunction**Probable causes**Corrective action*

Magneto incorrectly timed.  
Magneto faulty.

Retime magneto (par. 49).  
Replace magneto (par. 49).

## 29. Radio Interference

*Malfunction**Probable causes**Corrective action*

Radio interference is caused by engine when running.

Loose connections in ignition conduit and lead assemblies.  
Shielding on conduit and lead assemblies damaged.

Tighten all connections (pars. 85-90).

Repair or replace conduit and lead assemblies (par. 53).

## 30. Clutch

*Malfunction**Probable causes**Corrective action*

Clutch slips.

Improper pedal adjustment.  
Clutch controls binding.

Adjust pedal free travel (par. 66).

Check to see that controls move freely.

Repair or replace as necessary.

Replace clutch driven disk (par. 62).

Replace pressure plate (par. 62).

Check to see that controls move freely.

Repair or replace as necessary.

Replace clutch driven disk (par. 62).

Replace pressure plate (par. 62).

Replace parts as necessary.

Tighten engine mounting bolts (par. 60).

Hook spring in proper position or install new one.

Replace clutch driven plate assembly (par. 62).

Clutch grabs.

Driven disk facings burned or worn.  
Weak springs.  
Clutch controls binding.

Driven disk facings burned or worn.  
Broken or bent parts on pressure plate.  
Friction surfaces rough or scored.  
Loose engine mounting.

Clutch rattles.

Clutch bearing carrier return spring unhooked or broken.  
Driven plate drive springs broken.

## 31. Axles, Including Transmission and Transfer

*Malfunction**Probable causes**Corrective action*

Excessive noise.

Insufficient or incorrect lubricant.  
Broken or worn parts in transmission or transfer.  
Overheated transmission.

Check lubricant for grade and quantity.

Replace transmission-axle assembly (par. 103).

Check lubricant for grade and quantity.

Replace lubricant if necessary.

Replace transmission-axle assembly (par. 103). Replace front axle (par. 99).

Repair or replace as necessary (par. 101).

Replace transmission-axle assembly (par. 103).

Replace transmission-axle assembly (par. 103).

Replace transmission-axle assembly (par. 103).

Adjust clutch pedal free travel (par. 66).

Replace or clean clutch driven plate or pressure plate as necessary (par. 62).

Lubricate.

Slips out of gear.

Wheel bearings or joint assemblies worn.  
Damaged poppets, springs, or interlock.

Gears or bearings worn.

Hard shifting.

Shift fork bent causing partial engagement.  
Clutch not releasing.  
Clutch driven plate binding on splines, or pressure plate faulty.  
Controls binding.

## 32. Propeller Shaft

*Malfunction**Probable causes**Corrective action*

Excessive vibration or noise.

Foreign material on shaft.  
Lack of lubricant.  
Bearings worn.  
Shaft bent.

Clean shaft.

Lubricate.

Install new bearings (par. 97).

Replace shaft (par. 96).

## 33. Brake

*Malfunction**Probable causes**Corrective action*

Brake drags.

Improper brake cable adjustment.  
Brake cable return spring broken or missing.

Adjust brake cable (pars. 107 and 108).

Install new return spring (par. 107).

Brake fails to hold.

Brake adjustment too loose.

Adjust brake cable (pars. 107 and 108).



## 34. Wheels and Tires

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Wheel wobbles.	Wheel bent. Wheel loose on wheel hub. Wheel hub loose on wheel joint.	Replace wheel (par. 112). Tighten nuts on wheel hub bolts. Tighten wheel hub nut, (par. 113). Align wheels (par. 116d).
Abnormal tire wear.	Wheels out of alignment. Excessive use of four wheel steer.  Wheel bent.	Do not use front wheel steer except when required. Replace wheel (par. 112).

## 35. Steering

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Steering difficult.	Lack of lubrication. Tire pressure low.	Lubricate. Inflate tires to correct pressure (par. 111).

## 36. Hour Meter

<i>Malfunction</i>	<i>Probable causes</i>	<i>Corrective action</i>
Not operating.	Internal breakage.	Notify ordnance maintenance personnel.

# Section IV. ENGINE DESCRIPTION AND MAINTENANCE IN VEHICLE

## 37. Description and Data

*a. Description* (figs. 2 and 3). The engine is an air cooled four cylinder, horizontally opposed, internal combustion type. Cylinder heads are detachable, and carry the valves and rocker arms which are operated through push rods and tappets from the camshaft. The camshaft is located beneath the crankshaft and driven by a roller chain. The magneto is also chain driven from the crankshaft, and is radio shielded. The oil pump is of the rotor type operated from the camshaft. The fuel pump is located on the oil pump cover and is driven from a cam on the oil pump shaft. The intake manifold is bolted to the top of the crankcase and incorporates an oil reservoir into which the engine oil drains when the vehicle is turned upside down. Air for cooling is circulated by a blower, the air being directed around the cylinder and through the oil cooler by a shroud assembly. The blower is driven by a V-belt from a pulley on the crankshaft. The clutch release bearing, rope starter mechanism, and clutch are all built into the engine assembly. The engine is bolted to and entirely supported by the rear axle assembly. A thermal contact is provided to interrupt ignition and stop the engine in case of overheating. A governor built into the magneto cuts out the ignition current if engine speed exceeds 4,300 rpm.

### *b. Data.*

Make-----Willys

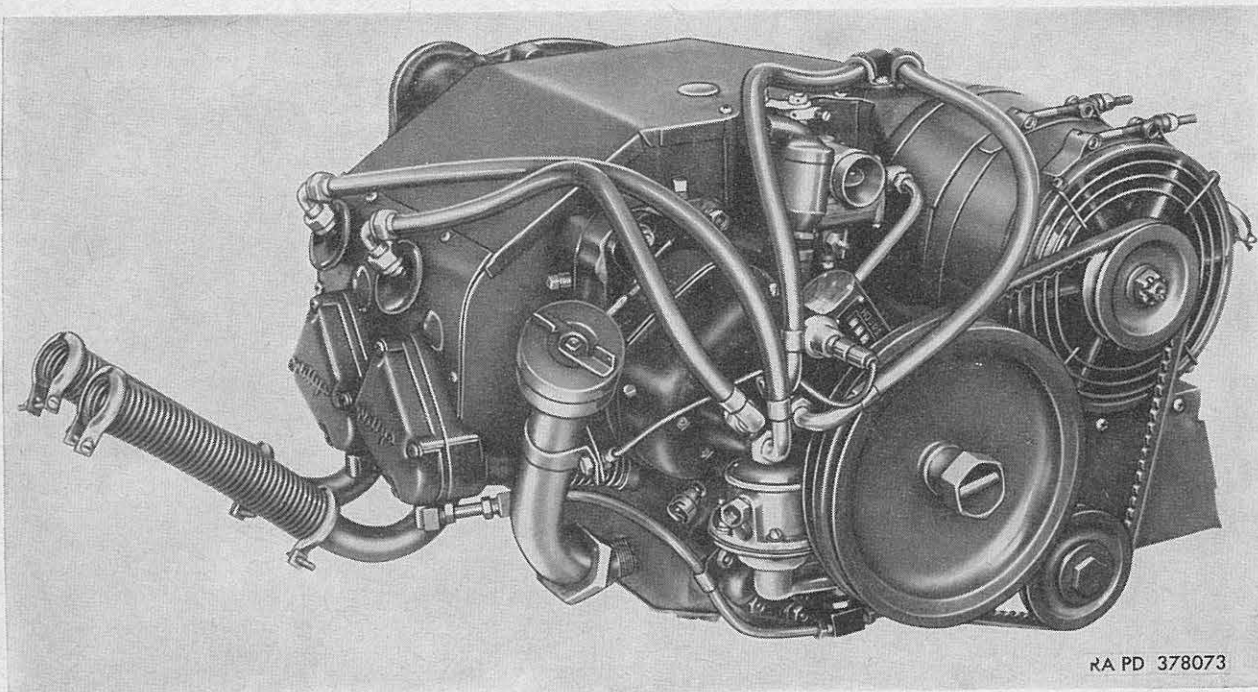
Part number-----	914241
Type-----	4 cylinder horizontal opposed
Bore-----	2.75 in.
Stroke-----	2.25 in.
Firing order-----	1-3-2-4
Piston displacement-----	53 cu in.
Governed speed-----	4,300 rpm
Compression ratio-----	7.0-1
Horsepower (including fan, less other accessories).-----	17 at 3,200 rpm
Torque (including fan, less other accessories).-----	31 lb-ft at 2,100 rpm
Ignition-----	Magneto, J. I. Case Model 48
Crankcase capacity-----	2 qt
Fuel (minimum)-----	83 octane
Oil filter-----	Air-Maze screen type
Oil pump-----	Rotor type
Clutch:	
Make-----	Auburn
Type-----	Single disk, 6.5-in., No. 100163-1

## 38. Operations Performed With Engine in Vehicle

Paragraphs 39 through 57 give directions for performing such operations as personnel of second echelon are allowed to perform.

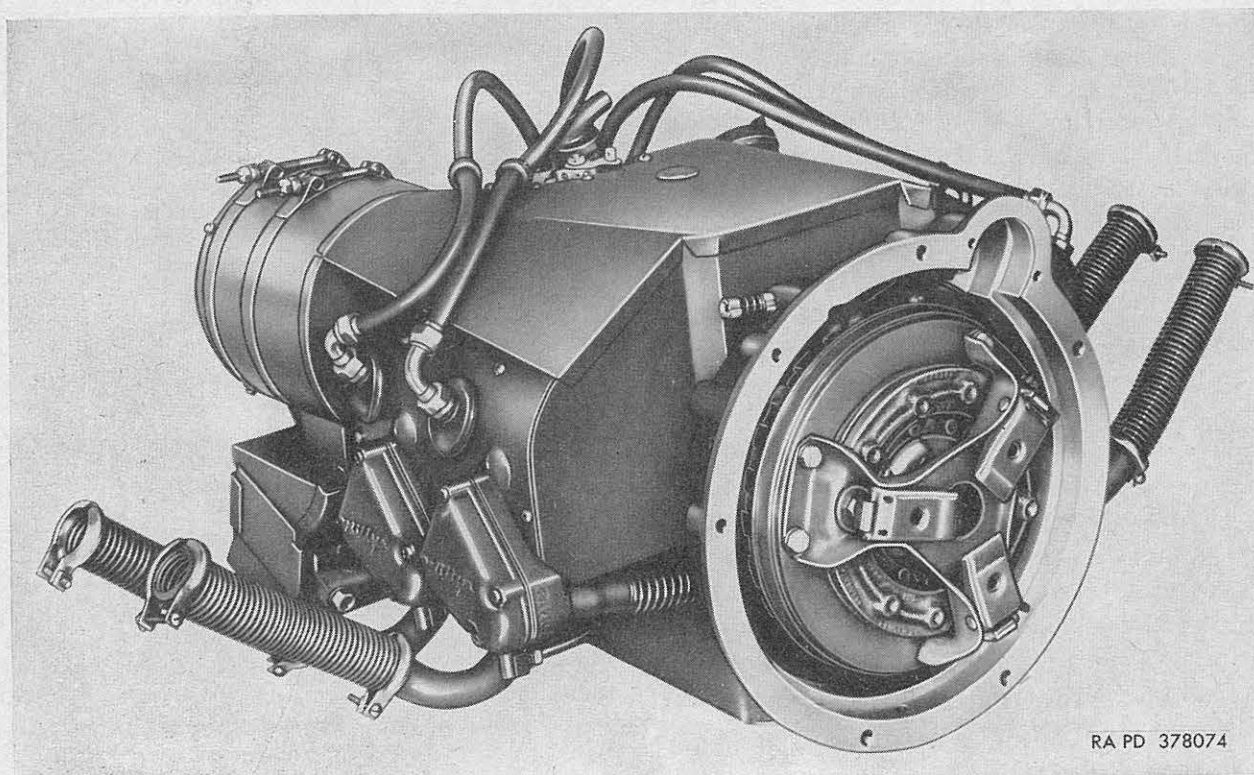
*Note.* It should be remembered that the front of the engine is toward the rear of vehicle and the rear of engine is toward front of vehicle. This makes the right and left sides of the engine the reverse of the sides of the vehicle. In describing parts of the engine in the remainder of this section, and other parts of the manual, directional and locational terms refer to the engine.





RA PD 378073

*Figure 2. Right front view of engine.*



RA PD 378074

*Figure 3. Left rear view of engine.*

### 39. Oil Filter—Service, Repair and Replacement (fig. 4)

*a. Removal.* Loosen nut on front end of idler pulley shaft and move pulley to the top of its adjustment in the idler bracket. Unscrew and remove oil filter assembly from oil pump housing. Remove gasket from filter head.

*b. Service.* Wash filter assembly thoroughly in clean mineral spirits paint thinner, and dry with compressed air.

*c. Disassembly (fig. 5).* Remove locking wire from hex-head screw, remove screw and copper washer; and remove filter head, felt washer, cover, filter element, felt washer and retaining washer from the center tube in the order named. Remove pin securing perforated valve plate to center tube and remove plate, valve disk and spring from tube in the order named.

*d. Repair.* Clean parts thoroughly in mineral spirits paint thinner and replace any showing damage. Note particularly the contacting faces of valve plate and valve disk. These must be smooth and free from scores.

*e. Assembly.* Slide the spring onto center tube, followed by the valve disk with protruding ring inside end of spring. Install valve plate over valve disk and against shoulder on tube and secure to tube with pin. Install retaining washer (flat side first) on tube followed by felt washer, filter element, cover, felt washer, and filter head in the order named. Secure parts with  $\frac{1}{4}$ -24NF x  $1\frac{1}{16}$  drilled hex-head screw with copper washer. Install locking wire to secure screw.

*f. Installation.* Install new cooper gasket on filter and screw oil filter assembly into oil pump housing. Move idler pulley down to tighten fan housing. Move idler pulley down to tighten fan

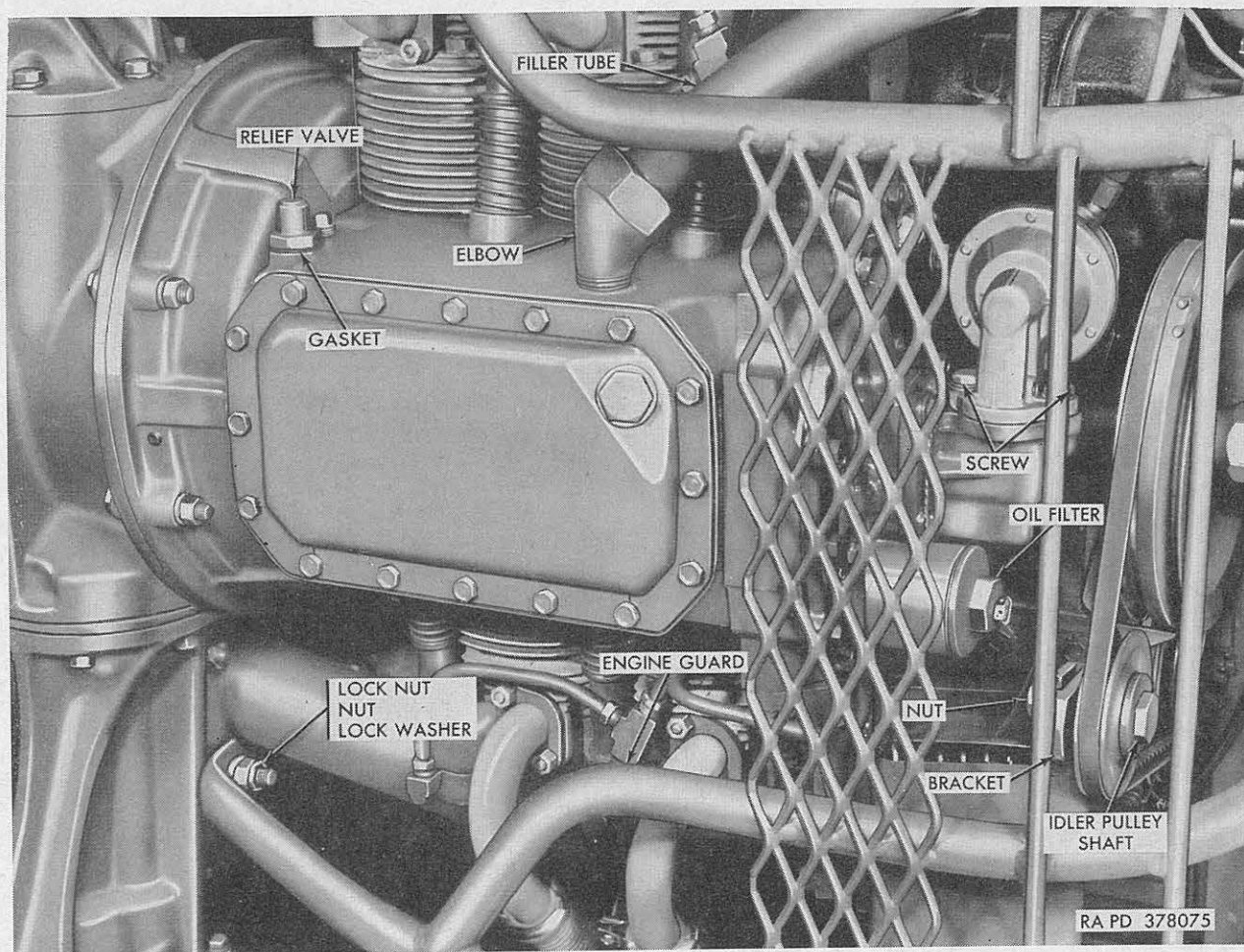


Figure 4. Bottom view of installed engine.



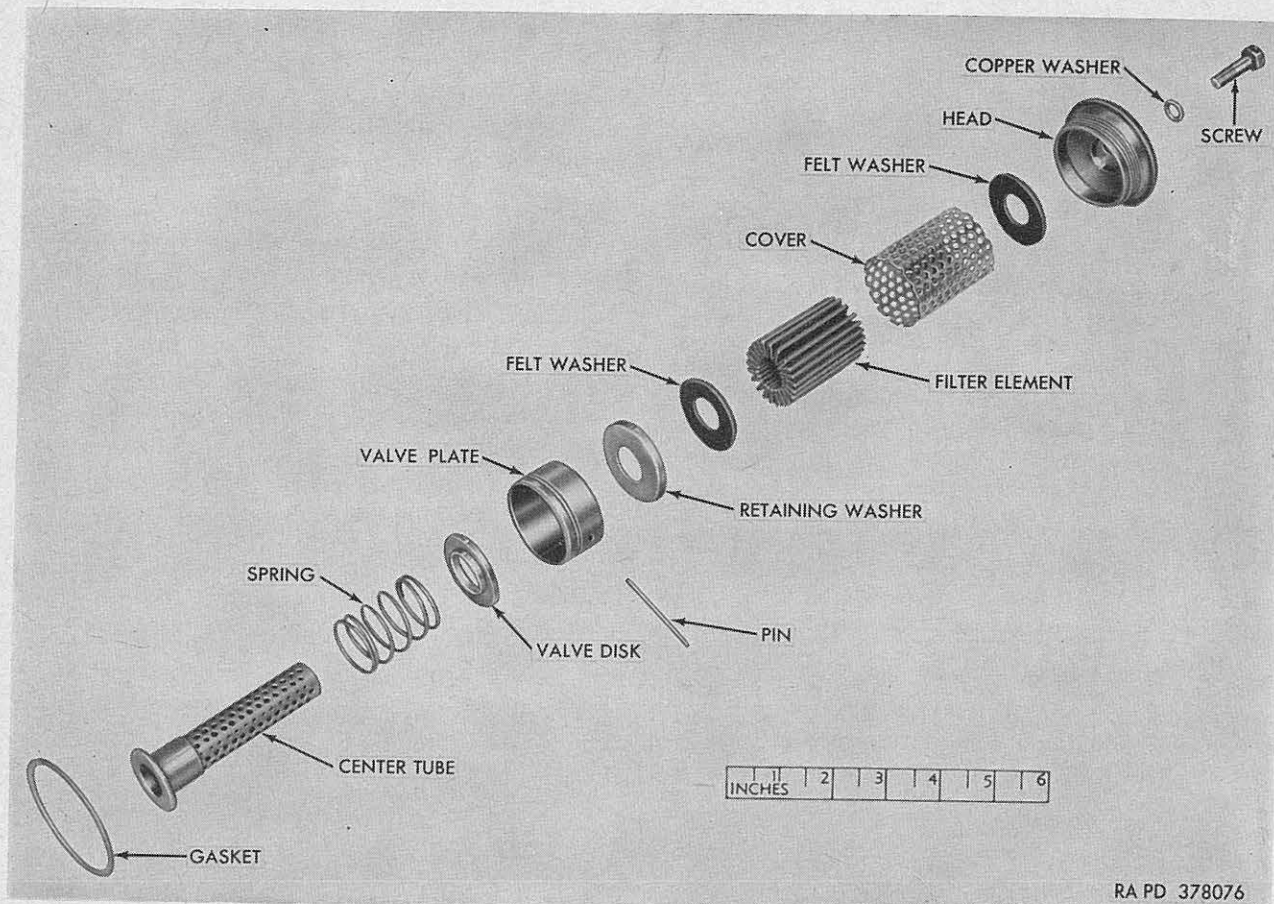


Figure 5. Oil filter—exploded view.

drive belt and tighten nut on idler pulley shaft. The belt should be tightened until two pounds pressure midway between blower and idler pulleys will deflect belt one-fourth of an inch.

#### 40. Oil Pressure Relief Valve Replacement (fig. 4)

*a. Removal.* Unscrew pressure relief valve plug from crankcase being careful not to lose oil pressure relief spring and oil pressure relief ball which are free to come out when plug is removed. Remove gasket from plug, and spring and ball from crankcase.

*b. Installation.* Install new gasket on pressure relief valve plug. Position oil pressure relief ball and spring in hole in crankcase, carefully start plug over spring, and screw plug into crankcase.

#### 41. Oil Filler Tube Replacement

*a. Removal.* Remove liquid level gage rod cap (fig. 6). Drain lubricating oil from crankcase.

Remove two hex nuts, external tooth lockwashers and hex-head bolts securing clamp (fig. 6), oil filler tube and magneto ground wire (rear bolt only) to bracket. Pull tube out of elbow (fig. 4) in crankcase and remove sealing ring from circular groove in elbow.

*b. Installation.* Install new sealing ring in annular groove inside elbow (fig. 4) in crankcase, and push oil filler tube into elbow being careful not to displace seal. Position clamp (fig. 6) over pipe and against bracket and install two  $\frac{1}{4}$ -20NC x  $\frac{5}{8}$  hex-head bolts. Position clip on magneto ground wire on rear bolt, and install two integral lockwasher hex nuts. Install liquid level gage rod cap in tube.

#### 42. Engine Oil Cooler Replacement

*a. Removal.* Remove two cross-recess-pan-head screws (fig. 7) securing oil cooler guard to engine shroud. Remove three nuts (fig. 7), lockwashers and plain washers from studs securing

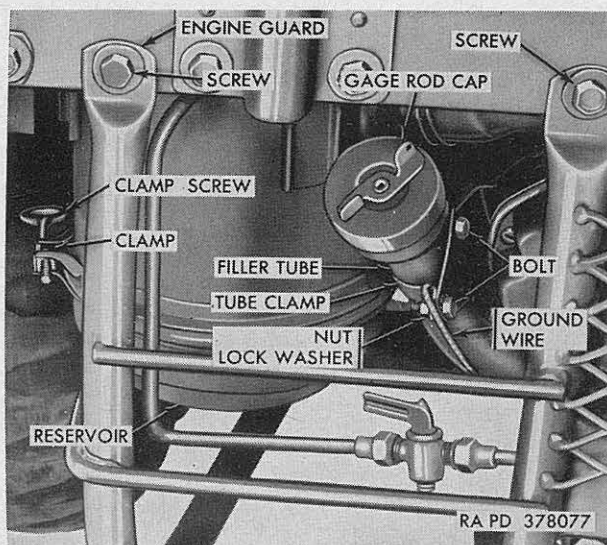


Figure 6. Oil filler tube and air cleaner reservoir.

cooler core to oil cooler support bracket. Remove cooler core with guard and two gaskets from bracket and separate cooler core, gaskets and guard (fig. 8).

*b. Installation.* Position new gasket on studs of engine oil cooler core, followed by oil cooler guard and second new gasket. With guard posi-

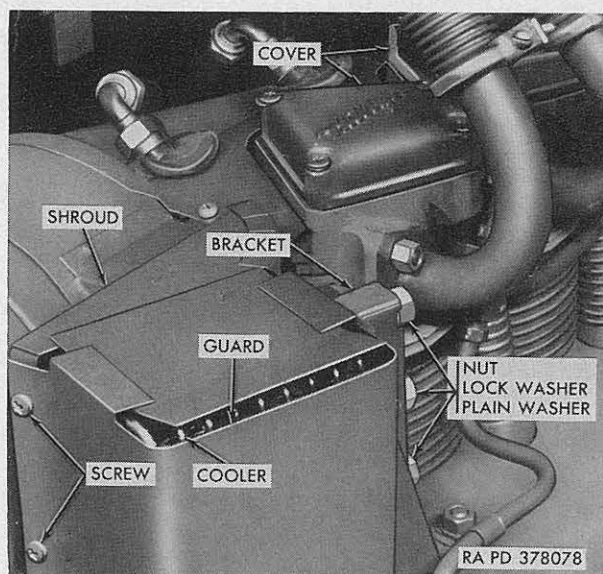


Figure 7. Engine oil cooler and valve rocker covers.

tioned below and forward of cooler core, push studs of cooler core through three holes in oil cooler support bracket and secure with three  $\frac{3}{8}$ -inch plain washers, internal teeth lockwashers and nuts. Secure guard to shroud with two 10-24NF x  $\frac{1}{4}$  cross-recess-pan-head screws.

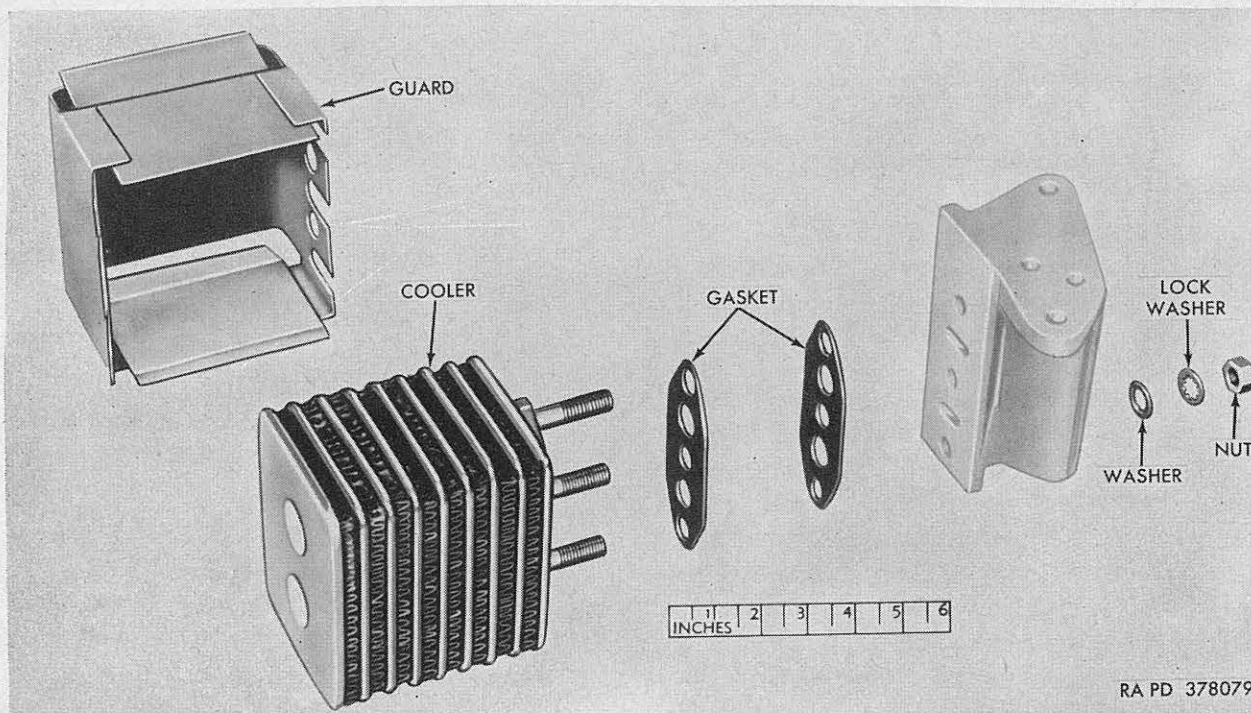


Figure 8. Engine oil cooler—exploded view.



#### 43. Engine Oil Cooler Bypass Valve Replacement (fig. 9)

*a. Removal.* Unscrew hex-head plug from left side of crankcase near oil cooler and remove helical spring and steel ball. Remove gasket from plug.

*b. Installation.* Install new gasket on plug. Position ball on seat in crankcase, install helical spring against ball and secure both with hex-head plug.

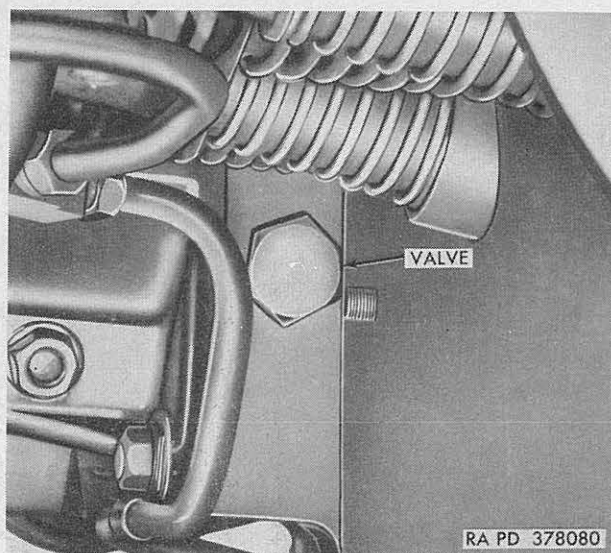


Figure 9. Engine oil cooler bypass valve.

#### 44. Oil Tube Assembly Replacement (fig. 10)

*a. Removal.* Remove engine guard (par. 48f(1)). Unscrew nut securing tube assembly from cylinders 1 and 3 to tee in pump housing. Remove nut and internal tooth lockwasher securing clip to oil cooler support bracket stud. Unscrew two nuts securing tubes to ells in valve rocker covers of cylinders 1 and 3, and remove tube assembly. Remove tube assembly from cylinders 2 and 4 to tee in pump housing in the same manner except that the clip is fastened on a stud of the oil pump housing. Do not remove tee from bottom of pump housing, or ells from four valve rocker covers unless damaged. If further disassembly of tube assembly is necessary, unscrew nuts securing tubes to tees and remove tubes as necessary.

*b. Installation.* If the oil tube assemblies were disassembled after removal, assemble them as shown in illustration but do not fully tighten nuts in tees at this time. If ells were removed from valve rocker covers, or tee from oil pump housing, screw them into proper position as shown in illustration. Position tube assembly from cylinders 2 and 4 to tee on pump housing, with clip on stud of pump housing, so that all parts are in correct alignment and tighten the five nuts. Secure clip by installing  $\frac{1}{4}$ -inch internal tooth lockwasher and hex nut on pump housing stud. Install tube assembly from cylinders 1 and 3 in the same manner except that clip goes on oil cooler support bracket stud and is secured by  $\frac{5}{16}$  inch internal tooth lockwasher and hex nut. Install engine guard (par. 48f(2)).

#### 45. Fuel Pump to Carburetor Line

##### *a. Removal.*

- (1) Unscrew four screws with lockwashers securing hour meter (fig. 11) to accessory drive bracket and remove hour meter and gasket.
- (2) Unscrew two nuts (fig. 12) at ends of fuel pump to carburetor line. Loosen screws (fig. 4) holding fuel pump to oil pump cover. Remove fuel line. Do not remove ells from pump or carburetor unless damaged.

##### *b. Installation.*

- (1) If ells were removed from pump or carburetor, screw new ells into place. Position fuel line (fig. 12) between ells and screw nuts on line loosely into ells. Tighten screws (fig. 4) holding fuel pump to oil pump cover. Tighten nuts (fig. 12) at both ends of fuel line.
- (2) Position gasket and hour meter on accessory drive bracket (fig. 11) with face of meter toward front of engine (rear of vehicle) and secure with four No. 10-32 x  $\frac{7}{8}$  roundhead screws and lockwashers.

#### 46. Carburetor Adjustment and Replacement

*Note.* The key letters shown below in parentheses refer to figure 14 except where otherwise indicated.

##### *a. Adjustment.*

- (1) Start engine and allow to warm up to operating temperature.

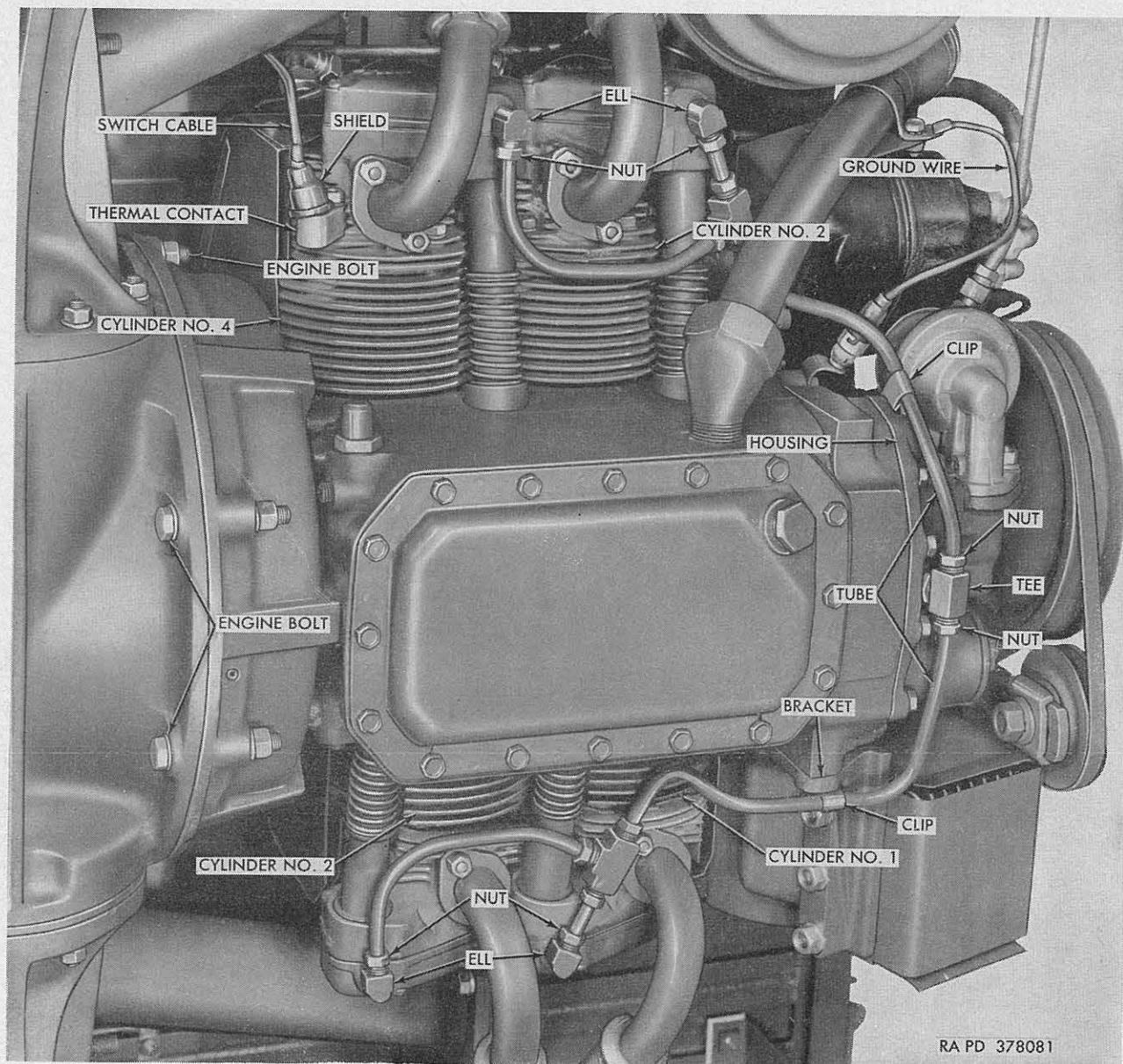


Figure 10. Oil tube assembly installed on engine.

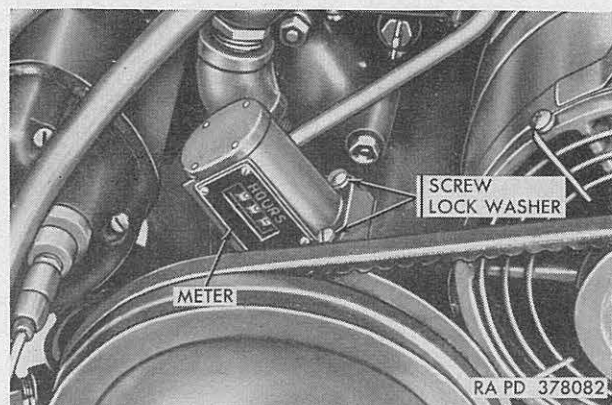


Figure 11. Hour meter.

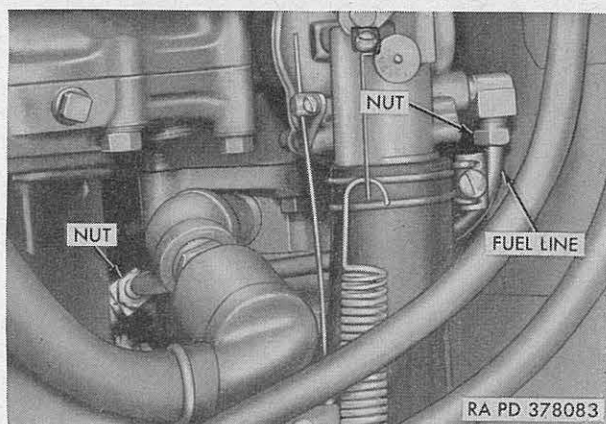


Figure 12. Fuel pump to carburetor line.



- (2) Open the main jet adjusting screw (fig. 13) about  $1\frac{1}{2}$  turns and idle adjusting needle (J) about one turn. Adjust throttle stop screw to obtain desired idling speed. Turn screw clockwise to increase speed, and counterclockwise to decrease speed.
- (3) Adjust idle adjusting needle (J) to obtain smooth idling at idling speed, readjust throttle stop screw (H), ((2) above), and again adjust idle adjusting needle (J) and throttle stop screw (H)

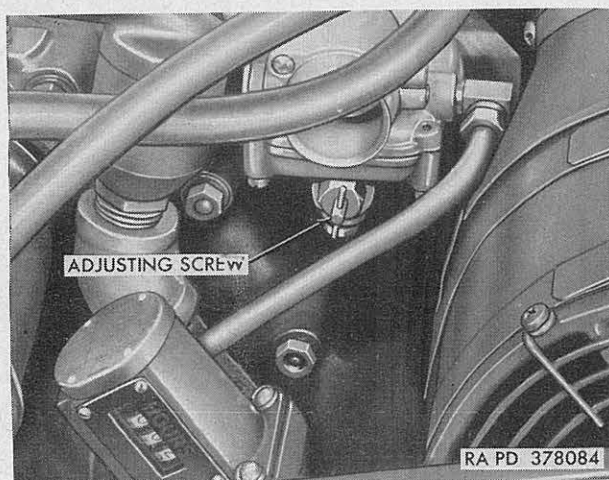


Figure 13. Location of main jet adjusting screw.

if necessary. Use vacuum gage while adjustments are being made. Turning idle adjusting needle clockwise reduces the flow, and turning counterclockwise increases flow of fuel.

#### b. Removal.

- (1) Unhook and remove return spring (N) from carburetor control retracting spring link (L) and hole in platform.
- (2) Loosen screw (T) in rear stop (U) and remove stop and retracting spring link (L) from control cable (F). Pull cable from throttle lever (K) being careful not to lose lever spring (C) between lever and front stop (E).
- (3) Loosen screw in stop on choke lever (V) and pull choke cable (W) from stop.
- (4) Remove fuel pump to carburetor line (par. 45a).
- (5) Loosen hose clamps (M and R) on ends of air cleaner to carburetor hose (Q) and remove hose.
- (6) Unscrew nut securing fuel line to carburetor. Remove two hex nuts and lockwashers (G) from studs securing carburetor to intake manifold and remove carburetor and gasket. Do not remove fuel line ell unless necessary.

#### c. Installation.

- (1) Install fuel line ell if removed. Install new gasket on studs securing carburetor to intake manifold, position carburetor on studs and secure with two  $\frac{1}{4}$ -inch internal teeth lockwashers and  $\frac{1}{4}$ -24NF hex nuts (G) tightened to a torque of 96 to 132 pound-inches. The thin nut goes on left stud next to idle adjusting needle.
- (2) Install fuel pump to carburetor line (par. 45b).
- (3) Position air cleaner to carburetor hose (Q) and secure by tightening hose clamps (M and R).
- (4) Push choke cable (W) through hole in stop on choke lever (V) and, with choke button pushed all the way in, tighten screw (T) in stop to secure control cable.
- (5) Install lever spring (C) on throttle con-

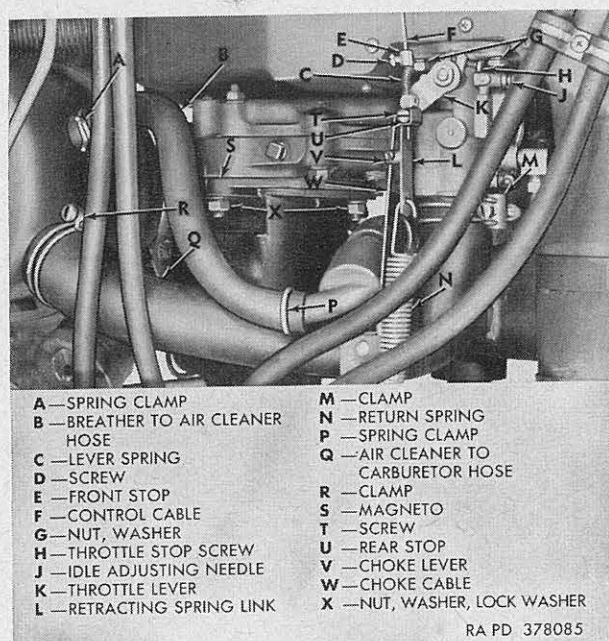


Figure 14. Carburetor adjustments.

trol cable (F) against stop (E) and push cable through hole in throttle lever (K). Install retaining spring link (L) and rear stop (U) on throttle control cable (F), with spring (C) compressed as illustrated, and tighten screw (D) in stop (E). Be sure full throttle opening can be obtained, and that the lever spring is not fully compressed in idle position.

- (6) Hook return spring (N) in place between hole in platform and hole in retracting spring link (L).

#### 47. Fuel Pump Replacement

*a. Removal.* Unscrew nuts (fig. 15) on both ends of shutoff valve to fuel pump line and remove line. Unscrew nut (fig. 12) securing fuel pump to carburetor line to elbow in pump. Remove two  $\frac{5}{16}$ -inch hex nuts (fig. 15), internal teeth lockwashers and plain washers securing fuel pump to oil pump cover, and remove pump and gasket. Do not remove fittings from pump unless necessary.

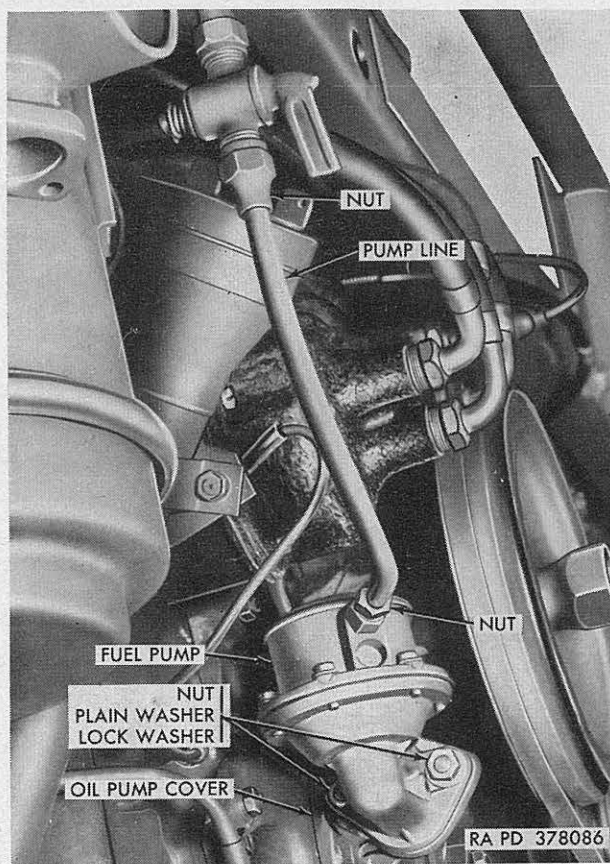


Figure 15. Disconnect points for fuel pump.

*b. Installation.* If fittings were removed from fuel pump, install ell in pump outlet and straight fitting in inlet. Install gasket on studs in oil pump cover (fig. 15). Position fuel pump on studs, with fuel pump to carburetor line positioned in ell, and loosely screw nut (fig. 12) into ell. Install two  $\frac{5}{16}$ -inch plain washers (fig. 15), internal teeth lockwashers, and  $\frac{5}{16}$ -24NF hex nuts on studs to secure fuel pump. Position shut-off valve to fuel pump line and secure by tightening nut at each end. Tighten nut (fig. 12) in ell.

#### 48. Belt, Blower, Pulleys and Bearings

*a. Belt Replacement* (fig. 16). Loosen nut on rear end of idler pulley shaft, move shaft to top of travel in bracket, and remove belt. Position new belt, push idler down to tighten belt, and secure by tightening nut on rear end of idler shaft. When properly tightened a pressure of two pounds midway between blower and idler pulleys should deflect belt one-fourth of an inch.

*b. Blower Replacement* (fig. 16). Remove engine guard (f(1) below). Remove belt (a above). Remove nuts from two clamps securing blower to accessory drive bracket and remove front clamp. Position new blower, making sure hole in blower fits over locating pin in accessory drive bracket, and secure with two clamps. Install belt (a above). Install engine guard f(2) below).

*c. Blower Pulley Replacement* (fig. 17). Remove blower (b above). Remove cotter pin (S), hex nut (C), and washer (D) securing groove pulley (E) to impeller shaft (M). Pull pulley

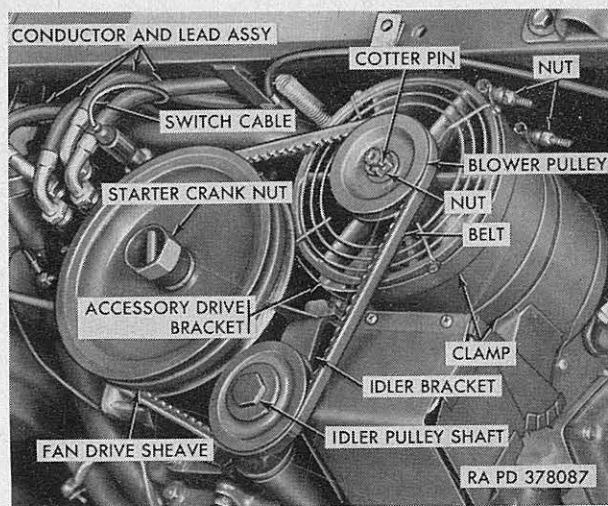


Figure 16. Front view of engine with guard removed.



from shaft and remove woodruff key (R). Install 0.12 x 0.50 woodruff key (R) and push grooved pulley (E) onto shaft (M). Secure pulley with 1/2-inch plain washer (D), 1/2-20NF slotted nut (C) tightened to a torque of 60 to 75-pound-feet and 3/32 x 1 cotter pin (S). Install blower (b above).

*d. Blower Bearing Replacement (fig. 17).*

- (1) *Removal.* Remove blower pulley (e above). Remove four screws (B) and inlet guard (A). Carefully press impeller shaft (M) with attached parts out of bearings in impeller housing.

**Caution:** The blower pulley, shaft and fan are a balanced assembly. If shaft and fan must be disassembled, mark for correct assembly.

Remove snap ring (L) from bore at rear end of housing (H). Using an arbor press, push two bearings (F and K) and spacer (G) toward rear of im-

peller housing until rear bearing (K) and spacer (G) come out of rear of housing. Turn housing over and press front bearing (F) out of front of housing. Remove second snap ring (J).

- (2) *Installation.* Install snap ring (J) in inner groove at rear end of impeller housing (H) bore. Press bearing (K) into bore against snap ring, and install second snap ring (L). Turn housing over and install spacer (G) against front end of rear bearing. Push front bearing (F) into bore until it fits against spacer. Push impeller shaft (M) with attached parts into bearings from rear end of housing. Position inlet guard (A) and secure with four No. 8-32 x 3/8 cross-recess-pan-head integral lockwasher screws. Install blower pulley (E) (c above).

*e. Idler Pulley Replacement (fig. 18). Remove*

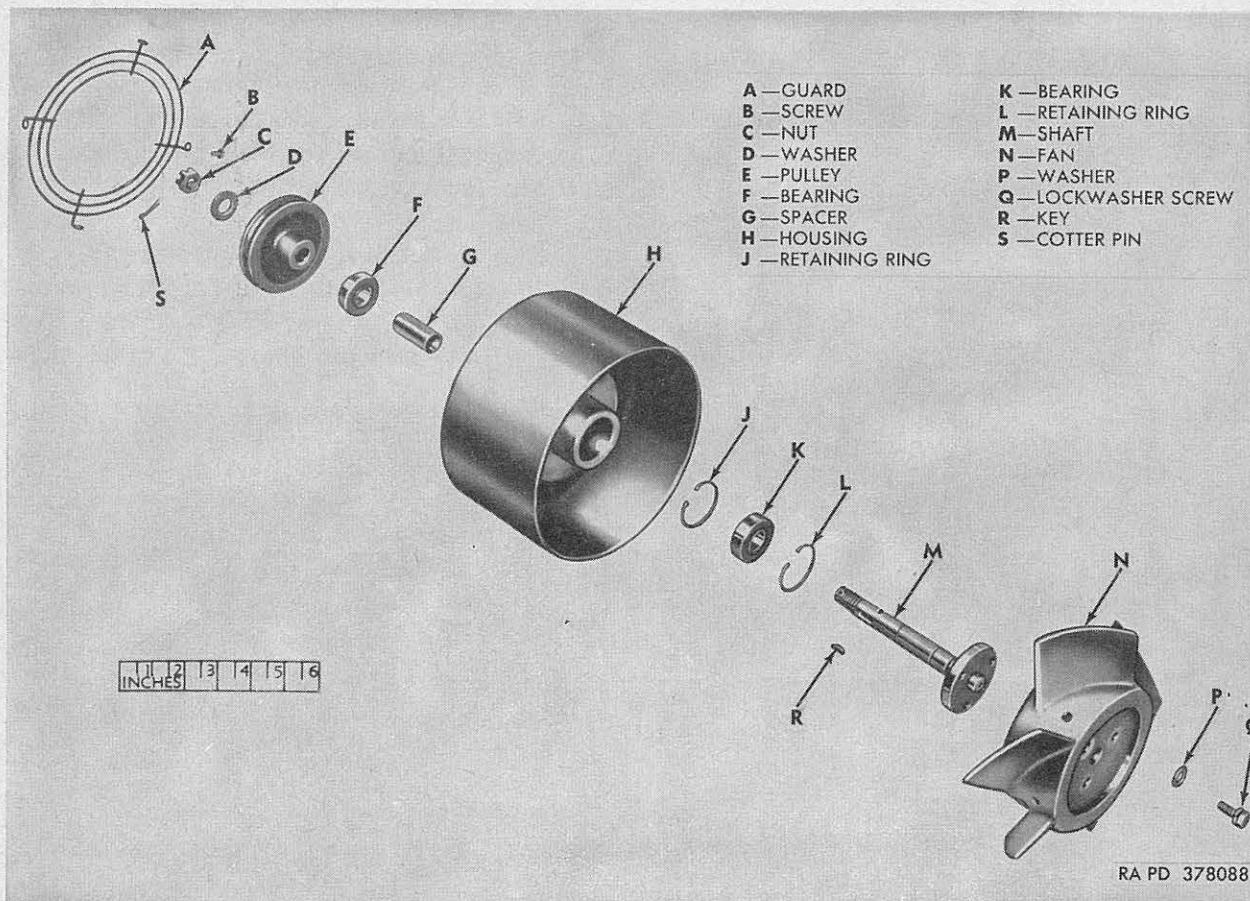


Figure 17. Blower—exploded view.

nut (N), internal teeth lockwasher (M), and clamp (L) securing idler shaft (A) to bracket (J) and remove shaft, pulley and attached parts. Remove shield washer (H), spacer (F), idler pulley (D) with bearing (E), spacer (C), and shield washer (B) from shaft in order named. Remove retaining ring (G) and press bearing out of pulley. Press new bearing into place and secure with retaining ring (G). Install shield washer (B), spacer (C), pulley (D) with bearing (E), spacer (F) and shield washer (H) on idler shaft (A) in order named. Push shaft through slot in bracket (J) and secure with clamp (L), internal teeth lockwasher (M), and  $\frac{1}{2}$ -20NF hex nut (N). Check integral lockwasher screw (K) to be sure it is secure.

*f. Fan Drive Sheave.*

- (1) *Removal.* Remove four hex-head screws, plain washers and lockwashers securing engine guard (fig. 6) to rear edge of platform, being careful not to lose spacers between guard and platform. Remove two locknuts (fig. 4), hex nuts and lockwashers from both outside lower bolts attaching rear axle. Remove

guard. Loosen nut on idler pulley shaft (fig. 16), move shaft to top of adjustment and remove belt. Unscrew starter crank nut (fig. 16) from front end of crankshaft and remove lockwasher and plain washer. Pull fan drive sheave off end of crankshaft and remove woodruff key and spacer from shaft.

- (2) *Installation.* Slide spacer onto end of crankshaft and install No. 10 woodruff key in crankshaft. Slide drive sheave (fig. 16) onto end of crankshaft over key and secure with  $\frac{5}{8}$ -inch plain washer, internal teeth lockwasher, and starter crank nut. Install V-belt (a above). Position engine guard on two lower bolts attaching rear axle (fig. 4), position spacers between rear ends of guard (fig. 6) and edge of platform (also choke cable clip under second end from right edge of platform), and secure with four  $\frac{3}{8}$ -24NF x  $1\frac{5}{8}$  hex-head screws with internal teeth lockwashers. Install  $\frac{7}{16}$ -inch internal teeth lockwashers,  $\frac{7}{16}$ -20NF hex nuts and lock-

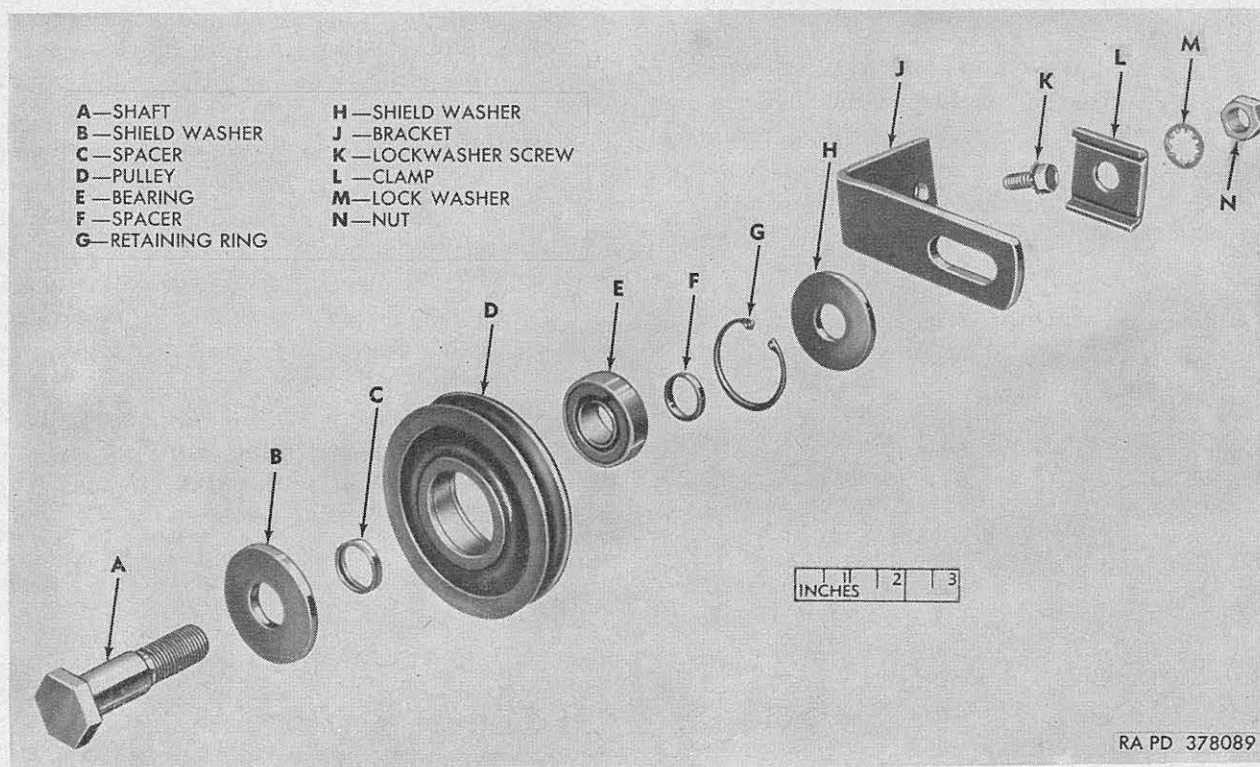


Figure 18. Idler shaft, pulley and bracket—exploded view.



nuts on the two bolts securing guard to axle.

## 49. Magneto Adjustment and Replacement

### a. Adjustment.

- (1) Disconnect the four conduit and lead assemblies (fig. 16) from the magneto. Disconnect the switch cable from the magneto. Remove the four special screws securing magneto cap, carefully pull cap off front of magneto housing, pull spring clip on lead (fig. 19) inside cap off terminal on breaker, and remove cap.
- (2) Carefully wipe parts of breaker clean with lint-free cloth to remove any dirt or oil that may have collected. Loosen pivot and adjusting screws (fig. 19) slightly, crank engine until breaker arm is on high point of cam, adjust opening between points to 0.008 to 0.012 inch (preferably nearer the 0.008 dimension), and tighten screws.
- (3) Install a new seal in the magneto cap, and new seals at the ends of the conduit and lead assemblies. Holding magneto cap close to magneto housing, install spring clip (fig. 19) on lead inside cap on terminal on breaker, position cap on body and secure with four special screws. Connect the switch cable (fig. 16) to the terminal on magneto. Connect the four conduit and lead assemblies to terminals on magneto.

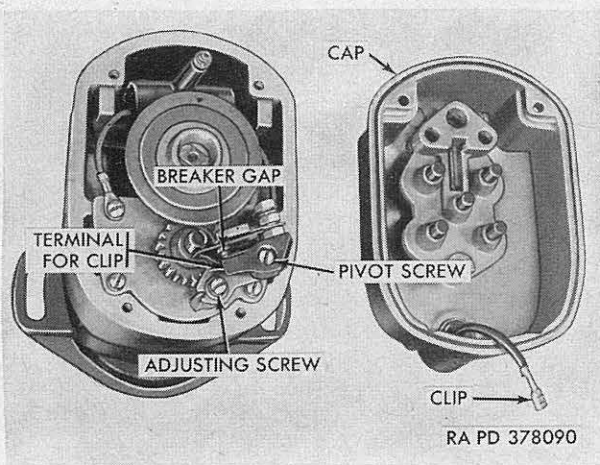


Figure 19. Magneto with cap removed showing breaker.

Terminals are marked to correspond with cylinder numbers.

b. *Removal.* Disconnect the four conduit and lead assemblies (fig. 16) from the magneto. Disconnect the cable leading to switch. Remove two nuts (X, fig. 14), plain washers and lockwashers securing magneto to accessory case and remove magneto (S, fig. 14).

### c. Installation and Timing.

- (1) With magneto on bench, install a cable in No. 1 terminal. Hold free end of cable approximately one-fourth of an inch from magneto case and rotate magneto coupling (fig. 19) counterclockwise until spark occurs between cable and case. The magneto fires as coupling dog goes past the two mounting holes of magneto. When No. 1 position is found, align coupling dogs with center line of mounting holes.
- (2) Remove No. 1 spark plug and turn crankshaft until compression is noted in No. 1 cylinder. Bring piston to top dead center as indicated by alignment of mark on drive sheave with pointer on idler bracket (fig. 16). At this point coupling holes in magneto drive sprocket should be very close to center line of magneto mounting studs on accessory case.
- (3) With engine set on top dead center and magneto set to fire at No. 1 lead, position magneto (S, fig. 14) on engine and secure with two  $\frac{5}{16}$ -inch plain washers (X, fig. 14), internal teeth lockwashers and  $\frac{5}{16}$ -24NF hex nuts. Connect the four conduit and lead assemblies, and switch cable.
- (4) Final timing of the magneto is done with a static timing light, adjustment being made by rotating the magneto on the mounting studs.

## 50. Valve Clearance Adjustment and Rocker Arms

a. *Adjustment.* Unscrew nut securing oil tube assembly (fig. 20) to valve rocker cover. Remove four cross-recess-pan-head screws, plain washers and internal teeth lockwashers securing rocker cover to cylinder head and remove cover and

gasket. Remove spark plugs (par. 54) and crank engine by hand until piston of cylinder on which clearance is being adjusted is at top dead center on firing stroke. Loosen nut on rocker arm adjusting screw (fig. 21), adjust screw to give clearance between arm and valve stem of 0.008 to 0.009 inch with engine cold, and tighten nut. Recheck the clearance and readjust if necessary. Adjust clearance of second valve in same manner. Position gasket and valve rocker cover (fig. 20) on oil tube assembly and cylinder head and start nut into elbow. Secure cover to cylinder head with four No. 10-24 x 1 cross-recess-pan-head

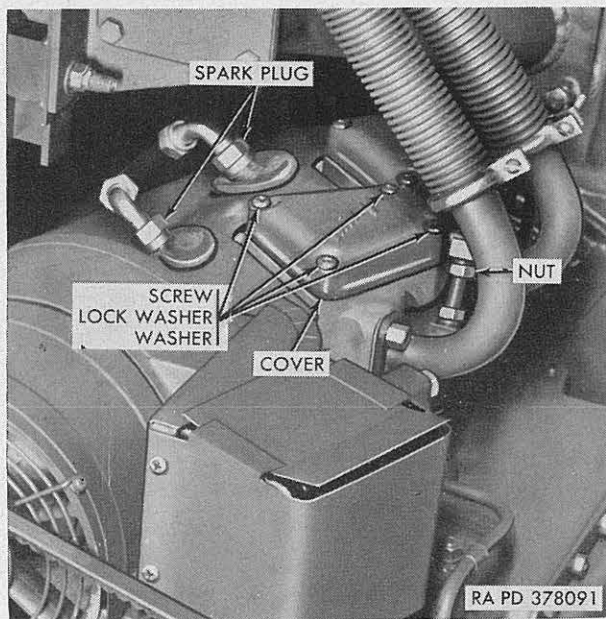


Figure 20. Valve rocker cover installed on cylinder head.

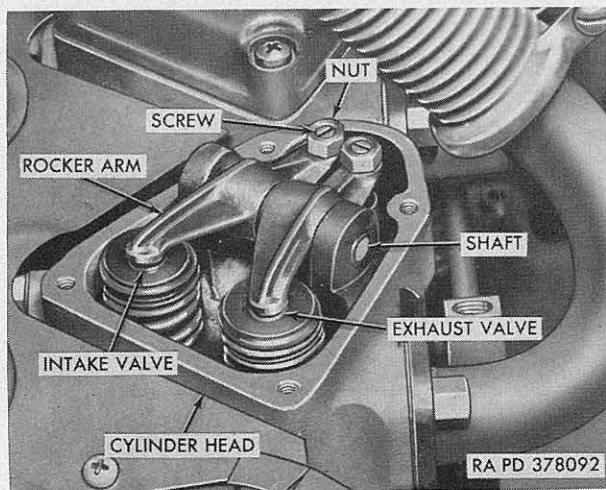


Figure 21. Cylinder head with valve rocker cover removed.

screws, internal teeth lockwashers and plain washers. Tighten nut into ell. Install spark plugs (par. 54).

*b. Replace Valve Rocker.* Remove valve rocker cover (a above) and slide valve rocker arm shaft (fig. 21) out of cylinder head and valve rockers. Position new rocker or rockers as required and slide rocker arm shaft into cylinder head and rockers. Adjust rocker clearance and install valve rocker cover and spark plugs (a above).

*c. Replace Valve Rocker Arm Adjusting Screw.* Remove valve rocker cover (a above). Loosen locknut (fig. 21) on rocker arm adjusting screw, and remove screw and nut from rocker arm. Install new screw and nut. Adjust clearance, and install valve rocker cover and spark plugs (a above).

## 51. Exhaust Manifold (fig. 22)

*a. Removal.* An exhaust manifold consists of exhaust pipe, flexible exhaust pipe and two grooved clamp couplings. Loosen screw in grooved clamp coupling connecting flexible exhaust pipe to muffler and slide clamp over flexible pipe. Remove two brass nuts securing exhaust pipe to cylinder head and remove exhaust manifold. Remove gasket from cylinder head. Loosen screw in grooved coupling connecting the two exhaust pipes and separate pipes. Remove coupling from pipe. Remove remaining three exhaust manifolds in same manner.

*b. Installation.* Slide two grooved clamp couplings onto flexible exhaust pipe. Position exhaust pipe against flexible exhaust pipe, slide grooved coupling over joint and tighten screw just enough to loosely hold pipes together. Install gasket on studs in cylinder head. Position exhaust manifold with exhaust pipe flange against gasket on cylinder head studs and loosely install two 1/4-28NF hex brass nuts. Position end of flexible exhaust pipe against muffler pipe, slide grooved coupling over joint and tighten. Finish tightening coupling between two exhaust pipes. Tighten two brass nuts on cylinder head studs to a torque of 96 to 132 pound-inches. Install remaining three exhaust manifolds in same manner.

## 52. Shroud Replacement (fig. 23)

*a. Removal.*



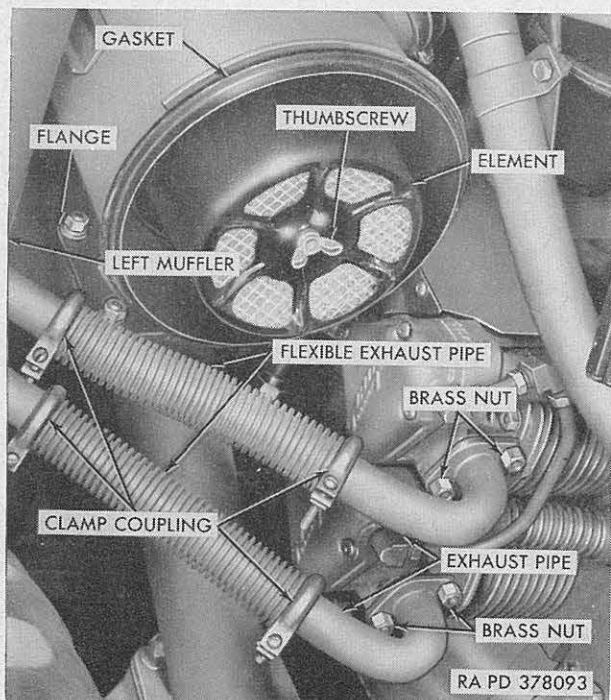


Figure 22. Right exhaust manifold—air cleaner oil reservoir removed.

- (1) Disconnect controls from carburetor (par. 46b).
- (2) Disconnect four conduit and lead assemblies from spark plugs. Remove tapping screw securing two cable clips to top of shroud and lay the four assemblies back over rear edge of platform.
- (3) Remove four cross-recess-pan-head screws holding each cover shroud to the shroud and pull cover shrouds away from spark plugs and shroud.
- (4) Remove 10 cross-recess-pan-head screws securing shroud. (Six screws to carburetor mounting plate, two to oil cooler guard, and two to crankcase.)
- (5) Remove blower (par. 48b).
- (6) Lift shroud away from body of engine.

*b. Installation.*

- (1) Position rear clamp for blower beneath accessory drive bracket and blower shroud. Be sure clamp is in position first because it cannot be installed after shroud is installed.
- (2) Position blower on accessory drive bracket so that blower fits into shroud, and locating pin on bracket is in hole

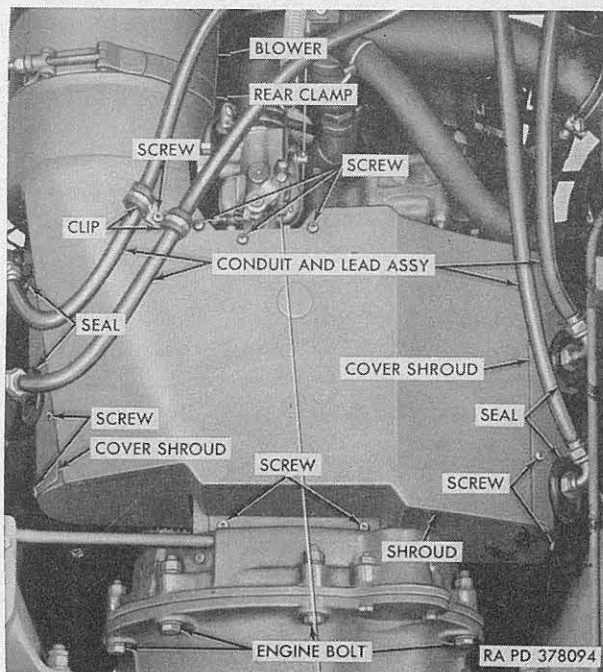


Figure 23. Disconnect points for shroud.

- in blower, and install two clamps just tight enough so blower is held in position.
- (3) Install ten No. 10-24 x  $\frac{1}{4}$  cross-recess-pan-head integral lockwasher screws securing shroud. (Six screws to carburetor mounting plate, two to oil cooler guard, and two to crankcase). Tighten nuts on two clamps securing blower, making sure blower is far enough back to clear sheave on crankshaft.
- (4) Position two cover shrouds over spark plugs and against shroud, and secure each to shroud with four No. 10-24 x  $\frac{1}{4}$  cross-recess-pan-head integral lockwasher screws.
- (5) Connect four conduit and lead assemblies to spark plugs, and secure assemblies to cylinders No. 2 and 4 to shroud with No. 10 x  $\frac{1}{2}$  cross-recess-pan-head tapping screw with internal teeth lockwasher.
- (6) Connect carburetor controls as directed in paragraph 46c.

### 53. Conduit and Lead Assembly Replacement

*a. Removal.* Unscrew eight nuts securing conduit and lead assemblies (fig. 23) to spark plugs

and magneto (fig. 16). Remove screw and lockwasher (fig. 23) securing assemblies for cylinders No. 2 and 4 to shroud. Remove the four assemblies from vehicle, and remove the two clips.

*b. Installation.* Install cable clips on conduit and lead assemblies for cylinders No. 2 and 4 as shown in figure 23. Install new seals at ends of conduit and lead assemblies. Position assemblies between magneto and spark plugs and screw terminal nuts onto magneto (fig. 16) and plugs (fig. 23). Terminals on magneto are numbered to agree with cylinder numbers. Secure clips on assemblies for cylinders No. 2 and 4 to shroud with No. 10 x 1/2 cross-recess-pan-head tapping screw with internal teeth lockwasher.

#### 54. Spark Plug Replacement (fig. 23)

*a. Removal.* Unscrew two nuts securing conduit and lead assemblies to two spark plugs. Remove four cross-recess-pan-head screws securing cover shroud to shroud, remove cover shroud, and remove two spark plug seals from cover shroud. Unscrew two spark plugs from cylinders and remove gaskets. Repeat operation for other two spark plugs.

*b. Clean Spark Plugs.* Clean spark plugs, re-gap to 0.023 to 0.028 inch or replace as necessary.

*c. Installation.* Install new spark plug gaskets on two spark plugs, and screw plugs into cylinder heads. Install two spark plug seals (large end first) in cover shroud. Position cover shroud over spark plugs and against shroud and secure with four No. 10-24 x 1/4 cross-recess-pan-head integral lockwasher screws. Position conduit and lead assemblies on spark plugs and secure with hex nuts. Repeat above operations to install second two spark plugs.

#### 55. Intake Tube and Manifold Replacement

##### *a. Removal of Intake Tube.*

- (1) Remove engine shroud (par. 52).
- (2) Remove carburetor (par. 46).
- (3) Remove two brass nuts (figs. 24 and 26) from studs securing flange and tube to cylinder head. Slide flange upon tube to clear studs, carefully turn tube as shown in figure 24 to clear studs, and pull tube out of intake manifold. Remove O-ring gasket from annular groove in mani-

fold. Remove flange from tube. Remove flange gasket. Remove three remaining tubes in the same manner.

##### *b. Installation of Intake Tube.*

- (1) Install new O-ring gasket (fig. 26) in annular groove in intake manifold. Install new flange gasket (figs. 25 and 26) on studs in cylinder head. Install flange on tube, counterbored face first. Push tube into bore of manifold as

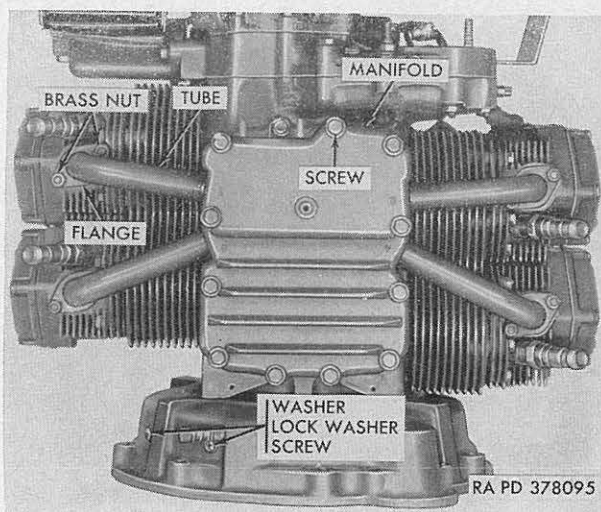


Figure 24. Intake manifold and tubes—shroud removed.

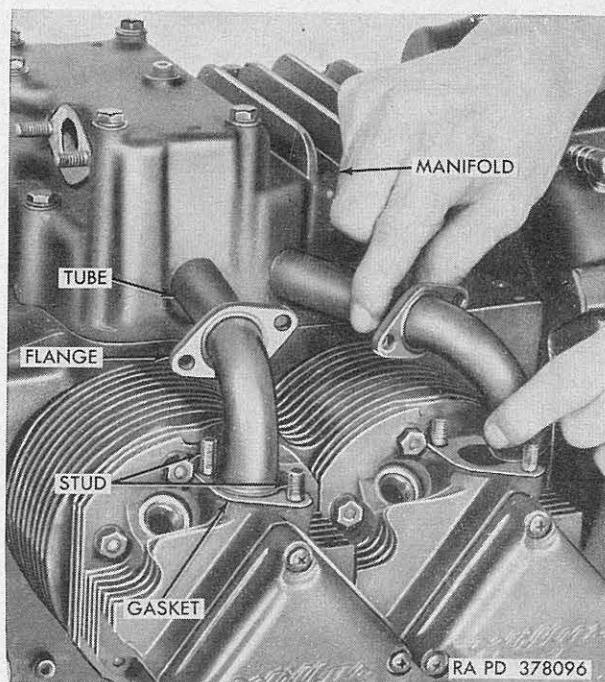


Figure 25. Removing intake tube from intake manifold.



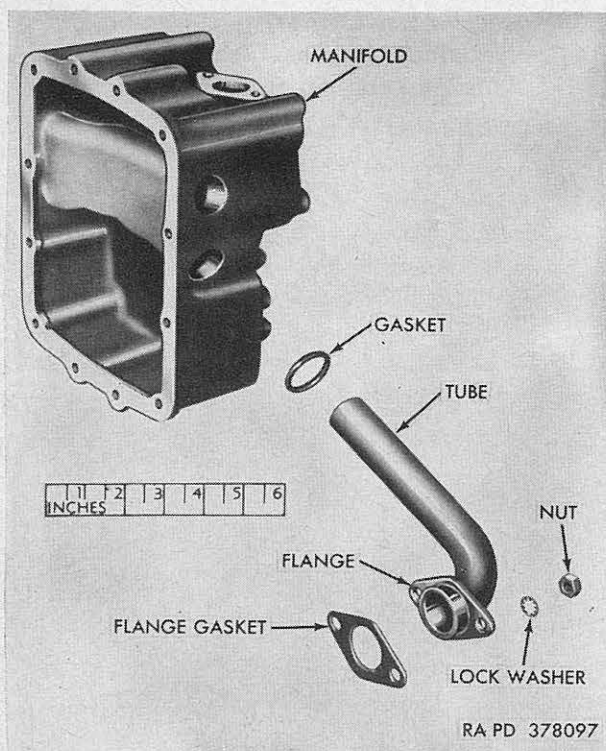


Figure 26. Intake tube and parts exploded from manifold.

shown in figure 25, being careful not to damage O-ring gasket. Slide flange down tube onto studs and secure with two  $\frac{1}{4}$ -28NF brass hex nuts, tightened to a torque of 96 to 132 pound-inches.

- (2) Install carburetor (par. 46).
- (3) Install engine shroud (par. 52).

*c. Removal of Intake Manifold (fig. 24).*

- (1) Remove intake tubes (a above).
- (2) Remove 12 hex-head screws, with plain washers and internal teeth lockwashers, securing intake manifold to crankcase. Lift manifold off crankcase, and remove gasket and  $\frac{1}{8}$ -inch pipe plug.

*d. Installation of Intake Manifold (fig. 24).*

- (1) Position new gasket on crankcase, and intake manifold on top of gasket. Secure manifold to crankcase with 12  $\frac{1}{4}$ -20NC hex-head screws with internal teeth lockwashers and plain washers tightened to a torque of 96 to 132 pound-inches. One  $2\frac{1}{4}$ -inch screw goes in hole in front end of manifold beneath carburetor mounting boss, six  $3\frac{1}{4}$ -inch screws in holes nearer rear end of mani-

fold (nearer flywheel end), and five  $4\frac{1}{4}$ -inch screws in holes nearer front end of manifold. Install  $\frac{1}{8}$ -inch pipe plug in top of manifold.

- (2) Install intake tubes (b above).

## 56. Engine Starter Front Rope

*a. Removal.*

- (1) Remove two spring clamps securing hose between engine starter rope tube (fig. 28) and starter rope pulley housing, and move clips and hose forward on tube as shown in figure 28. Push front sleeve of coupling to rear and remove engine starter front rope.
- (2) Grasp engine starter rope handle (fig. 40) and pull rope out of vehicle. Unscrew two screws (fig. 27), remove locking plate and pull rope out of handle.

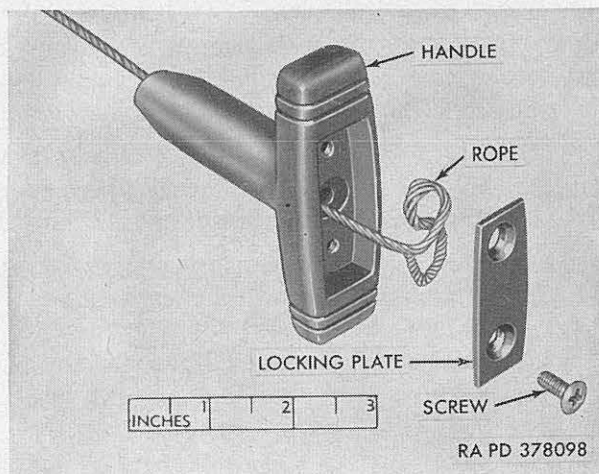


Figure 27. Starter front rope handle.

*b. Installation.*

- (1) Push ball end of engine starter rope into tube at front edge of platform as far as possible. Push front sleeve of coupling (fig. 28) to the rear, push ball end of starter rope into coupling and release sleeve. Push hose to rear onto starter rope pulley housing and secure with one spring clamp at each end of hose.
- (2) Push plain end of engine starter front rope (fig. 27) through hole in engine starter front rope handle, from small end. Form a figure "8" around screw

holes in handle with end of rope so that handle will be held snugly against the guide tube without pulling starter rope forward in guide. Position locking plate over figure "8" in rope and secure with two 8-32 x 1/2 cross-recess-oval-head screws.

## 57. Engine Starter Front Rope Handle

*a. Removal.* Grasp engine starter front rope handle and unscrew two screws (fig. 27). Re-

move locking plate, and pull handle off front end of rope.

*b. Installation.* Push end of engine starter front rope (fig. 27) through hole in engine starter front rope handle, from small end, and form a figure "8" around screw holes in handle with end of rope. The rope must be long enough to hold handle against guide tube without pulling starter sheave pawl (fig. 35) off engine starter shoe. Position locking plate (fig. 27) over figure "8" in rope and secure with two 8-32 x 1/2 cross-recess-oval-head screws.

## Section V. ENGINE REMOVAL AND INSTALLATION

### 58. Coordination with Ordnance Maintenance Unit

Refer to paragraph 2 for information on coordination with ordnance maintenance unit.

### 59. Engine Removal

*a.* Unlock engine opening access lid using wrench on end of emergency starting crank and remove lid. Drain oil.

*b.* Remove engine guard (par. 48f(1)).

*c.* Position jack or blocking under engine in such a manner that engine may be moved toward rear of vehicle about two inches after connecting screws are removed.

*d.* Pull switch cable (fig. 16) from terminal on magneto. Disconnect ground wire (fig. 10) at connector on accessory case and push onto terminal on magneto (fig. 16). Disconnect switch cable at connector on thermal contact (fig. 10).

*e.* Close fuel shutoff valve. Unscrew nuts (fig. 15) at both ends of fuel shutoff to fuel pump line, and remove line.

*f.* Loosen screws in eight grooved couplings (fig. 22), slide couplings onto flexible exhaust pipes and remove the four flexible exhaust pipes.

*g.* Disconnect carburetor controls (par. 46b(1)-(4)).

*h.* Loosen two hose clamps (M and R, fig. 14) and remove air cleaner to carburetor hose. Remove spring clamps (A and P, fig. 14) and remove crankcase breather to air cleaner hose (B, fig. 14). Remove air cleaner (par. 77b(2) and (3)).

*i.* Slide the two spring clamps (fig. 28) securing hose between starter rope pulley housing and starter rope tube off hose and move clamps and hose forward on tube as shown in figure 28. Disconnect starter front rope from front end of coupling.

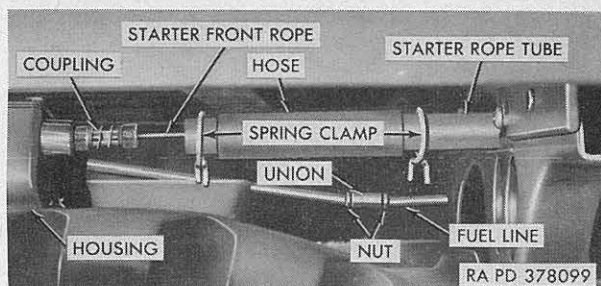


Figure 28. Coupling between starter front and rear ropes.

*j.* Remove nut, lockwasher and bolt (fig. 30) securing starter rope pulley housing to top of front flange of rear bed support. Remove locknuts, hex nut, lockwasher and plain washer from upper inside bolt passing through frame tube flanges and rear axle. Remove locknut from upper outside bolt passing through frame tube flanges and rear axle, and unscrew bolt from pulley housing. Pull tube with pulley housing out of flywheel housing, and lay pulley housing and tube on top of engine.

*k.* Remove six hex nuts, lockwashers, bolts (fig. 10), and internal teeth lockwashers securing engine to transmission. Carefully move engine, on blocking, toward rear of vehicle until clutch driven plate clears transmission shaft. Lower engine and move away from vehicle.

*l.* Move starter rope pulley housing (fig. 30) with attached starter rope tube to right and



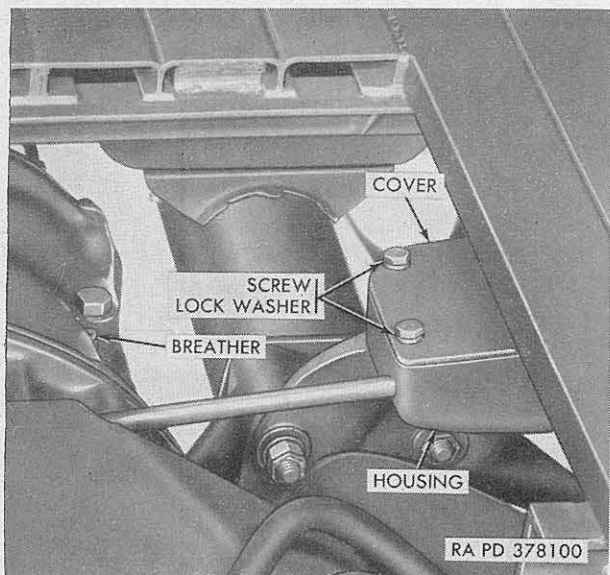


Figure 29. Starter rope pulley housing.

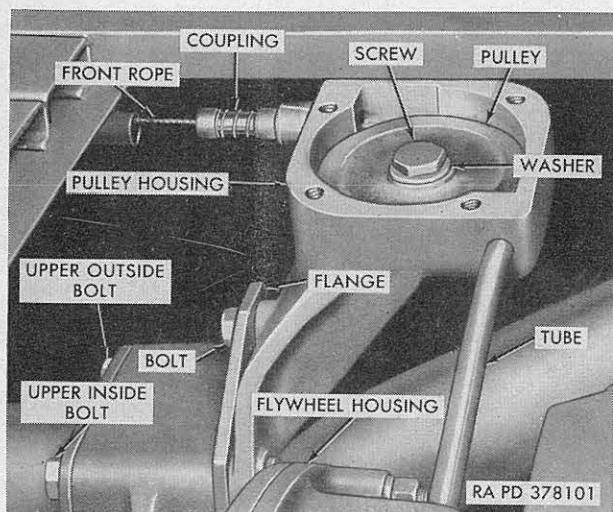


Figure 30. Starter rope pulley housing—cover removed showing pulley.

away from flywheel housing. Attach a clamp to starter rear rope between flywheel housing and tube to prevent rope being pulled back into flywheel housing when coupling is removed. Remove four hex-head screws (fig. 29) with lockwashers securing starter rope pulley housing cover to housing and remove cover and gasket. Remove screw (fig. 30) and plain washer securing pulley to housing and remove pulley. Move rear sleeve of coupling forward and remove coupling from front end of rope. Pull pulley housing and tube off rope and remove tube from

housing. Install coupling on end of starter rope, remove clamp from rope, and allow rope to be drawn into flywheel housing until stopped by coupling which is too large to go through hole in housing.

## 60. Engine Installation

a. Pull starter rope out of starter housing until coupling on end of rope is about 18 inches from housing, and install clamp on rope to prevent it being drawn back into housing by starter spring. Remove coupling from ball on end of rope. Push rope through starter rope tube (fig. 30), into starter rope pulley housing through hole in left side, out of housing through hole in front, and install coupling on end of rope. Work pulley into pulley housing with starter rope in groove of pulley and secure with plain washer and screw. Position gasket and starter rope pulley housing cover (fig. 29) on top of pulley housing and secure with four  $\frac{1}{4}$ -20NC x  $\frac{3}{8}$  hex-head screws and lockwashers. Remove clamp previously installed on rope and allow starter spring to pull rope back until coupling contacts front of pulley housing.

b. Using a  $\frac{5}{8}$ -inch mandrel, align bore of clutch drive disk with pilot bushing in flywheel.

c. Block up engine beneath its installed position in vehicle until transmission shaft is approximately in line with clutch driven disk and pilot bearing. Moving engine on blocking and adjusting height of transmission shaft, carefully work engine onto shaft into installed position. Secure engine to transmission housing with six  $\frac{3}{8}$ -24NF x  $2\frac{1}{2}$  bolts (fig. 10) installed from transmission side and with internal tooth lockwasher under head and split lockwasher under nut, tighten to a torque of 25 to 33 pound-feet.

d. Position starter rope pulley housing (fig. 30) against rear face of flange on front end of rear bed support, with starter rope tube secured between counterbores in flywheel housing and pulley housing. Screw upper outside  $\frac{3}{8}$ -24NF x  $3\frac{1}{2}$  bolt passing through frame tube flanges and rear axle into starter rope pulley housing, and install locknut. Install plain washer, internal teeth lockwasher, hex nut, and locknut on upper inside  $\frac{3}{8}$ -24NF x  $3\frac{1}{2}$  bolt passing through frame tube flanges, rear axle, and pulley housing. Install  $\frac{3}{8}$ -24NF x  $1\frac{3}{8}$  bolt se-

curing pulley housing to flange on rear bed support.

e. Connect starter front rope (fig. 28) into front end of coupling. Slide hose on starter rope tube to rear onto starter rope pulley housing and secure to housing and tube with spring clamps.

f. Install air cleaner (par. 77c1 and 2). Position crankcase breather to air cleaner hose (B, fig. 14) and secure with spring clamps (A and P, fig. 14). Position air cleaner to carburetor hose (A, fig. 14) and secure by tightening hose clamps (M and R, fig. 14).

g. Position four flexible exhaust pipes be-

tween exhaust pipes and mufflers and secure with eight grooved couplings.

h. Position fuel shutoff to fuel pump line and secure by tightening nut (fig. 15) at each end.

i. Pull ground wire off of terminal on magneto and connect to connector on accessory case (fig. 10). Connect switch cable connectors to thermal contact (fig. 10) and terminal on magneto (fig. 16).

j. Position engine access lid in top of platform with locks to rear. Fasten locks, using wrench on end of emergency starting crank.

k. Install engine guard (par. 48f(2)).

## Section VI. ENGINE MAINTENANCE, REMOVED FROM VEHICLE

### 61. Coordination With Ordnance Maintenance Unit

Refer to paragraph 2 for information on coordination with ordnance maintenance unit.

### 62. Clutch and Starter Component Replacement

In order to gain access to starter components it is necessary to remove the engine from the vehicle, the pressure plate from flywheel, and the flywheel from the crankshaft. Figures 31 through 38 show the parts at various stages of removal or assembly. Figure 39 shows parts from the flywheel to the flywheel housing arranged to show their relative positions when installed.

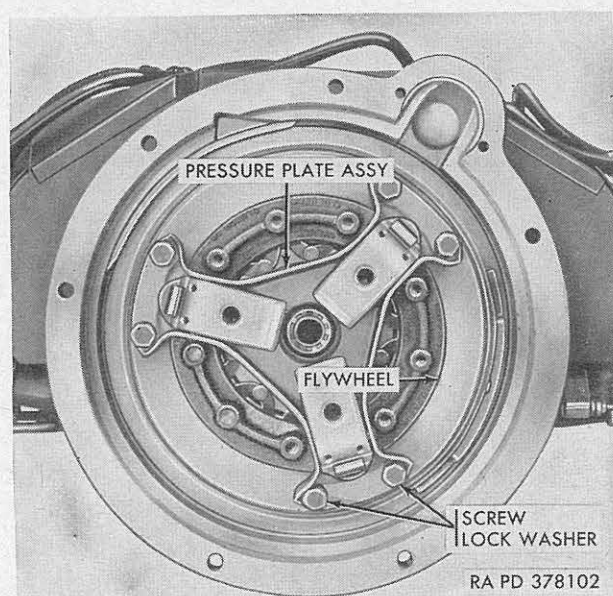


Figure 31. Rear view of engine with clutch installed.

#### a. Removal.

- (1) Remove engine from vehicle (par. 59).
- (2) Remove six hex-head screws (fig. 31) and lockwashers attaching clutch pressure plate to flywheel, and remove pressure plate assembly and clutch disk (fig. 32).
- (3) Remove four hex-head screws (fig. 33) and lockwashers securing flywheel to crankshaft and remove flywheel. If necessary to replace clutch pilot bearing sleeve, press out of flywheel with arbor press.

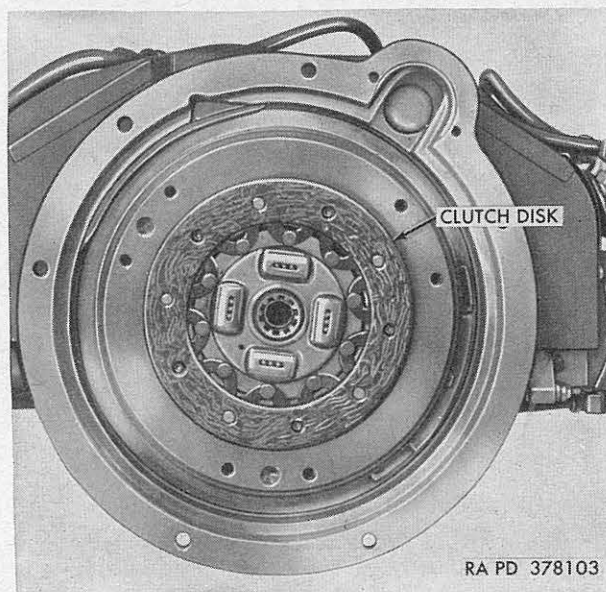


Figure 32. Engine with clutch pressure plate removed showing clutch disk.



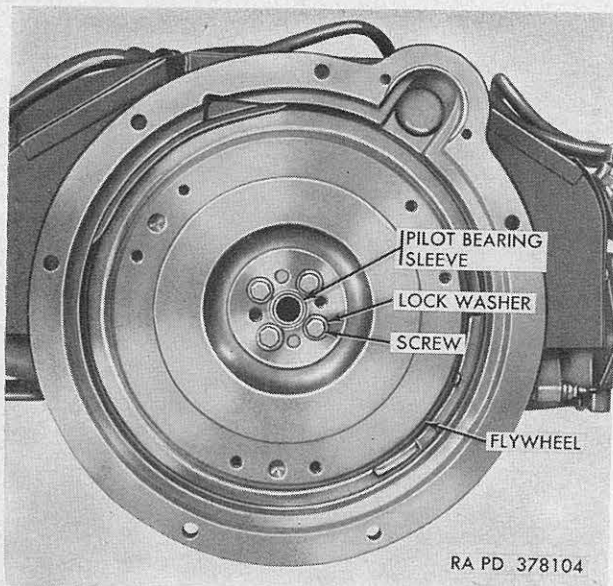


Figure 33. Engine with clutch disk removed showing flywheel.

- (4) Remove coupling from front end of starter rear rope and allow starter spring to pull rope into housing. Remove three pan-head screws (fig. 34) and internal teeth lockwashers securing torsion spiral spring cover to starter sheave. Carefully pull cover out to disengage lugs from holes in sheave, allow cover and spring to unwind to relieve spring tension, and pull cover and spring from starter sheave.
- (5) Remove two cross-recess-pan-head screws (fig. 24), plain washers and lockwashers securing engine starter shoe (fig. 35) on inside of flywheel housing, and remove shoe. Remove coupling from end of starter rear rope and turn starter sheave clockwise to pull entire rope inside flywheel housing. Remove spirolox ring and flat washer securing starter sheave assembly to rear bearing adapter. Hold starter pawl in position shown in figure 35 and pull sheave assembly off adapter. Remove helical spring from starter pawl.

**Caution:** Do not lose helical spring holding starter pawl against flywheel housing, when sheave assembly is removed.

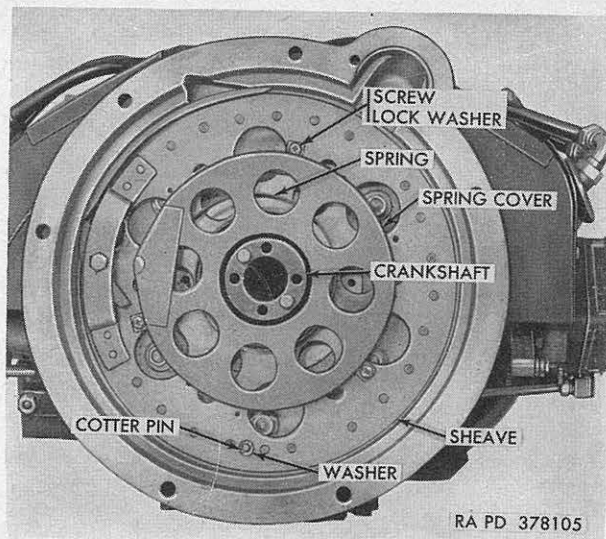


Figure 34. Engine with flywheel removed showing starter mechanism.

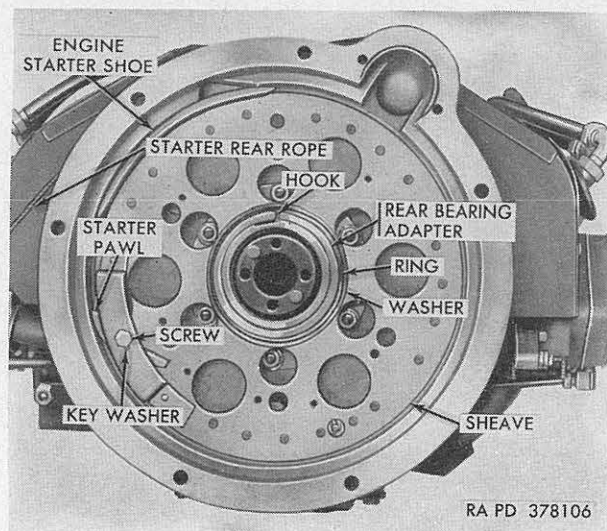


Figure 35. Engine with torsion spiral spring and cover removed showing starter sheave.

- (6) Unwind starter rear rope from sheave. Remove cotter pin (fig. 34), washer, clevis pin (fig. 36) and spacer securing end of rope to sheave. Bend tab on key washer (fig. 35), and remove hex-head screw, bushing, and starter pawl.
- (7) Pull outside end of torsion spiral spring (fig. 37) off pin in spiral spring cover and carefully pull spring from cover. Remove loop clip from spring.

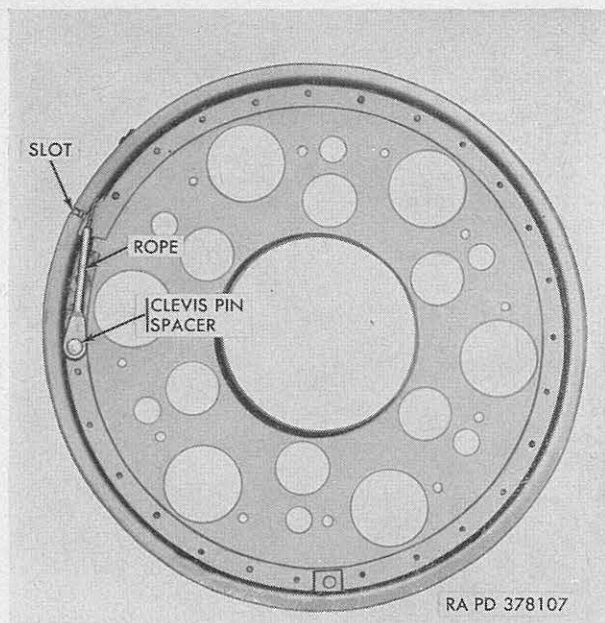


Figure 36. Front view of starter sheave assembly showing method of attaching starter rear rope.

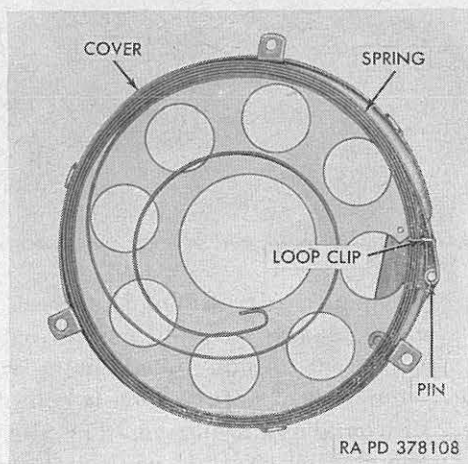


Figure 37. Torsion spiral spring and cover.

*b. Installation.*

- (1) Push loop clip (fig. 37) onto end of torsion spiral spring, push both onto pin in spiral spring cover and wind spring into cover in position shown in figure 37.
- (2) Position starter pawl and bushing in starter sheave (fig. 35) and secure with a new key washer and  $\frac{1}{4}$ -20NC x 1 hex-head screw. Bend tab on washer to lock screw in place. Push starter rear rope through slot (fig.

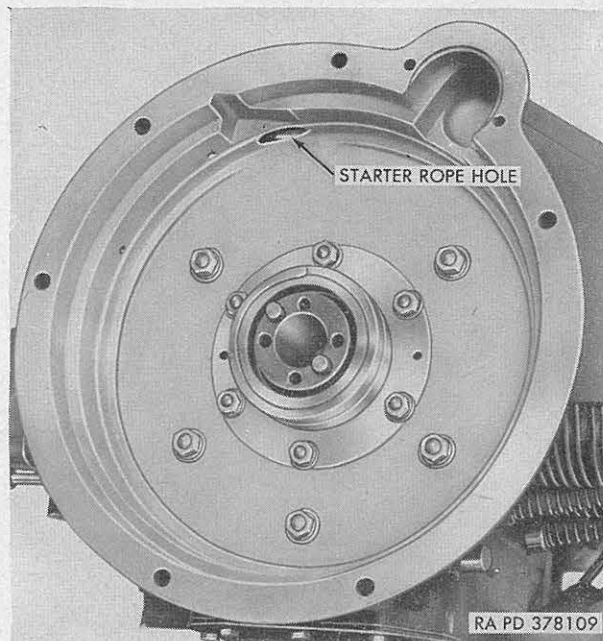


Figure 38. Rear view of flywheel housing.

36) in edge of sheave and swing end of rope into the position shown. Push clevis pin through end of rope, spacer, sheave, and plain washer (fig. 34) and secure all with  $\frac{1}{16}$  x  $\frac{1}{2}$  cotter pin. Wind starter rear rope onto sheave.

- (3) With starter rear rope wound on sheave, aline ball on end of rope with hole (fig. 38) through flywheel housing. Position spring between starter pawl and bracket on sheave, hold end of pawl in against pressure of spring, and push entire sheave assembly onto rear bearing adapter and inside flywheel housing as shown in figure 35. Release pawl which will now be held by flywheel housing. Install flat spacing washer on adapter against sheave and secure by installing spirolox ring in groove in adapter. Turn sheave counterclockwise working end of rope out through hole in flywheel housing and install coupling on end of rope to prevent rope being drawn back into housing. Position engine starter shoe (fig. 35) and secure with two 10-32 x  $\frac{7}{16}$  cross-recess-pan-head screws (fig. 24), internal teeth lockwashers and plain washers.



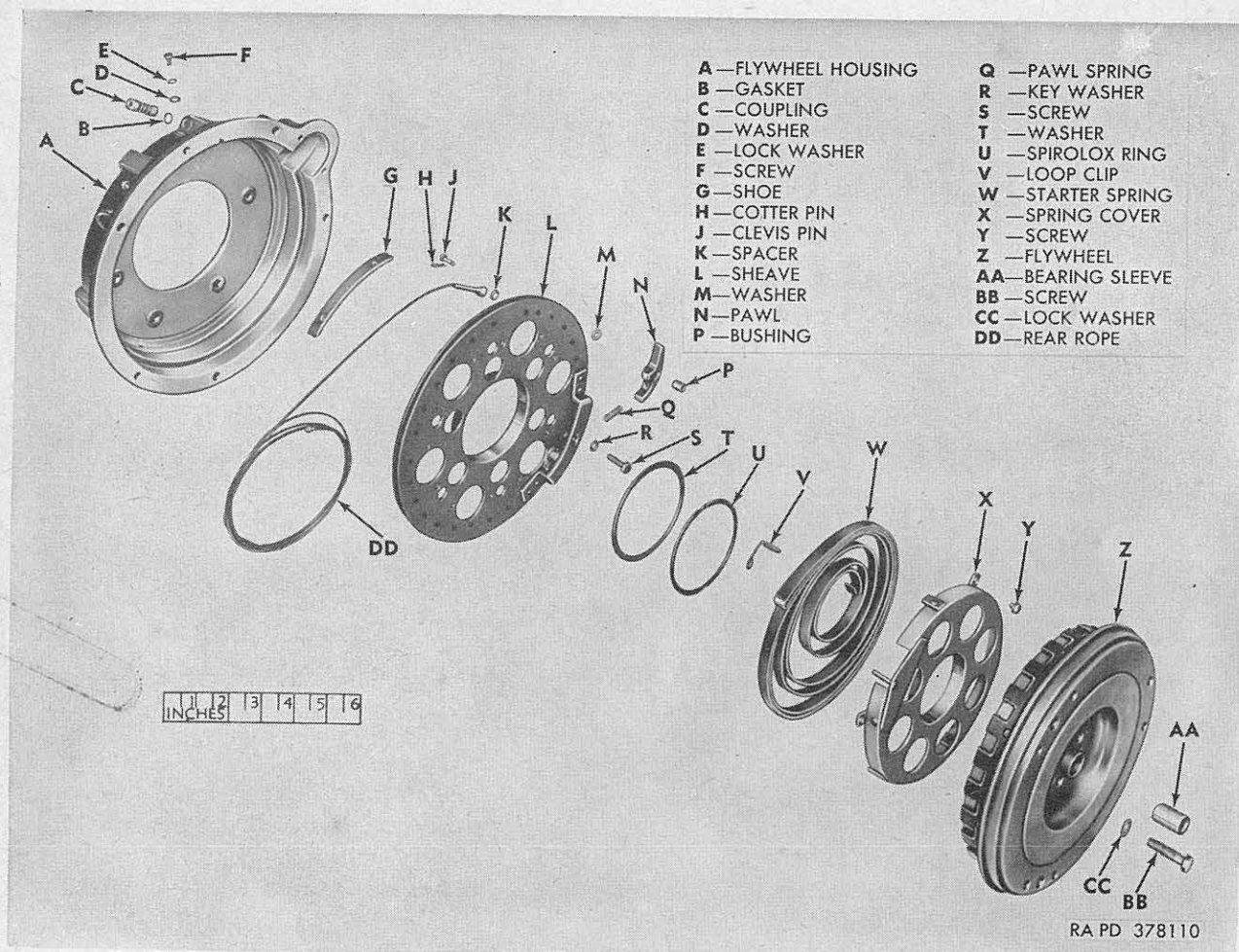


Figure 39. Exploded view showing relative positions of flywheel, flywheel housing and starter components.

- (4) Pull starter rear rope out of flywheel housing to end of travel. Turn sheave clockwise approximately two and one-half turns until pawl rides on shoe attached inside flywheel housing.

*Note.* This is the position of starter sheave which must be maintained after installation of engine in vehicle so that starter pawl will bear against shoe (not flywheel) while engine is in operation.

With sheave in this position, position torsion spiral spring (fig. 34) and cover against rear face of sheave with hook on inner end of spring engaging hook (fig. 35) on rear bearing adapter. Turn cover (fig. 34) counterclockwise until lugs engage holes in cover and temporarily install three No. 10-32 x  $\frac{1}{4}$  cross-recess-pan-head integral lock-washer screws securing cover to sheave. Starter must now be checked

to be sure adjustment is correct. Pull cable all the way out. If adjustment is correct torsion spiral spring will be wound tight before rope is completely unwound from sheave. The spring is the starter stop. If cable is unwound before spring becomes tight, adjustment is not correct. In this case remove the three screws securing cover, turn cover one hole counterclockwise on sheave, and install screws. Repeat above check and, if adjustment is correct, tighten the three screws securely. If not correct turn cover counterclockwise, one hole at a time, until correct adjustment is obtained.

- (5) If clutch pilot bearing sleeve (fig. 33) was removed from flywheel, press in new sleeve making sure ends of sleeve are flush with faces of flywheel hub.

Position flywheel on two locating pins in end of crankshaft and secure with four  $\frac{5}{16}$ -24NF x  $1\frac{1}{4}$  hex-head screws and internal teeth lockwashers tightened to a torque of 14 to 19 pound-feet.

- (6) Position clutch disk (fig. 32) against flywheel (side with short hub toward

flywheel). Position clutch pressure plate (fig. 28) against clutch disk, and secure plate to flywheel with six  $\frac{5}{16}$ -18NC x  $\frac{5}{8}$  special hex-head screws and lockwashers tightened to a torque of 14 to 19 pound-feet.

- (7) Install engine in vehicle (par. 60).

## Section VII. CLUTCH AND CONTROLS

### 63. Description and Data

*a. Description.* The clutch is of the standard automotive single disk type, the disk operating between the rear face of the flywheel and the front face of the pressure plate. It is located inside the flywheel housing on the rear end of the engine, and is considered as part of the engine assembly. The clutch release bearing (fig. 41), bearing carrier, and yoke are installed in the rear axle housing. A clutch control rear cable extends from the clutch release yoke to a coupling located just forward of the front edge of the platform. From this coupling the clutch control front cable (fig. 40) extends to a lever on the right end of the clutch pedal shaft. An adjustment is incorporated in the front cable.

*b. Data.* Refer to paragraph 37b for clutch data.

### 64. Clutch and Pilot Bearing Sleeve Replacement

Refer to paragraph 62.

### 65. Clutch Release Bearing, Bearing Carrier, Yoke, and Clutch Control Rear Cable Replacement

*Note.* The key letters shown below in parentheses refer to figure 42.

*a. Coordination with Ordnance Maintenance Unit.* Refer to paragraph 2 for information on coordination with ordnance maintenance unit.

*b. Removal.*

- (1) Remove engine (par. 59).
- (2) Disconnect front end of clutch control rear cable (fig. 40) from coupling at front edge of platform.
- (3) Disconnect carrier spring (Q) from lugs on transmission drive gear bearing retainer and release bearing carrier (P), and remove carrier and re-

lease bearing (R). Press bearing carrier out of bearing. Pull release yoke (N) out from between release spring (L) and ball on end of rear cable assembly (K), and remove spring. Pull fulcrum (M) out of drive gear bearing retainer.

- (4) Unscrew threaded adapter of rear cable assembly (K) from transmission housing and remove cable assembly from vehicle.

*c. Installation.*

- (1) Screw threaded adapter of clutch control rear cable assembly (K) into transmission housing.
- (2) Position release spring (L) over rear end of cable assembly and work end of release yoke (N) in between rear end of spring and ball on rear end of cable. Press release bearing (R) onto release bearing carrier (P). With yoke in position on fulcrum, slide bearing and carrier onto transmission drive gear bearing retainer and secure with car-

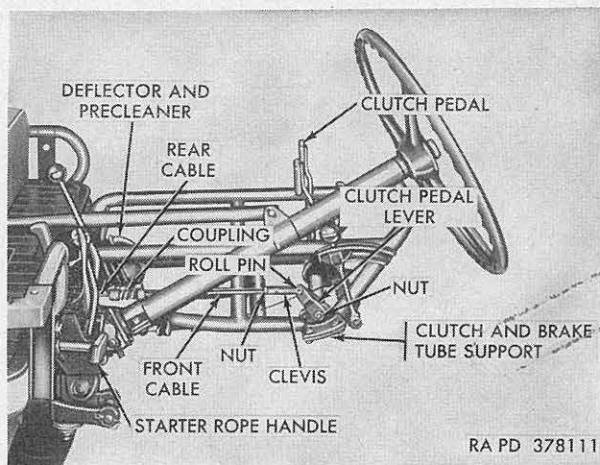


Figure 40. Clutch pedal and control front cable.



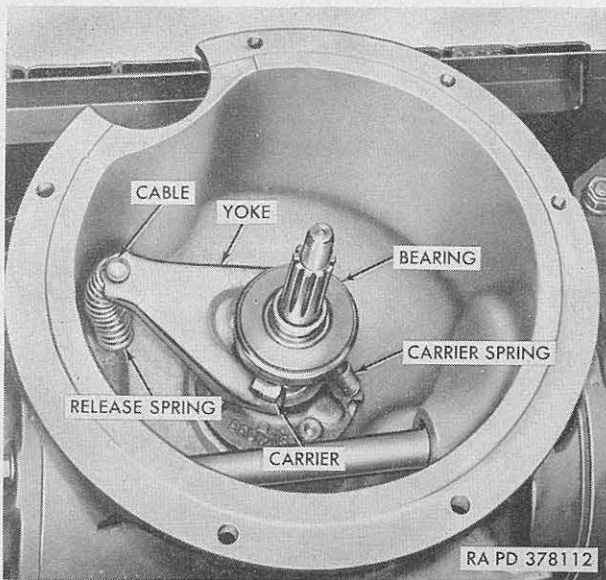


Figure 41. Clutch release bearing, carrier and yoke installed.

rier spring (Q) installed between lug on retainer and lug on carrier.

- (3) Slide front end of clutch control rear cable through guide in front bed support crossmember and install ball on end of cable in coupling (fig. 40) attached to rear end of clutch control front cable.

(4) Install engine (par. 60).

## 66. Clutch Control Front Cable Assembly Replacement (fig. 40)

*a. Removal.* Separate rear end of clutch control front cable assembly from coupling. Drive out roll pin connection clevis on front end of cable assembly to clutch pedal lever, and remove cable. Loosen nut securing clevis, and remove clevis and nut from cable.

*b. Installation.* Screw  $\frac{1}{4}$ -28NF hex nut and clevis onto end of front cable. Position clevis on clutch pedal lever and secure with  $\frac{1}{4} \times \frac{5}{8}$  roll pin driven through clevis and lever. Install ball on rear end of clutch control front cable in front end of coupling on front end of clutch control rear cable. Turn front cable in clevis to remove slack from clutch control cable and secure by tightening nut against clevis.

## 67. Clutch Pedal and Lever Replacement

*a. Removal.* Drive out roll pin (fig. 40) connecting clutch control front cable and clutch pedal lever. Unscrew nut from end of clutch pedal shaft. Pull plain washer and clutch pedal lever off right end of shaft. Remove two hex nuts, lockwashers and bolts securing bearing

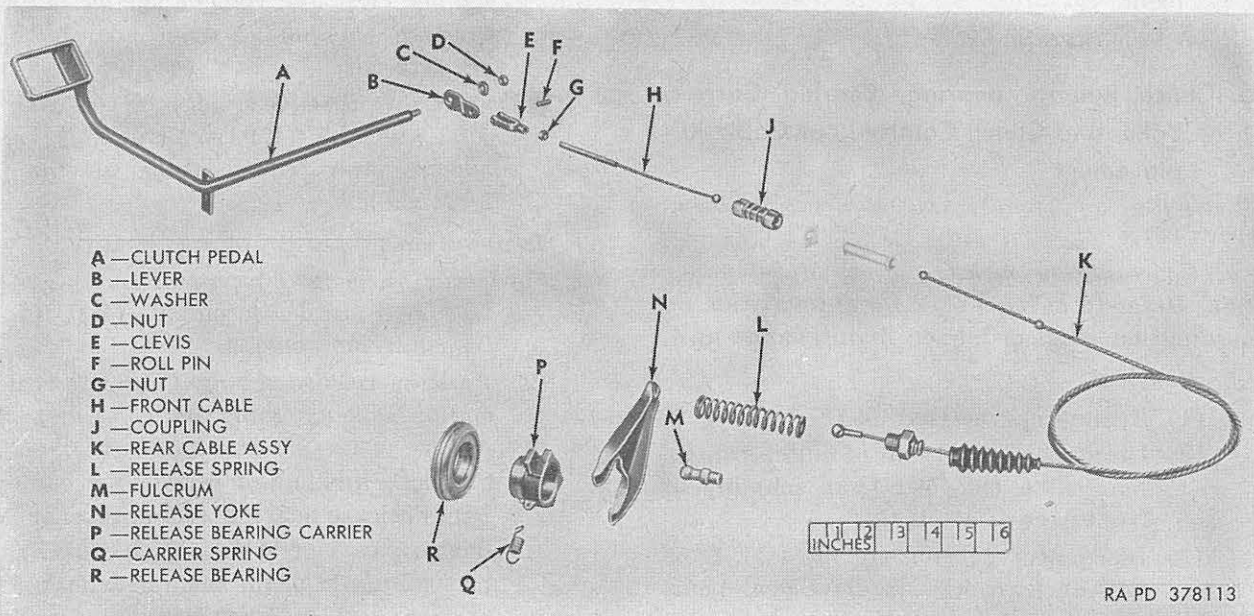


Figure 42. Clutch controls—exploded view.

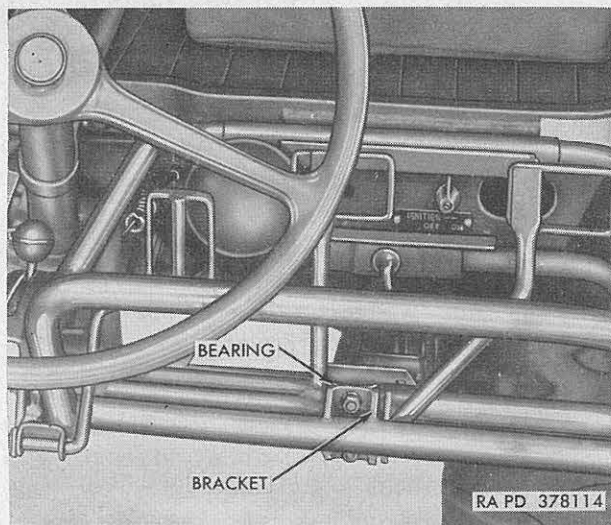


Figure 43. Support for left end of clutch pedal shaft.

## Section VIII. FUEL, AIR, AND EXHAUST SYSTEMS

### 68. Description and Data

#### a. Description.

- (1) The fuel system includes fuel tank, shutoff valve, filter, lines, pump, carburetor, air cleaner, rain deflector and precleaner, hose, and controls.
- (2) The fuel tank is located on left side of vehicle beneath platform and includes an impregnated paper filter. The cap is pressurized (opening at pressure between three and four pounds per square inch) and has a level gage attached. The cap is constructed to prevent leakage of fuel when vehicle is turned upside down.
- (3) The fuel pump is of the diaphragm type, is mounted on left side of engine, and is driven from an eccentric on the oil pump shaft.
- (4) The carburetor is a horizontal draft, float feed type and is attached to the front of the intake manifold. Control is through flexible cable to the accelerator and hand throttle at the front of the vehicle.
- (5) The air cleaner is a combination silencer and oil bath type cleaner. Air enters the system through a rain deflector and precleaner at the front of the vehicle, and passes through the

(fig. 43) near left end of clutch pedal shaft to bracket on foot rest. Pull clutch pedal (fig. 40) to left out of bearing, brake pedal and tube, and clutch and brake tube support.

b. *Installation.* Slide bearing (fig. 43) onto clutch pedal shaft (fig. 40) and push shaft through brake pedal and tube, and clutch and brake tube support. Position bearing (fig. 43) on bracket on foot rest and secure with two  $\frac{5}{16}$ -24NF x  $1\frac{1}{16}$  hex-head bolts, lockwashers, and hex nuts. Position clutch pedal lever (fig. 40) on flats at right end of brake pedal shaft, with offset pointing up and to the right, and secure with plain washer and  $\frac{5}{16}$ -24NF hex locknut. Position clevis on clutch control front cable assembly on upper end of clutch pedal lever and install  $\frac{1}{4}$  x  $\frac{5}{8}$  roll pin.

left frame tube to the cleaner. Thence through the silencer and oil bath, and through a hose to the carburetor. The air cleaner is so constructed that oil will not leak out when vehicle is turned upside down.

#### b. Data.

Fuel tank capacity	8.5 gal
Filler cap type	Pressurized, with level gage
Fuel pump:	
Make	AC
Model	Type FD GP-30236 with top rotated
Pressure	.4 to $5\frac{1}{4}$ psi 16 in. above outlet at 1,800 rpm
Carburetor:	
Make	Zenith
Model	87-85
Number	0-12120
Type	Horizontal draft
Fuel filter:	
Make	Bendix-Skinner
Type	Crepe paper—impregnated
Air cleaner:	
Make	United Specialties Corp
Model	T-80D1

### 69. Fuel Tank and Screen Replacement

#### a. Removal.

- (1) Remove pipe plug and drain fuel tank.
- (2) Disconnect fuel line at forward end of union (fig. 28) beneath platform at rear of stowed tow bar.



- (3) Remove four nuts (fig. 44) plain washers, shims and flathead bolts securing fuel tank beneath platform and remove tank. Figure 44 shows the two bolts at front end of tank, the remaining two are at rear end. Unscrew nut

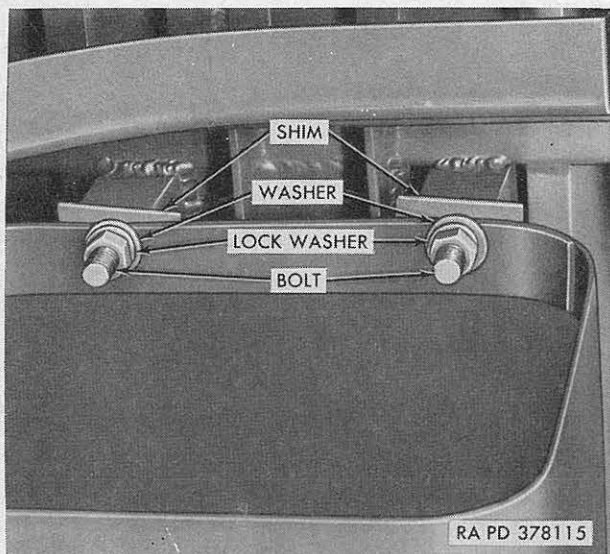


Figure 44. Disconnect points for fuel tank.

attaching fuel line (fig. 28) to screen and remove line.

- (4) Remove eight pan-head integral lockwasher screws (fig. 45) securing fuel screen to top of tank and remove screen and gasket.
- (5) Remove hex nut (fig. 45) and lockwasher from long roundhead screw securing element to outlet cover plate and remove screw, end plate and element from cover plate.

*b. Installation.*

- (1) Position end plate (fig. 45) and new element on cover plate and secure with No. 10-24 x 4 roundhead screw, lockwasher and hex nut.
- (2) Position new gasket (fig. 45) on under side of cover plate and lower screen and gasket into position in top of fuel tank with fuel outlet pointed toward rear of tank. Secure screen to tank with eight 8-32 x  $\frac{3}{8}$  cross-recess-pan-head integral lockwasher screws.
- (3) Position end of fuel line (fig. 28) in fuel outlet in screen and tighten nut.

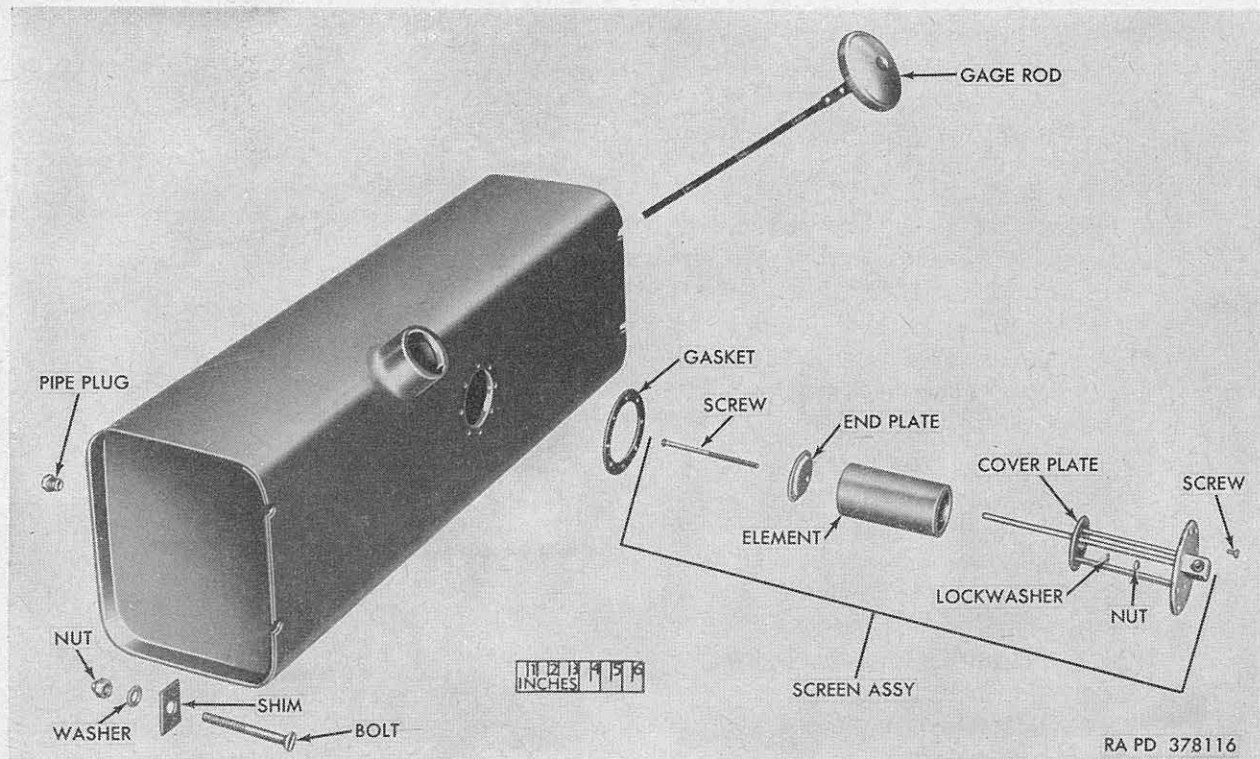


Figure 45. Fuel tank and screen—exploded view.

Install four  $\frac{3}{8}$ -16NC flathead screws (fig. 44) from top of platform. Install shim on each screw and against underside of platform. Position fuel tank on the four screws and secure with four  $\frac{3}{8}$ -inch plain washers, and lock-nuts.

- (4) Position rear end of fuel line from tank in end of union (fig. 28) and secure by tightening nut.
- (5) Replace  $\frac{3}{8}$ -inch hex-head pipe plug (fig. 45) in tank drain.

## 70. Fuel Line Replacement and Repair

### *a. Removal.*

- (1) Remove fuel tank to union line as directed in paragraph 69a(1), (2) and (3).
- (2) To remove union to shutoff valve line, remove pan-head screw, lockwasher and nut securing clip on fuel line to platform. Unscrew nut connecting forward end of line to union. Unscrew nut connecting rear end of line to shutoff valve and remove line.
- (3) To remove shutoff valve to fuel pump line, unscrew nut connecting end of line to shutoff valve. Unscrew nut connecting end of line to connector in fuel pump and remove line.
- (4) Remove fuel pump to carburetor line as directed in paragraph 45.

*b. Repair.* The lines are made from lengths of steel tubing, double flared; with fittings of the flare or inverted flare type. If fittings are damaged install new ones. If flares on ends of lines are damaged and tubing is of sufficient length, cut off damaged flare, install new nut and reflare. If new tubing must be used, bend to proper shape using old tube as sample, cut to length, install new nuts and flare. Use new fittings on new or reflared tubing.

### *c. Installation.*

- (1) Install fuel pump to carburetor line as directed in paragraph 45.
- (2) To install shutoff valve to fuel pump line, position line between valve and connector in fuel pump and secure by tightening nuts.
- (3) To install union to shutoff valve line,

position line between union and valve and secure by tightening nuts.

- (4) Install fuel tank to union line as directed in paragraph 69b(3), (4) and (5).

## 71. Fuel Shutoff Valve Replacement (fig. 15)

*a. Removal.* Unscrew two nuts connecting fuel lines to valve and remove valve.

*b. Installation.* Position shutoff valve between ends of two fuel lines and secure by tightening nuts onto shutoff valve.

## 72. Fuel Pump Replacement

Replace fuel pump as directed in paragraph 47.

## 73. Carburetor Adjustment and Replacement

*a. Adjustment.* Adjust carburetor as directed in paragraph 46a.

*b. Replacement.* Replace carburetor as directed in paragraph 46b and c.

## 74. Accelerator, Hand Throttle, and Carburetor Control Front Cable

### *a. Removal* (fig. 46).

- (1) Disconnect connector from rear end of throttle control front cable. Remove pan-head tapping screw securing clip and wire conduit to foot rest-lower left tube. Slide plain washer to rear off hooked end of front cable and unhook cable from clevis pin in accelerator. Remove clevis pin and throttle control cable assembly from vehicle.
- (2) Remove cotter pin and plain washer from end of accelerator shaft, slide accelerator to left out of hand throttle lever and footrest, and remove plain washer from accelerator shaft.
- (3) Remove nut and friction spring from stud on hand throttle lever. Unscrew ball from lever and remove lever from footrest.

### *b. Repair.*

- (1) Check to see that screw threads on the hand throttle lever have not been damaged. If threads are damaged either



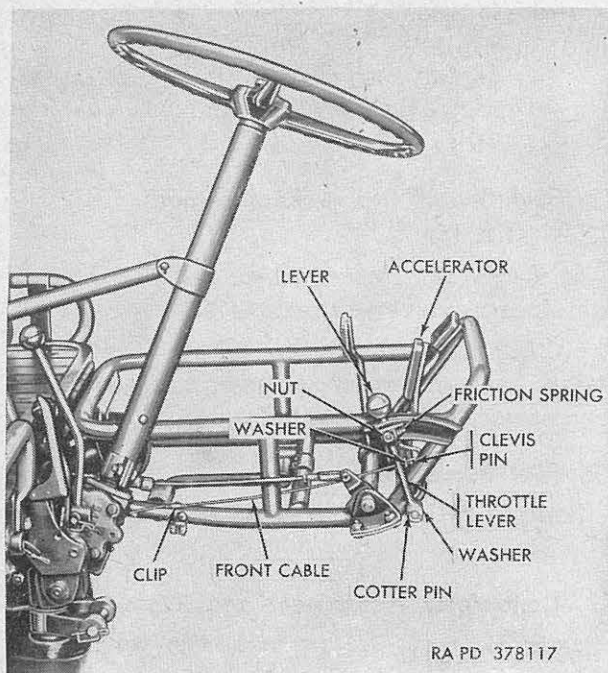


Figure 46. Accelerator, hand throttle, and carburetor control front cable.

clean up with a die or replace. If lever has been bent either straighten or replace.

- (2) Check accelerator to see that it has not been bent or damaged. If bent either straighten or replace. Be sure holes for cotter and clevis pins are open to allow installation of pins.
- (3) See that wire conduit and clip slide freely on throttle control front cable; and that connector ball on rear end of cable is tight. If not replace cable.

*Note.* If conduit has to be replaced it will also be necessary to replace the cable due to the fact that the hook on the front end of cable is formed after conduit is installed on cable.

If new cable is to be installed slide wire conduit and clip onto cable followed by  $\frac{3}{16}$ -inch plain washer. With these parts in place on cable bend front end of cable into hook as shown in figure 47.

#### c. Installation (fig. 46).

- (1) Position throttle hand lever through sector on footrest, with stud toward right, and screw ball onto end of lever. Position friction spring on stud with

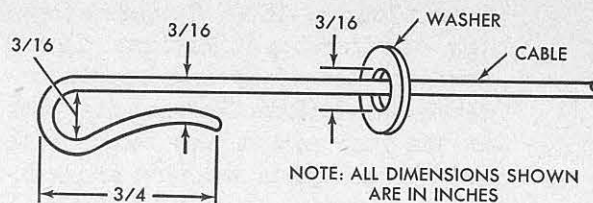


Figure 47. Hook in front end of carburetor control front cable.

ends against sector and secure with  $\frac{5}{16}$ -18NC self-locking nut tightened to give desired friction.

- (2) Install  $\frac{3}{8}$ -inch plain washer on shaft of accelerator and slide accelerator through bracket on footrest from left side. Slide lower end of hand throttle lever onto left end of accelerator followed by  $\frac{3}{8}$ -inch plain washer, and install  $\frac{3}{32} \times \frac{5}{8}$  cotter pin.
- (3) Push  $\frac{3}{16} \times \frac{5}{8}$  clevis pin through accelerator from left side, hook front end of carburetor control front cable through hole near end of pin, and secure by sliding  $\frac{3}{16}$ -inch washer forward over free end of hook. Position wire conduit and clip on hole in lower right tube of footrest and secure with No. 10-16  $\times \frac{3}{8}$  cross-recess-pan-head tapping screw. Install ball on rear end of cable in connector on front end of carburetor control rear cable.
- (4) Check adjustment of carburetor throttle lever on carburetor control rear cable (par. 46a).

## 75. Carburetor Control Rear Cable Replacement

### a. Removal.

- (1) Loosen screws in two stops (fig. 14) on carburetor control rear cable, one forward and one rear of throttle lever on carburetor, and pull cable out of retracting spring link, stop, throttle lever, spring and stop in the order named.
- (2) Disconnect front end of carburetor control rear cable from connector (fig. 61) on rear end of front cable, and pull cable out of two bushings and one wire conduit.

- (3) If necessary to remove wire conduit (fig. 61) from lower edge of front support crossmember, remove pan-head screw and nut and remove conduit and clip from crossmember.
- (4) If necessary to remove cable bushings (fig. 58) from the two intermediate bed supports, pull push clips off bushings and push bushings out of bed supports.

*b. Repair.*

- (1) Examine threads of screws and stops, and replace if damaged.
- (2) Examine wire conduit and bushings and replace if damaged.
- (3) Examine carburetor control rear cable to see that ball on front end is tight, and that there are no sharp bends or other damage. Replace cable if any of these conditions exist.

*c. Installation.*

- (1) If cable bushings (fig. 58) were removed from the two intermediate bed supports, push bushings into holes in supports from front and secure with clips pushed onto rear ends of bushings.
- (2) If wire conduit (fig. 61) and clip were removed from lower edge of front support crossmember, slide conduit into clip, position clip and conduit on crossmember and secure with No. 10-24 cross-recess-pan-head integral lock-washer screw and nut.
- (3) Push carburetor control rear cable through wire conduit (fig. 61) on front support crossmember, and two bushings (fig. 58) in intermediate bed supports, and install ball on front end in connector (fig. 61) on rear end of front cable.
- (4) Slide front stop (fig. 14) and spring onto rear end of rear cable, and push end of cable through hole in carburetor throttle lever. Position rear stop in end of retracting spring link and push end of cable through hole in end of link, stop and second hole in link in order named. Pull cable as far toward rear of vehicle as it will travel,

hold throttle lever in closed position, and tighten rear stop on cable so that link will just contact throttle lever. Hook retracting spring between link and hole in platform. Push front stop toward throttle lever to compress spring and tighten screw in stop.

## 76. Air Cleaner to Carburetor Hose Replacement (fig. 14)

*a. Removal.* If air cleaner to carburetor hose (Q) is damaged, loosen hose clamps (M and R), remove hose, and remove clamps from hose.

*b. Installation.* Slide hose clamps (M and R) onto each end of hose (Q), position hose between air cleaner and carburetor, and tighten the two hose clamps.

## 77. Air Cleaner

*a. Service.*

- (1) Unscrew clamp screw (fig. 6), remove clamp and reservoir from body of air cleaner, and separate clamp and inner reservoir (fig. 48) from outer reservoir.
- (2) Unscrew thumb screw (figs. 22 and 48) and remove filter element.
- (3) There are two gaskets (fig. 48) in air cleaner body, one between top of filter element and body, and the other between reservoir and body. Do not remove these gaskets unless damaged.
- (4) Wash filter element thoroughly in dry-cleaning solvent and allow to drain. After draining dip element in seasonal grade engine oil and again allow to drain before installation. Wash the two reservoirs thoroughly in dry-cleaning solvent.
- (5) If gaskets were removed from air cleaner body, install new ones.
- (6) Position filter element (fig. 22) against gasket in top of body and secure by tightening thumbscrew.
- (7) Position inner reservoir inside of outer reservoir and fill to oil level mark with seasonal grade engine oil. Position reservoir against gasket at bottom of body, position clamp over



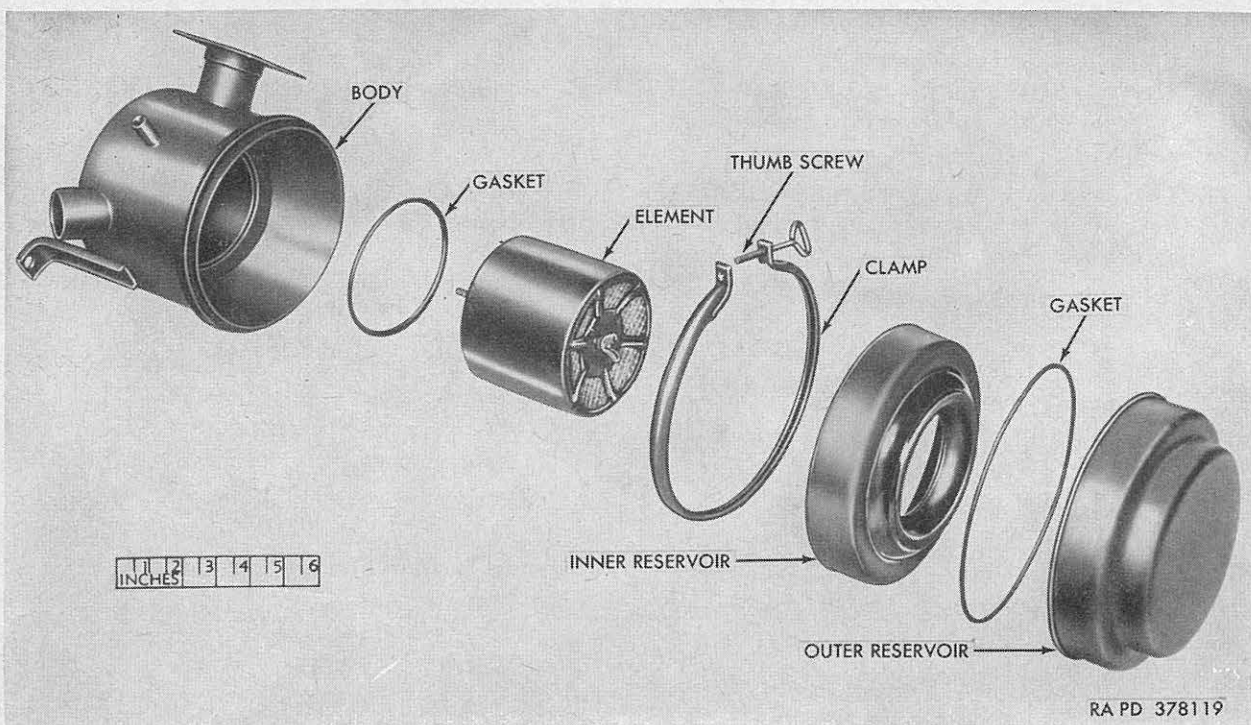


Figure 48. Air cleaner—exploded view.

joint between body and reservoir, and secure reservoir by tightening clamp screw.

*Note.* The edge of the clamp which turns inward must be installed upward against underside of flange on body.

**b. Removal.**

- (1) Loosen hose clamp and pull air cleaner to carburetor hose (fig. 14) off air cleaner. Remove spring clamp and remove crankcase breather to air cleaner hose.
- (2) Remove four hex nuts, lockwashers, plain washers and hex-head bolts securing flange (fig. 22) of air cleaner to rear flange of left rear bed support, and remove gasket from between flanges.
- (3) Remove two hex nuts, lockwashers, and flat-head screws (fig. 50) securing arms on air cleaner to under side of platform, and remove air cleaner and two shims between arms and platform.

**c. Installation.**

- (1) Place two  $\frac{5}{16}$ -24NF x  $1\frac{1}{4}$  flathead screws (fig. 50) in holes, near left

rear corner of platform, from top. Position one shim on each screw against bottom of platform, position arms of air cleaner on screws against shims, and install  $\frac{5}{16}$ -inch lockwasher and hex nut on each screw fingertight.

- (2) Position gasket between flange (fig. 22) on air cleaner and flange on left rear bed support and install four  $\frac{5}{16}$ -24NF x  $\frac{7}{8}$  hex-head bolts through flanges from front. Install  $\frac{5}{16}$ -inch plain washer, lockwasher and hex nut on each bolt. Finish tightening two screws through platforms and air cleaner arms.
- (3) Push air cleaner to carburetor hose (fig. 14) onto air cleaner and tighten hose clamp. Push crankcase breather to air cleaner hose onto air cleaner and secure with spring clamp.

**78. Rain Deflector and Precleaner (fig. 56)**

**a. Removal.** Loosen hose clamp securing rain deflector and precleaner to air cleaner tube, and remove precleaner. Remove hose clamp from precleaner.

*b. Service.* Clean rain deflector and pre-cleaner thoroughly in dry-cleaning solvent. Inspect screen for breaks and replace entire unit if necessary.

*c. Installation.* Install hose clamp on rain deflector and precleaner. Push precleaner onto end of air cleaner tube and secure by tightening hose clamp.

## 79. Muffler Replacement

*a. Removal.* Loosen screws in two clamps (fig. 49) connecting flexible exhaust pipes to muffler, and slide clamps onto flexible exhaust pipes. Unscrew four flathead screws (fig. 50) securing muffler to under side of platform and remove muffler and two asbestos muffler insulators.

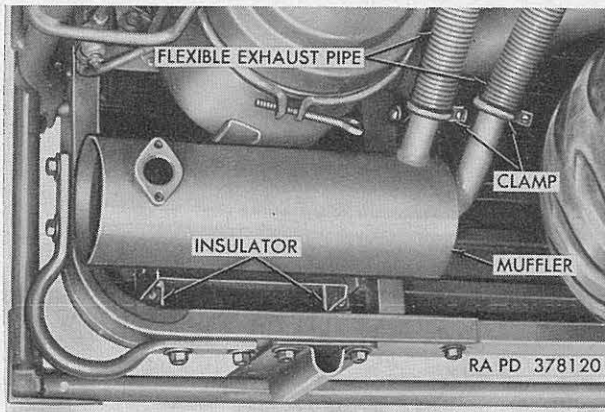


Figure 49. Disconnect points for muffler.

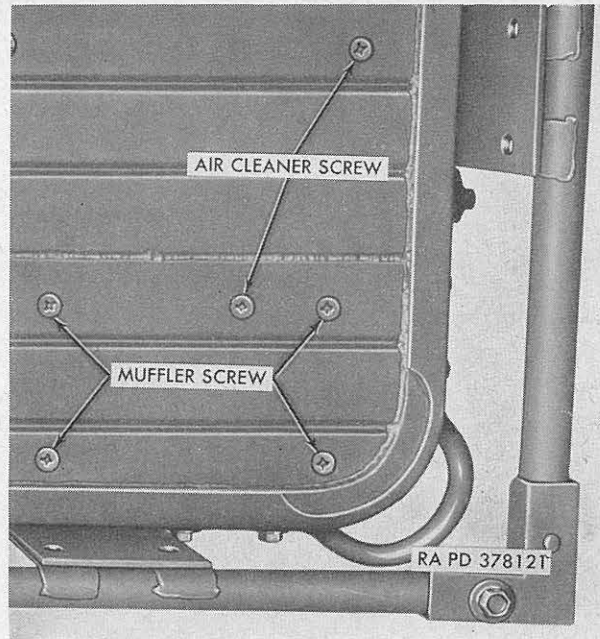


Figure 50. Screws for air cleaner and muffler.

*b. Installation.* Place four  $\frac{5}{16}$ -24NF x  $1\frac{1}{4}$  flathead screws (fig. 50) in holes in top of platform. Position insulators (fig. 49) and muffler on screws against lower face of platform and secure by turning screws into  $\frac{5}{16}$ -inch tapping nuts on muffler brackets. Position clamps securing flexible exhaust pipes to muffler, and tighten clamp screws.

## Section IX. COOLING SYSTEM

### 80. Shroud Replacement

Refer to paragraph 52.

### 81. Blower Belt Replacement

Refer to paragraph 48a.

### 82. Blower Replacement

Refer to paragraph 48b.

### 83. Blower Pulley Replacement

Refer to paragraph 48c.

### 84. Blower Bearing Replacement

Refer to paragraph 48d.

## Section X. ELECTRICAL SYSTEM

### 85. Spark Plugs—Clean and Replace

Refer to paragraph 54.

### 86. Conduit and Lead Assembly Replacement

Refer to paragraph 53.

### 87. Magneto Adjustment and Replacement

Refer to paragraph 49.

### 88. Switch Cable Replacement

*a. Ignition Switch to Magneto Cable Removal.* Pull connector on front end of cable out of upper socket "A" on rear of ignition switch (fig. 51). Pull connector on rear end of cable out of socket on front end of magneto (fig. 16). Remove hex nut, lockwasher and plain washer securing eyelet



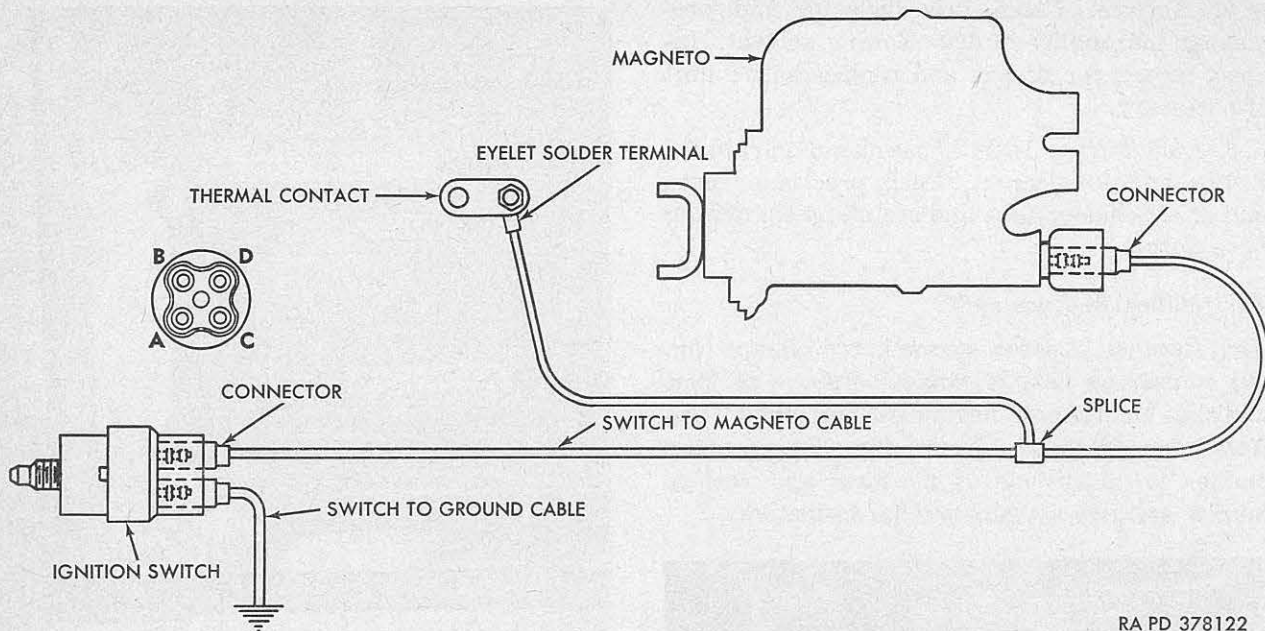


Figure 51. Switch, magneto, and thermal contact wiring.

solder terminal on cable to thermal contact (fig. 10). Remove eight clips securing cable to underside of platform and remove cable.

*b. Ignition Switch to Magneto Cable Installation.* Position cable (fig. 52) on under side of platform in sixth groove from left side. Push connector on rear end of cable into socket on

front end of magneto (fig. 16). Push connector on front end of cable into upper socket "A" on rear of ignition switch (fig. 51). Secure eyelet solder terminal on cable to stud on thermal contact with plain washer, internal teeth lockwasher and No. 10-32 brass hex nut. Position cable so that there will be slack at all three ends, and secure to flange on platform with eight clips.

*c. Ignition Switch to Ground Cable Removal.* Pull connector on end of cable out of right socket "B" on rear of ignition switch (fig. 51). Remove nut, lockwasher and screw (fig. 53) securing eyelet solder terminal on other end of cable to lower edge of front bed support crossmember. Remove clip and cable from crossmember.

*d. Ignition Switch to Ground Cable Installation.* Secure eyelet solder terminal of cable to lower edge of front bed support crossmember with No. 10-24 x 1/2 roundhead screw (fig. 53), internal teeth lockwasher and hex nut. Push connector on other end of cable into right socket "B" on rear of ignition switch (fig. 51). Secure cable to lower edge of crossmember with clip.

## 89. Ignition Switch Replacement

*a. Removal.* Pull switch to magneto cable (fig. 51) out of socket "A", and switch to ground cable out of socket "B" on rear of ignition switch. Remove screw (fig. 53) and lockwasher securing

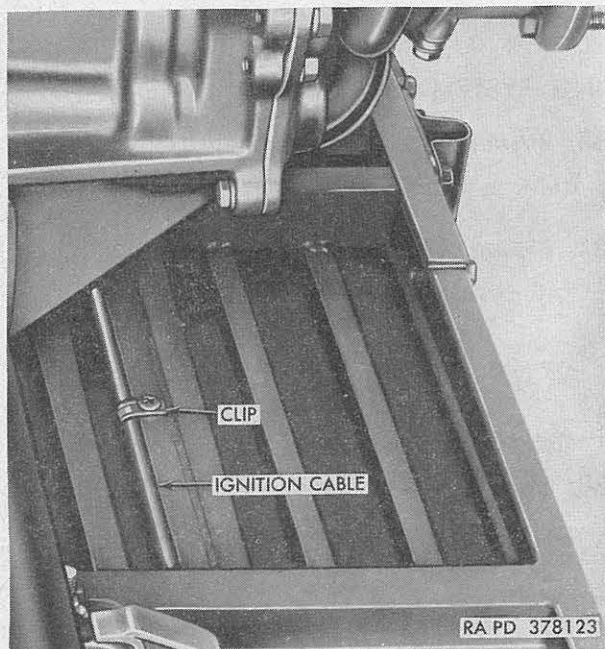


Figure 52. Position of ignition switch to magneto cable beneath platform.

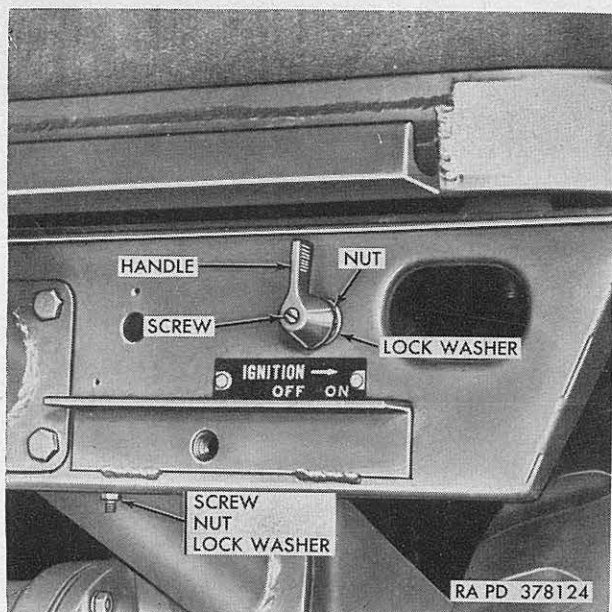


Figure 53. Ignition switch.

switch handle to switch, and remove handle. Remove nut and lockwasher securing switch in front bed support crossmember, and pull switch out of crossmember from rear.

*b. Installation.* Push switch through front bed support crossmember from rear, making sure

positioning lug on front of switch case fits into positioning hole in crossmember. Secure with  $\frac{1}{2}$ -inch internal teeth lockwasher (fig. 53) and special nut. Position switch handle on shaft and secure with lockwasher and No. 8-32 fillister head screw. Push connector on end of ignition switch to ground cable into socket "B" on rear of switch. Push connector on end of ignition switch to magneto cable into socket "A" on rear of ignition switch.

## 90. Thermal Contact Replacement (fig. 10)

*a. Removal.* Push shield away from contact. Remove hex nut, lockwasher and plain washer securing ignition switch to magneto cable to thermal contact, and remove cable from contact. Remove hex nut and lockwasher from stud securing thermal contact, and remove contact.

*b. Installation.* Position thermal contact on lower rear stud of No. 4 cylinder head and secure with  $\frac{1}{4}$ -inch internal teeth lockwasher and  $\frac{1}{4}$ -28NF hex nut. Position eyelet solder terminal on end of ignition switch to magneto cable on stud of thermal contact, and secure with plain washer, lockwasher and No. 8-32 hex nut. Push rubber shield over connection.

## Section XI. TRANSMISSION

### 91. Description

The transmission is of the synchronized type and provides three speeds forward and one reverse as well as high and low ranges. This construction gives six speeds forward and two reverse. The case housing the parts of the transmission forms the center section of the rear axle. For further details and data refer to paragraphs 102 through 104.

### 92. Control Rod Rigid Linkage Replacement

*a. Removal.* Remove three cotter pins (fig. 71) and clevis pins securing rear ends of transmission and transfer control rod rigid linkages to transmission. Remove safety pin (fig. 54) securing front end of transfer linkage to gear shift range lever and remove linkage from lever. Remove two safety pins from studs in gear shift lever brackets, and pull front ends of transmission control rod rigid linkages from studs. Re-

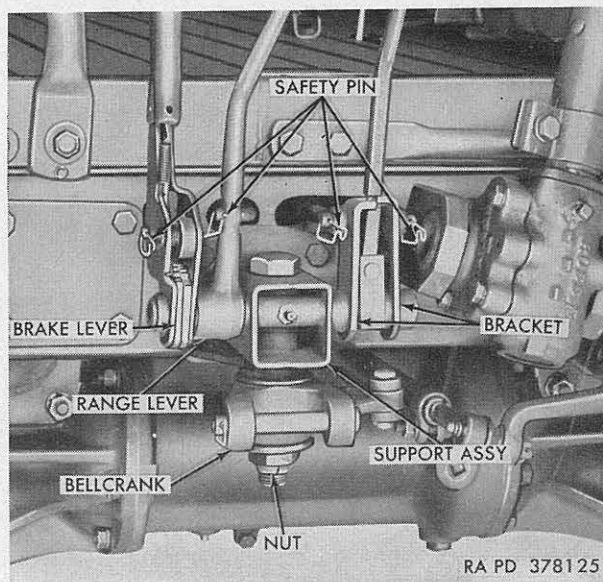


Figure 54. Brake and shift lever support assembly and attached parts mounted on front of platform.



move three cotter pins from clevis pins securing linkages to linkage hangers (fig. 55) and remove clevis pins. Pull linkages out of holes in front crossmember and remove from vehicle.

b. *Installation.* Slide ell shaped end of transfer control rod rigid linkage through hole in front crossmember, hook end into hole in gearshift range lever (fig. 54) and secure with safety pin. Slide eye ends of transmission control rod rigid

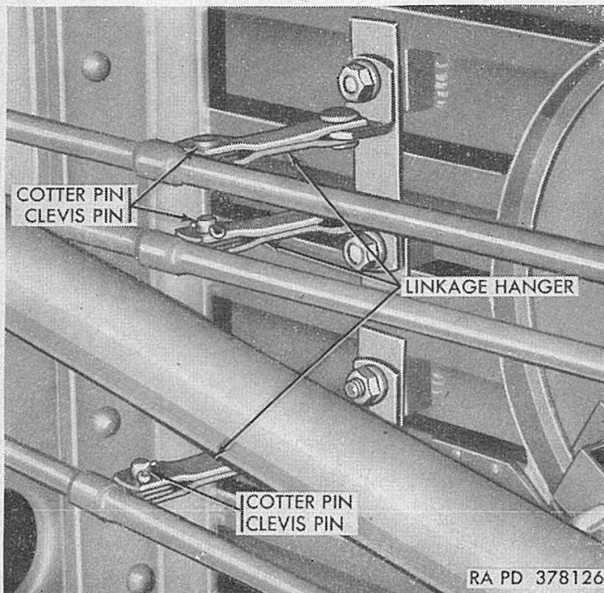


Figure 55. Transmission and range control linkage hangers.

linkages through holes in front crossmember and install on studs of gearshift lever brackets, and secure with safety pins. Loosen locknuts (fig. 71) for clevises on rear ends of linkages, and adjust clevises so that when attached to transmission shift rails, shift levers at front of platform will be in correct position. Secure clevises to shift rails with  $\frac{5}{16} \times 1$  clevis pins and  $\frac{3}{32} \times \frac{3}{4}$  cotter pins. Tighten locknuts on clevises. Install three  $\frac{5}{16} \times \frac{1}{2}$  clevis pins (fig. 55) securing linkages to linkage hangers and secure with  $\frac{3}{8} \times \frac{1}{2}$  cotter pins.

### 93. Brake and Shift Lever Support Assembly Replacement

#### a. Removal.

- (1) Unscrew nut (fig. 56) securing tow bar bellcrank to brake and shift lever support and remove washer.
- (2) Remove safety pin (fig. 54) and cotter pin securing handbrake control flexible linkage to handbrake lever.
- (3) Remove safety pin from end of transfer control rod rigid linkage and separate rod from gearshift range lever. Remove two safety pins from studs in gearshift lever brackets and remove front ends of transmission control rigid linkages from studs.

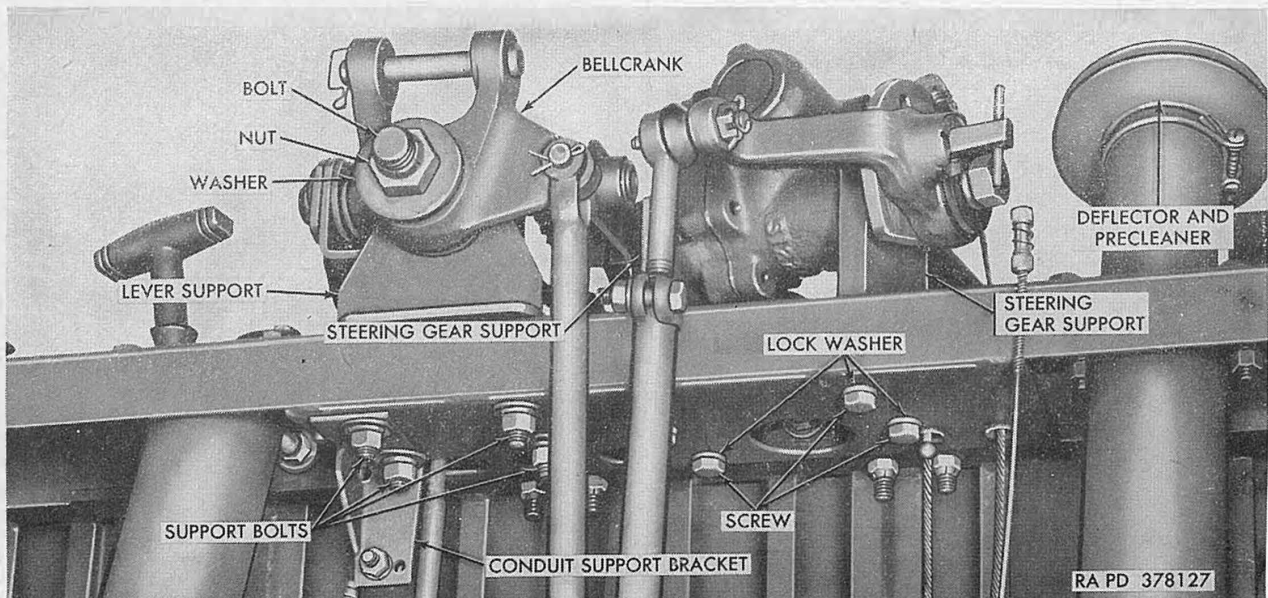


Figure 56. Disconnect points on rear of bed support front cross member.

- (4) Remove four hex nuts and lockwashers from bolts (fig. 56) securing brake and shift lever support to bed support front crossmember and remove support assembly from vehicle. The two right bolts also secure brake conduit support bracket to rear of crossmember. Three attaching bolts may be removed but lower right bolt cannot be removed until support assembly is partially disassembled. Remove bolt used to secure tow bar bellcrank.

*b. Disassembly (fig. 57).*

- (1) Remove hex-head screw (A) and lockwasher (B) securing sector to brake and shift lever support (H). Pull hand-

brake lever (C) and gearshift range lever (D) off shaft on right side of support (H). Remove fourth bolt (T) securing support to crossmember. Unscrew ball (E) from top end of lever.

- (2) Remove snap ring (M) from end of shaft on left side of support and pull gearshift lever bracket (N), lever pivot block (R) with lever (K), and second bracket (J) off shaft in order named.
- (3) Remove cotter pin (Q) and clevis pin (R) securing transmission gearshift lever (K) to gearshift lever pivot block (R), and separate lever and block. Unscrew ball (L) from top end of lever.

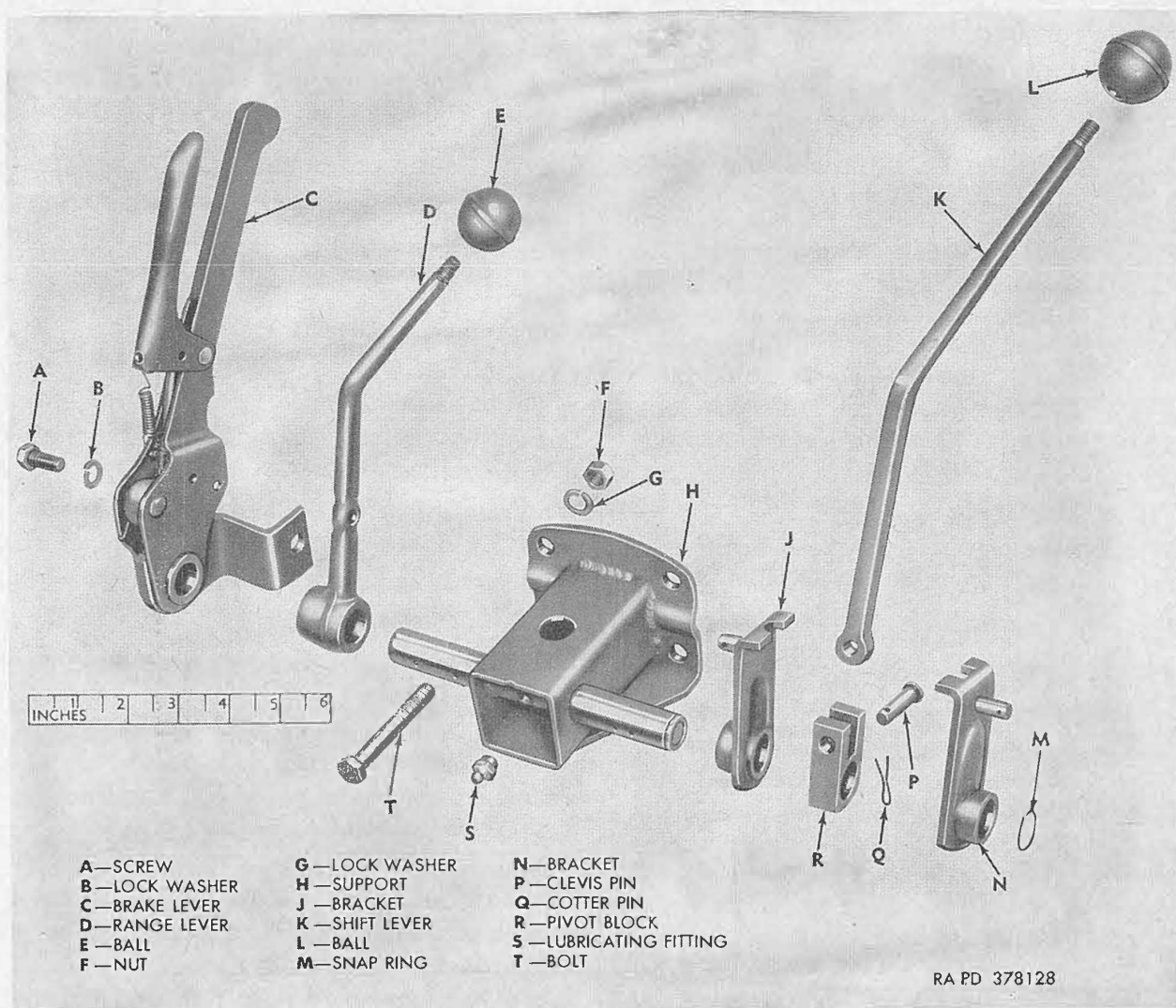


Figure 57. Brake and shift lever support assembly—exploded view.



- (4) Remove lubricating fitting (S) from support only if necessary.

*c. Assembly.*

- (1) If lubricating fitting (S) was removed from shaft of brake and shift lever support, screw fitting into hole in front of shaft.
- (2) Position transmission gearshift lever (K) and gearshift lever pivot block (R) so holes are alined and install  $\frac{5}{16} \times 1\frac{1}{4}$  clevis pin (P) and  $\frac{3}{32} \times \frac{1}{2}$  cotter pin (Q). Screw ball (L) onto top end of lever (K).
- (3) Slide gearshift lever bracket (J), lever pivot block with lever, and second lever bracket (N) onto left end of shaft of brake and shift lever support and secure with snap ring (M). Parts must be so positioned that notches in brackets surround lever, and lever must point backward when support is installed.
- (4) Screw ball (E) onto top end of gearshift range lever (D). Slide one  $\frac{3}{8}$ -24NF x  $2\frac{1}{2}$  hex-head bolt through lower right hole in support from the front. Slide range lever (D) onto shaft on right side of support with top end pointing to rear, followed by handbrake lever (C) and sector. Install  $\frac{3}{8}$ -16NC x  $\frac{7}{8}$  hex-head screw (A) and lockwasher (B) securing sector to support.

*d. Installation.*

- (1) Slide  $\frac{3}{4}$ -16 x  $5\frac{1}{2}$  bolt (fig. 56) for bellcrank through brake and shift lever support from the top. Position assem-

bly against bed support front crossmember with bolt in lower right hole of support through crossmember and conduit support bracket and install lockwasher and  $\frac{3}{8}$ -24NF hex nut fingertight at rear of crossmember. Install remaining three  $\frac{3}{8}$ -24NF x  $2\frac{1}{2}$  hex-head bolts, lockwashers and nuts, and tighten all four nuts to a torque of 20 to 30 pound-feet.

- (2) Position front ends of transmission control rigid linkages on studs in gearshift lever brackets (fig. 54) and secure with safety pins. Push end of transfer control rod linkage through hole in gearshift range lever from left and secure with safety pin.
- (3) Position front end of handbrake control flexible linkage in alinement with holes in handbrake lever (fig. 54) and secure with  $\frac{1}{4} \times 1\frac{1}{16}$  clevis pin and safety pin.
- (4) Position tow bar bellcrank (fig. 54) on bolt at bottom of support and secure with plain washer and  $\frac{3}{4}$ -16NF locknut, tightened to a torque of 90 to 110 pound-feet.

## 94. Breather Replacement

*a. Removal.* The breather (fig. 29) is located on top of transmission at right side (fig. 70). To remove, unscrew from tapped hole in transmission housing.

*b. Installation.* Screw breather (fig. 29) into tapped hole in top of transmission housing at the right.

## Section XII. PROPELLER SHAFT

### 95. Description and Data

The propeller shaft (fig. 60) is of the tubular type with universal joint at each end. The rear end of the shaft has a splined yoke which slides onto a splined shaft in the transmission. The front end of the shaft has a companion flange which bolts to the rear of the brakedrum. The universal joints are of the Cardan type.

### 96. Propeller Shaft Replacement

*a. Removal.* Remove four hex-head screws

(fig. 58) and lockwashers securing front end of propeller shaft to brakedrum and front companion flange. Move front end of shaft to clear brakedrum and pull rear end of propeller shaft (fig. 59) off shaft of drive pinion in transmission.

*b. Installation.* Push rear end of propeller shaft onto splined end of shaft of drive pinion in transmission (fig. 59). Check to see that holes in front companion flange are alined with tapped holes in brakedrum. Position flange on front end of propeller shaft (fig. 58) against front com-

panion flange and secure with four  $\frac{5}{16}$ -24NF x 1 hex-head screws and lockwashers, tightened to a torque of 10 to 15 pound-feet.

## 97. Universal Joint Disassembly and Repair (fig. 60)

*a. Disassembly.* Remove propeller shaft as directed in paragraph 96a. Remove two snap rings securing the two bearings in a yoke. Press on the end of one bearing assembly until the opposite bearing assembly is pushed from the yoke. Turn yoke over and press on exposed end of journal cross until second bearing assembly is pushed from the yoke. Remove the other two bearing assemblies in the same manner. Remove lubricating fitting from journal cross only if

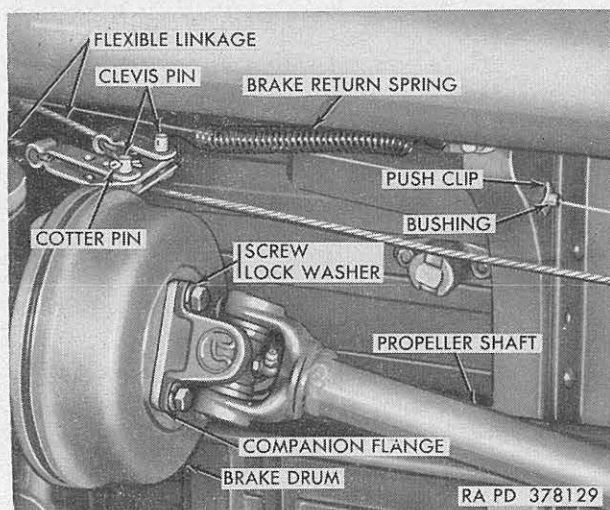


Figure 58. Front end of propeller shaft, and brake.

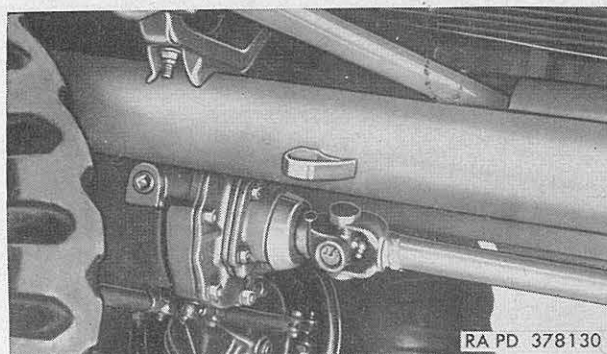


Figure 59. Rear end of propeller shaft.

necessary. If necessary press dust guard off of rear yoke.

### *b. Repair.*

- (1) Clean all parts thoroughly with dry-cleaning solvent and dry with compressed air.
- (2) Examine yokes carefully to see that they have not been damaged or distorted. If boltholes or splines show damage or wear replace flange. If bearing bores show distortion replace entire unit affected.
- (3) If bearing surfaces of bearing, journal cross or rollers show damage or wear replace entire journal cross and bearing assembly.
- (4) Check the tubular shaft and replace if bent or dented sufficiently to throw it out of line.

### *c. Assembly.*

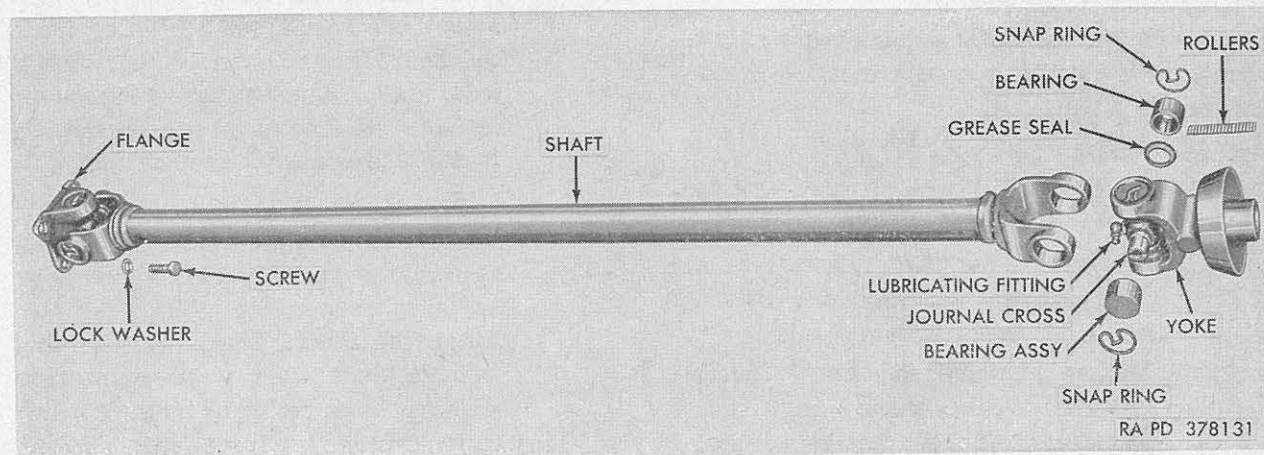


Figure 60. Propeller shaft—partially exploded.



- (1) Screw lubricating fitting into journal cross, making sure fitting is positioned at 45° to the centerlines of journals. Press dust guard onto rear yoke if removed.
- (2) Coat inside of bearings with a layer of GAA automotive and artillery grease to hold rollers in place and install 20 rollers in bearing. Install grease seal on end of bearing.

- (3) Position journal cross between arms of yoke, and carefully press two bearing assemblies into yoke and onto journals, being careful not to damage grease seals or rollers. Install snap ring in annual groove in yoke bore at outer end of each bearing. Install two bearings in other yoke in same manner. Assemble second universal joint in the same manner.

### Section XIII. FRONT AXLE

#### 98. Description and Data

*a. Description.* The front axle assembly is bolted directly between the center tubular frame members, connecting it to the rear axle, and the front support tubes supporting the front end of the platform as shown in figure 61. The axle incorporates no differential, conducting torque from the driven gear to the wheels through a spur gear reduction and universal joint at each end of the axle. The steering arms are integral with the steering knuckles. Bearings for the steering front bellcrank are incorporated in the gear carrier assembly (center housing).

##### *b. Data.*

Make \_\_\_\_\_ Spicer  
 Type \_\_\_\_\_ Inverted drop center  
 Lubricant capacity for bevel gears 6 oz  
 Universal joints:  
   Make \_\_\_\_\_ Bendix  
   Size \_\_\_\_\_ Large—3 $\frac{1}{8}$  in.  
   Maximum turning angle \_\_\_\_\_ 27 deg  
 Lubricant capacity for drop gears 12 oz per joint

#### 99. Front Axle Replacement

*a. Coordination.* Refer to paragraph 2 for information on coordination with ordnance maintenance unit.

##### *b. Removal.*

- (1) Position vehicle upside down and support on suitable blocking.
- (2) Remove five hex nuts, lockwashers and plain washers securing each wheel to wheel hub, and remove wheels.
- (3) Remove four hex-head screws (fig. 58) and lockwashers securing front end of propeller shaft to brakedrum, and swing to one side out of way.

- (4) Remove two cotter pins and hex nuts securing outer ends of tie rods (fig. 62) to arms on steering knuckles, and remove tie rod ends from arms. Remove nut and clamp bolt from bellcrank lower arm (fig. 63), pull arm with tie rods off bellcrank. Remove woodruff key from bellcrank.
- (5) Unhook brake return spring (fig. 58) from clevis pin in brake lever and bracket on left tube, and remove clevis pin securing handbrake flexible linkage to brake lever. Remove cotter pin and clevis pin connecting footbrake rear flexible linkage to brake lever.
- (6) Remove eight locknuts, and hex nuts from bolts securing front axle between flanges of frame tubes (fig. 61) and front support tubes. Remove handbrake flexible linkage support bracket from upper inside bolt on left side. Support axle, remove the eight bolts from flanges and axle, and lift axle away from frame, while pushing front bellcrank (fig. 63) out of bearings in front axle. Remove gaskets installed between axle housing and flanges on frame tube and front support tube.

##### *c. Installation.*

- (1) Position vehicle upside down on suitable blocking. Support front axle with hoist and slowly lower into position between flanges of frame tubes (fig. 61) and front support tubes, at the same time pushing front bellcrank (fig. 63) into its bearings in front axle. Install gaskets between flanges of left frame

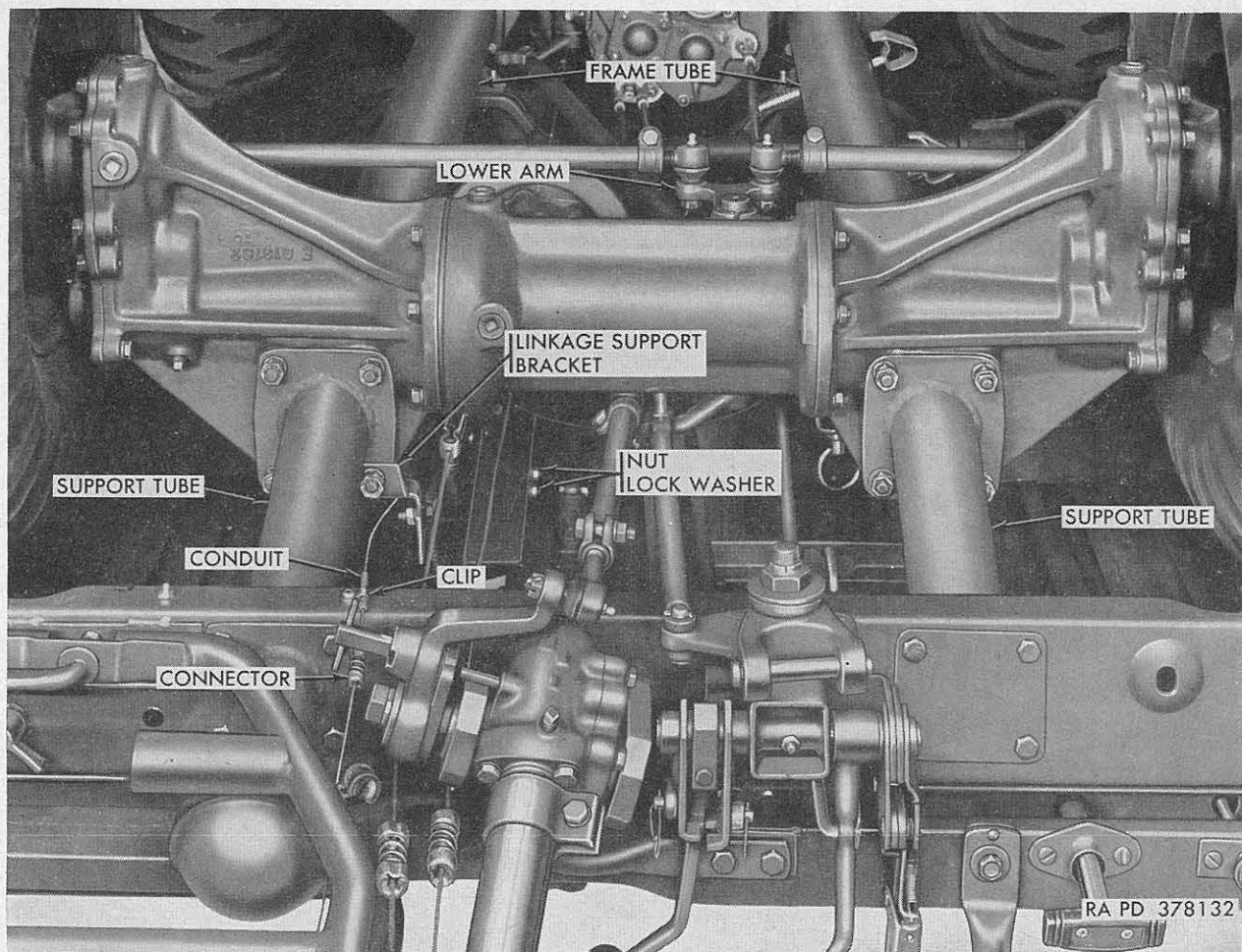


Figure 61. Front axle installed in vehicle.

tubes and axle. Push eight  $\frac{7}{16}$ -20NF x  $3\frac{1}{2}$  hex-head bolts through flanges (fig. 61) and axle from rear. Position handbrake flexible linkage support bracket on the top inside bolt on left side of vehicle. Install lockwashers,  $\frac{7}{16}$ -20NF hex nuts, and locknuts on bolts.

- (2) Position clevis on end of footbrake rear flexible linkage (fig. 58) on lower hole in brake lever and install  $\frac{5}{16}$  x  $2\frac{7}{32}$  clevis pin and  $\frac{3}{32}$  x  $1\frac{1}{2}$  cotter pin. Position clevis on end of handbrake flexible linkage on upper hole in brake lever and install  $\frac{5}{16}$  x  $2\frac{7}{32}$  clevis pin. Hook brake return spring into hole in clevis pin and hole in bracket on left frame tube.
- (3) Install No. 8 woodruff key in keyway

near lower end of bellcrank (fig. 63). Push steering bellcrank lower arm (with tie rods on lower side) onto end of bellcrank over woodruff key. Push arm onto bellcrank far enough to remove end play of bellcrank shaft in bearings and secure with  $\frac{3}{8}$ -24NF x 2 clamp bolt, and hex self-locking nut in lower arm. Position outer ends of tie rods (fig. 62) in holes in arms on steering knuckles and secure with  $\frac{3}{8}$ -24NF slotted hex nuts and  $\frac{3}{32}$  x 1 cotter pins.

- (4) Position front end of propeller shaft (fig. 58) against front companion flange in brakedrum, turn drum to aline holes in drum, flange and propeller shaft and install four  $\frac{5}{16}$ -24NF x 1 hex-head screws.
- (5) Position two wheels on wheel hubs and



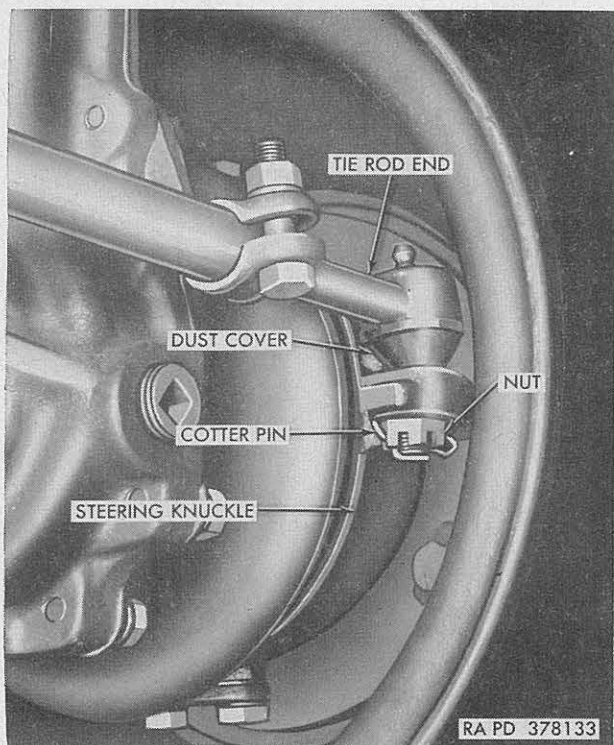


Figure 62. Tie rod and steering knuckle.

secure each wheel with five plain washers, lockwashers, and  $\frac{3}{8}$ -24NF self locking nuts tightened to a torque of 20 to 30 pound-feet.

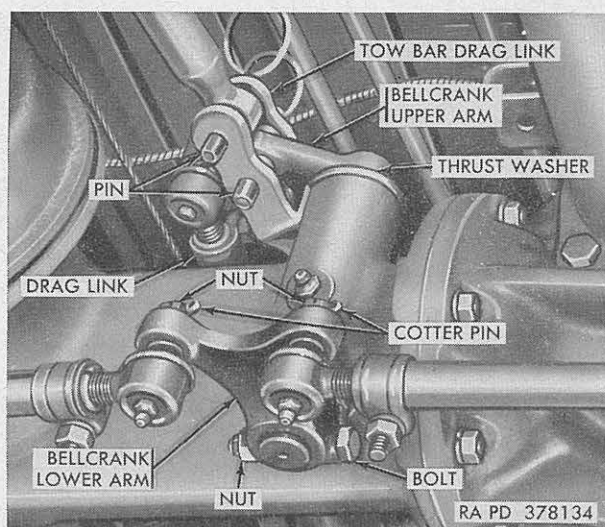


Figure 63. Bellcrank on front axle.

## 100. Breather Replacement (fig. 64)

*a. Removal.* The breather is located on top of front axle gear carrier just in front of brake. To remove breather, unscrew from carrier.

*b. Installation.* Screw breather into tapped hole in top of front axle gear carrier just in front of brake.

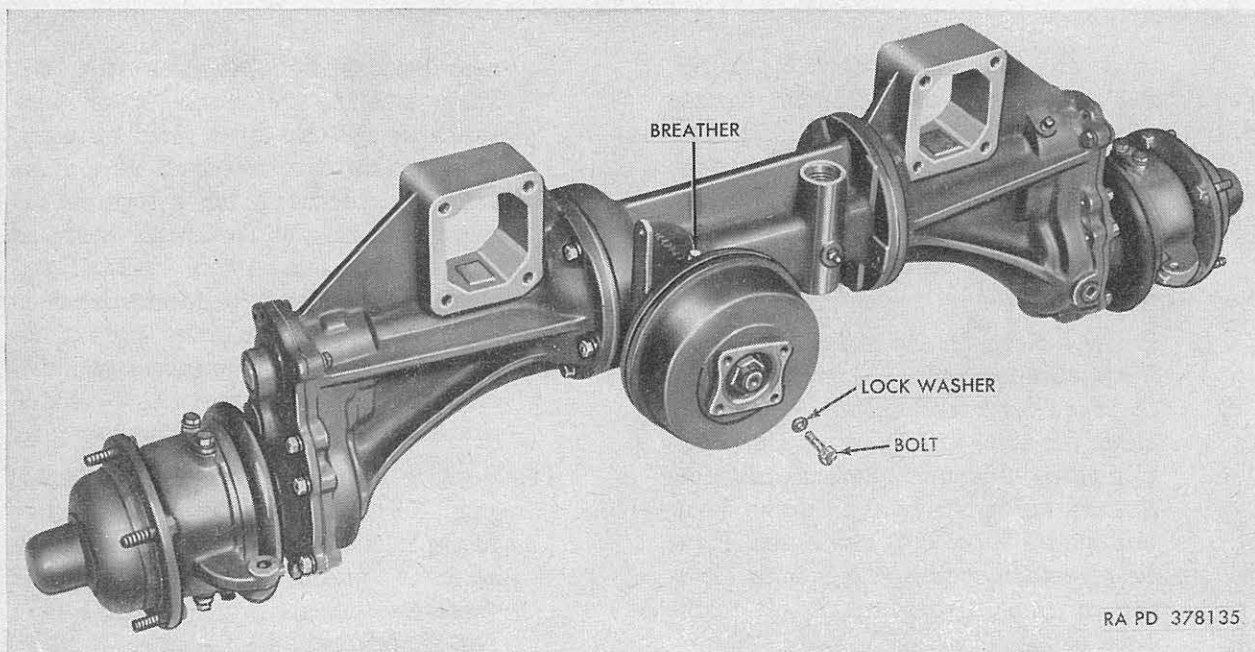


Figure 64. Rear view of front axle removed from vehicle.

## 101. Boot, Universal Joint, and Steering Knuckle Replacement and Repair

### a. Removal.

- (1) Remove five hex nuts (fig. 81), lockwashers and plain washers from studs in wheel hub and remove wheel.
- (2) Pry hubcap off wheel hub (fig. 65) and remove sealing ring from end of hub.
- (3) Remove cotter pin (fig. 65) and hex nut from end of universal joint and pull wheel hub off splines.
- (4) Remove cotter pin and nut securing steering tie rod end (fig. 62) to arm on steering knuckle and drive rod end out of arm.
- (5) Remove screw (fig. 66) and nut securing steering boot clamp and remove clamp from boot.
- (6) Remove four hex nuts (fig. 66) and lockwashers from studs securing steering pivot pins in steering knuckle. Pull pins out of steering knuckle being careful to keep each set of shims with the pins on which they were originally installed. Slip outer end of steering boot off inner end of knuckle and remove knuckle from steering knuckle cover, being careful not to lose bearing cones and rollers which may drop out when

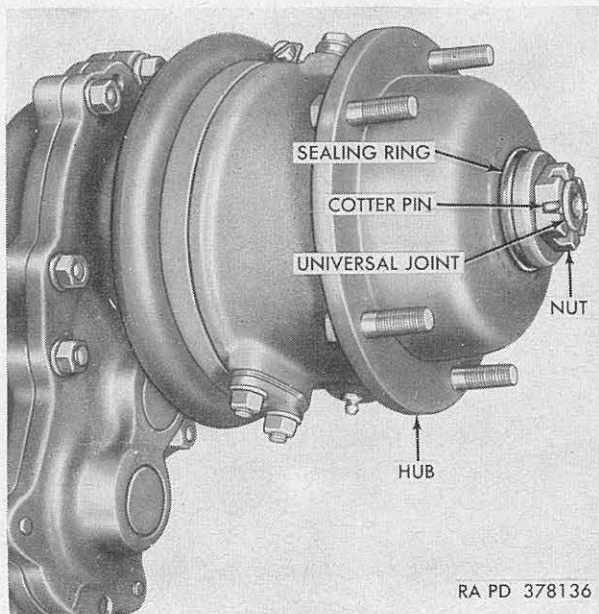


Figure 65. End of axle with wheel and hubcap removed.

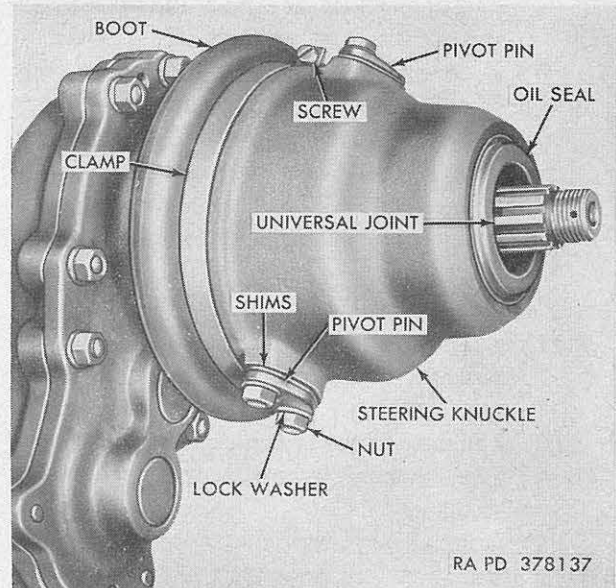


Figure 66. End of axle with hub removed from universal joint.

knuckle is removed. Remove two bearing cones and rollers from cups in knuckle cover (fig. 67).

- (7) Pull universal joint (fig. 67) out of gear in axle housing and remove driven gear sleeve bearing (spacer) from between joint and gear.
- (8) If necessary to remove dust and moisture seal boot (fig. 67), cut wire se-

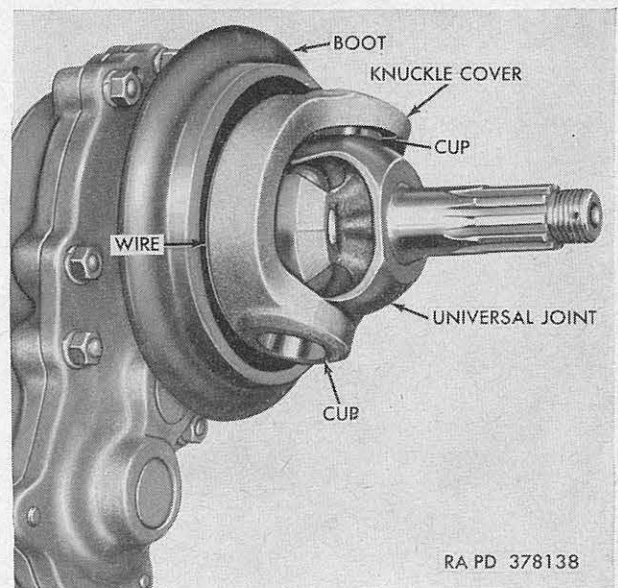


Figure 67. End of axle with steering knuckle removed showing knuckle cover and universal joint.



curing boot to steering knuckle cover and carefully work boot off of cover.

- (9) If necessary, press the two bearing cups (fig. 67) out of steering knuckle cover.
- (10) If necessary, remove spirollox retaining ring (fig. 68) securing bearing and oil seal (figs. 67 and 68) in steering knuckle and press bearing and seal out of knuckle.

#### b. Repair.

- (1) Examine steering knuckle for cracks or distortion and replace knuckle if any are found.
- (2) Examine threads for damaged. If damaged either rethread or replace the knuckle.
- (3) Remove any burrs found on corners of machined surfaces with a fine file.

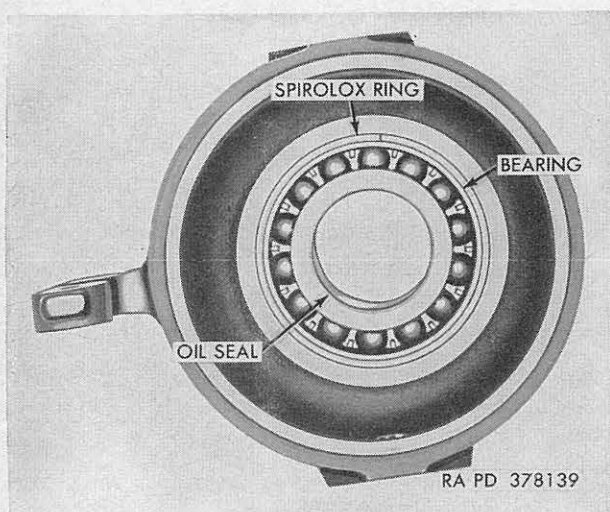


Figure 68. Inside of steering knuckle showing spirollox ring and oil seal.

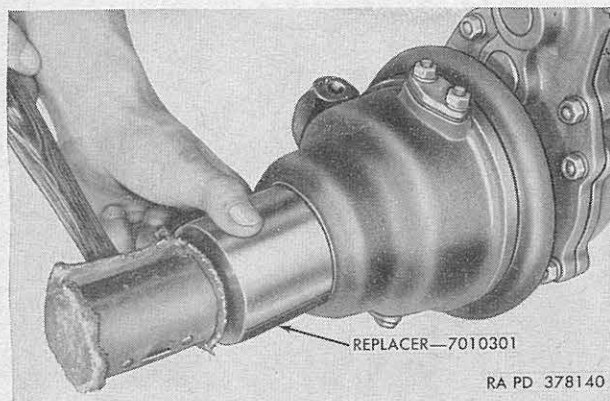


Figure 69. Installing seal in steering knuckle using tool 7010306.

#### c. Installation.

- (1) If bearing (fig. 68) and oil seal were removed from steering knuckle, position new seal (felt end first) in bore of knuckle and press in with special tool 7010306 until seated against shoulder. Position bearing and press into bore until seated against oil seal. Secure seal and bearing with spirollox ring.
- (2) If two bearing cups (fig. 67) were removed from steering knuckle cover, press cups (small bore first) into cover until seated against shoulders.
- (3) If dust and moisture seal boot (fig. 67) was removed, work boot onto steering knuckle cover, large end first, position a length of locking wire around boot and twist ends to secure boot to cover.

*Note.* After twisting ends of wire, drive ends down close to boot so that ends of wire will not puncture boot when knuckle is turned after assembly.

- (4) Position driven gear sleeve bearing (spacer) against gear in axle housing and push universal joint through bearing (spacer) and into splines in gear.
- (5) Fill two bearing cones and rollers with automotive and artillery lubricating grease, GAA, and insert into bearing cups (fig. 67) in steering knuckle cover. Slide steering knuckle (with steering arm to rear) (fig. 66) onto universal joint being careful not to knock the cones and rollers out of the cups. If no new bearing parts are being used, position steering pivot pins in steering knuckle and bearing cones using the same shims between pins and knuckle as were removed at disassembly. Install four  $\frac{5}{16}$ -24NF hex nuts and lockwashers, tightened to a torque of 10 to 15 pound-feet, on studs. If new bearing parts are used the shims installed between the two pivot pins and the steering knuckle should be equal in thickness. Test adjustment as directed in (b) below. If adjustment of steering pivot pins (fig. 66) in steering knuckle is required proceed as follows:

- (a) Install a complete shim set, consisting of one each 0.003, 0.005, 0.010

and 0.030 shims, on each pivot pin, install pins, and tighten nuts.

- (b) Using spring scale in hole in arm on steering knuckle (at right angles to line connecting centerlines of hole and pivot pin) test pull required to turn steering knuckle on bearings. The pull required should be  $3\frac{1}{2}$  pounds at first movement of knuckle.
  - (c) If adjustment is not correct remove equal amounts of shim from both pivot pins, and again test with spring scale.
  - (d) When correct shimming is obtained remove all parts, clean in volatile mineral spirits paint thinner, lubricate, install, and again test preloading with spring scale for correctness.
- (6) Work outer end of steering boot (fig. 66) into annual groove on inner end of

steering knuckle. Position steering boot clamp on outer end of boot and secure by tightening screw and nut.

- (7) With dust cover (fig. 62) installed on stud in steering tie rod end, push stud into hole in arm on steering knuckle from the top and secure with  $\frac{3}{8}$ -24NF slotted hex nut and  $\frac{3}{32}$  x 1 cotter pin.
- (8) Push wheel hub (fig. 65) onto splines on universal joint and secure with  $\frac{7}{8}$ -14NF slotted hex nut and  $\frac{1}{8}$  x  $1\frac{1}{4}$  cotter pin.
- (9) Install sealing ring (fig. 65) in annual groove in wheel hub and tap hubcap onto end of hub.
- (10) Position wheel on wheel hub and secure with five plain washers, lockwashers, and  $\frac{3}{8}$ -24NF self-locking nuts tightened to a torque of 20 to 30 pound-feet.

## Section XIV. REAR AXLE AND TRANSMISSION

### 102. Description and Data

a. *Description.* The rear axle and transmission assembly (fig. 70) is bolted directly between the center tubular frame members, connecting it to the front axle, and the rear tubular frame members, supporting the rear end of the platform. The assembly consists primarily of three assemblies; the rear axle housing assembly, and two axle housings with attached parts. The rear axle housing assembly contains the transmission

and speed range parts necessary to receive power from the clutch and deliver it to the rear axle shafts in any one of the three forward speeds or reverse in either of two speed ranges. The two axle housings carry the rear axle shafts, reduction gearing, universal joints, steering knuckles, etc. necessary to transmit power from the rear axle housing assembly to the two wheel hubs. The two axle housings, universal joint covers, universal joints, steering knuckles, and hubs are exactly the same as those used on the front axle.

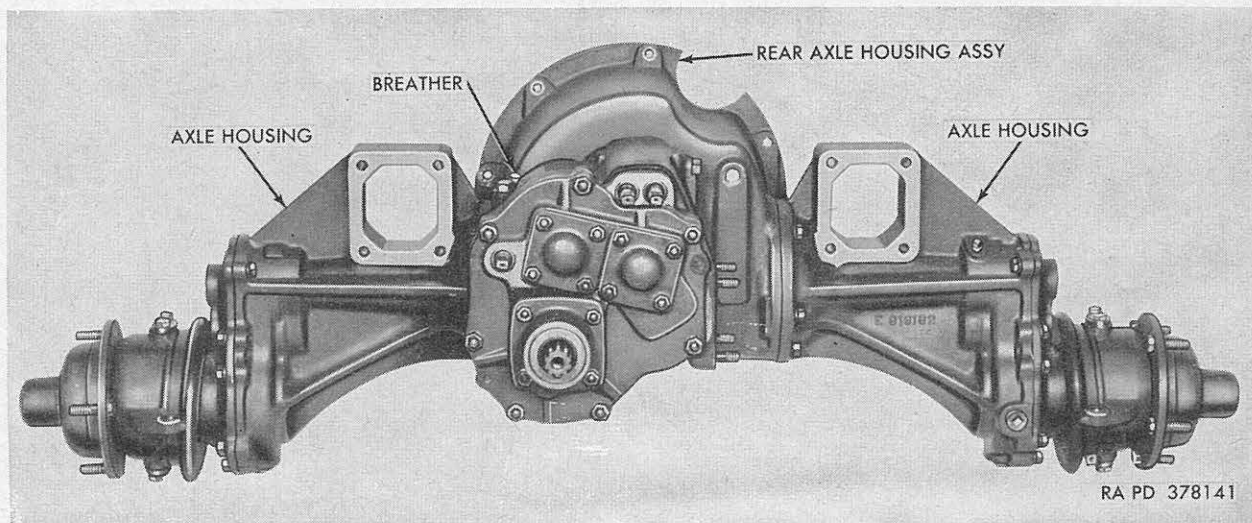


Figure 70. Rear axle transmission assembly.



*b. Data.*

Make	Spicer
Model	SKT-70373
Type	Inverted drop center
Transmission:	
Location	In rear axle housing assy.
Lubricant capacity	2 qt
Speeds and ranges	3 forward, 1 reverse with 2 ranges.
Universal joints:	
Make	Bendix
Size	Large—3 $\frac{3}{8}$ in.
Maximum turning angle	27 deg
Lubricant capacity for drop 12 oz per joint gears, universal joints, bearings.	

### 103. Rear Axle Replacement

*a. Coordination.* Refer to paragraph 2 for information on coordination with ordnance maintenance unit.

*b. Removal.*

- (1) Remove engine (par. 59).
- (2) Remove clutch release bearing, bearing carrier yoke, and clutch control rear cable from transmission housing (par. 65b (2), (3) and (4)).
- (3) Drain lubricant from transmission and install drain plug. Turn vehicle upside down and support with suitable blocking.
- (4) Remove five hex nuts, lockwashers and plain washers securing each wheel to wheel hub, and remove wheels.
- (5) Remove four hex-hd screws (fig. 58) and lockwashers securing front end of propeller shaft to brakedrum, and pull shaft off of shaft of transmission.
- (6) Remove two cotter pins (fig. 62) and hex nuts securing outer ends of tie rods to arms on steering knuckles and remove tie rod ends from arms. Remove cotter pin and clevis pin (fig. 72) securing connecting tie rod to rear bellcrank upper arm, and swing rod to one side. Remove three cotter pins (fig. 71) and clevis pins securing transmission and range control rod rigid linkages to transmission. Remove four nuts (fig.

72) and lockwashers from studs securing rear bellcrank bracket to transmission housing and remove bracket, bellcrank, and tie rods from transmission without further disassembly.

- (7) Remove eight locknuts (fig. 73), seven hex nuts and seven lockwashers from bolts securing rear axle between flanges of frame tubes and rear support tubes. Remove right outside upper bolt which passes through axle and two flanges and is screwed into starter rope pulley housing. Support axle on hoist, remove remaining seven bolts, and lift axle away from vehicle frame. Remove gaskets installed between flanges of left tubes and axle.

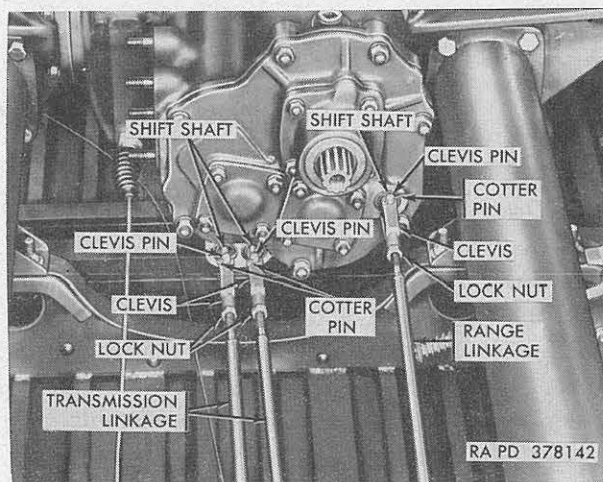


Figure 71. Disconnect points for transmission and Range control rod rigid linkages.

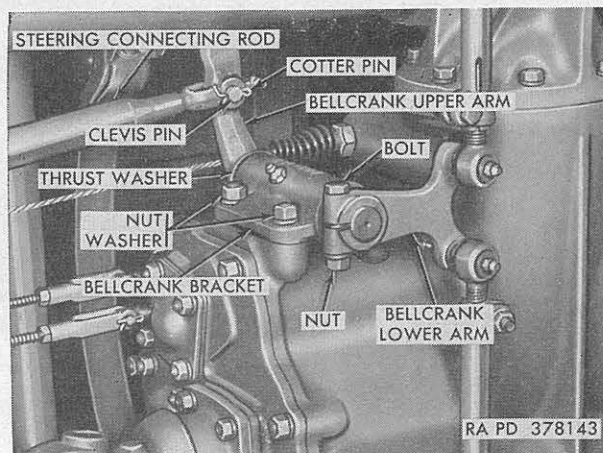


Figure 72. Rear bellcrank bracket.

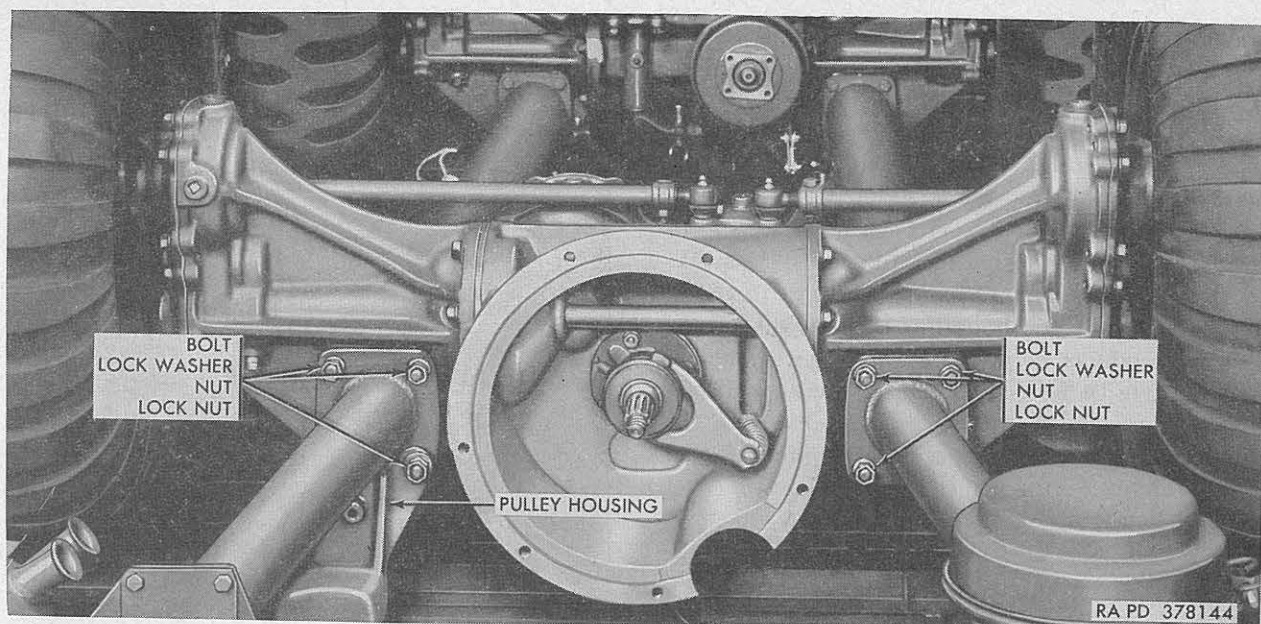


Figure 73. Disconnect points for rear axle.

*c. Installation.*

- (1) With vehicle turned upside down, raise rear axle with hoist and lower to position between flanges of frame tubes and rear support tubes. Install gaskets between flanges of left frame tubes and axle. Push eight  $\frac{3}{8}$ -24NF x  $3\frac{1}{2}$  hex-head bolts (fig. 73) through flange of frame tube, rear axle and flange of rear support. Screw right outside upper bolt into starter rope pulley housing and install locknut. Install  $\frac{3}{8}$ -inch lockwashers, hex nuts and locknuts on remaining seven bolts.
- (2) Position rear bellcrank bracket (fig. 72) with bellcrank and attached tie rods on studs in transmission housing and secure with four  $\frac{3}{8}$ -inch lockwashers and  $\frac{3}{8}$ -24NF hex nuts. Install three  $\frac{5}{16}$  x 1 clevis pins (fig. 71) securing transmission and range control rod rigid linkages to rods of transmission, and secure clevis pins with  $\frac{3}{32}$  x  $\frac{3}{4}$  cotter pins. Position rear end of steering connecting rod (fig. 72) on rear bellcrank upper arm and secure  $\frac{7}{16}$  x  $1\frac{1}{4}$  clevis pin and  $\frac{3}{32}$  x 1 cotter pin. Insert outer ends of tie rods (fig. 62) in holes in arms on steering knuckles and secure each with  $\frac{3}{8}$ -24NF slotted hex nut and  $\frac{3}{32}$  x 1 cotter pin.
- (3) Push rear end of propeller shaft (fig. 59) onto splines of shaft in transmission. Turn brakedrum (fig. 58) to aline holes in drum and companion flange. Position rear end of propeller shaft against companion flange and secure to brake drum with four  $\frac{5}{16}$ -24NF x 1 hex-head screws.
- (4) Position the two wheel hubs and secure each wheel with five plain washers, lockwashers and  $\frac{3}{8}$ -24NF self-locking nuts.
- (5) Install clutch control rear cable, bearing carrier, and clutch release bearing (par. 65c(1), (2) and (3)).
- (6) Remove vehicle from horses and stand on its wheels.
- (7) Install engine (par. 60).
- (8) Fill transmission as directed on lubrication order.

#### 104. Boot, Universal Joint and Steering Knuckle Replacement and Repair

Boots, universal joints and steering knuckles are exactly the same as those on the front axle, and are removed and installed in the same way except that the ends of the arms on the steering knuckles point toward the front when installed. Refer to paragraph 101 for replacement and repair instructions.



## Section XV. BRAKE

### 105. Description and Data

*a. Description.* A single brake (fig. 58) of the internal expanding type is used. It is located on the rear of the front axle. The brake is mechanically operated by either the foot pedal or the hand lever. The brake lining is in four sections, fused to the brake band. Brake adjustment is accomplished by changing the lengths of the flexible linkages connecting the hand and foot levers. Length is changed by screw adjustment at the front end of linkage; or by changing the hole through which clevis on rear end of foot brake linkage is attached to the brake lever.

*b. Data.*

Type	Internal expanding, Mechanical
Number	One
Location	Rear of front axle
Drum diameter	5.5 in.
Lining area	164 sq in.

### 106. Oil Seal and Brake Band Replacement

*a. Removal.*

- (1) Drain lubricant from axle housing. Remove four hex-head screws (fig. 58) and lockwashers securing front end of propeller shaft to brakedrum, and push end of propeller shaft to one side out of the way.
- (2) Unscrew hex nut (fig. 74) from rear end of drive gearshaft and remove plain washer. Pull brakedrum and front companion flange off shaft of drive gear and separate drum and flange.
- (3) Remove band locating spring (fig. 75) from between brake band and right prong on brake support plate. Remove brake actuating cam. Spring brake band off support plate.
- (4) Pull actuating cam (fig. 76) off brake support plate and from between ends of brake band. Remove four nuts and lockwashers, and remove oil slinger, gasket, brake support plate, and second gasket in order named.
- (5) Work dirt and liquid deflector (fig. 77) off studs and brake lever. Remove gasket.

**Caution:** Do not disturb the pinion

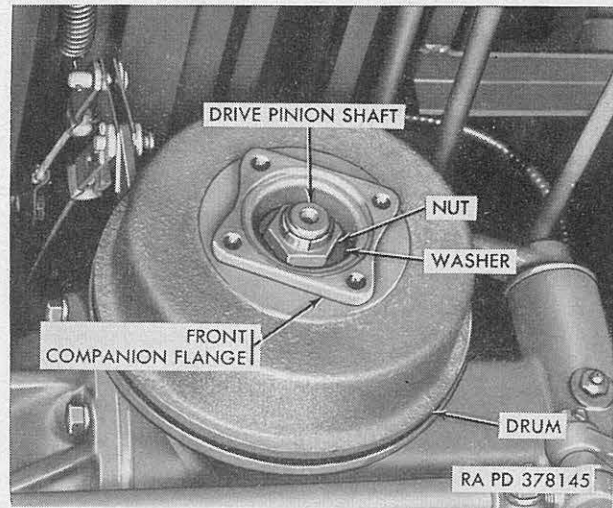


Figure 74. Brake with propeller shaft removed.

bearing retainer plate or shims (fig. 78) located between the deflector and front axle carrier as these control the adjustment of the drive gear.

- (6) Press oil seal (fig. 77) out of dirt and liquid deflector.
- (7) Unhook return spring (fig. 78) from clevis pin connecting handbrake flexible linkage to upper end of brake lever, and remove clevis pin. Remove cotter pin and clevis pin connecting foot brake flexible linkage to lower hole in brake lever and remove lever. Note hole in clevis in which pin is installed for convenience at assembly.

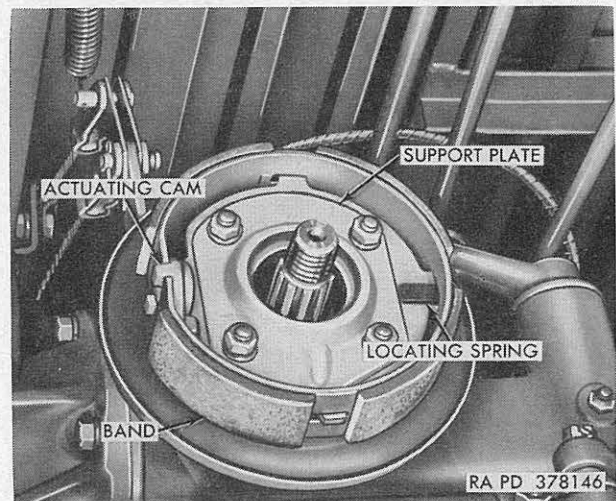


Figure 75. Brake with drum removed.

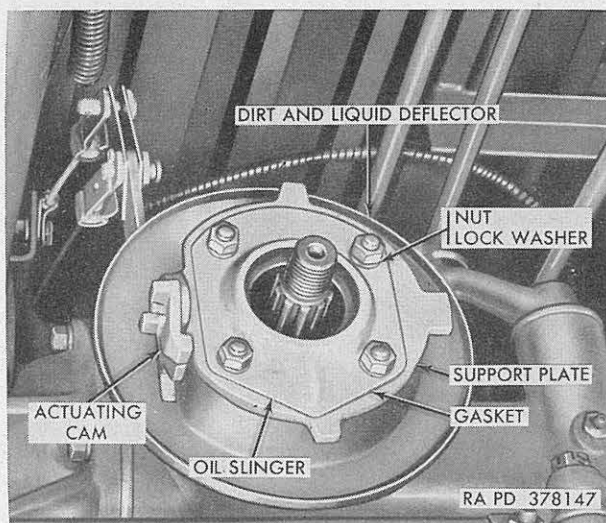


Figure 76. Brake with band removed.

*b. Installation.*

- (1) Secure rear end of footbrake flexible linkage at brake lever lower hole (fig. 78) with  $\frac{5}{16} \times 2\frac{7}{32}$  clevis pin and  $\frac{3}{32} \times \frac{1}{2}$  cotter pin. Secure rear end of handbrake flexible linkage to top hole in brake lever with  $\frac{5}{16} \times 2\frac{7}{32}$  clevis pin and hook return spring into hole in clevis pin.
- (2) Press new oil seal (fig. 77) into dirt and liquid deflector, making sure lip of seal is toward large, or front, end of deflector.
- (3) Position dirt and liquid deflector (fig. 77), with oil seal, on studs of front axle

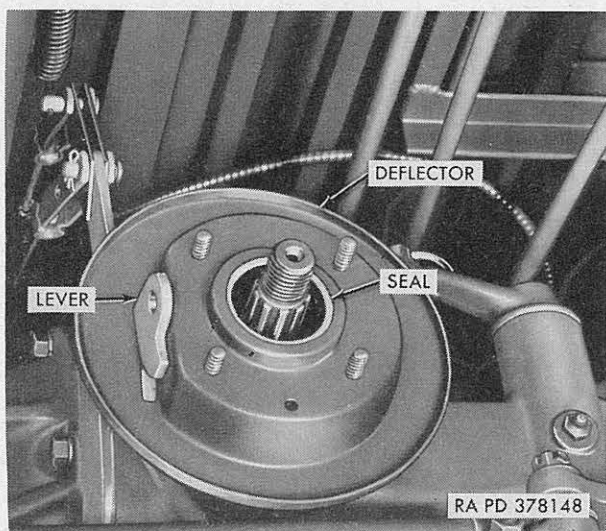


Figure 77. Brake lever, and dirt and liquid deflector.

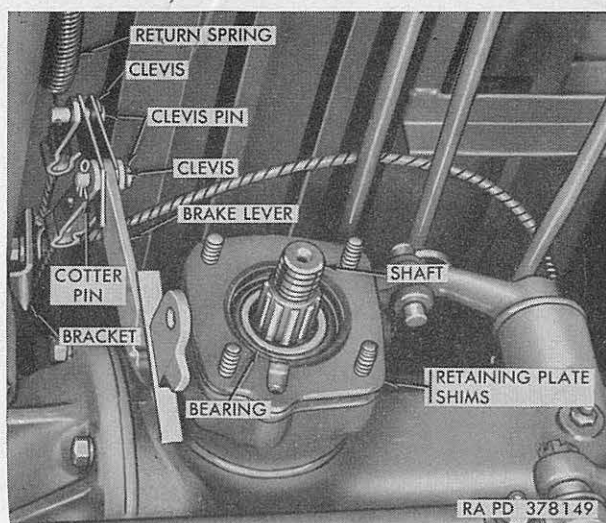


Figure 78. Shaft bearing and adjusting shims after removal of brake.

carrier with brake lever through slot in deflector. Install gasket (fig. 76) on studs against deflector. Work brake support plate into hole in end of brake lever and onto studs. Position gasket and oil slinger on studs against support plate and secure with four  $\frac{3}{8}$ -inch lockwashers and  $\frac{5}{16}$ -24NF hex nuts.

- (4) Spring brake band (fig. 75) onto prongs of brake support plate, and install band locating spring between right prong and band. Spread ends of band slightly and install actuating cam on left prong of support plate and between ends of brake band.
- (5) Push front companion flange (fig. 74) into brakedrum from rear face, and slide drum and flange over brake band and onto drive gearshaft. Secure flange with plain washer and hex self-locking nut on end of shaft.
- (6) Aline holes in brakedrum and front companion flange, position flange on front end of propeller shaft against companion flange and secure with four  $\frac{5}{16}$ -24NF x 1 hex-head screws (fig. 58) and lockwashers.

## 107. Footbrake Flexible Linkage Replacement

### *a. Front Flexible Linkage.*

- (1) *Removal.* Disconnect front flexible linkage from coupling (fig. 79) just forward of front edge of platform.



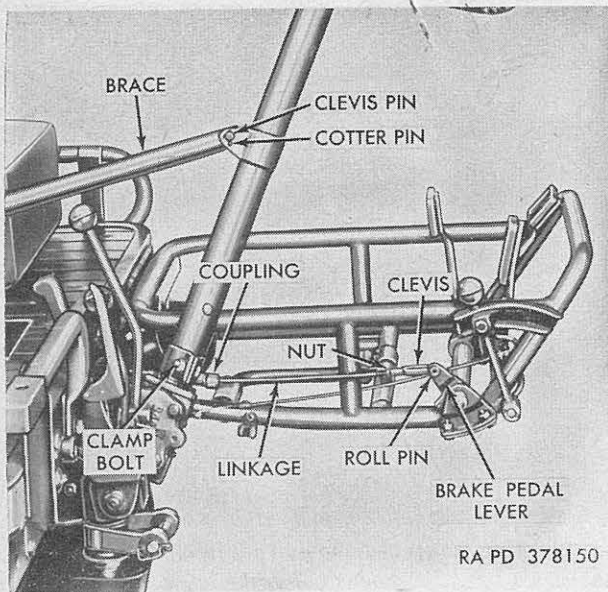


Figure 79. Footbrake front control flexible linkage.

Drive out roll pin securing clevis on front end of linkage to brake pedal lever.

- (2) *Installation.* Position clevis (fig. 79) on front end of front flexible linkage on brake pedal lever and install  $\frac{1}{4} \times \frac{5}{8}$  roll pin. Install ball on rear end of front flexible linkage in coupling on front end of rear flexible linkage.
- (3) *Adjustment.* The total length of front and rear flexible linkages when installed must be so adjusted that when brake lever and brake pedal are in extreme rear position there is no slack in linkages. Adjustment may be made by loosening nut (fig. 79) on front linkage and turning threaded end of cable in clevis, by changing the hole used in the clevis on rear end of rear linkage, or by both.

#### b. Rear Flexible Linkage.

- (1) *Removal.* Disconnect rear flexible linkage from coupling (fig. 79) on rear end of front flexible linkage. Remove cotter pin (fig. 78) and clevis pin connecting clevis on rear end of rear flexible linkage to brake lever, and pull linkage out of guide in bed support front crossmember. Note hole from which clevis pin is removed for convenience at assembly.

- (2) *Installation.* Push front end of flexible linkage through guide in bed support front crossmember from the rear. Install ball on front end of linkage in coupling (fig. 79) on rear end of front flexible linkage. Pull clevis on rear linkage back to remove slack, position clevis on lower hole in brake lever (fig. 78) and install  $\frac{5}{16} \times \frac{27}{32}$  clevis pin and  $\frac{3}{32} \times \frac{1}{2}$  cotter pin securing clevis to lever.
- (3) *Adjustment.* Adjust length of linkages as directed in a (3) above.

### 108. Handbrake Flexible Linkage Replacement

a. *Removal.* Remove safety pin and clevis pin (fig. 80) securing clevis on front end of handbrake flexible linkage to handbrake lever. Remove retracting spring (fig. 78) and clevis pin connecting clevis on rear end of linkage to upper hole in brake lever. Remove two hex nuts, washers and hex-head bolts securing clamps on ends of conduit to conduit support bracket (fig. 56) on bed support front crossmember and bracket (fig. 78) attached to front axle. Pull linkage to rear of crossmember and remove from vehicle.

b. *Installation.* Push front end of hand brake flexible linkage through hole in bed support front crossmember. Position clevis on rear end of linkage at upper hole in brake lever and install  $\frac{5}{16} \times \frac{27}{32}$  clevis pin (fig. 78). Install retracting spring

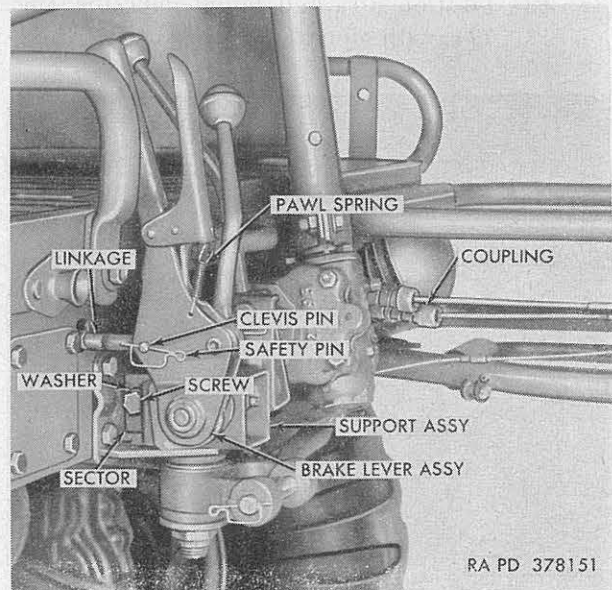


Figure 80. Disconnect points for brake control flexible linkages.

between hole in clevis pin and hole in tube bracket. Secure clamp and rear end of conduit to bracket secured to rear axle with  $\frac{5}{16}$ -24NF x 1 hex-head bolt, lockwasher and hex nut. Secure clamp and front end of conduit to conduit support bracket (fig. 56) on front crossmember with  $\frac{5}{16}$ -24NF x 1 hex-head bolt, lockwasher and hex nut. Loosen nut securing clevis on front end of linkage (fig. 80) and adjust clevis to aline with hole in handbrake lever when lever is in extreme rear position. Install clevis pin securing clevis to lever and secure clevis pin with safety pin. Tighten nut against clevis.

### 109. Handbrake Lever

*a. Removal.* Remove hex-head screw (fig. 80) and lockwasher securing the sector to brake and shift lever support assembly. Remove safety pin from cotter pin securing handbrake flexible link-

age to brake lever and remove cotter pin. Pull handbrake lever assembly off shaft in support assembly.

*b. Repair.* The handbrake lever (fig. 80) assembly is welded and riveted together, the pawl spring being the only part which can be replaced without destroying other parts. To replace pawl spring unhook ends from body and finger grip and remove from assembly. Hook a new spring in place with the longer end hooked into finger grip.

*c. Installation.* Push handbrake lever assembly (fig. 80) onto shaft in support assembly, with hole in sector alined with threaded hole in support. Secure sector to support with  $\frac{3}{8}$ -16NC x  $\frac{7}{8}$  hex-head screw and lockwasher. Position clevis on front end of handbrake flexible linkage in alinement with hole in brake lever and install clevis pin and safety pin.

## Section XVI. WHEELS, HUBS, AND TIRES

### 110. Tire Replacement

#### *a. Removal.*

- (1) Raise the wheel so tire clears ground.
- (2) Remove wheel hub bolt nuts and lift tire and wheel off hub.
- (3) Place tire and wheel on ground with outside up, and completely deflate by removing valve core.
- (4) Using tire remover, break bead from rim, stand on tire to force rest of bead loose from rim. Turn tire and wheel over and repeat procedure to break inner bead loose from rim.
- (5) Insert two tire tools about eight inches apart between outside bead and rim flange near valve and pry short lengths of bead over rim flange. Then leave one tool in position and follow around rim with other tool until bead is completely free of rim. If in prying bead over the flange too much force is required, it is an indication that the bead is not down in the well on the opposite side of the rim. Inside of each tire bead is a loop of wire which must not be broken or unnecessarily strained.

**Caution:** Be careful not to pinch tube with tire tools. Do not damage soft rubber tip at toe of bead in prying

bead over rim flange. Do not attempt to remove both beads at the same time.

- (6) Remove tube.

- (7) Stand wheel in upright position with inside bead in well of rim at bottom. Insert tire tool between inside bead and rim flange at top side of wheel and pry wheel out of tire.

#### *b. Installation.*

- (1) Inflate tube until slightly rounded out and insert in tire.
- (2) Before installing tire and tube on wheel, soap the exposed surface of tube, tire beads, and inside of casing one inch from the beads, with a mixture of vegetable oil soap and water.

*Note.* Do not allow soapy water to run into tire crown.

- (3) Place wheel on floor with outside face of wheel up.
- (4) With valve side of tire up and valve located at valve hole in wheel rim, place inner tire bead in rim well and pry inner tire bead over outer wheel rim using tire iron.
- (5) Pull valve stem through hole in rim, start opposite side of outer tire bead over outer wheel rim, and press bead completely into bottom of rim well.



Using tire irons, carefully pry bead over wheel rim advancing both ways toward valve so that bead goes over the rim at the valve last.

**Caution:** Be careful not to pinch the tube or damage soft rubber lip on bead with tire tools.

- (6) Pull valve out through hole in rim so that valve base seats firmly on inner surface of rim, at the same time centering the valve, and inflate tire to recommended 12 psi pressure so as to properly seat tire beads.

- (7) Deflate tube completely; then inflate to recommended pressure of 12 psi for usual terrain, or 7 psi for mud or snow.

*Note.* This step is extremely important to insure smooth uniform distribution of the tube in the casing.

- (8) Position wheel and tire assembly on wheel hub bolts and install five  $\frac{3}{8}$ -inch plain washers and self-locking nuts tightened to a torque of 20 to 30 pound-feet.

- (9) Remove jack or blocking.

### 111. Tube Replacement

*a. Removal.* Remove tube following directions given in paragraph 110a(1) through (6).

*b. Repair.* Refer to TM 9-1870-1 for instructions for repairing inner tubes.

*c. Installation.*

- (1) Inflate tube until slightly rounded out and insert in tire
- (2) Soap the exposed surface of tube, tire beads, and inside of casing one inch from the beads, with a mixture of vegetable oil soap and water.

*Note.* Do not allow soapy water to run into tire crown.

- (3) Pull valve stem through hole in rim, start opposite side of outer tire bead over outer wheel rim, and press bead completely into bottom of rim well. Using tire irons, carefully pry bead over wheel rim advancing both ways toward valve so that bead goes over the rim at the valve last.

**Caution:** Be careful not to pinch the tube or damage soft rubber lip on bead with tire tools.

- (4) Pull valve out through hole in rim so that valve base seats firmly on inner surface of rim, at the same time centering the valve, and inflate tire to recommended 12 psi pressure so as to properly seat tire beads.

- (5) Deflate tire completely; then inflate to recommended pressure of 12 psi for usual terrain, or 7 psi for mud or snow.

- (6) Position wheel and tire assembly on wheel hub bolts and install five  $\frac{3}{8}$ -inch plain washers and self-locking nuts.

- (7) Remove jack or blocking.

### 112. Wheel Replacement

*a. Removal.* Remove wheel and tire from vehicle, and wheel from tire as directed in paragraph 110a.

*b. Installation.* Install tire on wheel, and wheel and tire on vehicle as directed in paragraph 110b.

### 113. Wheel Hub Replacement

*a. Removal.*

- (1) Raise wheel off ground, remove five nuts (fig. 81) and plain washers, and pull wheel and tire from wheel hub.
- (2) Pry hubcap (fig. 81) off hub.
- (3) Remove cotter pin (fig. 65) and nut from end of universal joint, and pull

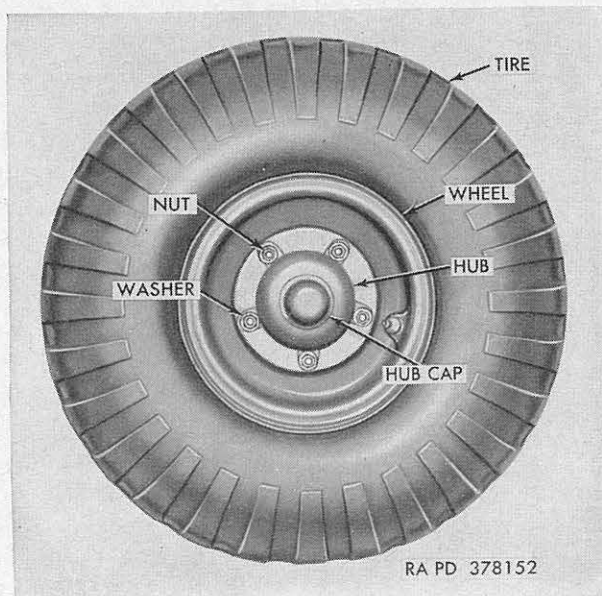


Figure 81. Wheel, hub and tire.

hub off splines of joint. Remove hubcap sealing ring from hub.

*b. Installation.*

- (1) Push hub (fig. 65) onto splines of universal joint and secure with  $\frac{7}{8}$ -14NF slotted hex nut and  $\frac{1}{8} \times 1\frac{1}{4}$  cotter pin. Install hubcap sealing ring in annular groove in hub.
- (2) Press hubcap onto end of hub.
- (3) Position wheel (fig. 81) and tire on

wheel hub and secure with five  $\frac{3}{8}$ -inch plain washers and self-locking nuts.

## 114. Seal Replacement

*a. Removal.* Pry hubcap (fig. 81) off of hub. Remove sealing ring (fig. 65) from annular groove in hub.

*b. Installation.* Install sealing ring (fig. 65) in annular groove in hub. Press hubcap into place on hub.

## Section XVII. STEERING SYSTEM

### 115. Description and Data

*a. Description.* The steering system (fig. 82) includes all parts from the steering wheel to the four steering tie rod ends which fasten to the arms of the steering knuckles, and to the tow bar bellcrank secured to the brake and shift lever support. The steering gear with shaft tube and steering wheel is held by trunnion supports secured to the frame support front crossmember, and by the shaft tube brace which anchors the shaft tube to the platform. A locking plate and steering arm are mounted on the end of the steering gearshaft. A locking pin in the steering arm serves to disconnect the steering gear and wheel when the vehicle is being towed. This eliminates movement of the steering wheel when the front wheels are turned by the tow bar when towing. There are two drag links, one connecting the front bellcrank to the steering arm and the other connecting the front bellcrank to the tow bar bellcrank. The latter serves to swing the wheels in relation to movement of the tow bar from side to side. The steering connecting rod allows the selection of either two- or four-wheel steer as desired. With the front end of the steering connecting rod attached to the rear end of the drag link by a removable pin, four-wheel steer is provided. With the front end of the steering connecting rod attached to the anchor on the right frame tube by the removable pin, the steering knuckles on the rear axle are prevented from turning on the pivot pins and the vehicle is in two-wheel steer. The rear end of the steering connecting rod is attached to the rear bellcrank. Motion of the front and rear bellcranks is transmitted to the front and rear steering knuckles through four tie rods. These tie rods are ad-

justable and provide the adjustment necessary for proper wheel alinement.

*b. Data.*

Make	Ross
Type	Special bevel gear
Ratio	5.94 to 1
Steerable wheels	2 or 4 as desired
Steering wheel	3 spoke, 17.25 in. dia
Tow-in	$\frac{1}{8}$ in.

### 116. Tie Rod Replacement and Repair

*a. Removal.* Remove two cotter pins and slotted hex nuts securing tie rod sockets to arm on steering knuckle (fig. 62) and bellcrank lower arm (fig. 63). Drive sockets out of tapered holes in knuckle and arm with soft hammer. Remove remaining three tie rods in the same manner.

*b. Repair* (fig. 83).

*Note.* The four tie rods and the drag link are the same except for the sleeves which are different in length. Sleeves for right front and left rear tie rods are 9.95 inches long, for left front and right rear tie rods 16.45 inches long, and for drag link 11.38 inches long. Repair operations on all five items are the same.

- (1) Examine dust covers on tie rod ends and replace if torn, stretched or otherwise damaged.
- (2) If ball in tie rod end is not held firmly in socket replace entire tie rod end. Examine threads of nut and ball stud and replace entire tie rod end if damaged. Examine threads on shaft of tie rod end and, if damaged, either rethread with die or replace entire tie rod end. If shaft of tie rod is bent, either straighten or replace entire tie rod end. Replace lubricating fitting if it is damaged.



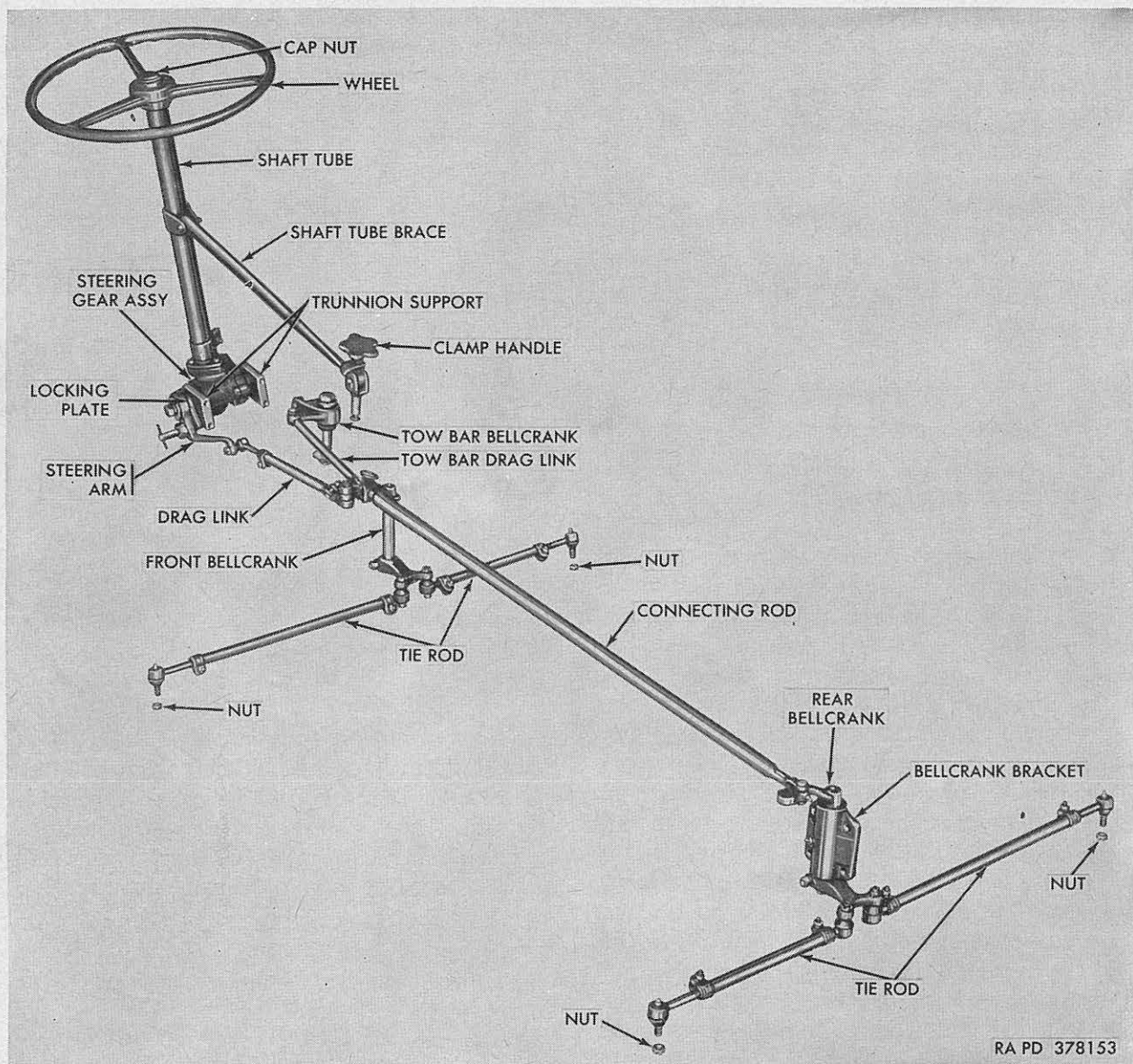


Figure 82. Steering system removed from vehicle.

- (3) Examine clamps, bolts, and nuts and replace damaged parts as required.
- (4) Examine sleeve for bends. If bent straighten or replace as required.

c. *Installation.* With dust covers installed, push ball stud of long tie rod end into hole in arm on steering knuckle (fig. 62), and stud of short tie rod end into hole in bellcrank lower arm (fig. 63). As holes are tapered, studs must go into bellcrank lower arm from bottom, and into steering knuckle from the top. Secure studs with  $\frac{3}{8}$ -24NF slotted hex nuts, tightened to a torque of 20 to 30 pound-feet, and  $\frac{3}{32}$  x 1 cotter pins.

d. *Adjustment* (fig. 82). Any overhaul or repair work which might change the lengths of any of the tie rods or the drag link will require a complete adjustment of the steering system. With all parts of the system installed adjustment is accomplished as follows:

- (1) Raise vehicle on blocks so that all four wheels just clear the ground.
- (2) Check to see that lockpin (fig. 84) in steering arm is pulled out to disconnect steering gear, and locked with handle in vertical position as shown in figure 84.

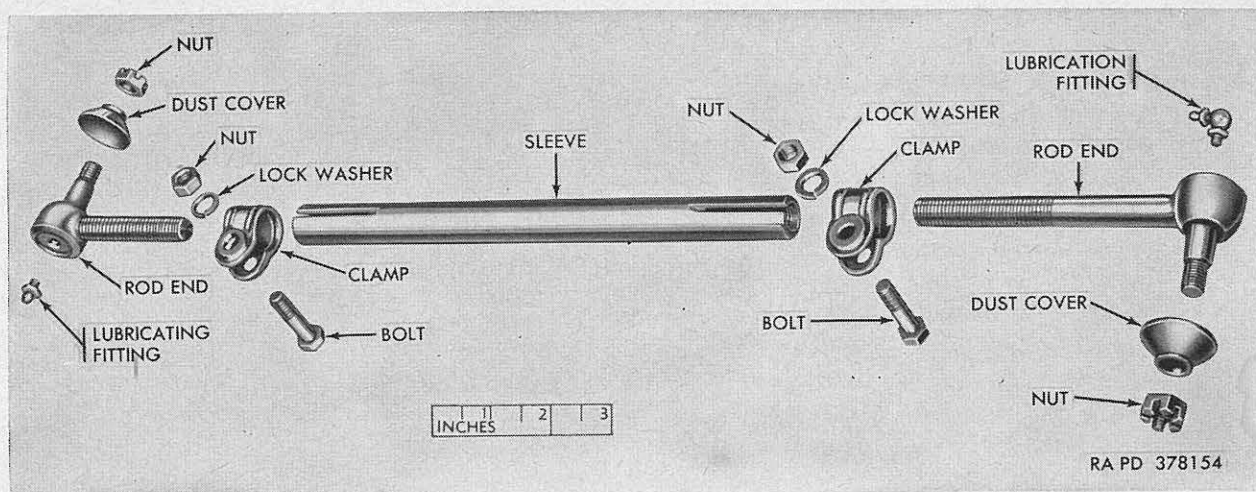


Figure 83. Tie rod—exploded view.

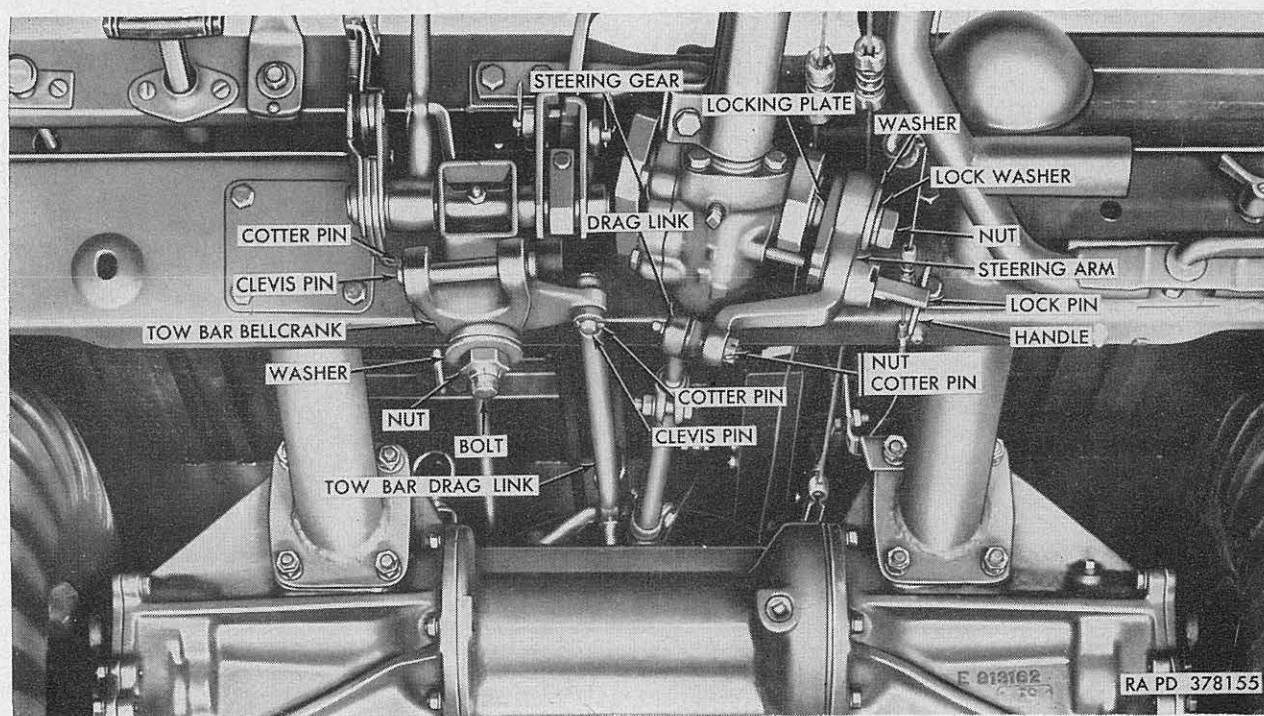


Figure 84. Steering gear and arm showing lockpin pulled out to disconnect steering arm from locking plate.

- (3) Check to see that steering connecting rod is installed between anchor on right frame tube and rear bellcrank upper arm.
- (4) Clean dirt from all four tires and chalk center of treads. Rotate wheels and scribe the centerline of the tread in the chalk with a suitable marking tool.
- (5) Loosen the clamp bolts on all four tie rods and drag link.
- (6) Place a straight edge against the outside of the front and rear tires on one side of the vehicle, and adjust the rear tie rod on this side to give the rear wheel  $\frac{1}{16}$ -inch toe-in as measured between the straight edge and the scribed centerline at the front and rear of the tire. Adjust the toe-in of the other rear wheel in the same manner. Check



adjustment by measuring distance between scribed lines at front and rear of wheels. The measurement should be one-eighth of an inch less at front than at rear. When correct tighten the four clamp bolts on rear tie rods.

- (7) Remove front end of steering connecting rod from anchor on frame tube and connect to rear end of tow bar drag link.
- (8) Adjust the toe-in of the front wheels in the same way that rear wheel toe-in was adjusted ((6) above).

**Caution:** To secure correct adjustment of front wheel toe-in the adjustment must be made with the rear wheels held exactly in the same position as they were in when the connecting rod was attached to the anchor.

- (9) Loosen clamp handle on shaft tube brace and pull steering wheel back until the outer tube of the brace reaches the end of its motion on the inner tube. Move wheel forward until there is about 1/4-inch clearance at the rear end of the outer tube and tighten clamp handle.
- (10) Turn the steering wheel as necessary to position it at the center point of its travel.

*Note.* If the locking plate has been correctly installed on the steering gear the notch in the edge of the plate (figs. 85 and 89) will be aligned with the pin in the steering housing when the steering wheel is at center point of its travel.

- (11) With the steering wheel (fig. 82) in center point of its travel as described in (10) above, and wheels in straight ahead position as described in (6), (7), and (8) above, adjust sleeve on drag link as necessary to allow lockpin (fig. 85) to enter rear hole in locking plate as shown. Tighten the two clamp bolts on drag link.

## 117. Bellcrank Bearing Replacement

### a. Removal of Front Bellcrank Bearings.

- (1) Remove nut (fig. 63) and clamp bolt securing bellcrank lower arm to bellcrank upper arm, pull lower arm off upper arm and remove woodruff key.
- (2) Remove cotter pin and nut securing

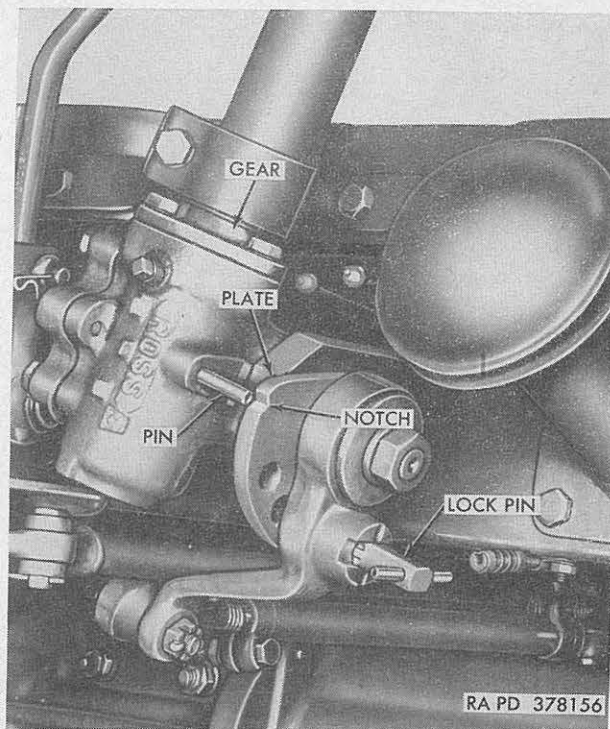


Figure 85. Position of steering gear, locking plate, and lockpin at final adjustment of steering system.

rear end of drag link (fig. 82) to end of bell crank upper arm (fig. 63) and press stud in end of link out of arm. Pull out pin connecting rear end of tow bar drag link to bellcrank upper arm and swing link off end of arm. Lift bellcrank upper arm out of needle bearings in front axle.

- (3) Drive needle bearings and seals out of bore in front axle with suitable drift.

### b. Installation of Front Bellcrank Bearings.

- (1) Using steering bellcrank bearing replacer 7010301 (figs. 1 and 86) install needle bearings in ends of bore in front axle, and install seals at outer ends of bearings. Seals are installed lip out to prevent entrance of water or dirt.
- (2) With thrust washer (fig. 63) installed on front bellcrank upper arm, push arm through bearings in front axle from top. Position fork in rear end of tow bar drag link in alignment with inner hole in bellcrank upper arm and install pin. Install ball stud on rear end of drag link in hole in end of bellcrank upper

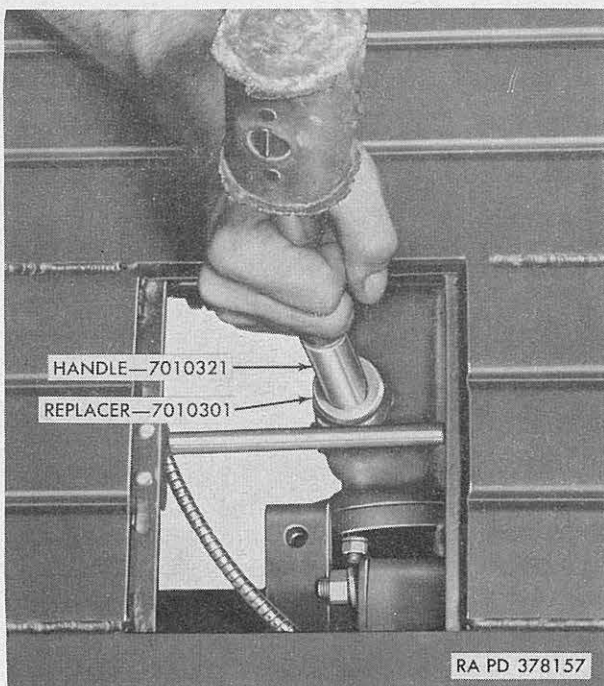


Figure 86. Installing front steering bellcrank bearing with replacer 7010301.

arm from underside and secure with  $\frac{3}{8}$ -24NF slotted hex nut and  $\frac{3}{32}$  x 1 cotter pin tightened to a torque of 20 to 30 pound-feet.

- (3) Install No. 8 woodruff key in lower end of bellcrank upper arm (fig. 63), push bellcrank lower arm over key and onto upper arm, and secure with  $\frac{3}{8}$ -24NF x 2 hex-head bolt and self-locking hex nut.

#### c. Removal of Rear Bellcrank Bearings.

- (1) Remove nut (fig. 72) and clamp bolt securing bellcrank lower arm, and pull lower arm off bellcrank upper arm. Remove woodruff key from upper arm.
- (2) Remove cotter pin (fig. 72) and clevis pin securing rear end of steering connecting rod to bellcrank upper arm, and slide rod off arm. Lift bellcrank upper arm out of bearings in bellcrank bracket.
- (3) Remove four hex nuts and lockwashers securing rear bellcrank bracket to axle housing and remove bracket. Drive needle bearings and seals out of bracket with suitable drift.

#### d. Installation of Rear Bellcrank Bearings.

- (1) Using steering bellcrank bearing replacer 7010301 (fig. 1 and 87) install needle bearings in ends of bore in bellcrank bracket, and install seals at outer ends of bearings. Seals are installed lip out to prevent entrance of water or dirt. Position bracket on left side of housing and secure with four  $\frac{3}{8}$ -inch lockwashers and  $\frac{3}{8}$ -24NF hex nuts.
- (2) With thrust washer (fig. 72) installed on rear bellcrank upper arm push arm through bearings in bellcrank bracket from top. Position fork in rear end of steering connecting rod in alinement

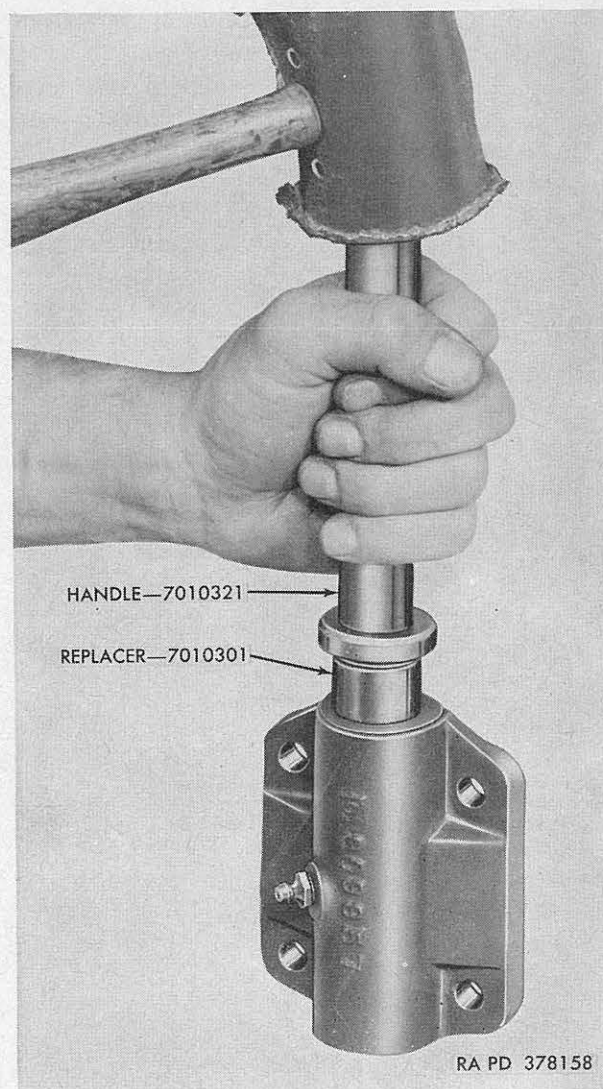


Figure 87. Installing rear steering bellcrank bearing with replacer 7010301.



with hole in upper arm and install  $\frac{7}{16}$  x  $1\frac{1}{4}$  clevis pin and  $\frac{3}{32}$  x  $\frac{7}{8}$  cotter pin.

- (3) Install No. 8 woodruff key in lower end of bellcrank upper arm (fig. 72), push bellcrank lower arm over key onto upper arm and secure with  $\frac{3}{8}$ -24NF x 2 hex-head bolt and self-locking hex nut.

### 118. Drag Link Replacement

*a. Removal.* Remove cotter pins and slotted hex nuts securing ball studs in drag link (fig. 82) ends to front bellcrank upper arm and steering arm. Press studs out of arms and remove drag link from vehicle.

*b. Installation.* Insert ball stud on long end of drag link (fig. 82) into hole in steering arm from right side, and stud on short end into end hole in front bellcrank upper arm from bottom. Secure studs to arms with  $\frac{3}{8}$ -24NF slotted hex nuts and  $\frac{3}{32}$  x 1 cotter pins, tightened to a torque of 20 to 30 pound-feet.

### 119. Tow Bar Drag Link Replacement

*a. Removal.* Remove the two pins connecting tow bar drag link (fig. 88) to steering connecting link and bellcrank upper arm. Remove cotter pin (fig. 84) and clevis pin connecting front end of tow bar drag link (fig. 82) to tow bar bellcrank (fig. 84), and remove tow bar drag link.

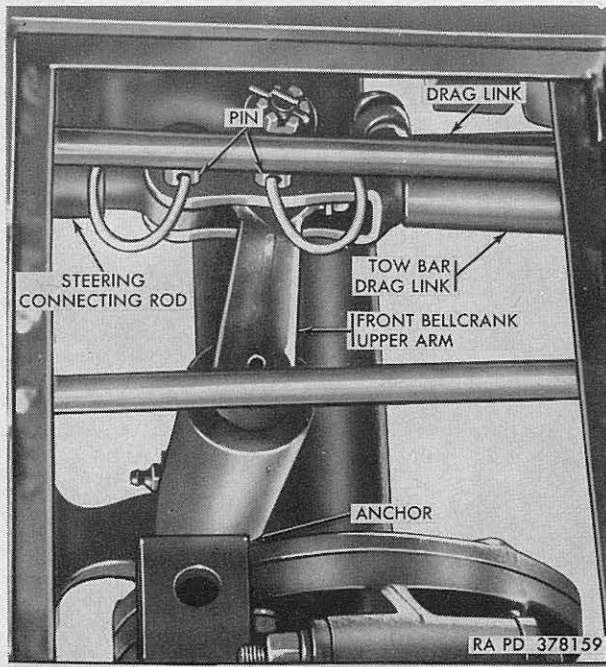


Figure 88. Disconnect points for drag links.

*b. Installation.* Position tow bar drag link (fig. 82) between tow bar bellcrank (fig. 84) and inner hole on front bellcrank upper arm (fig. 88). Secure link to tow bar bellcrank with  $\frac{7}{16}$  x  $1\frac{1}{4}$  clevis pin and  $\frac{3}{32}$  x  $\frac{7}{8}$  cotter pin (fig. 84). Secure link to bellcrank upper arm with special clevis pin (fig. 88) with finger ring. Position front end of steering connecting link at end hole in front bellcrank upper arm and secure with special clevis pin with finger ring.

### 120. Tow Bar Bellcrank Replacement (fig. 84)

*a. Removal.* Remove cotter pin and clevis pin securing front end of tow bar drag link to tow bar bellcrank. Remove self-locking nut from bolt securing tow bar bellcrank to brake and shift lever support assembly, and remove bellcrank from vehicle.

*b. Installation.* Push tow bar bellcrank onto bolt in brake and shift lever support assembly, with arm for drag link to left as shown in the illustration, and secure with  $\frac{3}{4}$ -inch plain washer and  $\frac{3}{4}$ -16NF self-locking nut. Align hole in front end of tow bar drag link with hole in arm of bellcrank and install  $\frac{7}{16}$  x  $1\frac{1}{4}$  clevis pin and  $\frac{3}{32}$  x  $\frac{7}{8}$  cotter pin.

### 121. Steering Arm Replacement (fig. 84)

*a. Removal.* Remove cotter pin and slotted hex nut securing front end of drag link to lower end of steering arm, and press end of link out of arm. Remove nut, lockwasher, and plain washer securing steering arm, and pull arm off left end of steering gear housing.

*b. Installation.* Position steering arm on left end of steering gear housing, as shown in illustration, and secure with special washer, lockwasher and  $\frac{5}{8}$ -18NF hex nut screwed onto end of lever shaft. Push stud in front end of drag link into lower end of steering arm from the right and secure stud in arm with  $\frac{3}{8}$ -24NF slotted head nut, tightened to a torque of 20 to 30 pound-feet, and  $\frac{3}{32}$  x 1 cotter pin.

### 122. Steering Wheel Replacement (fig. 82)

*a. Removal.* Unscrew capnut from upper end of steering wheel shaft. Using steering wheel puller, pull wheel off shaft.

b. *Installation.* Push steering wheel into position on serrations at top end of steering wheel shaft and secure by installing special capnut.

### 123. Steering Gear Replacement

#### a. *Removal.*

- (1) Remove cotter pin (fig. 79) and clevis pin securing steering shaft tube brace to steering shaft tube (fig. 82). Loosen clamp bolt (fig. 79) and pull shaft tube and attached parts off steering gear assembly (fig. 82).
- (2) Remove steering arm (par. 121a).
- (3) Remove four hex-head screws (fig. 56) and lockwashers, securing the two steering gear trunnion supports to frame support front crossmember, and remove steering gear and attached parts.
- (4) Pull locking plate (fig. 89) off serrations on lever shaft, and remove trunnion

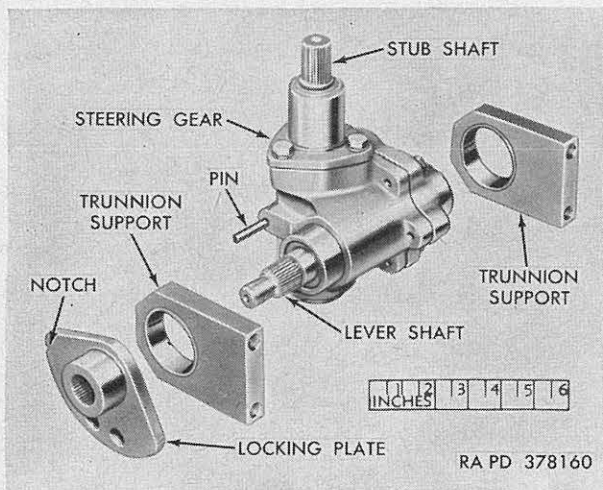


Figure 89. Steering gear, trunnions, and locking plate as removed from vehicle—exploded view.

nion supports from trunnions of steering gear.

#### b. *Installation.*

- (1) Install two trunnion supports (fig. 89) on trunnions of steering gear.

*Note.* It is necessary that the locking plate be installed on the lever shaft in such a position that the notch in the plate is aligned with the pin in the steering gear housing when the steering wheel is at the center point of its travel.

Temporarily install shaft tube (fig. 82) and attached parts on steering gear so that serrations on steering shaft coupling inside tube mesh with serrations on stub shaft. Turn steering wheel until center position is located, and with wheel held at this point press locking plate onto serrations of lever shaft with notch aligned with pin. Remove shaft tube and attached parts from steering gear.

- (2) Position steering gear (fig. 84) on front of frame support front crossmember and secure with four  $\frac{3}{8}$ -inch lockwashers (fig. 56) and  $\frac{3}{8}$ -16NC x  $2\frac{1}{2}$  hex-head screws tightened to a torque of 20 to 30 pound-inches.
- (3) Install steering arm (par. 121b).
- (4) Install steering shaft tube (fig. 82) with attached parts on top of steering gear with steering shaft coupling inside tube on stub shaft (fig. 89). Turn tube until clamp near center of tube is aligned with shaft tube brace (fig. 82) and secure brace to clamp with  $\frac{3}{8}$  x  $1\frac{5}{8}$  clevis pin (fig. 79) and  $\frac{3}{32}$  x  $\frac{7}{8}$  cotter pin. Tighten clamp bolt securing shaft tube to steering gear.

## Section XVIII. FRAME AND BRACKETS

### 124. Brake and Shift Lever Support Repair

a. *Removal.* Remove brake and shift lever support as directed in paragraph 93a and b.

#### b. *Repair.*

- (1) If tubular shaft is bent either straighten or replace entire unit. Inspect plugs at each end of shaft and replace if missing or if there is any signs of looseness or leakage of lubricant. Check lubricating

fitting and install a new one if necessary. Force lubricant through fitting and see that it comes out of the four lubricating holes in the front of shaft. Check outside surface of shaft and, if found to be rough, smooth with a fine file.

- (2) Inspect body for bends in the sheet metal and either straighten or replace entire assembly.



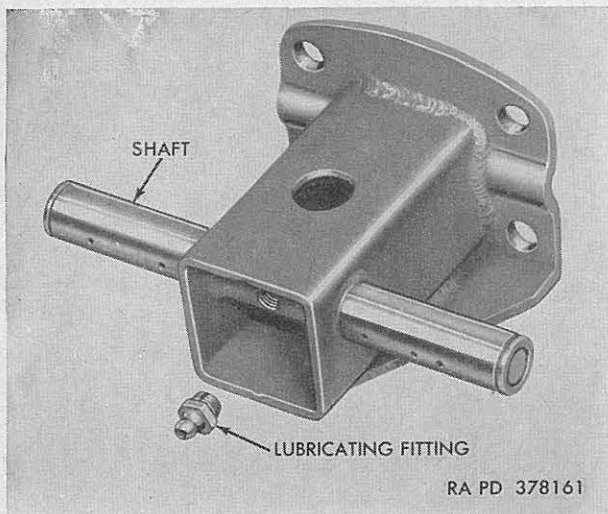


Figure 90. Brake and shift lever support.

(3) Inspect welds and reweld if welds are broken or defective.

c. *Installation.* Install brake and shift lever support as directed in paragraph 93c and d.

## 125. Steering Gear Trunnion Support Repair

a. *Removal.* Remove steering gear trunnion supports as directed in paragraph 123a (3).

b. *Repair.* Check threaded holes and, if there is any indication of thread stripping, replace support. If a support bushing is cracked or loose, press bushing out of support and install a new one in its place. If a support is bent or distorted install a new one.

c. *Installation.* Install steering gear trunnion supports as directed in paragraphs 123b (1).

## 126. Seat Stowage Hook

(fig. 91)

a. *Removal.* Hold spring in a compressed position to prevent flying when cotter pin is pulled out and remove cotter pin and plain washer from end of seat stowage hook. Release and remove spring. Pull hook out of right frame tube. Remove second hook in like manner.

b. *Installation.* Push seat stowage hook through holes in right frame tube from outside, and position spring on inside end of hook and against frame tube. Compress spring and install  $1\frac{3}{32} \times 1\frac{3}{16}$  plain washer  $\frac{3}{32} \times \frac{3}{4}$  cotter pin. Install second hook in same manner.

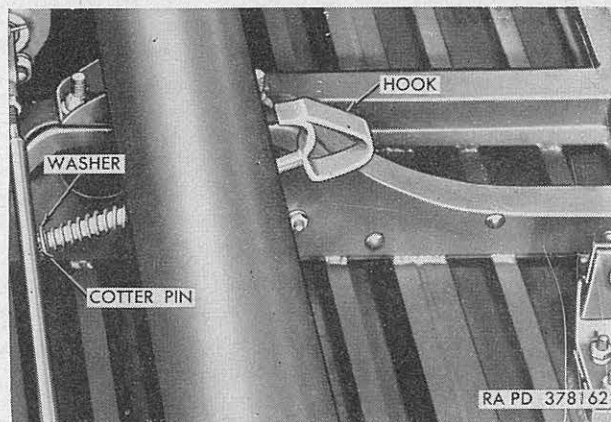


Figure 91. Seat stowage hook.

## 127. Tow Bar Replacement

a. *Replacement from Stowed Position.*

(1) *Removal.* Loosen retainer screw (fig. 92), turn long end of retainer plate down, pull eye of tow bar off support clip, and pull bar out of socket of tow bar support bracket (fig. 93) on left side of vehicle.

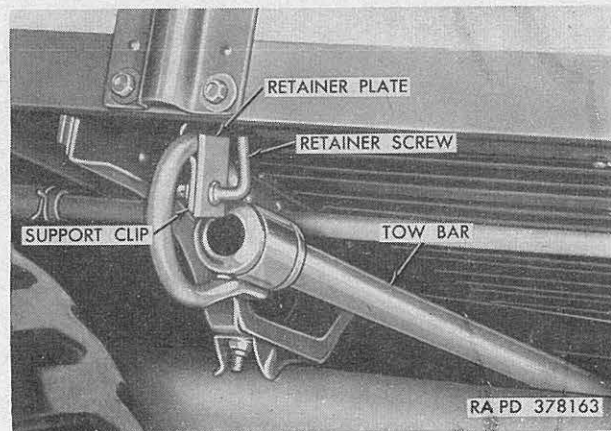


Figure 92. Tow bar stowed.

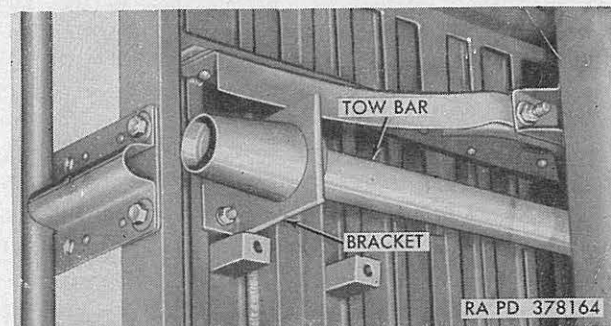
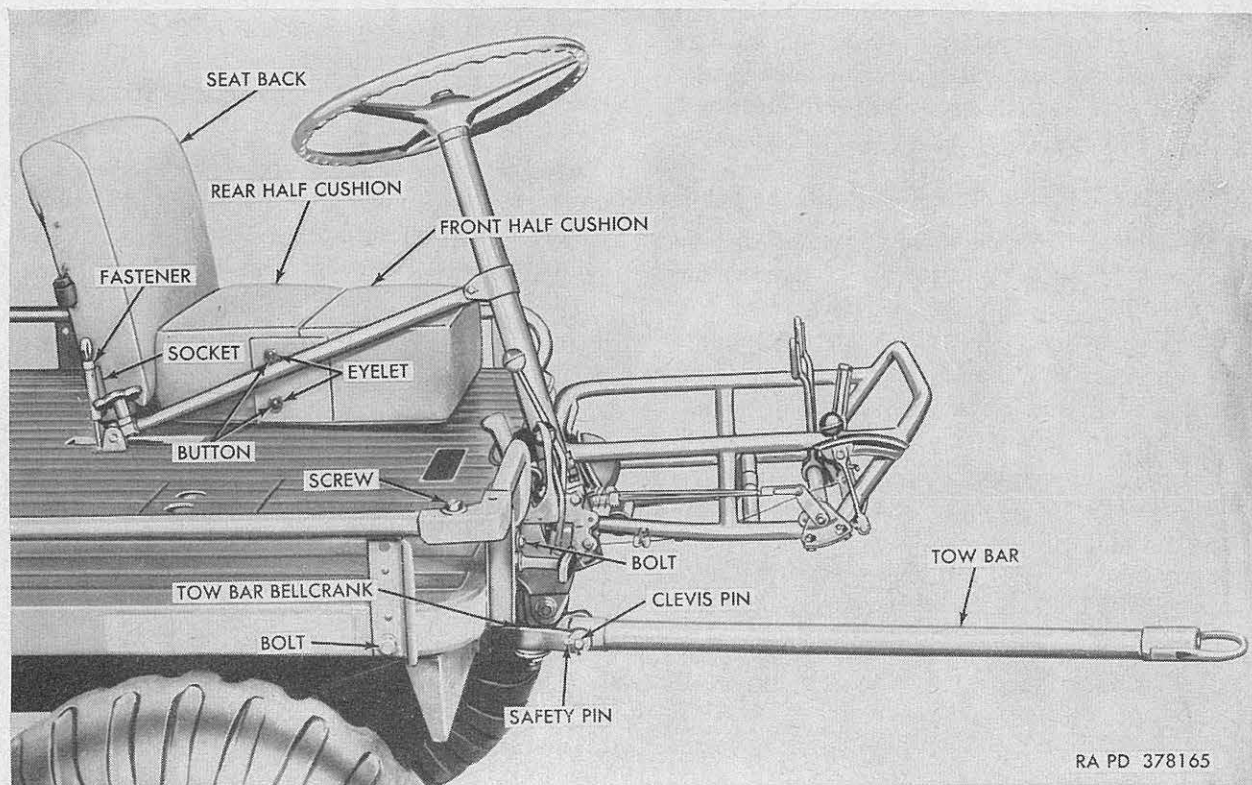


Figure 93. Tow bar support bracket.

(2) *Installation.* Working at right side of vehicle, push rear end of tow bar under platform and into socket of tow bar support bracket (fig. 93) under left edge of platform. Position front end of tow bar (fig. 92) on tow bar support clip under right edge of platform, turn long end of retainer plate up as shown and secure by tightening retainer screw.

b. *Replacement from Towing Position* (fig. 94).

- (1) *Removal.* Remove safety pin and cotter pin securing tow bar to tow bar bellcrank, and remove tow bar.
- (2) *Installation.* Position tow bar so that holes near rear end are aligned with holes in tow bar bellcrank, install  $\frac{1}{2}$  x  $\frac{3}{4}$  clevis pin, and secure with safety pin.



RA PD 378165

Figure 94. Tow bar in towing position.

## Section XIX. BODY

### 128. Seat Cushion Replacement (fig. 95)

#### a. *Front Half Seat Cushion.*

- (1) *Removal.* Unfasten four buttons, two on each side edge of seat cushion, and remove front half cushion.
- (2) *Installation.* Position new front half cushion against rear half, position eyelets over buttons and turn buttons 90° to lock.

#### b. *Rear Half Seat Cushion.*

- (1) *Removal.* Unhook spring cylinder fastener from socket on seat back. Pull seat back up out of sockets in platform and eyelets in flap on rear lower corner of rear half seat cushion. Separate rear half seat cushion from front half as directed in a(1) above.
- (2) *Installation.* Position rear half seat cushion with eyelets in flap on rear lower corner aligned with sockets (fig. 95) in platform. Push two legs of seat back through eyelets down into sockets



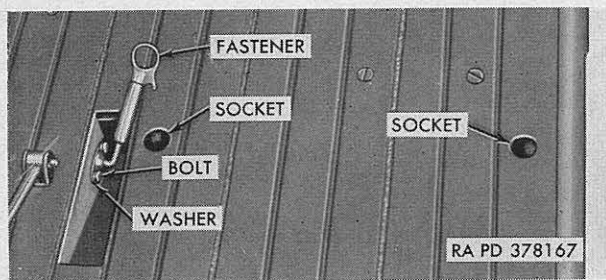


Figure 95. Spring cylinder fastener for seat back.

in platform. Pull up on spring cylinder fastener and hook into socket on right edge of seat back, securing back to platform. Attach front half seat cushion to rear half as directed in *a*(2) above.

## 129. Spring Cylinder Fastener Replacement

*a. Removal.* Unhook spring cylinder fastener (fig. 95) from socket on seat back. Remove two hex nuts (fig. 61) and lockwashers from bolts (fig. 95) securing fastener to platform, and remove fastener from platform. Remove two bolts from fastener, and plain washers from bolts.

*b. Installation.* Position spring cylinder fast-

ener as shown in figure 95. Install  $\frac{1}{4}$ -inch plain washers under boltheads, push  $\frac{1}{4}$ -20NC x  $\frac{5}{8}$  hex-head bolts through holes in fastener and platform and secure on underside of platform with  $\frac{1}{4}$ -inch lockwashers (fig. 61) and hex nuts.

## 130. Handrail Replacement (fig. 94)

*a. Removal.* Remove 20 hex-head bolts and square nuts securing handrail to edge of platform and remove handrail from vehicle.

*b. Disassembly.* Remove three hex-head screws (fig. 96) used to hold the parts of the handrail together, and separate handrail into front, right, rear and left sections.

*c. Assembly.* Using such new sections as necessary, secure the four parts (fig. 96) of the handrail together with three  $\frac{3}{8}$ -24NF x  $1\frac{1}{4}$  hex-head integral lockwasher screws.

*d. Installation.* Position assembled handrail as desired in upper or lower position on edge of platform, and secure with 20  $\frac{3}{8}$ -24NF x  $1\frac{1}{4}$  hex-head integral lockwasher screws with square nuts.

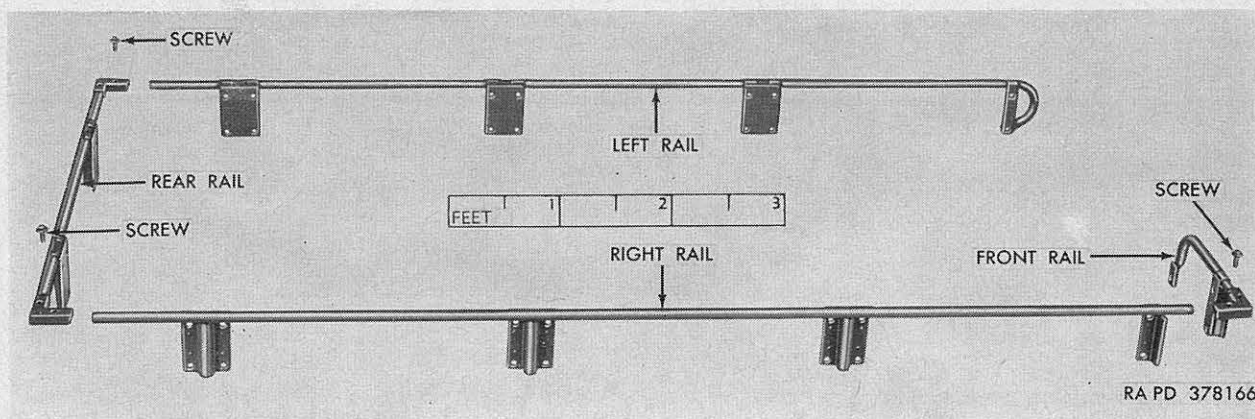


Figure 96. Handrail—exploded view.

## Section XX. ENGINE GUARD

### 131. Removal

Remove engine guard as directed in paragraph 48f(1).

### 132. Installation

Install engine guard as directed in paragraph 48f(2).

## Section XXI. DATA PLATES

### 133. Shifting Data Plate Replacement (fig. 97)

a. *Removal.* Chisel off ends of four rivets flush with under surface of platform and drive rivets upward out of platform with suitable punch. If shifting data plate is to be again installed, work rivets out of plate being careful not to damage plate.

b. *Installation.* Position shifting data plate with holes alined with holes in top of platform,



Figure 97. Shifting data plate mounted on top of platform.

install four 0.12 x 0.22 drive rivets in holes and drive pins down until flush with top of rivet heads.

### 134. Vehicle Data Plate Replacement (fig. 98)

a. *Removal.* The four bottom rivets go through the edge of the platform, the four top rivets go into blind holes. Chisel off the inner ends of the four bottom rivets flush with inside surface of platform and drive out rivets with suitable punch. Carefully chisel off heads of four top rivets and remove vehicle data plate. File four top rivets until flush with outside edge of platform.

b. *Installation.* Position new vehicle data plate on edge of platform and scribe positions for eight new rivet holes slightly forward or rear of old holes. Drill eight new rivet holes with No. 30 drill. Position plate, insert 0.12 x 0.22 drive rivets, and drive pins down until flush with top of rivet heads.

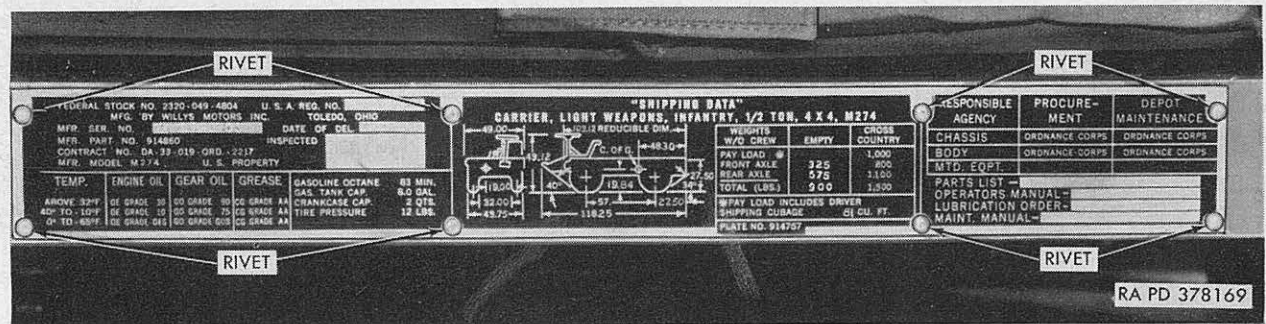


Figure 98. Vehicle data plate mounted on edge of platform.

## Section XXII. RADIO INTERFERENCE SUPPRESSION

### 135. General

Radio interference suppression is the elimination or minimizing of the electrical disturbances which interfere with radio reception, adversely affect the operation of electronic equipment, or disclose the location of the vehicle to sensitive electrical detectors. It is important, therefore, that vehicles with, as well as vehicles without radios be properly suppressed to prevent radio interference. Radio interference suppression is accomplished in this vehicle by use of capacitors, integrally suppressed spark plugs, shielding, braided bond straps, and tooth-type lockwashers.

Shielding is used on all secondary high voltage ignition circuits in the vehicle. To insure effectiveness of the radio interference suppression system, all suppression components and interference producing sub-assemblies must be bonded to their respective mounts with plated tooth-type lockwashers and/or tinned copper braid bond straps.

### 136. Radio Interference Suppression System

The radio interference suppression system applied to this vehicle is as follows:

a. Each of the spark plugs is integrally shielded and suppressed by a 10,000 ohm resistor-suppressor built into the spark plug.



*b.* The conduit and lead assemblies consist of high tension leads inclosed in rubber covered metallic hose terminating in appropriate threaded fittings at each end. These fittings must be kept tight at all times.

*c.* The magneto is bonded to the engine using two plated tooth-type lockwashers and a metallic gasket. A 0.2  $\mu$ f, feed-thru-type capacitor is installed within the magneto in series with the switch cable.

*d.* The shroud is bonded to the engine by plated tooth-type lockwashers.

*e.* The flywheel housing is bonded to the transmission housing by nine plated tooth-type lockwashers.

### 137. Radio Interference Suppression Maintenance.

Whenever radio interference resulting from the operation of the vehicle is reported, or experienced, the cause of the interference can be determined by the following procedures:

*a.* Inspect the ignition system to determine that all retaining nuts at the magneto and spark plugs are tight.

*b.* Check resistance of spark plugs, replace if necessary with 10,000 ohm, integrally shielded and suppressed spark plugs.

*c.* If noise still persists, check breaker points and magneto capacitor and replace if necessary.

*d.* Inspect shielded cables for damage and replace if necessary.

## Section XXIII. MAINTENANCE UNDER UNUSUAL CONDITIONS

### 138. Unusual Conditions

Refer to paragraph 20 this manual, and TM

9-8034-10. For additional information refer to TM 9-2853 and TM 9-2855.

## CHAPTER 4

### DOMESTIC SHIPMENT AND LIMITED STORAGE AND DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

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#### 139. Domestic Shipment and Limited Storage

Domestic shipment and limited storage information on the 1/2-ton 4 x 4 infantry light weapons carrier M274 is not available at the date of publication. Information will be included when acquired.

#### 140. Destruction

##### *a. General.*

- (1) Destruction of the 1/2-ton infantry light weapons carrier M274 by means of demolition materials is given in *b* below. For information on conditions under which destruction of materiel to prevent enemy use should be undertaken and for other methods of destruction, refer to TM 9-8034-10.
- (2) The procedure outlined in *b* below requires the use of demolition explosives which normally may not be authorized

items for the vehicle. The issue of these and related materials, and the conditions under which destruction will be effected are command decisions in each case, according to the tactical situation.

##### *b. Destruction by Demolition.*

- (1) Planning for simultaneous detonation, prepare five demolition charges using a 1-lb TNT block or equivalent per charge. Place the *first* charge on the engine. Place *each* of the *four* remaining charges on the axle adjacent to each wheel. The danger zone is approximately 400 yards. Elapsed time: about 5 minutes.
- (2) For complete details on the use of demolition materials and methods of priming and detonating demolition charges refer to FM 5-25. Training and careful planning are essential.



## APPENDIX I REFERENCES

### 1. Military Publication Indexes

DA Pamphlets 310-1, -2, -3, -4, -5, -7, -29, and DA Pamphlet 108-1 should be consulted frequently for latest changes or revisions of reference material listed in this appendix, and for new publications pertinent to major item materiel on technical manual being prepared.

### 2. Supply Manuals Maintenance and Repairs

Brake Lining Kits, Curtains, Paulins, V-Belts, and Miscellaneous Materials.	ORD 5 SNL H-17
Common Hand Tools	ORD 3 SNL J-17
Engine Air and Oil Filters, Strainer, and Cleaners Nonaircraft	SM 9-1-2940
Items of Soldering, Metalizing, Brazing, and Welding Materials; Gases and Related Items.	ORD 3 SNL K-2
Lubricating Fittings, Oil Filters, and Oil Filter Elements	ORD 5 SNL H-16
Miscellaneous Engine Accessories, Nonaircraft	SM 9-1-2990
Standard Hardware	ORD 5 SNL H-1
Tires and Tubes	SM 9-1-2600
Tires and Tubes, Pneumatic	SM 9-1-2610
Tire Rebuilding and Tire and Tube Repair Materials	SM 9-1-2640
Tool Set, General Mechanics (41-T-3534-30)	ORD 6 SNL J-10, Sec 4
Tool Set, Organizational Maintenance (2nd echelon), No. 1, Common (5180-754-0654).	ORD 6 SNL J-7, Sec 1
Tool Set, Organizational Maintenance (2nd echelon), No. 1, Supplemental (41-T-3538-865).	ORD 6 SNL J-7, Sec 2
Tool Set, Organizational Maintenance (2nd echelon), No. 2, Common (41-T-3538-85).	ORD 6 SNL J-7, Sec 3
Tool Set, Organizational Maintenance (2nd echelon), No. 2 Supplemental	ORD 6 SNL J-7, Sec 4

### 3. Forms

DA Form 9-1, Materiel Inspection Tag	
DA Form 9-3, Processing Board for Shipment and Storage of Vehicles and Boxed Engines (Tag)	
DA Form 9-4, Vehicular Storage and Servicing Record (Card)	
DA Form 9-68, Spot Check Inspection for Wheeled and Half Tracked Vehicles	
DA Form 348, Driver Qualification Record	
DA Form 460, Preventive Maintenance Roster	
DA Form 461, Preventive Maintenance Service and Inspection for Wheeled and Half Tracked Vehicles.	
DA Form 461-5, Limited Technical Inspection	
DA Form 478, Organizational Equipment File	
DA Form 811, Work Request and Job Order and Receipt (Set)	
DD Form 6, Report of Damaged or Improper Shipment	

### 4. Other Publications

#### a. Camouflage

Camouflage, Basic Principles	FM 5-20
Camouflage, of Vehicles	FM 5-20B

*b. General*

Cooling Systems: Vehicle and Powered Ground Equipment	TM 9-2858
Driver Selection and Training	TM 21-300
Inspection of Ordnance Materiel in Hands of Troops	TM 9-1100
Military Vehicles (Ordnance Corps Responsibility)	TM 9-2800-1
Preparation of Ordnance Materiel for Deep-Water Fording (if applicable)	TM 9-2853
Preservation, Method of	MIL-P-116
Principles of Automotive Vehicles	TM 9-8000
Spark Plugs	TB ORD 313 (TM 9-8638)
Supplies and Equipment (Motor Vehicles)	AR 700-38

*c. Maintenance and Repair*

Emergency Repair of Cracks in Cylinder Heads, Cylinder Blocks, Radiators, Fuel Tanks, and Liquid Containers.	TB ORD 607
General Supply: Winterization Equipment for Automotive Materiel	SB 9-16
Instruction Guide: Care and Maintenance of Ball and Roller Bearings	TM 37-265
Maintenance and Care of Hand Tools	TM 9-867
Tires, Repair and Rebuild of Pneumatic Tires and Tubes	TM 9-1871

*d. Vehicular Operation and Maintenance*

Care and Maintenance of Pneumatic Tires	TM 9-1870-1
Painting Instructions for Field Use	TM 9-2851
Preparation of Ordnance Materiel for Deep-Water Fording	TM 9-2853
Tactical Motor Vehicle Inspection and Preventive Maintenance Services	TM 9-2810
Instruction Guide: Ordnance Preservation, Packaging, Packing, Storage, and Shipping.	TM 9-1005
Marking of Arctic-Lubricated Materiel and Equipment	SR 746-30-10
Marking of Oversea Supply	SR 746-30-5
Shipment Digit Marking	SR 746-30-6
Organizational Repair Parts and Special Tools (Pertinent to Vehicle)	TM 9-8034-20P
Operators Manual (Pertinent to Vehicle)	TM 9-8034-10
Ordnance Storage and Shipment Chart Group G: Major Items and Major Combinations of Group G.	TB 9-OSSC-G
Packaging and Shipping of Materiel: Army Shipping Document	TM 38-705
Packaging and Shipping Materiel:	
Preservation, Packaging, and Packing of Military Supplies and Equipment	TM 38-230
Preparation of Supplies and Equipment For Shipment:	
Processing of Unboxed and Uncrated Equipment for Overseas Shipment	AR-747-30
Processing of Unboxed Self-Propelled and Towed Class II Ordnance General	SB 9-4
Supplies and Related Materiel for Shipment and Storage.	
Protection of Ordnance General Supplies in Open Storage	TB ORD 379
Report of Damaged or Improper Shipment	AR 700-58
Standards for Oversea Shipment and Domestic Issue of Ordnance Materiel Other Than Ammunition and Army Aircraft.	TB ORD 385



## APPENDIX II

### MAINTENANCE ALLOCATION CHART

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Carrier, Light Weapons, Infantry: 1/2-Ton, 4 x 4, M274  
SNL G-823

4 September 1956 (This chart supersedes all previous charts covering the above vehicle.)

**PURPOSE:** To allocate specific maintenance operations to the proper echelon.

**BASIS:** Allocation of maintenance operations is made on the basis of time, tools, and skills normally available to the various echelons in a combat situation and influenced by maintenance policy and sound maintenance practices as outlined in AR 750-5 and FM 9-10.

**EXPLANATION AND DEFINITIONS:** The maintenance allocation chart designates overall responsibility for the maintenance function on an end item or assembly. Repair and/or rebuild of major assemblies is designated by authority of the Army Commander representative, except for the specific repair sub-functions listed in the Maintenance Allocation Chart. Deviation from maintenance operations allocated in the Maintenance Allocation Chart are authorized only upon approval of the Army Commander representative.

**SERVICE**

Service normally includes cleaning, adjusting, preserving, replenishment of fuel and lubricants, etc.

**REPLACE**

To substitute serviceable items for unserviceable items.

**REMOVE AND INSTALL**

To remove and install the same item for service of when required for the performance of other maintenance allocation chart.

**REPAIR**

To restore to a serviceable condition by replacing unserviceable parts or by any other action required, using tools and equipment authorized and skills available, to include welding, riveting, straightening, etc.

**SECOND ECHELON "C" AND "D"**

"C" and "D" columns under second echelon refer to those levels of organizational maintenance which normally perform the "C" and "D" preventive maintenance services as defined in TM 9-2810. "C" and "D" columns are intended as a guide for unit commanders and motor pool officers in the performance of organizational maintenance. Deviations from this guide within the second echelon are authorized where considered appropriate by the unit commander.

**SYMBOL "X"**

This symbol indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that spare parts will be stocked at that level.

Symbol "X", used with a repair operation requiring no parts, indicates overall responsibility for performance, however, authority for less complex repairs will be governed by time, tools and skills available.

**SYMBOL "% %"**

This symbol indicates that the second echelon can perform that maintenance operation when authorization is obtained from the supporting ordnance officer.

Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
	<i>GROUP 01 ENGINE</i>					
0100.2	Engine					
	remove and install		X			
	replace		% %	X		
0101	Crankcase					
	replace				X	
	Head, cylinder					
	replace			X		
	Sleeve, cylinder					
	replace					X
0102	Adapter, rear bearing					
	replace				X	
	Bearing, crankshaft, front					
	replace				X	
	Crankshaft					
	replace				X	
	rebuild					X
	Seal, oil crankshaft, rear					
	replace			X		
	Washer, thrust, crankshaft					
	replace				X	
0103	Flywheel					
	replace			X		
0104	Bearing, connecting rod					
	replace				X	
	Pin, piston					
	replace				X	
	Piston					
	replace				X	
	Ring, piston					
	replace				X	
	Rod, connecting					
	replace				X	
	repair				X	
0105.1	Guide, valve					
	replace				X	
	Insert, valve (seat)					
	grind			X		
	Spring, valve					
	replace			X		
	Valves, intake and exhaust					
	adjust clearance	X				
	replace			X		
	reface			X		
0105.2	Housing, push rod					
	replace			X		
	Rocker, valve					
	replace		X			
	repair				X	
	Rod, push					
	replace			X		
	Screw, adjusting, tappet					
	replace	X				
	Tappet, valve					
	replace			X		
0105.3	Camshaft					
	replace				X	



Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
	<i>GROUP 01 ENGINE—continued</i>					
0105.5	Sprockets and chains, camdrive replace				X	
0106.1	Pump, oil, engine replace			X		
0106.2	Filter, oil engine service	X				
	replace	X				
	repair	X				
0106-3	Cooler, oil, engine replace		X			
	repair			X		
0106.4	Regulator, oil pressure replace	X				
0106.5	Pipe, filler, oil replace		X			
	Pan, oil repair			X		
0106-6	Lines, hoses and connections (external) replace		X			
0107	Cable, starting, front replace	X				
	Cable, starting, rear replace		(%%)	X		
	Handle, front, starting cable replace	X				
	Sheave, rear starting cable (on frame) replace		X			
	Hand starter components replace		(%%)	X		
0108	Manifold exhaust replace	X				
	Manifold, intake pipes replace		X			
0109.11	Cover, accessory case replace				X	
0109.13	Fuel pump and oil pump drive components replace			X		
0109.15	Magneto drive components replace				X	
0109.3	Pulley, fan drive replace		X			
	Fan drive components replace			X		
	<i>GROUP 02 CLUTCH</i>					
0200	Housing, clutch replace			X		
0201	Bearing, pilot replace		(%%)	X		
	Disk, driven clutch replace		(%%)	X		
	reline			X		
	Plate, pressure replace		(%%)	X		
	repair				X	

Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
0202	<i>GROUP 02 CLUTCH—Continued</i>					
	Bearing, release, clutch replace		(%%)	X		
	Cable control, clutch, front replace	X				
	Cable, control, clutch, rear replace		(%%)	X		
	Fork, clutch release bearing replace		(%%)	X		
0301	<i>GROUP 03 FUEL SYSTEM</i>					
	Carburetor					
	adjust	X				
	replace	X				
	repair			X		
0302	clean			X		
	Pump, fuel					
	replace	X				
0304	repair			X		
	Cleaner, air					
	service	X				
	replace	X				
0306.1	repair		X			
	Ducts and hose					
	replace	X				
0306.2	Tank, fuel					
	replace	X				
	repair			X		
0309	Lines and fittings					
	replace	X				
	repair	X				
0312	Valve, fuel shutoff					
	replace	X				
	Element, fuel filter (in tank)					
0401	replace	X				
	Controls, choke, throttle, and accelerator					
	replace	X				
0502	repair	X				
	<i>GROUP 04 EXHAUST SYSTEM</i>					
	Muffler					
0505	replace	X				
	<i>GROUP 05 COOLING SYSTEM</i>					
	Shroud, air, engine					
0505	replace		X			
	Bearings, fan shaft					
	replace		X			
0505	Belt, fan					
	replace	X				
	Fan, cooling					
0505	replace	X				
	repair		X			
	Pulley, fan					
0505	replace	X				



Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
	<i>GROUP 06 ELECTRICAL SYSTEM</i>					
0604.1	Magneto,					
	adjust		X			
	replace		X			
	repair			X		
0605	Cable, ignition wire					
	replace	X				
	repair	X				
	Cable, spark plug					
	replace	X				
	Plug, spark					
	clean		X			
	replace	X				
0608.1	Switch, ignition					
	replace	X				
	Switch, thermo, ground, magneto					
	replace	X				
	<i>GROUP 07 TRANSMISSION</i>					
0700	Transmission					
	replace		(%%)	X		
0702.1	Shaft, input					
	replace			X		
0702.3	Gears					
	replace			X		
	Shaft, main					
	replace			X		
	Seal, output shaft					
	replace			X		
	Shaft, output					
	replace			X		
0702.5	Gears					
	replace			X		
	Gear, cluster					
	replace			X		
	Countershaft					
	replace			X		
	Shaft, intermediate					
	replace			X		
	Shaft, reverse idler					
	replace			X		
0704	Controls transmission					
	replace	X				
	Shaft, shifter					
	replace			X		
0706.7	Vent, transmission					
	replace	X				
	<i>GROUP 09 PROPELLER SHAFT</i>					
0900	Joint, universal					
	replace	X				
	repair	X				
	Shaft, propeller					
	replace	X				
	<i>GROUP 10 FRONT AXLE</i>					
1000	Axle, front					
	replace		(%%)	X		

Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
	<i>GROUP 10 FRONT AXLE—Continued</i>					
1001	Housing, drop gear replace			X		
1002	Drop gear and steering knuckle support components replace			X		
	Bearings replace			X		
	Gears replace			X		
1005	Vent, housing replace	X				
1006	Boot, steering knuckle replace	X				
	Joint, universal, steering knuckle replace	X				
	Knuckle, steering replace	X				
	repair	X				
	Shaft, axle replace			X		
	<i>GROUP 11 REAR AXLE</i>					
1101	Housing, drop gear replace			X		
1102	Drop gear and steering knuckle support components replace			X		
	Bearings replace			X		
	Gears replace			X		
1104.1	Boot, steering knuckle replace	X				
	Joint, universal, steering knuckle replace	X				
	Knuckle, steering replace	X				
	repair	X				
	Shaft, axle replace			X		
	<i>GROUP 12 BRAKES</i>					
1201	Lever, handbrake replace	X				
	repair	X				
1202	Seal, oil, brake shield replace	X				
	Shoe, brake replace	X				
	reline				X	
1206	Cable, footbrake replace	X				
	Cable, handbrake replace	X				
	<i>GROUP 13 WHEELS, HUBS</i>					
1311	Hub, wheel replace	X				
	Ring, "O" replace	X				



Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
	<i>GROUP 13 WHEELS, HUBS—Continued</i>					
1311	Hub, wheel					
	replace	X				
	Ring "O"					
	replace	X				
	Wheel					
	replace	X				
	repair					X
1313	Tires					
	replace	X				
	repair					X
	Tubes					
	replace	X				
	repair	X				
	<i>GROUP 14 CONTROLS</i>					
1401	Arm, pitman					
	replace	X				
	Bearing, bellcrank					
	replace		X			
	Bellcrank					
	replace	X				
	Gear, steering					
	replace	X				
	repair			X		
	Link, drag					
	replace	X				
	Rod, tie					
	replace	X				
	repair	X				
	Wheel, steering					
	replace	X				
	<i>GROUP 15 FRAME AND BRACKETS</i>					
1501	Brackets, mounting (gearshift and steering mechanisms)					
	repair	X				
	Clips, retaining, foot rest, and seat stowage					
	replace	X				
	Supports, platform					
	repair			X		
	Frame					
	replace			X		
	rebuild					X
1503	Drawbar					
	replace	X				
	repair			X		
	<i>GROUP 18 BODY</i>					
1806	Cushion, seat					
	replace	X				
	repair			X		
	Latch, cushion					
	replace	X				

Group No.		Echelons				
		2d		3d	4th	5th
		(C)	(D)			
1810	<i>Group 18 Body—Continued</i>					
	Platform, body repair-----			X		
	Rail, side, platform body replace-----	X				
	repair-----			X		
2101	<i>GROUP 21 GUARDS</i>					
	Guard, brush, engine replace-----	X				
	repair-----			X		
	Support, crank repair-----	X				
2210	<i>GROUP 22 MISCELLANEOUS BODY AND ACCESSORIES</i>					
	Plates, vehicle data replace-----	X				



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By Order of *Wilbur M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,  
*General, United States Army,*  
*Chief of Staff.*

Official:

HERBERT M. JONES,  
*Major General, United States Army,*  
*The Adjutant General.*

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5-226  
5-227  
6-200  
6-201  
6-228  
7-31  
7-32  
7-37  
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*NG*: State AG; units—Same as Active Army.

*USAR*: None.

For explanation of abbreviations used, see AR 320-50.