

TECHNICAL MANUAL
ORGANIZATIONAL MAINTENANCE
TRUCK, 5-TON, 6X6, M939,
M939A1 AND M939A2 SERIES (DIESEL)

HOW TO USE THIS
MANUAL

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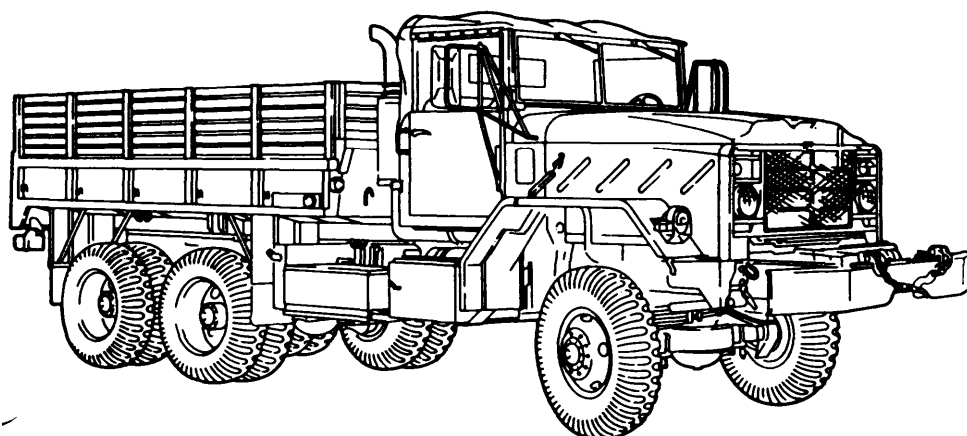
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TRUCK, CARGO, DROPSIDE: 5-TON, 6X6,
M923 (2320-01 -050-2084), M923A1 (2320-01-206-4087), M923A2 (2320-01 -230-0307),
M923 (2320-01 -047-8769), M925A1 (2320-01 -206-4088), M925A2 (2320-01 -230-0308);
TRUCK, CARGO: 5-TON, 6X6,
M924 (2320-01-047-8773), M924A1 (2320-01-205-2692),
M926 (2320-01 -047-8772), M926A1 (2320-01 -205-2693);
TRUCK, CARGO XLWB: 5-TON, 6X6,
M927 (2320-01 -047-8771), M927A1 (2320-01 -206-4089), M927A2 (2320-01 -230-0309),
M928 (2320-01 -047-8770), M928A1 (2320-01 -206-4090), M928A2 (2320-01 -230-0310);
TRUCK, DUMP: 5-TON, 6X6,
M929 (2320-01 -047-8756), M929A1 (2320-01 -206-4079), M929A2 (2320-01 -230-0305),
M930 (2320-01 -047-8755), M930A1 (2320-01 -206-4080), M930A2 (2320-01 -230-0306);
TRUCK, TRACTOR: 5-TON, 6X6,
M931 (2320-01 -047-8753), M931A1 (2320-01 -206-4077), M931A2 (2320-01 -230-0302),
M932 (2320-01 -047-8752), M932A1 (2320-01 -205-2684), M932A2 (2320-01 -230-0303);
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6,
M934 (2320-01 -047-87501), M934A1 (2320-01 -205-2682), M934A2 (2320-01 -230-0300),
M935 (2320-01 -047-8751); M935A1 (2320-01 -205-2683); M935A2 (2320-01 -230-0301);
TRUCK, MEDIUM WRECKER: 5-TON, 6X6,
5 (2320-01 -047-8754), M936A1 (2320-01 -206-4078), M936A2 (2320-01 -230-0304)

This copy is a reprint which includes current
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No. 9-2320-272-20-1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., 25 March 1991

TECHNICAL MANUAL
ORGANIZATIONAL MAINTENANCE
TRUCK, 5-TON, 6X6, M939,
M939A1 AND M939A2 SERIES (DIESEL)

TRUCK, CARGO, DROPSIDE: 5-TON, 6X6,
M923 (2320-01 -050-2084), M923A1 [2320-01 -206-4087), M923A2 (2320-01 -230-0307),
M923 (2320-01 -047-8769), M925A1 (2320-01 -206-4088), M925A2 [2320-01 -230-0308);
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TRUCK, CARGO XLWB: 5-TON, 6X6,
M927 (2320-01 -047-8771), M927A1 (2320-01 -206-4089), M927A2 (2320-01 -230-0309],
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TRUCK, DUMP: 5-TON, 6X6,
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M930 (2320-01 -047-8755), M930A1 (2320-01 -206-4080), M930A2 (2320-01 -230-0306);
TRUCK, TRACTOR: 5-TON, 6X6,
M931 (2320-01 -047-8753), M931A1 (2320-01 -206-4077), M931A2 (2320-01 -230-0302),
M932 (2320-01 -047-8752), M932A1 (2320-01 -205-2684), M932A2 (2320-01 -230-0303);
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6,
M934 (2320-01 -047-8750), M934A1 (2320-01 -205-2682), M934A2 (2320-01 -230-0300),
M935 (2320-01 -047-8751), M935A1 (2320-01 -205-2683), M935A2 (2320-01 -230-0301);
TRUCK, MEDIUM WRECKER: 5-TON, 6X6,
M936 (2320-01 -047-8754), M936A1 (2320-01 -206-4078), M936A2 (2320-01 -230-0304)

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1. Remove old pages and insert new pages as indicated below.
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Remove pages	Insert pages	Remove pages	Insert pages
cover	cover	2-3 through 2-8	2-3 through 2-8
title page	title page	2-11 through 2-14	2-11 through 2-14
warning c	warning c	2-21 and 2-22	2-21 and 2-22
(warning d blank)	(warning d blank)	2-29 and 2-30	2-29 and 2-30
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4-155 through 4-158	4-155 through 4-158	Index 15	Index 15
5-1 through 5-8	5-1 through 5-8	(Index 16 blank)	(Index 16 blank)

3. File this change sheet in front of the publication for reference purposes.

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Official:

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The Adjutant General

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MERRILL A. McPEAK

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CHARLES C. McDONALD

General, United States Air Force
Commander, Air Force Logistics Command

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DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, DC
26 April 1990

TECHNICAL MANUAL
VOLUME 1 OF 2
ORGANIZATIONAL MAINTENANCE
TRUCK, 5-TON, 6X6, M939, M939A1 AND M939A2 SERIES
(DIESEL)

TRUCK, CARGO, DROPSIDE: 5-TON, 6X6,
M923 (2320-01-050-2084), M923A1 (2320-01-206-4087), M923A2 (2320-01-230-0307),
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M928 (2320-01-047-8770), M928A1 (2320-01-206-4090); M928A2 (2320-01-230-0310),
TRUCK, DUMP: 5-TON, 6X6,
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M930 (2320-01-047-8755), M930A1 (2320-01-206-4080); M930A2 (2320-01-230-0306),
TRUCK, TRACTOR: 5-TON, 6X6,
M931 (2320-01-047-8753), M931A1 (2320-01-206-4077), M931A2 (2320-01-230-0302),
M932 (2320-01-047-8752), M932A1 (2320-01-205-2684); M932A2 (2320-01-230-0303),
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6,
M934 (2320-01-047-8750), M934A1 (2320-01-205-2682), M934A2 (2320-01-230-0300),
M935 (2320-01-047-8751), M935A1 (2320-01-205-2683); M935A2 (2320-01-230-0301),
TRUCK, MEDIUM WRECKER: 5-TON, 6X6,
M936 (2320-01-047-8754), M936A1 (2320-01-206-4078) M936A2 (2320-01-230-0304),

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4-1and4-2	4-1and4-2
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6-1 and 6-2	6-1 and 6-2
6-27 and 6-28	6-27 and 6-28
6-33 and 6-34	6-33 and 6-34

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Chief of Staff

WILLIAM J. MEEHAN II
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General, United States Air Force
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To be distributed in accordance with DA Form 12-38 (Block No. 0386),
Unit maintenance requirements for M939, 5-ton vehicles.

CHANGE

NO. 1

DEPARTMENT OF THE ARMY
AND THE AIR FORCE
WASHINGTON, DC 13 Dec 1986

TECHNICAL MANUAL
ORGANIZATIONAL MAINTENANCE

**TRUCK, 5-TON, 6X6, M939 AND
M939A1 SERIES (DIESEL)**

TRUCK CARGO: 5-TON, 6X6, DROPSIDE,
M923 (2320-01 -050-2084), M923A1 (2320-01 -206-4087),
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M931 (2320-01 -047-8753), M931A1 (2320-01 -206-4077),
M932 (2320-01 -047-8752), M932A1 (2320-01 -205-2684);
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6,
M934 (2320-01 -047-8750), M934A1 (2320-01 -205-2682),
M935 (2320-01 -047-8751), M935A1 (2320-01 -205-2683);
TRUCK, MEDIUM WRECKER: 5-TON, 6X6,
M936 (2320-01 -047-8754), M936A1 (2320-01 -206-4078)

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Remove pages	Insert pages
Front Cover	Front Cover
i and ii	i and ii
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General, USAF, Commander, Air Force
Logistics Command

Distribution:

To be distributed in accordance with DA Form 12-38-R, Organizational Maintenance requirements for Truck 5-Ton, 6x6, M939 and M939A1 Series.

WARNING

EXHAUST GASE CAN KILL

1. DO NOT operate your vehicle engine in enclosed area
2. DO NOT idle vehicle engine with cab windows closed.
3. DO NOT drive vehicle with inspection plates or cover plates removed.
4. BE ALERT at all times for exhaust odors.
5. BE ALERT for exhaust poisoning symptoms, they are
 - Headache
 - Dizziness
 - Sleepiness
 - Loss of muscular control
6. If YOU SEE another person with exhaust poisoning symptoms
 - Remove person from area
 - Expose to open air
 - Keep person warm
 - Permit person to move
 - Administer artificial respiration, if necessary*

* For artificial respiration, refer to FM21-11.

WARNING SUMMARY

- When dump body is held in a raised position, oil in filter system is under pressure. Any movements of the control valve, or leakage at the hydraulic cylinder line or hose connection will cause dump body to drop to sub frame. Never work under dump body unless safety braces are properly positioned. Failure to do this may result in injury to personnel.
- After Nuclear, Biological, or Chemical (NBC) exposure of this vehicle, all air filters shall be handled with extreme caution. Unprotected personnel may experience injury or death if residual toxic agents or radioactive material are present. Servicing personnel will wear protective overgarments, mask hood and chemical protective gloves and boots. All contaminated air filters will be placed into double lined plastic bags and moved immediately to a temporary segregation area away from the work site. If contaminated by radioactive dust, the company NBC team will measure the radiation before removal. The NBC team will determine the extent of safety procedures required. The temporary segregation area will be marked with the appropriate NBC signs. Final disposal of contaminated air filters will be in accordance with local SOP.
- Do not depress service brake pedal during removal of plug and/or installation of test gage. Injury to personnel may result.
- Do not look into brake valve ports when performing tests. Injury to personnel may result.

WARNING SUMMARY (Cont'd)

- Loosen outlet line at compressor very slowly. Stop procedure and tighten fitting the moment air begins to escape. Injury to personnel may result if line is accidentally disconnected from a serviceable operating compressor.
- Do not perform testing near fuel tank with fill cap or sending unit removed. Fuel may ignite causing injury to personnel.
- Loosen supply and delivery lines at valves very slowly. Stop procedure and tighten fittings the moment air begins to escape. Injury to personnel may result if lines are disconnected from valves.
- Drycleaning fluid is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel.
- Do not perform battery system procedures near open flame. Injury to personnel may result.
- Remove all jewelry. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result and may cause injury to personnel.
- Care should be taken when removing surge tank filler cap. Steam or hot coolant under pressure may cause injury to personnel.
- Ether is extremely flammable, Performing ether starting system procedures near open flames may result in injury to personnel.
- Do not drain oil when engine is hot. Injury to personnel may result.
- Compressed air source will not exceed 30 psi (207 kPa). When cleaning with compressed air, eyeshields must be worn. Failure to wear eyeshields may result in injury to personnel.
- Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.
- Do not touch hot exhaust system components with bare hands. Injury to personnel may result.
- Make sure vehicle ignition is off during fan blade procedure. Injury to personnel may result.
- Lamp door retaining clips are under great tension and must be removed with firm grip, or injury to personnel may result.
- Hydraulic jack is used for raising and lowering and is not used to support vehicle. Injury to personnel may result if vehicle suddenly lowers or falls.
- Do not disconnect air lines, remove safety valve, or perform brake chamber repairs before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.
- Do not smoke when removing alcohol evaporator. Injury may result from improper handling of alcohol evaporator.
- Do not remove or install spring brake chamber release bolt without placing housing in vise. Parts may shoot out causing injury to personnel.
- Tire lockring must be properly seated when installed, and must never be removed without first deflating tire. If lockring is not correctly installed, it may pop off when tire is inflated causing injury to personnel.
- Never inflate a tire without a tire inflation cage, or injury to personnel may result.
- Do not start engine when steering hoses are disconnected. Pressure may whip hoses, causing injury to personnel.
- Never stand between vehicles. Assistant must remain in secondary vehicle to engage service brake if cable snaps or automatic brake fails while towing vehicle. Failure to do this may result in injury to personnel.

WARNING SUMMARY (Cont'd)

- Wear hand protection when handling winch cable. Broken wires may cause injury to personnel.
- All personnel must stand clear of crane during boom hoisting and lowering operations. A shifting or swinging load may cause injury to personnel.
- Hood must be supported during installation of hood support bar mounting bracket, or injury to personnel may result.
- Cab seat base has sharp edges. Use extreme caution when removing or installing seat or injury to personnel may result.
- Top of sizing must not be less than 4-1/8 in. (10.5 cm) from end of cable. Faulty installation will cause cable failure and may result in injury to personnel.
- Remove and replace snubber valve and lift cylinder adapter cap as one assembly. Do not disconnect adapter cap from snubber valve. Valve and cap are locked together against spring tension. Injury to personnel may result from improper removal of valve from adapter cap.
- Hydraulic filter assembly is under great pressure and oil will spurt out from housing during removal and installation. Wear eyeshields during removal and installation of assembly. Failure to do this may result in injury to personnel.
- The tailgate is heavy. Be prepared to support tailgate weight as soon as retaining pins are removed. Failure to do this may result in injury to personnel.
- Vehicle will become charged with electricity if A-frame contacts or breaks high voltage wire. Do not leave vehicle while high voltage line is in contact with A-frame or vehicle. Failure to do so may result in injury to personnel.
- Cleaning fluids are flammable and toxic. Keep them away from open flame, and wear protective clothing or injury to personnel may result.
- Do not disconnect transmission oil cooler hoses without first allowing transmission sufficient time to cool, or injury to personnel may result.
- Do not wear jewelry when repairing harnesses. Injury to personnel may result if circuit is suddenly energized.
- Use caution when testing thermostat. Hot water may cause injury to personnel.
- When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against the top of the batteries. Failure to do this may result in severe injury to personnel or damage to equipment.

TECHNICAL MANUAL
No. 9-2320-272-201

**DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C.**

TECHNICAL ORDER
No. 36A12-1C442-1

TECHNICAL MANUAL
VOLUME 1 OF 2
ORGANIZATIONAL MAINTENANCE
TRUCK, 5-TON, 6X6, M939, M939A1 AND M939A2 SERIES
(DIESEL)

Model		NSN Without Winch	NSN With winch
Truck, Cargo, Dropside	M923	2320-01-050-2084	
Truck, Cargo, Dropside	M923A1	2320-01-206-4087	
Truck, Cargo, Dropside	M923A2	2320-01-230-0307	
Truck, Cargo, Dropside	M925		2320-01-047-8769
Truck, Cargo, Dropside	M925A1		2320-01-206-4088
Truck, Cargo, Dropside	M925A2		2320-01-230-0308
Truck, Cargo	M924	2320-01-047-8773	
Truck, Cargo	M924A1	2320-01-205-2692	
Truck, Cargo	M926		2320-01-047-8772
Truck, Cargo	M926A1		2320-01-205-2693
Truck, Cargo, XLWB	M927	2320-01-047-8771	
Truck, Cargo, XLWB	M927A1	2320-01-206-4089	
Truck, Cargo, XLWB	M927A2	2320-01-230-0309	
Truck, Cargo, XLWB	M928		2320-01-247-8770
Truck, Cargo, XLWB	M928A1		2320-01-206-4090
Truck, Cargo, XLWB	M928A2		2320-01-230-0310
Truck, Dump	M929	2320-01-047-8756	
Truck, Dump	M929A1	2320-01-206-4079	
Truck, Dump	M929A2	2320-01-230-0305	
Truck, Dump	M930		2320-01-047-8755
Truck, Dump	M930A1		2320-01-206-4080
Truck, Dump	M930A2		2320-01-230-0306
Truck, Tractor	M931	2320-01-047-8753	
Truck, Tractor	M931A1	2320-01-206-4077	
Truck, Tractor	M931A2	2320-01-230-0302	
Truck, Tractor	M932		2320-01-047-8752
Truck, Tractor	M932A1		2320-01-205-2684
Truck, Tractor	M932A2		2320-01-230-0303
Truck, Van, Expansile	M934	2320-01-047-8750	
Truck, Van, Expansile	M934A1	2320-01-205-2682	
Truck, Van, Expansile	M934A2	2320-01-230-0300	
Truck, Van, Expansile, W/HLG	M935	2320-01-047-8751	
Truck, Van, Expansile, W/HLG	M935A1	2320-01-205-2683	
Truck, Van, Expansile, W/HLG	M935A2	2320-01-230-0301	
Truck, Medium Wrecker	M936		2320-01-047-8754
Truck, Medium Wrecker	M936A1		2320-01-206-4078
Truck, Medium Wrecker	M936A2		2320-01-230-0304

This manual is published in two parts. TM 9-2320-272 -20-1 contains chapters 1 through 6, and TM 9-2320-272-20-2 contains chapters 7 through 12, appendices A, B, C, D, E, F, and G.

This manual contains a table of contents for both volumes 1 and 2. Volume 1 contains an alphabetized index for chapters 1 through 6 only, Volume 2 contains a table of contents and alphabetized index for chapters 7 through 12.

ORGANIZATIONAL MAINTENANCE
TRUCK, 5-TON, 6X6, M939, M939A1 AND M939A2 SERIES (DIESEL)

REPORTING OF ERRORS

You can help improve this manual. If you find any mistake's or if you know of a way to improve the procedures, please let us know, Mail your Letter, IJA Form 2028 (Recommended Changes to Publications and Blank Forms), or IJA Form 2028-2 located in back of this manual direct to: Commander U.S. Army Tank-Automotive Command, ATTN AMSTA-M 13, Warren, Michigan 48397-5000 A reply will be furnished to you

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HOW TO USE THIS MANUAL

ABOUT YOUR MANUAL

Spend some time looking through this manual. You'll find that it has a new look different than most of the TMs you've been using.

New features added to improve the convenience of this manual and increase your efficiency are

- a. Accessing Information — These include physical entry features such as the bleed-to-edge indicators on the cover and edge of the manual. Extensive troubleshooting guides for specific systems lead directly to step by step directions for problem solving and maintenance tasks.
- b. Illustrations — A variety of methods are used to make locating and fixing components much easier. Locator illustrations with keyed text, exploded views, and cut-away diagrams make the information in this manual easier to understand and follow.
- c. Keying Text With Illustrations — Instructions/text are located together with figures that illustrate the specific task you are working on. In most cases, the task steps and figures are located side by side. Continue reading for an example of modular text and figure layouts.

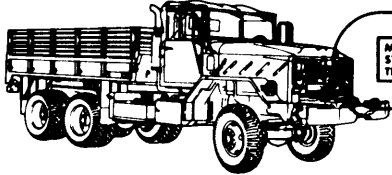
USING YOUR MANUAL: AN EXAMPLE

**ARMY TM 9-2320-272-20-1
AIR FORCE TO 36A12-1C-442-1**

TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE

**TRUCK, 5-TON, 6X6, M939 SERIES
(DIESEL)**



**TRUCK, CARGO: 5-TON, 6X6, DROPSIDE,
M923 (2320-01-050-2084), M925 (2320-01-047-8769);
TRUCK, CARGO: 5-TON, 6X6,
M924 (2320-01-047-8773), M926 (2320-01-047-8772);
TRUCK, CARGO: 5-TON, 6X6, XLWB,
M927 (2320-01-047-8771), M928 (2320-01-047-8770);
TRUCK, DUMP: 5-TON, 6X6,
M929 (2320-01-047-8756), M930 (2320-01-047-8755);
TRUCK, TRACTOR: 5-TON, 6X6,
M931 (2320-01-047-8753), M932 (2320-01-047-8752);
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6,
M934 (2320-01-047-8750), M935 (2320-01-047-8751);
TRUCK, MEDIUM WRECKER: 5-TON, 6X6,
M936 (2320-01-047-8754)**

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

HOW TO USE THIS MANUAL IV

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TASK: The operator of an series vehicle has complained of excessive exhaust noise and exhaust fumes entering the cab of his vehicle. The vehicle has been assigned to you for repair.

TROUBLESHOOTING STEPS:

- Look at the cover of this manual. see chapter/section titles listed from top to bottom on the right-hand side.
- Look at the right edge of the manual. On some of the pages see black bars (edge indicators) that are aligned with the chapter/section bars on the cover. These are the locations of the chapters/sections in the text.
- Look for "MECHANICAL SYSTEMS TROUBLESHOOTING" in the chapter/section list on the cover.
- Turn to pages with the edge indicator matching the black bar for MECHANICAL SYSTEMS TROUBLESHOOTING. Page numbers are also listed next to chapter/section titles.

TM 9-2320-272-20-1

**MECHANICAL TROUBLESHOOTING
SYMPTOM INDEX**

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
ENGINE		
1	Fails to crank	2-21
2	Cranks but fails to start	2-21
3	Cranks slowly, hard to start	2-22
4	Runs, but muffler	2-22
5	Starts but fails to keep running	2-23
6	Poor acceleration and/or lack of power	2-23
7	Speed unstable or surges at all speeds	2-24
8	Excessive oil consumption	2-24
9	Low oil pressure	2-24
10	Overheats according to engine coolant temperature gage	2-25
11	Black exhaust smoke at idle	2-25
12	Stops abruptly, not used	2-26
13	Dies upon deceleration	2-26
14	Excessive fuel consumption	2-27
ETHER START SYSTEM		
15	Engine cranks but will not start in cold weather (ether system operating properly)	2-27
EXHAUST SYSTEM		
16	Excessive exhaust noise	2-28
17	Exhaust fumes in cab	2-28
COOLING SYSTEM		
18	Engine does not reach normal operating temperature (according to coolant temperature gage)	2-28
19	No cab heat (coolant temperature gage reads normal)	2-29
TRANSMISSION		
20	Excessive noise during shifting	2-29
21	Low transmission oil pressure	2-29
22	Transmission oil leakage	2-29
23	No response to shift lever movement	2-30
24	Rough shifting	2-30
25	Transmission overheats (according to transmission temperature gage)	2-30
26	Dirt or metal particles in oil	2-30
27	Oil thrown from filter tube	2-30
TRANSFER CASE		
28	Hard shifting of transfer case	2-30
29	Transfer case oil leakage	2-31
30	Excessive noise	2-31
31	Excessive vibration	2-31
PROPELLER AND DRIVE SHAFTS		
32	Excessive noise or vibration	2-31

2-18

- One of the first pages having the mechanical systems troubleshooting edge indicators is the "MECHANICAL TROUBLESHOOTING INDEX".
- Look down the list until you find "EXHAUST". Beneath that heading you will find the symptoms noted by the vehicle operator "Excessive exhaust noise" and "Exhaust fumes in cab".
- Turn to the page indicated: 2-28.

8. On page 2-28, steps/tests relating to resolving the problem of "Excessive exhaust noise" are listed:
- Step 1. You inspect the muffler and find that it is serviceable.
- Step 2. During your inspection you discover that the "front exhaust pipe is cracked and rusted. The part must be replaced. Chapter 3, section V, is referenced.

TM 9-2320-272-20-1

Table 2-2 Mechanical Troubleshooting (Line 18)

Malfunction	Test or Inspection	Corrective Action
Step 4. Check stamper and stamper tubing for restrictions.		
a. Disconnect tubing between thermal close valve and stamper at thermal close valve (para. 4-18).		
b. Blow compressed air into tubing at thermal close valve end to determine if system is clear.		
c. If restricted, disconnect tubing from stamper and check for restrictions in tubing.		
d. If tubing is clear, replace stamper (para. 4-18).		
e. If tubing is restricted, replace tubing (para. 4-18).		
END OF TESTING!		
EXHAUST SYSTEM		
16. EXCESSIVE EXHAUST NOISE		
Step 1. Inspect muffler for wear and damage.		
Replace muffler if necessary (para. 3-43).		
Step 2. Inspect exhaust pipes and gaskets for wear and damage.		
Replace pipes or gaskets as needed (chapter 3, section V).		
END OF TESTING!		
17. EXHAUST PUMPS IN CAB		
Step 1. Inspect exhaust manifold, pipes, and connections for leaks, cracks, or damage.		
a. If leaking at pipe connection, replace gaskets.		
b. If manifold or pipes are cracked or damaged, replace as necessary (chapter 3, section V).		
END OF TESTING!		
COOLING SYSTEM		
WARNING		
Care should be taken when removing surge tank filler cap. Steam or hot coolant under pressure may cause injury to personnel.		
18. ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE (ACCORDING TO COOLANT TEMPERATURE GAGE)		
NOTES		
If RTE/ICE is available, perform NG31 — gage test (chapter 2, section VI).		
Step 1. Test thermostat for proper operation.		
Replace thermostat if defective (para. 3-60).		
Step 2. Test coolant temperature gage, sending unit, and electrical circuits for malfunction.		
a. See troubleshooting table 2-3.		
b. Replace coolant temperature gage if defective (para. 4-63).		
c. Replace water temperature sending unit if defective (para. 4-60).		
END OF TESTING!		

3-38

9. Turn to chapter 3, section V. NOTE: At this point, for most tasks, you will be directed to a specific detailed procedure to correct the deficiency. However, the exhaust system is extensive and we now refer to a list of procedures.
- 10 Refer to the first page of chapter 3, section V (page 3-103). Find "Front Exhaust Pipe" in the "Exhaust System Maintenance Task Summary". You are directed to task paragraph 3-42 on page 3-110.

TM 9-2320-272-20-1

Section V. EXHAUST SYSTEM

3-38. GENERAL

This section provides maintenance procedures assigned to organizational level for the exhaust system. To find a specific maintenance procedure, see the maintenance task summary below.

3-39. EXHAUST SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-40	Exhaust Stack Replacement	3-104
3-41	Rear Exhaust Pipe, Support Bracket, and Cab Heat Shield Maintenance	3-106
3-42	Front Exhaust Pipe Replacement	3-110
3-43	Muffler and Shield Maintenance	3-114

3-103

TM 9-2320-272-20-1

3-42. FRONT EXHAUST PIPE REPLACEMENT

The task covers:

a. Removal b. Installation

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set Hood raised and secured Right splash shield removed

Test Equipment:
None

Special Tools:
None

Materials/Parts:
Two locknuts
Two gaskets
GAA grease (Appendix D, Item 13)

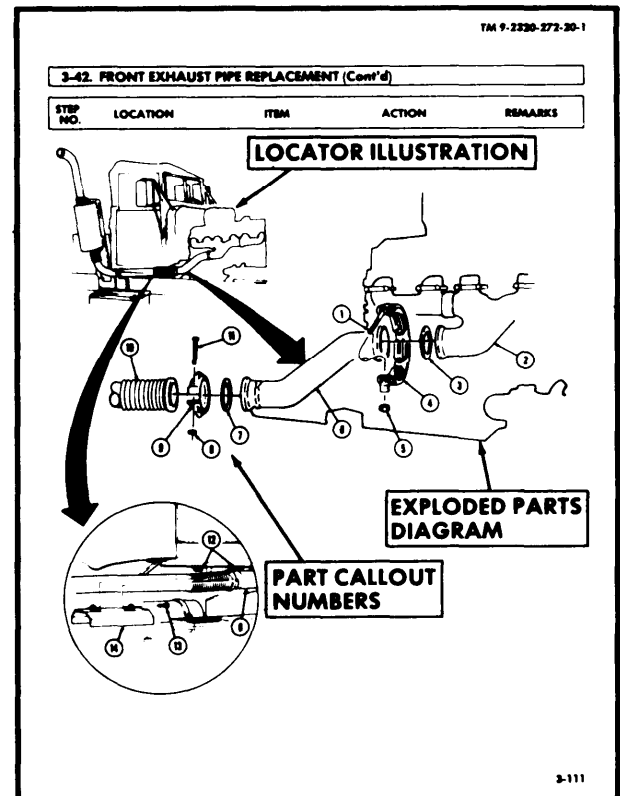
Personnel Required:
Light wheeled vehicle mechanic MOB 630

General Safety Instructions:
Do not touch hot exhaust system components with bare hands

Manual References:
TM 9-2320-272-10
TM 9-2320-272-30P

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
WARNING				
Do not touch hot exhaust system components with bare hands. Injury to personnel may result.				
1	Exhaust pipe cab heat shield brackets (12)	Heat shield (14) and two screws (13)	Remove	
2	Front exhaust pipe (6) to manifold (2)	Manifold coupling clamp (4), T-bolt (11), and locknut (5)	a. Remove locknut (5) b. Slide coupling clamp (4) away from mating flanges	Discard locknut (5)
3	Front exhaust pipe (6) to rear flex pipe (10)	Pipe coupling clamp (9), screw (11), and locknut (8)	a. Remove locknut (8) b. Remove screw (11) and coupling clamp (9)	Discard locknut (8)
4	Front exhaust pipe (6) and two flange gaskets (3) and (7)		Remove and clean flange areas	Discard gaskets (3) and (7)

3-110



11. Turn to paragraph 3-42 on page 3-110. Here you find the detailed procedure for removing the old front exhaust pipe and replacing it with a new one.

DETAILED MAINTENANCE PROCEDURES:

12. Detailed procedures: Include everything you must do to accomplish a basic maintenance task
 - a. Before beginning the maintenance task look through the procedure. You must familiarize yourself with the entire maintenance procedure before beginning the maintenance task. The entire procedure of paragraph 3-42: Front Exhaust Pipe Replacement includes: a Removal and b. Installation.
 - b. The nine basic headings listed under "INITIAL SETUP" outline the task conditions, materials, manpower requirements, and special conditions or tools. They are
 - Applicable Models: Any models that require that particular maintenance task
 - Test Equipment: Test equipment needed to complete a task
 - Special Tools: Those special tools needed to finish a maintenance task. The use of common tools is not explained.
 - Materials/Parts: All parts or materials needed to complete a task
 - Personnel Required: The number and type of personnel needed to accomplish a task
- NOTE: If you think that you need more help to correctly or safely complete a task (perhaps as the result of unusual conditions, *etc.*) alert your supervisor and ask for help.
- Manual References: Those manuals needed to complete the task

- Equipment Condition: Notes the conditions that must exist before starting the task For front exhaust replacement, the vehicle must be stopped and have the parking brake set, the hood must be raised and secured, and the engine side panel must be removed.
 - Special Environmental Conditions: Outlines specific environmental conditions necessary to perform a task For example darkening an area when adjusting headlight beams.
 - General Safety Instructions Summarizes all safety warnings for the maintenance task
- c. A step by step maintenance procedure follows the Initial Setup. Five columns, "Step No.", "Location", "Item", "Action", and "Remarks" give detailed instructions for the procedure. They are
- Step No.: Gives the sequence of task steps.
 - Location: Indicates the general location of the parts(s) you are working on in this step. Example for Front Exhaust Pipe Replacement, a Removal; the location of step no. 2 is "Front exhaust pipe (6) to manifold (2)". NOTE: The numbers in parentheses correspond to that part's callout number in the accompanying illustration.
 - Item: Lists the specific part(s) you are concerned with in this step. In our example they are: "Manifold coupling clamp (4), T-bolt (1), and locknuts (5)".
 - Action: Explains the action to be taken with those parts listed in the Item column. In our example you are directed to "a Remove locknut (5)." and "b. Slide coupling clamp (4) away from mating flanges".
 - Remarks: Provides additional information. In our example "Discard locknut (5)."
- d. At the end of a procedure, "FOLLOW-ON TASKS" will list those additional tasks that must be performed to complete the procedure. The Follow-On Tasks for Front Exhaust Pipe Replacement is "Start engine (TM 9-2320-272-10) and check for exhaust leaks." and "Install engine side panel (TM 9-2320-272-10)".
13. Refer to the example pages for para 3-42, Front Exhaust Pipe Replacement as we review the following points:
- a. Modular Text: Both pages of text and illustrations are to be used together. This manual was designed so that the two pages would be visible at once, making part identification and procedure sequence easy to follow.
 - b. Initial Setup: Outlines task conditions.
 - c. Illustrations: A locator diagram shows us where the front exhaust pipe is on the truck A cut-away view (part of the truck was "erased") is used to expose the part of the exhaust system we are working on. An exploded diagram of the component, removed from the truck shows part locations, attachments, and spatial relationships.
14. You can also use the Table of Contents (page ii) to find more information about the vehicle. For example: Principles of Operation in chapter 1.
15. Organizational PMCS are presented in table 2-1 starting on page 2-4.
16. Chapter 2, section VI. STE/ICE Troubleshooting, can be used if STE/ICE is available for troubleshooting or PMCS.
17. Refer to TM 9-2320-272-20P, Organizational Maintenance Repair Parts and Special Tools List for Truck 5-Ton, 6x6, M939 Series, when requisitioning parts, special tools, and equipment for organizational maintenance.
18. Your manual is easier to use once you understand its design. We hope it will encourage you to use it more often.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

a. This technical manual contains instructions for organizational maintenance of 5-ton, 6x6, M939, M939A1 and M939A2 series vehicles. Organizational maintenance instructions for M939A2 unique engine and central tire inflation are contained in TM 9-2320-358-24&P.

b. The vehicle model numbers and equipment names covered include:

M923, M923A1, M923A2 Cargo Truck, WO/W (Dropside)
M924, M924A1, M924A2 Cargo Truck, WO/W
M925, M925A1, M925A2 Cargo Truck, W/W (Dropside)
M926, M926A1, M926A2 Cargo Truck, W/W
M927, M927A1, M927A2 Cargo Truck, WO/W (XLWB)
M928, M928A1, M928A2 Cargo Truck, W/W (XLWB)
M929, M929A1, M929A2 Dump Truck, WO/W
M930, M930A1, M930A2 Dump Truck, W/W
M931, M931A1, M931A2 Tractor Truck, WO/W
M932, M932A1, M932A2 Tractor Truck, W/W
M934, M934A1, M934A2 Expansible Van, WO/W
M935, M935A1, M935A2 Expansible Van, WO/W (W/HLG)
M936, M936A1, M936A2 Medium Wrecker, W/W

1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

1-3. DESTRUCTION OF ARMY EQUIPMENT TO PREVENT ENEMY USE

Procedures for destruction of Army equipment to prevent enemy use can be found in TM 750-244-6.

1-4. PREPARATION FOR STORAGE AND SHIPMENT

Storage and shipment instructions are in chapter 12 of this manual. Additional information can be found in. TM 740-90-1, Administrative Storage of Equipment, and TM 746-10, Marking, Packaging and Shipment of Supplies and Equipment: General Packaging Instructions for Field Use.

1-5. OFFICIAL NAMES AND NOMENCLATURE

The nomenclature, names, and designations used in this manual are in accordance with MIL-HDBK-63038-2.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your 5-ton, M939 series vehicle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why YOU don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MT, Warren, Michigan 48397-5000. We'll send you a reply.

The quarterly Equipment Improvement Report and Maintenance Digest, TB 43-0001-39 series, contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles resulted from comments, minor alterations, proposed Modification Work Orders (MWO's), actions taken on some of your DA form 2028's (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual. The information will help you in doing your job better and will help in keeping you advised of the latest changes to this manual.

1-7. WARRANTY INFORMATION

The (5-ton, 6x6, M939 series), Cummins engine (model NHC 250), and Allison transmission (model MT654CR) are warranted in accordance with TB 9-2300 295- 15/21. The warranty starts on the date, found in block 23, DA form 2408-9, in the logbook Report all defects in material or workmanship to your supervisor, who will take appropriate action.

Section II. EQUIPMENT DESCRIPTION AND DATA

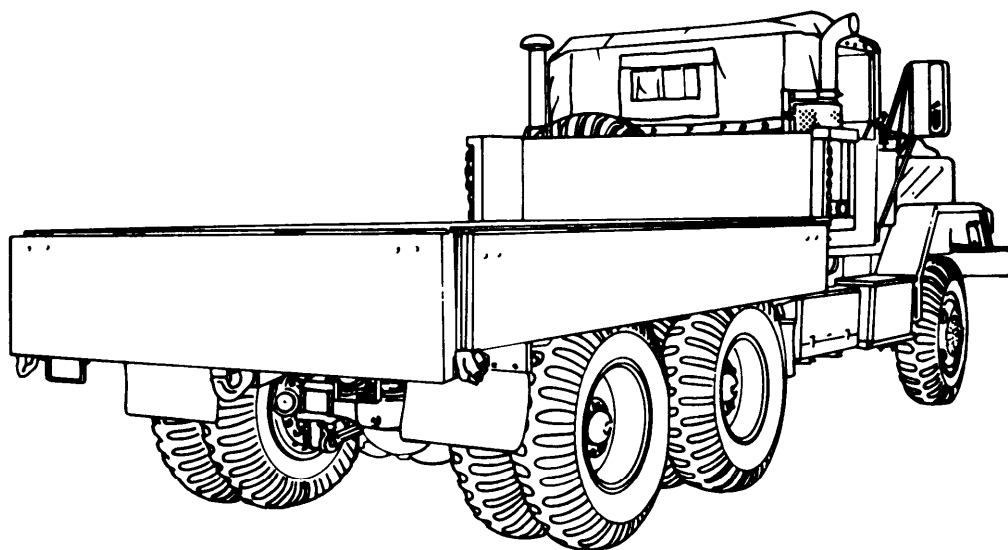
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

M939 series, 6x6, 5-ton vehicles are highly mobile tactical vehicles capable of traversing most terrain types under severe weather conditions. The vehicles of this series utilize common cab body, engine, drivetrain, electrical, brake, and chassis components that accommodate a variety of configurations to accomplish multiple combat support and service roles. A tilt-up hood for improved engine accessibility, an external STE/ICE connector, and parts interchangeability, ease maintenance and logistics requirements. All M939 series vehicles have a pintle hook for towing and tiedowns and lifting shackles for air, rail, or sea transport. Additionally, all vehicles are equipped with front and rear emergency and service couplings which improve towing characteristics by interconnecting the airbrake systems of the recovery and disabled vehicles.

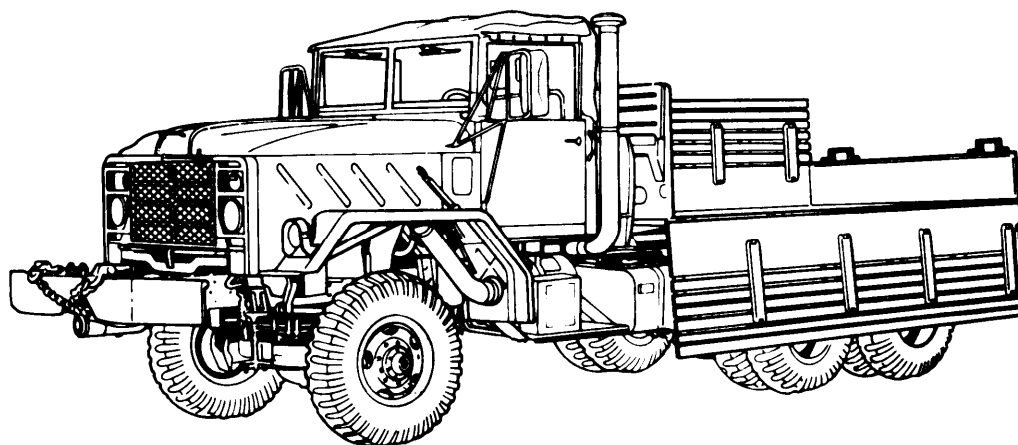
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

a. Cargo Trucks With Dropsides: M923 WO/W and M925 W/W.

PURPOSE: These models are used to transport cargo and troops. The vehicle has a payload rating of 20,000 pounds (9,080 kg) and provides 550 cubic feet (15.4 cubic meters) of cargo space. Removable dropsides and tailgate permit hauling of extra wide loads and easy access for unloading cargo. Troop seats, bows, and canvas are also available. The M925 model has a winch and can be used for recovery operations.



M923 WO/W

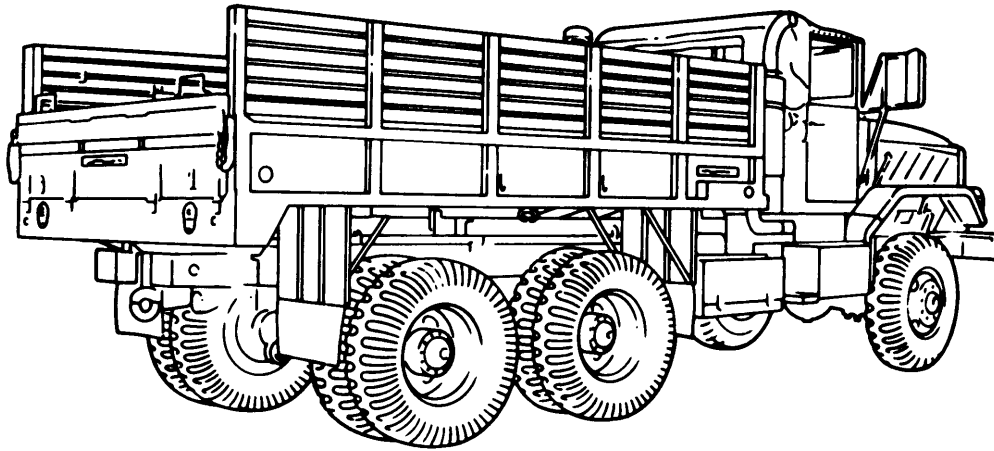


M925 W/W

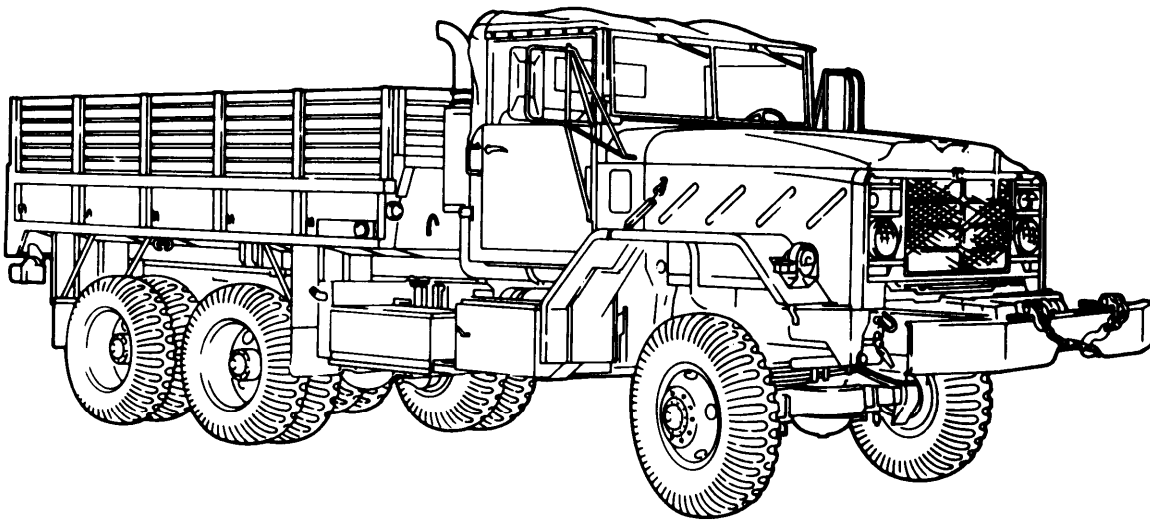
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

b. Cargo Trucks: M924 WO/W and M926 W/W.

PURPOSE: These models are used to transport cargo and troops. They are similar to M923 and M925 cargo trucks. M924 and M926 trucks have permanent steel welded sides, making them a preferred vehicle when transporting bulky or shifting loads. The M926 has a winch and can be used for recovery operations.



M924 WO/W

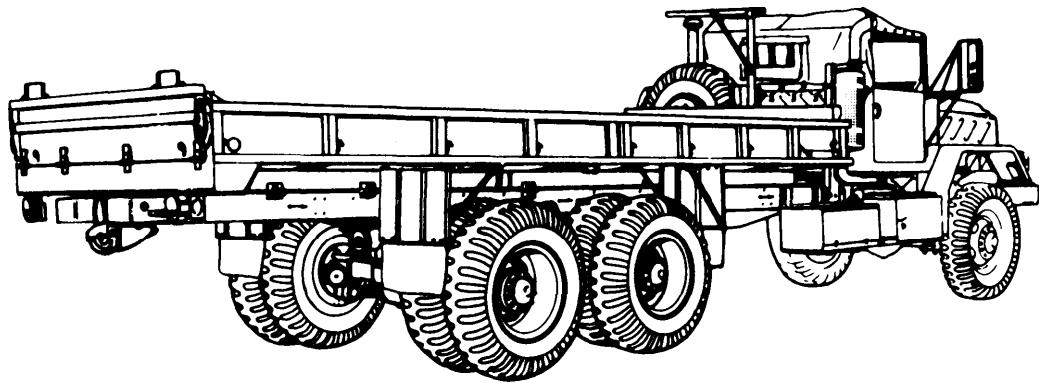


M926 W/W

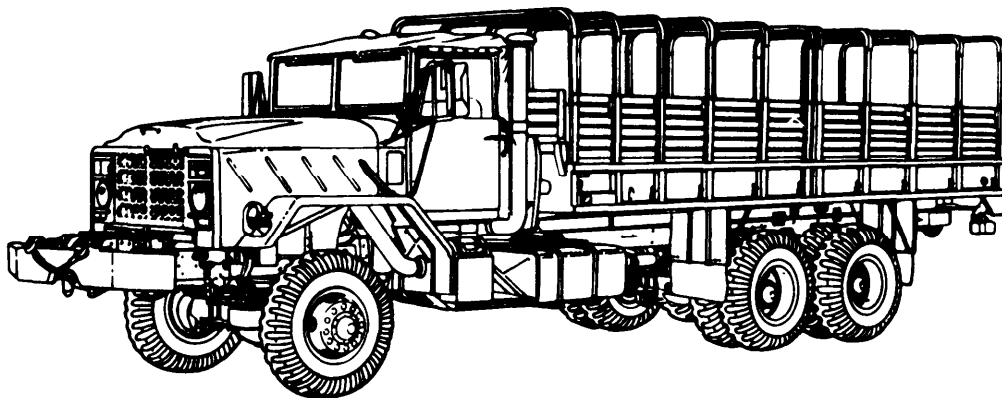
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

c. Cargo Trucks With Extra Long Wheelbases (XLWB): M927 WO/W and M928 W/W.

PURPOSE: These models are used for hauling troops and longer cargo loads. M927 and M928 models have the same payload characteristics as M923, M924, M925, and M926 models, but have another 76 inches (193 centimeters) of bed space that allows an additional 194 cubic feet (5.4 cubic meters) of cargo space. Troop seats, bows, and canvas are available. This vehicle has permanent steel-welded sides. The M928 model has a winch and can be used for recovery operations.



M927 WO/W

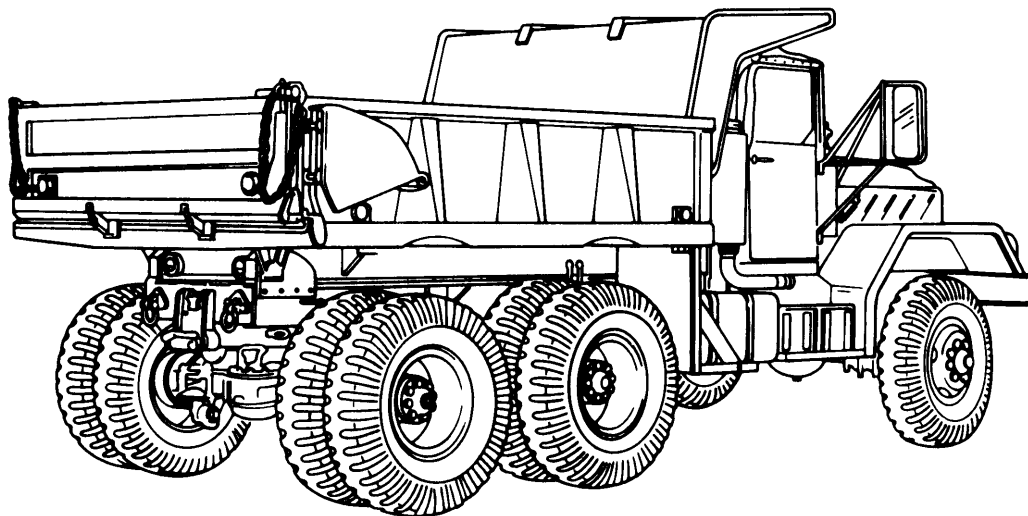


M928 W/W

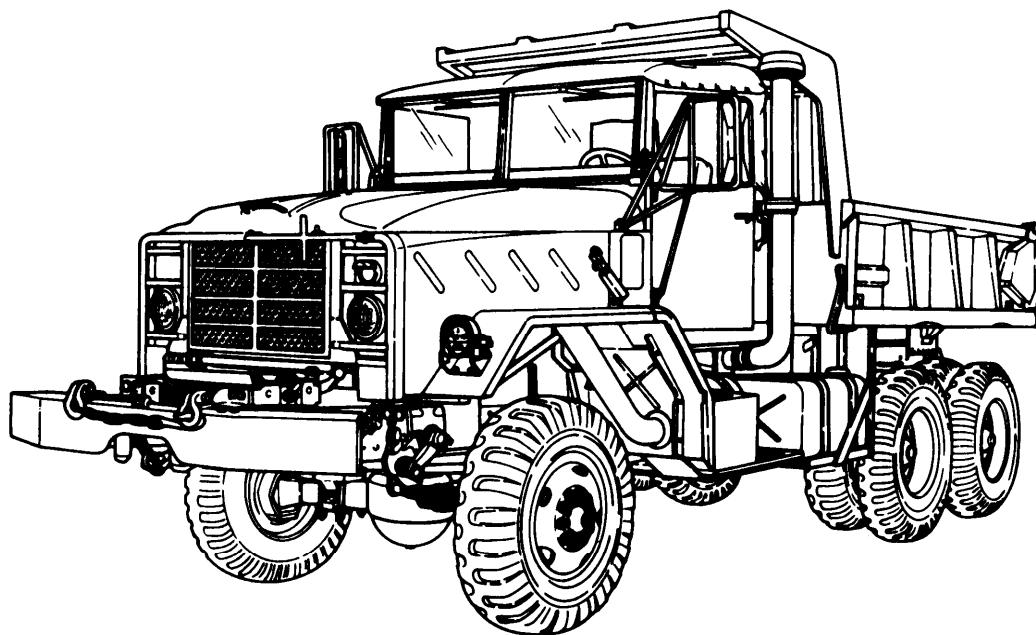
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

d. Dump Trucks: M929 WO/W and M930 W/W.

PURPOSE: These models are used for hauling and dumping cargo. They have a capacity of five cubic yards (3.84 cubic meters). The body has provisions for side racks, troop seats, bows, and canvas for troop transport. The M930 model has a winch and can be used for recovery operations.



M929 WO/W



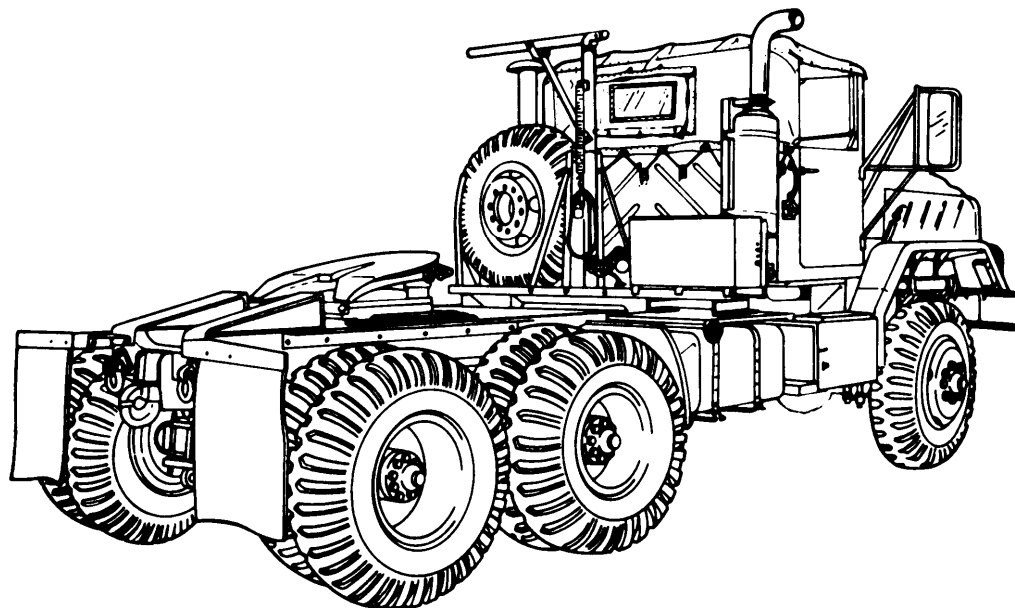
M930 W/W

TA 348856

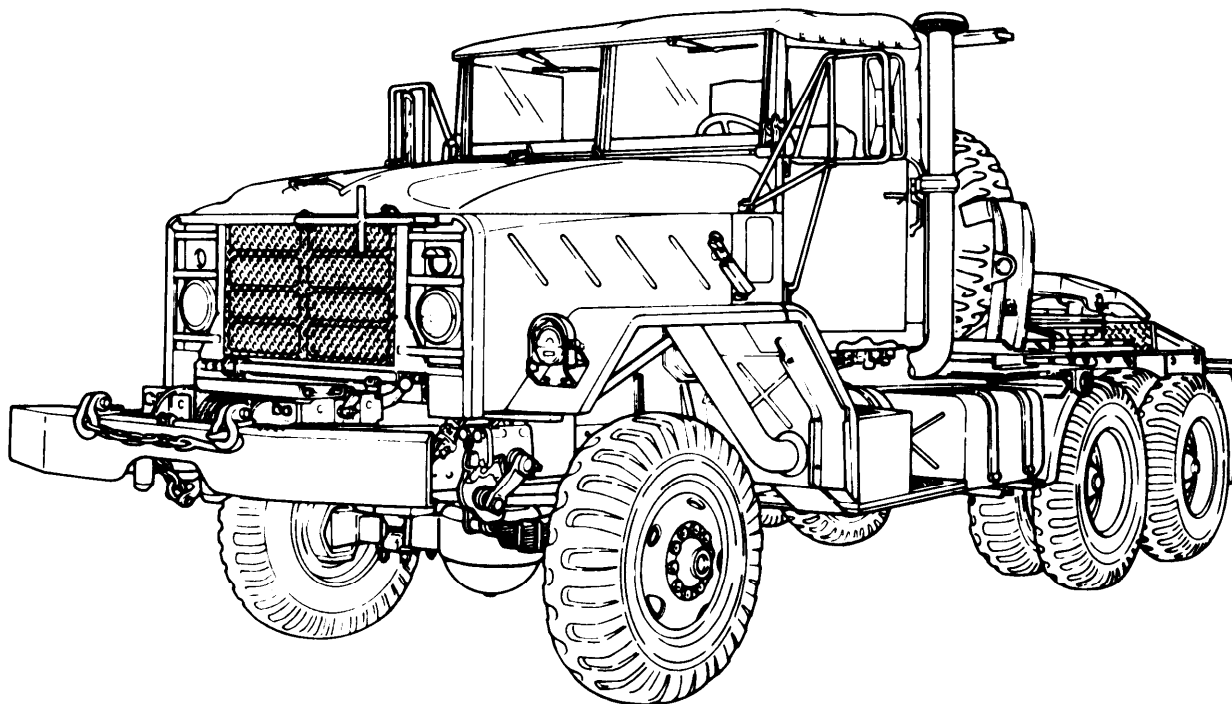
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

e. Tractor Trucks: M931 WO/W and M932 W/W.

PURPOSE: These models are equipped with a fifth wheel and are used for hauling semitrailers. The fifth wheel is capable of pivoting 21 degrees up, 15 degrees down, or 7 degrees sideways. The M932 has a winch and can be used for recovery operations.



M931 WO/W



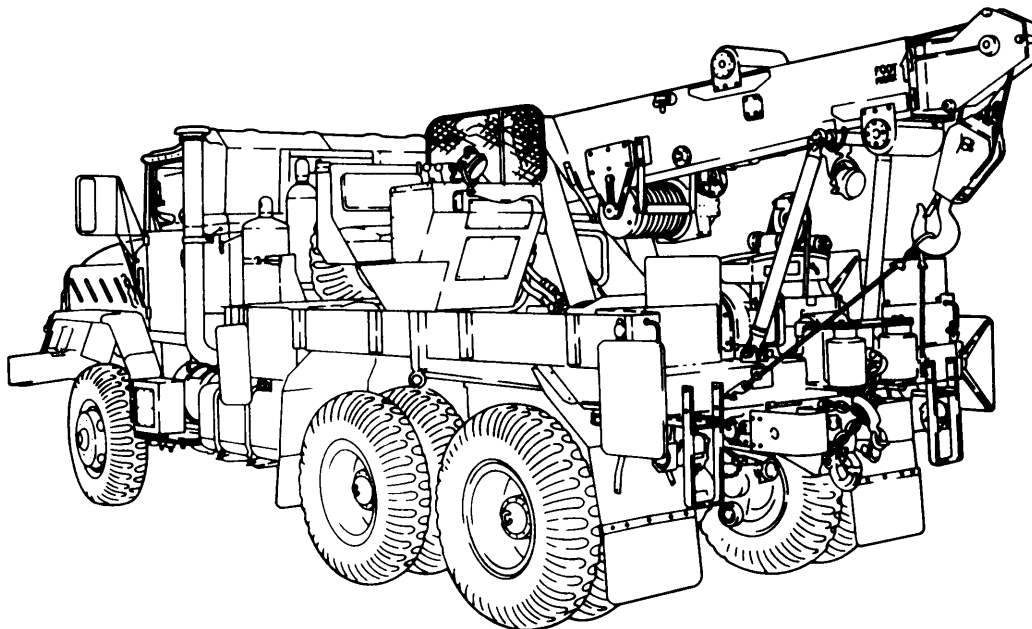
M932 W/W

TA 340857

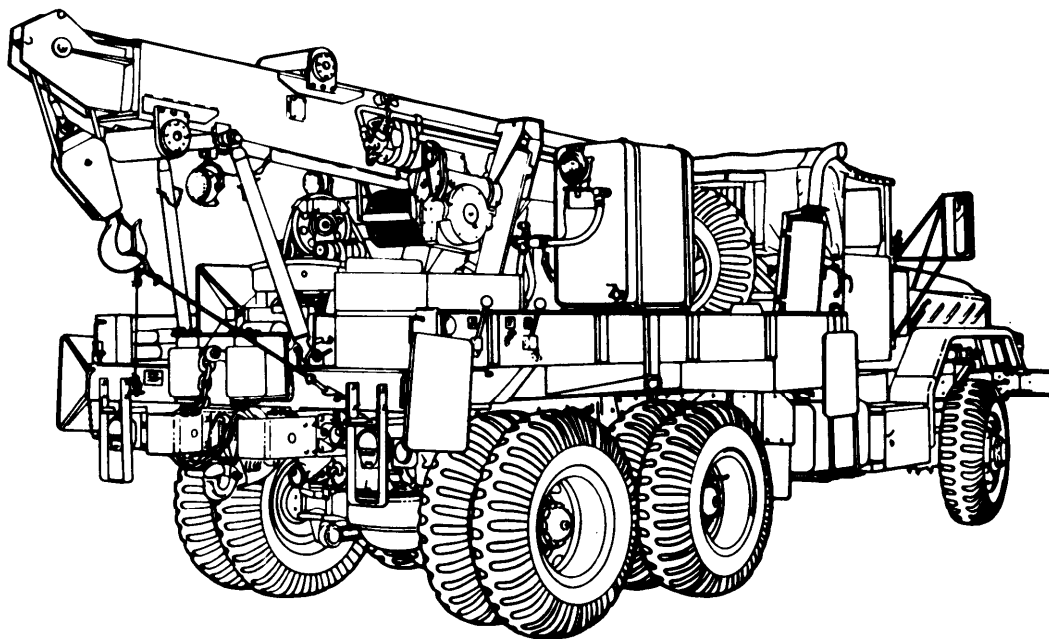
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

f. Medium Wrecker: M936 W/W.

PURPOSE: This model is used for wrecker and salvage operations. It has a revolving hydraulic crane with a self-supported extendable boom. Boom-to-ground supports and outriggers are provided. Crane lifting capacity is 20,000 pounds (9,080 kg). The vehicle is also equipped with a front winch [20,000 pound (9,080 kg) capacity] and a rear winch [45,000 pound (20,250 kg) capacity].



M936 W/W (LEFT SIDE VIEW)



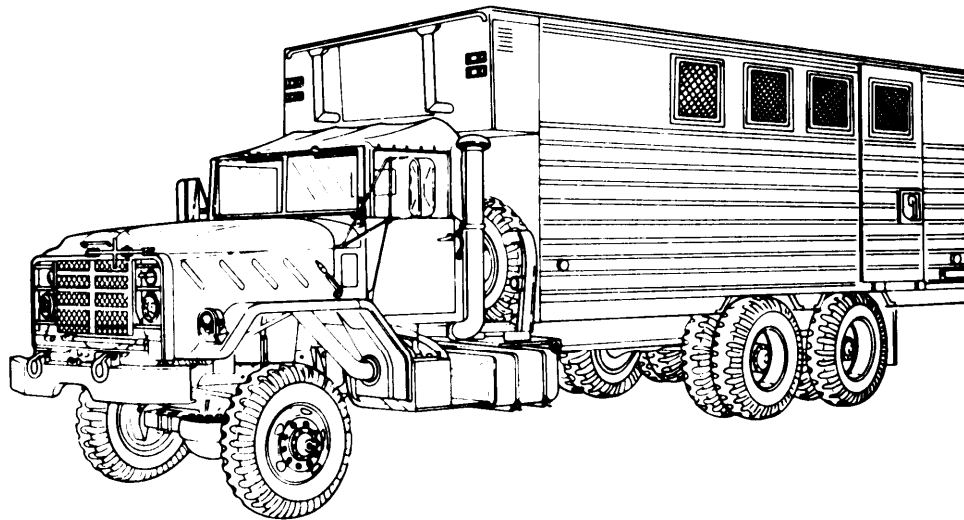
M936 W/W (RIGHT SIDE VIEW)

TA 348858

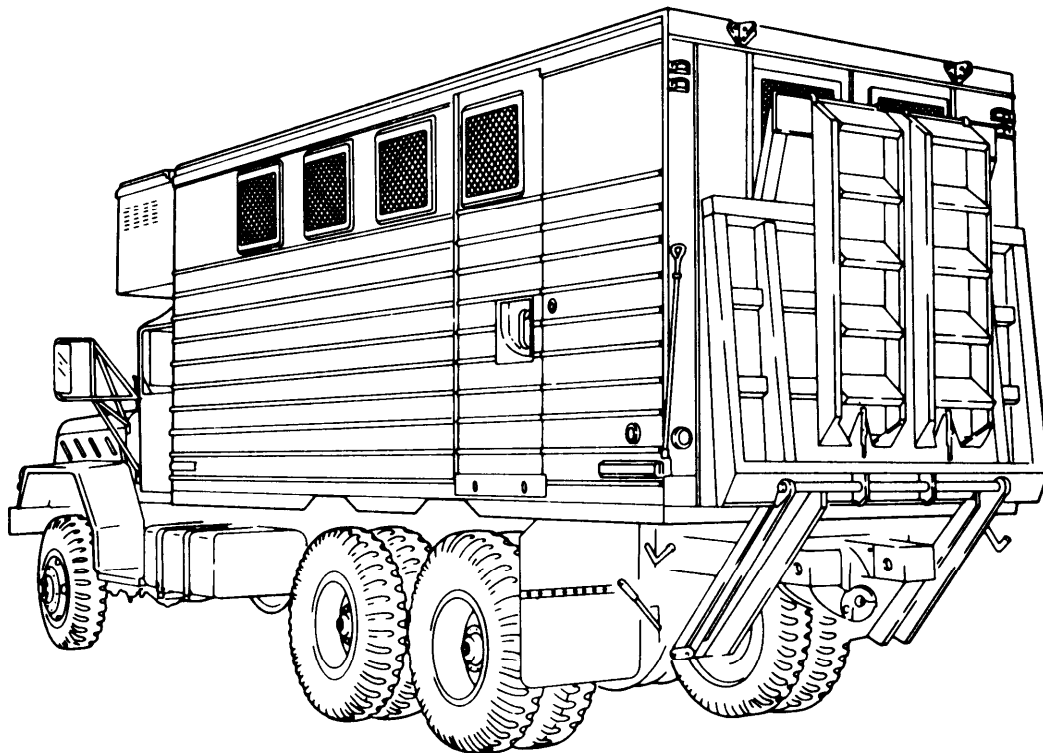
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Cont'd)

g. Expansible Vans: M934 WO/HLG and M935 W/HLG.

PURPOSE: These models are used for electronic, maintenance, supply, power, and base station operations. The M935 has a hydraulic liftgate [3,000 pound (1,362 kg) capacity] that can be used for lifting and lowering heavy equipment.



M934 WO/HLG



M935 W/HLG

TA 348859

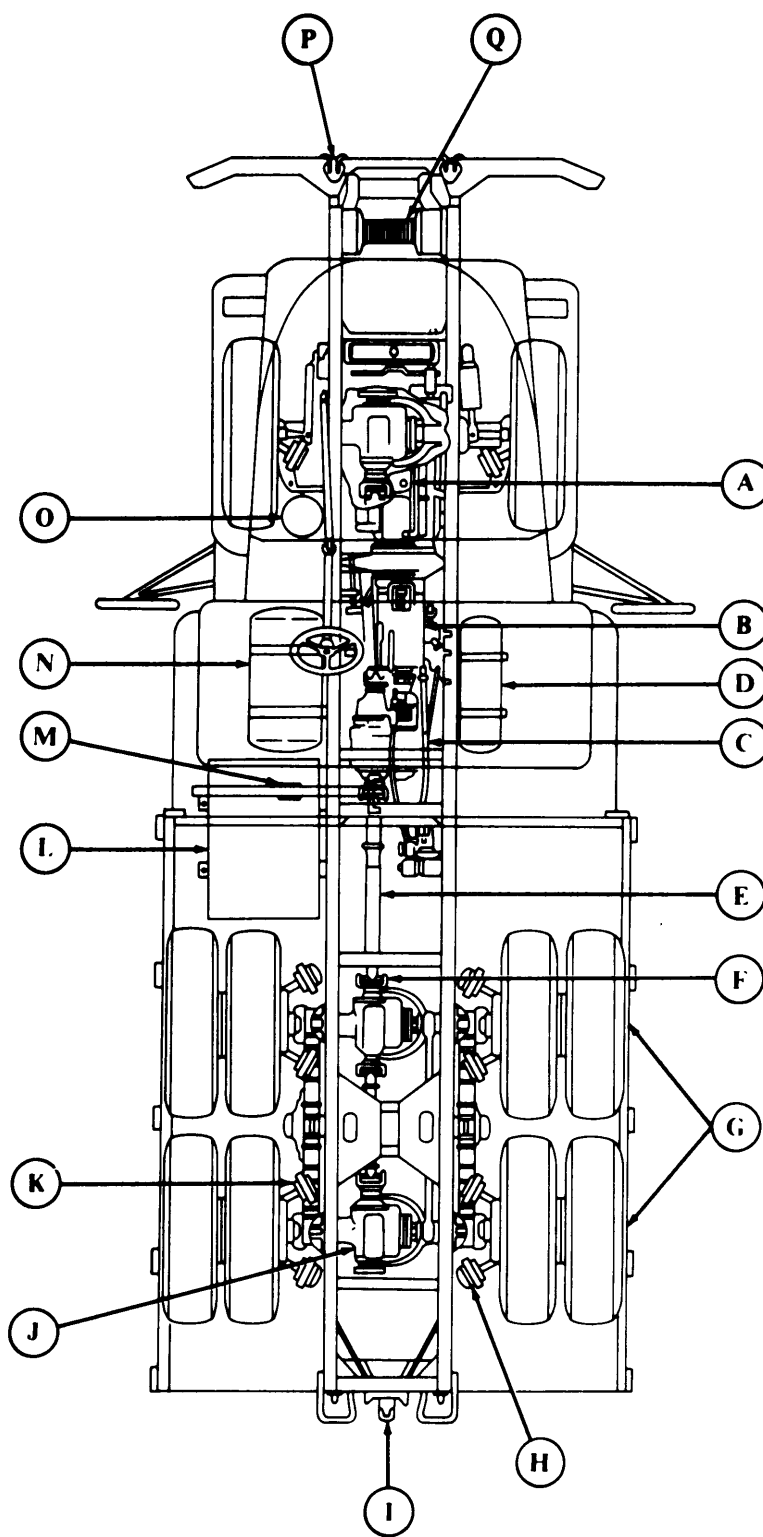
1-9. LOCATION AND DESCRIPTION OF MAJOR EXTERIOR COMPONENTS

The exterior components described below are common to most of the vehicles covered in this manual. Special differences can be found in TM 9-2320-272-10 or table 1-1, Differences Between Models, in this manual.

- (A) ENGINE** — Provides power for the vehicle.
- (B) TRANSMISSION** — Adapts engine to different operating speeds.
- (C) TRANSFER CASE** — Transmits engine and transmission power to front and rear axles.
- (D) AIR RESERVOIR** — Storage tank(s) for compressed air.
- (E) REAR PROPELLER SHAFT(S)** — Transmits engine power from transmission to transfer case and then to the rear differential
- (F) UNIVERSAL JOINT(S)** — Connections between drive/propeller shafts that permit one to drive the other even though they may join at an angle.
- (G) REAR BOGIE** — Suspension system that supports rear vehicle weight.
- (H) SPRING BRAKE CHAMBER** — Contains a large spring which applies rear brakes when spring brake air pressure is released.
- (I) TOWING PINTLE** — Permits towing of vehicles or equipment.
- (J) REAR DIFFERENTIAL(S)** — Transmits power from propeller shaft to axles.
- (K) AIRBRAKE CHAMBER(S)** — Converts air pressure to mechanical braking force.
- (L) FUEL TANK(S)** — Stores fuel. Dual tanks are found on M929, M930, M931, M932, and M936 models.
- (M) SPARE TIRE CARRIER** — Stores spare tire and provides a boom for lowering and raising spare. Found only on M923, M925, M924, M926, M927, M928, M931, and M932 models.
- (N) AIR CLEANER** — Filters air before it enters the intake manifold.
- (O) FUEL FILTER** — Filters dirt and water from fuel.
- (P) LIFTING SHACKLE(S)** — Permit vehicle to be towed by another vehicle or for tie down attachment when transporting vehicle.
- (Q) FRONT WINCH** — Hydraulically powered to permit recovery operations. Found only on M925, M926, M928, M930, M932, and M936 models.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Cont'd)

- (A) ENGINE**
- (B) TRANSMISSION**
- (C) TRANSFER CASE**
- (D) AIR RESERVOIR(S)**
- (E) REAR PROPELLER SHAFT(S)**
- (F) UNIVERSAL JOINT(S)**
- (G) REAR BOGIE**
- (H) SPRING BRAKE CHAMBER**
- (I) TOWING PINTLE**
- (J) REAR DIFFERENTIAL(S)**
- (K) AIRBRAKE CHAMBER(S)**
- (L) FUEL TANK(S)**
- (M) SPARE TIRE CARRIER**
- (N) AIR CLEANER**
- (O) FUEL FILTER**
- (P) LIFTING SHACKLE(S)**
- (Q) FRONT WINCH**



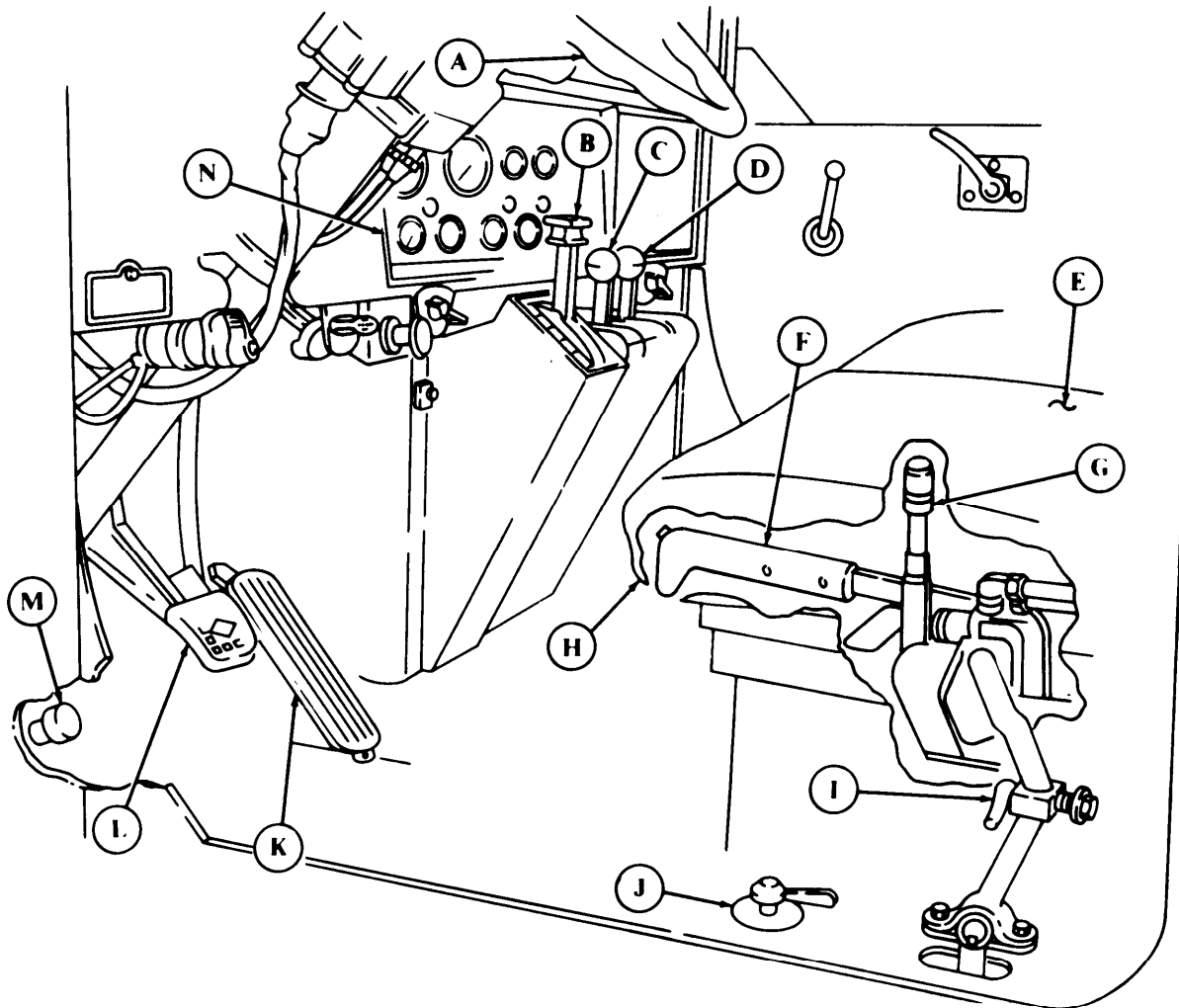
TA 348860

1-10. LOCATION OF MAJOR INTERIOR COMPONENTS

The major interior components shown below are common to one or more models covered by this manual. Components not covered here can be found in TM 9-2320-272-10 or the applicable maintenance chapters of this manual.

- (A)** STEERING WHEEL — Manual control for turning vehicle.
- (B)** TRANSMISSION SELECTOR LEVER — Manual control to select driving gear.
- (C)** TRANSMISSION POWER TAKEOFF LEVER — M925, M926, M928, M929, M930, M932, and M936 models only. Provides hydraulic power for front winch and dump body operation.
- (D)** WINCH CONTROL LEVER — Front winch models only. Manual control pulls back to wind winch.
- (E)** PASSENGER SEAT — Combination two-person crew seat and battery box. Holds four batteries and provides area for storage.
- (F)** TRANSFER CASE SHIFT LEVER — Pushed down to HIGH for light load operation — up to LOW for heavy load operation. Six-wheel drive is achieved automatically when transfer case shift lever is placed in LOW.
- (G)** PARKING BRAKE CONTROL LEVER — Pulled up to engage spring and mechanical parking brakes — down to disengage brakes. Knob on top of handle is turned clockwise to increase braking action, counterclockwise to decrease braking action.
- (H)** DRIVER'S SEAT — One crew member adjustable seat.
- (I)** DUMP BODY CONTROL LEVER — M929 and M930 models only. Control lever for lowering and raising dump body.
- (J)** FUEL TANK SELECTOR LEVER — Dual tank models only. Opens supply of fuel from either left or right fuel tanks to fuel pump.
- (K)** ACCELERATOR PEDAL — Foot control for determining engine speed.
- (L)** BRAKE PEDAL — Foot control for stopping vehicle.
- (M)** DIMMER SWITCH — Depressed to raise or lower headlight beam.
- (N)** INSTRUMENT PANEL — Houses controls and indicators.

1-10. LOCATION OF MAJOR INTERIOR COMPONENTS (Cont'd)



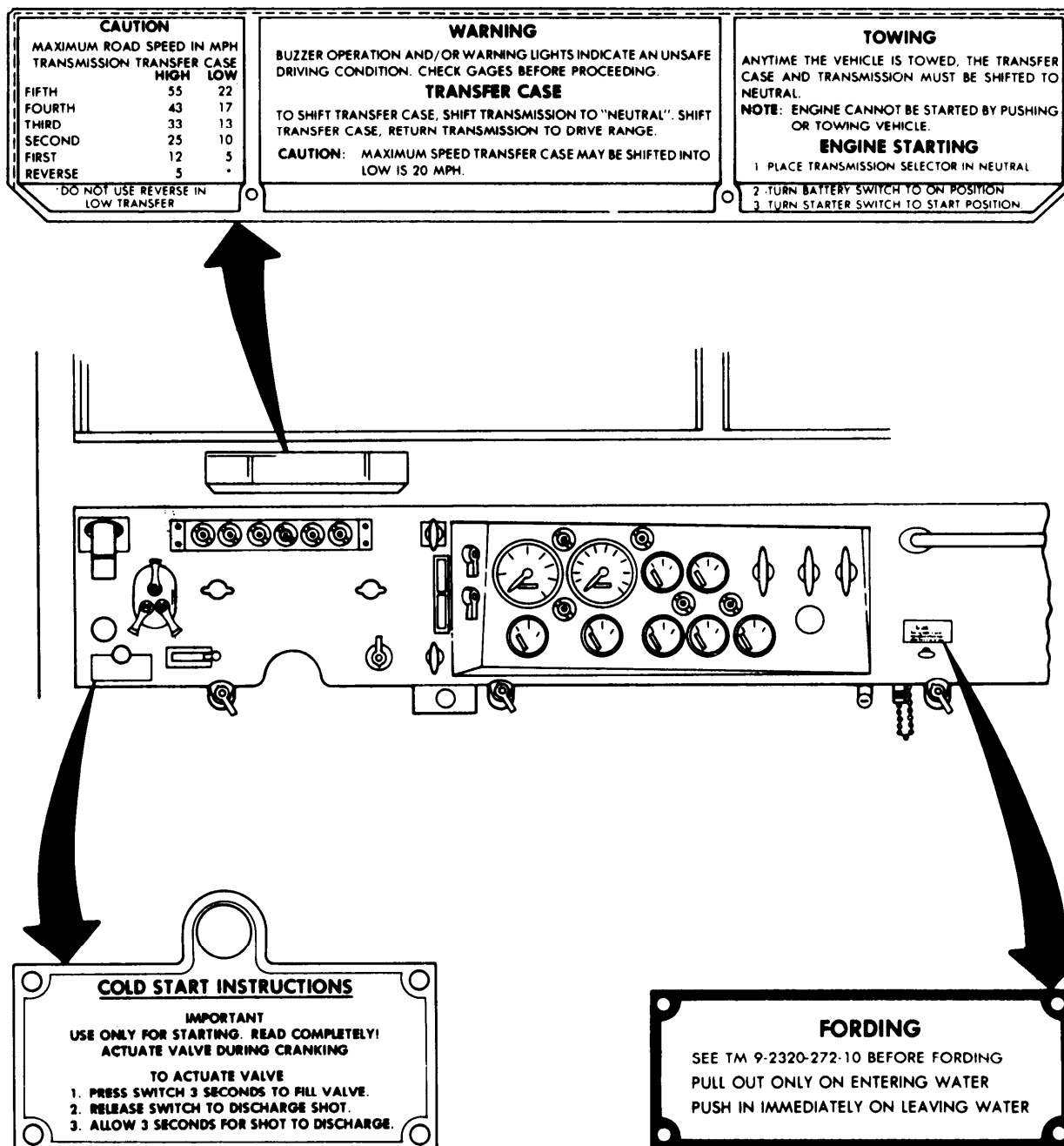
- | | |
|---|-------------------------------------|
| (A) STEERING WHEEL | (H) DRIVER'S SEAT |
| (B) TRANSMISSION SELECTOR LEVEL | (I) DUMP BODY CONTROL LEVER |
| (C) TRANSMISSION POWER TAKEOFF LEVER | (J) FUEL TANK SELECTOR LEVER |
| (D) WINCH CONTROL LEVER | (K) ACCELERATOR PEDAL |
| (E) PASSENGER SEAT | (L) BRAKE PEDAL |
| (F) TRANSFER CASE SHIFT LEVER | (M) DIMMER SWITCH |
| (G) PARKING BRAKE CONTROL LEVER | (N) INSTRUMENT PANEL |

TA 348861

1-11. LOCATION AND CONTENTS OF CAUTION, DATA AND WARNING PLATES

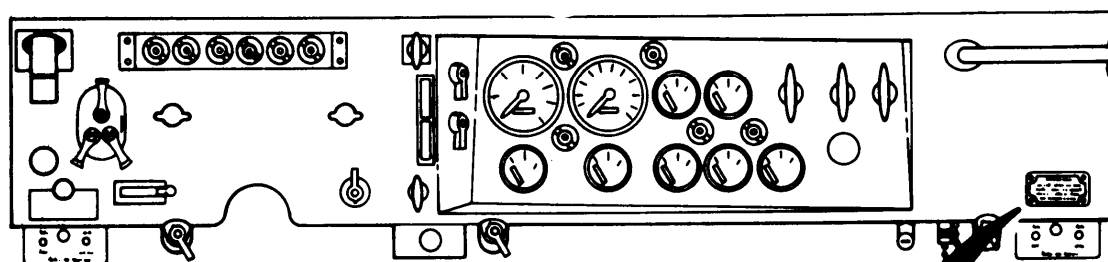
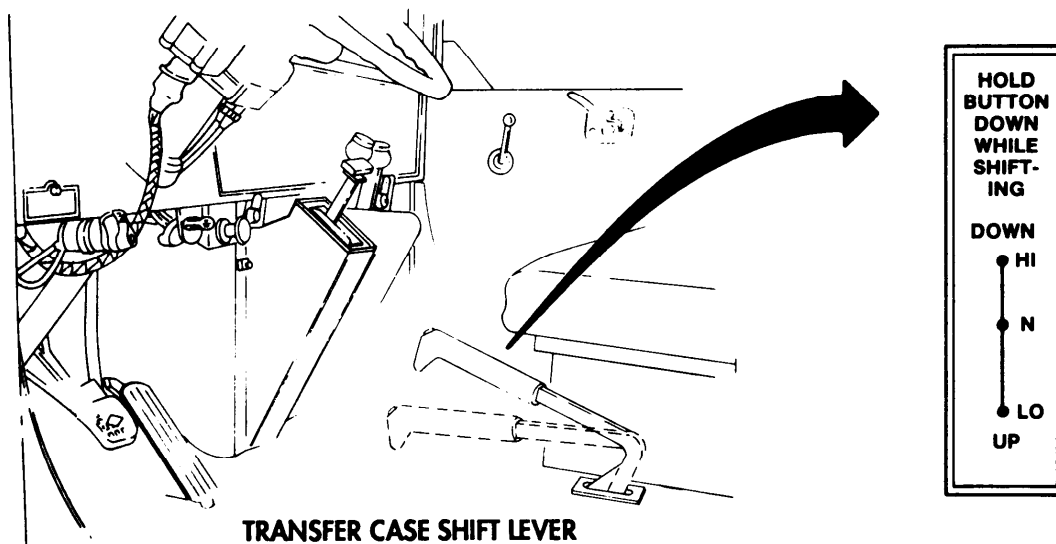
a. The location and contents of caution, data and warning plates are provided in this paragraph. A complete list and location of all caution, data warning, and identification plates is in TM 9-2320-272-20P. If any of these plates are worn, broken, painted over, missing, or unreadable, they must be replaced.

b. Below are those plates that are located inside the cab. These plates are common to one or more models covered in this manual.



TA 348862

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)



HEATER OPERATING INSTRUCTIONS

TO START HEATER:

1. WITH HEATER "HI-LO" SWITCH IN "LO" POSITION, HOLD HEATER SWITCH IN "START" POSITION.
2. WHEN HEATER INDICATOR LIGHT COMES ON, MOVE HEATER SWITCH TO "RUN" POSITION.

TO SELECT TEMPERATURE

1. SNAP "HI-LO" SWITCH TO DESIRED LEVEL

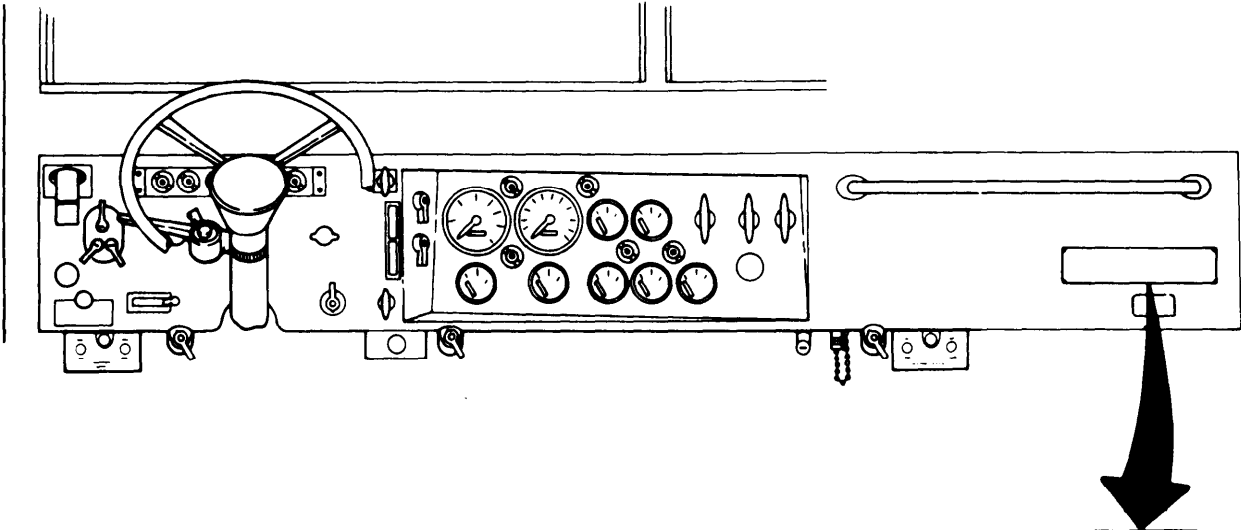
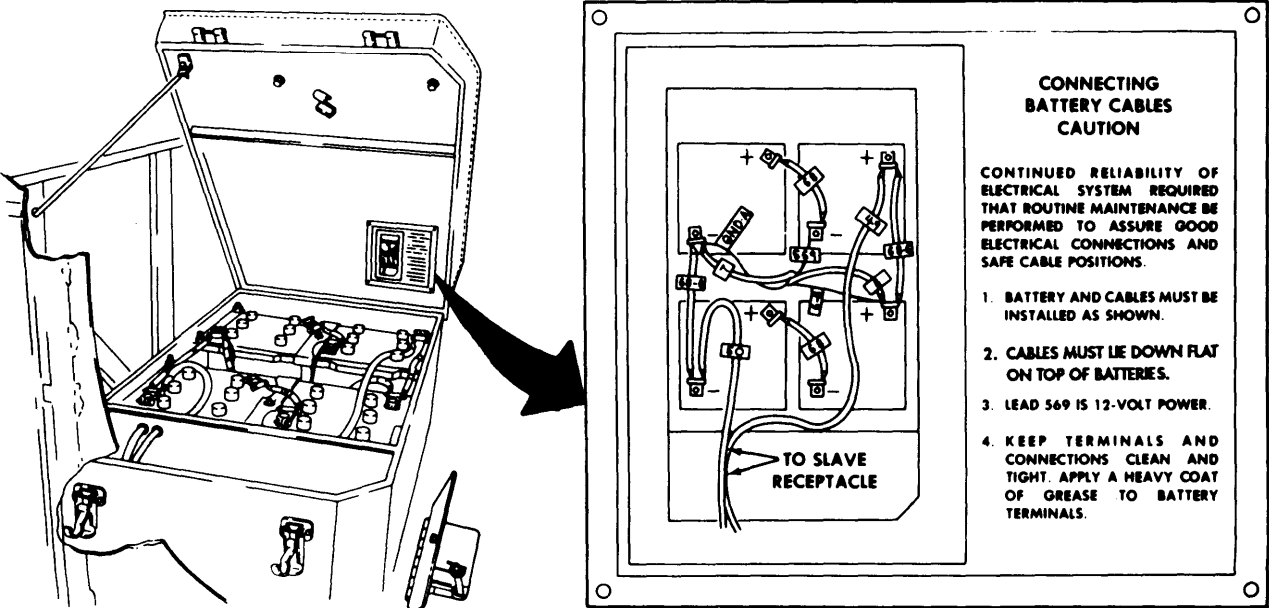
TO DEFROST (IF APPLICABLE)

1. CLOSE DAMPER

IF HEATER FAILS TO START

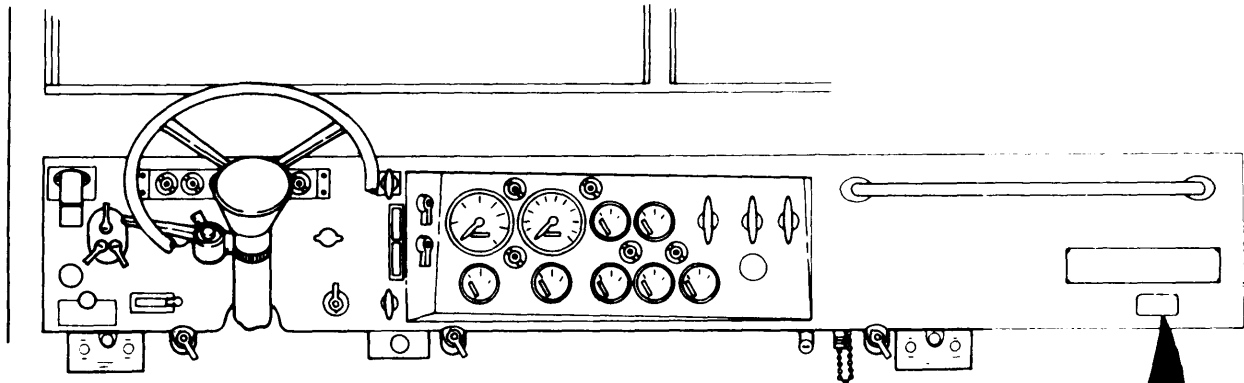
1. CHECK "PRESS TO TEST" INDICATOR LIGHT.
 2. IF LIGHT WORKS AND HEATER STILL FAILS TO START IN APPROXIMATELY 3 MINUTES, SERVICE IS REQUIRED. SEE SERVICE MANUAL
- NOTE: CLEAN FUEL FILTER FREQUENTLY TO PREVENT ICE FORMATION.**

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)



SERVICING DATA			ELECTRICAL SYSTEM 24V			PUBLICATIONS APPLYING TO THIS VEHICLE
DIESEL FUEL PER FEDERAL SPEC VVF 800			TIRE INFLATION PRESSURE (PSI)			
FUEL TANK	CAPACITY	81 GAL	HIGHWAY	FRT 80	REAR 50	OPER. MANUAL 9-2320-272-10 LUB. ORDER 9-2320-272-12 MAINT. MANUAL 9-2320-272-20 PARTS MANUAL 9-2320-272-20P
COOLING SYSTEM	CAPACITY	47 QTS	OFF HIGHWAY	FRT 60	REAR 30	
CRANKCASE	CAPACITY	27 QTS	MUD, SAND & SNOW	FRT 25	REAR 25	
TRANSMISSION	CAPACITY	17 QTS				
TEMPERATURE	ENGINE OIL	GEAR OIL	TRANSMISSION			CHANGE OIL EVERY 6000 MILES OR 6 MONTHS
ABOVE 32°F	MIL-L-2104 GR 30	MIL-L-2105 GR 80/90	ABOVE 0°F MIL-L-2104 GR 10			
40°F TO -10°F	MIL-L-2104 GR 10	MIL-L-2105 GR 80/90	0° TO -65°F MIL-L-46167			
0°F TO -65°F	MIL-L-40167	MIL-L-10323	GREASE: LUBRICATION			
			OPOFH: LO 9-2320-272-12			

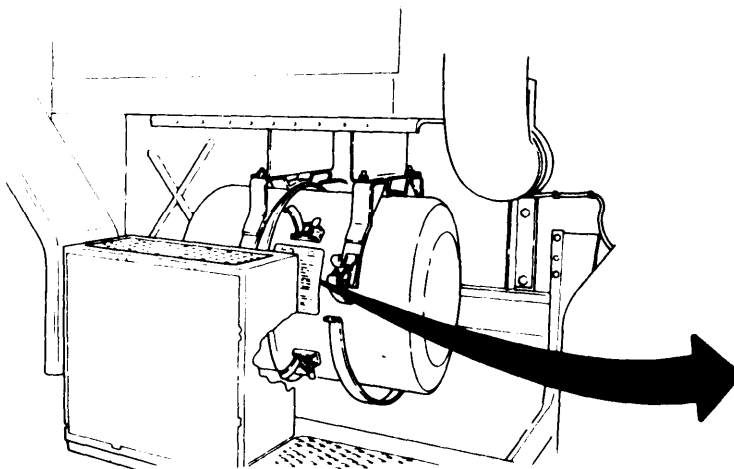
1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)



RUSTPROOFING

MATERIAL MFD BY _____
 RUSTPROOFED BY **AM General Corporation**
 DATE RUSTPROOFED _____

c. The plate shown below is located on the air cleaner assembly and is common to _____ series vehicles.



FOR MAXIMUM SERVICE LIFE
 WITH HORIZONTAL INSTALLATIONS, DUST SLOT IN
 INTERNAL BAFFLE MUST BE IN TOP POSITION. (NOTE
 ARROWS ON DUST CUP BOTTOM.)

SERVICE INSTRUCTIONS:

REMOVE FILTER ELEMENT. IF END SEAL OR FABRIC IS
 DAMAGED, REPLACE WITH ORDNANCE
 NO. 11604545. FOR SERVICEABLE UNITS, USE 100
 PSI COMPRESSED AIR TO CLEAN AS FOLLOWS: DIRECT
 AIR STREAM INSIDE TO OUTSIDE, BLOW OFF OUTSIDE
 AND AGAIN DIRECT AIR STREAM INSIDE TO OUTSIDE,
 OR WASH IN WARM WATER AND A DETERGENT.
 RINSE AND DRY BEFORE RE-USE.

WARNING

**DO NOT CLEAN IN GASOLINE OR
 OTHER PETROLEUM SOLVENTS.**

EMERGENCY CLEANING:
 LOOSEN AND REMOVE DIRT BY TAPPING SIDES
 GENTLY WITH HANDS.

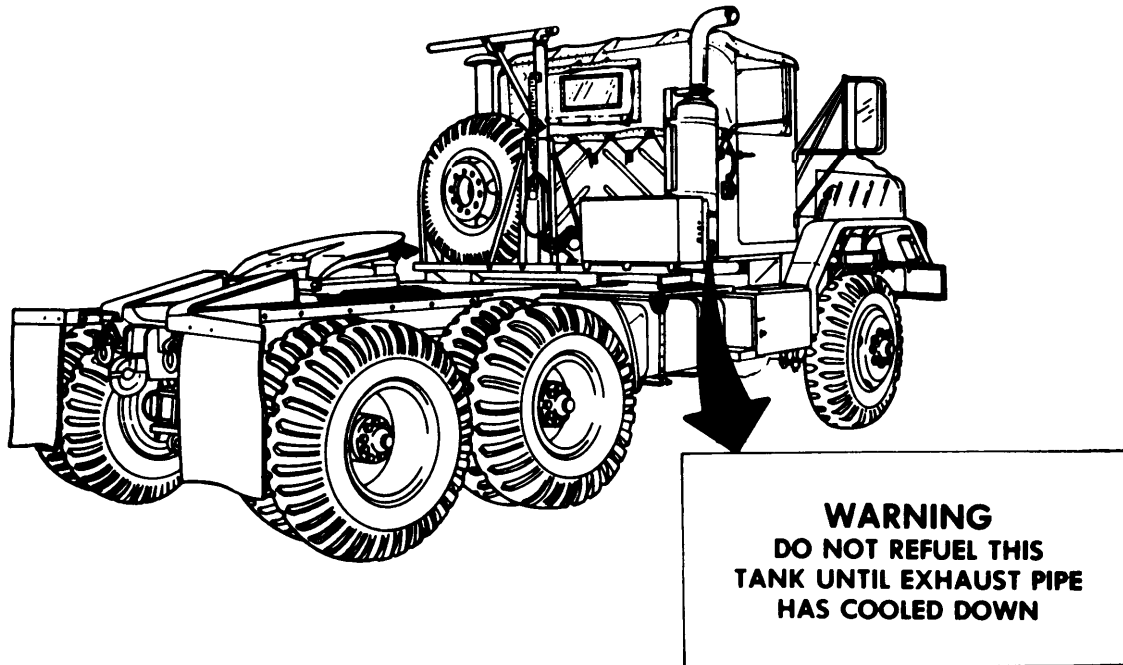
DO NOT STRIKE ENDS

CONSULT VEHICLE MANUAL FOR DETAILED
 CLEANING INSTRUCTIONS.

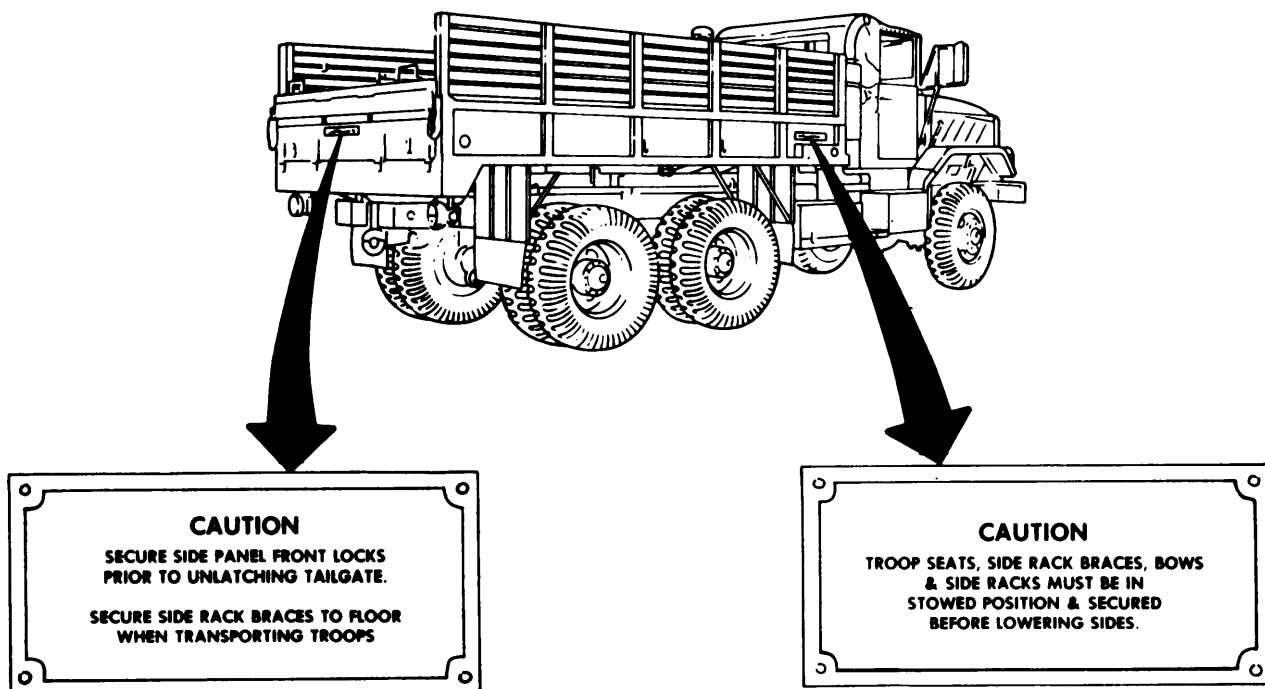
348865

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)

d. The vehicle plate shown below is common only to the dump (M929) M930) tractor (M931, M932), AND wrecker (M936) vehicles.



e. The caution plates shown below are common only to the dropside cargo (M923, M925) model vehicles.



348866

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES [Cont'd]

f. The data plates shown below are common only to the expansible van (M934, M935) models.

NOTICE

DO NOT ATTEMPT TO EXPAND VAN UNTIL THESE INSTRUCTIONS ARE READ AND FOLLOWED TO THE LETTER TO PREVENT POSSIBLE PERMANENT BODY DAMAGE.

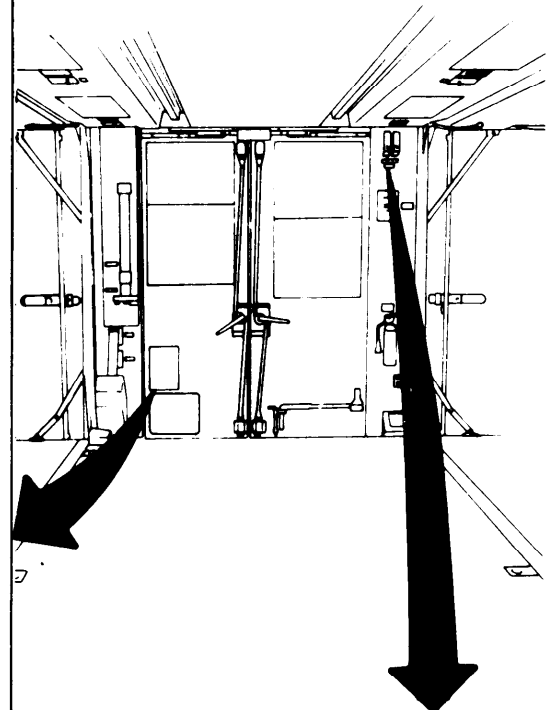
1 BEFORE EXPANDING SIDE SECTIONS, MAKE SURE VAN IS APPROXIMATELY LEVEL. SEE INSTRUCTIONS BELOW FOR LEVELING.

NOTE: LEVELING JACKS SHALL BE USED REGARDLESS OF GROUND CONDITION TO IMPROVE STABILITY OF EXPANDED VAN.

- 2 RELEASE FOUR (4) SIDEWALL CORNER LOCKS, LOCATED ONE (1) EACH LOWER CORNER.
- 3 USING SQUARE SOCKET WRENCH HANDLE PROVIDED, RELEASE FOUR (4) SIDE LOCKS ONE QUARTER (1/4) TURN COUNTERCLOCKWISE LOCATED TWO (2) EACH SIDE IN MIDDLE OF SIDE PANELS MARKED "A".
- 4 USING RATCHET, CRANK WITH HEXAGON SOCKET PROVIDED, RELEASE RATCHETS MARKED "B" LOCATED BELOW DOORS ON REAR. CRANK BOTH SIDES FULL OUT.
- 5 OPEN FOUR (4) SIDE END DOORS USING HOOK HOLDERS AT BOTTOM MARKED "C" TO HOLD ALL DOORS OPEN 120°.
- 6 RELEASE LOCKS ON OUTSIDE OF UPPER CEILING PANELS MARKED "D" AND PULL PARTIALLY OUTWARD. STANDING CLEAR ON GROUND PULL ON GRAB HANDLE ATTACHED TO LOWER FLOOR PANELS AND RAISE COUNTER BALANCED CEILING PANELS.
- 7 LIFT HINGED ROOF AND TURN SIX (6) SWIVEL HOOKS 90° FROM SIDE MARKED "E". PULL SWIVEL HOOKS IN UNTIL HINGED ROOF CAN REST ON THEM.
- 8 RELEASE FOUR (4) HOOKS MARKED "C" (BE SURE TO REPLACE IN CLIP HOLDERS) FROM END PANEL DOORS AND PULL DOORS IN UNTIL THEY MAKE CONTACT WITH HINGED FLOOR AND ROOF SEALS.
NOTE: IT IS NECESSARY TO LIFT HINGED ROOF TO GET A SNUG FIT WITH SEALS.
- 9 WITH END PANEL DOORS IN PLACE USE LARGE END OF SQUARE SOCKET WRENCH TO PUSH SLIDING BOLT INSIDE CORNER POST GUIDE MARKED "F" (NOTE: FULLY EXTEND SLIDING BOLT).
- 10 SWITCH RATCHET LOCKING MECHANISM MARKED "B" INTO ITS CLOSED POSITION AND PUT RATCHET CRANK "B" ARM INTO A HORIZONTAL POSITION.
- 11 BRING SIDE SECTION IN JUST ENOUGH TO ENGAGE EYE BOLTS ON TOGGLE CLAMPS MARKED "C". PULL SIDE PANEL STRAIGHT BY PARTIALLY CLOSING "G". WHILE DOING THIS, LIFT HINGED ROOF AT END PANEL DOORS SLIGHTLY TO ENSURE SEAL ALIGNMENT. THE SIDE IS NOW READY TO BE COMPLETELY CLOSED.
- 12 FOR FINAL LOCKING OF SIDE, STEP INSIDE VAN AND JUMP LIGHTLY UP AND DOWN ON HINGED FLOOR TO FREE SAME FROM POSSIBLE BINDING OF ALIGNMENT PINS. NOW APPLY FULL WEIGHT ON CRANK TO ENSURE A FINAL AND TIGHT SEAL. MAKE SURE THAT SEALS ON HINGED ROOF AND NEOPRENE RUBBER BLOCKS ARE LIBERALLY GREASED TO PREVENT BINDING. THIS IS ESPECIALLY IMPORTANT WHERE END PANEL DOOR MOVES INTO THE HINGED ROOF CORNER SEAL AT CORNER POST.
- 13 ENGAGE SIX (6) DRAW CLAMP LOCKS MARKED "G" IN GUIDE HOOKS MARKED "E" ON RAISED CEILING PANELS TO DRAW SIDES, END DOORS AND CEILING PANELS TIGHT AGAINST SEALS (CLOSE CENTER CLAMP FIRST).
- 14 EXTEND SLIDING BOLTS TO FULLY EXTENDED POSITION IN CORNER POST GUIDE.
- 15 ENGAGE FOUR (4) SIDEWALL CORNER LOCKS IN EXTENSION RODS LOCATED ON FOUR (4) CORNER POSTS.
TO RETRACT VAN REVERSE PROCEDURE ABOVE. BE CERTAIN TO USE EXTREME PRESSURE ON RATCHET "B" TO LOCK SIDES TIGHT AGAINST BOTTOM SEALS BEFORE CLOSING FOUR (4) SIDE LOCKS "A".

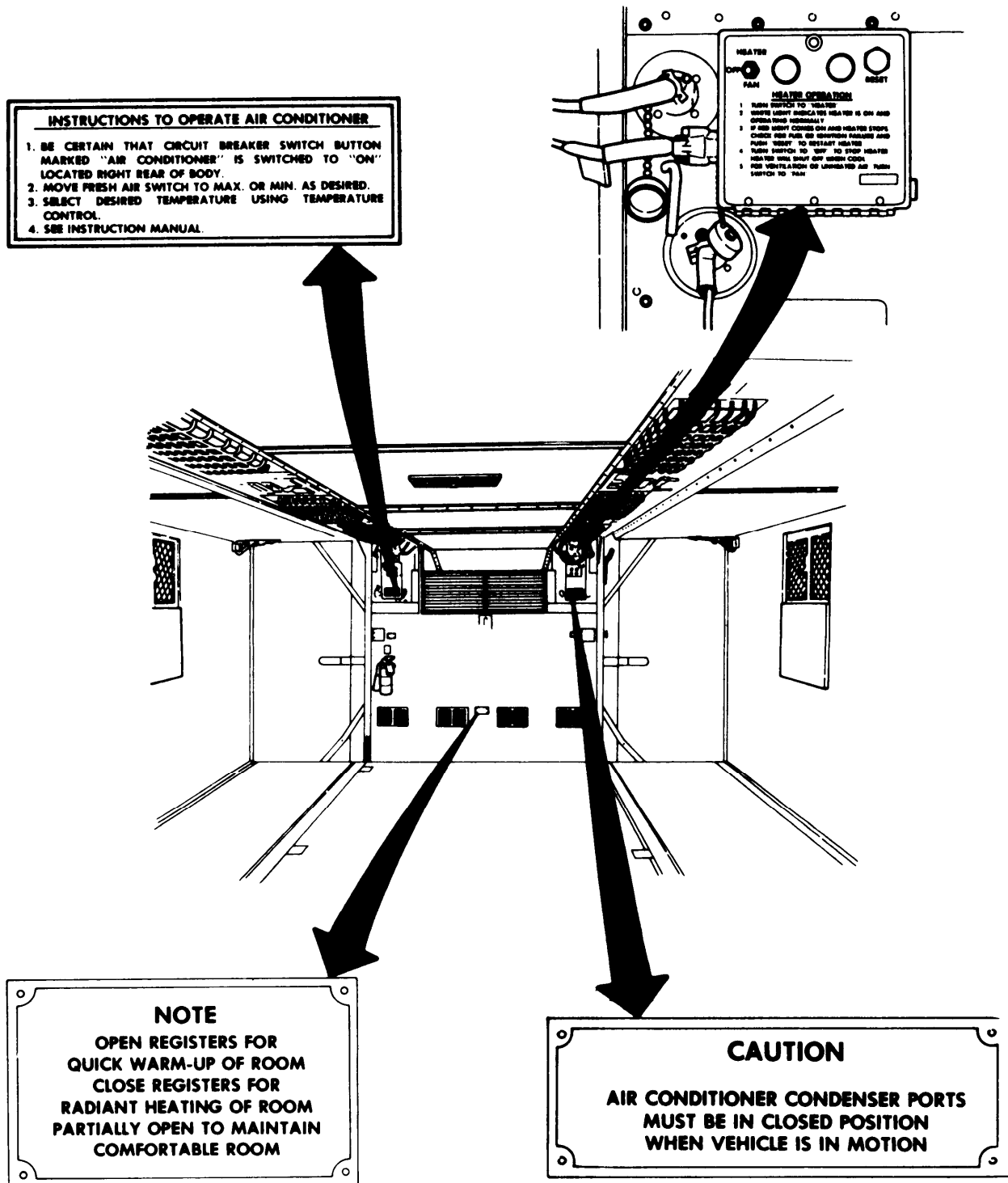
INSTRUCTIONS FOR LEVELING VAN

- 1 SELECT LOCATION IF POSSIBLE TO PROVIDE NEAREST LEVEL OF VEHICLE. IF NECESSARY USE DUNNAGE UNDER APPROPRIATE WHEEL TO OBTAIN NEAR LEVEL FLOOR LINE.
- 2 REMOVE FOUR (4) ADJUSTING JACKS AND BASE PLATES FROM COMPARTMENT UNDER REAR OF BODY AND PLACE ONE IN EACH OF FOUR (4) SOCKETS MARKED "H" LOCATED AT THE FOUR (4) CORNERS UNDER MAIN BODY SIDE SILLS.
- 3 USING CHAINED PINS, ADJUST LENGTH OF JACKS AS REQUIRED.
- 4 RATCHET JACK SCREW TO RAISE OR LOWER EACH CORNER OF VAN.
- 5 DO NOT ATTEMPT TO JACK VAN CLEAR OF GROUND WITH LEVELING JACKS.



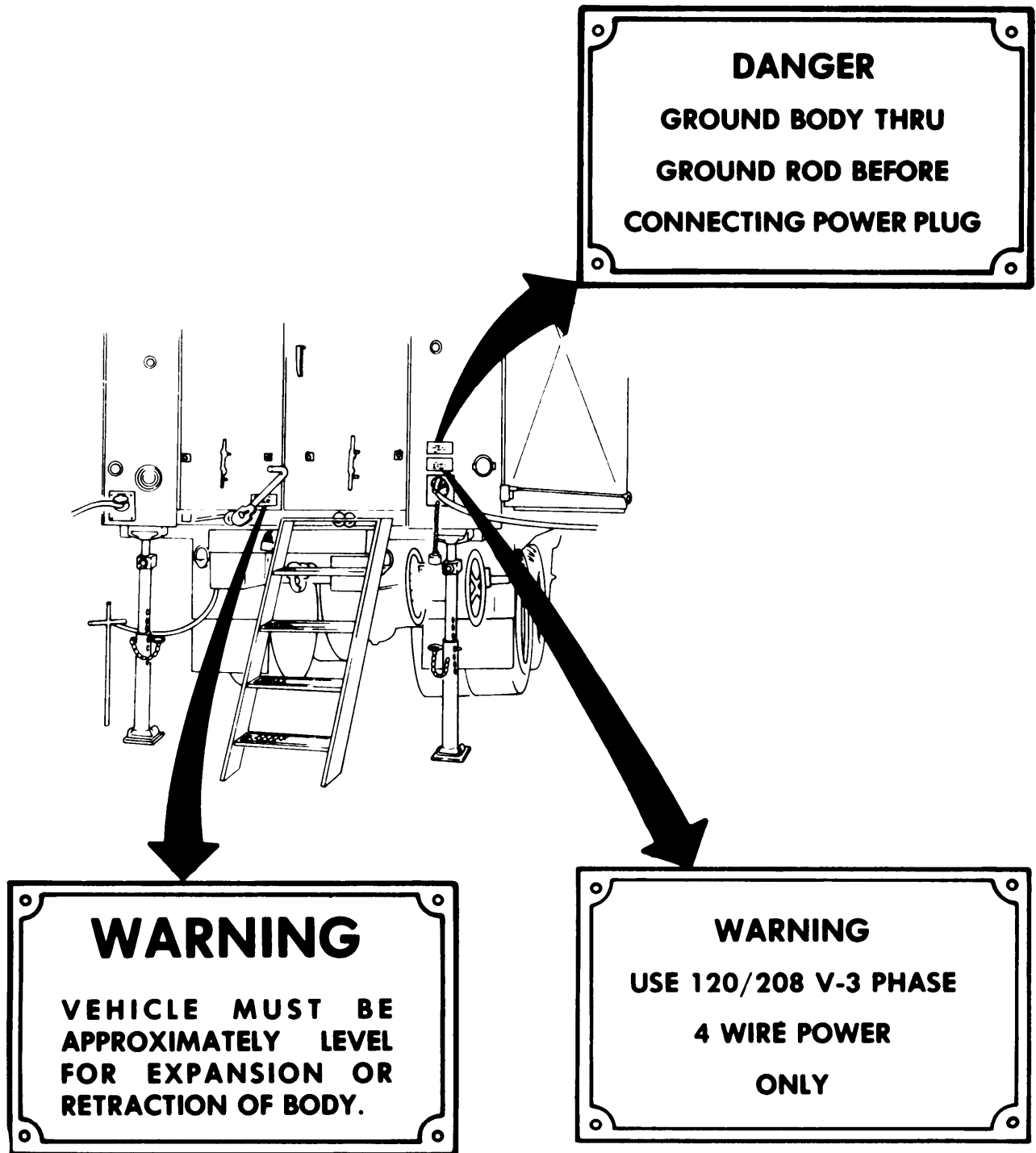
NOTICE: THESE THERMOSTATS MUST BE SET ABOVE ROOM TEMPERATURE BEFORE HEATERS CAN BE STARTED.

1-11. LOCATION AND CONTENTS OF CAUTION, DATA AND WARNING PLATES (Cont'd)



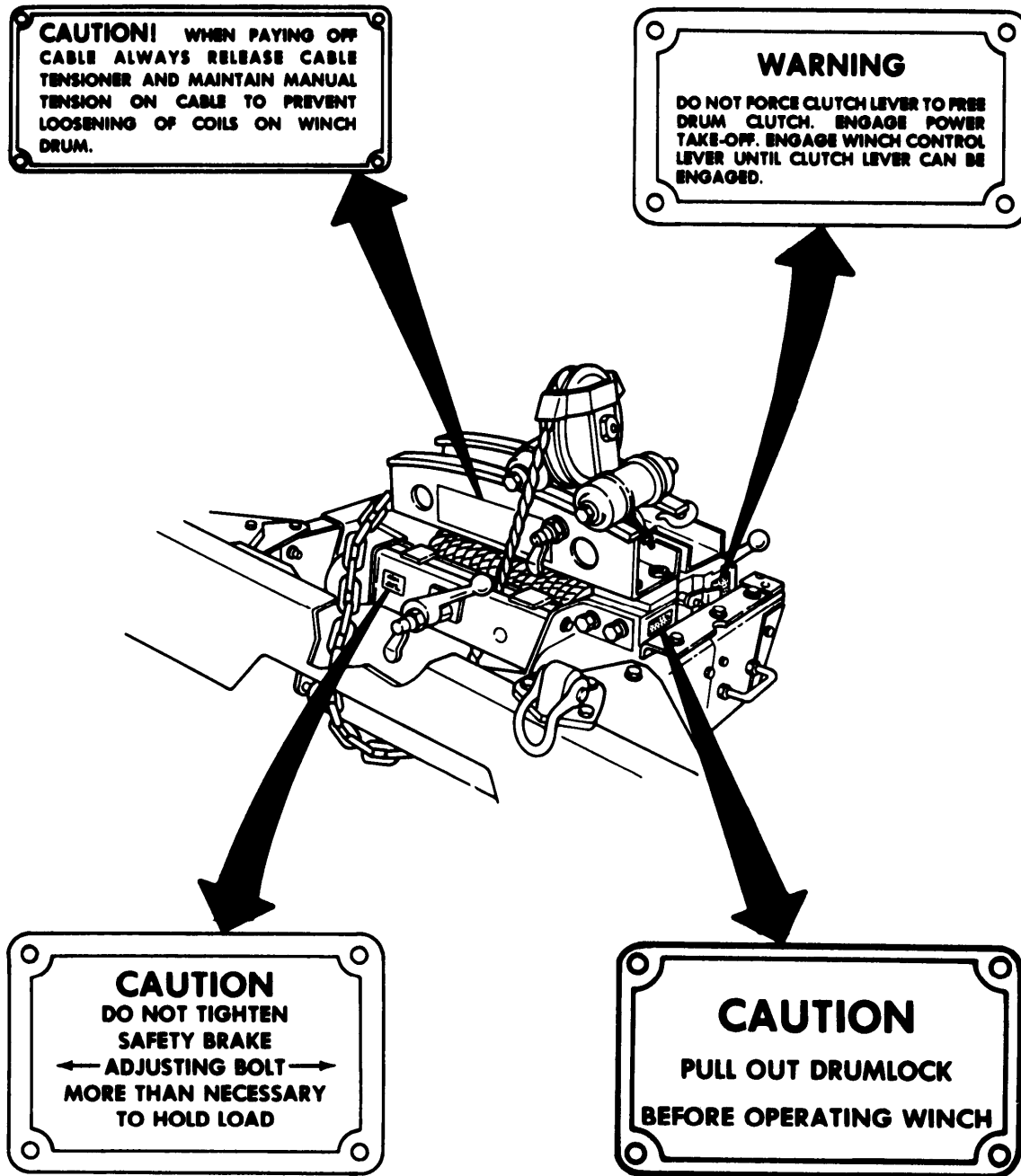
TA 348868

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)



1-11. LOCATION AND CONTENTS OF CAUTION, DATA AND WARNING PLATES (Cont'd)

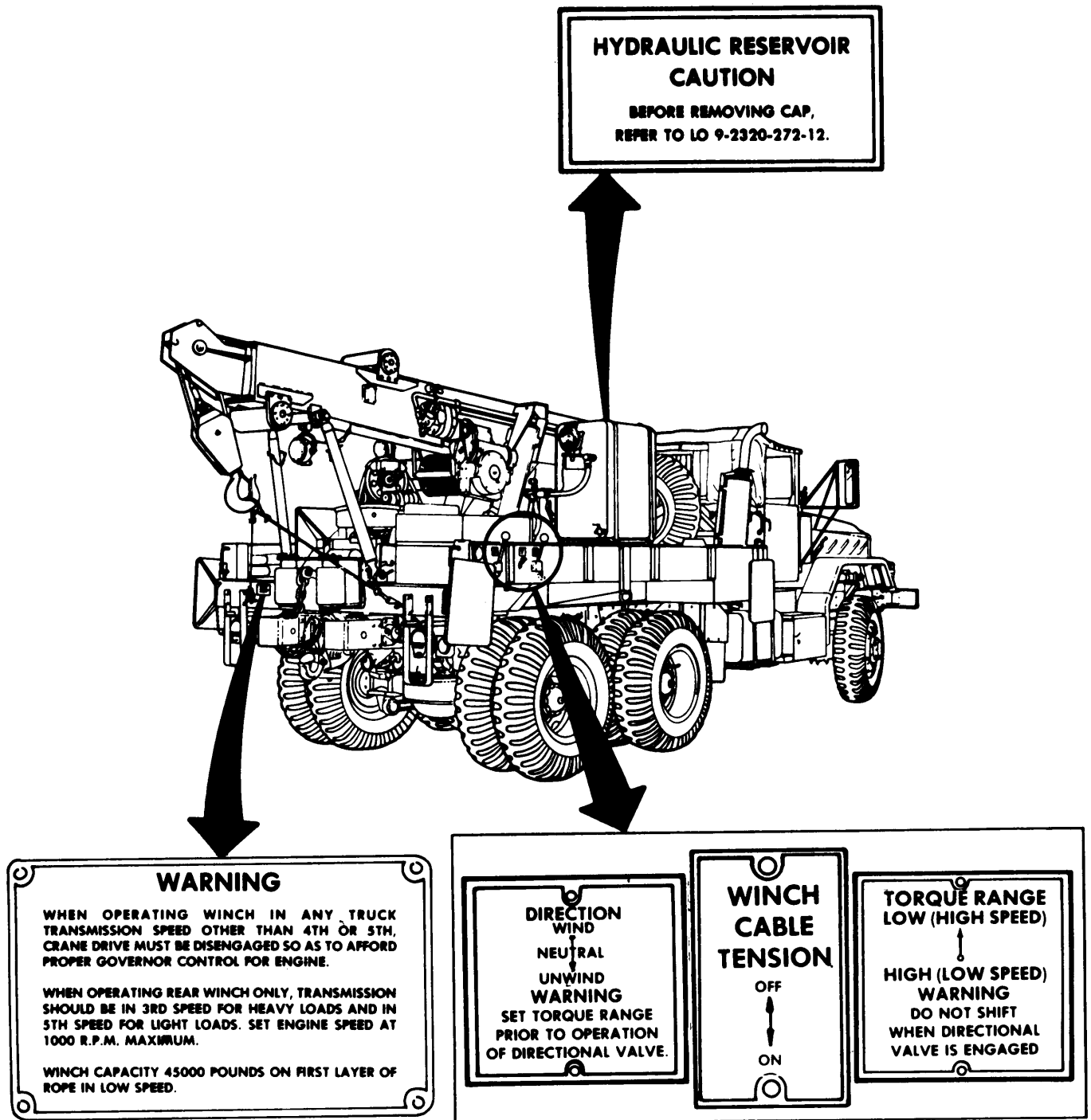
g. The plates shown below are common to front winch models and wrecker rear winch winch M926, M928, M930, M932, and M936) models.



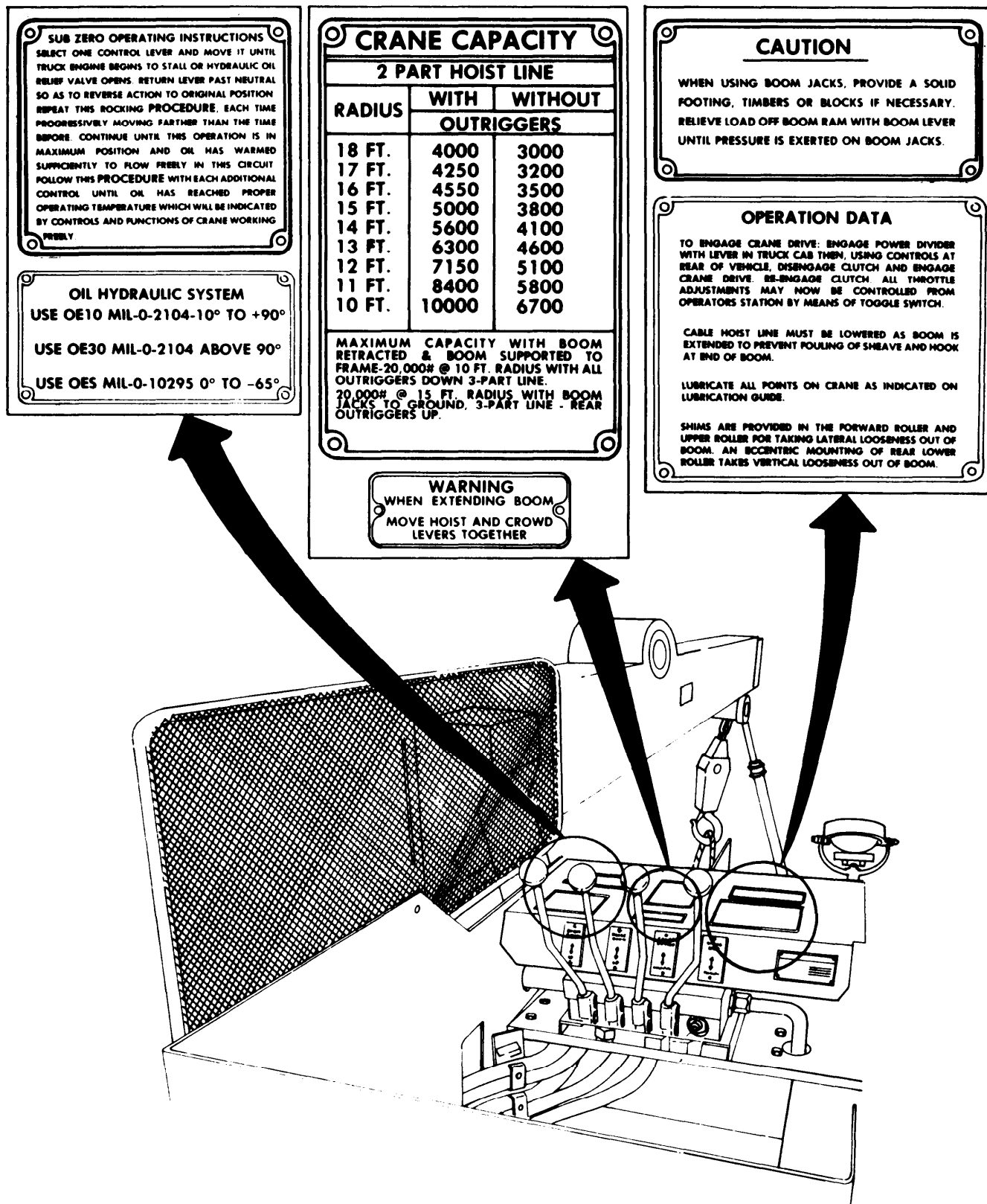
TA 348870

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)

h. The plates shown below are common only to the medium wrecker (M936) model.



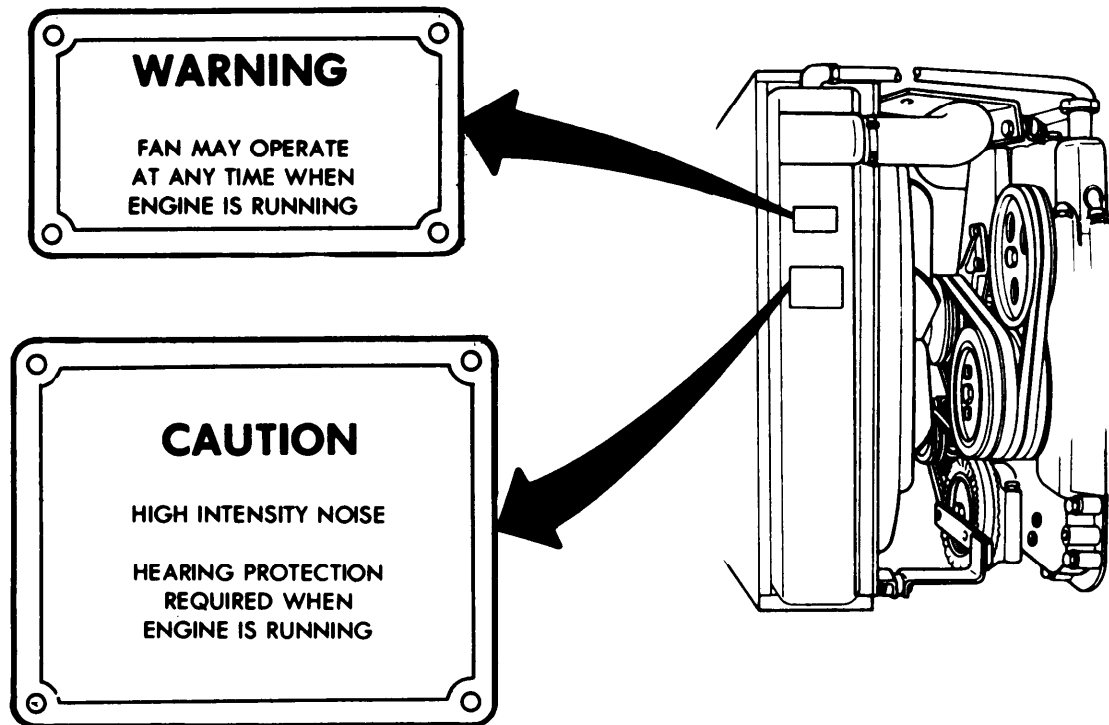
1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)



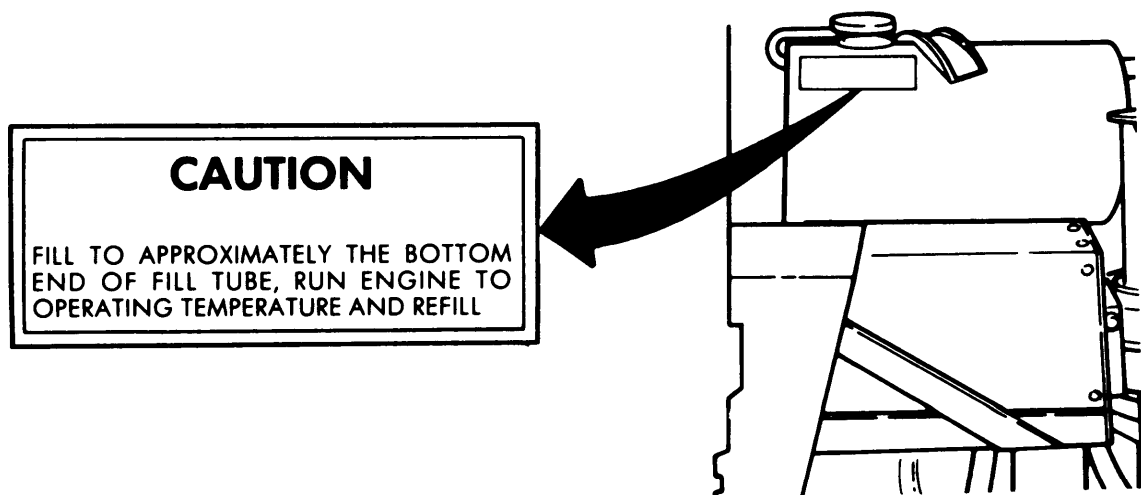
TA 348872

1-11. LOCATION AND CONTENTS OF CAUTION, DATA, AND WARNING PLATES (Cont'd)

i. The plates shown below are located on the radiator, and are common to all M939 series vehicles.



j. The plate shown below is located on the surge tank and is common to all series vehicles.



1-12. DIFFERENCES BETWEEN MODELS

The major differences between models are given in table 1-1.

Table 1-1. Differences Between Models

Equipment/ Function	M923	M924	M925	M926	M927	M928	M929	M930	M931	M932	M934	M935	M936
Personnel/Cargo Operations	x	x	x	x	x	x	x	x					
Wrecker Operations													x
Dump Operations							x	x					
Fifth Wheel Operations									x	x			
Communications/ Electronic Repair Operations											x	x	
Front Winch			x	x		x		x		x			x
Rear Winch													x
Wheelbases: 179 in. (454.7 cm)	x	x	x	x									x
167 in. (424.2 cm)					x	x	x	x	x	x		x	
215 in. (546.1 cm)											x	x	
Floodlights													x
Body: Cargo Dropside	x		x										
Cargo (permanent sides)		x		x	x	x							
Dump							x	x					
Tractor									x	x			
Van											x	x	
Crane													x
Heat/Air Conditioned Body											x	x	
Fuel Tanks: Single Tanks	x	x	x	x	x	x					x	x	
Dual (116 gal.) (439 l)							x	x	x	x			
Dual (139 gal.) (526 l)													x
Hydraulic Liftgate												x	
Hydraulic Oil Tanks			x	x		x	x	x		x		x	x
Tires: 11x20	x	x	x	x	x	x	x	x	x	x	x	x	x

1-13. VEHICLE PERFORMANCE DATA

Vehicle performance data for the M939 series vehicles are listed in table 1-2. Additional information and equipment service data are in TM 9-2320-272-10.

Table 1-2. Vehicle Performance Data

NOTE

Standard and metric measurements will be used in this manual. A list is provided below.

PERFORMANCE DATA ABBREVIATIONS

ABBREVIATION	MEASUREMENT	ABBREVIATION	MEASUREMENT
pt	Pints	ft	Feet
qt	Quarts	km/l	Kilometers Per Liter
gal	Gallons	psi	Per Square Inch
in.	Inches	rpm	Revolutions Per Minute
mm	Millimeters	l	Liters
cm	Centimeters	GTW.....	Towed Weight
lb	Pounds	kPa	Kilopascals
lb-ft	Pound-feet	kg	Kilograms
N°m	Newton Meters	max	Maximum
mph	Miles Per Hour	min	Minimum
km/h	Kilometers Per Hour	F	Fahrenheit
mpg	Miles Per Gallon	C	Celsius

	STANDARD	METRIC
1. PAYLOAD		
M923,M924,M925, M926, M927,M928,M929, M930	10,000 lb	4,540 kg
M931,M932(on fifth wheel).	15,000 lb	6,810 kg
(semitrailer GTW)	37,500 lb	17,025 kg
M934, M935	15,000 lb	6,810 kg
M936 (with boom shipper braced and secure)	7,000 lb	3,178 kg
Pintle Towed Load Allowance (models M923, M935).. . . .	15,000 lb	6,810 kg
Pintle Towed Load Allowance (model M936)	20,000 lb	9,080 kg
2. CAPACITIES*		
Cooling System	47 qt	44.46 l
Crankcase Only	23qt	21.76 l
Crankcase and Filter	27 qt	25.54 l
Differential (each)	12 qt	11.4 l
*ALL HYDRAULIC SYSTEMS AND ALL FUEL CAPACITIES ARE CALCULATED APPROXIMATIONS		

Table 1-2. Vehicle Performance Data (Cont 'd)

	STANDARD	METRIC
FUEL TANKS		
M923, M924, M925, M926, M927, M928, M934, M935	81 gal.	306.61
M929, M930, M931, M932 (two tanks)	116gal.	439.11
M936 (two tanks)	139 gal.	526.12 1
TRANSMISSION		
All Models	17qt	16.1 1
(W/PTO)	19qt	18.0 1
W/Dry Converter	29qt	27.4 1
Transfer Case	6.5 qt	6.1 1
HYDRAULIC OIL TANK		
M925, M926, M928, M932	8.75 gal.	33.11
M9295 gal.	18.91
M930	6.25 gal.	23.61
M935	3 gal.	11.4 1
M936	100 gal.	378.4 1
front Winch (gearcase)	2.6pt	1.231
Rear Winch(gearcase)	3pt	1.411
3. ENGINE		
Model	Cummins NHC 250	
me	Diesel Liquid Cooled	
front Mount	Trunnion Mount	
Rear Mount	Rubber Biscuit Mount	
Idle Speed	600-650 rpm	
Operating Speed	1500-2100 rpm	
Fuel Consumption (approx.)	3-4 mpg	1.28-1.70 km/1
Brake Horsepower	240 hp @ 2100 rpm	
Oil Pressure:		
@ Idle	15 psi	103.4 kPa
@ Full Power	55-75psi	379.2-517.1 kpa
4. FUEL SYSTEM		
Fuel Pump (mechanical):		
Model	PT (pressure time)	
Fuel Filter:		
Model	Fleetguard	
Air Cleaner:		
Type	Dry Element	

Table 1-2. Vehicle Performance Data (Cont 'd)

	STANDARD	METRIC
5. COOLING SYSTEM		
Surge Tank Cap Pressure	14 psi	96.5 kpa
Thermostat:		
Type	Modulating	
Starts to Open	171°F	79°C
Fully Open	185° F	85° C
Water Pump:		
Type	Centrifugal Impeller	
Radiator:		
Type.. . . .	Crossflow	
Fan:		
Type	Six Blade, 26 in. (air actuated)	660 mm
6. ELECTRICAL SYSTEM		
Batteries:		
Model	6 TN	
Voltage	12 volts	
Plates Per Cell	23	
Number of Batteries Used	4	
Specific Gravity (full charge)	@70°F	@ 21° C
Alternator:		
Model	AMA	
Voltage Output	28 Volts	
Maximum Output.. . . .	60 Amperes	
Voltage Regulator	Mounted Internally	
Protective Control Box:		
Model	WSU.4001-UT	
Starter:		
Model	MES 6401-CUT	
Voltage	24 Volts	
7. TRANSMISSION		
Type	MT654CR	
Drive Sequences	Reverse, Neutral 1-2-3-4-5, 1-2-3-4, 1-2-3, 1-2, 1	
Drive Range and Shift Control	Mechanical	
Oil Type	OE/HDO 10	
Lubrication Pressure	26 psi	179.27 kPa
Power Takeoff		
Type	Converter Driven	
Mounting Flange	One.opening, SAE, 6 Bolt	
Location	Right Side	
8. TRANSFER CASE		
Model	T-1138	
Type	Two-speed Synchronized	

Section III. PRINCIPLES OF OPERATION

1-14. GENERAL

This section explains how components of the 5-ton M939 series vehicles work together. A functional description of these components and their related parts will be covered in the following paragraphs. To find the operation of a specific system or component, see the principles of operation reference index below.

1-15. PRINCIPLES OF OPERATION REFERENCE INDEX

REF. PARA.	SYSTEM/COMPONENT	PAGE NO.
1-16.	Control System Operation	1-30
1-17.	Power System Operation..	1-41
1-18.	Electrical Systems Operation	1-64
1-19.	Compressed Air and Brake System Operation	1-65
1-20.	Hydraulic System Operation	1-80

1-16. CONTROL SYSTEM OPERATION

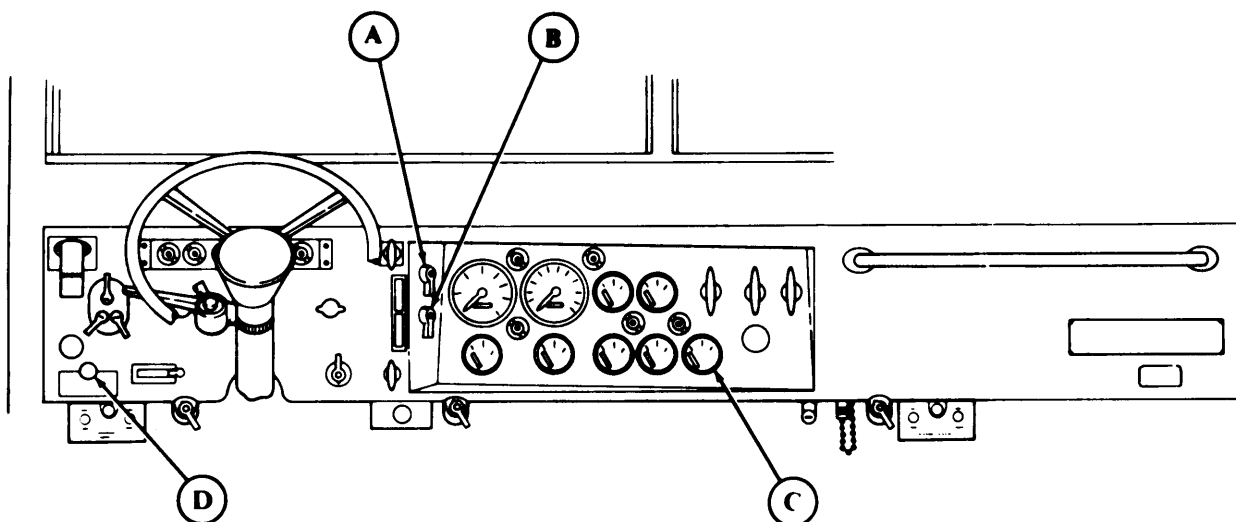
The control system includes those controls and their related parts that are essential to the operation of the vehicle. These controls are common to all vehicles with the exception of the transmission and transfer case power takeoff controls. All originate from the cab. Each of these controls and their related parts will be described as part of the following systems:

- a. Starting and Ether Starting System Operation (page 1-31).
- b. Accelerator Controls System Operation (page 1-33).
- c. Parking Brake System Operation (page 1-34).
- d. Steering System Operation (page 1-35).
- e. Transmission Control System Operation (page 1-37).
- f. Transfer Case Control System Operation (page 1-38).

a. Starting and Ether Starting System Operation.

The starting system is identical on all models covered in this manual. It will start the engine in all types of weather and has built-in protection that prevents starting components from reengaging once the engine has been started. Major components of the starting and ether starting system are:

- (A) BATTERY SWITCH** — Activates all electrical circuits except arctic heaters.
- (B) IGNITION SWITCH** — Has OFF, RUN, and START positions. Switch automatically returns from START to RUN when hand pressure is released.
- (C) VOLTMETER** — Indicates charging condition of the battery.
- (D) ETHER START SWITCH** — Injects ether into engine for cold weather starting.



(A) BATTERY SWITCH

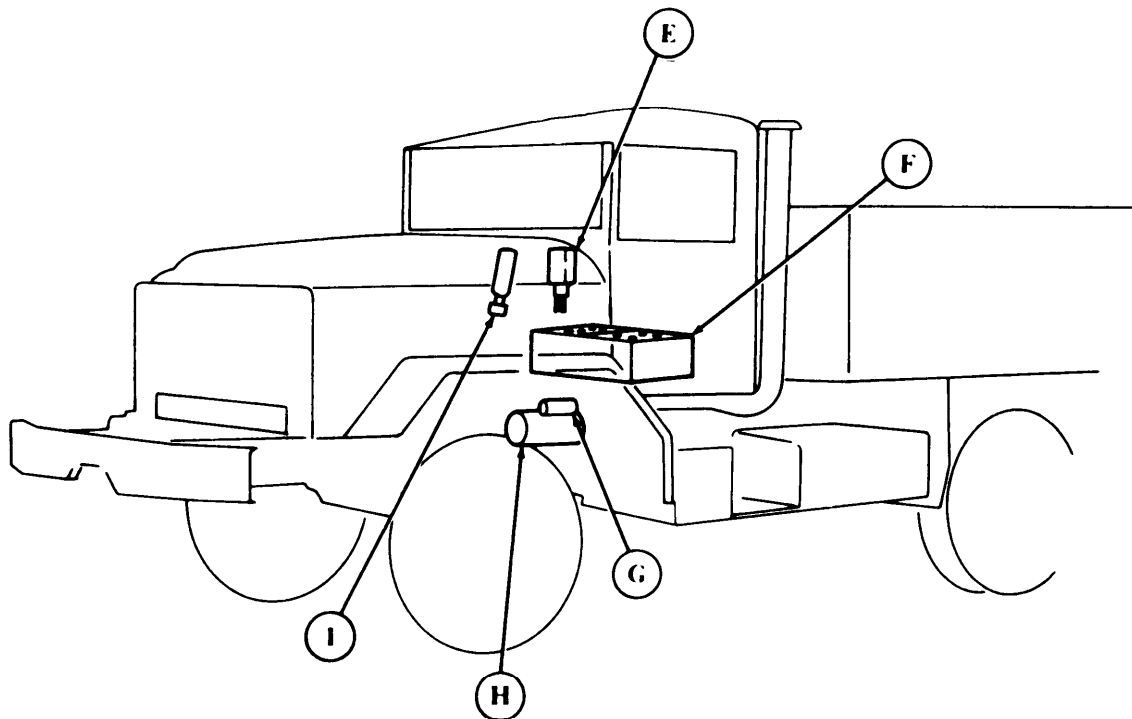
(B) IGNITION SWITCH

(C) VOLTMETER

(D) ETHER START SWITCH

a. Starting and Ether Starting System Operation (Cont'd).

- (E) PROTECTIVE CONTROL BOX** — Prevents reengagement of starter motor once engine is running.
- (F) BATTERIES** — Provide 24-volt electrical current for energizing electrical starting circuits.
- (G) STARTER SOLENOID** — Relays 24-volt battery power to energize starter motor.
- (H) STARTER MOTOR** — When energized, it converts electrical energy to mechanical power as it engages the flywheel to crank engine.
- (I) ETHER START CYLINDER** — Stores ether used for cold weather starting.



(E) PROTECTIVE CONTROL BOX

(F) BATTERIES

(G) STARTER SOLENOID

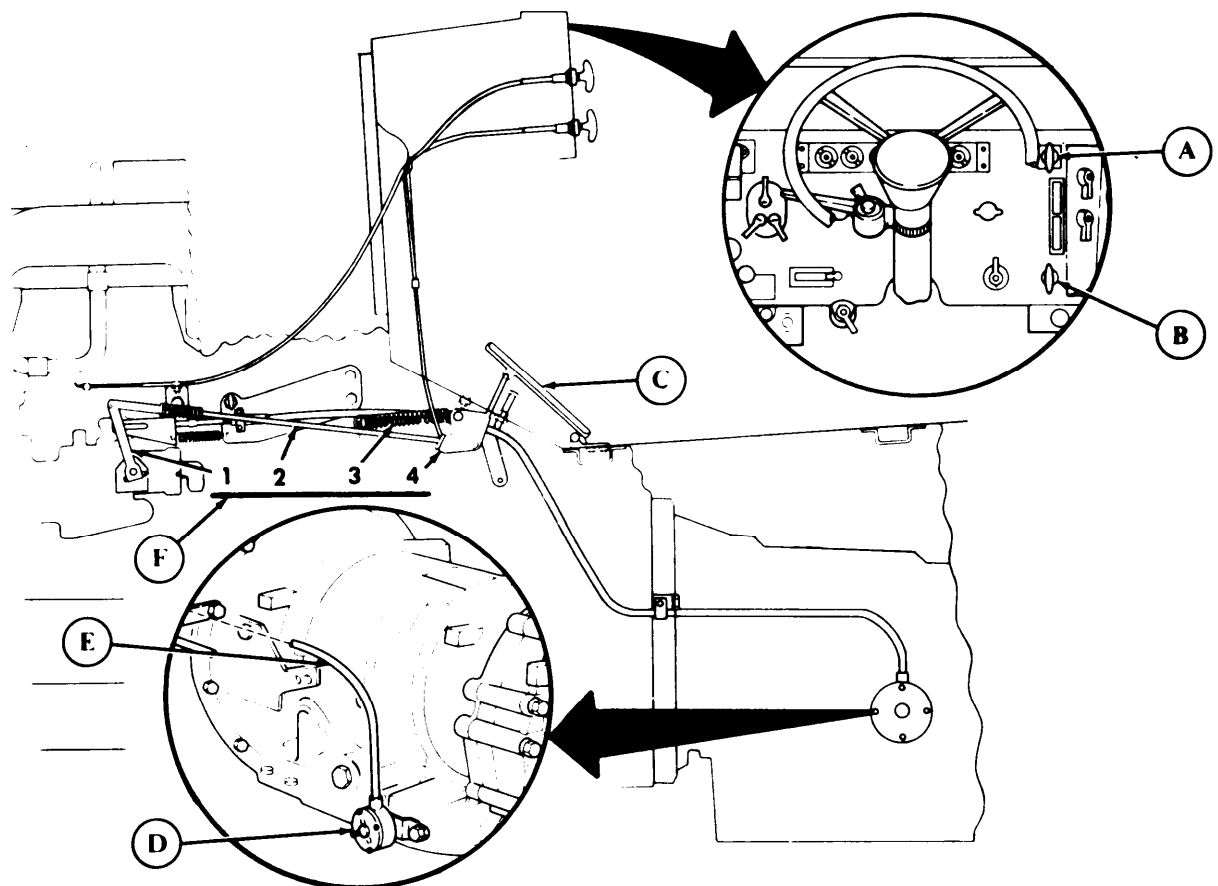
(H) STARTER MOTOR

(I) ETHER START CYLINDER

b. Accelerator Controls System Operation.

The accelerator controls system permits the operator to control vehicle speed and engine power. It is identical on all models covered in this manual. Major components of the accelerator control system are:

- (A) HAND THROTTLE CONTROL — Sets engine speed at desired rpm without maintaining pressure on accelerator pedal.
- (B) EMERGENCY ENGINE STOP CONTROL — Is pulled out to cut off fuel to engine. It is used only in an emergency.
- (C) ACCELERATOR PEDAL — Controls engine speed.
- (D) MODULATOR — With transmission selector lever in drive, modulator controls transmission upshifting and downshifting as engine rpm changes.
- (E) CABLE — Connects modulator to fuel pump.
- (F) ACCELERATOR LINKAGE — Links accelerator pedal and throttle control to fuel pump.



- (A) HAND THROTTLE CONTROL
- (B) EMERGENCY ENGINE STOP CONTROL
- (C) ACCELERATOR PEDAL
- (D) MODULATOR
- (E) CABLE

(F) ACCELERATOR LINKAGE

- 1. Injection pump lever.
- 2. Accelerator rod.
- 3. Return spring.
- 4. Pivot lever assembly.

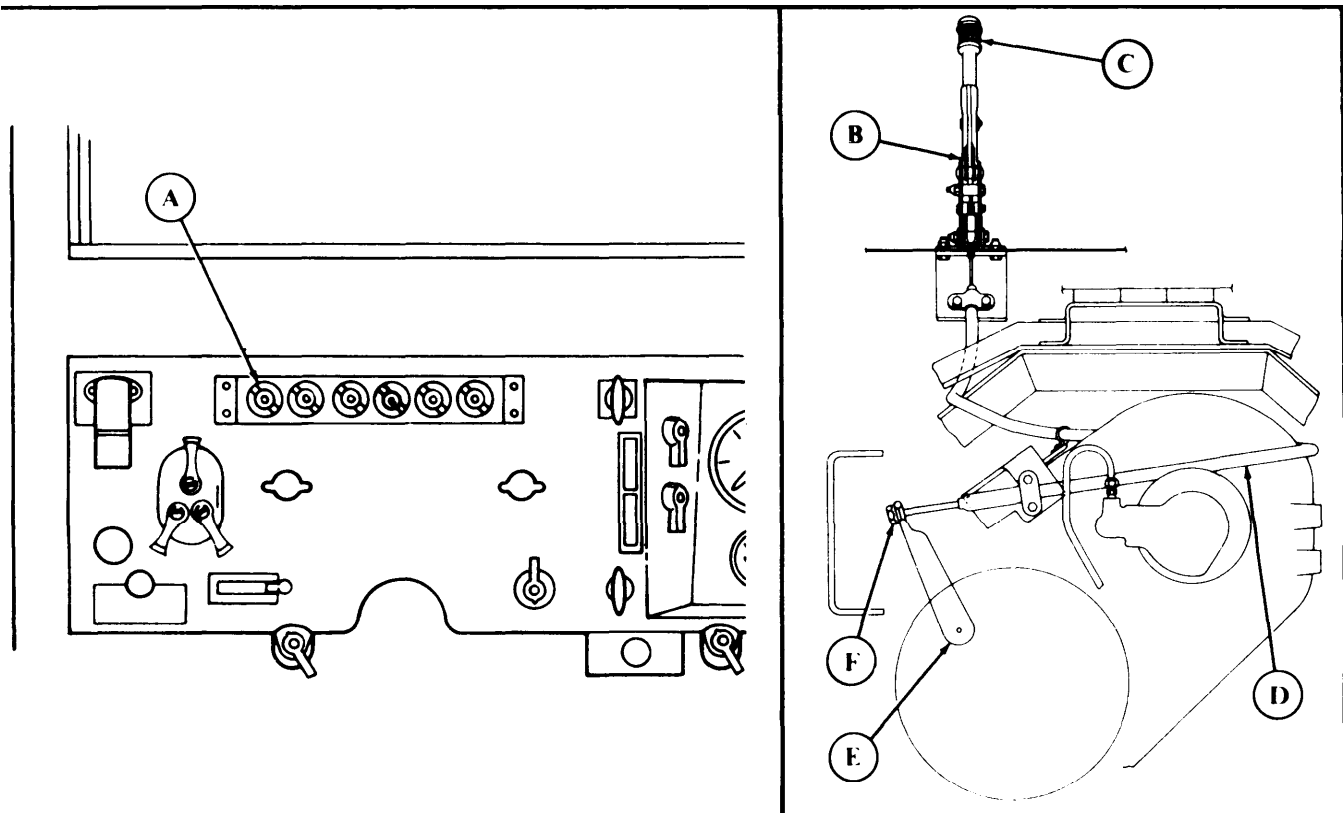
c. Parking Brake System Operation.

A mechanical and air-actuated brake system performs the following functions for all vehicles covered in this manual:

1. Keeps vehicle from rolling once it has stopped.
2. Slows down or stops vehicle movement.
3. Provides emergency stopping if there is a complete air system failure.

The mechanical brake system is covered below. The compressed air function of the brake system will be covered in a following paragraph. Major components of the parking brake system are:

- (A) PARKING BRAKE WARNING LIGHT — Illuminates when parking brake is engaged,
- (B) PARKING BRAKE CONTROL LEVER — Is positioned up to engage parking brake and down to disengage parking brake.
- (C) PARKING BRAKE CONTROL LEVER ADJUSTING KNOB — Permits operator to make minor tension adjustment of parking brake.
- (D) PARKING BRAKE CABLE — Links parking brake lever to brakeshoe lever.
- (E) BRAKESHOE LEVER — Lever turns cam which pushes brakeshoes against drum.
- (F) PARKING BRAKE ADJUSTING NUT — Permits major tension adjustment between parking brake lever and brakeshoes.



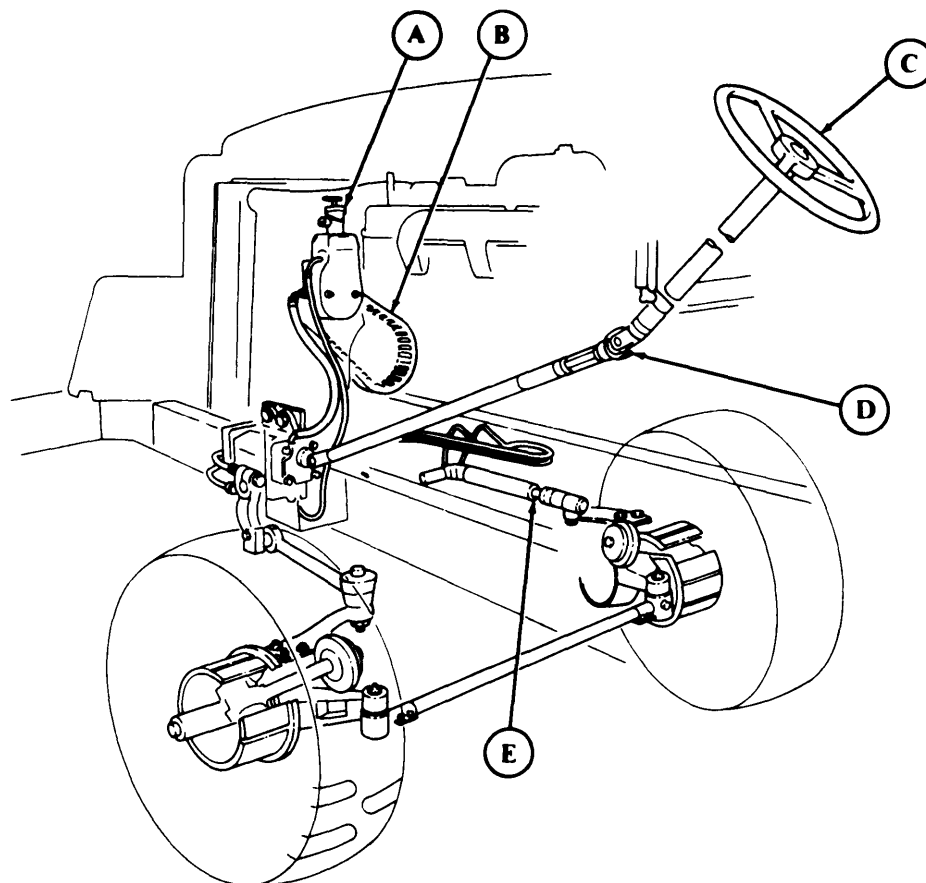
- (A) PARKING BRAKE WARNING LIGHT
- (B) PARKING BRAKE CONTROL LEVER
- (C) PARKING BRAKE CONTROL LEVER ADJUSTING KNOB
- (D) PARKING BRAKE CABLE
- (E) BRAKESHOE LEVER
- (F) PARKING BRAKE ADJUSTING NUT

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d. Steering System Operation.

The steering system is identical for all models covered in this manual. It is a hydraulically assisted system that provides ease of turning and control for the operator. Major components of the steering system are:

- (A) OIL RESERVOIR AND STEERING PUMP — Combined in one unit, the reservoir serves as an oil filling point and the pump mechanically creates pressure to supply oil throughout the steering system.
- (B) ACCESSORY DRIVE PULLEY BELTS — Transmits mechanical driving power from accessory drive pulley to steering pump pulley which drives the steering pump.
- (C) STEERING WHEEL — Serves as manual steering control for the operator.
- (D) STEERING COLUMN UNIVERSAL JOINT — Connects, at an angle, the steering wheel column and input shaft of power steering gear.
- (E) POWER STEERING ASSIST CYLINDER — Receives hydraulic pressure from the steering gear to assist in turning the right wheel.



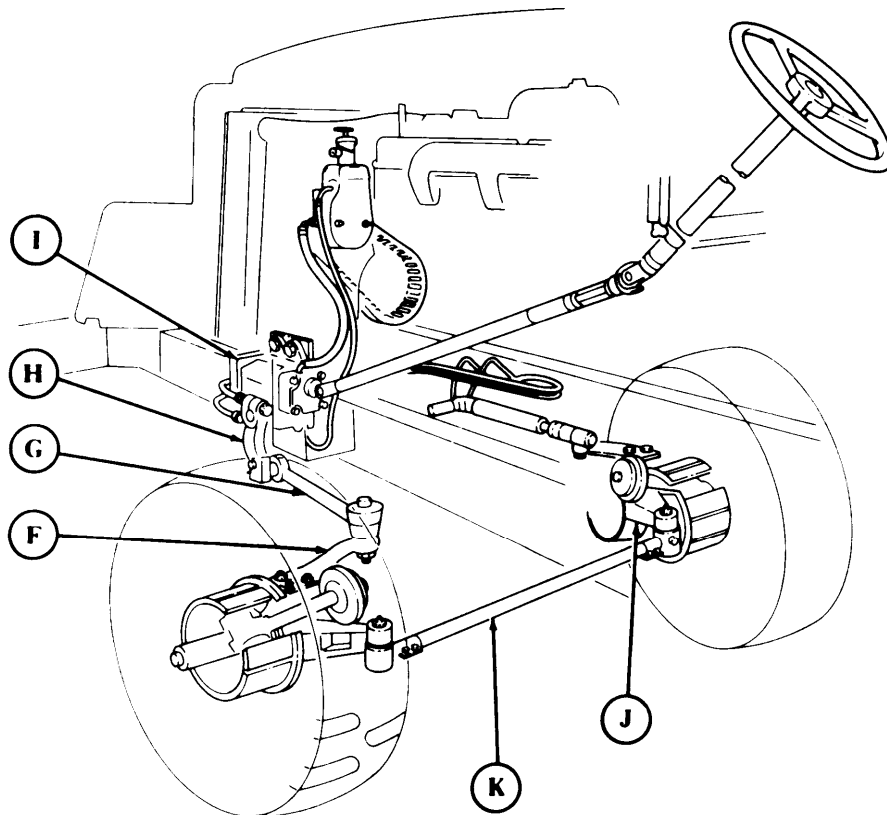
- (A) OIL RESERVOIR AND STEERING PUMP
- (B) ACCESSORY DRIVE PULLEY BELTS
- (C) STEERING WHEEL

- (D) STEERING COLUMN UNIVERSAL JOINT
- (E) POWER STEERING ASSIST CYLINDER

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d. Steering System Operation (Cont'd).

- (F) STEERING ARM — Connects drag link to steering knuckle.
- (G) DRAG LINK — Transmits movement from pitman arm to steering gear to drag link.
- (H) PITMAN ARM — Transfers steering torque from power steering gear to drag link.
- (I) STEERING GEAR — Converts hydraulic pressure from steering pump to mechanical power at pitman arm,
- (J) STEERING KNUCKLE — Serves as the pivot point and link for the front wheel from the tie rod assembly.
- (K) TIE ROD ASSEMBLY — Connects steering knuckles so both wheels will turn at the same time.



- (F) STEERING ARM
- (G) DRAG LINK
- (H) PITMAN ARM

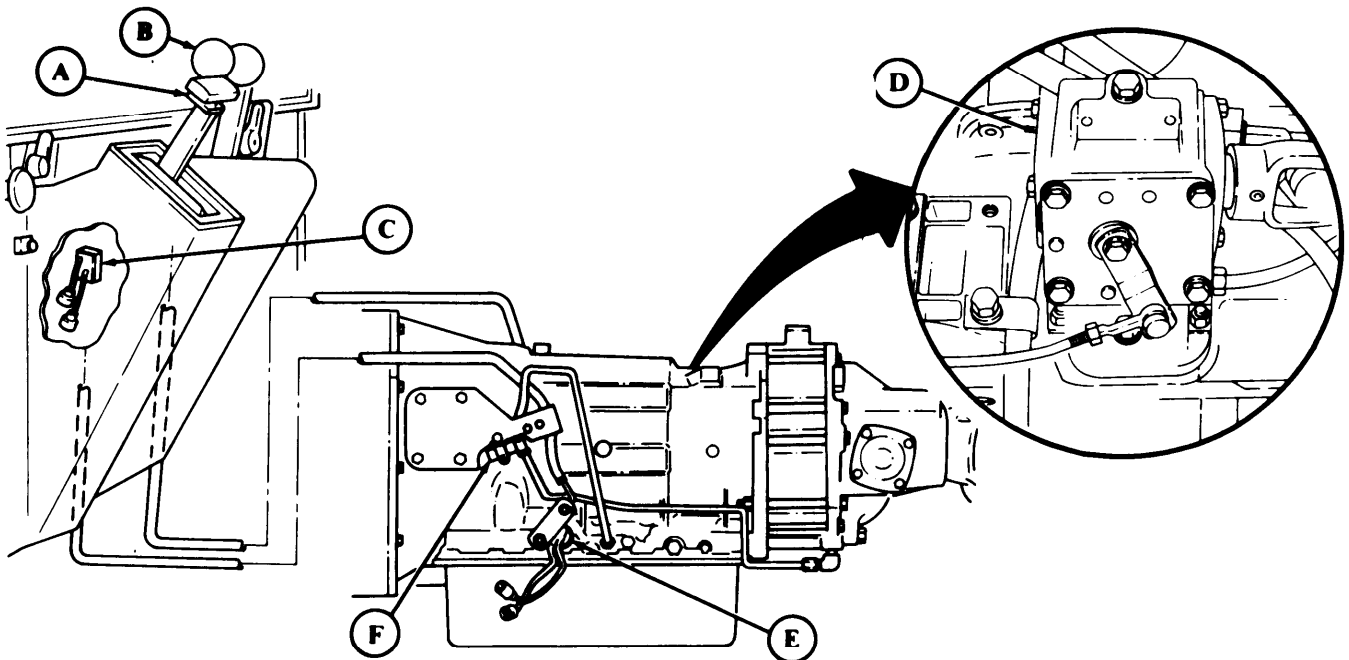
- (I) STEERING GEAR
- (J) STEERING KNUCKLE
- (K) TIE ROD ASSEMBLY

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e. Transmission Control System Operation.

The transmission control system permits shifting of transmission, prevents starting of engine with transmission in gear, and prevents shifting of transfer case unless transmission is in neutral. This system also permits engagement of the transmission power takeoff (PTO) to provide hydraulic power for auxiliary equipment on M925, M926, M928, M929, M930, M932, M935, and M936 vehicles. Major components of the transmission control system are:

- (A) TRANSMISSION SELECTOR LEVER — Is used to select vehicle driving gear.
- (B) POWER TAKEOFF CONTROL LEVER — Engages transmission power takeoff to provide power for auxiliary equipment.
- (C) TRANSMISSION CONTROL SWITCH — Actuates transmission lockup solenoid valve when transmission selector lever is placed in neutral and transfer case shift lever lock-out switch is pressed.
- (D) TRANSMISSION POWER TAKEOFF — Driven by the transmission, the PTO drives the hydraulic pump which provides hydraulic pressure to power the front winch on M925, M926, M928, M930, M932, and M936 vehicles, and to power the dump body on M929 and M930 vehicles. The PTO is mounted on the right front side of the transmission.
- (E) TRANSMISSION NEUTRAL START SWITCH — The neutral start switch, wired to the starter switch, prevents the engine from being started with transmission in gear.
- (F) TRANSMISSION 5TH-GEAR LOCKUP SOLENOID VALVE — Activated by transmission control switch and transfer case switch, the 5th-gear lockup solenoid valve directs main oil pressure of transmission to the transmission governor system. This puts the transmission in 5th-gear creating less drag on the transfer case synchronizer which permits smoother shifting from one transfer case drive range to another. Refer to paragraph 1- 16f, transfer case control system operation, for further details.



- | | |
|---------------------------------|---|
| (A) TRANSMISSION SELECTOR LEVER | (D) TRANSMISSION POWER TAKEOFF |
| (B) POWER TAKEOFF CONTROL LEVER | (E) TRANSMISSION NEUTRAL START SWITCH |
| (C) TRANSMISSION CONTROL SWITCH | (F) TRANSMISSION 5TH-GEAR LOCKUP SOLENOID VALVE |

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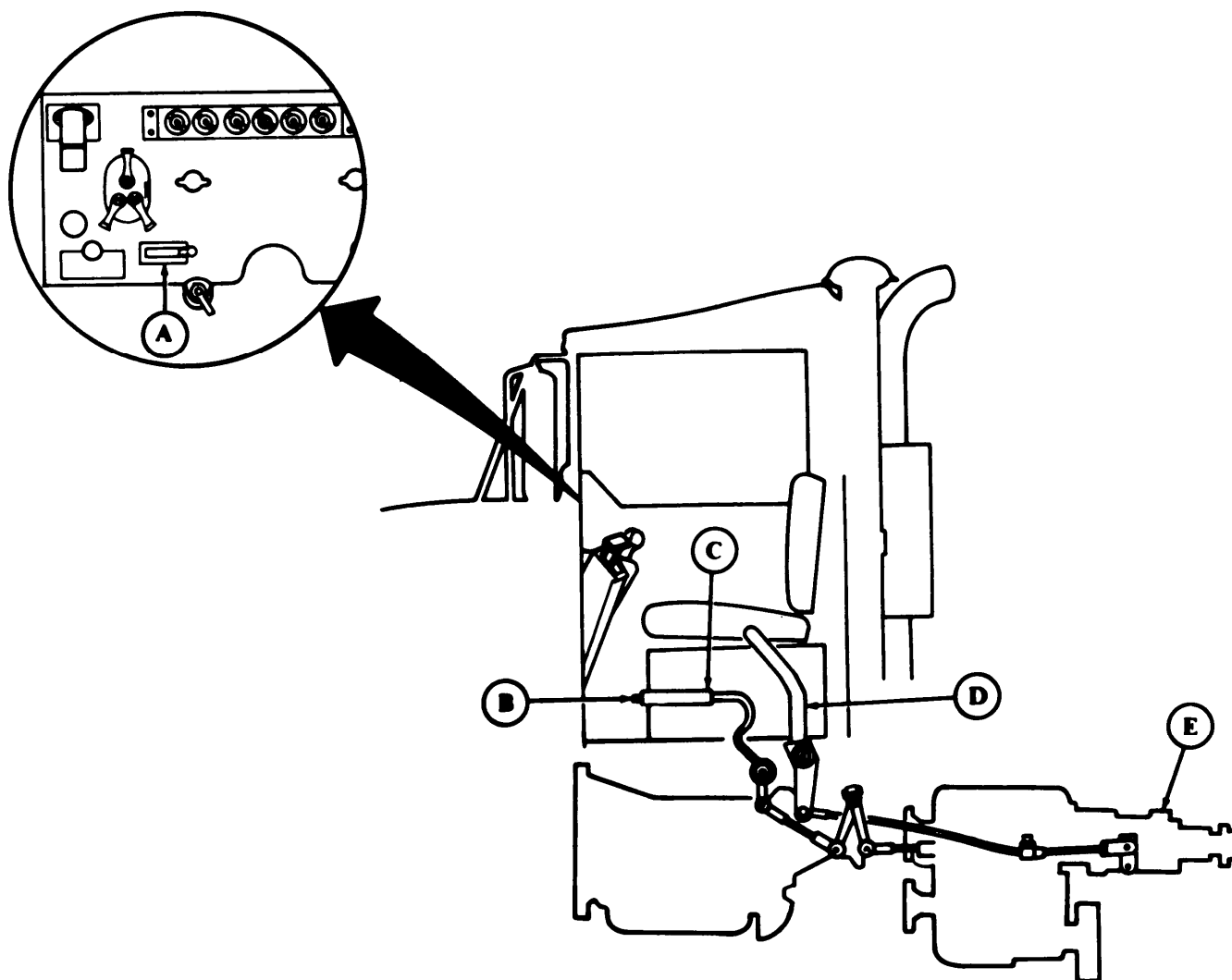
f. Transfer Case Control System Operation.

The transfer case control system converts four-wheel driving power into six-wheel driving power, provides smooth shifting of transfer case into high or low driving ranges while vehicle is in motion, prevents transfer case from being shifted with transmission in gear, and provides hydraulic power for auxiliary equipment through a power takeoff (PTO).

1. Six-wheel drive is achieved two different ways depending on the drive range (high or low) desired. In low range, the transfer case shift linkage automatically moves a cam-actuated valve which dumps air into the front drive cylinder. This forces a piston against the transfer case clutch to engage front wheel drive. In high range, front wheel drive is engaged in the same manner except that the front wheel drive valve is manually actuated by the front wheel drive lock-in switch on the instrument panel.
2. In order to shift the transfer case from one driving range to another, an interlock system working in conjunction with the 5th-gear lockup solenoid is used. This system permits the transfer case input shaft to speed up or slow down so the synchronizer will smoothly mesh with high or low gears. This system also prevents the transfer case from being shifted unless the transmission is in neutral.
3. With the automatic transmission, several actions must occur in order to shift the transfer case from one driving range to another: (1) Because of the interlock system, the transmission must be placed in neutral. This activates the transmission control switch. (2) The transfer case shift lever switch must be depressed. This switch, in conjunction with the transmission control switch, signals the interlock solenoid valve and the 5th-gear lockup solenoid. The interlock solenoid valve exhausts air pressure from the interlock air cylinder which permits the high/low shift shaft to move. After the driving range is selected and the transfer case lever switch is released, air is again supplied to the interlock air cylinder to lock in the high/low shift shaft. The 5th-gear lockup solenoid is also deactivated when the transmission is placed in gear.
4. The transfer case control system, through the use of a PTO driven by the transfer case, also provides hydraulic power to operate the crane and rear winch on the M936 wrecker.
5. Major components of this system are:

- (A) FRONT WHEEL DRIVE LOCK-IN SWITCH — Manual control for activating front wheel drive valve to provide front wheel drive with transfer case in high drive range.
- (B) TRANSFER CASE SHIFT LEVER SWITCH — When depressed with transmission in neutral, signals interlock solenoid valve to exhaust air pressure from interlock air cylinder and actuates transmission lockup solenoid.
- (C) TRANSFER CASE SHIFT LEVER — Is pushed down to high for light load operations, up to low for heavy load operations. Six-wheel drive is achieved automatically when transfer case shift lever is placed in low.
- (D) TRANSFER CASE POWER TAKEOFF CONTROL LEVER — Manual control for engaging power takeoff.
- (E) TRANSFER CASE POWER TAKEOFF — Mounted and mechanically driven at rear of transfer case, the PTO drives a pump to supply hydraulic pressure to power the liftgate on the M935 expansible van and the rear winch and crane on the M936 wrecker.

f. Transfer Case Control System Operation (Cont'd).



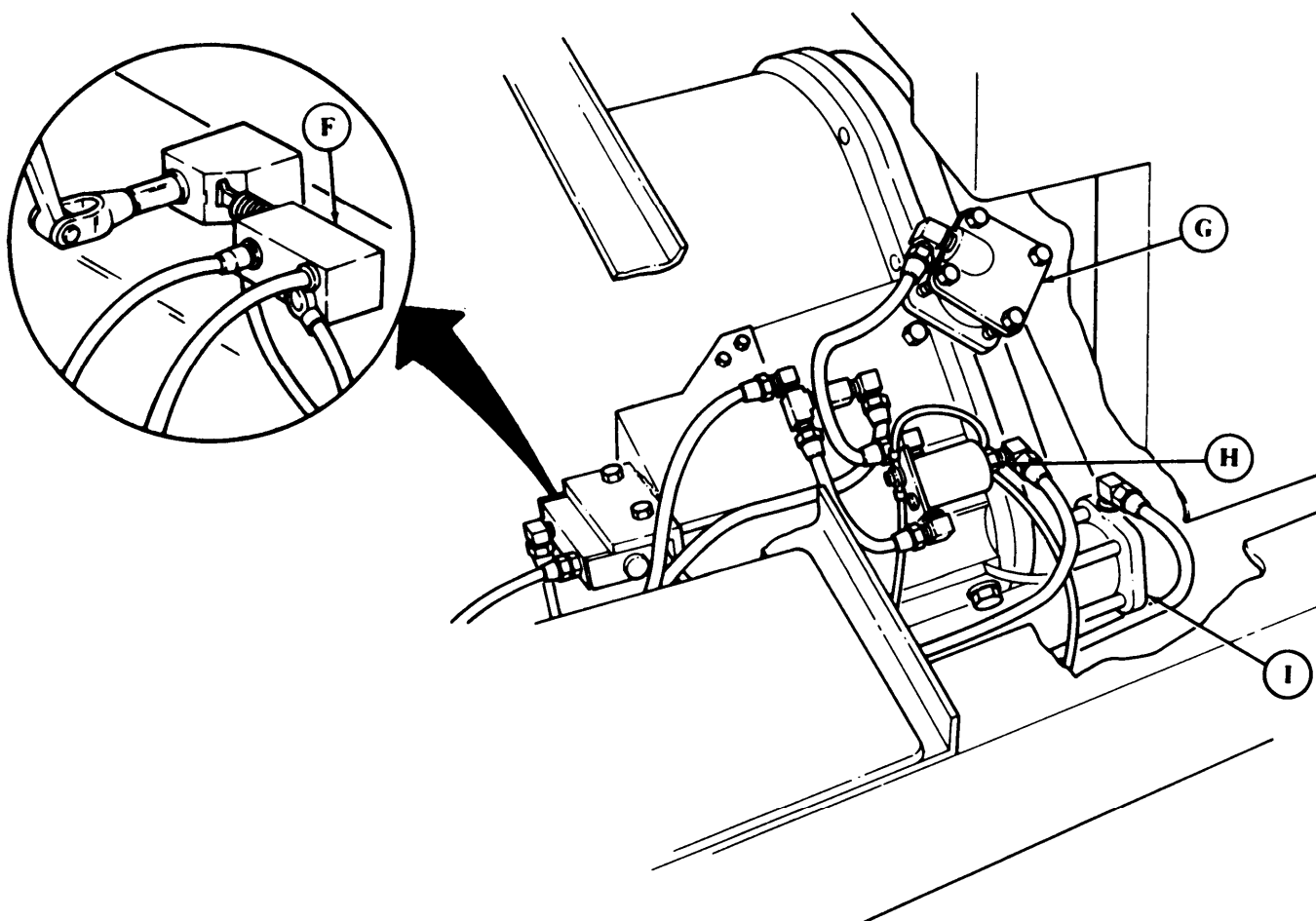
- (A) FRONT WHEEL DRIVE LOCK-IN SWITCH
- (B) TRANSFER CASE SHIFT LEVER SWITCH
- (C) TRANSFER CASE SHIFT LEVER

- (D) TRANSFER CASE POWER TAKEOFF CONTROL LEVER
- (E) TRANSFER CASE POWER TAKEOFF

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f. Transfer Case Control System Operation (Cont'd).

- (F) FRONT WHEEL DRIVE VALVE — When tripped by a cam on transfer case shift shaft the front wheel drive valve dumps air into the front wheel drive air cylinder.
- (G) INTERLOCK AIR CYLINDER — Under air pressure, a piston in the interlock air cylinder forces a shaft against one of three grooves in transfer case shift lever. This prevents transfer case from being shifted with transmission in gear,
- (H) INTERLOCK SOLENOID VALVE — Releases air from interlock air cylinder when transmission is in neutral and transfer case shift lever switch is depressed. This permits the transfer case high/low shift shaft to move.
- (I) FRONT WHEEL DRIVE AIR CYLINDER — When under pressure, it moves transfer case clutch forward to engage front wheel drive.



(F) FRONT WHEEL DRIVE VALVE

(G) INTERLOCK AIR CYLINDER

(H) INTERLOCK SOLENOID VALVE

(I) FRONT WHEEL DRIVE AIR CYLINDER

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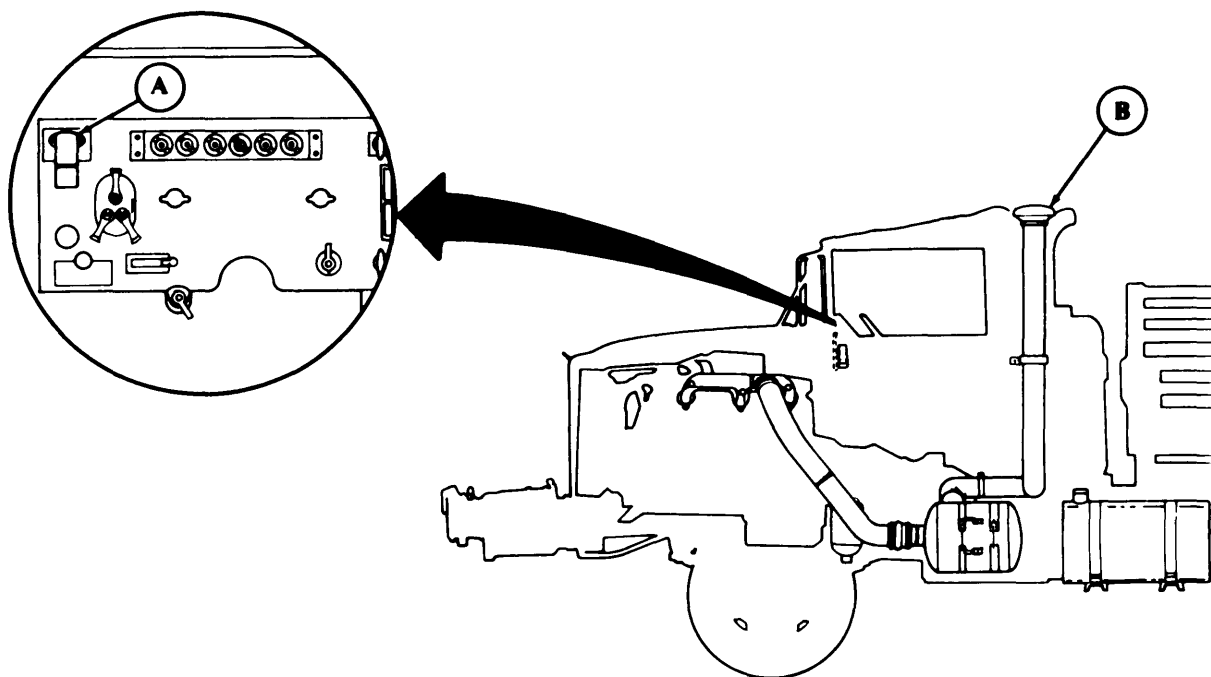
1-17. POWER SYSTEM OPERATION

The power system includes those components that give all vehicles covered in this manual the power to move. Each of these components will be described as part of the following subsystems:

- a. Air Intake System Operation (page 1-41).
 - b. Fuel System (Dual Tank) Operation (page 1-43).
 - c. Fuel System (Single Tank) Operation (page 1-46).
 - d. Cooling System Operation (page 1-48).
 - e. Exhaust System Operation (page 1-50).
 - f. Engine Oil System Operation (page 1-51).
 - g. Powertrain System Operation (page 1-53).
- a. Air Intake System Operation.

The air intake system channels and cleans air going to the combustion chamber where it mixes with fuel from the injectors to provide power for the engine. This system is identical on all models covered in this manual. Major components of the air intake system are:

- (A)** AIR CLEANER INDICATOR — Shows red when engine air filter needs servicing.
- (B)** RAIN CAP — Prevents rain and large objects from entering air intake system.

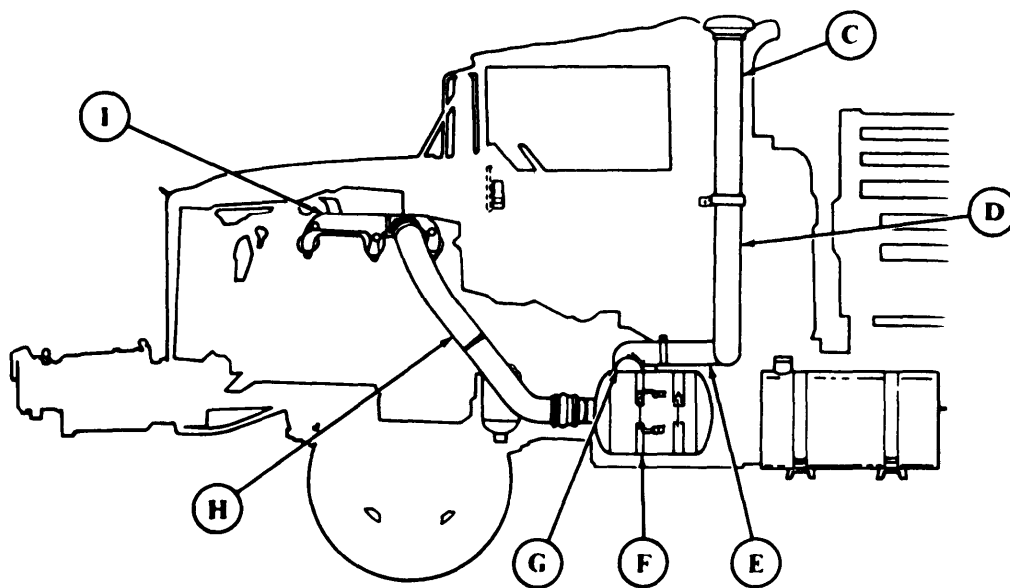


(A) AIR CLEANER INDICATOR

(B) RAIN CAP

a. Air Intake System Operation (Cont'd).

- (C) AIR INTAKE EXTENSION TUBE— Routes air to air intake system. Can be removed for shipping.
- (D) STACK-TO-AIR INTAKE EXTENSION TUBE— Routes air to air cleaner and is high enough to keep intake opening above fording level.
- (E) STACK-TO-AIR CLEANER ELBOW— Flexible connection between air stack and air cleaner.
- (F) AIR CLEANER— Filters dirt and dust from air.
- (G) HUMP HOSE— Flexible connection between air cleaner and air cleaner outlet tube.
- (H) AIR CLEANER OUTLET TUBE— Routes air from air cleaner to intake manifold.
- (I) INTAKE MANIFOLD — Distributes air to combustion chambers in each cylinder head.



- | | |
|--|-----------------------------|
| (C) AIR INTAKE EXTENSION TUBE | (G) HUMP HOSE |
| (D) STACK-TO-AIR INTAKE EXTENSION TUBE | (H) AIR CLEANER OUTLET TUBE |
| (E) STACK-TO-AIR CLEANER ELBOW | (I) INTAKE MANIFOLD |
| (F) AIR CLEANER | |

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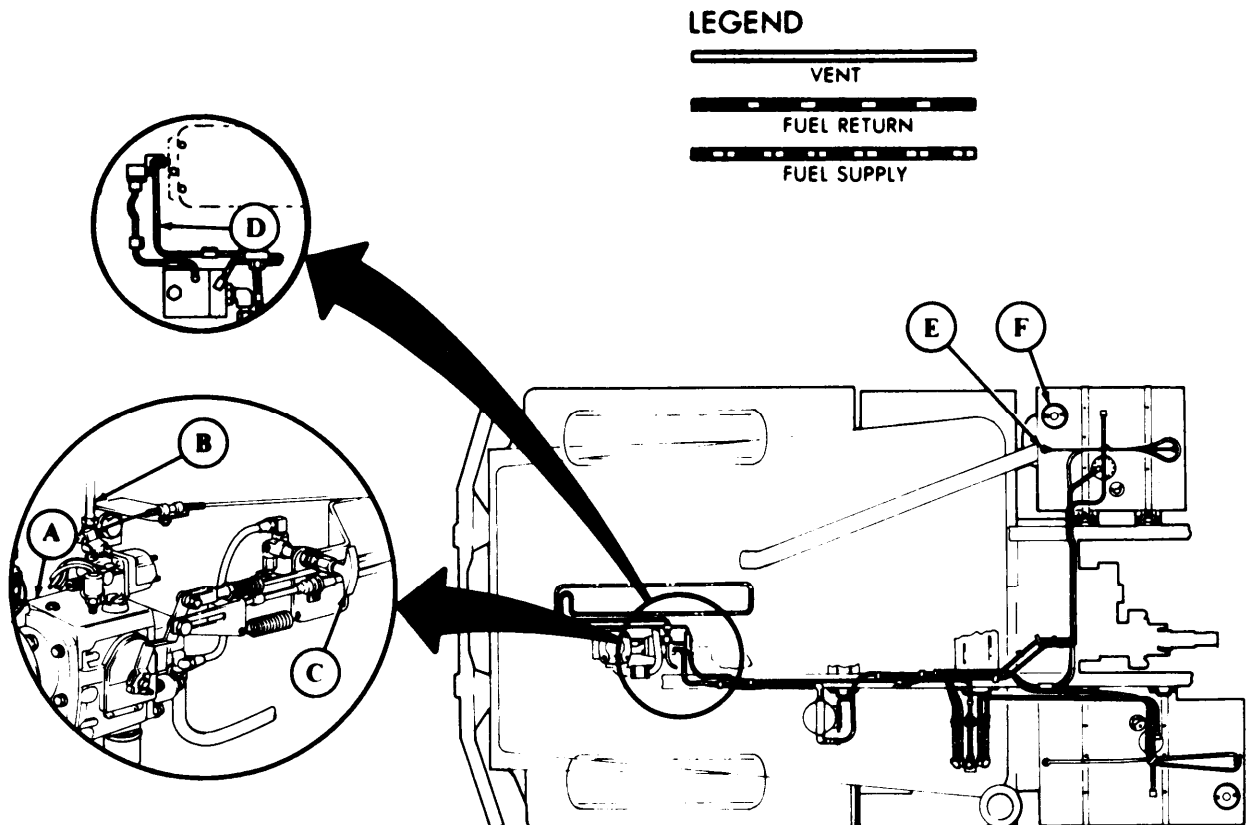
b. Fuel System (Dual Tank) Operation.

1. The fuel system stores, cleans, and supplies fuel to the fuel injectors where it is mixed with air to initiate engine combustion.

2. The fuel system is not identical for all models. Vehicles covered in this manual have either one or two tanks. These tanks can differ in capacity also. See table 1-2, Vehicle Performance Data for these differences.

3. A typical two-tank fuel system is described below. A single tank is described later in paragraph 1-17c. Both systems include fuel supply, return, and vent line legends that show the flow and release the fumes throughout the system. Major components of fuel system (dual tank) are:

- (A) FUEL PUMP — Draws fuel from tank(s) and pumps it through supply line to fuel injectors
- (B) FUEL SUPPLY LINE — Directs fuel from fuel pump to fuel injectors
- (C) FUEL PRIMER PUMP — Purges air from fuel system.
- (D) FUEL RETURN LINE — Returns unused fuel back to fuel tank.
- (E) RIGHT TANK (FRONT) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack.
- (F) RIGHT TANK FILLER CAP — Covers fuel filler opening on right fuel tank.

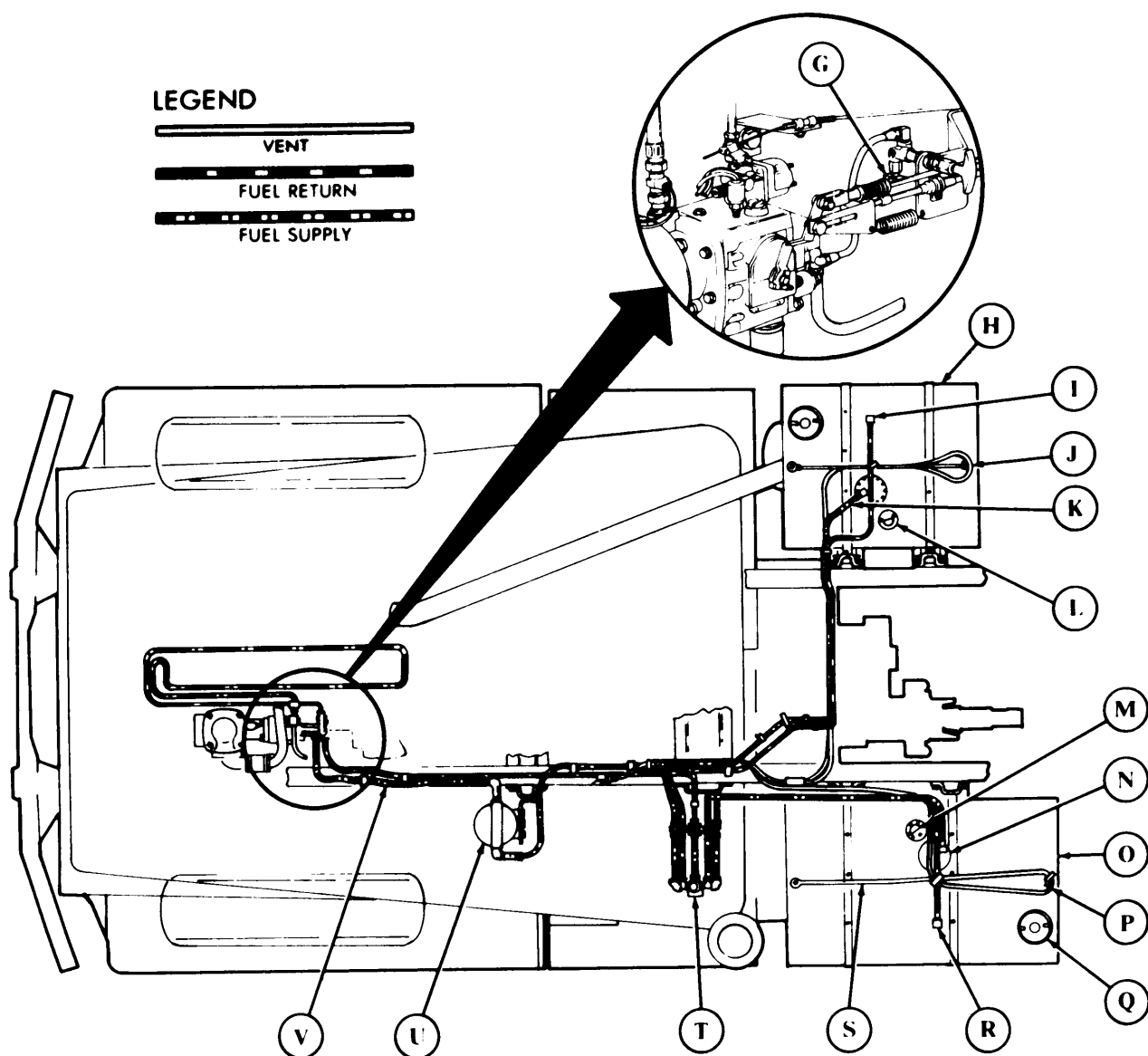


- | | |
|---|---|
| <ul style="list-style-type: none"> (A) FUEL PUMP (B) FUEL SUPPLY LINE (C) FUEL PRIMER PUMP | <ul style="list-style-type: none"> (D) FUEL RETURN LINE (E) RIGHT TANK (FRONT) VENT LINE (F) RIGHT TANK FILLER CAP |
|---|---|

b. Fuel System (Dual Tank) Operation (Cont'd).

- (G) DRAIN COCK — Opened prior to purging fuel system of air using fuel primer pump.
- (H) RIGHT FUEL TANK — Stores fuel for vehicle use.
- (I) RIGHT TANK FUEL RETURN LINE — Returns unused fuel back to fuel tank.
- (J) RIGHT TANK (REAR) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack.
- (K) RIGHT TANK FUEL SUPPLY LINE — Directs fuel from tank to fuel filter.
- (L) RIGHT TANK FUEL LEVEL SENDING UNIT — Electrical signal registers fuel level in right tank at gage on instrument panel.
- (M) LEFT TANK FUEL LEVEL SENDING UNIT — Electrical signal registers fuel level in left tank at gage on instrument panel.
- (N) LEFT TANK FUEL SUPPLY LINE — Directs fuel from left tank to fuel filter.
- (O) LEFT FUEL TANK — Stores fuel for vehicle use.
- (P) LEFT TANK (REAR) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack
- (Q) LEFT TANK FILLER CAP — Covers fuel filler opening on left fuel tank.
- (R) LEFT TANK FUEL RETURN LINE — Returns unused fuel back to fuel tank.
- (S) LEFT TANK (FRONT) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack.
- (T) FUEL SELECTOR VALVE — Manual control valve that opens fuel flow to engine from left or right fuel tank.
- (U) FUEL FILTER/WATER SEPARATOR — Filters water and dirt from fuel.
- (V) FUEL FILTER TO PUMP SUPPLY LINE — Directs fuel from fuel filter to fuel pump.

b. Fuel System (Dual Tank) Operation (Cont'd).



- | | |
|--|-------------------------------------|
| (G) DRAINCOCK | (O) LEFT FUEL TANK |
| (H) RIGHT FUEL TANK | (P) LEFT TANK (REAR) VENT LINE |
| (I) RIGHT TANK FUEL RETURN LINE | (Q) LEFT TANK FILLER CAP |
| (J) RIGHT TANK (REAR) VENT LINE | (R) LEFT TANK FUEL RETURN LINE |
| (K) RIGHT TANK FUEL SUPPLY LINE | (S) LEFT TANK (FRONT) VENT LINE |
| (L) RIGHT TANK FUEL LEVEL SENDING UNIT | (T) FUEL SELECTOR VALVE |
| (M) LEFT TANK FUEL LEVEL SENDING UNIT | (U) FUEL FILTER/WATER SEPARATOR |
| (N) LEFT TANK FUEL SUPPLY LINE | (V) FUEL FILTER TO PUMP SUPPLY LINE |

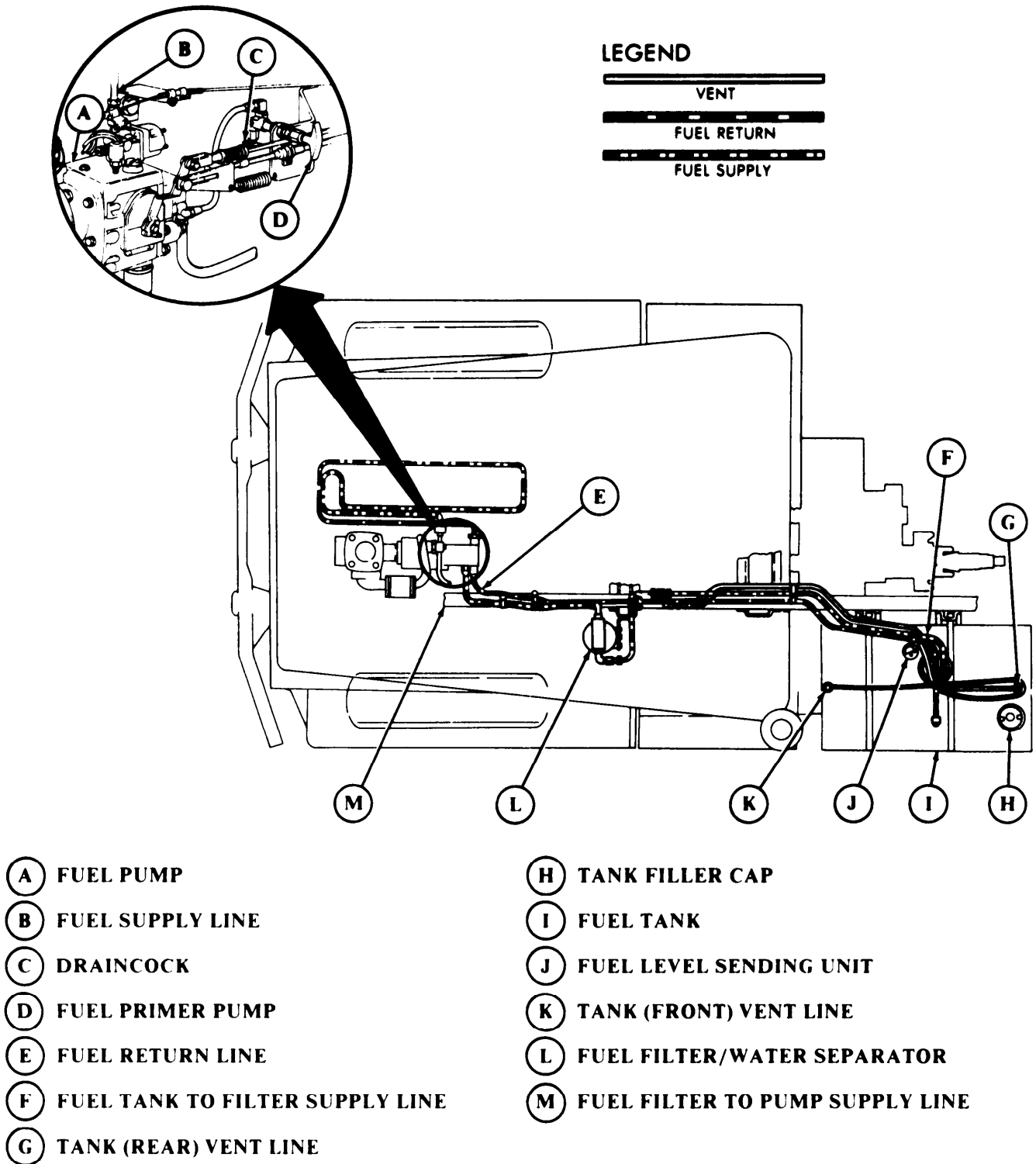
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c. Fuel System (Single Tank) Operation.

Major components of the fuel system (single tank) are.

- (A)** FUEL PUMP — Draws fuel from tank and pumps it through supply line to fuel injectors
- (B)** FUEL SUPPLY LINE — Directs fuel from fuel pump to fuel injectors
- (C)** DRAINCOCK — Opened prior to purging fuel system of air using fuel primer pump.
- (D)** FUEL PRIMER PUMP — Purges air from fuel system.
- (E)** FUEL RETURN LINE — Returns unused fuel back to fuel tank.
- (F)** FUEL TANK TO FILTER SUPPLY LINE — Directs fuel from fuel tank to fuel filter
- (G)** TANK (REAR) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack
- (H)** TANK FILLER CAP — Covers fuel fill opening.
- (I)** FUEL TANK — Stores fuel for vehicle use.
- (J)** FUEL LEVEL SENDING UNIT — Electrical signal registers fuel level in tank at gage on instrument panel.
- (K)** TANK (FRONT) VENT LINE — Vents vapors from fuel tank to vent hole in air intake stack
- (L)** FUEL FILTER/WATER SEPARATOR — Filters water and dirt from fuel.
- (M)** FUEL FILTER TO PUMP SUPPLY LINE — Directs fuel from fuel filter to fuel pump.

c. Fuel System (Single Tank) Operation (Cont'd).



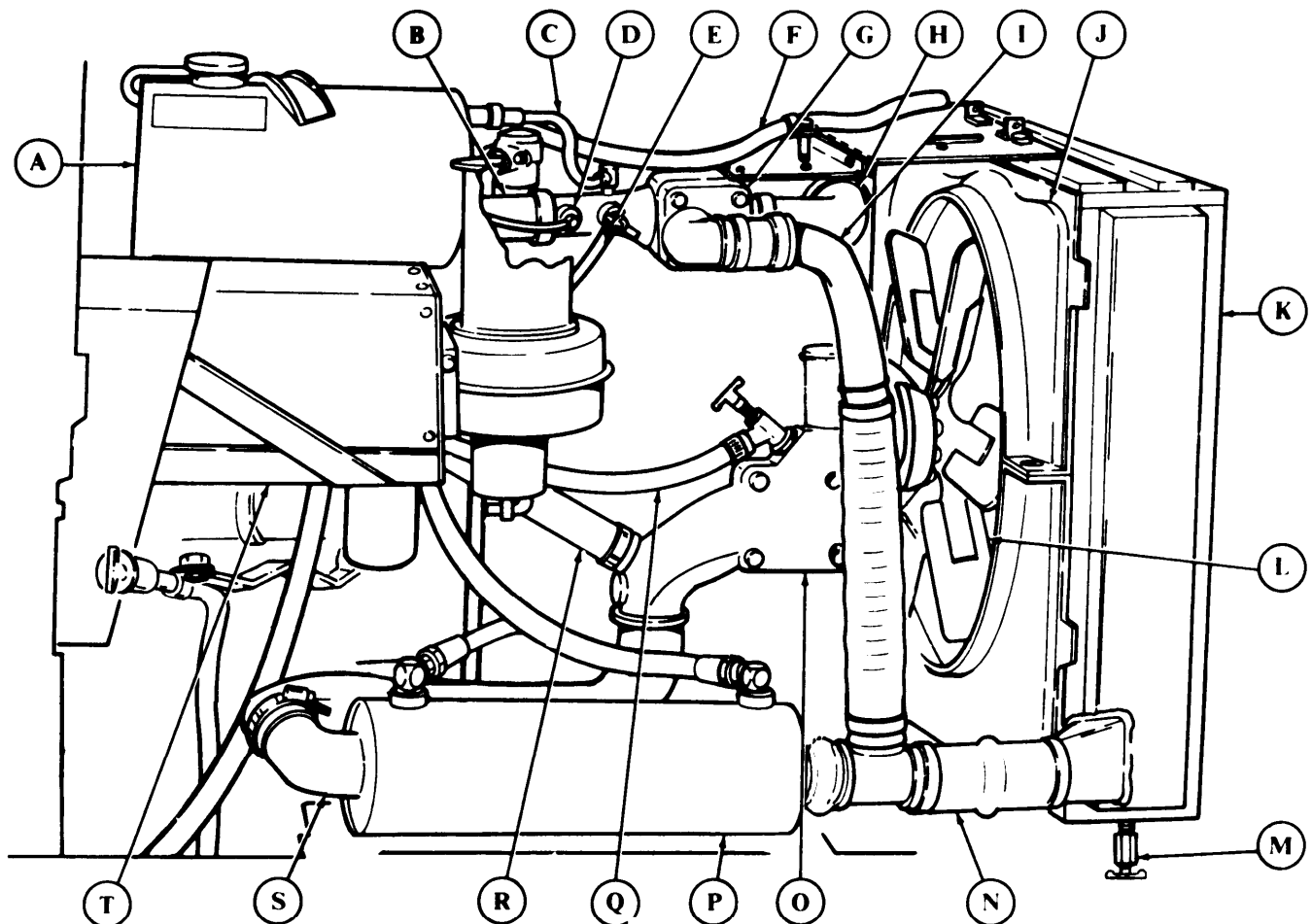
TA 348887

d. Cooling System Operation.

The cooling system removes excessive heat from the engine, engine oil, and transmission oil. This system is identical on all models covered in this manual. Major components of the cooling system are:

- (A)** SURGE TANK — Filling point for the cooling system.
- (B)** WATER MANIFOLD — Collects coolant from cylinder heads and directs it to the thermostat housing where it is redirected through system.
- (C)** SURGE TANK TO WATER MANIFOLD VENT HOSE — Vents air trapped in water manifold.
- (D)** TEMPERATURE GAGE SENDING UNIT — Sends signal indicating coolant temperature to gage in cab.
- (E)** HEATER TO WATER MANIFOLD HOSE — Directs coolant from heater to water manifold.
- (F)** SURGE TANK TO RADIATOR VENT HOSE — Vents air in cooling system.
- (G)** THERMOSTAT — Shuts off coolant flow to radiator until temperature reaches 175F (79°C). Coolant is then directed to the radiator through the radiator inlet hose.
- (H)** RADIATOR INLET HOSE — Directs coolant from water manifold to radiator after thermostat has opened.
- (I)** BYPASS TUBE — Directs coolant back to transmission oil cooler where it is then recirculated through the engine block until the thermostat opens.
- (J)** RADIATOR SHROUD - Permits a greater concentration of air to be pulled through the radiator.
- (K)** RADIATOR — Directs coolant through a series of fins or baffles so outside air can remove excessive heat from coolant.
- (L)** FAN BLADES — A six-blade fan operated by an air-actuated clutch pulls air through radiator to remove excessive heat from coolant.
- (M)** RADIATOR DRAINCOCK — Permits coolant draining from bottom of radiator.
- (N)** RADIATOR TO TRANSMISSION OIL COOLER HOSE — Directs coolant from radiator to transmission oil cooler.
- (O)** ENGINE OIL COOLER — Removes excessive heat from engine oil
- (P)** TRANSMISSION OIL COOLER — Removes excessive heat from transmission oil.
- (Q)** ENGINE OIL COOLER TO HEATER HOSE — When shutoff valve is open, coolant is directed to personnel water heater where it is converted to heat for cab and personnel.
- (R)** SURGE TANK TO ENGINE OIL COOLER HOSE — Directs coolant to engine oil cooler when filling the system.
- (S)** TRANSMISSION OIL COOLER TO ENGINE OIL COOLER HOSE — Directs coolant from transmission oil cooler to engine oil cooler.
- (T)** PERSONNEL WATER HEATER — Provides heat for cab and personnel.

d. Cooling System Operation (Cont'd).



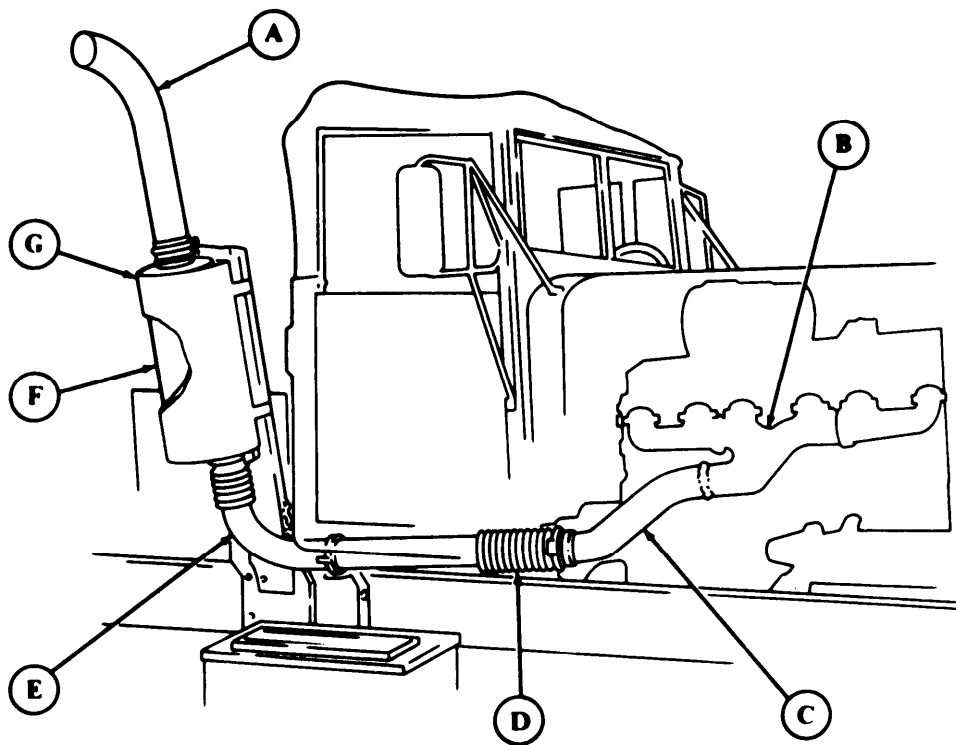
- | | |
|---|--|
| (A) SURGE TANK | (L) FAN BLADES |
| (B) WATER MANIFOLD | (M) RADIATOR DRAINCOCK |
| (C) SURGE TANK TO WATER MANIFOLD VENT HOSE | (N) RADIATOR TO TRANSMISSION OIL COOLER HUMP HOSE |
| (D) TEMPERATURE GAGE SENDING UNIT | (O) ENGINE OIL COOLER |
| (E) HEATER TO WATER MANIFOLD HOSE | (P) TRANSMISSION OIL COOLER |
| (F) SURGE TANK TO RADIATOR VENT HOSE | (Q) ENGINE OIL COOLER TO HEATER HOSE |
| (G) THERMOSTAT | (R) SURGE TANK TO ENGINE OIL COOLER HOSE |
| (H) RADIATOR INLET HOSE | (S) TRANSMISSION OIL COOLER TO ENGINE OIL COOLER HOSE |
| (I) BYPASS TUBE | (T) PERSONNEL WATER HEATER |
| (J) RADIATOR SHROUD | |
| (K) RADIATOR | |

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e. Exhaust System Operation.

The exhaust system directs exhaust gases away from the vehicle for all models covered in this manual. Major components of the exhaust system-are:

- (A)** EXHAUST STACK — Directs exhaust from muffler away from vehicle.
- (B)** EXHAUST MANIFOLD — Collects exhaust from cylinder head ports and directs it to front exhaust pipe.
- (C)** FRONT EXHAUST PIPE — Directs exhaust to rear exhaust pipe.
- (D)** FLEX PIPES — Parts of rear exhaust pipe. Allows flexibility for vibration and expansion in system.
- (E)** REAR EXHAUST PIPE — Directs exhaust to muffler.
- (F)** MUFFLER — Quiets exhaust noises.
- (G)** MUFFLER SHIELD — Protects personnel from muffler heat.

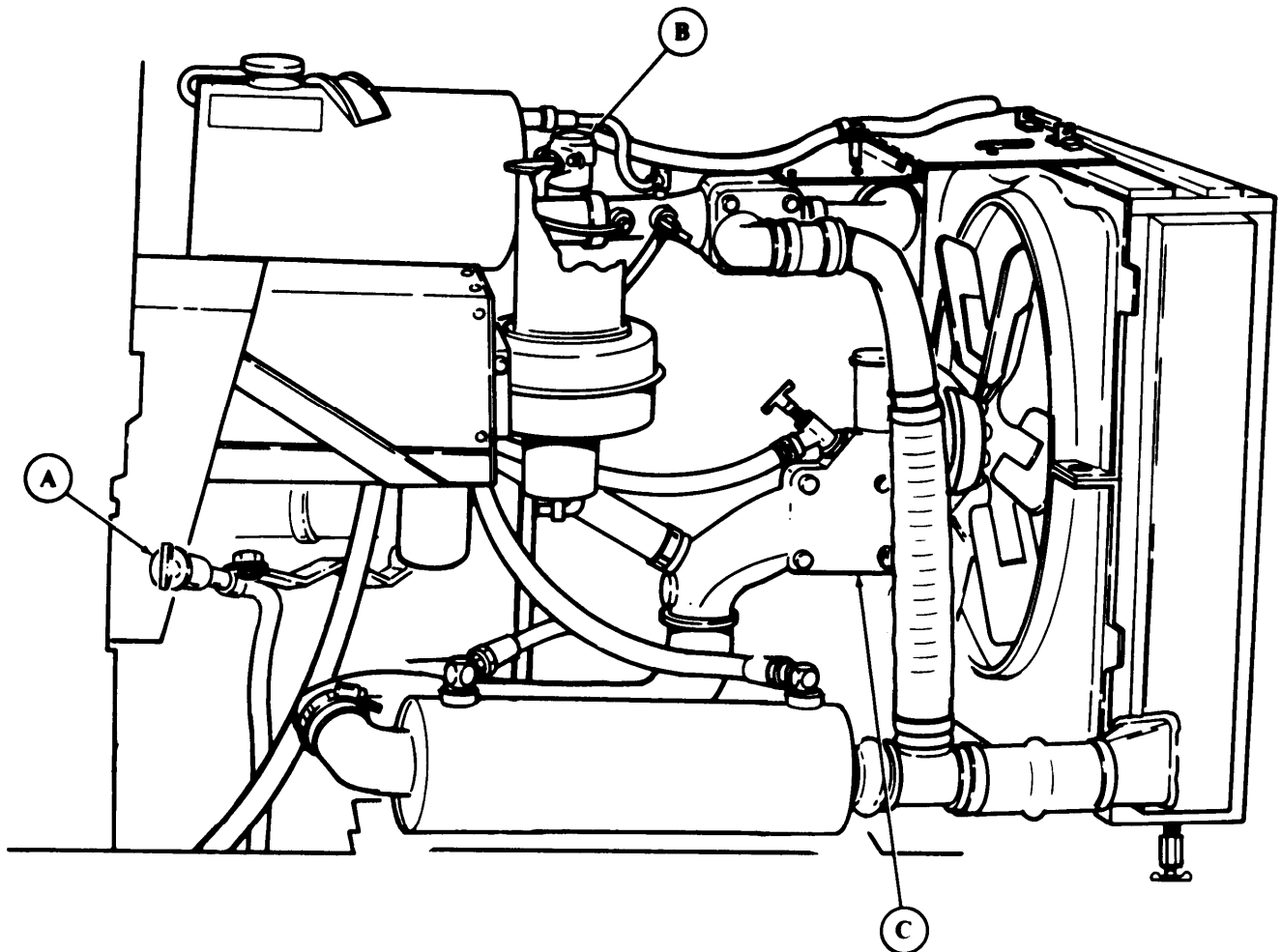


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|-------------------------------|------------------------------|
| (A) EXHAUST STACK | (E) REAR EXHAUST PIPE |
| (B) EXHAUST MANIFOLD | (F) MUFFLER |
| (C) FRONT EXHAUST PIPE | (G) MUFFLER SHIELD |
| (D) FLEX PIPES | |

f. Engine Oil System Operation.

The engine oil system provides lubricating oil for moving internal engine parts and is identical on all models covered in this manual. Major components of the engine oil system are:

- (A) OIL DIPSTICK — Indicates engine oil level.
- (B) CRANKCASE BREATHER — Vents hot engine oil fumes from engine and allows fresh air to enter.
- (C) ENGINE OIL COOLER — Removes heat from engine oil as coolant circulates through internal tubes of oil cooler.

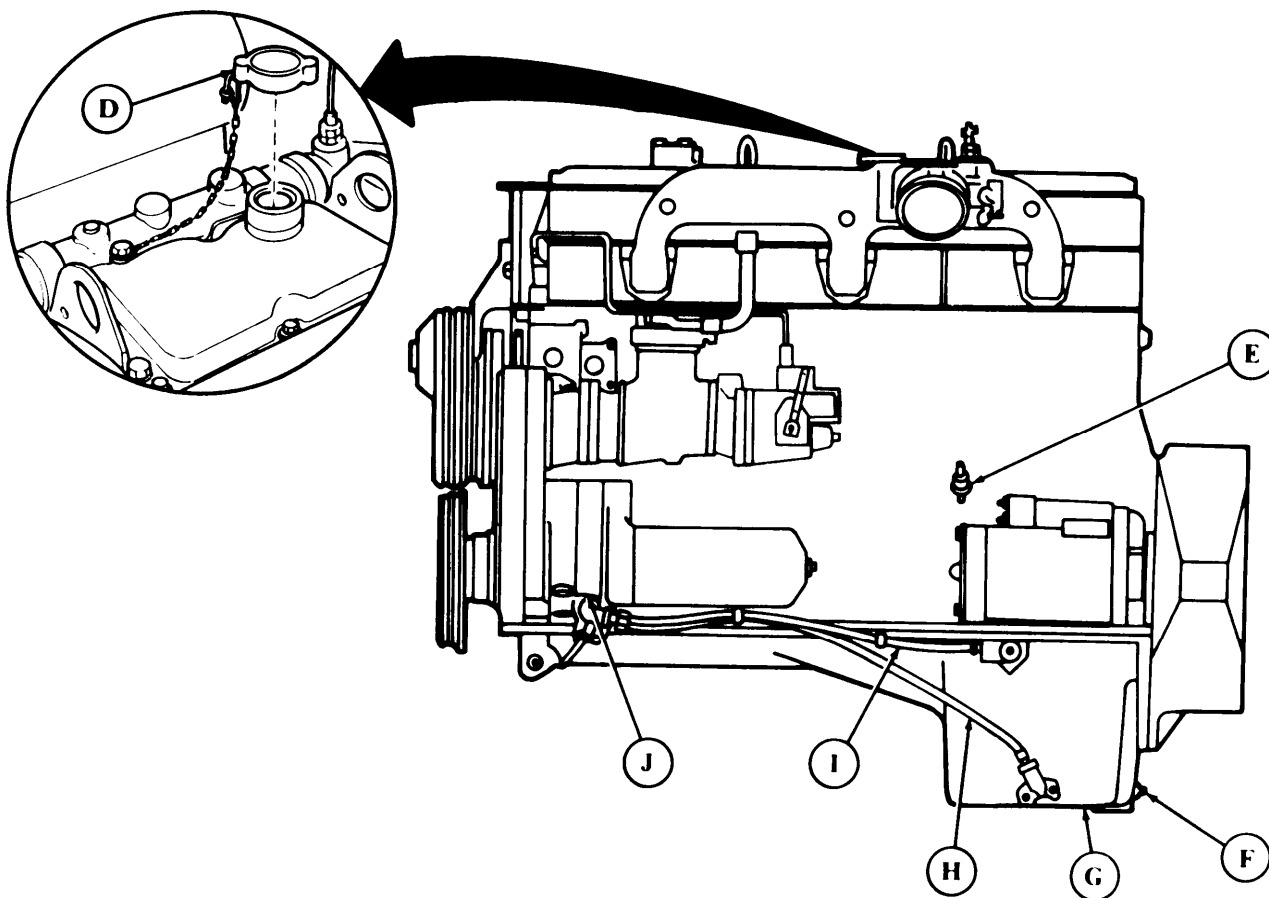


- (A) OIL DIPSTICK
- (B) CRANKCASE BREATHER

- (C) ENGINE OIL COOLER

f. Engine oil System Operation (Cont'd).

- (D) OIL FILLER CAP — Located on rocker lever cover, cap covers engine oil fill opening.
- (E) OIL PRESSURE TRANSMITTER — Sends an electrical signal that indicates engine oil pressure to gage on instrument panel,
- (F) OIL PAN DRAIN PLUG — Plugs engine oil drain opening.
- (G) OIL PAN — Reservoir for engine oil.
- (H) OIL SUPPLY LINE — Carries oil from oil pan to the oil pump.
- (I) OIL BYPASS RETURN LINE — Returns oil from oil pump to the oil pan.
- (J) OIL PUMP — Provides mechanical pressurization of oil to circulate it through the oil system.

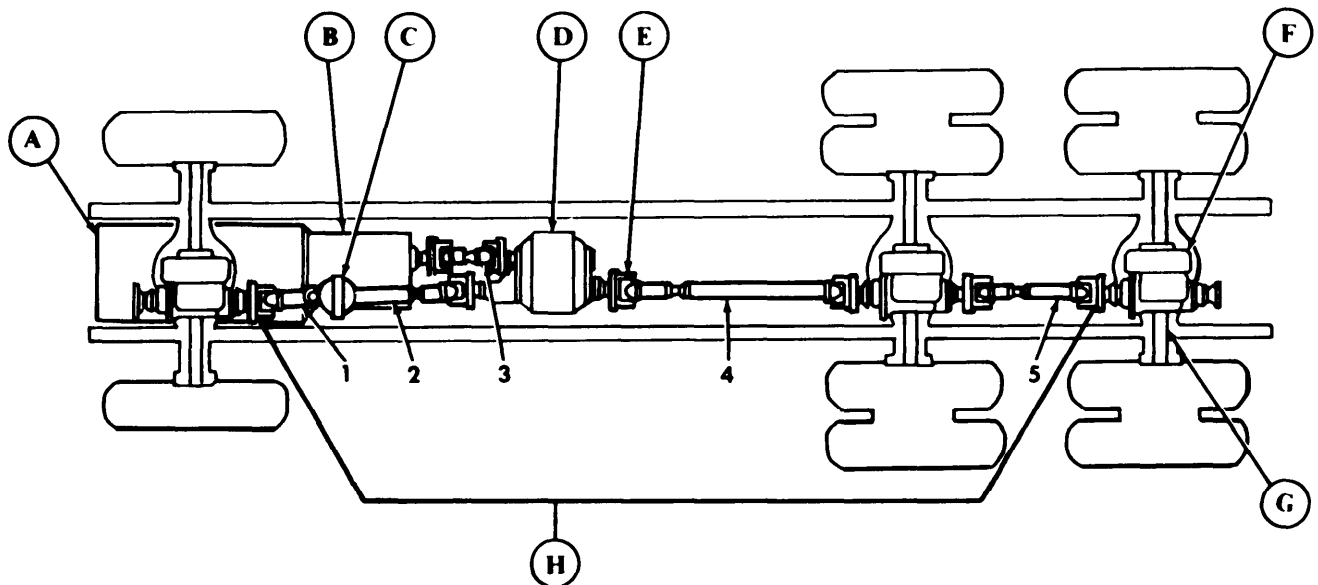


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|------------------------------|----------------------------|
| (D) OIL FILLER CAP | (H) OIL SUPPLY LINE |
| (E) OIL PRESSURE TRANSMITTER | (I) OIL BYPASS RETURN LINE |
| (F) OIL PAN DRAIN PLUG | (J) OIL PUMP |
| (G) OIL PAN | |

g. Powertrain System Operation.

The powertrain system is the same on all models in this manual except the extra long wheelbase models which have an additional propeller shaft and a center bearing. This system transmits engine power throughout the vehicle to put it in motion. Major components of the powertrain system are:

- (A) ENGINE — Provides power needed for powertrain component operation.
- (B) TRANSMISSION — Adapts engine power to meet different driving conditions.
- (C) CENTER BEARING — Provides support for propeller shaft to decrease vibration and wear on universal joints.
- (D) TRANSFER CASE — Distributes power evenly to front and rear axles.
- (E) UNIVERSAL JOINTS — Connections between two propeller shafts that permit one to drive the other even though they may be at different angles.
- (F) DIFFERENTIALS — Distribute power to left and right axle shafts independently so vehicle can make turns.
- (G) AXLES — Transmit power from differentials to rotate wheels.
- (H) PROPELLER SHAFTS — Serve as driving shafts that connect the transmission to the transfer case, and connect the transfer case to the differentials.



- (A) ENGINE
- (B) TRANSMISSION
- (C) CENTER BEARING
- (D) TRANSFER CASE
- (E) UNIVERSAL JOINTS
- (F) DIFFERENTIALS
- (G) AXLES

(H) PROPELLER SHAFTS

1. Center bearing to front differential propeller shaft.
2. Transfer case to center bearing propeller shaft.
3. Transmission to transfer case propeller shaft.
4. Transfer case to forward-rear differential propeller shaft.
5. Forward-rear differential to rear-rear differential propeller shaft.

TA 348892

1-18. ELECTRICAL SYSTEMS OPERATION

Nearly every component of the models covered in this manual is affected by the electrical system. These components and their electrical connections are described as part of the following electrical subsystems:

- a. Battery System Operation (page 1-56).
- b. Starting System Operation (page 1-57).
- c. Ether Starting System Operation (page 1-58).
- d. Generating System Operation (page 1-59).
- e. Directional Signal System Operation (page 1-60).
- f. Heating System Operation (page 1-61).
- g. Indicator, Gage, and Warning System Operation (page 1-62).
- h. Trailer and Van Connection System Operation (page 1-64).

For additional information, a complete wiring schematic diagram is in appendix G.

Electrical Terms and Definitions.

The following electrical terms and definitions will be frequently referred to throughout this section and should be understood before proceeding:

CIRCUIT — The complete path of electric current through a wire from one component or point to another.

CIRCUIT BREAKER — An automatic switch that stops current flow in a circuit when there is an electrical overload.

RELAY — An electromagnetic device that operates like an automatic switch to control the flow of current in the same or different circuit.

GROUND — A common return to complete an electrical circuit.

FEMALE CONNECTOR — One-half of a circuit connector which fits over the other half of the connector.

MALE CONNECTOR — One-half of a circuit connector which fits inside the other half of the connector.

HARNESS — A group of similarly routed wires with other devices and connectors that are bound and routed together to prevent damage and ease repair and replacement.

TERMINAL — Fastener at end of wire used to connect the wire to an electrically powered device.

SPLICE — A permanent physical connection of two or more wires.

POLARITY — Arrangement of positive and negative leads to complete an electrical circuit.

REVERSE POLARITY — The condition that exists when circuit polarity is connected opposite of that which was intended.

Electrical Terms and Definitions (Cont'd).

SENDING UNIT — A device that produces an electrical signal and sends this signal to the device which will make use of it.

SENSOR – An electrical sensor takes a physical condition (temperature, oil presence or absence) and converts this into an electrical signal.

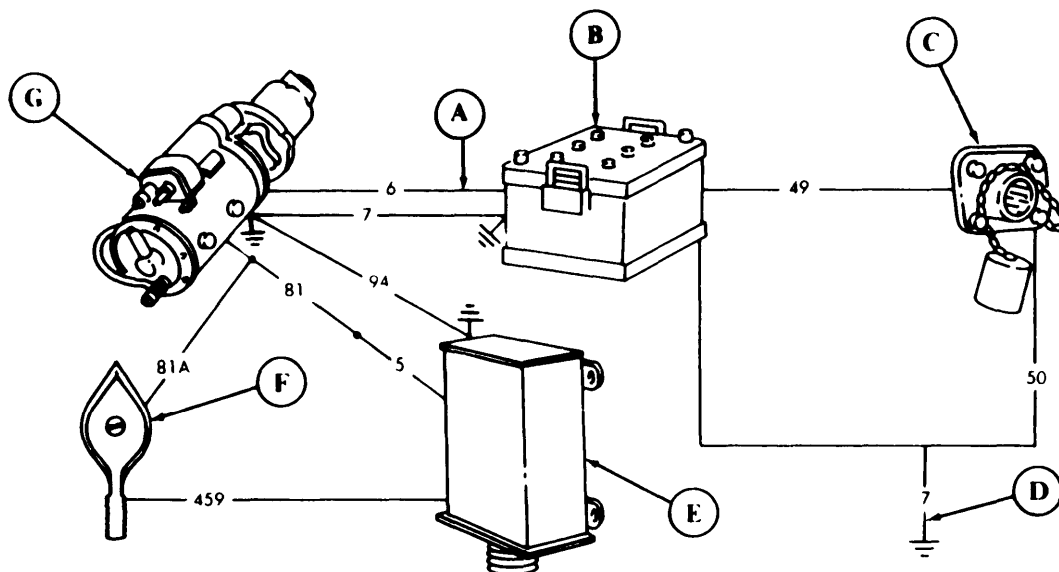
DIRECT CURRENT (D.C. SIGNAL) – Current in a circuit that flows in one direction.

ALTERNATING CURRENT (A.C. SIGNAL) – Current in a circuit that flows, in one direction first, then in the other direction.

a. Battery System Operation.

The battery system is identical for all models covered in this manual and consists of the following major components and circuits:

- (A) CIRCUIT 6 — Connects the batteries to the starting motor, and to the protective control box through circuit 81.
- (B) BATTERIES — Four 6TN batteries are connected in series parallel to provide 24-volts D.C. for the electrical starter system and 12-volts D.C. for the heater fan low speed.
- (C) SLAVE RECEPTACLE — Links an external power source directly to the slaved vehicle's batteries to assist in cranking the engine when the batteries are not sufficiently charged.
- (D) CIRCUIT 7 — Connects the battery system to the starter negative terminal and to chassis ground.
- (E) PROTECTIVE CONTROL BOX — Protects the vehicle electrical system in the event the battery system polarity is reversed. Connects battery power to vehicle electrical lead through circuit 81 and circuit 5. Connects positive ground through circuit 94 to the starter.
- (F) BATTERY SWITCH — Controls a relay in the protective control box through circuit 459 that connects the batteries to the vehicle electrical load.
- (G) STARTER SOLENOID — Junction point for battery positive lead (circuit 6) and vehicle electrical feed wire (circuit 81).



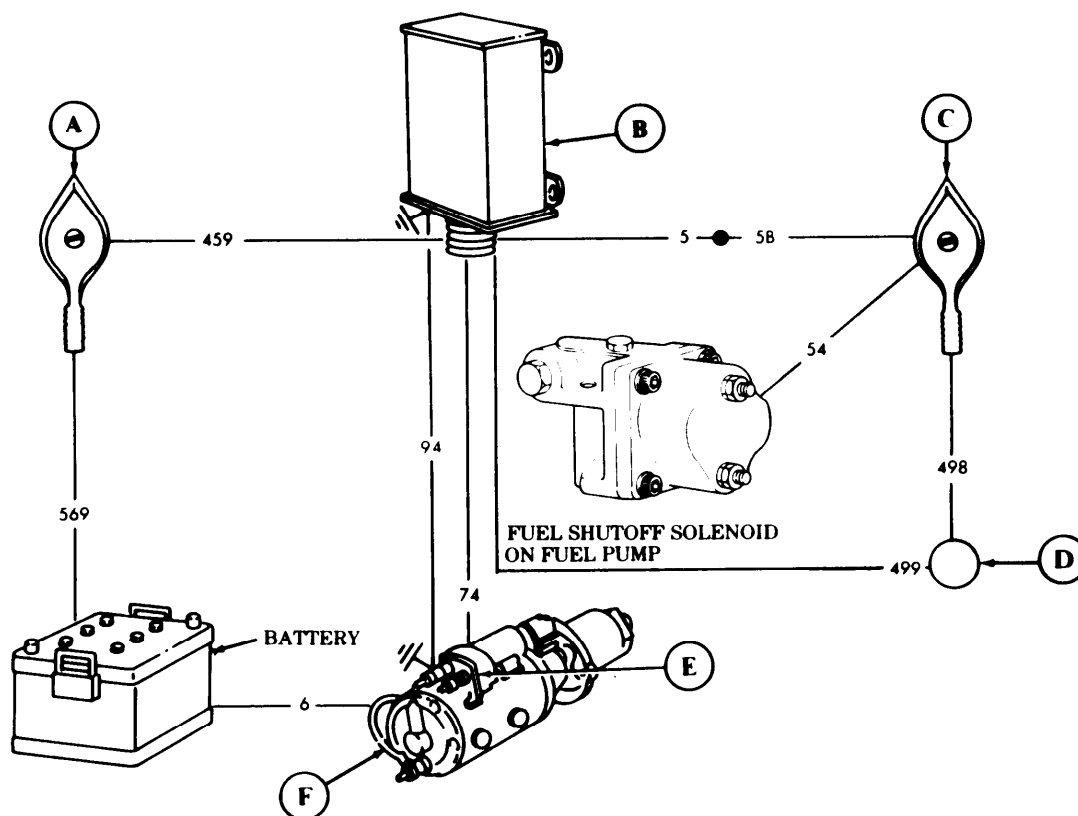
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|----------------------|----------------------------|
| (A) CIRCUIT 6 | (E) PROTECTIVE CONTROL BOX |
| (B) BATTERIES | (F) BATTERY SWITCH |
| (C) SLAVE RECEPTACLE | (G) STARTER SOLENOID |
| (D) CIRCUIT 7 | |

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b. Starting System Operation.

The starting system is identical for all models covered in this manual and consists of the following major components and circuitry:

- (A) **BATTERY SWITCH** – Closes a relay in the protective control box through circuit 459 that provides battery power to the ignition switch through circuits 5 and 5B.
- (B) **PROTECTIVE CONTROL BOX** – Locks out starter circuit, which prevents starter from re-engaging while engine is running.
- (C) **IGNITION SWITCH** — Provides battery power to the fuel solenoid through circuit 54 and the neutral start safety switch through circuit 498.
- (D) **NEUTRAL START SAFETY SWITCH** — When the gear selector is in neutral, this switch closes a relay in the protective control box through circuit 499. This relay sends battery power to the starter solenoid through circuit 74. The result of this action prevents the engine from starting when the transmission is in gear.
- (E) **STARTER SOLENOID** — A magnetic relay that is powered by circuit 74 to transmit 24-volt battery power to the starter motor through circuit 6.
- (F) **STARTER MOTOR** — Cranks the engine for starting. Supplied with 24-volt battery power through circuit 6.

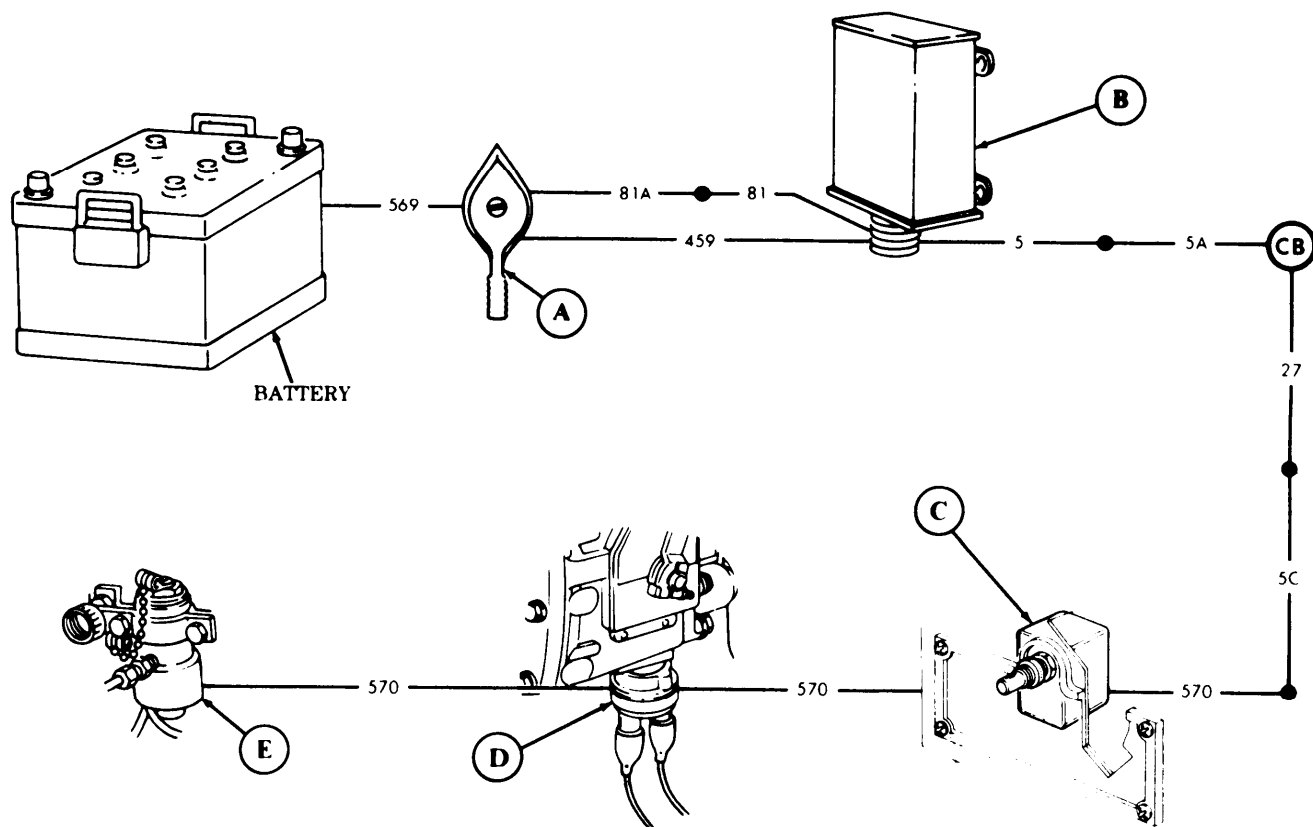
(A) **BATTERY SWITCH**(B) **PROTECTIVE CONTROL BOX**(C) **IGNITION SWITCH**(D) **NEUTRAL START SAFETY SWITCH**(E) **STARTER SOLENOID**(F) **STARTER MOTOR**

TA 348894

c. Ether Starting System Operation.

The ether starting system is identical for all models covered in this manual and consists of the following major components and circuitry

- (A) BATTERY SWITCH — Provides 24-volt battery power to the protective control box through circuits 459, 81A, and 81.
- (B) PROTECTIVE CONTROL BOX — Energizes the ether feed switch through circuits 5, 5A, 27, 5C, and 570.
- (C) ETHER FEED SWITCH — Controls 24-volt power to the ether pressure switch through circuit 570.
- (D) ETHER PRESSURE SWITCH — Connects the ether feed switch to the ether tank valve through circuit 570,
- (E) ETHER TANK VALVE — Is activated through circuit 570 when the ether pressure switch is closed and the ether feed switch is pressed.



(A) BATTERY SWITCH

(B) PROTECTIVE CONTROL BOX

(C) ETHER FEED SWITCH

(D) ETHER PRESSURE SWITCH

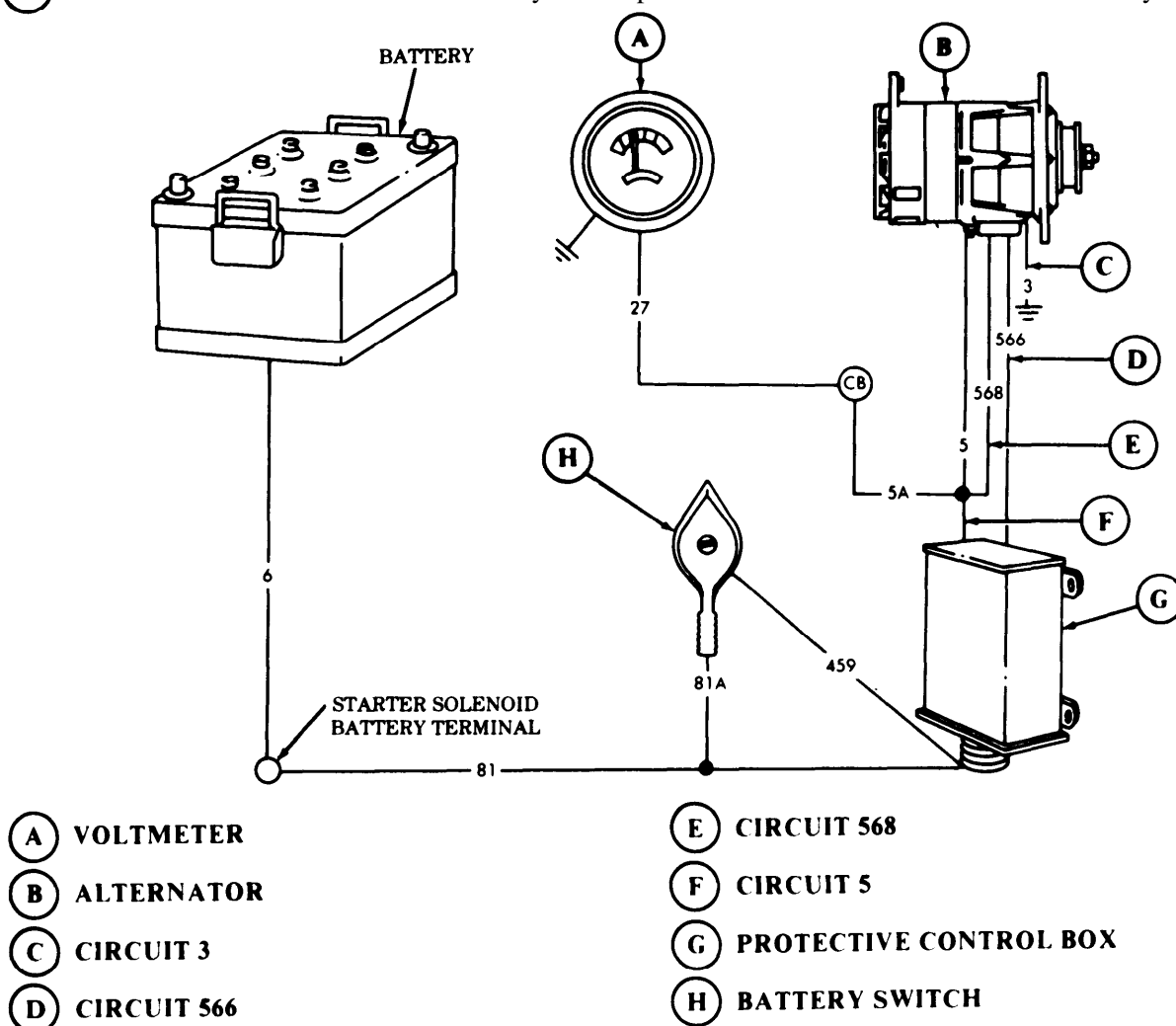
(E) ETHER TANK VALVE

TA 348895

d. Generating System Operation.

The generating system is identical for all vehicles covered in this manual and consists of the following major components and circuitry

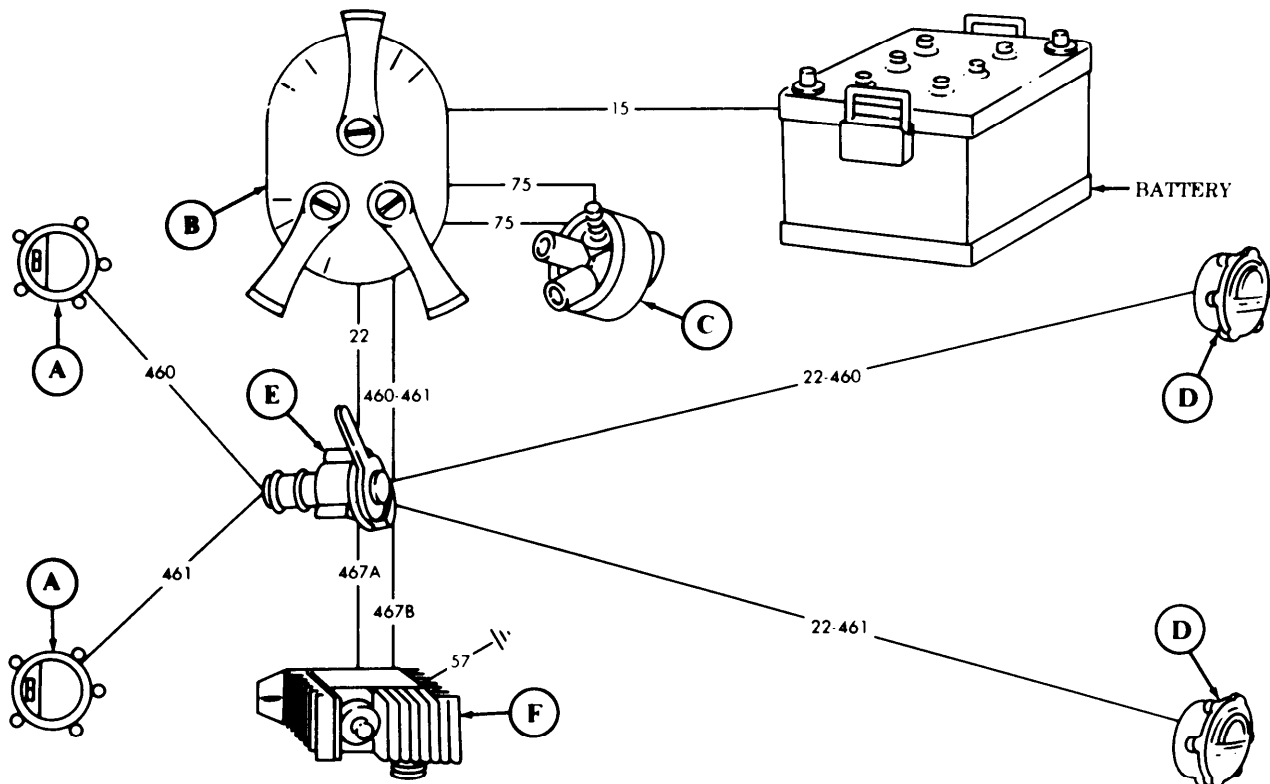
- (A) VOLTMETER — Indicates electrical system voltage. It is connected to the electrical system through circuit 27.
- (B) ALTERNATOR — Rated at 26-30 volts, 60 amperes, the alternator assists and recharges the batteries during operation.
- (C) CIRCUIT 3 — Provides a ground circuit to the alternator.
- (D) CIRCUIT 566 — Controls a relay in the protective control box that prevents the starter from reactivating while the engine is running.
- (E) CIRCUIT 568 — Senses system voltage and excites the field circuit in the alternator.
- (F) CIRCUIT 5 — Conducts alternator output to charge the batteries and maintain vehicle voltage.
- (G) PROTECTIVE CONTROL BOX — Connects circuit 5 to 81 to power the electrical system and charge the batteries.
- (H) BATTERY SWITCH — Closes the relay in the protective control box that connects battery circuits.



e. Directional Signal System Operation.

The directional signal system is identical on all models covered in this manual and consists of the following major components and circuitry

- (A) **FRONT COMPOSITE LAMP** — Receives power from turn signal control through circuits 460 and 461 to indicate turning direction.
- (B) **LIGHT SWITCH** — Provides battery power to the directional signal switch through circuits 460 and 461, and to the stoplight switch through circuit 75.
- (C) **STOPLIGHT SWITCH** — Closing this switch allows power to flow from the light switch through circuit 75 to circuit 22 to the directional signal switch.
- (D) **REAR COMPOSITE LAMP** — Receives power from turn signal control through circuit 22-460 and 22-461, to indicate turning direction.
- (E) **DIRECTIONAL SIGNAL SWITCH** — A four-position switch that directs power to the composite and signal lamps through circuits 460, 461, 22-460, and 22-461 to indicate direction of turn.
- (F) **TURN SIGNAL FLASHER** — Receives power through circuit 467A which causes the flasher to send intermittent current to the signal lamp through circuit 467B.



- (A) **FRONT COMPOSITE LAMP**
- (B) **LIGHT SWITCH**
- (C) **STOPLIGHT SWITCH**

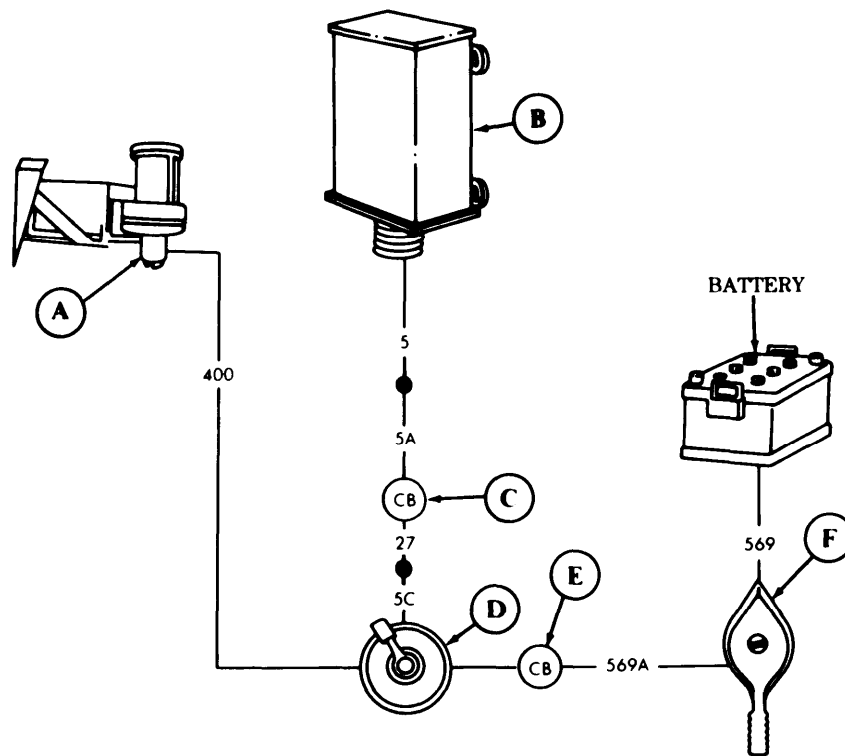
- (D) **REAR COMPOSITE LAMP**
- (E) **DIRECTIONAL SIGNAL SWITCH**
- (F) **TURN SIGNAL FLASHER**

TA 348897

f. Heating System Operation.

The electrical portion of the heating system is identical for all models covered in this manual and consists of the following major components and circuitry

- (A) HEATER BLOWER MOTOR — A direct current motor controlled by the heater switch through circuit 400.
- (B) PROTECTIVE CONTROL BOX — Provides 24-volt power to circuit breaker through circuits 5 and 5a and to the heater switch through circuits 27 and 5c.
- (C) CIRCUIT BREAKER — Provides overload protection for 24-volt circuits 5, 5a, 27, and 5c leading to the heater switch.
- (D) HEATER SWITCH — Controls low and high blower motor speed and has two sources of power. 12-volt power is supplied through circuit 569a from the battery switch and is used to provide low speed heater motor power. 24-volt power is supplied through circuit 5c from the protective control box and is used to provide high speed heater motor power.
- (E) CIRCUIT BREAKER — Provides overload protection for 12-volt circuit 569a leading to heater switch.
- (F) BATTERY SWITCH — Provides 12-volt battery power from circuit 569 through 569a to the heater switch.



- (A) HEATER BLOWER MOTOR
- (B) PROTECTIVE CONTROL BOX
- (C) CIRCUIT BREAKER

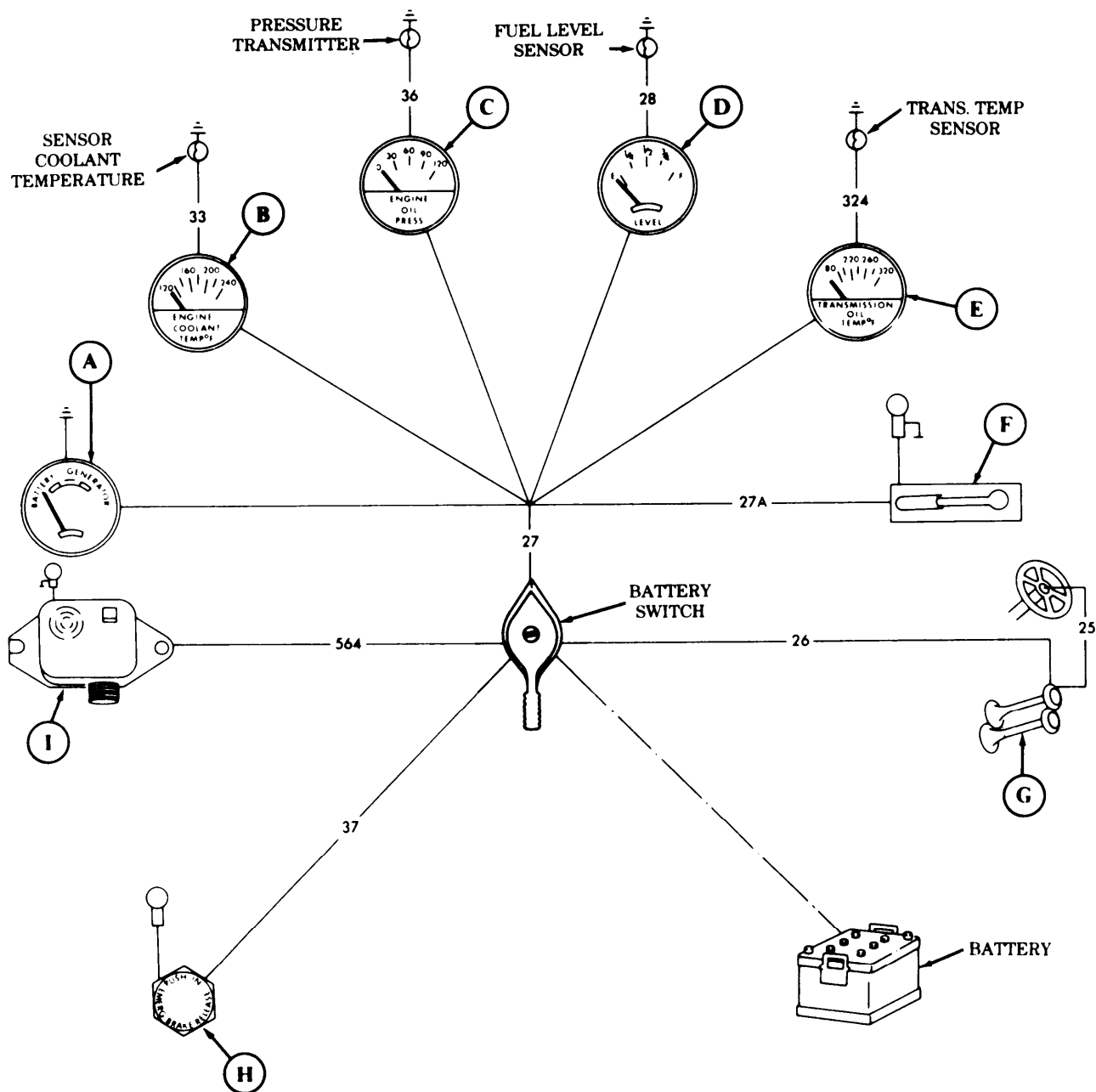
- (D) HEATER SWITCH
- (E) CIRCUIT BREAKER
- (F) BATTERY SWITCH

g. Indicator, Gage, and Warning System Operation.

The indicator, gage, and warning system is comprised of several subsystems. These subsystems will be handled individually as follows:

- (A) VOLTMETER** — Indicates system voltage and is connected to the batteries through circuit 27 and to chassis ground through instrument panel.
- (B) ENGINE COOLANT TEMPERATURE INDICATOR** — Indicates engine coolant temperature and receives battery power through circuit 27. Circuit 33 completes the circuit to ground through a coolant temperature sensor that reacts to changes in engine coolant temperature by increasing or decreasing the resistance in the ground circuit.
- (C) ENGINE OIL PRESSURE INDICATOR** — Indicates engine oil pressure and receives battery power through circuit 27. Circuit 36 completes the circuit to ground through the oil pressure transmitter located on the engine block.
- (D) FUEL INDICATOR** — Indicates fuel level. Receives battery power through circuit 27. Circuit 28 or 29, depending upon which position the fuel selector switch is in, completes the circuit to ground through the fuel level sensor.
- (E) TRANSMISSION OIL TEMPERATURE INDICATOR** — Indicates transmission oil temperature and receives battery power through circuit 27. Circuit 324 completes the circuit to ground through a temperature sensor located in the transmission.
- (F) FRONT WHEEL DRIVE ENGAGEMENT LIGHT** — Informs the operator that the front wheel drive is engaged. The system consists of a normally open pressure switch, which is powered through circuit 27a and an indicator lamp powered through circuit 27a.
- (G) HORN SYSTEM** — The horn system consists of an air-operated horn that is controlled by an electric solenoid. The solenoid is powered through circuit 26 and controlled by the horn switch through circuit 25.
- (H) SPRING BRAKE WARNING SYSTEM** — Warns the operator that the spring brakes are applied. The system consists of a normally open pressure switch powered through circuit 37 and an indicator lamp which is powered through circuit 37.
- (I) FAILSAFE WARNING SYSTEM** — Intended to give the operator an audible as well as visual signal of a malfunction in one of the primary systems. Power for the system is supplied from the ignition switch through circuit 564. The failsafe module causes an indicator lamp to illuminate and an alarm to sound when the air pressure falls below 60 psi (413 kPa) or when the parking brake is set.

g. Indicator, Gage, and Warning System Operation (Cont'd).



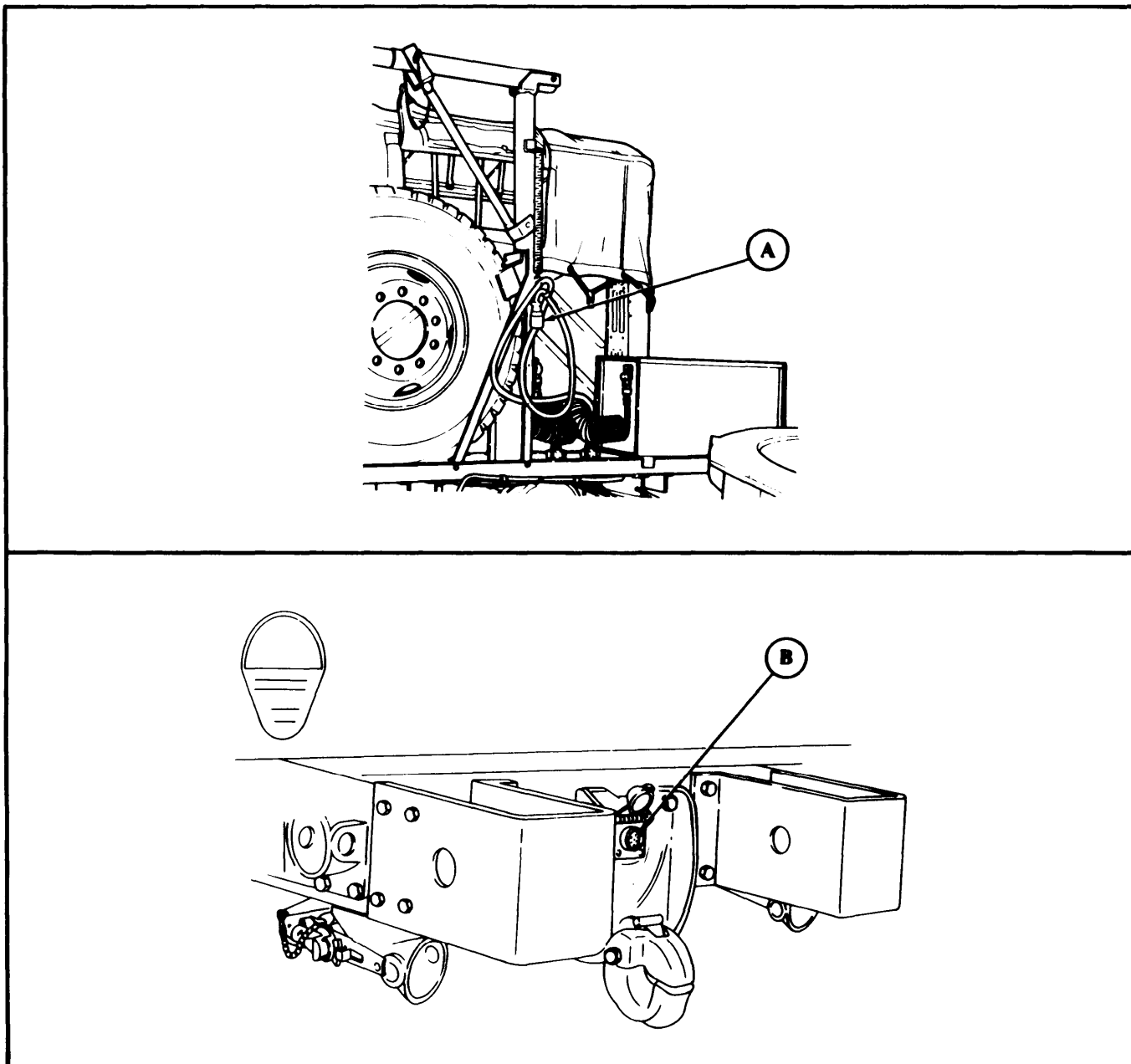
- (A) VOLTMETER
- (B) ENGINE COOLANT TEMPERATURE INDICATOR
- (C) ENGINE OIL PRESSURE INDICATOR
- (D) FUEL INDICATOR
- (E) TRANSMISSION OIL TEMPERATURE INDICATOR

- (F) FRONT WHEEL DRIVE ENGAGEMENT LIGHT
- (G) HORN SYSTEM
- (H) SPRING BRAKE WARNING SYSTEM
- (I) FAILSAFE WARNING SYSTEM

h. Trailer and Van Connection System Operation.

The trailer receptacle is identical on all models covered in this manual. The semitrailer receptacle is on the tractor body only.

- (A)** SEMITRAILER RECEPTACLE — All vehicles equipped with a fifth wheel are provided with a semitrailer receptacle. This receptacle provides vehicle lighting, auxiliary power, and a ground circuit for semitrailer.
- (B)** TRAILER RECEPTACLE — Provides vehicle lighting, auxiliary power, and a ground circuit for trailers.



(A) SEMITRAILER RECEPTACLE

(B) TRAILER RECEPTACLE

TA 348900

1-19. COMPRESSED AIR AND BRAKE SYSTEM OPERATION

The compressed air and brake system, common to all models, takes filtered air, compresses it, and supplies it to various components that enable the operator to slow down or stop the vehicle. This system also supplies compressed air to air-actuated accessories throughout the vehicle. These components and accessories will be described as part of the following systems:

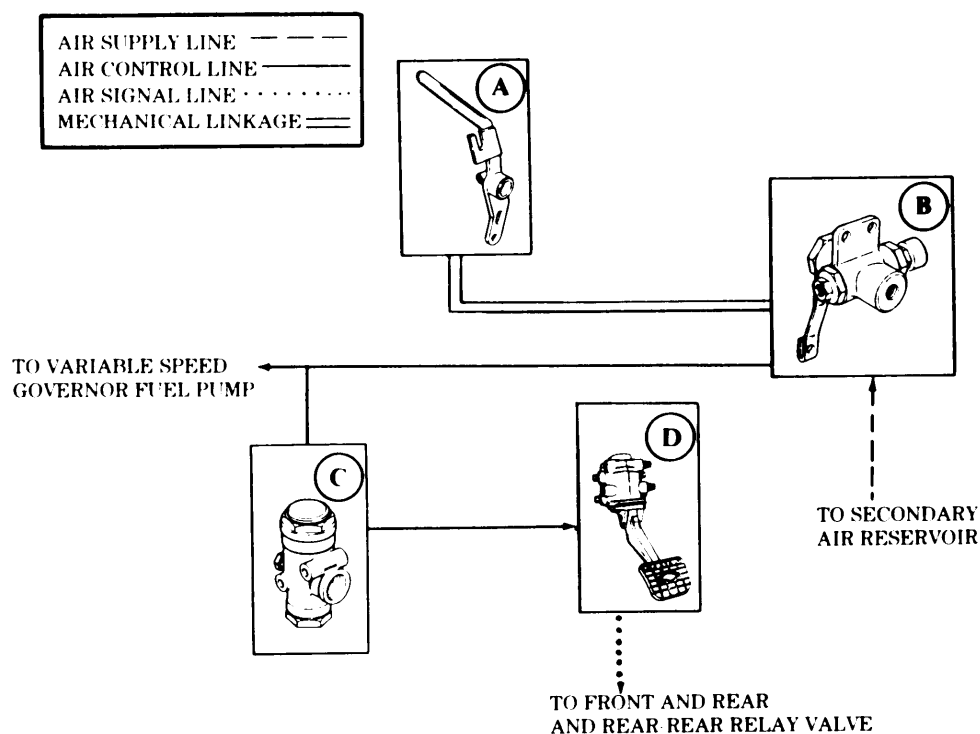
- a. Medium Wrecker Automatic Brake Lock System Operation (page 1-65).
- b. Air Pressure Supply System Operation (page 1-66).
- c. Primary Service Airbrake System Operation (page 1-68).
- d. Secondary Service Airbrake System Operation (page 1-72).
- e. Spring Airbrake System Operation (page 1-74).
- f. Auxiliary Air-powered System Operation (page 1-76).
- g. Air Venting System Operation (page 1-78).

a. Medium Wrecker Automatic Brake Lock System Operation.

The M936 Medium Wrecker Automatic Brake Lock System locks the service airbrakes when the transfer case power takeoff lever is engaged. Major components of the automatic brake lock system are:

- (A) **TRANSFER CASE POWER TAKEOFF LEVER** — Opens the brake lock control valve through mechanical linkage when engaged.
- (B) **BRAKE LOCK CONTROL VALVE** — Allows air pressure to flow from secondary air reservoir to pressure regulator and activate variable speed governor.
- (C) **TREADLE VALVE** — Provides a connection point between pressure regulator and service airbrakes.
- (D) **PRESSURE REGULATOR** — Reduces and regulates system air pressure to 70 psi (483 kPa) for automatic brake lock application.

MEDIUM WRECKER AUTOMATIC BRAKE LOCK SYSTEM



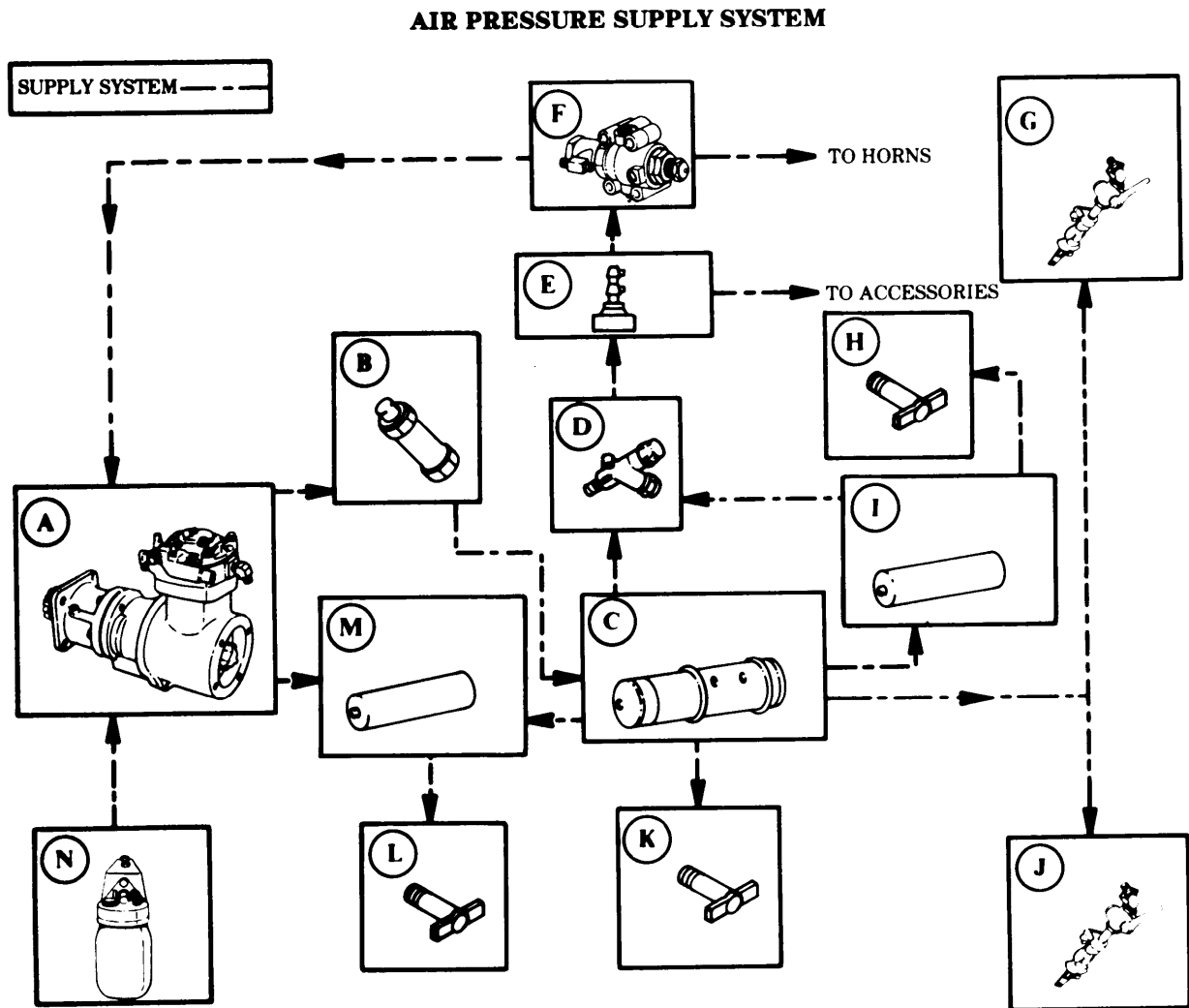
TA 348901

b. Air Pressure Supply System Operation.

The constant air pressure supply system provides air pressure regulated at 90 to 120 psi (620 to 827 kPa) to the airbrake system. The major components of the system are:

- (A) AIR COMPRESSOR — Draws in air from the intake manifold and forces it into the brake system.
- (B) SAFETY VALVE — Located at the inlet side of the wet reservoir, it prevents pressure build-up by releasing air pressure exceeding 150 psi (1034 kPa) when the governor fails to regulate air supplied by the compressor.
- (C) WET TANK RESERVOIR — Performs two functions:
 - (1) Traps water in air reservoir to protect other air systems from freezing or corrosive damage.
 - (2) Stores air enabling operator to make normal stops when engine stalls or compressor fails.
- (D) PRESSURE PROTECTION VALVE — Performs two functions:
 - (1) Allows air pressure to build to 60-65 psi (413-448 kPa) before supplying air to auxiliary air-powered equipment.
 - (2) Closes off auxiliary air system from other systems if an accessory fails and prevents loss of air from secondary reservoir.
- (E) ACCESSORY MANIFOLD — Distributes air to various accessories.
- (F) GOVERNOR — Trips valve inside compressor to regulate flow of air to the system. When pressure builds to 120-127 psi (827-875 kPa), the governor will close valve.
- (G) FRONT EMERGENCY COUPLING — When vehicle is being towed, coupling receives compressed air from towing vehicle's brake system to charge its own brake system.
- (H) SECONDARY AIR RESERVOIR DRAINCOCK — Provides a drain for moisture and air from the secondary reservoir.
- (I) SECONDARY AIR RESERVOIR — Stores enough air pressure in case constant pressure system fails or engine stalls the operator can make normal brake application before running out of air.
- (J) REAR EMERGENCY COUPLING — When towing another vehicle, coupling allows pressurized air from brake system to charge towed vehicle's brake system.
- (K) WET TANK RESERVOIR DRAINCOCK — Provides a drain for moisture and air from reservoir.
- (L) DRAINCOCK — Provides a drain for moisture and air from wet reservoir.
- (M) PRIMARY AIR RESERVOIR — Stores sufficient air pressure to allow operator to make normal brake applications, should system pressure fail or engine stall.
- (N) ALCOHOL EVAPORATOR — Protects airlines from freezing.

b. Air Pressure Supply System Operation (Cont'd).



c. Primary Service Airbrake System Operation.

a. The primary service airbrake system is made up of two subsystems:

- (1) Primary constant pressure system provides continuous air pressure to:
 - (a) Pedal valve.
 - (b) Rear relay valve.
 - (c) Spring brake air reservoir.
 - (d) Spring parking brake valve.
- (2) Primary signal system serves three functions:
 - (a) Contains pressure only when operator steps on brake pedal.
 - (b) Is regulated by various valves to give operator control over amount of braking.
 - (c) Provides pressure to apply front service brakes and the front two service brakes on the intermediate and rear axles stamped with an "A". Service brakes on the intermediate axle are "piggybacked" to spring brakes but operate independently of them.

The primary constant pressure system is made up of the following components:

ONE-WAY CHECK VALVE — Allows air pressure to flow into primary reservoir but prevents it from coming out if constant pressure system fails or engine stalls.

PRIMARY AIR RESERVOIR — Stores enough air pressure so if constant pressure fails or engine stalls the operator can make five normal brake applications before running out of air.

PRIMARY RESERVOIR LOW AIR PRESSURE SWITCH — Activates warning buzzer and warning light when air pressure goes below 60 psi (413 kPa).

The primary signal system is made up of the following components:

PEDAL VALVE — Allows air pressure from primary constant pressure system to flow into primary signal system when operator depresses brake pedal.

PRIMARY AIR PRESSURE GAGE — Indicates amount of air pressure in primary system.

DOUBLECHECK VALVE #1 — Serves two functions:

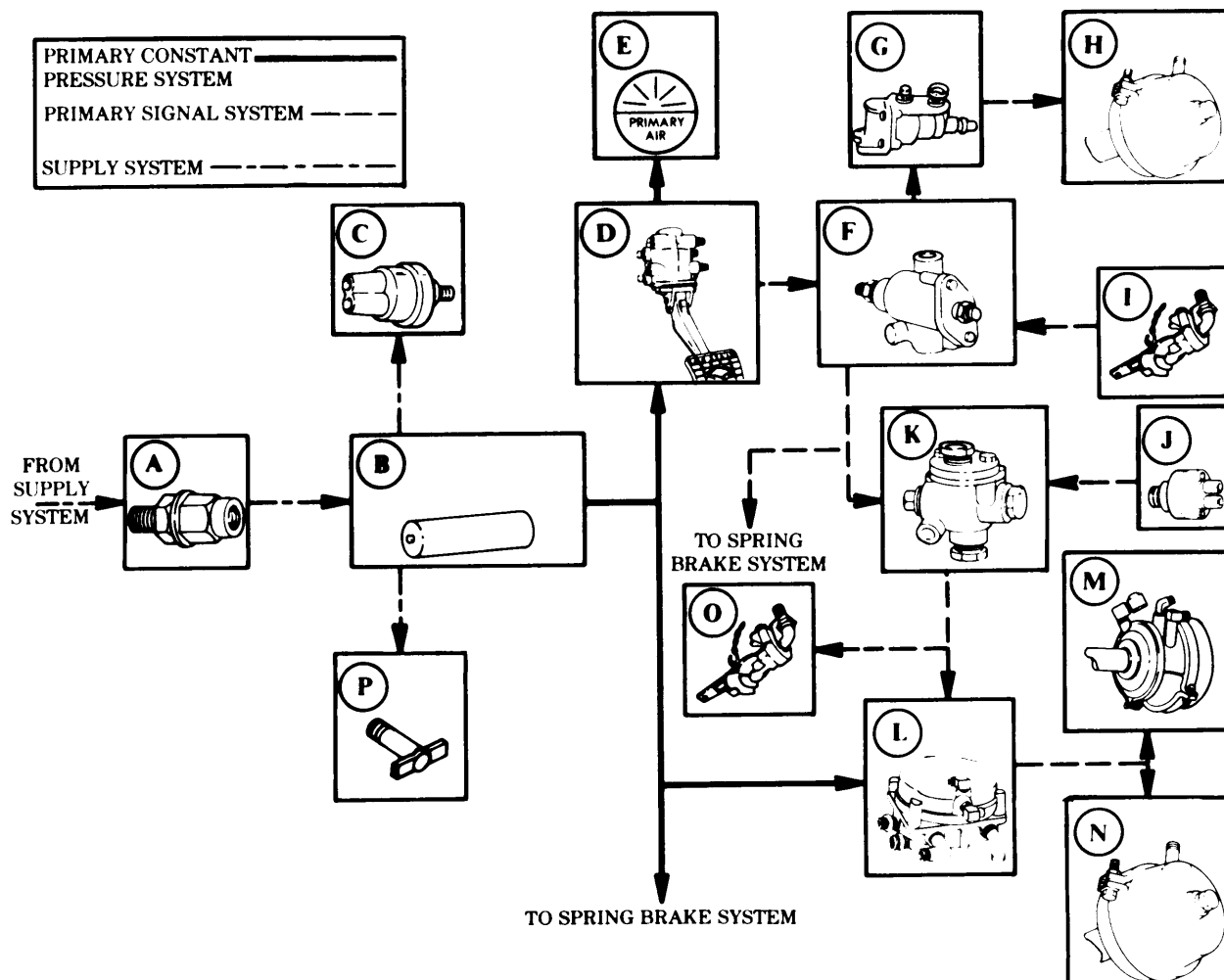
- (1) Allows system to receive signal pressure from either pedal-valve or, when towed, from brake system of towing vehicle.
- (2) Serves as a tee between front and rear primary signal lines.

LIMITING VALVE — Serves three functions:

- (1) Regulates signal air pressure going to front brake chambers so rear brakes are applied first,
- (2) Regulates signal air pressure to front brake chambers so operator has control over amount of braking.
- (3) Releases air pressure in front brake chambers directly to vent in the valve when brake pedal is released,

c. Primary Service Airbrake System Operation (cont'd).

PRIMARY SERVICE AIRBRAKE SYSTEM

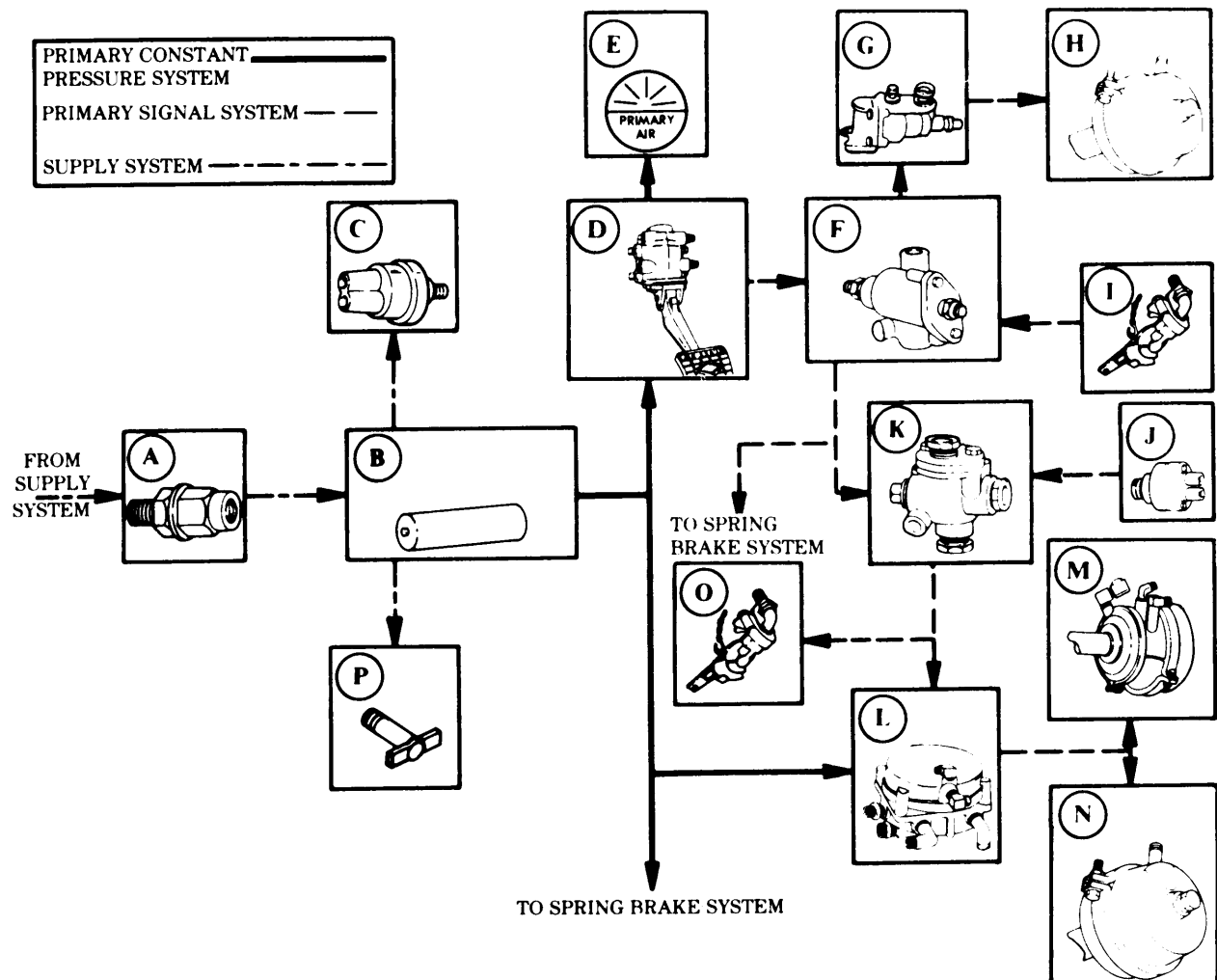


c. Primary Service Airbrake System Operation (Cont'd).

- H** FRONT BRAKE CHAMBERS — Converts air pressure to mechanical force which applies front service brakes.
- I** FRONT SERVICE COUPLING — When vehicle is being towed, coupling is connected to towing vehicle so that the brake systems of the two vehicles work together.
- J** STOPLIGHT SWITCH — As the brake pedal is depressed, switch receives an air pressure signal which closes electric contacts turning on stoplight.
- K** DOUBLECHECK VALVE #2 — Allows either primary or secondary signal air pressure to activate stoplight switch while keeping the two systems separate.
- L** REAR RELAY VALVE — Serves three functions:
 - (1) Boosts signal air pressure to rear brake chambers. Air signal from brake pedal opens valve to route constant air pressure to rear brake chambers.
 - (2) Regulates signal air pressure from brake pedal to rear brake chambers so operator has control over amount of braking. Regulates amount of constant air pressure going to brake chambers as the operator depresses the brake pedal.
 - (3) Releases air pressure in rear brake chamber directly to vent system when brake pedal is released.
- M** INTERMEDIATE FRONT BRAKE CHAMBERS — Converts air pressure to mechanical force which applies intermediate rear service brake.
- N** REAR FRONT BRAKE CHAMBERS — Converts air pressure to mechanical force which applies rear service brakes.
- O** REAR SERVICE COUPLING — When towing another vehicle, coupling is connected to towed vehicle so that the brake system of the two vehicles work together.
- P** PRIMARY RESERVOIR DRAINCOCK — Provides a drain for moisture and air from primary air reservoir.

c. Primary Service Airbrake System Operation (Cont'd).

PRIMARY SERVICE AIRBRAKE SYSTEM



d. Secondary Service Airbrake System Operation.

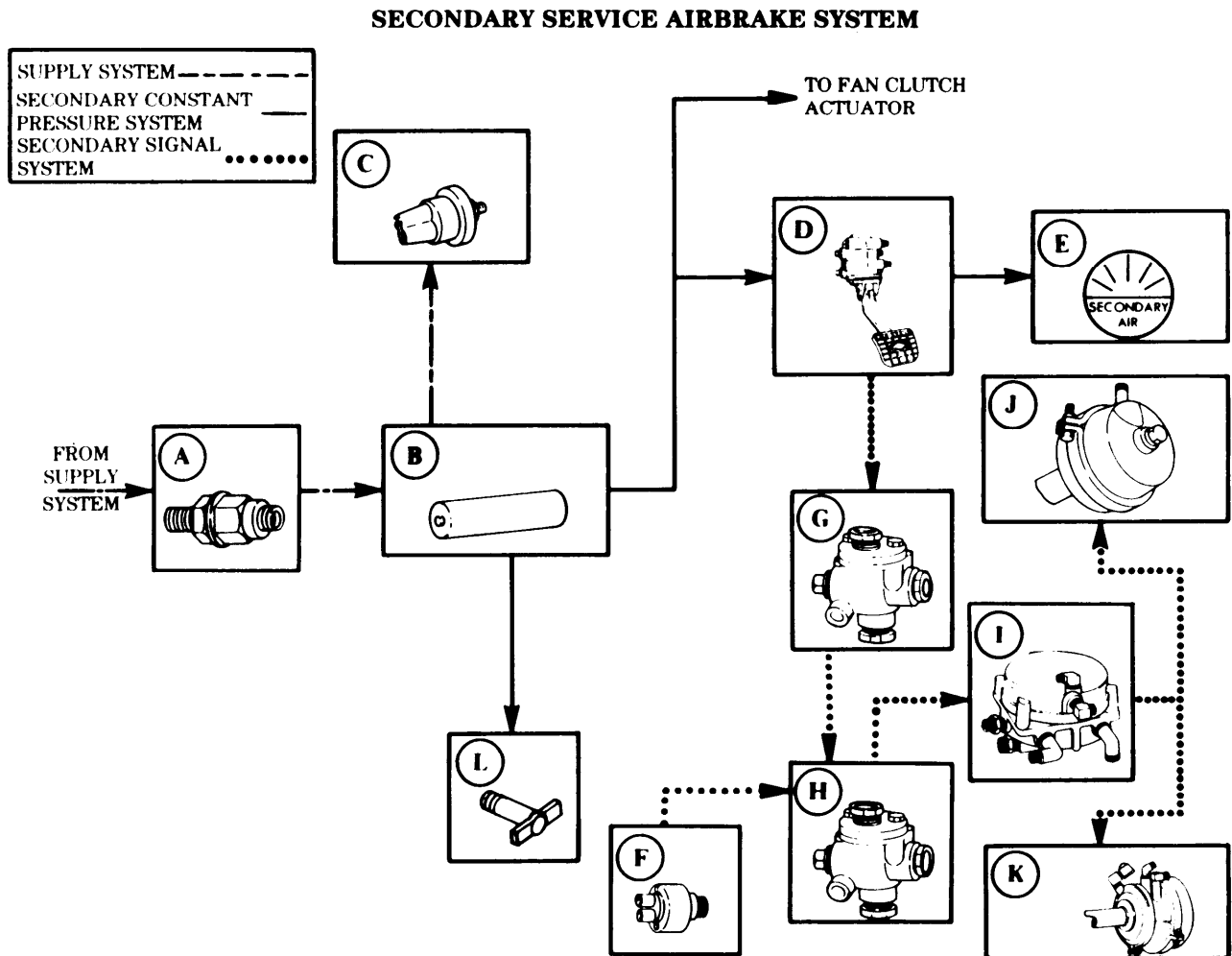
a. The secondary service airbrake system is made up of two subsystems:

- (1) Secondary constant pressure system provides air pressure to:
 - (a) Pedal valve.
 - (b) Front relay valve.
- (2) Secondary signal system serves three functions:
 - (a) Contains air pressure only when operator steps on brake pedal.
 - (b) Is regulated by various valves to control amount of braking.
 - (c) Provides pressure to apply the rear two service brakes and the intermediate and rear axles stamped with a "B". Service brakes on the rear axle are "piggybacked" to spring brakes but operate independently of them.

b. The secondary constant pressure system is made up of the following components:

- (A)** ONE-WAY CHECK VALVE — Allows air pressure to flow into secondary reservoir but prevents it from coming out if constant pressure system fails or engine stalls.
- (B)** SECONDARY AIR RESERVOIR — Stores enough air pressure so if constant pressure system fails or engine stalls, the operator can make normal brake application before running out of air.
- (C)** LOW AIR PRESSURE SWITCH — Activates warning buzzer and warning lights when air pressure goes below 60 psi (413 kpa).
- (D)** PEDAL VALVE — Allows air pressure from secondary constant pressure system to flow into secondary signal system when operator depresses pedal.
- (E)** SECONDARY AIR PRESSURE GAGE — Indicates amount of air pressure in the secondary system.
- (F)** STOPLIGHT SWITCH — As the brake pedal is depressed, switch receives an air pressure signal at electrical contacts which close to activate circuits to taillights.
- (G)** DOUBLECHECK VALVE #1 — Serves two functions:
 - (1) Allows system to receive signal pressure from either pedal valve or, when towed, from brake system of towing vehicle. •
 - (2) Serves as a tee between front and rear primary signal lines.
- (H)** DOUBLECHECK VALVE #2 — Allows either primary or secondary signal air pressure to activate stoplight switch while keeping the systems separate.
- (I)** FRONT RELAY VALVE — Boosts signal air to rear brake chambers; regulates air pressure to rear brake chambers so operator has control over amount of braking and releases air pressure to rear brake chambers directly to vent when brake pedal is released.
- (J)** INTERMEDIATE REAR BRAKE CHAMBERS — Converts air pressure to mechanical force which applies intermediate rear brakes.
- (K)** REAR-REAR BRAKE CHAMBERS — Converts air pressure to mechanical force which applies rear-rear brakes.
- (L)** SECONDARY AIR RESERVOIR DRAINCOCK — Provides a drain for moisture and air from secondary reservoir.

d. Secondary Service Airbrake System Operation (Cont'd).

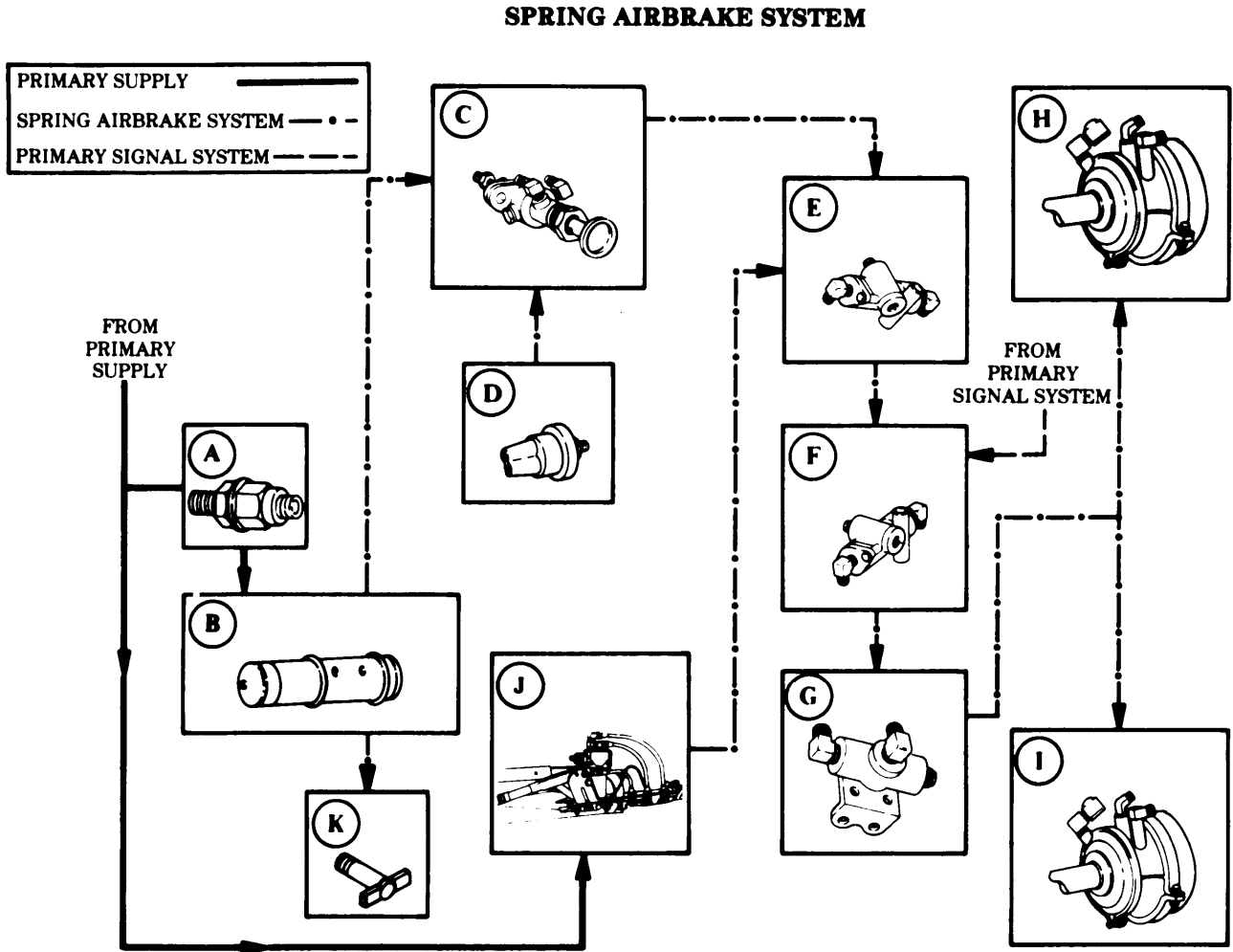


e. Spring Airbrake System Operation.

The spring airbrake system applies rear brakes when vehicle parking brake is applied or in event of a major brake failure. The spring brake is located on one of the two service brake chambers at each rear wheel. Major components of the spring airbrake system are:

- (A) ONE-WAY CHECK VALVE** — Allows air pressure to flow into spring brake reservoir but prevents it from coming out if constant pressure or primary systems fail,
- (B) SPRING BRAKE AIR RESERVOIR** — Stores enough air pressure to release spring brakes for emergency operation in event of primary or secondary air system failure.
- (C) SPRING BRAKE RELEASE CONTROL VALVE** — Pushed in to release spring brakes independently of mechanical parking brake. Control is also used to release spring brakes in order to test and adjust mechanical brake.
- (D) SPRING BRAKE WARNING LIGHT SWITCH** — Activates warning light when spring brakes are engaged.
- (E) DOUBLECHECK VALVE #4** — Allows spring brake air pressure to come from either release control valve or spring parking brake valve directly to doublecheck valve #3.
- (F) DOUBLECHECK VALVE #3** — Allows spring brake air pressure to come from either release control valve or spring parking brake valve directly to doublecheck valve #4.
- (G) QUICK-RELEASE VALVE** — Releases spring brake air pressure directly to vent if parking brake has been set or brake system fails.
- (H) INTERMEDIATE FRONT SPRING BRAKE CHAMBER** — Contains a large spring which applies rear brakes when spring brake air pressure is released.
- (I) REAR-REAR SPRING BRAKE CHAMBER** — Contains a large spring which applies rear brakes when spring brake air pressure is released.
- (J) SPRING BRAKE VALVE** — Automatically sets spring brakes when parking brake is set. Valve can be released independently of parking brake when spring brake control valve is pushed in.
- (K) SPRING BRAKE RESERVOIR DRAINCOCK** — Provides a drain for moisture and air from spring brake reservoir.

e. Spring Airbrake System Operation (Cont'd).

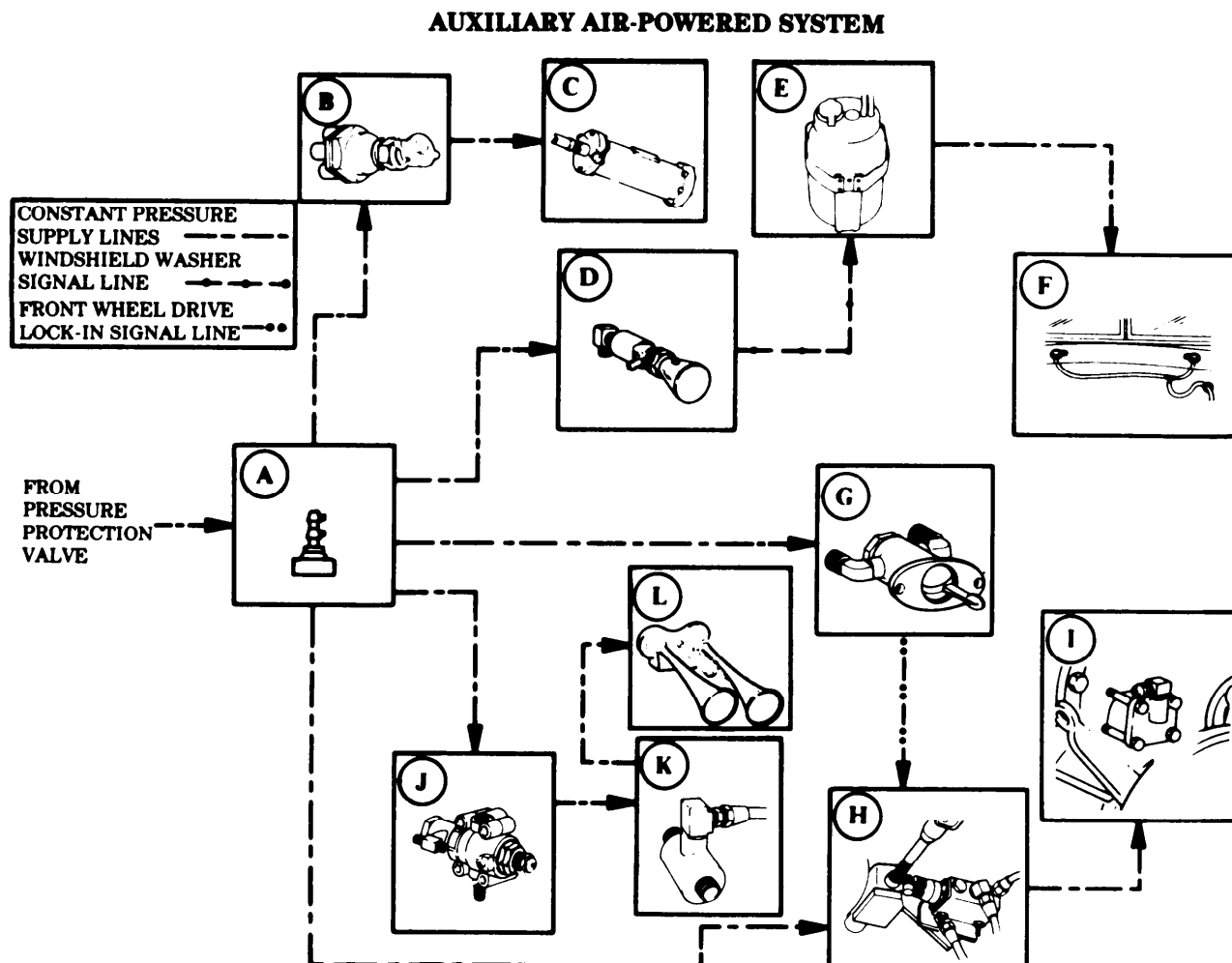


f. Auxiliary Air-Powered System Operation.

The auxiliary air powered system consists of air-actuated vehicle accessories. All of these accessories receive air pressure through the accessory manifold and off the pressure protection valve with the exception of the horns. Components of the auxiliary air-powered system are:

- (A) ACCESSORY MANIFOLD — Receives air pressure from the pressure protection valve and distributes it to the various accessories.
- (B) WINDSHIELD WIPER CONTROL SWITCH — Opens air pressure valve in wiper motor to operate wipers.
- (C) WINDSHIELD WIPER MOTOR — Air-actuated motor powers windshield wipers.
- (D) WINDSHIELD WASHER CONTROL — Spring loaded valve that allows air pressure to force washer fluid from washer reservoir to windshield.
- (E) WINDSHIELD WASHER RESERVOIR — Container for windshield washer fluid.
- (F) WINDSHIELD WASHER NOZZLES — Directs washer fluid on windshield.
- (G) FRONT WHEEL DRIVE LOCK-IN SWITCH — Air-actuated switch that engages front wheel drive when transfer case is in HIGH.
- (H) FRONT AXLE ENGAGEMENT CONTROL VALVE — Operates off cam on transfer case shift linkage so front wheel drive engages automatically when transfer case is put into LOW.
- (I) TRANSFER CASE AIR SHIFT CYLINDER — Engages front wheel drive when it receives air pressure from lock-in switch (G) or engagement control valve (H).
- (J) GOVERNOR — Serves as a tee between accessory manifold and horn relay valve. It also signals the air compressor to stop compressing air for the supply system when operating pressure has been reached.
- (K) HORN RELAY VALVE — Electrical signal from horn button on steering wheel opens valve in horn relay allowing air pressure to sound horns.
- (L) HORNS — Receive air pressure from horn relay valve to sound off.

f. Auxiliary Air-Powered System Operation (Cont'd).

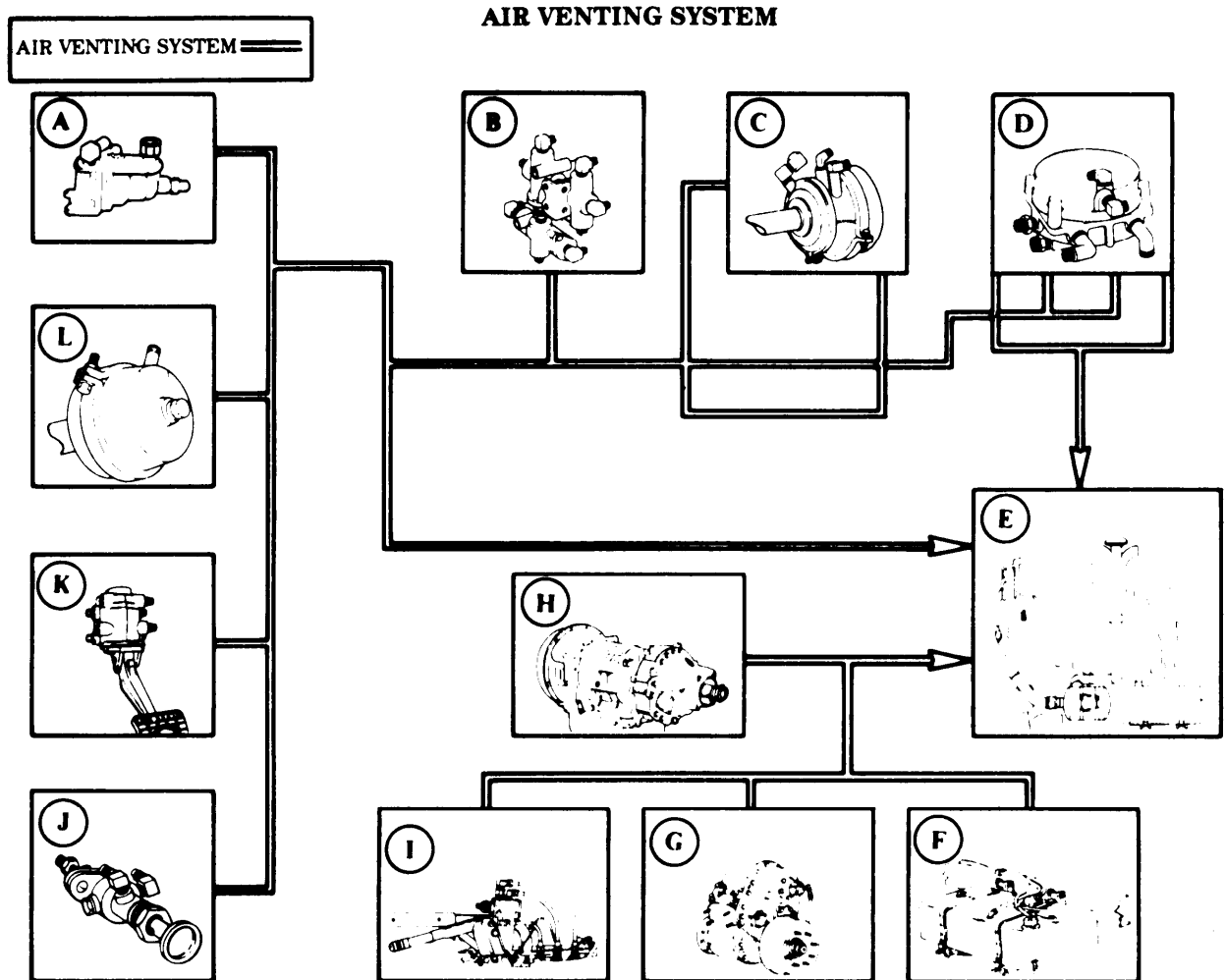


g. Air Venting System Operation.

The air venting system vents exhaust air from brake system powertrain, and fuel vapors from fuel system to vent in air intake stack where it is released into the atmosphere. The components of the air venting system are:

- (A) LIMITING VALVE — Vents signal air pressure going to front brake chambers so rear brakes apply first.
- (B) STEP BOX QUICK-RELEASE VALVE — Vents air pressure from spring brake chambers when parking brake valve has been actuated.
- (C) REAR BRAKE CHAMBERS — Vent ports on chambers release air to prevent air pressure build-up.
- (D) RELAY VALVES — Vents air pressure in rear brake chambers directly to intake tube when brake pedal is released. Vents signal air pressure through upper port in valve.
- (E) AIR INTAKE STACK — Venting point for the vent system.
- (F) FUEL TANK VENTS — Vents fuel vapors to prevent partial vacuum from stopping fuel flow.
- (G) TRANSFER CASE VENT — Vents internal air pressure build-up due to internal operating heat.
- (H) TRANSMISSION VENT — Vents internal air pressure build-up due to internal operating heat,
- (I) SPRING PARKING BRAKE VALVE — Vents air pressure from air and doublecheck valves #3 and #4.
- (J) SPRING BRAKE RELEASE CONTROL VALVE — This valve functions as an override when a failure in the supply air system (causing spring brakes to engage) occurs. When valve is manually pushed in, emergency air is supplied to the spring brake chambers. This releases the spring brakes, allowing vehicle movement.
- (K) PEDAL VALVE — Vents primary or secondary signal air pressure when pedal is released.
- (L) FRONT BRAKE CHAMBER VENT — Vents air pressure inside chambers when pedal valve is released.

g. Air Venting System Operation (Cont'd).



1-20. HYDRAULIC SYSTEM OPERATION

Oil pressure (hydraulics) is used to provide operating power for the auxiliary equipment on the vehicles covered in this manual. The components that provide hydraulic power are discussed in the following order:

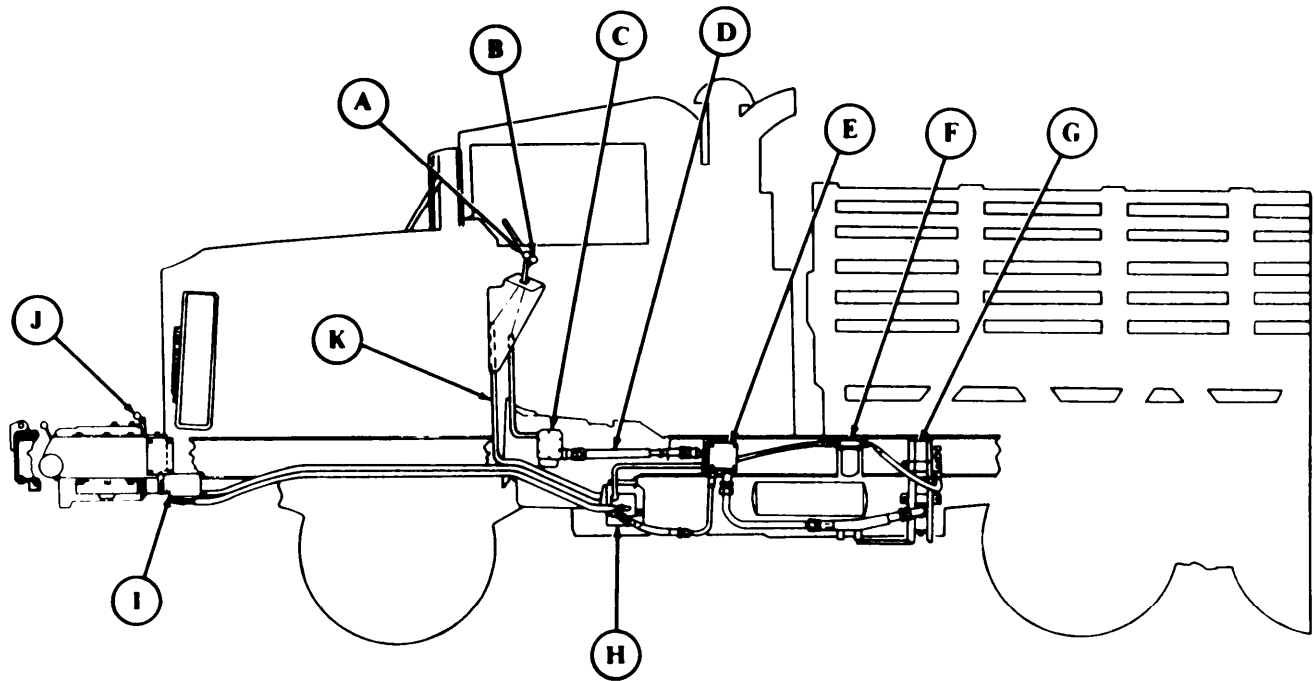
- a. Front Winch Hydraulic System Operation (page 1-80).
- b. Rear Winch Hydraulic System Operation (page 1-82).
- c. Dump Body Hydraulic System Operation (page 1-84).
- d. Expansible Van Liftgate Hydraulic System Operation (page 1-86).
- e. Medium Wrecker Crane Hydraulic System Operation (page 1-88).

a. Front Winch Hydraulic System Operation.

A front winch is installed on the M925, M926, M928, M930, M932 and M936 model vehicles. The front winch hydraulic system converts mechanical power from the engine into fluid power through use of the hydraulic pump, and back into mechanical power at the winch drive motor. The basic operating principles are the same for each model. Major components of this system are:

- (A) TRANSMISSION POWER TAKEOFF CONTROL** — A manually-operated control lever located inside the cab that permits engagement or disengagement of the transmission power takeoff (PTO).
- (B) WINCH CONTROL LEVER** — An operator control that determines the hydraulic oil pressure flow from the control valve to the winch motor. The flow of this oil determines the direction the winch drum will turn.
- (C) TRANSMISSION POWER TAKEOFF (PTO)** — Uses driving power of the transmission to provide mechanical driving power for the hydraulic pump.
- (D) POWER TAKEOFF DRIVE SHAFT** — Transmits mechanical power from the PTO to the hydraulic pump.
- (E) HYDRAULIC PUMP** — Driven by the PTO drive shaft, it draws oil from the oil reservoir through hydraulic hoses, then pressurizes and directs this oil to the control valve.
- (F) OIL FILTER** — Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.
- (G) HYDRAULIC OIL RESERVOIR** — Storage tank for hydraulic oil.
- (H) CONTROL VALVE** — Four-port valve accepts pressurized oil from the hydraulic pump and directs this oil to the winch motor. It also directs oil returning from the winch back to the oil reservoir. The flow of this oil from the valve determines the directional drive of the winch motor.
- (I) WINCH MOTOR** — Converts hydraulic power into mechanical power as hydraulic oil is forced through the winch motor.
- (J) CLUTCH LEVER** — Manual control that engages the winch drum gear to the drive gear of the winch motor.
- (K) CONTROL LINKAGE** — Connects winch control lever inside cab to the control linkage.

a. Front Winch Hydraulic System Operation (Cont'd).



(A) TRANSMISSION POWER TAKEOFF CONTROL

(B) WINCH CONTROL LEVER

(C) TRANSMISSION POWER TAKEOFF (PTO)

(D) POWER TAKEOFF DRIVE SHAFT

(E) HYDRAULIC PUMP

(F) OIL FILTER

(G) HYDRAULIC OIL RESERVOIR

(H) CONTROL VALVE

(I) WINCH MOTOR

(J) CLUTCH LEVER

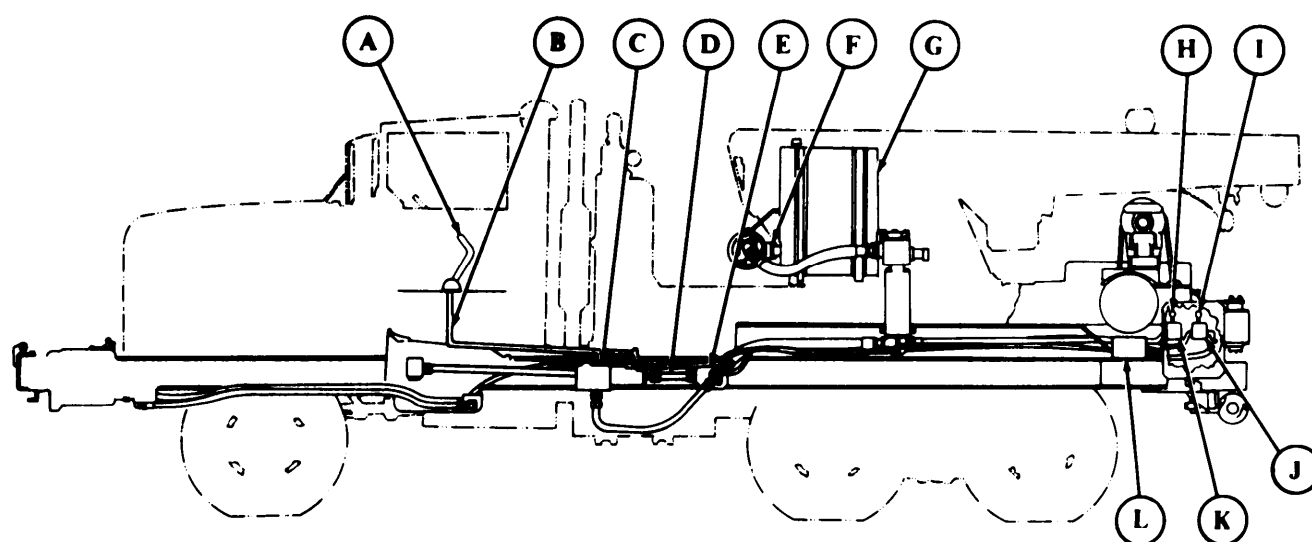
(K) CONTROL LINKAGE

b. Rear Winch Hydraulic System Operation.

A rear winch is installed only on the M936 medium wrecker. It is used primarily to rescue vehicles that have become deeply mired. The rear winch hydraulic system converts mechanical power of the engine into fluid power through use of the hydraulic pump and back into mechanical power at the winch drive motor. The major components of the rear winch hydraulic system are:

- (A) **TRANSFER CASE POWER TAKEOFF CONTROL** — A manually-operated control lever located inside the cab that permits engagement or disengagement of the power takeoff (PTO).
- (B) **CONTROL LINKAGE** — Connects transfer case power takeoff control to transfer case power takeoff (PTO).
- (C) **TRANSFER CASE POWER TAKEOFF** — Uses driving power of the transfer case to provide mechanical driving power for the hydraulic pump.
- (D) **POWER TAKEOFF DRIVE SHAFT** — Transmits mechanical driving power from PTO to the hydraulic pump.
- (E) **HYDRAULIC PUMP** — Draws oil from hydraulic oil reservoir and directs it to the rear winch control valve and winch drive motor.
- (F) **OIL FILTER** — Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.
- (G) **HYDRAULIC OIL RESERVOIR** — Storage tank for hydraulic oil.
- (H) **TORQUE CONTROL LEVER** — Controls the operating gear ratio of the winch drive motor. Lever is pulled outward to HIGH for heavy loads or pushed inward to LOW for light loads.
- (I) **WINCH DIRECTIONAL CONTROL LEVER** — Manually-operated lever that controls the WIND and UNWIND direction of the rear winch drum. Lever does this by opening and closing the directional control valve to the winch motor, and reversing the direction of pressurized hydraulic fluid. Lever is pushed inward to wind and pulled outward to unwind winch cable.
- (J) **DIRECTIONAL CONTROL VALVE** — Receives pressurized hydraulic oil from the hydraulic pump and directs it to the winch motor. The flow of the hydraulic oil to and from this control valve provides forward or reverse driving power to the winch motor. Valve also returns used oil back to the hydraulic oil reservoir from the winch.
- (K) **TORQUE CONTROL VALVE** — Hydraulically controls the hydraulic oil pressure to engage rear winch drum clutch in HIGH or LOW gear range.
- (L) **WINCH MOTOR** — Converts hydraulic power back into mechanical power needed to turn the rear winch drum.

b. Rear Winch Hydraulic System Operation (Cont'd).



- (A) TRANSFER CASE POWER TAKEOFF CONTROL
- (B) CONTROL LINKAGE
- (C) TRANSFER CASE POWER TAKEOFF
- (D) POWER TAKEOFF DRIVE SHAFT
- (E) HYDRAULIC PUMP
- (F) OIL FILTER

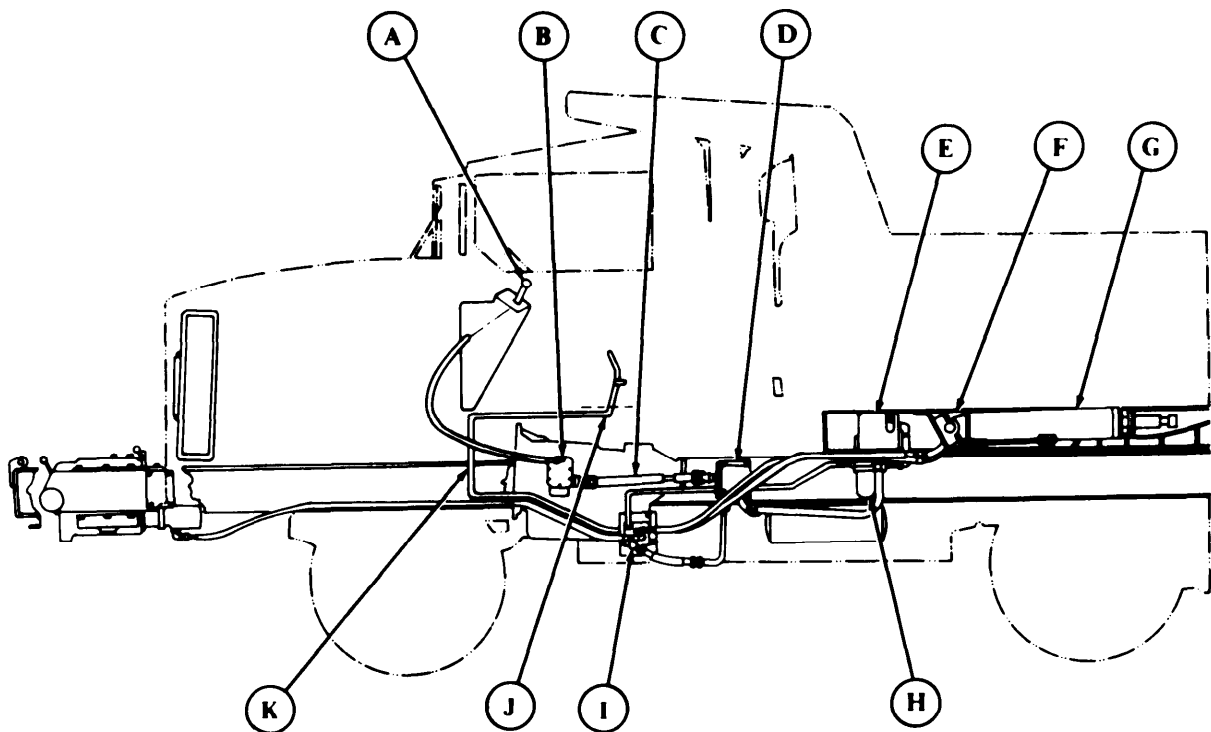
- (G) HYDRAULIC OIL RESERVOIR
- (H) TORQUE CONTROL LEVER
- (I) WINCH DIRECTIONAL CONTROL LEVER
- (J) DIRECTIONAL CONTROL VALVE
- (K) TORQUE CONTROL VALVE
- (L) WINCH MOTOR

c. Dump Body Hydraulic System Operation.

The dump body is installed on M929 and M930 vehicles. These models are used to transport and deposit cargo. The dump body hydraulic system converts mechanical power from the engine into fluid power through use of the hydraulic pump. The pump draws fluid from the oil reservoir and then forces it into the control valve. This hydraulic pressure raises and lowers the dump body. Major components of the dump body hydraulic system are:

- (A) **TRANSMISSION POWER TAKEOFF CONTROL** — A manually-operated control lever located inside the vehicle cab that permits engagement or disengagement of the transmission power takeoff (PTO).
- (B) **TRANSMISSION POWER TAKEOFF (PTO)** — Uses driving power of the transmission to provide mechanical driving power for the hydraulic pump.
- (C) **POWER TAKEOFF DRIVE SHAFT** — Transmits mechanical driving power from the PTO to the hydraulic pump.
- (D) **HYDRAULIC PUMP** — Driven by the PTO drive shaft, it draws oil from the oil reservoir through hydraulic hoses, then pressurizes and directs it to the control valve.
- (E) **HYDRAULIC OIL RESERVOIR** — Storage tank for hydraulic oil,
- (F) **DUMP BODY SAFETY LATCH** — Hydraulically-operated in conjunction with the dump body control lever, the safety latch locks the dump body in the lowered position and releases it when the control lever is pulled back to the raised position.
- (G) **DUMP BODY CYLINDER ASSEMBLY** — Consists of two piston-type hydraulic cylinder hoists. Assembly raises and lowers dump body with hydraulic oil forcing the cylinder upward or downward.
- (H) **OIL FILTER** — Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.
- (I) **CONTROL VALVE** — Four-port valve accepts pressurized oil from the hydraulic pump and directs oil pressure flow from control valve to the hydraulic cylinders. It also directs unused or bypassed oil returning from the hydraulic cylinders back to the hydraulic oil reservoir.
- (J) **DUMP BODY CONTROL LEVER** — An operator control that determines the hydraulic oil pressure flow from control valve to the hydraulic cylinders. The route this oil takes will determine whether the dump will raise or lower.
- (K) **CONTROL LINKAGE** — Connects dump body control lever inside cab to the control valve.

c. Dump Body Hydraulic System Operation (Cont'd).



- (A) TRANSMISSION POWER TAKEOFF CONTROL
- (B) TRANSMISSION POWER TAKEOFF (PTO)
- (C) POWER TAKEOFF DRIVE SHAFT
- (D) HYDRAULIC PUMP
- (E) HYDRAULIC OIL RESERVOIR

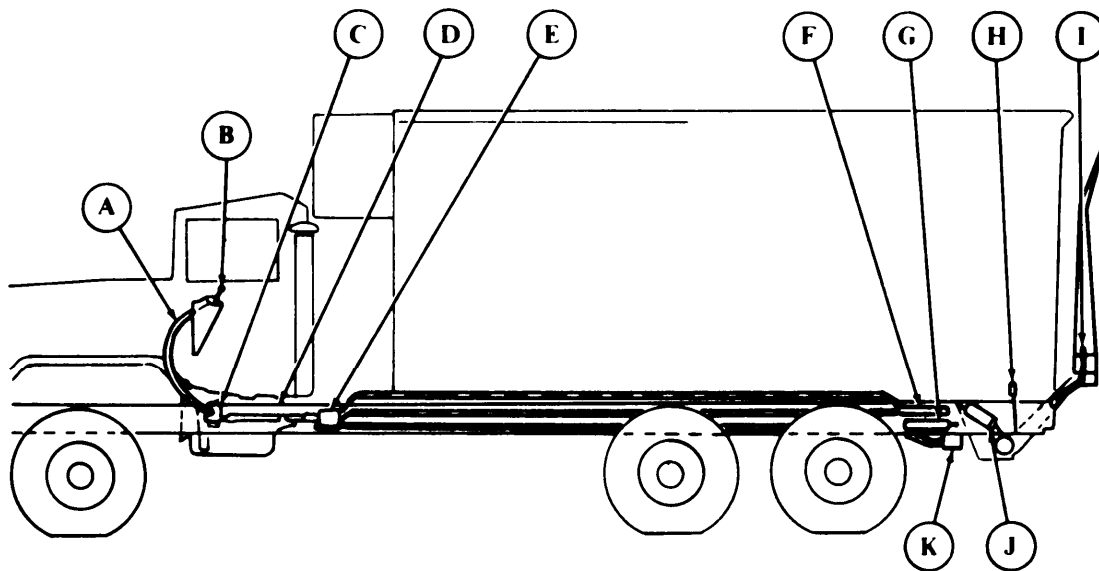
- (F) DUMP BODY SAFETY LATCH
- (G) DUMP BODY CYLINDER ASSEMBLY
- (H) OIL FILTER
- (I) CONTROL VALVE
- (J) DUMP BODY CONTROL LEVER
- (K) CONTROL LINKAGE

d. Expansible Van Liftgate Hydraulic System Operation.

The M935 expansible van is equipped with a hydraulic liftgate. The liftgate is used to lift and lower equipment in and out of the van. The liftgate is hydraulically powered when the gate is opened and when the gate is elevated. The gate is lowered by gravity. Hydraulic power is provided by a pump which is driven by the transmission. The pump supplies pressurized oil to a control valve. The valve directs this pressurized oil to the two cylinders which extend or retract. These cylinders are connected to a lever system which opens, closes, lowers, and elevates the gate. After the van has been expanded in the field, an electric motor drives a pump to elevate the liftgate. The major components of the liftgate hydraulic system are:

- (A) CONTROL LINKAGE** — Connects transmission power takeoff (PTO) control lever with transmission PTO.
- (B) TRANSMISSION POWER TAKEOFF CONTROL** — A manually-operated control lever located inside the cab that permits engagement or disengagement of transmission power takeoff (PTO).
- (C) TRANSMISSION POWER TAKEOFF (PTO)** — Receives driving power from transmission to provide mechanical driving power for the hydraulic pump.
- (D) POWER TAKEOFF DRIVE SHAFT** — Transmits mechanical driving power from transmission PTO to the hydraulic pump.
- (E) HYDRAULIC PUMP** — Driven by the PTO shaft, it draws oil from reservoir, then pressurizes and directs it to the control valve.
- (F) HYDRAULIC OIL RESERVOIR** — Storage tank for hydraulic oil.
- (G) OPENING/CLOSING CYLINDER** — Piston-type cylinder that receives hydraulic pressure from control valve and extends to open liftgate and retracts to close liftgate.
- (H) OPENING/CLOSING CONTROL** — Manually-operated lever controls operation of a hydraulic valve which opens liftgate when lever is pulled rearward, and closes liftgate when pushed forward,
- (I) LOWERING/ELEVATING CONTROL** - Manually-operated control lever operates valve to lower liftgate when lever is pulled rearward, and elevates liftgate when pushed forward.
- (J) LOWERING/ ELEVATING CYLINDER** — Piston-type cylinder that receives hydraulic pressure from control valve, and extends to lower liftgate or retracts to elevate liftgate.
- (K) CONTROL VALVE** — Five-port valve directs pressurized hydraulic oil from hydraulic pump to the opening! closing and lowering/elevating cylinders. The valve also directs return oil from the cylinder back to the hydraulic oil reservoir.

d. Expansible Van Liftgate Hydraulic System Operation (Cont'd).



- (A) CONTROL LINKAGE
- (B) TRANSMISSION POWER TAKEOFF CONTROL
- (C) TRANSMISSION POWER TAKEOFF (PTO)
- (D) POWER TAKEOFF DRIVE SHAFT
- (E) HYDRAULIC PUMP

- (F) HYDRAULIC OIL RESERVOIR
- (G) OPENING/CLOSING CYLINDER
- (H) OPENING/CLOSING CONTROL
- (I) LOWERING/ ELEVATING CONTROL
- (J) LOWERING/ELEVATING CYLINDER
- (K) CONTROL VALVE

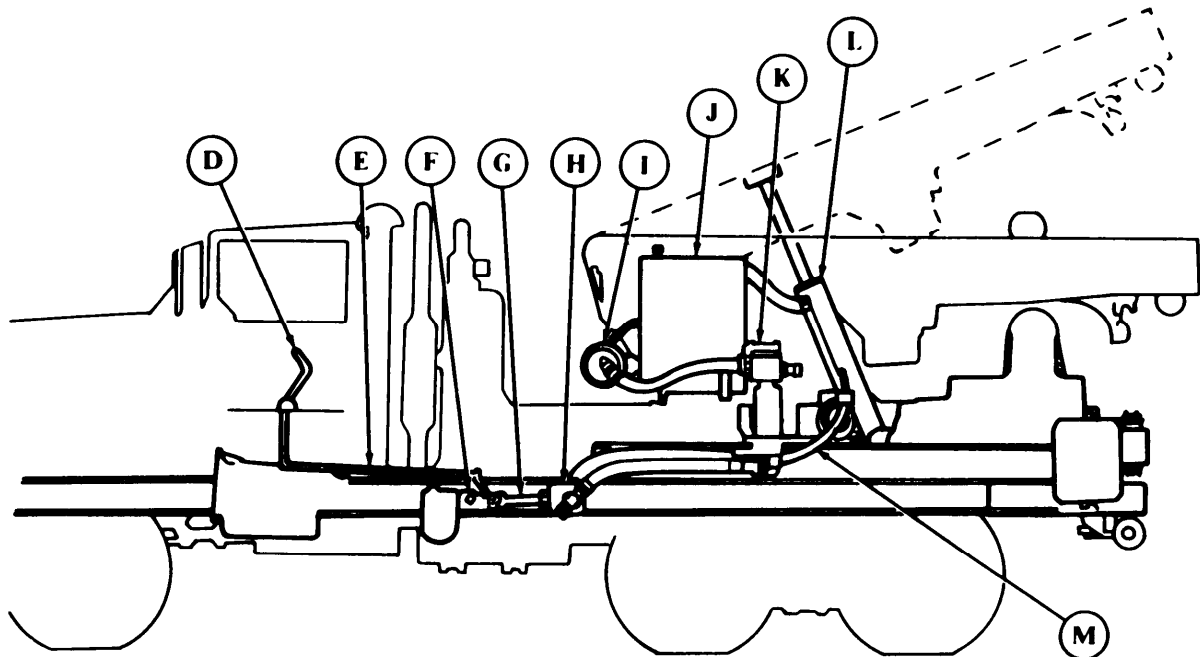
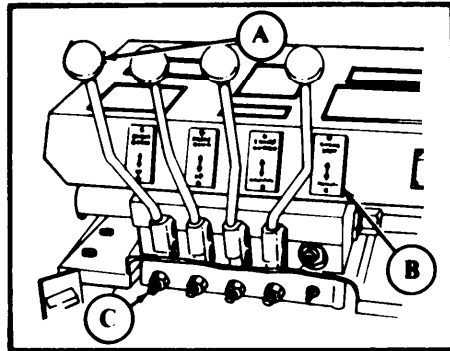
e. Medium Wrecker Crane Hydraulic System Operation.

The M936 medium wrecker is equipped with a hydraulically-operated crane that extends 18 feet, elevates 45 degrees and swings 360 degrees. It is capable of lifting loads up to 20,000 lbs. (9,080 kg).

The crane hydraulic system converts power of the engine into fluid power for use by the hydraulic pump. At this pump, oil pressure is supplied to different crane control valves - BOOM, HOIST, CROWD, and SWING. Each of these actions are dealt with separately. The major components for raising and lowering the wrecker boom are:

- (A) BOOM CONTROL LEVER** — Manual control attached to the control valve that determines hydraulic oil flow for raising and lowering action of the boom. Lever is pulled back to raise the boom and pushed forward to lower boom.
- (B) CRANE CONTROL CONSOLE** — Houses BOOM, HOIST, CROWD, and SWING levers and their control valves.
- (C) BOOM CONTROL VALVE** — Located directly below boom control lever. Valve directs hydraulic oil from the hydraulic pump to the boom lift cylinder for lifting, or out of the lift cylinder and back to the hydraulic oil reservoir for lowering.
- (D) TRANSFER CASE POWER TAKEOFF CONTROL** — A manually-operated control lever located inside the cab that engages and disengages the transfer case power takeoff,
- (E) TRANSFER CASE POWER TAKEOFF LINKAGE** — Connects transfer case power takeoff control to transfer case power takeoff (PTO).
- (F) TRANSFER CASE POWER TAKEOFF** — Receives driving power from vehicle's engine through the transfer case to provide mechanical driving power for the hydraulic pump.
- (G) POWER TAKEOFF DRIVE SHAFT** — Transmits mechanical driving power from the power takeoff to the hydraulic pump.
- (H) HYDRAULIC PUMP** — Draws oil from hydraulic oil reservoir and directs it to valves inside the crane control console.
- (I) OIL FILTER** — Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.
- (J) HYDRAULIC OIL RESERVOIR** — Storage tank for hydraulic oil.
- (K) SWIVEL VALVE** — Permits oil to channel through pivot post while crane is swinging and eliminates twisting of the hydraulic lines connecting reservoir to the stationary pump.
- (L) BOOM LIFT CYLINDER** — A hydraulically-driven piston that extends upward when boom control lever is pulled back to UP position, raising the boom. A check valve located near hydraulic oil inlet hose prevents piston from lowering when control lever is in neutral. Oil returns through boom control valve back to hydraulic oil reservoir allowing piston to lower when control lever is pushed forward to DOWN position.
- (M) BOOM HYDRAULIC LINES** — Carry the hydraulic oil to and from boom lift cylinder. Oil pumped through the bottom lines pushes the lift cylinder piston upward. Oil pumped through the top lines pushes the lift cylinder piston downward. When this downward action occurs, the oil that originally pushes the cylinder upwards is returned to the hydraulic oil reservoir.

e. Medium Wrecker Crane Hydraulic System Operation (Cont'd).



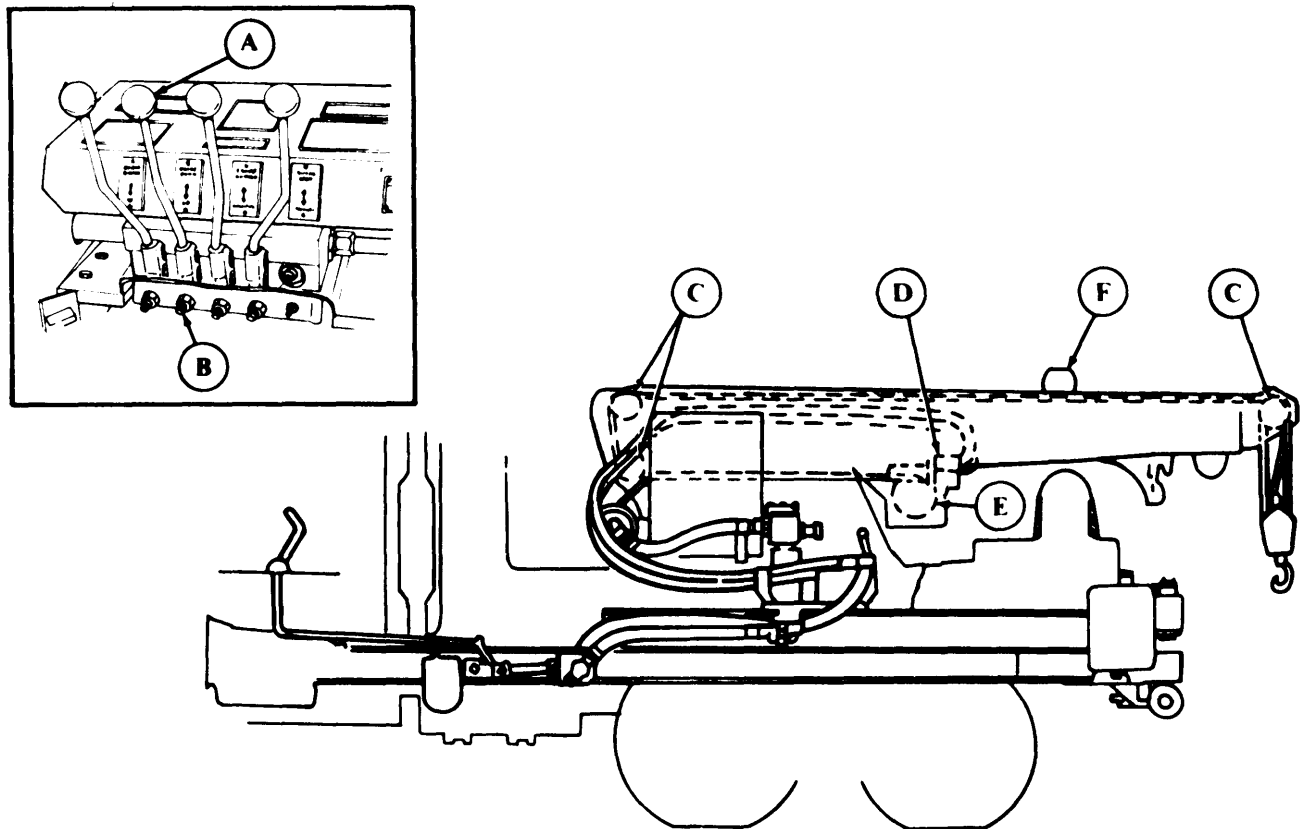
- A BOOM CONTROL LEVER
- B CRANE CONTROL CONSOLE
- C BOOM CONTROL VALVE
- D TRANSFER CASE POWER TAKEOFF CONTROL
- E TRANSFER CASE POWER TAKEOFF LINKAGE
- F TRANSFER CASE POWER TAKEOFF

- G POWER TAKEOFF DRIVE SHAFT
- H HYDRAULIC PUMP
- I OIL FILTER
- J HYDRAULIC OIL RESERVOIR
- K SWIVEL VALVE
- L BOOM LIFT CYLINDER
- M BOOM HYDRAULIC LINES

e. Medium Wrecker Crane Hydraulic System Operation (Cont'd).

The major components for raising and lowering the crane cable and hook for the HOIST action are:

- A HOIST CONTROL LEVER** — Manual control attached to the control valve that determines hydraulic oil flow for the raising and lowering action of the crane hoist cable and hook. Lever is pulled back to raise cable and hook and pushed forward to lower cable and hook
- B HOIST CONTROL VALVE** — Two-way hydraulic valve located directly below hoist control lever. Valve directs hydraulic oil from the hydraulic pump to the hoist motor assembly and back through the valve to the hydraulic oil reservoir.
- C SHEAVES** — Grooved wheels that guide hoist cable through boom.
- D HOIST MOTOR ASSEMBLY** — Converts hydraulic power back into mechanical power needed to turn the hoist drum.
- E CRANE HOIST CABLE DRUM** — Is turned by the worm gear in hoist motor assembly. Drum unwinds cable when turning toward front of vehicle. Drum winds cable when turning toward rear of vehicle.
- F UPPER ROLLER ASSEMBLY** — Prevents cable from contacting inner boom during winding/unwinding.



A HOIST CONTROL LEVER

B HOIST CONTROL VALVE

C SHEAVES

D HOIST MOTOR ASSEMBLY

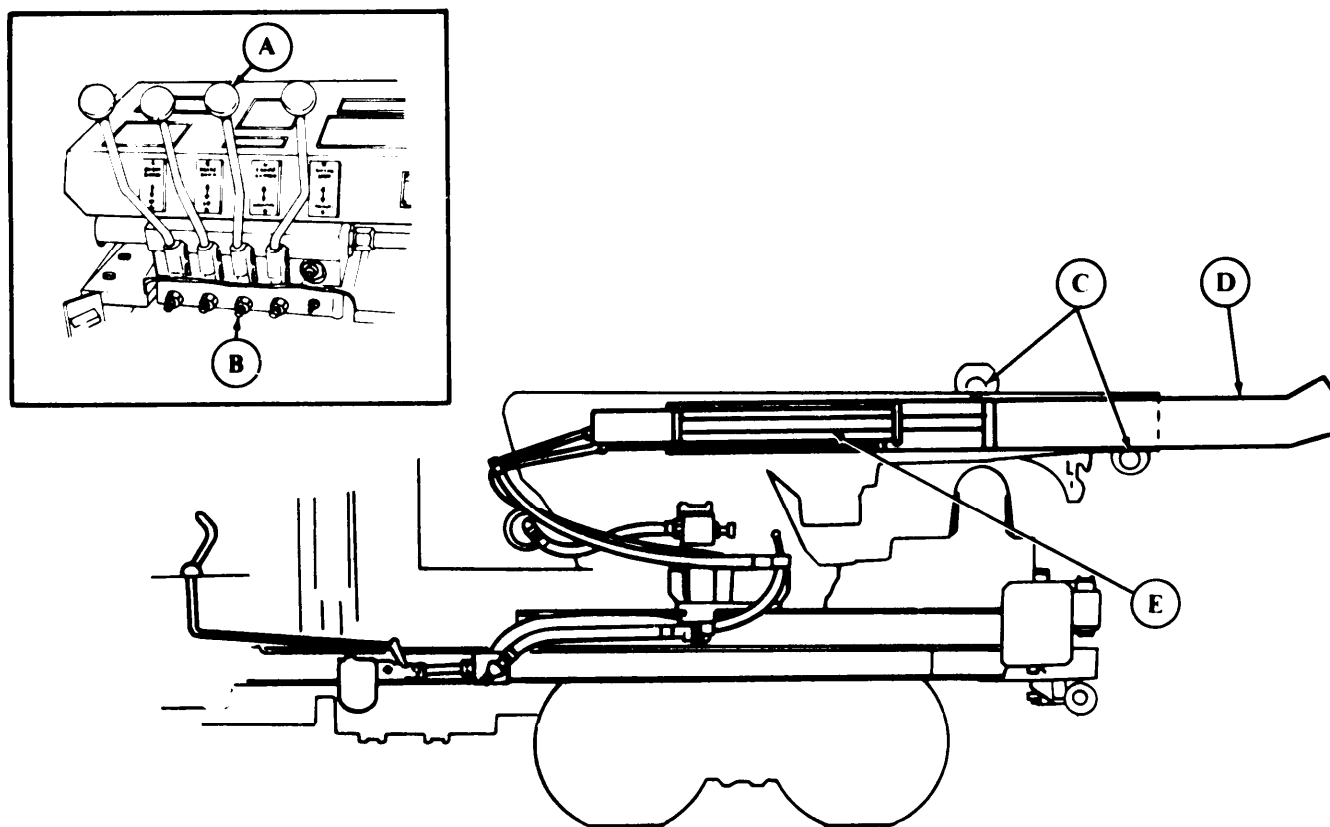
E CRANE HOIST CABLE DRUM

F UPPER ROLLER ASSEMBLY

e. Medium Wrecker Crane Hydraulic System Operation (Cont'd).

Major components for extending and retracting the boom for the CROWD action are:

- A CROWD CONTROL LEVER** – Manual control attached to the control valve that determines oil flow for extending and retracting the crane boom. Lever is pushed forward to extend the boom and pulled back to retract the boom.
- B CROWD CONTROL VALVE** — Two-way hydraulic valve located directly below crowd control lever. Valve directs hydraulic oil from the hydraulic pump to the crowd cylinder to extend and retract inner boom assembly.
- C ROLLERS** – Guides inner boom assembly and permits smooth extension and retraction of boom.
- D INNER BOOM ASSEMBLY** – Extends when crowd control lever is pushed forward and retracts when control lever is pulled back.
- E CROWD CYLINDER** – A hydraulically-driven piston that extends outward when crowd control lever is pushed forward to EXTEND position. Piston is hydraulically driven back into the cylinder when crowd control lever is pulled back to RETRACT position. This cylinder is contained in the inner boom assembly.



A CROWD CONTROL LEVER

B CROWD CONTROL VALVE

C ROLLERS

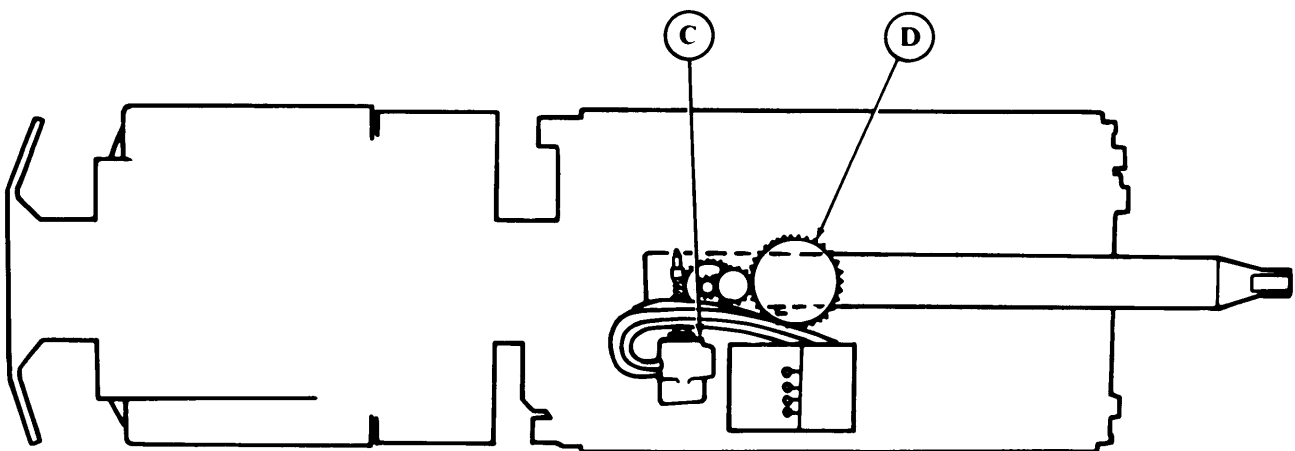
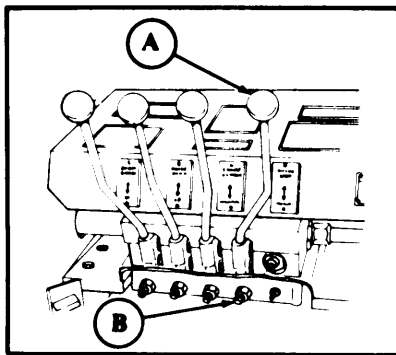
D INNER BOOM ASSEMBLY

E CROWD CYLINDER

e. Medium Wrecker Crane Hydraulic System Operation (Cont'd).

The major components for swinging the crane left and right for the SWING action are:

- A SWING CONTROL LEVER** — Manual control attached to the control valve that determines hydraulic oil flow for swinging wrecker boom to the left and to the right. Lever is pushed inward for left boom movement, and pulled outward for right boom movement.
- B SWING CONTROL VALVE** — Two-way hydraulic valve located directly below swing control lever. Valve directs hydraulic oil from the hydraulic pump to the swing motor assembly and back through the valve to the hydraulic oil reservoir.
- C SWING MOTOR** — Converts hydraulic power back into mechanical power needed to turn the crane turntable when hydraulic fluid is forced through its worm gear. This gear turns a large gear at the base of the turntable to swing the crane.
- D TURNTABLE ASSEMBLY** — Driven by the swing motor through a ring gear at the base of the assembly, permits the crane to swing 360 degrees.



A SWING CONTROL LEVER

B SWING CONTROL VALVE

C SWING MOTOR

D TURNTABLE ASSEMBLY

CHAPTER 2

SERVICE AND TROUBLESHOOTING INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special Tools, Special Test, Measurement, and Diagnostic Equipment (TMDE), and Support Equipment used to maintain the vehicles covered in this manual can be found in TM 9-2320-272-20P.

2-3. REPAIR PARTS

Repair parts covering organizational maintenance are listed and illustrated in the Repair Parts and Special Tools List (TM 9-2320-272-20P).

Section II. SERVICE UPON RECEIPT

2-4. GENERAL

a. Upon receipt of a new, used, or reconditioned vehicle, you must determine if the vehicle has been properly prepared for service. The following steps should be performed:

- (1) Inspect all assemblies, subassemblies, and accessories to be sure they are in proper working order.
 - (2) Secure, clean, lubricate, or adjust as needed.
 - (3) Check all Basic Issue Items (TM 9-2320-272-10) to be sure every item is present, in good condition, and properly mounted or stowed.
 - (4) Follow general procedures for all service and inspections given in TM 9-2320-272-10.
- b. The operator will assist when performing service upon receipt inspections.
- c. See TM 9-2320-272-10 when testing equipment for proper operation.

2-5. GENERAL INSPECTION AND SERVICING INSTRUCTIONS

The following steps should be taken while performing general inspection and services:

- (1) Use TM 9-2320-272-10 and LO 9-2320-272-12, as well as other sections of this manual, when servicing and inspecting equipment.
- (2) Clean all exterior surfaces coated with rust-preventive compounds with drycleaning solvent.
- (3) Read "Processing and Reprocessing Record of Shipping, Storage, and Issue of Vehicles and Spare Engines" tag (DD Form 1397) and follow all precautions listed. This tag should be attached to steering wheel, shift column, or battery switch.

NOTE

If vehicle has been driven to using organization, all of the above work should have been completed.

2-6. SPECIFIC INSPECTION AND SERVICING INSTRUCTIONS

The following steps should be taken while performing specific inspections and services:

- (1) Perform the semiannual S (six months, or 6,000 miles (9,654 kilometers)) preventive maintenance checks and services listed in section III of this chapter.
- (2) Lubricate the vehicle according to LO 9-2320-272-12. Do not lubricate gearcases or engine unless processing, tag states that the oil is unsuitable for 500 miles (805 kilometers) of operation. If oil is suitable, just check level.
- (3) Schedule semiannual service on DD Form 314 (Preventive Maintenance Schedule and Record Card).
- (4) If vehicle is delivered with a dry charged battery, activate it according to TM 9-6140-200-14.
- (5) Check vehicle coolant level and determine if solution is proper for climate (see TB 750-651 for preparation of antifreeze solutions).

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-7. GENERAL

The best way to maintain vehicles covered by this manual is to inspect them on a regular basis so minor faults can be discovered and corrected before they result in serious damage, failure, or injury. This section contains systematic instructions for inspection, adjustment, and correction of vehicle components to avoid costly repairs of major breakdowns. This is referred to as preventive maintenance checks and services (PMCS).

2-8. INTERVALS

NOTE

Designated intervals are performed under usual operating conditions. PMCS intervals must be performed more frequently when operating under unusual conditions.

a. Organizational maintenance assisted by operator/crew will perform the checks and services contained in table 2-1 at the following intervals:

- (1) **Semiannually (S).** Every 6 months or 6,000 miles (9,654 kilometers), whichever comes first.
- (2) **Annually (A).** Every 12 months or 12,000 miles (19,308 kilometers), whichever comes first.
- (3) **Biennially (B).** Every 24 months or 24,000 miles (38,616 kilometers), whichever comes first.

b. Perform all (S) inspections in addition to (A) inspections at the time of the annual inspection. Perform all (A) and (S) inspections in addition to (B) inspections at the time of the biennial inspection.

2-9. REPORTING REPAIRS

All uncorrected defects will be recorded on Equipment Inspection and Maintenance Worksheet, DA Form 2404, in accordance with DA Pam 738-750.

2-10. GENERAL SERVICE AND INSPECTION PROCEDURES

a. While performing specific PMCS procedures, make sure items are correctly assembled, secure, serviceable, not worn, not leaking, and adequately lubricated as defined below:

- (1) An item is **CORRECTLY ASSEMBLED** when it is in proper position and all parts are present.
- (2) When wires, nuts, washers, hoses, or attaching hardware cannot be moved by hand, wrench, or pry-bar, they are tight.
- (3) An item is **UNSERVICEABLE** if it is worn beyond established wear limits or is likely to fail before the next scheduled inspection.

(4) An item is WORN if there is play between joining parts, or warning and caution plates are not readable.

(5) LEAKS. TM 9-2320-272-10 contains definitions of class I, II, and III leaks and their effect on vehicle operation.

(6) If an item meets the requirements specified by lubrication order, LO 9-2320-272-12, then it is ADEQUATELY LUBRICATED.

b. Where the instruction "tighten" appears in a procedure, you must tighten with a wrench to the given torque value even when the item appears to be secure.

WARNING

Drycleaning solvent is flammable and will not be used near fire. Use only in well-ventilated places. Failure to do this may result in injury to personnel.

c. Where the instruction "clean" appears in a procedure, you must use drycleaning solvent (SD-2), specification P-D 680, to clean grease or oil from metal parts. After the item is cleaned, rinsed, and dried, apply a light grade of oil to unprotected surfaces to prevent rusting. On rubber and plastic materials, use soap and water.

2-11. SPECIFIC PMCS PROCEDURES

a. The preventive maintenance checks and services for which you are responsible are provided in table 2-1. The checks and services listed are arranged in logical order requiring minimal time and effort on your part.

b. The following columns read across on the PMCS schedule:

(1) **Item Number.** Provides logical order for PMCS performance and is used as a source number for DA 2404, on which your PMCS results will be recorded.

(2) **Interval.** Shows a bullet (•) opposite each item to indicate when that check is to be performed. The bullet will be repeated when consecutive item numbers are to be inspected during the same interval. Interval columns include:

(a) **Semiannually (S).** Every 6 months or 6,000 miles (9,664 kilometers), whichever comes first.

(b) **Annually (A).** Every 12 months or 12,000 miles (19,308 kilometers), whichever comes first.

(c) **Biennially (B).** Every 24 months or 24,000 miles (38,616 kilometers), whichever comes first.

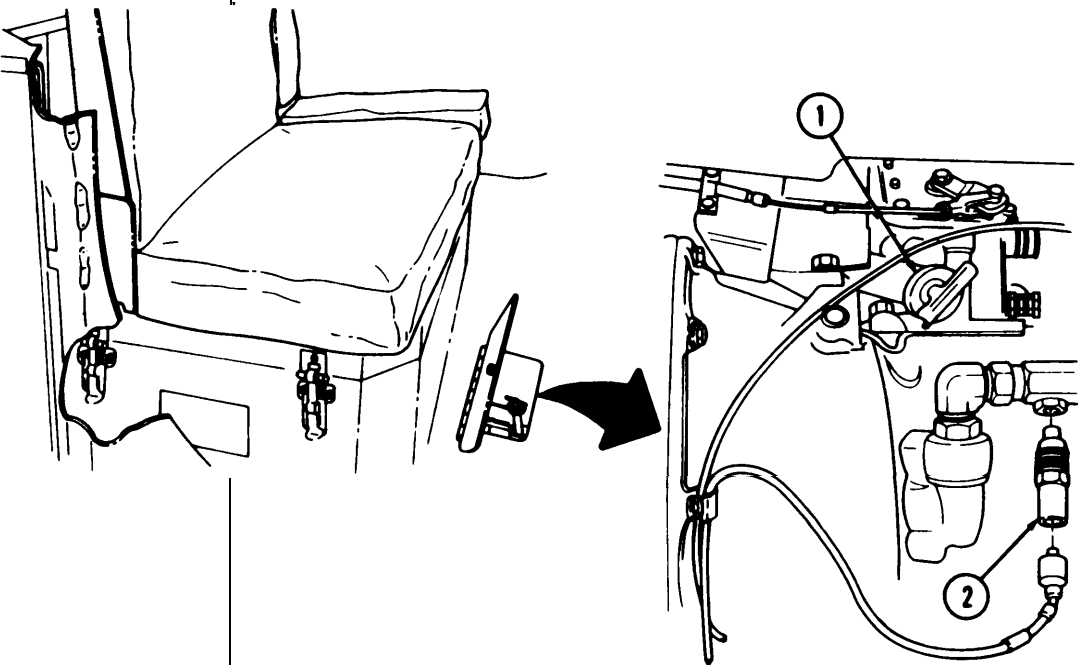
(3) **Item To Be Inspected.** Lists the system, common name, or location of the item to be inspected.

(4) **Procedures.** Provides instructions for servicing, inspection, replacement, or adjustment, and in some cases, having item repaired at a higher level. If a defect is found, repair, fill, replace, or adjust as needed.

Table 2-1. Preventive Maintenance Checks and Services

S—Semiannually				A—Annually	B—Biennially
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
					<p>PRIOR TO ROAD TEST</p> <p>Perform all before operation checks listed in TM 9-2320-272-10, “Preventive Maintenance Checks and Services”.</p> <p>ROAD TEST</p> <p>Perform all during operation checks listed in TM 9-2320-272-10, in addition to those provided below. Drive the vehicle at least five miles (8 kilometers), over varied terrain and on and off road. This will provide ample time to check reported malfunctions, and to locate unreported malfunctions.</p>
1	•			Starter	While starting vehicle, listen for unusual noises and difficult cranking.
2	•			Engine and engine compartment	<p>a. Observe response to accelerator feed. Listen for unusual noises. Observe for hesitation, varying idle speed, and sticking or binding of accelerator pedal.</p> <p>b. Be alert for excessive vibration and the smell of fuel, oil, coolant, and exhaust.</p>
3	•			Brakes	<p>a. Reach a desired speed and lightly apply brake pedal with steady force. Vehicle should slow down immediately and stop smoothly, without noticeable side-pull or chatter.</p> <p>b. After stopping vehicle and with transmission in “1-5” (drive), release brake pedal. The wheel brakes should release immediately and without difficulty.</p>
4	•			Engine	<p>a. Check engine throughout the range of operating speeds. Ensure that engine does not exceed governed speed of 2100 rpm with no-load.</p> <p>b. Check engine instruments. (Refer to TM 9-2320-272-10 for proper readings.)</p>
5	•			Transmission	<p>a. Check transmission oil temperature gage. (Refer to TM 9-2320-272-10 for proper reading.)</p> <p>b. Check for response to shifting and smoothness of operation in all speed ranges.</p>
6	•			Transfer case	Engage transfer case to ensure proper operation. Observe for smoothness of engagement.
					<p>NOTE</p> <p>Item 7 will be performed with engine running, transmission in “N” (neutral), and parking brake applied.</p>
7	•			Emergency fuel Cut-off	Pull out to stop engine. When engine has stopped, push in to original position and reset shutoff valve control lever.
					<p>AFTER ROAD TEST</p> <p>Perform all after-operation, weekly and monthly checks in TM 9-2320-272-10 PMCS. Then make the following inspections in the order given, including kit items on vehicles so equipped.</p>

Table 2-1. Preventive Maintenance Checks and Service (Cont'd)

S-Semiannually				A-Annually	B-Biennially
Item No.	Interval			Item to be Inspected	Procedure
	S	A	B		
					INSIDE VEHICLE CAB
					<u>WARNING</u>
					<ul style="list-style-type: none"> Do not perform battery system checks or inspection near open flame. Injury to personnel may result. Remove all jewelry. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result, and may cause injury to personnel. When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lay flat against the top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.
8	•			Batteries	Check and record specific gravity of each cell. Check electrolyte level. If low, add distilled water. Inspect battery cables for frays, splits, and security. Clean top of batteries and coat terminals lightly with grease.
9				Transmission	<u>CAUTION</u> Do not remove transmission dipstick before cleaning dirt away from access plate, filler tube, and dipstick. Dirt may enter and damage transmission. <ul style="list-style-type: none"> a. Inspect dipstick (1) and oil for evidence of metal particles. Notify your supervisor if metal particles are found. b. Inspect temperature sending unit (2) for security. Inspect sending unit wiring for frays, splits, breaks, and missing insulation.
	•				
	•				
					

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Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

S—Semiannually

A—Annually

B—Biennially

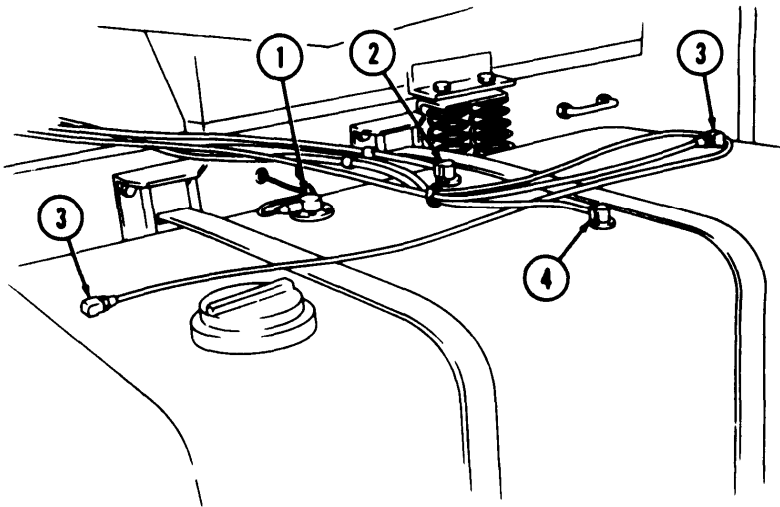
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
10	•			Air cleaner indicator	Test air cleaner indicator for proper operation (para. 3-17).
11			•	Data, caution, and warning plates	Inspect for completeness, security, and readability.
VEHICLE EXTERIOR					
12	•			Fuel system	<p>a. Inspect fuel tank(s) for dents, cracks, and broken welds that could cause leaks.</p> <p>b. Inspect all fuel lines for loose connections, splits, cracks, and bends that could cause leaks.</p> <p>c. Visually inspect fuel sending unit (1) and wiring for loose connection, presence, frays, splits, and missing insulation.</p> <p>d. Visually inspect fuel inlet tube (2), fuel return tube (4), and vent hoses (3) at fuel tank for loose connections, cracks, and splits.</p>
					
13	•			Air intake system	<p>a. Inspect filter element for tears and the presence of dirt and oil.</p> <p>b. If dirt is present, clean or replace as necessary.</p> <p>c. If oil is present, check oil levels in transmission and transfer. If oil levels are excessive, drain the excess.</p> <p>d. Check for fuel diluting the oil, change if necessary.</p> <p>e. If oil levels are low, notify next higher level maintenance to check transfer interlock air cylinder for leaks.</p> <p>f. When filling fuel tanks, make sure fuel level remains two inches from top of filler cap.</p> <p>g. If fuel levels are excessive, drain the excess.</p>

Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

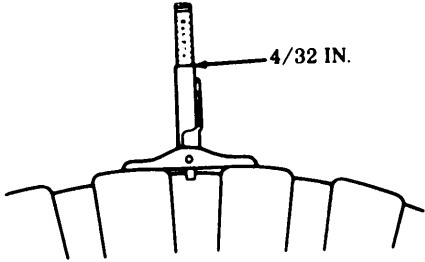
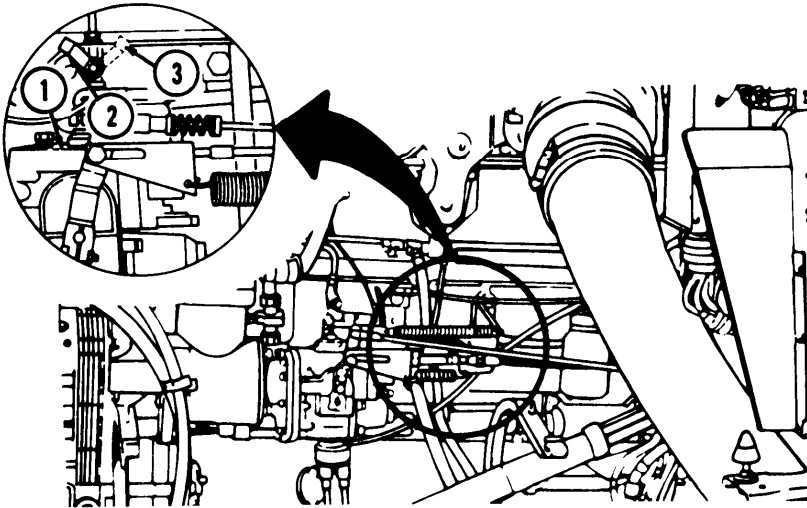
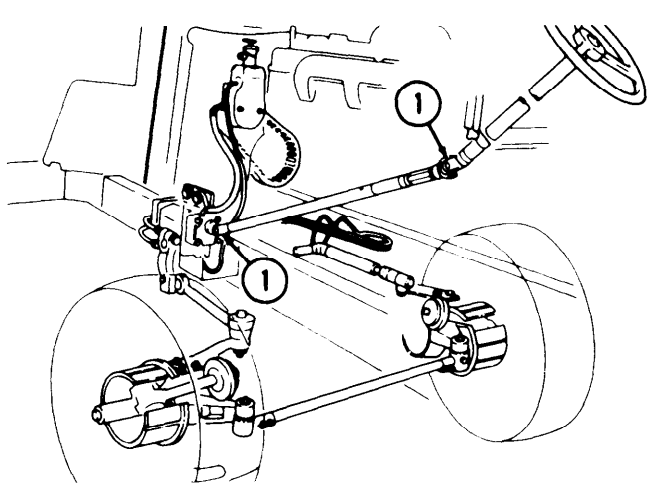
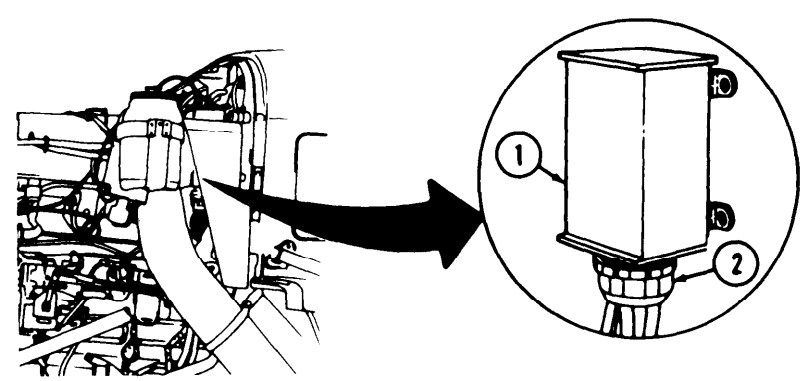
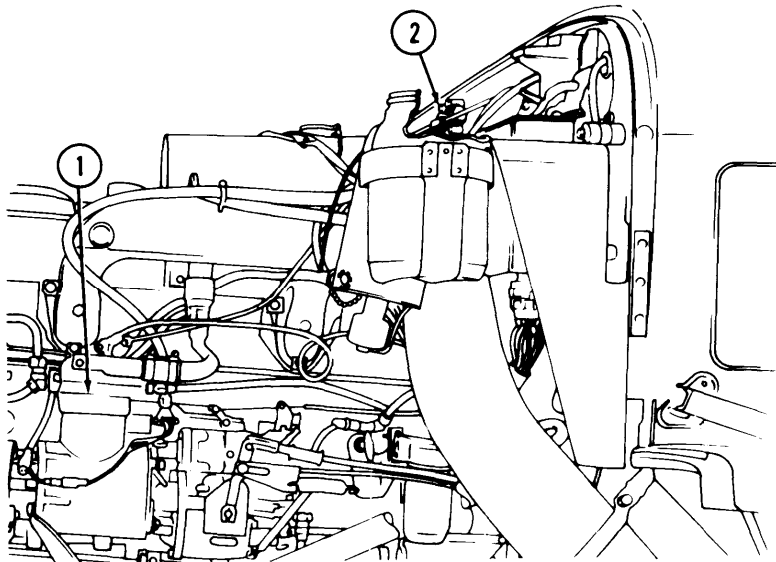
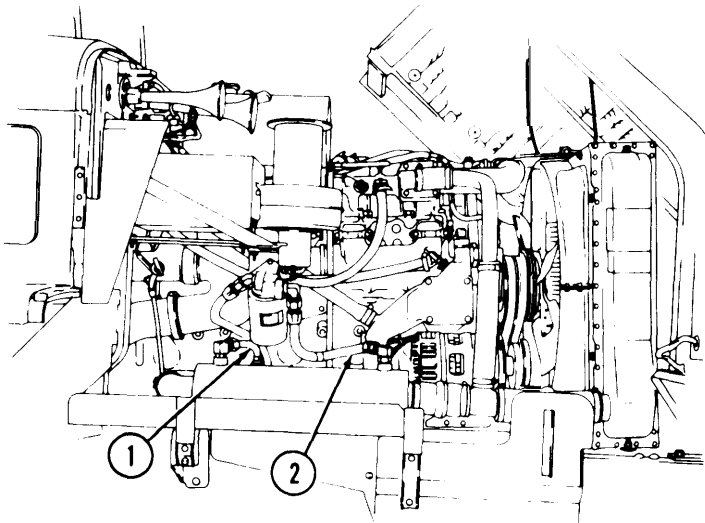
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
14		•		Tires	<p>a. Check each tire for wear using tire tread depth gage as shown below. Tread depth should not be less than 1/8 in. or 4/32 in. as indicated on tire tread depth gage. (Refer to TM 9-2610-201-14.)</p>  <p>b. Make sure all wheel lugnuts are present. Tighten rear inner capnuts 400-425 lb-ft (542-576 N·m) and rear outer lugnuts 325-355 lb-ft (441-481 N·m). Tighten front lugnuts 400-425 lb-ft (542-576 N·m).</p> <p>c. Inspect wheel side rings for dents or breaks that could cause them to pop off.</p> <p>ENGINE COMPARTMENT</p> <p>NOTE</p> <ul style="list-style-type: none"> • Open engine hood and secure with retaining bar. Also remove both splash shields, (TM 9-2320-272-10). • Before proceeding to Item 15, reposition fuel cutoff valve above fuel pump (1). Move valve from cutoff position (3) to operating position (2). 
15	•			Fuel system	<p>a. Inspect fuel filter housing for dents and cracks that could cause leaks. Install new fuel filter and prime fuel system.</p> <p>b. Inspect fuel pump and fittings for leaks.</p>

Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
16	•			Steering system	<p>a. Inspect power steering pump for cracks or dents that could cause leaks.</p> <p>b. Follow routing of all hydraulic steering lines, hoses, and tubing and inspect for loose fittings, cracks, bends, breaks, and leaks.</p>  <p>c. Inspect steering column U-joints (1) for breaks, cracks, and rust.</p> <p>d. Tighten steering gear mounting bolts 260-280 lb-ft (353-380 N·m). Inspect steering gear for leaks.</p> <p>e. With vehicle engine OFF, have one person hold steering column while watching U-joints for movement between caps and cross. Have assistant turn steering wheel slowly to right and then left. If wear is found, notify your supervisor.</p>
17		•			<p>Inspect starter mounting bolts and starter wiring for presence, corrosion and loose connections. Tighten mounting bolts 80-110 lb-ft (108-149 N·m).</p>
18			•		<p>a. Inspect control box (1) for secure mounting.</p> <p>b. Make sure quick-disconnect (2) to box is secure.</p> 
	•				
	•				
	•				

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Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

S—Semiannually				A—Annually	B—Biennially
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
19				Compressed air system	<p>NOTE</p> <p>Anytime leakage is suspected in the compressed air system, use the soap suds method of detection. If a leak exists, bubbles will form around the area in question. If leakage exists, tighten connection or replace component.</p> <p>a. Check all air lines and connections for secure mounting and leaks.</p> <p>b. Inspect air compressor (1) and air governor (2) for secure mounting and leaks.</p> 
20	•			Transmission oil cooler	<p>Inspect oil cooler inlet hose (1) and outlet hose (2) for splits, frays, and tight connections</p> 

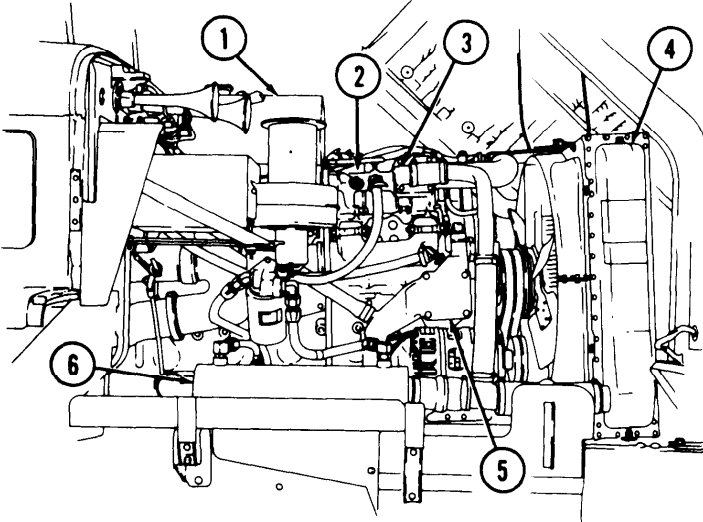
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Table 2-1. Preventive Maintenance Checks and Services (Cont 'd)

S-Semiannually

A-Annually

B-Biennially

Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
21	•			Engine lubrication and oil lines	<p>a. Check oil and dipstick for metal particles at end of dipstick.</p> <p>b. Inspect all oil lines and hoses for cracks, frays, and wear that could cause leaks.</p> <p>c. Inspect oil filter housing for security. Make sure filter center bolt is tight, 25-35 lb-ft (34-48 N·m).</p> <p>d. Inspect rocker housing covers for evidence of leaks. Notify DS maintenance if leaks exist.</p>
22	•			Alternator and alternator wiring	<p>a. Inspect alternator for secure mounting.</p> <p>b. Inspect alternator mounting bracket and attaching hardware for cracks, bends, and secure mounting.</p> <p>c. Inspect alternator wiring for frays, bare wires, breaks, and loose terminal connections.</p>
23	•			Cooling system	<p>a. Inspect all hoses for splits, wear, and cracks that could cause leaks. Inspect hose clamps for tightness.</p> <p>b. Check antifreeze protection temperature.</p> <p>c. Inspect surge tank (1), water manifold (2), thermostat housing (3), radiator (4), engine oil cooler (5), and transmission oil cooler (6) for leaks and secure mounting.</p>
	•				
	•				<p>d. Inspect radiator core (4) for clogged or bent fins, leaks, and protruding debris. Clean clogged core and remove debris.</p> <p>e. Inspect fan blades for security, breaks, missing or loose bolts, and rivets.</p> <p>f. Inspect temperature sending unit for security. Inspect sending unit wiring for frays, splits, breaks, and worn or missing insulation.</p>

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Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
24	•			Electrical wiring	Inspect all engine compartment wiring for frays, splits, missing insulation and poor connections. Replace any damaged wires.
25		•		Engine and cab mounts	<p>a. Inspect front and rear engine and cab mounting brackets for security, wear, cracks, splits, broken welds, loose bushings, and missing bolts.</p> <p>b. Check two front engine mounting trunnion screws for tightness. If loose, notify your supervisor.</p> <p>c. Tighten five lower trunnion mount bolts 65-75 lb-ft (88-102 N•m). Tighten four flywheel housing brackets-to-frame mounting bolts 75-85 lb-ft (102-115 N•m).</p> <p>d. Tighten front cab mounting bolts.</p>
26	•			Hubs and drums	<p>a. Beginning at front of vehicle, check each wheel hub and brakedrum for overheating, which can indicate a defective wheel bearing or dragging brake.</p> <p>b. Hot brakedrums usually indicate improper adjustment, or defective or inoperative brake.</p>
27	•			Engine underside	<p>a. Inspect underside of engine for fuel, water, and oil leaks.</p> <p>b. Inspect oil pan and pan drainplug for leaks and security. Tighten oil pan mounting screws 30-40 lb-ft (41-54 N•m).</p>
28	•			Transmission	<p>a. Inspect transmission body for cracks or loose bolts that could cause leaks.</p> <p>b. Inspect transmission shift linkage for bends, cracks, and wear that could cause failure.</p> <p>c. Tighten transmission oil pan mounting bolts 5 lb-ft (7 N•m). Tighten oil pan drainplug 15-20 lb-ft (20-27 N•m).</p>
29	•			Transfer case	<p>a. Check transfer case for overheating which can indicate low lubrication level. If overheated, check fluid level and fill according to LO 9-2320-272-12.</p> <p>b. Inspect transfer case for oil leaks, cracks, and loose bolts that could cause leaks.</p> <p>c. Inspect tightness of transfer case mounting bolts and mounting brackets. Tighten three transfer case mounting bracket to frame bolts 180-190 lb-ft (244-258 N•m). Tighten seven transfer case to mounting bracket bolts 125-135 lb-ft (170-183 N•m).</p> <p>d. Inspect shift linkage for cracks, bends, and wear.</p>
30	•			Axles and differentials	<p>Check each for overheating which can indicate low lubrication levels. If any of these components are overheated, check fluid level and add or fill according to LO 9-2320-272-12.</p> <p>b. Inspect axle housings for cracks that could cause leaks.</p> <p>c. Make sure axle housing grease fittings, plugs, and fittings are present and tight.</p>

Table 2-1. Preventive Maintenance Checks and Services (Cont'd)

S—Semiannually

A—Annually

B—Biennially

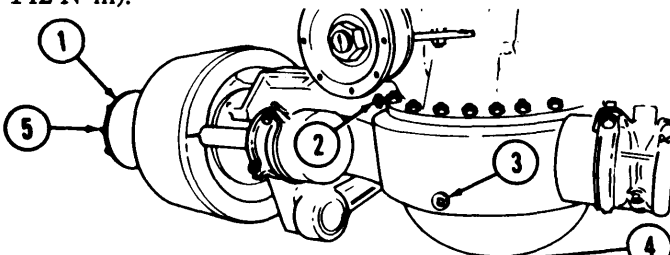
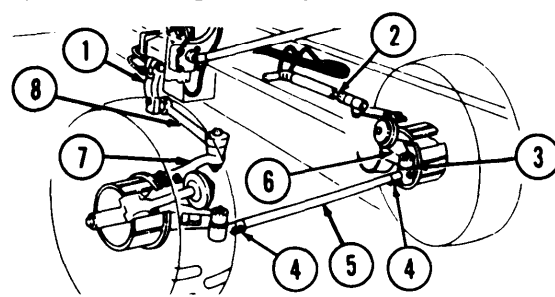
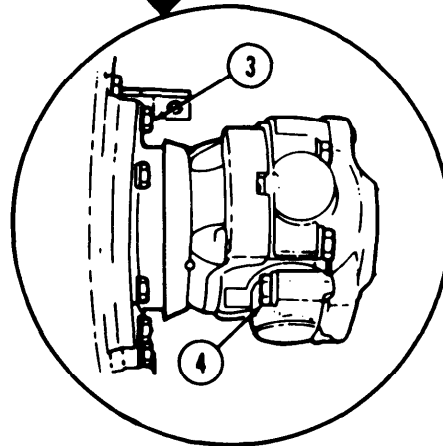
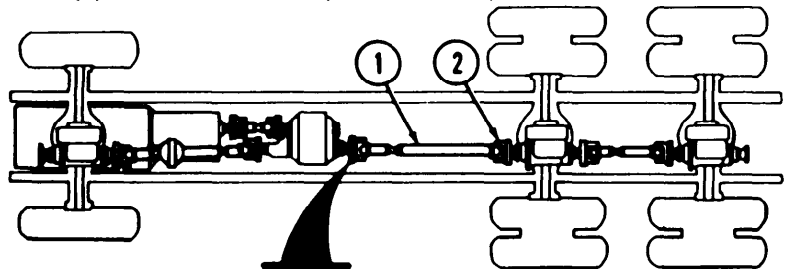
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
		•			d. Remove breather valves (2) and clean.
		•			e. Inspect differentials for cracks that could cause leaks.
	•				f. Inspect axle drive flange (1) for leaks. If oil is present on front axle flanges notify your supervisor.
	•				g. Inspect differential seals for leaks.
	•				h. Make sure that differential fill plug (3) and drainplug (4) are not leaking and are tight.
		•			i. Tighten all axle drive flange bolts (5) 80-105 lb-ft (108-142 N·m).
					
31	•			Front suspension	a. Inspect springs and shackles for cracks, breaks, and security. Tighten spring U-bolts 350-400 lb-ft (475-542 N·m).
	•				b. Inspect spring shackle pins and bushings for wear.
		•			c. Inspect shock absorbers and mounting brackets for looseness, wear, cracks, serviceability, and leaks. Replace leaking shock absorbers if more than a class I leak.
	•				d. Observe how vehicle responds to road shock. Malfunction is indicated by constant bouncing or swaying from side to side.
32	•			Steering system	a. Inspect steering knuckles (3), tie rod assembly (5), CV boots (6), steering arm (7), drag link (8), and pitman arm (1) for breaks, cracks, rust, wear, and unserviceability.
	•				b. Inspect steering stops for presence and security.
					c. Turn steering wheel about 2 inches to right and left several times. Check that there is no free play between these parts. If free play is present, tighten four steering knuckle nuts (4) 155-200 lb-ft (210-271 N·m).
					d. Repeat item 32c. If free play is still present, notify your supervisor.
					e. Inspect power steering assist cylinder (2) for looseness.
					

Table 2-1. Preventive Maintenance Checks and Services (Cont'd.)

Item No.	S—Semiannually			Item to be Inspected	Procedures
	S	A	B		
33		•		Front wheel alinement	Check front end alinement with toe-in gage. Correct toe-in is $1/8 \pm 1/16$ in. (0.063-0.125 mm). When toe-in is correct, tighten cross-shaft screws and nuts 60-80 lb-ft (81-109 N·m)
34	•			Compressed air and brake system	<p>a. Inspect four air reservoirs, attaching valves, lines, and connections for security, bends, dents, and cracks that could cause leaks.</p> <p>b. Check brakeshoes for condition. Replace brakeshoes if worn beyond chamfer on linings.</p> <p>c. Check brakeshoe to drum clearance. If clearance is more than 0.060 in. (1.5 mm) manually adjust brakes or notify your supervisor of inoperative adjusters.</p>
35			•	Frame and crossmembers	<p>a. Inspect frame side rails for cracks, breaks, bends, wear, and rust.</p> <p>b. Inspect crossmembers for missing rivets, bolts, obstructions to other components, and breaks.</p>
36	•			Propeller shafts and universal joints	<p>a. Inspect all propeller shafts (1) for bends, cracks, and looseness.</p> <p>b. Inspect U-joints (2) for play and broken or missing lubrication fittings. There should be no play at U-joints.</p> <p>c. Make sure all companion flange mounting screws (3) and U-joint mounting screws (4) are tight. Tighten companion flange mounting screws (3) 30-40 lb-ft (41-54 N·m) and U-joint mounting screws (4) both 90-110 lb-ft (122-149 N·m).</p>



TA 349405

B—Biennially

VEHICLE REAR

Table 2-1. Preventive Maintenance Checks and Services (Cont 'd)

Item No.	S-Semiannually			Item to be Inspected	Procedures
	S	A	B		
41		•		Front winch (M925, M926, M928, M930, M932, M936)	<p>SPECIAL BODIES AND EQUIPMENT</p> <p>a. Inspect front winch for tight mounting and broken or missing parts.</p> <p>b. Test drag brake for proper operation.</p> <p>c. Test winch automatic brake for proper operation.</p> <p>d. Unwind winch cable completely and inspect for kinks, frays, and wear.</p> <p>a. Inspect rear winch and winch controls for tight mounting and broken or missing parts.</p> <p>b. Inspect hydraulic pump for leaks.</p> <p>c. Test winch automatic brake for proper operation.</p> <p>d. Unwind winch cable completely and inspect for kinks, frays, and wear.</p> <p>e. Check cable tensioner sheaves for proper adjustment.</p> <p>a. Test automatic hoist drum brake for proper operation.</p> <p>b. With boom raised, inspect crane cylinder piston rods for bends and scoring.</p> <p>c. While operating crane, observe that the fuel pump governor is maintaining 1250-1300 rpm during hoisting operation. Notify DS maintenance if engine rpm is surging erratically.</p> <p>d. Extend crane cable completely and inspect for kinks, frays, and broken strands.</p> <p>e. Inspect and clean hydraulic tank swing motor and hoist crane motor breather caps.</p> <p>a. Inspect dump body for completeness of assembly. Make sure dump body is aligned with frame.</p> <p>b. Inspect dump hydraulic lines, hoses, and their fittings for leaks, splits, and frays that could cause leaks.</p> <p>c. Inspect transmission power take-off, hydraulic pump propeller shaft, and hydraulic pump for tight mounting and leaks.</p> <p>d. Make sure tailgate control rod hand lever locks and unlocks tailgate lower latch. Inspect control linkage for security, bends, and binding.</p> <p>e. Operate dump body and observe for smooth raising and lowering of dump body.</p> <p>f. With dump body raised, inspect cylinder piston rods for scoring and wear.</p> <p>g. Tighten all dump body mounting bolts 240 lb-ft (325 N•m).</p>
	•				
	•				
		•			
42		•		Rear winch (M936)	
		•			
	•				
		•			
	•				
43		•		Hydraulic crane and wrecker (M936)	
		•			
		•			
		•			
		•			
		•			
44		•		Dump body and hoist (M929, M930)	
		•			
		•			
		•			
		•			
		•			

Table 2-1. Preventive Maintenance Checks and Services (Cont 'd)

S—Semiannually				A—Annually	B—Biennially
Item No.	Interval			Item to be Inspected	Procedures
	S	A	B		
45	•	•		Expansible van body (M934, M935)	<p>a. Make a general inspection of the van body. Inspect and operate heater, air conditioner, ventilators, dome lights and switches to insure proper operation.</p> <p>b. Inspect electrical wiring for frays, splits, and loose terminals (para. 4-49).</p> <p>c. Expand and retract van body. Check for binding, sticking and bends, and lack of proper lubrication of expanding and retracting mechanisms.</p>
46		•		Expansible van with liftgate (M935)	With liftgate extended, inspect lift arms and support assemblies for mounting security and completeness of assembly.
47			•	Fifth wheel (M931, M932)	Inspect fifth wheel for completeness of assembly. Make sure mounting screws are tightened 160-170 lb-ft (217-231 N•m).
48	•			Rifle mounting kit	a. Check top mount and lower mount for looseness and damage.
	•				b. Check handle for excessive looseness, binding, and damage.
49				Machine gun mount	(Refer to TM 9-1005-245-14 for preventive maintenance checks and services.)
50				M-8 chemical alarm	(Refer to TM 3-6665-225-12 for preventive maintenance checks and services.)
51				M - n decontamination unit	(Refer to TM 3-4230-204-12&P for preventive maintenance checks and services.)
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Lubricate vehicle in accordance with LO 9-2320-272-12.</p> <p style="text-align: center;">FINAL ROAD TEST</p> <p>After all services and inspections have been completed, take vehicle on a short road test to make sure all corrections have been implemented. Correct any defects or malfunctions that may occur during this test.</p>					

Section IV. MECHANICAL SYSTEMS TROUBLESHOOTING

2-12. GENERAL

NOTE

If malfunction corrective action does not correct malfunction, notify direct support maintenance.

a. This section provides information to diagnose and correct malfunctions of the mechanical system. Because of its complexity, the mechanical system is divided into the following functional systems:

- Engine (page 2-21)
- Ether Start System (page 2-27)
- Exhaust System (page 2-28)
- Cooling System (page 2-28)
- Transmission (page 2-29)
- Transfer Case (page 2-30)
- Propeller and Drive Shafts (page 2-31)
- Front and Rear Axles (page 2-32)
- Wheels and Tires (page 2-32)
- Steering (page 2-33)
- Frame and Brackets (page 2-35)
- Springs and Shock Absorbers (page 2-36)
- Winch (page 2-37)
- Power Takeoff (page 2-39)
- Instruments and Gages (page 2-40)
- Radio Interference Suppression (page 2-40)
- Fifth Wheel (page 2-40)
- Medium Wrecker (page 2-41)
- Dump Body (page 2-41)
- Expansible Van (page 2-42)
- Power Liftgate (page 2-44)

b. Principles of operation showing system operation for each mechanical system can be found in chapter 1, section III. It should be used as a reference when performing mechanical troubleshooting (table 2-2).

c. Each malfunction symptom given for an individual component or system is followed by step(s) that should be taken to determine the cause and corrective action that must be taken to remedy the problem.

d. Before taking any action to correct a possible malfunction, the following rules should be followed:

(1) Question the vehicle operator to obtain any information that might help determine the cause of the problem.

(2) Never overlook the chance that the problem could be of simple origin. The problem could be corrected with minor adjustment.

(3) Use all senses to observe and locate troubles.

(4) Use test instruments or gages to help determine and isolate problem.

(5) Always isolate the system where the malfunction occurs and then locate the defective component.

(6) Use Principles of Automotive Vehicles, TM 9-8000, when troubleshooting the vehicles covered in this manual.

e. Omissions. This manual cannot list all mechanical malfunctions that may occur. If a malfunction occurs that is not listed in table 2-2, notify your supervisor.

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
ENGINE		
1.	Fails to crank	2-21
2.	Cranks but fails to start	2-21
3.	Cranks slowly, hard to start.. . . .	2-22
4.	Runs, but misfires	2-22
5.	Starts but fails to keep running	2-23
6.	Poor acceleration and/or lack of power	2-23
7.	Speed unstable or surges at all speeds	2-24
8.	Excessive oil consumption.. . . .	2-24
9.	Low oil pressure	2-24
10.	Overheats according to engine coolant temperature gage	2-25
11.	Black exhaust smoke at idle.. . . .	2-26
12.	Stops abruptly, not seized...	2-26
13.	Dies upon deceleration	2-26
14.	Excessive fuel consumption.	2-27
ETHER START SYSTEM		
15.	Engine cranks but will not start in cold weather (fuel system operating properly).	2-27
EXHAUST SYSTEM		
16.	Excessive exhaust noise...	2-28
17.	Exhaust fumes in cab	2-28
COOLING SYSTEM		
18.	Engine does not reach normal operating temperature (according to coolant temperature gage)	2-28
19.	No cab heat (coolant temperature gage reads normal)	2-29
TRANSMISSION		
20.	Excessive noise during shifting	2-29
21.	Low transmission oil pressure	2-29
22.	Transmission oil leakage	2-29
23.	No response to shift lever movement	2-30
24.	Rough shifting	2-30
25.	Transmission overheats (according to transmission temperature gage)	2-30
26.	Dirt or metal particles in oil.. . . .	2-30
27.	Oil thrown from filler tube...	2-30
TRANSFER CASE		
28.	Hard shifting of transfer case	2-30
29.	Transfer case oil leakage	2-31
30.	Excessive noise	2-31
31.	Excessive Vibration	2-31
PROPELLER AND DRIVE SHAFTS		
32.	Excessive noise or vibration.	2-31

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX (Cont'd)

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
FRONT AND REAR AXLES		
33.	Continuous axle or wheel noise.....	2-32
WHEELS AND TIRES		
34.	Uneven tire wear	2-32
35.	Wheel shimmy or wobble	2-32
STEERING		
36.	Hard steering	2-33
37.	Vehicle wanders or pulls to one side	2-33
38.	Excessive play in steering wheel	2-34
39.	Shimmy	2-34
FRAME AND BRACKETS		
40.	Towing pintle does not latch or lock	2-35
41.	Pintle hook does not turn...	2-35
42.	Excessively loose lifting shackle	2-35
43.	Loose spare tire carrier	2-36
SPRINGS AND SHOCK ABSORBERS		
44.	Continuous wandering or swaying (poor control)	2-36
45.	Harsh or hard ride	2-36
46.	Spring leaf defect	2-36
WINCH		
47.	Does not operate	2-3
48.	Operates in one direction only.	2-37
49.	Operates at one speed only (rear winch)	2-38
50.	Drag brake does not operate	2-38
51.	Will not hold load	2-38
52.	Automatic brake overheats.. . . .	2-38
53.	Cable tensioner will not operate (rear winch)	2-39
54.	Vehicle rolls while operating rear winch	2-39
POWER TAKEOFF		
55.	Excessive noise at power takeoff	2-39
56.	Hard shifting of power takeoff.	2-39
57.	Leaking lubricant at power takeoff	2-39
INSTRUMENTS AND GAGES		
58.	Speedometer or tachometer noisy or erratic	2-40
59.	Air pressure gage inoperative	2-40
60.	Oil pressure gage inoperative (oil level is proper)	2-40
RADIO INTERFERENCE SUPPRESSION		
61.	Interference while vehicle is in motion	2-40
62.	Interference only when engine is running	2-40

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX (Cont'd)

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
FIFTH WHEEL		
63.	Trailer will not hitch to fifth wheel.	2-40
MEDIUM WRECKER (M936)		
64.	Hydraulic system does not operate	2-41
65.	Hydraulic pump noisy	2-41
DUMP BODY (M929, M930)		
66.	Will not raise	2-41
67.	Does not lower	2-42
68.	Does not hold in raised position	2-42
69.	Hydraulic pump noisy	2-42
70.	Tailgate does not open.	2-42
EXPANSIBLE VAN BODY (M934,M935)		
71.	Side panels hard to retract or expand	2-42
72.	Side panel cannot be locked in retracted position	2-43
73.	Van body not waterproof or lighttight	2-43
74.	Door lock will not operate.	2-43
75.	Heater will not ignite	2-43
POWER LIFTGATE (M935)		
76.	Liftgate will not operate	2-44
77.	Platform stops before reaching stowed position or stops above body floor when raised from the ground	2-44
78.	Platform closes at angle other than straight up	2-44
79.	Platform opens at angle to body floor	2-44
80.	Liftgate operates slow or jerky	2-45

Table 2-2 Mechanical Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
--

ENGINE**1. ENGINE FAILS TO CRANK**

- Step 1. Examine battery cables, clamps, and posts for breaks, looseness, corrosion, and damage. Examine battery cases for cracks.
- Clean and repair any corroded or damaged cable or clamp (para. 4-23).
 - Tighten any loose battery cable clamps.
 - Repair or replace any batteries with cracked cases (TM 9-6140-200-14 and para. 4-24).
 - Replace any battery having broken, loose, or damaged posts (para. 4-24).
- Step 2. Examine cable from battery to starter and ground cable to frame for looseness, corrosion, and damage.
- Tighten, clean, repair, or replace cable as necessary (para. 4-25).
- Step 3. Test specific gravity level in each battery with optical battery tester (TM 9-6140-200-14). Add distilled water or recharge batteries, if necessary (TM 9-6140-200-14).

NOTE

If STE/ICE is available, perform NG20 – no crank – no start (chapter 2, section VI).

- Step 4. Test batteries for proper voltage.
- See electrical troubleshooting, table 2-3, malfunction 3.
- Step 5. Test starter motor for electrical malfunction. See electrical troubleshooting, table 2-3, malfunction 5.
- Step 6. Remove starter and visually check starter drive and ring gear for broken and missing teeth.
- If starter teeth are damaged, replace starter (para. 4-3).
 - If ring gear is damaged, notify your supervisor.

END OF TESTING!**2. ENGINE CRANKS BUT FAILS TO START**

- Step 1. Check air cleaner indicator for air restriction indication.
- If red appears at indicator window, inspect air intake stack for restrictions and if necessary air cleaner element (para. 3-13).
 - Reset cleaner indicator by pressing button down.
- Step 2. Inspect fuel filter for dirty and clogged condition.
- If fuel filter is dirty or clogged, replace filter (paras. 3-26 or 3-27)
- Step 3. Inspect fuel lines and connections for leaks, obstructions, and damage.
- Visually check for leaks. If a leak is at a connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing.
 - Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.
 - Reconnect fuel line(s).
 - Prime fuel system (TM 9-2320-272-10).
 - Check and reset fuel shutoff lever.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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NOTE

If STE/ICE is available, perform NG30 — engine crank — no start (chapter 2, section VI).

Notify DS maintenance.

END OF TESTING!

3. ENGINE CRANKS SLOWLY, HARD TO START

- Step 1. Examine battery cables, clamps, and posts for breaks, looseness, corrosion, and damage.
- Clean, repair or replace any corroded or damaged cable or clamp (para. 4-23 or para. 4-25).
 - Tighten any loose battery cable clamps.
 - Replace any battery having broken, damaged, or loose posts (para. 4-24).
- Step 2. Test specific gravity level in each battery with optical battery tester (TM 9-6140-200-14).
Add distilled water or recharge batteries, if necessary (TM 9-6140-200-14).
- Step 3. In cold weather, make sure proper engine oil is being used.
Add or replace oil (LO 9-2320-272- 12).

NOTE

If STE/ICE is available, perform NG80 — starter circuit tests (chapter 2, section VI).

- Step 4. Check starting circuits. See electrical troubleshooting, table 2-3, malfunction 6.

END OF TESTING!

4. ENGINE RUNS, BUT MISFIRES

- Step 1. Check fuel for water or dirt contamination.
- Open draincock at fuel filter and drain into glass container.
 - If container is one-fourth full of water, fuel is contaminated. Drain fuel tank(s).
 - Disconnect fuel lines at both ends. Clean lines with compressed air.
 - Replace fuel filter (para. 3-29).
 - Reconnect fuel lines.
 - Refill tanks with fuel (TM 9-2320-272-10).
 - Prime fuel system (TM 9-2320-272-10).
- Step 2. Check air cleaner indicator for air restriction indication.
- If red appear at indicator window, inspect air intake stack for restrictions and if necessary, service air cleaner element (para. 3-13).
 - Reset cleaner indicator by pressing button down.
- Step 3. Inspect fuel lines and connections for leaks, obstructions, and damage.
- Visually check for leaks, if leak is at connection, tighten, If leak results from cracked, split or damaged tubing, replace tubing.
 - Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.
 - Reconnect fuel line(s).
 - Prime fuel system (TM 9-2320-272-10).

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 4. Inspect throttle linkage for proper operation and adjustment at fuel pump.

If linkage does not operate properly or is incorrectly adjusted, clean, adjust, or replace as necessary (para. 3-34).

NOTE

If STE/ICE is available, perform NG90 — governor power test fault isolation (chapter 2, section VI).

END OF TESTING!

5. ENGINE STARTS BUT FAILS TO KEEP RUNNING

Step 1. Check air cleaner indicator for air restriction indication.

a. If red appears at indicator window, inspect air intake stack for restrictions and, if necessary, service air cleaner element (para. 3-13).

b. Reset cleaner indicator by pressing button down.

Step 2. Check fuel for contamination.

See malfunction 4, step 1.

Step 3. Inspect fuel lines and connections for leaks, obstructions, and damage.

a. Visually check for leaks. If leak is at connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing.

b. Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.

c. Reconnect fuel line(s).

d. Prime fuel system (TM 9-2320-272-10).

END OF TESTING!

6. POOR ACCELERATION AND/OR LACK OF POWER

Step 1. Check air cleaner indicator for air restriction indication.

a. If red appears at indicator window, inspect air intake stack for restrictions and, if necessary, service air cleaner element (para. 3-13).

b. Reset cleaner indicator by pressing button down.

Step 2. Inspect fuel lines and connections for leaks, obstructions, and damage.

a. Visually check for leaks. If leak is at connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing.

b. Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.

c. Reconnect fuel line(s).

d. Prime fuel system (TM 9-2320-272-10).

Step 3. Examine exhaust system for restrictions.

Remove restrictions or replace exhaust part(s) as necessary (chapter 3, section V).

Step 4. Inspect for full accelerator pedal and throttle lever travel,

Adjust throttle lever travel (para. 3-34).

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
--

Step 5. Check throttle linkage for binding and sticking.

If linkage is binding or sticking, clean, repair, or replace throttle linkage (para. 3-34).

NOTE

IF STE/ICE is available, perform NG90 — governor/power test fault isolation (chapter 2, section VI).

Notify DS maintenance.

END OF TESTING!

7. ENGINE SPEED UNSTABLE OR SURGES AT ALL SPEEDS

Step 1. Inspect fuel lines and connections for leaks, obstructions, and damage.

- Visually check for leaks. If leak is at connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing.
- Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.
- Reconnect fuel line(s).
- Prime fuel system (TM 9-2320-272-10).

Step 2. Inspect throttle linkage for proper operation and adjustment.

If linkage does not operate properly or is incorrectly adjusted, clean, adjust, or repair as necessary (para. 3-34).

END OF TESTING!

8. EXCESSIVE OIL CONSUMPTION

Step 1. Check for overfilling. Remove dipstick for reading (TM 9-2320-272-10).

If dipstick has been read correctly and indicates excessive oil, drain crankcase to safe operating level (LO 9-2320-272- 12).

Step 2. Check for external oil leaks.

- Wipe off edges of rocker arm cover, oil pan, oil filter, and other external engine surfaces.
- Start engine and observe for leaks.
- Tighten nuts, screws, and oil filter and replace gaskets as necessary.

NOTE

If STE/ICE is available, perform NG90 — governor/power test fault isolation (chapter 2, section VI).

Notify DS maintenance.

END OF TESTING!

9. LOW OIL PRESSURE

Step 1. Check oil supply lines for cracks, splits, leaks, damage, and obstructions.

- Tighten loose fittings and connections.
- Replace oil lines that are cracked, split, or damaged (chapter 3, section I).
- Clear clogged or obstructed lines with compressed air or sturdy wire.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Step 2. Inspect oil filter for leaks.</p> <ul style="list-style-type: none"> a. Tighten oil filter center bolt. b. If leaking continues, service oil filter (para. 3-3). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If STE/ICE is available, perform NG05 — low oil pressure check (chapter 2, section VI).</p> <p>Step 3. Test oil pressure gage for proper operation.</p> <ul style="list-style-type: none"> a. See electrical troubleshooting, table 2-3, malfunctions 26 and 27. b. If gage is inoperative, replace (para. 4-53). <p style="text-align: center;">END OF TESTING!</p>		
10. ENGINE OVERHEATS ACCORDING TO ENGINE COOLANT TEMPERATURE GAGE		
<p>Step 1. Check coolant level.</p> <p style="text-align: center;"><u>CAUTION</u></p> <p style="text-align: center;">Do not add coolant when engine is hot. Internal engine damage could result.</p> <p style="text-align: center;">If coolant level is low, fill to proper level at surge tank (para. 3-46).</p> <p>Step 2. Inspect water pump drivebelt for looseness, absence, and worn out condition.</p> <ul style="list-style-type: none"> a. If belt deflects more than 3/4 in. (1.8 cm) or less than 1/2 in. (1.3 cm), adjust (para. 3-55). b. If belt is missing or worn out, install new belt (para. 3-55). <p>Step 3. Inspect radiator, hoses and hose connections, and draincocks for leaks.</p> <ul style="list-style-type: none"> a. Tighten hose clamps and fittings. b. Replace defective cooling system components (chapter 3, section VI). c. Tighten or close draincocks. d. If radiator or water pump leaks, notify DS maintenance. <p>Step 4. Inspect fan for cracked and missing blades.</p> <p style="text-align: center;">Replace fan blade if necessary (para. 3-50).</p> <p>Step 5. Check radiator for airflow obstructions.</p> <p style="text-align: center;">Remove obstructions from front of radiator (para 3-51).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).</p> <p>Step 6. Test thermostat for proper operation.</p> <p style="text-align: center;">Replace thermostat if defective (para. 3-60).</p> <p>Step 7. Inspect fan drive clutch for proper operation (TM 9-2320-272-10).</p> <ul style="list-style-type: none"> a. Make sure override lockup bolts are removed from clutch housing and stored in clutch housing bracket. b. Replace fan drive clutch actuator if defective (para. 3-58). c. Replace fan drive clutch if defective (para. 3-59). 		

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Step 8. Check cooling system for clogging.
Clean and flush system (para. 3-46).

NOTE

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

- Step 9. Test temperature gage for proper operation.
See electrical troubleshooting, table 2-3, malfunction 27.

END OF TESTING!

11. BLACK EXHAUST SMOKE AT IDLE

- Step 1. Check fuel for water or dirt contamination.
See malfunction 4, step 1.
- Step 2. Check air cleaner indicator for restriction indication,
If red appears at indicator window, inspect air intake stack for restriction and, if necessary, service air cleaner element (para. 3-13).

END OF TESTING!

12. ENGINE STOPS ABRUPTLY, NOT SEIZED

- Step 1. Check fuel level.
If empty, fill tank(s) with recommended fuel (TM 9-2320-272-10).
- Step 2. Make sure emergency fuel shutoff valve is in disengaged position.
Disengage shutoff valve if in shutoff position (TM 9-2320-272-10).
- Step 3. Check fuel for water or dirt contamination.
- Open draincock at fuel filter and drain into glass container.
 - If container is one-fourth full of water, fuel is contaminated. Replace with uncontaminated fuel. (See table 2-2, malfunction 4, step 1).
- Step 4. Inspect fuel lines and connections for leaks, breaks, and obstructions.
- Visually check for leaks. If leak is at connection, tighten. If leak results from cracked, split or damaged tubing, replace tubing.
 - Disconnect fuel lines at both ends. If fuel line is clogged, clear with compressed air or sturdy wire.
 - Reconnect fuel line(s).
 - Prime fuel system (TM 9-2320-272-10).
- Step 5. Check fuel tank air vent lines for obstructions,
- Remove air vent lines at both ends and clean with compressed air.
 - Clean venting line connecting elbow at tank(s) with sturdy wire.

END OF TESTING!

13. ENGINE DIES UPON DECELERATION

- Step 1. Check throttle linkage adjustment.
Adjust throttle linkage (para. 3-37).

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 2. Check to see if idle speed is set too low.

Set idle speed 600-650 rpm.

END OF TESTING!

14. EXCESSIVE FUEL CONSUMPTION

Step 1. Check air cleaner for restriction indication.

If red appears at indicator window, inspect air intake stack for restrictions and, if necessary, service air cleaner (para. 3-13).

Step 2. Inspect fuel lines, hoses, and connections for leaks and damage.

a. Tighten any loose connections.

b. Replace leaking or damaged fuel lines, hoses, and connections.

Step 3. Check fuel return lines for bends and kinks.

Straighten or replace fuel return lines.

END OF TESTING!

ETHER START SYSTEM

WARNING

Ether is extremely flammable. Do not perform ether start system testing procedures near fire. Injury to personnel may result.

15. ENGINE CRANKS BUT WILL NOT START IN COLD WEATHER (FUEL SYSTEM OPERATING PROPERLY)

Step 1. Check ether cylinder.

a. Remove ether cylinder from valve, shake cylinder and listen for liquid splashing inside cylinder (para. 4-15).

b. If cylinder is empty, replace with full cylinder (para. 4-15).

Step 2. Check ether valve for proper operation.

a. Disconnect tubing at ether valve (para. 4-19).

b. Press ether start switch. A small amount of ether should be released by ether valve.

c. If ether is not evident, check electrical system (table 2-3, malfunction 24).

d. If electrical system works properly, replace ether valve (para. 4-15).

Step 3. Check thermal close valve and thermal close valve tubing for restrictions.

a. Disconnect ether valve to thermal close valve tubing at ether valve. Disconnect thermal close valve to atomizer tubing at thermal close valve (para. 4-19).

b. With thermal close valve cold, blow compressed air into tubing at ether valve end to determine if system is clear.

c. If restricted, disconnect tubing from thermal close valve and check for restrictions in tubing (para. 4-19).

d. If tubing is clear, replace thermal close valve (para. 4-17)..

e. If tubing is restricted, replace tubing (para. 4-19).

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 4. Check atomizer and atomizer tubing for restrictions.

- a. Disconnect tubing between thermal close valve and atomizer at thermal close valve (para. 4-19).
- b. Blow compressed air into tubing at thermal close valve end to determine if system is clear.
- c. If restricted, disconnect tubing from atomizer and check for restrictions in tubing.
- d. If tubing is clear, replace atomizer (para. 4-18).
- e. If tubing is restricted, replace tubing (para. 4-19).

END OF TESTING!

EXHAUST SYSTEM

16. EXCESSIVE EXHAUST NOISE

Step 1. Inspect muffler for wear and damage.

Replace muffler if necessary (para. 3-43).

Step 2. Inspect exhaust pipes and gaskets for wear and damage.

Replace pipes or gaskets as needed (chapter 3, section V).

END OF TESTING!

17. EXHAUST FUMES IN CAB

Step 1. Inspect exhaust manifold, pipes, and connections for leaks, cracks, or damage.

a. If leaking at pipe connection, replace gaskets.

b. If manifold or pipes are cracked or damaged, replace as necessary (chapter 3, section V).

END OF TESTING!

COOLING SYSTEM

WARNING

Care should be taken when removing surge tank filler cap. Steam or hot coolant under pressure may cause injury to personnel.

18. ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE (ACCORDING TO COOLANT TEMPERATURE GAGE)

NOTE

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

Step 1. Test thermostat for proper operation.

Replace thermostat if defective (para. 3-60).

Step 2. Test coolant temperature gage, sending unit, and electrical circuits for malfunction.

a. See troubleshooting table 2-3.

b. Replace coolant temperature gage if defective (para. 4-53).

c. Replace water temperature sending unit if defective (para. 4-60).

END OF TESTING!

Table 2-2 Mechanical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
<p>19. NO CAB HEAT (COOLANT TEMPERATURE GAGE READS NORMAL)</p> <p>Step 1. Check position of engine coolant shutoff valves. Open engine coolant shutoff valves (TM 9-2320-272-10).</p> <p>Step 2. Check for air in personnel heater system. Bleed air from personnel heater (TM 9-2320-272- 10).</p> <p style="text-align: center;"><u>CAUTION</u></p> <p style="text-align: center;">Do not add coolant when engine is hot. Internal engine.damage could result.</p> <p>Step 3. Check coolant level Fill to proper level at surge tank (para. 3-46). END OF TESTING!</p> <p style="text-align: center;">TRANSMISSION</p> <p>20. EXCESSIVE NOISE DURING SHIFTING</p> <p>Step 1. Check transmission fluid level and viscosity. Add or replace fluid as necessary (LO 9-2320-272-12).</p> <p>Step 2. Inspect propeller shaft universal joints for looseness, wear, and damage.</p> <ol style="list-style-type: none"> Tighten universal joint yoke if loose. Tighten 90-110 lb-ft (122-149 N•m). Replace worn or damaged universal joints (para. 6-4). <p>Step 3. Check propeller shaft flanges for loose mounting bolts. Tighten 30-40 lb-ft (41-54 N•m). END OF TESTING!</p> <p>21. LOW TRANSMISSION OIL PRESSURE</p> <p>Step 1. Check transmission oil level (TM 9-2320-272-10). Add oil as necessary (LO 9-2320-272-12).</p> <p>Step 2. Replace transmission oil filter (para. 5-3). END OF TESTING!</p> <p>22. TRANSMISSION OIL LEAKAGE</p> <p>Step 1. Inspect drainplug for leaks.</p> <ol style="list-style-type: none"> Tighten plug 15-20 lb-ft (20-27 N•m) If leak continues, notify DS maintenance. <p>Step 2. Inspect transmission at oil pan gasket for leaks.</p> <ol style="list-style-type: none"> Tighten mounting screws 5 lb-ft (7 N•m) (para. 5-3.). Replace leaking oil pan gasket (para. 5-3). <p>Step 3. Inspect transmission housing for leaks. Notify your supervisor. END OF TESTING!</p>

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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23. NO RESPONSE TO SHIFT LEVER MOVEMENT

Check transmission oil level.

Add oil as necessary (LO 9-2320-272-12).

END OF TESTING!

24. ROUGH SHIFTING

Check transmission oil level.

Add oil as necessary (LO 9-2320-272-12).

END OF TESTING!

25. TRANSMISSION OVERHEATS (ACCORDING TO TRANSMISSION TEMPERATURE GAGE)

Step 1. Check transmission oil level.

Add oil as necessary (LO 9-2320-272-12).

Step 2. Test transmission temperature gage for proper operation using a gage known to be good.

Replace oil temperature gage if test gage does not indicate overheating (para. 4-53).

END OF TESTING!

26. DIRT OR METAL PARTICLES IN OIL

Submit special sample in accordance with TB 43-0210.

END OF TESTING!

27. OIL THROWN FROM FILLER TUBE

Step 1. Check transmission fluid level for overfilling.

Drain oil to proper level (para. 5-3).

END OF TESTING!

TRANSFER CASE

28. HARD SHIFTING OF TRANSFER CASE

Step 1. Check transfer case fluid level.

Fill or drain to proper level as necessary (LO 9-2320-272-12).

Step 2. Inspect transfer case shift linkage for proper lubrication.

Lubricate linkage as necessary (LO 9-2320-272-12),

Step 3. Inspect shift linkage for bends, breaks, and missing parts.

Replace any parts missing, broken, or bent.

step 4. Check wire 586 for good ground.

Repair or replace wire 586 (para. 4-49).

END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

29. TRANSFER CASE OIL LEAKAGE

Step 1. Inspect drainplugs for leaks and looseness.

Tighten drainplug 35 lb-ft (48 N•m).

Step 2. Inspect transfer case housing for leaks.

Notify DS maintenance.

END OF TESTING!

30. EXCESSIVE NOISE

Step 1. Check transfer case fluid level.

a. Fill to proper fluid level (LO 9-2320-272-12).

b. Tighten filler plug 35 lb-ft (48 N•m).

c. Notify DS maintenance.

END OF TESTING!

31. EXCESSIVE VIBRATION

Step 1. Check transfer case fluid level.

a. Fill to proper fluid level (LO 9-2320-272-12).

b. Tighten filler plug 35 lb-ft (48 N•m).

Step 2. Check yoke and companion flange screws for proper torque.

Tighten screws 32-40 lb-ft (43-54 N•m).

END OF TESTING!

PROPELLER AND DRIVE SHAFTS**32. EXCESSIVE NOISE OR VIBRATION**

Step 1. Check universal joints for lubrication.

Lubricate universal joints as necessary (LO 9-2320-272-12).

Step 2. Check torque of all propeller shaft flange yoke screws.

Tighten screws 32-40 lb-ft (43-54 N•m).

Step 3. Inspect propeller shafts for wear and damage.

Replace any worn or damaged propeller shafts (chapter 6, section 1).

Step 4. Inspect center bearing (M927 and M928 only) for looseness and damage.

a. Tighten center bearing-to-forward rear axle propeller shaft yoke to transfer-to-center-bearing rear flange screws 32-40 lb-ft (43-54 N•m).

b. Replace damaged center bearing assembly (para. 6-8).

END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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FRONT AND REAR AXLES

33. CONTINUOUS AXLE OR WHEEL NOISE

- Step 1. Check to see if front wheel drive is engaged.
 Disengage front wheel drive when traveling on hard flat surfaces.
- Step 2. Check for loose or missing wheel lug nuts.
 a. Tighten lug nuts 450-500 lb-ft (610-678 N•m).
 b. Replace missing lug nuts (para. 8-3).
- Step 3. Check lubrication level in axle housing and differential.
 Lubricate differential and axle housing to proper level (LO 9-2320-272-12).
- Step 4. Check for loose or damaged wheel bearings. Raise wheels off ground. Use prybar to lift up on bottom of tire. Excessive play indicates improperly adjusted or damaged bearings.
 a. Adjust loose bearings (para. 8-7).
 b. Replace damaged bearings (para. 8-5 and 8-6).

END OF TESTING!

WHEELS AND TIRES

34. UNEVEN TIRE WEAR

- Step 1. Check for loose or missing wheel lug nuts.
 a. Tighten lug nuts 450-500 lb-ft (610-678 N•m).
 b. Replace missing lug nuts (para. 8-3).
- Step 2. Check for improper toe-in adjustment if problem is on front tires.
 Adjust toe-in (para. 6-11).
- Step 3. Check wheel bearings for proper adjustment and damage. Raise wheels off ground. Use prybar to lift up on bottom of tire. Excessive play indicates improperly adjusted or damaged bearings.
 a. Adjust wheel bearings (para. 8-7).
 b. Replace damaged bearings (para. 8-5 and 8-6).

END OF TESTING!

35. WHEEL SHIMMY OR WOBBLE

- Step 1. Inspect wheels for bends and damage.
 Replace bent or damaged wheels (para. 8-3).

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 2. Inspect wheel bearings for proper adjustment and damage. Raise wheels off ground. Use prybar to lift upon bottom of tire. Excessive play indicates improperly adjusted or damaged bearings.

- a. Adjust wheel bearings (para. 8-7).
- b. Replace damaged bearings (para. 8-5 and 8-6).

END OF TESTING!

STEERING

36. HARD STEERING

Step 1. Inspect all hydraulic lines and hoses for leaks.

Tighten loose fittings and replace leaking lines (chapter 8, section II).

Step 2. Inspect steering linkage for binding, damage, and improper lubrication.

- a. Repair or replace binding or damaged linkage (chapter 8, section II).
- b. Lubricate linkage (LO 9-2320-272-12).

Step 3. Inspect steering knuckles for binding. Raise front wheels off ground. Disconnect drag link at pitman steering arm (para. 8-11). Turn wheels from side to side to determine binding.

Notify DS maintenance if wheels do not turn from side to side without binding.

Step 4. Check spring U-bolts for tightness.

Tighten U-bolts 350-400 lb-ft (475-542 N•m).

Step 5. Check front wheel alinement.

- a. Check front tires for underinflation and uneven tire pressure. Inflate tires to proper pressure (TM 9-2320-272-10).
- b. Adjust alinement to specifications (para. 6-11).

END OF TESTING!

37. VEHICLE WANDERS OR PULLS TO ONE SIDE

Step 1. Check front tires for underinflation and uneven tire pressure.

Inflate tires to proper pressure (TM 9-2320-272-10).

Step 2. Check front tires for uneven wear (indicates alinement problem).

Adjust front wheel alinement (para. 6-11).

Step 3. Check for dragging brakes. Raise wheels off ground. Spin wheels by hand. Wheels should turn with slight drag when properly adjusted.

See compressed air and brake system troubleshooting, table 2-12, malfunction 4.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
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- Step 4. Check wheel bearings for proper adjustment and damage. Raise wheels off ground. Use prybar to lift upon bottom of tire. Excessive play indicates improperly adjusted or damaged bearings.
- a Adjust wheel bearings (para. 8-7).
 - b. Replace damaged bearings (para. 8-5 and 8-6).
- Step 5. Inspect steering assist cylinder for damage and improper adjustment.
Replace or adjust steering assist cylinder (para. 8-16).
- Step 6. Inspect tie rod for looseness and damage.
Tighten or replace tie rod assembly (para. 6-12).
- Step 7. Check for loose steering gear mounting bolts.
Tighten mounting bolts 260-280 lb-ft (353-380 N•m).
- Step 8. Check for worn pitman arm.
Replace worn pitman arm (para. 8-11).
- Step 9. Check front spring shackle pins for damage and breaks.
Replace worn or broken shackle pins (para. 6-22).
- Step 10. Check toe-in for improper adjustment.
Adjust toe-in (para. 6-11).

END OF TESTING!

38. EXCESSIVE PLAY IN STEERING WHEEL

- Step 1. Check steering wheel free play. With engine running, place stiff wire against dash and long enough to touch steering wheel rim. Turn steering wheel left then right until there is resistance. Mark the points on the steering wheel where the travel ends. Then measure the distance between these points. If there is more than 2-1/2 in. (6.3 cm) of play, proceed to step 2.
- Step 2. Check drag link for looseness and damage.
Tighten or replace drag link (para. 8- 12).
- Step 3. Inspect tie rod for damage and loose ends. No free play is allowable.
Tighten or replace tie rod (para 6- 12).
- Step 4. Inspect pitman arm for damage.
Replace pitman arm (para. 8-11).
- Step 5. Inspect steering assist cylinder for improper adjustment and damage.
Replace or adjust steering assist cylinder (para. 8-16).
- Step 6. If 2-1/2 in. (6.3 cm) of play still exists, the steering gear needs adjustment.
Notify DS maintenance.

END OF TESTING!

39. SHIMMY

- Step 1. Check for loose or missing wheel lug nuts.
- a. Tighten lug nuts 450-500 lb-ft (610-678 N•m).
 - b. Replace any missing lug nuts.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Step 2. Inspect wheels for bends and damage.</p> <p>Replace bent or damaged wheels (para. 8-3).</p> <p>Step 3. Check for improper wheel bearing adjustment. Raise off ground. Use prybar to lift upon bottom of tire. Excessive play indicates improper adjustment or damaged bearings.</p> <p>a. Adjust wheel bearings (para. 8-7).</p> <p>b. Replace defective bearings (para. 8-5 and 8-6).</p> <p>Step 4. Check front wheel alinement.</p> <p>Adjust front wheel alinement to specifications (para. 6-11).</p> <p>Step 5. Check for loose front axle steering knuckle(s). Raise wheels off ground. Turn wheels from side to side to observe loose steering knuckle.</p> <p>Notify DS maintenance.</p>		

END OF TESTING!

FRAME AND BRACKETS

40. TOWING PINTLE DOES NOT LATCH OR LOCK

- Step 1. Inspect pintle hook for lubrication.
- Lubricate pintle hook (LO 9-2320-272-12).
- Step 2. Check pintle hook lock for proper operation.
- Replace defective pintle hook (para. 9-4).

END OF TESTING!

41. PINTLE HOOK DOES NOT TURN

- Step 1. Check for lubrication.
- Lubricate (LO 9-2320-272- 12).
- Step 2. Check clearance between thrust washer and mounting bracket housing using feeler gage. Clearance should be .010 in. \pm .007 in. (.25 mm \pm .18 mm).
- a. If clearance is the same completely around but not .010 in. \pm .007 in. (.25 mm \pm .18 mm), adjust (para. 9-4).
- b. If clearance is not the same completely around, go to step 3.
- Step 3. Inspect pintle hook shaft for bends.
- Replace bent pintle hook (para 9-4).

END OF TESTING!

42. EXCESSIVELY LOOSE LIFTING SHACKLE

- Step 1. Inspect shackle pin for wear and bend.
- Replace worn or bent shackle pin (para 9-3).
- Step 2. Inspect shackle for bends and wear.
- Replace bent or worn shackle (para 9-3).
- Step 3. Inspect for proper size shackle pin.
- Replace shackle pin (para. 9-3).

END OF TESTING!

Table 2-2 Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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43. LOOSE SPARE TIRE CARRIER

- Step 1. Check for missing and worn mounting bolts.
Replace missing or worn mounting bolts.
 - Step 2. Inspect carrier frame for damage.
Replace any unserviceable carrier component.
- END OF TESTING!

SPRINGS AND SHOCK ABSORBERS

44. CONTINUOUS WANDERING OR SWAYING (POOR CONTROL)

- Step 1. Inspect front leaf spring for breaks.
Replace broken main leaves (para. 6-21).
 - Step 2. Inspect shock absorbers for leaks and damage.
Replace leaking or damaged shock absorbers (para 6-25).
 - Step 3. Inspect spring U-bolts for looseness and damage.
 - a. Tighten loose spring U-bolts 350-400 lb-ft (475-542 N•m).
 - b. Replace damaged U-bolts (para. 6-20).
 - Step 4. Check steering system (see malfunction 37).
- END OF TESTING!

45. HARSH OR HARD RIDE

- Step 1. Check lubrication of springs pivots, and shackle pins.
Lubricate springs, pivots, and shackle pins (LO 9-2320-272-12).
 - Step 2. Check spring shackles for frozen condition.
Free shackles and lubricate (LO 9-2320-272-12).
 - Step 3. Test shock absorbers for resistance. Disconnect top end of shock absorber. Pull up and down to test resistance. If there is little or no resistance or spaced resistance, shock is defective.
Replace defective shock absorber (para. 6-25).
- END OF TESTING!

46. SPRING LEAF DEFECT

- Step 1. Inspect for loose and damaged front spring shackles.
Replace damaged shackles (para. 6-22).
 - Step 2. Inspect for loose and damaged U-bolts and nuts.
 - a. Tighten loose U-bolts 350-400 lb-ft (475-542 N•m).
 - b. Replace broken U-bolts (chapter 6, section III).
 - Step 3. Inspect spring leaves for breaks.
Replace broken main leaves (chapter 6, section III).
- END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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WINCH**47. WINCH DOES NOT OPERATE**

- Step 1. Check reservoir for proper oil level.
Fill to proper oil level (LO 9-2320-272-12).
- Step 2. Check if power takeoff is engaged.
 - a. Engage power takeoff (TM 9-2320-272-10).
 - b. If power takeoff does not engage, notify DS maintenance.
- Step 3. Check power takeoff linkage for breaks and adjustment.
If linkage is broken or needs adjustment, notify DS maintenance.
- Step 4. Check if drum clutch is engaged (front winch).
 - a. Engage drum clutch (TM 9-2320-272-10).
 - b. If drum clutch does not engage, replace front winch (para. 10-9).
- Step 5. Check if drum lock is pulled out, (front winch);
 - a. Pull out drum lock (TM 9-2320-272-10).
 - b. If drum lock will not pull out, replace front winch (para. 10-9).
- Step 6. Check winch control cable for damage (front winch).
Notify DS maintenance if front winch control cable is damaged.
- Step 7. Check all oil lines for damage and leaks.
 - a. Tighten loose fittings.
 - b. Replace leaking or damaged hoses.
- Step 8. Check return line oil filter for leaks (front winch).
 - a. Tighten filter housing nut 30-35 lb-ft (41-48 N•m) (para. 10-16).
 - b. If leak is not corrected, notify DS maintenance.
- Step 9. Check hydraulic oil tank filter.
 - a. Tighten loose fittings.
 - b. If BYPASS is indicated, replace filter (para 10- 16).
- Step 10. Check pump for leaks and overheating.
Tighten loose fittings.
- Step 11. Check motor for leaks.
 - a. Tighten loose fitting.
 - b. Replace winch motor (para. 10-8).

END OF TESTING!

48. WINCH OPERATES IN ONE DIRECTION ONLY

- Step 1. Check winch control cable for damage (front winch).
Notify your supervisor if front winch control cable is damaged.
- Step 2. Check valve shaft movement in and out (front winch).
Notify your supervisor if shaft will not move.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 3. Inspect control valve for damage and leaks (front winch).

- a. Tighten loose fittings.
- b. Notify DS maintenance.

Step 4. Check if air operated tensioner is released (rear winch).

Release tensioner.

Step 5. Check if torque control lever is engaged (rear winch).

Engage torque control lever.

END OF TESTING!

49. WINCH OPERATES AT ONE SPEED ONLY

Step 1. Check control valve for damage and leaks (front winch).

- a. Tighten loose fittings.
- b. Notify DS maintenance.

Step 2. Check winch control cable for damage (front winch).

Notify DS maintenance if front winch control cable is damaged.

Step 3. Check throttle control cable for damage (front winch).

If damaged, notify DS maintenance.

END OF TESTING!

50. DRAG BRAKE DOES NOT OPERATE

Step 1. Check drag brake adjustment.

- a. Adjust drag brake (para. 10-4, 10-6 (front winch) or 10-10 (rear winch)).
- b. Replace winch (para. 10-9 or 10-12).

END OF TESTING!

51. WINCH WILL NOT HOLD LOAD

Step 1. Check torque control lever position (rear winch).

Reposition torque control lever to HIGH OR LOW position.

Step 2. Check automatic brake adjustment (front and rear winch).

Adjust automatic brake setscrew (para. 10-3 and 10-10).

END OF TESTING!

52. AUTOMATIC BRAKE OVERHEATS

Step 1. Check weight limits of winch.

Adjust size of load.

Step 2. Check automatic brake adjustment (front and rear winch).

Adjust setscrew counterclockwise one quarter turn. Recheck brake for overheating (para. 10-3).

END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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53. CABLE TENSIONER WILL NOT OPERATE (REAR WINCH)

Step 1. Check air supply lines for leaks.

- a. Tighten loose fittings.
- b. If leaks persist, notify DS maintenance.

END OF TESTING!

54. VEHICLE ROLLS WHILE OPERATING REAR WINCH

Step 1. Check parking brake for proper adjustment.

Adjust parking brake (TM 9-2320-272- 10).

Step 2. Check spring brake caging.

Release spring brake cage (TM 9-2320-272-10).

Step 3. Check field chock positioning.

Position chocks facing load for direct pulls (TM 9-2320-272- 10).

END OF TESTING!

POWER TAKEOFF**55. EXCESSIVE NOISE AT POWER TAKEOFF**

Step 1. Inspect FTO universal joint for insufficient lubrication.

Lubricate according to LO 9-2320-272-12.

Step 2. Inspect propeller shaft for bends.

Replace bent propeller shaft (para. 10-15 or 10-30).

END OF TESTING!

56. HARD SHIFTING OF POWER TAKEOFF

Step 1. Inspect PTO shift linkage for bends, cracks, and improper lubrication.

a. Lubricate according to LO 9-2320-272-12.

b. Notify DS maintenance to replace bent or broken linkage.

END OF TESTING!

57. LEAKING LUBRICANT AT POWER TAKEOFF

Step 1. Inspect mounting screws for security.

a. Tighten loose mounting screws.

b. If leak continues, notify DS maintenance.

END OF TESTING!

Table 2-2 Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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INSTRUMENTS AND GAGES

58. SPEEDOMETER OR TACHOMETER NOISY OR ERRATIC

Step 1. Inspect tachometer or speedometer flexible shaft for binding and kinks.

Replace tachometer or speedometer flexible shaft (para. 4-56 or 4-73).

Step 2. Inspect speedometer or tachometer for proper operation.

a. Test proper operation of speedometer or tachometer by replacing them with speedometer or tachometer known to be good (para. 4-55).

b. If test speedometer or tachometer functions properly replace defective speedometer or tachometer (para. 4-55),

END OF TESTING!

59. AIR PRESSURE GAGE INOPERATIVE

Step 1. Inspect air pressure gage for proper operation.

a. Replace gage with air pressure gage known to be good (para. 4-54).

b. If test gage works properly, replace defective gage (para. 4-54).

END OF TESTING!

60. OIL PRESSURE GAGE INOPERATIVE (OIL LEVEL IS PROPER)

Step 1. Check oil pressure sending unit for proper operation.

a. Replace oil pressure sending unit with test sending unit.

b. If gage does not work properly with test sending unit installed, replace pressure gage (para. 4-53).

END OF TESTING!

RADIO INTERFERENCE SUPPRESSION

61. INTERFERENCE WHILE VEHICLE IS IN MOTION

Step 1. Inspect wiring for loose connections and frayed or broken wiring.

Tighten all loose connections and repair or replace frayed or broken wiring (para. 4-49).

END OF TESTING!

62. INTERFERENCE ONLY WHEN ENGINE IS RUNNING

Step 1. Inspect alternator for defects.

Replace defective alternator (para. 4-9).

END OF TESTING!

FIFTH WHEEL

63. TRAILER WILL NOT HITCH TO FIFTH WHEEL

Step 1. Inspect coupling jaws for bends and breaks.

Replace fifth wheel (para. 10-40).

END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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MEDIUM WRECKER (M936)**64. HYDRAULIC SYSTEM DOES NOT OPERATE**

- Step 1. Check oil reservoir dipstick for proper level.
 Fill to proper level (LO 9-2320-272-12).
- Step 2. Check if power takeoff is engaged.
 a. Engage power takeoff control (TM 9-2320-272-10).
 b. If power takeoff does not engage, notify DS maintenance to repair power takeoff.
- Step 3. Check all hydraulic lines for leaks and breaks.
 a. Tighten loose fittings.
 b. Replace cracked, frayed, or leaking hoses (para. 10-25).
- Step 4. Check reservoir drainplug and valve for leaks.
 a. Close valve.
 b. Tighten plug.

END OF TESTING!

65. HYDRAULIC PUMP NOISY

- Step 1. Check oil level in reservoir.
 Fill to proper level (LO 9-2320-272-12).

END OF TESTING!

DUMP BODY (M929, M930)**WARNING**

When dump body is in raised position, oil in filter system is under pressure. Any movements of the control valve or leakage at the hydraulic cylinder line or hose connection will cause dump body to drop to subframe. Never work under dump body unless safety braces are properly positioned.

66. DUMP BODY WILL NOT RAISE

- Step 1. Check if power takeoff is engaged.
 a. Engage power takeoff control (TM 9-2320-272-10).
 b. If power takeoff will not engage, notify DS maintenance.
- Step 2. Check all hydraulic lines for leaks and breaks.
 a. Tighten loose fittings.
 b. If hoses are cracked, frayed, or leaking, notify DS maintenance.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3. Visually inspect control valve for leaks and damage.	a. Tighten loose fittings. b. If damaged, notify DS maintenance.
	Step 4. Check control valve shaft movement in and out.	Notify DS maintenance if shaft will not move.
	Step 5. Inspect pump housing for leaks and overheating with power takeoff engaged.	a. Tighten loose fittings. b. Notify DS maintenance.
	END OF TESTING!	
67. DUMP BODY DOES NOT LOWER		
	Step 1. Check for braces in raised position under dump body.	Lower and stow braces (TM 9-2320-272- 10).
	Step 2. Check control valve shaft movement in and out.	Notify DS maintenance if shaft will not move.
	END OF TESTING!	
68. DUMP BODY DOES NOT HOLD IN RAISED POSITION		
	Step 1. Check all hydraulic lines for leaks and breaks.	a. Tighten loose fittings. b. If hoses are cracked, frayed, or leaking, notify DS maintenance.
	Step 2. Check control valve for leaks.	a. Tighten loose fittings. b. Notify DS maintenance to replace damaged or leaking valve.
	END OF TESTING!	
69. HYDRAULIC PUMP NOISY		
	Check oil level in reservoir.	Fill to proper level (LO 9-2320-272-12).
	END OF TESTING!	
70. TAILGATE DOES NOT OPEN		
	Check for bent or broken linkage.	Replace bent or broken linkage (para 10-50).
	END OF TESTING!	

EXPANSIBLE VAN (M934, M 9 3 5)**71. SIDE PANELS HARD TO RETRACTOR EXPAND**

- Step 1. Check for dirt or other foreign material in sprocket assembly.
- Clean and lubricate sprocket assembly (LO 9-2320-272-12).
 - If sprocket will not turn or engage properly, notify DS maintenance.

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

Step 2. Check for dirt in rollers or damaged rollers.

a. Clean dirt from rollers.

b. Notify DS maintenance to replace damaged rollers.

END OF TESTING!

72. SIDE PANEL CANNOT BE LOCKED IN RETRACTED POSITION

Step 1. Visually inspect front edge of side panel to see if it is fully retracted.

Place heavy block of wood (2" x 4" or 4" x 4") against rub rail at front of panel. Strike block with heavy hammer.

Step 2. Visually check to see if top of side panel is too far out to engage edge of roof.

Place heavy block of wood against flat surface of seal retainer opposite locking bar at top of side panel. Strike block with heavy hammer.

END OF TESTING!

73. VAN BODY NOT WATERPROOF OR LIGHTTIGHT

Step 1. Visually inspect lower part of side panel for tightness against van body.

Place heavy block of wood against rub rail at end of side panel where leak occurs. Strike block with heavy hammer.

Step 2. Check for sagging end panel.

Add rubber seal material to seal on outer edge of hinged roof until seal meets top edge of panel door.

Step 3. Check lip of block seal at inner rear corner of hinged roof to see if it is out of position.

Move side panel out to disengage corner block seal. Push seal lip up into correct position so end panel door properly engages seal when side panel is retracted.

Step 4. Check for loose or worn seal at top of rear doors.

Recover worn or loose area with sealing material.

END OF TESTING!

74. DOOR LOCK WILL NOT OPERATE

Step 1. Check for jammed lock bolt.

Disassemble and repair lock assembly (para. 10-78).

Step 2. Check alinement of lock bolt and striker plate.

Add or remove shims behind lock until bolt properly engages striker plate (para. 10-78).

END OF TESTING!

75. HEATER WILL NOT IGNITE

Step 1. Check electrical system.

See electrical troubleshooting, table 2-3.

END OF TESTING!

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
POWER LIFTGATE (M935)	
76. LIFTGATE WILL NOT OPERATE	
Step 1. Check hydraulic oil reservoir for proper level. Fill to proper level (LO 9-2320-272-12).	
NOTE Be sure platform is at ground level when checking or filling oil reservoir.	
Step 2. Check if power takeoff is engaged. a. Engage power takeoff control (TM 9-2320-272-10). b. If power takeoff does not engage or stay engaged, notify DS maintenance.	
Step 3. Visually inspect control linkage for damage. If damaged, notify DS maintenance.	
Step 4. Check all hydraulic lines for leaks and breaks. a. Tighten loose fittings, b. Notify DS maintenance, if cracked, frayed, or leaking.	
Step 5. Check hydraulic pump for cracks and leaks. a. Tighten loose fittings. b. Notify DS maintenance to replace pump.	
END OF TESTING!	
77. PLATFORM STOPS BEFORE REACHING STOWED POSITION OR STOPS ABOVE BODY FLOOR WHEN RAISED FROM THE GROUND	
Step 1, Check for loose or bent lift frame adjusting bolt. a. Tighten adjusting bolt. b. Notify DS maintenance if adjusting bolt is damaged.	
END OF TESTING!	
78. PLATFORM CLOSES AT ANGLE OTHER THAN STRAIGHT UP	
Step 1. Check closing kickout bolt for breaks and damage. Notify DS maintenance if kickout bolt is broken or damaged.	
END OF TESTING!	
79. PLATFORM OPENS AT ANGLE TO BODY FLOOR	
Step 1. Check opening kickout bolt for breaks and damage. Notify DS maintenance if kickout bolt is broken or damaged.	
END OF TESTING!	

Table 2-2. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

80. LIFTGATE OPERATES SLOW OR JERKY**NOTE**

Be sure platform is at ground level when checking or filling oil reservoir.

- Step 1. Check oil reservoir for proper oil level.
 Fill to proper level (LO 9-2320-272-12).
- Step 2. Visually inspect moving parts for grease lubrication.
 Lubricate at grease points (LO 9-2320-272-12).
 Notify DS maintenance.

END OF TESTING!

Section V. ELECTRICAL SYSTEMS TROUBLESHOOTING

2-13. GENERAL

a. This section provides information to diagnose and correct malfunctions of the electrical system. Because of its complexity, the electrical system is divided into the following functional systems:

- Battery System (page 2-62)
- Starting System (page 2-66)
- Generating System (page 2-78)
- Lighting System (page 2-84)
- Directional Signal System (page 2-94)
- Ether Start System (page 2-100)
- Indicator, Gage, and Warning System (page 2-104)
- Trailer Connection System (page 2-123)
- Heater System (page 2-125)
- 100 Amp Alternator Kit (page 2-128.1)
- Transfer case system (page 2-128.6)

b. Principles of operation showing wiring diagrams for each electrical system can be found in chapter 1. The wiring schematic (appendix G of this manual) shows the interrelationship of these systems. Both should be used as a reference when performing electrical troubleshooting (table 2-3).

c. Each malfunction symptom given for an individual component or system is followed by step(s) that should be taken to determine the cause and then corrective action that must be taken to remedy the problem.

d. Before taking any action to correct a possible malfunction, the following rules should be followed: “

(1) Question the vehicle operator to obtain any information that might help determine the cause of the problem.

(2) Never overlook the chance that the problem could be of simple origin. The problem could be corrected with minor adjustment.

(3) Use all senses to observe and locate troubles.

(4) Use test instruments or gages to help you determine and isolate problems.

(5) Always isolate the system where the malfunction occurs and then locate the defective component.

(6) Use Principles of Automotive Vehicles, TM 9-8000, when troubleshooting the vehicles covered in this manual.

e. Table 2-3 lists electrical malfunctions that may occur in individual units or systems of the vehicle. This table covers electrical troubleshooting only. Troubleshooting procedures for the mechanical systems can be found in table 2-2, section IV.

f. Omissions. This manual cannot list all the electrical malfunctions that may occur. If a malfunction occurs that is not listed in table 2-3, notify your supervisor.

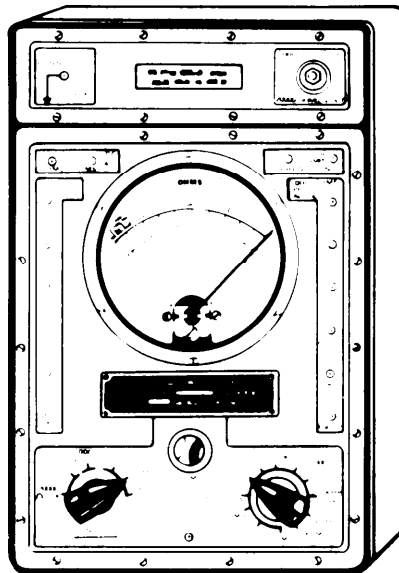
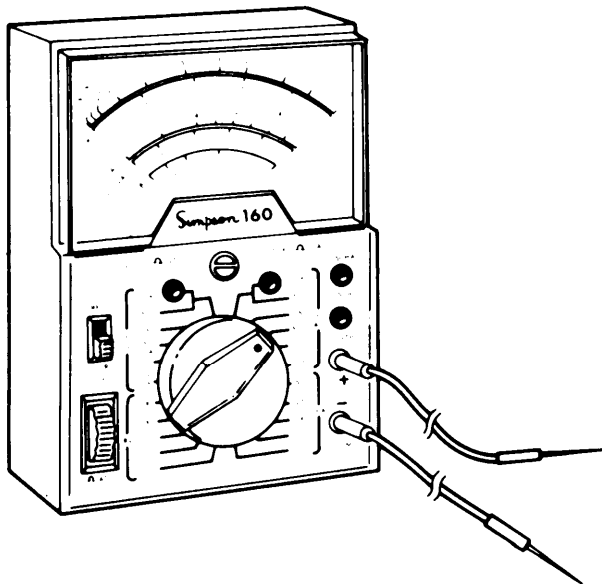
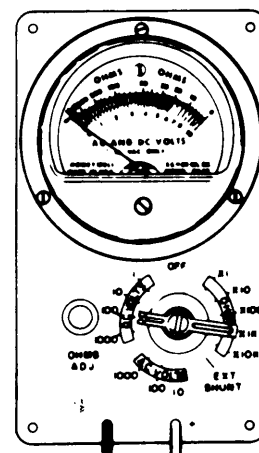
2-14. TEST EQUIPMENT

In troubleshooting the electrical system, the lightweight Simpson 160, TS-352 B/U, or AN/URM- 105 multimeters will be used to make resistance or continuity tests, and voltage or low ampere current tests. Any one of these meters may be found in the common no. 1 or no. 2 organizational maintenance automotive shop sets.

2-14. TEST EQUIPMENT (Cont'd)

NOTE

The Simpson 160 is only available in new shop sets as a substitute for the TS-352 B/U or the AN/URM-105. The electrical testing instructions which follow show use of all of these instruments, as any of the three can be used.

TS-352 B/U**SIMPSON 160****AN/URM-105**

2-15. INSTRUCTIONS FOR USING THE MULTIMETER

a. General. Each of the test instruments discussed here must be set up and "zeroed" before making any tests.

NOTE

If needle will not "zero" on any instrument after following procedures below, replace batteries. If needle still will not "zero" after replacing batteries, turn meter in for repair,

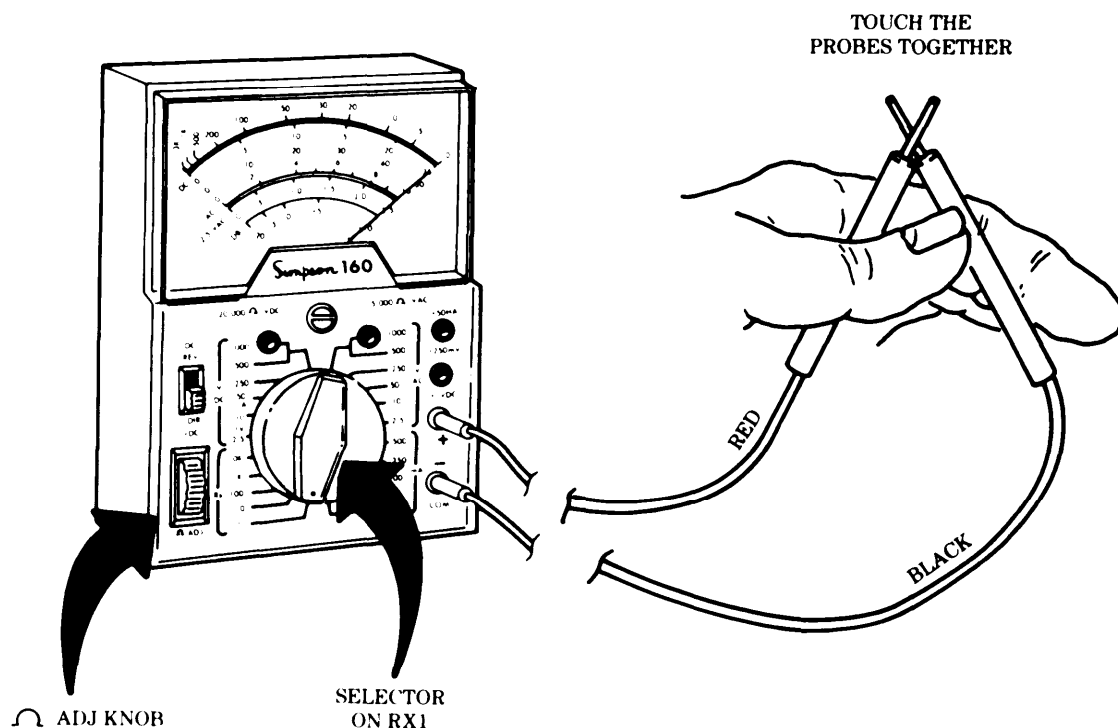
b. Zeroing the Simpson 160. Perform the following steps:

Step 1. Set selector switch on "RX1" position.

Step 2. Put black probe in "COM" jack.

Step 3. Put red probe in "+" jack.

Step 4. Touch red and black probes together and turn "ADJ" knob until needle is over the "0" on the top scale.

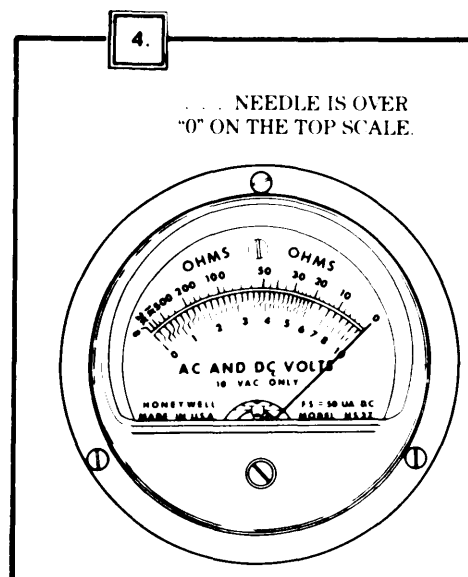
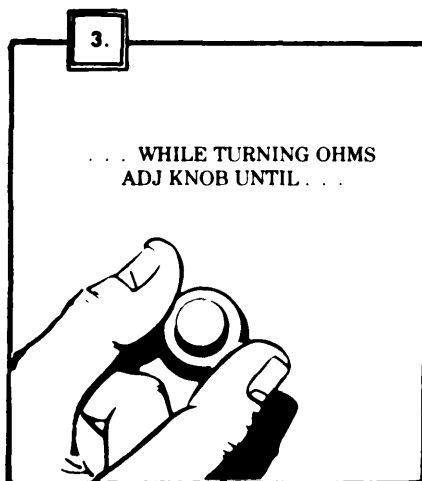
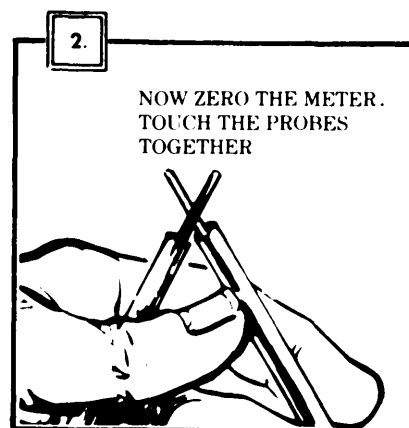
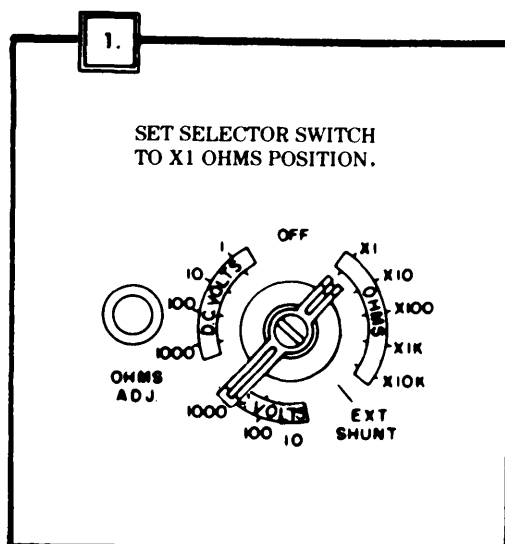


ZEROING SIMPSON 160

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

c. Zeroing the AN/URM-105. Perform the following steps.

- Step 1. Set selector switch on "X1" ohms position, insert black probe in "-" jack and red probe in "+" jack.
- Step 2. Touch red and black probes together.
- Step 3. Turn "ADJ" knob until needle is over the "0" on the top scale.

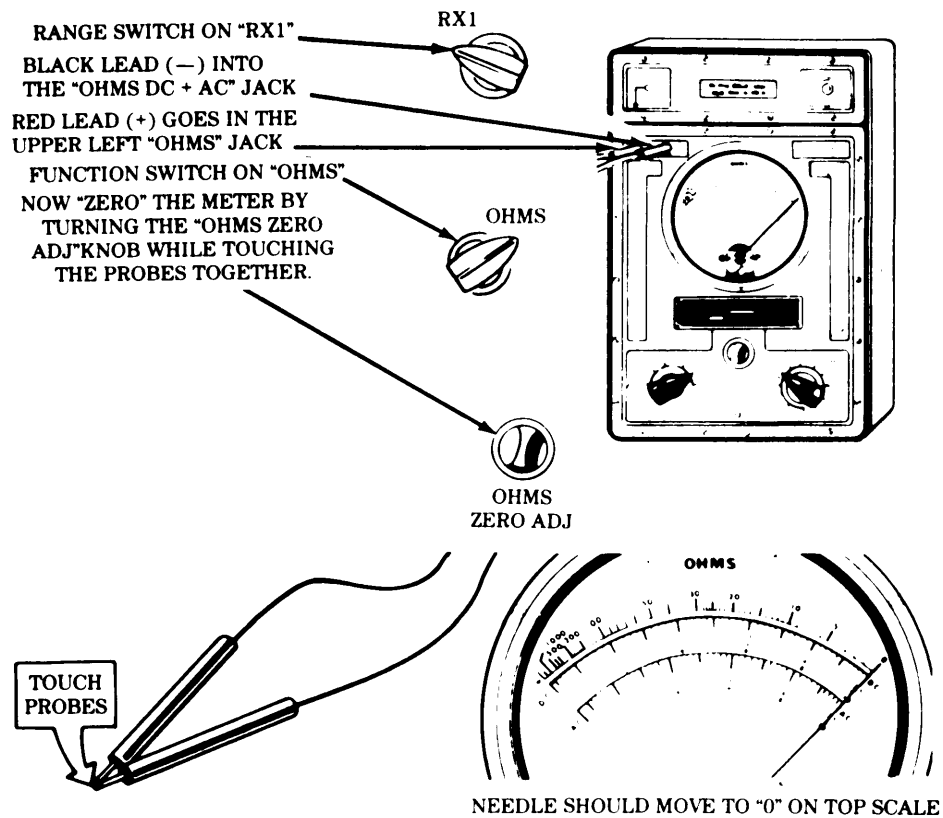


ZEROING AN/URM-105

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

d. Zeroing the TS-352 B/U. Perform the following steps.

- Step 1. Set range switch on "RX1" position.
- Step 2. Put black probe into "OHMS -DC+AC" jack.
- Step 3. Put red probe into "+" jack.
- Step 4. Turn function switch to "OHMS" position.
- Step 5. Touch red and black probes together and turn "OHMS ZERO ADJ" knob until the needle is over the "0" on the top scale,

**ZEROING TS 352 B/U**

e. Using the Ohms Scale. Once zeroed, the multimeter ohms scale can be used to make tests for continuity, shorts, and resistance.

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

NOTE

Tests for continuity, shorts, and resistance are performed identically using any of the multimeters discussed here.

f. Testing for Continuity (all three meters). Continuity tests are made to check for breaks in a circuit (such as switch, light bulb, or electrical cable as shown). To make a continuity check, perform the following steps:

Step 1. Zero the multimeter.

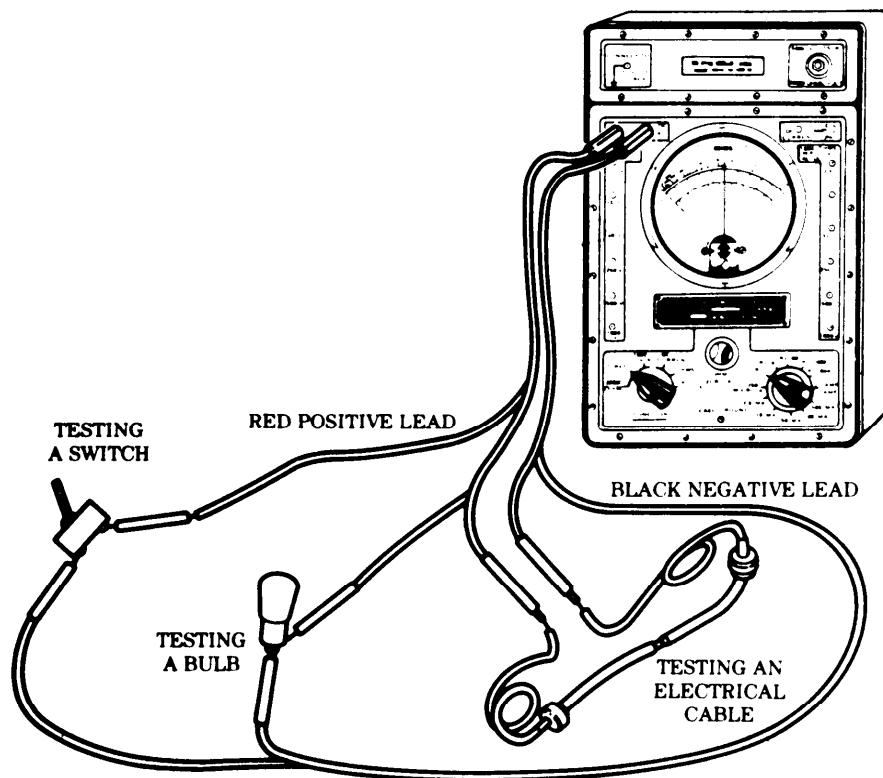
CAUTION

Failure to perform next step can damage multimeter.

Step 2. Disconnect circuit being tested.

Step 3. Connect meter probes to both terminals of circuit being tested. (The TS-352 B/U is illustrated, but all meters are connected the same way.)

Step 4. Look at meter needle. If needle swings over "0" on top of scale, circuit has continuity. If needle does not move, circuit is open (broken). If needle jumps or flickers, there is a loose connection in circuit being tested.



2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

g. Testing for Shorts (all three meters). A short circuit occurs when two circuits that should not be connected have metal-to-metal contact with each other, or when a circuit that should not touch ground, has metal-to-metal contact with ground. To check for shorts, perform the following steps:

Step 1. Zero multimeter.

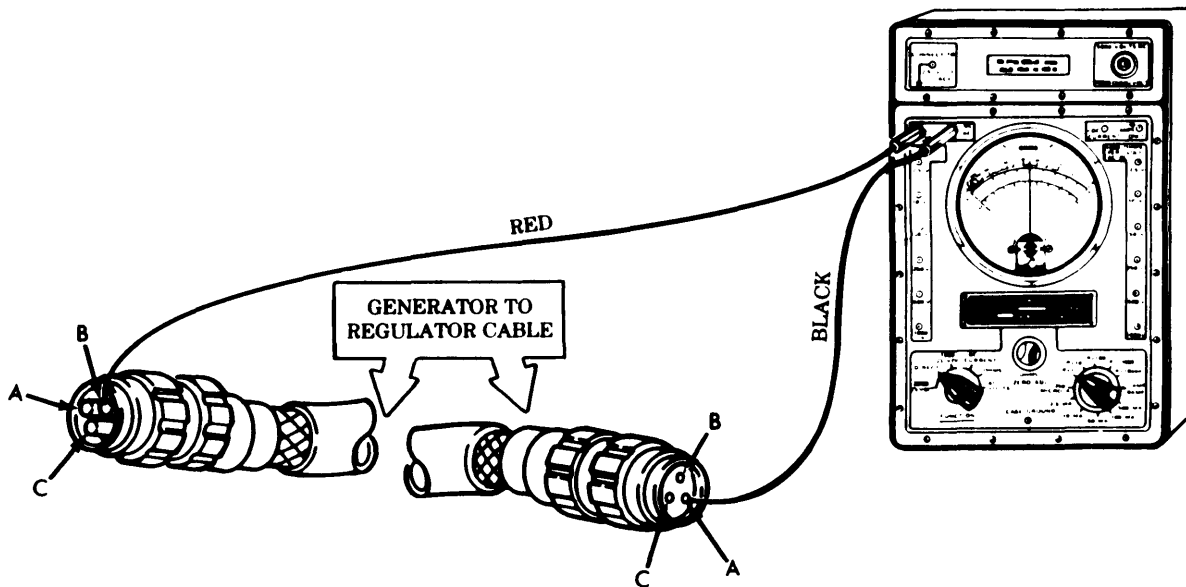
CAUTION

Failure to perform next step can damage multimeter.

Step 2. Disconnect circuit being tested.

Step 3. If checking for a short to ground, connect one probe to one circuit and the other to a ground. If checking for a short between two circuits, connect one probe to each circuit being tested.

Step 4. Look at meter needle. If needle swings over "0" on top scale, circuit is shorted. If needle doesn't move, there is no short. If needle jumps or flickers, there is an intermittent short in circuit being tested.



TESTING FOR SHORTS

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

h. Testing Resistance (all three meters). To measure resistance in a circuit, perform the following steps:

Step 1. Set up and "zero" test meter.

CAUTION

Failure to perform the next step can damage the multimeter.

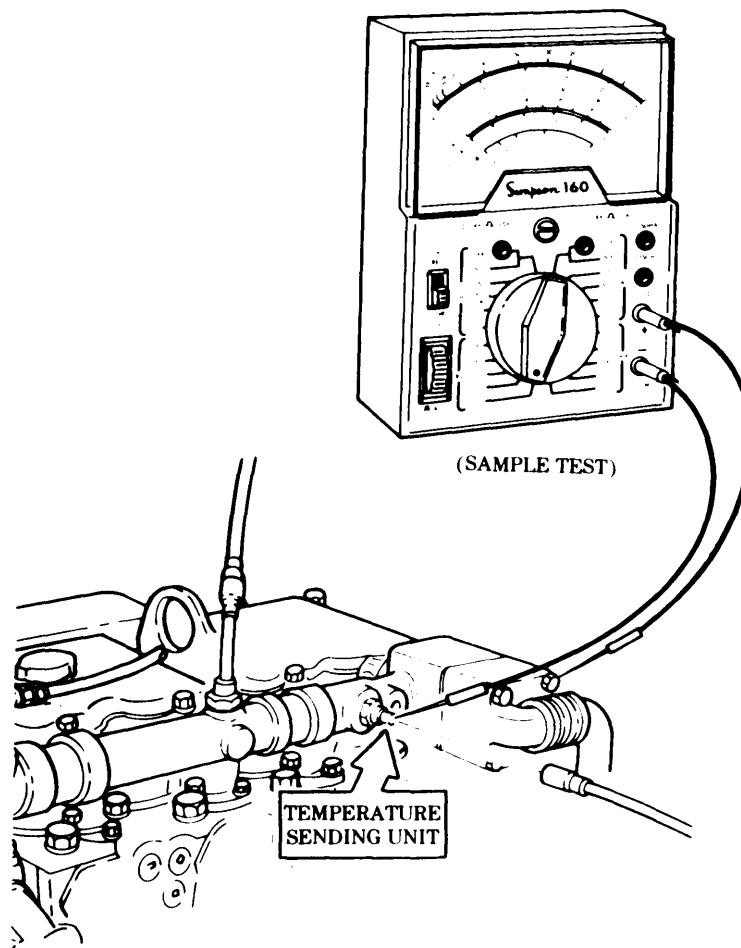
Step 2. Disconnect circuit being tested.

Step 3. If test in this manual calls for an "OHMS RANGE" different than "RX1 or X1", set selector switch to that range (like "RX10 or X10").

NOTE

Zero the meter whenever you change ranges.

Step 4. Connect probes across the circuit or item or element to be measured. (The following illustration shows measuring resistance of a temperature sending unit.)



TESTING RESISTANCE

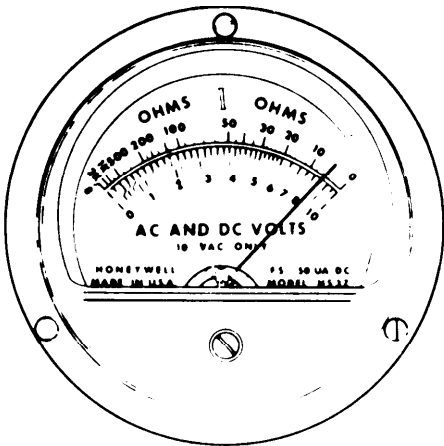
2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

Step 5. Read meter. If meter switch is on "RX1 or X1" range, reading is taken from top scale. If meter switch is on a different range, multiply reading on scale according to table below:

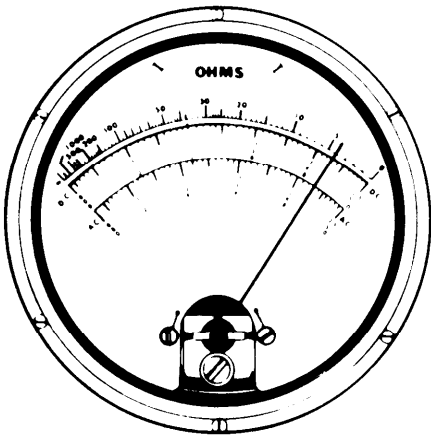
Ohms Switch Setting	You Do
X1 or RX1	Read number on scale
X10 or RX10	Multiply reading by 10
X100 or RX100	Multiply reading by 100
X1K or RX1K	Multiply reading by 1000
X10K or RX10K	Multiply reading by 10,000
(Remember: K= 1000)	

For example, the meter ohm switch will show the following readings on the multimeters as shown below:

Ohms Switch Setting	Meter Indicates	Actual Resistance
X1 or RX1	4 ohms	4 ohms
X10 or RX10	4 ohms	40 ohms
X100 or RX100	4 ohms	400 ohms

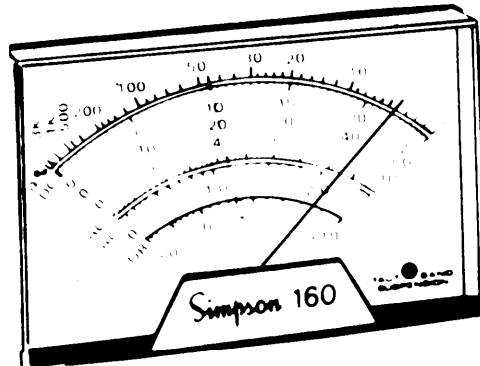


AN/URM-105



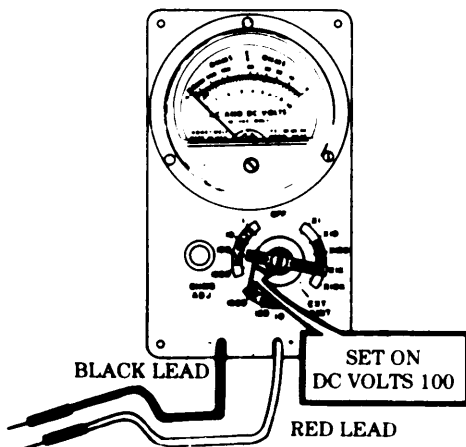
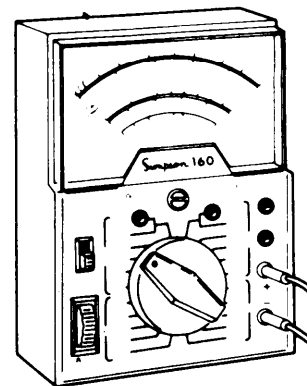
TS-352 B/U

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

**READING OHMS SCALE**

i. Using the DC Volt Scale with the AN/URM-105 and Simpson 160. Before using these multimeters to measure DC voltage, perform the following step:

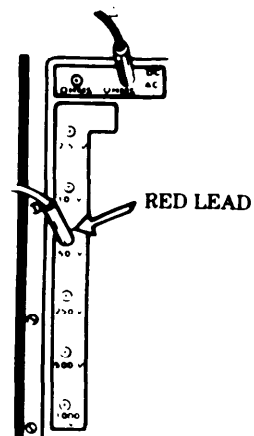
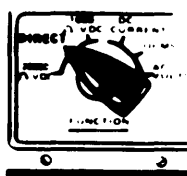
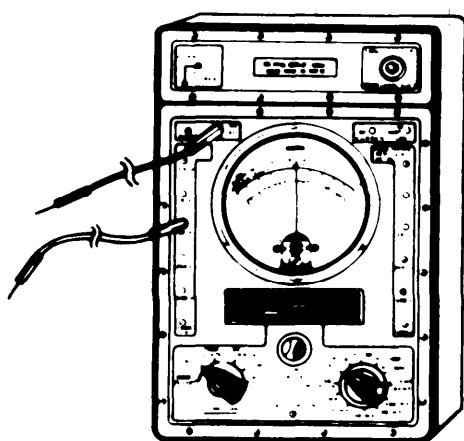
Step 1. Set meter switch to DC volt range given in test procedure. (To measure 24 volts DC on the AN/URM-105, set switch on "100 DC volts" range, and on the Simpson 160, set switch on "50 V DC" range as shown below.)

**AN/URM-105 DC VOLT SCALE****SIMPSON 160 DC VOLT SCALE**

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

j. Using DC Volt Scale with the TS-352 B/U. Before using this multimeter to measure DC voltage, perform the following steps:

- Step 1. Set function switch to "direct" (range switch can be at any position),
- Step 2. Put black lead in "DC/+AC/OHMS" jack.
- Step 3. To measure 24 volts DC, plug red lead into "50 V" jack on left side of meter. If measuring less than 10 volts DC, use "10 V" jack. If measuring less than 2.5 volts DC, use "2.5 V" jack.



TS 352 B/U DC VOLT SCALE

k. Measuring DC Voltage (all three meters). To measure DC voltage, perform following steps:

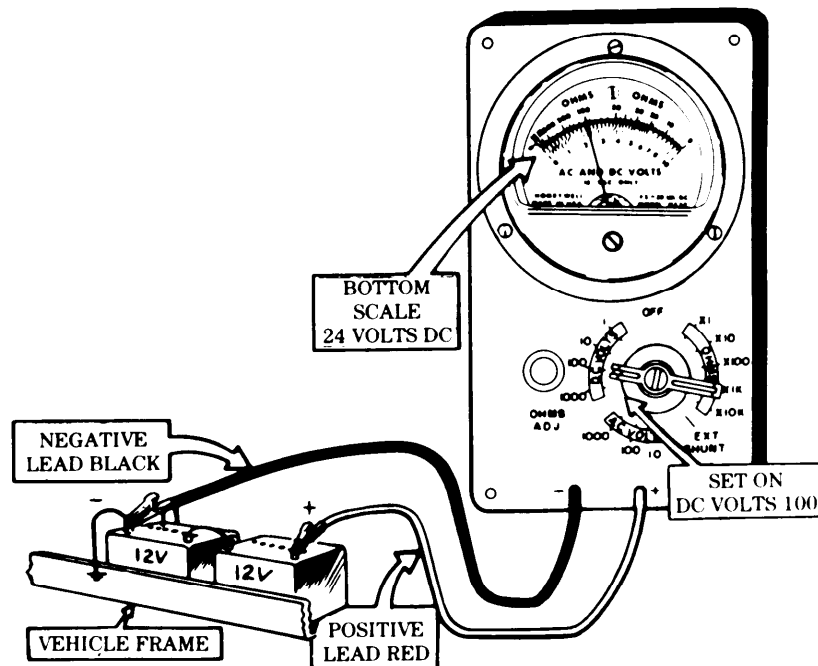
- Step 1. Set up multimeter as described in i or j.

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

NOTE

If you are not sure of the voltage to be measured on the vehicle, always start on the highest range of the meter you are using. This will protect the meter from damage.

Step 2. With all three multimeters, connect red probe to positive (+) side of circuit and black probe to negative (-) side. The following example shows 24 volts DC being measured across batteries.

**MEASURING DC VOLTAGE**

Step 3. Read the meter, (The following examples show how to read all three multimeters.) If needle tries to move off scale to the left, reverse probes on circuit.

2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

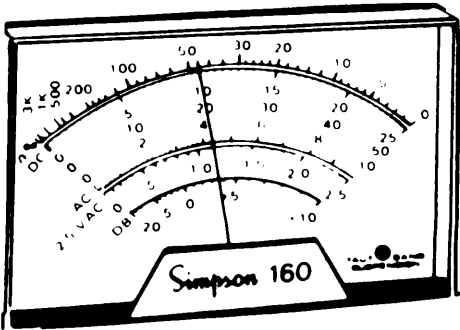
I. Reading the Simpson 160. Perform the following steps:

Step 1. Read the "DC volts" scale for range corresponding to selector switch position. (See illustration below.)

SWITCH SETTING	SCALE
V DC 50	0-50
V DC 10	0-10
V DC 2.5	0.25 (AND DIVIDE BY 10)

Step 2. Observe the following readings on meter as shown below,

SWITCH SETTING	READING
V DC 50	20 VOLTS DC
V DC 10	4 VOLTS DC
V DC 2.5	1 VOLT DC



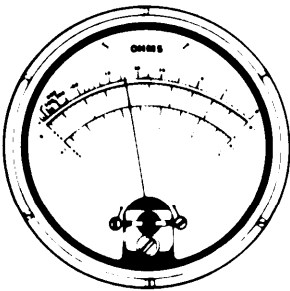
m. Reading the TS-352 B/U. Perform the following steps:

Step 1. Read "DC" volts scale for range corresponding to red lead position.

RANGE	SCALE
50V	0-5 (AND MULTIPLY BY 10)
10V	0-10
2.5V	0-25

Step 2. Observe reading on meter as shown below.

RANGE	READING
50V	20 VOLTS DC
10V	4 VOLTS DC
2.5V	1 VOLT DC



2-15. INSTRUCTIONS FOR USING THE MULTIMETER (Cont'd)

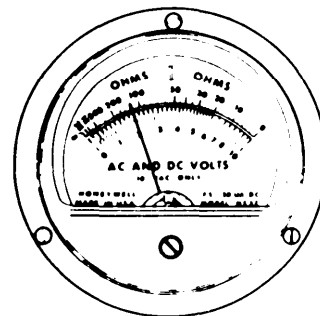
n. **Reading the AN/U R M-1 05.** Perform the following steps:

Step 1. Read upper, black, straight-lined portion of "AC and DC volts" scale for range corresponding to selector switch position.

SWITCH SETTING	SCALE
1000 DC VOLTS	0-10 (AND MULTIPLY BY 100)
100 DC VOLTS	0-10 (AND MULTIPLY BY 10)
10 DC VOLTS	0-10
1 DC VOLT	0-10 (AND DIVIDE BY 10)

Step 2. Observe reading on meter as shown below.

SWITCH SETTING	READING
100 DC VOLTS	20 VOLTS DC
10 DC VOLTS	2 VOLTS DC
1 DC VOLT	0.2 VOLTS DC



ELECTRICAL TROUBLESHOOTING SYMPTOM INDEX

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
BATTERY SYSTEM		
1.	Batteries are hot, electrolyte is boiling, or excessive use of water.	2-62
2.	Specific gravity will not increase to 1.280 under charge	2-63
3.	Engine will not crank, some electrical systems inoperative or weak	2-63
4.	All vehicle electrical systems inoperative ,	2-64
STARTING SYSTEM		
5.	Starter motor inoperative	2-66
6.	Solenoid operates, starter motor operates, but engine cranks slowly	2-68
7.	Starter motor inoperative. No solenoid thump	2-74
GENERATING SYSTEM		
8.	Batteries hot or boiling, corrected specific gravity of all cells is 1.280. . . .	2-78
9.	Batteries use excessive water.. . . .	2-80
10.	Batteries run down in service	2-80
11.	No alternator output	2-80
12.	Alternator output voltage low	2-83
13.	Battery indicator gage in high red position	2-83
LIGHTING SYSTEM		
14.	Lamps will not light	2-84
15.	Headlamp (one side) inoperative	2-86
16.	Headlamps (both sides) inoperative	2-87
17.	Blackout drive or blackout marker light inoperative	2-89
18.	Stoplight inoperative	2-90
19.	Rear lights inoperative	2-91
20.	One or more trailer lights inoperative	2-92
DIRECTIONAL SIGNAL SYSTEM		
21.	Individual lamps do not light with directional signal control lever in any on position	2-94
22.	No lights operate with directional signal control lever in any on position	2-97
23.	System operates incorrectly in one or more positions of directional signal control lever	2-99
ETHER START SYSTEM		
24.	Engine cranks but will not start (fuel available)	2-100
INDICATOR, GAGE, AND WARNING SYSTEM		
25.	All gages inoperative	2-104
26.	One gage inoperative o.....	2-108
27.	Temperature gage inoperative (coolant)	2-109
28.	Fuel gage inoperative	2-110

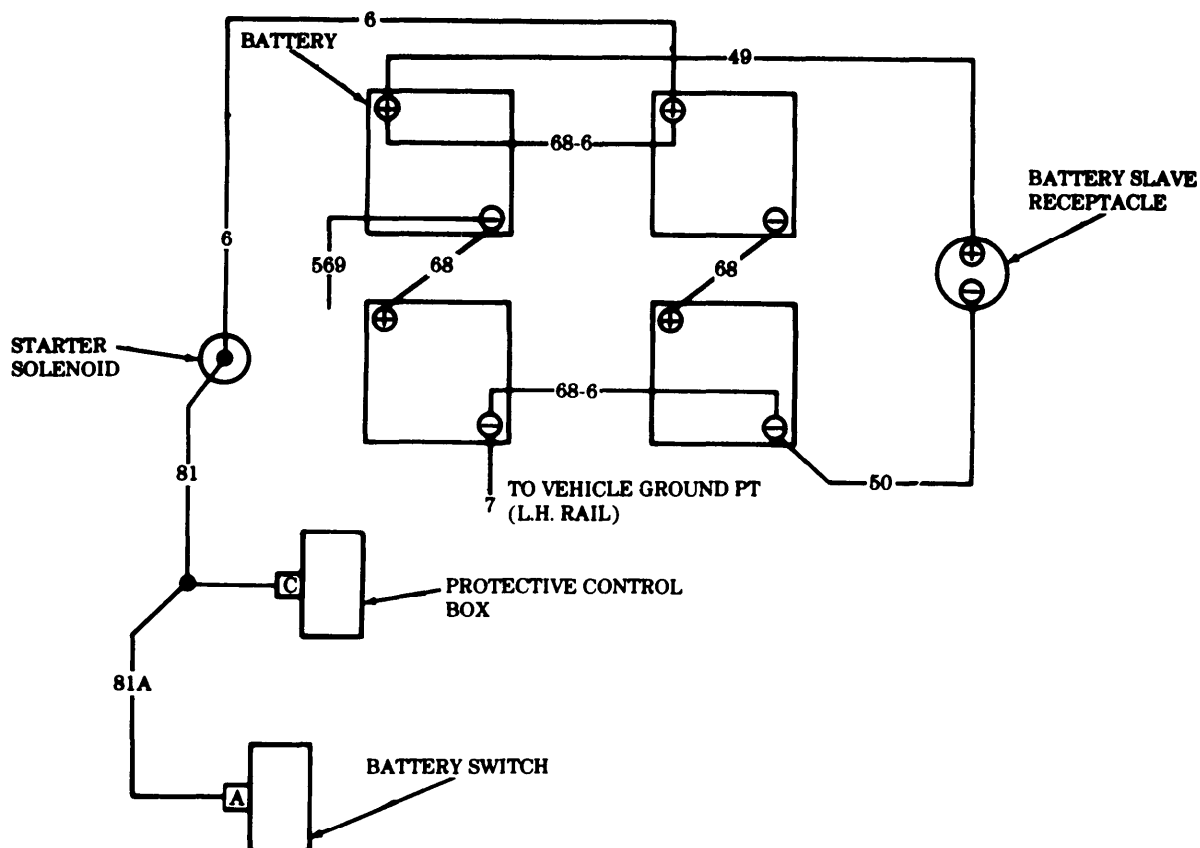
ELECTRICAL TROUBLESHOOTING SYMPTOM INDEX (Cont'd)

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
29.	Battery-alternator gage inoperative	2-112
30.	Horn inoperative	2-113
31.	Low air pressure warning buzzer will not shut off (air pressure gages normal system pressure)	2-117
32.	Spring brake warning light inoperative with spring brake override engaged	2-120
33.	Transfer case control lever will not shift, low to high, or high to low when vehicle is in motion	2-122
TRAILER CONNECTION SYSTEM		
34.	One or more lighting systems do not function on the trailer	2-123
HEATER SYSTEM		
35.	Heater will not operate with switch in low position (high position operation normal)	2-125
36.	Heater will not operate with switch in high position (low position operation normal)	2-127
37.	Heater will not operate in low or high position	2-128
100 AMP ALTERNATOR KIT		
38.	Batteries hot or boiling, corrected specific gravity of all cells is 1.280	2-128.1
39.	Batteries use excessive water	2-128.2
40.	Batteries run down in service	2-128.2
41.	No alternator output	2-128.2
TRANSFER CASE SYSTEM		
42.	Transfer case shifts hard (while engine is running)	2-128.6

Table 2-3. Electrical Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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BATTERY SYSTEM



1. BATTERIES ARE HOT, ELECTROLYTE IS BOILING, OR EXCESSIVE USE OF WATER

NOTE

If STE/ICE is available, perform NG50 — charging circuit tests (chapter 2, section VI).

Test 1. Check electrolyte temperature and specific gravity and note reading (TM 9-6140-200-14).

- a. If temperature is over 12(YF (49°C) and specific gravity is 1.280 or greater, batteries are being overcharged. Go to generating system troubleshooting (malfunction 8, test 1).
- b. If temperature is over 120°F (49°C), but specific gravity's 1.235-1.250, recharge battery (TM 9-6140-200-14).

END OF TESTING!

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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2. SPECIFIC GRAVITY WILL NOT INCREASE TO 1.280 UNDER CHARGE**NOTE**

If STE\ICE is available, perform NG50 – charging circuit tests (chapter 2, section VI).

Test 1. Check rate of charging.

Step 1. Place battery on charge, assuring that cells are gassing freely (TM 9-6140-200-14). Maintain charge rate slightly below heavy gassing.

If specific gravity does not recover to 1,280 in 25 hours of charging, replace battery (para. 4-24).

END OF TESTING!

3. ENGINE WILL NOT CRANK, SOME ELECTRICAL SYSTEMS INOPERATIVE OR WEAK

Test 1. Perform the following steps to inspect batteries:

Step 1. Visually check batteries for cracks, leaks, and corroded or broken terminal posts.

- Replace any cracked, leaking, corroded, or broken batteries, or batteries with loose or broken terminal posts (para. 4-24).
- Clean corroded terminal posts to bright metal.

Step 2. Check for loose, broken, or worn terminals and cables.

- Tighten any loose terminal or cable (para. 4-23 and 4-25).
- Replace any terminal or cable that is broken or worn (para. 4-23 or 4-25).

Step 3. Check electrolyte level in each battery cell (TM 9-6140-200-14).

Fill each cell to fill ring with distilled water (TM 9-6140-200-14).

Step 4. Perform a specific gravity test (TM 9-6140-200-14). Batteries must test 1.225 or greater, temperature corrected, and each cell in a battery must test within 25 points of the others.

- Charge all batteries not meeting requirements (TM 9-6140-200-14), and check specific gravity again,
- If 25 point variation still exists, the battery is defective and must be replaced (para. 4-24).

Step 5. Attempt to crank engine for 15 seconds, then turn switch to OFF position. Check batteries for overheating by feeling the terminal connections. If battery terminal(s) is hot this indicates loose or corroded connections.

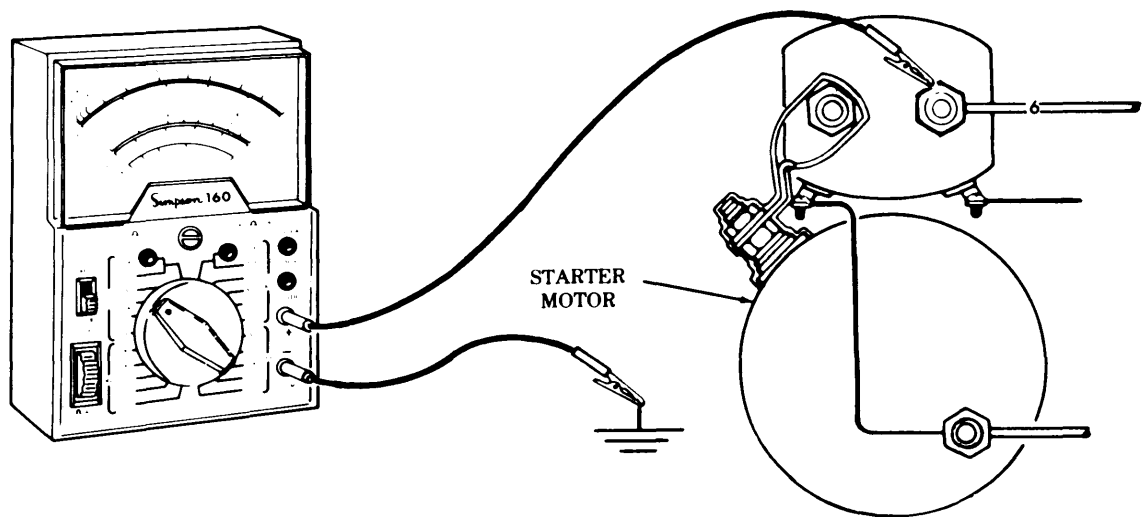
- Tighten all loose connections at batteries.
- Tighten battery ground wire (circuit 7) at vehicle chassis ground. Tighten battery positive wire (circuit 6) at starter solenoid.

NOTE

If STE\ICE is available, perform NG20 — no crank, no start (chapter 2, section VI).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Test 2. Test batteries under load to determine adequate current capability and voltage drop during a 15 second amperage load.	
	Step 1, Set multimeter to 50 volt range.	
	Step 2. Connect meter positive lead to starter solenoid terminal 6 and negative lead to the ground strap. Meter should indicate battery voltage.	
	Step 3. With meter still connected as above, place headlight switch and battery switch on ON position for 15 seconds (headlights on bright). Meter should not register a 1 volt drop from step 2 reading above.	
	Recharge batteries when voltage reading is low (TM 9-6140-200-14).	



END OF TESTING!

4. ALL VEHICLE ELECTRICAL SYSTEMS INOPERATIVE

- Test 1. Check connection of battery cables.
- Step 1, Assure battery cables are correctly connected to batteries. (See wiring diagram in Appendix G.)
- If cables are not correctly connected, reconnect (para. 4-23).
- Test 2. Inspect batteries.
- Step 1. Go to malfunction 3 and do test 1.

NOTE

If STE/ICE is available, perform NG81 — battery tests (chapter 2, section VI).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 3. Check protective control box continuity from pin C to pin D.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 81 connector from protective control box.

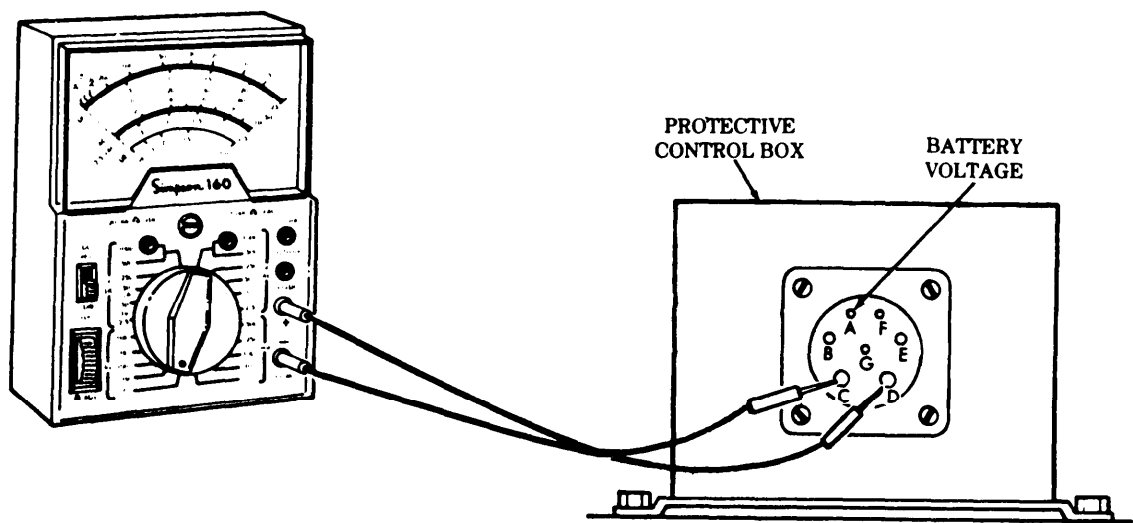
Step 3. Set multimeter to RX1 for continuity reading.

Step 4. Apply battery voltage to pin A of control box.

Step 5. Touch negative meter lead to pin C and positive lead to pin D on control box as shown.

a. Continuity should be indicated between pins C and D.

b. If continuity is not indicated, replace defective control box (para. 4-11).



END OF TESTING!

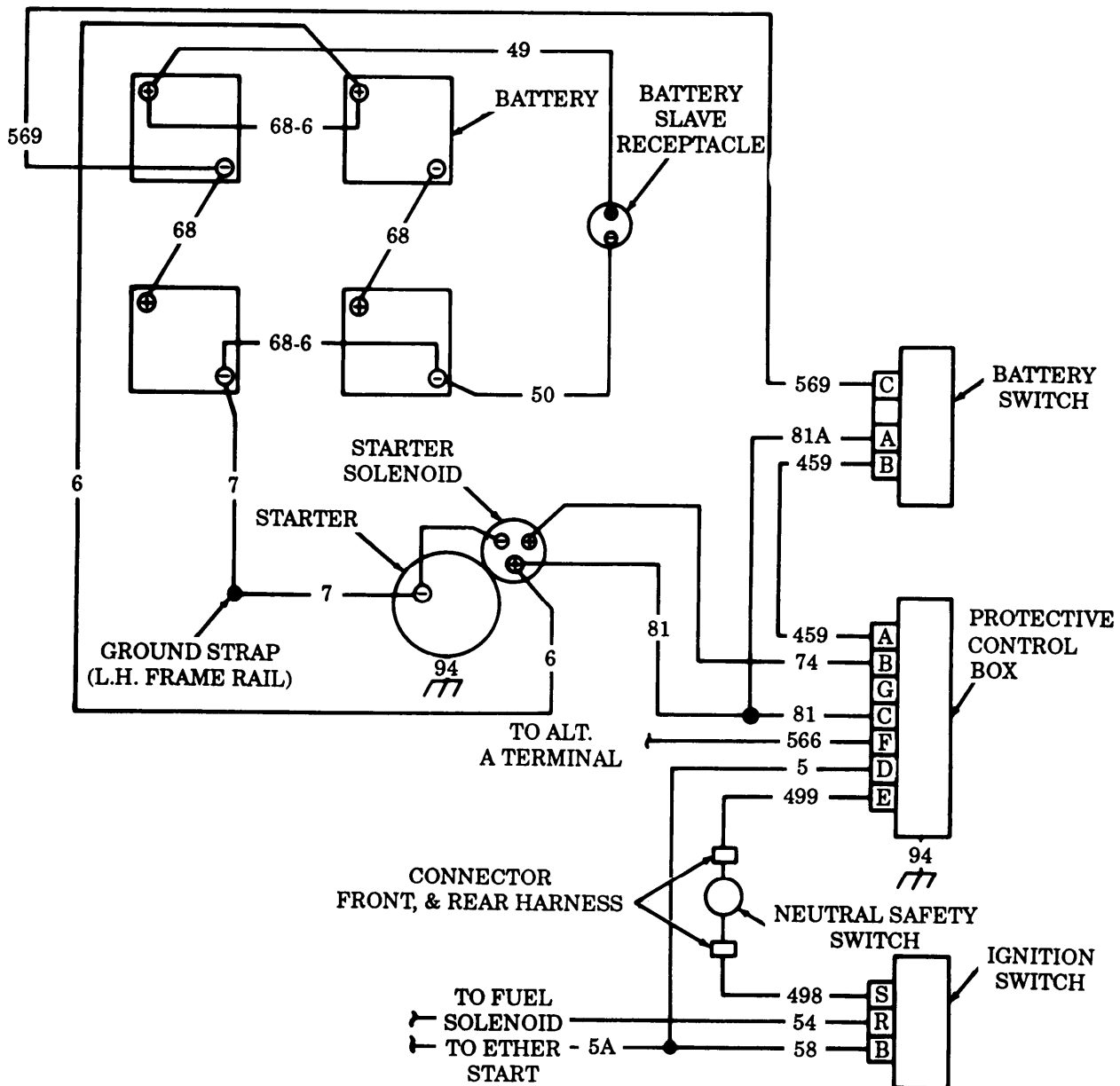
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Change 3 2-65

Table 2-3 Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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STARTING SYSTEM



5. STARTER MOTOR INOPERATIVE

NOTE

If STE/ICE is available, perform NG 80 – starter circuit tests (chapter 2, section VI).

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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 1. Check starter solenoid operation.

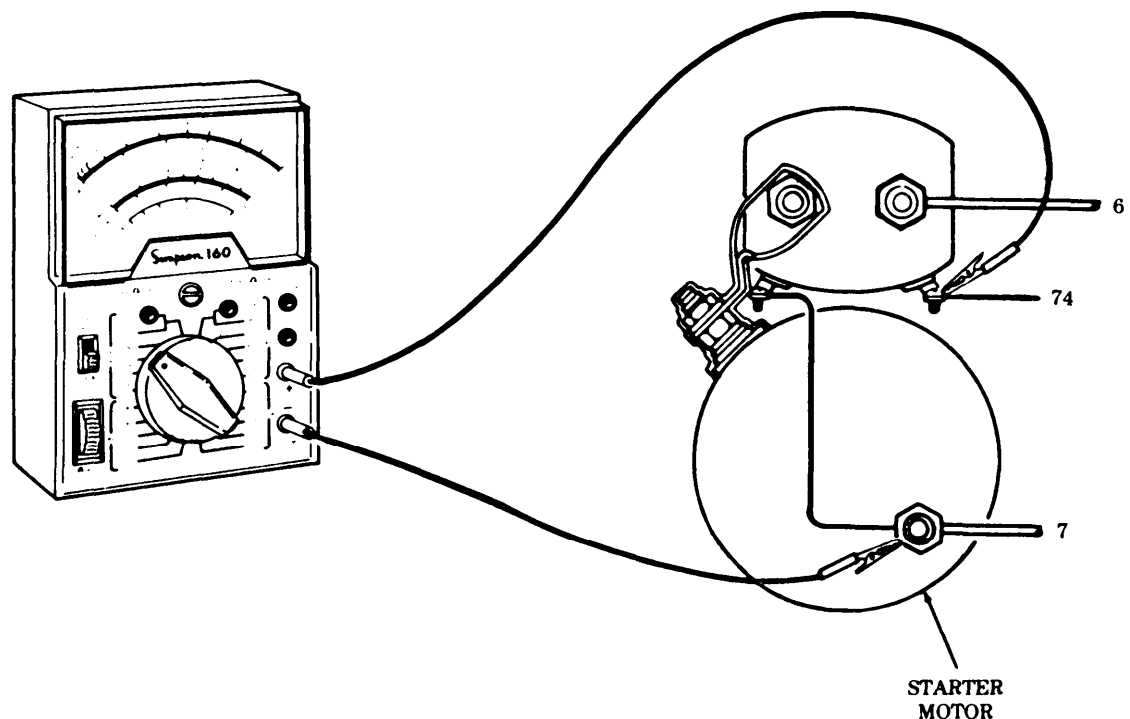
Step 1. Turn starter switch to "Start" and listen for starter 'solenoid to energize. If thump of starter solenoid energizing is heard, proceed to malfunction 6, and continue troubleshooting. If thump of starter solenoid is not heard, go to step 2.

Step 2. Set multimeter to 50 volt range.

Step 3. Connect multimeter positive lead to starter solenoid terminal circuit 74 and negative lead to starter motor ground as shown below.

Step 4. Turn starter switch to "Start" and observe meter for a 24 volt reading.

- a. If battery voltage IS NOT indicated, proceed to malfunction 7 and continue troubleshooting.
- b. If battery voltage IS indicated, replace starter motor and solenoid (para. 4-3).



END OF TESTING!

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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. SOLENOID OPERATES, STARTER MOTOR OPERATES, BUT, ENGINE CRANKS SLOWLY		
NOTE		
If STE/ICE is available, perform NG80 — starter circuit tests (chapter 2, section VI).		
Test 1. Check batteries for overheating. Crank engine for 15 seconds. Check batteries for overheating by feeling battery terminal connections. If battery terminal is HOT this indicates a loose or corroded connection.		
a. Clean corroded connection to bright metal.		
b. Tighten all loose connections at batteries, ground, and starter.		
Test 2. Test specific gravity for each battery.		
Step 1. Perform a specific gravity test (TM 9-6140-200-14). Batteries must test 1.225 or greater, temperature corrected, and each cell in a battery must test within 25 points of the others.		
a. Charge all batteries not meeting requirements (TM 9-6140-200-14) and check specific gravity again,		
b. If 25 point variation still exists within any battery, it is defective and must be replaced (para. 4-24).		
Test 3. Test starter motor voltage.		
Step 1, Set multimeter to 50 volt range.		
Step 2. Connect meter positive lead to positive terminal stud of starter motor and negative lead to terminal stud on end plate of starter motor as shown.		
Step 3. Crank engine and observe cranking voltage on meter. Voltage should exceed 22 volts.		
If voltage is low, clean and tighten connections.		

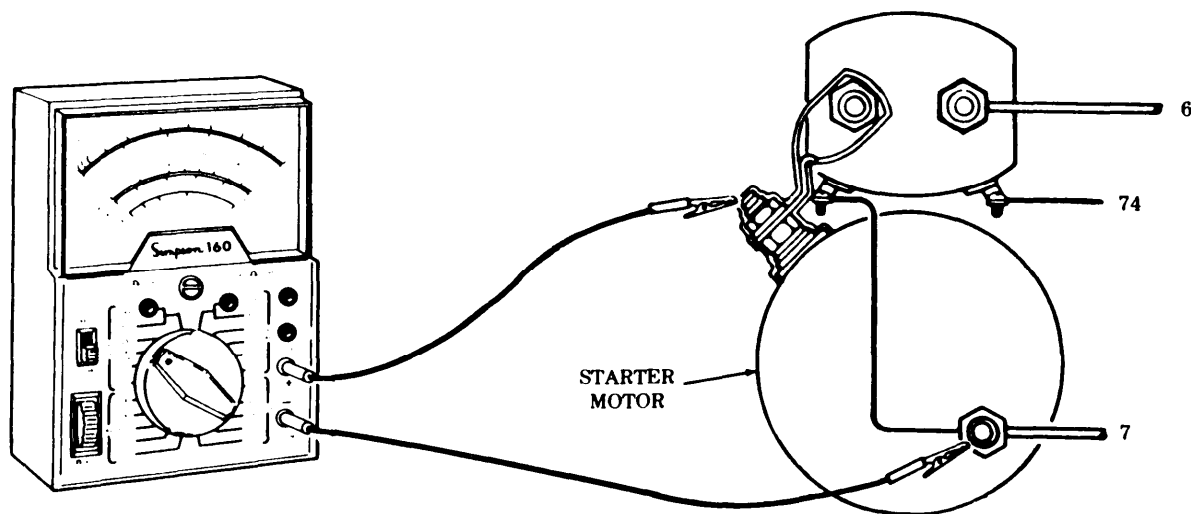


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 4. Test starting motor-to-solenoid strap.

Step 1. Set multimeters to 10 volt range.

Step 2. Connect meter negative lead to positive terminal stud of starter motor and positive lead to motor terminal stud of solenoid as shown.

Step 3. Crank engine and observe meter. A voltage reading exceeding 0.1 volts indicates a bad connection at starter motor terminal stud and terminal stud of solenoid.

Clean and tighten connections.

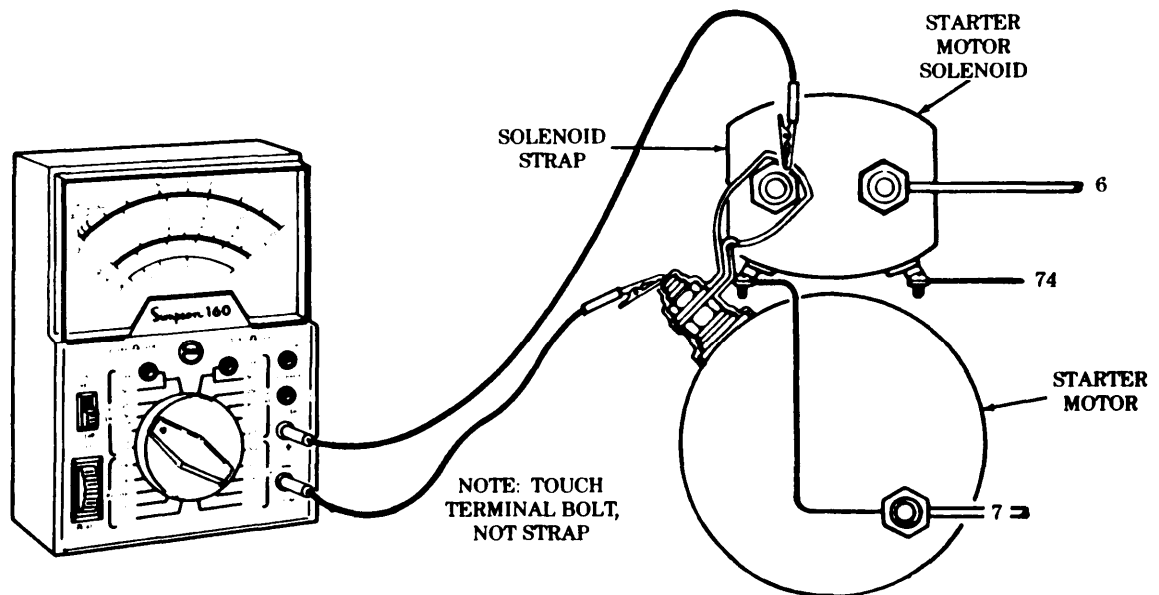


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 5. Test starting motor solenoid contractors.

Step 1. Set multimeter to 10 volt range.

Step 2. Connect meter between starter motor solenoid terminals as shown.

Step 3. Crank engine and observe meter. A voltage reading exceeding 0.4 volts indicates a defective starter motor solenoid.

a Replace starter motor and solenoid assembly (para 4-3).

b. If malfunction still exists, go to tests 6,7, and 8.

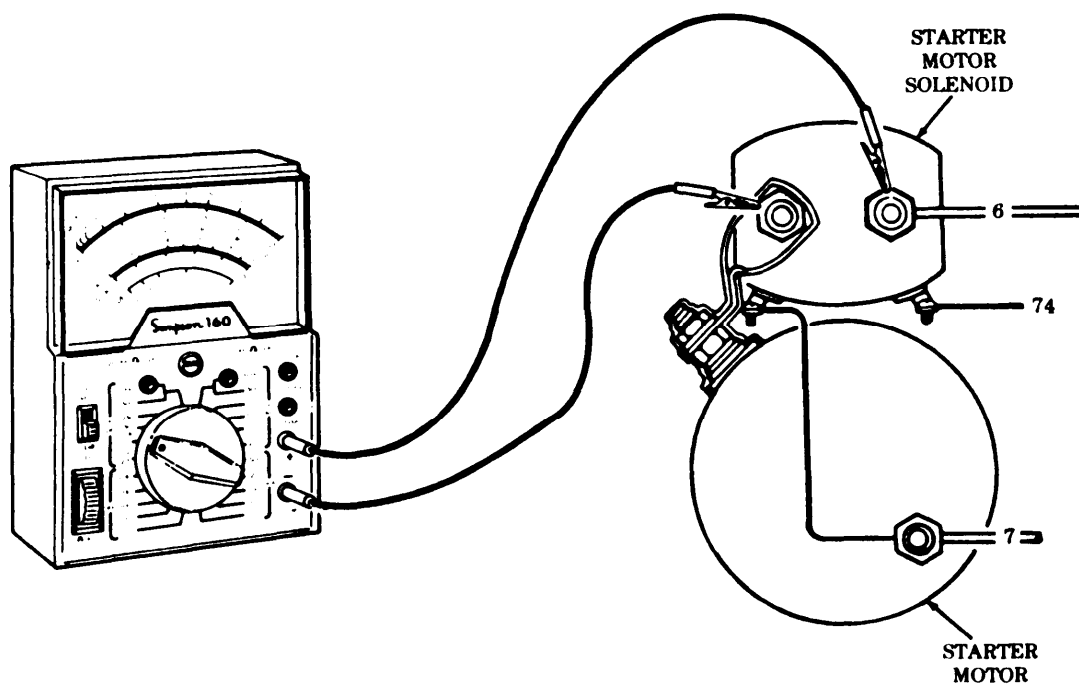


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 6. Test negative cable 7 voltage drop from batteries to starter motor.

Step 1. Set multimeter to 10 volt range.

Step 2. Connect meter positive lead to terminal stud on end plate of starter motor and negative lead to grounding point at batteries as shown below.

Step 3. Crank engine and observe meter. A voltage reading exceeding 0.4 volts indicates a loose or corroded connection(s).

Clean and tighten cable connections at batteries, starter, and chassis (para. 4-23).

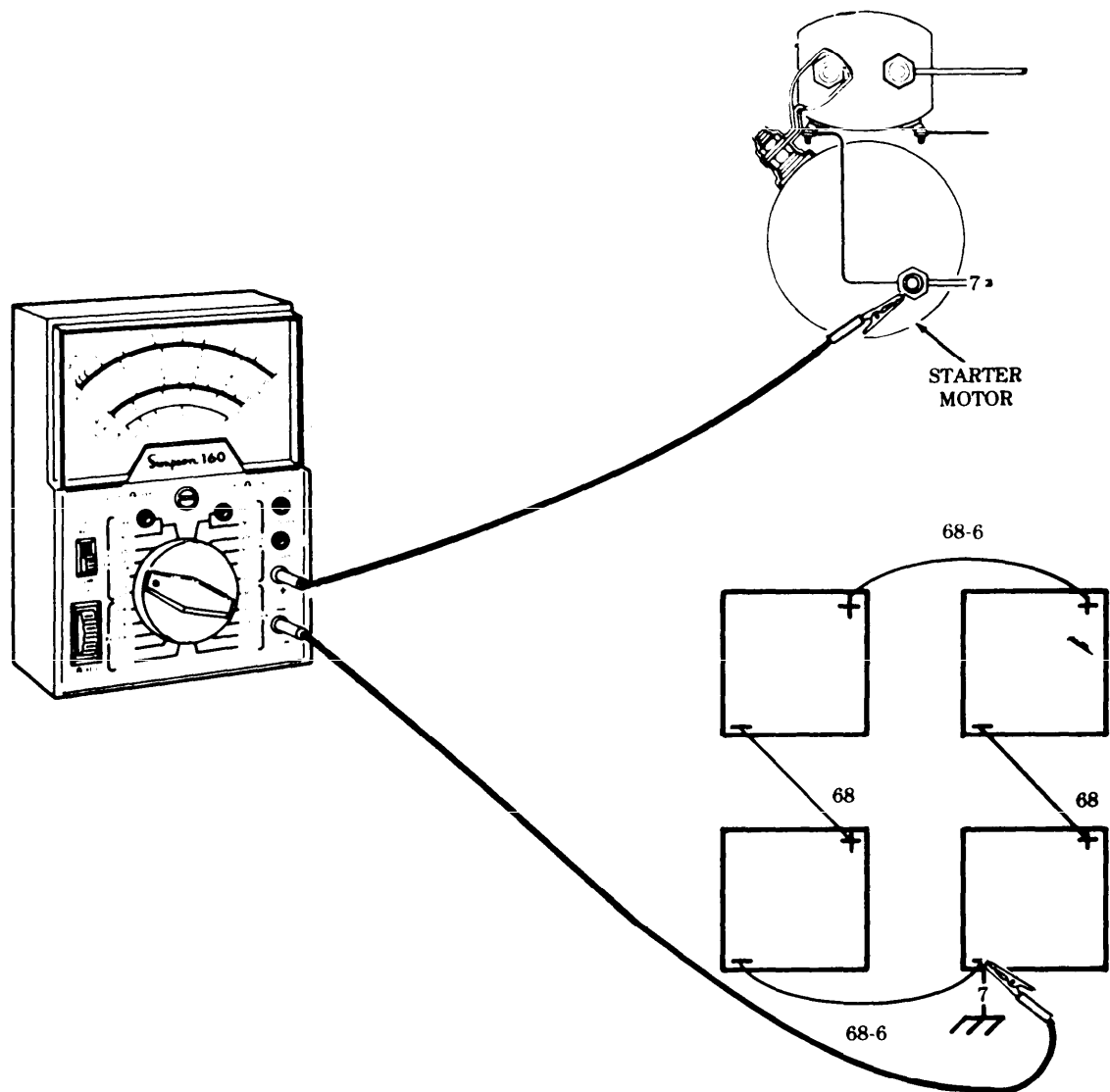


Table 2-3 . Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

- Test 7. Test positive cable 6 voltage from batteries to starter motor solenoid.
- Step 1. Set multimeter to 10 volt range.
- Step 2. Connect meter positive lead to positive terminal point on batteries and negative lead to positive terminal on starter motor solenoid as shown.
- Step 3. Crank engine and observe meter. A voltage reading exceeding 0.4 volts indicates a loose or corroded connection.
- Clean and tighten cable connections at batteries, starter, and chassis (para. 4-23).

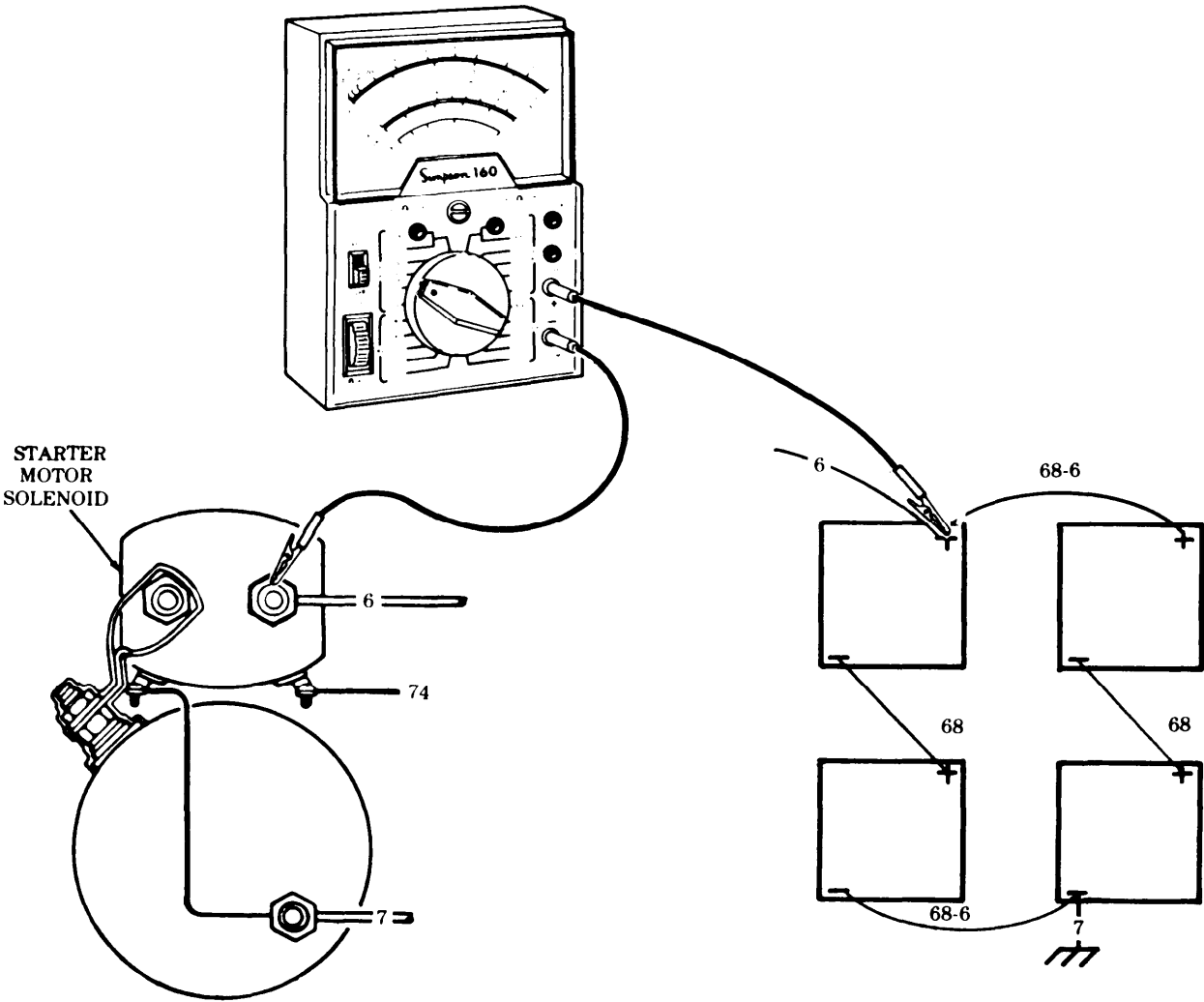
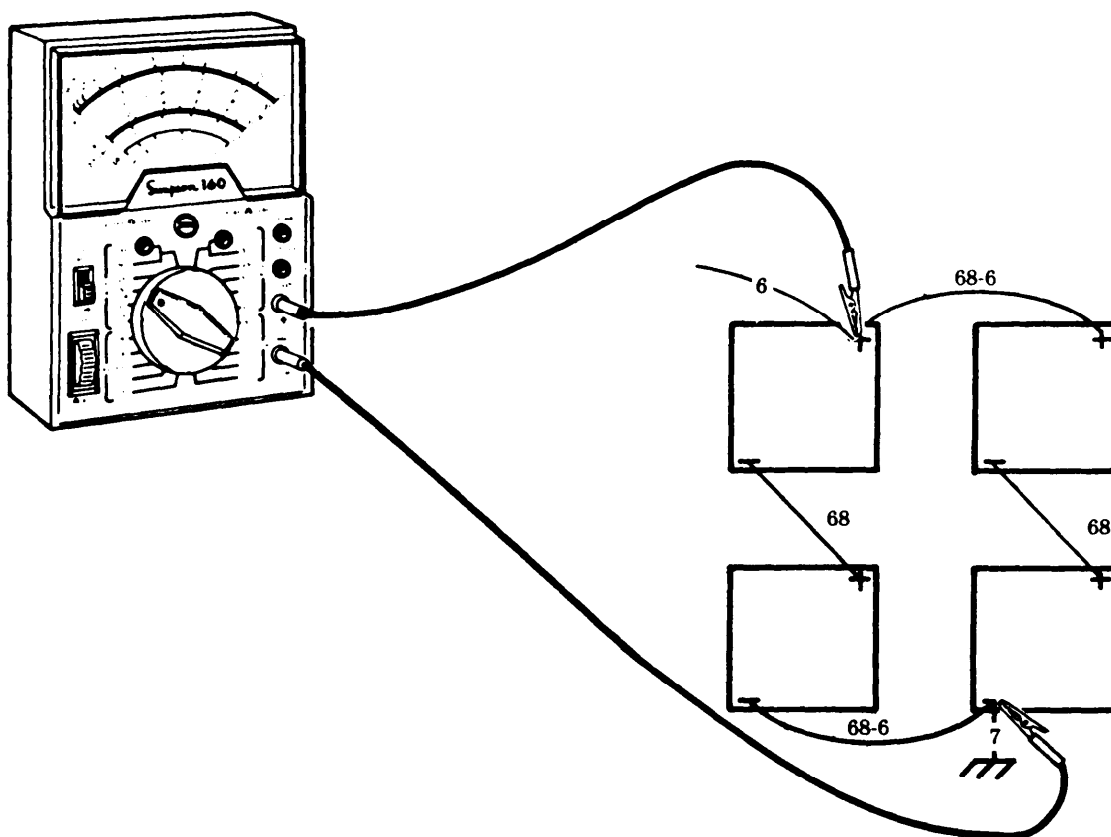


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 8. Test battery voltage after cranking load is applied.

- Step 1. Set multimeter to 50 volt range.
- Step 2. Connect meter directly across battery terminal posts, positive lead to positive post and negative lead to negative post as shown.
- Step 3. With "Emergency Engine Stop" handle pulled, crank engine for 30 seconds (TM 9-2320-272-10). Voltage reading should be 20 volts or more after cranking has stopped.
 - a. If battery voltage IS NOT satisfactory, go to malfunction 2.
 - b. If battery voltage IS satisfactory, replace starter motor and solenoid (para. 4-3).
- Step 4. Disengage fuel shutoff control lever (TM 9-2320-272-10).
If engine still cranks slowly, notify DS maintenance.



END OF TESTING!

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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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7. STARTER MOTOR INOPERATIVE, NO SOLENOID THUMP

Test 1. Test batteries and starter operations.

Perform malfunctions 1,2,3,5, and 6.

Test 2. Test starter lockout reset.

Step 1. Disconnect harness connector to protective control box.

Step 2. Connect harness connector to protective control box to reset starter lockout switch.

Step 3. Start engine (TM 9-2320-272-10).

a. If engine fails to start, go to test 3.

b. If engine starts, replace alternator (para. 4-9).

Test 3. Test battery switch for voltage.

Step 1. Set multimeter to 50-volt range.

Step 2. Disconnect lead 81A (pin A) at battery switch.

Step 3. Connect meter positive lead to contact end of lead 81A and negative lead to ground.

a. Meter should indicate battery voltage. If voltage is not indicated, repair broken circuit 81A/81 (para. 4-4).

b. If voltage is indicated, go to step 4.

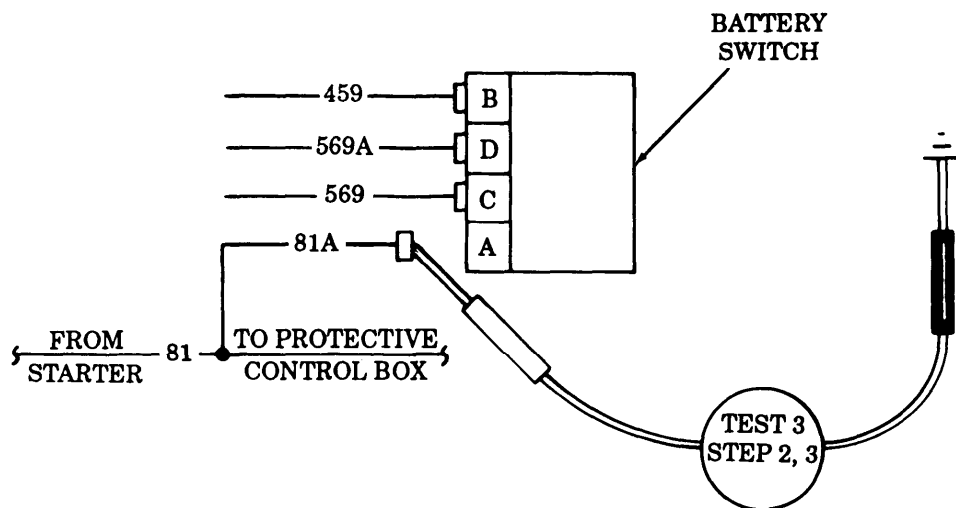


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- step 4. Connect lead 81A to battery switch pin A.
- step 5. Disconnect lead 459 (pin B) at battery switch.
- Step 6. Place battery switch to ON.
- step 7. Connect meter positive lead to contact end of pin B.
- Step 8. Connect meter negative lead to ground.
- Meter should indicate battery voltage. If voltage is not indicated, replace battery switch (para. 4-4).
 - If voltage is indicated, connect lead 459 to battery switch (pin B) and go to test 4.

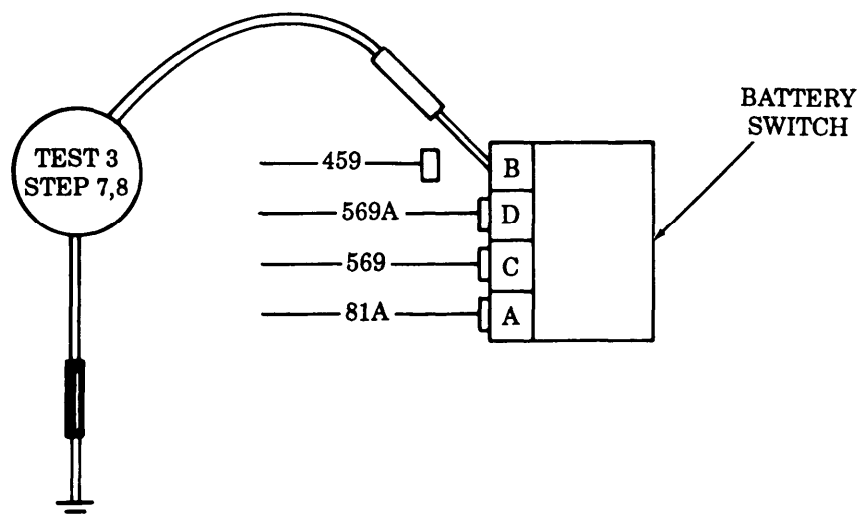


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 4. Test voltage input for protective control box.

step 1. Set multimeter to 50-volt range.

step 2. Disconnect harness connector at control box.

step 3. Place battery switch to ON.

step 4. Connect meter positive lead to pin A (lead 459) at harness connector and negative lead to ground.

a. Meter should indicate battery voltage. If voltage is not indicated, repair broken circuit 459 (para. 4-47).

b. If voltage is indicated, go to step 5.

step 5. Place battery switch to OFF.

step 6. Connect meter positive lead to pin C (lead 81) at harness connector and negative lead to ground.

a. Meter should indicate battery voltage. If voltage is not indicated, repair broken circuit 81 (para. 4-47).

b. If voltage is indicated, go to test 5.

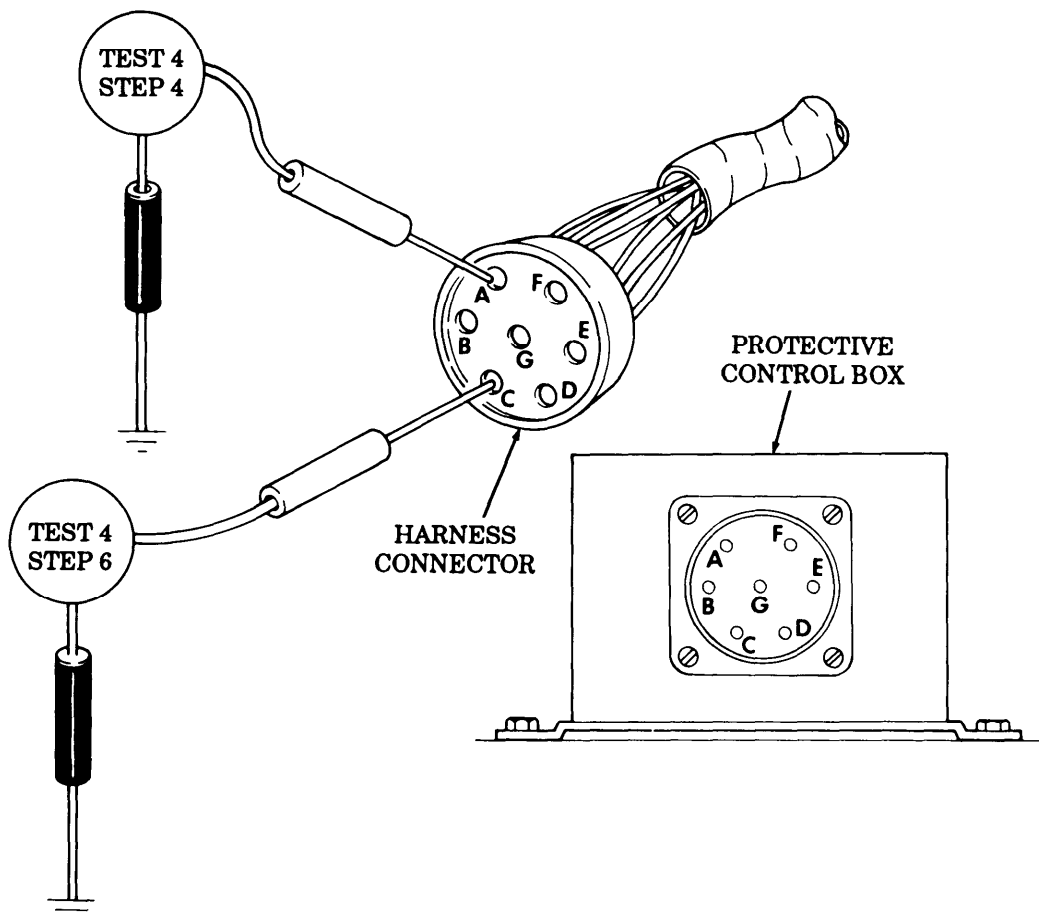


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 5. Test continuity of protective control box harness.

step 1. Disconnect battery ground cables (para. 4-25).

step 2. Set multimeter to RX1 to read continuity.

step 3. Disconnect harness connector at control box.

step 4. Disconnect lead 74 at starter solenoid.

step 5. Connect meter positive lead to pin B (lead 74) at harness connector and negative lead to lead 74 at starter solenoid.

a. Meter should indicate continuity. If continuity is not indicated, repair broken circuit 74 (para. 4-47).

b. If continuity is indicated, go to step 6.

step 6. Connect lead 74 to starter solenoid.

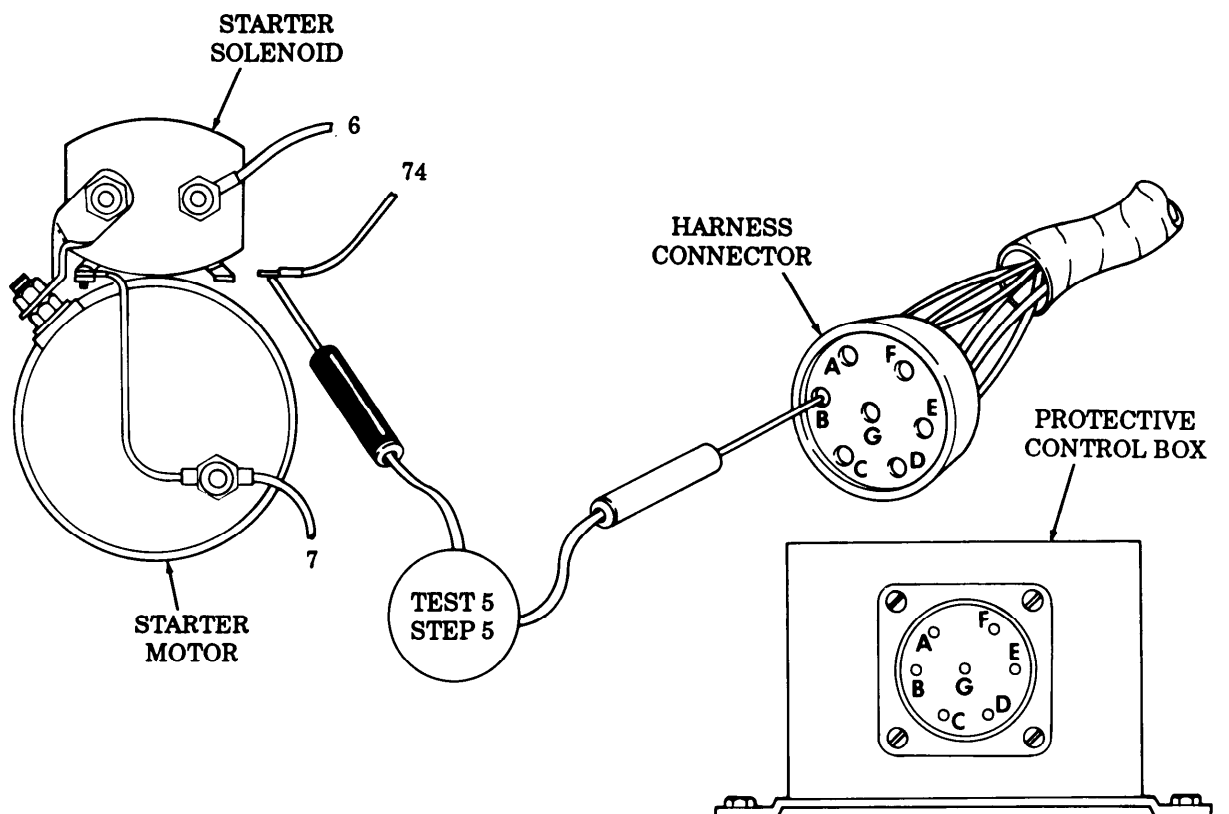


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 7. Disconnect lead 5B (pin B) at start switch.

Step 8. Connect meter positive lead to pin D at harness connector and negative lead to contact end of 5B at start switch.

- a. Meter should indicate continuity. If continuity is not indicated, repair broken circuit 5A/5B (para. 4-47).
- b. If continuity is indicated, go to test 6.

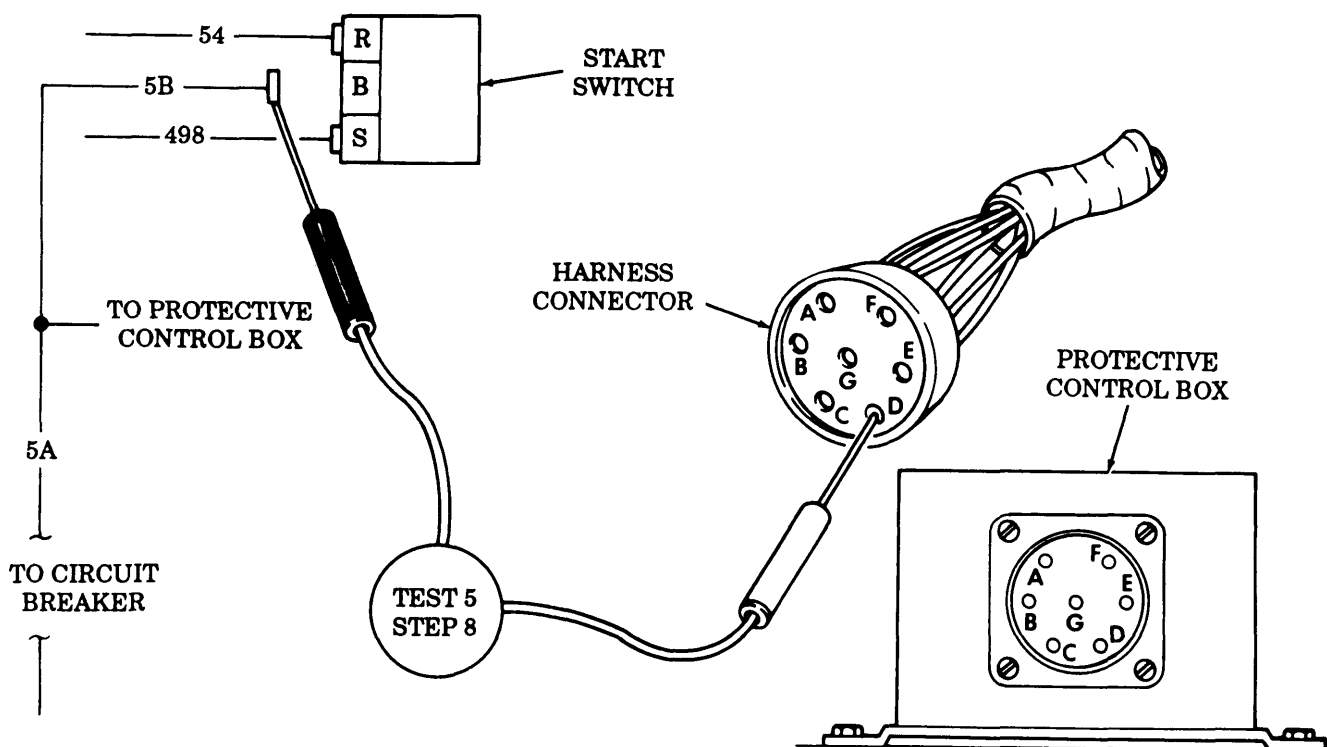


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 6. Test start switch for continuity.

- step 1. Set multimeter to RX1 to read continuity.
- step 2. Disconnect lead 5B (pin B) and lead 498 (pin S) at start switch.
- step 3. Connect meter positive lead to pin B and negative lead to pin S.
- step 4. Place start switch to start position and hold.
 - a. Meter should indicate continuity. If continuity is not indicated, replace start switch (para. 4-5).
 - b. If continuity is indicated, connect lead 5B to start switch (pin B) and go to test 7.

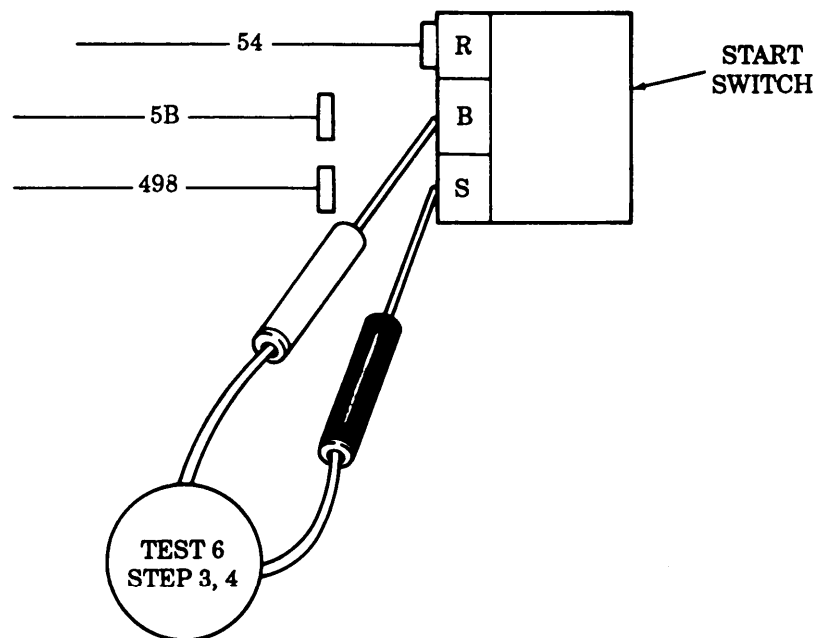


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

Test 7. Test continuity of neutral start switch and leads 498 and 499.

step 1. Set parking brake (TM 9-2320-272-10).

step 2. Place transmission in neutral.

step 3. Disconnect lead 498 at start switch.

step 4. Disconnect lead 498 at neutral start switch.

step 5. Connect meter positive lead to contact end of lead 498 at start switch and negative lead to contact end of lead 498 at neutral start switch.

a. Meter should indicate continuity. If continuity is not indicated, repair broken circuit 498 (para. 4-47).

b. If continuity is indicated, connect lead 498 to start switch (pin S) and go to step 6.

step 6. Disconnect lead 499 at neutral start switch.

step 7. Connect meter positive lead to neutral start switch contact end of lead 499 and negative lead to neutral start switch contact end of lead 498.

a. Meter should indicate continuity. If continuity is not indicated, replace neutral start switch (para. 4-67).

b. If continuity is indicated, connect lead 498 to neutral start switch and go to step 8.

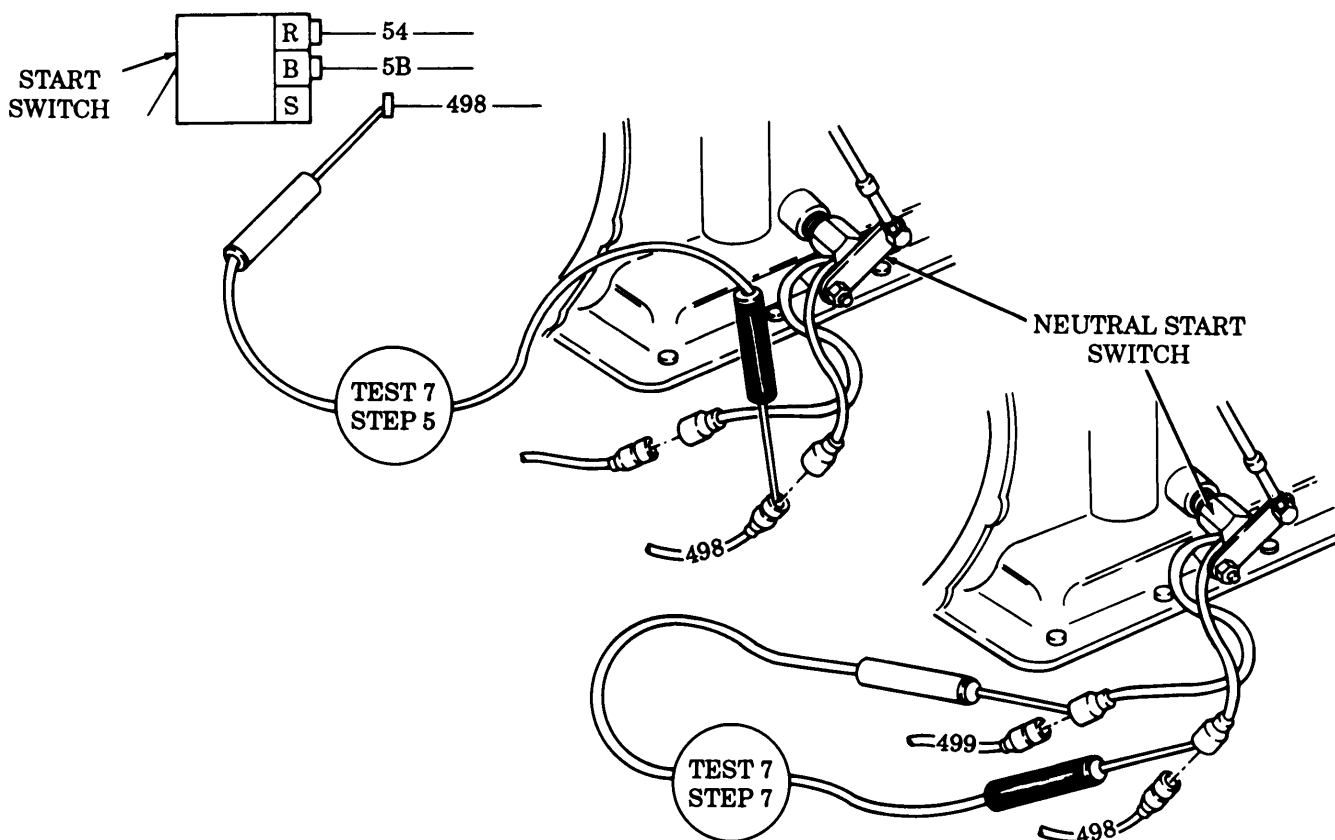


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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step 8. Disconnect harness connector at control box.

step 9. Connect meter positive lead to contact end of lead 499 and negative lead to pin E at harness connector.

a. Meter should indicate continuity. If continuity is not indicated, repair broken circuit 499 (para. 4-47).

b. If continuity is indicated, connect lead 499 to neutral start switch and go to test 8.

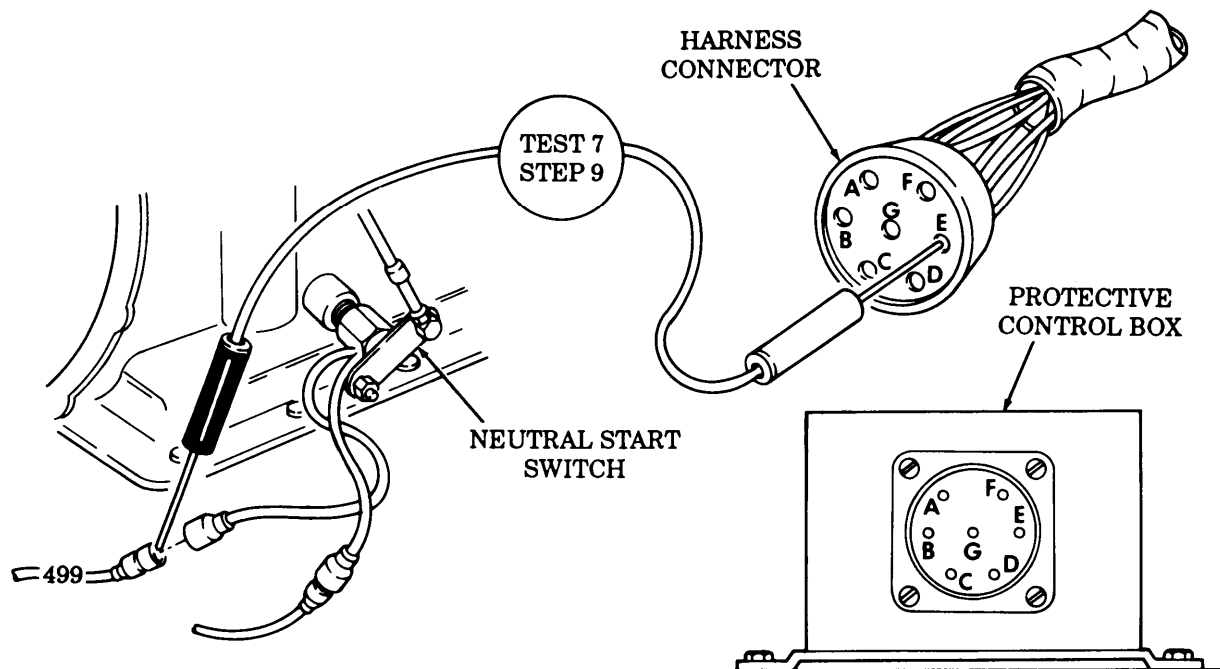


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 8. Test continuity of alternator lead 566.

step 1. Set multimeter to RX1 to read continuity.

NOTE

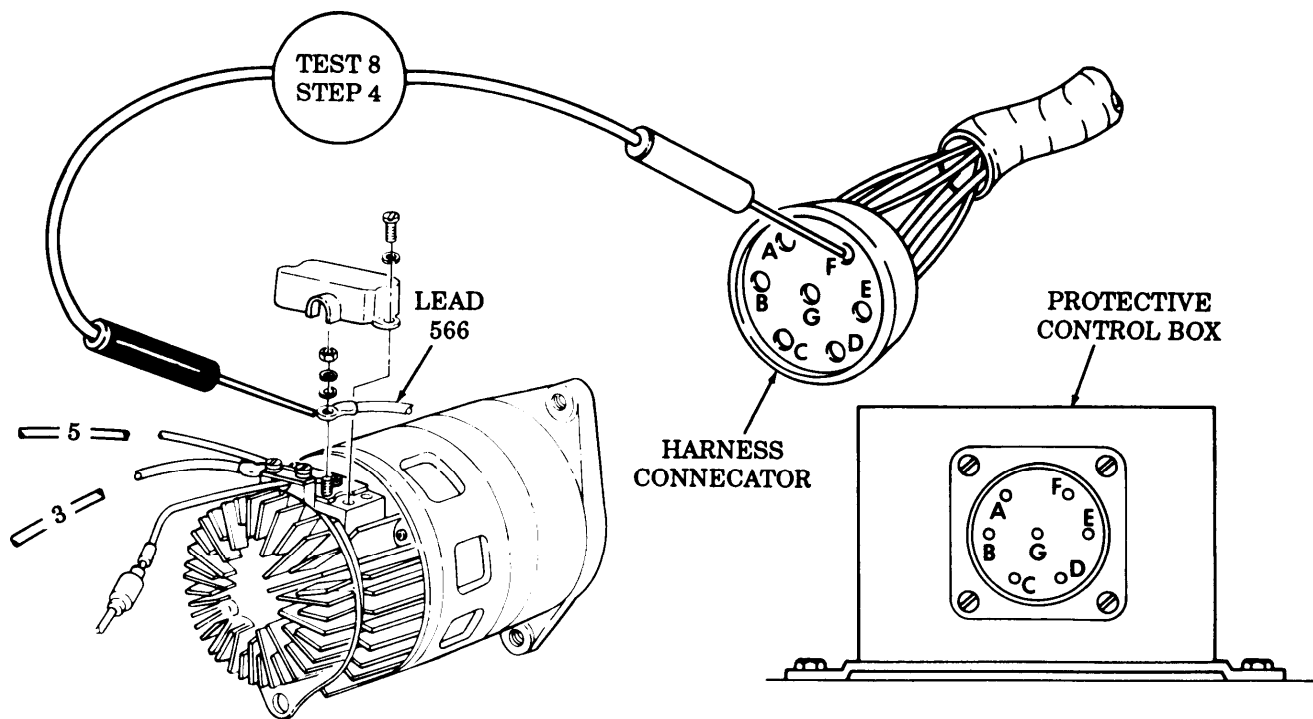
Sealant must be removed before removing leads.

step 2. Disconnect lead 566 at alternator.

step 3. Disconnect harness connector at control box.

step 4. Connect meter positive lead to pin Fat harness connector and negative lead to contact end of lead 566 at alternator.

- meter should indicate continuity. If continuity is not indicated, repair broken circuit 566 (para. 4-47).
- If continuity is indicated, connect harness connector to protective control box. DO NOT connect lead 566 to alternator. Go to test 9.



Test 9. Test starter lockout signal.

Step 1. Attempt to start engine with lead 566 disconnected from alternator.

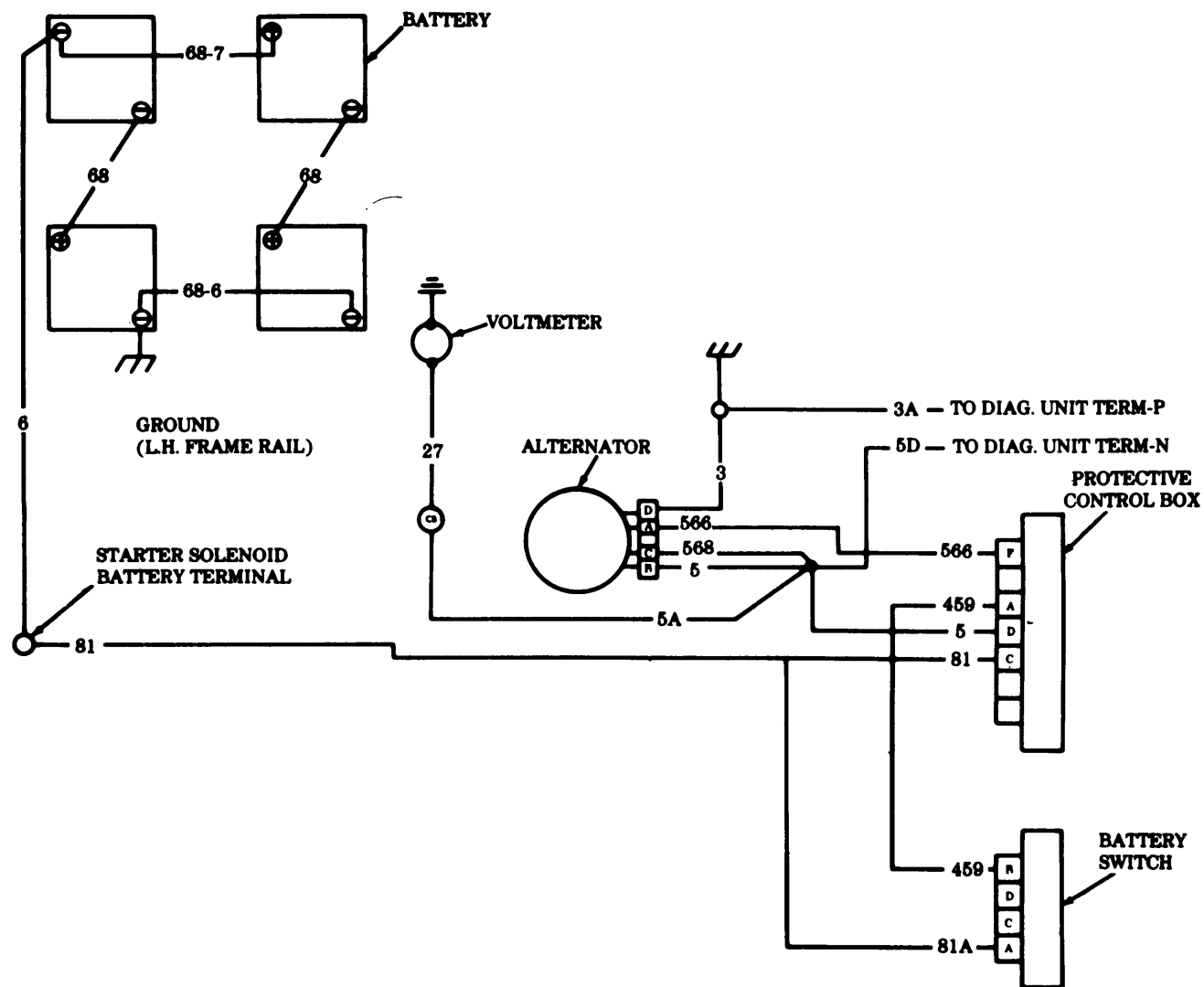
- If engine fails to start, replace protective control box (para. 4-11).
- If engine starts, replace alternator (para. 4-9).

END OF TASK!

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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GENERATING SYSTEM



8. BATTERIES HOT OR BOILING, CORRECTED SPECIFIC GRAVITY OF ALL CELLS IS 1.280

NOTE

If STE/ICE is available, perform NG50 – charging circuit tests (chapter 2, section VI).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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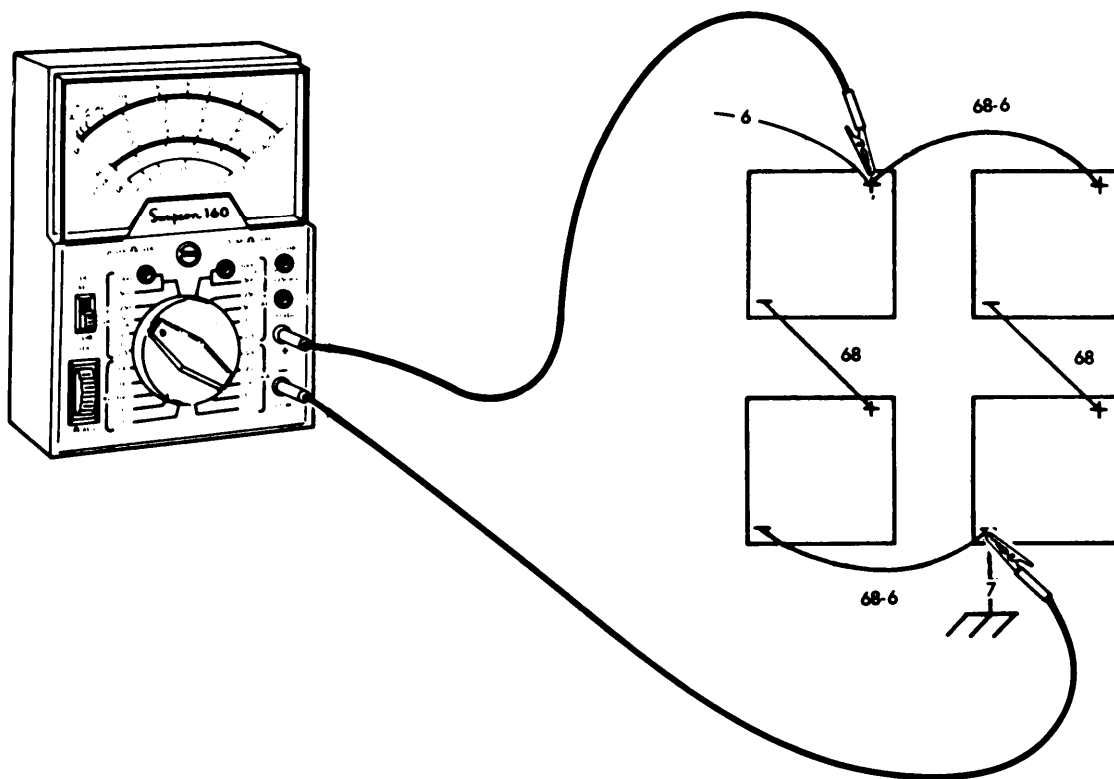
Test 1. Test charging voltage.

Step 1. Set multimeter to 50 volt range.

Step 2. Connect multimeter directly across battery terminal posts. Positive lead to positive post and negative lead to negative post as shown.

Step 3. Start engine and allow engine to stabilize at 700-600 rpm.

Meter should indicate 26.5 to 29.5 volts. If not, replace alternator (para. 4-9).



END OF TESTING!

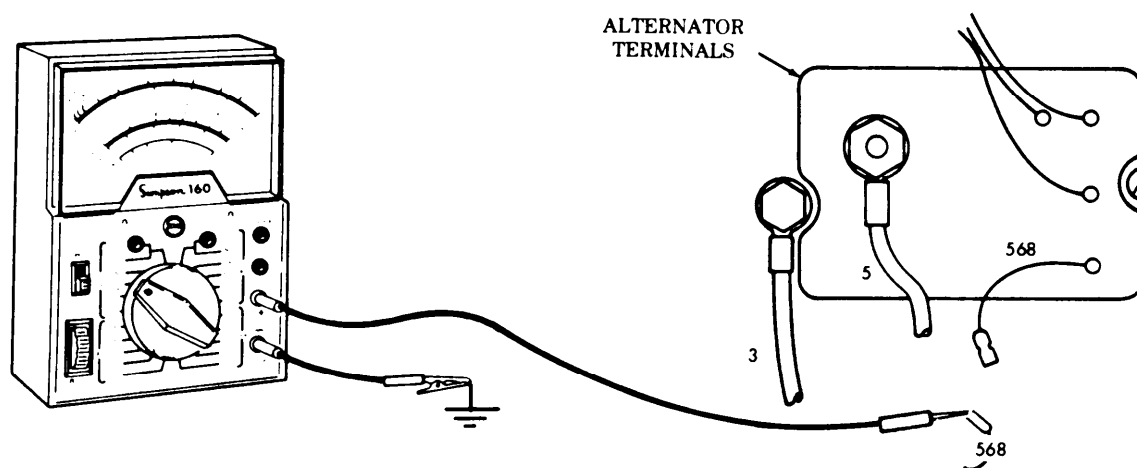
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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION	
9. BATTERIES USE EXCESSIVE WATER	
	NOTE
	If STE/ICE is available, perform NG81 – battery tests or NG50 – charging circuit tests (chapter 2, section VI).
	Test 1. Test charging voltage (malfunction 8, test 1).
	END OF TESTING!
10. BATTERIES RUN DOWN IN SERVICE	
	NOTE
	If STE/ICE is available, perform NG50 – charging circuit tests (chapter 2, section VI).
	Test 1. Check for loose, broken, or missing alternator belts.
	a Adjust loose belts (para. 4-8).
	b. Replace broken or missing belts (para 4-8).
	Test 2. Test charging voltage (malfunction 8, test 1).
	If proper voltage is indicated, problem is not in generating system. See battery system troubleshooting.
	END OF TESTING!
11. NO ALTERNATOR OUTPUT	
	NOTE
	If STE/ICE is available, perform NG50 – charging circuit tests (chapter 2, section VI).
	Test 1. Check for loose, broken, or missing alternator belts.
	a Adjust loose belts (para 4-8).
	b. Replace broken or missing belts (para 4-8).
	Test 2. Test alternator circuit 568 for voltage.
	Step 1. Disconnect circuit 568 wire at alternator.
	Step 2. Set multimeter on 50 volt range.
	Step 3. Connect meter positive lead to circuit 568 wire and negative lead to vehicle chassis ground.
	Step 4. Place battery switch to ON position.
	a Meter should indicate battery voltage.
	b. If battery voltage is indicated, place battery switch to OFF position and replace alternator (para. 4-9).
	c. If battery voltage is not indicated, go to step 5.

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Step 5. Touch meter positive lead to circuit 5, alternator terminal as shown.
- Meter should indicate battery voltage.
 - If battery voltage is indicated, repair broken circuit 568 wire (para. 4-49).
 - If battery voltage is not indicated, go to step 6.

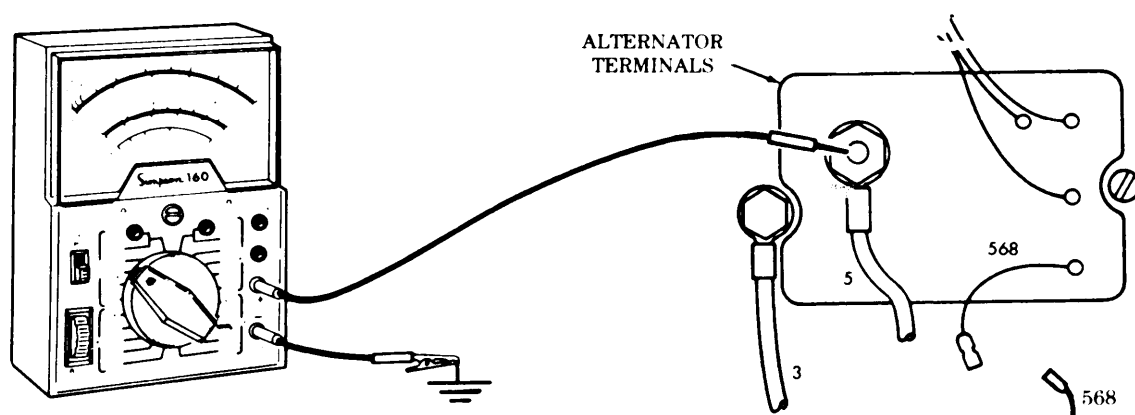
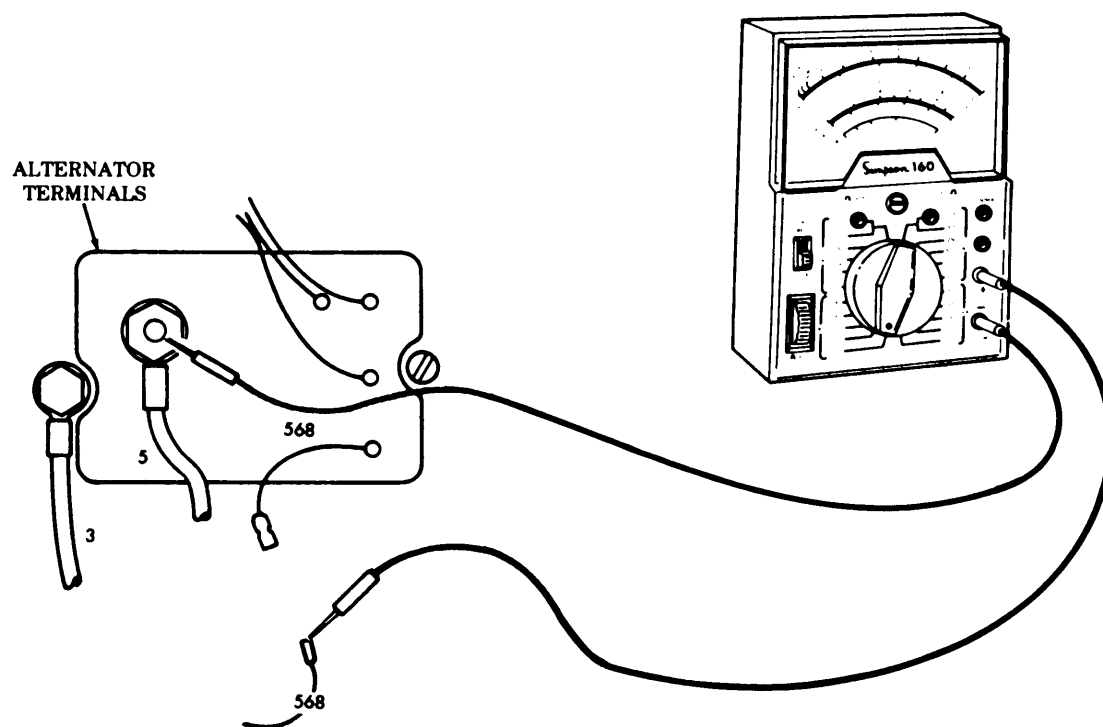


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

- Step 6. Set multimeter on RX1 for continuity reading.
- Step 7. Disconnect battery negative cable.
- Step 8. Connect meter positive lead to circuit 568 wire and negative lead to circuit 5 alternator terminal as shown.
- Step 9. Meter should read continuity. If continuity IS NOT read, there is an OPEN circuit.
Repair broken circuit 568 wire (para 4-49).



END OF TESTING!

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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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12. ALTERNATOR OUTPUT VOLTAGE LOW**NOTE**

If STE/ICE is available, perform NG50 — charging circuit tests (chapter 2, section VI).

Test 1. Check for loose, broken, or missing alternator belts.

- a. Adjust loose belts (para 4-8).
- b. Replace broken or missing belts (para. 4-8).

Test 2. Test battery voltage (malfunction 8, test 1).

END OF TESTING!

13. BATTERY INDICATOR GAGE IN HIGH RED POSITION**NOTE**

If STE/ICE is available perform NG50— charging circuit tests (chapter 2, section VI).

Test 1. Test battery voltage (malfunction 8, test 1).

Test 2. Check alternator for overheating.

Step 1. Run engine for approximately 10 minutes.

Step 2. With engine off, check alternator for high temperature by holding hand NEAR alternator.

Step 3. If alternator is HOT, disconnect circuit 568 wire at alternator and allow alternator to cool.

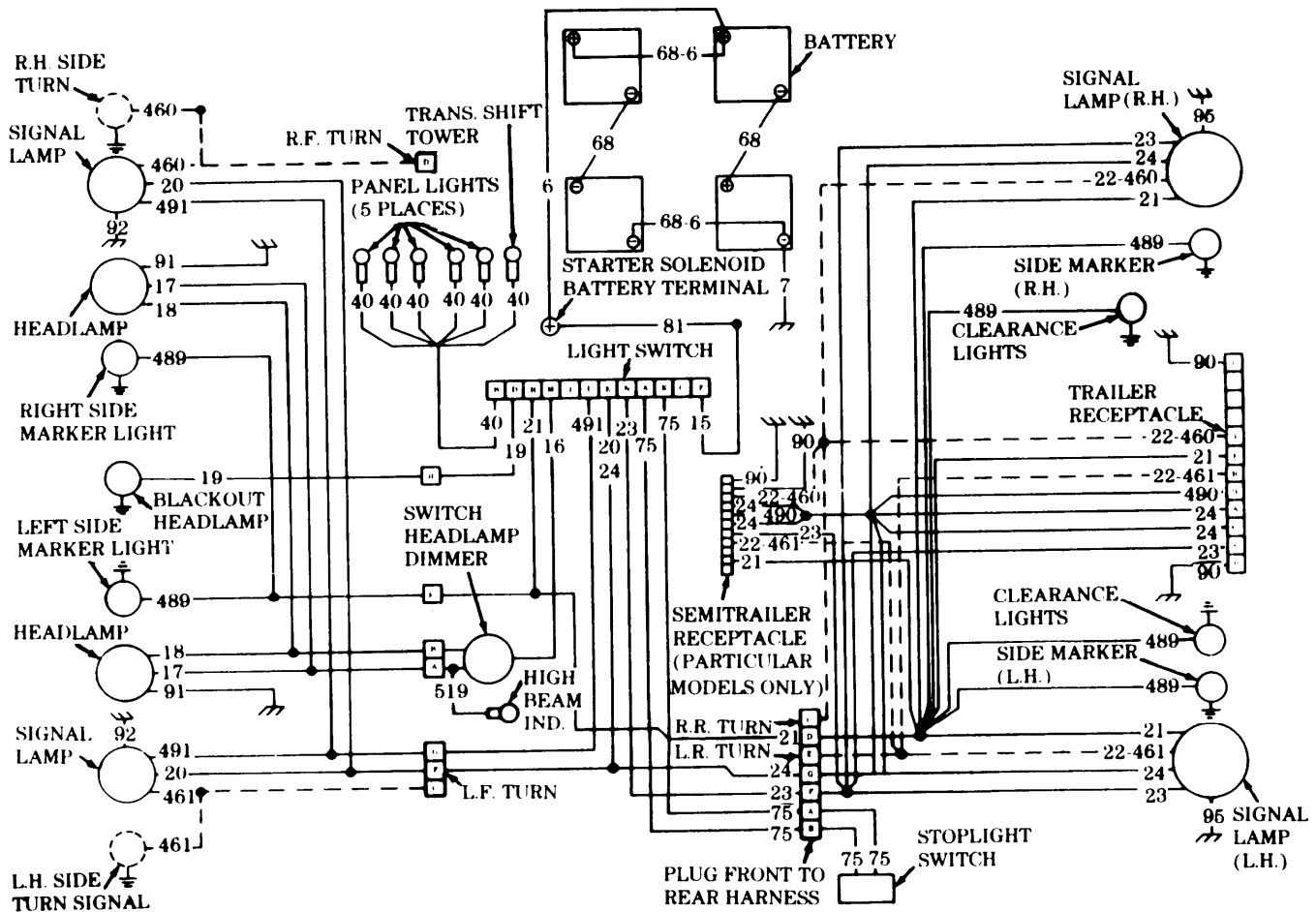
Step 4. Connect circuit 568 wire and start engine. If indicator returns to high RED position and alternator heats up again, replace alternator (para 4-9).

END OF TESTING!

Table 2-9. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. No power to the engine	Check battery voltage and connections	Recharge battery or replace if necessary
2. Engine won't start	Check spark plug and timing	Replace spark plug and adjust timing
3. Engine overheats	Check coolant level and fan operation	Top up coolant and replace fan if needed
4. Engine leaks oil	Check oil level and seals	Replace seals and top up oil
5. Engine runs rough	Check air filter and fuel system	Replace air filter and clean fuel system
6. Engine won't idle	Check carburetor and throttle cable	Adjust carburetor and throttle cable
7. Engine won't rev	Check throttle cable and fuel system	Adjust throttle cable and clean fuel system
8. Engine won't stop	Check kill switch and battery	Replace kill switch and battery
9. Engine won't start after shutdown	Check battery and fuel system	Recharge battery and clean fuel system
10. Engine won't start after long storage	Check battery and fuel system	Recharge battery and clean fuel system

LIGHTING SYSTEM



NOTE: BROKEN LINES INDICATE TURN SIGNAL CIRCUITS

14. LAMPS WILL NOT LIGHT

Test 1. Check for defective bulb.

- Replace bulb with one known to be operative.
- If bulb does not light, go to test 2.

Test 2. Check for corrosion or dirt in sockets or on terminals.

- Clean corroded connections.
- Clean dirt from sockets and terminals.

Table 2-3, Electrical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
--

Test 3. Check lamp holders for loose connections and broken wire terminals.

- a. Tighten all loose connections.
- b. Repair or replace broken wire terminals (para. 4-49).

Test 4. Test lighting system harness connector voltage.

Step 1. Place battery switch to OFF position.

Step 2. Remove lighting switch from instrument panel and disconnect harness connector.

Step 3. Place battery switch to ON position.

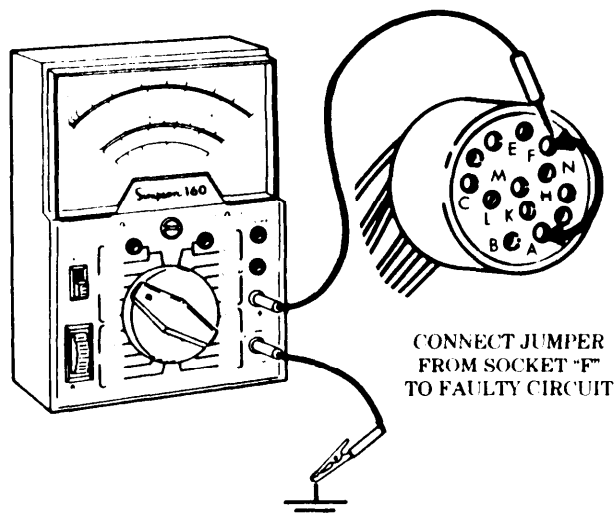
Step 4. Set multimeter to 50 volt range.

Step 5. Connect meter negative lead to vehicle chassis ground as shown, Connect positive lead to connector socket pin F.

- a. If battery voltage IS NOT indicated, go to step 6.
- b. If battery voltage IS indicated at socket pin F, connect a jumper wire from socket pin F to socket of faulty circuit as shown.
- c. If lamps light with jumper wire connected, replace main light switch (para. 4-38).

Step 6. Check wiring harness for loose connections, or broken wiring.

- a. Tighten all loose connections.
- b. Repair broken wiring harness (para. 4-49).



SOCKET	WIRE NO.	CIRCUIT
A	75	STOPLIGHT SWITCH
B	40	PANEL LIGHTS
C	22	DIRECTIONAL CONTROL
D	19	B.O. DRIVING LIGHT
E	20-24	B.O. MARKER LIGHTS
F	15	BATTERY POS. 24 VOLTS
H	21	SERVICE REAR LIGHTS
J	460-461	DIRECTIONAL INDICATOR
K	75	STOPLIGHT SWITCH
L	491	SERVICE PARKING LIGHTS
M	16	SERVICE HEADLIGHTS
N	23	B.O. STOPLIGHT

END OF TESTING!

TA 349440

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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15. HEADLAMP (ONE SIDE) INOPERATIVE

Test 1. Test headlamp connector voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuits 18 and 91 at headlights.

Step 3. Place battery switch to ON position.

Step 4. Place lighting switch to SERVICE DRIVE position, and press dimmer switch to LOW BEAM.

Step 5. Set multimeter to 50 volt range.

Step 6. Connect meter positive lead to circuit 18 wire and negative lead to circuit 91 wire, as shown.

a. Meter should indicate battery voltage. If battery voltage is not indicated, reposition selector switch from SERVICE DRIVE to OFF and back to SERVICE DRIVE.

b. If malfunction is not cleared wiring harness from headlamp to selector switch or the switch itself is defective. Go to malfunction 16.

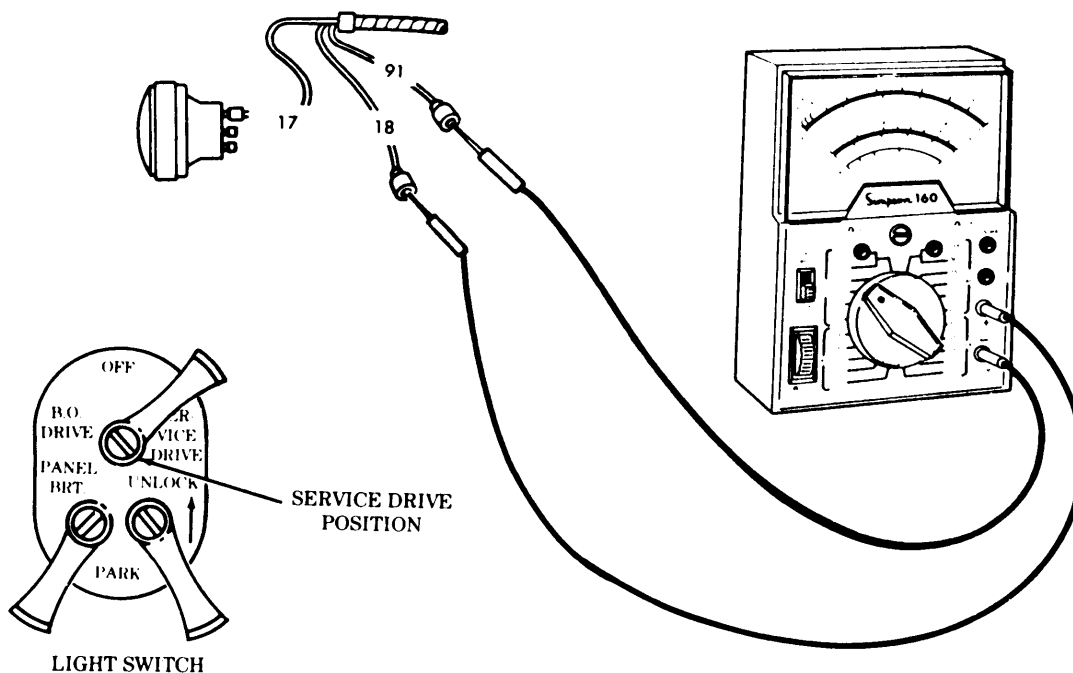
c. If voltage is present and malfunction is not cleared, go to malfunction 16, test 2.

Step 7. Visually inspect headlamp body pin connector for corrosion and loose connections.

a. Clean corroded parts.

b. Tighten loose connections.

c. If malfunction is not cleared, go to malfunction 16, test 2.



END OF TESTING!

TA349441

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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16. HEADLAMPS (BOTH SIDES) INOPERATIVE

Test 1. Test headlamps connector voltage for both sides. See malfunction 15, test 1.

Test 2. Test headlamp beam selector switch.

Step 1. Place battery switch and light switch to OFF position.

Step 2. Disconnect circuit 17 wire and circuit 18 wire at beam selector switch.

Step 3. Set multimeter to 50 volt range.

Step 4. Place battery switch to ON position.

Step 5. Place light switch to ON position.

Step 6. Connect meter positive lead to terminal 17 on switch. Connect negative lead to vehicle chassis ground as shown.

Step 7. Make note of meter reading.

Step 8. With meter negative lead connected to ground, connect positive meter lead to exposed terminal 18 on switch.

Step 9. Make note of meter reading.

a. If battery voltage was indicated at terminals 17 or 18 on switch, but not at headlamps, the wiring harness is defective. Notify DS maintenance to replace headlamp harness.

b. If battery voltage WAS NOT indicated at terminals 17 or 18 on switch, go to step 10.

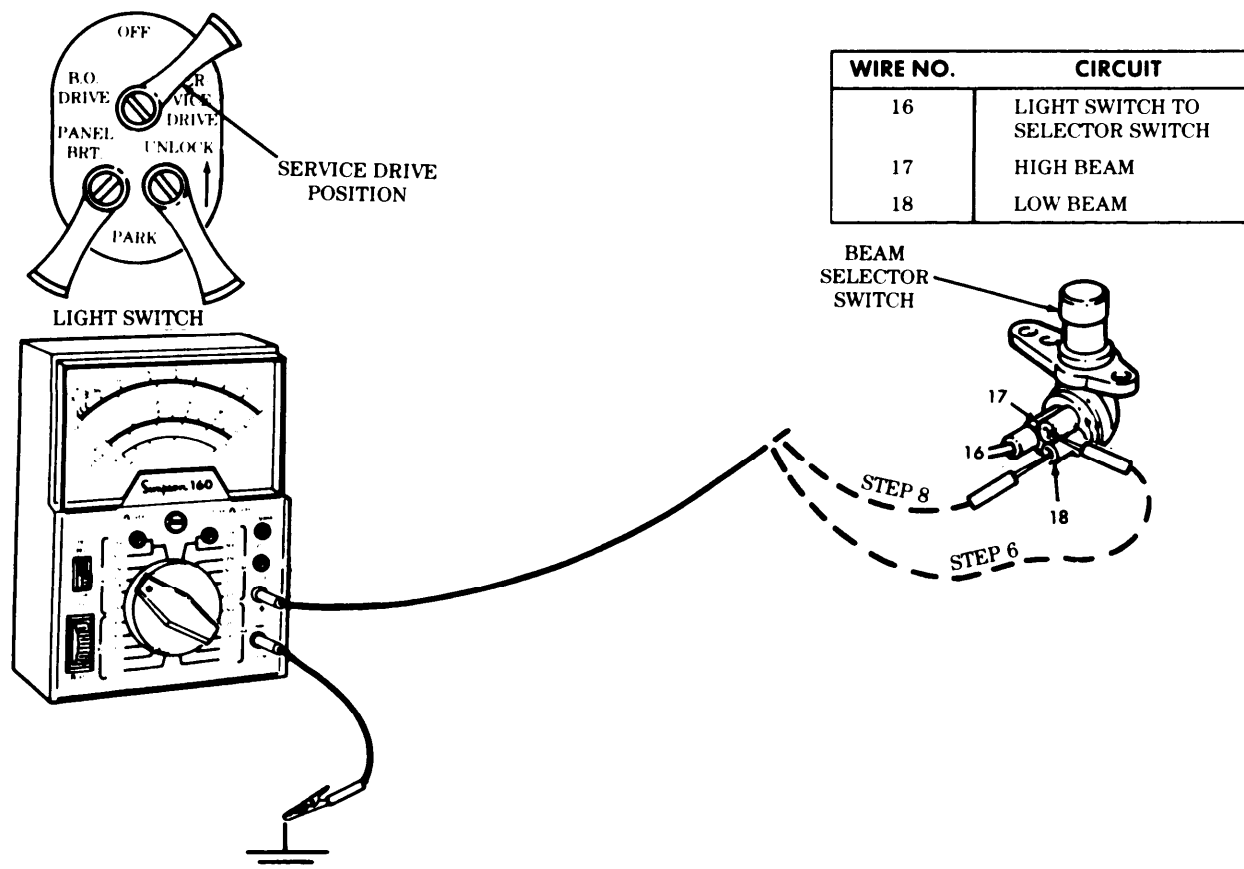
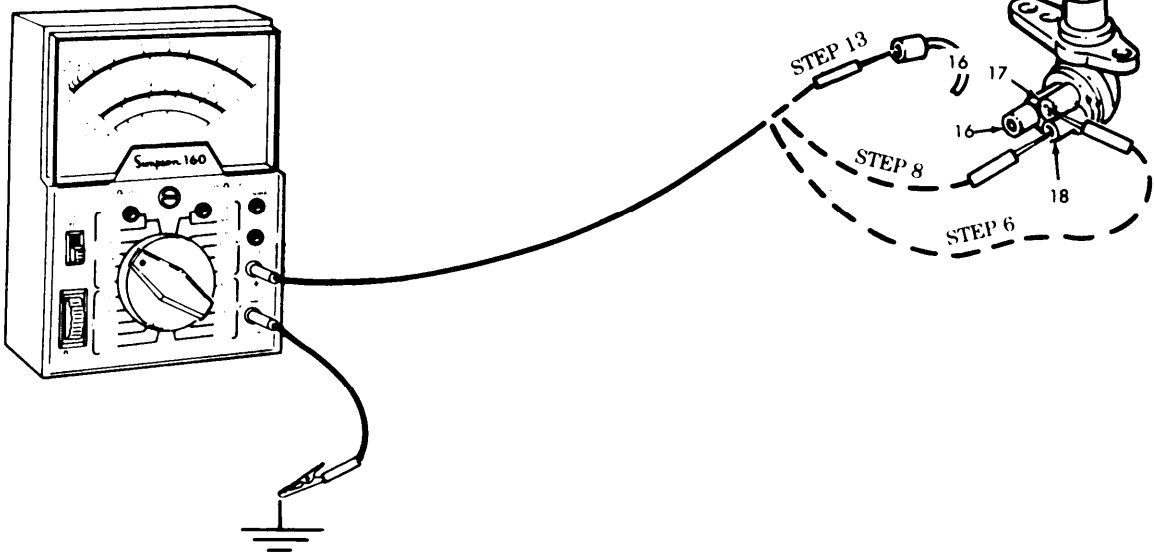
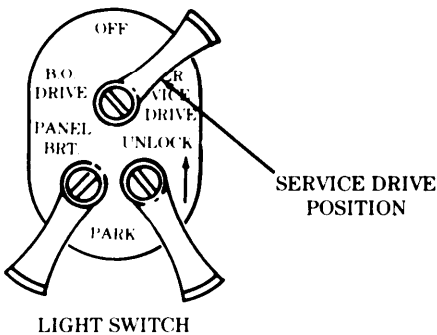


Table 2-3, Electrical Troubleshooting Cont'd]

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Step 10. Operate headlamp beam selector switch, repeat steps 6 through 9.
- a. If battery voltage was indicated at terminals 17 and 18 alternately as switch was operated, but not at the headlamps, wiring harness is defective. Notify DS maintenance.
 - b. If battery voltage was not indicated at terminals 17 and 18 alternately as switch was operated, go to step 11.
- Step 11. Place battery switch and light switch to OFF position.
- Step 12. Disconnect circuit 16 wire from beam selector switch.
- Step 13. Place battery switch to ON, and light switch to SERVICE DRIVE position.
- Step 14. With negative lead of meter connected to ground, connect positive lead of meter to circuit 16 wire (not the switch terminals). Meter should indicate battery voltage.
- a. If battery voltage is indicated, replace headlamp beam selector switch (para. 4-39).
 - b. If battery voltage is not indicated, go to light switch and connector voltage test (malfunction 14. test 4).

WIRE NO.	CIRCUIT
16	LIGHT SWITCH TO SELECTOR SWITCH
17	HIGH BEAM
18	LOW BEAM



END OF TESTING!

Table 2-3 Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

17. BLACKOUT DRIVE OR BLACKOUT MARKER LIGHT INOPERATIVE

Test 1. Test front blackout lamp connector voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 19 wire at blackout drive light. Disconnect circuit 20 wire at both left and right front composite lights.

Step 3. Place battery switch to ON position.

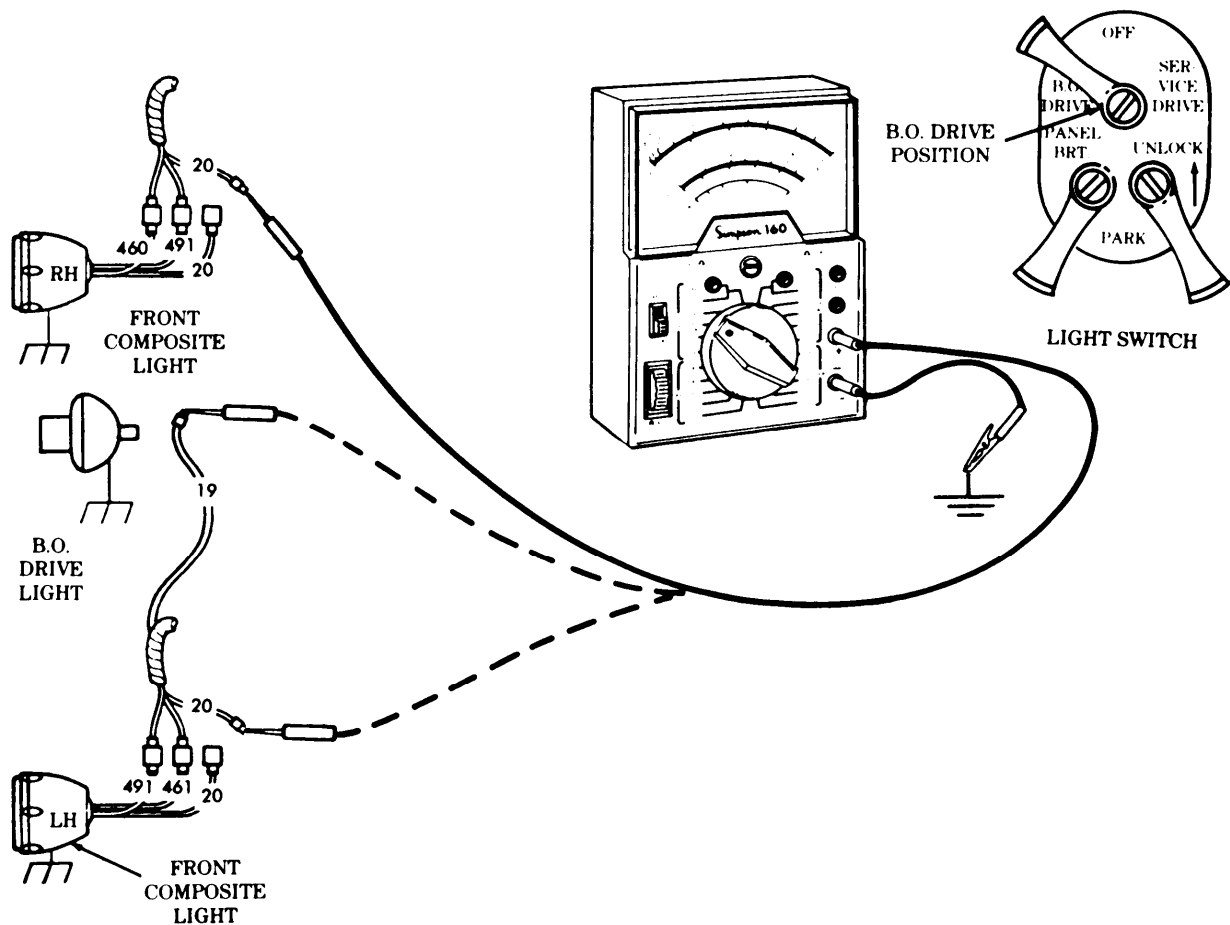
Step 4. Place light switch to B.O. DRIVE position.

Step 5. Set multimeter to 50 volt range.

Step 6. Connect meter negative lead to vehicle chassis ground as shown. Touch positive lead to each of disconnected circuit wires and note voltage indication through each wire.

a. If battery voltage WAS indicated, replace beam unit (para. 4-32) or bulb (para. 4-33).

b. If battery voltage WAS NOT indicated, go to malfunction 14, test 4.



END OF TESTING!

TA349444

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

18. STOPLIGHT INOPERATIVE

Test 1. Test stoplight switch voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect both circuit 75 wires at stoplight switch.

Step 3. Place battery switch to ON and light switch to stoplight position.

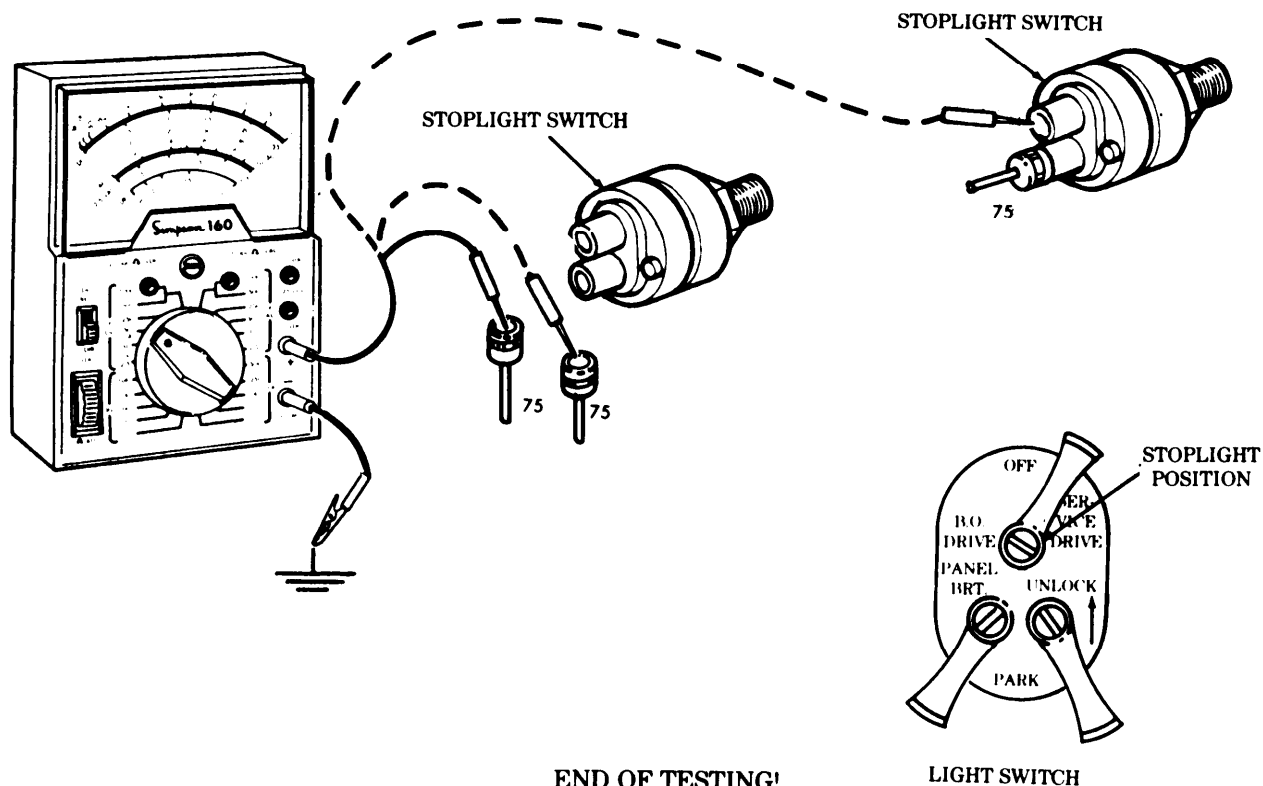
NOTE

For stoplight circuit test, brake pedal must be depressed and air pressure maintained.

Step 4. Set multimeter to 50 volt range.

Step 5. Connect meter negative lead to a good ground and meter positive lead to each exposed circuit 75 wire and note voltage indicated.

- Meter should indicate battery voltage through one of the circuit 75 wires. If no voltage is present, go to malfunction 14, test 4. If voltage IS indicated, connect that wire to one terminal of stoplight switch.
- With brake pedal depressed, connect meter positive lead to exposed stoplight switch terminal, Meter should indicate battery voltage.
- If battery voltage IS indicated, the stoplight switch is operational. If no voltage is indicated, replace stoplight switch (para. 4-42).



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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

19. REAR LIGHTS INOPERATIVE

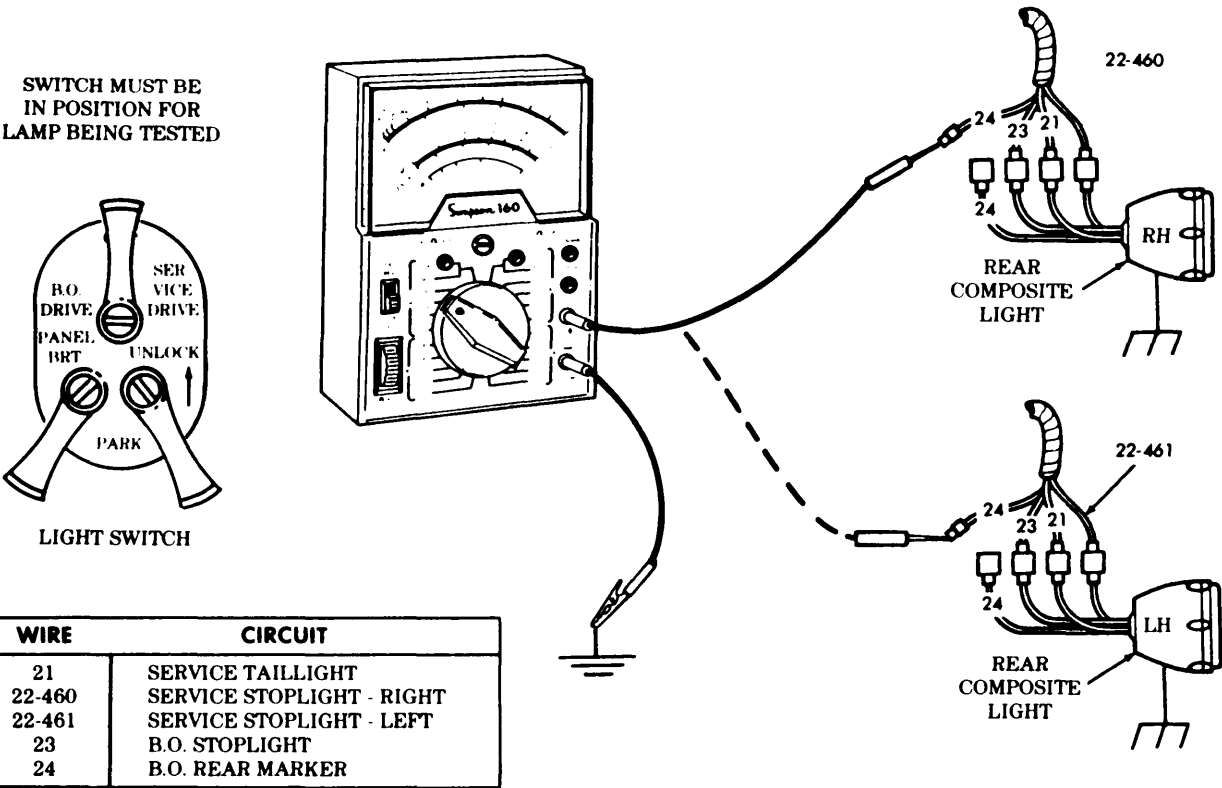
Test 1. Test rear lamp connector voltage.

- Step 1. Place battery switch to OFF position.
- Step 2. Disconnect circuit wire corresponding to inoperative rear lamp.
- Step 3. Place battery switch to ON position.
- Step 4. Place light switch to position corresponding to disconnected circuit wire.

NOTE

For stoplight circuit test, brake pedal must be depressed and air pressure maintained.

- Step 5. Set multimeter to 50 volt range.
- Step 6. Connect meter negative lead to vehicle chassis ground as shown. Touch positive lead to disconnected wire. Light switch must be in the corresponding position. Note voltage indication.
 - a. If battery voltage WAS indicated, replace bulb. If new bulb fails to operate, go to malfunction, 14, test 2.
 - b. If battery voltage WAS NOT indicated, go to malfunction 14, test 4.



END OF TESTING!

Table 2-3. Electrical Troubleshooting [Cont'd]

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

20. ONE OR MORE TRAILER LIGHTS INOPERATIVE

Test 1. Test trailer receptacle voltage.

Step 1. Place battery switch to ON position.

Step 2. Place light switch to position corresponding to inoperative lamp.

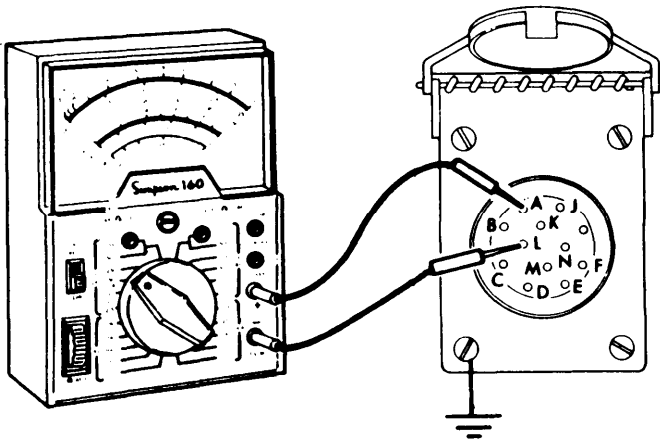
NOTE

For stoplight circuit test, brake pedal must be depressed and air pressure maintained,

Step 3. Set multimeter to 50 volt range.

Step 4. Connect meter negative lead to socket terminal pin L on receptacle, as shown. Touch positive lead on appropriate connector socket of circuit being tested. Light switch must be in corresponding position.

- a Battery voltage should be indicated at connector socket being tested.
- b. If battery voltage WAS NOT indicated at one or more of pins being tested, go to test 2.
- c. If voltage WAS indicated, disconnect and reconnect male connector to ensure positive connection. If trailer lamps still do not light, check male connection for corrosion.
- d. If trailer lamps still do not light, check trailer lighting system.



PIN	WIRE NO.	CIRCUIT
A	24	REAR B.O. MARKER (L.H.)
B	22-461	SERVICE STOPLIGHT (L.H.)
C	24	REAR. B.O.MARKER (R.H.)
D	90	GROUND TO FRAME
E	21	SERVICE TAILLIGHT
F	23	B.O. STOPLIGHT
H	490	B.O. MARKER LIGHTS
J	22-460	SERVICE STOPLIGHT (R.H.)
K	37	AUXILIARY POWER
L	90	GROUND TO FRAME
M	NONE	NOT USED
N	NONE	NOT USED

NOTE: REFER TO TRAILER MANUAL FOR TYPE AND LOCATION OF LIGHTS ON TRAILER

Table 2-3. Electrical Troubleshooting (Cont'd)

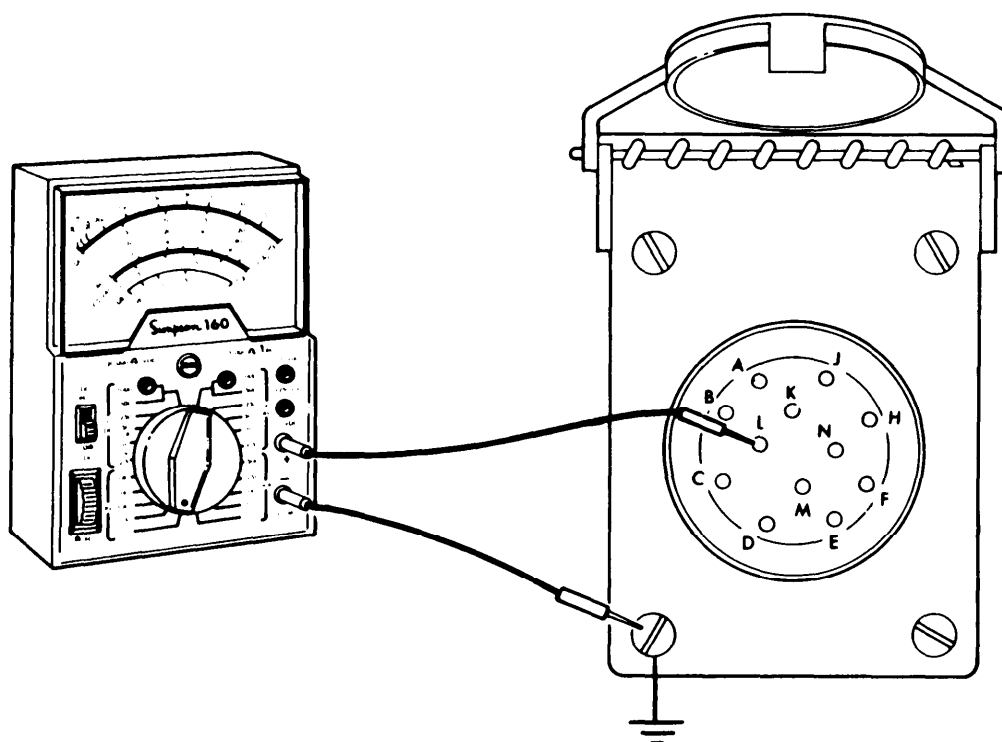
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Check trailer receptacle ground.

Step 1. Set multimeter on RX 1 for continuity reading.

Step 2. Connect meter positive lead to circuit 90 wire at socket (receptacle terminal L and then D) and negative to chassis. Meter should indicate continuity from both L and D to chassis.

- a. If continuity WAS indicated, go to malfunction 14, test 4.
- b. If continuity WAS NOT indicated, repair broken circuit 90 wire.

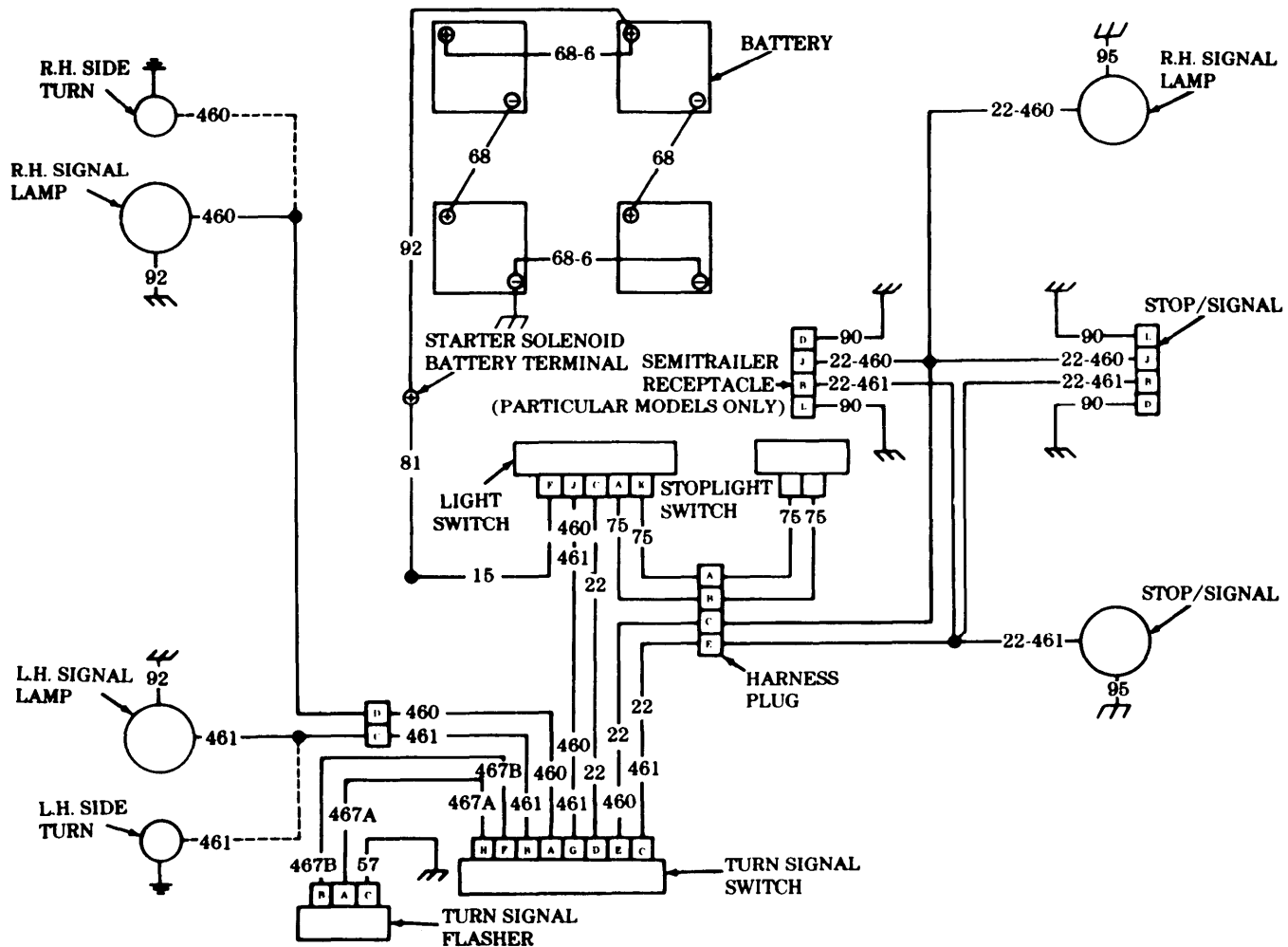


END OF TESTING!

TA349440

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

DIRECTIONAL SIGNAL SYSTEM**21. INDIVIDUAL LAMPS DO NOT LIGHT WITH DIRECTIONAL SIGNAL CONTROL LEVER IN ANY ON POSITION**

Test 1. Check for defective lamp.

Step 1. Place battery switch to ON position, and light switch to STOP TURN position.

Step 2. With air pressure maintained, depress brake pedal.

- a. If stop signal lamp lights, go to test 2.
- b. If stop signal lamp does not light, replace.

Test 2. Test wiring harness voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 460, 461, 22-460 and 22-461 wires from lights.

Step 3. Place battery switch to ON position.

Step 4. Place light switch to STOP TURN position.

Step 5. Place directional signal control lever to HAZARD warning position.

TA349449

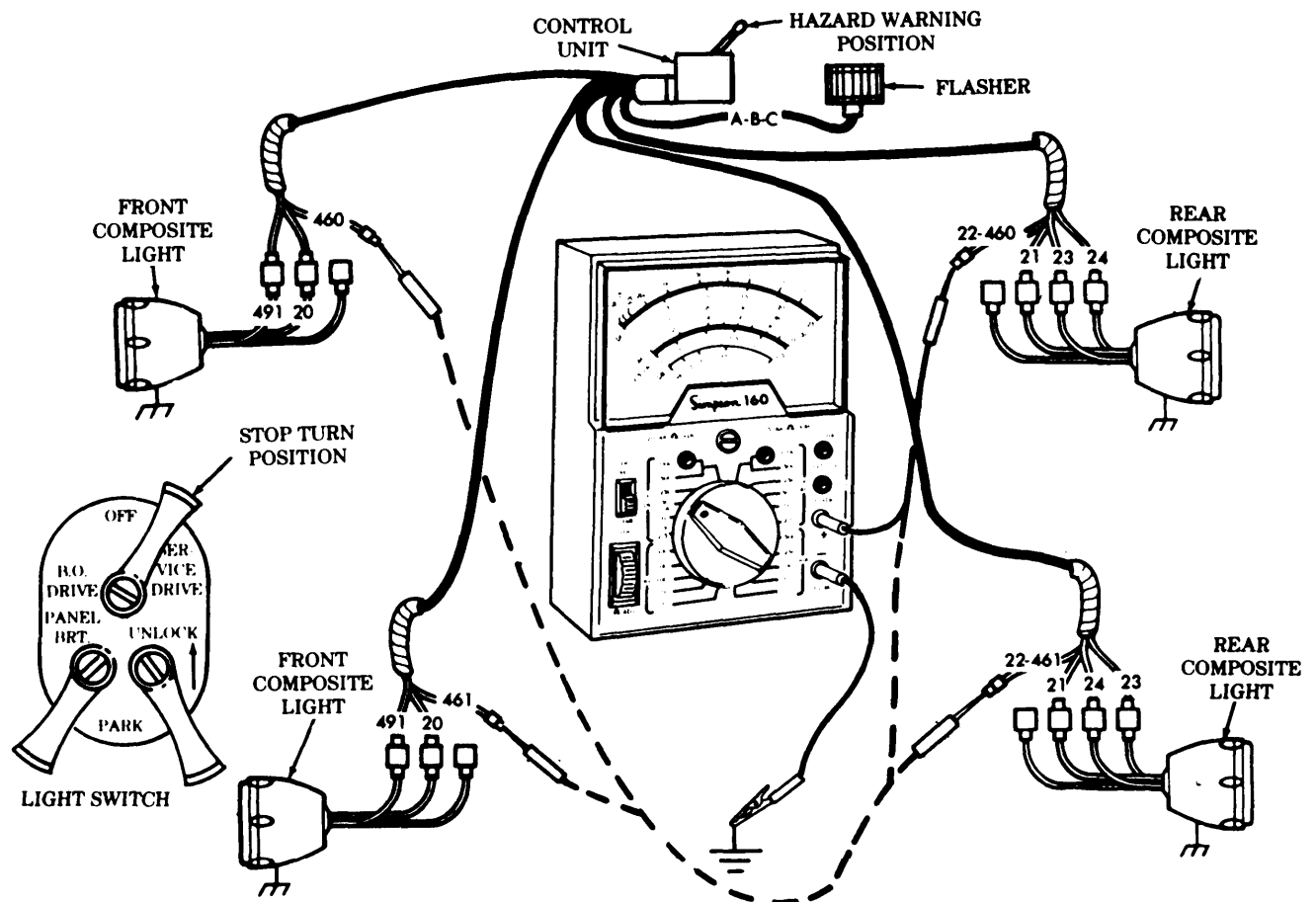
Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 6. Set multimeter to 50 volt range.

Step 7. Connect meter negative lead to vehicle chassis ground. Touch positive lead to center contact of circuit (460, 461, 22-460, or 22-461) wire as shown.

- Meter needle should deflect at a rate of 1 to 2 cycles per second. If meter DOES deflect, clean light socket.
- If meter DOES NOT deflect, go to test 3.



Test 3. Test wiring harness continuity.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect wire connector from control unit and disconnect wire from defective light at lamp base.

Step 3. Place a jumper wire from disconnected light wire at light to ground.

Step 4. Set multimeter to RX1 for continuity reading.

Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to control unit harness connector socket point for wire that was jumped to ground.

TA349450

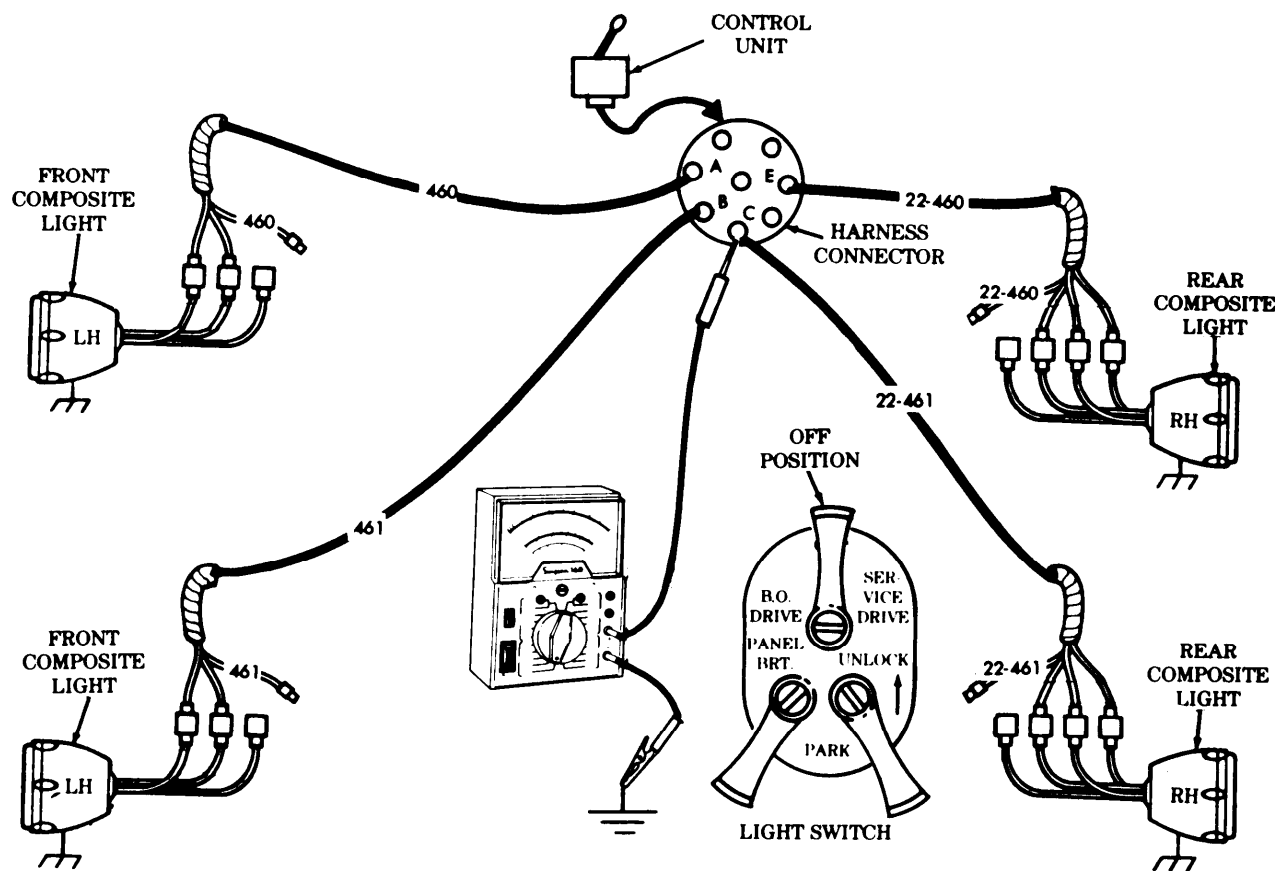
Table 2-9. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

- Step 6. Meter should read continuity. If continuity IS NOT read, check wiring harness for broken, frayed, or pinched wires.
- a. Repair broken, frayed, or pinched wires (para 4-49).
 - b. If system is still not operational go to test 4.

Test 4. Test wiring harness for short.

- Step 1. Remove jumper wire from light wire to ground that was connected in test 3, step 3.
- Step 2. With multimeter set for continuity, and wires disconnected as in step 1, connect meter negative lead to vehicle chassis ground. Touch positive lead to wire corresponding to defective circuit as shown.
- Step 3. Meter should NOT read continuity (infinite reading). If there is a reading the wiring harness has a short circuit.
- Step 4. Check harness for short circuit by visually locating frayed or pinched wires.
- a. Repair frayed or pinched wires (para. 4-49).
 - b. If system is still not operational, go to malfunction 22.



END OF TESTING!

TA349451

Table 2-3 Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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22. NO LIGHTS OPERATE WITH DIRECTIONAL SIGNAL CONTROL LEVER IN ANY ON POSITION.

Test 1. Test control unit voltage feed.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect connector control unit harness from directional signal control unit.

Step 3. Place battery switch to ON position.

Step 4. Place light switch to STOP TURN position.

Step 5. Set multimeter to 50 volt range.

Step 6. Connect meter negative lead to vehicle chassis ground and connect meter positive lead to connector terminal point G as shown.

a. Meter should indicate battery voltage. If battery voltage WAS NOT, indicated go to malfunction 14, test 4.

b. If battery voltage WAS indicated, go to test 2.

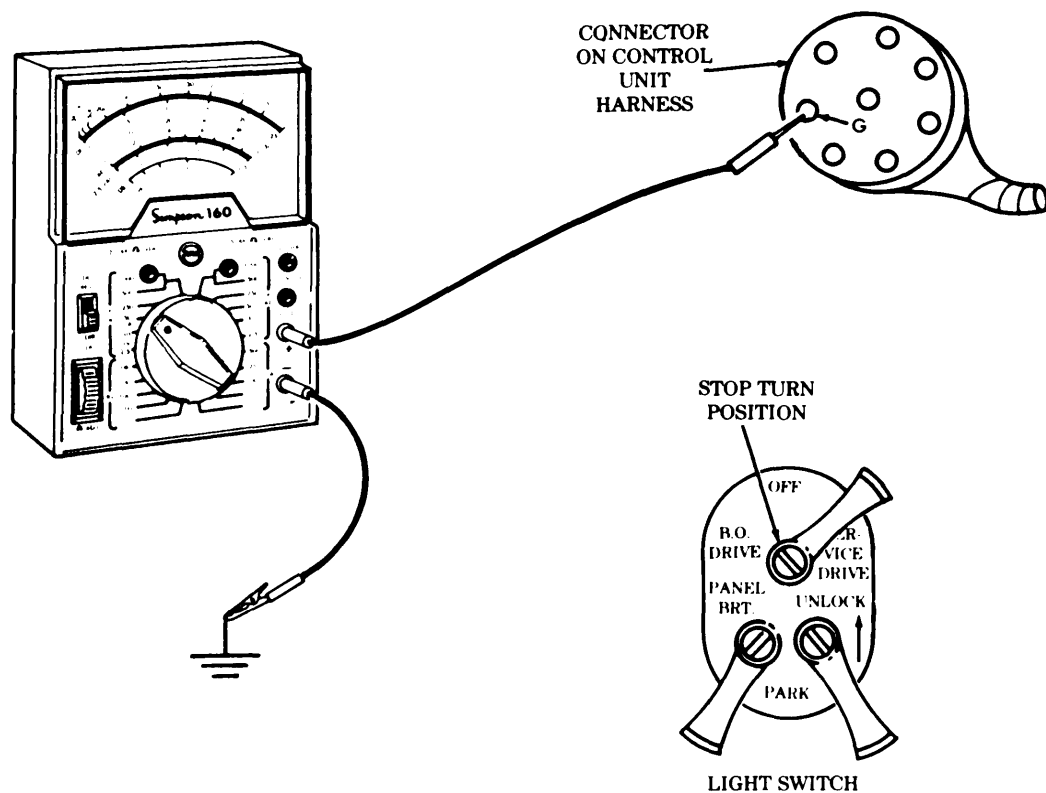
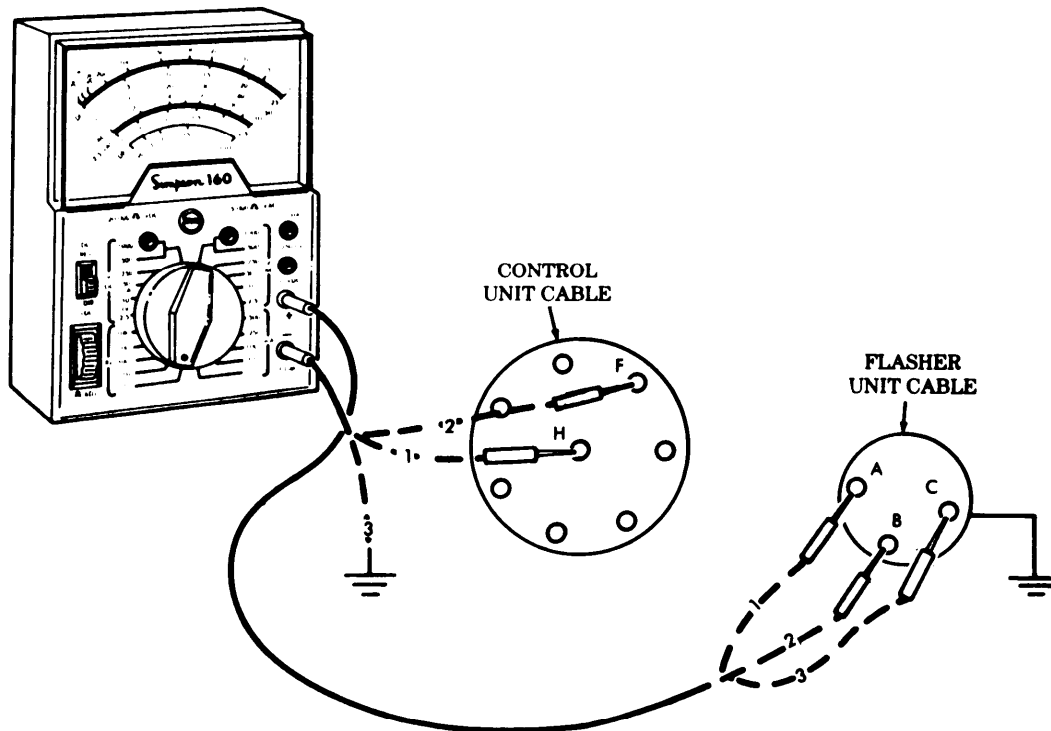


Table 2-3, Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Flasher harness continuity test,

- Step 1. Set multimeter to RX1, and connect positive lead to terminal A of flasher unit. Connect negative lead to terminal H of control unit cable, and observe meter for continuity.
- Step 2. Connect meter negative lead to terminal F of control unit socket, positive lead to terminal B of the flasher unit, and observe meter for continuity.
- Step 3. Connect meter positive lead to terminal C of the flasher unit connector. Connect meter negative lead to ground, and observe meter for continuity.
 - a. If any circuit does not have continuity, repair (para. 4-49),
 - b. If all circuits have continuity, and turn signals still do not work, replace flasher (para. 4-43).
 - c. If turn signals still do not work, go to malfunction 23.



END OF TESTING!

TA349453

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
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23. SYSTEM OPERATES INCORRECTLY IN ONE OR MORE POSITIONS OF DIRECTIONAL SIGNAL CONTROL LEVER

Test 1. Test directional signal control unit continuity.

Step 1. Place battery switch to OFF position.

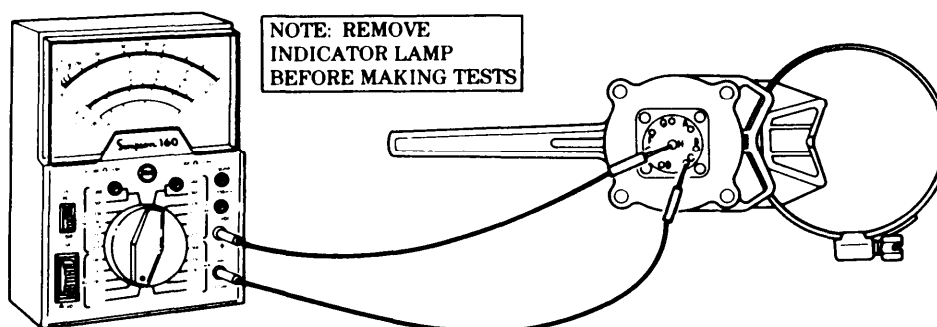
Step 2. Remove harness connector from control unit.

Step 3. Remove indicator lamp from directional signal control (para. 4-44).

Step 4. Set multimeter to RX1 for continuity reading.

Step 5. Set control lever in each of four operating positions and test as shown.

If any circuit does not test as shown in tables below, replace directional signal control unit (para. 4-44).



CONTROL UNIT TEST CHART

A. DIRECTIONAL SIGNAL CONTROL LEVER IN "NEUTRAL" POSITION			C. DIRECTIONAL SIGNAL CONTROL LEVER IN "RIGHT TURN" POSITION		
FROM PIN	TO PIN	CONTINUITY INDICATION	FROM PIN	TO PIN	CONTINUITY INDICATION
H	A	OPEN	F	G	SHORTED
H	B	OPEN	H	A	SHORTED
H	C	OPEN	H	E	SHORTED
H	E	OPEN	H	B	OPEN
D	C	SHORTED	H	C	OPEN
D	E	SHORTED	D	C	SHORTED
F	G	OPEN	D	E	OPEN
B. DIRECTIONAL SIGNAL CONTROL LEVER IN "LEFT TURN" POSITION			D. DIRECTIONAL SIGNAL CONTROL LEVER IN "HAZARD WARNING" POSITION		
FROM PIN	TO PIN	CONTINUITY INDICATION	FROM PIN	TO PIN	CONTINUITY INDICATION
H	B	SHORTED	H	A	SHORTED
H	C	SHORTED	H	B	SHORTED
H	A	OPEN	H	C	SHORTED
H	E	OPEN	H	E	SHORTED
F	G	SHORTED	D	E	OPEN
D	E	SHORTED	D	C	OPEN
D	C	OPEN	F	G	SHORTED

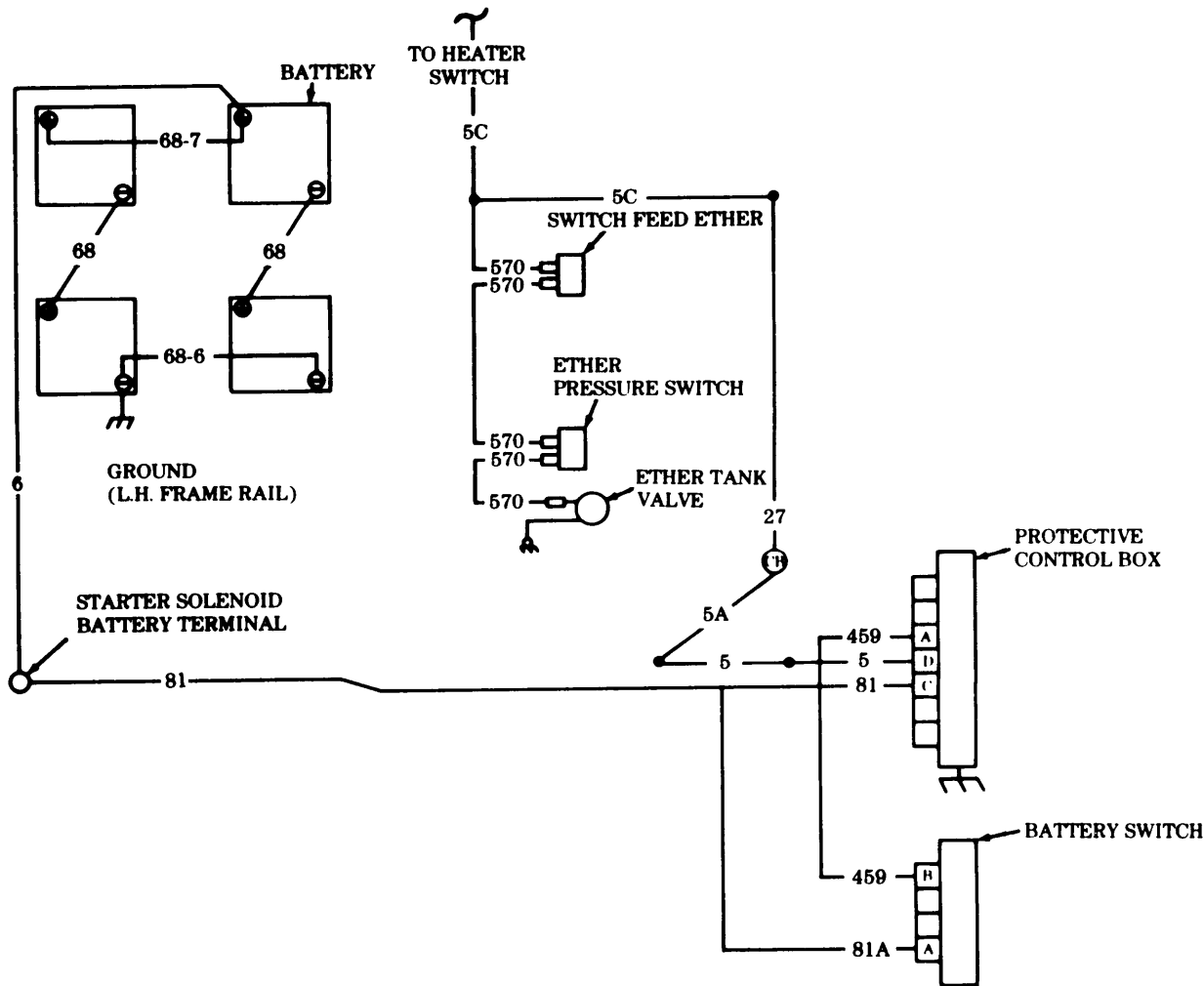
END OF TESTING!

TA349454

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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ETHER START SYSTEM



24. ENGINE CRANKS BUT WILL NOT START (FUEL AVAILABLE)

Test 1. Check ether cylinder.

- Step 1. Remove ether cylinder from ether valve, shake and listen for liquid splashing inside cylinder,
- a. If cylinder is empty, replace with full cylinder (para. 4-15) and try starting engine.
 - b. If cylinder is full, reinstall (para. 4-15) and proceed to test 2.

TA349455

Table 2-9. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Check ether start system electrical power source.

Step 1. Operate personnel heater blower motor with switch in HIGH position (TM 9-2320-272-10).

a. if personnel heater blower motor does not operate, see malfunction 36.

b. If personnel heater blower motor operates, go to test 3.

Test 3. Test circuit 570 for voltage at ether valve.

Step 1. Disconnect circuit 570 wire at ether valve.

Step 2. Set multimeter to 50 volts, connect positive lead to disconnected circuit 570 wire and meter negative lead to ground.

Step 3. Turn battery switch to ON.

Step 4. Crank engine, depress ether start switch and observe meter.

a. If meter indicates battery voltage and ether valve does not function, replace ether valve (para. 4-15).

b. If no voltage is indicated proceed to test 4,

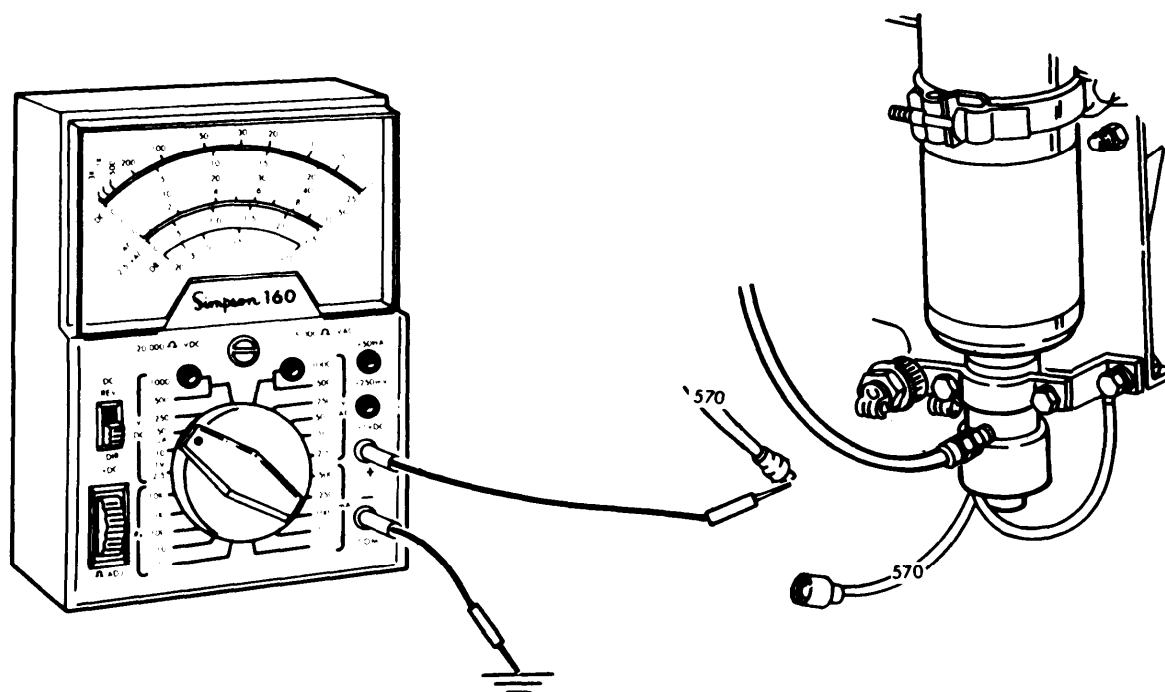


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 4. Test circuit 570 wire at fuel pressure switch.

Step 1. Disconnect circuit 570 wire to ether cylinder valve from fuel pressure switch.

Step 2. Connect meter positive lead to circuit 570 terminal on fuel pressure switch and negative lead to chassis ground.

Step 3. Crank engine, depress ether start switch and observe meter.

a. If meter indicates battery voltage, repair circuit 570 wire to ether valve (para 4-49).

b. If voltage is not indicated, go to step 4.

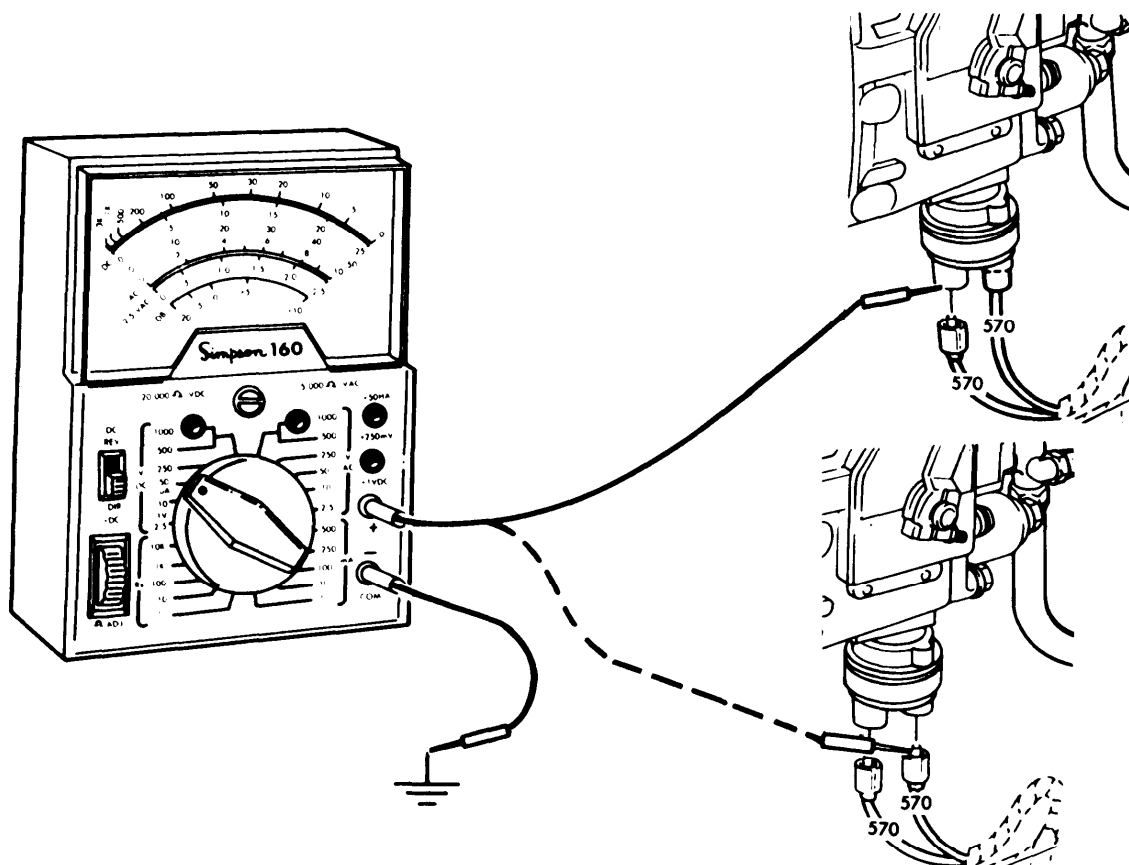
Step 4. Disconnect circuit 570 wire to ether start switch.

Step 5. Connect meter positive lead to circuit 570 wire from ether start switch and negative lead to chassis ground.

Step 6. Crank engine, depress ether start switch and observe meter.

a. If meter indicates battery voltage, replace fuel pressure switch (para. 4-16).

b. If battery voltage is not indicated, go to test 5.



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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 5. Test circuit 570 wire at ether start switch.

Step 1. Disconnect circuit 570 wire to fuel pressure switch from ether start switch.

Step 2. Connect meter positive lead to circuit 570 ether start switch connector and negative lead to chassis ground.

Step 3. Depress ether start switch and observe meter.

a. If meter indicates battery voltage, replace circuit 570 wire to fuel pressure switch (para. 4-49).

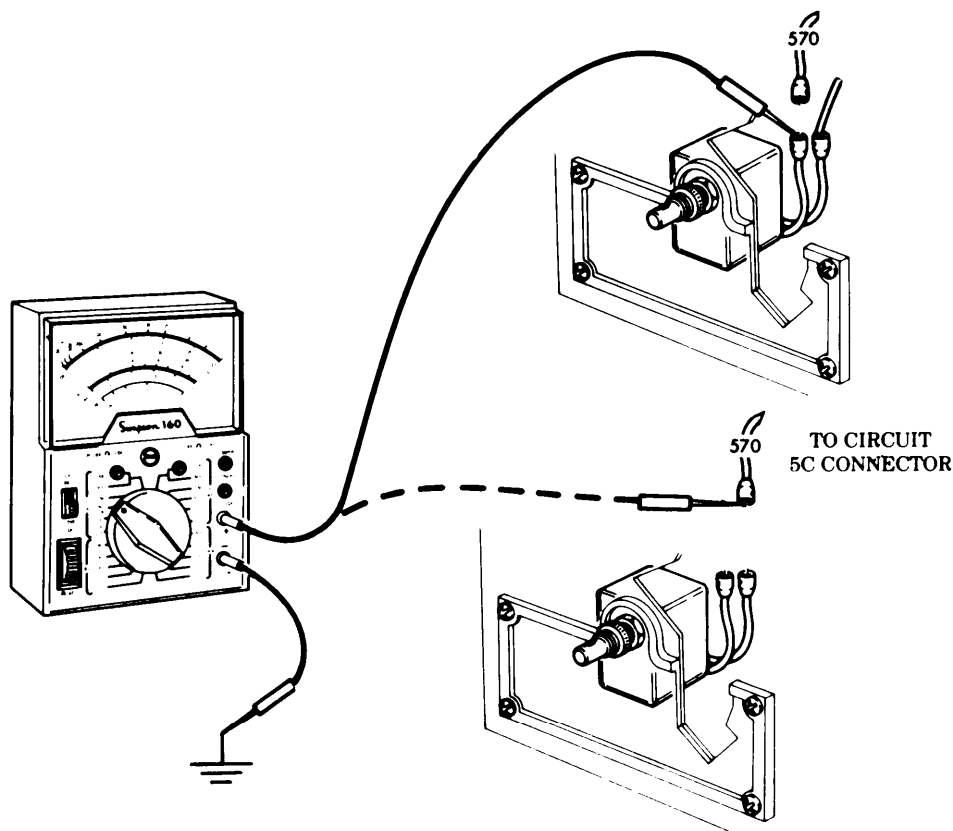
b. If voltage is not indicated, go to step 4.

Step 4. Disconnect circuit 570 wire to circuit 5C connector, at ether start switch.

Step 5. Connect meter positive lead to circuit 570 wire and negative lead to chassis ground.

a. If meter indicates battery voltage, replace ether start switch (para. 4-14).

b. If voltage is not indicated, replace circuit 570 wire to circuit 5C connector.



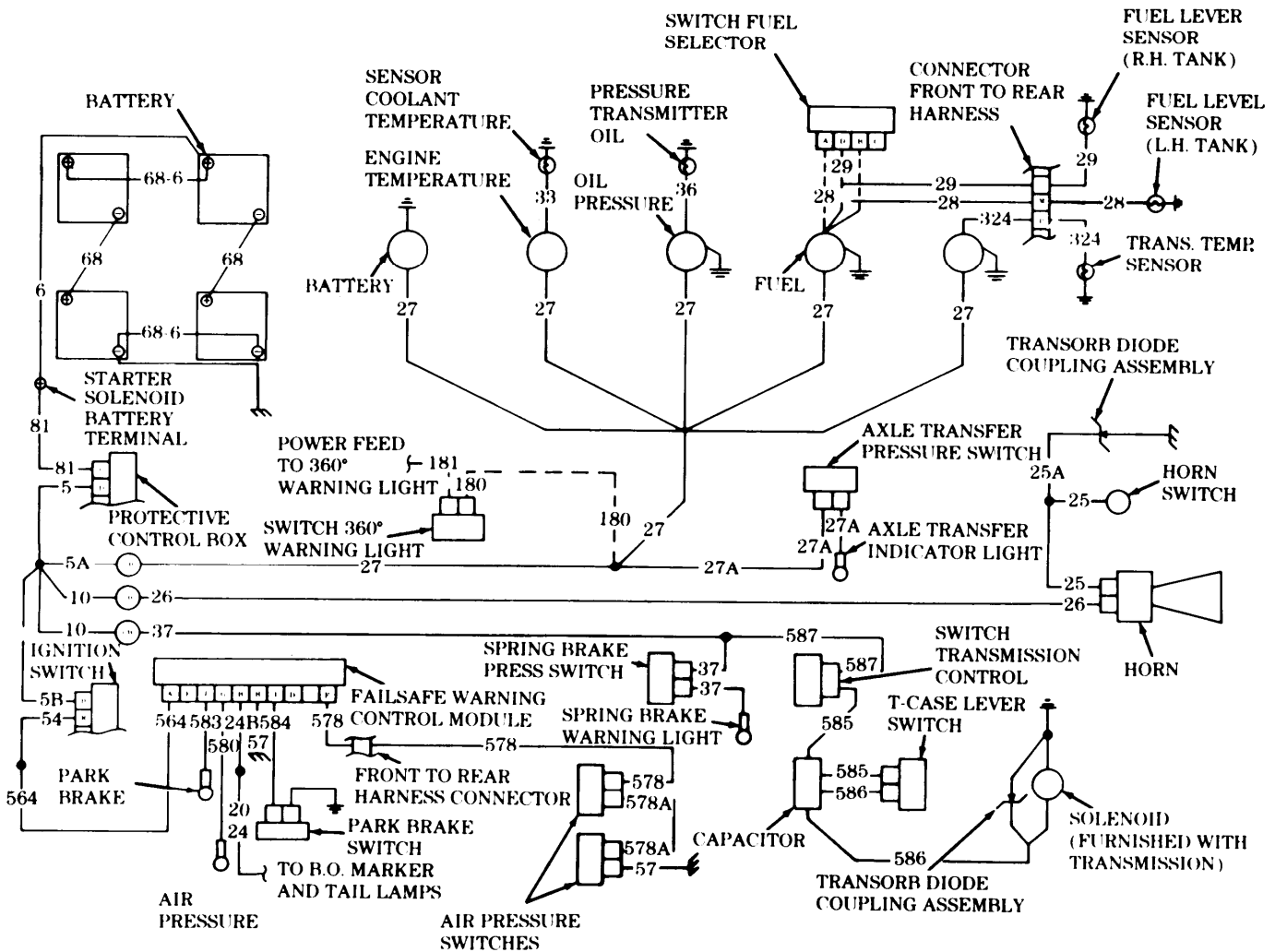
END OF TESTING!

TA349458

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

INDICATOR, GAGE, AND WARNING SYSTEM



25. ALL GAGES INOPERATIVE

NOTE

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

Test 1. Test instrument cluster voltage feed.

- Step 1. Place battery switch to OFF position.
- Step 2. Disconnect circuit 5A wire at circuit breaker.
- Step 3. Place battery switch to ON position.
- Step 4. Set multimeter to 50 volt range.

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- | | | |
|--|--|--|
| Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to circuit 5A wire as shown. Meter should indicate battery voltage. | | |
| a. If battery voltage IS indicated, go to step 6. | | |
| b. If battery voltage IS NOT indicated, go to malfunction 7, test 1. | | |
| Step 6. Place battery switch to OFF position. | | |
| Step 7. Reconnect circuit 5A wire and disconnect circuit 27 wire. | | |
| Step 8. Place battery switch to ON position. | | |
| Step 9. With meter negative lead connected to ground, touch positive lead to circuit 27 terminal of circuit breaker. | | |
| Meter should indicate battery voltage. If battery voltage IS NOT indicated, replace defective circuit breaker (para. 4-71). | | |

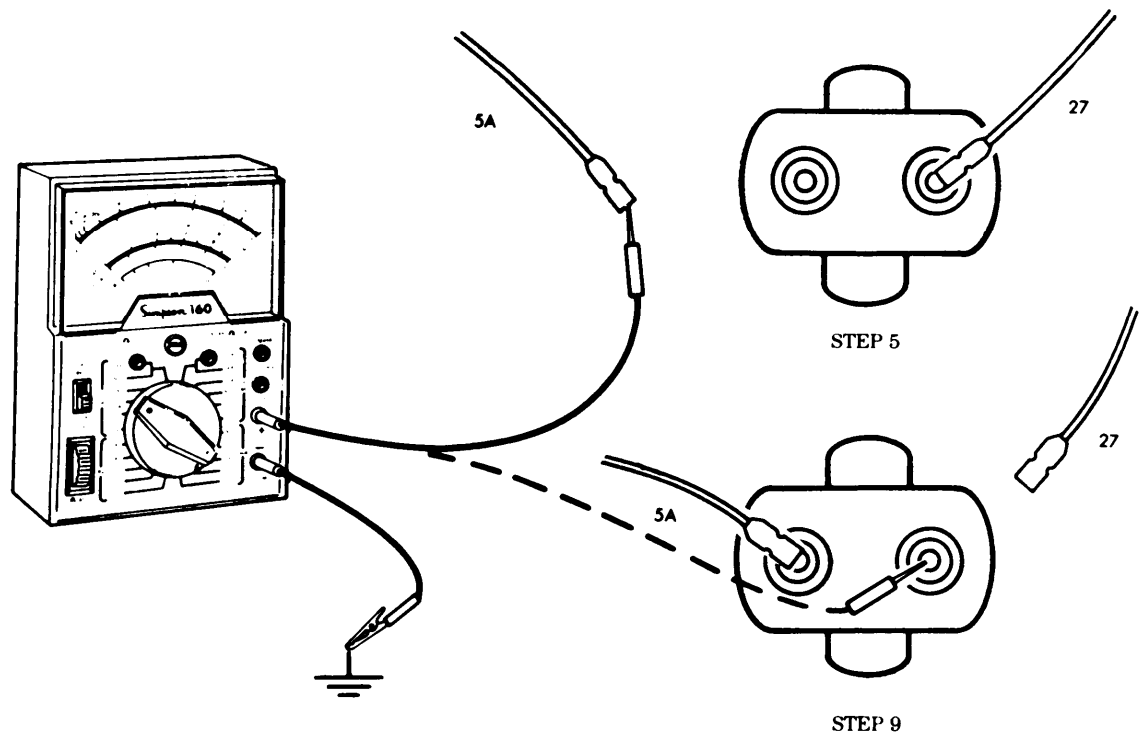


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Test instrument cluster for short circuit.

Step 1. Remove instrument cluster panel (para. 4-52).

Step 2. Place battery switch to OFF position.

Step 3. Disconnect circuit 27 wire connectors at each gage.

Step 4. Place battery switch to ON position.

Step 5. Connect one lead of a 24-volt test lamp to engine temperature gage disconnected circuit 27 wire. Connect other lead to ground. Reconnect each gage circuit 27 wire one at a time and note lamp indication. Lamp should be on each time.

Step 6. Disconnect oil pressure gage circuit 27 wire. Connect one lead of test lamp to disconnected oil pressure gage wire. Connect other lead to ground. Reconnect engine temperature disconnected wire and note lamp indication. Lamp should be on.

If lamp dimmed, blinked on and off, or went out as a gage was connected, that gage is shorted. Replace defective gage (para 4-53).

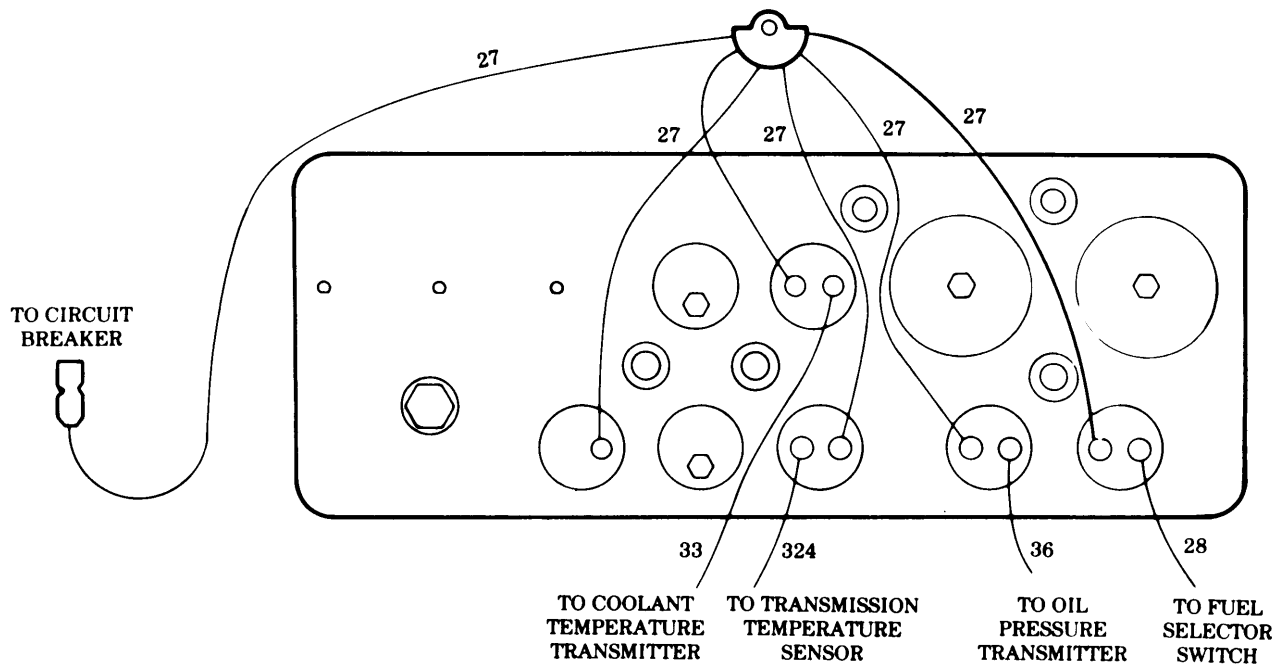


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 3. Test instrument cluster voltage.

Step 1. Place battery switch to OFF position.

Step 2. Remove instrument cluster panel (para. 4-52).

Step 3. Disconnect circuit 27 wire connector from any gage.

Step 4. Place battery switch to ON position.

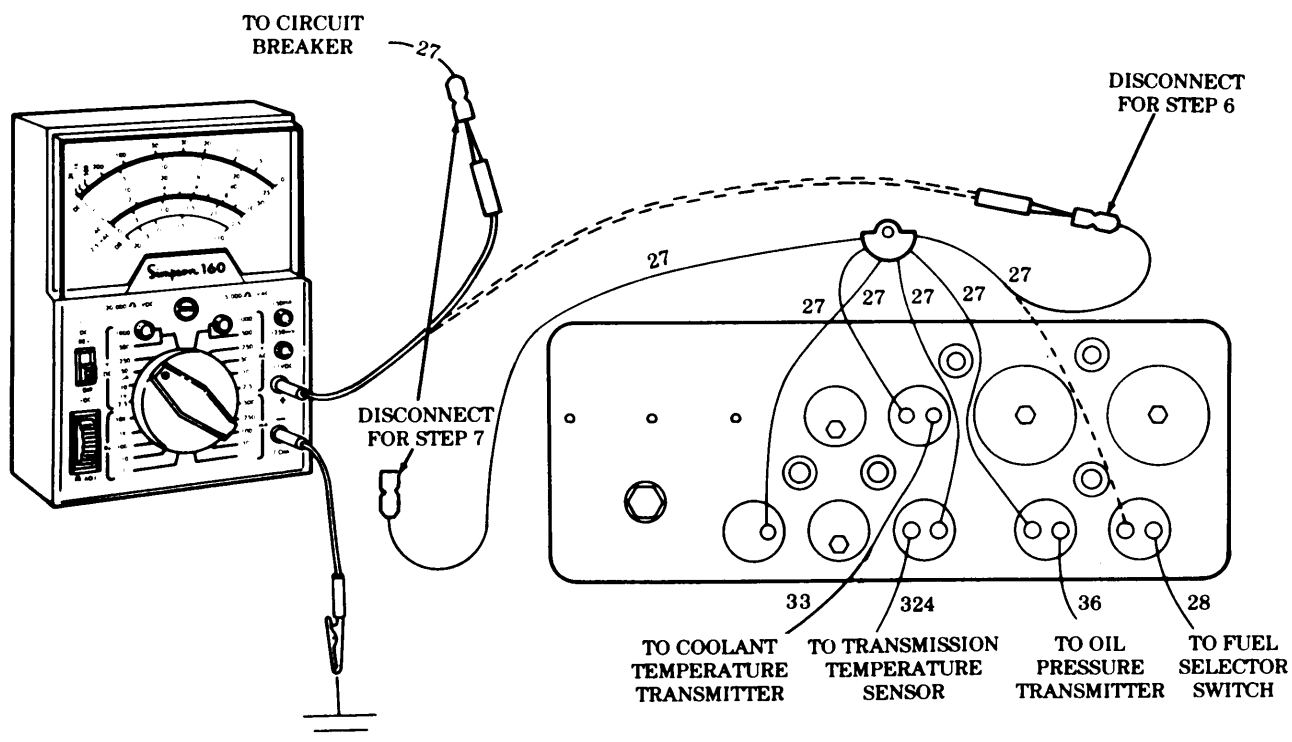
Step 5. Set multimeter to 50 volt range.

Step 6. Connect meter negative lead to vehicle chassis ground. Touch positive lead to disconnected circuit 27 wire connector as shown. Meter should indicate battery voltage.

If battery voltage IS NOT indicated, disconnect instrument cluster wire assembly from circuit 27 power wire,

Step 7. With meter negative lead connected to ground, touch positive lead to circuit 27 wire connector at the point where instrument cluster wire was disconnected. Meter should indicate battery voltage.

If battery voltage IS indicated, replace instrument cluster wire assembly. If battery voltage IS NOT indicated, and voltage was corrected in test 1, step 9, repair circuit 27 power wire (para. 4-49).



END OF TESTING!

TA349462

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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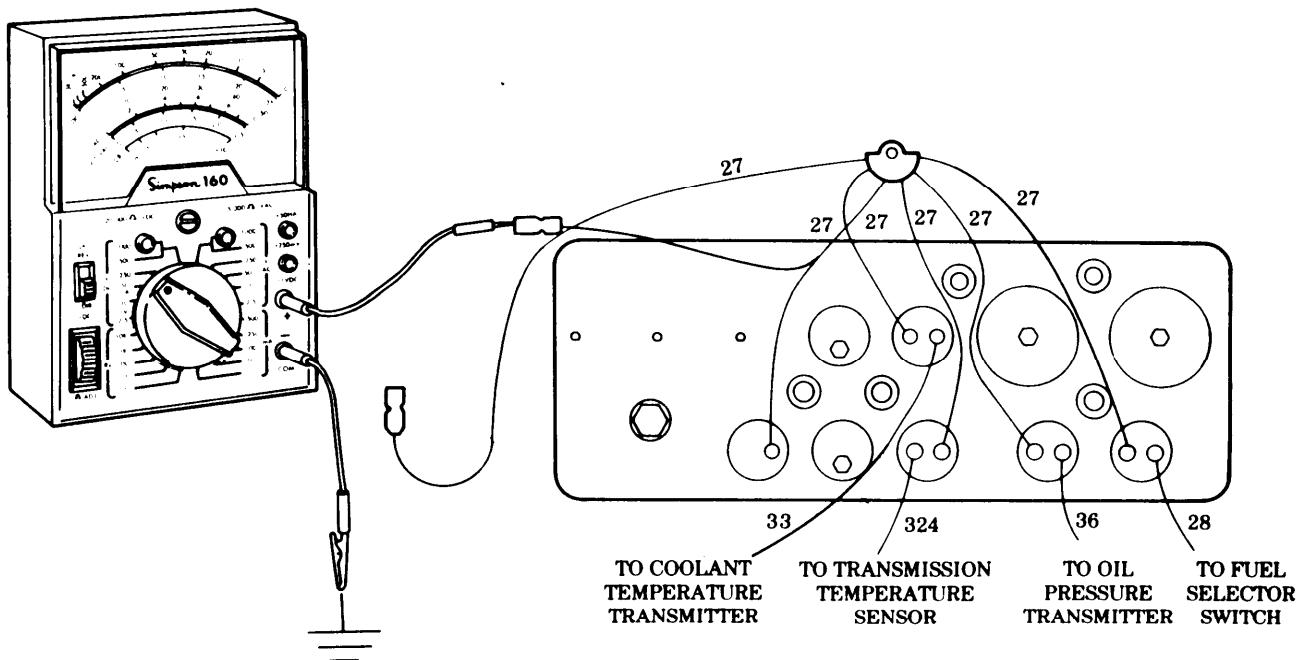
26. ONE GAGE INOPERATIVE

NOTE

If STE/ICE is available, perform NG 31 — gage test (chapter 2, section VI).

Test 1. Test individual gage voltage.

- Step 1. Place battery switch to OFF position.
 - Step 2. Remove instrument cluster panel (para 4-52).
 - Step 3. Disconnect circuit 27 wire connector from inoperative gage.
 - Step 4. Place battery switch to ON position.
 - Step 5. Set multimeter to 50 volt range,
 - Step 6. Connect meter negative lead to vehicle chassis ground. Touch positive lead to disconnected circuit 27 wire connector as shown. Meter should indicate battery voltage.
- If battery voltage IS NOT indicated, replace the instrument cluster wire assembly (para. 4-49). If battery voltage IS indicated, replace the defective gage (para. 4-53).



END OF TESTING!

TA349463

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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27. TEMPERATURE GAGE INOPERATIVE (coolant)

NOTE

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

Test 1. Test temperature gage voltage.

Step 1. Go to malfunction 26.

Test 2. Test the coolant temperature gage sending unit.

Step 1. Allow engine to cool.

Step 2. Set multimeter to RX 1 for resistance reading.

Step 3. Disconnect circuit 33 wire from temperature sending unit.

Step 4. Start vehicle engine.

Step 5. Connect meter negative lead to vehicle engine ground and connect positive lead to sending unit terminal 33 as shown. The meter reading should decrease as engine temperature increases.

If resistance does not show any decrease as temperature increases, replace temperature sending unit (para. 4-60).

Test 3. Test circuit 33 wire continuity.

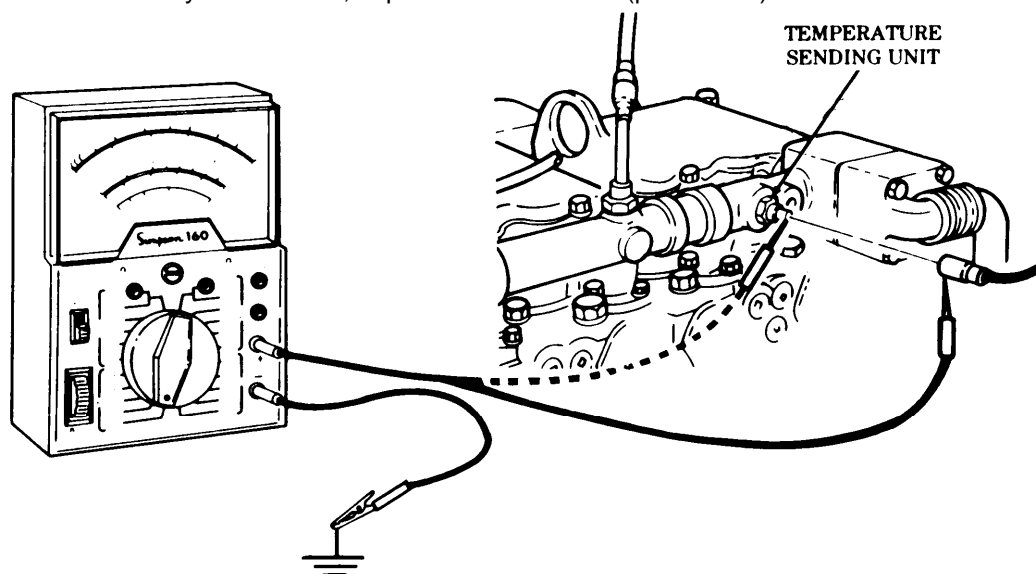
Step 1. Disconnect circuit 33 wire from temperature gage and temperature sending unit.

Step 2. Attach end of circuit 33 wire disconnected from temperature gage to chassis ground.

Step 3. Set multimeter to RX 1 for continuity reading.

Step 4. Connect meter negative lead to vehicle chassis ground and positive lead to circuit 33 wire disconnected from sending unit. Meter should read continuity.

If continuity is not read, repair circuit 33 wire (para. 4-49).



END OF TESTING!

TA349464

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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28. FUEL GAGE INOPERATIVE**WARNING**

Do not perform testing near fuel tank with fill cap or sending unit removed. Fuel may ignite, causing injury to personnel.

NOTE

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

Test 1. Test fuel level gage voltage. Go to malfunction 26.

Test 2. Test fuel level sending unit.

Step 1. Disconnect circuit wire from inoperative sending unit (wire 28 for left hand tank wire 29 for right hand tank).

Step 2. Place battery switch to ON position and fuel selector switch to affected tank.

Step 3. Set multimeter to 50 volt range.

Step 4. Connect meter negative lead to vehicle chassis ground, and positive lead to disconnected circuit wire as shown.

Meter should indicate battery voltage. If battery voltage IS indicated, replace fuel level sending unit (para. 4-59).

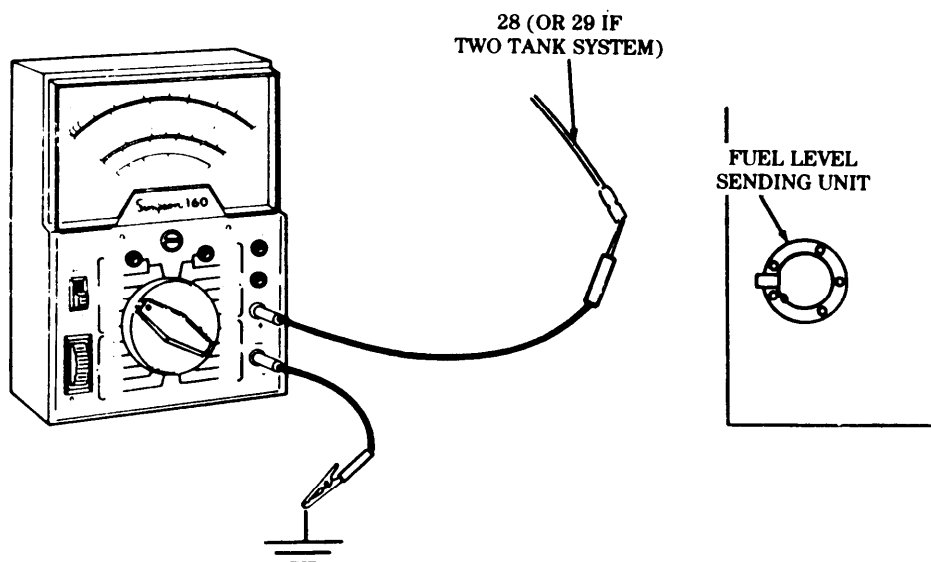


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 3. Test circuit wire of affected tank.

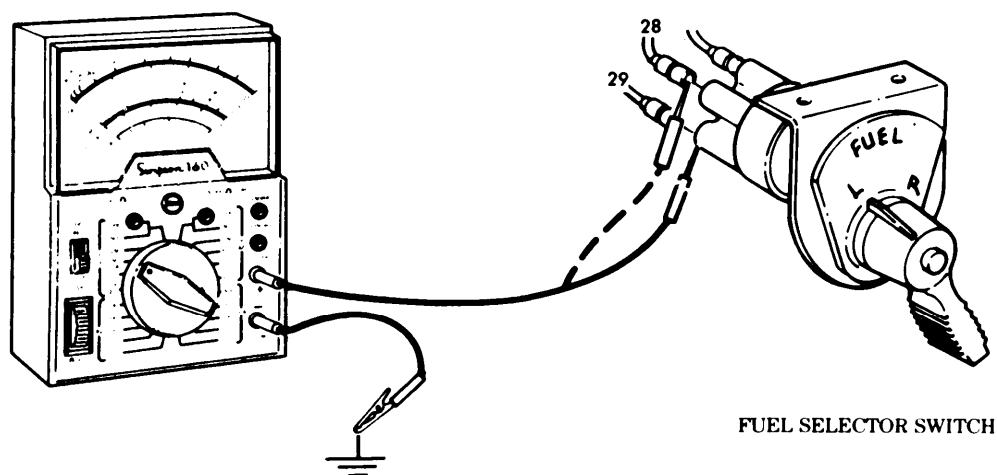
- Step 1. Disconnect circuit affected from fuel selector switch (right hand tank wire 29, pin D, left hand tank wire 28, pin B).
- Step 2. Place battery switch to ON position and set fuel selector switch to affected tank.
- Step 3. Set multimeter to 50 volt range.
- Step 4. Connect meter negative lead to vehicle chassis ground and positive lead to affected pin on the fuel selector switch.

Meter should indicate battery voltage. If battery voltage IS indicated, repair affected wire from switch to sending unit (para. 4-49). IF NOT, continue with test 4.

Test 4. Test fuel selector switch.

- Step 1. Disconnect circuit 28 wire from pin A of fuel selector switch.
- Step 2. Place battery switch to ON position.
- Step 3. Set multimeter to 50 volt range.
- Step 4. Connect meter negative lead to vehicle chassis ground, and touch positive lead to connector of disconnected circuit 28 wire.

Meter should indicate battery voltage. If battery voltage IS indicated, replace fuel selector switch (para. 4-41). IF NOT repair circuit 28 wire (para. 4-49). Fuel and warning signal lamp switches are removed identically.



END OF TESTING!

TA349466

Table 2-3, Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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29. BATTERY-ALTERNATOR GAGE INOPERATIVE**NOTE**

If STE/ICE is available, perform NG31 — gage test (chapter 2, section VI).

Test 1. Test battery-alternator indicator voltage. Go to malfunction 26.

Test 2. Check battery-alternator indicator continuity.

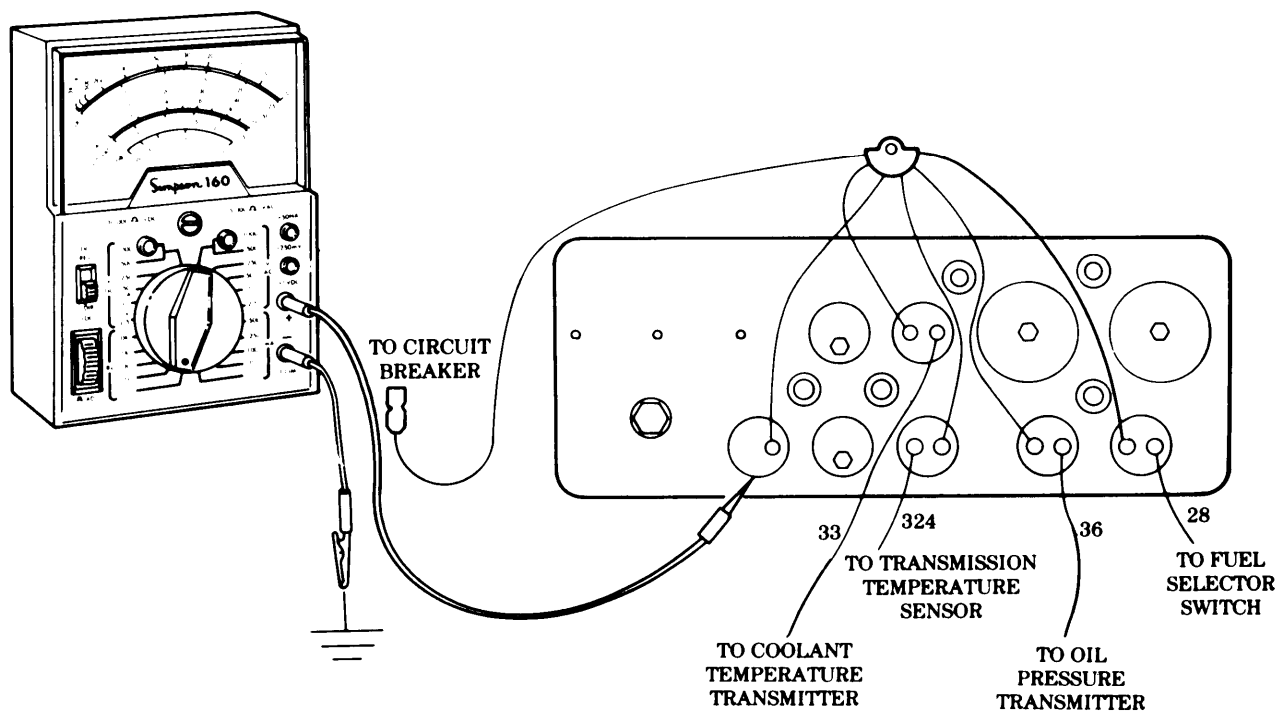
CAUTION

Place battery switch to OFF position. If ground is open and battery voltage is present, the multimeter maybe damaged.

Step 1. Set multimeter to RX1 for continuity reading.

Step 2. Touch meter negative lead to vehicle chassis ground, and touch positive lead to indicator case as shown.

Meter should read continuity. IF NOT, clean and tighten indicator mounting points. If continuity IS read, replace gage (para. 4-53).



END OF TESTING!

TA349467

Table 2-3. Electrical Troubleshooting (Cont'd)

**MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION**

30. HORN INOPERATIVE

Test 1. Test horn circuit breaker voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 10 wire at circuit breaker.

Step 3. Place battery switch to ON position.

Step 4. Set multimeter to 50 volt range.

Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to circuit 10 wire as shown. Meter should indicate battery voltage.

a. If battery voltage IS NOT indicated, go to malfunction 7, test 1.

b. If battery voltage IS indicated, go to step 6.

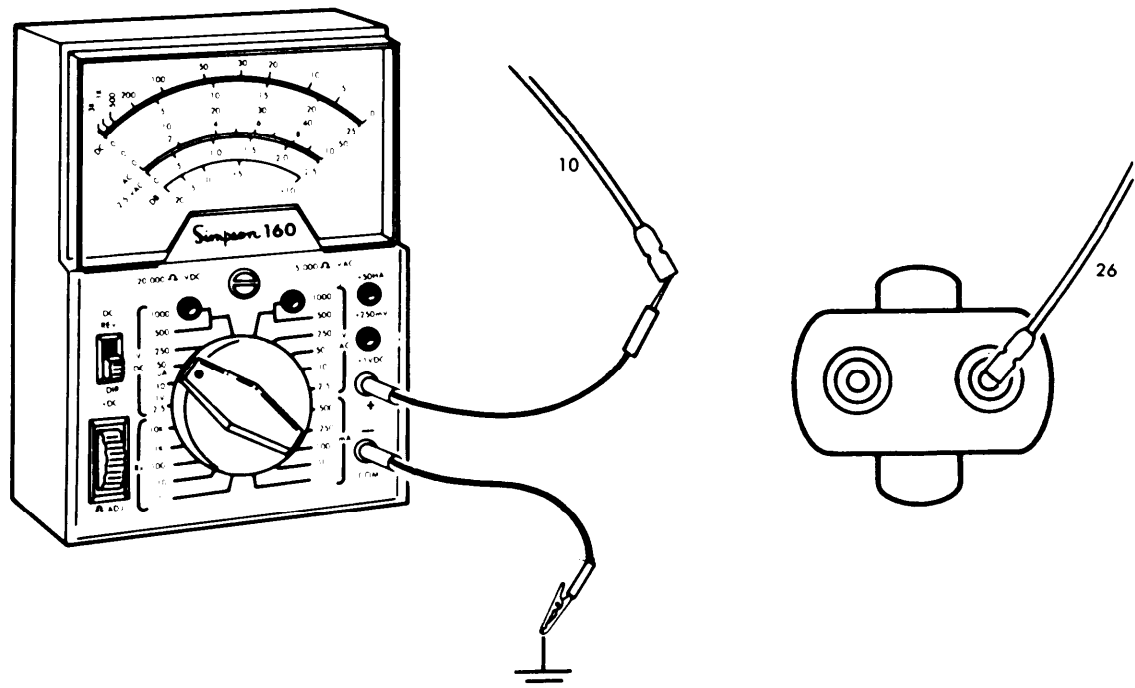


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Step 6. Place battery switch to OFF position.

Step 7. Reconnect circuit 10 wire and disconnect circuit 26 wire.

Step 8. Place battery switch to ON position.

Step 9. With meter negative lead connected to ground, touch positive lead to circuit 26 terminal of circuit breaker.

Meter should indicate battery voltage. IF NOT indicated, replace defective circuit breaker (para. 4-71).

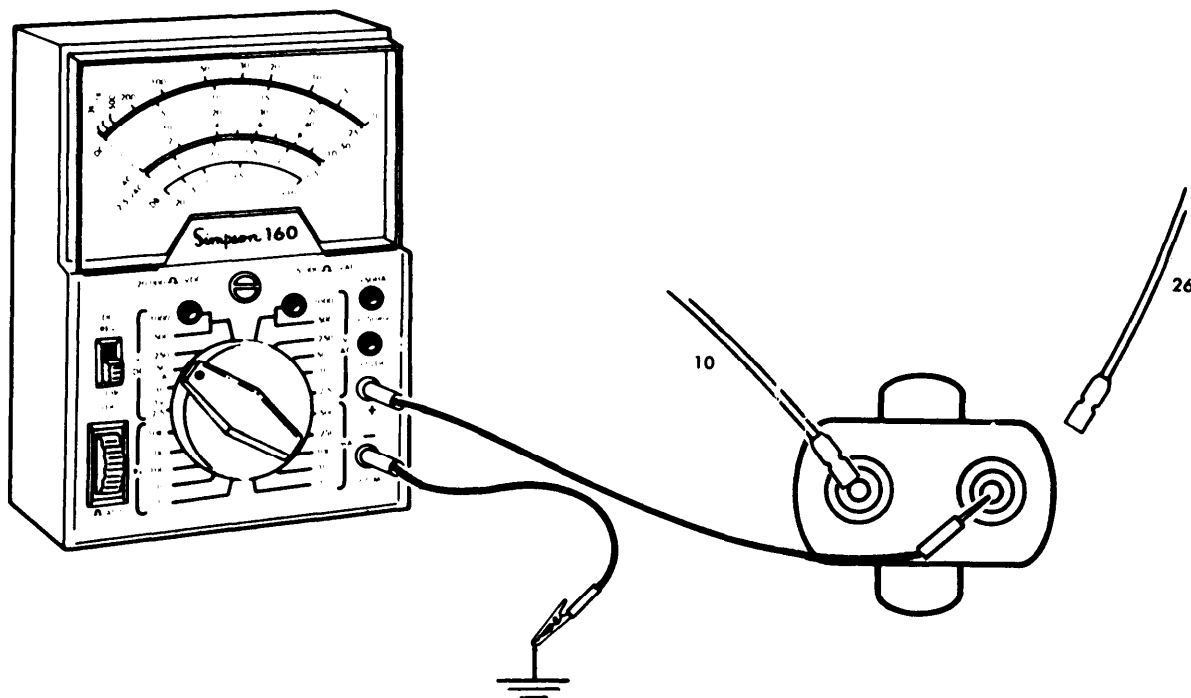


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 2. Test horn circuit voltage.

Step 1. Disconnect circuit 25 and 26 wire from horn solenoid.

Step 2. Set multimeter to 50 volt range.

Step 3. Connect meter negative lead to vehicle chassis ground and touch positive lead to disconnected circuit 26 wire. Meter should indicate battery voltage.

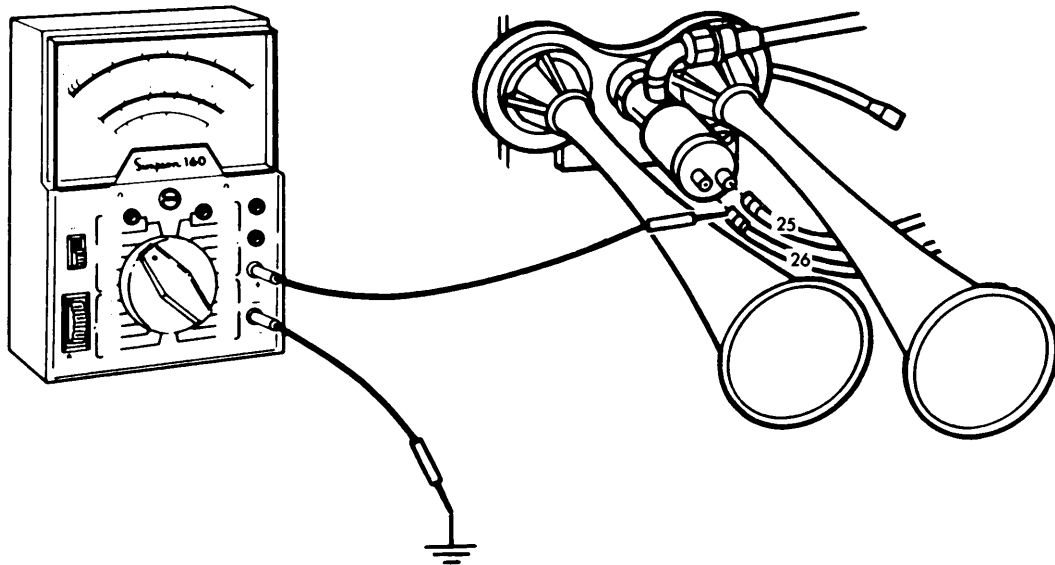


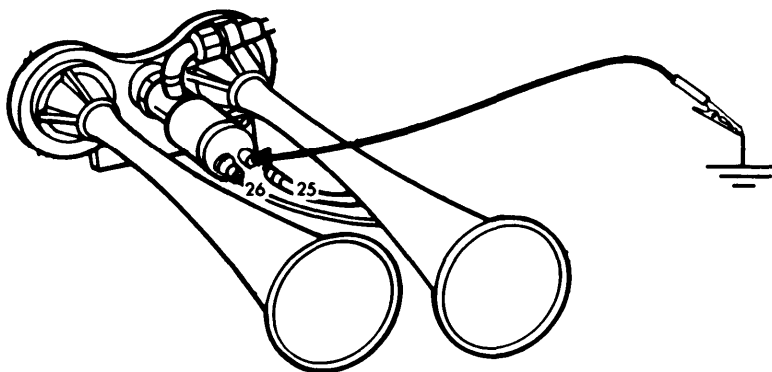
Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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		If battery voltage IS NOT indicated, repair circuit 26 wire (para. 4-49). If battery voltage IS indicated, continue to step 4.
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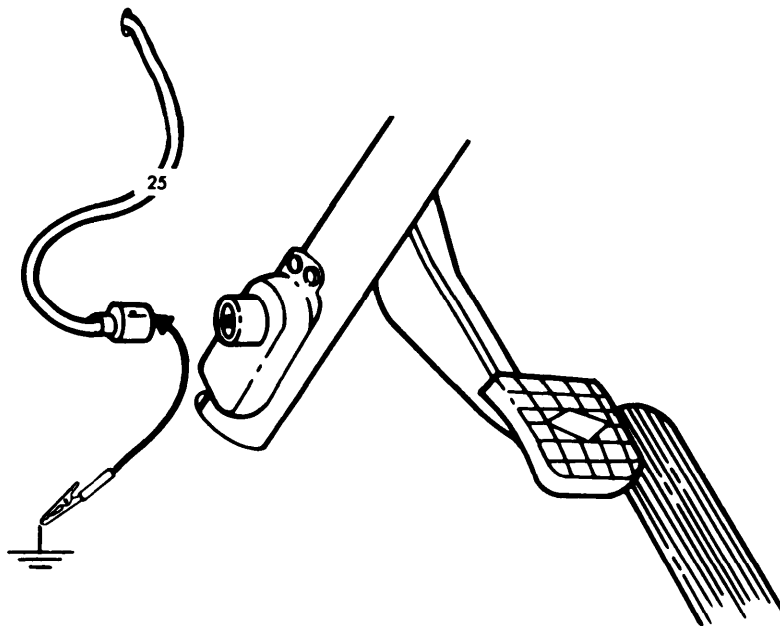
	Step 4. Reconnect circuit 267 wire, and connect one end of a jumper wire to vehicle chassis ground. Touch other end to circuit 25 connection point on solenoid.	
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		If horn does not sound, replace horn solenoid (para. 4-69). If horn sounds, reconnect circuit 26 wire and continue with test 3.
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Test 3. Test horn switch.

	Step 1. Disconnect circuit 25 wire from horn switch. Connect one end of a jumper wire to vehicle chassis ground and touch other end to disconnected circuit 25 wire connector. If horn sounds, replace horn switch (para. 4-70).
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END OF TESTING!

TA349471

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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31. LOW AIR PRESSURE WARNING BUZZER WILL NOT SHUT OFF (AIR PRESSURE GAGES INDICATE NORMAL PRESSURE)

- step 1. Ensure air pressure of 90 psi.
- step 2. Disconnect leads 578 and 578A from low air pressure switch A.
- step 3. Set multimeter to RX4.
- step 4. Touch positive lead of multimeter to contact end of pressure switch A.
- step 5. Touch negative lead of multimeter to other contact end of pressure switch A.
 - a. If resistance is 300 ohms or less, go to step 6.
 - b. If resistance is 300 ohms or more, replace low air pressure switch (para. 4-64).
- step 6. Install leads 578 and 578A at low air pressure switch A.
- step 7. Disconnect leads 57 and 578A from low air pressure switch B.
- step 8. Touch positive lead of multimeter to contact end of pressure switch B.
- step 9. Touch negative lead of multimeter to other contact end of pressure switch B.
 - a. If resistance is 300 ohms or less, go to test 2.
 - b. If resistance is 300 ohms or more, replace low air pressure switch (para. 4-64).

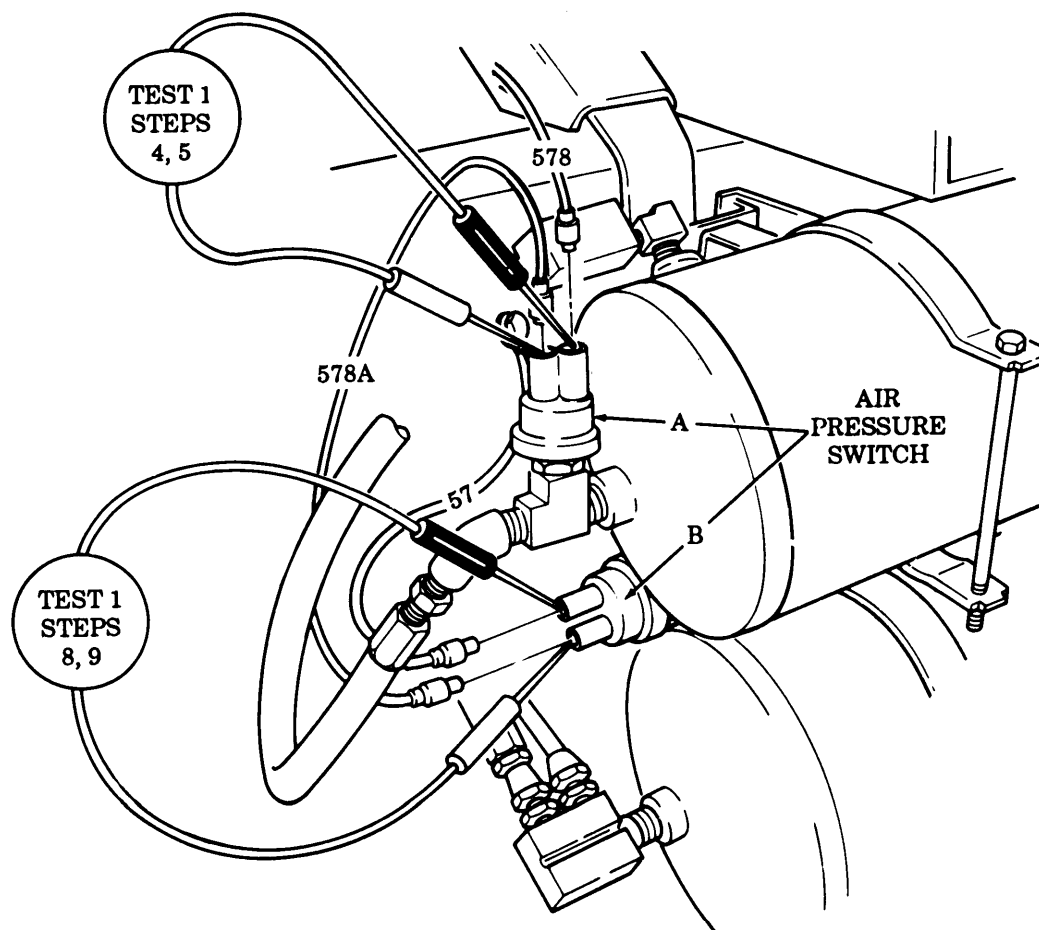


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Test low air pressure switches.

step 1. Ensure air pressure of 90 psi.

step 2. Disconnect lead 57 at pressure switch B.

step 3. Touch positive lead of multimeter to contact end of lead 57 and negative lead to frame ground.

a. If continuity is present, go to step 4.

b. If continuity is not present, replace lead 57 (para. 4-49).

step 4. Install lead 57 to pressure switch B.

step 5. Disconnect lead 578 from pressure switch A.

Step 6. Touch positive lead of multimeter to contact end of lead 578 and negative lead to frame ground.

a. If continuity is present, go to step 7.

b. If continuity is not present, replace lead 578 (para. 4-49).

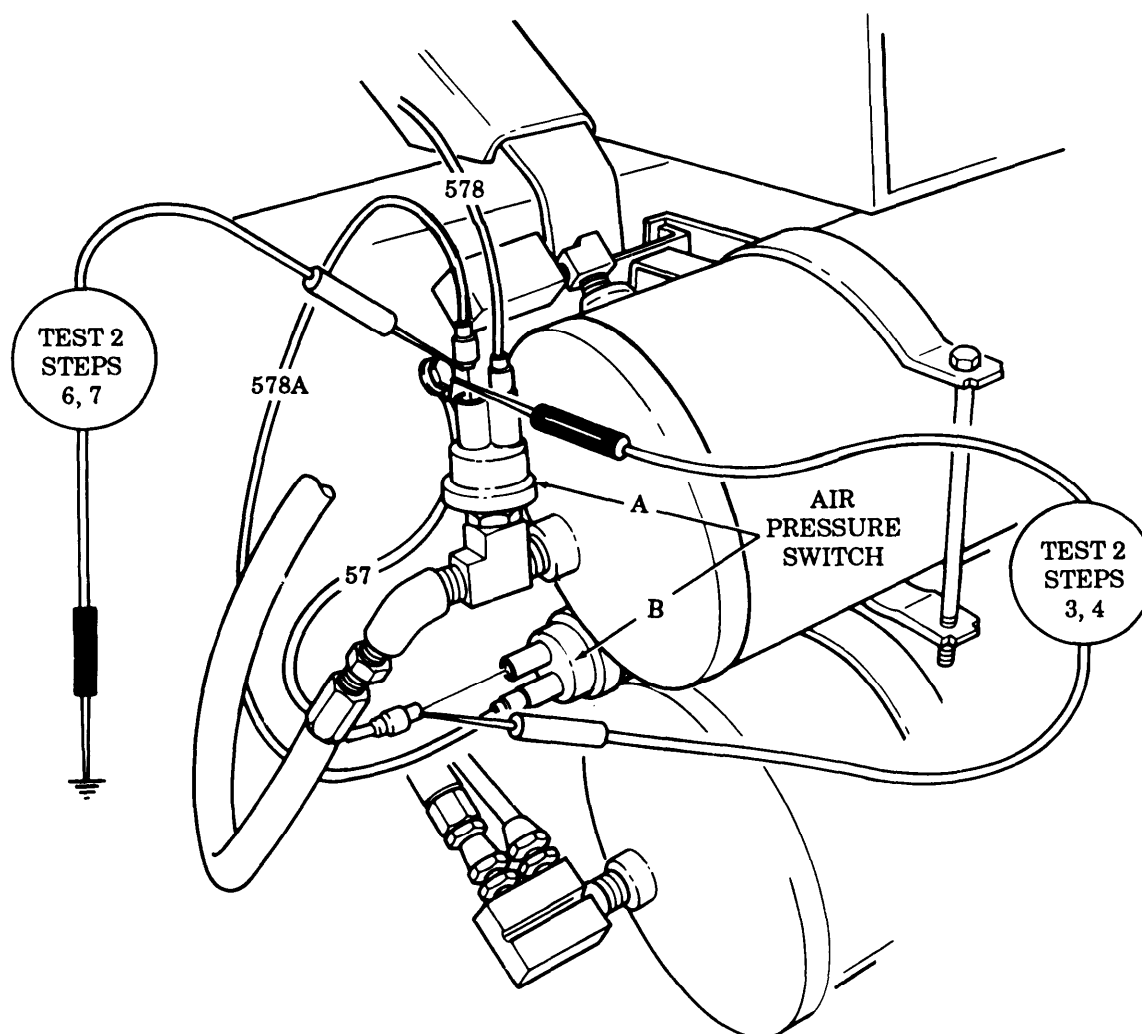


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
<p>Step 7. Install lead 578 to pressure switch A.</p> <p>Step 8. Disconnect wiring harness at failsafe warning control module.</p> <p>Step 9. Touch positive lead of multimeter to pin F (lead 578) and negative lead to frame ground.</p> <ul style="list-style-type: none">a. If continuity is present, go to step 10.b. If continuity is not present, replace lead 578 (para. 4-49). <p>Step 10. Touch positive lead of multimeter to pin H (lead 57) and negative lead to frame ground.</p> <ul style="list-style-type: none">a. If continuity is present, go to step 11.b. If continuity is not present, relate lead 57 (para. 4-49). <p>Step 11. Touch positive lead of multimeter to pin D (lead 350) and negative lead to frame ground.</p> <ul style="list-style-type: none">a. If continuity is present, go to step 12.b. If continuity is not present, replace lead 350. (Refer to Digest Article, Engine Overheating Warning System.) <p>Step 12. Ensure parking brake lever is down.</p> <p>Step 13. Touch positive lead of multimeter to pin I (lead 584) and negative lead to frame ground. Continuity should be present.</p> <p>If continuity is not present, replace lead 584 (para. 4-49).</p>

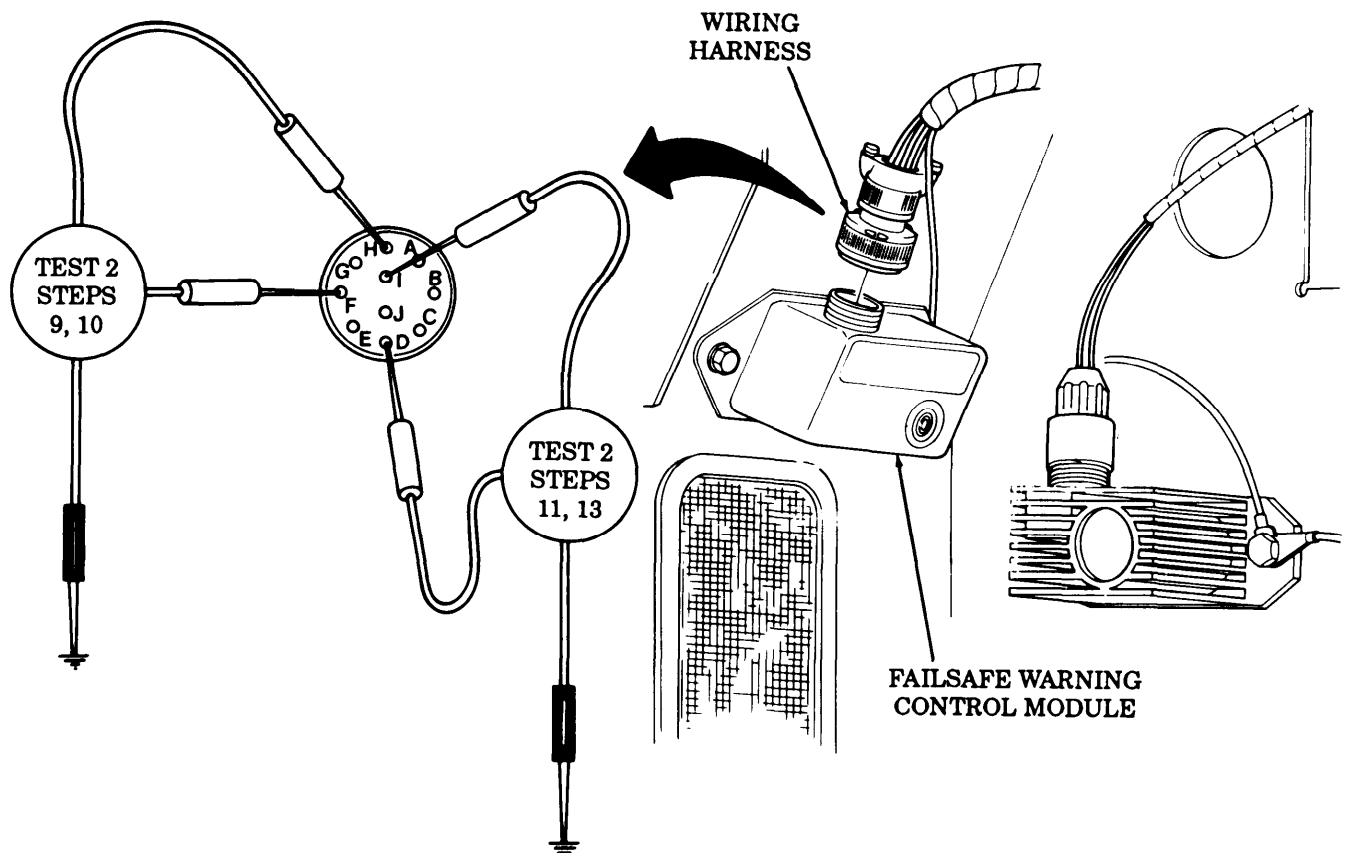


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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32. SPRING BRAKE WARNING LIGHT INOPERATIVE WITH SPRING BRAKE OVERRIDE ENGAGED.

- Test 1. Check spring brake override warning light (lamp).
Replace lamp with one known to be operational (para. 4-57).
- Test 2. Test spring brake pressure switch.
- Step 1. Disconnect both circuit 37 wires. Connect a jumper wire from one circuit 37 wire to other.
The light should operate.
If light is ON with jumpers connected, replace defective spring brake override switch (para 4-65).



- Test 3. Test spring brake override warning light circuit breaker voltage.
- Step 1. Place battery switch to OFF position.
- Step 2. Disconnect circuit 10 wire at circuit breaker.
- Step 3. Place battery switch to ON position.
- Step 4. Set multimeter to 50 volt range.
- Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to circuit 10 wire as shown.
- Meter should indicate battery voltage. If battery voltage IS NOT indicated, go to malfunction 7 test 1.

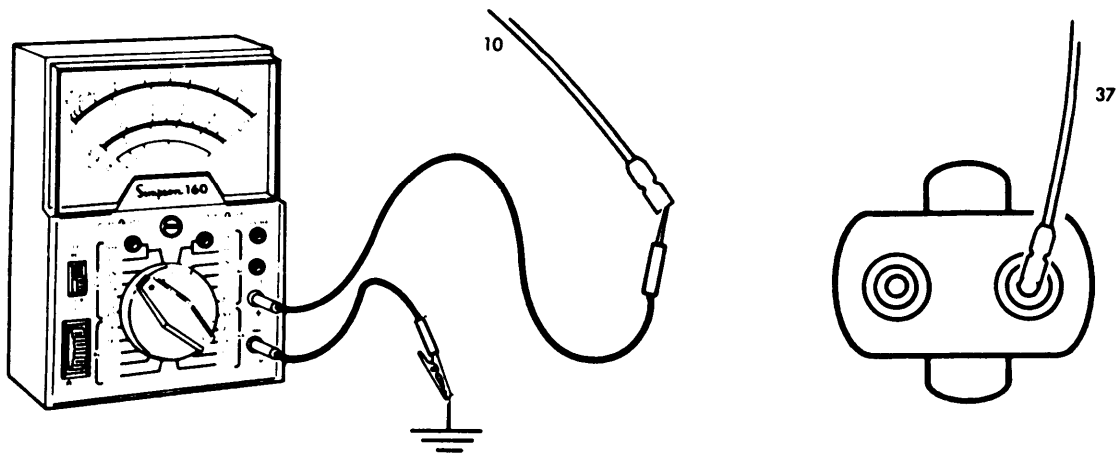
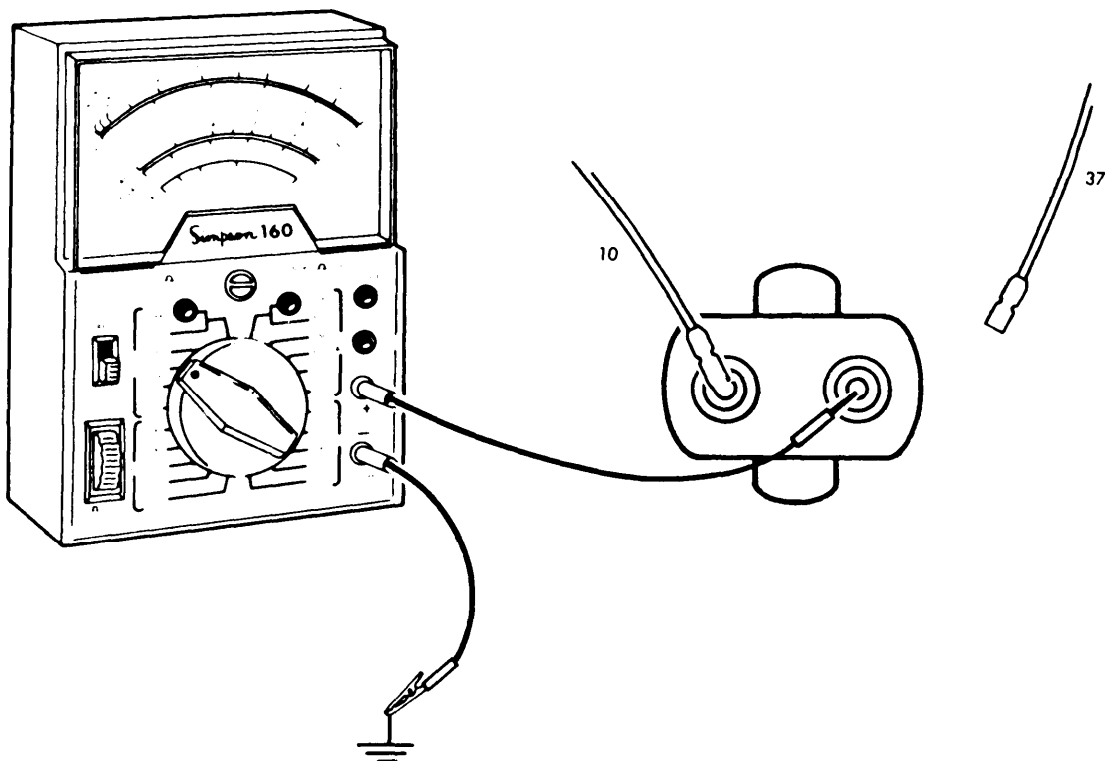


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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|--|--|--|
| | Step 6. Place battery switch to OFF position, | |
| | Step 7. Reconnect circuit 10 wire and disconnect circuit 37 wire from circuit breaker. | |
| | Step 8. Place battery switch to ON position. | |
| | Step 9. With meter negative lead connected to chassis ground, touch positive lead to circuit 37 terminal of circuit breaker. | |
| | Meter should indicate battery voltage. IF NOT indicated, replace defective circuit breaker (para. 4-71). | |



END OF TESTING!

TA349476

Table 2-3, Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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33. TRANSFER CASE CONTROL LEVER WILL NOT SHIFT, LOW TO HIGH, OR HIGH TO LOW WHEN VEHICLE IS IN MOTION.

Test 1. Test transfer case control circuit breaker. Go to malfunction 32, test 3,

Test 2. Test transfer case control switch.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 585 wire from transfer case control switch.

Step 3. Place battery switch to ON position.

Step 4. Set multimeter to 50 volt range,

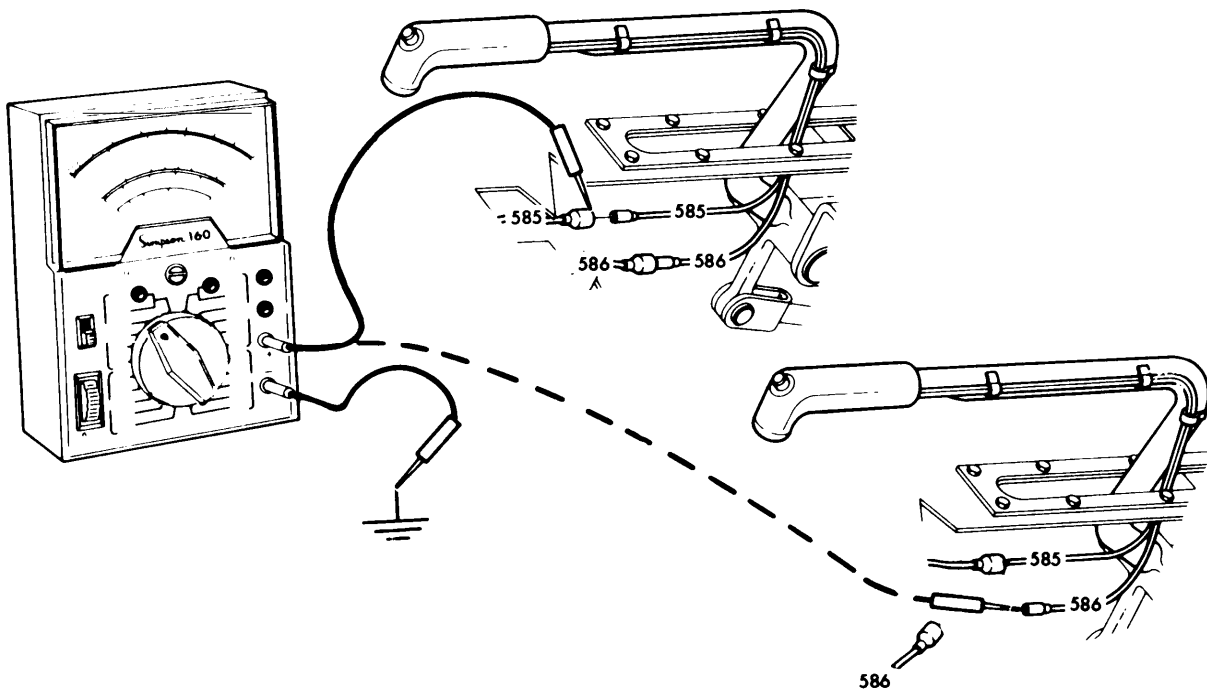
Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to disconnected circuit 585 wire,

a. Meter Should indicate battery voltage. IF NOT, repair circuit 585 wire (para. 4-49).

b. If battery voltage is indicated, reconnect circuit 585 wire and disconnected circuit 586 wire from control switch.

Step 6. Place transmission control lever to neutral. With negative lead of meter connected to ground, and with transfer case switch button depressed, touch positive lead to circuit 586 terminal on control switch,

Meter should indicate battery voltage. IF NOT notify DS maintenance.



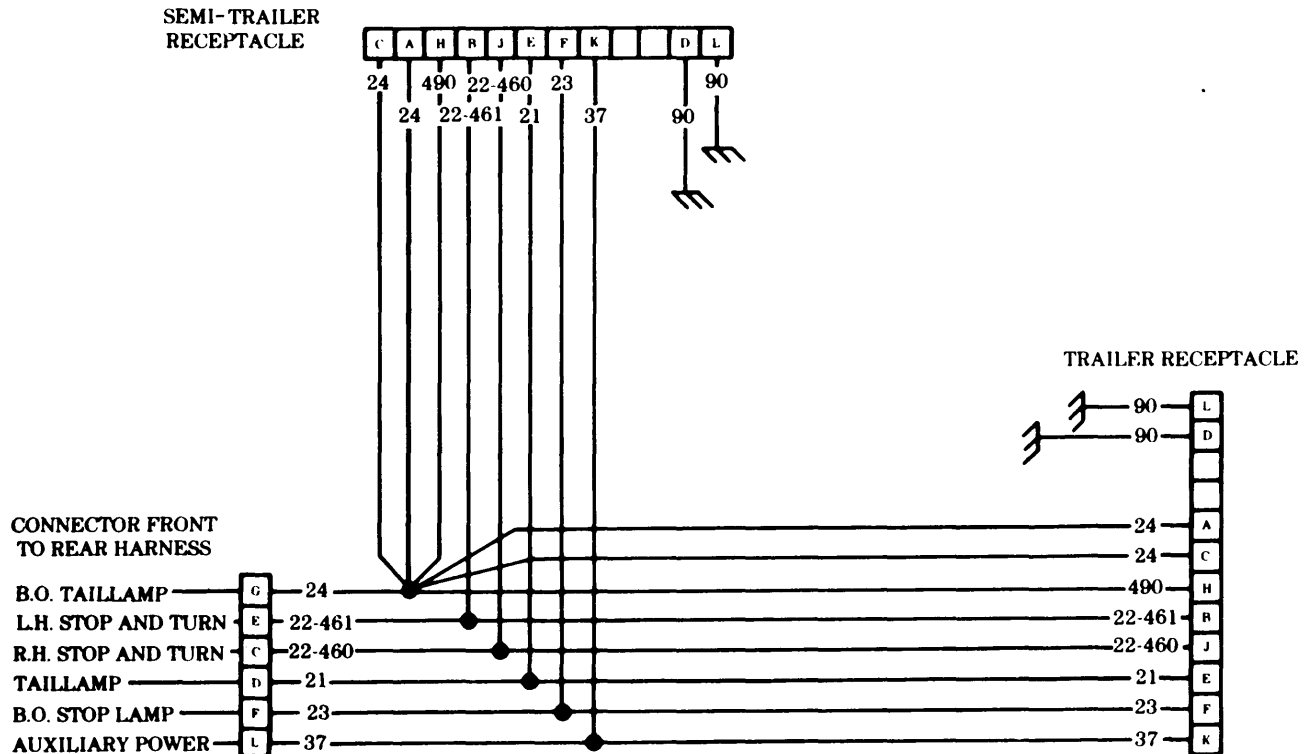
END OF TESTING!

TA349477

Table 2-9. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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TRAILER CONNECTION SYSTEM



34. ONE OR MORE LIGHTING SYSTEMS DO NOT FUNCTION ON THE TRAILER

Test 1. Test trailer connecting receptacle voltage. Go to malfunction 20.

Test 2. Test trailer connecting cable continuity.

Step 1. Remove connecting cable from truck.

Step 2. Place both ends of cable at a convenient point near each other. Open and lock hinged covers on each end.

Step 3. Set multimeter to RX1 for continuity reading.

Step 4. Connect meter leads from socket letter A on one connector to socket letter A on other connector as shown. Note meter reading.

NOTE

Wires M and N are not used and continuity is not required.

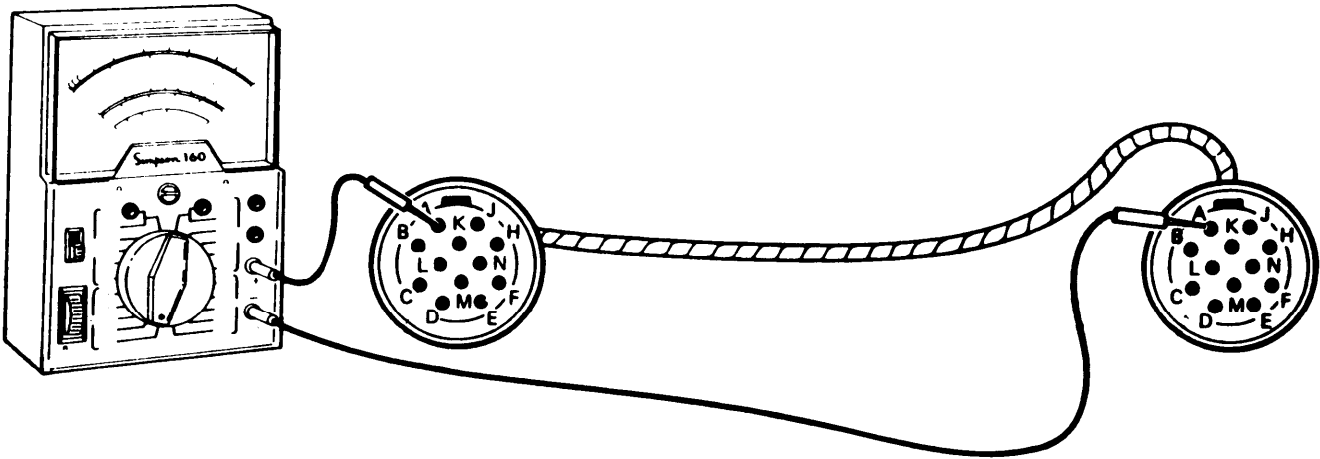
TA349478

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 3. Test each wire the same until all 10 wires have been tested. Continuity should be read on each wire. If not, replace defective connecting cable.

Step 1, If continuity IS read, plug cable into truck receptacle and test receptacle voltage at trailer end of the cable. Go to malfunction 20.



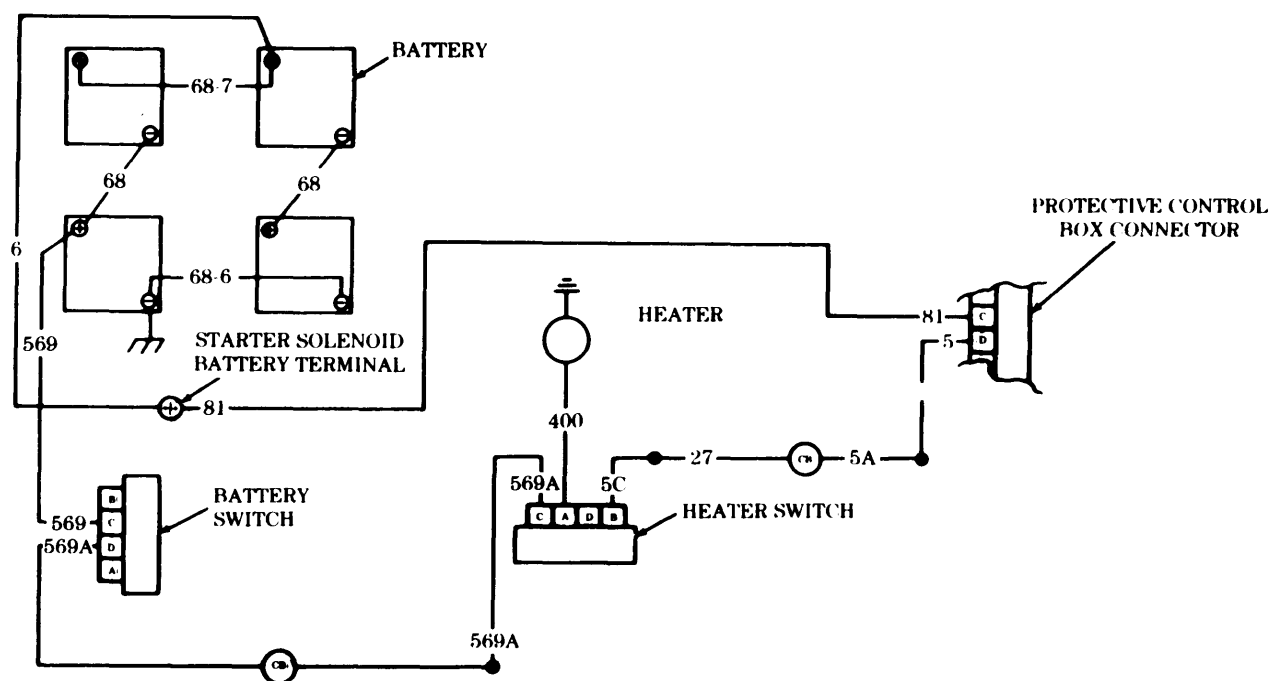
END OF TESTING!

TA349479

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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HEATER SYSTEM



35. HEATER WILL NOT OPERATE WITH SWITCH IN LOW POSITION (HIGH POSITION OPERATION NORMAL)

Test 1. Test circuit 569A for voltage.

Step 1. Place battery switch to OFF position.

Step 2. Disconnect circuit 569A wire from heater switch.

Step 3. Place battery switch to ON position.

Step 4. Set multimeter to 50 volt range.

Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to circuit 569A wire. Meter should indicate 12 to 13 volts.

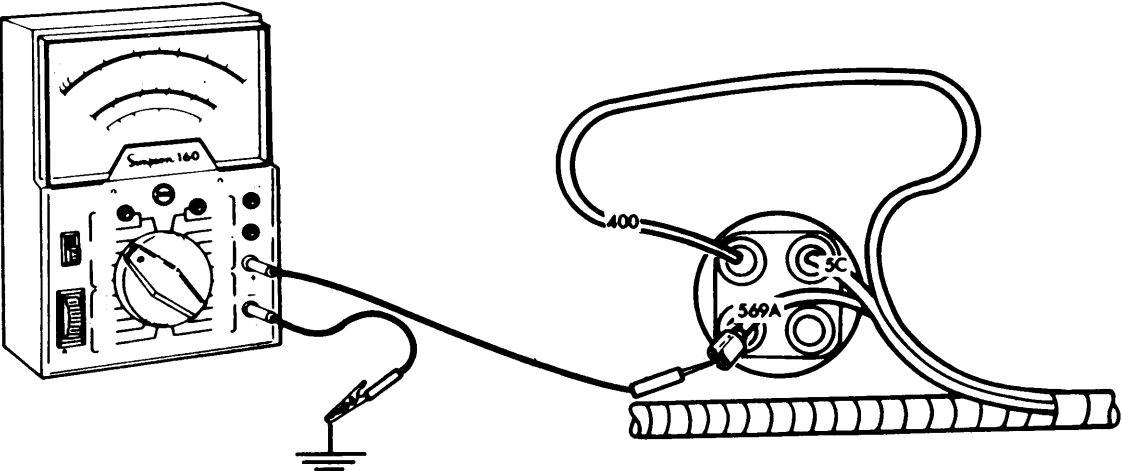
a. If voltage is not present, go to test 2.

b. If voltage is present, replace defective heater switch (para. 4-74).

TA349480

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Test circuit breaker.

- Step 1. Disconnect circuit 569A wire to heater switch from circuit breaker.
- Step 2. Set multimeter to 50 volt scale, connect negative lead to ground, and positive lead to exposed circuit breaker terminal.
- Step 3. Turn battery switch to ON position and observe meter.
- Step 4. Disconnect circuit 569A wire to battery switch from circuit breaker. Connect multimeter positive lead to wire and observe meter.
 - a. If meter indicates 12-13 volts in 'step 3, repair or replace circuit 569A between circuit breaker and heater switch (para 4-49).
 - b. If meter indicated 12-13 volts in step 4, replace circuit breaker (para 4-71).

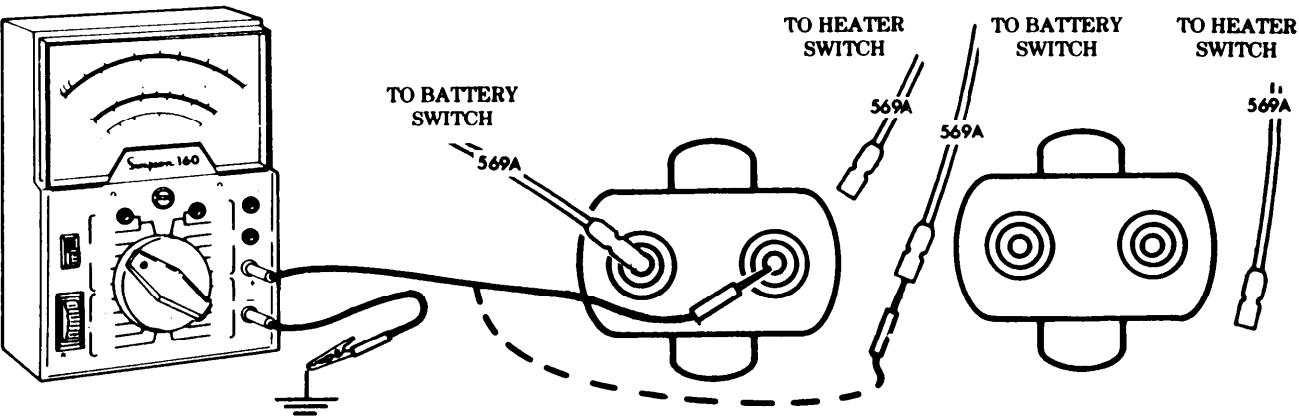
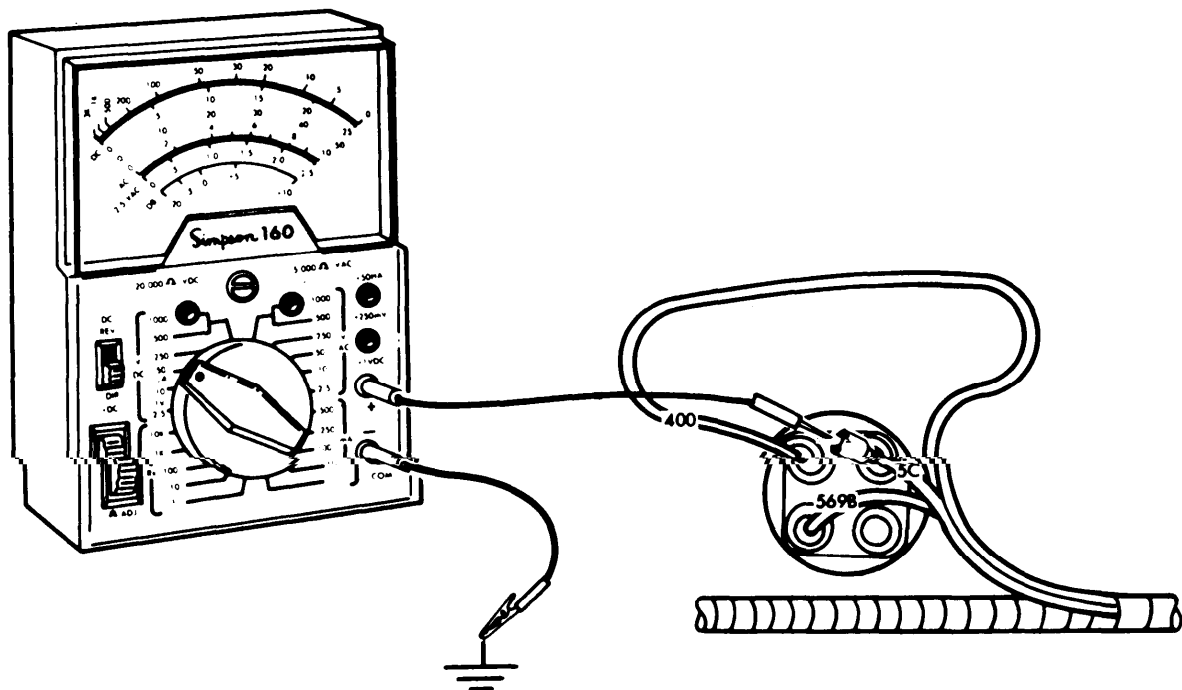


Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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36. HEATER WILL NOT OPERATE WITH SWITCH IN HIGH POSITION (LOW POSITION OPERATION NORMAL)		
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|---|--|
| <p>Step 1. Place battery switch to OFF position.</p> <p>Step 2. Disconnect circuit 5C wire from heater switch.</p> <p>Step 3. Place battery switch to ON position.</p> <p>Step 4. Set multimeter to 50 volt range.</p> <p>Step 5. Connect meter negative lead to vehicle chassis ground. Touch positive lead to disconnected circuit 5c wire, Meter should indicate battery voltage. IF NOT indicated, go to malfunction 25 test 1.</p> <p>If battery voltage is indicated, replace defective heater switch (para. 4-74).</p> | |
|---|--|



END OF TESTING!

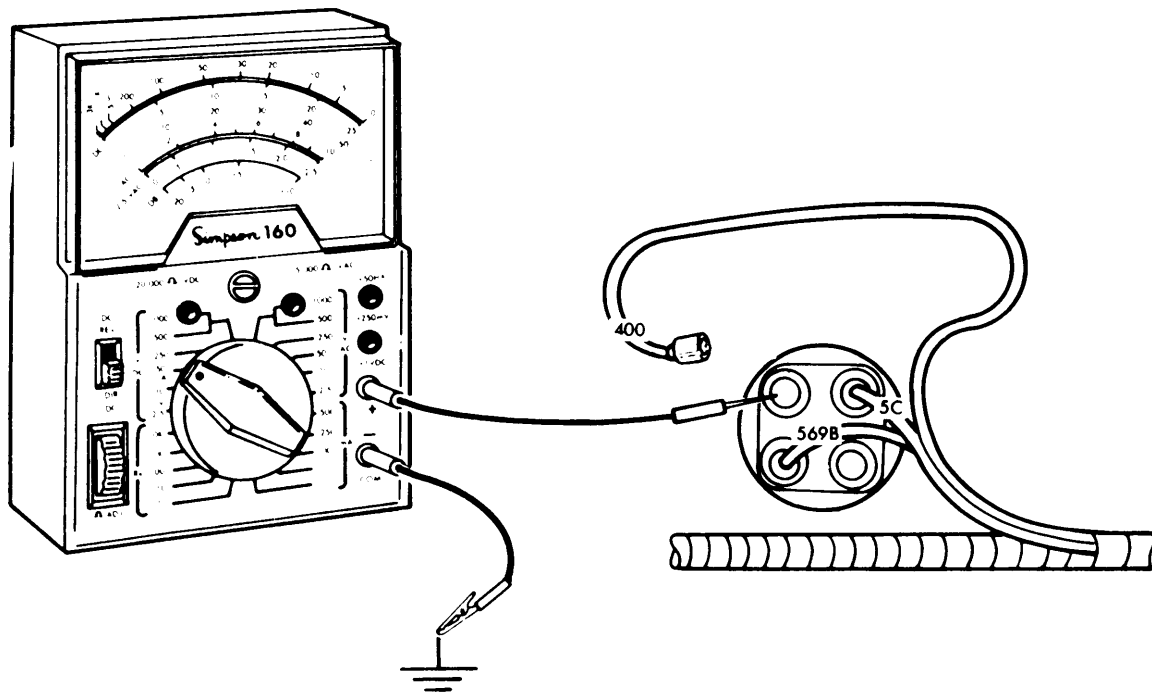
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Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
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37. HEATER WILL NOT OPERATE IN LOW OR HIGH POSITION

- Step 1. Place battery switch to OFF position.
- Step 2. Disconnect circuit 400 wire from heater switch.
- Step 3. Place battery switch to ON position.
- Step 4. Set multimeter to 50 volt range.
- Step 5. Connect meter negative lead to vehicle chassis ground.
- Step 6. Touch positive lead to circuit 400 wire terminal on switch and note reading.
 - a. Meter should indicate 12 or 13 volts in LOW switch position and battery voltage in HIGH switch position. If correct voltage IS NOT present, replace defective heater switch (para. 4-74).
 - b. If correct voltage IS present, clean and tighten heater ground point connection. If heater is still not operational, replace heater (para. 9-35).



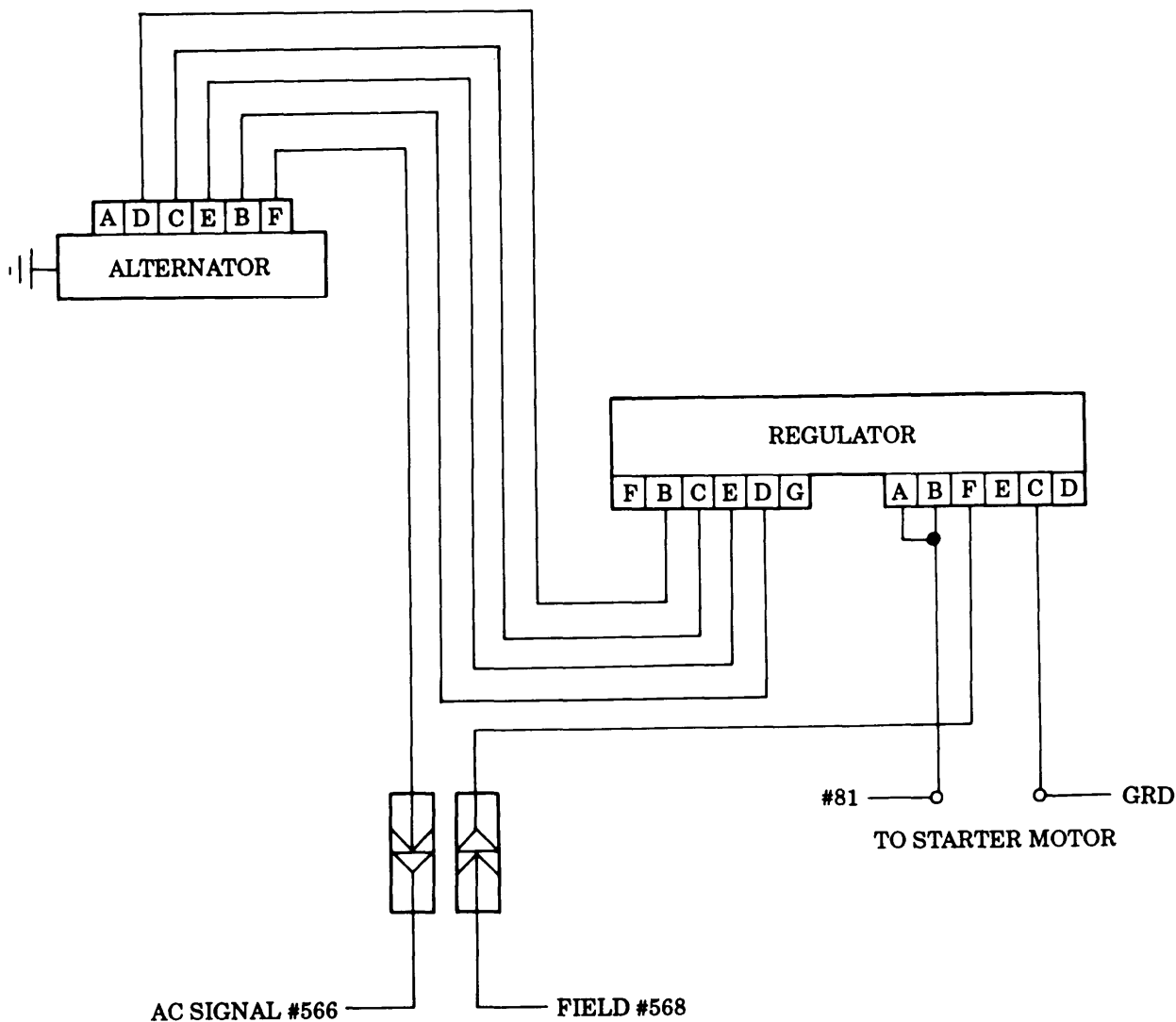
END OF TESTING!

TA349483

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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100 AMP ALTERNATOR KIT



38. BATTERIES HOT OR BOILING, CORRECTED, SPECIFIC GRAVITY OF ALL CELLS IS 1.280

NOTE

If STE/ICE is available, perform NG50 - Charging Circuit Tests (chapter 2, section VI).

Test 1. Test charging voltage (malfunction 8, test 1).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
39. BATTERIES USE EXCESSIVE WATER	NOTE	If STE/ICE is available, perform NG81 - Battery Tests or NG50 - Charging Circuit Tests (chapter 2, section VI).
		Test 1. Test charging voltage (malfunction 8, test 1).
40. BATTERIES RUN DOWN IN SERVICE	NOTE	If STE/ICE is available, perform NG50 - Charging Circuit Tests (chapter 2, section VI).
		Test 1. Check for loose, broken, or missing belts.
		a. Adjust loose belts (para. 4-8). b. Replace broken or missing belts (para. 4-8).
		Test 2. Test charging voltage (malfunction 8, test 1).
		a. If proper voltage is indicated, problem is not in generating system. (Refer to battery system troubleshooting.) b. If proper voltage is not indicated, go to malfunction 41, No Alternator Output.
41. NO ALTERNATOR OUTPUT	NOTE	If STE/ICE is available, perform NG50 - Charging Circuit Tests (chapter 2, section VI).
		Test 1. Check for loose, broken, or missing belts.
		Adjust loose belts (para. 4-8).
		Test 2. Test continuity of alternator harness.
		Step 1. Disconnect quick disconnect for lead 566.
		Step 2. Disconnect voltage regulator harness connector at alternator and voltage regulator.
		Step 3. Set meter to RX1.
		Step 4. Connect meter negative lead to contact end of lead 566 and positive lead to pin F. Continuity should be present.
		a. If continuity is present, go to step 5. b. If continuity is not present, replace voltage regulator harness (para. 11-51).
		Step 5. Connect meter positive lead to contact end of pin D at voltage regulator harness connector and negative lead to contact end of pin B at alternator harness connector. Continuity should be present.
		a. If continuity is present, go to step 6. b. If continuity is not present, replace voltage regulator harness (para. 11-51).
		Step 6. Connect meter positive lead to contact end of pin E at voltage regulator harness connector and negative lead to contact end of pin E at alternator harness connector. Continuity should be present.
		a. If continuity is present, go to step 7. b. If continuity is not present, replace voltage regulator harness (para. 11-51).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 7. Connect meter positive lead to contact end of pin Cat voltage regulator harness connector and negative lead to pin C at alternator harness connector. Continuity should be present.

a. If continuity is present, go to step 8.

b. If continuity is not present, replace voltage regulator harness (para. 11-51).

Step 8. Connect meter positive lead to contact end of pin Bat voltage regulator harness connector and negative lead to contact end of pin D at alternator harness connector. Continuity should be present.

a. If continuity is present, go to test 3.

b. If continuity is not present, replace voltage regulator harness (para. 11-51).

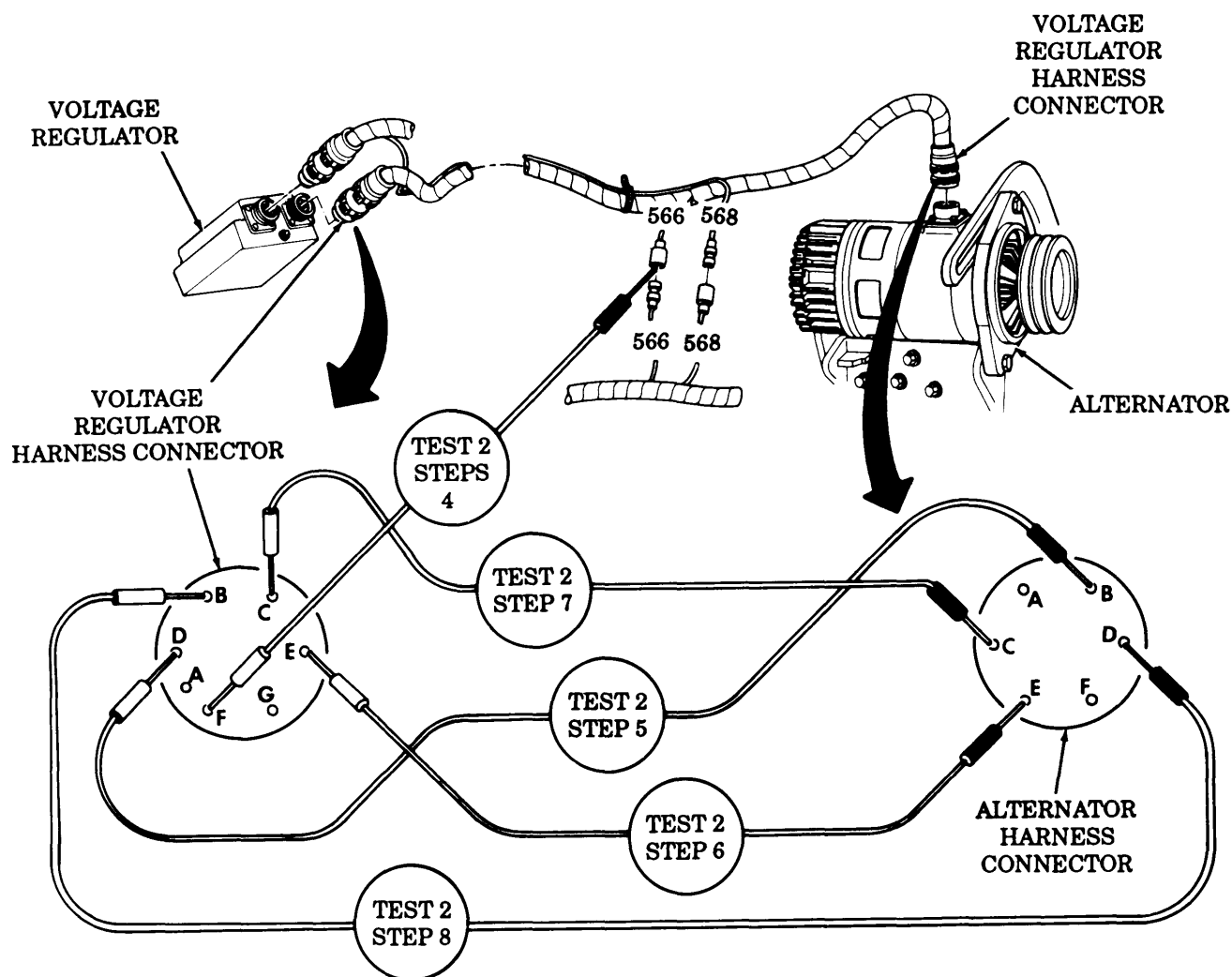


Table 2-3. Electrical Troubleshooting (Cont'd)

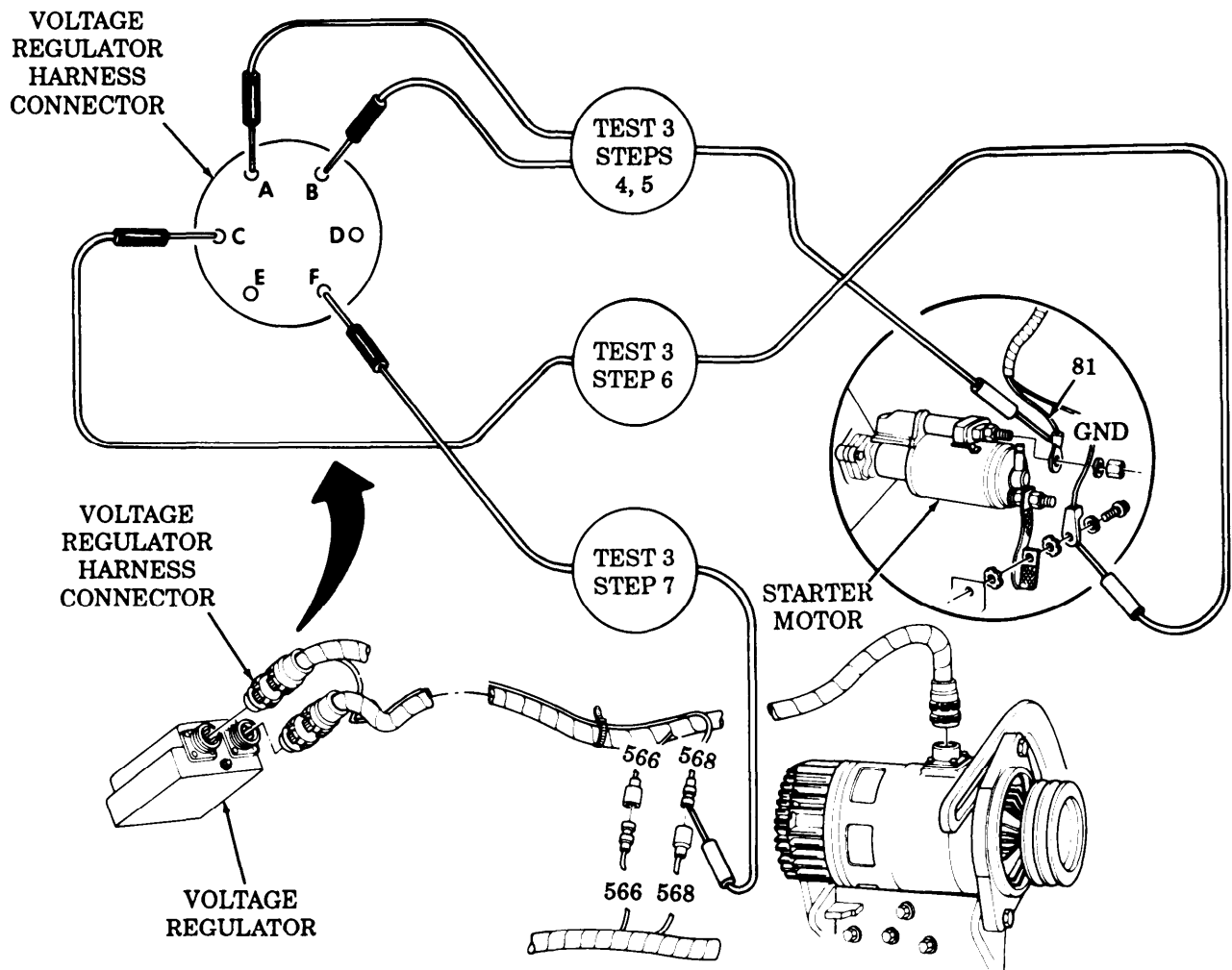
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 3. Test continuity of starter harness.

- Step 1. Disconnect quick disconnect km lead 568.
- Step 2. Disconnect voltage regulator harness connector at voltage regulator.
- Step 3. Disconnect voltage regulator harness at starter motor and starter solenoid (para. 11-51).
- Step 4. Connect meter positive lead to contact end of lead 81 at starter solenoid and negative lead to pin B at voltage regulator harness connector.
- Step 5. Connect meter positive lead to contact end of lead 81 at starter solenoid and negative lead to pin A at voltage regulator harness connector. Continuity should be present.
 - a. If continuity is indicated, go to step 6.
 - b. If continuity is indicated, replace voltage regulator harness (para. 11-51).
- Step 6. Connect meter negative lead to contact end of pin Cat voltage regulator harness connector and positive lead to contact end of lead end at starter motor. Continuity should be present.
 - a. If continuity is present, go to step 7.
 - b. If continuity is not present, replace voltage regulator harness (para. 11-51).
- step 7. Connect meter positive lead to contact end of lead 568 and negative lead to contact end of pin F at voltage regulator harness connector. Continuity should be present.
 - a. If continuity is present, notify your supervisor.
 - b. If continuity is not present. redade voltage regulator harness para. 11-51).

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION



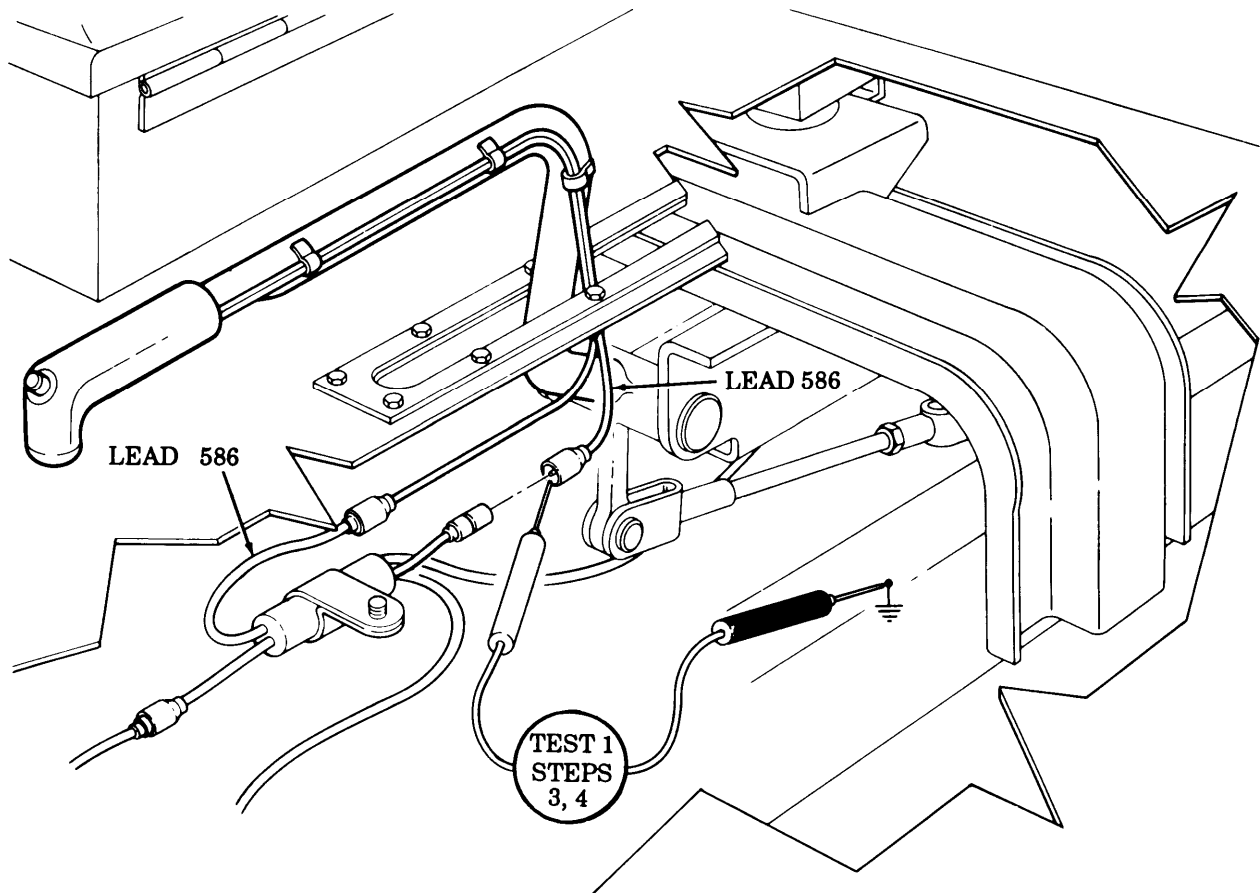
END OF TESTING!

Table 2-3. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

42. TRANSFER CASE SHIFTS HARD (WHILE ENGINE IS RUNNING)

- Test 1. Test transfer case shift lever switch for voltage output.
- Step 1. Set multimeter to a range that will measure 24 volts.
 - Step 2. Disconnect lead 586 at transfer case shift lever switch.
 - Step 3. Touch positive lead of multimeter to the contact end of transfer case shift lever switch and negative lead to ground.
 - Step 4. Have assistant position ignition switch to ON, and push the transfer case shift lever button. Voltage should be present.
 - a. If 24 volts are present, the linear valve is defective. Notify DS maintenance.
 - b. If voltage is not present, transfer case shift lever switch or the wiring is bad. Notify DS maintenance



END OF TESTING!

Section VI. STE/ICE TROUBLESHOOTING (SIMPLIFIED TEST EQUIPMENT FOR INTERNAL COMBUSTION ENGINES)

2-16. GENERAL

a. This section is applicable only if STE/ICE is available. This section contains information and tests which may be used with STE/ICE to locate malfunctions that may develop in the vehicle. The tests can be used during troubleshooting, PMCS, or after replacing parts to isolate malfunctions, anticipate failures, and to make sure that proper repairs have been made.

b. STE/ICE is used primarily with the vehicle electrical system. These tests cannot cover all possible troubles which may occur. If a particular malfunction is not covered, refer to table 2-3, Electrical Troubleshooting, and locate the troubleshooting procedure for the malfunction observed. To obtain the maximum number of observed symptoms of the malfunction, question the operator.

2-17. STE/ICE CHAIN INDEX

Preventive Maintenance Checks and Services (table 2-1) contains a list of various troubles which may occur during operation or inspection of the vehicle. When one of the malfunctions listed occurs, the mechanic proceeds to the associated STE/ICE Chain Index (tables 2-8 and 2-9).

2-18. VEHICLE TEST METER (VTM) TROUBLESHOOTING

The vehicle test meter (VTM) troubleshooting procedures can be found in STE/ICE Go-Chain Tests (table 2-8). Additional VTM troubleshooting can be found in TM 9-4910-571-12&P, Simplified Test Equipment for Internal Combustion Engines.

2-19. STE/ICE TESTS AND SETUP PROCEDURES

a. STE/ICE Setup Procedure. The STE/ICE setup and internal checks (test no. GO 1, table 2-10) must be performed prior to performing tests.

b. STE/ICE **Go-Chain** Index (table 2-8) contains a list of GO test numbers and titles. Refer to this table for locating a specific GO-chain test.

c. The STE/ICE NO-GO Chain Index (table 2-9) contains a list of NO-GO test numbers and titles. Refer to this table for locating a specific NO-GO chain test.

2-20. STE/ICE DESCRIPTION AND OPERATION

a. General. The following describes the operation of the Simplified Test Equipment for Internal Combustion Engines (STE/ICE) system and contains detailed operating procedures.

It is used to test the serviceability of M939 vehicles and to perform primary fault detection and isolation. After the technician has identified a faulty part or subsystem, he is referred to a paragraph number for replacement or repair procedures for individual parts.

b. Description and Operation. STE/ICE is a testing system that performs tests and measurements on internal combustion engines. STE/ICE measures standard voltage, current, resistance, pressure, temperature, and speed. Special tests, such as compression balance tests and starter system evaluations, are performed by STE/ICE. Standard equipment functions including vacuum pressure gage, compression gage, low-current tester, and multimeter are features of the STE/ICE set.

STE/ICE is portable and operates on either 12- or 24-volt vehicle batteries or equivalent power source. The STE/ICE system consists of a vehicle test meter (VTM), a transducer kit (TK), four electrical cables, a transit case, and technical publications.

2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

c. Vehicle Test Meter.

(1) General. The VTM provides a method for the technician to test vehicle electrical and mechanical components. Readings are either pass/fail indications or digital displays in units familiar to the technician (psi, rpm, volts, ohms, amps, etc.). The diagnostic connector assembly (DCA) is permanently mounted in the vehicle and provides accessibility to the most frequently needed test points. The use of the VTM through the DCA is referred to as DCA mode. The VTM interfaces with the vehicle directly with a transducer(s) from the transducer kit (TK). The use of the VTM through the TK is referred to as TK mode. The DCA and the TK can be used at the same time. This may be necessary when the diagnostic connector assembly has a missing transducer. If a transducer is missing, a no sensor indication (E002) is displayed when a measurement is made. If this happens, the TK mode can be used to make the measurement. The use of the VTM through the DCA and TK is referred to as the combined mode. Additional tests can be done that involve manually probing and/or connecting transducers to appropriate test points. Operating power for the VTM is drawn from the vehicle batteries or some equivalent battery source. Power is routed to the VTM through the DCA connected to the battery. The STE/ICE general purpose testing capabilities that may be applied to the vehicle are: 0-1000 psig pressure, 0-45 volts dc, and 0-40k ohms resistance. The following control functions can be performed in conjunction with the special tests: interleave (displays rpm with next test), display maximum value, display minimum value, and display peak-to-peak value.

(2) Controls and Indicators. The controls and readout display on the VTM are illustrated. The following paragraphs describe how the controls are used and how the display functions.

(a) Power Switch (PUSH ON/PULL OFF). The power switch controls DC power to the VTM. The VTM can operate from a 12-volt or 24-volt battery system. When the power switch is pushed in (PUSH ON), the VTM power is on. To shut the VTM off, pull out the power switch (PULL OFF). The power switch contains a 4-amp circuit breaker. The power switch will pop out automatically if something is wrong which causes the VTM to use more power than it should. If the switch pops out, check your hookup carefully and try again before returning the VTM to direct support maintenance.

(b) TEST SELECT Switches. The TEST SELECT switches are used to select the actual test to be performed. There are ten positions on each switch numbered 0 through 9. The number dialed into these switches is read by the VTM when you press the test button. Changing the TEST SELECT switch positions has no effect until the TEST button is pushed.

(c) TEST Button. Depressing and releasing the TEST button causes the test measurement to begin. Observe the measured value on the readout display. The reading will be in units normally used for the particular vehicle measurement. These units are listed on the flip cards. The TEST button must be pressed and immediately released. Depressing and holding the TEST button down initiates an offset test. Offset tests are described in TM 9-4910-571-12&P.

(d) Readout Display. The readout display will show different types of readouts during testing up to a maximum of 4-characters (for example .8.8.8.8). The types of readouts are described in detail in paragraph (3) and are summarized as follows:

1. Status Readout. This type of readout keeps the technician informed of what is happening such as power applied, failed test, etc.

2. Numerical Readout. This type of readout is the measured value in units of the measurement being made. If you are measuring 0-45 volts dc, the number 24 on the display indicates 24 volts.

3. Error Readout. This type of readout indicates that the wrong test number was selected, the transducer is not connected, or the VTM is faulty.

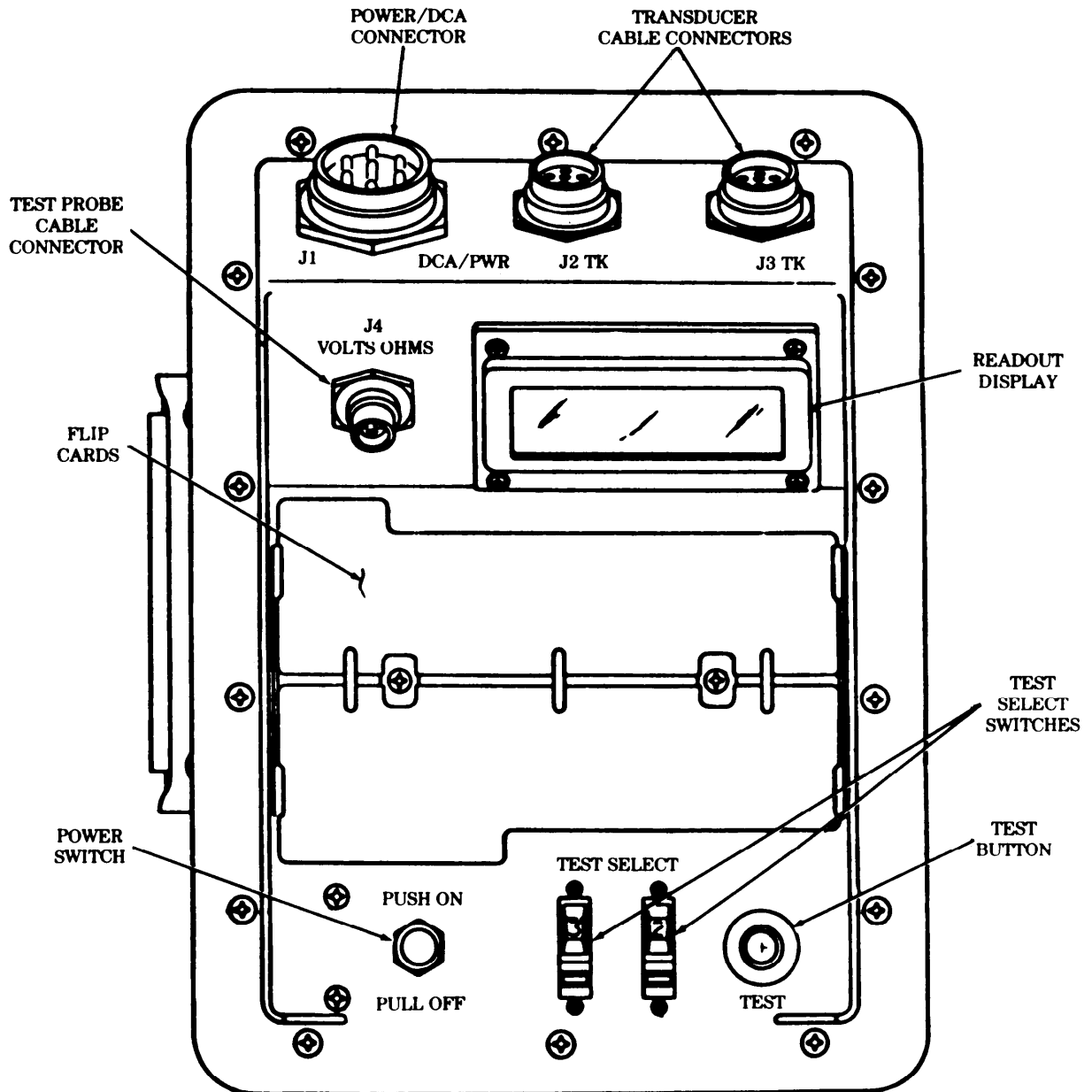
(e) Flip Cards. The flip cards list the 2-digit test number system for selecting the various tests. The cards also summarize the test and operating instructions contained herein.

(f) Power/DCA Connector J1. Connector J1 connects the VTM to either a vehicle diagnostic connector using the DCA cable, or to the vehicle batteries using the power cable. Operating power and signals from the installed transducers are supplied to the VTM through the DCA cable.

2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

(g) **Transducer Cable Connectors J2, J3.** Connector J2 or J3 connects the VTM to any transducer in the transducer kit. Operating power is supplied to the transducer and signals from the transducers are supplied to the VTM through the cable. Connectors J2 and J3 are identical and can be interchanged with each other or used in combination.

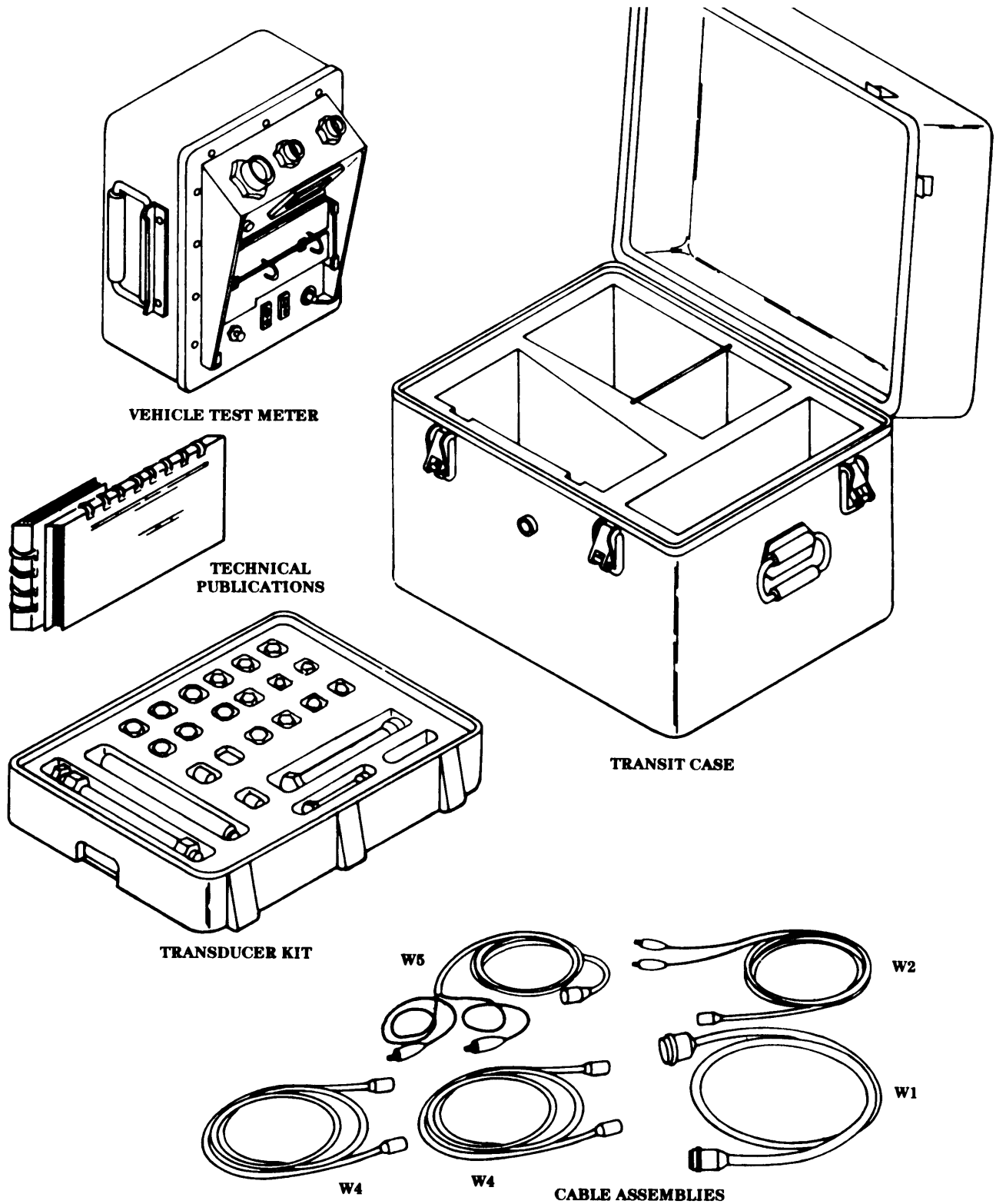
(h) **Test Probe Cable Connector J4.** Connector J4 connects test leads to the VTM when doing manual voltage and resistance tests.



VTM Controls and Readout Display

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2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

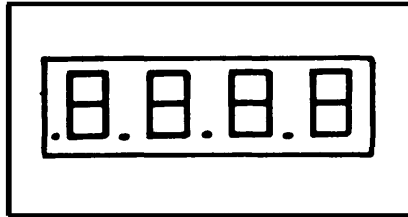


Simplified Test Equipment for Internal Combustion Engines (STE/ICE) System

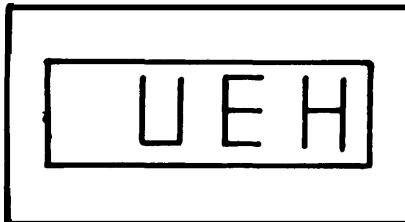
2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

(3) Readouts. The following paragraphs describe the different types of readouts that can occur during testing.

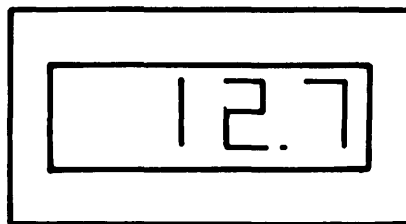
(a) Status Readout. A status readout keeps the technician informed of what is happening. For example, .8.8.8.8 is displayed each time the power switch is pushed on. It means that power is applied, and that all elements of the display are operative. It changes to ---- 1.5 seconds later, indicating that the VTM is ready to be used for testing. The status readout displays are described in table 2-4.



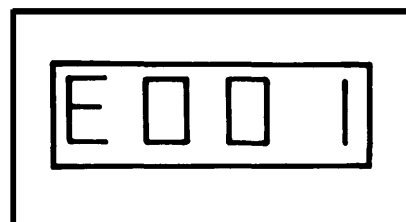
(b) Prompting Message. A prompting message is a technician action message. It is a signal for you to do something such as crank the engine. For example, UEH tells you to enter the vehicle type identification number into the WM. After the technical action is performed, the test will automatically continue. Prompting messages are listed in table 2-5.



(c) Numerical Readout. A numerical readout is the measured value in units of the measurement being made. For example, if you are measuring 0-45 volts dc, 12.7 is volts dc. If you are measuring 0-25 psig pressure, 12.7 is psig. The units for each test are listed on the flip card. The numbers displayed in the VTM are always positive unless there is a minus shown to make them negative.



(d) Error Readout. E001 is a typical error readout. There are 14 different error readouts. All error readouts start with E. An error readout is a warning that you forgot to connect the transducer, selected a wrong test number, failed to start the engine, etc. All of the error messages mean you must correct the problem before continuing testing. If the error message does not go away after corrective action, refer to TM 9-4910-571-12&P.



2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

(e) Confidence Error Readouts. C004 is a typical error readout resulting from the detection of a faulty VTM during confidence test. For detailed information concerning confidence error readouts refer to TM 9-4910-571-12&P.

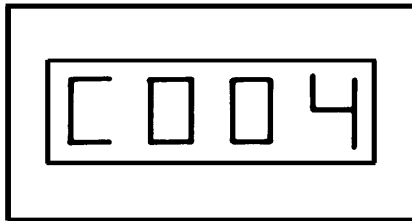


Table 2-4. Status Readouts

VTM Readout	Interpretation
.8.8.8.8	A readout of .8.8.8.8 appears for 1 to 2 seconds each time the power is applied to the VTM. It means that there is power to the VTM, and that all elements of the readout display are operative.
----	A readout of ---- indicates the following: (1) After power turn on it signifies that the VTM is ready for testing. (2) During a compression unbalance test it signifies testing is in progress.
.9.9.9.9	A readout of .9.9.9.9 indicates that the VTM is reading a test value beyond the range of its measurement capability. Either (1) the wrong test number is selected for the parameter being measured, or (2) there is a fault in the vehicle.
PASS FAIL	A PASS or FAIL readout is the result of a test that checks the condition of a component being measured. A PASS/FAIL readout means just that — the component either passes the test or fails the test.
AUE	A readout of AUE indicates to the technician that the numerical readout is an average value, AUE is displayed only when measuring vacuum variation and the variation is less than one inch of mercury.

Table 2-5. Prompting Messages

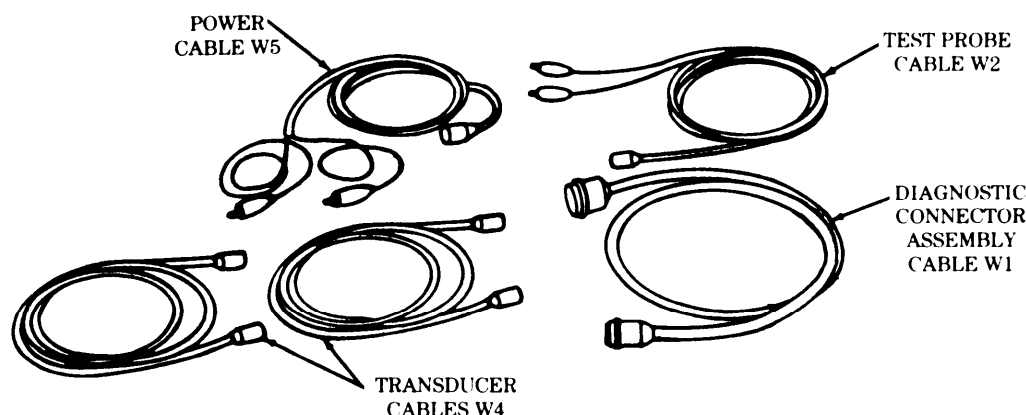
VTM Readout	Interpretation
UEH	Signal to technician to enter vehicle type identification number (VID) on the TEST SELECT switches. Vehicle ID numbers are found under TEST DATA on the flip card, on the vehicle test cards.
GO	Signal to technician to crank engine in compression balance or first peak tests.
OFF	Signal to technician to stop cranking in compression balance test or to release the accelerator in the CI power test.
CAL	Signal to the technician to release the TEST button during an offset test.
CIP	Signal to technician to apply full throttle in a CI power test.
66	Numbers are used for prompting messages in several tests. In confidence test, a readout of 66 signals the technician to dial in 99. In CI acceleration/deceleration power test No. 12, the first numerical readout signals the technician to shut off fuel.

2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)*Table 2-6. Error Readouts*

VTM Readout	Interpretation
E000	Occurs if you request the VTM for information it does not have. For example, if you request the vehicle ID and it has not been entered.
E001	Occurs in either the DCA or TK mode of operation. It indicates that a non-existent test number has been dialed into the TEST SELECT switches.
E002	Indicates that the required transducer is not connected.
E003	Indicates that a test number has been dialed which does not apply to the vehicle under test. It can only occur in the DCA mode.
E004	Indicates that a vehicle identification number or number of cylinders information has not been entered.
E005	Indicates that the transducer offset test was not performed.
E007	Indicates a conflict between the vehicle identification number (VID) dialed in and the number of cylinders dialed in. It may occur in response to either VID entry or number-of-cylinders entry.
E008	Indicates the VTM is not receiving the required voltage signal for the test selected. This error code is related only to starter and compression balance tests.
E009	Indicates that the engine was not running at the start of the test.
E010	Indicates that a wrong vehicle identification number was dialed into the VTM.
E011	Indicates that the throttle control was operated incorrectly during power test, taking too much time to either accelerate or decelerate.
E013	Indicates bad data were taken for the test in progress. Repeat the test one time.
E014	Indicates that a wrong number of cylinders was dialed into the VTM.
E018	Indicates that an engine RPM or AC frequency test was terminated automatically to protect the VTM. Termination is only after several minutes of no-signal operation. Most likely the VTM was left on the vehicle and the engine stalled.

d. Cable Assemblies.

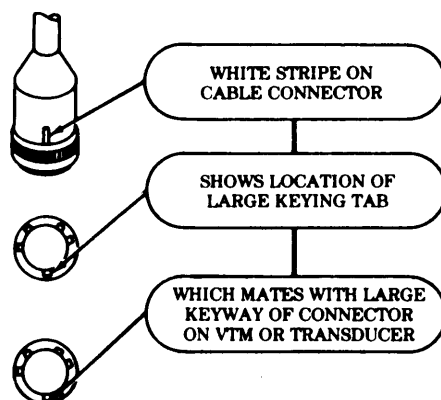
1. General. The cable assemblies are shown below and are referred to by the cable number and by a name which describes how the cable is used. If necessary, the two transducer cables (W4) can be joined with the adapter supplied in the transducer kit to make one long cable.

*Cable Assemblies*

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2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

2. Installation. When cables are connected, large key on the cable connector mates with a keyway on the transducer connector or the VTM connector for proper installation. If you experience any difficulty during testing and suspect that a cable is bad, refer to TM 9-4910-571-12&P for checking cable continuity.



Connector Key Location

e. Transducer Kit

(1) General. The transducer kit contains a pulse tachometer transducer, a pressure and a vacuum transducer and the necessary adapters (bushing, plugs, tees, etc.). Also included in the kit is a current probe for measuring voltage and resistance.

Not all fittings have part number markings. The legend will help to identify the items.

Before installing any transducer kit item on the vehicle, be sure to clean the mounting surfaces. This is particularly important if you are going to open fuel lines or tap into manifolds. Dirt particles entering the engine can cause damage to both the engine and the transducer kit item.

The transducers should be kept clean, free of dirt and grease, and handled with care.

(2) Pressure Traducers. The pressure transducers have a small breather hole on the side of the housing which should be kept unplugged. Do not use high pressure to unplug breather hole.

(3) Pulse Tachometer. Make sure that the slotted hole in the engine tachometer drive shaft is clear and not hard packed before installing the pulse tachometer.

(4) Threaded Adapters. observe threaded fittings carefully to avoid engaging straight threads with pipe threads.

Each measurement device (transducer) in the transducer kit has its own identification resistor. The VTM uses this identification resistor to check that the correct transducer is connected for the measurement being made. If the correct transducer is not connected, error code E002 will be displayed,

Table 2-7. Transducer Kit Components

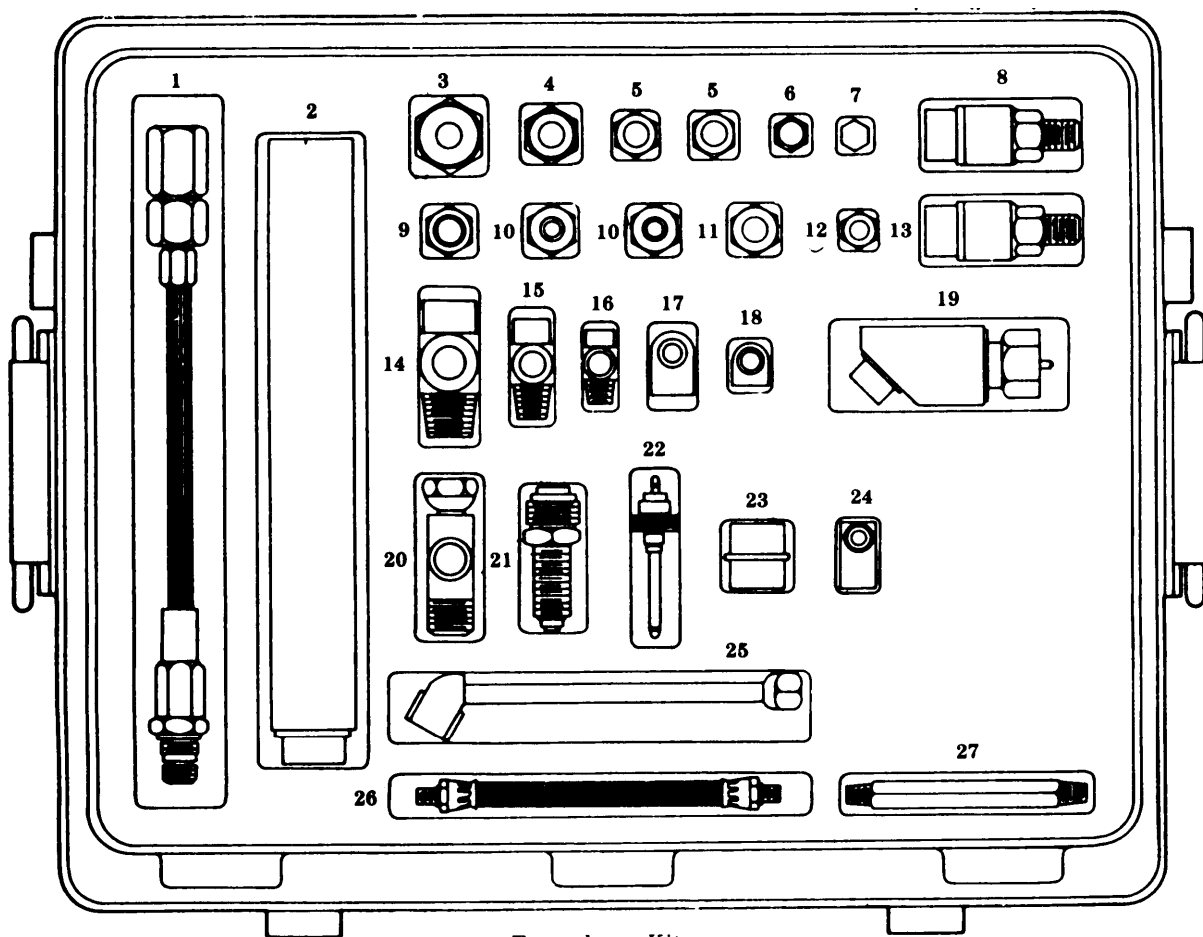
ITEM NO.	TK NO.	PART NO.	QTY	ITEM
1	10	11669227	1	Hose and fitting assy (spark plug adapter)
2	11	12258878	1	Current probe
3	12	12258853-1	1	Pipe thread reducer, 3/4 MPT to 1/4 FPT
4	13	12258853-3	1	Pipe thread reducer, 1/2 MPT to 1/4 FPT
5	14	12258853-2	2	Pipe thread reducer, 3/8 MPT to 1/4 FPT
6	15	444620	1	Hex head plug, 1/4 MPT
7	16	5327970	1	Hex head plug, 1/8 MPT
8	17	12258876	1	Pressure transducer, 0-1000 psig
9	21	12258881	1	Snubber

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2-20. STE/ICE DESCRIPTION AND OPERATION (Cont'd)

Table 2- 7. Transducer Kit Components (Cont'd)

ITEM NO.	TK NO.	PART NO.	QTY	ITEM
10	20	3204X2	2	Adapter, 1/8 MPT to 1/4 FPT
11	19	3304X2	1	Coupling reducer, 1/8 FPT to 1/4 FPT
12	18	234X5	1	Male connector, 5/16 tube to 1/4 MPT
13	22	12258877	1	Pressure transducer, -15 in. Hg to 25 psig
14	23	444152	1	Street tee, 1/2 pipe thread
15	24	3750X4	1	Street tee, 1/4 pipe thread
16	25	547002	1	Street tee, 1/8 pipe thread
17	26	12258879-2	1	Street elbow, 1/4 pipe thread
18	27	12258879-1	1	Street elbow, 1/8 pipe thread
19	34	12258875	1	Pulse tachometer
20	32	12258880	1	Fuel line adapter
21	31	MS53099-2	1	Tachometer drive adapter
22	30	7540877	1	Ignition adapter
23	29	MS3119E14-19	1	Adapter (connector-to-connector)
24	28	12258762	1	Tee, inverted flare
25	33	8840543	1	Air chuck
26	35	11669236	1	Hose assembly, 1/8 MPT
27	36	12258852	1	Pipe nipple, 1/8 MPT



Transducer Kit

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2-21. VEHICLE TESTING I

a. General. To troubleshoot a vehicle problem, the technician can use the STE/ICE (vehicle test meter and transducers) and the vehicle test card.

b. Data Entry Tests. For information regarding Data Entry, Cylinder Entry, Vehicle ID Entry, and Data Display Tests, refer to TM 9-4910-571-12&P.

c. Offset Tests. The STE/ICE VTM performs a test by setting the TEST SELECT switches to the test number and pressing the TEST button. For some tests, an offset test is required before the test itself can be performed. This is done by selecting the number of the desired test and holding the TEST button down for several seconds.

The offset test voids characteristic differences in the VTM, test leads, and transducers. It zeros the meter. Once the offset is performed, the VTM automatically corrects for the offset before displaying measured values. The displayed offset value should be checked against limits on the vehicle test card. If the displayed value is outside these limits, either the transducer or the test cable is faulty and must be replaced. This is another form of self-test. The offset is performed when each transducer is connected. All tests requiring offset are identified by a star (*) on the flip cards and by OFFSET LIMITS on the vehicle test cards. The offset test is performed with the test probe cable or transducer connected to the VTM. Care should be taken to see that no stimulus is applied to the transducer. Test probe cable leads should be shorted together. To perform an offset test, dial the test number into the TEST SELECT switches. Press and hold the TEST button until the prompting message CAL appears on the display. In a few seconds after release of the TEST button, a number will appear. This is the measured offset value associated with the test probe cable or transducer and cable.

d. Control Tests. These tests are used to change (or control) the way a vehicle test is displayed, or the way it is run. There are four control tests:

- 01 Interleave (displays RPM with next test).
- 02 Display minimum value for next test.
- 03 Display maximum value for next test.
- 04 Display peak-to-peak value for next test.

Control tests 01, 02, 03, and 04 specify the action to be taken by the next test only.
A subsequent test will reset the control.

(1) Interleave (Test 01). This test alternately measures engine speed and a second parameter such as fuel pressure or alternator voltage. To initiate interleave, dial 01 into the TEST SELECT switches and press and release the TEST button. The prompting message PASS will signal the technician to dial in the second test number and again press and release the TEST button.

(2) Minimum Value (Test 02). This test displays the minimum value measured during a test. To initiate a minimum value display, dial 02 into the TEST SELECT switches and press and release the TEST button. The prompting message PASS will signal the technician to dial in the desired test number and again press and release the TEST button. The minimum value is displayed and updated whenever a lower minimum value is measured. Entering 02 and the test number again will reset the process and a new minimum value will be displayed.

(3) Maximum Value (Test 03). This test displays the maximum value measured during a test. To initiate a maximum value display, dial 03 into the TEST SELECT switches and press and release the TEST button. The prompting message PASS will signal the technician to dial in the desired test number and again press and release the TEST button. The maximum value is displayed and updated whenever a higher maximum value is measured. Entering 03 and the test number again will reset the process and a new maximum value will be displayed.

(4) Peak-to-Peak Value (Test 04). This test displays the peak-to-peak value of alternator/generator output volts and 0-45 volts DC (89), 0-1500 amps DC (90), and battery volts (67). To start a peak-to-peak measurement, dial 04 into the TEST SELECT switches and press the TEST button. The prompting message PASS will signal the operator to dial in one of the three numbers (89, 90, 67) and again press the TEST button.

2-22. ENGINE CHAIN INDEXES I

Tables 2-8 and 2-9 provide indexes GO and NO-GO test chains for the M939 series vehicles. The test chains are presented on the pages which follow.

Table 2-8. CI Engine Go Index, Combined Mode Chain

GO TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
G01	DCA	VTM Connections and Checkout	2-140
G02	TK	First Peak Test — Starter Current	2-145
G03	TK	Engine Start — Lubrication Check	2-147
G04	DCA	Charging Circuit and Battery voltage Test	2-150
G05	DCA	Engine Warmup/Coolant Check/Oil Pressure Test	2-152
G06	DCA	Governor Check/Power Test	2-154
G07	DCA	Idle Speed/Governor Check	2-156
G08	DCA	Compression Unbalance Test	2-157

Table 2-9. CI Engine No-Go Index, Combined Mode Chain

NO-GO TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
NG05	TK	Low Oil Pressure Check	2-159
NG20	DCA	No Crank — No Start	2-161
NG30	DCA	Engine Crank — No Start	2-162
NG31	DCA	Gage Test	2-166
NG50	DCA	Charging Circuit Tests	2-168
NG80	DCA - TK	Starter Circuit Tests	2-169
NG81	DCA	Battery Tests	2-174
NG90	DCA	Governor/Power Test Fault Isolation	2-180
NG130	DCA	Engine Tightness Test	2-185

Table 2-10. STE/ICE GO-Chain Tests

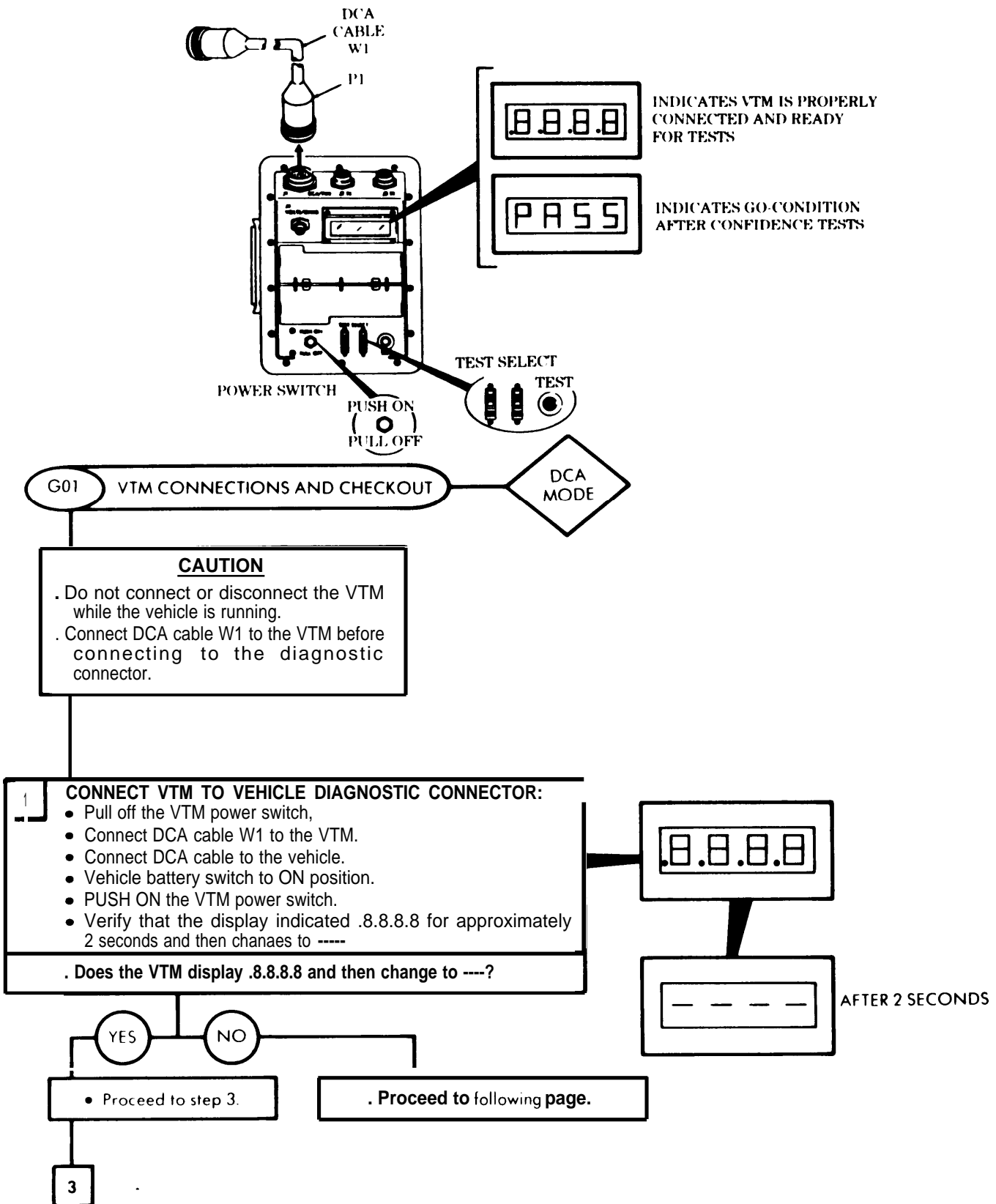


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

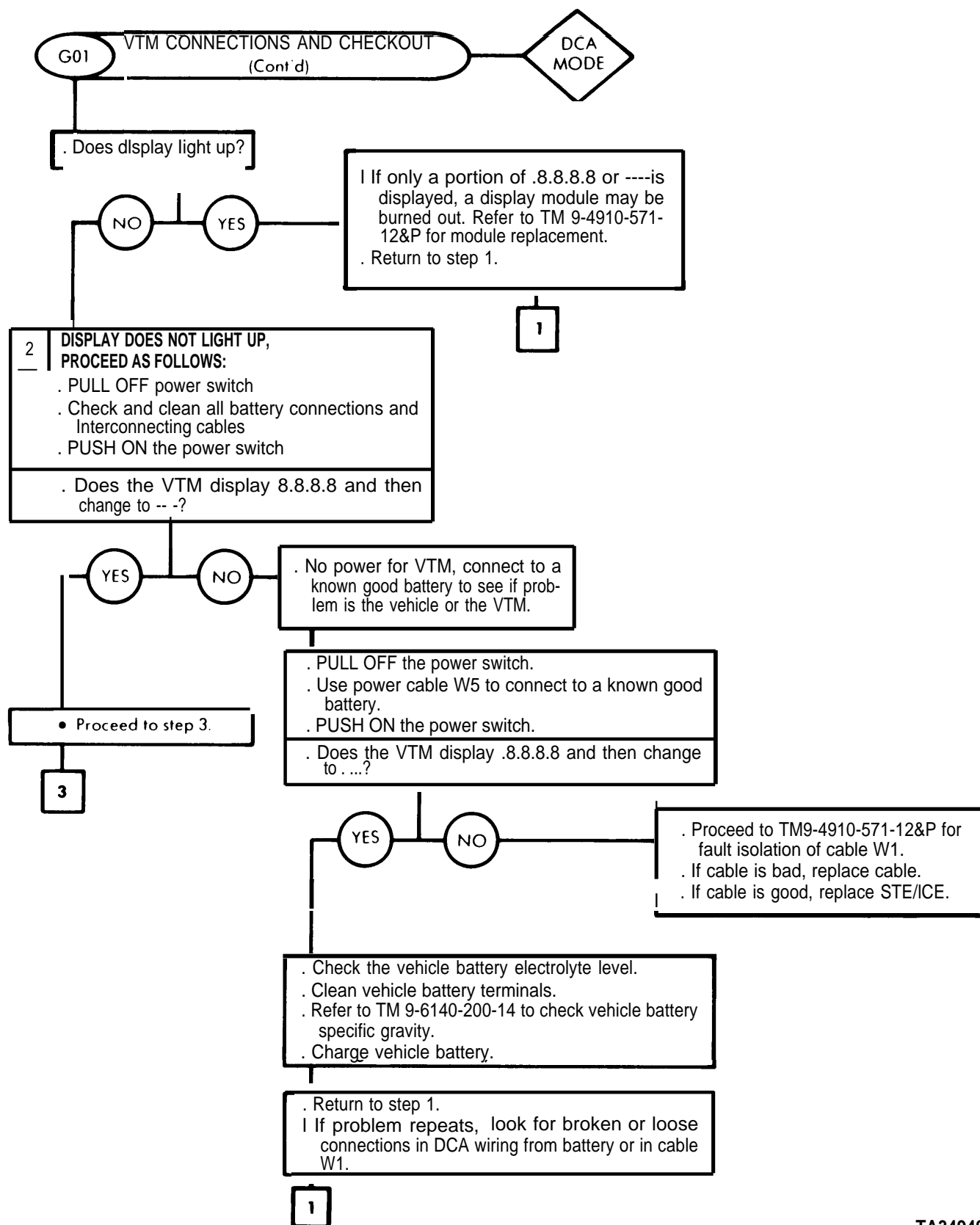


Table 2 10. STE/ICE GO-Chain Tests (Cont'd)

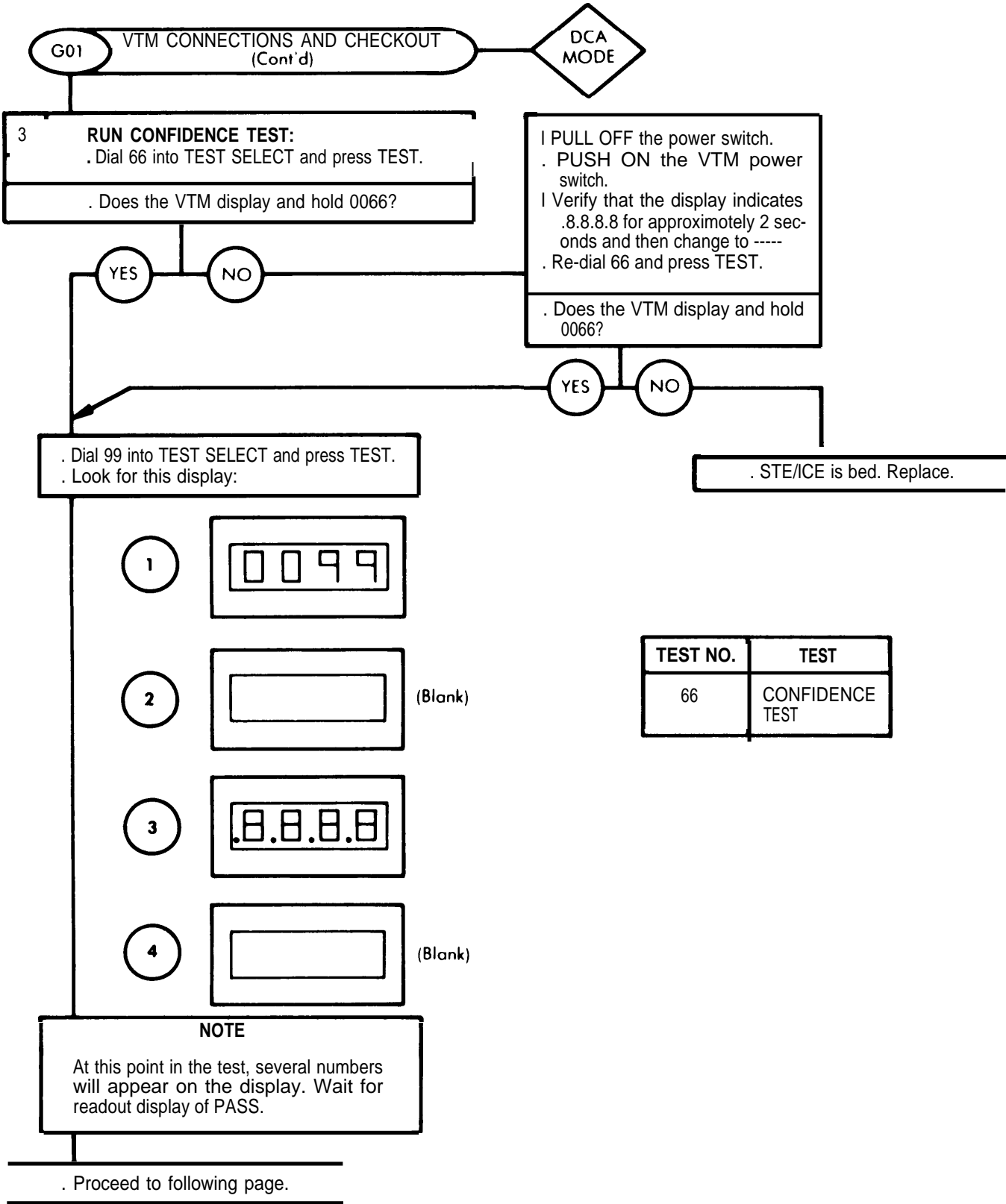


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

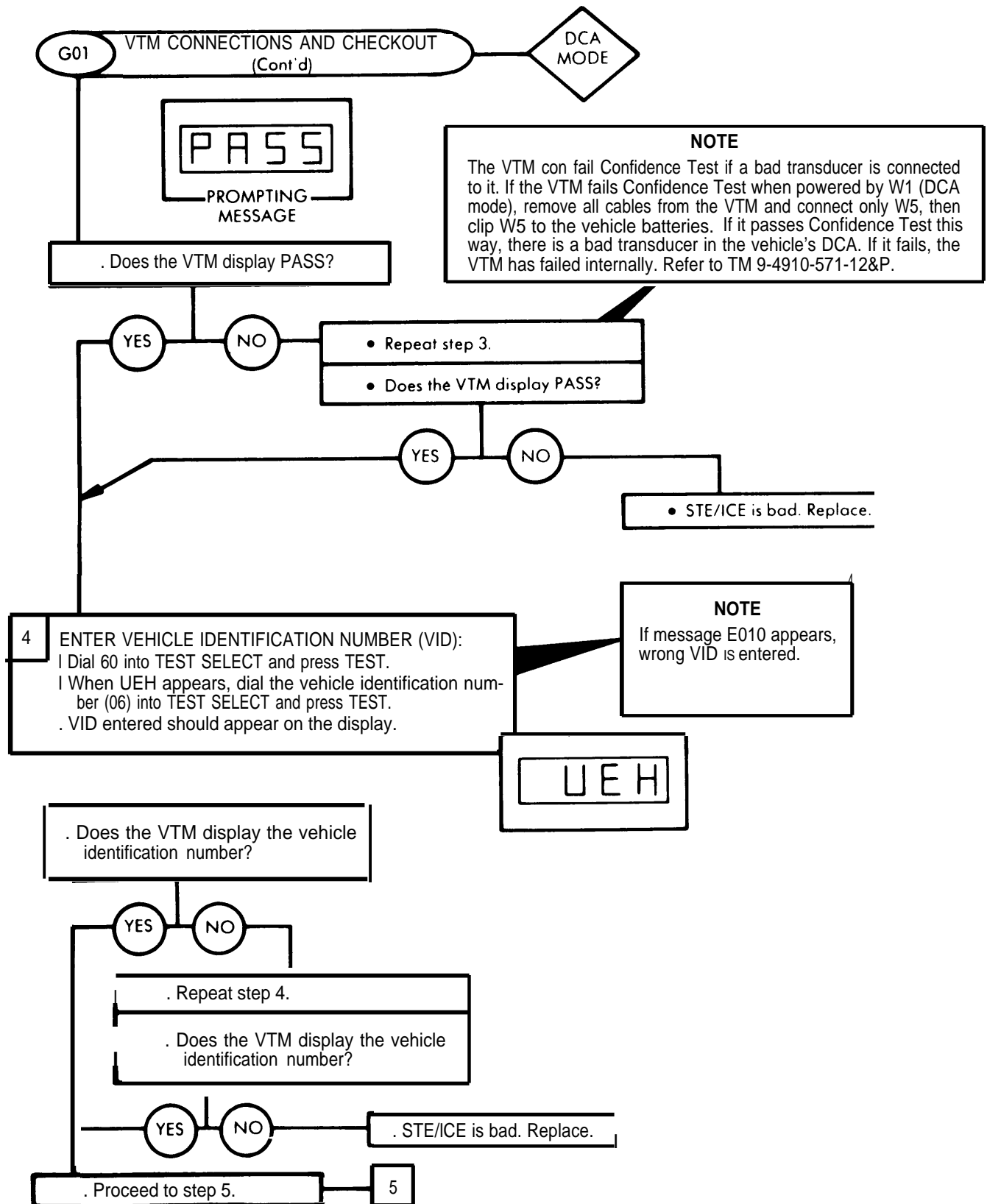


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

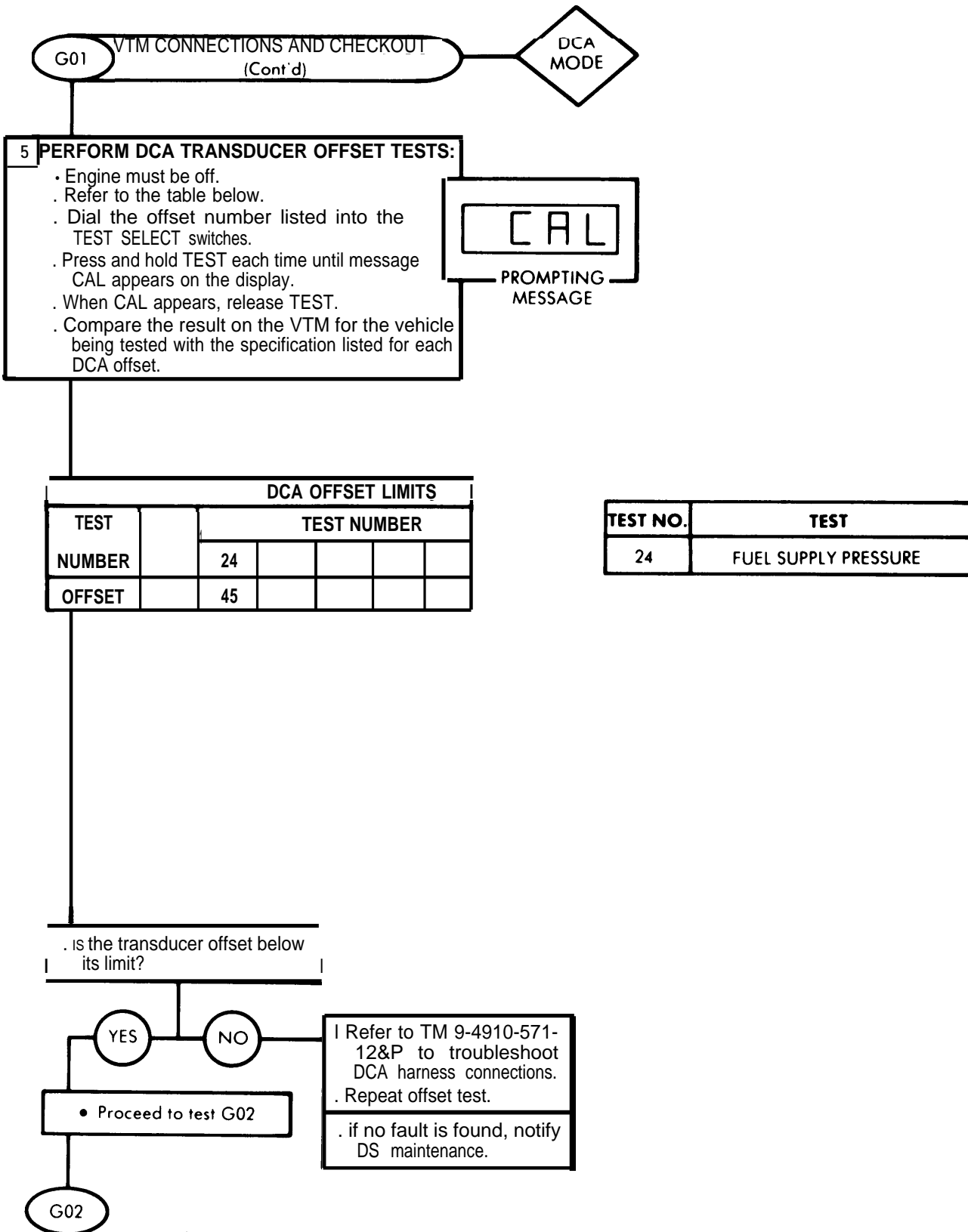


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

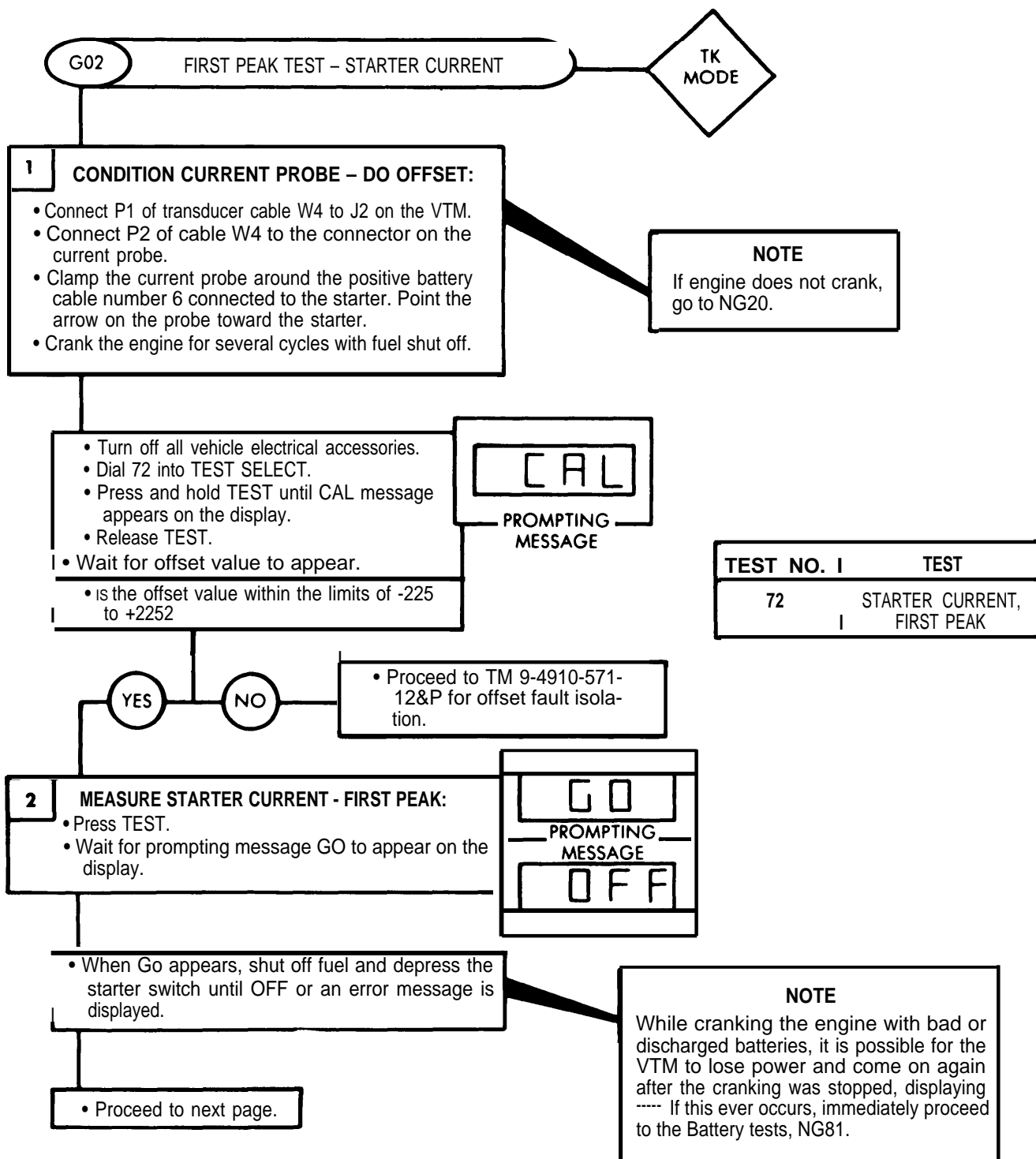


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

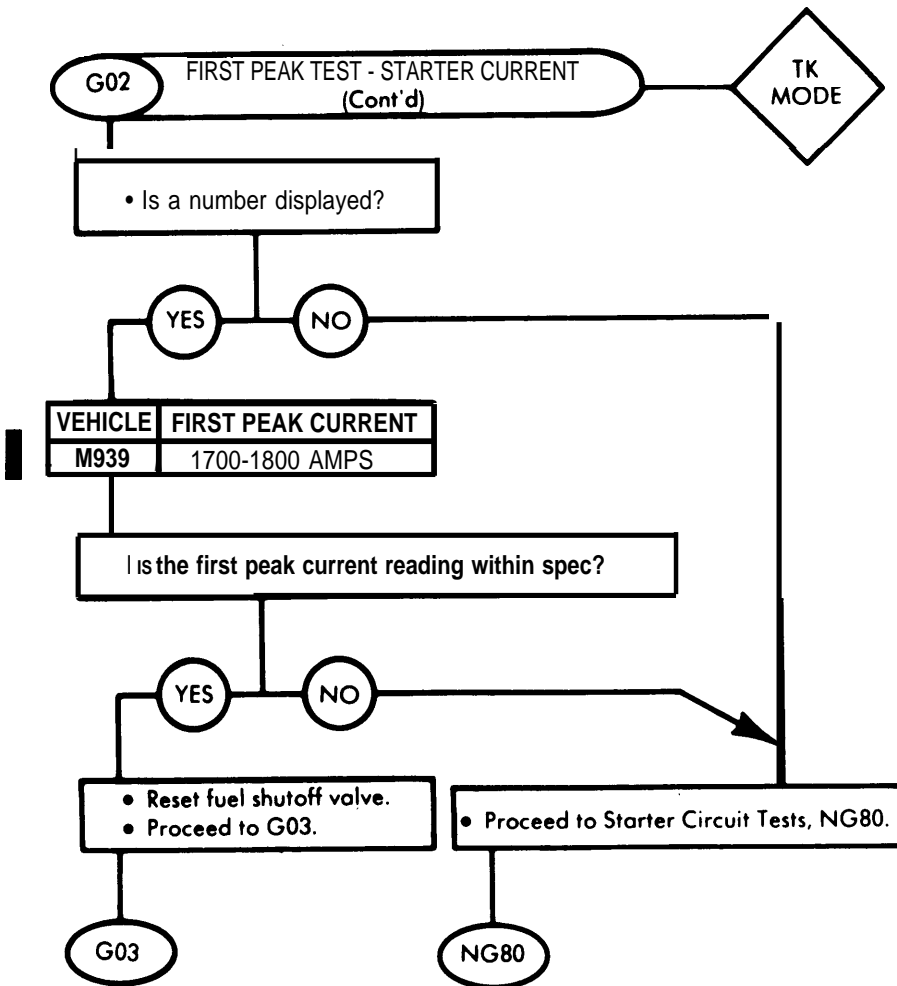


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

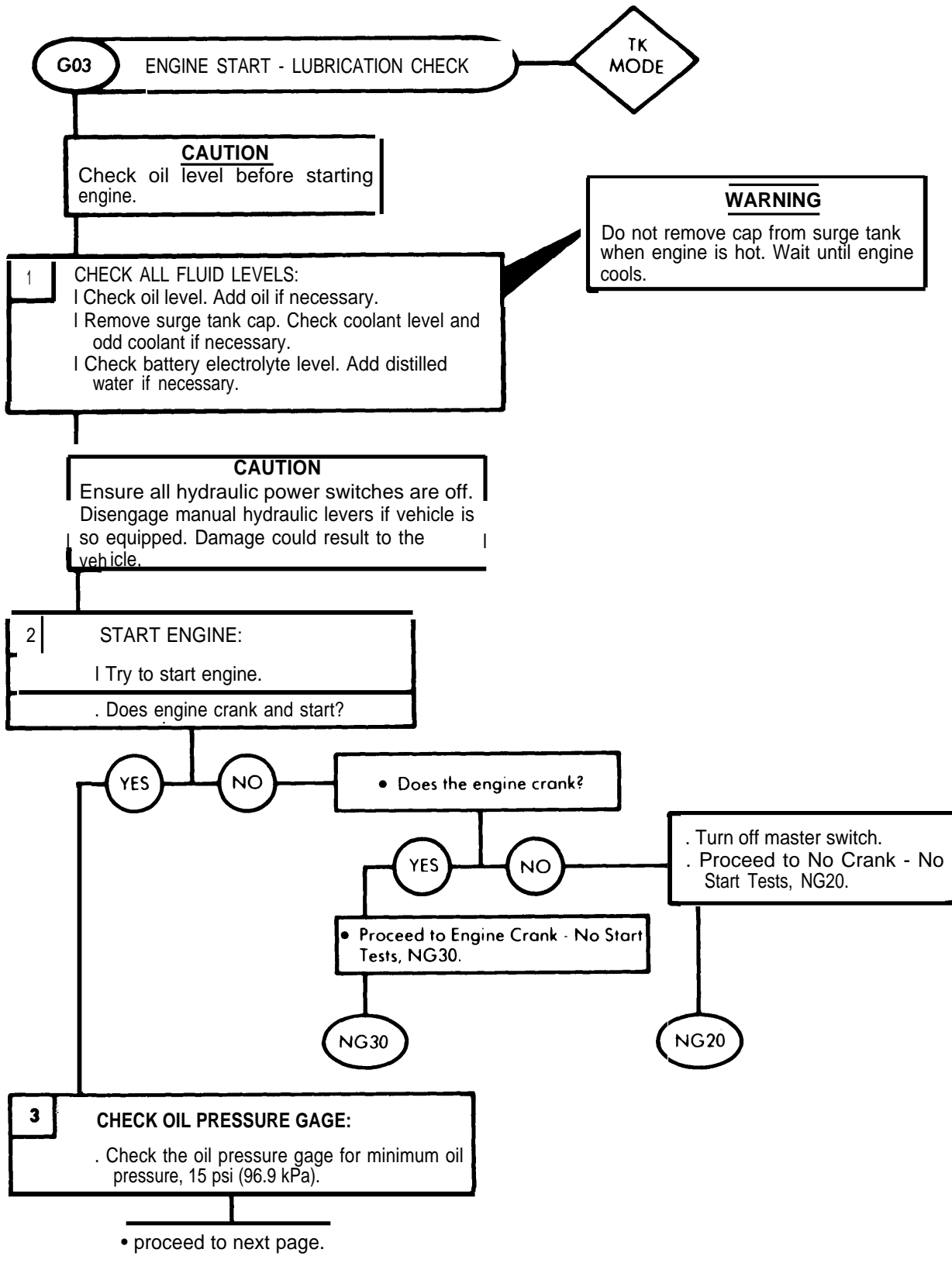


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

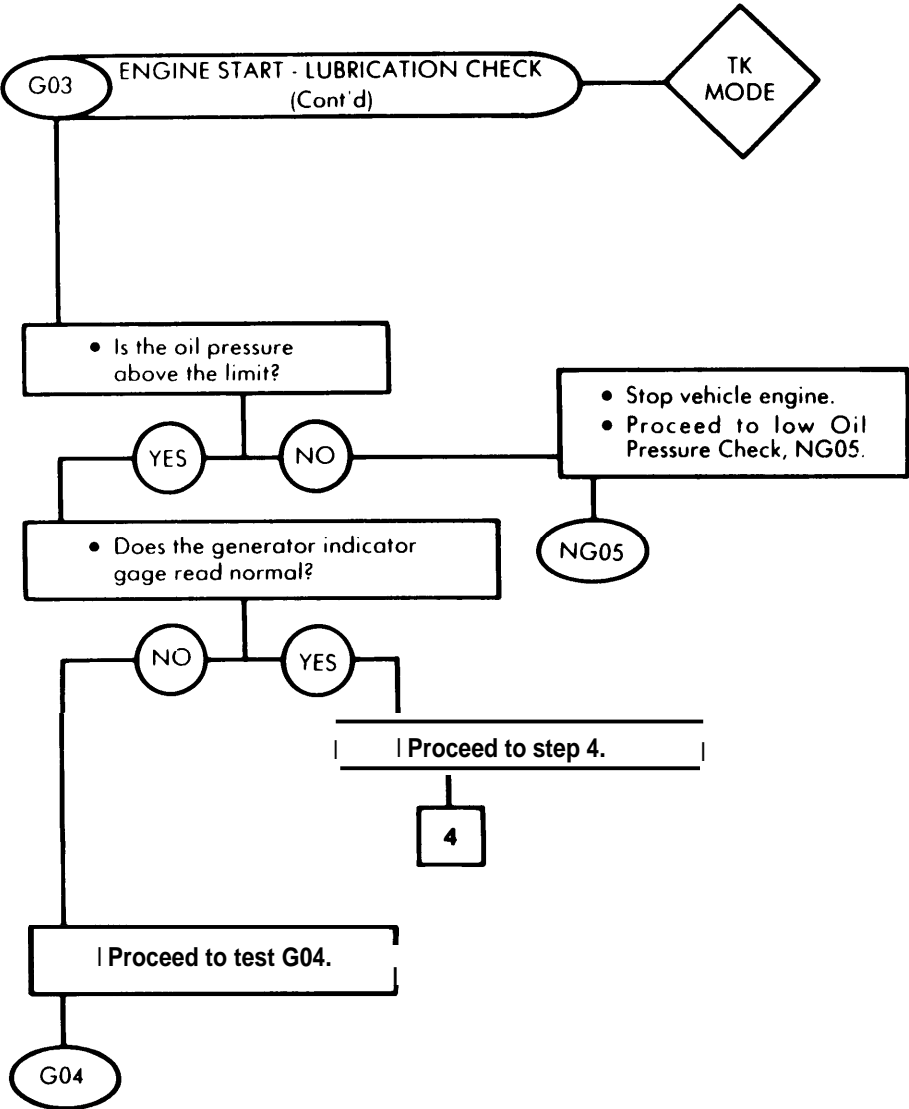


Table 2-10. STE/ICE G0-Chain Tests (Cont'd)

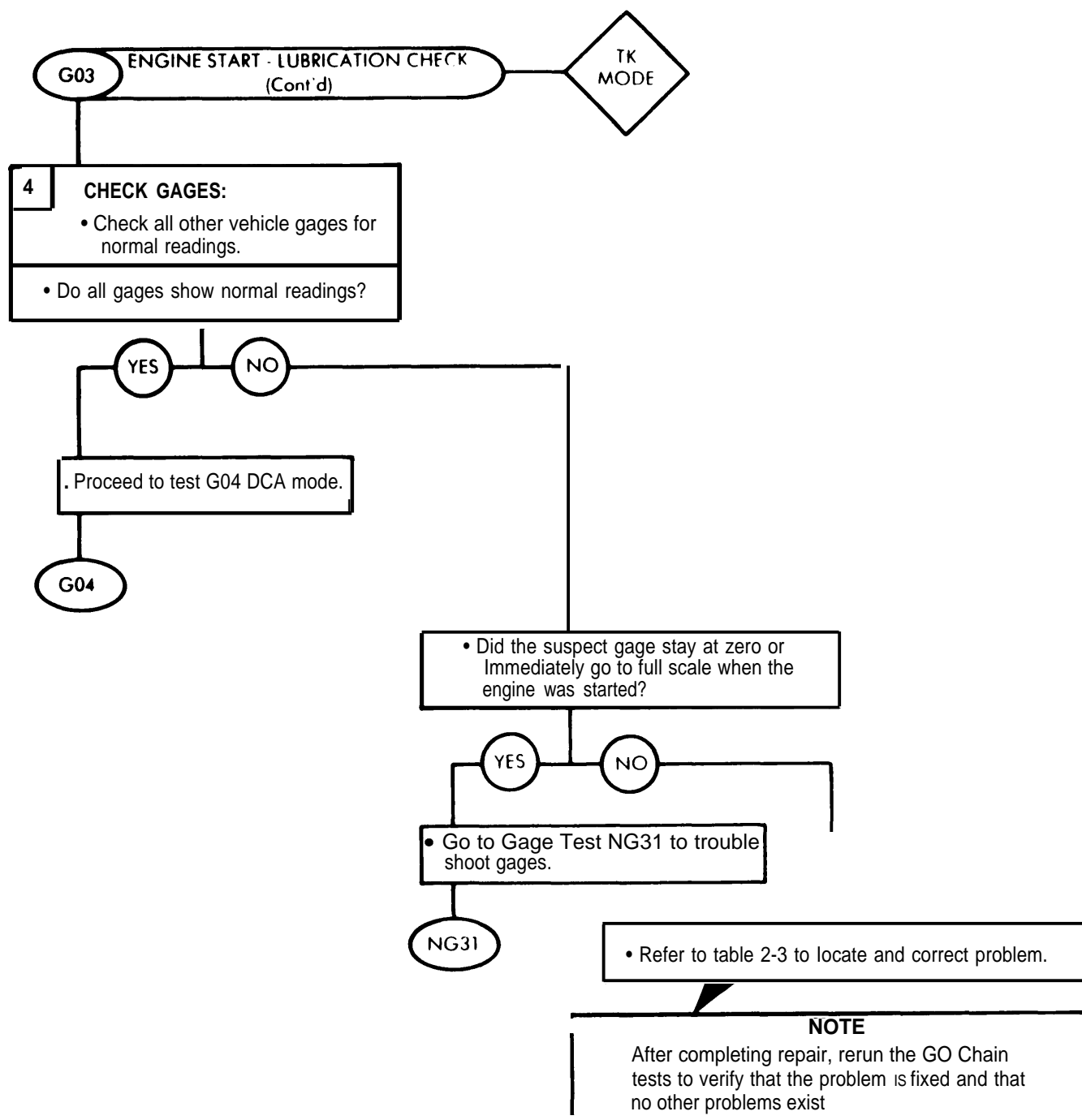


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

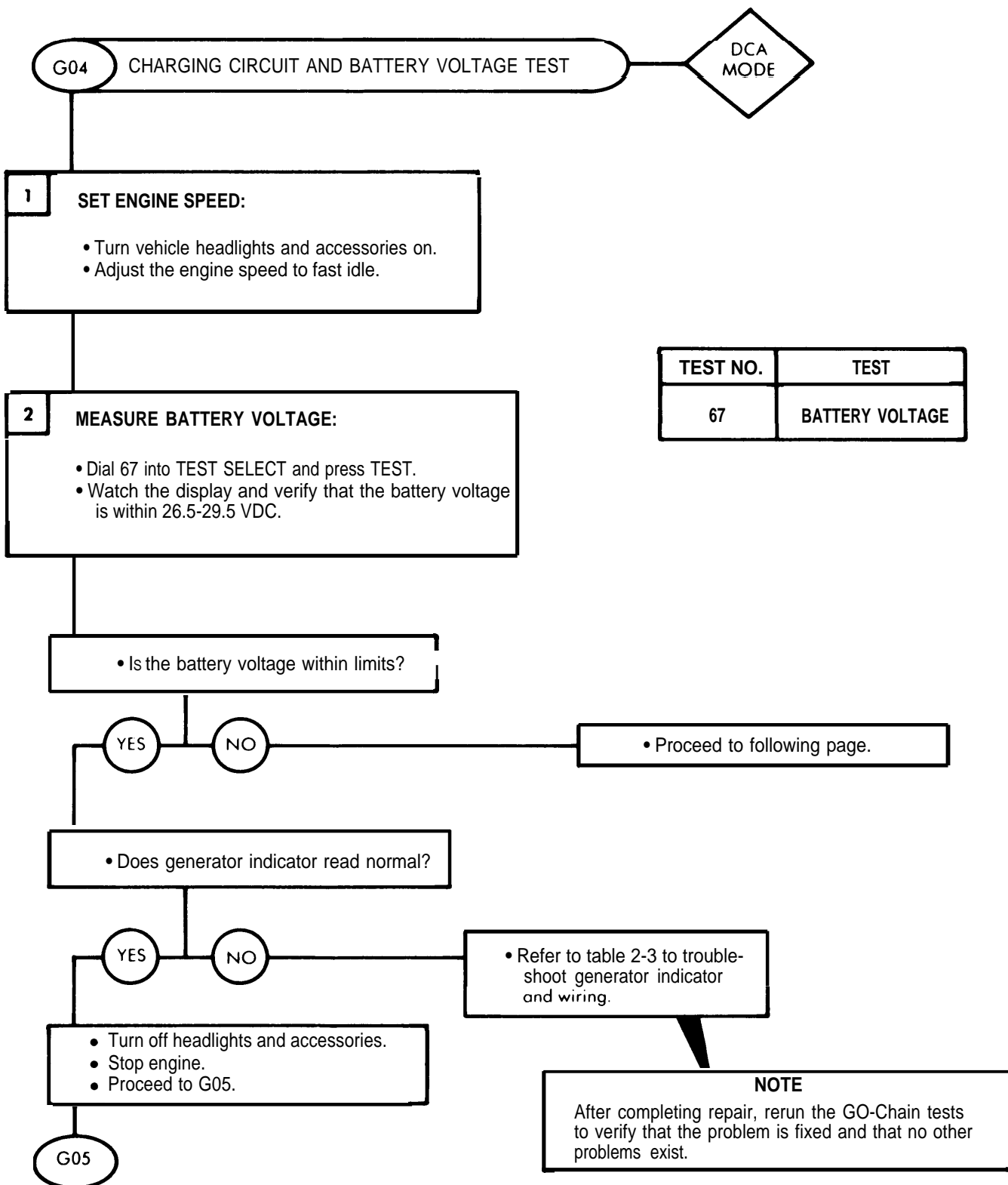


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

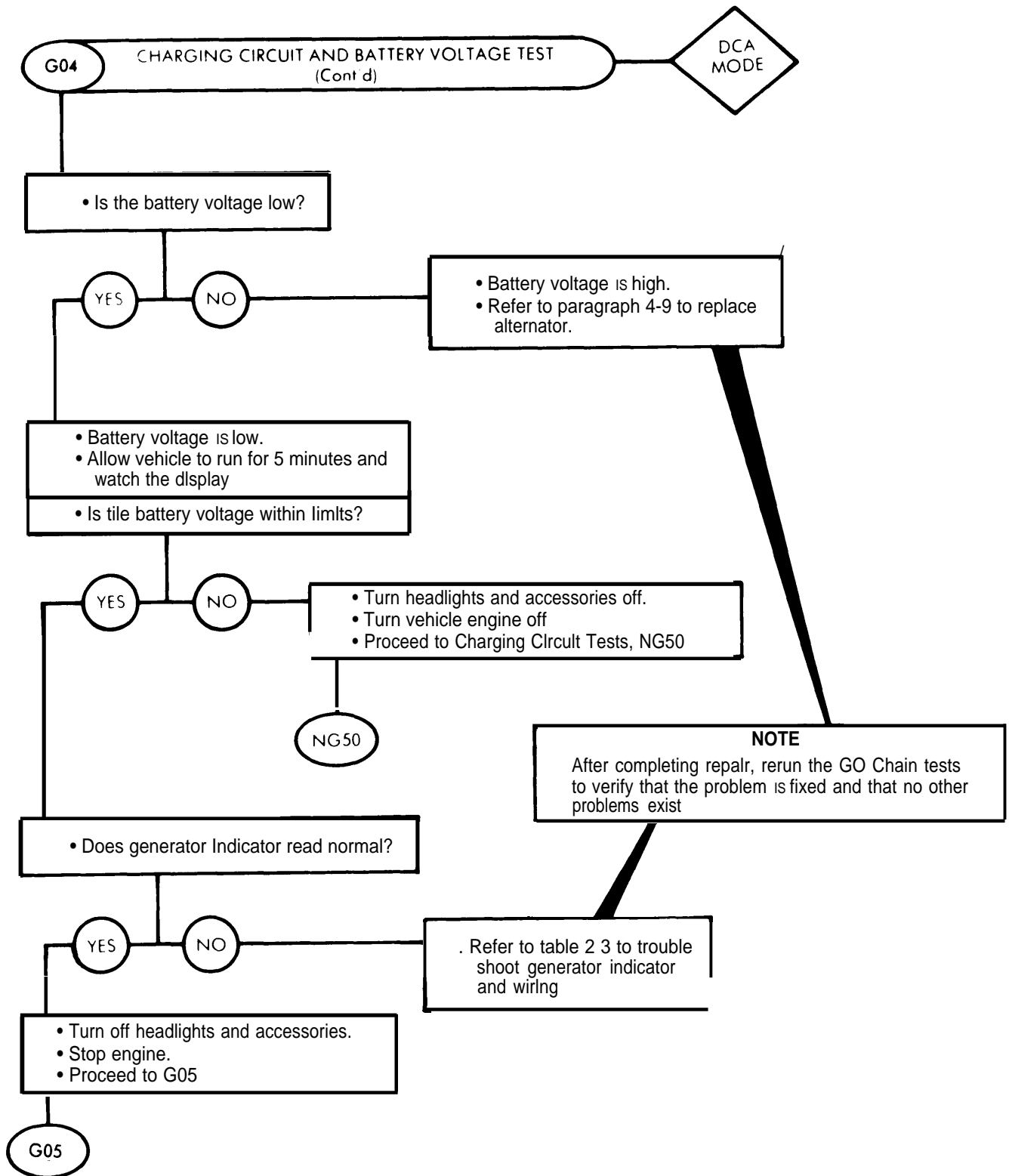


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

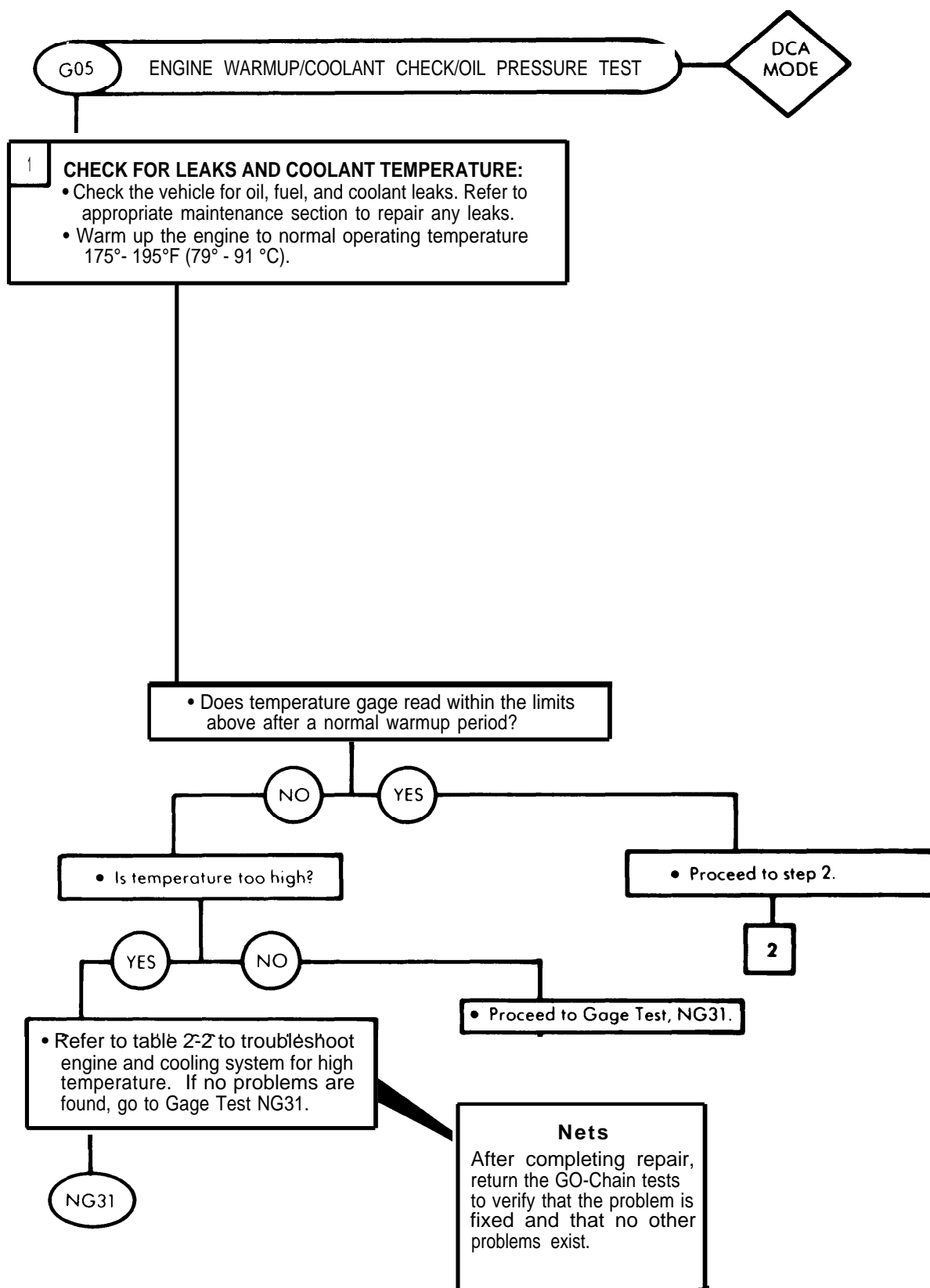


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

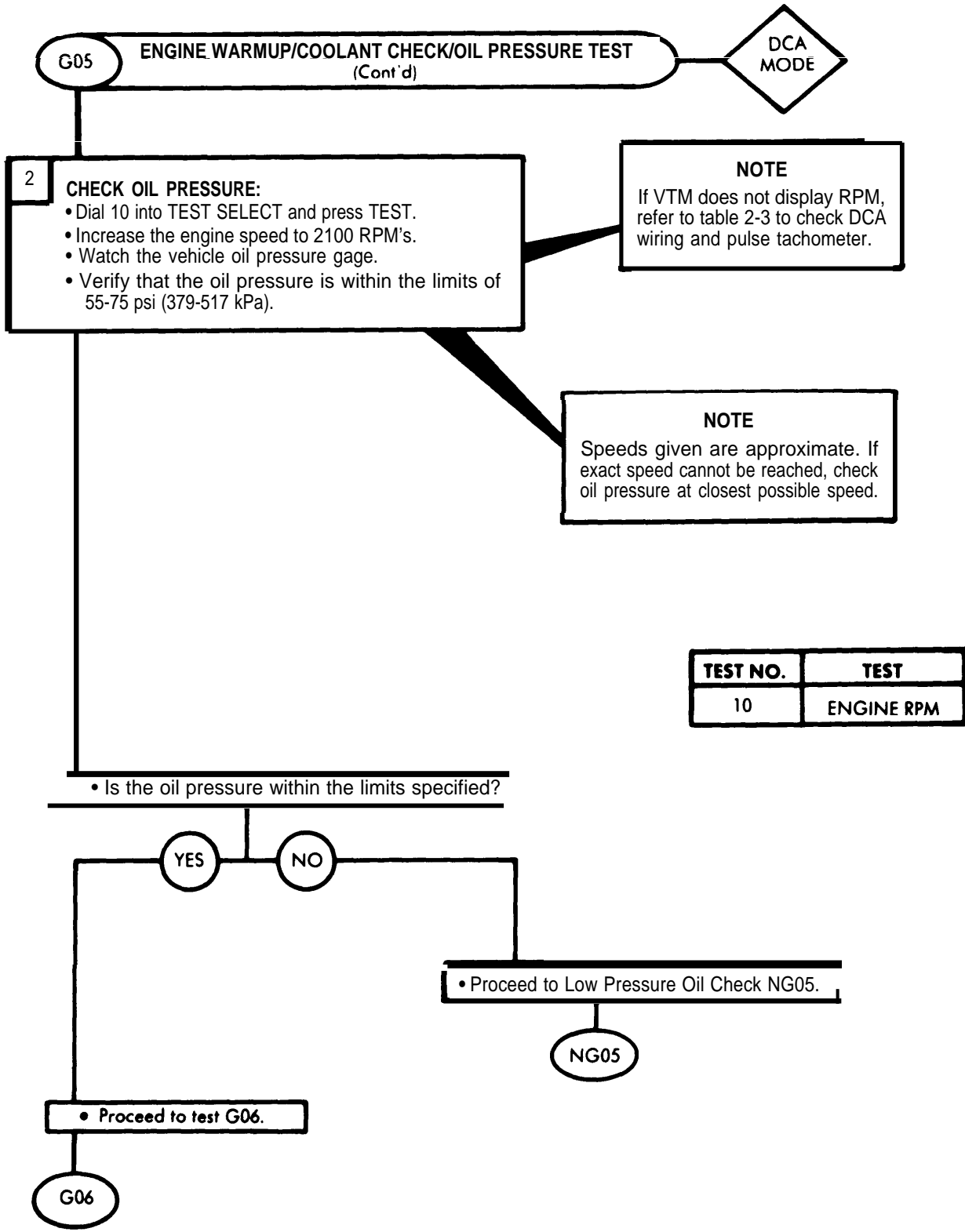


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

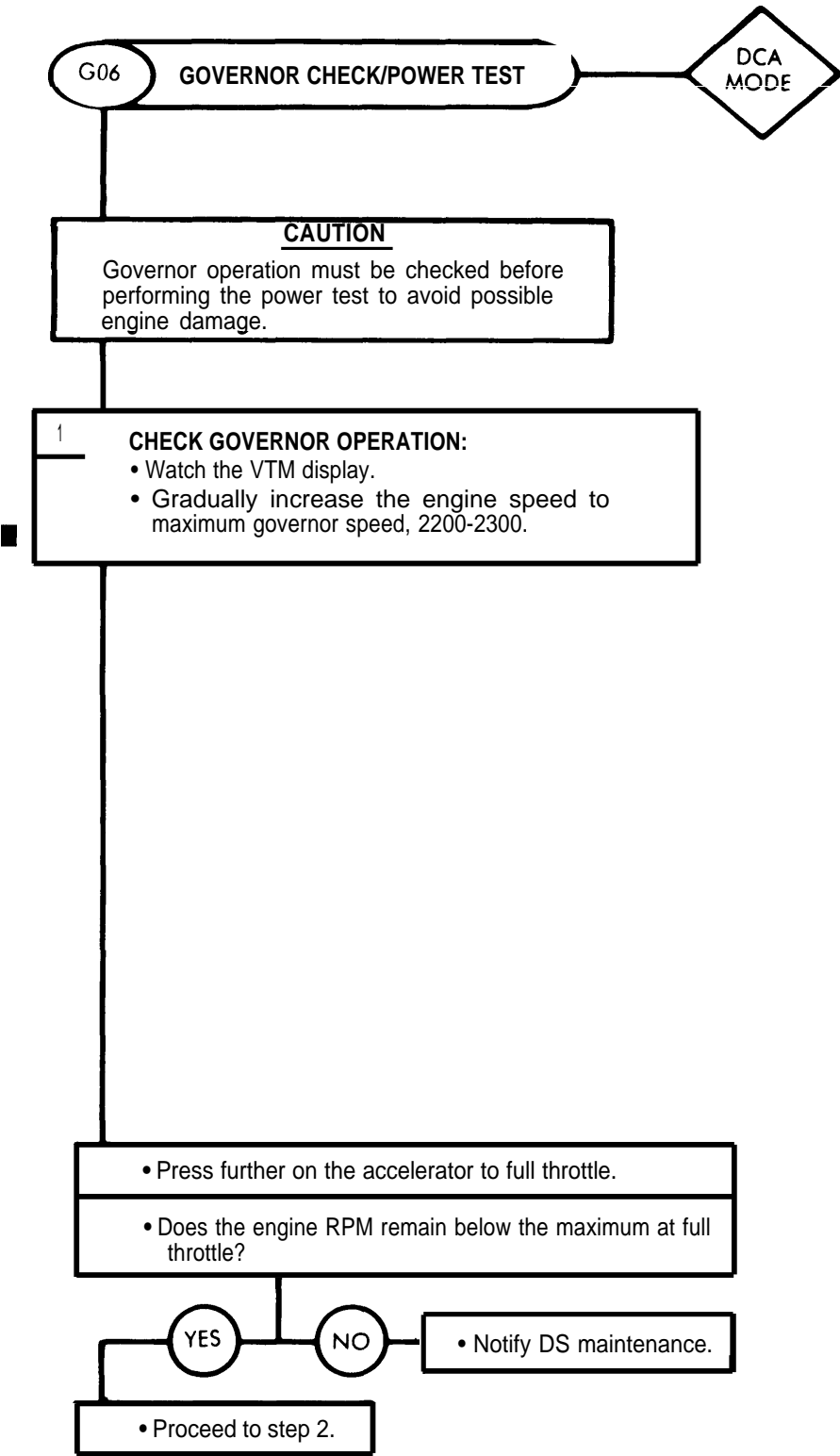


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

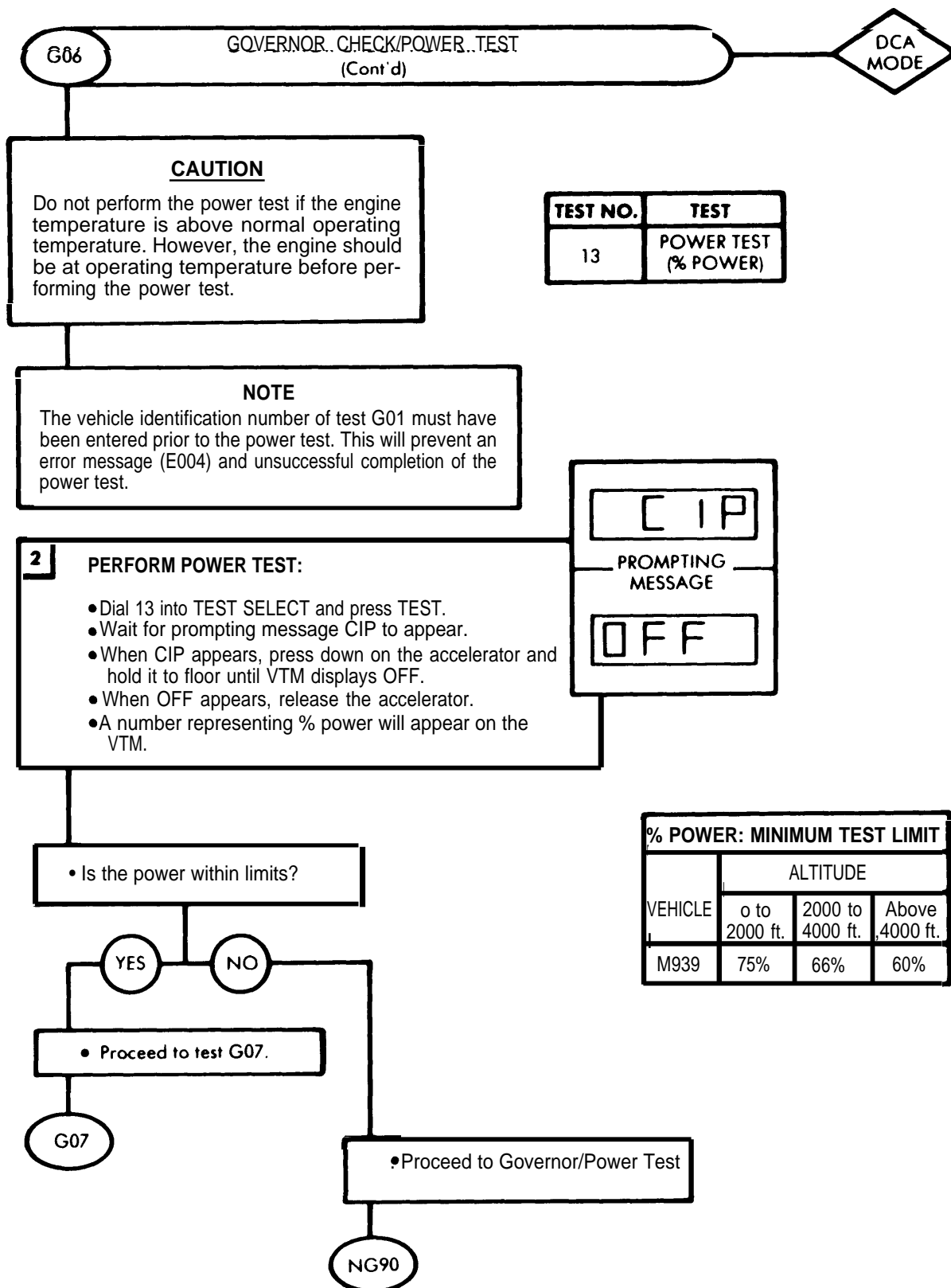


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

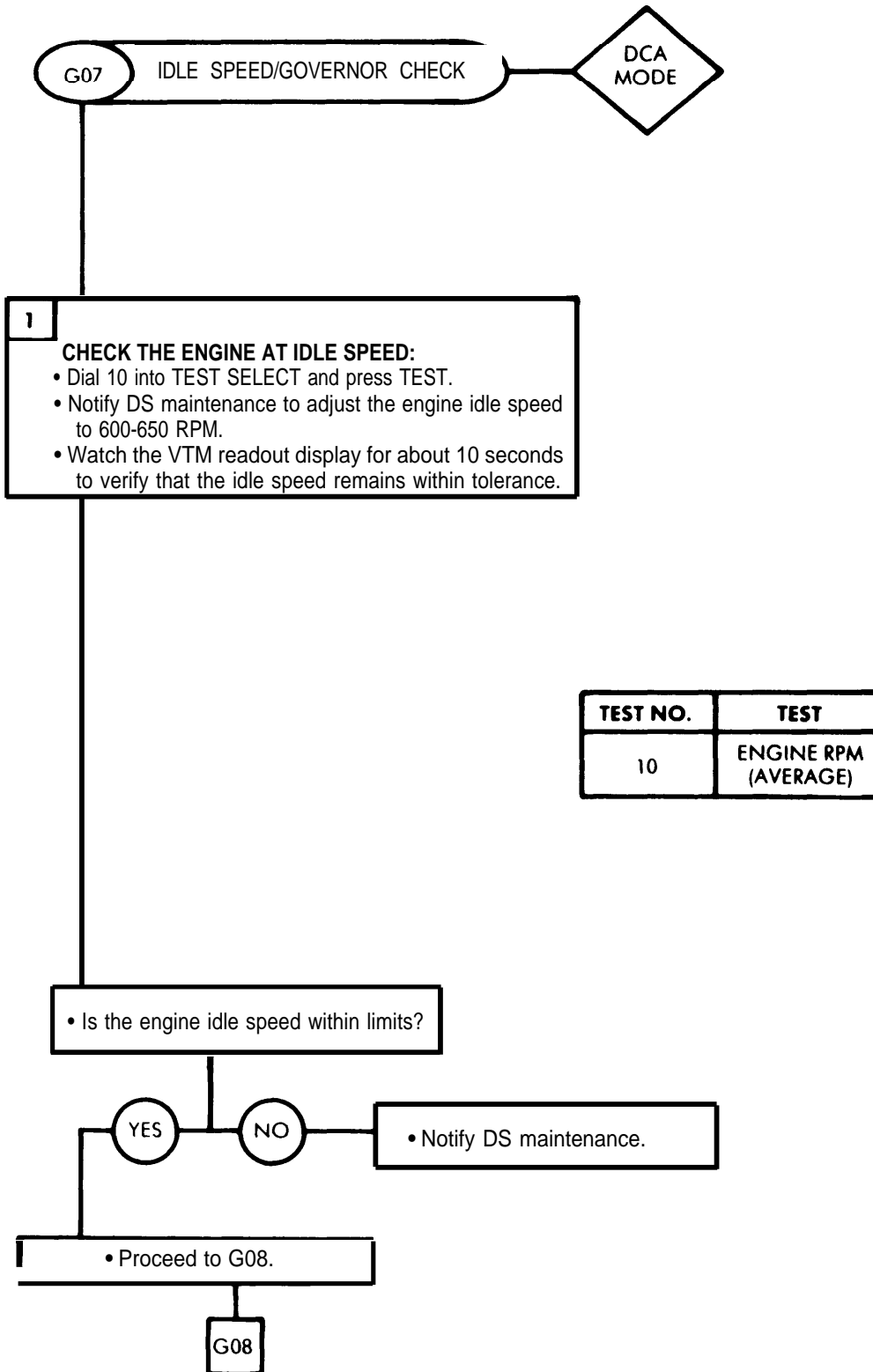


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

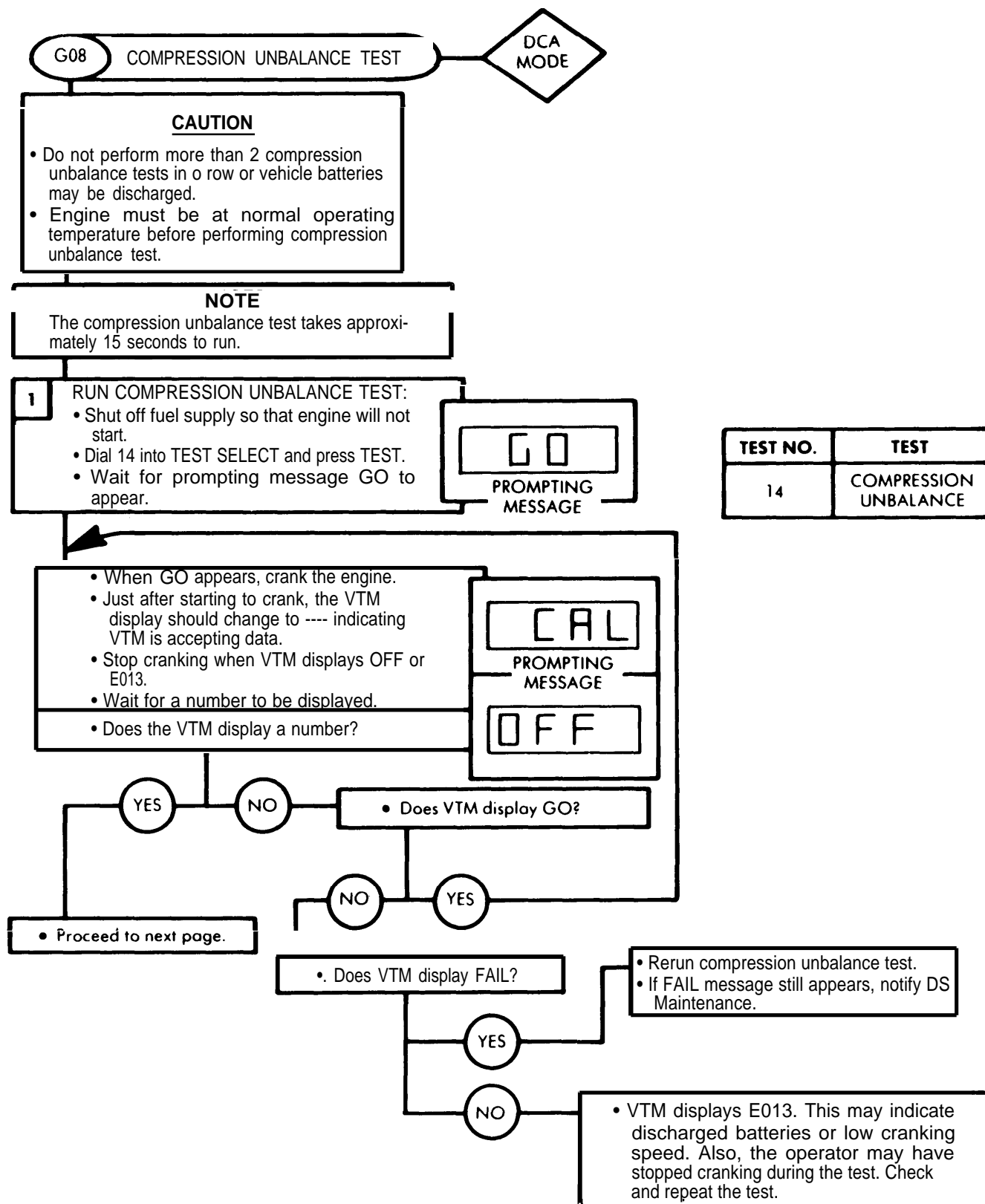


Table 2-10. STE/ICE GO-Chain Tests (Cont'd)

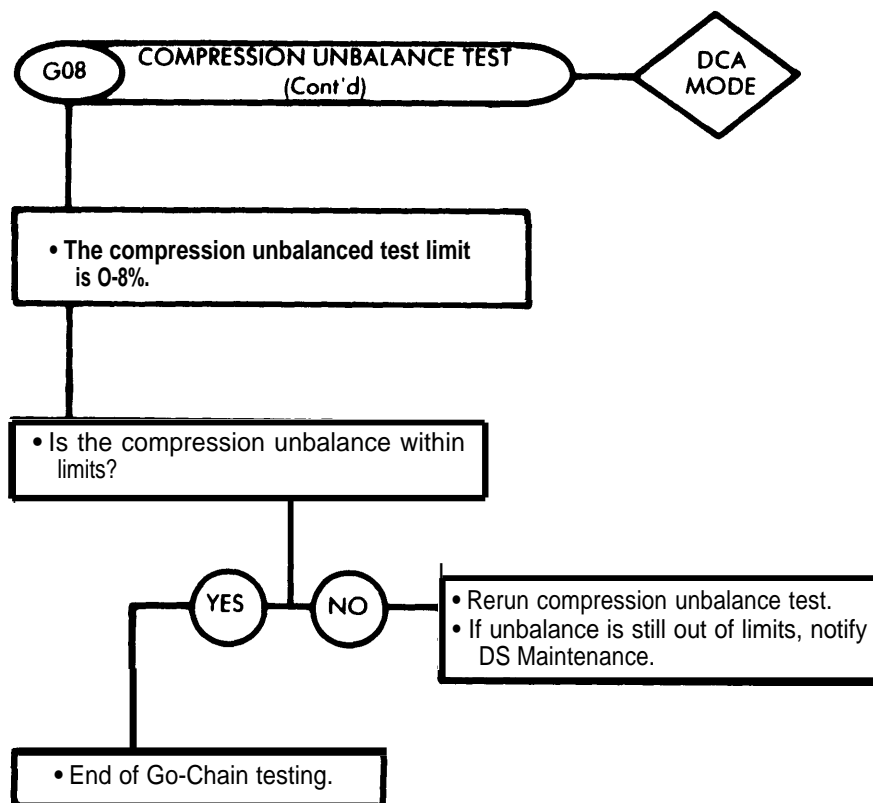
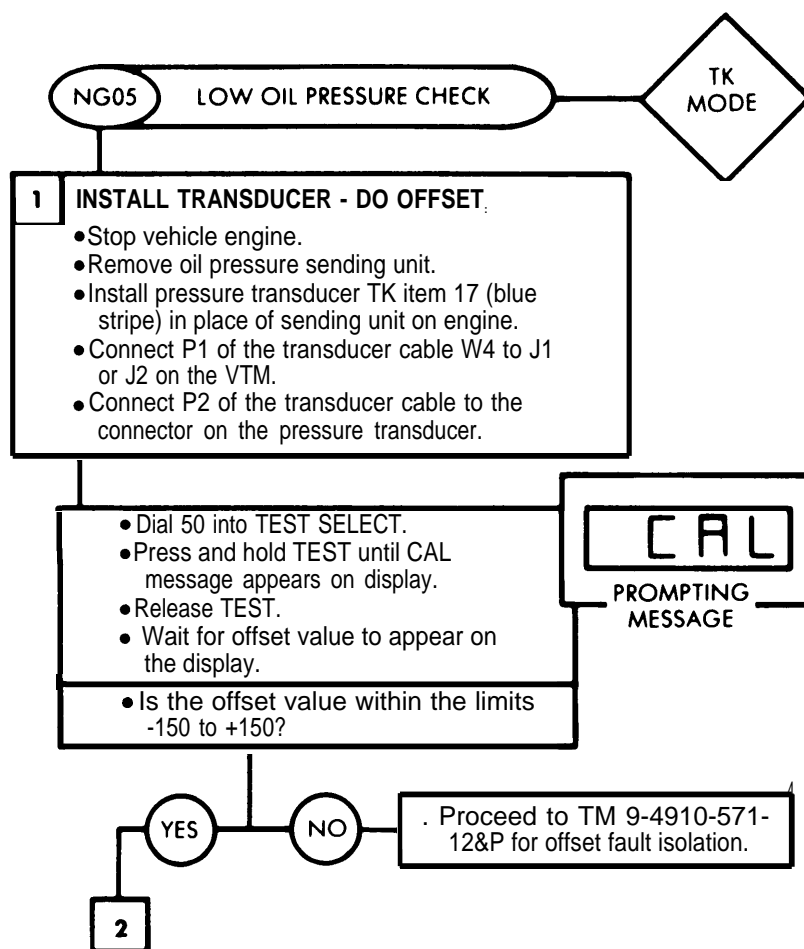
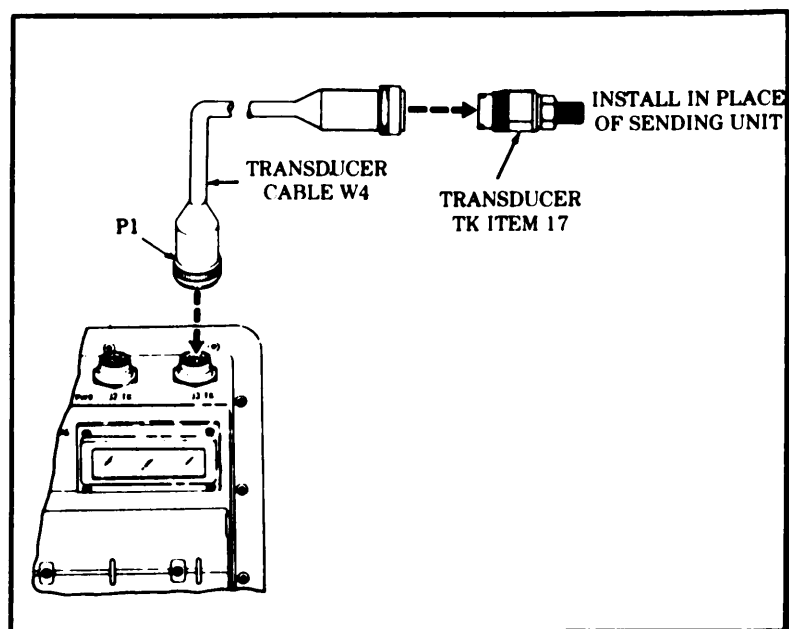


Table 2-11. STE/ICE NO-GO-Chain Tests



TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

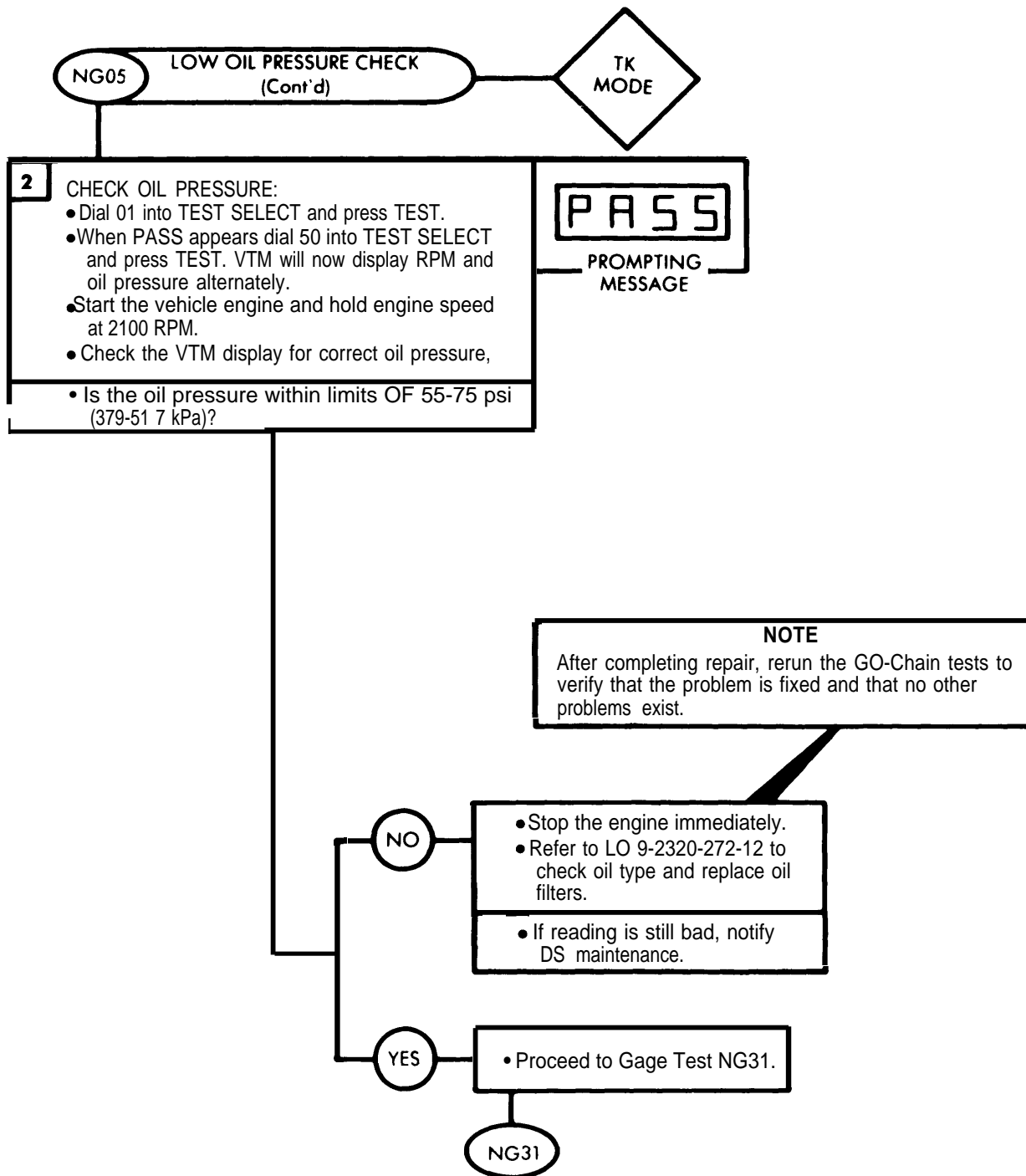


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

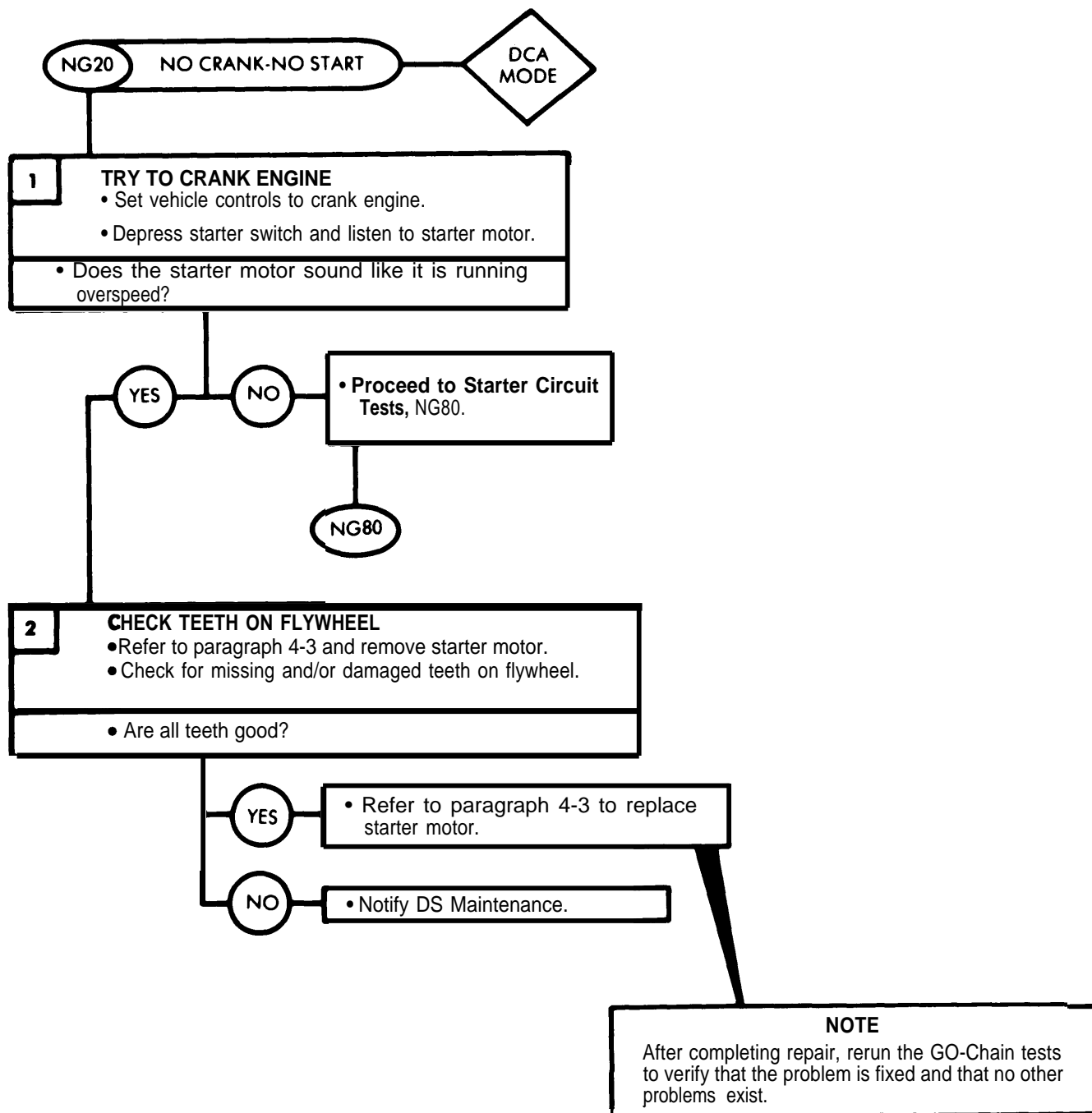
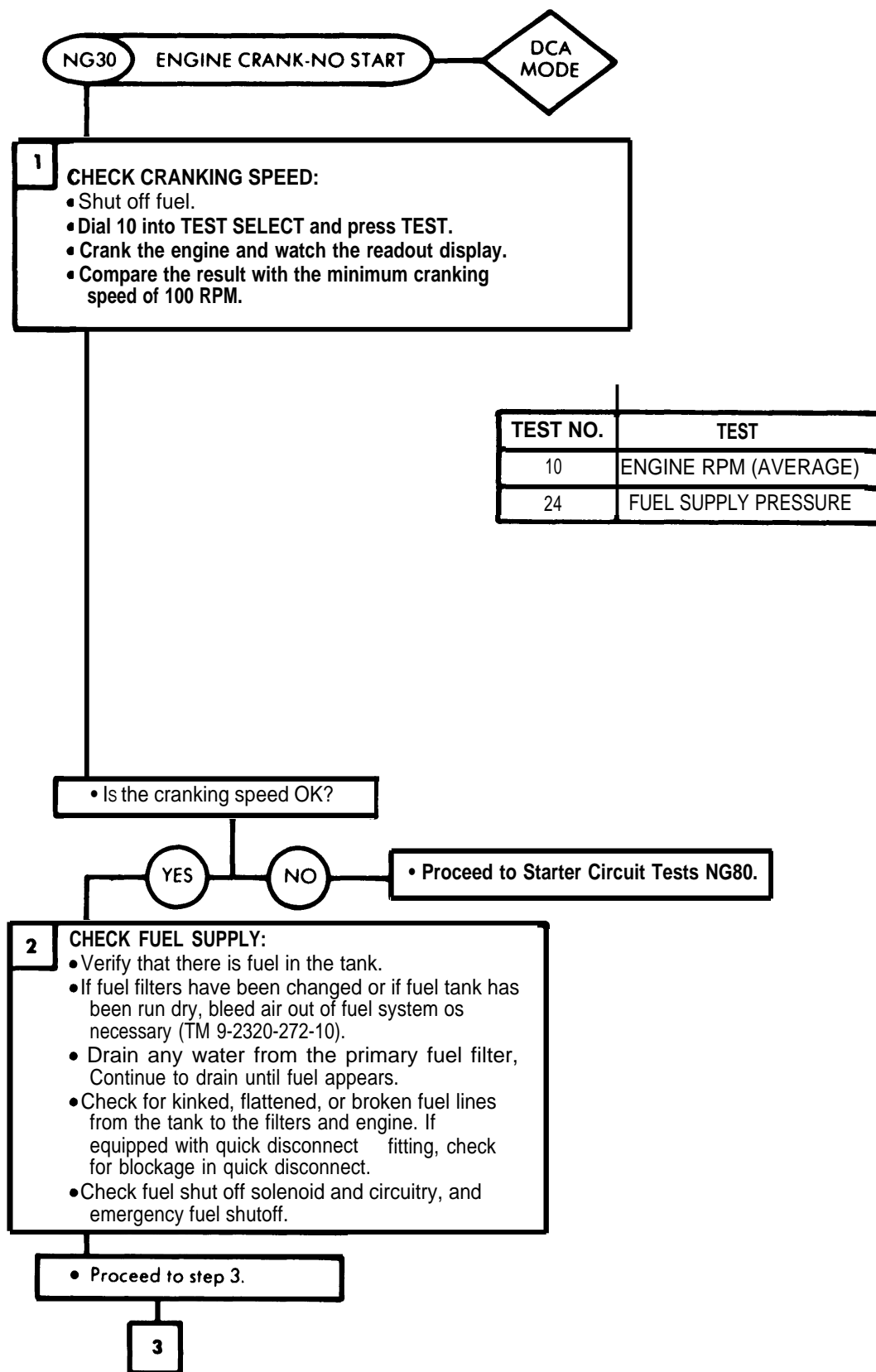


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)



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Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

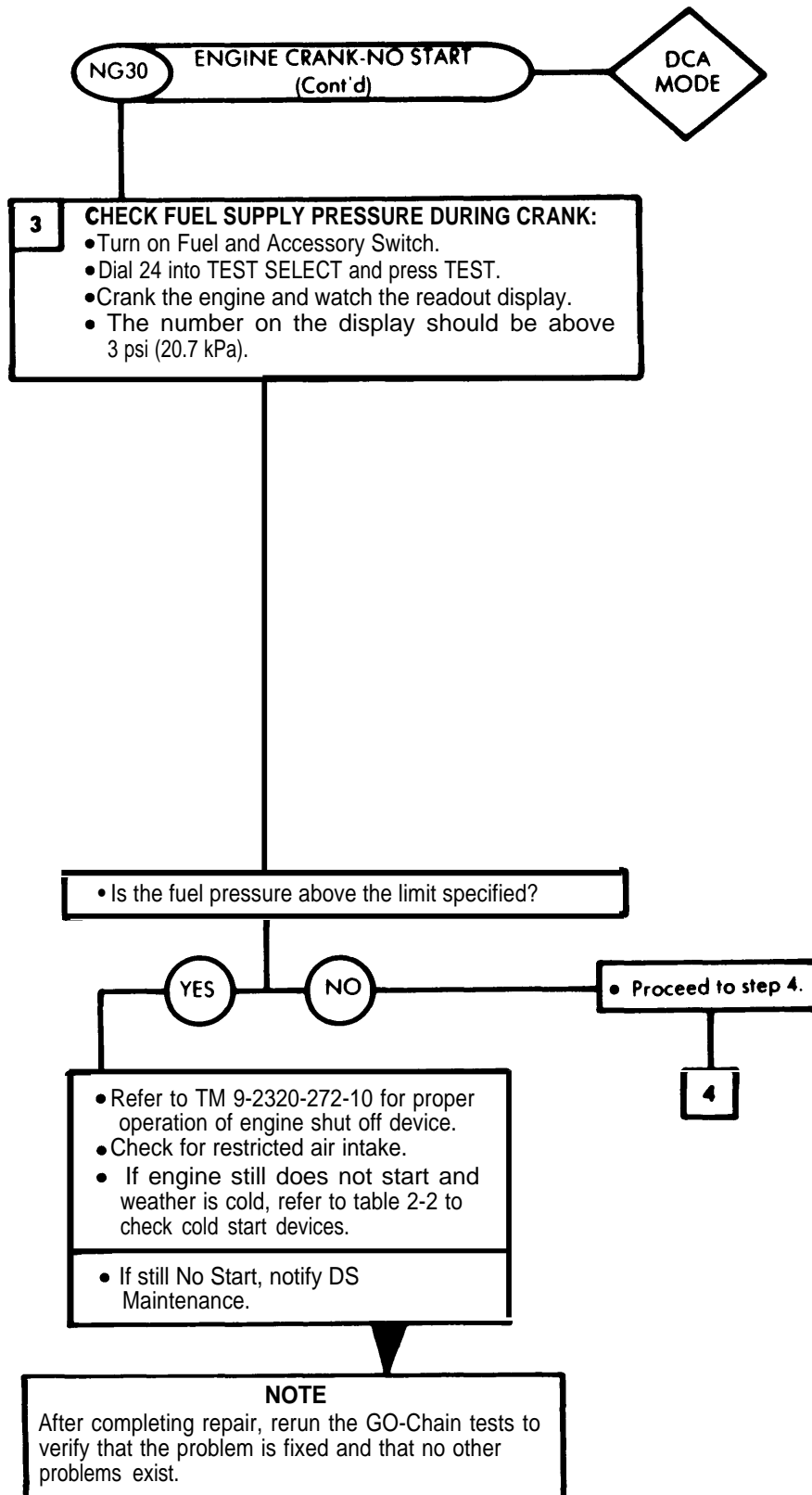


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

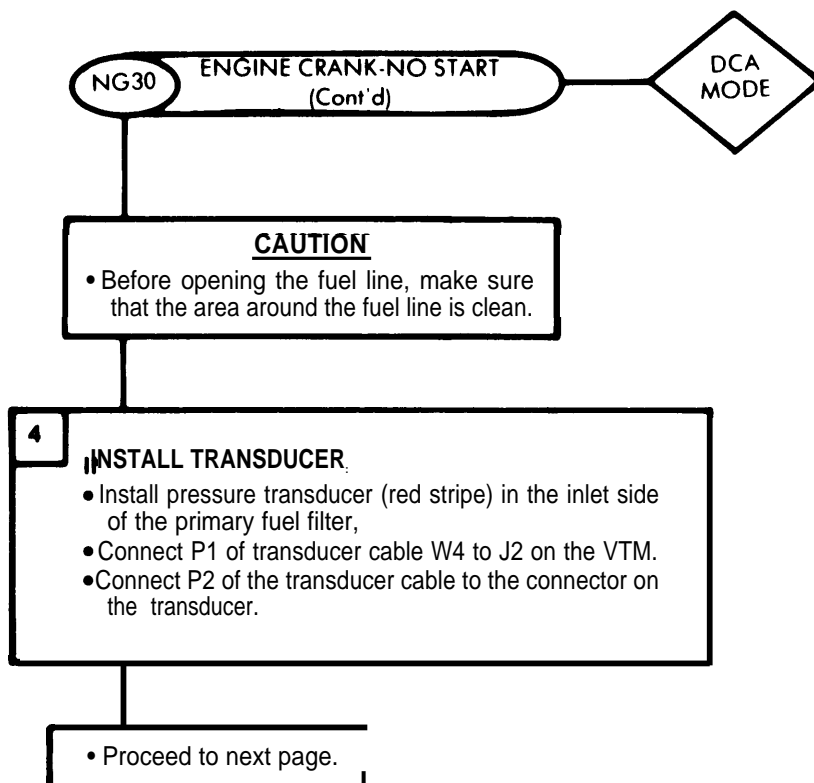
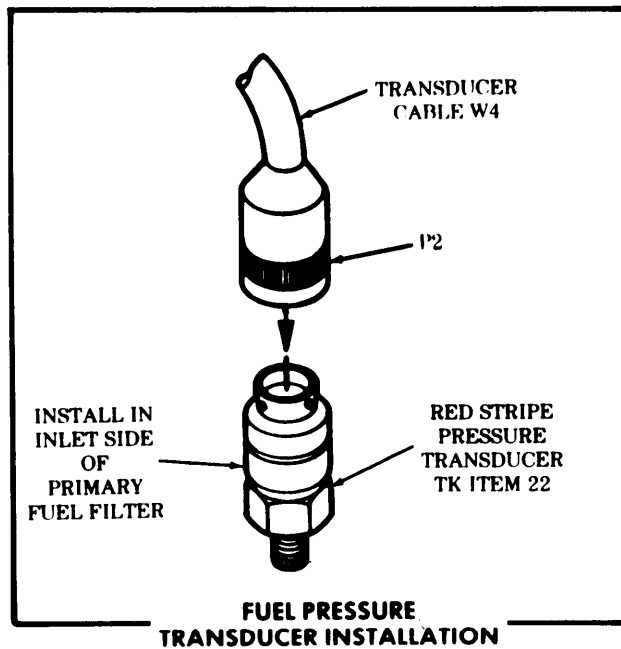


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

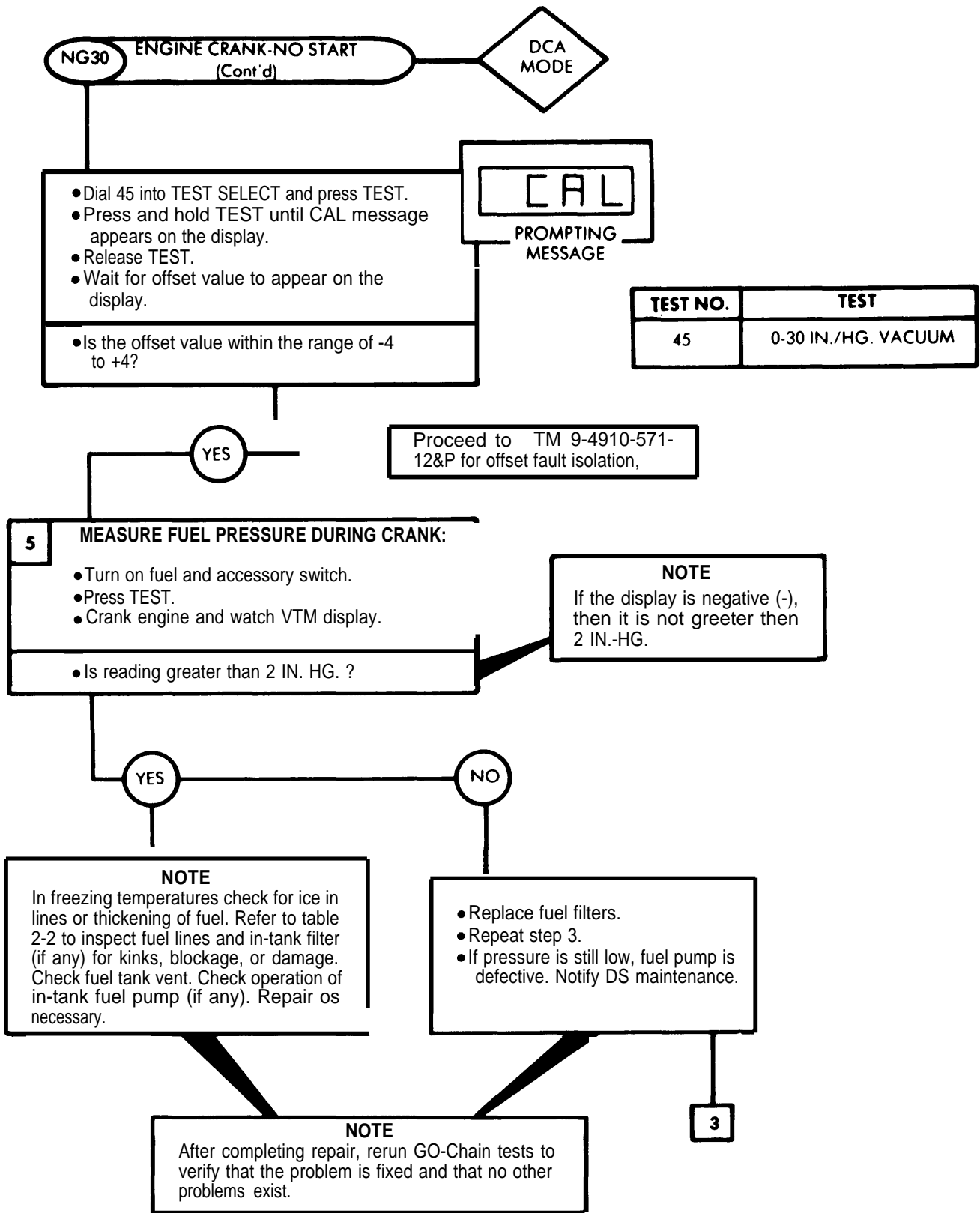


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

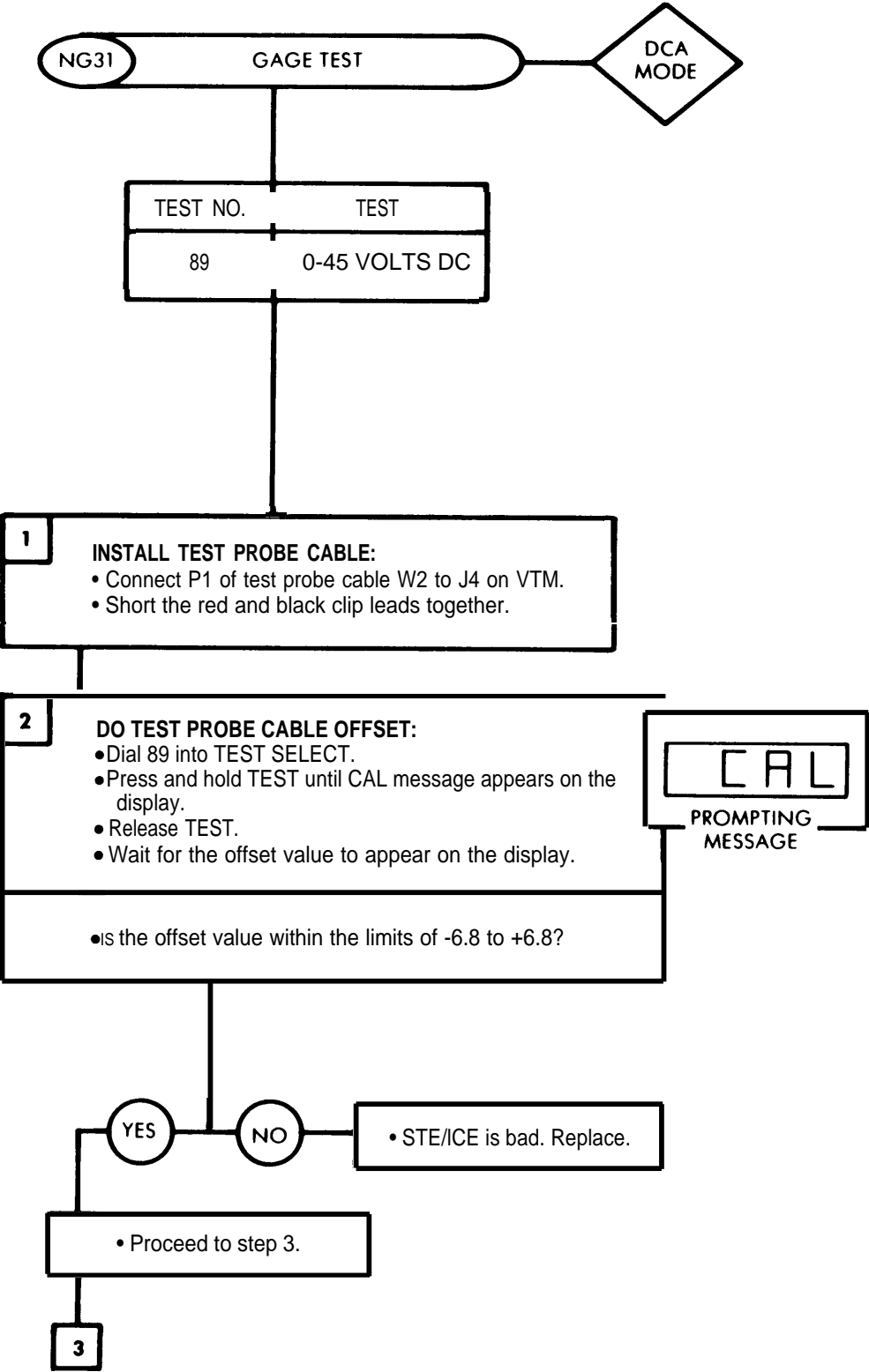
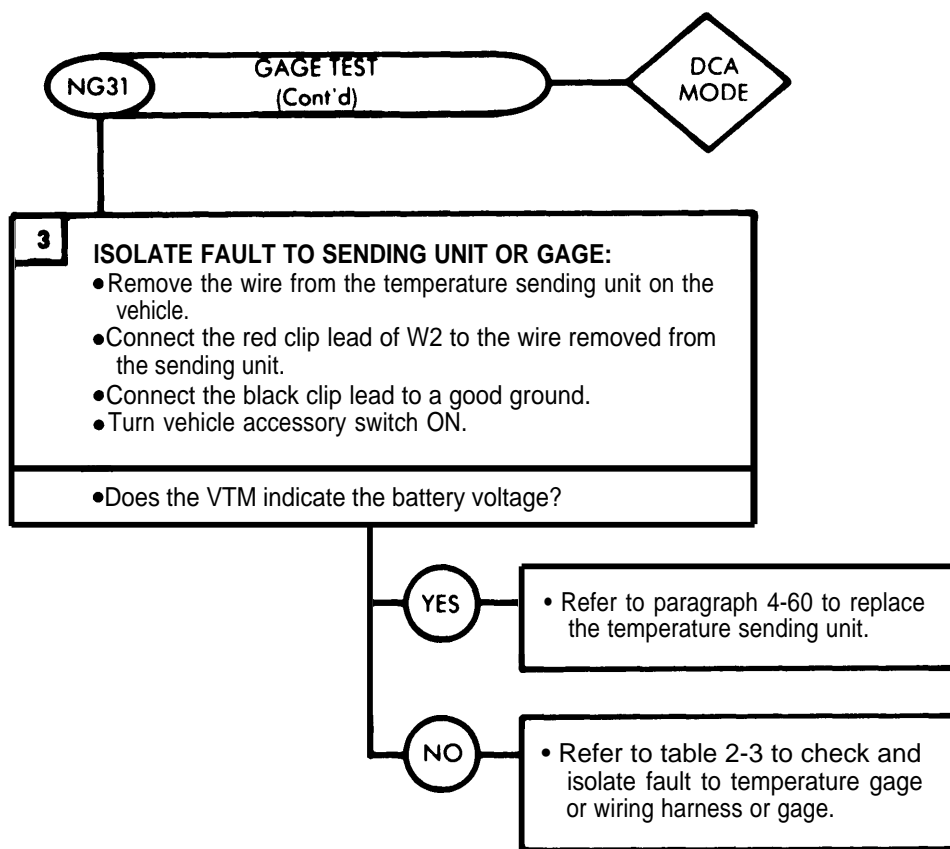
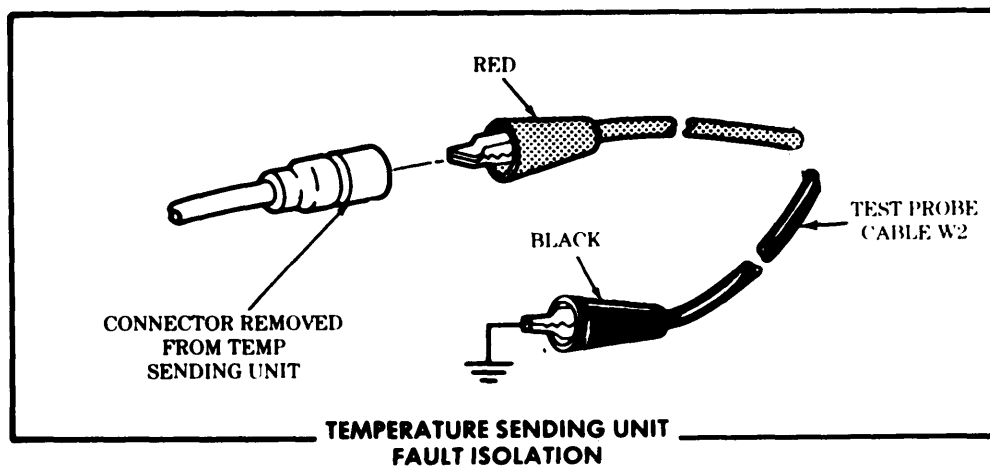


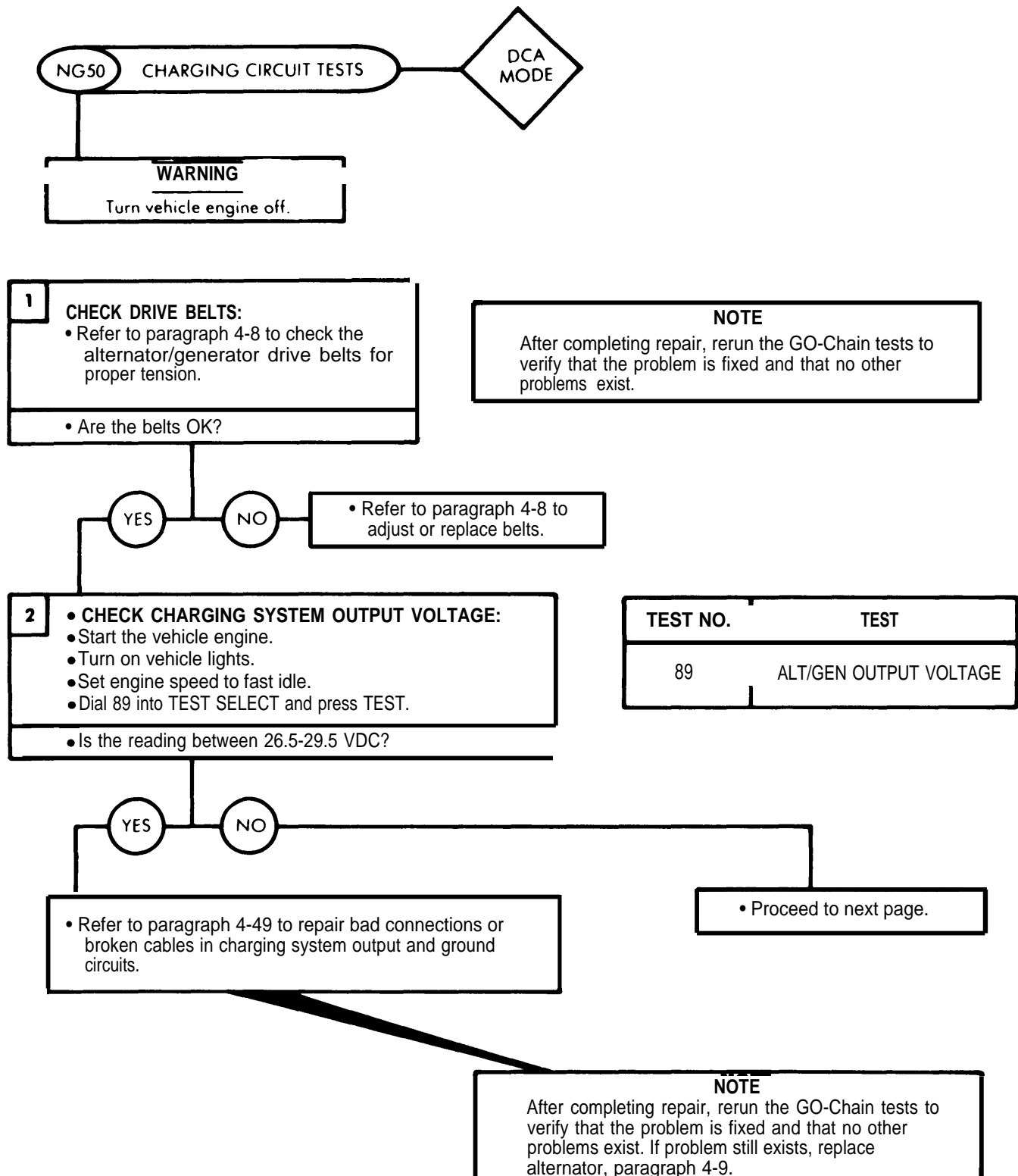
Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

**NOTE**

After completing repair, rerun GO-Chain tests to verify that the problem is fixed and that no other problems exist.

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Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)



TA349519

Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

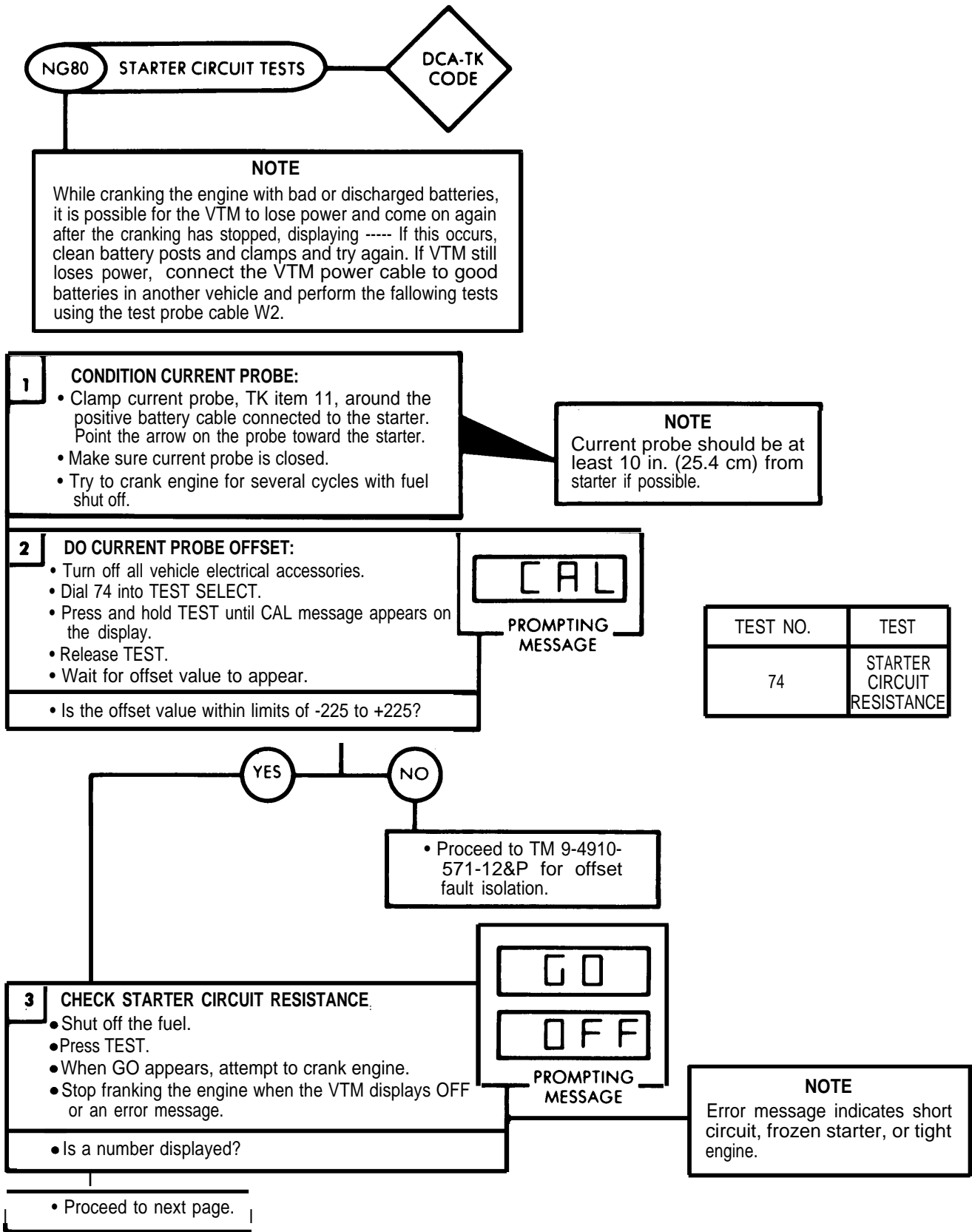


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

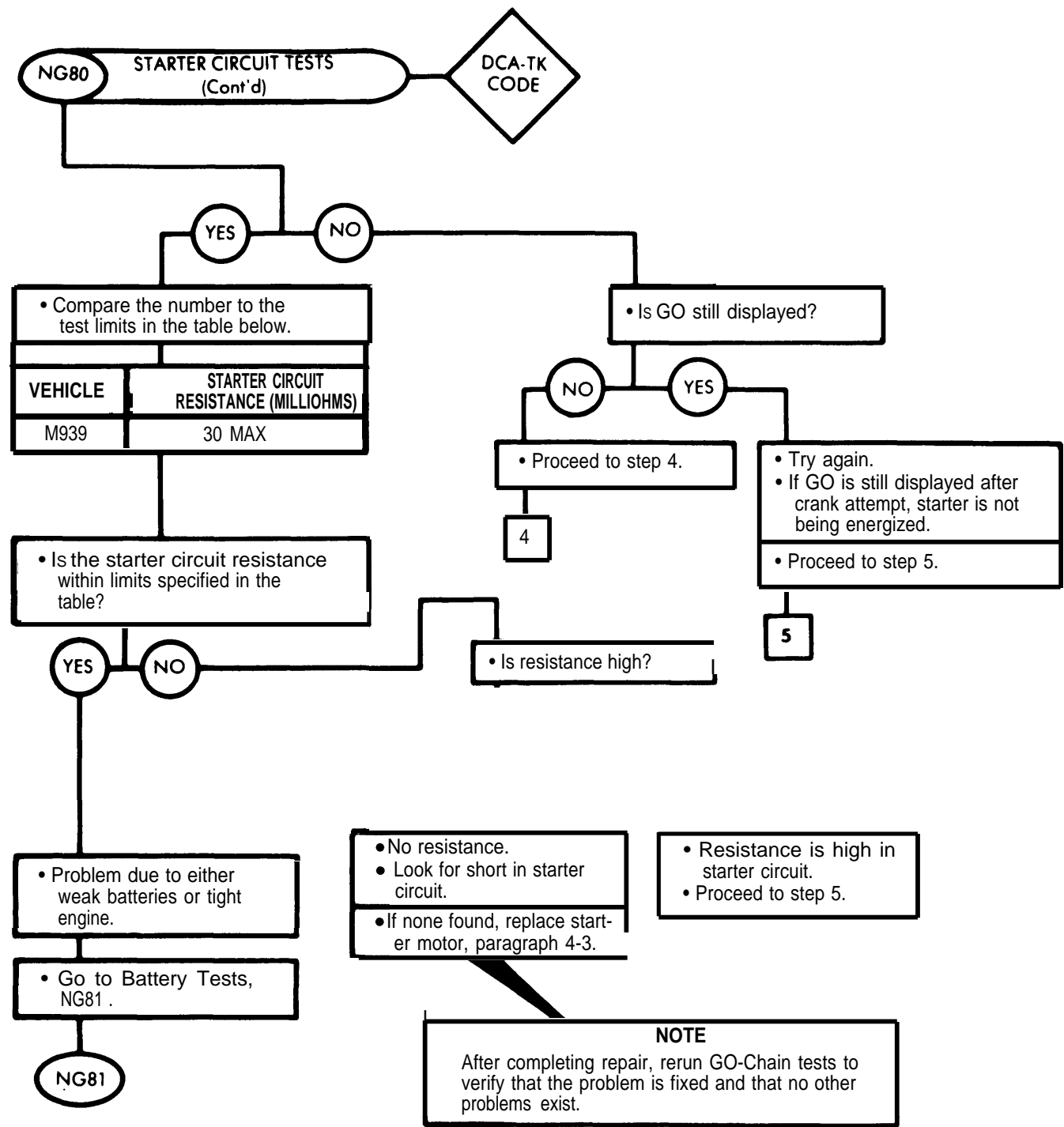


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

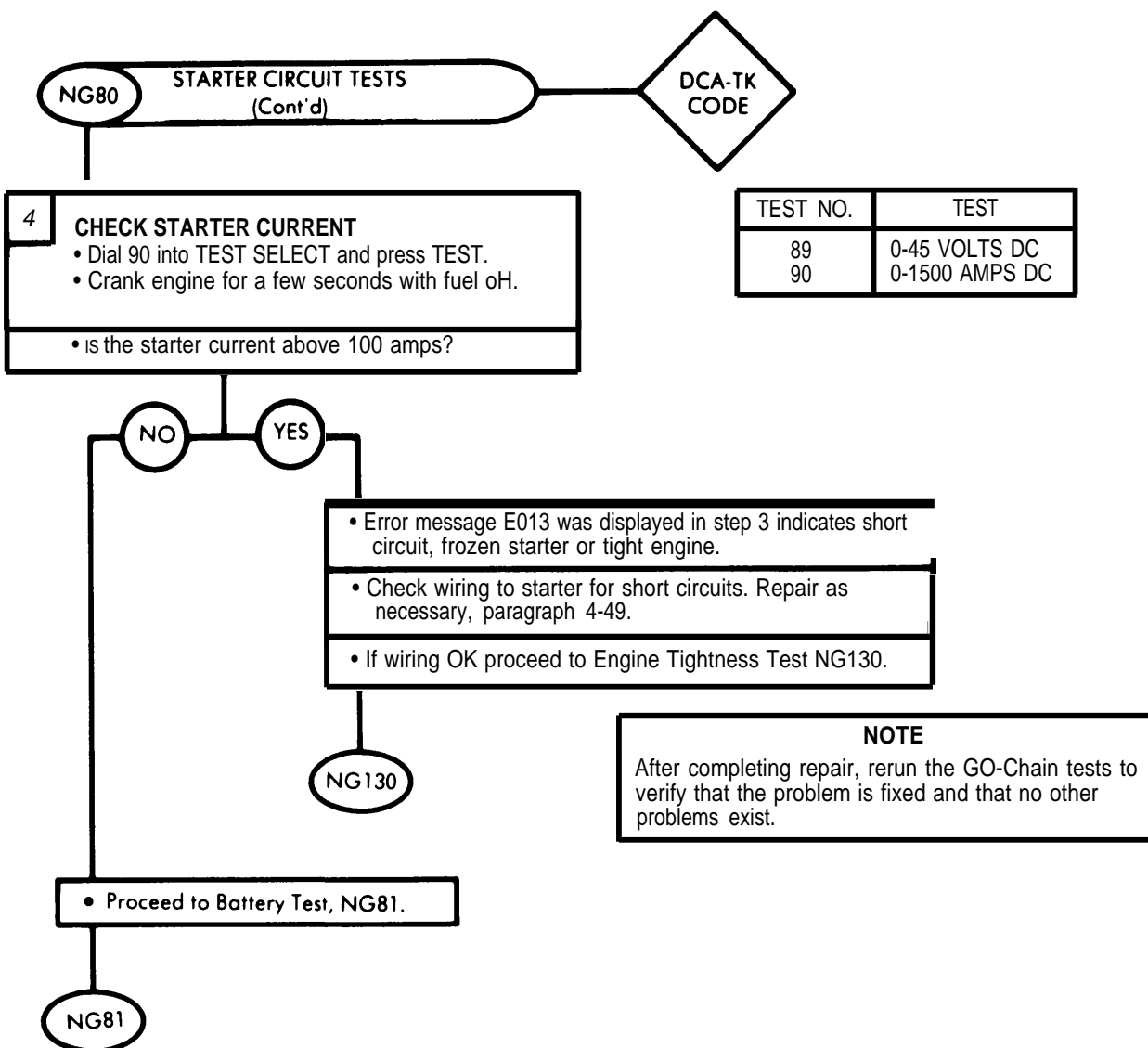


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

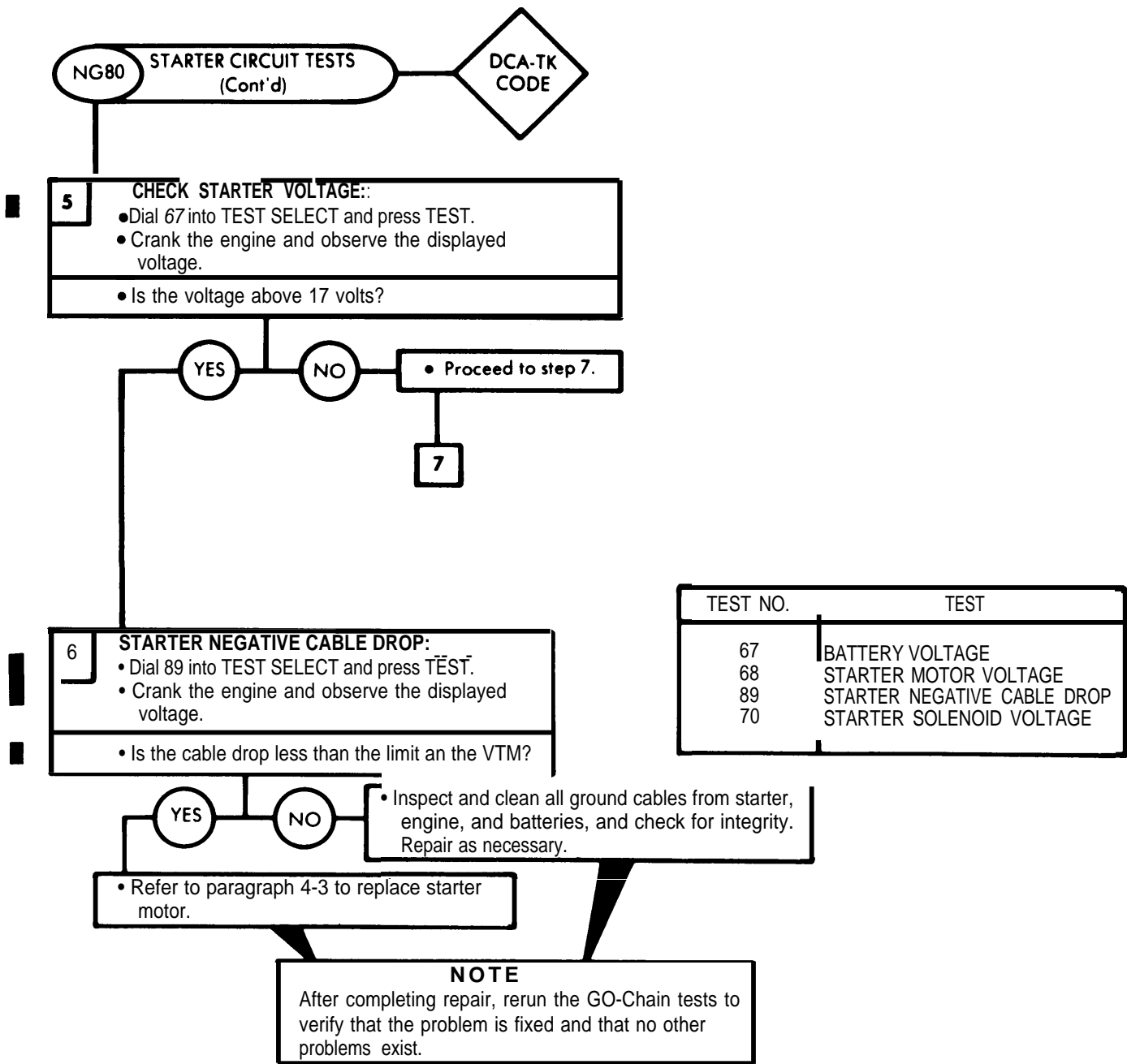


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

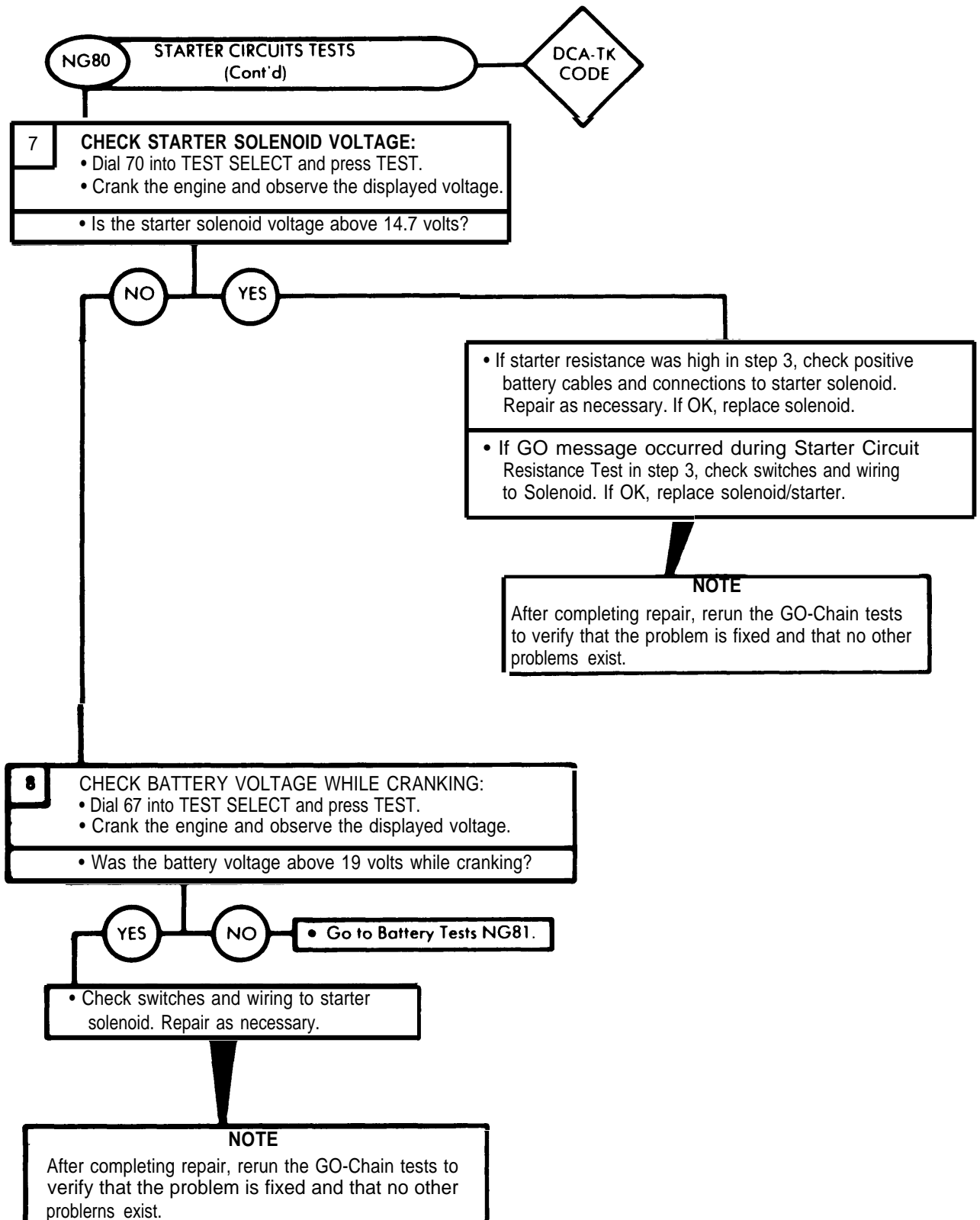


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

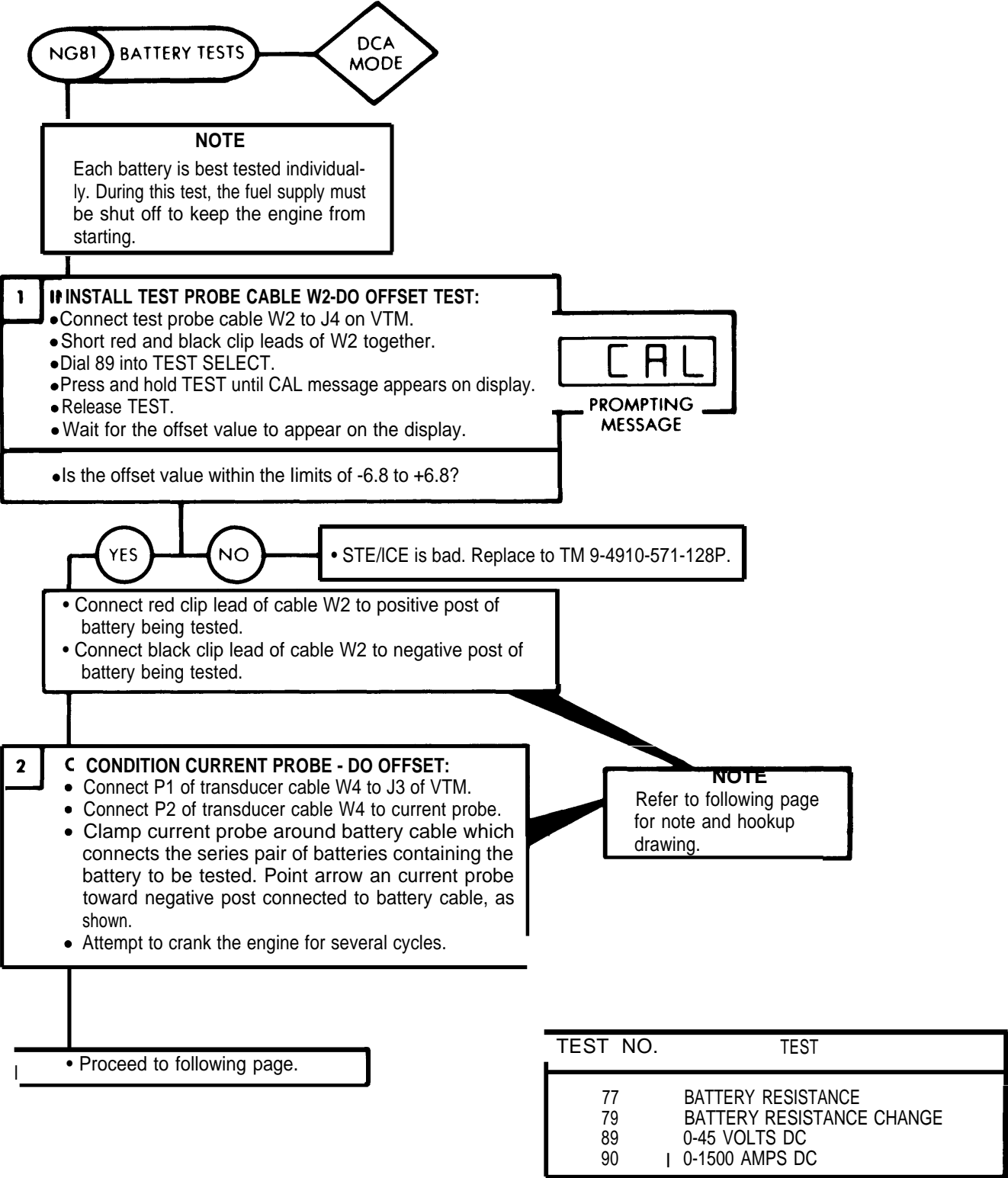
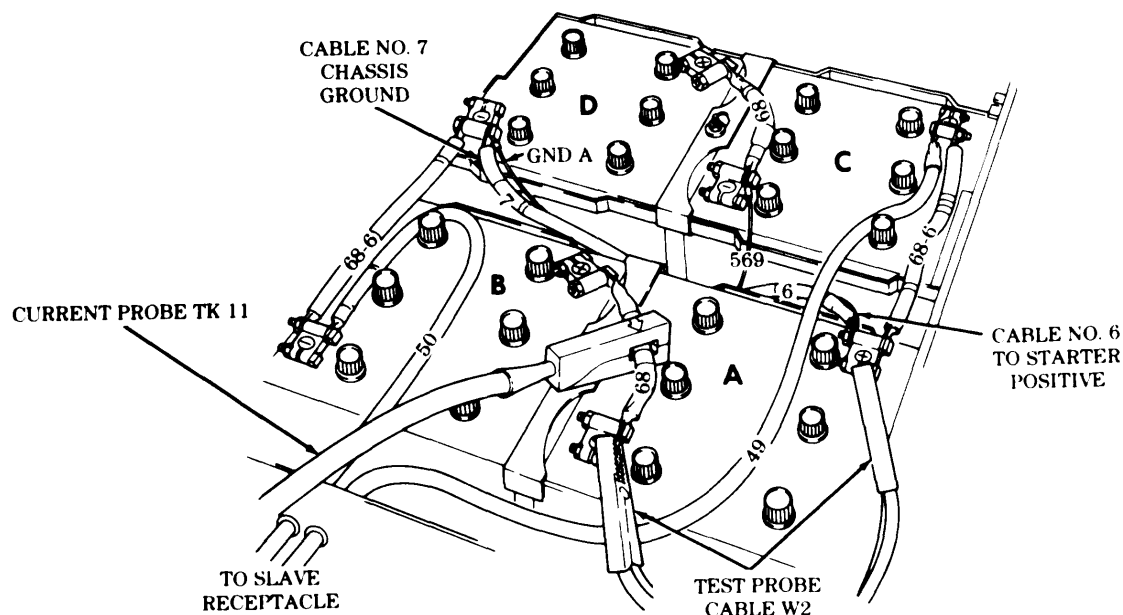


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

NOTE**TEST PROCEDURE**

1. Test each battery of a series pair, then proceed to batteries of next series pair.
2. To find the series pairs of batteries, find pairs for which the negative terminal of one battery is connected by a cable to the positive terminal of another battery. This makes the two batteries a series pair. For example, in the figure below, batteries A and B are a series pair, and batteries C and D are also a series pair.
3. To test battery A or B, clamp current probe around cable connecting battery A and battery B. Point arrow on current probe in the direction of the negative post connected to the cable.
4. The test probe cable W2 is first connected to battery A for testing battery A.
5. The test probe cable W2 is then connected to battery B for testing battery B. (Current probe in same place as for testing battery A).
6. To test battery C or D, clamp current probe around cable connecting battery C and battery D. Point arrow on current probe in the direction of the negative post connected to the cable.
7. The test probe cable W2 is then connected to battery C for testing battery C.
8. The test probe cable W2 is then connected to battery D for testing battery D.

**BATTERY CABLE
INSTALLATION SEQUENCE**

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Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

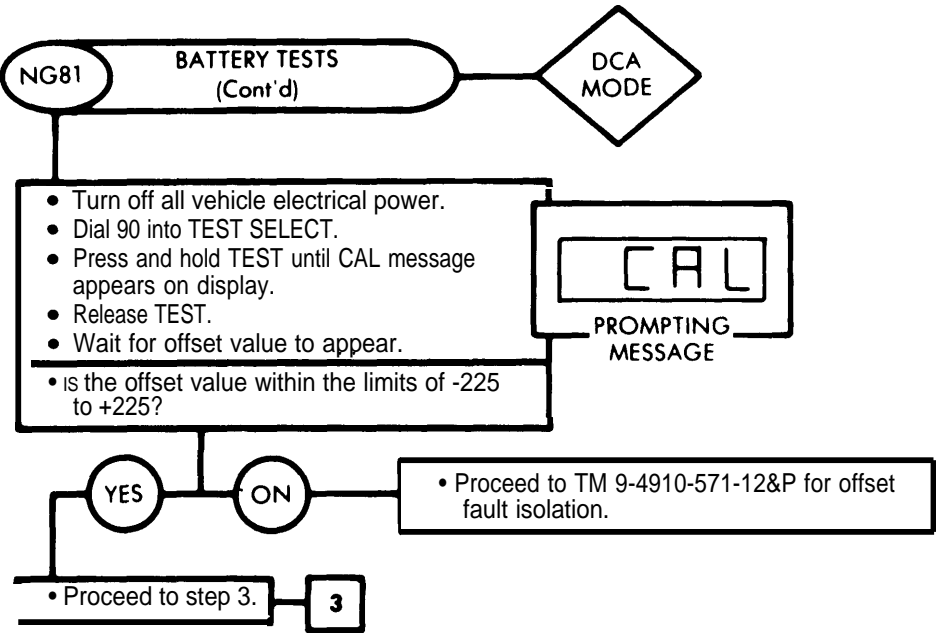


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

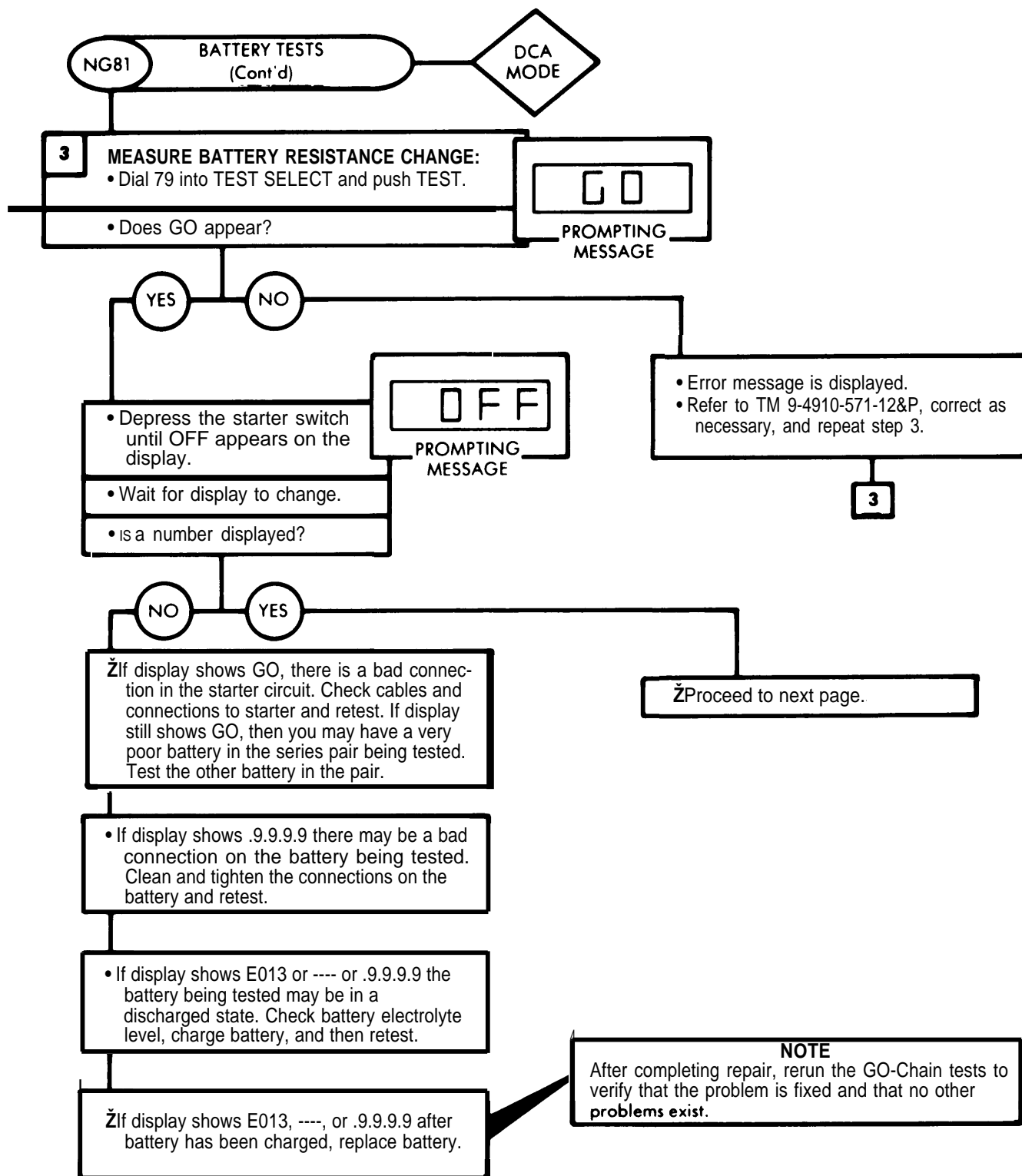


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

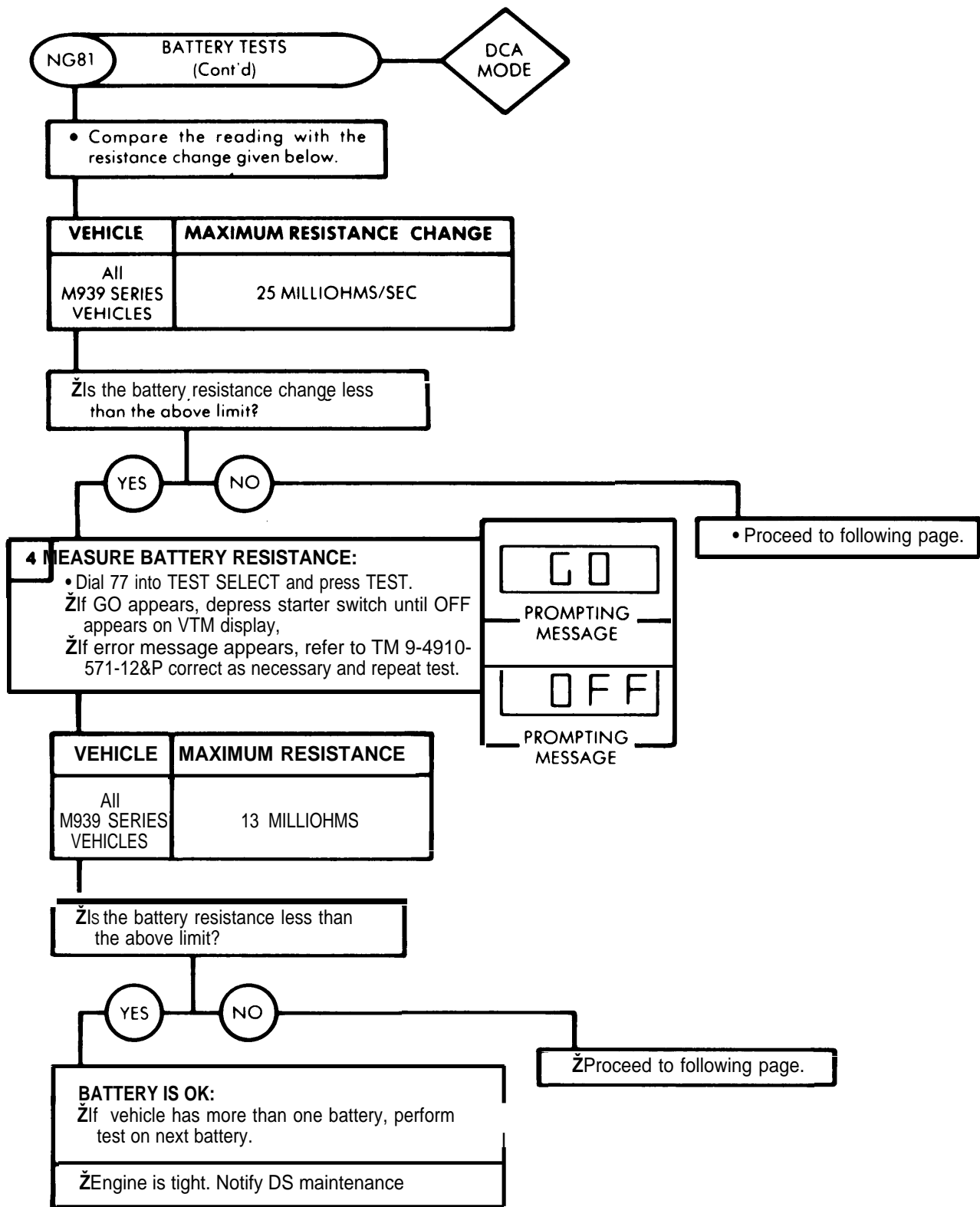


Table 2-11. STE/ICE NO-GO-Chain Tests (Cont'd)

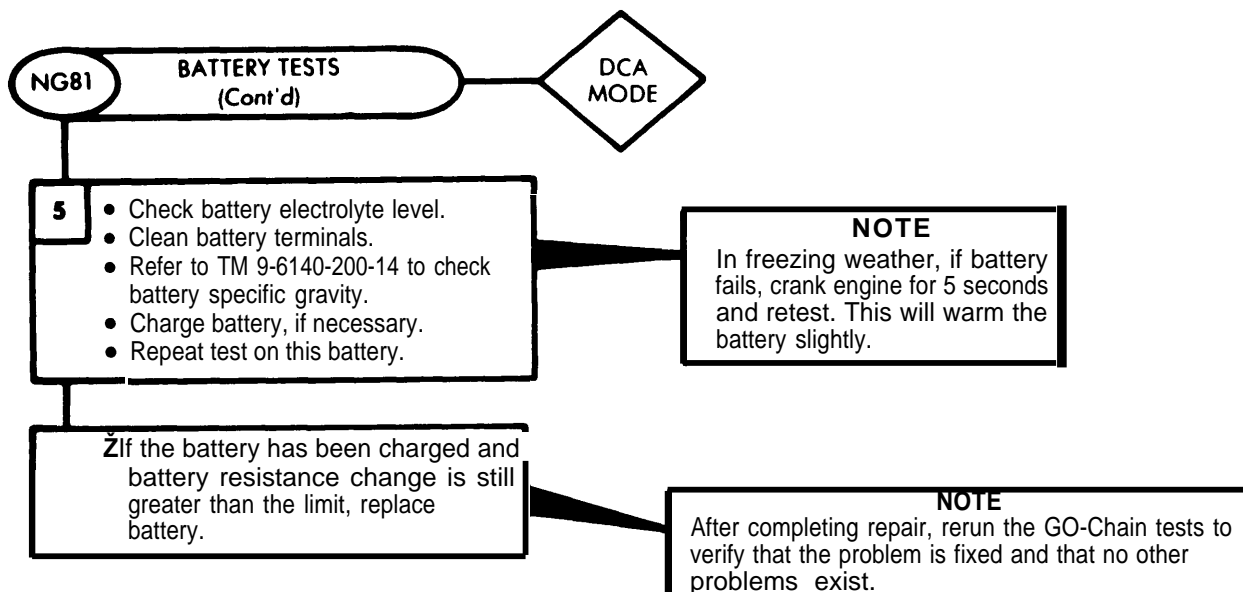


Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)

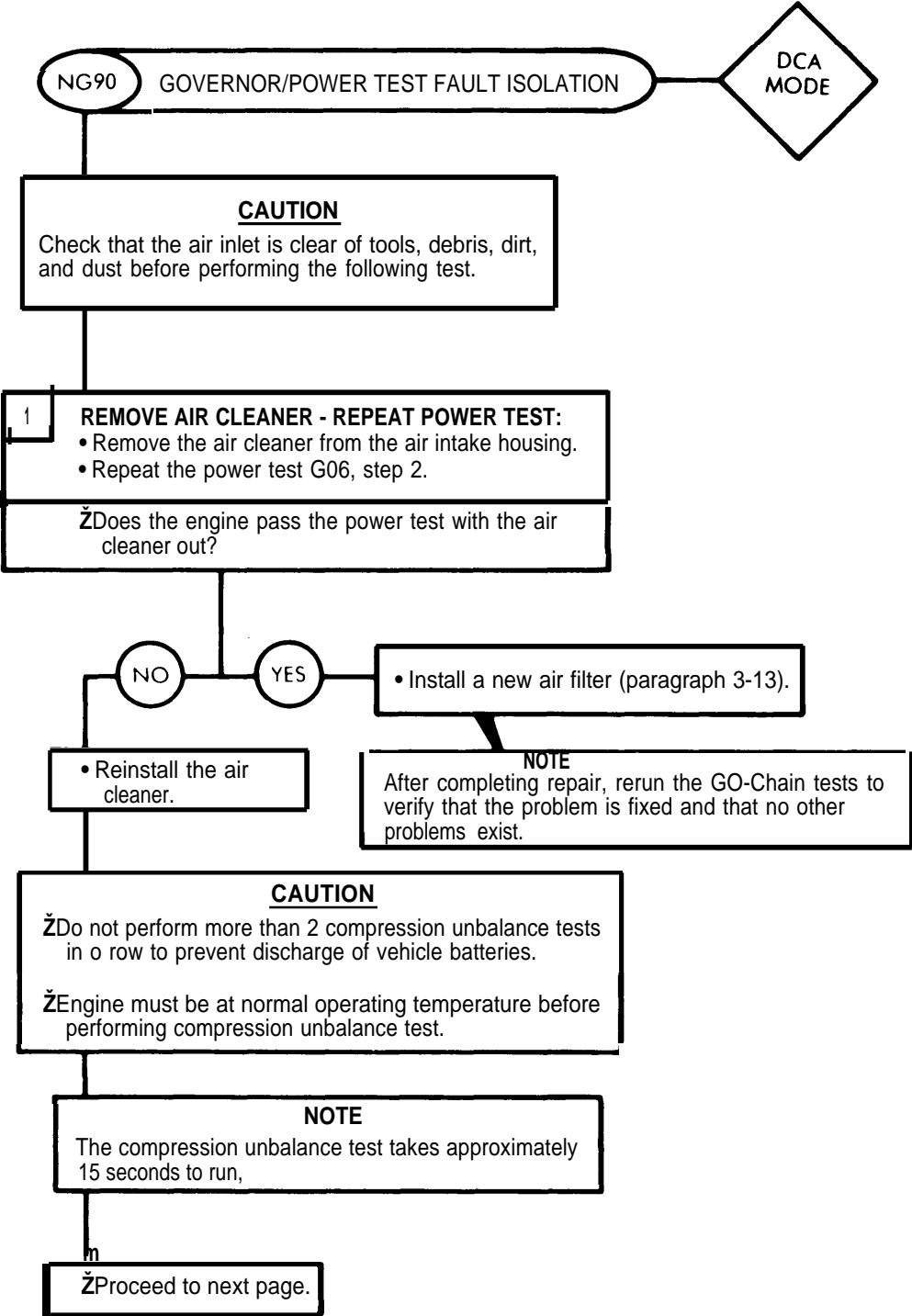


Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)

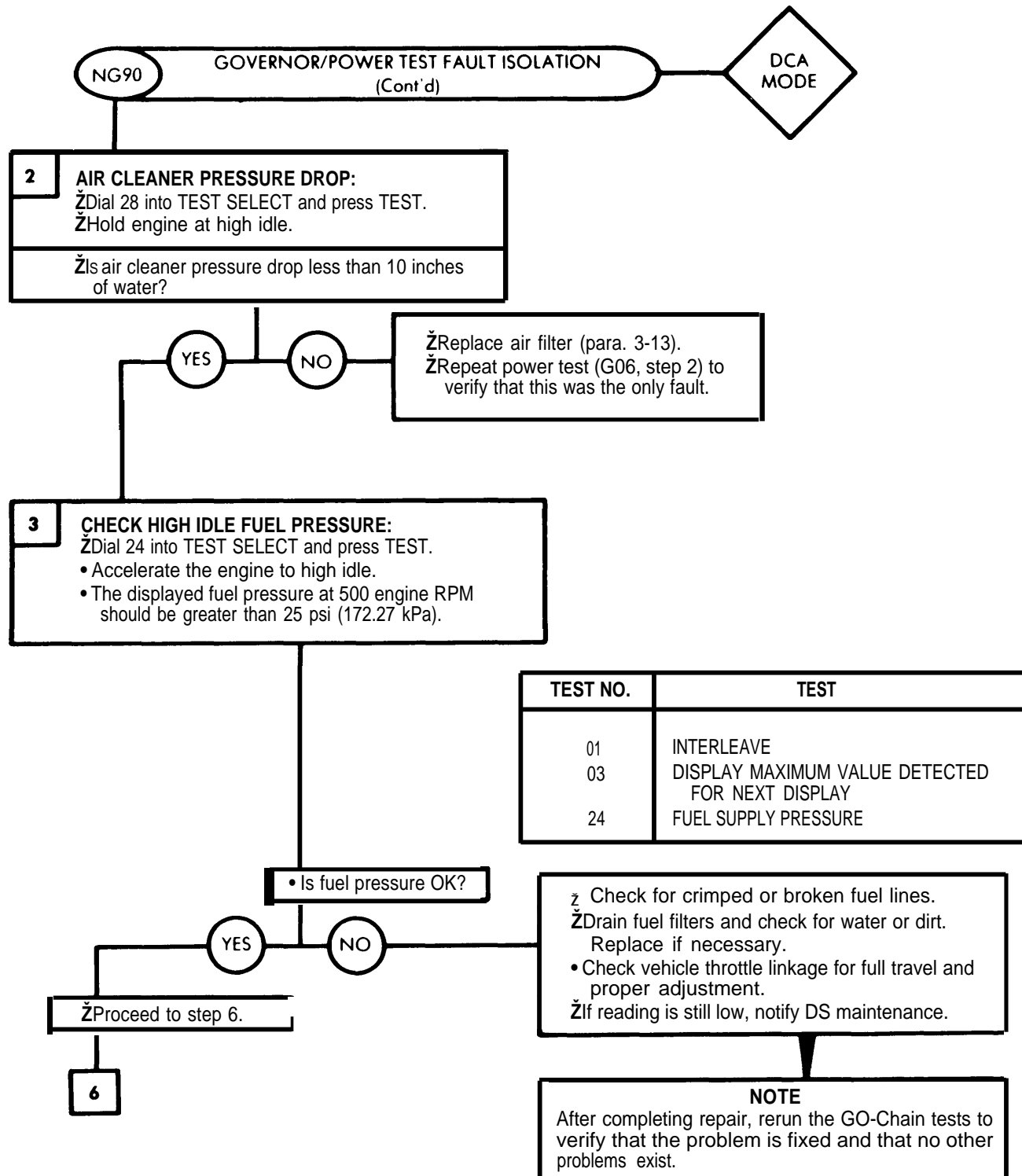
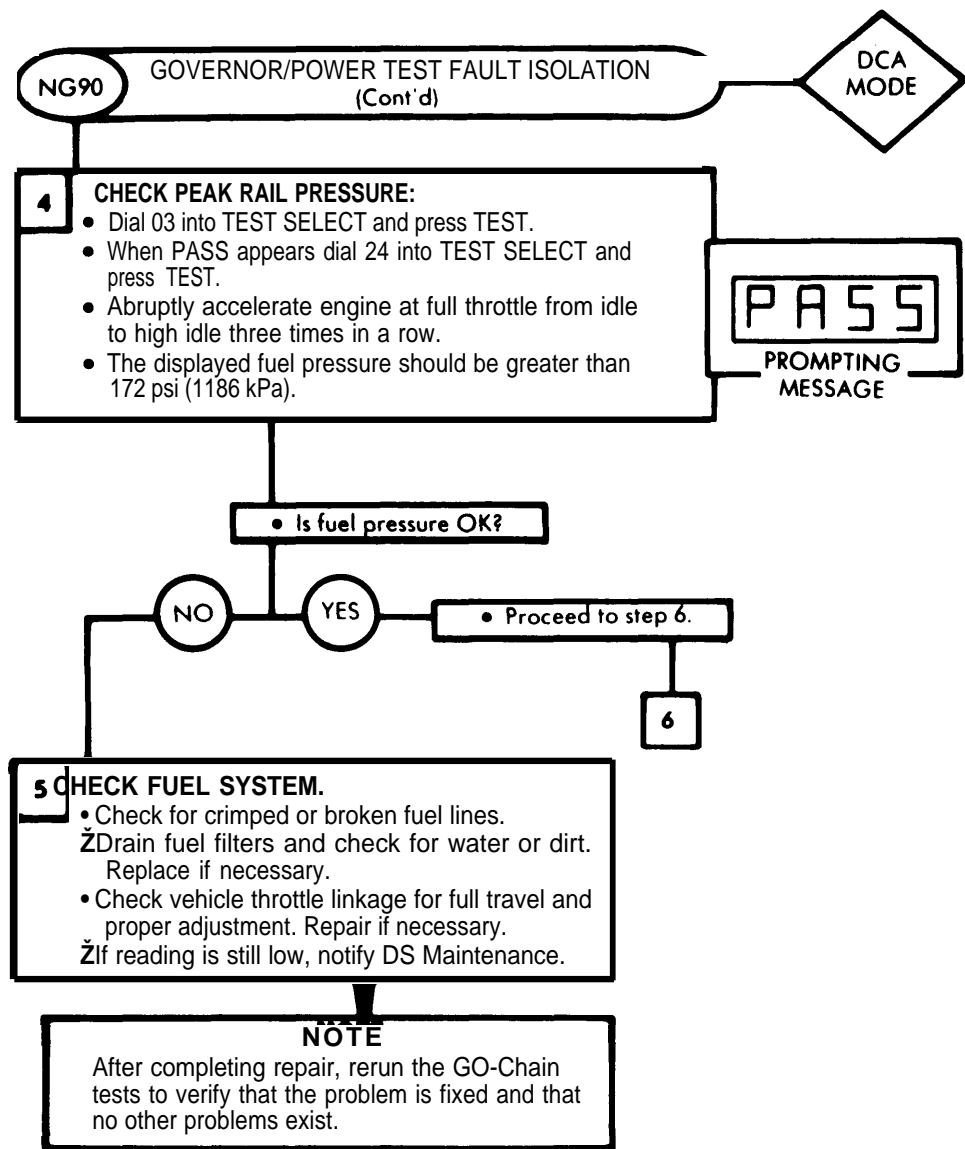


Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)



TEST NO. I	TEST
01	INTERLEAVE
03	DISPLAY MAXIMUM VALUE DETECTED FOR NEXT DISPLAY
24	FUEL SUPPLY PRESSURE

Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)

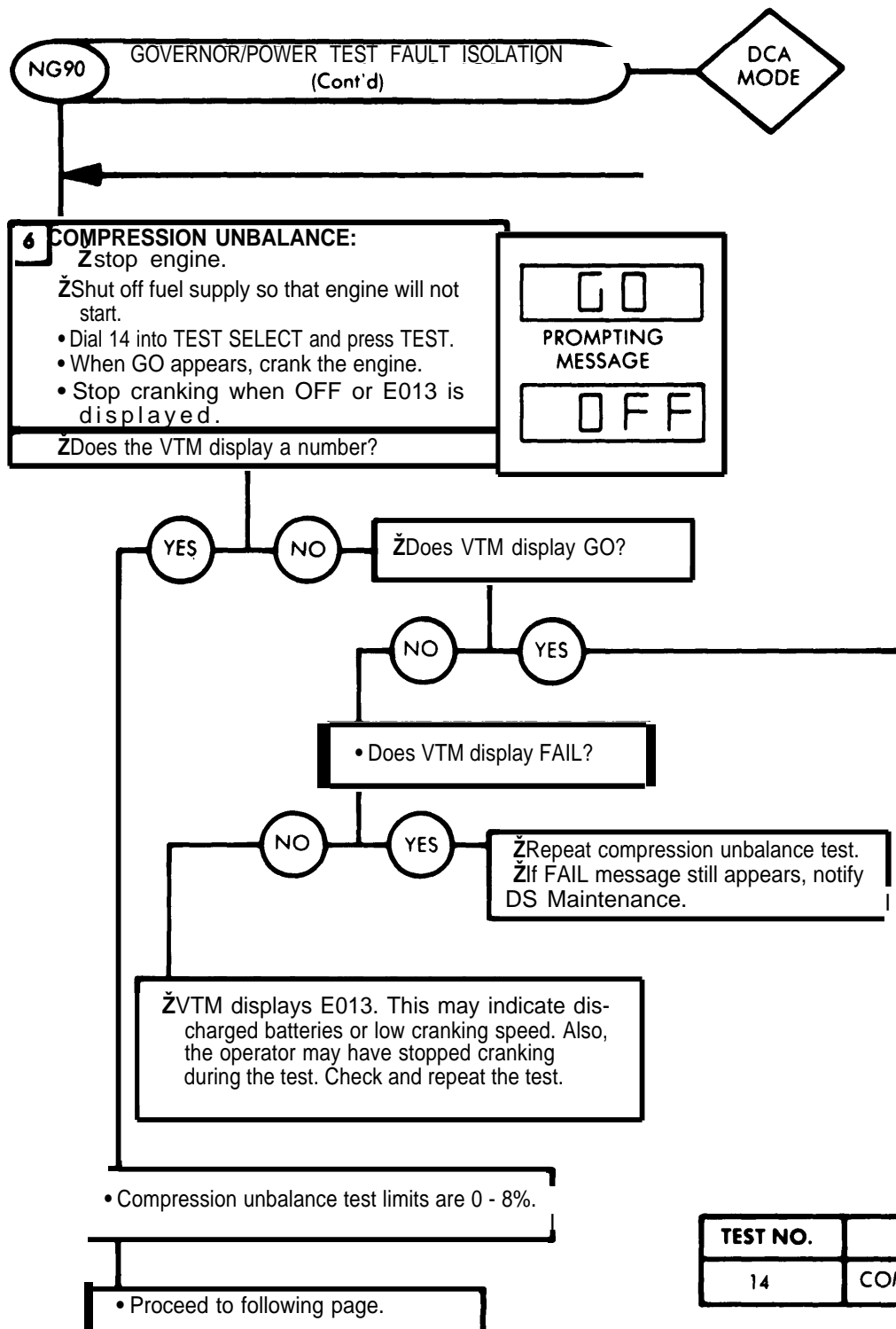


Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)

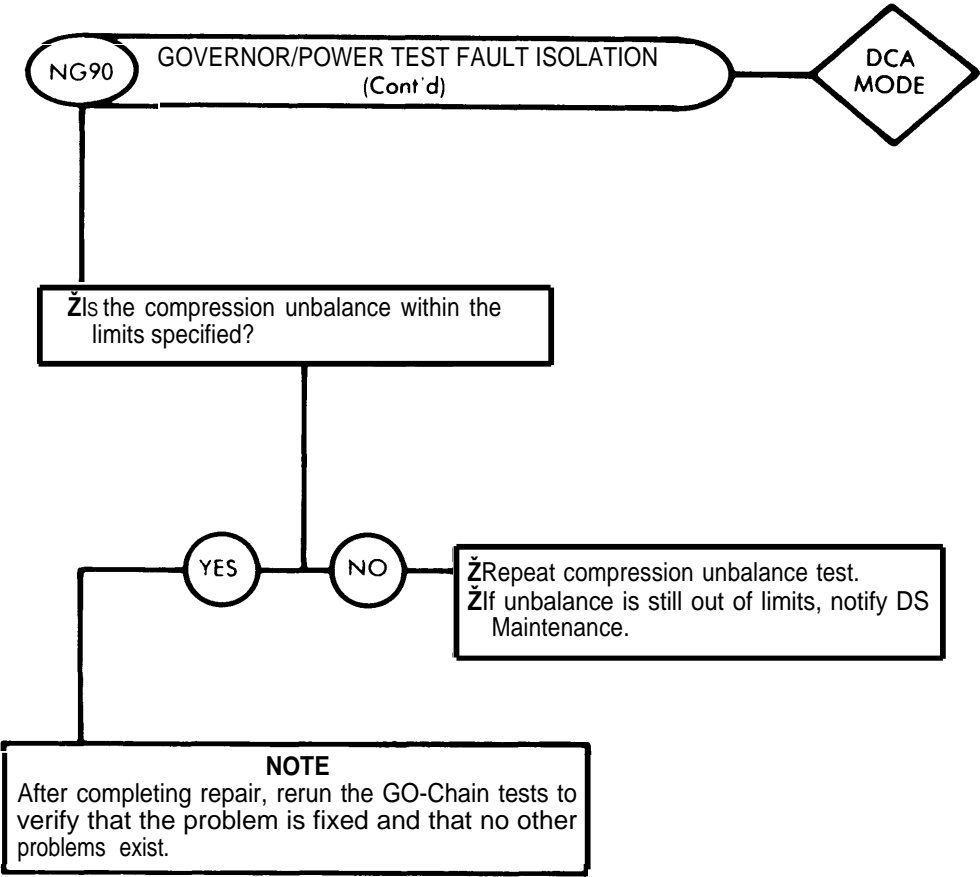
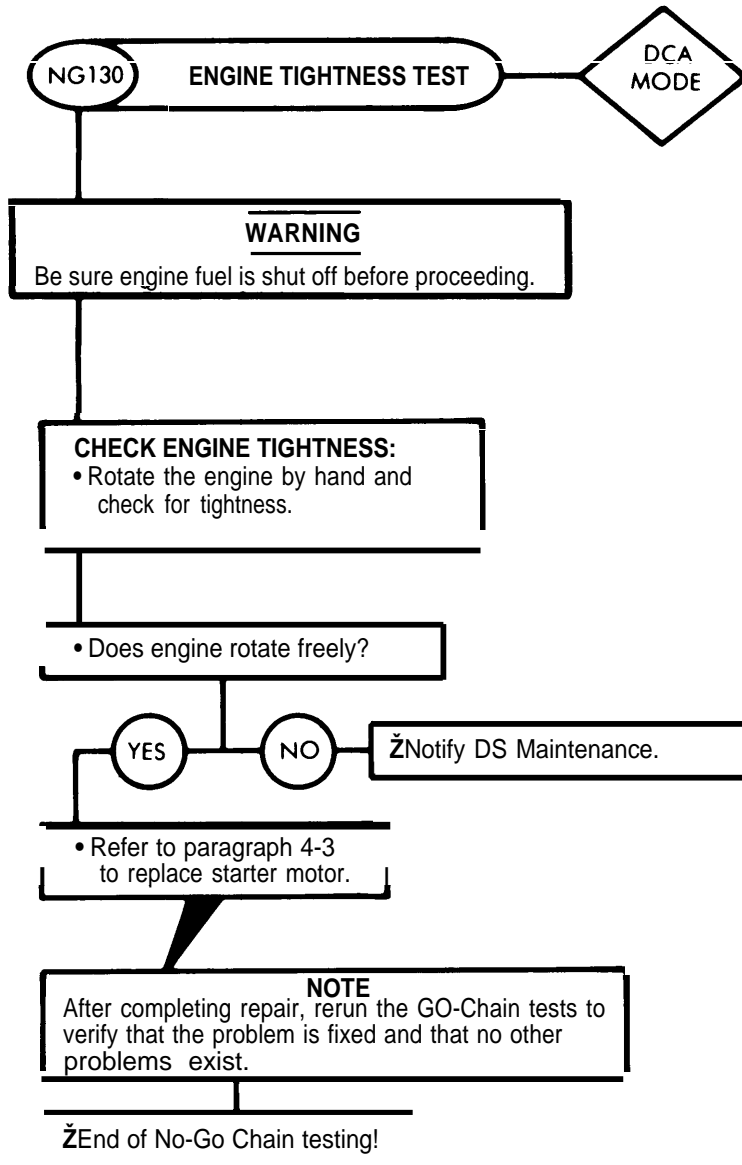


Table 2-11. STE/ICE NO-GO Chain Tests (Cont'd)



Section VII. COMPRESSED AIR AND BRAKE SYSTEM TROUBLESHOOTING

2-23. GENERAL

a. This section contains troubleshooting information and tests for locating and correcting malfunctions which may develop in the compressed air and brake system on the vehicles covered in this manual. Each symptom or malfunction given for an individual component or system is followed by step(s) you should take to determine the cause and then corrective action you must take to remedy the problem. The compressed air and brake system is divided into the following functional systems:

- Parking Brake (page 2-189)
- Service Brakes (page 2-190)
- Compressed Air Supply (page 2-207)
- Air Operated Accessories (page 2-223)

b. This troubleshooting guide is used to keep your vehicle operating and troublefree as much as possible in the quickest, easiest way.

(1) When a malfunction occurs, start at the source of the trouble and keep working back to eliminate elements that are not defective to isolate the parts of the system that are. When found, this part, line or element is repaired, replaced or otherwise corrected to get your vehicle running again.

(2) In the compressed air and brake system, emphasis in the troubleshooting guide is placed on leaks, blockages in tubing and hoses, and the correct pressure for operating the various air operated devices. Leaks and blockages are easily determined using methods indicated in the tests.

(3) Correct air pressure requires a gage of known accuracy, which is a special tool, to test whether an element of the system is functioning or operating properly when supplied with the correct air pressure.

c. Before taking any action to correct a possible malfunction, the following rules should be followed:

- (1) Question operator to obtain any information that might help you determine the cause of the problem.
- (2) Operate vehicle yourself to make sure operator's description of problem is correct.
- (3) Never overlook the chance that the problem could be of a simple origin.
- (4) Use all senses to observe and locate trouble.
- (5) Always isolate the system where the malfunction occurs.
- (6) Always park vehicle on level surface and chock wheels during compressed air and brake system troubleshooting.
- (7) Always wear eyeshields when troubleshooting the compressed air system.
- (8) Anytime you are troubleshooting the compressed air system, refer to the system schematic in appendix G of this manual. This will help you isolate and identify the component(s) that may be causing the malfunction.

d. Table 2-12 lists possible malfunctions that may occur in the vehicle or individual units of the vehicle. This table covers compressed air and brake system troubleshooting only. Troubleshooting procedures for mechanical systems can be found in table 2-2, section IV. Troubleshooting procedures for electrical systems can be found in table 2-3, section V.

e. Omissions. This manual cannot list all Compressed Air and Brake System malfunctions that may occur. If a malfunction occurs that is not listed in table 2-12, notify your supervisor.

COMPRESSED AIR AND BRAKE SYSTEM TROUBLESHOOTING SYMPTOM INDEX

MALFUNCTION NO.	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
PARKING BRAKE		
1.	Parking brake does not hold vehicle on grade	2-189
2.	Parking brake drags, indicated by smoking or burning smell.	2-190
SERVICE BRAKES		
3.	Insufficient brakes (vehicle stopping distance too long, no apparent air system failure with gages at normal operating pressure, warning buzzer not sounding)	2-190
4.	Vehicle pulls to right or left when applying brakes.	2-204
5.	Vehicle rear brakes grab or drag.	2-206
6.	Vehicle titrates, chatters, or bounces when brakes are applied	2-206
7.	Brakes squeal	2-206
8.	Warning buzzer sounds when brakes are applied (primary and secondary gage pressure drops below 55-65 psi)	2-206
COMPRESSED AIR SUPPLY		
9.	No air pressure (warning buzzer sounding, air pressure not building to normal operating range as indicated by gages)	2-207
10.	Air pressures do not build to normal operating pressure (above 80 psi) according to gages	2-209
11.	Air pressure builds slowly (takes excessive amount of time to build to 100 psi)	2-209
12.	Air pressure exceeds maximum (gages show over 130 psi) safety valve opens to release pressure	2-210
13.	Primary pressure gage reads no pressure, low pressure, or builds to normal operating pressure slowly, Secondary pressure gage reads normal (engine idling, brake pedal not applied).	2-212
14.	Secondary pressure gage reads no pressure, low pressure, or builds too slowly. Primary pressure gage reads normal (engine idling, brake pedal not applied)	2-216
15.	Primary air system fails to hold pressure (no major leaks, air can be heard escaping into air intake stack, parking brake applied)	2-220
16.	Secondary air system fails to hold pressure (no major leaks, air can be heard escaping into air intake stack, parking brake applied)	2-220
17.	Warning buzzer fails to sound or fails to shutoff on low pressure (below 55-65 psi), air pressure system operating normally	2-220
18.	Spring brakes do not release (vehicles brakes grab or drag)	2-220
19.	Spring brakes do not set (gages at normal operating pressures, air exhausting not heard when parking brake applied)	2-222
AIR-OPERATED ACCESSORIES		
20.	All air-operated accessories do not work (horn, windshield wipers, windshield washers, and transfer case controls). Gages at normal operating pressure	2-223
21.	Cooling fan does not operate, engine temperature above 195°F (91°C) as indicated by temperature gage	2-223
22.	Cooling fan does not stop running, engine temperature below normal operating range (override bolt not installed)	2-223
23.	Front wheel drive does not engage (front wheel drive lock-in switch engaged and transfer case shift lever in high position)	2-224
24.	Horn does network (gages at normal operating pressure, warning buzzer not sounding)	2-228

Table 2-12. Compressed Air and Brake System Troubleshooting

MALFUNCTION		TEST OR INSPECTION		CORRECTIVE ACTION	

PARKING BRAKE

1. PARKING BRAKE DOES NOT HOLD VEHICLE ON GRADE

Test 1. Check parking brake adjustment.

- a Turn knob (1) on top of parking brake lever clockwise to increase braking action (para 7-3).
- b. If adjustment does not correct malfunction, perform test 2.

Test 2. Inspect parking brake cable (2) for binding or breaks.

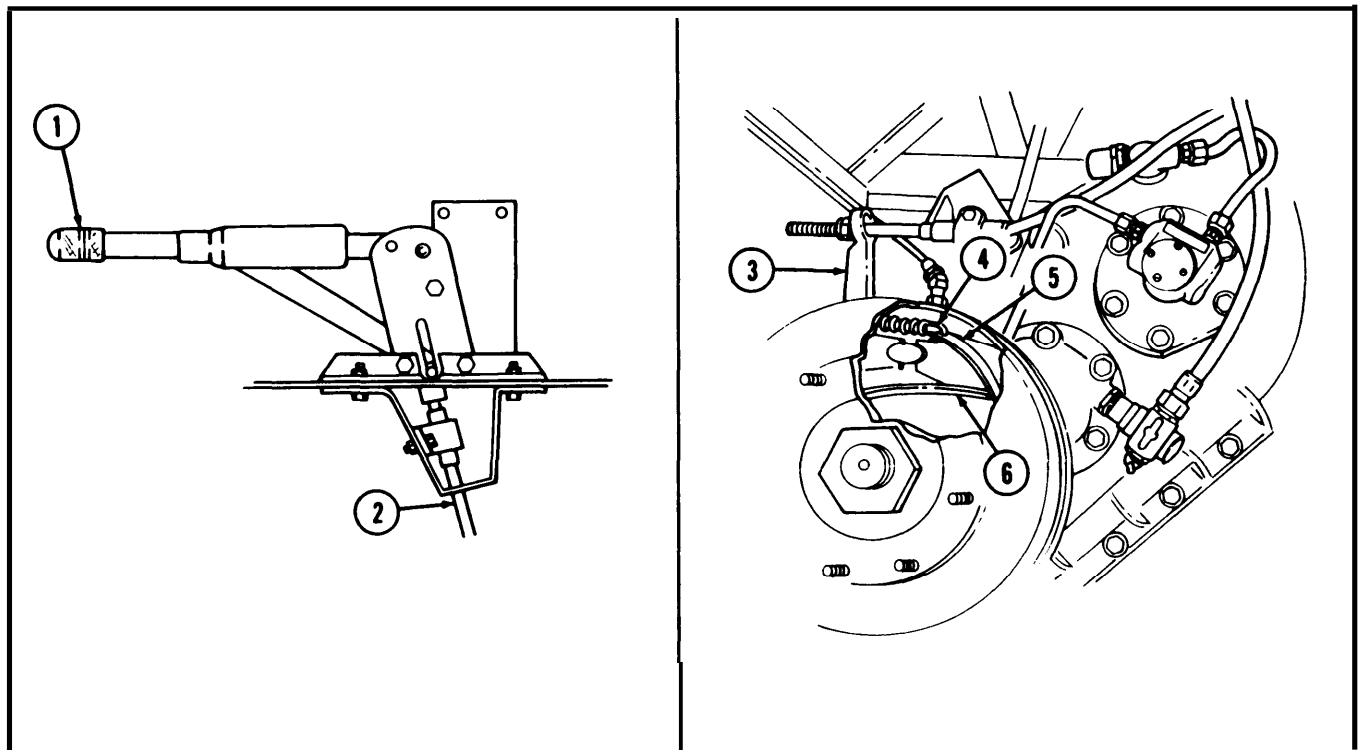
- a. Repair or replace bound or broken cable (2) as required (para. 7-5).
- b. If cable is not damaged, perform test 3.

Test 3. Inspect parking brake brakeshoes (5) for evidence of wear.

- Push parking brake lever (3) clockwise by hand and measure brake lever (3) travel.
- If travel is more than 2 in. (51 mm), replace brakeshoes (5).

Test 4. Inspect for broken or faulty actuating plate (6) with lever (3) and spring (4).

- a. If actuating mechanism is defective, notify DS maintenance.
- b. If actuating mechanism is serviceable, refer to malfunction 19.



END OF TESTING!

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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2. PARKING BRAKE DRAGS, INDICATED BY SMOKING OR BURNING SMELL

Make certain parking brake lever (1) is not partially engaged.

- a Fully release partially engaged parking brake.
- b. If parking brake still drags, see malfunction 1, tests 1, 2, and 4.

END OF TESTING!

SERVICE BRAKES

3. INSUFFICIENT BRAKES (VEHICLE STOPPING DISTANCE TOO LONG, NO APPARENT AIR SYSTEM FAILURE WITH GAGES AT NORMAL OPERATING PRESSURE, WARNING BUZZER NOT SOUNDING

Test 1. Check lines and hoses.

Direct assistant to fully apply service brakes.

- a. If air leaks are found, repair as required.
- b. If no air leaks in lines and hoses are found, perform test 2.

Test 2. Check service brake chambers (1) for air leaks through vent lines (2).

WARNING

Do not look into service chamber vent port when performing test.

Injury to personnel may result.

step 1. Disconnect vent line (2) from service brake chamber (1).

Step 2. Direct assistant to apply service brakes and feel for evidence of escaping air at vent port (3),

- a. If escaping air is present, refer to DS maintenance.
- b. If no air is escaping, reinstall vent line (2). Check all vent lines on service brake chambers before proceeding to test 3.

Test 3. Check front service brake chambers (1) for proper pressure.

Step 1. Stop engine and open all draincocks (4) until brake system air pressure is vented.

Step 2. Close draincocks (4).

Step 3. Disconnect delivery line (6) from service brake chamber (1).

Step 4. Disconnect adapter fitting (8) from service brake chamber (1).

Step 5. Connect tee (7) to service brake chamber (1) and connect test gage (5) and delivery line (6) to tee (7).

Step 6. Direct assistant to start engine and build air supply to normal operating pressure.

Step 7. Direct assistant to fully apply and hold service brakes.

Step 8. Check test gage (5) reading and compare with reading on instrument panel primary air pressure gage,

- a. If readings on both front service brake chambers compare with primary air pressure gage, proceed to test 4.

Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- b. If test gage readings are non-existent or far less than primary air pressure gage, perform tests 6 through 10.

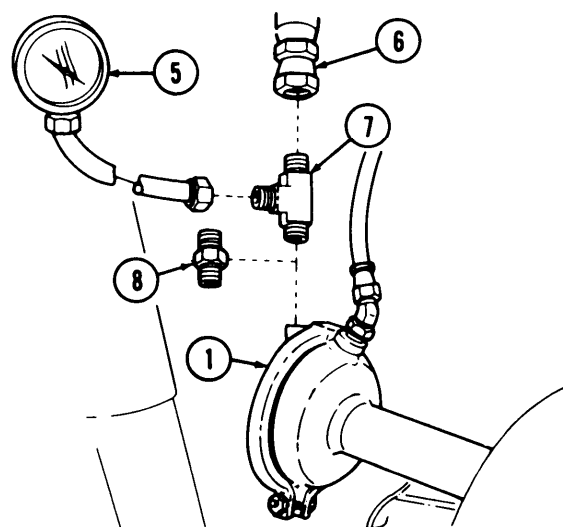
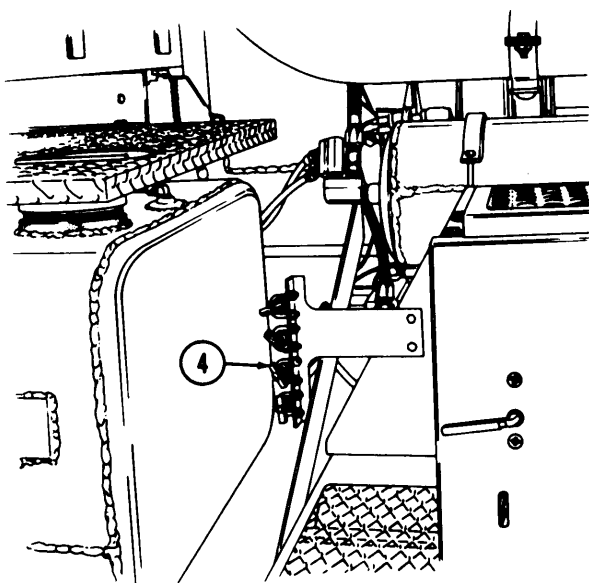
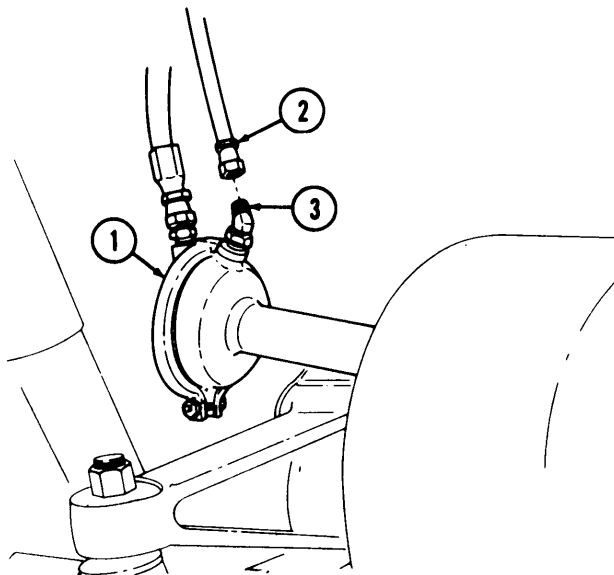


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

Test 4. Check service brake chambers (2) and (3) for proper pressure.

NOTE

Air pressure to service brake chambers must compare with reading on primary air pressure gage. Air pressure to spring and service brake chambers must compare with reading on secondary air pressure gage.

Step 1. Install test gage to service brake chambers (2) or (3) as outlined in test 3, steps 1 through 7.

Step 2. Check test gage reading and compare with reading on instrument panel primary air pressure gage.

- a. If reading on four service brake chambers (2) and (3) compare with primary air pressure gage, proceed to test 5.
- b. If only the two forward-rear rear service brake chambers (2) are defective, perform test 11.
- c. If only the two rear-rear forward service brake chambers (3) are defective, perform test 12.
- d. If all four service brake chambers (2) and (3) are defective, perform test 13.

Test 5. Check spring and service brake chambers (1) and (4) for proper pressure.

Step 1. Install test gage to spring and service brake chambers (1) and (4) as outlined in test 3, steps 1 through 7.

Step 2. Check test gage reading and compare with reading on instrument panel secondary air pressure gage.

- a. If reading on four spring and service brake chambers (1) and (4) compare with secondary air pressure gage, proceed to test 17.
- b. If only the two forward-rear forward spring and service brake chambers (1) are defective, perform test 14.
- c. If only the two rear-rear rear spring and service Brake chambers (4) are defective, perform test 15.
- d. If all four service brake chambers (1) and (4) are defective, perform test 16.

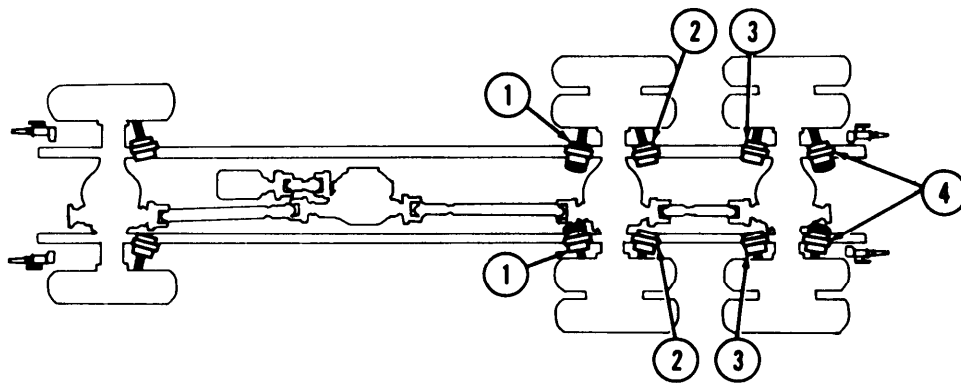


Table 2-12. Compressed Air and Brakes System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 6. Check limiting valve (7) for venting (front service brake chambers test low or non-existent air pressure).

WARNING

Do not look into limiting valve vent port when performing test.
Injury to personnel may result.

Step 1. Direct assistant to apply and hold service brake pedal.

Step 2. Disconnect vent line (5) from limiting valve vent port (6).

Step 3. Feel for escaping air pressure at limiting valve vent port (6).

- a. If air pressure is felt, replace defective limiting valve (7) (para. 7-22).
- b. If no air pressure is felt, reconnect vent line and proceed to test 7.

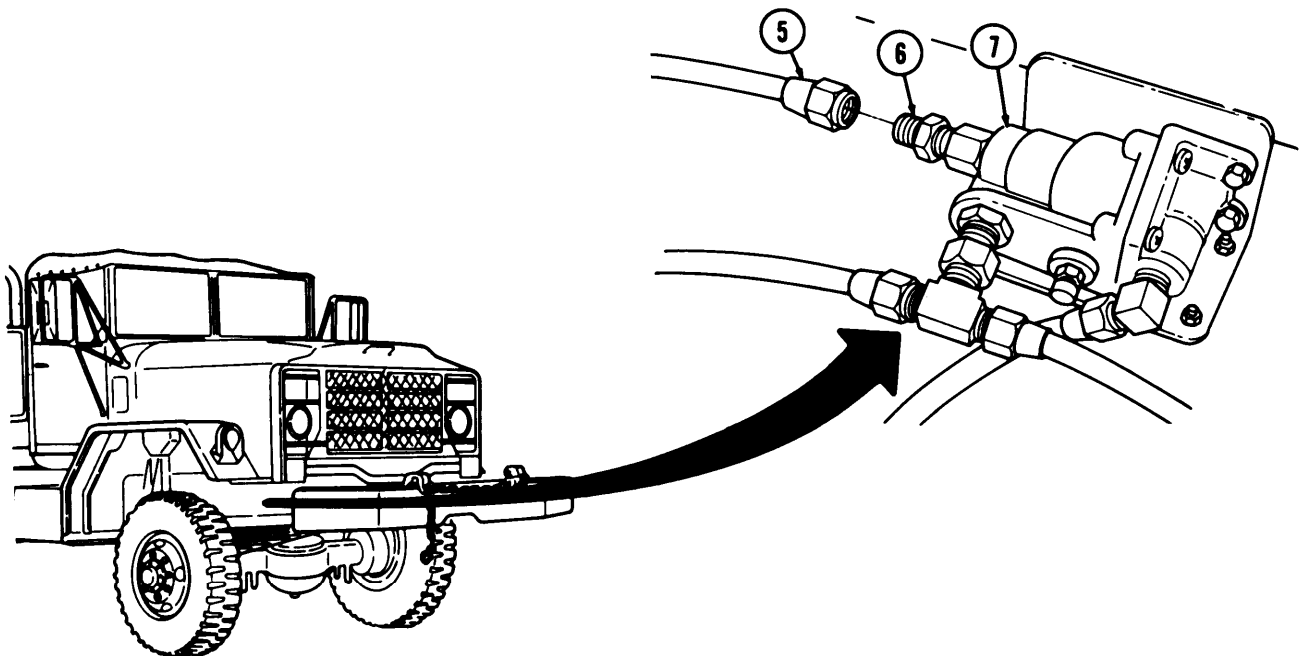


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 7. Check limiting valve (3) for proper air delivery pressure (front service brake chambers test low or non-existent air pressure).

Step 1. Stop engine and open all draincocks (1) until brake system air pressure is vented.

Step 2. Close draincocks (1).

Step 3. Disconnect air delivery lines (6) and (4) and remove tee fitting (5).

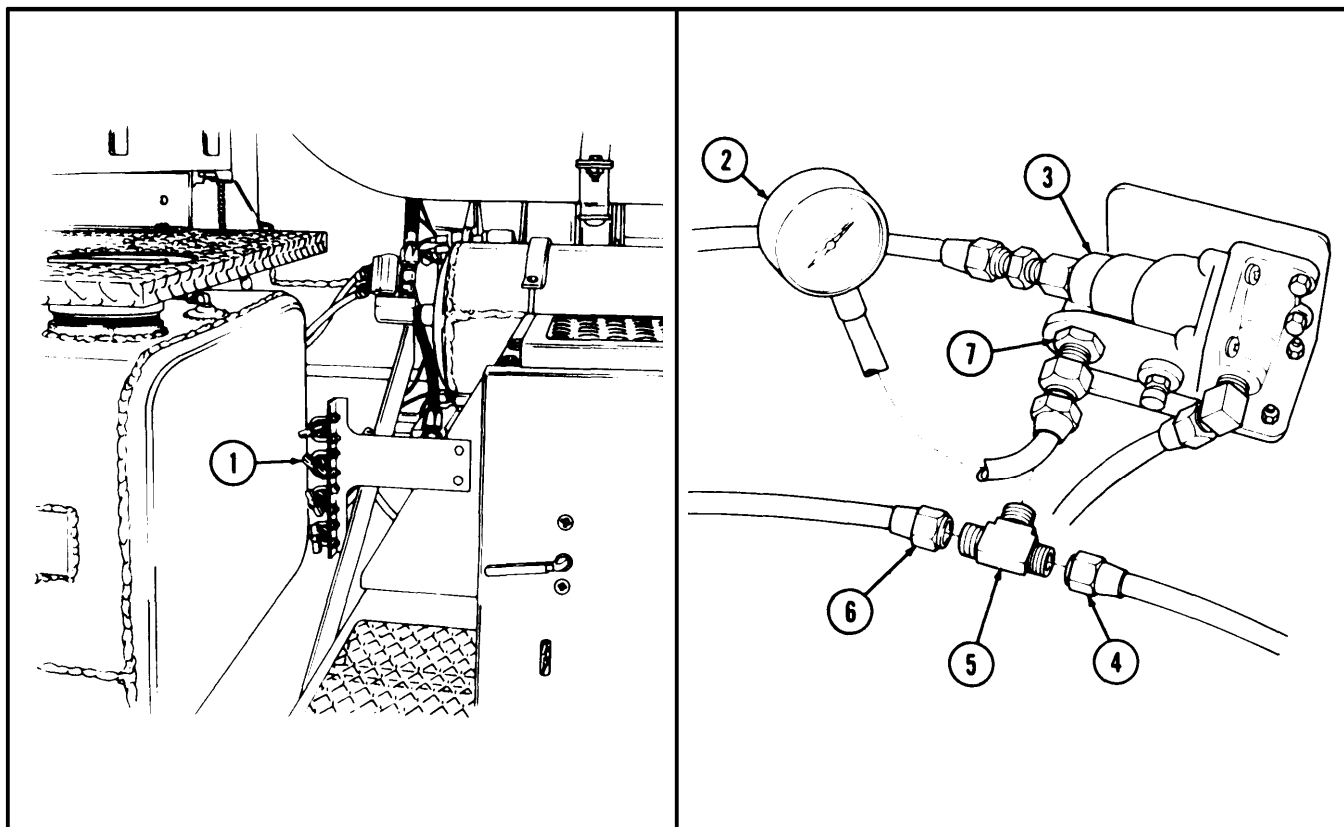
Step 4. Install test gage (2) to limiting valve delivery port (7).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (2) reading.

- a. If pressure reads normal, check air delivery lines (6) and (4) for blockage. Repair or replace as necessary.
- b. If pressure is below normal or non-existent, stop engine, drain air, reconnect lines to limiting valve (3), and proceed to test 8.



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Table 2-12 Compressed Air and Brake System Troubleshooting(Cont 'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 8. Check limiting valve (3) for proper air supply pressure (front service brake chambers test low or non-existent air pressure).

Step 1. Stop engine and open all draincocks (1) until brake system air pressure is vented.

Step 2. Close draincocks (1).

Step 3. Disconnect air supply line (8).

Step 4. Install test gage (2) to air supply line (8).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Check test gage (2).

a. If pressure reads normal, replace defective limiting valve (3) (para. 7-22).

b. If pressure is below normal or non-existent, check air supply line (8) for blockage. Repair or replace as necessary. If no blockage is present, reconnect air supply line (8) and proceed to test 9.

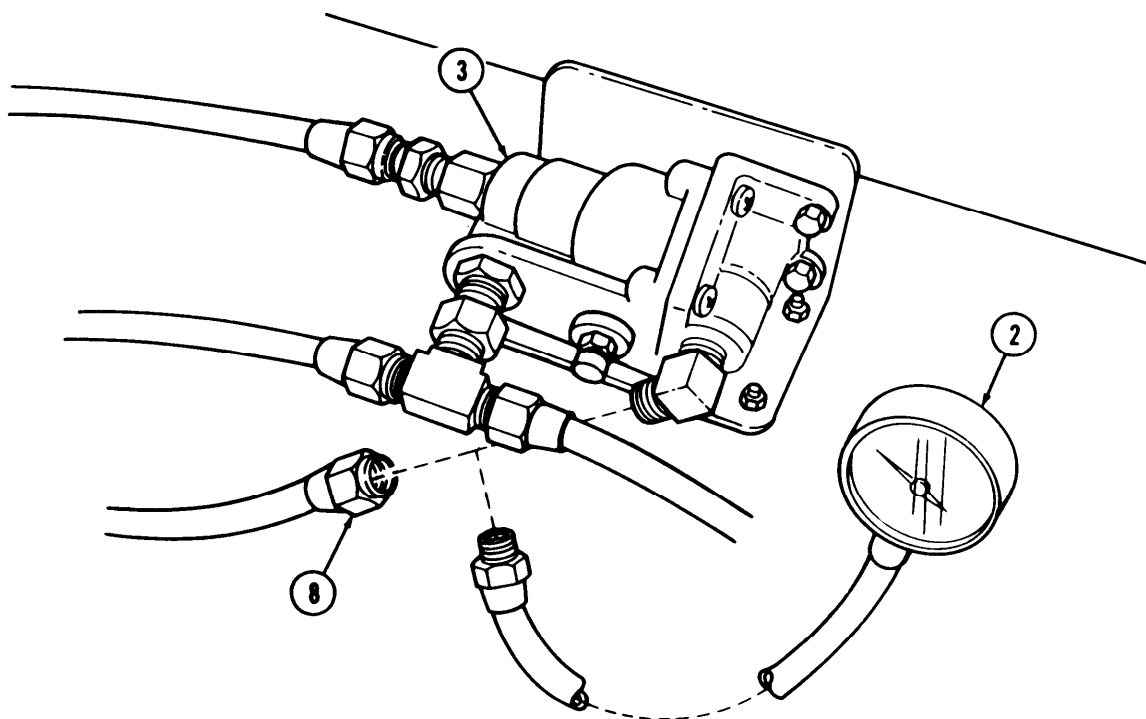


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 9. Test doublecheck valve #1 (3) supply pressure (front service brake chambers test low or non-existent air pressure).

WARNING

Do not depress service brake pedal during installation of test gage.
This may result in injury to personnel.

- Step 1. Direct assistant to keep foot off service brake pedal (7).
- Step 2. Disconnect doublecheck valve air supply line (1).
- Step 3. Connect test gage (2) to air supply line (1). Direct assistant to start engine and build air supply to normal operating pressure.
- Step 4. Depress service brake pedal (7).
- Step 5. Check test gage (2).
 - a. If pressure reads normal and delivery line (4) to limiting valve is not blocked (as determined by test 8) replace defective doublecheck valve #1 (3) (para. 7-45).
 - b. If pressure is below normal or non-existent, perform test 10.

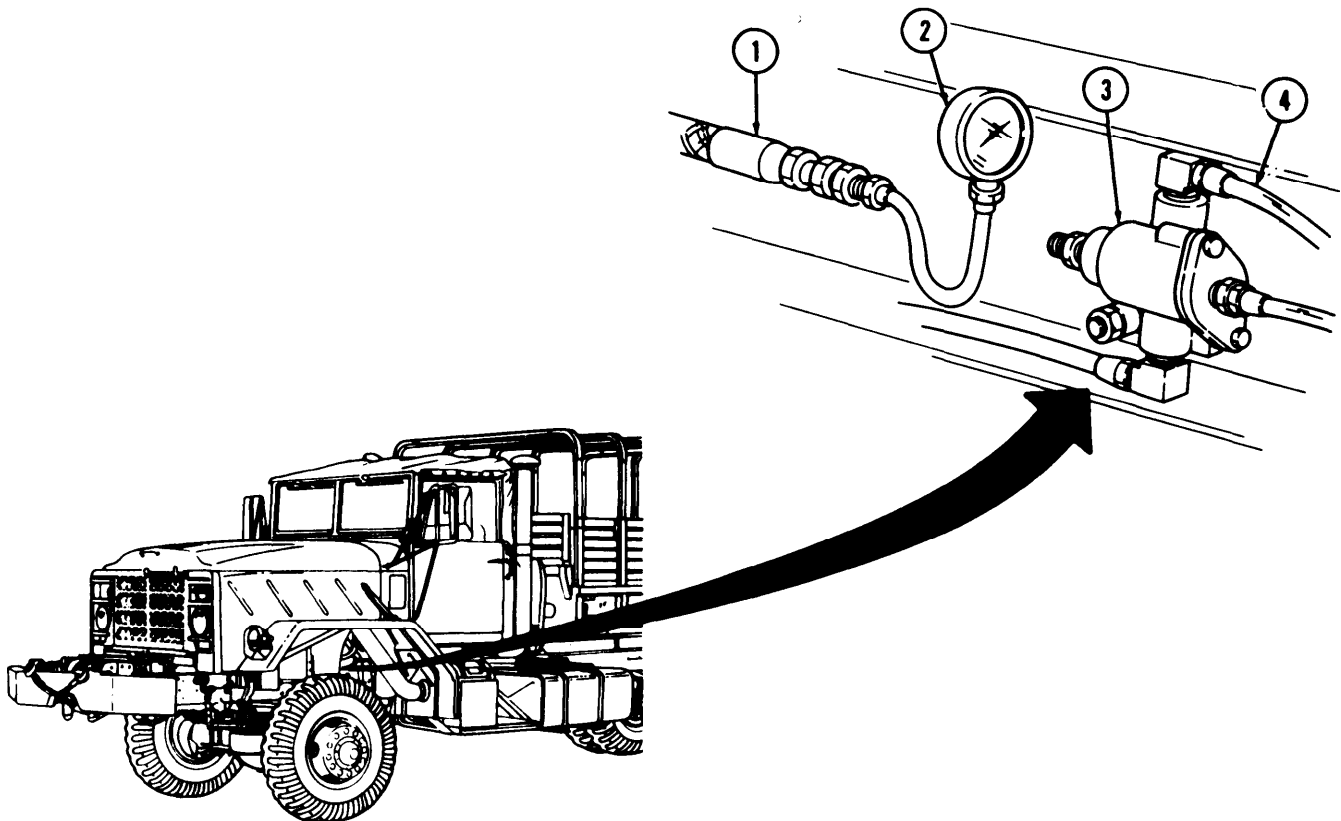


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 10. Check service brake pedal valve primary air system delivery port (5) (front service brake chambers test low or non-existent air pressure).

WARNING

- Do not depress service brake pedal during removal of plug and/or installation of test gage. This procedure may result in injury to personnel.
- Remove correct plug only. Removal of incorrect plug may result in injury to personnel.

Step 1. Remove plug (8).

Step 2. Install test gage (2) at service brake pedal primary air system delivery port (5). Direct assistant to start engine and build air supply to normal operating pressure.

Step 3. Depress service brake-pedal (7).

Step 4. Check test gage (2).

- If air pressure reads normal, check delivery line (1) to #1 doublecheck valve (3) for blockage. Repair or replace as necessary.
- If air pressure is below normal or non-existent, replace defective service brake pedal valve (6) (para. 7-31).

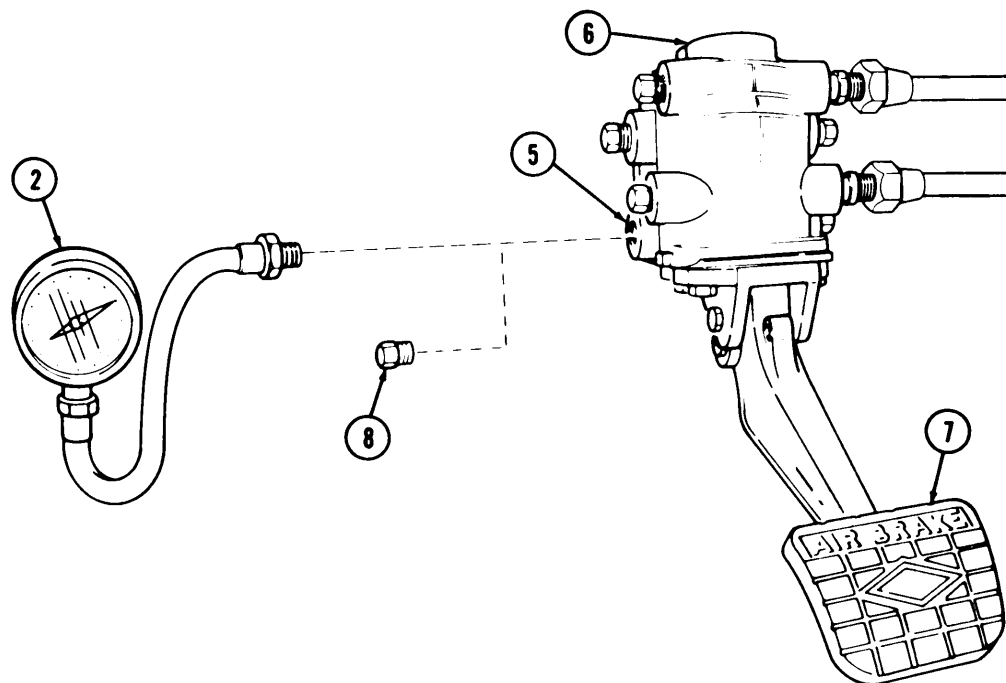


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 11. Check primary air system relay valve (3) for proper pressure (forward-rear rear service brake chambers (1) are defective).

Step 1. Stop engine and open all draincocks (2) until brake system air pressure is vented.

Step 2. Close draincocks (2).

Step 3. Disconnect delivery line (5) from forward-rear rear service brake chambers (1) and remove elbow (6) from relay valve delivery port (7).

Step 4. Install test gage (4) to delivery port (7).

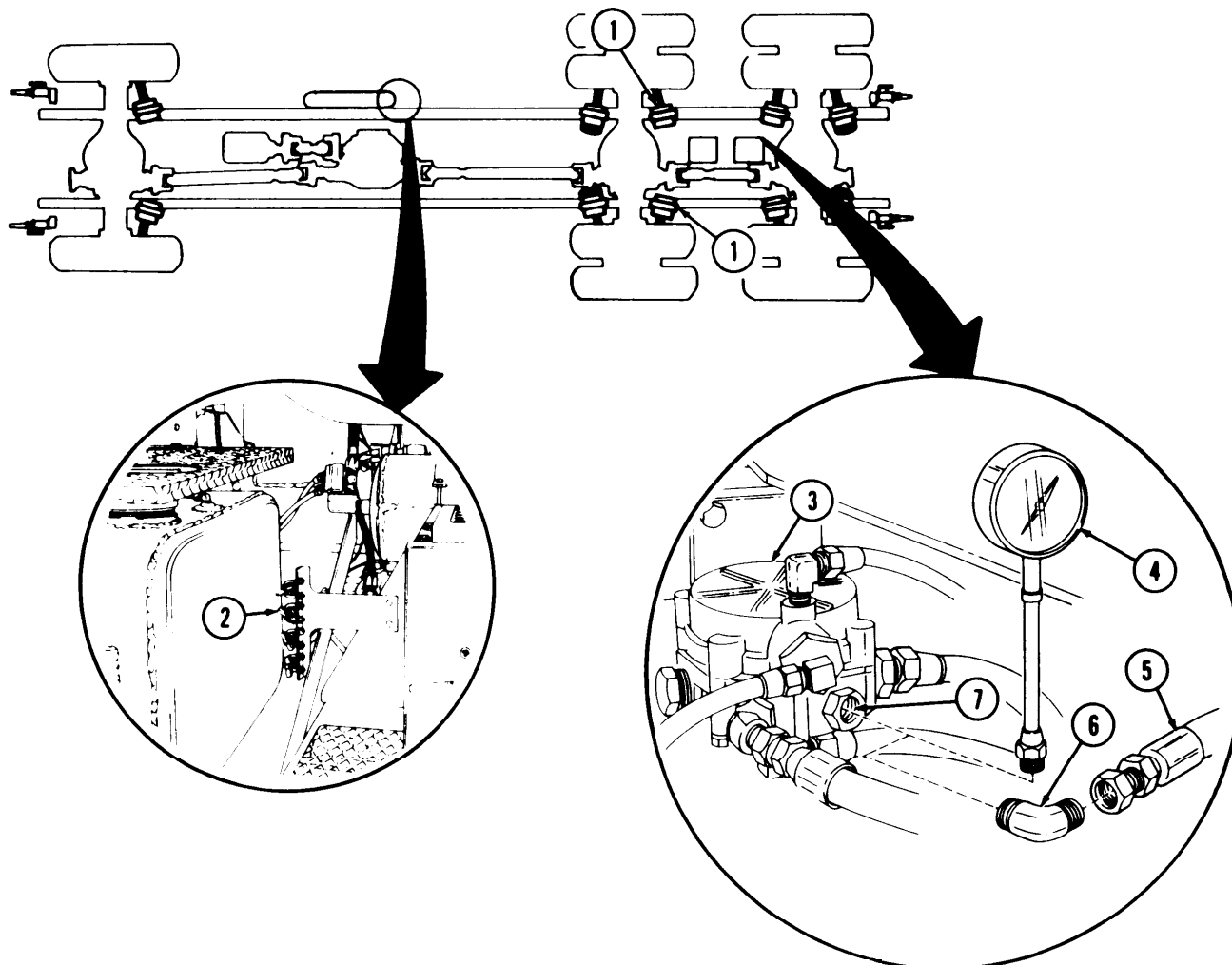
Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (4).

a. If pressure is below normal, proceed to test 13.

b. If pressure is normal, inspect relay valve to service brake chamber delivery lines (5) for blockage. Repair or replace as necessary.



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Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Test 12. Check primary air system relay valve (3) for proper pressure (rear-rear forward service brake chambers (8) are defective).

Step 1. Stop engine and open all draincocks (2) until brake system air pressure is vented.

Step 2. Close draincocks (2).

Step 3. Disconnect delivery line (11) from rear-rear forward service brake chambers (8) and remove elbow (10) from relay valve (3).

Step 4. Install test gage (4) to delivery port (9).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (4).

a. If pressure is below normal, proceed to test 13.

b. If pressure is normal, inspect relay valve to service brake chamber delivery lines (11) for blockage. Repair or replace as necessary.

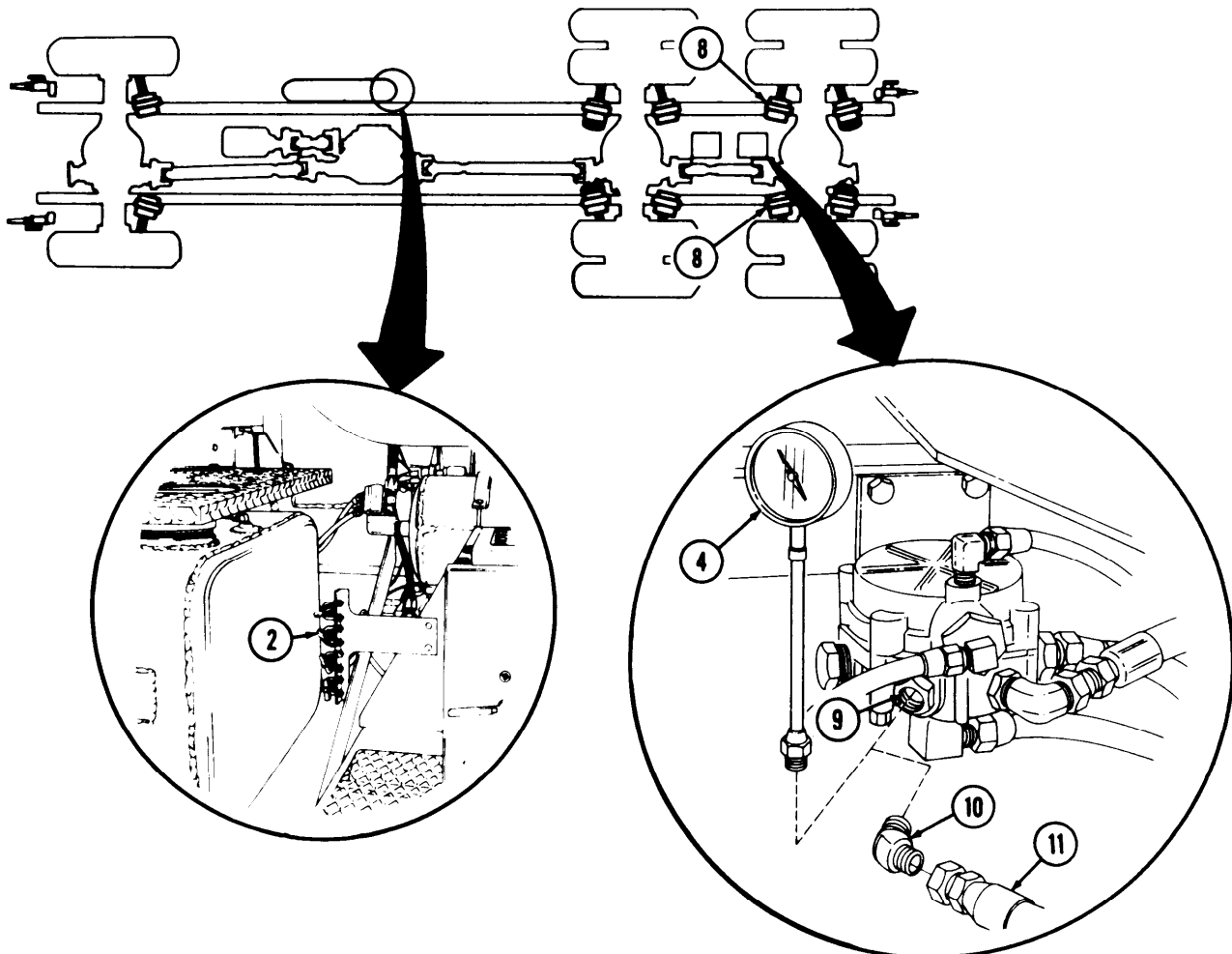


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 13. Check primary air tank to relay valve supply line (3) (all four primary air system service brake chambers are defective).

Step 1. Stop engine and open all draincocks (5) until brake system air pressure is vented.

Step 2. Close draincocks (5).

Step 3. Disconnect supply line (3) from primary air system relay valve (1).

Step 4. Install test gage (2) to supply line (3).

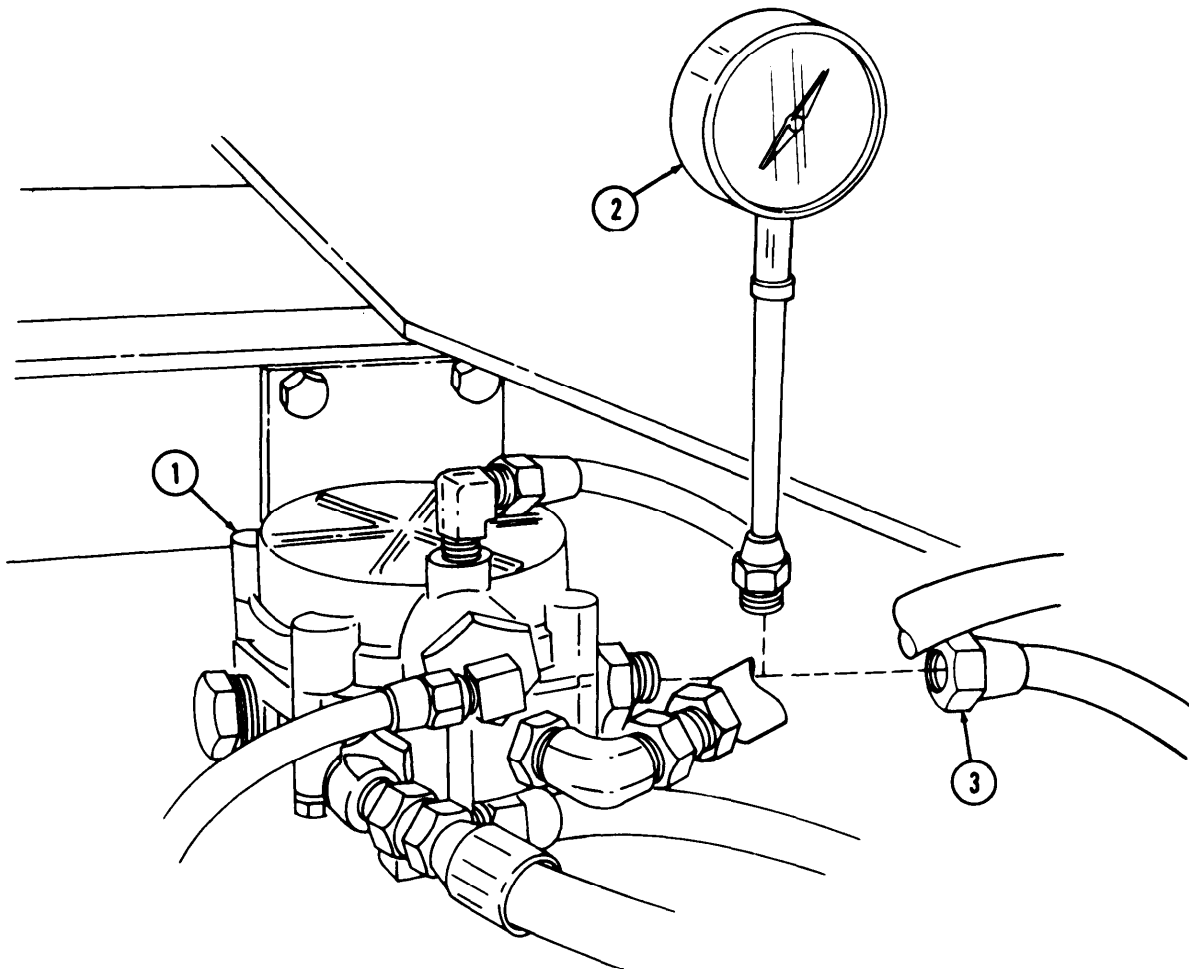
Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (2),

a. If pressure is below normal, inspect supply line (3) for blockage. Repair or replace as necessary.

b. If pressure is normal, replace defective primary air system relay valve (1) (para. 7-20).



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Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 14. Check secondary air system relay valve (6) for proper pressure (only spring and service brake chambers (4) are defective).

Step 1. Stop engine and open all draincocks (5) until brake system air pressure is vented.

Step 2. Close draincocks (5).

Step 3. Disconnect delivery line (9) from service brake chambers (4) and remove elbow (8) from relay valve (6).

Step 4. Install test gage (2) to delivery port (7).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (2).

a. If pressure is below normal, proceed to test 16.

b. If pressure is normal, repair or replace blocked delivery line (9).

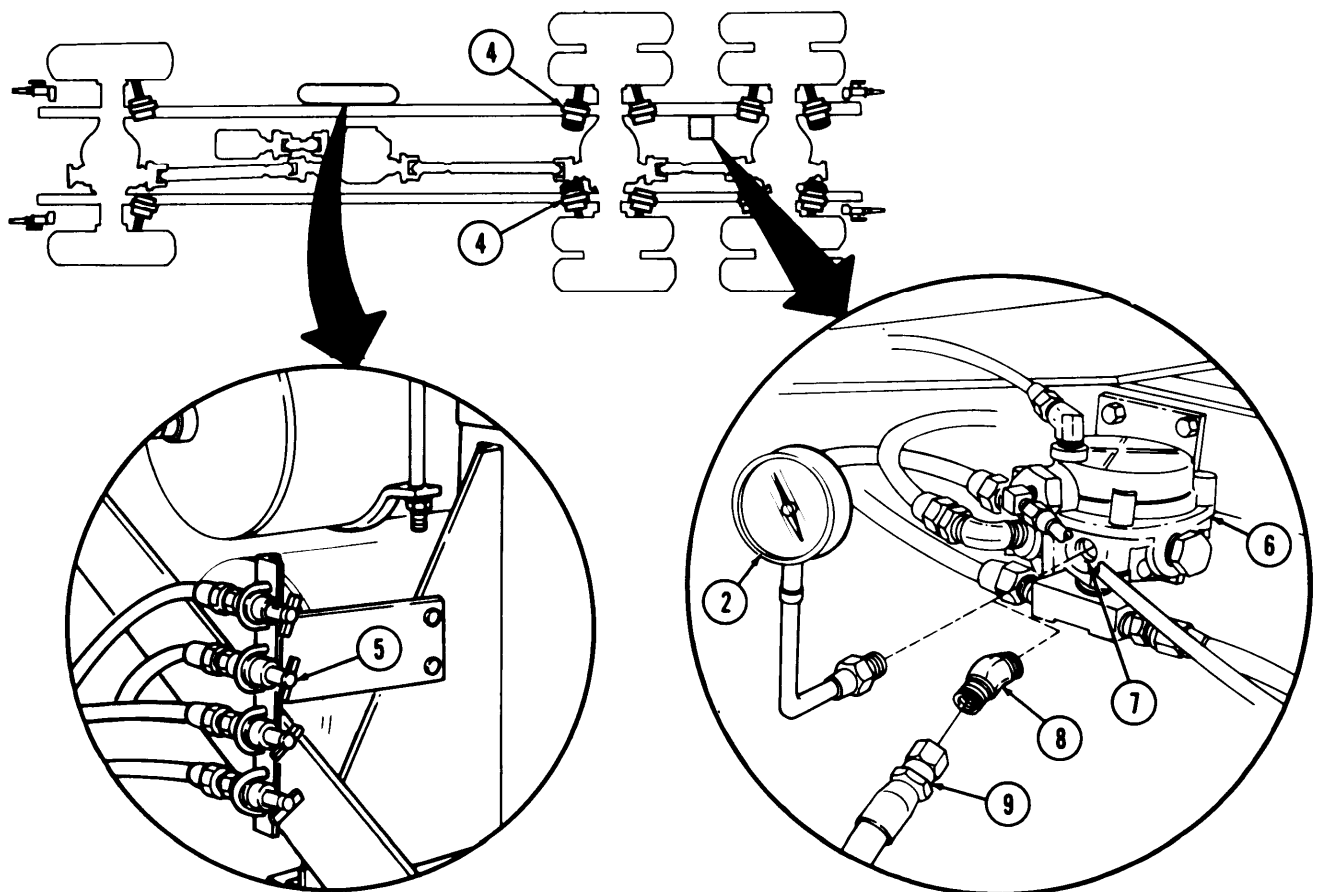


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 15. Check secondary air system relay valve (4) for proper pressure (only spring and service brake chambers (1) are defective).

Step 1. Stop engine and open all draincocks (2) until brake system air pressure is vented.

Step 2. Close draincocks (2).

Step 3. Disconnect delivery line (7) from service brake chambers (1) and remove elbow (6) from relay valve (4).

Step 4. Install test gage (3) to delivery port (5).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (3).

a. If pressure is below normal, proceed to test 16.

b. If pressure is normal, repair or replace blocked delivery lines (7).

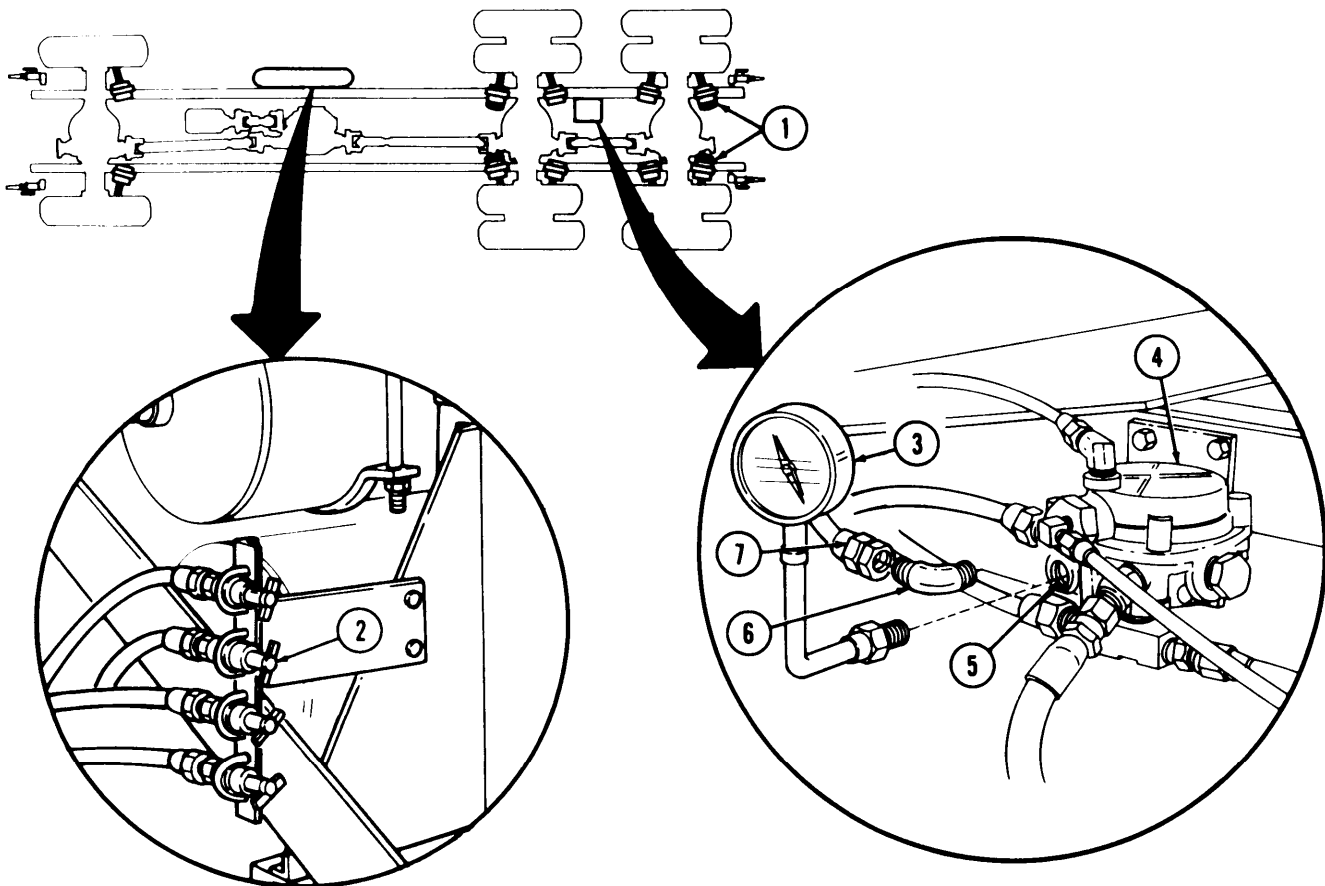


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 16. Check secondary air tank to relay valve supply line (8) (all four secondary air system spring and service brake chambers are defective).

Step 1. Stop engine and open all draincocks (2) until brake system air pressure is vented.

Step 2. Close draincocks (2).

Step 3. Disconnect supply line (8) from secondary air system relay valve (4).

Step 4. Install test gage (3) to supply line (8).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Direct assistant to fully apply and hold service brakes.

Step 7. Check test gage (3).

a. If pressure is below normal, inspect supply line (8) for blockage. Repair or replace as necessary.

b. If pressure is normal, replace defective secondary air system relay valve (4) (para 7-19).

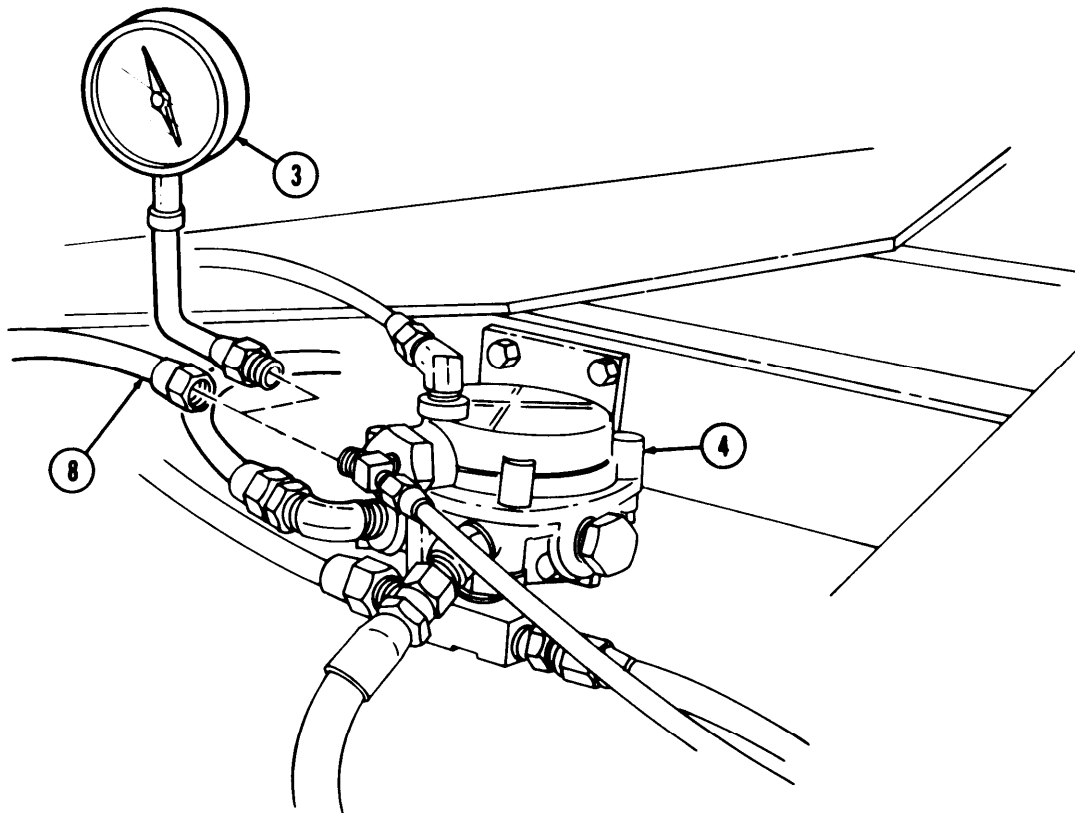


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 17. Inspect brake mechanisms.

Step 1. Remove brake dustcovers (para. 7-10).

Step 2. Inspect chamfer (2) on brakeshoe lining (1) for wear.

If brakeshoe lining is worn to depth of chamfer (2) or less than 5/16 in. (7.94 mm), replace brakeshoe (para. 7-12).

Step 3. Inspect for oil on shoes (1) or drum. If oil is found, notify DS maintenance.

Step 4. Inspect actuator seals (3) for rotted, torn, or worn condition. If defective, notify DS maintenance.

END OF TESTING!

4. VEHICLE PULLS TO RIGHT OR LEFT WHEN APPLYING BRAKES

NOTE

Vehicle pulling to right or left indicates malfunction in one of the two front wheel service brakes.

Test 1. Determine which brake is grabbing.

Step 1. In a safe test area, bring vehicle to a hard, sudden stop.

Step 2. Inspect front wheels for excessive heat on wheel and drum. Inspect for smoke or skid marks.

a. If grabbing is found, go to test 3.

b. If no signs of grabbing are present, perform test 2.

Test 2. Check front service brake chambers for proper air pressure. Go to malfunction 3, test 3.

Test 3. Remove front brake dustcovers (para. 7-10) and inspect brake mechanism.

Step 1. Inspect chamfer (2) on brakeshoe lining (1) for wear.

If brakeshoe lining (1) is worn to depth of chamfer (2), or less than 5/16 in. (7.94 mm), replace brakeshoe (para. 7-12).

Step 2. Inspect for oil on lining (1) or drum.

a. If any oil is found, replace shoes (para. 7-12).

b. Replace axle seal (para. 8-5) and clean hub and drum.

Step 3. Inspect actuator seals (3) for rotted, torn, or worn conditions.

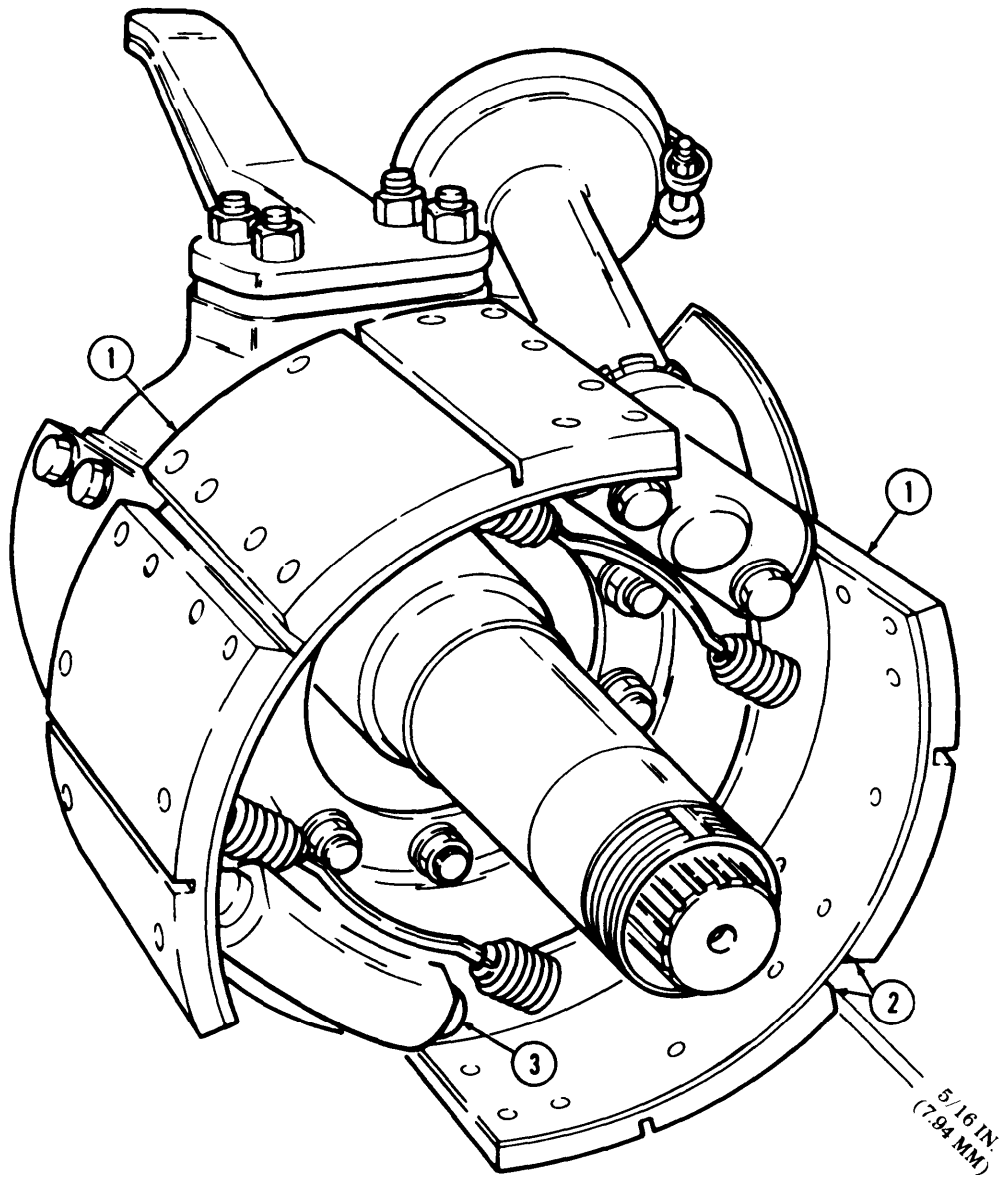
If rotted, torn, or worn, notify DS maintenance.

Step 4. Inspect brakeshoe lining to drum clearance (para. 7-11).

Test 4. Go to malfunction 37, table 2-2.

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

Table 2-12. Compressed Air and Brake System Troubleshooting {Cont'd}

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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5. VEHICLE REAR BRAKES GRAB OR DRAG

Test 1. Inspect rear brakes to isolate malfunction.

Step 1. Inspect for signs of locking, smoke, skid marks, and excessive heat on wheels and drums.

a. If locking is found, perform malfunction 4, test 3 on rear brakes.

b. If no signs of locking are present, go to step 2.

Step 2. Inspect for leaks. Apply brakes, listen, and locate.

a. If leakage is indicated, repair or replace defective lines or fittings.

b. If no leakage is found, go to test 2.

Test 2. Check rear brake chambers for proper air pressure. Go to malfunction 3, tests 4 and 5.

END OF TESTING!

6. VEHICLE VIBRATES, CHATTERS, OR BOUNCES WHEN BRAKES ARE APPLIED

See malfunction 5, tests 1 and 2.

END OF TESTING!

7. BRAKES SQUEAL

Inspect for glazed or wornout lining.

Step 1. Remove brakedrums (para. 8-5 and 8-6).

Step 2. Inspect chamfer on brakeshoe lining for wear.

If brakeshoe lining is worn to depth of chamfer, or less than 5/16 in. (7.94 mm), replace brakeshoe.

Step 3. Inspect for glazed lining. Lining should appear dull.

If lining is shiny, remove glaze with wire brush.

Step 4. Inspect for dirt or metal trapped in shoes.

Clean out with wire brush.

END OF TESTING!

8. WARNING BUZZER SOUNDS WHEN BRAKES ARE APPLIED (PRIMARY AND SECONDARY GAGE PRESSURE DROPS BELOW 55-65 PSI)

NOTE

Malfunction 8 indicates major leakage in air delivery components.

Listen and locate leaks.

Step 1. Direct assistant to start engine and build air supply to normal operating pressure.

Step 2. Direct assistant to fully apply and hold service brakes.

Step 3. Inspect for leaks.

Locate and repair leak as appropriate.

END OF TESTING!

Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION****COMPRESSED AIR SUPPLY****9. NO AIR PRESSURE (WARNING BUZZER SOUNDING, AIR PRESSURE NOT BUILDING TO NORMAL OPERATING RANGE AS INDICATED BY GAGES)**

Test 1. Check for leaks.

Step 1. Direct assistant to start engine.

Step 2. Listen and locate leaks.

a. If leakage is found, repair air lines or fittings as necessary.

b. If no leakage is found, go to test 2.

Test 2. Check compressor (1) with engine running.

Step 1. Loosen and bleed air from governor signal line (2) to air compressor (1).

Step 2. Feel compressor outlet line (3) for heat.

a. If compressor is operating normally, outlet line (3) will be hot (under great pressure). Proceed to test 3 if outlet line is hot.

b. If outlet line (3) is not hot, proceed to step 3.

WARNING

Loosen outlet line at compressor very slowly. Stop procedure and tighten fitting the moment air begins to escape. Injury to personnel may result if line is accidentally disconnected from a serviceable operating compressor.

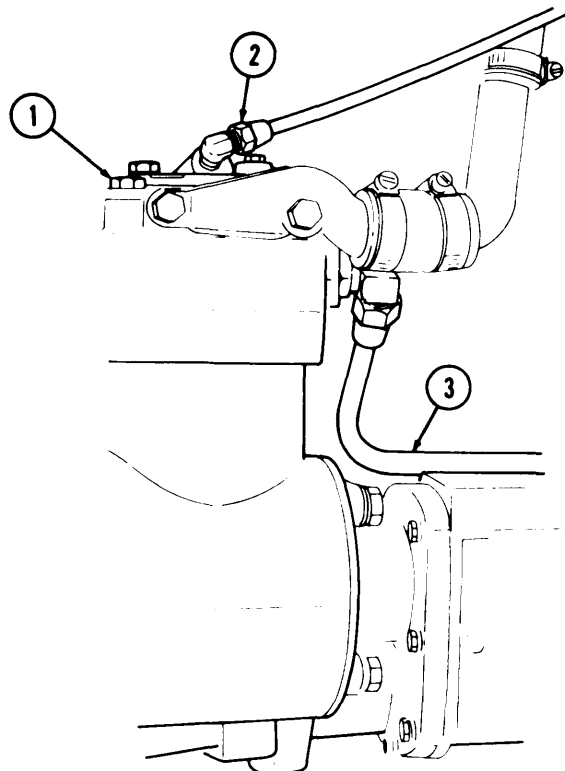
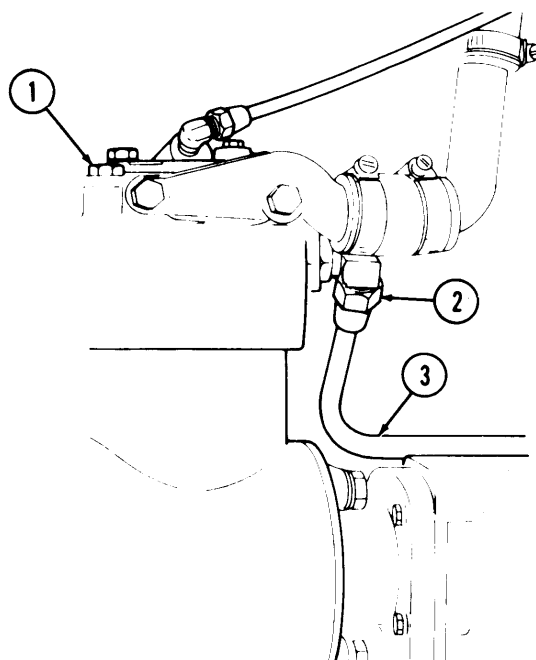


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Step 3. Carefully loosen fitting (2) until air is heard escaping.
- If air is heard, tighten fitting and proceed to test 3.
 - If no air is present, notify DS maintenance of defective compressor (1).
- Test 3. Inspect outlet line (3) for damage that could restrict airflow.
- If damage is present, repair or replace outlet line.
 - If no damage is present, perform test 4.
- Test 4. Check outlet line (3) for blockage.
- Step 1. Stop engine and open all draincocks (7) until brake system air pressure is vented.
- Step 2. Close draincocks (7).
- Step 3. Disconnect outlet line (3) at wet supply tank (6) and install tee (5) between tank (6) and line (3).
- Step 4. Install test gage (4) in tee (5).
- Step 5. Direct assistant to start engine and allow sufficient time for pressure to build.
- Step 6. Compare test gage (4) reading with gage readings on instrument panel.
- If readings compare (below 80 psi), perform test 5.
 - If test gage (4) reads normal operating pressure, test instrument panel gages for proper operation. See malfunction 13 and 14.
- Test 5. Check air governor.
- Step 1. Replace governor with one known to be operative (para. 7-40).
- Step 2. Start engine and allow sufficient time to build to normal operating pressure.
- If air pressure is normal, governor was defective.
 - If air pressure remains below 80 psi, notify DS maintenance of defective compressor (1).

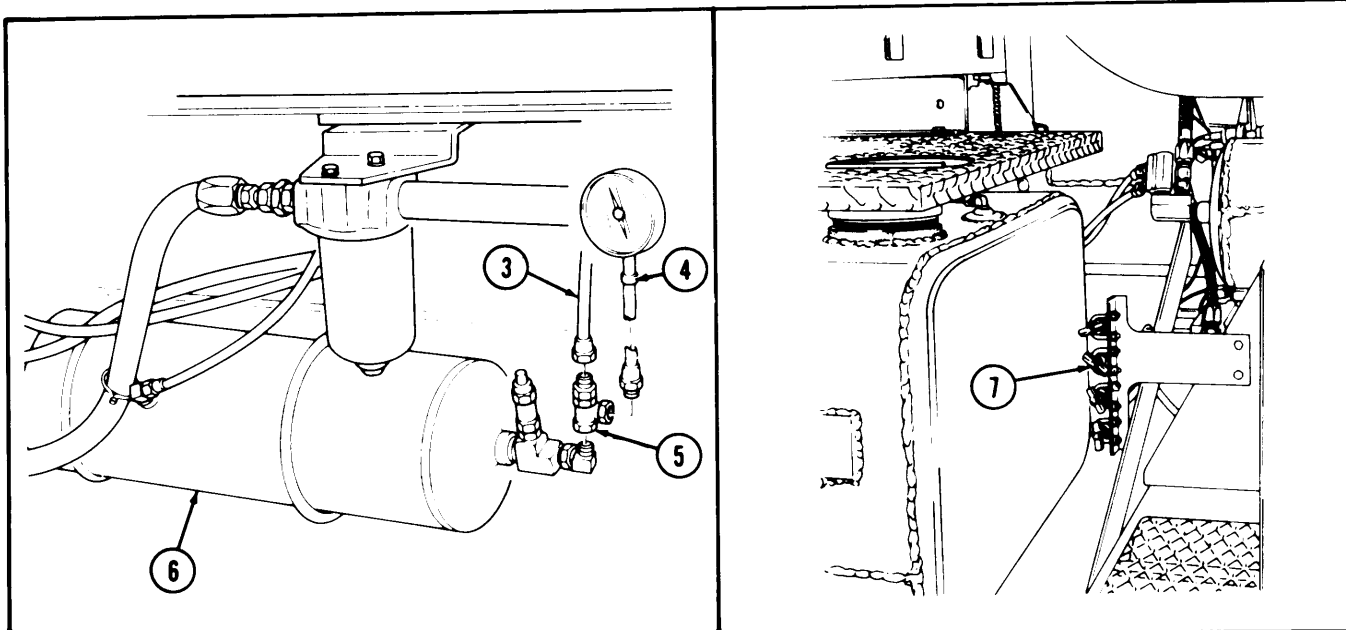
END OF TESTING!



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Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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10. AIR PRESSURES DO NOT BUILD TO NORMAL OPERATING PRESSURE (ABOVE 80 PSI) ACCORDING TO GAGES

Test 1. Inspect for leaks.

Listen and locate leakage.

- a. If leakage is indicated, repair or replace lines or fittings as necessary.
- b. If no leakage is indicated, perform test 2.

Test 2. Adjust governor (para. 7-40).

Test 3. Check compressor. See malfunction 9, tests 2, 3, and 4.

END OF TESTING!

11. AIR PRESSURE BUILDS SLOWLY (TAKES EXCESSIVE AMOUNT OF TIME TO BUILD TO 100 PSI)

Perform tests, malfunction 10.

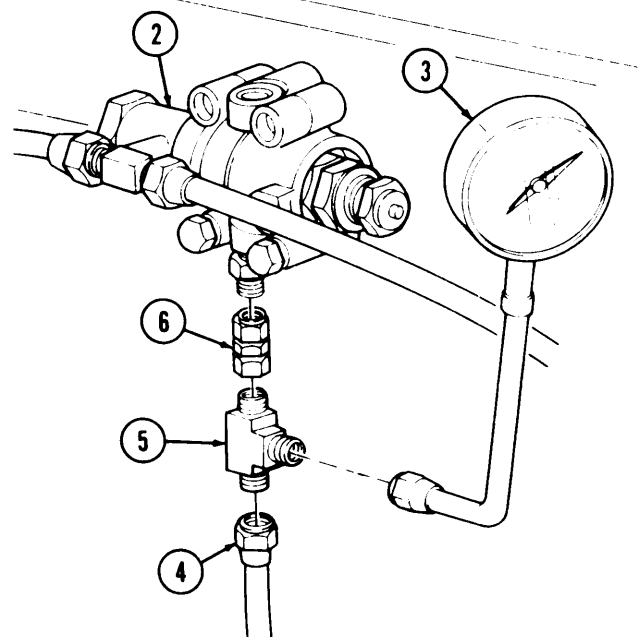
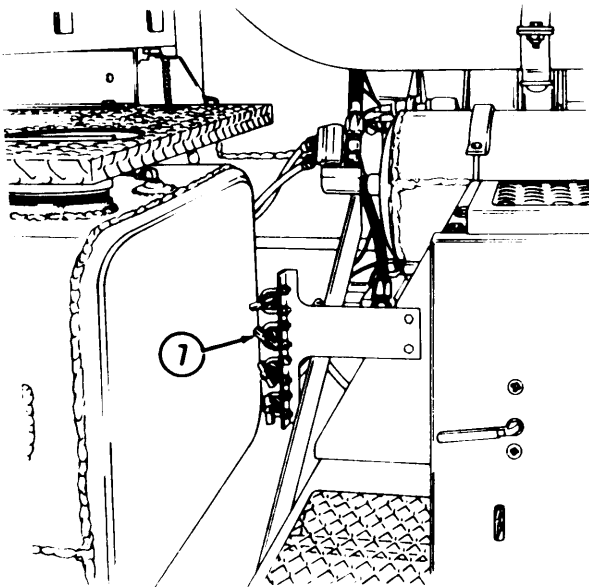
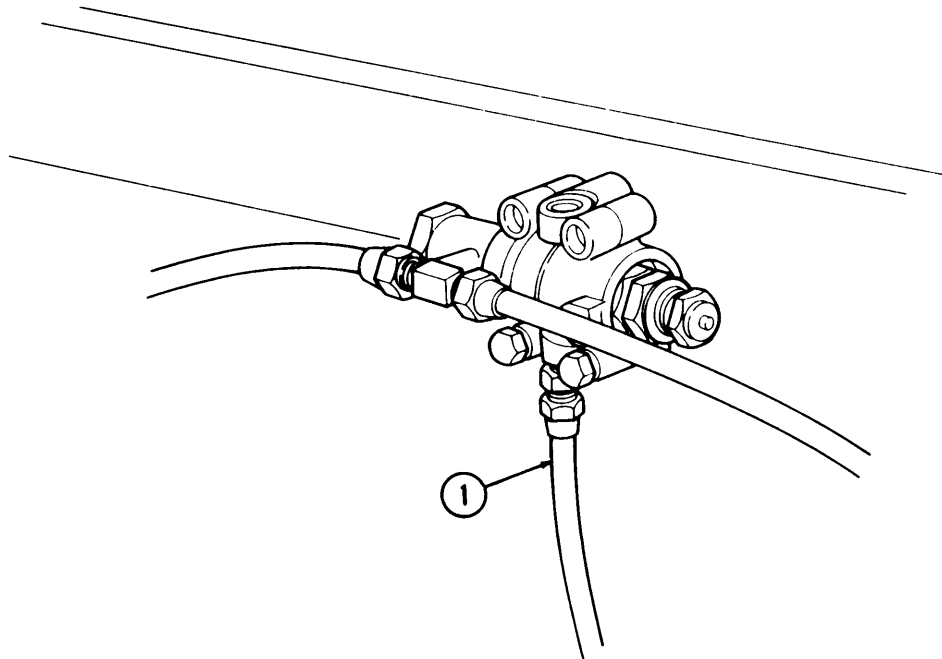
END OF TESTING!

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
12. AIR PRESSURE EXCEEDS MAXIMUM (GAGES SHOW OVER 130 PSI), SAFETY VALVE OPENS TO RELEASE PRESSURE		
Test 1. Check for air loss through accessories. See malfunction 20.		
Test 2. Check governor signal line (1).		
Step 1. Inspect for leaks, and crimping in governor signal line (1).		
a. If leaks or crimping are present, repair or replace as necessary.		
b. If no leaks or crimping are apparent, perform step 2.		
Step 2. Remove signal line (1) and inspect for clogging.		
a. If clogged, repair or replace as necessary.		
b. If signal line (1) is not clogged, perform test 3.		
Test 3. Check governor signal line (4) pressure.		
Step 1. Stop engine and open all draincocks (7) until brake system is vented.		
Step 2. Close draincocks (7).		
Step 3. Disconnect governor signal line (4) from air governor (2).		
Step 4. Connect adapter fitting (6) to air governor (2) and tee (5) to fitting (6).		
Step 5. Connect test gage (3) to tee fitting (5).		
Step 6. Direct assistant to start engine and build air supply to normal operating pressure.		
Step 7. Compare air pressure indicated on test gage (3) to pressure on instrument panel gages.		
a. If test gage air pressure reading is the same as gage readings on instrument panel (exceeds maximum), notify DS maintenance of defective compressor.		
b. If test gage air pressure reading is below 80 psi, replace defective governor (2) (para. 7-40).		

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

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Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
13. PRIMARY PRESSURE GAGE READS NO PRESSURE, LOW PRESSURE, OR BUILDS TO NORMAL OPERATING PRESSURE SLOWLY. SECONDARY PRESSURE GAGE READS NORMAL (ENGINE IDLING, BRAKE PEDAL NOT APPLIED)		
Test 1. Check for leaks.		
Listen and locate leakage.		
a. If leakage is indicated, repair or replace air lines or fittings as necessary.		
b. If no leakage is indicated, perform test 2.		
Test 2. Check primary pressure gage (4).		
Step 1. Stop engine and open all draincocks (1) until brake system is vented.		
Step 2. Close draincocks (1).		
Step 3. Disconnect air line (2) from primary air pressure gage (4).		
Step 4. Connect test gage (3) to air line (2).		
Step 5. Direct assistant to start engine and build air supply to normal operating pressure (as indicated by secondary air pressure gage (5)).		
Step 6. Check test gage (3).		
a. If pressure reads normal, replace defective primary air pressure gage (4).		
b. If gage reads no pressure, low pressure, or pressure is building slowly, perform test 3		

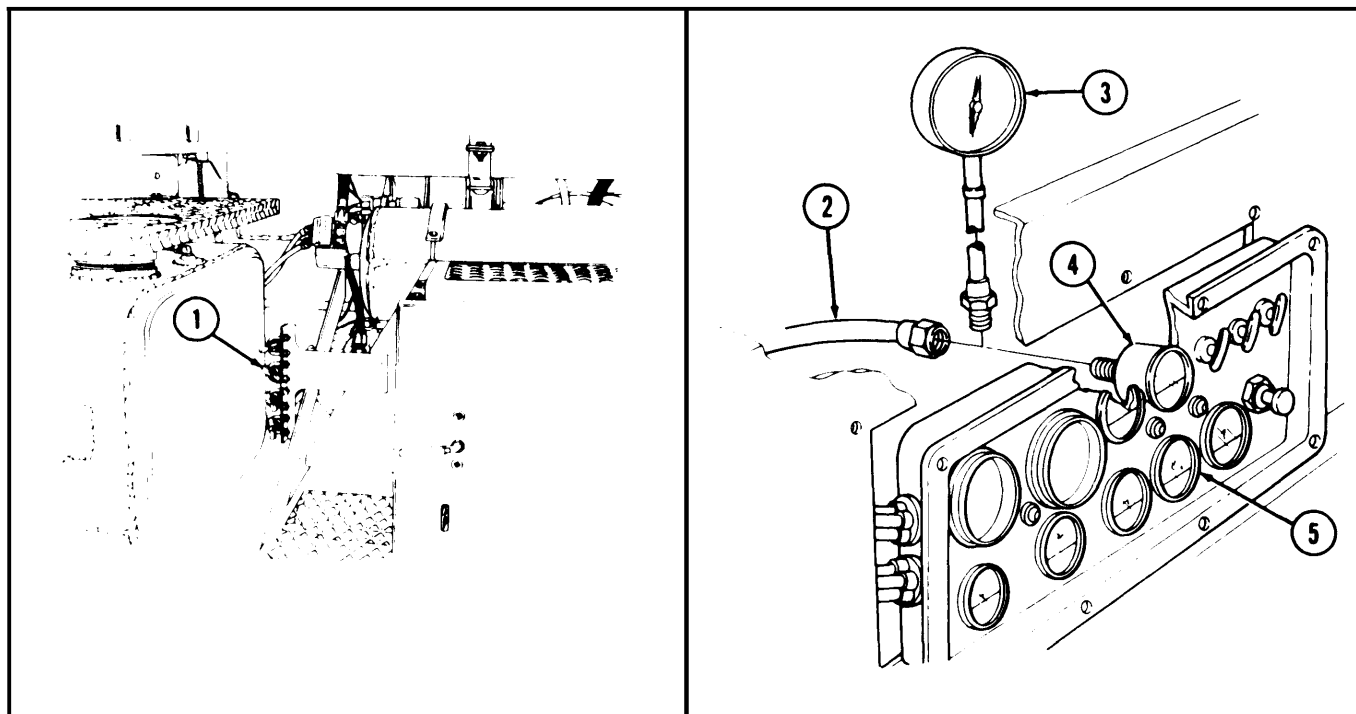


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 3. Test brake pedal valve supply port (7) pressure.

Step 1. Stop engine and open all draincocks (1) until brake system is vented.

Step 2. Close draincocks (1).

Step 3. Disconnect primary pressure gage air line (8) from pedal valve (6).

Step 4. Connect test gage (3) to brake pedal valve supply port (7).

Step 5. Direct assistant to start engine and build air supply to normal operating pressure.

Step 6. Check test gage (3).

- a. If air pressure reads normal, repair or replace clogged air line (8) to primary air pressure gage on instrument panel.
- b. If test gage (3) reads no pressure, low pressure, or pressure is building slowly, perform test 4.

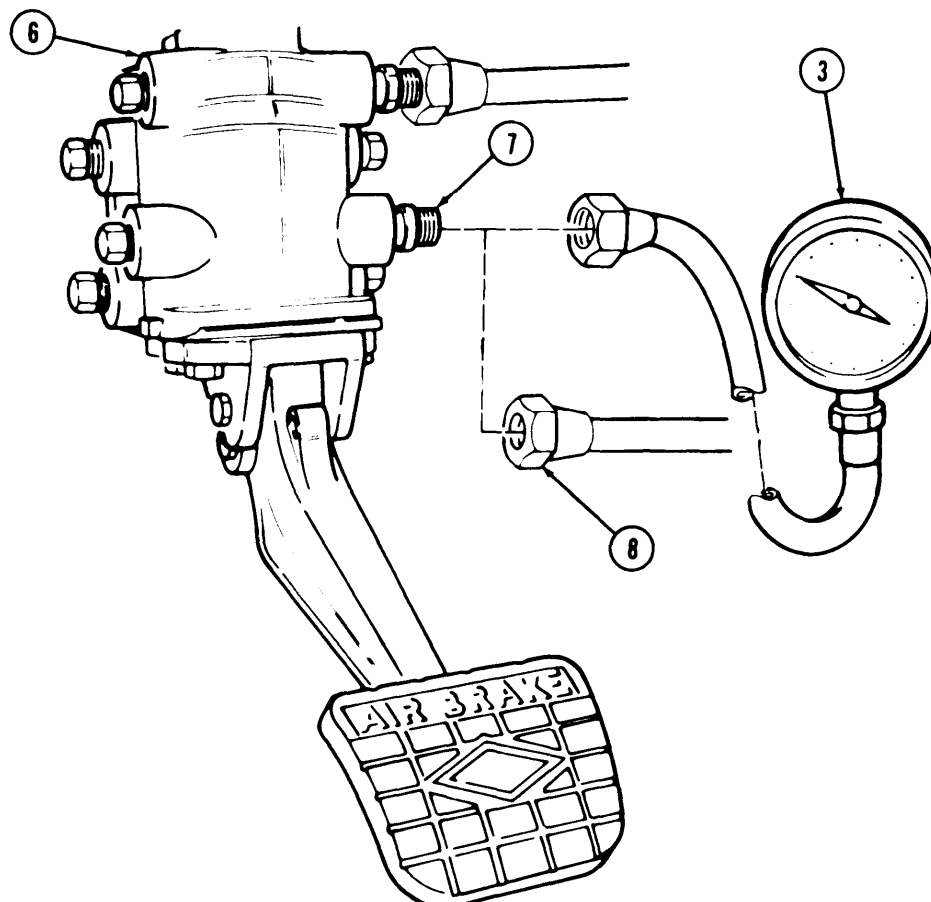


Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 4. Check primary reservoir air pressure.

Step 1. Stop engine and drain primary air reservoir at draincock (7).

Step 2. Disconnect draincock (7) from drain line (6).

Step 3. Connect test gage (3) to primary drain line (6).

Step 4. Start engine and allow air pressure to build.

Step 5. Observe reading on test gage (3).

a. If test gage (3) reads normal operating pressure, perform test 5.

b. If test gage (3) reads no pressure, low pressure, or is building slowly, perform test 6.

Test 5. Check primary air system supply line (4) from primary air reservoir to brake pedal valve (1).

Step 1. Stop engine and open all draincocks (7) until air system is vented. Close draincocks (7) after venting.

Step 2. Disconnect primary air system supply line (4) from brake pedal valve fitting (5) and install test gage (3) to supply line (4).

Step 3. Direct assistant to start engine and allow air system to build to normal operating pressure.

Step 4. Check test gage (3).

a. If test gage (3) indicates normal operating pressure, replace defective brake pedal valve (1).

b. If test gage (3) reads no pressure, low pressure, or pressure is building slowly, repeat steps 1 and 2, reinstall primary air system supply line (4) and proceed to test 6.

Test 6. Check one-way check valve (2).

Step 1. Stop engine and open all draincocks (7) until brake system is vented.

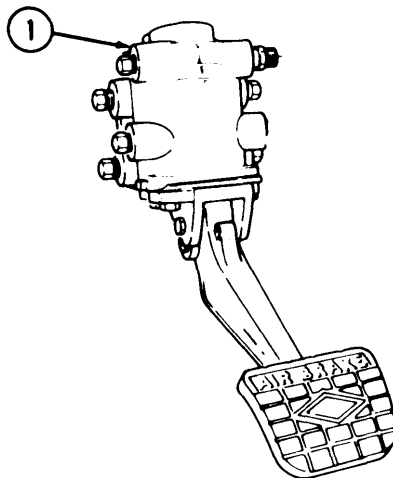
Step 2. Remove one-way check valve (2) (para. 7-18).

Step 3. Inspect check valve (2) for clogging and damage.

a. If clogging or damage is indicated, replace defective one-way check valve (2) (para. 7-18).

b. If no clogging or damage is present, repair or replace clogged primary air supply line (4).

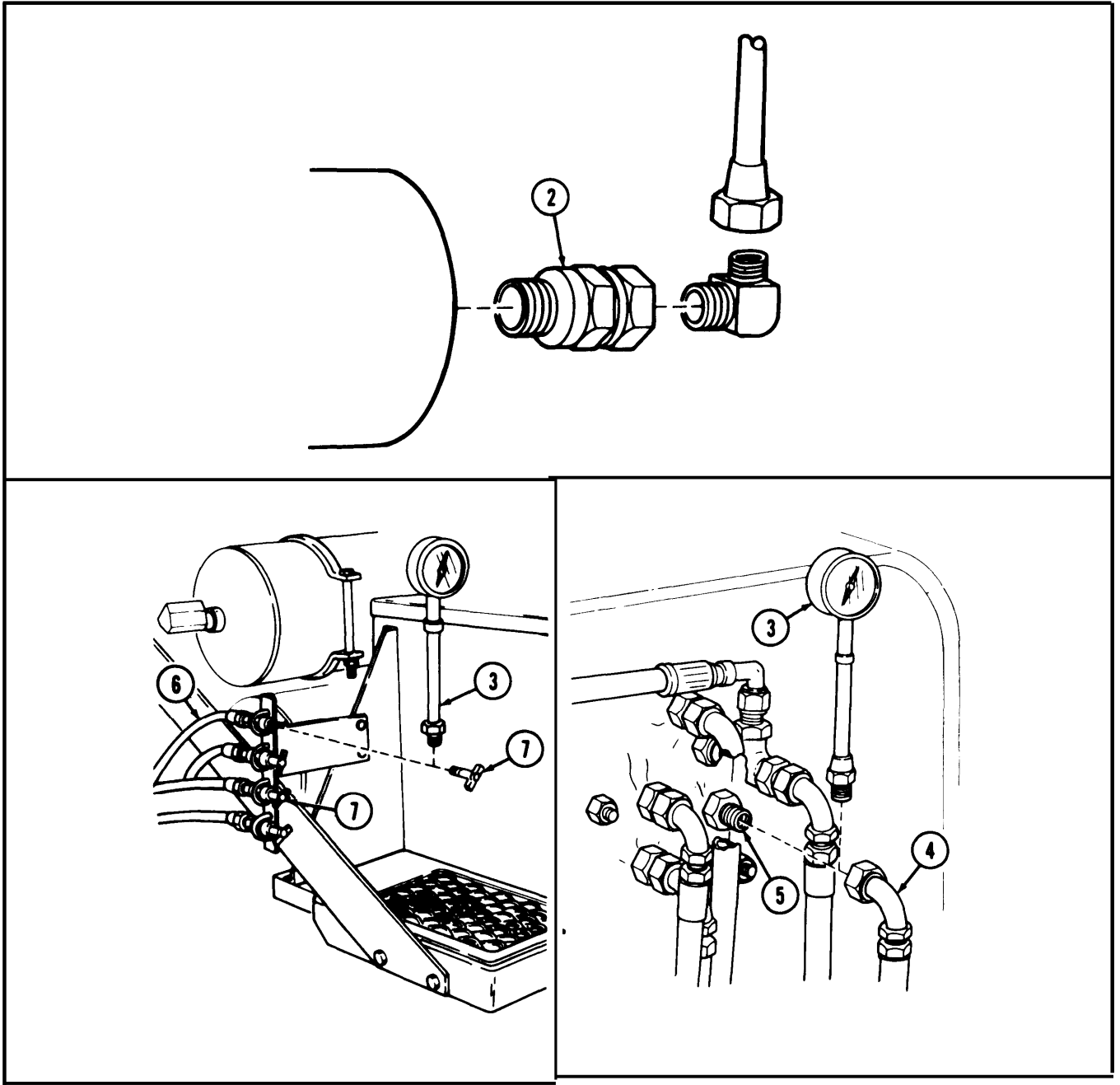
END OF TESTING!



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Table 2-12. compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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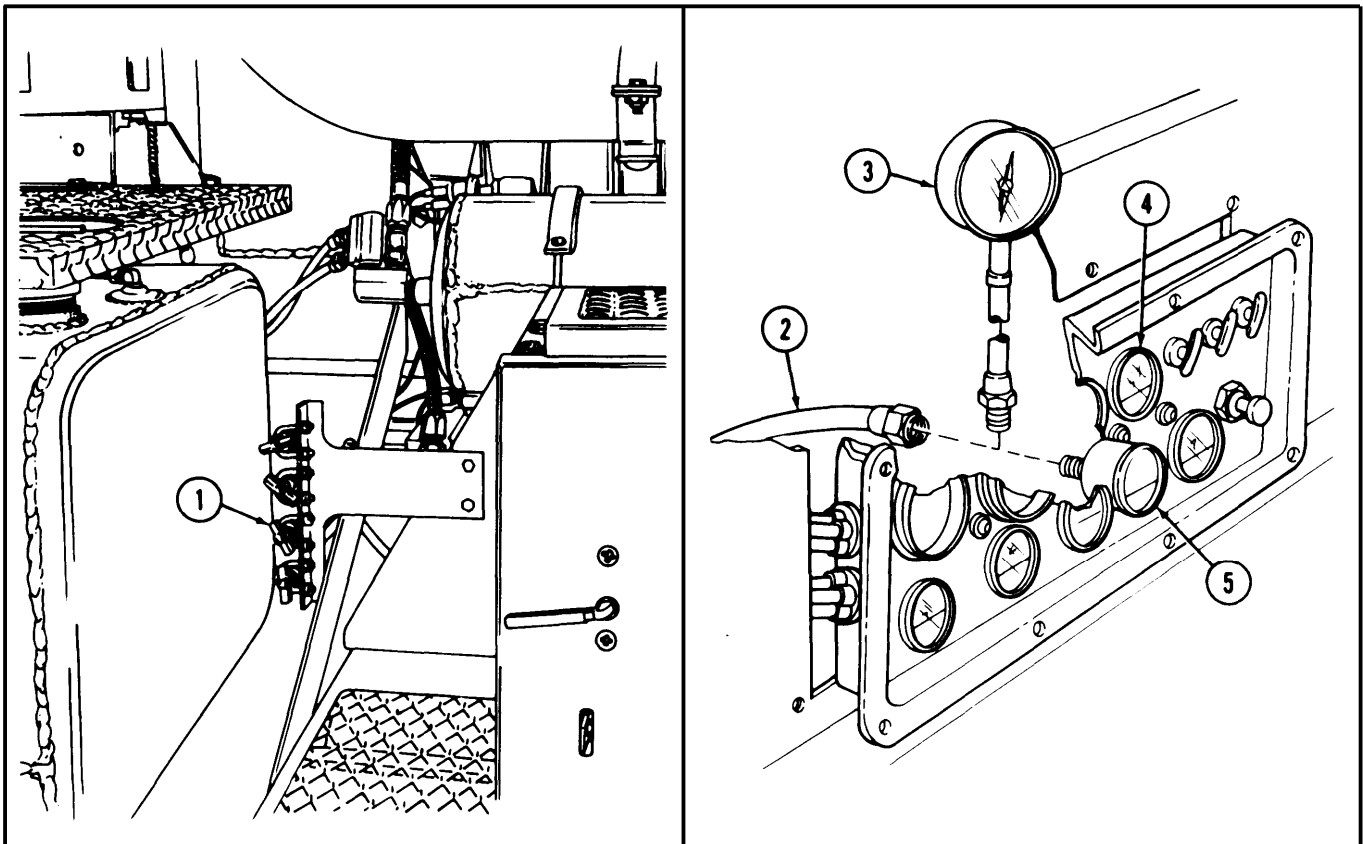


END OF TESTING!

TA 349559

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
14. SECONDARY PRESSURE GAGE READS NO PRESSURE, LOW PRESSURE, OR BUILDS TOO SLOWLY. PRIMARY PRESSURE GAGE READS NORMAL (ENGINE IDLING, BRAKE PEDAL NOT APPLIED)		
Test 1. Perform test 1, malfunction 13.		
Test 2. Check secondary pressure gage (5).		
Step 1. Stop engine and open all draincocks (1) until brake system is vented.		
Step 2. Close draincocks (1).		
Step 3. Disconnect air line (2) from secondary air pressure gage (5).		
Step 4. Connect test gage (3) to air line (2).		
Step 5. Direct assistant to start engine and build air supply to normal operating pressure (as indicated by primary air pressure gage (4)).		
Step 6. Check test gage (3).		
a. If pressure reads normal, replace defective secondary air pressure gage (5).		
b. If gage reads no pressure, low pressure, or pressure is building slowly, perform test 3.		



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Table 2-12. Compressed Air and Brake System Troubleshooting(Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 3. Test brake pedal valve supply port (7).

Step 1. Stop engine and open all draincocks (1) until brake system is vented.

Step 2. Close draincocks (1).

Step 3. Disconnect secondary pressure gage air line (8) from pedal valve supply port (7).

Step 4. Connect test gage (3) to brake pedal valve (6) supply port (7).

Step 5. Direct assistant to start engine and build air pressure to normal operating pressure.

Step 6. Check test gage (3).

- a. If air pressure reads normal repair or replace clogged air line (8) to secondary air pressure gage on instrument panel.
- b. If test gage (3) reads no pressure, low pressure, or pressure is building slowly, perform test 4.

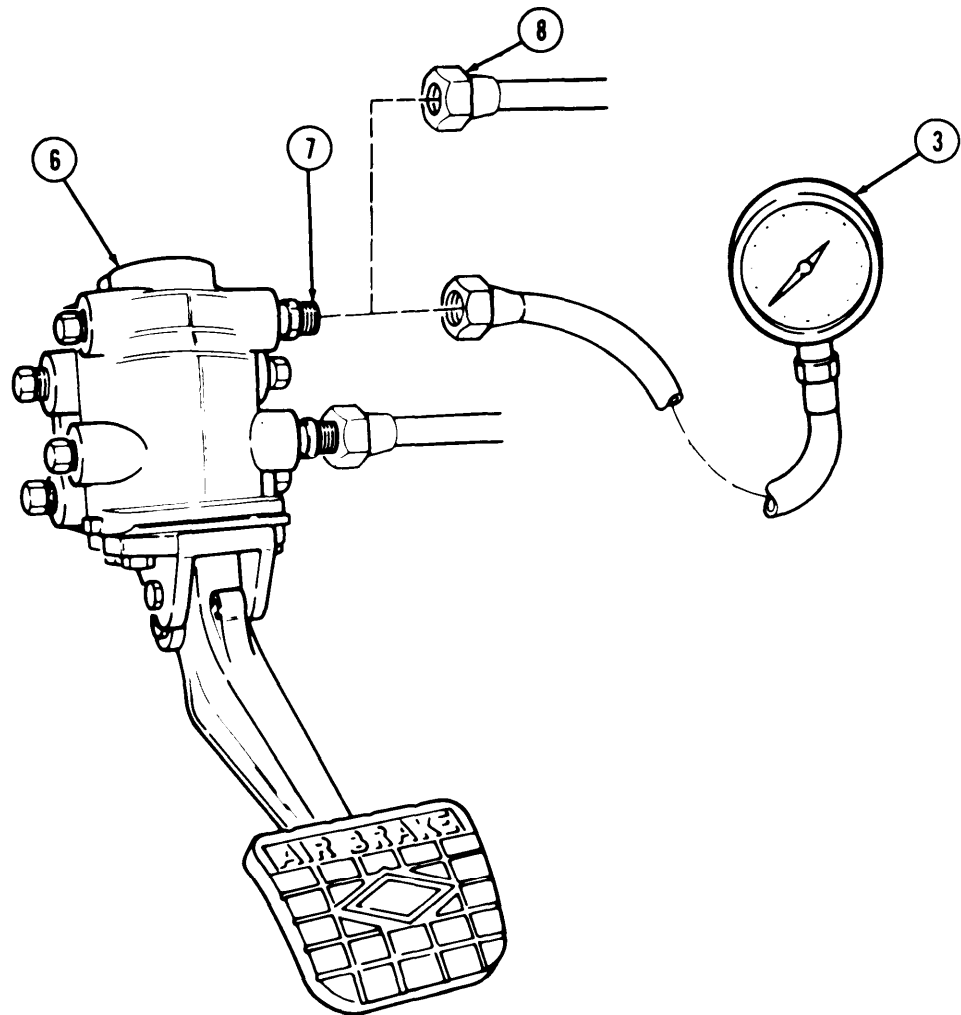
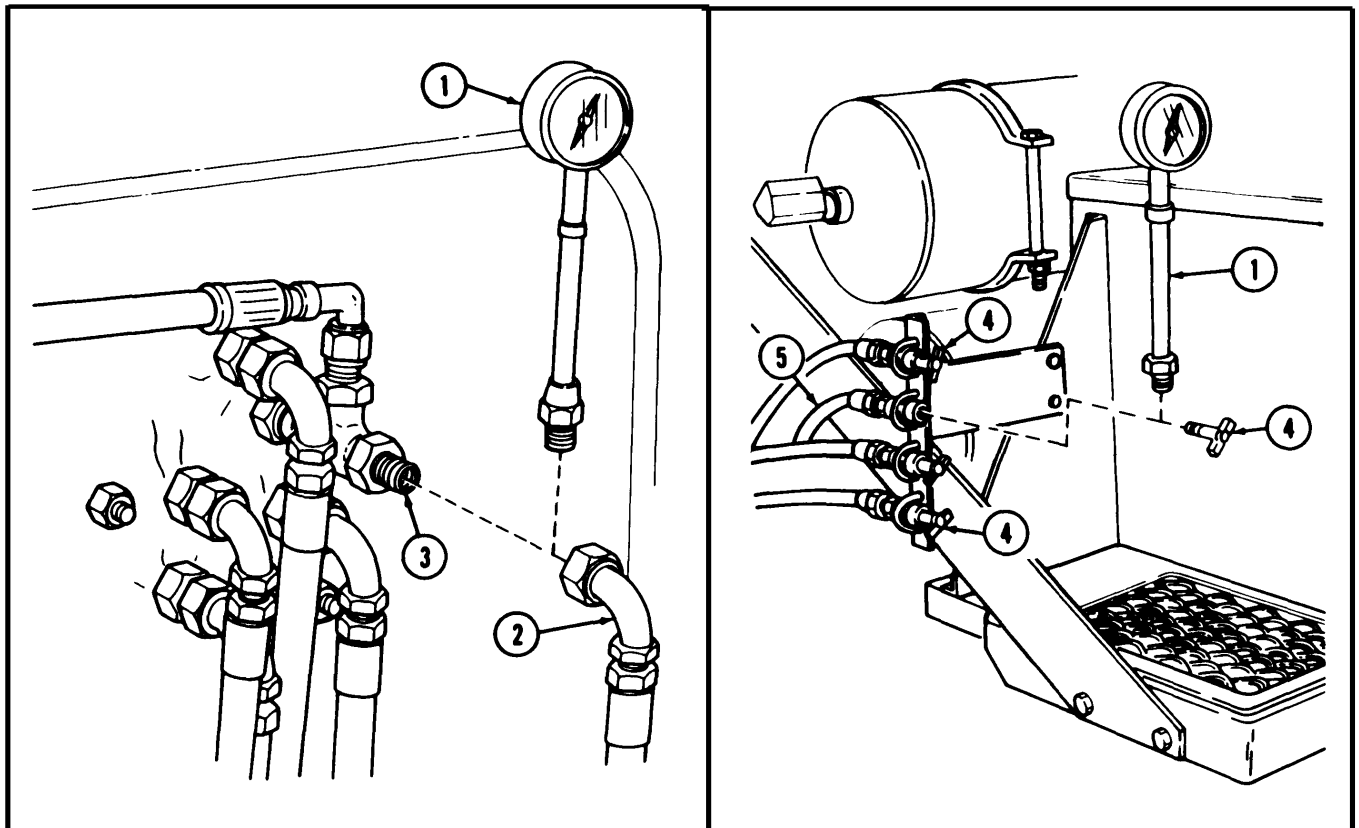


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Test 4. Check secondary reservoir air pressure.		
	Step 1. Stop engine and drain secondary air reservoir at draincock (4).	
	Step 2. Disconnect draincock (4) from drain line (5).	
	Step 3. Connect test gage (1) to secondary drain line (5).	
	Step 4. Start engine and allow air pressure to build.	
	Step 5. Observe reading on test gage (1).	
	a. If test gage (1) reads normal operating pressure, perform test 5.	
	b. If test gage (1) reads no pressure, low pressure, or pressure is building slowly, perform test 6.	
Test 5. Check supply line (2) from secondary air reservoir to brake pedal valve.		
	Step 1. Stop engine and open all draincocks (4) until air system is vented. Close draincocks (4) after venting.	
	Step 2. Disconnect secondary air system supply line (2) to brake pedal valve fitting (3) and connect test gage (1) supply line (2).	
	Step 3. Direct assistant to start engine and build air supply to normal operating pressure.	
	Step 4. Check test gage (1).	
	a. If test gage (1) reads normal pressure, replace defective brake pedal valve (para. 7-31).	
	b. If test gage reads no pressure, low pressure, or pressure is building slowly, repeat steps 1 and 2, reinstall secondary air system supply line (2) and proceed to test 6.	
Test 6. Inspect one-way check valve.		
	Step 1. Stop engine and open all draincocks (4) until brake system is vented.	
	Step 2. Remove one-way check valve (para. 7-18).	
	Step 3. Inspect check valve for clogging and damage.	
	a. If damage is indicated, replace defective check valve (para. 7-18).	
	b. If no damage is present, repair or replace clogged secondary air supply line (2).	

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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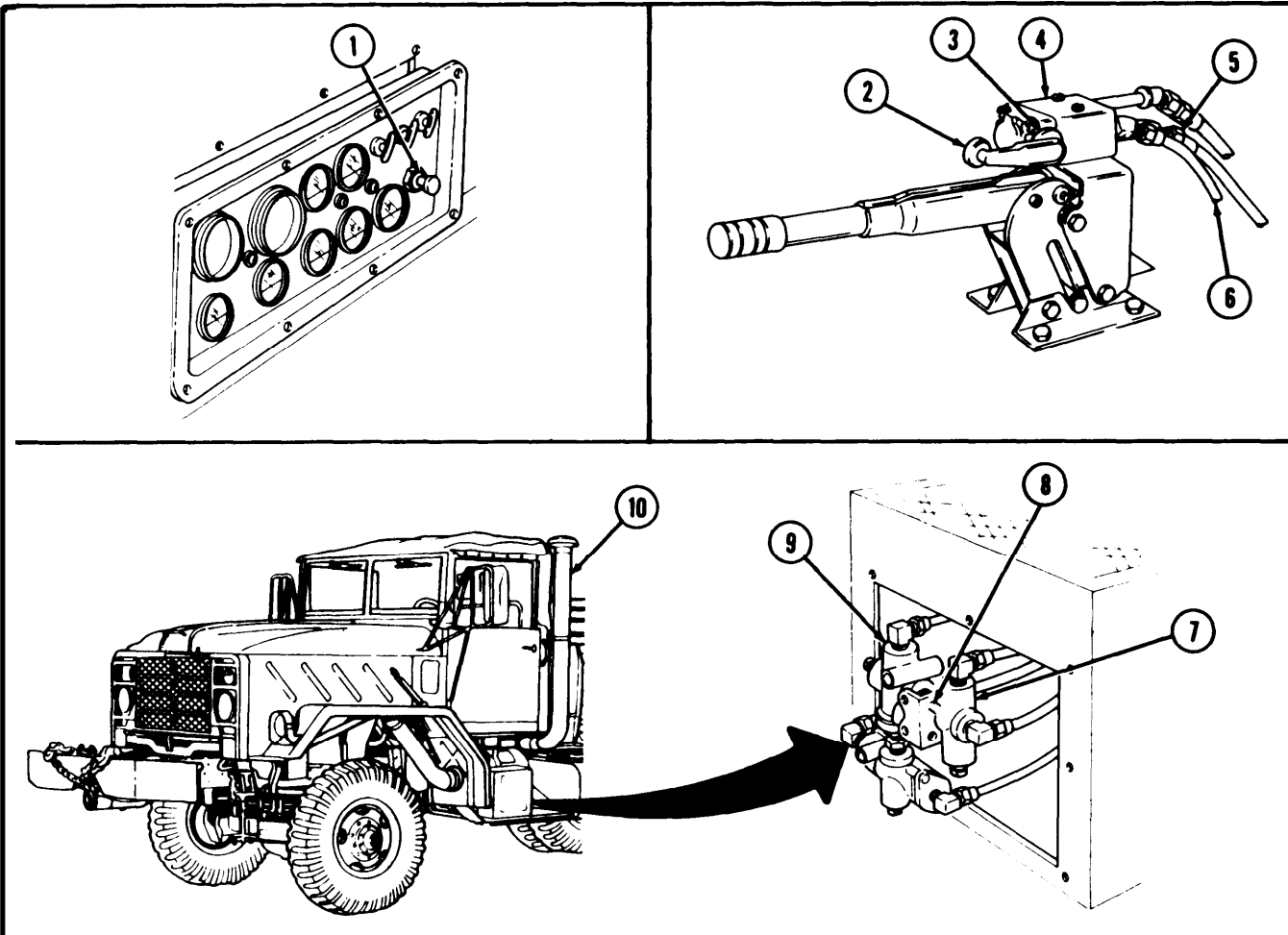


END OF TESTING!

Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
<p>15. PRIMARY AIR SYSTEM FAILS TO HOLD PRESSURE (NO MAJOR LEAKS, AIR CAN BE HEARD ESCAPING INTO AIR INTAKE STACK, PARKING BRAKE APPLIED)</p> <p>Perform malfunction 3, test 2.</p> <p>END OF TESTING!</p>
<p>16. SECONDARY AIR SYSTEM FAILS TO HOLD PRESSURE (NO MAJOR LEAKS, AIR CAN BE HEARD ESCAPING INTO AIR INTAKE STACK, PARKING BRAKE APPLIED)</p> <p>Test 1. Check secondary relay valve. See malfunction 3, tests 14 and 15.</p> <p>Test 2. Check brake pedal valve.</p> <p>See malfunction 14, test 3.</p> <p>END OF TESTING!</p>
<p>17. WARNING BUZZER FAILS TO SOUND OR FAILS TO SHUT OFF ON LOW PRESSURE (BELOW 55-65 PSI), AIR PRESSURE SYSTEM OPERATING NORMALLY</p> <p>See electrical troubleshooting, table 2-3.</p> <p>END OF TESTING!</p>
<p>18. SPRING BRAKES DO NOT RELEASE (VEHICLE BRAKES GRAB OR DRAG)</p> <p>NOTE</p> <p>If only one spring brake chamber fails to release, perform malfunction 5.</p> <p>Test 1. Isolate malfunction.</p> <p>Pull out emergency spring brake release control (1) and move vehicle forward to determine if spring brakes are released.</p> <p>a. If spring brakes release, perform test 2.</p> <p>b. If spring brakes do not release, perform test 3.</p> <p>Test 2. Check parking brake valve (4) supply pressure.</p> <p>Step 1. Inspect valve (4) to determine if mechanical actuator (2) is stuck in engaged position.</p> <p>a. If sticking is present, pull back rubber boot (3) and apply a few drops of light machine oil.</p> <p>b. Proceed to step 2 if malfunction continues.</p>
<p><u>WARNING</u></p> <p>Loosen supply line at valve very slowly. Stop procedure and tighten fitting of supply line the moment air begins to escape. injury to personnel may result if supply line is disconnected from valve.</p> <p>Step 2. With engine still running, slowly loosen supply line (5) to check for pressure.</p> <p>a. If pressure is not present, proceed to test 3.</p> <p>b. If pressure is present, proceed to test 4.</p> <p>Test 3. Check quick-release valve (6).</p> <p>With engine idling and parking brake released, listen for sounds of air escaping through air intake stack (10).</p>

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
		<p>a. If sounds of air are present, replace defective quick-release valve (7) (para 7-49).</p> <p>b. If no sounds are present, inspect line (8) between quick-release valve (7) and double-check valve (9). If clogged, repair or replace line (8). If not clogged, replace doublecheck valve (9) (para. 7-27).</p>
<p style="text-align: center;">WARNING</p> <p>Loosen delivery line at valve very slowly. Stop procedure and tighten fitting of delivery line the moment air begins to escape. Injury to personnel may result if delivery line is disconnected from valve.</p>		
	Test 4. Check parking brake valve (4) delivery pressure (supply pressure confirmed in test 2). With engine running and parking brake released, slowly loosen delivery line (6).	<p>a. If pressure is not present, replace defective parking brake valve (4).</p> <p>b. If pressure is present, notify DS maintenance of defective spring brake diaphragms.</p>
		

END OF TESTING!

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Table 2-12 Compressed air and Brake System LTroubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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19. SPRING BRAKES DO NOT SET (GAGES AT NORMAL OPERATING PRESSURES, AIR EXHAUSTING NOT HEARD WHEN PARKING-BRAKE APPLIED)

Test 1. Make sure spring brake release control (1) is not out.

Test 2. Make sure parking brake is fully applied.

Test 3. Check quick-release valve (2).

Inspect for crimping in air lines (3).

a. If crimping is present, replace lines (3).

b. If no damage to lines (3) is apparent, perform test 4.

WARNING

Do not look into parking brake valve vent port when performing test. Injury to personnel may result.

Test 4. Check parking brake valve (4).

Step 1. Disconnect vent line (6) from parking brake valve vent port (5).

Step 2. With engine running and parking brake released, apply parking brake.

Step 3. Feel for air venting through parking brake valve vent port (5).

a. If air is felt, replace defective parking brake valve (4) (para 7-28).

b. If air is not venting, replace defective quick-release valve (2) (para 7-26).

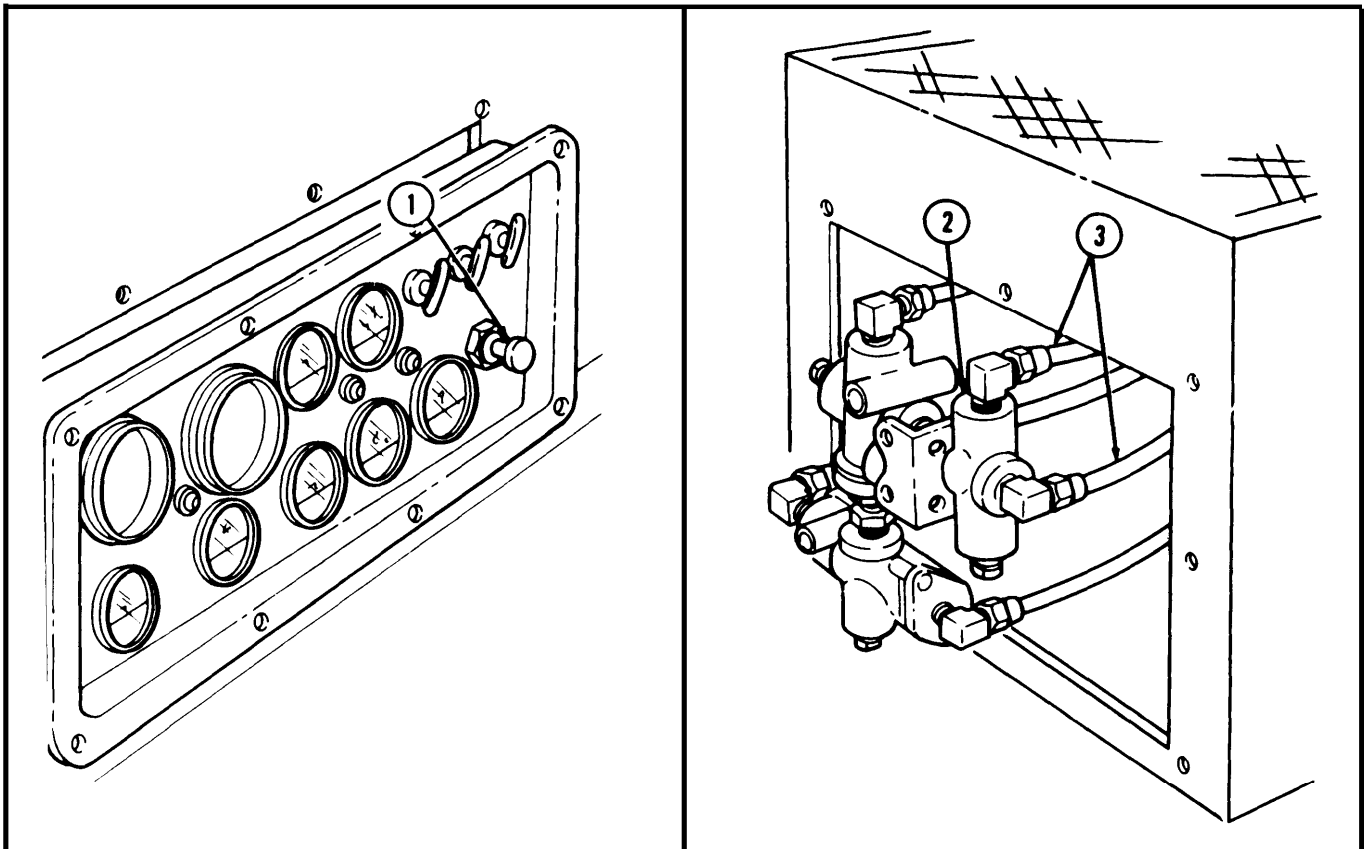
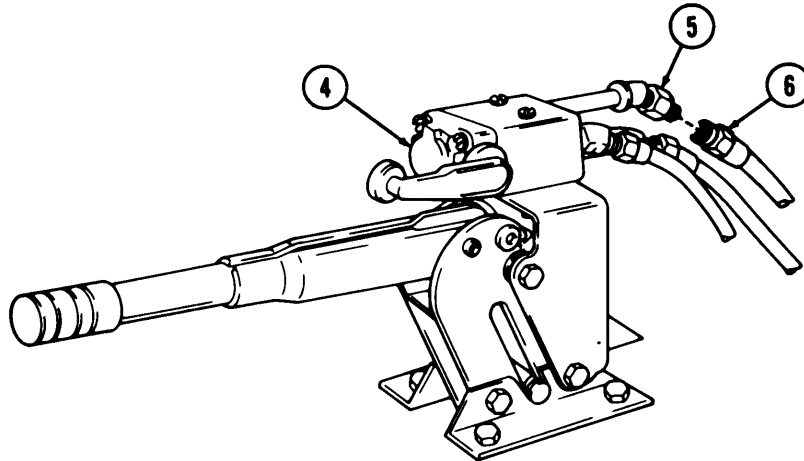


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

AIR-OPERATED ACCESSORIES

20. ALL AIR-OPERATED ACCESSORIES DO NOT WORK (HORN, WINDSHIELD WIPERS, WINDSHIELD WASHERS, AND TRANSFER CASE CONTROLS). GAGES AT NORMAL OPERATING PRESSURE

Check air pressure gages on instrument panel.

a. If gages indicate normal air pressure the defect is in the air lines between the governor and accessories or in the accessories themselves.

b. If gages indicate excessive air pressure replace pressure protection valve (para. 7-17).

END OF TESTING!

21. COOLING FAN DOES NOT OPERATE, ENGINE TEMPERATURE ABOVE 195°F (91°C) AS INDICATED BY TEMPERATURE GAGE

Test 1. Check availability of air as indicated by secondary air system pressure gage. See malfunction 14 if secondary air system pressure is below normal.

Test 2. Check temperature gage. See electrical troubleshooting, table 2-3.

Test 3. Check fan drive clutch actuator. Remove and replace clutch actuator with one known to be operative (para. 3-58), Notify DS maintenance if fan remains inoperative after performing test 3.

END OF TESTING!

22. COOLING FAN DOES NOT STOP RUNNING, ENGINE TEMPERATURE BELOW NORMAL OPERATING RANGE (OVERRIDE BOLT NOT INSTALLED)

Replace fan drive clutch actuator (para. 3-58).

END OF TESTING!

Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
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23. FRONT WHEEL DRIVE DOES NOT ENGAGE (FRONT WHEEL DRIVE LOCK-IN SWITCH ENGAGED AND TRANSFER CASE SHIFT LEVER IN HIGH POSITION)

Test 1. Isolate malfunction.

Shift transfer case shift lever into low position.

- a. If front wheel drive continues to malfunction, perform test 2.
- b. If front wheel drive functions, perform test 5 and 6.

Test 2. Inspect for leakage in air system.

Step 1. Shift transfer case shift lever down into high position and engage front wheel drive lock-in switch.

Step 2. Start engine and allow air pressure to build to normal operating pressure.

Step 3. Stop engine.

Step 4. Observe secondary air pressure gage.

- a. If gage indicates steady loss of air, see malfunction 14.
- b. If gage indicates no loss of air from secondary air system, proceed to step 5.

Step 5. Shift transfer case shift lever into "low" position and observe secondary air pressure gage.

- a. If gage indicates steady loss of air, perform tests 3 and 4.
- b. If gage indicates no loss of air from secondary air system, perform tests 7 and 8.

Test 3. Inspect air line (3) from actuator valve (2) to transfer case (transfer case shift lever in low position, secondary air pressure gage indicates steady loss of air).

- a. If leakage is present, repair or replace air line (3).
- b. If no leakage is present at air line, perform test 4.

Test 4. Inspect supply line (4) for leakage (transfer case shift lever in low position, secondary air pressure gage indicates steady loss of air).

- a. If leakage is present, repair or replace air line (4).
- b. If no leakage is present, notify DS maintenance of defective actuator valve (2).

Test 5. Check air line (5) from actuator valve (2) to front wheel drive lock-in switch (front wheel drive functions with transfer case shift lever in low position, but does not function with transfer case shift lever in high position and front wheel drive lock-in switch engaged).

Step 1. Connect test gage (1) to air line (5).

Step 2. With engine at idle and transfer case shift lever in high position, engage front wheel drive lock-in switch.

Step 3. Observe test gage (1).

- a. If air pressure is not indicated, perform test 6.
- b. If air pressure is indicated, notify DS maintenance of defective actuator valve (2).

Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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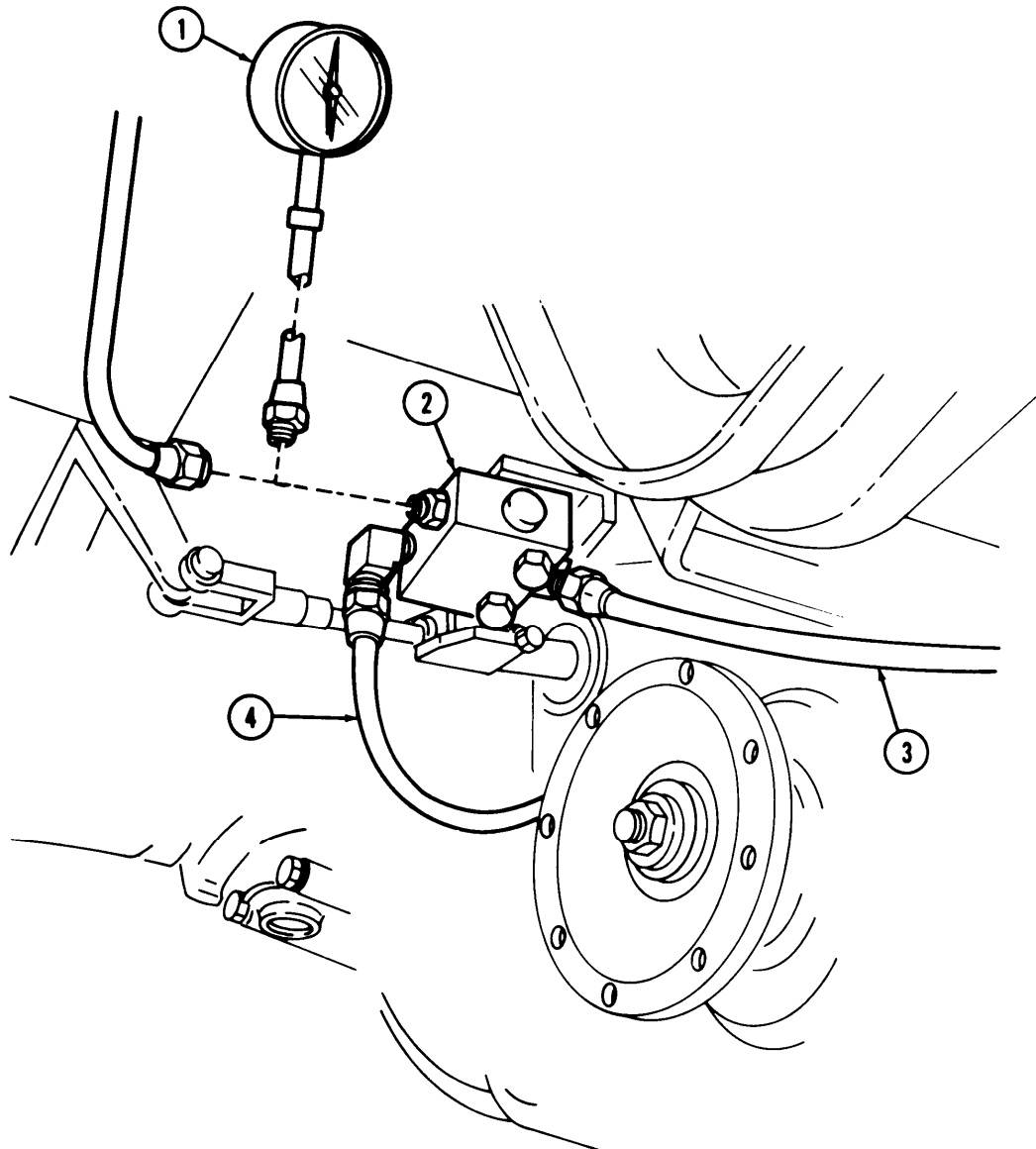


Table 2-12. Compressed Air and Brake System Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 6. Check front wheel drive lock-in switch (2).

Step 1. Connect test gage (3) to front wheel drive lock-in switch (2).

Step 2. With engine at idle and transfer case shift lever in high position, engage front wheel drive lock-in switch (2).

Step 3. Observe test gage (3).

a. If air pressure is not indicated, replace defective switch (2) (para. 7-23).

b. If air pressure is indicated, repair or replace defective air line (1).

Test 7. Check actuator valve air delivery line (5) at transfer case for blockage (supply pressure normal).

Step 1. Install test gage (3) to delivery line (5).

Step 2. With engine at idle, shift transfer case shift lever into "low" position.

Step 3. Observe test gage.

a. If air delivery pressure is normal, notify DS maintenance that transfer case does not engage front wheel drive.

b. If air delivery pressure is below normal, perform test 8.

Test 8. Check actuator valve air delivery at actuator valve (4) (supply pressure normal). Install test gage (3) to actuator valve air delivery port (6) and test as in test 7, steps 2 and 3.

a. If air delivery is normal, repair or replace blocked delivery line (5).

b. If air delivery is below normal. notify DS maintenance of defective actuator valve (4).

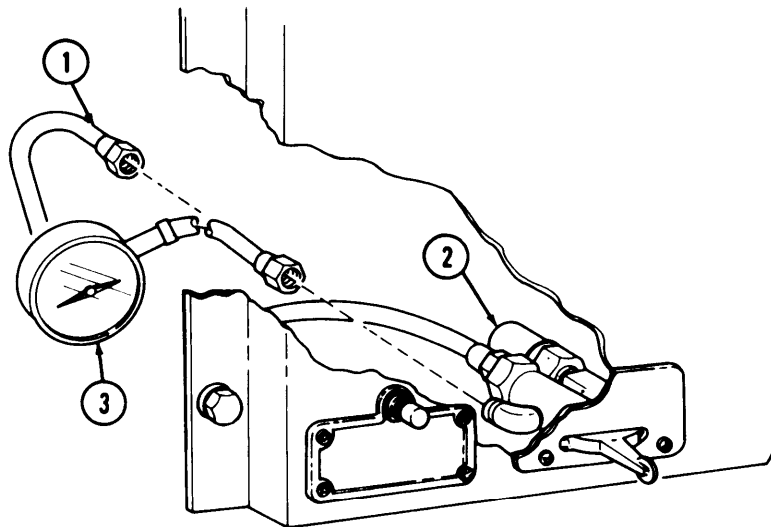
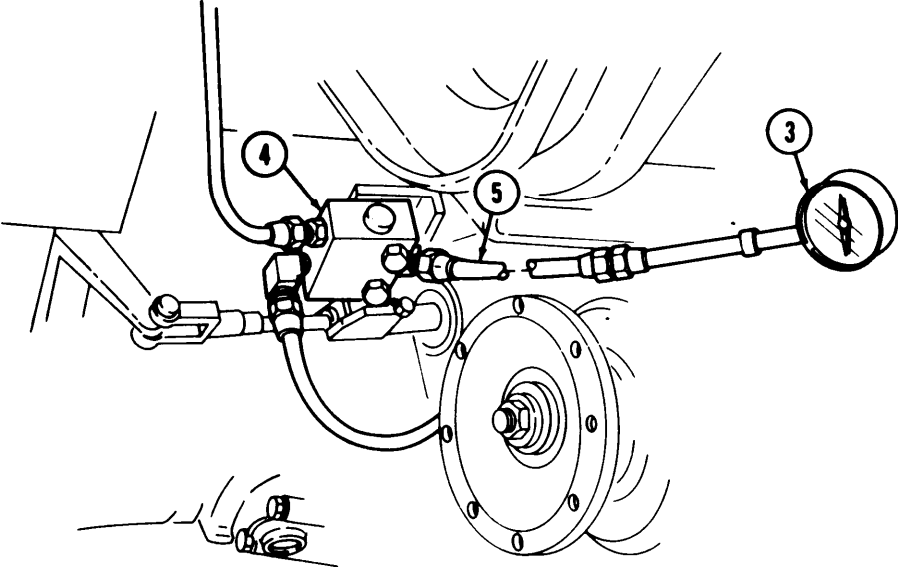
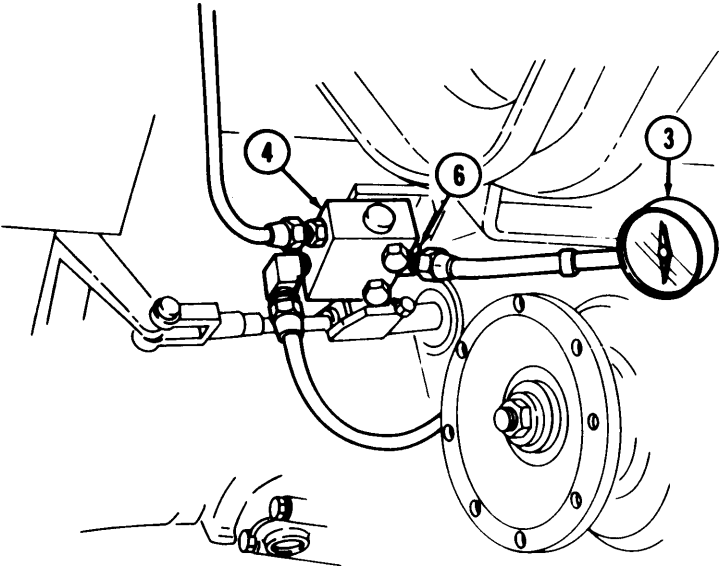


Table 2-12. Compressed Air and Brake System Troubleshooting (Con'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
		
		

END OF TESTING!

Table 2-12 Compressed Air and Brake System Troubleshooting (Cont'd)

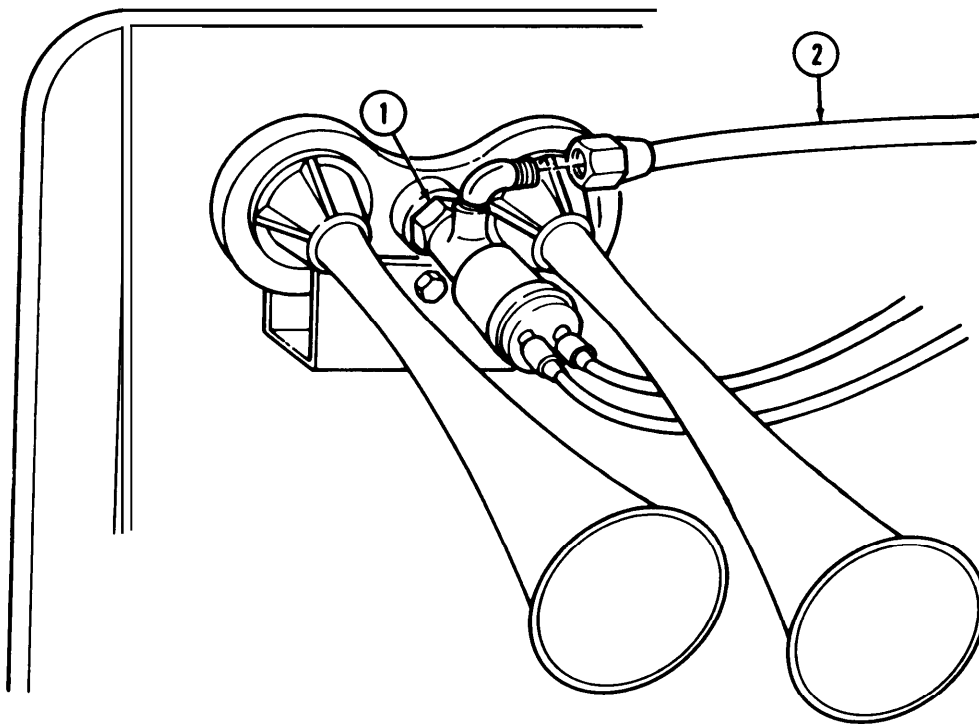
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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24. HORN DOES NOT WORK (GAGES AT NORMAL OPERATING PRESSURE, WARNING BUZZER NOT SOUNDING)

Test 1. Check air supply at air electric valve (1).

Loosen supply line (2) very slowly,

- a. If air is not heard escaping, repair or replace defective supply line (2).
- b. If air supply is present, go to electrical troubleshooting, table 2-3.



END OF TESTING!

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CHAPTER 3

ENGINE SYSTEMS MAINTENANCE

Refer to TM 9-2320-358-24&P for unique M939A2 maintenance procedures

Section 1. OIL SYSTEM

3-1. GENERAL

This chapter provides maintenance procedures for both early, before model number 1124663, and late model engines. The differences between the early and late models are changes to make the clean air configuration, which provides for controlled engine exhaust gas recirculation back to the air intake manifold, and the use of top-stop fuel injectors.

This section provides procedures assigned to the organizational level for the engine lubricating system. To find a specific maintenance procedure, see the maintenance task summary below:

3-3. ENGINE LUBRICATING SYSTEM MAINTENANCE TASK SUMMARY

PARA. NO.	PROCEDURES	PAGE NO.
3-3.	Engine Oil Filter and Shell Maintenance	3-2
3-4.	Oil Pump Pickup Hose Maintenance	3-6
3-5.	Oil Pump Return Hose Maintenance	3-8
3-6.	Crankcase Breather Tube and Mounting Bracket Maintenance	3-10
3-7.	Crankcase Breather Replacement	3-12
3-8.	Oil Dipstick Tube Maintenance	3-14
3-9.	Front Sump Tube Maintenance	3-16

3-3. ENGINE OIL FILTER AND SHELL MAINTENANCE

This task covers

- | | |
|--------------------------------------|-----------------------------------|
| a. Draining Oil | e. Inspection |
| b. Removing Filter | f. Filter Shell and Bolt Assembly |
| c. Filter Shell and Bolt Disassembly | g. Installing Filter |
| d. Cleaning | |

INITIAL SETUP:

<u>Applicable Models</u>	Equipment Condition Reference	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
Test Equipment		
None		
Special Tools		
None		
Special Environmental Conditions		
None		

Materials/Parts

Two gaskets
Seal and element kit
Lubricating oil OE/HDO 30
(Appendix D, Item 17)
DryCleaning solvent (Appendix D, Item 25)

Personnel Required

Light-wheeled vehicle mechanic MOS 63B

General Safety Instructions

- Do not drain oil when engine is hot.
- Keep fire extinguisher nearby when using drycleaning solvent.
- Compressed air source will not exceed 30 psi (207 kpa).
- Eyeshields must be worn when cleaning with compressed air.

Manual References

TM 9-2320-272-10
TM 9-2320-272-20P
LO 9-2320-272-12

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a.	Draining Oil			

WARNING

Do not drain oil when engine is hot. Hot oil may cause injury to personnel.

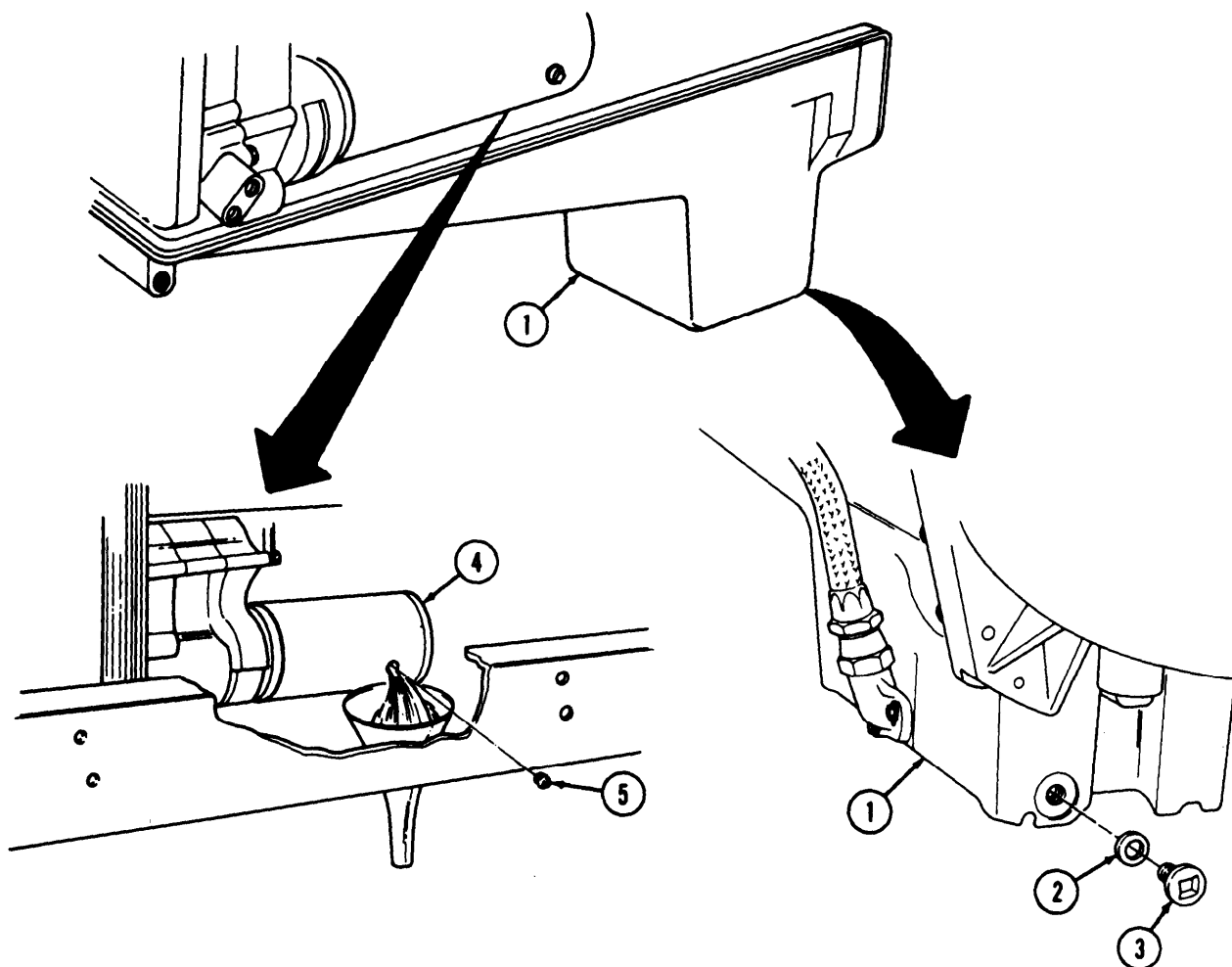
NOTE

Have drainage container ready to catch oil.

- | | | | | |
|----|---------------------|------------------------------|---|---------------------|
| 1. | Rear of oil pan (1) | Drainplug (3) and gasket (2) | Remove and allow oil to completely drain. | Discard gasket (2). |
|----|---------------------|------------------------------|---|---------------------|

3-3. ENGINE OIL FILTER AND SHELL MAINTENANCE (Cont'd)

STEP N O	LOCATION	ITEM	ACTION	REMARKS
2.		New gasket (2) and drainplug (3)	Install,	Tighten 100 ft-lb (136 N•m).
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Avoid spilling oil by placing funnel beneath oil filter when draining.</p>				
3.	Oil filter shell (4)	Drainplug (6)	a Remove and allow oil to completely drain. b. Install.	Tighten 25-35 lb-ft (34-47 N•m).



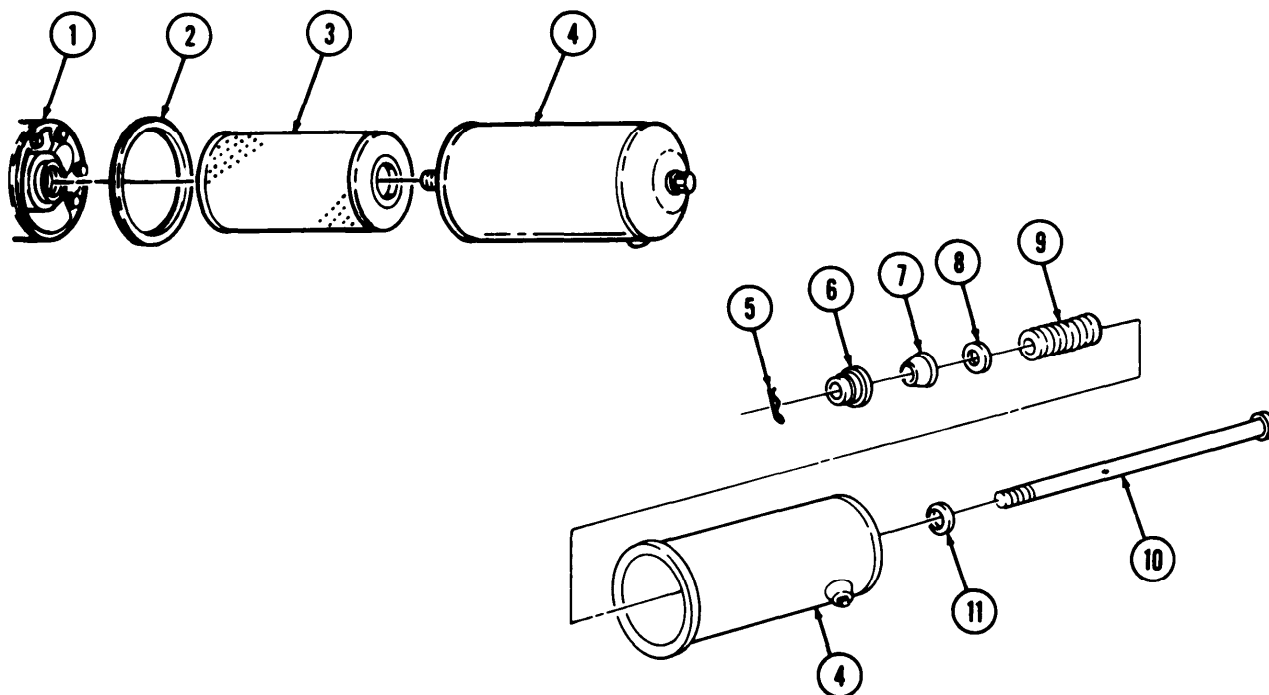
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3-3. ENGINE OIL FILTER AND SHELL MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Removing Filter				
4.	Oil filter shell (4)	Center bolt (10)	Remove.	Frees oil filter shell (4) from filter base (1).
5.		Filter element (3) and seal (2)	Remove.	Discard element (3) and seal (2).
c. Filter Shell and Bolt Disassembly				
6.	Center bolt (10)	Clip pin (5), filter element support (6), seal (7), washer (8), and spring (9)	Remove.	
7.	Filter shell (4)	Copper gasket (11) and center bolt (10)	Remove.	Discard copper gasket (11).
d. CLEANING				
<p style="text-align: center;"><u>WARNING</u></p> <ul style="list-style-type: none"> • Drycleaning solvent is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel. • Compressed air source will not exceed 30 psi (207 kPa). When cleaning with compressed air, eyeshields must be worn. Failure to wear eyeshields may result in injury to personnel. 				
8.		Center bolt (10) and filter shell (4)	Clean with drycleaning solvent and dry with compressed air.	
e. Inspection				
9.		Filter base (1)	Inspect for cracks, nicks, and stripped threads.	If cracked, nicked, or threads are stripped, notify DS maintenance.
10.		Filter element support (6) and seal (7)	Inspect for cracks and grooves.	Replace if cracked or grooved.
11.		Spring (9)	Inspect for cracks and breaks.	Replace if cracked or broken.
12.		Center bolt (10)	Inspect for stripped threads.	Replace if threads are stripped.

3-3. ENGINE OIL FILTER AND SHELL MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
f. Filter Shell and Bolt Assembly				
13.		New copper gasket (11)	Install.	
14.		Center bolt (10)	Install.	
15.		Spring (9), washer (8), seal (7), and filter element support (6)	Slide over center bolt (10).	
16.		Clip pin (5)	Install.	
g. Installing Filter				
17.		New falter element (3)	Place in filter shell (4).	
18.		New seal (2)	a. Coat with light film of engine oil. b. Install on falter head (1).	
19.		Filter shell (4)	Install with center bolt (10).	Tighten 25-35 lb-ft (34-47 N•m).



END OF TASK!

FOLLOW-ON TASKS

- Fill to proper oil level (LO 9-2320-272-12).
- Install left splash shield (TM 9-2320-272-10).
- Start engine (TM 9-2320-272-10) and check for oil leaks.

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3-4. OIL PUMP PICKUP HOSE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

	Equipment Condition Reference	
<u>Applicable Models</u>		<u>Condition Description</u>
All	TM 0-2320-272-10 TM 9-2320-272-10 Para 3-3	Parking brake set. Left splash shield removed. Oil drained.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Engine oil pan is mounted with screw-assembled washers on late model engine.

a. Removal

1. Oil pan (2) and oil pump hoses (1) and (7)
- Two screws (5), washers (6), and clamps (4)
- Remove.

NOTE

Have drainage container ready to catch oil.

2. Adapter flange (3) and oil pump (8)
- Oil pump pickup hose (1)
- Disconnect.

b. Inspection

3.
- Oil pump pickup hose (1)
- Inspect for cracks, frays, and stripped threads.
- Replace if cracked, frayed, or threads are stripped.

3-4. OIL PUMP PICKUP HOSE MAINTENANCE (Cont'd)

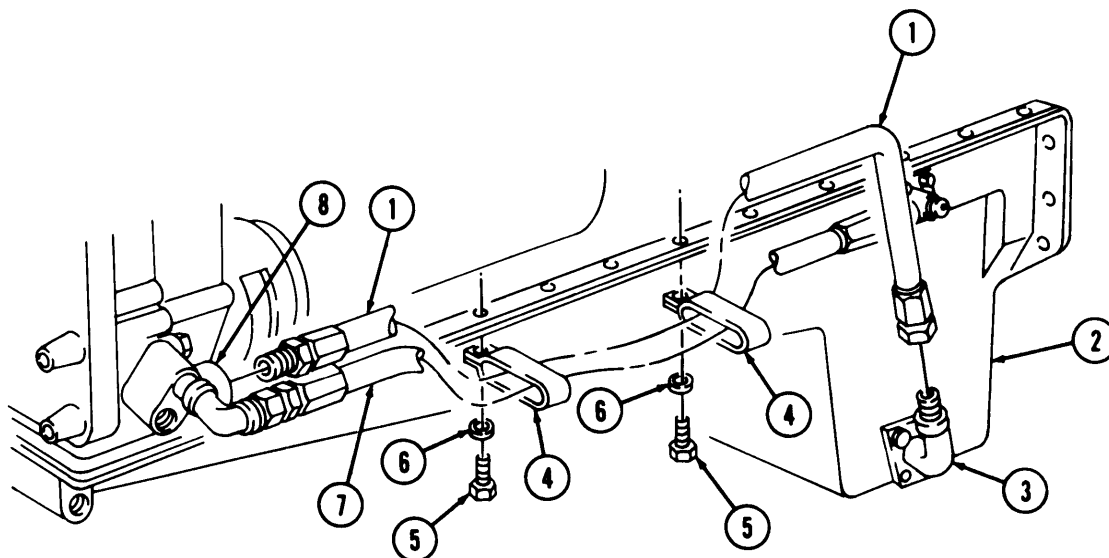
STEP NO	LOCATION	ITEM	ACTION	REMARKS
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c. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

- | | | | |
|----|--------------------------|--|---|
| 4. | Oil pump pickup hose (1) | a. Connect to oil pump (8).
b. Connect to oil pan adapter flange (3). | |
| 5. | TWO hose clamps (4) | a. Position over oil pump pickup hose (1) and return hose (7).
b. Align to holes in oil pan (2).
c. Install with two washers (6) and screws (5). | Tighten screws (5) 35-40 lb-ft (47-54 N•m). |



END OF TASK!

- FOLLOW-ON TASKS:
- Fill to proper oil level (LO 9-2320-272-12).
 - Install left splash shield (TM 9-2320-272-10).
 - Start engine (TM 9-2320-272-10) and check for oil leaks.

TA 349572

3-5. OIL PUMP RETURN HOSE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

NOTE

Engine oil pan is mounted with screw-assembled washers on late model engine.

a. Removal

- | | | |
|---|---|---------|
| 1. Oil pan (3) and oil pump hoses (1) and (4) | Two screws (6), washers (7), and clamps (5) | Remove. |
|---|---|---------|

NOTE

Have drainage container ready to catch oil.

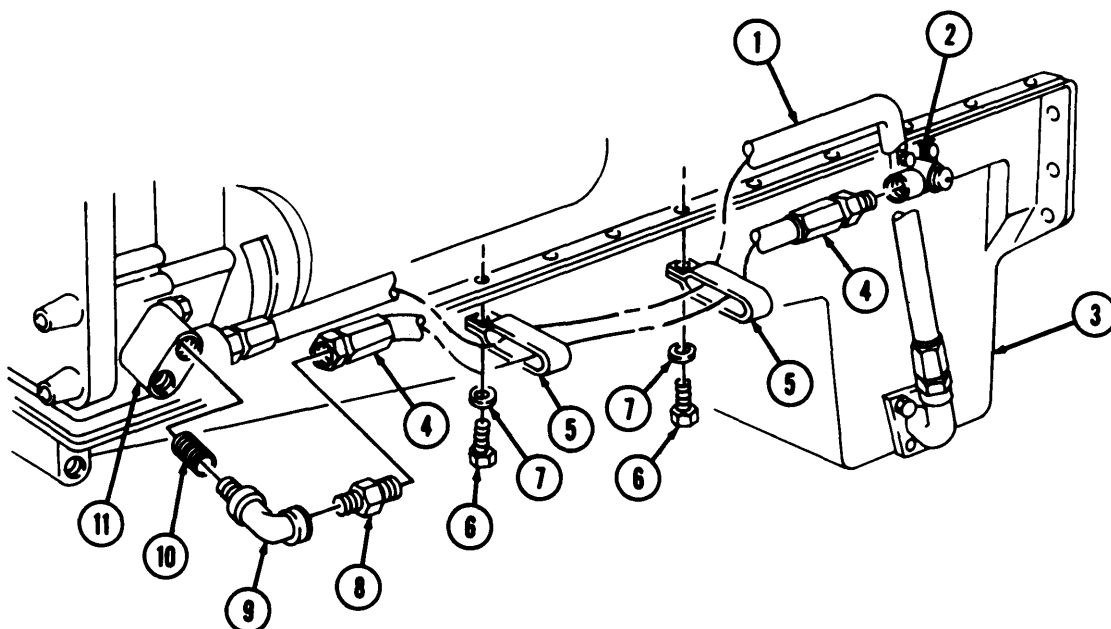
- | | | |
|--|---|-------------|
| 2. Adapter (8) and oil pan aerator (2) | Oil return hose (4) | Disconnect. |
| 3. Oil pump (11) | Adapter (8), elbow (9), and nipple (10) | Remove. |

b. Inspection

- | | | | |
|----|---|---|--|
| 4. | Oil return hose (4) | Inspect for cracks, frays, and splits. | Replace if cracked, frayed, or split. |
| 5. | Elbow (9), adapter (8), and nipple (10) | Inspect for cracks and stripped or crossed threads. | Replace if cracked or threads stripped or crossed. |

3-5. OIL PUMP RETURN HOSE MAINTENANCE (Cont'd)

STEP NO	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
<p style="text-align: center;">NOTE</p> <p>Male pipe threads must be wrapped with sealing tape before installation.</p>				
6.		Nipple (10), elbow (9), and adapter (8)	Install on oil pump (11).	
7.		Oil return hose (4)	a. Connect to oil pan aerator (2). b. Connect to adapter (8).	
8.		Two hose clamps (5)	a. Position over oil pump return hose (4) and pickup hose (1). b. Aline with holes in oil pan (3). c. Install with two washers (7) and screws (6).	Tighten screws (6) 35-40 lb-ft (47-54 N•m).



END OF TASK!

- FOLLOW-ON TASKS**
- Fill to proper oil level (LO 9-2320-272-12).
 - Install left splash shield (TM 9-2320-272-10).
 - Start engine (TM 9-2320-272-10) and check for leaks.

TA 349573

3-6. CRANKCASE BREATHER TUBE AND MOUNTING BRACKET MAINTENANCE

This task covers:

- a. Removal
- b. Cleaning and Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Locknut Lockwasher		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.

Mounting bracket (6)

Screw (7), locknut (11), and retaining clamp (10)

Remove.

Discard locknut (11).
2.

Engine block (5)

Screw (8), lockwasher (9), and mounting bracket (6)

Remove.

Discard lockwasher (9).
3.

Crankcase breather connector (4)

Two hose clamps (2), breather hose (3), and breather tube (1)

Remove.

NOTE

Perform step 3.1 for late model engine.

- 3.1.

Crankcase breather connector (4) and elbow (15)

Four hose clamps (12), two breather hoses (13), and breather tube (14)

Remove.

b. Cleaning and Inspection

4.

Breather tube (1) and (14)

Inspect for obstruction and bends that could cause restrictions.

Remove obstruction, replace if bent.

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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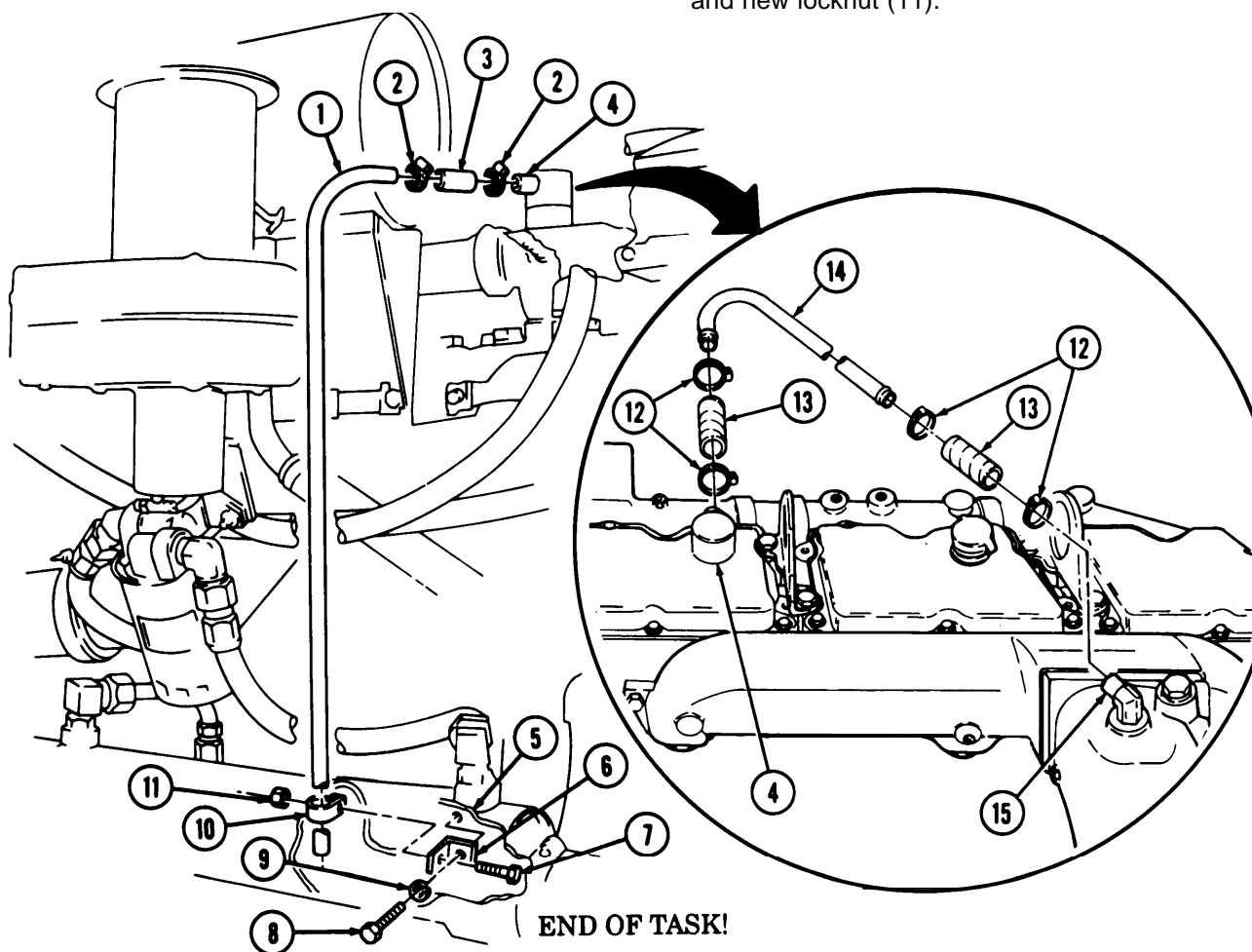
NOTE

Perform step 4.1 for late model engine.

- 4.1. Two breather hoses (13), Connect with four hose breather tube (14), crank- clamps (12). case breather connector (4), and elbow (15)

c. Installation

5. Breather hose (3),
breather tube (1), and
crankcase breather
connector (4) Connect with two hose
clamps (2).
6. Mounting bracket (6) Install with new
lockwasher (9) and
screw (8).
7. Retaining clamp (10) Install with screw (7)
and new locknut (11).



FOLLOW-ON TASK. Install right splash shield (TM 9-2320-272-10).

3-7. CRANKCASE BREATHER REPLACEMENT

This task covers:
a. Removal
b. Installation

INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Crankcase breather Sealant (Appendix D, Item 2)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

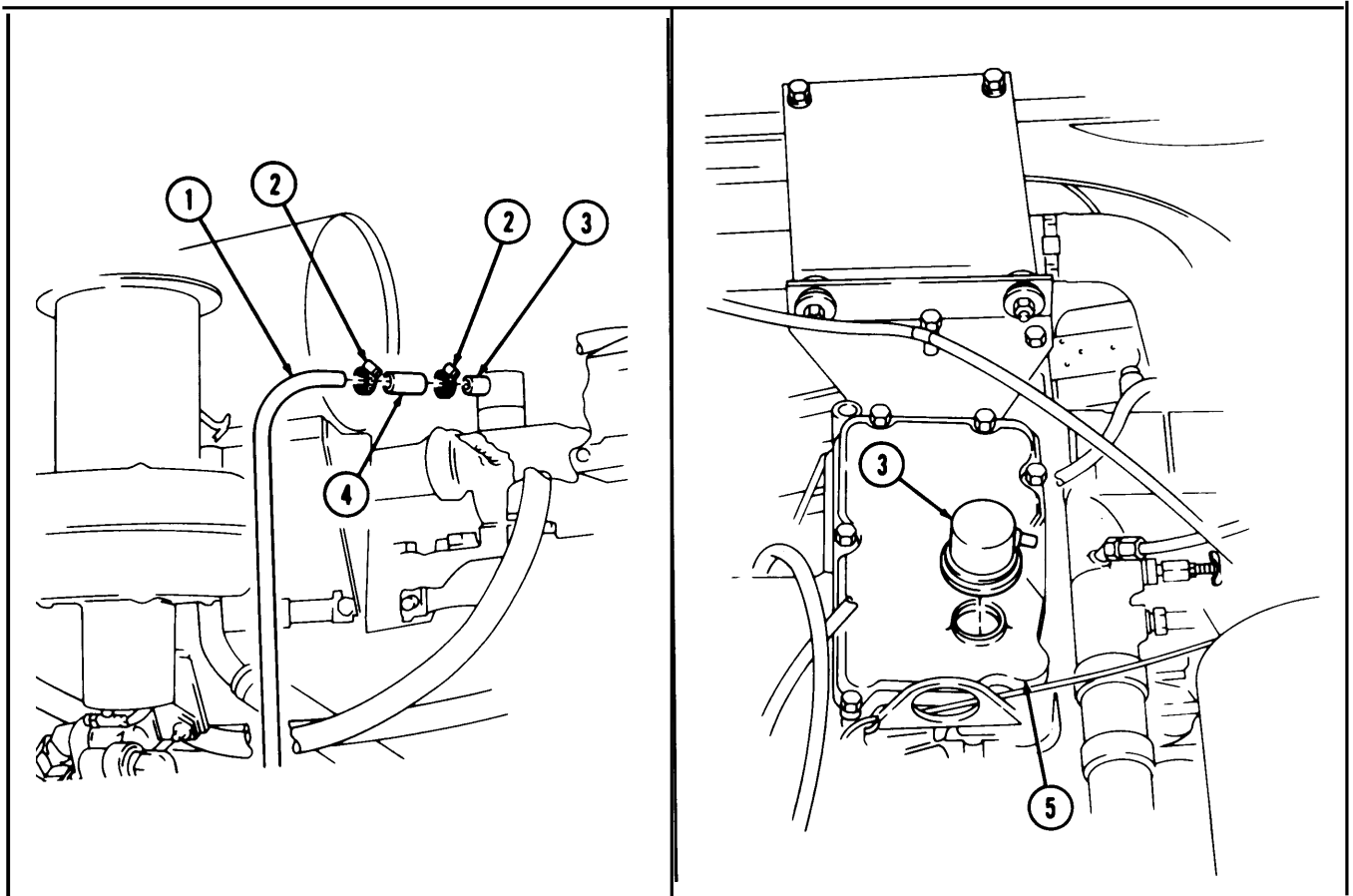
1.	Crankcase breather tube (1)	Two hose clamps (2)	Loosen.	
2.		Crankcase breather hose (4)	Remove.	
3.	Front rocker lever housing cover (5)	Crankcase breather (3)	Remove.	Crankcase breather (3) is permanently damaged when removed. Discard crankcase breather (3).

b. Installation

4.	New crankcase breather (3)	a Apply sealant to mating surface. b. Install		
----	----------------------------	--	--	--

3-7. CRANKCASE BREATHER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Crankcase breather hose (4) and breather tube (1)	Install.	
6.		Two hose clamps (2)	Tighten.	



END OF TASK!

FOLLOW-ON TASKS: • Install right splash shield (TM 9-2320-272-10).
 • Start engine (TM 9-2320-272-10) and check for air leaks.

TA 349575

3-8. OIL DIPSTICK TUBE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers "O" ring		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

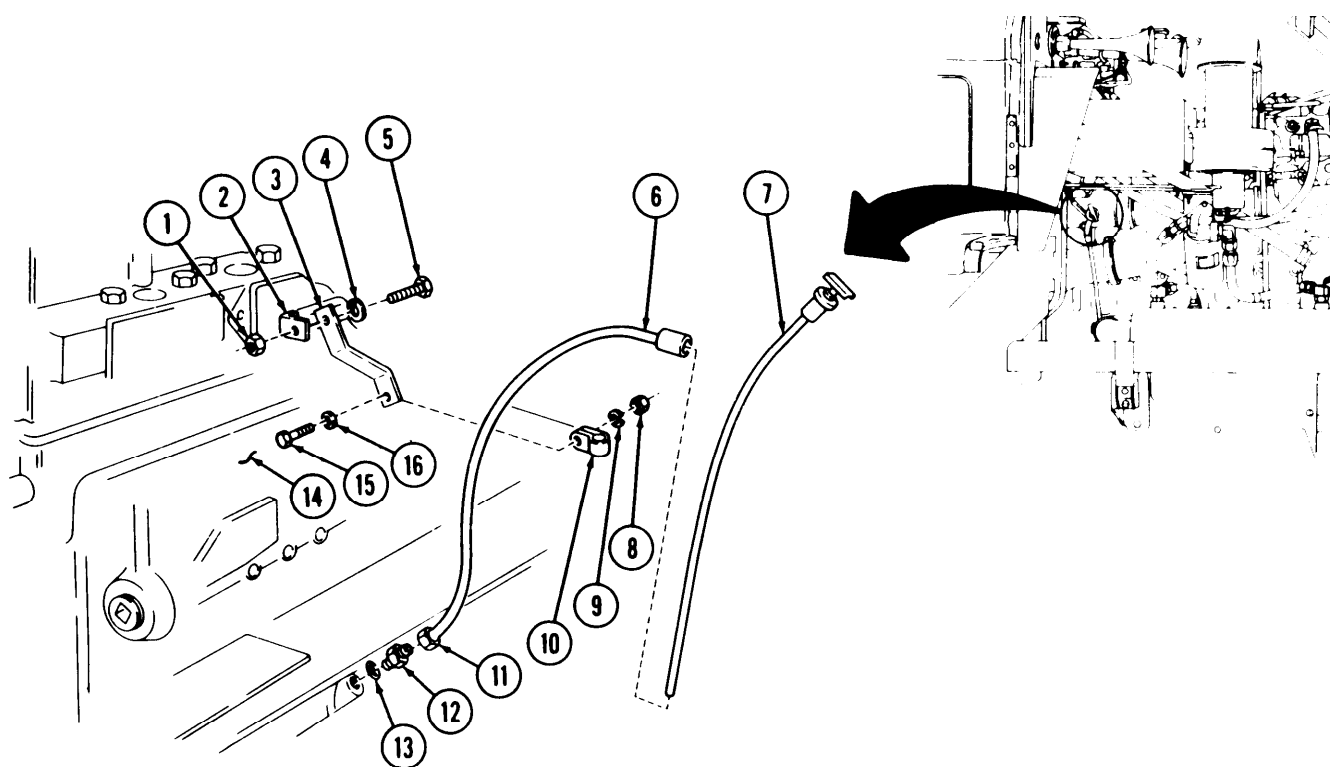
- | | | | | |
|----|------------------------------|---|---------|-------------------------|
| 1. | Right side engine (14) | Dipstick (7) | Remove. | |
| 2. | Oil dipstick bracket (3) | Nut (8), lockwasher (9), washer (16), screw (15), and tube clamp (10) | Remove. | Discard lockwasher (9). |
| 3. | Exhaust manifold bracket (2) | Nut (1), lockwasher (4), screw (5), and oil dipstick bracket (3) | Remove. | Discard lockwasher (4). |
| 4. | Engine (14) | Tube ferrule nut (11), dipstick tube (6), adapter (12), and "O" ring (13) | Remove. | Discard "O" ring (13), |

b. Inspection

- | | | | | |
|----|--|-------------------|--------------------------------|-------------------------------|
| 5. | | Dipstick tube (6) | Inspect for cracks and breaks. | Replace if cracked or broken, |
|----|--|-------------------|--------------------------------|-------------------------------|

3-8. OIL DIPSTICK TUBE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
6.		Dipstick tube (6)	Install with new "O" ring (13), adapter (12), and tube ferrule nut (11).	
7.		Oil dipstick bracket (3)	Install on exhaust manifold bracket (2) with nut (1), new lockwasher (4), and screw (5).	
8.		Dipstick tube (6)	Install on oil dipstick bracket (3) with tube clamp (10), screw (15), washer (16), new lockwasher (9), and nut (8).	
9.		Dipstick (7)	Install in dipstick tube (6) and tighten.	



END OF TASK!

FOLLOW-ON TASK: Install right splash shield (TM 9-2320-272-10).

TA 349576

3-9. FRONT SUMP TUBE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two packing sleeves Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

Have drainage container ready to catch oil.

- | | | | | |
|----|---------------------------|-------------------------|---|---------------------------------|
| 1. | Adapter (4) and elbow (1) | Front sump tube (3) | Loosen nuts (2) and slide toward center of front sump tube (3). | |
| 2. | | Elbow (1) | Turn to tighten 1/4 turn. | |
| 3. | | Front sump tube (3) | Remove. | |
| 4. | | Two packing sleeves (5) | Remove from front sump tube (3) and two nuts (2). | Discard packing sleeves (5) |
| 5. | | Adapter (4) | Remove. | |
| 6. | | Elbow (1) | Remove. | Mark position for installation. |

3-9. FRONT SUMP TUBE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				

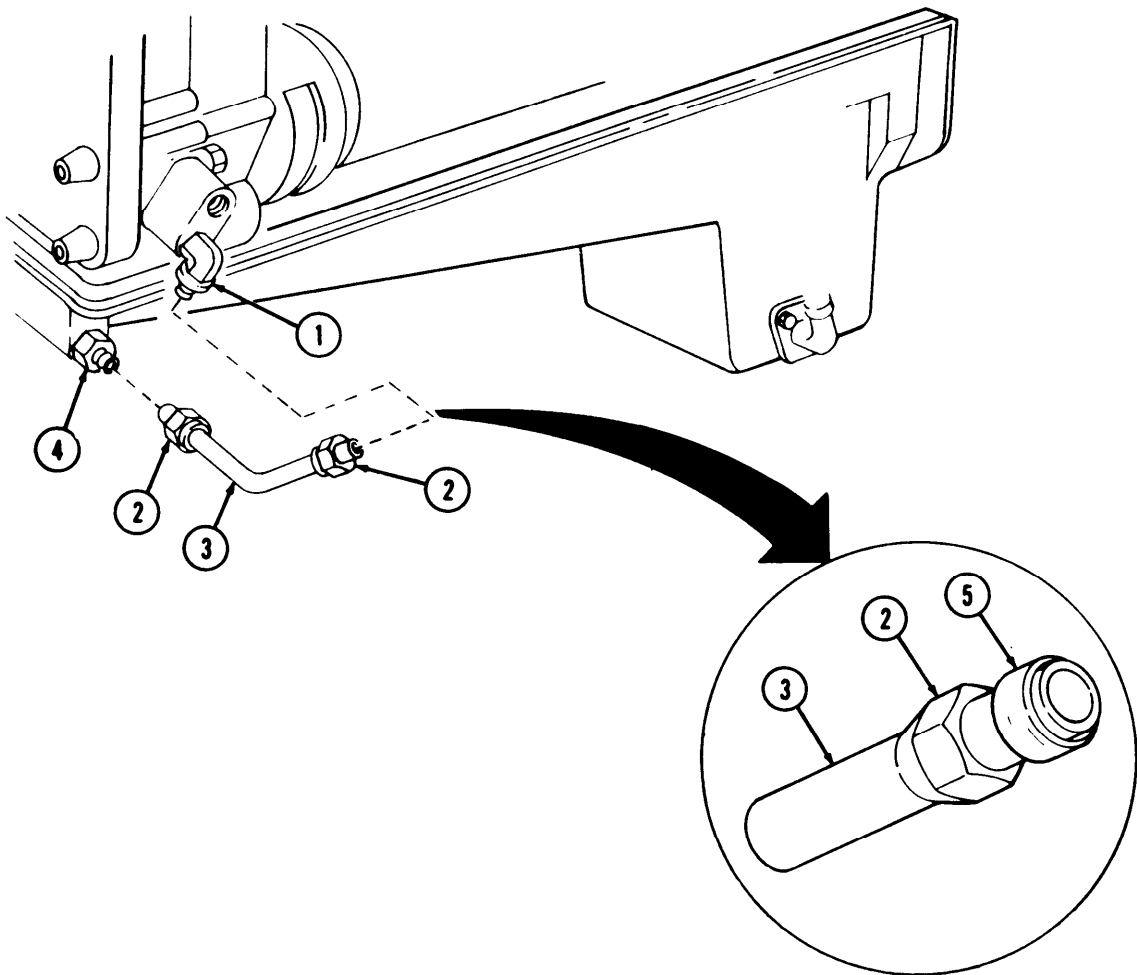
Front sump tube (3)

a. Inspect nuts (2) for stripped threads.

Replace if threads stripped.

b. Inspect front sump tube (3) for cracks.

Replace if cracked.



3-9. FRONT SUMP TUBE MAINTENANCE (Cont'd)

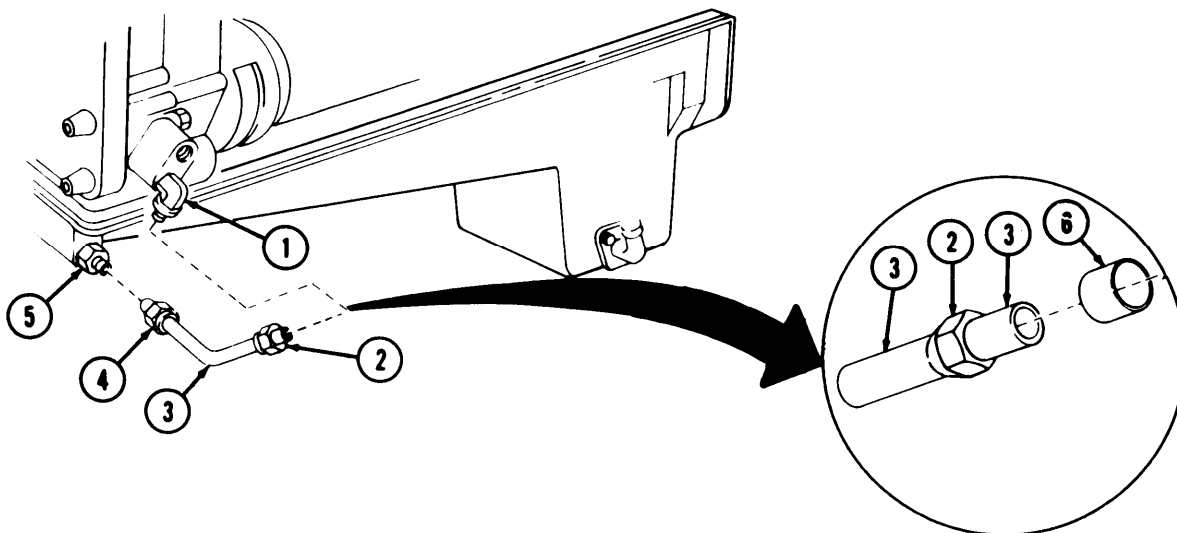
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

8.		Adapter (5)	Install.	
9.		Elbow (1)	Install.	Make sure elbow (1) is 1/8 turn less than final position.
10.		Two nuts (2) and (4)	Slide toward center of tube (4).	Expose ends of tube (3)
11.		Two new packing sleeves (6)	Install on two ends of tube (3).	
12.		Tube (3) and nut (4)	Position tube (3) end in adapter (5) and start nut (4) on adapter (5).	Do not tighten nut (4).
13.		Tube (3) and nut (2)	Position tube (3) end in elbow (1), turn elbow (1) to tighten in final position, and start nut (2) on elbow (1).	Make sure tube (3) end aligns in elbow (1).
14.		Two nuts (2) and (4)	Tighten	



END OF TASK!

FOLLOW-ON TASKS:

- Fill to proper oil level (LO 9-2320-272-12),
- Start engine (TM 9-2320-272-10) and check for oil leaks.
- Install left splash shield (TM 9-2320-272-10).

TA 349578

Section II. AIR INTAKE SYSTEM

3-10. GENERAL

This section provides maintenance procedures assigned to the organizational level for the air intake system. To find a specific maintenance procedure, see the maintenance task summary below:

3-11. AIR INTAKE SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-12,	Air Intake Tubes, Cap, Clamps, and Hose Replacement	3-20
3-13.	Air Cleaner Element Servicing	3-24
3-14.	Air Cleaner Assembly Maintenance	3-28
3-15,	Air Cleaner Mounting Bracket Replacement	3-32
3-16.	Air Intake Pipe and Hump Hose Maintenance	3-34
3-17.	Air Cleaner Indicator, Tube, and Filter Maintenance	3-38

3-12. AIR INTAKE TUBES, CAP, CLAMPS, AND HOSE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

APPLICABLE EQUIPMENT		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Six locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

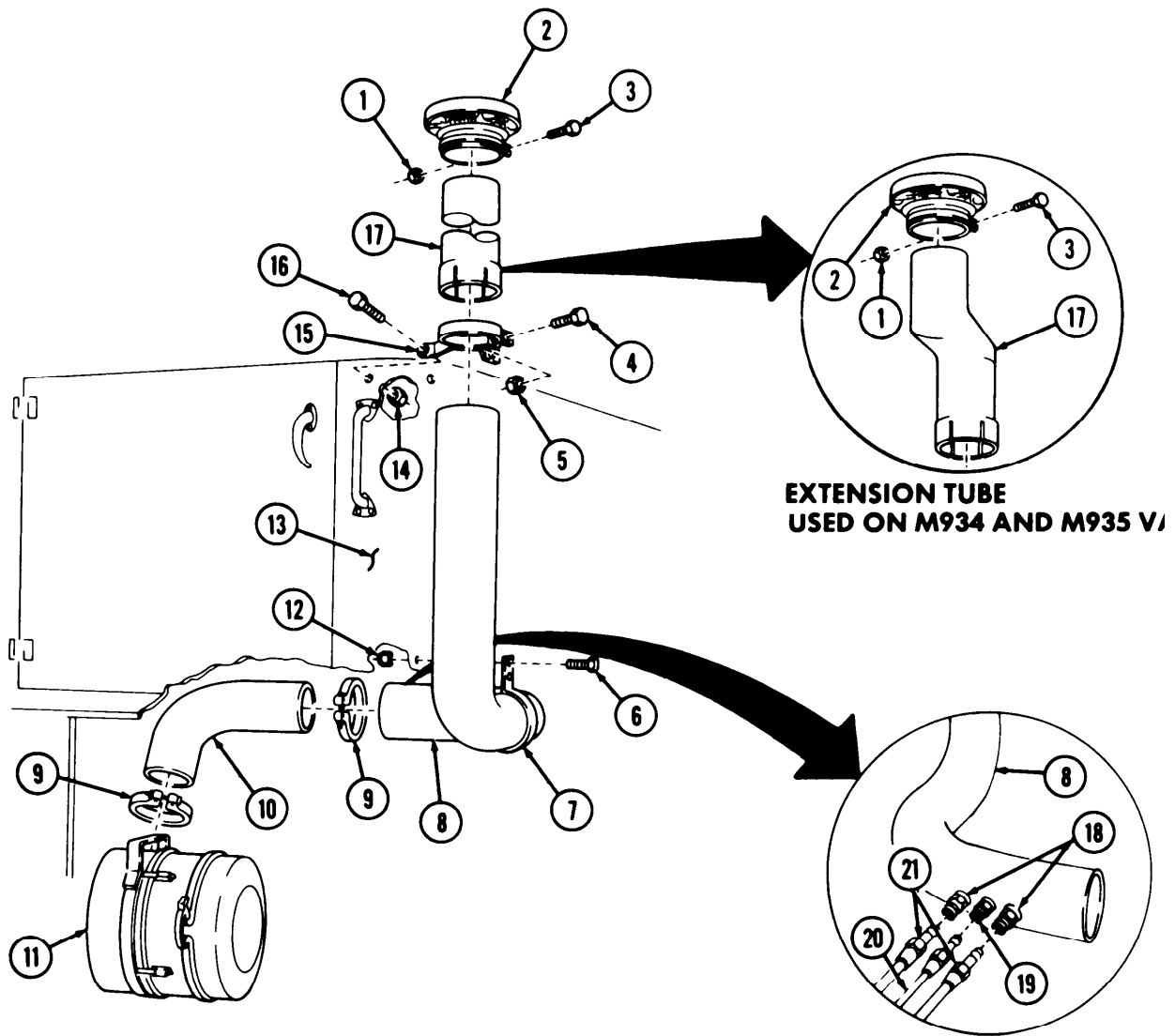
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Extension tube (17)	Screw (3), locknut (1), and extension tube cap (2)	Remove.	Discard locknut (1).
2.	Upper clamp assembly (15) to extension tube (17)	Screw (4) and locknut (5)	Remove.	Discard locknut (5).
3.		Upper clamp assembly (15)	Bend ends apart until clear of extension tube (17).	
4.		Extension tube (17)	Remove.	
5.	Inside cab (13)	Two locknuts (14)	Remove.	Pull insulation away from cab to reach locknuts (14). Discard locknuts (14)
6.	Left rear corner of cab (13)	Two screws (16) and upper clamp assembly (15)	Remove.	
7.	Air cleaner tube (8) and fittings (18)	Two air vent lines (21)	Disconnect.	Tag air lines (21) for installation.
8.	Air cleaner tube (8) and fitting (19)	Air vent line (20)	Disconnect.	Tag air line (20) for installation.
9.	Bracket (7)	Two screws (6) and locknuts (12)	Remove.	Discard locknuts (12).

3-12. AIR INTAKE TUBES, CAP, CLAMPS, AND HOSE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
10.	Air cleaner tube hose (10)	Two hose clamps (9)	Loosen.	
11.		Air cleaner tube (8)	Remove.	
12.	Air cleaner assembly (11)	Air cleaner tube hose (10)	Remove.	
13.	Air cleaner tube hose (10)	Two hose clamps (9)	Remove.	



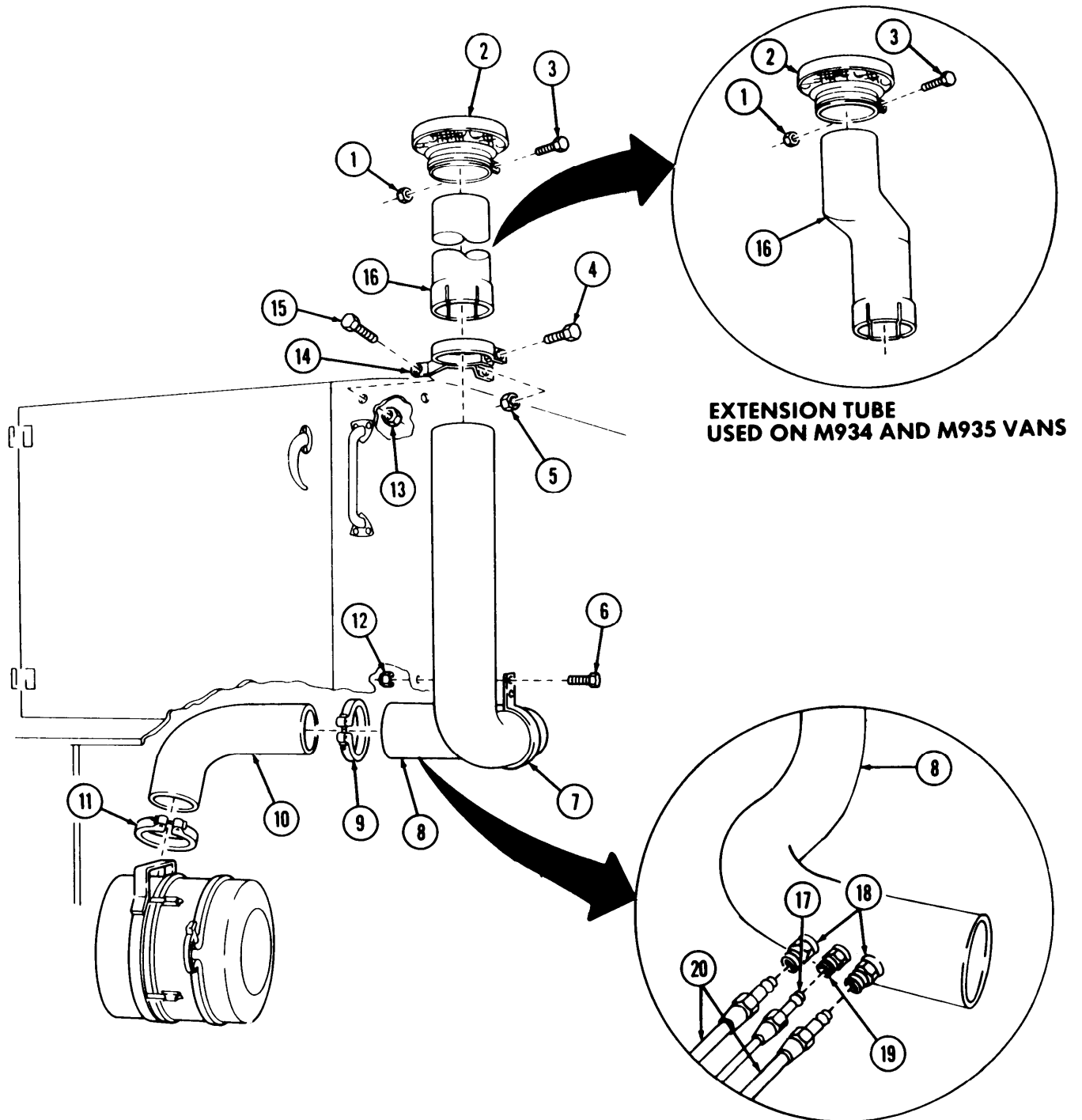
TA 349579

3-12. AIR INTAKE TUBES, CAP, CLAMPS, AND HOSE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
14.		Air cleaner tube hose (10)	Install with clamp (11).	
15.		Air cleaner tube (8)	Install with clamp (9).	
16.		Bracket (7)	Install with two screws (6) and new locknuts (12).	
17.		Air vent line (17)	Connect to fitting (19).	
18.		Two air vent lines (20)	Connect to fittings (18).	
19.		Extension tube (16)	Install.	
20.		Upper clamp assembly (14)	a. Install with two screws (15) and new locknuts (13). b. Close with screw (4) and new locknut (5).	Place insulation back over locknuts (13).
21.		Extension tube cap (2)	Install with screw (3) and new locknut (1).	

3-12. AIR INTAKE TUBES, CAP, CLAMPS, AND HOSE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

TA 349580

3-13. AIR CLEANER ELEMENT SERVICING

This task covers:

- | | |
|----------------------------|----------------------|
| a. Removal | d. Cleaning with Air |
| b. Inspection | e. Installation |
| c. Cleaning with Detergent | |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>	<u>Special Environmental Conditions</u>	
None	None	
<u>Materials/Parts</u>		
Nonsudsing detergent (Appendix D, Item 12)		
<u>Personnel Required</u>	<u>General Safety Instructions</u>	
Light-wheeled vehicle mechanic MOS 63B	<ul style="list-style-type: none"> Compressed air source will not exceed 30 psi (207 kpa). Eyeshields must be worn when cleaning with compressed air. 	
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

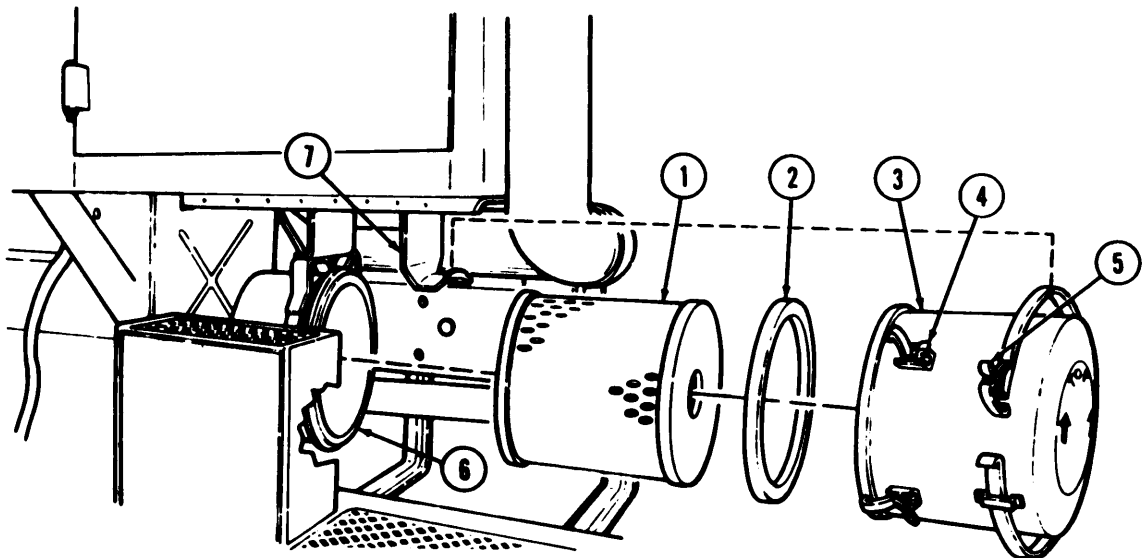
After Nuclear, Biological, or Chemical (NBC) exposure of this vehicle all air filters shall be handled with extreme caution. Unprotected personnel may experience injury or death if residual toxic agents or radioactive material are present. Servicing personnel will wear protective overgarments, mask, hood, and chemical protective gloves and boots. All contaminated air filters will be placed into double lined plastic bags and moved immediately to a temporary segregation area away from the work site. If contaminated by radioactive dust, the company NBC team will measure the radiation before removal. The NBC team will determine the extent of safety procedures required. The temporary segregation area will be marked with the appropriate NBC signs. Final disposal of contaminated air filters will be in accordance with local SOP.

a. Removal

- | | |
|---|--|
| 1. Air cleaner body (3) to manifold (6) and mounting bracket (7). | Support strap latch (5) Release. and five manifold latches (4) |
|---|--|

3-13. AIR CLEANER ELEMENT SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
2.		Air cleaner body (3)	Remove from manifold (6) and mounting bracket (7).	
3.		Filter element (1)	Remove and gently set aside with closed end facing ground.	
4.		Manifold to body gasket (2)	Remove.	
b. Inspection				
5.,		Filter element (1) and gasket (2)	Inspect for tears and rips.	Replace if ripped or torn.



TA 34951

3-13. AIR CLEANER ELEMENT SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Cleaning with Detergent

WARNING

Compressed air source will not exceed 30 psi (207 kpa). When cleaning with compressed air, eyeshields must be worn. Failure to wear eyeshields may result in injury to personnel.

6.		Filter element (2)	Remove dirt as follows: a. Use compressed air to remove heavy dirt. b. Gently hand wash in warm water and nonsudsing detergent. c. Gently rinse with warm water. d. Allow to air dry.	Do not dry with compressed air.
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d. Cleaning with Air

WARNING

Compressed air source will not exceed 30 psi (207 kPa). When cleaning with compressed air, eyeshields must be worn. Failure to wear eyeshields may result in injury to personnel.

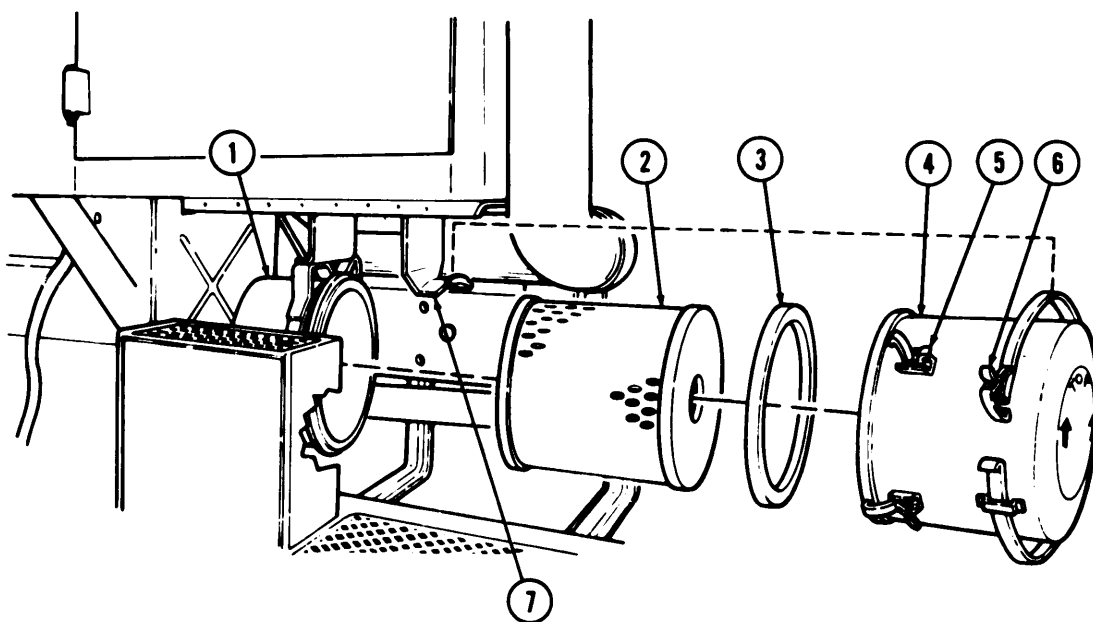
7.		Filter element (2)	Remove dirt and dust as follows: a. Direct air stream from inside to outside. b. Hold nozzle at angle 6 in. (15.2 cm) from outside and blow away loosened dirt or dust.	
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e. Installation

8.		Manifold to body gasket (3)	Position to body (4).	Gasket (3) must not be kinked or twisted when installed.
9.		Filter element (2)	Place in manifold (1).	Open end must face inward.

3-13. AIR CLEANER ELEMENT SERVICING (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
10.	Air cleaner body (4)	Position to manifold (1) and install with five latches (5) and support strap latch (6) around body (4) and mounting bracket (7).	

**END OF TASK!**

FOLLOW-ON TASKS: . Start engine (TM 9-2320-272-10) and check for air leaks,
 . Make sure air filter indicator in cab indicates green (TM 9-2320-272-10).

TA 349582

3-14. AIR CLEANER ASSEMBLY MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>	<u>Special Environmental Conditions</u>	
None	None	
<u>Materials/Parts</u>		
Three locknuts		
<u>Personnel Required</u>	<u>General Safety Instructions</u>	
Light-wheeled vehicle mechanic MOS 63B (2)	None	
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|---|---------------------------------|------------------------------------|-----------------------|
| 1. | Air cleaner tube hose (4) | Hose clamp (6) | Loosen. | |
| 2. | Cleaner to intake pipe hump hose (13) | Hose clamp (12) | Loosen. | |
| 3. | | Support strap latch (8) | Release from mounting bracket (5). | |
| 4. | Mounting bracket (3) to mounting band (6) | Two screws (2) and locknuts (1) | Remove. | Discard locknuts (1). |

NOTE

Assistant will help with step 5.

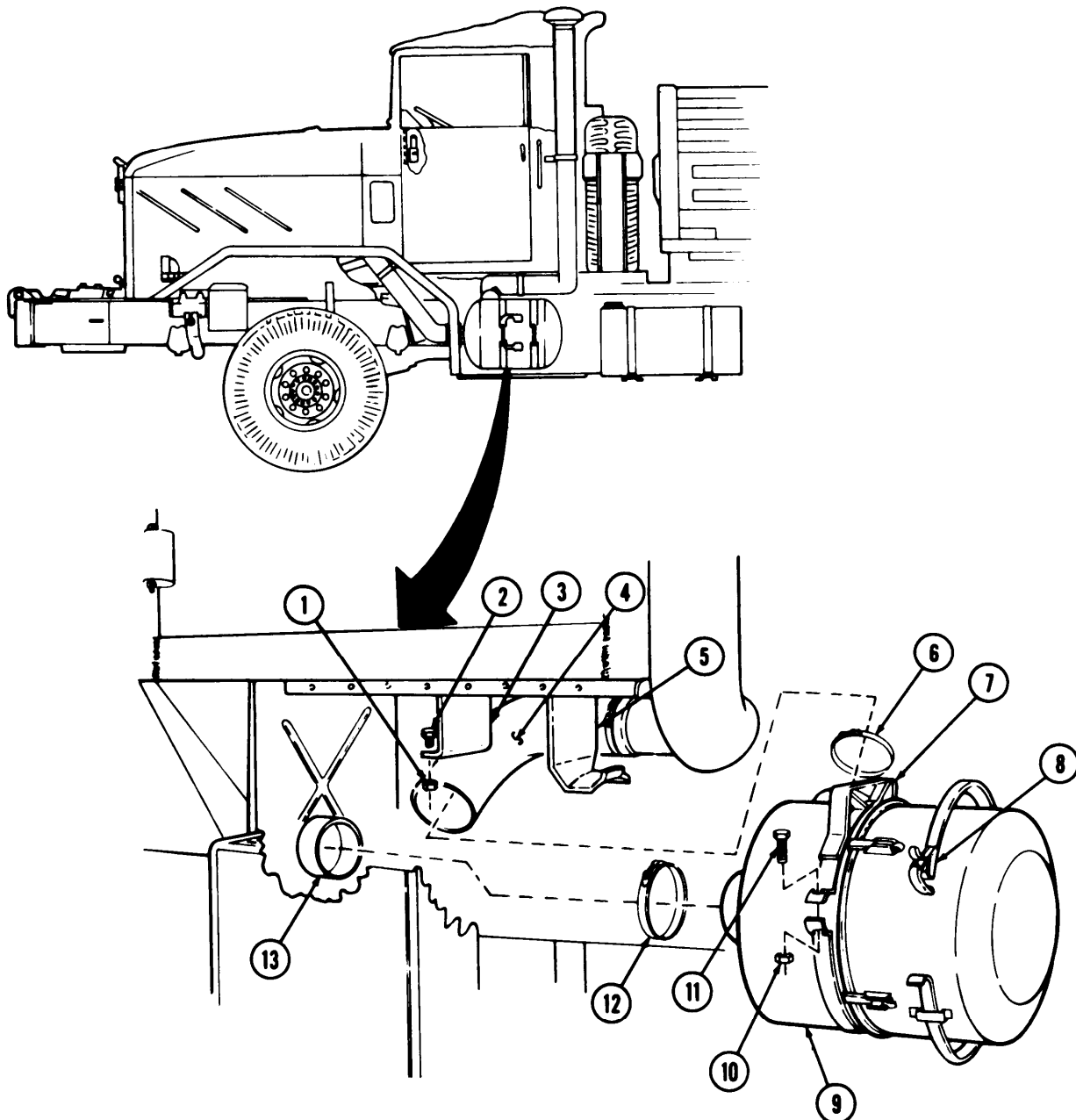
- | | | | | |
|----|--------------------------|--|---------|-----------------------|
| 5. | | Air cleaner assembly (9) | Remove. | |
| 6. | Air cleaner assembly (9) | Locknut (10), screw (11), mounting band (7), and support strap (8) | Remove. | Discard locknut (10). |

3-14. AIR CLEANER ASSEMBLY MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Inspection

7.		Air cleaner assembly (9)	Inspect for cracks and splits that would allow unfiltered air to enter.	Replace if cracked or split.
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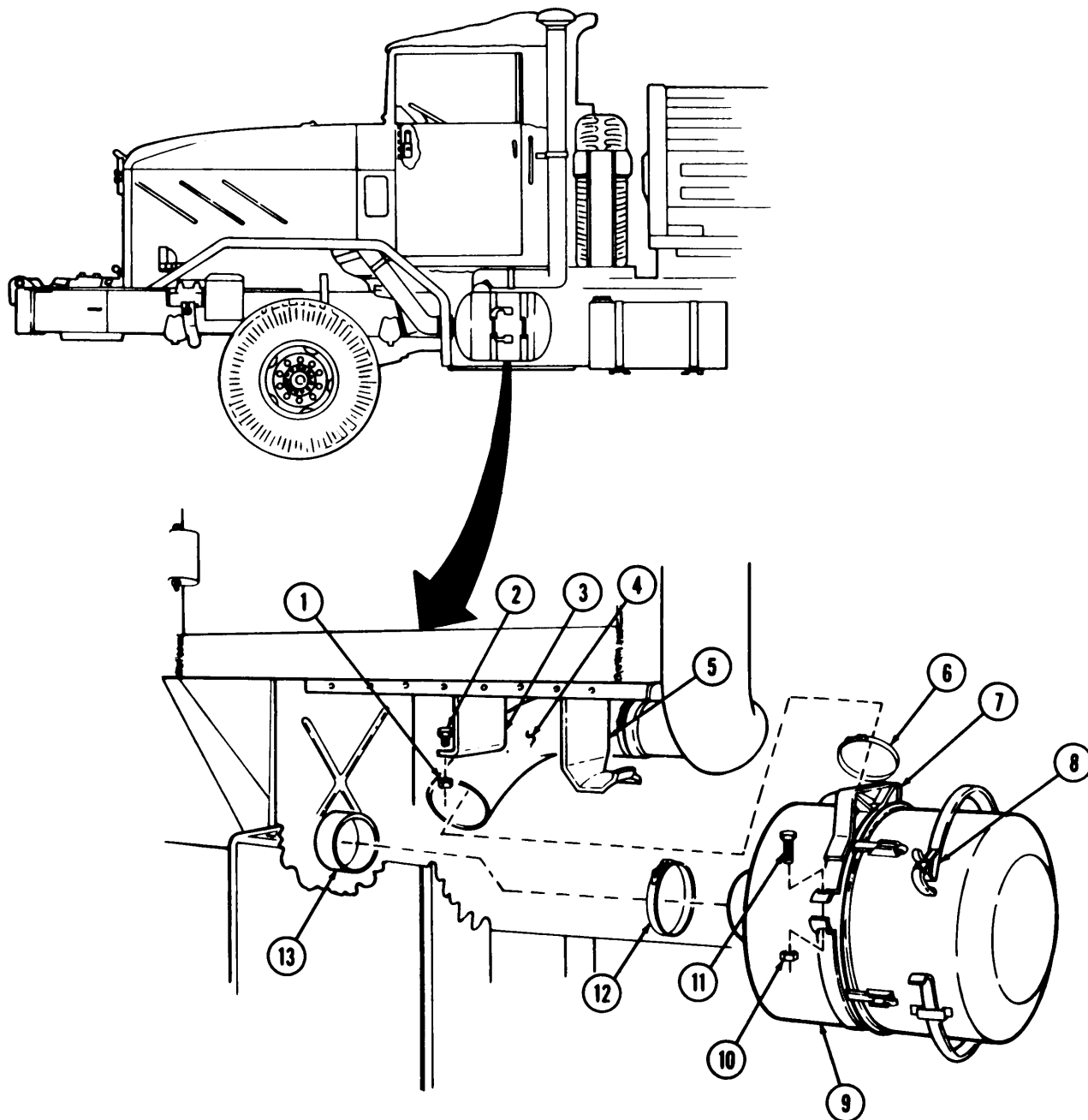
TA 349583

3-14. AIR CLEANER ASSEMBLY MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
8.		Mounting band (7)	Install with new lock-nut (10) and screw (11).	
9.		Support strap (8)	Place on air cleaner assembly (9).	Do not tighten.
10.		Hose clamp (6)	Install to air cleaner tube hose (4).	Do not tighten.
11.		Hose clamp (12)	Install to intake pipe hump hose (13).	Do not tighten.
NOTE				
Assistant will help with step 12.				
12.		Air cleaner assembly (9)	Place on hump hose (13) and air cleaner tube hose (4).	
13.		Mounting band (7)	Install to mounting bracket (3) with two screws (2) and new locknuts (1).	
14.		Support strap (8)	Position over mounting bracket (5) and tighten.	
15.		Hose clamps (6) and (12)	Tighten.	

3-14. AIR CLEANER ASSEMBLY MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Start engine (TM 9-2320-272-10) and check for air leaks.
 . Make sure air filter indicator in cab indicates green (TM 9-2320-272-10).

TA 349584

3-150 AIR CLEANER MOUNTING BRACKET REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 3-13	Parking brake set. Air cleaner element removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Enviromental Conditions</u>
None		None
<u>Materials/Parts</u>		
Five lockwashers Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|----------------------|---------------------------------|---------|-----------------------|
| 1. | Mounting bracket (4) | Two screws (6) and locknuts (5) | Remove. | Discard locknuts (5). |
|----|----------------------|---------------------------------|---------|-----------------------|

NOTE

Floor mat must be pulled back to gain access to one screw.

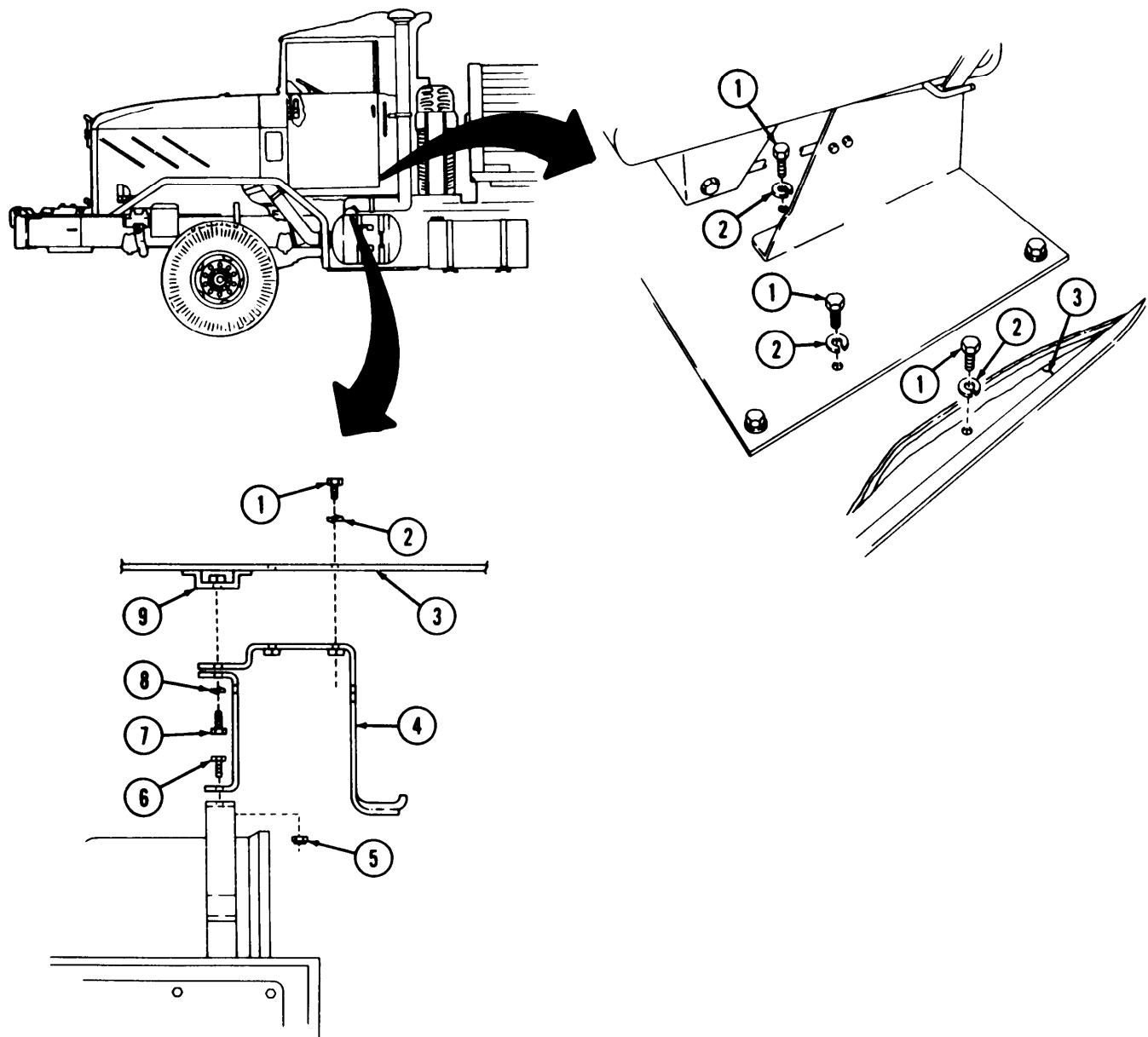
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|----|---------------------|--|---------|--------------------------|
| 2. | Cab floor (3) | Three screws (1) and lockwashers (2) | Remove. | Discard lockwashers (2). |
| 3. | Sub-floor mount (9) | TWO screws (7) and lockwashers (8), and mounting bracket (4) | Remove. | Discard lockwashers (8). |

b. Installation

- | | | |
|----|----------------------|--|
| 4. | Mounting bracket (4) | a. Install with two screws (7) and new lockwashers (8).
b. Install with three screws (1) and new lockwashers (2). |
|----|----------------------|--|

3-15. AIR CLEANER MOUNTING BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Two screws (6) and new locknuts (5)	Install.	



END OF TASK!

FOLLOW-ON TASK: Install air cleaner element (para 3-13).

TA 349585

3-16. AIR INTAKE PIPE AND HUMP HOSE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection

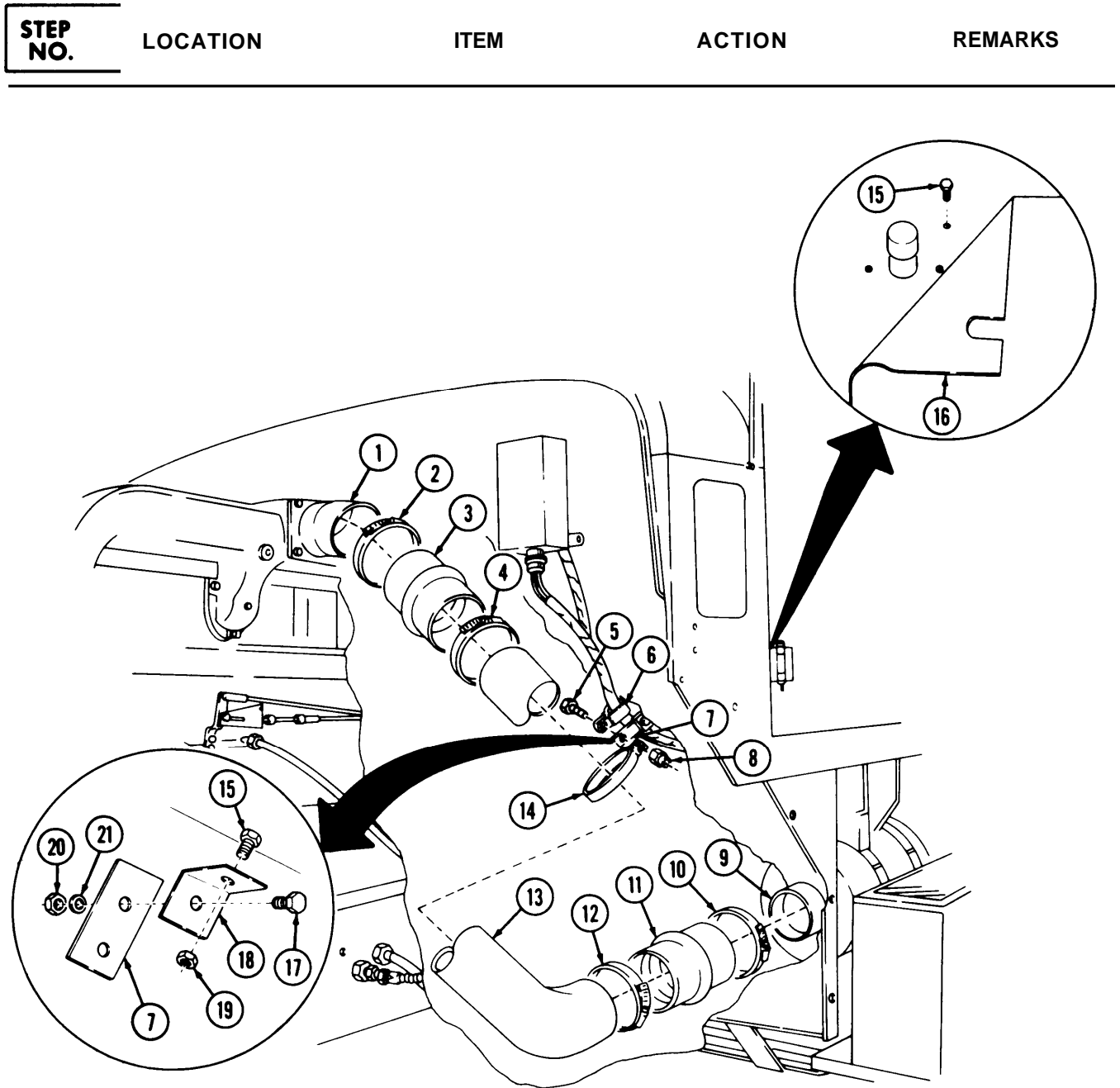
c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-15	Parking brake set. Left splash shield removed. Ether valve and bracket removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Hanger strap (7)	Screw (5), locknut (8), and intake clamp (14)	Remove.	Releases harness cable clamp (6). Discard locknut (8).
2.	Lower hump hose (11)	Hose clamp (12)	Loosen.	
3.	Upper hump hose (3)	Hose clamp (4) and intake pipe (13)	Remove.	
4.	Air intake manifold (1)	Hose clamp (2) and upper hump hose (3)	Remove.	
5.	Air cleaner (9)	Hose clamps (10) and (12), and lower hump hose(n)	Remove.	
6.	Hanger strap (7)	Screw (17), washer (21), and locknut (20)	Remove.	Discard locknut (20).
NOTE Assistant will help with step 7.				
7.	Mounting bracket (18)	Screw (15) and locknut (19)	Remove.	Pull back floormat (16) in cab. Discard locknut (19).
8.	Intake pipe (13)	Intake clamp (14)	Remove.	

3-16. AIR INTAKE PIPE AND HUMP HOSE MAINTENANCE (Cont'd)

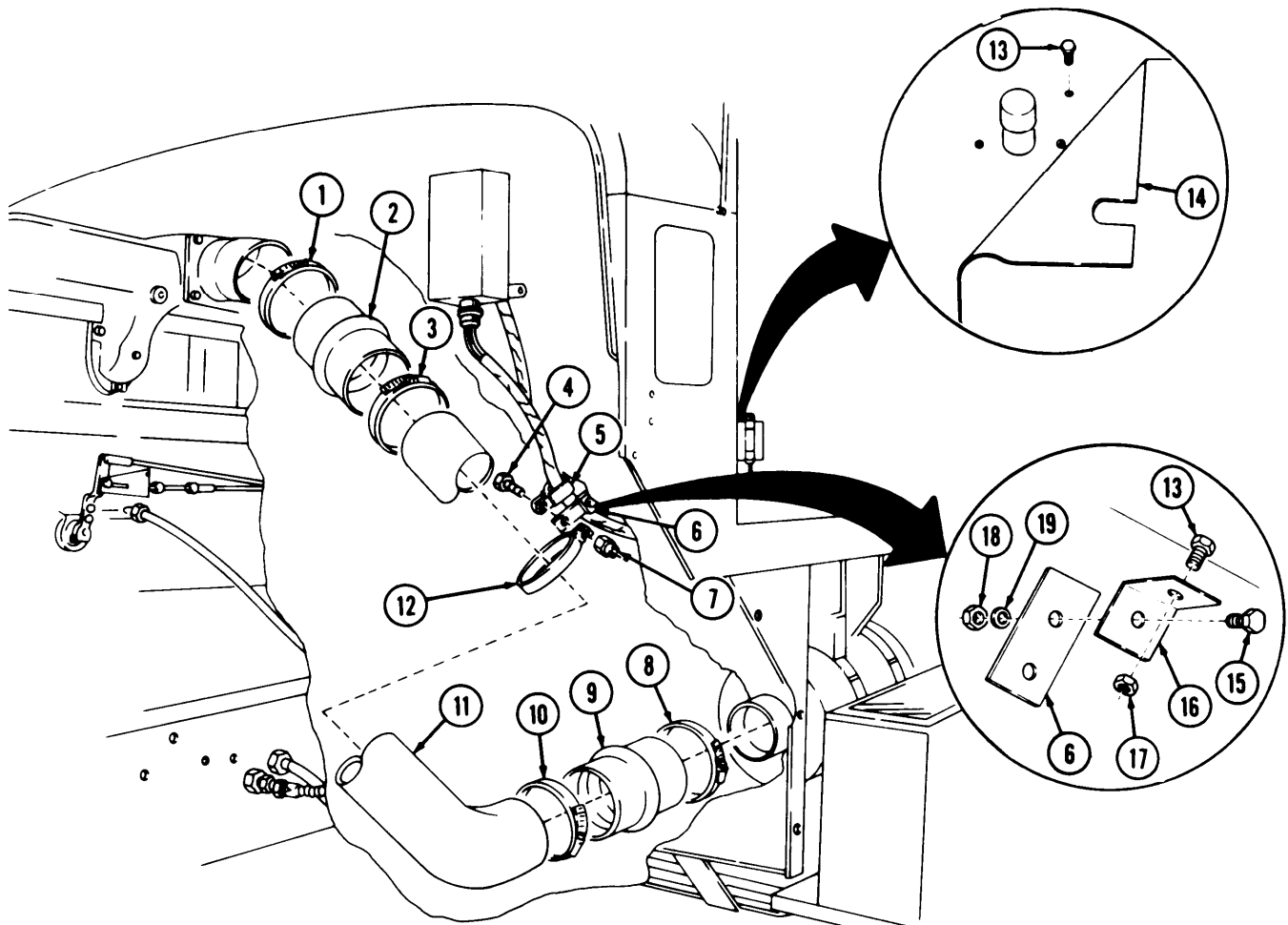


3-16. AIR INTAKE PIPE AND HUMP HOSE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
9.		Hump hoses (2) and (9) and intake pipe (11)	Inspect for cracks.	Replace if cracked.
c. Installation				
10.		Hanger strap (6)	Install with screw (15), washer (19), and new locknut (18).	
NOTE				
Assistant will help with step 11.				
11.		Mounting bracket (16)	Install with screw (13) and new locknut (17).	Replace floormat (14).
12.		Lower hump hose (9)	Install with hose clamp (8).	
13.		Upper hump hose (2)	Install with hose clamp (1).	
14.		Intake pipe clamp (12)	Position over intake pipe (11).	
NOTE				
Assistant will help with step 15.				
15.		Intake pipe (11)	Install with hose clamps (3) and (10).	
16.		Intake pipe clamp (12) and harness cable clamp (5)	Install with screw (4) and new locknut (7).	

3-16. AIR INTAKE PIPE AND HUMP HOSE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Install ether valve and bracket (para. 4- 15).
 . Start engine (TM 9-2320-272-10) and check for air leaks.

TA 349587

3-17. AIR CLEANER INDICATOR, TUBE, AND FILTER MAINTENANCE

This task covers:

- | | |
|------------|----------------------------|
| a. Testing | c. Cleaning and Inspection |
| b. Removal | d. Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three locknuts		
Filter		
Sealing tape (Appendix D, Item 26)		
Air cleaner indicator		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		<ul style="list-style-type: none"> Compressed air source will not exceed 30 psi (207 kPa). Eyeshields must be worn when cleaning with compressed air.
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

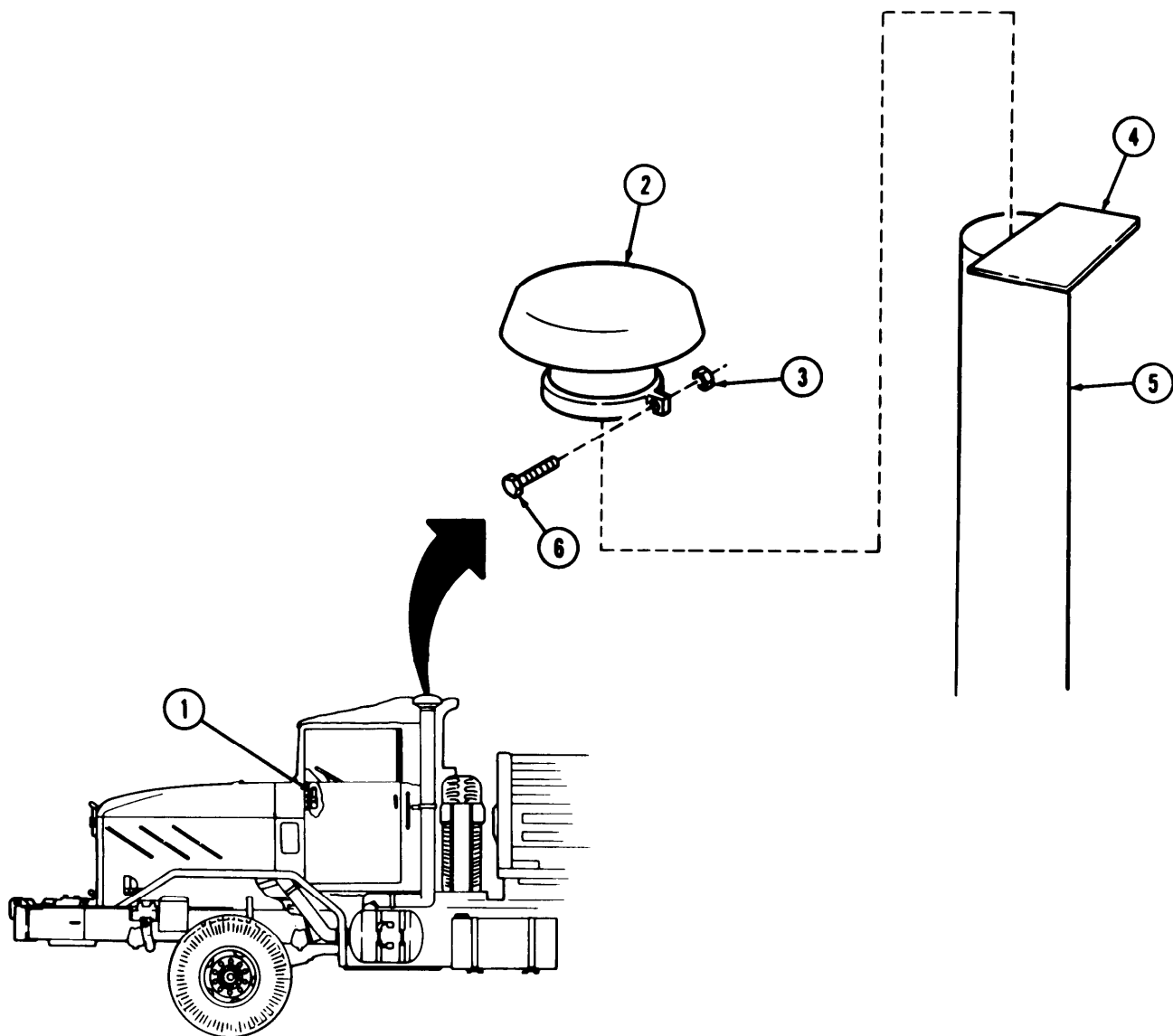
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Testing

1.	Extension tube (5)	Screw (6), locknut (3), and extension tube cap (2)	Remove.	Discard locknut (3).
2.		Engine	Start and run at 1200 rpm.	Refer to TM 9-2320-272-10.
3.		Intake extension tube (5)	Cover opening with carboard (4).	90% of opening should be covered.
4.		Filter indicator (1)	Observe to make sure red band is visible.	If red band is visible, indicator works properly. If not, replace indicator.
5.		Carboard (4)	Remove and reset indicator (1) if working properly.	Refer to TM 9-2320-272-10.

3-17. AIR CLEANER INDICATOR, TUBE, AND FILTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349588

3-17. AIR CLEANER INDICATOR, TUBE, AND FILTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Removal				
6.	Instrument panel (11)	Four screws (12), plate (15), and air cleaner indicator (8)	Remove.	
7.	Elbow (7)	Indicator tube nut (6)	Disconnect.	
8.	Adapter (16)	Elbow (7)	Remove.	
9.	Air cleaner indicator (8)	TWO locknuts (17) and screws (13), plate (15), and gasket (14)	Remove.	Discard locknuts (17).
10.		Adapter (16)	Remove.	Discard air cleaner indicator (8).
11.	Elbow (1)	Indicator tube nut (2)	Disconnect.	
12.	Firewall (5)	Grommet (4) and indicator tube (3)	Remove.	
13.	Intake manifold (9)	Elbow (1) and filter (10)	Remove.	Discard filter (10).

c. Cleaning and Inspection

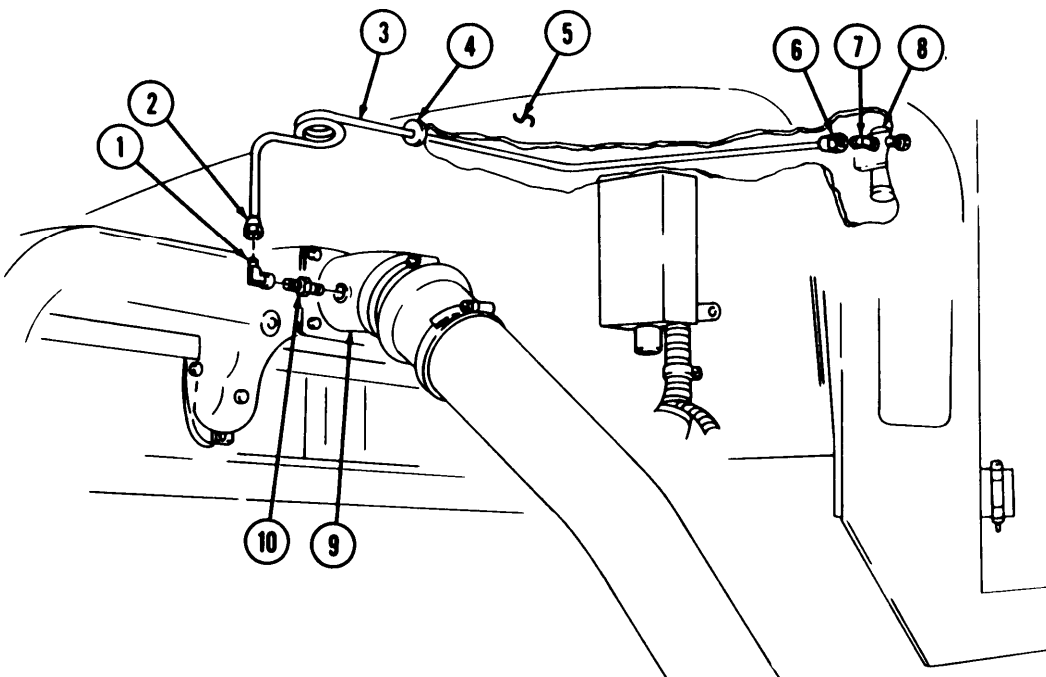
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|-----|--------------------|-----------------------------|
| 14. | Indicator tube (3) | a. Inspect for obstruction. |
|-----|--------------------|-----------------------------|

WARNING

Compressed air sources will not exceed 30 psi (207 kPa). When cleaning with compressed air, eyeshields must be worn. Failure to wear eyeshields may result in injury to personnel.

- | | | | |
|-----|--------------------------------------|---|----------------------------------|
| 15. | Elbows (1) and (7), and adapter (16) | b. Clean by blowing compressed air through indicator tube (3),
Inspect for stripped threads. | Replace if threads are stripped. |
|-----|--------------------------------------|---|----------------------------------|

3-17. AIR CLEANER INDICATOR, TUBE, AND FILTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
 <p>The diagram illustrates the maintenance of the air cleaner indicator, tube, and filter. The top section shows the indicator and tube assembly, with callouts 1 through 10 identifying various components. The bottom section shows the filter assembly, with callouts 11 through 17 identifying various components.</p>				

TA 349589

3-17. AIR CLEANER INDICATOR, TUBE, AND FILTER MAINTENANCE (Cont'd)

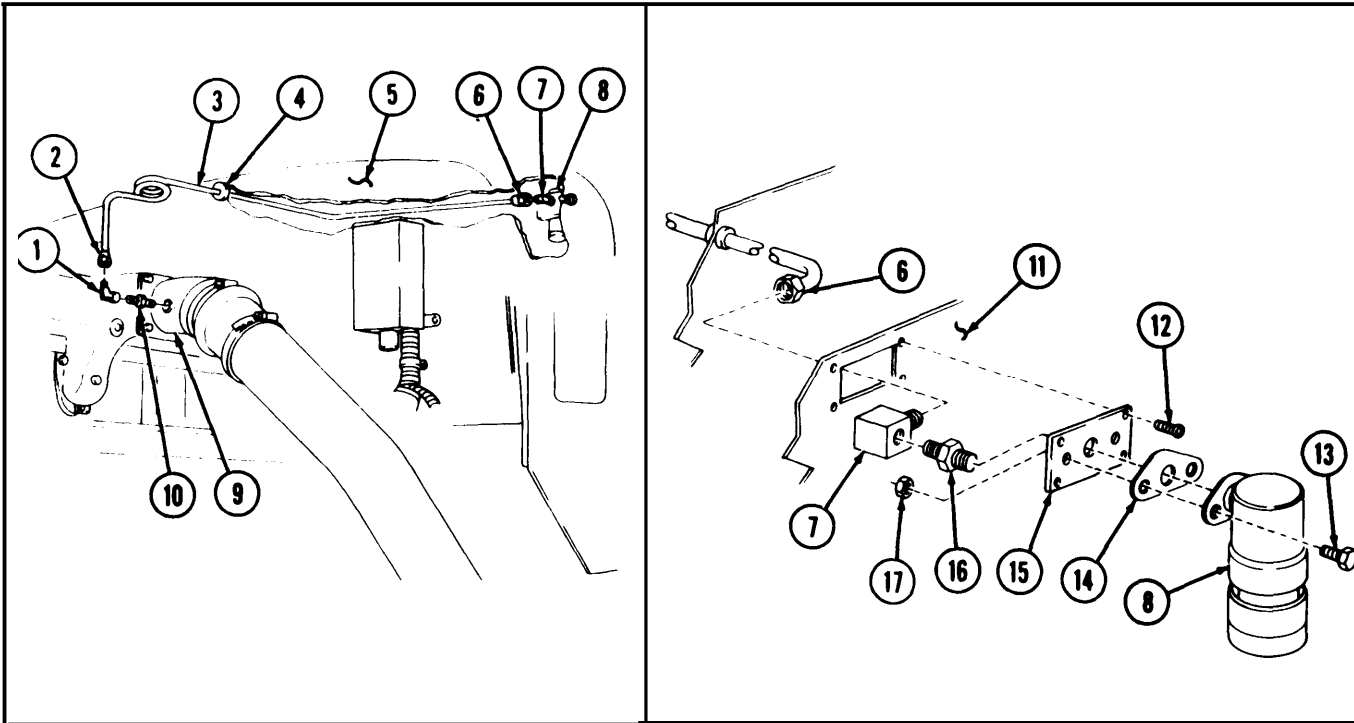
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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d. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

16.		New filter (10) and elbow (1)	Install in intake manifold (9).	
17.		Indicator tube (3) and grommet (4)	Install through firewall (5).	
18.		Indicator tube nut (6) and elbow (7)	Connect.	
19.		Adapter (16)	Install to elbow (7).	
20.		Plate (15) and gasket (14)	Install over adapter (16).	
21.		New air cleaner indicator (8)	Install with two screws (13) and new locknuts (17).	
22.		Plate (15)	Install with four screws (12) on instrument panel (11).	
23.		Indicator tube nut (2)	Connect to elbow(1)	



END OF TASK!

FOLLOW-ON TASK: Install left splash shield (TM 9-2320-272- 10).

TA 349590

Section III. FUEL SYSTEM

3-18. GENERAL

This section provides maintenance procedures assigned to the organizational level for the fuel system. To find a specific maintenance procedure, see the maintenance task summary below:

3-19. FUEL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-20.	Selector Valve Flex Hose Replacement	3-44
3-21.	Fuel Selector Valve, Mounting Bracket, and Indicator Plate Replacement	3-46
3-22.	Fuel Tank Filler Cap and Spout Replacement	3-50
3-23.	Fuel Tank Replacement	3-52
3-24.	Fuel Tank (M936) Replacement	3-58
3-25.	Fuel Tank Hangers and Retaining Straps Replacement	3-68
3-26.	AFC Standard Pump Filter Replacement	3-72
3-27.	Fuel Pump with VS Governor Filter Replacement	3-74
3-28.	Fuel Primer Pump Replacement	3-76
3-29.	Fuel Filter Maintenance	3-78
3-30.	Fuel Filter Cover and Adapter Maintenance	3-82

3-20. SELECTOR VALVE FLEX HOSE REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M929, M930, M931, M932, M936	TM 9-2320-272-10	Parking brake set,
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Protective cap plugs (Appendix D, Item 5) Sealing tape (Appendix C, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

a. Removal

NOTE

1.

Fuel lines (3) and selector valve (1)

Six flex hoses (4)

a.

Disconnect at six fuel lines (3) and fuel line to hose adapter fittings (5).

b.

Disconnect at two selector valve ports (6) and four adaptor elbows (2).
- Plug all fuel lines using protective cap plugs. Tag for installation.

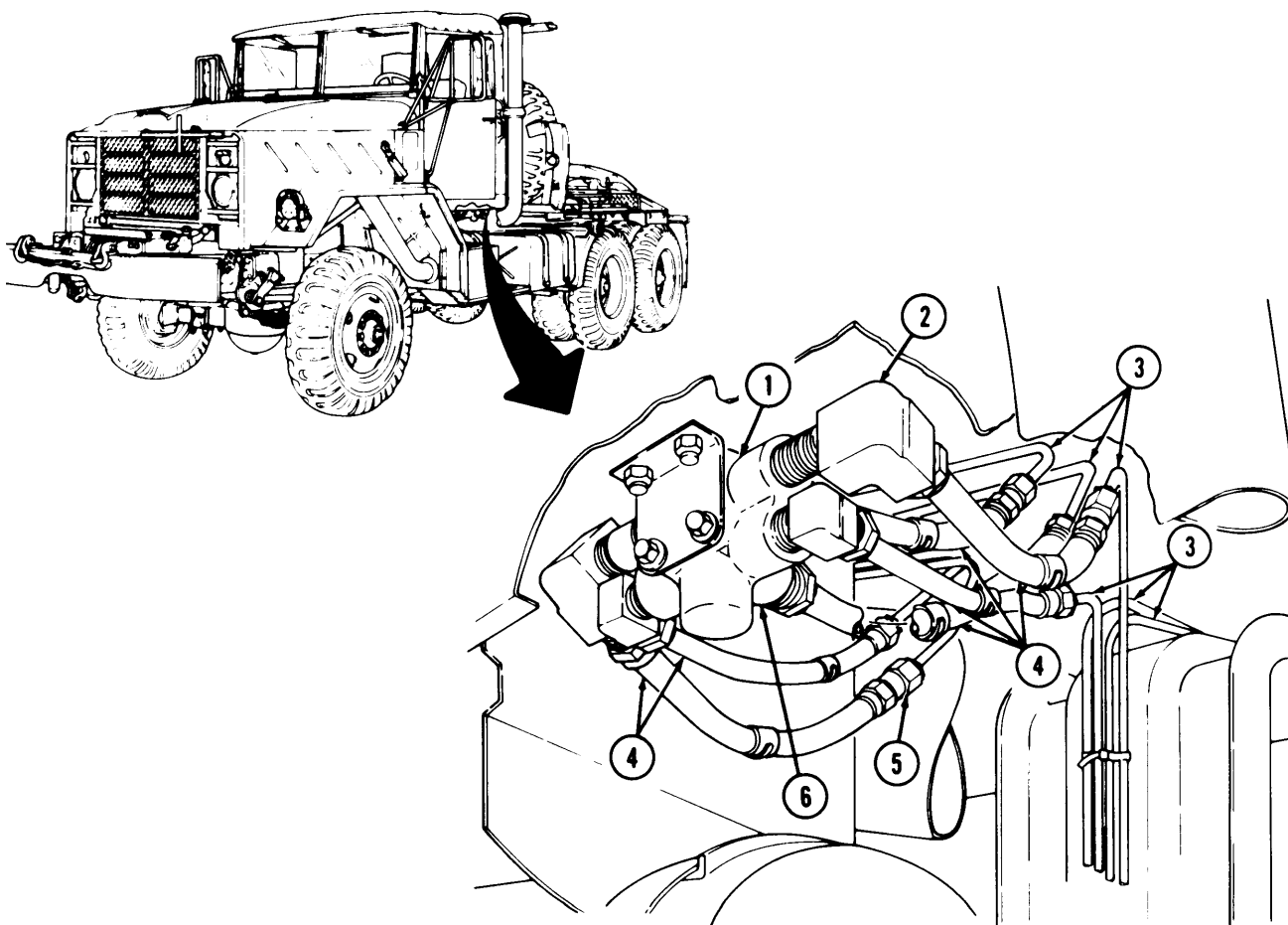
3-20. SELECTOR VALVE FLEX HOSE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation**NOTE**

- Male pipe threads must be wrapped with sealing tape before installation.
- Remove protective cap-plugs from fuel lines before connecting.

2. Six flex hoses (4)
 - a. Connect at two ports (6) and four adapter elbows (2) on selector valve (1).
 - b. Connect to each fuel line (3) and fuel line to hose adapter fitting (5).

**END OF TASK!**

Start engine (TM 9-2320-272- 10) and test selector valve for fuel leaks and proper operation.

TA 349591

3-21. FUEL SELECTOR VALVE, MOUNTING BRACKET, AND INDICATOR PLATE REPLACEMENT

This task covers:

- a. Removal
b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M929, M930, M931, M932, M936	TM 9-2320-272-10 Para. 3-20	Parking brake set. Selector valve flex hoses removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three lockwashers Two locknuts Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

a. Removal

- | | | | | |
|----|--|---|----------------------------|---------------------------|
| 1. | Left rear cab floor (5) | Screw (1), lockmaster (2), and lever (3) | Remove. | Discard lockwasher (2). |
| 2. | Mounting bracket (10) | Two screws (13) and lockwashers (12), and fuel selector valve (9) | Remove. | Discard lockwashers (12). |
| 3. | Indicator plate (4) and mounting bracket (10) to cab floor (5) | Two screws (15), washers (14), and locknuts (11) | Remove. | Discard locknuts (11). |
| 4. | | Indicator plate (4) and mounting bracket (10) | Remove from cab floor (5). | |

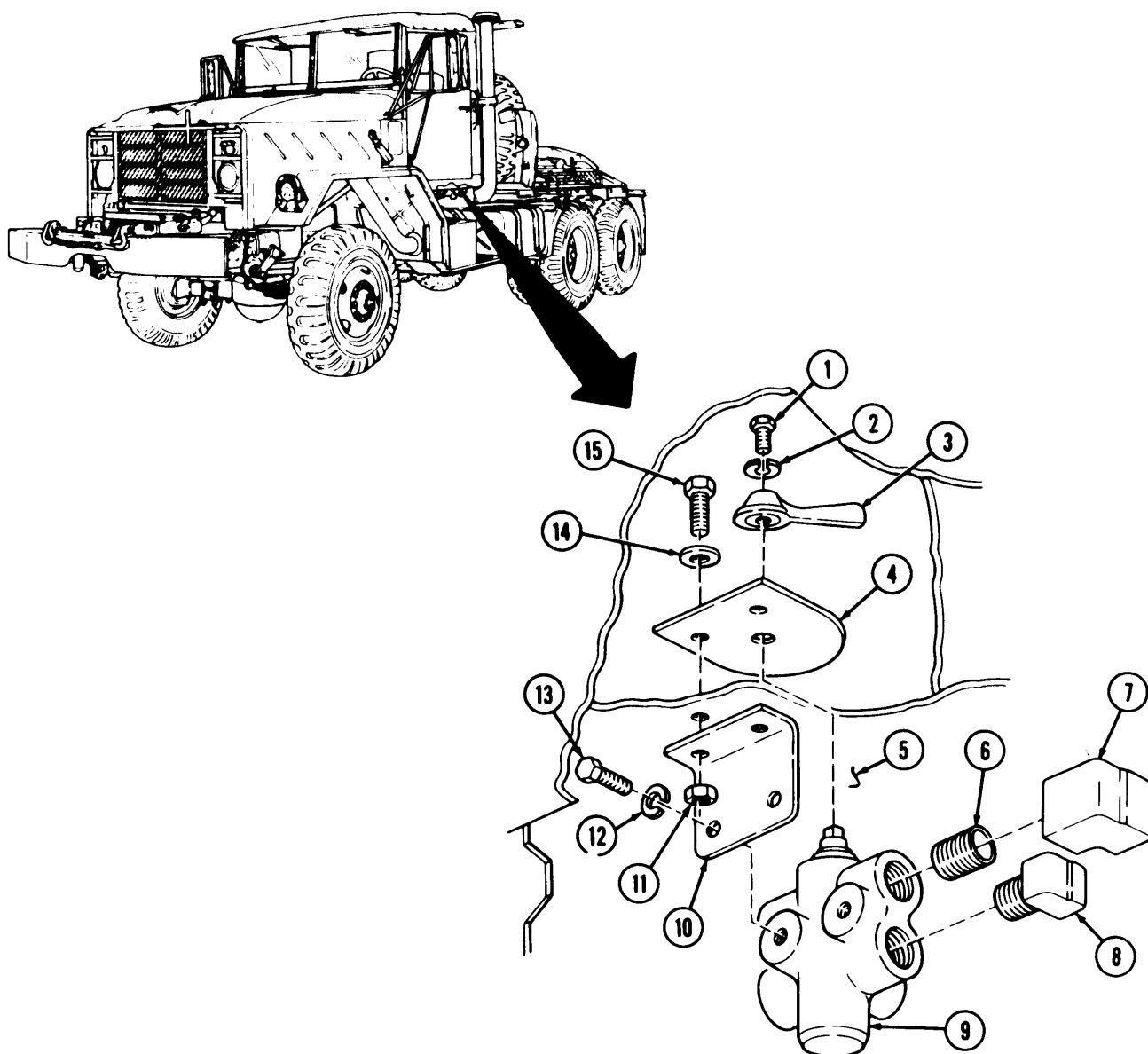
3-21 FUEL SELECTOR VALVE, MOUNTING BRACKET, AND INDICATOR PLATE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Use soft nosed vise to hold selector valve.

5.	Fuel selector valve (9)	Two elbow fittings (7)	Remove.	Tag for installation.
6.		Two pipe nipples (6)	Remove.	
7.		Two elbow fittings (8)	Remove.	Tag for installation,

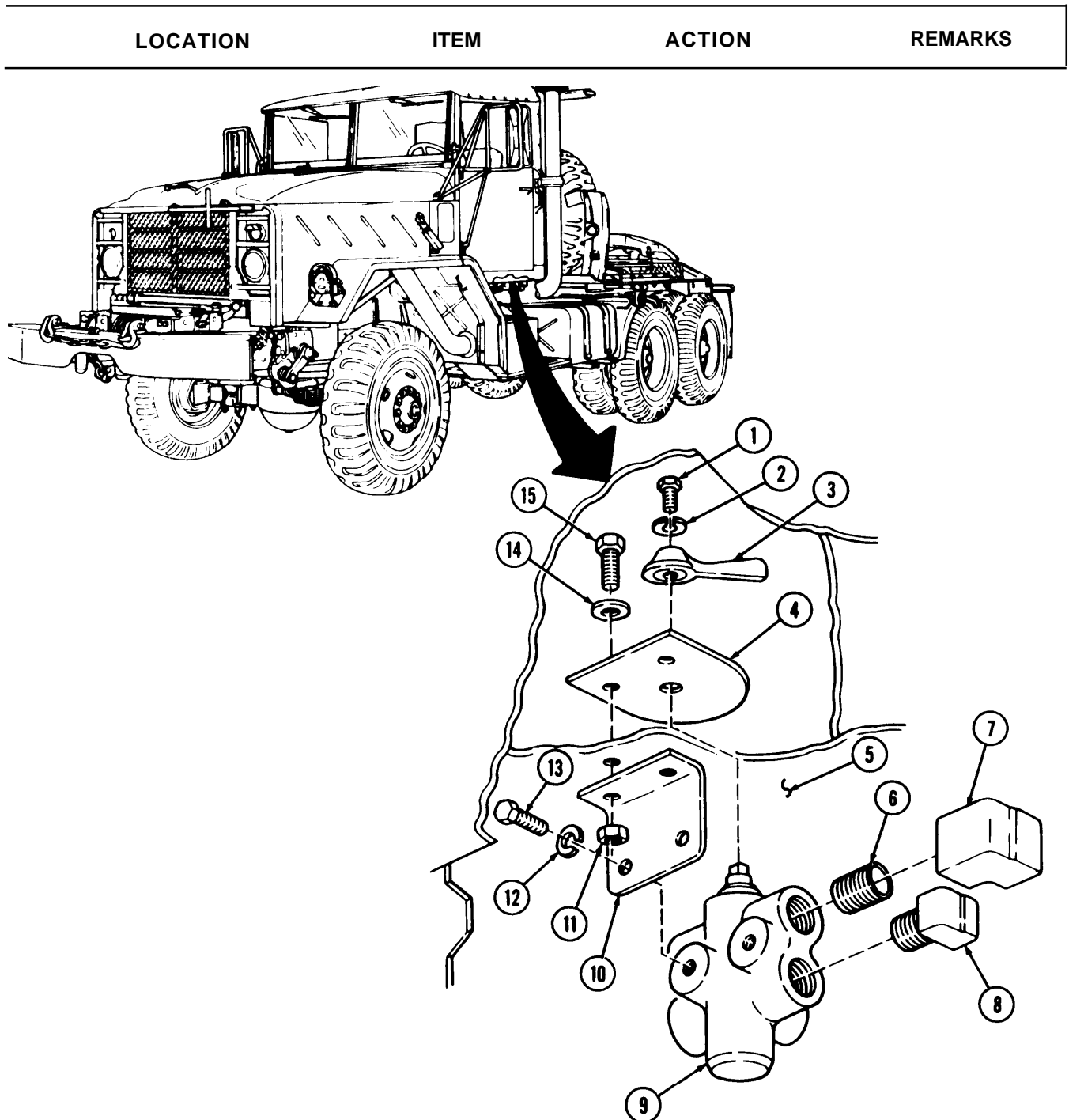


TA 349592

3-21 .FUEL SELECTOR VALVE, MOUNTING BRACKET, AND INDICATOR PLATE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
8.		Selector valve (9)	a. Install lever (3) with screw (1). b. Turn lever (3) left then right while checking inside valve for burrs and nicks.	Replace if burred or nicked.
9.		Lever (3) and screw (1)	Remove.	
10.		Two pipe nipples (6) and four elbows (7) and (8)	Inspect for stripped threads.	Replace if threads are stripped.
c. Installation				
11.		Indicator plate (4) and mounting bracket (10)	a. Aline to holes in cab floor (5). b. Install with two screws (15), washers (14), and new locknuts (11).	New locknuts (11) are installed under cab floor (5).
<p style="text-align: center;">NOTE</p> <p>Male pipe threads must be wrapped with sealing tape before installation.</p>				
12.		Two elbow fittings (8)	Install.	
13.		Two pipe nipples (6)	Install.	
14.		Two elbow fittings (7)	Install.	
15.		Selector valve (9)	Install with two new lockwashers (12) and screws (13).	
16.		Lever (3)	Install with new lockwasher (2) and screw (1).	Lever (3) pointer must be positioned opposite notch on selector valve stem.

3-21. FUEL SELECTOR VALVE, MOUNTING BRACKET, AND INDICATOR PLATE REPLACEMENT (Cont'd)



END OF TASK!

FOLLOW-ON TASKS:

- . Connect selector valve flex hoses (para. 3-20).
- . Start engine (TM 9-2320-272-10) and check for fuel leaks at valve when switching selector valve to both tanks.

TA 349593

3-22. FUEL TANK FILLER CAP AND SPOUT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Filler cap removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two gaskets		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Ž Diesel fuel is flammable. Do not perform this procedure-near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

<u>STEP NO.</u>	<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

a. REMOVAL

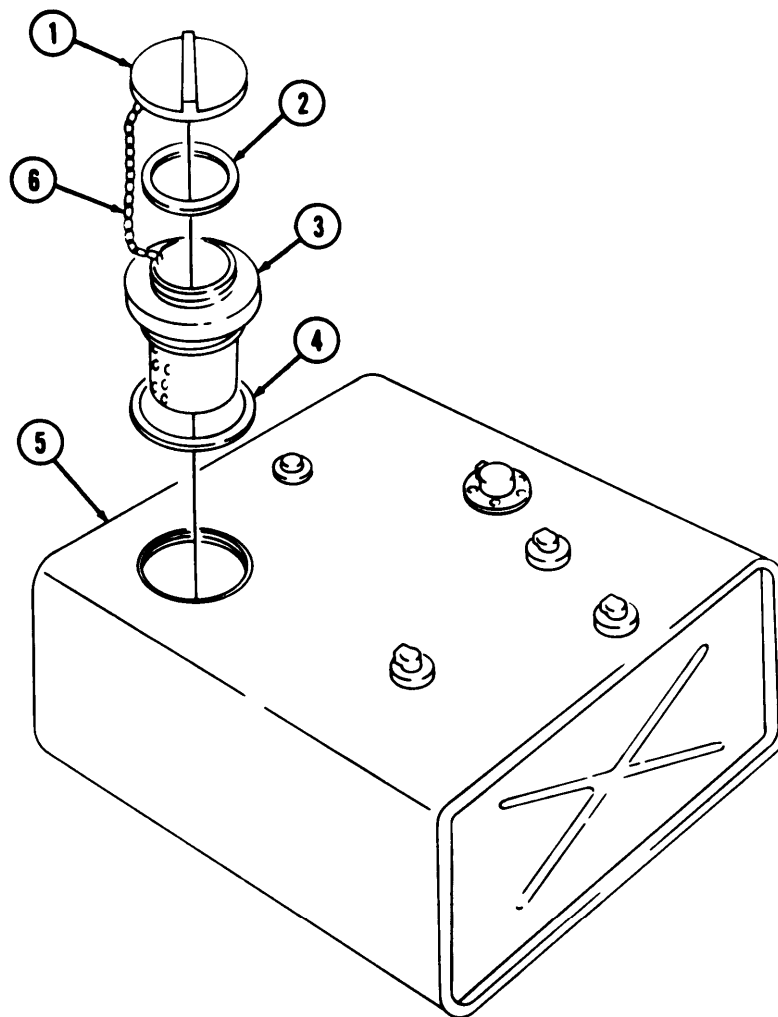
1.	Filler cap (1)	Gasket (2)	Remove.	Discard filler cap gasket (2).
2.	Filler spout assembly (3)	Filler cap retaining chain (6)	Remove.	
3.	Fuel tank (5)	Filler spout assembly (3)	Turn counterclockwise and remove.	
4.	Filler spout assembly (3)	Spout gasket (4)	Remove.	Discard spout gasket (4).

b. Installation

5.	New filler cup gasket (2)	Install on filler cap (1).
6	New spout gasket (4)	Install on filler spout assembly (3).

3-22. FUEL TANK FILLER CAP AND SPOUT REPLACEMENT (Cent'd)

STEP: NO.	LOCATION	ITEM	ACTION	REMARKS
7.		Filler spout assembly (3)	Install in fuel tank (5) and turn clockwise to tighten.	
8.		Filler cap retaining chain (6)	Attach to filler spout assembly (3).	

**END OF TASK!****FOLLOW-ON TASK:** Install filler cap (TM 9-2320-272-10).

TA 349594

3-23. FUEL TANK REPLACEMENT

This task covers:

- | | |
|-------------|-----------------|
| a. Draining | c. Inspection |
| b. Removal | d. Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All except M936	TM 9-2320-272-10 Para. 3-22	Parking brake set. Fuel tank filler cap and spout removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
"IWO gaskets Four locknuts Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P FM 43-2		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

a. Draining**NOTE**

Have drainage container ready to catch fuel.

- | | | | | |
|----|--------------------------|-------------------------------------|-------------------------------------|-----------------------|
| 1. | Bottom of fuel tank (20) | Drainplug (12), and gasket (11) | Remove. | Discard gasket (11). |
| 2. | | New gasket (11) and drainplug (12) | Install after draining is complete. | |

b. REMOVAL

- | | | | | |
|----|----------------------|-------------------------|-------------|-----------------------|
| 3. | Elbows (10) and (19) | Vent lines (9) and (18) | Disconnect. | Tag for installation. |
| 4. | Elbow (14) | Fuel return line (15) | Disconnect. | Tag for installation. |
| 5. | Elbow (16) | Fuel supply line (8) | Disconnect. | Tag for installation. |

3-23. FUEL TANK REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.	Fuel transmitter unit (17)	Fuel transmitter wire (5)	Disconnect.	
7.		Screw (6) and ground wire (7)	Remove.	
8.	Two hangers (1)	Two locknuts (13)	Remove.	Discard locknuts (13).
9.		Two locknuts (4), screws (2), and hanger straps (3)	Remove.	Discard locknuts (4).

NOTE

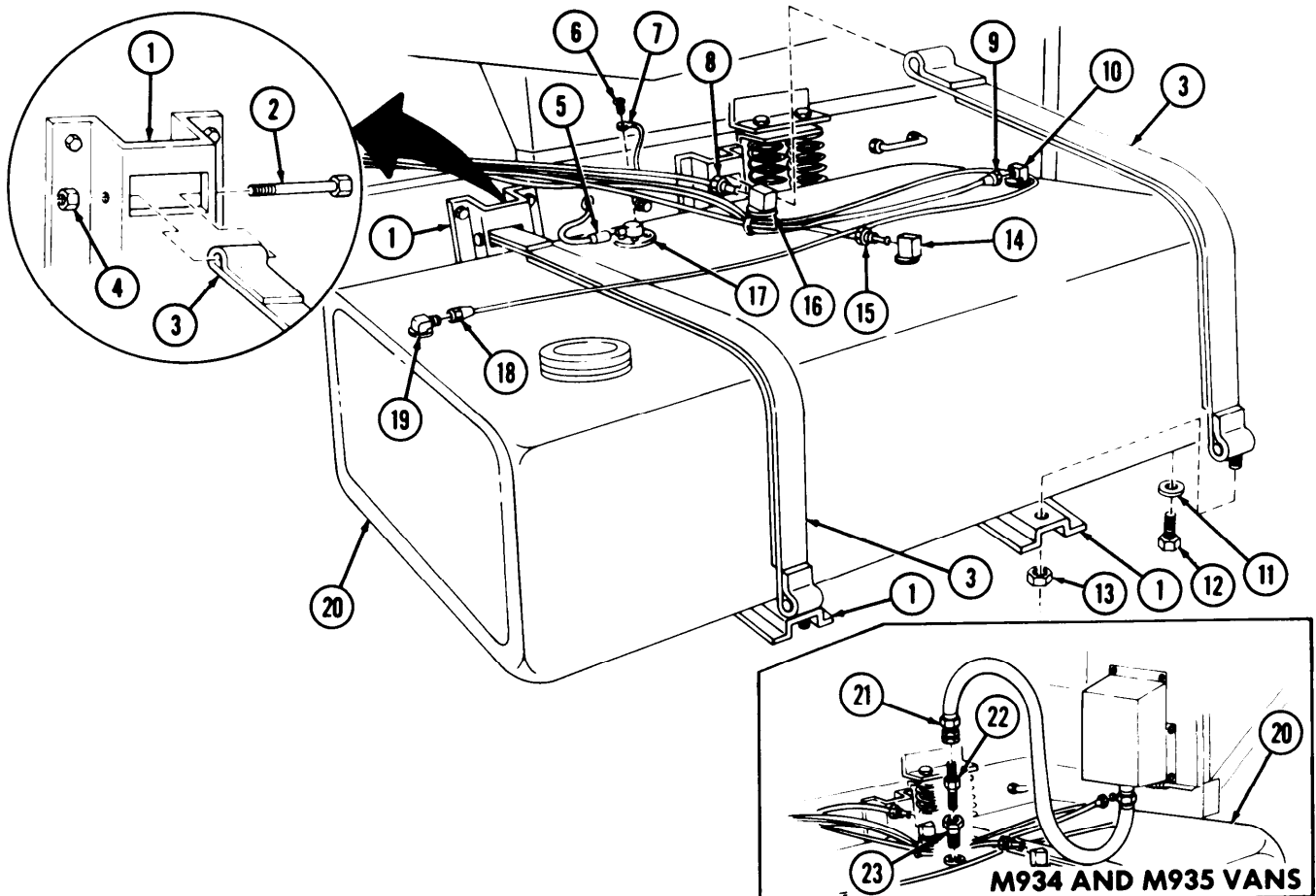
Perform step 10 on M934 and M935 van.

10.	Top of fuel tank (20)	Personnel heater fuel supply line (21), adapter (22), and fitting (23)	Remove.	
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NOTE

Assistant will help with step 11.

11.	Two hangers (1)	Fuel tank (20)	Remove.	
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M934 AND M935 VANS

TA 349595

3-23. FUEL TANK REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
12.	Top of fuel tank (6)	Fuel supply tube and elbow (3)	Remove.	Mark direction of elbow (3) for installation.
13.		Two vent line elbows (5) and return line elbow (4)	Remove.	Tag elbows (4) and (5) for installation.
14.		Four screws (1), fuel transmitter unit (2), and gasket (7)	Remove.	Discard gasket (7). Mark direction of electrical connector (8) for installation.

c. Inspection

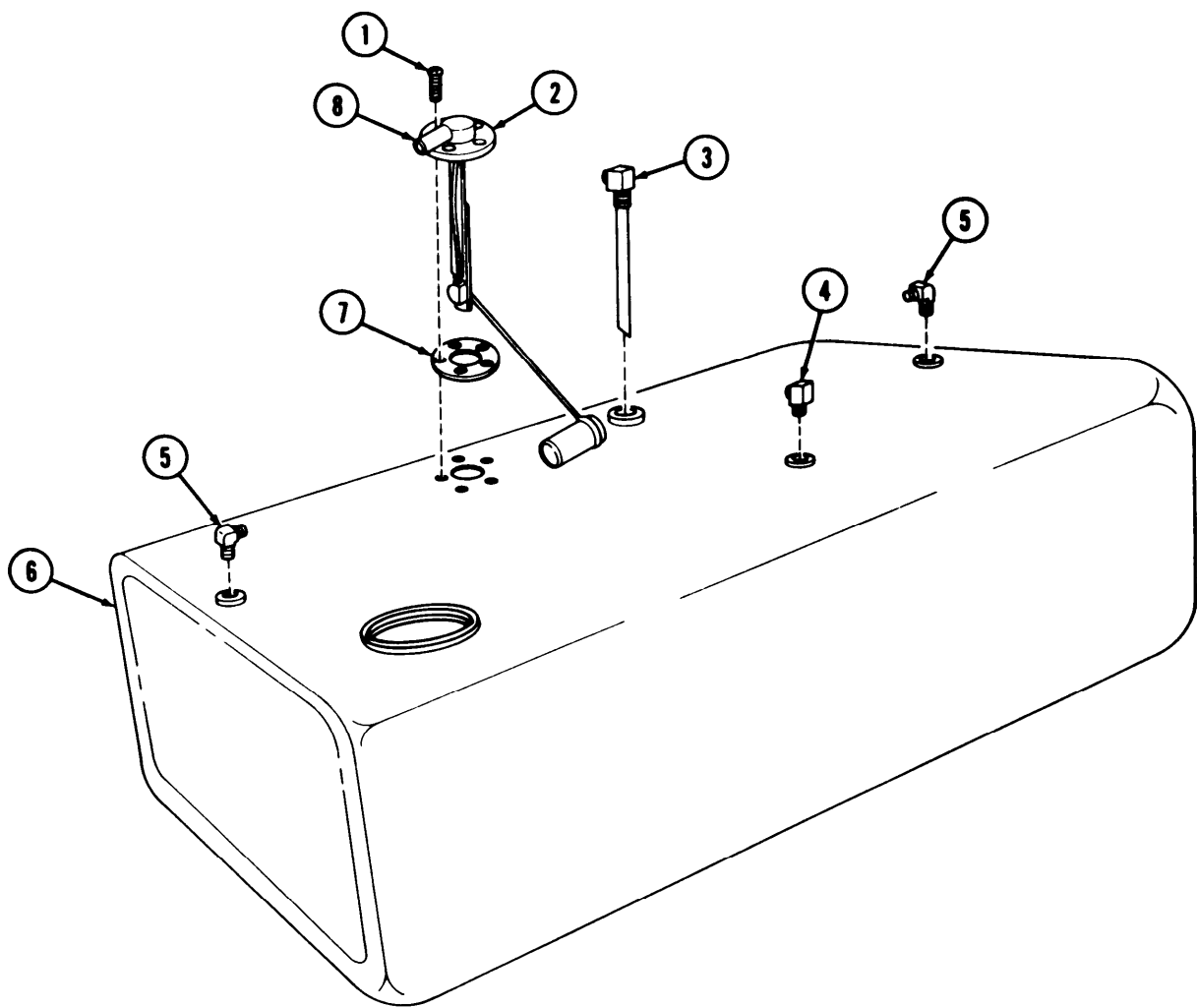
15.		Fuel tank (6)	Inspect for cracks, holes, and stripped threads.	Refer to FM 43-2.
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d. Installation**NOTE**

- I Male pipe threads must be wrapped with sealing tape before installation,
- I Do not use screw hole closest to frame. Ground wire will be installed at this location.

16.		New gasket (7) and fuel transmitter unit (2)	Install with four screws (1).
17.		Return line elbow (4) and two vent line elbows (5)	Install,
18.		Fuel supply tube and elbow (3)	Install.

3-23. FUEL TANK REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



3-23. FUEL TANK REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Assistant will help with step 19.

- | | | | |
|-----|--|-----------------------|--|
| 19. | | Fuel tank (18) | Place on two hangers (1). |
| 20. | | Two hanger straps (3) | Install on hangers (1) with two screws (2), new locknuts (4), and new locknuts (11). |

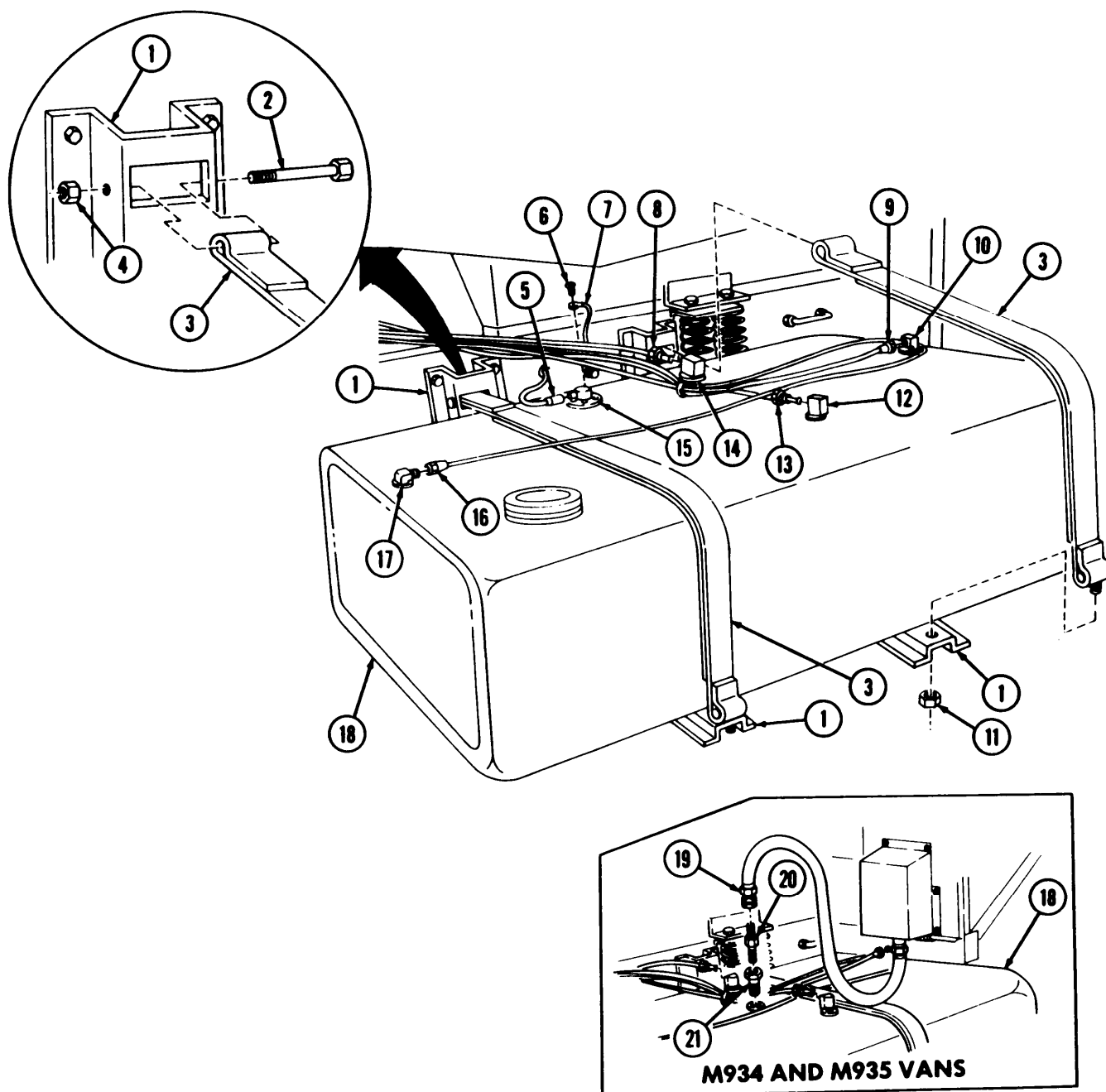
NOTE

Perform step 21 on M934 and M935 van.

- | | | | |
|-----|--|---|--|
| 21. | | Fitting (21), adapter (20), and personnel heater fuel supply line (19) | Install. |
| 22. | | Ground wire (7) | Install to fuel trans-mitter unit (15) with screw (6). |
| 23. | | Fuel transmitter wire (5) | Install. |
| 24. | | Fuel supply line (8) | Connect to elbow (14). |
| 25. | | Fuel return line (13) | Connect to elbow (12). |
| 26. | | Vent lines (9) and (16) | Connect to elbows (10) and (17). |

3-23. FUEL TANK REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Install fuel tank filler cap and spout (para. 3-22).

TA 349597

3-24. FUEL TANK (M936) REPLACEMENT

This task covers:

- | | |
|-------------|-----------------|
| a. Draining | c. Inspection |
| b. Removal | d. Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Outriggers unlocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Six lockwashers Six gaskets Eight locknuts Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P FM 43-2		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

a. DRAINING

- | | | | |
|----|----------------------|-----------------|---------|
| 1. | Top of fuel tank (5) | Filler cap (13) | Loosen. |
|----|----------------------|-----------------|---------|

NOTE

Have drainage container ready to catch fuel.

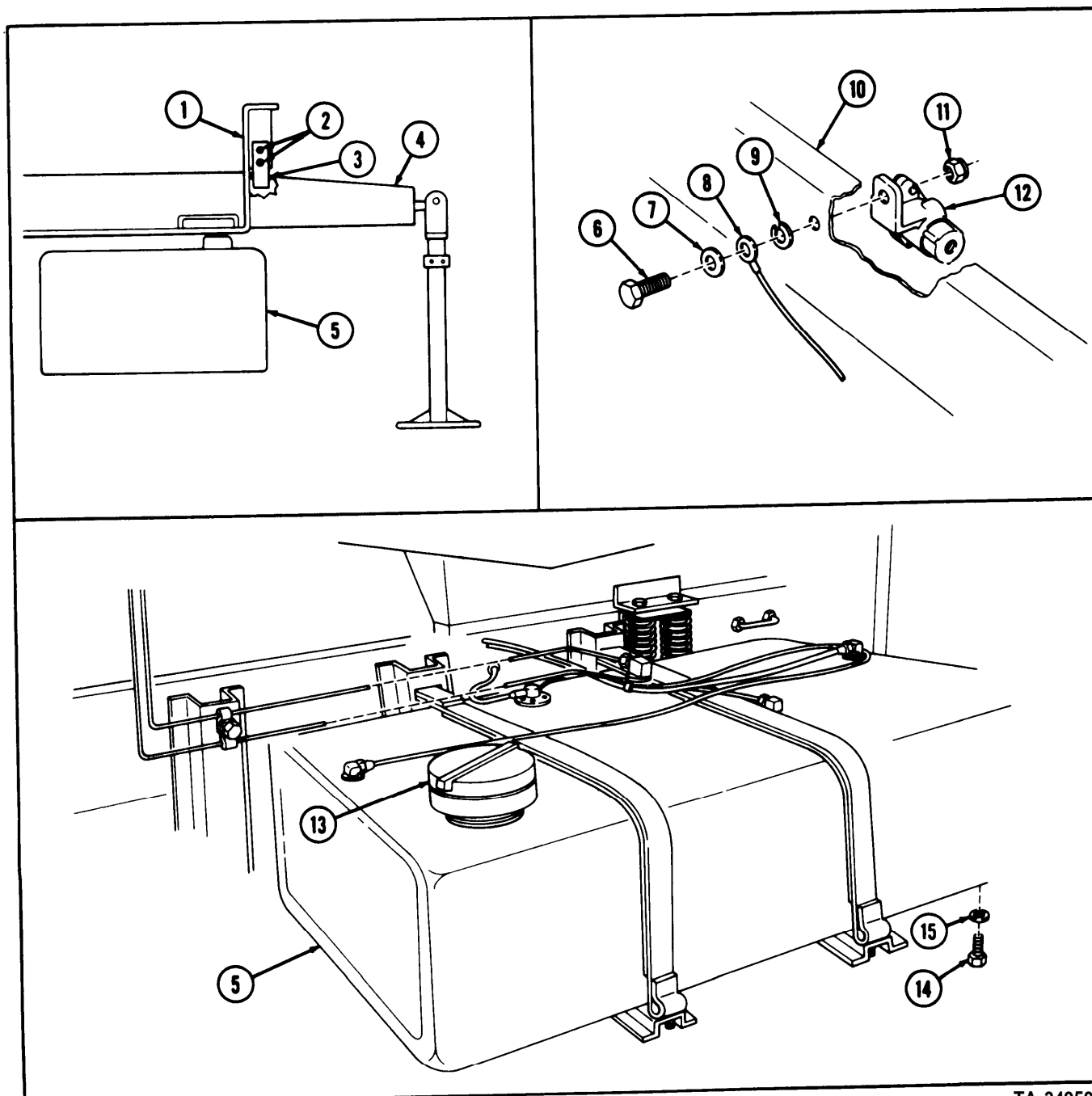
- | | | | | |
|----|-------------------------|------------------------------------|-------------------------------------|----------------------|
| 2. | Bottom of fuel tank (5) | Drainplug (14) and gasket (15) | Remove. | Discard gasket (15). |
| 3. | | New gasket (15) and drainplug (14) | Install after draining is complete. | |

b. Removal

- | | | | |
|----|------------------|-------------------------|---|
| 4. | Wrecker body (1) | Two nuts and screws (2) | Loosen and slide stop-plate (3) upward. |
|----|------------------|-------------------------|---|

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Outrigger (4)	Remove.	
6.	left side frame (10) and double check valve (12)	Locknut (11), lockwasher (9), ground wire (8), washer (7), and screw (6)	Remove.	Discard locknut (11) and lockwasher (9).

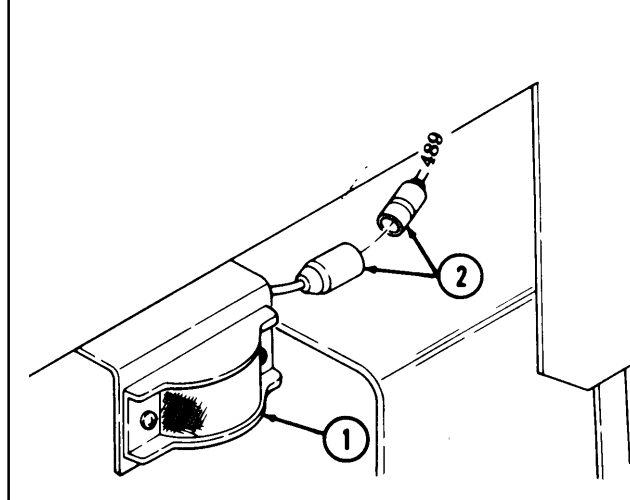
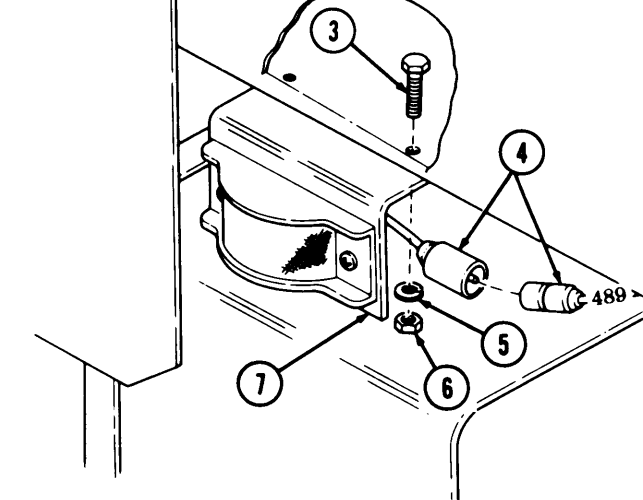
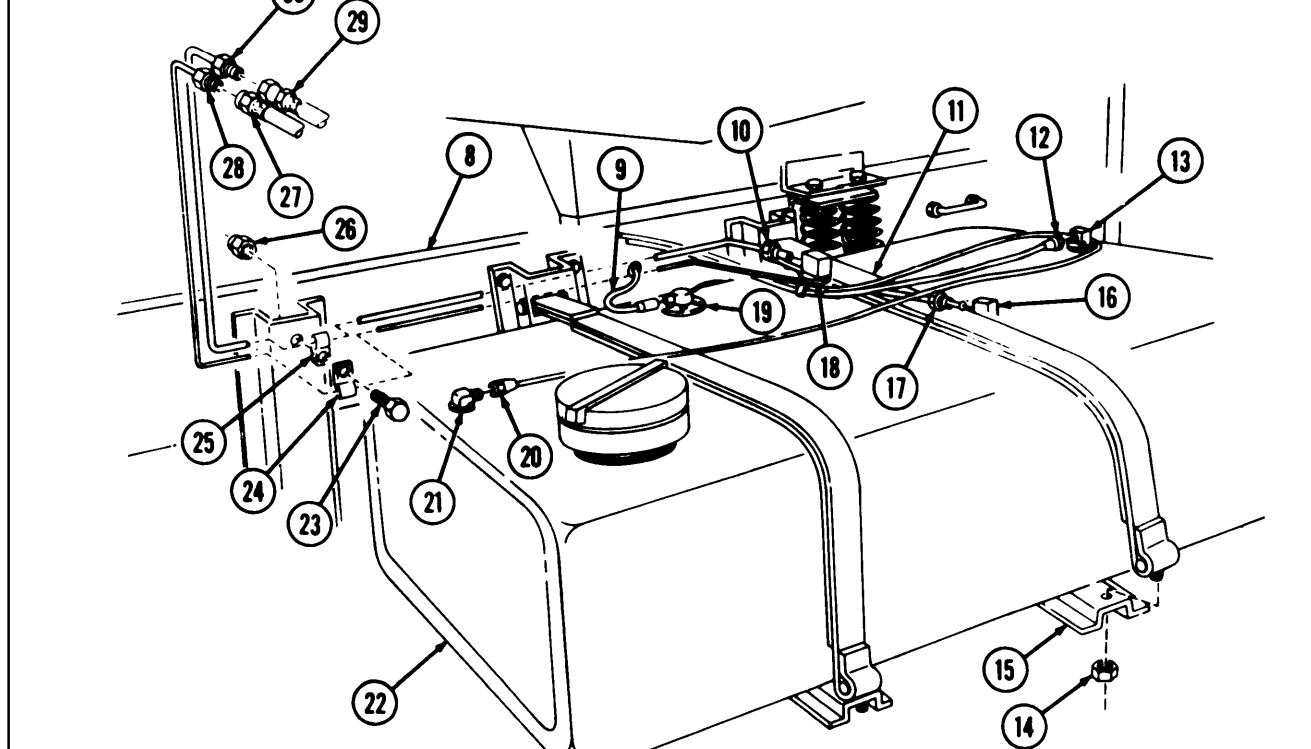


TA 349598

3-24. FUEL TANK (M936) REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
7.	Fuel transmitter (19)	Fuel transmitter wire (9)	Disconnect.	
8.	Underside of cab.	Rubber hose adapter (29) and supply line (30)	Disconnect.	Left tank only.
9.		Rubber hose adapter (27) and return line (28)	Disconnect.	Left tank only.
10.	Left side frame (8)	Locknut (26), screw (23), and clamps (24) and (25)	Remove.	Left tank only. Discard locknut (26).
11.	Elbow (18)	Fuel supply line (10)	Disconnect.	Right tank only.
12.	Elbow (16)	Fuel return line (17)	Disconnect.	Right tank only.
13.	Left side marker light (7)	Wire connector (4)	Disconnect.	
14.	Right side marker light (1)	Wire connector (2)	Disconnect.	
NOTE				
Assistant will help with steps 15 through 19.				
15.		Two screws (3), lockwashers (5), and nuts (6), and side marker light (7)	Remove.	Screws (3) are accessible through storage compartment 1A Refer to TM 8-2320-272-10. Discard lockwashers (5),
16.	Two hangers (15) and hanger straps (11)	Two locknuts (14)	Remove.	Discard locknuts (14).
NOTE				
Slide fuel tank out from vehicle for step 17.				
17.	Elbows (13) and (21)	Vent lines (12) and (20)	Remove.	Tag for installation.
18.	Elbows (16) and (18)	Fuel supply line (10) and return line (17)	Disconnect.	Left tank only.
19.	Two hangers (15)	Fuel tank (22)	Remove.	

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
		1		
		2		
		3		
		4		
		5		
		6		
		7		
		489		
		8		
		9		
		10		
		11		
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		19		
		20		
		21		
		22		
		23		
		24		
		25		
		26		
		27		
		28		
		29		
		30		

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
20.	Top of fuel tank (8)	Fuel supply tube and elbow (5)	Remove.	Mark direction of elbow (5) for installation.
21.		Vent line elbows (7) and (9), and fuel return elbow (6)	Remove.	Tag elbows (6), (7), and (9) for installation.
22.		Screw (2) and ground wire (3)	Remove.	
23.		Four screws (2), fuel transmitter unit (4), and gasket (11)	Remove.	Discard gasket (11). Mark direction of electrical connector for installation.
24.		Filler cap (1)	Remove and disconnect S-chain (13) from fuel strainer (12).	
25.		Fuel strainer (12) and gasket (10)	Remove.	Discard gasket (10).

c. Inspection

26.	Fuel tank (8)	Inspect for cracks, holes, and stripped threads.	Refer to FM 43-2 for repair.
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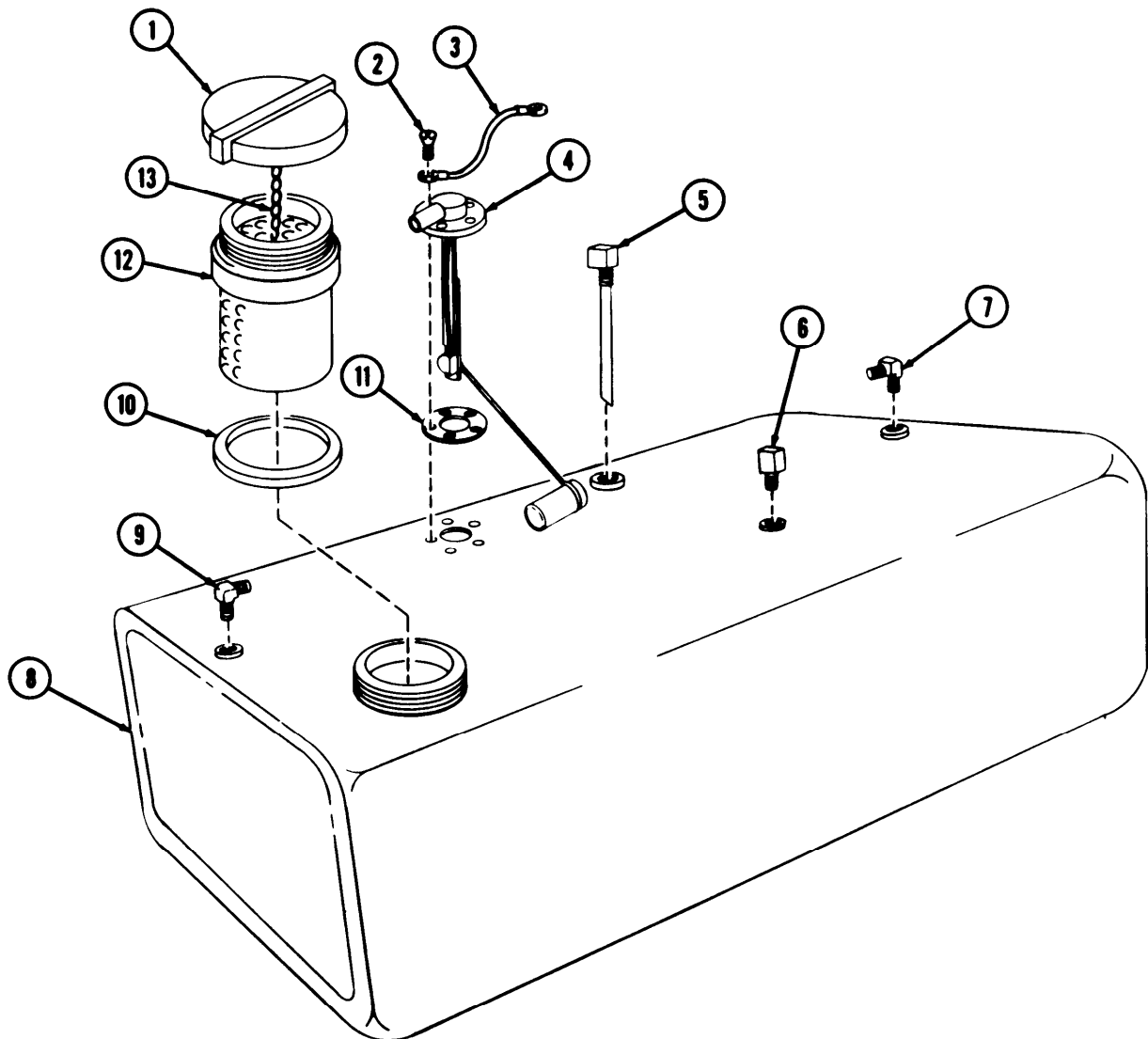
d. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation.

27.	New gasket (10) and fuel strainer (12)	Install.	
28.	Filler cap (1) with S-chain (13)	Connect S-chain (13) to fuel strainer (12) and install filler cap (1).	
29.	New gasket (11) and fuel transmitter unit (4)	Install with four screws (2).	Omit screw hole closest to frame.
30.	Ground wire (3)	Install to fuel transmitter unit (4) with screw (2).	
31.	Return line elbow (6) and vent line elbows (7) and (9)	Install.	

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Assistant will help with steps 32 through 36,

32.		Fuel tank (22)	Place on two hangers (15).	
33.		Fuel supply line (10)	Install to elbow (18).	
34.		Vent lines (12) and (20)	Connect to elbows (13) and (21).	
35.		Fuel return line (17)	Connect to elbow (16).	
36.		Two hanger straps (11)	Install on two hangers (15) with two new locknuts (14).	

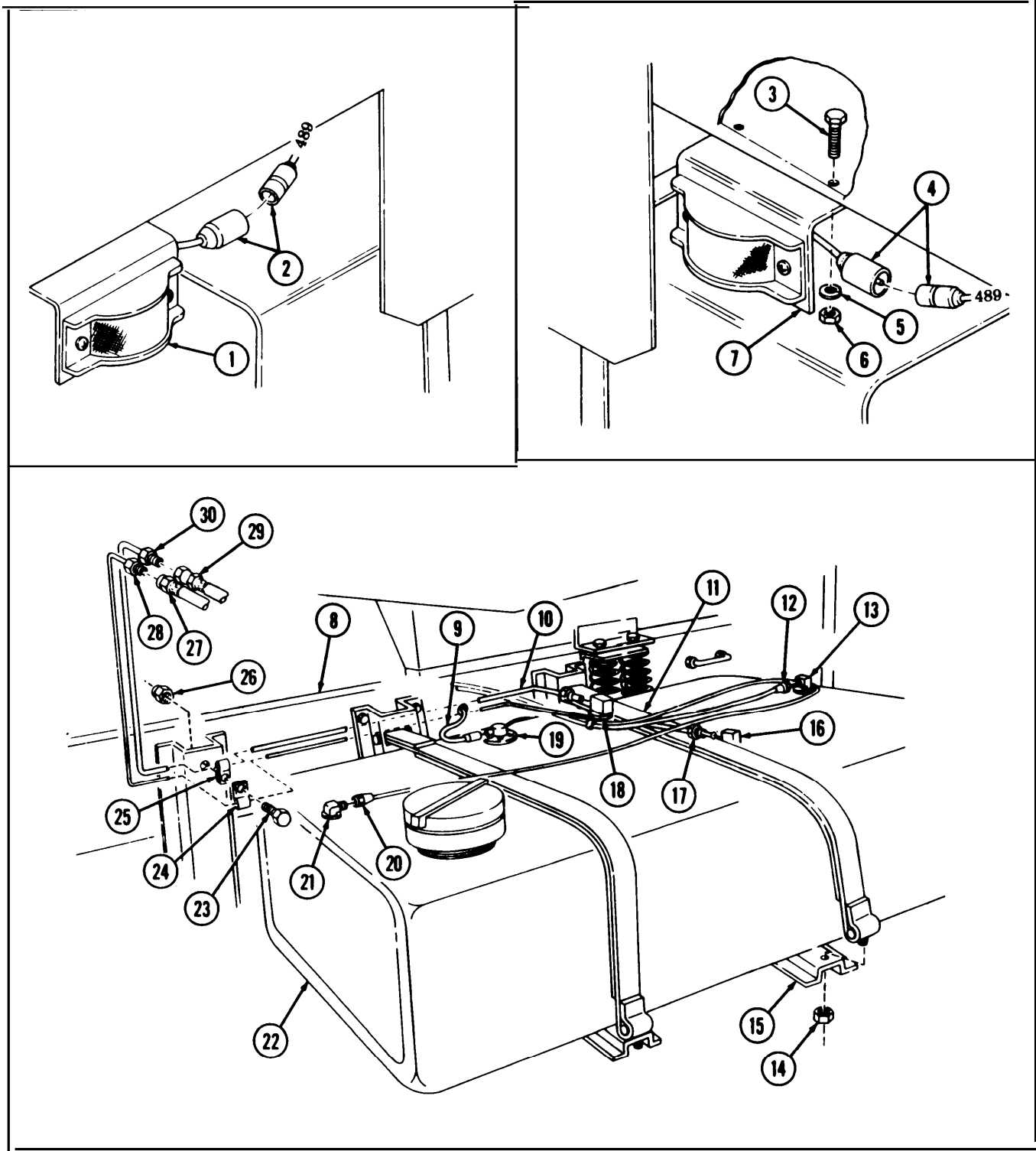
NOTE

Slide fuel tank in before performing steps 37 and 38.

37.		Left side marker light (7)	Install with two screws (3), new lockwashers (5), and nuts (6).	
38.		Right side marker light (1) and wire connector (2)	Connect.	
39.		Left side marker light (7) and wire connector (4)	Connect.	
40.		Fuel supply line (30)	Connect to rubber hose adapter (29),	Left tank only.
41.		Fuel return line (28)	Connect to rubber hose adapter (27).	Left tank only.
42.		Clamps (24) and (25)	Install to frame (8) with screw (23) and new locknut (26).	Left tank only.
43.		Fuel transmitter wire (9)	Connect to fuel transmitter unit (19).	

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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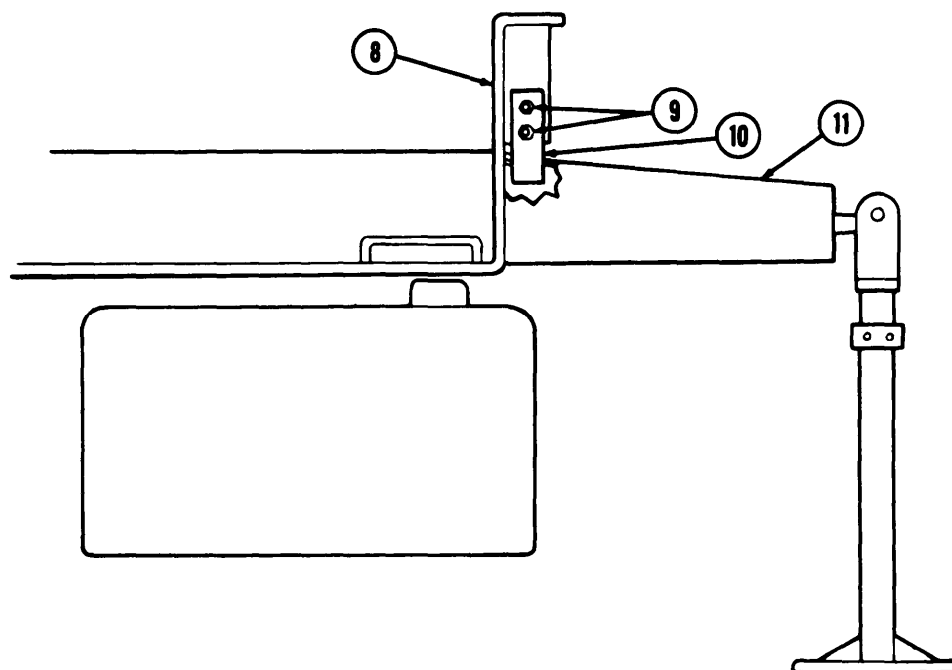
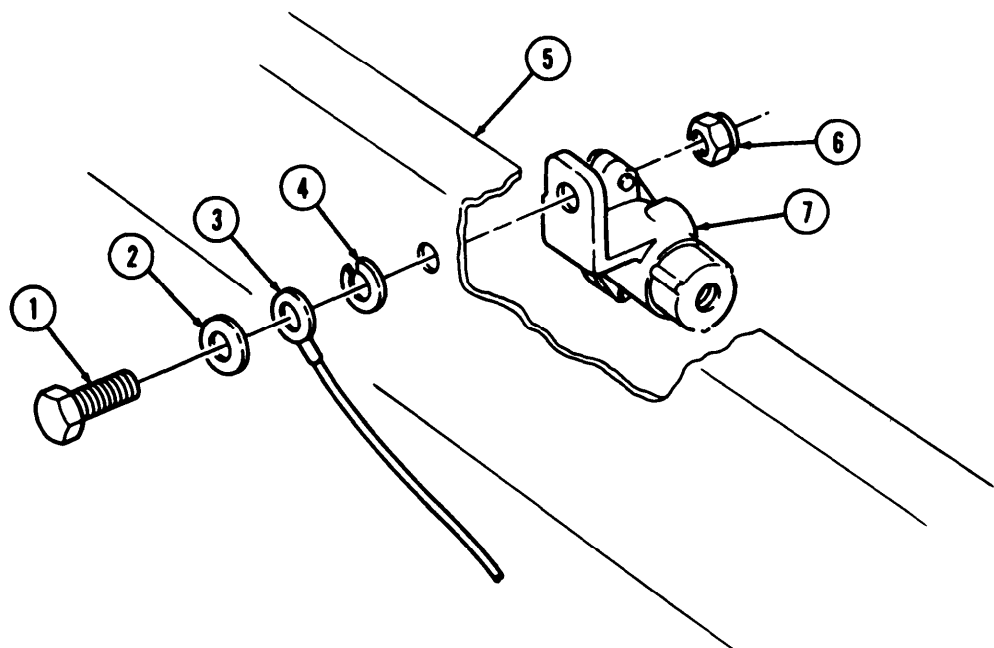
TA349601

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
44.		Ground wire (3)	Install to frame (5) and double check valve (7) with screw (1), washer (2), new lockwasher (4), and new locknut (6).	
45.		Stop plate (10)	Loosen two nuts and screws (9) and slide upward,	
46.		Outrigger (11)	a. Install in wrecker body (8). b. Slide stop plate (10) down. c. Tighten two nuts and screws (9).	Stop plate (10) must contact back of slot in top of outrigger(11).

3-24. FUEL TANK (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Relock outriggers in stowage position (TM 9-2320-272-10).
 . Start engine and road test vehicle (TM 9-2320-272-10).

TA 349602

3-25. FUEL TANK HANGERS AND RETAINING STRAPS REPLACEMENT

This task covers:

- a. Removal
b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference.</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 3-23 Para. 7-33	Parking brake set. Fuel tank(s) removed. Wet air reservoir of dual fuel tank models (M929, M930, M931, M932, M936) (right side fuel tank only) removed. Fuel tank(s) (M936) removed.
<u>Test Equipment</u>	Para. 3-24	
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers Twenty-three locknuts Adhesive sealant (Appendix D, Item 2)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

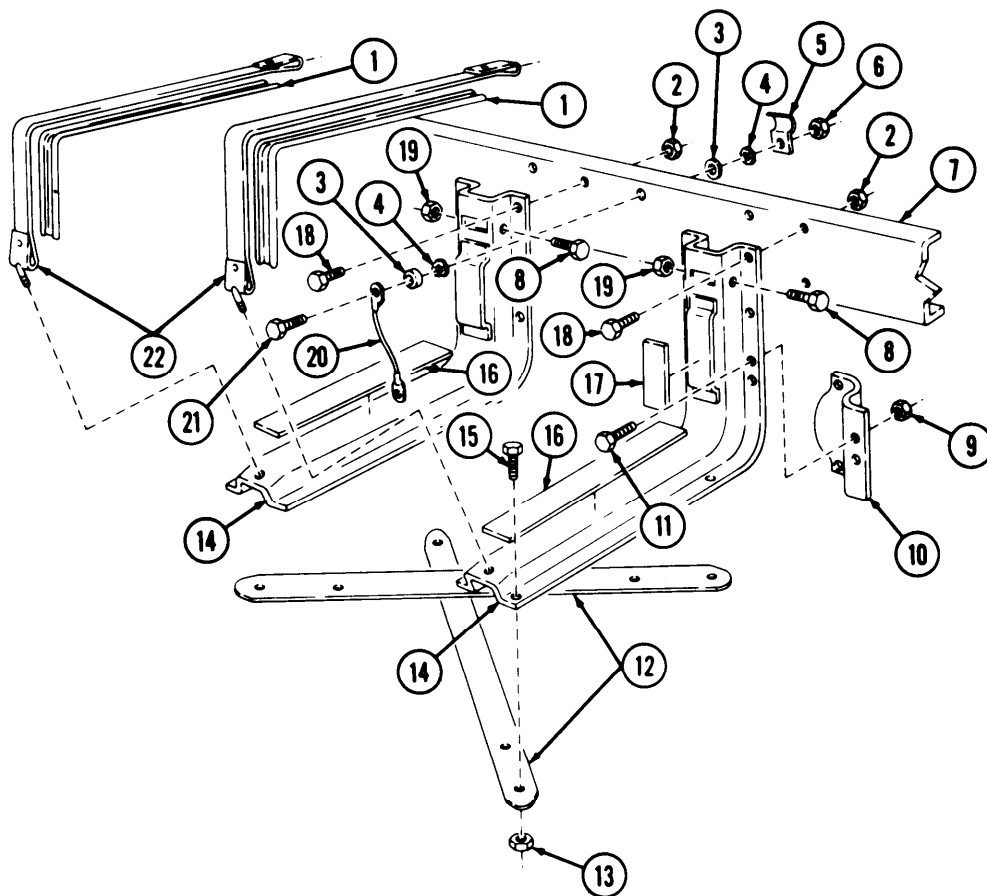
On models with dual fuel tanks (M929, M930, M931, M932, M936), forward fuel tank hanger, right side, must be removed and installed at Direct Support maintenance.

a. Removal

- | | | | | |
|----|----------------------------|---|---------|------------------------|
| 1. | Two fuel tank hangers (14) | Two locknuts (19), screws (8), retaining straps (22), and insulators (1) | Remove. | Discard locknuts (19). |
| 2. | | Eight locknuts (13) and screws (15), and two hanger stabilizing straps (12) | Remove. | Discard locknuts (13). |
| 3. | | Four locknuts (9) and screws (11), and two support brackets (10) | Remove. | Discard locknuts (9). |

3-25. FUEL TANK HANGERS AND RETAINING STRAPS REPLACEMENT (Cent'd).

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
4.	Frame side rail (7)	Screw (21), two washers (3), fuel tank ground wire (20), two lockwashers (4), wiring harness bracket (5), and locknut (6)	Remove.	Discard lockwashers (4) and locknut (6).
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Assistant required for step 5.</p>				
5.	Frame side rail (7)	Eight locknuts (2) and screws (18), and two fuel tank hangers (14)	Remove.	Discard locknuts (2).
6.	Two fuel tank hangers (14)	Two rubber sheets (16) and rubber sheets (17)	Remove.	



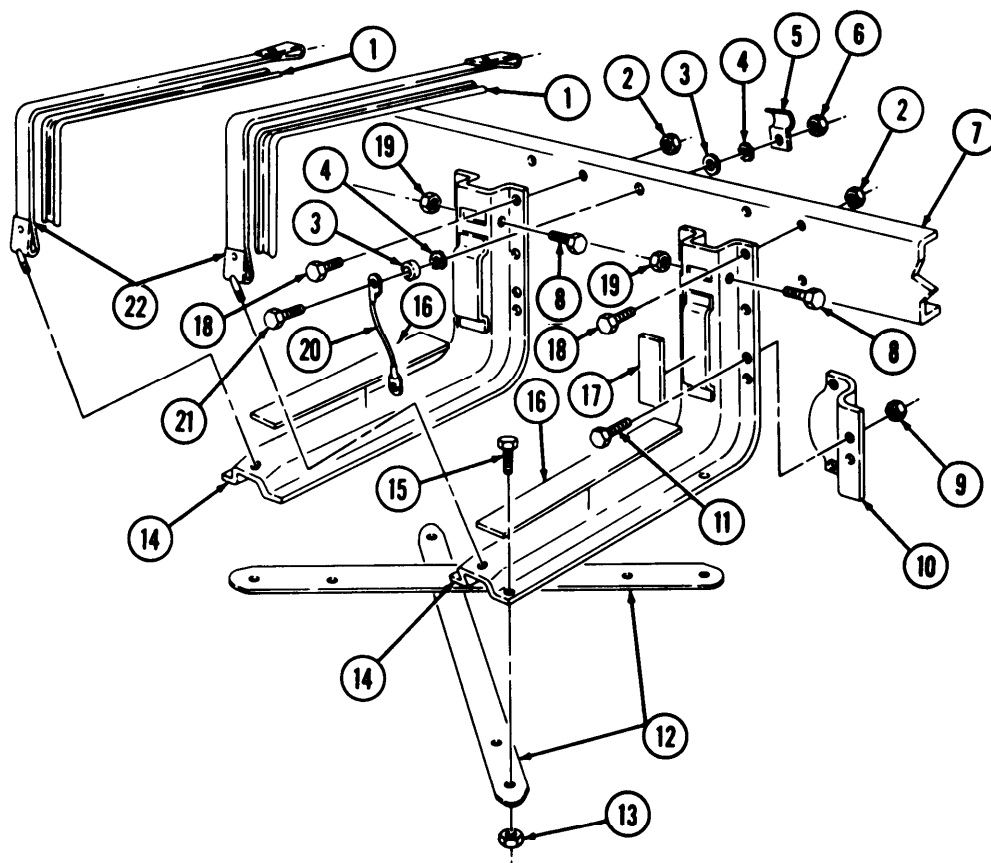
TA 349603

3-25. FUEL TANK HANGERS AND RETAINING STRAPS REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
7.		Two rubber sheets (16) and rubber sheets (17)	Inspect for deteriorated or missing rubber sheets.	Replace if deteriorated or missing.
8.		Two insulators (1)	Inspect for deterioration or missing insulators.	Replace if deteriorated or missing.
c. Installation				
9,		Two rubber sheets (16) and rubber sheets (17)	Install with adhesive sealant.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Assistant required for step 10.</p>				
10.		Fuel tank hangers (14)	Install with eight new locknuts (2) and screws (18).	
11.		Fuel tank ground wire (20) and wiring harness bracket (5)	Install to frame side rail (7) with screw (21), two washers (3) and new lockwashers (4), and new locknut (6),	Position wiring harness bracket (5) over wiring harness.
12.		Two support brackets (10)	Install with four new locknuts (9) and screws (11).	
13.		Two fuel tank hanger stabilizing straps (12)	Install with eight new locknuts (13) and screws (15).	
14.		Two retaining straps (22) and two insulators (1)	Install with two screws (8) and new locknuts (19).	

3-25. FUEL TANK HANGERS AND RETAINING STRAPS REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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- FOLLOW-ON TASKS:**
- Install fuel tank(s) (para. 3-23).
 - Install wet air reservoir of dual fuel tank models (M929, M930, M931, M932, M936) (right side fuel tank only) (para. 7-33).
 - Install fuel tank(s) (M936) (para. 3-24).

3-26. AFC STANDARD PUMP FILTER REPLACEMENT

This task covers:

- a. Removal

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All (except M936)	TM 9-2320-272-10	Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket		
Filter		
Dry cloth (Appendix C, Item 21)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

CAUTION

Fuel pump exterior must be cleaned before falter cap is removed to prevent foreign particles from entering fuel pump.

- | | | | | |
|----|---------------------|----------------------------------|-----------------|----------------------|
| 1. | Left side of engine | Fuel pump (5) | Clean exterior. | Use clean dry cloth. |
| 2. | Fuel pump (5) | Filter cap (3) and gasket (4) | Remove. | Discard gasket (4). |
| 3. | | Filter spring (2) and filter (1) | Remove. | Discard filter (1). |

b. Installation

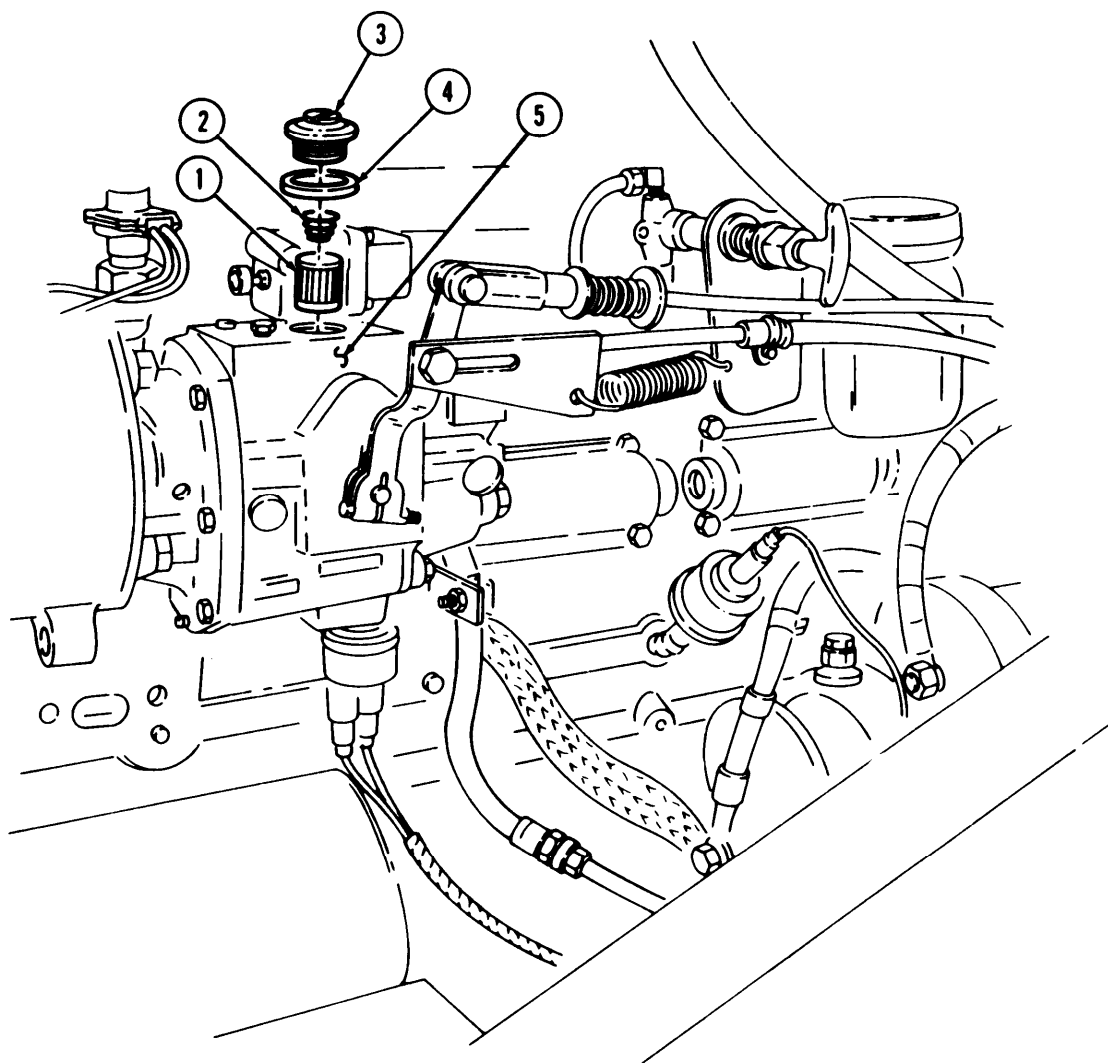
CAUTION

Make sure small end of filter spring is against filter to ensure proper flow. Failure to do this will result in fuel pump damage.

- | | | | |
|----|------------|----------|-------------------------|
| 4. | Filter (1) | Install. | Install open end first. |
|----|------------|----------|-------------------------|

3-26. AFC STANDARD PUMP FILTER REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Filter spring (2) and gasket (4)	Install on filter cap (3).	
6.		Filter cap (3)	Install.	Tighten 8-12 lb-ft (11-16 N•m).



END OF TASK!

FOLLOW-ON TASKS: • Install left splash shield (TM 9-2320-272-10).
 • Start engine (TM 9-2320-272-10) and check for leaks.

TA 349605

3-27. FUEL PUMP WITH VS GOVERNOR FILTER REPLACEMENT

This task covers:

a. Removalb. Installation

INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
“O” ring Dry cloth (Appendix D, Item 21)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Diesel fuel is flammable. Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP .NO	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a, Removal

WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

CAUTION

Fuel pump exterior must be cleaned before filter cap is removed to prevent foreign particles from entering fuel pump.

1. Left side of engineFuel pump (1)Clean exterior. Use clean dry cloth,

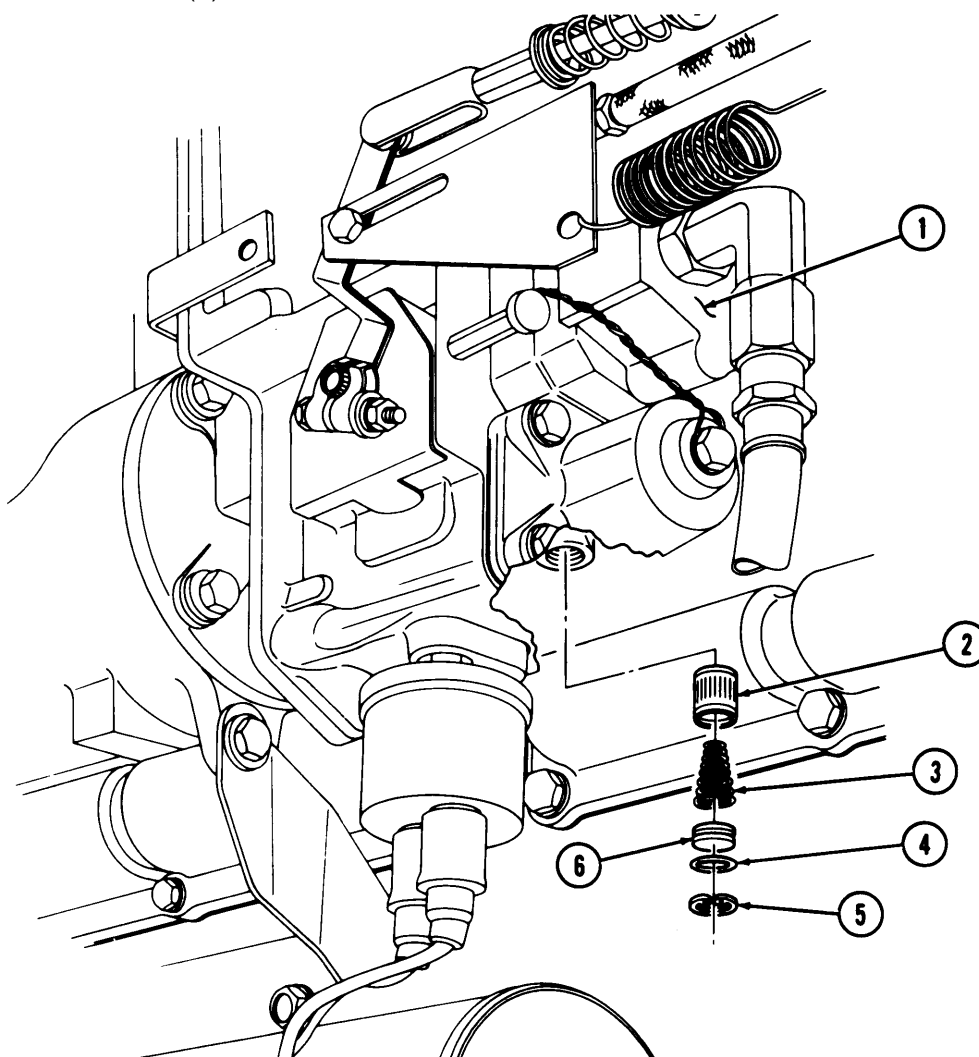
NOTE

Place hand under fuel filter to catch assembly when snapping is removed.

2. Fuel pump (1)Snapping (5), retainer (6), filter spring (3), and filter (2)Remove. Use snapping pliers.
3. Retainer (6)“O” ring (4)Remove. Discard “O” ring (4).
4. Filter (2)Inspect for holes or imbedded metal particles. If holes or metal particles are found, discard filter,

3-27. FUEL PUMP WITH VS GOVERNOR FILTER REPLACEMENT (Cont'd)

Step NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
5.		New "O" ring (4)	Install on retainer (6).	
<p>CAUTION</p> <p>Small end of filter spring and hole in filter screen must be facing up to pump to allow fuel flow. Failure to do this will result in fuel pump damage.</p>				
6.		Filter screen (2), filter spring (3) and retainer (6)	Install in fuel pump (1) Use snapping pliers. with snapping (5).	



END OF TASK!

FOLLOW-ON TASKS • Prime fuel system (TM 9-2320-272-10).
• Replace left splash shield (TM 9-2320-272-10).

3-28. FUEL PRIMER PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

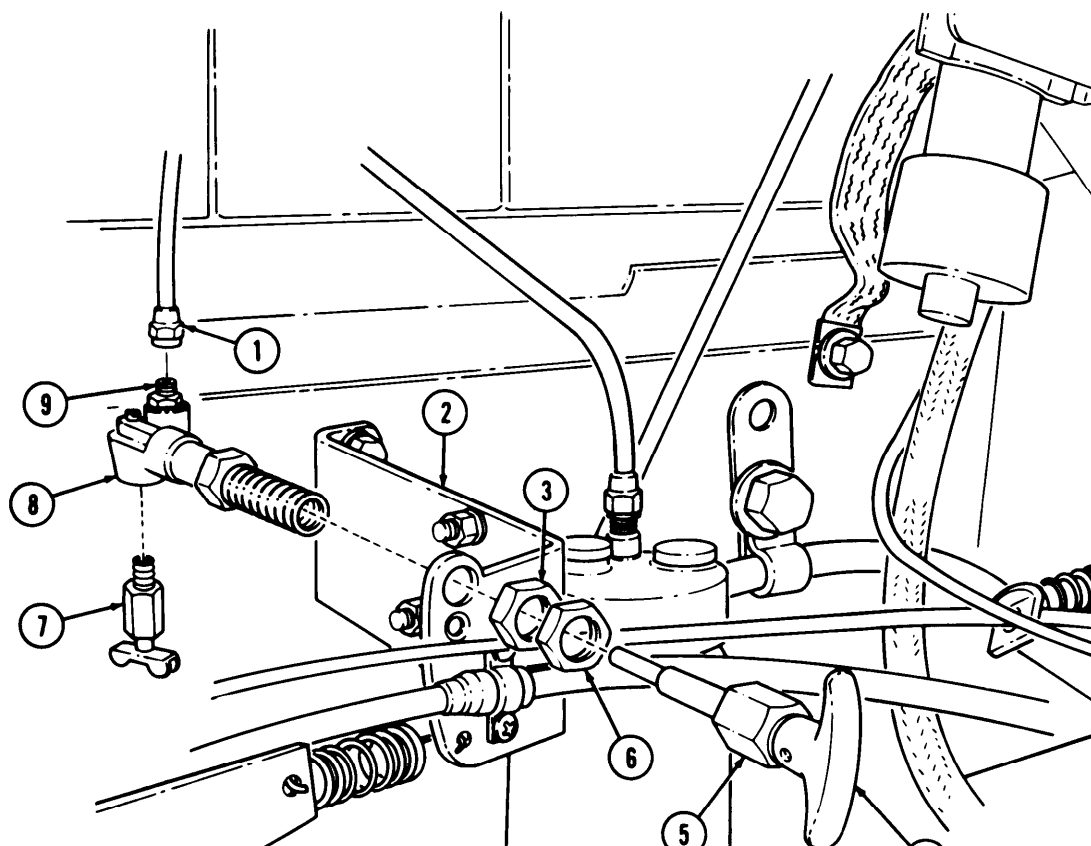
INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Plunger retainer locknut		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Primer pump (8)	Draincock (7)	Open.	Have drainage container ready to catch fuel.
2.	Fuel primer adapter (9)	Fuel primer supply line (1)	Disconnect.	
3.	Plunger retainer (5)	Plunger retainer locknut (6)	Loosen.	
4.		Plunger retainer (5)	Loosen.	
5.	Primer pump (8)	Plunger (4)	Remove.	
6.		Plunger retainer locknut (6)	Remove.	Discard locknut (6)
7.	Primer pump (8) to accelerator bracket (2)	Jamnut (3)	Remove.	
8.		Primer pump (8)	Remove.	
9.	Primer pump (8)	Draincock (7)	Remove.	
b. Installation				
10.		Draincock (7)	Install in primer pump (8).	
11.		Primer pump (8)	Install on accelerator bracket (2) with jamnut (3).	Tighten jamnut (3) against accelerator bracket (2).

3-28. FUEL PRIMER PUMP REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
12.		New plunger retainer locknut (6)	Install on primer pump (8).	
13.		Plunger :4)	Install into primer pump (8).	
14.		Plunger retainer (5)	Tighten.	
15.		Locknut (6)	Tighten against plunger retainer (5).	
16.		Fuel primer supply (1)	Connect to fuel primer adapter (9).	



END OF TASK!

FOLLOW-ON TASK: Prime fuel system (TM 9-2320-272- 10).

3-29. FUEL FILTER MAINTENANCE

This task covers:

- | | |
|-------------|----------------------------|
| a. Draining | c. Cleaning and Inspection |
| b. Removal | d. Installation |

INITIAL SETUP:

APPLICABLE MODELS		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>	<u>Special Environmental Conditions</u>	
None	None	
<u>Materials/Parts</u>		
Fluid pressure parts kit		
Lint-free cloth (Appendix D, Item 9)		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
<u>General Safety Instructions</u>		
<ul style="list-style-type: none">. Diesel fuel is flammable. Do not perform this procedure near flames.. Keep fire extinguisher nearby when using dry cleaning solvents.		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame. Injury to personnel may result.

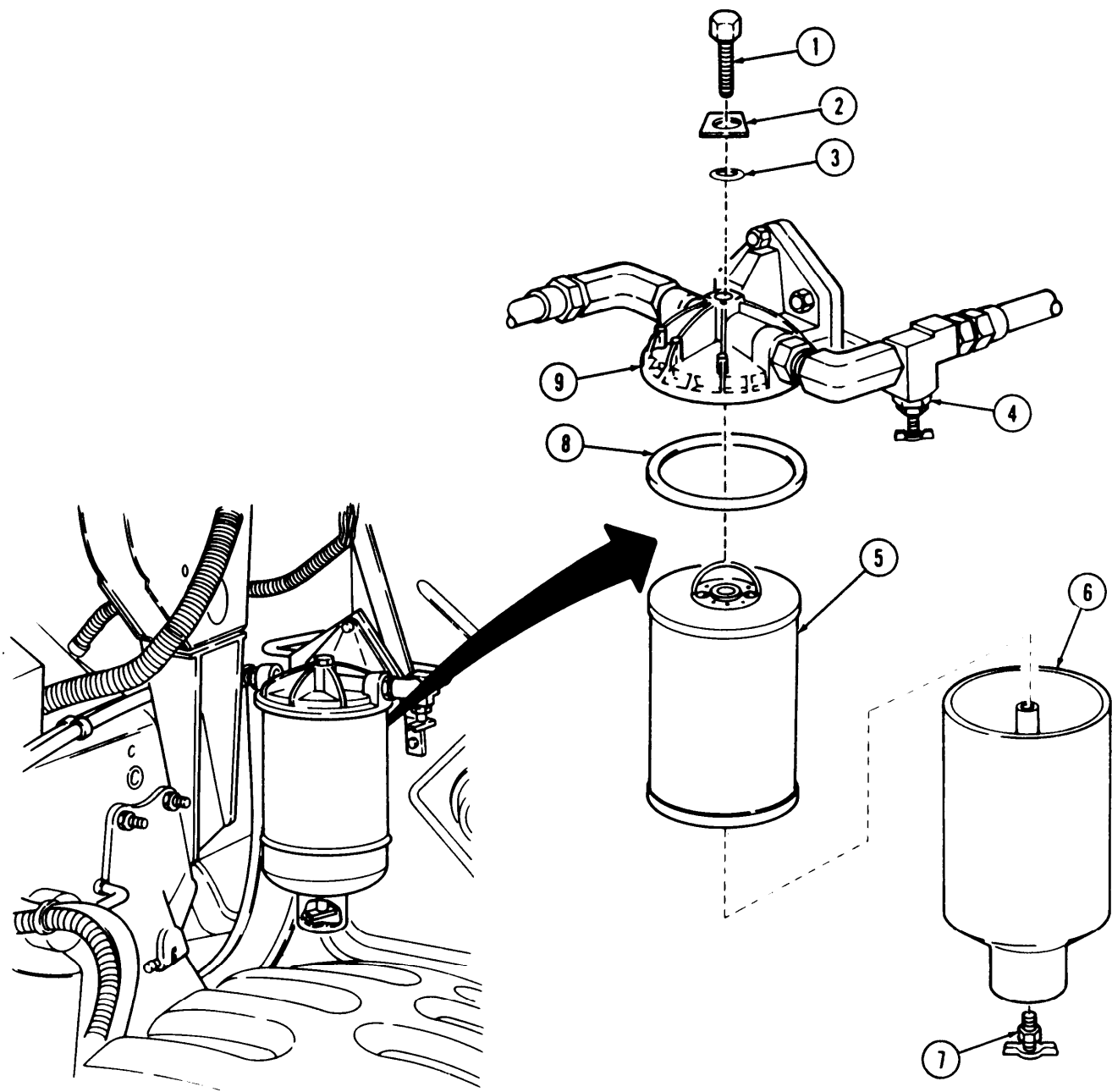
a. Draining

- | | | | | |
|----|-----------------------------|---|-------|--|
| 1. | Underside of left front cab | Filter inlet line draincock (4) and fuel filter draincock (7) | Open. | Have drainage container ready to catch fuel.
When drained, close both draincocks (4) and (7). |
|----|-----------------------------|---|-------|--|

b. Removal

- | | | | | |
|----|------------------|---|---------|---|
| 2. | Filter cover (9) | Center bolt (1), square washer (2), and "O" ring (3) | Remove. | Discard "O" ring (3). |
| 3. | Filter case (6) | Gasket (8) and filter element (5) | Remove. | Discard gasket (8) and fuel filter element (5). |
| 4. | | Draincock (7) | Remove. | |

3-29. FUEL FILTER MAINTENANCE (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



3-29. FUEL FILTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Cleaning and Inspection**WARNING**

Drycleaning solvent is flammable and will not be used near open flame, Use only in well-ventilated places. Failure to do this may result in injury to personnel.

5.		Filter cover (9) and filter case (6)	Clean with drycleaning solvent and dry with dry lint-free cloth.	
6.		Draincock (7)	Inspect for stripped threads,	Replace if threads are stripped.

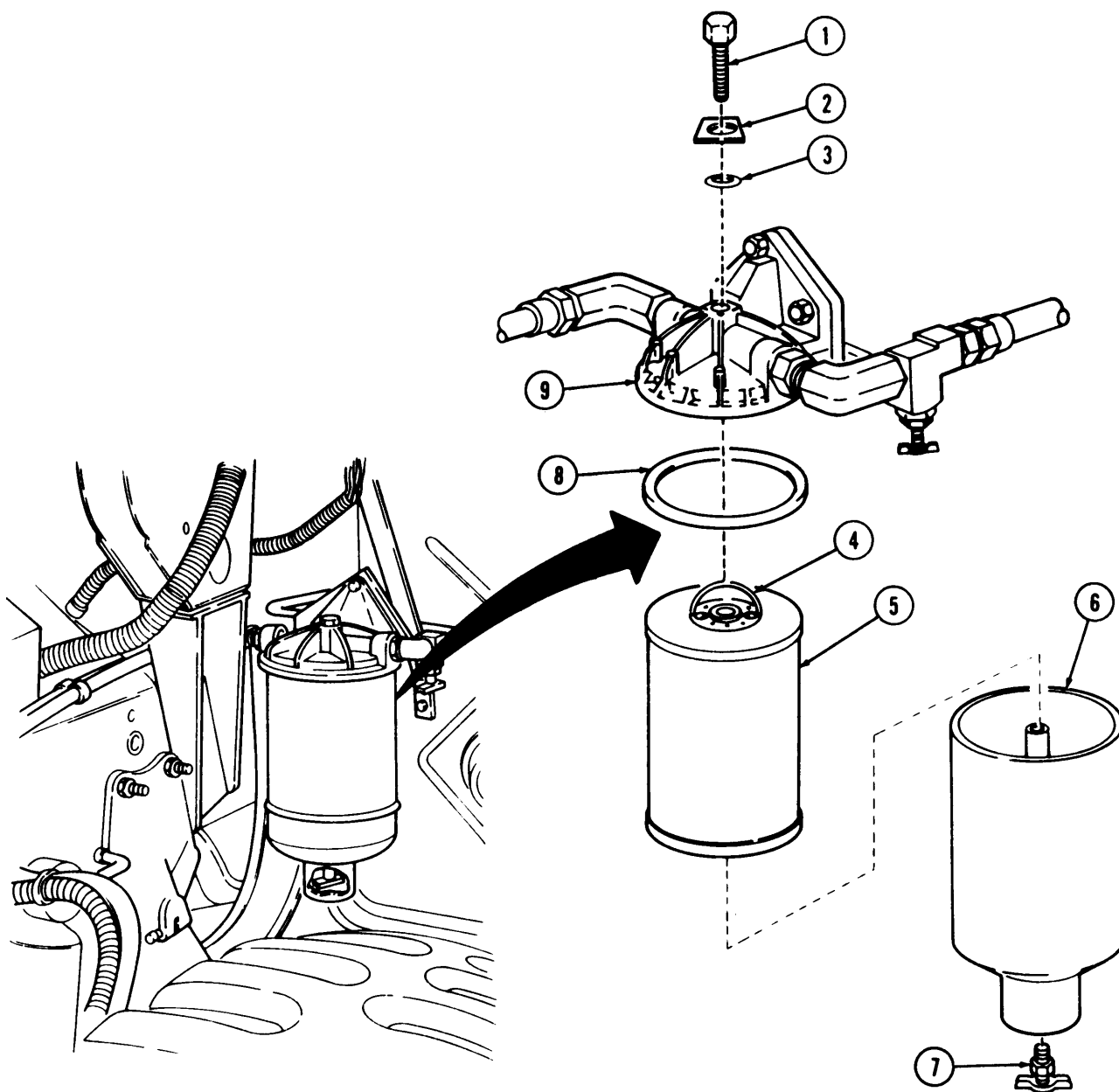
d. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation,

7.		Draincock (7)	Install in filter case(6).	
8.		New gasket (8)	Position in filter cover (9).	
9.		New filter element (5)	a. Place in filter case (6). b. Fill to top of case (6) filter cover (9) with fuel.	Fuel filter element handle (4) must face
10.		Filter case (6)	a. Position against filter cover (9). b. Install with new "O" ring (3), washer (2), and screw (1).	Tighten to 20-25 lb-ft (27-34 N•m).

3-29. FUEL FILTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:

- Prime fuel system (TM 9-2320-272-10).
- Start engine (TM 9-2320-272-10) and check for leaks.

TA 349609

3-30. FUEL FILTER COVER AND ADAPTER MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
Ail	TM 9-2320-272-10 Para. 3-29	Parking brake set. Fuel filter element and cover removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three locknuts Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Diesel fuel is flammable. Do not perform this procedure near flames,
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame, Injury to personnel may result.

a. Removal

- | | | | | |
|----|-----------------------------|-----------------------------------|---|-----------------------|
| 1. | Underside of left front cab | Filter inlet line (8) | Disconnect at adapter fitting (7). | |
| 2, | | Filter outlet line (1) | Loosen at adapter elbow (2), | |
| 3, | | Adapter elbow (2) | Loosen at falter cover (11). | |
| 4. | Mounting bracket (4) | Three screws (3) and locknuts (5) | Remove. | Discard locknuts (5), |
| 5, | | Filter cover (11) | Disconnect at filter adapter elbow (2). | |
| 6. | | Filter outlet line (1) | Disconnect at filter adapter elbow (2). | |

NOTE

Assistant will help with steps 7 and 8.

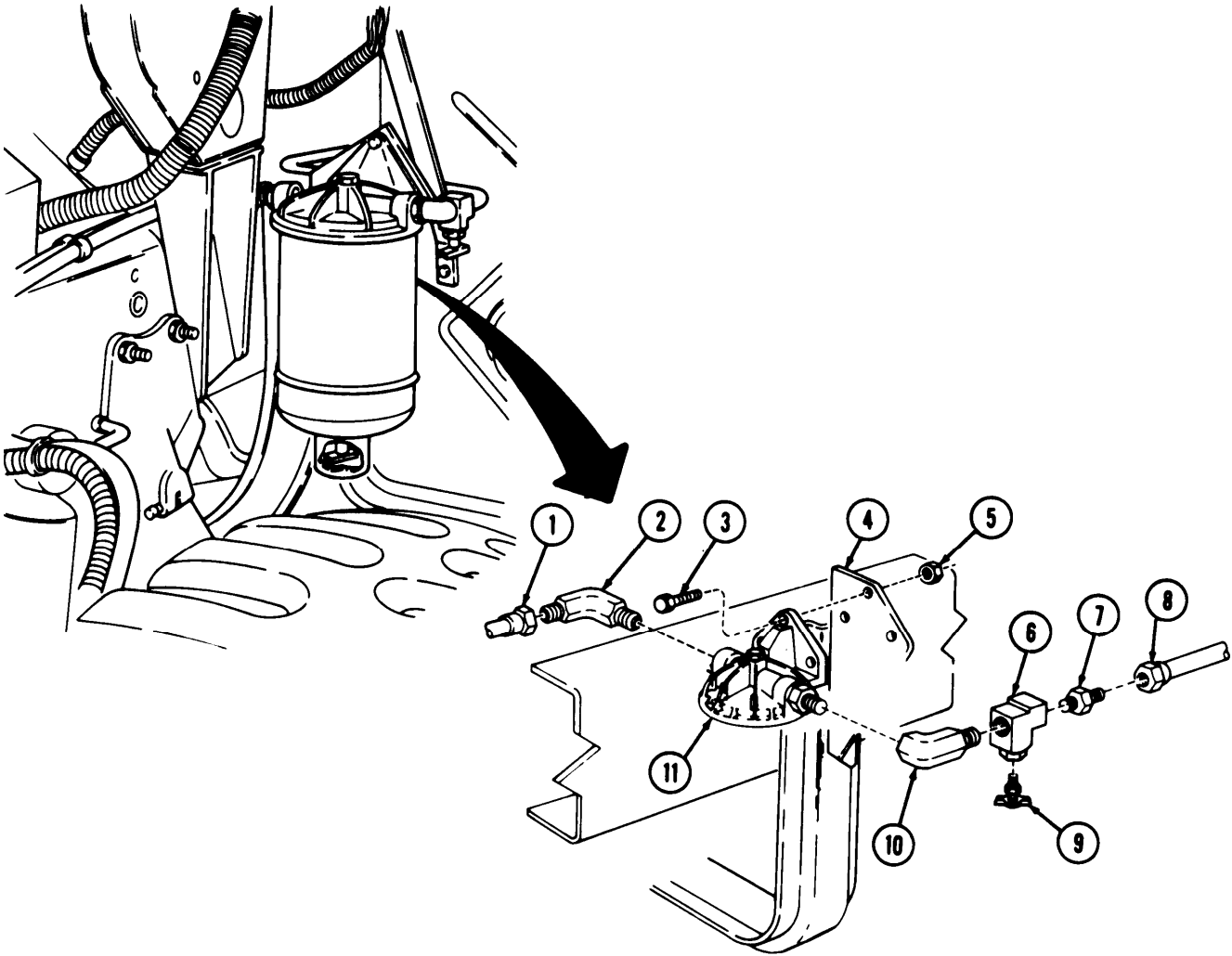
- | | | | |
|----|-----------------|-------------|---------|
| 7. | Tee adapter (6) | Adapter (7) | Remove. |
|----|-----------------|-------------|---------|

3-30. FUEL FILTER COVER AND ADAPTER MAINTENANCE (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.		Draincock (9)	Remove.	
9.	Adapter elbow (10)	Tee adapter (6)	Remove.	
10,	Fuel filter cover (11)	Adapter elbow (10)	Remove.	

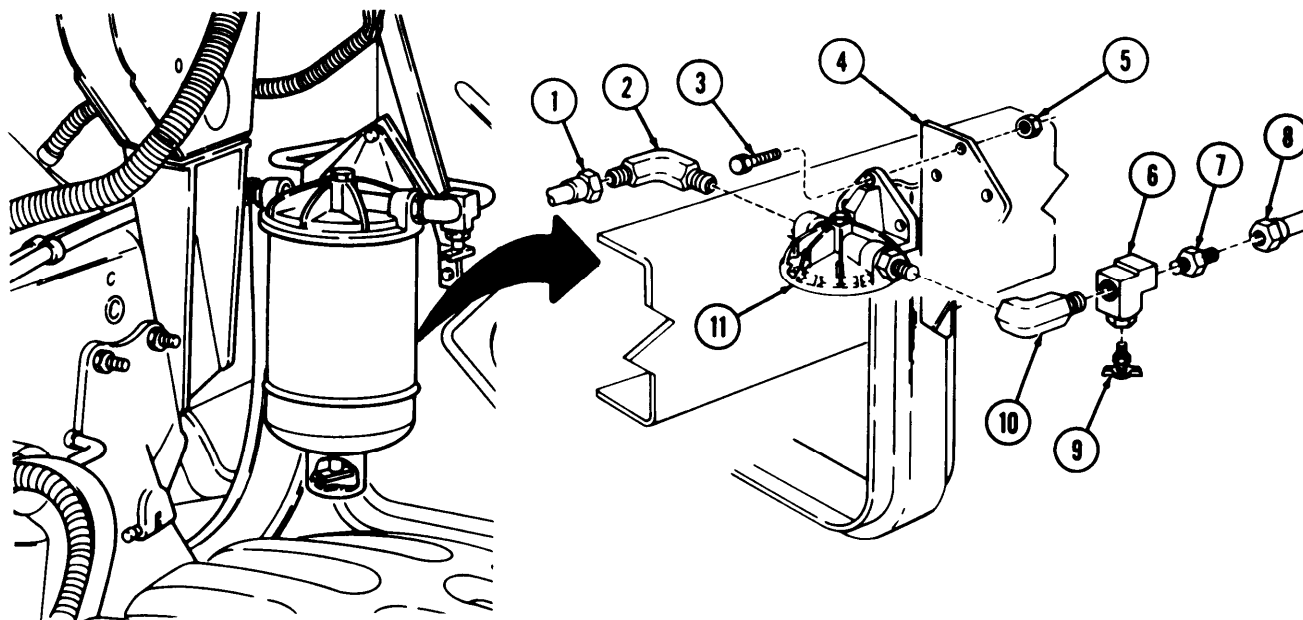
b. Inspection

11.	Adapter elbows (2) and (10), tee adapter (6), adapter (7), and draincock (9)	Inspect for stripped threads.	Replace if threads are stripped.
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3-30. FUEL FILTER COVER AND ADAPTER MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
<p style="text-align: center;">NOTE</p> <p>Male pipe threads must be wrapped with sealing tape before installation,</p>				
12.		Adapter elbow (10)	Connect to fuel falter cover (1 1).	
13.		Tee adapter (6)	Connect to adapter elbow (10).	
14.		Draincock (9) and adapter (7)	Install in tee adapter (6).	
15.		Filter outlet line (1)	Connect to adapter elbow (2).	
16.		Adapter elbow (2)	Connect to fuel falter cover (1 1).	
17.		Fuel filter cover (11)	Install on mounting bracket (4) with three screws (3) and new locknuts (5).	
18.		Fuel inlet line (8)	Connect to adapter (7).	



END OF TASK!

FOLLOW-ON TASKS:

- Install fuel filter element and cover (para. 3-29).
- Prime fuel system (TM 9-2320-272-10).
- Start engine (TM 9-2320-272-10) and check for fuel leaks.

TA 349611

Section IV. ACCELERATOR SYSTEM

3-310 GENERAL

This section provides maintenance procedures assigned to the organizational level for the accelerator, throttle, and emergency stop controls. To find a specific maintenance procedure, see the maintenance task summary below:

3-32. ACCELERATOR SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-33.	Accelerator Pedal, Bracket, Rod, and Stop Screw Replacement	3-86
3-34.	Accelerator Pedal Link to Fuel Pump Throttle Lever Rod Maintenance	3-88
3-35.	Modulator and Cable Maintenance	3-92
3-36.	Emergency Stop Control and Cable Maintenance	3-96
3-37.	Throttle Control and Cable Maintenance	3-100

3-33. ACCELERATOR PEDAL, BRACKET, ROD, AND STOP SCREW REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield remove.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two cotter pins		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

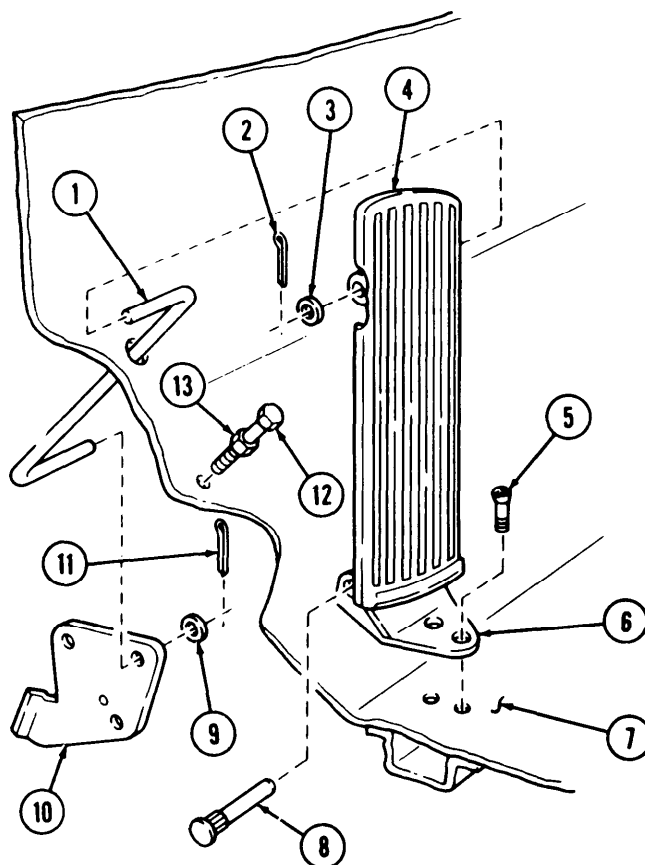
- | | | | | |
|----|-------------------------------|---|---------|--------------------------|
| 1. | Accelerator pedal push rod(1) | Cotter pin (2) and washer (3) | Remove. | Discard cotter pin (2), |
| 2. | Accelerator pedal bracket (6) | Hinge pin (8) and accelerator pedal (4) | Remove, | |
| 3. | Cab floor (7) | Two screws (5) and bracket (6) | Remove. | |
| 4. | Link assembly (10) | Cotter pin (11), washer (9), and accelerator pedal rod (1) | Remove. | Discard cotter pin (11). |
| 5. | Above cab floor (7) | Jamnut (13) | Loosen. | |
| 6. | | Accelerator pedal stop screw (12) | Remove. | |

b. Installation

- | | | | |
|----|--|------------------------|--|
| 7. | | Jamnut (13) | Install to limit of threads on pedal stop screw (12). |
| 8. | | Pedal stop screw (12) | Install. |
| 9. | | Jamnut (13) | Tighten against cab floor (7). |

3-33. ACCELERATOR PEDAL BRACKET, ROD, AND STOP SCREW REPLACEMENT (Çont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
10.		Accelerator pedal bracket (6)	Install with two screws (5).	
11.		Accelerator pedal (4)	Install with hinge pin (8).	
12.		Accelerator pedal push rod(1)	a. Install with washer (3) and new cotter pin (2). b. Install with washer (9) and new cotter pin (1 1).	Bend cotter pin (2) ends outward. Bend cotter pin (11) ends outward.



END OF TASK!

FOLLOW-ON TASKS:

- Check accelerator pedal stop screw for proper adjustment (para. 3-35).
- Check accelerator pedal link to fuel pump throttle lever rod adjustment (para. 3-34).
- Install left splash shield (TM 9-2320-272-10).

TA 349612

3-34. ACCELERATOR PEDAL LINK TO FUEL PUMP THROTTLE LEVER ROD MAINTENANCE

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Screw Spring pin Locknut		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

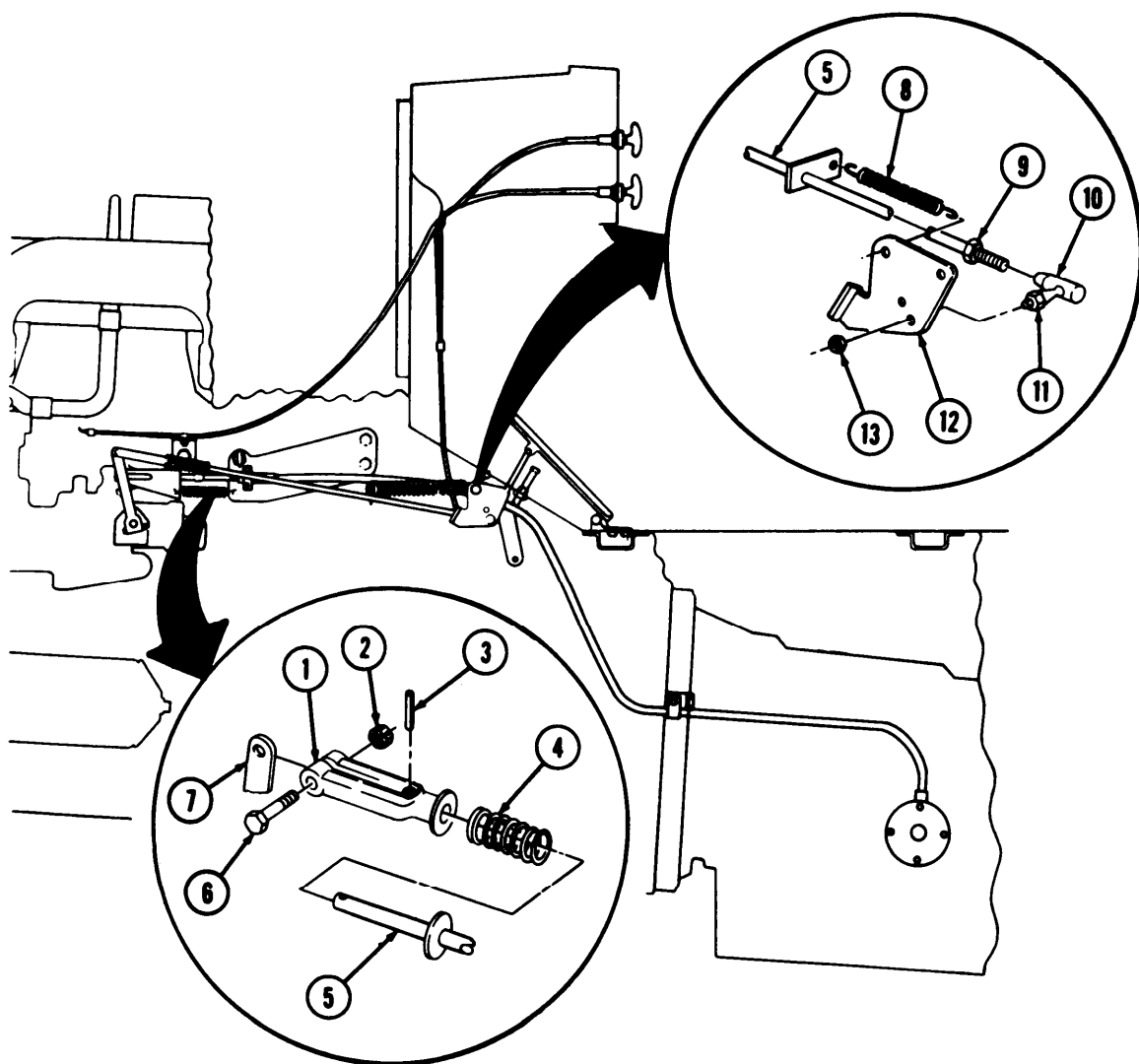
1.	Throttle lever (7)	Screw (6), locknut (2), and rod clevis (1)	Remove.	Discard screw (6) and locknut (2).
2.	Accelerator rod (5)	Return spring (8)	Disconnect.	
3.	Link assembly (12)	Locknut (13)	Remove while holding nut(n).	Discard locknut (13).
4.		Accelerator rod (5)	Remove.	
5.	Accelerator rod (5)	Jamnut (9)	Loosen.	
6.		Ball joint (10)	Remove.	
7.	Accelerator rod (5)	Spring pin (3), rod clevis (1), and spring (4)	Remove.	Discard spring pin (3).

b. Installation

8.		Spring (4), rod clevis (1), and new spring pin (3)	Install.	
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3-34. ACCELERATOR PEDAL LINK TO FUEL PUMP THROTTLE LEVER ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION.	REMARKS
9.		Ball joint (10)	Install on accelerator rod (5).	
10.		Accelerator rod (5)	Install with new locknut (13) while holding nut boss (11) on ball joint (10).	



TA 349613

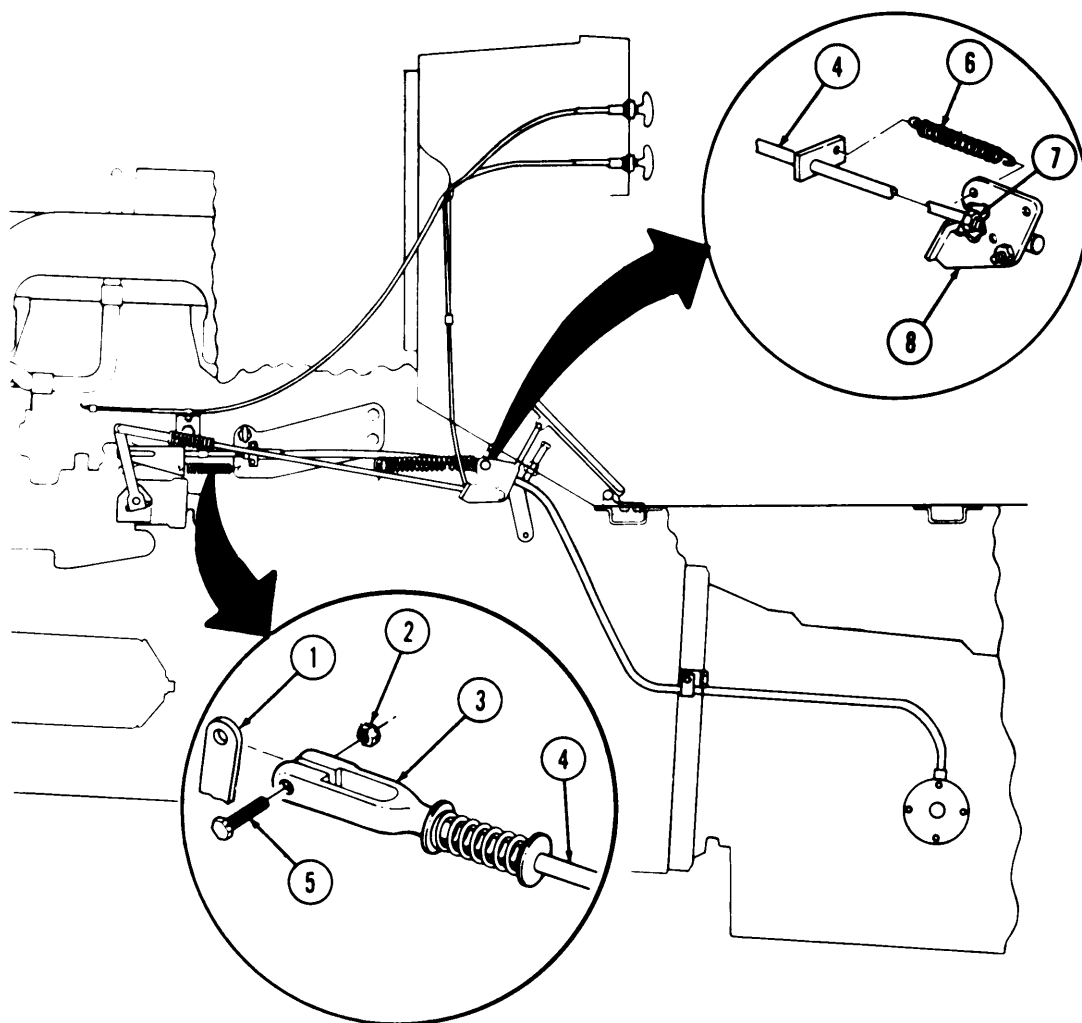
Change 3 3-89

3-340 ACCELERATOR PEDAL LINK TO FUEL PUMP THROTTLE LEVER ROD MAINTENANCE (Cont'd)

STEP No.	LOCATION	ITEM	ACTION	REMARKS
c. Adjustment				
11.		Screw (5), and locknut (2)	Remove.	Perform only if link was removed. Discard locknut (2).
NOTE				
Assistant will help with steps 12 through 17.				
12.		Throttle lever (1)	Push forward to full throttle position.	
19.		Rod clevis (3)	Pull forward as far as possible.	
14.		Jamnut (7)	Loosen.	
16.		Accelerator rod (4)	Hand turn to shorten or lengthen as needed to aline holes for screw (6) in throttle lever (1) and rod clevis (3).	
16.		Screw (6)	Install with new locknut (2).	
17.		Jamnut (7)	Tighten.	
18.		Return spring (6)	Install to accelerator rod (4) and link assembly (8),	

3-34. ACCELERATOR PEDAL LINK TO FUEL PUMP THROTTLE LEVER ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Install left splash shield (TM 9-2320-272- 10).

TA 349614

3-35. MODULATOR AND CABLE MAINTENANCE

This task covers:

- a. Removal

b. Installation
- c. Adjustment

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
Test Equipment		
None		
Special Tools		Special Environmental Conditions
None		None
Materials/Parts		
“O” ring Four locknuts		
Personnel Required		General Safety Instructions
Light-wheeled vehicle mechanic MOS 63B (2)		None
Manual References		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

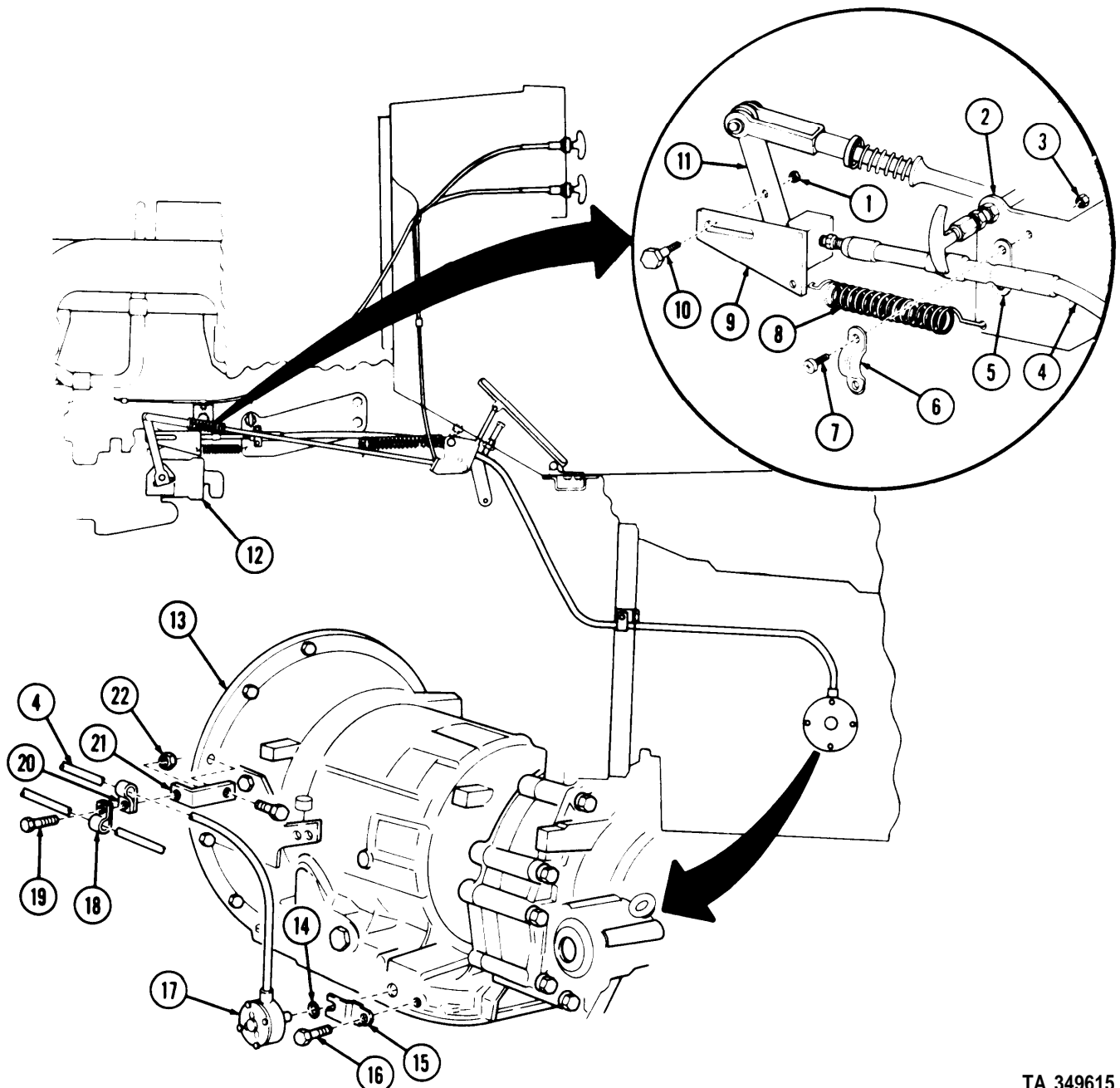
NOTE

Have drainage container ready to catch oil.

1.	Left side of trans- mission (13)	Screw (16), retaining bracket (15), mod- ulator (17), and “O” ring (14)	Remove.	Discard “O” ring (14).
2.	Transmission bracket (21)	Locknut (22), screw (19), speedometer cable clamp (18), and modulator cable clamp (20)	Remove.	Discard locknut (22).
3.	Modulator link (9) and bracket (2)	Modulator return spring (8)	Remove.	
4.	Bracket (2)	Two locknuts (3) and screws (7), clamp (6), and shim (5)	Remove.	Discard locknuts (3).

3-35. MODULATOR AND CABLE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.	Throttle lever (11) on fuel pump (12)	Locknut (1), screw (10), modulator link (9), and modulator cable (4)	Remove.	Discard locknut (1)
6.	Threaded end of modulator cable (4)	Modulator link (9)	Remove.	



TA 349615

3-35. MODULATOR AND CABLE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
7.		Modulator (24) and new "O" ring (21)	Install on left side of transmission (20) with retaining bracket (22) and screw (23),	Tighten 16-20 lb-ft (22-27 N•m).
8.		Modulator cable (14)	Install on bracket (11) with shim (13), clamp (16), two screws (17), and new locknuts (12).	Clamp (16) and shim (13) must aline on collar (15) on modulator cable (14).
9.	Transmission bracket (28)	Modulator cable (14)	Install with modulator cable clamp (27), screw (26), speedometer cable clamp (25), and new locknut (29).	Locate away from sharp edges and avoid sharp bends.

c. Adjustment**NOTE**

Assistant will help with steps 10 and 11.

10.	Fuel pump (6)	Throttle lever (8)	Move to fully opened position and hold.	
11.		Modulator cable (14)	a. Pull threaded end out to stop position. b. Loosen jamnut (10) and thread modulator link (19) onto modulator cable (14) until front of slot alines with hole in throttle lever (8). c. Back off modulator link (19) two turns. d. Tighten jamnut (10).	Continue to loosen jamnut (10) as needed to position modulator link (19).
12.		Modulator link (19)	Install to throttle lever (8) with screw (7) and new locknut (9).	Provides free pin clearance.

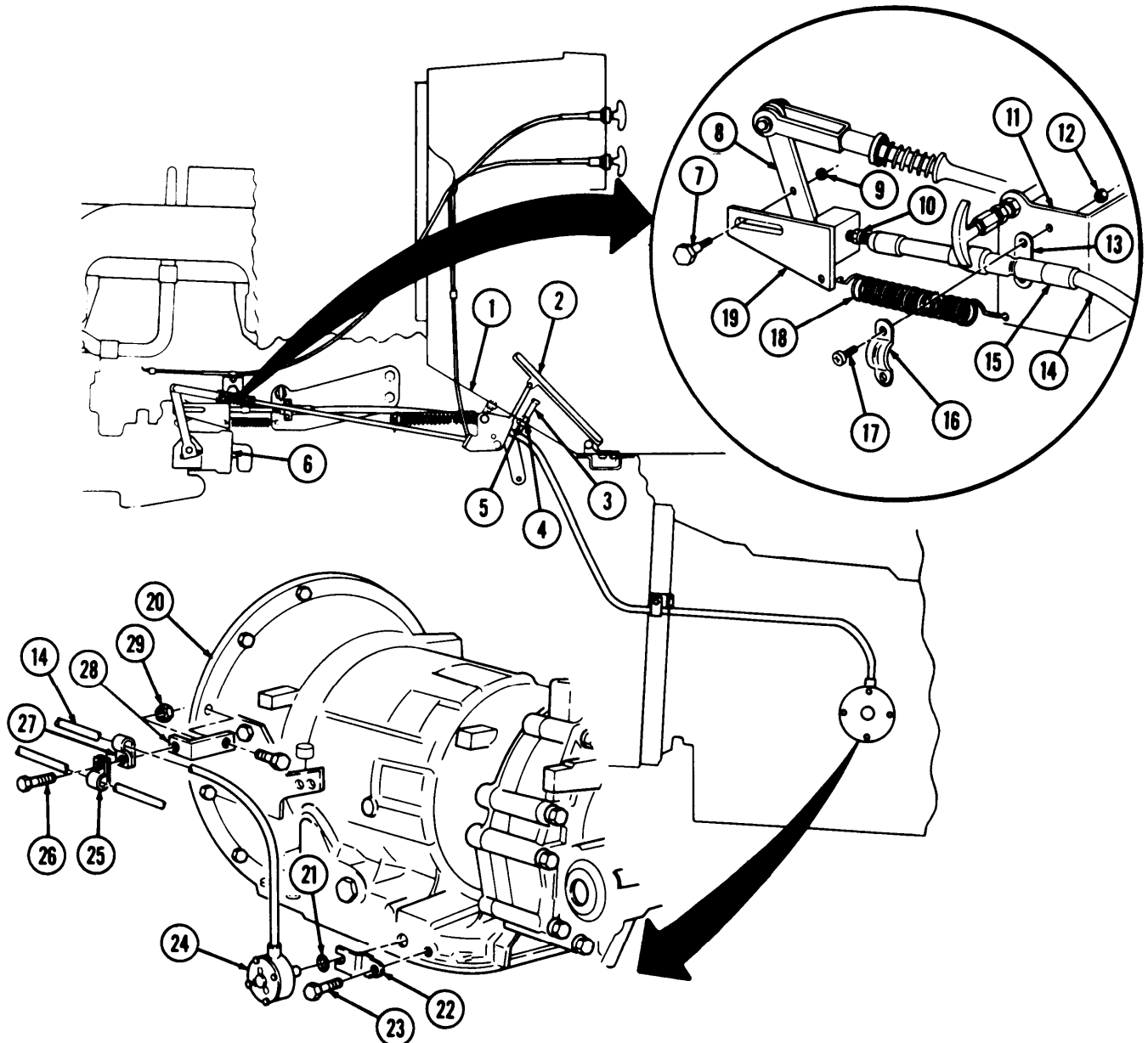
NOTE

Assistant will help with step 13,

13.	Cab floor (1)	Throttle stop screw (3) and jamnut (4)	a. Loosen. b. Adjust screw (3) to just touch cab floor side of accelerator pedal (2). c. Tighten jamnut (4) and nut (5).	Throttle lever (8) is still in fully opened position. Loosen nut (5) as needed.
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3-35. MODULATOR AND CABLE MAINTENANCE (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
14.	Fuel pump (6)	Throttle lever (8)	Release.	
15.	Bracket (11)	Modulator return spring (18)	Install to modulator link (19) and bracket (11).	



END OF TASK!

FOLLOW-ON TASKS:

- . Fill with transmission fluid to proper level (LO 9-2320-272-12).
- . Install left splash shield (TM 9-2320-272-10).
- . Start engine (TM 9-2320-272-10) and road test vehicle.

TA 349616

3-36. EMERGENCY STOP CONTROL AND CABLE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

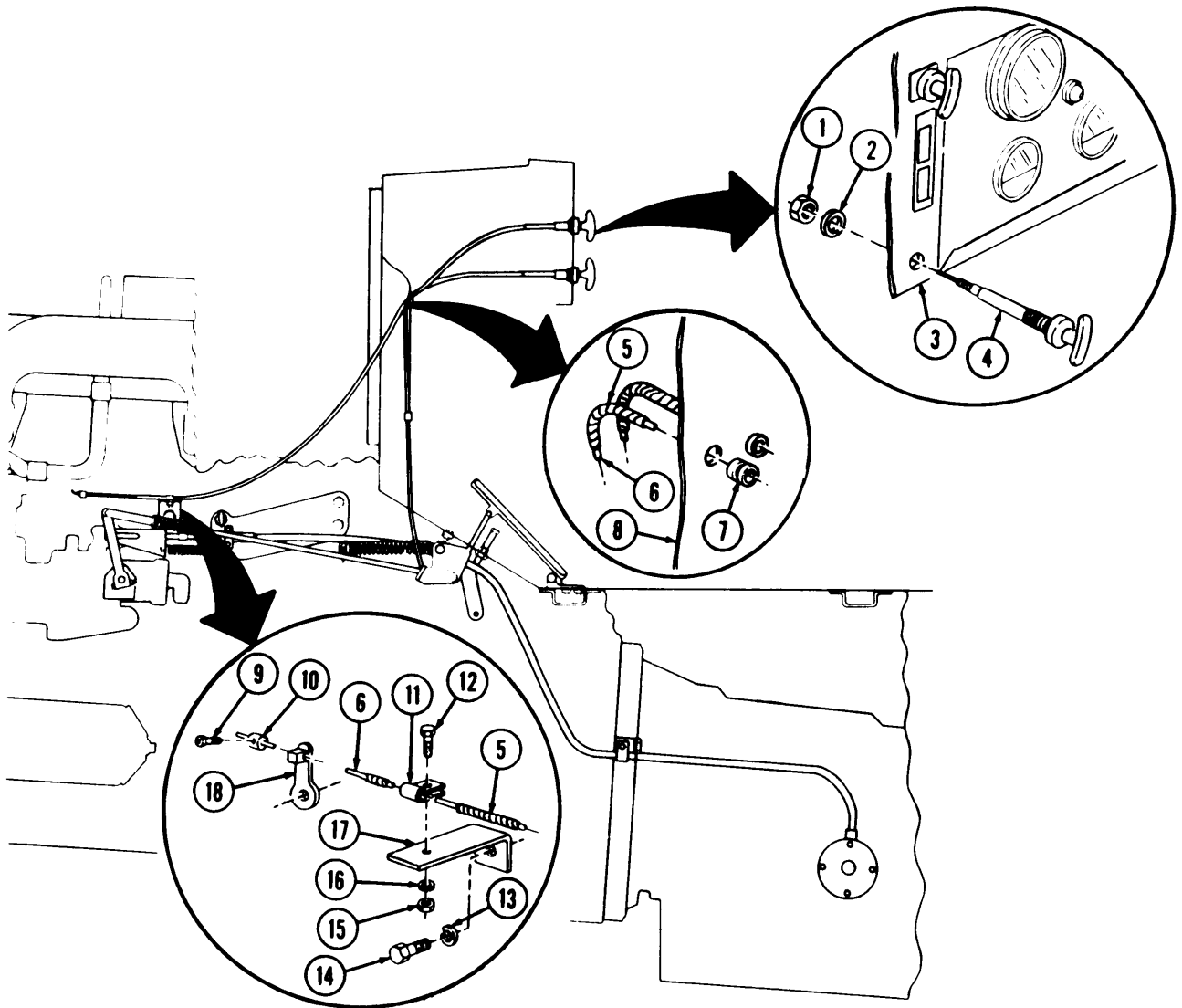
INITIAL SETUP:

<u>Applicable. Models</u>	<u>Equipment Condition Reference.</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para 4-25	Parking brake set. Left splash shield removed. Battery ground cable removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Locknut Two lockwashers GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. REMOVAL				
1.	Shutoff valve control lever (18)	Connector screw (9)	Remove from connector (10).	
2.		Connector (10)	Remove from stop control cable (6).	
3.	Stop control conduit (5) and conduit clamp (11)	Screw (12), locknut (15), and washer (16)	Remove and detach clamp (11) from clamp bracket (17).	Discard locknut (15).
4.		Screw (14), lockwasher (13), and clamp) bracket (17)	Remove.	Discard lockwasher (13).
5.		Clamp(n)	Remove.	
6.	Emergency stop control (4)	Nut (1) and lockwasher (2)	Remove from behind instrument panel (3).	Discard lockwasher (2).
7.		Emergency stop control (4), cable (6), and conduit (5)	Pull through firewall grommet (7) and front of instrument panel (3).	
8.	Firewall (8)	Grommet (7)	Remove.	

3-36. EMERGENCY STOP CONTROL AND CABLE MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
9. Stop control cable (6)	Conduit (5)	Remove.	This applies only if cable (6) is replaced.

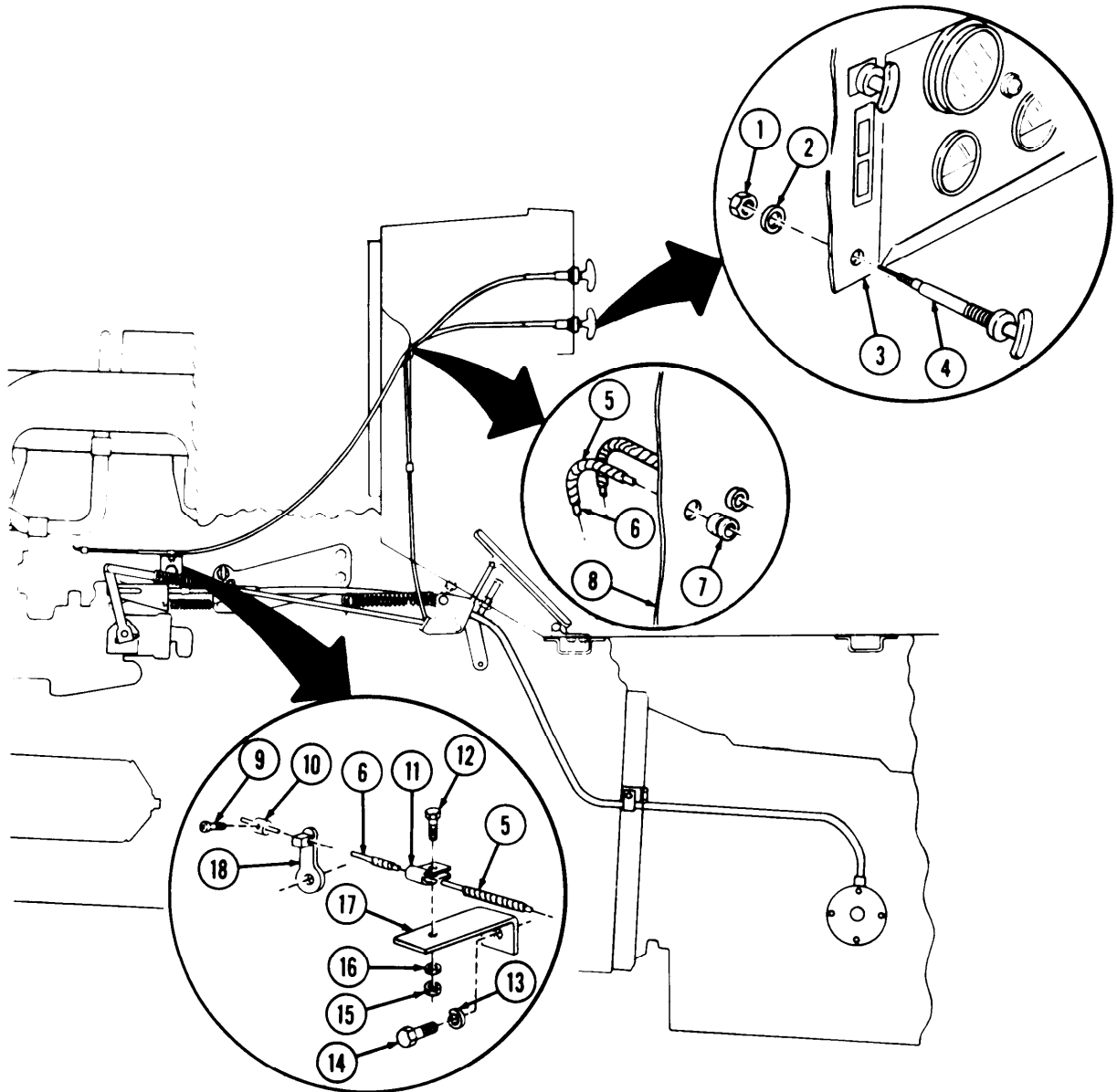


3-36. EMERGENCY STOP CONTROL AND CABLE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
10.		Stop control cable (6)	Inspect for binding and breaks.	Replace if binding or broken.
c. Installation				
11.		Stop control cable (6)	Coat with light film of GAA grease and thread through cable conduit (5).	
12.		Emergency stop control (4), cable (6), and conduit (5)	a. Thread through front of instrument panel (3). b. Position new lockwasher (2) and nut (1) over conduit (5). c. Install to instrument panel (3) with new lockwasher (2) and nut (1).	
13.		Grommet (7)	Install in firewall (8).	
14.		Cable (6) and conduit (5)	Thread through firewall grommet (7) and stop control clamp (11).	
15.		Cable (6)	Thread through hole in shutoff valve control lever (18).	
16.		Shutoff valve control lever (18)	Push all the way forward.	
17.		Connector (10)	a. Slide over end of cable (6) to closest point against shutoff valve control lever (18). b. Tighten with screw (9).	
18.		Cable (6)	Bend end to 90° angle upward behind connector (10).	
19.		Clamp bracket (17)	Install with screw (14) and new lockwasher (13).	
20.		Stop control clamp (11)	Position against hole in clamp bracket (17) and install with screw (12), washer (16), and new locknut (15).	

3-36. EMERGENCY STOP CONTROL AND CABLE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Connect battery ground cable (para. 4-25).

- Install left splash shield (TM 9-2320-272-10).
- Start engine (TM 9-2320-272-10) and test emergency stop control for proper operation.

TA 349326

3-37. THROTTLE CONTROL AND CABLE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Lockwasher Locknut GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Throttle cable (18)	Connector screw (17) and connector (16)	Remove.	Cable (18) end may have to be bent straight.
2.	Throttle rod link (15)	Throttle cable (18)	Remove.	
3.	Firewall (8) and bracket (13)	Locknut (9), screw (14), washer (10), and conduit clamp (12)	Remove.	Discard locknut (9).
4.		Grommet (1)	Remove.	
5.	Throttle control plate (6)	Four screws (4)	Remove.	
6.	Instrument panel (2)	Throttle control (15), plate (6), and cable (18)	Remove.	
7.	Throttle control (5)	Nut (3), lockwasher (7), and plate (6)	Remove.	Discard lockwasher (7).
8.	Throttle cable (18)	Conduit (11)	Remove.	This applies only if cable (18) is replaced.

3-37. THROTTLE CONTROL AND CABLE MAINTENANCE (Cont'd)

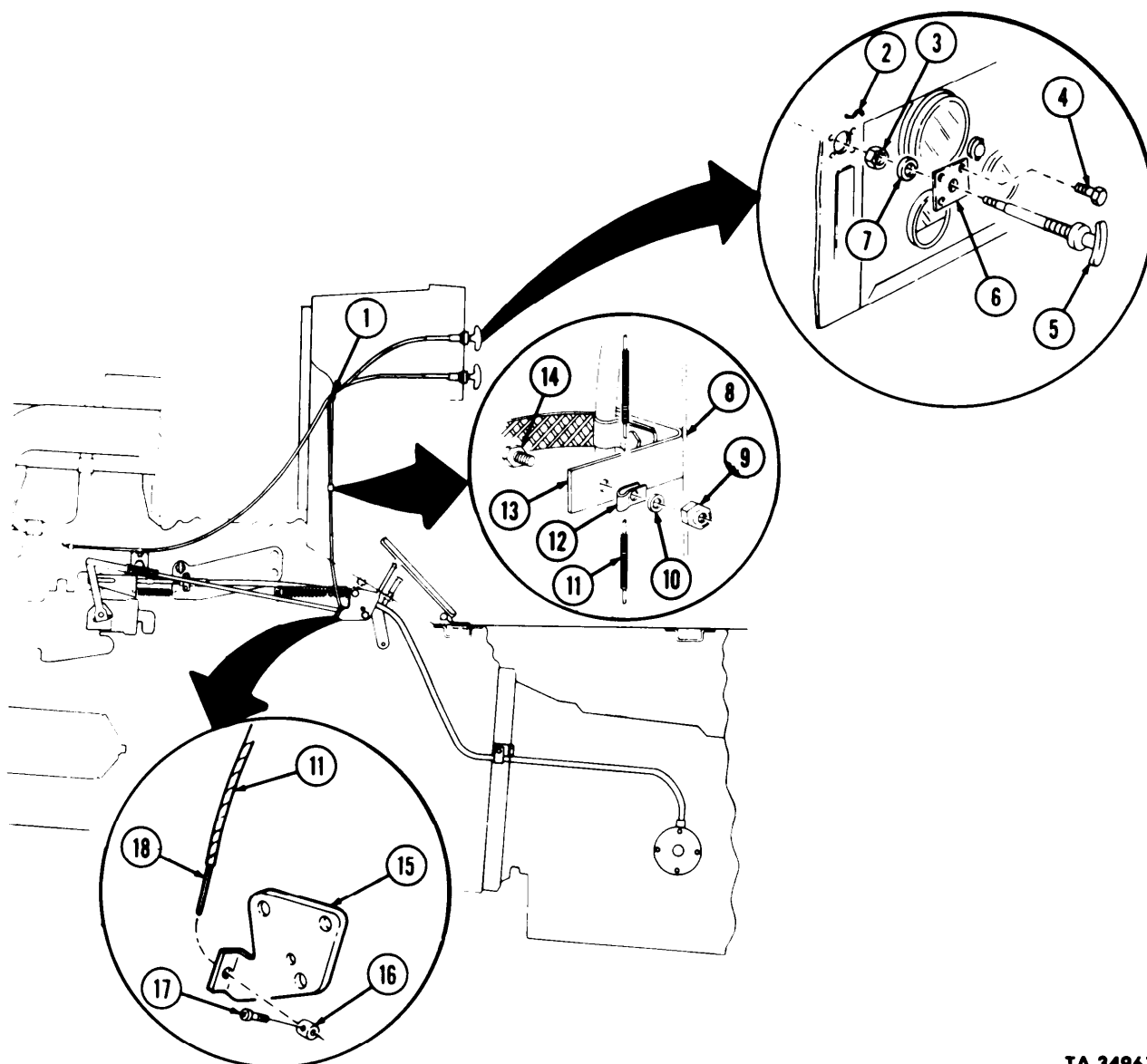
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Inspection

- | | | | |
|----|---------------------|---------------------------------|-------------------------------|
| 9. | Throttle cable (18) | Inspect for binding and breaks. | Replace if binding or broken. |
|----|---------------------|---------------------------------|-------------------------------|

c. Installation

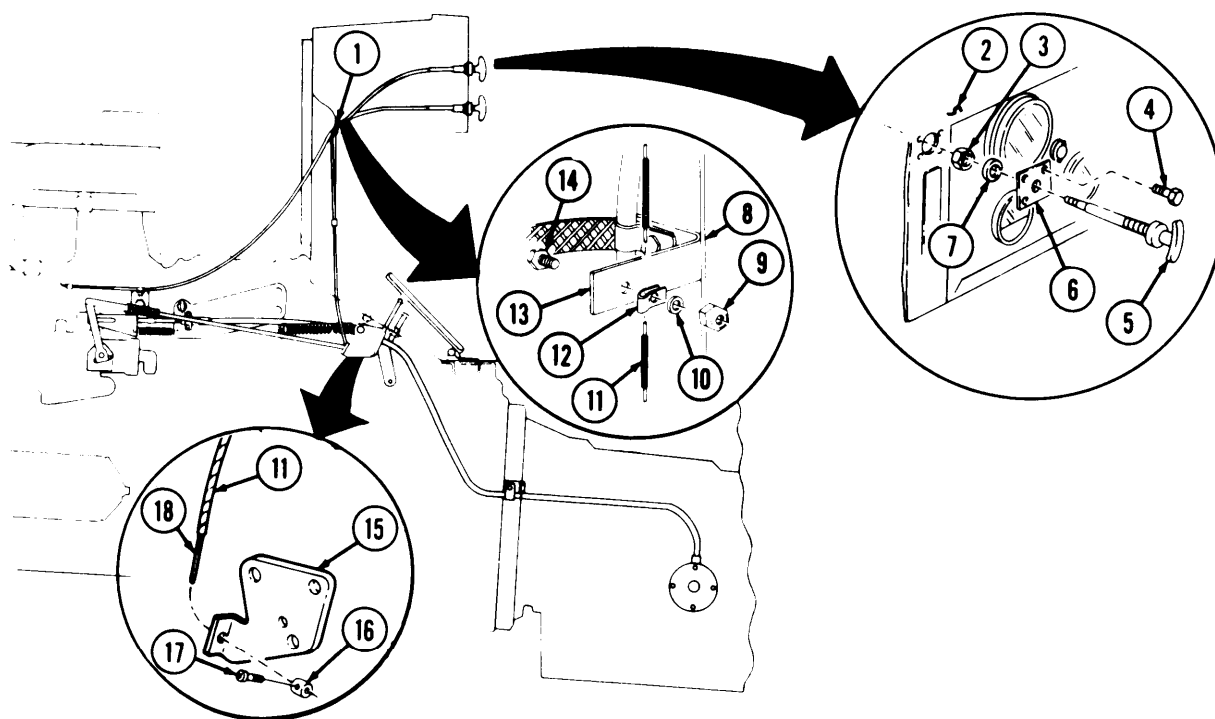
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|-----|---------------------|---|
| 10. | Throttle cable (18) | Coat with light film of GAA grease and thread through conduit (11). |
|-----|---------------------|---|



TA 349618

3-37. THROTTLE CONTROL AND CABLE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
11.		Plate (6)	Install over conduit (11) with new lock-washer (7) and nut (3).	
12.		Throttle control (5), cable (18), and plate (6)	Install in instrument panel (2) with four screws (4).	Make sure throttle control (5) handle is pushed all the way in,
13.		Throttle cable (18) and conduit (11)	Thread through grommet (1) and firewall (8).	
14.		Grommet (1)	Install,	
15.		Throttle cable (18)	a. Install with connector (16) and connector screw (17). b. Bend end of cable (18) behind connector (16).	Make sure throttle rod, link (15) is positioned so throttle is closed,
16.		Conduit clamp (12), throttle cable (18), and conduit (11)	Install on bracket (13) with screw (14), washer (10), and new locknut (9).	



END OF TASK!

FOLLOW-ON TASKS: • Install left splash shield (TM 9-2320-272-10).
• Start engine (TM 9-2320-272- 10) and test throttle control for proper operation.

TA 349619

Section V. EXHAUST SYSTEM

3-38. GENERAL

This section provides maintenance procedures assigned to the organizational level for the exhaust system. To find a specific maintenance procedure, see the maintenance task summary below:

3-39. EXHAUST SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-40.	Exhaust Stack Replacement	3-104
3-41.	Rear Exhaust Pipe, Support Bracket, and Cab Heat Shield Maintenance	3-106
3-42.	Front Exhaust Pipe Replacement	3-110
3-43.	Muffler and Shield Maintenance	3-114

a. Removal

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket		
Locknut		
GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Do not touch hot exhaust system components with bare hands,
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

1.	Right rear of cab (7)	Screw (3) and locknut (6)	Remove from stack to muffler coupling clamp (2).	Discard locknut (6).
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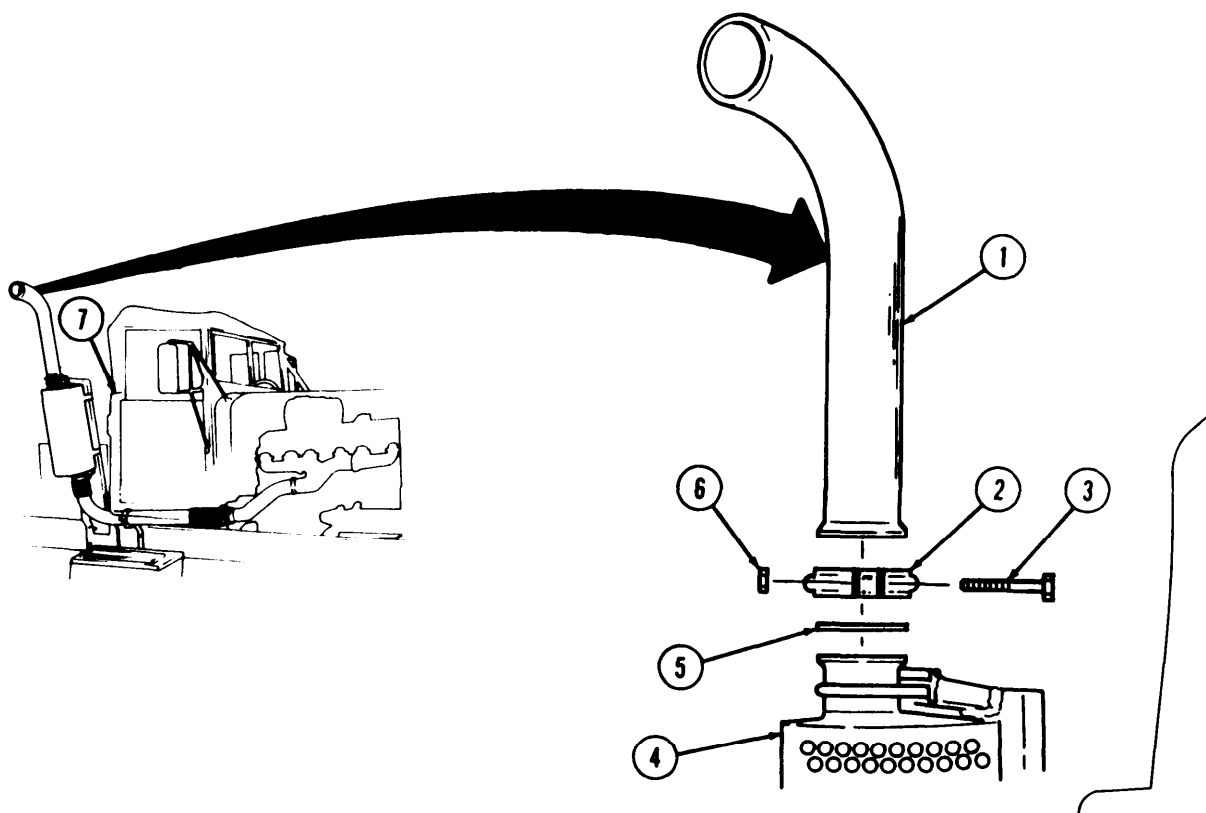
Assistant will help with step 2.

- | | | | |
|----|-------------------------------------|---------|---|
| 2. | Stack to muffler coupling clamp (2) | Remove, | |
| 3. | Exhaust stack (1) | Remove, | |
| 4. | Exhaust stack to muffler gasket (5) | Remove. | Discard gasket (5).
Clean gasket remains from mating surfaces. |

5.	New exhaust stack to muffler gasket (5)	Place over exhaust stack (1) mating flange.	Apply small amount of heavy grease to hold it in place.
----	---	---	---

3-40. EXHAUST STACK REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Exhaust stack (1)	Position over muffler (4) so opening is directly away from vehicle.	
<p style="text-align: center;">NOTE Assistant will help with step 7.</p>				
7.		Exhaust stack to muffler coupling clamp (2)	Install with screw (3) and new locknut (6),	Slide over exhaust stack opening.



END OF TASK!

FOLLOW-ON TASK: Start engine (TM 9-2320-272- 10) and check for exhaust leaks.

TA 349620

3-41. REAR EXHAUST PIPE, SUPPORT BRACKET, AND CAB HEAT SHIELD MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>	<u>Special Environmental Conditions</u>	
None	None	
<u>Materials/Parts</u>		
Two gaskets		
Six locknuts		
GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>	<u>General Safety Instructions</u>	
Light-wheeled vehicle mechanic MOS 63B	Do not touch hot exhaust system components with bare hands.	
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

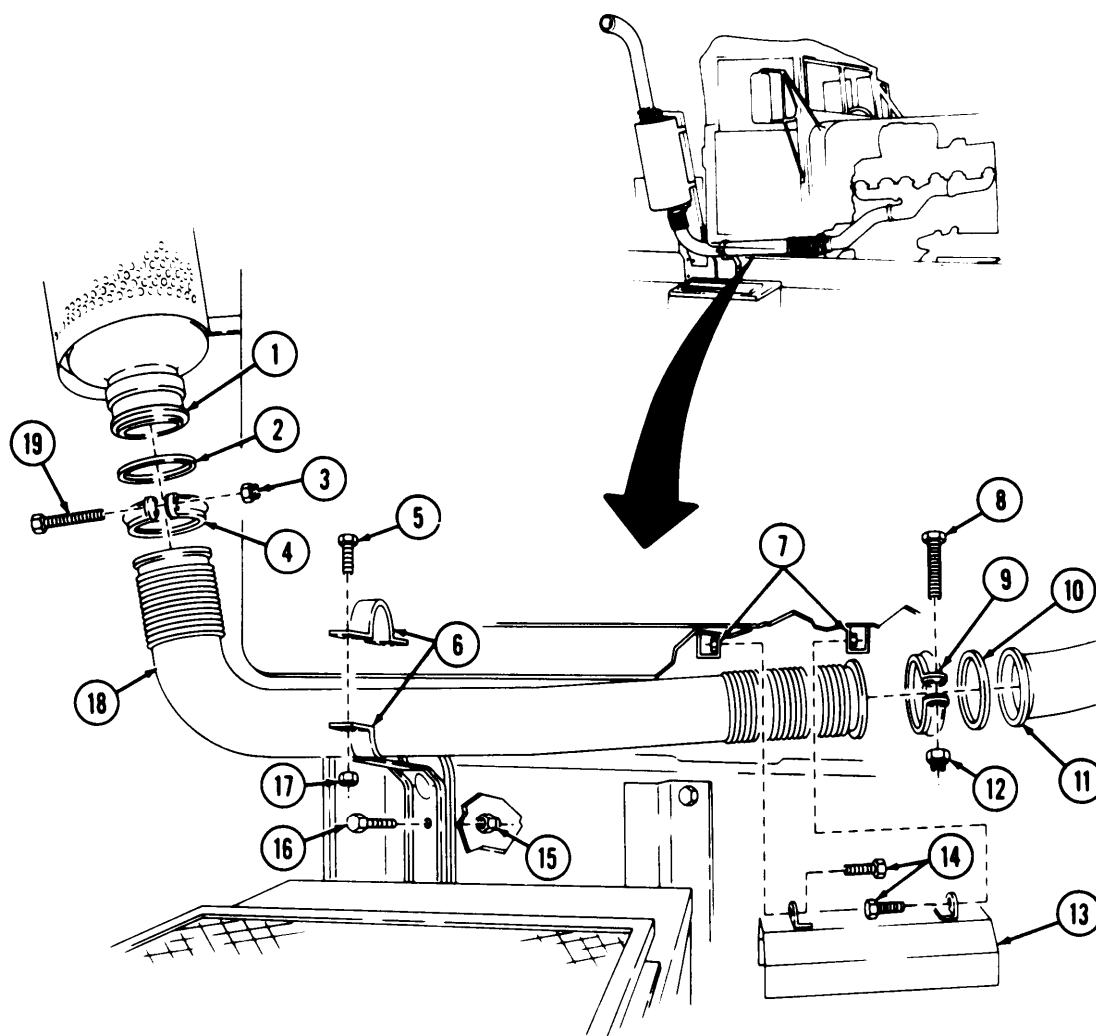
WARNING

Do not touch hot exhaust system components with bare hands.
Injury to personnel may result.

- | | | | | |
|----|---|---|---------|---------------------------------------|
| 1. | Exhaust pipe cab heat shield brackets (7) | Heat shield (13) and two screws (14) | Remove, | |
| 2. | Muffler flange (1) | Screw (19), locknut (3), exhaust pipe coupling clamp (4), and gasket (2) | Remove, | Discard locknut (3) and gasket (2). |
| 3. | Front exhaust pipe flange (11) | Screw (8), locknut (12), exhaust pipe coupling clamp (9), and gasket (10) | Remove. | Discard locknut (12) and gasket (10). |
| 4. | Rear exhaust pipe (18) | Two screws (5), locknuts (17), and top of support bracket (6) | Remove. | Discard locknuts (17), |

3-41. REAR EXHAUST PIPE, SUPPORT BRACKET, AND CAB HEAT SHIELD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Rear exhaust pipe (18)	Remove.	
6.	Bottom of support bracket (6)	Two screws (16), locknuts (15), and support bracket (6)	Remove.	Discard locknuts (15).



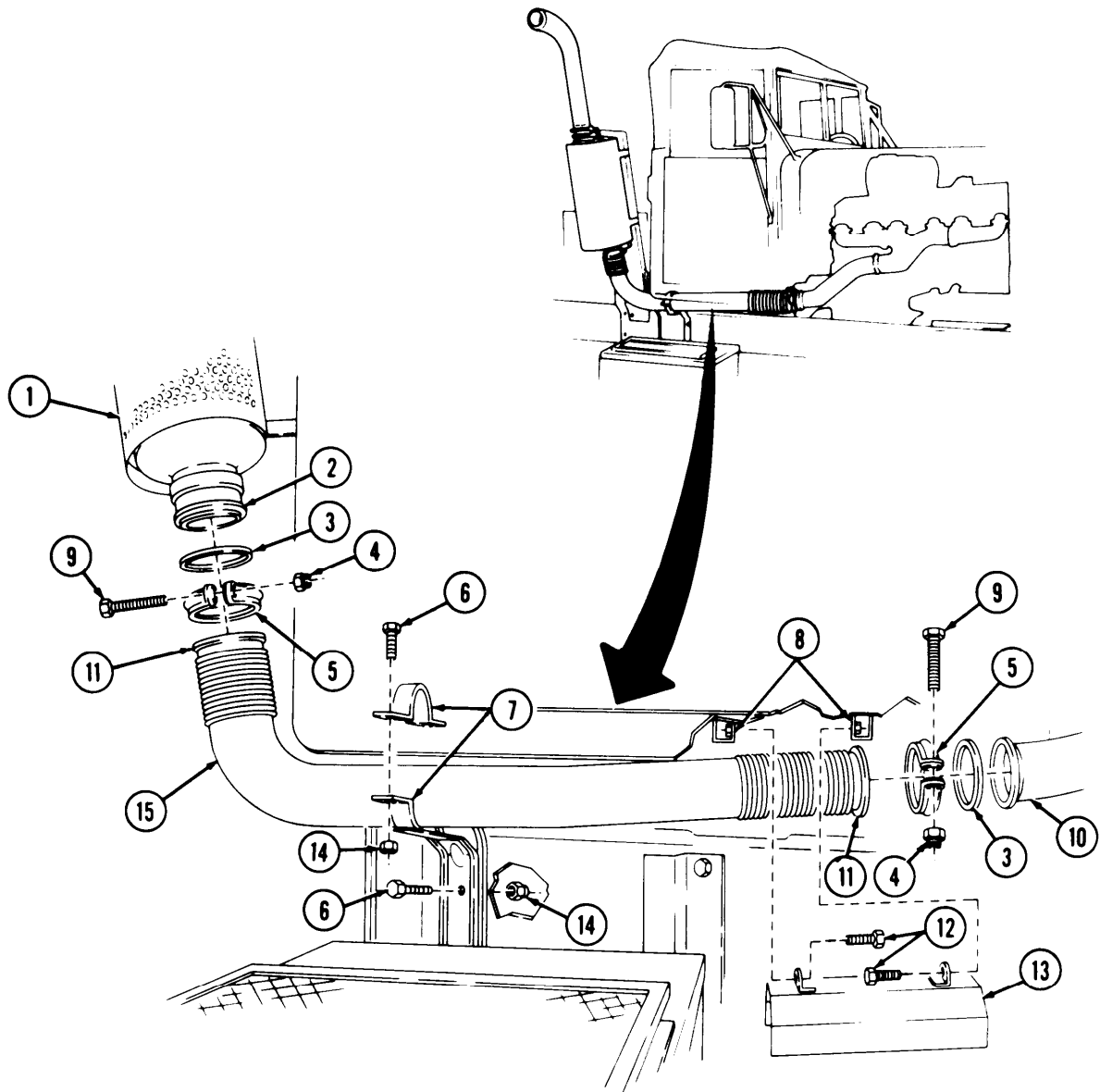
TA 349621

3-41. REAR EXHAUST PIPE, SUPPORT BRACKET, AND CAB HEAT SHIELD MAINTENANCE (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
7.		Rear exhaust pipe (15), pipe flanges (11), front exhaust pipe flange (10), and muffler flange (2)	Remove gasket remains and inspect for cracks.	Replace if cracked. Clean gasket remains from mating surfaces.
c. Installation				
8.		Bottom of support bracket (7), two screws (6), and new locknuts (14)	Install.	
9.		Rear exhaust pipe (15), two new gaskets (3), exhaust pipe coupling clamps (5), screws (9), and new locknuts (4)	Install between muffler (1) and front exhaust pipe flange (10).	Apply small amount of heavy grease to hold gaskets (3) in place.
10.		Top of support bracket (7), two screws (6), and new locknuts (14)	Install.	
11.		Exhaust pipe cab heat shield (13) and two screws (12)	Install on exhaust pipe cab heat shield brackets (8).	

3-41. REAR EXHAUST PIPE, SUPPORT BRACKET, AND CAB HEAT SHIELD
MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

TA 349622

3-42. FRONT EXHAUST PIPE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Hood raised and secured. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts Two gaskets GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not touch hot exhaust system components with bare hands.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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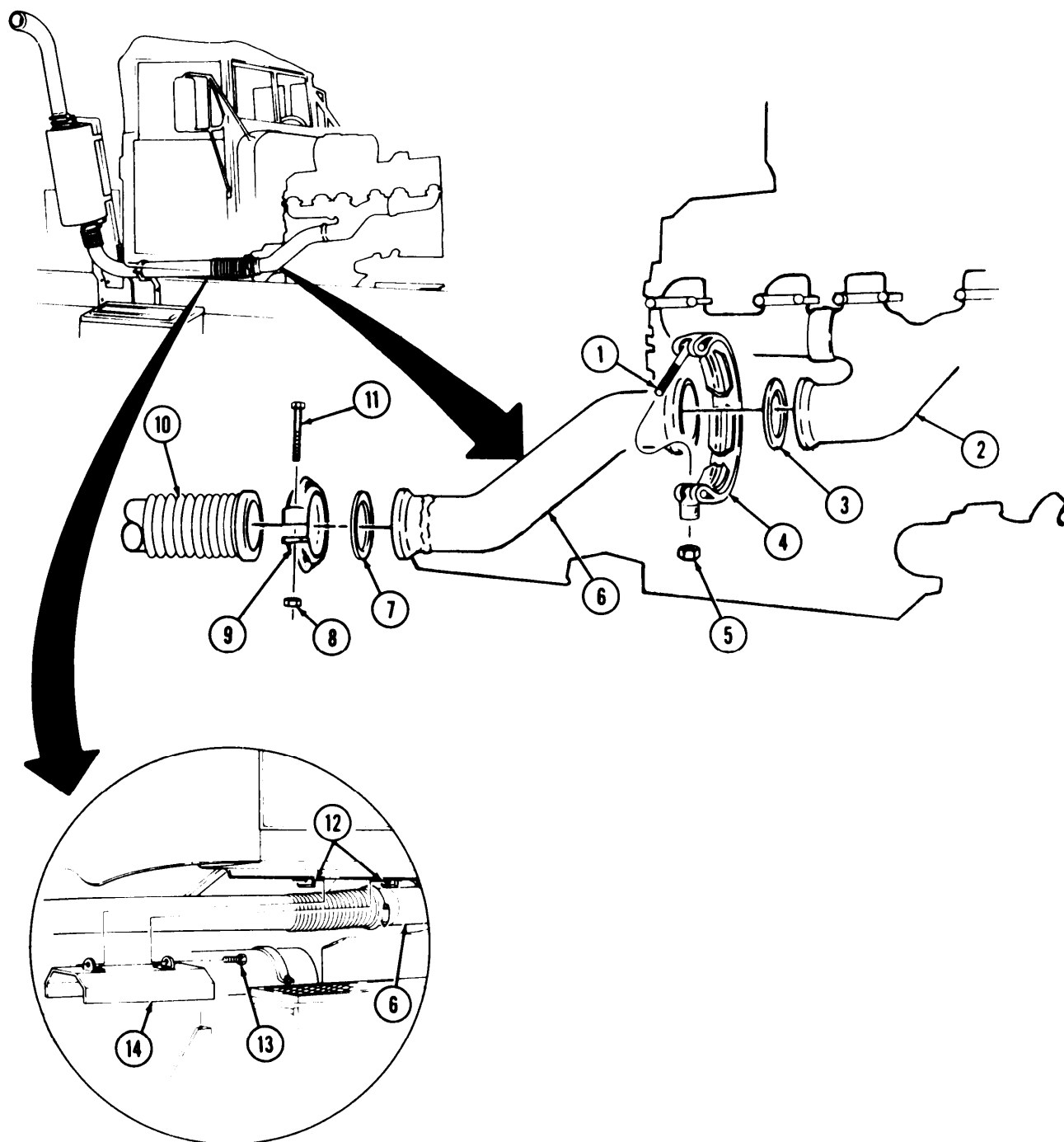
a. Removal**WARNING**

Do not touch hot exhaust system components with bare hands.
Injury to personnel may result.

- | | | | | |
|----|---|---|---|------------------------------|
| 1. | Exhaust pipe cab heat shield brackets (12) | Heat shield (14) and two screws (13) | Remove, | |
| 2. | Front exhaust pipe (6) to manifold (2) | Manifold coupling clamp (4), T-bolt (1), and locknut (5) | a. Remove locknut (5).
b. Slide coupling clamp (4) away from mating flanges. | Discard locknut (5). |
| 3. | Front exhaust pipe (6) to rear flex pipe (10) | Pipe coupling clamp (9), screw (11), and locknut (8) | a. Remove locknut (8).
b. Remove screw (11) and coupling clamp (9). | Discard locknut (8). |
| 4. | | Front exhaust pipe (6) and two flange gaskets (3) and (7) | Remove and clean flange areas. | Discard gaskets (3) and (7). |

3-42. FRONT EXHAUST PIPE REPLACEMENT (Cont'd)

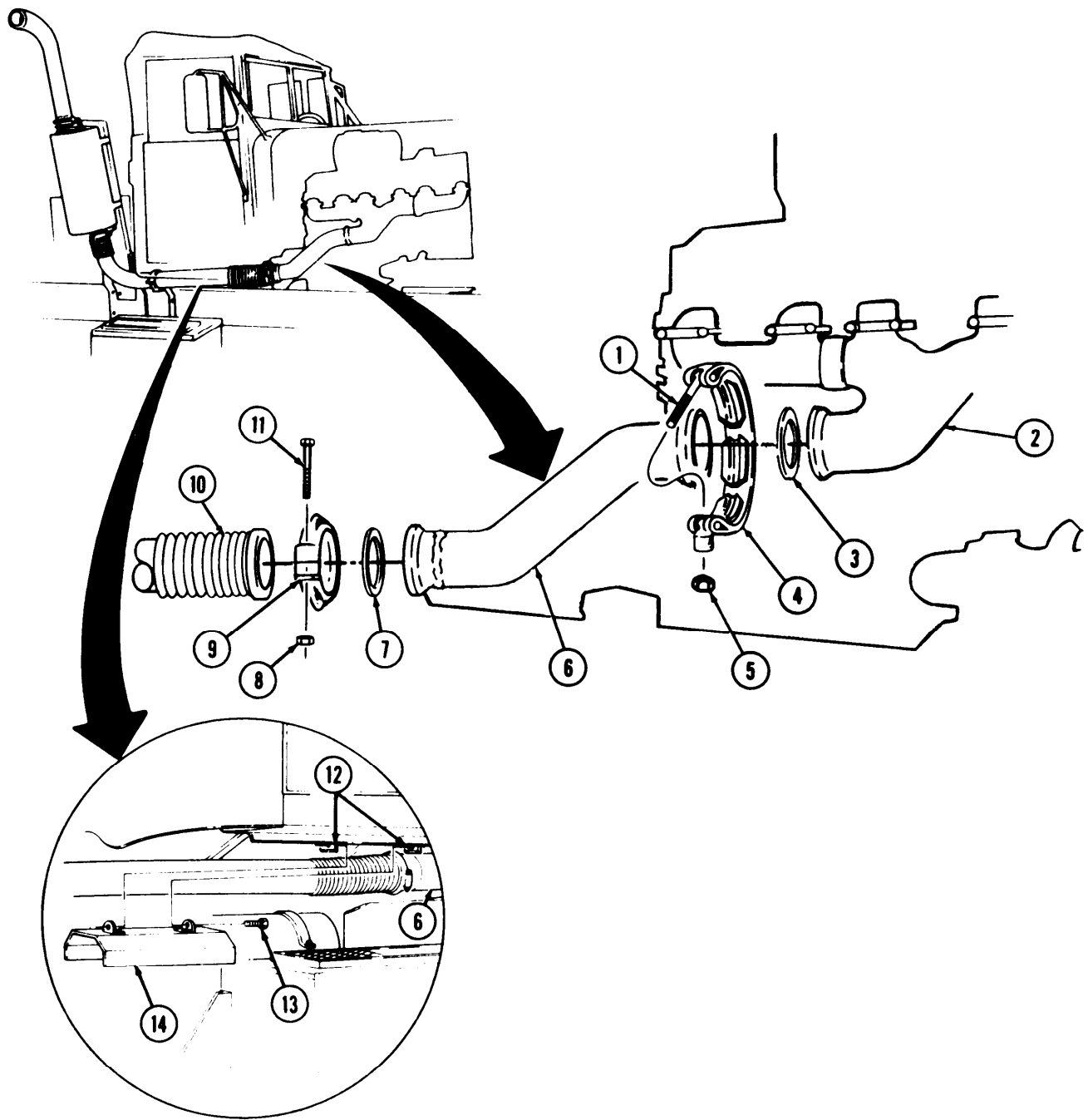
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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3-42. FRONT EXHAUST PIPE REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
5.		New flex pipe flange gasket (7)	Place on manifold (2) flange.	Apply small amount of heavy grease to hold in place.
6.		New flange gasket (3)	Place on flex pipe (10) flange.	Apply small amount of heavy grease to hold in place.
7.		Coupling clamp (9) and manifold coupling clamp (4)	Place on front exhaust pipe (6).	
8.		Front exhaust pipe (6)	a. Position to flex pipe (10) flange and manifold (2) flange. b. Slide pipe coupling clamp (9) over flanges and install with screw (11) and new locknut (8).	Make sure gaskets (3) and (7) are in position.
9.		Manifold coupling clamp (4)	Slide over flanges and install with T-bolt (1) and new locknut (5).	
10.		Exhaust pipe cab heat shield (14)	Install to brackets (12) with two screws (13).	

3-42. FRONT EXHAUST PIPE REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

FOLLOW-ON TASKS: Ž Start engine (TM 9-2320-272-10) and check for exhaust leaks.
• Install right splash shield (TM 9-2320-272-10).

TA 349624

3-43. MUFFLER AND SHIELD MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Discription</u>
All	TM 9-2320-272-10 Para. 3-40	Parking brake set. Exhaust stack removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket Four lockwashers Five locknuts		
<u>Personnel Rewired</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Do not touch hot exhaust system components with bare hands.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

WARNING

Do not touch hot exhaust system components with bare hands.
Injury to personnel may result.

- | | | | | |
|----|----------------------------|--|---------|-----------------------|
| 1. | Muffler shield support (5) | Four locknuts (8) and screws (14), and muffler shield assembly (1) | Remove. | Discard locknuts (8). |
|----|----------------------------|--|---------|-----------------------|

NOTE

Assistant will help with steps 2 and 3.

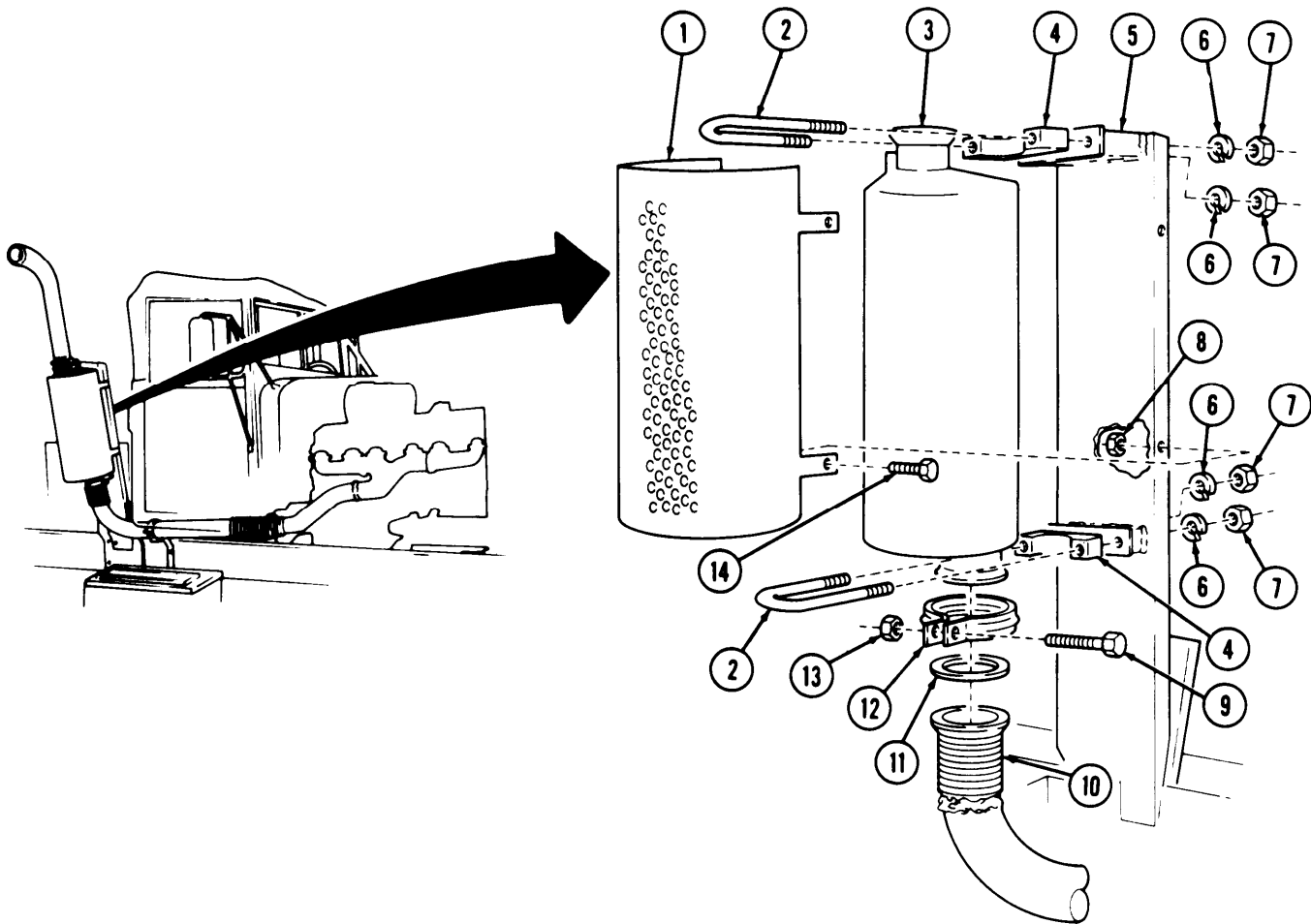
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|----|-------------|---|---------|--------------------------|
| 2. | Muffler (3) | Four nuts (7) and lockwashers (6), two U-clamps (4) and U-bolts (2) | Remove. | Discard lockwashers (6). |
|----|-------------|---|---------|--------------------------|

3-43. MUFFLER AND SHIELD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
3.	Exhaust pipe mating flange (10)	Screw (9), locknut (13), and exhaust pipe coupling clamp (12)	Remove.	Discard locknut (13).
4.		Muffler (3) and exhaust pipe gasket (11)	Remove.	Discard gasket (11). Clean gasket remains from mating surfaces.

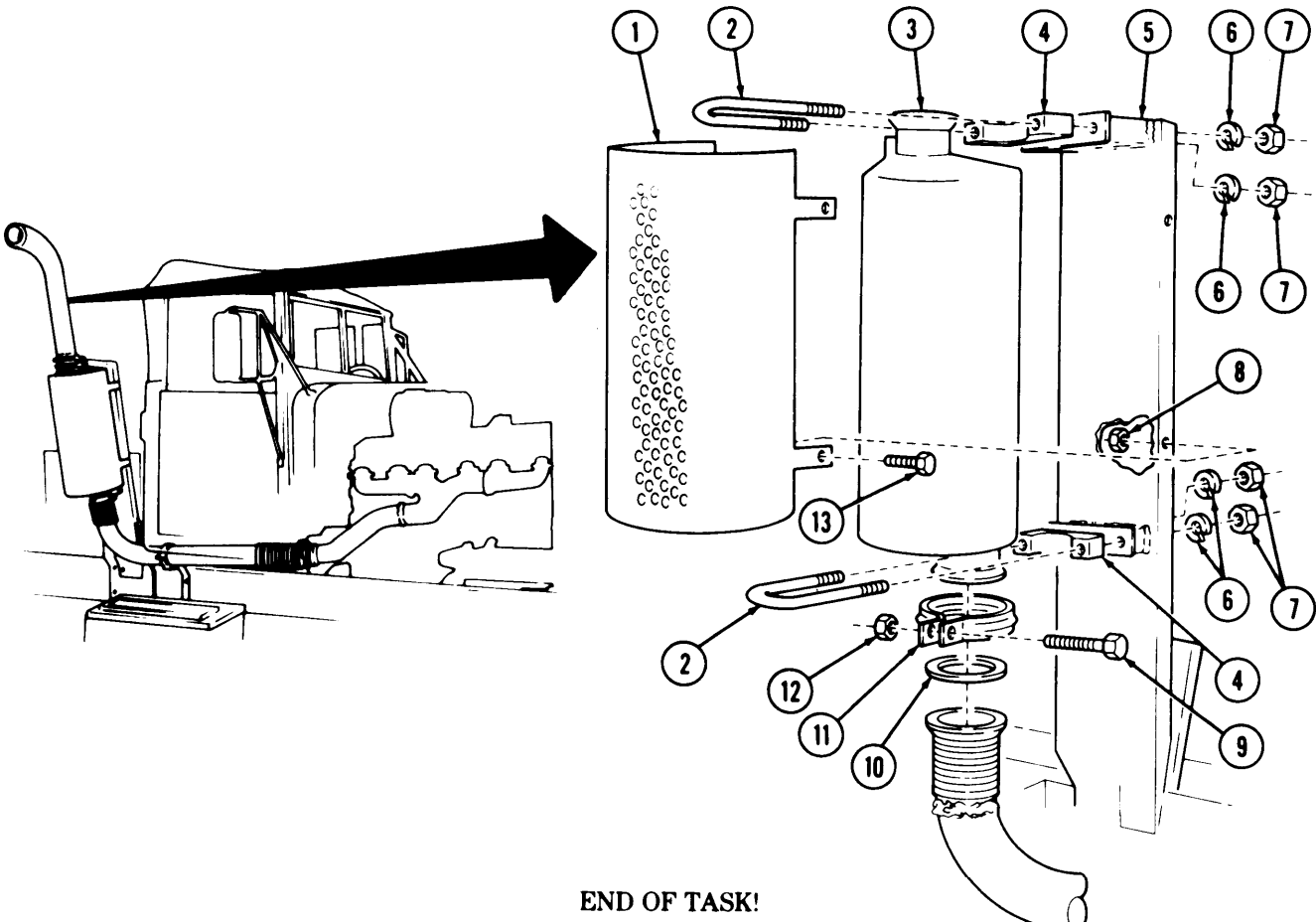
b. Inspection

5.		Muffler (3)	Inspect for cracks.	Replace if cracked.
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3-43. MUFFLER AND SHIELD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
NOTE Assistant will help with steps 6 and 7.				
6.		New exhaust pipe gasket (10) and muffler (3)	Install with exhaust pipe coupling clamp (1 1), screw (9), and new locknut (12).	Narrow side of muffler (3) faces away from vehicle.
7.		Two U-bolts (2)	Install on muffler support (5) with two U-clamps (4), four new lockwashers (6), and nuts (7).	
8.		Muffler shield assembly (1)	Install with four screws (13) and new locknuts (8).	



END OF TASK!

- FOLLOW-ON TASKS:
- Install exhaust stack (para. 3-40).
 - Start engine (TM 9-2320-272- 10) and check for exhaust leaks.

TA 349626

Section VI. COOLING SYSTEM

3-44. GENERAL

This section provides maintenance procedures assigned to the organizational level for the cooling system. To find a specific maintenance procedure, see the maintenance task summary below:

3-45. COOLING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-46.	Cooling System Servicing	3-118
3-47.	Radiator Vent Hose and Manifold Return Hose Replacement	3-122
3-48.	Radiator Inlet Piping Replacement	3-124
3-49.	Radiator Fan Shroud Replacement	3-126
3-50.	Radiator Fan Blade Replacement	3-130
3-51.	Radiator Replacement	3-132
3-52.	Surge Tank Replacement	3-142
3-53.	Coolant Hoses and Tubes Replacement	3-146
3-54.	Fan Drivebelts Maintenance	3-152
3-55.	Water Pump Drivebelt Maintenance	3-156
3-56.	Engine to Air Compressor Coolant Supply Tube Replacement	3-160
3-57.	Air Compressor to Engine Oil Cooler Coolant Return Tube Replacement	3-162
3-58.	Fan Drive Clutch Actuator Maintenance	3-166
3-59.	Fan Drive Clutch Replacement	3-170
3-60.	Thermostat Maintenance	3-174

3-46. COOLING SYSTEM SERVICING

This task covers:			
a. Repressurizing System		c. Cleaning and Flushing System	
b. Draining System		d. Filling System	

INITIAL SETUP:			
<u>Applicable Models</u>		<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All		TM 9-2320-272-10	Parking brake set.
		TM 9-2320-272-10	Right splash shield removed.
<u>Test Equipment</u>			
Antifreeze tester			
<u>Special Tools</u>			<u>Special Environmental Conditions</u>
None			None
<u>Materials/Parts</u>			
Antifreeze (Appendix D, Item 3 or 4)			
Cleaning compound kit (Appendix D, Item 8)			
<u>Personnel Required</u>			<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B			Cooling system must be depressurized to remove surge tank cap when engine temperature is above 175°F (79°C). Steam or hot coolant under pressure may cause injury to personnel.
<u>Manual References</u>			
TM 9-2320-272-10			
TM 9-2320-272-20P			

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Repressurizing System

WARNING

Care should be taken when removing surge tank filler cap, Steam or hot coolant under pressure may cause injury to personnel.

1.	Surge tank (2)	Surge tank filler cap (1)	If engine is hot, remove filler cap (2) as follows: a. Place thick cloth over cap (1) and turn to first stop. b. After pressure has escaped, remove.	Releases internal pressure.
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3-46. COOLING SYSTEM SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Draining System

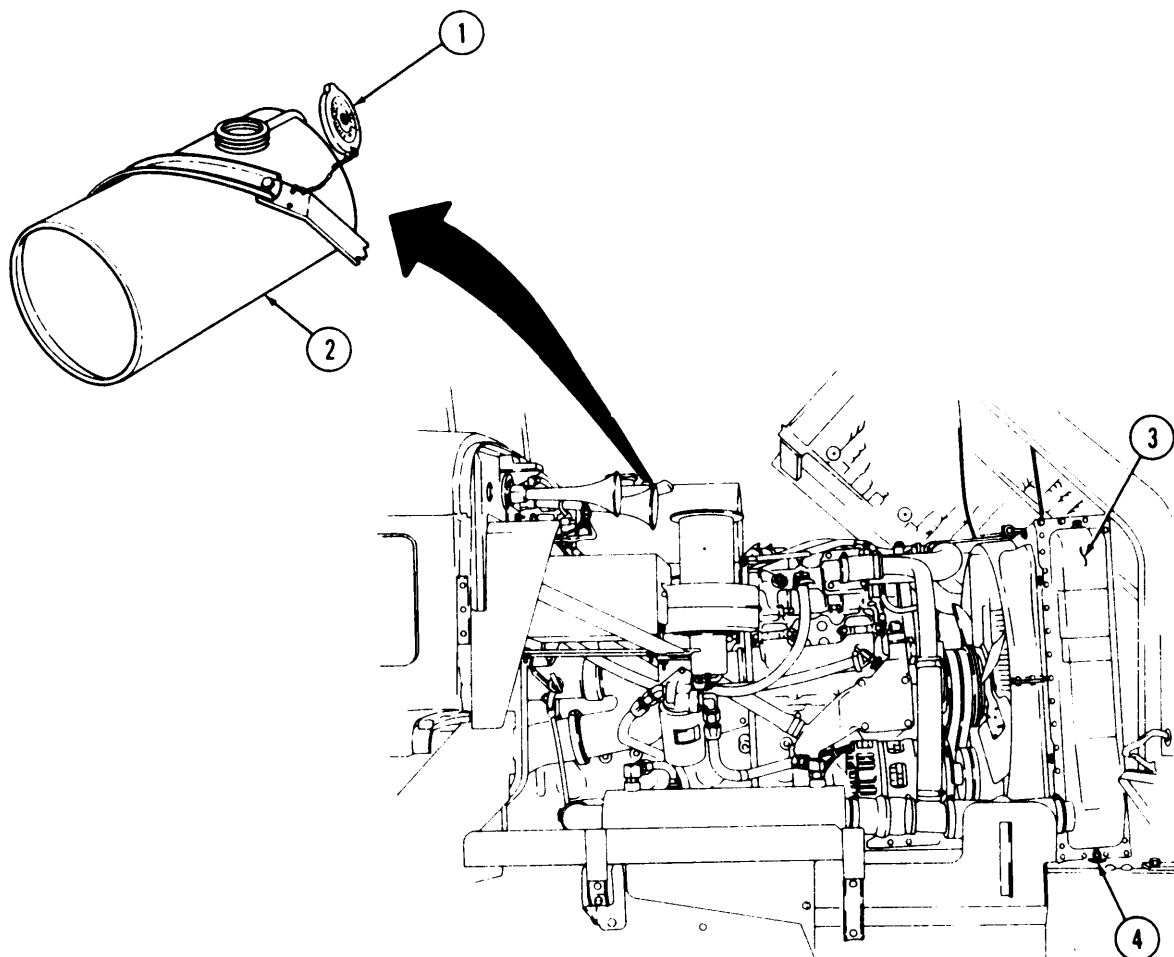
NOTE

Have drainage container ready to catch coolant.

9.	Radiator (3)	Draincock (4)	<p>a. Open and allow system to drain.</p> <p>b. Inspect coolant for rust and foreign particles.</p> <p>c. Close.</p>	Clean and flush system if heavily rusted or partially clogged.
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c. Cleaning and Flushing System

3.	Radiator (3) and cooling system	Clean and flush using cleaning compound kit.	Follow instructions provided with kit.
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TA 349627

3-46. COOLING SYSTEM SERVICING (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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d. Filling System

Table 3-1. Guide for Preparation of Antifreeze Solutions.

ETHYLENE-GLYCOL -60°F (-51°C) INHIBITED MIL-A-46153				
LOWEST EXPECTED AMBIENT TEMPERATURE		QUARTS OF ANTIFREEZE REQUIRED	ARCTIC GRADE ANTIFREEZE -90°F (-68°C) MIL-A-11755	
°F	°C			
+20	-7	9	Freezing point of -90°F (-68°C). Issued ready for use and must not be mixed with any other liquid.	
+10	-12	11-3/4		
0	-18	16		
-10	-23	19		
-20	-29	20-1/2		
-30	-34	23-1/2		
-40	-40	25		
-50	-46	26-1/2		
-55	-48	28		
Below -60	Below -51	Use arctic grade antifreeze (-90°F) (-68°C)		

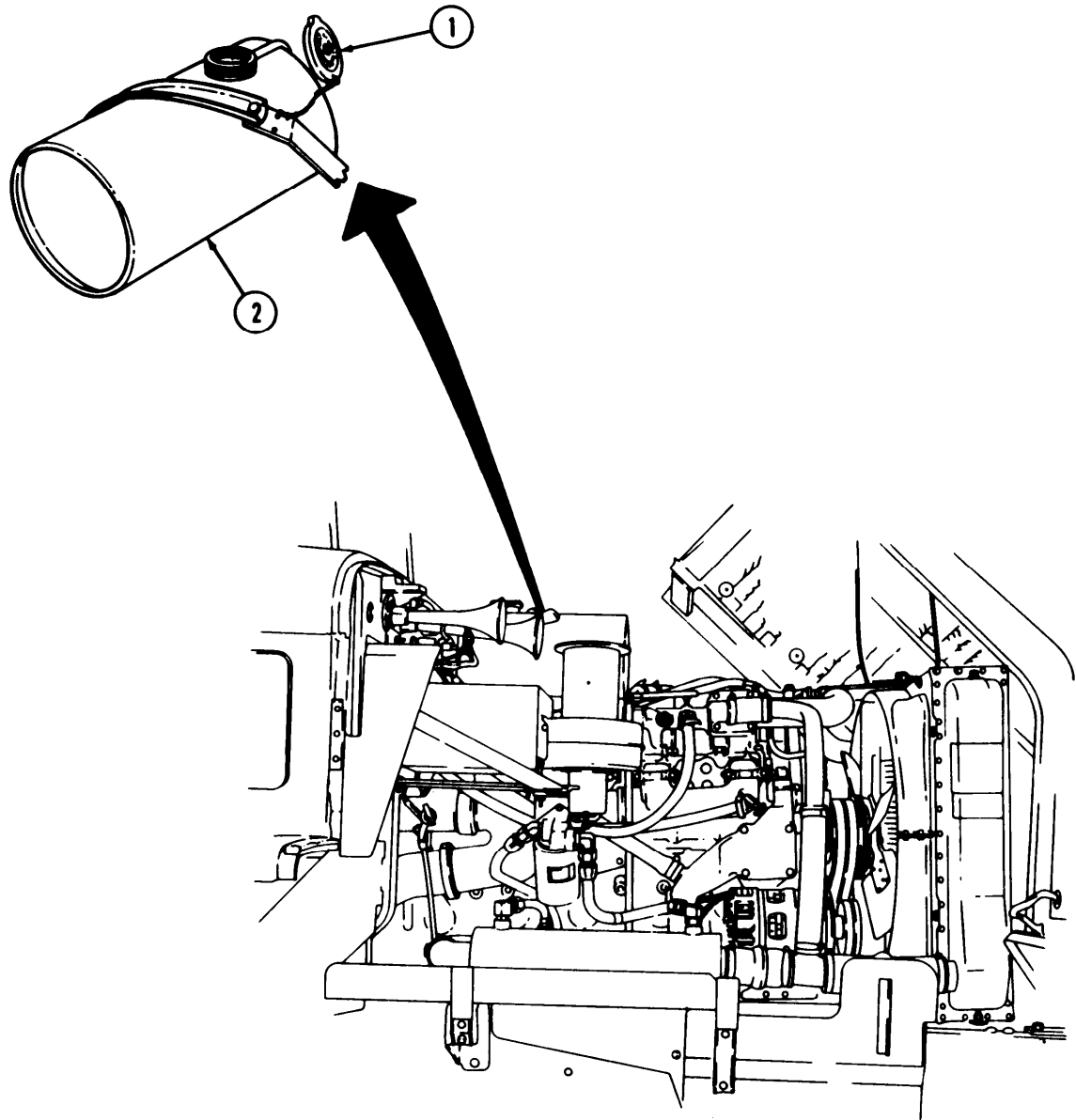
NOTE

The cooling system for the vehicles covered in this manual has a 1 1-3/4 gallon (47 quart), (44.5 liter) capacity.

- | | | | |
|----|----------------|---|--|
| 4. | Cooling system | Fill as follows | See table 3-1. |
| | | a. Fill with required amount of antifreeze and add water to full mark. | |
| | | b. Install surge tank filler cap (1). | |
| | | c. Run engine at fast idle (800- 1000 rpm) until engine temperature reaches 185°F (85°C). | Fully opens thermostat to circulate coolant. |
| | | d. Check antifreeze protection level. | Refer to step 1 for removal of surge tank filler cap (1). Use antifreeze tester. |

3-46. COOLING SYSTEM SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: • Install right splash shield (TM 9-2320-272-10).
 • Start engine (TM 9-2320-272-10) and check for coolant leaks.

TA 349628

3-47. RADIATOR VENT HOSE AND MANIFOLD RETURN HOSE REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 3-46	Parking brake set. Drain cooling system.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

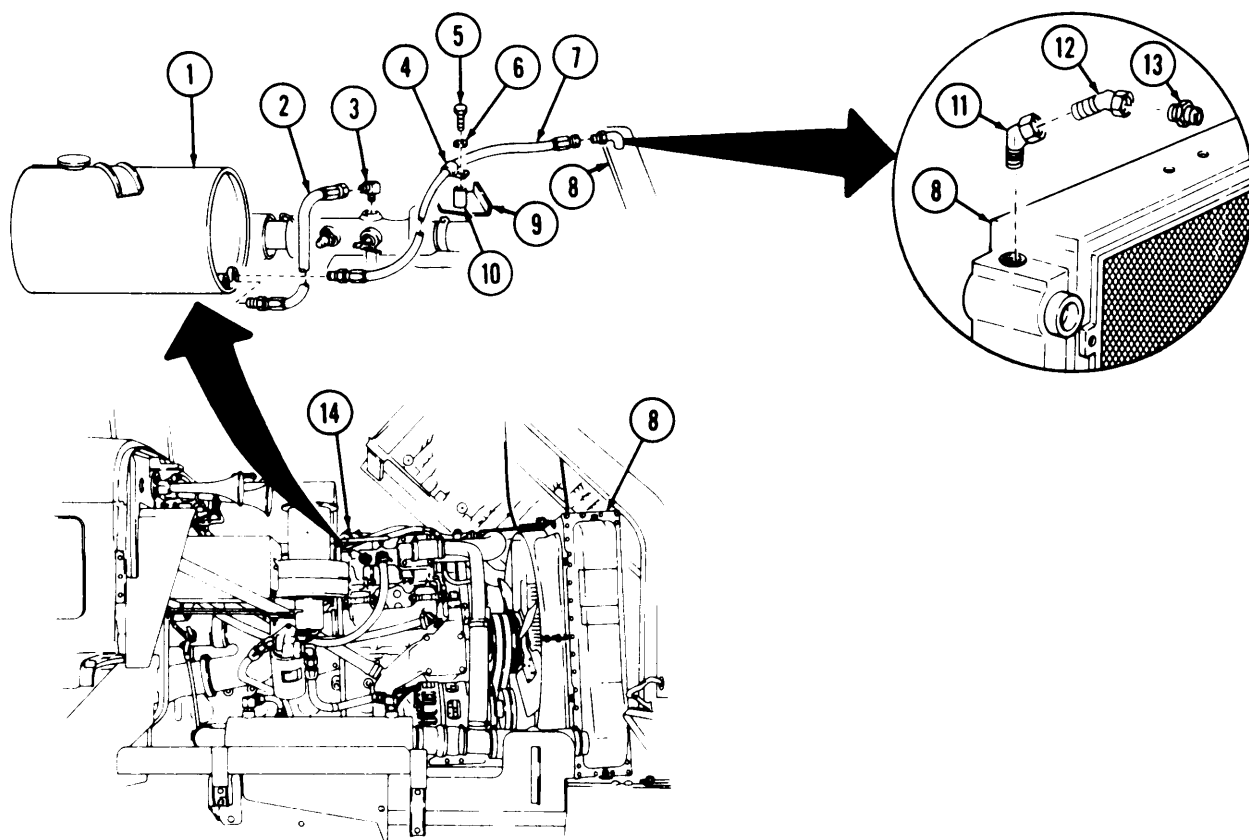
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|-----|---------------------------------------|--|---|
| 1. | Top of radiator (8) and adapter (13) | Radiator vent hose (7) | Disconnect from radiator adapter (13). |
| 2. | | Adapter (13) and two elbows (11) and (12) | Remove. |
| 3 . | Engine bracket (9) | Screw (5), washer (6), spacer (10), and hose clamp (4) | Remove. |
| 4. | Water manifold (14) | Manifold return hose (2) | Disconnect from manifold adapter elbow (3). |
| 5, | Surge tank (1) | Manifold return hose (2) and radiator vent hose (7) | Disconnect. |
| 6. | | Manifold adapter elbow (3) | Remove, |

b. installation**NOTE**

- Ž Fittings must be cleaned and inspected for cracks or stripped threads,
- Male pipe threads must be wrapped with sealing tape before installation.

3-47. RADIATOR VENT HOSE AND MANIFOLD RETURN HOSE REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
7.		Manifold return hose (2) and radiator vent hose (7)	Connect to surge tank (1).	
8.		Elbow (3)	Install.	
9.		Two elbows (11), and (12), and adapter (13)	Install in top of radiator (8).	
10.		Manifold return hose (2)	Connect to manifold elbow (3).	
11.		Radiator vent hose (7)	Connect to radiator adapter (13).	
12.		Hose clamp (4)	Install with spacer (10), washer (6), and screw (5).	Tighten 75-95 lb-in. (8-10 N·m).



END OF TASK!

FOLLOW-ON TASKS: • Fill cooling system to proper level (para. 3-46).
• Start engine (TM 9-2320-272-10) and check coolant system for leaks.

TA 249629

3-48. RADIATOR INLET PIPING REPLACEMENT

This task covers:

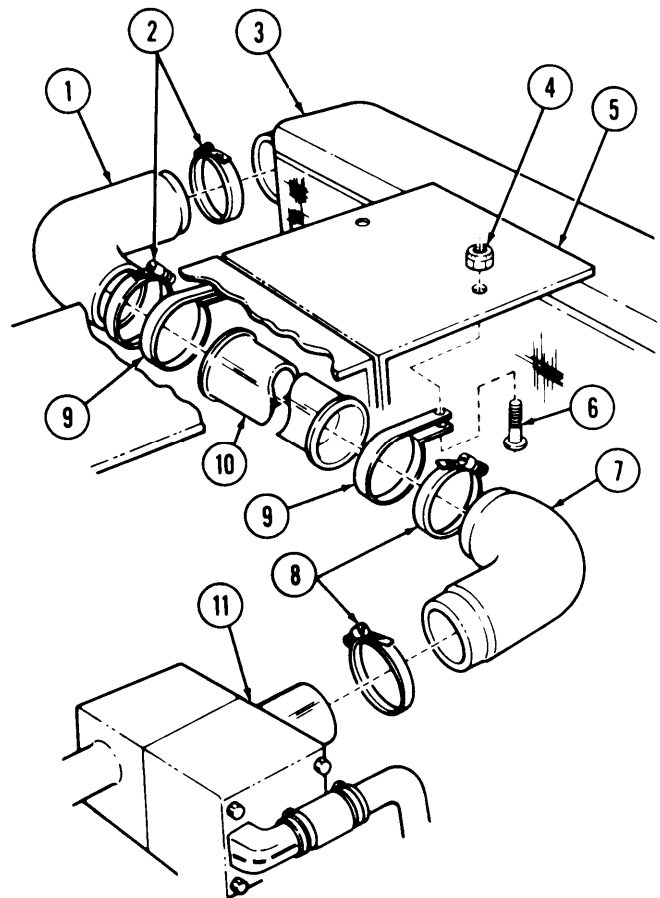
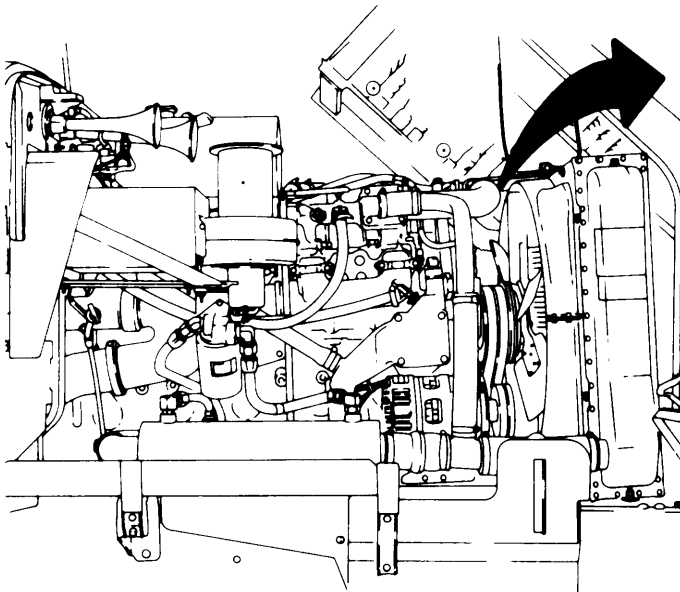
a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-46	Parking brake set. Left splash shield removed. Cooling system drained as needed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
NOTE				
Have drainage container ready to catch coolant.				
1.	Hose (7) to thermostat housing (11) and inlet pipe (10)	Two clamps (8) and hose (7)	a. Loosen and disconnect hose (7). b. Remove two clamps (8).	Have drainage container ready to catch coolant.
2.	Hose (1) to inlet pipe (10) and radiator (3)	Two clamps (2) and hose (1)	a. Loosen and disconnect hose (1). b. Remove two clamps (2).	
3.	Upper radiator bracket (5)	Two screws (6) and locknuts (4)	Remove.	Discard locknuts (4).
4.		Inlet pipe (10) and two clamps (9)	Remove.	
b. Installation				
5.		Two inlet pipe clamps (9)	Position over inlet pipe (10).	

3-48. RADIATOR INLET PIPING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Inlet pipe (10)	Install to upper radiator bracket (5) with two screws (6) and new locknuts (4).	
7.		Radiator hose (1)	Connect to inlet pipe (10) and radiator (3) with two hose clamps (2),	
8.		Inlet pipe hose (7)	Connect to thermostat housing (11) and inlet pipe (10) with two hose clamps (8).	



END OF TASK!

FOLLOW-ON TASKS: \checkmark Fill cooling system to proper level (para. 3-46).
 \checkmark Start engine (TM 9-2320-272- 10) and check cooling system for leaks.
 • Install left splash shield (TM 9-2320-272- 10).

TA 349630

3-49. RADIATOR FAN SHROUD REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-46	Parking brake set. Left and right splash shields removed. Radiator coolant drained as needed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Five lockwashers Sixteen locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				

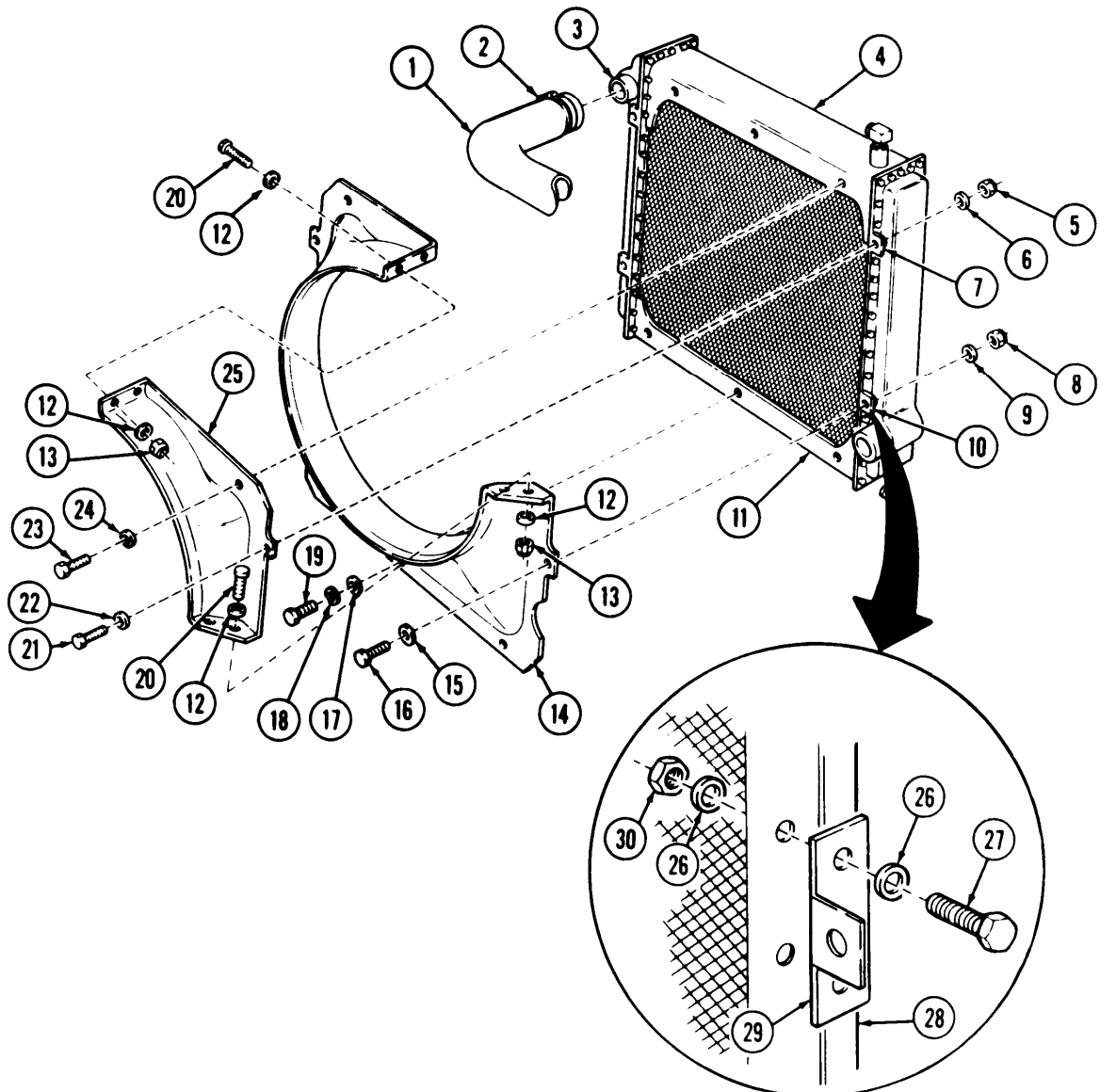
NOTE

Have drainage container ready to catch coolant.

- | | | | | |
|----|---|--|--|---------------------------|
| 1. | Radiator inlet piping (3) to radiator hose (1) | Hose clamp (2) | Loosen and disconnect hose (1). | |
| 2. | Corner shroud (25) to upper radiator bracket (4) | Screw (23) and washer (24) | Remove. | |
| 3. | Corner shroud (25) to fan shroud bracket (7) | Screw (21), washer (22), washer (6), and locknut (5) | Remove. | Discard locknut (5). |
| 4. | Corner shroud (25) to basic shroud (14) | Four screws (20), eight washers (12), and four locknuts (13) | Remove and set corner shroud (25) aside. | Discard locknuts (13). |
| 5. | Basic shroud (14) to three fan shroud brackets (10) | Three screws (16), washers (15), washers (9), and locknuts (8) | Remove. | Discard locknuts (8). |
| 6. | Basic shroud (14) to upper radiator bracket (4) and lower radiator bracket (11) | Five screws (19), washers (17), and lockwashers (18) | Remove. | Discard lockwashers (18). |

3-49. RADIATOR FAN SHROUD REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
7.		Basic shroud (14)	Remove from left side of vehicle.	
8.	Two radiator end tanks (28)	Eight screws (27), sixteen washers (26), eight locknuts (30), and four shroud brackets (29)	Remove.	Discard locknuts (30).

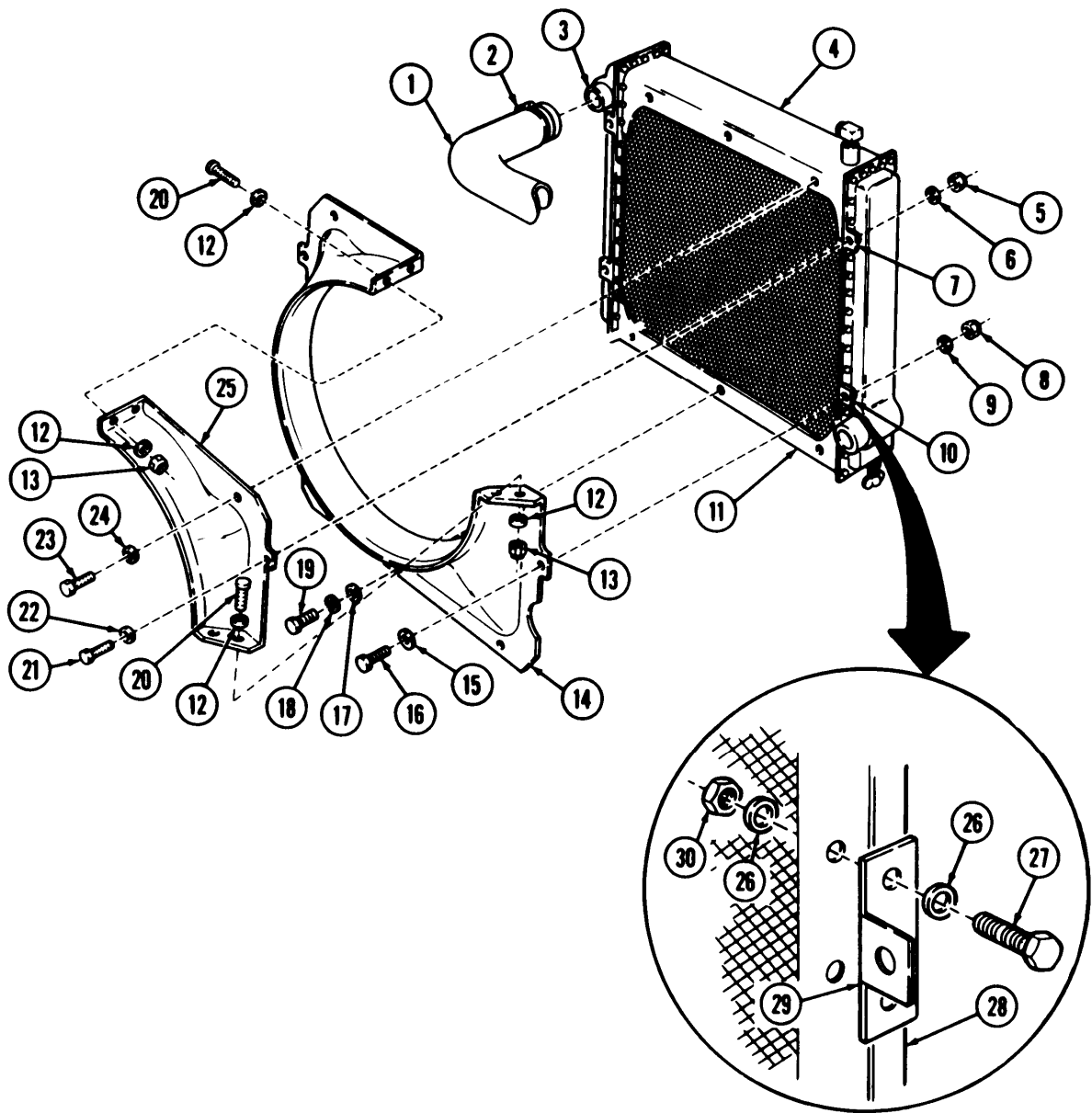


TA 349631

3-49. RADIATOR FAN SHROUD REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
9.		Four shroud brackets (29)	Install two shroud brackets (29) on each radiator end tank (28) with four screws (27), eight washers (26), and four new locknuts (30).	Tighten screws (27) 10-14 lb-ft (14-19 N·m).
10.		Basic shroud (14)	a. Position to upper radiator bracket (4) and lower radiator bracket (11) from left side of vehicle. b. Install to upper radiator bracket (4) and lower radiator bracket (11) with five washers (17), new lockwashers (18), and screws (19). c. Install to three fan shroud brackets (10) with three washers (15), screws (16), washers (9), and new locknuts (8).	Tighten screws (19) 10-14 lb-ft (14-19 N·m).
11.		Corner shroud (25)	a. Install to basic shroud (14) with four screws (20), eight washers (12), and four new locknuts (13). b. Install to fan shroud bracket (7) with washer (22), washer (6), new locknut (5), and screw (21). c. Install to upper radiator bracket (4) with washer (24) and screw (23).	Tighten screws (20) 66-86 lb-in. (7-10 N·m). Tighten screw (21) 10-14 lb-ft (14-19 N·m). Tighten screw (23) 10-14 lb-ft (14-19 N·m).
12.		Radiator hose (1) and clamp (2)	Connect to radiator inlet piping (3) and tighten clamp (2).	

3-49. RADIATOR FAN SHROUD REPLACEMENT (Cont'd)				
STEP N O .	LOCATION	ITEM	ACTION	R E M A R K S



END OF TASK!

- FOLLOW-ON TASKS:
- Refill cooling system (para. 3-46).
 - Start engine (TM 9-2320-272-10) and check hose connection for coolant leaks.
 - Install left and right splash shields (TM 9-2320-272-10).
- TA 349632

3-50. RADIATOR FAN BLADE REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Five locknuts Six lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|-------------------|--|---------|---------------------------|
| 1. | Corner shroud (4) | Four screws (3), eight washers (2), and four locknuts (1) | Remove. | Discard locknuts (1). |
| 2. | | Screw (5) and washer (6) | Remove. | |
| 3. | Radiator (11) | Screw (7), washer (8), washer (10), locknut (9), and corner shroud (4) | Remove. | Discard locknut (9). |
| 4. | Fan hub (14) | Six screws (12), lockwashers (13), and Fan (15) | Remove. | Discard lockwashers (13). |

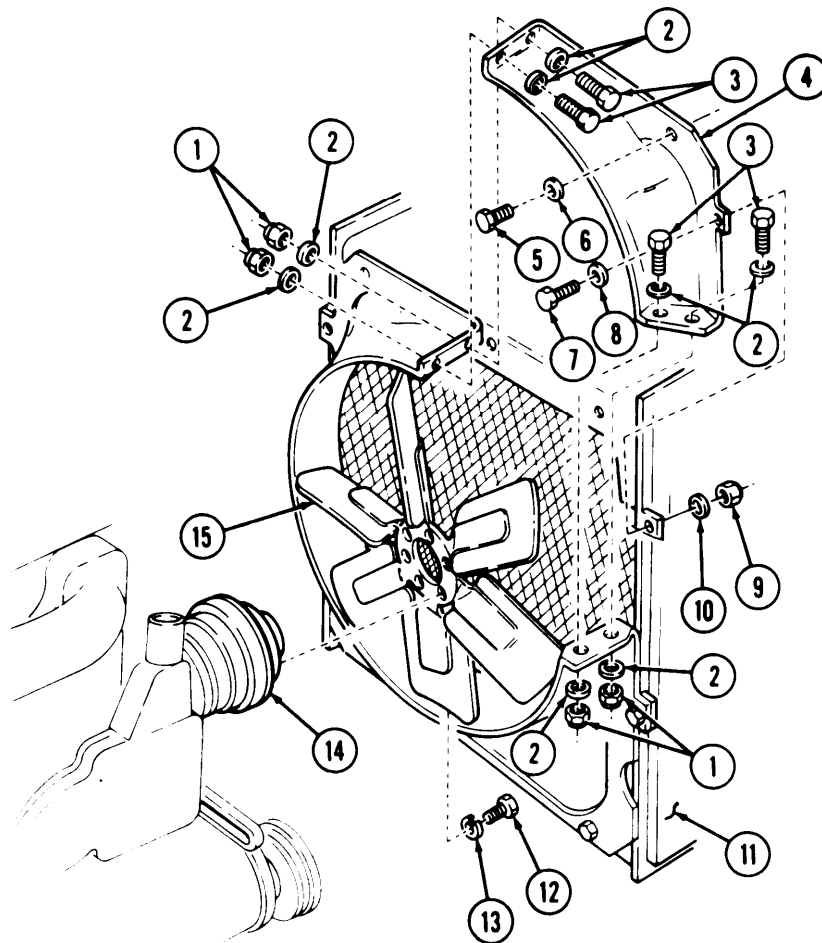
b. Installation**NOTE**

Make sure fan installation does not block fan drive clutch lock up holes.

- | | | | |
|----|----------|--|--|
| 5. | Fan (15) | Install with six screws (12) and new lockwashers (13). | Tighten screws (12) 25-31 lb-ft (34-42 N·m). |
|----|----------|--|--|

3-50. RADIATOR FAN BLADE REPLACEMENT (Cent'd)

S T E P N O .	LOCATION	ITEM	ACTION	REMARKS
6.		Corner shroud (4)	a. Install with screw (7), washer (8), washer (10), and new locknut (9). b. Install with screw (5) and washer (6). c. Install with four screws (3), eight washers (2), and four new locknuts (1).	Tighten screw (7) 10-14 lb-ft (14-19 N·m). Tighten screw (5) 10-14 lb-ft (14-19 N·m). Tighten screws (3) 66-86 lb-in. (7-10 N·m).



END OF TASK!

FOLLOW-ON TASK: Install right splash shield (TM 9-2320-272- 10).

TA 349633

3-51. RADIATOR REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 3-46 Para. 3-49	Parking brake set. Coolant drained. Fan shroud removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Fourteen locknuts Ten lockwashers Three rubber mounts Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Radiator (19)	Radiator vent hose (18)	Disconnect.	
2.	Upper radiator bracket (1)	Two locknuts (6), hood stop cables (7), washers (8), and screws (9)	Remove.	Discard locknuts (6).
3.		Two screws (4), lockwashers (3), and washers (2)	Remove.	Discard lockwashers (3).
4.		Two locknuts (5) and screws (15)	Remove.	Discard locknuts (5).
5.	Engine bracket (10)	Two locknuts (11), washers (12), screws (14), and upper radiator bracket (1)	Remove.	Discard locknuts (11).

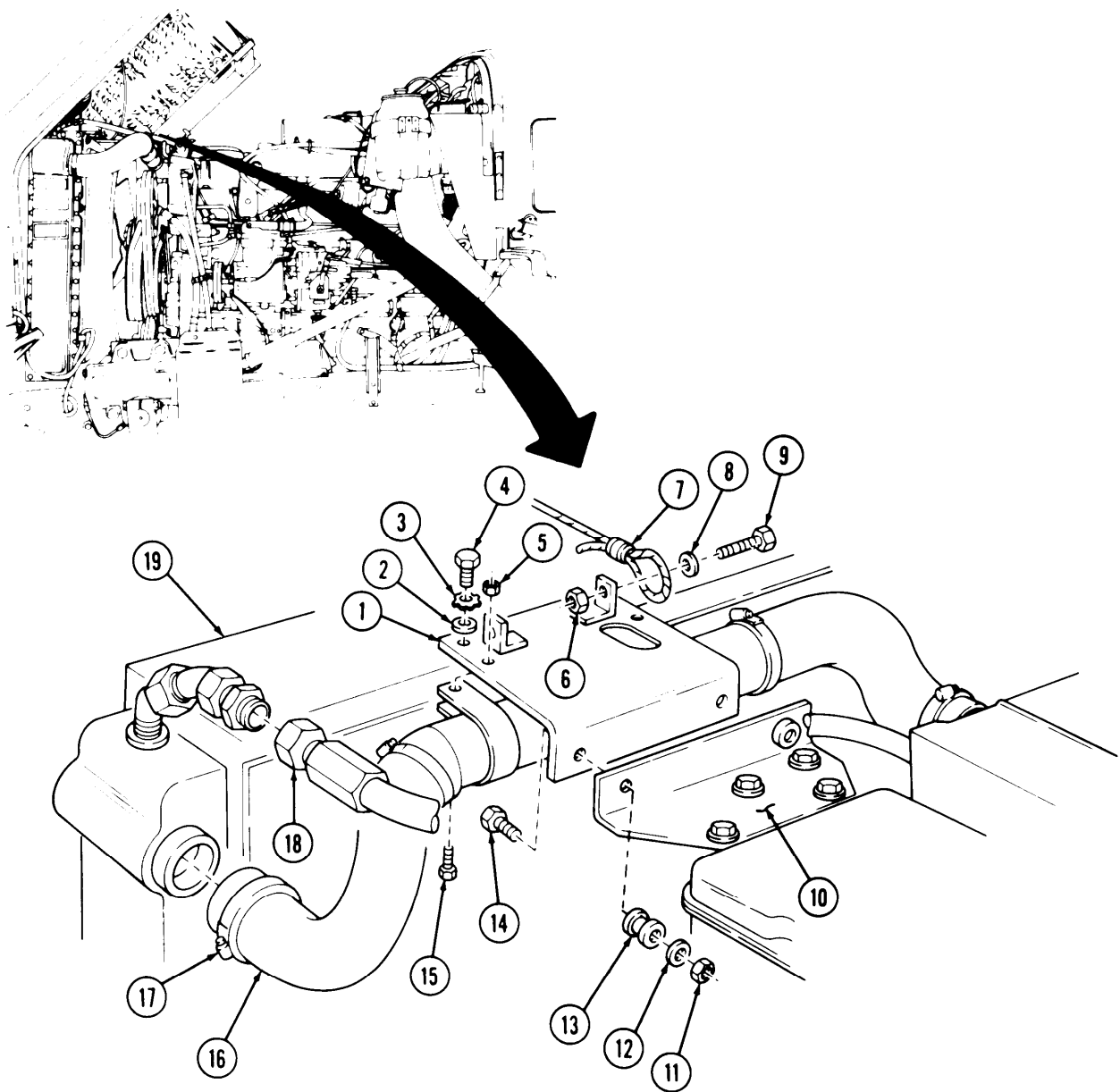
3-51. RADIATOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Perform step 6 only if rubber mounts are damaged or new radiator is being installed,

6.	Engine bracket (10)	Two rubber mounts (13)	Remove.	Discard rubber mounts (13).
7.	Radiator (19)	Clamp (17) and radiator hose (16)	Disconnect.	

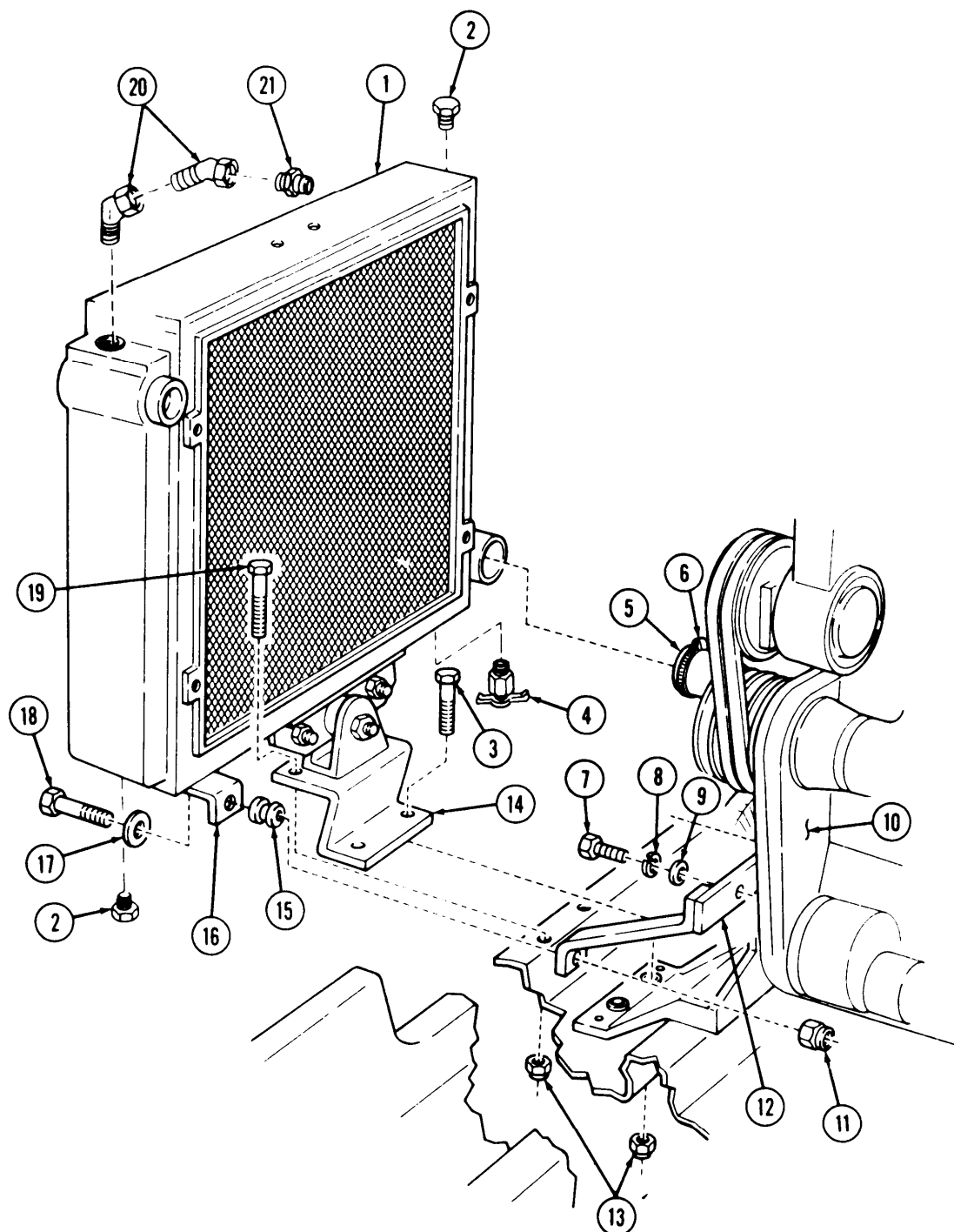


3-51. RADIATOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.	Radiator (1)	Adapter (21) and two elbows (20)	Remove.	
9.		Two plugs (2) and draincock (4)	Remove.	
10.		Clamp (6) and radiator outlet hose (5)	Disconnect.	
11.	Angle bracket (16)	Locknut (11), washer (17) and screw (18)	Remove.	Discard locknut (11).
NOTE				
Perform step 12 only if rubber mount is damaged or a new radiator is being installed.				
12.		Rubber mount (15)	Remove.	Discard rubber mount (15).
NOTE				
Assistant needed for steps 13 and 14.				
13.	Radiator support (14)	Four locknuts (13), two screws (3), and two screws (19)	Remove.	Discard locknuts (13).
14.		Radiator (1)	Remove.	
NOTE				
Perform step (15) only if bracket is damaged or being replaced.				
15.	Engine (10)	Two screws (7), lockwashers (8), washers (9), and radiator support bracket (12)	Remove.	Discard lockwashers (8),

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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TA 349635

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
16.	Bottom of radiator (1)	Screw (13), locknut (8), and radiator support (7)	Remove.	Discard locknut (8).
17.		Two locknuts (3) and screws (15), and control assembly (14)	Remove.	Discard locknuts (3).
18.		Four screws (6), lockwashers (5), and washers (4), and mounting bracket (2)	Remove.	Discard lockwashers (5).
19.		Two screws (10), lockwashers (11), and angle bracket (12)	Remove.	Discard lockwashers (11).

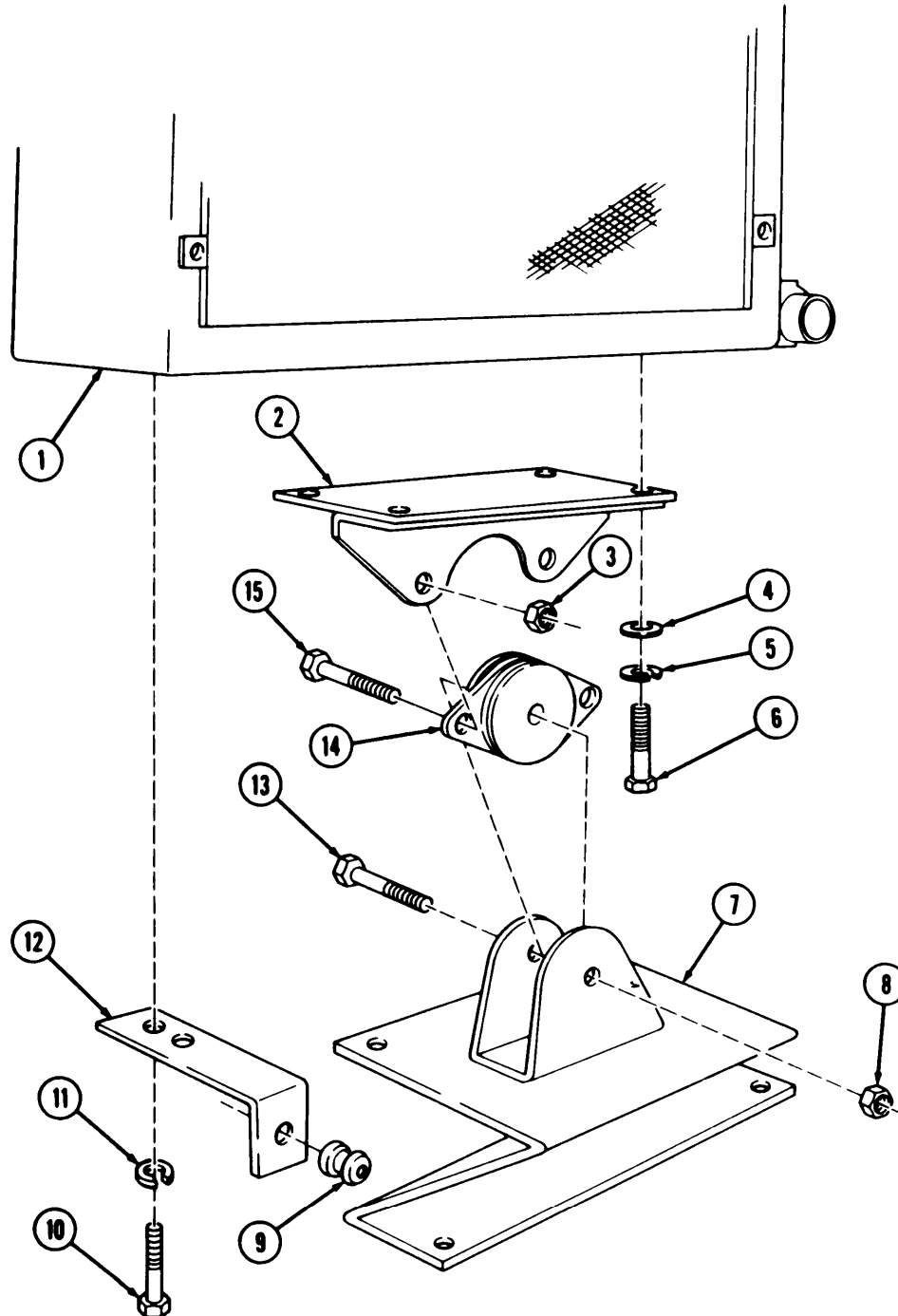
b. Installation**NOTE**

- When new radiator is installed, use attaching parts and fittings from old radiator.
- Fittings must be cleaned and inspected for cracks or stripped threads.
- Male pipe threads must be wrapped with sealing tape before installation.
- Perform step 20 only if rubber mount was removed.

20.		New rubber mount (9)	Install to angle bracket (12).
21.		Angle bracket (12)	Install with two screws (10) and new lockwashers (11).
22.		Mounting bracket (2)	Install with four washers (4), new lockwashers (5), and screws (6).
23.		Control assembly (14)	Install with two screws (15) and new locknuts (3).
24.		Radiator support (7)	Install with screw (13) and new locknut (8).

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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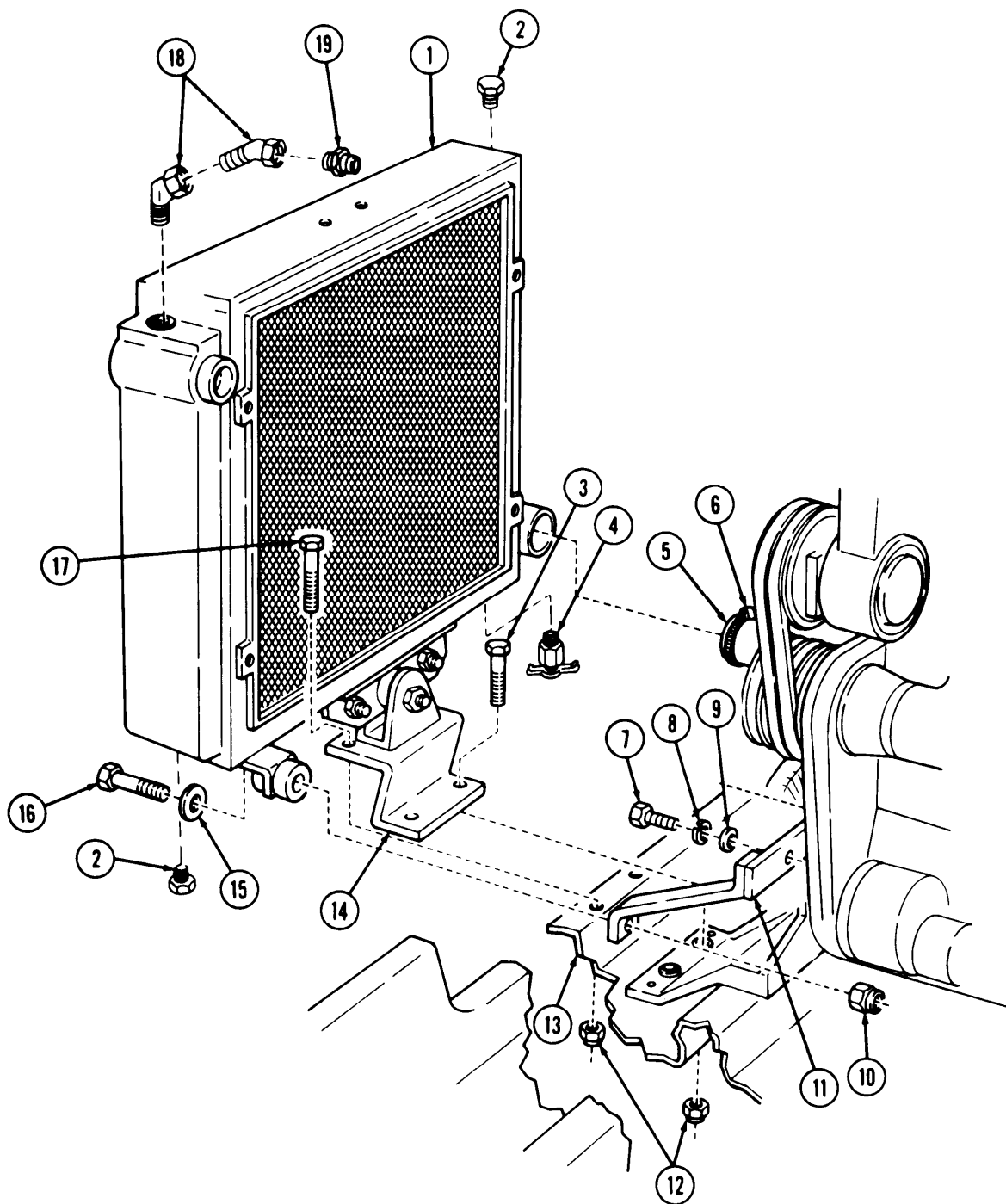
TA 349636

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
NOTE				
Perform step 25 only if bracket was removed.				
25.		Radiator support bracket (11)	Install with two screws (7), new lockwashers (8), and washers (9).	
NOTE				
Assistant needed for steps 26, 27, and 28.				
26.		Radiator (1)	Place onto frame (13).	
27.		Radiator support (14)	Install with two screws (3), and screws (17), and four new locknuts (12).	
28.		Screw (16), washer (15), and new locknut (10)	Install.	
29.		Radiator outlet hose (5) and clamp (6)	Connect.	
NOTE				
Male pipe threads must be wrapped with sealing tape before installation,				
30.		Two plugs (2) and draincock (4)	Install.	
31.		Two elbows (18) and adapter (19)	Install,	

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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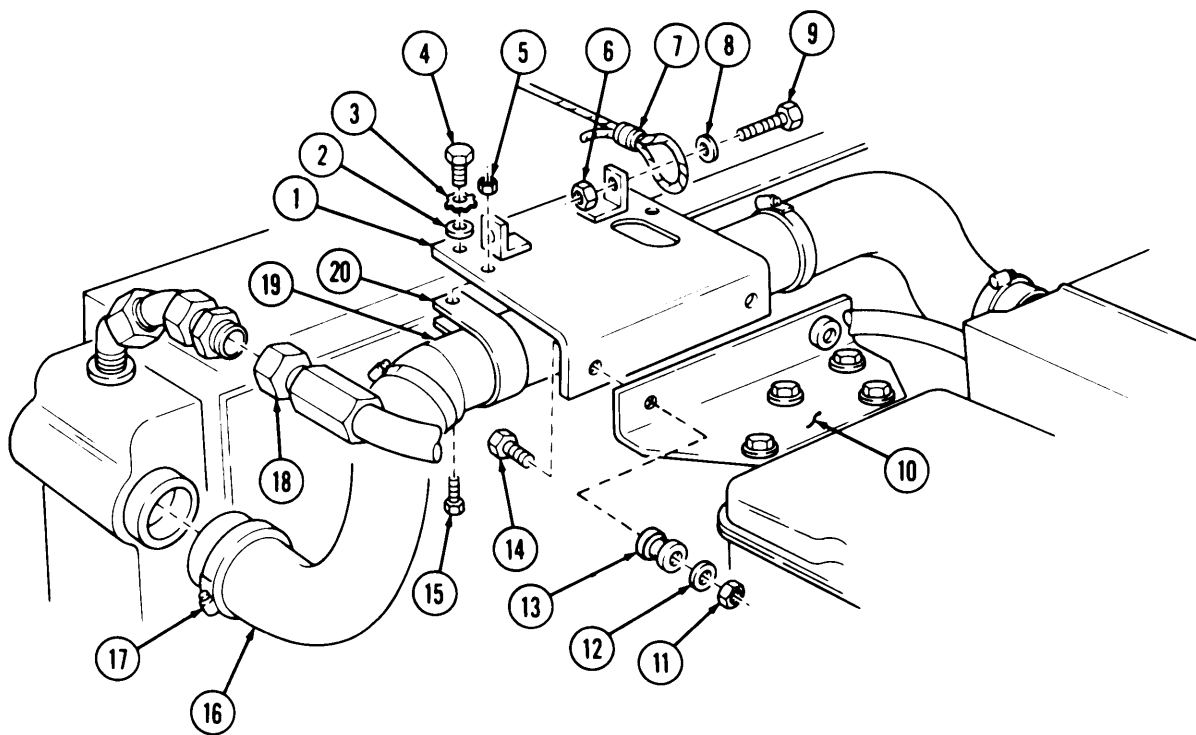
TA 349637

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
32.		Radiator hose (16) and Connect. clamp (17)		
NOTE				
Perform step 33 only if rubber mounts were removed.				
33.		Two new rubber mounts (13)	Install to engine bracket (10).	
34.		Upper radiator bracket (1)	a. Install with two screws (14), washers (12), and new locknuts (11). b. Install with two screws (4), new lock- washers (3), and washers (2).	
35.		Two hood stop cables (7)	Install with two screws (9), washers (8), and new locknuts (6).	
36.		Two clamps (20) and inlet pipe (19)	Install with two screws (15) and new locknuts (5).	
37.		Radiator vent hose (18)	Connect.	Wrap male pipe threads with sealing tape before install- ation.

3-51. RADIATOR REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:

- Install fan shroud (para. 3-49).
- Fill cooling system to proper level (para. 3-46).
- Start engine (TM 9-2320-272-10) and check coolant system for leaks.

TA 349638

3-52. SURGE TANK REPLACEMENT

This task covers:

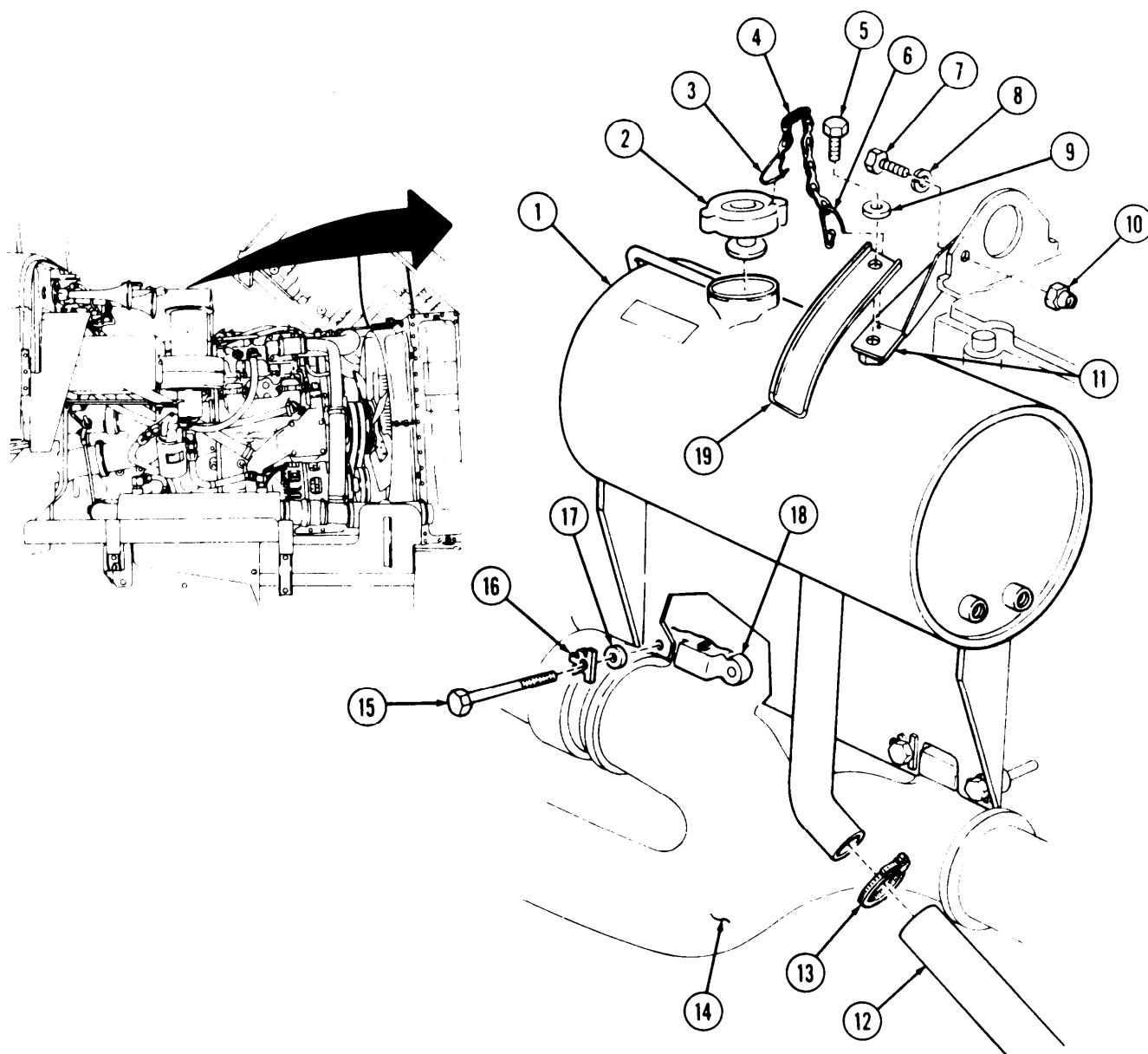
a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-47	Parking brake set. Right splash shield removed. Radiator vent hose and manifold return hose removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Lockwasher Four locktabs		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Surge tank (1)	Cap (2) and retaining pin (3)	Remove cap (2).	
2.	Surge tank support (11)	Chain (4) and retaining pin (6)	Remove.	
3.		Screw (5), washer (9), and surge tank support extension (19)	Remove.	
4.		Screw (7), lockwasher (8), locknut (10), and surge tank support (11)	Remove.	Discard lockwasher (8).
5.	Engine oil cooler hose (12)	Clamp (13)	Remove.	
6.	Exhaust manifold (14)	Four screws (15), locktabs (16) and washers (17), and two exhaust manifold clamps (18)	Remove.	Locktabs (16) must be unlocked before removal. Discard locktabs (16).
7.		Surge tank (1)	Remove.	

3-52. SURGE TANK REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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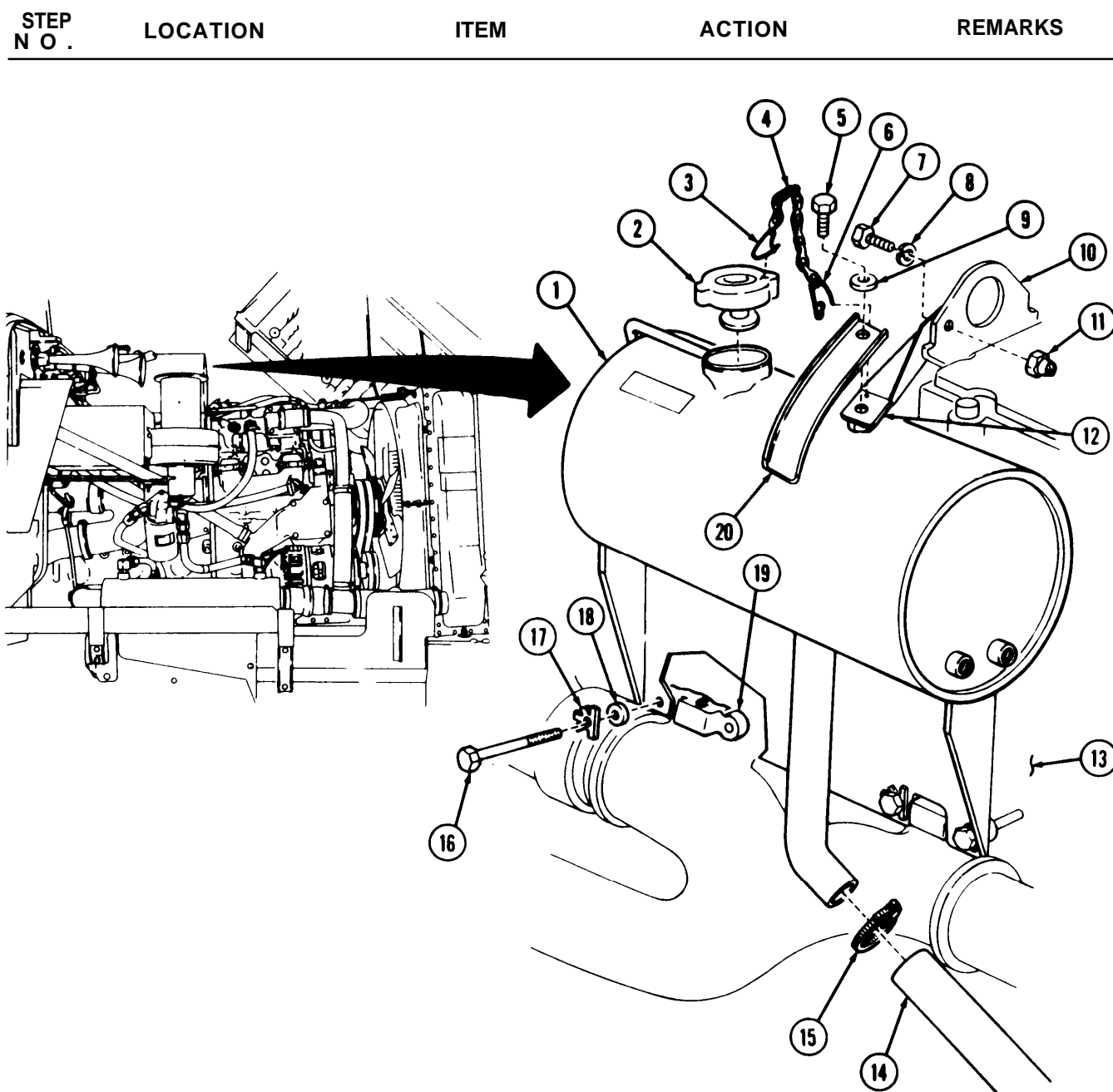


TA 349639

3-52. SURGE TANK REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
8.		Surge tank (1)	Install with two exhaust manifold clamps (19), four washers (18), new locktabs (17), and screws (16).	Tighten 15-20 lb-ft (20-27 N·m). Make sure exhaust manifold clamps (19) are parallel to surface of cylinder head (13). Tighten screws (16) 40-45 lb-ft (54-61 N·m). Bend locktabs (17), to prevent rotation of screws (16).
9.		Engine oil cooler hose (14)	Install with clamp (15).	
10.		Surge tank support (12)	a. Install to lifting eye (10) with screw (7), new lockwasher (8), and locknut (11). b. Install to surge tank (1) with screw (5), washer (9), and surge tank support extension (20).	
11.		Chain (4)	a. Install to cap (2) with retaining pin (3). b. Install to surge tank support (12) with retaining pin (6).	
12.		Cap (2)	Install.	

3-52. SURGE TANK REPLACEMENT (Cont'd)



END OF TASK!

FOLLOW-ON TASKS: • Install radiator vent hose and manifold return hose (para. 3-47).
 • Install right splash shield (TM 9-2320-272-10).

TA 349640

3-53. COOLANT HOSES AND TUBES REPLACEMENT

This task covers:

- | | |
|---|---|
| a. Removing Radiator Inlet Hoses and Tube | f. Installing Transmission Oil Cooler Hoses and Tube |
| b. Removing Thermostat Housing Hose, Radiator Bypass Tube, and Hose | g. Installing Radiator Outlet Hoses and Tee |
| c. Removing Surge Tank Hose | h. Installing Surge Tank Hose |
| d. Removing Radiator Outlet Hoses and Tee | i. Installing Thermostat Housing Hose, Radiator Bypass Tube, and Hose |
| e. Removing Transmission Oil Cooler Hoses and Tube | j. Installing Radiator Inlet Hoses and Tube |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-46	Parking brake set. Right splash shield removed. Coolant drained.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removing Radiator Inlet Hoses and Tube

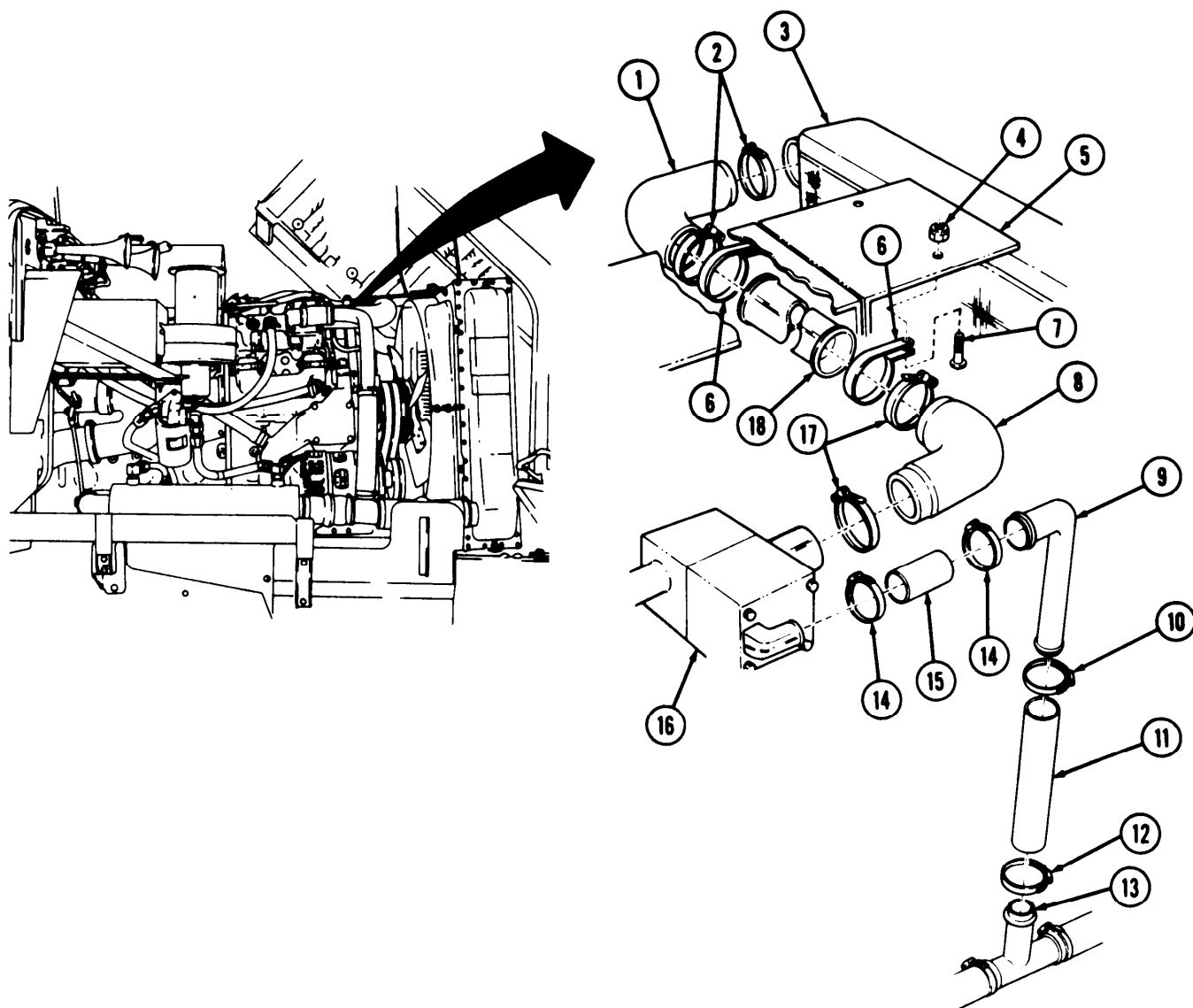
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|----|--|---|---------|-----------------------|
| 1. | Radiator (3) and radiator inlet tube (18) | Two clamps (2) and radiator hose (1) | Remove. | |
| 2. | Radiator inlet tube (18) and thermostat housing (16) | Two clamps (17) and inlet tube hose (8) | Remove. | |
| 3. | Upper radiator bracket (5) | Two locknuts (4) and inlet tube clamps (6), inlet tube (18), and two screws (7) | Remove. | Discard locknuts (4). |

b. Removing Thermostat Housing Hose, Radiator Bypass Tube, and Hose

- | | | | |
|----|---|--|---------|
| 4. | Thermostat housing (16) and bypass tube (9) | Two clamps (14) and thermostat housing hose (15) | Remove. |
|----|---|--|---------|

3-53. COOLANT HOSES AND TUBES REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
5.	Bypass hose (11)	Clamp (10) and bypass tube (9)	Remove.	
6.	Tee (13)	Clamp (12) and bypass hose(11)	Remove.	



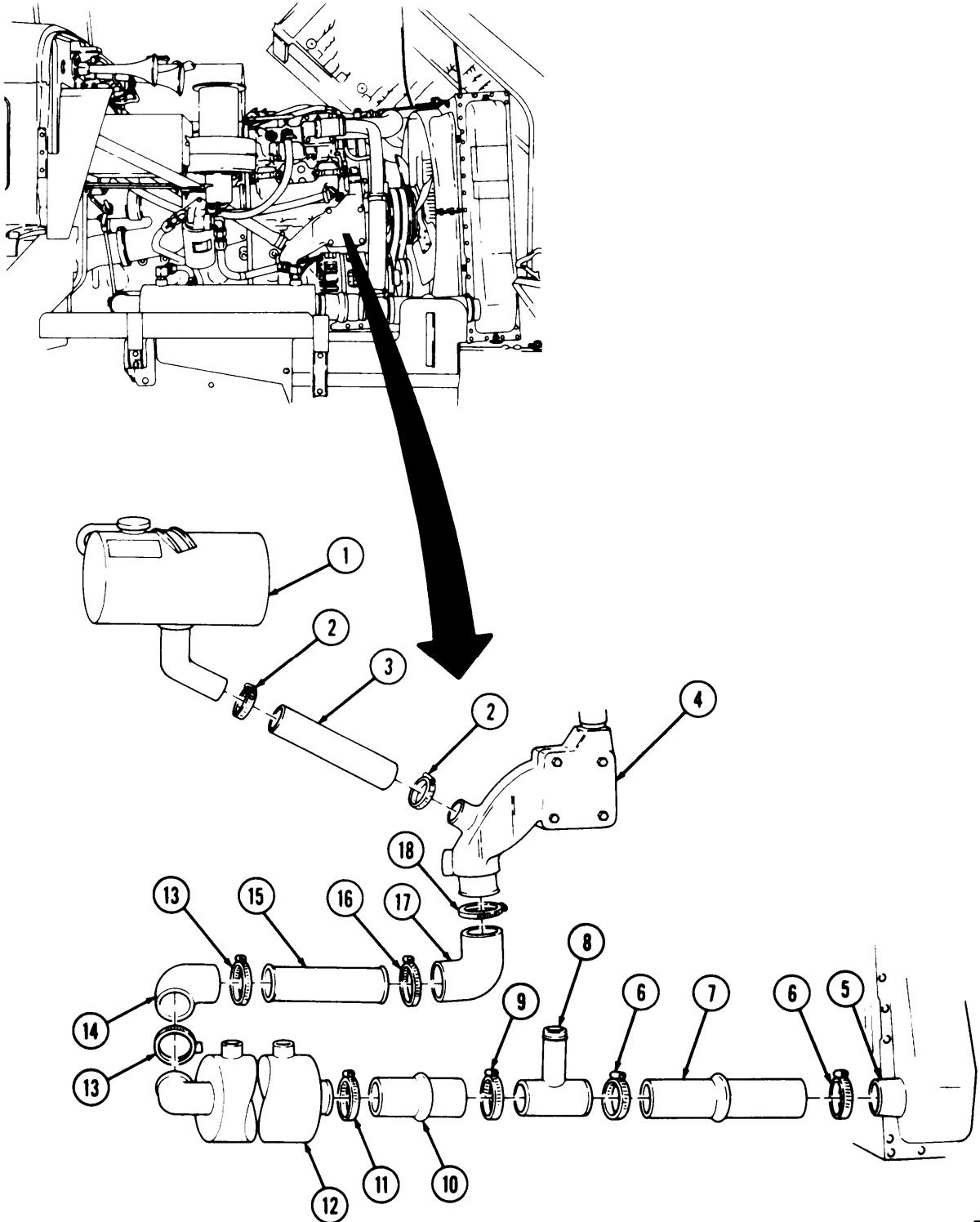
TA 349641

3-53. COOLANT HOSES AND TUBES REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Removing Surge Tank Hose				
7.	Surge tank (1) and engine oil cooler (4)	Two clamps (2) and surge tank hose (3)	Remove.	
d. Removing Radiator Outlet Hoses and Tee				
8.	Radiator outlet (5) and tee (8)	Two clamps (6) and hose (7)	Remove.	
9.	Hose (10)	Clamp (9) and tee (8)	Remove.	
10.	Transmission oil cooler (12)	Clamp (11) and hose (10)	Remove,	
e. Removing Transmission Oil Cooler Hoses and Tube				
11.	Transmission oil cooler (12) and oil cooler tube (15)	Two clamps (13) and hose (14)	Remove.	
12.	Hose (17)	Clamp (16) and oil cooler tube (15)	Remove.	
13.	Engine oil cooler (4)	Clamp (18) and hose (17)	Remove.	
f. Installing Transmission Oil Cooler Hoses and Tube				
14.		Hose (17)	Install with clamp (18).	
15.		Oil cooler tube (15)	Install with clamp (16).	
16.		Hose (14)	Install with two clamps (13).	
g. Installing Radiator Outlet Hoses and Tee				
17.		Hose (10)	Install with clamp (11).	
18.		Tee (8)	Install with clamp (9).	
19.		Hose (7)	Install with two clamps (6).	
h. Installing Surge Tank Hose				
20.		Surge tank hose (3)	Install with two clamps (2).	

3-53. COOLANT HOSES AND TUBES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349642

3-53. COOLANT HOSES AND TUBES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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i. Installing Thermostat Housing Hose, Radiator Bypass Tube, and Hose

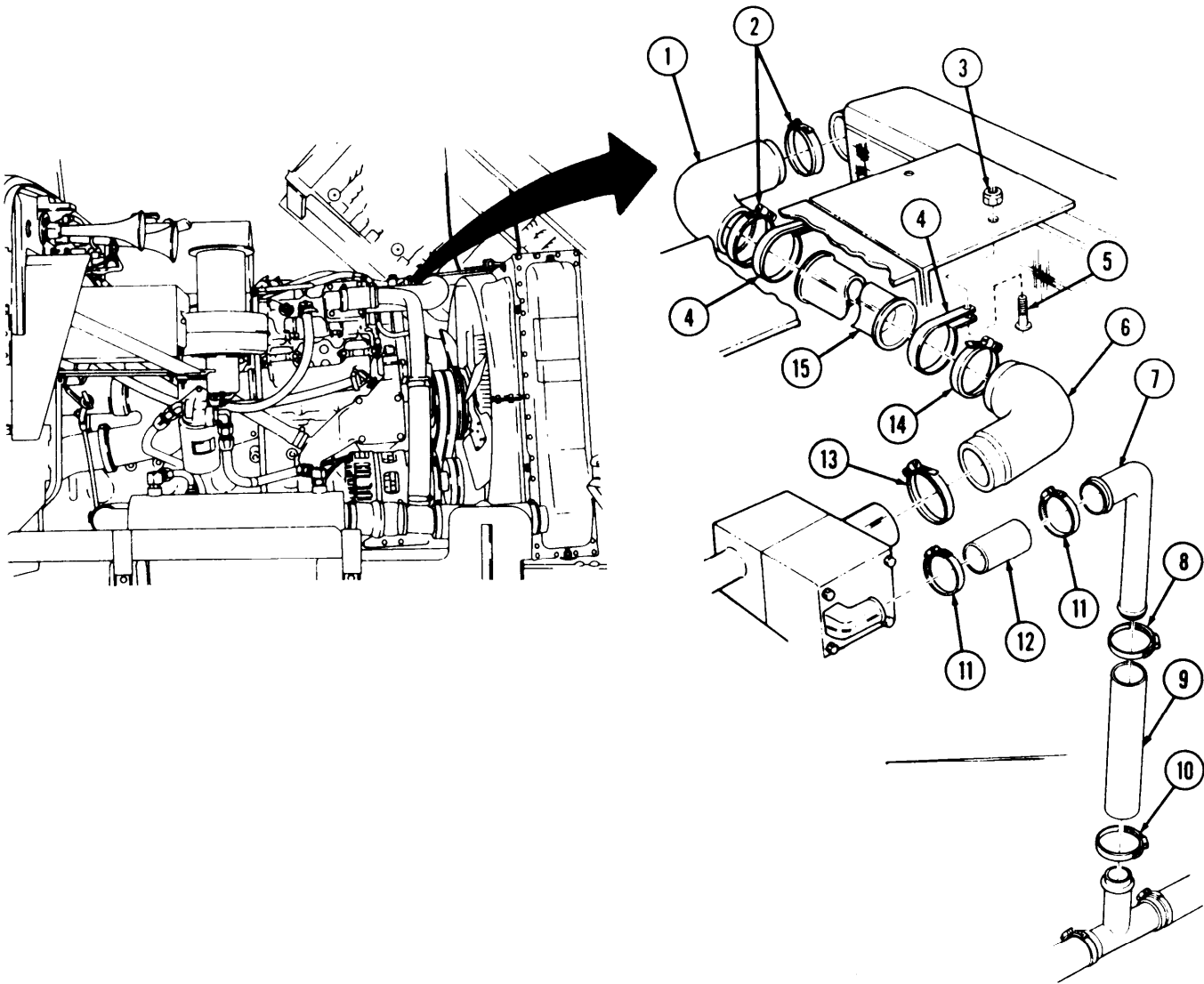
21.		Bypass hose (9)	Install with clamp (10).	
22.		Bypass tube (7)	Install with clamp (8),	
23.		Thermostat housing hose (12)	Install with two clamps (11).	

j. Installing Radiator Inlet Hoses and Tube

24.		Inlet tube hose (6)	Install with clamp (13).	
25.		Inlet tube (15)	Slide two clamps (4) over inlet tube and install with clamp (14).	
26.		Radiator hose (1)	Install with two clamps (2).	
27.		Two clamps (4)	Install with two screws (5), and new locknuts (3).	

3-53. COOLANT HOSES AND TUBES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Fill cooling system to proper level (para. 3-46).
 - Install right splash shield (TM 9-2320-272-10).
 - Start engine (TM 9-2320-272-10) and check for coolant leaks.

TA 349643

3-54. FAN DRIVEBELTS MAINTENANCE

This task covers:

- a. Adjustment
b. Removal

- c. Inspection
d. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Air reservoirs drained. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
Belt tension gage J-23600-B		None
<u>Materials/Parts</u>		
Protective cap plugs (Appendix D, Item 5) Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

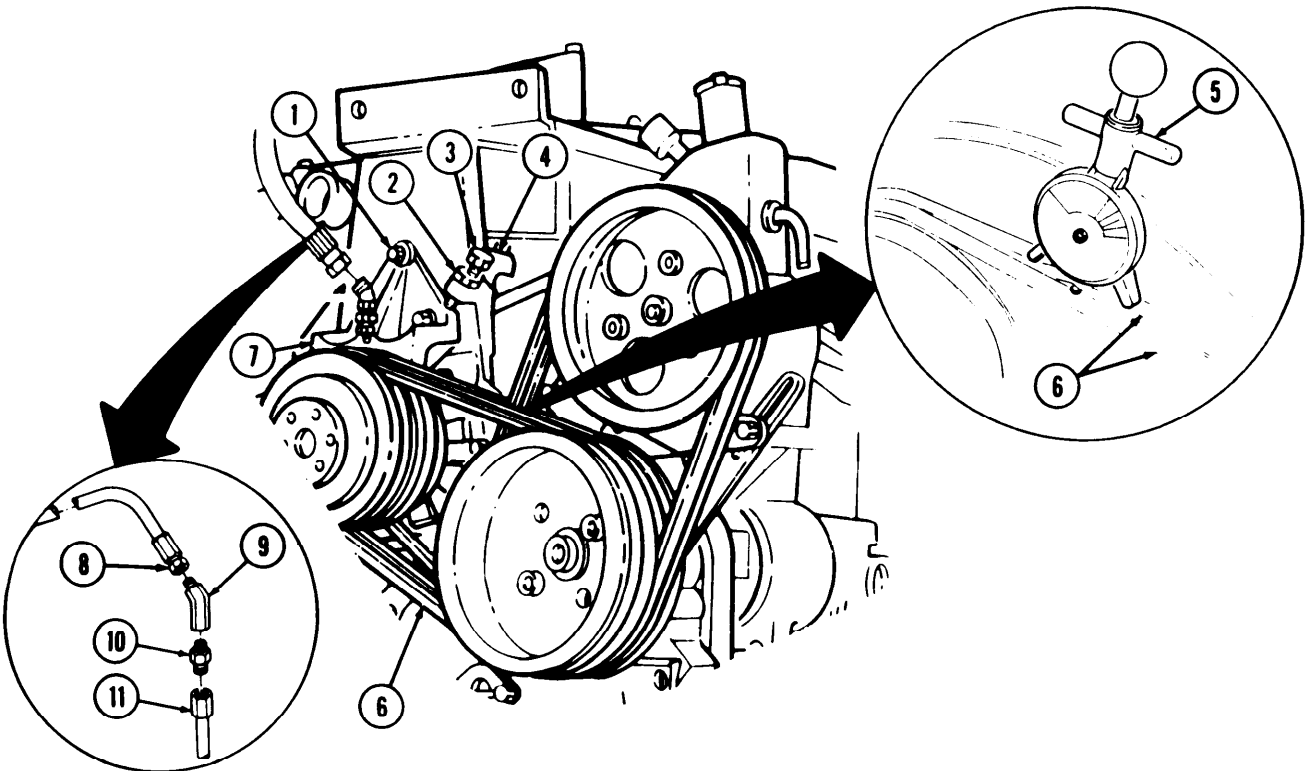
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Adjustment

- | | | | | |
|----|---|----------------------------------|---|--|
| 1. | Fan clutch pulley bracket (7) and elbow (9) | Air line (8) | Disconnect. | Plug air line (8). |
| 2. | | Elbow (9) and adapter (10) | Remove. | Plug union (11). Do not remove union (11). |
| 3. | | Three screws (1) and bracket (7) | Loosen. | Do not remove. |
| 4. | Water pump clamp ring (4) | Fan pulley adjusting screw (3) | a. Loosen screw (3) and locknut (2).
b. Tighten screw (3) until belts (6) appear tight.
c. Once belts (6) are tight, tighten locknut (2). | |

3-54. FAN DRIVEBELTS MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Two fan drivebelts (6)	Using belt tension gage (5), check for proper tension.	New belt (6) tension should be 100 ± 5 pounds (445 ± 22 newtons). Used belt (6) tension should be 90 ± 5 pounds (400 ± 22 newtons). If belt (6) tension cannot be properly adjusted, replace belts (6).
6.		Three screws (1)	Tighten.	Tighten to 25-35 lb-ft (34-47 N-m).
NOTE Male pipe threads must be wrapped with sealing tape before installation.				
7.	Fan clutch pulley bracket (7)	Adapter (10) and elbow (9)	Install.	
8.		Air line (8)	Connect to elbow (9).	



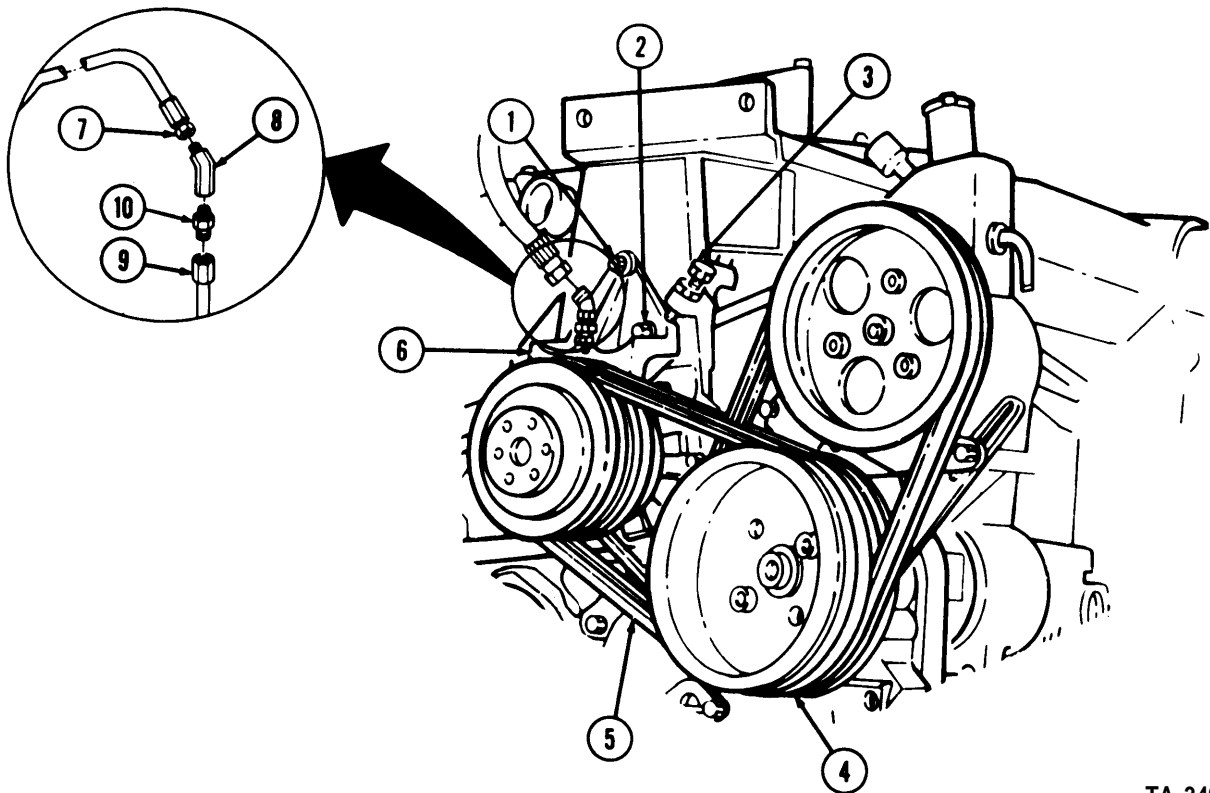
TA 349644

3-54. FAN DRIVEBELTS MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Removal				
9.	Fan clutch pulley bracket (6) and elbow (8)	Air line (7)	Disconnect.	Plug air line (7).
10.	Fan clutch pulley bracket (6)	Elbow (8) and adapter (10)	Remove.	Plug union (9). Do not remove union (9).
11.		Three screws (1)	Loosen.	Do not remove.
12.		Jamnut (2) and adjusting screw (3)	Loosen.	
13.		Fan clutch pulley bracket (6)	Push toward accessory drive pulley (4).	
14.		Two fan drivebelts (5)	Remove,	

c. Inspection

15.		Two fan drivebelts (5)	Inspect for cracks.	Replace if cracked.
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TA 349645

3-54. FAN DRIVEBELTS MAINTENANCE (Cont'd)

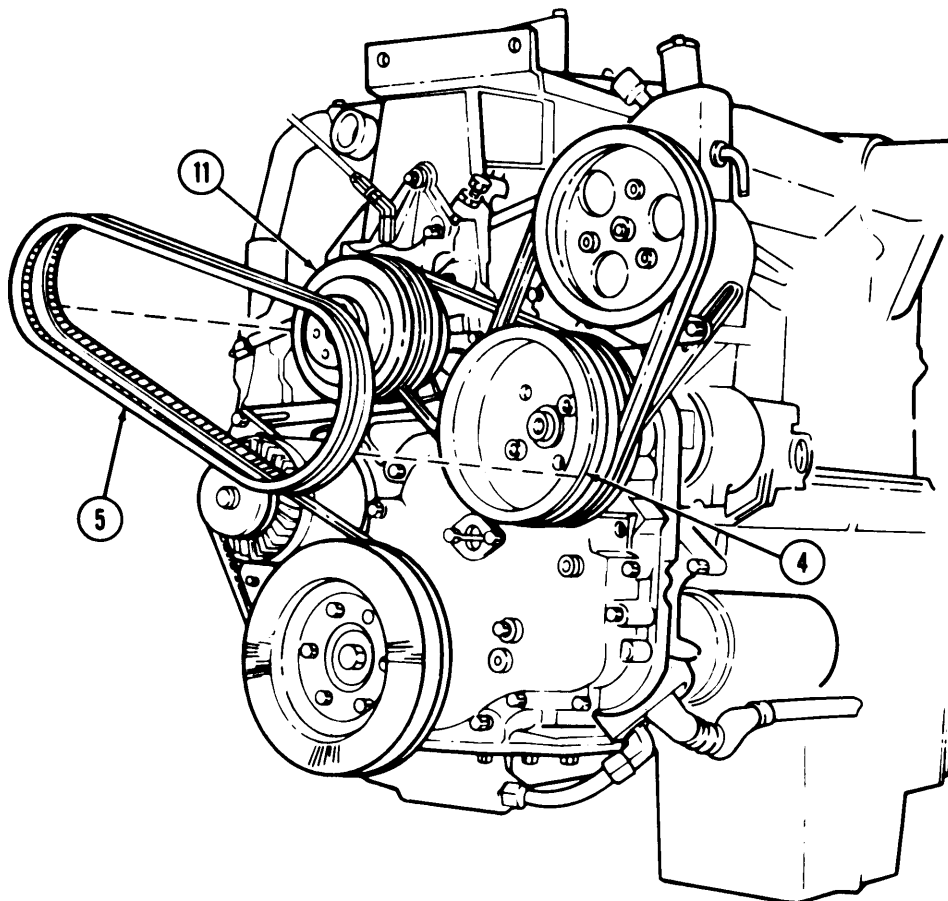
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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d. Installation

CAUTION

Fan drivebelts must be replaced in matched sets. Failure to do so will result in premature belt wear or failure.

- | | | | |
|-----|------------------------|---|------------|
| 16. | Two fan drivebelts (5) | Place over fan clutch pulley (11) and first and second slots of accessory drive pulley (4). | |
| 17. | | Complete installation with adjustment. | See task a |



END OF TASK!

- FOLLOW-ON TASKS:
- Start engine (TM 9-2320-272-10) and idle for five minutes.
 - Recheck belt tension (see task a).
 - Install right splash shield (TM 9-2320-272- 10).

TA 349646

3-55. WATER PUMP DRIVEBELT MAINTENANCE

This task covers:

- a. Adjustment
b. Removal

- c. Inspection
d. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 3-54 Para. 8-13	Right splash shield removed. Drivebelts removed. Power steering pump drivebelts removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
Belt tension gage J-23600-B		None
<u>Materials/Parts</u>		
Three lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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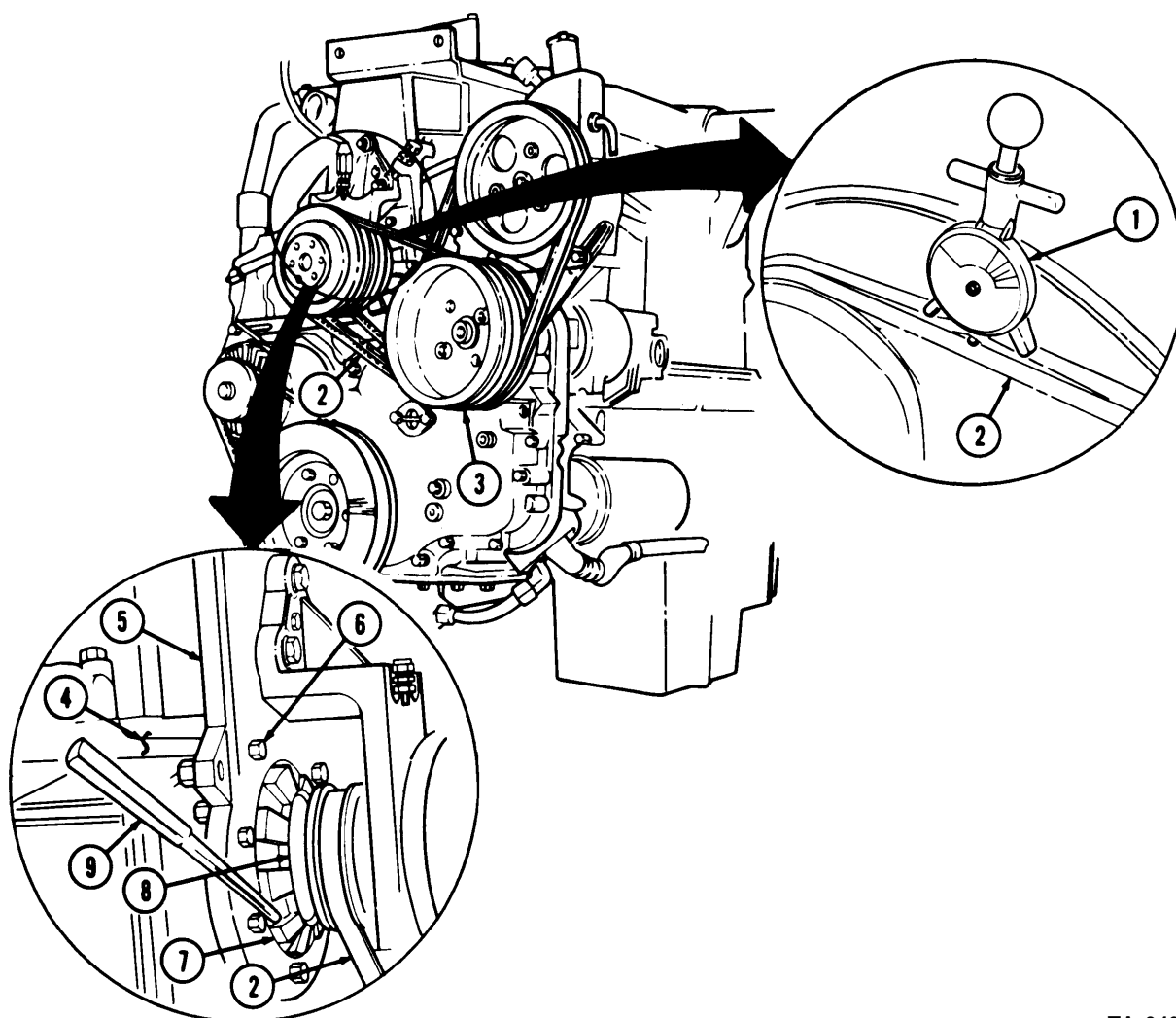
a. Adjustment**NOTE**

Have drainage container ready to catch antifreeze.

- | | | | | |
|----|-----------------------------------|-----------------|--|----------------|
| 1. | Support bracket (5) to engine (4) | Six screws (6) | Loosen. | Do not remove. |
| 2. | | Brass drift (9) | a. Place against stud (7) on water pump housing (8).
b. Punch stud (7) clockwise facing pump housing (8) to tighten belt (2) tension.
c. Punch stud (7) counterclockwise facing pump housing (8) to loosen belt (2) tension. | |

3-55. WATER PUMP DRIVEBELT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
3.		Pump drivebelt (2)	Position belt tension gage (1) on drivebelt (2) between pump housing (8) and accessory drive pulley (3), and check for proper tension.	<p>New belt (2) tension should be 100 ± 5 pounds (445 ± 22 N-m).</p> <p>Used belt (2) tension should be 90 ± 5 K pounds (400 ± 22 N-m).</p> <p>If belt (2) tension cannot be properly adjusted, replace belt (2).</p>
4.	Support bracket (5) to engine (4)	Six screws (6)	Tighten.	



TA 349653

3-55. WATER PUMP DRIVEBELT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

An assistant will help with step 5.

b. Removal

5.	Fan pulley bracket (3) to support bracket (4)	Screw (1) and lock-washer (2), two screws (10), lockwashers (9), and washers (8)	Remove.	Discard lockwashers (2) and (9).
6.	Support bracket (4) to engine (12)	Fan pulley bracket (3) Six screws (13)	Lower into radiator. Loosen.	Do not remove.
7.		Brass drift (11)	a. Place against stud (14) on water pump housing (15). b. Punch stud (14) counterclockwise facing pump housing (15) until belt (7) can be removed.	
8.		Water pump drivebelt (7)	Remove from pump pulley (6) and accessory drive pulley (5).	

c. Inspection

9.		Water pump drivebelt (7)	Inspect for cracks, splits and breaks.	Replace if cracked, split or broken.
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d. Installation

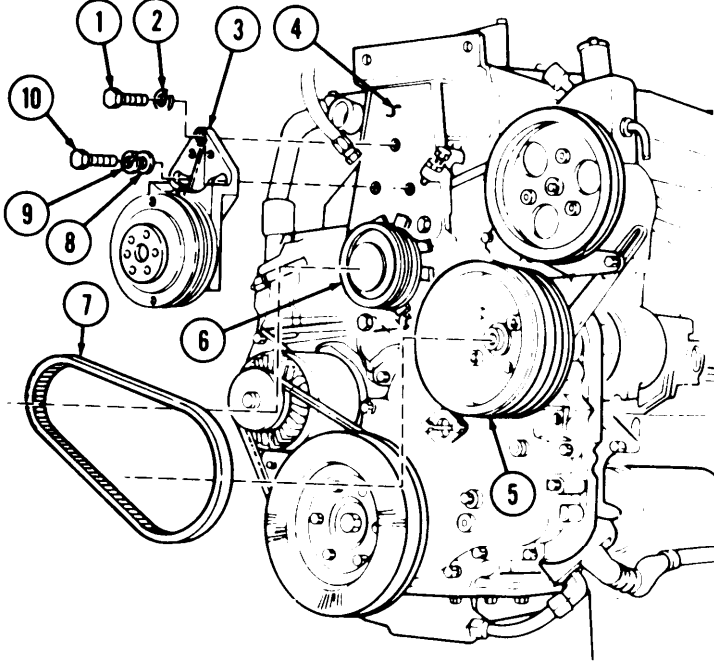
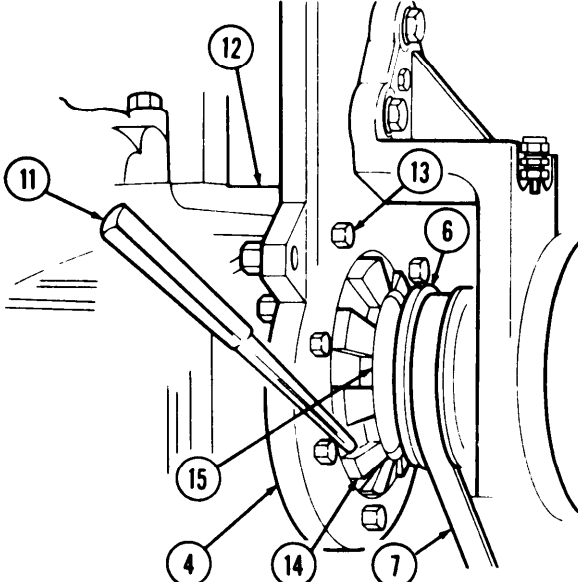
10.		Water pump drivebelt (7)	Install.	
11.		Water pump drivebelt (7)	Adjust belt (7) tension.	See task a.
12.		Six screws (13)	Tighten.	

NOTE

An assistant will help with step 13.

13.		Fan pulley bracket (3)	Install with screw (1) and new lockwasher (2), two screws (10), new lockwashers (9), and washers (8).	Do not tighten.
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3-55. WATER PUMP DRIVEBELT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

END OF TASK!

- FOLLOW-ON TASKS:
- Install power steering pump drivebelts (para. 8-13).
 - Install fan drivebelts (para. 3-54).
 - Start engine (TM 9-2320-272-10), idle for five minutes, and stop engine.
 - Recheck belt tension (step 4 of this paragraph).
 - Install right splash shield (TM 9-2320-272-10).

TA 349647

3-56. ENGINE TO AIR COMPRESSOR COOLANT SUPPLY TUBE REPLACEMENT

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para, 3-46	Parking brake set. Coolant drained.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		
None		
<u>Materials/Parts</u>		
Two bushings Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P TM 9-243		
<u>Special Environmental Conditions</u>		
None		
<u>General Safety Instructions</u>		
None		

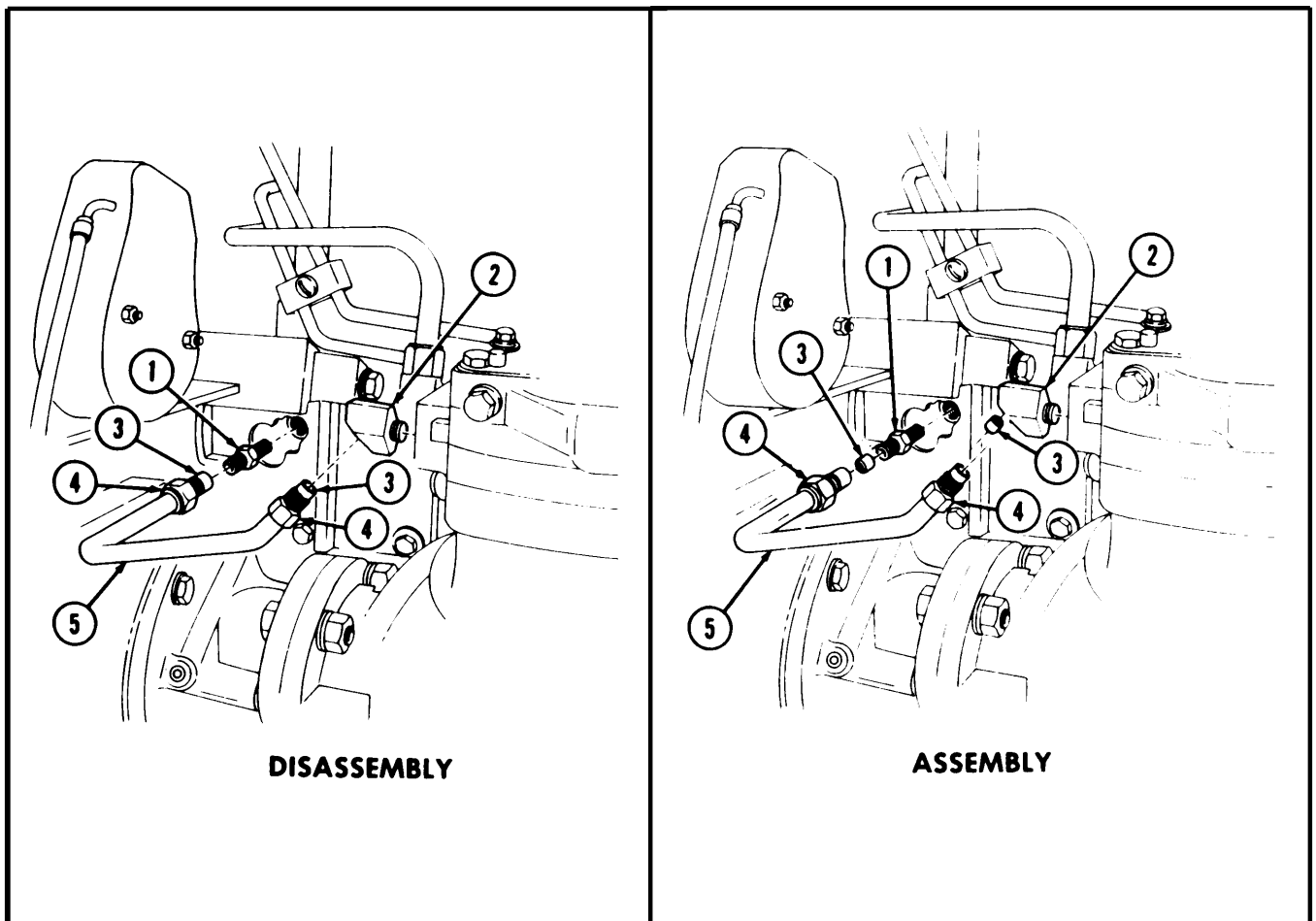
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Water pump adapter (1) and air compressor elbow (2)	Engine to air compressor coolant supply tube (5)	Remove,	Slide nuts (4) toward center of tube (5),
2.		Two bushings (3)	Remove.	Discard bushings (3).
3.		Water pump adapter (1) and air compressor elbow (2)	Remove.	
b. Inspection				
4.		Engine to air compressor coolant supply tube (5), two tubing nuts (4), adapter (1), and elbow (2)	Inspect for cracks and stripped threads.	Replace if cracked or threads are stripped. Refer to TM 9-243.
c. Installation				

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

3-56. ENGINE TO AIR COMPRESSOR COOLANT SUPPLY TUBE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Adapter (1) and elbow (2)	Install.	
6.		Engine to air compressor coolant supply tube (5)	Install with two new bushings (3) and tubing nuts (4).	



END OF TASK!

FOLLOW-ON TASKS: • Fill cooling system to proper level (para. 3-46).
 • Start engine (TM 9-2320-272-10) and check for coolant leaks.

TA 349648

3-57. AIR COMPRESSOR TO ENGINE OIL COOLER COOLANT RETURN TUBE REPLACEMENT

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 3-46	Parking brake set, Cooling system drained.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Lockwasher		
Two bushings		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
TM 9-243		

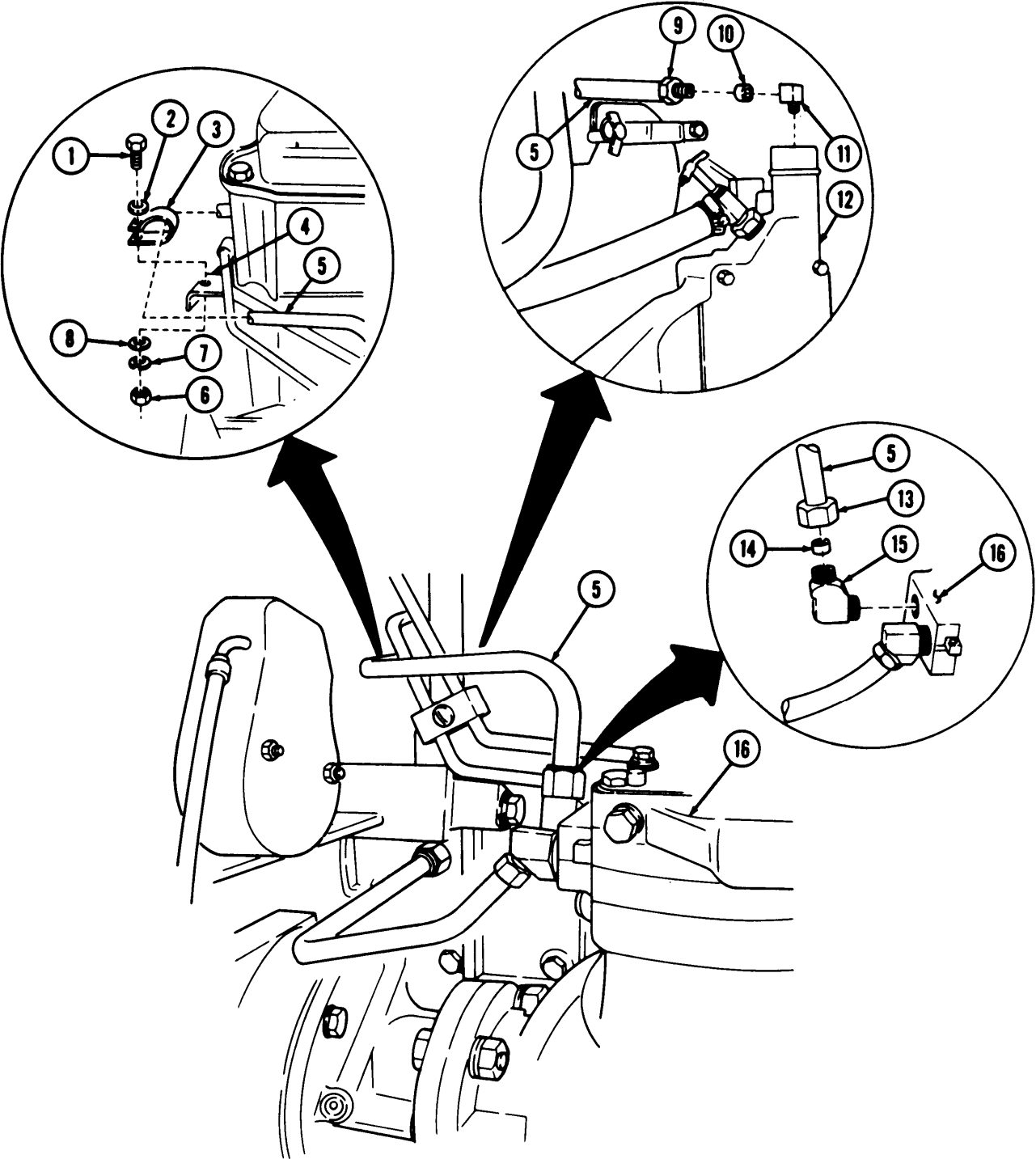
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|---|---|---|---------------------------------|
| 1. | Engine oil cooler elbow (11) | Coolant return tube flare nut (9) | Loosen and pull away from elbow (11). | |
| 2. | Coolant return tube support bracket (4) | Nut (6), lockwasher (7), washer (8), screw (1), washer (2), and coolant return tube clamp (3) | Remove. | Discard lockwasher (7). |
| 3. | Air compressor elbow (15) | Coolant return tube flare nut (13) and bushing (14) | Disconnect and remove coolant return line (5) and bushing (10). | Discard bushings (10) and (14). |
| 4. | Engine oil cooler (12) | Elbow (11) | Remove. | |
| 5. | Air compressor (16) | Elbow (15) | Remove. | |

3-57. AIR COMPRESSOR TO ENGINE OIL COOLER COOLANT RETURN TUBE
REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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3-57. AIR COMPRESSOR TO ENGINE OIL COOLER COOLANT RETURN TUBE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
6.		Coolant return tube (5)	a Inspect flare nuts (9) and (13) for stripped threads. b. Inspect tubing (5) for cracks and severe bends.	Replace if stripped. Replace if damaged. Refer to TM 9-243 for tube fabrication.

c. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

7.		Air compressor elbow (15)	Install on air compressor (16).
8.		Engine oil cooler elbow (11)	Install on engine oil cooler (12).
9.		Coolant return tube (5) and new bushing (14)	Install on air compressor elbow (15) with flare nut (13).
10.		Coolant return tube (5) and new bushing (10)	Install on engine oil cooler elbow (11) with flare nut (9).
11.		Coolant return tube clamp (3), washer (2), screw (1), washer (8), new lockwasher (7), and nut (6)	Install on coolant return tube (5) and on support bracket (4).

**3-57. AIR COMPRESSOR TO ENGINE OIL COOLER COOLANT RETURN TUBE
REPLACEMENT (Cont'd)**

STEP NO.	LOCATION	ITEM	ACTION	REMARKS

END OF TASK!

FOLLOW-ON TASKS: **Z**Refill cooling system to proper level (para. 3-46).
ZStart engine (TM 9-2320-272-10) and check for coolant leaks.

TA 349650

3-58. FAN DRIVE CLUTCH ACTUATOR MAINTENANCE

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Primary and secondary air tanks drained. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Protective cap-plugs (Appendix D, Item 5) Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

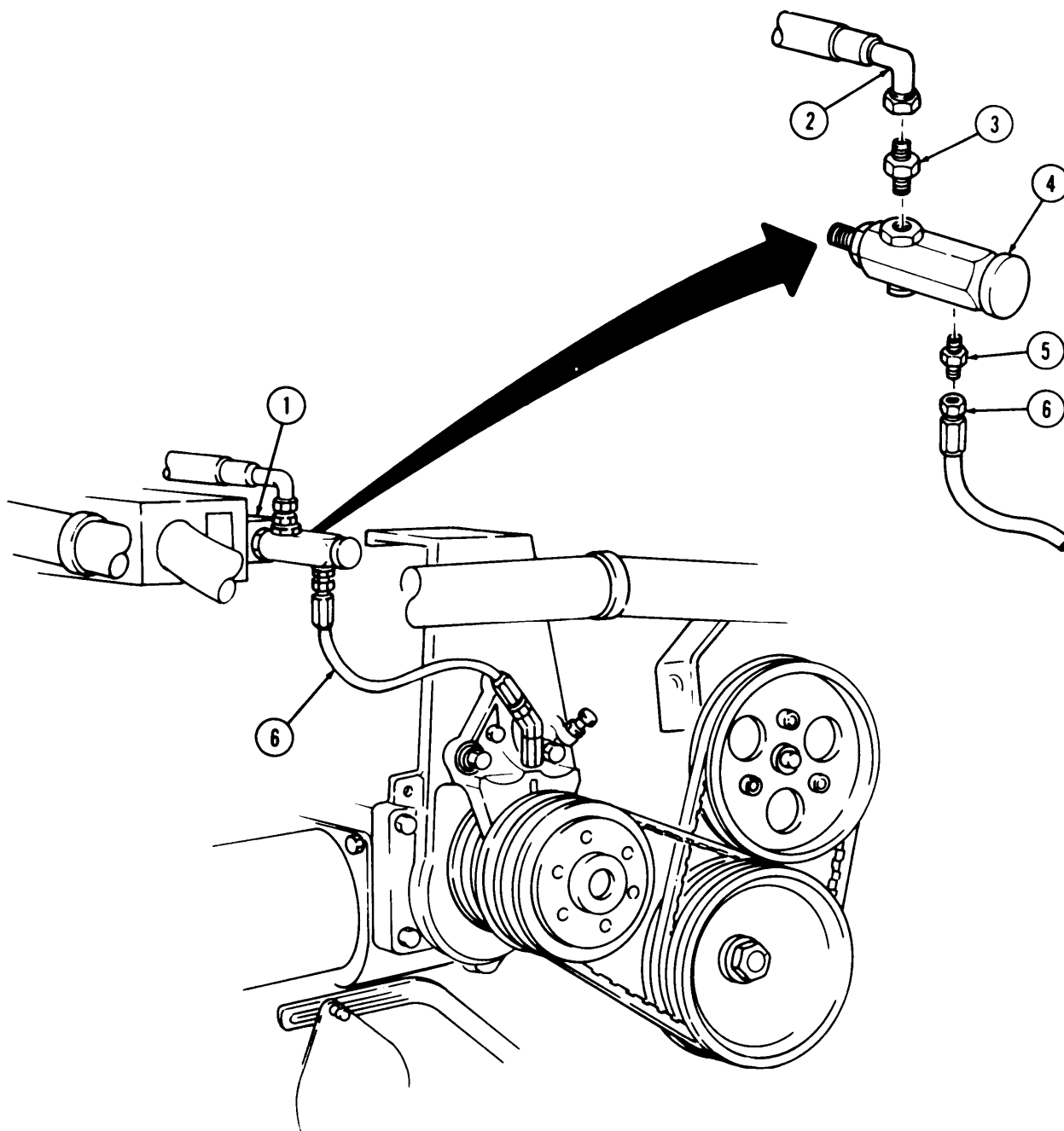
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|-------------------------------|-------------------------------------|----------------------------------|---|
| 1. | Fan drive clutch actuator (4) | Air hose (2) | Remove from adapter fitting (3). | Plug openings. |
| 2. | | Adapter fitting (3) | Remove | Plug openings.
Tag for installation. |
| 3. | | Actuator to fan connecting hose (6) | Remove from adapter fitting (5). | Plug openings. |
| 4. | | Adapter fitting (5) | Remove | Plug openings.
Tag for installation, |
| 5. | Water manifold (1) | Actuator (4) | Remove. | |

3-58. FAN DRIVE CLUTCH ACTUATOR MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349651

3-58. FAN DRIVE CLUTCH ACTUATOR MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Inspection

- | | | | |
|----|--|---|----------------------|
| 6. | | a. Inspect fittings for stripped threads. | Replace if stripped. |
| | | b. Inspect for cracks. | Replace if cracked. |

c. Installation

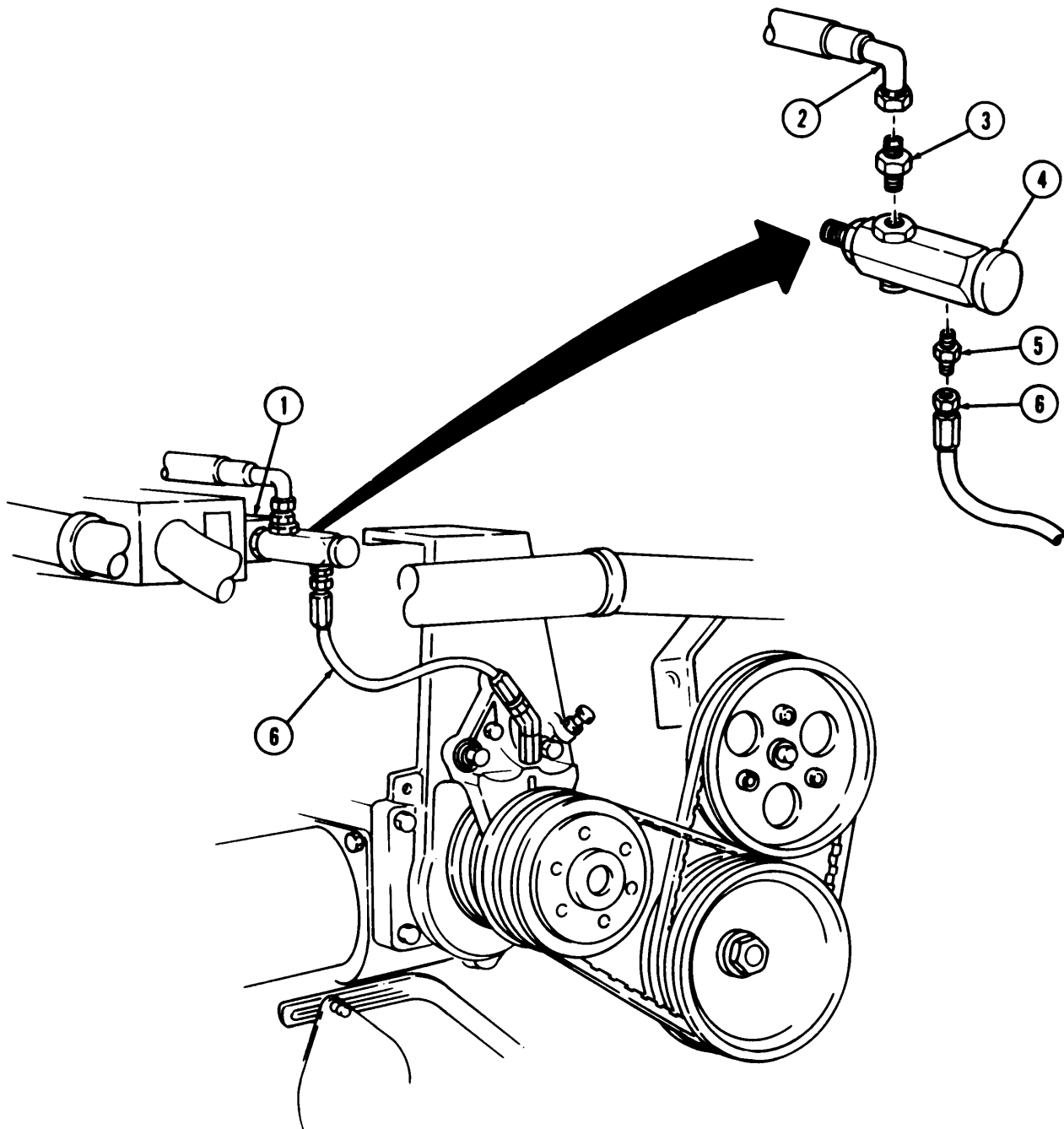
NOTE

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|-----|-------------------------------------|--------------------------------|
| 7. | Actuator (4) | Install on water manifold (1). |
| 8. | Adapter fitting (5) | Install. |
| 9. | Actuator to fan connecting hose (6) | Install. |
| 10. | Adapter fitting (3) | Install. |
| 11. | Air hose (2) | Install. |

3-58. FAN DRIVE CLUTCH ACTUATOR MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: • Start engine (TM 9-2320-272-10) and check for coolant and air leaks.
 Ž Check for proper operation of actuator (TM 9-2320-272-10).

TA 249652

3-59. FAN DRIVE CLUTCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

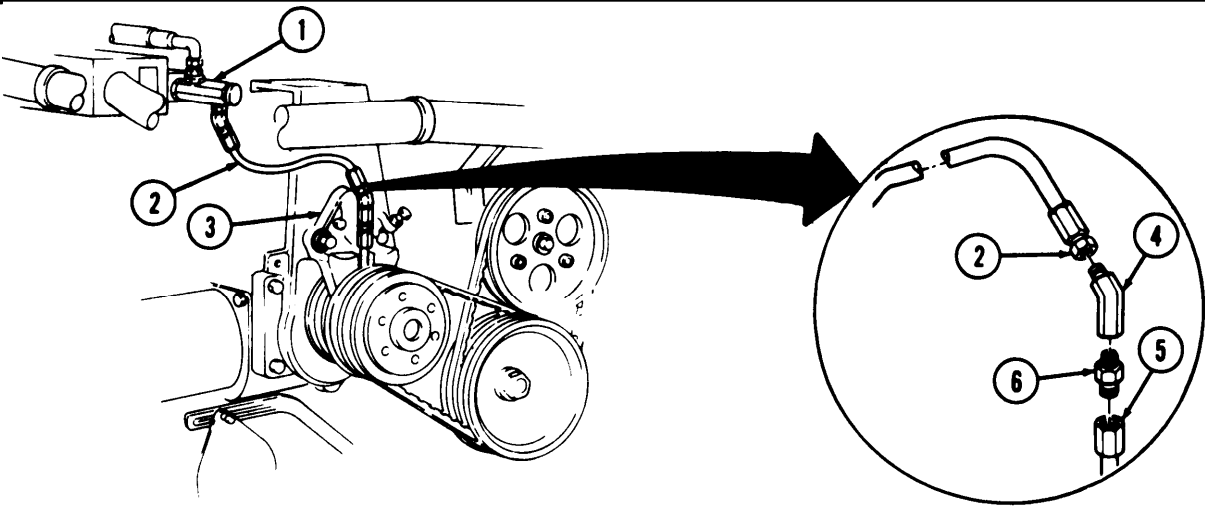
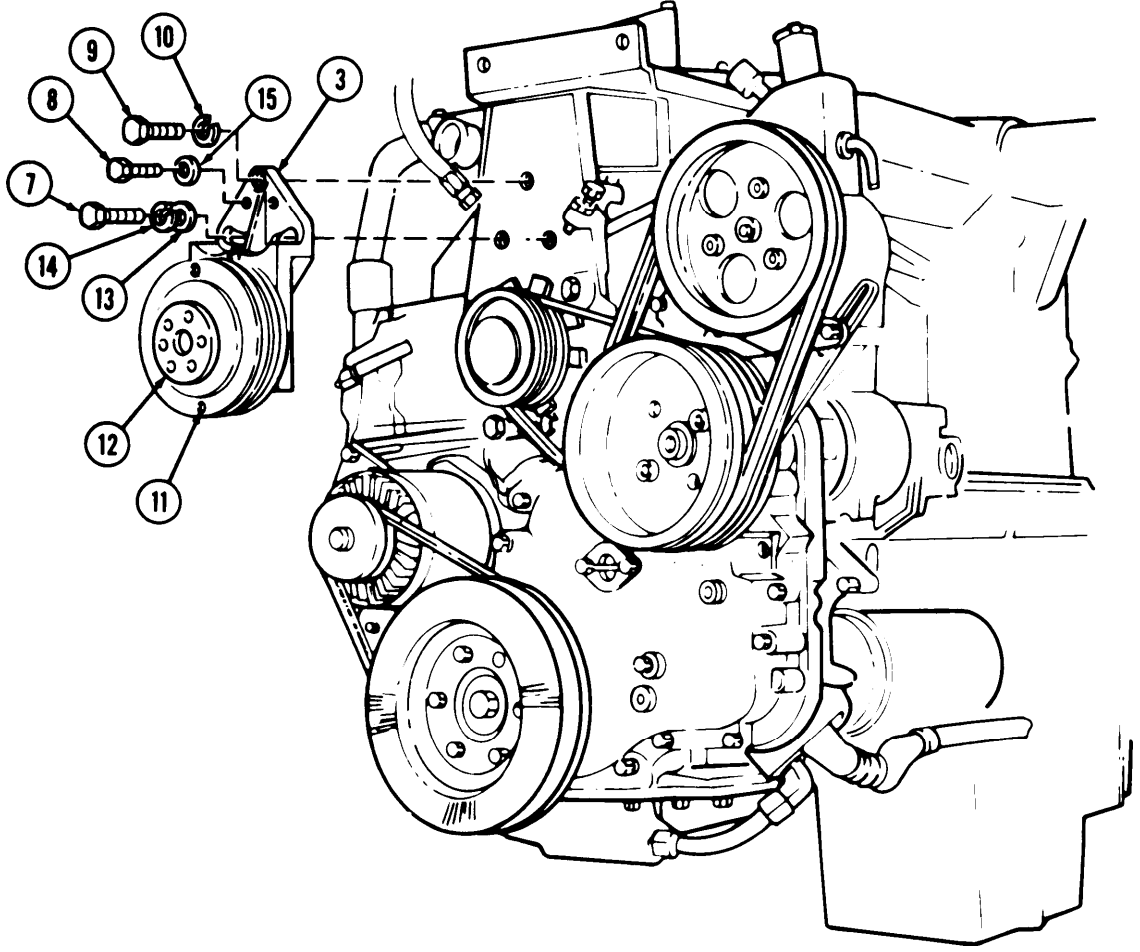
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
Ail	TM 9-2320-272-10 Para. 3-50 Para. 3-54	Parking brake set. Fan removed. Fan drivebelts removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three lockwashers Protective cap plugs (Appendix D, Item 5) sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|--|---|-------------|--|
| 1. | Fan drive actuator (1) to fan drive clutch bracket (3) | Hose (2) | Disconnect. | Plug hose (2). |
| 2. | Fan drive clutch bracket (3) | Swivel elbow (4) and adapter (6) | Remove. | Plug lower union (5). Union (5) is part of fan drive clutch bracket (3). |
| 3. | | Two fan clutch override screws (8) and washers (15) | Remove. | Screws (8) may be in fan drive clutch (12) holes (11). |
| 4. | | Two screws (7), lockwashers (14), and washers (13), screw (9), lockwasher (10), fan drive clutch (12), and fan drive clutch bracket (3) | Remove. | Discard lockwashers (10) and (14). |

3-59. FAN DRIVE CLUTCH REPLACEMENT (Cont'd)

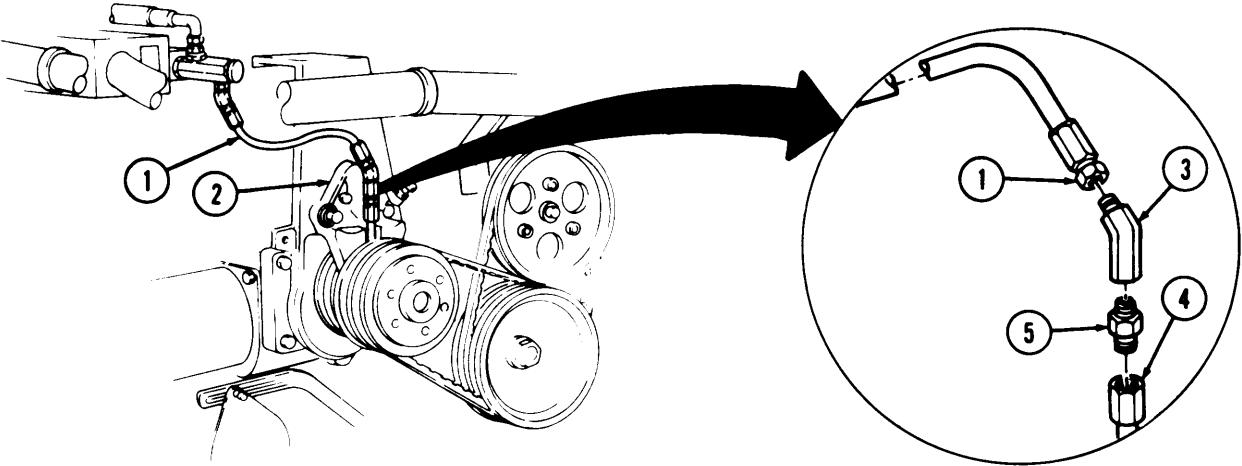
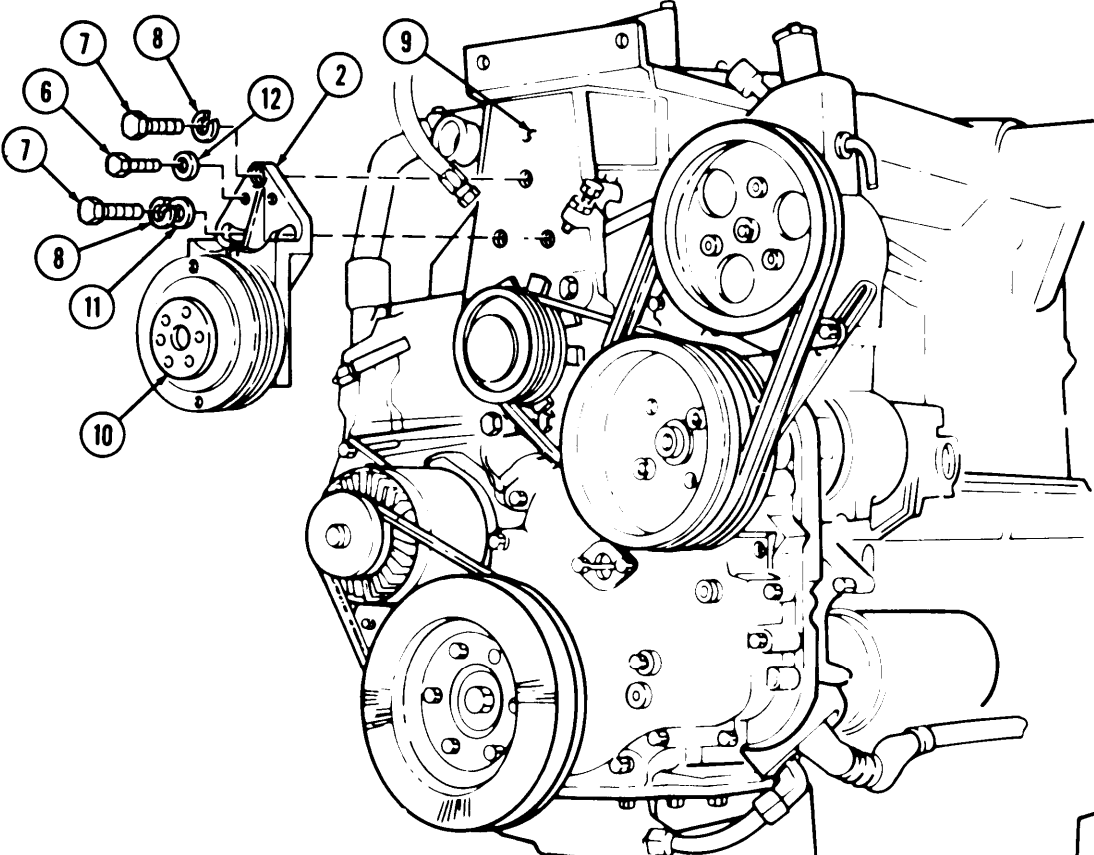
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

TA 349654

3-59. FAN DRIVE CLUTCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
5.		Two fan clutch override screws (6) and washers (12)	Install in fan drive clutch bracket (2).	Use Loctite on screw (6) threads.
6.		Fan drive clutch (10) and fan drive clutch bracket (2)	Install on water pump bracket (9) with three screws (7), new lock-washers (8), and two washers (11).	Do not tighten screws (7) until drivebelts are installed.
NOTE				
Male pipe threads must be wrapped with sealing tape before installation.				
7.		Adapter (5) and swivel elbow (3)	Install on fan drive clutch bracket (2) union (4).	
8.		Hose (1)	Connect to elbow (3).	

3-59. FAN DRIVE CLUTCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

END OF TASK!

FOLLOW-ON TASKS:

- Install fan drivebelts (para. 3-54).
- Ž Install fan (para. 3-50).
- Ž Start engine (TM 9-2320-272-10) and check for air leaks and proper fan operation.

TA 349655

3-60. THERMOSTAT MAINTENANCE

This task covers:

- a. Removal
- b. Testing

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-46	Parking brake set. Right splash shield removed. Coolant drained as necessary.
<u>Test Equipment</u>		
Hot water thermometer		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket Thermostat seal Four lockwashers GAA grease (Appendix D, Item 13)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Use caution when testing thermostat. Scalding hot water may cause severe burns.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|---|--|---|---|
| 1. | Radiator inlet hose (7) to thermostat housing (5) | Hose clamp (6) | Loosen and disconnect hose (7). | |
| 2. | Radiator bypass tube hose (10) | Two hose clamps (9) | Loosen and pull hose (10) off thermostat housing (5) and bypass tube (8). | |
| 3. | Thermostat housing (5) to water manifold header (1) | Four screws (11) and lockwashers (12) | a. Remove.
b. Remove thermostat housing (5). | Discard lockwashers (12). |
| 4. | | Thermostat housing gasket (2) | Remove. | Discard gasket (2).
Clean gasket remains from mating surfaces. |
| 5. | | Thermostat (3) | Remove from thermostat housing (5). | |

3-60. THERMOSTAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Seal (4)	Remove from thermostat housing (5).	Discard seal (4).

b. Testing

WARNING

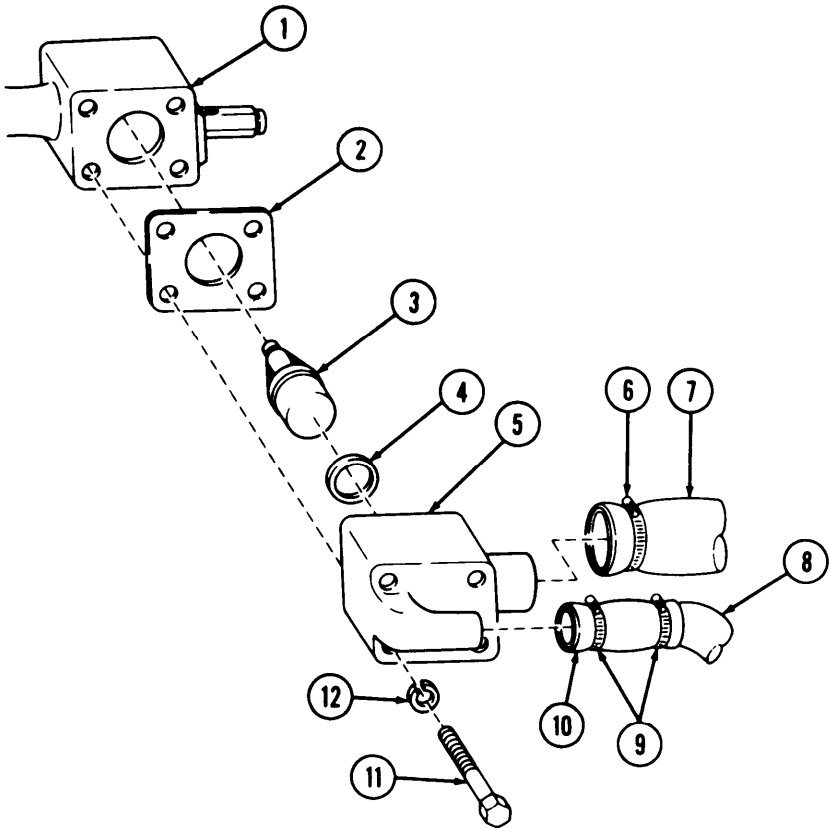
Use caution when testing thermostat. Hot water may cause injury to personnel.

7.		Thermostat (3)	a. Place in container of water at 185°F (85°C).	Use cooling system thermometer to check temperature.
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NOTE

Don't let thermostat touch container sides during testing

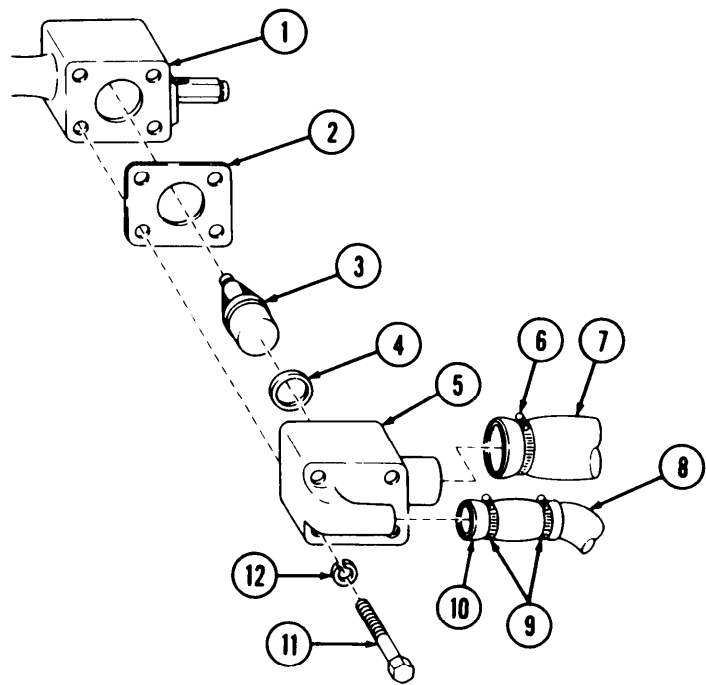
b. Observe thermostat (3) to see if valve opens.	Replace thermostat (3) if valve does not fully open.
--	--



T A 3 4 9 6 5 6

3-60. THERMOSTAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
8.		New rubber seal (4)	Position in thermostat housing (5).	
9.		Thermostat (3)	Place in thermostat housing (5).	
10.		New gasket (2)	Position to four holes in water manifold header (1).	Use small amount of heavy grease to hold gasket (2) in place.
11.		Housing (5)	Aline to holes in gasket (2) and install with four new lockwashers (12) and screws (11),	
12.		Radiator bypass tube (8)	Connect to thermostat housing (5) with hose (10) and two clamps (9).	
13.		Radiator inlet hose (7)	Connect to thermostat housing (5) with clamp (6).	



END OF TASK!

- FOLLOW-ON TASKS: Ž Refill cooling system (para. 3-46).
- Start engine (TM 9-2320-272- 10), check for coolant leaks, and check instrument gage for normal reading. Gage should read 175°F- 195°F (70°C-97°C).
- Ž Install right splash shield (TM 9-2320-272-10).

TA 349657

CHAPTER 4
ELECTRICAL SYSTEMS MAINTENANCE
NOTE

Refer to TM 9-2320-358-24&P for unique M939A2 maintenance procedures.

Section I. STARTING AND STARTING CONTROL SYSTEM

4-1. GENERAL

This section provides maintenance procedures assigned to the organizational level for the starting and starting control system. To find a specific maintenance procedure, see the maintenance task summary below:

4-2. STARTING AND STARTING CONTROL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-3.	Starter Motor Replacement	4-2
4-4.	Battery Switch Replacement	4-6
4-5.	Starter Switch Replacement	4-8

4-3. STARTER MOTOR REPLACEMENT

This task covers:

- a. Removal
- b. Cleaning

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 4-25 TM 9-2320-272-10	Parking brake set. Battery ground cables disconnected. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Five lockwashers Two gaskets		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

Tag all wires for installation.

1.	Starter solenoid (4)	Screw (3) and clip (2)	Remove.	
2.		Wire (1)	Disconnect.	
3.		Nut (12) and lockwasher (13)	Remove.	Discard lockwasher (13).
4.		Wires (11) and (14)	Disconnect.	
5.	Starter motor (5)	Nut (8) and lockwasher (9)	Remove.	Discard lockwasher (9).
6.		Wires (7) and (10), and ground strap (6)	Disconnect.	
7.	Starter motor (5)	Screw (15) and lockwasher (16)	Remove.	Discard lockwasher (16).

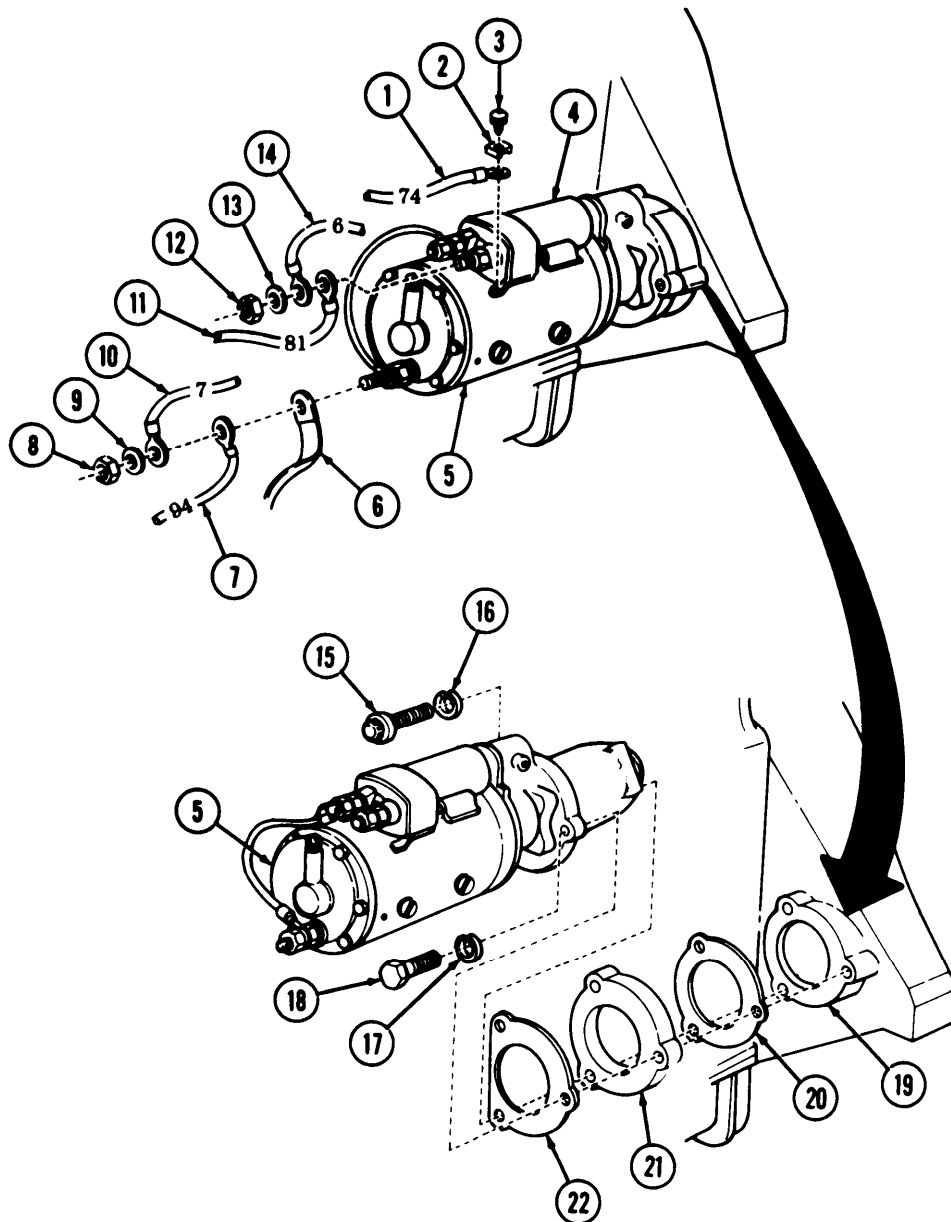
4-3. STARTER MOTOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Assistant will help with step 8.

- | | | | | |
|----|-----------------------|---|---------|--------------------------------|
| 8. | Flywheel housing (19) | Two screws (18) and lockwashers (17), and starter motor (5) | Remove. | Discard lockwashers (18). |
| 9. | | Gasket (22), spacer (21), and gasket (20) | Remove. | Discard gaskets (22) and (20). |



TA 349013

4-3. STARTER MOTOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

b. Cleaning

- | | | | | |
|-----|--|---|--|--|
| 10. | | Starter motor (5) and flywheel housing (19) | Clean gasket remains from mating surfaces. | |
|-----|--|---|--|--|

c. Installation

- | | | | | |
|-----|--|---|-------------------------------|---|
| 11. | | New gasket (22), spacer (21), and new gasket (20) | Install to starter motor (5). | Make sure flat side of gasket (22) faces starter motor (5). |
|-----|--|---|-------------------------------|---|

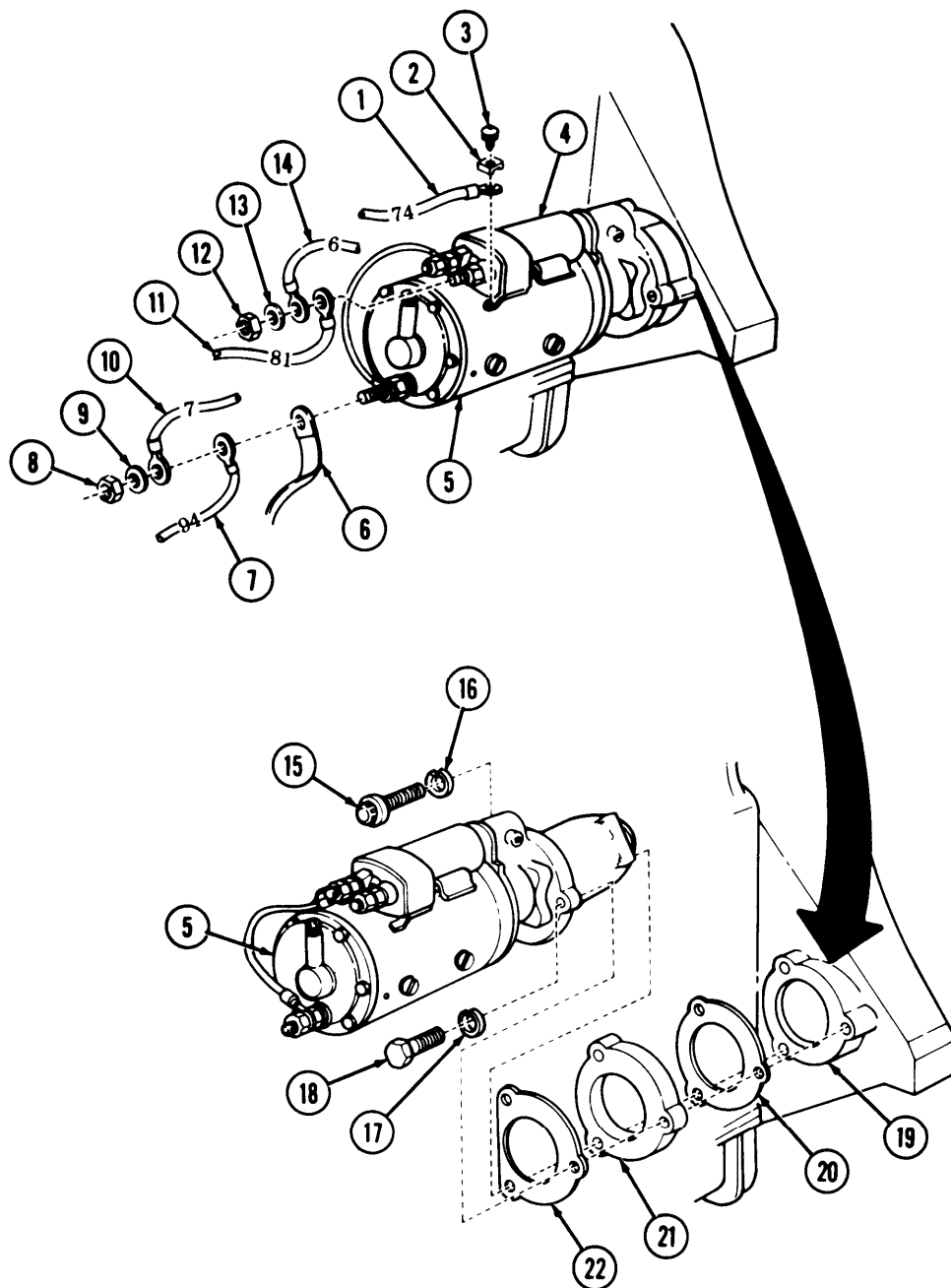
NOTE

Assistant will help with step 12.

- | | | | | |
|-----|--|--|--|--------------------------------------|
| 12. | | Starter motor (5) | Install with screw (15), new lockwasher (16), two screws (18), and new lockwashers (17). | Tighten 100-110 lb-ft (136-150 N-m). |
| 13. | | Wires (7) and (10), and ground strap (6) | Connect with new lockwasher (9), and nut (8). | |
| 14. | | Wires (11) and (14) | Connect with new lockwasher (13), and nut (12). | |
| 15. | | Wire (1) | Connect to starter solenoid (4) with clip (2), and screw (3). | |

4-3. STARTER MOTOR REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS: ŽConnect battery ground cables (para. 4-25).
- Check starter motor operation (TM 9-2320-272-10).
 - Install left splash shield (TM 9-2320-272-10).

TA 349014

4-4. BATTERY SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set, Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a. Removal

- | | | | | |
|----|------------------------|---|---|-------------------------|
| 1. | Battery switch (5) | Screw (9), lockwasher (8), switch lever (1), felt washer (2), and shouldered washer (3) | Remove, | Discard lockwasher (8). |
| 2. | Instrument cluster (6) | Nut (7) and lockwasher (4) | Remove, and pull switch (5) from behind instrument cluster (6). | Discard lockwasher (4). |
| 3. | | Wires (10), (11), (12), and (13) | Disconnect. | Tag for installation. |
| 4. | | Battery switch (5) | Remove, | |

b. Installation

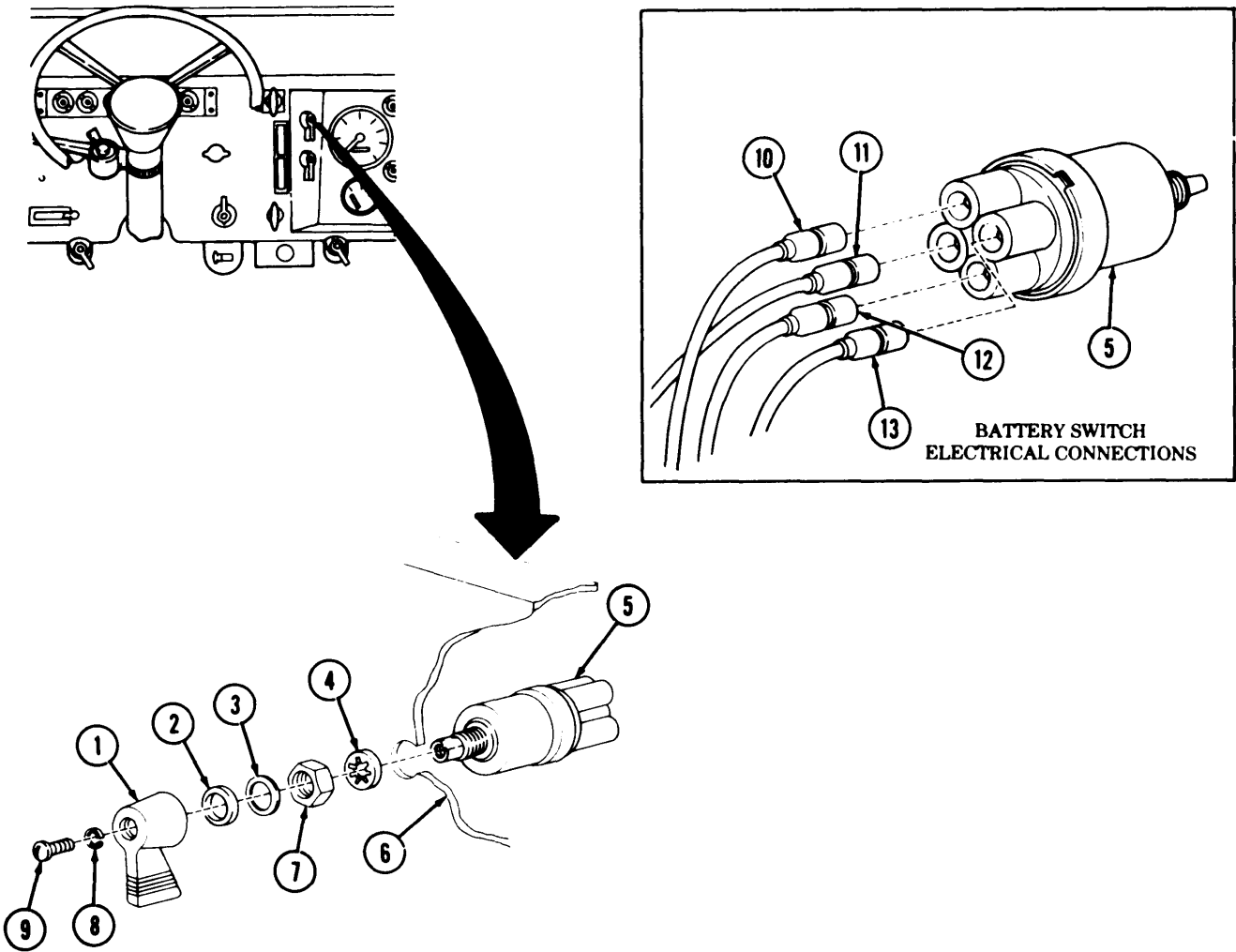
NOTE

If new battery switch is being installed, use mounting hardware supplied with switch.

- | | | |
|----|----------------------------------|--------------------------------|
| 5. | Wires (13), (12), (11), and (10) | Connect to battery switch (5). |
|----|----------------------------------|--------------------------------|

4-4. BATTERY SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Battery switch (5)	Position through instrument cluster (6) from the rear and install with new lockwasher (4) and nut (7).	
7.		Shouldered washer (3), felt washer (2), and switch lever (1)	Position to battery switch (5) and install with new lockwasher (8) and screw (9).	



END OF TASK!

FOLLOW-ON TASKS: • Connect battery ground cables (para 4-25).
 • Check battery switch operation (TM 9-2320-272-10).

TA 349015

4-5. STARTER SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

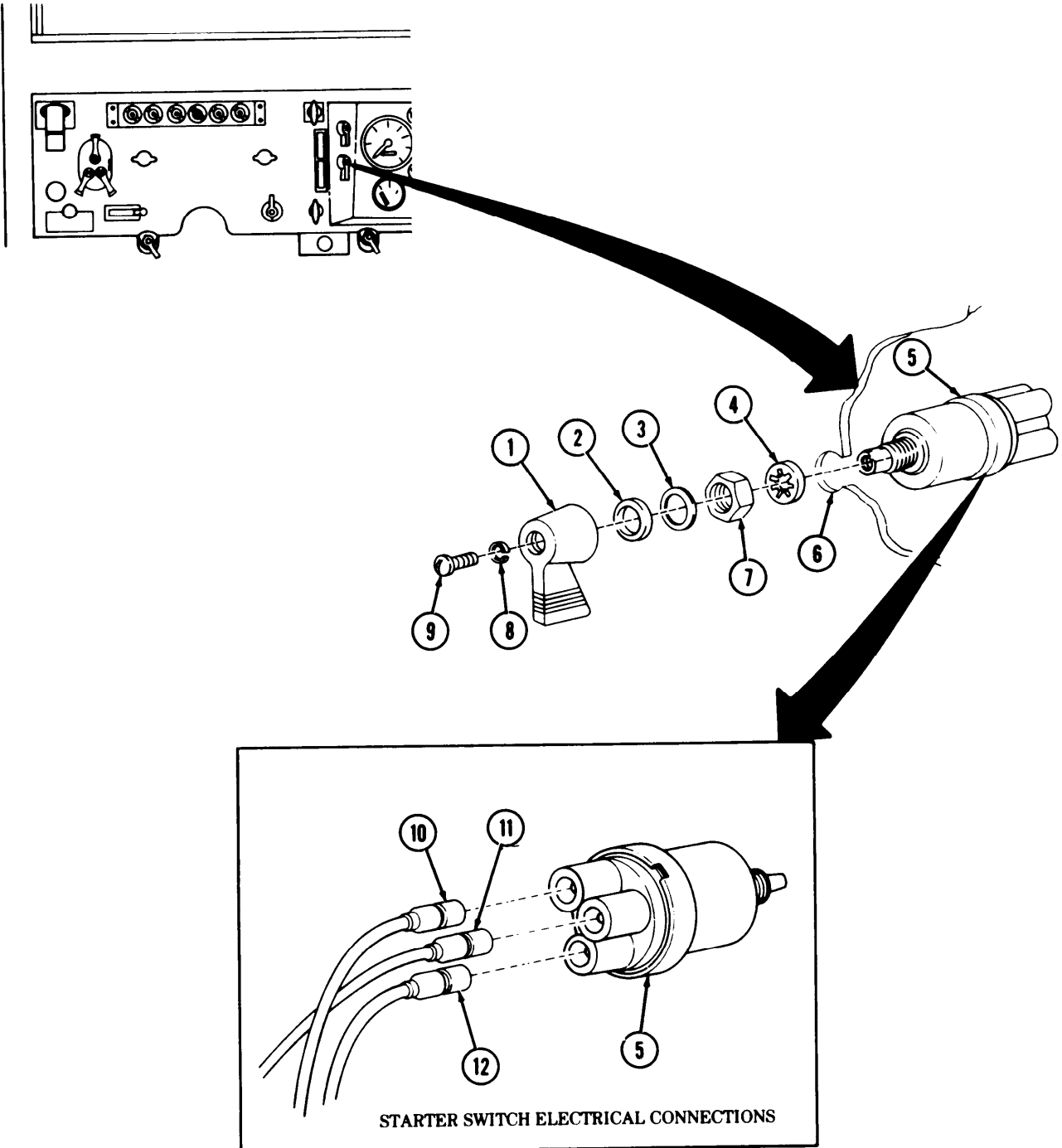
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|------------------------|--|--|-------------------------|
| 1. | Starter switch (5) | Screw (9), lockwasher (8), switch lever (1), felt washer (2) and shouldered washer (3) | Remove. | Discard lockwasher (8). |
| 2. | Instrument cluster (6) | Nut (7) and lockwasher (4) | Remove and pull starter switch (5) from behind instrument cluster (6). | Discard lockwasher (4). |
| 3. | | Wires (10), (11), and (12) | Disconnect. | Tag for installation. |
| 4. | | Starter switch (5) | Remove. | |

4-5. STARTER SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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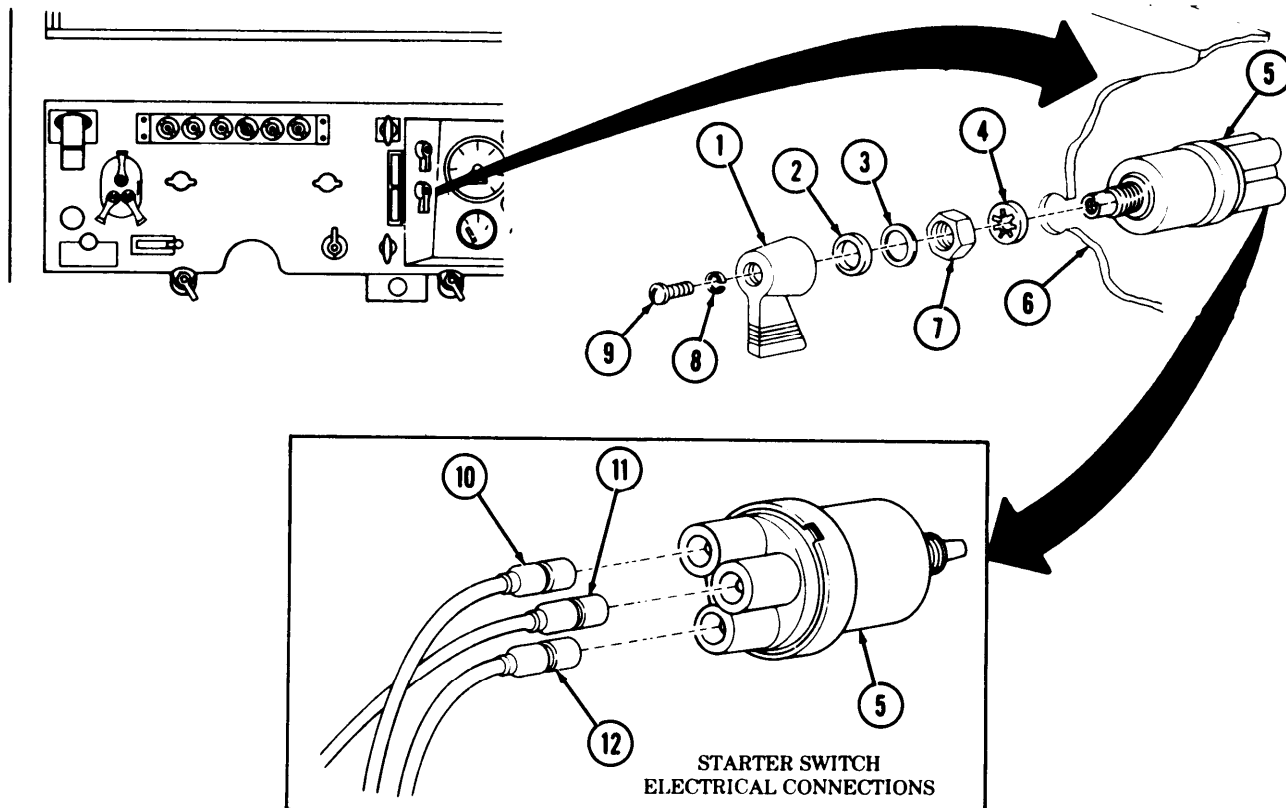
4-5. STARTER SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation**NOTE**

If new starter switch is being installed, use mounting hardware supplied with switch.

- | | | |
|----|--|--|
| 5. | Wires (10), (11), and (12) | Connect to starter switch (5). |
| 6. | Starter switch (5) | Position through instrument cluster (6) from the rear and install with new lockwasher (4) and nut (7). |
| 7. | Shouldered washer (3), felt washer (2), and switch lever (1) | Position to starter switch (5) and install with new lockwasher (8) and screw (9). |



END OF TASK!

FOLLOW-ON TASKS: **Z**Connect battery ground cables (para. 4-25).
ZCheck starter switch operation (TM 9-2320-272-10).

TA 349017

Section II. GENERATING AND PROTECTIVE CONTROL BOX SYSTEM

4-6. GENERAL

This section provides maintenance procedures assigned to the organizational level for generating and protective control box system. To find a specific maintenance procedure, see the maintenance task summary below:

4-7. GENERATING AND PROTECTIVE CONTROL BOX SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-8.	Alternator Belts Maintenance	4-12
4-9.	Alternator and Mounting Bracket Replacement	4-16
4-10.	Alternator Pulley Replacement	4-22
4-11.	Protective Control Box Replacement	4-24

4-8. ALTERNATOR BELTS MAINTENANCE

This task covers:

- a. Removal
- b. Inspection

- c. Installation and Adjustment

INITIAL SETUP:

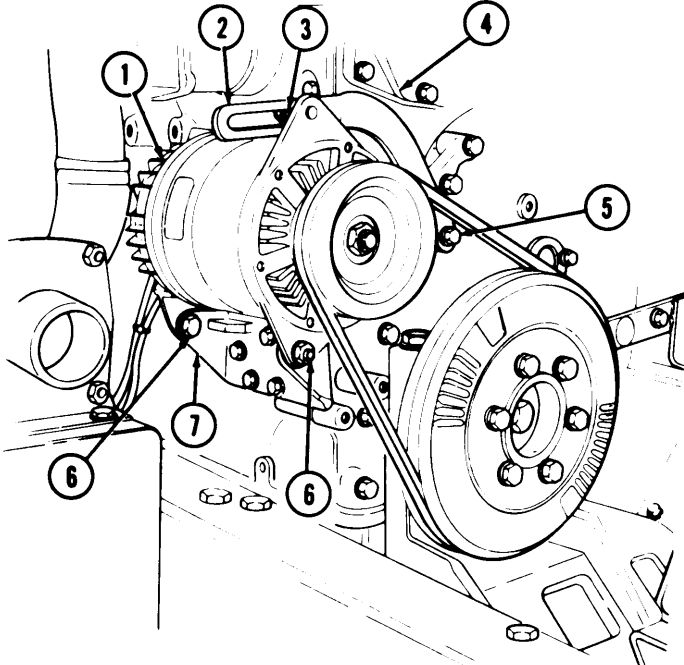
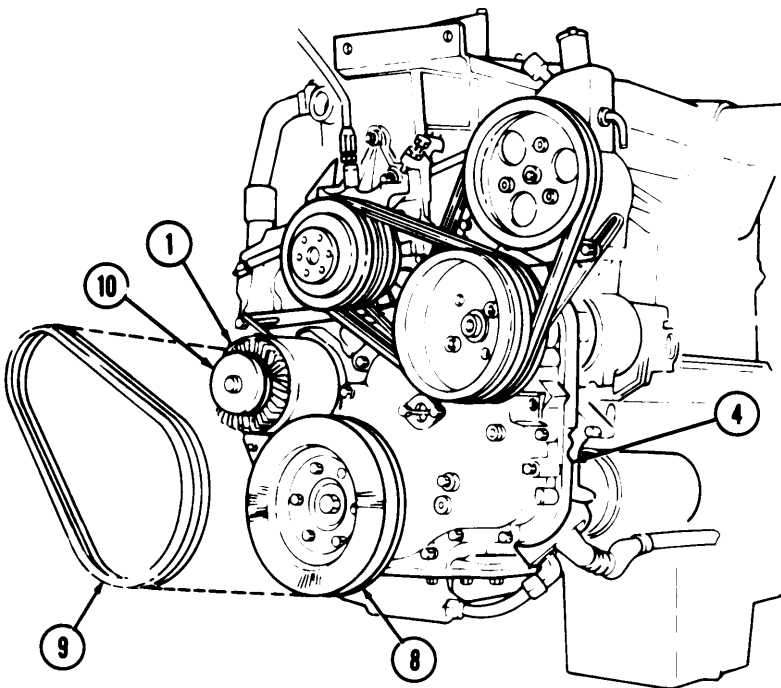
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Right splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
Belt tension gage J-23600-B		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|---------------------------------|--------------------------|--|----------------|
| 1. | Adjusting link (2) | Screws (3) and (5) | Loosen. | Do not remove. |
| 2. | Alternator mounting bracket (7) | Two screws (6) | Loosen. | Do not remove. |
| 3. | | Alternator (1) | Push toward engine (4) until slack exists in two alternator belts (9). | |
| 4. | | Two alternator belts (9) | Remove from alternator pulley (10) and vibration damper (8). | |

4-8. ALTERNATOR BELTS MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

4-8. ALTERNATOR BELTS MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Inspection

5.		Two alternator belts (8)	Inspect for breaks, cracks, or splits.	Replace if broken, cracked, or split.
----	--	--------------------------	--	---------------------------------------

c. Installation and Adjustment

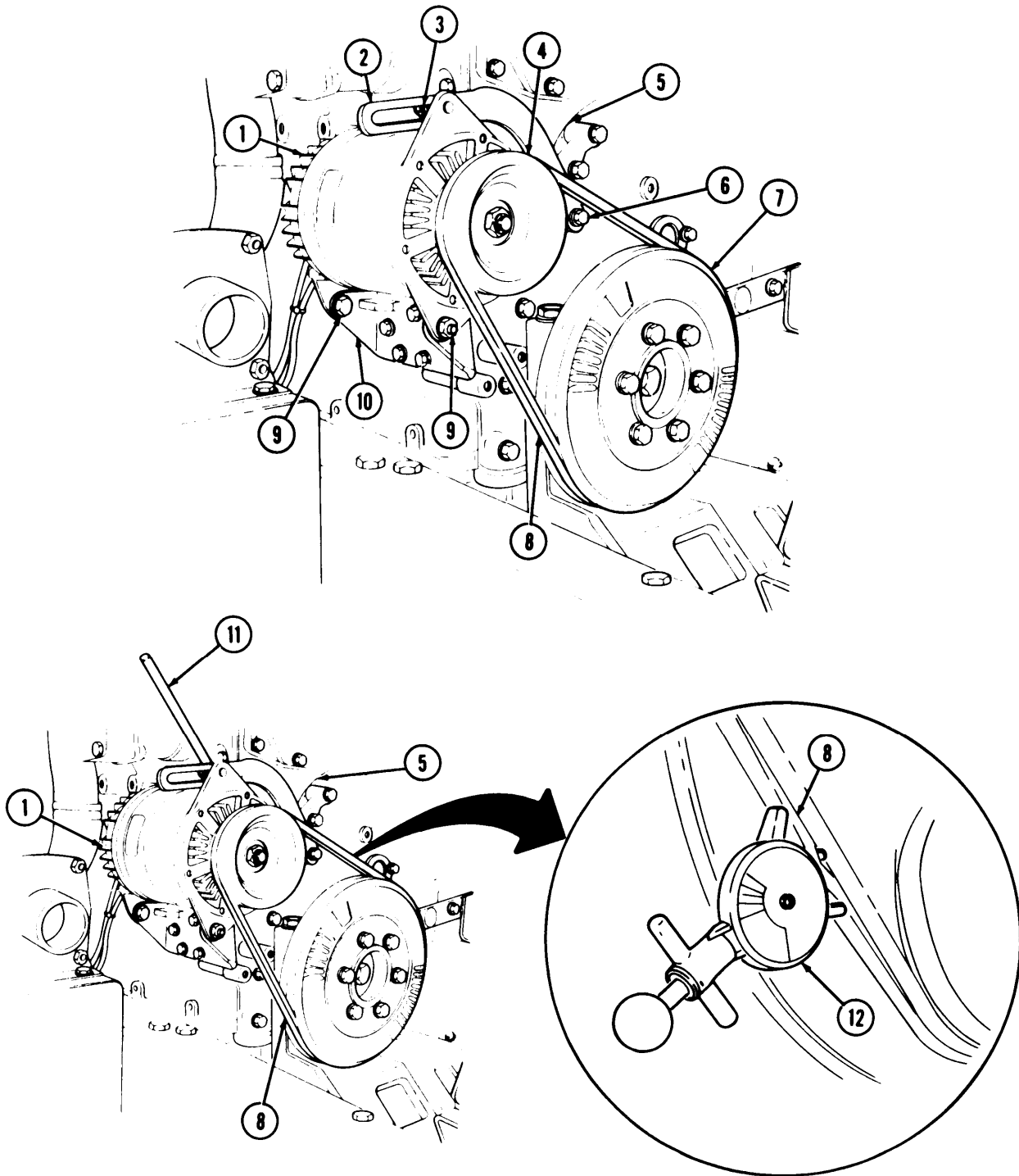
NOTE

Alternator belts are matched sets.

6.		Two alternator belts (8)	a. Position over vibration damper (7) and alternator pulley (4). b. Insert pry bar (11) between engine (5) and alternator (1). c. Pull bar (11) down until belts (8) appear tight. d. Tighten screw (3) at adjusting link (2). e. Tighten screw (6) at adjusting link (2). f. Using belt tension gage (12), check for proper tension.	Tighten 15-20 lb-ft (20-27 N-m), Tighten 25-31 lb-ft (34-42 N.m). New belt (8) tension should be 100 ± 5 pounds (445 ± 22 Newtons). Used belt (8) tension should be 90 ± 5 pounds (400 ± 22 Newtons). If belts (8) cannot be adjusted, replace.
7.		Mounting bracket (10)	Tighten two screws (9).	Tighten 39-49 lb-ft (53-66 N-m).

4-8. ALTERNATOR BELTS MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:

- Start engine (TM 9-2320-272-10) and check alternator operation.
- Install right splash shield (TM 9-2320-272-10).

TA 349019

4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All

Equipment Condition Reference

Para. 4-25
TM 9-2320-272-10
Para. 4-8

Condition Description

Battery ground cables disconnected.
Right splash shield removed.
Remove alternator belts.

Test Equipment

None

Special Tools

None

Special Environmental Conditions

None

Materials/Parts

Eleven lockwashers
Two locknuts
Gasket sealant (Appendix D, Item 14)
Tiedown strap (Appendix D, Item 18)

Personnel Required

Light-wheeled vehicle mechanic MOS 63B

General Safety Instructions

None

Manual References

TM 9-2320-272-10
TM 9-2320-272-20P

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|-----------------|--|---------|--|
| 1. | Alternator (11) | Two screws (5) and lockwashers (4), and terminal cover (6) | Remove. | Discard lockwashers (4). |
| 2. | | Two screws (3) and lockwashers (2), and wire retaining strap (1) | Remove. | Discard lockwashers (2). |
| 3. | | Screw (16), lockwasher (15), and wire (14) | Remove. | Discard lockwasher (15). Tag wire (14) for installation. |

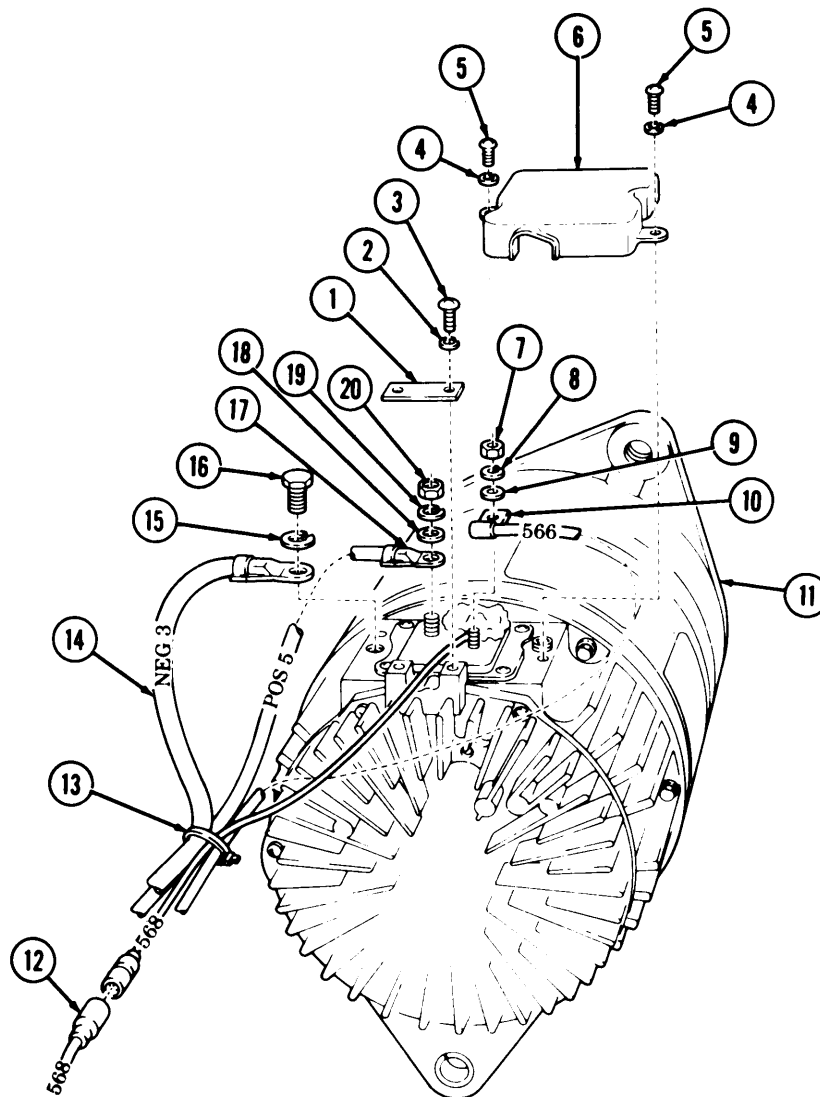
NOTE

Sealant must be removed before removing wires.

- | | | | | |
|----|--|---|---------|--|
| 4. | | Nut (20), lockwasher (19), washer (18), and wire (17) | Remove. | Discard lockwasher (19). Tag wire (17) for installation. |
| 5. | | Nut (7), lockwasher (8), washer (9), and wire (10) | Remove, | Discard lockwasher (8). Tag wire (10) for installation. |

4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Connector (12)	Disconnect.	Tag wire for installation.
7.		Tiedown strap (13)	cut.	Discard tiedown strap (13).



4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT (Cont'd)

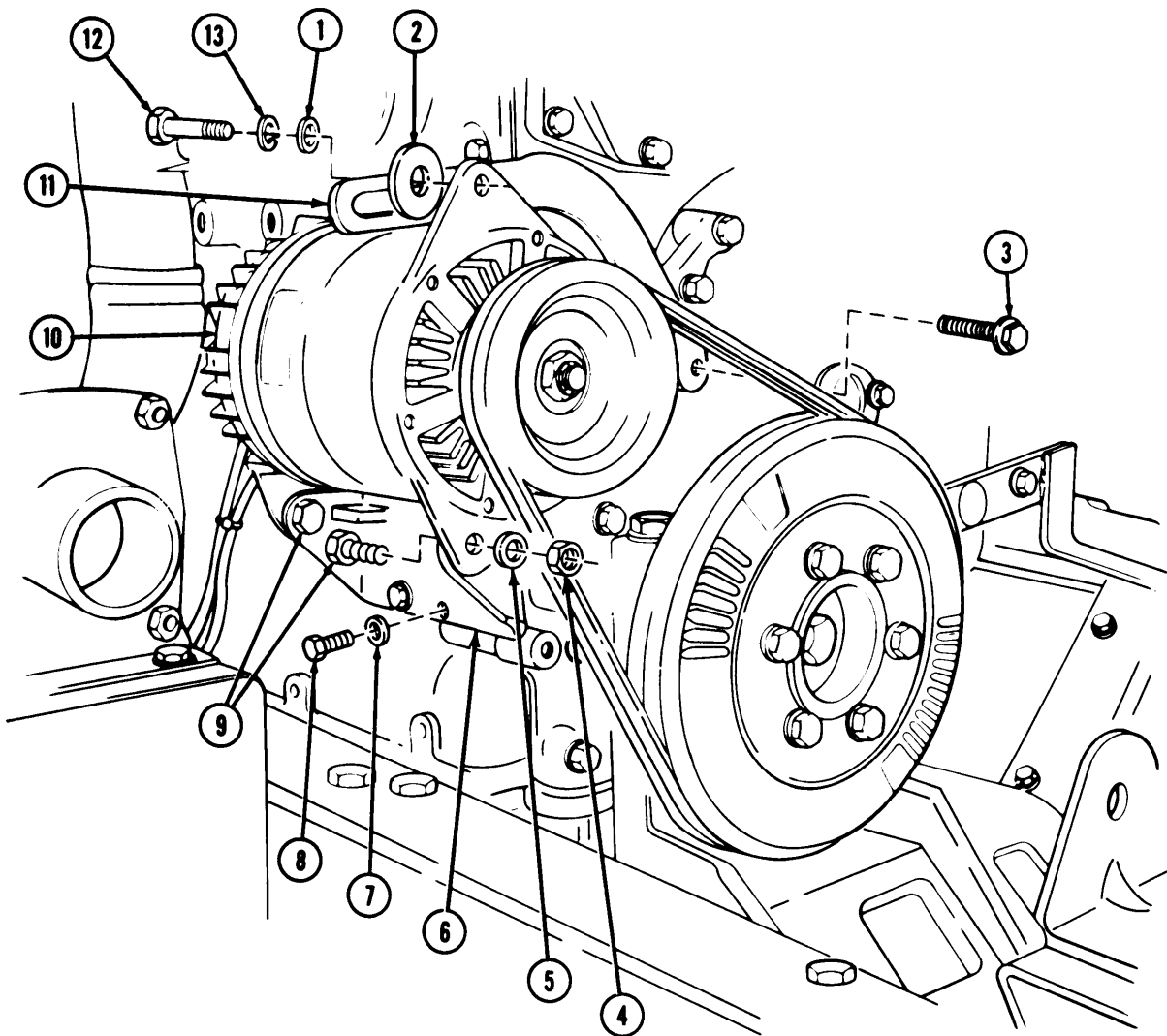
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.	Alternator (10)	Screw (12), lockwasher (13), washer (1) and (2), screw-assembled washer (3), and adjusting link (11)	Remove.	Discard lockwasher (13).
9.	Mounting bracket (6)	Two screws (9), washers (5), and locknuts (4), and alternator (10)	Remove.	Discard locknuts (4).
10.		Four screws (8) and lockwashers (7), and mounting bracket (6)	Remove.	Discard lockwasher's (7),

b. Installation

11.		Mounting bracket (6)	Install with four screws (8) and new lockwashers (7).	
12.		Alternator (10)	Install with two screws (9), washers (5), and new locknuts (4).	Finger tighten.

4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT (Cont'd)

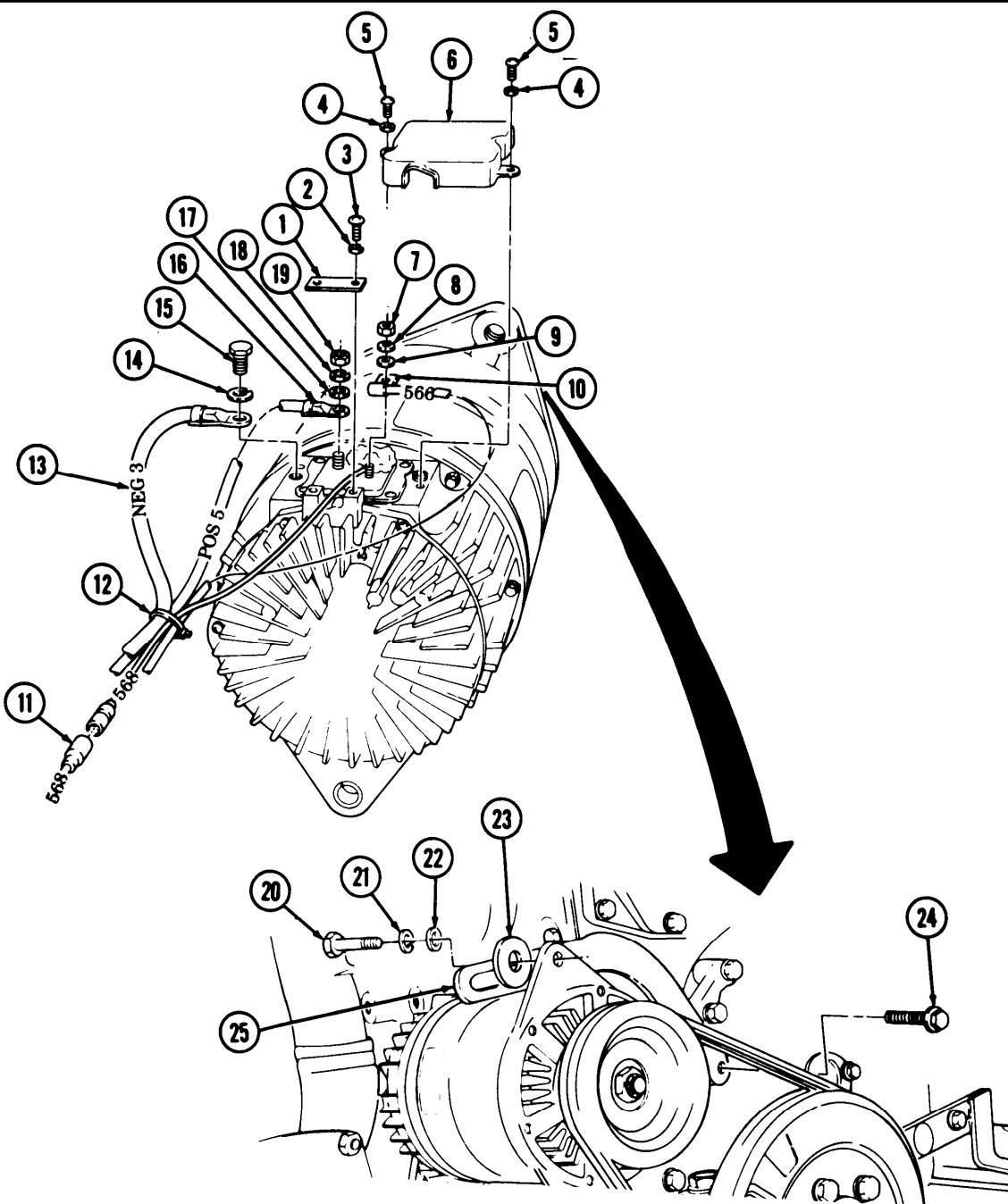
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<p style="text-align: center;">NOTE</p> <p>Make sure wire connecting points are thoroughly cleaned before connections are made.</p>				
13.		Wire (16)	Install with washer (17), new lockwasher (18), and nut (19).	Tighten 45-55 lb-in. (5-6 N-m).
14.		Wire (10)	Install with washer (9), new lockwasher (8), and nut (7).	Tighten 20-25 lb-in. (2-3 N-m).
15.		Wire(11)	Connect.	
16.		Wire retaining strap (1)	Install with two new lockwashers (2) and screws (3).	Wires (16), (10), and (11) are held in place with strap (1).
17.		Wire (13)	Install with new lockwasher (14) and screw (15).	Tighten 82-102 lb-in. (9-12 N-m).
18.		Adjusting link (25)	Install with screw-assembled washer (24), screw (20), new lockwasher (21), and washers (22) and (23).	Finger tighten.
19.		Terminal cover (6)	a Seal wires (16) and (10) connectors completely. b. Install with two new lockwashers (4) and screws (5).	Use gasket sealant.
20.		New tiedown strap (12)	Install.	

4-9. ALTERNATOR AND MOUNTING BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				

END OF TASK!

FOLLOW-ON TASKS:

- Install alternator belts (para. 4-8).
- Connect battery ground cables (para. 4-25).
- Start engine (TM 9-2320-272-10) and check alternator operation.
- Install right splash shield (TM 9-2320-272-10).

TA 349022

4-10. ALTERNATOR PULLEY REPLACEMENT

This task covers:

a. Removal

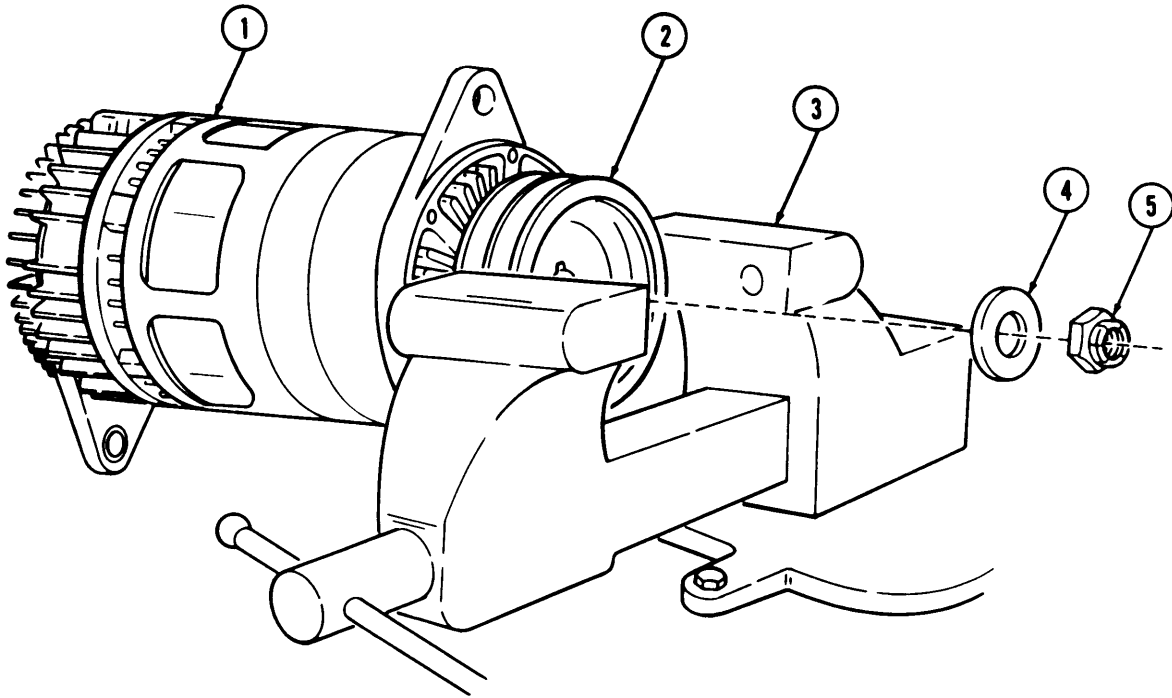
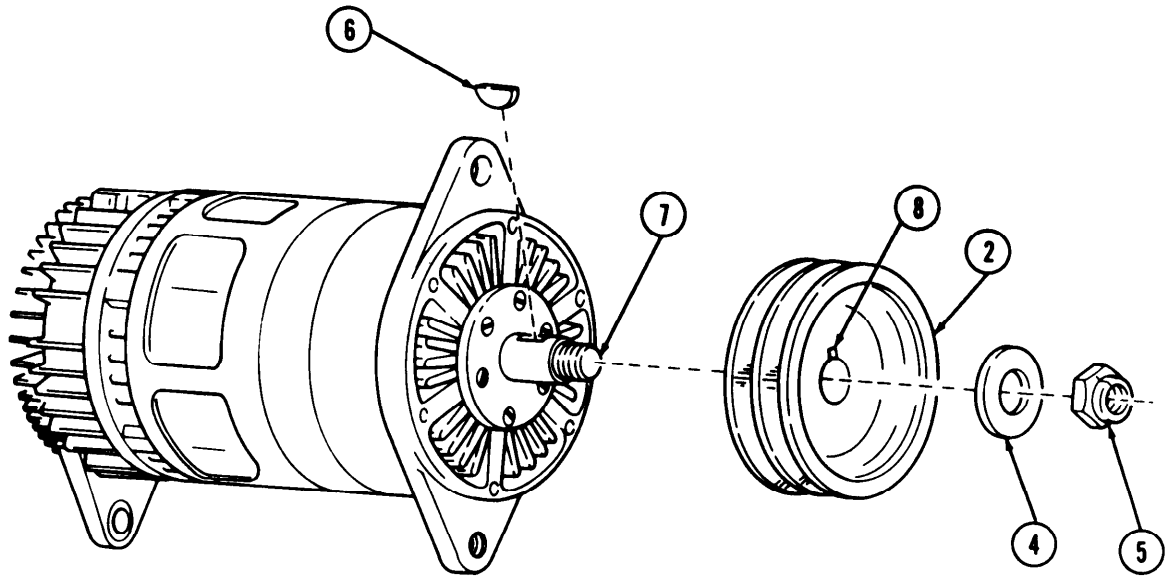
b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	Para. 4-9	Alternator removed.
<u>Test Equipment</u>	<u>Special Environmental Conditions</u>	
None	None	
<u>Special Tools</u>	<u>General Safety Instructions</u>	
None	None	
<u>Materials/Parts</u>		
Locknut		
Woodruff key		
<u>personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Alternator (1)	Pulley (2)	Position in vise (3).	
2.	Pulley shaft (7)	Locknut (5) and washer (4)	Remove.	Discard locknut (5).
3.	Alternator (1)	Pulley (2)	Remove from vise (3).	
		Pulley (2) and woodruff key (6)	Remove.	Discard woodruff key (6).
b. Installation				
4.		New woodruff key (6)	Install in pulley shaft (7) groove with flat edge up.	
5.		Pulley (2)	Install with keyway (8) to woodruff key (6).	
6.		Washer (4) and new locknut (5)	Install on pulley shaft (7).	Do not tighten.
7.		Pulley (2)	Position in vise (3) and Tighten new locknut (5).	Tighten 90-95 lb-ft (122-128 N-m).

4-10. ALTERNATOR PULLEY REPLACEMENT (Cont'd)

Step No.	LOCATION	ITEM	ACTION	REMARKS
				
				

END OF TASK!

FOLLOW-ON TASK: Install alternator (para. 4-9).

TA 349023

4-11. PROTECTIVE CONTROL BOX REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25 Para. 4-15	Parking brake set. Battery ground cables disconnected. Ether cylinder and valve removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Six lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

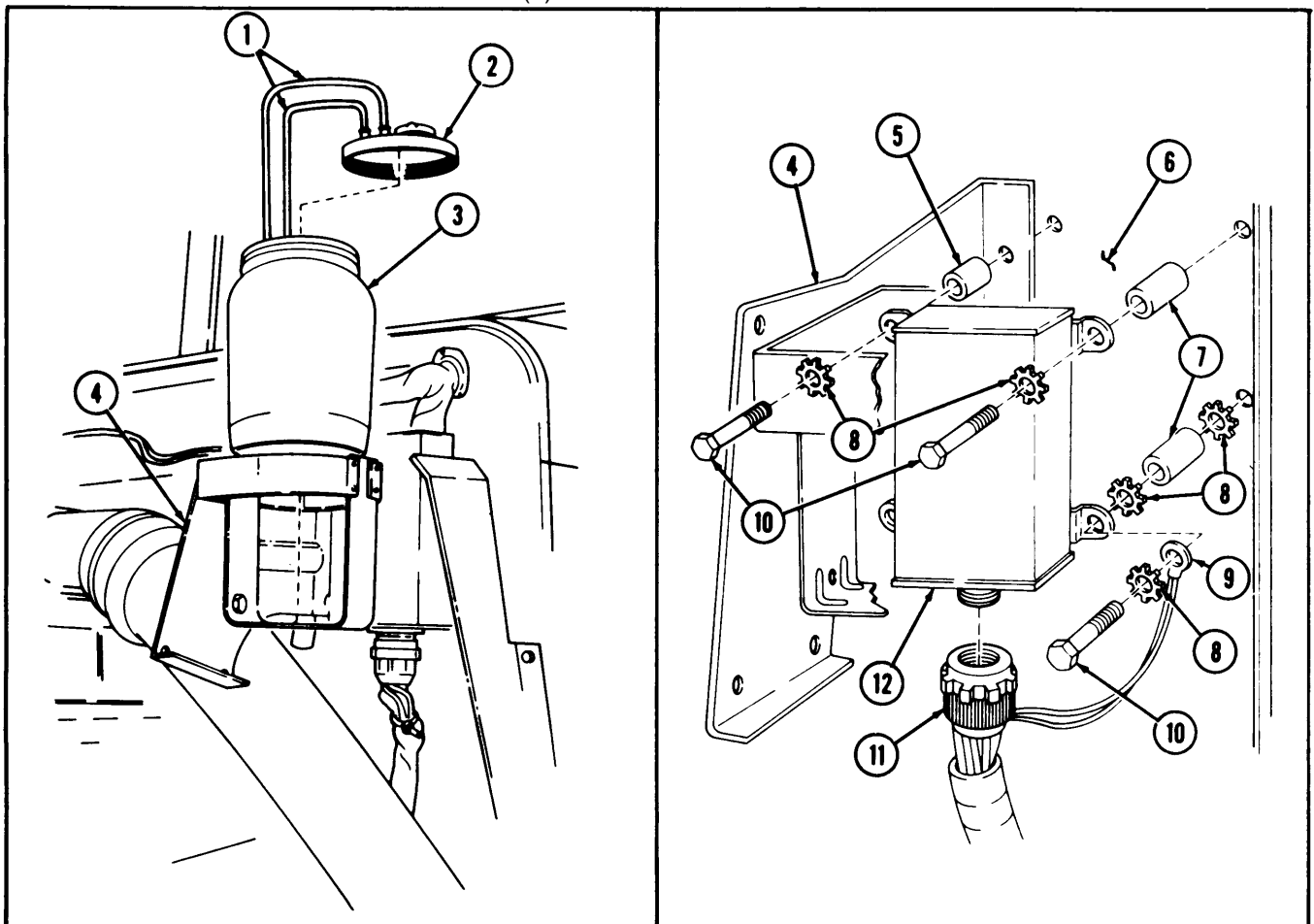
1.	Windshield washer bottle bracket (4)	Windshield washer bottle lid (2)	Remove.	Do not disconnect windshield washer hoses (1).
2.		Windshield washer bottle (3)	Remove.	
3.	Protective control box (12)	Harness connector (11)	Disconnect.	
4.	Firewall (6)	Four screws (10), six lockwashers (8), two spacers (5), two spacers (7), ground wire (9), protective control box (12), and washer bottle bracket (4)	Remove.	Discard lockwashers (8).

4-11. PROTECTIVE CONTROL BOX REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

- | | | | |
|----|---|---|----------------------------|
| 5. | Washer bottle bracket (4), protective control box (12), and ground wire (9) | Install with six new lockwashers (8), two spacers (7), two spacers (5), and four screws (10). | |
| 6. | Harness connector (11) | Connect. | Tighten 10 lb-ft (14 N•m). |
| 7. | Windshield washer bottle (3) | Install. | |
| 8. | Windshield washer bottle lid (2) | Install. | |



END OF TASK!

- FOLLOW-ON TASKS:
- Install ether cylinder and valve (para. 4-15).
 - Connect battery ground cables (para. 4-25).

TA 349024

Section III. ETHER COLD STARTING SYSTEM

4-12. GENERAL

This section provides maintenance procedures assigned to the organizational level for the ether cold starting system. To find a specific maintenance procedure, see the maintenance task summary below

4-13. ETHER COLD STARTING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-14.	Ether Start Switch Replacement	4-26
4-15.	Ether Cylinder and Valve Replacement	4-28
4-16.	Ether Start Fuel Pressure Switch Replacement	4-32
4-17.	Ether Thermal Close Valve and Bushing Replacement	4-34
4-18.	Ether Atomizer Replacement	4-36
4-19.	Ether Tubing Replacement	4-38

4-14. ETHER START SWITCH REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

4-14. ETHER START SWITCH REPLACEMENT (Cont'd)

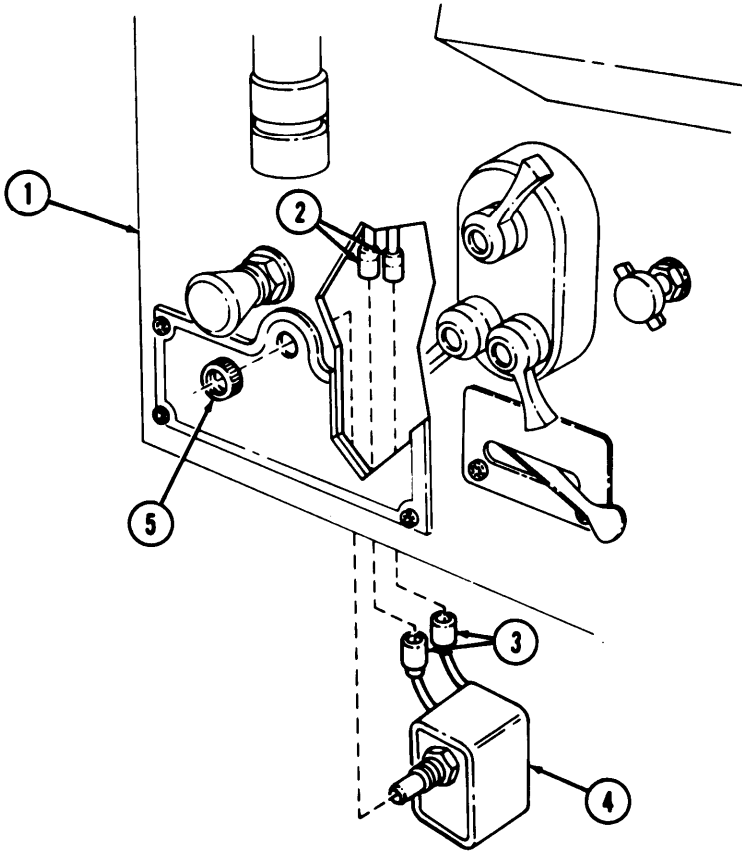
LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Two wires (2) under left side of dash (1)	Two ether start switch wires (3)	Disconnect.	Tag wires for installation.
2.	Dash (1)	Nut (5) and ether start switch (4)	Remove.	

b. Installation

3.	Ether start switch (4)	Install with nut (5).
4.	Two ether start switch wires (3)	Connect.



END OF TASK!

FOLLOW-ON TASK: Connect battery ground cables (para. 4-25).

TA 34902S

4-15. ETHER CYLINDER AND VALVE REPLACEMENT

This task covers:

- a. Ether Cylinder Removal
- b. Ether Valve Removal

- c. Ether Valve Installation
- d. Ether Cylinder Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	Para. 4-25 TM 9-2320-272-10	Battery ground cables disconnected. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts Lockwasher		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not remove or install ether cylinder or valve near fire or sparks.
<u>Manual References</u>		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Ether is extremely flammable. Performing ether starting system procedures near open flames may result in injury to personnel.

a. Ether Cylinder Removal

- | | | | | |
|----|---|--------------------------------|---------|-----------------------|
| 1. | Ether cylinder relief inlet adapter (2) | Ether cylinder relief tube (6) | Remove. | Tag for installation. |
| 2. | Ether cylinder (1) | Ether cylinder clamp (14) | Loosen. | |

NOTE

Ether cylinder must be unscrewed quickly to allow ether cylinder check valve to close and prevent loss of ether.

- | | | | | |
|----|------------------|--------------------|---------|--|
| 3. | Ether valve (12) | Ether cylinder (1) | Remove. | |
|----|------------------|--------------------|---------|--|

NOTE

Perform step 4 only if new ether cylinder is being installed.

- | | | | | |
|----|--------------------|--------------------------|---------|--|
| 4. | Ether cylinder (1) | Relief inlet adapter (2) | Remove. | |
|----|--------------------|--------------------------|---------|--|

4-15. ETHER CYLINDER AND VALVE REPLACEMENT (Cont'd)

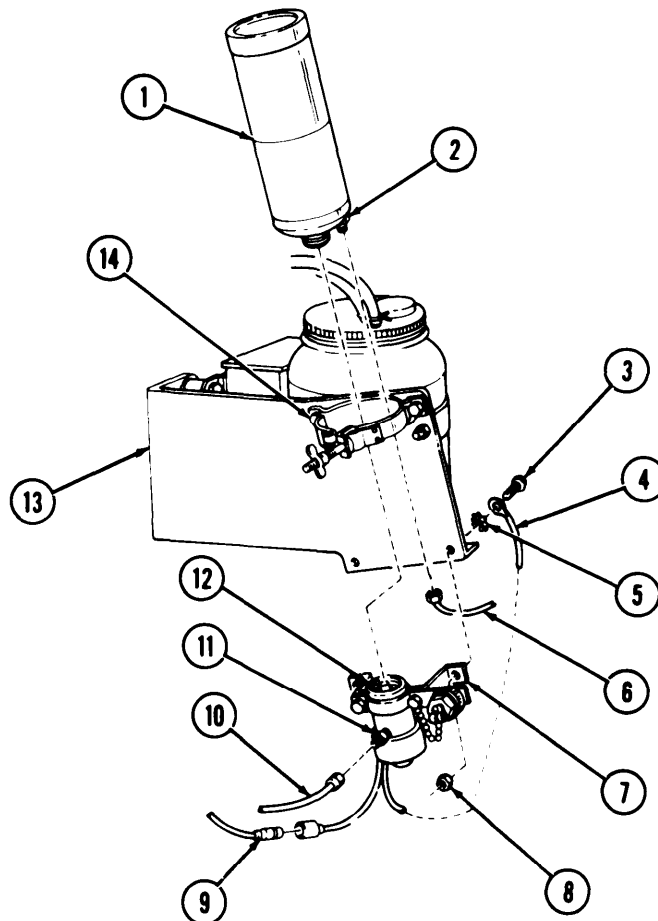
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Ether Valve Removal

CAUTION

When ether cylinder is removed, cover must be installed to prevent dust or dirt from entering ether valve.

- | | | | | |
|----|----------------------------------|--|-------------|--|
| 5. | Ether valve (12) | Connector (9) | Disconnect. | Tag for installation. |
| 6. | Ether valve adapter fitting (11) | Ether supply tube (10) | Disconnect. | Tag for installation. |
| 7. | Ether cylinder bracket (13) | Two locknuts (8) and screws (3) lockwasher (6), ether valve bracket (7), ground wire (4); and ether valve (12) | Remove. | Tag ground wire (4) for installation. Discard lockwasher (5) and two locknuts (8). |



TA 349026

4-15. ETHER CYLINDER AND VALVE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Ether Valve Installation

8.		Ether valve bracket (7), ether valve (11), and ground wire (4)	Install with two screws (3), new lockwasher (5), and two new lock-nuts (8).	
9.		Connector (9) and ether supply tube (10)	Connect.	

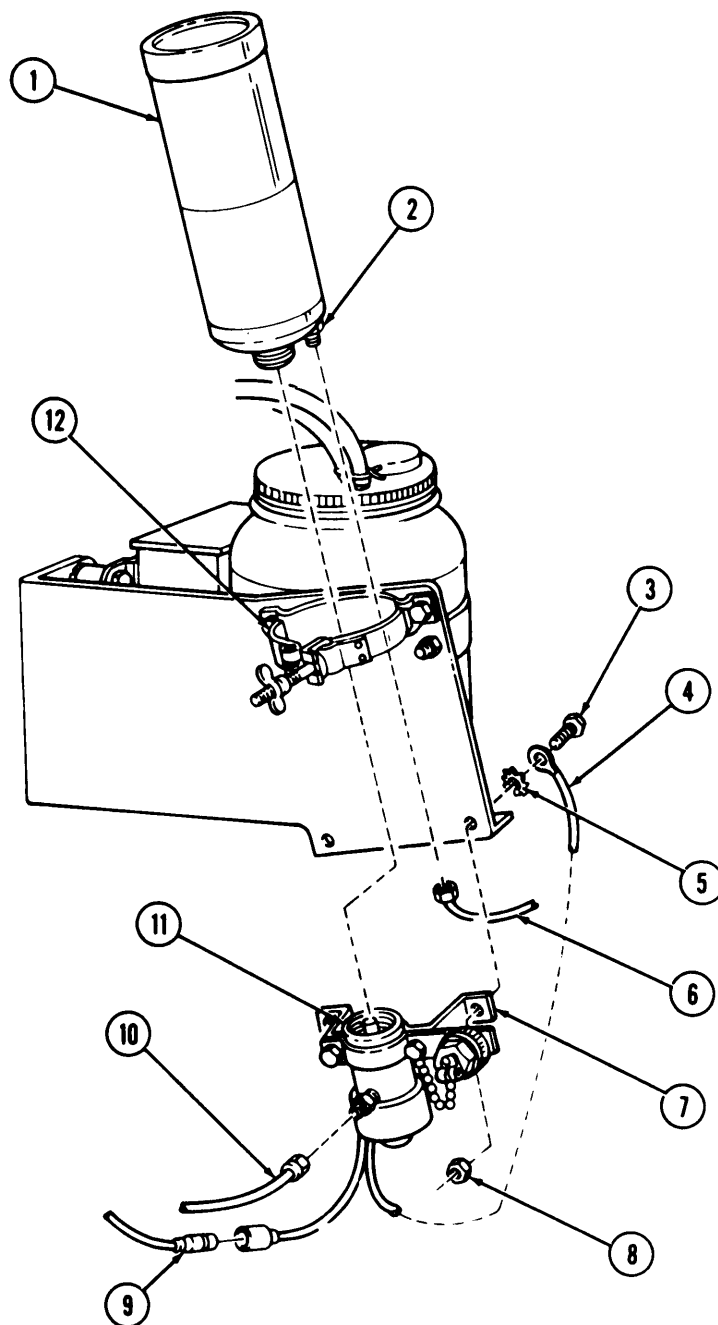
d. Ether Cylinder Installation
NOTE

Perform step 10 only if new ether cylinder is being installed.

10.		Relief inlet adapter (2)	Install.	
11.		Ether cylinder (1) and ether cylinder clamp (12)	Tighten.	
12.		Ether cylinder relief tube (6)	Connect.	

4-15. ETHER CYLINDER AND VALVE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Connect battery ground cables (para. 4-25).
 . Install left splash shield (TM 9-2320-272-10).

TA 349027

4-16. ETHER START FUEL PRESSURE SWITCH REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25 TM 9-2320-272-10	Parking brake set. Battery ground cables disconnected. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Have drainage container ready to catch fuel.

a. Removal

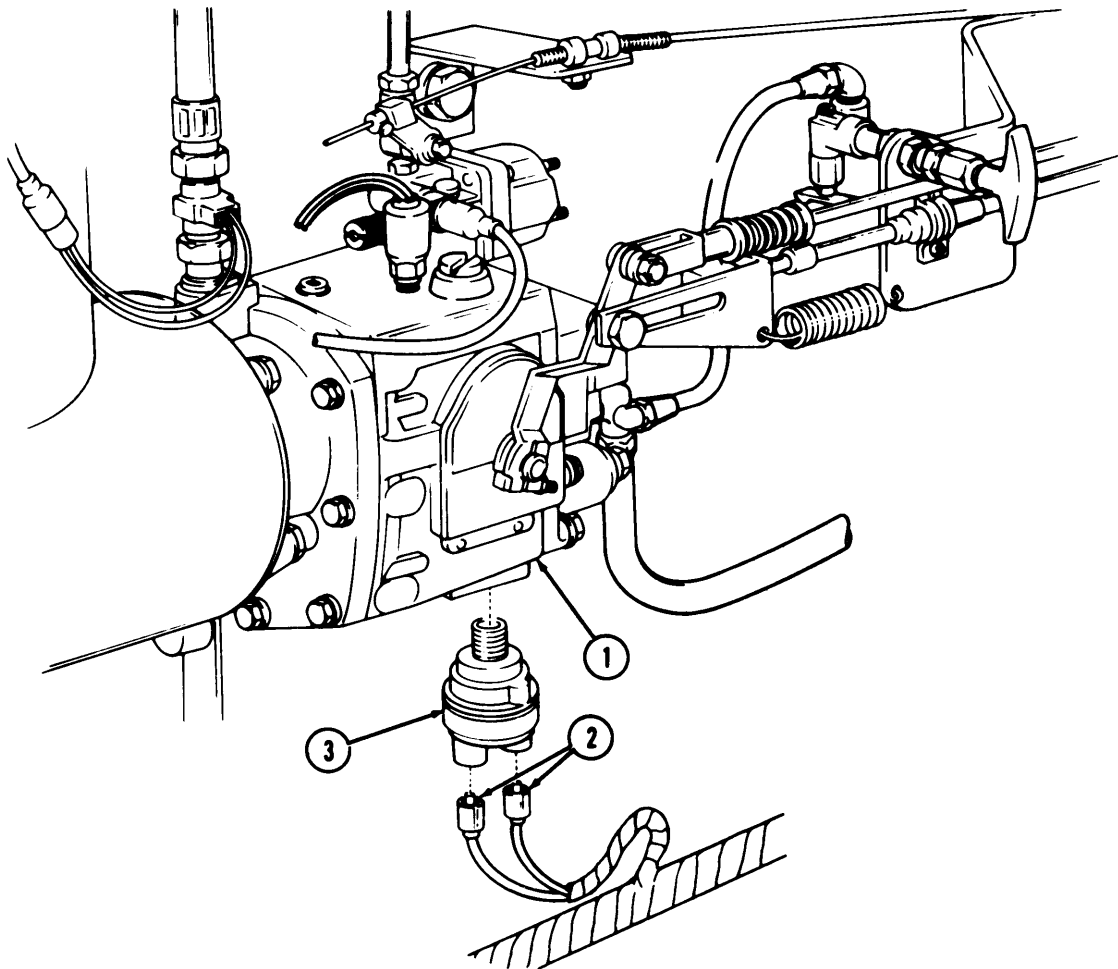
- | | | | |
|----|--|--------------------------------------|-------------|
| 1. | Bottom of ether start fuel pressure switch (3) | Two wires (2) | Disconnect. |
| 2. | Bottom of fuel pump (1) | Ether start fuel pressure switch (3) | Remove. |

b. Installation

- | | | |
|----|--------------------------------------|--|
| 3 | Ether start fuel pressure switch (3) | Install. |
| 4. | Two wires (2) | Connect to ether start fuel pressure switch (3). |

4-16. ETHER START FUEL PRESSURE SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: • Connect battery ground cables (para. 4-25).
• Install left splash shield (TM 9-2320-272-10).

TA 349028

4-17. ETHER THERMAL CLOSE VALVE AND BUSHING REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.

Thermal close valve (6)

Thermal close ether supply tube (3) and atomizer ether supply tube (1)

Disconnect.

Tag for installation.
2.

Adapter bushing (4)

Thermal close valve (6)

Remove.
3.

Water manifold (5)

Adapter bushing (4)

Remove.

b. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

4.

Adapter bushing (4)

Install.
5.

Thermal close valve (6)

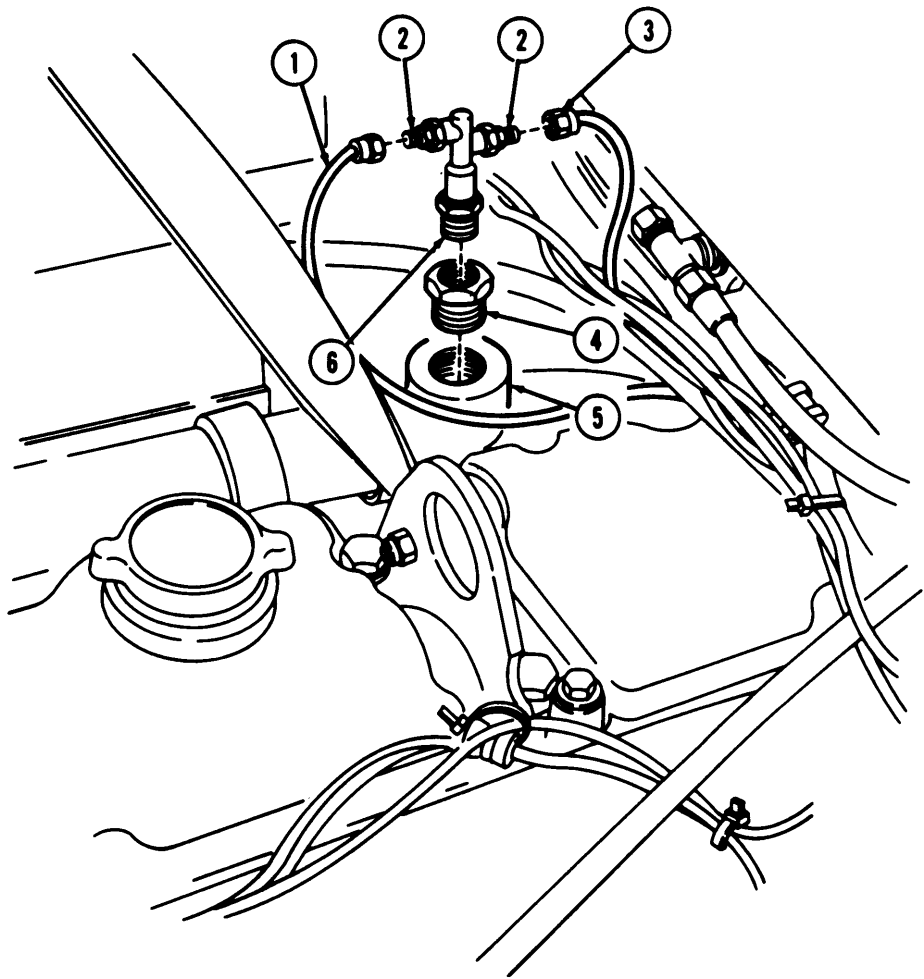
Install.
6.

Atomizer ether supply tube (1) and thermal close ether supply tube (3)

Connect to two thermal close adapter fittings (2).

4-17. ETHER THERMAL CLOSE VALVE AND BUSHING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Start engine (TM 9-2320-272-10). Check for coolant leaks around thermal close valve and adapter bushing.

TA 349029

4-18. ETHER ATOMIZER REPLACEMENT

This task covers:

a. Removalb. Installation

INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Ether atomizer (1)	Atomizer ether supply tube (2)	Disconnect.	
2.	Intake manifold connection (3)	Atomizer (1)	Remove.	

b. Installation

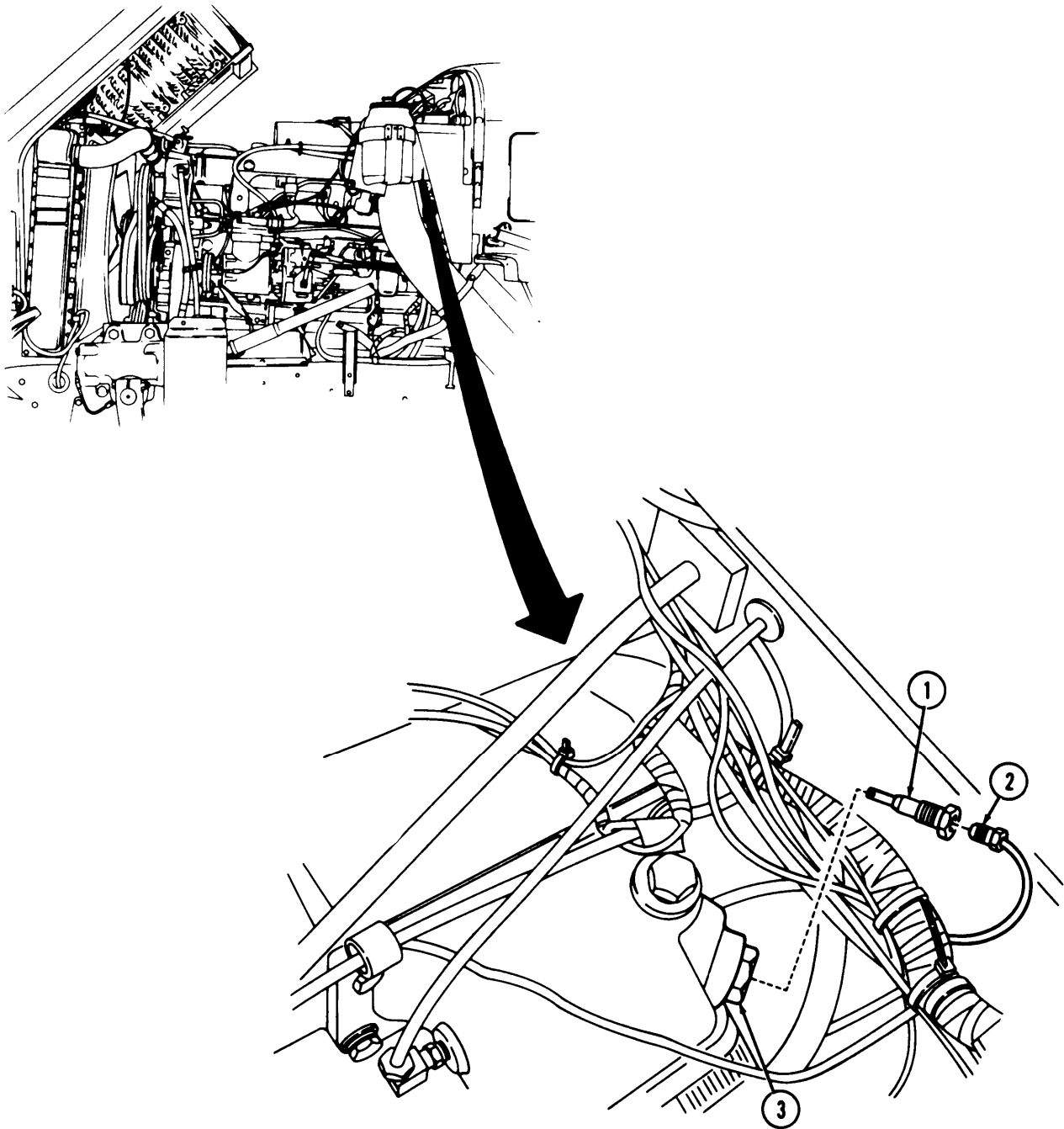
NOTE

Male pipe threads must be wrapped with sealing tape before installation.

3.		Atomizer (1)	Install.	
4.		Atomizer ether supply tube (2)	Connect.	

4-18. ETHER ATOMIZER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

4-19. ETHER TUBING REPLACEMENT

This task covers:

- a. Removal
- b. Installation

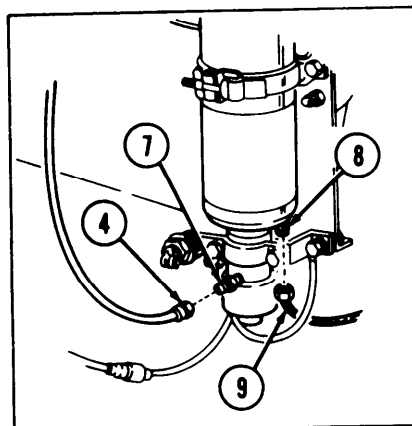
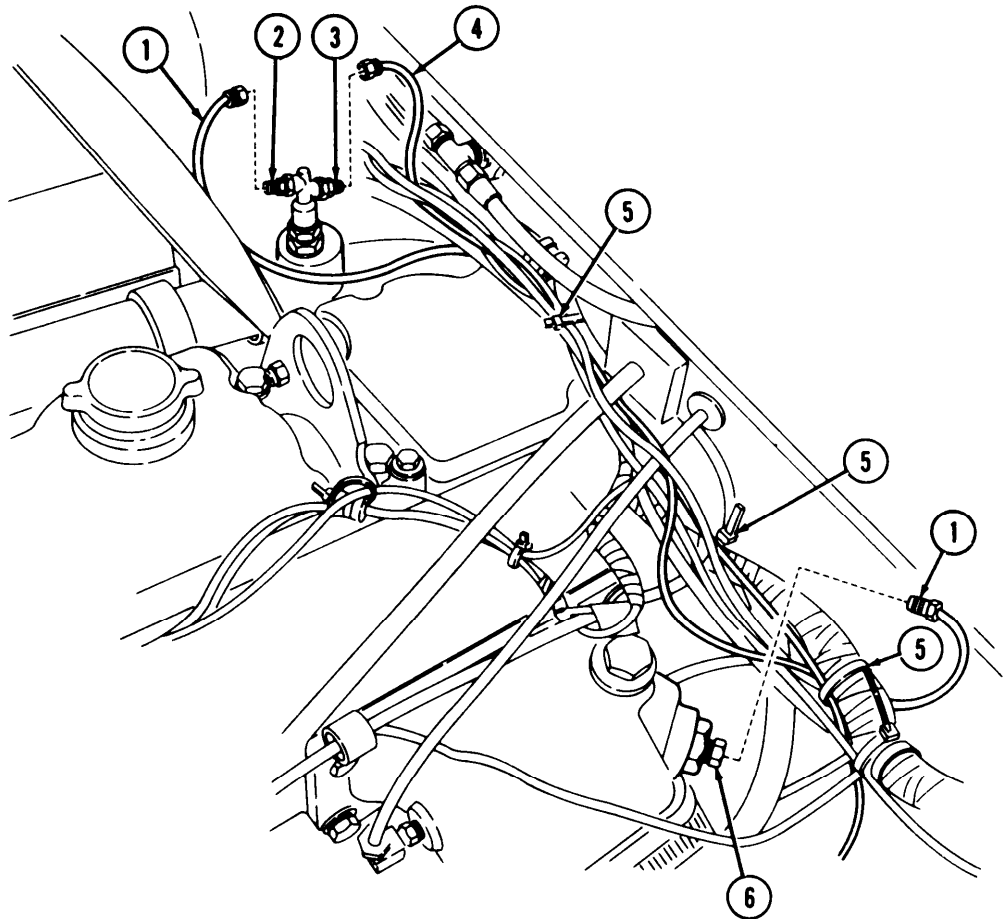
INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Tiedown straps (Appendix D, Item 18)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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- | | | | | |
|----|--|-------------------------------------|-------------|-----------------------------|
| 1. | Atomizer ether supply tube (1) and thermal close ether supply tube (4) | Three tiedown straps (5) | cut. | Discard tiedown straps (5). |
| 2. | Thermal close adapter fitting (3) and ether valve adapter fitting (7) | Thermal close ether supply tube (4) | Disconnect. | Tag for installation. |
| 3. | Thermal close adapter fitting (2) and atomizer (6) | Atomizer ether supply tube (1) | Disconnect. | Tag for installation. |
| 4. | Ether cylinder relief inlet adapter (8) | Ether cylinder relief tube (9) | Disconnect. | Tag for installation. |

4-19. ETHER TUBING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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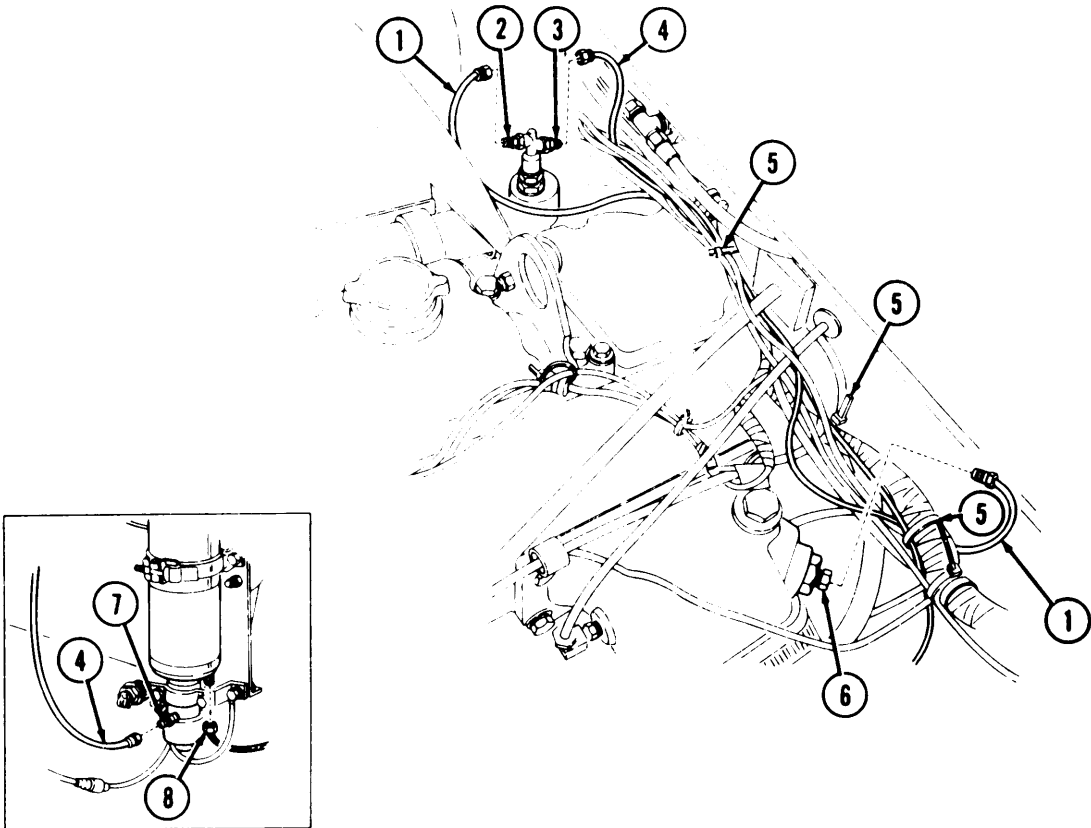


4-19. ETHER TUBING REPLACEMENT (Cont'd)

STEP NO .	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

5.		Ether cylinder relief tube (8)	Connect.	
6.		Atomizer ether supply tube (1)	Connect to thermal close adapter fitting (2) and atomizer (6).	
7.		Thermal close ether supply tube (4)	Connect to thermal close adapter fitting (3) and ether valve adapter fitting (7).	
8.		Atomizer ether supply tube (1) and thermal close ether supply tube (4)	Install with three new tie-down straps (5).	



END OF TASK!

FOLLOW-ON TASK: Install left splash shield (TM 9-2320-272-10).

Section IV. BATTERY SYSTEM

4-20. GENERAL

This section provides maintenance procedures assigned to the organizational level for the battery system. To find a specific task see the maintenance task summary below:

4-21. BATTERY SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE N O .
4-22.	Battery Box Cover Replacement	4-42
4-23.	Battery Cable and Terminal Adapter Replacement	4-44
4-24.	Battery Maintenance	4-46
4-25.	Battery Ground Cable Maintenance	4-50
4-26.	Slave Receptacle Replacement	4-52
4-27.	Battery Box Replacement	4-54

4-22. BATTERY BOX COVER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 Para. 9-29	Parking brake set. Companion seat cushion removed.
Test Equipment		
None		
Special Tools		Special Environmental Conditions
None		None
Materials/Parts		
Cotter pin six locknuts		
Personnel Required		General Safety Instructions
Light-wheeled vehicle mechanic MOS 63B (2)		Make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against top of batteries.
Manual References		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

Assistant will hold battery box cover open while mechanic removes support rod.

- | | | | |
|----------------------------------|---|-------------------------------|-------------------------|
| 1. Battery box cover (6) | Two latches (7) | Release, and raise cover (6). | |
| 2. Battery box cover hinge (9) | Six screws (8) and locknuts (10) and battery box cover (6) | Remove. | Discard locknuts (10). |
| 3. Battery box cover bracket (1) | Cotter pin (2), washer (3), swivel pin (4), and support rod (5) | Remove. | Discard cotter pin (2). |

b. Installation

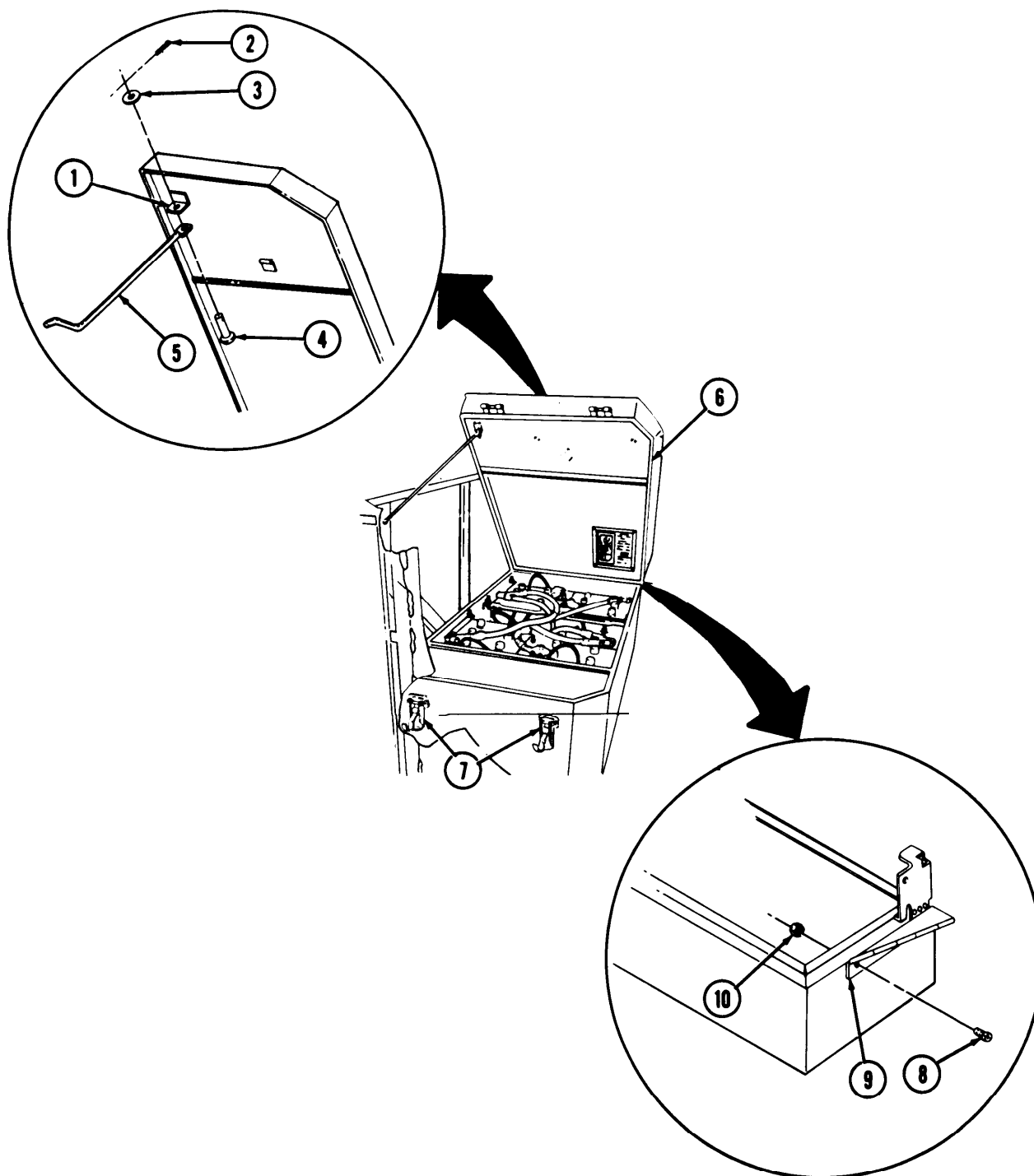
WARNING

When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against the top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.

- | | | |
|----|-----------------------|---|
| 4. | Support rod (5) | Install with swivel pin (4) washer (3), and new cotter pin (2). |
| 5. | Battery box cover (6) | Install with six screws (8) and new locknuts (10). |

4-22. BATTERY BOX COVER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Install companion seat cushion (para. 9-29).

TA 349032

4-23. BATTERY CABLE AND TERMINAL ADAPTER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
Test Equipment		Special Environmental Conditions
None		None
Special Tools		
None		
Materials/Parts		General Safety Instructions
None		•Make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against top of batteries.
Personnel Required		• Do not wear jewelry when disconnecting battery ground cables.
Light-wheeled vehicle mechanic MOS 63B		
Manual References		
TM 9-2320-272-10		
TM 9-2320-272-20P		
TM 9-6140-200-14		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Remove all jewelry. If jewel or disconnected battery ground cable contacts battery terminal a direct short will result an may cause injury to personnel.

a. Removal

NOTE

- All battery cables and terminal adapters are removed the same.
- Tag cables for installation.

1. Terminal adapter (4)	Nut (1) and screw (6)	Loosen.
2. Battery post (7)	Terminal adapter (4) and rubber boot (8)	Remove.
3. Terminal adapter (4)	Nut (2), screw (5), and two battery cables (3)	Remove.

NOTE

Refer to batterny TM 9-6140-200-14 for inspection and service of battery cables and adapters.

b. Installation

WARNING

When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed clamps are well down on battery posts, and all battery cables lie flat against the top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.

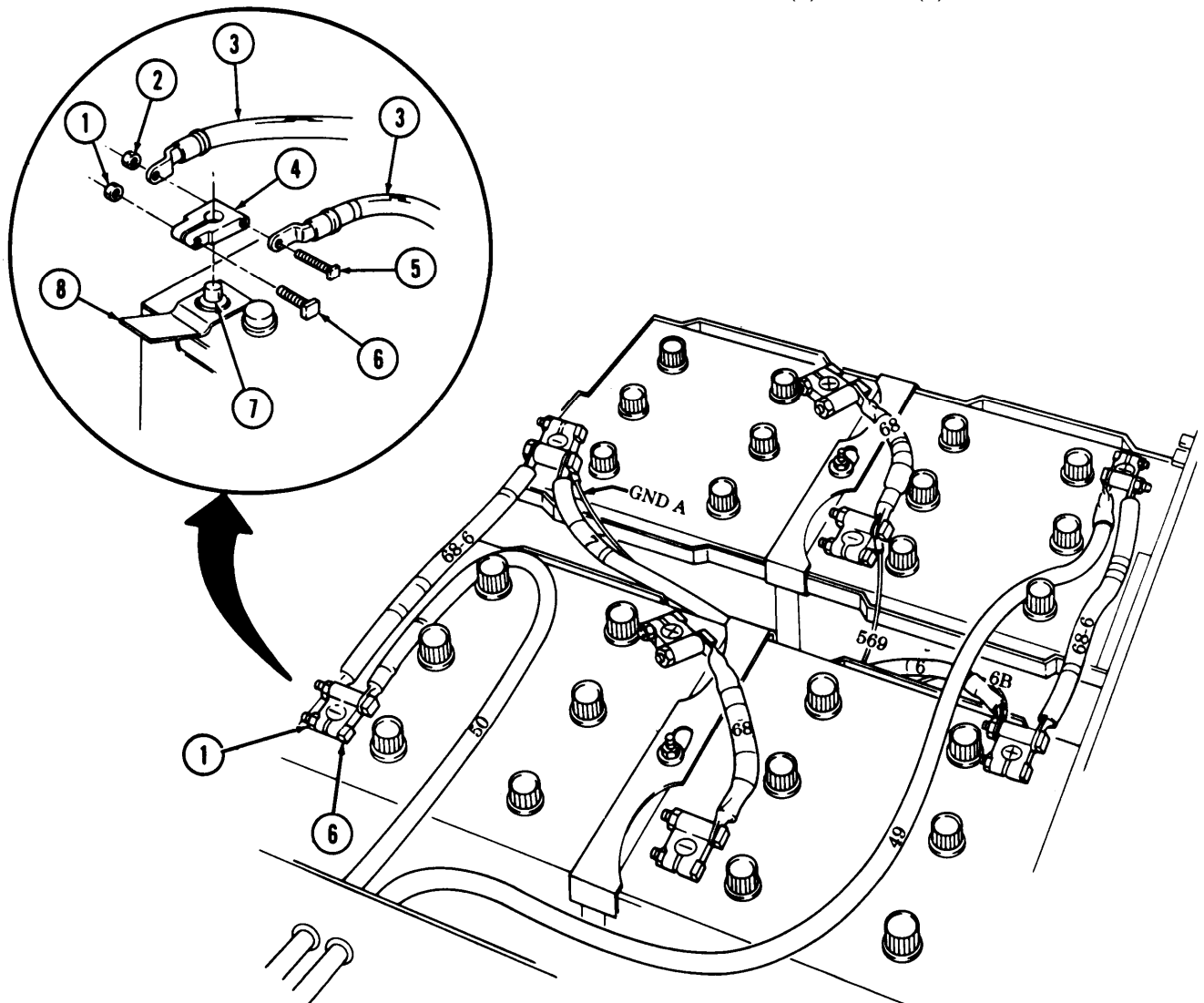
4-23. BATTERY CABLE AND TERMINAL ADAPTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

- All battery cables and terminal adapters are installed the same.
- When installing one cable to an adapter, place the cable under the bolt head. When installing two cables, place one cable on each side of the adapter.

- | | | |
|----|----------------------------|---|
| 4. | Rubber boot (8) | Install on battery post (7). |
| 5. | Screw (5), two cables (3), | Install on terminal adapter (4). |
| 6. | Terminal adapter (4) | Install on battery post (7) with screw (6) and nut (1). |



END OF TASK!

FOLLOW-ON TASK: Connect battery ground cables (para. 4-25).

4-24. BATTERY MAINTENANCE

This task covers:

- a. Removal

b. Inspection and Cleaning
- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Ten lockwashers Epoxy coating (Appendix D, Item 11) Wiping rag (Appendix D, Item 21) Sodium bicarbonate (Appendix D, Item 23)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		Make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against top of batteries.
<u>Manual References</u>		
TM 9-6140-200-14 TM 9-2320-272-20P		

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1. Terminal adapters (2)

2. Four batteries (1)

3. Ten battery tiedown bolts (10)

4. Battery box (9)
- Eight nuts (3) and bolts (4)

Eight terminal adapters (2) and rubber boots (11)

Ten nuts (6), lockwashers (7), and washers (8)

Two battery tiedowns (5)
- Loosen.

Remove.

Remove.

Remove.
- Tag for installation.

Discard lockwashers (7).

NOTE

- Assistant will help with step 5.
5.

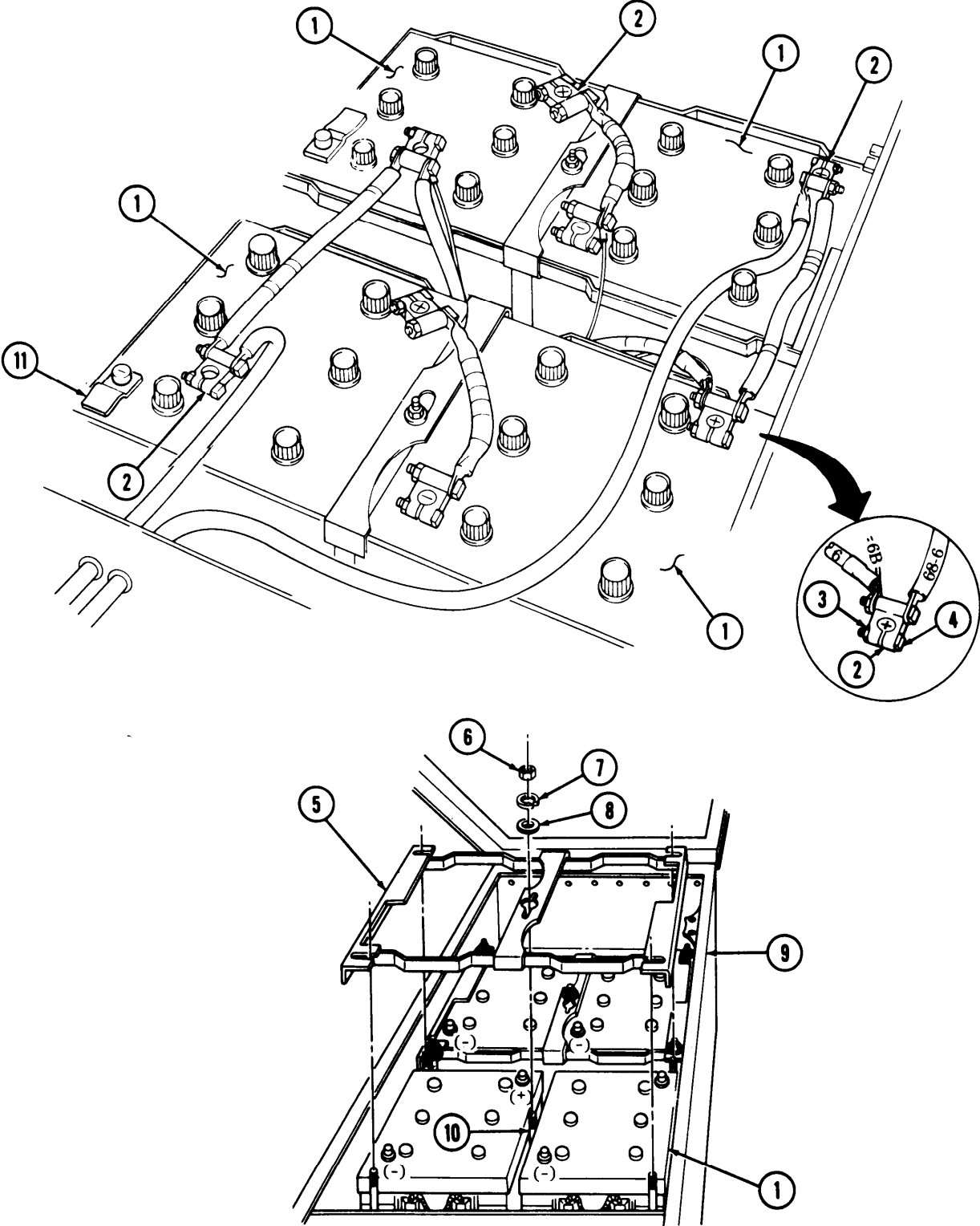
6.
- Four batteries (1)

Ten battery tiedown bolts (10)
- Remove.

Remove.

4-24. BATTERY MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4-24. BATTERY MAINTENANCE (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Inspection and Cleaning**NOTE**

Refer to TM 9-6140-200-14 for battery inspection and service.

7.		Battery box (9)	Inspect for corrosion and acid deposits. If found:	
			a. Apply sodium bicarbonate and water solution to inside of battery box.	Neutralizes acid.
			b. Let solution set for five minutes.	
			c. Rinse with clean water.	
			d. Wipe dry with clean rag.	

c. Installation**WARNING**

When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against the-top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.

8.	Ten battery tiedown bolts (10)	Install.
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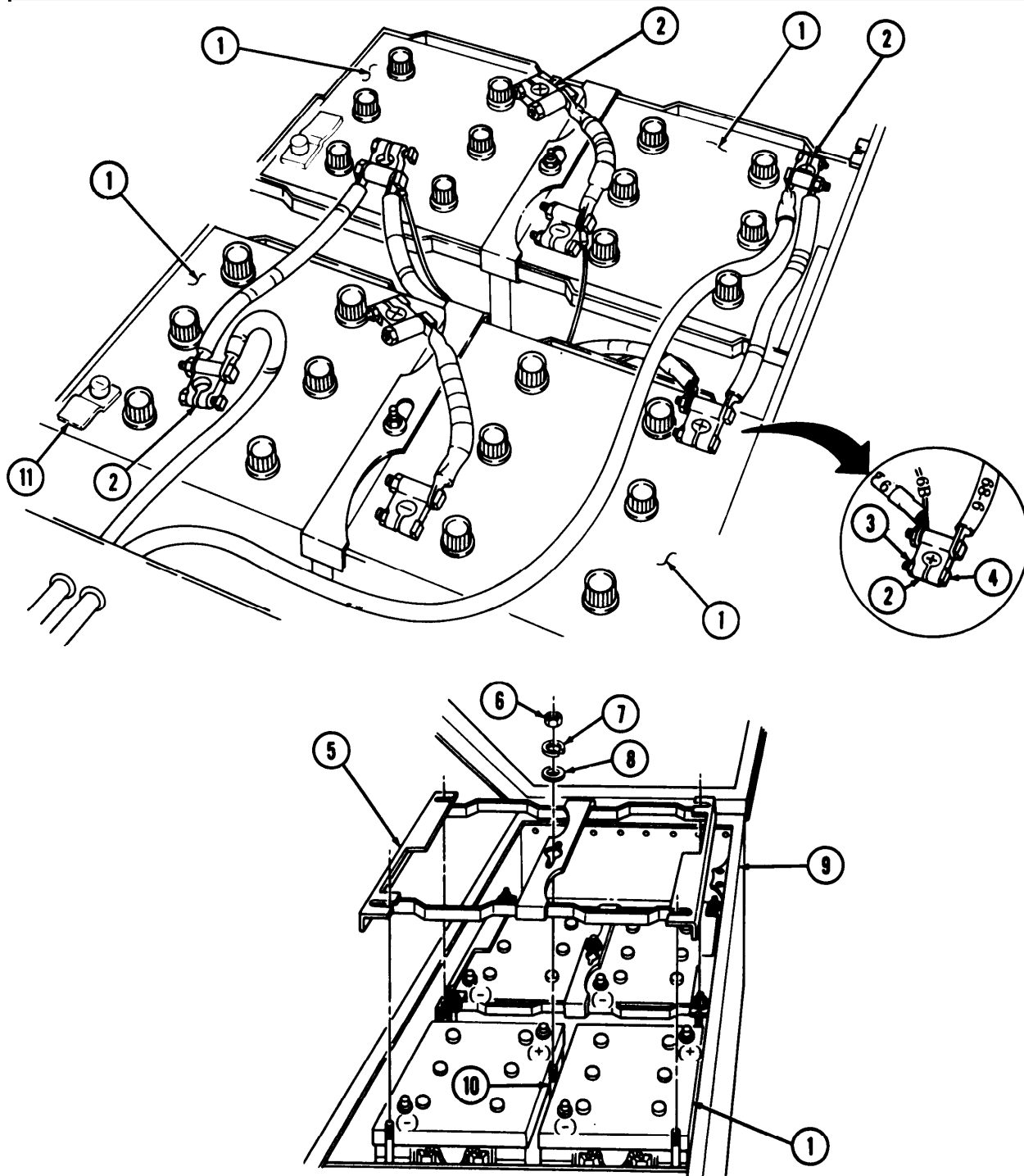
NOTE

Assistant will help with step 9.

9.	Four batteries (1)	Lower into battery box (9).
10.	Two battery tiedowns (5)	Install over ten bolts (10) with ten washers (8), new lockwashers (7), and nuts (6).
11.	Eight rubber boots (11)	Install on batteries (1).
12.	Terminal adapters (2)	Install with eight bolts (4) and nuts (3).

4-24. BATTERY MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK Connect battery ground cables (para. 4-25).

4-25. BATTERY GROUND CABLE MAINTENANCE

This task covers:

a. Disconnection

b. Connection

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>	TM 9-2320-272-10	Battery box cover raised and secured.
None		<u>Special Environmental Conditions</u>
<u>Special Tools</u>		None
None		<u>General Safety Instructions</u>
<u>Materials/Parts</u>		<ul style="list-style-type: none"> Do not wear jewelry when disconnecting battery ground cables. Make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against top of batteries.
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Remove all jewelry. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result and may cause injury to personnel.

a. Disconnection

1. Terminal adapter (7)	Nut (6) and screw (4)	Loosen.	
2. Battery(8)	Terminal adapter (7) and rubber boot (5)	Remove.	Tag for installation.
3. Terminal adapter (2)	Nut (1) and screw (3)	Loosen.	
4. Battery (9)	Terminal adapter (2) and rubber boot (5)	Remove.	Tag for installation.

b. Connection

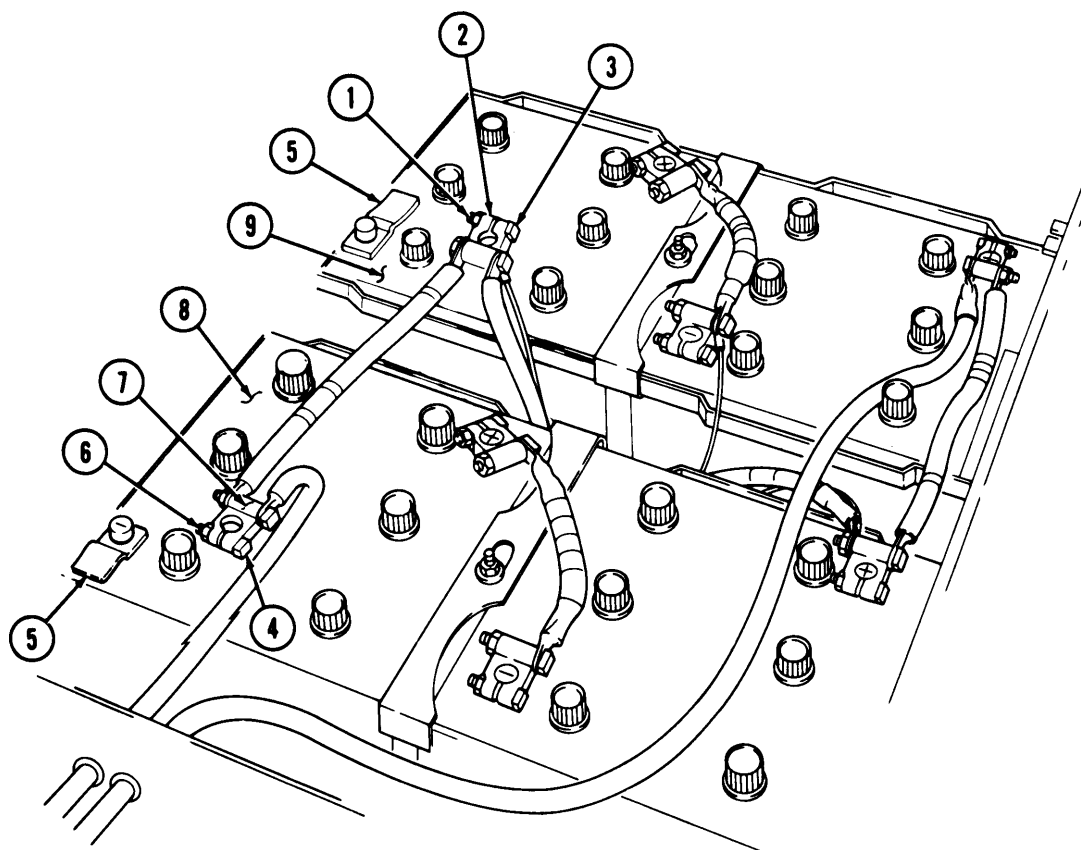
WARNING

When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against the top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.

5.	Two rubber boots (5)	Install on two batteries (8) and (9).
6.	Terminal adapter (2)	Install with screw (3) and nut (1).
7.	Terminal adapter(7)	Install with screw (4) and nut (6).

4-25. BATTERY GROUND CABLE MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Lower battery box cover and secure (TM 9-2320-272-10).

4-26. SLAVE RECEPTACLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		<u>General Safety Instructions</u>
Two lockwashers		<ul style="list-style-type: none">• Ground cables must be disconnected before removing receptacle.• Make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against top of batteries.
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

- Remove all jewelry. If jewelry or disconnected battery ground cables contacts battery terminal, a direct short will result and may cause injury to personnel.
- Do not remove slave receptacle before disconnecting battery ground cables. If energized battery cable contacts cab, a direct short will result and may cause injury to personnel.

a. Removal

1.	Cab (6)	Four nuts (7), and screws (10), rope (9), and cover (11)	Remove.	
2.		Slave receptacle (12)	Pull until battery cables (3) and (8) are exposed.	Insulating hose (13) remains inside cab (6).
3.	Slave receptacle (12)	Two screws (1) and lockwashers (2), and battery cables (3) and (8)	Remove.	Tag cables (3) and (8) for installation. Discard lockwashers (2).
4.		Insulator (5) and gasket (4)	Remove.	
5.	Inside cab (6)	Insulating hose (13)	Pull cables (3) and (8) clear and remove.	

4-26. SLAVE RECEPTACLE REPLACEMENT (Cont'd)

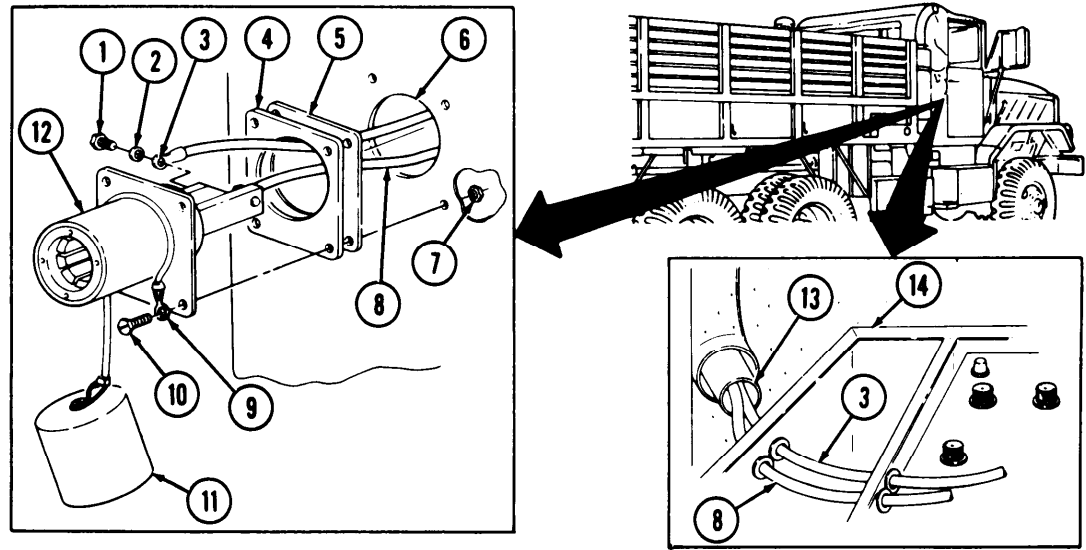
STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

WARNING

When performing battery maintenance, make sure batteries are seated and clamped down, all rubber boots are installed, clamps are well down on battery posts, and all battery cables lie flat against the top of the batteries. Failure to do so may result in severe injury to personnel or damage to equipment.

- | | | |
|-----|------------------------------|--|
| 6. | Insulating hose (13) | Position over cables (3) and (8) against battery box (14). |
| 7. | Cables (3) and (8) | Pull through insulating hose (13) until exposed outside cab (6). |
| 8. | Gasket (4) and insulator (5) | Position to slave receptacle (12). |
| 9. | Battery cables (3) and (8) | Install on slave receptacle (12) with two new lockwashers (2) and screws (1). |
| 10. | Slave receptacle (12) | a. Insert in cab (6) and position insulating hose (13) over screws (1).
b. Install with three screws (10) and nuts (7). |
| 11. | Cover (11) and rope (9) | Install with screw (10) and nut (7). |



END OF TASK!

FOLLOW-ON TASK: Install battery ground cables (para. 4-25).

TA 349037

4-27. BATTERY BOX REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-22 Para 4-23 Para. 4-24	Parking brake set. Battery box cover removed. Battery cable terminal adapters removed. Batteries removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Four lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Right rear of cab (12)	Slave receptacle cables (11) and (13)	Pull through grommets (14).	
2.	Hose (3)	IWO clamps (2)	Loosen.	
3.	Battery box (6) and right rear of cab (12)	Vent hose (3)	Remove.	
4.	Battery box (6)	Wood battery support blocks (1)	Remove.	
5.		Four screws (4) and lockwashers (5)	Remove.	Discard lockwashers (5).
6.	Right rear of cab (12)	Battery box (6)	Remove.	Push battery cables (7) through grommets (8).
7.	Battery box (6)	Four grommets (14) and two grommets (8)	Remove.	

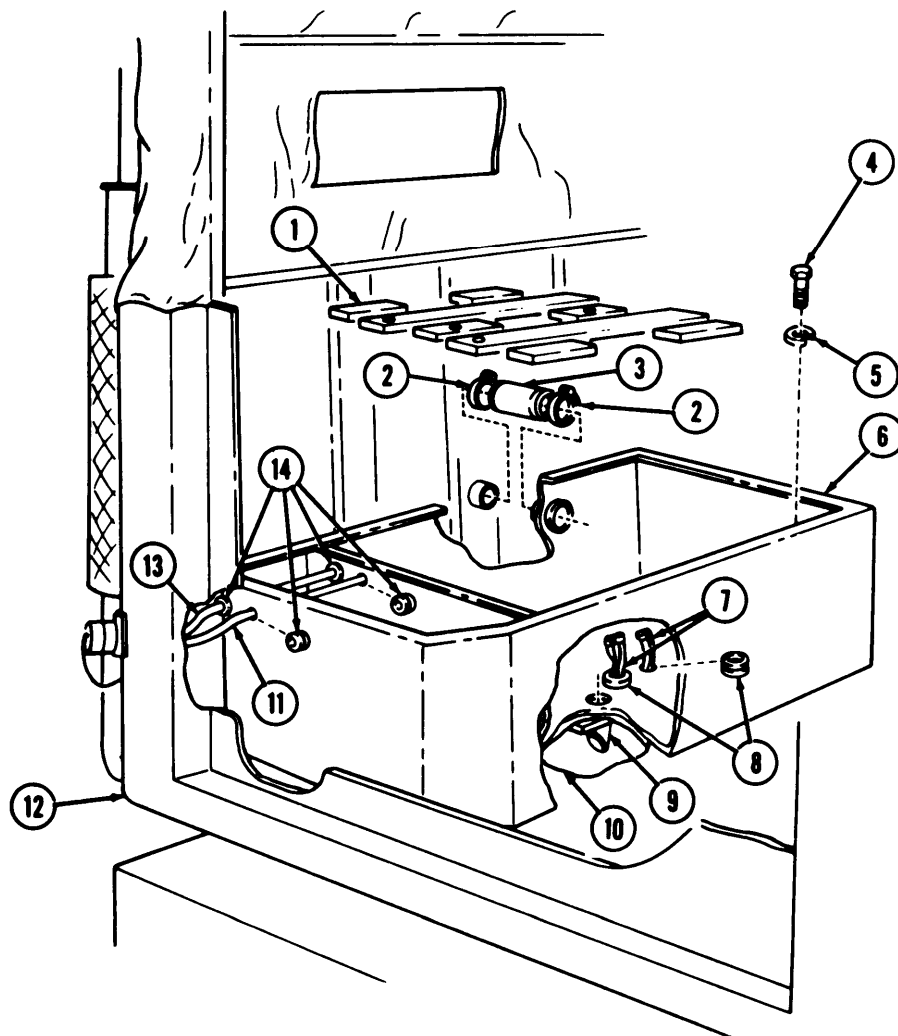
4-27. BATTERY BOX REPLACEMENT (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

- | | | | | |
|----|--|---|--|---|
| 8. | | Four grommets (14) and two grommets (8) | Install. | |
| 9. | | Battery box (6) | a. Install with cable grommets (8) alined with cables (7).
b. Pull battery cables (7) through grommets (8).
c. Install with four screws (4) and new lockwashers (5). | Vent tube (9) will be alined with hole in cab floor (10).

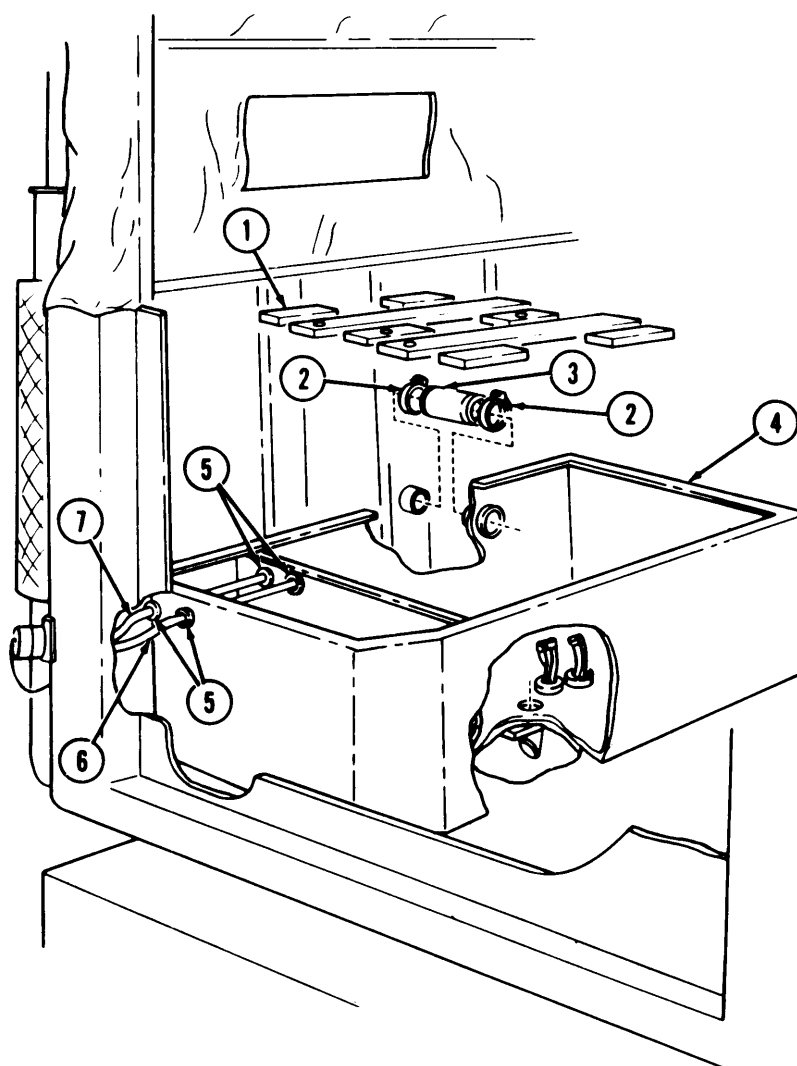
Tighten 25 lb-ft (34 N•m). |



TA349038

4-27. BATTERY BOX REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
10.		Wood battery support blocks (1)	Place in battery box (4).	
11.		Battery box vent hose (3)	Install with two hose clamps (2).	
12.		Slave receptacle cables (6) and (7)	Pull through grommets (5).	



END OF TASK!

FOLLOW-ON TASKS:

- Install batteries (para. 4-24).
- Install battery cable terminal adapters (para. 4-23).
- Install battery box cover (para. 4-22).

TA 349039

Section V. LIGHTING SYSTEM

4-28. GENERAL

This section provides maintenance procedures assigned to the organizational level for the lighting system. To find a specific maintenance procedure, see the maintenance task summary below:

4-29. LIGHTING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-30.	Headlight Unit Replacement	4-58
4-31.	Headlight Unit Adjustment	4-60
4-32.	Blackout Light Maintenance	4-64
4-33.	Front Light Assembly Replacement	4-70
4-34.	Rear Composite Light and Bracket Replacement	4-78
4-35.	Floodlight Sealed Beam Lamp and Door (M936) Replacement	4-90
4-36.	Floodlight (M936) Maintenance	4-92
4-37.	Floodlight Control switch (M936) Maintenance	4-98
4-38.	Main Light Switch Replacement	4-100
4-39.	Headlight Beam Selector Switch Replacement	4-102
4-40.	Warning Signal Lamp Switch Maintenance	4-104
4-41.	Fuel Selector Valve Switch Replacement	4-106
4-42.	Stoplight Switch Replacement	4-108
4-43.	Turn Signal Flasher Replacement	4-110
4-44.	Turn Signal Control and Indicator Lamp Replacement	4-112
4-45.	Trailer Cable Receptacle Cover Replacement	4-114
4-46.	Auxiliary Outlet Socket and Receptacle (M936) Replacement	4-116

4-30. HEADLIGHT UNIT REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	Para 4-25 TM 9-2320-272-10	Battery ground cables disconnected. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Headlamp housing (1)	Three screws (3) and retainer ring (2)	Remove.	
2.		Headlamp (4)	Pull out from head-lamp housing (1).	
3.		Three connectors (5)	Disconnect.	Tag for installation.
4.		Three nuts (9) and lockwashers (8), and headlamp housing (1)	Remove.	Nuts (9) and lockwashers (8) are removed horn inside hood. Discard lockwashers (8).
5.		Three connectors (10)	Disconnect.	Tag for installation.
6.		Three headlamp connectors (7) and grommets (6)	Remove.	

b. Installation

7.		Three grommets (6) and headlamp connectors (7)	Install.	
8.		Three connectors (10)	Connect.	

4-30. HEADLIGHT UNIT REPLACEMENT (Cont'd)

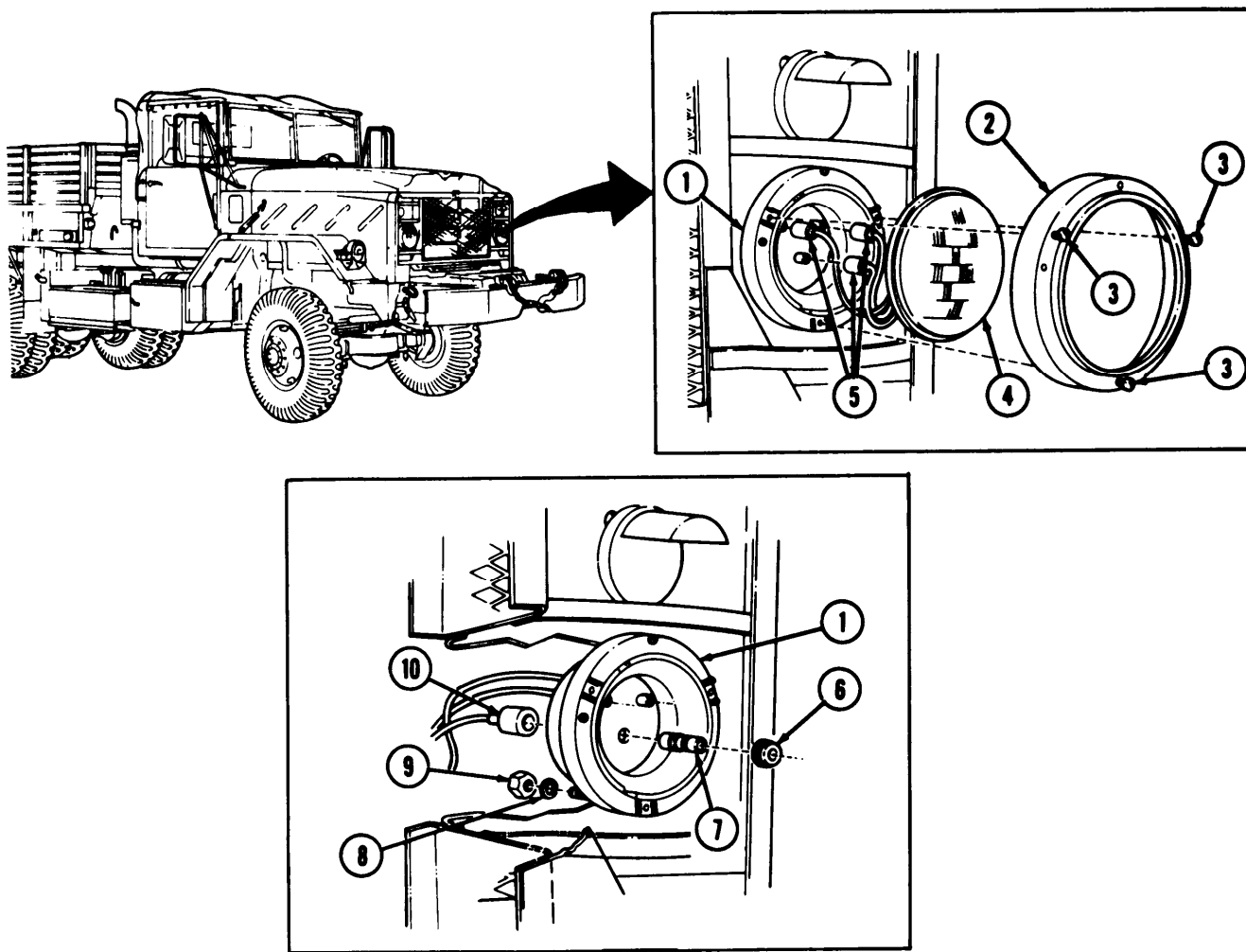
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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- | | | | |
|-----|--|----------------------|--|
| 9. | | Headlamp housing (1) | Install with three new lockwashers (8) and nuts (9). |
| 10. | | Three connectors (5) | Connect. |

NOTE

Make sure the words SEALED BEAM are positioned at bottom of headlamp.

- | | | | |
|-----|--|-------------------|-----------------------------------|
| 11. | | Headlamp (4) | Position in headlamp housing (1). |
| 12. | | Retainer ring (2) | Install with three screws (3). |



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Check headlamps for proper operation (TM 9-2320-272-10).
 - Check adjustment of headlight unit (para. 4-31).

TA 349040

4-31. HEADLIGHT UNIT ADJUSTMENT

This task covers

Adjustment

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Headlamps cleaned. Tires properly inflated.
<u>Test Equipment</u>		
Headlight aiming chart NSN 4910-00-240-7529		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Marking chalk (Appendix D, Item 6) Chalk line (Appendix D, Item 7)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

LOCATION	ITEM	ACTION	REMARKS
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Adjustment

NOTE

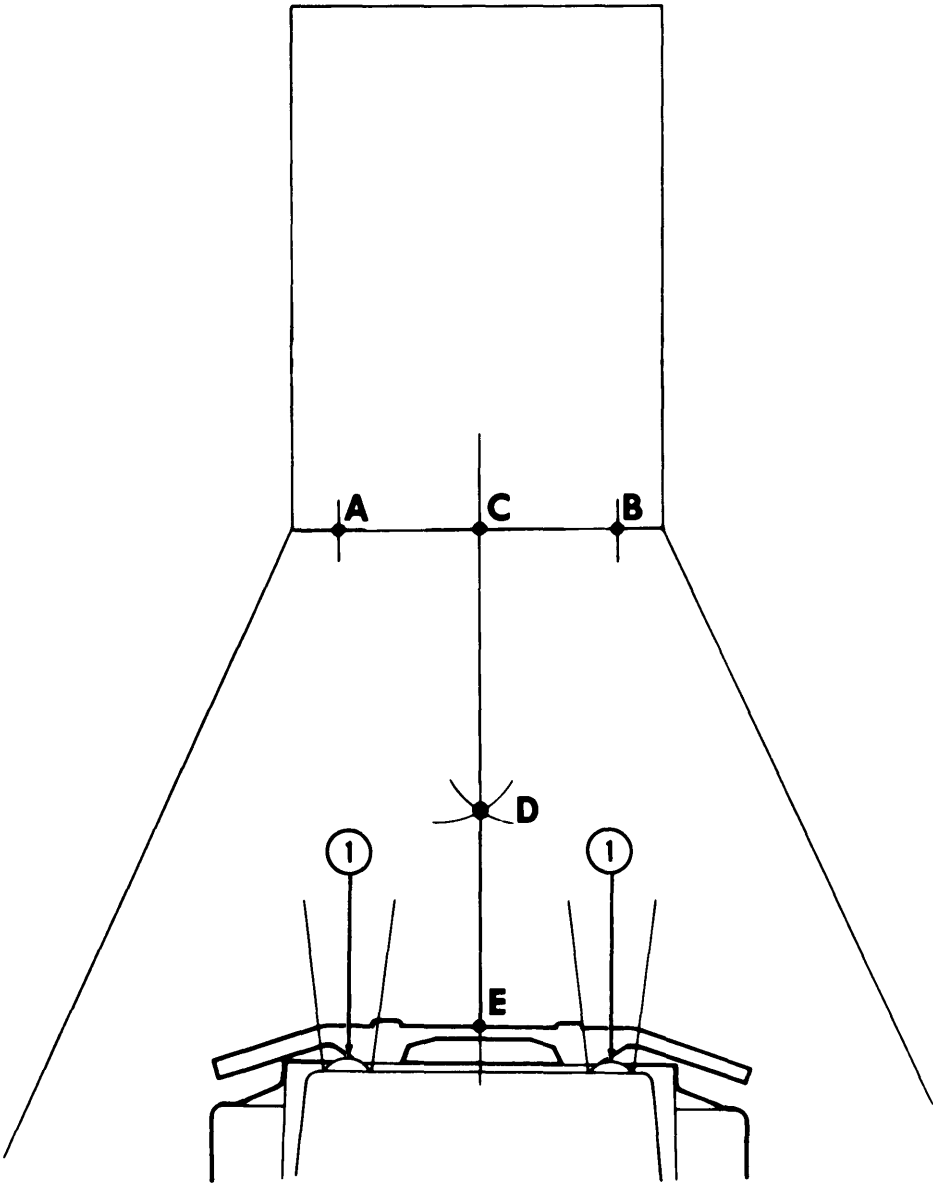
- . Use service headlamp aiming chart for adjustment when available.
- . Make sure vehicle is unloaded.

- | | | |
|----|--------------|---|
| 1. | Headlamp (1) | <p>Adjust as follows:</p> <ol style="list-style-type: none"> a. Mark two A and B points 10 ft (3 m) apart at bottom of wall. b. Mark center point C between A and B. c. Measure 20 ft (6 m) from point A and B and make arcing chalk marks as shown. d. Measure from point C 25 ft (7.6 m) through point D. |
| | | <p>Mark where two arcing lines meet as point D.</p> <p>The 25 ft (7.6 m) mark is point E.</p> |

4-31. HEADLIGHT UNIT ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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e. Position front center of vehicle at point E and measure left and right sides to ensure straight on positioning.



4-31. HEADLIGHT UNIT ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
			f. Measure 27 1/4 in. (70 cm) left from point C and mark as point F.	
			g. Measure 27 1/4 in. (70 cm) right from point C and mark as point G.	
			h. Measure distance (height) of head light center to floor. Mark a line across the wall at this height.	Mark this line as points X-X.
			i. Mark a line Y-Y one-twelfth the distance between line X-X and the floor.	
			j. Draw lines from points F and G on the wall as shown.	Mark where these lines meet line Y-Y as points H and I.
			k. Turn on low beam lights.	

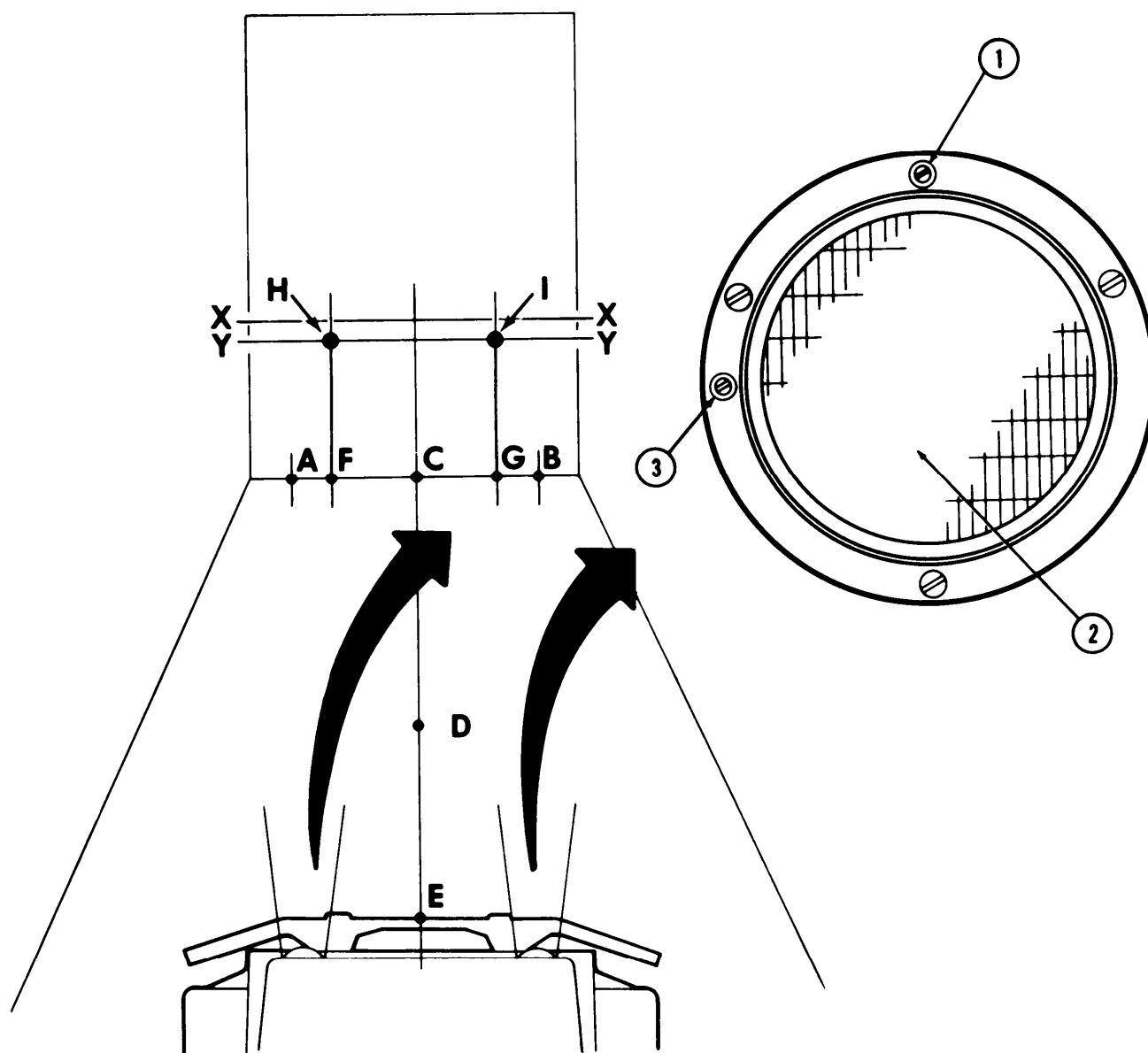
NOTE

Headlamp beam direction is changed by two lamp adjusting screws. Screw (1) adjusts beam direction up and down. Screw (3) adjusts beam direction left and right.

- | | | |
|----|--------------|---|
| 2. | Headlamp (2) | <p>l. Cover one headlamp while adjusting the other.</p> <p>m. Aim the headlamp so the center of the hot spot registers with points H (for left) and I (for right) light.</p> <p>After each headlamp is aimed, check both lights at the same time for proper adjustment.</p> |
|----|--------------|---|

4-31. HEADLIGHT UNIT ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

TA 349042

4-32. BLACKOUT LIGHT MAINTENANCE

This task covers:

- a. Removal

b. Disassembly
- c. Reassembly

d. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25. TM 9-2320-272-10	Parking brake set. Battery ground cables disconnected. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three lockwashers Four locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

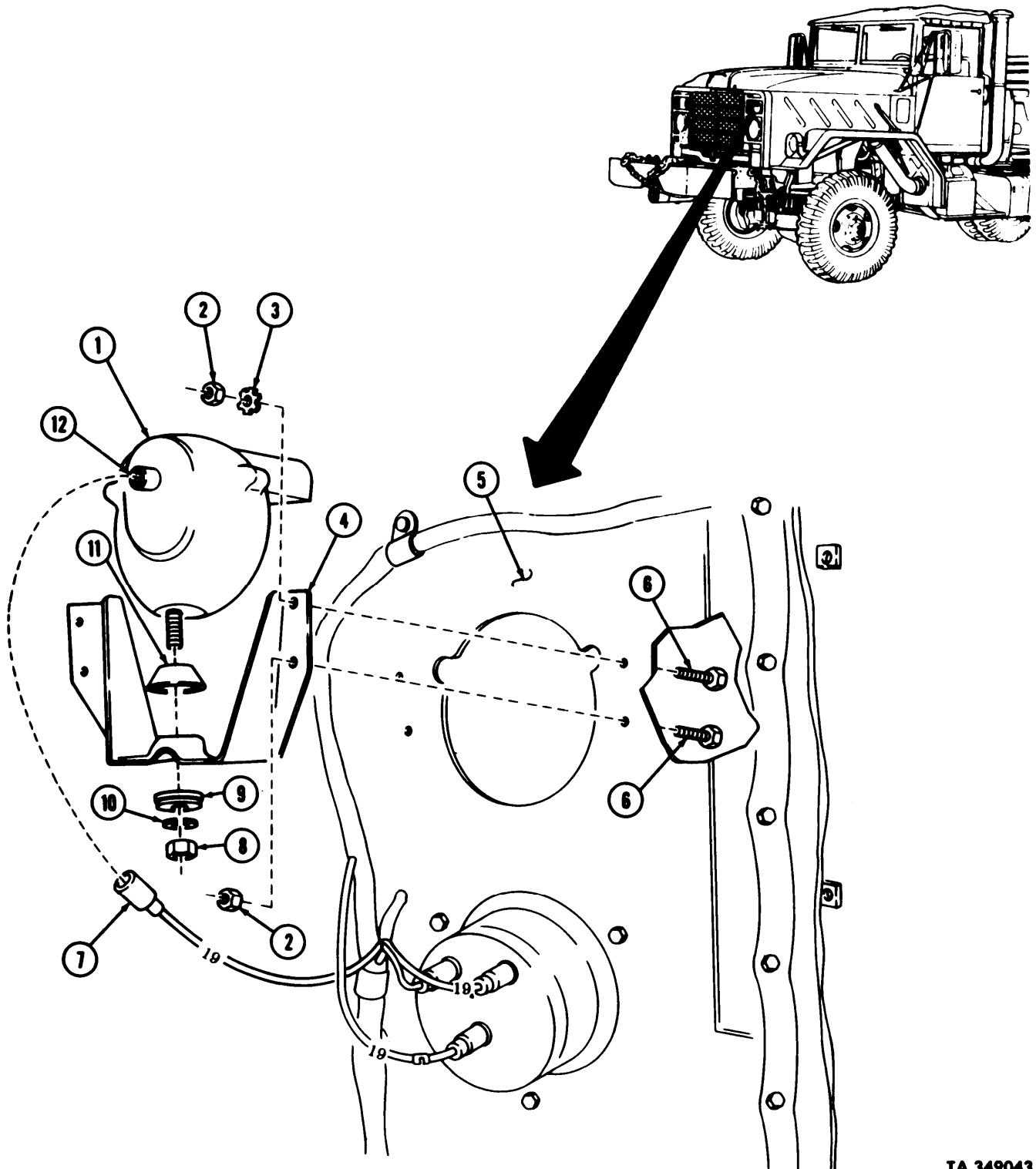
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Blackout light connector (12)	Wire (7)	Disconnect.	
2.	Mounting bracket (4)	Nut (8), lockwasher (10), and adjustment washer (9)	Remove.	Discard lockwasher (10).
NOTE Assistant will help with step 3.				
3.	Hood (5)	Four screws (6) and locknuts (2), lockwasher (3), and mounting bracket (4)	Remove.	Discard lockwasher (3) and locknuts (2).
4.	Mounting bracket (4)	Blackout light (1) and spacer (11)	Remove.	

4-32. BLACKOUT LIGHT MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
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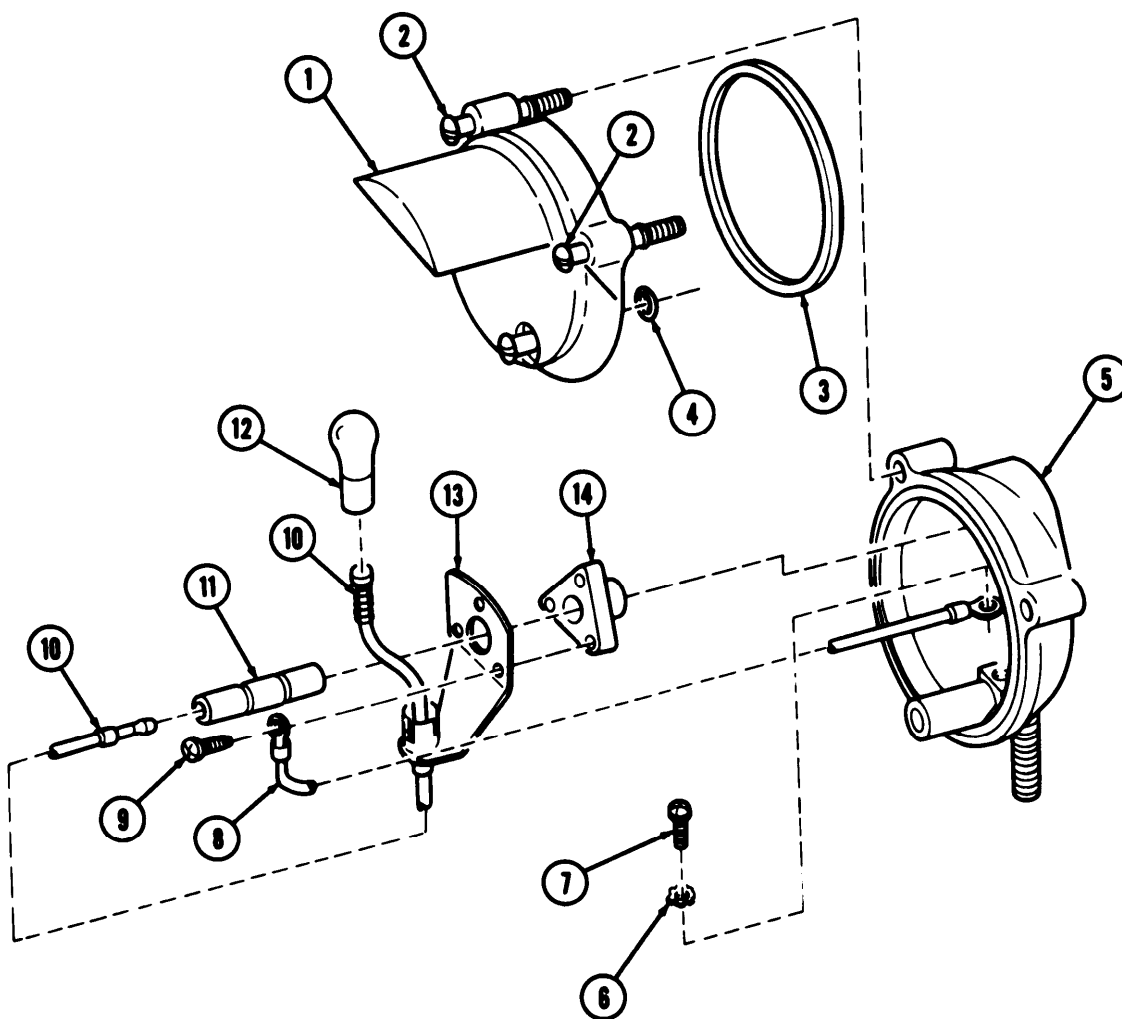
TA 349043

4-32. BLACKOUT LIGHT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Disassembly				
5.	Door (1)	Three screws (2)	Loosen.	
6.	Light housing (5)	Door (1)	Remove.	
7.	Door (1)	Gasket (3) and "O" ring (4)	Remove.	
8.	Light housing (5)	Lamp (12)	Remove.	
9.		Wire (10)	Disconnect from connector (11).	Tag for installation.
10.		Three screws (9), socket (13), and wire (8)	Remove.	
11.		Grommet (14) and connector (11)	Remove.	
12.	Grommet (14)	Connector (11)	Remove.	
13.	Light housing (5)	Screw (7), lockwasher (6), and wire (8)	Remove.	Tag wire (8) for installation. Discard lockwasher (6).
c. Reassembly				
14.		Wire (8)	Install with new lockwasher (6) and screw (7).	
15.		Connector (11)	Install to grommet (14).	
16.		Grommet (14) and connector (11)	Install.	
17.		Socket (13) and wire (8)	Install with three screws (9).	
18.		Wire (10)	Install to connector (11).	
19.		Lamp (12)	Install.	
20.		Gasket (3) and "O" ring (4)	Install.	
21.		Door (1)	Install with three screws (2).	

4-32. BLACKOUT LIGHT MAINTENANCE (Cent'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349044

4-32. BLACKOUT LIGHT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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d. Installation

22.

Blackout light (1) and spacer (10)

Install.

NOTE

Assistant will help with step 23.

23.

Mounting bracket (4)

Install with four screws (6), new lock-washer (3), and four new locknuts (2).

24.

Adjustment washer (8), new lockwasher (9), and nut (7)

Install.

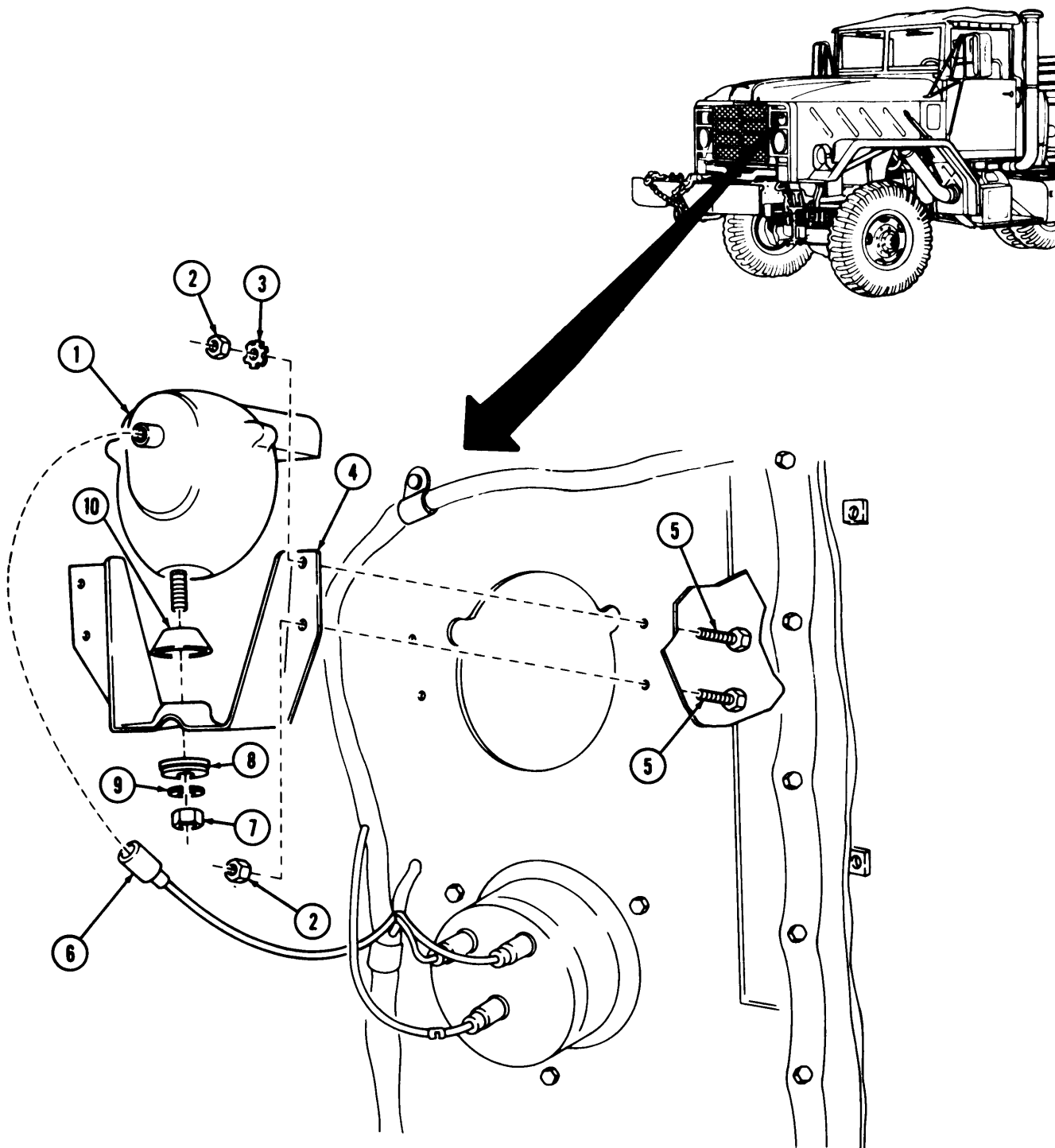
25.

Wire (6)

Connect.

4-32. BLACKOUT LIGHT MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Connect battery ground cables (para. 4-25).
 . Check blackout light for proper operation (TM 9-2320-272-10).

TA 349045

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT

This task covers:

- a. Composite Light Removal
b. Composite Light Installation

- c. Side Marker Light Removal
d. Side Marker Light Installation

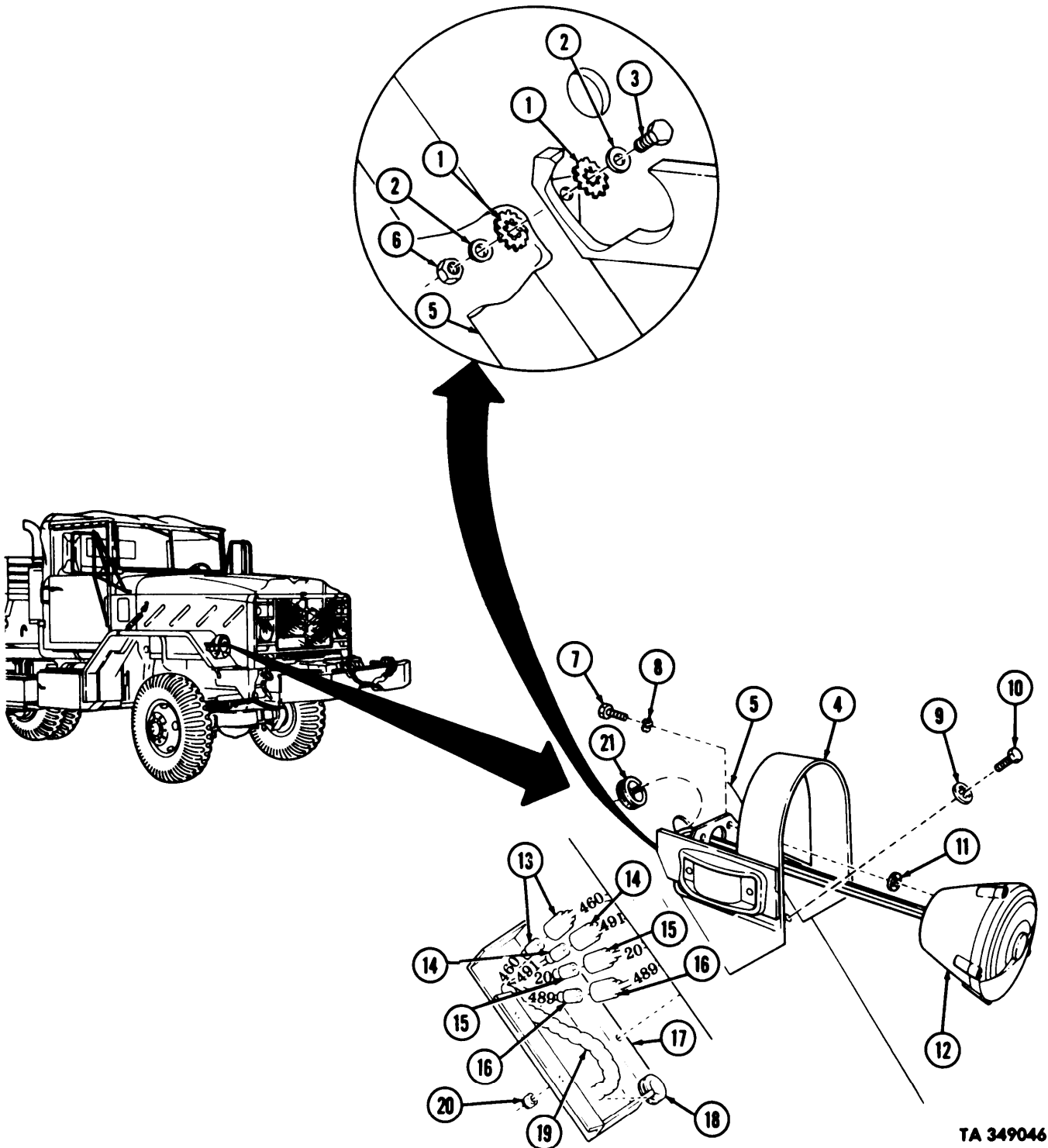
INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected,
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket Eighteen lockwashers Ten locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Composite Light Removal				
1.	Fender (5)	Four locknuts (20), screws (10), and lockwashers (9)	Remove.	Discard locknuts (20) and lockwashers (19).
2.		Wires (13), (14), (15), and (16)	Disconnect.	Tag for installation.
3.	Wiring cover (17)	Grommet (18)	Remove.	
4.	Cable (19)	Wiring cover (17)	Remove.	
5.	Fender (5)	Grommet (21)	Remove.	
6.		Two screws (7), lockwashers (8) and (11), and composite light (12)	Remove.	Discard lockwashers (8) and (11).
7.		Locknut (6), two washers (2) and lockwashers (1), screw (3), and mounting bracket (4)	Remove.	Discard lockwashers (1) and locknut (6).

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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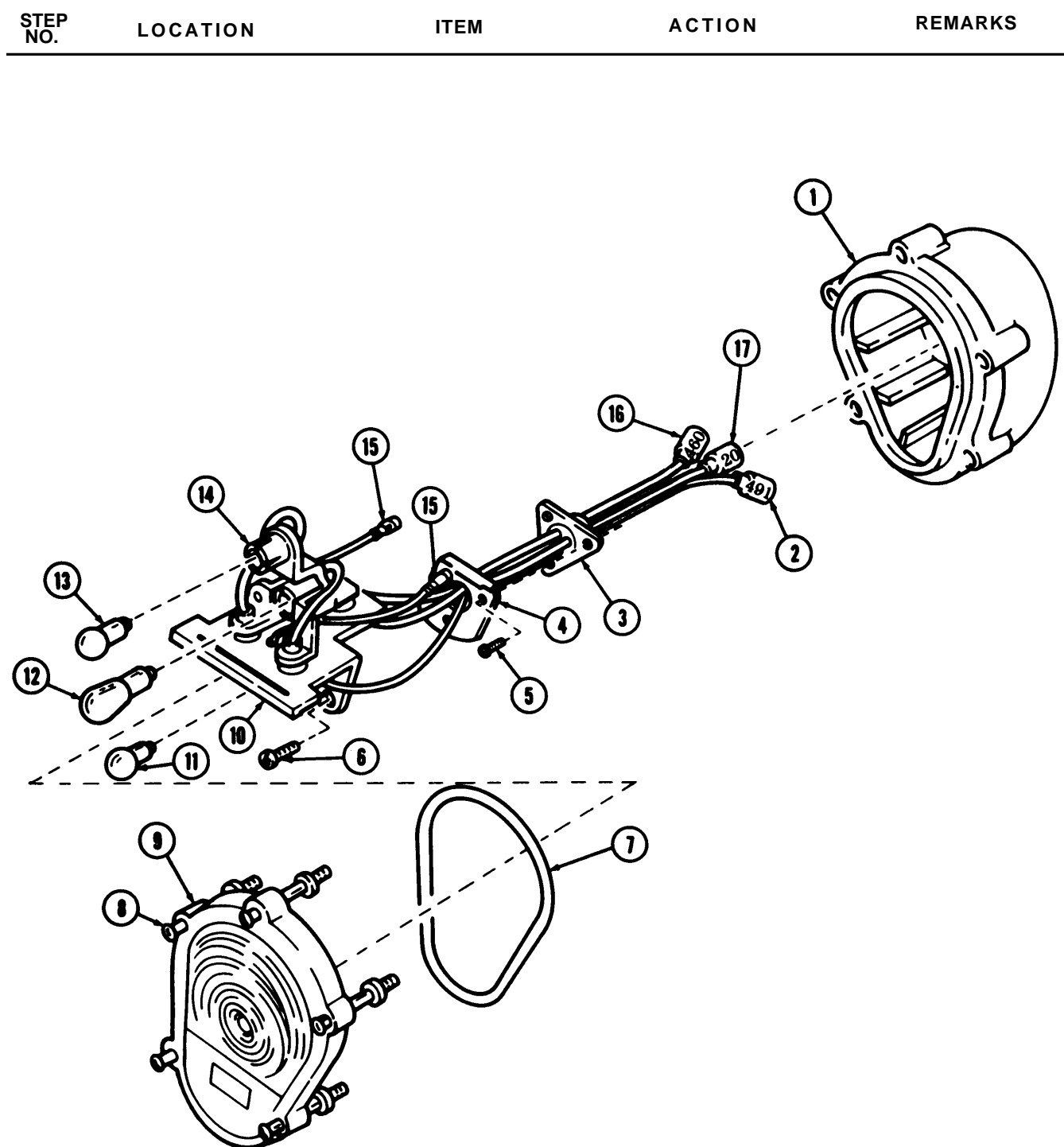
4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)
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STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.	Composite light body (1)	Five screws (8)	Loosen.	
9.		Lens cover (9) and gasket (7)	Remove,	Discard gasket (7).
10.	Lamp holder (14)	Blackout marker lamp (1 1), turn signal lamp (12), and parking lamp (13)	Remove.	
11.		Two screws (6) and bracket (10)	Remove and disconnect two ground wires (15).	
12.		Three screws (5), retaining bracket (4), and grommet (3)	Remove.	

b. Composite Light Installation
--

13.	Grommet (3) and retaining bracket (4)	a. Insert wires (2), (16), and (17) through hole in composite light body (1). b. Install with three screws (5).
14.	Bracket (10)	a. Connect two ground wires (15). b. Install with two screws (6).
15.	Blackout marker lamp (1 1), turn signal lamp (12), and parking lamp (13)	Install.
16.	Lens cover (9) and new gasket (7)	Install with five screws (8).

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

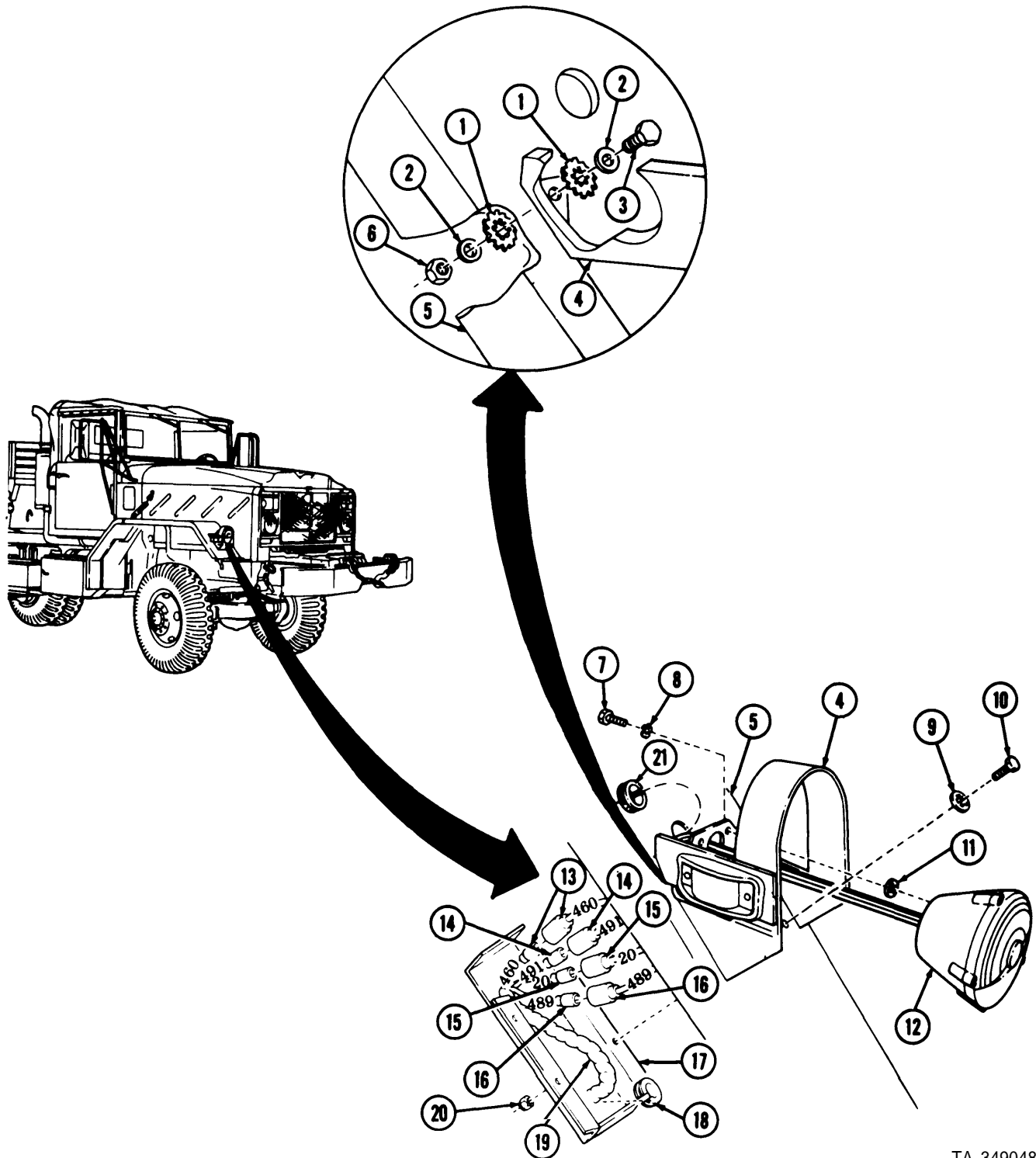


4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
17.		Mounting bracket (4)	Install with screw (3), two washers (2), and new lockwashers (1), and new locknut (6).	
18.		Wires (13), (14), (15), and (16)	Insert through hole in fender (5).	
19.		Grommet (21)	Install.	
20.		Composite light (12)	Install with two new lockwashers (8), new lockwashers (11), and screws (7).	
21.		Wires (13), (14), (15), and (16)	Insert through hole in wiring cover (17) and connect.	
22.		Grommet (18)	Install around cable (19).	
23.		Wiring cover (17)	Install with four screws (10), new lockwashers (9), and new locknuts (20).	

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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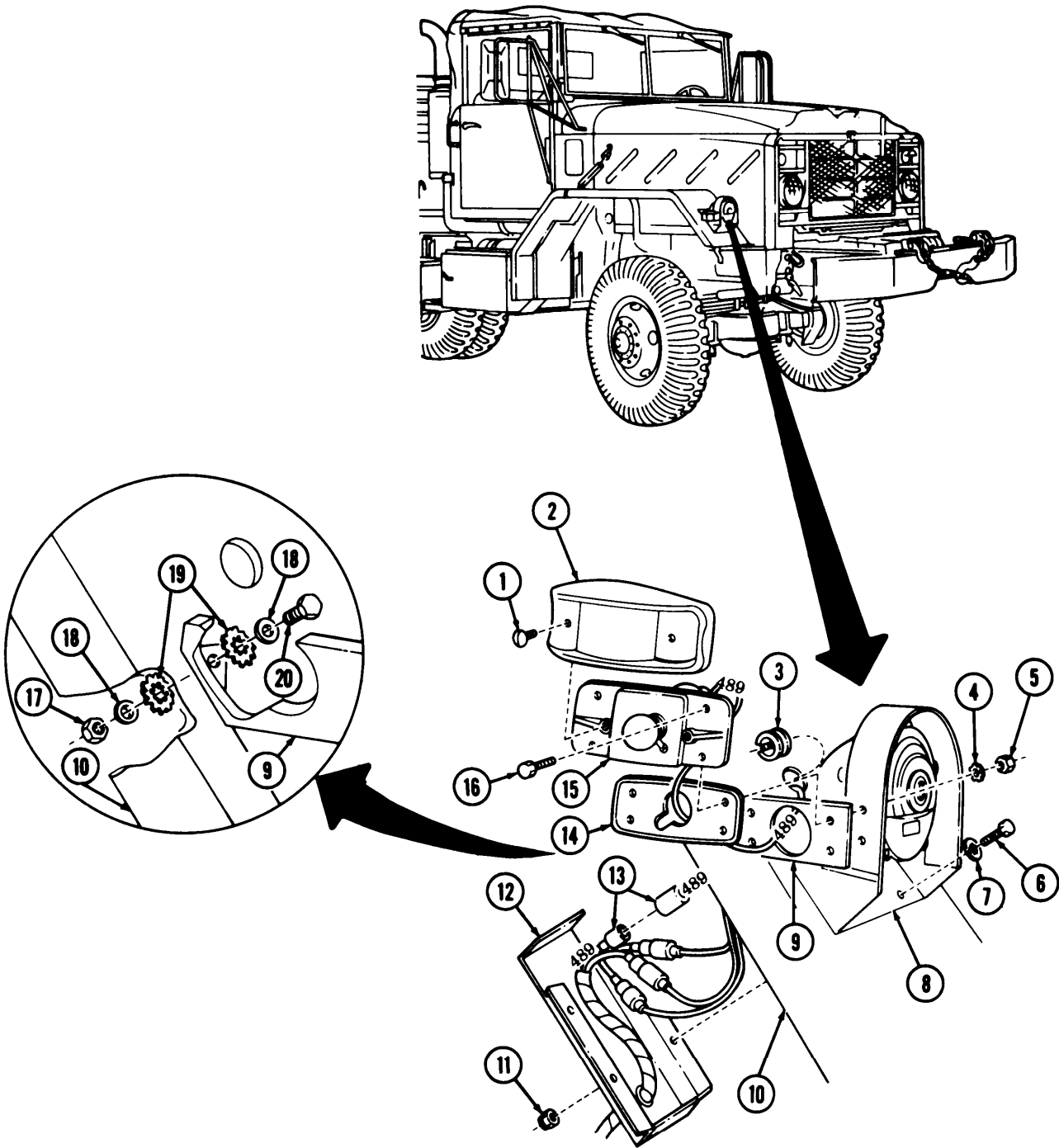
TA 349048

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Side Marker Light Removal				
24.	Top offender (10)	Four locknuts (11), screws (6), lockwashers (7), and wiring cover (12)	Remove.	Discard locknuts (11) and lockwashers (7).
25.	Underside offender (10)	Wire (13)	Disconnect.	Tag for installation.
26.		Grommet (3)	Remove.	
27.	Lamp holder (15)	Two screws (1) and side marker lens cover (2)	Remove.	
28.	Mounting bracket (9)	Four nuts (5), lockwashers (4), screws (16), lamp holder (16), and gasket (14)	Remove.	Discard lockwashers (4).
29.	Hood (8) and top of fender (10)	Locknut (17), two washers (18) and lockwashers (19), screw (20), and mounting bracket (9)	Remove.	Discard two lockwashers (19) and locknut (17).
d. Side Marker Light Installation				
30.		Mounting bracket (9)	Install with screw (20), two washers (18) and new lockwashers (19), and new locknut (17).	
31.		Gasket (14) and lamp holder (15)	Install with four screws (16), new lockwashers (4), and nuts (5).	
32.		Side marker lens cover (2)	Install with two screws (1).	
33.		Wire (13)	Insert through hole in fender (10) and connect.	
34.		Grommet (3)	Install.	
35.		Wiring cover (12)	Install with four screws (6), new lockwashers (7), and new locknuts (11).	

4-33. FRONT LIGHT ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Check operation of front light assembly lamps (TM 9-2320-272-10).

1A 349049

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT

This task covers:

- | | |
|------------------------------|--------------------------------------|
| a. Removal (M923) | g Removal (M931) |
| b. Installation (M923) | h. Installation (M931) |
| c. Removal (M924, M936) | i. Removal (M934) |
| d. Installation (M924, M936) | j. Installation (M934) |
| Removal (M929) | k. Composite Light Lamp Removal |
| f. Installation (M929) | l. Composite Light Lamp Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para, 4-25	Parking brake set, Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Eight lockwashers Thirteen locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal (M923)

NOTE

Left and right composite lights are removed the same way.

- | | | | | |
|----|----------------|--|-------------|-------------------------------|
| 1. | Bracket (1) | Two screw-assembled lockwashers (2), clamp (3), and rear composite light (6) | Remove. | Bracket (1) is not removable. |
| 2. | Four wires (5) | Four connectors (4) | Disconnect. | Tag for installation. |

b. Installation (M923)

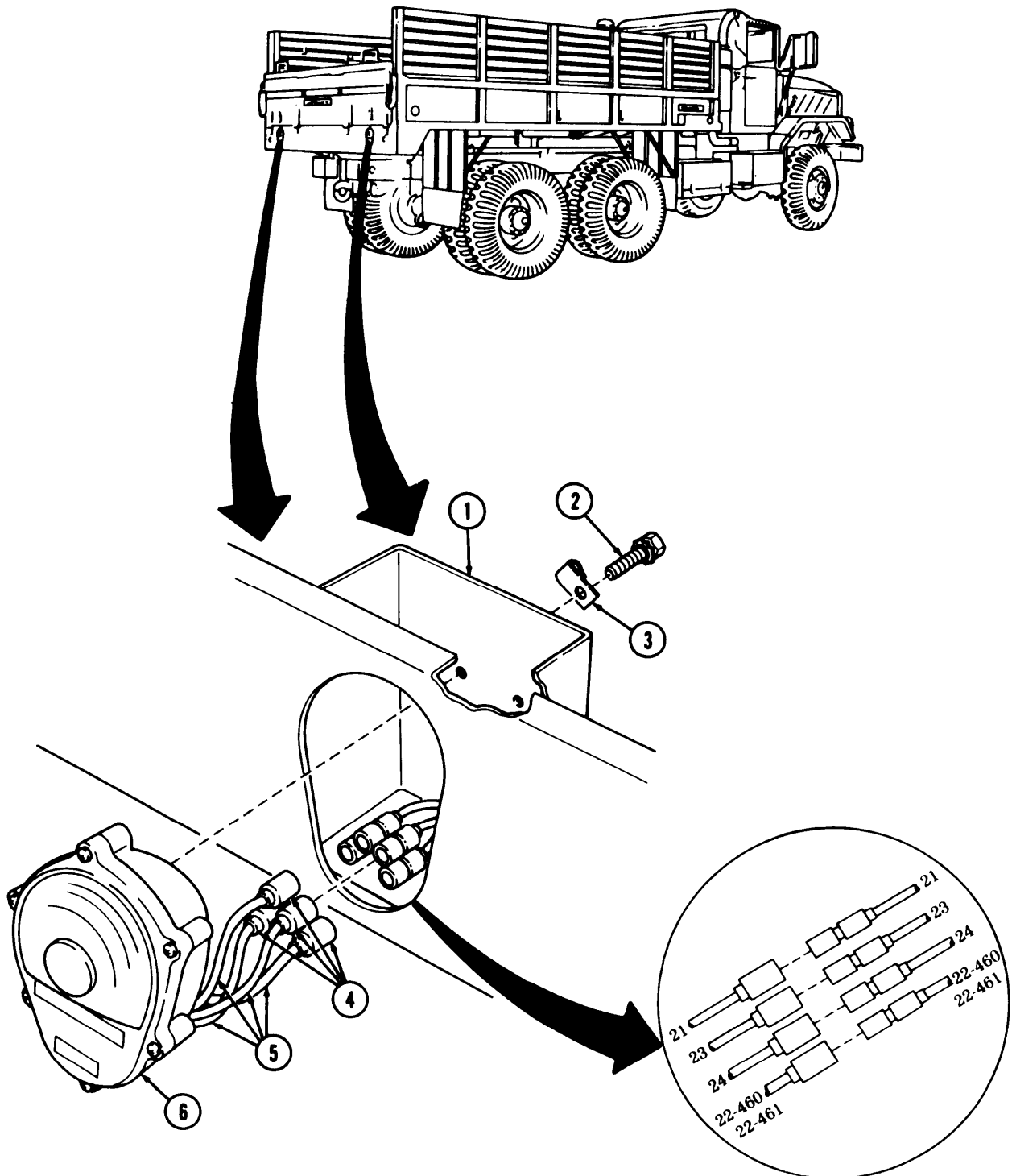
NOTE

Left and right composite lights are installed the same way.

- | | | |
|----|--------------------------|---|
| 3. | Four connectors (4) | Connect. |
| 4. | Rear composite light (6) | Install with two screw-assembled lockwashers (2) and clamp (3), |

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349050

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<hr/> c. Removal (M924, M936) <hr/>				
NOTE				
<ul style="list-style-type: none"> • Left and right composite lights and brackets are removed the same way. • M924 has no ladder bracket. 				
5.	Taillight guard (6)	Two nuts (8), screws (11), and lockwashers (9), and reflector (10)	Remove.	Discard lockwashers (9).
6.	Bracket (15)	Four screws (7) and taillight guard (6)	Remove.	
7.	Four wires (13)	Four connectors (12)	Disconnect.	Tag for installation.
8.	Bracket (15)	Two screw-assembled lockwashers (5) and rear composite light (14)	Remove.	
9.	Ladder bracket (16) or cargo bed (1)	Two locknuts (4), lockwashers (3), and screws (2), and bracket (15)	Remove.	Discard locknuts (4) and lockwashers (3).

d. Installation (M924, M936)

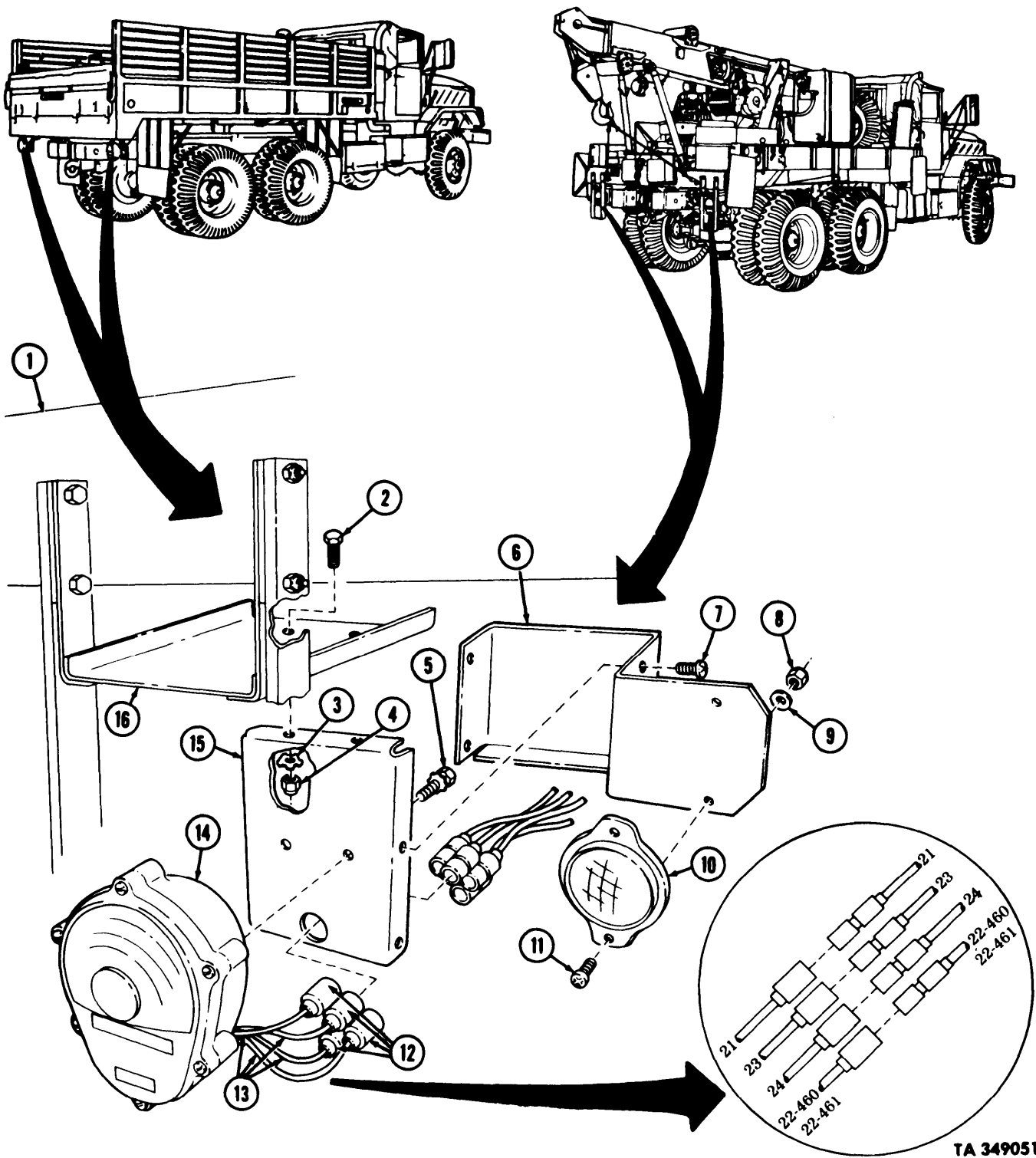
NOTE

Left and right composite light and brackets are installed the same way.

10.	Bracket (15)	Install with two screws (2), new lockwashers (3), and new locknuts (4).
11.	Rear composite light (14)	Install with two screw-assembled lockwashers (5).
12.	Four connectors (12)	Connect.
13.	Taillight guard (6)	Install with four screws (7).
14.	Reflector (10)	Install with two screws (11), new lockwashers (9), and nuts (8).

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

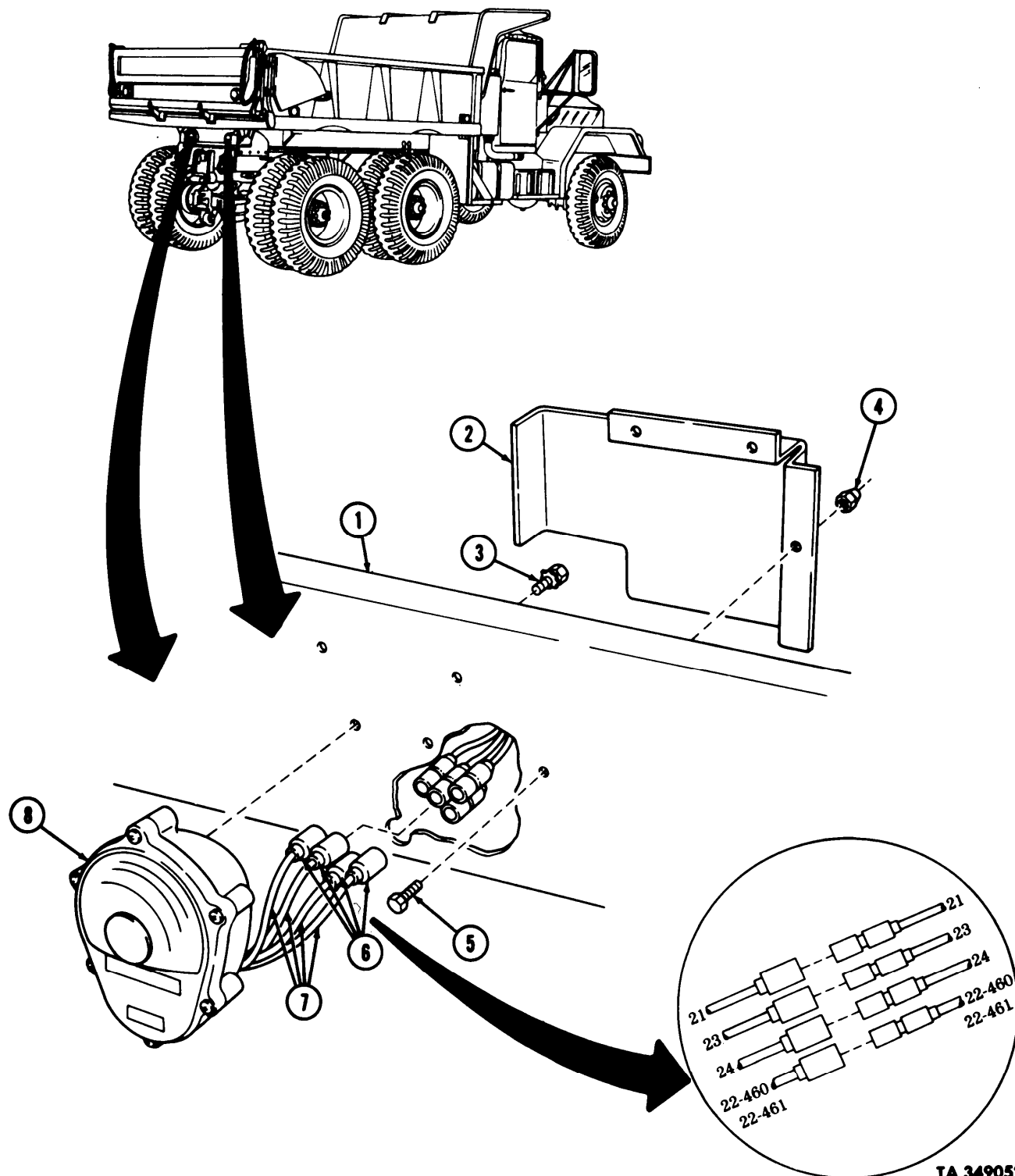
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
e. Removal (M929)				
NOTE				
Left and right composite lights and covers are removed the same way.				
15.	Dump bed (1)	Three locknuts (4) and screws (5), and cover (2)	Remove.	Discard locknuts (4).
16.	Four wires (7)	Four connectors (6)	Disconnect.	Tag for installation.
17.	Dump bed (1)	Two screw-assembled lockwashers (3) and rear composite light (8)	Remove.	

f. Installation (M929)

NOTE				
Left and right composite lights and covers are installed the same way.				
18.		Rear composite light (8)	Install with two screw-assembled lockwashers (3).	
19.		Four connectors (6)	Connect.	
20.		Cover (2)	Install with three screws (5) and new locknuts (4).	

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

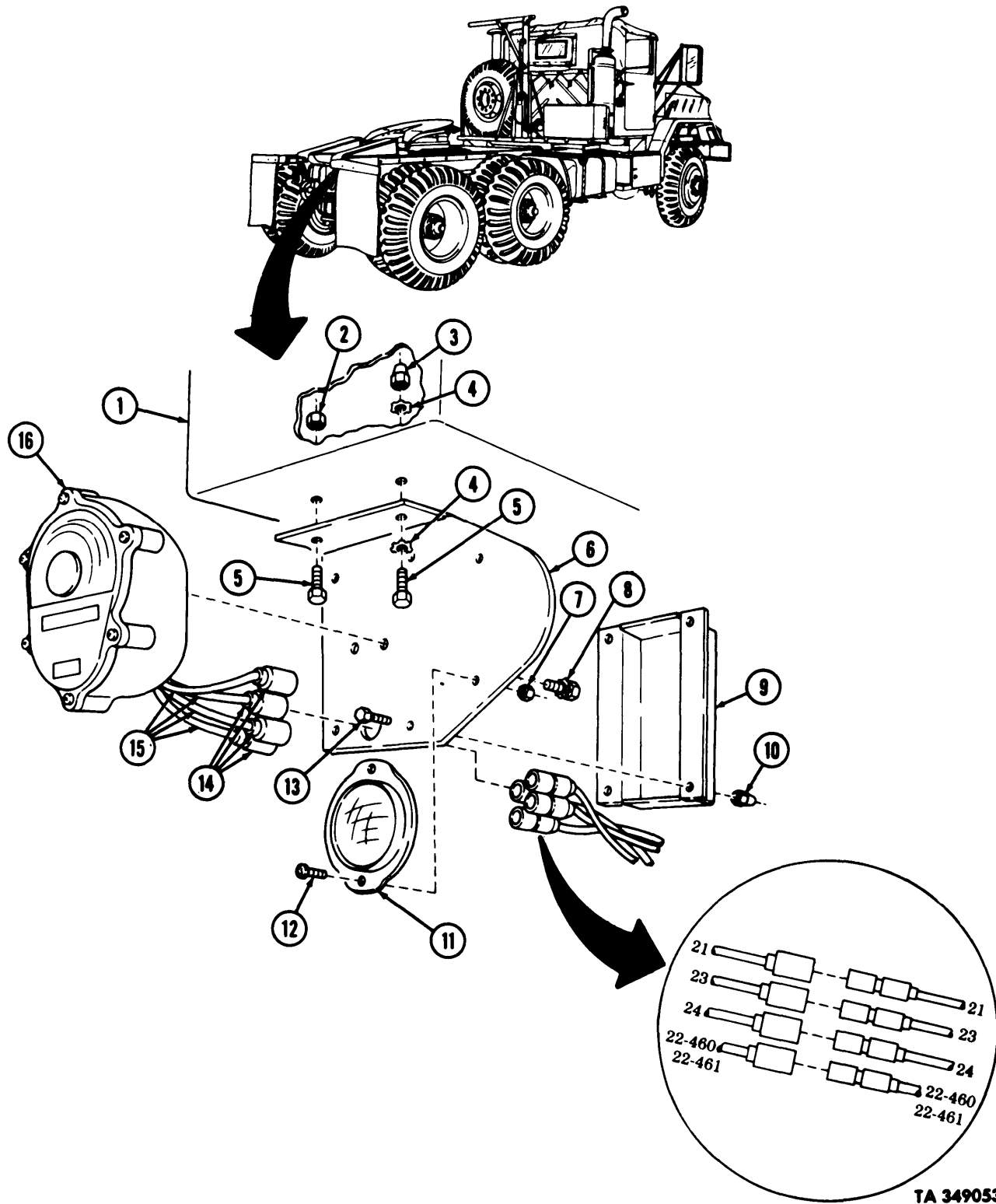
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<hr/>				
g. Removal (M931)				
NOTE				
Left and right composite lights, covers, and brackets are removed the same way.				
21. Bracket (6)		Two locknuts (7) and screws (12), and reflector (11)	Remove.	Discard locknuts (7).
22.		Four locknuts (10) and screws (13), and cover (9)	Remove.	Discard locknuts (10).
23. Four wires (15)		Four connectors (14)	Disconnect.	Tag for installation.
24. Bracket (6)		Two screw-assembled lockwashers (8) and rear composite light (16)	Remove.	Tag for installation.
25. Frame (1)		Nut (2), locknut (3), two lockwashers (4), two screws (5), and bracket (6)	Remove.	discard lockwashers (4) and locknut (3).

h. Installation (M931)

NOTE				
Left and right composite lights, covers, and brackets are installed the same way.				
26.		Bracket (6)	Install with two screws (5) and new lockwashers (4), new locknut (3), and nut (2).	
27.		Rear composite light (16)	Install with two screw-assembled lockwashers (8).	
28.		Four connectors (14)	Connect.	
29.		Cover (9)	Install with four screws (13) and new locknuts (10).	
30.		Reflector (11)	Install with two screws (12) and new locknuts (7).	

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 349053

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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i. Removal (M934)

NOTE

Left and right composite lights, brackets, covers, and braces are removed the same way.

31.	Bracket (9)	Four screws (7) and cover (6)	Remove.	
32.	Four wires (11)	Four connectors (10)	Disconnect.	Tag for installation.
33.	Bracket (9)	Two screw-assembled lockwashers (5) and rear composite light (15)	Remove.	
34.	Brace (2)	Locknut (12), nut (8), two lockwashers (4) and two screws (3), and bracket (9)	Remove.	Discard locknut (12) and lockwashers (4).
35.	Frame rail (1)	Two nuts (14) and screws (13), and brace (2)	Remove.	

j. Installation (M934)

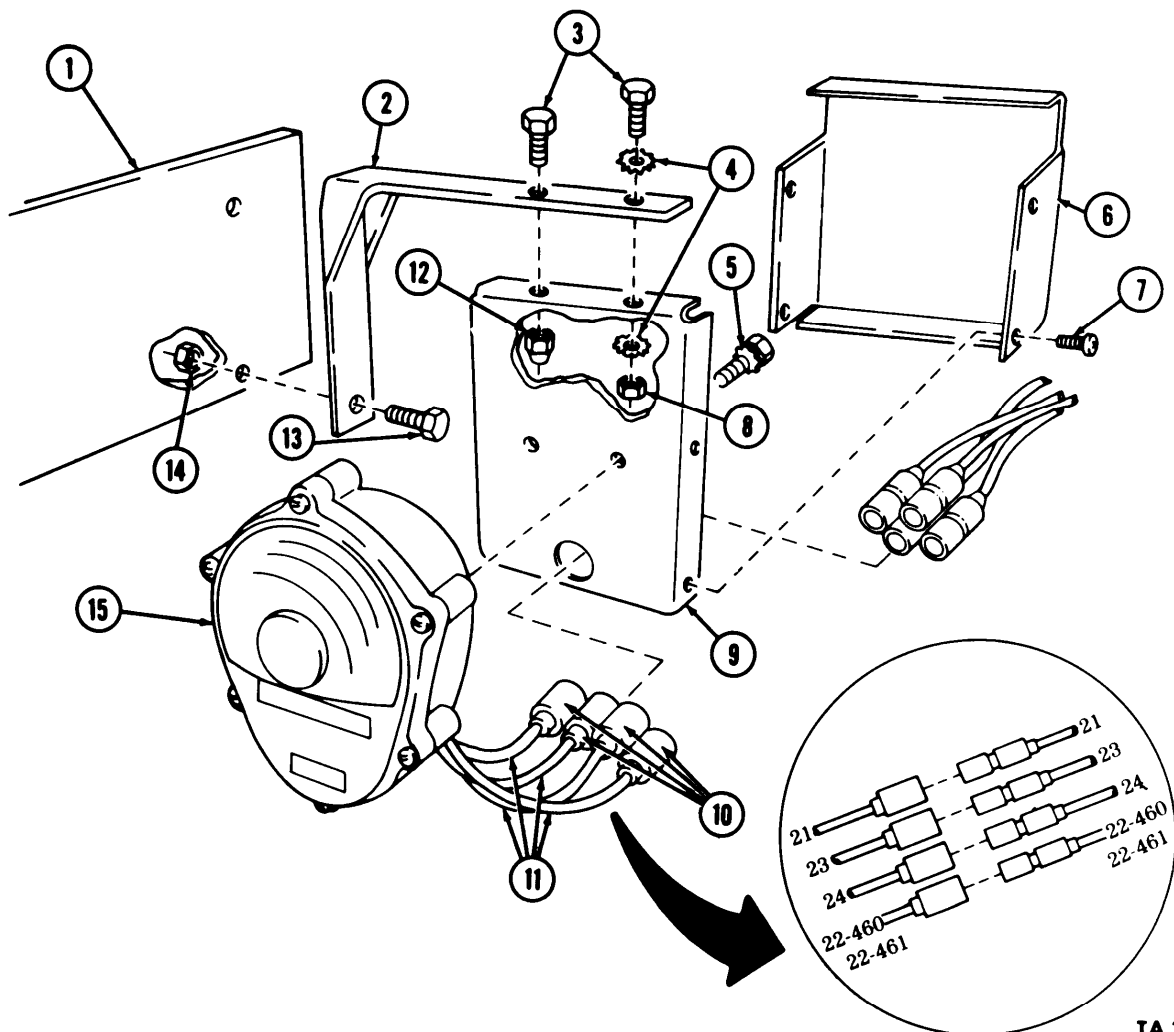
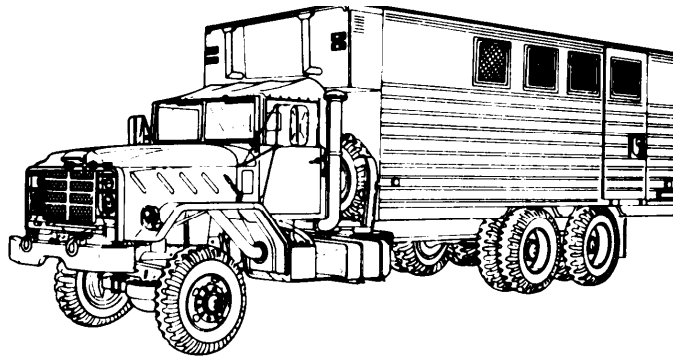
NOTE

Left and right composite lights, brackets, covers, and braces are installed the same way.

36.		Brace (2)	Install with two screws (13) and nuts (14).	
37.		Bracket (9)	Install with two screws (3) and lockwashers (4), nut (8), and new locknut (12).	
38.		Rear composite light (15)	Install with two screw-assembled lockwashers (5).	
39.		Four connectors (10)	Connect.	
40.		Cover (6)	Install with four screws (7).	

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP	LOCATION	ITEM	ACTION	REMARKS
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TA 349054

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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k. Composite Light Lamp Removal**NOTE**

Composite light is off the vehicle during steps 41 through 43.

41.	Composite light body (4)	Six screws (8)	Loosen.
42.		Composite light door (1) and seal (7)	Remove.
43.		Stoplight lamp (5), blackout marker lamp (6), turn signal lamp (2), and parking lamp (3)	Remove.

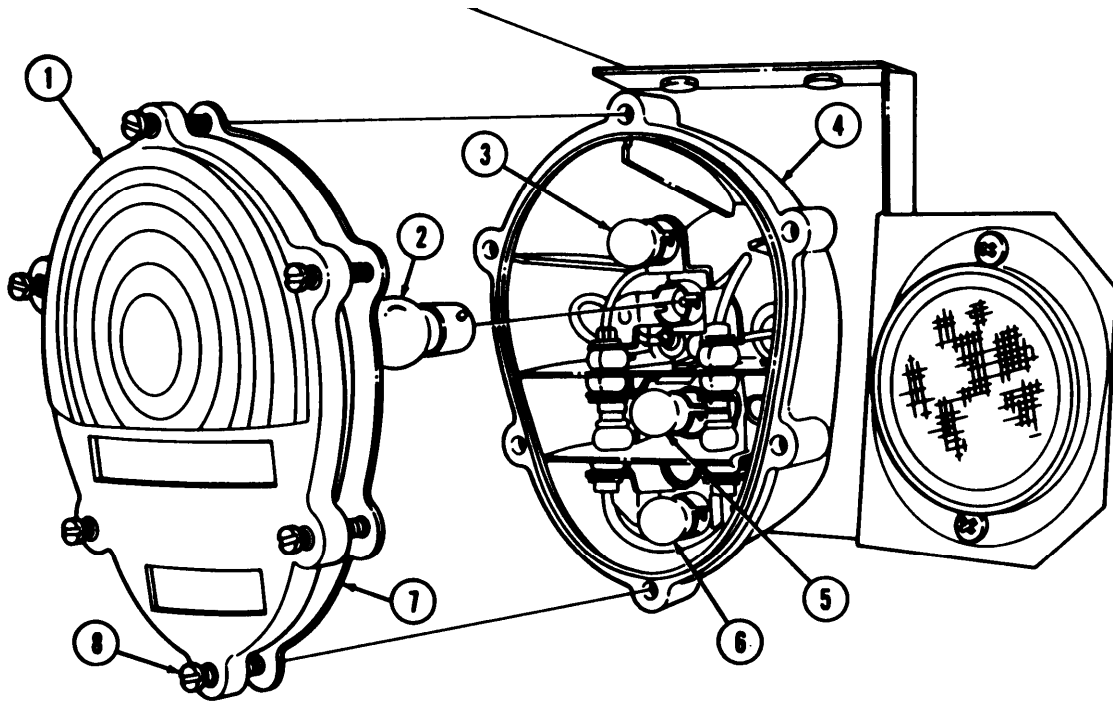
1. Composite Light Lamp Installation**NOTE**

Composite light is off the vehicle during steps 44 and 45.

44.		Stoplight lamp (5), blackout marker lamp (6), turn signal lamp (2), and parking lamp (3)	Install.
45.		Seal (7) and light door (1)	Install with six screws (8).

4-34. REAR COMPOSITE LIGHT AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS
- Connect battery ground cables (para 4-25).
 - Check rear composite light for proper operation (TM 9-2320-272-10).

TA 349055

4-35. FLOODLIGHT SEALED BEAM LAMP AND DOOR (M936) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Lamp door retaining clips are removed and installed under pressure.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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w o n

All floodlight sealed beam lamps and doors are removed and installed the same way.

a. Removal

- | | | | |
|----|----------------------|--|-----------|
| 1. | Lamp door (4) | Three screws (1) and retaining rings (2) | Remove. |
| 2. | Lamp housing (3) | Lamp door (4) | Separate. |
| 3. | Sealed beam lamp (6) | Two screws (7) and wires (8) | Remove. |

WARNING

Lamp door retaining clips are under great tension and must be removed with firm grip, or injury to personnel may result.

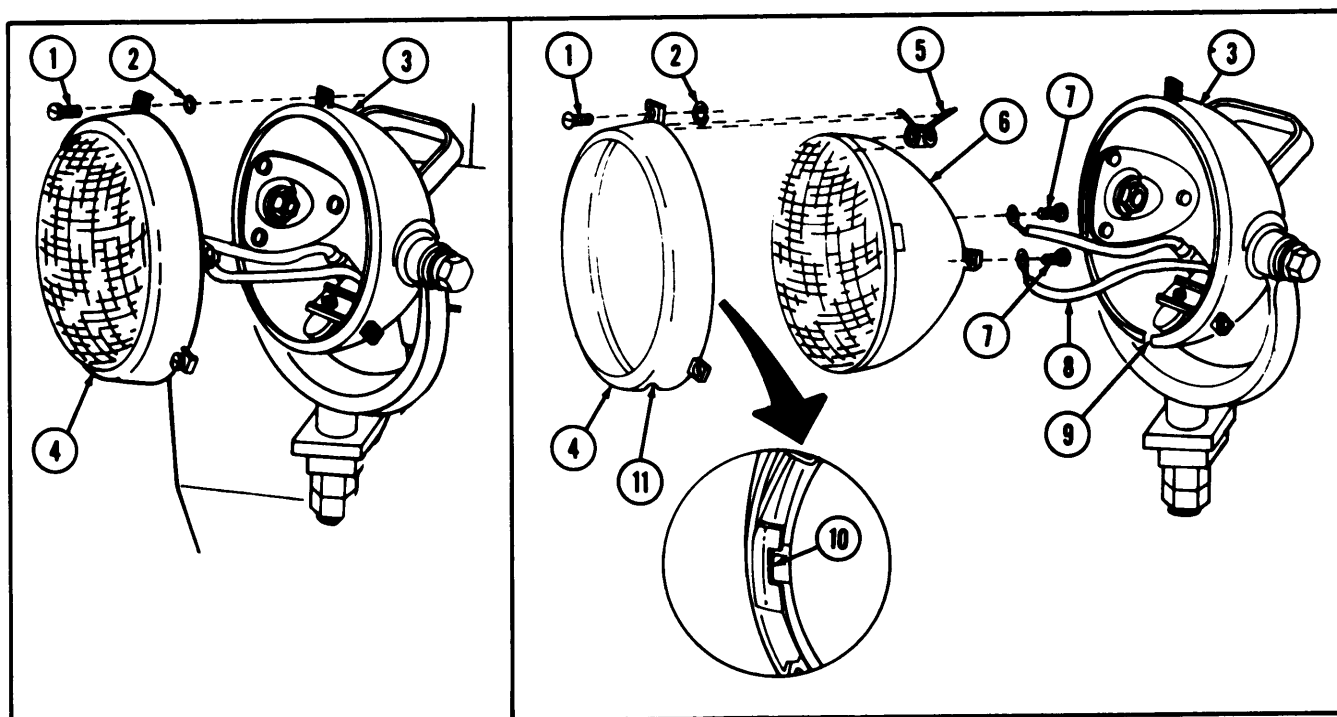
- | | | | | |
|----|---------------|--------------------------|---------|---------------------------------|
| 4. | Lamp door (4) | Four retaining clips (5) | Remove. | Note position for installation. |
| 5. | | Sealed beam lamp (6) | Remove. | |

b. Installation

- | | | | |
|---|----------------------|---------------------------|---|
| 6 | Sealed beam lamp (6) | Install in lamp door (4). | Aline lamp (6) with notch (10) on door (4). |
|---|----------------------|---------------------------|---|

4-35. FLOODLIGHT SEALED BEAM LAMP AND DOOR (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
7.		Four retaining clips (5)	Install.	
8.		Two wires (8)	Connect to lamp (6) with two screws (7).	
9.		Lamp door (4)	Install to lamp housing (3) with three screws (1) and retaining rings (2).	Align drain hole (11) in door (4) with notch (9) in lamp housing (3).



END OF TASK!

FOLLOW-ON TASKS: I Connect battery ground cables (para. 4-25).
 . Check floodlight for proper operation (TM 9-2320-272-10).

TA 3490S6

4-36. FLOODLIGHT (M936) MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Reassembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	Para 4-35	Floodlight sealed beam lamp and door (M936) removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Four lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

All floodlights are maintained in the same way.

a. Removal

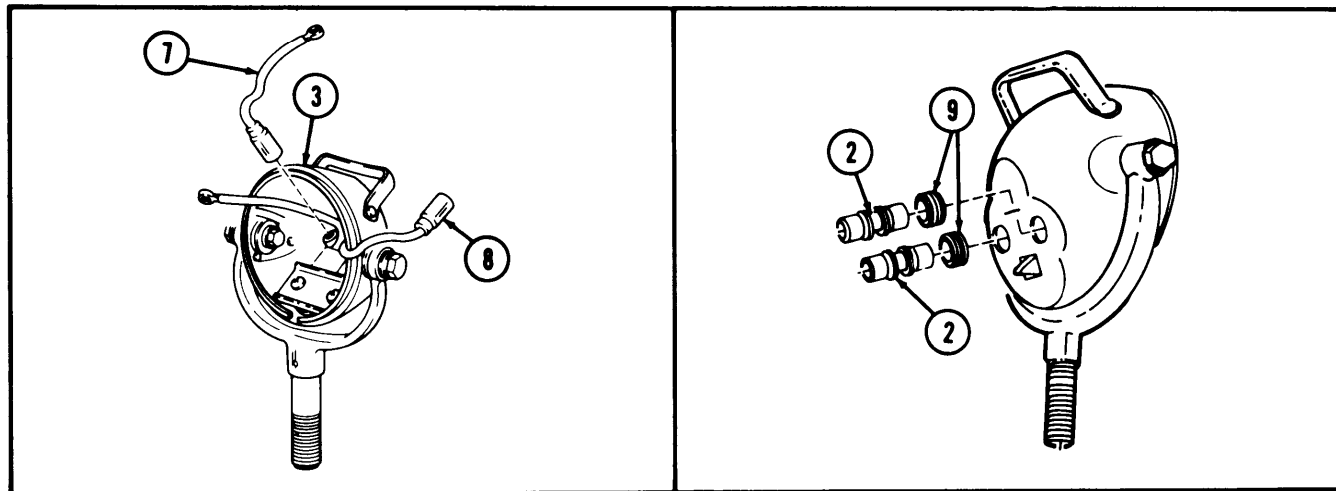
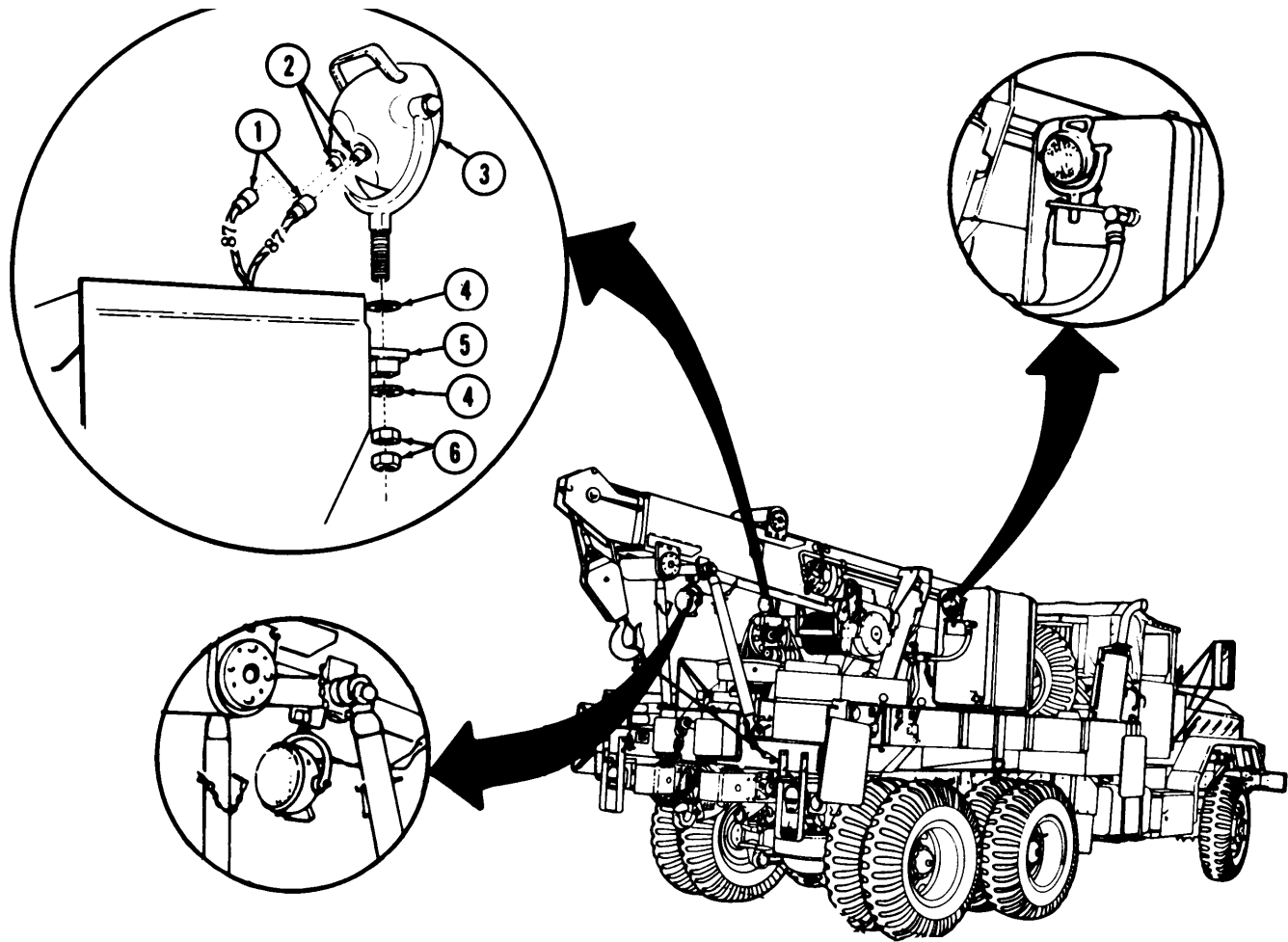
- | | | | | |
|----|------------------------|---|-------------|-----------------------|
| 1. | Two connectors (2) | Two wires (1) | Disconnect. | Tag for installation. |
| 2. | Floodlight bracket (5) | Floodlight housing (3), two washers (4), and two nuts (6) | Remove. | |

b. Disassembly

- | | | | | |
|----|------------------------|-------------------------------------|-------------|-----------------------|
| 3. | Floodlight housing (3) | Switch wire (8) and lamp wire (7) | Disconnect. | Tag for installation, |
| 4. | | Two connectors (2) and grommets (9) | Remove. | |

4-36. FLOODLIGHT (M936) MAINTENANCE (Cont'd)

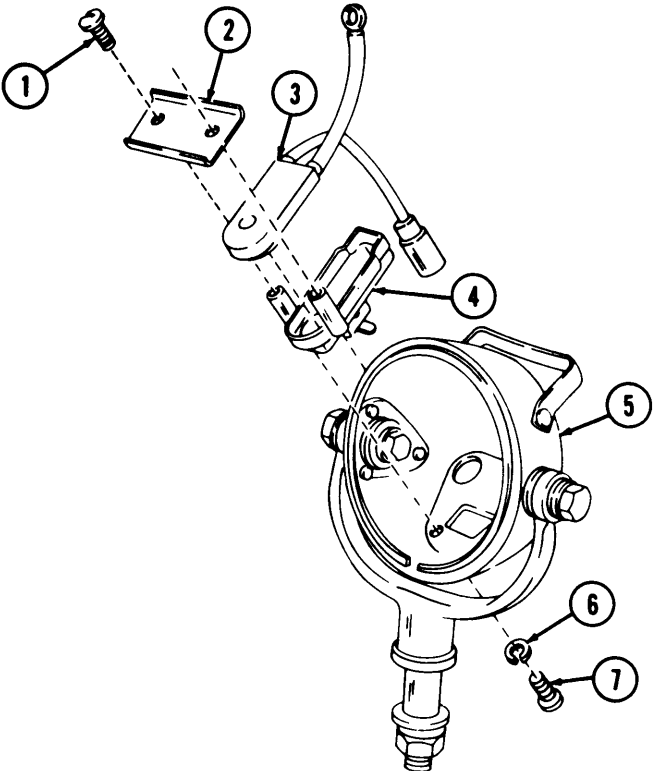
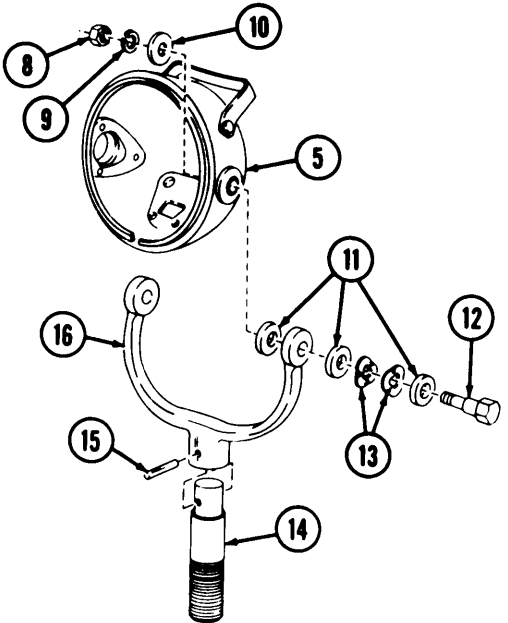
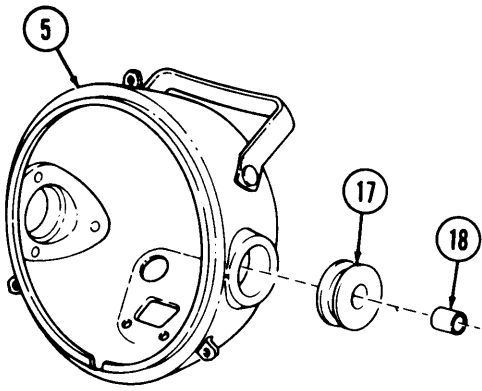
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4-36. FLOODLIGHT (M936) MAINTENANCE (Cont'd)

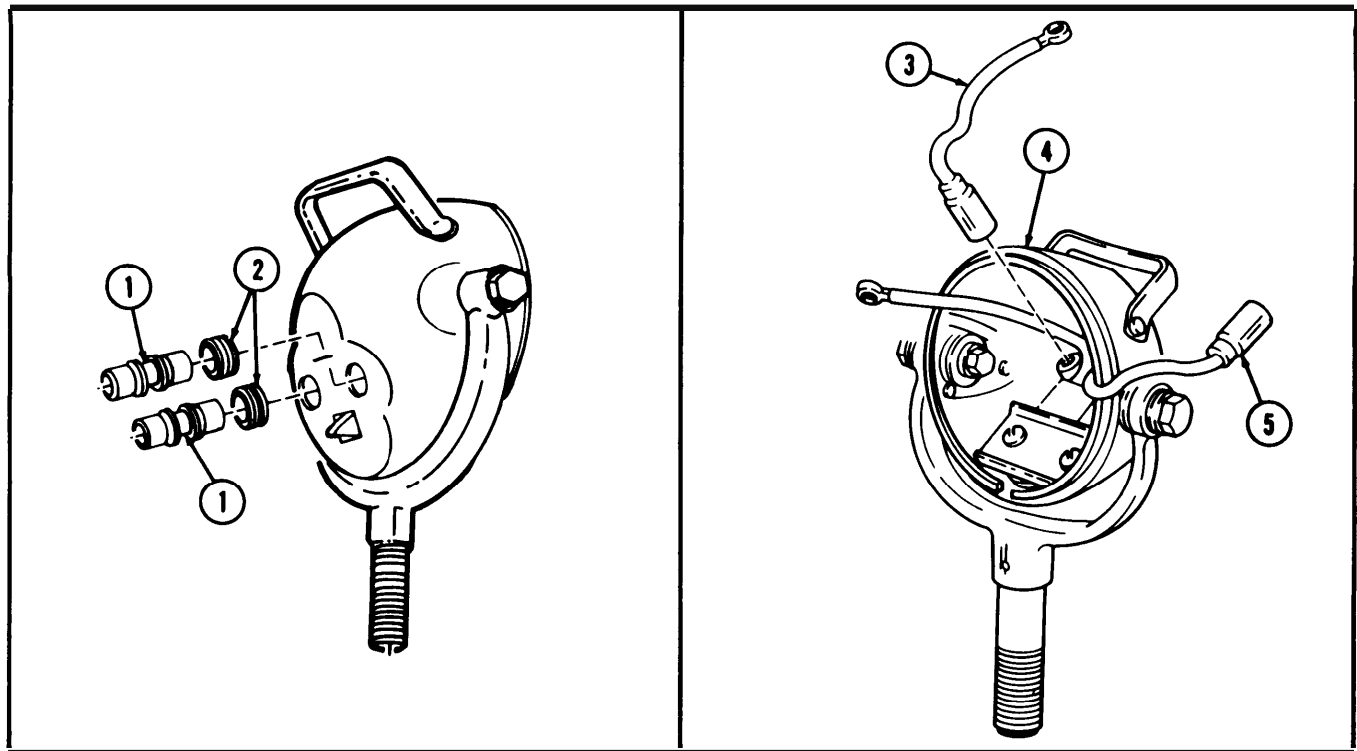
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.	Floodlight housing (5)	Two screws (1), retain- er (2), and pressure switch (3)	Remove.	
6.		Two screws (7) and lockwashers (6), and switch housing (4)	Remove.	Discard lockwashers (6).
7.		Two nuts (8) and lock- washers (9), and washers (10)	Remove.	Discard lockwashers (9).
8.	Mounting bracket (16)	Two bolts (12), six washers (11), four spring washers (13), and floodlight housing (5)	Remove.	
9.		Pin (15) and stud (14)	Remove.	
10.	Floodlight housing (5)	Two spacers (18) and grommets (17)	Remove.	
<hr/> c. Reassembly <hr/>				
11.		Two grommets (17) and spacers (18)	Install.	
12.		Stud (14)	Install with pin (15).	
13.		Floodlight housing (5)	Install with six washers (11), four spring washers (13), and two bolts (12),	
14.		Two washers (10), new lockwashers (9), and nuts (8)	Install,	
15.		Switch housing (4)	Install with two new lockwashers (6) and screws (7).	
16.		Pressure switch (3)	Install with retainer (2) and two screws (1).	

4-36. FLOODLIGHT (M936) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				
				

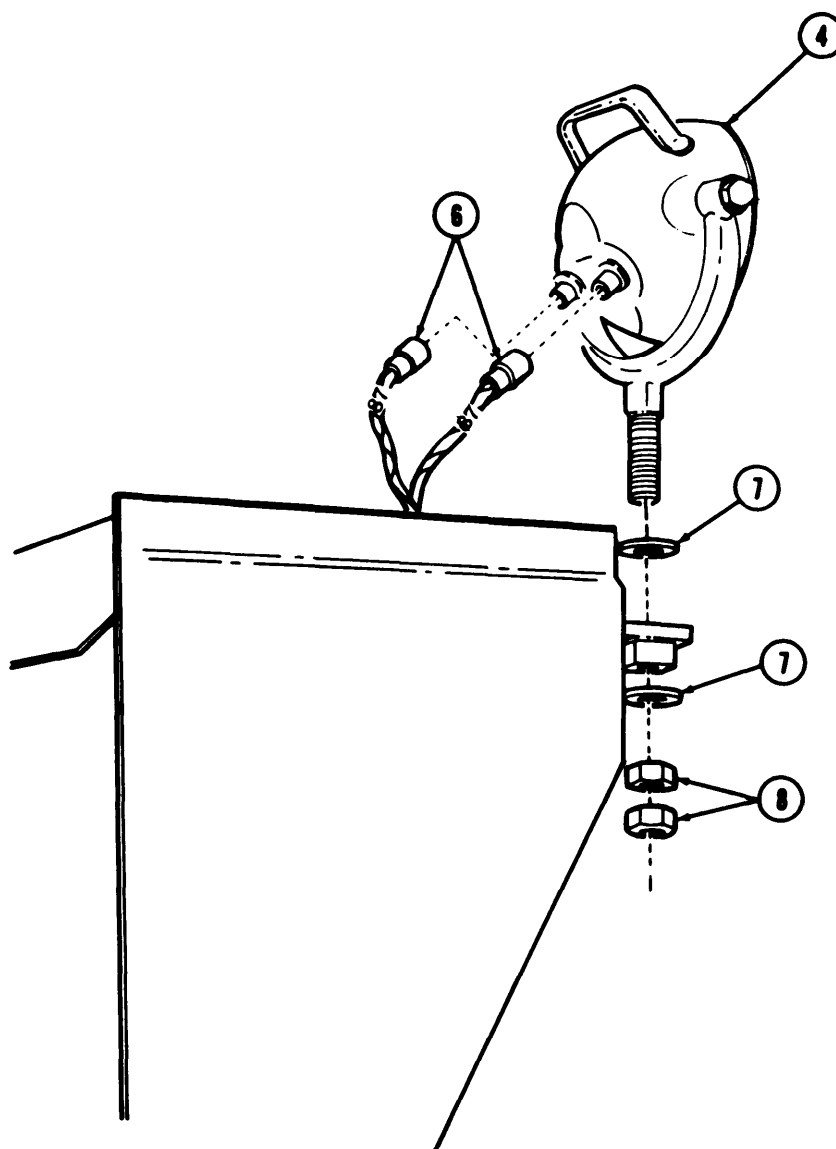
4-36. FLOODLIGHT (M936) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
17.		Two grommets (2) and connectors (1)	Install.	
18.		Lamp wire (3) and switch wire (5)	Connect.	
d. Installation				
19.		Floodlight housing (4)	Install with two washers (7) and nuts (8).	
20.		Two wires (6)	Connect.	



4-36. FLOODLIGHT (M936) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS
- Install floodlight sealed beam lamp and door (M936) (para. 4-35).
 - Connect battery ground cables (para 4-25).
 - Check floodlight for proper operation (TM 9-2320-272-10).

TA 349060

4-37. FLOODLIGHT CONTROL SWITCH (M936) MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | d. Reassembly |
| b. Disassembly | e. Installation |
| c. Inspection | |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts Lockwasher		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

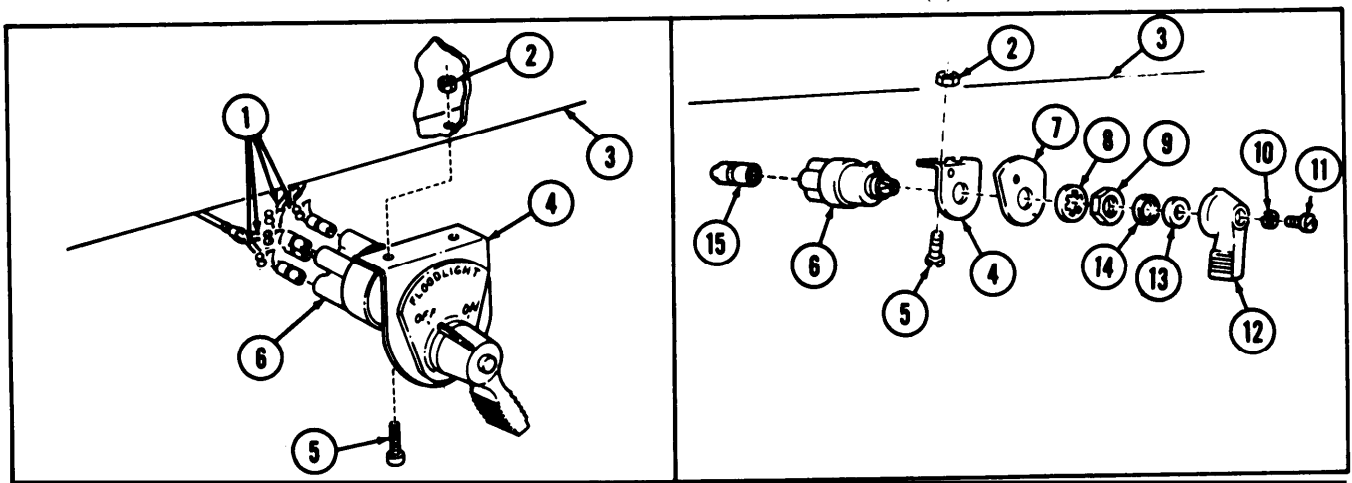
- | | | | | |
|----|---|--|--|-----------------------|
| 1. | Floodlight control switch angle bracket (4) to instrument panel (3) | Two mounting screws (5) and locknuts (2) | Remove, and lower floodlight control switch (6). | Discard locknuts (2). |
| 2. | | Four connectors (1) | Disconnect from floodlight control switch (6). | Tag for installation. |
| 3. | | Floodlight switch (6) | Remove. | |

b. Disassembly

- | | | | | |
|----|-----------------------|--|---------|-------------------------|
| 4. | Floodlight switch (6) | Screw (11), lockwasher (10), switch lever (12), washer (13), and felt washer (14) | Remove. | |
| 5. | | Nut (9), lockwasher (8), identification plate (7), angle bracket (4), and shell (15) | Remove. | Discard lockwasher (8). |

4-37. FLOODLIGHT CONTROL SWITCH (M936) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Inspection				
6.		Floodlight control switch (6)	Inspect for breaks and cracks in housing of floodlight control switch (6).	Discard if broken or cracked.
7.		Switch lever (12)	Inspect for breaks and cracks.	Discard if broken or cracked.
d. Reassembly				
8.		Shell (15), angle bracket (4), identification plate (7), new lockwasher (8), and nut (9)	Install on floodlight control switch (6).	
9.		Felt washer (14), washer (13), switch lever (12), lockwasher (10), and screw (11)	Install on floodlight control switch (6).	
e. Installation				
10.		Two new locknuts (2) and screws (5), floodlight control switch (6), and angle bracket (4)	Install on instrument panel (3).	
11.		Four connectors (1)	Connect on floodlight control switch (6).	



END OF TASK!

FOLLOW-ON TASKS:

- Connect battery ground cables (para 4-25).
- Check operation of floodlight control switch (TM 9-2320-272-10).

TA349061

4-38. MAIN LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Three lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Two different types of light switches are used.

a. Removal

1.	Main light switch (1)	Three screws (8), lockwashers (7), switch levers (6), and washers (5)	Remove.	Discard lockwashers (7).
2.		Four screws (4)	a Remove. b. Push light switch (1) through instrument panel (3).	Switch (1) is removed from behind instrument panel (3).
3.		Harness connector (2)	Disconnect.	Connector (2) is located behind instrument panel (3).

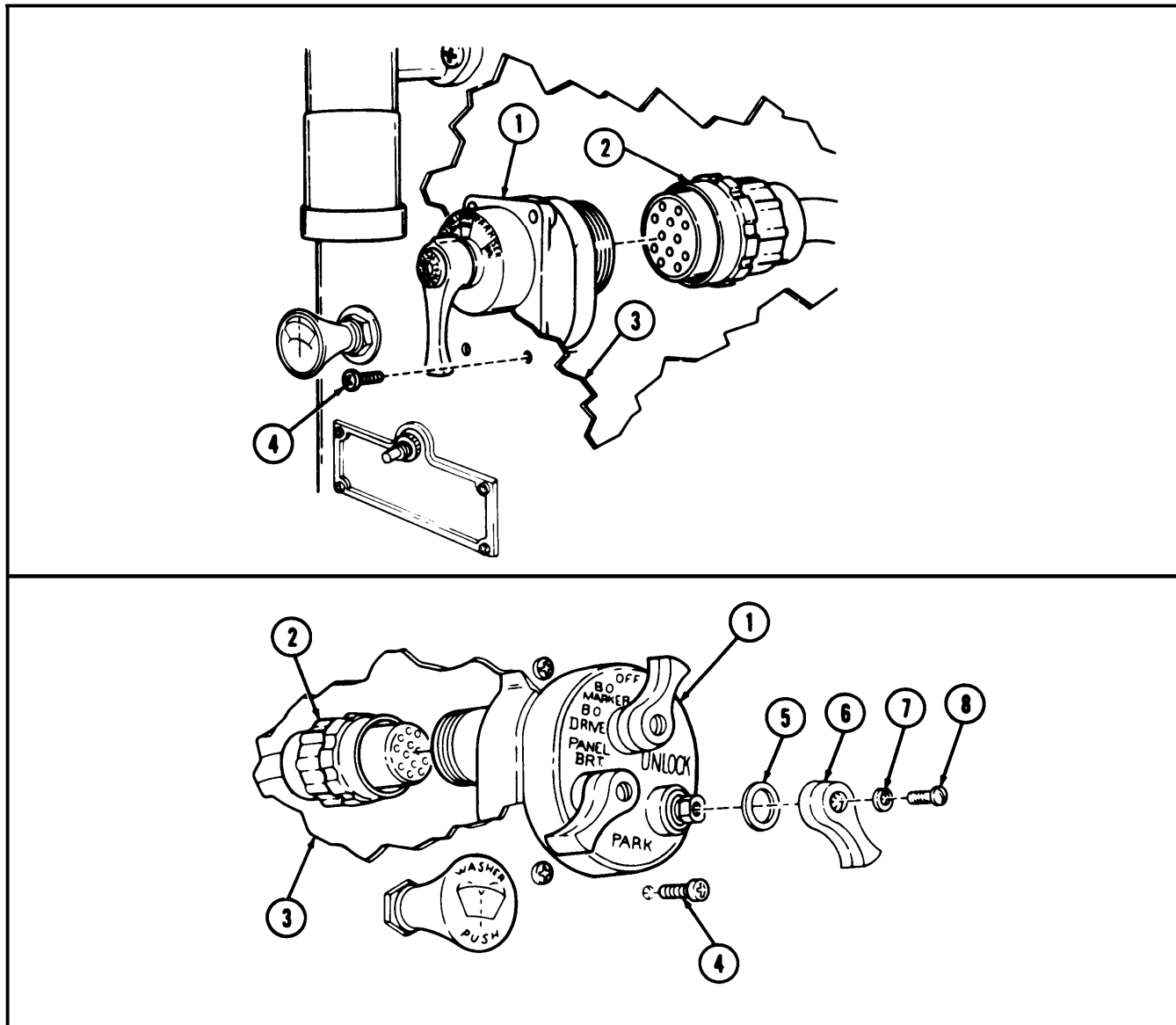
b. Installation

4.		Harness connector (2) and main light switch (1)	Connect.	
5.		Main light switch (1)	Install on instrument panel (3) with four screws (4).	

4-38. MAIN LIGHT SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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- | | | | | |
|----|--|---|--|--|
| 6. | | Three washers (5) and switch levers (6) | Install with three new lockwashers (7) and screws (8). | |
|----|--|---|--|--|



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Check lights for proper operation (TM 9-2320-272-10).

TA349062

4-39. HEADLIGHT BEAM SELECTOR SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para, 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Rewired</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

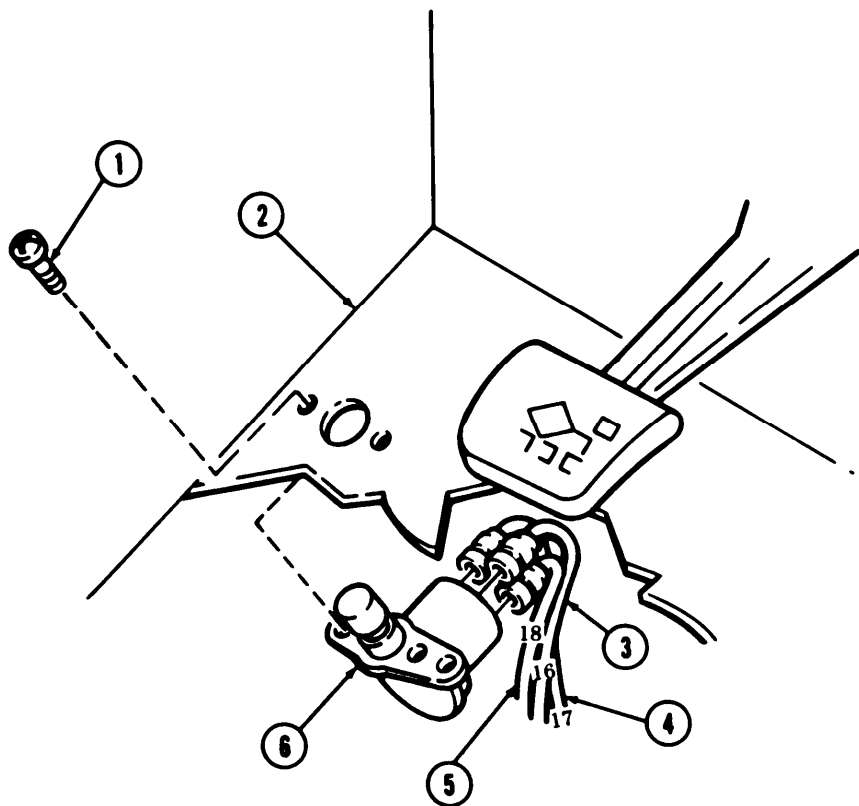
- | | | | | |
|----|---------------------|--|-------------|-----------------------|
| 1. | Under cab floor (2) | Electrical wires (3), (4), and (5) | Disconnect. | Tag for installation. |
| 2. | | Two screws (1) and selector switch (6) | Remove. | |

b. installation**NOTE**

Assistant will help with step 3.

- | | | |
|----|------------------------------------|---------------------------------|
| 3. | Selector switch (6) | Install with two screws (1). |
| 4. | Electrical wires (3), (4), and (5) | Connect to selector switch (6). |

4-39. HEADLIGHT BEAM SELECTOR SWITCH REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

- FOLLOW-ON TASKS
- Connect battery ground cables (para 4-25).
 - Check headlight beam selector for proper operation (TM 9-2320-272-10).
- TA 349063

4-40. WARNING SIGNAL LAMP SWITCH MAINTENANCE

This task covers:

- a. Removal
- b. Disassembly
- co Inspection
- d. Reassembly
- e. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts Lockwasher		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.

Warning signal lamp switch (14)

Two connectors (1)

Disconnect.
2.

Instrument panel (3)

Two screws (5) and locknuts (2), warning signal lamp switch (14), and angle bracket (4)

Remove.

Discard locknuts (2).

b. Disassembly

3.

Warning signal lamp switch (14)

Screw (10), lockwasher (9), switch lever (1 1), washer (12), and felt washer (13)

Remove.
4.

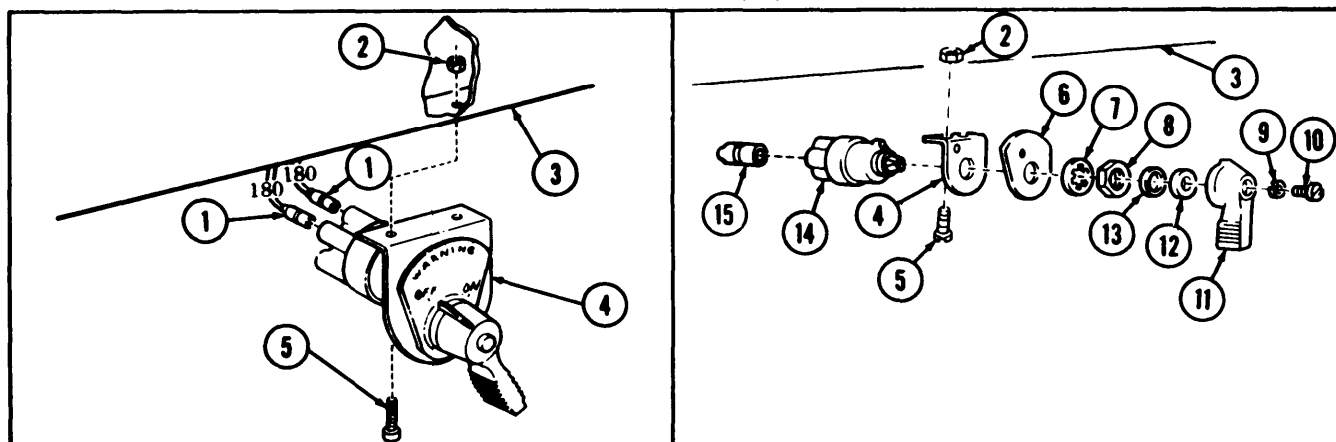
Nut (8), lockwasher (7), identification plate (6), angle bracket (4), and shell (15)

Remove.

Discard lockwasher (7).

4-40. WARNING SIGNAL LAMP SWITCH MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<u>c. Inspection</u>				
5.		Warning signal lamp switch (14)	Inspect for breaks and cracks in housing of warning signal lamp switch (14).	Discard if broken or cracked.
6.		Switch lever (11)	Inspect for breaks and cracks.	Discard if broken or cracked.
<u>d. Reassembly</u>				
7.		Shell (15), angle bracket (4), identification plate (6), new lockwasher (7), and nut (8)	Install on warning signal lamp switch (14).	
		Felt washer (13), washer (12), switch lever (11), lockwasher (9), and screw (10)	Install on warning signal lamp switch (14).	
<u>e. Installation</u>				
9.		Two new locknuts (2) and screws (5), warning signal lamp switch (14), and angle bracket (4)	Install on instrument panel (3).	
10.		Two connectors (1)	Connect on warning signal lamp switch (14).	



END OF TASK!

FOLLOW-ON TASKS: • Connect battery ground cables (para. 4-25).
• Check operation of warning signal lamp switch (TM 9-2320-272-10).

TA 349064

4-41. FUEL SELECTOR VALVE SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M929, M930, M931, M932, M936	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

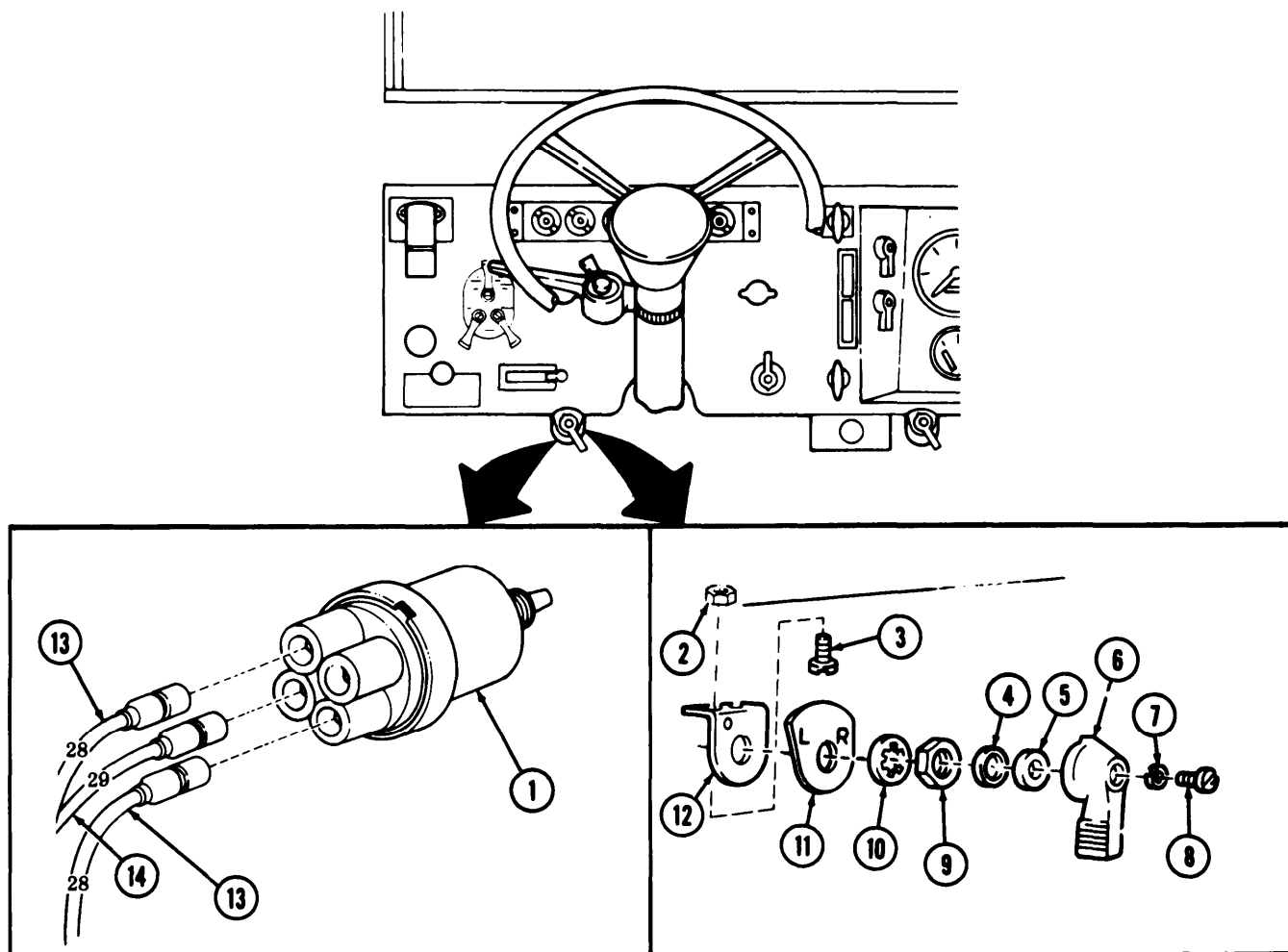
- | | | | | |
|----|---|---|-------------|-----------------------------|
| 1. | Fuel selector valve switch (1) | Two wires (13) and one wire (14) | Disconnect. | Tag wires for installation. |
| 2. | | Screw (8), lockwasher (7), lever (6), felt washer (5), and washer (4) | Remove. | Discard lockwasher (7). |
| 3. | | Nut (9), lockwasher (10), and plate (11) | Remove. | Discard lockwasher (10). |
| 4. | | Fuel selector valve switch (1) | Remove. | |
| 5. | Fuel selector valve switch bracket (12) | Two screws (3) and locknuts (2) | Remove. | Discard locknuts (2). |

b. Installation

- | | | | |
|----|--|---|--|
| 6. | | Fuel selector valve switch bracket (12) | Position to instrument panel and install with two screws (3) and new locknuts (2). |
|----|--|---|--|

4-41. FUEL SELECTOR VALVE SWITCH REPLACEMENT (Cont'd)

STEP N O.	LOCATION	ITEM	ACTION	REMARKS
7.		Fuel selector valve switch (1)	Position in bracket (12) and install with plate (11), new lock-washer (10), and nut (9).	
8.		Fuel selector valve switch lever (6)	Position over fuel selector valve switch (1) and install with felt washer (5), washer (4), new lockwasher (7), and screw (8).	
9.		Two wires (13) and one wire (14)	Connect.	



END OF TASK!

FOLLOW-ON TASKS: . Connect battery ground cables (para. 4-25).
 . Check fuel selector valve switch for proper operation (TM 9-2320-272-10). TA349065

4-42. STOPLIGHT SWITCH REPLACEMENT

This task covers:

- a. Removal

b. Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para 4-25	Parking brake set. Air reservoirs drained. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a. Removal

- | | | | | |
|----|------------------------|----------------------|-------------|-----------------------|
| 1. | Double check valve (3) | Two Wires(1) | Disconnect. | Tag for installation. |
| 2. | | Stoplight switch (2) | Remove. | |

b. Installation

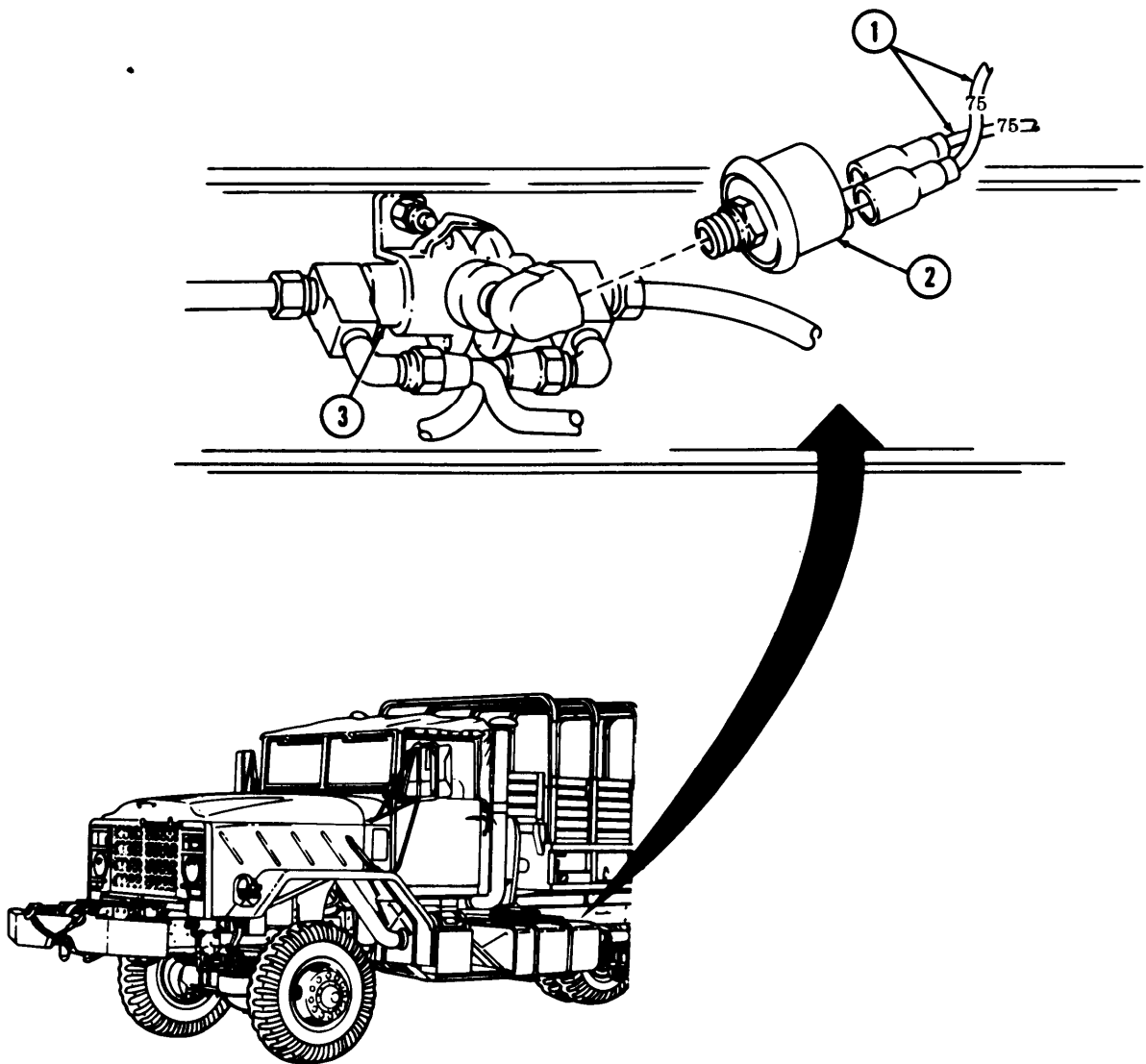
NOTE

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----------------|----------------------|----------------------------------|
| 3. | Stoplight switch (2) | Install. |
| 4 ₀ | Two wires (1) | Connect to stoplight switch (2). |

4-42. STOPLIGHT SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (pars- 4-25).
 - Start engine (TM 9-2320-272-10) and allow air pressure to build up to normal operating range. Check for air leaks at switch.
 - Check stoplights for proper operation (TM 9-2320-272-10).

TA 349066

4-43. TURN SIGNAL FLASHER REPLACEMENT

This task covers:

a. Removal

b. Installation

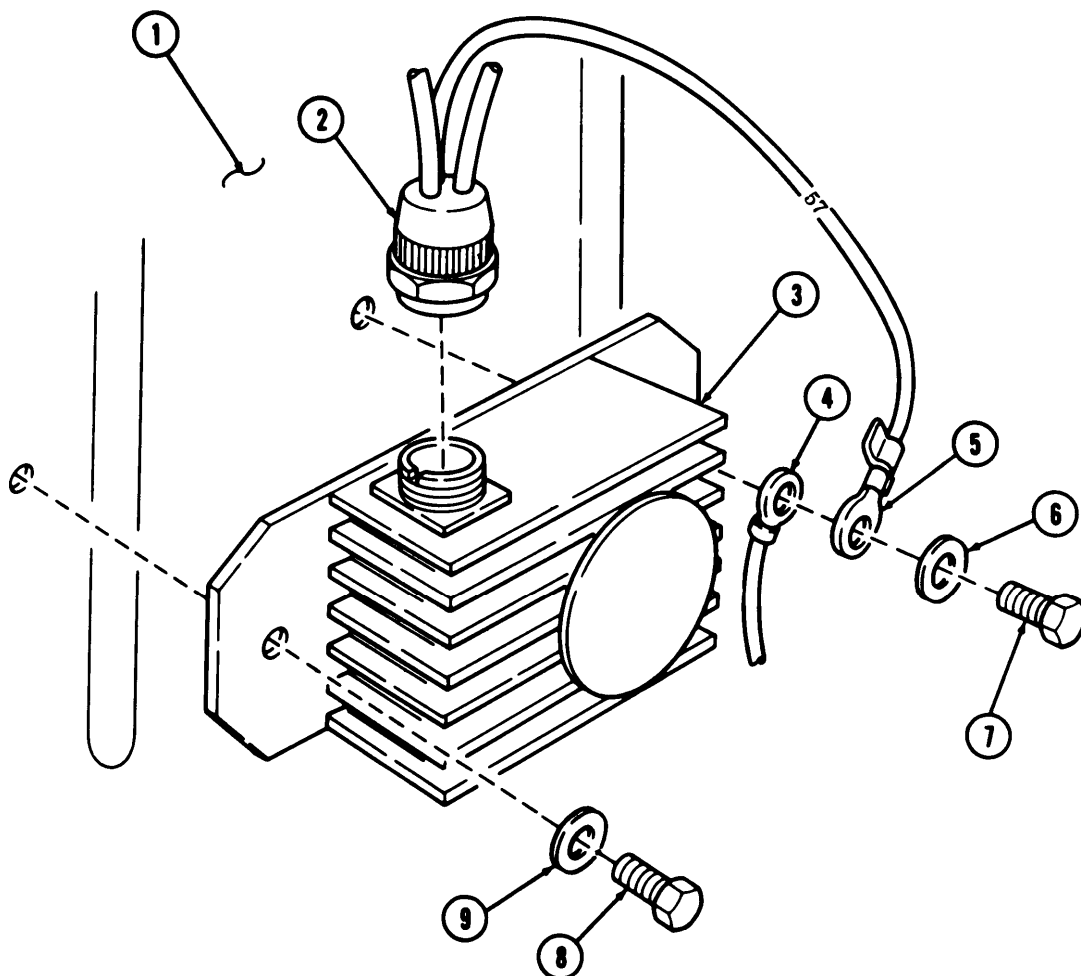
INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para, 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal				
1.	Left firewall (1) inside cab	Screw (7), washer (6), wire (5), and horn ground wire (4)	Remove.	
2.	Flasher (3)	Screw (8) and washer (9)	Remove.	
3.	Harness connector (2)	Flasher (3)	Remove.	
b. Installation				
4.		Harness connector (2)	Install on flasher (3).	
5.		Left side of flasher (3)	Install with washer (9) and screw (8).	
6.		Right side of flasher (3), horn ground wire (4), and wire (5)	Install with washer (6) and screw (7).	

4-43. TURN SIGNAL FLASHER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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FOLLOW-ON TASKS: • Connect battery ground cables (para 4-25)
• Check turn signal flasher for proper operation (TM 9-2320-272-10).

TA 349067

4-44. TURN SIGNAL CONTROL AND INDICATOR LAMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	Para. 4-25	Battery ground cables disconnected,
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a. Removal

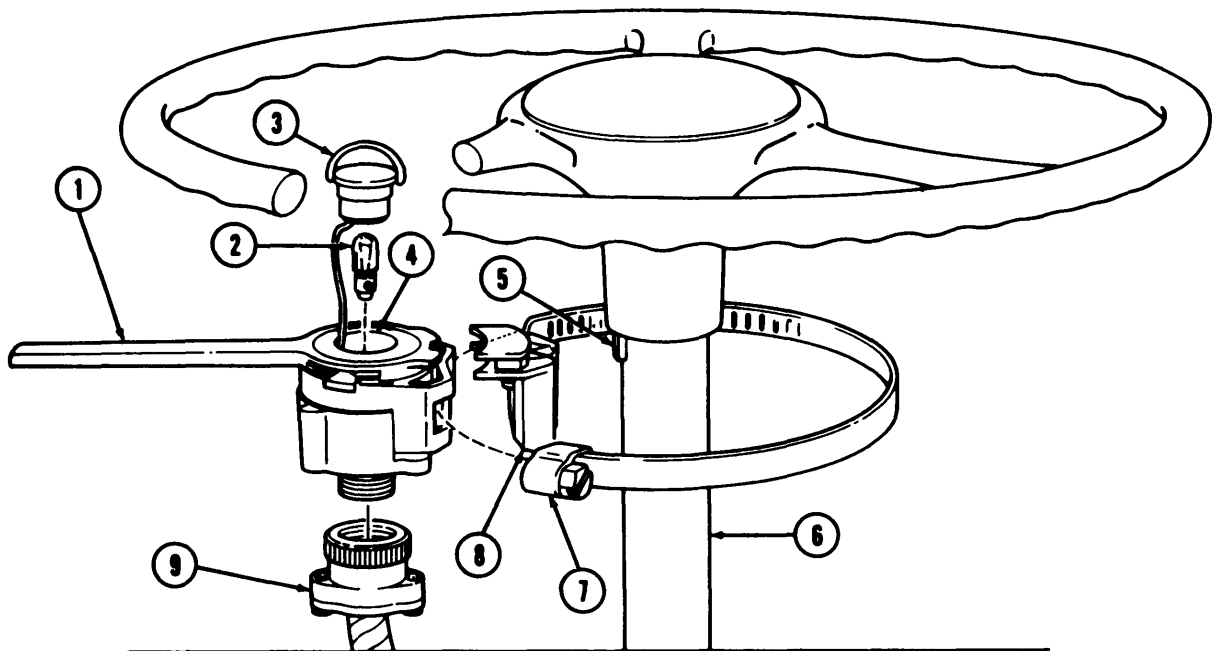
- | | | | |
|----|-------------------------|---|-------------|
| 1. | Turn signal control (1) | Connector (9) | Disconnect, |
| 2. | | Clamp (7) and signal self-canceller (8) | Remove. |
| 3. | | Lamp lens (3) | Remove. |
| 4. | Lamp socket (4) | Lamp (2) | Remove. |

b. Installation

- | | | | |
|----|--|---|---|
| 5. | | Lamp (2) | Install. |
| 6. | | Lamp lens (3) | Install. |
| 7. | | Signal self-canceller (8) and clamp (7) | a. Position to steering column (6) and align signal self-canceller (8) to canceling pin (5).
b. Tighten clamp (7). |
| 8. | | Connector (9) | Connect. |

4-44. TURN SIGNAL CONTROL AND INDICATOR LAMP REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Connect battery ground cables (para. 4-25).
 . Check turn signal control for proper operation (TM 9-2320-272-10).

TA 349068

4-45. TRAILER CABLE RECEPTACLE COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Condition</u>
None		None
<u>Materials/Parts</u>		
Four locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a. Removal**NOTE**

Assistant will help with step 1.

- | | | | | |
|----|---|----------------------------------|---|-----------------------|
| 1. | Receptacle cover (1), receptacle (2), and frame (4) | Four screws (6) and locknuts (3) | Remove. | Discard locknuts (3). |
| 2. | Receptacle cover (1) | | Remove from trailer cable receptacle (2). | |

b. Installation

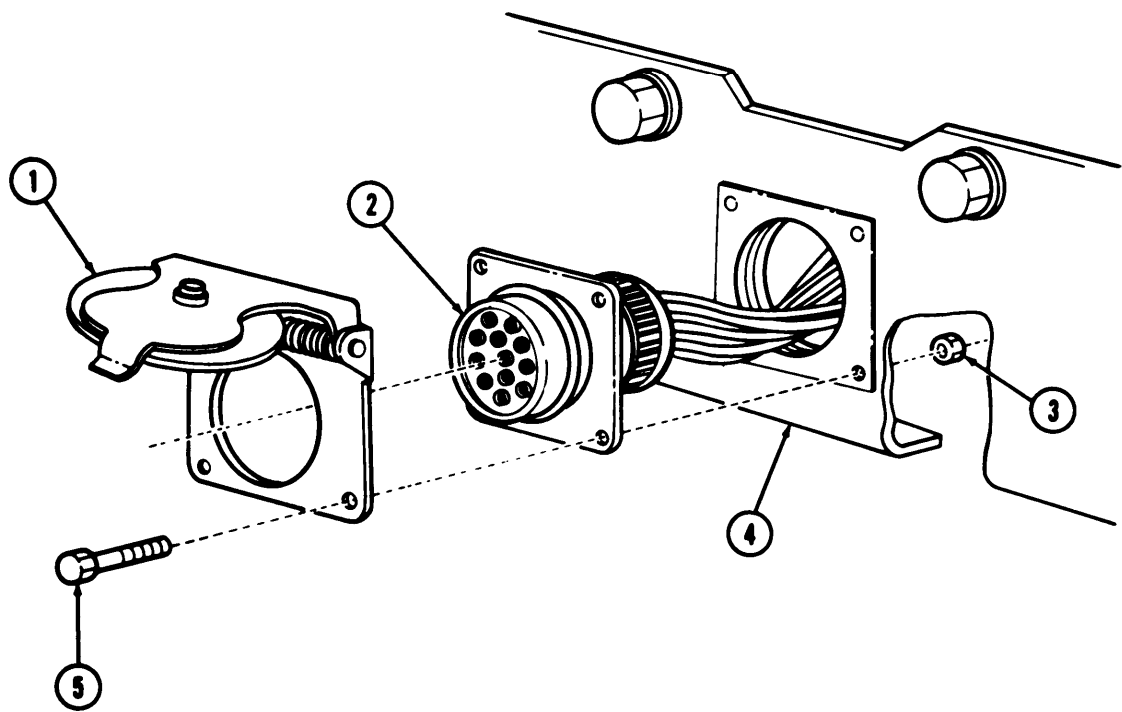
- | | | |
|----|----------------------|--|
| 3. | Receptacle cover (1) | a. Position to trailer cable receptacle (2). |
|----|----------------------|--|

NOTE

Assistant will help with step 3b.

- | |
|--|
| b. Install to vehicle frame (4) with four screws (5) and new locknuts (3). |
|--|

4-45. TRAILER CABLE RECEPTACLE COVER REPLACEMENT (Cont'd)				
STEP N O .	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!
FOLLOW-ON TASK: Connect battery ground cables (para 4-25).

TA 349069

4-46. AUXILIARY OUTLET SOCKET AND RECEPTACLE (M936) REPLACEMENT

This task covers:

a. Removal

b. Installation

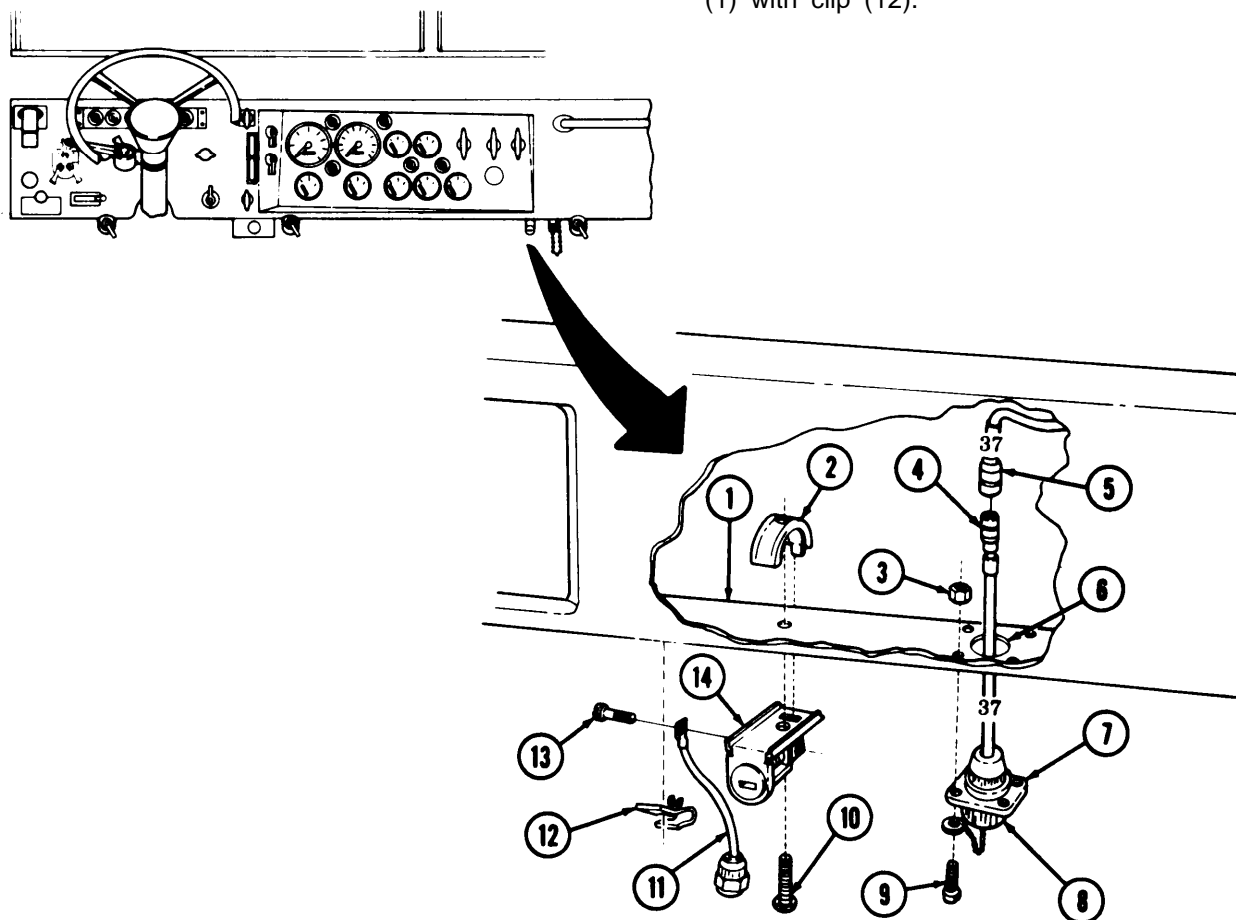
INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M936	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Four locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP INO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Auxiliary outlet socket (14)	Screw (13) and outlet cable (11)	Remove.	
2.	Instrument panel (1)	Screw (10), clamp (2), and auxiliary outlet socket (14)	Remove.	
3.		Outlet cable (11)	Remove from instrument panel clip (12).	
4.	Instrument panel (1)	Clip (12)	Remove.	
5.	Wire (5)	Wire (4)	Disconnect.	
6.	Auxiliary outlet receptacle (7) to instrument panel (1)	Four screws (9) and locknuts (3)	Remove, and unfasten cover (8).	Discard locknuts (3).
b. Installation				
7.		Wire (4)	Insert through hole (6) on instrument panel (1) and connect to wire (5).	

14-46. AUXILIARY OUTLET SOCKET AND RECEPTACLE (M936) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.		Auxiliary outlet receptacle (7)	Install on instrument panel (1) with four screws (9) and new locknuts (3).	
9.		Cover (8)	Install on auxiliary outlet receptacle (7).	
10.		clip (12)	Install.	
11.		Auxiliary outlet socket (14)	Install on instrument panel (1) with auxiliary outlet socket clamp (2) and screw (10).	
12.		Outlet cable (11)	Install on auxiliary outlet socket with screw (13) and install on instrument panel (1) with clip (12).	



END OF TASK!

FOLLOW-ON TASK: Connect battery ground cables (para 4-25).

TA 349070

Section VI. WIRING CIRCUITS AND HARNESSSES

4-47. GENERAL

This section provides maintenance information for the organizational level for wiring circuits and harnesses. To find a specific maintenance procedure, see the maintenance task summary below:

4-48. WIRING CIRCUITS AND HARNESSSES MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-49.	Wiring Harness Repair	4-118

4-49. WIRING HARNESS REPAIR

This task covers:

- | | |
|-----------------------------------|------------------------|
| a. Terminal-Type Cable Connector | d. Plug Assembly |
| b. Male Cable Connector | e. Receptacle Assembly |
| c. Female Connector (With Sleeve) | |

INITIAL SETUP:

<u>APPLICABLE SEVERITY</u>		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Solder (Appendix D, Item 24)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not wear jewelry when repairing harnesses,
<u>Manual References</u>		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Do not wear jewelry when repairing harnesses. Injury to personnel may result if circuit is suddenly energized.

NOTE

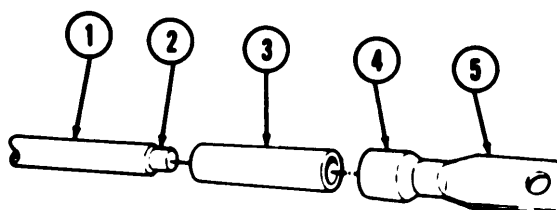
If a wiring harness is damaged beyond repair, notify DS maintenance for replacement.

4-49. WIRING HARNESS REPAIR (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

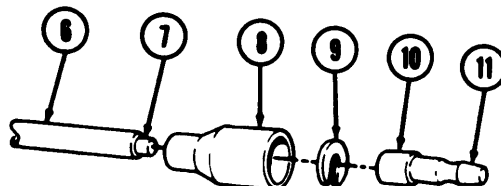
a. Terminal-Type Cable Connector

- | | | |
|----|----------------------|---|
| 1. | Cable insulation (1) | Strip from cable (2) to equal depth of terminal well (4). |
| 2. | Insulator (3) | Slide over cable (2). |
| 3. | Cable (2) | Insert into terminal well (4) and crimp. |
| 4. | Insulator (3) | Slide over crimped end of terminal (5). |



b. Male Cable Connector

- | | | |
|-----|----------------|---|
| 6. | Cable (7) | Strip cable insulation (6) equal to depth of ferrule well (10). |
| 7. | Shell (8) | Slide over cable (7). |
| 8. | Cable (7) | Insert into ferrule well (10) and Crimp. |
| 9. | "C" washer (9) | Place over crimped junction at terminal (11). |
| 10. | Shell (8) | Slide over "C" washer (9) and terminal (11). |

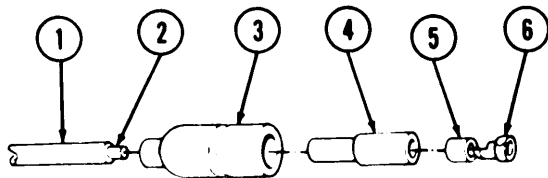


TA349071

4-49. WIRING HARNESS REPAIR (Cont'd)				
STEP .NO.	LOCATION	ITEM	ACTION	REMARKS

c. Female Cable Connector (With Sleeve)

10,	Cable (2)	Cable insulation (1)	Strip to equal depth of terminal well (5).	
11.		Shell (3) and sleeve (4)	Slide over cable (2).	
12.		Cable (2)	Insert into ferrule well (5) and crimp.	
13.		Shell (3) and sleeve (4)	Slide over terminal (6).	

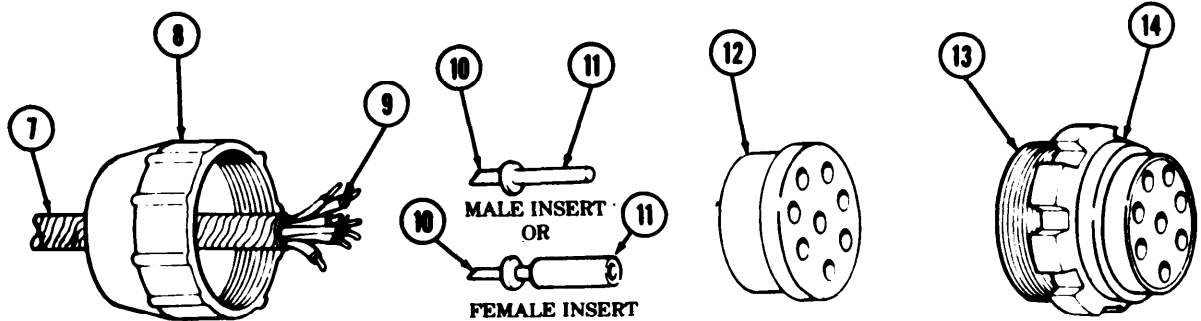


d. Plug Assembly

14.		Cable insulation (7)	Strip to equal depth of solder wells (10) of inserts (1 1)0	
15.		Cable ends (9)	a. Pass through grommet retaining nut (8), grommet (12), and coupling nut (14). b. Insert into solder wells of inserts (11) and solder.	
16.		Grommet (12)	Slide over inserts (11) and press into shell assembly (13) until seated.	
17.		Grommet retaining nut (8)	Thread into shell assembly (13) until seated.	

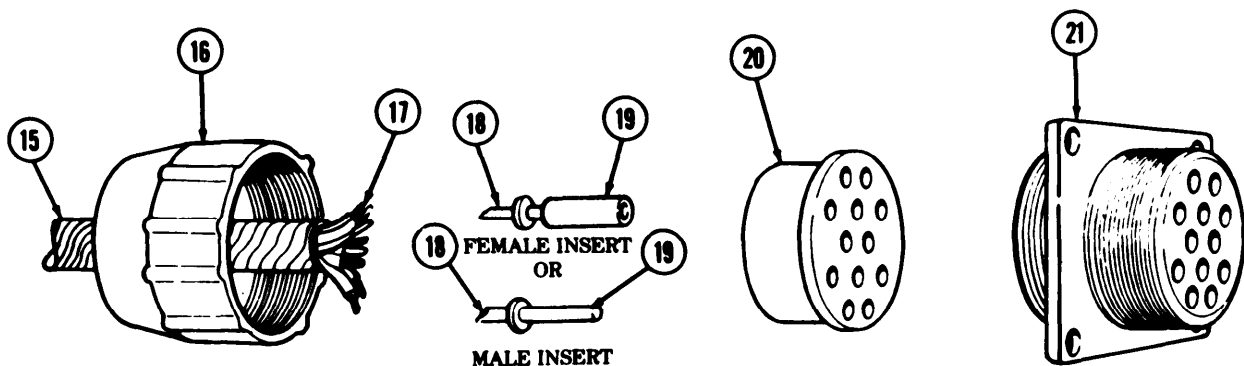
4-49. WIRING HARNESS REPAIR (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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e. Receptacle Assembly

- | | | |
|-----|----------------------------|--|
| 18. | Cable insulation (15) | Strip to equal depth of solder wells (18) of inserts (19). |
| 19. | Cable ends (17) | <p>a. Pass through grommet retaining nut (16) and grommet (20).</p> <p>b. Insert into solder wells (18) of insert (19) and solder.</p> |
| 20. | Grommet (20) | Slide over inserts (19) and press into receptacle assembly (21) until seated. |
| 21. | Grommet retaining nut (16) | Thread into receptacle (21) until seated. |



END OF TASK!

FOLLOW-ON TASK: Connect battery ground cable (para 4-25).

TA 349073

Section VII. INSTRUMENTS, SENDING UNITS SWITCHES, AND HORN

4-50. GENERAL

This section provides maintenance instructions for the organizational level for instruments, sending units, switches, and horn. To find a specific procedure, see the maintenance task summary below

4-51. INSTRUMENTS, SENDING UNIT, SWITCHES, AND HORN SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-52.	Instrument Cluster Replacement	4-124
4-53.	Electrical Gages Replacement	4-136
4-54.	Air Gages Replacement	4-136
4-55.	Speedometer and Tachometer Replacement	4-140
4-56.	Tachometer Flexible Drive Shaft and Drive Core Maintenance	4-142
4-57.	Indicator Panel Lights Assembly and Lamp Replacement	4-146
4-58.	Oil Pressure Sending Unit Replacement	4-150
4-59.	Fuel Level Sending Unit Replacement	4-152
4-60.	Water Temperature Sending Unit Replacement	4-154
4-61.	Tachometer Pulse Sender Replacement	4-156
4-62.	Fuel Pressure Transducer Replacement	4-158
4-63.	Transmission Temperature Transmitter Replacement	4-160
4-64.	Primary and Secondary Low Air Pressure Switch Replacement	4-162
4-65.	Spring Brake Pressure Switch Replacement	4-166
4-66.	Front-Wheel Drive Lock-In Switch Replacement	4-166
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4-68.	Horn Contact Brush Replacement	4-172
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4-70.	Horn Switch Replacement	4-160
4-71.	Circuit Breaker Replacement	4-182
4-72.	Failsafe Warning Module Replacement	4-186
4-73.	Speedometer Flexible Drive Shaft and Drive Core Maintenance	4-188
4-74.	Heater Blower Motor Switch Replacement	4-196
4-75.	Parking Brake Switch Replacement	4-200

4-52. INSTRUMENT CLUSTER REPLACEMENT

This task covers:

- a. Removal
b. Disassembly

- c. Reassembly
d. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25 TM 9-2320-358-24&P	Parking brake set. Air reservoirs drained. Hood raised and secured, Battery ground cables disconnected. Disconnect CTIS electrical components on M939A2.

Test Equipment

None

Special Tools

None

Special Environmental Conditions

None

Materials/Parts

Three cotter pins
Three spring nuts

Personnel Required

Light-wheeled vehicle mechanic MOS 63B

General Safety Instructions

Do not disconnect air lines before draining air reservoirs.

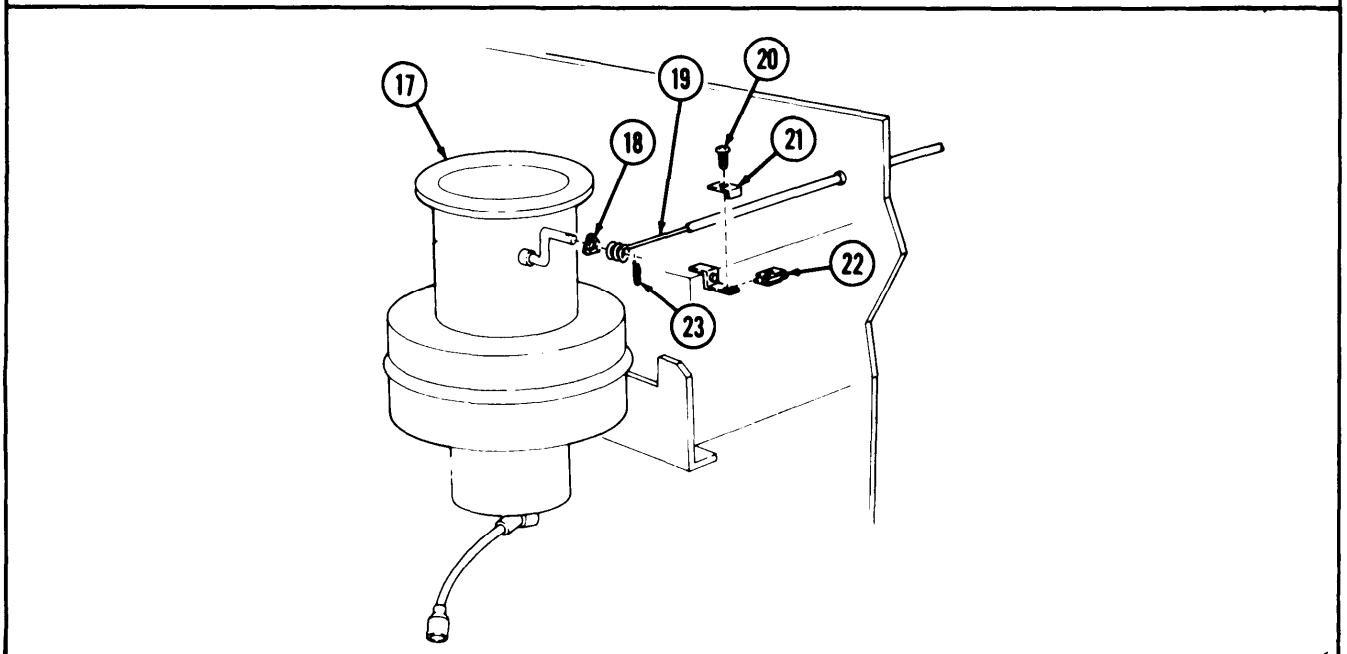
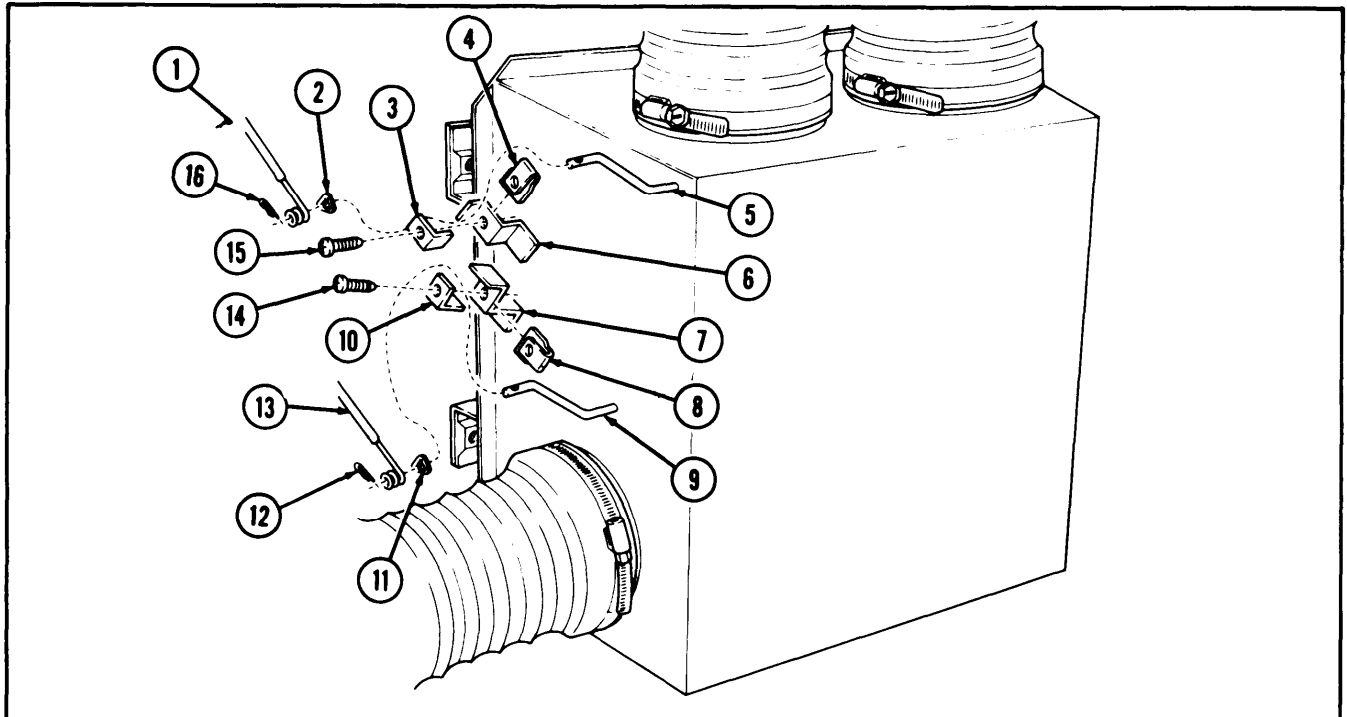
Manual References

TM 9-2320-272-10
TM 9-2320-272-20P

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Diverter bracket (6)	Screw (15), clamp (3), cable (1), and retaining clip (4)	Remove.	
2.	Control rod (5)	Cotter pin (16)	Remove,	Discard cotter pin (16).
3.		Defrost control cable (1) and spring nut (2)	Remove.	Tag cable (1) for installation. Discard spring nut (2).
4.	Diverter bracket (7)	Screw (14), clamp (10), cable (13), and retaining clip (8)	Remove.	
5.	Control rod (9)	Cotter pin (12)	Remove,	Discard cotter pin (12).
6.		Heat control cable (13) and spring nut (11)	Remove.	Tag cable (13) for installation. Discard spring nut (11).
7.	Heater assembly (17) right side engine compartment	Screw (20), retaining nut (22), and clamp (21)	Remove.	

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

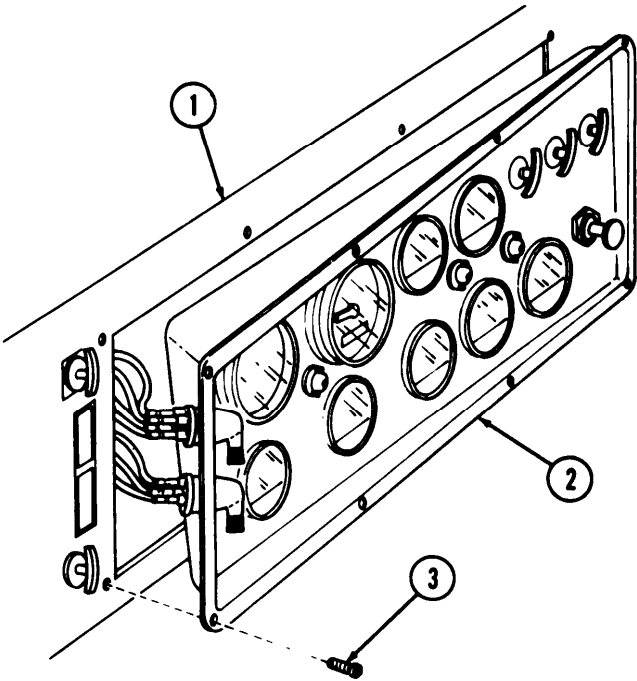
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.		Cotter pin (23)	Remove.	Discard cotter pin (23).
9.		Fresh air control cable (19) and spring nut (18)	Remove.	Discard spring nut (18).



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4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
10.	Instrument cluster (2)	Eight screws (3)	Remove.	
11	Instrument panel (1)	Instrument cluster (2)	Separate.	



NOTE

Tag each wire, tube, and drive shaft for proper installation.

12.	Behind instrument cluster (2)	Tachometer drive shaft (6)	Disconnect.
13.		Speedometer drive shaft (5)	Disconnect.

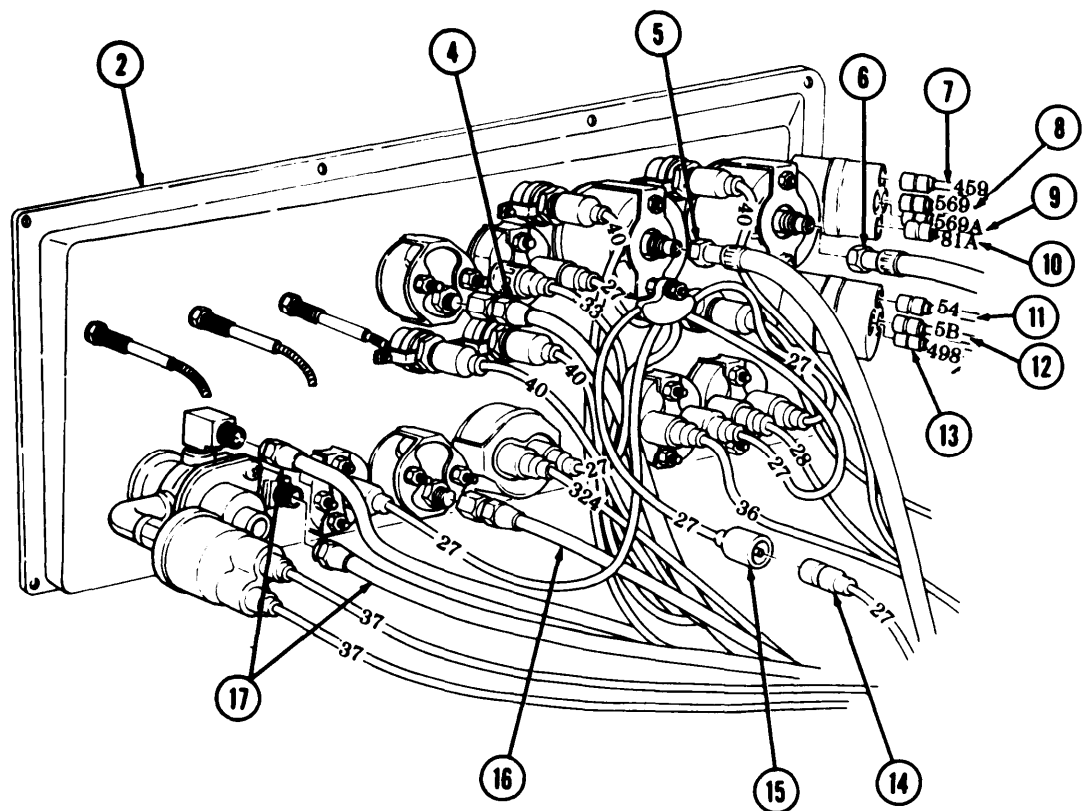
WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

14.	Air line (4)	Disconnect.
-----	--------------	-------------

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
16.		Air line (16)	Disconnect.	
16.		Two air lines (17)	Disconnect.	
17.		Wires (7), (8), (9), and (10)	Disconnect.	
18.		Wires (11), (12), and (13)	Disconnect.	
19.		Wires (14) and (15)	Disconnect.	

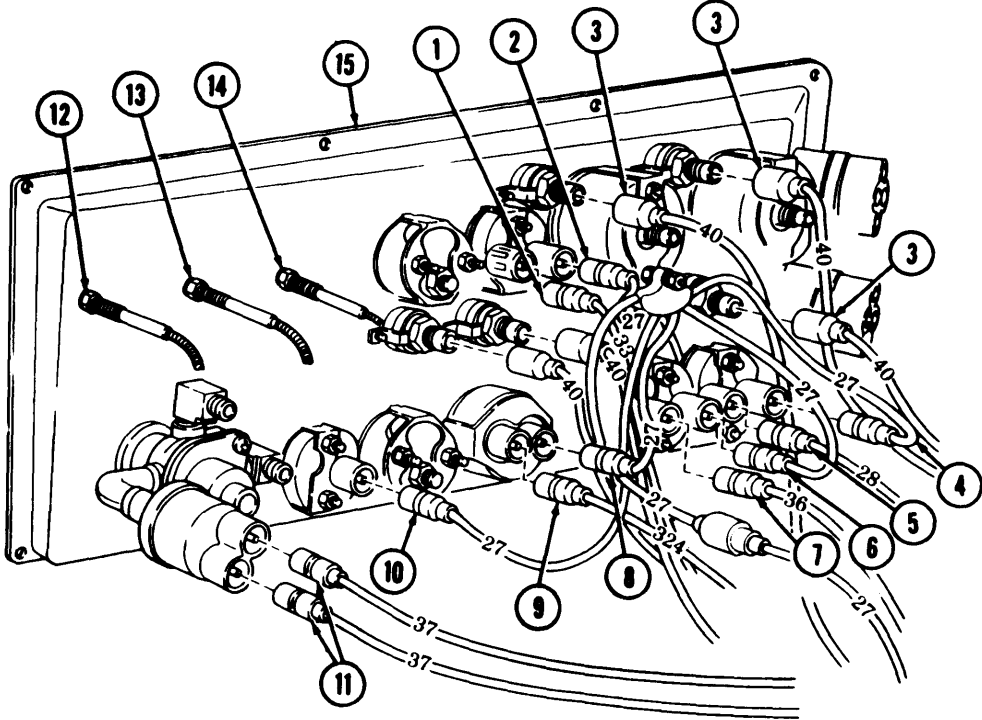
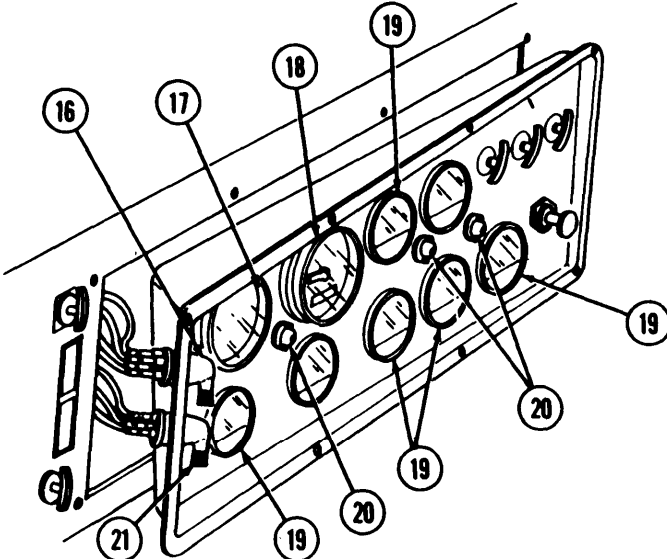


TA 349076

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
20.	Behind instrument cluster (15)	Five wires (3)	Disconnect.	
21.		Wires (4) and (5)	Disconnect,	
22.		Wires (6) and (7)	Disconnect.	
23.		Wires (8) and (9)	Disconnect.	
24.		Wires (1) and (2)	Disconnect.	
25.		Wire (10)	Disconnect.	
26.		Two wires (11)	Disconnect.	
27.		Three cables (12), (13), and (14)	Disconnect.	
28.		Instrument cluster (15)	Remove.	
<hr/>				
b. Disassembly				
29.		Battery switch lever (16)	Remove.	Refer to para. 4-4.
30.		Starter switch lever (21)	Remove.	Refer to para. 4-5,
31.		Five indicator panel lights (20)	Remove.	Refer to para. 4-57.
32.		Tachometer (17)	Remove.	Refer to para. 4-55.
33.		Speedometer (18)	Remove.	Refer to para. 4-55.
34.		Five electrical gages (19)	Remove.	Refer to para. 4-53

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

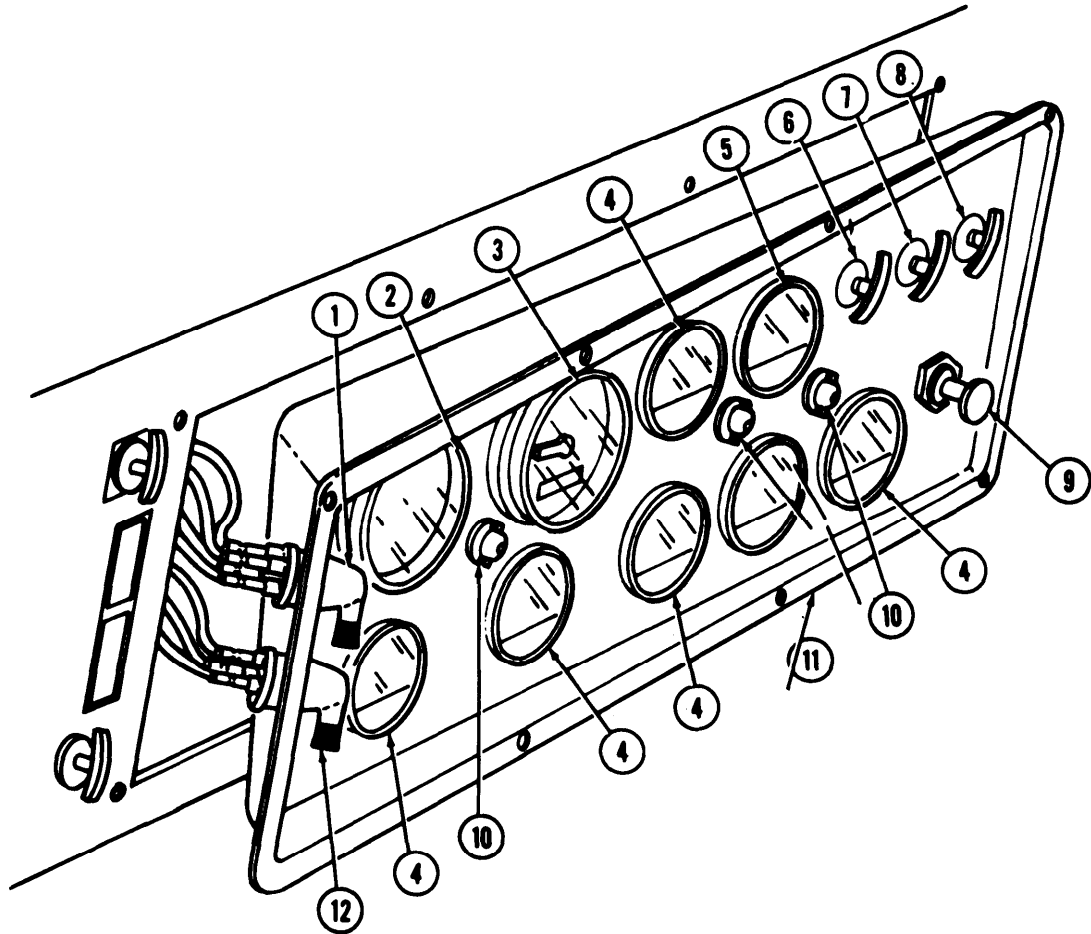
TA 349077

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
35.		Primary air gage (6)	Remove.	Refer to para 4-54.
36.		Secondary air gage (11)	Remove.	Refer to para 4-54.
37.		Fresh air vent control (8)	Remove.	Refer to para 9-36.
38.		Defroster control (6)	Remove.	Refer to para 9-37.
39.		Heater control (7)	Remove.	Refer to para 9-37.
40.		Spring brake pressure switch (9)	Remove.	Refer to para 4-65.
c. Reassembly				
41.		Indicator panel lights (10)	Install.	Refer to para 4-57.
42.		Spring brake pressure switch (9)	Install.	Refer to para 4-66.
43.		Heater control (7)	Install.	Refer to para 9-37.
44.		Defroster control (6)	Install.	Refer to para 9-37.
45.		Fresh air vent control (8)	Install.	Refer to para 9-36.
46.		Secondary air gage (11)	Install.	Refer to para 4-64.
47.		Primary air gage (5)	Install.	Refer to para 4-64.
48.		Electrical gages (4)	Install.	Refer to para 4-53.
49.		Speedometer (3)	Install.	Refer to para 4-55.
50.		Tachometer (2)	Install.	Refer to para 4-55.
51.		Starter switch lever (12)	Install.	Refer to para 4-5.
52.		Battery switch lever (1)	Install.	Refer to para 4-4.

4-52 INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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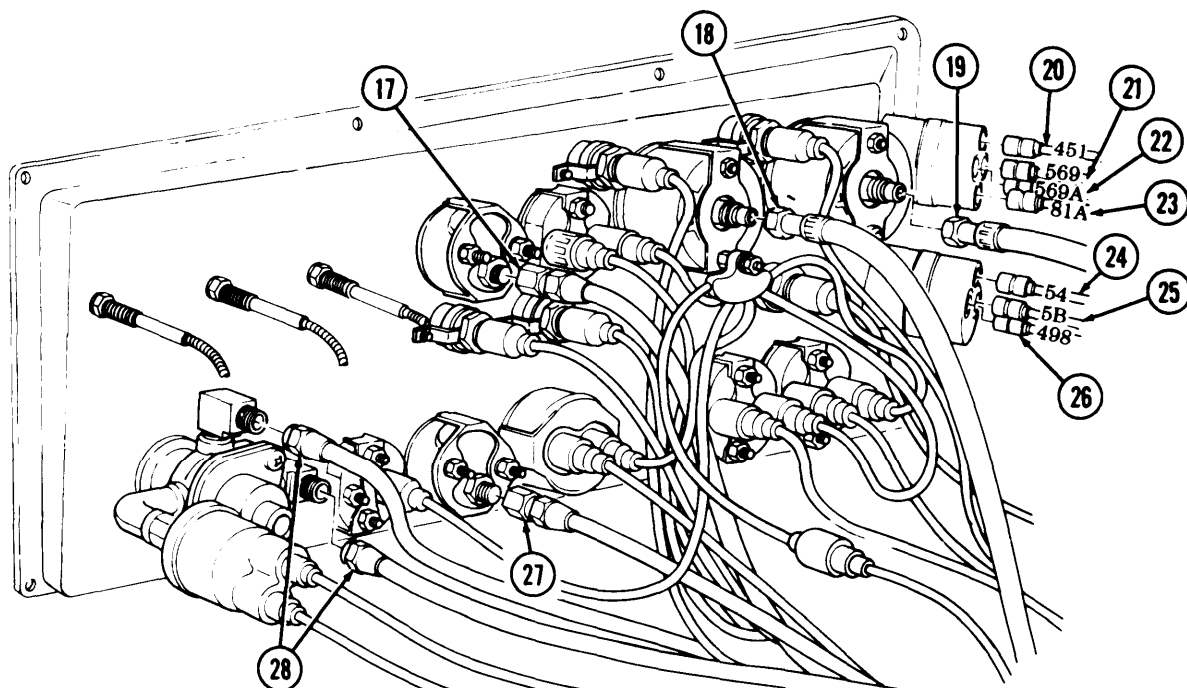
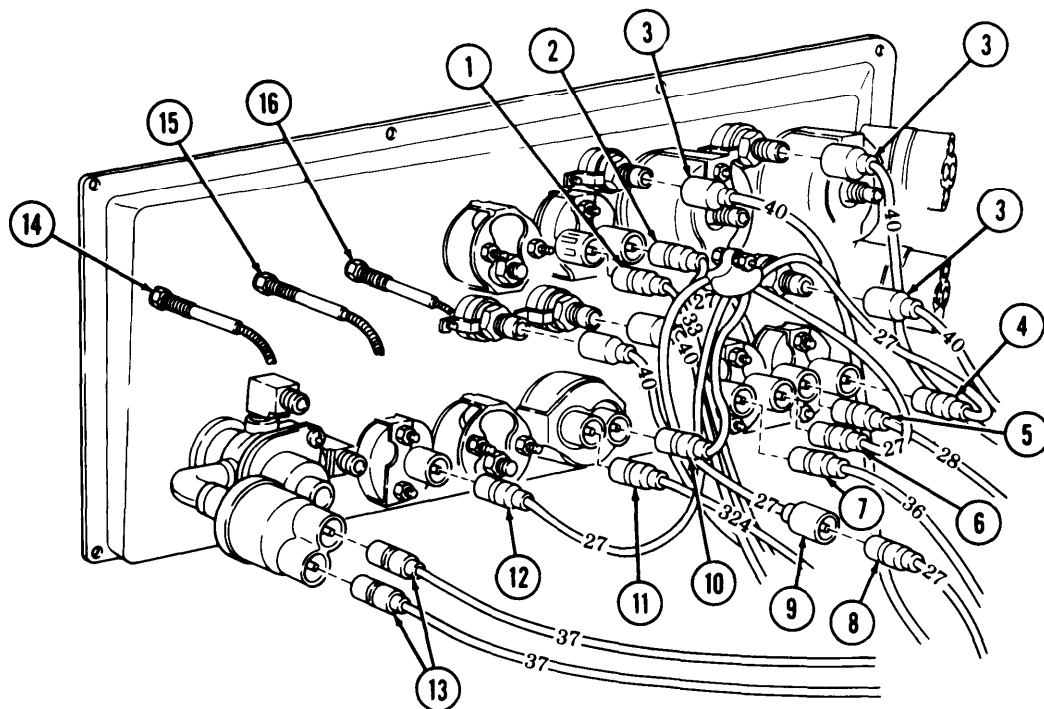


4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
d. Installation				
53.		Three cables (14), (15), and (16)	Connect.	
54.		Two wires (13)	Connect.	
55.		Wire (12)	Connect.	
56.		Wires (10) and (11)	Connect.	
57.		Wires (8) and (9)	Connect.	
58.		Wires (6) and (7)	Connect.	
59.		Wires (4) and (5)	Connect.	
60.		Five wires (3)	Connect.	
61.		Wires (1) and (2)	Connect.	
62.		Wires (24), (25), and (26)	Connect.	
63.		wires (20), (21), (22), and (23)	Connect.	
64.		Two air lines (28)	Connect.	
65.		Air line (27)	Connect.	
66.		Air line (17)	Connect.	
67.		Speedometer drive shaft (18)	Connect.	
68.		Tachometer drive shaft (19)	Connect.	

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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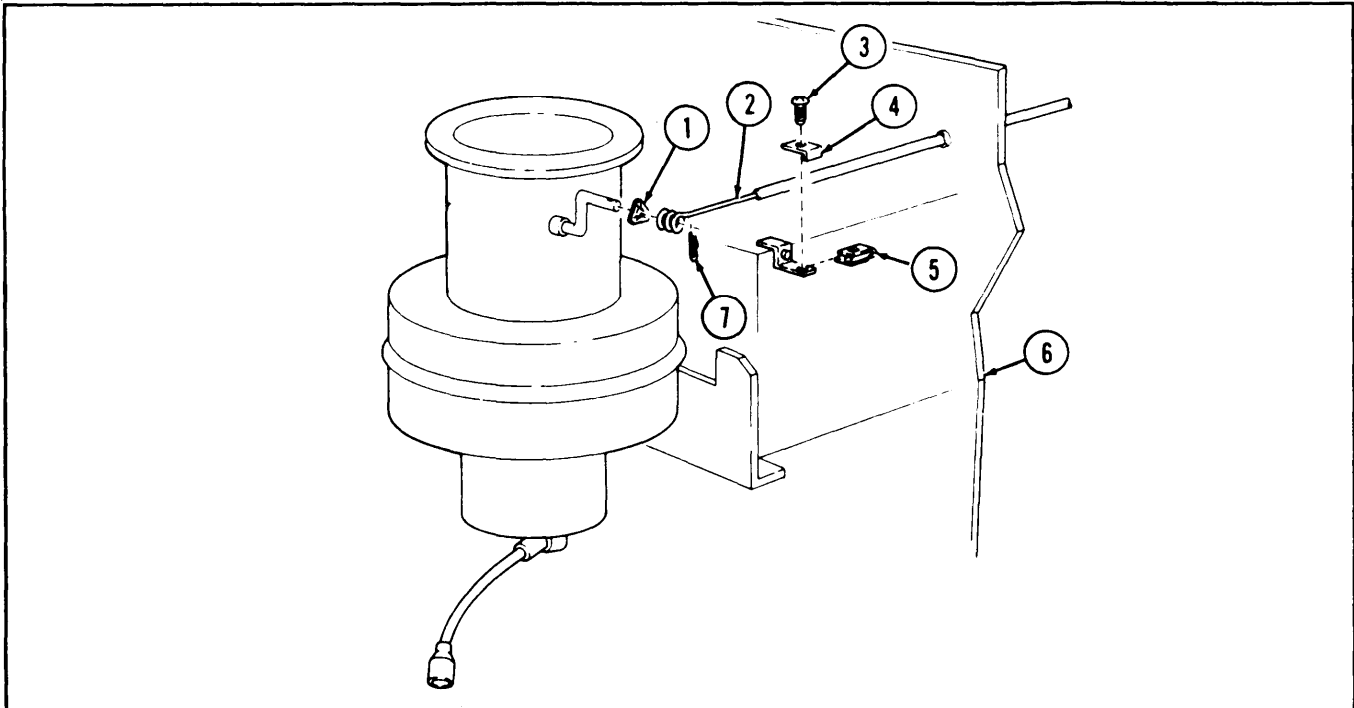
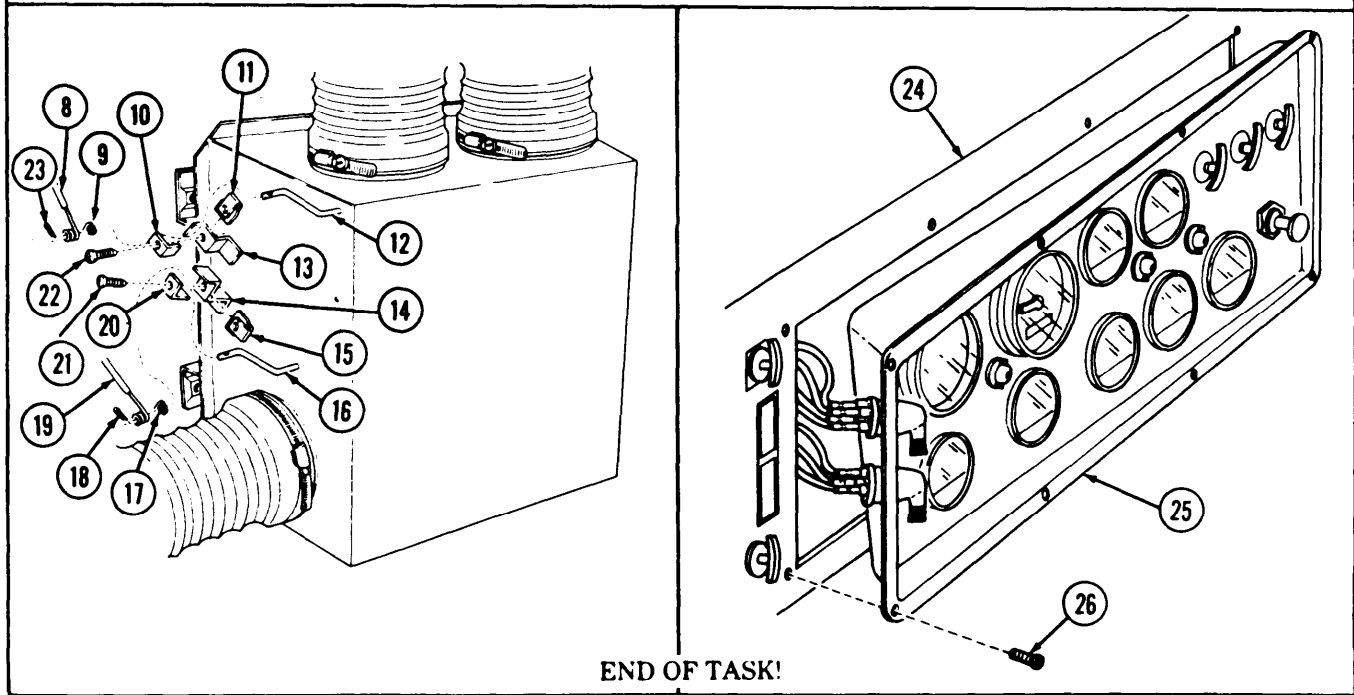


TA 349079

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
69.		Fresh air control cable (2) and new spring nut (1)	Install through opening in instrument panel (24) and firewall (6).	
70.		New cotter pin (7)	Install.	
71.		Clamp (4), retaining nut (5), and screw (3)	Install.	
72.		Heat control cable (19), defrost control cable (8), and new spring nuts (9) and (17)	Install through opening in instrument panel (24).	Route cables (19) and (8) to diverter brackets (13) and (14).
73.		New cotter pins (18) and (23)	Install on control rods (16) and (12).	
74.		TWO retaining clips (11) and (15), cables (8) and (19), clamps (10) and (20), and screws (21) and (22)	Install on diverter brackets (13) and (14).	
75.		Instrument cluster (25)	Install to instrument panel (24) with eight screws (26).	

4-52. INSTRUMENT CLUSTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				
END OF TASK!				

FOLLOW-ON TASKS:

- On M939A2 connect CTIS electrical components (TM 9-2320-358-24&P).
- Connect battery ground cables (para. 4-25).
- Start engine (TM 9-2320-272-10) and check if gages work properly. Check for air leaks at air gages

TA 349080

4-53. ELECTRICAL GAGES REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Engine coolant temperature, transmission oil temperature, engine oil pressure, and fuel level gages are removed and installed the same.

a. Removal

1.

Instrument panel (4)

Eight screws (7)

Remove.
2.

Instrument cluster (5)

Pull away from instrument panel (4).

NOTE

Battery indicator gage has only one wire to disconnect.

3.

Fuel level gage (6)

Wires (3) and (9)

Disconnect.

Tag for installation.
4.

Two nuts (1), lockwashers (2), and gage mounting bracket (8)

Remove.

Discard lockwashers (2).
5.

Instrument cluster (5)

Fuel level gage (6)

Remove.

b. Installation

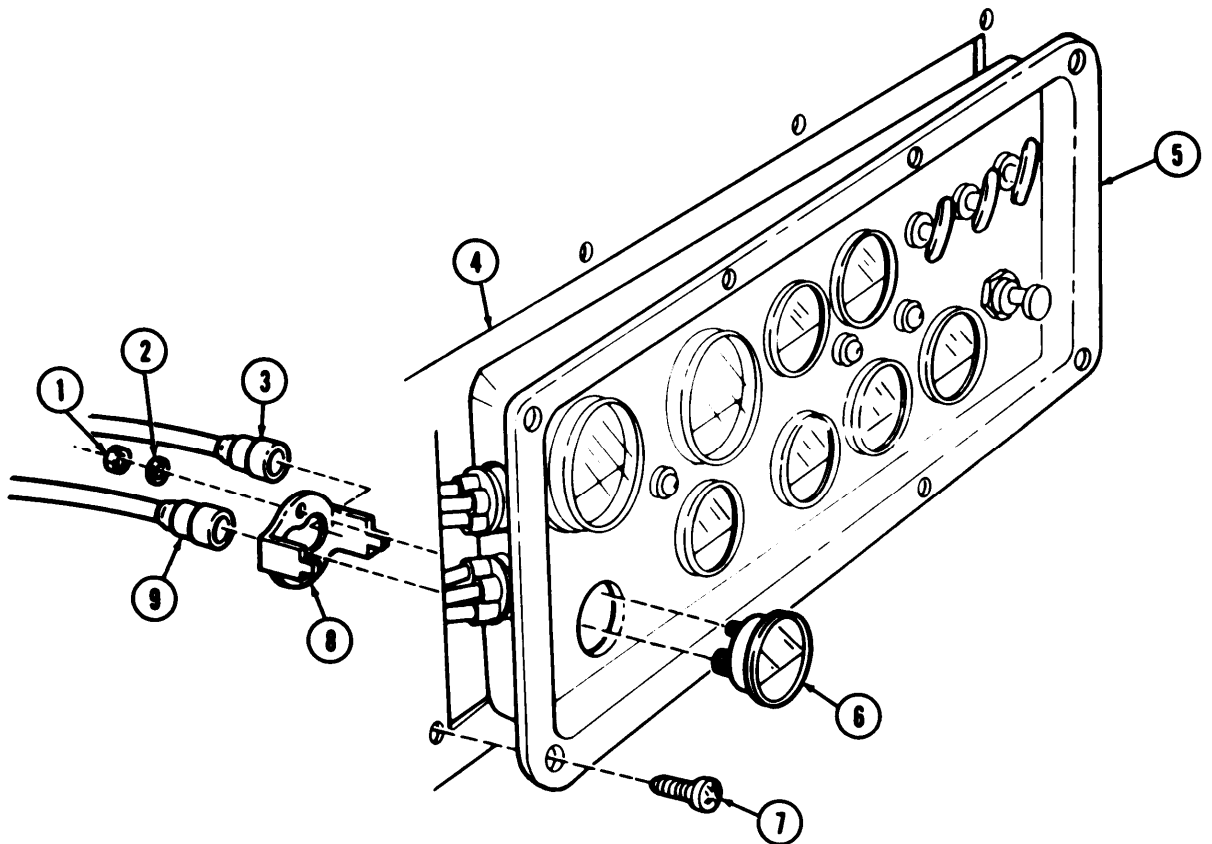
6.

Fuel level gage (6)

Position through front of instrument cluster (5).

4-53. ELECTRICAL GAGES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
7.		Gage mounting bracket (8)	Install with two new lockwashers (2) and nuts (1).	
<p align="center">NOTE</p> <p align="center">Battery indicator gage has only one wire to connect.</p>				
8.		Wires (3) and (9)	Connect to fuel level gage (6).	
9.		Instrument cluster (5)	Install with eight screws (7).	



END OF TASK!

FOLLOW-ON TASKS: • Connect battery ground cables (para. 4-25).
• Start engine (TM 9-2320-272-10) and check if gage works properly.

TA 349081

4-54. AIR GAGES REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Air reservoirs drained. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers Sealing tape (Appendix D, Item 28)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

The primary and secondary air pressure gages are removed and installed the same.

a. Removal

- | | | | | |
|----|----------------------|--|--------------------------------------|--------------------------|
| 1. | Instrument panel (8) | Eight screws (7) | Remove. | |
| 2. | | Instrument cluster (6) | Pull away from instrument panel (8). | |
| 3. | Primary air gage (5) | Air tube (1) | Disconnect. | Tag for installation. |
| 4. | | Two nuts (2), lockwashers (3), and gage mounting bracket (4) | Remove. | Discard lockwashers (3). |
| 5. | | Primary air gage (5) | Remove. | |

4-54. AIR GAGES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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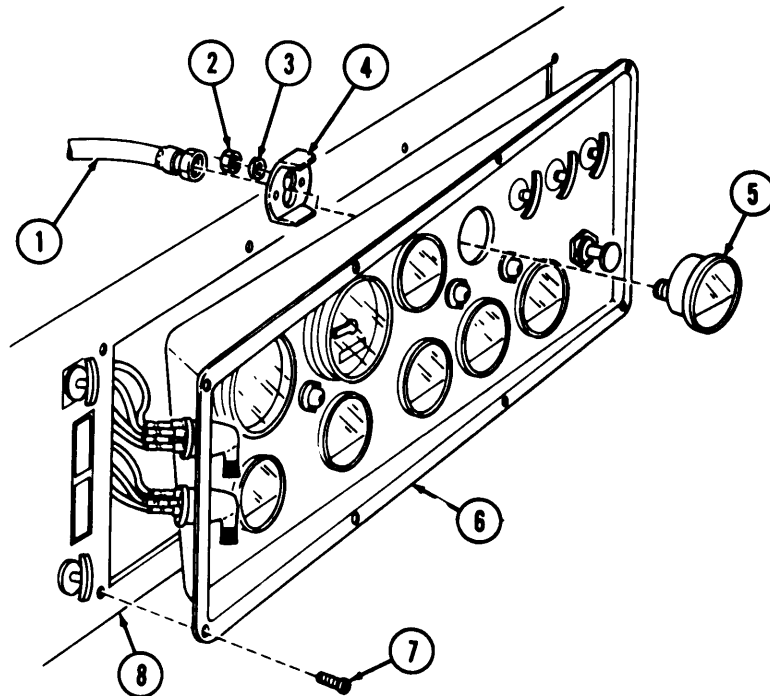
b. Installation

- | | | |
|----|---------------------------|--|
| 6. | Primary air gage (5) | Position through front of instrument cluster (6). |
| 7. | Gage mounting bracket (4) | Install with two new lockwashers (3) and nuts (2). |

NOTE

Male pipe threads must be wrapped with sealing tape before **installation**.

- | | | |
|----|------------------------|----------------------------------|
| 8. | Air tube (1) | Connect to primary air gage (5). |
| 9. | Instrument cluster (6) | Install with eight screws (7). |



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Start engine (TM 9-2320-272-10), and allow air pressure to build up to normal operating range, check for air leaks at gage.
 - Check if gage is indicating air pressure (TM 9-2320-272-10).

TA 349082

4-55. SPEEDOMETER AND TACHOMETER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

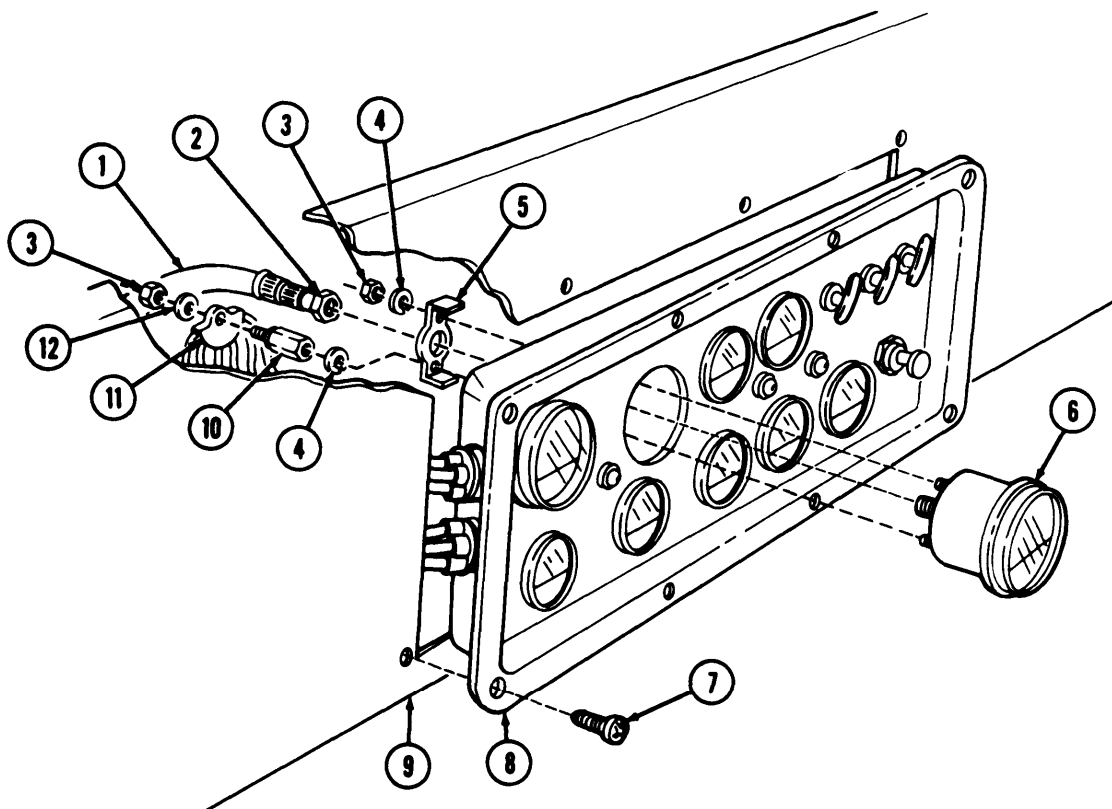
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|----------------------------------|---|-------------|--------------------------|
| 1. | Instrument cluster (8) | Eight screws (7) | Remove. | |
| 2. | Instrument panel (9) | Instrument cluster (8) | Separate. | |
| 3. | Speedometer (6) | Speedometer drive shaft (1) | Disconnect. | |
| 4. | Speedometer mounting bracket (5) | Two nuts (3), cable assembly (11), extension stud (10), washer (12), and two lockwashers (4) | Remove. | Discard lockwashers (4). |
| 5. | Instrument cluster (8) | Speedometer mounting bracket (5) and speedometer (6) | Remove. | |

4-55. SPEEDOMETER AND TACHOMETER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
6.		Speedometer (6)	Install with mounting bracket (5) two new lockwashers (4), extension stud (10), and nut (3).	Extension stud (10) replaced by nut on tachometer.
7.		Cable assembly (11)	Install with washer (12) and nut (3).	
8.		Speedometer drive shaft (1)	Install to speedometer (6) with shaft nut (2).	
9.		Instrument cluster (8)	Install with eight screws (7).	



END OF TASK!

FOLLOW-ON TASKS:

- Connect battery ground cables (para. 4-25).
- Start engine (TM 9-2320-272-10) and road test to check speedometer and tachometer for proper operation.

TA 349083

4-56. TACHOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE

This task covers:

a. Removal**c. Installation****b. Inspection****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Rubber grommet		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

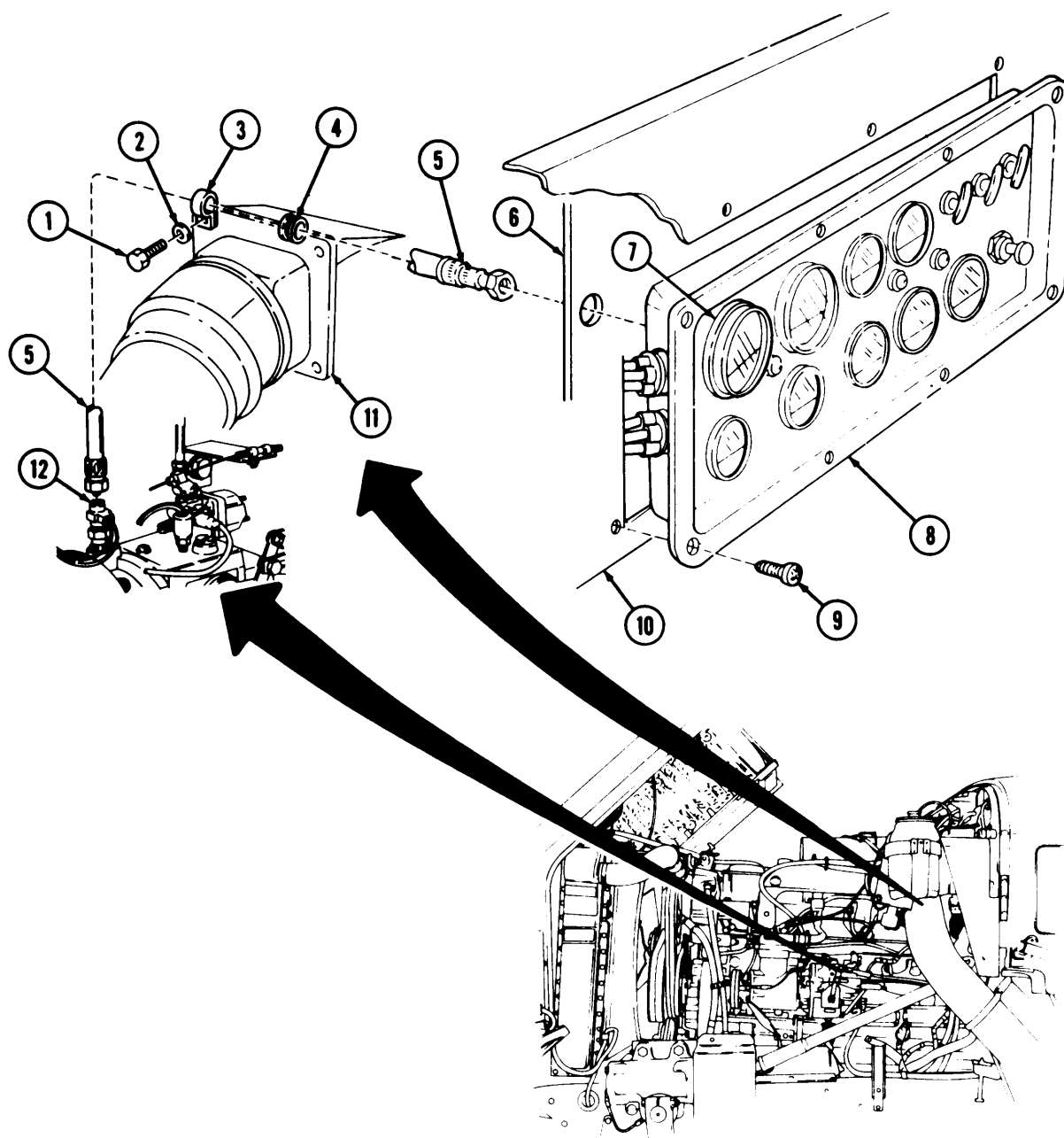
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|--------------------------------|---|---|----------------------|
| 1. | Left side of engine | Tachometer drive shaft (5) | Disconnect from tachometer pulse sender unit (12). | |
| 2. | Intake manifold (11) | Screw (1), washer (2), and loop clamp (3) | Remove. | |
| 3. | Firewall (6) | Rubber grommet (4) | Remove. | Discard grommet (4). |
| 4. | Instrument panel (10) | Eight screws (9) | Remove. | |
| 5. | | Instrument cluster (8) | Pull away from instrument panel (10). | |
| 6. | Back of instrument cluster (8) | Tachometer drive shaft (5) | a. Disconnect from tachometer (7).
b. Remove from engine side of firewall (6). | |

4-56. TACHOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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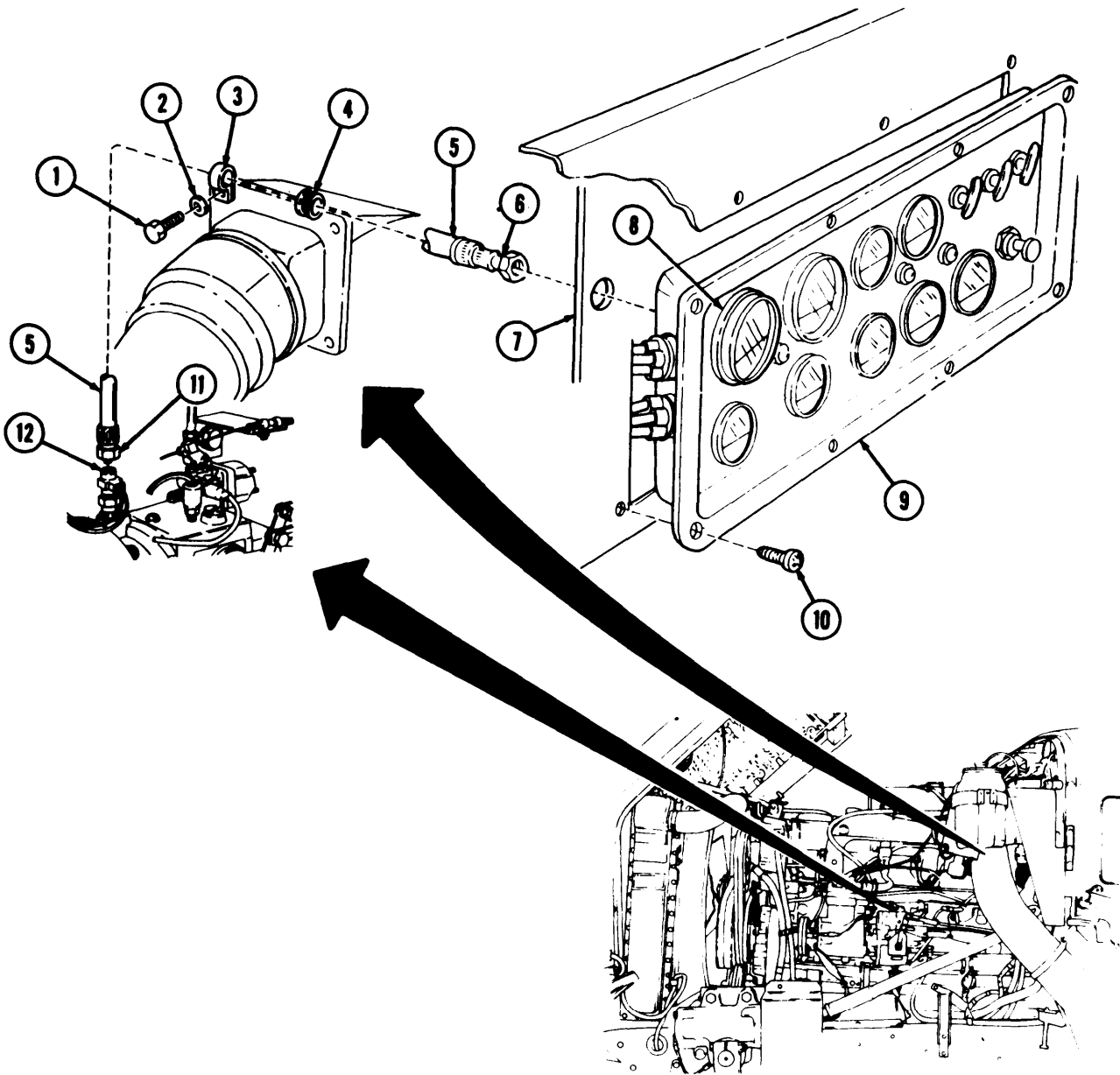
TA 349084

**4-56. TACHOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)**

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
7.		Drive shaft (5)	Inspect for bends and cracks.	Replace if bent or cracked.
c. Installation				
8.		Tachometer drive shaft (5)	a. Push through hole in firewall (7) to tachometer (8), b. Install to tachometer (8) with drive shaft nut (6).	
9.		Instrument cluster (9)	Install with eight screws (10).	
10.		New rubber grommet (4)	Slide over disconnected end of drive shaft (5) and position to hole in firewall (7).	
11.		Drive shaft (5)	Install to tachometer pulse sender unit (12) with drive shaft nut (11).	
12.		Loop clamp (3)	Position over drive shaft (5) and install with washer (2) and screw (1).	

4-56. TACHOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Install left splash shield (TM 9-2320-272-10).
 - Start engine (TM 9-2320-272-10) and check tachometer for proper operation.

TA 349085

4-57. INDICATOR PANEL LIGHTS ASSEMBLY AND LAMP REPLACEMENT

This task covers:

- | | |
|--------------------------|----------------------|
| a. Assembly Removal | c. Lamp Removal |
| b. Assembly Installation | d. Lamp Installation |
-

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

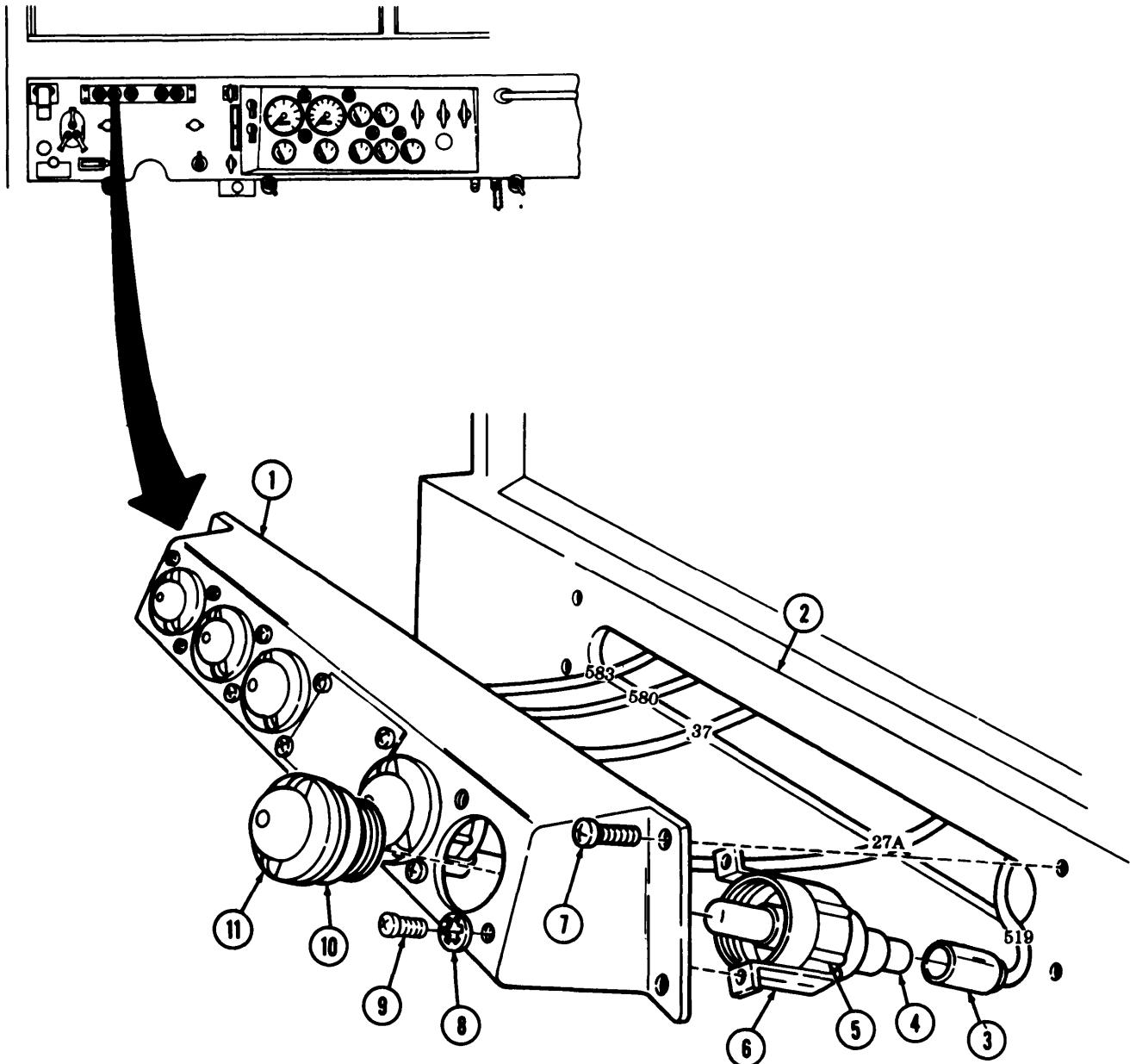
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Assembly Removal

- | | | | | |
|----|---|------------------------------------|--|--------------------------|
| 1. | Warning light panel assembly (1) to instrument panel (2) | Four screws (7) | Remove. | |
| 2. | | Warning light panel (1) | Pull away from instrument panel (2). | |
| 3. | | Lamp lens (11) and gasket (10) | Unscrew from high-beam lamp holder (5). | |
| 4. | Warning light panel assembly (1) to lamp holder bracket (6) | Two screws (9) and lockwashers (8) | Remove. | Discard lockwashers (4). |
| 5. | | Wire (3) | Disconnect from rear of lamp holder connector (4). | Tag for installation. |
| 6. | | Lamp holder (5) and bracket (6) | Remove. | |

4-57. INDICATOR PANEL LIGHTS ASSEMBLY AND REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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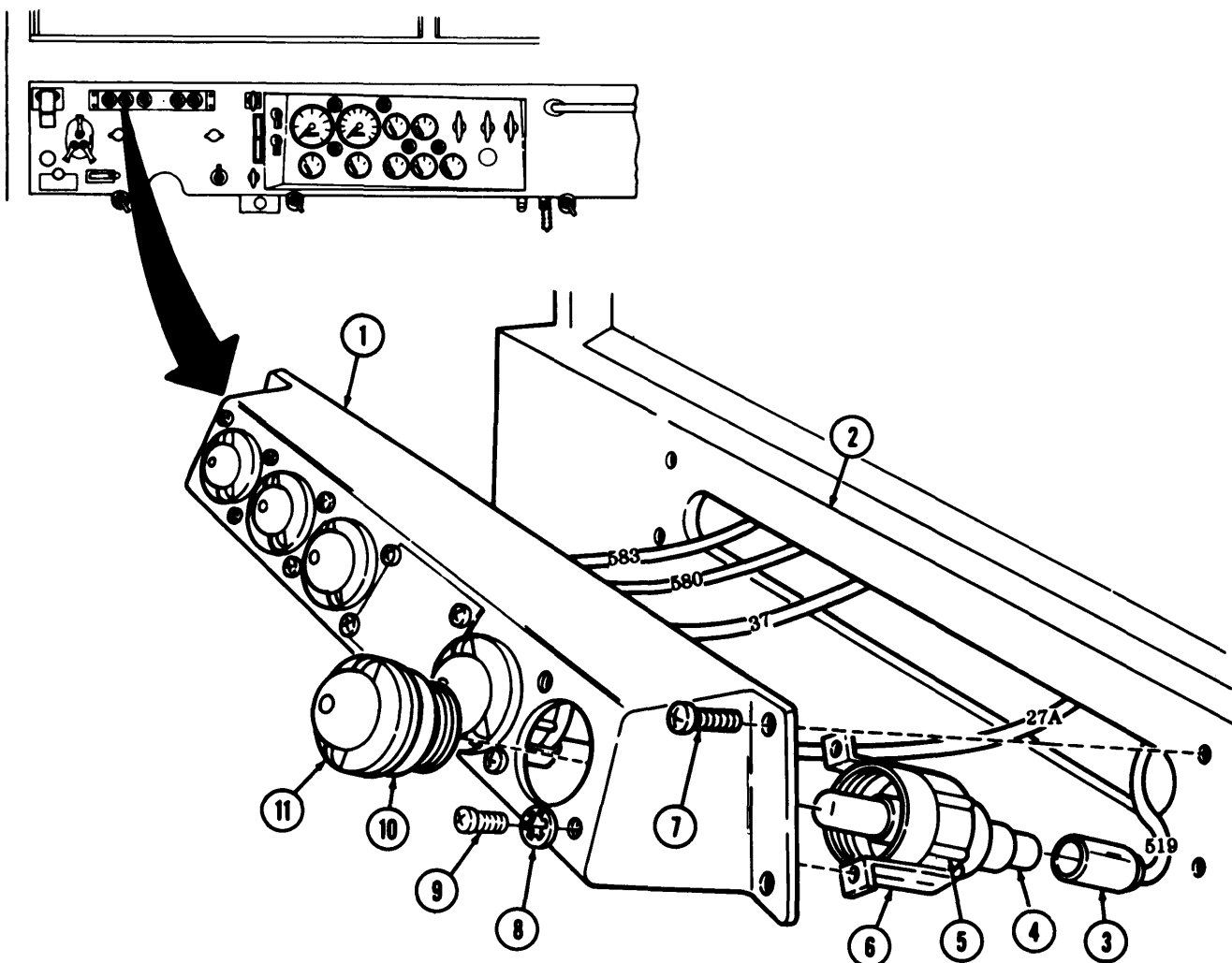
TA 349086

4-57 INDICATOR PANEL LIGHTS ASSEMBLY AND REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Assembly Installation

- | | | |
|-----|---------------------------------|---|
| 7. | Lamp holder (5) and bracket (6) | Install to warning light panel (1) with two new lockwashers (8) and screws (9). |
| 8. | Wire (3) | Connect to lamp holder connector (4). |
| 9. | Gasket (10) and lamp lens (11) | Install in lamp holder (5). |
| 10. | Warning light panel (1) | Install to instrument panel (2) with four screws (7). |



TA 349087

4-57. INDICATOR PANEL LIGHTS ASSEMBLY AND REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Lamp Removal

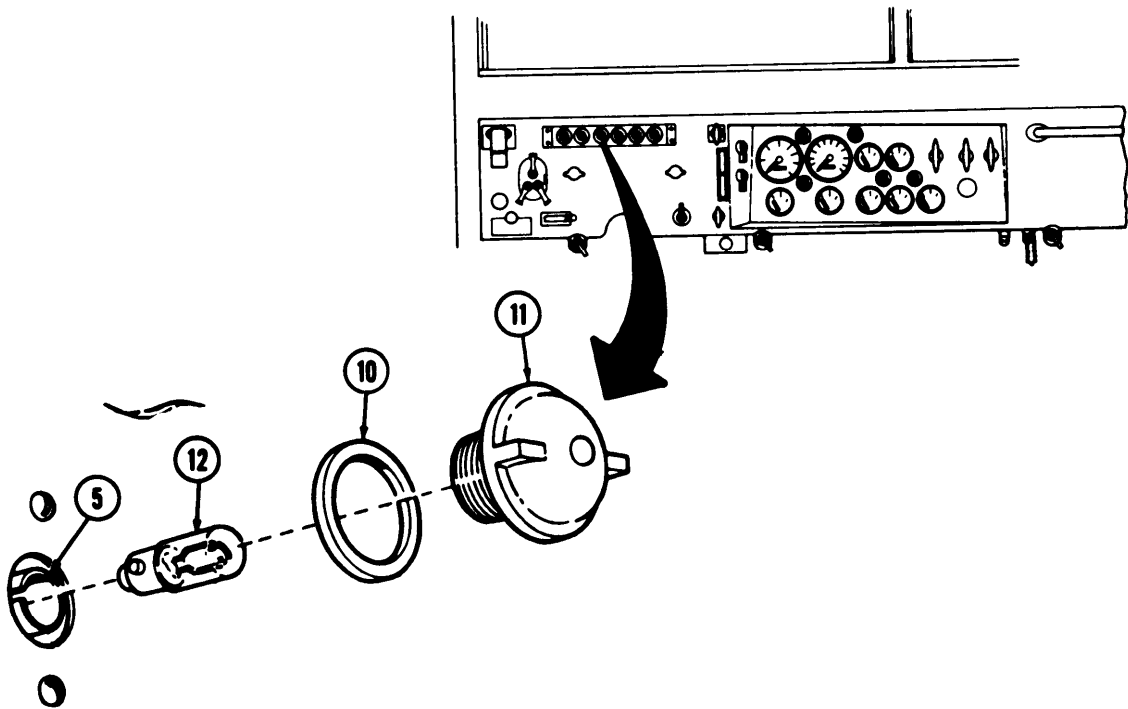
NOTE

AU panel light lamps are removed and installed the same.

- | | | |
|-----|--------------------------------|--|
| 11. | Lamp lens (11) and gasket (10) | Remove from lamp holder (5). |
| 12. | Lamp (12) | Push inward and turn counterclockwise to remove. |

d. Lamp Installation

- | | | |
|-----|--------------------------------|--|
| 13. | Lamp (12) | Push inward and turn clockwise to install. |
| 14. | Gasket (10) and lamp lens (11) | Install in lamp holder |



END OF TASK!

FOLLOW-ON TASK: Connect battery ground cables (para. 4-25).

TA 349088

4-58. OIL PRESSURE SENDING UNIT REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Left splash shield removed. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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-
1. Oil sending unit (2)

Wire (1)

Disconnect.
2. Adapter fitting (5)

Oil sending unit (2)

Remove.
3. Elbow (4)

Adapter fitting (5)

Remove.
4. Left side of engine (3)

Elbow (4)

Remove.

b. Installation

NOTE

Male pipe threads must be wrapped with sealing tape before installation.

5.

Elbow (4)

Install.
6.

Adapter fitting (5)

Install.
7.

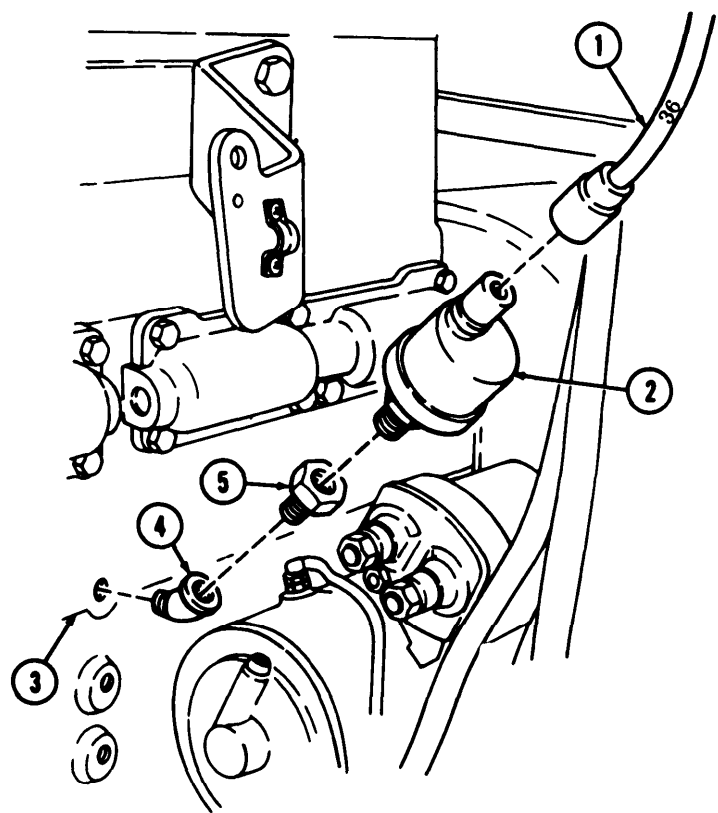
Oil sending unit (2)

Install.
8.

Wire (1)

Connect.

4-58. OIL PRESSURE SENDING UNIT REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

- FOLLOW-ON TASKS
- Install left splash shield (TM 9-2320-272-10).
 - Connect battery ground cables (para 4-25).
 - Start engine (TM 9-2320-272-10) and check for oil leaks.

TA 349089

4-59. FUEL LEVEL SENDING UNIT REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 10-45 Para. 4-25	Parking brake set. Spare tire carrier access step removed (M931 and M932). Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not perform this procedure near flames.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Diesel fuel is highly flammable. Do not perform fuel system procedures near open flame, injury to personnel may result.

a. Removal

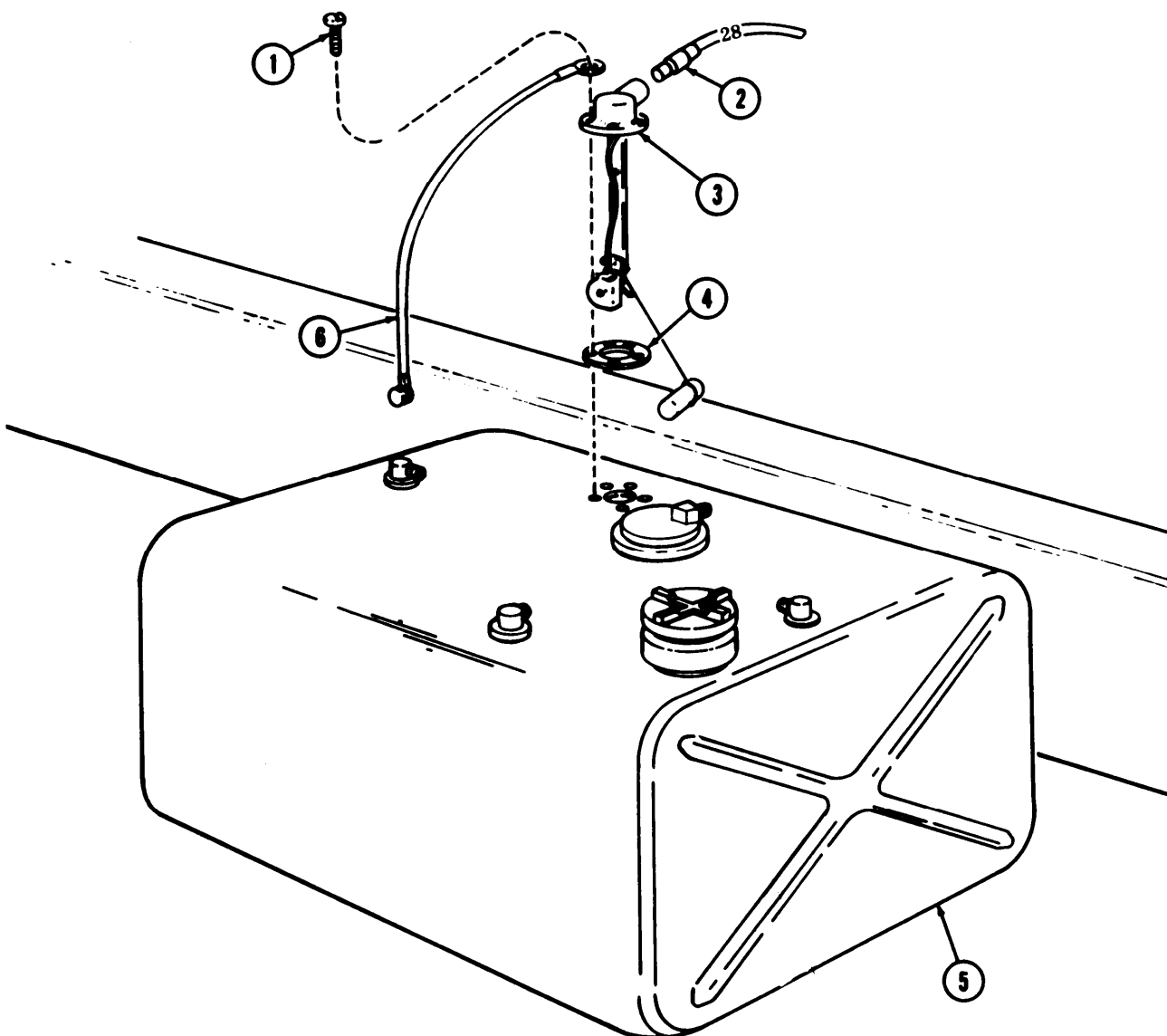
- | | | | | |
|----|-----------------------------------|-------------------------------------|----------------------------|---------------------|
| 1. | Sending unit (3) | Wire (2) | Disconnect. | |
| 2. | Sending unit (3) to fuel tank (5) | Five screws (1) and ground wire (6) | Remove, | |
| 3. | | Sending unit (3) and gasket (4) | Remove from fuel tank (5). | Discard gasket (4). |

b. Installation

- | | | | |
|----|--|---|-------------------------------|
| 4. | | New gasket (4), ground wire (6), and sending unit (3) | Install with five screws (1). |
| 5. | | Wire (2) | Connect to sending unit (3). |

4-59. FUEL LEVEL SENDING UNIT REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS
- Install spare tire carrier access step (M931 and M932) (para. 10-40).
 - Connect battery ground cables (para 4-25).
 - Start engine and check fuel gage (TM 9-2320-272-10).

TA 349090

4-60. WATER TEMPERATURE SENDING UNIT REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Battery ground cables disconnected. Right splash shield removed. Remove surge tank cap.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | |
|----|--|-----------------------------------|-------------|
| 1. | Engine temperature gage sending unit (2) | Wire (3) | Disconnect. |
| 2. | Water manifold (1) | Temperature gage sending unit (2) | Remove. |

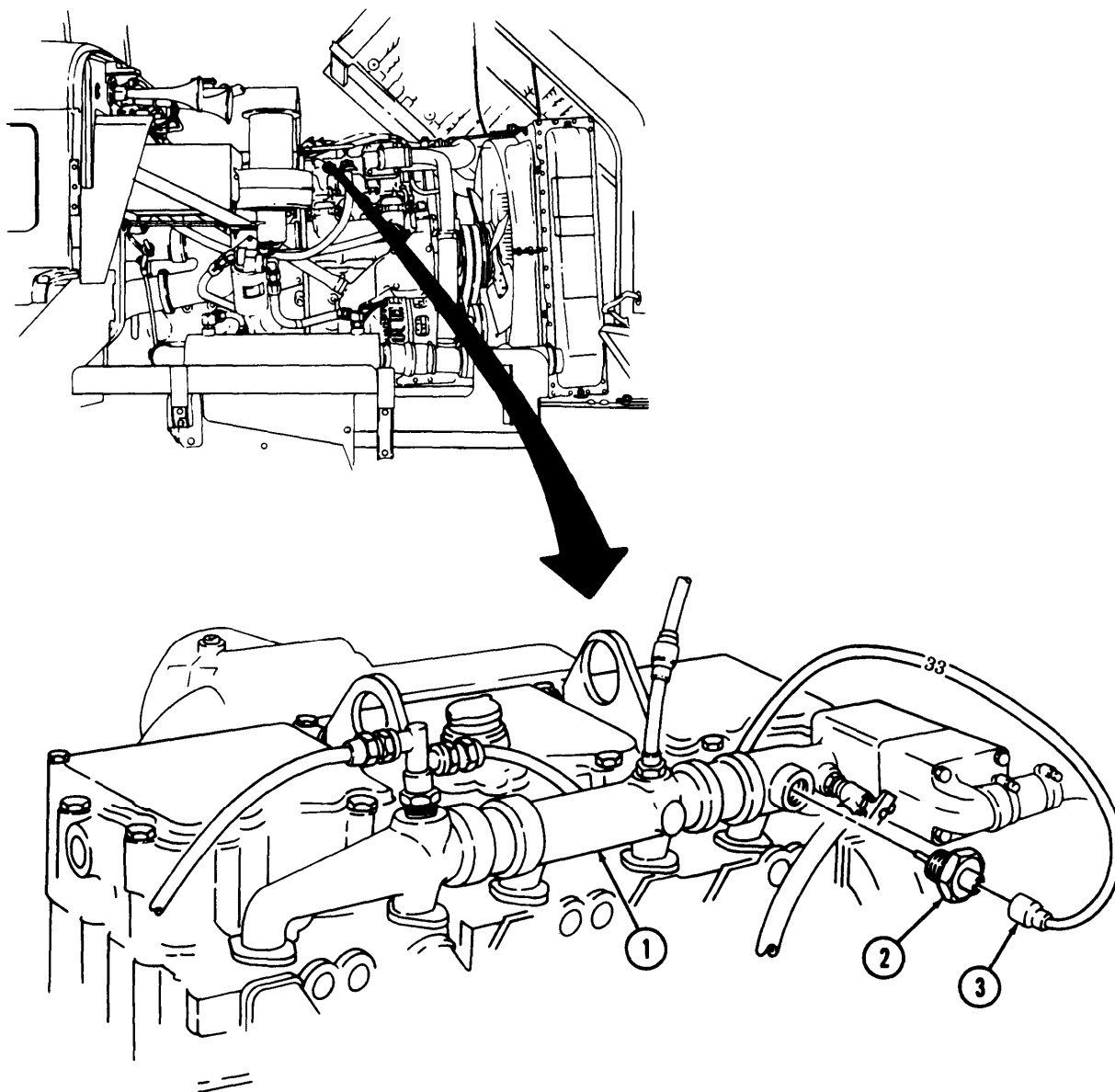
b. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----|-----------------------------------|---|
| 3. | Temperature gage sending unit (2) | Install in water manifold (1). |
| 4. | Wire (3) | Connect to temperature gage sending unit (2). |

4-60. WATER TEMPERATURE SENDING UNIT REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Replace surge tank cap (TM 9-2320-272-10).
 - Connect battery ground cables (para. 4-25).
 - Start engine (TM 9-2320-272-10) and check for leaks at water manifold. Check temperature gage for proper operation.
 - Install right splash shield (TM 9-2320-272-10).

TA 349091

4-61. TACHOMETER PULSE SENDER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All

Test Equipment

None

Special Tools

None

Materials/Parts

None

Personnel Required

Light-wheeled vehicle mechanic MOS 63B

Manual References

TM 9-2320-272-10
TM 9-2320-272-20P

Equipment Condition Reference

TM 9-2320-272-10
Para, 4-25

Condition Description

Parking brake set.
Battery ground cables disconnected.

Special Environmental Conditions

None

General Safety Instructions

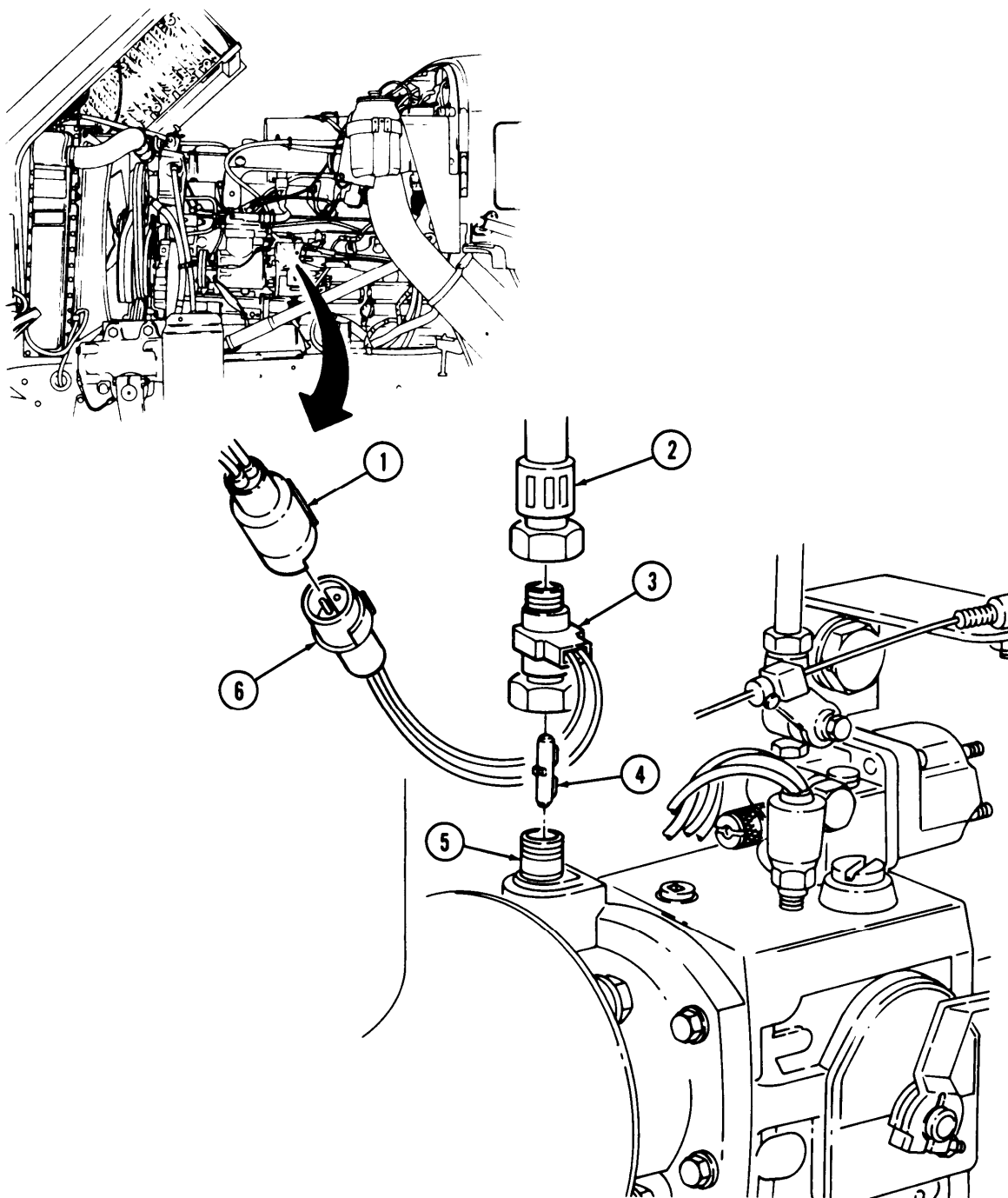
None

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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<u>a. Removal</u>				
1.	Pulse sender receptacle (6)	Tachometer pulse sender connector (1)	Disconnect.	
2.	Tachometer pulse sender (3)	Tachometer cable (2)	Remove.	
3.	Adapter fitting (5)	Tachometer pulse sender (3)	Remove.	
4.		Drive tip (4)	Remove.	
<u>b. Installation</u>				
5.		Drive tip (4)	Install in adapter fitting (5).	
6.		Tachometer pulse sender (3)	Install on adapter fitting (5).	
7.		Tachometer cable (2)	Install on tachometer pulse sender (3).	
8.		Tachometer pulse sender connector (1)	Connect to pulse sender receptacle (6).	

4-61. TACHOMETER PULSE SENDER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Start engine (TM9-2320-272-10) and test tachometer for proper operation.

4-62. FUEL PRESSURE TRANSDUCER REPLACEMENT

This task covers:

a. Removalb. Installation

INITIAL SETUP:		
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25 TM 9-2320-272-10	Parking brake set. Battery ground cable disconnected. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Harness wire (1) at top of fuel pump (3)	Fuel pressure transducer connector (4)	Disconnect.	
2.	Fuel pump (3)	Fuel pressure transducer (2)	Remove.	

b. Installation

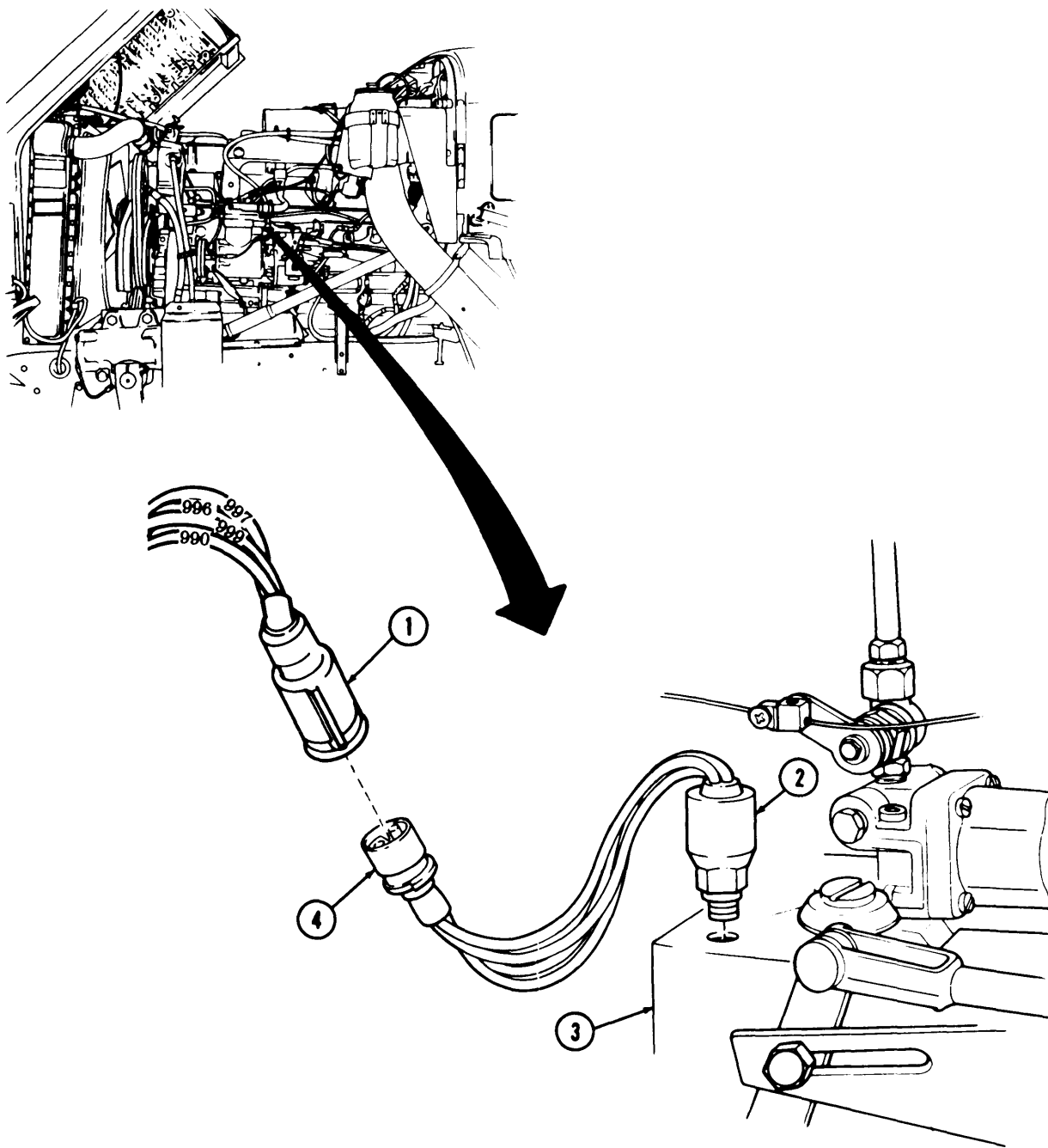
NOTE

Male pipe threads must be wrapped with sealing tape before installation.

3.		Fuel pressure transducer (2)	Install.	
4.		Fuel pressure transducer connector (4)	Connect.	

4-62. FUEL PRESSURE TRANSDUCER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Start engine (TM 9-2320- 272-10) and check fuel pressure gage for proper operation.
 - Install left splash shield (TM 9-2320-272-10).

TA 349093

4-63. TRANSMISSION TEMPERATURE TRANSMITTER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Access to transmitter can be gained through access plate on cab floor.

a. Removal

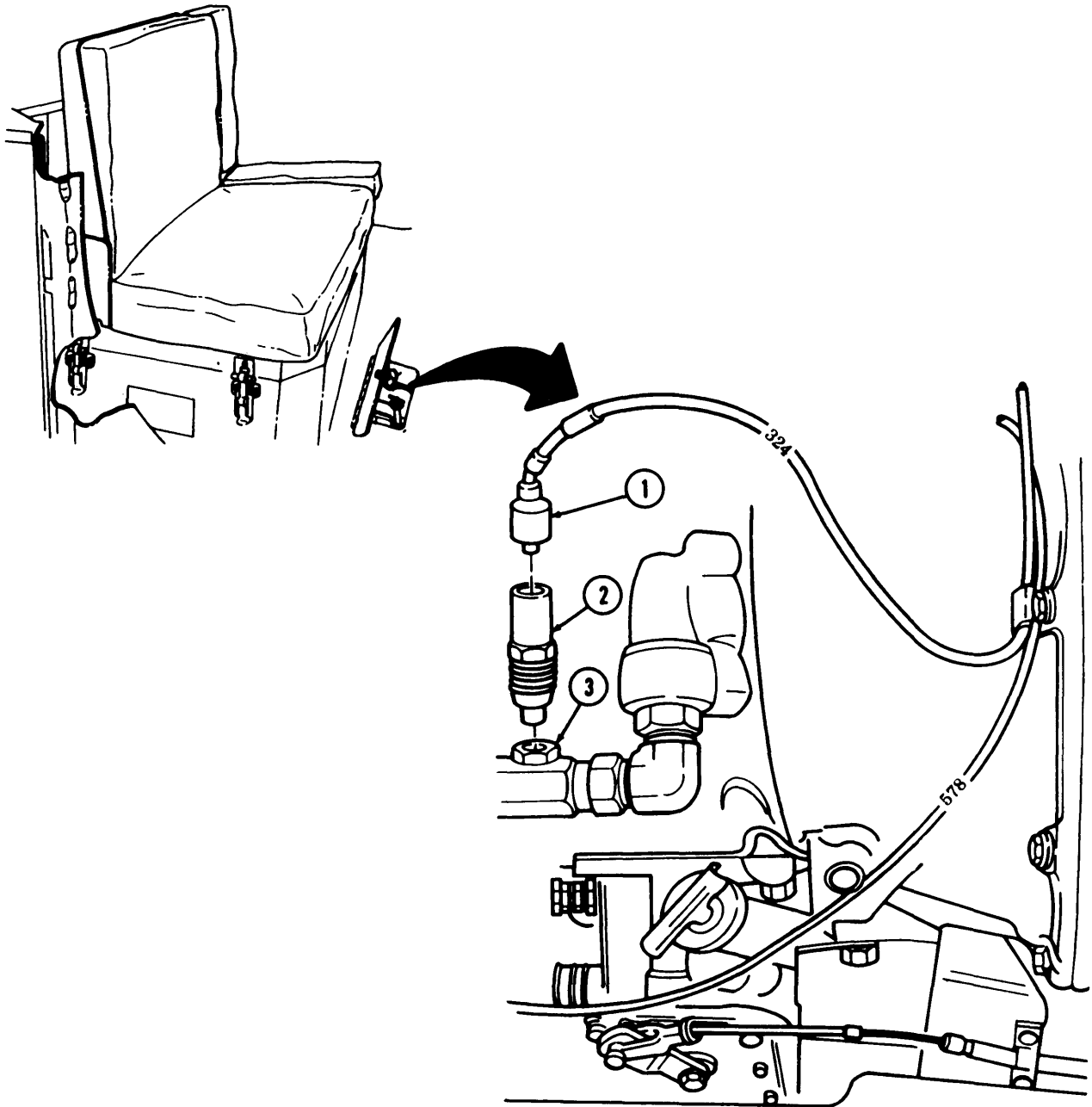
- | | | | |
|----|----------------------------------|-----------------------------|----------------|
| 1. | Temperature transmitter (2) | Wire (1) | Disconnect. |
| 2. | Transmission adapter fitting (3) | Temperature transmitter (2) | Remove. |

b. Installation

- | | | |
|----|-----------------------------|----------|
| 3. | Temperature transmitter (2) | Install. |
| 4. | Wire (1) | Connect. |

4-63. TRANSMISSION TEMPERATURE TRANSMITTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:
 Ž Connect battery ground cables (para. 4-25).
 Ž Start engine (TM 9-2320-272-10) and check transmission temperature gage for operation.

TA 349094

4-64. PRIMARY AND SECONDARY LOW AIR PRESSURE SWITCH REPLACEMENT

This task covers:

- a. Primary Switch Removal
- b. Primary Switch Installation

- c. Secondary Switch Removal
- d. Secondary Switch Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 0-2320-272-10 Para 4-25	Parking brake set. Air reservoirs drained. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		<ul style="list-style-type: none"> Do not disconnect air lines before draining air reservoirs. Do not touch hot exhaust system components with bare hands.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP N O .	LOCATION	ITEM	ACTION	REMARKS
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WARNING

- Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.
- Do not touch hot exhaust system components with bare hands. Injury to personnel may result.

a. Primary Switch Removal

- | | | | | |
|----|-------------------------------------|---|-------------|-----------------------|
| 1. | Primary low air pressure switch (5) | Wire (1) and wire (2) | Disconnect. | Tag for installation. |
| 2. | Adapter elbow (3) | Low air pressure switch (5) and adapter fitting (4) | Remove. | |

b. Primary Switch Installation**NOTE**

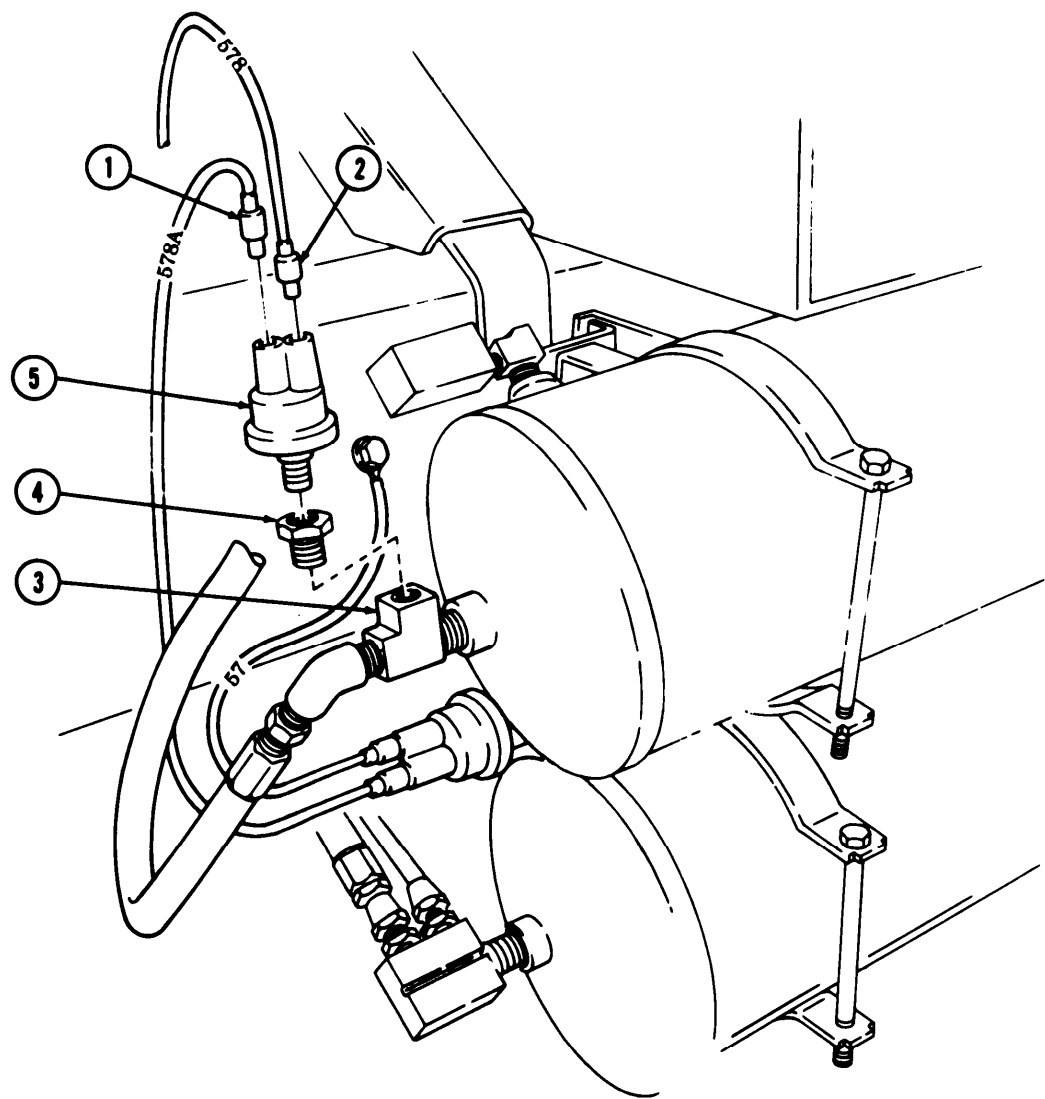
Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----|---|----------|
| 3. | Adapter fitting (4) and low air pressure switch (5) | Install. |
|----|---|----------|

4-64. PRIMARY AND SECONDARY LOW AIR PRESSURE SWITCH
REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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4.		Wires (1) and (2)	Connect.	
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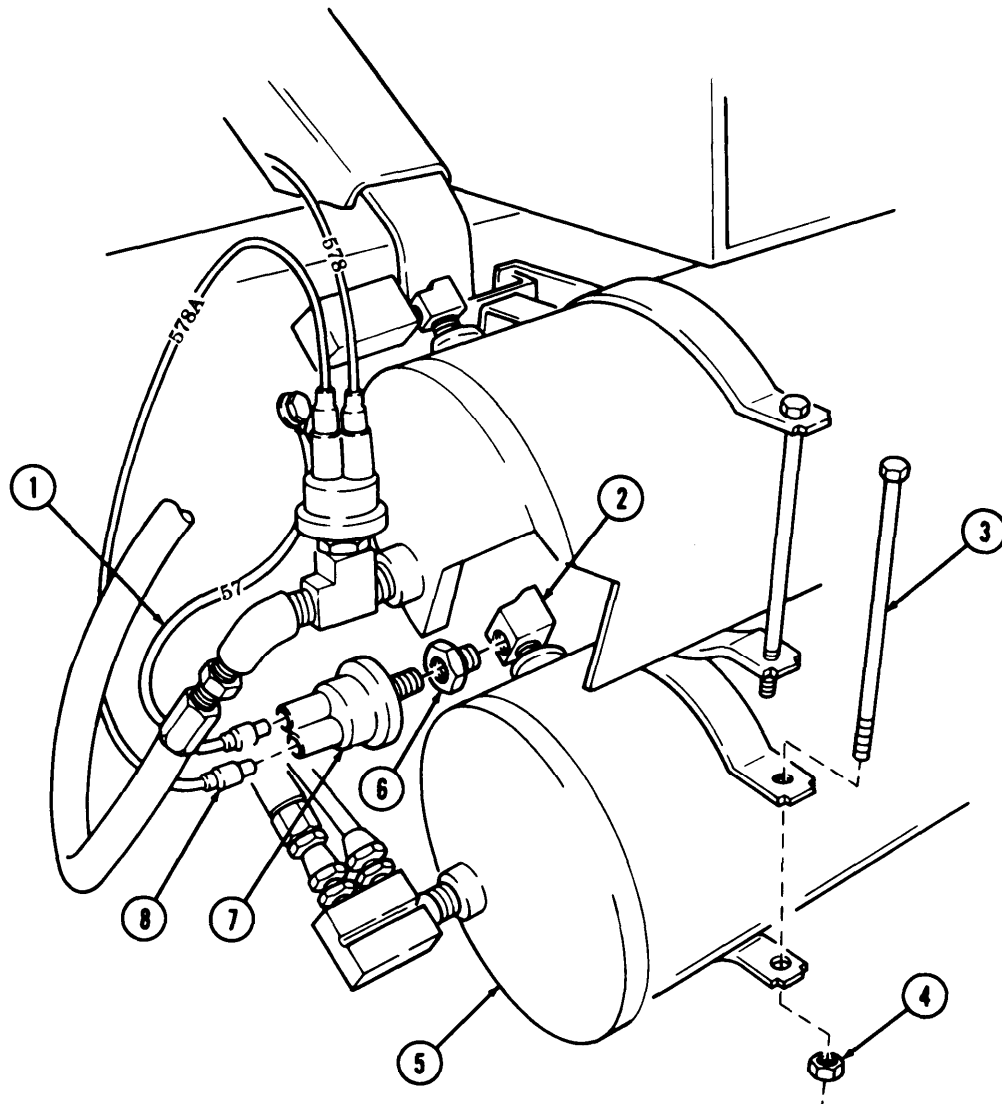


4-64. PRIMARY AND SECONDARY LOW AIR PRESSURE SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Secondary Switch Removal				
5.	Secondary low air pressure switch (7)	Wire (8) and ground wire (1)	Disconnect.	Tag for installation.
NOTE				
Assistant will help with steps 6 and 7.				
6.	Secondary air reservoir (5)	Two bolts (3) and nuts (4)	Remove.	
7.		Secondary air reservoir (5)	Push and rotate air reservoir (5) toward rear of vehicle.	
8.	Adapter elbow (2)	Low air pressure switch (7) and adapter fitting (6)	Remove.	
d. Secondary Switch Installation				
NOTE				
Male pipe threads must be wrapped with sealing tape before installation.				
9.		Adapter fitting (6) and low air pressure switch (7)	Install.	
NOTE				
Assistant will help with step 10.,				
10.		Secondary air reservoir (5)	Install with two bolts (3) and nuts (4).	
11.		Wire (8) and ground wire (1)	Connect.	

4,64. PRIMARY AND SECONDARY LOW AIR PRESSURE SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:

- Connect battery ground cable (para. 4-25).
- Start engine (TM 9-2320-272-10) and allow air pressure to build up to normal operating range. Check for air leaks at switch. Check if air pressure warning light and buzzer stop operating once air pressure has built up to 60 psi (413 kPa). TA 349096

4-65. SPRING BRAKE PRESSURE SWITCH REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Air reservoirs drained. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not disconnect air lines before draining air reservoirs.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

a. Removal

- | | | | |
|----|--|----------------------------------|-------------------------------------|
| 1. | Instrument cluster (2) | Eight screws (3) | Remove. |
| 2. | | Instrument cluster (2) | Separate from instrument panel (1). |
| 3. | Spring brake pressure switch (7) | Two wires (8) | Disconnect. |
| 4. | | Spring brake pressure switch (7) | Remove. |
| 5. | Spring brake release control valve (4) | Fitting (6) and elbow (5) | Remove. |

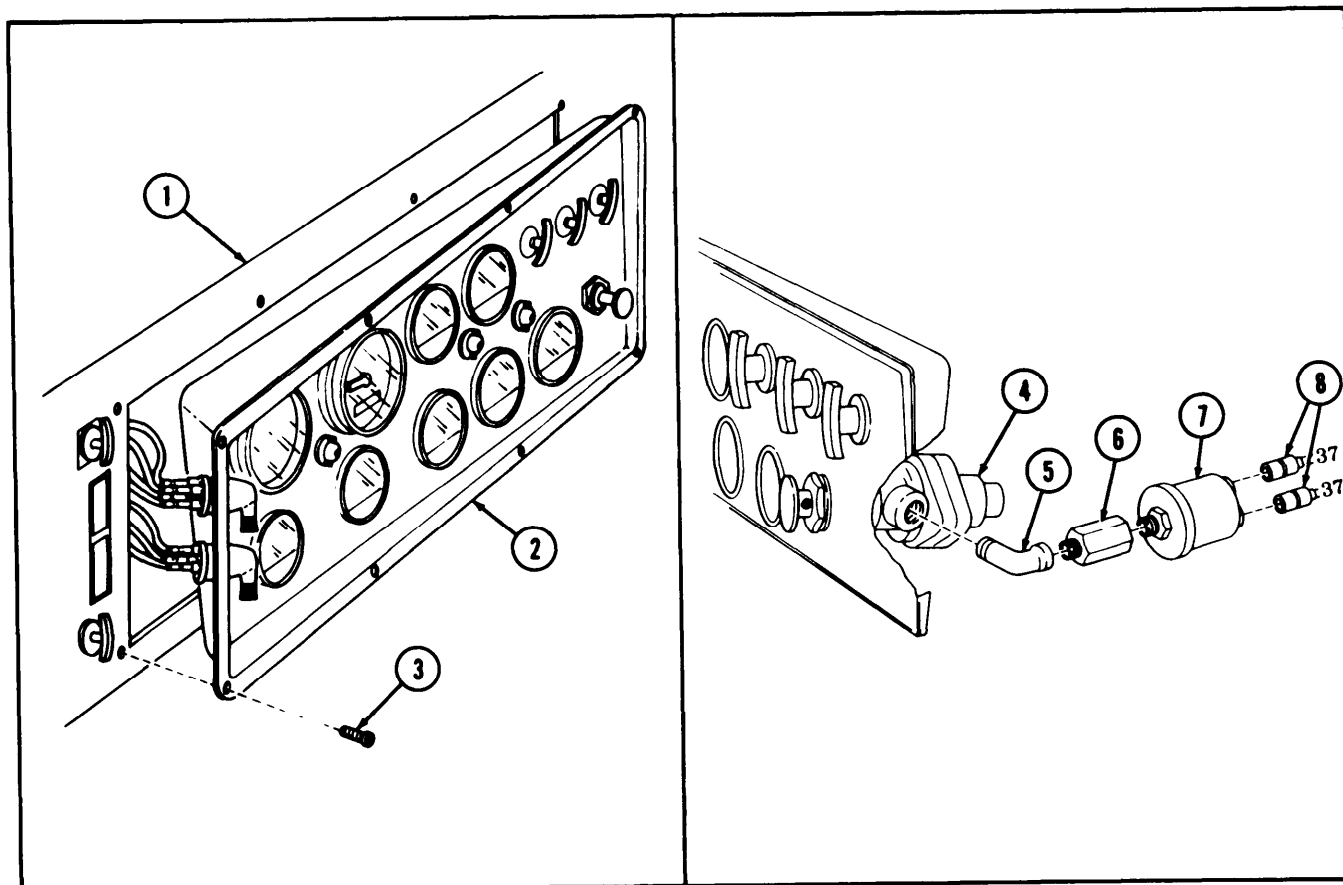
4-65. SPRING BRAKE PRESSURE SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----|--|--------------------------------|
| 6. | Elbow (5), fitting (6), and spring brake pressure switch (7) | Install. |
| 7. | Two wires (8) | Connect. |
| 8. | Instrument cluster (2) | Install with eight screws (3). |



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Start engine (TM 9-2320-272-10) and allow air pressure to build up to normal operating range. Check for air leaks where switch is attached to valve. Stop engine and engage spring brakes. Spring brake warning light should glow.

TA 349097

4-66. FRONT-WHEEL DRIVE LOCK-IN SWITCH REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Air reservoirs drained. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not disconnect air lines before draining air reservoirs.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

a. Removal

- | | | | |
|----|---|---------------------|-------------|
| 1. | Front-wheel drive pressure switch (2) | Wire connector (3) | Disconnect. |
| 2. | Front-wheel drive lock-in valve elbow (1) | Pressure switch (2) | Remove. |

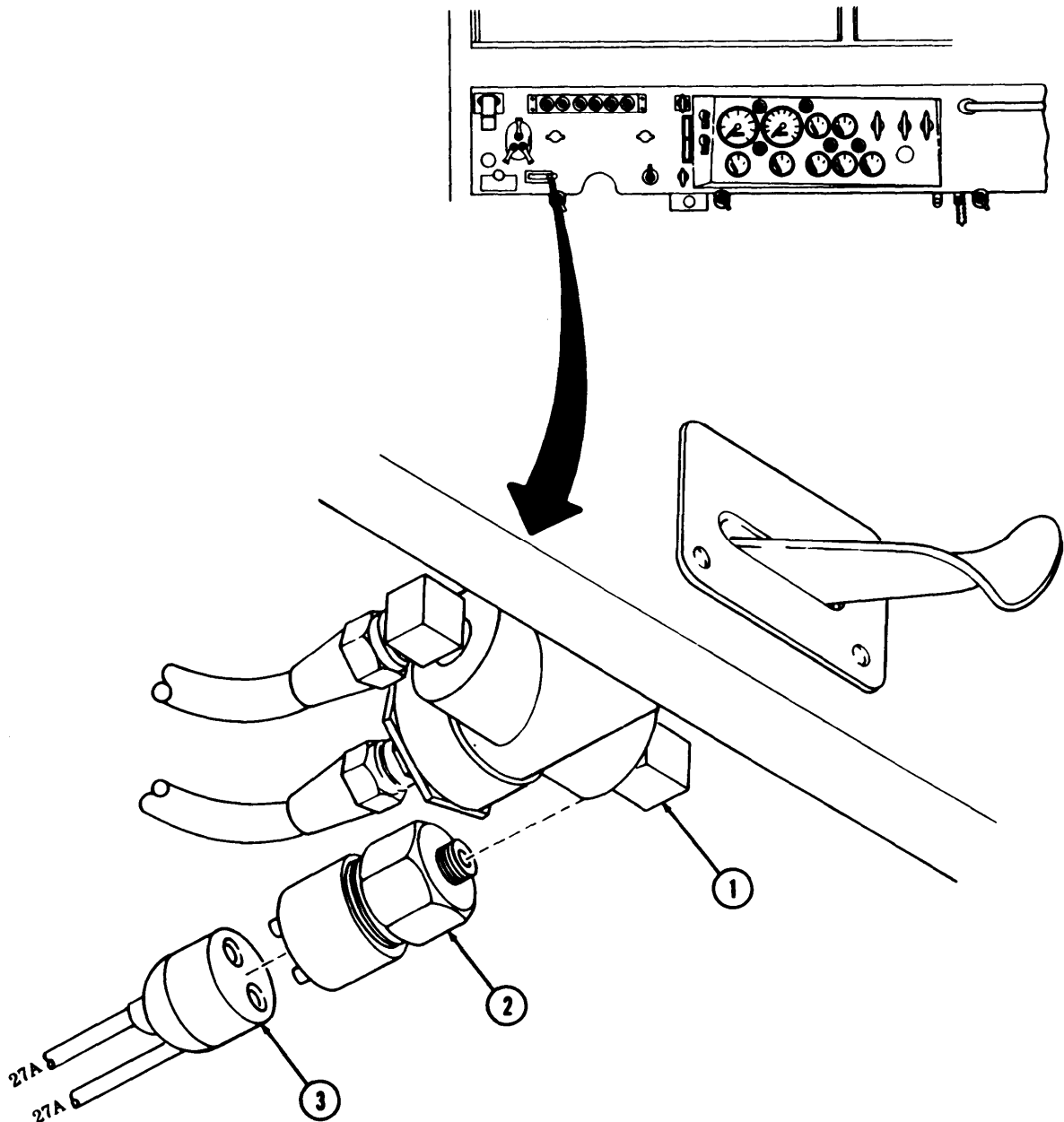
b. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----|---------------------|----------|
| 3. | Pressure switch (2) | Install, |
| 4. | Wire connector (3) | Connect. |

4-66. FRONT-WHEEL DRIVE LOCK-IN SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para 4-25).
 - Start engine (TM 9-2320-272-10) and allow air pressure to build up to normal operating range. Check for air leaks at switch.
 - Engage front-wheel drive and check if AXLE LOCK-IN indicator light is illuminated.

TA 349098

4-67. TRANSMISSION NEUTRAL START SWITCH REPLACEMENT

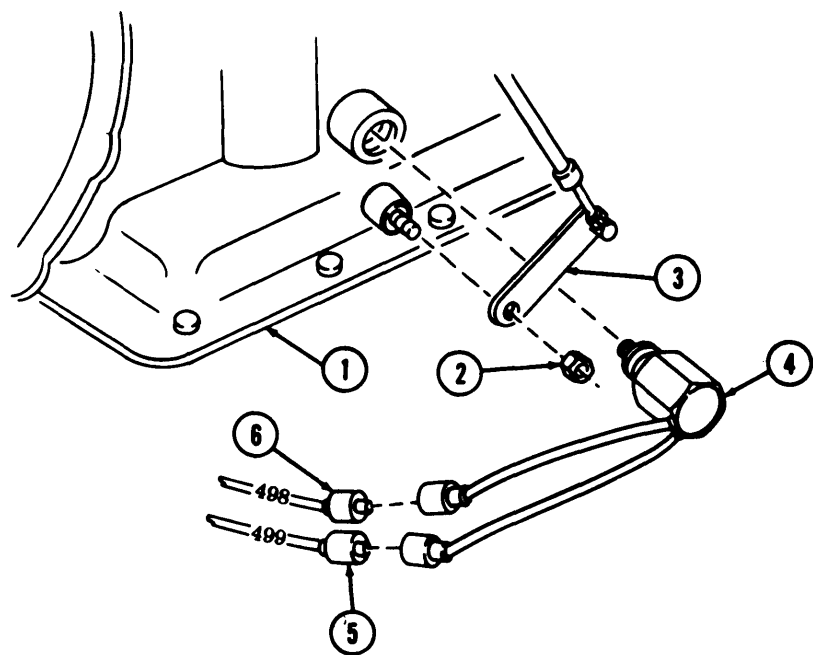
This task covers:

a. Removal**b. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Metric locknut		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Left side transmission (1)	Retainer shift linkage (3) and metric locknut (2)	Remove.	Discard metric locknut (2).
2.	Neutral start switch (4)	Wire (5) and wire (6)	Disconnect.	Tag for installation.
3.	Left side transmission (1)	Neutral start switch (4)	Remove.	
b. Installation				
4.		Neutral start switch (4)	Install.	Do not overtighten.
5.		Wire (5) and wire (6)	Connect.	
6.		Retainer shift linkage (3)	Install with new metric locknut (2).	

4-67. TRANSMISSION NEUTRAL START SWITCH REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para 4-25).
 - Check operation of neutral start switch (TM 9-2320-272-10).

TA 349099

4-68. HORN CONTACT BRUSH REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 4-25 TM 9-2320-272-10	Parking brake set. Battery ground cables disconnected, Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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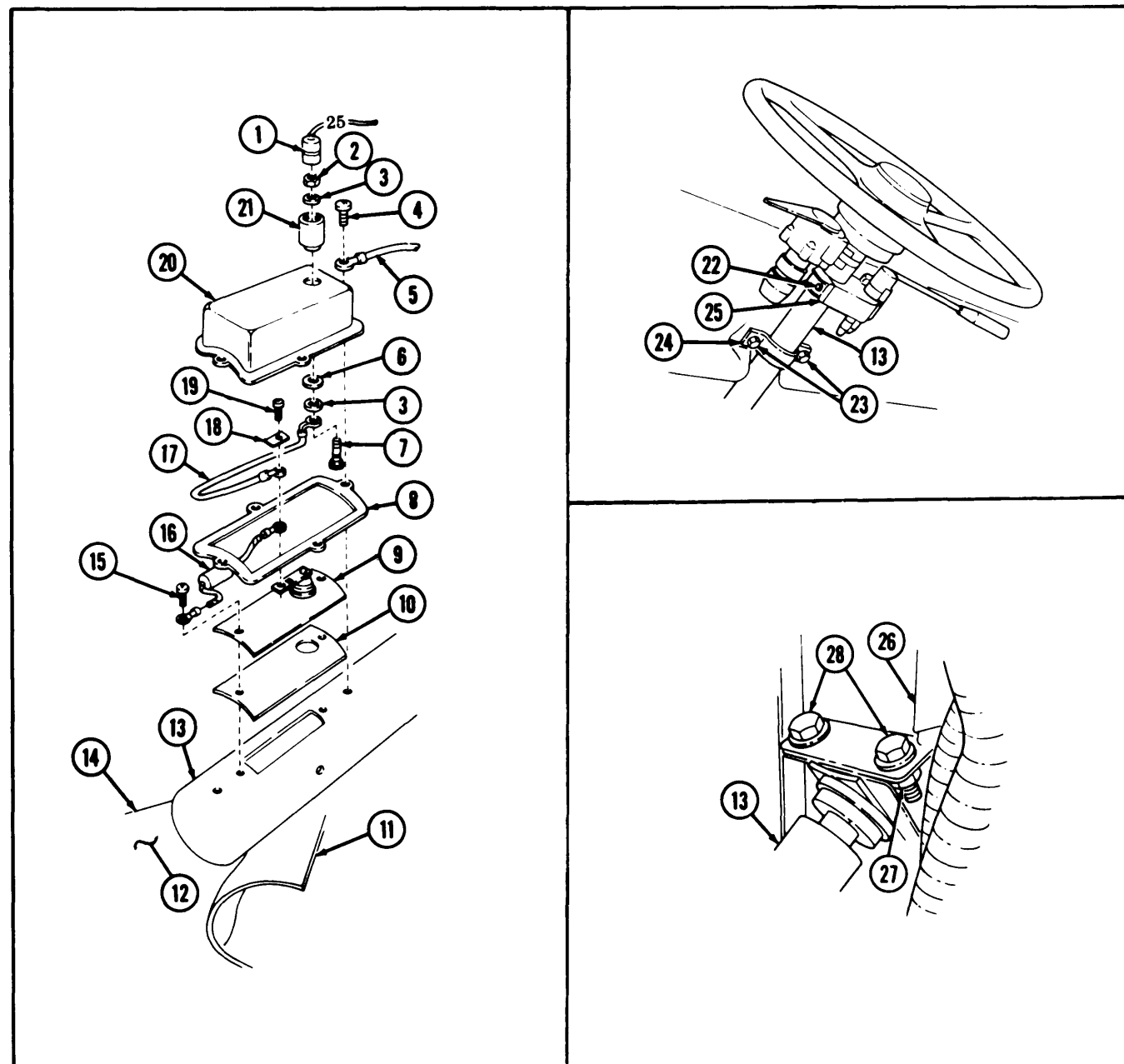
a. Removal

1.	Outer cab firewall (26)	Two screws (28) and nuts (27)	Loosen.	
2.	Trailer brake control valve bracket (25)	Two screws (22)	Loosen.	M931 and M932 only.
3.	Steering column bracket (24)	Two screws (23)	Loosen.	Turn steering column (13) until contact brush cover (20) is free of firewall (14).
4.	Steering column (13) and inside cab floor (12)	Floormat (11)	Separate from steering column (13).	
5.	Brush cover (20)	Connector (1) and boot (21)	Disconnect.	
6.		Four screws (4), wire (5), contact brush cover (20), and gasket (8)	Remove.	
7.	Contact brush (9)	Screw (19) and lock-tab (18)	Remove.	Disconnect wire (17) and capacitor (16).
8.	Steering column (13)	Two screws (15), capacitor (16), contact brush (9), and pad (10)	Remove.	

4-68. HORN CONTACT BRUSH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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- | | | | | |
|----|---------------------------------|---|---------|--|
| 9. | Top of contact brush cover (20) | Nut (2), two washers (3), washer (6), wire (17), screw (7), and boot (21) | Remove. | |
|----|---------------------------------|---|---------|--|

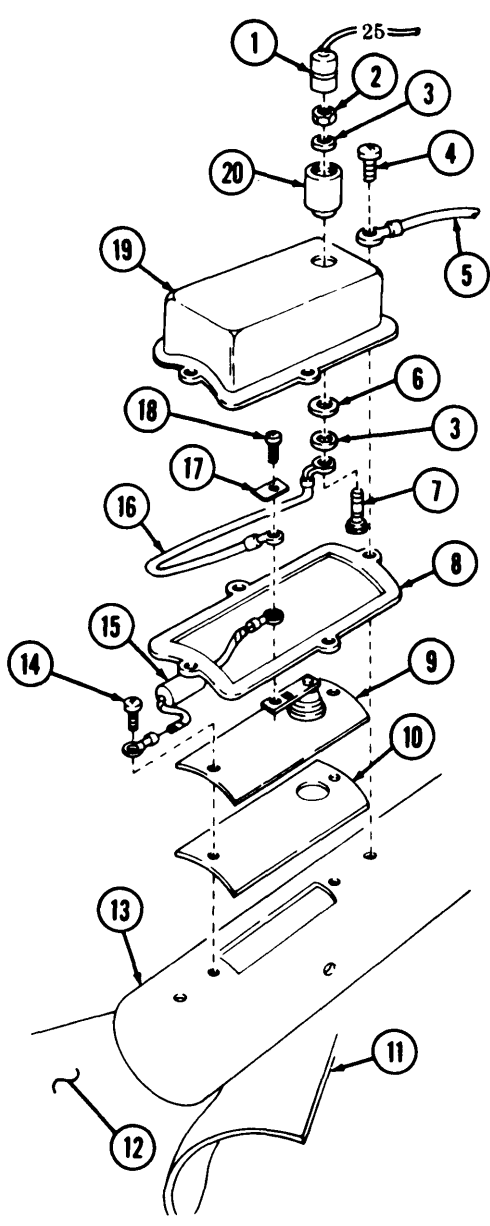
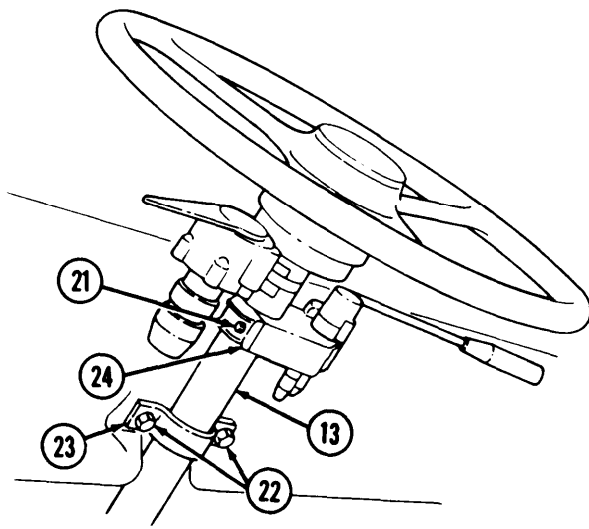
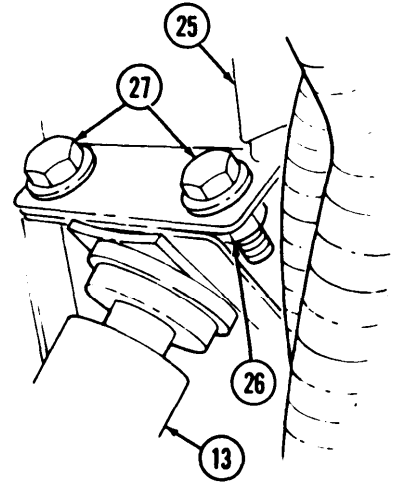


TA 349100

4-68. HORN CONTACT BRUSH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
10.		Pad (10), contact brush (9), and capacitor (15)	Install with two screws (14).	
11.		Boot (20) and wire (16)	Install with screw (7), two washers (3), washer (6), and nut (2).	
12.		Wire (16) and capacitor (15)	Install with screw (18) and locktab (17).	
13.		Gasket (8), contact brush cover (19), and ground wire (5)	Install with four screws (4).	
14.		Connector (1) and boot (20)	Connect.	
15.		Steering column (13)	Turn until contact brush cover (19) is on top.	
16.	Cab floor (12)	Floormat (11)	Position against steering column (13).	
17.	Steering column bracket (23)	Two screws (22)	Tighten.	
18.	Trailer brake control valve bracket (24)	Two screws (21)	Tighten.	M931 and M932 only.
19.	Outer cab firewall (25)	Two screws (27) and nuts (26)	Tighten.	

4-68. HORN CONTACT BRUSH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				

END OF TASK!

- FOLLOW-ON TASKS:
- Connect battery ground cables (para. 4-25).
 - Check horn for proper operation.
 - Install left splash shield (TM 9-2320-272-10).

TA 349101

4-69. HORN, SOLENOID, AND BRACKET REPLACEMENT

This task covers:

- a. Removal

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Air reservoirs drained. Hood raised and secured. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		
None		
<u>Materials/Parts</u>		
Two lockwashers Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B (2)		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		
<u>Special Environmental Conditions</u>		
		None
<u>General Safety Instructions</u>		
		Do not disconnect air lines before draining air reservoirs.

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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I a. Removal I

- | | | |
|----------------------|-----------------------|-------------|
| 1. Horn solenoid (5) | Wire (6) and wire (7) | Disconnect. |
|----------------------|-----------------------|-------------|

WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

- | | | | |
|----|-------------------|--------------|-------------|
| 2. | Elbow (3) | Air line (4) | Disconnect. |
| 3. | Horn solenoid (5) | Elbow (3) | Remove. |

NOTE

Horn solenoid to horn fitting (17) may become disconnected from horn solenoid (5) during removal. Horn solenoid (5) and fitting (17) are replaced as an assembly.

- | | | | | |
|----|-------------------|---|---------|---------------------------|
| 4. | Horn (2) | Horn solenoid (5) | Remove. | |
| 5. | Horn bracket (13) | Two nuts (10), wire (9), two lockwashers (11) and two screws (1), and horn (2) | Remove. | Discard lockwashers (11). |

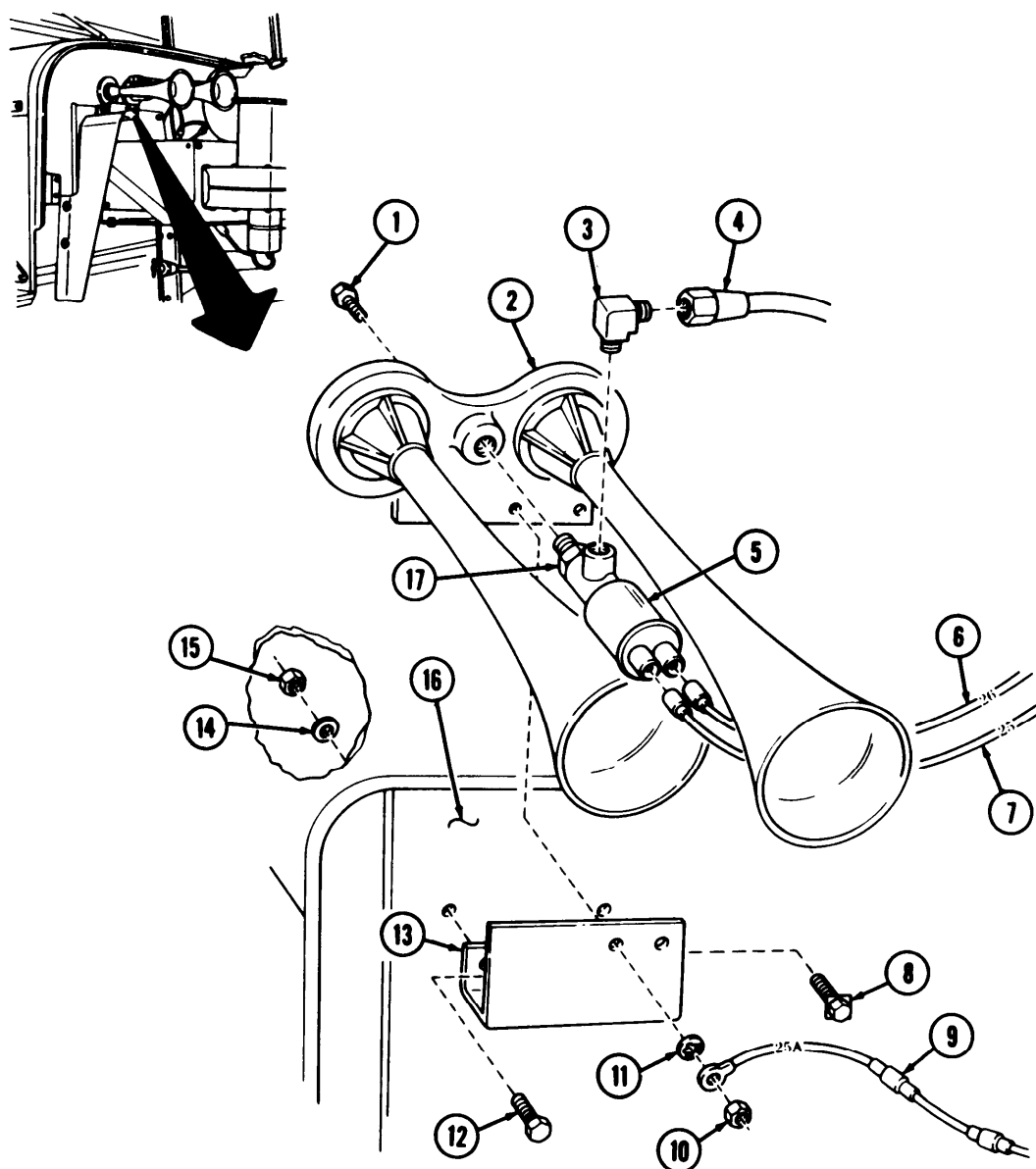
4-69. HORN, SOLENOID, AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REWORKS
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NOTE

Assistant will help with step 6.

6.	Firewall (16)	Screw-assembled lock-washer (8), screw (12), washer (14), nut (15), and bracket (13)	Remove.	Pull insulation away from inside cab firewall to reach washer (14) and nut (15).
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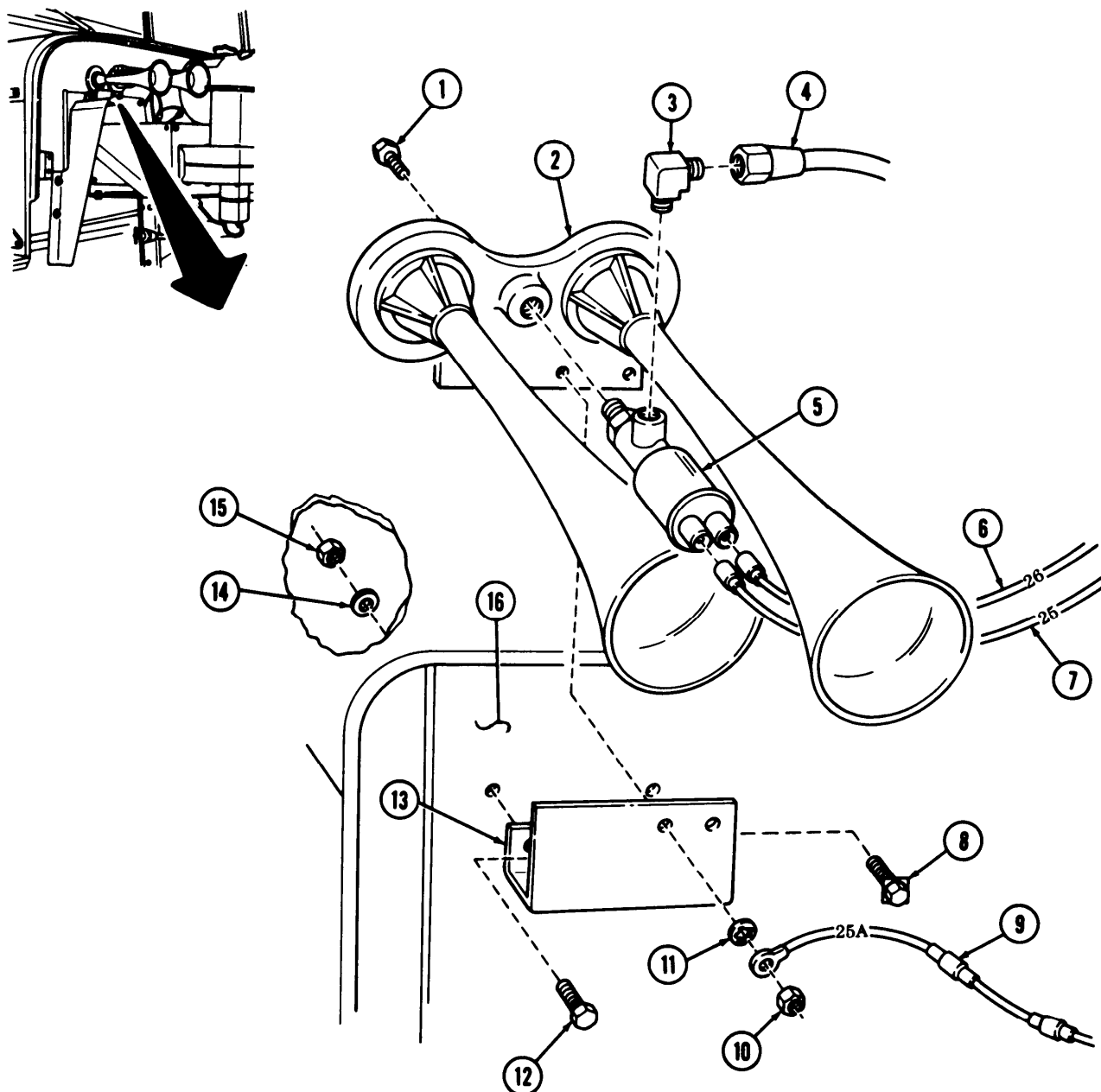
TA 349102

4-69. HORN, SOLENOID, AND BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> When new solenoid is installed, fitting from old solenoid may be used. Fitting must be cleaned and inspected for cracks or stripped threads. Male pipe threads must be wrapped with sealing tape before installation. Assistant will help with step 7. 				
7.		Bracket (13)	Install with screw (12), washer (14), nut (15), and screw-assembled lockwasher (8).	Pull insulation away from inside cab firewall (16) to install washer (14) and nut (15).
8.		Horn (2)	Install with two screws (1) and new lockwashers (11), wire (9), and two nuts (10).	
9.		Horn solenoid (5)	Install.	
10.		Elbow (3)	Install.	
11.		Air line (4)	Connect.	
12.		Wire (6) and wire (7)	Connect.	

4-69. HORN, SOLENOID, AND BRACKET REPLACEMENT

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:**
- Connect battery ground cables (para 4-25).
 - Start engine (TM 9-2320-272-10) and allow air pressure to build up to normal operating range. Check for air leaks at horn solenoid.
 - Check horn for proper operation (TM 9-2320-272-10).

TA 349103

4-70. HORN SWITCH REPLACEMENT

This task covers

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable. Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
"O" ring		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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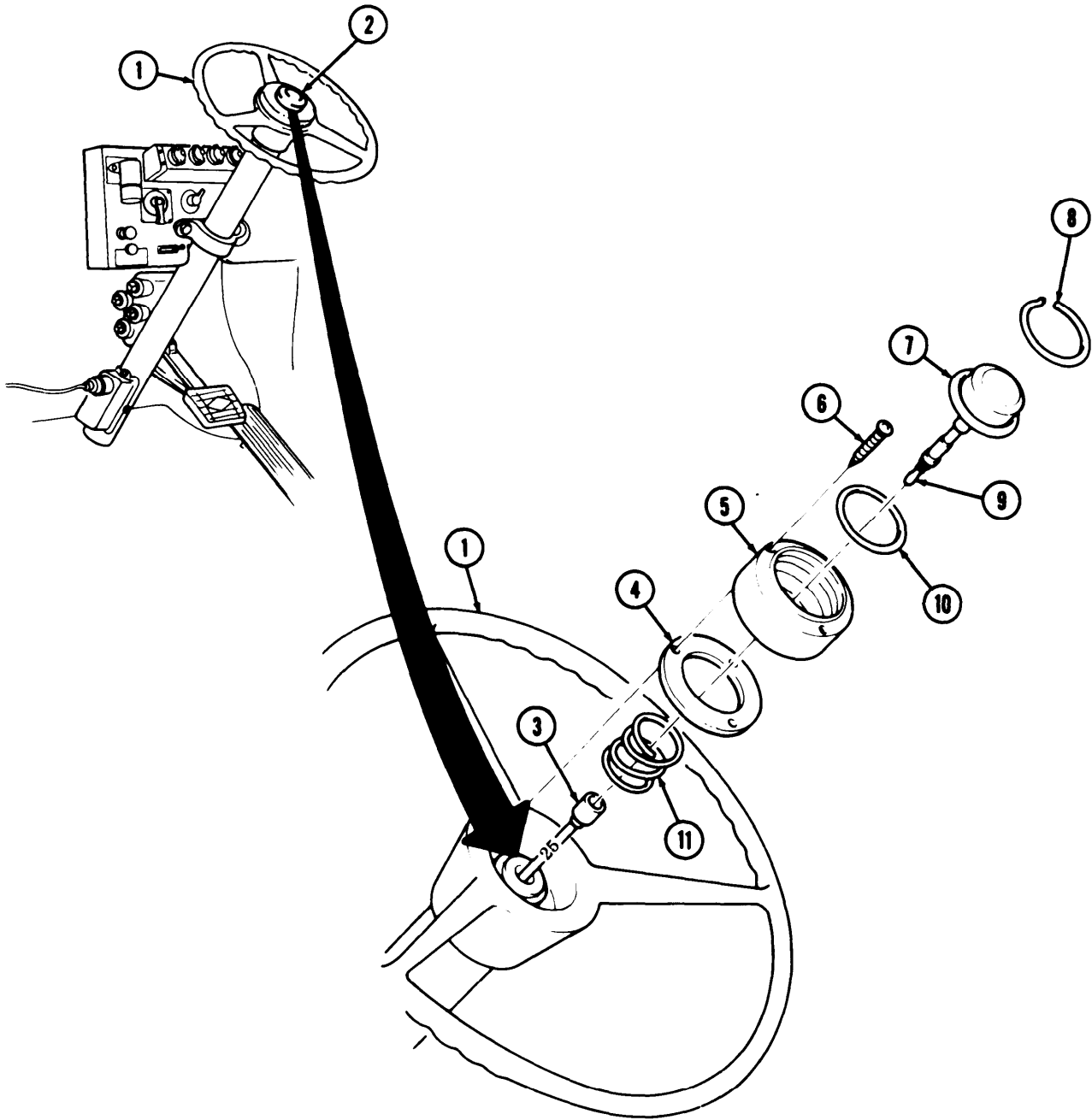
a. Removal

1.	Steering wheel (1)	Three screws (6) and horn switch assembly (2)	Remove.	Lifting will be restricted by electrical connection.
2.	Diode lead (3)	Horn switch connector (9)	Disconnect.	
3.		Spring (11) and seat (4)	Remove.	
4.	Adapter (5)	Retaining ring (8), horn switch (7), and "O" ring (10)	Remove.	Discard "O" ring (10).

b. Installation

5.		New "O" ring (10), horn switch (7), and retaining ring (8)	Install to adapter (5).
6.		Seat (4) and spring (11)	Install over diode lead (3).
7.		Horn switch connector (9)	Connect to diode lead (3).
8.		Horn switch assembly (2)	Install with three screws (6).

4-70. HORN SWITCH REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

- FOLLOW-ON TASKS:**
- Connect battery ground cables (para. 4-25).
 - Check horn for proper operation (TM 9-2320-272-10).

4-71. CIRCUIT BREAKER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-25	Parking brake set. Hood raised and secured. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

Perform steps 1 and 2 to remove circuit breakers located on engine firewall.

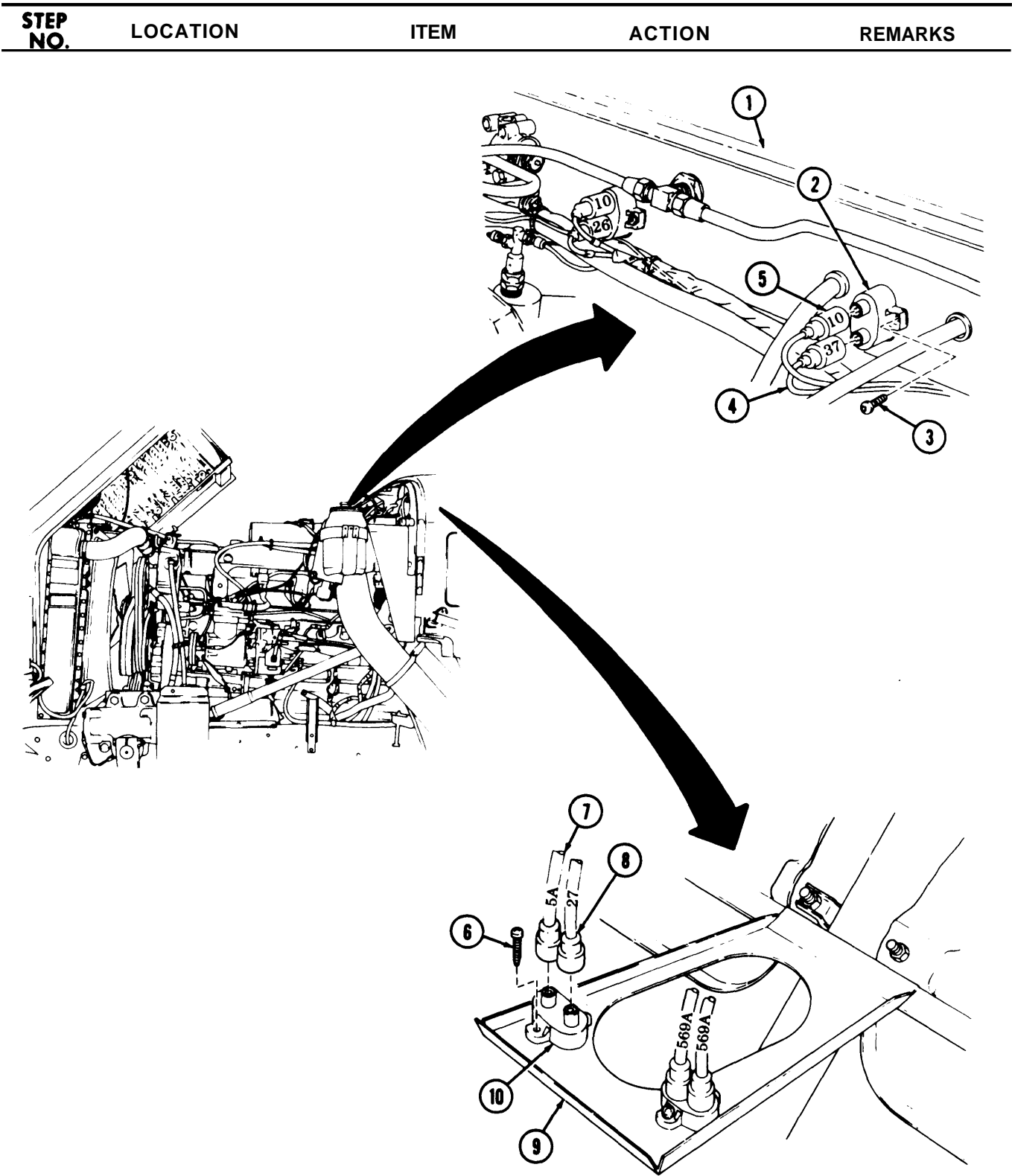
- | | | | | |
|----|---------------------|--|-------------|-----------------------|
| 1. | Circuit breaker (2) | Wires (4) and (5) | Disconnect. | Tag for installation. |
| 2. | Firewall (1) | Two screws (3) and circuit breaker (2) | Remove. | |

NOTE

Perform steps 3 and 4 to remove circuit breakers located behind the instrument panel and above steering column.

- | | | | | |
|----|----------------------------|---|-------------|--|
| 3. | Circuit breaker (10) | Wires (7) and (8) | Disconnect. | Tag for installation. |
| 4. | Instrument panel brace (9) | Two screws (6) and circuit breaker (10) | Remove. | Grip screws (6) shank end with pliers to loosen. |

4-71. CIRCUIT BREAKER REPLACEMENT (Cont'd)



4-71. CIRCUIT BREAKER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

NOTE

Perform steps 5 and 6 to install circuit breakers on engine **firewall**.

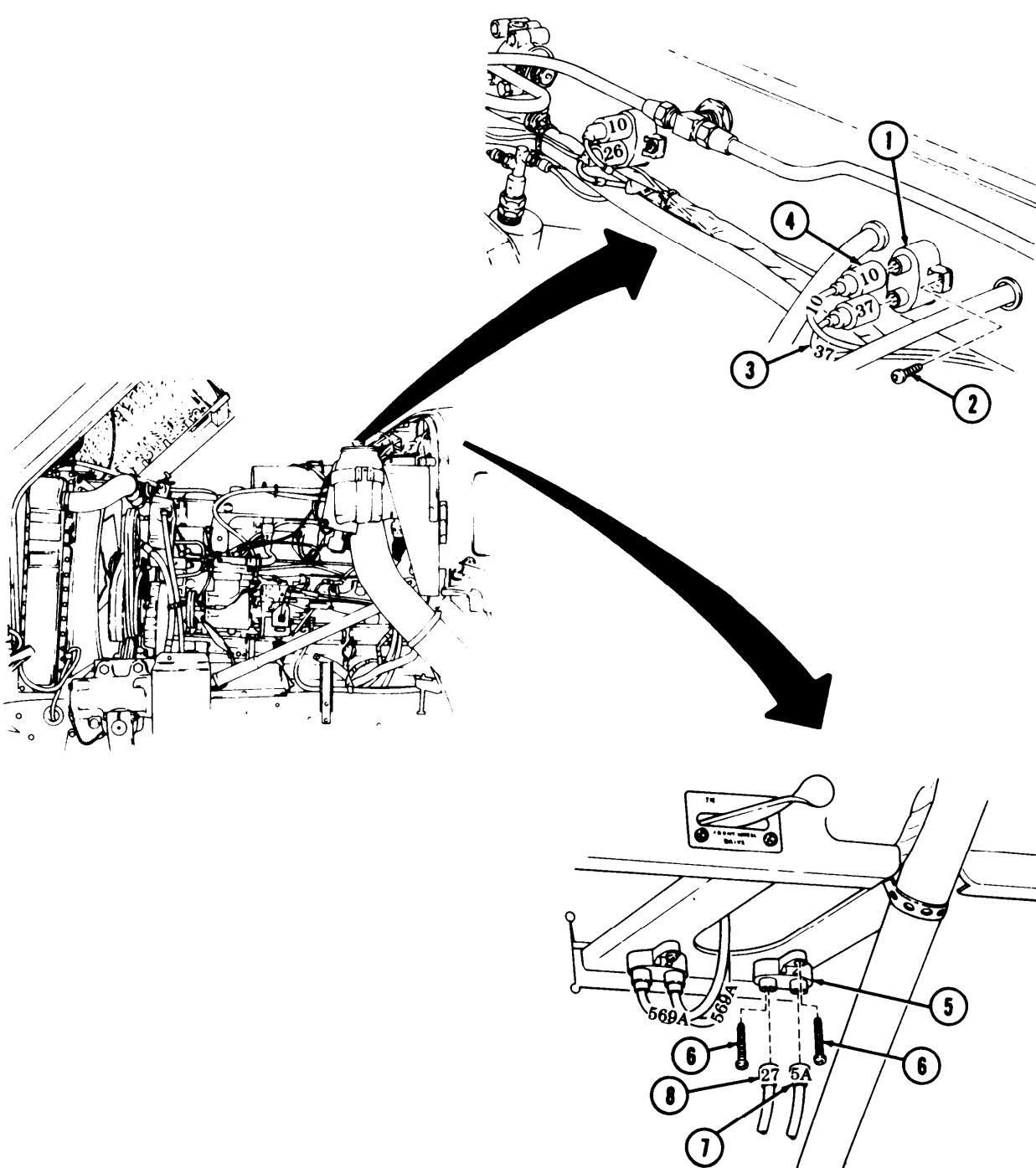
- | | | | |
|----|--|---------------------|---------------------------------|
| 5. | | Circuit breaker (1) | Install with two screws (2). |
| 6. | | Wires (3) and (4) | Connect to circuit breaker (1). |

NOTE

Perform steps 7 and 8 to install circuit **breakers** behind the instrument panel.

- | | | | |
|----|--|---------------------|---|
| 7. | | Circuit breaker (5) | Install below instrument panel brace with two screws (6). |
| 8. | | Wires (7) and (8) | Connect to circuit breaker (5). |

4-71. CIRCUIT BREAKER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
 <p>The diagram illustrates the removal of a circuit breaker. A large arrow points from a detailed view of the circuit breaker assembly (top right) to a smaller view of the vehicle's engine compartment (bottom left). The detailed view shows the circuit breaker assembly with components labeled 1 through 4. The engine compartment view shows the circuit breaker assembly with components labeled 5 through 8.</p>				

END OF TASK!

FOLLOW-ON TASK: Connect battery ground cables (para. 4-25).

TA 349106

4-72. FAILSAFE WARNING MODULE REPLACEMENT

This task covers:

a. Removal

b. Installation

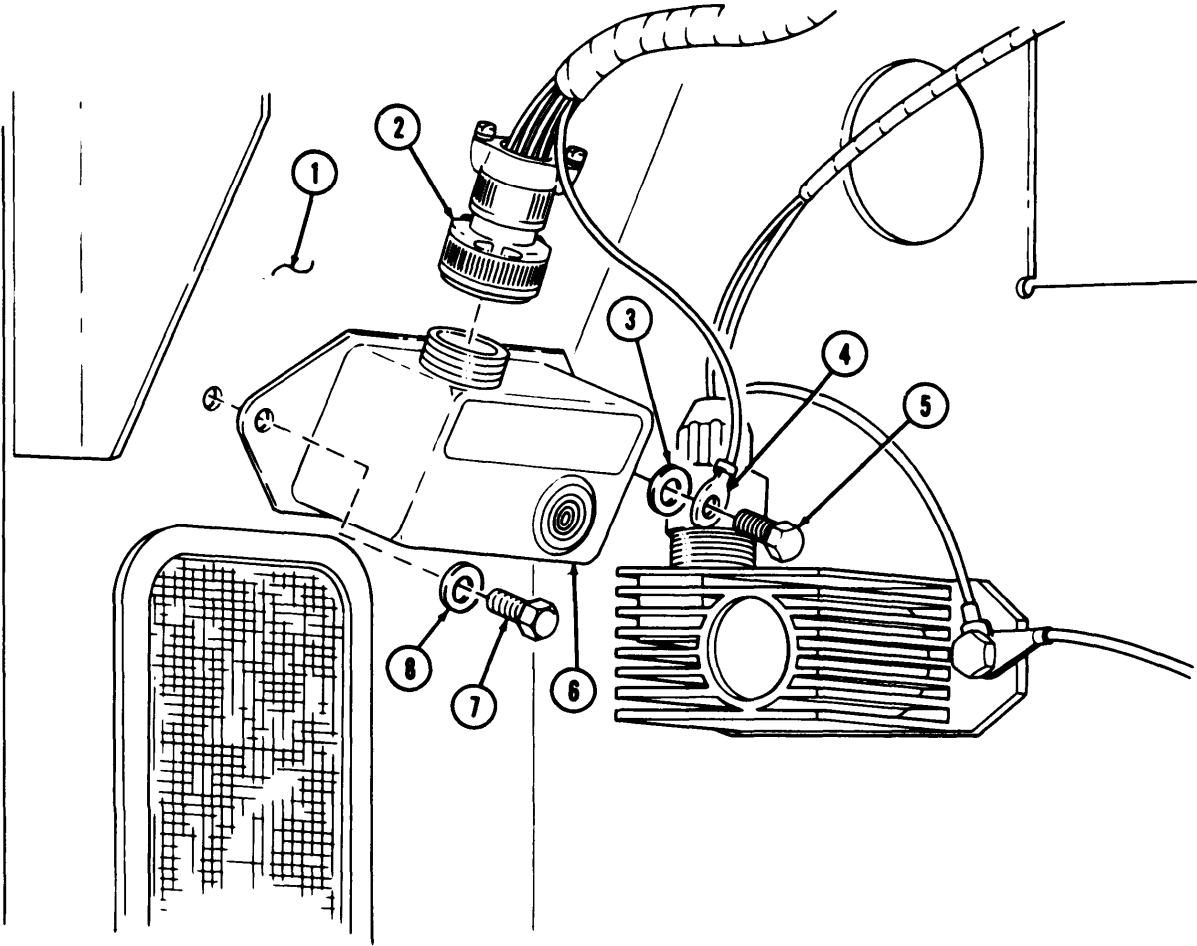
INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 4-25	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Failsafe warning module (6) on left side cowl (1)	Harness connector (2)	Disconnect.	
2.	Right side of failsafe warning module (6)	Screw (5), ground wire (4), and washer (3)	Remove.	
3.	Left side cowl (1)	Screw (7), washer (8), and warning module (6)	Remove.	
b. Installation				
4.	Left side of failsafe warning module (6)		Install with washer (8) and screw (7).	
5.	Ground wire (4) and right side of warning module (6)		Install with washer (3) and screw (5).	
6.		Harness connector (2)	Connect,	

4-72. FAILSAFE WARNING MODULE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:**
- Connect battery ground cable (para. 4-25).
 - Start engine (TM 9-2320-272-10) and check failsafe warning module for proper operation.

TA 349107

4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE

This task covers:

- a. Removal
- b. Disassembly
- c. Inspection and Lubrication

- d. Reassembly
- e. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Left splash shield removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Lockwasher GAA grease (Appendix D, Item 13) Seven tiedown straps (Appendix D, Item 18)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | |
|----|-----------------------------|--|---|
| 1. | Air intake manifold (1) | Screw (5), washer (4), two clamps (2), and clamp (3) | Remove. |
| 2. | Speedometer drive shaft (6) | clamp (3) | Remove. |
| 3. | Instrument panel (9) | Instrument cluster (10) | Remove eight screws (11) and pull away from instrument panel (9). |
| 4. | Speedometer (8) | Shaft nut (7) | Disconnect. |

4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE (Cont'd)

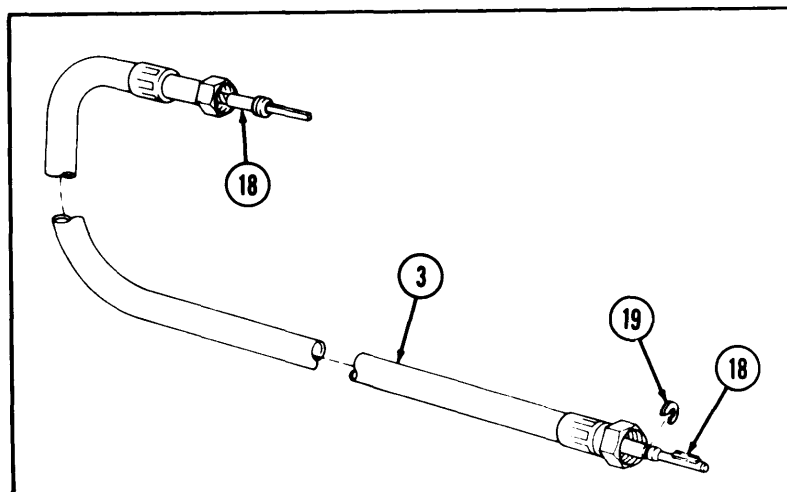
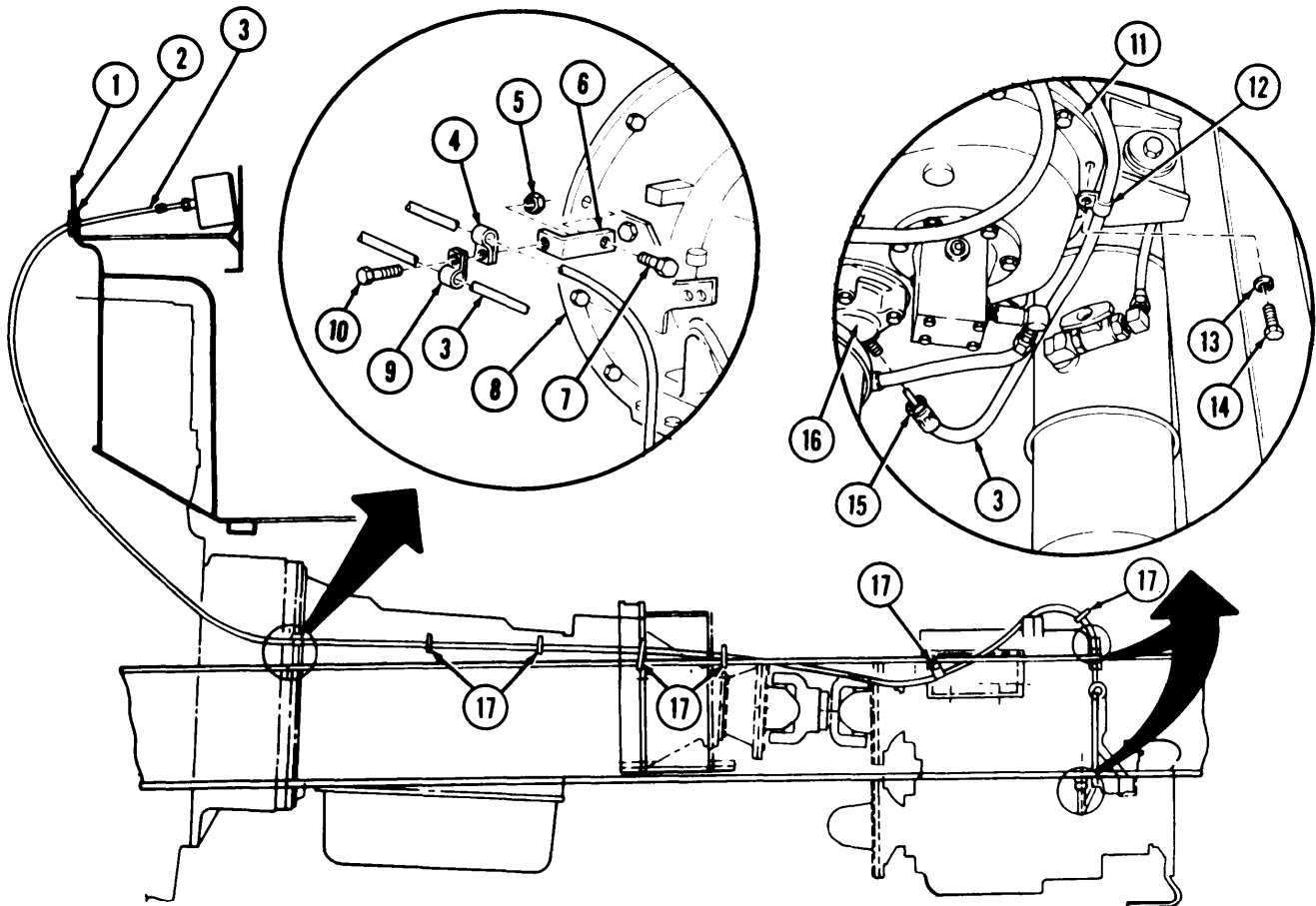
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4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.	Engine bell housing (8)	Screw (10), nut (5), clamp (9), clamp (4), screw (7), and bracket (6)	Remove.	
6.	Speedometer drive shaft (3)	clamp (9)	Remove.	
7.	Transfer case (11)	Screw (14), lockwasher (13), and clamp (12)	Remove.	Discard lockwasher (13).
8.	Speedometer drive shaft (3)	clamp (12)	Remove.	
9.	Transfer case input gear cover (16)	Shaft nut (15)	Disconnect.	
10.	Speedometer drive shaft (3)	Seven tiedown straps (17)	Remove.	Discard tiedown straps (17).
11.	Firewall (1)	Speedometer drive shaft (3) and rubber grommet (2)	Remove.	
12.	Speedometer drive shaft (3)	Rubber grommet (2)	Remove.	
b. Disassembly				
13.	Drive shaft (3)	Retaining washer (19) and drive shaft core (18)	Remove.	Pull drive shaft core (18) out from drive shaft conduit (3) 1-1/2 in. (38 mm) to gain access to retaining washer (19).
c. Inspection and Lubrication				
14.		Drive shaft conduit (3)	Inspect for cracks.	Replace if cracked.
15.		Drive shaft core (18)	a. Inspect for breaks. b. Apply thin coat of GM grease.	Replace if broken.
d. Reassembly				
16.		Drive shaft conduit (3)	Install drive shaft core (18) and retaining washer (19).	

**4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)**

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA349109

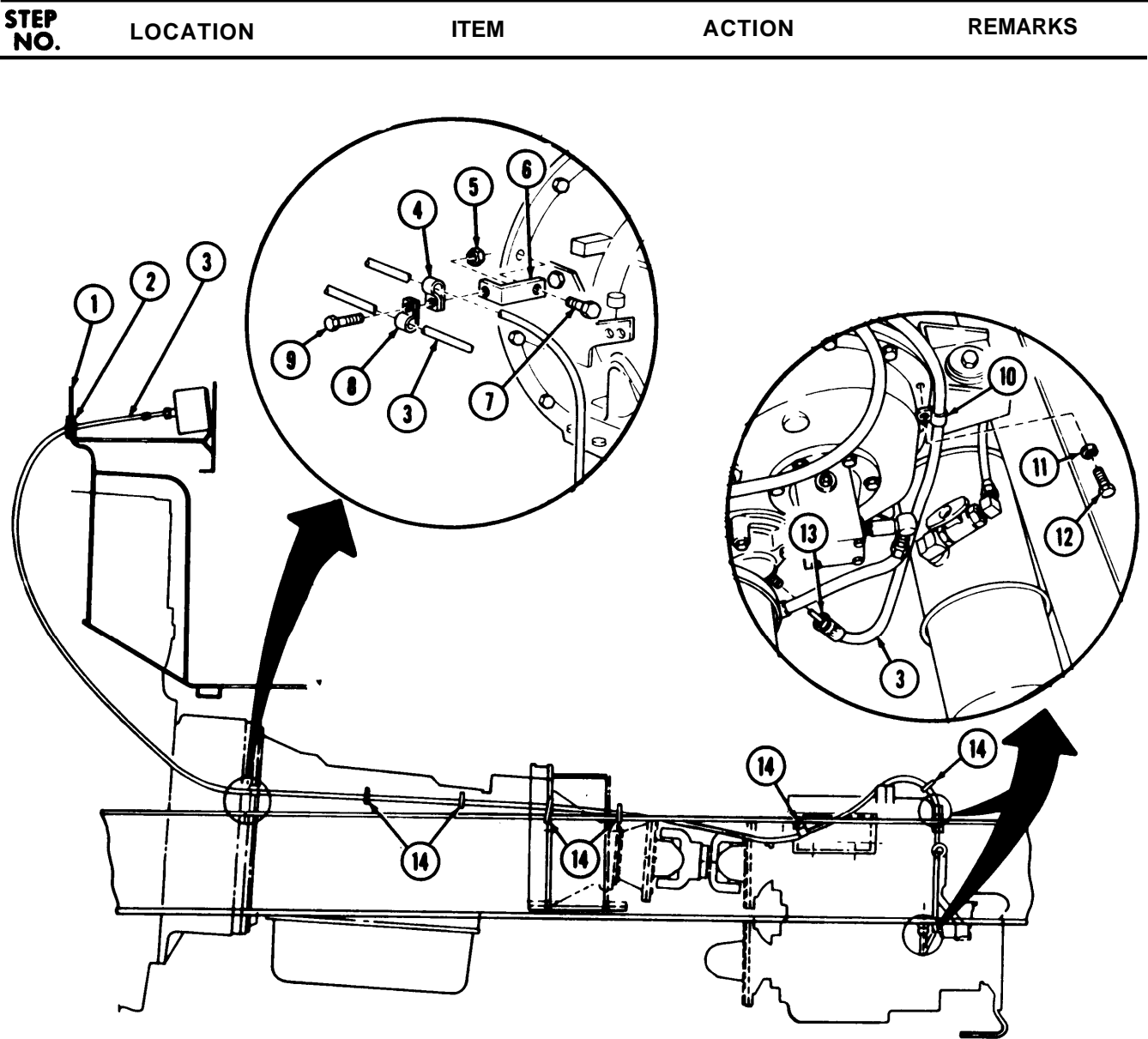
4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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e. Installation

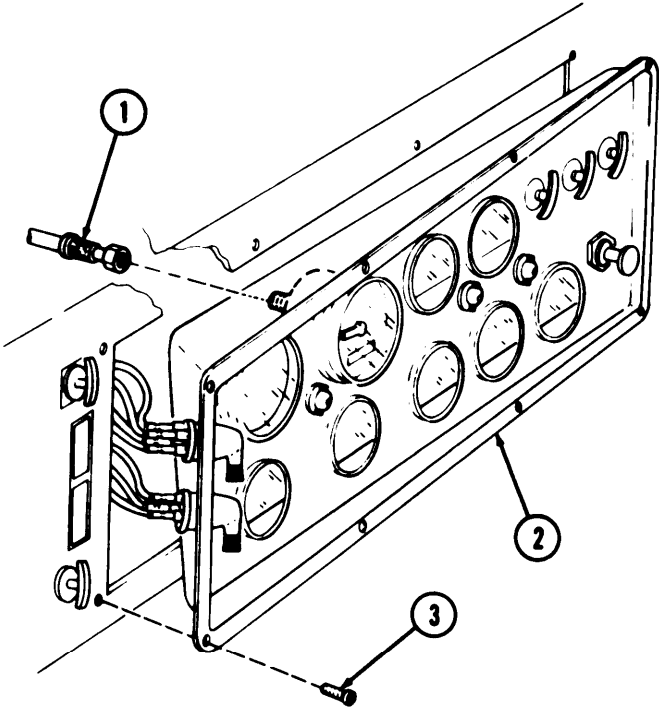
17.		Rubber grommet (2)	a. Install on speedometer drive shaft (3). b. Install in firewall (1).	
18.		Speedometer drive shaft nut (13)	Connect.	
19.		Speedometer drive shaft (3), clamp (10), new lockwasher (11), and screw (12)	Install.	Tighten 40-65 lb-ft (54-88 N•m).
20.		Bracket (6) and screw (7)	Install.	Tighten 25-31 lb-ft (34-42 N•m).
21.		Speedometer drive shaft (3), clamp (8), clamp (4), screw (9), and nut (5)	Install.	
22.		Seven new tiedown straps (14)	Install.	

4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)



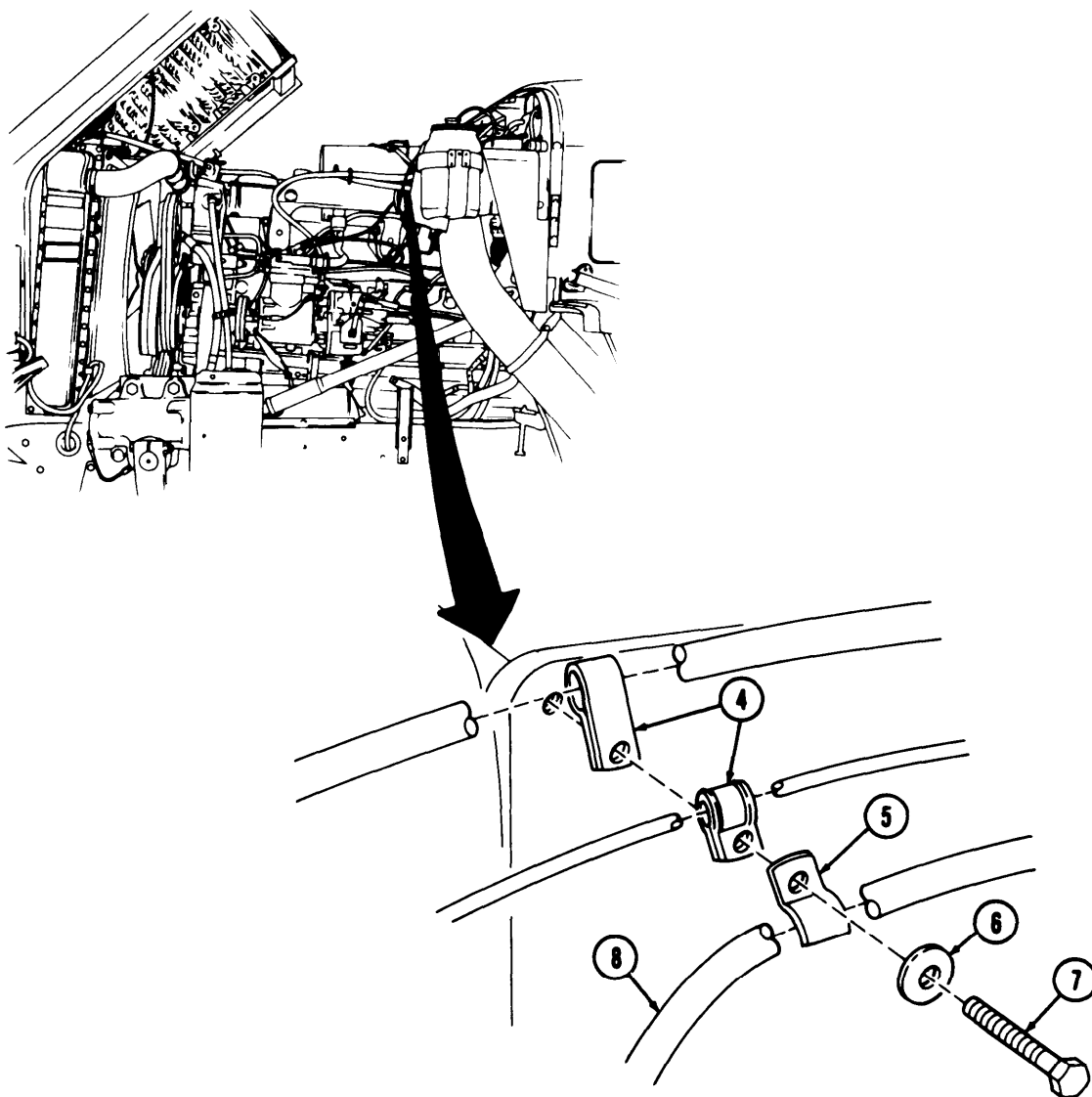
4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE
MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
23.		Shaft nut (1)	Connect.	
24.		Instrument cluster (2)	Install with eight screws (3).	
25.		Speedometer drive shaft (8)	Install clamp (5).	
26.		Two champs (4), clamp (5), washer (6), and screw (7)	Install.	



4-73. SPEEDOMETER FLEXIBLE DRIVE SHAFT AND DRIVE CORE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: . Start engine (TM 9-2320-272-10) and road test to check speedometer for proper operation.
I Install left splash shield (TM 9-2320-272-10).

TA349112

4-74. HEATER BLOWER MOTOR SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

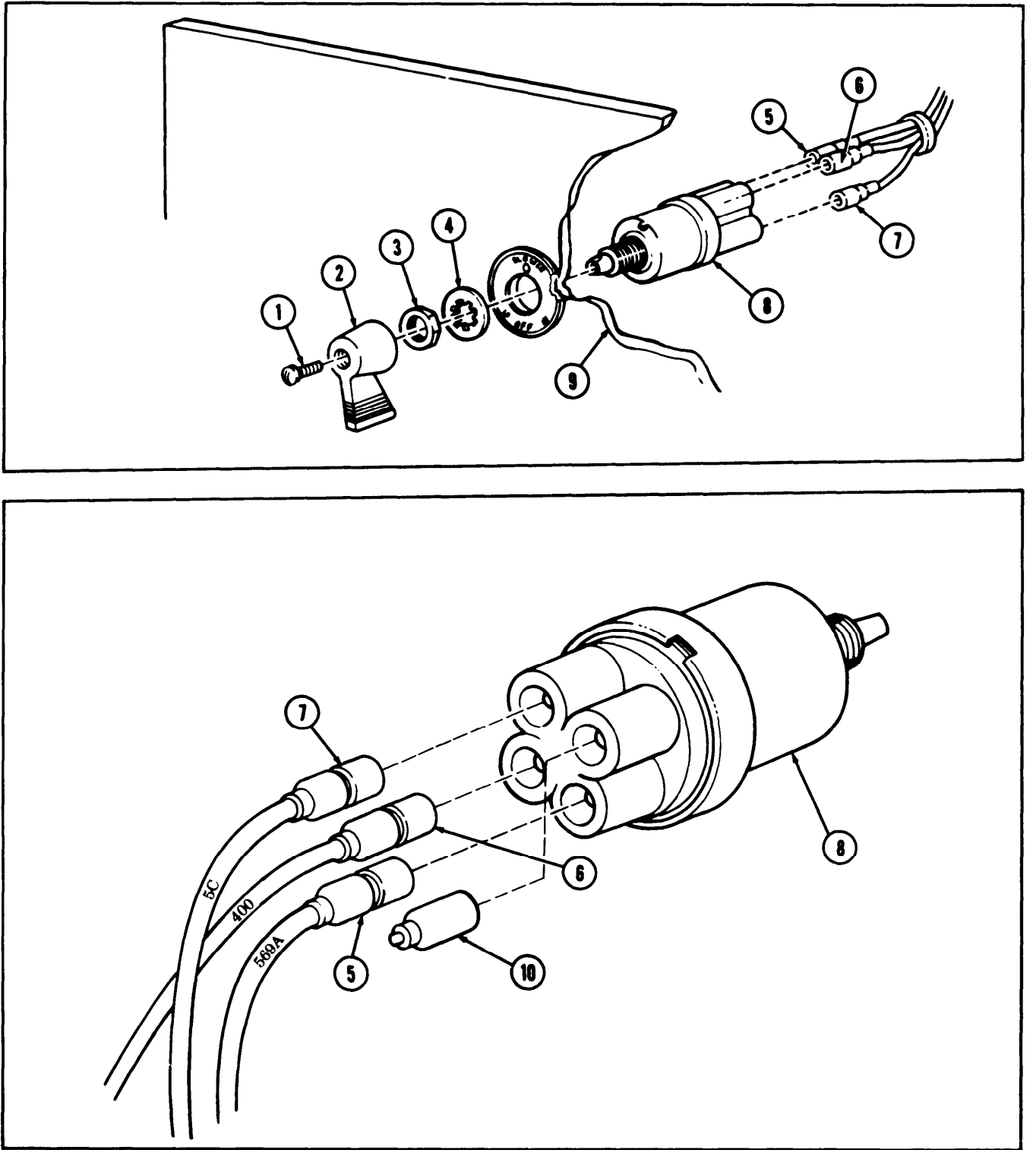
<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 0-2320-272-10 Para 4-25	Parking brake set. Blower motor in OFF position.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Lockwasher		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|-------------------------|--|--------------------------------------|-------------------------|
| 1. | Blower motor switch (8) | Screw (1) | Remove. | |
| 2. | | Lever (2) | Remove. | |
| 3. | Instrument panel (9) | Nut (3), lockwasher (4), and blower motor switch (8) | Remove. | Discard lockwasher (4). |
| 4. | | Three connectors (5), (6), and (7) | Disconnect. | Tag for installation. |
| 5. | | Plug (10) | Remove from blower motor switch (8). | |

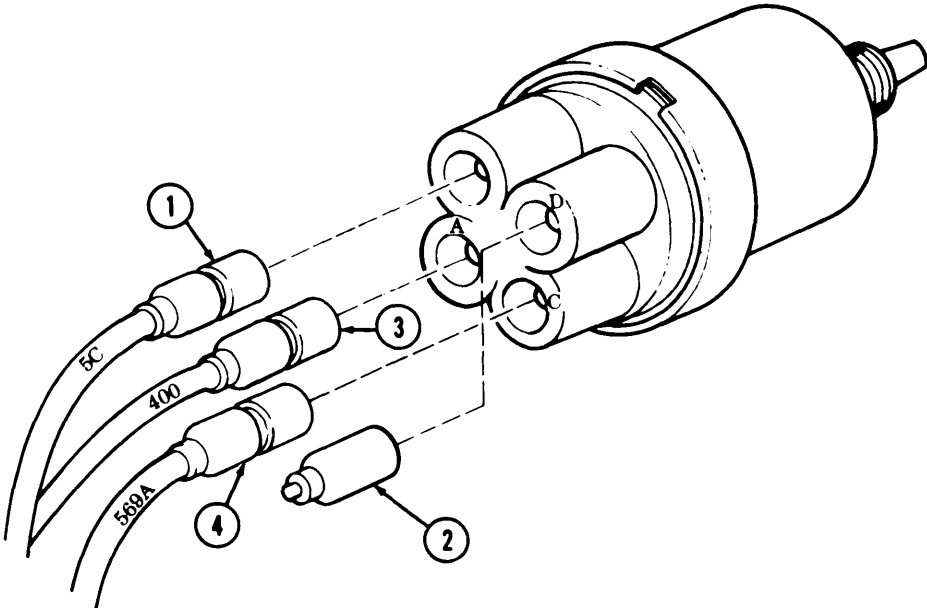
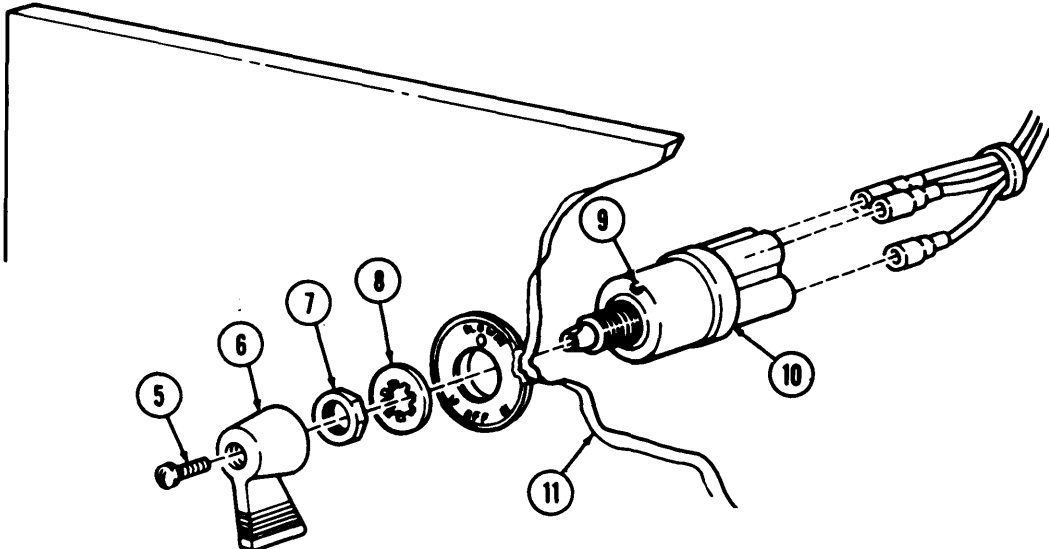
4-74. HEATER BLOWER MOTOR SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				

4-74. HEATER BLOWER MOTOR SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<hr/> b. Installation <hr/>				
<u>CAUTION</u>				
Blower motor switch terminal ends are marked A, B, C, and D. Make sure each connector is inserted into the proper terminal end.				
6.		Plug (2)	Insert into terminal marked "D".	
7.		Connector (3)	Insert into terminal marked "A".	
8.		Connector (1)	Insert into terminal marked "B".	
9.		Connector (4)	Insert into terminal marked "C".	
10.		Blower motor switch (10)	Position on dash panel (11) with key (9) on top and install with new lockwasher (8) and nut (7).	Key (9) will fit into keyway behind panel (11).
11.		Lever (6)	Install with screw (5).	Pointing edge placed in "OFF" position.

4-74. HEATER BLOWER MOTOR SWITCH REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

END OF TASK!

FOLLOW-ON TASK: Start engine (TM 9-2320-272-10) and test Mower motor switch for proper operation.

TA 349152

4-75. PARKING BRAKE SWITCH REPLACEMENT

For parking brake switch replacement, refer to paragraph 7-4.

CHAPTER 5
TRANSMISSION SERVICE AND MAINTENANCE

Section I. TRANSMISSION OIL SERVICING

5-1. GENERAL

This section provides service instructions assigned to the organizational level for the transmission lubricating system. To find a specific maintenance procedure, see the maintenance task summary below:

5-2. TRANSMISSION LUBRICATING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
5-3.	Transmission Oil Service Instructions	5-2
5-4.	Transmission Oil Cooler Oil Filter Replacement	5-10

5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS

This task covers:

- a. Draining Oil
- b. Transmission Oil Filter Removal
- c. Transmission Oil Filter Installation
- d. Governor Filter Removal
- e. Governor Filter Installation
- f. Replenishing Oil

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Governor filter		
Governor filter "O" ring		
Rubber "O" ring		
Transmission oil filter		
Transmission oil pan gasket		
Tiedown strap		
(Appendix D, Item 19)		
Fiber washer		
Lubricating oil OE/HDO10		
(Appendix D, Item 16)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		<ul style="list-style-type: none">• Keep fire extinguisher nearby when using drycleaning solvent.• Exhaust gases can kill. Operate vehicle only in a well-ventilated area
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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WARNING

Exhaust gases can kill. Operate vehicle only in a well-ventilated area. Failure to do this may result in injury to personnel.

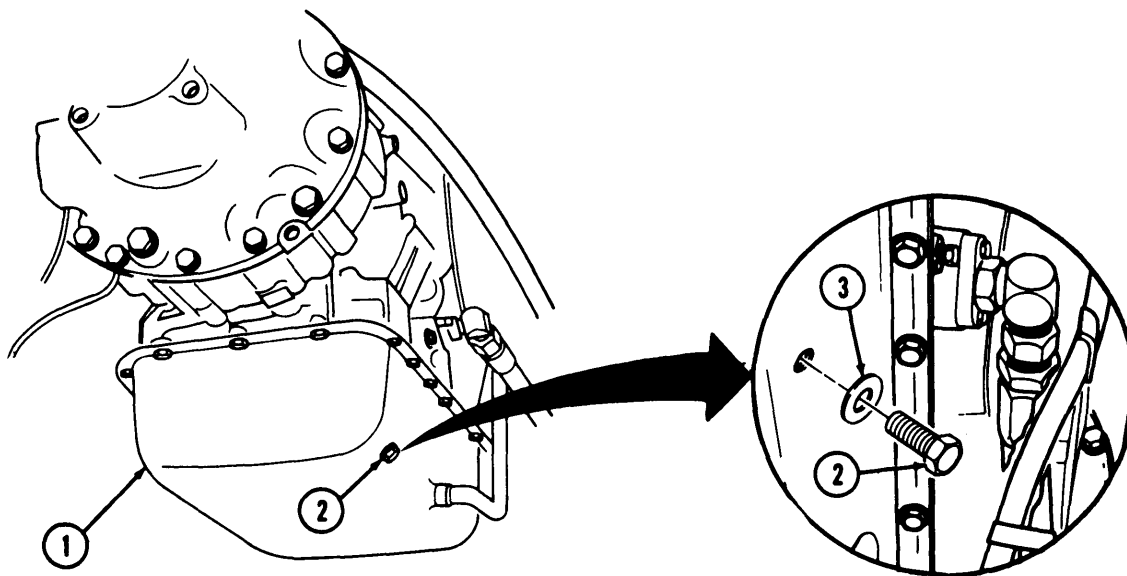
a. Draining Oil

NOTE

Do not shift transmission through driving gear ranges when warming transmission oil. Shifting through driving gear ranges is a procedure used only when replenishing transmission oil.

5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
1.		Vehicle	a. Operate engine at 700-750 rpm until transmission oil reaches normal operating temperature of 120°-220 °F (49°- 105°C). b. Shut off engine.	Refer to TM9-2320-272-10.
NOTE Have drainage container ready to catch oil.				
2.	Right rear of transmission oil pan (1)	Drain plug (2) and fiber washer (3)	Remove and drain oil.	Discard fiber washer (3).
NOTE Inspect oil for grit, foaminess, and/or milkiness. If present, notify your supervisor.				
3.		New fiber washer (3) and drain plug (2)	Install in transmission oil pan (1).	



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5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Transmission Oil Filter Removal

4.	Cab floor	Access door (4)	Open.	
CAUTION				
Clean area around dipstick tube before removal to prevent entry of dirt. Damage will occur if dirt or dust enters the transmission.				
5.	Transmission (1)	Screw (5) and washer (3)	Remove.	
6.	Transmission oil pan (13)	Dipstick tube flare nut (7) and tiedown strap (6)	Unscrew, and remove dipstick tube (2) and tiedown strap (6).	Discard tiedown strap (6).
7.	Oil pan (13) to transmission (1)	Twenty-one screws (14)	Remove.	
8.		Oil pan (13) and oil pan gasket (12)	Remove from transmission (1).	Discard gasket (12). Clean gasket (12) remains from mating surfaces.
9.	Transmission oil filter assembly (16) to transmission (1).	screw (15)	Remove and lower oil filter assembly (16).	
10.	Transmission oil filter assembly (16)	Suction tube (11)	a. Remove.	Discard oil filter assembly (16).

WARNING

Drycleaning solvent is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel.

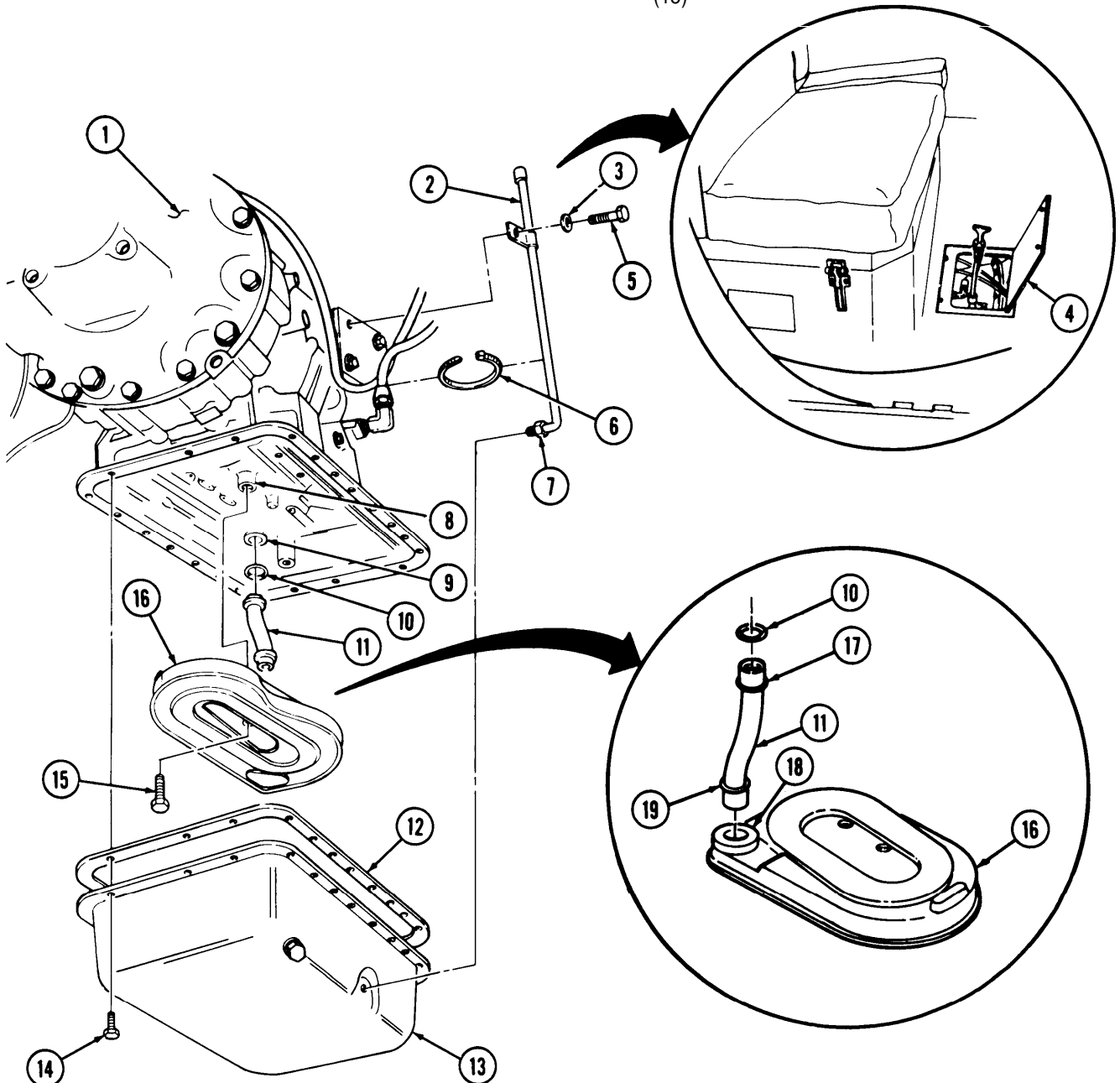
b. Remove rubber "O" ring (10) and clean suction tube (11) thoroughly with drycleaning solvent.	Discard "O" ring (10).
---	------------------------

c. Transmission Oil Filter Installation

11.		Suction tube (11)	Insert one end into new oil filter assembly intake grommet (18) until suction tube lip (19) contacts grommet (18).	Suction tube (11) ends are interchangeable.
12.		New rubber "O" ring (10)	Install onto upper end of suction tube (11) and slide downward until "O" ring (10) contacts suction tube lip (17).	

5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO	LOCATION	ITEM	ACTION	REMARKS
13.		New transmission oil filter assembly (16)	<p>a. Position to transmission (1).</p> <p>b. Install on transmission mounting boss (8) with screw (15)</p>	<p>Suction tube (11) must be inserted into oil input port (9).</p> <p>Tighten 10-15 lb-ft (14-20 N•m).</p>



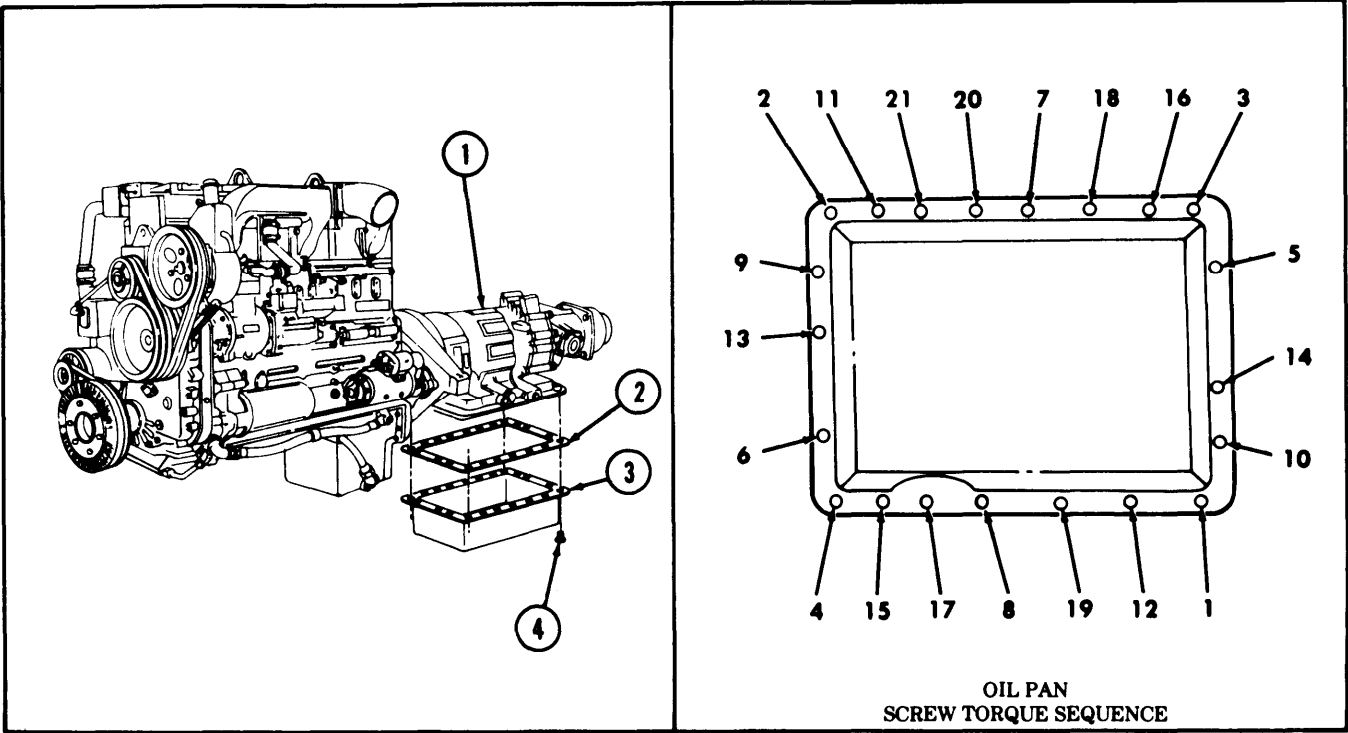
5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
CAUTION				
Do not use gasket sealing compound when installing oil pan gasket as oil leakage will result. If necessary, oil or light grease coating may be used to hold oil pan gasket in position during installation.				
14.		New oil pan gasket (2)	Position against transmission (1).	Gasket (2) holes must be alined with screw (4) holes on trans- mission (1).
15.		Transmission oil pan (3)	a. Wipe clean and position against oil pan gasket (2). b. Install twenty-one screws (4) finger tight.	
16.		Twenty-one screws (4)	a. Tighten to seat gasket.	Tighten 10-15 lb-ft (14-20 NŹm). Follow sequence shown.

NOTE

Due to gasket compression, torque values will be lost and screws must be retightened.

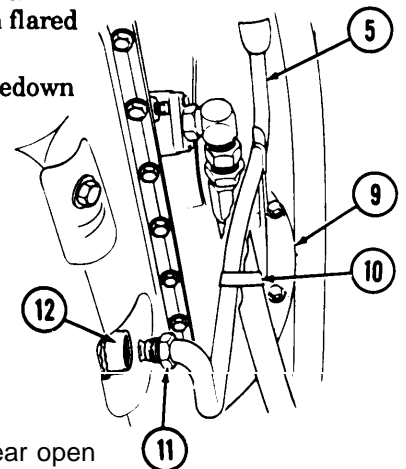
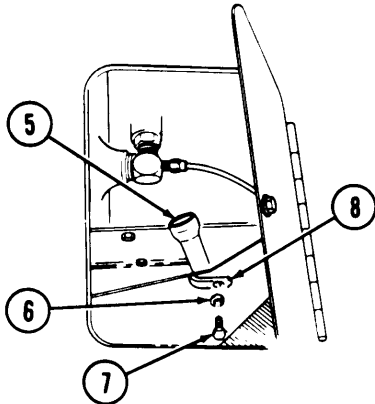
- b. After oil pan gasket (2) is seated, retighten. Tighten 5 lb-ft (7 NŹm). Follow sequence shown to achieve final torque.



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5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
17.		Dipstick tube (5)	a. Install to top of transmission (9) with washer (6) and screw (7) and clamp (8). b. Install in oil pan port (12) with flared nut (11). c. Install new tiedown strap (10).	Tighten flared nut (11) 10-25 lb-ft (14-34 NŹm).



d. Governor Filter Removal

WARNING

Drycleaning solvent is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel.

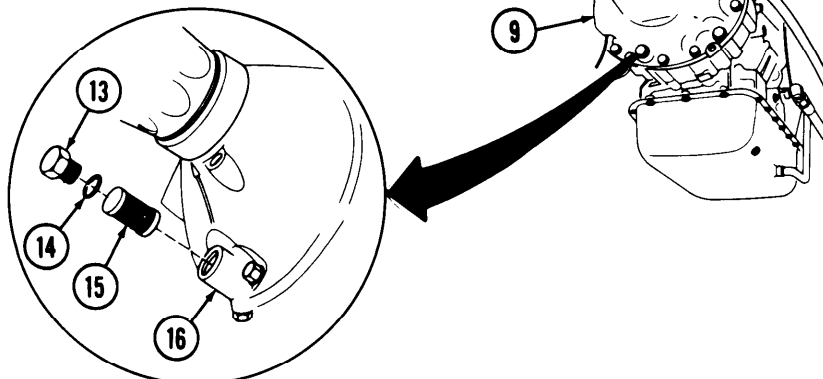
- | | | | | |
|-----|--------------------------|---|---|------------------------|
| 18. | Rear of transmission (9) | Governor filter plug (13) and "O" ring (14) | a. Remove.

b. Clean plug (13) thoroughly with drycleaning solvent. | Discard "O" ring (14). |
|-----|--------------------------|---|---|------------------------|

CAUTION

Do not pry filter from governor filter housing. Use thin pliable wire as a hook to reach into the housing to slide filter out. Failure to do this will result in governor filter housing damage.

- | | | | | |
|-----|------------------------------|----------------------|---------|----------------------|
| 19. | Governor filter housing (16) | Governor filter (15) | Remove. | Discard filter (15). |
|-----|------------------------------|----------------------|---------|----------------------|



5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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e. Governor Filter Installation

NOTE

Failure to properly install governor filter into governor filter housing will greatly reduce its effectiveness.

20.		New governor filter (3)	Insert into governor filter housing (4).	Open end must be inserted first.
21.		New "O" ring (2)	Install on governor filter plug (1).	
22.		Governor filter plug (1)	Install in filter housing (4).	Tighten 15 lb-ft (20 N•m).

f. Replenishing Oil

NOTE

Refer to LO 9-2320-272-12 for drain and refill capacity and recommended grade of transmission oil.

23.	Transmission oil dipstick tube (6) below access door (11) inside vehicle cab	Transmission oil dipstick (10)	a. Remove. b. Add recommended quantity of transmission oil in transmission oil dipstick tube (6). c. Insert transmission oil dipstick (10) in filler tube (6) and check transmission oil level.	Be sure oil reaches the full level on dipstick,
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WARNING

Exhaust gases can kill. Operate vehicle only in well-ventilated area. Failure to do this may result in injury to personnel.

24.	Vehicle		a. Operate engine at 700-750 rpm until transmission oil reaches normal operating temperature of 120°-220°F (49°-105°C).	Refer to TM 9-2320-272-10.
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5-3. TRANSMISSION OIL SERVICE INSTRUCTIONS (Cont'd)

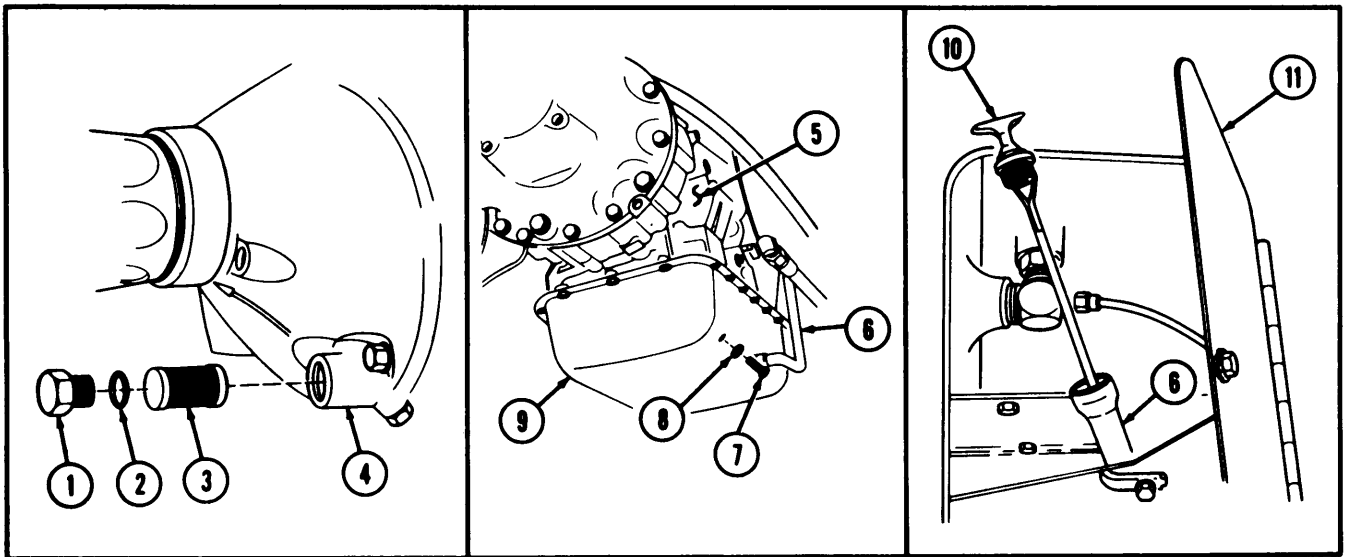
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Begin shifting transmission through driving ranges only after transmission oil has reached normal operating temperature. Perform shifting procedure for approximately two minutes before returning transmission to neutral and shutting off engine.

- b. Shift transmission (5) through driving ranges to allow oil to circulate throughout transmission (5).

- c. Check transmission oil and fill to proper level. Refer to LO9-2320-272-12.



END OF TASK!

FOLLOW-ON TASK: Start engine (TM 9-2320-272-10), check for leaks, and road test vehicle.

TA 348921

5-4. TRANSMISSION OIL COOLER OIL FILTER REPLACEMENT

This task covers:

a. Removal

b. Installation

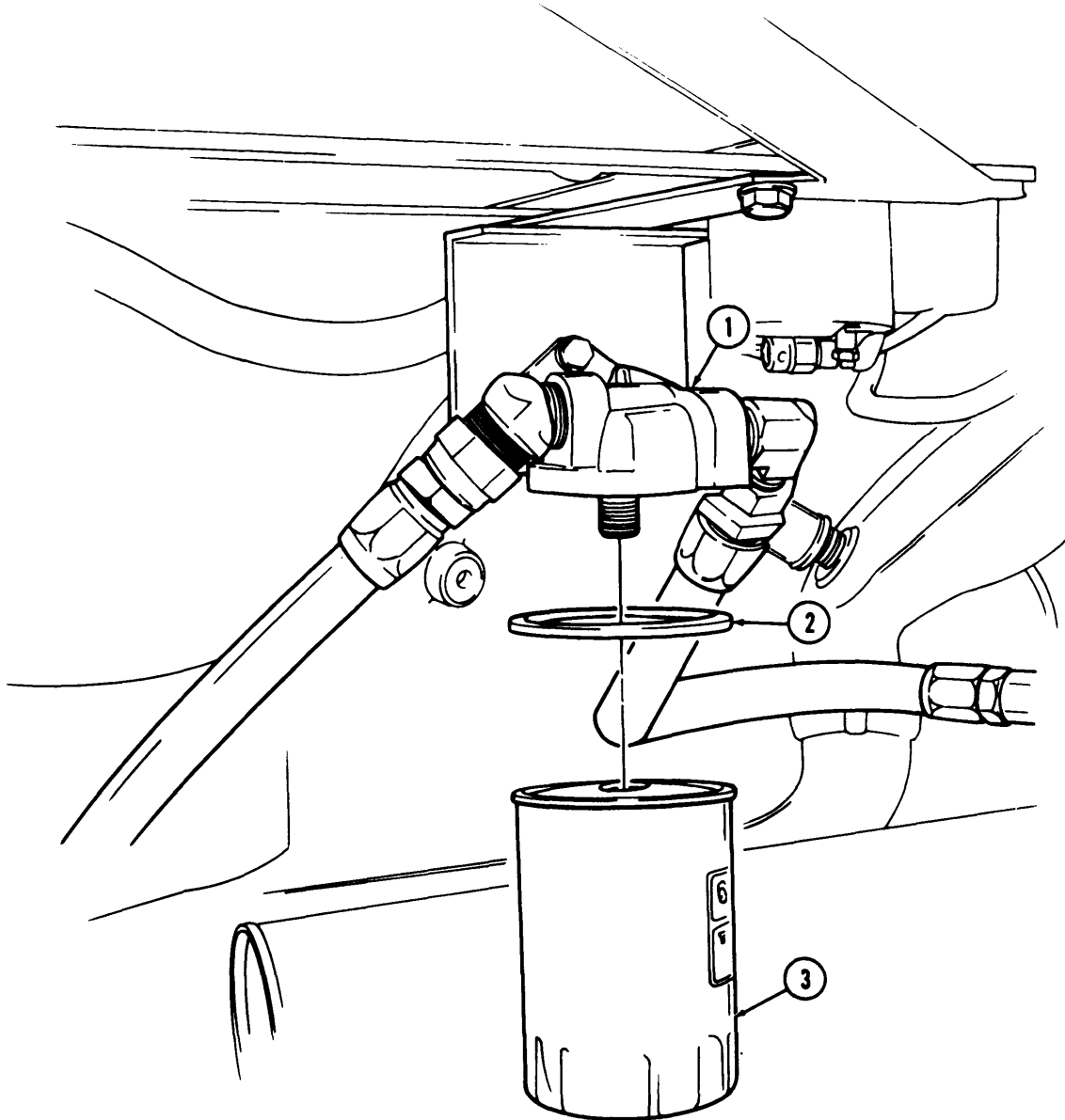
INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Hood raised and secured.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Oil filter Oil filter seal Lubricating oil OE/HDO 10 (Appendix D, Item 16)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
NOTE				
		Have drainage container ready to catch oil.		
1.	Oil filter housing assembly (1)	Oil filter (3) and oil inter seal (2)	Remove.	Drain oil and discard filter (3) and filter seal (2).
b. Installation				
2.		New oil filter seal (2)	Coat lightly with clean oil and position on oil filter housing assembly (1).	
3.		New oil filter (3)	Install.	

5-4. TRANSMISSION OIL COOLER OIL FILTER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: • Fill transmission oil to proper level (LO 9-2320-272-12).
• Start engine (TM 9-2320-272-10), check for leaks, and road test vehicle.

TA 348922

Section II. TRANSMISSION COMPONENTS MAINTENANCE

5-5 GENERAL

This section provides maintenance procedures assigned to the organizational level for transmission components. To find a specific maintenance procedure, see the maintenance task summary below.

5-6. TRANSMISSION COMPONENTS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
5-6.1.	Transmission Selector Lever Assembly Replacement	5-12
5-7.	Transmission Oil Cooler Oil Filter Assembly Replacement	5-14
5-8.	Transmission Oil Cooler Replacement	5-16
5-9.	Transmission Breather Replacement	5-20
5-10.	Transmission Oil Dipstick Tube Maintenance	5-22
5-11.	Transmission Oil Cooler Hoses Replacement	5-24

5-6.1. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

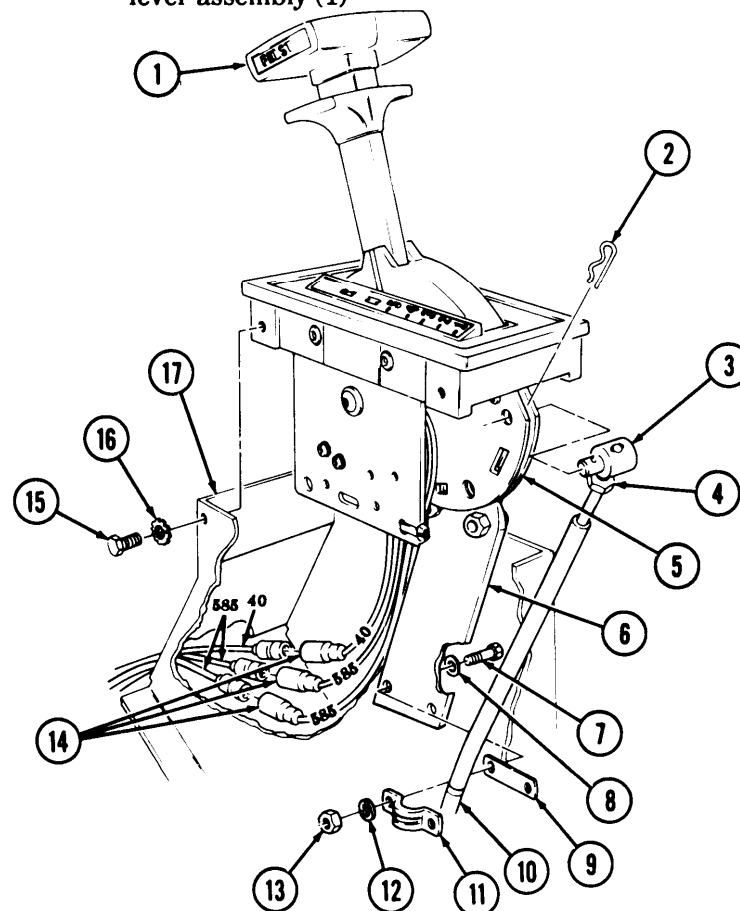
INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320 -272-20-1	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		<u>General Safety Instructions</u>
Six lockwashers		None
<u>Personnel Required</u>		
Wheeled vehicle repairman MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20-1 TM 9-2320-272-34P		

5-6.1. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Transmission control lever console (17)	Four screws (15) and lockwashers (16)	Remove.	Discard lockwashers (16).
2.		Transmission selector lever assembly (1)	Pull away from transmission control lever console (17).	
3.		Three connectors (14)	Disconnect.	Tag for installation.
4.	Hanger plate (6)	Two nuts (13), lockwashers (12), cable clamp (11), shim (9), two washers (8), and two screws (7)	Remove.	Discard lockwashers (12).
5.	Selector lever plate (5)	Spring clip (2)	Remove and pull trunnion (3) and transmission shift cable (10) free.	

Transmission selector lever assembly (1)



5-6.1. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

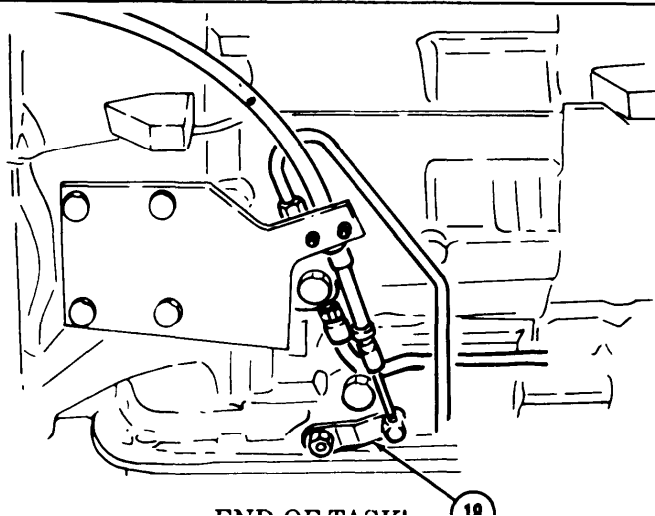
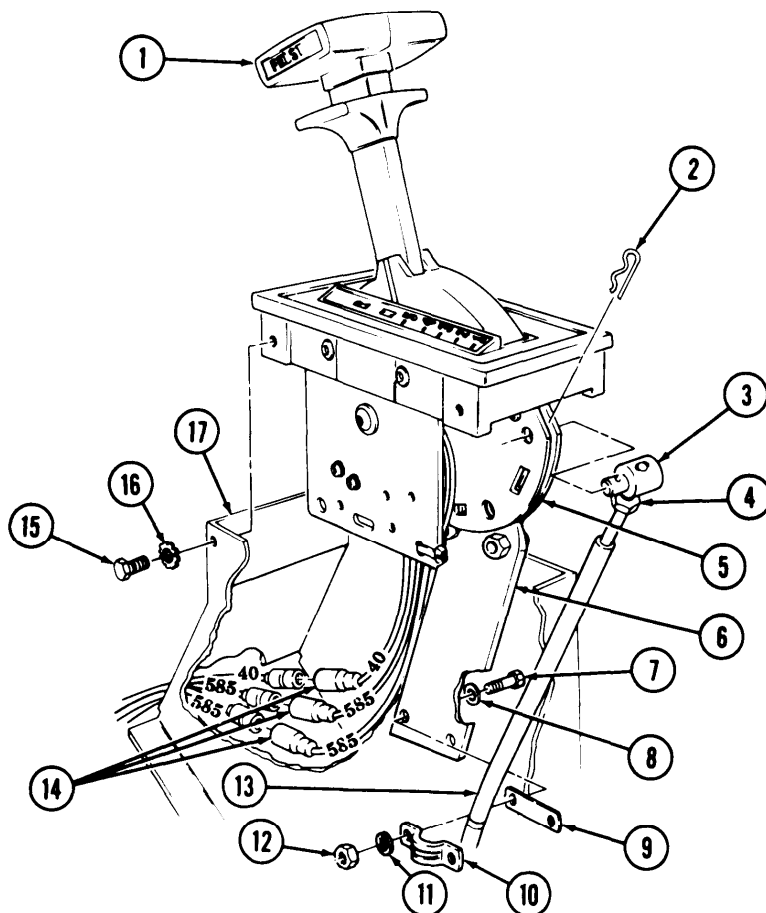
NOTE

Vehicle must be started in "N" (neutral) to check selector lever assembly. Vehicle will start if installation is correct. Remove and reinstall selector lever assembly if vehicle fails to start in "N" (neutral).

7.		Transmission selector lever (1)	Place in "N" (neutral).	
8.		Manual control linkage arm (18)	Place in "N" (neutral).	Linkage arm (18) will be one detent down from full up position.
9.		Shim (9), transmission shift cable (13), and cable clamp (10)	Install on hanger plate (6) with two screws (7), washers (8), new lockwashers (11), and nuts (12).	Make sure cable clamp (10) seats in groove of shift cable (13) housing.
10.		Cable trunnion (3)	a. Loosen jamnut (4) and align with first hole above elongated slot in selector lever plate (5). b. Tighten jamnut (4) and install in plate (5) with spring clip (2).	Cable trunnion (3) is turned clockwise to shorten and counter-clockwise to lengthen.
11.		Three electrical connectors (14)	Connect.	
12.		Transmission selector lever assembly (1)	Install in transmission control lever console (17) with four screws (15) and new lockwashers (16).	

5-6.1. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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FOLLOW-ON TASKS:

- Connect battery ground cables (TM 9-2320-272-20-1).
- Start engine (TM 9-2320-272-10) and road test vehicle.

5-7. TRANSMISSION OIL COOLER OIL FILTER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Models

All

Test Equipment

None

Special Tools

None

Materials/Parts

Three locknuts
Protective cap-plugs (Appendix D, Item 5)

Personnel Required

Wheeled vehicle repairman MOS 63B

Manual References

TM 9-2320-272-10
TM 9-2320-272-20P
LO 9-2320-272-12

Equipment Condition Reference

TM 9-2320-272-10
TM 9-2320-272-10
Para. 5-4

Condition Description

Parking brake set.
Hood raised and secured.
Transmission oil cooler filter removed.

Special Environmental Conditions

None

General Safety Instructions

None

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

CAUTION

- Clean area around hoses before removal to prevent entry of dirt. Damage will occur if dirt or dust enters the transmission.
- Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Failure to do this will result in transmission damage.

NOTE

- Have drainage container ready to catch oil.
- Tag hoses for installation.

- | | | | |
|---|---|---|-----------------------|
| 1. Transmission oil cooler oil filter assembly adapter elbow (4) | Oil cooler to cooler filter supply hose (5) | Remove. | |
| 2. Transmission oil cooler oil filter assembly adapter elbow (7) | Cooler filter to transmission supply hose (6) | Remove. | |
| 3. Transmission oil cooler oil filter assembly (2) to oil filter assembly bracket (1) | Three screws (3) and locknuts (8) | Remove and detach oil cooler oil filter assembly (2). | Discard locknuts (8). |

5-7. TRANSMISSION OIL COOLER OIL FILTER ASSEMBLY REPLACEMENT (Cont'd)

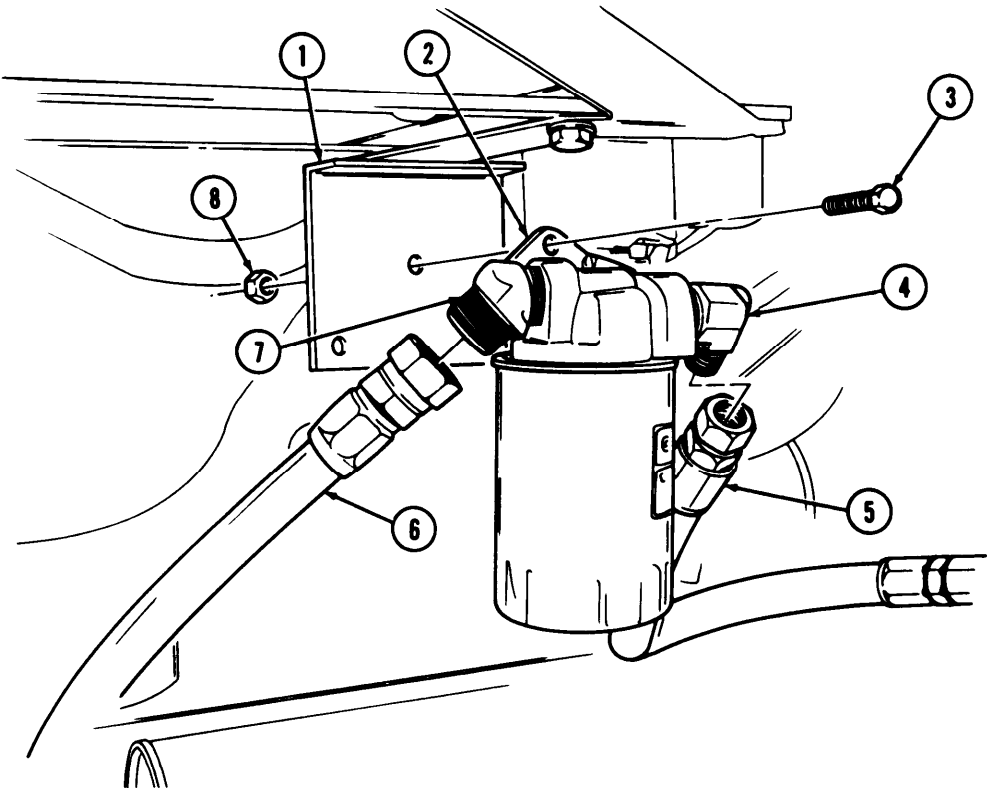
STEP: NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

CAUTION

Make sure plugs or covers are completely removed from all hoses and connections. Failure to do this will result in transmission damage.

- | | | |
|----|---|--|
| 4. | Transmission oil cooler filter assembly (2) | Connect to oil filter assembly bracket (1) with three screws (3) and new locknuts (8). |
| 5. | Cooler filter to transmission supply hose (6) | Connect to elbow (7). |
| 6. | Oil cooler to cooler filter supply hose (5) | Connect to elbow (4). |



END OF TASK!

- FOLLOW-ON TASKS:
- Install transmission oil cooler filter (para. 5-4).
 - Fill transmission to proper oil level (LO 9-2320-272-12).
 - Start engine (TM 9-2320-272-10), check for leaks, and road test vehicle.

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5-8. TRANSMISSION OIL COOLER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 3-46	Parking brake set. Right splash shield removed. Radiator drained.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Four locknuts Protective cap-plugs (Appendix D, Item 5)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

CAUTION

- Clean area around hoses before removal to prevent entry of dirt. Damage will occur if dirt or dust enters the transmission.
- Cover or plug all open hoses and connections immediately after disconnection to prevent contamination. Failure to do this will result in transmission damage.

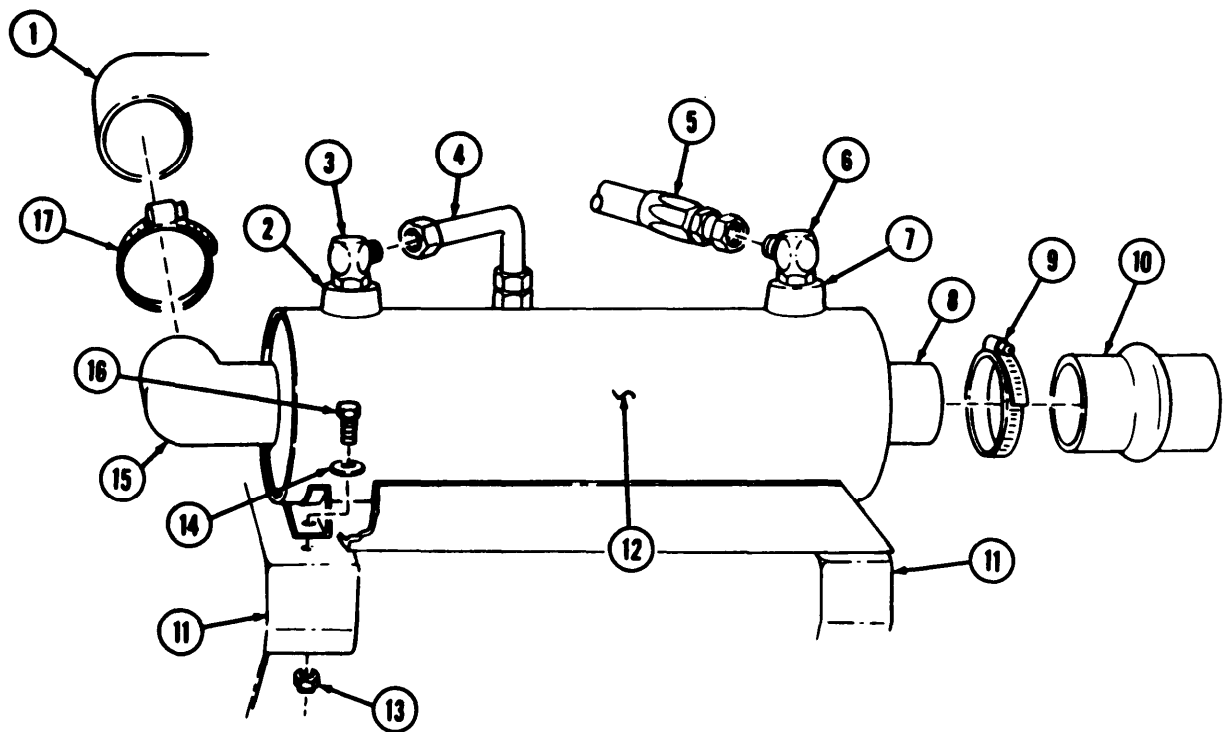
NOTE

- Have drainage container ready to catch oil and coolant.
- Tag hoses for installation.

- | | |
|---|--|
| 1. Coolant inlet flange (8) Hose clamp (9) and coolant supply hose (10) | a. Loosen clamp (9).
b. Disconnect hose (10) and clamp (9). |
|---|--|

5-8. TRANSMISSION OIL COOLER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
2.	Coolant outlet flange (16)	Hose clamp (17) and coolant return hose (1)	a Loosen clamp (17). b. Disconnect hose (1) and clamp (17).	
3.	Oil return port (7)	Transmission oil cooler to cooler filter supply hose (5)	Disconnect from elbow (6).	
4.	oil supply port (2)	Transmission to transmission oil cooler Supply hose (4)	Disconnect from elbow (3).	
5.	Transmission oil cooler (12)	Four screws (16), washers (14), and locknuts (13)	Remove.	Discard locknuts (13).
6.	Two brackets (11)	Transmission oil cooler (12)	Remove.	Lift straight up and tilt to dump coolant.



TA348924

5-8. TRANSMISSION OIL COOLER REPLACEMENT (Cont'd)

STEP: NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

CAUTION

Make sure plugs or covers are completely removed from all hoses and connections before installation. Failure to do this will result in transmission and oil cooler damage.

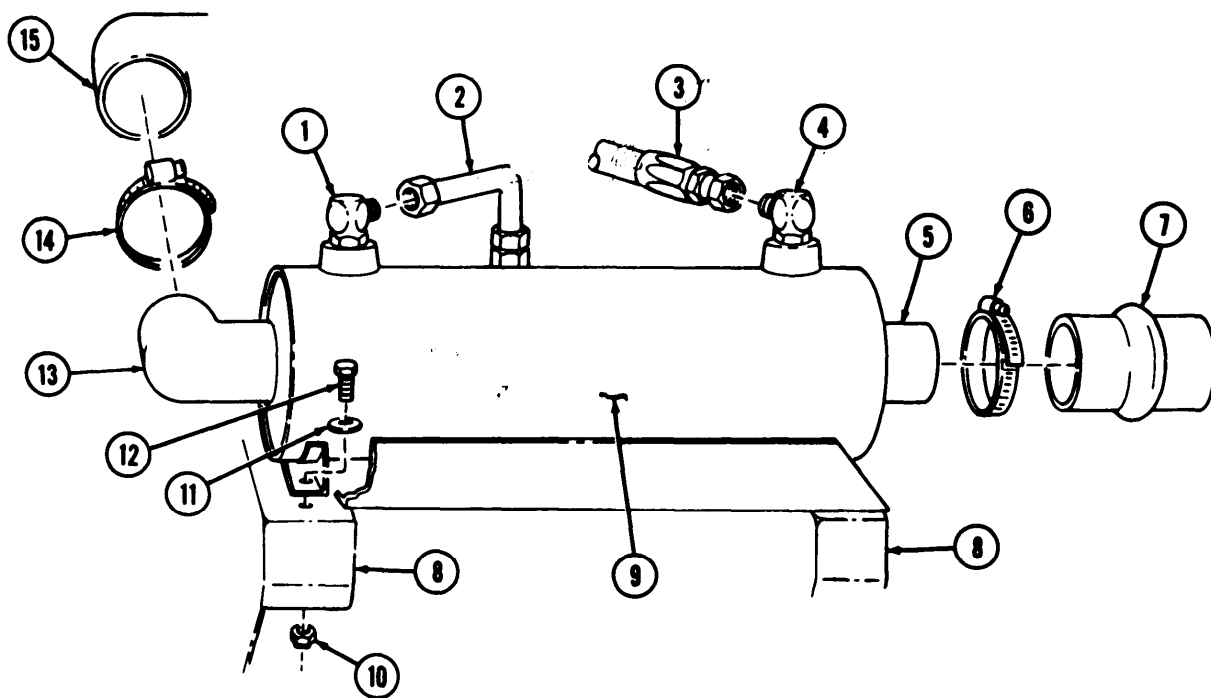
NOTE

If new oil cooler is to be installed, use fittings from old oil cooler.

7.	Transmission oil cooler (9)	Install on brackets (8) with four screws (12), washers (11), and new locknuts (10).
8.	Transmission oil cooler to cooler filter supply hose (3)	Install on cooler adapter elbow (4).
9.	Transmission to oil cooler supply hose (2)	Install on cooler adapter elbow (1).
10.	Coolant return hose (15)	Install on coolant outlet flange (13) with clamp (14).
11.	Coolant supply hose (7)	Install on coolant inlet flange (5) with clamp (6).

5-8. TRANSMISSION OIL COOLER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS:
- Fill vehicle cooling system to proper operating level (para 3-46).
 - Install right splash shield, (TM 9-2320-272-10).
 - Fill transmission oil to proper level (LO 9-2320-272-12).
 - Start engine (TM 9-2320-272-10), check for leaks, and road test vehicle.

TA348925

5-9. TRANSMISSION BREATHER REPLACEMENT

This task covers:

a. Removal**b. Installation****INITIAL SETUP**

	Equipment Condition Reference	Condition Description
<u>Applicable Models</u>		
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Condition</u>
None		None
<u>Materials/Parts</u>		
Sealing tape (Appendix D, item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

a. Removal**CAUTION**

Clean area around breather before to prevent entry of dirt.
Damage will occur if dirt or dust enters the transmission.

- | | | | | |
|----|------------------|---|-------------|--|
| 1. | Breather (1) | Breather vent line (2) | Disconnect. | |
| 2. | Transmission (3) | Transmission breather (1) and adapter (4) | Remove. | Inspect threads and replace if stripped. |

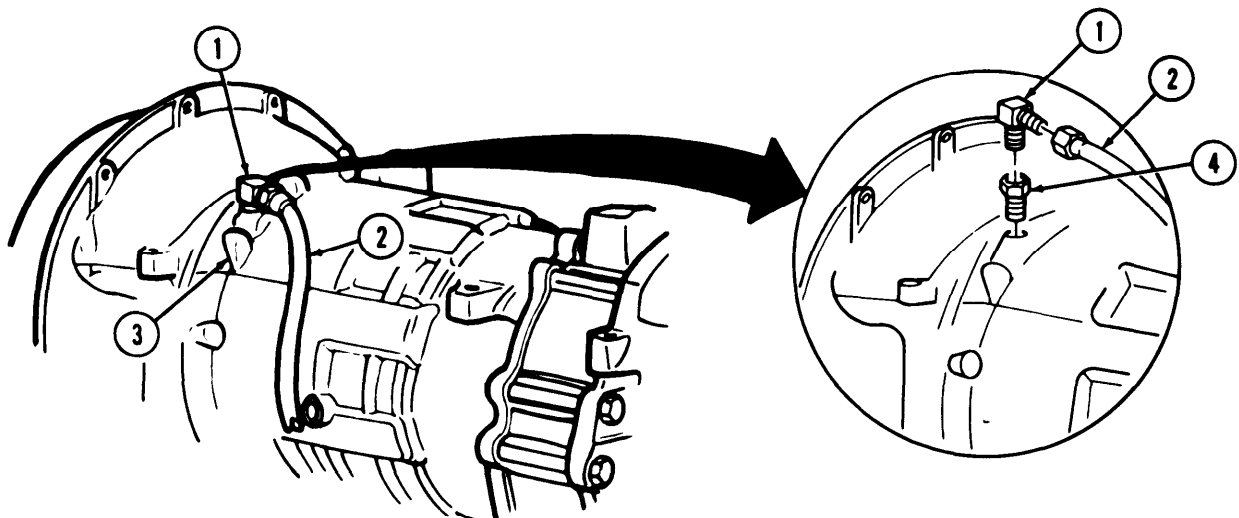
b. Installation**NOTE**

Male pipe threads must be wrapped with sealing tape before installation.

- | | | |
|----|--|----------|
| 3. | Adapter (4) and trans-
mission breather (1) | Install. |
| 4. | Breather vent line (2) | Install. |

5-9. TRANSMISSION BREATHER REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

TA 348926

5-10. TRANSMISSION OIL DIPSTICK TUBE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10	Parking brake set.
	Para. 5-3	Transmission oil drained.
Test Equipment	TM 9-2320-272-10	Transmission oil dipstick removed.
None		
Special Tool		Special Environmental Conditions
None		None
Materials/Parts		
Tiedown strap (Appendix D, Item 19)		
Personnel Required		General Safety Instructions
Light-wheeled vehicle mechanic MOS 63B		None
Manual References		
TM 9-2320-272-10		
TM 9-2320-272-34P		
LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

CAUTION

Clean area around dipstick tube before removal to prevent entry of dirt. Damage will occur if dirt or dust enters the transmission.

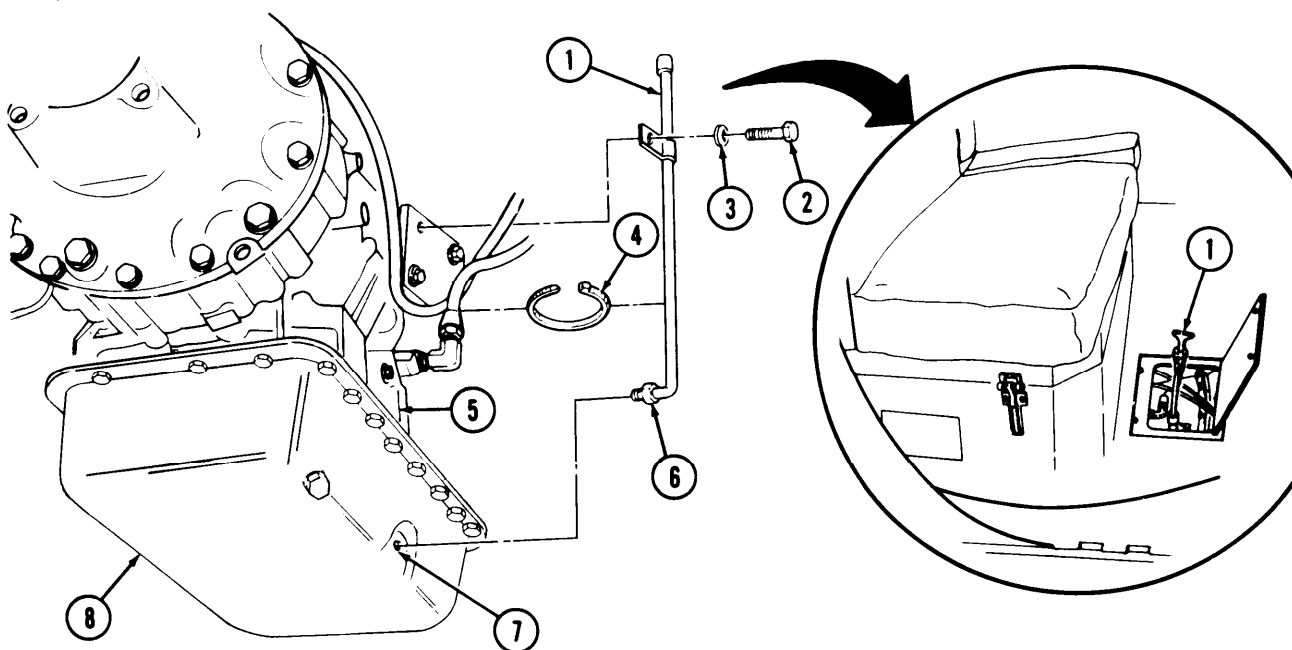
1. Transmission (5)	Screw (2) and washer (3)	Remove.	
2. Transmission oil pan (8)	Dipstick tube flare nut (3) and tiedown strap	Unscrew and remove dipstick tube (1) and cut tiedown strap (4).	Discard tiedown strap (4).
b. Inspection			
3.	Dipstick tube (1)	Inspect for cracks, blockage, and damage to flared end.	If cracked, or welds broken or damaged, replace tube (1). If blocked, remove obstruction.

5-10. TRANSMISSION OIL DIPSTICK TUBE MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
4.	Dipstick tube flare nut (6)	Inspect for cross threading and burrs.	If cross threaded or burred, replace dipstick tube (1).
5.	Oil pan dipstick tube port (7)	Inspect for cracked or broken welds, burrs and cross threading.	If cracked or broken, replace oil pan (8). If burred or cross threaded, repair threads.

c. Installation

- | | | | |
|----|-------------------|---|---|
| 6. | Dipstick tube (1) | <p>a. Install to top of transmission (5) with washer (3) and screw (2).</p> <p>b. Install in oil pan dipstick tube port (7) with flared nut (6).</p> <p>c. Install new tiedown strap (4).</p> | Tighten flared nut (6) 10-25 lb-ft (14-34 N•m). |
|----|-------------------|---|---|



END OF TASK!

- FOLLOW-ON TASKS: :
- Fill transmission to proper oil level (LO 9-2320-272-12).
 - Install transmission oil dipstick (TM 9-2320-272-10).
 - Start engine (TM 9-2320-272-10), check for leaks, and road test vehicle.

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT

This task covers:

- ## a. Removal b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 4-63	Parking brake set, Right splash shield removed. Transmission temperature transmitter removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		
None		
<u>Materials/Parts</u>		
Four "O" rings Two lockwashers Locknut Protective cap-plugs (Appendix D, Item 5) Two tiedown straps (Appendix D, Item 19) Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		
<u>Special Environmental Conditions</u>		
None		
<u>General Safety Instructions</u>		
None		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

- Have oil drainage container ready to catch oil,
- Access to hose connection in step 1 is gained through access door in cab floor.
- Tag lines for installation.

- | | | |
|--|--|-------------|
| 1. Temperature transmitter adapter (6) | Transmission to oil cooler supply hose (1) | Disconnect. |
|--|--|-------------|

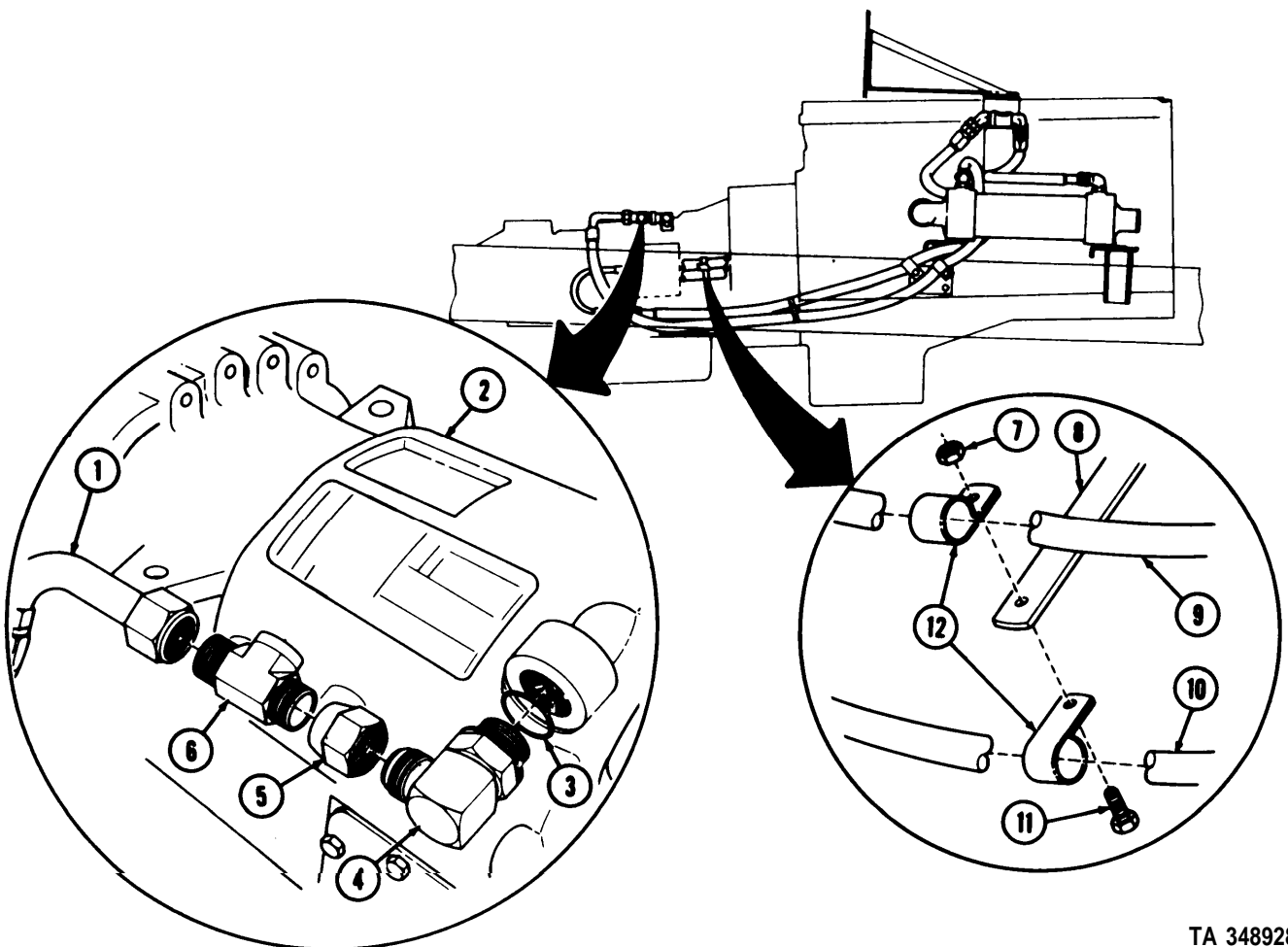
5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
2.	Temperature trans-mitter adapter fitting (5)	Temperature trans-mitter adapter (6)	Remove.	
3.	Temperature trans-mitter adapter elbow (4)	Temperature trans-mitter adapter fitting (5)	Remove.	
4.	Top of transmission (2)	Temperature trans-mitter adapter elbow (4) and "O" ring (3)	Remove.	Discard "O" ring (3).

NOTE

Step 5 is required only when vehicle is equipped with front winch.

5.	Hanger strap (8)	Locknut (7) and screw (11)	Remove.	Move winch hydraulic hose (9) and (10) and two clamps (12) aside.
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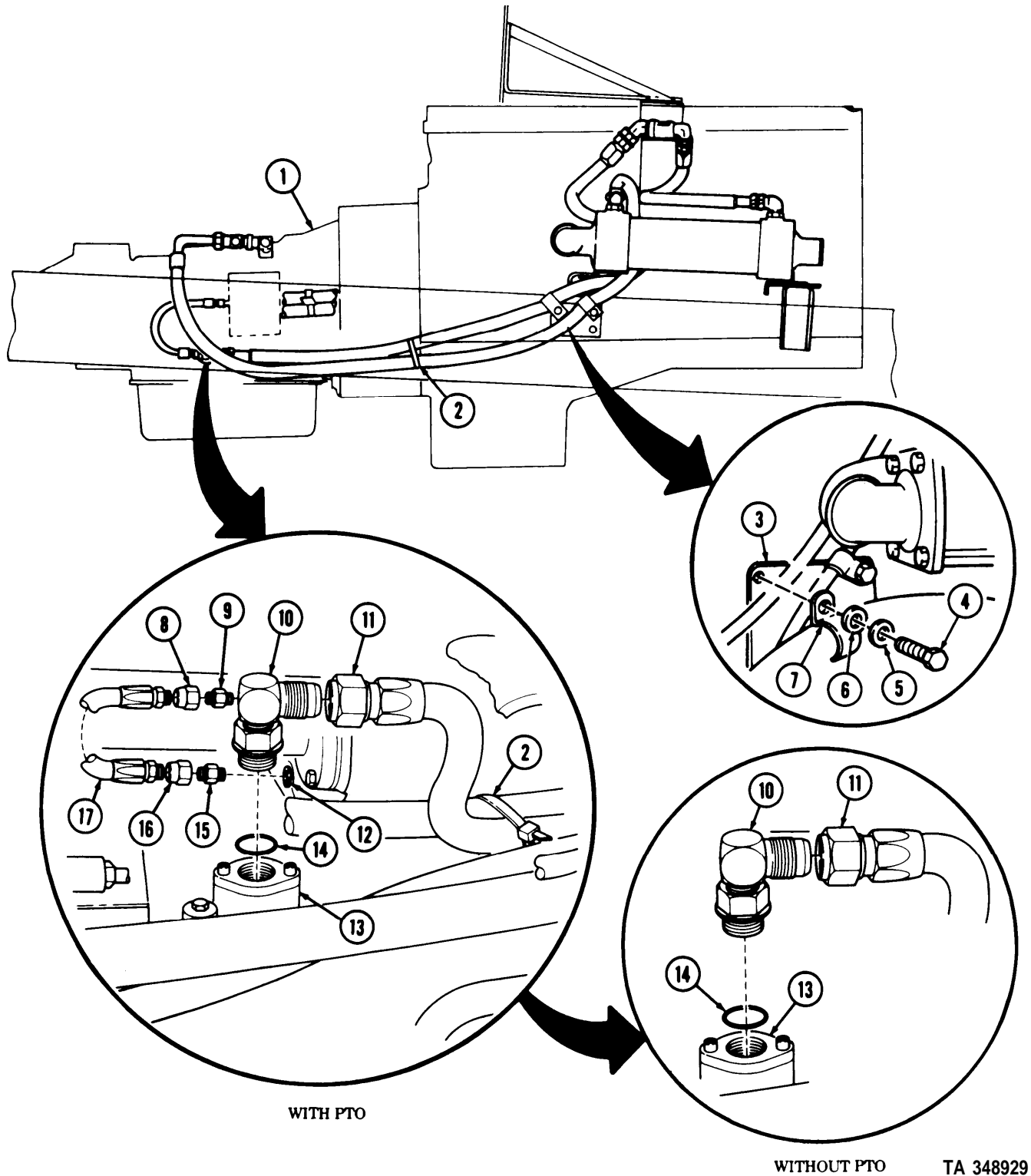
TA 348928

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Steps 6 through 11 are required only when vehicle is equipped with transmission power takeoff (PTO).</p>				
6.	Lubrication valve hose adapter fitting (8)	Power takeoff to transmission lubrication valve return hose (17)	Disconnect.	
7.	Lubrication valve adapter fitting (9)	Lubrication valve hose adapter fitting (8)	Remove.	
8.	Lubrication valve adapter (10)	Lubrication valve adapter fitting (9)	Remove.	Cover opening in lubrication valve adapter (10).
9.	Power takeoff hose adapter fitting (16)	Power takeoff to transmission lubrication valve return hose (17)	Disconnect.	
10.	Power takeoff adapter fitting (15)	Power takeoff hose adapter fitting (16)	Remove.	
11.	Power takeoff (12)	Power takeoff adapter fitting (15)	Remove.	Cover opening in power takeoff (12).
12.	Lubrication valve adapter (10)	Transmission oil filter to transmission return hose(n)	Disconnect.	
13.	Transmission lubrication valve housing (13)	Lubrication valve adapter (10) and "O" ring (14)	Remove.	Cover opening in transmission lubrication valve housing (13). Discard "O" ring (14).
14.	Right front of transmission (1)	Two tiedown straps (2)	Remove.	Discard tiedown straps (2).
15.	Engine access cover (3)	Two screws (4), lockwashers (5), washers (6). and clamps(7)	Remove.	Discard lockwashers (5).

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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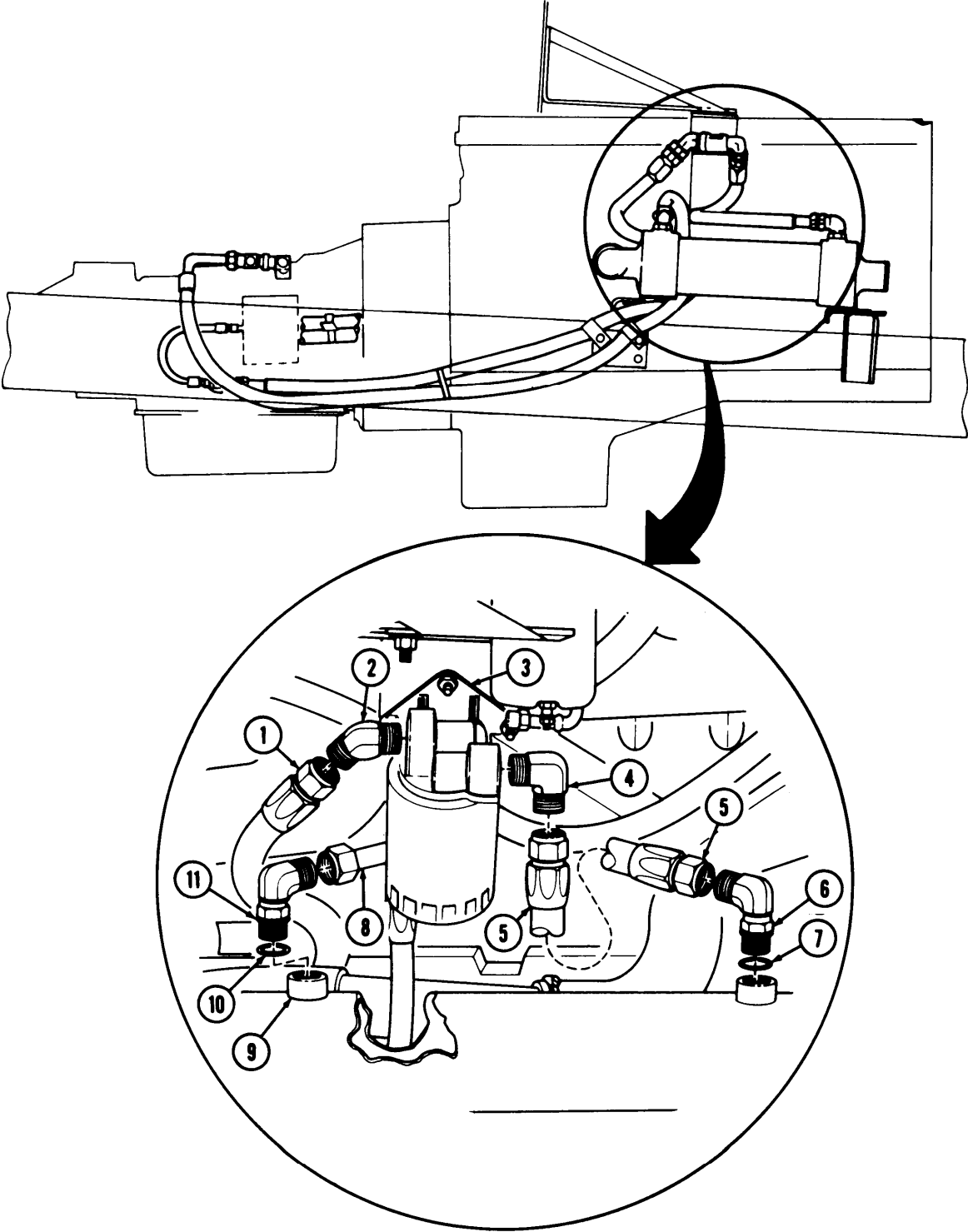


5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
16.	Oil cooler supply adapter elbow (11)	Transmission to oil cooler supply hose (8)	Disconnect.	
17.	Oil cooler (9)	Oil cooler supply adapter elbow (11) and "O" ring (10)	Remove.	Cover opening in oil cooler (9). Discard "O" ring (10).
18.	Oil cooler to transmission oil filter supply hose adapter elbow (6)	Oil cooler to transmission oil filter supply hose (5)	Disconnect.	
19.	Oil cooler (9)	Oil cooler to transmission oil filter supply hose adapter elbow (6) and "O" ring (7)	Remove.	Cover opening in oil cooler (9). Discard "O" ring (7).
20.	Transmission oil filter supply hose adapter elbow (4)	Oil cooler to transmission oil filter supply hose (5)	Disconnect.	
21.	Transmission oil filter housing (3)	Transmission oil filter supply hose adapter elbow (4)	Remove.	Cover opening in transmission oil filter housing (3).
22.	Transmission oil filter to transmission return hose adapter elbow (2)	Transmission oil filter to transmission return hose(1)	Disconnect.	
23.	Transmission oil filter housing (3)	Transmission oil filter to transmission return hose adapter elbow (2)	Remove.	Cover opening in transmission oil filter housing (3).

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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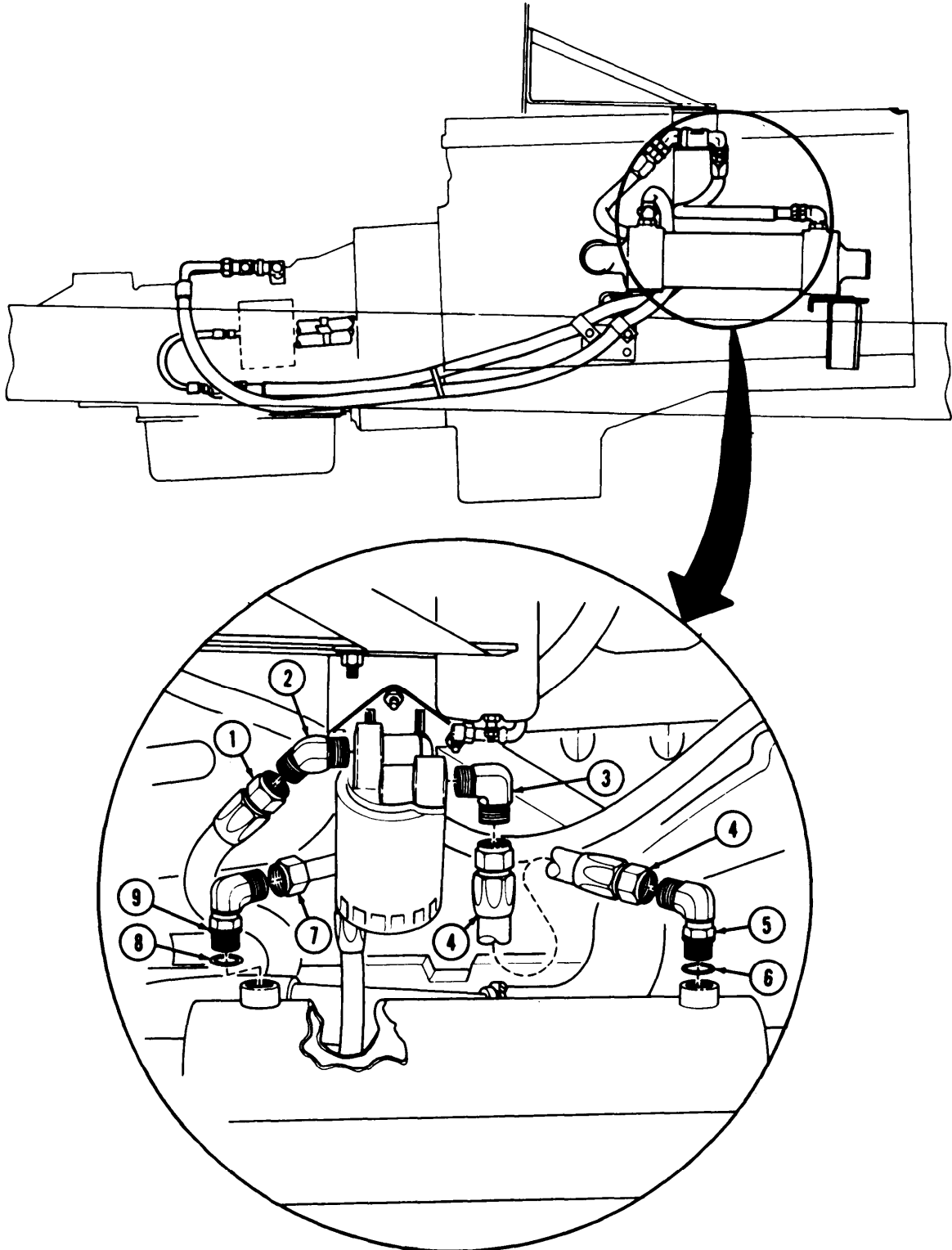
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5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<hr/>				
b. Installation				
<hr/>				
NOTE				
Male pipe threads must be wrapped with sealing tape before installation.				
24.		Transmission oil falter to transmission return hose adapter elbow (2)	Install.	
25.		Transmission oil falter to transmission return hose (1)	Connect.	
26.		Transmission oil falter supply hose adapter elbow (3)	Install.	
27.		Oil cooler to trans- mission oil filter supply hose (4)	Connect.	
28.		New "O" ring (6) and transmission oil falter supply hose adapter elbow (5)	Install.	
29.		Oil cooler to trans- mission oil filter supply hose (4)	Connect.	
30.		New "O" ring (8) and oil cooler supply adapter elbow (9)	Install	
31.		Transmission to oil cooler supply hose (7)	Connect.	

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 348931

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
32.		Transmission to oil cooler supply hose (5) and transmission oil filter to transmission return hose (4)	a. Install with two clamps (9), washers (8), new lockwashers (7), and screws (6) to engine access cover (3). b. Install two new tiedown straps (2).	Install near right front of transmission (1).
33.		New "O" ring (13) and transmission lubrication valve adapter (12)	Install.	
34,		Transmission oil filter to transmission return hose (4)	Connect.	

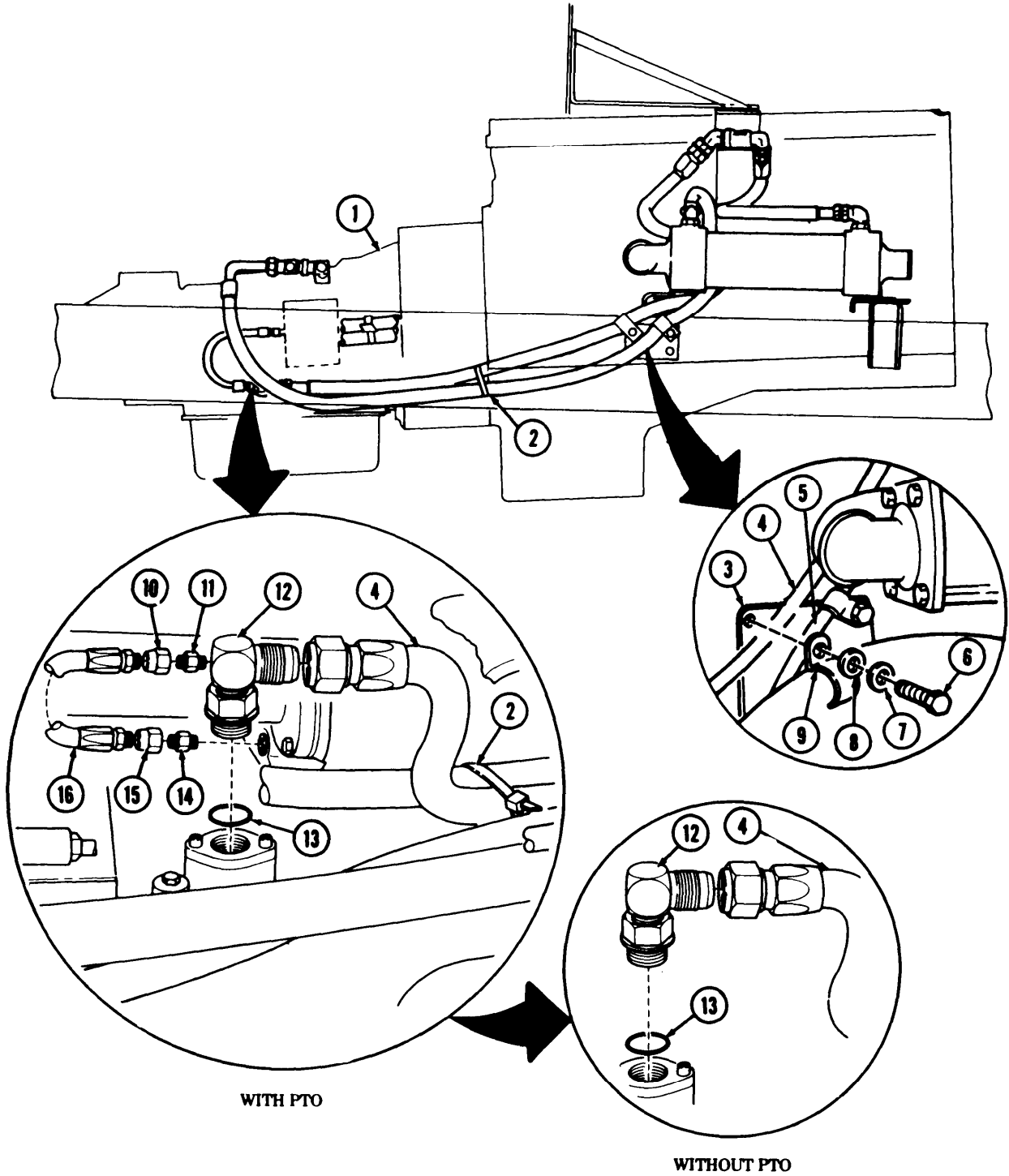
NOTE

Steps 35 through 40 are required only when vehicle is equipped with transmission power takeoff (PTO).

35.		Power takeoff adapter fitting (14)	Install.	
36.		Power takeoff hose adapter fitting (15)	Install.	
37.		Power takeoff to transmission lubrication valve return hose (16)	Connect.	
38.		Lubrication valve adapter fitting (11)	Install.	
39.		Lubrication valve hose adapter fitting (10)	Install.	
40.		Power takeoff to transmission lubrication valve return hose (16)	Connect.	

5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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TA 348932

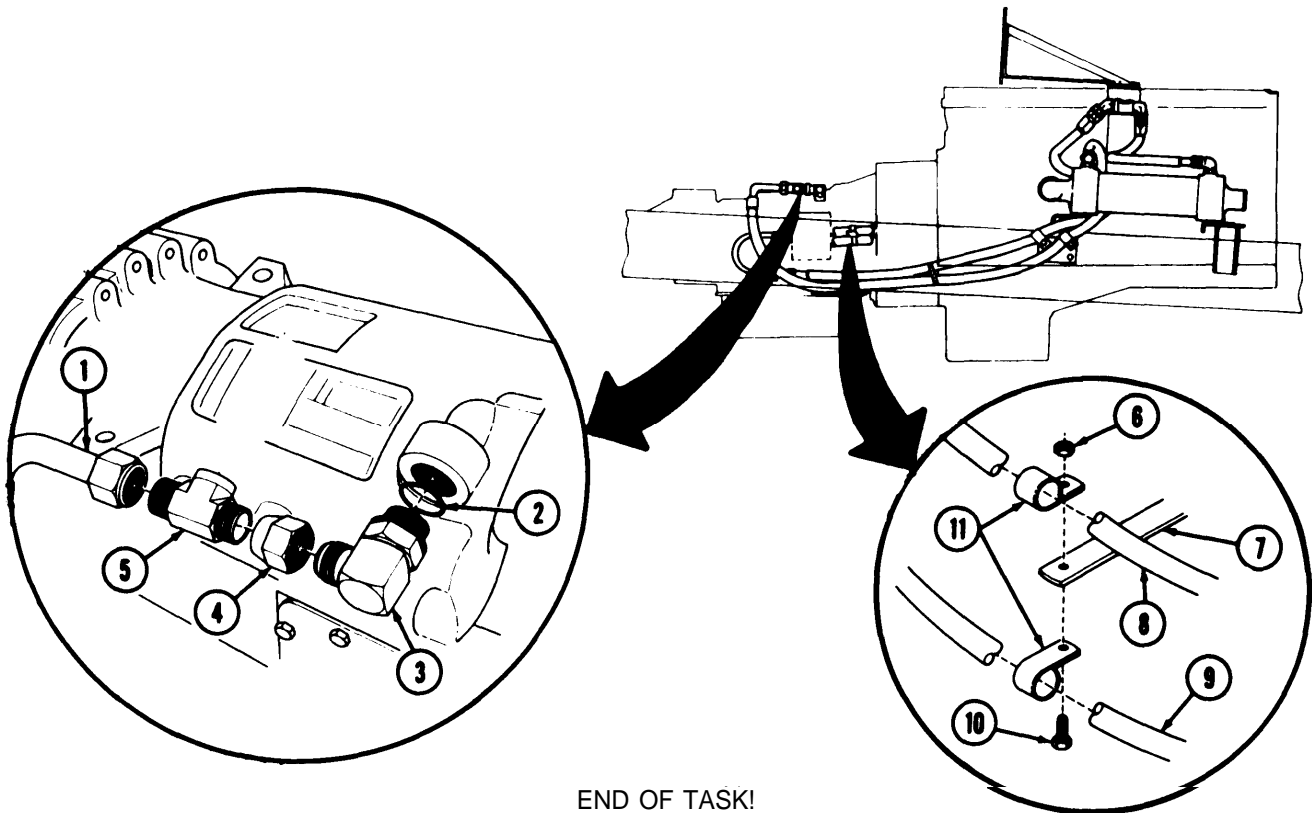
5-11. TRANSMISSION OIL COOLER HOSES REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Step 41 is required when vehicle is equipped with front winch.

41.		Winch hydraulic hose (8) and (9) and two clamps (11)	Aline with hanger strap (7) and install screw (10) and new locknut (6).	
42.		New "O" ring (2) and temperature transmitter adapter elbow (3)	Install.	
43.		Temperature transmitter adapter fitting (4)	Install.	
44.		Temperature transmitter adapter (5)	Install.	
45.		Transmission oil cooler supply hose (1)	Connect.	



END OF TASK!

FOLLOW-ON TASKS: | Install transmission temperature transmitter (para. 4-63).
 | Fill transmission oil reservoir to proper level (LO 9-2320-272-12).
 | Install right splash shield (TM 9-2320-272-10).
 | Start engine (TM 9-2320-272-10). Check for leaks, and road test vehicle. TA 348933

7-3. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272 -20-1	Parking brake set. Battery ground cables disconnected.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		<u>General Safety Instructions</u>
Six lockwashers		None
<u>Personnel Required</u>		
Wheeled vehicle repairman MOS 63W		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20-1 TM 9-2320-272-34P		

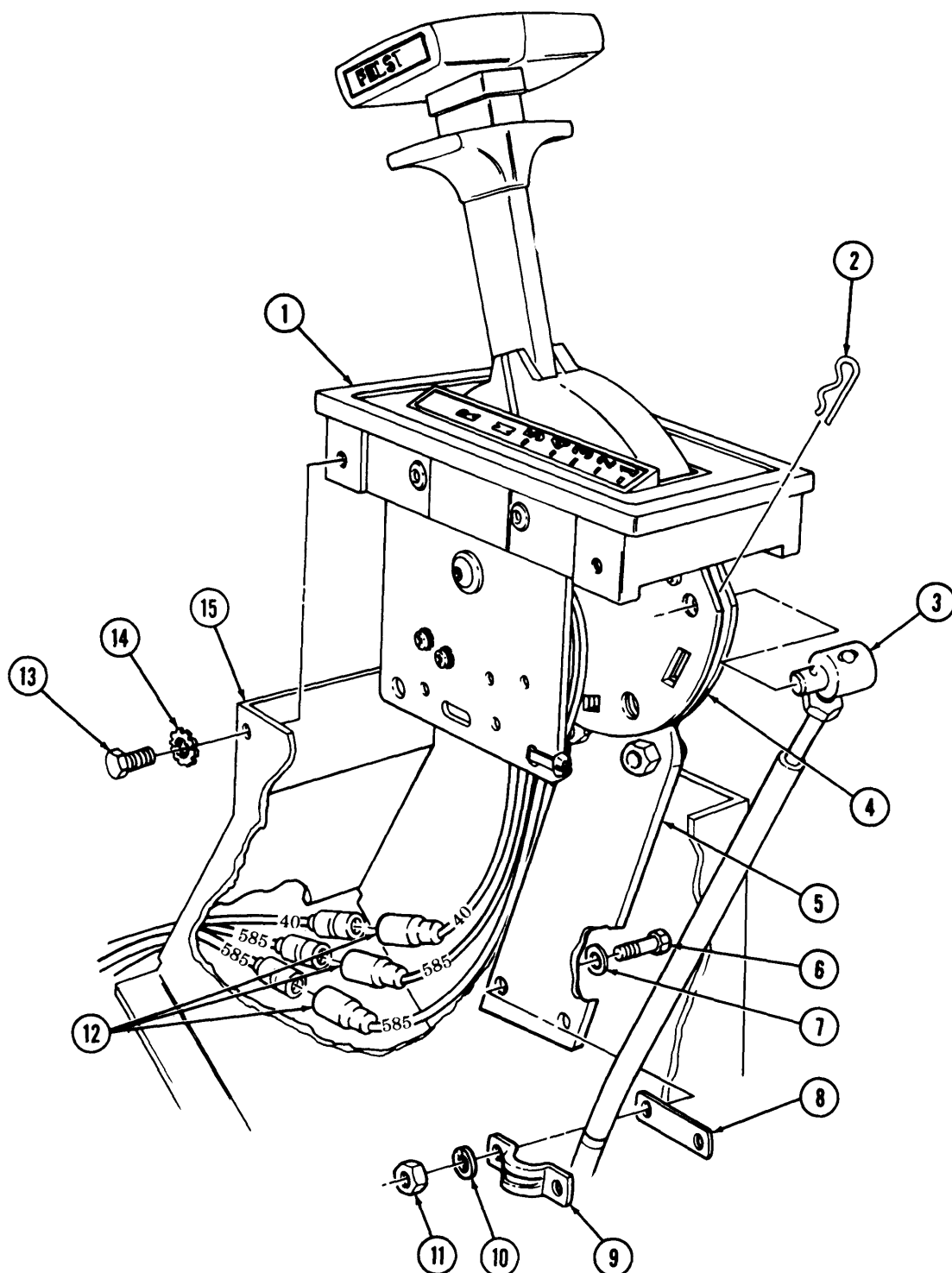
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Transmission control lever console (15)	Four screws (13) and lockwashers (14)	Remove.	Discard lockwashers (14).
2.		Transmission selector lever assembly	Pull away from console (15).	
3.		Three connectors (12)	Disconnect.	Tag for installation.
4.	Hanger plate (5)	Two nuts (11) and lockwashers (10), cable clamp (9), shim (8), two washers (7) and two screws (6)	Remove.	Discard lockwashers (10).
5.	Selector lever plate (4)	Spring clip (2)	Remove and pull trunnion (3) free.	
6.		Transmission selector lever assembly (1)	Remove.	

7-3. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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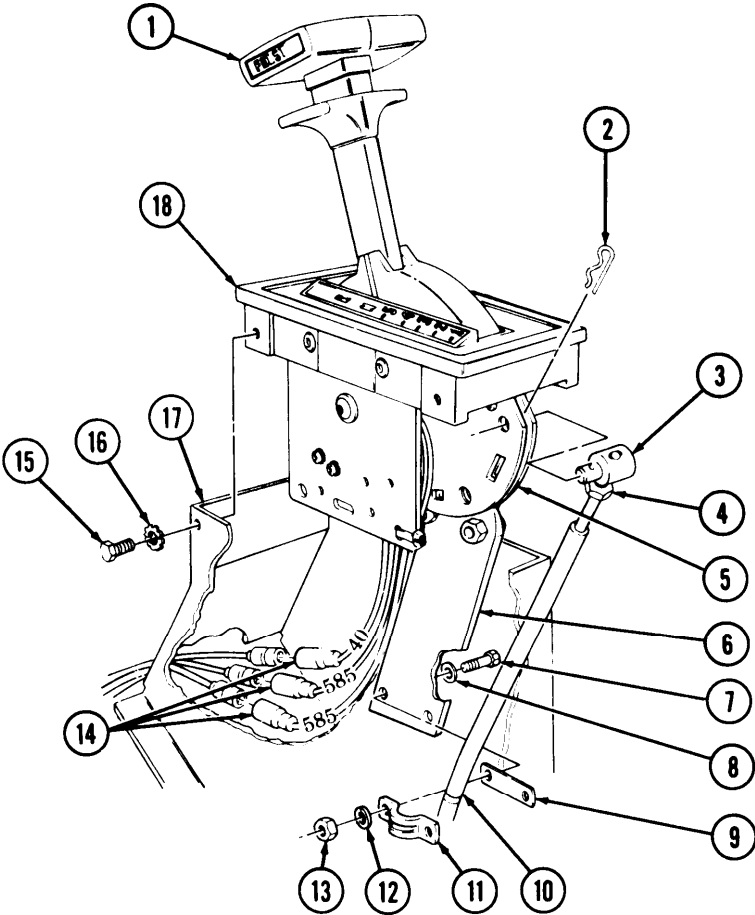
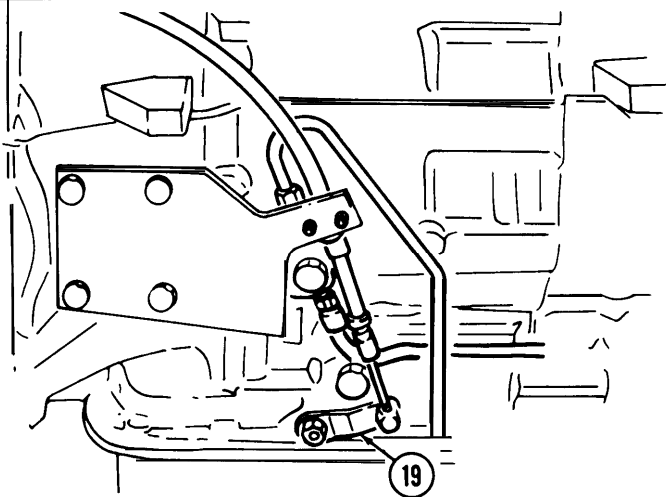


TA 349910

7-3. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
<p style="text-align: center;">NOTE</p> <p>Vehicle must be started in "N" (neutral) to check selector lever assembly. Vehicle will start if installation is correct. Remove and reinstall selector lever assembly if vehicle fails to start in "N" (neutral).</p>				
7.		Transmission selector lever (1)	Place in "N" (neutral).	
8.		Manual control linkage arm (19)	Place in "N" (neutral).	Linkage arm (19) will be one detent down from full up position.
9.		Shim (9), transmission shift cable (10), and cable clamp (11)	Install on hanger plate (6) with two screws (7), washers (8) new lockwashers (12), and nuts (13).	Make sure cable clamp (11) seats in groove of shift cable (10) housing.
10.		Cable trunnion (3)	a. Loosen jamnut (4) and aline with first hole above elongated slot in selector lever plate (5). b. Tighten jamnut (4) and install in plate (5) with spring clip (2).	Cable trunnion (3) is turned clockwise to shorten and counter-clockwise to lengthen,
11.		Three electrical connectors (14)	Connect.	
12.		Transmission selector lever assembly (18)	Install in transmission control lever console (17) with four screws (15) and new lockwashers (16).	

7-3. TRANSMISSION SELECTOR LEVER ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

END OF TASK!

FOLLOW-ON TASKS:

- Connect battery ground cables (TM 9-2320-272-20-1).
- Start engine (TM 9-2320-272-10) and road test vehicle.

TA 349911

CHAPTER 6

PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE

NOTE

Refer to TM 9-2320-358-24&P for unique M939A2 maintenance procedures. ■

Section 1. PROPELLER SHAFT MAINTENANCE

6-1. GENERAL

This section provides maintenance procedures assigned to the organizational level for the propeller shafts. To find a specific maintenance procedure, see the maintenance task summary below:

6-2. PROPELLER SHAFTS MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-3.	Propeller Shaft (Without Center Bearing) Maintenance	6-2
6-4.	Universal Joint Replacement	6-4
6-5.	Propeller Shaft Servicing	6-6
6-6.	Transmission to Transfer Case Propeller Shaft Maintenance	6-10
6-7.	Transfer Case to Forward Rear Axle Propeller Shaft and Center Bearing Replacement	6-16
6-8.	Transfer Case to Front Axle Propeller Shaft (With Center Bearing) Replacement	6-18

6-3. PROPELLER SHAFT (WITHOUT CENTER BEARING) MAINTENANCE

This task covers:

- a. Removal
b. Inspection

c. Installation

INITIAL SETUP

INITIAL SETUP

	Equipment Condition	
<u>Applicable Models</u>	<u>Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sixteen locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|--|-----------------------------------|---------|-----------------------|
| 1. | Front propeller shaft yoke (7) to companion flange (8) | Eight screws (1) and locknuts (9) | Remove. | Discard locknuts (9). |
|----|--|-----------------------------------|---------|-----------------------|

NOTE

Assistant will help with steps 2 and 3.

- | | | | | |
|----|---|-----------------------------------|---------|-----------------------|
| 2. | Rear propeller shaft yoke (6) to companion flange (5) | Eight screws (4) and locknuts (3) | Remove. | Discard locknuts (3). |
| 3. | | Propeller shaft (2) | Remove. | |

b. Inspection

- | | | | |
|----|---------------------|--------------------------------|-------------------------------|
| 4. | propeller shaft (2) | Inspect for cracks and damage. | Replace if cracked or damaged |
|----|---------------------|--------------------------------|-------------------------------|

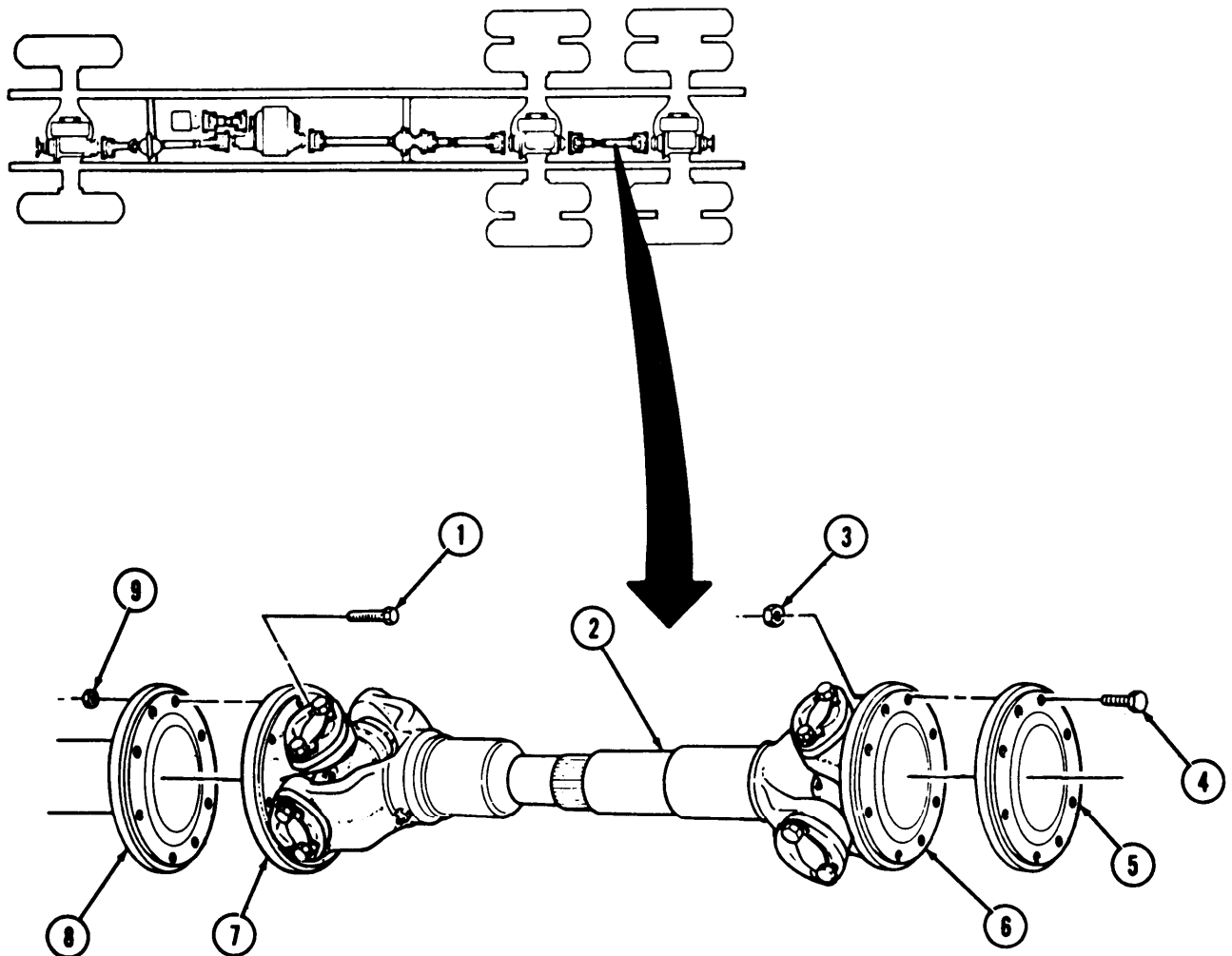
6-3. PROPELLER SHAFT (WITHOUT CENTER BEARING) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				

NOTE

Assistant will help with step 5.

- | | | | |
|----|---------------------|---|---|
| 5. | Propeller shaft (2) | <p>a. Install with eight screws (4) and new locknuts (3).</p> <p>b. Install with eight screws (1) and new locknuts (9).</p> | <p>Tighten locknuts (3) 30-40 lb-ft (41-54 N•m).</p> <p>Tighten locknuts (9) 30-40 lb-ft (41-54 N•m).</p> |
|----|---------------------|---|---|



END OF TASK!

FOLLOW-ON TASK: Lubricate universal joint (LO 9-2320-272-12).

TA 349658

6-4. UNIVERSAL JOINT REPLACEMENT

This task covers:

- a. Removal
b. Inspection

c. Installation

INITIAL SETUP:

Applicable Models

All

Test Equipment

None

Special Tools

None

Materials/Parts

Four lockplates
Universal joint kit P/N CP16NS

Personnel Required

Light-wheeled vehicle mechanic MOS 63B

Manual References

TM 9-2320-272-10
TM 9-2320-272-20P
LO 9-2320-272-12

Equipment Condition Reference

TM 9-2320-272-10
TM 9-2320-272-10

Condition Description

Parking brake set.
Wheels chocked.

Special Environmental Conditions

None

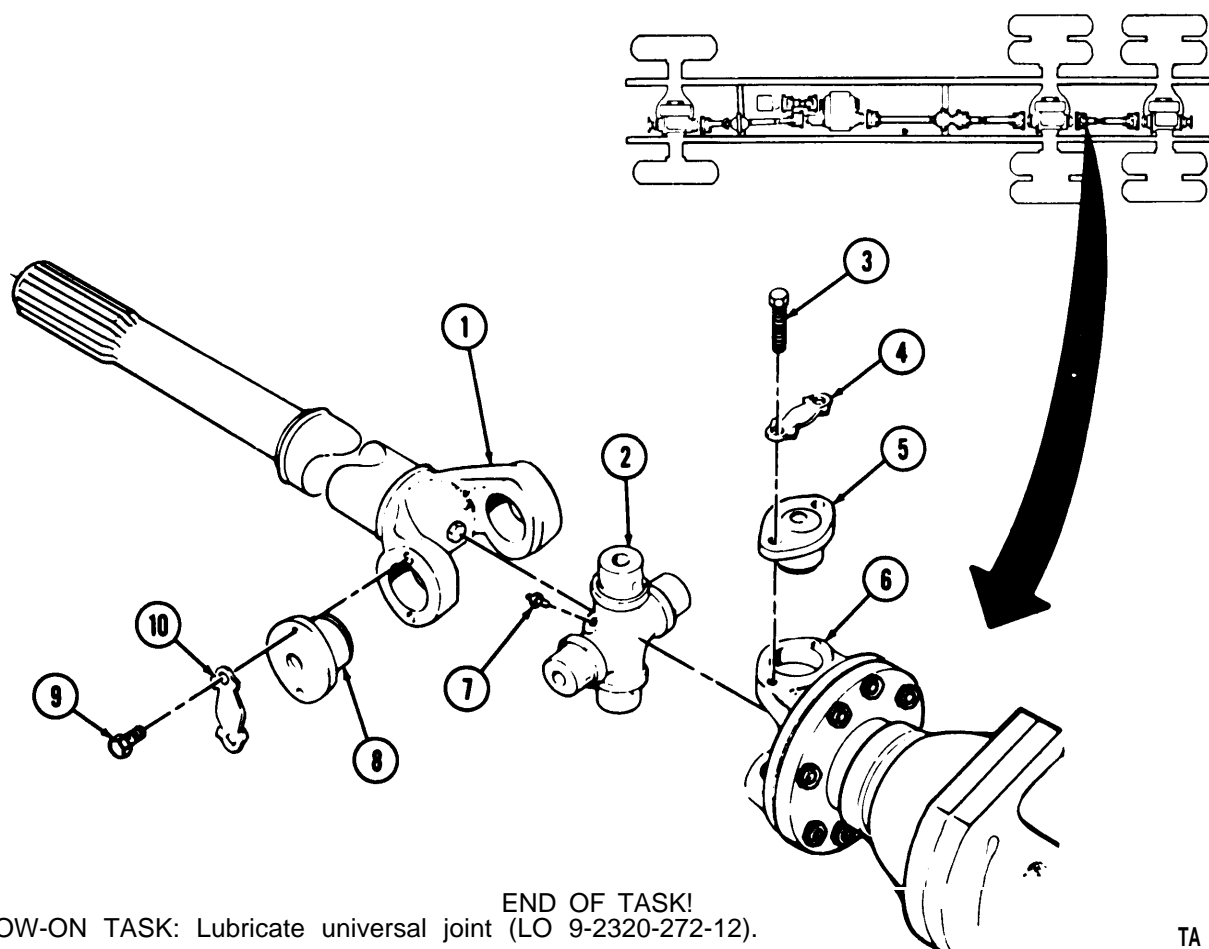
General Safety Instructions

None

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Propeller shaft yoke (6)	Two lockplates (4)	Bend tabs away from four screws (3).	
2.		Four screws (3) and two lockplates (4) and bearing cups (5)	Remove,	Discard lockplates (4).
3.		Cross (2)	Remove from yoke (6).	
4.	Propeller shaft (1)	Two lockplates (10)	Bend tabs away from four screws (9).	
5.		Four screws (9), and two lockplates (10) and bearing cups (8)	Remove.	Discard lockplates (10).
6.		Cross (2)	Remove.	
7.	Cross (2)	Grease fitting (7)	Remove.	
b. Inspection				
8.		Cross (2) and bearing cups (8) and (5)	Inspect for cracks and pitting.	Replace if cracked or pitted.
c. Installation				
9.		Grease fitting (7)	Install.	

6-4. UNIVERSAL JOINT REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
10.		Cross (2)	Place in propeller shaft (1)	Grease fitting (7) must be aligned with opposite grease fitting of opposite U-joint.
11.		Two bearing cups (8) and new lockplates (10)	a. Install on cross (2) with four screws (9). b. Bend tabs on lockplates (10) over each screw (9).	Tighten 30-40 lb-ft (41-54 N•m).
12.		Cross (2)	Place in propeller shaft yoke (6).	
13.		Two bearing cups (5) and new lockplates (4)	a. Install on cross (2) with four screws (3). b. Bend tabs on lockplates (4) over each screw (3).	Tighten 30-40 lb-ft (41-54 N•m).



END OF TASK!

FOLLOW-ON TASK: Lubricate universal joint (LO 9-2320-272-12).

TA 349459

6-5. PROPELLER SHAFT SERVICING

- This task covers:
- a. Disassembly
- c. Reassembly
- b. Cleaning and Inspection

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 Para. 6-3	Parking brake set. Propeller shaft removed.
Test Equipment		
None		
Special Tools		Special Environmental Conditions
None		None
Materials/Parts		
Seal Two washers		
Personnel Required		General Safety Instructions
Light-wheeled vehicle mechanic MOS 63B		None
Manual References		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Disassembly

NOTE

Perform steps 1 through 3 for Dana propeller shaft.

1.

Propeller shaft (1)

Dust cap (2)

Unscrew.
2.

Propeller shaft (1)

Separate.
3.

Dust cap (2), seal (3),
and two washers (4)

Remove.

Discard seal (3) and washers (4).

NOTE

Perform steps 4 and 5 for Rockwell propeller shaft.

4.

Propeller shaft (1)

Unscrew cap seal (5)
and separate.
5.

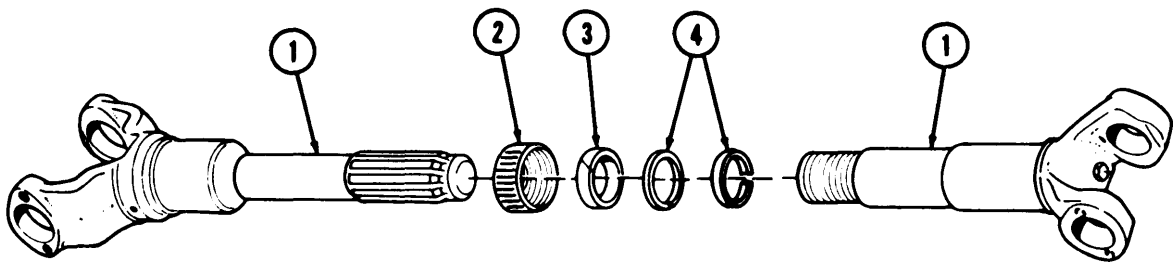
Cap seal (5)

Remove.

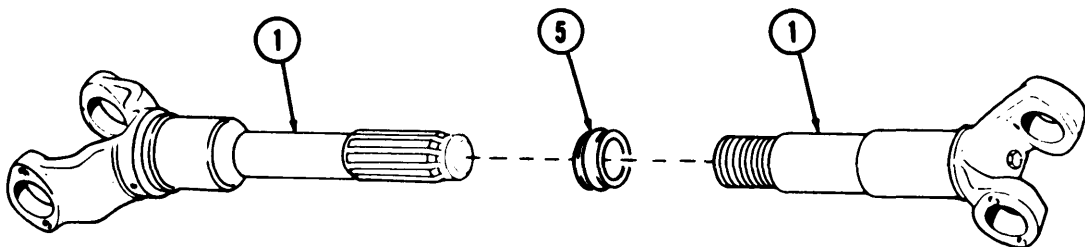
Discard seal (5).

6-5. PROPELLER SHAFT SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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DANA



ROCKWELL

6-5. PROPELLER SHAFT SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Cleaning and Inspection				
6.		Propeller shaft (1)	Clean splined and threaded ends.	
7.		Propeller shaft (1)	a. Inspect both halves for damage. b. Inspect splined and threaded ends of shaft (1) for damage.	Replace if damaged. Replace shaft (1) if splined or threaded end is damaged.

c. Reassembly

NOTE

Perform steps 8 through 10 for Dana propeller shaft.

8.	Dust cap (2)	Place over splined end of shaft (1).
9.	New seal (3) and two new washers (4)	Place in dust cap (2).
10.	Propeller shaft (1)	a. Put ends together. b. Install with dust cap (2).

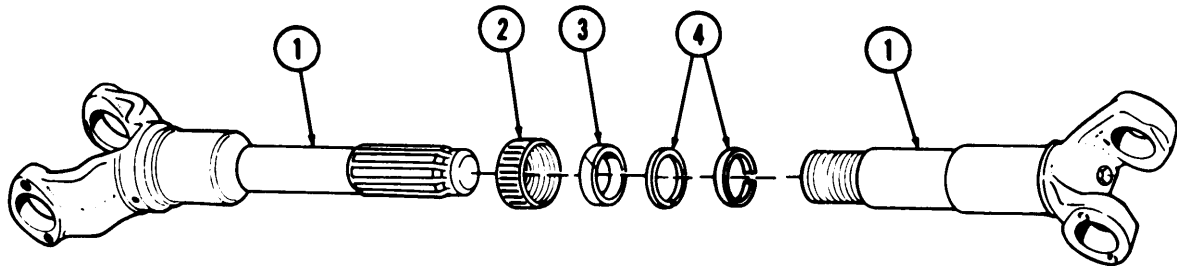
NOTE

Perform steps 11 and 12 for Rockwell propeller shaft.

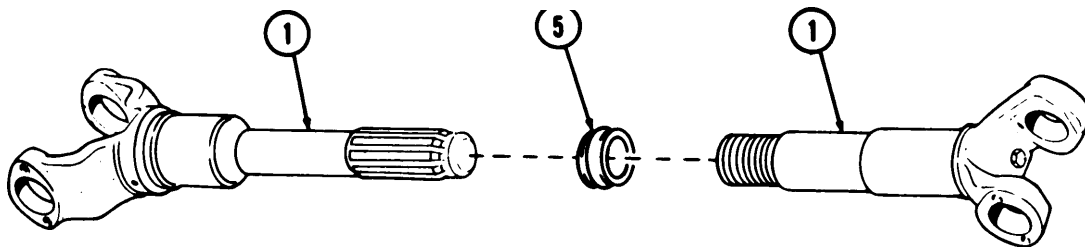
11.	New cap seal (5)	Place over splined end of shaft (1).
12.	Propeller shaft (1)	Put ends together and screw seal (5) on shaft (1).

6-5. PROPELLER SHAFT SERVICING (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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DANA



ROCKWELL

END OF TASK!

FOLLOW-ON TASKS: • Install propeller shaft (para 6-3).
• Lubricate universal joints (LO 9-2320-272-12).

TA 349661

6-6. TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT MAINTENANCE

This task covers:

- | | |
|----------------|-----------------|
| a. Removal | c. Reassembly |
| b. Disassembly | d. Installation |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Wheels chocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Twelve lockwashers Universal joint kit		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

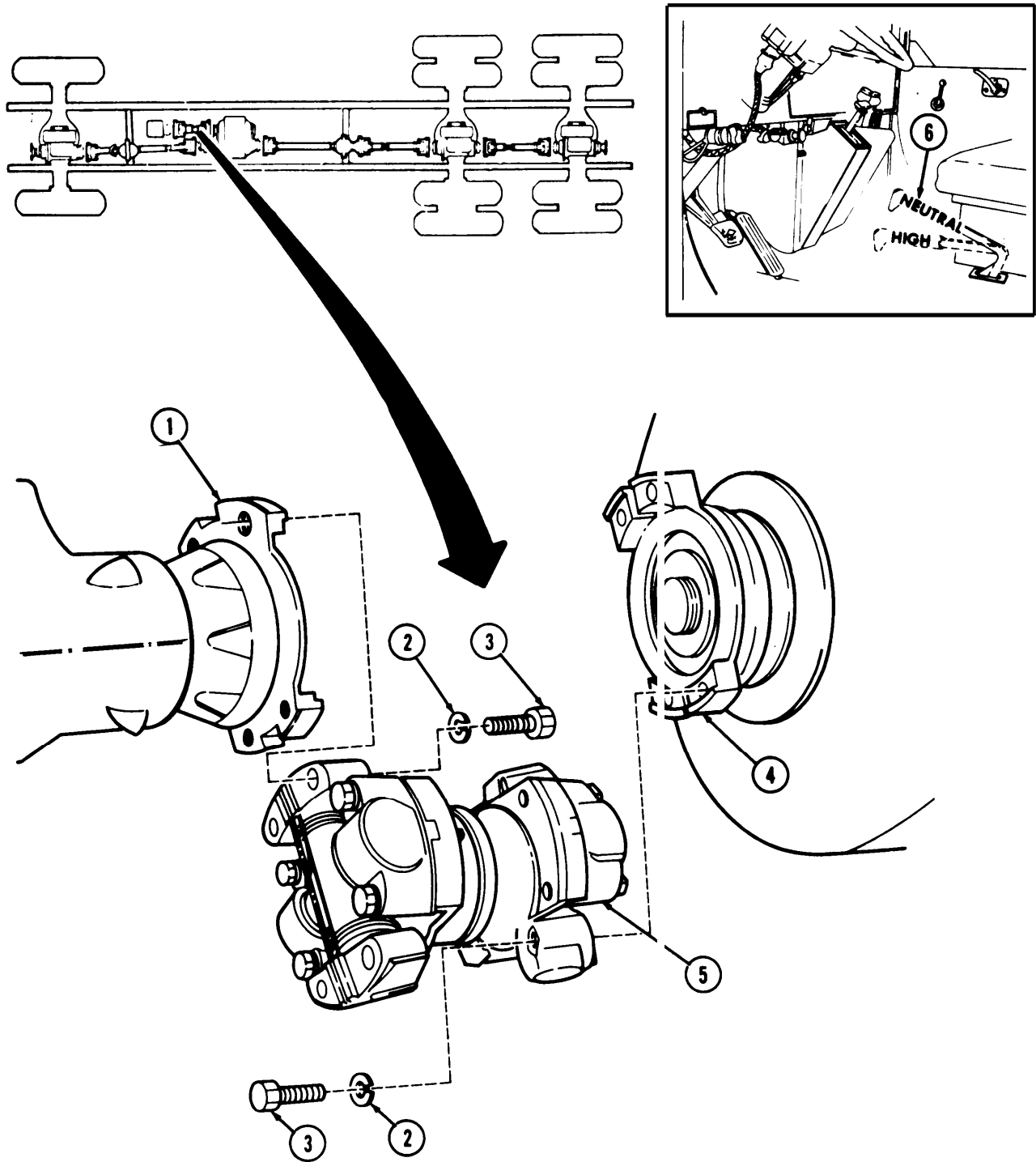
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|---|--|---|--|--------------------------|
| 1. | | Transfer case lever (6) | Place in "high". | |
| 2. | Transmission yoke (1) and transfer case yoke (4) | Four screws (3) and lockwashers (2) | Remove. | Discard lockwashers (2). |
| 3. | | Transfer case lever (6) | Place in "neutral". | |
| 4. | | Propeller shaft (5) | Turn until remaining screws (3) can be seen. | |
| 5. | | Transfer case lever (6) | Place in "high". | |
| NOTE | | | | |
| Assistant will help with steps 6 and 7. | | | | |
| 6. | Transmission yoke (1) and transfer case yoke (4) | Remaining four screws (3) and lockwashers (2) | Remove. | Discard lockwashers (2). |
| 7. | | Propeller shaft (5) | Remove. | |

6-60 TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT
MAINTENANCE (Cont'd)

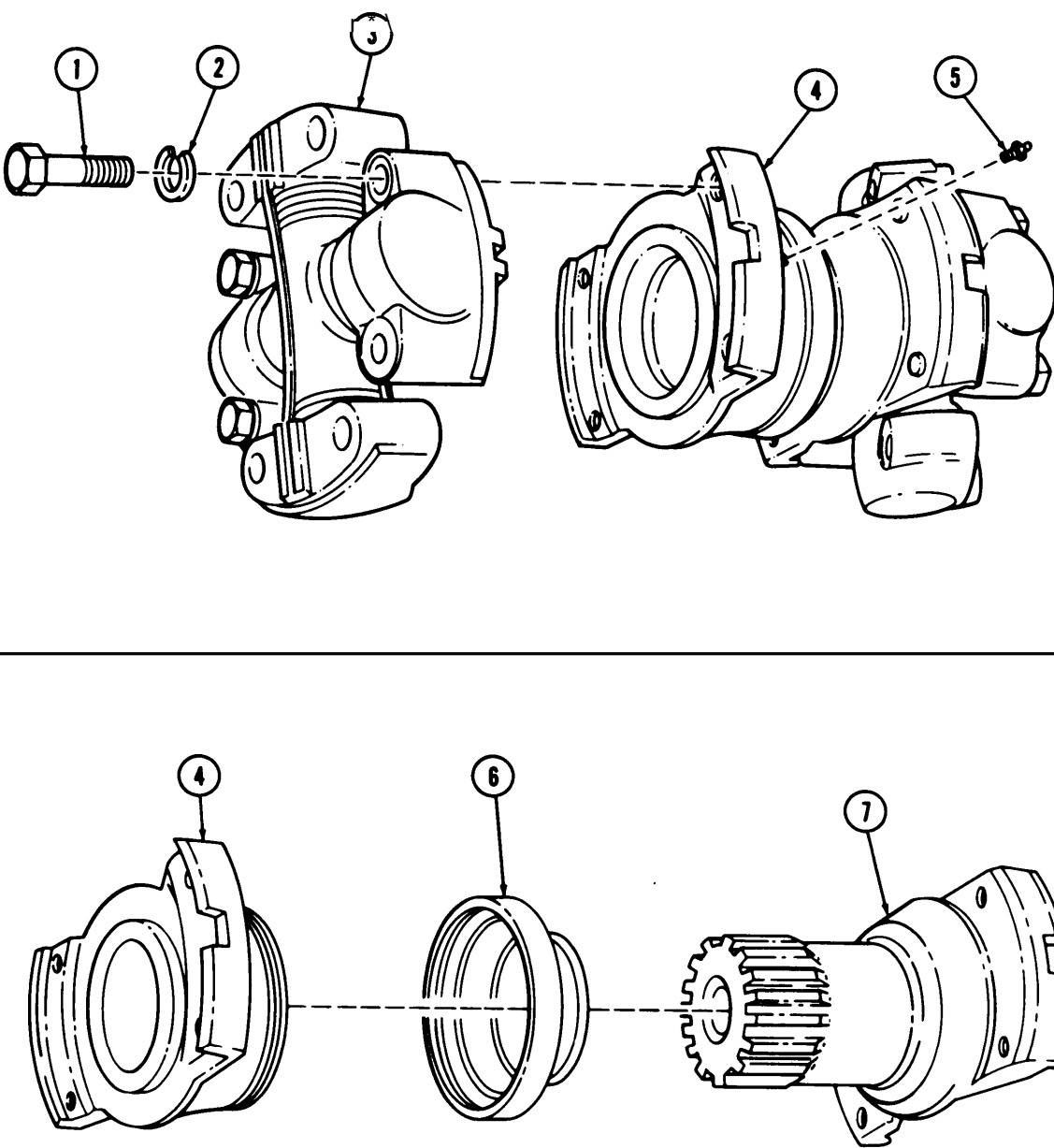
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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6-6. TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT MAINTENANCE (Cont'd)
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STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Disassembly				
8.		Grease fitting (5)	Remove.	
9.	Input yoke (4)	Four screws (1), lockwashers (2), and cross assembly (3)	Remove.	Discard lockwashers (2).
10.		Seal assembly (6)	Unscrew and separate input yoke (4) from output yoke (7).	Old seal (6) can be reused if undamaged.
c. Reassembly				
11.		Seal assembly (6)	Install over splined output yoke (7).	
12.		Output yoke (7)	Install into input yoke (4).	
13.		Seal assembly (6)	Screw onto input yoke (4).	
14.		Cross assembly (3)	Install with four new lockwashers (2) and screws (1).	Tighten 90-110 lb-ft (122-149 N•m).
15.		Grease fitting (5)	Install.	

6-6. TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT
MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				

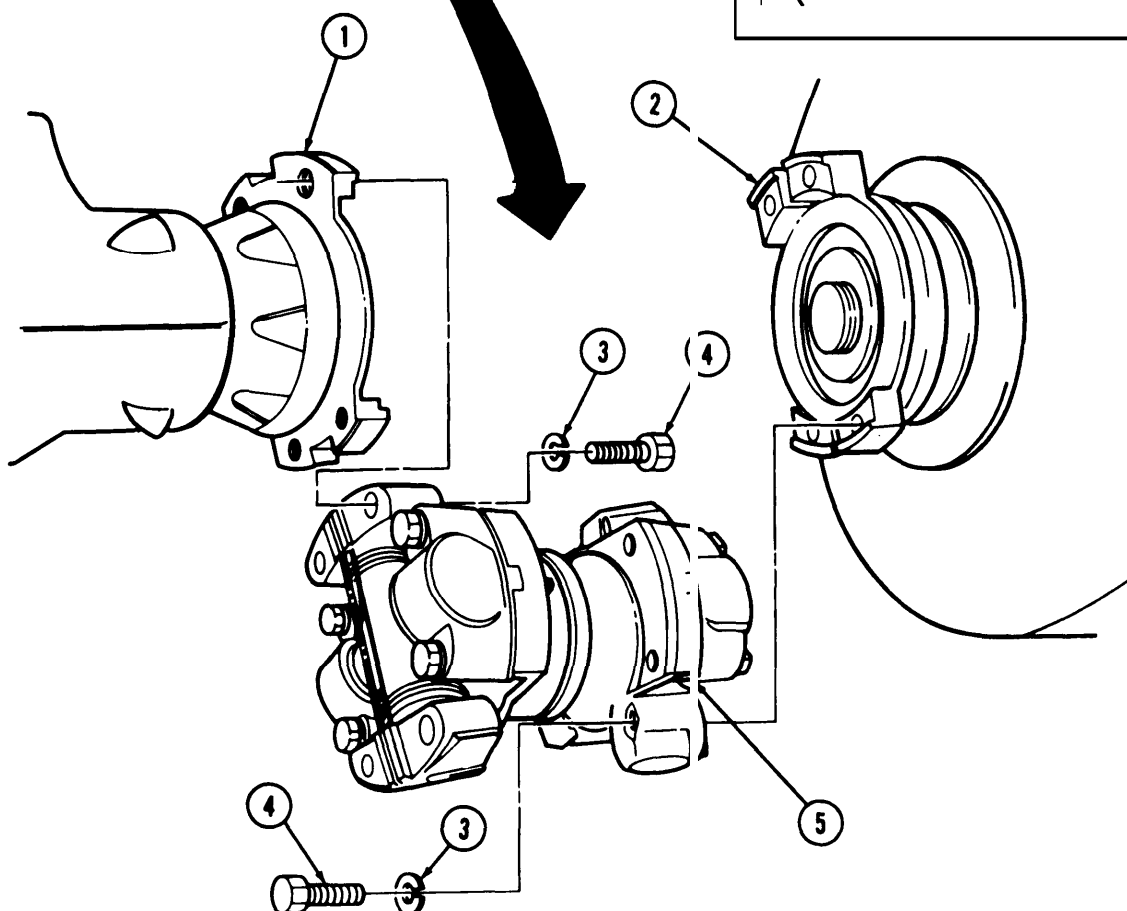
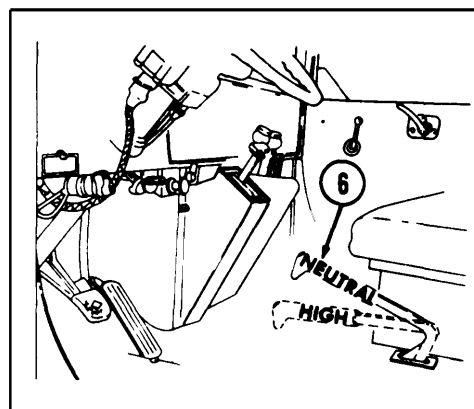
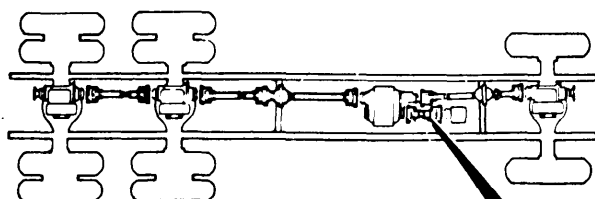
TA 349663

6-60 TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
d. Installation				
NOTE				
Assistant will help with step 16.				
16.		Propeller shaft (5)	a. Install between transmission yoke (1) and transfer case yoke (2). b. Install with four new lockwashers (3) and screws (4).	Tighten 90-110 lb-ft (122-149 N•m).
17.		Transfer case lever (6)	Place in "neutral".	
18.		Propeller shaft (5)	Turn until remaining screws (4) can be seen.	
19.		Transfer case lever (6)	Place in "high".	
20.		Four remaining new lockwashers (3) and screws (4)	Tighten.	Tighten 90-110 lb-ft (122-149 N•m).

**6-60 TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT
MAINTENANCE (Cont'd)**

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Lubricate propeller shaft universal joints (LO 9-2320-272-12).

TA 349664

6-7. TRANSFER CASE TO FORWARD REAR AXLE PROPELLER SHAFT AND CENTER BEARING REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
M927, M928, M934, M935, M936	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Wheels chocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		<u>General Safety Instructions</u>
Twenty-eight locknuts Cotter pin		None
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B (2)		
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

NOTE

Assistant will help with steps 1,2,3, and 4.

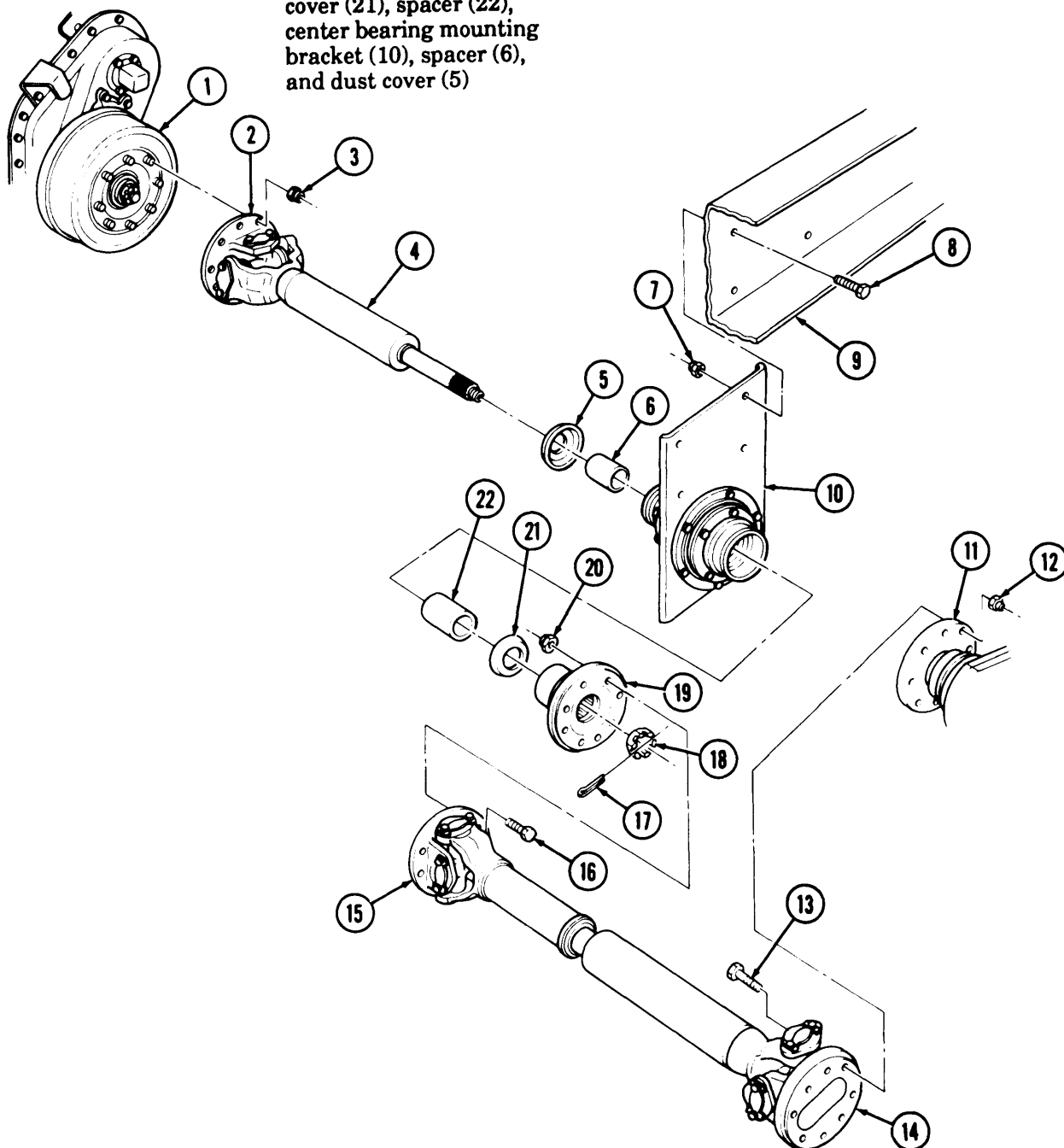
1. Rear propeller shaft companion flange (15) and center bearing flange (19)	Eight screws (16) and locknuts (20)	Remove.	Discard locknuts (20).
2. Center bearing mounting bracket (10) and crossmember (9)	Four screws (8) and locknuts (7)	Remove.	Discard locknuts (7).
3. Transfer case brake-drum (1) to transfer case drive shaft yoke flange (2)	Eight locknuts (3)	Remove.	Discard locknuts (3). Remove forward-rear axle propeller shaft and center bearing assembly.
4. Rear propeller shaft yoke flange (14) and forward-rear axle yoke flange (11).	Eight screws (13) and locknuts (12)	Remove.	Discard locknuts (12). Remove rear-rear axle propeller shaft

6-7. TRANSFER CASE TO FORWARD REAR AXLE PROPELLER SHAFT AND CENTER BEARING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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5.		Cotter pin (17) and nut (18)	Remove.	Discard cotter pin (17).
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6.	Forward propeller shaft (4)	Center bearing companion flange (19), dust cover (21), spacer (22), center bearing mounting bracket (10), spacer (6), and dust cover (5)	Remove.	
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6-7. TRANSFER CASE TO FORWARD REAR AXLE PROPELLER SHAFT AND CENTER BEARING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

N O T E

- | | | |
|----|--|---|
| 7. | Dust cover (5), spacer (6), Install on forward center bearing mounting propeller shaft (4) with bracket (10), spacer (23), nut (19). dust cover (22), and center bearing companion flange (20) | Tighten 100-115 lb-ft (136-156 N•m). Then if needed, turn nut (19) clockwise to align the nearest slot with hole in shaft (4) to install new cotter pin (18). |
| 8. | New cotter pin (18) | Install on nut (19) and propeller shaft (4). |

NOTE

- I Assistant will help with steps 9 through 12.
- I Position rear-rear axle propeller shaft so that grease fitting on U-joint faces downward.

- | | | | |
|-----|--|---|----------------------------------|
| 9. | Rear-rear propeller shaft yoke flange (14) | Install on forward-rear axle yoke flange (11) with eight screws (13) and new locknuts (12). | Tighten 30-40 lb-ft (41-54 N•m). |
| 10. | Transfer case drive shaft yoke flange (2) | Install on transfer case brakedrum (1) with eight new locknuts (3). | Tighten 30-40 lb-ft (41-54 N•m). |
| 11. | Center bearing mounting bracket (10) | Install on crossmember (9) with four screws (8) and new locknuts (7). | |

NOTE

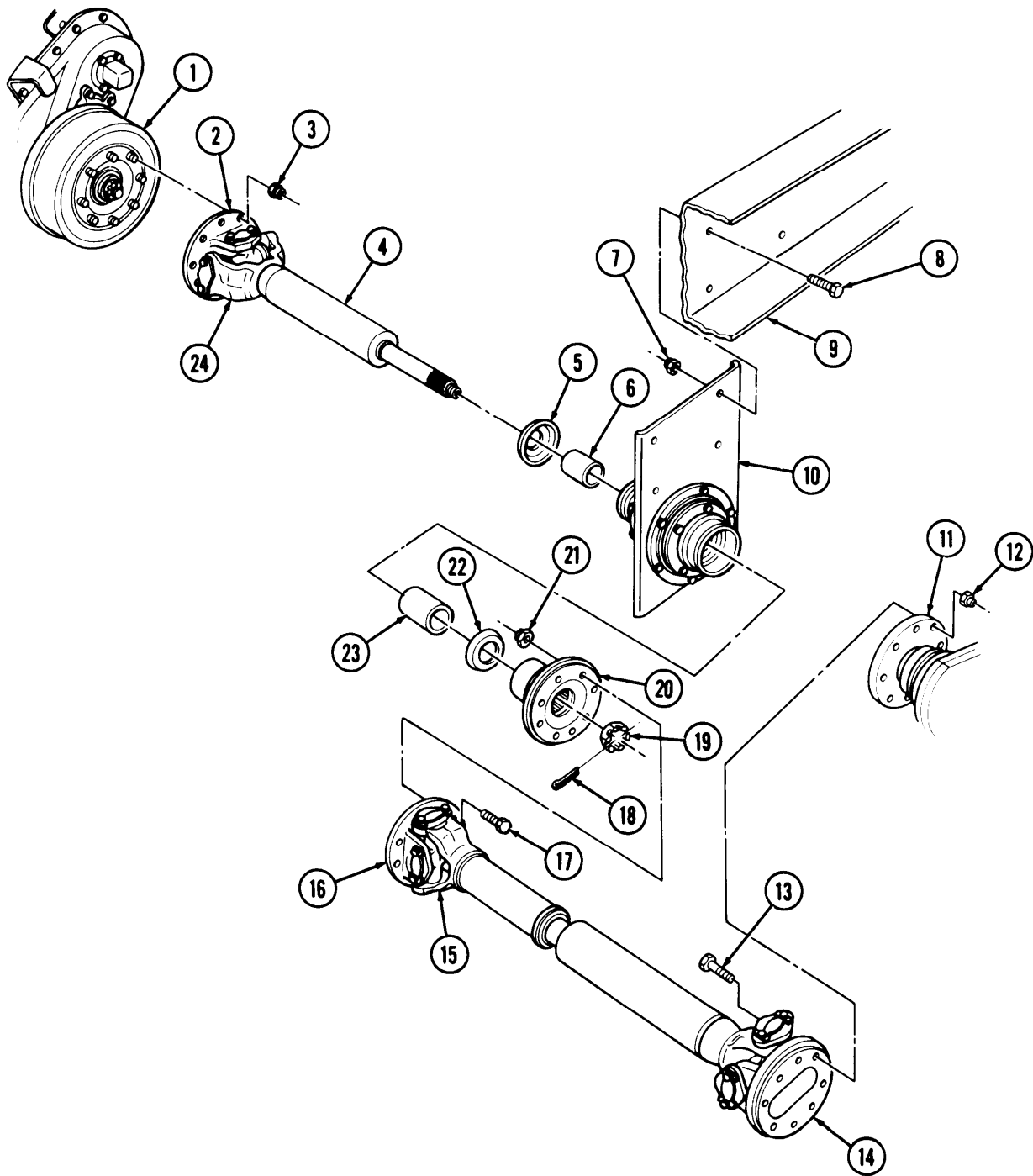
- All grease fittings on rear-rear propeller shaft and forward propeller shaft U-joints must face downward.

- | | | | |
|-----|--|---|--|
| 12. | Rear propeller shaft companion flange (16) | Install on center bearing companion flange (20) with eight screws (17) and new locknuts (21). | Forward propeller shaft yoke (24) and rear propeller shaft yoke (15) must be turned 90° from each other.

Tighten locknuts (21) 30-40 lb-ft (41-54 N•m). |
|-----|--|---|--|

6-7. TRANSFER CASE TO FORWARD REAR AXLE PROPELLER SHAFT AND
CENTER BEARING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Lubricate propeller shaft universal joints (LO 9-2320-272-12),

TA 349665

6-8. TRANSFER CASE TO FRONT AXLE PROPELLER SHAFT (WITH CENTER BEARING) REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Wheels chocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Sixteen locknuts Two lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|--|-------------------------------------|---------|--------------------------|
| 1. | Center bearing bracket (3) | Two screws (2) and lockwashers (1) | Remove. | Discard lockwashers (1). |
| 2. | Propeller shaft flange (9) to differential flange (10) | Eight screws (12) and locknuts (11) | Remove. | Discard locknuts (11). |
| 3. | Propeller shaft flange (7) to transfer case flange (6) | Eight screws (4) and locknuts (5) | Remove. | Discard locknuts (5). |

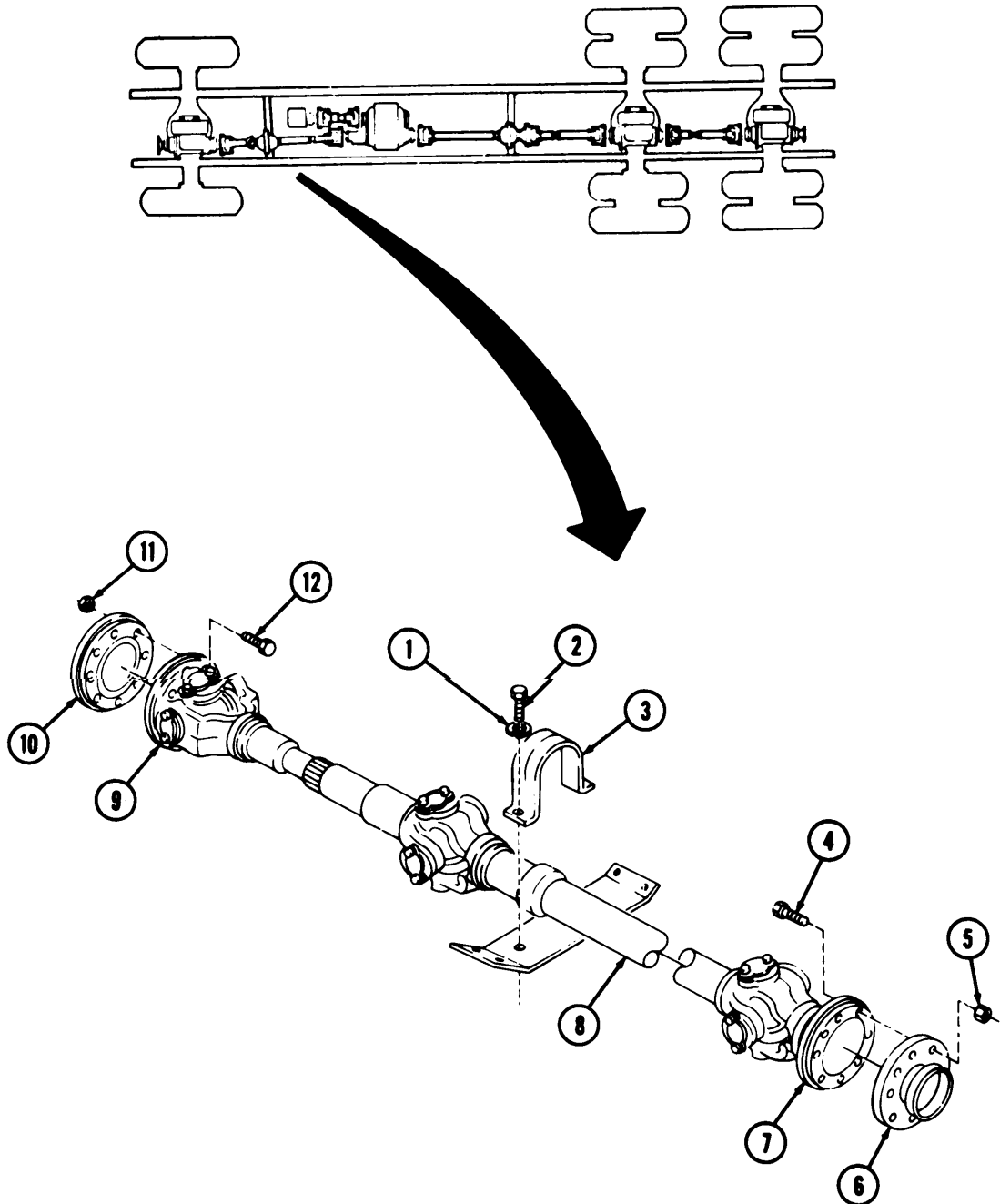
NOTE

Assistant will help with step 4.

- | | | |
|----|--|---------|
| 4. | Transfer case to front axle propeller shaft assembly (8) | Remove. |
|----|--|---------|

6-8. TRANSFER CASE TO FRONT AXLE PROPELLER SHAFT (WITH CENTER BEARING) REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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6-8. TRANSFER CASE TO FRONT AXLE PROPELLER SHAFT (WITH CENTER BEARING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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b. Installation

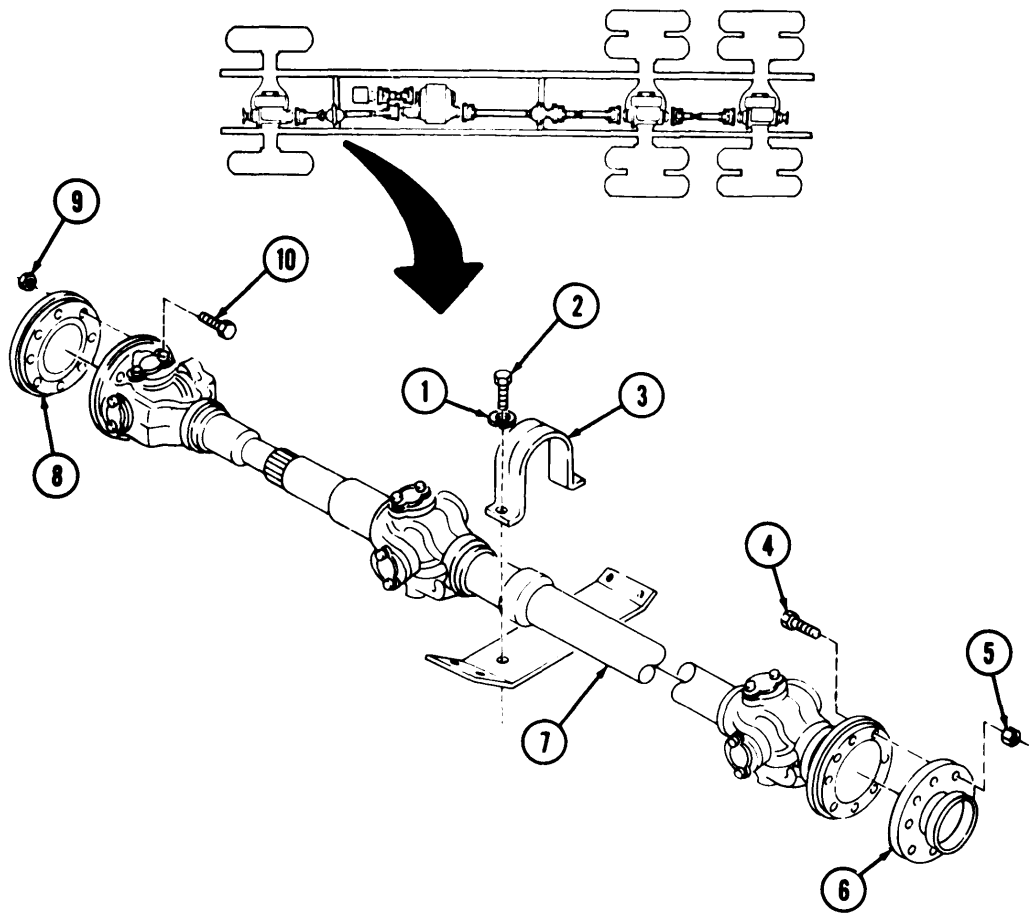
NOTE

Assistant will help with step 5,

- | | | | |
|----|--|---|--|
| 5. | Transfer case to front axle propeller shaft assembly (7) | a. Install to transfer flange (6) with eight screws (4) and new locknuts (5).

b. Install to differential flange (8) with eight screws (10) and new locknuts (9). | Tighten 32-40 lb-ft (43-64 N•m).

Tighten 32-40 lb-ft (43-54 N•m). |
| 6. | Center bearing bracket (3) | Install with two screws (2) and new lock-washers (1). | |



END OF TASK!

FOLLOW-ON TASK: Lubricate propeller shaft universal joints (LO 9-2320-272- 12).

TA 349667

Section II. FRONT AXLE AND REAR AXLE MAINTENANCE

6-9. GENERAL

This section provides maintenance procedures assigned to the organizational level for the front and rear axles. To find a specific procedure, see the maintenance task summary below:

6-10. FRONT AND REAR AXLE MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-11.	Toe-In Check and Adjustment	6-22
6-12.	Cross-Shaft (Tie Rod) Maintenance	6-26
6-13.	Front Axle Shaft and Universal Joint Maintenance	6-28
6-14.	Steering Knuckle Seal Replacement	6-34
6-15.	Front Axle Drive Flange Maintenance	6-38
6-16.	Rear Axle Shaft Maintenance	6-40
6-17.	Carrier Differential Top Cover Gasket and Side Cover Gasket Replacement	6-42

6-11. TOE-IN CHECK AND ADJUSTMENT

This task covers:

a. Toe-in Check

b. Toe-in Adjustment

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
Toe-in gage		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		Vehicle on level surface.
<u>Materials/Parts</u>		
None		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Toe-in Check

- | | | |
|----|------------------|--|
| 1. | Front wheels (1) | Place in straight ahead position. |
| 2. | Toe-in gage (4) | a. Place ends (2) against inner tire side walls (3) in front of axle (5) parallel to front of truck and ends (2) 7 in. (178 mm) off ground.
b. Reset pointer (6) to register "O". |

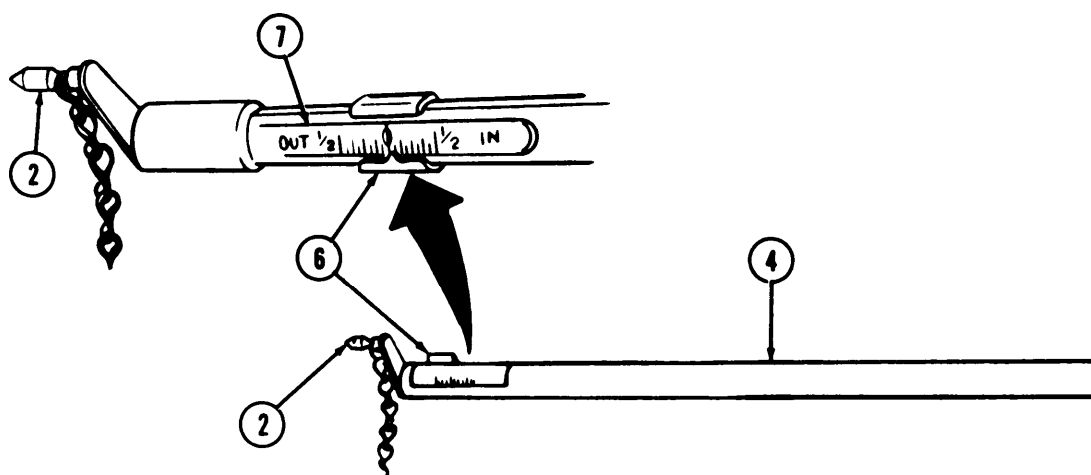
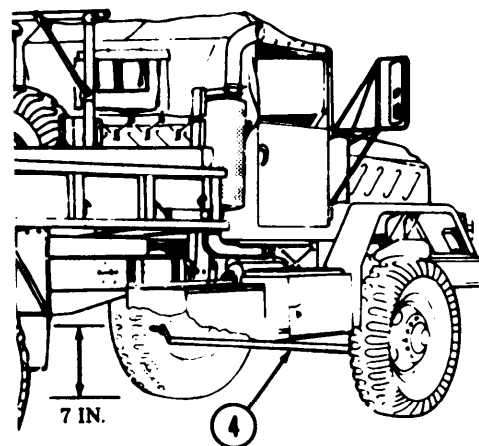
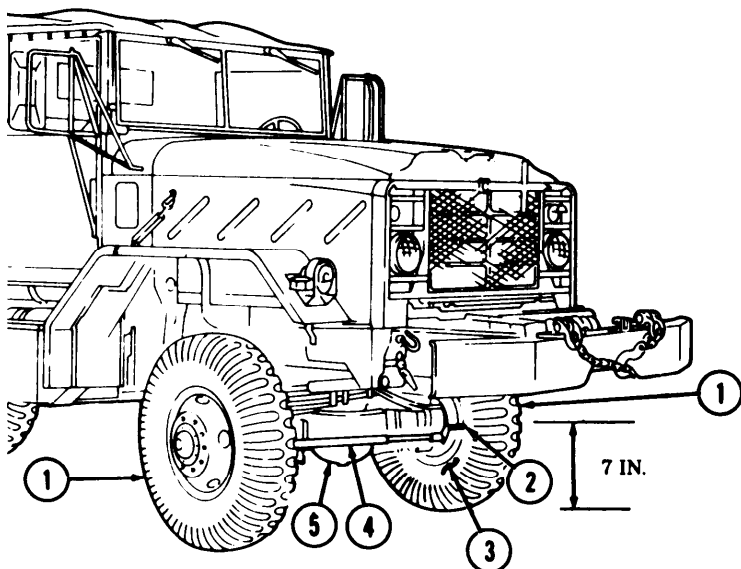
NOTE

Assistant will help with steps 3 through 5.

- | | | | |
|----|---------------|--|----------------------------|
| 3. | Engine | Start. | Refer to TM 9-2320-272-10. |
| 4. | Parking brake | Release, drive forward until bar (4) is 7 in. (178 mm) off ground to rear of axle (5). | |

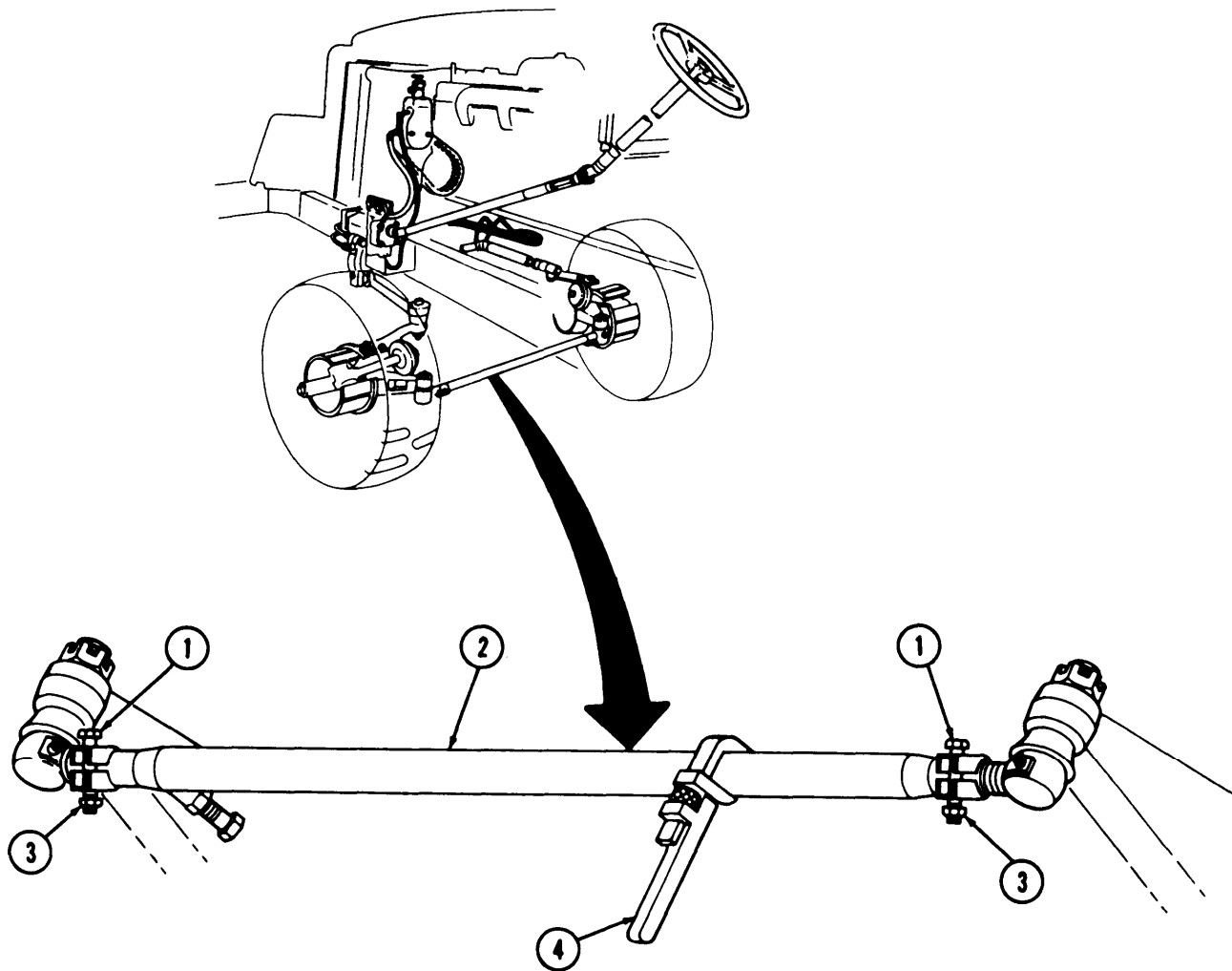
6-11. TOE-IN CHECK AND ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
5.		Toe-in gage	Correct toe-in is 1/8 in. \pm 1/16 in. (3.2 mm \pm 1.6 mm) increase on toe-in gage register (7).	If toe-in is incorrect go to task b.



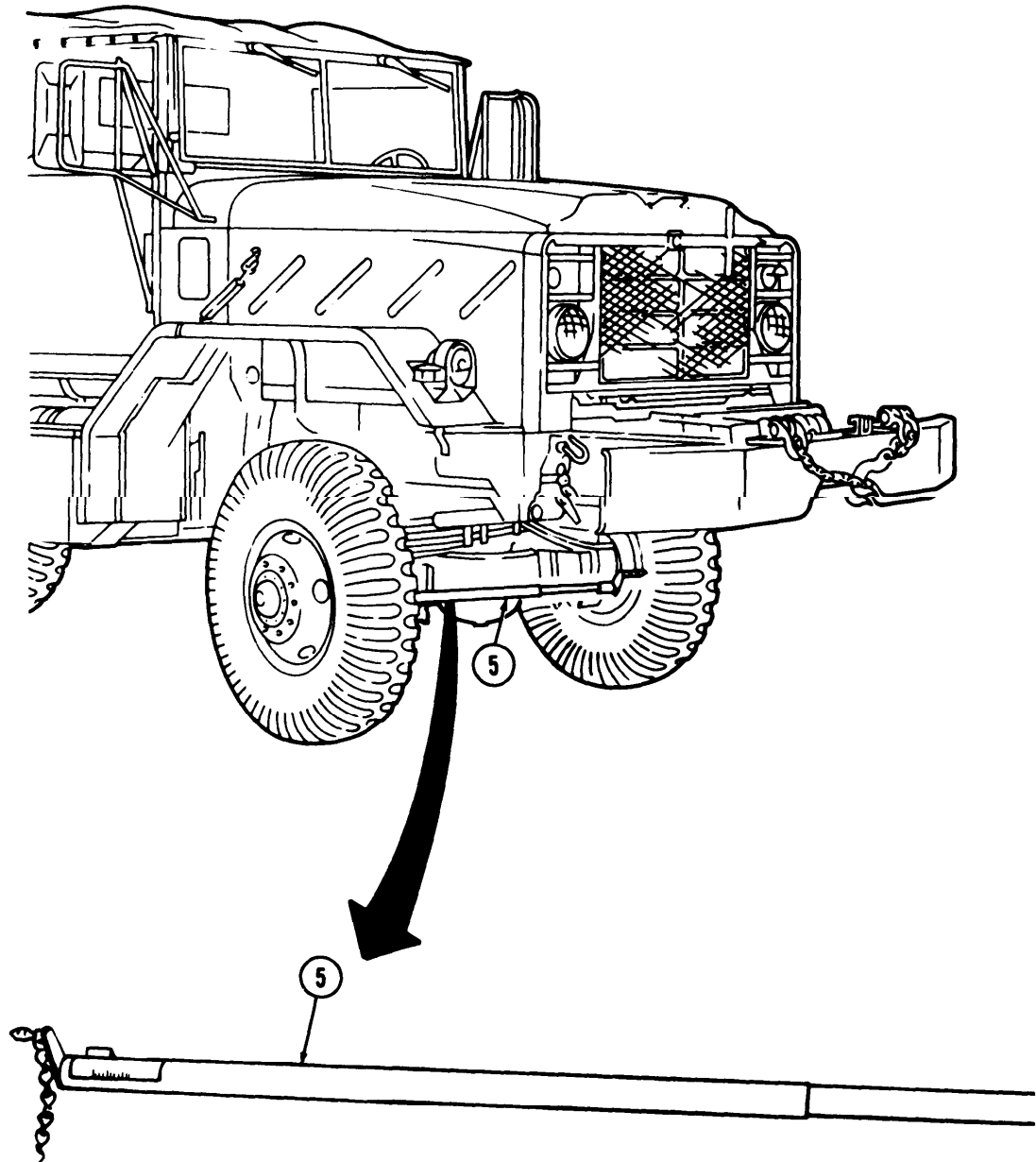
6-11. TOE-IN CHECK AND ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Toe-in Adjustment				
6.	Cross-shaft (tie rod) (2)	Two nuts (3) and screws (1)	Loosen.	Do not remove.
7.	Cross-shaft (tie rod) (2)		a. Turn with pipe wrench (4) until toe-in of $1/8 \pm 1/16$ in. (3.2 ± 1.6 mm) is obtained. b. Once correct toe-in is obtained, tighten two screws (1) and nuts (3).	Tighten 60-80 lb-ft (81-109 N•m).
8.		Toe-in gage (5)	Remove.	



6-11. TOE-IN CHECK AND ADJUSTMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

TA 349670

Change 3 6-25

6-12. CROSS-SHAFT (TIE ROD) MAINTENANCE

This task covers:

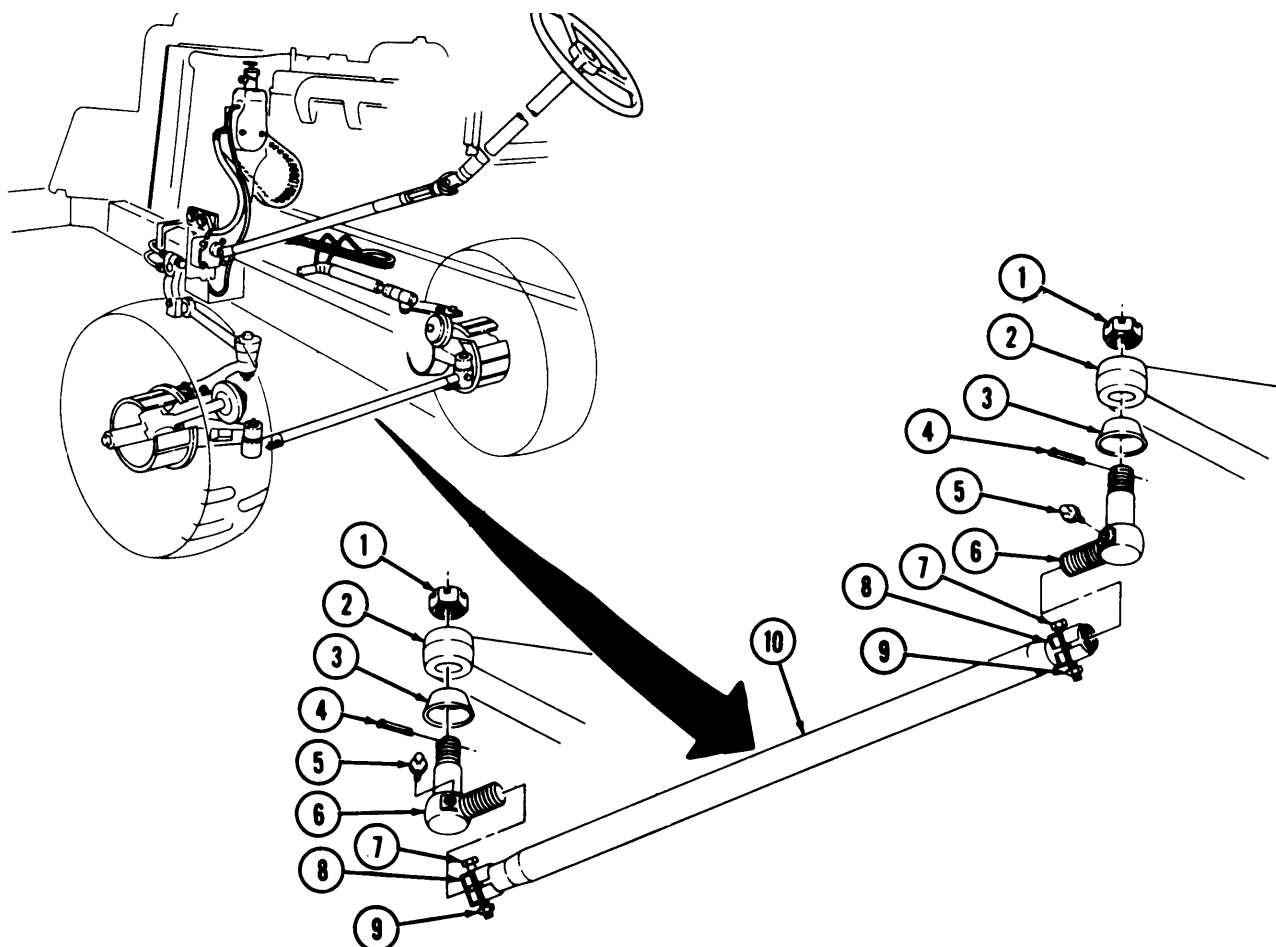
a. Removal**b. Inspection****c. Installation****INITIAL SETUP:**

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Wheels chocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two cotter pins		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Two tie rod end mounting nuts (1)	Two cotter pins (4)	Remove.	Discard cotter pins (4).
2.	Two tie rod ends (6)	Two mounting nuts (1)	Loosen.	Loosen taper, tap or use puller, mark tie rod cross-shafts left or right.
3.	Tie rod ends (6)	Two mounting nuts (1)	Remove.	
4.	Left and right steering knuckle arms (2)	Tie rod cross-shaft (10)	Remove.	
5.	Tie rod cross-shaft (10)	Two screws (7), lock-nuts (9), and clamps (8)	Loosen.	
6.		1%0 tie rod ends (6)	Remove.	Record number of turns required to remove.
7.	Tie rod ends (6)	Two tie rod boots (3) and grease fittings (5)	Remove.	
b. Inspection				
8.		Tie rod cross-shaft (10) and tie rod ends (6)	Inspect for cracks, bends and stripped threads.	Replace if cracked, bent, or threads are stripped.

6-12. CROSS-SHAFT (TIE ROD) MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
9.		Two tie rod boots (3) and grease fittings (5)	Install on tie rod ends (6).	
10.		Two tie rod ends (6)	Install on tie rod cross-shaft (10).	Use same number of turns recorded during removal.
11.		Two screws (7), lock-nuts (9), and clamps (8)	Tighten.	
12.		Tie rod cross-shaft (10)	Install on left and right steering knuckle arms (2) with two mounting nuts (1).	Tighten 160-180 lb-ft (217-244 N•m).
13.		Two new cotter pins (4)	Install.	



END OF TASK!

FOLLOW-ON TASK: Check and adjust toe-in (para. 6-11).

6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE

This task covers:

- a. Removal
- b. Cleaning and Inspection
- c. Universal Joint Disassembly
- d. Universal Joint Assembly
- e. Installation

INITIAL SETUP:		Equipment Condition Reference	Condition Description
<u>Applicable Models</u>		TM 9-2320-272-10	Parking brake set.
All		TM 9-2320-272-10	Air reservoir drained.
		Para. 8-5	Front hub and drum removed.
		Para. 7-10	Wheel brakedrum dust covers removed.
		TM 9-2320-358-24&P	Front hub and drum removed on M939A2.
<u>Test Equipment</u>			
None			
<u>Special Tools</u>			<u>Special Environmental Conditions</u>
None			None
<u>Materials/Parts</u>			
Ten locknuts			
Universal joint parts kit			
Protective cap-plug (Appendix D, Item 5)			
GM Grease (Appendix D, Item 13)			
Silicone sealant (Appendix D, Item 14)			
Drycleaning solvent (Appendix D, Item 25)			
Sealing tape (Appendix D, Item 26)			
<u>Personnel Required</u>			<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)			. Keep fire extinguisher nearby when drycleaning solvent is used.
<u>Manual References</u>			. Do not disconnect air lines before draining air reservoirs.
TM 9-2320-272-10			
TM 9-2320-272-20P			
LO 9-2320-272-12			
TM 9-2320-358-24&P			

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

- | | | | | |
|----|-------------------------------|--|-------------|------------------------------|
| 1. | Front brake chamber (4) | Vent air line (2) and service brake air line (1) | Disconnect. | Plug openings. |
| 2. | Steering knuckle housing (11) | Ten locknuts (7) and washers (8), and brake spider slinger (6) | Remove. | Discard locknuts (7). |
| 3. | | Brakeshoe, spider, and chamber assembly (5) | Remove. | |

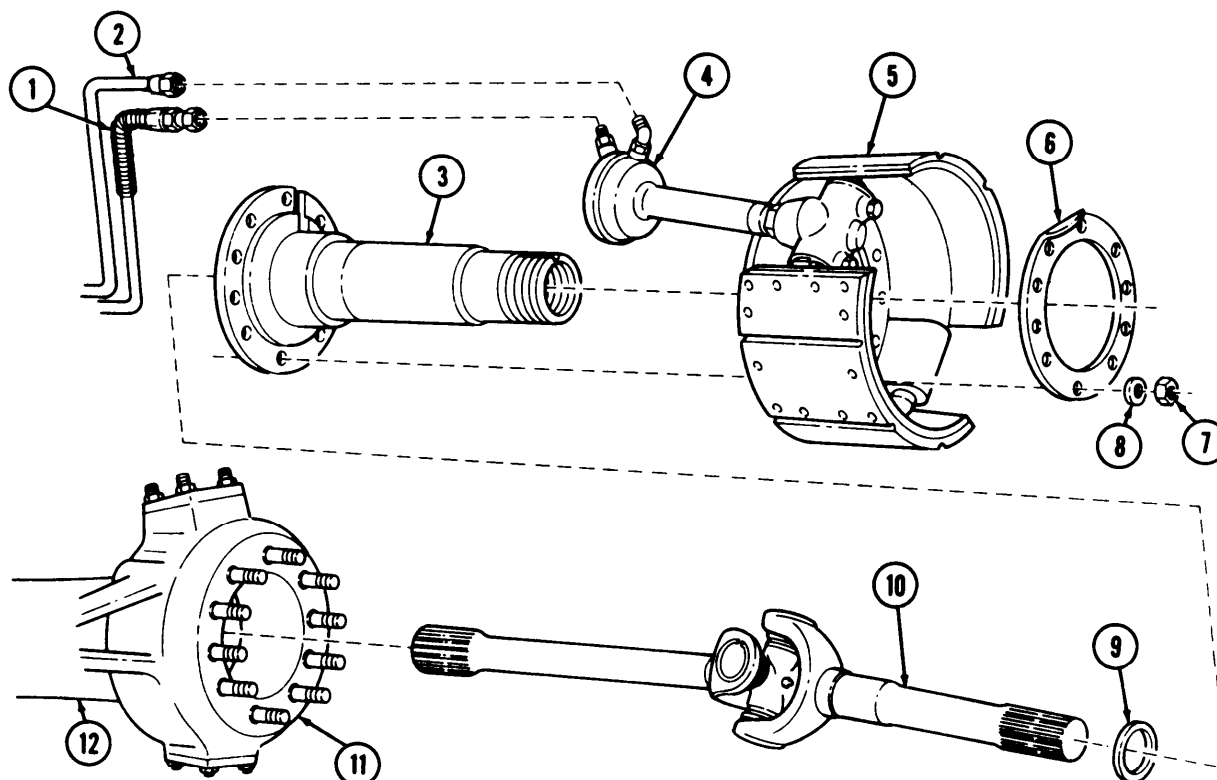
6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
4.		Spindle (3)	Remove.	Place wood block on nonbearing surface and tap with hammer
5.	Axle housing (12)	Axle shaft and universal joint (10)	Pull out of axle housing (12) and steering knuckle housing (11).	
6.	Axle shaft and universal joint (10)	Washer (9)	Remove,	

b. Cleaning and Inspection**WARNING**

Drycleaning solvent is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel.

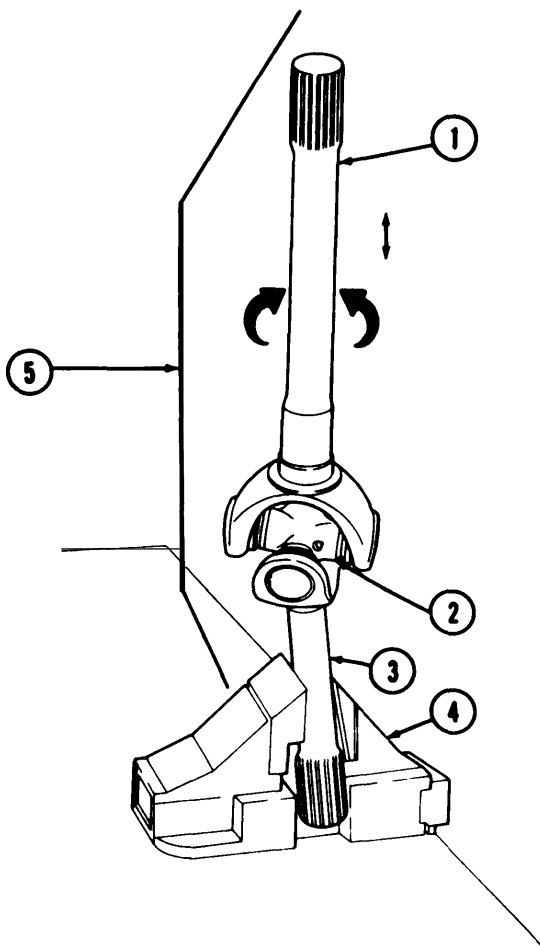
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|----|-------------------------------------|--|--|
| 7. | Steering knuckle housing (11) | Clean. | |
| 8. | Axle shaft and universal joint (10) | Inspect for nicks and cracks at shaft splines, | If shaft splines are cracked or nicked, replace. |



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6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
9.		Axle shaft and universal joint (5)	a. Place short end (3) in soft-jawed vise (4). b. Pull and push up and down on inner shaft (1). c. Twist inner shaft (1).	Replace universal joint (2) if any noticeable end free play is observed. Replace universal joint (2) if any noticeable free play is observed.



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6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Universal Joint Disassembly				
10. Front axle shaft yoke (6)		Two retaining rings (10)	Remove.	Discard retaining rings (10). Place front axle shaft yoke (6) in soft-jawed vise.
11. Cross (7)		Two bearing cups (9) and "O" rings (8)	Remove.	
NOTE				
Repeat steps 10 and 11 to remove cross from front axle shaft.				
12.		Cross (7)	Remove.	
13. Cross (7)		Grease fitting (11)	Remove.	Discard cross (7).

d. Universal Joint Assembly

14.		Grease fitting (11)	Install on new cross (7).
15.		Cross (7)	Place in front axle shaft (12).

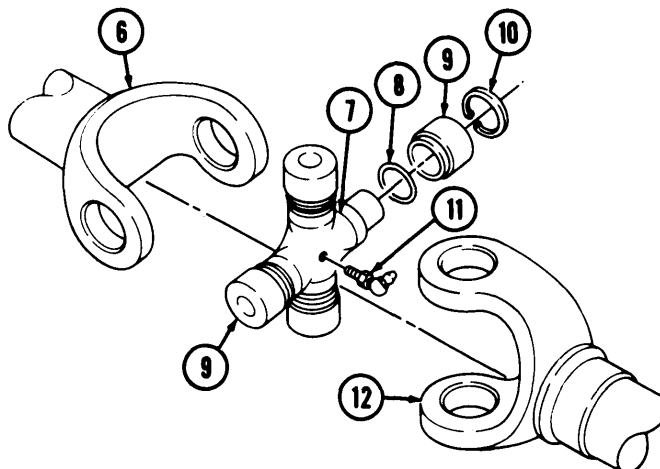
NOTE

Press bearing cups into yoke enough to install retaining ring.

16.		Two new "O" rings (8) and new bearing cups (9)	Install.
17.		Two new retaining rings (10)	Install.

NOTE

Repeat steps 16 and 17 to complete installation of cross in front axle yoke.

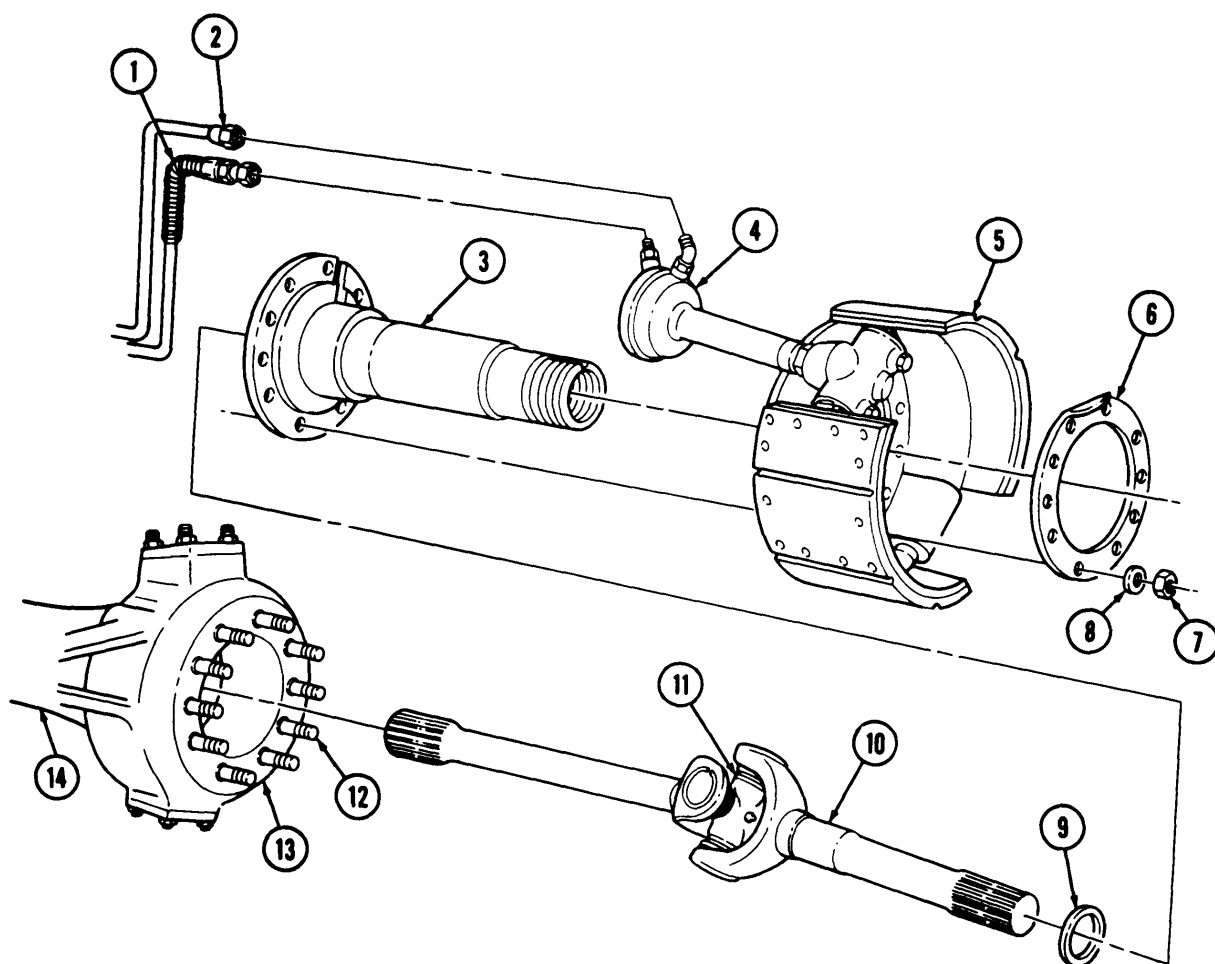


6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
e. Installation				
18.		Washer (9)	Install on axle shaft (10).	
19.		Axle shaft (10)	a. Lubricate universal joint (11). b. Grease all bearing surfaces on shaft (10) and fill steering knuckle cavity with GAA grease. c. While supporting axle shaft (10), install in axle housing (14) and steering knuckle housing (13). d. Repack the steering knuckle cavity with GAA grease.	Use GAA grease. Make sure GAA grease is packed well up against inner oil seal.
20.		Spindle (3)	Apply sealant to steering knuckle housing (13) and align with mounting studs (12) on steering knuckle housing (13).	Seal with silicone sealant. Make sure spindle (3) is slot end up.
21.		Brake shoe spider, and chamber assembly (5)	Install over spindle (3) on steering knuckle housing (13).	
22.		Brake spider slinger (6)	Install with ten washers (8) and new locknuts (7).	Tighten 110-145 lb-ft (149-197 N•m).
NOTE Male pipe threads must be w-rapped with sealing tape before installation.				
23.		Vent air line (2) and service brake air line (1)	Connect to front brake chamber (4).	

6-13. FRONT AXLE SHAFT AND UNIVERSAL JOINT MAINTENANCE (Cont'd)

STEP	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS:

- Install wheel brakedrum dust covers (para. 7-10).
- On M939A2 install front hub and drum (TM 9-2320-358-34&P).
- Install front hub and drum (para. 8-5).
- Start engine (TM 9-2320-272-10) and check air lines at brake chambers for leaks.

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6-14. STEERING KNUCKLE SEAL REPLACEMENT

This task covers:

- a. Removal
- b. Cleaning and Inspection
- c. Installation

INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10	Parking brake set.
Test Equipment		
None		
Special Tools		Special Environmental Conditions
None		None
Materials/Parts		
Steering knuckle boot (seal) replacement kit		
Four lockwashers		
Lint-free cloth (Appendix D, Item 9)		
sealant (Appendix D, Item 2)		
Personnel Required		General Safety Instructions
Light-wheeled vehicle mechanic MOS 63B		None
Manual References		
TM 9-2320-272-10		
TM 9-2320-272-20P		
TM 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Removal				
1.	Seal guard (5)	Four screws (4) and lockwashers (3)	Remove guard (5) from steering knuckle (2).	Discard lockwashers (3).
2.	Seal retaining plate (6)	Safety wire (1)	Remove from twelve screws (7).	Discard safety wire (1).
3.		Twelve screws (7) and retaining plate (6)	Remove.	
4.		Steering knuckle seal (13)	Pull one side away from steering knuckle (2) to expose inner retaining clamp screw (11).	
5.		Inner retaining clamp screw (11), spacer (10), and locknut (9)	Remove,	Discard clamp screw (11) and locknut (9).
6.		Inner retaining clamp (12)	Remove from seal (13).	

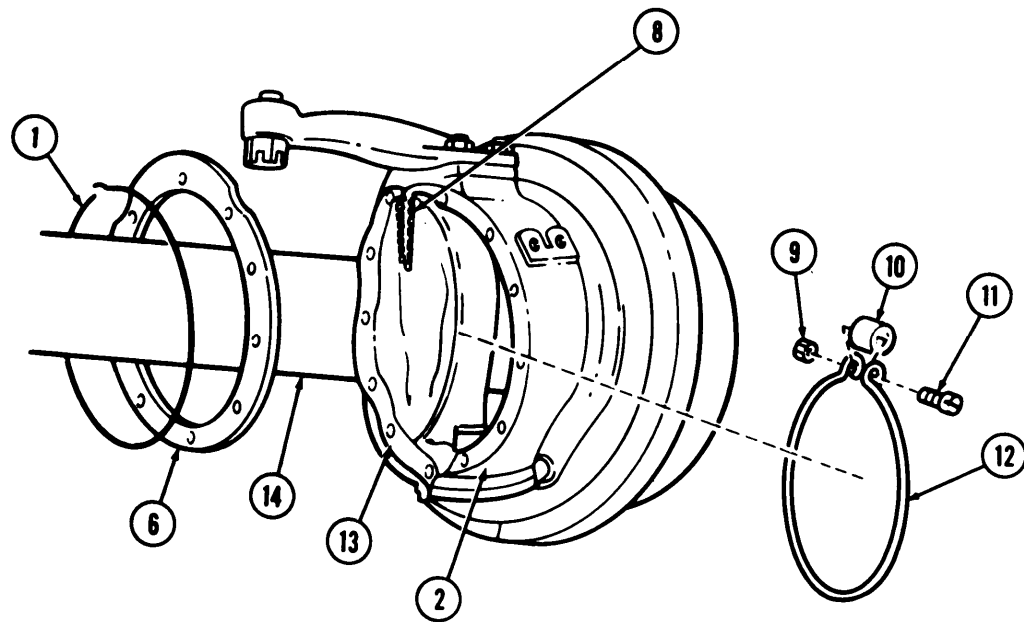
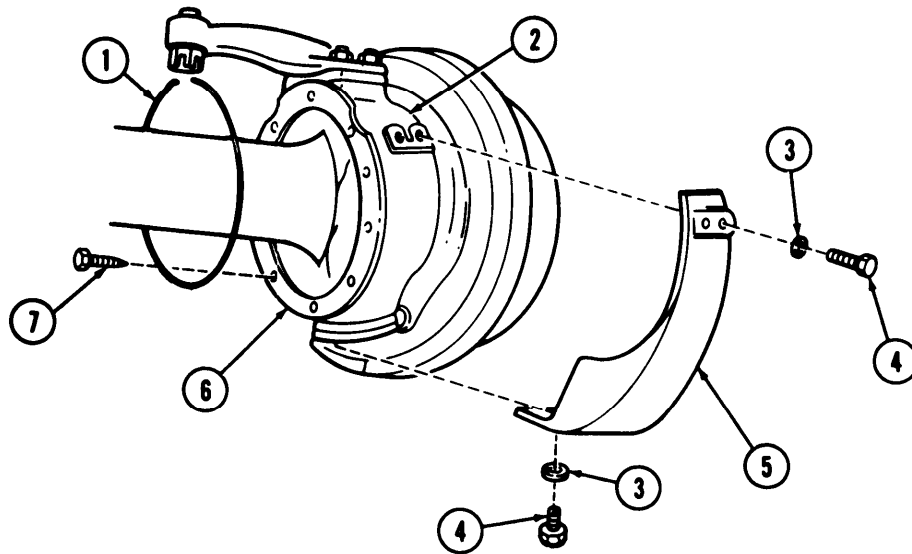
6-14. STEERING KNUCKLE SEAL REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Some seals may not have zipper.

- | | | |
|----|----------------------------|--|
| 7. | Steering knuckle seal (13) | Open zipper (8) or cut to remove from axle housing (14). |
|----|----------------------------|--|



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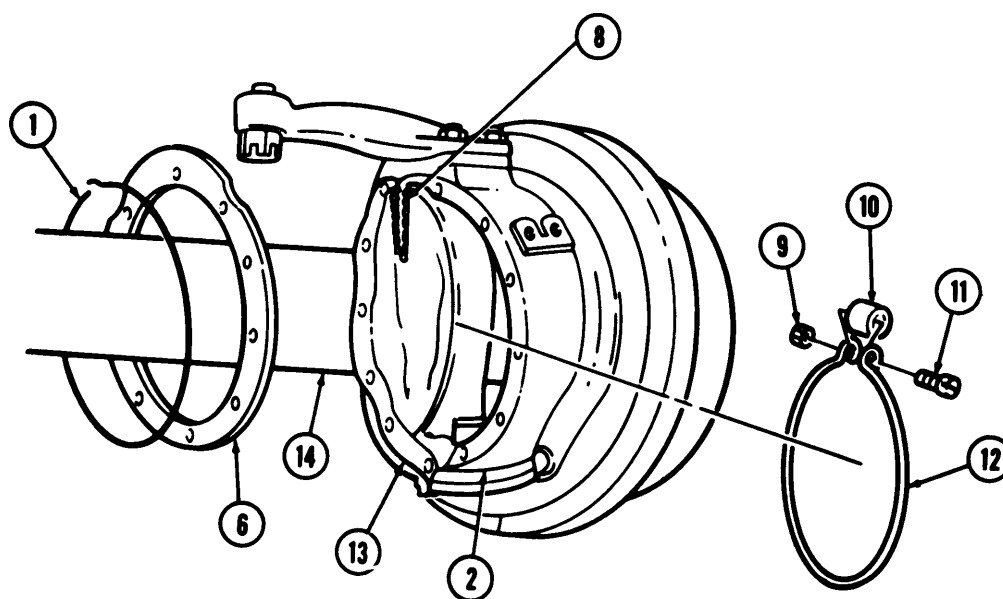
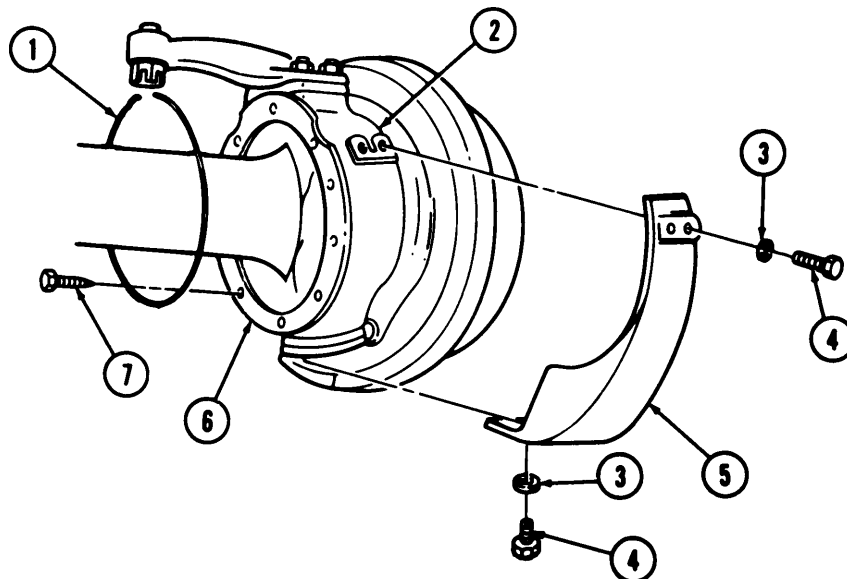
6-14. STEERING KNUCKLE SEAL REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Cleaning and Inspection				
8.		Steering knuckle (2) retaining plate (6), and steering knuckle seal (13)	Wipe surface clean with dry lint-free cloth.	Make sure there is no dirt or dust inside steering knuckle (2).
9.		Steering knuckle seal (13)	Inspect for cracks, tears, and damaged zipper (8).	Replace if cracked, torn, or zipper (8) damaged.
c. Installation				
10.		Steering knuckle seal (13)	a. Place on axle housing (14) with fabric side of zipper (8) facing steering knuckle (2). b. Close zipper (8) and apply large amount of sealant to zipper (8) locks and fabric. c. Force inner lip of seal (13) into groove, on axle housing (14).	Be sure TOP on seal (13) is in line with top of steering knuckle (2). Allow sealant to set overnight. Make sure seal (13) is aligned to holes in steering knuckle (2).
11.		Inner retaining clamp (12)	Position to lip of seal (13) and install with new clamp screw (11), spacer (10), and new locknut (9).	
12.		Steering knuckle seal (13)	a. Lace zipper (8) locks with fine wire near edge of seal (13) and twist together. b. Cut off excess zipper (8) and apply sealant to exposed zipper (8) and fabric.	Allow sealant to set overnight.
13.		Seal retaining plate (6)	Align to holes in steering knuckle (2) and install with twelve screws (7).	Make sure notches in screw (7) heads are aligned so safety wire (1) can be installed.
14.		New safety wire (1)	Thread around each screw (7) and tie off.	

6-14. STEERING KNUCKLE SEAL REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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15.		Seal guard (5)	Position to steering knuckle (2) and install with four new lock-washers (3) and screws (4).	Tighten 130-170 lb-ft (176-231 N·m).
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END OF TASK!

FOLLOW-ON TASK: Lubricate steering knuckle (LO 9-2320-272-12).

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Change 3 6-37

6-15. FRONT AXLE DRIVE FLANGE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		<u>General Safety Instructions</u>
Gasket sealant (Appendix D, Item 14)		None
<u>Personnel Required</u>		
Light-wheeled vehicle mechanic MOS 63B		
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

1.	Axle drive flange (3)	Ten screws (1) and washers (2)	Remove.	
2.		Two screws (1)	Install in threaded holes (7).	Turn two screws (1) evenly and flange (3) will separate from hub (5).
3.		Two screws (1)	Remove.	
4.		Gasket (4)	Remove, if present.	Discard gasket (4). Clean gasket or sealant remains from mating surfaces.

b. Inspection

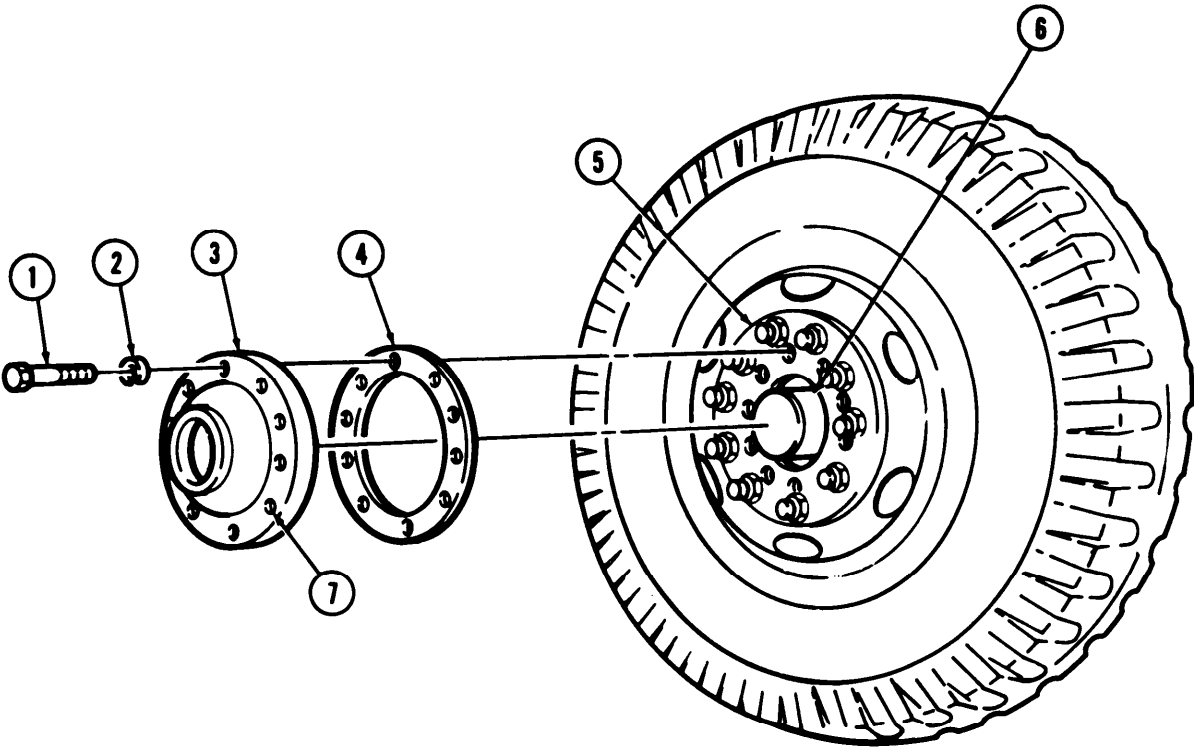
5.		Axle drive flange (3) and hub (5)	Inspect mating surfaces for burrs, cracks, and gouges.	File down surface having burrs. Replace if cracked or gouged (para. 8-5).
6.		Axle shaft (6)	Inspect for damaged splines.	Notify your supervisor if damaged.

6-15. FRONT AXLE DRIVE FLANGE MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Installation

7.		Axle drive flange (3)	Coat surface with sealant and align with holes on hub (5).	
8.		Axle drive flange (3)	Mount to hub (5) with ten washers (2) and screws (1).	Tighten 85-100 lb-ft (115-136 N-m).



END OF TASK!

TA349678

6-16. REAR AXLE SHAFT MAINTENANCE

This task cover's:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Gasket sealant (Appendix D, Item 14)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		
LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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I a. Removal I

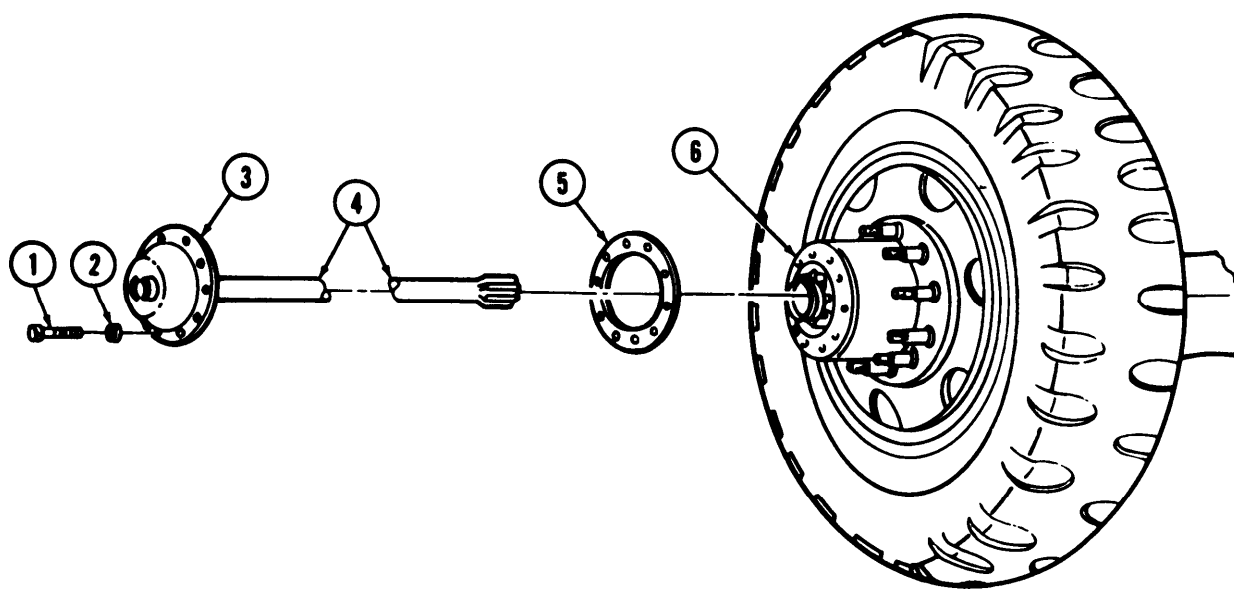
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|----|-----------------------|--|----------------------------------|--|
| 1. | Axle shaft flange (3) | Ten screws (1) and washers (2) | Remove. | |
| 2. | Axle housing (6) | Axle shaft flange (3) and axle shaft (4) | Tap shaft flange (3) and remove. | |
| 3. | Axle shaft flange (3) | Gasket (5), if present | Remove. | Discard gasket (5).
Clean gasket or sealant remains from mating surfaces. |

I b. Inspection I

- | | | | |
|----|-------------------------------------|--|--|
| 4. | Axle shaft (4) and axle housing (6) | Inspect for cracks, burrs, and damaged splines on shaft. | Replace if cracked, burred, or damaged splines on shaft. |
|----|-------------------------------------|--|--|

6-16. REAR AXLE SHAFT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
c. Installation				
5.		Axle shaft flange (3)	Coat surface with sealant.	
6.		Axle shaft (4)	Position splined end into axle housing (6).	Make sure axle shaft (4) slides into splined differential gear.
7.		Axle shaft flange (3)	a. Aline to hole in axle housing (6). b. Install with ten washers (2) and screws (1).	Tighten 80-105 lb-ft (108-142 N-m).



END OF TASK!

FOLLOW-ON TASK: Lubricate axle assembly (LO 9-2320-272-12).

TA349679

6-17. CARRIER DIFFERENTIAL TOP COVER GASKET AND SIDE COVER GASKET REPLACEMENT

This task covers:

- | | |
|---|---|
| a. Top Cover Gasket Removal
b. Top Cover Gasket Installation | c. Side Cover Gasket Removal
d. Side Cover Gasket Installation |
|---|---|

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 TM 9-2320-272-10	Parking brake set. Air reservoirs drained. Rear wheels chocked.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Top cover gasket Side cover gasket Eight lockwashers Sealing compound (Appendix D, Item 14) Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not disconnect air lines before draining air reservoirs.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Top Cover Gasket Removal

WARNING

Do not disconnect air lines before draining air reservoirs. Small parts under pressure may shoot out with high velocity, causing injury to personnel.

NOTE

Perform steps 1 through 4 for forward-rear and rear-rear axle carrier differential top cover.

- | | | | | |
|----|------------------------------------|---|---------|---|
| 1. | Four adapters (4) | Four air lines (5) | Remove. | |
| 2. | Two manifolds (1) | Two adapters (4) | Remove. | |
| 3. | Carrier differential top cover (6) | Two screws (2), washers (3), and bracket (7) | Remove. | |
| 4. | Carrier differential housing (9) | Eight screws (2) and washers (3), top cover (6), and gasket (8) | Remove. | Discard gasket (8).
Clean gasket remains from mating surfaces. |

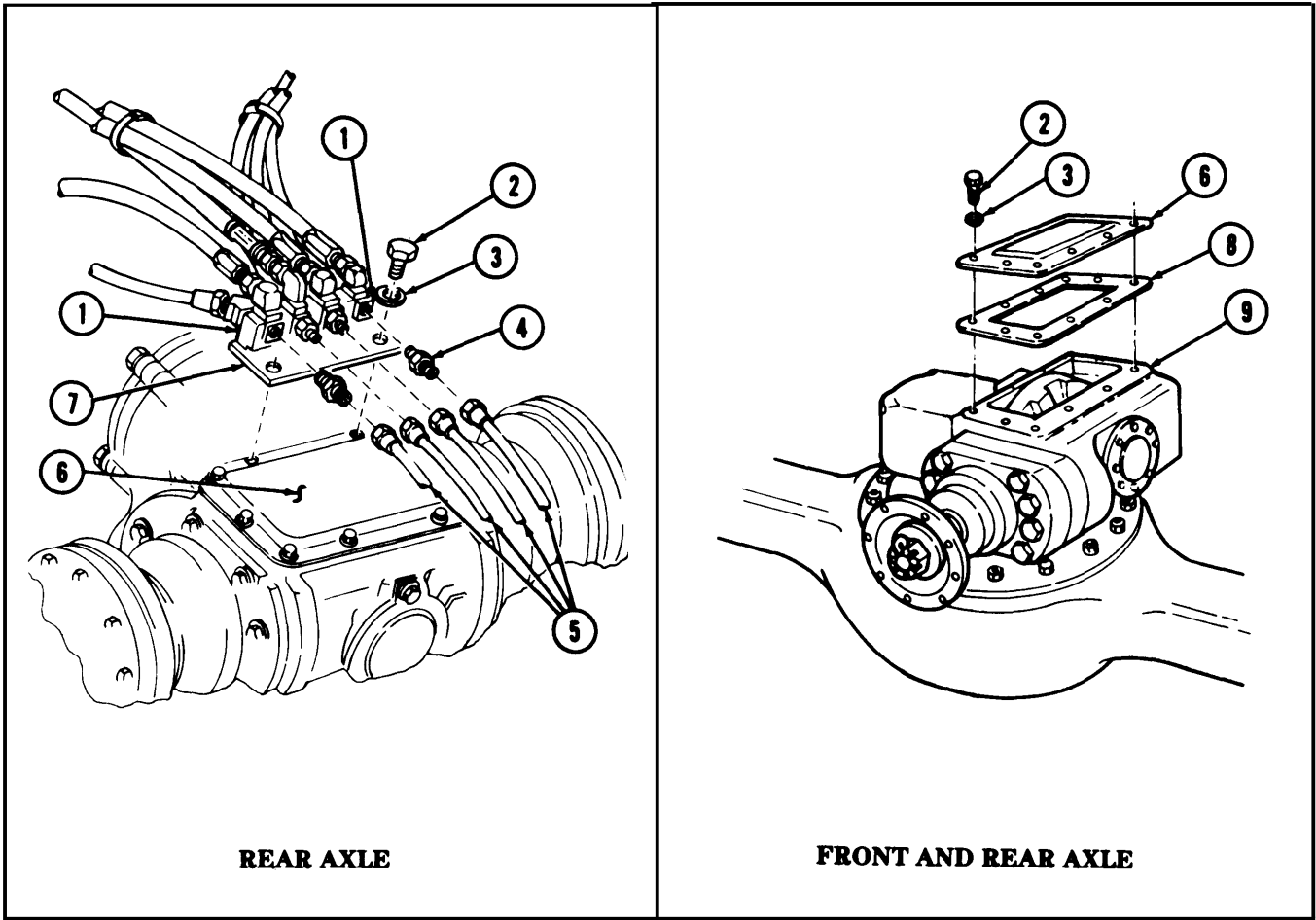
6-17. CARRIER DIFFERENTIAL TOP COVER GASKET AND SIDE COVER GASKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

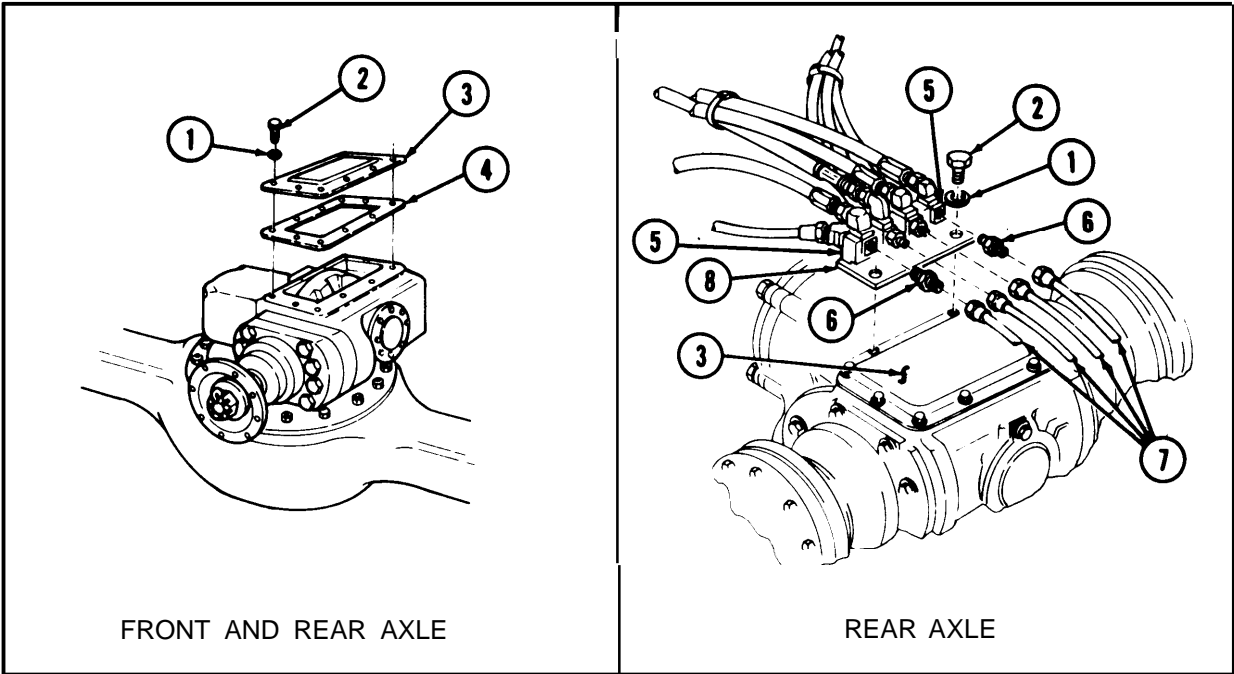
Perform step 5 for front axle carrier differential top cover.

5.		Ten screws (2) and washers (3), top cover (6), and gasket (8)	Remove.	Discard gasket (8). Clean gasket remains horn mating surfaces.
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6-17. CARRIER DIFFERENTIAL TOP COVER GASKET AND SIDE COVER GASKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Top Cover Gasket Installation				
6.		Top cover (3)	Apply sealing compound to mating surfaces.	
NOTE				
Perform step 7 for front axle carrier differential top cover,				
7.		New gasket (4) and top cover (3)	Install with ten screws (2) and washers (1).	
NOTE				
• Perform steps 8 through 11 for forward-rear and rear-rear axle carrier differential top cover.				
• Male pipe threads must be wrapped with sealing tape before installation.				
8.		Top cover (3) and top cover new gasket (4)	Install with eight screws (2) and washers (1).	Tighten 27-34 lb-ft (37-48 N·m).
9.		Bracket (8)	Install with two screws (2) and washers (1).	Tighten 27-35 lb-ft (37-48 N·m).
10.		Two adapters (6)	Install into two manifolds (5).	
11.		Four air lines (7)	Connect to four adapters (6).	



6-17. CARRIER DIFFERENTIAL TOP COVER GASKET AND SIDE COVER GASKET REPLACEMENT (Cont'd)

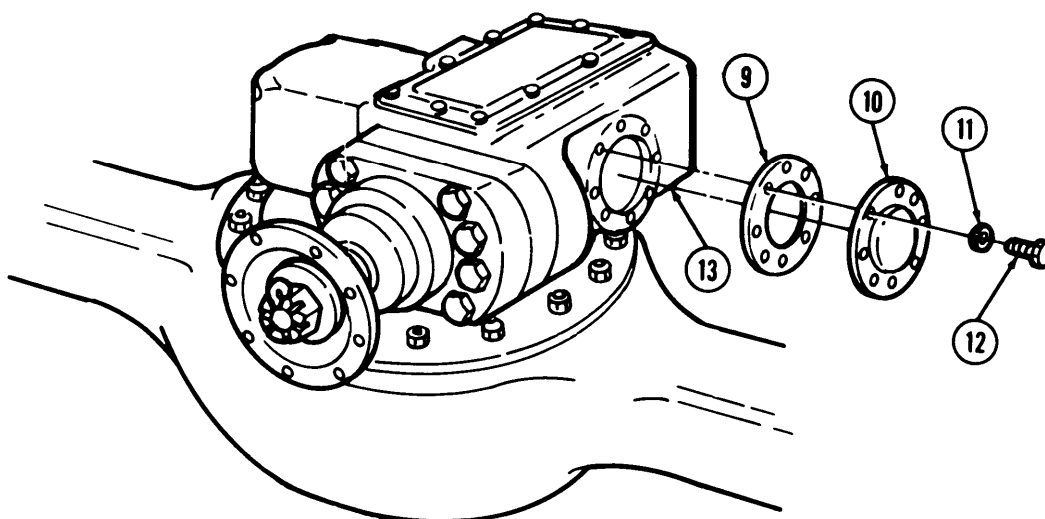
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Side Cover Gasket Removal

12.	Carrier differential housing side cover (10) to differential housing (13)	Eight screws (12) and lockwashers (11)	Remove.	Discard lockwashers (11).
13.		Side cover (10) and side cover gasket (9)	Remove from housing (13).	Discard gasket (9). Clean gasket remains from mating surfaces.

d. Side Cover Gasket Installation

14.	Side cover (10) differential housing (13)	Apply sealing compound to mating surfaces.	
15.	New side cover gasket (9) and side cover (10)	Install on differential housing (13) with eight new lockwashers (11) and screws (12).	Tighten screws (12) 27-35 lb-ft (37-48 N.m).



END OF TASK!

FOLLOW-ON TASK: Start engine (TM 9-2320-272-10), road test vehicle, and check for leaks.

TA349682

Section III. SUSPENSION

6-18. GENERAL

This section provides maintenance procedures assigned to the organizational level for the front and rear suspensions. To find a specific procedure, see the maintenance task summary below

6-19. FRONT AND REAR SUSPENSION MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
6-20.	Front Spring Replacement	6-48
6-21.	Front Spring Main Leaf Replacement	6-56
6-22.	Front Spring Shackle Replacement	6-58
6-23.	Front Spring Bushing Maintenance	6-60
6-24.	Front Spring Bumper Replacement	6-64
6-25.	Shock Absorber Replacement	6-66
6-26.	Shock Absorber Mounting Pins Replacement	6-68
6-27.	Rear Spring Assembly Replacement	6-70
6-28.	Rear Spring Leaf Maintenance	6-78
6-29.	Rear Axles Spring Seat Wear Pads and Upper Bracket Replacement	6-82
6-30.	Rear Spring Bumper Replacement	6-88
6-31.	Rear Spring Seat Maintenance	6-90
6-32.	Upper and Lower Torque Rod Maintenance	6-95.1

6-20. FRONT SPRING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para 6-25 Para 8-14 TM 9-2320-272-10 Para 8-3	Parking brake set. Air reservoirs drained. Shock absorber removed. Stone shield removed. Right splash shield removed. Front wheels removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Cotter pin Two locknuts Four lockwashers Sealing tape (Appendix D, Item 26)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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I a. Removal I

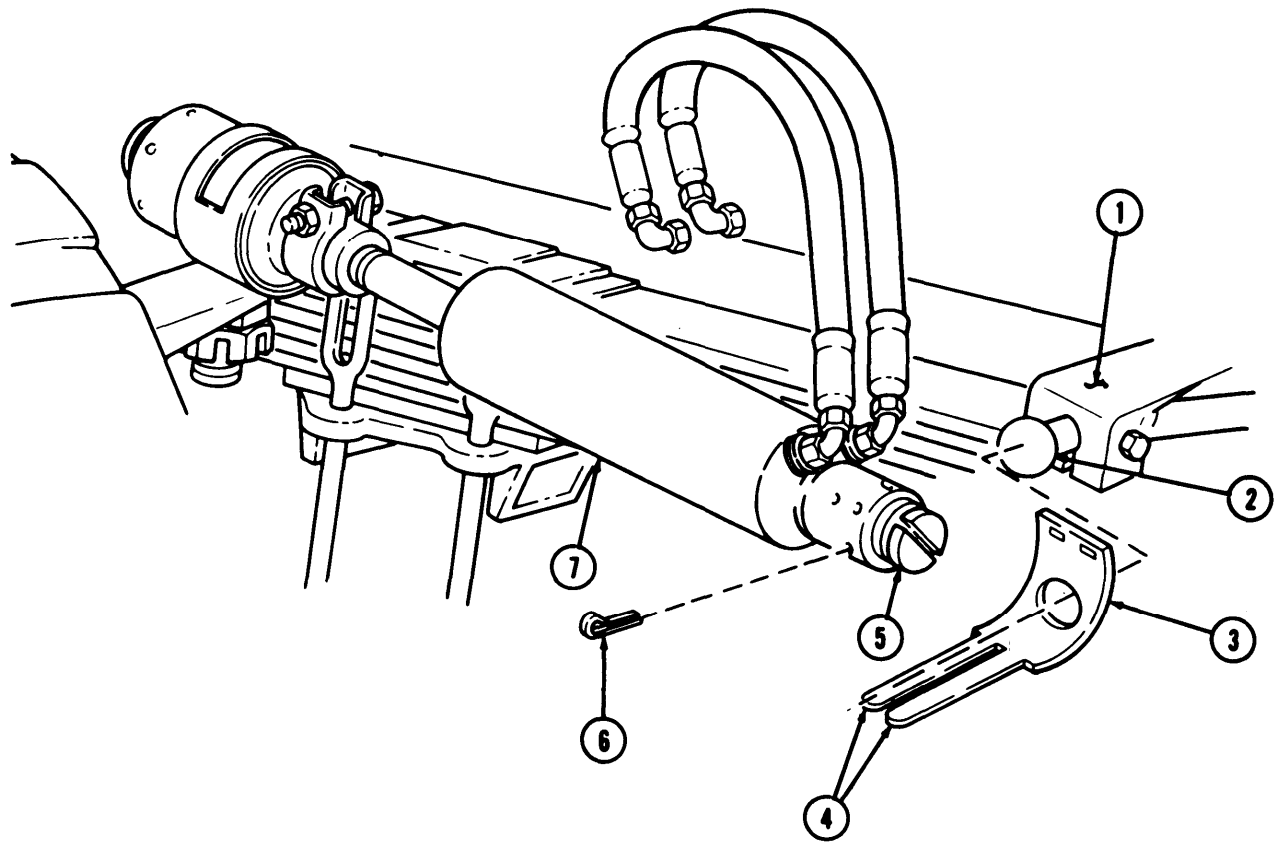
NOTE

Steps 1 through 5 apply to right side spring removal only.

- | | | | | |
|----|------------------------------|----------------------------------|---|-------------------------|
| 1. | Right side spring hanger (1) | Steering cylinder dust cover (3) | Bend tabs (4) clear of steering cylinder (7). | |
| 2. | Steering cylinder (7) | Cotter pin (6) | Remove. | Discard cotter pin (6). |
| 3. | | Cylinder adjusting plug (5) | Back out. | |
| 4. | Ball stud (2) | Steering cylinder (7) | Remove. | Swing out of way. |
| 5. | | Steering cylinder dust cover (3) | Remove. | |

6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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6.	Service brake chamber (7)	Two air lines (8)	Disconnect.	Cover openings.
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7.		Jack stands (3)	Place under frame (9) at rear of hanger (14).	
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NOTE

support axle to prevent from falling when removing U-bolts.

8.	Two u-bolts (2)	Four nuts (6), lockwashers (5) and shock absorber mounting plate (4)	Remove.	Discard lockwashers (5).
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9.		Two U-bolts (2) and upper spring seat (1)	Remove.	Frame may have to be raised further to provide clearance for U-bolt (2) removal. If U-bolts (2) must be forced out, place a piece of wood between hammer and bolts to prevent U-bolt (2) damage.
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NOTE

- The spring pins in the right spring hanger and left spring shackle must be driven out from the inside. The remaining two pins can be driven out from either side.
- An assistant will help with steps 10 through 20.

10.	Spring hanger (11)	Pin retaining locknut (10) and screw (12)	Remove and spread apart hanger (11).	Discard locknut (10).
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11.		Pin (24)	Drive out of hanger (11) and spring leaf eye (23).	
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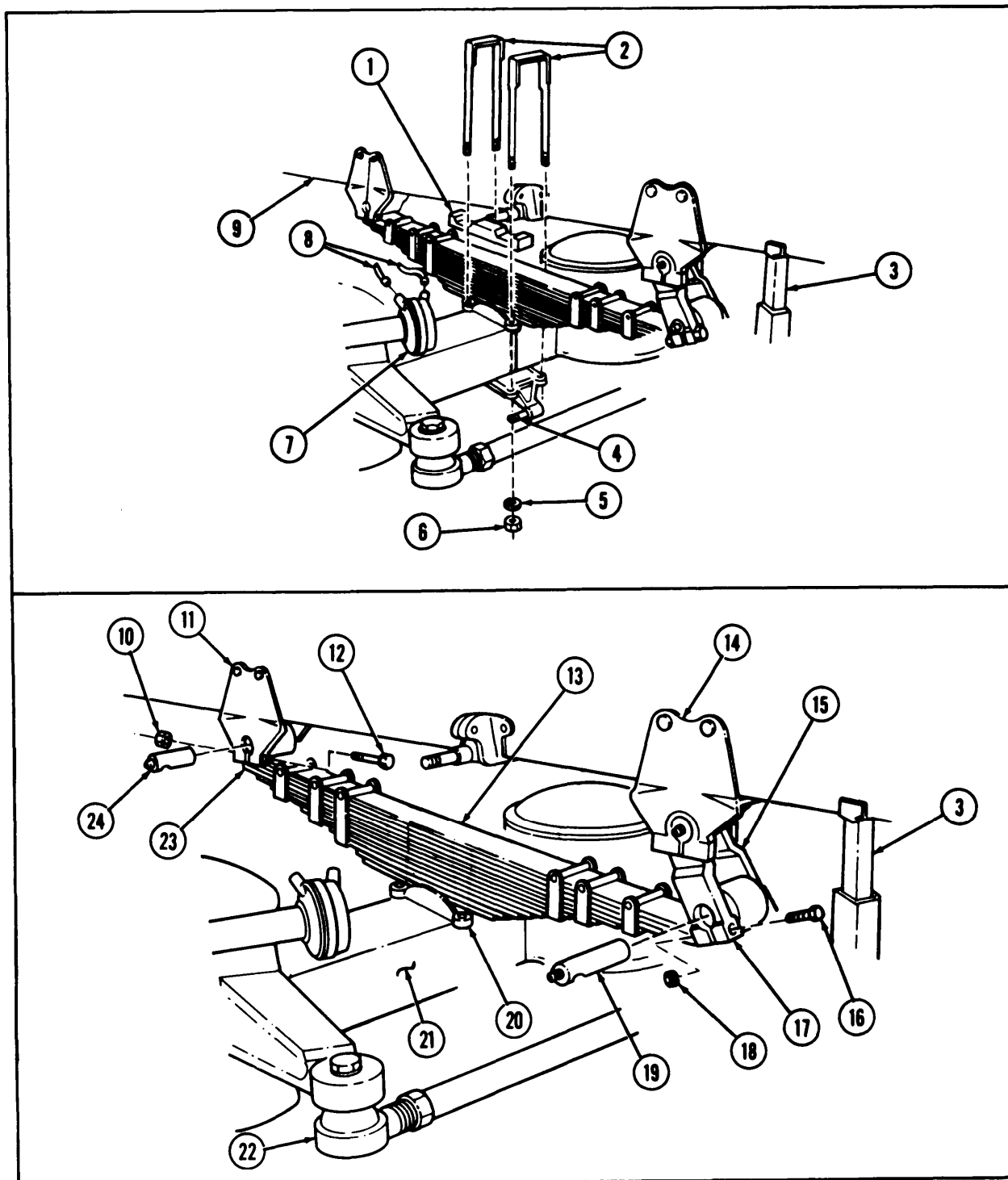
12.	Spring shackle (15)	Pin retaining locknut (18) and screw (16)	Remove and spread apart shackle (15).	Discard locknut (18).
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13.		Pin (19)	Drive out of shackle (15) and spring leaf eye (17).	
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14.		Spring (13)	Lift from lower spring seat (20) and carefully move over rear of axle (21) and tie rod (22) to the ground.	
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6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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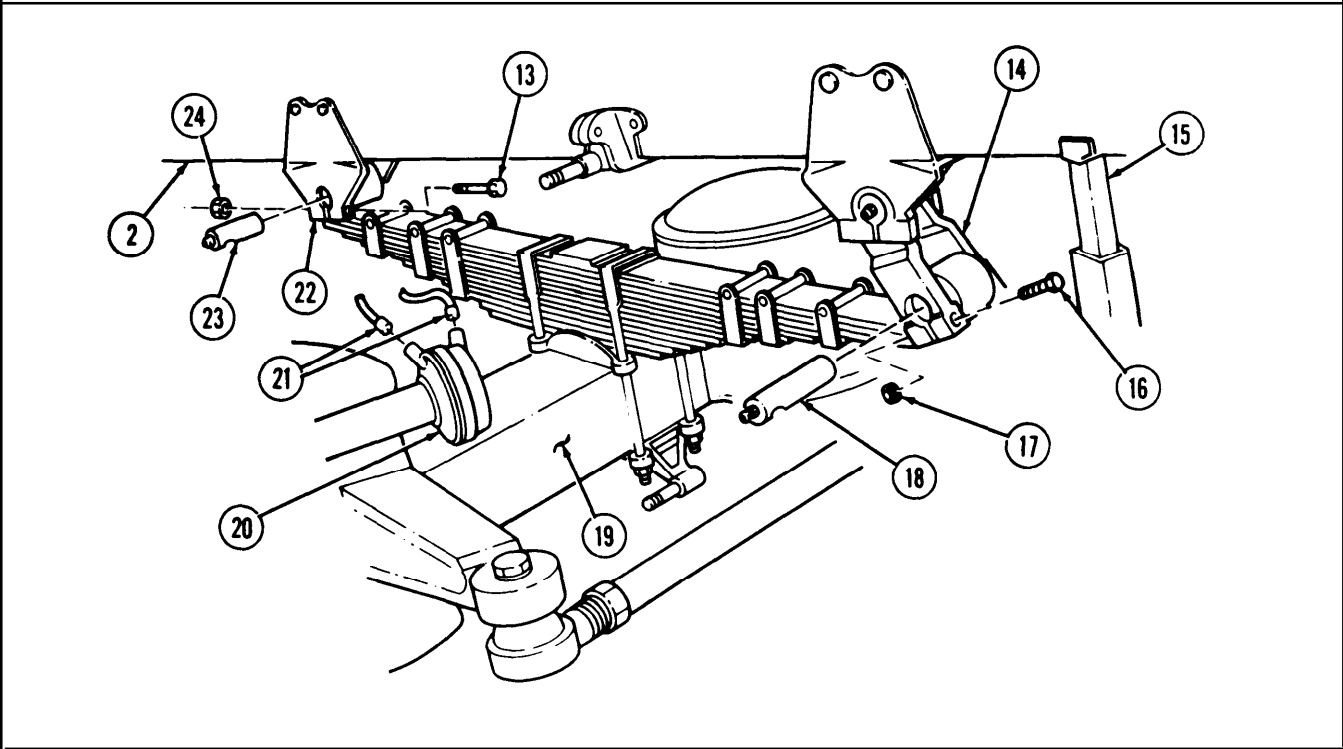
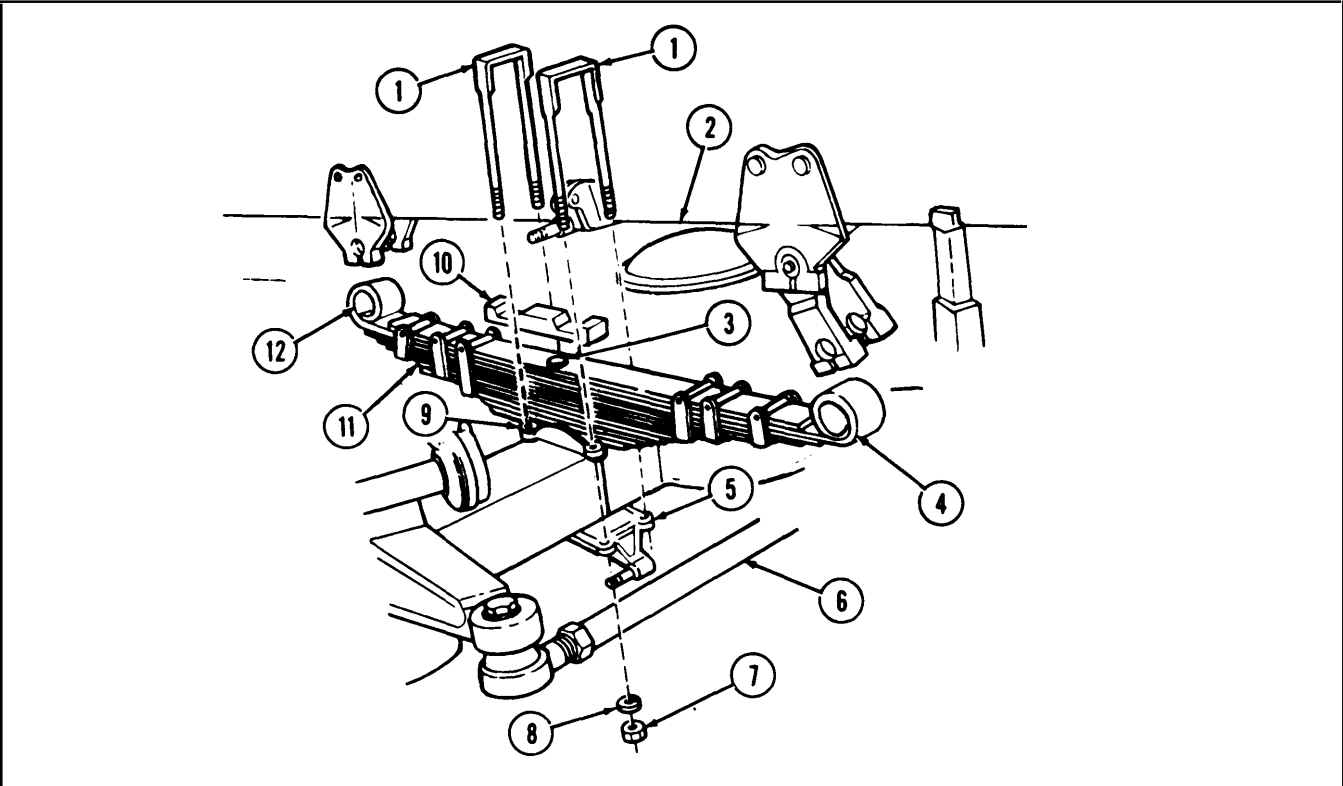
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6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
I b. Installation I				
15.		Spring (11)	a. Raise one end over tie rod (6). b. Edge forward until spring center bolt (3) enters hole in center of lower spring seat (9).	
16.		Upper spring seat (10)	Position over top of spring (11).	
17.		Two U-bolts (1)	a. Place over upper spring seat (10) and through holes in lower spring seat (9) with long end toward wheel. b. Install to shock absorber mounting plate (5) with four new lockwashers (8) and nuts (7).	U-bolt (1) ends may have to be forced together to install through holes in lower spring seat (9). Tighten nuts (7) 350-400 lb-ft (475-542 N-m).
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Assistant will help with step 18.</p>				
18.		Spring (11)	Raise to frame (2) until spring eyes (4) and (12) aline with holes in hanger (22) and shackle (14).	
19.		Pin (23)	Install through front spring eye (12) and hanger (22) with screw (13) and new locknut (24).	Groove in pin (23) must be in position to angle of screw holes before screw (13) can be installed.
20.		Pin (18)	Install through spring eye (4) and holes in shackle (14) with screw (16) and new locknut (17).	Groove in pin (18) must be in position to angle of screw holes before screw (16) can be installed.
21.		Two air lines (21)	Connect to service brake chamber (20) and tighten,	Clean male pipe threads and wrap with sealing tape.
22.	Frame rail (2)	Jack stands (15)	Remove and place under axle (19).	

6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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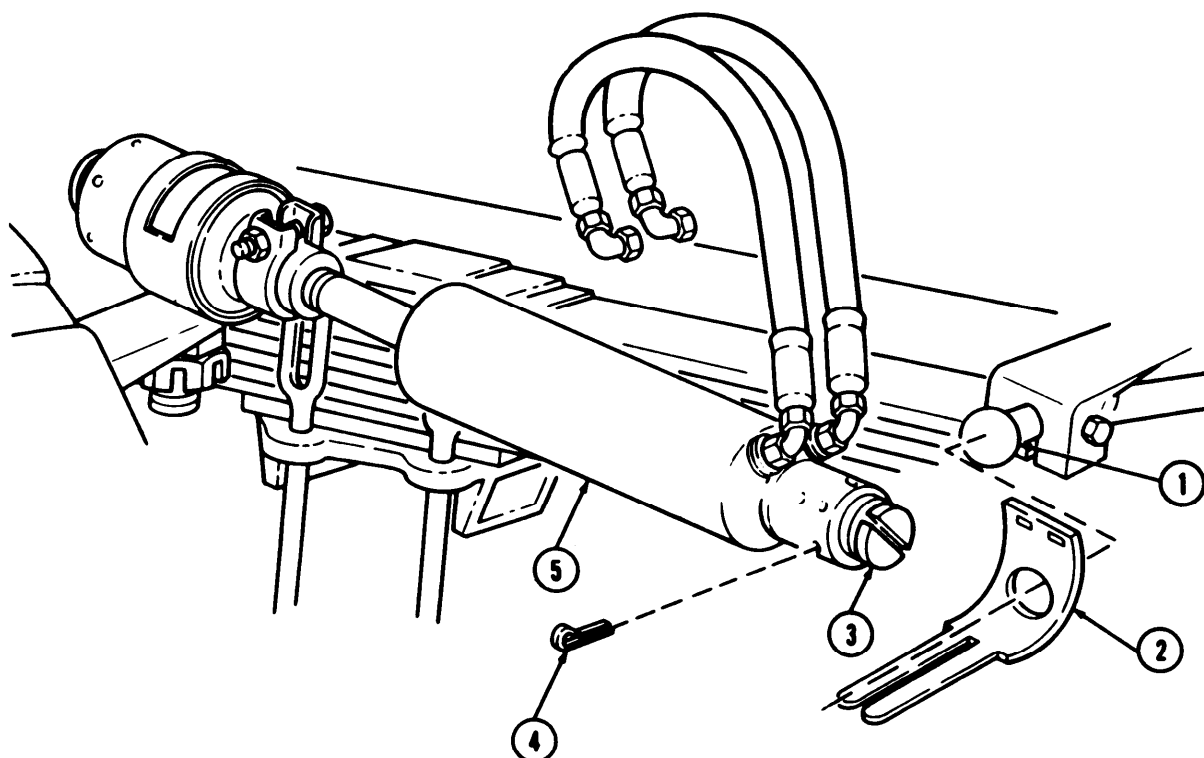
TA349685

6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<p style="text-align: center;">NOTE</p> <p>Steps 23 through 26 apply to right side spring replacement only.</p>				
23.		Steering cylinder dust cover (2)	Install to ball stud (1).	
24.		Steering cylinder (5)	Position over ball stud (1).	
25.		Cylinder adjusting plug (3)	<p>a. Tighten until cylinder (5) does not move on ball stud (1).</p> <p>b. Tighten slightly more if necessary to align slot with hole in cylinder (5).</p> <p>c. Install with new cotter pin (4).</p>	
26.		Steering cylinder dust cover (2)	Fasten around steering cylinder (5).	

6-20. FRONT SPRING REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

- FOLLOW-ON TASKS
- Install steering cylinder stone shield (para 8-14).
 - Install shock absorber (para 6-25).
 - Start engine (TM 9-2320-272-10) and check brake chamber for leaks.
 - Install front wheels (para 8-3).
 - Install right splash shield (TM 9-2320-272-10).

TA349686

6-21. FRONT SPRING MAIN LEAF REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 6-20	Parking brake set. Spring removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Spring center bolt Center bolt nut Powdered graphite (Appendix D, Item 20)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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I a. Removal I

1.	Six spring leaf clips (5)	Screw (6), nut (3), and spacer (4)	Remove from each clip (5).	Compress spring assembly (7) with c-clamps.
2.		Spring center bolt (8) and nut (2)	Remove.	Discard bolt (8) and nut (2). Remove C-clamps.
3.		Rebound leaf (1)	Remove.	
4.		Upper main leaf (10) and lower main leaf (9)	Remove and separate.	

I b. Installation I

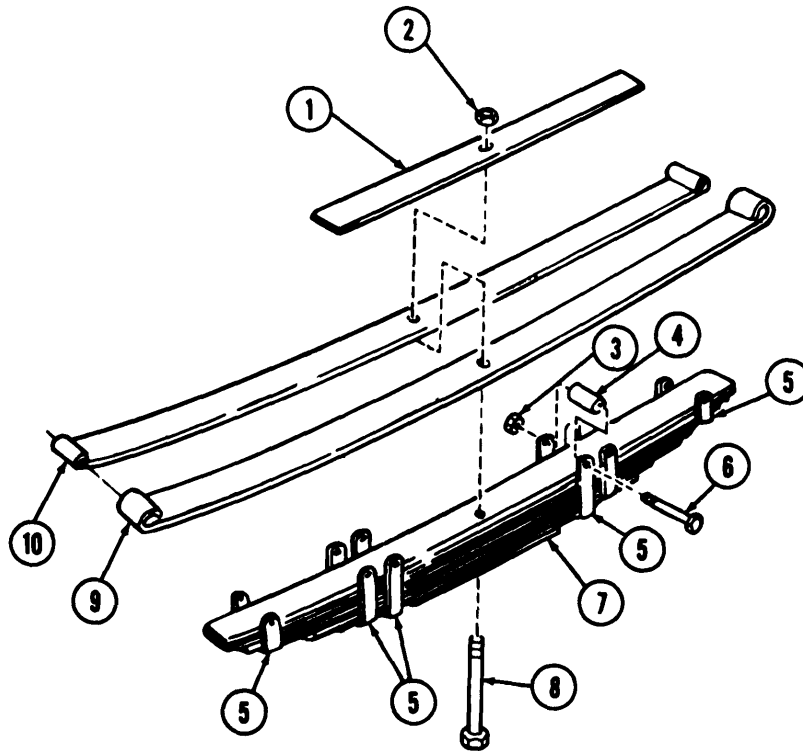
NOTE

Coat all replacement leaves with powdered graphite before installation.

5.	Upper main leaf (10)	a. Position into lower main leaf (9). b. Position both to remaining leaves.	Make sure rounded spring eye ends face upward.
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6-21. FRONT SPRING MAIN LEAF REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Rebound leaf (1)	Position over upper main leaf (10).	
7.		Spring assembly leaves (7)	Aline center bolt holes.	Compress spring assembly leaves (7) with C-clamps.
8.		New spring center bolt (8)	a. Install through center holes in leaves and install with new nut (2). b. Peen end of new bolt (8) over nut (2).	
9.		Six spring leaf clips (5)	Install spacer (4) between each clip end and install each with screw (6) and nut (3).	Remove C-clamps.



END OF TASK!

FOLLOW-ON TASK: Install spring (para. 6-20),

TA349667

6-22. FRONT SPRING SHACKLE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 8-3	Parking brake set. Front wheels removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts Screw		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Do not support weight of vehicle with hydraulic jack.
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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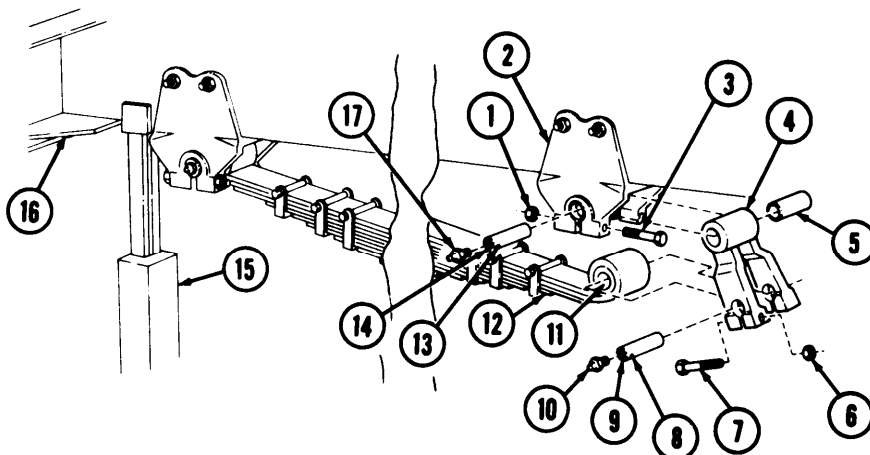
I a. Removal I

NOTE

		Support will be needed for axle housing.		
1.		Left and right front hubs	Remove.	Refer to para 8-5.
2.		Frame (16)	Raise to remove load from spring (12).	Support frame with jackstand (15).
3.	Shackle (4) and hanger (2)	Locknut (1) and screw (3)	Remove.	Discard locknut (1).
4.	Shackle (4)	Locknut (6)	Remove.	Discard locknut (6).
5.		Screw (7)	Loosen until screw (7) head reaches leaf spring bracket.	
6.	Shackle (4) and spring eye (11)	Grease fitting (10) and lower shackle pin (9)	Remove.	Pin (9) must be pushed through toward underside of vehicle.
7.	Shackle (4) and hanger (2)	Grease fitting (17) and upper shackle pin (14)	Remove.	Pin (14) must be pushed through toward underside of vehicle.

6-22. FRONT SPRING SHACKLE REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.	Hanger (2)	Shackle (4)	Remove.	
9.		Screw (7)	Remove.	Discard screw (7).
10.	Shackle (4)	Bushing (5)	Remove.	
b. Installation				
11.		Bushing (5)	Install,	
12.		New screw (7)	Start loosely.	
13.		Shackle (4)	Install with pin (14).	Make sure pin slot (13) is positioned downward so screw (3) can be installed.
14.		Grease fitting (10)	Install.	
15.		Screw (3) and new locknut (1)	Install.	
16.		Frame (16)	Lower until spring eye (11) aligns with holes in shackle (4).	
17.		Pin (9)	Install.	Make sure pin slot (8) is positioned downward so screw (7) can be installed.
18.		Grease fitting (17)	Install.	
19.		New screw (7) and new locknut (6)	Install.	
20.		Frame (16)	Remove axle housing support.	



END OF TASK!

FOLLOW-ON TASKS: • Lubricate shackles (LO 9-2320-272-12).
• Install front wheels (para. 8-3).

6-23. FRONT SPRING BUSHING MAINTENANCE

This task covers:

- a. Inspection
- b. Removal

- c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para. 8-3	Parking brake set. Hood raised and secured. Front wheels removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Locknut Bushing Pin		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P LO 9-2320-272-12		

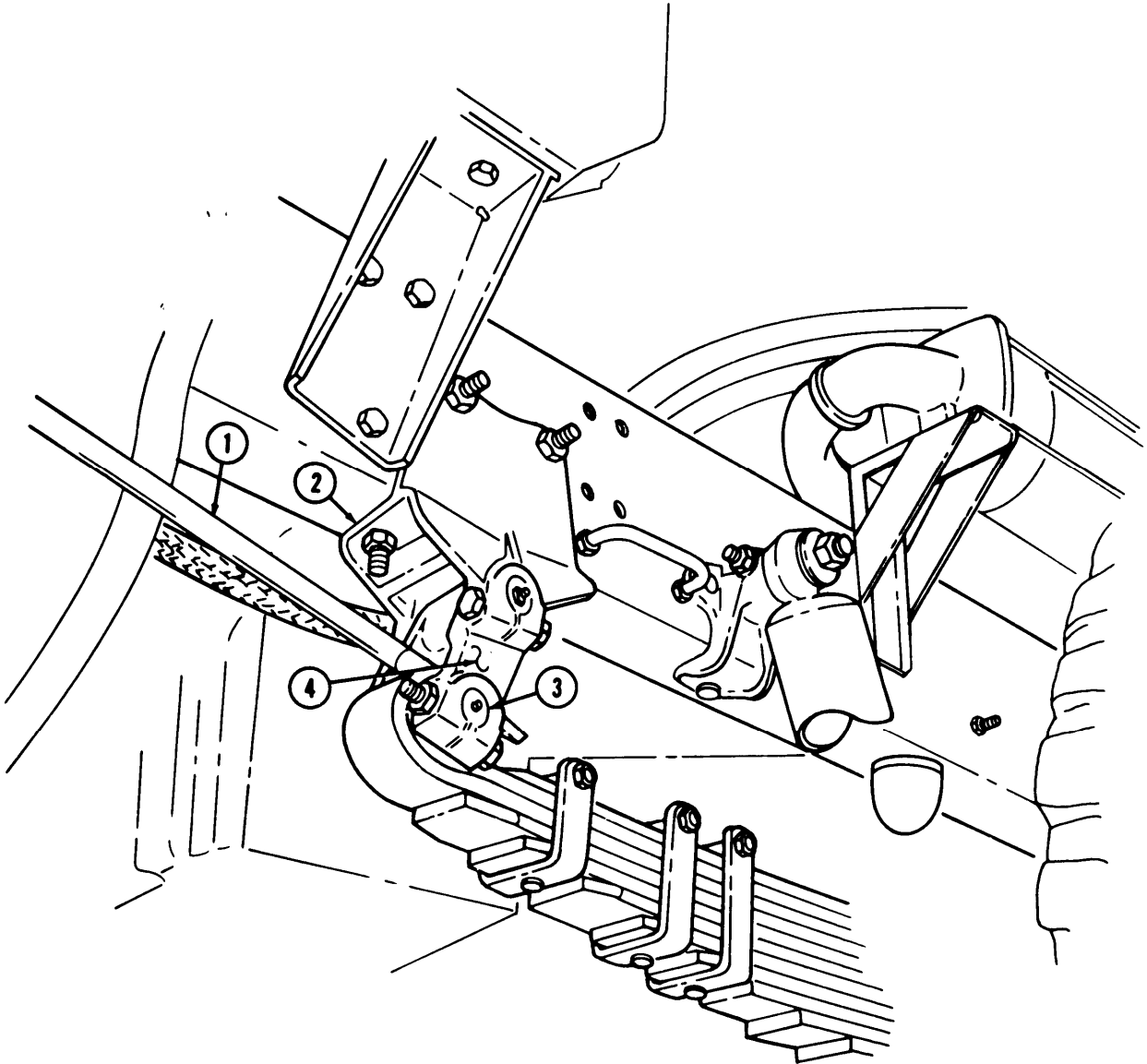
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Inspection

- | | | | |
|----------------------------|-------------|--|--|
| 1. Front spring hanger (2) | Pry bar (1) | <ul style="list-style-type: none"> a. Insert prybar (1) between spring hanger (2) and front spring shackle (4). b. Press down on front spring shackle (4). | <p>If movement is evident between front spring shackle (4) and pin (3),. perform task b.</p> |
|----------------------------|-------------|--|--|

6-23. FRONT SPRING BUSHING MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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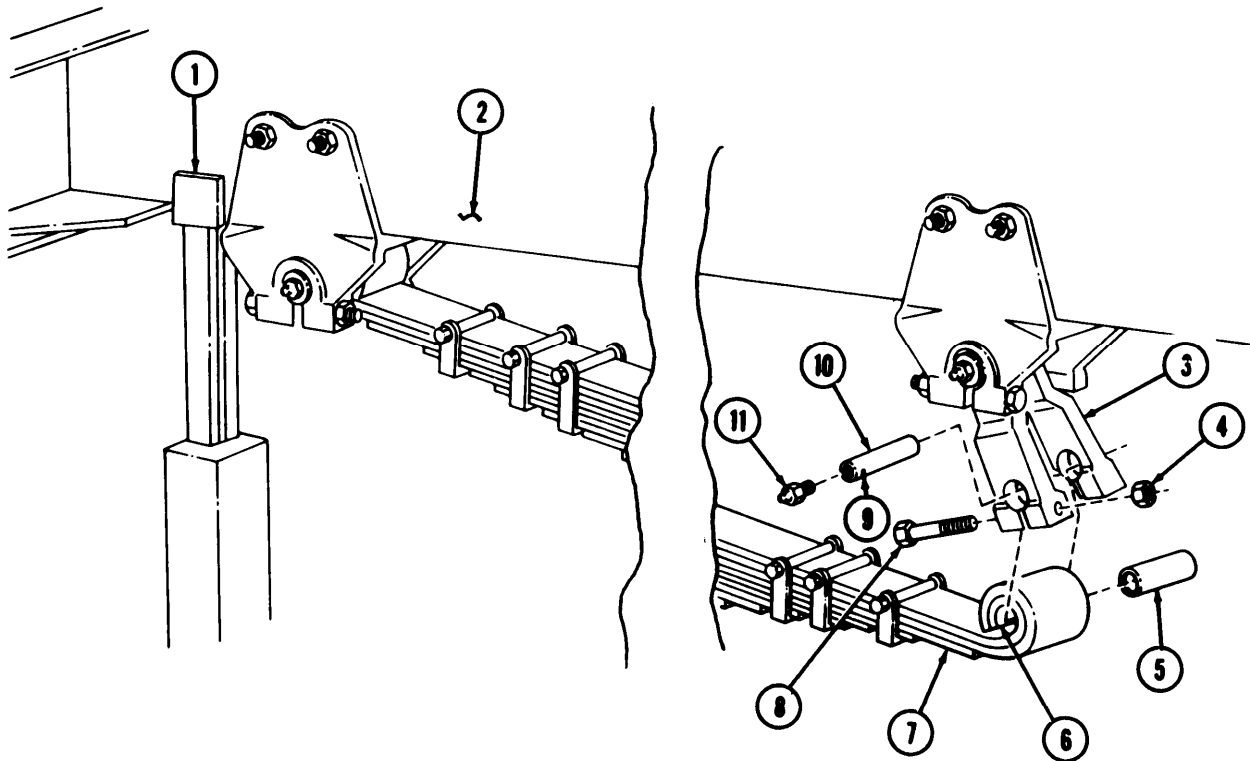


6-23. FRONT SPRING BUSHING MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Removal				
NOTE				
		Support will be needed for axle housing.		
2.		Frame (2)	Raise to remove load from spring (7).	Support frame with jackstand (1).
3.	Shackle (3)	Screw (8) and locknut (4)	Remove.	Discard locknut (4).
4.		Grease fitting (11)	Remove.	
5.	Shackle (3) and spring eye (6)	Pin (10)	Remove.	Discard pin (10).
6.		Spring (7)	Separate from shackle (3).	
7.	Shackle (3)	Bushing (5)	Remove.	Discard bushing (5).
c. Installation				
8.		New bushing (5)	Install.	
9.		Frame (2)	Lower until spring eye (6) is aligned with holes in shackle (3).	
10.		New pin (10)	Install.	Make sure pin slot (9) is positioned downward so screw (8) can be installed.
11.		Grease fitting (11)	Install.	
12.		Screw (8) and new locknut (4)	Install.	

6-23. FRONT SPRING BUSHING MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASKS: • Lubricate shackles (LO 9-2320-272-12).
• Install front wheels (para 8-3).

TA349690

6-24. FRONT SPRING BUMPER REPLACEMENT
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This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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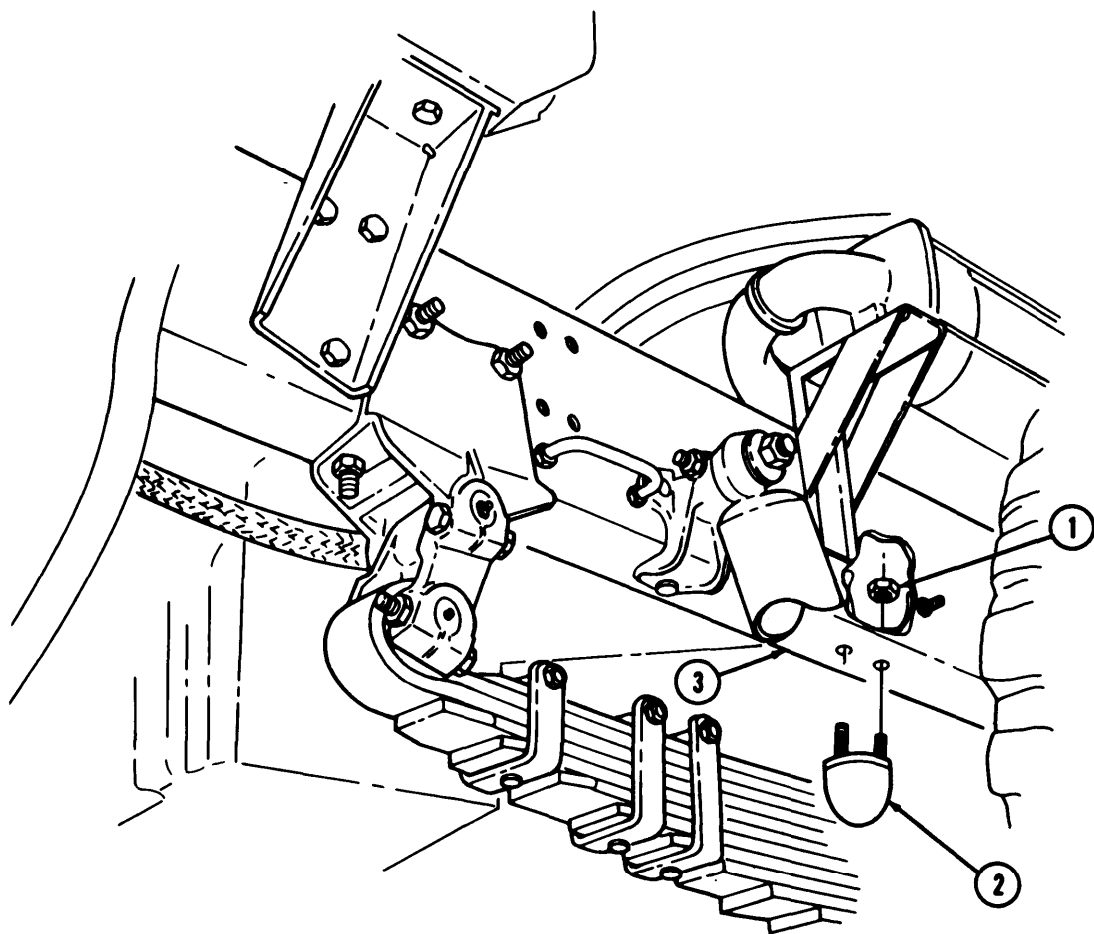
a. Removal

- | | | | | |
|----|-------------------------|-------------------------|---------|-----------------------|
| 1. | Front spring bumper (2) | Two locknuts (1) | Remove. | Discard locknuts (1). |
| 2. | | Front spring bumper (2) | Remove. | |

b. Installation

- | | | |
|----|-------------------------|--|
| 3. | Front spring bumper (2) | Install through holes in frame rail (3) with two new locknuts (1). |
|----|-------------------------|--|

6-24. FRONT SPRING BUMPER REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

TA349691

6-25. SHOCK ABSORBER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
Four rubber grommets		
<u>Personnel Rewired</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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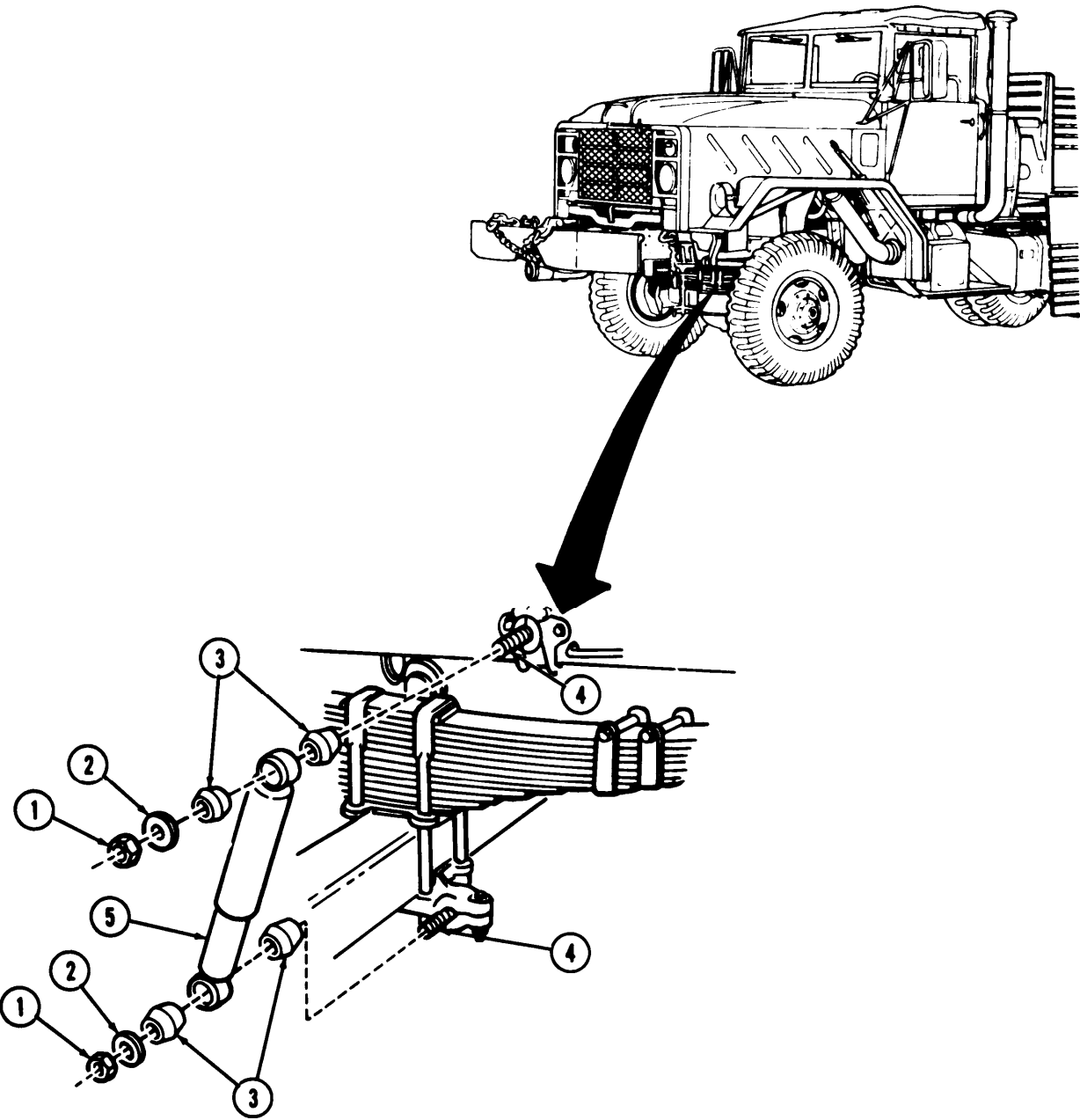
a. Removal

- | | | | | |
|----|--------------------|---|--|------------------------------|
| 1. | Shock absorber (5) | Two locknuts (1) and washers (2) | Remove. | Discard locknuts (1). |
| 2. | | Shock absorber (5) and four rubber grommets (3) | Pull away from upper and lower mounting studs (4). | Discard rubber grommets (3). |

b. Installation

- | | | | |
|----|--|--|---|
| 3. | | Two new inner rubber grommets (3) | Place one on each mounting stud (4). |
| 4. | | Shock absorber (5) | Position to each mounting (4). |
| 5. | | Two new outer rubber grommets (3), washers (2), and new locknuts (1) | a. Install to mounting studs (4).
b. Tighten locknuts (1) until seated and rubber grommets (3) are compressed. |

6-25. SHOCK ABSORBER REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

TA349692

6-26. SHOCK ABSORBER MOUNTING PINS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para. 6-25	Parking brake set. Shock absorber removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
<u>Personnel Rewired</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

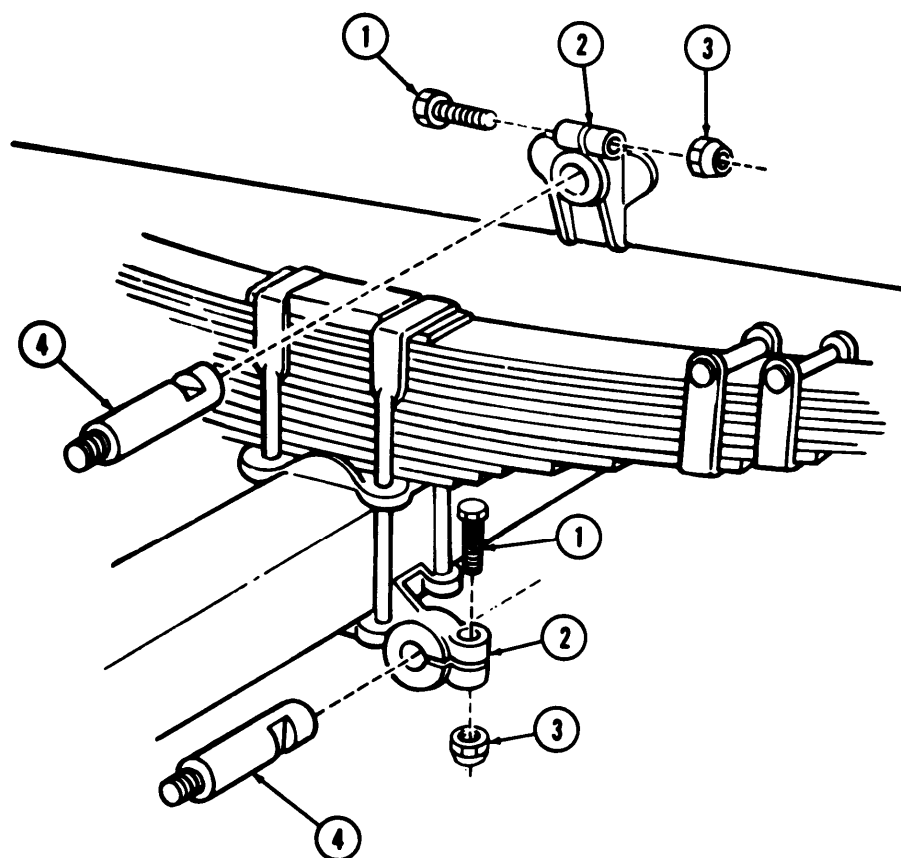
- | | | | | |
|----|-------------------------------|---------------------------------|---------------------------|-----------------------|
| 1. | Two mounting pin brackets (2) | Two locknuts (3) and screws (1) | Remove. | Discard locknuts (3). |
| 2. | | Mounting pin bracket (2) | Spread bracket (2) apart. | |
| 3. | | Two mounting pins (4) | Remove. | |

b. Installation

- | | | | | |
|----|--|-----------------------|---|--|
| 4. | | Two mounting pins (4) | Install with screws (1) and new locknuts (3). | Be sure pin (4) slots are positioned so screws (1) can be installed. |
|----|--|-----------------------|---|--|

6-26. SHOCK ABSORBER MOUNTING PINS REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Install shock absorber (para 6-25).

TA349693

6-27. REAR SPRING ASSEMBLY REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 TM 9-2320-272-10 Para 8-3	Parking brake set. Front wheels chocked. Four rear wheels removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Twelve lockwashers		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (3)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|-----------------|-----------------------------------|---|--|
| 1. | | Vehicle | Raise and place two jack stands (12) under cross tube (11), two jack stands (3) under both forward-rear hubs (4) and two jack stands (3) under both rear-rear hubs (9). | Position tops of jack stands (12) four inches above tops of jack stands (3) to relieve pressure on rear springs. |
| 2. | Spring seat (7) | Two clamp bolts (8) | Loosen. | |
| 3. | Two u-bolts (1) | Four nuts (5) and lockwashers (6) | Remove. | Discard lockwashers (6). |

NOTE

Step 4 applies to all models except M936 wrecker.

- | | | | | |
|----|---------------------------|---|---------|---|
| 4. | Leaf spring assembly (10) | Two U-bolts (1) and upper spring saddle (2) | Remove, | It maybe necessary to raise frame to remove u-bolt (1). |
|----|---------------------------|---|---------|---|

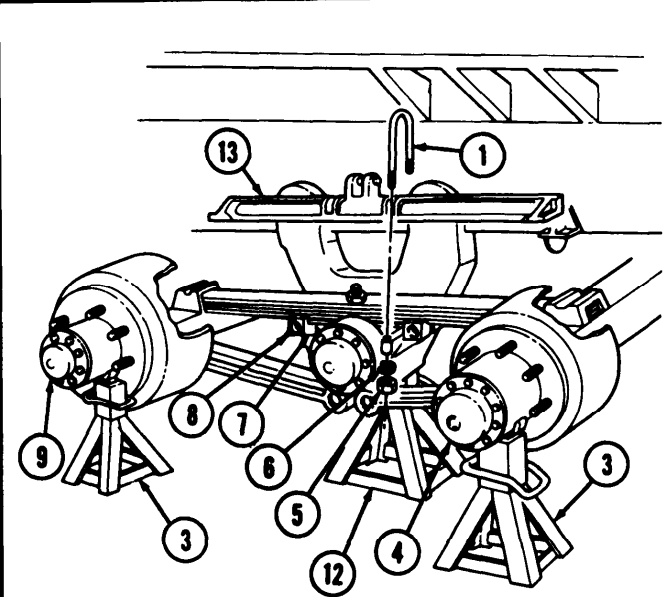
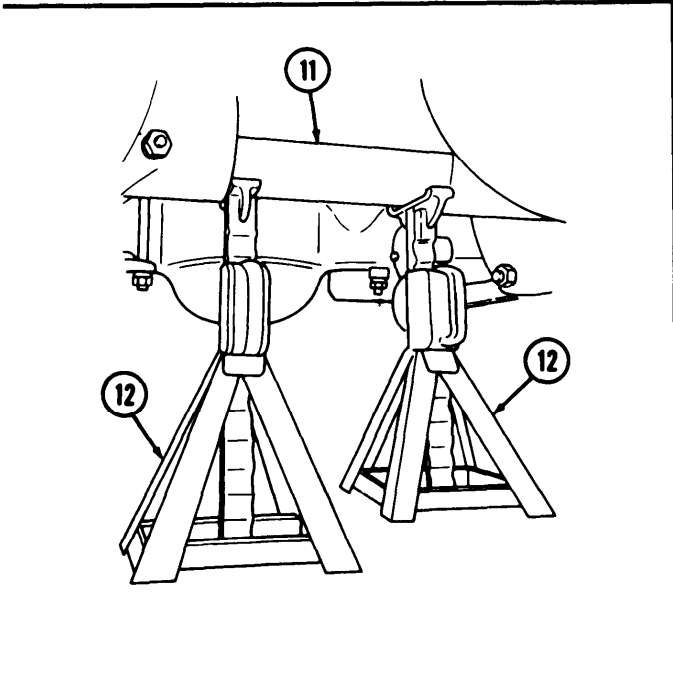
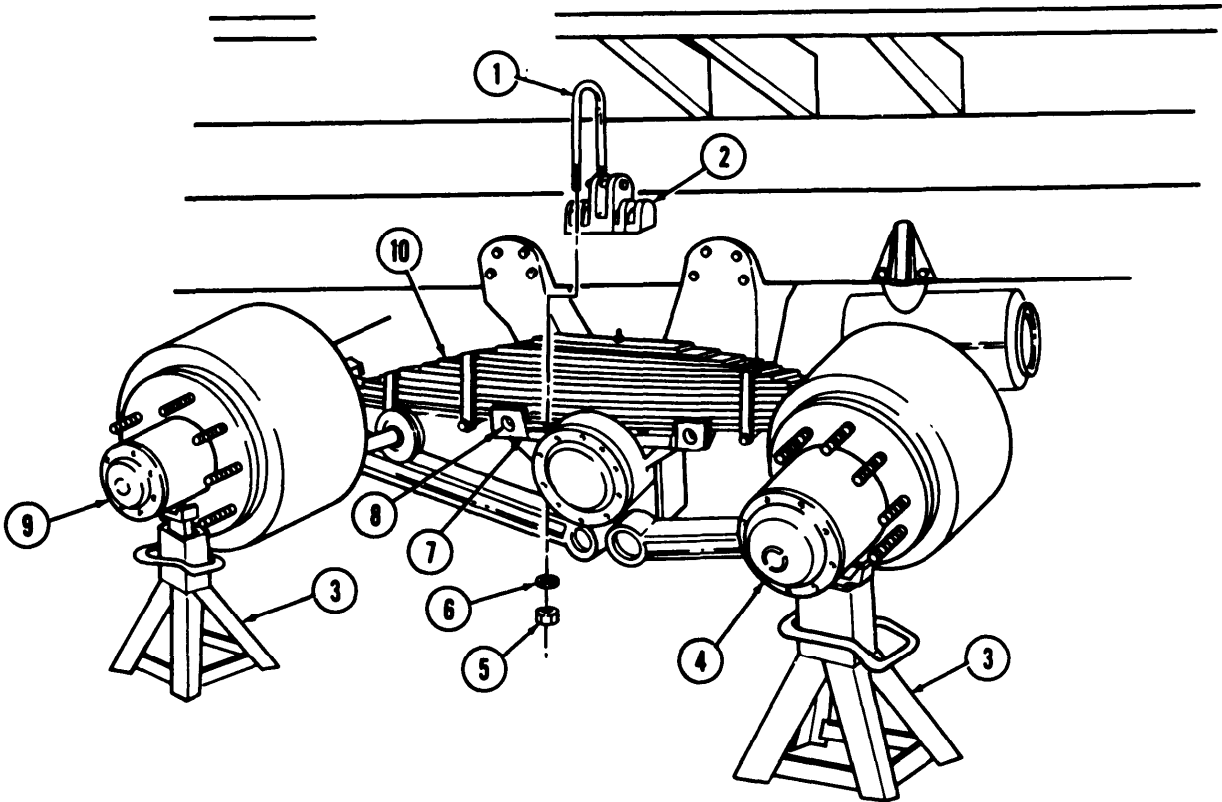
NOTE

Step 5 applies to M936 wrecker only.

- | | | | | |
|----|--|--|---------|--|
| 5. | | Two U-bolts (1) and stabilizer beam (13) | Remove. | |
|----|--|--|---------|--|

6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

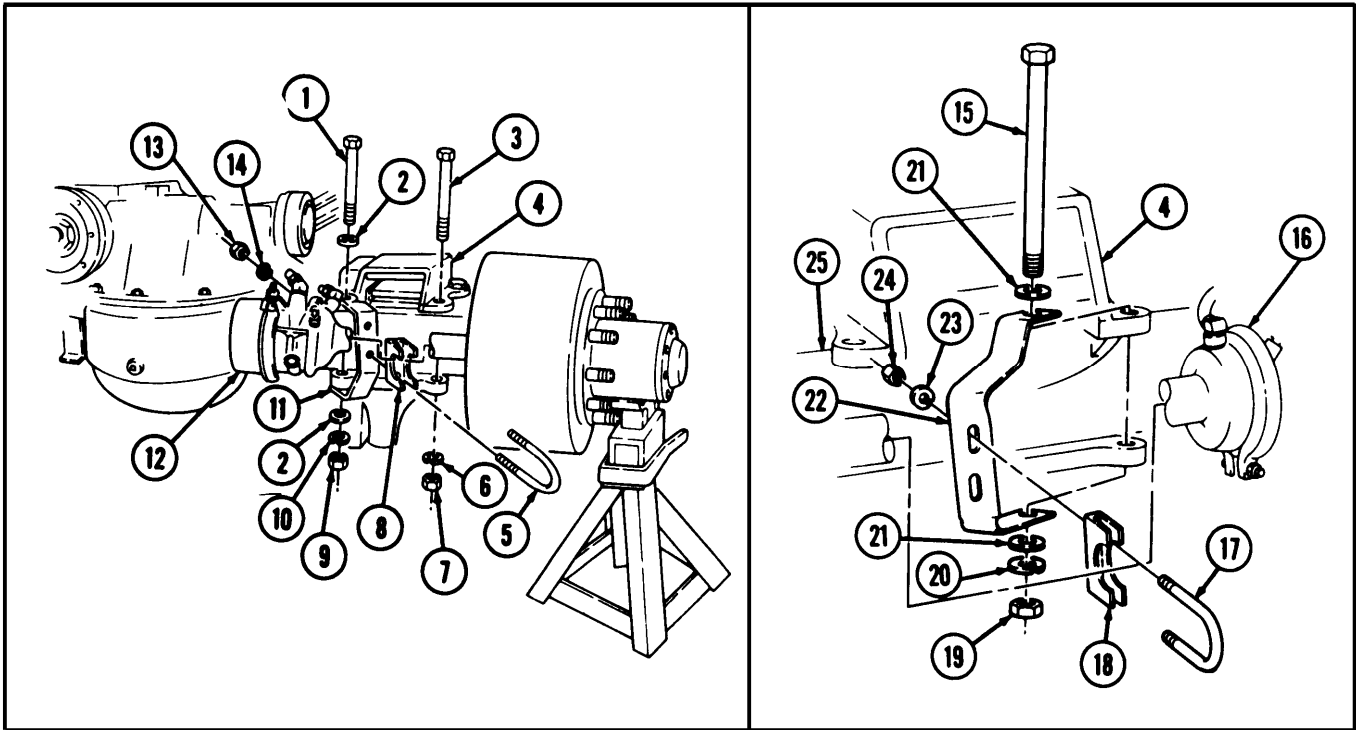
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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M936 WRECKER ONLY

6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.	Spring brake chamber (12)	Two nuts (13) and lock-washers (14), U-bolt (5), and U-bolt bracket (8)	Remove.	Discard lockwashers (14).
NOTE Assistant will help with steps 7,8, and 10.				
7.	Upper spring bracket (4)	Nut (9), lockwasher (10), two washers (2), screw (1), and spring brake chamber bracket (11)	Remove.	Discard lockwasher (10).
8.		Two nuts (7), lock-washers (6), and screws (3)	Remove.	Discard lockwashers (6).
9.	Service brake chamber (16)	Two nuts (24) and lock-washers (23), U-bolt (17), and U-bolt bracket (18)	Remove.	Discard lockwashers (23).
10.	Upper spring bracket and wear pad (4)	Nut (19), lockwasher (20), two washers (21) screw (15), and service brake chamber bracket (22)	Remove.	Discard lockwasher (20).
11.	Axle housing (25)	Upper spring bracket and wear pad (4)	Remove.	



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6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

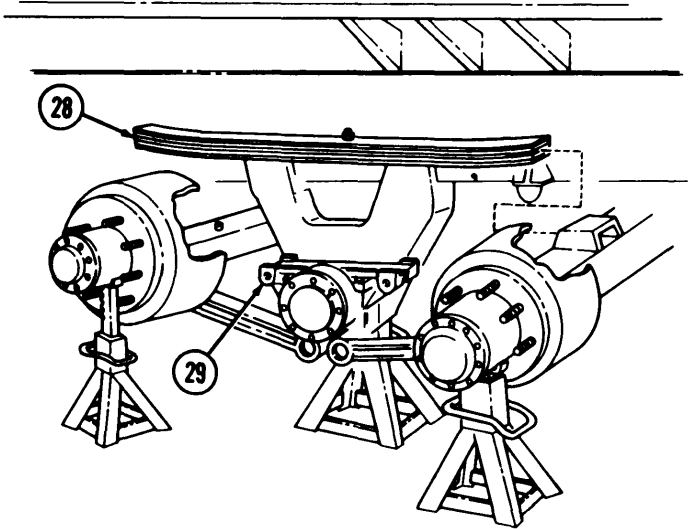
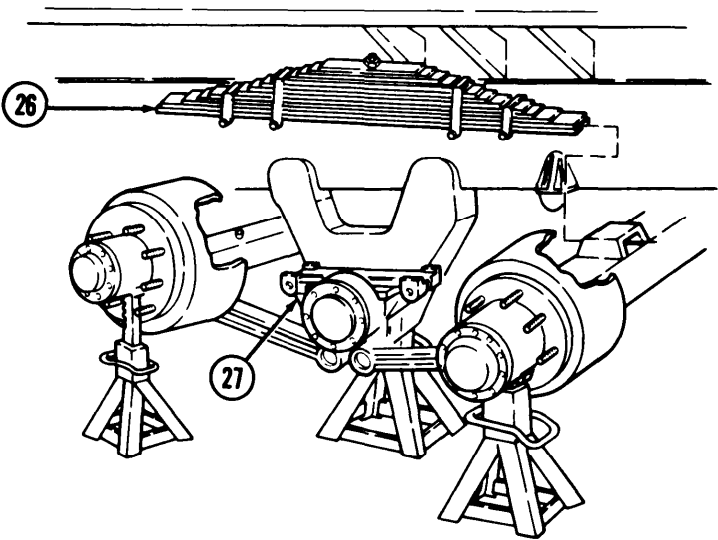
Assistants will help with steps 12 and 13.

12. Spring seat (27) Spring assembly (26) Remove.

NOTE

Step 13 applies to M936 wrecker only.

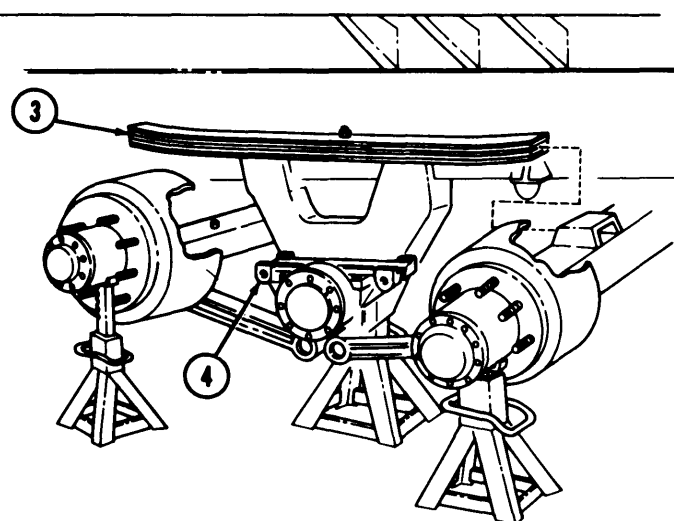
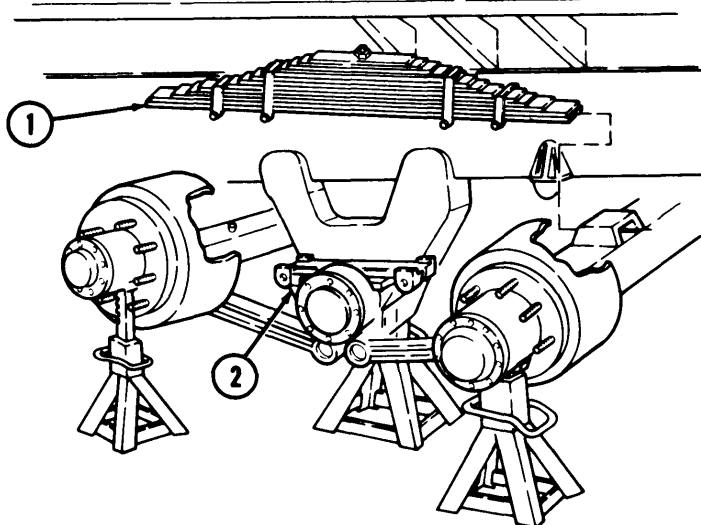
13. Spring seat (29) Spring assembly (28) Remove.



M936 WRECKER

6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

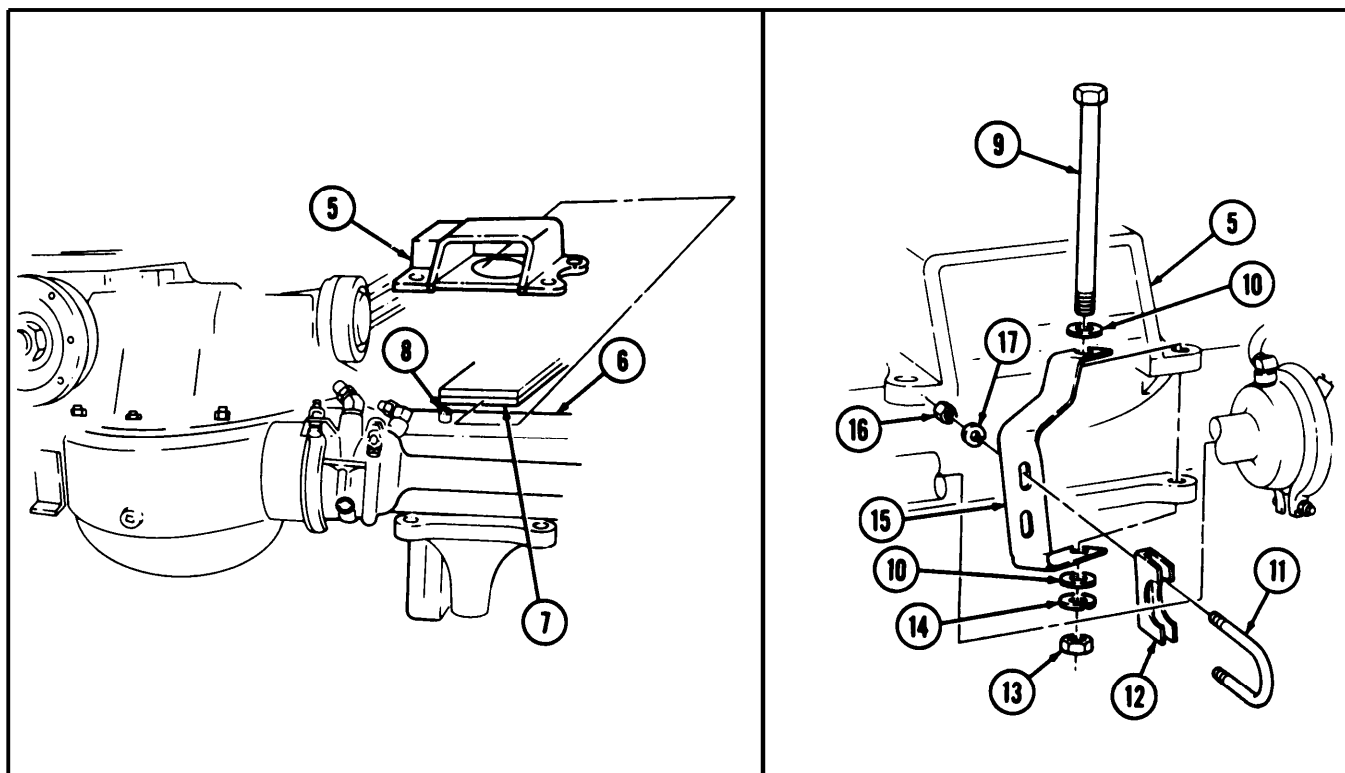
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Installation				
<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • Assistants will help with steps 14 and 15. • Step 14 applies to M936 wrecker only. 				
14.		Spring assembly (3)	Install to spring seat (4).	
15.		Spring assembly (1)	Install to spring seat (2).	Make sure head of center bolt seats in hole of spring seat.



M936 WRECKER

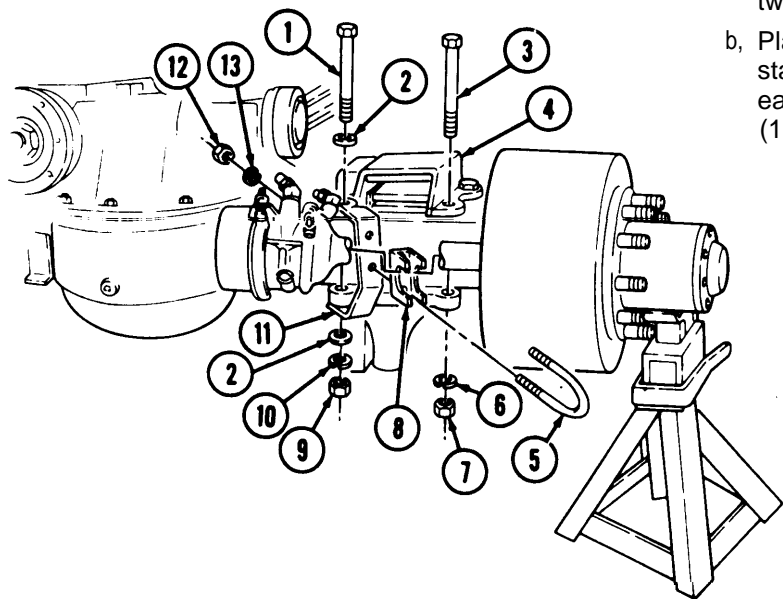
16-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS .
16.		Upper spring bracket and wear pad (5)	Slide onto main leaves (7) and position on axle housing (6) over dowel pin (8).	
17.		Service brake chamber bracket (15)	Install with screw (9), two washers (10), new lockwasher (14), and nut (13).	Do not tighten nut (13).
18.		U-bolt bracket (12)	Install with U-bolt (11), two new lockwashers (17), and nuts (16).	



6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
19.		Spring brake chamber bracket (11)	Install with screw (1), two washers (2), new lockwasher (10), and nut (9).	Do not tighten nut (9).
20.		U-bolt bracket (8)	Install with U-bolt (5), two new lockwashers (13), and nuts (12).	Tighten 120-160 lb-in. (14-18 N-m).
NOTE Assistant will help with steps 21 and 22.				
21.		Upper spring bracket (4)	a. Install with two screws (3), new lockwashers (6), and nuts (7). b. Tighten two nuts (7), and two nuts (9).	Tighten 280-360 lb-ft (380-488 N-m).
22.		Upper spring saddle (15)	Install with two U-bolts (14), four new lockwashers (19), and four nuts (18).	Tighten 300-400 lb-ft (407-542 N-m).
NOTE Step 23 applies to M936 wrecker only.				
23.		Stabilizer beam (23)	Install with two U-bolts (14), four new lockwashers (19), and four nuts (18).	Tighten 300-400 lb-ft (407-542 N-m).
24.	Rear spring seat (20)	Two clamp bolts (21)	Tighten.	
25.	Vehicle		a. Raise and remove two jack stands (22). b. Place two jack stands (17) under each axle housing (16).	Permits wheel instal- lation,



6-27. REAR SPRING ASSEMBLY REPLACEMENT (Cont'd)

[illegible]

END OF TASK!

FOLLOW-ON TASKS:

- Install rear wheels (para. 8-3).
- Start engine (TM 9-2320-272-20).
- Check U-bolts for tightness after road test.

6-28. REAR SPRING LEAF MAINTENANCE

This task covers:

- a. Disassembly
b. Inspection

c. Reassembly

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 6-27	Parking brake set. Rear spring assembly removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Five nuts Five screws Powdered graphite (Appendix D, Item 20)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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I a. Disassembly I**NOTE**

Steps 1 through 5 apply to all models except M936 wrecker.

1.	Two C-clamps	Position one over each side of third leaf spring (10) and under no. 1 main spring leaf (18) and tighten.	Relieves tension from spring mounting hardware.
2.	Spring leaf (12)	Center nut (13) and center screw (19)	Remove. Discard nut (13) and screw (19).
3.	Four spring leaf clips (15)	Four nuts (14), screws (16), and spacers (17)	Remove. Discard nuts (14) and screws (16).
4.	Two c-clamps	Remove.	
5.	Spring leaves (12), (11), (10), (9), (8), (7), (6), (5), (4), (3), (2), and (1)	Separate.	

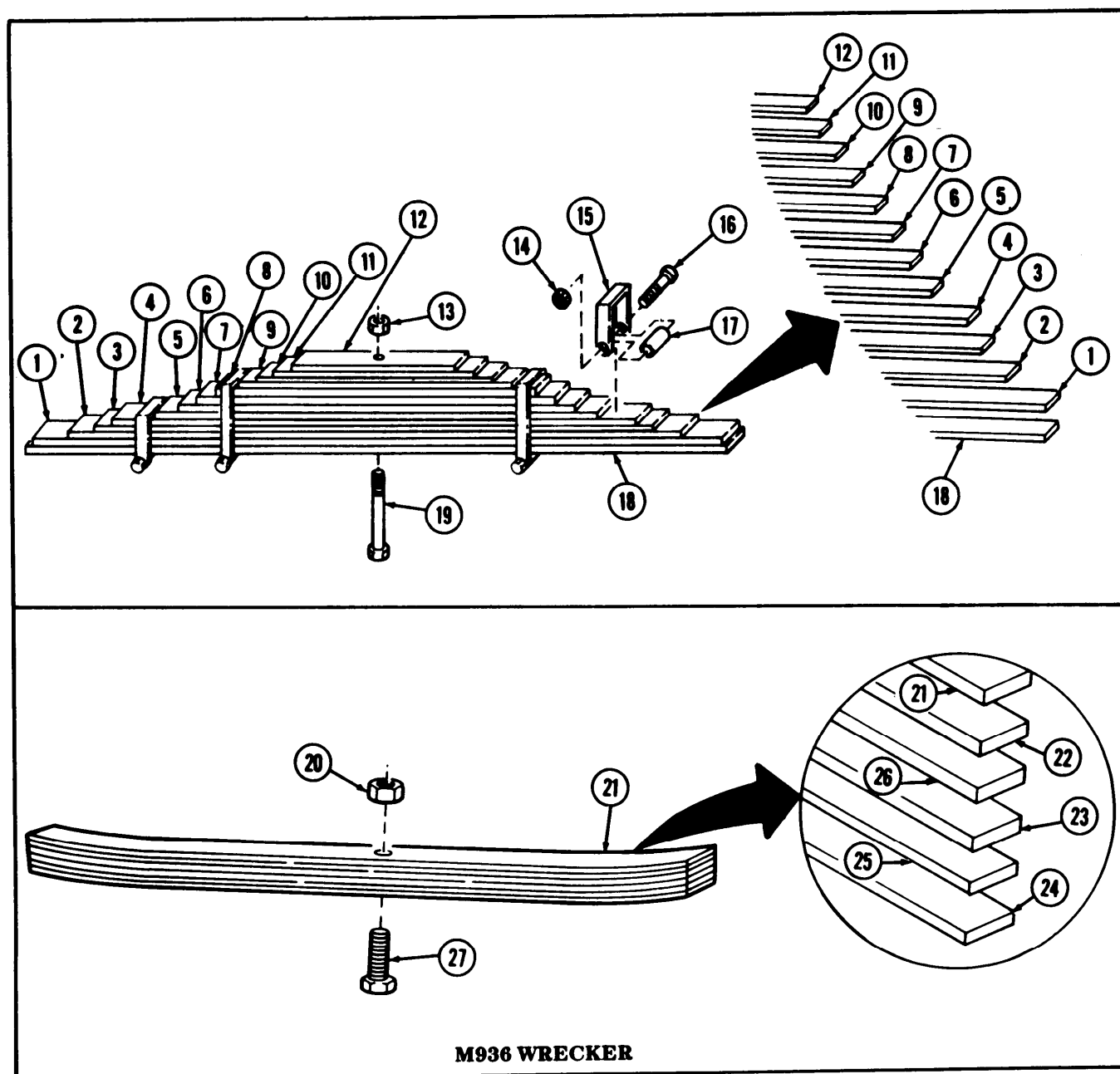
6-28. REAR SPRING LEAF MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Steps 6 and 7 apply to M936 wrecker only.

- | | | | |
|----|--|---------|----------------------------------|
| 6. | Center nut (20) and center screw (27) | Remove. | Discard nut (20) and screw (27). |
| 7. | Spring leaves (21), (22), (26), (23), (25), and (24) | Remove. | |



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6-28. REAR SPRING LEAF MAINTENANCE (Cont'd)

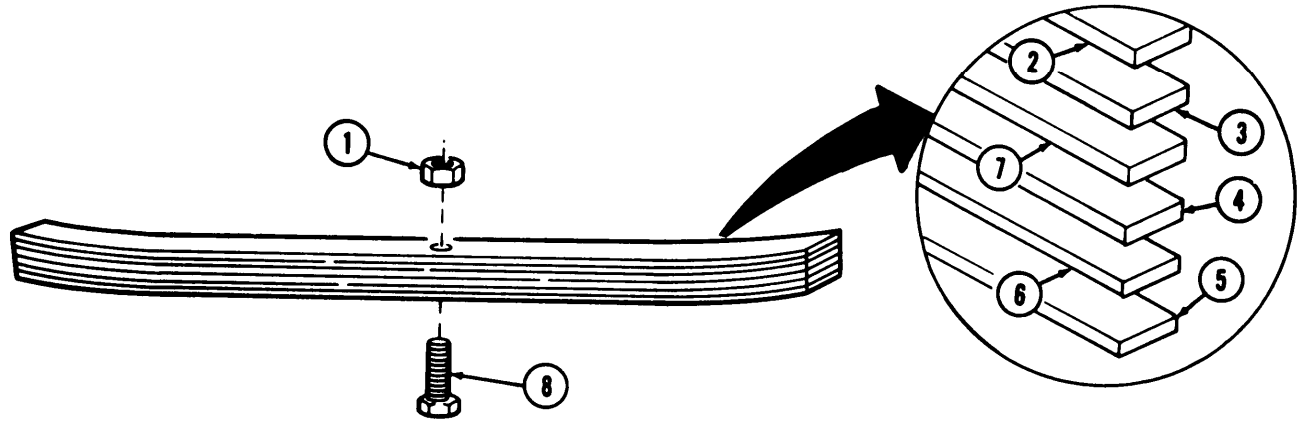
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Inspection				
NOTE				
If replacing entire spring assembly, proceed to task c.				
8.		Spring leaves (2), (3), (4), (6), and (7) or (9) through (20)	Inspect for cracks or breaks.	Replace if cracked or broken.
9.		Main leaf no. 1 (26) or (5)	Inspect for cracks, breaks, or wear.	Replace if cracked broken or wear pad area worn 1/16 in. below main leaf bottom surface.

c. Reassembly

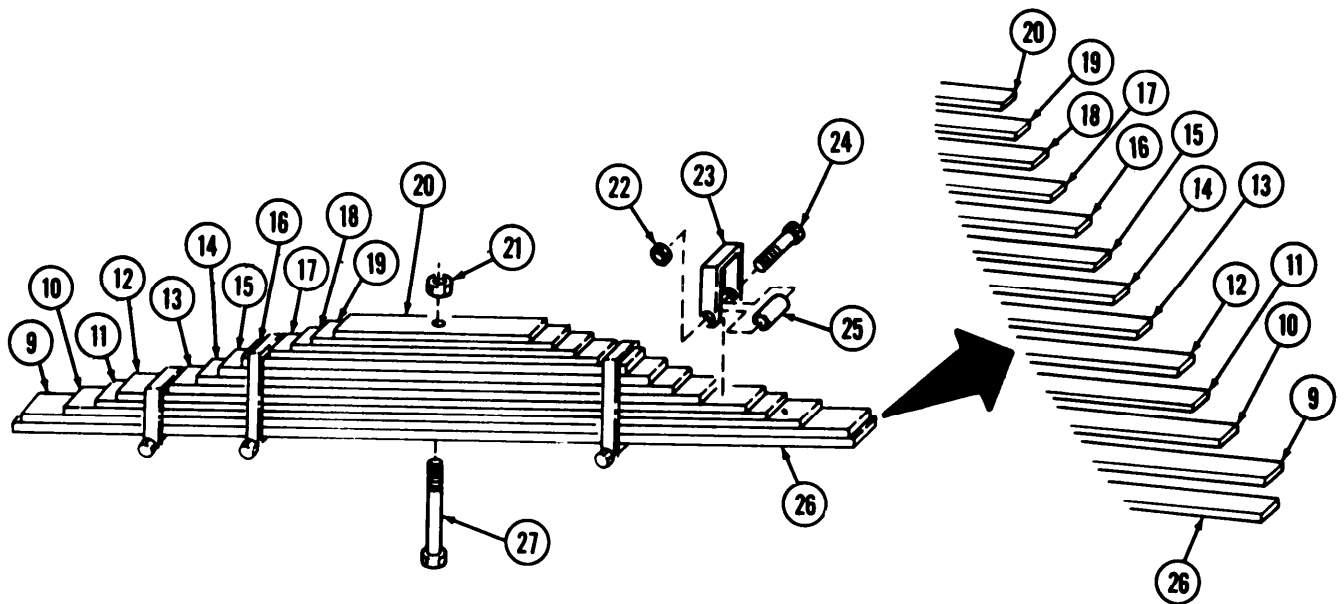
NOTE				
<ul style="list-style-type: none"> • If reinstalling original leaves, coat all spring leaves with powdered graphite. • Step 10 applies to M936 wrecker only. 				
10.		Spring leaves (2), (3), (7), (4), (6), and (5)	Install with new center screw (8) and new center nut (1).	Peen screw (8) end.
11.		Spring leaves (26), (9), (10), (U), (12), (13), (14), (15), (16), (17), (18), (19), and (20)	Install with new center screw (27) and new center nut (21).	Make sure curved ends of main leaves (26) and (9) face down.
12.		Two c-clamps	Position one over each side of third spring leaf (18) and under no. 1 main spring leaf (26) and tighten.	Permits installation of spring mounting hardware.
13.		Four spring leaf clips (23)	a. Install with four spacers (25), new screws (24), and new nuts (22). b. Peen screw (27) and (24) ends.	
14.		Two C-clamps	Remove.	

6-28. REAR SPRING LEAF MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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M936 WRECKER



END OF TASK!

FOLLOW-ON TASK: Install rear spring assembly (para. 6-27).

TA349702

6-29. REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET REPLACEMENT

This task covers:

- a. Removal
- b. Inspection

c. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Referent.</u>	<u>Condition Description</u>
All	TM 9-2320-272-10 Para 8-3	Parking brake set. Four rear wheels removed.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Eight lockwashers		
<u>Personnel Rewired</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B (2)		None
<u>Manual References</u>		
TM 9-2320-272-10 TM 9-2320-272-20P		

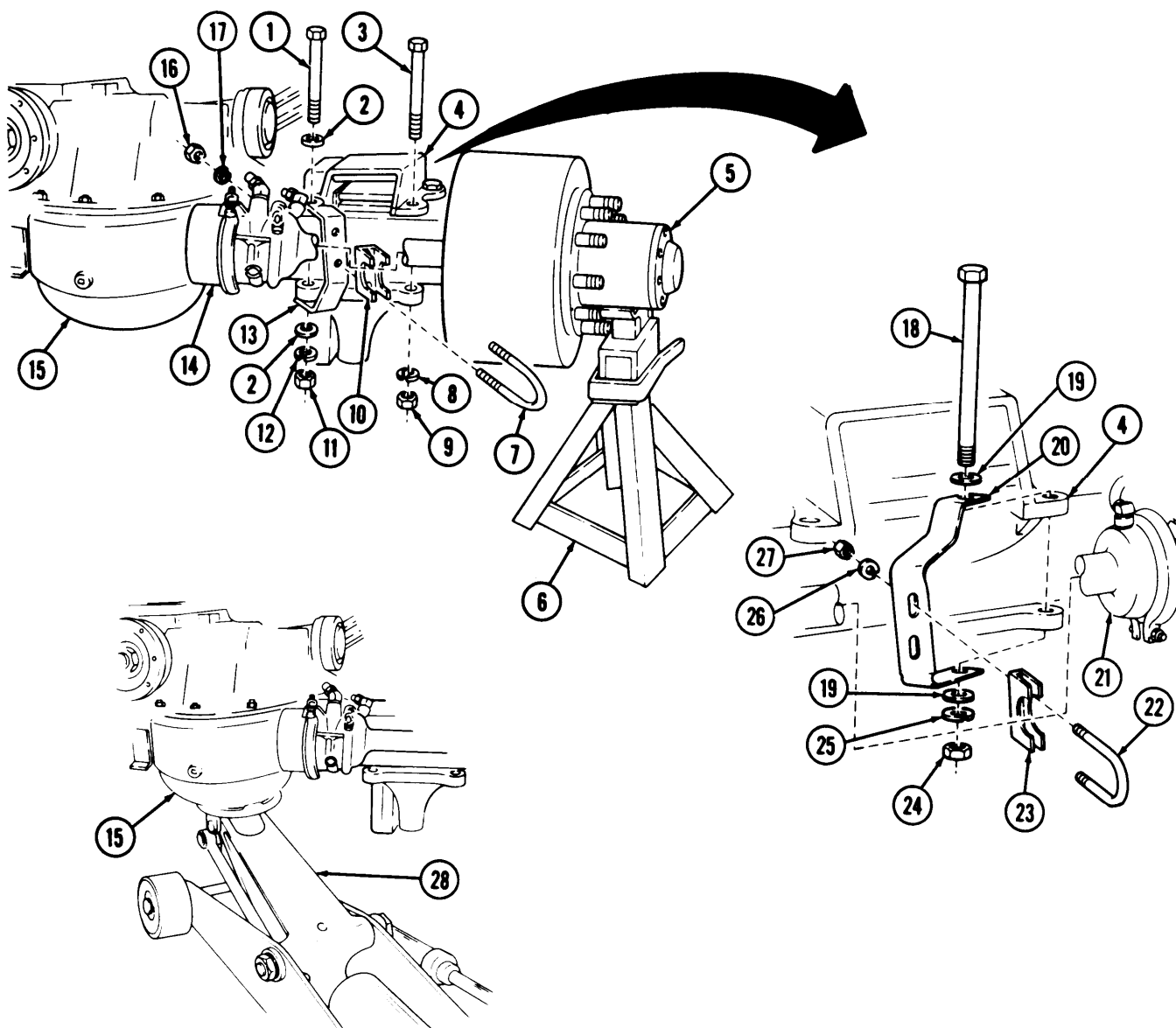
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|--|----------------------------|--|---|---------------------------|
| 1. | | Hydraulic jack (28) | Place under rear-rear axle differential housing (15) and raise vehicle. | |
| 2. | | Jack stand (6) | Place under wheel hubs (5). | |
| 3. | Spring brake chamber (14) | Two nuts (16) and lockwashers (17), U-bolt (7), and U-bolt bracket (10) | Remove. | Discard lockwashers (17). |
| NOTE | | | | |
| Assistant will help with steps 4,6, and 7. | | | | |
| 4. | Upper spring bracket (4) | Nut (11), lockwasher (12), two washers (2), screw (1), and spring brake chamber bracket (13) | Remove. | Discard lockwasher (12). |
| 5. | Service brake chamber (21) | Two nuts (27) and lockwashers (26), U-bolt (22), and U-bolt bracket (23) | Remove. | Discard lockwashers (26). |

6-29. REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET REPLACEMENT (Cont'd)

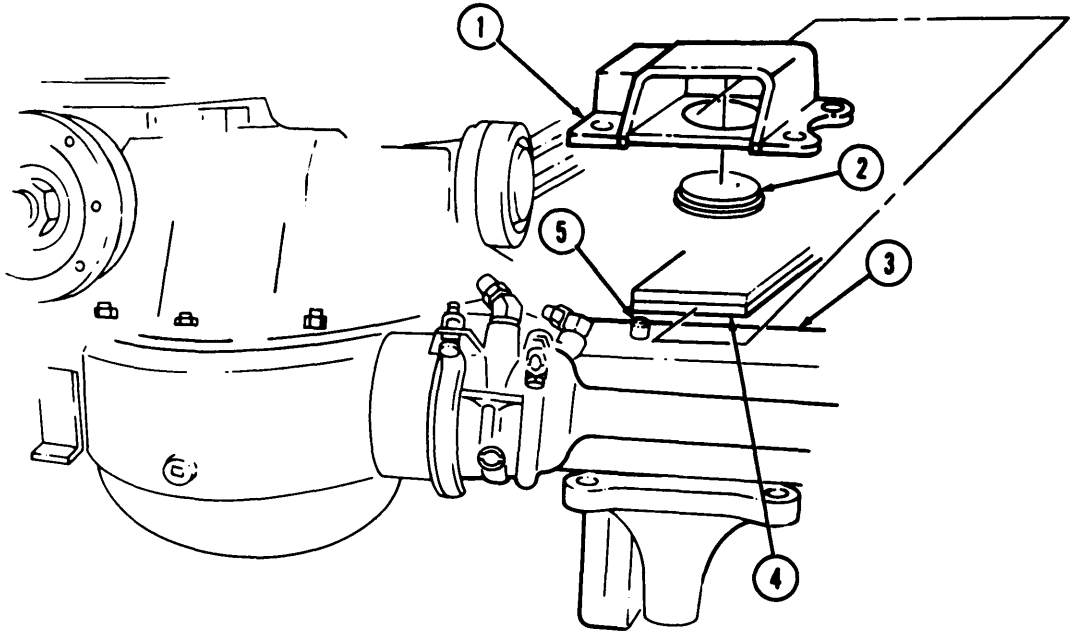
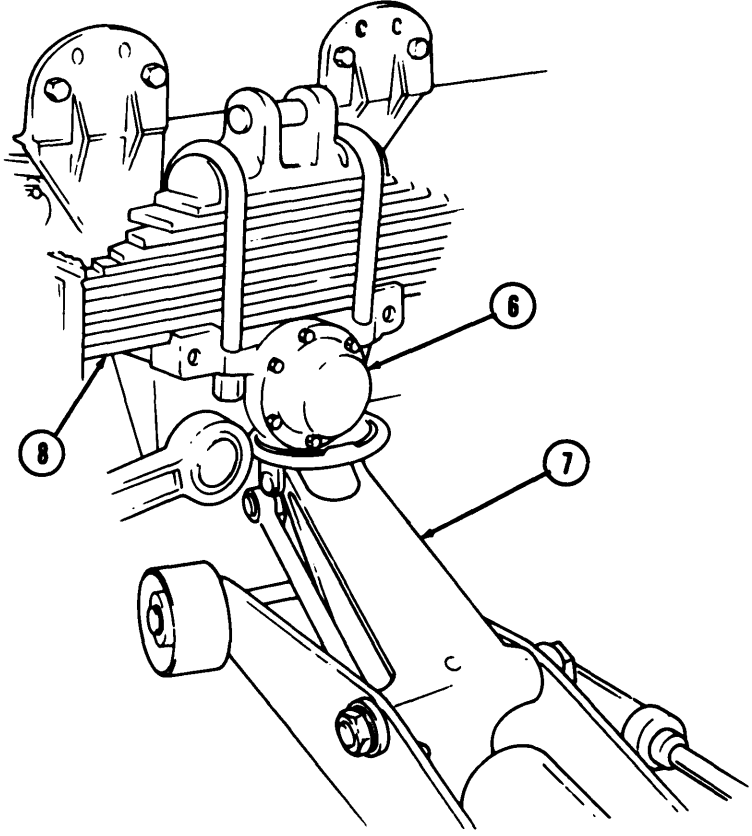
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.	Upper spring bracket (4)	Nut (24), lockwasher (25), two washers (19), screw (18), and service brake chamber bracket (20)	Remove.	Discard lockwasher (25).
7.		Two nuts (9), lockwashers (8), and screws (3)	Remove.	Discard lockwashers (8).



6-29. REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
8.		Hydraulic jack (7)	Place under spring seat (6) and raise leaf spring assembly (8) until upper spring bracket (1) is clear of axle housing (3) and dowel pin (5).	
9.	Leaf spring assembly (8)	Upper spring bracket (1)	Slide from bottom leaf (4) and remove.	
10.	Upper spring bracket (1)	Spring seat wear pad (2)	Remove.	
b. Inspection				
11.		Spring seat wear pad (2)	Inspect for cracks.	If cracked, replace pad (2).
12.		Upper spring bracket (1)	Inspect for cracks.	If cracked, replace bracket (1).
c. Installation				
13.		Spring seat wear pad (2)	Install in upper spring bracket (1).	
14.		Upper spring bracket (1)	Slide onto leaf spring assembly (8) and install on axle housing (3) over dowel pin (5).	
15.		Hydraulic jack (7)	Lower until leaf spring assembly (8) seats in upper spring bracket (1) and remove jack (7).	

**6-29. - REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET
REPLACEMENT (Cont'd)**

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				

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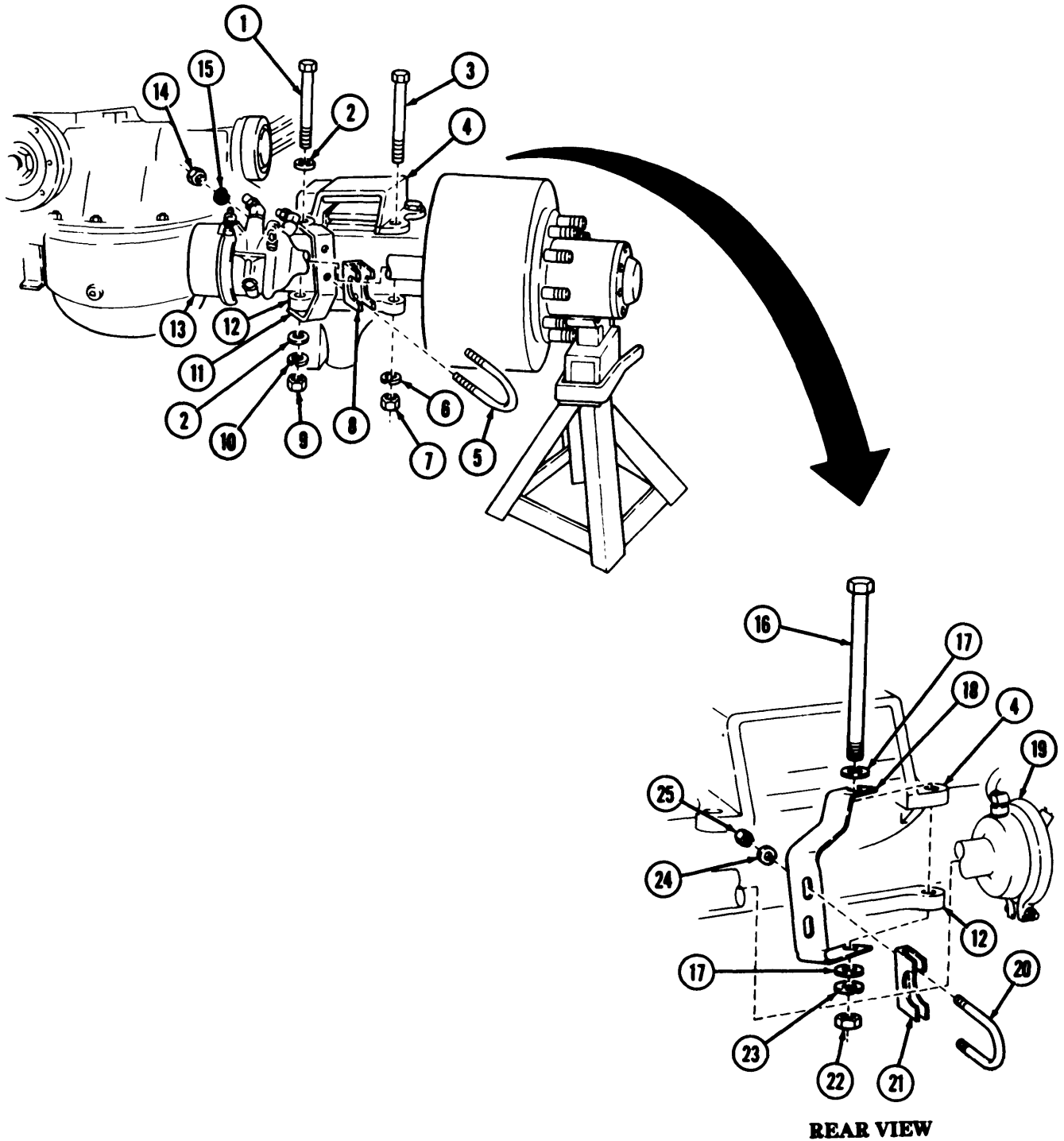
Change 3 6-85

6-29. REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
16.		Spring brake chamber bracket (11)	a. Position over upper spring bracket (4) and lower torque rod bracket (12), b. Install with screw (1), two washers (2), new lockwasher (10), and nut (9).	Do not tighten nut (9).
17.		Spring brake U-bolt bracket (8)	Install between brake chamber (13) and brake chamber bracket (11) with U-bolt (5), two new lockwashers (15), and nuts (14).	
18.		Service brake chamber bracket (18)	a. Position over upper spring bracket (4) and lower torque rod bracket (12). b. Install with screw (16), two washers (17), new lockwashers (23), and nut (22).	Do not tighten nut (22).
19.		Service brake U-bolt bracket (21)	Install between service brake chamber (19) and brake chamber bracket (18) with U-bolt (20), two new lockwashers (24), and nuts (25).	
NOTE				
Assistant will help with step 20.				
20.		Upper spring bracket (4)	a. Install with two screws (3), new lockwashers (6), and nuts (7). b. Tighten nuts (9) and (22).	Tighten 280-360 lb-ft (380-488 N•m). Tighten 280-360 lb-ft (380-488 N•m).

6-29. REAR AXLES SPRING SEAT WEAR PADS AND UPPER BRACKET REPLACEMENT (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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END OF TASK!

FOLLOW-ON TASK: Mount rear tires (TM 9-2320-272- 10).

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6-30. REAR SPRING BUMPER REPLACEMENT

This task covers:

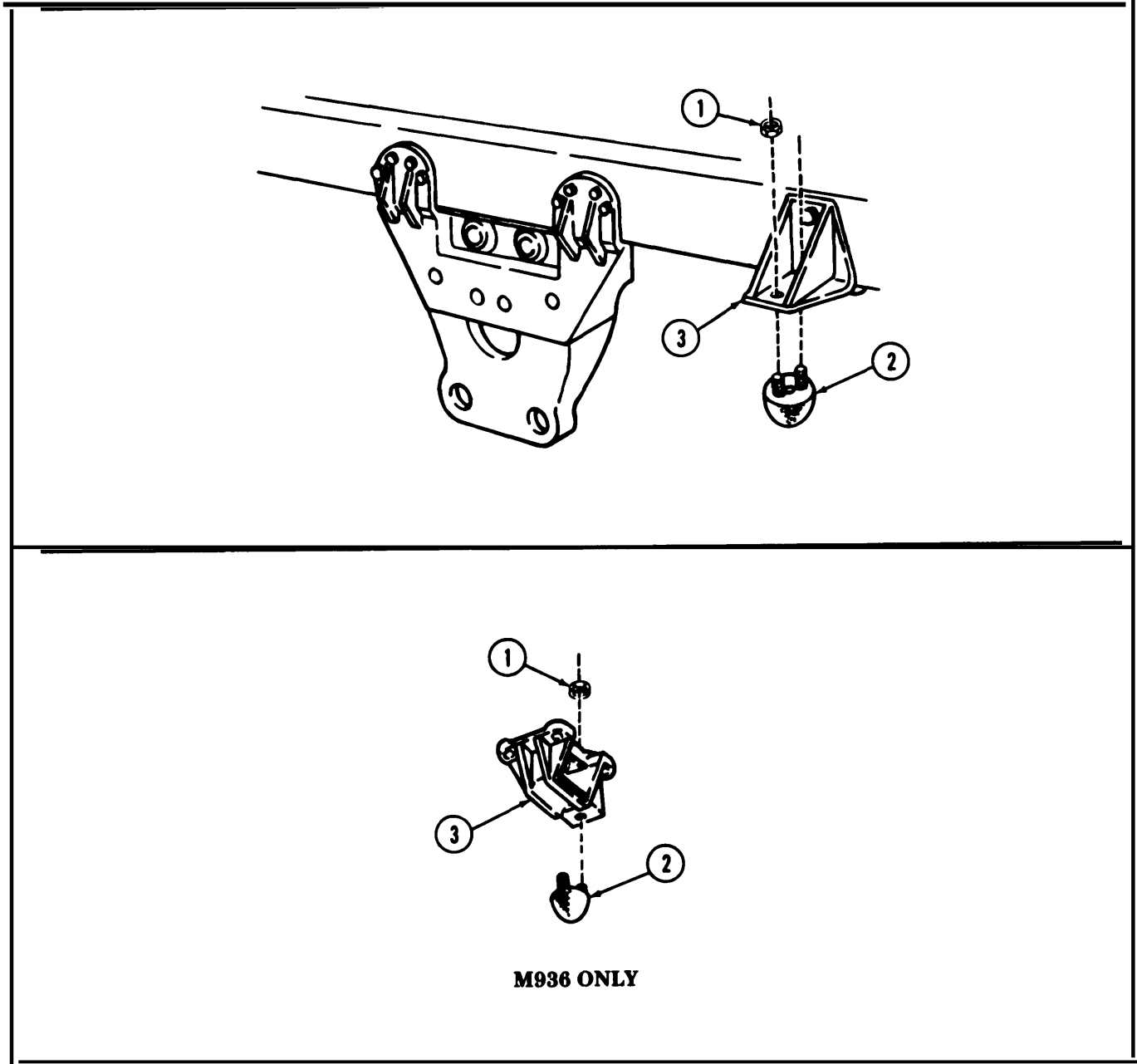
- a. Removal
- b. Installation

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	TM 9-2320-272-10	Parking brake set.
<u>Test Equipment</u>		
None		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Two locknuts		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		None
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
<u>a. Removal</u>				
1.	Bumper bracket (3) to bumper (2)	Two locknuts (1)	Remove.	Discard locknuts (1).
2,		Bumper (2)	Remove.	
<u>b. Installation</u>				
3.		Bumper (2)	Place through two holes in bumper bracket (3) and install with two new locknuts (1).	

6-30. REAR SPRING BUMPER REPLACEMENT (Cont'd)				
STEP NO.	LOCATION	ITEM	ACTION	REMARKS



END OF TASK!

6-31. REAR SPRING SEAT MAINTENANCE

This task covers:

- | | |
|----------------------------|-----------------|
| a. Removal | d. Installation |
| b. Cleaning and Inspection | e. Adjustment |
| c. Lubrication | |

INITIAL SETUP:

<u>Applicable Models</u>	<u>Equipment Condition Reference</u>	<u>Condition Description</u>
All	Para. 6-27	Rear spring assembly removed.
<u>Test Equipment</u>		
Spring seat tester scale		
<u>Special Tools</u>		<u>Special Environmental Conditions</u>
None		None
<u>Materials/Parts</u>		
Six lockwashers		
Felt washer		
Seal assembly		
Gasket		
GM grease (Appendix D, Item 13)		
Lubricating oil OE/HDO 30 (Appendix D, Item 17)		
<u>Personnel Required</u>		<u>General Safety Instructions</u>
Light-wheeled vehicle mechanic MOS 63B		Fire extinguisher will be kept nearby when drycleaning solvent is used.
<u>Manual References</u>		
TM 9-2320-272-10		
TM 9-2320-272-20P		

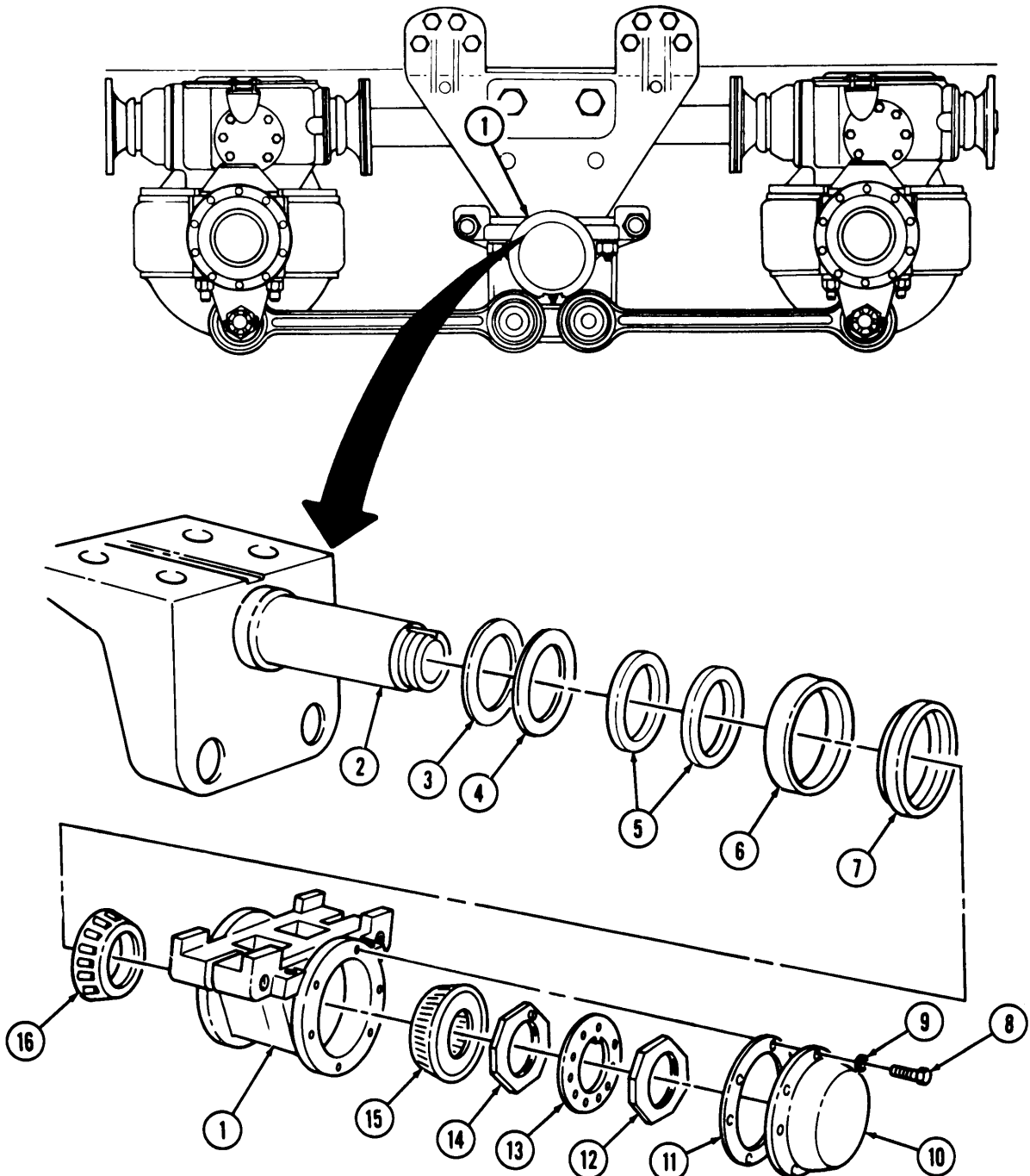
STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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a. Removal

- | | | | | |
|----|----------------------|---|---------|---|
| 1. | Spring seat cap (10) | Six screws (8) and lock-washers (9) | Remove. | Discard lockwashers (9). |
| 2. | | Spring seat cap (10) and gasket (11) | Remove. | Discard gasket (11). Clean gasket remains from mating surfaces. |
| 3. | Cross tube (2) | Locking nut (12) and key washer (13) | Remove. | |
| 4. | | Bearing adjusting nut (14) and outer bearing (15) | Remove. | |
| 5. | | Spring seat (1) | Remove. | |

6-31. REAR SPRING SEAT MAINTENANCE (Cont'd)

LOCATION	ITEM	ACTION	REMARKS
6. Spring seat (1)	Wiper ring (3), flat washer (4), two felt washers (5), packing retainer (6), grease seal assembly (7), and inner bearing (16)	Remove.	Discard felt washer (5) and grease seal assembly (7).



6-31. REAR SPRING SEAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Perform step 7 only when bearing races must be removed because of cracked, pitted, or scored condition, or if bearings are to be installed.

7.	Spring seat (1)	Bearing races (2) and (3)	Remove.	
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b. Cleaning and Inspection

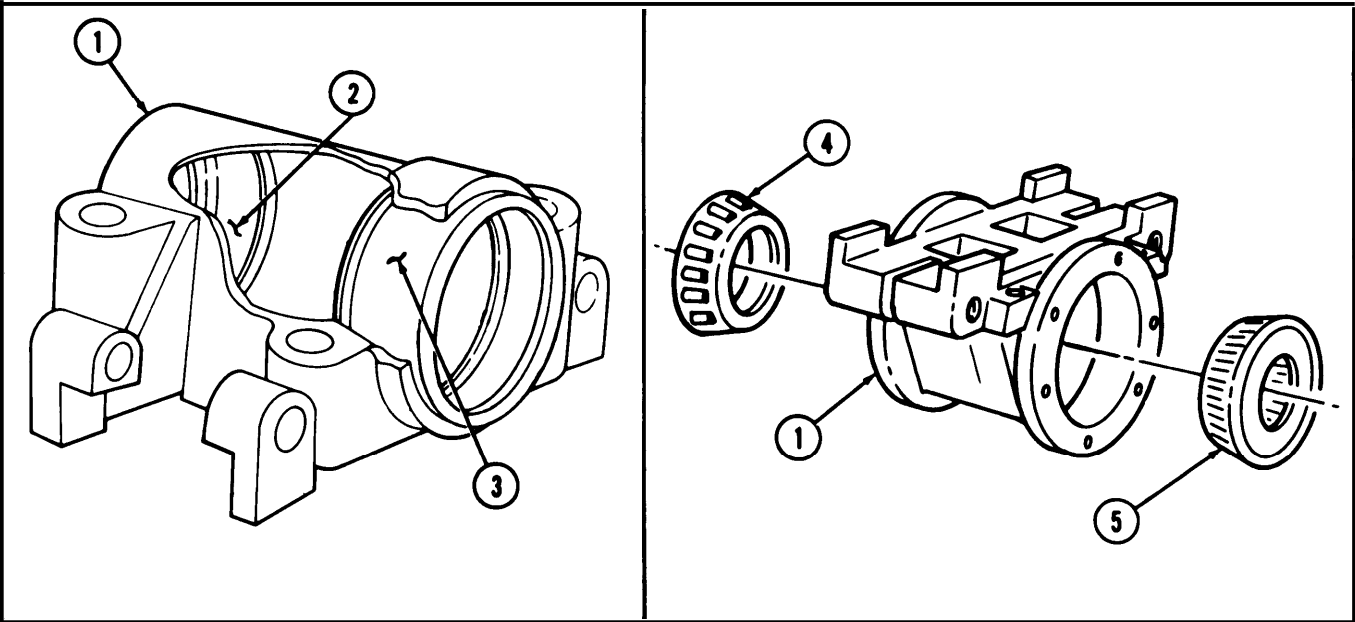
WARNING

Drycleaning solvent is flammable and will not be used near open flame. Use only in well-ventilated places. Failure to do this may result in injury to personnel.

8.	Spring seat (1), inner bearing (4) and outer bearing (5)	a. Clean all parts in drycleaning solvent and allow to dry. b. Inspect all parts for cracks, pitting, and scoring.	Refer to paragraph 8-6. Replace any part that is cracked, pitted, and scored.
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c. Lubrication

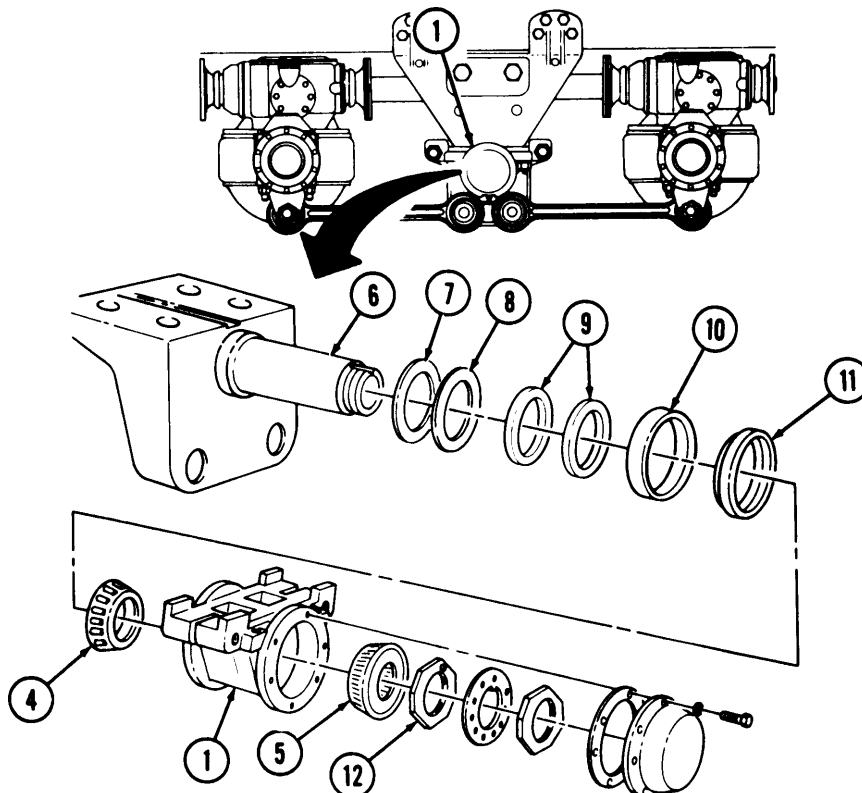
9.	Spring seat (1) and bearings (4) and (5)	a. Repack bearings with GAA grease. b. Pack grease on inside of spring seat (1).	Refer to paragraph 8-6.
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6-31. REAR SPRING SEAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
d. Installation				
<p style="text-align: center;">NOTE</p> <p>Perform step 10 if bearing races are to be installed.</p>				
10.		Bearing races (2) and (3)	Install.	
11.		Wiper ring (7), flat washer (8), two new felt washers (9), and packing retainer (10).	Install on cross tube (6).	Soak new felt washer (9) with oil before installation.
12.		Inner bearing (4)	Install in spring seat (1).	
13.		New grease seal assembly (11)	Install over inner bearing (4) side of spring seat (1).	
14.		Spring seat (1)	Install on cross tube (6).	
15.		Outer bearing (5)	Install in spring seat (1).	
16.		Bearing adjusting nut (12)	Install.	Finger tighten only.



6-31. REAR SPRING SEAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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e. Adjustment

17.

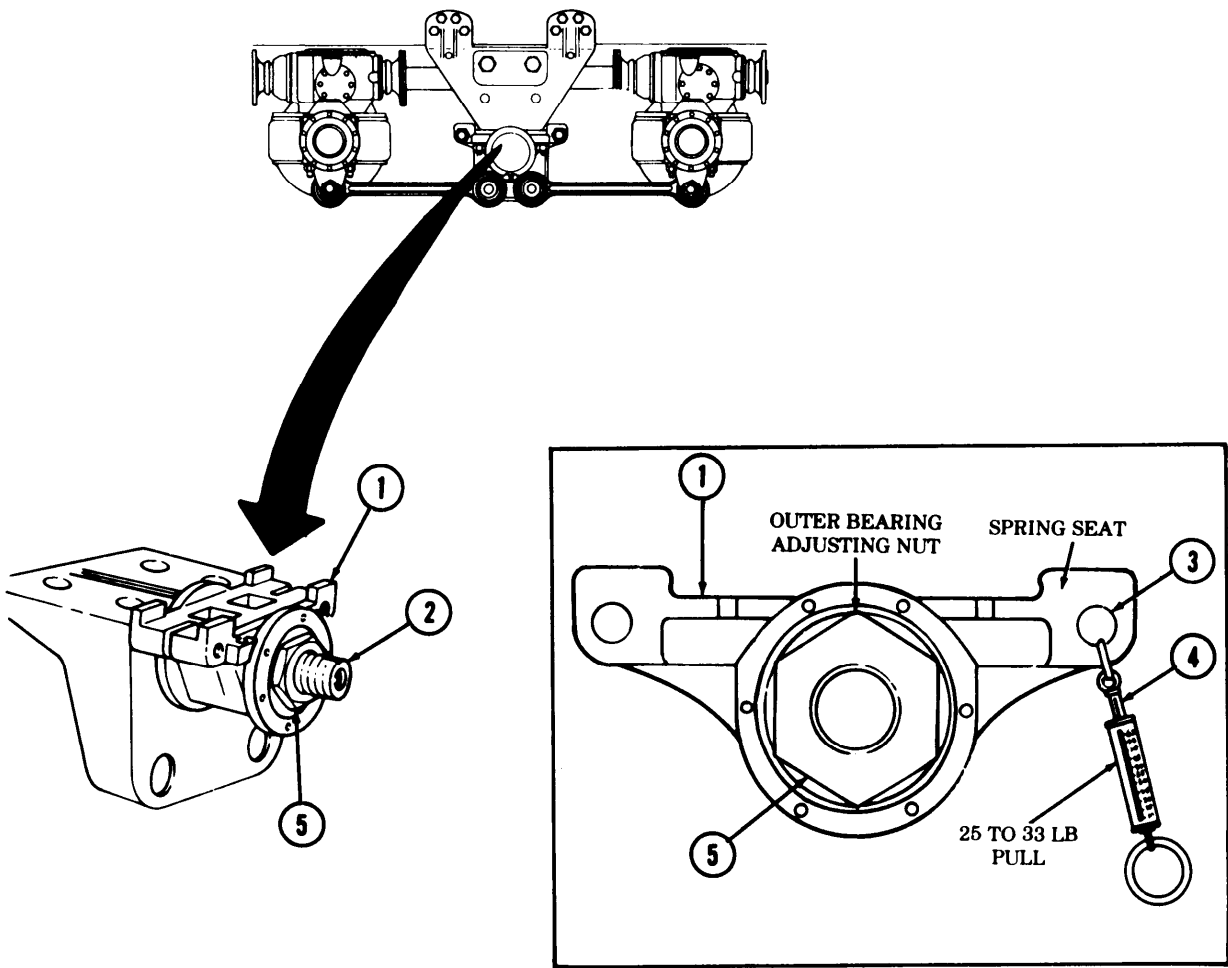
Tester scale (4)

a. Hook tester scale (4) in bolt hole (3).

b. Tighten adjusting nut (5) and pull tester scale (4) downward.

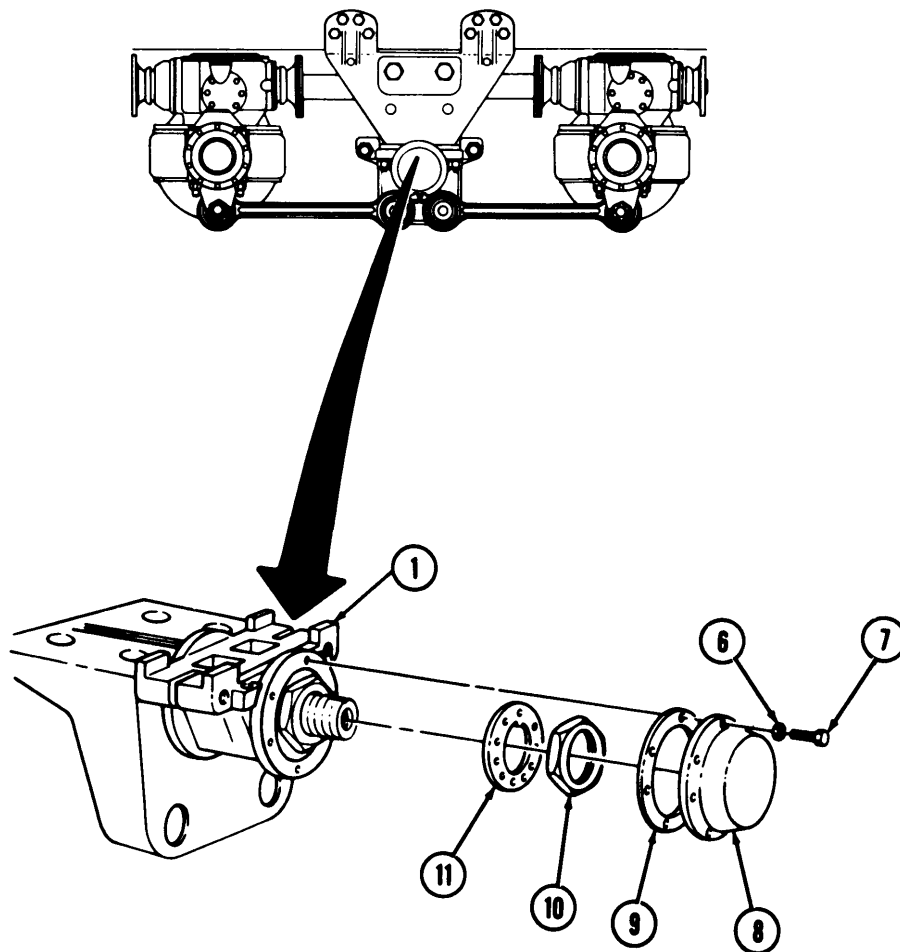
c. Note pull required to rotate spring seat (1) around cross tube (2).

Bearings are correctly adjusted when pull on scale required to rotate seat is 25-33 lb (11-15 kg). This is equal to 15-20 lb-ft (20-27 N•m) preload on bearings.



6-31. REAR SPRING SEAT MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
18.		Key washer (11) and locking nut (10)	Install and repeat step 17 to make sure bearing adjustment does not change.	Tighten locking nut (10) 150-160 lb-ft (203-217 N•m).
19.		New gasket (9) and spring seat cap (8)	Install with six new lockwashers (6) and screws (7).	Tighten 16-20 lb-ft (22-27 N•m).



END OF TASK!

FOLLOW-ON TASKS:

- Install rear spring assembly (para. 6-27).
- Lubricate spring seat (LO 9-2320-272-12).

6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE

This task covers:

- a. Upper Torque Rod Removal

b. Lower Torque Rod Removal

c. Cleaning and Inspection
- d. Setting Preload For Upper Torque Rod

e. Upper Torque Rod Installation

f. Lower Torque Rod Installation

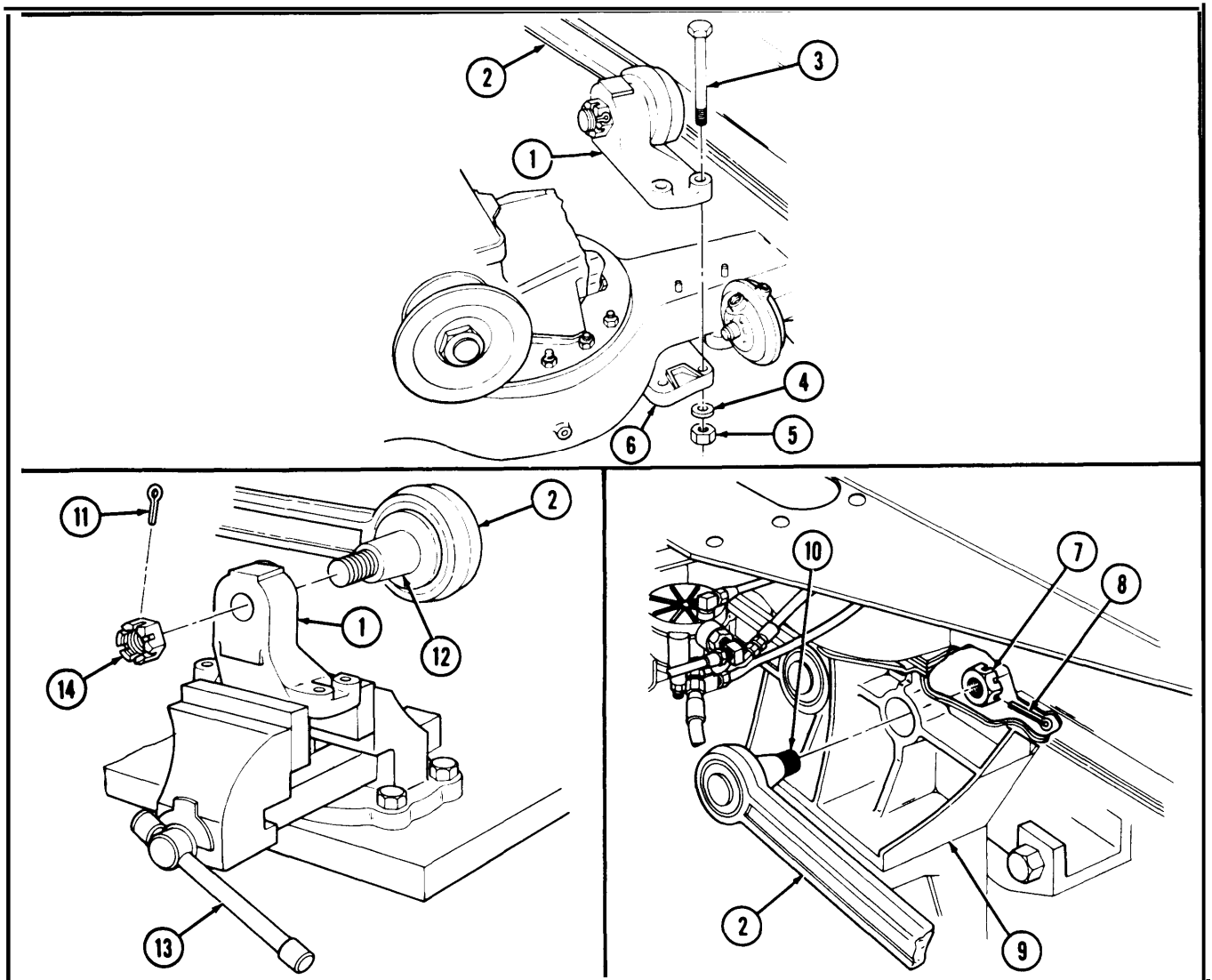
INITIAL SETUP:

Applicable Models	Equipment Condition Reference	Condition Description
All	TM 9-2320-272-10 Para. 6-27 Para. 8-3	Parking brake set. Right-rear spring assembly removed (for upper torque rods only). Two front tires removed (for lower torque rods only).
Test Equipment		
None		
Special Tools		Special Environmental Conditions
None		None
Materials/Parts		General Safety Instructions
Four cotter pins Four slotted nuts Eight lockwashers		Eyeshields must be worn when cleaning with a wire brush.
Personnel Required		
Wheeled vehicle repairman MOS 63B		
Manual References		
TM 9-2320-272-10 TM 9-2320-272-20P TM 9-237		

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
a. Upper Torque Rod Removal				
1.	Upper torque rod bracket (1)	Four nuts (5), lockwashers (4), screws (3), and torque rod plate (6)	Remove.	Discard lockwashers (4).
2.	Upper torque rod (2) to spring seat bracket (9)	Cotter pin (8)	Remove.	Discard cotter pin (8).
3.		Slotted nut (7)	Back off until even with end of ball shaft (1o).	Use nut (7) as striking surface.
4.		Torque rod ball shaft (1o)	Drive out of spring seat bracket (9).	
5.		Slotted nut (7)	Remove.	Discard slotted nut (7).

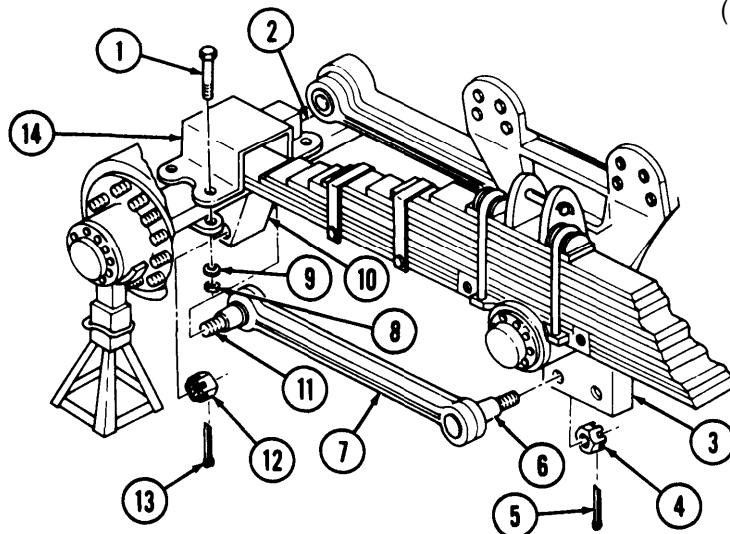
6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
6.		Upper torque rod (2) with upper torque rod bracket (1)	Remove.	
7.	Upper torque rod (2)	Upper bracket (1)	Place in vise (13).	
8.		Cotter pin (11)	Remove.	Discard cotter pin (11).
9.		Slotted nut (14)	Back off until even with end of ball shaft (12).	Use nut (14) as striking surface.
10.		Torque rod ball shaft (12)	Drive out of upper bracket (1).	
11.		Slotted nut (14)	Remove.	Discard slotted nut (14).



6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
b. Lower Torque Rod Removal				
12.	Upper spring bracket (14) to lower torque rod bracket (10)	Four nuts (8), lockwashers (9), screw (1), and upper spring bracket (14).	Remove.	Discard lockwashers (9).
13.	Lower torque rod (7) to spring seat bracket (3)	Cotter pin (5)	Remove.	Discard cotter pin (5).
14.		Slotted nut (4)	Back off until even with end of torque rod ball shaft (6).	Use nut (4) as striking surface.
15.		Torque rod ball shaft (6)	Drive out of spring seat bracket (3).	
16.		Slotted nut (4)	Remove.	Discard slotted nut (4).
17.	Rear axle (2)	Lower torque rod (7) with lower torque rod bracket (10)	Remove.	
18.	Lower torque rod (7)	Lower torque rod bracket (10)	Place in vise.	
19.		Cotter pin (13)	Remove.	Discard cotter pin (13).
20.		Slotted nut (12)	Back off until even with end of torque rod ball shaft (11).	Use nut (12) as striking surface.
21.		Torque rod ball shaft (11)	Drive out of lower torque rod bracket (10).	
22.		Slotted nut (12)	Remove.	Discard slotted nut (12).



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6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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c. Cleaning and Inspection

WARNING

Eyeshields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.

NOTE

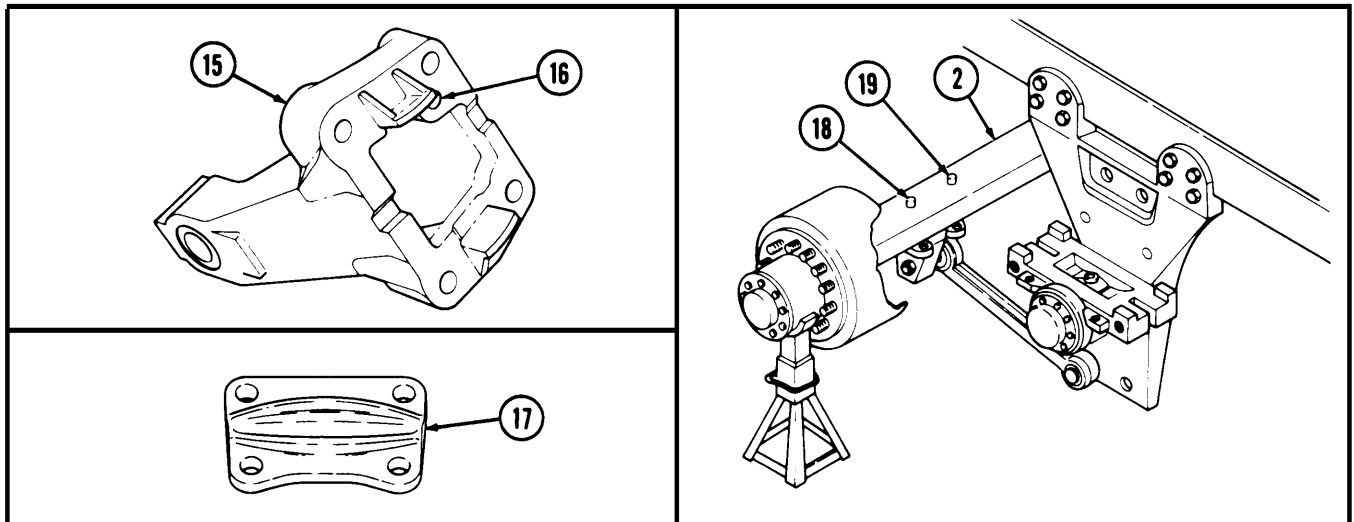
Perform steps 23 through 27 for upper torque rod.

23.		Upper torque rod bracket (15)	a. Clean rust from axle mating surface and dowel hole (16). b. Inspect for breaks and cracks.	If broken or cracked, replace.
24.		Upper torque rod plate (17)	Clean and inspect for breaks and cracks.	If broken or cracked, replace.
25. Rear axle (2)		Upper torque rod bracket dowel (19) and upper spring bracket dowel (18)	a. Clean. b. Inspect for flat, broken, or out-of-round condition.	If flat, broken, or out-of-round, replace.

NOTE

Steps 25c and 26 are performed only if dowels are to be replaced.

			c. File weld securing dowels (19) and (18) to rear axle (2) and remove.	
26.		New upper torque rod bracket dowel (19) and upper spring bracket dowel (18)	Tap in rear axle (2) and spot weld.	Dowel bight must be 3/8 in. (9.53 mm). Refer to TM 9-237



6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
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NOTE

Perform step 28 for upper and lower torque rods.

27.		Upper and lower torque rod (2)	Inspect rubber around ball shafts (1) for breaks, cracks, and separation from torque rod (2).	If broken, cracked, or separated, replace.
28.		Lower torque rod bracket (3)	Clean and inspect for breaks and cracks.	If broken or cracked, replace.

d. Setting Preload for Upper Torque Rod

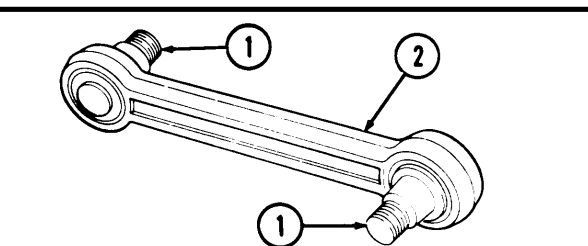
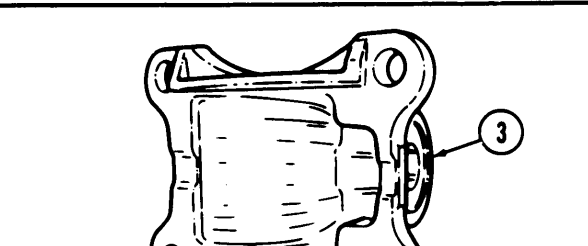
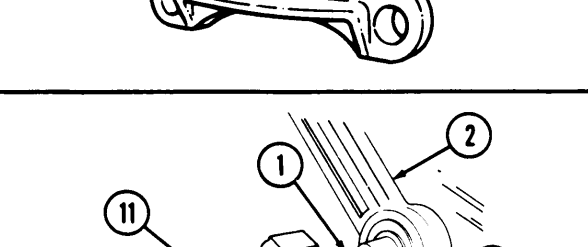
29.		Upper spring bracket (7)	Position over upper spring bracket dowel (8).	
30.		Rear axle (9)	a. Raise until 6 in. (15.24 cm) is obtained between bottom of frame rail (6) and top of spring bracket (7). b. Raise until 7-1/4 in. (18.4 cm) is obtained between bottom of frame rail (6) and top of spring bracket (7).	All models except M936 wrecker. M9326 wrecker only.
31.		Upper torque rod (2)	Place ball shaft (1) in upper torque rod bracket (5) and install new slotted nut (11).	Finger tighten slotted nut (11).
32.		Upper torque rod (2) with upper torque rod bracket (5)	a. Place upper torque rod bracket (5) over dowel (10) on rear axle (9) and torque rod ball shaft (1) in spring seat bracket (4).	

NOTE

Make sure upper torque rod bracket is seated over dowel pin and ball shaft is in spring seat bracket before alignment is made.

- b. Scribe an alignment mark from upper torque rod bracket (5) to torque rod (2).

6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
			c. Remove from rear axle (9) and spring seat bracket (4).	
			d. Place in vise (13) with alinement marks aligned.	
			e. Tighten slotted nut (11) 350-400 lb-ft (475-542 N•m) and install new cotter pin (12).	
				
				
				

6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Contd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
----------	----------	------	--------	---------

e. Upper Torque Rod Installation

- | | | |
|-----|---|---|
| 33. | Upper torque rod (4) with attached bracket (12) | Place bracket (12) end over inner dowel pin (11) on rear axle (7) and torque rod ball shaft (5) in spring seat bracket (3). |
|-----|---|---|

CAUTION

Make sure upper bracket is seated over axle dowel pin before torque rod plate is installed. If not, dowel pin will be damaged.

- | | | | |
|-----|--|---|--|
| 34. | Upper torque rod plate (10) and bracket (12) | Install on axle (7) with four screws (6), new lockwashers (8), and nuts (9). | Tighten nuts (9) 280-360 lb-ft (380-488 N•m). |
| 35. | Upper torque rod ball shaft (5) | Install on spring seat bracket (3) with new slotted nut (1) and new cotter pin (2). | Tighten slotted nut (1) 350-400 lb-ft (475-542 N•m). |

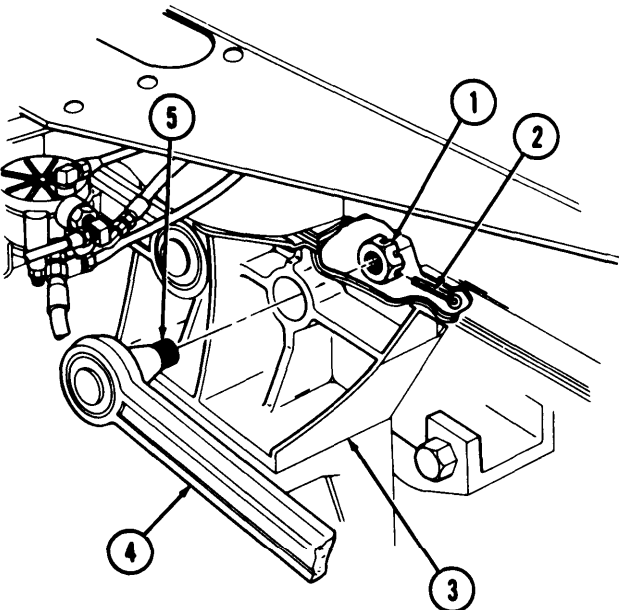
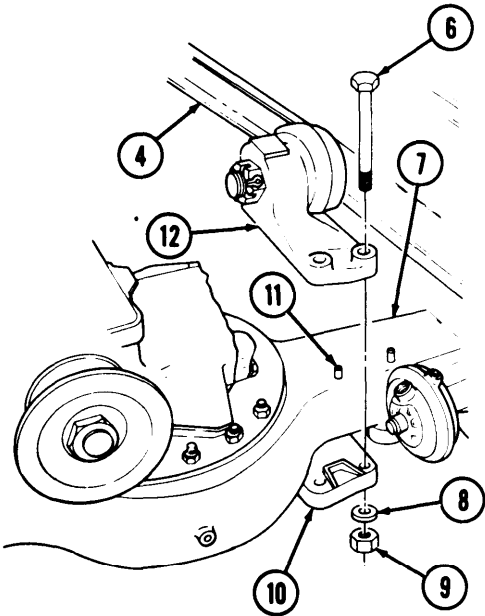
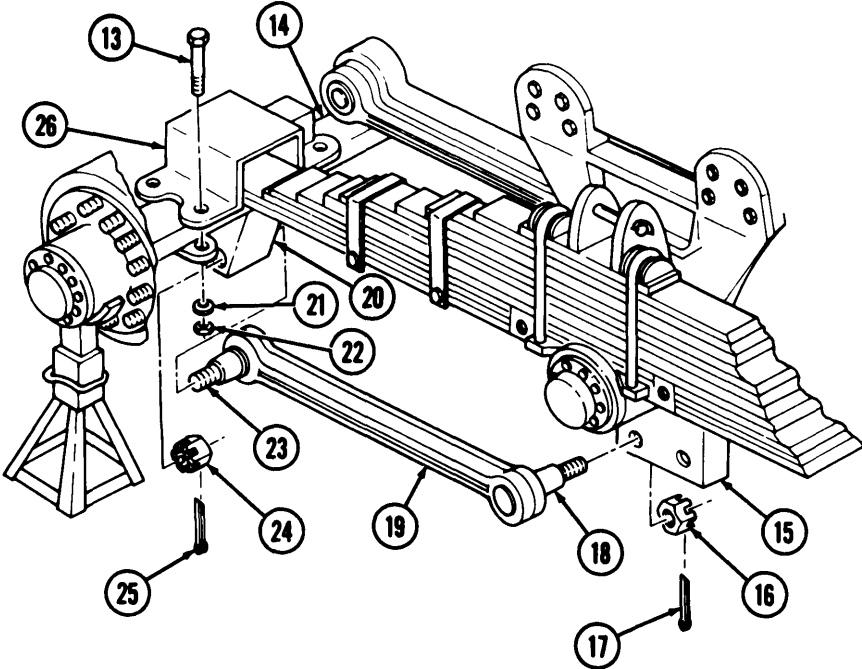
f. Lower Torque Rod Installation

CAUTION

Make sure 6 in. (15.24 cm) clearance remains between top of upper spring bracket and bottom of frame rail for all vehicles except M936 wrecker. For M9346 wrecker, this clearance is 7-1/4 in. (18.4 cm). If clearance is not proper, torque rods will be damaged.

- | | | | |
|-----|---|---|---|
| 36. | Lower torque rod (19) | a. Install torque rod ball shaft (23) to lower torque rod bracket (20) with new slotted nut (24) and new cotter pin (25). | Finger tighten. |
| | | b. Install torque rod ball shaft (18) to spring seat bracket (15) with new slotted nut (16) and new cotter pin (17). | Tighten slotted nuts (16) and (24) 350-400 lb-ft (475-542 N•m). |
| | Lower torque rod bracket (20) and upper spring bracket (26) | Install on rear axle (14) with four screws (13), new lockwashers (2 1), and nuts (22). | Tighten nuts (22) 280-360 lb-ft (380-488 N•m).
For M936 wrecker only, tighten 320-425 lb-ft (434-576 N•m). |

6-32. UPPER AND LOWER TORQUE ROD MAINTENANCE (Cont'd)

STEP NO.	LOCATION	ITEM	ACTION	REMARKS
				
				
				

END OF TESTING!

FOLLOW-ON TASKS: • If upper torque rod was replaced, install right rear spring (para. 6-27).
• If lower torque rod was replaced, install two front-rear tires (para. 8-3).

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