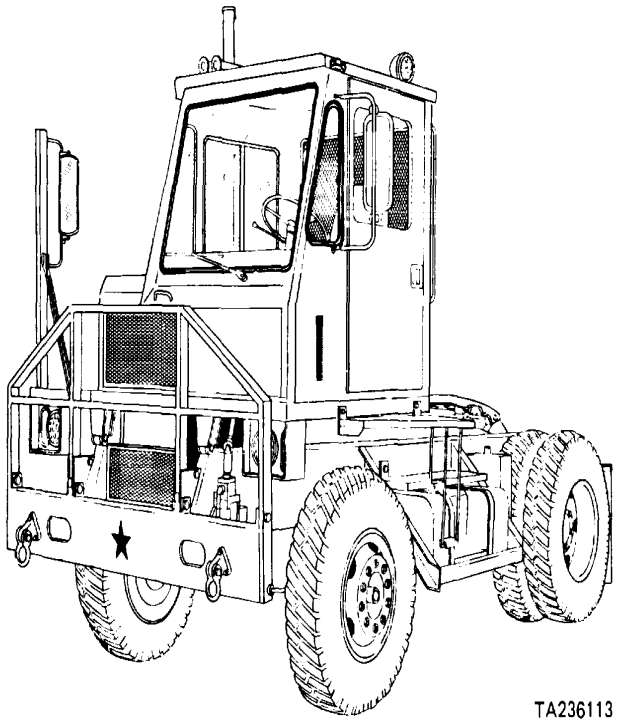
TECHNICAL MANUAL

ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL



TA236113

TRUCK TRACTOR, YARD TYPE, 43,500 LB GVW, DED, 4x2, ARMY MODEL M878A1 (OTTAWA MODEL 50) (NSN 2320-01-121-2102)

HEADQUARTERS, DEPARTMENT OF THE ARMY
OCTOBER 1985

WARNING

Winterization system heaters operate from 110 Vac commercial power source. Disconnect winterization system cable from receptacle at front bumper before removing winterization system heaters. When installing winterization system heaters, be sure you twist together the same color wire ends. Incorrect wire connections, or exposed wire due to frayed insulation, can cause the engine and body of tractor to be energized at 110 Vac. Serious injury or death can result from contact with energized 110 Vac power lines. If you are injured, obtain medical aid immediately.

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

WARNING

Battery electrolyte is toxic and corrosive. Wear protective goggles and gloves when removing battery caps and checking electrolyte. Avoid contact with skin, eyes, clothes, and don't breathe vapors. Don't smoke or use an open flame near batteries. Batteries release hydrogen, an explosive gas, during charging. Failure to follow this procedure could cause serious injury or death due to batteries exploding.

WARNING

Allow components to cool before removing. Hot oil, steam, and coolant can cause severe injury. If you are scalded or burned, seek medical aid immediately.

WARNING

Before performing a procedure that requires raising tractor, be sure that tractor is securely supported by jack stands; if possible, be sure that chain hoist is bearing some of the weight of vehicle as a safety precaution in the event jack stands collapse. Failure to follow this procedure could result in serious injury or death due to tractor falling. If you are injured, seek medical aid immediately.

WARNING

Never crawl under equipment when performing maintenance unless equipment is blocked securely. Keep clear of equipment when it is raised or lowered. Do not place any part of body between movable and fixed elements of the equipment. Don't allow heavy components to swing while suspended by lifting device. Use extreme caution when working near a cable or chain under tension. When using chain hoist to remove or install parts, be sure hoist is securely fastened to the part and that all slack in chain is taken up. Death or severe injury may result if personnel fail to observe these safety precautions. If you are hurt by a falling object or chain or cable under tension, seek medical aid immediately.

WARNING

Be sure chain hoist is securely fastened to heavy tractor components before removing supporting hardware. Do not allow heavy components to fall freely. Failure to follow these precautions could cause serious injury due to parts falling on you. If you are injured by falling equipment, seek medical aid immediately.

WARNING

Battery box lid is heavy. Secure lid in open position to prevent injury from falling lid. If you are injured, obtain medical aid immediately.

WARNING

Stand out from raised cab unless safety bar is supporting full weight of cab. Keep clear of deck when raising or lowering cab. Failure to do so could cause serious injury or death.

WARNING

Personal injury and property damage can result if vehicle is allowed to move during transmission stall test or hydraulic pressure test. Secure tractor frame to an immovable object, chock all wheels, and apply service brakes before you accelerate engine. Do not permit anyone to stand in front of tractor during test.

WARNING

If hydraulic steering system or fuel system connectors or elbows require replacement, discard hose. If hydraulic steering system hose is reused, hydraulic oil leakage could occur causing loss of steering control. This in turn could cause serious injury or loss of life. If fuel system hose is reused, leakage could occur causing a fire hazard.

WARNING

Be sure tire is completely deflated and valve core is removed before dismounting tire. Failure to do so could cause serious injury due to parts flying off wheel and tire. Don't use oil to lubricate tire when mounting. Oil will cause rubber to deteriorate over a period of time with possible personal injury resulting. Place tire and wheel assembly in a safety cage before inflating tire. Don't overinflate tire. If not properly assembled, inflation may cause the wheel and rim to separate with explosive force causing serious injury or death. If you are injured, seek medical help immediately.

WARNING

Use caution when you remove components under pressure from compression spring. Failure to do so could cause serious injury by parts flying up and hitting your eye. If you are injured, obtain medical aid immediately.

WARNING

Brake linings contain asbestos fibers. Do not generate dust when working on brake system. Don't remove dust or dirt with compressed air. Serious bodily harm may result from breathing asbestos dust.

WARNING

Compressed air must not exceed 30 psi. Wear safety glasses when using compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, obtain medical attention immediately.

WARNING

Relieve all pressure from tractor air system before disconnecting air system lines and fittings. Wear safety glasses and stand clear of loosened air line fitting. High pressure air can propel debris at high speed, causing eye injury or blindness. If you are injured, obtain medical aid immediately.

WARNING

When installing air tubing on insert-type fitting, tubing must be installed over insert for secure connection. Installation of fitting without insert will allow air pressure to force tubing j from fitting, resulting in dangerous loss of air pressure.

WARNING

Diesel fuel is highly combustible. Do not smoke or allow sparks or open flames near fuel. Death or severe injury may result if you fail to observe this precaution. If you are burned, obtain medical aid immediately.

WARNING

Do not use quick start switch without cranking engine. Overcharge of ether starting fluid can cause explosion of engine air intake system. Ether is highly flammable. Do not puncture ether cylinder or discard in an open fire. Failure to follow this precaution could cause severe injury.

WARNING

Wear protective goggles and heavy gloves when you remove or install glass. Remove and handle broken glass carefully. Failure to do so could cause serious injury due to glass puncturing or cutting your skin or eye. If you are injured by broken glass, obtain medical aid immediately.

WARNING

Wear safety glasses when using hammer or removing rivets. Don't strike hardened steel parts with steel hammer. Failure to do so could cause injury due to metal chips striking your eyes. Obtain medical attention immediately if you get metal chips in your eyes.

WARNING

Be careful not to come in contact with rotating fan, belts, or other moving parts. To do so will cause serious injury. If you are injured, obtain medical aid immediately.

WARNING

Don't bleach or dye tethers or seat belt. To do so may reduce their strength resulting in seat belt or tether breaking under stress, causing serious injury or death if there is an accident involving stress on these parts.

Refer to FM 21-11 for first aid for injured personnel.

Technical Manual

No. 9-2320-285-24-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 14 October 1985

TECHNICAL MANUAL
ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

TRUCK TRACTOR, YARD TYPE 43,500 LB GVW, DED, 4X2, ARMY MODEL M878A1 (OTTAWA MODEL 50) NSN 2320-01-121-2102

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MT, Warren, MI 48397-5000 . A reply will be furnished to you.

CHAPTER 3
DIRECT SUPPORT MAINTENANCE PROCEDURES

CHAPTER OVERVIEW

This chapter has some important information that you need to know about the direct support maintenance requirements of the vehicle. This information includes but isn't limited to:

- Maintenance of the various systems and subsystems which the vehicle comprises. These systems and subsystems are listed in the chapter index below.
- Troubleshooting of the various systems and subsystems.
- Refer to TM 9-2815-205-34 for troubleshooting and maintenance of the engine.

Index

Section I. ENGINE AND COOLING SYSTEMS MAINTENANCE

This section contains the information you need to maintain the:

- Engine
- Cooling System

It gives you instructions on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

NOTE

Refer to TM 9-2815-205-34 for inspection, maintenance, repair, and adjustment of the engine cylinder block, valves and tappets, rocker arm, oil cooler, oil pan, oil inlet tube, and regulator and relief valve.

NOTE

Refer to TM 9-2815-205-34 for test, maintenance, and repair of the fuel injector assemblies and rack, fuel pump assembly, fuel lines, blower assembly, turbo-charger, and governor.

3-1. TROUBLESHOOTING SYMPTOM INDEX

3-2. ENGINE TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. ENGINE LACKS POWER

Perform stall test (para 3-17a(3)).

a. If maximum engine speed is excessive, troubleshoot transmission (para 3-14).

b. If maximum engine speed is low, refer to TM 9-2815-205-34 for troubleshooting of the engine and its components.

3-3. COOLING SYSTEM TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. ENGINE OVERHEATS OR DOES NOT REACH OPERATING TEMPERATURE

Step 1. Shut down engine.
Relieve all air pressure in air system (para 2-41h(1)).
Try to rotate fan by hand.

a. If fan cannot be rotated by hand, repair fan clutch assembly (para 3-5c).

b. If fan can be rotated by hand, proceed to step 2 below.

Step 2. Disconnect tubing from fitting at top of fan clutch assembly (para 2-15e).
Apply 90 to 120 psi air pressure to fitting.
Check if fan can be rotated by hand with air pressure applied to fitting.

a. If fan can be rotated by hand, repair fan clutch assembly (para 3-5c).

b. If fan cannot be rotated by hand, proceed to step 3 below.

Step 3. Check radiator and hoses for leakage or damage.

a. If radiator is leaking or damaged, replace (para 3-5a).

b. If hoses are leaking or damaged, replace (para 2-15c).

c. If leakage and damage are not observed, refer to TM 9-2815-205-34 for troubleshooting of the engine cooling system.

3-3. COOLING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

2. COOLING SYSTEM NOT PRESSURIZED

Pressure test radiator (para 2-15a(2)).

a. If pressure drops quickly, radiator has serious leakage. Repair or replace radiator (para 3-5a).

b. If pressure drops slowly, radiator has seepage or slight leakage; repair or replace radiator (para 3-5a).

c. If pressure holds steady for two or more minutes, radiator is not leaking. Refer to TM 9-2815-205-34 for troubleshooting of the engine cooling system.

3-4. ENGINE MAINTENANCE

This task covers engine-transmission:

a. Removal
b. Cleaning
c. Inspection/Repair
d. Installation

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Socket wrench set
- Rubber mallet
- Rubber mallet Maintenance Manual)
- Hoist, 4000 pounds capacity
- Three-branch chain sling
- Transmission jack, wheeled

Personnel Required
Three Automotive Repairers MOS 63H

References
TM 9-2815-205-34 (6V53T Diesel Engine Maintenance Manual)

Troubleshooting References
Paragraph
Paragraph
3-2 Engine
3-3 Cooling system
3-14 Transmission

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Automatic transmission fluid	Item 8, Appendix C
Hydraulic sealant	Item 20, Appendix C

Equipment Condition

Paragraph	Condition Description
	Tractor parked on level surface, parking brakes applied, and wheels blocked securely.
3-35j	Cab tilted 90 degrees.
2-12b	Engine crankcase drained.
2-12c	Engine-mounted oil filter removed.
2-12d	External engine oil filter lines disconnected.
2-13a	Air cleaner assembly removed; restriction indicator hose disconnected from engine.
2-13b(2)	Fuel lines disconnected from cylinder head, fuel pump, and fuel filters.
2-13c	Fuel filters removed.
2-13d	Quick start removed.
2-13e	Throttle linkage removed from engine.
2-14a	Exhaust pipes removed.
2-14b	Muffler and exhaust stack removed.
2-15a(l)	Radiator drained.
2-15b(2)	Coolant filter assembly, hoses, and fittings removed.
2-15c	Radiator coolant hoses removed and fittings removed from engine.
2-15d	Drive belts, fan, and fan clutch assembly removed.
2-15e	Clutch fan control system removed.
2-24	Belts, alternator assembly, and brackets removed.
2-29	Water level sensor removed.
2-32c	Transmission temperature sender removed.
2-34a	Battery cables disconnected from transmission and starter.
2-35e	Engine-transmission grounding strap removed.
2-41b	Transmission fluid drained.

3-4. ENGINE MAINTENANCE (CONT)

INITIAL SETUP (cont)

Equipment Condition (cont)

Paragraph	Condition Description
2-41e	External transmission oil filter and transmission cooler hoses and fittings removed.
2-41g(l)	Gear shift control cable and linkage removed from transmission.
2-41h(l)	Tubing disconnected from shift lockout cylinder.
2-41i	Modulator cable assembly removed.
2-41j	Transmission oil sampling valve removed.
2-42	Drive shaft disconnected from transmission yoke.
2-51b	Air compressor governor tubing removed, and supply hose disconnected from air compressor and air reservoir.
2-52b	Air strainer removed.
2-52c	Alcohol evaporator removed.
2-58b	Hoses removed from power steering pump and rear cab guard.
2-65c	Rear platform removed.
2-65d	Rear cab guard removed.
2-73a	Cab heater hoses disconnected from engine.
2-73d	Engine oil heater removed.
2-73e	Coolant heater removed.
2-78b(2)	Hydraulic hose brackets removed from transmission.
2-79b	Hydraulic hose assembly between cab tilt pump and left hand hydraulic latch removed.
2-85	Speedometer cable, adapter, and gear assembly removed from transmission.
2-86	Tachometer sender unit removed.
3-5a	Radiator removed.
3-12d	Wiring harness disconnected and removed from engine.
3-17d	Torque converter capscrews removed.
3-42a	Hydraulic pump removed (lines still connected).
3-42b	Power take-off removed.

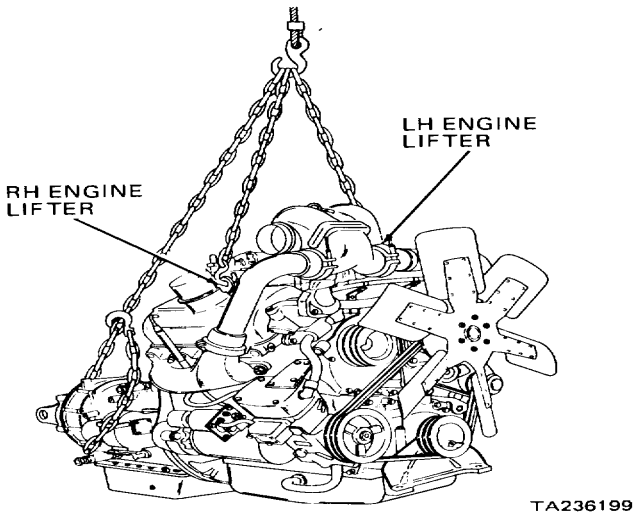
General Safety Instructions

WARNING

Do not stand under items being handled by hoist or crane. Do not put any body part between moveable and fixed elements of the equipment. If you are injured, seek medical aid immediately.

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Engine and transmis-sion	Three-branch chain Attach sling		Hook one leg to each engine lifter bracket; hook the third leg to a chain around rear of transmission. Take out slack and apply slight upward pressure



WARNING

Keep clear of engine-transmission during hoisting and swinging to skid cradle. Never allow hands or body to get under engine-transmission. To do so may result in serious injury or death should the sling, a fastening, or the hoist or crane break and drop the engine-transmission during removal or setting it in the cradle. If you are injured obtain medical aid immediately.

2	Engine, front	Two capscrews	Remove	From front engine mount (nuts and washers were removed during para 2-73e step of initial equipment condition)

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
3	Transmission mount	Two locknuts, snubbing washers, and capscrews	Remove	Para 3-17f
		CAUTION		
		Lift engine-transmission slowly, watching for any hoses, lines, electrical wiring, or linkage(s) that may have been overlooked. If necessary, lower the engine transmission and disconnect any such items that may be discovered before continuing with removal.		
4	Tractor	a. Engine and transmission	a. Remove b. Position	Lift from tractor On skid
5	Engine and transmission	a. Solenoid and 70A circuit breaker	Remove	Para 2-25a
		b. Starter	Remove	Para 2-25b
		c. Engine oil dipstick and tube	Remove	Para 2-12e
		d. Engine oil sampling valve	Remove Para 2-12f	
		e. Oil pressure sender and sensor	Remove Para 2-32a	
		f. Water temperature sender and alarmstat	Remove Para 2-32d	
		g. Shift lockout cylinder and linkage	Remove Para 2-41h(2)	
		h. Air compressor	Remove	Para 2-52d
		i. Power steering pump	Remove from adapter	Para 3-28f
		j. Transmission mount crossmember	Remove Para 3-17f	
		k. Transmission dipstick	Remove Para 2-41b	
		l. Transmission dipstick tube	Remove Para 2-41k	

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
6	Transmission, assembly front	a. Transmission	Support	Support transmission with a wheeled transmission jack
		b. 12 capscrews and lock washers	Remove	Para 3-17c(2)
		CAUTION Install converter retaining strap immediately. Torque converter is now free to move and can fall off.		
		c. Transmission	Remove from engine	Para 3-17c(2)
7	Engine and transmission	Lines, fittings, and component openings created by removal	Seal	Prevents entry of contaminants

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
8	Exterior surfaces	Engine and transmission	Clean	Use cleaning solvent P-D-680 and a stiff brush. Dry with compressed air or clean cloths
INSPECTION/REPAIR				
9	Engine	a. Castings	Inspect	Refer to TM 9-2815-205-34 (6V53 Diesel Engine Maintenance Manual) for repair or replacement of worn, bent, deformed or broken parts
		b. Linkages	Inspect	
		c. Sheet metal	Inspect	
10	Transmission	a. Castings	Inspect	Refer to Chapter 4 for repair or replacement of worn, deformed, or broken parts
		b. Torque converter	Inspect	
INSTALLATION				
11	Transmission,	a. Transmission	Position	On back of engine
		b. 12 capscrews front and lock washers	Install and tighten	
12	Engine and transmission	a. Engine oil dipstick and tube	Install	Para 2-12e
		b. Engine oil sampling valve	Install	Para 2-12
		c. Starter	Install	Para 2-25b
		d. Solenoid and 70A circuit breaker	Install	Para 2-25a
		e. Transmission dipstick tube	Install	Para 2-41k
		f. Transmission dipstick	Install	Para 2-41b
		g. Power steering pump	Install	Para 3-28f
		h. Air compressor	Install	Para 2-52d
		i. Transmission mount cross-member	Install	Para 3-17f

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
12		j. Shift lockout (cont) cylinder and linkage	Install	Para 2-41h(2)
		k. Water temperature sender and alarmstat	Install	Para 2-32c
		l. Oil pressure sender and sensor	Install	Para 2-32a
		m. Power take-off	Install	Para 3-42b
13	Engine and transmission	a. Three-branch chain sling	Attach	Hook one leg to each engine lifter bracket; hook the third leg to a chain around rear of transmission. Take out slack and apply slight upward pressure

WARNING

Keep clear of engine-transmission during hoisting and swinging from skid cradle. Never allow hands or body to get under engine-transmission. To do so may result in serious injury or death should the sling, a fastening, or the hoist or crane break and drop the engine transmission during installation or lifting from the skid.
If you are injured obtain medical aid immediately.

b. Engine and transmission — Lift From skid
c. Skid — Remove

CAUTION

Lower engine-transmission slowly, watching for hoses, lines, electrical wiring, or linkage(s) that may be in the way. If necessary, raise the engine-transmission and move any such items that may be discovered before continuing with installation.

14	Tractor	Engine and transmission	Position	Lower slowly
15	Transmission mount	Two capscrews, snubbing washers, and locknuts	Install	Para 3-17f

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
16	Engine, front	Two capscrews	Position	On front engine mount (para 2-73e). Nuts and washers will be installed in step 22k below
17	Engine and transmis-sion	Three-branch chain sling	Disconnect and remove	
18	Engine, rear, underside	Torque converter capscrews	Install	Para 3-17c(2)
19	Transmis-sion	a. Hydraulic pump	Install	Para 3-42a
		b. Hydraulic hose brackets	Install	Para 2-78b(2)
		c. Modulator cable assembly	Install	Para 2-41i
		d. Drive shaft	Connect	Para 2-42
		e. Transmission oil sampling valve	Install	Para 2-41j
		f. Shift lockout tubing	Connect	Para 2-41h(l)
		g. Gear shift con-trol cable and linkage	Install	Para 2-41g(1)
		h. Battery ground cable	Connect	To transmission only; see para 2-34a
		i. Speedometer gear assem-bly, adapter, and cable	Install	Pars 2-85
20	Tractor chassis	a. Rear cab guard	Install	Para 2-65d
		b. Muffler and exhaust stack	Install	Para 2-14b
		c. Cab tilt hose assembly	Install	Para 2-79b
		d. Engine-transmission grounding strap	Install	Para 2-35e

3-4. ENGINE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
21	Tractor, front	a. Radiator	Install	Para 3-5a
		b. Fan clutch assembly, fan, and drive belts	Install; adjust belt tension	Para 2-15d
		c. Radiator coolant hoses and fittings	Install	Para 2-15c
		d. Alcohol evaporator	Install	Para 2-52c
		e. Air strainer	Install	Para 2-52b
22	Engine	a. Air cleaner assembly and restriction indicator hose	Install	Para 2-13a
		b. Fuel lines	Connect	Para 2-13b(2)
		c. Quick start	Install	Para 2-13d
		d. Throttle linkage	Install	Para 2-13e
		e. Exhaust pipes	Install	Para 2-14a
		f. Clutch fan control system	Install	Para 2-15e
		g. Brackets, alternator assembly, and	Install;	Para 2-24 adjust belt tension belts
		h. Water level sensor	Install	Para 2-29
		i. Air compressor governor lines	Install	Para 2-51b
		j. Engine oil heater	Install	Para 2-73d
		k. Coolant heater	Install	Para 2-73e
		l. Tachometer sender unit	Install	Para 2-86
		m. Cab heater hoses	Connect	Para 2-73a
		n. External engine oil filter lines	Connect	Para 2-12d
		o. Wiring harness connect	Install and	Para 3-12d
		p. Engine-mounted oil filter	Install	Para 2-12c

3-4. ENGINE MAINTENANCE (CONT)I

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
23	Rear cab guard	a. Hydraulic steering hoses	Install	Para 2-58b
		b. Fuel filters	Install	Para 2-13c
		c. Coolant filter assembly, fittings, and hoses	Install	Para 2-15b(2)
		d. External transmission oil filter and cooler fittings and hoses	Install	Para 2-41e
		e. Transmission temperature sender	Install	Para 2-32d
24	Engine and transmission	a. Battery cable starter	Connect to	Para 2-34a
		b. Coolant	Install	Para 2-15a(l)
		c. Engine oil	Install	Para 2-12b
		d. Transmission fluid	Install	Para 2-41b
		e. Power steering fluid	Install	Para 2-58c
25	Tractor, front	Cab and deck	Lower to 45 degree position	Para 3-35j
26	Cab tilt pump	Cab	Lower	To normal operating position
27	Cab	Key switch	Engage	Start engine and check for fluid leaks at engine, transmission, and reconnected hoses, lines, and fittings

3-5. COOLING SYSTEM MAINTENANCE

NOTE

Refer to TM 9-2815-205-34 (6V53T Diesel Engine Maintenance Manual) for maintenance/repair of the water pump.

a. Radiator.

This task covers: a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set, 3/8 inch
Scratch wire brush
Chain hoist, 1/2 ton capacity

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C

Personnel Required
Automotive Repairer MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

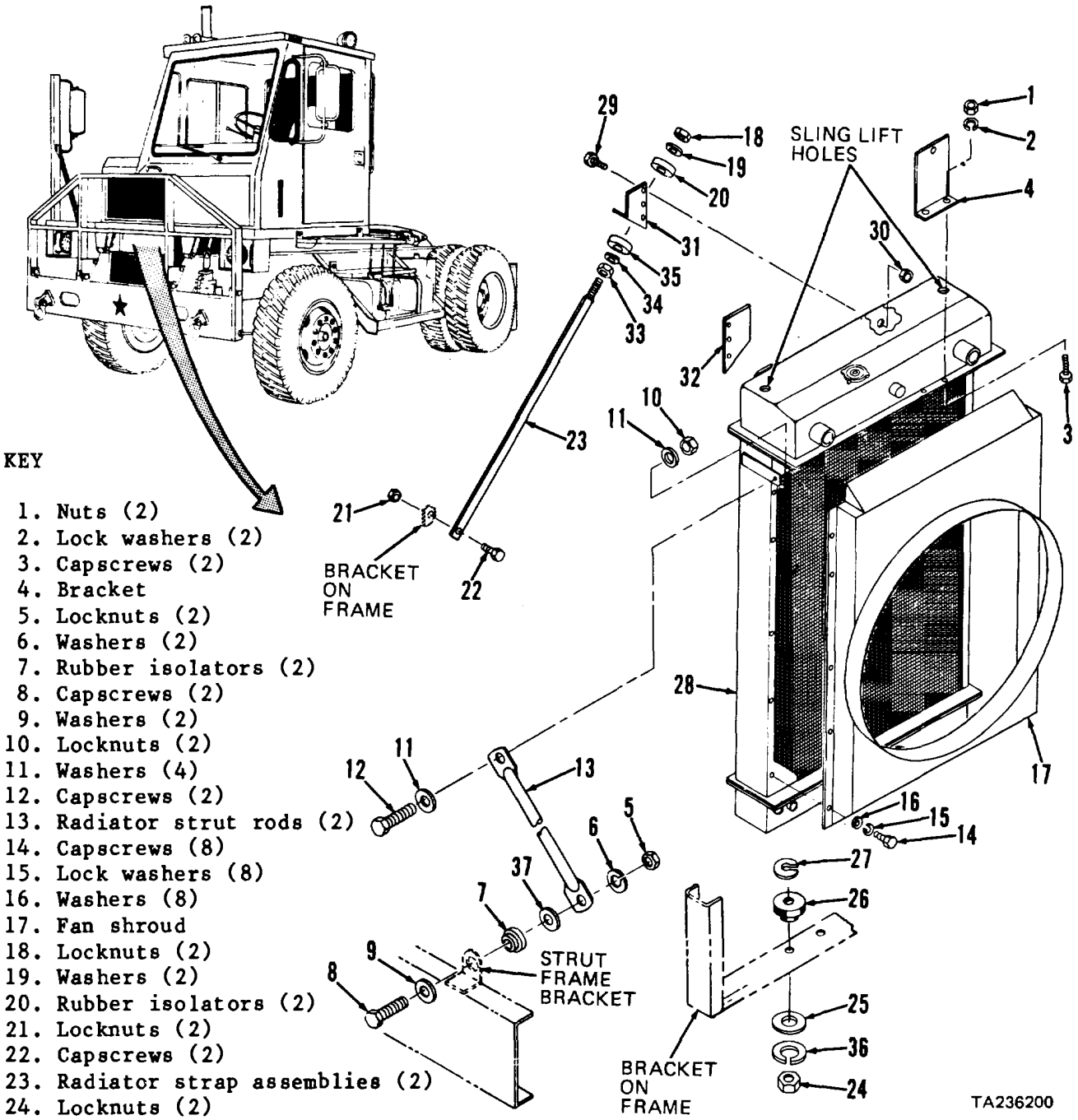
Troubleshooting References
Paragraph
2-11 Radiator upper tank leaking
2-11 Radiator lower tank leaking
2-11 Radiator core leaking

Equipment Condition
Paragraph Condition Description

Tractor parked on a level surface, parking brake applied and engine off.
3-35j Cab tilted 90 degrees.
2-15a(1) Radiator drained.
2-15c Coolant hoses removed.
2-15f Coolant overflow system kit removed.
2-41e Transmission oil cooler hoses disconnected.

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).



KEY

1. Nuts (2)
2. Lock washers (2)
3. Capscrews (2)
4. Bracket
5. Locknuts (2)
6. Washers (2)
7. Rubber isolators (2)
8. Capscrews (2)
9. Washers (2)
10. Locknuts (2)
11. Washers (4)
12. Capscrews (2)
13. Radiator strut rods (2)
14. Capscrews (8)
15. Lock washers (8)
16. Washers (8)
17. Fan shroud
18. Locknuts (2)
19. Washers (2)
20. Rubber isolators (2)
21. Locknuts (2)
22. Capscrews (2)
23. Radiator strap assemblies (2)
24. Locknuts (2)
25. Special washers (2)
26. Rubber isolators (2)
27. Shims (AR)
28. Radiator
29. Capscrews (4)
30. Locknut
31. RH radiator strap bracket
32. LH radiator strap bracket
33. Nuts (2)
34. Washers (2)
35. Rubber isolators (2)
36. Lock washers (2)
37. Special washers (2)

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Radiator, top	Chain hoist and sling	Position	As shown
2	RH and LH strut rods at frame	a. Two locknuts Loosen and (5), washers remove (6), washers (37), cap-screws (8), and washers (9)		
		b. Two locknuts (10), four washers (11), and two cap-screws (12), and two radiator strut rods (13)	Loosen and	remove
		c. Two rubber isolators (7)	Remove	Pull from strut frame brackets
3	Rear of	a. Eight capscrews radiator (14), lock washers (15), and washers (16)	Remove	
		b. Fan shroud (17) secure safely		Move shroud back over fan,
4	Front of radiator	a. Two locknuts (18), washers (19), and rubber isolators (20)	Loosen and remove	
		b. Two locknuts (21) and cap-screws (22)	Loosen and remove	
		c. Two radiator strap assemblies (23)	Remove	Attached to brackets on frame
		d. Two rubber isolators (35), washers (34), and nuts (33)	Remove	From strap assemblies (23)

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
5	Front of frame	a. Two locknuts (34) and washers (25)	Loosen and remove	
		CAUTION		
		Use care in lifting radiator out of frame and cab area to avoid bending fins of radiator or puncturing radiator core or tanks.		
		b. Radiator (28)	Lift	Approximately one inch
		c. Shims (27)	Remove if	Note number and location of installed shims
		d. Radiator (28)	Remove	Lift out of vehicle
		NOTE		
		Move radiator to a clean flat work area and place it on its back supported by blocks.		
		e. Two rubber isolators (26)	Remove	Pry out of radiator support frame crossmember
DISASSEMBLY				
6	Front of radiator	a. Four capscrews (29) and locknut (30)	Loosen and remove	
		b. RH radiator strap bracket (31) and LH radiator strap bracket (32)	Remove	Pull from between radiator frame sides and core gussets
7	Radiator, top rear	a. Two nuts (1), lock washers holes (2), and capscrews (3)	Remove	Note position of mounting
		b. Bracket (4)	Remove	

3-5. COOLING SYSTEM MAINTENANCE (CONT)I

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING **Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.**		
8	Front of frame	a. Radiator support frame cross-member	Clean	Use cleaning solvent P-D-680 and a stiff brush. Wipe dry using clean cloths
		b. RH radiator strap brackets (31 and 32), two radiator strap assemblies (23), strut rods (13), and hardware	Clean	Use cleaning solvent P-D-680 and a stiff brush. Dry using clean cloths
INSPECTION				
9	On bench	a. Radiator strut rods (13)	Check	For bends or kinks
		b. RH and LH radiator strap brackets (31 and 32)	Inspect	For damage to tapped holes. Chase if possible; otherwise replace bracket
REASSEMBLY				
10	Front of radiator	a. RH and LH radiator strap brackets (31 and 32)	Position	

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
10 (cont)		b. Four capscrews (29) and locknut (30)	Install	
11	Rear of radiator	a. Two nuts (1), lock washers (2), and capscrews (3)	Remove	
		b. Bracket (4)	Position	
		c. Four capscrews (3), lock washers (2), and nuts (1)	Install	
INSTALLATION				
12	Front of engine	Fan shroud (17)	Position and secure	Over fan, as far toward engine as possible. Secure fan shroud in this position temporarily to protect fan blades
13	Radiator support frame cross member	Two rubber isolators (26)	Install	Drive squarely into mounting holes

CAUTION

Move radiator slowly and guide carefully to avoid damaging radiator fins or tanks when installing radiator in following step.

14	Front of frame	a. Chain hoist	Attach	To sling lift holes in top of of radiator
		b. Radiator (28)	Position and	Lift radiator and guide into f install position in front of engine

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
15	Radiator support frame crossmember	a. Radiator (28) mounting studs	Position	Guide studs into holes in rubber isolators
		b. Shims (27)	Slip onto studs on top of rubber isolators	Use number of shims as noted in step 5c above
		c. Two special washers (25) and lock nuts (24)	Secure lightly	Adjust shimming until radiator sits level then tighten.
16	Radiator straps (23)	Two nuts (33), washers (34), and rubber isolators (35)	Install	Install nuts (33) all the way on stud of strap
17	Front of radiator	a. Two radiator strap assemblies (23)	Install	Insert studs into radiator strap brackets (31 and 33)
		b. Two capscrews (22) and locknuts (21)	Install	Through radiator strap brackets on frame
		c. Two rubber isolators (20), washers (19), and lock nuts (18)	Install	Tighten locknuts (21) above, then snug down locknuts (18) until radiator is squared in frame and secure
18	Radiator side	a. Two radiator strut rods (13), capscrews (12), four washers (11), and two locknuts (10)	Install	Tighten finger tight
		b. Two rubber isolators (7)	Install	Push into strut frame brackets from inside

3-5. COOLING SYSTEM MAINTENANCE (CONT)

a. Radiator (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
18		c. Two capscrews (cont) (8), washers (9), washers (6), washers (37), and locknuts (5)	Install	Tighten locknuts (10 and 5) securely
19	Engine, front	a. Fan shroud (17)	Position	Move forward to radiator; use care to prevent damage to fan blades
		b. Eight capscrews (14), lock washers (15), and washers (6)	Install and tighten	
20	Radiator, bottom	Transmission cooler lines	Install	Para 2-41e
21	Transmission	Dipstick	Check oil level	Add oil if necessary (refer to current lubrication order)
22	Radiator	a. Coolant overflow system kit	Install	Para 2-15f
		b. Radiator hoses	Install	Para 2-15c
		c. Radiator	Refill with coolant	Para 2-15a(1)

NOTE

Operate vehicle and check for leaks; correct as necessary.

3-5. COOLING SYSTEM MAINTENANCE (CONT)

b. Fan Shroud.

This task covers: a. Removal b. Cleaning c. Inspection/Repair d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Scratch wire brush
- Safety glasses

Welding shop equipment
Hammer

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off. Cab tilted 90 degrees, Air pressure relieved from air system (air reservoir drain cock opened).
2-15a(1)	Coolant drained from radiator.
2-13a	Air cleaner precleaner removed
2-15f	Coolant overflow system kit removed.
2-15c	Radiator hoses removed.
2-15d	Fan and drive belts removed.
2-52c	Alcohol evaporator removed.
3-5a	Right hand radiator strut removed.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Radiator	a. Chain hoist and sling	Attach	To fan shroud
		b. Fan shroud attaching hardware	Remove	Para 3-5a
		c. Fan shroud	Remove	Use two men and chain hoist; raise and work from under cab carefully to avoid damaging radiator or other parts. Move fan shroud to a flat work surface

3-5. COOLING SYSTEM MAINTENANCE (CONT)

b. Fan Shroud (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING **Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.**		
2	Fan shroud		Clean	Use cleaning solvent P-D-680; use wire brush to remove corrosion. Dry using compressed air
INSPECTION/REPAIR				
3	Fan shroud		Inspect for cracks breaks dents	Repair cracked or broken welds by grinding off old welds, pounding out dents using hammer and wooden backing block, and rewelding seams
INSTALLATION				
4	Front of vehicle	a. Fan shroud	Position	Use two men and chain hoist; move fan shroud under cab and lower in position against radiator
		b. Fan shroud attaching tighten hardware	Install and	Para 3-5a
5	Fan shroud, right side	Alcohol evaporator	Install	Para 2-52c

3-5. COOLING SYSTEM MAINTENANCE (CONT)

b. Fan Shroud (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
6	Engine, front	Fan and drive belts	Install	Para 2-15d
7	Frame, right side	Right hand radiator strut	Install	Para 3-5a
8	Engine, front	Radiator hoses	Install	Para 2-15c
9	Radiator, top rear	Coolant overflow system kit	Install	Para 2-15f
10	Air cleaner	Precleaner	Install	Para 2-13a
11	Front of vehicle	Radiator	Fill	With coolant (para 2-15a(1))
12	Cab tilt pump	Cab Lower	To normal operating position	

NOTE

Operate vehicle and check for leaks; correct as necessary.

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly.

This task covers: a. Disassembly c. Inspection
b. Cleaning d. Reassembly

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance
Tool Kit
Socket wrench set
Screwdriver
Socket head screw key set
Torque wrench
Retaining ring pliers
Safety glasses
Automotive Mechanic's Tool Kit
Hammer
Adjusting nut socket
FSCM 31875 PN B11861
Vise
Brass drift
Arbor press

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Lubricant	Item 17, Appendix C
Sealant	Item 19, Appendix C
Mineral spirits	Item 33; Appendix C
Bearing grease	FSCM 31875 PN 808537
Seal kit	FSCM 31875 PN 819883
Lock washer	FSCM 31875 PN 995

Personnel Required
Automotive Repairer MOS 63H

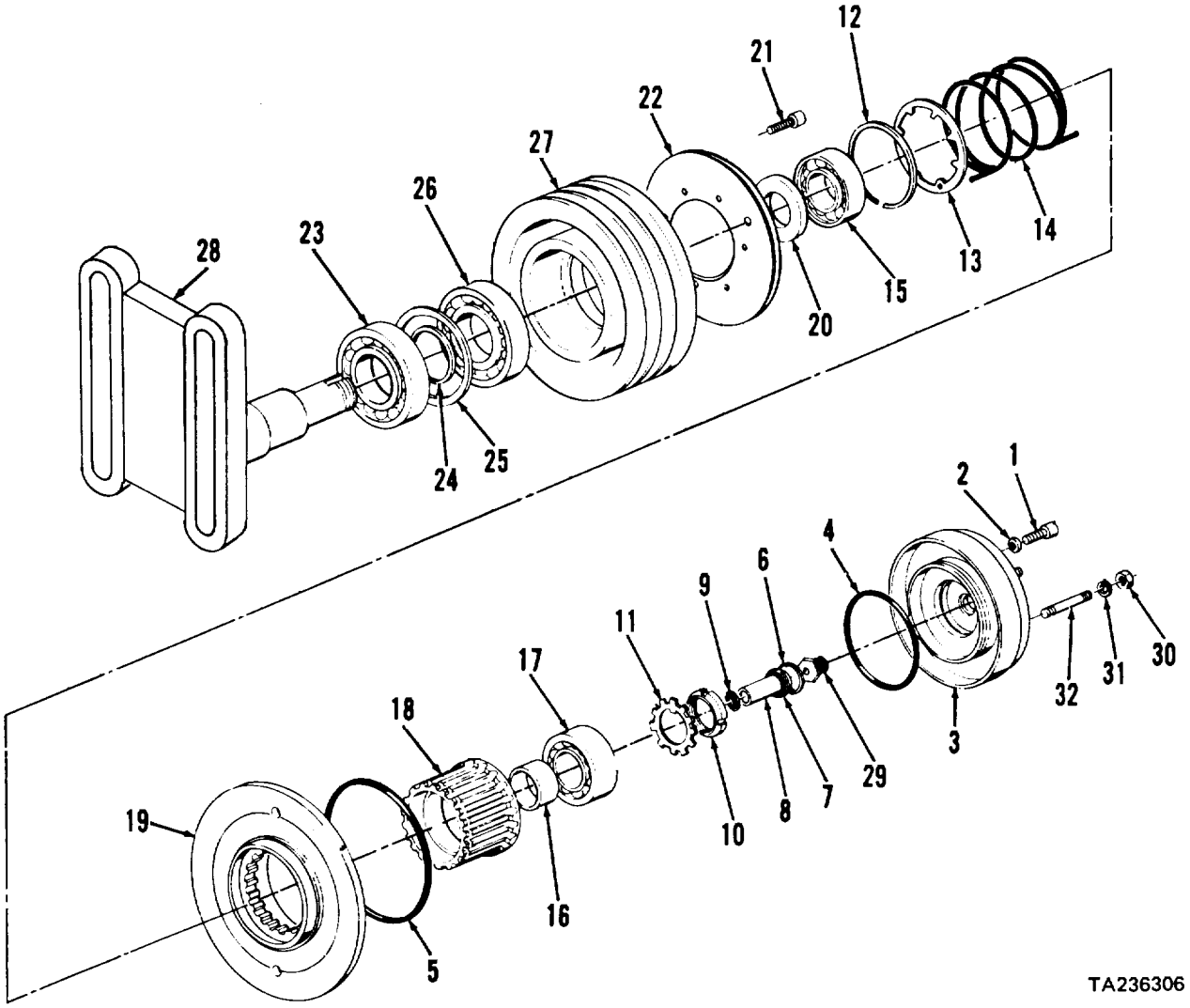
Equipment Condition

Paragraph	Condition Description
2-15d	Fan drive assembly removed.

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Fan drive assembly	a. Bracket (28)	Clamp	In vise, sheave (27) and air chamber (3) free to rotate
		b. Eight socket head cap-screws (1) and lock washers (2)	Remove and discard	
		c. Air chamber (3)	Remove	Apply air pressure to fitting to aid removal, if necessary
		d. O-rings (4 and 5)	Remove and discard	
		e. Retaining ring (6)	Remove	Use retaining ring pliers
		f. O-ring (7), cartridge (8), and U-cup (9)	Remove	Discard cartridge assembly (6 thru 9)

3-5. COOLING SYSTEM MAINTENACE (CONT)

c. Fan Drive Assembly (cont).



1. Socket head capscrews (8)
2. Lock washers (8)
3. Air chamber
4. O-ring
5. O-ring
6. Retaining ring
7. O-ring
8. Cartridge
9. U-cup
10. Adjusting nut
11. Lock washer
12. Retaining ring
13. Spring retainer
14. Spring
15. Bearing
16. Bearing spacer
17. Bearing
18. Splined hub
19. Clutch disc
20. Journal spacer
21. Socket head capscrews (6)
22. Clutch lining
23. Bearing
24. Bearing spacer
25. Bearing spacer
26. Bearing
27. Sheave
28. Bracket
29. Seal
30. Nuts (6)
31. Lock washers (6)
32. Studs (6)

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		g. Lock washer (11) tab	Pry	Use screwdriver and hammer to push tab out from adjusting nut (10)
		h. Adjusting nut (10) and lock washer (11)	Remove	Use adjusting nut socket; discard lock washer (11)
		i. Clutch disc assembly (12 thru 19)	Remove	As an assembly
		j. Journal spacer (20)	Remove	
		k. Sheave assembly (21 thru 27)	Remove	As an assembly
		l. Bracket (28)	Remove	From vise
		NOTE		
		Perform step 2 below only if inspection indicates need for replacement of items in clutch disc assembly (12 thru 19).		
2	Clutch disc assembly (12 thru 19)	a. Retaining ring (12)	Remove	Press spring retainer (13) to compress spring (14)
		b. Spring retainer (13) and spring (14)	Remove	
		c. Splined hub (18) with bearings (15 and 17) and bearing spacer (16)	Remove	From clutch disc (19)
		d. Bearing (15)	Remove	Press out from splined hub (18)
		e. Bearing spacer (16)	Remove	
		f. Bearing (17)	Remove	Press out from nearest side in splined hub (18); do not press all the way through hub

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE **Perform step 3 below only if inspection indicates need for replacement of items in sheave assembly (21 thru 27).**		
3	Sheave assembly (21 thru 27)	a. Six socket head capscrews (21)	Remove	
		b. Clutch lining (22)	Remove	
		c. Spacer (24) sideways	Move	Allows brass drift to be placed on inner race of bearing (23)
		d. Bearing (23)	Remove	Tap with brass drift and hammer around bearing inner race
		e. Two spacers (24 and 25)	Remove	
		f. Bearing (26)	Remove	Tap out using brass drift and hammer
4	Cartridge (8)	Seal (29)	Remove and discard	
5	Air chamber (3)	a. Six nuts (30) and lock washers (31)	Remove	If necessary
		b. Six studs (32)	Remove and discard	Only if necessary for replacement
CLEANING				
6	a.	Bearings (15, 17, 23, and 26)	a. Clean b. Pack c. Wrap in paper	Use volatile mineral spirits Use new bearing grease Protects bearings from dust

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING **Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.** **Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.**		
	b.	All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
INSPECTION				
7	a.	Bearings (15, 17, 23, and 26)	Inspect	Replace if chipped, rough or excessively worn
	b.	Clutch lining (22)	Inspect	Replace if deformed, oily, or if worn to 1/16-inch (new lining is 3/16-inch thick)
	c.	Clutch disc (19) and splined hub (18)	Inspect	Replace if splines worn, cracked, chipped, or bent
	d.	Spacers (16, 20, 24, and 25)	Inspect	Replace if cracked, chipped, or deformed. Replace bearing spacers (24 and 25) as matched set only
	e	All other parts	Inspect	Replace if cracked, chipped, deformed, or threads damaged

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
8	Air chamber (3)	a. Six new studs (32)	Install, if removed	Coat threads with sealant before installation
		b. Six lock washers (31) and nuts (30)	Install	Hand tight only
		c. New seal (29)	Install	In air chamber (3)
9	Bearings (15, 17, 23, and 26)	Inner seals	Remove, if present	All bearings must be single sealed
		NOTE		
		Perform step 10 below only if items in sheave assembly (21 thru 27) were removed.		
10	Sheave assembly (21 thru 27)	a. Bearing (26)	Install	Press in, V of outer race pointing down
		b. Two bearing spacers (24 and 25)	Position	
		c. Bearing (23) pointing down	Install	Press in, V of outer race
		d. Clutch lining (22)	Position	On sheave (27)
		e. Six socket head capscrews (21)	Install	Tighten to 60 pounds inch torque
		NOTE		
		Perform step 11 below only if items in clutch disc assembly (12 thru 19) were removed.		
11	Clutch disc assembly (12 thru 19)	a. Bearing (17)	Install	Press into splined hub (18), seal facing outward
		b. Bearing spacer (16)	Position	
		c. Bearing (15)	Install	Press into splined hub (18), seal facing outward
		d. Splined hub (18)	Install	In clutch disc (19)

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		e. Spring (14)	Install	Place spring tang in clutch disc (19) hole
		f. Spring retainer (13)	Install	On spring (14), hole at least two teeth counterclockwise from spring tang
		g. Retaining ring (12)	Install	Compress spring (14) to install; use screwdriver to force tang of spring into hole in spring retainer (13)
12	Fan drive assembly	a. Bracket (28)	Clamp	In vise; shaft up
		b. Sheave assembly (21 thru 27)	Install	On bracket (28) shaft
		c. Journal spacer (20)	Install	
		d. Clutch disc assembly (12 thru 19)	Install	
		e. New lock washer (11)	Position	
		f. Adjusting nut (10)	a. Install	Use adjusting nut socket; tighten to 150 pounds foot torque
			b. Secure	Pry lock washer (11) tab into adjusting nut slot with screwdriver
		NOTE		
		Use new items 1, 2, and 4 thru 9 from seal kit in following steps.		
		g. New U-cup (9)	Install	In bracket (28) cavity, open side down
		h. New O-ring (7)	a. Lubricate	Use lubricant
			b. Install	On cartridge (8)
		i. New cartridge (8)	Install	

3-5. COOLING SYSTEM MAINTENANCE (CONT)

c. Fan Drive Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)	ring (6)	j. New retaining	Install	Use retaining ring pliers
		k. Two new O-rings (4 and 5)	a. Lubricate b. Install	Use lubricant
		l. Air chamber (3)	Position	
		m. Eight new lock washers (2) and socket head cap-screws (1)	Install	Tighten to 15 pounds foot torque

Section II. ELECTRICAL SYSTEM MAINTENANCE

This section contains the information you need to maintain the:

- Alternator
- Starter
- Wiring Harness

It gives you instructions on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

3-6. TROUBLESHOOTING SYMPTOM INDEX

NOTE

An electrical system wiring schematic is located at the back of this manual in appendix E.

3-7. ALTERNATOR TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. ALTERNATOR NOT OPERATING PROPERLY

Perform alternator electrical tests (para 3-9).

If tests indicate parts are defective, replace (para 3-9).

3-8. STARTER TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. STARTER NOT OPERATING PROPERLY

Step 1. Perform starter bench test (para 3-10).

a. If test indicates parts are defective, replace (para 3-10).

b. If test does not indicate parts are defective, proceed to step 2 below.

Step 2. Connect voltmeter leads to ground and starter switch control terminal (single black electrical lead behind shield). Turn key switch to on position.

a. If voltmeter indicates zero volts, replace starter switch (para 3-10).

b. If voltmeter indicates 12-14 Vdc, replace solenoid (para 2-25a).

3-9. ALTERNATOR MAINTENANCE

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Testing
e. Reassembly

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Combination wrench set
- Socket head screw key set
- Multimeter
- Safety glasses
- Torque wrench
- Puller kit

Fuel and Electrical Systems Tool Kit
Soft mallet

Personnel Required
Electrical Systems Repairer MOS 63G

Equipment Condition

Paragraph	Condition Description
2-24	Alternator removed from tractor.

Materials/Parts

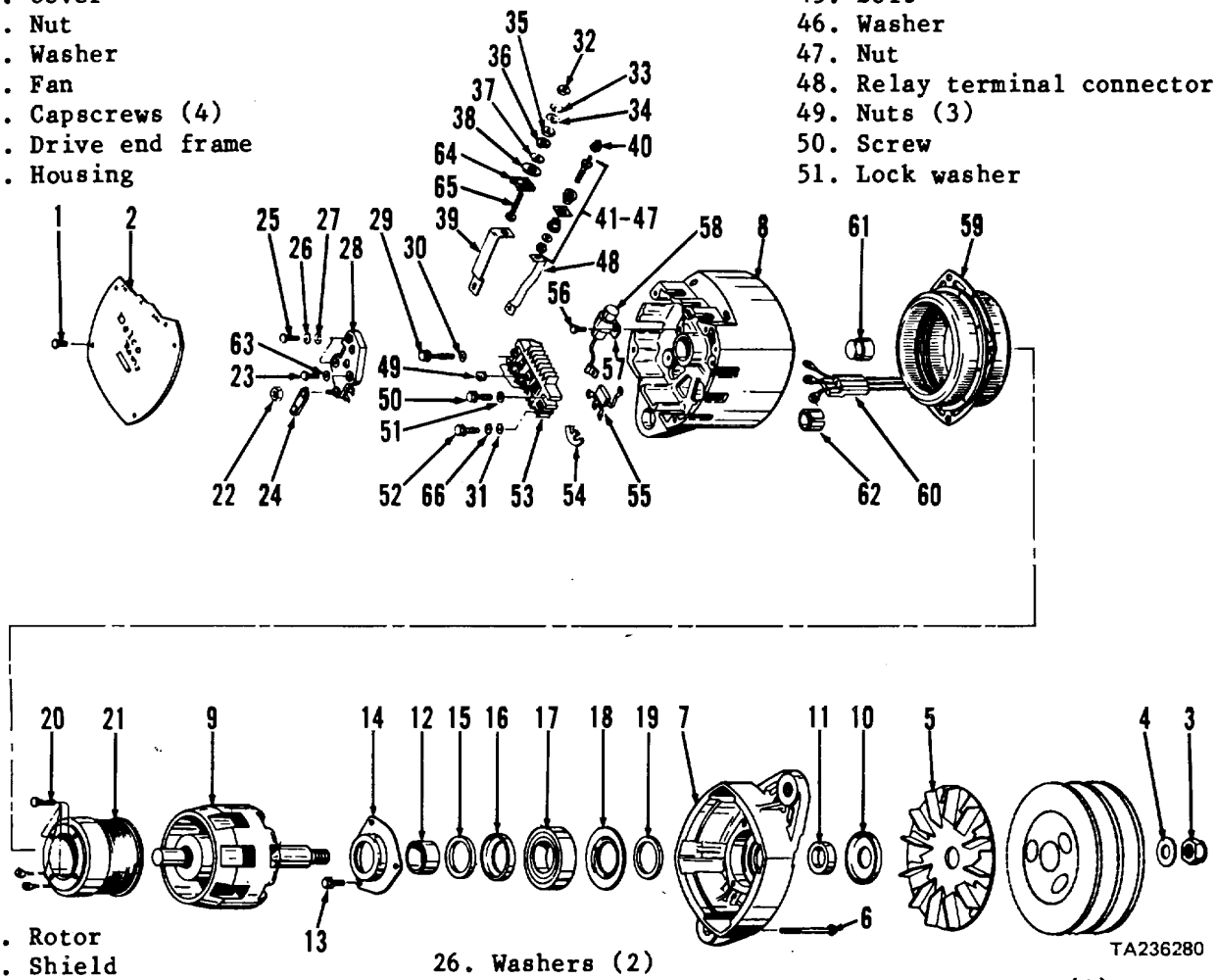
Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Light machine oil	Item 7, Appendix C
Felt seal	FSCM 16764 PN 825197
Felt seal	FSCM 16764 PN 1955660
Thin wall tubing	

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Housing (8)	a. Five capscrews (1) and cover (2)	Remove	
		b. Nut (3) and washer (4)	Remove	Hold rotor (9) shaft using socket head screw key
		c. Pulley	Remove	If installed; para 2-24
		d. Fan (5)	Remove	
		e. Four capscrews (6)	Remove	
		f. Drive end frame (7) and housing (8)	Scribe	To aid reassembly
		g. Drive end frame (7) with rotor (9)	Remove	From housing (8) as an assembly
		h. Rotor (9)	Remove	Press from drive end frame (7)
		i. Shield (10)	Remove	

3-9. ALTERNATOR MAINTENANCE (CONT)

KEY

1. Capscrews (5)
2. Cover
3. Nut
4. Washer
5. Fan
6. Capscrews (4)
7. Drive end frame
8. Housing



9. Rotor
10. Shield
11. Outside collar
12. Inside collar
13. Capscrews and washers (3)
14. Inside retainer plate
15. Felt seal
16. Cup
17. Ball bearing
18. Outside retainer plate
19. Felt seal
20. Screws (5)
21. Field coil
22. Nut
23. Screw
24. Connector
25. Screws (2)
26. Washers (2)
27. Insulators (2)
28. Regulator
29. Screw and washer
30. Lock washer
31. Washers (2)
32. Nut
33. Lock washer
34. Washer
35. Nut
36. Lock washer
37. Washer
38. Insulated washer
39. Output terminal connector
40. Cap
41. Bushing
42. Washer
43. Bushing
44. Washer
45. Bolt
46. Washer
47. Nut
48. Relay terminal connector
49. Nuts (3)
50. Screw
51. Lock washer
52. Screws (2)
53. Rectifier bridge
54. Insulator
55. Diode trio
56. Screw
57. Bracket
58. Capacitor
59. Stator assembly
60. Grommet
61. Bearing
62. Bushing
63. Washer
64. Insulator
65. Bolt
66. Washers (2)

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		j. Outside collar (11)	Remove	
		k. Inside collar (12)	Remove	
2	Drive end frame (7)	a. Three capscrews (13) and inside retainer plate (14)	Remove	
		b. Cup (16) with felt seal (15)	Remove	
		c. Felt seal (15)	Remove	Separate from cup (16) only if necessary
		d. Ball bearing (17)	Remove	Press from drive end frame (7)
		e. Outside retainer plate (18) and felt seal (19)	Remove	
3	Housing (8)	a. Nut (22)	Remove	
		b. Screw (50) and lock washer (51)	Remove	
		c. Connector (24)	Remove	From regulator (28) and rectifier bridge (53)
		d. Three nuts (49)	Remove	
		e. Three stator (59) leads	Disconnect	From rectifier bridge (53)
4	Relay terminal connector (48)	a. Cap (40)	Remove	
		b. Nut (47)	Loosen	
		c. Relay terminal connector assembly (41 thru 48)	Remove	
		d. Bushing (41), washer (42), bushing (43), washer (44), bolt (45), washer (46), and nut (47)	Remove	From relay terminal connector (48)

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5	Housing (8)	a. Two screws (25), washers (26), and insulators (27)	Remove	
		b. Two field coil (21) leads	Disconnect	From regulator (28)
		c. Screw (23) and washer (63)	Remove	
		d. Diode trio (55) and regulator (28)	Remove	
6	Output terminal connector (39)	a. Screw (29) and lock washer (30)	Remove	
		b. Capacitor (58) lead	Disconnect	Move aside
		c. Nuts (32 and 35)	Loosen	
		d. Output terminal connector assembly (32 thru 39, 65, and 66)	Remove	
		e. Nut (32), washers (33 and 34), nut (35), washers (36, 37, and 38), insulator (64), and bolt (65)	Remove, if necessary	From output terminal connector (39)
7	Rectifier bridge (53)	a. Two screws (52), washers (66), and washers (31)	Remove	
		b. Rectifier bridge (53)	Remove	
		c. Insulator (54)	Remove	

3-9. ALTERNATOR MAINTENANCE (CONT)

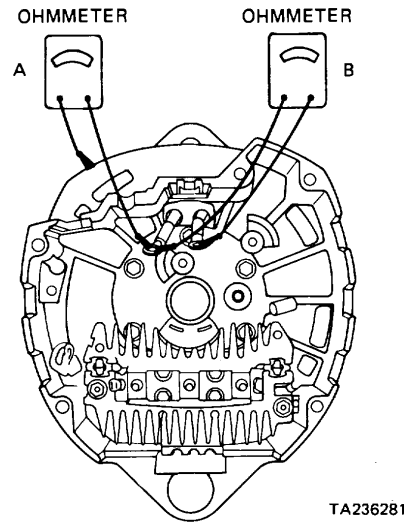
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8	Housing (8)	a. Screw (56), bracket (57), and capacitor (58)	Remove	
		b. Stator assembly (59)	Remove	
		c. Grommet (60)	Remove	
		d. Five screws (20)	Remove	
		e. Field coil (21)	Remove	
		f. Bearing (61)	Remove	Use thin wall tubing to press from housing (8)
		g. Bushing (62)	Remove	Only if needed for replacement. Use suitable sleeve to press out
CLEANING				
		CAUTION		
		Do not clean rotor or stator assembly with cleaning solvent.		
9		a. Rotor (9) and stator assembly (59)	Clean	Wipe with clean, absorbent, lintless cloth to remove grease
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		

3-9. ALTERNATOR MAINTENANCE (CONT)

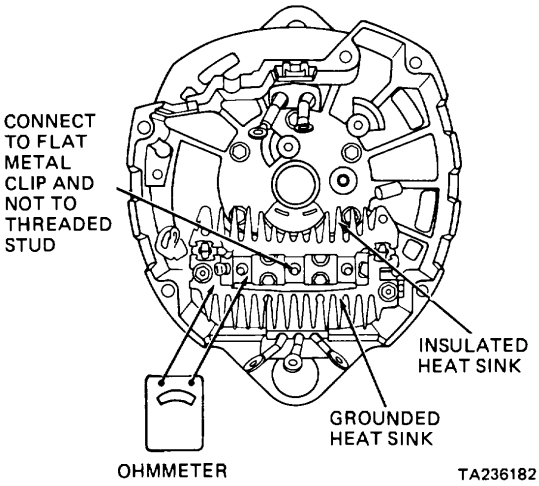
STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		CAUTION		
		Do not spin bearings when drying with compressed air to prevent damage.		
9 (cont)	b.	All other parts	Clean	Wipe with clean, soft, lint-less cloth moistened with cleaning solvent P-D-680. Dry with compressed air
INSPECTION				
10	a.	Cover (2)	Inspect	Replace if cracked or distorted
	b.	Fan (5)	Inspect	Replace if cracked, broken, or distorted. Be sure to inspect fan blades
	c.	Rotor (9)	Inspect	Replace if cracked, worn, distorted, threads damaged, shaft bent, or slip rings damaged or scored
	d.	Ball bearing (17) and bearing (61)	Inspect damaged	Replace if worn, cracked, pitted, or otherwise
	e.	Stator assembly (59)	Inspect	Replace if cracked, worn, discolored, unwound, or evidence of overheating
	f.	All other parts	Inspect	Replace if cracked, broken, worn, distorted, leads or connectors damaged, or threads damaged

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING				
11		a. Field coil (21) Test	Using ohmmeter check: a. For grounds. Connect ohmmeter between one field coil lead and housing (sequence A as shown). Field coil is grounded if reading is low b. For opens. Connect ohmmeter between two field coil leads (sequence B as shown). Field coil is open if ohmmeter reading is high or infinite c. For short circuits. Connect ohmmeter between two field coil leads (sequence B as shown). Winding is shorted if ohmmeter reading is less than 0.2 ohms. Replace field coil if defective	



		b. Rectifier bridge (53) Test	Using ohmmeter connect prod to grounded heat sink and base of one of the three terminals as shown. Observe reading. Reverse prods. Observe reading. If readings are identical, replace rectifier bridge. Repeat procedure with remaining two terminals. Connect prods to insulated heat sink and one of three terminals. Observe reading. Reverse prods. Observe reading. If readings are identical, replace rectifier bridge. Repeat procedure with each of two remaining terminals	



3-9. ALTERNATOR MAINTENANCE (CONT)

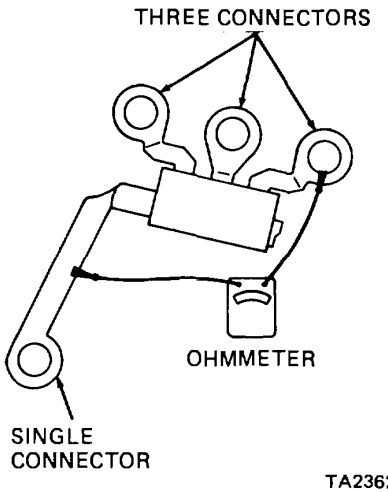
STEP	LOCATION	ITEM	ACTION	REMARKS

TESTING (cont)

11 (cont)

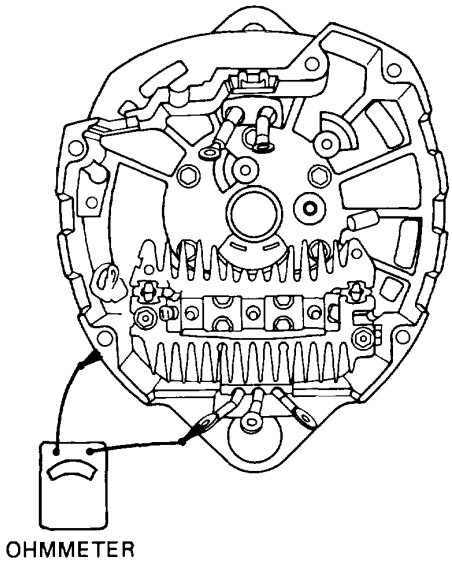
c. Diode trio (55) Test

Set ohmmeter with 1-1/2 volt cell to lowest resistance range. Connect ohmmeter leads to single connector and one of three stator lead connectors as shown. Observe reading. Reverse ohmmeter leads and observe reading. Repeat procedure with each of two remaining stator lead connectors. There should be one low and one high reading for each test. Readings should not be identical in each test. If readings are the same, replace diode trio



TA236282

Connect ohmmeter between each stator lead and housing as shown to check for grounds. If ohmmeter reading is low, the stator assembly is grounded. Replace a defective stator assembly



TA236283

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
11 (cont)				
		NOTE		
		It is not possible to check the stator assembly for opens or short circuits without laboratory test equipment. However, if all other checks are normal and alternator does not produce rated output, shorted windings are indicated.		
REASSEMBLY				
12	Housing (8)	a. Bushing (62)	Install	Use suitable sleeve and press in
		b. Bearing (61)	Install	Use thin wall, tubing to press in. Bearing must be flush with drive end of housing
		c. Grommet (60)	Install	
		d. Stator assembly (59)	Install	
		e. Capacitor (58)	Position	
		f. Bracket (57) and screw (56)	Install	
		g. Field coil (21)	Position	
		h. Five screws (20)	Install and tighten	
		i. Insulator (54)	Install	
		j. Rectifier bridge (53)	Install	
		k. Two screws (52), washers (66), and washers (31)	Install	
13	Output terminal connector (39)	a. Insulated washer (38), washer (37), lock washer (36), nut (35), washer (34), lock washer (33), nut (32), insulator (64) and bolt (65)	Assemble	On top of connector (39)

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13 (cont)		b. Output terminal connector (39)	Position	On rectifier bridge (53)
		c. Nut (35)	Tighten	
		d. Screw (29) and washer (30)	Install	Through capacitor (58) lead and output terminal connector (39)
14	Housing (8)	a. Regulator (28)	Position	
		b. Screw (23) and washer (63)	Install	
		c. Connector (24)	Position	
		d. Screw (50), nut (22), and lock washer (51)	Install	
		e. Diode trio (55)	Install	
		f. Two screws (25) with washers (26) and insulators (27)	Install	Through field coil (21) leads and diode trio (55) leads
15	Relay terminal connector (37)	a. Nut (47), washer (46), bolt (45), bushing (43), washer (42), and bushing (41)	Assemble	On top of relay terminal connector (48)
		b. Relay terminal connector (48)	Position	On rectifier bridge (53)
		c. Stator assembly (59) leads	Connect	
		d. Three nuts (49)	Install and tighten	
		e. Nut (47)	Tighten	
		f. Cap (40)	Install	

NOTE

Soak felt seals (15 and 19) in light oil before reassembly.

3-9. ALTERNATOR MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
16	Drive end frame (7)	a. Felt seal (19)	Install	
		b. Outside retainer plate (18)	Install	
		c. Ball bearing (17)	Install	Press in
		d. Cup (16)	Install	
		e. Felt seal (15)	Install	
		f. Inside retainer plate (14)	Position	
		g. Three capscrews (13)	Install	
		h. Inside collar (12)	Install	
		i. Outside collar (11)	Install	
		j. Shield (10)	Position	
		k. Rotor (9)	Install	Press in drive end frame (7)
		l. Housing (8) and drive end frame (7)	Assemble	Align scribe marks
		m. Four capscrews (6)	Install	
		n. Fan (5)	Install	
		o. Pulley	Install	Para 2-24
		p. Washer (4) and nut (3)	Install and tighten	Hold rotor (9) shaft using socket head screw key
17	Housing (8)	a. Cover (2)	Position	
		b. Five capscrews (1)	Install and tighten	
18	Engine, rear	Alternator	Install	Para 2-24

3-10. STARTER MAINTENANCE

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Testing
e. Reassembly

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Clean cloths
Socket wrench set
Combination wrench set
Retaining ring pliers
Screwdriver
Torque wrench
Vise jaw caps
Safety glasses
Automotive Mechanic's Tool Kit
Thickness gage
Hammer
Punch
Soldering iron, electric
Armature tester FSCM 82386 PN AT-75
Bore micrometer
RPM indicator
Soft metal (brass) rod
Block of wood
Arbor press
from tractor.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Item 2, Appendix C	
Grease	Item 3, Appendix C
Engine oil, SAE 20	Item 24, Appendix C
Electrical tape	Item 37, Appendix C
Solder	Item 41, Appendix C
O-ring	FSCM 16764 PN 1894642
O-ring	FSCM 16764 PN 1894643
Gasket	FSCM 16764 PN 1945476
Four brushes	FSCM 16764 PN 1852883
Lubricant, Delco-Remy	FSCM 16764 PN 1960954

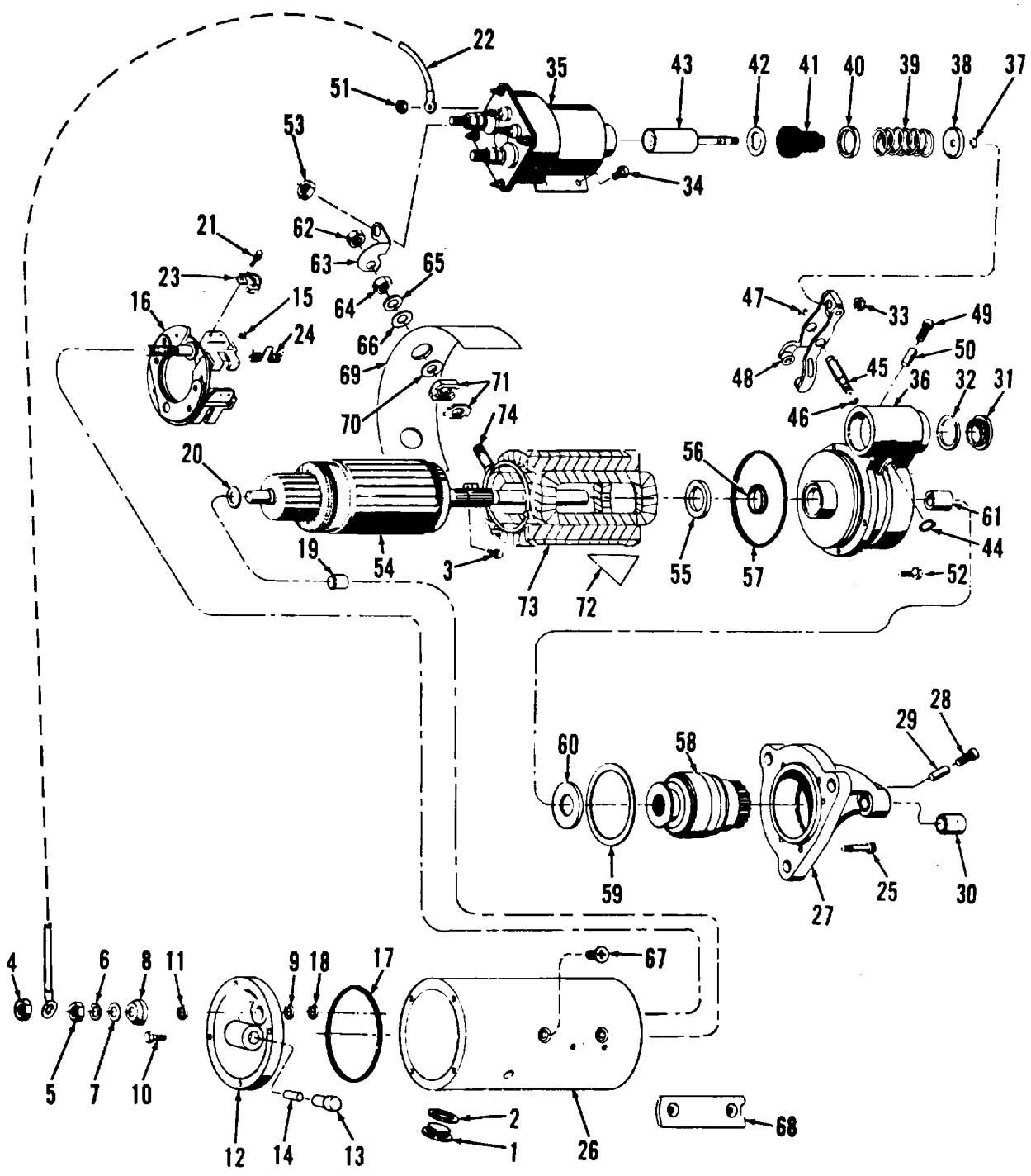
Personnel Required
Electrical Systems Repairer MOS 63G

Equipment Condition

Paragraph	Condition Description
2-25b	Starter with switch removed

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Starter	a. Drive housing (27), switch (35), housing (36), field frame (26), and frame (12)	Scribe	Use center punch to scribe position marks to aid in reassembly
		b. Two plugs (1) and gaskets (2)	Remove	
		c. Nut (4)	Remove	
		d. Electrical lead (22)	Disconnect	From brush plate assembly (16) ground stud
		e. Nut with washer (51)	Remove	

3-10. STARTER MAINTENANCE (CONT)I



TA236263

3-10. STARTER MAINTENANCE (CONT)

KEY

1. Plugs (2)
2. Gaskets (2)
3. Screws (2)
4. Nut
5. Nut
6. Lock washer
7. Washer
8. Insulator
9. Washer
10. Capscrews (4)
11. O-ring
12. Frame
13. Plug
14. Wick
15. Screws (3)
16. Brush plate assembly
17. O-ring
18. Washer
19. Bushing
20. Washer
21. Capscrews (4)
22. Electrical lead (BLK)
23. Brushes (4)
24. Springs (4)
25. Capscrews (6)
26. Field frame
27. Drive housing
28. Plug
29. Wick
30. Bushing
31. Plug
32. Gasket
33. Nut
34. Screws with washers (4)
35. Switch
36. Housing
37. Snap ring
38. Retainer
39. Spring
40. Retainer
41. Boot
42. Washer
43. Plunger
44. Snap ring
45. Shaft
46. O-ring
47. O-ring
48. Lever
49. Plug
50. Wick
51. Nut with washer
52. Screws (5)
53. Nut
54. Armature
55. Washer
56. Oil seal
57. O-ring
58. Drive assembly
59. Gasket
60. Washer
61. Bushing
62. Nut
63. Connector
64. Nut
65. Washer
66. Washer
67. Screws (8)
68. Poleshoes (4)
69. Insulator
70. Washer
71. Bushing package
72. Insulator
73. Field coil
74. Stud

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		f. Electrical lead (22)	a. Disconnect	From switch (35) ground terminal
			b. Remove	
		g. Two screws (3)	Remove	Through plug (1) holes in field frame (26)
		h. Four capscrews (10)	Remove	
		i. Frame (12) with brush plate assembly (16)	Remove	As an assembly
		j. Washer (20)	Remove	
2	Frame (12)	a. O-ring (17)	Remove	
		b. Four capscrews (21), springs (24), and brushes (23)	Remove	

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)	c.	Nut (5), lock washer (6), washer (7), and insulator (8)	Remove	
		d. Three screws (15) and brush plate assembly (16)	Remove	
		e. O-ring (11), washer (9), and washer (18)	Remove	From brush plate assembly (16)
		f. Plug (13) and wick (14)	Remove	From frame (12)
		g. Bushing (19)	Remove	Only if inspection indicates need for replacement
3	Drive housing (27)	a. Six capscrews (25), drive housing (27), and gasket (59)	Remove	Discard gasket (59)
		b. Plug (28) and wick (29)	Remove	
		c. Drive housing (27)	Support	In soft-faced vise
		d. Bushing (30)	Remove	Use soft metal rod or wood dowel. Strike rod with hammer
4 (36)	Housing	a. Plug (31), gasket (32), and nut (33)	Remove	
		b. Five screws (52)	Remove	
		c. Housing (36) with drive assembly (58) and washer (60)	Remove	As an assembly
		d. Snap ring (44)	Remove	Use retaining ring pliers
		e. Shaft (45)	Remove	Use wood dowel to push out
		f. Two O-rings (46 and 47)	Remove and discard	

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		g. Drive assembly (58) and washer (60)	Remove	From housing (36)
		h. Lever (48)	Remove	
		i. Plug (49) and wick (50)	Remove	
		j. Washer (55), oil seal (56), and O-ring (57)	Remove	
		k. Housing (36)	Support	In soft-faced vise
		l. Bushing (61)	Remove	Use soft metal rod or wood dowel. Strike rod with hammer
5	Switch (35)	a. Four screws with washers (34)	Remove	
		b. Nut (53)	Remove	Disconnect connector (63) from switch (35)
		c. Switch (35)	Remove	From housing (36)
		d. Snap ring (37)	Remove	Use retaining ring pliers
		e. Retainer (38), spring (39), retainer (40), boot (41), washer (42), and plunger (43)	Remove	
6	Field frame (26)	a. Armature (54)	Remove	
		b. Nut (62), connector (63), nut (64), and two washers (65 and 66)	Remove	
		c. Eight screws (67) and four poleshoes (68)	Remove	
		d. Insulator (69)	Remove	Only if inspection indicates need for replacement
		e. Washer (70), bushing package (71), and insulator (72)	Remove	

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
6 (cont)		f. Field coil (73) Remove with stud (74)		
		g. Stud (74)	Remove	Unsolder and remove only if necessary for replacement
CLEANING				
7		a. Frame (12), brush plate assembly (16), brushes (23), armature (54), drive assembly (58), and field coil (73)	Clean	Wipe with a clean, dry, lint-free cloth only. Do not use cleaning solvent
		b. Electrical lead (22) Clean		Wipe with clean, dry cloth

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

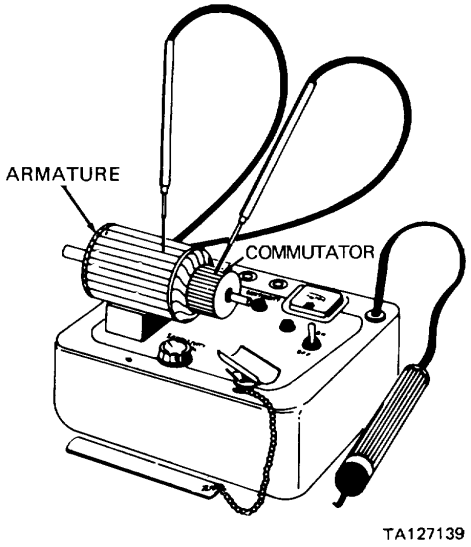
Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-10. STARTER MAINTENANCE (CONT)

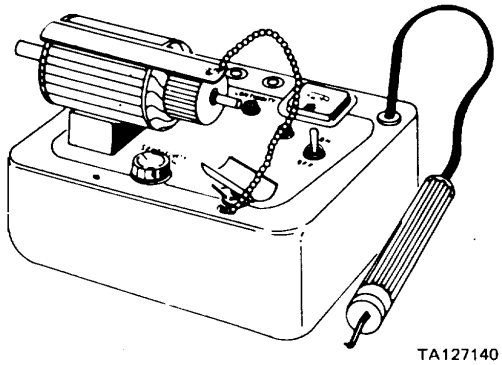
STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
7 (cont)		c. All other metal parts	Clean	Use clean cloth moistened with cleaning solvent P-D-680; dry with compressed air
INSPECTION				
8		a. Electrical lead (22)	Inspect	Replace if insulation cut or frayed, or conductor or terminals corroded or broken
		b. O-rings (11, 17, and 57) and gaskets (2 and 32)	Inspect	Replace if cracked, worn, damaged, or distorted
		c. Two bushings (30 and 61)	Inspect	Replace if worn, cracked, pitted or burred, or if inside diameter exceeds 0.6250 inch
		d. Armature (54)	Inspect	Replace if cracked, worn, damaged or distorted, or commutator rough or out of round
		e. Drive assembly (58)	Inspect	Replace if worn, damaged, distorted, or pinion teeth cracked, chipped, worn or damaged
		f. Field coil (73)	Inspect	Replace if windings broken or loose, or if cracked, broken or distorted
		g. Springs (24 and 39)	Inspect	Replace if cracked, broken, or permanently set
		h. All other parts	Inspect	Replace if cracked, worn, broken, distorted, or threads damaged

3-10. STARTER MAINTENANCE (CONT)

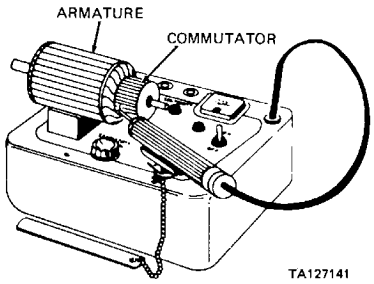
STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING				
9		a. Armature (54)	a. Test for grounded winding	Place armature in growler and turn power on. Touch one test probe to armature core, the other probe to commutator, as shown. If test lamp glows, the armature winding or commutator is grounded



			b. Test for shorted winding	a. Position armature in growler. Turn on power. Use steel blade provided with tester. Hold blade parallel with, and touching, the armature core segment, as shown b. Rotate armature slowly one or more revolutions. If the armature is shorted, the steel blade will vibrate. Turn power off c. Position armature in growler, as shown. Turn power on



3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
9		c. Test commutator bars		Follow directions supplied with growler, and test commutator bars for abnormal readings. Abnormal readings will indicate a short, open or poor connection. If testing indicates commutator is grounded, the armature is shorted, or commutator readings indicate a short, open or poor connection, replace armature
				
		b. Field coil (73) Test		Disconnect field coil ground connection. Use test lamp. Connect one test probe of the test lamp to the connector (63) and the other probe to the frame (12). If test lamp lights, the field coils (73) are grounded, remove and replace coils. Touch test probes to each end of the field coil winding. If test lamp does not light, the field coils are open. If coils are open, replace field coil (73).
REASSEMBLY				
10	Field frame (26)	a. Stud (74)	a. Position if removed b. Solder Position	In field coil (73)
		b. Insulator (72) c. Bushing package age (71) and washer (70)	Install	On stud (74)

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
10 (cont)		d. Insulator (69)	Position	Around field coil (73), if removed
		e. Four poleshoes (68) and eight screws (67)	Install and tighten	
		f. Two washers (66 and 65)	Install	
		g. Nut (64), connector (63), and nut (62)	Install; tighten nuts	
		h. Armature (54)	Install	
11	Drive housing (27)	a. Drive housing (27)	Support	In soft-faced vise
		b. Wick (29) and bushing (30)	Lubricate	Soak in SAE 20 engine oil.
		c. Wick (29)	Install	
		d. Bushing (30)	Press in	Use arbor press
		e. Plug (28)	Install	
12	Housing (36)	a. Housing (36)	Support	In soft-faced vise
		b. Wick (50) and bushing (61)	Lubricate	Soak in SAE 20 engine oil
		c. Wick (50)	Install	
		d. Bushing (61)	Install	Use arbor press
		e. Plug (49)	Install	
		f. Oil seal (56) and O-ring (57)	Install	
		g. Washer (60)	a Coat with grease b Install	Holds washer in place
		h. Drive assembly (58)	Lubricate	Use Delco-Remy lubricant FSCM 16764 PN 1960954
		i. Lever (48) and drive assembly (58)	Position	
		j. Two new O-rings (47 and 46)	Install	On shaft (45)
		k. Shaft (45)	Install	
		l. Snap ring (44)	Install	Use retaining ring pliers

3-10. STARTER MAINTENANCE (CONT)

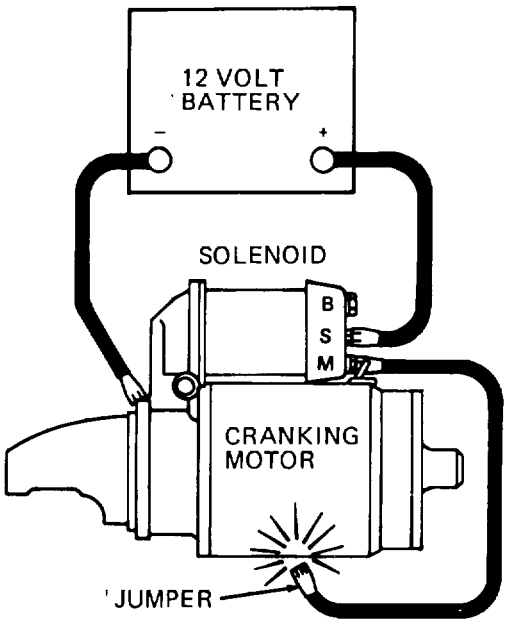
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13	Plunger (43)	a. Washer (42), boot (41), retainer (40), spring (39), and retainer (38)	Install	On plunger (43)
		b. Snap ring (37)	Install	On plunger (43); us retaining ring pliers
		c. Plunger assembly (37 thru 43)	Position	Install plunger and assembled parts into switch (35)
		d. Switch (35)	Position	
		e. Four screws with washers (34)	Install and tighten	
		f. Connector (63)	Install	On switch (35) M terminal
		g. Nut (53)	Install and tighten	
14	Field frame (26)	a. Washer (55)	Install	On armature (54)
		b. Housing (36)	Install	Observe caution when inserting plunger (43) and assembled parts into housing
		c. Five screws (52)	Install and tighten	
		d. Nut (33)	Install	
		e. New gasket (32) and plug (31)	Install	
		f. New gasket (59)	Install	
		g. Drive housing (27)	Position	Against housing (36)
		h. Six capscrews (25)	Install	Tighten to 13-17 pounds ft torque
15	Frame (12)	a. Wick (14) and bushing (19)	Lubricated	Soak in SAE 20 engine oil
		b. Wick (14)	Install	
		c. Bushing (19)	Install	Use arbor press, if removed
		d. Washers (18 and 9)	Install	On brush plat assembly (16)
		e. Brush plat assembly (16)	Position	On frame (12)
		f. Three screws (15)	Install and tighten	
		g. O-ring (11)	Install	

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
15 (cont)		h. Insulator (8)	Install	
		i. Washer (7), lock washer (6), and nut (5)	Install	Tighten nut to 20-25 pounds foot torque
		j. Four brushes (23), springs (24), and capscrews (21)	Install	
		k. Plug (13) and O-ring (17)	Install	
16	Field frame (26)	a. Armature (54)	Pull out	Pull armature from field frame (26) just enough to fully expose commutator
		b. Washer (20)	a. Lubricate b. Install	On armature (54)
		c. Frame (12)	Install	On armature (54) Pull up brushes (23) just enough to allow them to slide onto commutator Then push in frame assembly
		d. Four capscrews (10)	Install and tighten	
		e. Two screws (3)	Install	Through plug (1) holes Be sure screws pass through field coil (73) leads
		f. Two plugs (1) and gaskets (2)	Install	
		g. Electrical lead (22)	Position	On brush plate assembly (16) ground stud and switch (35) ground terminal
		h. Nut with washer (51)	Install	Tighten to 16-30 pounds inch torque
		i. Nut (4)	Install	Tighten to 20-25 pounds foot torque

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
17	Insulator (69)	a. Connector (63) b. Starter with switch	Tape Connect	Wrap with electrical tape To test circuit as shown



TA236249

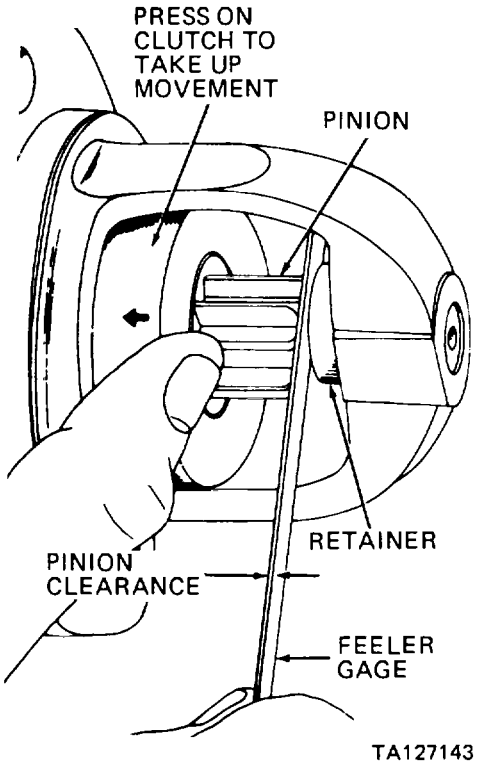
CAUTION

Check pinion clearance quickly to avoid overheating and damaging switch windings.

	c. Jumper lead	Momentarily connect	From switch motor (M) terminal (to shift pinion into cranking position)

3-10. STARTER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
17 (cont)		d. Drive assembly (58) pinion	Check clearance	Push clutch back as far as possible toward armature; check clearance as shown



NOTE

Pinion clearance must measure 0.359 inch to prevent buttons on lever (48) from rubbing on the clutch collar during cranking. If clearance is not correct, nut (33) can be adjusted. If proper clearance can't be achieved, recheck for proper assembly, and replace all worn parts.

	e. Starter with switch	Disconnect	From pinion clearance test set-up
	f. Connector (63)	a. Remove tape	
		b. Install	On motor (M) terminal of switch (35)
	g. Nut (53)	Install	Tighten to 20-25 pounds foot torque

3-11. WATER LEVEL WARNING KIT MAINTENANCE

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP:

Tools
No 2 Common Organizational Maintenance Tool Kit
- Socket head screw key set
- Combination wrench set
- Soldering gun, electric
- Safety glasses

Automotive Mechanic's Tool Kit
- Pliers

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

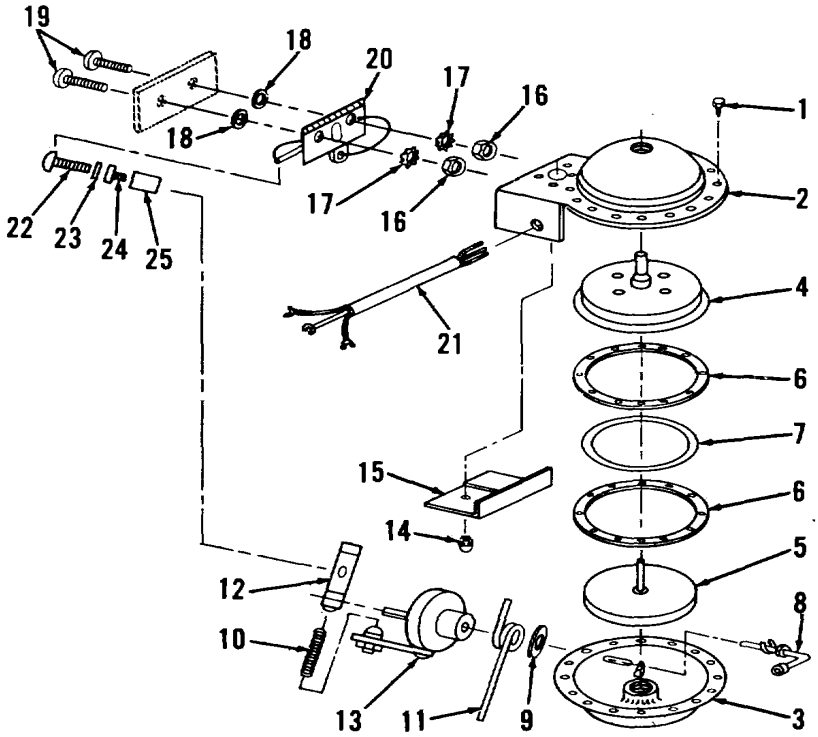
2-29 Water level sensor removed from tractor.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Solder	Item 41, Appendix C
Two gaskets	FSCM 90915 PN 8154

KEY

1	Capscrews (12)
2	Top cover
3	Bottom cover
4	Cylinder
5	Piston
6	Gaskets (2)
7	Ring
8	Arm assembly
9	Washer
10	Spring
11	Torsion spring
12	Torsion arm
13	Spring holder
14	Locknut
15	Contact cover
16	Nuts (2)
17	Lock washers (2)
18	Washers (2)
19	Screws (2)
20	Contact assembly
21	Wiring assembly
22	Screw
23	Washer
24	Sleeve
25	Spacer



TA236351

3-11. WATER LEVEL WARNING KIT MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Water level warning kit	a. 12 capscrews (1)	Remove	
		b. Top cover (2) and bottom cover (3)	Separate	
		c. Cylinder (4)	Remove	
		d. Piston (5)	Remove	
		e. Two gaskets (6)	Remove and discard	
		f. Ring (7)	Remove	
		g. Locknut (14) and contact cover (15)	Remove	
		h. Arm assembly (8)	Remove	
		i. Washer (9)	Remove	
		j. Spring (10)	Remove	
		k. Torsion spring (11)	Remove	
		l. Spring holder (13)	Remove	
		m. Screw (22), washer (23), sleeve (24), and spacer (25)	Remove	
		n. Torsion arm (12)	Remove	
		o. Two nuts (16), lock washers (17), washers (18), and screws (19)	Remove	
		p. Contact assembly (20) with wiring assembly (21)	Remove	
		NOTE		
		Perform step 2 below only if replacement of wiring assembly (21) is required.		
2	Contact assembly (20)	Three wiring assembly (21) leads	a. Tag b. Remove	Unsolder wire leads connected to contact assembly (20)

3-11. WATER LEVEL WARNING KIT MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
3		a. Wiring assembly (21) and contact assembly (20)	Clean	Wipe with clean, dry cloth

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

		b. All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths
INSPECTION				
4		a. Wiring assembly (21)	Inspect	Replace if insulation cracked or frayed, or conductors corroded or broken
		b. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged

3-11. WATER LEVEL WARNING KIT MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
5	Water level warning kit	a. Three wiring assembly (21) leads	Connect	To contact assembly (20), if removed Solder wire leads to contacts
		b. Contact assembly (20)	Position	
		c. Two screws (19), washers (18), lock washers (17), and nuts (16)	Install and	tighten
		d. Three wiring assembly (21) leads	Route	Through top cover (2) hole
		e. Torsion arm (12)	Position	
		f. Spacer (25), sleeve (24), washer (23) and screw (22)	Install	Do not tighten screw
		g. Spring holder (13)	Install	
		h. Torsion spring (11)	Install	
		i. Spring (10)	Install	
		j. Screw (22)	Tighten	Make sure torsion arm (12) is positioned correctly
		k. Washer (9)	Install	
		l. Arm assembly (8)	Install	
		m. Contact cover (15) and locknut (14)	Install	
		n. Ring (7)	Install	
		o. Two new gaskets (6)	Install	
		p. Piston (5)	Install	
		q. Cylinder (4)	Install	
		r. Bottom cover (3) and top cover (2)	Mate	
		s. 12 capscrews (1)	Install and tighten	Tighten alternately
6	Transmission cross tie	Water level sensor	Install	Para 2-29

3-12. WIRING HARNESS MAINTENANCE

a. Cab Harnesses.

(1). Upper Cab Harness. This task covers removal and installation.

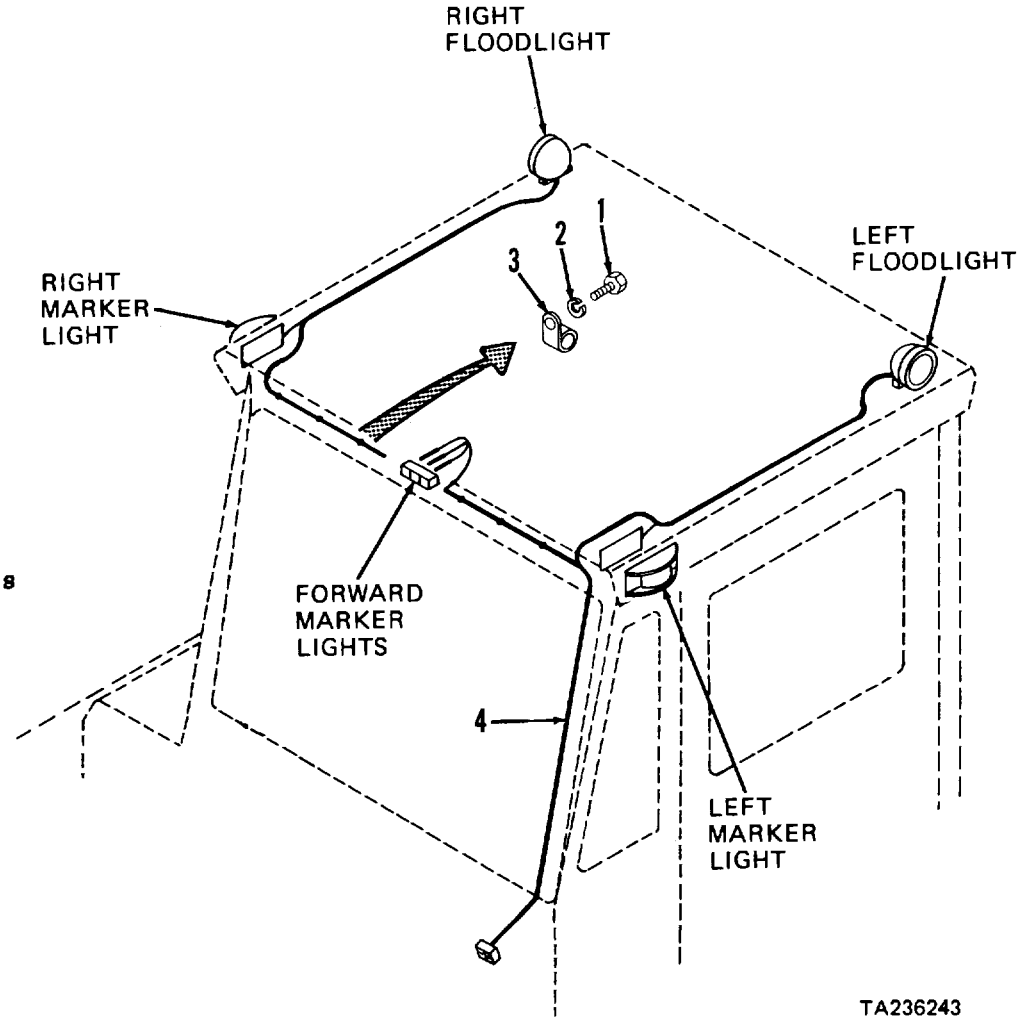
INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Screwdriver

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and parking brake applied
2-34a Battery ground cable disconnected.
2-26g(1) Instrument panel raised.



KEY

1. Screws (6)
2. Washers (6)
3. Clamps (6)
4. Upper cab harness

3-12. WIRING HARNESS MAINTENANCE (CONT) I

a. Cab Harnesses (cont).

(1). Upper Cab Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, inside	Upper cab harness (4) connector	Disconnect	Para 2-35a(1)
2	Cab ceiling	a. Roof floodlight connectors	Disconnect	Para 2-31g
		b. Marker light connectors	Disconnect	Para 2-31e
		c. Six screws (1), washers (2), and clamps (3)	Remove	From upper cab harness (4); note locations for installation
3	Cab	Upper cab harness (4)	Remove	From tractor
INSTALLATION				
4	Cab	Upper cab harness (4)	Position	
5	Cab ceiling	a. Six clamps (3), washers (2), and screws (1)	Install	On upper cab harness (4), at locations noted during removal
		b. Marker light connectors	Install	Para 2-31e
		c. Roof floodlight connectors	Install	Para 2-31g
6	Cab, inside	a. Upper cab harness (4) connector	Connect	Para 2-35a(1)
		b. Instrument panel	Lower and secure	Para 2-26g(1)
7	Battery box	Battery ground cable	Connect	Para 2-34a

3-12. WIRING HARNESS MAINTENANCE (CONT)

a. Cab Harnesses (cont).

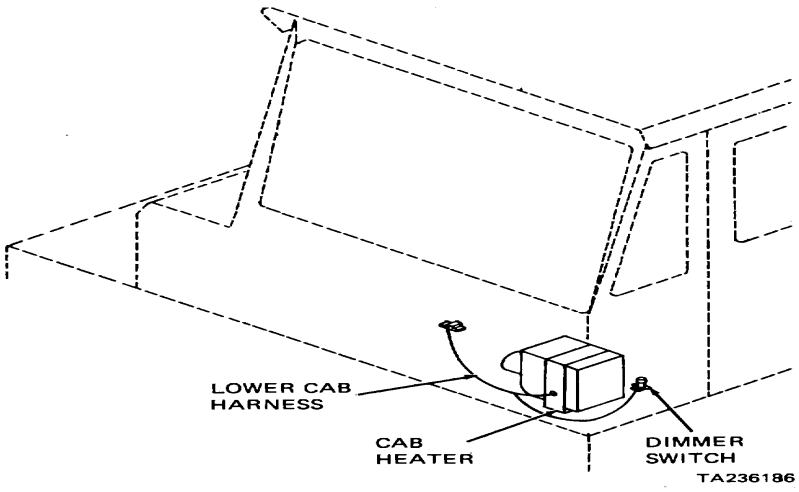
(2). Lower Cab Harness. This task covers removal and installation.

INITIAL SETUP

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

	Vehicle parked on level surface, engine off, and parking brake applied.
2-34a	Battery ground cable disconnected.
2-26g(1)	Instrument panel raised.



STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, inside	Lower cab harness	a Disconnect b Remove	Para 2-35a(2) From cab
INSTALLATION				
2	Cab, inside	a Lower cab harness b Instrument panel	a Position b Connect Lower and secure	In cab Para 2-35a(2) Para 2-26g(1)
3	Battery box	Battery ground cable	Connect	Para 2-34a

3-12. WIRING HARNESS MAINTENANCE (CONT)I

b Chassis Harnesses.

(1). Front Chassis Harness. This task covers removal and installation.

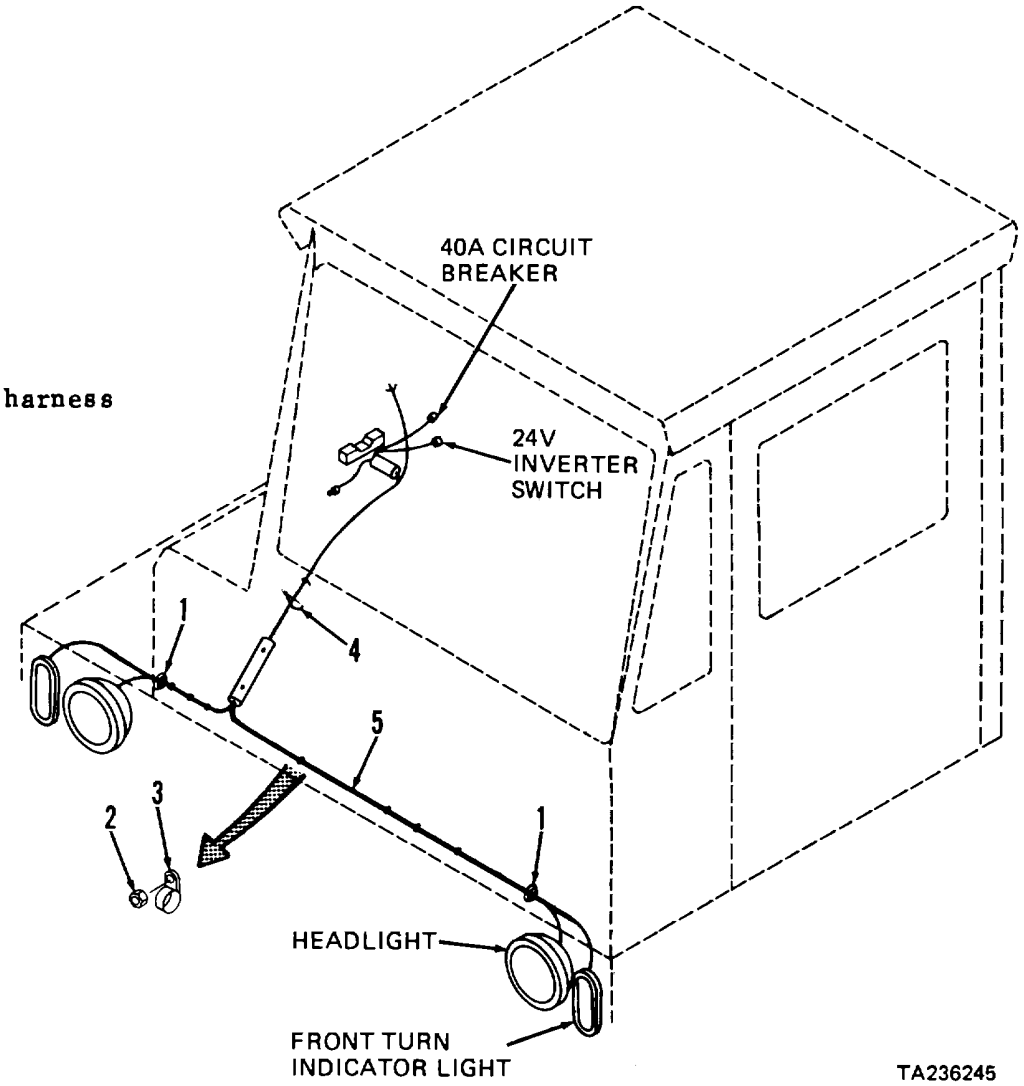
INITIAL SETUP

Tools Equipment Condition
No 1 Common Organizational Maintenance Tool Kit
Combination wrench set

Materials/Parts
Tie straps FSCM 96906 PN MS3667-1-9

Personnel Required
Automotive Repairer MOS 63H

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees.
2-34a	Battery ground cable disconnected.



13-12. WIRING HARNESS MAINTENANCE (CONT)

b. Chassis Harnesses (cont).

(1). Front Chassis Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, under hood	Front chassis harness connectors	Disconnect	Para 2-35b(1)
2	Tractor front	a. Headlights	a Remove b Disconnect	Para 2-31a
		b. Front turn indicator lights	a Remove b Disconnect	Para 2-31d
3	Cab, underside	24V INVERTER switch black/ yellow electrical lead	Disconnect	Para 2-26a(9)
4	Corner instrument panel, underside	40A circuit breaker brown/ orange electrical lead	Disconnect	Para 2-26e
5	24V inverter	a. Three 24V inverter electrical leads	Disconnect para 2-30	From GND.-, BAT.+, and IGN. terminals of 24V inverter,
		b. Six 15A circuit breaker electrical leads	Disconnect	From same side of circuit breakers, para 2-30
		c. White (ground) wire	Disconnect	Para 2-30
6	Engine compartment rear grille	Windshield washer pump and reservoir brown/ blue electrical lead	Disconnect	Para 2-69c
7	Front chassis harness	a. Two grommets (1)	Remove	Note location for installation
		b. 13 nuts (2) and clamps (3)	Remove	Note location for installation
		c. Tie straps (4)	Cut, remove, and discard	As necessary; note locations for installation

13-12. WIRING HARNESS MAINTENANCE (CONT)

b. Chassis Harnesses (cont).

(1). Front Chassis Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
8	Cab	Front chassis harness (5)	Remove	From tractor
INSTALLATION				
9	Cab	Front chassis harness (5)	Position	
10	Front chassis harness	a. New tie straps (4)	Install	At locations noted during removal
		b. 13 clamps (3) and nuts (2)	Install and tighten	At locations noted during removal
		c. Two grommets (1)	Install	At locations noted during removal
11	Engine compartment rear grille	Windshield washer pump and reservoir brown/ blue electrical lead	Connect	Para 2-69c
12	24V inverter	a. Six 15A circuit breaker electrical leads	Connect	Para 2-30
		b. Three 24V inverter electrical leads	Connect	Para 2-30
		c. White (ground) wire	Connect	Para 2-30
13	Corner instrument panel, underside	40A circuit breaker brown/orange electrical lead	Connect	Para 2-26e
14	Cab, underside	24V INVERTER switch black/ yellow electrical lead	Connect	Para 2-26a(9)

13-12. WIRING HARNESS MAINTENANCE (CONT) I

b. Chassis Harnesses (cont).

(1). Front Chassis Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
15	Tractor front	a. Front turn indicator lights	a. Connect b. Install	Para 2-31d
		b. Headlights	a. Connect b. Install	Para 2-31a
16	Cab, under hood	Front chassis harness connectors	Connect	Para 2-35b(1)
17	Cab tilt pump	Cab Lower	To normal operating position	
18	Battery box	Battery ground cable	Connect	Para 2-34a

13-12. WIRING HARNESS MAINTENANCE (CONT)

b. Chassis Harnesses (cont).

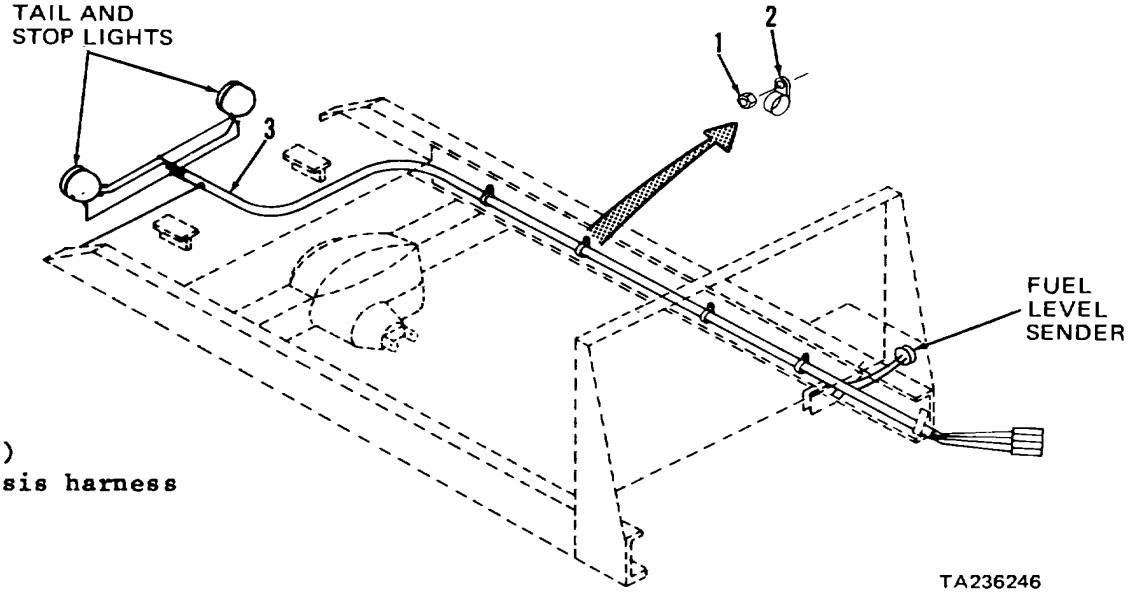
(2). Rear Chassis Harness. This task covers removal and installation.

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Combination wrench set

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description
Vehicle parked on level surface, engine off, and parking brake applied. Fifth wheel boom raised. Cab tilted 45 degrees.
2-34a Battery ground cable disconnected.



KEY

1. Nuts (4)
2. Clamps (4)
3. Rear chassis harness

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Tractor, underside	a. Rear chassis harness (3) connector	Disconnect	Para 2-35b(2)
		b. Fuel level sender white and yellow/ black electrical leads	Disconnect	Para 2-32b

13-12. WIRING HARNESS MAINTENANCE (CONT) I

b Chassis Harnesses (cont).

(2). Rear Chassis Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Tractor rear	a. White ground lead	Disconnect	From tractor protection valve mounting hardware; para 3-24h
		b. Tail and stop lights	a Remove b Disconnect	Para 2-31b
3	Left frame rail	a. Four nuts (1) and clamps (2)	Remove	
		b. Rear chassis harness (3)	Remove	From tractor
INSTALLATION				
4	Left frame rail	a. Rear chassis harness (3)	Position	
		b. Four clamps (2) and nuts (1)	Install	
5	Tractor rear	a. Tail and stop lights	a Connect b Install	Para 2-31b
		b. White ground lead	Connect	Use tractor protection valve mounting hardware; para 3-24h
6	Tractor, underside	a. Fuel level sender white and yellow/ black electrical leads	Connect	Para 2-32b
		b. Rear chassis harness (3) connector	Connect	Para 2-35b(2)
7	Cab tilt pump	Cab Lower	To normal operating position	
8	Battery box	Battery ground cable	Connect	Para 2-34a
9	Cab	Fifth wheel boom	Lower fully	

13-12. WIRING HARNESS MAINTENANCE (CONT) I

c. Instrument Panel Harnesses.

(1). Front Panel Harness. This task covers removal and installation.

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Combination wrench set
Screwdriver
parking brake applied.
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and

2-34a Battery ground cable disconnected,
2-26g(1) Instrument panel with harness removed from tractor.

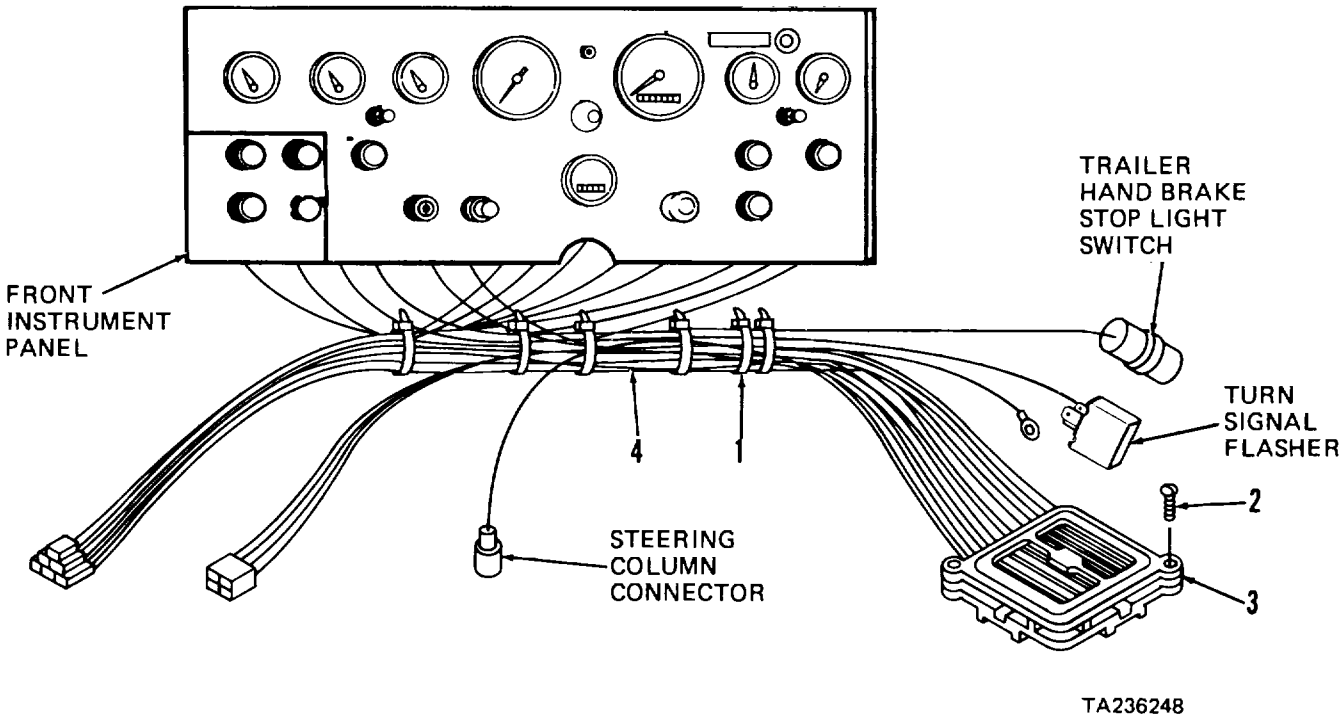
KEY

1 Tie straps

2 Capscrews (2)

3 Fuse block and bulkhead connector

4 Front panel harness



TA236248

13-12. WIRING HARNESS MAINTENANCE (CONT) I

c. Instrument Panel Harnesses (cont).

(1). Front Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Instrument panel, underside	a. Turn signal flasher	Unplug	Para 2-26a(10)
		b. Six ignition switch electrical leads	Disconnect	Para 2-26a(1)
		c. Two engine stop switch electrical leads	Disconnect	Para 2-26a(3)
		d. Four dash light electrical leads	Disconnect	Para 2-26d(2)
		e. Three blower switch electrical leads	Disconnect	Para 2-26a(8)
		f. Three hourmeter electrical leads	Disconnect	Para 2-88
		g. Two quick start switch electrical leads	Disconnect	Para 2-26a(2)
		h. Two windshield washer switch electrical leads	Disconnect	Para 2-69c
		i. Four headlight switch electrical leads	Disconnect	Para 2-26a(4)
		j. Two trailer light switch electrical leads	Disconnect	Para 2-26a(7)
		k. FUEL gage and circuit board	a. Disconnect leads	Para 2-26b(3)
			b. Remove circuit board	Para 2-26b(3)
		l. TRANS/TORQUE CONVERTER light socket	Unplug	Para 2-26b(2)

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(1). Front Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)		m. High beam indicator light socket	Unplug	Para 2-26b(1)
		n. Three tachometer electrical leads	Disconnect	Para 2-86
		o. AIR PRESS gage, FUEL gage, speedometer, tachometer, OIL PRESS gage, WATER TEMP gage, and voltmeter gage light sockets	Unplug	Para 2-26d(1)
		p. Two WATER TEMP gage electrical leads	Disconnect	Para 2-87d
		q. Two voltmeter electrical leads	Disconnect	Para 2-26f
		NOTE Do not remove tie straps (1) unless necessary to remove front panel harness (4) from front panel.		
		r. Tie straps (1)	Cut, remove, and discard	As necessary; note locations for installation
		s. Front panel harness (4)	Remove	From instrument panel
INSTALLATION				
2	Instrument panel, underside	a. Turn signal flasher	Connect	Para 2-26a(l0)
		b. Six ignition switch electrical leads	Connect	Para 2-26a(1)

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(1). Front Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
2 (cont)		c. Two engine stop switch electrical leads	Connect	Para 2-26a(3)
		d. Four dash light electrical leads	Connect	Para 2-26d(2)
		e. Three blower switch electrical leads	Connect	Para 2-26a(8)
		f. Three hour meter electrical leads	Connect	Para 2-88
		g. Two quick start switch electrical leads	Connect	Para 2-26a(2)
		h. Two windshield washer switch electrical leads	Connect	Para 2-69c
		i. Four headlight switch electrical leads	Connect	Para 2-26a(4)
		j. Two trailer light switch electrical leads	Connect	Para 2-26a(7)
		k. FUEL gage and circuit board board	a. Install circuit	Para 2-26b(3)
			b. Connect leads	Para 2-26b(3)
		l. TRANS/TORQUE CONVERTER light socket	Install	Para 2-26b(2)
		m. High beam indicator light socket	Install	Para 2-26b(1)
		n. Three tachometer electrical leads	Connect	Para 2-86

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(1). Front Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
2 (cont)		o. AIR PRESS gage, FUEL gage, speedometer, tachometer, OIL PRESS gage, WATER TEMP gage, and voltmeter gage light sockets	Install	Para 2-26d(1)
		p. Two WATER TEMP gage electrical leads	Connect	Para 2-87d
		q. Two voltmeter electrical leads	Connect	Para 2-26f
		r. New tie straps (1)	Install	At locations noted during removal
3	Cab, inside	Front panel with front panel harness (4)	Install	Para 2-26g(1)
4	Battery box	Battery ground cable	Connect	Para 2-34a

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(2). Right Corner Panel Harness. This task covers removal and installation.

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Tool kit, electrical connector
Crimping tool
Wire stripper

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description
Vehicle parked on level surface, engine off, and parking brake applied.
Cab tilted 45 degrees.
2-34a Battery ground cable disconnected.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab	Right corner panel harness (2) connectors	Disconnect	Para 2-35c(2)
2	Instrument panel, underside	a. Ammeter light socket	Unplug	Para 2-26d(1)
		b. WATER LEVEL, WATER TEMP, OIL PRESSURE, and LOW AIR warning light sockets (3)	Unplug	Para 2-26b(4)
		c. Three flood light switch electrical leads	Disconnect	Para 2-26a(6)
		d. Six connectors (1)	Unplug 2-35	From three diodes, para f. Remove diodes
		e. Two water level warning bell electrical leads	Disconnect	Para 2-26c(1)
3	Cab	Right corner panel harness (2)	Remove	From tractor

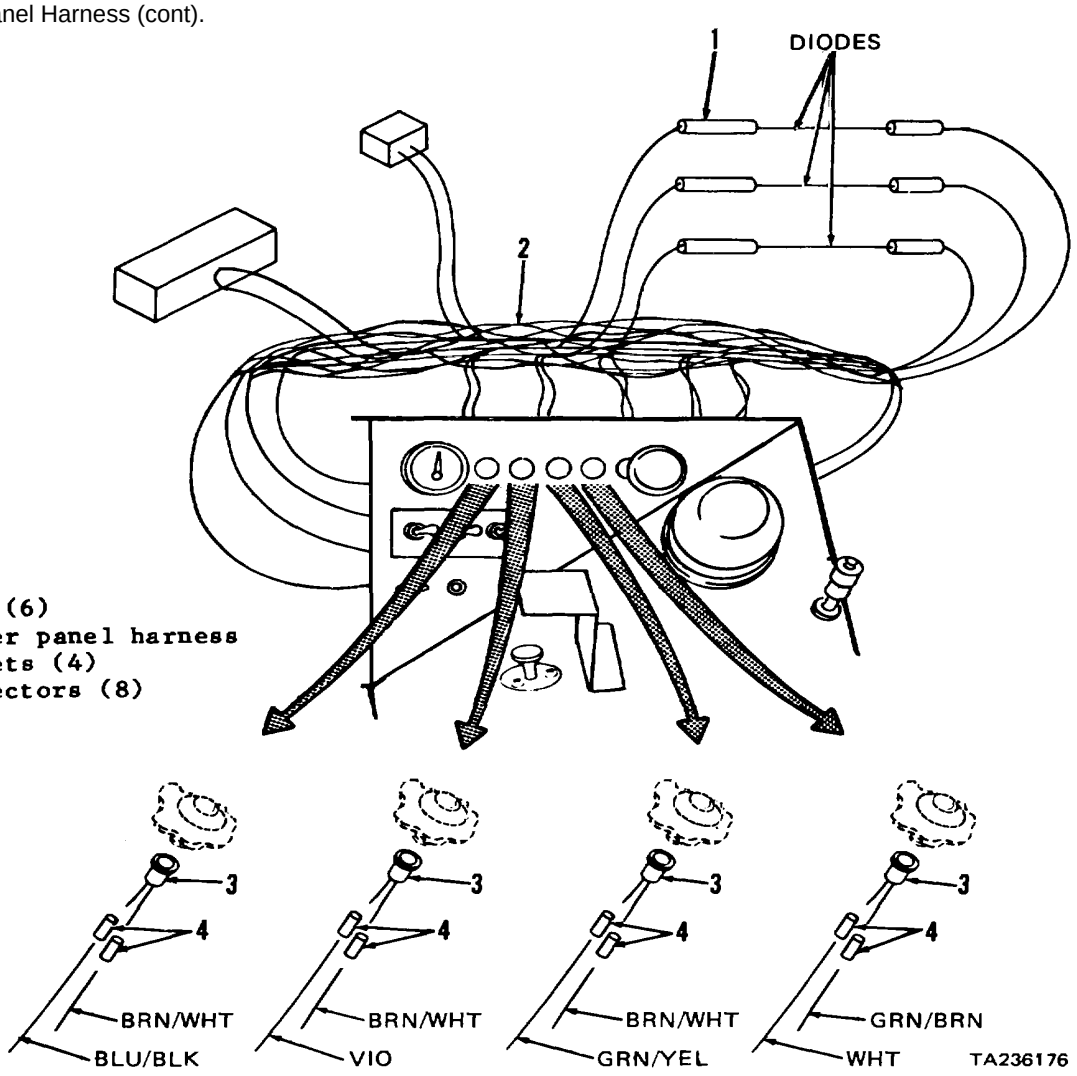
NOTE

Perform step 4 below only if necessary to replace right corner panel harness (2).

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(2). Right Corner Panel Harness (cont).



KEY

1. Connectors (6)
2. Right corner panel harness
3. Light sockets (4)
4. Crimp connectors (8)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
4	Right corner panel harness (2)	Four light sockets (3)	a. Remove	Cut light socket leads as close to crimp connectors (4) as possible
			b. Save	For installation on new right corner panel harness (2)

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(2). Right Corner Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
		NOTE		
		Perform step 5 below only if new right corner panel harness (2) is being installed.		
5	New right corner panel harness (2)	Four light sockets (3) b. Connect	a. Strip	Strip 1/4 inch insulation from wire ends To right corner panel harness leads as shown with crimp connectors (4)
6	Cab	Right corner panel harness (2)	Position	
7	Instrument panel, underside	a. Ammeter light socket	Install	Para 2-26d(1)
		b. WATER LEVEL, WATER TEMP, OIL PRESSURE, and LOW AIR warning light sockets (3)	Install	Para 2-26b(4)
		c. Three flood light switch electrical leads	Connect	Para 2-26a(6)
		d. Six connectors (1)	Connect	To three diodes, para 2-35f
		e. Two water level warning bell electrical leads	Connect	Para 2-26c(1)
8	Cab	Right corner panel harness (2) connectors	Connect	Para 2-35c(2)
9	Cab tilt pump	Cab Lower	To normal operating position	
10	Battery box	Battery ground cable	Connect	Para 2-34a.

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(3). Right Panel Harness. This task covers removal and installation.

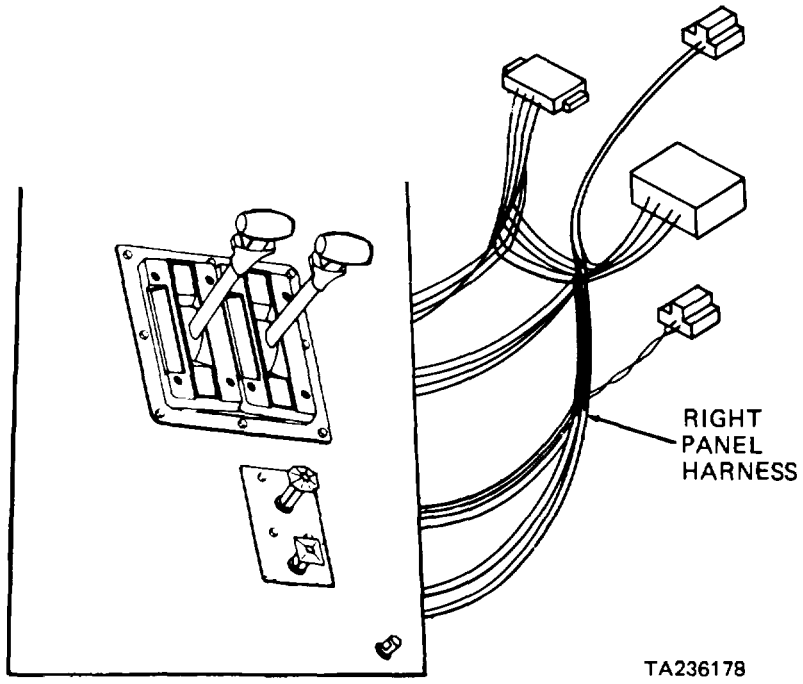
INITIAL -SETUP

Materials/Parts
Tags Item 14, Appendix C
Electrical tape Item 37, Appendix C

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and parking brake applied.
2-34a Battery ground cable disconnected.
Cab tilted 45 degrees.



STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, under hood	Right panel harness connectors	Disconnect	Para 2-35c(3)
2	Instrument panel, underside	a. Two dash light electrical leads	Disconnect	Para 2-26d(2)

13-12. WIRING HARNESS MAINTENANCE (CONT)

c. Instrument Panel Harnesses (cont).

(3). Right Panel Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2 (cont)		b. Three low air switch electrical leads	Disconnect	Para 2-51c
		c. Two low air pressure buzzer electrical leads	Disconnect	Para 2-26c(2)
		d. White ground lead	Disconnect	Para 2-41g(2)
		e. Right panel harness	Remove	From tractor
INSTALLATION				
3	Instrument panel, underside	a. Right panel harness	Position	
		b. Two dash light electrical leads	Connect	Para 2-26d(2)
		c. Three low air switch electrical leads	Connect	Para 2-51c
		d. White ground lead	Connect	Para 2-41g(2)
		e. Two low air pressure buzzer electrical leads	Connect	Para 2-26c(2)
		f. Loose end of BRN/WHT electrical lead	Tape	Wrap end with electrical tape to prevent short circuit
4	Cab, under hood	Right panel harness connectors	Connect	Para 2-35c(3)
5	Cab tilt pump	Cab Lower	To normal operating position	
6	Battery box	Battery ground cable	Connect	Para 2-34a.

13-12. WIRING HARNESS MAINTENANCE (CONT)

d. Engine Harness. This task covers removal and installation.

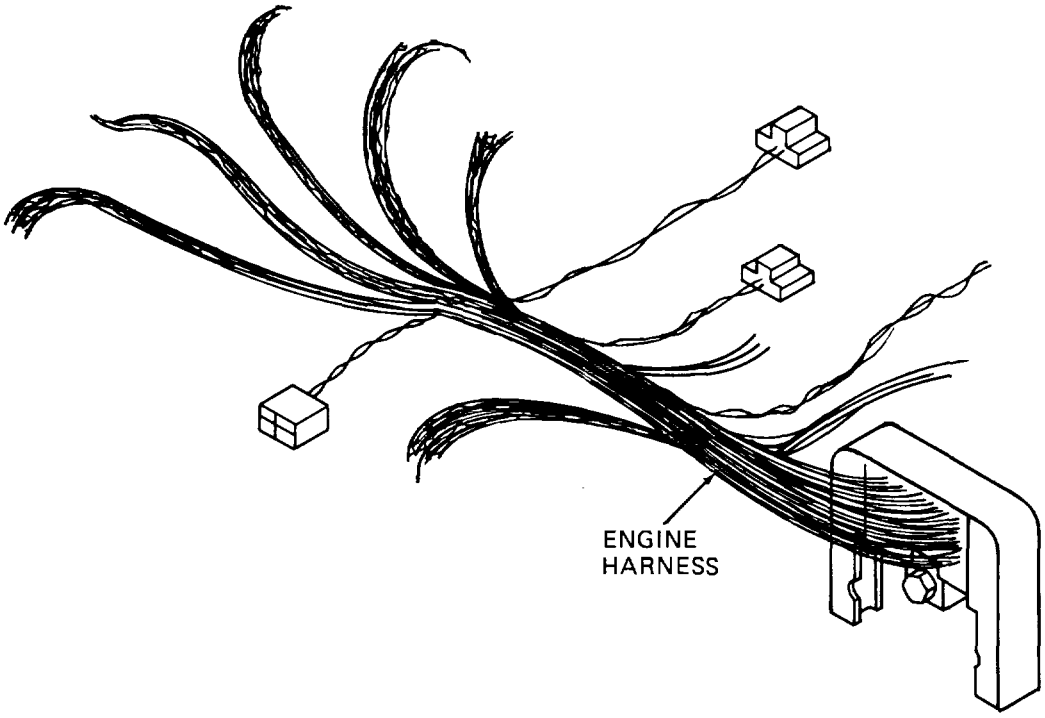
INITIAL SETUP

Materials/Parts
Tags — Item 14, Appendix C
Tie straps — FSCM 96906 PN MS3667-2-9

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and parking brake applied. Cab tilted 45 degrees.
2-34a. Battery ground cable disconnected.
2-65d. Heat shield removed.



TA236381

13-12. WIRING HARNESS MAINTENANCE (CONT)

d. Engine Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Tractor	Engine harness connectors	Disconnect	Para 2-35d
2	Corner panel, underside	Ammeter red electrical lead and three 40A circuit breaker orange electrical leads	Disconnect	Para 2-26e
3	Right panel, underside	Low air switch red electrical lead	Disconnect	Para 2-51c
4	Left hand frame rail	a Service brakes stop light switch electrical leads	Disconnect	Para 2-32f(1)
		b Rear chassis harness	Tag and disconnect	Para 2-35b(2)
5	Right hand frame rail	a Two horn relay electrical leads	Disconnect	Para 2-33a
		b Nut, lock washer, and white ground lead	Remove location for installation	From frame rail stud; note
6	Engine	a Thermal switch electrical leads and harness plug	Disconnect	Pars 2-15e
		b Water temperature sender electrical lead	Disconnect	Green/black lead; pars 2-32c
		c Alarmstat electrical lead	Disconnect	Violet lead; para 2-32c
		d Oil pressure sender and sensor electrical leads	Disconnect	Pars 2-32a
		e Solenoid and 70A circuit breaker electrical leads	Disconnect	Red and tan/green leads; pars 2-25a

13-12. WIRING HARNESS MAINTENANCE (CONT)

d. Engine Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
6 (cont)		f Alternator electrical leads	Disconnect	Para 2-24
		g Tachometer sender electrical leads	Disconnect	White, gray, and gray/black leads; para 2-86
		h Water level sensor electrical leads	Disconnect	Para 2-29
		i Ether valve electrical leads	Disconnect	Para 2-13d
		j Engine stop solenoid electrical leads	Tag and disconnect	
		k Transmission temperature sender electrical leads	Disconnect	Para 2-32d
		l Capscrew, lock washer, and white ground lead	Remove	From left hand thermostat housing; note location for installation
7	Rear cab guard	Rear floodlight connector	Disconnect	Para 2-31g
8	Tractor	a Tie straps	Cut, remove, and discard	As necessary to remove engine harness
		b Engine harness	Remove	From tractor
INSTALLATION				
9	Tractor	a Engine harness	Position	As noted during removal
		b New tie straps	Install	If removed
10	Rear cab guard	Rear floodlight connector	Connect	Para 2-31g
11	Engine	a Thermal switch electrical leads and harness plug	Connect	Para 2-15e

13-12. WIRING HARNESS MAINTENANCE (CONT)

d. Engine Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
11 (cont)		b Water temperature sender electrical lead	Connect	Green/black lead; para 2-32c
		c Alarmstat electrical lead	Connect	Violet lead; para 2-32c
		d Oil pressure sender and sensor electrical leads	Connect	Para 2-32a
		e Solenoid and 70A circuit breaker electrical leads	Connect	Red and tan/green leads; para 2-25a
		f Alternator electrical leads	Connect	Para Z-24
		g Tachometer sender electrical leads	Connect	White, gray, and gray/black leads; para 2-86
		h Water level sensor electrical leads	Connect	Para 2-29
		i Ether valve electrical leads	Connect	Para 2-13d
		j Engine stop solenoid electrical leads	Connect	As tagged
		k Transmission temperature sender electrical leads	Connect	Para 2-32d
		l White ground lead, lock washer, and capscrew	Install and tighten	On left hand thermostat housing at location noted during removal
12	Right hand frame rail	a Two horn relay electrical leads	Connect	Para 2-33a

13-12. WIRING HARNESS MAINTENANCE (CONT)

d. Engine Harness (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
12 (cont)		b White ground lead, lock washer, and nut	Install and tighten	On frame rail stud at location noted during removal
13	Left hand frame rail	a Service brakes stop light switch electrical leads	Connect	Para 2-32f(1)
		b Rear chassis harness	Connect	Para 2-35b(2)
		c Heat shield	Install	Para 2-65d
14	Right panel, underside	Low air switch red electrical lead	Connect	Para 2-51c
15	Corner panel, underside	Ammeter red electrical lead and three 40A circuit breaker orange electrical leads	Connect	Para 2-26e
16	Tractor	Engine harness connectors	Connect	Para 2-35d
17	Cab tilt pump	Cab Lower	To normal operating position	
18	Battery box	Battery ground cable	Connect	Para 2-34a

Section III. POWER TRAIN MAINTENANCE

This section contains the information you need to maintain the:

- Transmission including Torque Converter * Front Axle
- Rear Axle

It gives you instructions on how to troubleshoot problems, and repair or replace the components that are within the scope of direct support maintenance.

3-13. TROUBLESHOOTING SYMPTOM INDEX

13-13. TROUBLESHOOTING SYMPTOM INDEX (CONT)

13-14. TRANSMISSION TROUBLESHOOTING I

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. TRANSMISSION FLUID IS MILKY

Inspect engine radiator and transmission oil cooler tank for evidence of damage or wear which allows coolant to contaminate transmission fluid.

a. If such damage or wear is found, repair or replace radiator and transmission oil cooler tank (para 3-5a). If transmission fluid continues to appear milky, notify general support maintenance.

b. If no such damage or wear is found, notify general support maintenance.

2. TRANSMISSION OVERHEATING

Check transmission oil cooler tank and engine radiator for clogged fins or obstructions, leakage, or damage.

a. If oil cooler or radiator fins are clogged, clean; if fins are obstructed, remove obstructions. If transmission oil cooler tank or radiator is leaking or damaged, repair or replace (para 3-5a).

b. If transmission oil cooler tank and radiator are not clogged, obstructed, leaking, or damaged, notify general support maintenance.

13-14. TRANSMISSION TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. LOW LUBRICATION PRESSURE

Step 1. Check fluid level on transmission dipstick with transmission at operating temperature and engine operating.

a. If fluid level is below ADD mark, add fluid (para 2-41b) to FULL mark.

b. If fluid level is not below ADD mark, proceed to step 2 below.

Step 2. Examine transmission cooler hoses for leakage or restriction.

a. If cooler hoses are leaking or restricted, replace and, if necessary, reroute (para 2-41e).

b. If cooler hoses are not leaking or restricted, proceed to step 3 below.

Step 3. Examine external oil filter for blockage.

a. If external filter is restricted, replace (para 2-41e).

b. If external filter is not restricted, notify general support maintenance.

4. LOW MAIN PRESSURE IN ALL RANGES (less than 125 psi with vehicle at 600 rpm idle, in forward drive range, brakes applied) (para 3-17a(2)).

Step 1. Check fluid level on transmission dipstick with transmission at operating temperature and engine operating.

a. If fluid level is below ADD mark, add fluid (para 2-41b) to FULL mark.

b. If fluid level is above ADD mark and at or below FULL mark, proceed to step 2 below.

Step 2. Drain fluid, remove transmission oil pan (para 2-41b), and remove oil filter (para 2-41c). Examine oil filter.

a. If oil filter is clogged, replace (para 2-41c).

b. If oil filter is not clogged, proceed to step 3 below.

3-14. TRANSMISSION TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4. LOW MAIN PRESSURE IN ALL RANGES (Cont)

Step 3. Examine seal ring on oil filter tube.

a. If seal ring is leaking or missing, replace (para 2-41c).

b. If seal ring is not leaking or missing, notify general support maintenance.

5. NO RESPONSE TO SHIFT LEVER MOVEMENT

Perform main pressure check to see if pressure is low (less than 125 psi with vehicle at 600 rpm idle, in forward range, brakes applied) (para 3-17a(2)).

a. If main pressure is low, refer to Malfunction 4 above.

b. If main pressure is not low, notify general support maintenance.

6. ALL AUTOMATIC SHIFTS OCCUR AT TOO HIGH SPEED

Drain fluid and remove oil pan (para 2-41b). Check if shift valve adjusting rings are properly set.

a. If shift valve adjusting rings are not properly set, adjust them higher the appropriate amount (para 3-17b). If more than one ring is moved in the same direction, move the adjusting ring on the modulator the same amount in the same direction.

b. If shift valve adjusting rings are properly set, notify general support maintenance.

7. INDIVIDUAL SHIFT (2-3, 3-4, 4-5) OCCURS AT TOO HIGH SPEED

Drain fluid and remove oil pan (para 2-41b). Check if adjusting ring for malfunctioning shift is positioned correctly.

a. If adjusting ring is not positioned correctly, reposition it to reduce shift point speed the appropriate amount (para 3-17b).

b. If adjusting ring is positioned correctly, notify general support maintenance.

3-14. TRANSMISSION TROUBLESHOOTING (CONT)I

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. ALL AUTOMATIC SHIFTS OCCUR AT TOO LOW SPEED

Drain fluid and remove oil pan (para 2-41b). Check if shift valve adjusting rings are properly set.

a. If shift valve adjusting rings are not properly set, adjust them higher the appropriate amount (para 3-17b). If more than one ring is moved in the same direction, move the adjusting ring on the modulator the same amount in the same direction.

b. If shift valve adjusting rings are properly set, notify general support maintenance.

9. INDIVIDUAL SHIFT (2-3, 3-4, 4-5) OCCURS AT TOO LOW SPEED

Drain fluid and remove oil pan (para 2-41b). Check if adjusting ring for malfunctioning shift is positioned correctly.

a. If adjusting ring is not positioned correctly, reposition ring to increase shift point speed the appropriate amount (para 3-17b).

b. If adjusting ring is positioned correctly, notify general support maintenance.

10. SLOW OR ERRATIC SHIFTING

Perform main pressure-check (para 3-17a(2)).

a. If main pressure is low (less than 125 psi with vehicle at 600 rpm idle in forward drive range, brakes applied), refer to Malfunction 4 above.

b. If main pressure is not low, notify general support maintenance.

11. ROUGH SHIFTING

Check position of spring adjusting ring on modulator valve assembly.

a. If position of spring adjusting ring is not correct, adjust (para 3-17b).

b. If position of spring adjusting ring is correct, notify general support maintenance.

3-14. TRANSMISSION TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

12. CLUTCH SLIPPAGE IN ALL FORWARD GEARS

Perform main pressure test (para 3-17a(2)).

a. If main pressure is low (less than 125 psi with vehicle at 600 rpm idle, in forward range, brakes applied), refer to Malfunction 4 above.

b. If main pressure is not low, notify general support maintenance.

13. EXCESSIVE CREEP IN FIRST AND REVERSE

Check idle throttle setting.

a. If setting is too high, adjust idle throttle setting lower (refer to TM 9-2815-205-34 to tune engine).

b. If setting is not too high, notify general support maintenance.

14. INSUFFICIENT CREEP IN FIRST AND REVERSE

Check idle setting.

a. If setting is too low, adjust higher (refer to TM 9-2815-205-34 to tune engine).

b. If setting is not too low, notify general support maintenance.

15. EXCESSIVE VIBRATION

Examine all mounting capscrews for looseness.

a. If capscrews are loose, tighten (para 3-17c(2)).

b. If capscrews are not loose, notify general support maintenance.

16. HIGH STALL SPEED (para 3-17a(3))

Check fluid level on transmission dipstick with transmission at operating temperature and engine operating.

a. If fluid is below ADD mark, add fluid (para 2-41b) to FULL mark. -_-

b. If fluid level is above ADD mark and at or below FULL mark, notify general support maintenance.

3-14. TRANSMISSION TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

17. LOW STALL SPEED (para 3-17a(3))

Examine engine for inadequate performance.

a. If performance is poor, repair or replace parts causing problems (refer to TM 9-2815-205-34 for repair and replacement of engine components).

b. If performance is adequate, notify general support maintenance.

13-15. FRONT AXLE TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. RAPID OR UNEVEN TIRE WEAR

Check toe-in setting (para 3-28c).

a. If toe-in not properly adjusted, adjust (para 3-28c).

b. If toe-in properly adjusted, proceed to Malfunction 2 below.

2. HARD STEERING

Step 1. Check that knuckle pins are adequately lubricated.

a. If knuckle pins are not adequately lubricated, lubricate (para 2-43a).

b. If knuckle pins are adequately lubricated, proceed to step 2 below.

Step 2. Check steering knuckle end play (para 3-18).

a. If end play is excessive, repair as necessary (para 3-18).

b. If end play is within acceptable range, troubleshoot steering system (para 3-27).

3-15. FRONT AXLE TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. CROSS TUBE ENDS WEAR RAPIDLY

Step 1. Check that tie rod ends are adequately lubricated.

a. If not adequately lubricated, lubricate (para 3-28c).

b. If adequately lubricated, proceed to step 2 below.

Step 2. Check if protective boots on tie rod ends are damaged.

a. If damaged, replace tie rod ends (para 3-28c).

b. If not damaged, check front axle toe-in setting (para 3-28c).

4. STEERING ARM BALL STUD HEAVILY WORN

Step 1. Check that front axle is adequately lubricated.

a. If not adequately lubricated, replace steering arm ball (para 3-18) and lubricate axle (para 2-43a).

b. If adequately lubricated, proceed to step 2 below.

Step 2. Check if steering link is over tightened.

a. If over tightened, loosen (para 3-28e).

b. If not over tightened, check front axle for binding and repair or replace as necessary (para 3-18).

5. KNUCKLE PINS AND BUSHINGS WORN EXCESSIVELY

Check that scheduled lubrication of these parts is performed as specified in para 2-43a and that correct lubricant is used.

Lubricate at interval specified in current lubrication order; use correct lubricant.

6. FRONT AXLE SHIMMYS OR VIBRATES

Check steering knuckle end play (para 3-18).

a. If end play is excessive, repair as necessary (para 3-18).J

b. If end play is within acceptable range, replace damaged front wheels (para 2-57) or adjust or replace front axle hubs (para 2-43b).

3-16. REAR AXLE TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

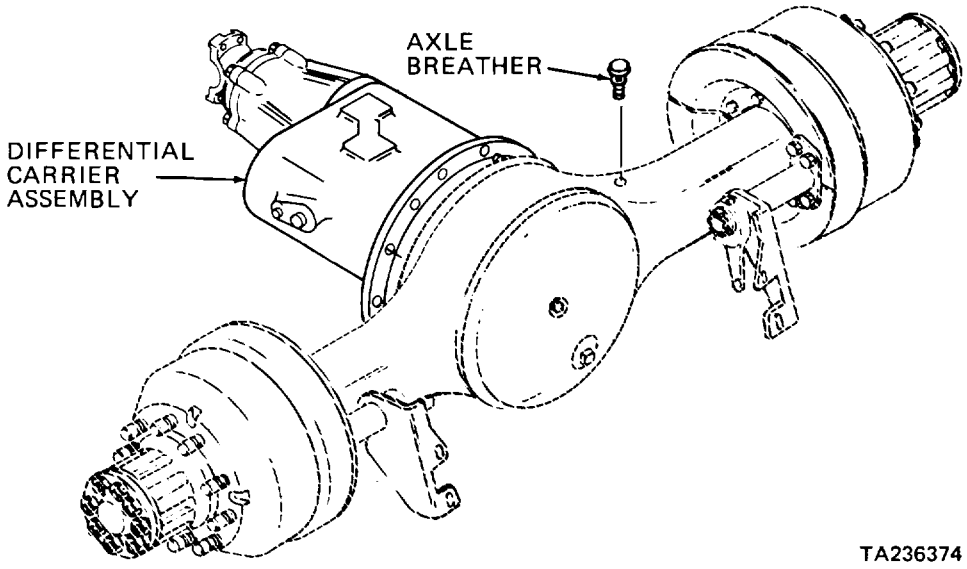
1. LUBRICANT LEAKING FROM DIFFERENTIAL CARRIER ASSEMBLY

Step 1. Check axle breather for damage or clogged condition.

a. If axle breather is damaged or clogged, clean or replace it.

b. If axle breather is not damaged or clogged, proceed to step 2 below.

Step 2. Check if lubricant is leaking between axle housing and differential carrier assembly.



a. If lubricant is leaking between axle housing and differential carrier assembly, remove differential carrier assembly, clean mating surfaces, apply sealant, and reinstall (para 3-19b).

b. If lubricant is not leaking between axle housing and differential carrier assembly, notify general support maintenance.

3-17. TRANSMISSION MAINTENANCE

a. Testing.

(1) Road Test.

This task covers road testing of the tractor to verify proper transmission operation.

INITIAL SETUP:

Materials/Parts
Note pad
Pen

Personnel Required
Wheel Vehicle Mechanic MOS 63B

Equipment Condition
Paragraph Condition Description

Parked on level surface; parking brake applied; engine off.

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING				
1	Tractor cab	a. Engine	Start	
		b. Brakes	Release	
		c. Tractor	Operate	Operate the tractor in all positions of the gear shift lever to check for slipping and variations in shifting. Note whether the shifts are harsh or spongy. Record this information on your note pad. Observe closely for slipping or engine speed flareups. Record this information
		NOTE		
		Slipping or flareup in any gear range usually indicates clutch problems.		
		d. Gear shift lever	Position	Place gear shift lever in the drive (2-5) position so that all automatic upshifts can occur

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(1) Road Test (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
		CAUTION		
		The 1-2 upshift is a manual shift, and will not be tested. Do not operate tractor at full throttle when gear shift lever is in 1st gear (creeper) range.		
e	Tractor		Drive	From a standing start, drive tractor at full throttle until the 4-5 shift occurs
f	Engine speed		Note	Note and record engine speed at which each upshift occurs
g	Tractor		Park	Park tractor in designated area
h	Engine		Turn off	
i	Brakes		Apply	
j	Engine speeds to data in table below f		Compare	Compare data recorded in step
			Upshift	Engine Speed (rpm)
			2-3	2200
			3-4	2600
			4-5	2600
k	All information		Report	Report all data gathered during road test to the proper maintenance personnel

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(2) Hydraulic Pressure Test.

This task covers hydraulic pressure testing of the transmission.

INITIAL SETUP:

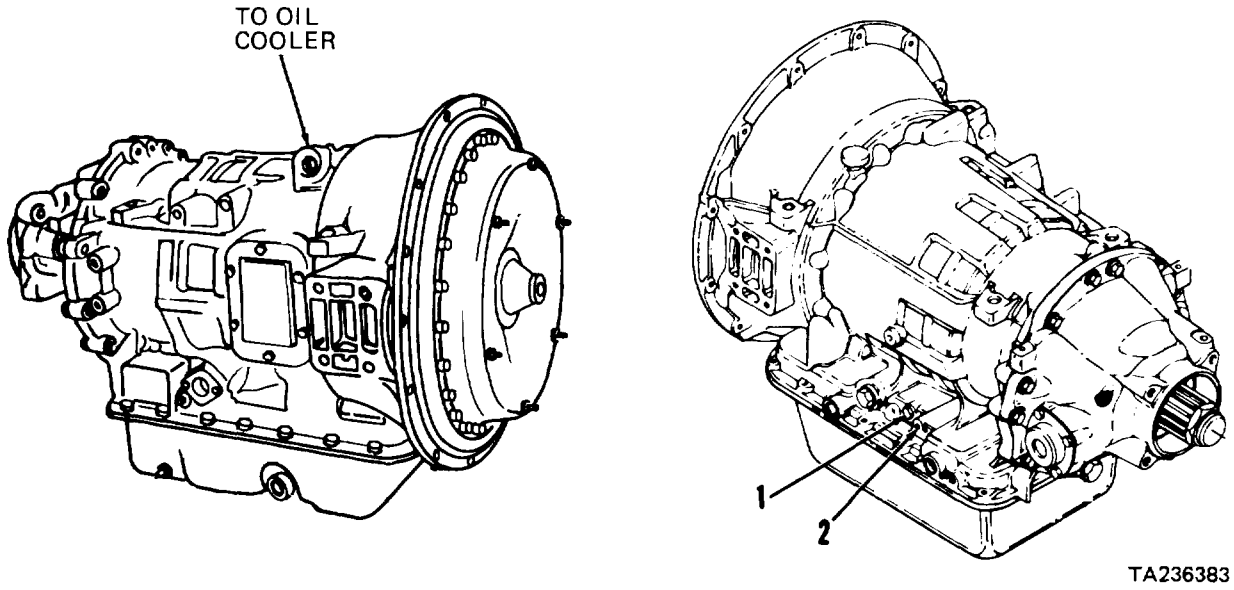
Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Fitting
Pressure gage, 190 psi capacity

Materials/Parts
Clean cloths Item 2, Appendix C
Note pad
Pen

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition
Paragraph Condition Description

Parked on level surface; engine off. Tractor frame securely fasten to an immovable object. All wheels chocked. Service brakes applied.
2-65c Rear platform removed.



KEY

1. Main pressure tap
2. Governor pressure tap

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(2) Hydraulic Pressure Test (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING				
		~~WARNING~~		
		Personal injury and property damage can result if vehicle is allowed to move during the hydraulic pressure test. Be sure tractor frame is secured to an immovable object, service brakes are applied, and all wheels are chocked before accelerating engine. Do not permit anyone to stand in front of tractor during hydraulic pressure test.		
1	Transmission, left side	a Main pressure tap (1) plug	Remove	
		b Fitting	Install	
		c Pressure gage	Install	
2	Tractor cab	Engine	Start	
3	Tractor cab	a Gear shift lever	Position	Place gear shift lever in drive (2-5) position
		b Engine	Accelerate	Accelerate engine to 600 rpm
4	Transmission, left side	Pressure gage	Observe	Gage should indicate 125 psi minimum. Record actual reading on note pad
5	Tractor cab	Engine	Accelerate	Accelerate engine to 1200 rpi
6	Transmission, left side	Pressure gage	Observe	Gage should indicate within 165-190 psi range Record actual reading on note pad
7	Tractor cab	a Engine	Decelerate	
		b Gear shift	Position	Place gear shift lever in neutral (N) position
		c Engine	Stop	
8	Transmission, left side	a Pressure gage and fitting	Remove	
		b Main pressure tap (1) plug	Install	

3-17. TRANSMISSION MAINTENANCE (CONT

a. Testing (cont).

(2) Hydraulic Pressure Test (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
8 (cont)		c Governor pressure tap (2) plug	Remove	
		d Fitting and pressure gage	Install	
9	Tractor cab	a Engine	Start	
		b Gear shift lever	Position	Place gear shift lever in drive (2-5) position
		c Engine	Accelerate	Accelerate engine to 1500 rpm
10	Transmis-sion, left side	Pressure gage	Observe	Gage should indicate within 54-58 psi range Record actual reading on note pad
11	Tractor cab	a Engine	Decelerate	
		b Gear shift lever	Position	Place gear shift lever in neutral (N) position
		c Engine	Stop	
12	Transmis-sion, left side	a Pressure gage and tee fitting	Remove	
		b Governor pressure tap (2) plug	Install	
13	Transmis-sion, right side	Tee fitting and pressure gage	Install transmission	In oil cooler line at top of
14	Tractor cab	a Engine	Start	
		b Gear shift lever	Position	Place gear shift lever in neutral (N) position
		c Engine	Accelerate	Accelerate engine to 2000 rpm
15	Transmis-sion, right side‘	Pressure gage	Observe	Gage should indicate within 23-30 psi range Record actual reading on note pad

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(2) Hydraulic Pressure Test (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
16	Tractor cab	a Engine	Decelerate	
		b Gear shift lever	Position	Place gear shift lever in neutral (N) position
		c Engine	Shut down	
17	Transmission, right side	a Pressure gage and tee fitting	Remove	
		b Oil cooler line	Connect	
18	Tractor, rear	Rear platform	Install	Para 2-65c

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(3) Transmission Stall Test.

This task covers stall testing of the tractor transmission.

INITIAL SETUP:

Materials/Parts
Note pad
Pen

Personnel Required
Wheel Vehicle Mechanic MOS 63B

References
TM 9-2815-205-34 (6V53T Diesel Engine Maintenance Manual)

Equipment Condition
Paragraph Condition Description

Parked on level surface; engine off.
Tractor frame securely fastened to an immovable object.
All wheels chocked.
Service brakes applied.

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING				
		WARNING Do not perform stall test while simply applying tractor service brakes; tractor will move at full throttle even with service brakes applied. Personal injury and property damage can result if vehicle is allowed to move during stall test. Be sure tractor frame is secured to an immovable object, service brakes are applied, and all wheels are chocked before accelerating engine. Do not permit anyone to stand in front of tractor during stall test.		
1	Tractor cab	a. Engine	a Start	

13-17. TRANSMISSION MAINTENANCE (CONT)

a. Testing (cont).

(3) Transmission Stall Test (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TESTING (cont)				
			CAUTION	
			Do not perform stall test for more than 30 seconds, due to rapid heating of transmission fluid. Overheating of fluid can damage transmission. Keep a constant check on fluid temperature leaving the torque converter and do not allow it to exceed 300 degrees F. If this temperature is reached before ending the stall test, shift transmission into neutral and run engine at 12001500 rpm for two minutes to cool transmission fluid.	
	b. Tachometer		b. Accelerate Observe	Accelerate to full throttle Tachometer reading shall be 1821 + 25 rpm
			NOTE	
			If maximum speed delivered is less than 1796 rpm, engine is not delivering full power, and should be tuned (see TM 9-2815-205-34). If maximum speed delivered is more than 1846 rpm, refer to transmission troubleshooting.	
	c. Engine		Shut down	
	d. All information		Report	Report all data gathered during transmission stall test to proper maintenance personnel

3-17. TRANSMISSION MAINTENANCE (CONT)

b. Speed Shift Adjustments.

This task covers speed shift adjustments of the transmission.

INITIAL SETUP:

Tools
Adjusting ring tool
FSCM 26095 PN J-24314

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off.
3-17a(1)	Transmission road test completed and shift points recorded.
2-41b	Transmission fluid drained and oil pan removed.
2-65c	Rear platform removed.

STEP	LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS

NOTE

Refer to data gathered in paragraph 3-17a(l) to determine requirements for speed shift adjustments.

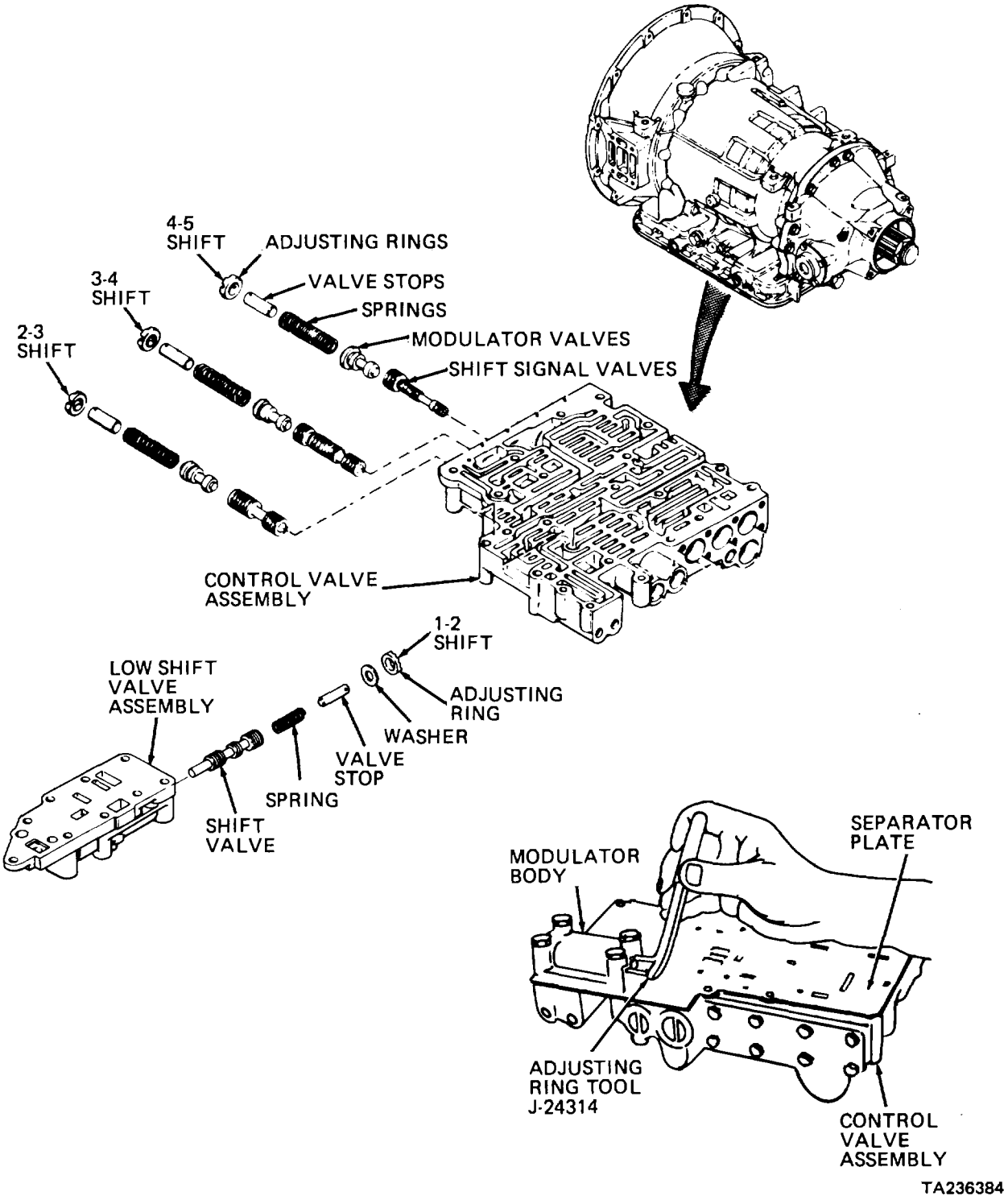
Adjust the force on only the springs for valves that do not upshift at the proper engine speed.

Clockwise rotation of adjusting rings raises shift points; counterclockwise rotation lowers shift points. Each notch of adjustment changes shift point approximately 40 rpm.

1	Shift signal valve	Adjusting ring	Adjust	Use adjusting ring tool J-24314

3-17. TRANSMISSION MAINTENANCE (CONT)

b. Speed Shift Adjustments (cont).



13-17. TRANSMISSION MAINTENANCE (CONT)

b. Speed Shift Adjustments (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT (cont)				
		NOTE If more than one shift signal valve spring requires adjustment, it may be necessary to adjust the spring force on the modulator valve one position in the same direction as adjustment for signal valves. If all upshift points are either too high or too low, by approximately the same amount, adjust the modulator valve only.		
2	Modulator valve	Adjusting ring	Adjust	Use adjusting ring tool J-24314
3	Transmission, underside	a Oil pan	Clean and install	Para 2-41b
		b Transmission fluid	Install	Para 2-41b
4	Tractor, rear	Rear platform	Install	Para 2-65c

13-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement.

(1) Summary Procedure Covering Replacement.

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance
Tool Kit
- Adjustable open end wrench
- Socket wrench set
- Adjustable auto wrench
- Retaining ring pliers
- Puller kit
- Socket head screw key set

Automotive Mechanic's Tool Kit
- Hammer
- Hammer
- Pliers
- Screwdriver
- Screwdriver
- Center punch
- Drive pin punch

Grease gun
Torque wrench, 700 pounds foot capacity
Three-strand sling
Hoist, 1000 pounds capacity
Soft hammer
Clamping type filter wrench

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Transmission fluid	Item 8, Appendix C

Personnel Required
Two Automotive Repairers MOS 63H

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(1) Summary Procedure Covering Replacement (cont).

List of Tasks

Task No.	Task	Task Ref.	Troubleshooting Ref. No. (Para)
1.	Park tractor over maintenance bay	-	-
2.	Tilt cab 45 degrees	-	2-77
3.	Remove rear platform	2-65c	2-60
4.	Drain transmission fluid and remove dipstick	2-41b	2-37
5.	Remove drive shaft	2-42	2-38
6.	Remove transmission temperature sender	2-32e	2-37
7.	Remove hoses and fittings from transmission	2-41e	2-37
8.	Remove transmission oil sampling valve	2-41j	2-37
9.	Disconnect battery ground cable	2-34a	2-18
10.	Remove hydraulic pump (lines still connected)	3-42a	3-40
11.	Remove power take-off	3-42b	3-40
12.	Disconnect gear shift linkage and lever	2-41g(1)	2-37
13.	Remove shift lockout cylinder 2-41h(2)	2-41h(1),	2-37
14.	Disconnect modulator cable	2-41i	2-37
15.	Disconnect speedometer cable; remove adapter and gear assembly	2-85	2-81
16.	Remove rear cab guard	2-65d	2-60
17.	Remove water level sensor	2-29	2-19
18.	Remove transmission dipstick tube	2-41k	2-37
19.	Remove transmission mount	3-17f	3-14

3-17. TRANSMISSION MAINTENANCE (CONT)I

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement.

This task covers the detailed procedure for replacing the transmission.

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
Combination wrench set
Socket wrench set
Automotive Mechanic's Tool Kit
Drive pin punch
Torque wrench, 700 pounds foot capacity
Three-strand sling
Hoist, 1000 pounds capacity

Materials/Parts
Transmission fluid Item 8, Appendix C
Converter retaining strap FSCM 73342 PN 6837993

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked over maintenance bay, engine off, and parking brake applied.
Cab tilted 45 degrees.
Rear of engine supported (with jack from below or chain from above).

2-29 Water level sensor removed.
2-65c Rear platform removed.

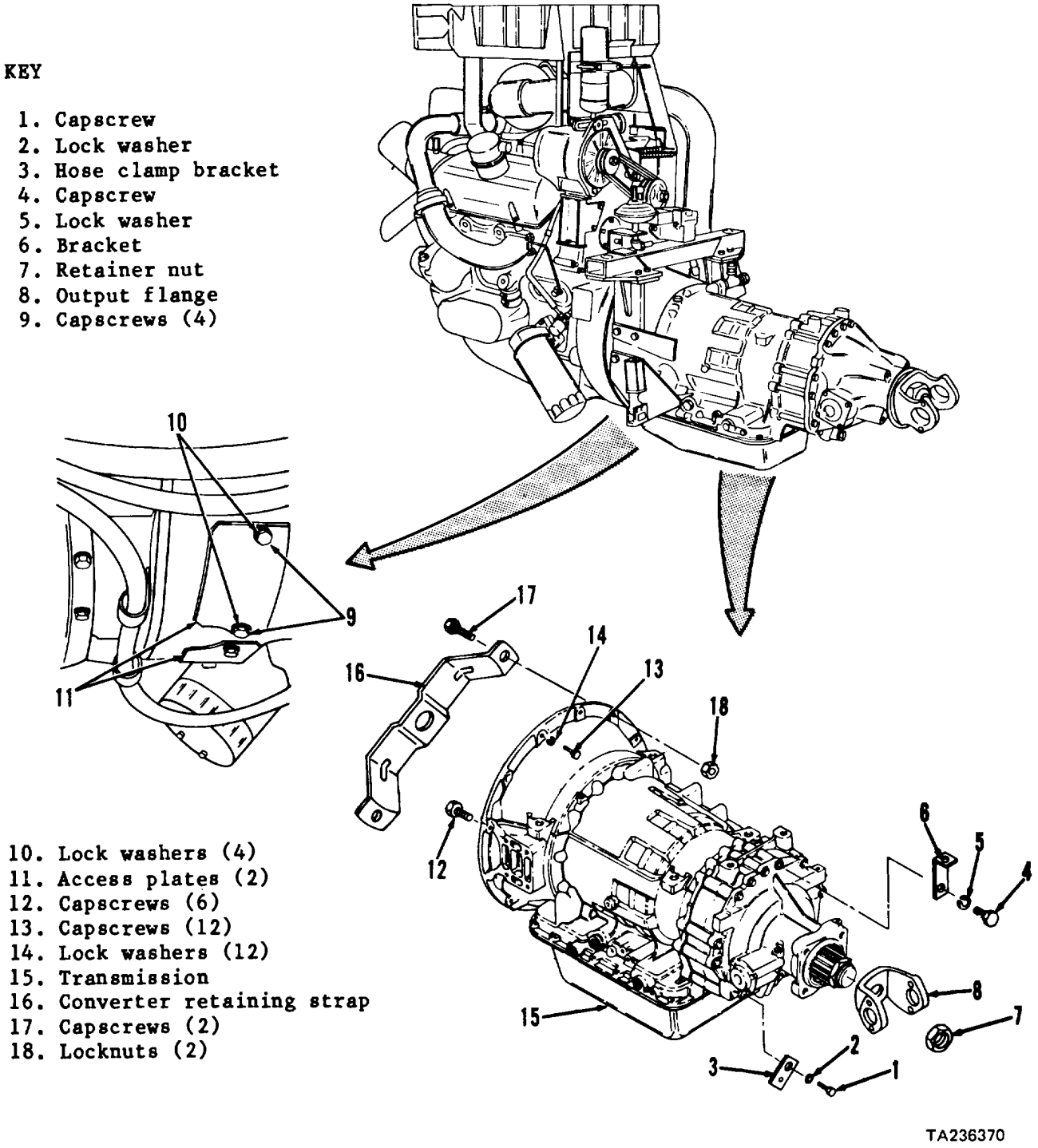
Equipment Condition (cont)
Paragraph Condition Description

2-65d Rear cab guard removed.
2-41i Modulator cable disconnected from transmission.
2-42 Drive shaft removed.
3-42a Hydraulic pump removed (lines still connected).
2-85 Speedometer cable, adapter, and gear assembly removed from transmission.
2-32e Transmission temperature sender disconnected from transmission.
2-41b Transmission dipstick removed.
2-41j Transmission oil sampling valve removed.
2-41k Transmission dipstick tube removed.
2-34a Battery ground cable disconnected from transmission.
3-42b Power take-off removed.
2-41h(l) Shift lockout cylinder air lines disconnected.
2-41h(2) Shift lockout removed (transmission mount capscrews reinstalled).
2-41g(1) Gear shift linkage and lever removed.
2-41e External oil filter hoses and fittings removed from transmission.

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).



13-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

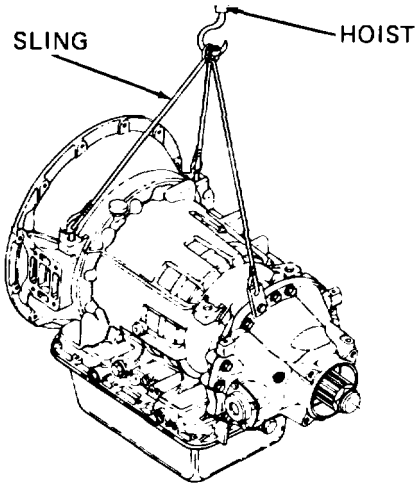
(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
		NOTE The transmission is normally removed by lowering from the tractor. If a suitable maintenance bay is not available, remove transmission from top of tractor or remove spare tire carrier, battery box, and other components as necessary to allow removal by lowering with a transmission jack.		
1	Trans-mission, rear	a Capscrew (1), lock washer (2), and hose clamp bracket (3)	Remove	
		b Capscrew (4), lock washer (5), and bracket (6)	Remove	
		c Retainer nut (7)	Remove and scribe	
		NOTE Retainer nut (7) may be reused up to a maximum of five times. Each time retainer nut is removed, use scribe or punch to deeply scribe one of its flats as a record of its use. Discard a retainer nut that has been used a maximum of five times.		
		d. Output flange (8)	Remove	

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REMOVAL (cont)					
2	Transmission	a	Three-strand sling and hoist	Attach	Attach to transmission as shown
					 TA236371
		b	Hoist	Operate	Operate hoist to take slack out of sling
3	Engine flywheel housing, bottom	a	Four capscrews (9) and lock washers (10)	Remove	Support access plates (11)
		b	Two access plates (11)	Remove	
		c	Six capscrews (12)	Remove	Remove capscrews securing torque converter flex plate to engine flywheel

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
4	Transmission, front	a. Transmission mount crossmember	Remove	Para 3-17f
		b. 12 capscrews (13) and lock washers (14)	Remove	
		CAUTION		
		In step (5) below, route hoses away from transmission as necessary to prevent three-strand sling from damaging hoses as transmission is moved and lowered from tractor.		
5	Transmission	a. Transmission (15)	Move	Use hoist to move transmission rearward just far enough to allow clearance for converter retaining strap
		CAUTION		
		Install torque converter retaining strap immediately. Torque converter is now free to move and can fall from transmission housing.		
		b. Converter retaining strap (16)	Position	Against torque converter
		c. Two capscrews (17) and locknuts (18)	Install	Secures converter retaining strap (16) to transmission housing
		d. Transmission (15)	Remove	From tractor. Use sling and hoist to lower transmission; then disconnect hoist from sling
6	Rear axle ends	Brake air chamber springs	Cage	Para 2-51c(2)
7	Tractor tow	Tractor	Tow	From maintenance bay shackles

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
8	Transmission	a. Hoist b. Transmission (15)	Reattach Remove	To sling Use sling and hoist to remove transmission from maintenance bay; then remove sling and hoist
INSTALLATION				
9	Transmission	a. Three-strand sling and hoist	Attach	To transmission
		b. Transmission (15)	Position	Use sling and hoist to lower transmission into maintenance bay; then remove hoist
10	Tractor tow shackles	Tractor	Tow	Tow tractor into maintenance bay and position over transmission
11	Rear axle ends	Brake air chamber springs	Uncage	Para 2-51c(2)
12	Transmission	a. Hoist	a. Attach b. Operate	To sling Operate hoist to take slack out of sling

CAUTION

When raising transmission into tractor, route hoses away from transmission as necessary to prevent three-strand sling from damaging hoses.

		b. Transmission (15)	Raise	Use sling and hoist to raise transmission into position
13	Transmission, front	a. Two locknuts (18), capscrews (17), and converter retaining strap (16)	Remove	

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
13 (cont)		b. 12 lock washers (14) and	Install	Secures transmission (15) to engine flywheel housing capscrews (13)
		c. Transmission mount	Install	Para 3-17f
14	Trans-mission	Sling and hoist	Detach and remove	
15	Engine flywheel(12) housing, bottom	a. Six capscrews	Install	Secures torque converter flex plate to engine flywheel
		b. Two access plates (11)	Position	
		c. Four lock washers (10) and capscrews (9)	Install	
16	Trans-mission, rear	a. Bracket (6)	Position	
		b. Capscrew (4) and lock washer (5)	Install	
		c. Hose clamp bracket (3)	Position	
		d. Lock washer (2) and capscrew (1)	Install	
		e. Output flange (8)	Install	
		f. Retainer nut (7)	Install	Tighten to 700 pounds foot torque
17	Trans-mission	a. External oil filter hoses and fittings	Install	Para 2-41e
		b. Gear shift linkage and lever	Install	Para 2-41g(1)
		c. Shift lockout cylinder	Install	Para 2-41h(2)

3-17. TRANSMISSION MAINTENANCE (CONT)

c. Replacement (cont).

(2) Detailed Procedure Covering Replacement (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
17 (cont)		d. Shift lockout air lines	Connect	Para 2-41h(l)
		e. Power take-off	Install	Para 3-42b
		f. Battery ground cable	Connect	Para 2-34a
		g. Oil sampling valve	Install	Para 2-41j
		h. Transmission dipstick tube	Install	Para 2-41k
		i. Transmission temperature sender	Install	Para 2-32e
		j. Speedometer gear assembly, adapter, and cable	Install	Para 2-85
		k. Hydraulic pump	Install	Para 3-42a
		l. Drive shaft	Install	Para 2-42
		m. Modulator cable	Install and adjust	Para 2-41i
		n. Water level sensor	Install	Para 2-29
		o. Transmission dipstick	a. Check fluid level b. Install	Para 2-41b
18	Tractor chassis	a. Rear cab guard	Install	Para 2-65d
		b. Rear platform	Install	Para 2-65c
19	Cab tilt pump	Cab	Lower	To normal operating position

3-17. TRANSMISSION MAINTENANCE (CONT)

d. Torque Converter. This task covers removal and installation.

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance
Tool Kit
Socket wrench handle, 1/2 inch drive
Socket wrench set, 1/2 inch drive
Machinist's steel rule
Hoist
Torque converter lifter J-6795-01
Flat bar, 6 inches long

Materials/Parts

Clean cloths	Item 2, Appendix C
Oil soluble grease	Item 9, Appendix C
Two nuts	FSCM 73342 PN 9416484

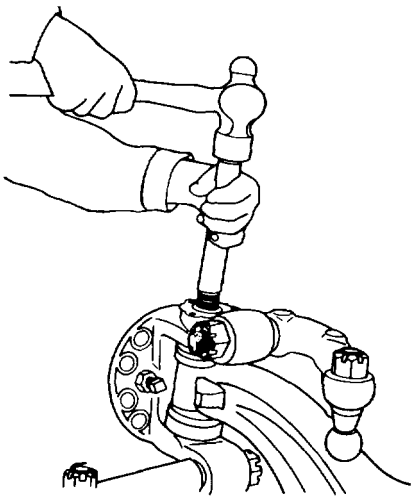
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
3-17c(2)	Transmission removed from vehicle. Transmission mounted front side up in stand.

KEY

1. Torque converter
2. Nuts (2)
3. Oil seal

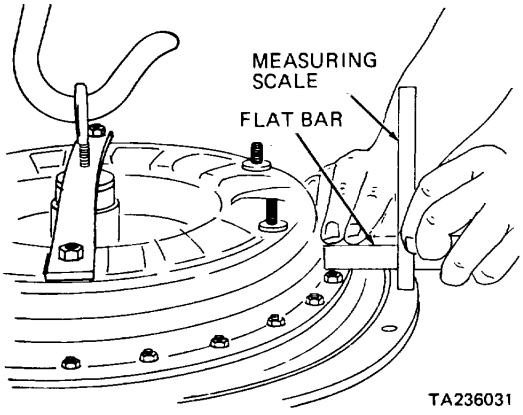


TA236094

3-17. TRANSMISSION MAINTENANCE (CONT)

d. Torque Converter (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Torque converter (1)	a. Torque converter lifter	Position	
		b. Two nuts (2)	Install	
		c. Torque converter (1)	Lift off using hoist attached to ring in torque converter lifter. Lift straight up and remove to table	
		d. Two nuts (2)	Remove	
		e. Torque converter lifter	Remove	
INSTALLATION				
		NOTE		
		Before installing torque converter (1), be sure that oil seal (3) is lubricated with oil-soluble grease and is seated in its groove in oil pump hub.		
2	Torque converter (1)	a. Torque converter lifter	Position	
		b. Two nuts (2)	Install	
3	Front of transmission	Torque converter (1)	Install using hoist attached to ring in torque converter lifter. Lower onto transmission while rotating to engage flats on torque converter hub with flats in transmission oil pump. Also, splines of turbine hub (inside torque converter) must engage splines of transmission turbine shaft. When seated, measure distance from transmission mounting flange to torque converter cover, as shown. If distance is greater than required 9/16 inch raise torque converter, rotate to align pump hub flats, and reseat. Then remove torque converter lifter	



3-17. TRANSMISSION MAINTENANCE (CONT)

e. Modulator Assembly. This task covers:

a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Torque wrench
- Socket head screw key set
- Safety glasses

Retaining ring pliers FSCM 79136 PN 2100

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Transmission fluid	Item 8, Appendix C
Petrolatum	Item 9, Appendix C
Detergent	Item 27, Appendix C

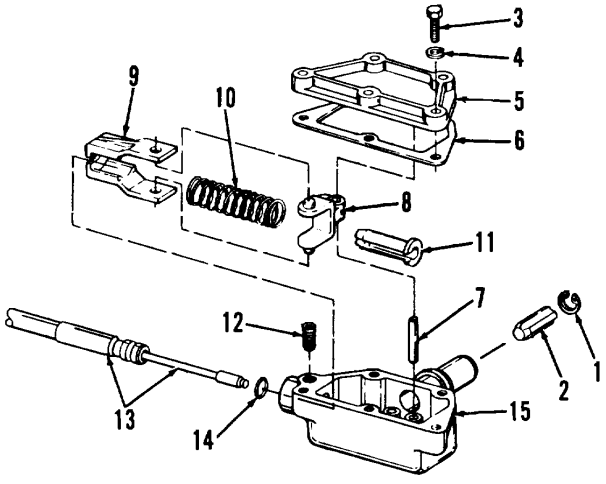
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-41i	Modulator cable O-ring removed.

KEY

1. Retaining ring
2. Plunger
3. Capscrews (5)
4. Lock washers (5)
5. Cover
6. Gasket
7. Pin
8. Lever
9. Retainer
10. Spring
11. Thimble
12. Setscrew
13. Cable
14. O-ring
15. Housing



TA236240

3-17. TRANSMISSION MAINTENANCE (CONT)

e. Modulator Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Modulator cable(1) assembly	a. Retaining ring	Remove	Use retaining ring pliers
		b. Plunger (2)	Remove	
		c. Five capscrews (3) and lock washers (4)	Remove	
		d. Cover (5)	Remove	
		e. Gasket (6)	Remove	
		f. Cable (13) core	Retract	Pull at free end of cable
		g. Pin (7)	Remove	Pull from lever (8) and bore in housing; note position of lever for reassembly
		h. Lever (8) and retainer (9)	a. Remove as assembly	Rotate lever and retainer outward about cable core through 90 degrees; then compress spring to cable end of housing to remove
			b. Separate	
		NOTE		
		Keep cable (13) core retracted when performing the following step.		
		i. Spring (10) and thimble (11)	a. Remove as assembly	Compress thimble and spring away from cable (13) to remove
			b. Separate	
		j. Setscrew (12)	Remove	Only if necessary to replace cable (13), O-ring (14), or housing (15)
		k. Cable (13)	Remove	Twist housing (15) slightly and pull cable to remove
		l. O-ring (14)Remove		
CLEANING				
2		a. Gasket (6) and O-ring (14)	Clean	Use clean, dry cloth only
		b. Cable (13)	Clean	Use clean cloth moistened with detergent; dry using clean cloths

3-17. TRANSMISSION MAINTENANCE (CONT)

e. Modulator Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
2 (cont)		**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		c. All other parts	Clean	Use cleaning solvent P-D-680; dry using compressed air
INSPECTION				
3		a. Gasket (6) and O-ring (14)or	Inspect	Replace if cut, cracked, or deteriorated
		b. Spring (10)	Inspect	Replace if cracked, deformed, or permanently set
		c. Cable (13)	Inspect	Replace if kinked, binding, or otherwise damaged
		d. All other parts	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
4	Modulator cable assembly	a. O-ring (14)	a. Position b. Lubricate	On cable (13) Apply thin film of petrolatum to outside of O-ring

3-17. TRANSMISSION MAINTENANCE (CONT)

e. Modulator Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
4 (cont)		b. Cable (13)	Install	Twist housing (15) slightly and push cable until large groove in cable hub aligns with setscrew (12) hole
		c. Setscrew (12)	Install	Tighten to 20-25 pounds inch
		d. Thimble (11)	Position	In spring (10)
		e. Cable (13) core	Retract	Pull at free end of cable
		f. Thimble (11) and spring (10)	Install	Compress thimble and spring, align thimble with cable core, and release spring
		g. Lever (8)	Position	In retainer
		h. Lever (8) and	Install	Rotate lever and retainer retainer (9)inward about cable core through 90 degrees
		i. Pin (7)	Install	Push into lever (8) and bore in housing (15)
		j. Gasket (6) and cover (5)	Position	On housing (15)
		k. Five capscrews (3) and locktorque washers (4)	Install	Tighten to 35-40 pounds inch

CAUTION

Tapered end of plunger (2) must be inserted first in following step.

	l. Plunger (2)	Install	Push tapered end first into housing (15)
	m. Retaining ring (1)	Install	Use retaining ring pliers

3-17. TRANSMISSION MAINTENANCE (CONT)

f. Transmission Mount.

This task covers: a. Removal c. Inspection/Repair
b. Cleaning d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Scratch wire brush
Adjustable open end wrench
Combination wrench set
Safety glasses
Hoist
Sling 2-65c

Materials/Parts
Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Detergent Item 27, Appendix C

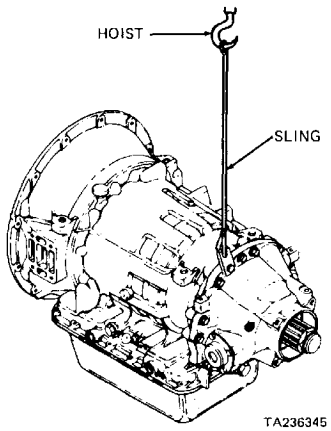
Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition
Paragraph Condition Description
Parked on level surface, engine off, and parking brake applied.
Rear platform removed.
2-29 Water level sensor and bracket removed.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

1	Transmission housing	Hoist and sling	Attach	To rear of transmission housing as shown. Apply sufficient lifting force to relieve stress on transmission housing and engine flywheel housing when transmission mount is removed

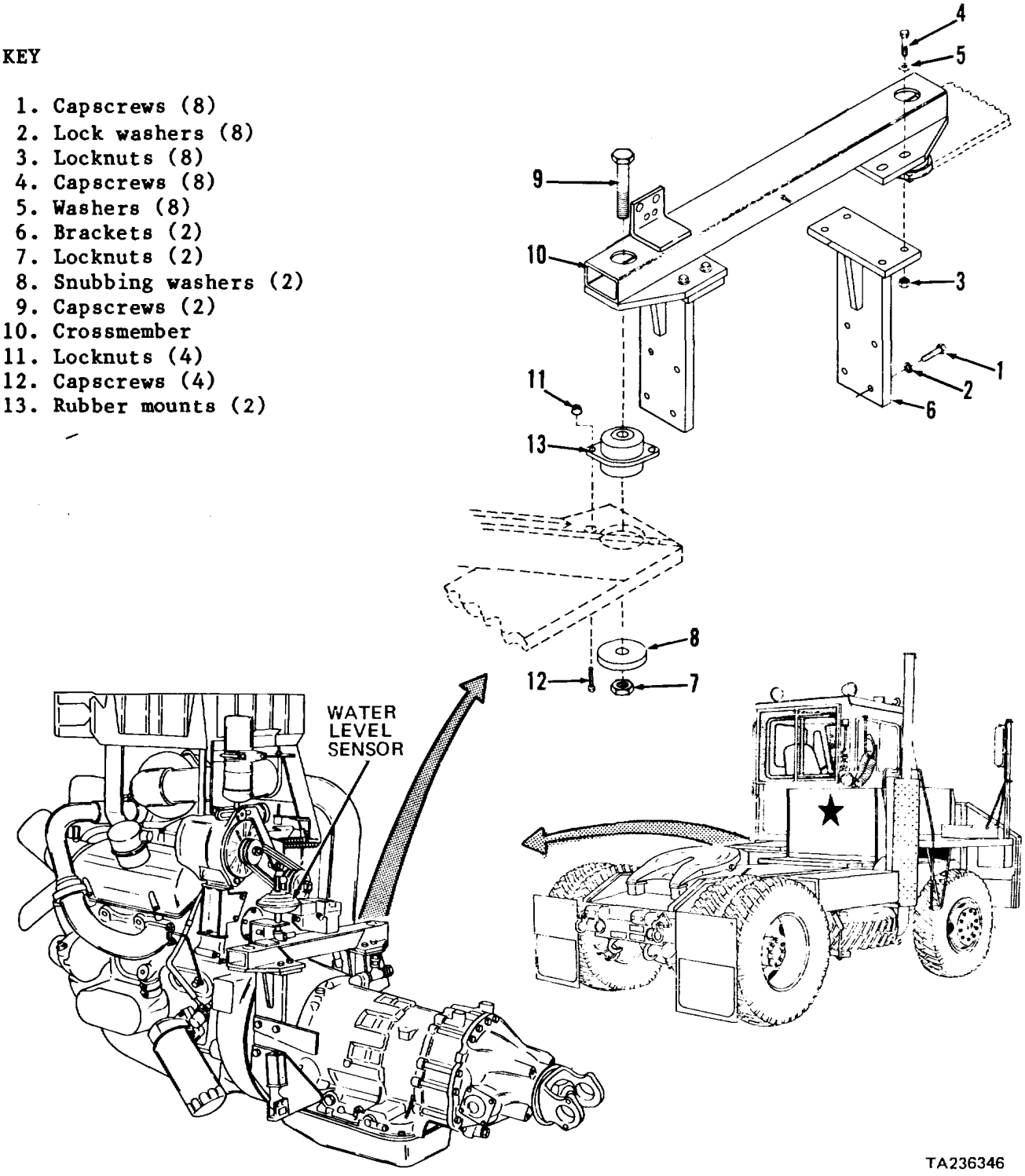


3-17. TRANSMISSION MAINTENANCE (CONT)

f. Transmission Mount (cont).

KEY

1. Capscrews (8)
2. Lock washers (8)
3. Locknuts (8)
4. Capscrews (8)
5. Washers (8)
6. Brackets (2)
7. Locknuts (2)
8. Snubbing washers (2)
9. Capscrews (2)
10. Crossmember
11. Locknuts (4)
12. Capscrews (4)
13. Rubber mounts (2)



3-17. TRANSMISSION MAINTENANCE (CONT)

f. Transmission Mount (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Transmission mount	a. Eight capscrews (1) and lock washers (2)	Remove	Support shift lockout bracket and shift cable bracket
		b. Eight locknuts (3), capscrews (4), and washers (5)	Remove	
		c. Two brackets (6)	Remove	
		d. Two locknuts (7), snubbing washers (8), and capscrews (9)	Remove	
		CAUTION		
		Transmission may have to be raised slightly to remove crossmember (10). Do not raise high enough to damage fan or fan shroud at front of engine.		
		e. Crossmember (10)	a. Tilt	Tilt crossmember diagonally and slide back over transmission
			b. Remove	
		f. Four locknuts (11) and capscrews (12)	Remove	
		g. Two rubber	Remove	From tractor frame members mounts (13)
CLEANING				
3		a. Two rubber mounts (13)	Clean	Use mild detergent solution. Rinse with clear water; dry thoroughly

3-17. TRANSMISSION MAINTENANCE (CONT)

f. Transmission Mount (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
3 (cont)		**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		b. All other parts	Clean	Use cleaning solvent P-D-680 and stiff bristled brush; dry thoroughly with compressed air
INSPECTION/REPAIR				
4		a. Two brackets (6) and crossmember (10)	Inspect for broken welds cracks	Repair broken welds or cracks by welding. Replace a bracket or crossmember beyond economical repair distortion
		b. Two rubber mounts (13)	Inspect for cracks breaks wear	Replace if necessary
		c. All other parts	Inspect for cracks breaks distortion damaged threads	Replace if necessary

3-17. TRANSMISSION MAINTENANCE (CONT)

f. Transmission Mount (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
5	Trans-mission mount	a. Two rubber mounts (13)	Position	On tractor frame members
		b. Four capscrews (12) and locknuts (11)	Install	
		c. Crossmember (10)	a. Install b. Tilt	Tilt crossmember (10) diagonally and slide back over transmission and into position
		d. Two capscrews (9), snubbing washers (8), and locknuts (7)	Install	
		e. Two brackets (6)	Position	
		f. Eight washers (5), cap-screws (4), and locknuts (3)	Install	
		g. Eight lock washers (2) and capscrews (1)	Install	In two brackets (6) and shift lockout bracket and shift cable bracket
		h. Hoist and sling	Remove	
6	Crossmember (10), left	Water level sensor and bracket side	Install	Para 2-29
7	Tractor, rear	Rear platform	Install	Para 2-65c
8	Tractor	Cab	Lower	To normal driving position

3-18. FRONT AXLE MAINTENANCE

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Open end wrench set
- Torque wrench
- Hammer
- Safety glasses
- Vise jaw caps
- Screwdriver
- Machinist's vise

Automotive Mechanic's Tool Kit
- Pry bar
- Hammer
- Pliers
- Machinist's rule

Brass drift
Jack
Two dollies
Arbor press
Dial indicator
Bushing removal and installation tool
Upper knuckle bushing reamer
Lower knuckle bushing reamer
Block of wood

Personnel Required
Two Automotive Repairers MOS 63H

References
LO 9-2320-285-12 (M878A1 Lubrication Order)

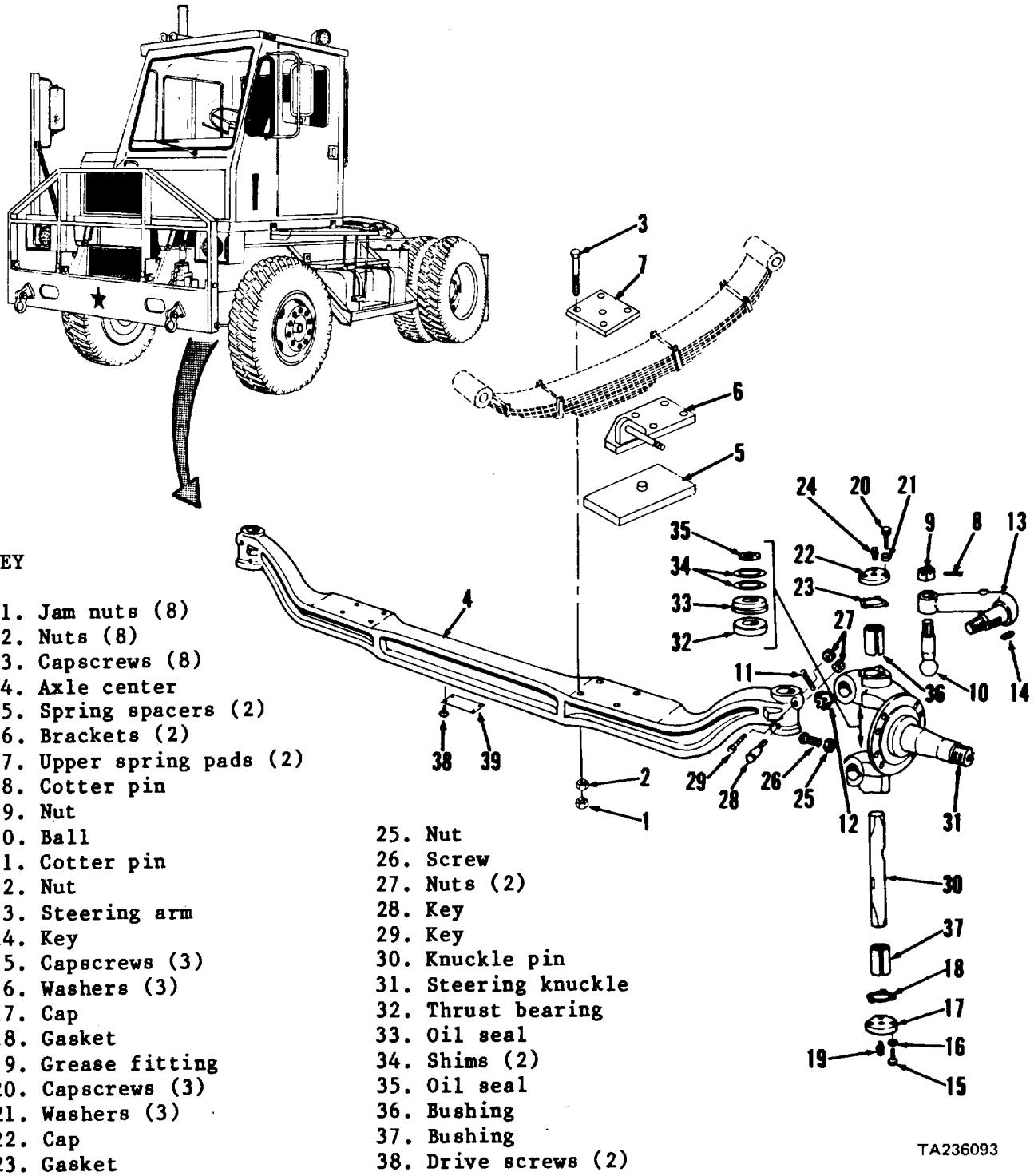
Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off. Rear wheels blocked. Front end supported, and hoist in place.
2-57	Front wheels and tires removed.
3-28e	Drag link disconnected.
2-43b	Hubs and drums removed.
2-51d(1)	Brake chambers removed.
2-50a	Front axle brakes and backing plates removed.
2-64	Shock absorbers removed.
3-28c	Tie rod removed.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Light machine oil	Item 7, Appendix C
Tags	Item 14, Appendix C
Cotter pins	FSCM 78500 PN K2616
Cotter pins	FSCM 78500 PN K2412
Four gaskets	FSCM 78500 PN 2008Q823
Two oil seals	FSCM 78500 PN A1205X1428
Two oil seals	FSCM 78500 PN A1205B1432

3-18. FRONT AXLE MAINTENANCE



KEY

1. Jam nuts (8)
2. Nuts (8)
3. Capscrews (8)
4. Axle center
5. Spring spacers (2)
6. Brackets (2)
7. Upper spring pads (2)
8. Cotter pin
9. Nut
10. Ball
11. Cotter pin
12. Nut
13. Steering arm
14. Key
15. Capscrews (3)
16. Washers (3)
17. Cap
18. Gasket
19. Grease fitting
20. Capscrews (3)
21. Washers (3)
22. Cap
23. Gasket
24. Grease fitting
25. Nut
26. Screw
27. Nuts (2)
28. Key
29. Key
30. Knuckle pin
31. Steering knuckle
32. Thrust bearing
33. Oil seal
34. Shims (2)
35. Oil seal
36. Bushing
37. Bushing
38. Drive screws (2)
39. Identification plate

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Tractor, front(4)	a. Axle center	Support	With jack under center of axle
		b. Eight jam nuts (1)	Remove	
		c. Eight nuts (2)	Remove	
		d. Eight cap-screws (3)	Remove	
		e. Axle center (4)	Lower	Onto two dollies. Remove jack
		f. Two spring spacers (5)	Remove	
		g. Two brackets (6)	Remove	
		h. Two upper spring pads (7)	Remove	
		i. Axle center (4)	Remove	Roll dollies out from under tractor; then mount axle center in suitable holding fixture
DISASSEMBLY				
2	Left steering knuckle (31)	a. Cotter pin (8) (8) and nut (9)	Remove; discard pin	

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when hammering.

		b. Ball (10)	Remove	Use bronze drift and hammer; then tap out
		c. Cotter pin (11) and nut (12)	Remove; discard pin	

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				

WARNING

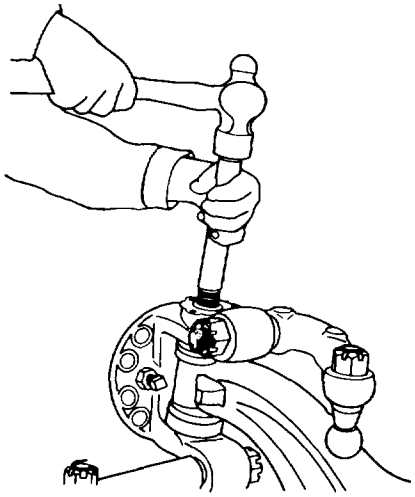
Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when hammering.

	d.	Steering arm (13) with key (14)	Remove; Use bronze drift and hammer; then tap out
	e.	Key (14)	Remove
	f.	Three cap-screws (15) and washers (16)	Remove
	g.	Cap (17) and gasket (18)	Remove; Discard gasket (18)
	h.	Grease fitting (19)	Remove; Only if needed for replacement
	i.	Three cap-screws (20) and washers (21)	Remove
	j.	Cap (22) and gasket (23)	Remove; Discard gasket (23)
	k.	Grease fitting (24)	Remove; Only if needed for replacement
	l.	Nut (25)	Loosen; Only if inspection indicates that screw (26) needs replacing
	m.	Screw (26)	Remove; Only if needed for replacement
	n.	Two nuts (27)	Remove

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when hammering.

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		o. Two keys (28 and 29)	Remove	Use bronze drift and hammer; tap out from threaded end
		p. Knuckle pin (30)	Remove	Use bronze drift and hammer; drive out
				 TA236094
		q. Steering knuckle (31)	Remove	From axle center (4)
3	Vise	a. Steering knuckle (31)	Position	Bottom side up in soft jawed vise with upper knuckle boss between vise jaws. Tighten vise
		b. Thrust bearing (32)	Remove	
		c. Oil seal (33)	Remove and discard	
		d. Shims (34)	Remove	Wire shims together to prevent loss. Tag shims, indicating from which steering knuckle they were removed
		e. Oil seal (35)	Remove and discard	Only if inspection indicates need for replacement. Pry out carefully with screwdriver
		f. Bushings (36 3-134and 37)	Press out	Only if inspection indicates need for replacement. Use arbor press and bushing removal and installation tool

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE		
		Repeat step 3 above for the right steering knuckle.		
4	Axle center (4)	a. Two drive screws (38)	Remove	Only if axle center (4) or identification plate (39) is to be replaced
		b. Identification plate (39)	Remove	
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
5		a. Axle center (4) and steering knuckles (31)	Clean	Use clean cloths moistened with cleaning solvent P-D-680; dry with compressed air

3-18. FRONT AXLE MAINTENANCE

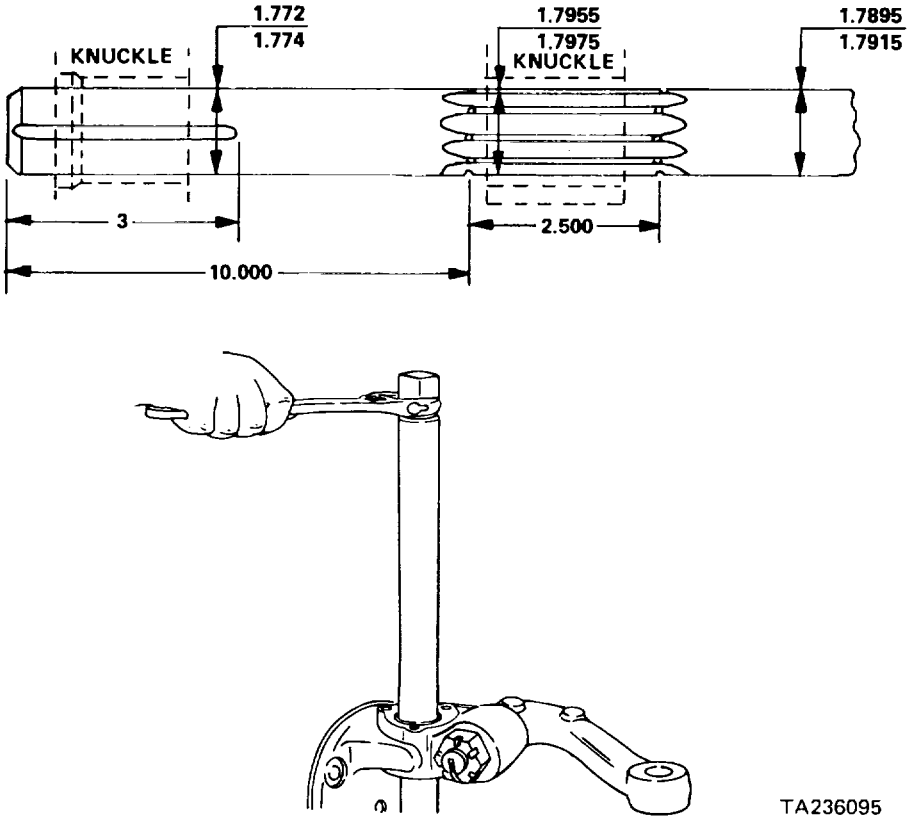
STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
5 (cont)		b. Thrust bearings (32)	Clean	Use cleaning solvent P-D-680. Immerse bearings in cleaning solvent and move up and down. Remove bearing. Strike larger side of cone against block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning solvent. Repeat process until bearings are clean. Dry using dry compressed air. Direct air stream across bearing. Do not spin bearings when drying. Rotate bearings slowly by hand to facilitate drying
		c. All other parts	Clean	Use cleaning solvent P-D-680. Immerse parts in cleaning solvent and move slowly up and down to dissolve all particles of lubricant. Dry parts with compressed air or clean cloths
INSPECTION				
6		a. Axle center (4)	Inspect	Replace if cracked, distorted or otherwise damaged
		b. Grease fittings (19 and 24)	Inspect	In caps (17 and 22). Clear bores with compressed air. Replace if cracked, broken, or bore clogged
		c. Thrust bearings (32)	Inspect	Inspect all rollers, cages and cups for wear, chips, nicks, damage and distortion. Replace bearing if any of these conditions are observed. After inspection, immerse in clean light oil and wrap in clean lintless cloth or paper

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
6 (cont)		d. Bushings (36 and 37)	Inspect	Inspect for flaking, cracking, or excessive wear. Replace if any of these conditions are observed
		e. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
7	Axle center (4)	a. Identification plate (39)	Position	On axle center (4), if removed
		b. Two drive screws (38)	Install	
8	Steering knuckle(36) (31)	a. New bushing	Install	If removed. Use arbor press and bushing removal and installation tool. Align oil holes in bushing with oil holes in steering knuckle. Press new bushing into knuckle about 1/8 inch; relieve press pressure. Press bushing in another 1/2 inch; relieve press pressure. Press bushing in until flush with surface of upper seal counterbore
		b. New bushing (37)	Install	If removed. Use arbor press and bushing removal and installation tool (refer to step 14a above). Press bushing in until flush with inside surface of lower knuckle boss

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8 (cont)		c. New bushing (36)	Ream	Clamp steering knuckle (31), right side up, in soft jawed vise with lower knuckle boss between vise jaws. Use upper knuckle bushing reamer



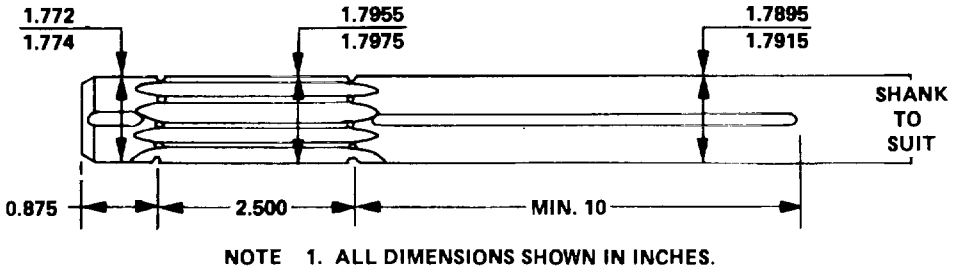
CAUTION

In following step, be sure you do not damage upper bushing (36) when inserting lower bushing reamer.

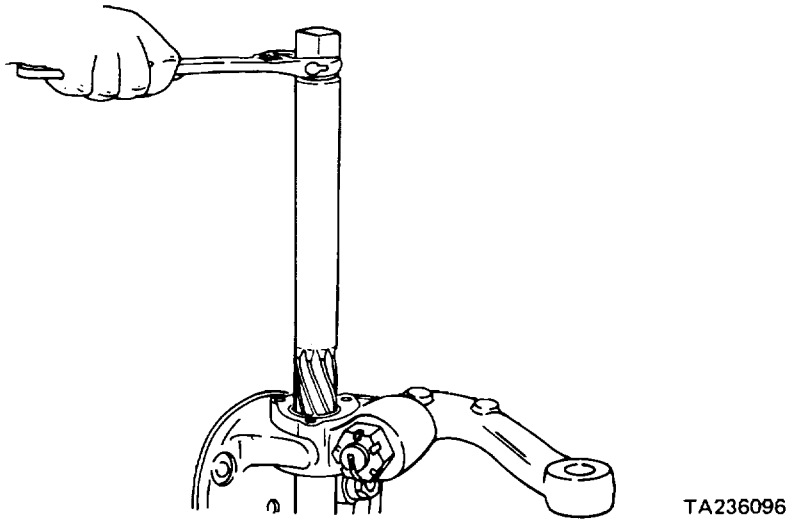
	d. Lower knuckle bushing reamer	Insert	Turn reamer slightly in non-cutting direction while inserting. Don't turn more than one-quarter turn, or cutting edges of reamer may be damaged

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8 (cont)		e. New bushing (37)	Ream	Use lower knuckle bushing reamer



NOTE 1. ALL DIMENSIONS SHOWN IN INCHES.



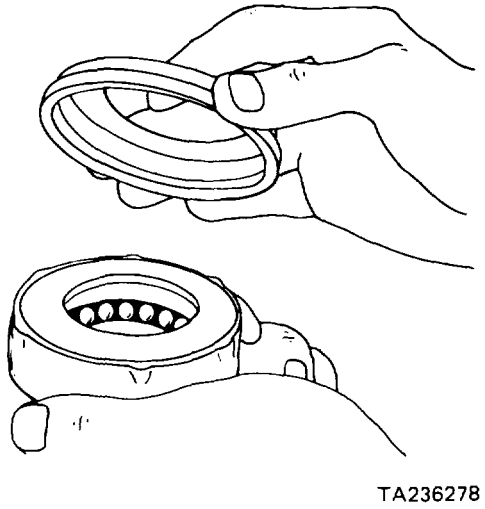
	f. Steering knuckle (31)	Position	Bottom side up in soft jawed vise with upper knuckle boss between vise jaws. Tighten vise
	g. New oil seal (35)	a. Position	In steering knuckle counter-bore with rubber lip facing up

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when hammering.

3-18. FRONT AXLE MAINTENANCE

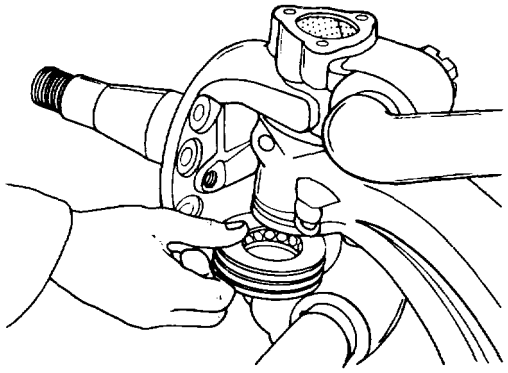
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8 (cont)			b. Install	Place small block of wood over seal. Insert bronze drift through lower knuckle boss, and in contact with wood block. Use hammer, and tap bronze drift until seal bottoms. Check at intervals to be sure seal is being seated squarely
		h. Thrust bearing (32)	Position	In hand, with thrust bearing gasket facing down
		i. New oil seal (33)	Install	On thrust bearing (32). Snap seal over chamfered side



TA236278

		j. Steering knuckle (31)	Remove	From vise
9	Axle center (4)	a. Steering knuckle (31)	Position	On left end of axle center (4). Be sure knuckle pin bore in end of axle center is clean and dry

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		b. Thrust bearing (32) and oil seal (33)	Install	Slide between lower face of axle center end and lower knuckle boss. Be sure to seat bottom side of thrust bearing (32) on face of lower knuckle yoke. Seal (33) must be centered below bottom face of axle center
				 TA236279
		c. Steering knuckle (31)	Raise	With jack. Take up all clearance between lower knuckle boss, thrust bearing (32), and lower face of axle center end. Be sure steering knuckle yoke holes are aligned with holes in axle center end and thrust bearing (32)

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when hammering.

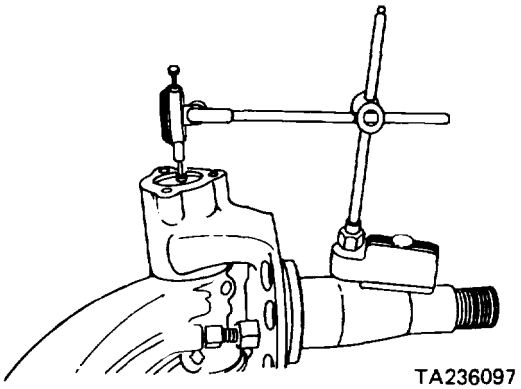
3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		d. Knuckle pin (30)	Install	Align knuckle pin flat with holes for keys (28 and 29). Install pin with brass hammer through steering knuckle yoke, axle center, and thrust bearing. Install pin so that bottom pin surface is 0.1 to 0.2 inch above the bottom surface of steering knuckle (31)

NOTE

All torque limits specified in steps 16 thru 24 below apply to parts lightly coated with rust preventive oil. Increase torques 10 percent for dry parts. Decrease torques 10 percent for parts heavily coated with oil.

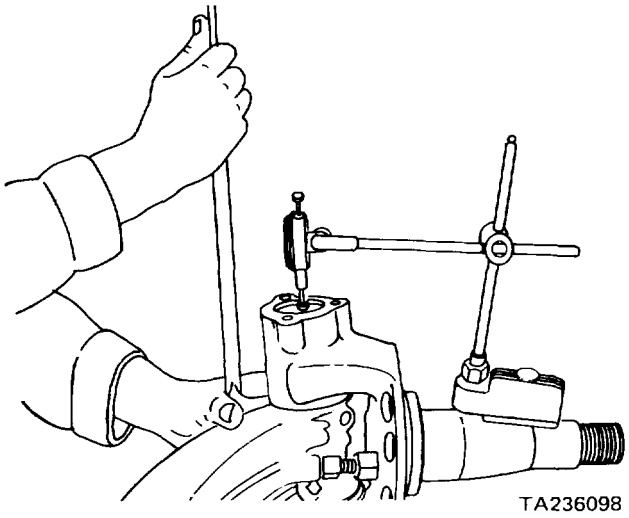
10	Steering knuckle (31)	a. Keys (2 and 28)	Install	
		b. Two nuts (27)	Install	Tighten to 38 pounds foot torque
		c. Dial indicator	Attach	With C clamp or magnetic base as shown. Place dial indicator plunger on end of knuckle pin (30) so it is parallel with knuckle pin centerline. Then, zero dial indicator



CAUTION

Place a piece of cardboard or heavy tape between pry bar and axle center (4) to prevent grooving axle center.

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
10 (cont)		d. Steering knuckle (31)	a. Turn	To extreme left turn position
			b. Lift	With pry bar
		e. Dial indicator	Read	Repeat readings with steering knuckle (31) in straight ahead and extreme right turn positions to get true clearance readings. Clearance shall be within 0.005 to 0.025 inch through full range of turn. Record readings
				 TA236098
		f. Two nuts (27), keys (28 and 29), and knuckle pin (30)	Remove	See steps 2n thru 2p above
		g. Two shims (34)	Install	Install shims required as determined in step 10e
		h. Knuckle pin (30)	Install	See step 9d above
		i. Keys (28 and 29) and two nuts (27)	Install	See steps 10a and 10b above
11	Steering knuckle (31), bottom	a. New gasket (18) and cap (17)	Position	
		b. Three washers (16) and cap-torque screws (15)	Install	Tighten to 25 pounds foot

3-18. FRONT AXLE MAINTENANCE

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		c. New grease fitting (19)	Install	
12	Steering knuckle (31), top (21) and cap-screws (20)	a. New gasket (23) and cap (22)	Position	
		b. Three washers	Install	Tighten to 25 pounds foot torque
		c. New grease fitting (24)	Install	
13	Steering knuckle(19 and 24) (31), top and bottom	Grease fittings	Lubricate	Refer to current lubrication order
14	Steering knuckle (31), top	a. Key (14)	Install	In steering arm (13)
		b. Steering arm (13)	Install	In steering knuckle (31)
		c. Nut (12)	Install	Tighten initially to 650 pounds foot torque. Then tighten to 1025 pounds foot torque
		d. New cotter	Install and pin (11)spread	
15	Steering arm (13)	a. Ball (10)	Install	In steering arm (13)
		b. Nut (9)	Install	Tighten initially to 287 pounds foot torque. Then, tighten to 450 pounds foot torque
		c. New cotter pin (8)	Install and spread	
16	Steering knuckle (31)	Nut (25) and screw (26)	Install	If removed. Do not tighten at this time

NOTE

Steps 8 thru 16 above cover reassembly of the left steering knuckle. Repeat steps 8 thru 16 to reassemble the right steering knuckle.

3-18. FRONT AXLE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
17	Tractor, front	a. Axle center (4)	a. Position	Use suitable hoist. Position axle center on two dollies. Roll dollies into position under front of tractor
			b. Support	With jack under center of axle. Then remove dollies
		b Two upper spring pads (7)	Position	On top of spring
		c Two spring spacers (5) and brackets (6)	Position	On axle center (4)
		d Axle center (4)	Raise	Into position
		e Eight cap-screws (3)	Install	
		f Eight nuts (2) foot torque	Install	Tighten to 310-330 pounds
		g Eight jam nuts (1)	Install	Tighten to 75 pounds foot torque
		h Jack	Remove	
18	Front axle	a Tie rod	Install	Para 3-28c
		b Brakes and backing plates	Install	Para 2-50a
		c Brake chambers	Install	Para 2-51c(l)
		d Hubs and drums	Install	Para 2-43b
		e Drag link	Install	Para 2-58e
		f Shock absorbers	Install	Para 2-64
		g Front wheels and tires	Mount	Para 2-57
		h Lubrication fittings	Lubricate	Para 2-43a
		i Front axle stops	Adjust	Loosen nut (25) on left side and adjust screw (26) to allow 3/4-inch clearance between tire and any part of frame and drag link. Then tighten nut (25) to 58 pounds foot torque and repeat for right side
		j Axle alignment	Check	Para 2-58d

3-19. REAR AXLE MAINTENANCE

a. Assembly. This task covers replacement of the rear axle assembly.

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Socket wrench set
Chain hoist
Two jack stands
Roller jack
supported by chain hoist.
Materials/Parts
Axle lubricant Item 6, Appendix C
Fifth wheel boom fully raised
Personnel Required
Two Wheel Vehicle Mechanics MOS 63B

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and parking brake applied. Front wheels blocked. Rear of tractor chassis supported by chain hoist.

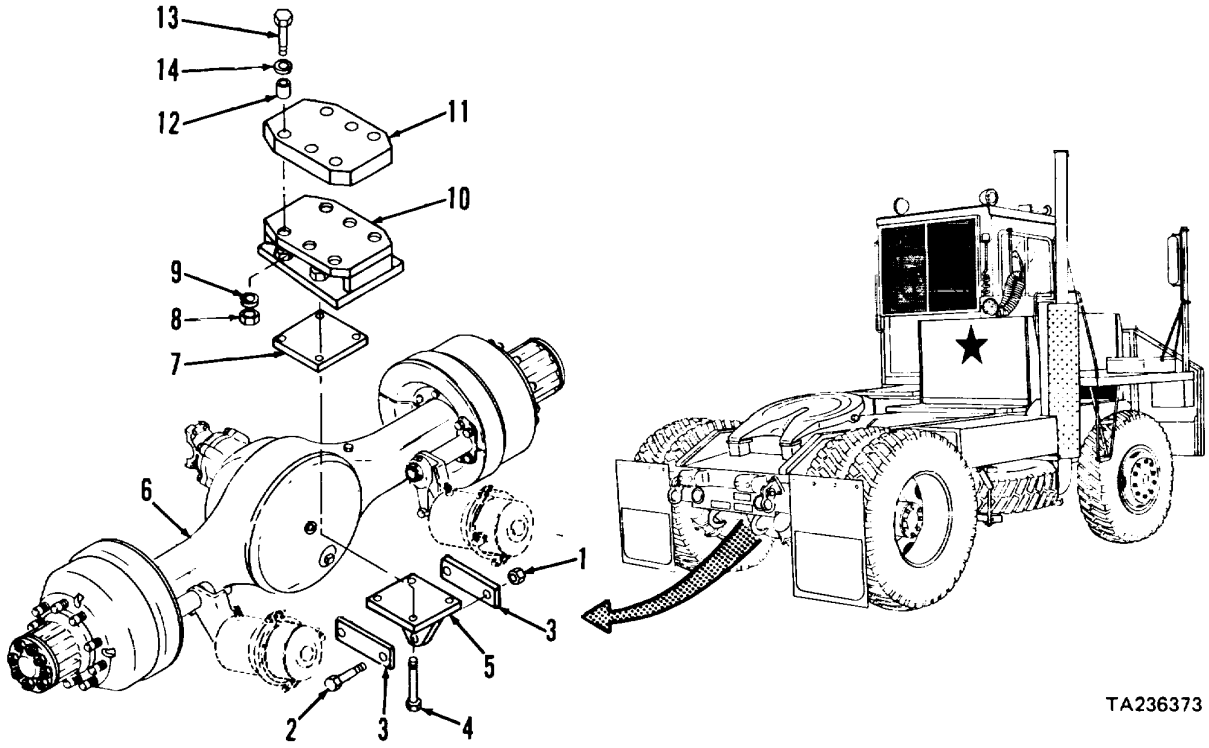
Two jack stands supporting rear of tractor chassis.

and blocked.

2-51c Rear axle brakes air chambers removed.
2-42 Drive shaft removed.
2-57 Rear wheels removed.
2-44a Axle lubricant drained.

KEY

1. Nuts (4)
2. Capscrews (4)
3. Torque links (4)
4. Capscrews (8)
5. Clamp plates (2)
6. Axle assembly
7. Locating pads (2)
8. Nuts (12)
9. Washers (12)
10. Spacers (2)
11. Pads (2)
12. Bushings (12)
13. Capscrews (12)
14. Washers (12)



3-19. REAR AXLE MAINTENANCE (CONT)

a. Axle Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
		WARNING Be sure front wheels are securely blocked so that tractor cannot roll off jack stands; be sure that chain hoist is bearing some of the weight of vehicle as a safety precaution in the event jack stands collapse. Failure to follow this procedure could result in serious injury or death due to tractor falling. If you are injured, obtain medical aid immediately.		
1	Rear axle, right side	Two nuts (1), capscrews (2), and torque links (3)	Remove	
		NOTE Repeat step 1 above on left side of rear axle.		
2	Axle assembly (6)	Roller jack	Position	Position under axle assembly (6) to support assembly
3	Rear axle, right side	Four capscrews (4) and clamp plate (5)	Remove	
		NOTE Repeat step 3 above on left side of rear axle.		
4	Axle assembly (6)	a Axle assembly (6)	Remove	Lower axle assembly (6) clear of chassis and roll out from under vehicle
		b Two locating pads (7)	Remove	From top of axle assembly (6)
5	Right hand frame rail	a Six nuts (8) and washers (9)	Remove	Support spacer (10)
		b Spacer (10)	Lower	

3-19. REAR AXLE MAINTENANCE (CONT)

a. Axle Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
5 (cont)		c. Spacer (10), pad (11), and six bushings (12)	Remove	
		d. Six capscrews (13) and washers (14)	Remove	
		NOTE		
		Repeat step 5 above on left hand frame rail.		
INSTALLATION				
6	Frame rails	a. 12 capscrews (13) and washers (14)	Install	
		b. 12 bushings (12) and two pads (11)	Assemble	On spacer (10)
		c. Two spacers (10)	Position	On capscrews (8)
		d. 12 nuts (8) and washers (9)	Install and tighten	
7	Axle assembly (6)			
		WARNING		
		Be sure vehicle is properly supported before proceeding. Failure to do so could cause serious injury or death due to vehicle falling on you. If you are injured, obtain medical aid immediately.		
		a. Two locating pads (7)	Position	On dowels on axle assembly (6) ends
		b. Axle assembly (6)	a. Position	Use roller jack; position axle assembly against spacers (10)
			b. Raise	Raise axle assembly; check to see that holes in vehicle frame align with holes in spacers (10)

3-19. REAR AXLE MAINTENANCE (CONT)

a. Axle Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
7 (cont)		c. Two clamp plates (5)	Position	
		d. Eight capscrews (4)	Install and tighten	
		e. Four torque links (3)	Position	On clamp plates (5)
		f. Four capscrews (2) and nuts (1)	Install and tighten	Secures torque links (3) to frame rails
8	Tractor, rear	a. Drive shaft	Install	Para 2-42
		b. Rear axle brakes air chambers	Install	Para 2-51c
9	Rear axle	Axle lubricant	Install	Para 2-44a
10	Tractor, rear	a. Rear wheels	Install	Para 2-57
		b. Two jack stands	Remove	
		c. Fifth wheel boom	a. Remove blocks	
			b. Lower	

3-19. REAR AXLE MAINTENANCE (CONT)

b. Differential. This task covers removal, cleaning, and installation.

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Scratch wire brush
- Socket wrench set
- Safety glasses
- Torque wrench, 175 pounds foot capacity

Pry bar
Soft hammer
Roller jack

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Axle lubricant	Item 6, Appendix C
Silicone rubber sealant	Item 40, Appendix C

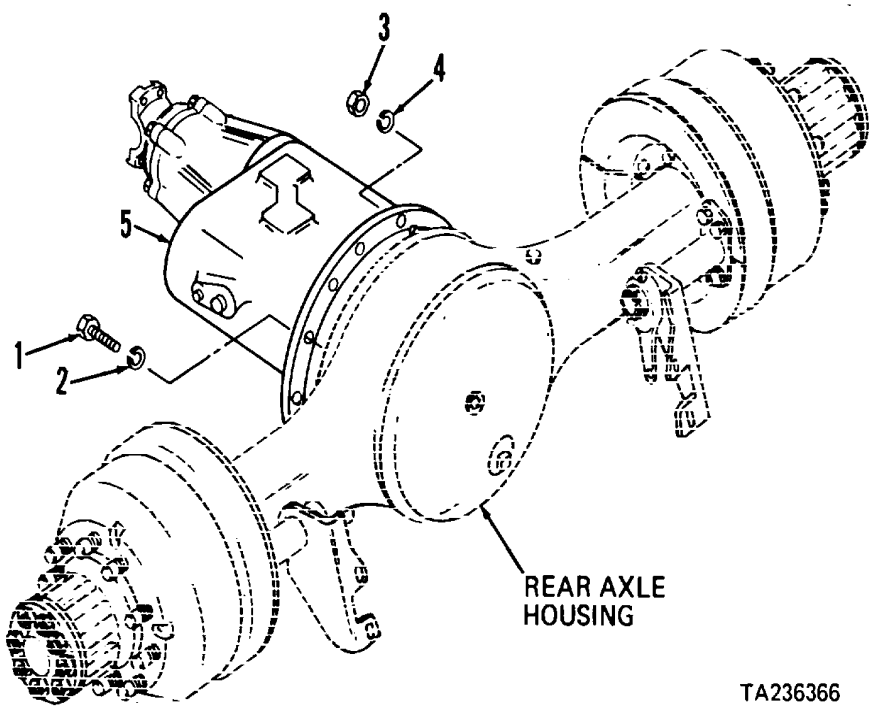
Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, parking brake applied, and front wheels blocked. Rear end supported.
2-44a	Rear axle housing drained.
2-57	Rear wheels removed.
2-42	Propeller shaft removed.
3-42d	Fifth wheel boom raised fully and supported with hoist. Hydraulic cylinders disconnected from bottom shaft. Bottom shaft and spacer tube removed.
2-44b	Rear axle shafts pulled from differential.

KEY

1. Capscrews (12)
2. Lock washers (12)
3. Nuts (2)
4. Lock washers (2)
5. Differential



3-19. REAR AXLE MAINTENANCE (CONT)

b. Differential (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Rear axle, center	a. Differential (5)	Support	With roller jack
		b. 12 capscrews (1) and lock washers (2)	Remove	
		c. Two nuts (3)	Loosen only	Do not remove, to prevent differential (5) from falling
		d. Differential	Loosen	Tap with soft hammer to break
(5)	differential away from axle			
housing				
		e. Two nuts (3) and lock washers (4)	Remove	
		f. Differential (5)	Remove	Use small pinch bar with rounded end to straighten assembly in housing bore. Be sure not to damage any mating surfaces. Lower jack to allow differential to be wheeled out from under tractor

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-19. REAR AXLE MAINTENANCE (CONT)

b. Differential (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
2		Differential (5) and axle housing mating surfaces	Clean	Use cleaning solvent P-D-680 and stiff bristled brush to remove sealant; dry using compressed air
INSTALLATION				
3	Axle housing	a. Silicone rubber Apply sealant		To mating surfaces of axle using and differential)
		b. Differential (5)	Position	Place on roller jack. Posi-ion under front of rear xle, and raise. Position lange of differential 1/4 nch onto axle housing tuds
		c. Two lock washers (4) and nuts (3)	Install	Do not tighten
		d. Six lock wash-ers (2) and capscrews (1)	Install	Equally spaced around differ-ntial (5). Hand tighten nly
		e. Six lock wash-ers (2) and capscrews (1)	Install	In remaining holes
		f. 12 capscrews (1)	Tighten	Tighten alternately to 70 pounds foot torque
		g. Roller jack	Lower and Remove	
4	Rear axle	a. Rear axle shafts	Install	Para 2-44b
		b. Propeller shaft	Install	Para 2-42
		c. Rear axle	Lubricate	Para 2-44a
5	Tractor, bottom rear	Spacer tube, bottom shaft, and hydraulic cylinder rod caps	Install	Para 3-42d
6	Rear axle ends	Rear wheels	Install	Para 2-57

Section IV. BRAKE SYSTEM MAINTENANCE

This section contains the information you'll need to maintain the:

- Treadle Valve
- Hand Brake Controls
- Brake Controls
- Air Compressor

This section tells you how to troubleshoot problems, and repair or replace the components that are within the scope of direct support maintenance.

3-20. TROUBLESHOOTING SYMPTOM INDEX

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. RAPID PRESSURE DROP AFTER ENGINE IS SHUT DOWN (BRAKES RELEASED)

Step 1. Check automatic drain valve at air supply reservoir for air exhaust.

a. If moderate to severe exhaust of air is observed, repair automatic drain valve (para 3-24e).

b. If constant slight exhaust of air is observed, proceed to step 2 below.

Step 2. Check treadle valve (para 3-23), air compressor governor (para 2-52d), air reservoirs (para 2-51b), safety valve (para 2-51b), and one way check valve (para 2-51b) for air leaks.

c. If a component is leaking air, repair or replace (para 3-23, 2-52d, or 2-51b).

d. If components are not leaking air, replace air compressor discharge valves (para 3-25b).

2. RAPID PRESSURE DROP AFTER ENGINE IS SHUT DOWN (BRAKES APPLIED)

Check shift lockout air cylinder, brake air chambers, treadle valves, quick release valves, relay valve, ratio reducing valve, and tractor protection valves for air leaks.

a. If a component is leaking air, repair or replace (para 2-41h(1), 2-51d(1), 2-51d(2), 3-23, 3-24b, 3-24g , 3-24f, or 3-24h).

b. If components are not leaking air, troubleshoot AIR PRESS gage (para 2-83).

3. PRESSURE BUILDS UP SLOWLY

Check air compressor governor adjustment (paragraph 2-52d).

a. If governor doesn’t cut out at 118-120 psi, or doesn’t cut in at 100-102 psi, repair (para 3-25a).

b. If governor cut out and cut in pressures are correct, refer to Malfunction 1 above. If the malfunction is not corrected in Malfunction 1, repair or replace air compressor (para 2-52e or 3-25b).

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4 PRESSURE TOO HIGH, OR COMPRESSOR WON'T CUT OUT

Step 1 Remove air compressor governor (para 3-25a).
Check for obstruction in passage between air compressor and governor.

a If passage is clogged, clean.

b If passage is not clogged, proceed to step 2 below.

Step 2 Install replacement air compressor governor (para 3-25a).
Check air compressor governor adjustment (para 2-52d).

a If malfunction is corrected, repair or replace air compressor governor (para 2-52d).

b If malfunction is not corrected, clean air compressor cylinder head (para 3-25b); repair or replace stuck inlet valves or leaking unloader grommets and back-up rings (para 3-25b), if necessary.

5 PARKING (SPRING) BRAKES WON'T RELEASE

Step 1 With AIR PRESS gage indicating 60 psi minimum and PARKING BRAKE valve pushed down fully, check emergency quick release valve, emergency port of rear axle brakes air chambers, and PARKING BRAKE valve for air leaks.

a If a component is leaking air, repair or replace (para 3-24b, 2-51d(2), or 3-24a).

b If components are not leaking air, proceed to step 2 below.

Step 2 Open drain cock on service air reservoir to relieve air system pressure.
Disconnect air brake tubing from elbow connector at emergency quick release valve (para 2-51a).
Install calibrated air pressure gage on tubing.
Close drain cock on service air reservoir.
Start engine and allow air system to charge to at least 60 psi pressure.
Push PARKING BRAKE valve in fully.
Watch AIR PRESS gage and test gage indications.

a If test gage indication differs from AIR PRESS gage indication by more than 10 psi, repair or replace PARKING BRAKE valve (para 3-24a).

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5 PARKING (SPRING) BRAKES WON'T RELEASE (Cont)

b If test gage indication is within 10 psi of AIR PRESS gage indication, proceed to step 3 below.

Step 3 Open drain cock on service air reservoir to relieve air system pressure.
Disconnect air brake tubing from elbow connector at emergency quick release valve (para 2-51a).
Install calibrated air pressure gage on tubing.
Close drain cock on service air reservoir.
Start engine and allow air system to charge to at least 60 psi pressure.
Pull PARKING BRAKE valve out fully.
Watch AIR PRESS gage and test gage indications.

a If test pressure gage does not indicate zero psi immediately, repair or replace PARKING BRAKE valve (para 3-24a).

b If test pressure gage immediately indicates zero psi, open service air reservoir drain cock to relieve air system pressure. Then proceed to step 4 below.

Step 4 Disconnect hose from fitting at emergency port of one rear axle brake air chamber.
Install calibrated pressure gage on hose.
Close drain cock on service air reservoir.
Start engine and allow air system to build to at least 60 psi pressure.
Push PARKING BRAKE valve in fully.
Watch AIR PRESS gage and test gage indications.

a If test gage indication differs from AIR PRESS gage indication by more than 10 psi, repair or replace emergency quick release valve (para 3-24b).

b If test gage indication is within 10 psi of AIR PRESS gage indication, proceed to step 5 below.

Step 5 Disconnect hose from fitting at emergency port of the other rear axle brake air chamber (see step 4 above).
Install calibrated pressure gage on hose.
Close drain cock on service air reservoir.
Start engine and allow air system to build to at least 60 psi pressure.
Push PARKING BRAKE valve in fully.
Watch AIR PRESS gage and test gage indications.

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5 PARKING (SPRING) BRAKES WON'T RELEASE (Cont)

a If test gage indication differs from AIR PRESS gage indication by more than 10 psi, repair or replace emergency quick release valve (para 3-24b).

b If test pressure gage indication is within 10 psi of AIR PRESS gage indication, troubleshoot rear axle brakes (para 2-46, Malfunction 12).

6 PARKING (SPRING) BRAKE WON'T APPLY

Step 1 Pull up PARKING BRAKE valve fully.
Open drain cock on service air reservoir.
Loosen fitting at hose connecting emergency port of rear axle brake air chamber to emergency quick release valve.

WARNING

Wear safety glasses, and stand clear of loosened air hose fitting High pressure can propel debris at high speed, causing eye injury or blindness.

a If air discharges from loosened fitting, repair or replace emergency quick release valve (para 3-24b).

b If air does not discharge from loosened fitting, proceed to step 2 below.

Step 2 Close drain cock on service air reservoir.
Start engine and allow air system to build to at least 60 psi pressure.
Pull up PARKING BRAKE valve fully.
Loosen fitting at hose connecting emergency port of rear axle brake air chamber to emergency quick release valve.

WARNING

Wear safety glasses, and stand clear of loosened air hose fitting High pressure can propel debris at high speed, causing eye injury or blindness.

a If air discharges from loosened fitting, repair or replace PARKING BRAKE valve (para 3-24a).

b If air does not discharge from loosened fitting, repair rear axle brake air chambers (para 2-51d(l) or 2-51d(2)).

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7 FRONT AND REAR SERVICE BRAKES RELEASE SLOWLY

Check if all brakes release slowly.

a If front and rear brakes release slowly, repair brake treadle valve (para 3-23).

b If front brakes release slowly and rear brakes release normally, proceed to Malfunction 8, step 1 below.

c If rear brakes release slowly and front brakes release normally, proceed to Malfunction 9, step 1 below.

8 FRONT SERVICE BRAKES RELEASE SLOWLY

Step 1 Disconnect supply and delivery air lines from ratio reducing valve (para 2-51a).
Connect supply air line to delivery air line.
Check release time of front service brakes.

a If brakes release normally, repair or replace ratio reducing valve (para 3-24f).

b It brakes do not release normally, proceed to step 2 below.

Step 2 Replace relay valve (para 3-24g).
Check release time of front service brakes.

a If front service brakes on both sides release slowly, repair brake treadle (para 3-23).

b If front service brakes on both sides release normally, no further action required.

c If front service brake on one side releases normally, and front service brake on other side releases slowly, repair or replace front axle brake air chambers on affected side (para 2-51d(l)).

9 REAR SERVICE BRAKES RELEASE SLOWLY

Replace service quick release valve (para 3-24b).
Check release time of rear service brakes.

a If rear service brakes on both sides release normally, no further action required.

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

9 REAR SERVICE BRAKES RELEASE SLOWLY (Cont)

b If rear service brakes on both sides release slowly, repair brake treadle (para 3-23).

c If rear service brake on one side releases normally, and rear service brake on other side releases slowly, repair or replace rear axle brake air chamber on affected side (para 2-51d(2)).

10 TRAILER BRAKES DO NOT RELEASE

Relieve air system of all pressure (para 2-41h(1)).
Disconnect air line from emergency side of tractor protection valve (hose from air control valve to tractor protection valve).
Install calibrated air pressure gage.
Start engine and allow air system to build to 100 psi pressure.
Depress tractor protection valve.
Watch test gage.

a If test gage indication is within 10 psi of AIR PRESS gage indication, repair or replace tractor protection valve (para 3-24h).

b If test gage indicates zero psi or differs from AIR PRESS gage indication by more than 10 psi, repair or replace air control valve (para 3-24a).

11 TRAILER SERVICE BRAKES DO NOT FUNCTION (CAB GUARD)

Step 1 Relieve air system of all pressure (para 2-41h(l)).
Disconnect air hose connecting brake treadle valve to double check valve (located at bottom of tractor protection valve).
Start tractor and allow air system to build to 100 psi pressure.
Install calibrated air pressure gage on hose.
Depress brake treadle valve fully.
Watch test gage.
Test gage shall indicate air system pressure (same as AIR PRESS gage indication).

a If test gage indication differs by more than 10 psi from AIR PRESS gage indication, repair or replace brake treadle valve (para 3-23).

b If test gage indication is within 10 psi of AIR PRESS gage indication, proceed to step 2 below.

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. TRAILER SERVICE BRAKES DO NOT FUNCTION (CAB GUARD) (Cont)

Step 2. Relieve air system of all pressure (para 2-41h(1)).
Disconnect air hose connecting brake treadle valve to double check valve (located at bottom of tractor protection valve).
Start tractor and allow air system to build to 100 psi pressure.
Push down trailer hand brake control valve fully.
Check for air exhaust at open port of double check valve.

a. If air is exhausting from double check valve, replace (para 3-24d).

b. If air is not exhausting from double check valve, proceed to step 3 below.

Step 3. Relieve air system of all pressure (para 2-41h(1)).
Disconnect hose connecting trailer hand brake control valve to double check valve (located at bottom of tractor protection valve).
Install calibrated air pressure gage on hose.
Start the tractor and allow air system to build to 100 psi pressure.
Push down trailer hand brake control valve fully.
Watch test gage.
Test gage shall indicate air system pressure (same as AIR PRESS gage indication).

a. If test gage indication is within 10 psi of AIR PRESS gage indication, proceed to step 4 below.

b. If test gage indication differs from AIR PRESS gage indication by more than 10 psi, replace trailer hand brake control valve (para 3-24c).

Step 4. Relieve air system of all pressure (para 2-41h(1)).
Disconnect hose connecting trailer hand brake control valve to double check valve (located at bottom of tractor protection valve).
Start the tractor and allow air system to build to 100 psi pressure.
Depress brake treadle valve.
Check for air exhaust at open port of double check valve.

a. If air is exhausting from double check valve, replace (para 3-24d).

b. If air is not exhausting from double check valve, repair or replace tractor protection valve (para 3-24h).

3-21. TREADLE VALVE AND BRAKE CONTROLS TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

12. TRAILER SERVICE BRAKES DO NOT FUNCTION (REAR OF TRACTOR)

Relieve air system of all pressure (para 2-41h(1)).
Disconnect air hose connecting brake treadle valve to double check valve (located at bottom of tractor protection valve).
Start tractor and allow air system to build to 100 psi pressure.
Install calibrated air pressure gage on hose.
Depress brake treadle valve fully.
Watch test gage.
Test gage shall indicate air system pressure (same as AIR PRESS gage indication).

If test gage indication differs by more than 10 psi from AIR PRESS gage indication, repair or replace brake treadle valve (para 3-23).

3-22. AIR COMPRESSOR TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. PRESSURE TOO HIGH, OR AIR COMPRESSOR WON'T CUT OUT

Install replacement air compressor governor (para 2-52d).
Perform air compressor governor adjustment (para 2-52d).

a. If malfunction is corrected, repair or replace air compressor governor (para 2-52d).

b. If malfunction is not corrected, clean air compressor cylinder head (para 3-25b); replace stuck inlet valves or leaking unloader grommets and back-up rings (para 3-25b), if necessary.

2. AIR COMPRESSOR KNOCKS

Remove air compressor (para 2-52e).
Check air compressor cylinder head for carbon deposits.
Check air compressor for worn or damaged front bearing.

a. If cylinder head contains carbon deposits, clean (para 3-25b).

b. If front bearing is worn or damaged, replace (para 3-25b).

3-23. TREADLE VALVE MAINTENANCE

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Torque wrench
- Safety glasses
- Retaining ring pliers

Automotive Mechanic's Tool Kit
- Punch
- Hammer
- Pliers

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Pneumatic grease	Item 35, Appendix C
Two cotter pins	FSCM 06853 PN 210067
Cotter pin	FSCM 06853 PN 210492
O-ring	FSCM 06853 PN 239643
O-ring	FSCM 06853 PN 239136
O-ring	FSCM 06853 PN 239645

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

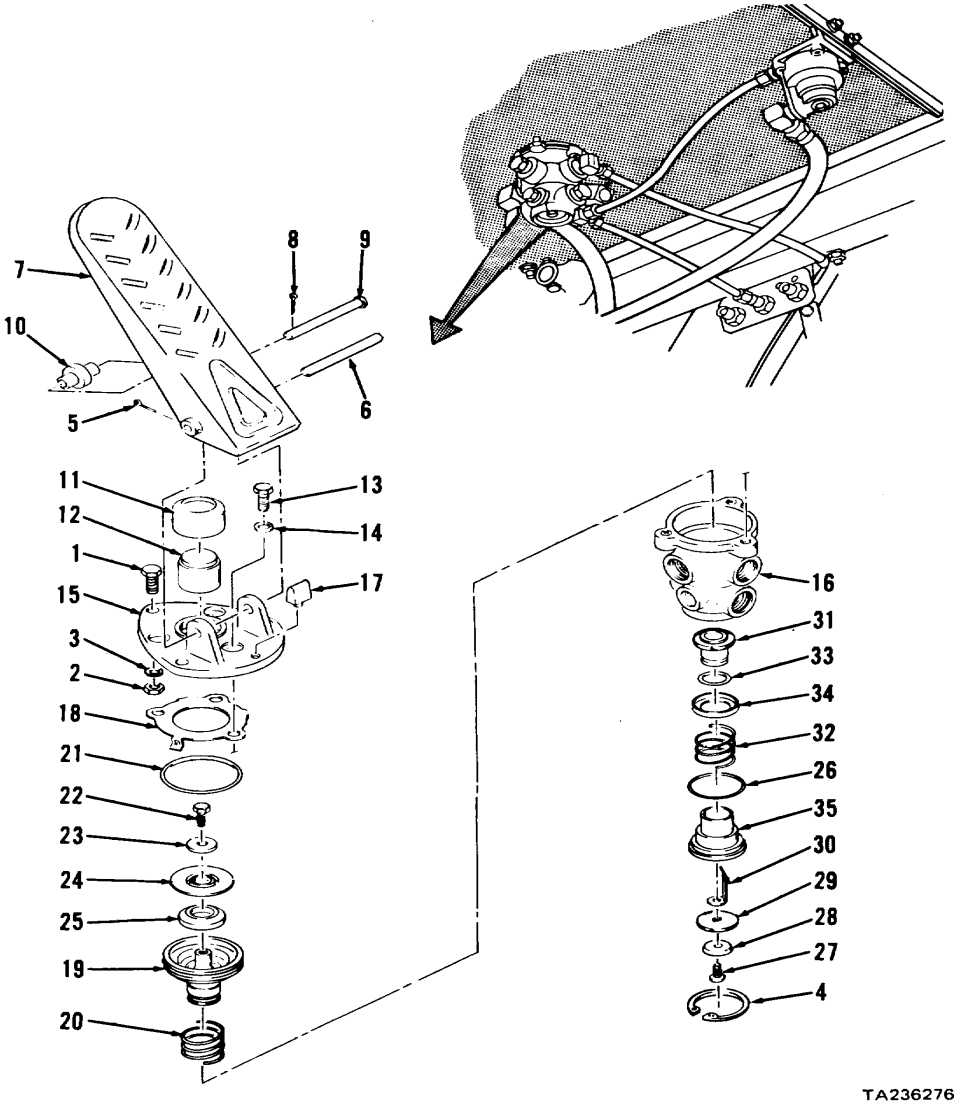
Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and wheels blocked.
2-41h(1)	All air pressure relieved. Shift lockout group lines and fittings removed from treadle valve.
2-51a	Air brake lines and fittings removed from treadle valve.
2-53	Trailer brakes lines and fittings removed from treadle valve.
3-33b	Unlatch valve lines and fittings removed from treadle valve.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, inside	a. Two capscrews (1), nuts (2) and lock washers (3)	Remove	
		b. Brake treadle valve assembly	Remove	Lift from top of cab floor
DISASSEMBLY				
2	Cab, underside	a. Retaining ring (4)	Remove	Use retaining ring pliers
		b. Valve insert assembly (items 26 thru 35)	Remove	

3-23. TREADLE VALVE MAINTENANCE (CONT)

KEY

1. Capscrews (2)
2. Nuts (2)
3. Lock washers (2)
4. Retaining ring
5. Cotter pins (2)
6. Fulcrum pin
7. Treadle
8. Cotter pin
9. Roller pin
10. Roller
11. Boot
12. Plunger
13. Capscrews (3)
14. Lock washers (3)
15. Mounting plate
16. Valve body
17. Stop button
18. Retainer
19. Piston
20. Piston return spring
21. O-ring
22. Capscrew
23. Washer
24. Spring seat
25. Rubber spring
26. O-ring
27. Screw
28. Washer
29. Diaphragm
30. Preload spring
31. Valve
32. Spring
33. O-ring
34. Retainer
35. Seat



3-23. TREADLE VALVE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3	Valve body (16)	a. Two cotter pins (5)	Remove and discard	
		b. Fulcrum pin (6)	Remove	Use punch and hammer
		c. Treadle (7)	Remove	
		d. Cotter pin (8)	Remove and discard	
		e. Roller pin (9)	Remove	Use punch and hammer
		f. Roller (10)	Remove	
		g. Boot (11) and plunger (12)	Remove	From treadle valve assembly
		h. Three capscrews (13) and lock washers (14)	Remove	
		i. Mounting plate (15) and valve body (16)	Separate	
		j. Stop button (17)	Remove	
4	Piston assembly	a. Retainer (18) then remove	Remove	Depress piston assembly,
		b. Piston (19) and piston return spring (20)	Remove	
		c. O-ring (21)	Remove and discard	
		d. Capscrew (22)	Remove	
		e. Washer (23), spring seat (24), and rubber spring (25)	Remove	
5	Valve insert assembly (items 26 thru 35)	a. O-ring (26)	Remove and discard	
		b. Screw (27)	Remove	
		c. Washer (28) and diaphragm (29)	Remove	
		d. Preload spring (30)	Remove	Depress and hold valve (31), then remove preload spring
		e. Valve (31), spring (32), O-ring (33), and retainer (34)	Remove	From seat (35). Discard O-ring

3-23. TREADLE VALVE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
		CLEANING		
		WARNING		
		Diesel fuel is highly combustible Do not smoke or allow open flames or sparks into the area. Death or severe injury may result if personnel fail to observe this precaution If you are burned, obtain medical aid immediately.		
6	a	Boot (11), plunger (12), and rubber spring (25)	Clean	Wipe with clean cloth moistened with clean diesel fuel. Dry with clean cloths
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
		Compressed air must not exceed 30 psi Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	b.	All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
		INSPECTION		
7	a.	Boot (11), plunger (12), and rubber spring (25)	Inspect or deteriorated	Replace if cracked, broken,

3-23. TREADLE VALVE MAINTENANCE (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION			
INSPECTION (cont)			
7 (cont)	b. Valve body (16)	Inspect	Replace entire brake treadle valve assembly if valve body (16) is cracked, broken, excessively worn, or bores or threads damaged
	c. Piston (19) and valve (31)	Inspect	Replace if cracked, broken, or scored
	d. Piston return spring (20), preload spring (30), and spring (32)	Inspect	Replace if cracked, broken, or permanently set
	e. Diaphragm (29)	Inspect	Replace if cracked, broken, inflexible, or deteriorated
	f. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY			
	NOTE Lightly coat piston (19), new O-rings (21, 26, and 33), and bores in valve body (16) with pneumatic grease before reassembly.		
8 Valve body (16)	Piston (19), new O-rings (21, 26, and 33), and bores in valve body (16)	Lubricate	Use pneumatic grease
9 Valve insert assembly (items 26 thru 35)	a. Preload spring (30)	Position	In seat (35)
	b. Diaphragm (29)	Install	
	NOTE In following step, washer (28) must be installed with lips pointing out.		
	c. Washer (28)	Install	
	d. Screw (27)	Install	Tighten securely

3-23. TREADLE VALVE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		e. New O-ring (33) and retainer (34)	Install	On valve (31)
		f. Spring (32)	Install	On seat (35)
		g. Valve (31)	Install	In seat (35). Press valve down until preload spring (32) snaps, and holds assembly together
		h. New O-ring (26)	Install	
10	Cab, underside	a. Valve insert assembly (items 26 thru 35)	Install	In valve body (16)
		b. Retaining ring (4)	Install down.	Press valve insert assembly Use retaining ring pliers to install
		NOTE Be sure retaining ring (4) snaps into ring groove in valve body (16) to lock valve insert assembly in place.		
11	Piston assembly	a. Rubber spring (25)	Install	In piston (19)
		b. Spring seat (24), washer (23), and capscrew (22)	Install	Tighten capscrew (22) to 50 pounds inch torque
		c. New O-ring (21)	Install	
		d. Piston return spring (20)	Install	On piston (19)
		e. Piston (19)	Install	In valve body (16)
		f. Retainer (18)	Install	Depress piston assembly, then install. Be sure retainer prongs snap over groove in valve body (16)
12	Valve body (16)	a. Stop button (17)	Install	
		b. Mounting plate (15)	Position	On valve body (16)
		c. Three lock washers (14) and capscrews (13)	Install and tighten	

3-23. TREADLE VALVE MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		d. Plunger (12) and boot (11)	Install	On treadle valve assembly
		e. Roller (10)	Install	On roller pin (9)
		f. Roller pin (9) install in treadle (7)	Install	Use punch and hammer to
		g. New cotter pin (8)	Install and spread	
		h. Treadle (7)	Position	On treadle valve assembly
		i. Fulcrum pin (6)	Install	Use punch and hammer
		j. Two new cotter pins (5)	Install and spread	
INSTALLATION				
13	Cab, inside	Brake treadle valve assembly	Position	Through top of cab floor
14	Cab, underside	Brake lines and fittings	Connect and 3-33b	Para 2-41h(1), 2-51a, 2-53,
15	Cab, inside	Two capscrews (1), lock washers (3), and nuts (2)	Install and tighten	
16	Air pressure	Restore	Para 2-41h(l)	
17	Instrument panel	Air pressure gage	Observe	For two minutes. Depress brake treadle. If air pressure drops more than four psig per minute, brake treadle valve is defective, or there is leakage

NOTE

If pressure drops more than four psig per minute in step 17 above, test for leaks as follows.

18		All connections	Test for leaks	Apply soapy water solution to all connections. Depress brake treadle. If leak is found, tighten connection. Then repeat step 17 above. If no leak is found, treadle valve assembly is defective and must be replaced

3-24. BRAKE CONTROLS MAINTENANCE

a. Air Control Valve.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Socket wrench set
Torque wrench
Screwdriver
Screwdriver set
Automotive Mechanic's Tool Kit
Pliers

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Gasket	FSCM 06853 PN 293426
Spool assembly	FSCM 06853 PN 101570
Spool assembly	FSCM 06853 PN 101569
Maintenance kit	FSCM 06853 PN 101557

Personnel Required
Two Automotive Repairers MOS 63H

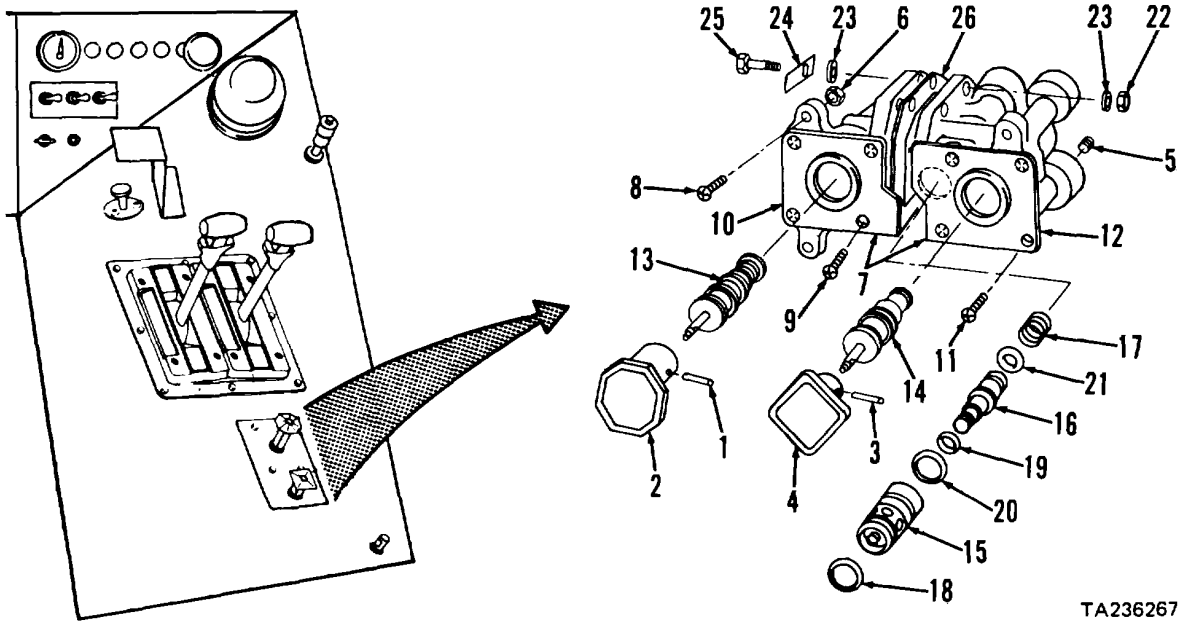
Equipment Condition

Paragraph	Condition Description
	Parked on level surface, engine off, and parking brake applied.
2-41h(l)	All air pressure relieved.
2-51a	Tractor brakes lines and fittings removed from air control valve.
2-53a	Trailer brakes lines and fittings removed from air control valve.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Right hand instrument panel	a. Pin (1)	Press out	
		b. Red button (2)	Remove	
		c. Pin (3)	Press out	
		d. Yellow button (4)	Remove	
2	Cab, underside	a. Plug (5)	Remove	
		b. Four locknuts (6)	Remove	While assistant holds screws (8) from above
		c. Valve assembly (7)	Remove	From tractor
3	Cab, inside	Four screws (8)	Remove	
DISASSEMBLY				
4	Air control valve	a. Four screws (9)	Remove	
		b. Cover plate (10)	Remove	
		c. Four screws (11)	Remove	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

a. Air Control Valve (cont).



KEY

1. Pin
2. Red button
3. Pin
4. Yellow button
5. Plug
6. Locknuts s(4)
7. Valve assembly
8. Screws (4)
9. Screws (4)
10. Cover plate
11. Screws (4)
12. Cover plate
13. Spool assembly
14. Spool assembly
15. Valve spool
16. Shuttle
17. Return spring
18. O-ring
19. O-ring
20. O-ring
21. O-ring
22. Locknuts (4)
23. Washers (8)
24. Identification tag
25. Screws (4)
26. Gasket

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		d. Cover plate (12)	Remove	
		e. Spool assembly (13)	Remove and discard	
		f. Spool assembly (14)	Remove and discard	
		g. Valve spool (15)	Remove	Use long nose pliers. Grasp spool webbing, twist, and pull free
		h. Shuttle (16)	Remove	
		i. Return spring (17)	Remove	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

a. Air Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		j. Four O-rings (18, 19, 20, and 21)	Remove and discard	
		k. Four locknuts (22), eight washers (23), identification tag (24) and four screws (25)	Remove	
		1. Valve assembly (7)	Separate	Into two halves
		m. Gasket (26)	Remove and discard	
CLEANING				
		CAUTION		
		Do not immerse or clean the air control valve, or its parts, in any solvent-type cleaner.		
5		a. Valve assembly (7)	Clean	Use clean, dry, lint-free cloth; wipe vigorously; be sure to clean valve bores
		b. Two cover plates (10 and 12), shuttle (16), and return spring (17)	Clean	Use clean, dry cloth
		c. Valve spool (15) and bore of valve spool (15)	Clean	Use clean, dry, lint-free cloth. Be sure to remove all old gasket material

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

a. Air Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		
	d.	All other parts	Clean	Use cleaning solvent P-D-680; allow to air dry
INSPECTION				
6	a.	Valve assembly (7)	Inspect for cracks deformation scored bores	Replace if defective
	b.	Two cover plates (10 and 12), valve spool (15), shuttle (16), and return spring (17)	Inspect for cracks breaks distortion other damage	Replace if defective
	c.	All other parts	Inspect for cracks deformation damaged threads	Replace if defective

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

a. Air Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
7	Air control valve	a. New gasket (26) assembly (7)	Position	Between halves of valve
		b. Halves of valve assembly (7)	Mate	
		c. Four screws (25), identification tag (24), eight washers (23), and four locknuts (22)	Install and tighten	
		d. Four new O-rings (18, 19, 20, and 21)	Install shuttle (16)	On valve spool (15) and
		e. Return spring (17) and shuttle (16)	Install	In bore of valve spool (14)
		f. Valve spool (15)	Install	Insert into valve bore until flush with top of housing
		g. New spool assembly (14)	Install	
		h. New spool assembly (13)	Install	
		NOTE Cover plates (10 and 12) are identical. Install cover plates with their convex sides up, and so that their stepped sides interlock.		
		i. Cover plate (12)	Position	
		j. Four screws (11)	Install and tighten	Tighten to 25 pounds inch torque
		k. Cover plate (10)	Position	
		l. Four screws (9)	Install and tighten	Tighten to 25 pounds inch torque

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

a. Air Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
8	Cab, inside	Four screws (8)	Insert	Through instrument panel holes
9	Cab, underside	a. Valve assembly (7)	Position	On screws (8)
		b. Four locknuts (6)	Install and tighten	Tighten alternately to 25 pounds inch torque while assistant holds screws (8) from above
		c. Plug (5)	Install	Tighten to 10 pounds foot torque
		NOTE Be sure you install yellow button (4) and red button (2) in their proper positions in following step.		
10	Right hand instrument panel	a. Yellow button (4)	Install	Rotate button until wording reads horizontally
		b. Pin (3)	Press in	
		c. Red button (2)	Install	Rotate button until wording reads horizontally
		d. Pin (1)	Press in	
11	Cab, underside	Air control valve fittings and lines	Connect	Para 2-51a and 2-53a
12	Tractor	Air pressure	Restore	Para 2-41h(l)

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

b. Quick Release Valves.

This task covers:

a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Screwdriver
Torque wrench
Safety glasses

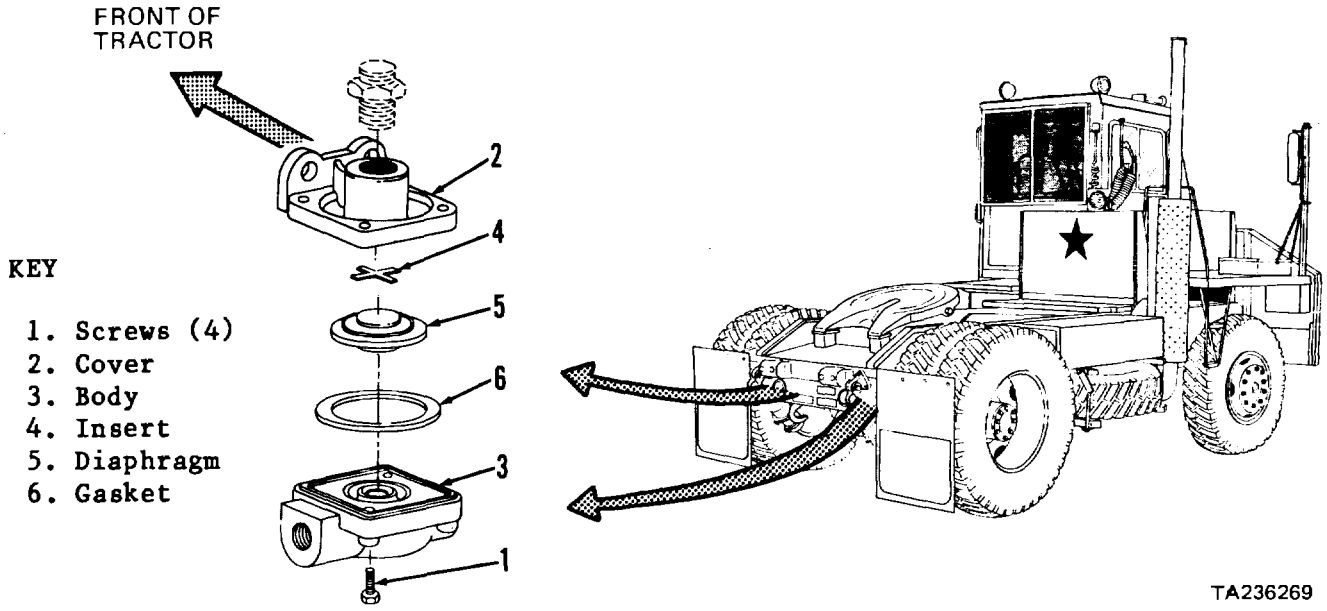
Personnel Required
Automotive Repairer MOS 63H

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Teflon tape	Item 43, Appendix C
Diaphragm	FSCM 06853 PN 245835
O-ring	FSCM 06853 PN 242837

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-41h(l)	All air pressure relieved.
2-51a	Air lines and fittings removed from quick release valves.



3-24. BRAKE CONTROLS MAINTENANCE (CONT)

b. Quick Release Valves (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Rear frame, above left brake air chamber	Quick release valve	Remove from	Turn counterclockwise fitting
2	Rear frame, above right brake air chamber	Quick release valve	Remove from	Turn counterclockwise fitting
DISASSEMBLY				
3	Valve, quick release	a Four screws (1) b Cover (2) and body (3) c Insert (4) d Diaphragm (5) and O-ring (6)	Remove Separate Remove Remove and	 discard
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

b. Quick Release Valves (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
4		All parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
INSPECTION				
5		a Cover (2) and body (3)	Inspect	Replace if cracked, broken, or mating surface is pitted
		b Insert (4)	Inspect	Replace if cracked or damaged
		c Screws (1)	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
6	Valve, quick release	a New gasket (6) and new diaphragm (5)	Install	In body (3)
		b Insert (4)	Install	
		c Cover (2) and body (3)	Mate	
		d Four screws (1)	Install and tighten	Tighten to 23 pounds foot torque
INSTALLATION				
		NOTE Wrap Teflon tape around threads of all male fittings before installation to prevent leakage.		
7	Rear frame, above right brake air chamber	Quick release valve	Install on fitting	Turn clockwise; flat side facing front of tractor
8	Rear frame, above left brake air chamber	Quick release valve	Install on fitting	Turn clockwise; flat side facing front of tractor
9	Valves, quick release	Fittings and air lines	Install and tighten	Para 2-51a

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Screwdriver set
- Screwdriver
- Torque wrench
- Brush
- Safety glasses

Automotive Mechanic's Tool Kit
- Hammer
- Punch
- Punch

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and wheels blocked.
2-41h(1)	All air pressure relieved.
2-53a	Trailer hand brake control air lines and fittings removed.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Lubricant	Item 17, Appendix C
Pin	FSCM 06853 PN 241556
Maintenance kit	FSCM 06853 PN 276122

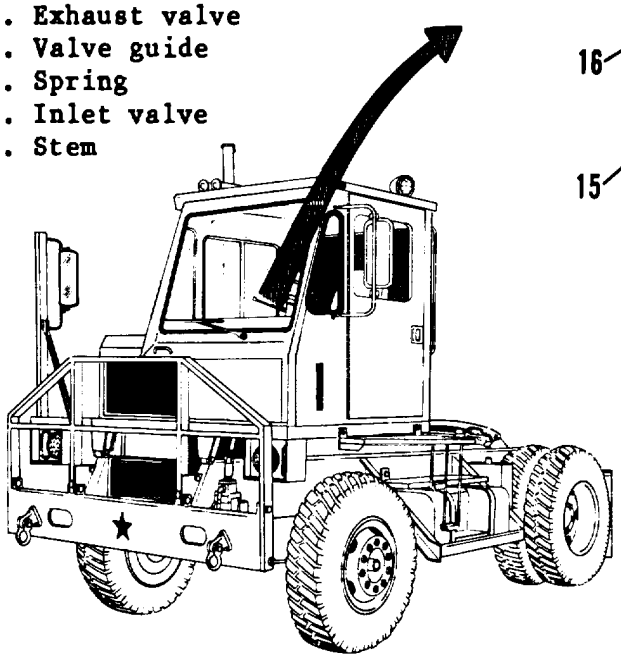
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Steering wheel column	a Valve assembly	Support	
		b Two screws (1) and lock washers (2)	Remove	
		c Clamp (3)	Remove	
		d Body (4)	Remove	
DISASSEMBLY				
2	Head (7)	a Pin (5)	Press-out and discard	
		b Handle (6)	Remove	
		c Head (7)	Remove	
		d Two grommets (8 and 9)	Remove and discard	
		e Knob (10)	Pull off	Handle (6)

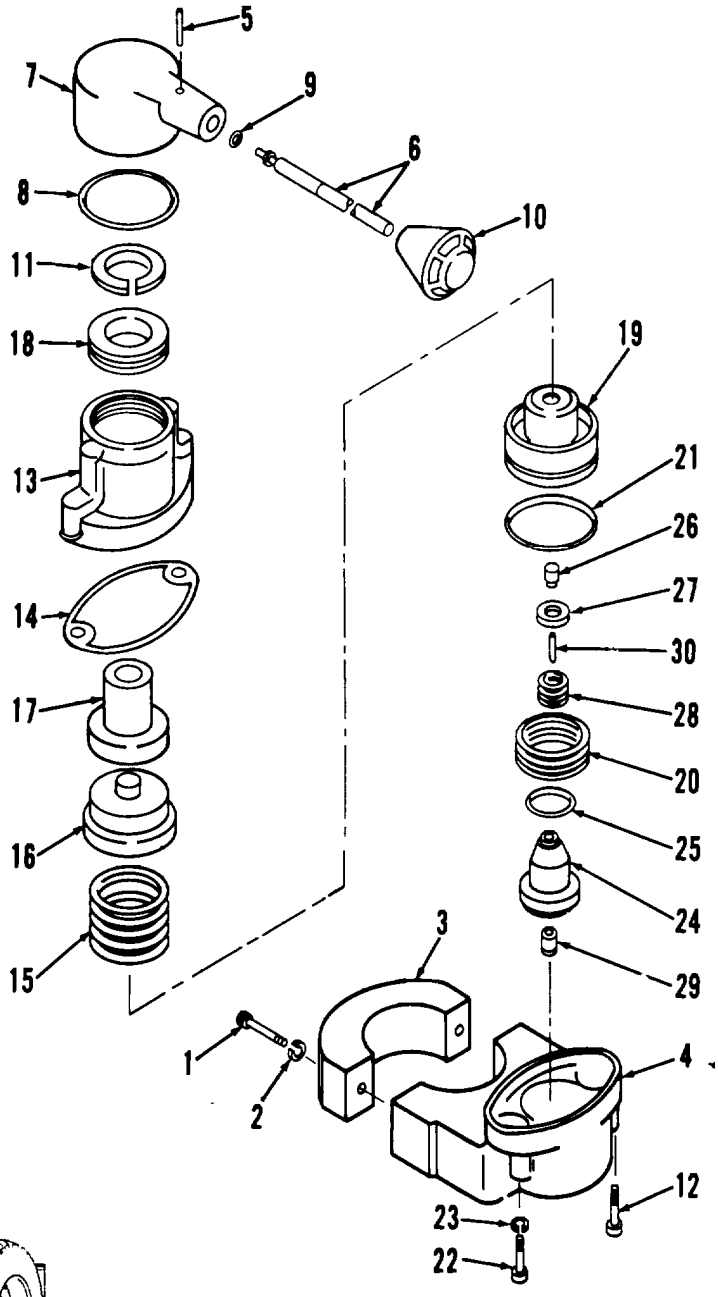
3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve (cont).

KEY

1. Screws (2)
2. Lock washers (2)
3. Clamp
4. Body
5. Pin
6. Handle
7. Head
8. Grommet
9. Grommet
10. Knob
11. Lock washer
12. Screws (2)
13. Cover
14. Gasket
15. Spring
16. Cam
17. Cam follower
18. Adjusting ring
19. Piston
20. Return spring
21. Grommet
22. Screws (2)
23. Lock washers (2)
24. Inlet valve seat
25. Grommet
26. Exhaust valve
27. Valve guide
28. Spring
29. Inlet valve
30. Stem





TA236270

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3	Cover	a Lock washer (13)	Remove	(11)
		b Two screws (12)	Remove	
		c Cover (13) and body (4)	Separate	
		d Gasket (14)	Remove and discard	
		e Spring (15)	Remove	
		f Cam (16)	Remove	
		g Cam follower (17)	Remove	
		h Adjusting ring (18)	Remove	
4	Body (4)	a Piston (19)	Remove	
		b Return spring (20)	Remove	
		c Grommet (21)	Remove and discard	
		d Two screws (22) and lock washers (23)	Remove	
		e Inlet valve seat (24)	Remove	
		f Grommet (25)	Remove and discard	
		g Punch	Insert	Into supply port, to hold inlet valve (29) on its seat
		h Valve guide (27)	Depress	
		i Exhaust valve (26)	Remove	
		j Valve guide (27)	Remove	
		k Spring (28)	Remove	
		l Inlet valve (29)	Remove	
		m Stem (30)	Remove	
CLEANING				
5 a	All rubber parts	Clean	Use clean, dry cloth	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
5 (cont)		**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		b. All remaining parts	Clean	Use cleaning solvent P-D-680 and stiff bristle brush; dry thoroughly with compressed air
INSPECTION				
6		a. All rubber parts	Inspect	Replace if worn or deteriorated
		b. All other parts	Inspect	Replace if cracked, broken, or damaged
REASSEMBLY				
7	Control	Bores of body (4), valve, hand brake	Lubricate cover (13), cam (16), cam follower (17), and new grommet (21)	Use lubricant

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8	Body (4)	a Stem (30)	Install	Lubricate with soap before installing in inlet valve (29)
		b Inlet valve (29)	Install	In inlet valve seat (24)
		c Punch	Insert	Into supply port, to hold inlet valve (29) against its seat
		d Spring (28) and valve guide (27)	a Position b Depress	On inlet valve seat (24)
		e Exhaust valve (26)	Install	On stem (30)
		f New grommet (25)	Position	On inlet valve seat (24)
		g Inlet valve seat (24)	Install	In body (4)
		h Two lock washers (23) and screws (22)	Install	Tighten screws (22) to 60-80 -- pounds inch
		i Return spring (20)	Install	In body (4)
		j New grommet (21)	Install	On piston (19)
		k Piston (19)	Install	
9	Cover (13)	a Adjusting ring (18)	Install	Screw in, until flush with top of cover (13)
		b Cam follower (17)	Install	
		c Cam (16)	Install	
		d Spring (15) and new gasket (14)	Position	
		e Cover (13) and body (4)	Mate	
		f Two screws (12)	Install	Tighten to 75-95 pounds inch
		g Lock washer (11)	Position	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

c. Trailer Hand Brake Control Valve (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
10	Head (7)	a	Knob (10)	Install	Push onto handle (6)
		b	New grommet (9)	Install	
		c	New grommet (8)	Position	
		d	Read (7)	Position	
		e	Handle (6)	Install	In head (7)
		f	New pin (5)	Press in	
INSTALLATION					
11	Steering wheel column	a	Body (4)	Position	Against steering wheel column
		b	Clamp (3)	Position	Against body (4)
		c	Two lock washers (2) and screws (1)	Install	Tighten screws (1) to 180-220 pounds inch
12	Cab, underside	a	Fittings and lines	Connect	Para 2-53a
		b	Air pressure	Restore	Para 2-41h(l)
		c	Fittings and lines	Inspect	For leakage, with engine stopped and while operating trailer hand brake control valve

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

d. Double Check Valve.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Pipe wrench
Safety glasses

Personnel Required
Automotive Repairer MOS 63H

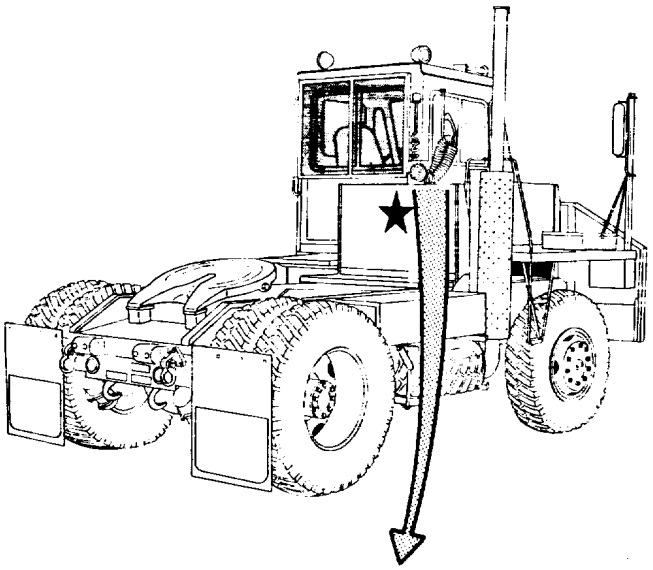
Equipment Condition
Paragraph — Condition Description
Vehicle parked on level surface, engine off, and parking brake applied.
2-41h(l) — All air pressure relieved.
2-53a — Air brake lines and fittings removed from double check valve.

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Grease — Item 35, Appendix C
Teflon tape — Item 43, Appendix C
O-ring — FSCM 06853 PN 239658

STEP	LOCATION	ITEM		ACTION	REMARKS
REMOVAL					
1	Rear cab guard	a	Double check valve	Remove	From tractor protection valve (note position of ports for installation)
		b	Nipple (1)	Remove	From body (9) or tractor protection valve
		c	Plug (2)	Remove	From body (9)
DISASSEMBLY					
2	Body (9)	a	Two capscrews (3) and washers (4)	Remove	
		b	Cap (5)	Remove	
		c	O-ring (6)	Remove	
		d	Shuttle (7) and shuttle guide (8)	Remove	

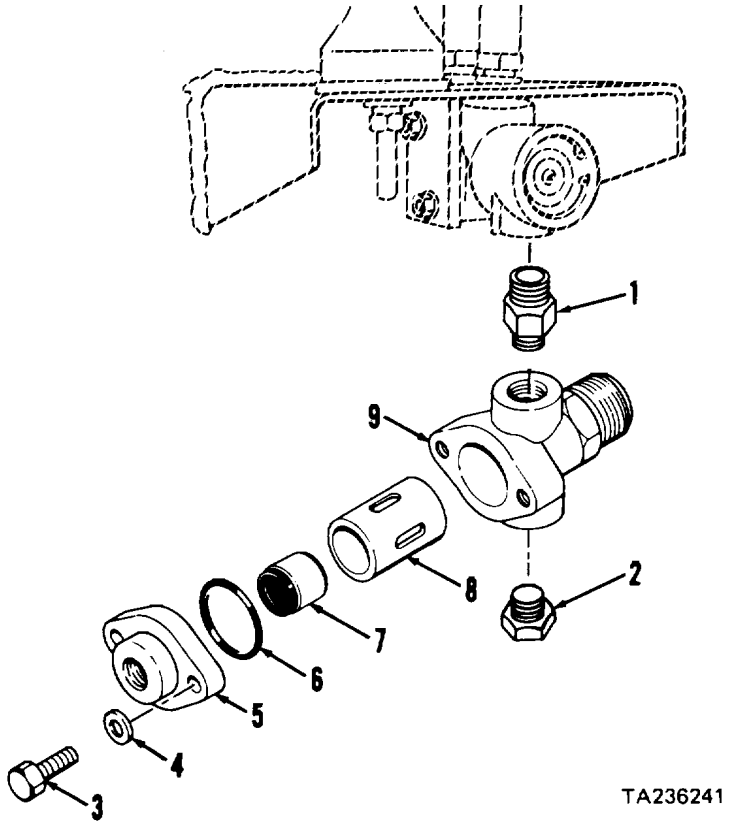
3-24. BRAKE CONTROLS MAINTENANCE (CONT)

d. Double Check Valve (cont).



KEY

1. Nipple
2. Plug
3. Capscrews (2)
4. Washers (2)
5. Cap
6. O-ring
7. Shuttle
8. Shuttle guide
9. Body



3-24. BRAKE CONTROLS MAINTENANCE (CONT)

d. Double Check Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
3		All parts	Clean	Use cleaning solvent P-D-680; dry using compressed air
INSPECTION				
4	a	O-ring (6)	Inspect	Replace if cracked, cut, or deteriorated
	b	Shuttle (7), shuttle guide (8), and body (9)	Inspect for scratched, pitted, or cracked	Replace valve as an assembly if parts gouged,
	c	All other parts	Inspect	Replace if cracked, broken, or threads damaged

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

d. Double Check Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
5	Body (9)	a Bore of body (9), shuttle guide (8), shuttle (7), and O-ring (6)	Lubricate	Apply light film of grease
		b Shuttle guide (8) and shuttle (7)	Position	In body (9)
		c O-ring (6)	Position	In groove of cap (5)
		d Cap (5)	Position	On body (9)
		e Two capscrews (3) and washers (4)	Install and tighten	
INSTALLATION				
6	Rear cab guard	a Plug (2)	a	Tape Wrap threads with Teflon tape
		b Install		
		b Nipple (1)	a	Tape Wrap threads with Teflon tape
		b Install	In tractor protection valve	
		c Double check valve removal	Install position noted during	In nipple (1); tighten to
		d Fittings and air lines	Install and connect	To double check valve (para 2-53a)
7	Cab	Air pressure	Restore	Para 2-41h(l)
8	Rear cab guard treadle	Double check valve, lines, and fittings	Inspect	Check for leaks while assistant operates brake and trailer hand brake control valve

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

e. Automatic Drain Valve.

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Socket head screw key set
Scratch wire brush
Torque wrench 2-51b
Safety glasses

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

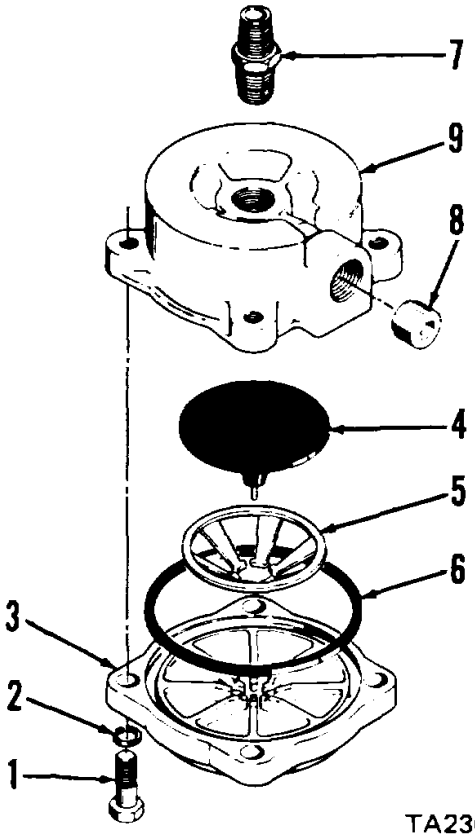
Paragraph	Condition Description
2-51b	Automatic drain valve removed from air reservoir.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Teflon tape	Item 43, Appendix C
Maintenance kit	FSCM 06853 PN 282134

KEY

1 Capscrews (4)
2 Lock washers (4)
3 Cover
4 Valve
5 Valve guide
6 Seal ring
7 Adapter
8 Pipe plug
9 Body



TA236233

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

e. Automatic Drain Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Body (9)	a Four screws (1) and lock washers (2)	Remove	Support cover (3)
		b Valve (4), valve guide (5), and seal ring (6)	Remove	Lift from cover (3); then discard
		c Adapter (7)	Remove	From body (9)
		d Pipe plug (8)	Remove	Only if necessary for replacement
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
2		All parts	Clean	Use cleaning solvent P-D-680 and stiff bristle brush; dry thoroughly with compressed air

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

e. Automatic Drain Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION				
3		a Cover (3) and body (9)	Inspect	Replace if cracked, warped, or otherwise damaged
		b All other parts	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
		NOTE Wrap Teflon tape around threads of pipe plug (8) and adapter (7) before installation.		
4	Body (9)	a Pipe plug (8)	Install and tighten	If removed
		b Adapter (7)	a Install b Tighten	Large end in body (9) To 130-170 pounds inch
		NOTE In the following steps, use new items 4 thru 6 included in automatic drain valve maintenance kit.		
		c Seal ring (6)	Position	In cover (3) groove
		d Valve (4) and valve guide (5)	Position	Place valve (4) into valve guide (5) and position in cover (3)
		e Cover (3)	Position	On body (9) Be sure valve (4) does not move out of place
		f Four capscrews (1) and lock washers (2)	Install	Tighten capscrews (1) to 80-120 pounds inch

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

f Ratio Reducing Valve.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Screwdriver set
Screwdriver
Scratch wire brush
Safety glasses
Automotive Mechanic's Tool Kit
Pliers
2-41h(1)

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Lubricant — Item 17, Appendix C
Maintenance kit — FSCM 06853 PN 289500

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied. Cab tilted 45 degrees. All air pressure relieved.
2-51a	Air brake lines and fittings removed from ratio reducing valve.

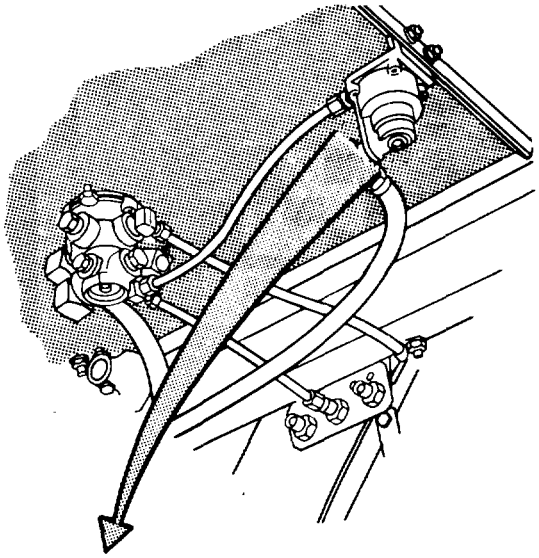
STEP	LOCATION	ITEM		ACTION	REMARKS
REMOVAL					
1	Cab deck, underside	a	Two capscrews (1), nuts (2), and lock washers (3)	Remove	Support valve assembly
		b	Valve assembly	Remove	From deck
DISASSEMBLY					
2	Ratio reducing valve	a	Four screws (4)	Remove	
		b	Cover (5)	Remove	Lift from body (15)
		c	Piston (6) and O-ring (7)	Remove	Discard O-ring (7)
		d	Springs (8 and 9)	Remove	Discard springs (8 and 9)
		e	Piston (10), valve (11), and O-rings (12 and 13)	Remove	Discard O-rings (12 and 13) and valve (11)
		f	Spring (14)	Remove	From body (15)

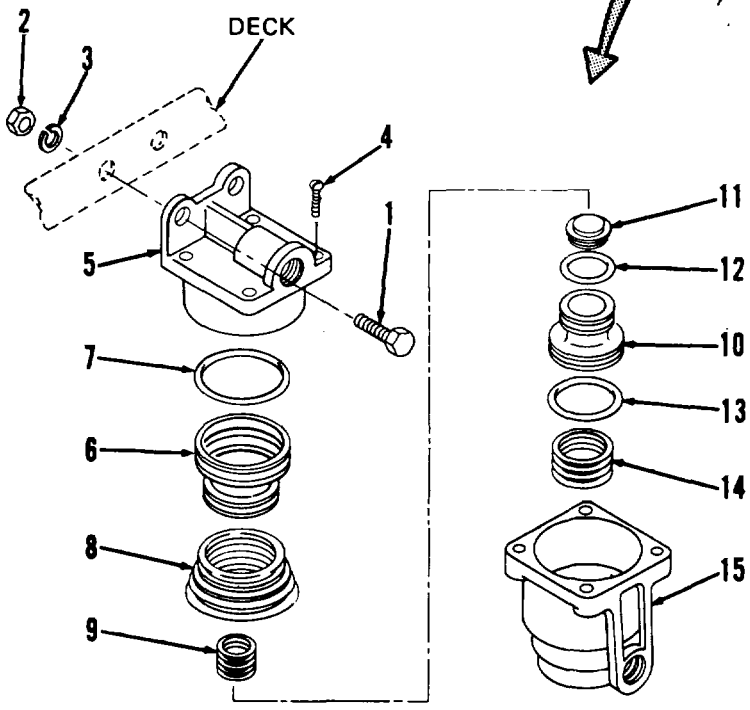
3-24. BRAKE CONTROLS MAINTENANCE (CONT)

f. Ratio Reducing Valve (cont).

KEY

1. Capscrews (2)
2. Nuts (2)
3. Lock washers (2)
4. Screws (4)
5. Cover
6. Piston
7. O-ring
8. Spring
9. Spring
10. Piston
11. Valve
12. O-ring
13. O-ring
14. Spring
15. Body





TA236231

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

f. Ratio Reducing Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
3		All parts	Clean	Use cleaning solvent P-D-680 and stiff bristle brush; dry thoroughly with compressed air
INSPECTION				
4	a	Spring (14)	Inspect	Replace if cracked or permanently set
	b	All other parts	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
		NOTE Use new items 7, 8, 9, 11, 12, and 13 included in ratio reducing valve maintenance kit.		

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

f. Ratio Reducing Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
5	Ratio reducing valve	a Bores of body (15), cover (5), pistons (6 and 10), and O-rings (7, 12, and 13)	Lubricate	
		b Spring (14)	Install	In body (15)
		c Two O-rings (12 and 13)	Install	On piston (10)
		d Valve (11)	Install	In piston (10)
		e Piston (10)	Install	In body (15)
		f Springs (8 and 9)	Install	
		g O-ring (7)	Install	On piston (6)
		h Piston (6)	Install	
		i Cover (5)	Position	On body (15)
		j Four screws (4)	Install and tighten	
INSTALLATION				
6	Cab deck, underside	a Valve assembly	Position	On cab deck
		b Two capscrews (1), lock washers (3), and nuts (2)	Install and tighten	
		c Air brake lines and fittings	Connect	Para 2-51a
7	Cab tilt pump	Cab	Lower	To normal operating position
8	Cab	Air pressure	Restore	Para 2-41h(1)
9	Deck, underside	Ratio reducing valve, lines, and fittings	Inspect	Check for leaks

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g Relay Valve.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Screwdriver set
Screwdriver
Scratch wire brush
Retaining ring pliers
Safety glasses
Automotive Mechanic's Tool Kit
Pliers
Torque wrench

Paragraph
Vehicle parked on level surface, engine off, and parking brake applied.
2-41h(1)
2-51a
removed from relay valve.

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Condition Description
All air pressure relieved.
Air brake lines and fittings

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Pneumatic grease — Item 35, Appendix C
Teflon tape — Item 43, Appendix C
Maintenance kit — FSCM 06853 PN 287370

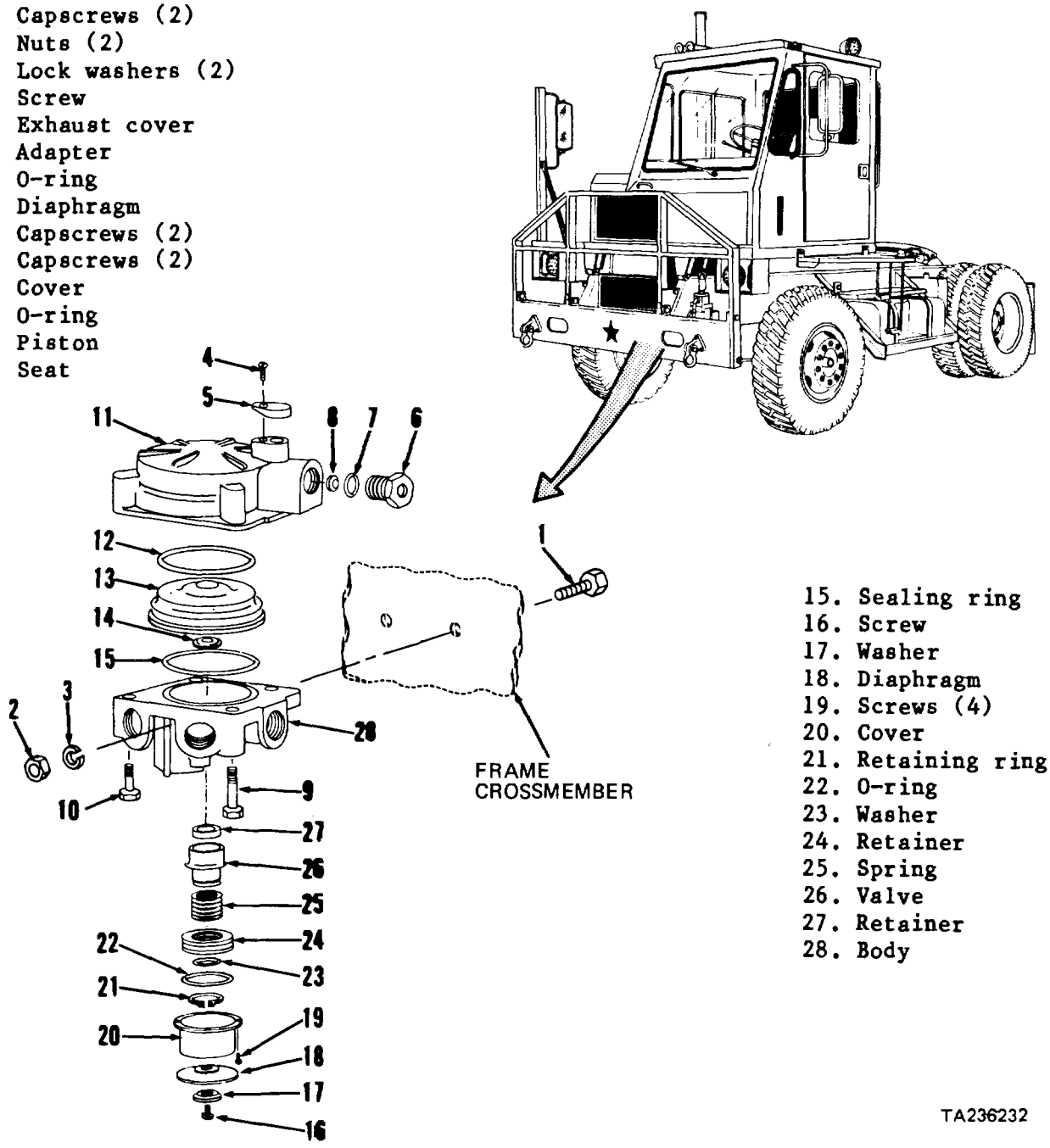
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Front frame crossmember, center	a Two capscrews (1), nuts (2), and lock washers (3)	Remove	Support relay valve assembly
		b Relay valve	Remove assembly	From crossmember
DISASSEMBLY				
2	Relay valve	a Screw (4)	Remove	
		b Exhaust cover (5)	Remove	
		c Adapter (6)	Remove	From cover (11)
		d O-ring (7) and diaphragm (8)	Remove and discard	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g. Relay Valve (cont).

KEY

1. Capscrews (2)
2. Nuts (2)
3. Lock washers (2)
4. Screw
5. Exhaust cover
6. Adapter
7. O-ring
8. Diaphragm
9. Capscrews (2)
10. Capscrews (2)
11. Cover
12. O-ring
13. Piston
14. Seat
15. Sealing ring
16. Screw
17. Washer
18. Diaphragm
19. Screws (4)
20. Cover
21. Retaining ring
22. O-ring
23. Washer
24. Retainer
25. Spring
26. Valve
27. Retainer
28. Body



TA236232

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g. Relay Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		NOTE Scribe or otherwise match mark cover (11) and body (28) to aid in reassembly.		
	e	Capscrews (9 and 10)	Remove	
	f	Cover (11) body (28)	Remove	Tap gently and separate from
	g	O-ring (12)	Remove and discard	
	h	Piston (13)	Remove	
	i	Seat (14)	Remove	
	j	Sealing ring (15)	Remove and discard	
	k	Screw (16) and washer (17)	Remove	
	l.	Diaphragm (18)	Remove and discard	
	m	Four screws (19)	Remove Support cover (20)	
	n	Cover (20)	Remove	
		NOTE Discard items 21 thru 27 in the following steps. New items 21 thru 27 are included in the relay valve maintenance kit.		
	o	Retaining ring (21)	Remove	Use retaining ring pliers
	p	O-ring (22)	Remove	
	q	Washer (23)	Remove	
	r	Retainer (24)	Remove	
	s	Spring (25)	Remove	
	t	Valve (26)	Remove	
	u	Retainer (27)	Remove	

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g. Relay Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
3		All parts	Clean	Use cleaning solvent P-D-680 and stiff bristle brush; dry thoroughly with compressed air
INSPECTION				
4	a	Cover (11) and body (28)	Inspect	Replace if cracked, warped, or damaged
	b	All other parts	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
		NOTE Use new items 7, 8, 12, 15 and 18, and new valve assembly (21 thru 27) included in relay valve maintenance kit.		

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g. Relay Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
5	Relay valve	a Bores of body (28), cover (11), piston (13), O-rings (7, 12 and 22) and sealing ring (15)	Lubricate	Use pneumatic grease
		b Spring (25)	Position	On valve (26)
		c Retainer (24)	Install	
		d Washer (23)	Install	
		e O-ring (22)	Install	
		f Retaining ring (21)	Install	Use retaining ring pliers
		g Valve (26) and retainer (27)	Position	In body (28)
		h Cover (20)	Position	
		i Four screws (19)	Install and tighten	
		j Diaphragm (18) (20)	Position	Between guide ribs in cover
		k Washer (17) and screw (16)	Install and tighten	
		l. Sealing ring (15)	Position	
		m O-ring (12)	Install	On piston (13)
		n Seat (14) and piston (13)	Install	
		o Cover (11)	Position	On body (28), with match marks aligned
		p Capscrews (9 and 10)	Install	Tighten to 120-150 pounds inch
		q Diaphragm (8) and O-ring (7)	Position	In cover (11)

NOTE

Wrap Teflon tape around threads of adapter (6) before installation.

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

g. Relay Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
5 (cont)		r Adapter (6)	Install	Tighten to 180-200 pounds inch
		s Exhaust cover (5)	Position	On cover (11)
		t Screw (4)	Install and tighten	
INSTALLATION				
6	Front frame crossmember, center	a Relay valve assembly	Position	
		b Two capscrews (1), nuts (2), and lock washers (3)	Install and tighten	
		c Air brake lines and fittings	Connect	Para 2-51a
7	Cab	Air pressure	Restore	Para 2-41h(1)
8	Front frame crossmember	Relay valve, lines and fittings	Inspect	Check for leaks

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

h. Tractor Protection Valves.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Reassembly
f Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Screwdriver set
Screwdriver
Scratch wire brush
Retaining ring pliers
Safety glasses
Automotive Mechanic's Tool Kit
Pliers

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Lubricant — Item 17, Appendix C
Maintenance kit — FSCM 06853 PN 280858

Personnel Required
Automotive Repairer MOS 63H

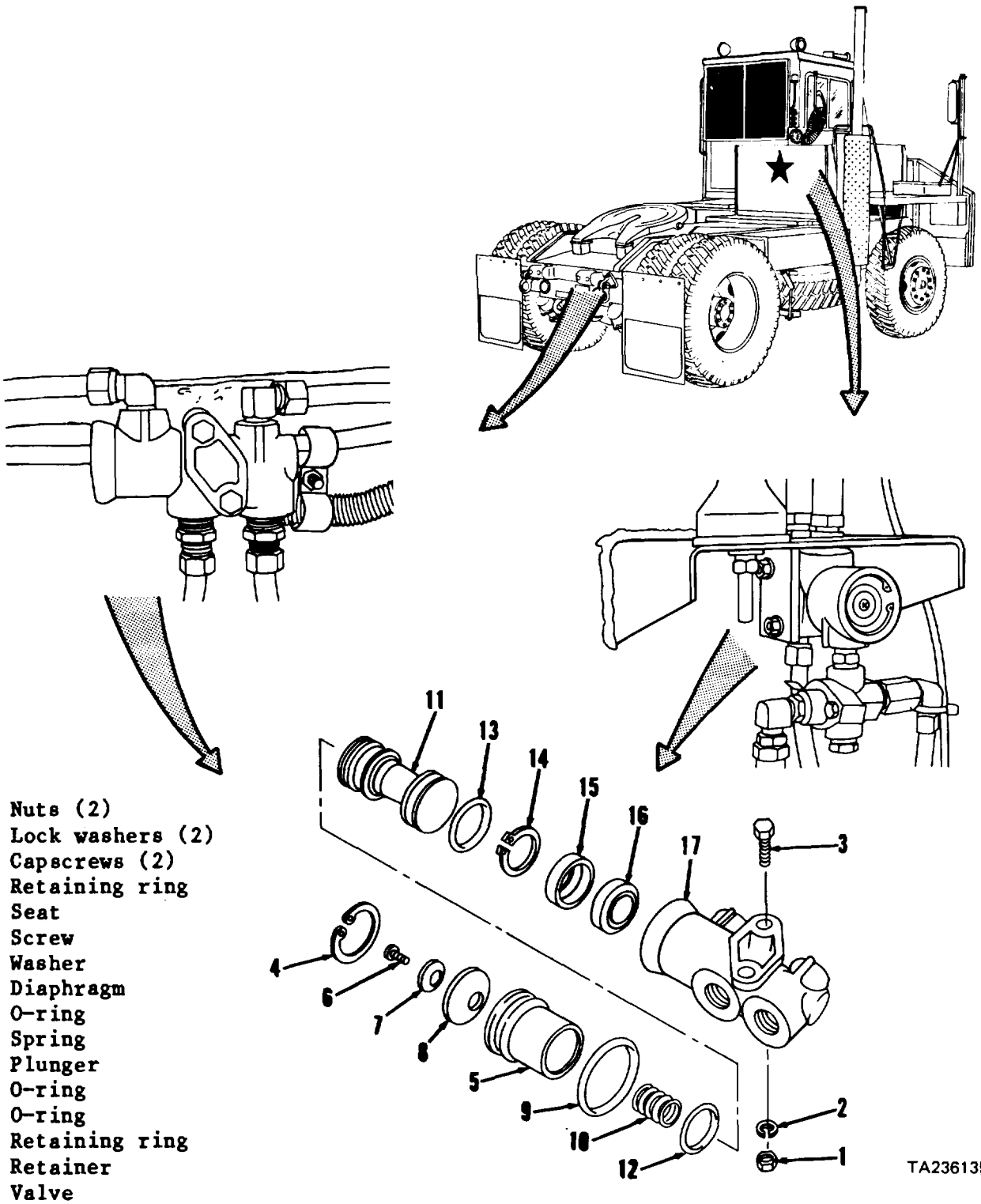
Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-41h(1)	All air pressure relieved.
2-51a	Tractor brake tubing and fittings removed from tractor protection valves.
2-53a	Trailer brake tubing and fittings removed from tractor protection valves.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (CAB GUARD)				
1	Rear cab guard	a Double check valve	Remove	Para 3-24d
		b Two nuts (1), lock washers (2), and capscrews (3)	Remove valve	Support tractor protection
		c Tractor protection valve	Remove	From rear cab guard
REMOVAL (REAR FRAME)				
2	Rear frame	a Two nuts (1), lock washers (2), and capscrews (3)	Remove	Support tractor protection valve; note location of white ground wire for installation
		b Tractor protection valve	Remove	From rear frame

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

h. Tractor Protection Valves (cont).



KEY

1. Nuts (2)
2. Lock washers (2)
3. Capscrews (2)
4. Retaining ring
5. Seat
6. Screw
7. Washer
8. Diaphragm
9. O-ring
10. Spring
11. Plunger
12. O-ring
13. O-ring
14. Retaining ring
15. Retainer
16. Valve
17. Body

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

h. Tractor Protection Valves (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
3	Tractor protection valve	a Retaining ring (4)	Remove	Use retaining ring pliers
		b Insert assembly (5 thru 16)	a b	Remove From body (17) Position On smooth surface; plunger (11) down
		c Screw (6), washer (7), and diaphragm (8)	Remove	While holding seat (5) down against spring (10) pressure Discard diaphragm (8)
		d O-ring (9)	Remove and discard	
		e Spring (10)	Remove	
		f Plunger (11)	Remove	
		g O-rings (12 and 13)	Remove and discard	
		h Retaining ring (14)	Remove	Use retaining ring pliers
		i Retainer (15) and valve (16)	Remove	From plunger (11)

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediate- ly. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

h. Tractor Protection Valves (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
4		All parts	Clean	Use cleaning solvent P-D-680 and stiff bristle brush; dry with compressed air
INSPECTION				
5		a Body (17)	Inspect	Replace if cracked or damaged
		b Seat (5) and plunger (11)	Inspect	Replace if cracked, scored, or damaged
		c Spring (10)	Inspect	Replace if cracked or permanently set
		d All other parts	Inspect	Replace if cracked, broken, or threads damaged
REASSEMBLY				
		NOTE Use new items 4, 8, 9, 10, and 12 thru 15 included intractor protection valve maintenance kit.		
6	Tractor protection valve	a Bores of body (17), plunger (11), seat (10), and O-rings (9, 12, and 13)	Lubricate	
		b Valve (16), retainer (15) and O-rings (12 and 13)	Install	On plunger (11)
		c Retaining ring (14)	Install	Use retaining ring pliers
		d Plunger (11)	Install	In body (17)
		e Diaphragm (8), washer (7), and screw (6)	Install	On seat (5)
		f Spring (10)	Install	
		g O-ring (9)	Install	
		h Seat assembly (5 thru 8)	Install	In body (17)
		i Retaining ring (4)	Install	Use retaining ring pliers

3-24. BRAKE CONTROLS MAINTENANCE (CONT)

h. Tractor Protection Valves (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (REAR FRAME)				
7	Rear frame	a. Tractor protection valve and white ground wire	Position	As noted during removal
		b. Two capscrews (3), lock washers (2), and nuts (1)	Install and tighten	
		c. Fittings and tubing	Install and connect	Para 2-51a and 2-53a
INSTALLATION (REAR CAB GUARD)				
8	Rear cab guard	a. Tractor protection valve	Position	
		b. Two capscrews (3), lock tighten washers (2), and nuts (1)	Install and	
		c. Double check valve	Install	Para 3-24d
		d. Fittings and tubing	Install and connect	Para 2-51a and 2-53a

NOTE

Restore air pressure (para 2-41h(l)) and check for leaks using soap solution before returning tractor to operation.

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

a. Air Compressor Governor.

This task covers: a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Wire brush
- Retaining ring pliers
- Socket wrench set
- Screwdriver set
- Safety glasses

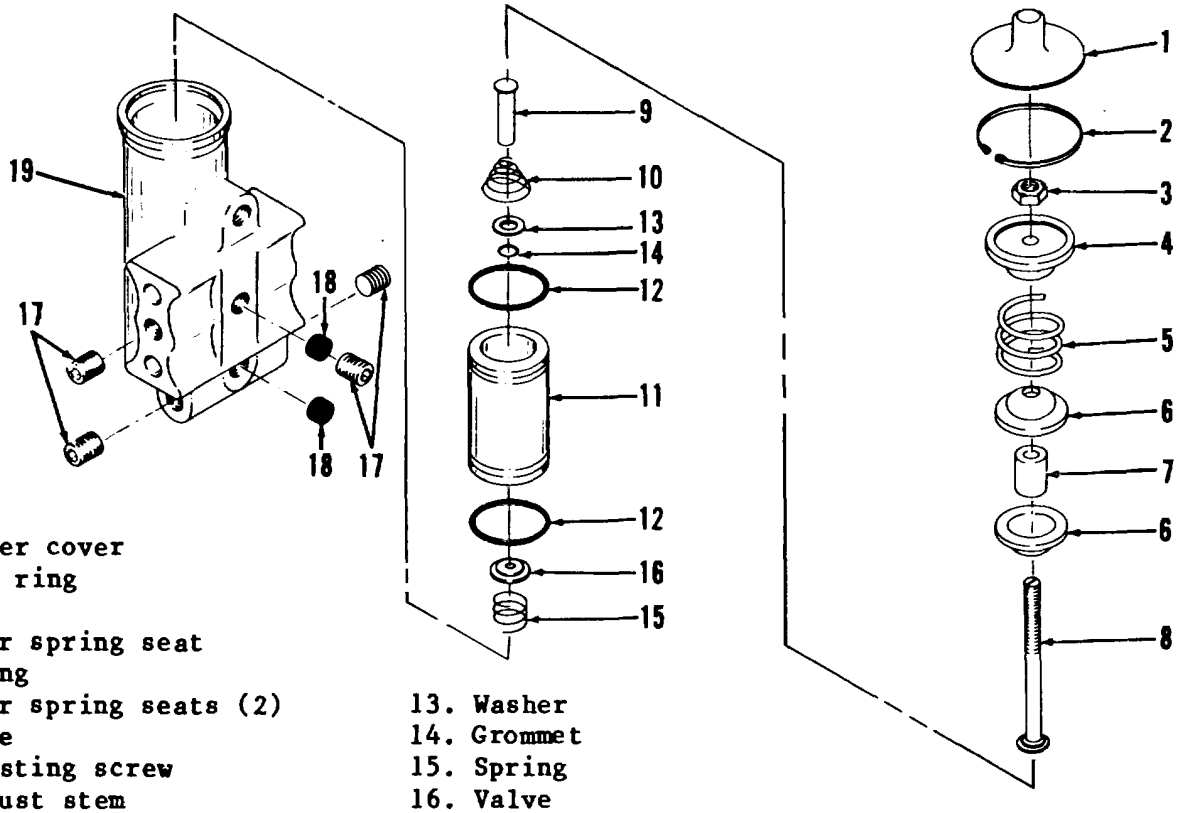
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-52d	Governor removed from air compressor.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Lubricant	Item 17, Appendix C
Detergent	Item 27, Appendix C



TA236234

KEY

1. Rubber cover
2. Snap ring
3. Nut
4. Upper spring seat
5. Spring
6. Lower spring seats (2)
7. Guide
8. Adjusting screw
9. Exhaust stem
10. Spring
11. Piston
12. Preformed packings (2)
13. Washer
14. Grommet
15. Spring
16. Valve
17. Pipe plugs (4)
18. Filters (2)
19. Body

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

a. Air Compressor Governor (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Compressor governor	a. Rubber cover (1)	Remove	Turn counterclockwise
		b. Snap ring (2)	Remove	Use retaining ring pliers
		c. Adjustment assembly (3 thru 8)	Remove	Pull from bore as an assembly
2	Adjustment assembly (3 thru 8) seat (4)	a. Nut (3)	Remove	From adjusting screw (8)
		b. Upper spring	Remove	Turn counterclockwise
		c. Spring (5)	Remove	
		d. Two lower spring seats (6) and guide (7)	Remove and separate	From adjusting screw (8)
3	Body (19)	a. Exhaust stem (9) and spring (10)	Remove	
		Piston (11)	Remove	
4	Piston (11) packings (12)	a. Two preformed piston (11)	Remove	From grooves in outside of
		b. Washer (13) and grommet (14)	Remove	
		c. Spring (15) and valve (16)	Remove	
5	Body (19)	a. Four pipe plugs (17)	Remove	
		b. Two filters (18)	Remove	From body (19)

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE (CONT)

a. Air Compressor Governor (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
6	a.	All metal parts	Clean	Use cleaning solvent P-D-680 and stiff bristled brush; dry with compressed air
	b.	All rubber	Clean	Use mild solution of parts detergent and water; dry using clean cloths
	c.	Piston (11) and body (19)	Clean	Clean air passages using compressed air
INSPECTION				
7	a.	Body (19)	Inspect	Replace if cracked, broken, or damaged
	b.	Piston (11)	Inspect	Replace if cracked, corroded, or scored
	c.	Springs (5, 10, and 15)	Inspect	Replace if cracked, broken, or permanently set

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

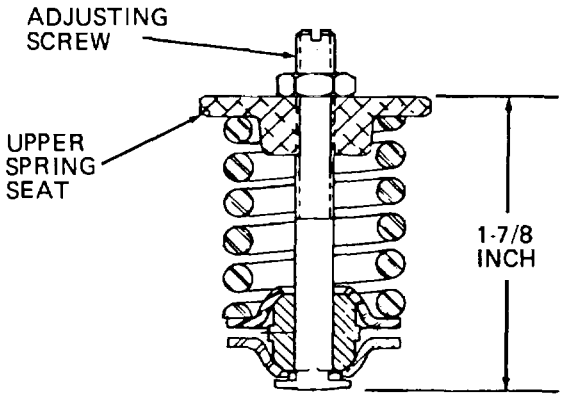
a. Air Compressor Governor (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
7 (cont)		d. Adjustment assembly (3 thru 8)	Inspect	Replace as an assembly if damaged
		e. All other parts	Inspect	Replace if cracked, broken, excessively worn, or threads damaged
REASSEMBLY				
8	Compressor governor	Body (19), piston (11), two pre-formed packings (12), and guide (7)	Lubricate	
9	Body (19)	a. Two filters (18)	Install	Press into body bores with eraser end of pencil
		b. Four pipe plugs (17)	Install and tighten	In side of body (19)
10	Piston (11)	a. Valve (16) and spring (15)	Position	In piston (11)
		b. Grommet (14) and washer (13)	Install	
		c. Two preformed packings (12)	Install	In piston (11) grooves
11	Adjustment assembly (3 thru 8)	a. Two lower spring seats (6) and guide (7)	Position	On adjusting screw (8)
		b. Spring (5)	Position	On spring seat (6)

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

a. Air Compressor Governor (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		c. Upper spring seat (4)	a. Install b. Adjust	Turn clockwise Turn upper spring seat (4) for 1-7/8 inch distance between top of upper spring seat and bottom of adjusting screw as shown
		d. Nut (3)	Install and tighten	Secures upper spring seat adjustment
12	Body (19)	a. Piston (11)	Install	In body (19) bore
		b. Spring (10) and exhaust stem (9)	Install	
		c. Adjustment assembly (3 thru 8)	Position	In body (19) bore
		d. Snap ring (2)	Install	Use retaining ring pliers
		e. Rubber cover (1)	Install	Turn clockwise



3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly.

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP

Tools

No. 1 Common Organizational Maintenance Tool Kit
- Scratch wire brush
- Socket wrench set
- Torque wrench
- Screwdriver set
- Safety glasses

Automotive Mechanic's Tool Kit
- Pliers, round nose
- Thickness gage
- Punch
- Machinist's rule
- Hammer

Bit set, socket head screw
Soft-faced mallet
Piston ring expander
Piston ring compressor
Micrometer
Inside micrometer
Bore gage
Brass drift
Arbor press
Holding fixture

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Engine oil, SAE 30	Item 24, Appendix C
Mineral spirits	Item 33, Appendix C
High temperature cup grease	Item 34; Appendix C
Maintenance kit	FSCM 06853 PN 287043
Four sealing rings	FSCM 06853 PN 292437
Oil seal	FSCM 06853 PN 243053
Four wrist pin buttons	FSCM 06853 PN 292392
Four lock straps	FSCM 06853 PN 249959

Personnel Required

Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-52e	Air compressor removed from tractor.

STEP	LOCATION	ITEM	ACTION	REMARKS

DISASSEMBLY

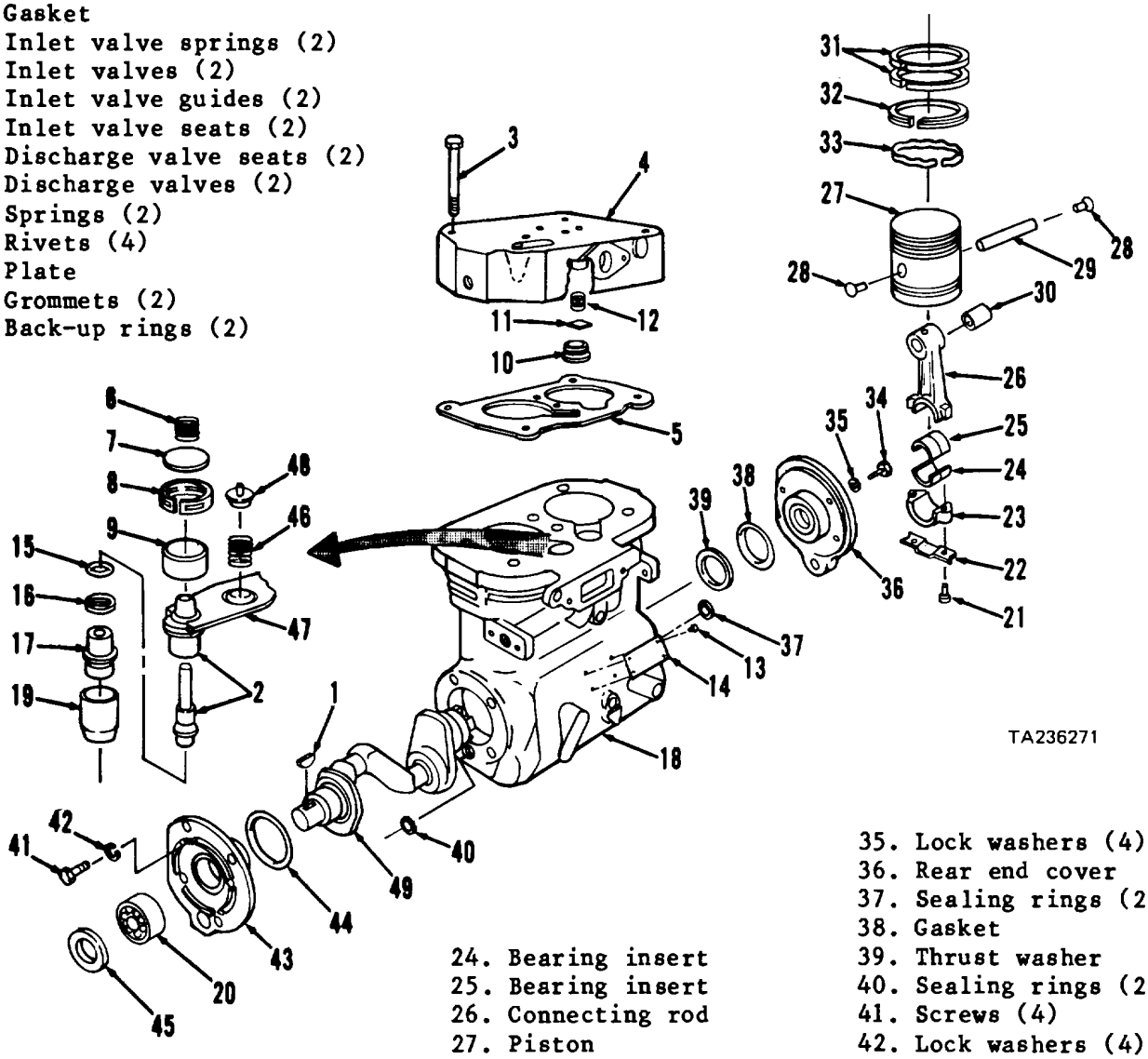
WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

KEY



1. Key
2. Unloader plungers (2)
3. Screws (6)
4. Cylinder head
5. Gasket
6. Inlet valve springs (2)
7. Inlet valves (2)
8. Inlet valve guides (2)
9. Inlet valve seats (2)
10. Discharge valve seats (2)
11. Discharge valves (2)
12. Springs (2)
13. Rivets (4)
14. Plate
15. Grommets (2)
16. Back-up rings (2)
17. Unloader plunger guides (2)
18. Crankcase
19. Unloader pistons (2)
20. Front bearing
21. Bolts (2)
22. Lock straps (2)
23. Connecting rod cap
24. Bearing insert
25. Bearing insert
26. Connecting rod
27. Piston
28. Wrist pin buttons (2)
29. Wrist pin
30. Bushing
31. Piston rings (2)
32. Expander ring
33. Oil ring
34. Screws (4)
35. Lock washers (4)
36. Rear end cover
37. Sealing rings (2)
38. Gasket
39. Thrust washer
40. Sealing rings (2)
41. Screws (4)
42. Lock washers (4)
43. Front end cover
44. Gasket
45. Oil seal
46. Unloader spring
47. Spring saddle
48. Spring seat
49. Crankshaft

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
1	Compressor	Exterior	a. Clean	Use cleaning solvent P-D-680 and stiff bristled brush; dry with compressed air
			b. Scribe	Use punch to make identifying marks for proper reassembly on: a. End covers (36 and 43), to indicate their relationship to crankcase' (18) b. Drive end of crankshaft (49) relative to front end cover (43) and crankcase (18) c. Cylinder head (4) relative to crankcase (18)
2	Crankshaft (49)	Key (1)	Remove	
3	Cylinder head (4)	a. Six screws (3) b. Cylinder head (4) sharply c. Gasket (5) d. Two inlet valve springs (6)	Remove a. Tap b. Separate Remove and discard	 With soft-faced mallet From crankcase (18)
		NOTE In following step remove two large valve seats (10) using socket head screw bit. The two smaller slotted valve stops in cylinder head are not separately replaceable.		

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3		e. Two discharge (cont) valve seats (10), discharge valves (11), and springs (12)	Remove	Turn discharge valve seats (10) counterclockwise using socket head screw bit
4	Crankcase 18)	a. Unloader spring (46)	Remove	Pry out using screwdriver blade between spring and spring saddle (47)
		b. Spring saddle (47)	Lift and	From unloader plungers (2) remove
		c. Spring seat (48)	Remove	
		d. Two unloader plungers (2) remove with plunger guides (17)	Lift and	Use round nose pliers
		e. Inlet cavity	Cover	With clean cloth

WARNING

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

	f. Governor mounting pad unloader port	Apply air pressure (19)	To raise unloader pistons
	g. Two grommets (15), back-up rings (16), and unloader pistons (19)	Remove	Use round nose pliers
	h. Two inlet valves (7)	Remove	
	i. Two inlet valve guides (8)	Remove	
	j. Two inlet valve seats (9)	Remove	

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		k. Four rivets (13) and plate (14)	Remove	Only if necessary to replace damaged plate (14)
		NOTE		
		Before removing connecting rods (26), mark each connecting rod and mating cap (23) to identify their relationship during reassembly.		
5	Crankshaft (49)	a. Connecting rod cap (23) and connecting rod (26)	Scribe	Use punch to scribe marks
		b. Crankshaft (49) is at its lowest point	Rotate	Until connecting rod cap (23)
		c. Two lock straps (22)	Straighten prongs	
		d. Two bolts (21) and lock straps (22)	Remove	Discard lock straps (22)
		e. Connecting rod cap (23) and bearing insert (24)	Remove	Discard bearing insert (24)
		f. Piston (27) and connecting rod (26)	Remove	Push out through top of crankcase (18)
		g. Bearing insert (25)	Remove and discard	
		h. Two wrist pin buttons (28)	Remove and discard	
		i. Wrist pin (29)	Press out	
		j. Connecting rod (26) and piston (27)	Separate	
		k. Bushing (30)	Press out and discard	
6	Piston	Two piston rings (27) (31), expander ring (32), and oil ring (33)	Remove	Use piston ring expander

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE		
		Repeat steps 5 and 6 above for removal and disassembly of remaining piston and connecting rod.		
7	Crankcase (18)	a. Four screws (34) and lock washers (35)	Remove	
		b. Rear end cover (36)	Remove	
		c. Two sealing rings (37) and gasket (38)	Remove and discard	
		d. Thrust washer (39)	Remove	
		NOTE		
		Do not attempt to remove crankshaft rear bearing. If inspection reveals an unserviceable rear bearing, a new rear end cover (36) assembly must be installed.		
		e. Four screws (41) and lock washers (42)	Remove	
		f. Front end cover (43)	Remove	
		g. Gasket (44) and two sealing rings (40)	Remove and discard	
		h. Oil seal (45)	Press out and discard	
		i. Crankshaft (49)	a. Rotate	So that front crankpin is in alignment with cutout in bearing bore in crankcase (18)
			b. Tap rear end	Use rawhide mallet. Tap until front bearing (20) is forced out of its bore in crankcase

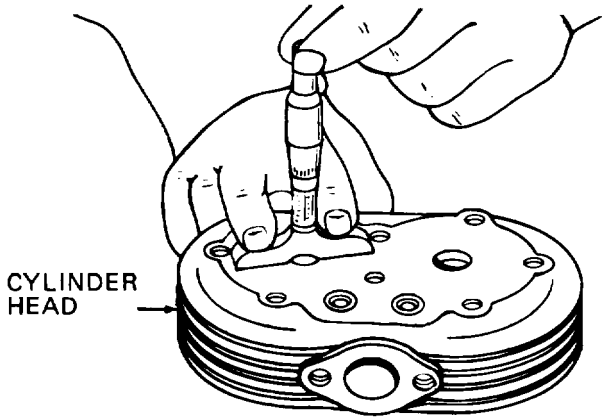
3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
7 (cont)		j. Front bearing (20)	Remove	
		k. Crankshaft (49)	Press out	
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
8		a. All parts	Clean	Use cleaning solvent P-D-680 and stiff bristled brush; dry with compressed air
		b. Cylinder head (4)	Clean	Remove all carbon deposits from discharge cavities. Remove rust and scale from cooling cavities. Scrape all foreign matter from all surfaces. Use shop air to clear all cavities
		c. Crankcase (18)	Clean	Remove all carbon deposits from inlet and unloader passages. Use shop air to clear unloader passages and oil passages. Run wire through oil passages

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
8 (cont)		d. Rear end cover (36) and front end cover (43)	Clean	Use shop air to clear oil passages; then run wire through oil passages
		e. Bearing in rear end cover (36) and front bearing (20)	Clean	Use mineral spirits; wipe dry with clean, dry cloth. Do not spin bearing (20) with compressed air
		f. Crankshaft (49)	Clean	Use shop air to clear oil passages; then run wire through oil passages
INSPECTION				
9		a. Key (1)	Inspect	Replace if cracked or broken
		b. Cylinder head (4)	a. Inspect	Replace if cracked, or mating surfaces pitted
			b. Measure/ inspect	Distance of travel of two discharge valves (11). Travel must not exceed 0.057 inch. Replace cylinder head if this measurement is exceeded, or if valve stop bores are excessively scored
				 TA236211
		c. Two inlet valve springs (6), two springs (12), and unloader spring (46)	Inspect	Replace if cracked, broken, or permanently set
		d. Two inlet valves (7) and inlet valve guides (8)	Inspect	Replace as an assembly if either is scratched or nicked

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

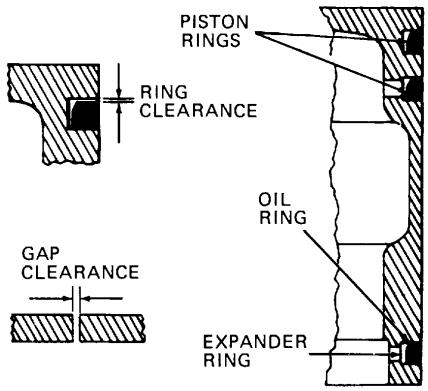
b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
9 (cont)		e. Crankcase (18)	a. Inspect	Replace if cracked, oil passages blocked, threads damaged, or other damage is apparent
			b. Check cylinder bores inside diameter for taper	Use inside micrometer or bore gage. Check below top ring location and at several points down length. If taper is more than 0.002 inch, replace crankcase
			c. Check cylinder bores out-of-roundness	Use bore gage. Measure lengthwise just below top ring location at four points 90 degrees from each other. If out-of-roundness exceeds 0.001 inch, replace crankcase
		f. Piston (27)	a. Inspect	Replace if cracked, scored, or if piston ring grooves are enlarged
			b. Measure outside diameter	Use micrometer. Measure piston in relationship to cylinder bore diameter. Diametral clearance is between 0.002 inch minimum, to 0.004 inch maximum. Replace piston if it does not fall within these clearance tolerances
		g. Piston rings (31), expander ring (32), and oil ring (33)	a. Inspect	Replace if cracked, scored, or excessively worn
			b. Check fit of rings in piston	Use ring expander to install rings. Use thickness gage to check fit. Piston ring clearance is between 0.002 inch minimum, to 0.004 inch maximum. Oil ring clearance is between 0.001 inch minimum to 0.003 inch maximum. Replace two piston rings (31) and/or oil ring (32) if clearances are excessive

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
9 (cont)			c. Check gap clearance	Install piston with rings in cylinder bore. Use thickness gage to check fit. Clearance is 0.002 inch minimum to 0.010 inch maximum. Replace two piston rings (31) and/or oil rings (32) if clearances are excessive



NOTE

Repeat steps 9f and 9g above for inspection of remaining piston and associated hardware.

h.	Rear end cover (36) with rear crankshaft bearing	Inspect	Replace if rear end cover is cracked, broken, or oil passages blocked, or if bearing is excessively worn or has flat spots
i.	Crankshaft (49)	a. Inspect	Replace if cracked, scored, or threads damaged
		b. Check journal diameters	Use micrometer. Diameter should be 1.1242 to 1.1250 inches. Replace crankshaft if excessively scored or worn out-of-round. If journal wear or damage is not excessive, the crankshaft should be reground for oversize connecting rod bearing inserts (24 and 25)

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
9 (cont)			c. Check main journal bearing surface to bearings clearance	Install front bearing (20) on , crankshaft (49), and press crankshaft into bearing on rear end cover (36). Use thickness gage. Clearance must not exceed 0.0065 inch. Replace crankshaft if clearance is excessive
		j. All other parts	Inspect	Replace if cracked, broken, worn, or threads damaged
REASSEMBLY				
10	Crankcase (18) (45)	a. New oil seal	a. Lubricate b. Install	Use SAE 30 oil In front end cover (43)
		b. New gasket (44) and two new (18) sealing rings (40)	Position	On front end of crankcase
		c. Front end cover (43)	Position	On front end of crankcase (18); align with scribe marks on crankcase made before disassembly
		d. Four lock washers (42) and screws (41)	Install	Tighten to 15-18 pounds foot torque
		e. Bearing (20)	a. Lubricate b. Install	Use high temperature cup grease On front end of crankshaft (49)
		f. Crankshaft (49)	Install	Align with scribe marks on crankcase (18) made before disassembly. Use arbor press to install in crankcase, making certain not to damage oil seal (45)
		g. Two new sealing rings (37)	a. Lubricate b. Install	Use SAE 30 oil Into grooves in rear of crankcase (18)
		h. New gasket (38)	Position	
		i. Thrust washer (39)	Install	On crankshaft (49)

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
10 (cont)		j. Rear end cover (36),	Position	On rear end of crankcase (18); align with scribe marks on crankcase made before disassembly
		k. Four lock washers (35) torque and screws (34)	Install	Tighten to 15-18 pounds foot
		NOTE		
		Steps 11 and 12 below cover reassembly and installation of one piston, connecting rod, and associated hardware.		
11	Piston (27)	a. New bushing (30)	a. Align	Align oil hole in bushing (30) with oil hole in connecting rod (26)
			b. Press in	Until flush with connecting rod
			c. Ream	Or hone bushing (30) to provide 0.0001 inch minimum to 0.0006 inch maximum clearance on wrist pin (29)
			d. Lubricate	Use SAE 30 oil
		b. Connecting rod (26)	Position	In piston (27)
		c. Wrist pin (29)	Install	Use hand pressure
		d. Two new wrist pin buttons (28)	Install	
		e. Two piston rings (31), expander ring (32), and oil ring (33)	Install	Use ring expander. Install rings with pipmarks up; stagger ring gaps around the piston
12	Crankshaft (49)	a. Crankshaft (49)	Rotate	So that journal will be at its lowest point

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		b. Connecting rod (26), crankshaft (49), wrist pin (29), piston (27), and rings (31, 32, and 33)	Lubricate	Use SAE 30 oil
		c. New bearing insert (25) (26)	a. Lubricate b. Position	Use SAE 30 oil Press into connecting rod
		d. Piston (27) and connecting rod (26)	Install	Through top of crankcase (18) using piston ring compressor
		e. New bearing insert (24)	a. Lubricate b. Position	Use SAE 30 oil Press into rod cap (23)
		f. Connecting rod cap (23) and two new lock straps (22)	Position	On crankshaft (49). Locking slots on connecting rod (26) and connecting rod cap (23) must be adjacent
		g. Two bolts (21)	Install	Tighten to 120-150 pounds inch
		h. Lock straps (22)	Bend tabs	Secures bolts (21)
		i. Two bearing inserts (24 and 25) and journal on crankshaft (49)	Check clearance	Use thickness gage. Clearance must not be less than 0.0003 inch nor more than 0.0021 inch

NOTE

Repeat steps 11 and 12 above for reassembly and installation of remaining piston, connecting rod, and associated hardware.

13	Crankcase (18)	a. Two new back-up rings (16) and two new grommets (15)	Install	In unloader piston bores

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13 (cont)		b. Two new unloader pistons (19)	Install	Carefully, into unloader piston bores
		c. Two new unloader (17) plungers (2)	Position	In unloader plunger guides
		d. Two unloader plungers (2) and unloader plunger guides (17)	Install	Over tops of unloader pistons (19)
		e. New unloader spring seat (48)	Install	In crankcase (18) inlet cavity
		f. New spring saddle (47)	Position	Between unloader plunger guides (17), so that forks of saddle are centered on plunger guides
		g. New unloader	Install	Make certain unloader spring spring (46) seats both in crankcase (18) and on spring saddle (47)
		h. Two inlet valve seats (9) and guides (8)	Install	
		i. Two inlet	Install	On inlet valve guides (8) valves (7)
14	Cylinder head (4)	a. Two inlet valve springs (6)	Install	Apply turning motion while installing
		b. Two discharge valve springs (12), two discharge valves (11), and two discharge valve seats (10)	Install	Tighten discharge valve seats (10) to 50-60 pounds foot

3-25. AIR COMPRESSOR ASSEMBLY MAINTENANCE

b. Air Compressor Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
15	Crankcase (18)	a. New gasket (5)	Position	On crankcase (18)
		b. Cylinder head (4)	Position	On crankcase (18); align scribe marks made before disassembly
		c. Six screws (3)	Install and tighten	Tighten to 25-30 pounds foot torque
		d. Plate (14)	Position	If removed
		e. Four new rivets (13)	Install	
16	Crankshaft (49)	Key (1)	Install	

Section V. STEERING SYSTEM MAINTENANCE

This section contains the information you will need to maintain the steering system.

It gives you information on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

3-26. TROUBLESHOOTING SYMPTOM INDEX

3-27. STEERING SYSTEM TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. STEERING WHEEL STOPS TURNING BEFORE TRACTOR FRONT WHEELS HIT STOP BLOCKS

Check that power steering gear sector shaft is centered.

a. If not centered, center power steering gear sector shaft (para 3-28d).

b. If centered, proceed to step 4 below.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. TOO MUCH PLAY IN STEERING WHEEL

Step 1. Check that power steering gear sector shaft is properly adjusted (does not have lash).

a. If sector shaft is not properly adjusted, adjust (para 3-28d).

b. If sector shaft is properly adjusted, proceed to step 2 below.

Step 2. Remove universal joint (para 3-28b).
Check universal joint components for wear or damage.

a. If universal joint components are worn or damaged, replace components (para 3-28b).

b. If components are not worn or damaged, proceed to step 3 below.

Step 3. Remove and disassemble power steering gear (para 3-28d). Check for damage to sector shaft gear and rack piston teeth.

a. If gear or teeth are damaged, replace (para 3-28d).

b. If gear and teeth are not damaged, overhaul power steering gear (para 3-28d).

3. TRACTOR WANDERS OVER ROAD

Step 1. Remove universal joint (para 3-28b).
Check universal joint components for wear or damage.

a. If universal joint components are worn or damaged, replace components (para 3-28b).

b. If components are not worn or damaged, proceed to step 2 below.

Step 2. Check if power steering gear mounting capscrews are loose.

a. If power steering gear mounting capscrews are loose, tighten (para 3-28d).

b. If power steering gear mounting capscrews are tight, proceed to step 3 below.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. TRACTOR WANDERS OVER ROAD (Cont)

Step 3. Check that power steering gear sector shaft is centered.

a. If sector shaft is not centered, center (para 3-28d).

b. If sector shaft is centered, proceed to step 4 below.

Step 4. Check if power steering gear worm shaft locknut is loose.

a. If locknut is loose, tighten and secure (para 3-28d).

b. If locknut is secure, overhaul or replace power steering gear (para 3-28d).

4. NO RECOVERY

Step 1. Check universal joint components for wear or damage.

a. If universal joint components are worn or damaged, replace (para 3-28b).

b. If universal joint components are not worn or damaged, proceed to step 2 below.

Step 2. Check for binding in universal joint assembly.

a. If universal joint assembly is binding, correct as necessary (para 3-28b).

b. If universal joint assembly is not binding, proceed to step 3 below.

Step 3. Check steering column components for binding.

a. If components are binding, replace (para 3-28a).

b. If components are not binding, proceed to step 4 below.

Step 4. Remove power steering reservoir dipstick (para 2-58c).
Attach a vacuum pump to power steering reservoir fill opening. Operate pump several minutes to create a vacuum inside the reservoir.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4. NO RECOVERY (Cont)

NOTE

If you do not draw enough air out of the power steering reservoir, hydraulic oil will gush out of hose when performing the following procedure (some loss of oil is normal).

With vacuum pump operating, disconnect power steering pump main supply hose at power steering pump (para 2-58b).
Connect 10 GPM flowmeter inlet hose to power steering pump.
Connect flowmeter outlet hose to main supply hose disconnected from power steering pump.
Turn off vacuum pump and disconnect from power steering reservoir.
Set flowmeter volume control for 10 US GPM and open flowmeter load valve.
Check power steering reservoir oil level; add oil if level is low (para 2-58c).
Start vehicle engine and operate at 1200 RPM.
Close flowmeter load valve until flowmeter pressure gage indicates 100 psi.
Flowmeter volume reading should be 4.0 GPM.

a. If flowmeter volume reading is not 4.0 GPM, remove and repair power steering pump (para 3-28f).

b. If flowmeter volume reading is 4.0 GPM, proceed to step 5 below.

Step 5. Increase engine speed to 1500 RPM.
If necessary, readjust flowmeter load valve to obtain 100 psi pressure indication.
Flowmeter volume reading should be 5.5 GPM.

a. If flowmeter volume reading is not 5.5 GPM, remove and repair power steering pump (para 3-28f).

b. If flowmeter volume reading is 5.5 GPM, shut down engine, connect and turn on vacuum pump, and disconnect flowmeter. Reconnect power steering pump main supply hose to pump (para 2-58b), and turn off and disconnect vacuum pump. Check oil level; add oil if level is low (para 2-58c). Then proceed to step 6 below.

Step 6. Remove power steering gear (para 3-28d).
Remove valve assembly from power steering gear (para 3-28d). Carefully remove valve spool from valve assembly. Check valve spool for damage or wear.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. NO RECOVERY (Cont)

a. If valve spool is damaged or worn, replace valve assembly (para 3-28d).

b. If valve spool is not damaged or worn, notify general support maintenance.

5. SHIMMY

Check ball sockets and drag link for wear or looseness.

a. If ball sockets are loose, tighten (para 3-28e); if components are worn, replace (para 3-28e).

b. If ball sockets and drag link are not worn or loose, refer to Malfunction 3 above.

6. OVERSTEERING OR DARTING

Step 1. Check ball sockets and drag link for wear or looseness.

a. If ball sockets are loose, tighten (para 3-28e); if components are worn, replace (para 3-28e).

b. If ball sockets and drag link are not worn or loose, proceed to step 2 below.

Step 2. Check if front axle alignment is correct.

a. If front axle alignment is not correct, adjust (para 3-28c).

b. If front axle alignment is correct, proceed to step 3 below.

Step 3. Check steering column components for binding.

a. If components are binding, replace components (para 3-28a).

b. If components are not binding, proceed to step 4 below.

Step 4. Check if power steering gear sector shaft adjustment is too tight.

a. If adjustment is too tight, readjust (para 3-28d).

b. If adjustment is correct, proceed to step 5 below.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

6. OVERSTEERING OR DARTING (Cont)

Step 5. Remove power steering gear (para 3-28d).
Remove valve assembly from power steering gear (para 3-28d).
Check if valve spool is sticking in valve assembly.

a. If valve spool is sticking in valve assembly, clean valve spool and inspect it for burrs, wear or damage (para 3-28d). Replace valve assembly (para 3-28d) if spool is burred, worn, or damaged. If spool is not burred, worn, or damaged, reinstall in valve assembly (para 3-28d) and recheck for sticking. Replace valve assembly if necessary (para 3-28d).

b. If valve spool is not sticking in valve assembly, notify general support maintenance.

7. HIGH STEERING EFFORT IN ONE DIRECTION

Step 1. Remove power steering reservoir dipstick (para 2-58c).
Attach a vacuum pump to power steering reservoir fill opening.
Operate pump several minutes to create a vacuum inside the reservoir.

NOTE

If you do not draw enough air out of the power steering reservoir, hydraulic oil will gush out of hose when performing the following procedure (some loss of oil is normal).

With vacuum pump operating, disconnect power steering pump main supply hose at power steering pump (para 2-58b).
Connect 10 GPM flowmeter inlet hose to power steering pump.
Connect flowmeter outlet hose to main supply hose disconnected from power steering pump.
Turn off vacuum pump and disconnect from power steering reservoir.
Set flowmeter volume control for 10 US GPM and open flowmeter load valve.
Check power steering reservoir oil level; add oil if level is low (para 2-58c).
Start vehicle engine and operate at 1200 RPM.Close flowmeter load valve until flowmeter pressure gage indicates 100 psi.
Flowmeter volume reading should be 4.0 GPM.

a. If flowmeter volume reading is not 4.0 GPM, remove and repair power steering pump (para 3-28f).

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. HIGH STEERING EFFORT IN ONE DIRECTION (Cont)

b. If flowmeter volume reading is 4.0 GPM, proceed to step 2 below.

Step 2. With engine operating at 1500 RPM, gradually close flowmeter load valve (adjust engine speed as required to maintain 1500 RPM) until flowmeter pressure gage indication is 1750 psi. Flowmeter volume reading should be 4.5 to 5.5 GPM.

a. If flowmeter volume reading is not 4.5 to 5.5 GPM or if pressure can not be maintained, remove and repair power steering pump (para 3-28f).

b. If flowmeter volume reading is 4.5 to 5.5 GPM, shut down engine, connect and turn on vacuum pump, and disconnect flowmeter. Reconnect power steering pump main supply hose to pump, and turn off and disconnect vacuum pump. Check oil level; add oil if level is low (para 2-58c). Then proceed to step 3 below.

Step 3. Remove universal joint (para 3-28b).
Check universal joint components for wear or damage that could cause binding.

a. If universal joint components are worn or damaged, replace components (para 3-28b).

b. If components are not worn or damaged, proceed to step 4 below.

Step 4. Check if power steering gear worm shaft locknut is loose.

a. If locknut is loose, tighten and secure (para 3-28d).

b. If locknut is secure, proceed to step 5 below.

Step 5. Remove and disassemble power steering gear (para 3-28d) and check seals for damage.

a. If seals are damaged, replace (para 3-28d).

b. If seals are not damaged, overhaul or replace power steering gear (para 3-28d).

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. HIGH STEERING EFFORT IN BOTH DIRECTIONS

Step 1. Remove universal joint (para 3-28b).
Check universal joint components for wear or damage that could cause binding (para 3-28b).

a. If universal joint components are worn or damaged, replace components (para 3-28b).

b. If components are not worn or damaged, proceed to step 2 below.

Step 2. Check power steering pump delivery (perform steps 1 and 2 of Malfunction 7 above).

a. If flow is low or pressure is low, proceed to step 3 below.

b. If flow and pressure are not low, proceed to step 5 below.

Step 3. Remove control valve assembly from power steering pump (para 3-28f).
Inspect control valve for burrs or other deformities which could cause it to stick in valve bore.
Check control valve spring for cracks, breaks, and loss of tension.

a. If control valve sticks in valve bore, is burred, or is otherwise deformed, replace (para 3-28f). If spring is cracked, broken, or permanently set, replace (para 3-28f).

b. If control valve assembly is not defective, reinstall (para 3-28f). Then proceed to step 4 below.

Step 4. Remove power steering pump from engine (para 3-28f).
Check gear and coupling for wear or damage, and missing or broken gear teeth.

a. Replace gear or coupling if worn or damaged, or gear teeth missing or broken (para 3-28f).

b. If gear and coupling are not worn or damaged and gear teeth are not missing or broken, reinstall power steering pump (para 3-28f). Proceed to step 5 below.

Step 5. Remove power steering gear (para 3-28d).
Remove valve assembly from power steering gear (para 3-28d).
Carefully remove valve spool from valve assembly.
Check valve spool for damage or wear or other deformities which could cause it to stick in valve bore.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. HIGH STEERING EFFORT IN BOTH DIRECTIONS (Cont)

a. If valve spool is damaged, worn, or sticks in valve bore, replace valve assembly (para 3-28d).

b. If valve spool is not damaged or worn, proceed to step 6 below.

Step 6. Disassemble power steering gear (para 3-28d) and check seals for damage.

a. If seals are damaged, replace (para 3-28d).

b. If seals are not damaged, overhaul or replace power steering gear (para 3-28d).

9. LOST MOTION AT STEERING WHEEL

Step 1. Check ball sockets for looseness and wear.

a. If ball sockets are loose, tighten (para 3-28e); if components are worn, replace components (para 3-28e).

b. If ball sockets are not loose or worn, proceed to step 2 below.

Step 2. Check if pitman arm is loose on power steering gear sector shaft.

a. If pitman arm is loose, tighten nut (para 3-28d).

b. If pitman arm is not loose, proceed to step 3 below.

Step 3. Check if power steering gear mounting capscrews are loose.

a. If power steering gear mounting capscrews are loose, tighten (para 3-28d).

b. If power steering gear mounting capscrews are tight, proceed to step 4 below.

Step 4. Check if universal joint mounting screws are loose.
Grasp slip yoke and move side to side. There should be only slight movement.

a. If a large amount of movement is felt, remove, repair, and reinstall universal joint (para 3-28b).

b. If slight movement only is felt, proceed to step 5 below.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

9. LOST MOTION AT STEERING WHEEL (Cont)

Step 5. Check power steering gear adjustments.

a. If power steering gear is not properly adjusted, adjust (para 3-28d).

b. If power steering gear is properly adjusted, overhaul or replace power steering gear (para 3-28d).

10. POWER STEERING PUMP NOT DELIVERING OIL

Step 1. Remove control valve assembly from power steering pump (para 3-28f).
Clean control valve (para 3-28f).
Install control valve in bore and slide back and forth.
Check if control valve sticks in bore.

a. If control valve is sticking and a gritty feeling is noted on valve outer diameter, polish with crocus cloth (avoid removal of excess material or rounding of valve edges during this operation). If control valve continues to stick, replace (para 3-28f).

b. If control valve does not stick, reinstall control valve assembly (para 3-28f). Then proceed to step 2 below.

Step 2. Remove power steering pump (para 3-28f).
Check gear and coupling for damage, wear, or missing teeth.

a. If gear or coupling is damaged, worn, or teeth missing, replace (para 3-28f).

b. If gear and coupling are not damaged or worn and teeth are not missing, proceed to step 3 below.

Step 3. Check power steering pump key and shaft for damage or wear.

a. If key or shaft are damaged or worn, replace (para 3-28f).

b. If key and shaft are not damaged or worn, proceed to step 4 below.

3-27. STEERING SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

10. POWER STEERING PUMP NOT DELIVERING OIL (Cont)

Step 4. Disassemble power steering pump (para 3-28f).
Examine rotor slots for dirt, grime, or small metal chips.
Clean rotor and vanes and reassemble pump (para 3-28f). Check for free vane movement.

a. If vane movement is not free, replace rotor and vanes (para 3-28f).

b. If vane movement is free, overhaul or replace power steering pump (para 3-28f).

11. POWER STEERING PUMP MAKING NOISE

Step 1. Remove power steering pump (para 3-28f).
Check that gear and coupling are correctly aligned and secure.

a. If gear and coupling are not correctly aligned or are loose, repair or replace (para 3-28f).

b. If gear and coupling are correctly aligned and secure, proceed to step 2 below.

Step 2. Disassemble power steering pump (para 3-28f).
Check shaft seal, bearings, and pump cartridge assembly (ring, rotor, pins, and vanes) for wear or damage.

If shaft seal, bearings, or pump cartridge assembly parts are worn or damaged, replace (para 3-28f).

3-28. STEERING SYSTEM MAINTENANCE

a. Steering Column.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Screwdriver set
Vise jaw caps
Mechanical puller kit
Safety glasses
Hammer
Brass drift

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Grease	Item 15, Appendix C
Mineral spirits	Item 33, Appendix C
Dust cap	FSCM 77640 P/N 029085

Sealant, Weatherban FSCM 04963 P/N 202

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, front wheels centered, and parking brake applied.
2-33b	Horn button removed.
2-58a	Steering wheel removed.
2-27	Steering column wiring harness pins disconnected from connector housing; turn signal and hazard switch assemblies removed from steering column.
3-24c	Trailer hand brake control removed.
3-28b	Universal joint bottom yoke disconnected from power steering gear shaft.
3-35e	Floor mat pulled back from steering column enclosure.

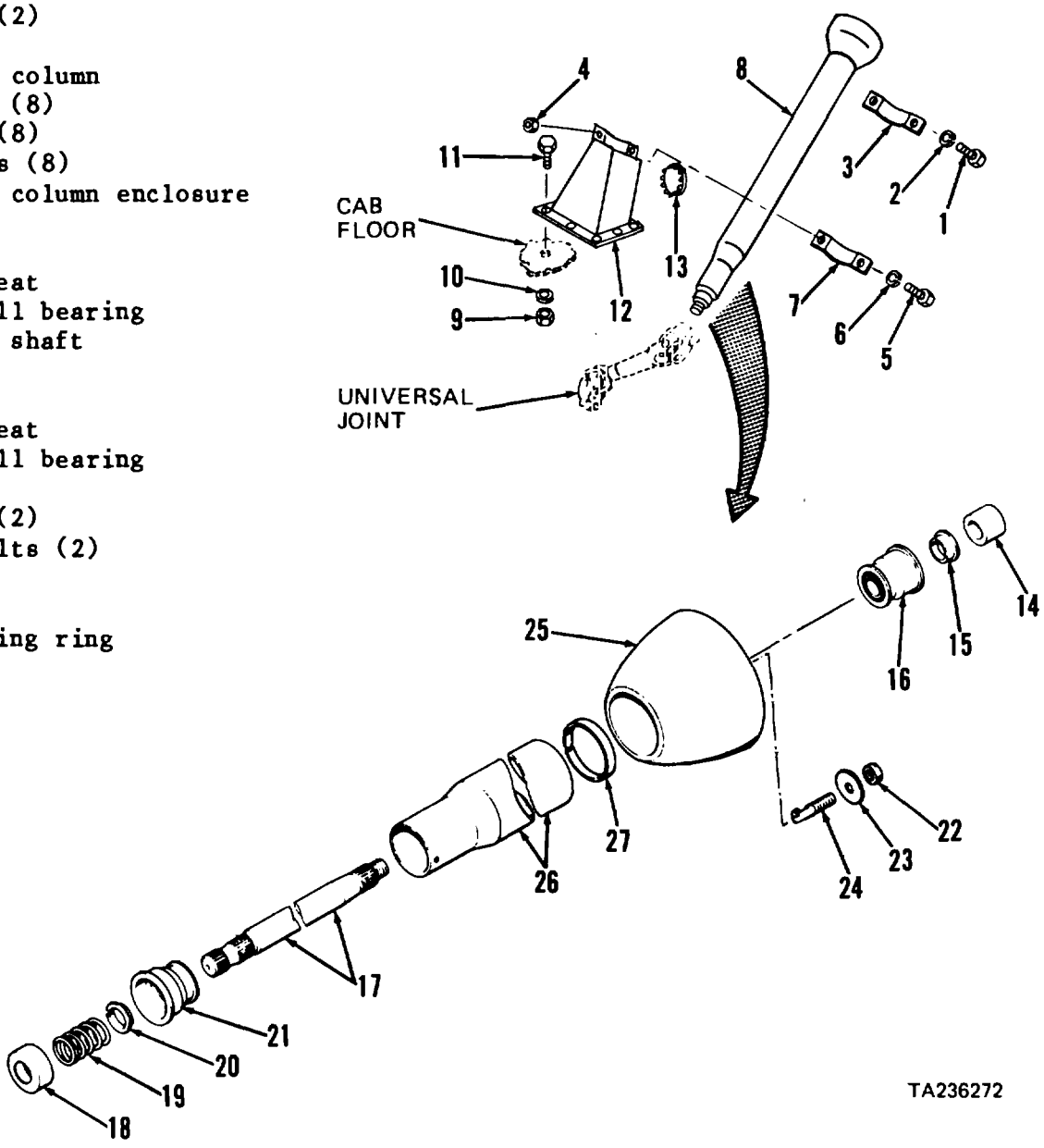
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, underside	Eight locknuts (9) and washers (10)	Remove	While assistant inside cab prevents capscrews (11) from turning
2	Cab, inside	a. Eight capscrews (11)	Remove	
		b. Two capscrews (1), lock washers (2), and bracket (3)	Remove	Support steering column (8)
		c. Steering column (8) with universal joint and enclosure (12)	Lift and remove	From cab

3-28. STEERING SYSTEM MAINTENANCE (CONT)

a. Steering Column (cont).

KEY

1. Capscrews (2)
2. Lock washers (2)
3. Bracket
4. Locknuts (2)
5. Capscrews (2)
6. Washers (2)
7. Bracket
8. Steering column
9. Locknuts (8)
10. Washers (8)
11. Capscrews (8)
12. Steering column enclosure
13. Plug
14. Spacer
15. Spring seat
16. Upper ball bearing
17. Steering shaft
18. Dust cap
19. Spring
20. Spring seat
21. Lower ball bearing
22. Nuts (2)
23. Washers (2)
24. Clamp bolts (2)
25. Housing
26. Tube
27. Reinforcing ring



3-28. STEERING SYSTEM MAINTENANCE (CONT)

a. Steering Column (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
3	Steering column (8)	a. Plug (13)	Remove	Only if necessary for replacement
		b. Two locknuts (4), cap-screws (5), washers (6), and bracket (7)	Remove	
		c. Universal joint top yoke	Disconnect	From steering shaft (17); para 3-28b
		d. Steering column enclosure (12)	Remove	From steering column (8)
DISASSEMBLY				
4	Steering column (8)	a. Steering column (8)	Position	In soft-jawed vise
		b. Two nuts (22), washers (23), and clamp bolts (24)	Remove	
		c. Housing (25) and tube (26)	Separate	
		d. Spacer (14), spring seat (15), and upper ball bearing (16)	Remove	Remove upper ball bearing (16) using brass drift and hammer
		e. Steering shaft (17)	Remove	From tube (26)
		f. Dust cap (18), spring (19), and spring seat (20)	Remove	Discard dust cap (18)
		g. Lower ball bearing (21)	Remove	Use bearing puller
		h. Reinforcing ring (27)	Remove	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

a. Steering Column (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		NOTE Do not use compressed air to dry ball bearings.		
5		a. Ball bearings (16 and 21)	Clean	Wash in mineral spirits; allow to air dry. When dry, repack with grease
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		b. All other metal parts	Clean	Use cleaning solvent P-D-680; dry with compressed air. Be sure you remove all traces of old sealant from cab floor and steering column enclosure (12)
INSPECTION				
6		a. Spring (19)	Inspect	Replace if cracked, broken, distorted, or compressed
		b. Ball bearings (16 and 21)	Inspect	Replace if cracked, excessively worn, or has flat spots

3-28. STEERING SYSTEM MAINTENANCE (CONT)

a. Steering Column (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
6 (cont)		c. Steering shaft (17)	Inspect	Replace if cracked, bent, or splines damaged
		d. Steering column enclosure (12)	Inspect	Replace if cracked, distorted or weldments broken
		e. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
7	Steering column (8)	a. Tube (26)	Position	In soft-jawed vise
		b. Reinforcing ring (27)	Install	On tube (26)
		c. Tube (26) and housing (25)	Mate	
		d. Two clamp bolts (24), washers (23), and nuts (22)	Install and tighten	
		e. Lower ball bearing (21)	a. Lubricate b. Install	Pack with grease On steering shaft (17)
		f. Spring seat (20)	Install	
		g. Spring (19)	Install	
		h. New dust cap (18)	Install	
		i. Steering shaft (17)	Install	In tube (26)
		j. Upper ball bearing (16)	Install	On steering shaft (17)
		k. Spring seat (15)	Install	
		l. Spacer (14)	Install	
INSTALLATION				
8	Steering column (8)	a. Steering column enclosure (12)	Position	On steering column (8)
		b. Universal joint top yoke	Connect	To steering shaft (17); para 3-28b

3-28. STEERING SYSTEM MAINTENANCE (CONT)

a. Steering Column (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
9	Cab, inside	a. Steering column enclosure (12)	a. Seal	Apply 1/8-inch bead of sealant to base
			b. Position	On cab floor, with capscrew holes aligned
		b. Eight capscrews (11)	Insert	In base of steering column enclosure (12)
		c. Bracket (3)	Position	
		d. Two lockwashers (2) and capscrews (1)	Install	Do not tighten
		e. Bracket (7)	Position	
		f. Two capscrews (5), washers (6), and locknuts (4)	Install	Do not tighten
10	Cab, underside	a. Eight washers (10) and locknuts (9)	Install and tighten	While assistant inside cab prevents capscrews (11) from turning
		b. Universal joint bottom yoke	Connect	To power steering gear shaft; para 3-28b
11	Cab, inside	a. Capscrews (1 and 7)	Tighten	While assistant holds steering column (8) in correct position
		b. Floor mat	Position	Over base of steering column enclosure (12); para 3-35f
		c. Plug (13)	Install	If removed
12	Steering column (8)	a. Turn signal control and hazard warning switch	Install	Para 2-27
		b. Steering wheel	Install	Para 2-58a
		c. Horn button	Install	Para 2-33b
		d. Trailer hand brake control	Install	Para 3-24c
13	Cab	Steering	Test	Test steering operation; check for binding or unusual noise

3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools

No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Vise jaw caps
- Scratch wire brush
- Retaining ring pliers
- Safety glasses

No. 2 Automotive Maintenance Tool Kit
- Lubricating kit
- Grease gun

Automotive Mechanic's Tool Kit
- Punch
- Pliers
- Hammer

Brass rod

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Grease	Item 3, Appendix C
Engine oil, SAE 30	Item 24, Appendix C
Seal	FSCM 95019 P/N 10-16-83
Two journals	FSCM 95019 P/N 10-14-29

Personnel Required

Two Automotive Repairers MOS 63H

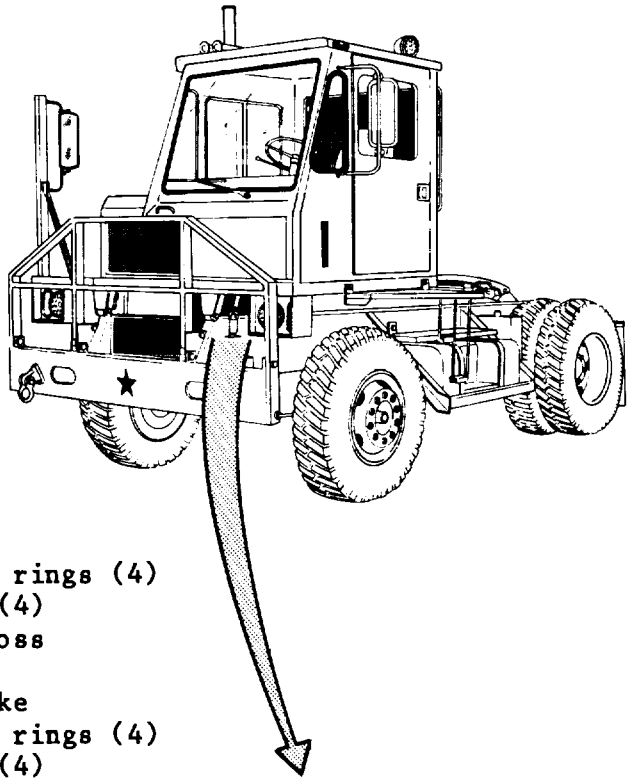
Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Bottom yoke (9)	a. Locknut (1) and capscrew (2)	Remove	
		b. Bottom yoke (9)	Disconnect	From steering gear
2	Cab, inside	Steering column with universal joint	Remove from vehicle	Para 3-28a
3	Steering column and universal joint	a. Nut (3), cap-screw (4), and lock washer (19)	Remove	
		b. Top yoke (14)	Disconnect	From steering column shaft
		c. Universal joint	a. Position	In soft jawed vise
			b. Scribe mark	Use punch to scribe mark on slip yoke (15) and splined yoke (18) to aid in reassembly

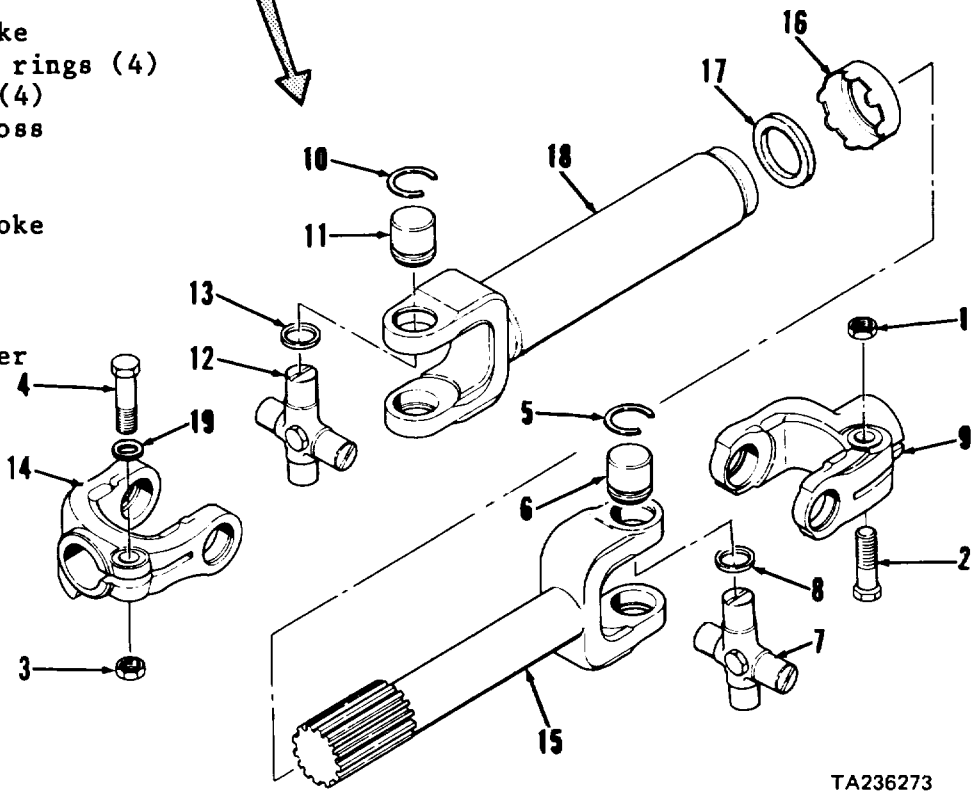
3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint (cont).



KEY

1. Locknut
2. Capscrew
3. Nut
4. Capscrew
5. Retaining rings (4)
6. Bushings (4)
7. Center cross
8. Seals (4)
9. Bottom yoke
10. Retaining rings (4)
11. Bushings (4)
12. Center cross
13 Seals (4)
14. Top yoke
15. Splined yoke
16. Seal cap
17. Seal
18. Slip yoke
19. Lock washer



TA236273

3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
4		a. Four retaining rings (5)	Remove	Use retaining ring pliers
		b. Four bushings (6) and seals (8)	Remove	Use brass rod having a diameter slightly smaller than bushing diameter; tap rod using hammer to remove bushings
		c. Center cross (7)	Remove	Separates bottom yoke (9) and splined yoke (15)
		d. Four retaining rings (10)	Remove	Use retaining ring pliers
		e. Four bushings (11) and seals (13)	Remove	Use brass rod having a diameter slightly smaller than bushing diameter; tap rod using hammer to remove bushings
		f. Center cross (14)	Remove	Separates top yoke (14) from slip yoke (18)
		g. Seal cap (16)	Bend tabs	
		h. Splined yoke (15)	Remove	From slip yoke (18)
		i. Seal cap (16)	Remove	
		j. Seal (17)	Remove and discard	
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
5		All parts	Clean	Use cleaning solvent P-D-680; use wire brush to remove corrosion. Dry using compressed air
INSPECTION				
6		a. Bottom yoke (9) and top yoke (14)	Inspect for cracks breaks distortion	Replace if any defects observed
		b. Splined yoke (15) and slip yoke (18)	Inspect for cracks distortion breaks chipped splines damaged teflon coating	Replace if any defects observed
		c. Remaining parts	Inspect for cracks breaks distortion damage stripped threads	Replace if any defects observed
REASSEMBLY				
7		a. All unpainted surfaces	Protect from corrosion	Wipe using clean cloth moistened with SAE 30 engine oil
		b. Cross (12)	Position	In top yoke (14) and slip yoke (18)

3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
7 (cont)		c. Four bushings (11) and seals (13)	Install	In top yoke (14) and slip yoke (18)
		d. Top yoke (14) and slip yoke (18)	Position	In soft jawed vise
		e. Soft jawed vise	Close jaws	Seats bushings (11); repeat for other ends of cross (12)
		f. Four bushings (11)	Depress	Use brass rod or discarded bushing to set bushings below retaining ring grooves
		g. Four retaining	Install	Use retaining ring pliers rings (10)
		NOTE		
		Perform steps 7b thru 7g to install cross (7), bushings (6), and retaining rings (5) in bottom yoke (9) and splined yoke (15).		
		h. Slip yoke (18)	Position	In soft jawed vise
		i. Seal cap (16) and new seal (17)	Install	Over splines on splined yoke (15)
		j. Splined yoke (15)	Insert	In slip yoke (18); line up scribe marks made in step 3c above
		k. Seal cap (16)	Bend tabs	Into grooves of splined yoke (15)
		l. Cross (7 and 12) and slip yoke (18)	Lubricate	Use grease gun
INSTALLATION				
8	Universal joint	a. Top yoke (14)	Position	On steering column shaft
		b. Lock washer (19), capscrew (4), and nut (3)	Install and tighten	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

b. Universal Joint (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
9	Cab	a. Steering column, universal joint, and column enclosure	Install	Para 3-28a
		b. Bottom yoke (9)	Connect	To steering gear
		c. Locknut (1) and capscrew (2)	Install and tighten	
10	Steering system	Steering	Check operation	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod.

This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Installation
e. Adjustment

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Torque wrench
Open end wrench set
Hammer
Safety glasses
Bronze drift
Full floating turning radius gage plate
Trammel bar
Jack

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off. Rear wheels blocked.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Penetrating oil	Item 44, Appendix C
Cotter pins	FSCM 78500 P/N K2412
Cotter pins	FSCM 78500 P/N K2616
Chalk	

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Left side steering knuckle	Cotter pin (1) and nut (2)	Remove	Discard cotter pin (1)
2	Right side steering knuckle	a. Cotter pin (1) and nut (2)	Remove	Discard cotter pin (1)

WARNING

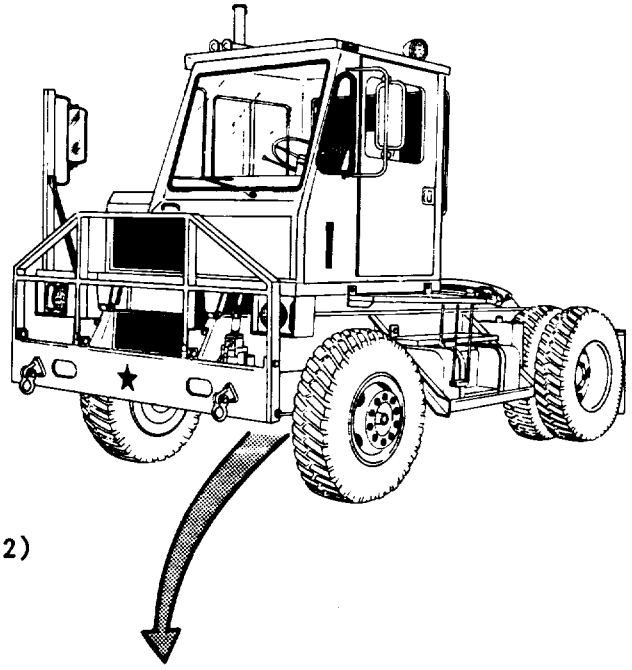
Don't strike hardened steel parts with steel hammer. To do so could cause metal chips to hit your eyes causing you serious injury. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when using a hammer.

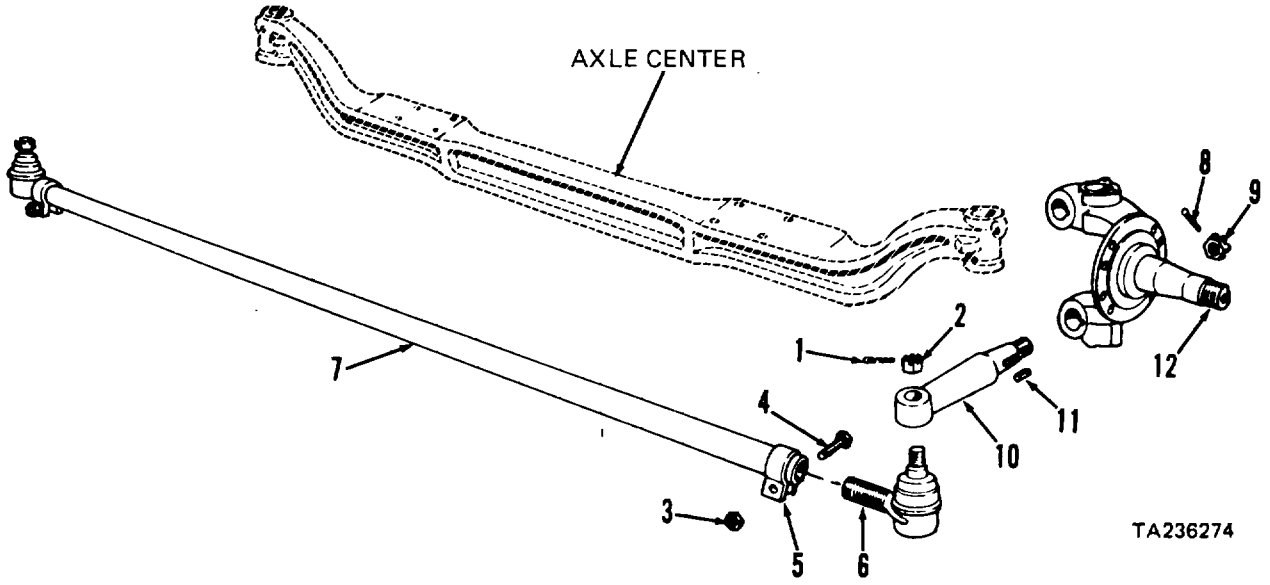
3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont).

KEY

1. Cotter pins (2)
2. Nuts (2)
3. Nuts (2)
4. Bolts (2)
5. Clamps (2)
6. Tie rod ends (2)
7. Cross tube
8. Cotter pins (2)
9. Nuts (2)
10. Tie rod arms (2)
11. Keys (2)
12. Steering knuckles (2)





3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2 (cont)		b. Tie rod end (6)	Separate	Use brass drift and hammer; separate tie rod end (6) from tie rod arm (10)
3	Left side steering knuckle	a. Tie rod end (6)	Separate	Use brass drift and hammer; separate tie rod end (6) from tie rod arm (10)
		b. Cross tube (7)	Lower to ground	
		c. Cotter pin (8) and nut (9)	Remove	Discard cotter pin (8)
		WARNING		
		Don't strike hardened steel parts with steel hammer. To do so could cause metal chips to hit your eyes causing you serious injury. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety glasses when using a hammer.		
		d. Tie rod arm (10)	Separate	Use brass drift and hammer; separate tie rod arm (10) from steering knuckle (12)
		e. Key (11)	Remove	
		NOTE		
		Perform steps 3c through 3e above to remove remaining tie rod arm (10).		
4	Tie rod	a. Nut (3) and bolt (4)	Remove	
		b. Tie rod end (6)	Remove	Turn left tie rod end clockwise to remove; turn right tie rod end counterclockwise to remove
		c. Two clamps (5)	Remove	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
5		All parts	Clean	Use cleaning solvent P-D-680; dry using clean cloths
INSPECTION				
6		a. Two clamps (5)	Inspect for: cracks distortion breaks	Replace if defects observed
		b. Two tie rod ends (6) and tie rod arms (10)	Inspect for: cracks distortion damaged threads bent condition	Replace if defects observed
		c. Cross tube (7)	Inspect for: cracks bent condition	Replace if defects observed
		d. Two keys (11)	Inspect for: cracks distortion chipping	Replace if defects observed
		e. Remaining parts	Inspect for: cracks breaks damaged threads bent condition	Replace if defects observed

3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
7	Left side steering knuckle	a. Key (11)	Install	In tie rod arm (10)
		b. Tie rod arm (10)	Install	In steering knuckle (12)
		c. Nut (9)	Install	Tighten to initial torque of 550 pounds foot; To align cotter pin holes in nut with holes in tie rod arm (10), tighten to 740 pounds foot. If final torque is exceeded, remove nut (9) and repeat this step
		d. New cotter pin (8)	Install and spread	
		NOTE		
		Perform step 7 above to install right side tie rod arm (10).		
8	Cross tube (7)	a. Two clamps (5)	Install	On ends of cross tube (7)
		b. Two bolts (4) and nuts (3)	Install	Don't tighten nut (3)
9	Front of vehicle	Two steering knuckles (12)	Position	In straight ahead position
10	Cross tube (7)	Two tie rod ends (6)	Install in cross tube	Turn right tie rod end clockwise to install; turn left tie rod end counterclockwise to install. Screw in equal amounts until studs on tie rod ends align with tapered holes in tie rod arms (10)
11	Tie rod arms (10)	a. Two tie rod ends (6)	Install	In tie rod arms (10)

3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont);

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
11 (cont)		b. Two nuts (2)	Install	Tighten to initial torque of 350 pounds foot. To align cotter pin holes in nut with holes in tie rod end (6), tighten to a final value of 475 pounds foot torque. If final torque is exceeded, remove nut (2) and repeat this step
		c. Two new cotter pins (1)	Install and spread	
		d. Two nuts (3) and bolts (4)	Tighten	Tighten to initial torque of 40 pounds foot. Then tighten to a maximum of 55 pounds foot torque
ADJUSTMENT				
12	Vehicle, rear	Rear wheels	Block	
13	Vehicle, front	a. Front axle	Raise from ground	Use jack
		b. Front tires	Whiten center area of both tires around entire circumference with chalk	
		c. Scribe or other pointed instrument	Position and scribe line	Against whitened part of each tire; scribe must be held firmly in place so that a single line is scribed all the way around the tire
		d. Full floating turning radius gage plate	Position	Under each front tire
		e. Front axle plates	Lower	Lower front tires onto gage
		f. Sliding scale end of trammel bar (located on gage plate)	Set to zero	
		g. Trammel bar	Position at rear of tires; adjust pointers to line up with scribe lines and lock in place (scale should be set to zero)	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

c. Tie Rod (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT (cont)				
13 (cont)		h. Trammel bar	Position at front of tires. Adjust scale end so that pointers line up with scribe marks	
		i. Scale	Read toe-in or toe-out. Toe-in should be 1/16 +1/16 inch. If necessary, perform steps j thru n below to adjust toe-in	
		j. Two nuts (3)	Loosen	
		k. Two tie rod ends (6)	Lubricate	With penetrating oil
		l. Cross tube (7)	Rotate	Forward rotation reduces toe-in; rearward rotation increases toe-in
		m. Toe-in	Recheck	Repeat steps f thru 1 above until toe-in is 1/16 +1/16 inch
		n. Two nuts (3)	Tighten	Secures toe-in adjustment
		o. Front axle	Raise from ground	Use jack
		p. Two gage plates	Remove	From under front tires
		q. Front axle	Lower	Then remove jack and rear wheel blocks

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Testing
g. Installation and adjustment

INITIAL SETUP

Tools

Automotive Mechanic's Tool Kit
  Socket wrench set, 1/2 inch drive
  Flat tip screwdriver
No. 1 Common Organizational Maintenance Tool Kit
  Mechanical puller kit
  Vise with jaw caps
  Socket wrench handle, 1/2 inch drive
  Socket wrench set, 3/4 inch drive
  Torque wrench, 1/2 inch drive, 175 pounds foot capacity
  Torque wrench, 3/4 inch drive, 600 pounds foot capacity
  Retaining ring pliers
  Sharpening stone
  Safety glasses
Mandrel FSCM 77640 P/N GA1913
Soft hammer
Torque wrench, 1/2 inch drive, 20 pounds inch capacity
Two gallon container
Pressure gage, 0-2000 psi
Tee

Materials/Parts

Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Grease — Item 15, Appendix C
Wheel bearing grease — Item 16, Appendix C
Degreasing solvent — Item 18, Appendix C
Stud sealant — Item 19, Appendix C
Hydraulic sealant — Item 20, Appendix C
Cellophane tape — Item 21, Appendix C
Hydraulic oil — Item 22, Appendix C
Seal kit — FSCM 77640 P/N HF640000

Personnel Required

Automotive Repairer MOS 63H

Equipment Condition

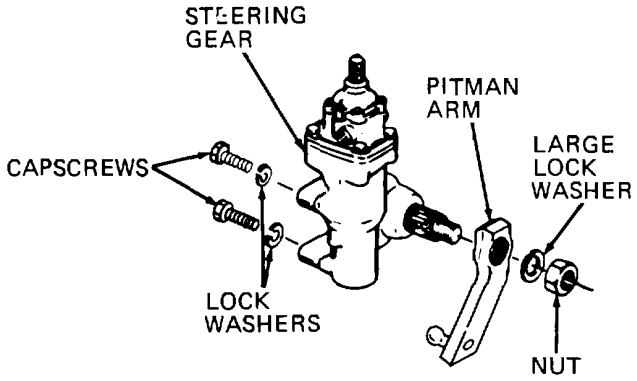
Paragraph	Condition Description
	Vehicle parked on level surface, front wheels centered and engine off. Cab tilted 90 degrees.
2-58b	Hydraulic steering lines and fittings removed from power steering gear.
3-28e	Drag link ball socket disconnected from pitman arm on power steering gear.
3-5a	Radiator removed.

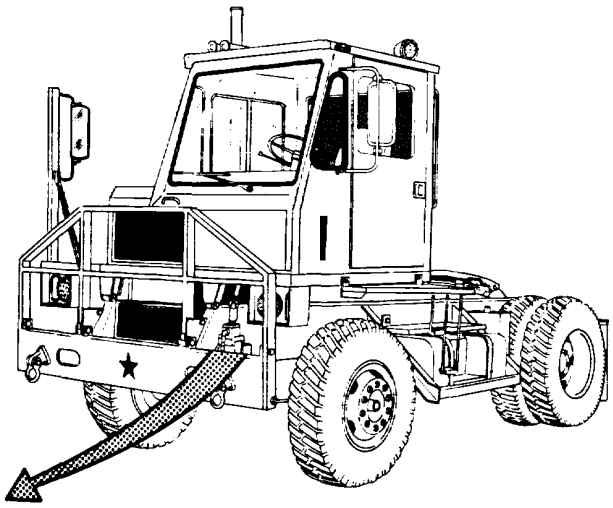
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Steering gear	a. Nut and large lock washer	Remove	
		b. Pitman arm	Remove	Use mechanical puller
2	Front left frame rail, inside	Four capscrews and lock washers	Remove	Support steering gear

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
3	Front left frame rail, outside	Steering gear	Remove	





DISASSEMBLY

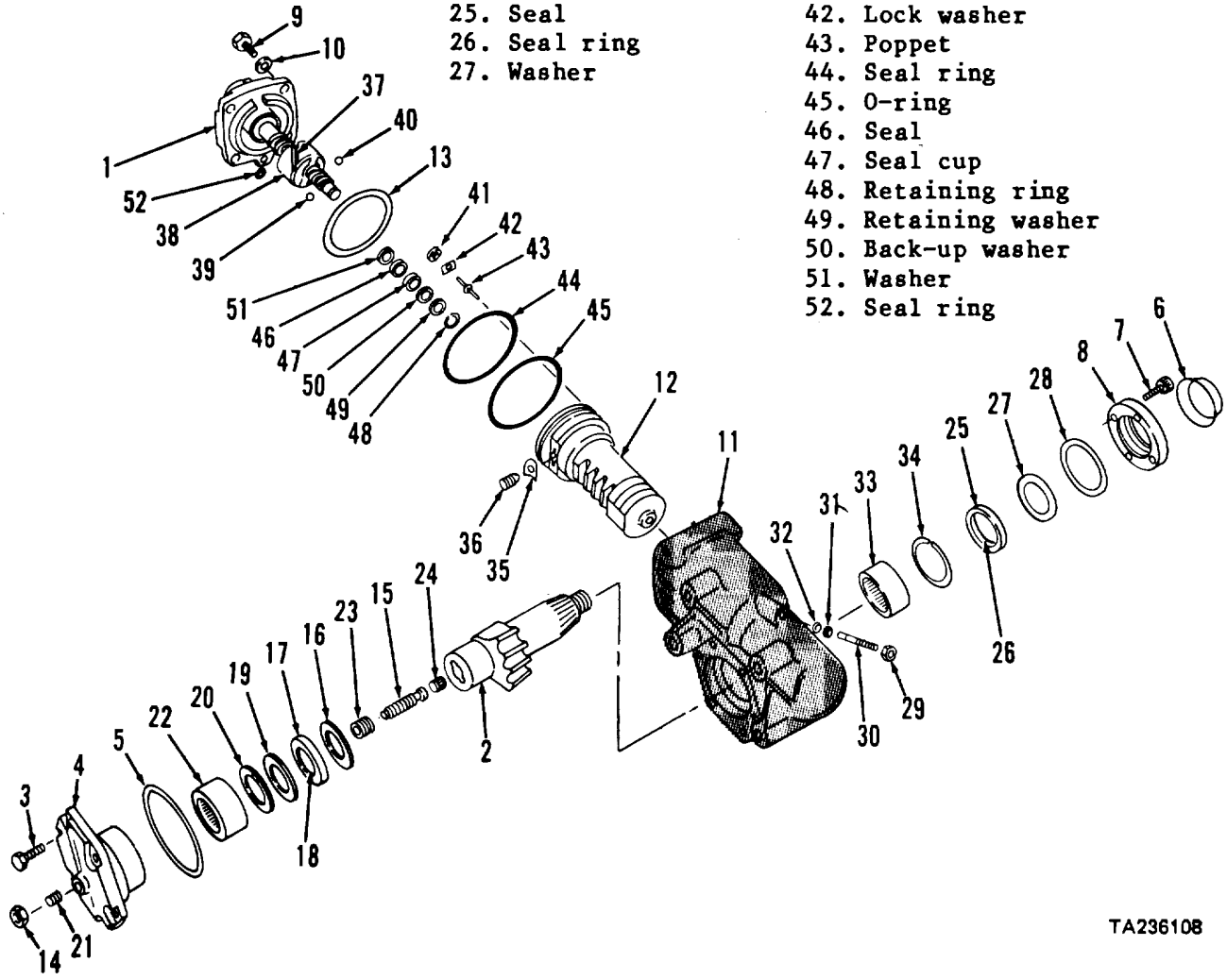
4	Steering gear	a.	Top cover assembly (1) worm shaft	Rotate to "straight ahead" position	Rotate until index mark on sector shaft (2) is perpendicular to centerline of worm shaft
		b.	Six capscrews (3)	Loosen and remove	
		c.	Pitman arm nut	Install	Para 3-28e
		d.	Side cover (4)	Remove	Lightly tap threaded end of sector shaft (2) with a soft hammer to loosen seal ring (5). Drain oil from steering gear before removing side cover (4) and sector shaft (2) as an assembly
		e.	Pitman arm nut	Remove	Para 3-28e
		f.	Seal ring (5)	Remove and discard	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

KEY

1. Top cover assembly
2. Sector shaft
3. Capscrews (6)
4. Side cover
5. Seal ring
6. Seal
7. Socket head screws (4)
8. Trunnion cover
9. Capscrews (4)
10. Washers (4)
11. Housing
12. Rack piston
13. Seal ring
14. Nut
15. Adjusting screw
16. Retaining ring
17. Seal
18. Seal ring
19. Washer
20. Back-up washer
21. Vent plug
22. Bearing
23. Retainer
24. Thrust insert
25. Seal
26. Seal ring
27. Washer
28. Seal ring
29. Locknut
30. Adjusting screw
31. Back-up washer
32. O-ring
33. Bearing
34. Retaining ring
35. Lock washer
36. Locking screw
37. Ball return guides (2)
38. Ball nut
39. Balls (14)
40. Balls (14)
41. Poppet seat
42. Lock washer
43. Poppet
44. Seal ring
45. O-ring
46. Seal
47. Seal cup
48. Retaining ring
49. Retaining washer
50. Back-up washer
51. Washer
52. Seal ring



3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		g. Seal (6)	Remove	
		h. Four socket head screws (7)	Loosen and remove	
		i. Trunnion cover (8)	Remove	
		j. Four capscrews (9) and washers (10)	Remove	
		k. Top cover assembly (1) worm shaft	Rotate	Until top cover assembly (1) slides 3/4 inch from housing (11). Drain oil from housing before proceeding
		l. Top cover assembly (1) with rack piston (12)	Remove as an assembly	
		m. Seal ring (13)	Remove and discard	From housing (11) or top cover assembly (1)
5	Sector shaft (2)	a. Nut (14)	Remove	From adjusting screw (15)
		b. Adjusting screw (15)	Turn clockwise	Until side cover (4) disengages from adjusting screw (15) and sector shaft (2)
		c. Retaining ring (16)	Remove	Use retaining ring pliers
		d. Seal (17) and seal ring (18)	Remove and discard	
		e. Washer (19) and back-up washer (20)	Remove	From side cover (4)
		f. Vent plug (21)	Remove and discard	

CAUTION

Do not nick or scratch surface of side cover (4) in following step. Remove bearing (22) only if required for replacement.

		g. Bearing (22)	Remove	From side cover (4) using puller

3-28. STEERING SYSTEM MAINTENANCE (CONT)

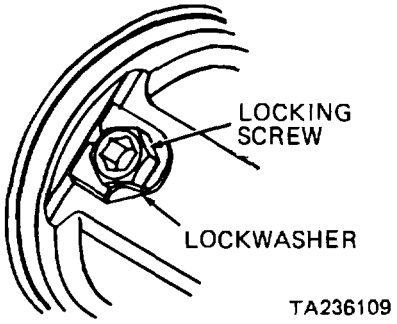
d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5 (cont)		**NOTE**		
		Remove retainer (23) and adjusting screw (15) only if required for replacement.		
		h Retainer (23)	Remove	Unstake from two locations in sector shaft (2) and unscrew
		i Adjusting screw (15)	Remove	From retainer (23). Discard retainer
		NOTE		
		Do not attempt to remove thrust insert (24). Thrust insert is press fit in the sector shaft (2) and is not serviceable separately.		
6	Trunnion cover (8)	a Seal (25) and seal ring (26)	Remove and discard	
		b Washer (27)	Remove and discard	
7	Housing (11)	a Seal ring (28)	Remove and discard	
		b Locknut (29)	Loosen and remove	From adjusting screw (30)
		c Adjusting screw (30)	Remove	From housing (11)
		d Back-up washer (31) and 0-ring (32)	Remove and discard	
		NOTE		
		Remove bearing (33) and retaining ring (34) only if necessary for replacement.		
		e Bearing (33)	Remove	Press from housing (11)
		f Retaining ring (34)	Remove from bearing (33)	Use retaining ring pliers

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8	Rack piston (12)	a. Lock washer (35)	Unlock	Carefully pry flattened tab of lock washer (35) from face of locking screw (36)



		b. Locking screw (36)	Remove	From rack piston (12)
		c. Lock washer (35)	Remove and discard	

CAUTION

Do not remove the rack piston (12) until you are instructed to do so. The ball nut (38) must be taped to prevent accidental disassembly of the ball return guides (37) and balls (39 and 40) before you remove the rack piston (12).

		d. Rack piston (12)	Rotate	Until teeth are positioned downward

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

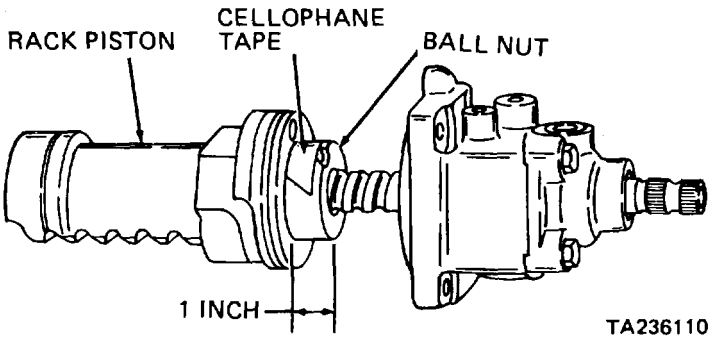
3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS

DISASSEMBLY (cont)

8 (cont)	e.	Ball nut (38)	Tape	Carefully disengage rack piston (12) until 1 inch of ball nut (38) is exposed. Wipe exposed surface of ball nut (38) with cleaning solvent P-D-680 and allow to air dry. Then apply cellophane tape over ball return guide (37) opening in ball nut (38) to prevent loss of parts

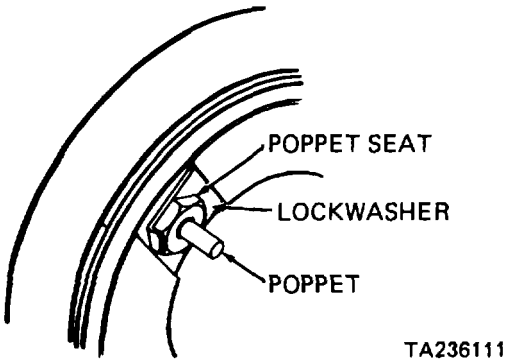


f	Rack piston (12)	Remove	Carefully pull from ball nut (38) and top cover assembly (1) worm shaft

NOTE

Remove poppet seat (41), lock washer (42), and poppet (43) only if required for replacement.

g	Lock washer (42)	Unlock	Carefully pry flattened tab of lock washer (42) from face of poppet seat (41)



h.	Poppet seat (41) and lock washer (42)	Remove and discard	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

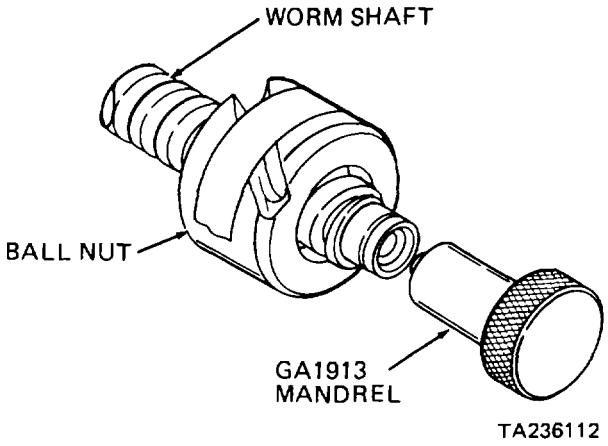
d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8 (cont)		i Poppet (43)	Remove	From bore in rack piston (12). Discard poppet (43)
		NOTE Remove seal ring (44) and O-ring (45) only if required for replacement.		
		j Seal ring (44) and O-ring (45)	Remove	Carefully pull from groove at large end of rack piston (12)
9	Top cover assembly (1)	a Seal (46) and seal cup (47)	Remove	Cut, remove, and discard
		b Retaining ring (48)	Remove	Use retaining ring pliers
		NOTE In the following step, set the parts aside in the order and position of removal to aid in reassembly.		
		c. Retaining washer (49), back-up washer (50), and washer (51)	Remove	Carefully pull from end of top cover assembly (1) worm shaft
		CAUTION Be sure the cellophane tape and mandrel do not separate from the ball nut (38) in the following step. The ball nut assembly is not serviced separately. If a ball accidentally falls from the ball nut, replace the ball nut, balls, and ball return guides with a new assembly.		

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
9 (cont)		d. Ball nut (38)	Remove	Press small end of mandrel against hole in end of top cover assembly (1) worm shaft. Maintain pressure against mandrel while rotating ball nut (38) clockwise to remove from worm shaft. When ball nut is fully seated on mandrel, remove mandrel with ball nut and set aside with large end of mandrel positioned on work surface.



		e. Seal ring (52)	Remove and discard	

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors.

Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
10	a	Top cover assembly (1) and ball nut (38)	Clean	Wipe exterior only using a clean, lint free cloth moistened with cleaning solvent P-D-680 Set these assemblies aside and allow to air dry Do not use compressed air to dry these parts
	b	Bearings (22 and 33)	Clean	Use cleaning solvent P-D-680. Immerse bearings in cleaning solvent and move slowly up and down until bearings are thoroughly clean Dry using moisture free compressed air Direct air stream across bearing Do not spin bearing while drying Rotate bearing slowly by hand to facilitate drying
	c	All other parts	Clean	Use cleaning solvent P-D-680. Dry thoroughly with moisture free compressed air
		NOTE Do not use cloths to dry internal parts.		
INSPECTION				
11	a	Back-up washers (20 and 50) and washers (10, 19, 49, and 51)	Inspect	Replace if cracked, pitted, scored, or excessively worn
	b	Retaining rings (16, 34, and 48)	Inspect	Replace if cracked or broken
	c	Sector shaft (2)	Inspect	Replace if cracked or bent, if seal area is pitted, corroded, or excessively worn, if gear teeth are chipped or pitted, if serrations are damaged or worn smooth, or if threads are damaged

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
11 (cont)	d	Side cover (4) and trunnion cover (8)	Inspect	Replace if cracked or broken, or if lapped face nicked, burred, or scored
	e	Top cover assembly (1)	a Inspect	Replace if cracked or broken, if lapped face nicked, burred, or scored, if seal area is pitted, corroded, or excessively worn, if gear teeth are chipped or pitted, if serrations are damaged or worn smooth, or if threads damaged
			b Check rotation	Grasp top cover assembly (1) while rotating worm shaft with torque wrench Worm shaft should rotate at 3-5 pounds inch
		NOTE		
		The housing will operate satisfactorily even with severe scratches in the rack piston bore Wear in the rack piston bore is not cause for housing replacement unless it is causing excessive internal leakage.		
	f	Housing (11)	Inspect	Check that housing is thoroughly cleaned, and that mating surfaces are free from nicks and burrs. Clean up using a soft hone Replace housing if cracked, or if threads are damaged
	g	Bearings (22	Inspect	Inspect bearing rollers and and 33) cages for wear, chips, nicks, cracks, damage, and distortion If any of these conditions are observed, replace bearing. After inspection, immerse bearing in clean hydraulic oil and wrap in clean lintless cloth or paper

3-28. STEERING SYSTEM MAINTENANCE (CONT) I

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
11 (cont)		h Screws (3, 7, 9, 15, 30, and 36) and nuts (14 and 29)	Inspect threads damaged	Replace if worn, or if
		i Seals (6 and 44) and 0-ring (45)	Inspect	Replace if cracked, deformed, or excessively worn
		j Rack piston (12)	Inspect	Check that outer ground surfaces are free from nicks and burrs. Clean up using a soft hone. Replace rack piston if cracked, or if threads are damaged
		k Ball nut (38)	Inspect	For completeness Replace as an assembly if ball return guides (37) or balls (39 and 40) have been removed from ball nut (38)
REASSEMBLY				
12	Top cover assembly (1)	a Seal ring (52)	Install	Retain using clean grease

CAUTION

Be sure the cellophane tape and mandrel do not separate from the ball nut (38) in the following step If a ball accidently falls from the ball nut, replace the ball nut, balls, and ball return guides with a new assembly.

		b Ball nut (38)	Install	Press small end of mandrel with ball nut attached against hole in end of top cover assembly (1) worm shaft. Maintain pressure against mandrel while rotating ball nut (38) counterclockwise to install fully on worm shaft. Then remove mandrel

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

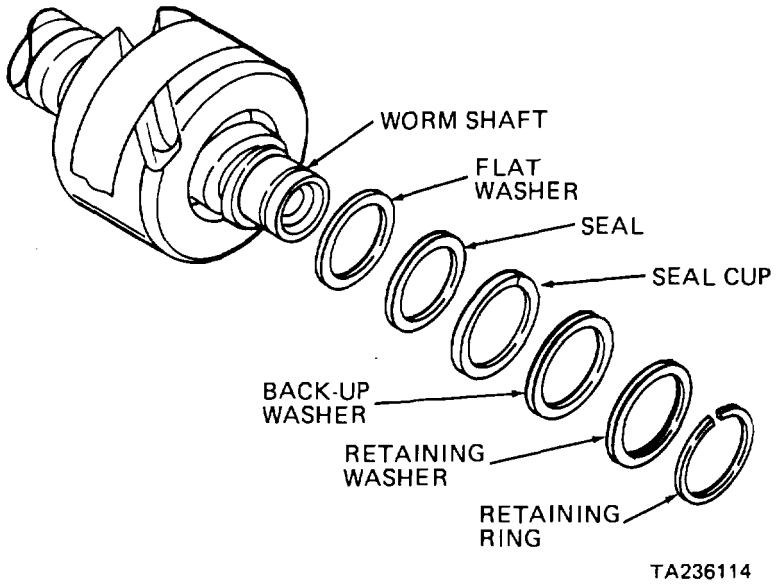
STEP	LOCATION	ITEM	ACTION	REMARKS

REASSEMBLY (cont)

12 (cont)

NOTE

Install the following six parts on the worm shaft as shown

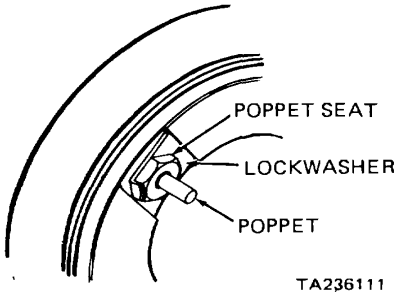


c	Washer (51)	Install with counter bore side facing seal (46)
d	Seal (46)	Install with clean grease
e	Seal cup (47)	
f	Back-up washer (50)	Compress the five previously installed parts and install retaining ring (48) using retaining ring pliers. Be sure the retaining ring is completely seated in groove of top cover assembly (1) worm shaft and is engaged in recessed area of retaining washer (49)
g	Retaining washer (49)	
h	Retaining ring (48)	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

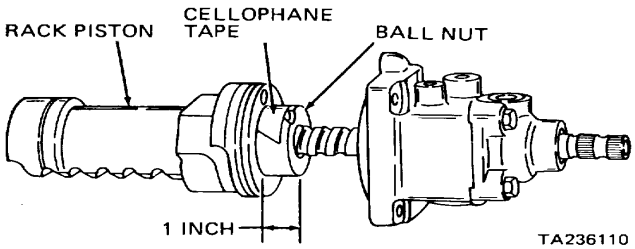
STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
12 (cont)		i	Ball nut (38)	Check rotation	Check for bind and completeness of assembly by rotating ball nut clockwise and counterclockwise through its full travel on worm shaft The ball nut must rotate smoothly in both directions at all locations on the worm
		j	Seal ring (13)	Install	Coat with clean grease, slide over ball nut (38), and position on top cover assembly (1.)
13	Rack piston (12)	a	O-ring (45)	Install	Coat with clean hydraulic oil, and urge onto groove at large end of rack piston (12)
		b	Seal ring (44)	Install	
		c	Poppet (43)	Install	
		d	Poppet seat (41) and lock washer (42)	Install, tighten, and secure piston (12)	Apply degreasing solvent to threads of poppet seat (41) and poppet bore in rack Allow to air dry 10 minutes, then lightly coat threads of poppet seat with stud sealant. Immediately install poppet seat (41) with lock washer (42) and tighten to 25-30 pounds foot . Bend tab of lock washer against face of poppet seat as shown
		e	Lock (36)		Apply degreasing solvent to threads of locking screw (36) and corresponding bore in rack piston (12). Allow to air dry 10 minutes

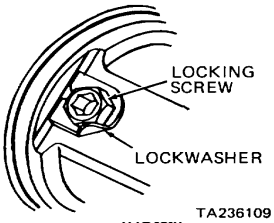


3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13 (cont)		f Rack piston (12)	Install	Carefully slide large end of rack piston over worm shaft of top cover assembly (1). Align conical hole in ball nut (38) with locking screw bore in rack piston, and slide ball nut into rack piston until 1 inch of ball nut is exposed. Remove cellophane tape from ball nut, and slide ball nut into rack piston. Be sure conical hole in ball nut is aligned with corresponding bore in rack piston
		g Locking screw (36) and lock washer (35)	Install, tighten, and secure	Lightly coat threads of locking screw (36) with hydraulic sealant. Immediately install locking screw (36) with lock washer (35) and tighten to 30-35 pounds foot. Bend tab of lock washer against face of locking screw as shown
14	Side cover (4)	b Bearing (22)	Install, if removed	Press in until flush Position side cover (4) on wooden block. Press bearing (22) into bore of side cover fully
		c Back-up washer (20)	Install	
		d Washer (19)	Install	
		e Seal ring (18) and seal (17)	Assemble and install	Position so OIL SIDE stamping is visible after installation
		f Retaining ring (16)	Install	Use retaining ring pliers





3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14 (cont)		g Seal ring (5)	Install	Coat with clean grease, and press into side cover groove
15	Sector shaft (2)	a Sector shaft (2)	Position and clamp	Clamp serrated end in soft-jawed vise so that gear end faces upward
		b Adjusting screw (15)	Install	Coat screw head with wheel bearing grease and press into bore at gear end of sector shaft
		c Retainer (23)	Install	Slide over adjusting screw (15) and thread into sector shaft until adjusting screw has no end play. Then stake retainer to sector shaft at the two slots provided
		d Sector shaft (2)	Position	Coat the adjusting screw end of sector shaft (2) with clean grease, and slide into side cover (4) until adjusting screw (15) contacts side cover
		e Adjusting screw (15)	Turn counter-clockwise	Use a screwdriver to turn adjusting screw until threads engage. Continue turning adjusting screw until firm resistance is felt
		f Nut (14)	Install	Tighten hand tight only
16	Housing (11)	a Retaining ring (34)	Install	On bearing (33) using retaining ring pliers
		b Bearing (33)	Install	Position housing (11) on wooden block to protect side cover face. Press bearing (33) into bore' of housing until retaining ring (34) contacts housing
		c Back-up washer (31)	Install	On non-threaded end of adjusting screw (30)
		d O-ring (32)	Install	Thoroughly coat with clean grease and install against back-up washer (31)

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
16 (cont)		e Adjusting screw (30)	Install	Screw into tapped hole in housing until 7/8 inch of thread is exposed
		f Locknut (29)	Install	Tighten hand tight only
		g Rack piston (12)	Install:	Thoroughly lubricate O-ring (45) and bore in housing (11) with clean hydraulic oil. Position rack piston (12) so teeth will be visible through side cover opening in housing. Compress O-ring (45) while sliding rack piston into bore of housing
		h Top cover assembly (1)	Position	Align oil transfer holes in top cover assembly (1) with corresponding holes in housing, then press top cover assembly against housing
		i Four capscrews (9) and washers (10)	Install	Alternately tighten to 70-80 pounds foot
		j Rack piston (12)	Position	Watch rack piston through side cover hole in housing, and rotate rack piston to mark on centerline
		k Sector shaft (2) and side cover (4)	Install	So the center of sector shaft gear engages center of rack piston teeth
		l Six capscrews (3)	Install	Alternately tighten to 150-170 pounds foot
		m Adjusting screw (15)	Adjust:	Rotate worm shaft of top cover assembly (1) 90 degrees each side of center using torque wrench and note indications. Turn adjusting screw (15) clockwise until torque wrench indicates 15-20 pounds inch. Back out adjusting screw one full turn and note torque wrench indications. Then turn adjusting screw clockwise to increase torque 2-4 pounds inch at or below 45 degrees each side of center. Tighten nut (14) to 20-25 pounds foot, and check that input torque at any point of rotation is at or below 15 pounds inch

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
16 (cont)	n	Seal ring (28)	Install	Cover serrations on sector shaft (2) with a single layer of cellophane tape. Lightly coat sector shaft and seal ring (28) with clean grease. Then slide seal ring over sector shaft and position over retaining ring (34)
	o	Washer (27)	Install	In trunnion cover (8)
	p	Seal ring (26) and seal (25)	Assemble and install	In trunnion cover (8) Position so OIL SIDE stamping is visible after installation
	q	Trunnion cover (8)	Install	Slide over sector shaft (2) and position against housing (11). Be sure seal ring (28) is correctly positioned over retaining ring (34)
	r	Four socket head screws (7)	Install	Alternately tighten to 13-23 pounds foot
	s	Seal (6)	Install	Pack with wheel bearing grease and press over trunnion cover (8). Then remove cellophane tape from sector shaft (2)

TESTING

WARNING

If steering gear does not pass the following test, it is defective and must not be returned to service. Disassemble the defective steering gear as necessary to replace binding or defective parts; then repeat the tests.

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
TESTING (cont)					
17			Input torque	Test: Rotate top cover assembly (1) worm shaft through five cycles of full rotation and repeat input torque check (step 16m above).	Input torque must not exceed 15 pounds inch over full input shaft rotation of 95 degrees and sector shaft must not bind or have lash when in center position
18			Reverse torque	Test: Rotate sector shaft (2) from stop-to-stop using torque wrench and note indications.	Reverse torque for full gear travel must not exceed 50 pounds foot in either direction
			NOTE		
			If steering gear is to be stored, plug one valve port and fill remaining valve port with clean hydraulic oil. Rotate top cover assembly (1) worm shaft while filling to remove air. Then plug remaining valve port.		
INSTALLATION AND ADJUSTMENT					
19	Front left frame rail	a	Steering gear	Position	On outside of frame rail, with mounting holes aligned
		b	Four capscrews and lock washers	Install	Tighten alternately to 320 pounds foot
20	Steering gear	a	Sector shaft (2)	Center	Rotate top cover assembly (1) worm shaft fully clockwise to stop; then rotate counterclockwise 3.1 turns to center sector shaft (2)
		b	Pitman arm	Position	Install vertically, with index mark on pitman arm aligned with mark on steering gear shaft

3-28. STEERING SYSTEM MAINTENANCE (CONT) I

d. Power Steering Gear (cont).

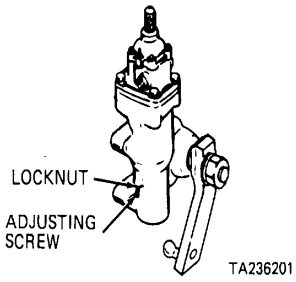
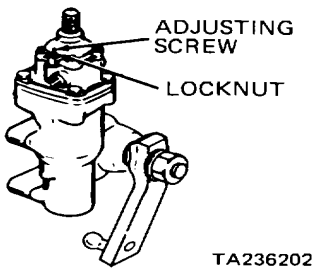
STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION AND ADJUSTMENT (cont)				
20 (cont)		c Nut and large lock washer	Install	Tighten to 500 pounds foot
		d Hydraulic steering lines and fittings	Connect	Para 2-58b
		e Pressure gage and tee	Connect	To front port on steering gear; then connect pressure hose from power steering pump to tee
21	Tractor, front	a Radiator	Install	Pars 3-5a
		b Cab	Lower	To normal operating position
22	Rear cab guard	Power steering reservoir	Fill	Para 2-58c
23	Tractor, front	a Steering axle stops	Adjust	Para 3-18
		b Drag link	Adjust and connect	Para 3-28e
24	Instrument panel	a Key switch	Turn on	To start engine. Run engine at 1300 rpm
		b Steering wheel	Turn	From side to side several times
25	Steering gear	Pressure gage	Watch	While assistant holds steering wheel at right stop. Pressure gage reading shall drop from about 1750 psi to 1000 psi or less. Then return steering wheel to center position

NOTE

If pressure in previous step did not drop to 1000 psi or less, perform step 26 below. If pressure did drop to 1000 psi or less, go to step 27 below.

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION AND ADJUSTMENT (cont)				
26	Steering gear, bottom	a Locknut	Loosen	
		b Adjusting screw	Adjust	Until pressure gage reading drops from about 1750 psi to 1000 psi or less while assistant turns steering wheel completely to the right. Then return steering wheel to center position
				
		c Locknut	Tighten	To 20-25 pounds foot
27	Steering gear.	Pressure gage	Watch	While assistant holds steering wheel at left stop. Pressure gage reading shall drop from about 1750 psi to 1000 psi or less. Then return steering wheel to center position
		NOTE		
		If pressure in previous step did not drop to 1000 psi or less, perform step 28 below. If pressure did drop to 1000 psi or less, go to step 29.		
28	Steering gear, top	a Locknut	Loosen	
		b Adjusting screw	Adjust	Until pressure gage reading drops from about 1750 psi to 1000 psi or less while assistant turns steering wheel completely to the left. Then return steering wheel to center position
				

3-28. STEERING SYSTEM MAINTENANCE (CONT)

d. Power Steering Gear (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION AND ADJUSTMENT (cont)				
28 (cont)		c Locknut	Tighten	To 20-25 pounds foot
29	Instrument panel	Key switch	Turn off	Press engine stop button to shut down engine
30	Steering gear	a Two gallon container	Position	Under steering gear
		b Pressure gage and tee	Remove	From pressure line and steering gear port
		c Pressure line	Connect	To steering gear port
		d Two gallon container	Remove	Dispose of used oil properly
31	Rear cab guard	Power steering reservoir	Fill	Para 2-58c

3-28. STEERING SYSTEM MAINTENANCE (CONT)

e. Steering Linkage and Ball Sockets.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Adjustable open end wrench
- Socket wrench set
- Combination wrench set
- Safety glasses

Lubricating kit
- Grease gun

Bit set, screwdriver

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

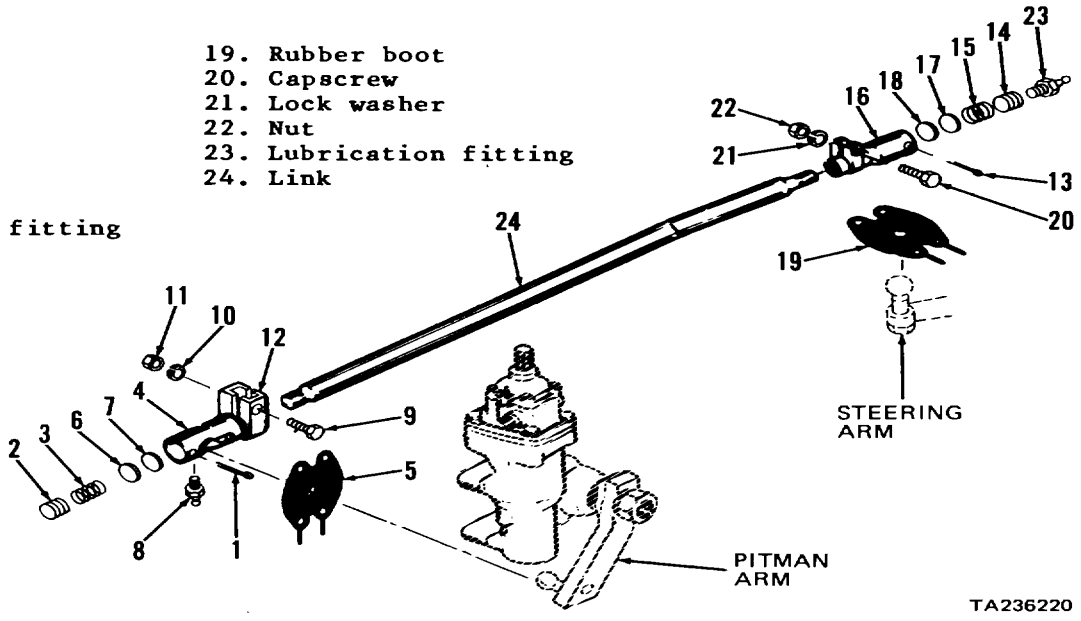
Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied. Front wheels pointed straight ahead.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Grease -	Item 3, Appendix C
Cotter pin	FSCM 90915 PN 90831083
Cotter pin	

KEY

1. Cotter pin
2. Plug
3. Spring
4. Body
5. Rubber boot
6. Ball seat
7. Ball seat
8. Lubrication fitting
9. Capscrew
10. Lock washer
11. Nut
12. Clamp
13. Cotter pin
14. Plug
15. Spring
16. Body
17. Ball seat
18. Ball seat
19. Rubber boot
20. Capscrew
21. Lock washer
22. Nut
23. Lubrication fitting
24. Link



F

3-28. STEERING SYSTEM MAINTENANCE (CONT)

e. Steering Linkage and Ball Sockets (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Front axle, steering gear	a Rubber boot (5)	Disconnect	Disconnect two metal tabs and open; pull over lubrication fitting (8)
		b Cotter pin (1)	Remove and discard	
		c Plug (2) and spring (3)	Remove	
		d Pitman arm	Move	Move pitman arm forward
		e Body (4) and rubber boot (5)	Remove	Pull from pitman arm ball stud
		f Two ball seats (6 and 7)	Remove	From body (4)
2	Front axle, steering arm	a Rubber boot (19)	Disconnect	Disconnect two metal tabs and open; pull over lubrication fitting (23)
		b Cotter pin (13)	Remove and discard	
		c Plug (14) and spring (15)	Remove	Unscrew
		d Body (16) link (24)	Remove	Slide forward and lift from
		e Two ball seats (17 and 18)	Remove	From body (16)
		f Rubber boot (19)	Remove	From steering arm ball stud
DISASSEMBLY				
		NOTE		
		Do not interchange ball socket parts (1 thru 12 and 13 thru 23) Ball socket assemblies are not identical.		
3	Steering linkage	a Lubrication fitting (8)	Remove	From body (4)
		b Capscrew (9), lock washer (10), and nut (11)	Remove	
		c Body (4)	Remove	From link (24)
		d Clamp (12)	Separate	From body (4)

3-28. STEERING SYSTEM MAINTENANCE (CONT)

e. Steering Linkage and Ball Sockets (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)	e	Capscrew (20), lock washer (21), and nut (22)	Remove	
	f	Body (16)	Remove	From link (24)
	g	Lubrication fitting (23)	Remove	From plug (23)
CLEANING				
4	a	Rubber boots (5 and 19)	Clean	Use clean, dry cloth only

WARNING

Dry cleaning solvent (PD680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately.

If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

	b	All other parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION				
5	a	Ball seats (6, 7, 17, and 18)	Inspect	Replace if cracked, broken, or excessively worn
	b	Springs (3 and 15)	Inspect	Replace if cracked, broken, or permanently set

3-28. STEERING SYSTEM MAINTENANCE (CONT)

e. Steering Linkage and Ball Sockets (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
5 (cont)		c All other parts	Inspect	Replace if cracked, broken, bent, distorted, or threads damaged
REASSEMBLY				
6	Steering linkage	a Body (16)	Install	On link (24). Be sure body is installed on correct end of link
		b Capscrew (20), lock washer (21), and nut (22)	Install	Do not tighten
		c Clamp (12)	Install	On body (4)
		d Body (4)	Install	On link (24)
7	Frame, left hand side, front	a Tires and frame rails	Measure	Measure the distance between frame rail and tire at both front and rear, left and right. Adjust front wheels until both measurements agree to within 1/8 inch
		b Pitman arm	Adjust position	Turn steering wheel fully right or left, until steering wheel begins to feel spongy. Then turn wheel 3.1 turns in opposite direction to center pitman arm
INSTALLATION				
8	Front axle, steering arm	a Rubber boot (19)	Install	
		b Ball seat (18)	a Lubricate	Use grease
			b Install	On body (16), flat side facing link (24)
		c Body (16)	Install	On steering arm ball stud
		d Ball seat (17)	a Lubricate	Use grease
		b Install		In body (16), concave side facing link (24)
		e Spring (15) and plug (14)	Install and tighten	Tighten plug (14), then back off until slot aligns with body (16) cotter pin hole
		f New cotter pin (13)	Install and spread	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

e. Steering Linkage and Ball Sockets (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
9	Front axle, steering gear	a Link (24)	Adjust	Adjust overall length of link until body (4) lubrication fitting opening is centered on ball stud of pitman arm. Be sure bend in link is at center of tractor. Also be sure same amount of link thread is engaged by each ball socket assembly
		b Rubber boot (5)	Install	On pitman arm ball stud
		c Ball seat (7)	a	Lubricate Use grease
		b Install facing link (24)	In body (4), flat side	
		d Pitman arm	Move	Move pitman arm forward just enough to allow installation of body (4)
		e Body (4)	Install	On pitman arm ball stud
		f Ball seat (6)	a Lubricate	Use grease
			b Install	In body (4), concave side facing link (24)
		g Spring (3) and plug (2)	Install and tighten	Tighten plug (2), then back off until slot aligns with body (4) cotter pin hole
		h New cotter pin (1)	Install and spread	
		i Capscrew (9), lock washer (10), and nut (11)	Install and tighten	On clamp (12)
		j Lubrication fitting (8)	Install	In body (4)
		k Rubber boot (5)	Secure	Wrap around ball socket assembly and bend tabs to secure
		l Lubrication fitting (8)	Lubricate	Use grease gun and grease
10	Front axle, steering arm	a Capscrew (20) and nut (22)	Tighten	
		b Rubber boot (20) Secure		Wrap around ball socket assembly and bend tabs to secure
		c Lubrication fitting (23)	a Install	In plug (14)
			b Lubricate	Use grease gun and grease

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Socket wrench set
- Torque wrench
- Vise jaw caps
- Retaining ring pliers
- Puller kit
- Safety glasses

Automotive Mechanic's Tool Kit
- Hammer
- Drive pin punch

Soft mallet
Bronze bar
Wooden block

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Non-hardening sealant	Item 10, Appendix C
Hydraulic oil drained.	Item 22, Appendix C

Seal kit	FSCM 32705 PN 922904
Manifold kit	FSCM 32705 PN 923845
Washer	FSCM 32705 PN 28931
Locknut	FSCM 90915 PN 90002940

Personnel Required
Automotive Repairer MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

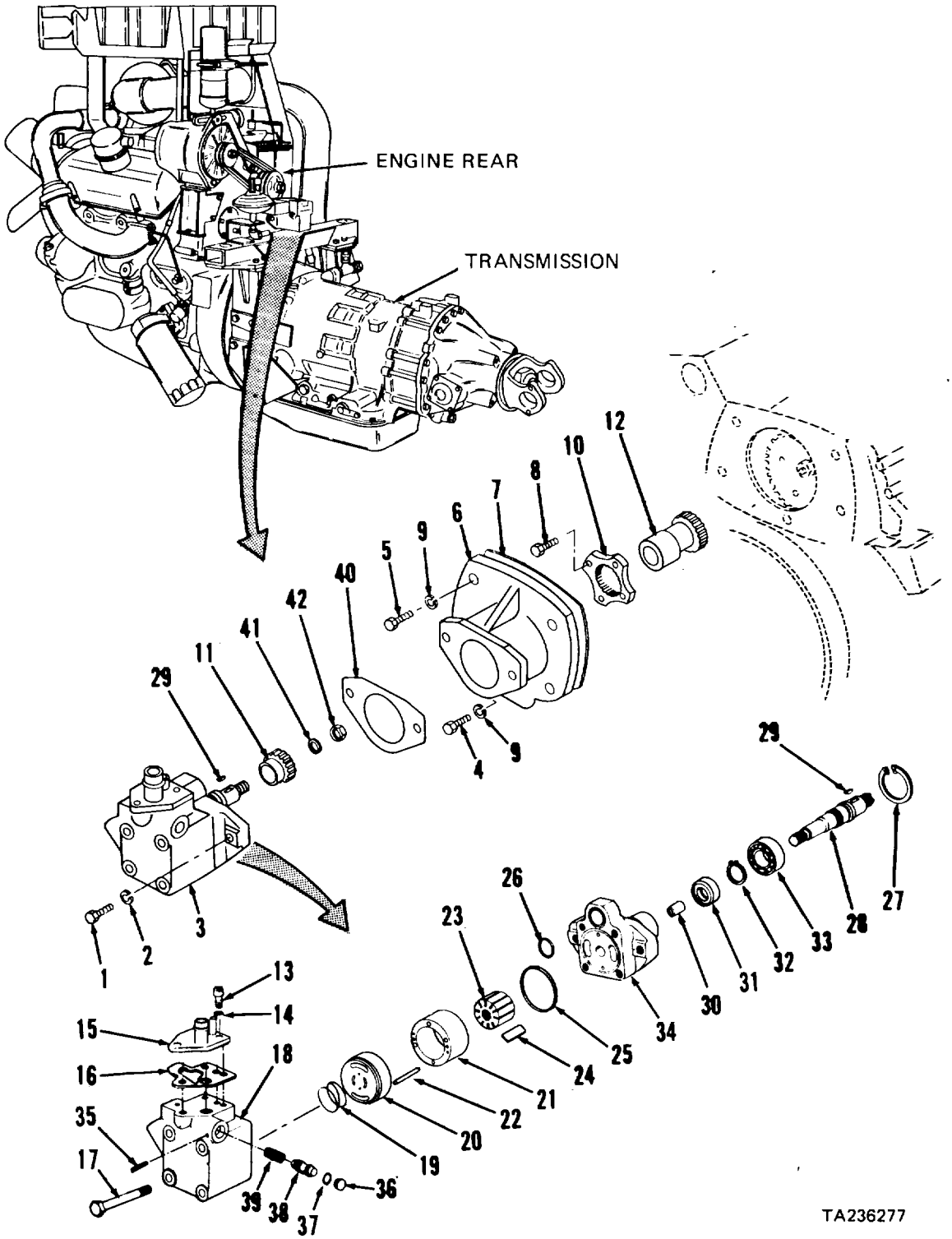
Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off. Cab tilted 45 degrees.
2-58b	Hydraulic steering lines and fittings removed from pump.
2-58c	Power steering reservoir

STEP	LOCATION	ITEM		ACTION	REMARKS
REMOVAL					
1	Engine, rear	a	Two capscrews (1) and lock washers (2)	Remove	
		b	Power steering pump assembly (3)	Remove	
		c	Gasket (40)	Remove and discard	
		d	Locknut (42) and washer (41)	Remove	Discard locknut (42)
		e	Gear (11)	Remove	Use gear puller
		f	Key (29)	Remove	

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).



3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

KEY

1	Capscrews (2)	15	Manifold	29	Key
2	Lock washers (2)	16	Gasket	30	Bearing
3	Power steering pump assembly	17	Capscrews (4)	31	Shaft seal
4	Capscrew	18	Cover	32	Retaining ring
5	Capscrews (4)	19	Spring	33	Bearing
6	Adapter	20	Pressure plate	34	Body
7	Gasket	21	Ring	35	Pin
8	Capscrews (4)	22	Pins (2)	36	Plug
9	Lock washers (5)	23	Rotor	37	O-ring
10	Plate	24	Vanes (10)	38	Control valve
11	Gear	25	O-ring	39	Spring
12	Coupling	26	O-ring	40	Gasket
13	Screw	27	Retaining ring	41	Washer
14	Washer	28	Shaft	42	Locknut

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)	g	Capscrew (4), four capscrews (5), and five lock washers (9)	Remove	
	h	Adapter (6) and gasket (7)	Remove	Discard gasket (7)
	i	Coupling (12)	Remove	Pull out

CAUTION

In following step, be careful not to drop anything into gear cover. If parts or foreign matter are dropped into gear cover, gear cover must be removed to gain access to, and remove these parts. Failure to do so will cause serious damage to engine.

j	Four capscrews (8)	Remove	Only if drive plate (10) is to be replaced
k	Drive plate (10)	Remove	Only if damaged

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM		ACTION	REMARKS
DISASSEMBLY					
		WARNING			
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.			
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.			
2	Power steering pump assembly (3)	a	Pump exterior	Clean	Wash exterior using cleaning solvent P-D-680; dry with compressed air
		b	Screw (13) and washer (14)	Remove	Discard washer (14)
		c	Manifold (15) and gasket (16)	Remove	Discard gasket (16)
		d	Power steering pump assembly (3)	Clamp	In soft jawed vise with vise jaws contacting body (34) and capscrews (17) facing up
		e	Four capscrews (17)	Remove	
		f	Cover (18) and spring (19)	Remove	
		g	Ring (21)	Hold securely	
		h	Pressure plate (20)	Remove	Lift up over pins (22)
		i	Ring (21)	Remove	Lift up over pins (22)
		j.	'Two pins (22)	Remove	
		k	Rotor (23)	Remove	Lift over shaft (28); vanes (24) will fall out

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		l. Ten vanes (24)	Remove	
		m 0-rings (25 and 26)	Remove and discard	
3	Body (34)	a Body (34)	Invert	Remove body from vise. Invert so that retaining ring (27) is facing up. Reclamp in vise
		b Retaining ring (27)	Remove	Use retaining ring pliers
		c Shaft (28)	Remove	Use bronze bar and mallet to tap out
		d Bearing (30)	Remove	Use puller
		e Shaft seal (31)	Remove and discard	
		f Retaining ring (32)	Remove	Use retaining ring pliers
		g Bearing (33)	Remove	Use puller
		h Body (34)	Remove	From vise
4	Cover (18)	a Cover (18)	Clamp	In soft jawed vise
		b Pin (35)	Remove	Use pin punch and hammer to drive out
		c Plug (36) and 0-ring (37)	Remove	Discard 0-ring
		d Control valve (38)	Remove	
		e Spring (39)	Remove	

CLEANING

WARNING

Dry cleaning solvent (PD680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes .and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
5	a	Bearing (33)	Clean	Use cleaning solvent P-D-680. Immerse bearing in cleaning solvent and move slowly up and down. Remove bearing. Strike larger side of cone against block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning solvent. Repeat process until bearing is thoroughly clean. Dry using moisture free compressed air. Direct air stream across bearing. Do not spin bearings when drying. Rotate bearings slowly by hand to facilitate drying
	b	All other parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION				
6	a	Adapter (6) and plate (10)	Inspect	Replace if cracked, broken, or distorted
	b	Gear (11) and coupling (12)	Inspect	Replace if cracked, broken, distorted or teeth pitted, nicked, scored, or badly worn

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
6 (cont)		**WARNING** Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	c	Manifold (15) and cover (18)	Inspect	Replace if cracked, broken, or distorted. Clean bores with compressed air
	d	Springs (19 and 39)	Inspect	Replace if cracked, broken, distorted, or permanently set
	e	Pressure plate (20), ring (21), rotor (23), and vanes (24)	Inspect	Inspect surfaces subject to wear. Light scoring may be removed from faces of body or wear plate with crocus cloth (by placing cloth on flat surface), medium India stone or by lapping. Check edges of vanes for wear. Vanes must not have excessive play in slots or burrs on edge. Replace if necessary. Check each rotor slot for sticky vanes or wear. Vanes should drop in rotor slot by their own weight when both slot and vane are dry
		NOTE Replace ring (21), rotor (23), and vanes (24) if inspection indicates any one part needs replacement.		
	f	Shaft (28)	Inspect	Replace if worn, cracked, broken, distorted, or splines or threads damaged
	g	Bearing (30)	Inspect	Replace if cracked, broken, distorted, or worn

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
6		h. Bearing (33)	Inspect	Inspect all rollers, cages (cont) and cups for wear, chips, nicks, cracks, damage, and distortion. If any of these conditions are observed, replace bearing. After inspection, immerse in clean light oil and wrap in clean lintless cloth or paper
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to-eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		i. Body (34)	Inspect	Replace if cracked, broken, distorted, or threads damaged. Clean bores with compressed air
		j. Control valve	Inspect	Replace if cracked, broken, (38) or distorted. Check for freedom of movement in bore of cover (18)
REASSEMBLY				
		NOTE Immerse all internal parts in clean hydraulic oil before reassembly. Shake off excess oil during reassembly, but don't wipe.		
7	Cover (18)	a Cover (18)	Clamp	In soft jawed vise
		b Spring (39), control valve (38), new O-ring (37), and plug (36)	Install	In cover (18)
		c Pin (35)	Install	Use pin punch and hammer
		d Cover (18)	Remove	From vise

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8	Body (34)	a Bearing (30)	Install	Use suitable sleeve and arbor press
		b New shaft seal (31)	Install	Use suitable sleeve and arbor press
		c Bearing (33)	Install	On shaft (28)
		d Retaining ring (32)	Install	Use retaining ring pliers
		e Body (34)	Clamp	In soft jawed vise
		f Shaft (28)	Install	Use bronze bar and mallet to tap in
		g Retaining ring (27)	Install	Use retaining ring pliers
		h Body (34)	Invert	Remove body from vise and invert. Reclamp vise
9	Body (34)	a New O-rings (26 and 25)	Install	
		b Two pins (22)	Install	
		c Ring (21)	Install	Observe correct direction of rotation
		d Rotor (23)	Install	Spline chamfer down
		e 10 vanes (24)	Install	Install in rotor (23) with rounded edges facing ring (21)
		f Pressure plate (20)	Install	Slide onto pins (22)
		g Spring (19)	Install	
		h Cover (18)	Position	On body (34)
		i Four capscrews (17)	Install	Tighten to 28 pounds foot torque
		j Power steering pump assembly (3)	Remove	From vise
		k New gasket (16)	Position	
		l Manifold (15)	Position	
		m New washer (14)	Position	
		n Screw (13)	Install	Tighten to 95 pounds inch torque
INSTALLATION				
10	Engine rear right side	a Drive plate (10)	Position	If removed

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
10 (cont)		b Four capscrews (8)	Install	Tighten to 35 pounds foot torque
		c Coupling (12)	Install	
		d New gasket (7) and adapter (6)	Position	Apply light coat of gasket sealer to gasket (7)
		e Four capscrews, (5), capscrew (4), and five lock washers (9)	Install	Capscrew (4) installs in bottom hole of adapter (6)
		f Capscrew (4)	Tighten	To 35 pounds foot torque
		g Capscrews (5)	Tighten	To 53 pounds foot torque
11	Power steering pump assembly (3)	a Key (29)	Install	In shaft (28)
		b Gear (11)	Install	
		c Washer (41) and new locknut (42)	Install	
		d Locknut (42)	Tighten	To 70-80 pounds foot torque
12	Engine, rear	a New gasket (40)	a Seal	Apply thin film of non-hardening sealant to both sides
		b Position	On pump (3)	
		b Power steering pump assembly (3) with gasket (40)	Position	
		c Two lock washers (2) and capscrews (1)	Install	Tighten to 35 pounds foot torque
13	Power steering pump (3)	Hydraulic steering fittings and lines	Install and connect	Para 2-58b
14	Steering gear	Hose	Connect	Para 2-58b
15	Rear cab guard	Power steering reservoir	Fill	Use clean hydraulic oil (refer to current lubrication order). Fill to correct level

3-28. STEERING SYSTEM MAINTENANCE (CONT)

f. Power Steering Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
16	Cab	a Tractor engine	Start	Run engine for five minutes to allow hydraulic oil to warm
		b Steering wheel	Rotate	Turn steering wheel through full travel four or five times to bleed air from system and to check operation
		c Tractor engine	Shut down	
17	Engine, rear	All connections	Check	For leaks Tighten fittings as necessary
18	Rear cab guard	Power steering reservoir	Check	Fill with clean hydraulic oil as necessary (refer to current lubrication order)

Section VI. FRAME AND TOWING ATTACHMENTS, SPRINGS, AND BODY AND CAB MAINTENANCE

This section contains the information you will need to maintain the:

- Frame
- Fifth Wheel
- Springs and Springs Seats
- Body and Cab

It gives you instructions on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

3-29 TROUBLESHOOTING SYMPTOM INDEX

3-29. TROUBLESHOOTING SYMPTOM INDEX (CONT)

3-30. FIFTH WHEEL TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FIFTH WHEEL JAWS DON'T OPEN

Step 1. Check if secondary lock handle is out (unlocked position).

a. If secondary lock handle is in (locked position), pull hair pin clip from secondary lock handle, pull secondary lock handle out, and reinsert hair pin clip outside fifth wheel plate (prevents secondary lock handle from returning to locked position).

b. If secondary lock handle is out (unlocked position), proceed to step 2 below.

Step 2. Pull out fifth wheel trip rod fully while watching fifth wheel jaws.

a. If fifth wheel jaws open, proceed to step 4 below.

b. If fifth wheel jaws don't open, proceed to step 3 below.

Step 3. Check if fifth wheel jaws are adequately lubricated. Inspect fifth wheel jaw spring.

a. If fifth wheel jaws are not adequately lubricated, lubricate (para 2-63d).
b. If fifth wheel jaw spring is broken, replace (para 3-33c).

c. If fifth wheel jaws are adequately lubricated and fifth wheel jaw spring is not broken, disassemble fifth wheel jaw components and replace as required (para 3-33c).

3-30. FIFTH WHEEL TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FIFTH WHEEL JAWS DON'T OPEN (Cont)

Step 4. Start vehicle engine and operate at 1200 rpm to build up air system pressure; then check indication on AIR PRESS gage.

a. If AIR PRESS gage indicates less than 100 psi, troubleshoot air system (refer to para 2-47 or 2-48).

b. If AIR PRESS gage indicates at least 100 psi, proceed to step 5 below.

WARNING

Wear safety glasses and stand clear when loosening air system fittings. High pressure air can propel debris at high speed, causing eye injury or blindness.

Step 5. Loosen hose connector at fitting on fifth wheel unlatch cylinder (para 3-33a).

Have assistant depress brake pedal and momentarily press FIFTH WHEEL UNLATCH CONTROL; listen for air discharge from loosened hose connector.

a. If air discharges from loosened hose connector, replace fifth wheel unlatch cylinder (para 3-33a).

b. If air does not discharge from loosened hose connector, proceed to step 6 below.

WARNING

Wear safety glasses and stand clear when loosening air system fittings. High pressure air can propel debris at high speed, causing eye injury or blindness.

Step 6. Loosen elbow at fifth wheel unlatch valve (para 3-33b). Have assistant depress brake pedal; listen for air discharge from loosened elbow.

a. If air discharges from loosened elbow, repair fifth wheel unlatch valve (para 3-33b).

b. air does not discharge from loosened elbow, troubleshoot air system at brake treadle valve (para 2-47 or 3-21).

3-31. SPRINGS AND SPRING SEATS TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. VEHICLE VIBRATES EXCESSIVELY DURING BUMPS

Check if springs are cracked, damaged, or permanently set.

a. If springs are cracked, damaged, or permanently set, replace both springs (para 3-34).

b. If springs are not cracked, damaged, or permanently set, troubleshoot shock absorbers (para 2-61).

2. SPRINGS SQUEAK OR GROAN

Step 1. Check if springs are cracked or damaged.

a. If springs are cracked or damaged, replace both springs (para 3-34).

b. If springs are not cracked or damaged, proceed to step 2 below.

Step 2. Check if springs are adequately lubricated.
Check if lubrication fittings are damaged.

a. If springs are not adequately lubricated, lubricate (para 3-34).

b. If lubrication fittings are damaged, replace (para 3-34).

3-32. BODY AND CAB TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. SEAT SQUEAKS OR BINDS IN UP AND DOWN TRAVEL

Step 1. Check for wear on all parts that pivot.

a. If parts are excessively worn, replace (para 3-35i(1) or 3-35i(2)).

b. If parts are not excessively worn, proceed to step 2 below.

Step 2. Check shock absorber for leaks.
Remove shock absorber (para 3-35i(2)) and check its operation.

a. If shock absorber is leaking, replace (para 3-35i(2)).

3-32. BODY AND CAB TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. SEAT SQUEAKS OR BINDS IN UP AND DOWN TRAVEL (Cont)

   b. If shock absorber operation is jerky, replace (para 3-35i(2)).

2. SEAT BOUNCES EXCESSIVELY AFTER A BUMP, OR BOTTOMS OR TOPS OUT TOO EASILY

   Check shock absorber for leaks.
   Remove shock absorber (para 3-35i(2)) and check its operation.

   a. If shock absorber is leaking, replace (para 3-35i(2)).

   b. If shock absorber operation is jerky, replace (para 3-35i(2)).

3. HARSH BUMP WHEN SEAT BOTTOMS OR TOPS OUT

   Step 1. Check for worn, damaged, or missing bottom or topping bumpers.

   a. If bottom or topping bumpers are worn, damaged, or missing, replace (para 3-35i(1) or 3-35i(2)).

   b. If bottom and topping bumpers are not worn, damaged, or missing, proceed to step 2 below.

   Step 2. Check shock absorber for leaks.
   Remove shock absorber (para 3-35i(2)) and check its operation.

   a. If shock absorber is leaking, replace (para 3-35i(2)).

   b. If shock absorber operation is jerky, replace (para 3-35i(2)).

4. SEAT BINDS, OR DOES NOT SLIDE SMOOTHLY, WHEN ADJUSTED BACKWARD OR FORWARD

   Check for worn, damaged, or bent parts at roller channels.

   If parts are worn, damaged, or bent, replace (para 3-35i(1) or 3-35i(2)).

5. WEIGHT ADJUSTMENT HANDLE FEELS LOOSE, HAS NO TENSION

   Step 1. Check if tension spring is bent, broken, or missing.

   a. If tension spring is bent, broken, or missing, replace (para 3-35i(2)).

   b. If tension spring is not bent, broken, or missing, proceed to step 2 below.

3-32. BODY AND CAB TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. WEIGHT ADJUSTMENT HANDLE FEELS LOOSE, HAS NO TENSION (Cont)

Step 2. Check if weight adjustment handle does not engage adjuster stud or is broken.

a. If weight adjustment handle does not engage adjuster stud, reconnect (para 3-35i(2)).

b. If weight adjustment handle is broken, replace (para 3-35i(2)).

6. SEAT OR BACK CUSHIONS ARE SEPARATING FROM PANS

Check for missing cushion fastener clips.

a. If cushion fastener clips are missing, replace pan (para 3-35i(1)).

b. If cushion fastener clips are not missing, disassemble and reassemble cushion and pad on pan (para 3-35i(1)).

7. SEAT HAS COLLAPSED

Check seat suspension metal parts for broken condition.

a. If parts are broken, replace (para 3-35i(2)).

b. If parts are not broken, disassemble and reassemble seat suspension; replace missing parts (para 3-35i(2)).

8. DOOR STICKS, OR WILL NOT OPEN OR CLOSE

Step 1. Check outside and inside panels for cracks, damage, or warpage.

a. If panels are cracked, damaged, or warped, repair or replace (para 3-35b).

b. If panels are not cracked, damaged, or warped, proceed to step 2 below.

Step 2. Check inner handle, outer handle, lock, and linkage rod assembly for damage.

If parts are damaged, replace (para 3-35b).

3-32. BODY AND CAB TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

9. DOOR WINDOW WILL NOT RAISE OR LOWER, OR WILL NOT TRAVEL SMOOTHLY

Step 1. Check window for obstructions.

a. If obstructions are found, remove.

b. If obstructions are not found, proceed to step 2 below.

Step 2. Check if window crank engages window regulator.

a. If window crank does not engage window regulator, repair (para 3-35b).

b. If window crank engages window regulator, proceed to step 3 below.

Step 3. Check window regulator for cracks, breaks, or stiff operation.

a. If window regulator is cracked, broken, or operates stiffly, replace (para 3-35b).

b. If window regulator is not cracked or broken, and operates smoothly, proceed to step 4 below.

Step 4. Check if glass channel engages window regulator.
Check if window regulator tab or glass channel is broken.

a. If window regulator tab is not inserted in glass channel slot, insert (para 3-35b).

b. If window regulator tab or glass channel is broken, replace (para 3-35b).

10. RIGHT SIDE OR REAR WINDOW WILL NOT CLOSE FULLY

Step 1. Check window for obstructions.

a. If obstructions are found, remove.

b. If obstructions are not found, proceed to step 2 below.

Step 2. Check if latch parts are bent or damaged.

a. If latch parts are bent or damaged, replace (para 3-35g).

b. If latch parts are not bent or damaged, proceed to step 3 below.

3-32. BODY AND CAB TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

10. RIGHT SIDE OR REAR WINDOW WILL NOT CLOSE FULLY (Cont)

Step 3. Check if glass frame or outer frame is bent, damaged, or distorted.

If glass frame or outer frame is bent, damaged, or distorted, replace (para 3-35g).

11. RIGHT SIDE OR REAR WINDOW WILL NOT SLIDE OR WILL NOT SLIDE SMOOTHLY

Step 1. Check window for obstructions.

a. If obstructions are found, remove.

b. If obstructions are not found, proceed to step 2 below.

Step 2. Check if glass frame or outer frame is bent, damaged, or distorted.

If glass frame or outer frame is bent, damaged, or distorted, replace (para 3-35g).

12. CAB DRAFTY

Step 1. Check cab door felt strips, felt channel, and weatherstrip for distortion, tears, cracks, or excessive wear.

a. If felt strips, felt channel, or weatherstrip are distorted, torn, cracked, or excessively worn, replace (para 3-35b).

b. If felt strips, felt channel, and weatherstrip are not distorted, cracked, or excessively worn, proceed to step 2 below.

Step 2. Check if steering column enclosure is inadequately sealed.

If steering column is inadequately sealed, seal (para 3-28a).

13. CAB VIBRATES EXCESSIVELY

Step 1. Check if cab deck latch brackets fully engage hydraulic latches.

a. If latch brackets do not fully engage hydraulic latches, troubleshoot cab tilt hydraulic system (para 2-77).

b. If latch brackets fully engage hydraulic latches, proceed to step 2 below.

3-32. BODY AND CAB TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. CAB VIBRATES EXCESSIVELY (Cont)

Step 2. Check cab mount locknuts for looseness.

a. If locknuts are loose, tighten (para 3-35a).

b. If locknuts are tight, proceed to step 3 below.

Step 3. Check if cab mounts are cracked, torn, deteriorated, or missing.

a. If cab mounts are cracked, torn, deteriorated, or missing, replace (para 3-35a).

b. If cab mounts are not cracked, torn, deteriorated, or missing, proceed to step 4 below.

Step 4. Check cab and deck for cracks, breaks, or distortion.

a. If cab and deck are cracked, broken, or distorted, repair; if beyond repair, replace (para 3-35c).

b. If cab and deck are not cracked, broken, or distorted, check door and windows for source of vibration; repair if necessary (para 3-35b or 3-35g).

3-33. FIFTH WHEEL MAINTENANCE

a. Unlatch Cylinder.

This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Combination wrench set
Adjustable open end wrench
Safety glasses

Personnel Required
Wheel Vehicle Mechanic MOS 63B

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off.
2-41(1)	All air pressure relieved.

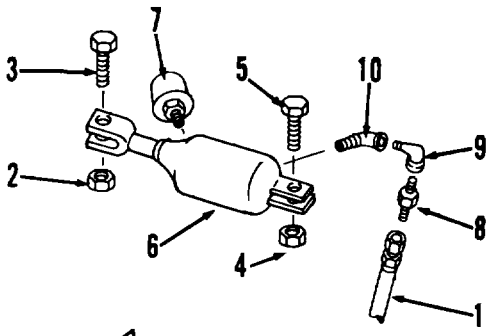
Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Fifth wheel	a Air hose (1)	Disconnect	From connector (8)
		b Locknut (2) and cap-screw (3)	Remove	
		c Locknut (4) and cap-screw (5)	Remove	
		d Unlatch cylinder (6)	Remove	From tractor
		e Air filter (7)	Remove	Rotate counterclockwise
		f Connector (8) and elbows (9 and 10)	Remove	
CLEANING				
2		a Air hose (1)	Clean	Wipe with clean cloth moistened with clean diesel fuel

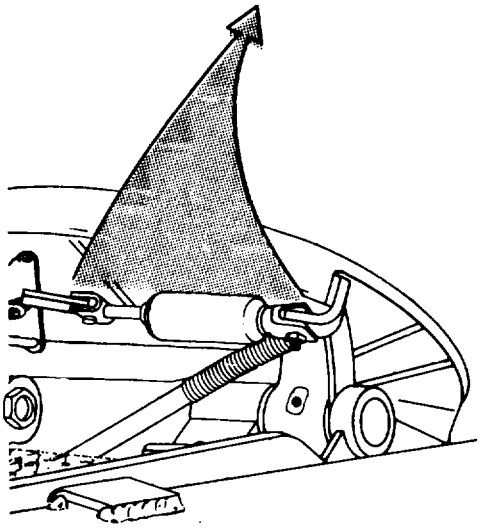
3-33. FIFTH WHEEL MAINTENANCE

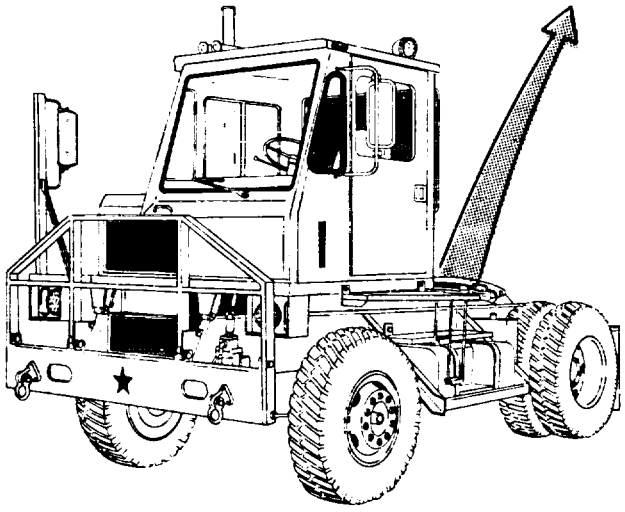
a. Unlatch Cylinder (cont).



KEY

1. Air hose
2. Locknut
3. Capscrew
4. Locknut
5. Capscrew
6. Unlatch cylinder
7. Air filter
8. Connector
9. Elbow
10. Elbow





TA236314

3-33. FIFTH WHEEL MAINTENANCE (CONT)

a. Unlatch Cylinder (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
2 (cont)				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	b	Unlatch cylinder (6)	Clean	Wipe exterior with clean cloth moistened with cleaning solvent P-D-680; dry thoroughly with clean cloths
	c	All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
INSPECTION				
3	a	Air hose (1)	Inspect	Replace if cracked, broken, deteriorated, or fittings damaged
	b	Unlatch cylinder (6)	Inspect	Replace if leaking, distorted, cracked, welds broken, or otherwise damaged

3-33. FIFTH WHEEL MAINTENANCE (CONT)

a. Unlatch Cylinder (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
3 (cont)		c Air filter (7)	Inspect	Replace if cracked, broken, or plugged
		d All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
INSTALLATION				
4	Unlatch cylinder (6)	a Elbows (9 and 10) and connector (8)	Install and	tighten
		b Air filter (7)	Install	Rotate clockwise
5	Fifth wheel	a Unlatch cylinder (6)	Position	In tractor
		b Capscrew (5) and locknut (4)	Install and tighten to pivot	Do not overtighten; unlatch cylinder (6) must be free
		c Capscrew (3) and locknut (2)	Install and tighten to pivot	Do not overtighten; unlatch cylinder (6) must be free
		d Air hose (1)	Connect	
6	Air tank	Air pressure	Restore	See para 2-41h(l)
7	Tractor cab	Fifth wheel unlatch control	Push	With fifth wheel jaws closed, depress brake pedal and push fifth wheel unlatch control
8	Fifth wheel	Fifth wheel jaws	Observe	Performing step 7 above should open fifth wheel jaws without any binding or sticking

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection
e Repair
f Reassembly
g Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Combination wrench set
Knife
Screwdriver
Safety glasses
Automotive Mechanic's Tool Kit
Rule
Pliers

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Tags — Item 14, Appendix C
Lubricant — Item 17, Appendix C
Thread sealant — Item 29, Appendix C
Diesel fuel — Item 45, Appendix C

Grommet — FSCM 06853 PN 214749
Seal ring — FSCM 06853 PN 236728
Tie straps — FSCM 96906 PN MS3667-1-9

Personnel Required
Two Wheel Vehicle Mechanics MOS 63B

Equipment Condition

Paragraph	Condition Description
	Parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees.
2-41h(1)	All air pressure relieved.
2-63e	Boom platform removed.
2-65d	Heat shield removed.

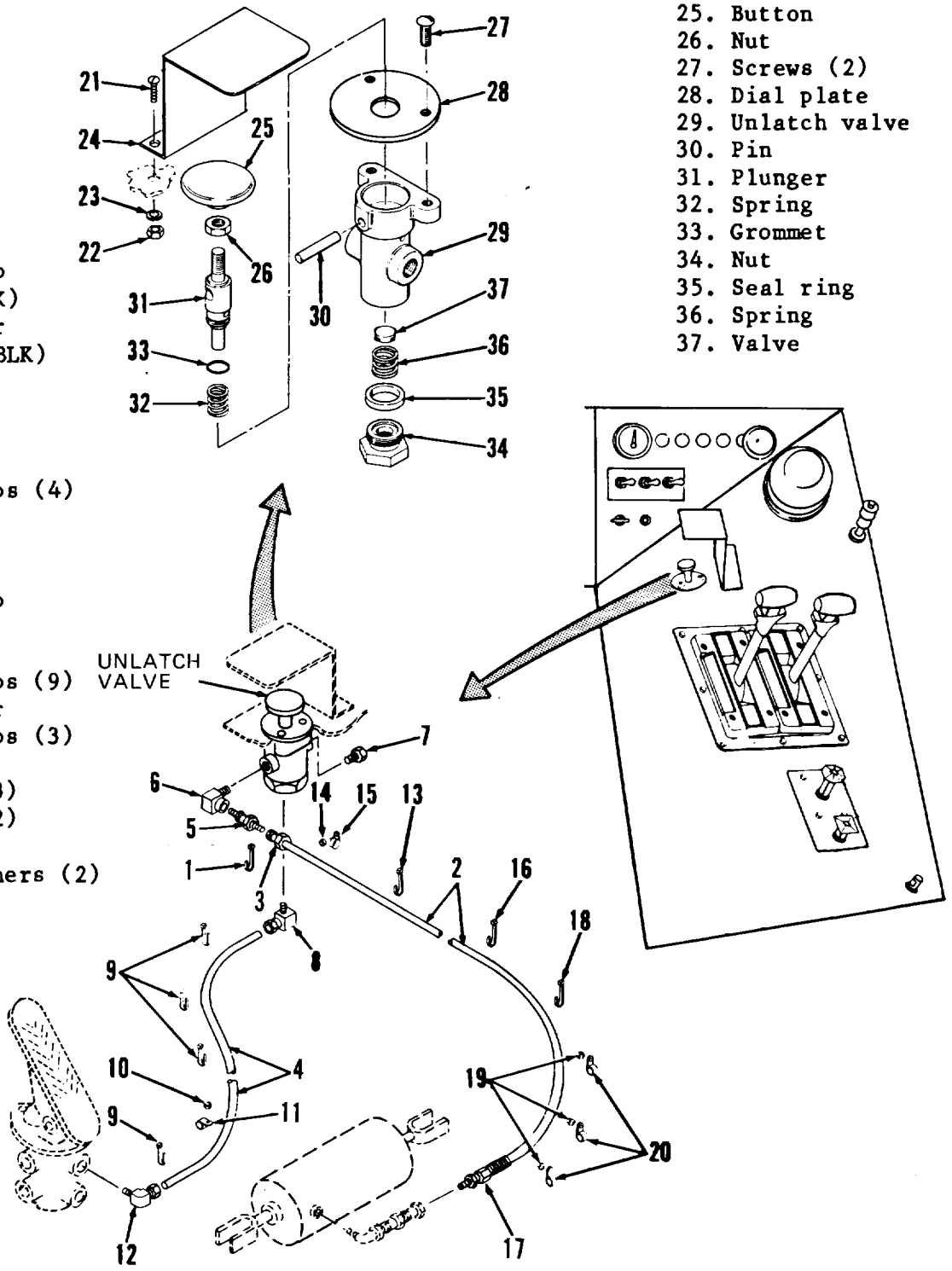
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, underside, unlatch valve (29)	a Tie strap (1)	Cut, remove, and discard	Note location for installation
		b Connector (3)	Loosen	
		c Hose (2) with connector (3)	a b	Tag Disconnect From fitting (5)
		d Elbow (8) nut	Loosen	
		e Tubing (4) with nut	Tag and	From elbow (8) disconnect
		f Fitting (5) and elbow (6)	Remove	From unlatch valve (29); note position of elbow for installation
		g Plug (7)	Remove	
		h Elbow (8)	Remove	Note position of elbow for installation
		i Four tie straps (9)	Cut, remove, and discard	Note locations for installation

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

KEY

1. Tie strap
2. Hose (BLK)
3. Connector
4. Tubing (BLK)
5. Fitting
6. Elbow
7. Plug
8. Elbow
9. Tie straps (4)
10. Nut
11. Clamp
12. Elbow
13. Tie strap
14. Nut
15. Clamp
16. Tie straps (9)
17. Connector
18. Tie straps (3)
19. Nuts (3)
20. Clamps (3)
21. Screws (2)
22. Nuts (2)
23. Lock washers (2)
24. Guard
25. Button
26. Nut
27. Screws (2)
28. Dial plate
29. Unlatch valve
30. Pin
31. Plunger
32. Spring
33. Grommet
34. Nut
35. Seal ring
36. Spring
37. Valve



TA236315

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Cab, underside, treadle valve	a Elbow (12) nut	Loosen	
		b Nut (10) and clamp (11)	Remove	
		c Tubing (4) with nuts	a b	Disconnect From elbow (12) Remove From tractor
		d Elbow (12)	Remove	From treadle valve; note position of elbow for installation
3	Cab front, underside	a Tie strap (13)	Cut, remove, and discard	Note location for installation
		b Nut (14) and clamp (15)	Remove	
4	Cab frame, underside, and rear of cab guard left hand side	Nine tie straps (16)	Cut, remove, and discard	Located between front of frame
5	Unlatch cylinder, under fifth wheel	a Three tie straps (18)	Cut, remove, and discard	Note locations for installation
		b Three nuts (19) and clamps (20)	Remove	From fifth wheel boom; note locations for installation
		c Connector (17) with hose (2)	Disconnect	From unlatch cylinder fitting located under fifth wheel
		d Hose (2) with connectors (3 and 17)	Remove	From tractor as an assembly
6	Cab tilt pump	Cab Lower	To normal driving position	
7	Tractor cab	a Hood	Open	
		b Two screws (21), nuts (22), and lock washers (23)	Remove (22) and lock washers (23) from underside	Have assistant remove nuts
		c Guard (24)	Remove	
		d Nut (26)	Remove	
		e Button (25)	Remove	Rotate counterclockwise
		f Nut (26)	Remove	

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REMOVAL (cont)					
7 (cont)		g	Two screws (27) and dial plate (28)	Remove	Have assistant support unlatch valve (29) from underside
		h	Unlatch valve	Remove	
DISASSEMBLY					
8	Unlatch valve (29)	a	Pin (30)	Remove	
		b	Plunger (31)	Remove	
		c	Spring (32)	Remove	
		d	Grommet (33)	Remove and discard	From plunger (31)
		e	Nut (34)	Remove	Rotate counterclockwise
		f	Seal ring (35)	Remove and discard	
		g	Spring (36)	Remove	
		h	Valve (37)	Remove	
CLEANING					
9		a	Hose (2) and tubing (4)	Clean	Wipe with clean cloth moistened with clean diesel fuel; dry with clean cloth
		b	Guard (24), button (25), and dial plate (28)	Clean	Wipe with clean, dry cloth

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-33. FIFTH WHEEL MAINTENANCE (CONT)

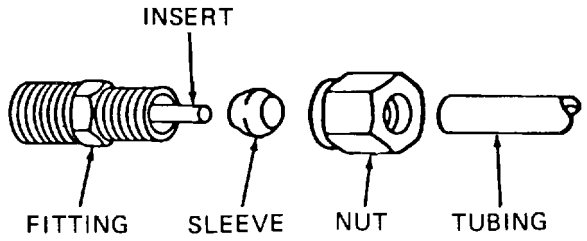
b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
9 (cont)				
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	c	All other parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION				
10	a	Hose (2) with connectors (3 and 17)	Inspect for: cracks wear chafing breaks damaged threads	Replace as an assembly if any defects are observed
	b	Tubing (4)	Inspect for: cracks chafing kinks wear	Replace if defects are observed Refer to step 11 below for replacement
	c	Unlatch valve (29)	Inspect for: cracks breaks nicked or pitted sealing surfaces	Replace if defects are observed
	d	Plunger (31)	Inspect for: cracks breaks distortion	Replace if defects observed or if plunger stem does not move freely when plunger (31) is inserted into unlatch valve (29)
	e	All other parts	Inspect for: cracks breaks damaged threads	Replace if defective. Refer to step 11 below for replacement of tubing elbows (8 and 12)

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REPAIR				
11	Tubing (4)	a. Tubing (4)	Cut	Between nut and sleeve
		b. Nut	Remove	Slide from tubing
		c. Insert	Remove, if	Pull from tubing only if necessary
separated from fitting				



TA236242

NOTE

Repeat steps lla thru lid above to disassemble remaining elbow (8 or 12).

	e	Tubing (4)	Cut to proper length	Use new tubing; use old tubing to determine proper length
	f	Nut	Position	Slide onto tubing; threaded end out
	g	New sleeve	Position	Slide onto tubing
	h	Insert	Install, if	Push into tubing only if necessary
separated from fitting				

WARNING

Tubing must be installed over insert for secure connection. Installation of connector without insert will allow air pressure to force tubing from fitting, resulting in dangerous loss of air pressure.

i	Tubing	Install	Push onto insert until seated inside fitting
j	Nut	Tighten	Hand tight only; prevents loss of sleeve before installation

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REPAIR (cont)				
		NOTE		
		Repeat steps lie thru lid above to install remaining elbow (8 or 12).		
REASSEMBLY				
		NOTE		
		Apply thin film of lubricant to valve bore and all internal parts before reassembly.		
12	Unlatch valve (29)	a Plug (7)	a Coat threads	Use pipe thread sealant
			b Install	Tighten securely
		b Valve (37)	Install	
		c Spring (36)	Install	
		d New seal ring (35)	Install	
		e Nut (34)	Install	Tighten securely
		f New grommet (33)	Install	On plunger (31)
		g Spring (32)	Install	
		h Plunger (31) and pin (30)	Install	
INSTALLATION				
13	Tractor cab	a Unlatch valve (29)	Install	Have assistant install from underside
		b Dial plate (28) and two screws (27)	Install	
		c Nut (26) and button (25)	Install	
		d Guard (24)	Position	
		e Two screws (21), lock washers (23), and nuts (22)	Install and tighten from underside	Have assistant install lock washers (23) and nuts (22)
		f Hood	Close	
14	Cab tilt pump	Cab	Tilt 45 degrees	

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
15	Cab, underside, unlatch valve (29)	a Elbow (6) and fitting (5)	a	Coat Use pipe thread sealant threads
		b Install		Tighten elbow (6) to position noted during removal
		b Connector (3) with hose (2)	Connect and	To fitting (5) tighten
		c Elbow (8)	Install	Tighten to position noted during removal
		d Elbow (8) nut with tubing (4)	Connect	To elbow (8)
		e Three new tie straps (9)	Install	At locations noted during removal
		f Hose (2) with connectors (3 and 17)	Route	
		g Clamp (15) and nut (14)	Install and	tighten
		h New tie strap (13)	Install	At location noted during removal
16	Cab, underside, treadle valve	a Elbow (12)	Install	Tighten to position noted during removal
		b Elbow (12) nut with tubing (4)	Connect	To elbow (12)
		c Clamp (11) and nut (10)	Install and	tighten
		d New tie strap (9)	Install	At location noted during removal
17	Fifth wheel,	Connector (17) with hose (2) unlatch cylinder	Connect and	To unlatch cylinder fitting tighten
18	Fifth wheel	a Hose (2) with connector (3)	Route	Along left hand frame rail
		b Nine new tie straps (16)	Install	Between front of frame and rear of cab guard at locations noted during removal
		c Heat shield	Install	Para 2-65d

3-33. FIFTH WHEEL MAINTENANCE (CONT)

b. Unlatch Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
18 (cont) during		d Three clamps (20) and nuts (19)	Install and tighten	On fifth wheel boom at locations noted removal
		e Three new tie straps (18)	Install	At locations noted during removal
19	Cab tilt pump	Cab	Lower	To normal driving position
20	Tractor	Air pressure	Restore	Para 2-41h(1)
21	Tractor cab	Brake pedal	Depress	Depress brake pedal, push unlatch valve, and check that fifth wheel jaws open
22	Fifth wheel boom	Boom platform	Install	Para 2-63e

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel.

This task covers:
a Removal
b Disassembly
c Cleaning
d Inspection/Repair
e Reassembly
f Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Wire brush
- Adjustable open end wrench
- Safety glasses
- Hammer

Automotive Mechanic's Tool Kit
- Pliers
- Punch
- Grease gun

Hoist

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Grease — Item 3, Appendix C
Engine oil — Item 24, Appendix C
Two cotter pins FSCM 74410 PN XB5
Capscrew FSCM 74410 PN XB2083
Two capscrews FSCM 74410 PN XB-BR118C7
Two lock washers FSCM 74410 PN XB-E536
Never-Seez

Personnel Required
Two Wheel Vehicle Mechanics MOS 63B

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off.
2-63e	Fifth wheel boom platform removed.
3-33a	Fifth wheel unlatch cylinder removed.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

WARNING

Fifth wheel weighs 300 pounds. Stand clear of fifth wheel when removing or installing. Failure to follow this procedure could result in severe injury. If you are injured, seek medical attention immediately.

NOTE

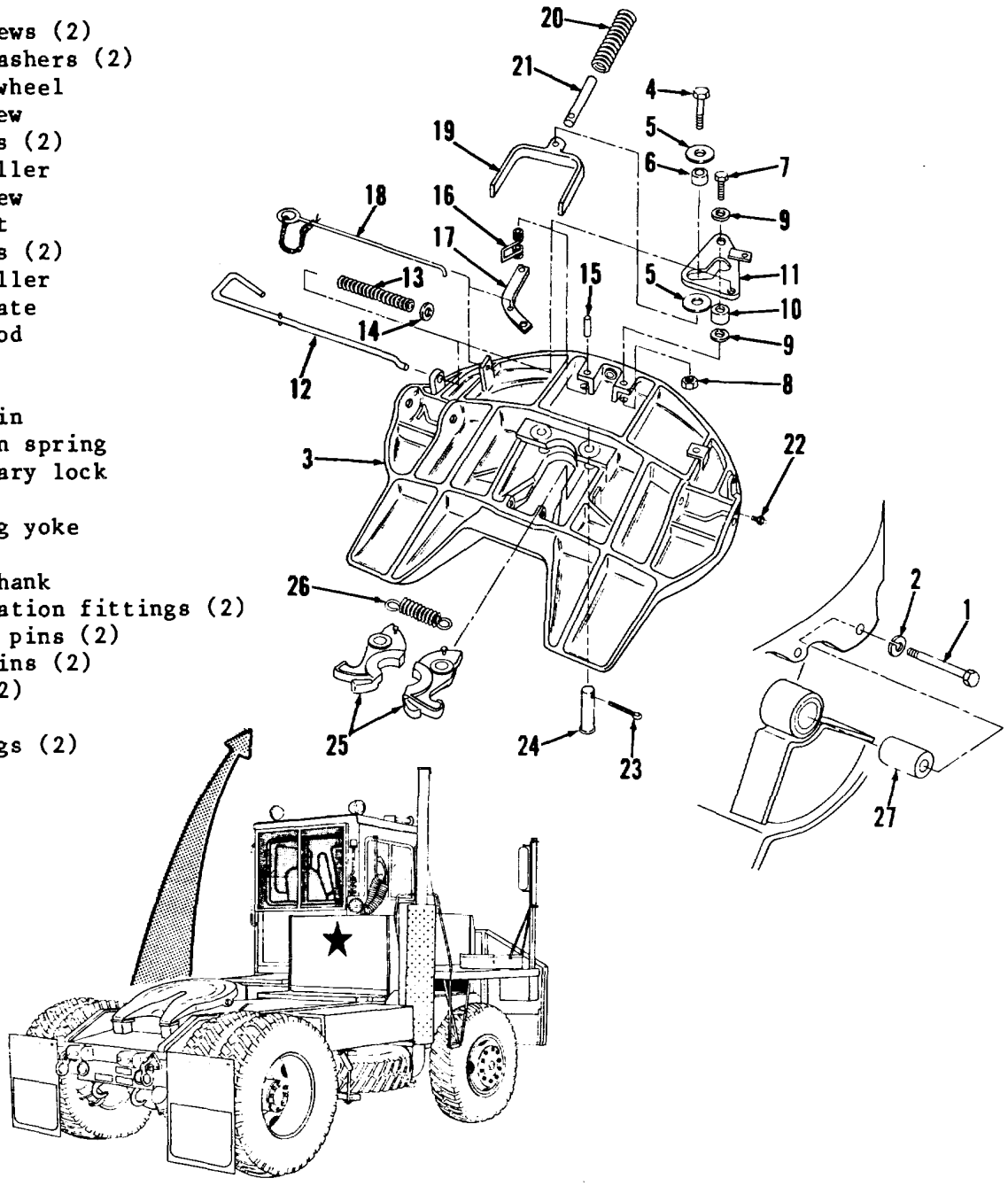
Fifth wheel components may be disassembled and repaired with fifth wheel installed on boom. Remove only if replacement of fifth wheel or removal of boom is required.

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

KEY

1. Capscrews (2)
2. Lock washers (2)
3. Fifth wheel
4. Capscrew
5. Washers (2)
6. Cam roller
7. Capscrew
8. Locknut
9. Washers (2)
10. Cam roller
11. Cam plate
12. Trip rod
13. Spring
14. Washer
15. Roll pin
16. Torsion spring
17. Secondary lock
18. Handle
19. Sliding yoke
20. Spring
21. Yoke shank
22. Lubrication fittings (2)
23. Cotter pins (2)
24. Lock pins (2)
25. Jaws (2)
26. Spring
27. Bushings (2)



TA236316

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1	Tractor, rear, fifth wheel (3)	a Suitable hoist	a	Attach To fifth wheel (3)
			b	Take strain To relieve weight of fifth wheel from capscrews (1)
		b Two capscrews (1) and lock washers (2)	Remove and discard	
		c Fifth wheel (3)	Remove	Lower onto suitable work surface; then detach hoist
DISASSEMBLY				
2	Fifth wheel (3)	a Capscrew (4)	Remove	
		b Two washers (5)	Remove	
		c Cam roller (6)	Remove	
		d Capscrew (7)	Remove and discard	
		e Locknut (8)	Remove	
		f Two washers (9)	Remove	
		g Cam roller (10)	Remove	
		h Cam plate (11)	Remove	From end of trip rod (12)
		i Trip rod (12)	Remove	
		j Spring (13) and washer (14)	Remove	
		k Roll pin (15)	Remove	
		l. Torsion spring (16), secondary lock (17), and handle (18)	Remove	
		m Secondary lock (17) and handle (18)	Separate	
		n Sliding yoke (19)	Remove	
		o Spring (20) and yoke shank (21)	Remove	
		p Two lubrication fittings (22)	Remove	
		q Two cotter pins (23)	Remove and discard	
		r Two lock pins (24)	Remove	
		s Two jaws (25)	Remove	
		t Spring (26)	Remove	

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3	Fifth wheel boom, top rear	Two bushings (27)	Remove	Only if inspection indicates need for replacement. Use suitable drift and hammer to remove
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

4	All parts		Clean	Use cleaning solvent P-D-680 and stiff bristled brush. Dry thoroughly with compressed air or clean cloths
INSPECTION/REPAIR				
5	a	Fifth wheel (3)	Inspect	Inspect for broken welds and cracks. Repair by welding.
				Inspect machined top surface for scores and rough spots Repair by polishing with crocus cloth or stone. Replace a fifth wheel that is beyond economical repair

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION/REPAIR (cont)				
5 (cont)		b Jaws (25)	Inspect	Replace as a set if cracked, broken, worn, or distorted
		c Bushings (27)	Inspect	Replace if cracked, worn, or flat spots. Remove with hammer and sleeve or drift
		d Springs (13, 16, 20, and 26)	Inspect	Replace if cracked, broken, distorted, or permanently set
		e All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
6	Fifth wheel boom, top rear	Two bushings (27)	Install	Use suitable sleeve and hammer to install, if removed
		NOTE Lightly coat all parts with clean engine oil before reassembly.		
7	Fifth wheel (3)	a. Spring (26)	Install	
		NOTE Lubricate holes in jaws (25) with Never-Seez or equivalent, before installing.		
		b Two jaws (25)	a Lubricate b Install	
		c Two lock pins (24)	Install	
		d Two new cotter pins (23)	Install and spread	
		e Trip rod (12)	Push in	To latch jaws (25)
		f Two lubrication fittings (22)	Install	
		g Spring (20)	Install	On yoke shank (21)
		h Yoke shank (21) and sliding yoke (19)	Install	

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
7 (cont)		i	Handle (18), secondary lock (17), torsion spring (16), and roll pin (15)	Install	
		j	Washer (14), spring (13), and trip rod (12)	Install	
		k	Cam plate (11)	Install	On end of trip rod (12)
		l.	Cam roller (10)	Position	
		m	Two washers (9)	Position	
		n	New capscrew (7) and locknut (8)	Install	
		o	Cam roller (6)	Position	
		p	Two washers (5)	Position	
		q	Capscrew (4)	Install	
INSTALLATION					
8	Tractor, rear, fifth wheel (3)	a	Suitable hoist	Attach	To fifth wheel (3)

WARNING

Fifth wheel weighs 300 pounds. Stand clear of fifth wheel when removing or installing. Failure to follow this procedure could result in severe injury. If you are injured, seek medical attention immediately.

		b	Fifth wheel (3)	Position	Over boom support brackets, until fifth wheel holes align with bushings (27)
		c	Two new cap-screws (1) and lock washers (2)	Install	

3-33. FIFTH WHEEL MAINTENANCE (CONT)

c. Fifth Wheel (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
8 (cont)		d Hoist	Remove	
		e Fifth wheel (3)	Lubricate	Use grease gun and grease to lubricate two lubrication fittings (22)
		f Fifth wheel unlatch cylinder	Install	Para 3-33a
		g Fifth wheel boom platform	Install	Para 2-63e
9	Tractor cab	Fifth wheel control	Depress	Momentarily depress fifth wheel control to check for proper opening of fifth wheel jaws

3-33. FIFTH WHEEL MAINTENANCE (CONT)

d. Fifth Wheel Boom.

This task covers:
a Removal
b Cleaning
c Inspection/Repair
d Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Adjustable open end wrench
- Safety glasses
- Hammer

Automotive Mechanic's Tool Kit
- Punch
- Hammer

Hoist

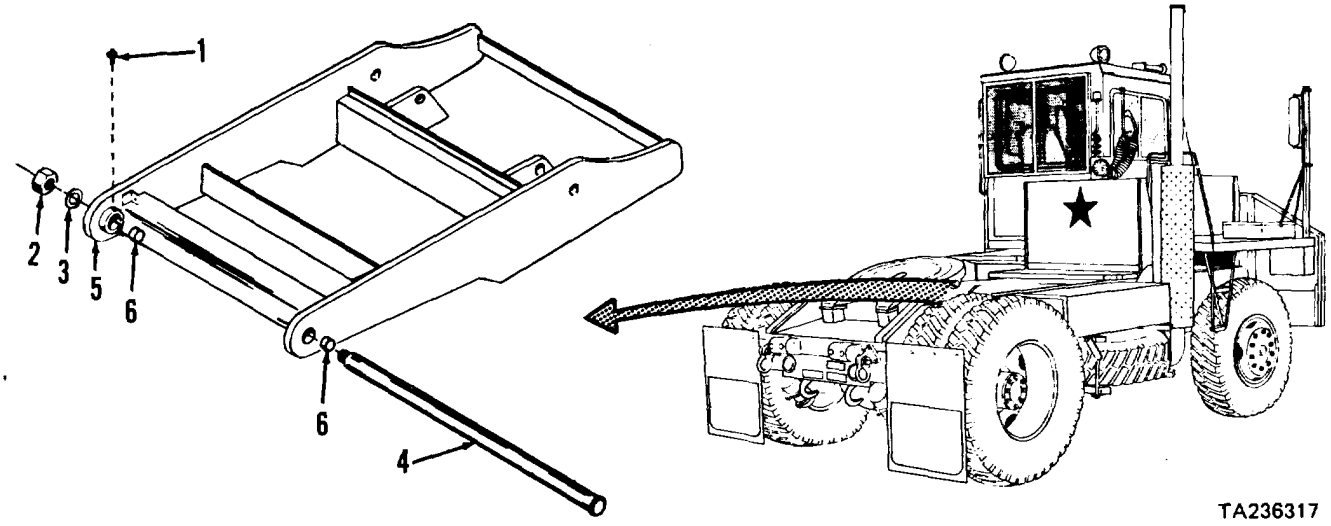
Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C

Personnel Required
Two Automotive Repairers MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

Equipment Condition

Paragraph	Condition Description
	Parked on level surface; parking brake applied; engine off.
2-78b(2)	Hydraulic lines and fittings removed from boom.
2-63e	Boom platform removed.
3-42d	Hydraulic cylinders and pins removed from boom.
3-33a	Fifth wheel unlatch cylinder removed.
3-33c	Fifth wheel removed.
2-34a	Front battery removed.



KEY

1. Lubrication fittings (2)
2. Locknut
3. Washer
4. Pivot shaft
5. Boom
6. Bushings (2)

3-33. FIFTH WHEEL MAINTENANCE (CONT)

d. Fifth Wheel Boom (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Tractor, rear	a Two lubrication fittings (1)	Remove	
		b Sling	Attach	To center of boom (5)
		c Hoist	Attach	To sling
		d Boom (5)	Raise	To vertical position
		e Locknut (2)	Loosen	Loosen locknut (2) until flush with pivot shaft (4)
		f Locknut (2) and pivot shaft (4)	Tap	Tap with hammer to loosen
		g Locknut (2) and washer (3)	Remove	
		h Pivot shaft (4)	Remove	Slide from tractor
		i Boom (5)	Remove	Lift from tractor
		j Hoist and sling	Detach and remove	

NOTE

Do not remove two bushings (6) unless inspection indicates need for replacement.

		k. Two bushings (6)	Remove	Use hammer and suitable sleeve or drift

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-33. FIFTH WHEEL MAAINTENANCE (CONT)

d. Fifth Wheel Boom (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
2		All parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths
INSPECTION/REPAIR				
3		a. Pivot shaft (4)	Inspect	Replace if cracked, broken, or distorted
		b. Boom (5)	Inspect	Inspect for cracks and broken welds. Repair by welding. Replace a boom beyond economical repair
		c. Two bushings (6)	Inspect	Replace if cracked, worn, or flat spotted
		d. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
INSTALLATION				
4	Tractor, rear(6)	a. Two bushings	Install	Use suitable sleeve and hammer
		b. Sling	Attach	To center of boom (5)
		c. Hoist	Attach	To sling
		d. Boom (5)	Position	In tractor. Keep boom (5) raised in vertical position
		e. Pivot shaft (4)	Install	Slide into tractor and boom
		f. Washer (3) and locknut (2)	Install	
		g. Boom (5)	Lower	
		h. Hoist and sling	Detach and remove	
		i. Two lubrication fittings (1)	a. Install	
			b. Lubricate	Refer to current lubrication order

3-33. FIFTH WHEEL MAAINTENANCE (CONT)

d. Fifth Wheel Boom (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
5	Fifth wheel boom	a. Fifth wheel	Install	Para 3-33c
		b. Fifth wheel unlatch cylinder	Install	Para 3-33a
		c. Hydraulic cylinders	Install	Para 3-42d
		d. Hydraulic lines and fittings	Install	Para 2-78b(2)
		e. Boom platform	Install	Para 2-63e
6	Battery box	Front battery	Install	Para 2-34a
7	Tractor cab	Boom and fifth wheel	Check	For proper operation

3-34. SPRINGS AND SPRING SEATS MAINTENANCE

This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Safety glasses
Combination wrench set
Adjustable open end wrench
Grease gun
Arbor press
Jack
Soft hammer

Materials/Parts
Cleaning solvent — Item 1, Appendix C3-18
Clean cloths — Item 2, Appendix C
Grease — Item 3, Appendix C

Personnel Required
Two Automotive Repairers MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

Equipment Condition
Paragraph — Condition Description
Parked on level surface; parking brake applied; engine off.
Rear wheels blocked.
Front of tractor supported.
Front axle removed.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

WARNING

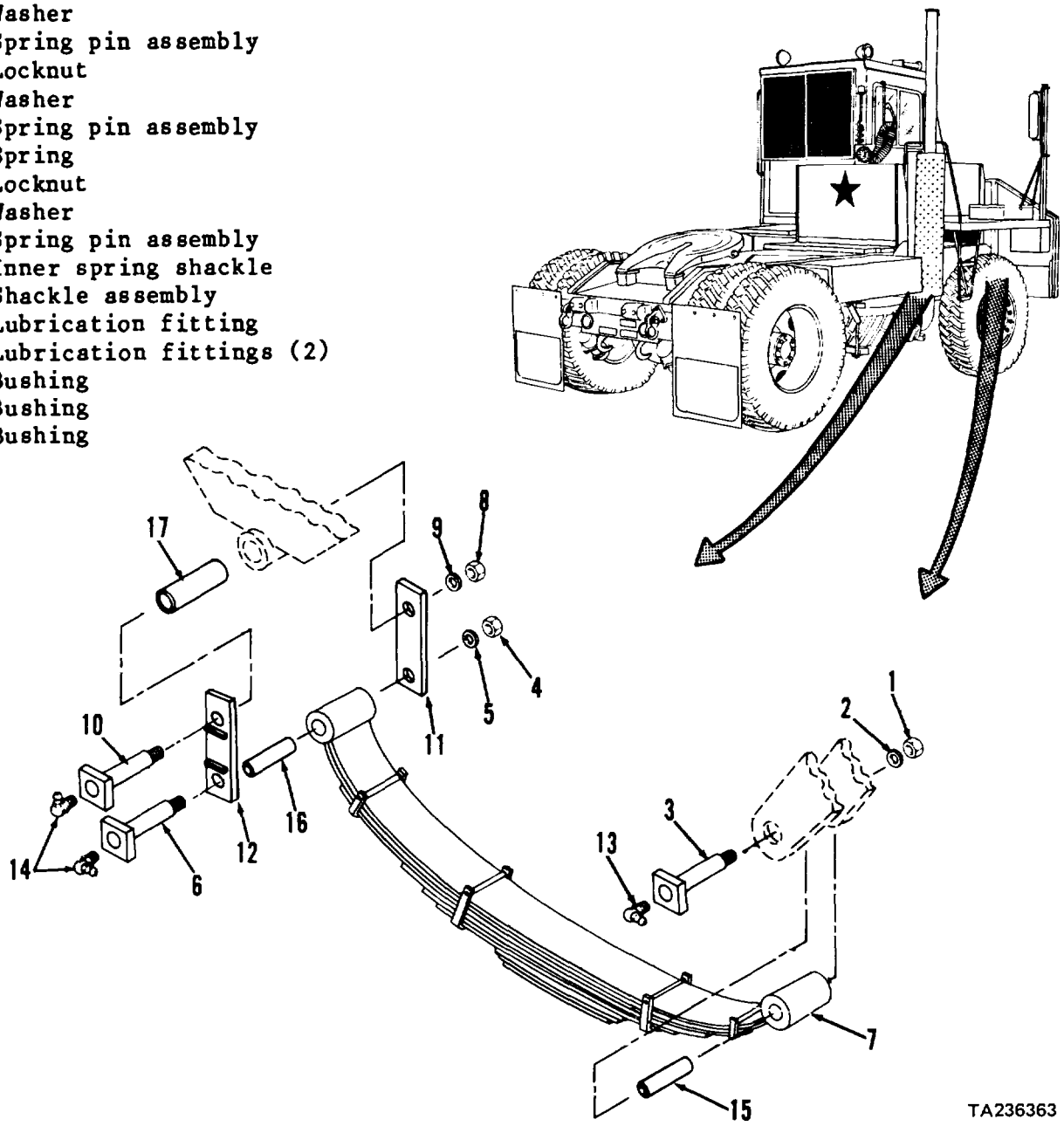
Never crawl under equipment when performing maintenance unless equipment is blocked securely. Keep clear of equipment when it is raised or lowered. Do not allow heavy components to swing while suspended by lifting device. Exercise extreme caution when working near a cable or chain under tension. Death or severe injury may result if personnel fail to observe this safety precaution. If you are hurt by a falling object or chain or cable under tension, seek medical aid immediately.

1	Right spring (7), front	a. Spring (7)	Support	With jack
		b. Locknut (1) and washer (2)	Remove	
		c. Spring pin assembly (3)	Remove	Tap out with soft hammer
		d. Spring (7) front	Lower to	With jack; then remove jack ground

3-34. SPRINGS AND SPRING SEATS MAINTENANCE (CONT)

KEY

1. Locknut
2. Washer
3. Spring pin assembly
4. Locknut
5. Washer
6. Spring pin assembly
7. Spring
8. Locknut
9. Washer
10. Spring pin assembly
11. Inner spring shackle
12. Shackle assembly
13. Lubrication fitting
14. Lubrication fittings (2)
15. Bushing
16. Bushing
17. Bushing



3-34. SPRINGS AND SPRING SEATS MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Right spring (7), rear	a. Spring (7)	Support	With jack
		b. Locknut (4) and washer (5)	Remove	
		c. Spring pin assembly (6)	Remove	Tap out with soft hammer
		d. Spring (7) rear	Lower to	With jack; then remove jack ground
3	Right frame rail	a. Locknut (8) and washer (9)	Remove	
		b. Spring pin assembly (10)	Remove	Support shackles (11 and 12); then tap out with soft hammer
		c. Spring shackles (11 and 12)	Remove	
4	Spring pins (3, 6, and 10)	Lubrication fittings (13 and 14)	Remove	
5	Spring (7)	Two bushings (15 and 16)	Remove	Drive out with arbor press only if inspection indicates replacement is required
6	Right frame rail	Bushing (17)	Remove	Drive out with suitable sleeve and hammer only if inspection indicates replacement is required

NOTE

Repeat steps 1 thru 6 above for removal of left front spring.

CLEANING				
7		a. Bushings (15, 16, and 17)	Clean	Wipe with clean, dry cloth

3-34. SPRINGS AND SPRING SEATS MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
7 (cont)		**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		
		b. All other parts	Clean	Use cleaning solvent P-D-680; dry with clean cloths
INSPECTION				
8		a. Spring pin assemblies (3, 6, and 10)	Inspect	Replace if cracked, scored, corroded, distorted, or threads damaged
		b. Springs (7)	Inspect	Replace as matched pair if either spring is cracked, broken, distorted, or otherwise damaged
		c. Spring shackles (11 and 12)	Inspect	Replace if cracked, corroded, distorted, or mounting holes elongated
		d. Lubrication fittings (13 and 14)	Inspect	Replace if cracked, broken, clogged, or threads damaged
		e. Bushings (15, 16, and 17)	Inspect	Replace if cracked, corroded, scored, excessively worn, or otherwise damaged
		f. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
INSTALLATION				
9	Spring (7)	Two bushings (15 and 16)	Press in	Use arbor press

3-34. SPRINGS AND SPRING SEATS MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
		CAUTION		
		Exercise care when installing bushing (17) to prevent damage to inside diameter.		
10	Right frame rail	a. Bushing (17)	Install	Drive in using suitable sleeve and hammer
		NOTE		
		In following step, make sure shackle assembly (12) is positioned outside the frame rail, with two bars positioned away from tractor.		
		b. Shackle assembly (12) and inner spring shackle (11)	Position	On right frame rail
		c. Spring pin assembly (10)	Install	Secures shackles (11 and 12) to frame rail
		d. Washer (9) and locknut (8)	Install and tighten(10)	Secures spring pin assembly
11	Right spring (7), rear	a. Spring (7) end	a. Raise and support	With jack
		b. Position		Between shackles (11 and 12)
		b. Spring pin assembly (6)	Install	Secures rear of spring (7) to shackles (11 and 12)
		c. Washer (5) and locknut (4)	Install and tighten	Secures spring pin assembly (6)
		d. Jack	Lower and remove	
12	Right spring (7), front	a. Spring (7) end	a. Raise and support	With jack
			b. Position	Between front frame rail mounting weldments
		b. Spring pin assembly (3)	Install	Secures front of spring (7) to front frame rail
		c. Washer (2) and locknut (1)	Install and tighten	Secures spring pin assembly (3)

3-34. SPRINGS AND SPRING SEATS MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
13	Spring pins (3, 6, and 10)	a. Lubrication fitting (13)	Install	In spring pin assembly (3)
		b. Lubrication fittings (14)	Install	In spring pin assemblies (6 and 10)
		c. Lubrication fittings (13 and 14)	Lubricate	Use grease gun (refer to current lubrication order)
		NOTE		
		Repeat steps 9 thru 13 above for installation of left front spring.		
14	Front springs (7)	Front axle	Install	Para 3-18

3-35. BODY AND CAB MAINTENANCE

a. Cab Mounts.

This task covers: a. Removal c. Inspection
b. Cleaning d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Socket wrench set
Safety glasses

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Detergent — Item 27, Appendix C
Four wood blocks, 2 by 4 by 5 inches — Cab tilted 45 degrees.

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-65h	Cab grille removed. Engine hood open.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab, rear	Two capscrews (1) and locknuts (2)	Remove	Have assistant positioned inside cab to remove capscrews (1)
2	Cab tilt pump	Cab	Lower	To normal operating position
3	Cab, right side	Two capscrews (3) and locknuts (4)	Remove	From engine hood posts
4	Cab, front	Three capscrews (5) and locknuts (6)	Remove	

WARNING

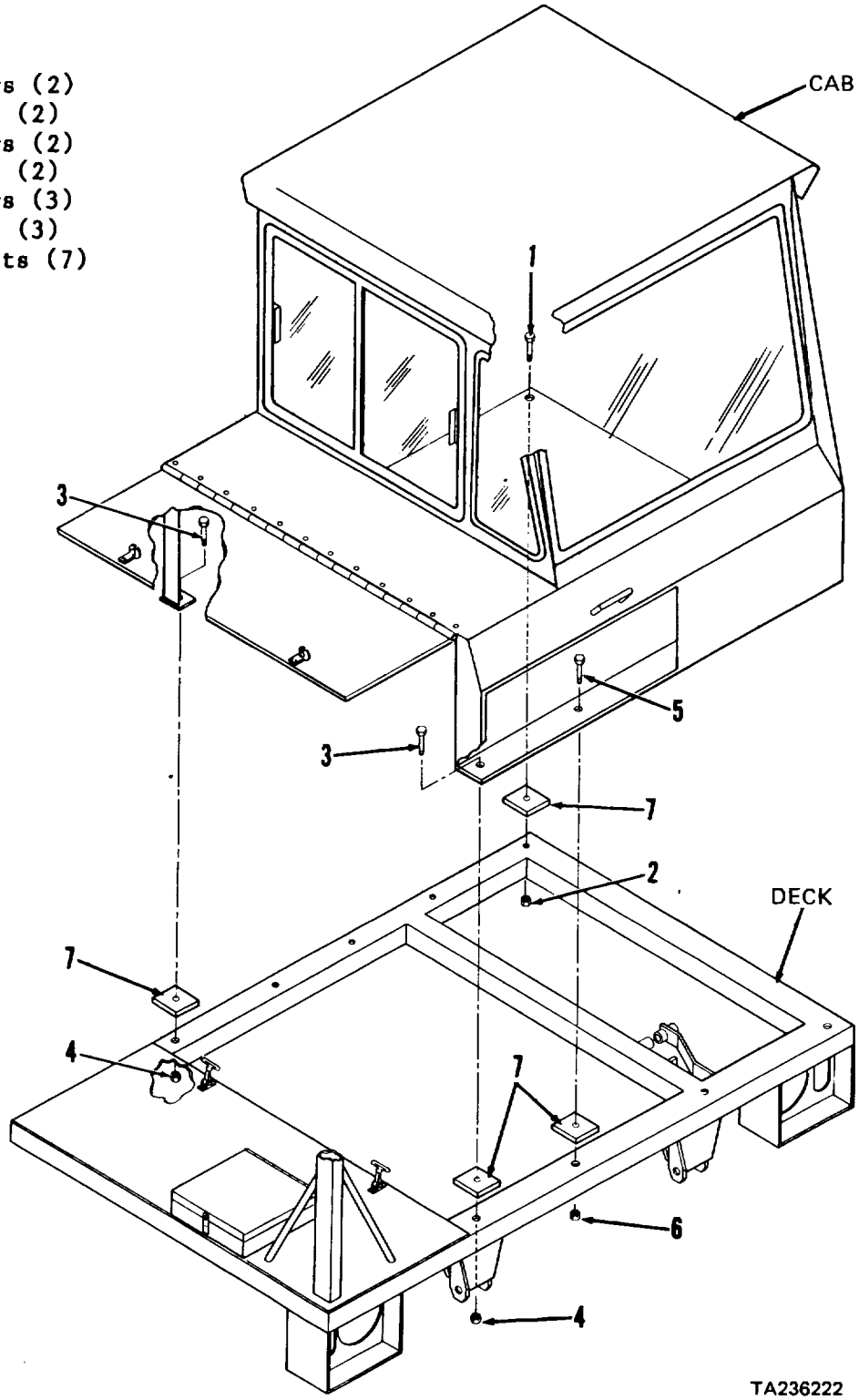
When using chain hoist to remove or install parts, be sure chain hoist is securely fastened to the part and that all slack in chain is taken up. Failure to do so could cause serious injury due to the part falling on you. If you are injured by falling equipment, obtain medical aid immediately.

3-35. BODY AND CAB MAINTENANCE

a. Cab Mounts.

KEY

1. Capscrews (2)
2. Locknuts (2)
3. Capscrews (2)
4. Locknuts (2)
5. Capscrews (3)
6. Locknuts (3)
7. Cab mounts (7)



3-35. BODY AND CAB MAINTENANCE

a. Cab Mounts.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
5	Cab, top	a. Hoist b. Cab	Attach Raise	Raise cab and insert four wood blocks between cab and cab deck weldment. Then lower cab onto wood blocks
6	Cab deck	Seven cab mounts (7)	Remove	Lift from cab deck weldment
CLEANING				
7		a. Cab mounts (7)	Clean	Wipe with clean cloth moistened with mild detergent solution. Dry thoroughly with clean cloth

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

		b. Capscrews and locknuts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air

3-35. BODY AND CAB MAINTENANCE

a. Cab Mounts.

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION				
8		a. Cab mounts (7)	Inspect	Replace if cracked, torn, or deteriorated
		b. Capscrews and locknuts	Inspect	Replace if cracked, broken, or threads damaged
INSTALLATION				
9	Cab deck weldment	Seven cab mounts (7)	Position	Align cab mount holes with holes in cab deck weldment

WARNING

When using chain hoist to remove or install parts, be sure chain hoist is securely fastened to the part and that all slack in chain is taken up. Failure to do so could cause serious injury due to the part falling on you. If you are injured by falling equipment, obtain medical aid immediately.

10	Cab, top	Cab	Lower	Raise cab, remove wood blocks, and lower cab onto cab mounts
11	Cab, front	Three capscrews (5) and locknuts (6)	Install and tighten	Assistant positioned inside cab
12	Cab, right side	Two capscrews (3) and locknuts (4)	Install and tighten	
13	Cab tilt pump	Cab	Tilt 45 degrees	
14	Cab, rear	Two capscrews (1) and locknuts (2)	Install and tighten	Have assistant positioned inside cab to hold cap-screws (1)
15	Cab tilt	Cab	Lower	To normal operating position pump
16	Cab, front	Cab grille	Install	Para 2-65h
17	Cab, right side	Engine hood	Close and latch	

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door.

This task covers: a. Disassembly b. Cleaning c. Inspection/Repair d. Reassembly

INITIAL SETUP

Tools

No. 1 Common Organizational Maintenance Tool Kit
- Screwdriver
- Safety glasses
- Socket wrench set
- Screwdriver set
- Pop rivet tool14 feet

Automotive Mechanic's Tool Kit
- Hammer
- Pliers
- Pliers
- Punch

Heavy gloves

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Adhesive	Item 11, Appendix C
Detergent	Item 27, Appendix C
18 pop rivets	FSCM 90915 PN 90004155
Felt strip, 5 feet	FSCM 90915 PN 90004041
8 drive rivets	FSCM 90915 PN 90005330
Felt channel, 8 feet	FSCM 90915 PN 90002698
Weatherstrip,	FSCM 90915 PN 90004040
Three cotter pins	FSCM 90915 PN 90831005
Tape, 2 feet	FSCM 90915 PN 90005292

Personnel Required

Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
2-65i	Door handle and arm rest removed, door window lowered fully, and door removed from tractor.

STEP	LOCATION	ITEM	ACTION	REMARKS

DISASSEMBLY

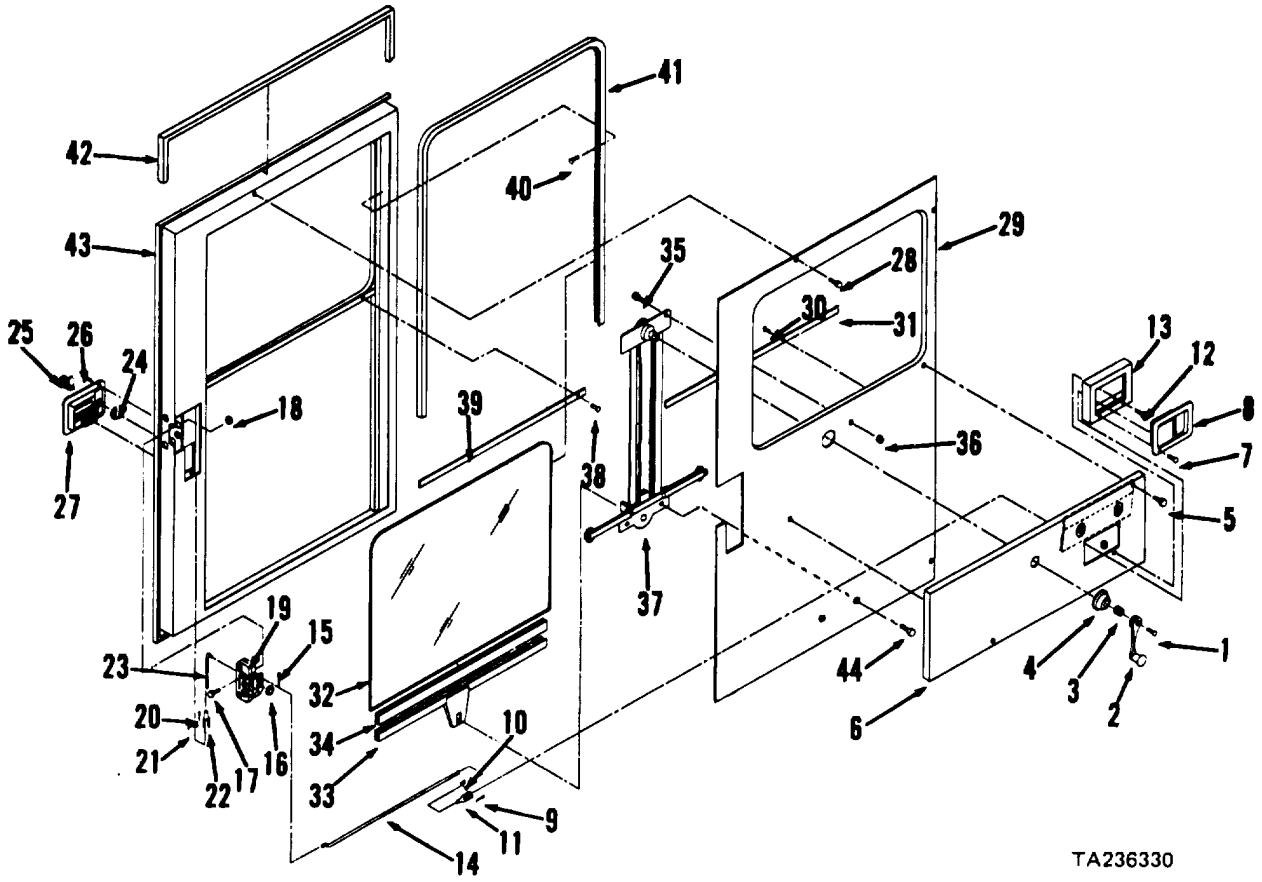
NOTE

Position door on work surface with inside of door facing up.

1	Door, inside	Screw (1), window crank (2), spring (3), and shield (4)	Remove	
2	Access panel (6)	a. Six capscrews (5)	Remove	
		b. Access panel (6)	Raise	
		c. Cotter pin (9)	Remove	Discard cotter pin (9)
		and clevis pin (10)	Remove	

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).



KEY

1. Screw
2. Window crank
3. Spring
4. Shield
5. Capscrews (6)
6. Access panel
7. Rivets (4)
8. Inner handle
9. Cotter pin
10. Clevis pin
11. Clevis
12. Capscrews (4)
13. Handle box
14. Linkage rod
15. Cotter pin
16. Washer
17. Capscrews (4)
18. Locknuts (4)
19. Lock
20. Cotter pin
21. Clevis pin
22. Clevis
23. Linkage rod
24. Locknut
25. Lock cylinder
26. Rivets (4)
27. Outer handle
28. Capscrews (20)
29. Inside panel
30. Rivets (4)
31. Felt strip
32. Window glass
33. Glass channel
34. Tape
35. Capscrews (4)
36. Nuts (4)
37. Window regulator
38. Rivets (4)
39. Felt strip
40. Rivets (10)
41. Felt channel
42. Weatherstrip
43. Outside panel
44. Capscrews (2)

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		d. Access panel (6)	Remove	From inside panel (29)
		e. Four capscrews (12)	Remove	
		f. Handle box (13)	Remove	
		WARNING		
		Wear protective goggles when removing rivets. Failure to do so could cause serious injury due to metal chips striking your eyes. If you injure your eyes, obtain medical aid immediately.		
		g. Four rivets (7)	Remove	Only if inner handle (8) or handle box (13) require replacement
		h. Inner handle (8)	Remove	Only if inspection indicates need for replacement
3	Inside panel (29)	a. 26 capscrews (28)	Remove	
		b. Two capscrews (44)	Remove	
		c. Inside panel (29)	Remove	
		WARNING		
		Wear protective goggles when removing rivets. Failure to do so could cause serious injury due to metal chips striking your eyes. If you injure your eyes, obtain medical aid immediately.		
		d. Four rivets (30)	Remove	Only if felt strip (31) requires replacement
		e. Felt strip (31)	Remove and discard	Only if inspection indicates need for replacement
		WARNING		
		Wear protective goggles and heavy gloves when removing window glass (32). Remove and handle broken glass carefully. Failure to do so could cause serious injury due to glass puncturing or cutting your skin. If you are injured by broken glass, obtain medical aid immediately.		

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)		f. Window glass (32)	Remove	
		g. Glass channel (33)	Remove	
		h. Tape (34)	Remove and discard	
		i. Four capscrews (35) and nuts (36)	Remove	
		j. Window regulator (37)	Remove	
4	Lock (19)	a. Cotter pin (15)	Remove and discard	
		b. Washer (16)	Remove	
		c. Linkage rod (14) and clevis (11)	Remove	
		d. Clevis (11) and linkage rod (14)	Separate	Pull clevis (11) from linkage rod (14) only if inspection indicates need for replacement of linkage rod (14) or clevis (11)
		e. Four capscrews (17) and locknuts (18)	Remove	
		f. Lock (19)	Remove	From door
		g. Cotter pin (20)	Remove and discard	
		h. Clevis pin (21) and clevis (22)	Remove	
		i. Linkage rod (23)	Remove	
		j. Locknut (24) and lock cylinder (25)	Remove	

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4 (cont)		**WARNING** Wear protective goggles when removing rivets. Failure to do so could cause serious injury due to metal chips striking your eyes. If you injure your eyes, obtain medical aid immediately.		
		k. Four rivets (26)	Remove	Only if outer handle (27) requires replacement
		l. Outer handle (27)	Remove	Only if inspection indicates need for replacement
5	Outside panel (43)	**WARNING** Wear protective goggles when removing rivets. Failure to do so could cause serious injury due to metal chips striking your eyes. If you injure your eyes, obtain medical aid immediately.		
		a. Four rivets (38)	Remove	Only if felt strip (39) requires replacement
		b. Felt strip (39) discard	Remove and	Only if inspection indicates need for replacement
		c. 10 rivets (40)	Remove	Only if felt channel (41) requires replacement
		d. Felt channel (41)	Remove and discard	Only if inspection indicates need for replacement
		e. Weatherstrip (42)	Remove and discard	
CLEANING				
6		a. Window glass (32)	Clean	Wipe with clean cloth moistened with mild detergent solution. Rinse with clear water; dry thoroughly with clean cloths
		b. Glass channel (33)	Clean	Wipe with clean, dry cloth

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
6 (cont)		**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		c. All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths
INSPECTION/REPAIR				
7		a. Spring (3)	Inspect	Replace if cracked, broken, or permanently set
		b. Inner handle (8), handle box (13), and outer handle (27)	Inspect	Replace if cracked, broken, or otherwise damaged
		c. Linkage rods (14 and 23)	Inspect or distorted	Replace if cracked, broken,
		d. Lock cylinder (25)	Inspect	Replace if cracked, broken, plugged, or inoperative
		e. Window regulator (37)	Inspect	Replace if cracked, broken, distorted, or does not operate smoothly

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION/REPAIR (cont)				
7 (cont)		f. Inside panel (29) and access panel (6)	Inspect for cracks and dents	Repair cracked metal by welding. Repair small dents by pounding out with hammer and backing block. Clean repaired surfaces of all paint with abrasive cloth; then apply primer and spray paint. Replace a panel beyond economical repair
		g. Felt strips (31 and 39) and felt channel (41)	Inspect	Replace if distorted, torn, cracked, or excessively worn
		h. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
8	Outside panel (43)	a. New weather-strip (42)	Install	Use adhesive
		b. New felt channel (41)	Position	If removed
		c. 10 new rivets (40)	Install	Use pop rivet tool, if removed
		d. New felt strip (39)	Position	If removed
		e. Four new rivets (38)	Install	Use pop rivet tool, if removed
		f. Outer handle (27)	Position	If removed
		g. Four rivets (26)	Install	Use rivet setter and hammer, if removed
9	Lock (19)	a. Lock cylinder (25)	Position	
		b. Locknut (24)	Install	Secures lock cylinder (25)
		c. Linkage rod (23)	Install	
		d. Clevis (22) and clevis pin (21)	Install	
		e. New cotter pin (20)	Install and spread	

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		f. Lock (19)	Position	In outside panel (43)
		g. Four capscrews (17) and locknuts (18)	Install and	Secures lock (19) tighten
10	Inside panel (29)			
		WARNING		
		Wear protective goggles and heavy gloves when handling window glass (32). Handle glass carefully. Failure to do so could cause serious injury if glass breaks and punctures or cuts your skin. If you are injured by broken glass, obtain medical aid immediately.		
		a. New tape (34)	Install	
		b. Glass channel (33)	Install	On window glass (32)
		c. Window glass (32)	Position	Against inside panel (29)
		d. New felt strip (31)	Install	If removed
		e. Four new rivets (30)	Install	Use pop rivet tool, if removed
		f. Window regulator (37)	Position	Insert tab of window regulator into slot in glass channel (33)
		g. Four capscrews (35) and nuts (36)	Install and	Secures window regulator (37) tighten
		h. Inside panel (29) (32) is lowered fully	Position	Make sure window regulator (37) with window glass
		i. Two capscrews (44)	Install and tighten	
		j. 26 capscrews (28)	Install and	Secures inside panel (29) tighten
11	Access panel (6)	a. Linkage rod (14)	Install	
		b. Washer (16)	Install	
		c. New cotter pin (15)	Install and spread	

3-35. BODY AND CAB MAINTENANCE (CONT)

b. Door (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		d. Handle box (13)	Position	
		e. Four capscrews (12)tighten	Install and	Secures handle box (13)
		f. Inner handle (8)	Position	If removed
		g. Four new rivets (7)	Install	Use rivet setter and hammer, if removed
		h. Clevis (11) and clevis pin (10)	Install	Insert clevis (11) in linkage rod (14), if removed
		i. New cotter pin (15)	Install and spread	
		j. Access panel (6)	Position	
		k. Six capscrews (5)	Install and tighten	Secures access panel (6)
12	Door, inside	Shield (4), spring (3), window crank (2), and screw (1)	Install	
13	Door, sides	Door	Check	Operate lock, window regulator, and inner and outer handles; check for smooth operation
14	Cab, left hand side	Door, handle, and arm rest	Install	Para 2-65i

3-35. BODY AND CAB MAINTENANCE (CONT)

c. Cab and Deck.

This task covers removal and installation of the cab and deck.

INITIAL SETUP

Tools
Lift sling
Hoist, 3000 pound capacity

Materials/Parts
Two wood blocks, 2 by 4 by 5 inches
Two wood beams, 4 by 4 inches by 8 feet

Personnel Required
Two Automotive Repairers MOS 63H

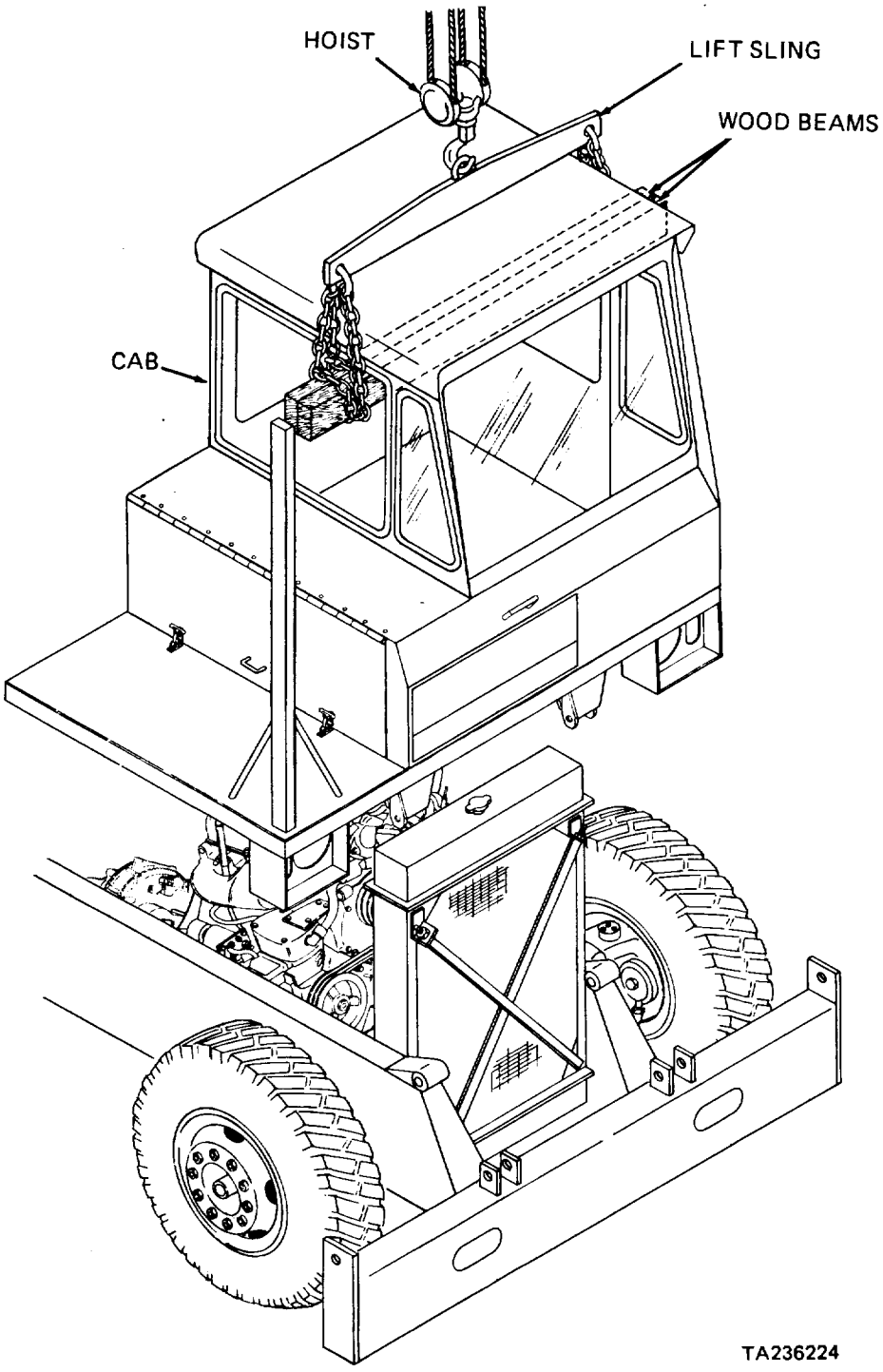
Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-85	Speedometer cable removed.
2-34a	Battery ground cable disconnected.
2-13a	Air restriction indicator hose removed.
2-13e	Throttle linkage cable removed from cab.
2-15a(1)	Coolant system drained.
2-41g(1)	Transmission gear shift control cable disconnected from gear shift control and removed from cab.
2-41h(1)	All air pressure relieved.
2-51a	Air lines disconnected from frame bulkhead fittings and tractor protection valve.
2-53a	Air lines disconnected from frame bulkhead fittings.
2-78a	Fifth wheel control cable disconnected from fifth wheel control and removed from cab.
3-28b	Universal joint disconnected from power steering gear.
3-33b	Fifth wheel unlatch valve hose disconnected and removed from cab.
2-35e	Ground strap removed.
2-31f	Trailer lighting cable disconnected and removed from cab.
2-35c	Chassis wiring harness disconnected from cab.
2-70b	Inside mirror removed.
2-73b	Heater lines disconnected from bottom of cab deck.
3-35g	Right side window removed.
3-42b	Power take-off cable disconnected and removed from cab.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab tilt pump	a. Cab deck	a. Raise	Enough to disengage deck from cab latches
		b. Block		Insert two wood blocks between cab deck and frame rails to prevent cab from engaging latches
		b. Cab tilt pump	Release	Release all pressure

3-35. BODY AND CAB MAINTENANCE (CONT)

c. Cab and Deck (cont).



3-35. BODY AND CAB MAINTENANCE (CONT)

c. Cab and Deck (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Cab	a. Two wood beams	Position	Through right side window opening and cab door window opening
		b. Lift sling	a. Position	Above cab
		b. Attach		To two wood beams
		c. Hoist	Attach	To lift sling. Take up slack and check balance
3	Cab deck	a. Tilt cylinder	Disconnect	From cab deck; para 3-43b
		b. Safety bar	Disconnect	Para 3-43e
		c. Cab pivot pins	Remove	Para 2-65k
		WARNING		
		When using hoist to remove or install parts, be sure hoist is securely fastened to the part and that all slack in hoist is taken up. Failure to do so could cause serious injury due to the part falling on you. If you are injured by falling equipment, obtain medical aid immediately.		
4	Cab	a. Cab and deck	Remove	Lift carefully and slowly; make sure all cables, hoses, and electrical leads are disconnected
		b. Hoist	Remove	From lift sling
		c. Lift sling	Remove	Support wood beams
		d. Two wood beams	Remove	From cab
INSTALLATION				
5	Cab	a. Two wood beams	Position	Through right side window opening and cab door window opening
		b. Lift sling	a. Position	Above cab
		b. Attach		To two wood beams
		c. Hoist	Attach	To lift sling. Take up slack and check balance

3-35. BODY AND CAB MAINTENANCE (CONT)

c. Cab and Deck (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
		WARNING		
		When using hoist to remove or install parts, be sure hoist is securely fastened to the part and that all slack in hoist is taken up. Failure to do so could cause serious injury due to the part falling on you. If you are injured by falling equipment, obtain medical aid immediately.		
6	Tractor frame	Cab and deck	Lower	Position slowly and carefully so pivot pin holes are aligned
7	Cab deck	a. Cab pivot pins	Install	Para 2-65k
		NOTE		
		Keep cab and deck resting on wood blocks for following two steps.		
		b. Safety bar	Connect	Para 3-43e
		c. Tilt cylinder	Connect	Para 3-43b
8	Cab	a. Speedometer	Connect	Para 2-85
		b. Hoist	Remove	From lift sling
		c. Lift sling	Remove	Support wood beams
		d. Two wood beams	Remove	From cab
9	Cab tilt pump	Cab and deck	Tilt 45 degrees	
10	Cab and deck	a. Power take-off cable	Install	Para 3-42b
		b. Heater lines	Connect	Para 2-73b
		c. Chassis harness	Connect	Para 2-35c
		d. Trailer lighting cable	Install and connect	Para 2-31f
		e. Ground strap	Connect	Para 2-35e
		f. Fifth wheel unlatch air line	Connect	Para 3-33b

3-35. BODY AND CAB MAINTENANCE (CONT)

c. Cab and Deck (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
10 (cont)		g. Steering column universal joint	Connect	Para 3-28b
		h. Fifth wheel control cable	Connect	Para 2-78a
		i. Air lines	Connect	Para 2-53a
		j. Air lines	Connect	Para 2-51a
		k. Transmission shift cable	Connect	Para 2-41g(1)
		l. Throttle linkage cable	Connect	Para 2-13e
		m. Air restriction indicator hose	Connect	Para 2-13a
		n. Right side window	Install	Para 3-35g
		o. Inside mirror	Install	Para 2-70b
11	Battery box	Battery ground cable	Connect	Para 2-34a
12	Cab tilt	Cab	Lower	To normal operating position pump
13	Radiator	Coolant system	Fill	Para 2-15a(1)

3-35. BODY AND CAB MAINTENANCE (CONT)

d. Rear Cab Panel.

This task covers: a. Removal c. Inspection
b. Cleaning d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Socket wrench set
Safety glasses

Materials/Parts
Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Caulk

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description
Vehicle parked on level surface, engine off, and parking brake applied.
2-65j Rear window guard removed.
3-35g Rear window removed.
2-65m Paper compartment removed.

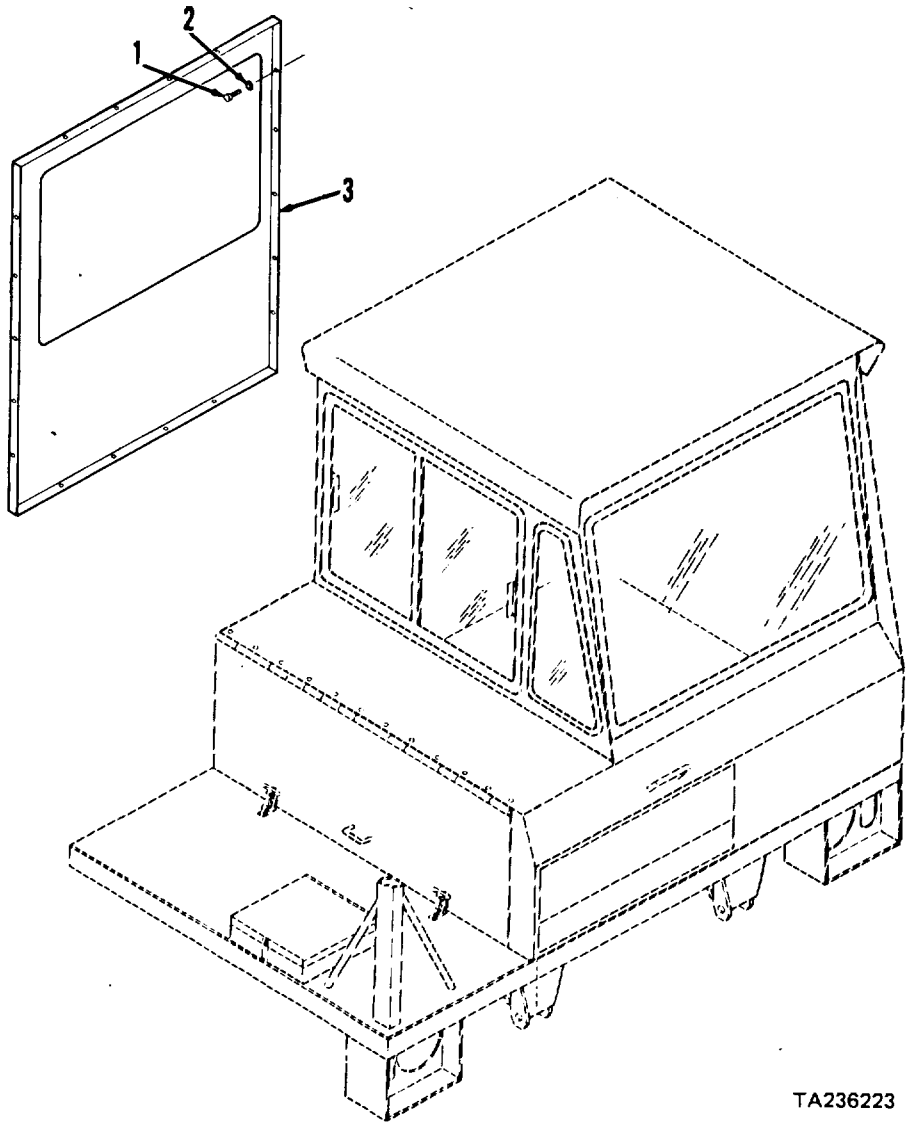
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab rear, inside	a. 18 capscrews (1) and washers (2)	Remove	
		b. Rear cab panel (3)	Remove	
CLEANING				
2		a. Rear cab panel (3) and cab opening	Clean	Remove caulk by scraping

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-35. BODY AND CAB MAINTENANCE (CONT)

d. Rear Cab Panel (cont).



KEY

1. Capscrews (18)
2. Washers (18)
3. Rear cab panel

3-35. BODY AND CAB MAINTENANCE (CONT)

d. Rear Cab Panel (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
2 (cont)		b. Capscrews (1) and washers (2)	Clean	Use cleaning solvent P-D-680 and dry with clean cloths
INSPECTION				
3		a. Rear cab panel (3)	Inspect	Replace if cracked or badly damaged
		b. All other parts	Inspect	Replace if cracked, corroded, or threads damaged
INSTALLATION				
4	Cab rear, inside(3)	a. Rear cab panel	Position	In cab opening
		b. 18 capscrews (1) and washers (2)	Install and tighten	
		c. Caulk	Apply	Apply bead of caulk all the way around seam between rear cab panel and cab
5	Rear cab panel (3), outside	a. Rear window	Install	Para 3-35g
		b. Rear window guard	Install	Para 2-65j
6	Rear cab panel (3), inside	Paper compartment	Install	Para 2-65m

3-35. BODY AND CAB MAINTENANCE (CONT)

e. Floor Mat.

This task covers: a. Removal b. Cleaning c. Inspection d. Installation

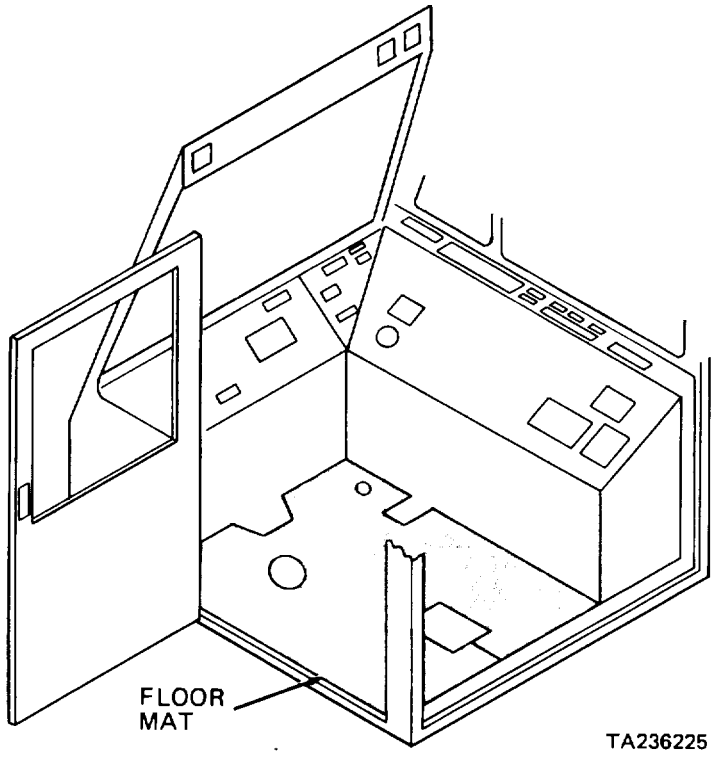
INITIAL SETUP

Materials/Parts
Clean cloths Item 2, Appendix C
Detergent Item 27, Appendix C

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

Vehicle parked on level surface, engine off, and parking brake applied.
2-651 Seat belt floor brackets removed from cab floor.
2-71b Warning triangle box and mount removed.



3-35. BODY AND CAB MAINTENANCE (CONT)

e. Floor Mat (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab floor	Floor mat	Remove	a Lift over dimmer switch b Lift over treadle valve c Pull up and away from around seat d Remove from cab
CLEANING				
2		Floor mat	Clean	Use clean cloth moistened with detergent-water solution; allow to air dry
		NOTE Do not install floor mat until foam backing is completely dry.		
INSPECTION				
3		Floor mat	Inspect	Replace if cracked, torn, or deteriorated
INSTALLATION				
4	Cab floor	a Floor mat	Install	a Position around seat b Place over treadle valve c Place over dimmer switch d Smooth out any buckling and tug at floor mat edges to position properly
		b Seat belt floor brackets	Install	Para 2-651
		c Warning triangle mount and box	Install	Para 2-71b

3-35. BODY AND CAB MAINTENANCE (CONT)

f. Windshield. This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
Knife
Safety glasses
Heavy gloves

Materials/Parts
Clean cloths Item 2, Appendix C
Detergent Item 27, Appendix C
Rubber channel FSCM 90915 PN 90004067

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition
Paragraph Condition Description
Vehicle parked on level surface, engine off, and parking brake applied.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

WARNING

Wear protective goggles and heavy gloves when removing windshield (1). Do not break glass out of rubber channel (2). Remove and handle broken glass carefully. Failure to do so could cause serious injury due to glass puncturing or cutting your skin.

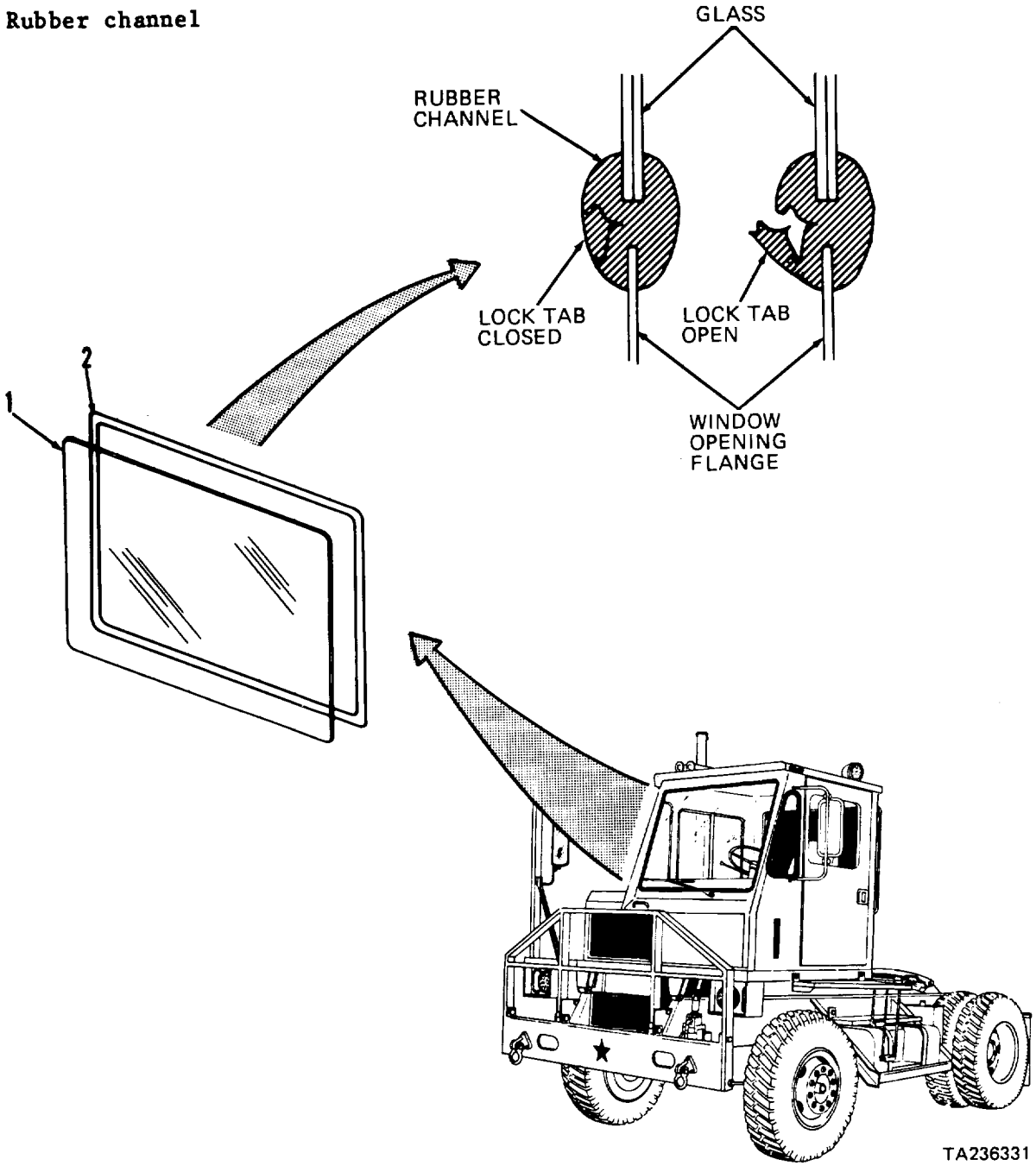
1	Tractor cab, outside	a	Rubber channel (2) lock tab	Open	Pull rubber channel (2) lock tab open all the way around rubber channel (2)
		b	Rubber channel (2) lip	Peel	Peel rubber channel (2) lip away from top of windshield (1); then, peel away from sides of windshield
		c	Windshield (1)	a Push out	Push outward at top of windshield (1)
				b Pull up	Pull windshield up and out of rubber channel in lower flange area
		d	Rubber channel (2)	c Remove Remove	Remove from windshield opening flange of cab

3-35. BODY AND CAB MAINTENANCE (CONT)

f. Windshield (cont).

KEY

1. Windshield
2. Rubber channel



3-35. BODY AND CAB MAINTENANCE (CONT)

f. Windshield (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
2	a	Windshield (1)	Clean	Wipe with clean cloth moistened with mild detergent solution Rinse with clear water; dry thoroughly with clean, dry, lintless cloth
		b Rubber channel (2)	Clean	Wipe with clean cloth
INSPECTION				
3		a Windshield (1)	Inspect	Replace if cracked, broken, or distorted
		b Rubber channel (2)	Inspect	Replace if cracked, torn, or deteriorated
INSTALLATION				
		NOTE		
		Perform step 4 below only if rubber channel (2) requires replacement.		
4	Tractor cab, inside	New rubber channel (2)	a Position	Position rubber channel (2) in windshield (1) opening flange of cab to determine proper length required
			b Cut	Cut to proper length
5	Tractor cab, outside	a Rubber channel (2)	a Lubricate	Generously lubricate rubber channel (2) with detergent-water solution
			b Install	Install in windshield (1) opening flange

WARNING

Wear protective goggles and heavy gloves when installing windshield (1) Failure to do so could cause serious injury due to glass puncturing or cutting your skin If you are injured by broken glass, obtain medical aid immediately.

3-35 BODY AND CAB MAINTENANCE (CONT)I

f. Windshield (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
5 (cont)		b Windshield (1)	Position and hold	Set bottom of windshield in rubber channel from outside of cab. Hold windshield against rubber channel
		c Rubber channel (2) lip	Pull	Pull rubber channel (2) lip over sides of windshield (1); then pull over top of windshield
		d Windshield (1)	Tap	Gently tap windshield with heel of hand to set windshield firmly in position
		e Rubber channel (2) lock tab	Close	Push in lock tab all the way around rubber channel (2)

3-35. BODY AND CAB MAINTENANCE (CONT)

g. Right Side and Rear Window.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
Knife
Screwdriver
Screwdriver set
Safety glasses
Heavy gloves

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Detergent	Item 27, Appendix C
Rubber channel	FSCM 90915 PN 90004067

Personnel Required
Two Wheel Vehicle Mechanics MOS 63B (Metal Work Repairer MOS 44B for glass replacement only)

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-65	Rear window guard open (for rear window replacement only).

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

WARNING

Wear protective goggles and heavy gloves when removing glass. Do not break glass out of frame or glazing channels. Remove and handle broken glass carefully. Failure to do so could cause serious injury due to glass puncturing or cutting your skin. If you are injured by broken glass, obtain medical aid immediately.

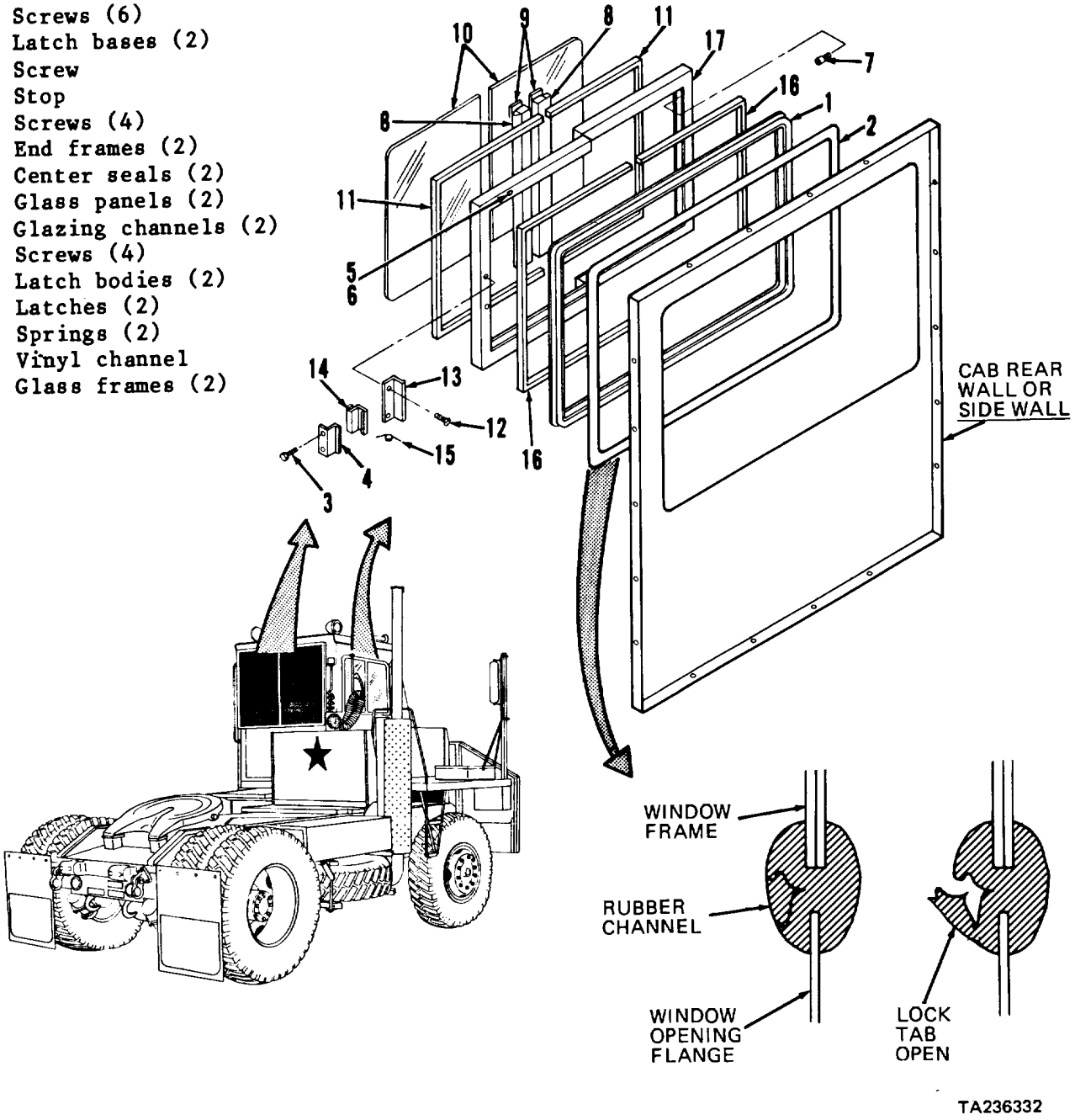
1	Tractor cab, outside	a	Rubber channel (2) lock tab	Open	Pull open lock tab all the way around rubber channel (2)
		b	Rubber channel (2) lip	Peel	Peel rubber channel (2) lip away from top of outer frame (1); then, peel away from sides of windshield
		c	Outer frame (1)	a Push out	Push outward at top of outer frame (1)
				b Pull up	Pull outer frame up and out of rubber channel (2) in lower flange area
				c Remove	Remove from tractor

3-35. BODY AND CAB MAINTENANCE (CONT)

g. Right Side and Rear Window (cont).

KEY

1. Outer frame
2. Rubber channel
3. Screws (6)
4. Latch bases (2)
5. Screw
6. Stop
7. Screws (4)
8. End frames (2)
9. Center seals (2)
10. Glass panels (2)
11. Glazing channels (2)
12. Screws (4)
13. Latch bodies (2)
14. Latches (2)
15. Springs (2)
16. Vinyl channel
17. Glass frames (2)



3-35. BODY AND CAB MAINTENANCE (CONT)

g. Right Side and Rear Window (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)		d Rubber channel (2)	Remove	Remove from window frame opening flange of cab
DISASSEMBLY				
2	Window assembly	a Outer frame (1)	Lay flat	On flat working surface, with inside of window facing upward
		b Six screws (3) and two latch bases (4)	Remove	
		c Outer frame (1)	Remove	Grasp left hand side of outer frame (1) and carefully spread until front half of window assembly can be separated from outer frame; then slide rear half of window assembly forward and separate from outer frame
		d Screw (5) and stop (6)	Remove	
		e Four screws (7)	Remove	
		f Two end frames (8)	Remove	
		g Two center seals (9)	Remove	Pull from end frames (8)
		h Vinyl channel (16)	Remove	Pull from glass frames (17)
		i Two glass panels (10)	Remove (11)	Slide from glazing channels
		j Two glazing channels (11)	Remove	Pull from glass frames (17)
		k Four screws (12)	Remove	
		l Two latch bodies (13), latches (14), and springs (15)	Remove	

3-35. BODY AND CAB MAINTENAIICE (CONT)

g. Right Side and Rear Window (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
3	a	All glass, rubber, and vinyl parts	Clean	Wipe with clean cloth moistened with mild detergent solution. Rinse with clear water; dry thoroughly with clean, dry, lintless cloth

~~WARNING~~

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

	b	All other parts	Clean	Wipe with clean cloth moistened with cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths
INSPECTION				
4	a	Outer frame (1), two glass frames (17), and two end frames (8)	Inspect	Replace if cracked, broken, distorted, or otherwise damaged

3-35 BODY AND CAB MAINTENANCE (CONT)

g. Right Side and Rear Window (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
4 (cont)		b Two glass panels (10)	Inspect	Replace if cracked, broken, scratched, or distorted
		c All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
5	Window assembly	a Vinyl channel (16)	Install	In glass frames (17)
		b Two springs (15), latches (14), and latch bodies (13)	Position	On glass frames (17)
		c Four screws (12)	Install and tighten	
		d Two glazing channels (11)	Install	In glass frames (17)
		e Two glass panels (10)	Install	Slide into glazing channels (11)
		f Two center seals (9)	Install	In end frames (8)
		g Two end frames (8)	Install	
		h Four screws (7)	Install	
		i Screw (5) and stop (6)	Install	
		j Two glass frames (17)	Install	In outer frame (1) Glass frame (17) without stop (6) installs on inside track; glass frame with stop installs on outside track
		k Two latch bases (4)	Position	
		l Six screws (3)	Install and tighten	

3-35. BODY AND CAB MAINTENANCE (CONT)

g. Right Side and Rear Window (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
		NOTE		
		Perform step 6 below only if rubber channel (2) requires replacement.		
6	Tractor cab, inside	New rubber channel (2)	a Position	Position rubber channel (2) in outer frame opening flange of cab to determine proper length required
			b Cut	Cut to proper length
7	Tractor cab, outside	a Rubber channel (2)	a Lubricate	Generously lubricate rubber channel (2) with detergent-water solution
			b Install	Install in outer frame (1) opening flange
		b Outer frame (1)	Install	Set bottom end of outer frame in rubber channel (2) from outside of cab
		c Rubber channel (2) lip	Pull	Pull rubber channel (2) lip over sides of outer frame (1); then pull over top of outer frame
		d Outer frame (1)	Tap	Gently tap outer frame with heel of hand to firmly set outer frame in position
		e Rubber channel (2) lock tab	Close	Push in lock tab all the way around rubber channel (2)
8	Tractor cab	Rear window guard	Install	See para 2-65j, if removed

3-35. BODY AND CAB MAINTENANCE (CONT)

h. Vent Windows.

This task covers:

a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP:

Tools
No. 1 Common Organizational Maintenance Tool Kit
Knife
Safety glasses
Heavy gloves

Materials/Parts
Clean cloths — Item 2, Appendix C
Detergent — Item 27, Appendix C
Rubber channel — FSCM 90915 PN 90004067

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition
Paragraph — Condition Description
Vehicle parked on level surface, engine off, and parking brake applied.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

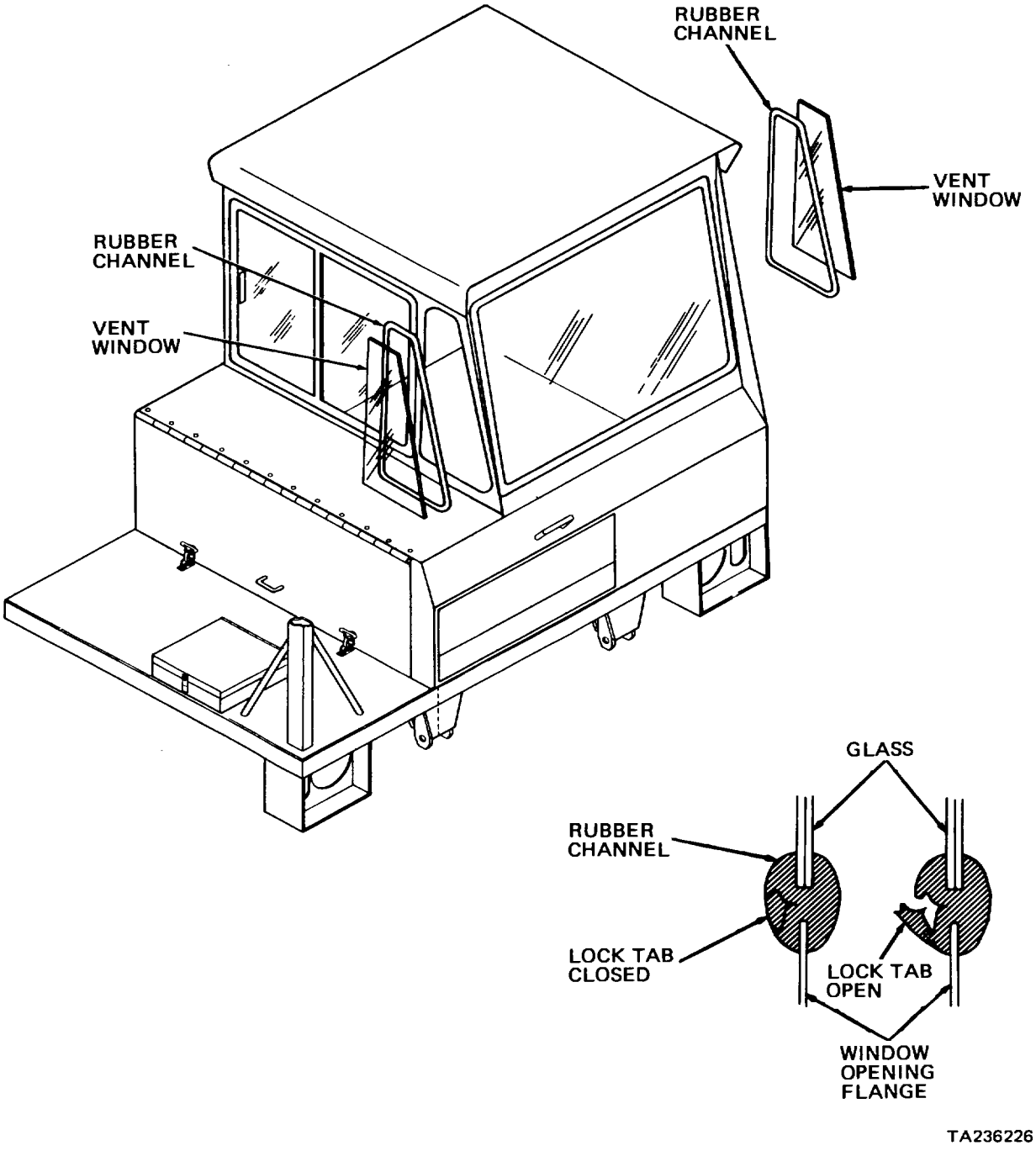
WARNING

Wear protective goggles and heavy gloves when removing vent window. Do not break glass out of rubber channel. Remove and handle broken glass carefully. Failure to do so could cause serious injury due to glass puncturing or cutting your skin.

1	Tractor cab, outside	a	Rubber channel lock tab	Open	Pull rubber channel lock tab open all the way around rubber channel
		b	Rubber channel lip	Peel	Peel rubber channel lip away from top of vent window; then, peel away from sides of vent window
		c	Vent window	a Push out	Push outward at top of window
				b Pull up	Pull window up and out of rubber channel in lower flange area
				c Remove	
		d	Rubber channel	Remove	Remove from vent window opening flange of cab

3-35 BODY AND CAB MAINTENANCE (CONT)

h. Vent Windows (cont).



3-35 BODY AND CAB MAINTENANCE (CONT)

h. Vent Windows (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
2		a Vent window	Clean	Wipe with clean cloth moistened with mild detergent solution. Rinse with clear water; dry thoroughly with clean, dry, lintless cloth
		b Rubber channel	Clean	Wipe with clean cloth
INSPECTION				
3		a Vent window	Inspect	Replace if cracked, broken, or distorted
		b Rubber channel	Inspect	Replace if cracked, torn, or deteriorated
INSTALLATION				
		NOTE Perform step 4 below only if rubber channel requires replacement.		
4	Tractor cab, inside	New rubber channel	a Position	Position rubber channel in vent window opening flange of cab to determine proper length required
			b Cut	Cut to proper length
5	Tractor cab, outside	a Rubber channel	a Install	Install in vent window opening flange
			b Lubricate	Generously lubricate rubber channel with detergent-water solution

WARNING

Wear protective goggles and heavy gloves when installing vent window. Failure to do so could cause serious injury due to glass puncturing or cutting your skin. If you are injured by broken glass, obtain medical aid immediately.

3-35. BODY AND CAB MAINTENANCE (CONT)

h. Vent Windows (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
5 (cont)	b	Vent window and hold	Position	From outside of cab, set bottom of vent window in rubber channel Hold vent window against rubber channel
	c	Rubber channel lip	Pull	Pull rubber channel lip over sides of vent window; then pull over top of window
	d	Vent window	Tap	Gently tap vent window with heel of hand to set window firmly in position
	e	Rubber channel lock tab	Close	Push in lock tab all the way around rubber channel

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat.

(1) Upper Seat Assembly.

This task covers:

a. Removal
b. Cleaning
d. Inspection/Repair
e. Reassembly

INITIAL SETUP:

Tools
No 1 Common Organizational Maintenance Tool Kit rings
Retaining ring pliers
Socket wrench set
Screwdriver 0.005 inch shim stock
Safety glasses
Automotive Mechanic's Tool Kit
Hammer Two Automotive Repairers MOS 63H
Pliers
Equipment Condition
Materials/Parts
Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Detergent Item 27, Appendix C
Two snap rings
Three snap
FSCM 71044 PN 24427-801
Two cotter pins FSCM 71044 PN 359103-002
Glue

Personnel Required
Two Automotive Repairers MOS 63H

Paragraph	Condition Description
2-651	Upper seat assembly and suspension assembly removed from tractor. FSCM 71044 PN 25989-801

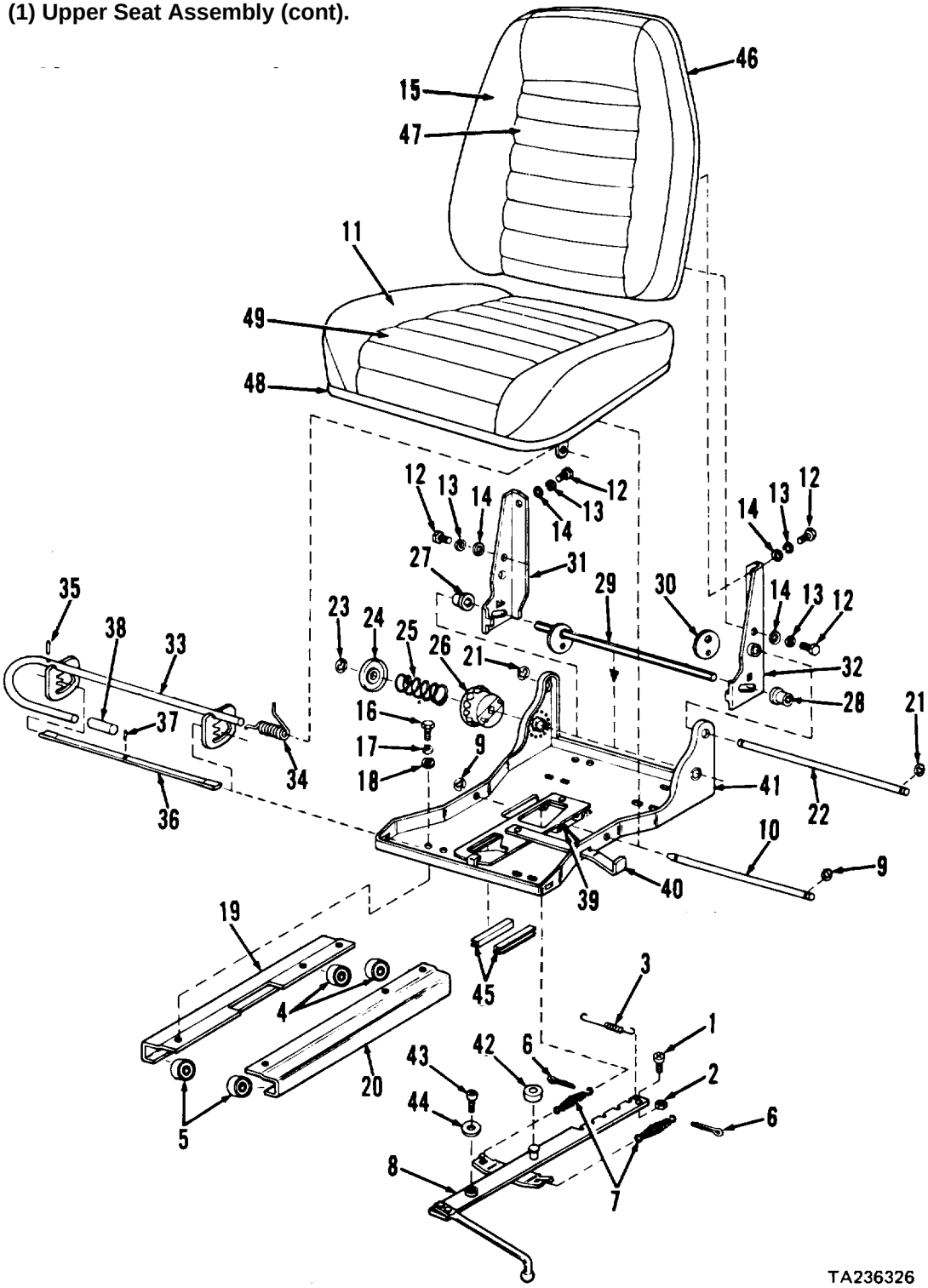
KEY

1. Screw
2. Nut
3. Spring
4. Rollers(2)
5. Rollers(2
6. Cotter pins(2)
7. Springs(2)
8. Latch assembly
9. Snap rings(2)
10. Pivot shaft
11. Seat cushion assembly
12. Capscrews(4)
13. Lockwashers(4)
14. Washers(4)
15. Back cushion assembly
16. Capscrews(6)
17. Lockwashers(6)
18. Washers(6)
19. Right hand roller channel
20. Left hand roller channel
21. Snap rings(2)
22. Shaft
23. Snap ring
24. Endplate
25. Spring
26. Knob assembly
27. Bushing
28. Bushing
29. Cam assembly
30. Cam
31. Right hand pivot bracket
32. Left hand pivot bracket
33. Latch and handle assembly
34. Spring
35. Roll pin
36. Latch bar
37. Roll pin
38. Plastic knob
39. Spring
40. Isolation handle
41. Plate and latch assembly
42. Rubber bumper
43. Screw
44. Washer
45. Edge welts
46. Back pan
47. Coverandpad
48. Seat cushion pan
49. Cover and pad

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).



3-35 BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

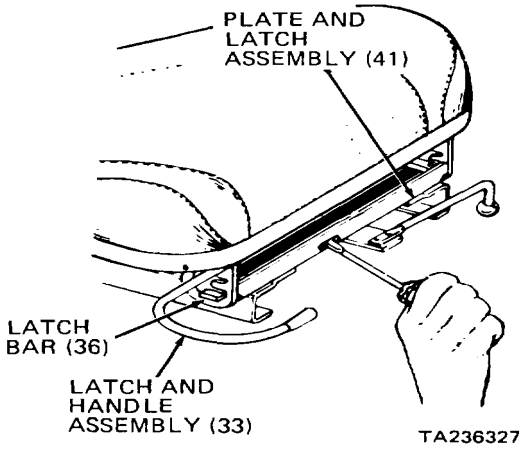
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Latch assembly (8)	a Latch assembly (8) handle	Pull	Pull to its forward most position
		b Isolation handle (40)	Unlock	
		c Seat pan (48)	Push forward	Push far enough forward to expose screw (1)
		d Screw (1) and nut (2)’	Remove	
		e Spring (3)	Remove	
		f Plate and latch assembly (41)	Slide	Slide forward to expose two rollers (4)
		g Two rollers (4)	Remove	
		h Plate and latch assembly (41)	Tilt forward	Tilt forward; then pull rearward to expose two rollers (5)
		i Two rollers (5)	Remove	
		NOTE		
		Be sure springs (7) clear shafts on rear bracket assembly and latch assembly (8) clears rear bracket assembly slot when removing upper seat assembly from suspension assembly.		
		j Upper seat assembly	a Remove	Lift upper seat assembly from suspension assembly
			b Invert	Turn upper seat assembly upside down
		k Latch assembly (8) tabs	Bend down	
		l Two springs (7)	Unhook	Unhook front of springs (7) from tabs
		m Two cotter pins (6)	Remove and discard	
		n Two springs (7)	Remove	

3-35. BODY AND CAB MAINTENANCE (CONT) I

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		o Plate and latch assembly (41)	Insert screwdriver	Insert screwdriver in slot at front of plate and latch assembly as shown. Pry upward on latch bar (36) to allow roll pin (37) in latch bar to clear hole in plate and latch assembly.



NOTE

Latch bar (36) is used for seat tilt adjustment, and roll pin (37) is used to center and hold latch bar.

		p	Latch bar (36)	Tap	Continue prying up on latch bar. Tap latch bar to one side until latch bar disengages from slots in latch and handle assembly (33)
2	Cushion assemblies (11 and 15)	a	Two snap rings (9)	Remove and discard	Use retaining ring pliers
		b	Pivot shaft (10)	Remove	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		c Seat cushion assembly (11)	Lift up	
		d Latch bar (36)	Disengage	From slots in latch and handle assembly (33)
		e Seat cushion assembly (11)	Remove	
		f Latch assembly (8)	Remove	
		g Four capscrews (12), lock washers (13), and washers (14)	Remove	
1		h Back cushion assembly (15)	Remove	
3	Plate and latch assembly (41)	a Six capscrews (16), lock washers (17), and washers (18)	Remove	
		b Two roller channels (19 and 20)	Remove	
		c Two snap rings (21)	Remove and discard	Use retaining ring pliers
		d Shaft (22)	Remove	
		e End plate (24)	Push in	
		f Snap ring (23)	Remove and discard	
		g End plate (24)	Remove	
		h Spring (25)	Remove	
		i Knob assembly (26)	Remove	
		j Cam assembly (29)	Move	Push cam assembly (29) to left
		k Bushing (27)	Remove	
		l Cam assembly (29)	Move	Push cam assembly (29) to right

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)		m Bushing (28)	Remove	
		n Cam assembly (29)	Remove	
		o Cam (30)	Remove	
		p Two pivot brackets (31 and 32)	Remove	
4	Latch and handle assembly (33)	a Spring (34)	Unhook	
		b Roll pin (35)	Remove	
		c Latch and handle assembly (33)	Remove	
		d Spring (34)	Remove	
		e Latch bar (36)	Remove	
		f Roll pin (37)	Remove	
		g Plastic knob (38)	Remove	
		h Spring (39)	Remove	Unhook from isolation handle (40) and plate and latch assembly (41)
		i Rubber bumper (42)	Remove	
		j Screw (43) and washer (44)	Remove	
		k Two edge welts (45)	Remove	

NOTE

Do not remove covers and pads (47 and 49) from back pan (46) and seat cushion pan (48) unless inspection indicates need for replacement If cover and pad is removed, leave clips fastened to pan (46 or 48).

CLEANING

5		a All vinyl, rubber, and plastic parts	Clean	Wipe with clean cloth moistened with mild detergent solution. Rinse thoroughly with clear water; dry thoroughly with clean cloths

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
5 (cont)	b	Two edge welts (45)	Clean	Wipe with clean, dry cloth
		WARNING Dry cleaning solvent (PD680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	c	All other parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION/REPAIR				
6	a	Cushion assemblies (11 and 15)	Inspect for: rips tears worn areas deteriora-tion	Repair small rips or tears by sewing Replace a vinyl cover and pad beyond economical repair
	b	All other parts	Inspect for: cracks breaks distortion damaged threads	Replace if defective

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
		NOTE		
		Heat back cover (47) with steam, hot air, or infrared lamps prior to and during installation. If these heat sources are not available, place cover in direct sunlight approximately 15 minutes before installation.		
7	Cushion assemblies (11 and 15)	a Cover (47)	Heat	
		b Cover and pad (47)	a Glue	Glue cover and pad to back pan (46)
			b Roll over	Roll cover over edge of pad
			c Fasten	Fasten to edge of back pan (46) by inserting plastic welt into clips where provided
8	Latch and handle assembly (33)	a Two edge welts (45)	Install	
		b Washer (44) and and screw (43)	Install and tighten	
		c Rubber bumper (42)	Install	
		d Spring (39)	Install	
		e Plastic knob (38)	Install	
		f Roll pin (37)	Install	
		g Latch bar (36) (33)	Install	In latch and handle assembly
		h Spring (34) (33)	Install	On latch and handle assembly
		i Latch and handle assembly (33)	Install	
		j Roll pin (35)	Install	
		k Spring (34)	Attach	
9	Plate and latch assembly (41)	a Two pivot brackets (32 and 31)	Position	
		b Cam (30)	Install	On cam assembly (29)
		c Cam assembly (29)	a Install	In pivot brackets (31 and 32)
			b Move	Push cam assembly to right

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		d Bushing (28)	Install	
		e Cam assembly (29)	Move	Push cam assembly to left
		f Bushing (27)	Install	
		g Knob assembly (26)	Install	
		h Spring (25)	Install	
		i End plate (24)	Install	Then push in
		j New snap ring (23)	Install	Use retaining ring pliers
		k End plate (24)	Release	
		l Shaft (22)	Install	
		m Two new snap rings (21)	Install	Use retaining ring pliers
		n Two channel rollers (19 and 20)	Position	
		o Six washers (18), lock washers (17), and capscrews (16)	Install and tighten	
10	Cushion assemblies (11 and 15)	a Back cushion assembly (15)	Position	
		b Four washers (14), lock washers (13), and capscrews (12)	Install and tighten	
11	Plate and latch assembly (41)	a Plate and latch assembly (41)	Tilt forward	
		b Two rollers (5)	Install	
		c Plate and latch assembly (41)	Slide forward	
		d Two rollers (4)	Install	
		e Isolation channels	Adjust	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		**NOTE** Use 0.005 inch shim stock for adjustment.		
	f	Plate and latch assembly (41)	Slide forward will go	Slide forward as far as it
	g	Isolation handle (40)	Lock out	
	h	Three capscrews (16)	Loosen	On left side of plate and latch assembly (41)
	i	Shim stock	a Position	Place shim stock between right hand roller channel (19) and right rear roller (4). Push roller channel assemblies together, and tighten capscrew (16) at rear left only
			b Remove	
	j	Plate and latch assembly (41)	Slide Slide to rearmost position	
	k	Isolation handle (40)	Lock out	
	l	Shim stock	a Position	Place shim stock between right hand roller channel (19) and right front roller (5). Push roller channel assemblies together; then tighten two capscrews (16) at left front and center
			b Remove	
	m	Isolation handle (40)	Engage	If travel is not satisfactory, readjust to tighten or loosen as required

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12	Cushion assemblies (11 and 15)			
		NOTE		
		Heat seat cover (49) with steam, hot air or infrared lamps prior to and during installation. If these heat sources are not available, place cover in direct sunlight approximately 15 minutes before installation.		
		a Cover (49)	Heat	
		b Cover and pad (49)	a Glue	Glue cover and pad to seat cushion pan (48)
			b Roll over	Roll cover over edge of pad
			c Fasten	Fasten to edge of seat cushion pan (48) by inserting plastic welt into clips where provided
		c Seat cushion assembly (11)	Install	
		d Latch bar (36)	Engage	In slots in latch and handle assembly (33)
		e Latch assembly (8)	Install	
		f Seat cushion assembly (11)	Push down	
		g Pivot shaft (10)	Install	
		h Two new snap rings (9)	Install	Use retaining ring pliers
13	Latch assembly (8)	a Latch bar (36)	Press down	Insert screwdriver in slot at front of plate and latch assembly (41) Press down on latch bar (36); then tap latch bar until it engages in slots in latch and'; handle assembly (33). Continue pressing down on latch bar until roll pin (37) engages hole in plate and latch assembly (41)

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(1) Upper Seat Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13 (cont)		b Two springs (7)	Position	
		c Two new cotter pins (6)	Install and spread	
		d Latch assembly (8) tabs	Bend up	
		e Two springs (7)	Attach	
		f Upper seat assembly	Install	On suspension assembly
		g Spring (3)	Install	
		h Capscrew (1) and nut (2)	Install and tighten	
14	Cab floor, inside	Upper seat assembly and suspension assembly	Install	Para 2-65g

3-35 BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension.

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP

Tools
No 1 Common Organizational Maintenance Tool Kit
- Retaining ring pliers
- Socket wrench set
- Screwdriver
- Safety glasses

Automotive Mechanic's Tool Kit
- Hammer
- Pliers
- Punch

Wood block, 2 by 4 by 5 Punch

Materials/Parts
Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Detergent Item 27, Appendix C

Snap ring FSCM 71044 PN 26343-801
Two roll pins FSCM 71044 PN 22705-801
Two roll pins FSCM 71044 PN 22526-801
Nine roll pins FSCM 71044 PN 22525-801
Drive lock pin FSCM 71044 PN 24129-801

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-651	Upper seat assembly and suspension assembly removed from tractor.
3-35i(1)	Upper seat assembly removed.

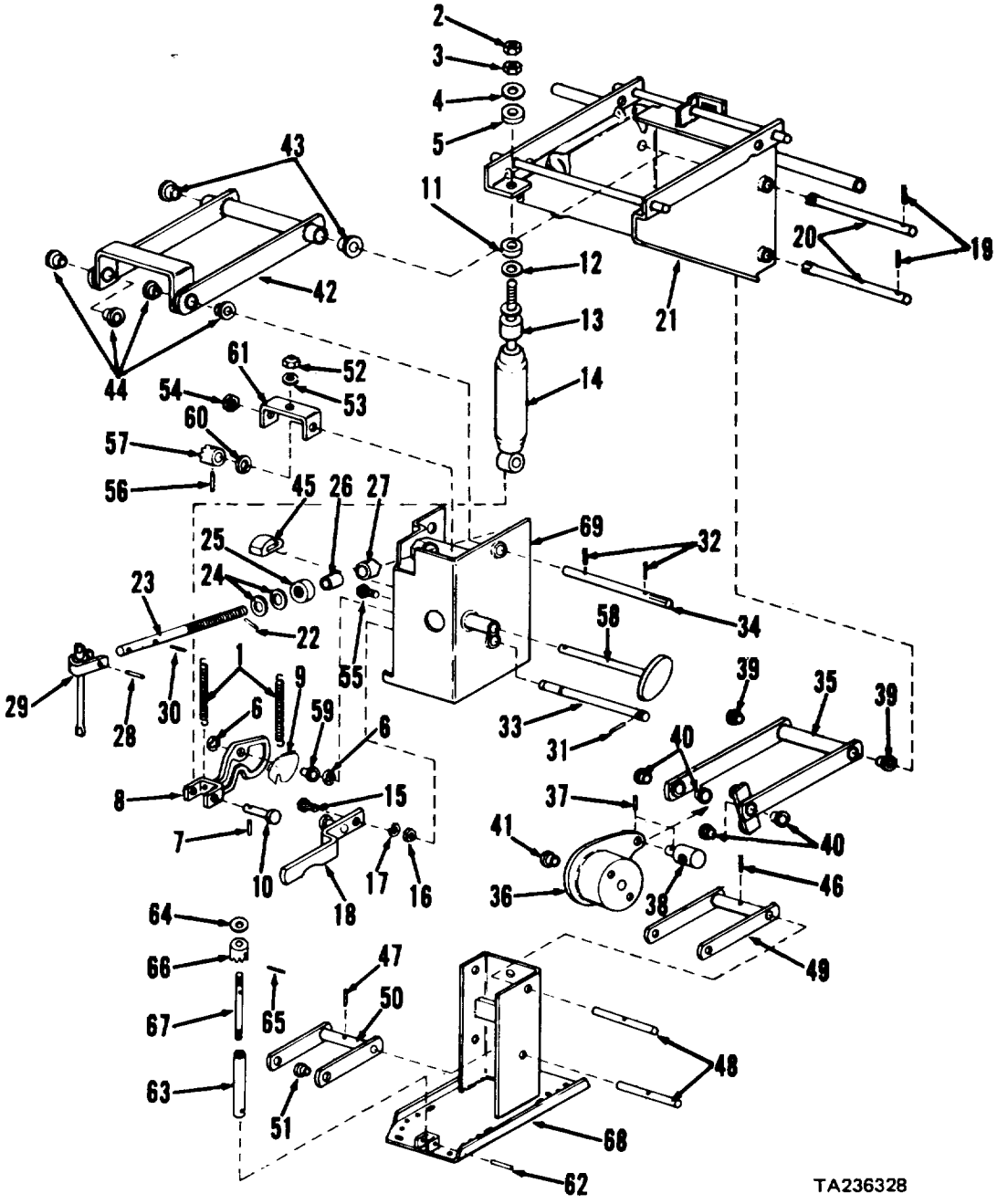
KEY

1	Springs (2)	25	Ball bearing	48	Center pins (2)
2	Locknut	26	Insert	49	Upper pivot arm
3	Nut	27	Pivot bushing	50	Pivot arm assembly
4	Washer	28	Roll pin	51	Flanged bearing
5	Spacer	29	Weight adjustment handle	52	Locknut
6	Snap rings (2)			53	Thrust washer
7	Roll pin	30	Drive lock pin	54	Nut
8	Pivot lever assembly	31	Roll pin	55	Capscrew
9	Wear plate	32	Roll pins (2)	56	Roll pin
10	Clevis pin	33	Lower hinge pin	57	Miter gear
11	Spacer	34	Upper hinge pin	58	Height adjustment handle
12	Washer	35	Lower arm assembly		
13	Rubber spacer	36	Rubber spring assembly	59	Flanged bearing
14	Shock absorber	37	Roll pin	60	Thrust washer
15	Capscrew	38	Adjuster clevis	61	Vertical adjuster bracket
16	Nut	39	Flanged bearings (2)		
17	Lock washer	40	Flanged bearings (4)	62	Roll pin
18	Release lever	41	Flanged bearing	63	Tube
19	Roll pins (2)	42	Upper arm assembly	64	Thrust washer
20	Hinge pins (2)	43	Flanged bearings (2)	65	Roll pin -
21	Rear bracket assembly	44	Flanged bearings (4)	66	Miter gear
22	Roll pin	45	Rubber bumper	67	Adjuster stud
23	Adjuster stud	46	Roll pin	68	Base-
24	Washers (2)	47	Roll pin	69	Spring support bracket

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).



3-35 BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Shock absorber (14)	a Height adjustment handle (58)	Turn	Turn handle clockwise to raise shock absorber rod to its highest position
		b Two springs (1)	Remove	
		c Locknut (2)	Remove	
		d Nut (3), washer (4), and spacer (5)	Remove	
		e Shock absorber (14) rod	Push down	
		f Two snap rings (6)	Remove and discard	Use retaining ring pliers
		g Roll pin (7)	Remove and discard	
		h Pivot lever assembly (8)	Remove	
		i Wear plate (9)	Remove	
		j Clevis pin (10)	Remove	
		k Spacer (11), washer (12), rubber spacer (13), and shock absorber (14)	Remove	
		1 Capscrew (15), nut (16), and lock washer (17)	Remove	
		m Release lever (18)	Remove	
2	Rear	a Two roll pins (19)	Remove and discard	
		bracket assembly (21)		

CAUTION

One end of each hinge pin (20) is serrated. Do not drive serrated end of hinge pin through rear bracket assembly (21).

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		b. Two hinge pins (20)	Remove	Use suitable drift and hammer. Drive hinge pins (20) out through right side of rear bracket assembly (21)
		c. Rear bracket assembly (21)	Remove	Lift off
3	Spring support bracket (69)	a. Roll pin (22)	Remove and discard	
		b. Adjuster stud (23)	Remove	Rotate counterclockwise
		c. Two washers (24)	Remove	
		d. Ball bearing (25), insert (26), and pivot bushing (27)	Remove	
		e. Roll pin (28)	Remove and discard	
		f. Weight adjustment handle (29)	Remove	
		g. Drive lock pin (30)	Remove and discard	
		h. Three roll pins (31 and 32)	Remove and discard	

CAUTION

One end of each hinge pin (33 and 34) is serrated. Do not drive serrated end of hinge pin through spring support bracket (69) assembly.

	i. Two hinge pins (33 and 34)	Remove	Use suitable drift and hammer. Drive hinge pins (33 and 34) out through left side of spring support bracket (69) assembly
	j. Spring support bracket (69)	Swing down	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4	Arm assemblies (35, 42, and 50)	a. Lower arm assembly (35) and rubber spring assembly (36)	Remove	
		b. Roll pin (37)	Remove and discard	
		c. Adjuster clevis (38)	Remove	
		NOTE Do not remove two flanged bearings (39), four flanged bearings (40), or flanged bearing (41) unless inspection indicates need for replacement.		
		d. Upper arm assembly (42)	Remove	
		NOTE Do not remove two flanged bearings (43) or four flanged bearings (44) unless inspection indicates need for replacement.		
		e. Rubber bumper (45)	Remove	
		f. Two roll pins (46 and 47)	Remove and discard	
		g. Two center pins (48)	Remove	
		h. Upper pivot arm (49)	Remove	
		i. Pivot arm assembly (50)	Remove	
		NOTE Do not remove flanged bearing (51) unless inspection indicates need for replacement.		

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5	Vertical adjustment bracket (61)	a. Locknut (52) and thrust washer (53)	Remove	
		b. Nut (54) and capscrew (55)	Remove	
		c. Roll pin (56)	Remove and discard	
		d. Miter gear (57)	Remove	
		e. Height adjustment handle (58) and flanged bearing (59)	Remove	
		f. Thrust washer (60)	Remove	
		g. Vertical adjustment bracket (61)	Remove	
6	Base (68)	a. Roll pin (62)	Remove and discard	
		b. Tube (63)	Remove	
		c. Thrust washer (64)	Remove	
		d. Roll pin (65)	Remove and discard	
		e. Miter gear (66)	Remove	
		f. Adjuster stud (67)	Remove	
CLEANING				
7		a. All vinyl, rubber, and plastic parts	Clean	Wipe With clean cloth moistened with detergent solution. Rinse thoroughly with clear water; dry thoroughly with clean cloths

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
		b. Shock absorber (14)	Clean	Wipe exterior with clean cloth moistened with cleaning solvent P-D-680; dry with clean cloths
		c. All other parts	Clean	Use cleaning solvent P-D-680; dry with clean cloths
INSPECTION				
8		a. Two springs (1)	Inspect	Replace if cracked, broken, distorted, or permanently set
		b. All bearings	Inspect	Replace if cracked, worn, distorted, or flat spotted
		c. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
9	Base (68)	a. Adjuster stud (67)	Install	In tube (63)
		b. Miter gear (66)	Install	
		c. New roll pin (65)	Install	
		d. Thrust washer (64)	Install	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		e. Tube (63)	Position	In base (68)
		f. New roll pin (62)	Install	
10	Vertical adjustment bracket (61)	a. Vertical adjustment bracket (61)	Position	
		b. Thrust washer (60)	Position	
		c. Flanged bearing (59), height adjustment handle (58), miter gear (57), and new roll pin (56)	Install	
		d. Capscrew (55) and nut (54)	Install	
11	Arm assemblies (35, 42, and 50)	a. Pivot arm assembly (50)	Position	In base (68)
		b. Upper pivot arm (49)	Position	In base (68)
		c. Two center pins (48)	Install	
		d. Two new roll pins (47 and 46)	Install	
		e. Rubber bumper (45)	Install	
		f. Base (68)	Install	In spring support bracket (69). Exercise care to guide adjuster stud (67) through vertical adjustment bracket (61)
		g. Thrust washer (53) and locknut (52)	Install	
		h. Adjuster clevis (38)	Position	In rubber spring assembly (36)

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

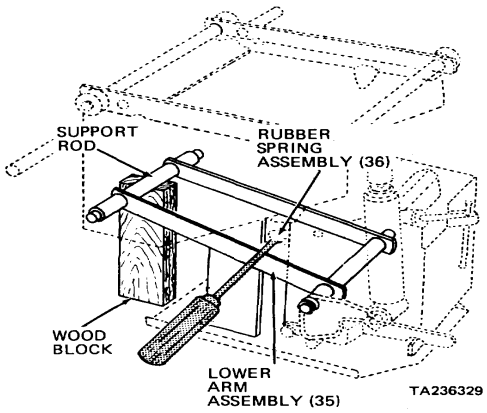
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		i. New roll pin (37)	Install	
		j. Rubber spring assembly (36)	Install	In lower arm assembly (35)
		NOTE		
		Be sure flanged bearing (41) is installed in rubber spring assembly (36), and flanged bearings (40 and 39) are installed in lower arm assembly (35).		
12	Spring support bracket (69)	a. Spring support bracket (69)	Raise	
		b. Lower arm assembly (35), pivot arm (50), and flanged bearing (51)	Install	
		NOTE		
		Be sure adjuster clevis (38) is on top of pivot arm (50) before proceeding.		
		c. Lower hinge pin (33)	Install	Insert from left side of spring support bracket (69)
		d. New roll pin (31)	Install	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		e. 2 by 4 by 5 inch wood block	Position	Under support rod of lower arm assembly (35) as shown. Wood block holds lower arm assembly in raised position and also raises adjuster clevis (38) to permit installation of adjuster stud (23)
		f. Screwdriver	Insert	Insert screwdriver, and raise rubber spring assembly (36) as shown
		g. New drive lock pin (30)	Install	In adjuster stud (23)
		h. Pivot bushing (27) and insert (26)3-391	Install	
		i. Ball bearing (25) and two washers (24)	Install	



3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		j. Adjuster stud (23)	Install	Rotate clockwise
		k. New roll pin (22)	Install	
		l. Weight adjustment handle (29)	Install	
		m. New roll pin (28)	Install	
13	Rear bracket	a. Upper arm assembly (42) assembly (21)	Position	In rear bracket assembly (21)
		NOTE Be sure flanged bearings (43 and 44) are installed in upper arm assembly (42).		
		b. One hinge pin (20)	Install	Insert from right side of rear bracket assembly (21)
		c. One new roll pin (19)	Install	
		d. Lower arm assembly (35)	Position	In rear bracket assembly (21)
		e. One hinge pin (20)	Install	Insert from right side of rear bracket assembly (21)
		f. One new roll pin (19)	Install	
		g. Upper arm assembly (42)	Position	In spring support bracket (69)
		NOTE Insert upper hinge pin (34) from left side of spring support bracket (69).		
		h. Upper hinge pin (34)	Install	From left side of spring support bracket (69)
		i. Two new roll pins (32)	Install	

3-35. BODY AND CAB MAINTENANCE (CONT)

i. Seat (cont).

(2) Seat Suspension (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14	Shock absorber (14)	a. Release lever (18)	Position	
		b. Capscrew (15) lock washer (17), and nut (16)	,Install	
		c. Shock absorber (14), rubber spacer (13), washer (12), and spacer (11)	Install	In rear bracket assembly (21)
		d. Wear plate (9) and pivot lever assembly (8)	Position	
		e. Clevis pin (10) and new roll pin (7)	Install	
		f. Two new snap rings (6)	Install	Use retaining ring pliers
		g. Spacer.(5) and washer (4)	Install	
		h. Nut (3)	Install	Install hand tight only, so shock absorber (14) can' pivot
		i. Locknut (2)	Install	
		j. Two springs (1)	Install	
15	Seat suspension	Upper seat assembly	Install	Para 3-35i(1)
16	Cab, inside	Upper seat assembly and suspension assembly	Install	Para 2-651

3-35. BODY AND CAB MAINTENANCE (CONT)

j. Cab Tilt. This task covers tilting cab 90 degrees.

INITIAL SETUP

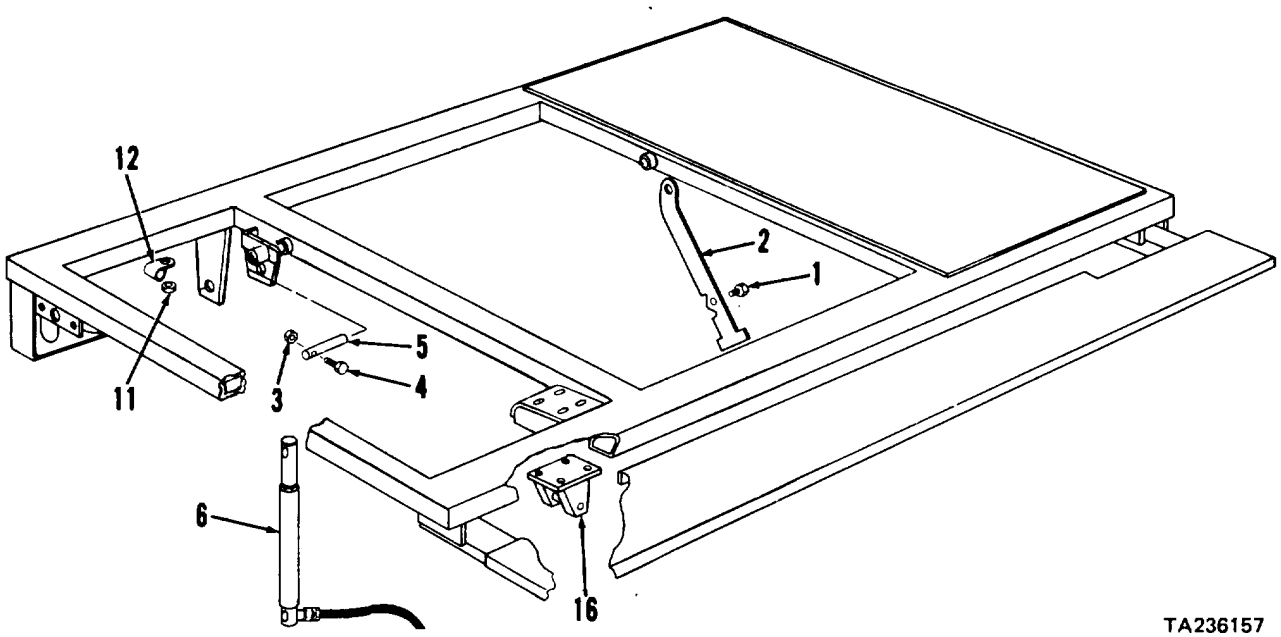
Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Come-a-long (block-and-tackle device)

Personnel Required
Four Automotive Repairers MOS 63H

Equipment Condition
Paragraph Condition Description

Materials/Parts
Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Thread sealant Item 29, Appendix C

Parked on level surface; parking brake applied; engine off.
Cab tilted 45 degrees.

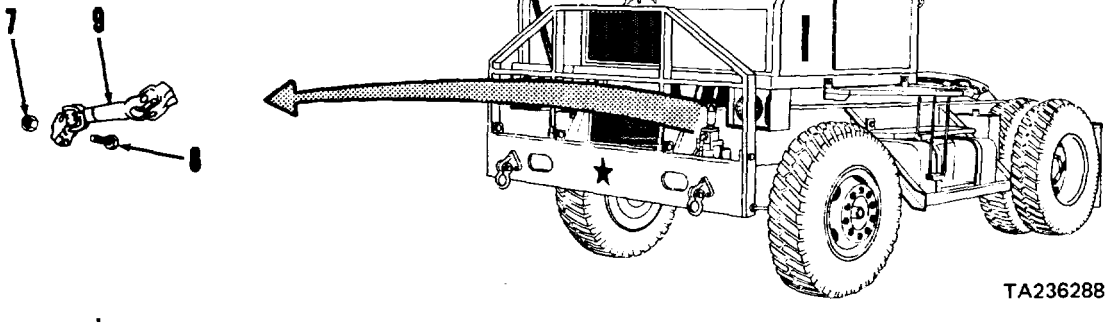


STEP	LOCATION	ITEM	ACTION	REMARKS
TILTING CAB TO 90 DEGREES				
1	Frame rail, right side	a. Capscrew (1)	Remove	From safety bar (2)
		b. Tilt pump control valve	Turn counter-clockwise	
2	Frame rail, left side	a. Nut (3), capscrew (4), and pin (5)	Remove cylinder (6)	From top of cab tilt

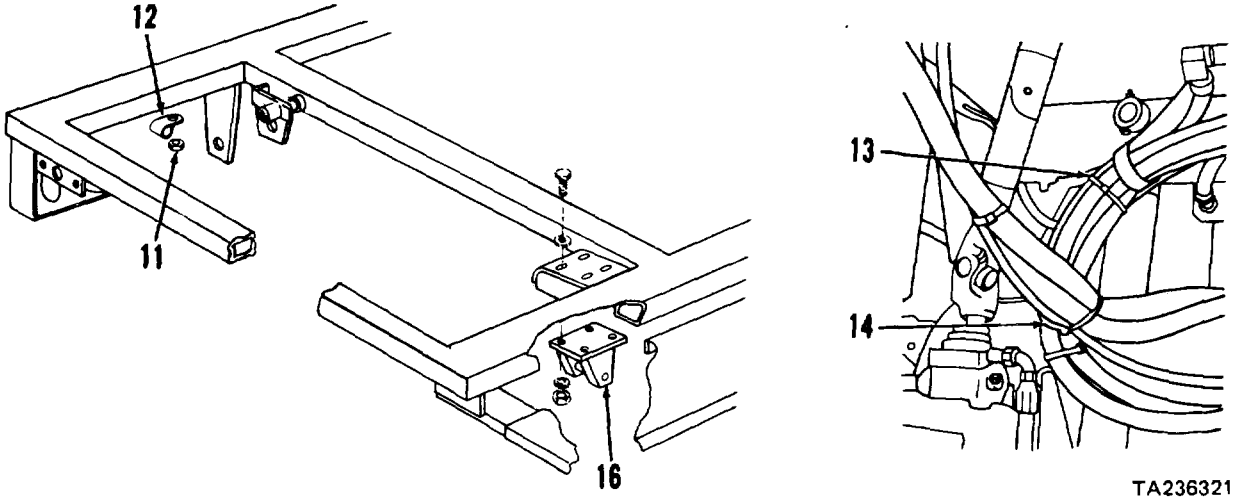
3-35. BODY AND CAB MAINTENANCE (CONT)

j. Cab Tilt (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TILTING CAB TO 90 DEGREES (cont)				
2 (cont)		b. Cab tilt cylinder (6)	Push down on rod	Swing cylinder out of way
		c. Nut (7) and capscrew (8)(9)	Remove	From steering joint assembly
		d. Steering joint assembly (9)	Pull up	From steering gear box



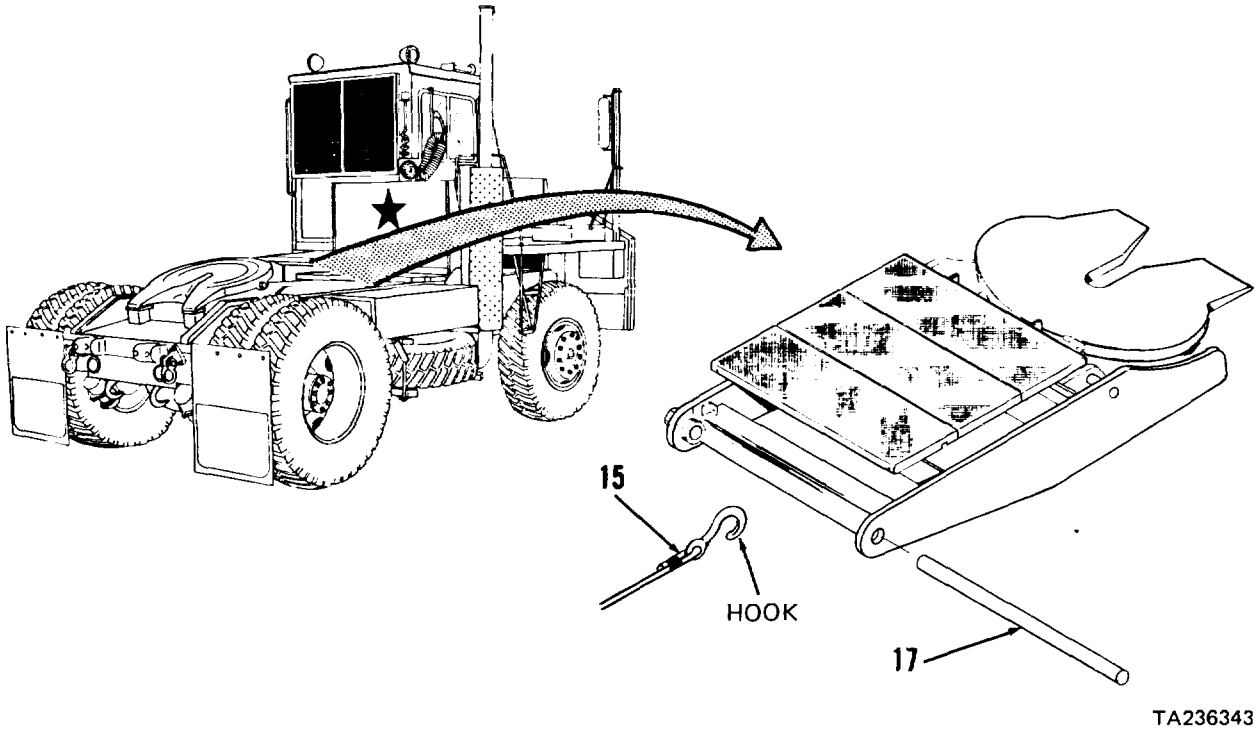
3	Cab deck, left side	a. Nut (11) and clamp (12)	Remove	From bottom of cab deck



3-35. BODY AND CAB MAINTENANCE (CONT)

j. Cab Tilt (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TILTING CAB TO 90 DEGREES (cont)				
3 (cont)		b. Two tie straps (13 and 14)	Cut, remove and discard	
		c. Come-a-long (15) hook	Attach	To bracket (16)



4	5th wheel boom	a. Come-a-long (15) hook	Attach	To crossmember (17)
		b. Come-a-long (15)	a. Release	Provide some slack
			b. Lock	Prevents cable slippage

NOTE

Four personnel are required to perform the following step.

3-35. BODY AND CAB MAINTENANCE (CONT)

j. Cab Tilt (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
TILTING CAB TO 90 DEGREES (cont)				
5	Tractor, front	a. Cab and deck b. Safety bar (2)	Pull forward Lift	 Raise out of first notch, past second notch, until downward weight of cab is supported entirely by come-a-long
6	5th wheel boom	Come-a-long (15)	a. Release b. Check c. Remove	Gradually release until cab is tilted 90 degrees, and safety bar (2) rests in third notch Come-a-long must be slack, with all weight of cab and deck resting on safety bar From tractor
LOWERING CAB TO 45 DEGREES				
1	Cab deck, left side	One come-a-long (15) hook	Attach	To bracket (16)
2	5th wheel boom	Come-a-long (15)	Attach hook	To crossmember (17)
		NOTE Four personnel are required to perform the following step.		
3	Tractor, front	a. Cab and deck b. Come-a-long (15) c. Cab and deck	Hold forward Tighten Release	Prevents cab from falling back to 45 degree position Raise cab from 90 degree to 45 degree position After safety bar (2) drops into its first notch
4	Frame rail, right side	a. Safety bar (2) b. Capscrew (1)	Check a. Seal b. Install	All weight of cab must rest on safety bar, and come-a-long must be slack Apply thread sealant threads On safety bar; tighten

3-35. BODY AND CAB MAINTENANCE (CONT)

j. Cab Tilt (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
LOWERING CAB TO 45 DEGREES (cont)				
5	5th wheel boom	Come-a-long (15)	Remove	From tractor
6	Cab deck, left side	a. Nut (11) and clamp (12)	Install	At bottom of cab deck
		b. Two new tie straps (13 and 14)	Install	
7	Frame rail, left side	a. Steering joint assembly (9)	Position	On steering gear box
		b. Nut (7) and capscrew (8)	Install and tighten	On steering joint assembly (9)
		c. Cab tilt cyl inder (6)	Pull up on rod	Swing cylinder into position
		d. Nut (3), cap-screw (4), and pin (5)	Install and tighten	Through top of cab tilt cylinder (6)
8	Cab tilt pump	Cab	Lower	To normal operating position

Section VII. ACCESSORIES MAINTENANCE

This section contains the information you will need to maintain the cab heater.

It gives you instructions on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

3-36. TROUBLESHOOTING SYMPTOM INDEX

3-37. HEATER TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. CAB HEATER DOESN'T HEAT CAB

Step 1. Remove motor (para 3-38).
Connect 12 Vdc power source to motor electrical leads.
Check if motor shaft rotates.

a. If motor shaft does not rotate, replace motor (para 3-38).

b. If motor shaft rotates, proceed to step 2 below.

Step 2. Check heater core for leaks, cracks, distortion, or obstructions.

a. If heater core is leaking, cracked, or distorted, replace (para 3-38); if obstructed, clean (para 3-38).

b. If heater core is not leaking, cracked, distorted, or obstructed, proceed to step 3 below.

Step 3. Check blower wheel for cracks, distortion, obstructions.

Check if setscrew is loose or missing.

a. If obstructions are found, remove; if blower wheel is cracked, or distorted, replace (para 3-38).

b. If setscrew is loose or missing, replace (para 3-38).

3-37. HEATER TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. FRESH AIR DOOR WILL NOT OPEN OR CLOSE

Check heater housing for cracks, bent condition, bent or cracked fresh air door, or broken bellcrank.

If housing is cracked or bent, fresh air door is cracked or bent, or bellcrank is broken, replace housing (para 3-38).

3. WINDSHIELD WILL NOT DEFROST

Check for cracked, broken, or missing strap link.
Check for missing strap link nuts.

a. If strap link is cracked, broken, or missing, replace (para 3-38).

b. If strap link nuts are missing, replace (para 3-38).

3-38. HEATER MAINTENANCE

This task covers: a. Disassembly b. Cleaning c. Inspection d. Reassembly

INITIAL SETUP

Tools

No. 1 Common Organizational Maintenance Tool Kit
- Screwdriver
- Key set, socket head screw
- Socket wrench set
- Hose clamp pliers
- Scratch wire brush
- Safety glasses
- Tool kit, electrical connector
  - Crimping tool
  - Wire stripper

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Detergent	Item 27, Appendix C
Rubber seal, self-adhesive	FSCM 59502 PN 4111-N-W/PSA
Gasket, motor	FSCM 90915 PN 90007293
Two wire connectors	FSCM 77060 PN 2965867

Personnel Required

Automotive Repairer MOS 63H

Equipment Condition

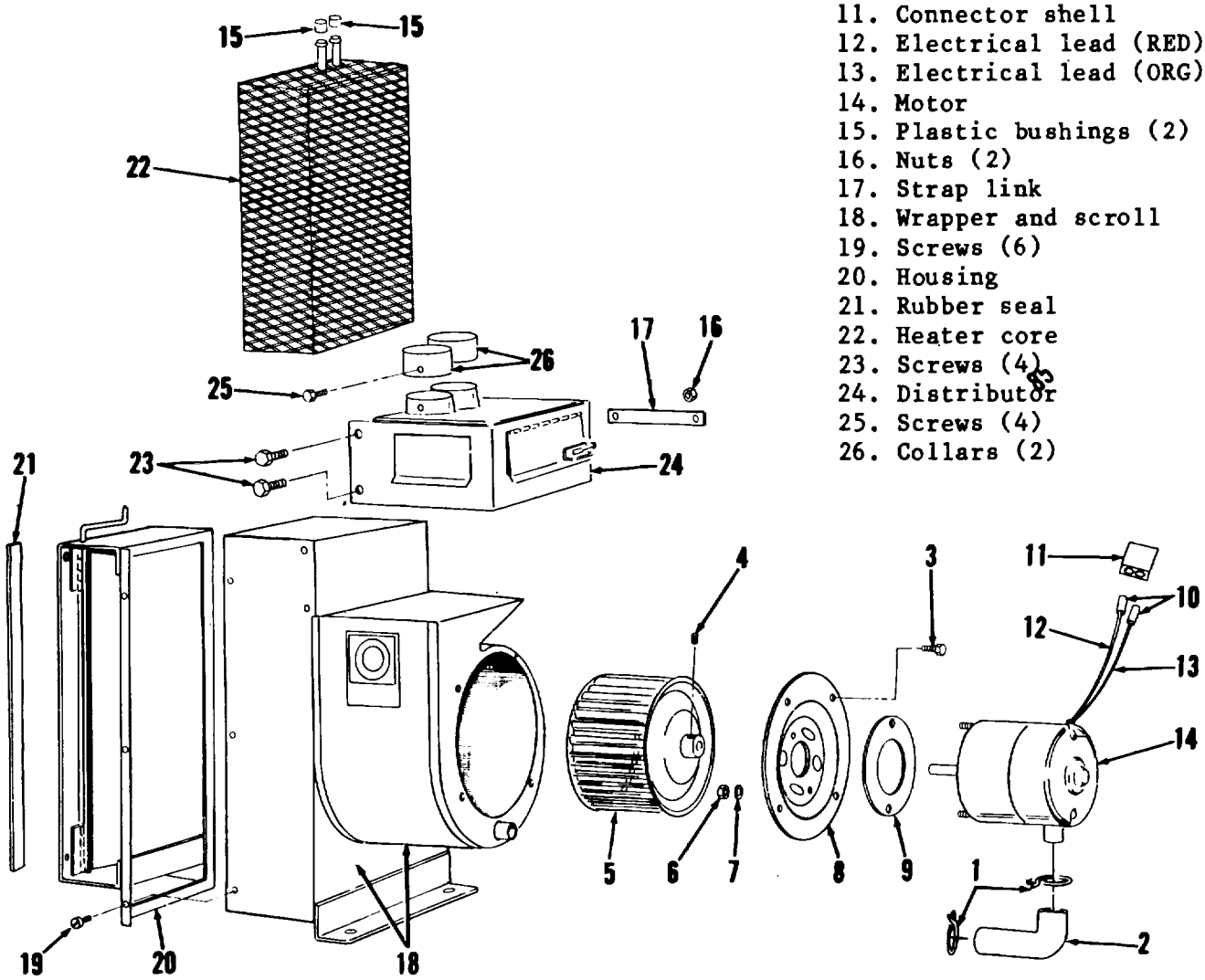
Paragraph	Condition Description
2-73a	Cab heater removed from tractor.

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Motor (14)	a. Two clamps (1)	Move	Loosen with hose clamp pliers and slide to center of hose (2)
		b. Hose (2)	Disconnect and remove	
		c. Two clamps (1)	Remove	Use hose clamp pliers
		d. Four screws (3)	Remove	Support motor (14)
		e. Plate (8) with motor (14)	Remove	
		f. Setscrew (4)	Loosen	
		g. Blower wheel (5)	Remove	Pull from motor (14) shaft
		h. Setscrew (4)	Remove	If necessary
		i. Two nuts (6) and washers (7)	Remove	
		j. Plate (8)	Separate	From motor (14)
		k. Gasket (9)	Remove and discard	

3-38. HEATER MAINTENANCE (CONT)

KEY

1. Clamps (2)
2. Hose
3. Screws (4)
4. Setscrew
5. Blower wheel
6. Nuts (2)
7. Washers (2)
8. Plate
9. Gasket
10. Wire connectors (2)
11. Connector shell
12. Electrical lead (RED)
13. Electrical lead (ORG)
14. Motor
15. Plastic bushings (2)
16. Nuts (2)
17. Strap link
18. Wrapper and scroll
19. Screws (6)
20. Housing
21. Rubber seal
22. Heater core
23. Screws (4)
24. Distributor
25. Screws (4)
26. Collars (2)



TA236325

3-38. HEATER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE		
		Tag connector shell (11) and electrical leads (12 and 13) before removing wire connectors (10) to aid in reassembly.		
		1. Two wire connectors (10)	a. Unplug b. Remove and discard	From connector shell (11) Only if necessary for replacement. Cut electrical leads (12 and 13) as close to wire connectors (10) as possible
2	Heater core (22)	a. Two plastic bushings (15)	Remove	
		b. Six screws (19)	Remove	
		c. Housing (20)	Remove	
		d. Rubber seal (21)	Remove and discard	Only if necessary for replacement
		CAUTION		
		Lift heater core (22) carefully in following step to prevent damage to core.		
		e. Heater core (22)	Lift and remove	
3	Distributor (24)	a. Four screws (23)	Remove	
		b. Distributor (24)	Remove	
		c. Four screws (25)	Remove	
		d. Two collars (26)	Lift and remove	
		e. Two nuts (16) and strap link (17)	Remove	
CLEANING				
4		a. Rubber seal (21)	Clean	Wipe with clean dry cloth only

3-38. HEATER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
4 (cont)		b. Hose (2), connector shell (11), plastic bushings (15), and collars (26)	Clean	Use clean cloth moistened with mild detergent; dry using clean cloths

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

	c. Motor (14)	Clean	Wipe exterior only with cloth moistened in cleaning solvent P-D-680; dry with clean cloths
	d. Heater core (22)	a. Clean	Clean exterior with stiff bristled brush and compressed air at 20-25 psi
		b. Flush	Connect water supply to core and flush tubes; then everse connection and flush in opposite direction
	e. All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths

3-38. HEATER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION				
5		a. Motor (14)	Inspect	Replace if burned out or otherwise defective
		b. Blower wheel (5)	Inspect	Replace if cracked, broken, distorted, or vanes damaged
		c. Heater core (22)	Inspect	Replace if leaking, cracked, distorted, or threads damaged
		d. Hose (2)	Inspect	Replace if cracked, split, or deteriorated
		e. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
		CAUTION		
		Lower heater core (22) carefully in following step to prevent damage to core.		
6	Heater core (22)	a. Heater core (22)	Install	
		b. New rubber seal (21)	Install, if removed	Peel protective paper backing from seal; then press adhesive side into position
		c. Housing (20)	Position	
		d. Six screws (19)	Install and tighten	
		e. Two plastic bushings (15)	Install	
7	Distributor (24)	a. Two collars (26)	Position	
		b. Four screws (25)	Install and tighten	
		c. Strap link (17)	Position	
		d. Two nuts (16)	Install and tighten	
		e. Distributor (24)	Position	
		f. Four screws (23)	Install and tighten	

3-38. HEATER MAINTENANCE (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8	Motor (14)	a. Plate (8) with new gasket (9)	Position	On motor (14)
		b. Two nuts (6) and washers (7)	Install	Tighten nuts (6) evenly
		c. Setscrew (4)	Install	If removed
		d. Blower wheel (5)	Position	Align setscrew with flat on motor shaft
		e. Setscrew (4)	Tighten	
		f. Plate (8) with motor (14)	Position	
		g. Four screws (3)	Install and tighten	
		h. Two clamps (1)	Position	Open with hose clamp pliers and slide to center of hose (2)
		i. Hose (2) with clamps (1)	Install	
		j. Two clamps (1)	Install	Loosen with hose clamp pliers and slide to ends of hose
		NOTE		
		Perform following steps only if necessary to install wire connectors (10) or connector shell (11).		
		k. Electrical leads (12 and 13)	Strip 1/4 inch insulation from ends	
		l. New wire connectors (10)wires	a. Install on	Crimp securely
			b. Push into	As tagged in step 1 above connector shell (11)

Section VIII. HYDRAULIC SYSTEMS MAINTENANCE

This section contains the information you need to maintain the:

* Fifth Wheel Hydraulic System
* Cab Tilt Hydraulic System

It gives you instructions on how to troubleshoot problems and repair or replace the components that are within the scope of direct support maintenance.

3-39. TROUBLESHOOTING SYMPTOM INDEX

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FIFTH WHEEL DOESN'T LIFT

WARNING

Keep clear of fifth wheel boom moving parts to prevent serious injury or death.

Step 1. Check for full movement of fifth wheel hydraulic control valve metering spool.

Have assistant operate 5th WHEEL control lever; watch movement of hydraulic control valve metering spool.

a. If metering spool does not move fully to "raise" or "lower" positions, repair or replace hydraulic control valve or cable (para 3-42c and 2-78a).

b. If control valve metering spool moves fully to "raise" and "lower" positions, proceed to step 2 below.

Step 2. Check hydraulic control valve relief pressure.

Disconnect hoses from two top ports of fifth wheel hydraulic control valve and install a pressure gage in each port.

CAUTION

Do not hold 5th WHEEL control lever back for more than 30 seconds at a time. Failure to follow this procedure could result in damage to the fifth wheel hydraulic pump.

With vehicle engine at governed speed, have assistant pull back 5th WHEEL control lever fully; watch both pressure gages.

a. If pressure gage in top rear port indicates 2000 psi and pressure gage in top front port indicates approximately zero psi, proceed to Malfunction 3, step 2, below.

b. If pressure gage in top rear port indicates less than 2000 psi, but more than 1500 psi, adjust hydraulic control valve relief pressure (para 3-42c). If pressure increases to 2000 psi without turning adjusting screw in all the way, return tractor to normal operation. If pressure does not increase when adjusting screw is turned, proceed to Malfunction 2, step 2, below.

c. If pressure gage in top rear port indicates less than 1500 psi, proceed to Malfunction 2, step 2, below.

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FIFTH WEEEL DOESN'T LIFT (Cont)

d. If pressure gages indicate approximately equal pressure, fifth wheel hydraulic control valve is defective; repair or replace (para 3-42c)

e. If both pressure gages indicate zero psi, proceed to step 3 below.

WARNING

Keep clear of fifth wheel boom moving parts to prevent serious injury or death.

Step 3. Have assistant operate PTO control; watch movement of power take-off shift lever.

a. If shift lever does not move fully to "power take-off engaged" position when PTO control is pulled out fully, adjust or replace PTO control cable (para 3-42b).

b. If shift lever moves fully to "power take-off engaged" position when PTO control is pulled out fully, proceed to step 4 below.

Step 4. Check hydraulic pump key for sheared condition.

a. If sheared, replace (para 3-42a).

b. If not sheared, proceed to step 5 below.

Step 5. Start vehicle engine and watch power take-off output shaft for rotation.

a. If power take-off output shaft rotates, repair or replace fifth wheel hydraulic pump (para 3-42a).

b. If power take-off output shaft does not rotate, repair or replace power take-off (para 3-42b). If malfunction is not corrected, notify general support maintenance (transmission may require overhaul).

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. FIFTH WHEEL LIFTS SLOWLY

Step 1. Check hydraulic control valve relief pressure (para 3-42c).

a. If pressure is less than 2000 psi, but more than 1500 psi, adjust (para 3-42c). If pressure increases to 2000 psi without turning adjusting screw in all the way, refer to para 2-76, Malfunction 2, step 1. If 2000 psi pressure is not obtained or adjusting screw must be turned in all the way to obtain 2000 psi, proceed to step 2 below.

b. If pressure is 2000 psi or less than 1500 psi, proceed to step 2 below.

Step 2. Install pressure gage in hydraulic control valve relief pressure check point (para 3-42c).

Install flowmeter at hose connecting hydraulic pump and hydraulic control valve.

CAUTION

Do not hold 5th WHEEL control lever back for more than 30 seconds at time. Failure to follow this procedure could result in damage to hydraulic pump.

With vehicle engine operating at governed speed, have assistant pull back 5th WHEEL control lever fully. Watch pressure gage and flowmeter. Pressure shall be 2000 psi with a flow rate of at least 10 GPM.

NOTE

With engine at governed speed, maximum performance is 14 GPM flow rate and 2000 psi relief pressure.

a. If flow rate is less than 10 GPM, hydraulic pump is defective; repair or replace (para 3-42a).

b. If flow rate is between 10 and 14 GPM, but relief pressure is less than 2000 psi, hydraulic control valve is defective; repair or replace (para 3-42c).

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. FIFTH WHEEL CREEPS DOWNWARD

Step 1. Check if hydraulic control valve metering spool is in neutral position.

a. If metering spool is not in neutral position, repair hydraulic control valve or cable as required (para 3-42 c and 2-78a).

b. If metering spool is in neutral position, proceed to step 2 below.

Step 2. Lower fifth wheel boom fully.

Disconnect hose from bleed valve (para 2-87b(2)) and cap the hose and bleed valve.
Raise fifth wheel boom fully and check for downward creep.

a. If fifth wheel boom does not creep downward, bleed valve is defective; replace (para 2-78b(2)).

b. If fifth wheel boom creeps downward, lower fifth wheel boom fully, reconnect hose to bleed valve, and proceed to step 3 below.

Step 3. Raise fifth wheel boom fully; support boom in raised position.

Disconnect two fifth wheel hydraulic cylinder hoses from the down-stroke ends of hydraulic cylinders (para 2-78b(2)) and cap the hoses.
Install a pressure gage in each hydraulic cylinder port.
Have an assistant pull back 5th WHEEL control lever fully; watch pressure gages.

a. If pressure gages indicate approximately zero psi and do not increase, hydraulic control valve is leaking internally; repair or replace (para 3-42c).

b. If pressure gage indicates increased pressure, hydraulic cylinder is leaking internally; repair or replace (para 3-42d).

4. FIFTH WHEEL DOESN'T LOWER

Step 1. Check hydraulic cylinder rods for bent or jammed condition.

a. If hydraulic cylinder rods are bent or jammed, repair or replace cylinders (para 3-42d).

b. If hydraulic cylinder rods are not bent or jammed, proceed to step 2 below.

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4. FIFTH WHEEL DOESN'T LOWER (Cont)

WARNING

Keep clear of fifth wheel boom moving parts to prevent serious injury or death.

Step 2. Check movement of fifth wheel hydraulic control valve metering spool.

Have assistant push 5th WHEEL control lever fully forward; watch movement of hydraulic control valve metering spool.

a. If metering spool does not move to the fully "down" position, repair or replace 5th WHEEL control lever or cable (para 2-78a).

b. If metering spool moves to the fully "down" position, proceed to step 3 below.

Step 3. Rotate handle of bleed valve to fully open (horizontal) position.

a. If fifth wheel lowers, close bleed valve and proceed to step 5 below.

b. If fifth wheel does not lower, proceed to step 4 below.

Step 4. Support fifth wheel boom.

Check hose assemblies between bleed valve and hydraulic cylinders for restrictions (sharp bends, blockage).

WARNING

Compressed air must not exceed 30 psi. Wear safety glasses when using compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

a. If hoses are blocked, use compressed air (30 psi maximum) to remove blockage; if hoses remain blocked, replace (para 2-78b(2)).

b. If hoses are not blocked, replace bleed valve (para 2-78b(2)). If malfunction is not corrected, proceed to step 5 below.

3-40. FIFTH WHEEL HYDRAULIC SYSTEM TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

4. FIFTH WHEEL DOESN'T LOWER (Cont)

Step 5. Lower fifth wheel boom fully using bleed valve.

Remove hydraulic cylinder velocity fuses (para 2-78b(2)).
Try to raise and lower fifth wheel boom.

a. If fifth wheel boom lowers, velocity fuses are contaminated by foreign material; replace (para 2-78b(2)).

b. If fifth wheel boom does not lower, hydraulic control valve is defective; repair or replace (para 3-42c).

5. HYDRAULIC OIL FOAMING

WARNING

Do not remove filler cap when hydraulic oil is hot. Hot oil can cause severe injury.

Remove hydraulic reservoir filler cap and check for proper viscosity hydraulic oil (compare thickness of oil to that of oil from new container).

a. If oil from reservoir has the same consistency as sample oil, repair or replace hydraulic pump (para 3-42a).

b. If oil from reservoir has different consistency than sample oil, drain and flush hydraulic system and replace oil filters (para 2-78c and 2-78b(1)).

6. HYDRAULIC OIL OVERHEATING

Check hydraulic control valve relief pressure (para 3-42c).

a. If pressure is less than 2000 psi, adjust (para 3-42c). If pressure does not increase to 2000 psi, repair or replace hydraulic control valve (para 3-42c).

b. If pressure is 2000 psi, refer to para 2-76, Malfunction 5, step 1.

3-41. CAB TILT HYDRAULIC SYSTEM TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. CAB WON'T RAISE TO 45 DEGREES

   Check if cab tilt hydraulic pump operates and hydraulic latches release.

   a. If cab tilt hydraulic pump operates and hydraulic latches release, hydraulic cylinder is defective; repair or replace (para 3-43b).

   b. If cab tilt hydraulic pump does not operate, repair or replace (para 3-43a).

   c. If hydraulic latches do not release, , replace (para 3-43c).

2. CAB WON'T LOWER OR STOPS PART WAY DOWN

   Repair or replace cab tilt hydraulic pump relief valve (para 3-43a).

3. HYDRAULIC LATCHES OR HYDRAULIC CYLINDER LEAK FLUID

   Replace a defective hydraulic latch (para 3-43c); repair or replace defective hydraulic cylinder (para 3-43b).

4. HYDRAULIC PUMP LEAKS FLUID AT FILLER PLUG OR VENT

   Check if fluid level is too high.

   a. If fluid level is too high, remove reservoir (para 2-79a) and pour off excess fluid (dispose of used fluid properly).

   b. If fluid level is correct, purge cab tilt hydraulic system (para 3-43b).

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE

a. Hydraulic Pump.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Retaining ring pliers
- Puller kit
- Safety glasses
- Torque wrench
- Vise jaw caps
- Socket head screw key set
- Machinist's vise

Automotive Mechanic's Tool Kit
- Hammer

Soft plastic hammer
Straightedge
removed from hydraulic pump.

Materials/Parts
Cleaning solvent
Clean cloths — Item 2, Appendix C
Hydraulic oil — Item 22, Appendix C
Service parts kit — FSCM 64294 PN 46099-6
Lubriplate
- Aero-lube grease

Block of wood
Sleeve

Personnel Required
Automotive Repairer MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-78b(2)	Hydraulic lines and fittings
2-65c	Rear platform removed.

Item 1, Appendix C

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission, right hand side	a. Two capscrews (19) and lock washers (20)	Remove	Support hydraulic pump
		b. Hydraulic pump	Remove	Pull from power take-off
DISASSEMBLY				

CAUTION

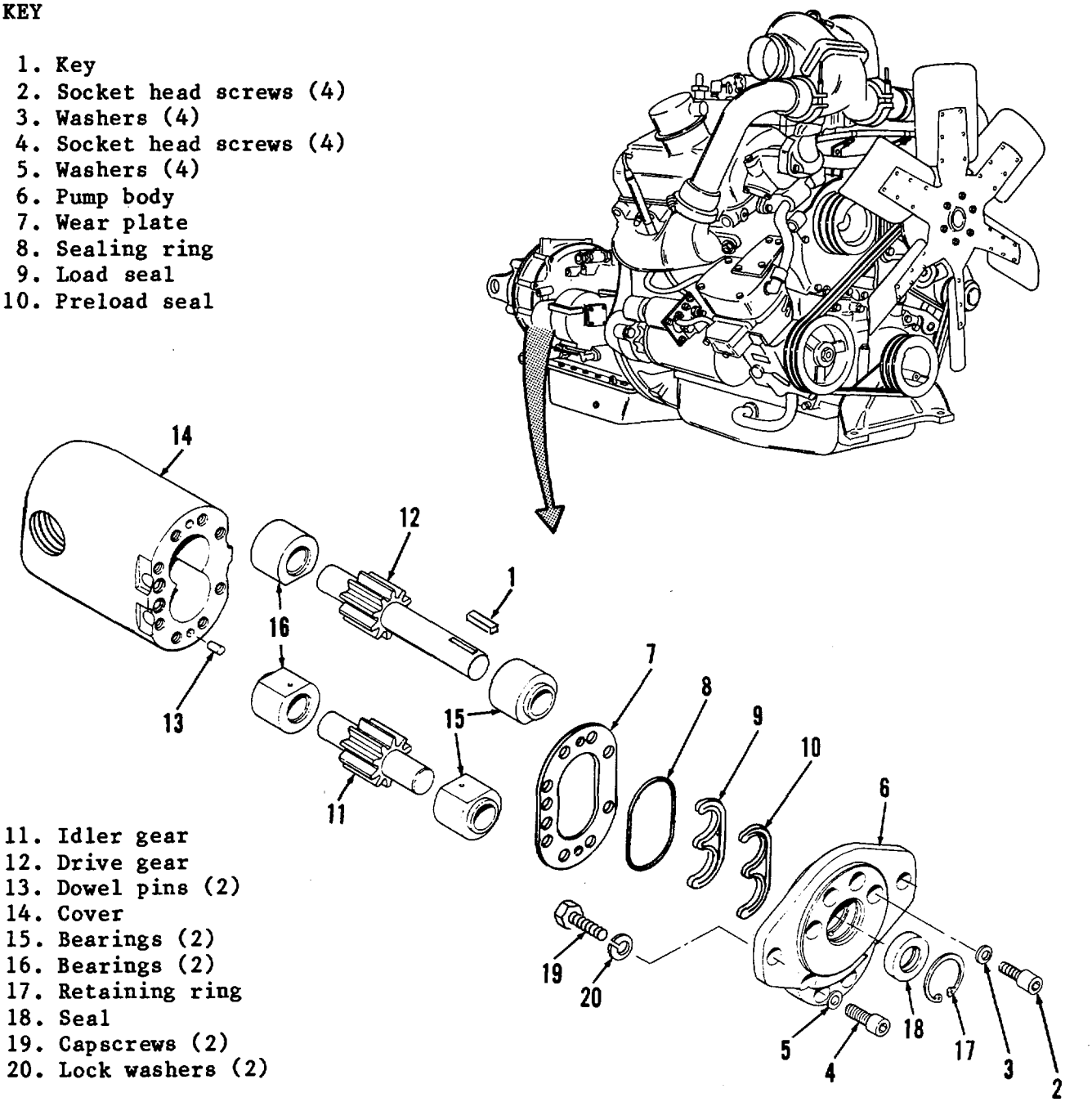
Exercise care when using vise to avoid distorting any parts. If vise is used, clamp vise jaws across rear of cover (14).

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)I

a. Hydraulic Pump (cont).

KEY

1. Key
2. Socket head screws (4)
3. Washers (4)
4. Socket head screws (4)
5. Washers (4)
6. Pump body
7. Wear plate
8. Sealing ring
9. Load seal
10. Preload seal
11. Idler gear
12. Drive gear
13. Dowel pins (2)
14. Cover
15. Bearings (2)
16. Bearings (2)
17. Retaining ring
18. Seal
19. Capscrews (2)
20. Lock washers (2)



TA236318

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2	Hydraulic pump	a. Key (1)	Remove and discard	
		b. Four socket head screws (2) and washers (3)	Remove	Discard washers (3)
		c. Four socket head screws (4) and washers (5)	Remove	Discard washers (5)
		CAUTION Do not attempt to pry pump sections apart in following step. Prying could scratch mating surfaces and cause a leak.		
		d. Pump body (6)	a. Tap lightly	Use soft plastic hammer; tap lightly to loosen
		b. Remove		
		e. Wear plate (7) and sealing ring (8)	Remove and discard	
		f. Load seal (9) and preload seal (10)	Remove and discard	
		g. Idler gear (11)	Remove	
		h. Drive gear (12)	Remove	
		NOTE Remove two dowel pins (13) only if inspection indicates need for replacement.		
		i. Two dowel pins (13)	Remove	
		NOTE Remove bearings (15 and 16) only if inspection indicates need for replacement.		

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		j. Two bearings (15)	Remove	Turn pump body (6) upside down, then tap against block of wood to loosen bearings
		NOTE		
		If bearings (15) are extremely tight and difficult to remove, it indicates operation with dirty hydraulic oil.		
		k. Two bearings (16)	Remove	Turn cover (14) upside down, then tap against block of wood to loosen bearings
		l. Retaining ring (17) discard	Remove and	Use retaining ring pliers
		NOTE		
		Exercise care not to damage seal recess in following step.		
		m. Seal (18)	Remove	Use bearing puller
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
3		All parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
INSPECTION				
4		a. Pump body (6) and cover (14)	Inspect	Place a straightedge across machined surfaces that mate pump body (6) with cover (14), to check for warped mating surfaces. Replace if warped, cracked, broken, of distorted
		b. Idler gear (11) and drive gear (12)	Inspect	Replace as set if teeth cracked, broken, or missing, or shafts cracked or distorted
		c. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
		NOTE Lightly coat all parts with clean hydraulic oil before reassembly.		
5	Hydraulic pump	a. All interior parts	Lubricate	Use clean hydraulic oil

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
5 (cont)		**CAUTION**		
		Place body (6) on soft wood block to prevent marring mating surfaces.		
	b.	New seal (18)	Install	In pump body (6) with metal case to outside of pump. Force seal firmly into place with suitable sleeve, or press into pump body
	c.	New retaining ring (17)	Install	Use retaining ring pliers
	d.	Two bearings (16)	Install	In cover (14)
	e.	Two dowel pins (13)	Install	Use soft plastic hammer; tap into cover (14)
	f.	Two bearings (15)	Install	In pump body (6)
	g.	Drive gear (12) and idler gear (11)	Install	In cover (14)
	h.	Seal (18)	Lubricate	Fill space between lips with Lubriplate Aero-lube grease
	i.	New preload seal (10), load seal (9), and sealing ring (8)	Assemble	On new wear plate (7)
	j.	New wear plate (7)	Install	Install with wear surface facing gears (11 and 12)
	k.	Pump body (6)	Position	Against cover (14)
	l.	Four new washers (5) and screws (4)	Install	Do not tighten
	m.	Four new washers (3) and screws (2)	Install	Do not tighten
	n.	Pump shaft	Rotate	
	o.	Screws (2 and 4)	Tighten	Tighten alternately to 140 pounds inch torque
	p.	Four screws (4)	Tighten	To 370 pounds inch torque
	q.	Four screws (2)	Tighten	To 200 pounds inch torque
	r.	New key (1)	Position	In drive gear (12) shaft keyway

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
6	Transmis-sion, right hand side	a. Hydraulic pump b. Two capscrews (19) and lock washers (20)	Position Install and tighten	On power take-off
7	Hydraulic system	Lines and fittings	Install	Para 2-78b(2)
8	Cab	Key switch	Turn on	Run engine at idle to allow hydraulic pump to break in slowly
9	Bleed valve	Hydraulic system	Bleed	Open bleed valve until air is purged from system
10	Cab	Fifth wheel control lever	Pull	With power take-off engaged and engine at fast idle, pull fifth wheel lever back to raise fifth wheel
11	Hydraulic reservoir	Hydraulic system	Fill	Add hydraulic oil (para 2-78c)
12	Hydraulic system	All connections	Inspect	Check for leaks
13	Cab	Key switch	Turn off	
14	Tractor	Rear platform	Install	Para 2-65c

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Retaining ring pliers
- Puller kit
- Safety glasses
- Torque wrench
- Socket wrench set
- Socket head screw key set

Automotive Mechanic's Tool Kit
- Pliers
- Hammer

Soft plastic hammer
Straightedge
Sleeve
Dial indicator
Arbor press
Brass drift

Materials/Parts

Cleaning solvent	Item 1, Appendix C	
Clean cloths	Item 2, Appendix C	
Mineral spirits	Item 33, Appendix C	

Gaskets:

0.010 inch	FSCM 95019 PN 22-P-24-1
0.020 inch	FSCM 95019 PN 22-P-24-2
0.010 inch	FSCM 95019 PN 35-P-9-1
0.020 inch	FSCM 95019 PN 35-P-9-2
Gasket	FSCM 95019 PN 35-P-8
O-ring	FSCM 95019 PN 28-P-49
Oil seal	FSCM 95019 PN 28-P-52
Tie straps	FSCM 96906 PN MS3667-1-9
Block of wood	

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-65c	Rear platform removed.
2-41b	Transmission fluid drained.
3-42a	Hydraulic pump removed and set aside (pump hoses connected).

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

CAUTION

Do not strike power take-off housing with hammer.

1	Transmission, right hand side (2), and	a.	Setscrew (6)	Loosen	
		b.	Nut (1), screw clamp (3)	Remove	
		c.	PTO cable (4)	Disconnect	Pull from pivot pin (5)
		d.	Pivot pin (5) and setscrew (6)	Remove	From shift lever (33)

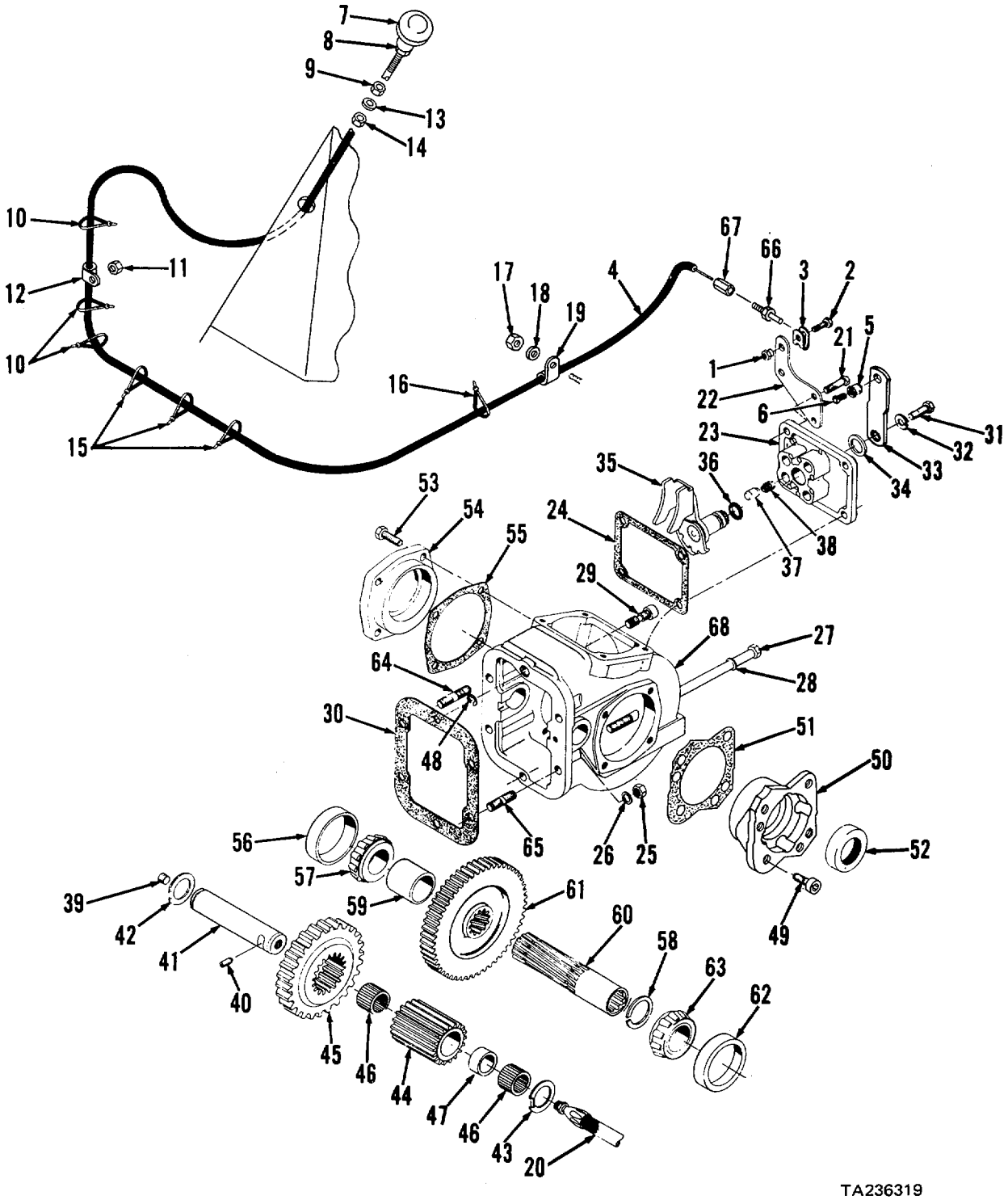
3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Corner instrument panel, top nut (8)	a. Nut (9)	Loosen	
		b. Knob (7) and	Remove	From PTO cable (4) shaft
		c. Nut (9)	Remove	
3	Cab tilt pump	Cab	Tilt 45 degrees	
4	Under cab hood	a. Three tie straps (10)	Remove	Cut and discard
		b. Nut (11) and clamp (12)	Remove	
		c. PTO cable (4)	Remove	From corner instrument panel
		d. Lock washer (13) and nut (14)	Remove	From PTO cable (4)
5	Frame, left hand side	a. Heat shield	Remove	Para 2-65d
		b. Three tie straps (15)	Remove	Cut and discard
6	Behind rear cab guard	a. Tie strap (16)	Remove	Cut and discard
		b. Clamp (19), nut (17), and washer (18)	Remove	From external engine oil filter
		c. PTO cable (4)	Remove	From tractor
7	Transmis-sion, right hand side	a. PTO hose (20)	Disconnect and remove	From power take-off; para 2-41e
		b. Four capscrews (21), bracket (22), cover (23), and gasket (24)	Remove	Discard gasket (24)
		c. Four nuts (25) and copper gaskets (26)	Remove	
		d. Capscrew (27) and copper gasket (28)	Remove	
		e. PTO assembly	Support	
		f. Socket head screw (29)	Loosen	From transmission housing only; do not attempt to remove from power take-off

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).



TA236319

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

KEY

1. Nut
2. Screw
3. Clamp
4. PTO cable
5. Pivot pin
6. Setscrew
7. Knob
8. Nut
9. Nut
10. Tie straps (3)
11. Nut
12. Clamp
13. Lock washer
14. Nut
15. Tie straps (3)
16. Tie strap
17. Nut
18. Washer
19. Clamp
20. PTO hose
21. Capscrews (4)
22. Bracket
23. Cover
24. Gasket
25. Nuts (4)
26. Copper gaskets (4)
27. Capscrew
28. Copper gasket
29. Socket head screw
30. Gasket
31. Capscrew
32. Washer
33. Shift lever
34. Washer
35. Shifter plate
36. O-ring
37. Poppet
38. Spring
39. Pipe plug
40. Setscrew
41. Idler shaft
42. Thrust washer
43. Thrust washer
44. Drive gear
45. Input gear
46. Needle rollers (2)
47. Spacer
48. Retaining ring
49. Socket head screws (4)
50. Open end bearing cap
51. Gaskets (AR)
52. Oil seal
53. Capscrews (4)
54. Closed end bearing cap
55. Gaskets (AR)
56. Bearing cup
57. Bearing cone
58. Lock ring
59. Spacer
60. Output shaft
61. Output gear
62. Bearing cup
63. Bearing cone
64. Studs (2)
65. Studs (2)
66. End fitting
67. Collar
68. Housing

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
7 (cont)		g. Power take-off	Remove	Pull from transmission
		h. Socket head screw (29)	Remove	From power take-off
		i. Gasket (30)	Remove and discard	
DISASSEMBLY				
8	Cover (23)	a. Capscrew (31), washer (32), shift lever (33), and washer (34)	Remove	
		b. Shifter plate (35)	Remove	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8 (cont)		c. O-ring (36), poppet (37), and spring (38)	Remove	Discard O-ring (36)
9 (44)	Drive gear	a. Pipe plug (39)	Remove	
		b. Setscrew (40)	Remove	
		c. Idler shaft (41)	Remove	Use brass drift and hammer
		d. Thrust washers (42 and 43)	Remove	
		e. Drive gear (44) and input gear (45)	Remove and separate	
		f. Two needle rollers (46) and spacer (47)	Remove	From drive gear (44)
10	Housing (68)	a. Retaining ring (48)	Remove	Use retaining ring pliers
		b. Four socket head screws (49)	Remove	
		c. Open end bearing cap (50)	a. Tap b. Remove	Use plastic hammer to loosen From housing (68)
		d. Gaskets (51)	Remove and discard	
		e. Oil seal (52)	Remove and discard	Press from open end bearing cap (50)
		f. Four capscrews (53)	Remove	
		g. Closed end bearing cap (54)	a. Tap b. Remove	Use plastic hammer to loosen
		h. Gaskets (55)	Remove and discard	Remove from housing (68)
11 (61)	Output gear	a. Bearing cup (56)	Remove	
		b. Bearing cone (57)	Remove	Use puller
		c. Lock ring (58)	Remove	
		d. Spacer (59)	Remove	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
11 (cont)		e. Output shaft (60)	Remove	From output gear (61)
		f. Output gear (61)	Remove	From housing (68)
		g. Open end bear-cap (50)	Position	On block of wood with PTO side down
		h. Bearing cup (62)	Remove	Use sleeve and hammer
		i. Bearing cone (63)	Remove	Use puller
		NOTE		
		Remove studs (64 and 65) only if inspection indicates need for replacement. Note location to aid in reassembly.		
12	Transmission housing	a. Two studs (64)	Remove	
		b. Two studs (65)	Remove	
		NOTE		
		Remove end fitting (66) and collar (67) only if inspection indicates need for replacement.		
13	PTO cable (4)	End fitting (66) and collar (67)	Remove	
CLEANING				
14		a. Bearings (46, 57, and 63)	Clean using mineral spirits. Immerse bearings and slowly move up and down. Remove bearings from mineral spirits and strike larger side of bearing (57 and 63) cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in mineral spirits and repeat procedure until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Direct air stream across bearings to avoid spinning. Do not spin bearings when drying them; bearings may be rotated slowly by hand to facilitate drying	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
14 (cont)		**WARNING**		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
	b.	All other parts	Clean	Use cleaning solvent P-D-680; dry thoroughly using compressed air or clean cloths
INSPECTION				
15	a.	PTO cable (4), end fitting (66), and collar (67)	Inspect	Replace cable if broken, frayed, kinked or otherwise damaged. Replace end fitting or collar if damaged
	b.	Spring (38)	Inspect	Replace if cracked, broken, distorted, or permanently set
	c.	Bearing caps (50 and 54) and housing (68)	Inspect	Place a straightedge across machined surfaces to check for warped mating surface. Replace if warped, cracked, broken, or distorted
	d.	Bearings (46, (57, and 63)	Inspect	Replace if chipped, nicked, worn, or flat spotted. If bearing is replaced, replace bearing and cup as a set

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
15 (cont)		e. Gears (44, 45, and 61)	Inspect	Replace if cracked, broken, distorted, teeth missing, nicked, or pitted
		f. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
16	PTO cable (4)	Collar (67) and end fitting (66)	Install	If removed
17	Transmission housing	a. Two studs (65)	Install	If removed
		b. Two studs (64)	Install	If removed
18	Output gear (61)	a. Lock ring (58)	Install	On output shaft (60)
		b. Bearing cone (63)	a. Position b.Install	On output shaft (60) Press or drive into place with soft hammer or arbor press
		c. Output gear (61)	Install	In housing (68)
		d. Output shaft (60)	Install	Through output gear (61)
		e. Spacer (59)	Install	
		f. Bearing cone (57)	Position	On output shaft (60)
		g. Housing (68)	Invert	
		h. Bearing cone (57)	Install	Press or drive into place with soft hammer or arbor press
		i. Bearing cup (56)	Install	In closed end bearing cap (54); press or drive in with soft hammer or arbor press
		j. Bearing cup (62)	Install	In open end bearing cap (50); press or drive in with soft hammer or arbor press
19	Housing (68)	a. New gaskets (55)	Position	Initially use two 0.020 inch gaskets; use more as needed
		b. Closed end bearing cap (54)	Position	Offset of bearing cap opposite input gear (45)

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
19 (cont)		c. Four capscrews (53)	Install and tighten	
		d. New gaskets (51)	Position	Initially use two 0.020 inch gaskets; use more as needed
		e. Open end bearing cap (50)	Position	Offset of bearing cap opposite input gear (45)
		f. Four socket head screws (49)	Install and tighten	
		g. Dial indicator	Position	On housing (68)
		h. Output shaft (60)	Check	Check that shaft turns freely and that end play does not exceed 0.006 inch
		i. Dial indicator	Remove	
		j. Oil seal (52)	Install	Use suitable sleeve and hammer to seat fully
20	Drive gear (44)	a. Input gear (45)	Lay flat	
		b. Drive gear (44)	Position	On top of input gear (45)
		c. One needle roller (46)	Install	
		d. Spacer (47)	Install	
		e. One needle roller (46)	Install	
		f. Idler shaft (41)	a. Position	In housing (68), with set-screw (40) side down
			b. Install	In housing (68), until idler shaft breaks through inside wall of housing

NOTE

Groove in idler shaft (41) must align with setscrew hole in housing (68).

		g. Thrust washer (43)	Position	In housing (68), to align with idler shaft (41) hole
		h. Gear assembly	Install	In housing (68)
		i. Idler shaft (41)	Install	Use soft hammer to tap in
		j. Thrust washer (42)	Install	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
20 (cont)		k. Idler shaft (41)	Install	Until flush with housing (37)
		l. Setscrew (40)	Install	
		m. Pipe plug (39)	Install	
		n. Retaining ring (48) and socket head screw (29)	Install	In housing (68)
21	Cover (23)	a. Spring (38), poppet (37), and new O-ring (36)	Install	
		b. Shifter plate (35)	Install	
		c. Washer (34)	Install	
		d. Shift lever (33)	Install	
		e. Washer (32) and capscrew (31)	Install	
INSTALLATION				
		NOTE		
		Gasket (30) thickness must be selected to provide 0.005 to 0.025 inch backlash between input gear (45) and transmission PTO drive gear.		
22	Transmis-sion, right hand side	a. New gasket (30)	Install	On power take-off
		b. Power take-off	Position	On transmission
		c. Copper gasket (28) and capscrew (27)	Install	Tighten capscrew to 33 pounds foot torque
		d. Four copper gaskets (26) and nuts (25)	Install	
		e. Socket head screw (29)	Tighten	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
23	Power takeoff	a. Gasket (24)	Position	On cover (23)
		b. Cover (23)	Position	On housing (68). Be sure shifter plate (35) engages input gear (45)
		c. Bracket (22)	Position	
		d. Four capscrews (21)	Install and tighten	
		e. PTO hose (20)	Install	Para 2-41e
24	Under cab hood	a. Nut (14) and lock washer (13)	Install	On PTO cable (4)
		b. PTO cable (4)	a. Install	Through corner instrument panel from bottom
			b. Route	To power take-off
		c. Three new tie straps (10)	Install	
		d. Clamp (12) and nut (11)	Install	Tighten nut (11)
25	Frame, left hand side	a. Three new tie straps (15)	Install	
		b. Heat shield	Install	Para 2-65d
26	External engine oil filter	a. Clamp (19), washer (18), and nut (17)	Install	Tighten nut (17)
		b. New tie strap (16)	Install	
27	Cab tilt pump	Cab	Lower	To normal operating position
28	Corner instrument panel, top	a. Nut (9)	Install and tighten	
		b. Nut (8) and knob (7) tighten	Install and	
		c. Knob (7)	Push in fully	
29	Transmission, right hand side	a. Pivot pin (5) and setscrew (6)	Position In shift lever (33)	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Power Take-off (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
29 (cont)		b. PTO cable (4)	a. Install	Push cable wire into pivot pin (5) hole
			b. Position	In clamp (3)
		c. Clamp (3), screw (2), and nut (1)	Install	Tighten nut (1)
		d. Setscrew (6)	Tighten	
		e. Hydraulic pump	Install	Para 3-42a
30	Tractor rear	Rear platform	Install	Para 2-65c
31	Tractor cab	a. Engine	a. Start	
			b. Run	Run at fast idle
		b. Power take-off	Engage	
		c. Fifth wheel lever	Pull	Pull lever back to check for proper system operation

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation
g. Adjustment

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set
Torque wrench
Retaining ring pliers
Safety glasses
Pressure gage, 3000 psi

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Hydraulic oil	Item 22, Appendix C
Retaining ring	FSCM 02249 PN 0914-001
Two O-ring seals	FSCM 02249 PN 7694-001
Washer	FSCM 02249 PN 1213-001
O-ring	FSCM 02249 PN 0926-001
Gasket	FSCM 02249 PN 0923-001
O-ring	FSCM 02249 PN 2706-001
Cotter pin	FSCM 02249 PN 929-001
Cotter pin	FSCM 02249 PN 086-001

Personnel Required
Three Automotive Repairers MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

Equipment Condition

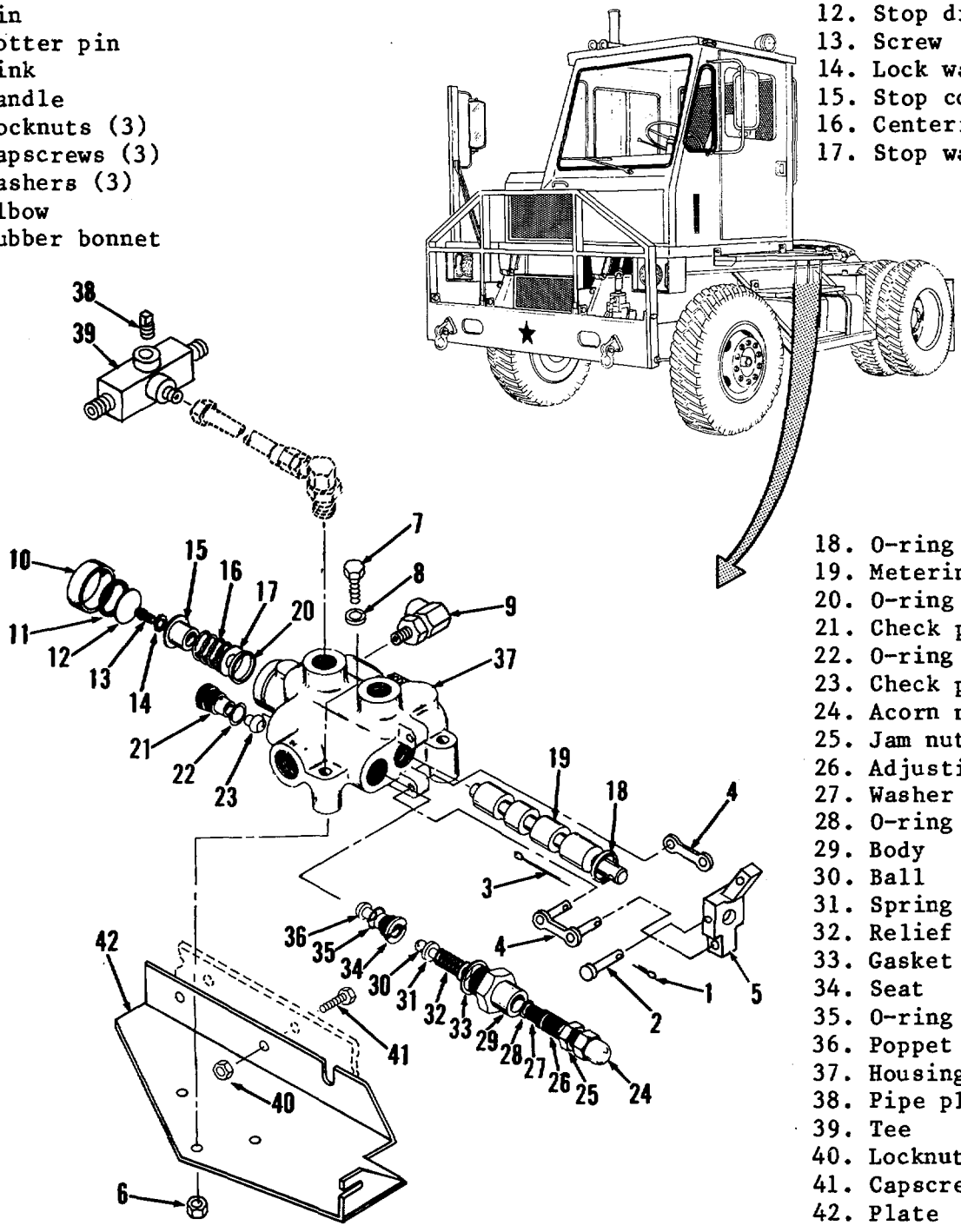
Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
2-63e	Boom platform removed.
2-65c	Rear platform removed.
2-78b(1)	Hydraulic reservoir drained.
2-78b(2)	Hydraulic lines and fittings / removed from hydraulic control valve.
2-78a	Fifth wheel control cable disconnected from control valve.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Left hand frame rail	a. Cotter pin (1)	Remove and discard	
		b. Pin (2)	Remove	
		c. Cotter pin (3)	Remove and discard	Remove from link (4)
		d. Link (4)	a. Separate b. Remove	Separate two sections of link
		e. Handle (5)	Remove	
		f. Three locknuts (6), capscrews (7), and washers (8)	Remove	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

1. Cotter pin
2. Pin
3. Cotter pin
4. Link
5. Handle
6. Locknuts (3)
7. Capscrews (3)
8. Washers (3)
9. Elbow
10. Rubber bonnet
11. Retaining ring
12. Stop disc
13. Screw
14. Lock washer
15. Stop collar
16. Centering spring
17. Stop washer



18. O-ring seal
19. Metering spool
20. O-ring seal
21. Check plug
22. O-ring
23. Check poppet
24. Acorn nut
25. Jam nut
26. Adjusting screw
27. Washer
28. O-ring
29. Body
30. Ball
31. Spring guide
32. Relief spring
33. Gasket
34. Seat
35. O-ring
36. Poppet
37. Housing
38. Pipe plug
39. Tee
40. Locknuts (2)
41. Capscrews (2)
42. Plate

TA236320

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)		g. Hydraulic control valve	Remove	Lift from plate (42)
		h. Two locknuts (40) and cap-screws (41)	Remove	Support plate (42)
		i. Plate (42)	Remove	
DISASSEMBLY				
		NOTE		
		Set parts aside in order of removal to aid in reassembly.		
2	Hydraulic control valve	a. Elbow (9)	Remove	
		b. Rubber bonnet (10)	Remove	
		c. Retaining ring (11)	Remove and discard	Use retaining ring pliers
		d. Stop disc (12)	Remove	
		e. Screw (13) and lock washer (14)	Remove	
		f. Stop collar (15) and centering spring (16)	Remove	
		g. Stop washer (17)	Remove	
		h. Metering spool (19)	Move	Push spool (19) into housing (37) from O-ring seal (18) end until O-ring seal (18) is exposed
		i. O-ring seal (18)	Remove and discard	
		j. Metering spool (19)	Remove	From housing (37)
		k. O-ring seal (20)	Remove and discard	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		l. Check plug (21), O-ring (22), and check poppet (23)	Remove	Discard O-ring (22)
		m. Acorn nut (24) and jam nut (25)	Remove	
		n. Adjusting screw (26)	Remove	
		o. Washer (27) and O-ring (28)	Remove and discard	
		p. Body (29)	Remove	
		q. Ball (30), spring guide (31), and relief spring (32)	Remove	
		r. Gasket (33)	Remove and discard	
		s. Seat (34), O-ring (35), and poppet (36)	Remove	Discard O-ring (35)
CLEANING				
3		a. Rubber bonnet (10)	Clean	Wipe with clean cloth moistened with water only. Dry thoroughly with clean cloth

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and seek medical aid immediately.

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
3 (cont)		**WARNING** Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
		b. All other parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION				
4 (19)		a. Metering spool	Inspect	Replace hydraulic control valve if metering spool is cracked, broken, burred, or does not slide easily in bore of housing (37)
		b. Housing (37)	Inspect	Replace hydraulic control valve if housing is cracked, broken, burred, or does not easily accept metering spool (19)
		c. Springs (16 and 32)	Inspect	Replace if cracked, broken, distorted, or permanently set
		d. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
		NOTE Immerse all inner control valve parts in clean hydraulic oil to provide initial lubrication.		
5	Inner parts (13 thru 36)	All inner parts (13 thru 36)	Lubricate	Immerse in clean hydraulic oil

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
6	Hydraulic control valve	a. Poppet (36), new O-ring (35), and seat (34)	Install	In housing (37)
		b. Relief spring (32)	Install	On relief spring guide (31)
		c. New O-ring (28)	Install	On adjusting screw (26)
		d. Jam nut (25) and acorn nut (24)	Install	On adjusting screw (26)
		e. New washer (27)	Install	In body (29)
		f. Ball (30)	Install	In seat (34)
		g. New gasket (33)	Position	Against body (29)
		h. Adjusting screw (26) assembly (24 thru 33)	Install	In housing (37). Tighten jam nut (25) and acorn nut (24) hand tight only
		i. Check poppet (23), new O-ring (22), and check plug (21)	Install	
		j. Metering spool (19)	a. Install	Install threaded end first from O-ring seal (18) end of housing (37)
			b. Move	Push spool far enough into housing to expose O-ring seal (20) groove in spool
		k. New O-ring seal (20)	Install	

NOTE

Exercise care that O-ring seal (20) is not twisted or rolled in O-ring groove.

		l. Metering spool (19)	Move	Pull spool into housing (37) far enough to expose O-ring (18) groove in spool
		m. New O-ring seal (18)	Install	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
6 (cont)		**NOTE**		
		Exercise care that O-ring seal (18) is not twisted or rolled in O-ring groove.		
		n. Lock washer (14), stop collar (15), centering spring (16), and stop washer (17)	Assemble	On screw (13)
		o. Screw (13)	Install	Tighten to 10 pounds foot torque
		p. Stop disc (12)	Install	
		q. New retaining ring (11)	Install	Use retaining ring pliers
		r. Rubber bonnet (10)	Install	
		s. Elbow (9)	Install and tighten	
INSTALLATION				
7	Left hand frame rail	a. Plate (42)	Position	On frame rail; align mounting holes
		b. Two capscrews (41) and locknuts (40)	Install and	Secures plate (42) tighten
		c. Hydraulic control valve	Position	On plate (42); align mounting holes
		d. Three washers (8), cap- screws (7), and locknuts (6)	Install and tighten	
		e. Handle (5)	Position	
		f. Link (4)	Install	
		g. New cotter pin (3)	Install and spread	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
7 (cont)		h. Pin (2)	Install	Push through center hole in handle (5) and hole in metering spool (19)
		i. New cotter pin (1)	Install and spread	
8	Hydraulic control valve and fittings	a. Control cable	Connect	Para 2-78a
		b. Hydraulic lines	Install	Para 2-78b(2)
9	Hydraulic system	a. Hydraulic reservoir	Fill	To proper level
		b. Hydraulic system	Bleed	Bleed hydraulic system by opening bleed valve and alternately raising and lowering fifth wheel until air is purged from system
		c. Hydraulic reservoir	Check	Check fluid level. Add fluid to maintain proper level (see current lubrication order)
ADJUSTMENT				
10	Fifth wheel boom boom	a. Fifth wheel	Lower fully	
		b. Pipe plug (38)	Remove	From tee (39)
		c. 3000 psi pressure gage	Install	In tee (39)
11	Hydraulic control valve	a. Acorn nut (24)	Remove	
		b. Jam nut (25)	Loosen	
12	Tractor cab	a. Engine	Start	
		b. Power take-off	Engage	
		c. Engine	Operate	At 2500 rpm

CAUTION

Do not hold fifth wheel control lever back for more than 15 seconds at a time.

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT) I

c. Hydraulic Control Valve (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT (cont)				
12 (cont)		d. Fifth wheel control lever	Pull back	To raise fifth wheel
		NOTE		
		Use assistants for the following steps.		
13	Fifth wheel boom	3000 psi pressure gage	Watch	While performing step 14 below
14	Hydraulic control valve	a. Adjusting screw (26)	Turn	Adjust screw for 2000 psi indication on pressure gage
		b. Jam nut (25)	Tighten	When pressure gage indicates 2000 psi
15	Tractor cab	a. Fifth wheel control lever	Push forward	To lower fifth wheel fully
		b. Engine	Turn off	
16	Fifth wheel boom	a. 3000 psi pressure gage	Remove	From tee (39)
		b. Pipe plug (38)	Install	In tee (39)
		c. Boom platform	Install	Para 2-63e
17	Rear platform	Rear platform	Install	Para 2-65c

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection/Repair
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench set, 3/4 inch drive
Torque wrench, 3/4 inch drive, 600 pounds foot
Hand hammer
Lubricating kit
Safety glasses
Brass drift

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Chassis grease	Item 3, Appendix C
Medium grit emery cloth	Item 4, Appendix C
Degreasing solvent	Item 18, Appendix C
Hydraulic oil	Item 22, Appendix C
Stud lock compound	Item 23, Appendix C
Seal kit	FSCM 89642 PN 272-2175

Personnel Required
Automotive Repairer MOS 63H

References
LO 9-2320-285-12
(M878A1 Lubrication Order)

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Fifth wheel boom elevated fully and supported with hoist.
2-78b(2)	Hydraulic lines and fittings removed from hydraulic cylinder to be removed.

STEP	LOCATION	ITEM	ACTION	REMARKS

REMOVAL

NOTE

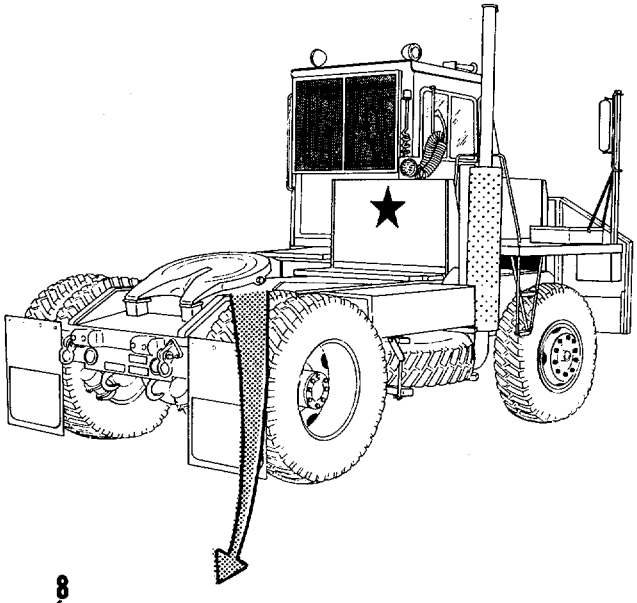
Before performing step 1 below, mark rod cap (3) and mating end of rod (12) using center punch and hammer to ensure correct alignment during reassembly.

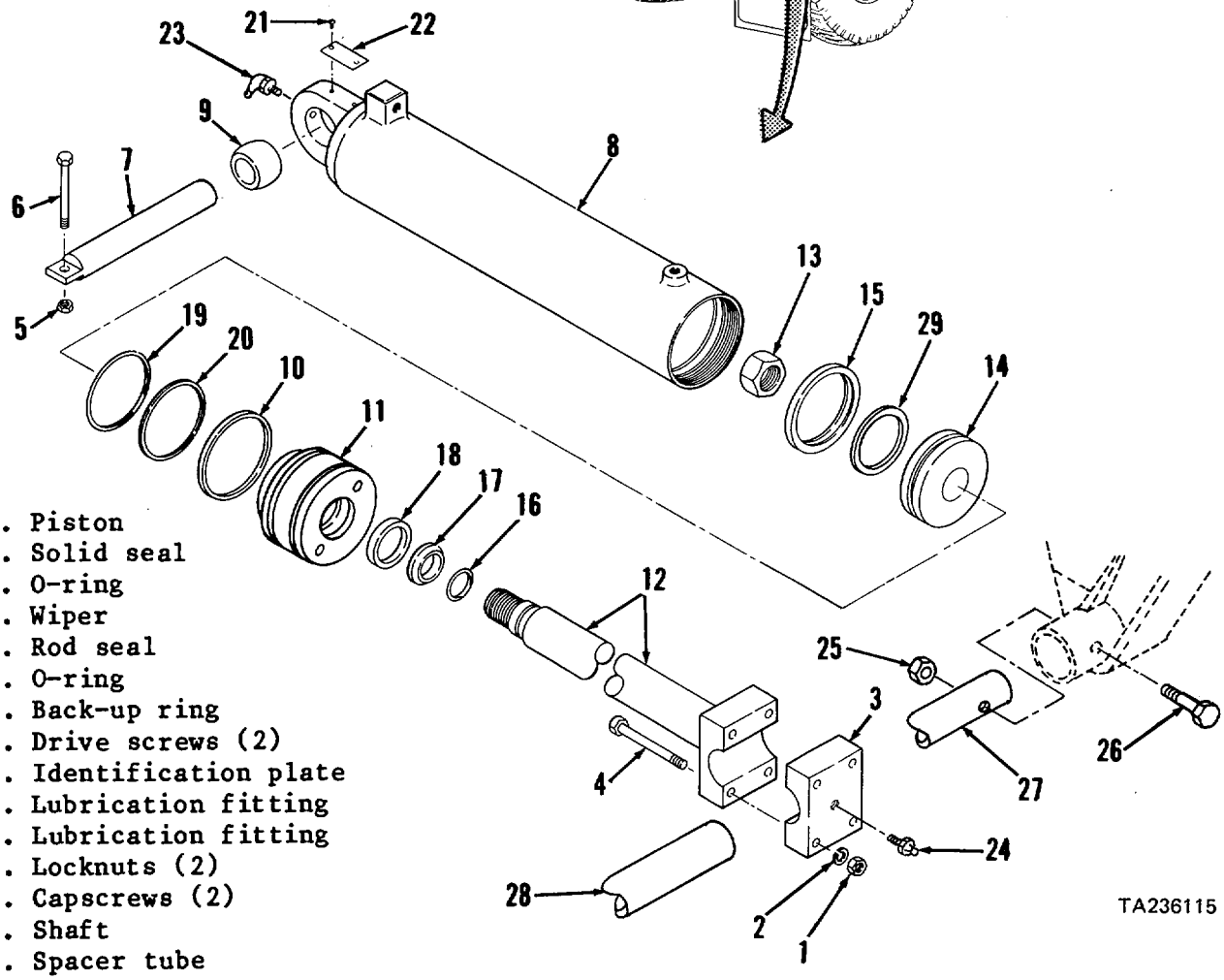
1	Hydraulic cylinder, bottom	a. Four nuts (1) and lock washers (2)	Remove	Support rod cap (3)
		b. Rod cap (3)	Remove	
		c. Four capscrews (4)	Remove	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

1. Nuts (4)
2. Lock washers (4)
3. Rod cap
4. Capscrews (4)
5. Locknut
6. Capscrew
7. Pin
8. Cylinder
9. Bearing
10. Retaining ring
11. Gland
12. Rod
13. Locknut





14. Piston
15. Solid seal
16. O-ring
17. Wiper
18. Rod seal
19. O-ring
20. Back-up ring
21. Drive screws (2)
22. Identification plate
23. Lubrication fitting
24. Lubrication fitting
25. Locknuts (2)
26. Capscrews (2)
27. Shaft
28. Spacer tube
29. Insert

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
2	Hydraulic cylinder, top	a Locknut (5) and capscrew (6)	Remove	
		b Pin (7)	Remove	Use brass drift and hammer if necessary
		c Hydraulic cylinder (8)	Remove	Push cylinder down fully; then lift from tractor
		NOTE		
		Perform steps 1 and 2 above to remove remaining hydraulic cylinder. Perform steps 3 and 4 below only if inspection indicates replacement of shaft (27) or spacer tube (28) is required.		
3	Tractor, rear, left side	Left rear tires and wheels	Remove	Para 2-57
4	Chassis rear, bottom	a Two locknuts (25) and capscrews (26)	Remove	
		b Shaft (27) and spacer tube (28)	Remove	If necessary, tap right end of shaft (27) with brass drift and hammer; then support spacer tube (28) while removing shaft (27)
5	Cylinder (8)	a Bearing (9)	Remove	Only if worn or damaged
		b Gland (11)	Position	Rotate until end of retaining ring (10) is visible in slot in cylinder (8) barrel
		c Retaining ring (10)	Pry up	Pry retaining ring (10) part of the way out of groove in gland (11)
		d Gland (11)	Position	Rotate until retaining ring (10) is completely dis-engaged from cylinder (8)

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5 (cont)		e. Retaining ring (10)	Remove and discard	
		f. Gland (11) and rod (12)	Remove	Pull from cylinder (8) as an assembly
6	Rod (12)	a. Locknut (13)	Remove and discard	
		b. Piston (14) with solid seal (15)	Remove	
		c. Solid seal (15) and insert (29)	Remove and discard	Remove from piston (14)
		d. Gland (11)	Remove	Pull from rod (12)
		e. O-ring (16)	Remove and discard	
7	Gland (11)	a. Wiper (17)	Remove and discard	
		b. Rod seal (18)	Remove and discard	
		c. O-ring (19)	Remove and discard	
		d. Back-up ring (20)	Remove and discard	
8	Cylinder (8)	a. Two drive screws (21) and identification plate (22)	Remove replacement	Only if required for
		b. Two lubrication fittings (23 and 24)	Remove (3)	From cylinder (8) and rod cap

NOTE

Repeat steps 5 thru 8 above to disassemble remaining hydraulic cylinder.

1342. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
9		All parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION/REPAIR				
10		a. Rod (12)	Inspect	Replace if bent, deeply grooved, or scored. Remove nicks or scratches with medium grit emery cloth polishing with a rotary motion
		b. Cylinder (8)	Inspect	Replace if deeply grooved, scored, or damaged. Remove nicks or scratches inside cylinder with medium grit emery cloth polishing with a rotary motion
		c. Bearing (9)	Inspect	Replace if worn, cracked, or split
		d. All other parts	Inspect	Replace if cracked, split, grooved, or otherwise damaged

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
11	Gland (11)			
		NOTE		
		Lubricate the following parts with clean hydraulic oil prior to installation.		
		a. New rod seal (18)	Install	Grooved side toward piston end
		b. New wiper (17)	Install	Chamfered side toward rod end
		c. New back-up ring (20)	Install	Butt against rod end of groove in gland (11)
		d. New O-ring (19)	Install	
		CAUTION		
		Use extreme care when performing following step not to damage wiper (17), rod seal (18), or O-ring (19).		
12	Rod (12)	a. Gland (11) with wiper (17), rod seal (18) and rings (19 and 20)	Install	As an assembly
		b. New O-ring (16)	Lubricate and install	Use clean hydraulic oil
		c. Piston (14)	Lubricate and install	Coat entire piston with clean hydraulic oil. Slide piston over O-ring (16) and butt against rod (12)
		d. New insert (29) and solid seal (15)	Lubricate and install	Use clean hydraulic oil
		e. New locknut (13)	Install	Coat threads of rod (12) and locknut (13) with degreasing solvent and allow to air dry ten minutes. Lightly coat threads of rod and locknut with stud lock compound; then tighten locknut to 375 pounds foot. Allow to air dry before testing cylinder

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
		CAUTION		
		Take care not to damage rings (19 and 20) or solid seal (15) when performing following step.		
13	Cylinder (8)	a. Cylinder (8)	Lubricate	Lightly coat inside diameter with clean hydraulic oil
		b. Rod (12) with piston (14) and gland (11)	Install	As an assembly. Compress solid seal (15) while sliding piston (14) into cylinder, and compress rings (19 and 20) while sliding gland (11) into cylinder
		c. Gland (11)	Position	Rotate until hole in gland (11) is visible in slot in cylinder (8) barrel
		d. Retaining ring (10)	Position	Engage retaining ring (10) in hole in gland (11)
		e. Gland (11)	Rotate	Rotate gland (11) until retaining ring (10) is completely drawn into cylinder (8)
		f. Identification plate (22)	Position and install	Use new drive screws (21), if removed
		g. Two lubrication fittings (23 and 24)	Install	Straight fitting (24) in rod cap (3); 90 degree fitting (23) in cylinder (8)
		NOTE		
		Repeat steps 11 thru 13 above to reassemble remaining hydraulic cylinder.		
INSTALLATION				
		NOTE		
		Perform steps 14 and 15 below only if shaft (27) and spacer tube (28) were removed; otherwise, proceed to step 16.		

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
14	Chassis rear, bottom	a. Shaft (27)	Position	Push into chassis bore from left side until 2-3 inches of shaft protrudes inside chassis
		b. Spacer tube (28)	Position	Push one end over short portion of shaft (27), and align free end with remaining chassis bore
		c. Shaft (27)	Install	Push through spacer tube (28) and into right side chassis bore. Align capscrew holes
		d. Two capscrews (26) and locknuts (25)	Install and tighten	
15	Tractor rear, left side	Left rear tires and wheels	Install	Para 2-57
16	Fifth wheel boom, top rear	a. Hydraulic cylinder (8)	Position	Position top of cylinder (8) between bores of boom, with cylinder ports facing rear of tractor
		b. Pin (7)	Install	Tap into bores of boom and bearing (9); then align capscrew hole
		c. Capscrew (6) and locknut (5)	Install and tighten	
17	Chassis rear, bottom	a. Spacer tube (28)	Slide	On shaft (27), away from hydraulic cylinder being installed
		b. Rod (12) (27)	Extend	Positions rod (12) on shaft
		c. Rod cap (3)	Position	Under rod (12) with holes aligned
		d. Four capscrews (4), lock washers (2), and nuts (1)	Install and tighten	

3-42. FIFTH WHEEL HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hydraulic Cylinders (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
		NOTE		
		Repeat steps 16 and 17 above to install remaining hydraulic cylinder.		
18	Hoist	a. Fifth wheel boom	Lower fully	While lowering hoist
		b. Hoist	Disconnect	From fifth wheel boom
19	Hydraulic cylinders	a. Four lubrication fittings (23 and 24)	Grease	Refer to current lubrication order
		b. Hydraulic lines and fittings	Install	On fifth wheel hydraulic cylinders, para 2-78b(2)
20	Hydraulic system	a. Hydraulic system	Bleed	Bleed hydraulic system by opening bleed valve and alternately raising and lowering fifth wheel until air is purged from system
		b. Hydraulic reservoir	Check	Check fluid level. Add fluid to maintain proper level (see current lubrication order)

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE

a. Hydraulic Pump.

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Retaining ring pliers
- Combination wrench set
- Safety glasses
- Socket wrench set
- Key set, socket head screw
- Torque wrench

Automotive Mechanic's Tool Kit
- Hammer
- Pliers
- Punch

Vise
Container

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Transmission fluid	Item 8, Appendix C
Loctite	Item 29, Appendix C
Seal and packing kit	FSCM 26953 P/N KH5003-30-01
Three cotter pins	FSCM 26953 P/N B1016-058
Retaining ring	FSCM 26953 P/N A8081-049

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-79a	Hydraulic pump removed.

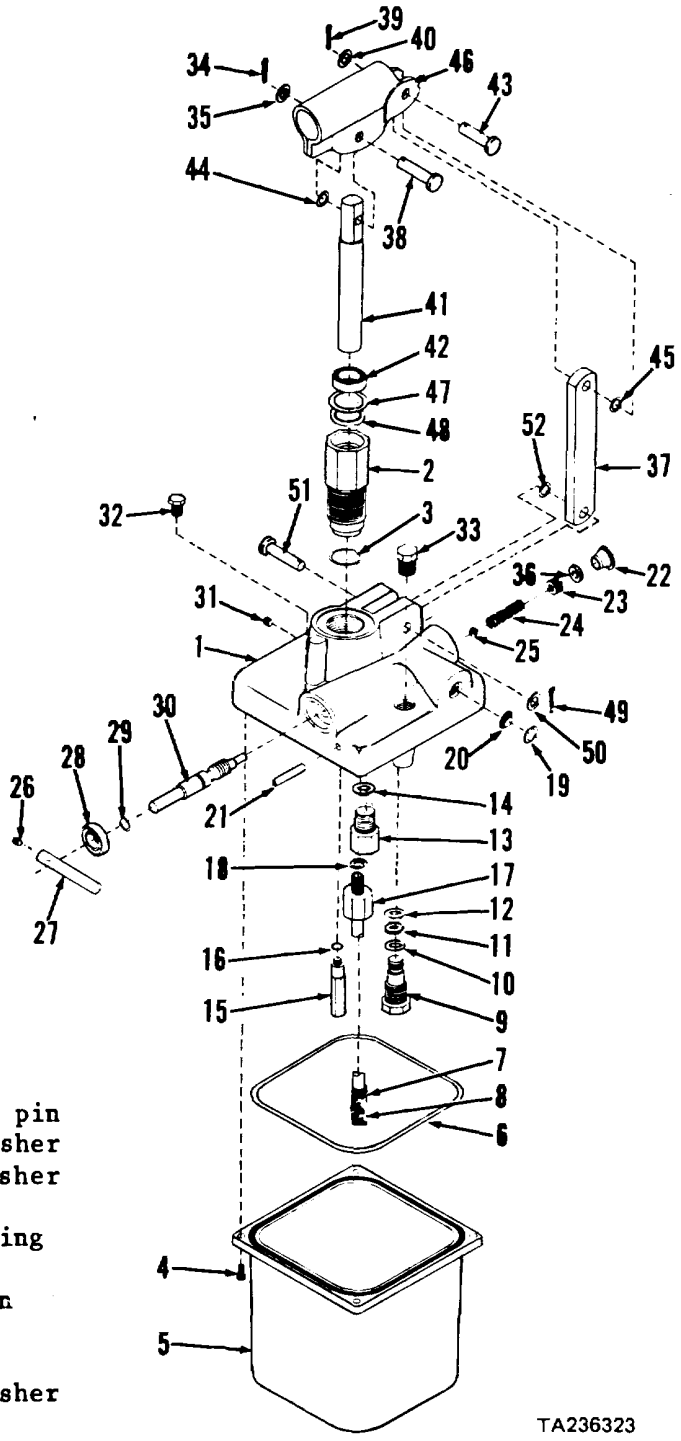
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Pump body (1), bottom	a. Four socket head screws (4)	Remove	
		b. Reservoir (5)	Remove	Dispose of used fluid properly
		c. Preformed packing (6)	Remove and discard	
		d. Retaining ring (7)	Remove and discard	Use retaining ring pliers
		e. Screen (8)	Remove	
		f. Outlet seat (9)	Remove	Do not disassemble
		g. O-ring (10), washer (12), and O-ring (11)	Remove and discard	
		h. Flow control assembly (13)	Remove	Do not disassemble

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

KEY

1. Pump body
2. Pump cylinder
3. Preformed packing
4. Socket head screws (4)
5. Reservoir
6. Preformed packing
7. Retaining ring
8. Screen
9. Outlet seat
10. O-ring
11. O-ring
12. Washer
13. Flow control assembly
14. O-ring
15. Relief valve
16. Copper gasket
17. Inlet seat
18. O-ring
19. Retaining ring
20. Screen
21. Pin
22. Plug
23. Lock screw
24. Lock spring
25. Ball
26. Setscrew
27. Handle
28. Seal
29. Preformed packing
30. Spindle
31. Plug
32. Vent fitting
33. Filler plug
34. Cotter pin
35. Washer
36. O-ring
37. Link
38. Piston pin
39. Cotter pin
40. Washer
41. Plunger
42. Seal
43. Beam link pin
44. Spring washer
45. Spring washer
46. Beam
47. Back-up ring
48. Quad ring
49. Cotter pin
50. Washer
51. Link pin
52. Spring washer



3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		i. O-ring (14)	Remove and discard	
		j. Relief valve (15)	Remove	Do not disassemble
		k. Copper gasket (16)	Remove and discard	
		l. Inlet seat (17)	Remove	Do not disassemble
		m. O-ring (18)	Remove and discard	
2	Pump body (1), sides	a. Retaining ring (19)	Remove	Use retaining ring pliers
		b. Screen (20)	Remove	
		c. Pin (21)	Remove	
		d. Plug (22) and O-ring (36)	Remove	
		e. Lock screw (23)	Remove	
		f. Lock spring (24)	Remove	
		g. Ball (25)	Remove	
		h. Setscrew (26)	Remove	
		i. Handle (27)	Remove	
		j. Seal (28)	Remove and discard	
		k. Preformed packing (29)	Remove and discard	
		l. Spindle (30)	Remove	
		m. Plug (31)	Remove	
3	Pump body (1), top	a. Vent fitting (32)	Remove	
		b. Filler plug (33)	Remove	
		c. Cotter pin (34)	Remove and discard	
		d. Washer (35)	Remove	
		e. Piston pin (38)	Remove	
		f. Cotter pin (39)	Remove and discard	
		g. Washer (40)	Remove	
		h. Beam link pin (43)	Remove	
		i. Beam (46)	Remove	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)		j. Two spring washers (44 and 45)	Remove	
		k. Cotter pin (49)	Remove and discard	
		l. Washer (50)	Remove	
		m. Link pin (51)	Remove	
		n. Link (37)	Remove	
		o. Spring washer (52)	Remove	
		p. Plunger (41)	Remove	
		q. Seal (42), back-up ring (47), and quad ring (48)	Remove and discard	
		r. Pump cylinder (2)	Remove	From pump body (1); do not disassemble
		s. Preformed packing (3)	Remove and discard	
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

1343. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
4		All parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air or clean cloths
INSPECTION				
5		a. Reservoir (5)	Inspect	Replace if cracked, broken, distorted, or otherwise damaged
		b. Screens (8 and 20)	Inspect	Replace if cracked, broken, or mesh damaged. Use compressed air to clear a clogged screen
		c. Pump cylinder (2) and pump body (1)	Inspect	Replace if cracked, broken, sealing surfaces pitted or nicked, or threads damaged
		d. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
		NOTE Apply light coat of clean transmission fluid to plunger (41) and all packing and seals before reassembly.		
6	Pump body (1), top	a. New preformed packing (3)	Install	On pump cylinder (2)
		b. Pump cylinder (2)	Install	In pump body (1)
		c. New quad ring (48), new back-up ring (47), and new seal (42)	Install	
		d. Plunger (41)	Install	
		e. Link (37)	Position	
		f. Spring washer (52) and link pin (51)	Install	
		g. Washer (50)	Install	
		h. New cotter pin (49)	Install and spread	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

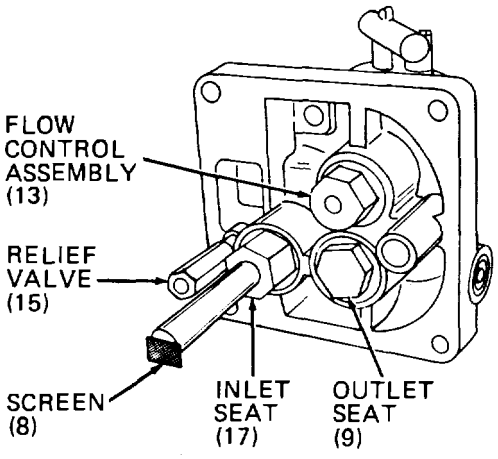
a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
6 (cont)		i. Beam (46)	Install	
		j. Two spring washers (45 and 44) and beam link pin (43)	Install	
		k. Washer (40)	Install	
		l. New cotter pin (39)	Install and spread	
		m. Piston pin (38)	Install	
		n. Washer (35)	Install	
		o. New cotter pin (34)	Install and spread	
		p. Vent fitting (32)	Install	
7	Pump body (1), sides	a. Plug (31)	a. Coat	Apply light coat of Loctite to plug threads
		b. Install	b. Spindle (30)	Install
		c. New preformed packing (29) and new seal (28)	Install	Carefully press seal (28) into pump body (1)
		d. Spindle (30) clockwise	Position	Turn shaft fully counter-
		e. Handle (27)	a. Install	On spindle (30)
			b. Position	Against pin (21) in released position
		f. Setscrew (26)	a. Coat	Apply light coat of Loctite to setscrew threads
			b. Install	
		g. Ball (25)	Install	
		h. Lock spring (24)	Install	
		i. Lock screw (23)	Install	
		j. O-ring (36) and plug (22)	Install	
		k. Pin (21)	Install	
		l. Screen (20)	Install	
		m. Retaining ring (19)	Install	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
8	Pump body	a. New O-ring (18)	Install	On inlet seat (17)
(1), bottom		b. Inlet seat (17)	Install	Tighten to 20 pounds foot torque



TA236163

c. New copper gasket (16)	Install	On relief valve (15)
d. Relief valve (15)	Install	Tighten to 5 pounds foot torque
e. New O-ring (14)	Install	On flow control assembly (13)
f. Flow control assembly (13)	Install	Tighten to 20 pounds foot torque
g. New O-ring (11), washer (12), and O-ring (10)	Install	
h. Outlet seat (9)	Install	Tighten to 20 pounds foot torque
i. Screen (8) and new retaining ring (7)	Install	
j. New preformed packing (6)	Position	On reservoir (5)
k. Reservoir (5)	Position	Against pump body (1)
l. Four socket head screws (4)	Install and tighten	Tighten evenly

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

a. Hydraulic Pump (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9	Pump body (1), top	a. Hydraulic pump	Fill	With clean transmission fluid
		b. Filler plug (33)	Install and tighten	
		c. Hydraulic pump	a. Test	Operate beam (46) and watch for fluid pumping out of screen (20)
			b. Install and service	Para 2-79a

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Hydraulic Cylinder.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Retaining ring pliers
- Adjustable open end wrench
- Safety glasses
- Combination wrench set

Automotive Mechanic's Tool Kit
- Hammer
- Punch

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Grease	Item 3, Appendix C
Transmission fluid	Item 8, Appendix C
Service parts kit	FSCM 26953 P/N KC1502

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees; safety bar engaged.
2-79a	Hydraulic pressure relieved; lines and fittings removed.

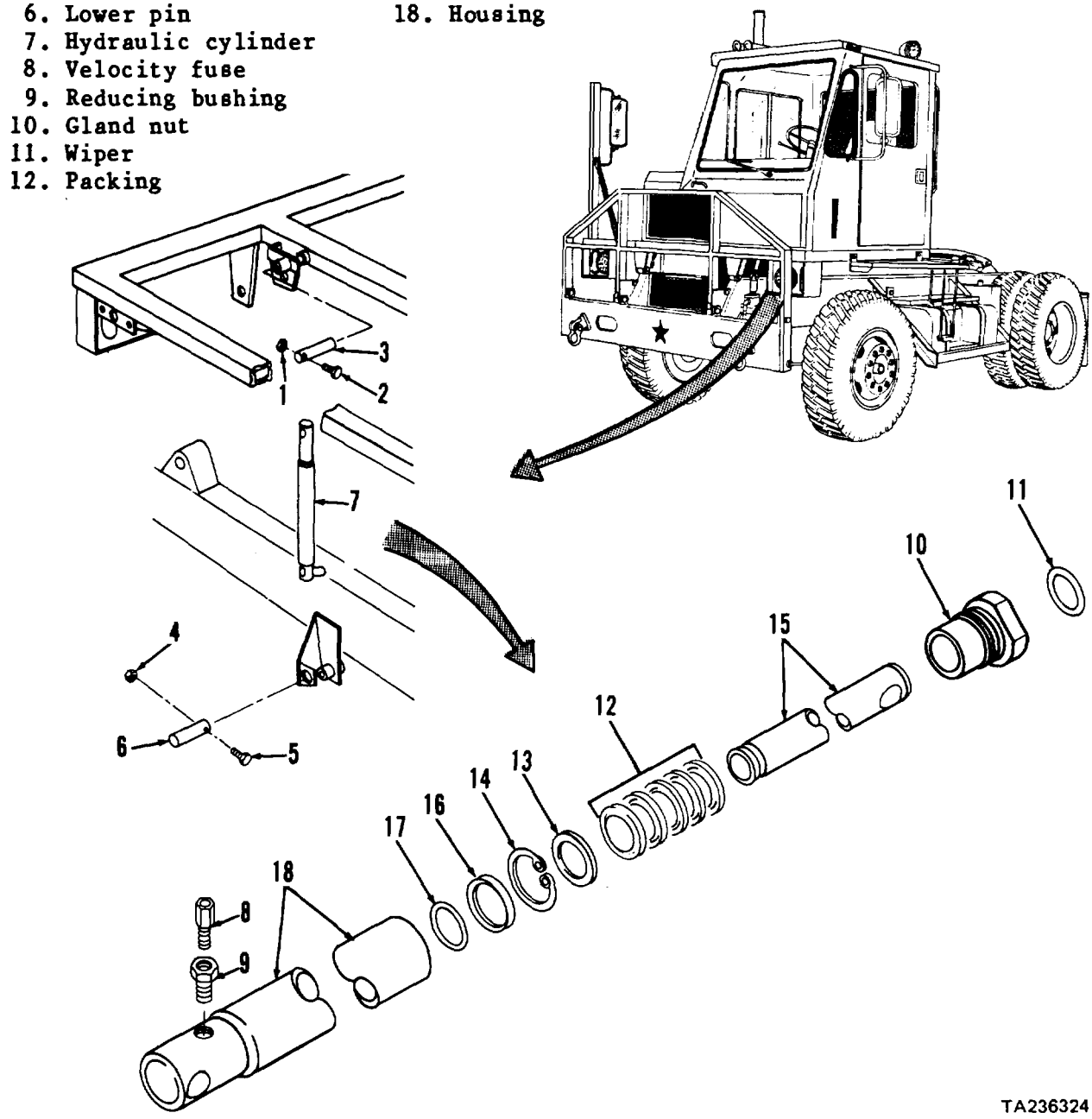
STEP	LOCATION	ITEM	ACTION	REMARKS
		REMOVAL		
1	Cab, underside	a. Locknut (1)	Remove	
		b. Capscrew (2)	Remove	
		c. Upper pin (3)	Remove	Do not drive pin toward radiator
		d. Locknut (4)	Remove	
		e. Capscrew (5)	Remove	
		f. Lower pin (6)	Remove	
		g. Hydraulic cylinder (7)	Remove	Remove from tractor
		DISASSEMBLY		
		CAUTION		
		Do not hammer cylinder rod (15) in following steps.		
2	Hydraulic cylinder	a. Velocity fuse (8)	Remove	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Hydraulic Cylinder (cont).

KEY

1. Locknut
2. Capscrew
3. Upper pin
4. Locknut
5. Capscrew
6. Lower pin
7. Hydraulic cylinder
8. Velocity fuse
9. Reducing bushing
10. Gland nut
11. Wiper
12. Packing
13. Adapter
14. Retaining ring
15. Cylinder rod
16. Lock ring
17. Snap ring
18. Housing



TA236324

1343. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Hydraulic Cylinder (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		b. Reducing bushing (9)	Remove	
		c. Gland nut (10) with wiper (11)	Remove	
		d. Wiper (11)	Remove and discard	
		e. Packing (12)	Remove and discard	
		f. Adapter (13)	Remove and discard	
		g. Retaining ring (14)	Remove and discard	Use retaining ring pliers
		h. Cylinder rod (15)	Remove	
		i. Lock ring (16)	Remove	
		j. Snap ring (17)	Remove	

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Hydraulic Cylinder (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
3		All parts	Clean	Use cleaning solvent P-D-680; dry thoroughly with compressed air
INSPECTION				
4		a. Cylinder rod (15) and housing (18)	Inspect	Replace hydraulic cylinder assembly if cracked, broken, distorted, or contact areas worn
		b. All other parts	Inspect	Replace if cracked, broken, distorted, or threads damaged
REASSEMBLY				
		CAUTION		
		Do not hammer cylinder rod (15) in following steps.		
5	Hydraulic cylinder	a. Packing (12) and three rings (14, 16, and 17)	Lubricate	Use clean transmission fluid
		b. Snap ring (17) and lock ring (16)	Install	
		c. Cylinder rod (15)	Install	
		d. New retaining ring (14)	Install	
		e. New adapter (13) and new packing (12)	Install	Packing (12) cup side down
		f. New wiper (11)	a. Install	In gland nut (10), wiper lip out
			b. Lubricate	Apply clean grease to wiper lip
		g. Gland nut (10) with wiper (11)	Install	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

b. Hydraulic Cylinder (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
5 (cont,)		h. Reducing bushing (9)	Install	
		i. Velocity fuse (8)	Install	
INSTALLATION				
6	Cab, underside	a. Hydraulic cylinder (7)	Position	In tractor
		b. Lower pin (6)	Install	
		c. Capscrew (5) and locknut (4)	Install	
		d. Upper pin (3)	Install	
		e. Capscrew (2) and locknut (1)	Install	
7	Hydraulic hose assemblies	Lines and fittings	Install and connect	Para 2-79a. Do not tighten fitting at base of hydraulic cylinder (7)
		WARNING Keep clear of deck when cab is raised or lowered. Failure to follow this procedure could result in severe injury or death. If you are injured, obtain medical aid immediately.		
8	Hydraulic system	System	Purge	Purge system by operating hydraulic pump to alternattily raise and lower cab deck until clear fluid emerges from loose hose connection; then slowly lower cab deck and tighten hose fitting
9	Hydraulic pump	Hydraulic pump reservoir	Check level	Add transmission fluid if necessary

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Latches.

This task covers: a. Removal b. Cleaning c. Inspection d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Combination wrench set
Safety glasses
Hulk bolt installation gun, 7.4 amperes
FSCM 92940 P/N LR1375

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees; safety bar engaged.
2-79b	Hydraulic pressure relieved; hose assemblies and fittings removed from hydraulic latches

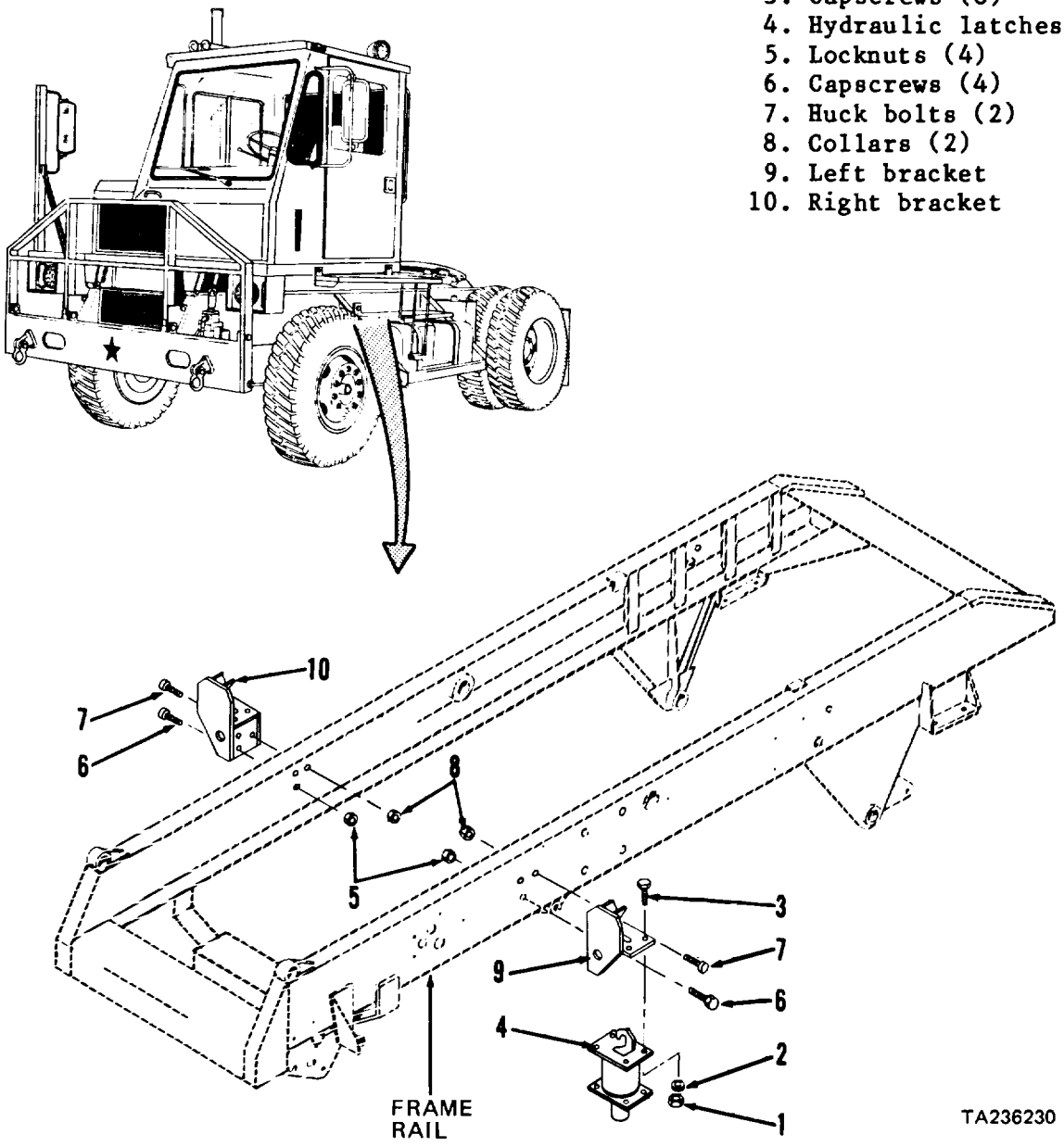
STEP	LOCATION	ITEM	ACTION	REMARKS
		REMOVAL		
1	Frame rail, left hand side	a. Four locknuts (1), washers (2), and capscrews (3)	Remove	Support hydraulic latch (4)
		b. Hydraulic latch (4)	Remove	Lower from bracket
		NOTE		
		Perform steps i.c. thru i.f. below only if necessary to remove bracket (9 or 10).		
		c. Transmission mount	Remove	Para 3-17f
		d. Two locknuts (5) and capscrews (6)	Remove	
		e. Hulk bolt (7) and collar (8)	a. Cut b. Remove and discard	Support bracket (9)
		f. Left bracket (9)	Remove	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Latches (cont).

KEY

1. Locknuts (8)
2. Washers (8)
3. Capscrews (8)
4. Hydraulic latches (2)
5. Locknuts (4)
6. Capscrews (4)
7. Huck bolts (2)
8. Collars (2)
9. Left bracket
10. Right bracket



3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Latches (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
		NOTE		
		Repeat step 1 above at right hand frame rail to remove remaining hydraulic latch (4) and bracket (10).		
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
2		All parts	Clean	Use cleaning solvent P-D-680; dry with compressed air
INSPECTION				
3		a. Hydraulic latches (4)	Inspect	Replace if leaking, cracked, or latch arm shows excessive wear
		b. All other parts	Inspect	Check for cracks, wear, and thread damage. Replace if necessary
INSTALLATION				
4	Frame rail, left hand side	a. Left bracket (9)	Position	On left frame rail

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

c. Hydraulic Latches (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
4 (cont)		b. Two capscrews (6) and locknuts (5)	Install	Do not tighten
		c. New collar (8) and huck bolt (7)	Install	Use huck bolt installation gun
		d. Two capscrews (6)	Tighten	
		e. Hydraulic latch Position (4)	Under bracket (9)	
		f. Four capscrews (3), washers (2), and locknuts (1)	Install and tighten	
		NOTE		
		Repeat step 4 above to install remaining bracket (10) and hydraulic latch (4) at right hand frame rail.		
5	Tractor frame	Transmission mount	Install, if removed	Para 3-17f
6	Hose assemblies	Lines and fittings Connect	Para 2-79b	
7	Cab tilt cylinder	Fitting	Loosen	
8	Tractor frame, right hand side	Cab tilt pump	Operate	Alternately raise and lower cab. Continue to purge air from hydraulic system until clear fluid emerges from loose hose fitting; then slowly lower cab
9	Cab tilt cylinder	Fitting	Tighten	
10	Tractor frame, sides	Hydraulic latches (4)	Inspect	Check that hydraulic latches (4) engage hold-down brackets properly with cab and deck lowered fully

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hold Down Assembly.

This task covers:
a. Removal
b. Cleaning
c. Inspection/Repair
d. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
- Adjustable open end wrench
- Socket wrench set
- Safety glasses

Welding shop equipment

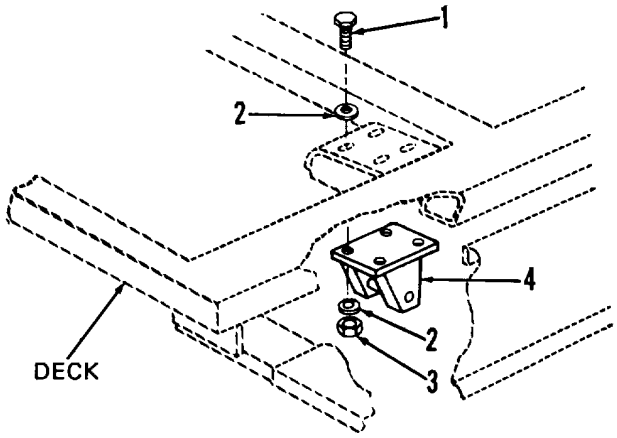
Materials/Parts

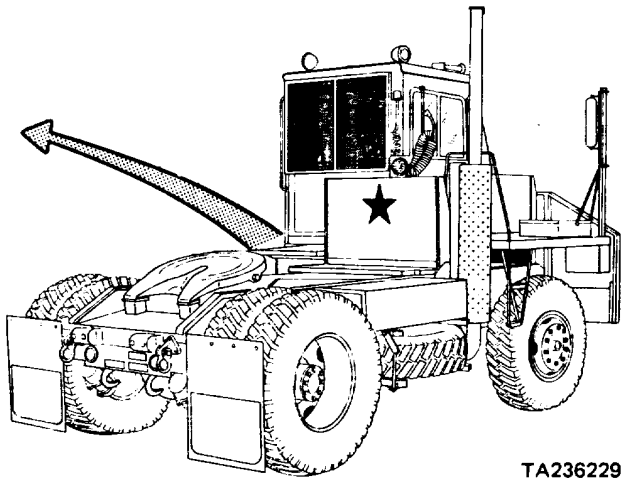
Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees; safety bar engaged.





TA236229

KEY

1. Capscrews (4)
2. Washers (8)
3. Locknuts (4)
4. Hold-down bracket

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hold Down Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Rear cab deck weldment, left hand side	a. Four capscrews (1), locknuts (3), and eight washers (2)	Remove	Support hold-down bracket (4)
		b. Hold-down bracket (4)	Remove	Lower from deck
		NOTE Repeat step 1 above to remove right hand hold-down bracket.		
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
2		All parts	Clean	Use cleaning solvent P-D-680; dry using compressed air

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

d. Hold Down Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION/REPAIR				
3		a. Hold-down brackets (4)	Inspect	Repair broken welds or cracks by welding; replace a hold-down bracket beyond economical repair
		b. Capscrews (1), washers (2), and locknuts (3)	Inspect	Replace if cracked, broken, or threads damaged
INSTALLATION				
4	Rear cab deck weldment, left hand side	a. Hold-down bracket (4)	Position	From bottom of deck
		b. Four capscrews (1), eight washers (2), and four locknuts (3)	Install	Do not tighten
		NOTE Repeat step 4 above to install right hand hold-down bracket.		
5	Cab tilt	Cab pump	Lower	To normal operating position; lower slowly, and be sure that hold-down brackets (4) engage V-shaped cradles on left and right latches
6	Rear cab deck weldment, left and right sides	Capscrews (1) and locknuts (3)	Tighten	

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

e. Safety Bar.

This task covers:
a. Removal
b. Cleaning
c. Inspection
d. Installation

INITIAL SETUP

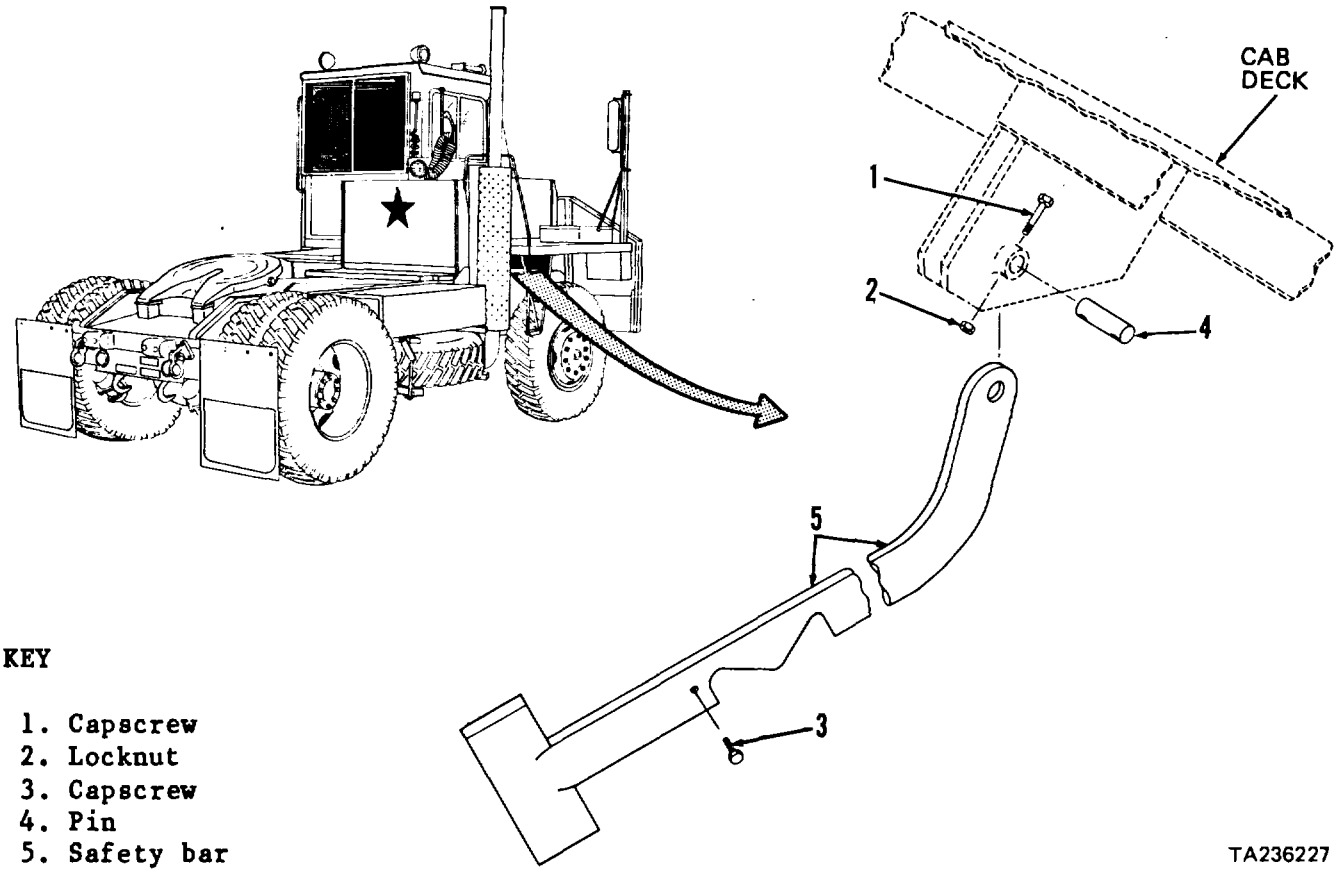
Tools
No. 1 Common Organizational Maintenance Tool Kit
Adjustable open end wrench
Socket wrench set
Safety glasses
Hoist

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Thread sealant — Item 29, Appendix C

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition.

Paragraph	Condition Description
	Vehicle parked on level surface, engine off, and parking brake applied.
	Cab tilted 45 degrees.



KEY

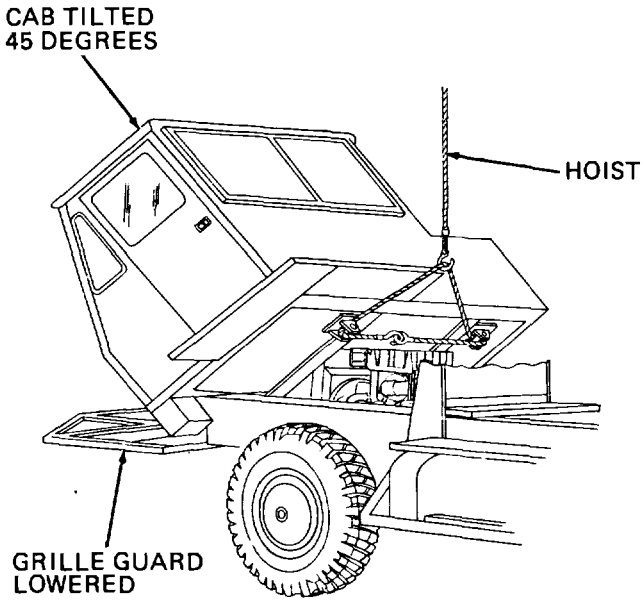
1. Capscrew
2. Locknut
3. Capscrew
4. Pin
5. Safety bar

TA236227

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

e. Safety Bar (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Cab deck weldment,	Hoist	Attach as shown	Secures deck in 45 degree position



TA236228

WARNING

Do not stand under items being secured by hoist. Do not put any body part between moveable and fixed elements of the equipment. If you are injured, seek medical aid immediately.

2	Cab deck weldment, right hand side	a.	Capscrew (1) and locknut (2)	Remove	
		b.	Capscrew (3)	Remove	
		c.	Pin (4)	Remove	Support safety bar (5)
		d.	Safety bar (5)	Remove	From bracket on frame

3-43. CAB TILT HYDRAULIC SYSTEM MAINTENANCE (CONT)

e. Safety Bar (cont) .

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and obtain medical aid immediately.		
3	All parts	Clean		Use cleaning solvent P-D-680; dry with clean cloths
INSPECTION				
4		a. Pin (4) and safety bar (5)	Inspect	Replace if cracked, bent, or otherwise damaged
		b. All other parts	Inspect	Replace if cracked, corroded, or threads damaged
INSTALLATION				
5	Cab deck weldment, right hand side	a. Safety bar (5)	Position	In bracket on frame
		b. Pin (4)	Install	Align hole in pin (4) with hole in cab deck bracket
		c. Capscrew (1) and locknut (2)	Install and tighten	
		d. Capscrew (3)	Install and tighten	Apply thread sealant to threads
6	Cab deck weldment	Hoist	Disconnect	
7	Cab tilt pump	Cab	Lower	To normal operating position

Section IX. PRE-EMBARKATION INSPECTION OF MATERIAL IN UNITS ALERTED FOR OVERSEAS SHIPMENT

Refer to the following publications for pre-embarkation inspection in units alerted for overseas shipment:

TB 740-97-1	Preparation for Shipment
TM 38-230-1	Packaging of Material
TM 38-230-2	Preservation and Packaging
TM 38-236	Preparation for Air Shipment
TM 55-2200-001-12	Block and Rail Transport

CHAPTER 4
GENERAL SUPPORT MAINTENANCE PROCEDURES

CHAPTER OVERVIEW

This chapter has some important information that you need to know about the general support maintenance requirements of the vehicle. This information includes:

- Repair of the engine components.
- Repair of the fuel system components.
- Repair of the transmission including its torque converter.
- Repair of the differential.

Index

Section I. ENGINE AND FUEL SYSTEM MAINTENANCE

This section references the information you need to repair the engine and fuel system components at the general support maintenance level.

Para

4-1. ENGINE MAINTENANCE

NOTE

Refer to TM 9-2815-205-34 for repair of the engine components.

4-2. FUEL SYSTEM MAINTENANCE

NOTE

Refer to TM 9-2815-205-34 for repair of the fuel injector assemblies, blower assembly, turbocharger, and governor.

Section II. POWER TRAIN MAINTENANCE

This section contains the information you need to repair the torque converter, transmission, and differential at the general support maintenance level.

Para

4-3. TORQUE CONVERTER I

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly
e. Adjustment

INITIAL SETUP

Tools
No 2 Common Organizational Maintenance Tool Kit
Clean cloths
Socket wrench handle, 1/2 inch drive
Socket wrench set, 1/2 inch drive
Torque wrench, 1/2 inch drive, 175 pounds foot capacity
Retaining ring pliers
Mechanical puller kit
Twist drill set
Safety glasses
Rubber mallet
Dial indicator
Arbor press
Drill press
Bushing installer J-24648
Stator thrust bearing installer J-23549
Stator roller retainer ring J-24218-1
Converter end play gage J-24470
Brass hammer
Base plate J-29521-1
Top plate J-29521-2
Capscrew 5/8-11 x 3.25
Fixture stand J-25587-1
Rivet removing pin J-29121-3
Rivet punch J-29121-1

Materials/Parts
Cleaning solvent Item 1, Appendix C
Item 2, Appendix C
Automatic transmission oil Item 8, Appendix C
Oil-soluble grease Item 9, Appendix C
Ring FSCM 73342 PN 6770822
Ring FSCM 73342 PN 6758036
Seal ring FSCM 73342 PN 6753866
Seal ring FSCM 73342 PN 6753866
Locking strips FSCM 73342 PN 6769631
Gasket FSCM 73342 PN 6759971
Hook type ring FSCM 73342 PN 6830187

Personnel Required
Automotive Repairer MOS 63H

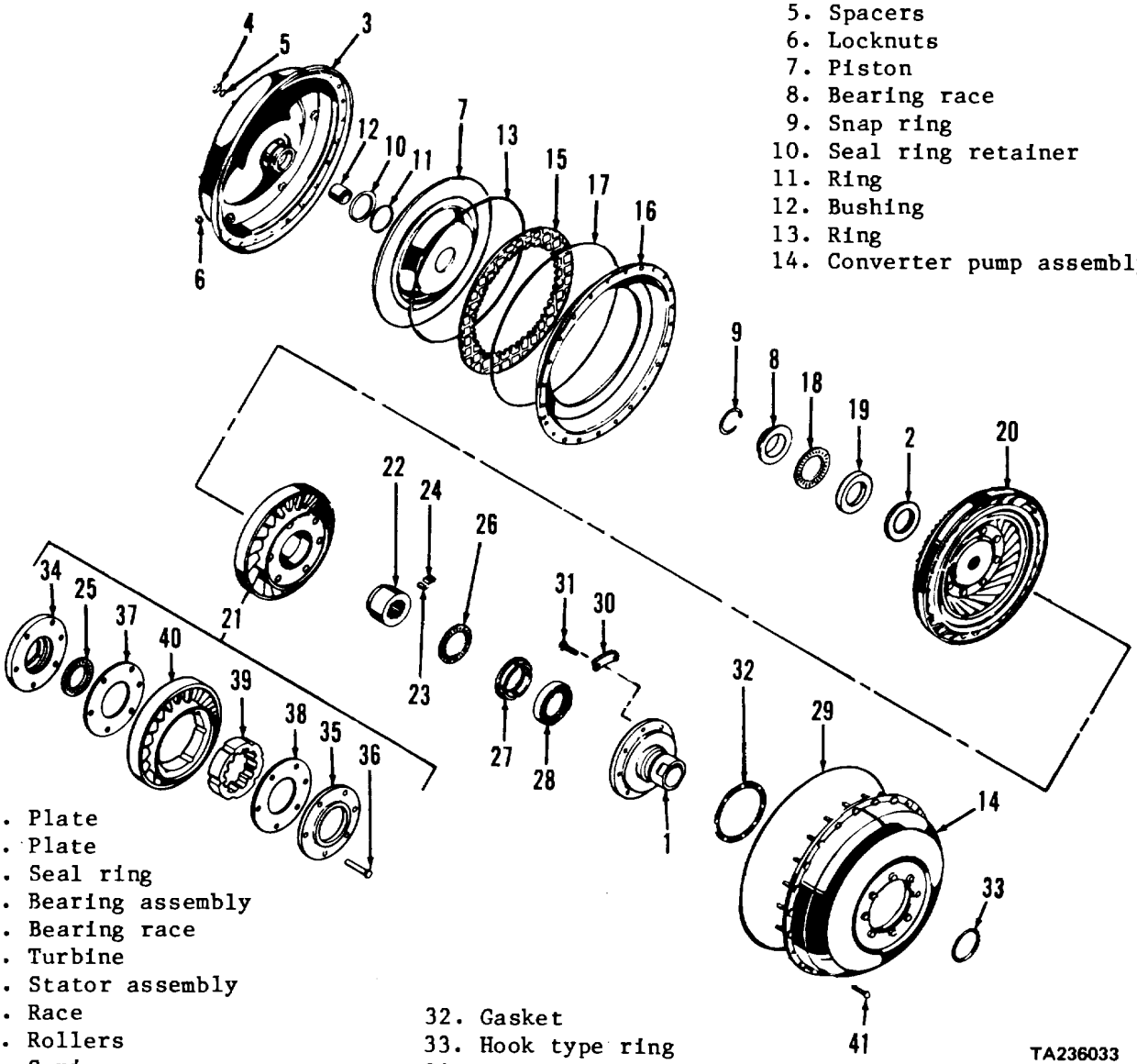
Equipment Condition

Paragraph	Condition Description
	Transmission removed from vehicle.
3-17c(2)	
3-17d	Torque converter removed from transmission.

4-3. TORQUE CONVERTER (CONT)

KEY

1. Converter pump hub
2. Spacer
3. Cover assembly
4. Spacer retainers
5. Spacers
6. Locknuts
7. Piston
8. Bearing race
9. Snap ring
10. Seal ring retainer
11. Ring
12. Bushing
13. Ring
14. Converter pump assembly

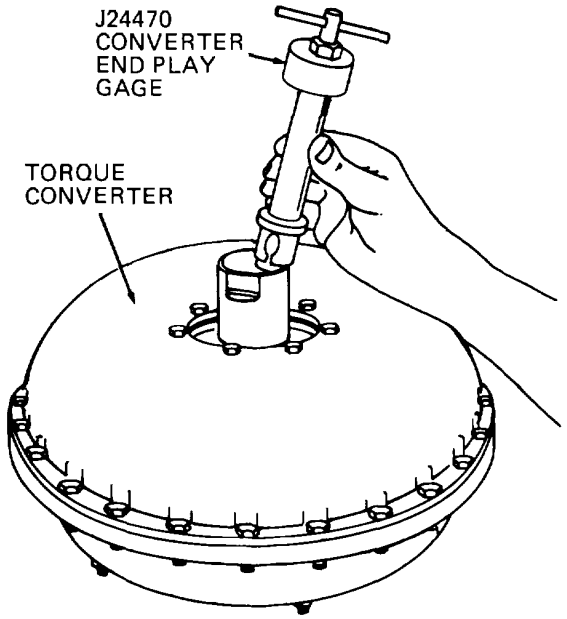


TA236033

15. Plate
16. Plate
17. Seal ring
18. Bearing assembly
19. Bearing race
20. Turbine
21. Stator assembly
22. Race
23. Rollers
24. Springs
25. Bearing assembly
26. Bearing assembly
27. Bearing race
28. Roller bearing
29. Seal ring
30. Locking strips
31. Capscrews
32. Gasket
33. Hook type ring
34. Washer
35. Washer
36. Rivet
37. Washer
38. Washer
39. Cam
40. Stator
41. Capscrews

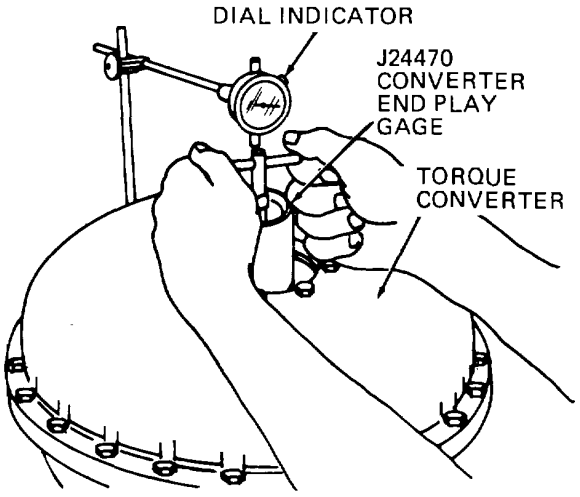
4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Converter pump hub (1)	Converter end play gage assembly	Install	As shown. Hold center screw of converter end play gage assembly and tighten nut



TA236034

STEP	LOCATION	ITEM	ACTION	REMARKS
2	Torque converter end play gage	Dial indicator	Install	As shown. Set dial to zero. Check end play by lifting on center screw of converter end play gage as far as possible. Note measurement



TA236035

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE End play more than 0.025 inch indicates need to replace worn torque converter parts and select new spacer (2). End play not more than 0.025 inch means same spacer (2) can be used on reassembly (except when replacing major parts).		
3	Cover assembly (3)	a Six spacer retainers (4)	Remove	
		b Six spacers (5)	Remove	
		c 24 locknuts (6)	Remove	
		d Cover assembly (3)	Remove	Place on table with piston (7) up
		e Bearing race (8)	Remove	
		f Snap ring (9) (7)	Remove	Push down on center of piston
		g Piston (7)	Remove	Turn cover assembly (3) over and bump on wood surface
		h Seal ring retainer (10) and ring (11)	Remove	Discard ring (11)
		i Bushing (12)	Remove	Remove only if inspection shows replacement is necessary Use mechanical puller kit
4	Piston (7)	Ring (13)	Remove	Discard
5	Converter pump assembly (14)	a Plate (15)	Remove	
		b Plate (16)	Remove	
6	Plate (16)	Seal ring (17)	Remove	Discard
7	Converter pump assembly (14)	a Bearing assembly (18)	Remove	
		b Bearing race (19)	Remove	
		c Spacer (2)	Remove	
		d Turbine (20)	Remove	

14-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
7 (cont)		e Stator assembly (21) and race (22)	Remove	Grasp outside of stator assembly (21) with fingers and inside of race (22) with thumbs and remove both as a unit. Place stator assembly (21) on table, race (22) upward
8	Stator assembly (21)	a Race (22) while lifting b 10 rollers (23) and springs (24) c Bearing assembly (25)	Remove Remove Remove	Rotate race (22) clockwise Remove only if inspection shows replacement is necessary. Use mechanial puller kit. Remove carefully so you don't damage bore
9	Converter pump hub (1)	a Bearing assembly (26) b Bearing race (27) c Roller bearing (28)	Remove Remove Remove	
10	Converter pump assembly (14)	Seal ring (29)	Remove	Discard
11	Converter pump hub (1)	a Four locking strips (30) b Eight capscrews (31) c Four locking strips (30)	Flatten corners Remove Remove	 Discard
12	Converter pump assembly (14)	a Converter pump hub (1) b Gasket (32)	Remove Remove	 Discard
13	Converter pump hub (1)	Hook type ring (33)	Remove	Discard

4-3. TORQUE CONVERTER (CONT)

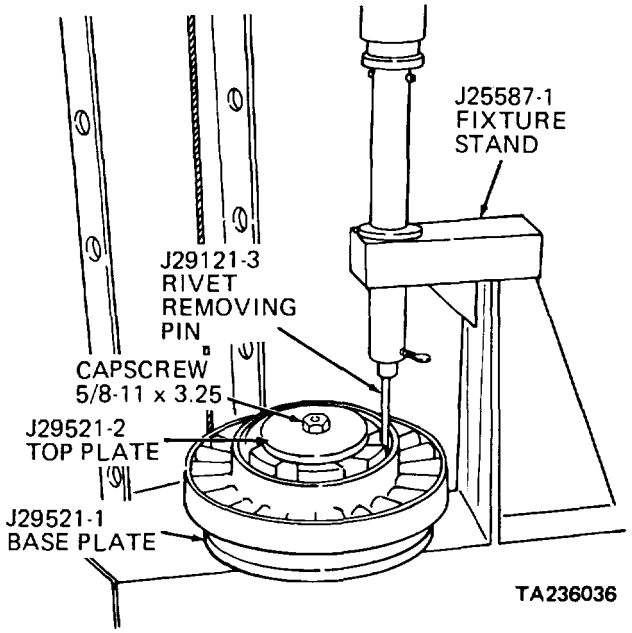
STEP	LOCATION	ITEM	ACTION	REMARKS

DISASSEMBLY (cont)

NOTE

Don't disassemble stator assembly (21) unless replacement of washers (34 and 35) or rivets (36) is

14	Stator assembly (21)	a	Rivets (36)	Remove



Place stator assembly on drill press, formed rivet side up. Drill rivets, removing formed heads, using 3/8 inch drill. Place stator rivet base under stator assembly (21), as shown, and top plate on top. Be sure that holes in stator rivet base are under rivets. Install capscrew to hold plates together. Tighten to 60 pounds foot. Place removing, in- stalling and swaging fixture on hydraulic press. Install rivet removing pin into re- moving, installing and swaging fixture head and tighten retainer thumb screw. Place stator assembly (21) drilled rivet side up. Press rivets (36) from stator assembly (21) with rivet removing pin. Remove removing, in- stalling and swaging fixture, capscrew, top plate, and stator rivet base

		b.	Washers (34, 35, 37 and 38), cam (39) and stator (40)	Remove

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety goggles when hammering.

4-3. TORQUE CONVERTER (CONT)

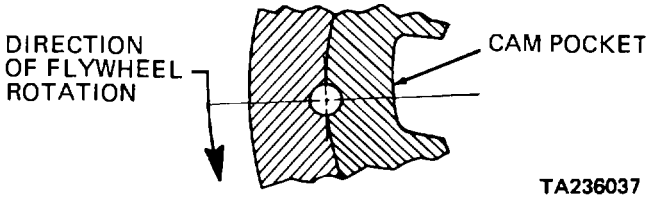
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
15	Converter pump assembly (14)	Capscrews (41)	Remove	If inspection shows replacement is necessary Drive out with brass hammer
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause ser- ious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medi- cal attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
16	a All parts except cover assembly (3) and converter pump assembly (14)		Clean	Use cleaning solvent P-D-680. Immerse parts in cleaning solvent and move up and down until all old lubricant and foreign material is dissolved Dry parts thoroughly after removal from cleaning solvent with moisture free compressed air or clean cloths. Don't use compressed air on any bearings

4-3. TORQUE CONVERTER (CONT)

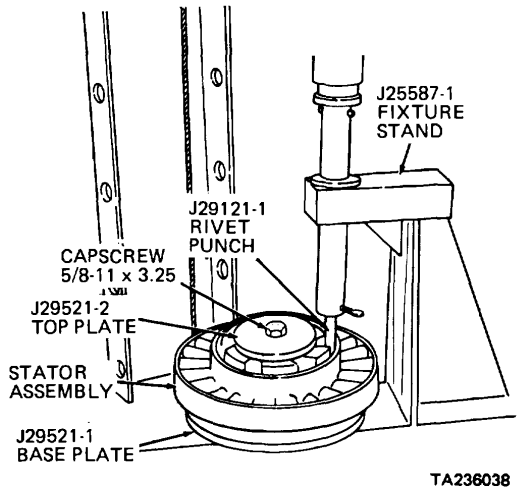
STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
16 (cont)	b	Cover assembly (3) and converter pump assembly (14)	Clean	Use clean cloths moistened with cleaning solvent P-D-680 Dry with moisture free compressed air
Be				sure not to lose any capscrews (41) from converter pump assembly (14)
INSPECTION				
17	a	Stator (40) and cam (39)	Inspect	Inspect for cracks, distortion, and swollen rivet holes If either part is defective, replace entire stator assembly (21). Check rivet holes for burrs. Deburr if necessary
	b	Bearing assembly	Inspect	Lubricate with automatic (25) transmission fluid. Replace race (22) over bearing assembly (25) in hub of stator assembly (21) Rotate bearing assembly (25) while pressing on race (22). Leave bearing assembly (25) in stator assembly (21) if there is no roughness or binding If defective, remove See step 8c
	c	Race (22)	Inspect	Inspect bearing ends for smoothness. Replace if there are any marks or scratches
	d	Bushing (12)	Inspect	Inspect for scratches and scoring. Replace if necessary See step 3i
	e	Washers (34 and 35) and rivets (36)	Inspect	Inspect for cracks, distortion and other damage. Check to see if rivets are bent or broken. Replace if necessary. See step 14a-
b				
	f	All other parts	Inspect	Inspect for any damage making them defective. Replace if necessary

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
18	Stator assembly (21)	a Cam (39) and stator (40) pocket	Assemble	If stator assembly (21) was disassembled. Cam positioned as shown

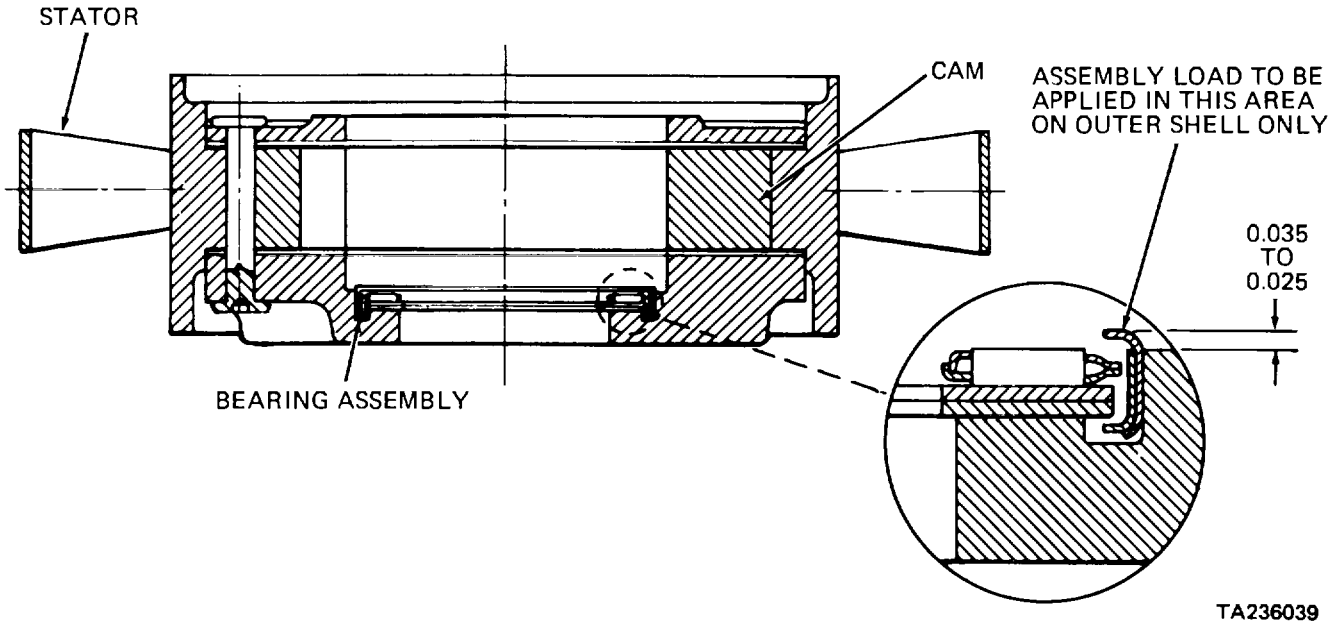


	b. Washers (37 and 38)	Position	One on each side of stator (37)
	c. New washers (34 and 35)	Position	If removed
	d. New rivets (36)		Line up rivet holes and install new rivets from rear to front of stator (40). Install top and base plates, as shown, making sure rivet heads are between holes. Install retaining capscrew and strike top plate with rubber mallet to seat parts. Tighten cap- screw to 60 pounds foot. Place stator assembly (21) on fixture stand. Install rivet punch in fixture head and tighten thumb screw. Apply about 8000 pound load with press to swage rivet. Swage second rivet 180 de- grees from first. Swage third rivet 60 degrees from second. Swage fourth rivet 180 degrees from third, etc., until all rivets are swaged. Remove capscrew, top plate, and base plate



4-3. TORQUE CONVERTER (CONT)

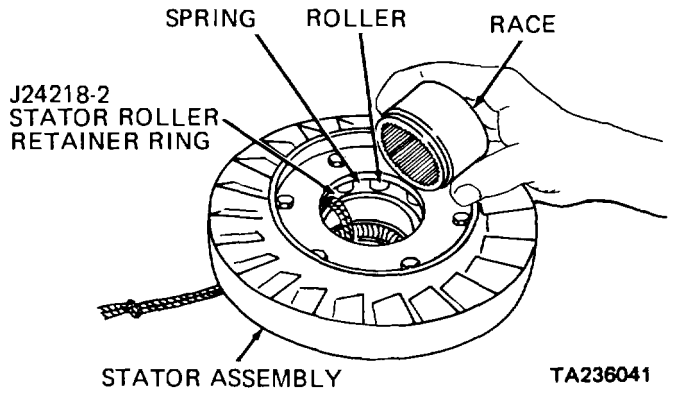
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
18 (cont)		e New bearing assembly (25)	Install	Only if removed earlier. Use bearing installer to drive bearing assembly into bore of stator assembly (21). Be sure pressure is is born by outer shell of bearing assembly only. Install until top of outer shell is 0.025 to 0.035 inch above the shoulder in the side plate as shown



19	Converter pump assembly (14)	a	New gasket (32)	Position	Must be dry
		b	Converter pump hub (1)	Position	Line up holes in converter pump assembly (14), gasket (32), and converter pump hub (1)
		c	Four new locking strips (30)	Position	
		d	Eight capscrews (31)	Install	Tighten to 9-11 pounds foot
		e	Locking strips (30)	Bend corners	Against heads of capscrews

4-3. TORQUE CONVERTER (CONT)

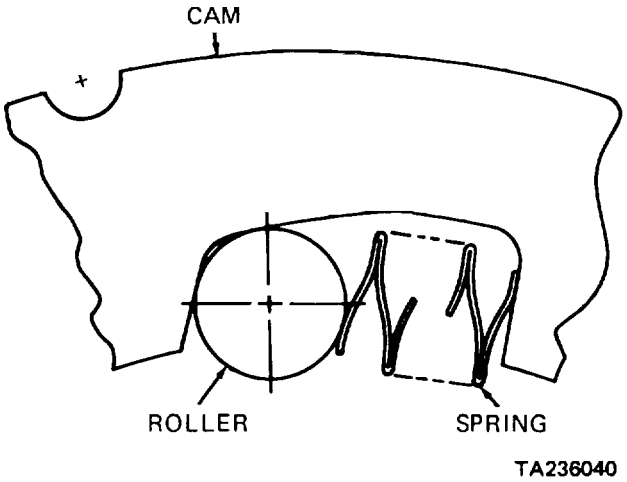
STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
19 (cont)					
			WARNING Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety goggles when hammering.		
		f	New capscrews (41)	Install	Any that need replacement. Be sure any weights are in original positions
Use					brass hammer
		g	New seal ring (29)	Install	
20	Converter pump hub (1)	a	Roller bearing (28)	Install	
		b	Bearing race (27)	Install	Lugged side first
		c	Bearing assembly (26)	Install	
		d	New hook type ring (33)	Install	Into groove
21	Stator assembly (21)	a	Cam (39)	Grease	Oil-soluble grease into bottom of cam pockets
		b	Stator roller retainer ring	Install	As shown



TA236041

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
21 (cont)		c	10 rollers (23) and springs (24)	Install	As shown Rollers (23) installed in shallow ends of of pockets. Open end of springs touch rollers and face center of cam (39)

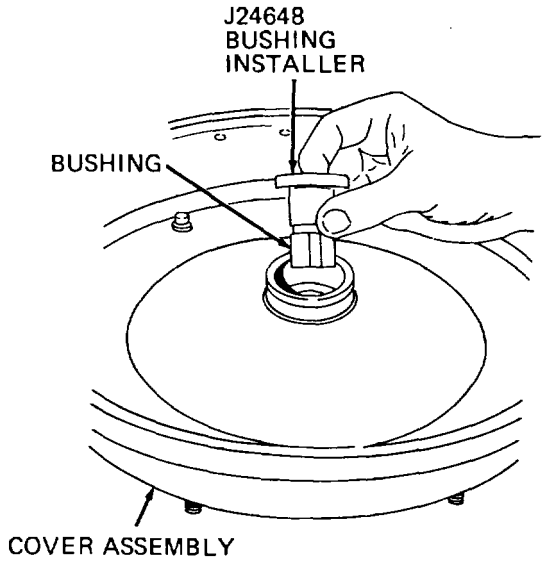


TA236040

		d	Race (22)	Install	Shoulder side first until it touches rollers, as shown in step 21b Turn race (22) clockwise and push down. Lift stator assembly and pull cord to remove retainer Push and rotate race until all the way down. Turn counterclockwise to lock stator assembly (21)
22	Converter pump assembly (14)	a	Stator assembly (21)	Install	Carefully turn on its edge on table. Grasp outside of stator assembly (21) with fingers and inside of race (22) with thumbs. Don't let race fall out. Turn stator assembly upside down and install
		b	Turbine (20)	Install	
		c	Spacer (2)	Install	Install original if end play before disassembly was satisfactory and no new

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
22 (cont)				parts affecting end play are installed. Otherwise, do not install spacer (2) at this time
		d Bearing race (19)	Install	Outer lip up
		e Bearing assembly (18)	Install	Grease first with oil-soluble grease
23	Plate (16)	New seal ring (17)	Install	
24	Converter pump assembly (14)	a Plate (16) b Plate (15)	Install Install	Line up balance marks
Install 25	Cover assembly (12) (3)	a New bushing	If original was removed. Use	bushing installer, as shown. After installation, bushing (12) inside diameter should BE 0.9990 to 1.0010 inch

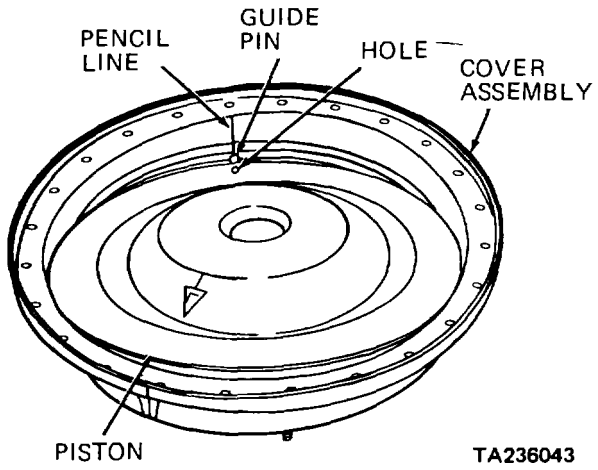


TA236042

		b Seal ring retainer (10)	Install	Onto hub, smaller end first
26	Seal ring retainer (10)	New ring (11)	Install	
27	Piston (7)	New ring (13)	Install	

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)		release	Place pencil line, as shown, in cover assembly	
28	Cover	a Piston (7)	Install	Piston (7) must engage guide pins in cover assembly (3) or lockup clutch will not RELEASE. Place pencil line, as shown, in cover assembly in line with pin nearest assembly hole in piston (7) when balance marks line up. Use pencil mark as guide to line up piston (7) with pin. If piston is seated properly, distance from cover assembly mounting surface to piston is about 1-1/2 inches
		b Snap ring (9)	Install	With hand, push down on piston (7)
		c Bearing race (8)	Install	Inner lip first in hub Retain with oil-soluble grease
29	Converter pump assembly (14)	a Cover assembly (3)	Position	Aline balance marks on cover assembly (3), plate (16), and converter pump assembly
		b 24 locknuts (6)	Install	Tighten to 19-23 pounds foot
30	Cover assembly (3)	a Spacers (5)	Install	Onto cover assembly drive studs
		b Spacer retainers (4)	Install	



TA236043

4-3. TORQUE CONVERTER (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS

REASSEMBLY (cont)

30 (cont)

NOTE

Repeat steps 1 and 2 to check end play on reassembled torque converter, even if original spacer (2) was installed in step 22c If end play is not within 0.001-0.025 inch, repeat steps 3a-d and 7a-c to partly disassemble torque converter Install correct spacer (2) as listed below.

Dial Indicator Reading	Spacer to Use	Dimension of Spacer
less than 0.0177	None	
0.0177-0.034	Gold	0.015
0.034-0.049	Silver	0.030
0.049-0.062	Plain	0.042
0.062-0.079	Black	0.060
0.079-0.093	Copper	0.075

Perform steps 22d-e, 29, and 30 to reassemble torque converter. Then perform steps 1 and 2 to double check end play.

4-4. TRANSMISSION

a. Transmission Housing.

This task covers: a. Disassembly b. Cleaning c. Inspection d. Reassembly

INITIAL SETUP

Tools

No 2 Common Organizational Maintenance Tool Kit
- Socket wrench handle, 1/2 inch drive
- Socket wrench set, 1/2 inch drive
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Mechanical puller kit
- Safety glasses

Arbor press
Seal remover J-26401
Seal installer J-26282

Selector seal FSCM 73342 PN 23010610
Cover gasket FSCM 73342 PN 6774323
Lube valve adapter gasket FSCM 73342 PN 6884872
Two socket head screws FSCM 73342 PN 6882586

Crocus cloth Item 12, Appendix C

Personnel Required
Automotive Repairer MOS 63H

Materials/Parts	Paragraph
Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Automatic transmission fluid	Item 8, Appendix C
Nonhardening sealant	Item 10, Appendix C

Equipment Condition

Paragraph	Condition Description
4-4b thru 4-41	All internal transmission parts and rear cover removed.

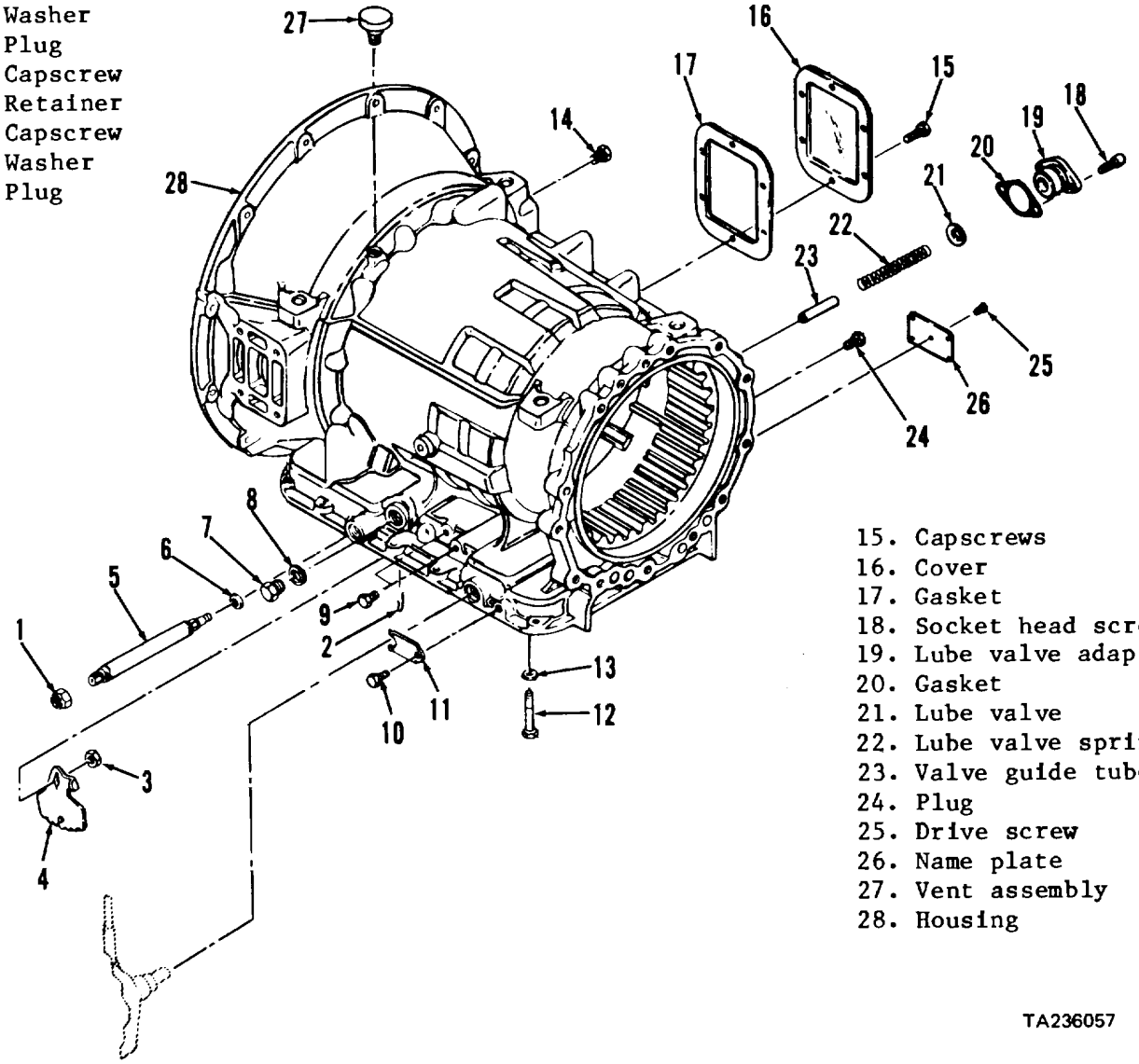
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1 (28)	Housing	a Nut (1)	Remove	
		b Shaft retainer pin (2)	Remove	
		c Nut (3)	Remove	
		d Lever (4) and manual selector shaft (5)	Remove	Hold lever (4) in one hand and carefully pull manual selector shaft (5) through selector seal (6)
		e Selector seal (6)	Remove	Use seal remover Discard
		f Plug (7) and washer (8)	Remove	
		g Plug (9)	Remove	
		h Capscrew (10) and retainer (11)	Remove	

4-4. TRANSMISSION (CONT)

a. Transmission Housing (cont).

KEY

1. Nut
2. Shaft retainer pin
3. Nut
4. Lever
5. Manual selector shaft
6. Selector seal
7. Plug
8. Washer
9. Plug
10. Capscrew
11. Retainer
12. Capscrew
13. Washer
14. Plug



15. Capscrews
16. Cover
17. Gasket
18. Socket head screws
19. Lube valve adapter
20. Gasket
21. Lube valve
22. Lube valve spring
23. Valve guide tube
24. Plug
25. Drive screw
26. Name plate
27. Vent assembly
28. Housing

TA236057

TA236057

4-4. TRANSMISSION (CONT)

a. Transmission Housing (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)	i	Capscrew (12) and washer (13)	Remove	
	j	Plug (14)	Remove	
	k	Six capscrews (15)	Remove	
	l.	Cover (16) and gasket (17)	Remove	Discard gasket (17)
	m	Two socket head screws (18)	Remove	Discard
	n	Lube valve adapter (19) and adapter gasket (20)	Remove	Discard adapter gasket (20)
	o	Assembly consisting of lube valve (21), lube valve spring (22) and valve guide tube (23)	Remove	Only if replacement is necessary. Pull from housing
	p	Plug (24)	Remove	
	q	Drive screw (25) and name plate (26)	Remove	Only if replacement is necessary Be sure new name plate (26) has identical information as original
	r	Vent assembly (27)	Remove	Only if replacement is necessary

4-4. TRANSMISSION (CONT)

a. Transmission Housing (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using clean- ing solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.			
2	a	All parts except housing (28)	Clean	Use dry cleaning solvent P-D-680. Move up and down in solvent until all old lubri- cant, dirt and grease are removed. Dry with clean cloths or with moisture-free compressed air
	b	Housing (28)	Clean	Use clean cloths moistened with dry cleaning solvent P-D-680. Dry with clean cloths or with moisture-free compressed air
INSPECTION				
3	a	Housing (28)	Inspect	Inspect for cracks, distortion and other damage, especially surfaces where housing mates

14-4. TRANSMISSION (CONT)

a. Transmission Housing (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
3 (cont)				with other components. Check all holes for distortion, gouges, and damage to threads. Replace if necessary
		b Manual selector shaft (5)	Inspect	Inspect for burrs Remove with crocus cloth. Replace if necessary
		c All other parts	Inspect	Inspect for damage to all threads. Check for cracks, distortion, and other damage. Replace any items if necessary
REASSEMBLY				
4	Housing (28)	a Vent assembly (27)	Install	If old vent assembly (27) was removed. Don't overtighten. Be careful not to distort or crush vent assembly stem
		b Drive screw (25) and new name plate (26)	Install	If old name plate (26) was removed. Stamp all information from old name plate onto new one
		c Plug (24)	Install	
		d New assembly consisting of lube valve (21), lube valve spring (22), and valve guide tube (23)	Install	If old assembly was removed. Press in
		e Lube valve adapter (19) and new adapter gasket (20)	Position	
		f Two new socket head screws (18)	Install	Tighten to 9-11 pounds foot

4-4. TRANSMISSION (CONT)

a. Transmission Housing (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
4 (cont)	g	Cover (16) and new gasket (17)	Position	
	h	Six capscrews (15)	Install	Tight enough to prevent leakage
	i	Plug (14)	Install	Tight enough to prevent leakage
	j	Capscrew (12) and washer (13)	Install	
	k	Capscrew (10) and retainer (11)	Install	
	l.	Plug (9)	Install	Tight enough to prevent leakage
	m	Plug (7) and washer (8)	Install	Tighten to 50-60 pounds foot
	n	Selector seal (6)	Install away from tool	Place into seal installer, lip Apply nonhardening sealant to outer edge Install in bore. Lubricate inner bore of selector seal (6) with automatic transmission fluid
	o	Manual selector shaft (5)	Install	Carefully push through selector seal (6)
	p	Lever (4)	Position	So that selector valve pin projects toward inside of housing (28)
	q	Nut (3)	Install	Tighten to 15-20 pounds foot
	r	Shaft retainer pin (2)	Install	
	s	Nut (1)	Install	

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly.

This task covers: a. Disassembly b. Cleaning c. Inspection d. Reassembly

INITIAL SETUP

Tools

No 2 Common Organizational Maintenance Tool Kit
- Flat tip screwdriver
- Twist drill set
- Retaining ring pliers
- Mechnical puller kit
- Safety glasses

Thickness gage
Slip joint pliers
Arbor press, 10 ton capacity, adjustable bed of 25 inches minimum opening
Drill press
Lathe
Soft-jawed vise
Main and output shaft orifice installer J-24369
Sun gear shaft bushing installer J-24468
Front planetary bushing installer J-24469
Planetary carrier rebuild tool kit J-25587-01
- Removing, installing and swaging fixture J-25587-1
- Pin remover and installer adapter J-25587-2
- Support block J-25587-3
- Support block J-25587-4
- Pin remover and installer spacer J-25587-6

Pin installer J-25587-11
Pin installer J-25587-12
Pin installer J-25587-13
Pin remover J-25587-16
Bottom swaging tool holder J-25587-17
Four 3/4 inch loading pins J-25587-18
Six 1/2 inch loading pins J-25587-22
Two swaging tools J-25587-23
Two swaging tools J-25587-27
Four 3/4 inch guide pins J-25587-48
Six 1/2 inch guide pins J-25587-50

Materials/Parts

Cleaning solvent Item 1, Appendix C
Clean cloths Item 2, Appendix C
Oil-soluble grease Item 9, Appendix C

Personnel Required

Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
4-4e	Main shaft and gear unit assembly removed from transmission

STEP	LOCATION	ITEM		ACTION	REMARKS
DISASSEMBLY					
1	Main shaft and gear unit assembly	a	Thrust washer (1)	Remove	
		b	Thrust washer (2)	Remove	
		c	Front sun gear (3)	Remove	Main shaft and gear assembly positioned shaft (4) end up
		d	Thrust washer (5)	Remove	

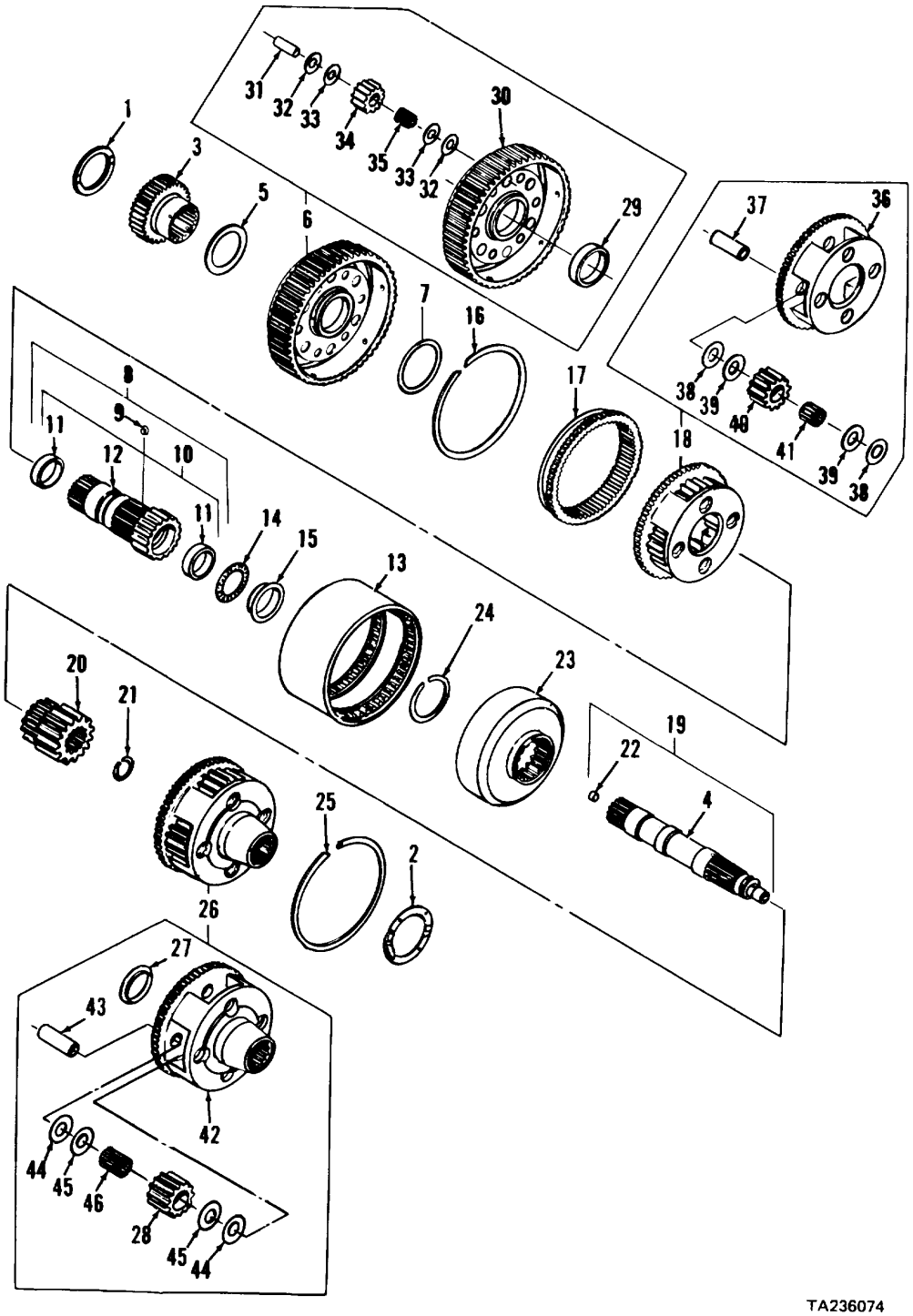
4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		e Front planetary carrier assembly (6)	Remove	
		f Thrust washer (7)	Remove	
		g Center sun gear shaft assembly (8)	Remove	
2	Center sun gear shaft assembly (8)	Two spring pins (9)	Remove	Only if inspection shows replacement is necessary
3	Shaft and bushings (10)	Two bushings (11)	Remove	Only if inspection shows replacement is necessary. Position shaft (12) in vise with soft jaws and use mechanical puller kit to remove bushings (11)
4	Drum (13)	a Bearing assembly (14) and roller bearing race (15)	Remove	
		b Internal snap ring (16)	Remove	
		c Gear (17)	Remove	
		d Center planetary carrier assembly (18)	Remove	
		e Main shaft assembly (19) and attached parts	Remove	
5	Gear (20)	a External snap ring (21)	Remove	
		b Shaft (4)	Remove	
6	Shaft (4)	Lube orifice plug (22)	Remove	Only if inspection shows replacement is necessary

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).



TA236074

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

KEY

1	Thrust washer	24	Snap ring
2	Thrust washer	25	Internal snap ring
3	Front sun gear	26	Rear planetary carrier assembly
4	Shaft	27	Bearing assembly
5	Thrust washer	28	Pinion set
6	Front planetary carrier assembly	29	Bushing
7	Thrust washer	30	Flange and carrier assembly
8	Center sun gear shaft assembly	31	Pins
9	Spring pins	32	Thrust washers
10	Shaft and bushings	33	Pinion thrust washers
11	Bushings	34	Pinion set
12	Shaft	35	Rollers
13	Drum	36	Carrier
14	Bearing assembly	37	Pins
15	Roller bearing race	38	Thrust washers
16	Internal snap ring	39	Pinion washers
17	Gear	40	Pinion set
18	Center planetary carrier assembly	41	Rollers
19	Main shaft assembly	42	Carrier
20	Gear	43	Pins
21	External snap ring	44	Thrust washers
22	Lube orifice plug	45	Pinion thrust washers
23	Gear	46	Rollers

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
7	Gear (23)	a Snap ring (24)	Remove	
		b Gear (20)	Remove	
8	Drum (13)	a Internal snap ring (25)	Remove	
		b Rear planetary carrier assembly (26)	Remove	
9	Rear planetary carrier assembly (26)	Bearing assembly (27)	Remove	If necessary, rotate pinion set (28) to help dislodge bearing assembly (27)

NOTE

Disassemble front, center, and rear planetary carrier assemblies (6, 18, and 26) only if inspection shows replacement of parts is necessary.

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
10	Front planetary carrier assembly (6)	Bushing (29)	Remove	Press out
11	Flange and carrier assembly (30)	a Six pins (31)	Remove: Use drill press and drill bit slightly smaller than diameter of pins (31). Drill into rear end of pins (31)	Do not drill into flange and carrier assembly (30). Place removing, installing and swaging fixture on arbor press. Place flange and carrier assembly (30) on fixture, drilled ends of pins (31) up. Install pin remover into fixture. Press pins (31) from flange and carrier assembly (30). Remove flange and carrier assembly (30) from arbor press
		b 12 thrust washers (32), 12 pinion thrust washers (33), pinion set (matched set of six pinions) (34), and 120 rollers (35)	Remove	

NOTE

Repeat step 11 to disassemble center planetary carrier assembly (18). Center planetary carrier assembly (18) consists of carrier (36), four pins (37), eight thrust washers (38), eight pinion washers (39), pinion set (matched set of four pinions) (40), and 72 rollers (41). Be sure in step Ila to drill into the front ends of pins (37).

Repeat step 11 to disassemble rear planetary carrier assembly (26). Rear planetary carrier assembly (26) consists of carrier (42), four pins (43), eight thrust washers (44), eight pinion thrust washers (45), 72 rol- lers (46), and pinion set (matched set of four pinions) (28). In step Ila be sure to use pin remover and installer adapter, and pin remover and installer spacer, to support rear planetary carrier assembly (26) in removing, installing and swaging fixture.

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
12	All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt and old lubricant. Dry thoroughly with clean, dry, lintless cloths or with compressed air. Don't use compressed air to dry bearing assembly (14) and rollers (35, 41, and 46)	
INSPECTION				
13	a Front, center, and rear planetary carrier assemblies (6, 18, and 26)	Inspect	Inspect for worn, overheated, or contaminated condition. Inspect rollers (35, 41, and 46) for roughness and binding in operation Check end play of pinion sets (28, 34, and 40) by inserting thick-	

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
13 (cont)				ness gage between carriers (30, 36, and 42) and thrust washers (32, 38, and 44). End play must be within 0.008-0.031 inch. If you notice any defective conditions, replace part. Replace entire pinion set (28, 34, and 40) if any individual pinion is damaged. Refer to steps 10 and 11.
	b	Bearing assembly (14)	Inspect	Inspect for roughness or binding in operation Inspect for worn, galled, or bent condition. If you notice any of these conditions, replace part
	c	Two spring pins (9)	Inspect	Inspect for worn, bent or broken condition. Replace if necessary. Refer to step 2
	d	Two bushings (11)	Inspect	Inspect for galling, scratches or other wear. Replace if necessary. Refer to step 3
	e	Lube orifice plug (22)	Inspect	Inspect for worn, bent or broken condition. Replace if necessary. Refer to step 6
	f	All other parts	Inspect	Inspect for worn, bent or broken condition. Closely examine all gear teeth for any damage. Replace part if necessary
REASSEMBLY				

NOTE

If the front, center, or rear planetary carrier assemblies (6, 18, or 26) were not disassembled, start with step 17. Otherwise start with steps 14 through 16 for reassembly of any planetary carrier assemblies that were disassembled.

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14	Front planetary carrier assembly (6)	a. 120 rollers (35), twelve thrust washers (32), and twelve pinion thrust washers (33)	Lubricate	Use oil-soluble grease
		b. Six groups, each consisting of two thrust washers (32), two pinion thrust washers (33), pinion (34) and 20 rollers (35)	Assemble. Insert 1/2 inch loading pins into pinions (34). Install rollers (35) around 1/2 inch loading pins. Install pinion thrust washers (33) and thrust washers (32) as shown in exploded view	
		c. Six groups, each consisting of two thrust washers (32), two pinion thrust washers (33), pinion (34), and 20 rollers (35)	Install	Flange and carrier assembly (30) rear end up
		d. Six 1/2 inch guide pins	Install	Larger diameters first. Push out 1/2 inch loading pins

CAUTION

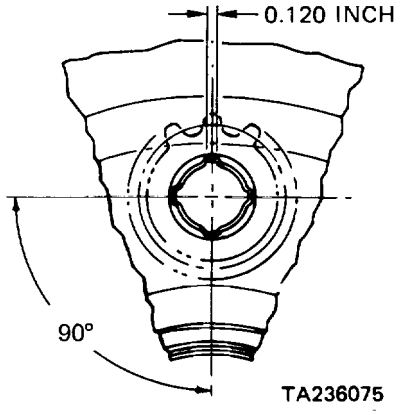
In following step, don't put any pressure on flange and carrier assembly (30), or you will distort it.

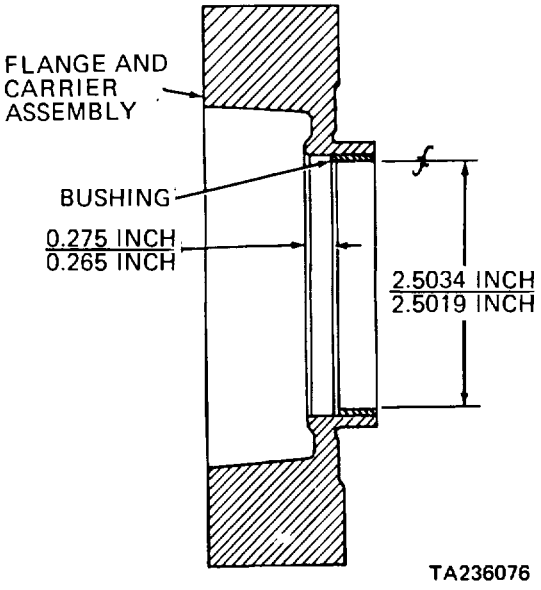
		e. Six pins (31)	Install removing, installing and swaging fixture onto arbor press. Install flange and carrier assembly (30) onto fixture. Install pin installer J-25587-13 into fixture, so that cutaway part will clear bosses of flange and carrier assembly (30) when pins (31) are pressed in. One at a time, place pins (31) on pilot ends of	

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14 (cont)				1/2 inch guide pins. Press into flange and carrier assembly (30) until pin installer touches flange and carrier assembly
		f. Six pins (31)	Swage. Remove flange and carrier assembly (30) from removing, installing and swaging fixture. Install bottom swaging tool holder into fixture. Install one swaging tool J-25587-27 into bottom swaging tool holder and one into fixture. Lubricate both ends of pins (31) with oil-soluble grease. Position flange and carrier assembly (30) rear end up on fixture. Use support block J-25587-4 to level flange and carrier assembly while lower swaging tool is supporting lower end of pin (31). One pin at a time, apply pressure gradually (about two tons) to swage ends of pins against flange and carrier assembly (30), as shown. Pinion set (34) must rotate freely and have 0.008-0.031 inch end play. Remove flange and carrier assembly from fixture. Remove bottom swage tool holder from fixture	
			Use front planetary bushing installer to press bushing (29) into flange and carrier assembly to dimension shown	





4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14 (cont)		h. Bushing (29)	Bore	Use lathe to bore bushing (29) to diameter shown, step 14g. Bushing bore must be square with surface of flange and carrier assembly (30) within 0.001 inch
15	Center planetary carrier assembly (18)	a. 72 rollers (41), eight thrust washers (38), and eight pinion washers (39)	Lubricate	Use oil-soluble grease
		b. Four groups, each consisting of two thrust washers (38), two pinion washers (39), pinion (40), and 18 rollers (41)	Assemble. Insert 3/4 inch loading pins into pinions (40). Install rollers (41) around 3/4 inch loading pins. Install pinion washers (39) and thrust washers (38) as shown in exploded view	
		c. Four groups, each consisting of two thrust washers (38), two pinion washers (39), pinion (40) and 18 rollers (41)	Install	Carrier (36) front end up
		d. Four 3/4 inch guide pins	Install	Larger diameters first. Push out 3/4 inch loading pins

CAUTION

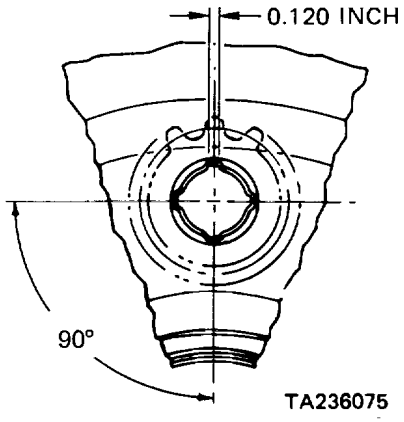
In following step, don't put any pressure on carrier (36), or you will distort it.

		e. Four pins (37)	Install carrier (36) onto removing, installing and swaging fixture. Install pin installer J-25587-11 into fixture, so that cutaway parts will clear bosses of carrier	

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
15 (cont)		f. Four pins (37)	(36) when pins (37) are pressed in. One at a time, place pins (37) on pilot ends of 3/4 inch guide pins. Press into carrier (36) until pin installer touches carrier Swage. Remove carrier (36) from removing, installing, and swaging fixture. Install bottom swaging tool holder into fixture. Install one swaging tool J-25587-23 into bottom swaging tool holder and one into fixture. Lubricate both ends of pins (37) with oil-soluble grease. Position carrier (36) front end up on fixture. Use support block J-25587-4 to level carrier while lower swaging tool is supporting lower end of pin (37). One pin at a time, apply pressure gradually (about three tons) to swage ends of pins (37) against carrier (36), as shown. Pinion set (40) must rotate freely and have 0.008-0.031 inch end play. Remove carrier (36) from fixture. Remove bottom swaging tool holder from fixture	
16	Rear planetary carrier assembly (26)	a. Bearing assembly (27)	Install	
		b. 72 rollers (46), eight thrust washers (44), and eight pinion thrust washers (45)	Lubricate	Use oil-soluble grease
		c. Four groups, ach consisting of two thrust washers (44), two pinion thrust washers (45), pinion (28) and 18 rollers (46)	Assemble. Insert 3/4 inch loading pins into pinions (28). Install rollers (46) around 3/4 inch loading pins. Install pinion thrust washers (45) and thrust washers (44) as shown in exploded view	



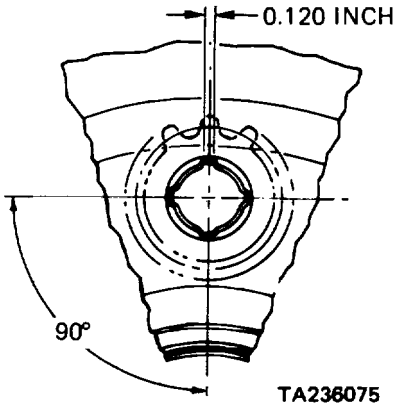
4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
16 (cont)		d. Four groups, each consisting of two thrust washers (44), two pinion thrust washers (45), pinion (28) and 18 rollers (46)	Install	Carrier (42) rear end up
		e. Four 3/4 inch guide pins	Install	Larger diameters first. Push out 3/4 inch loading pins
		CAUTION		
		In following step, don't put any pressure on carrier (42), or you will distort it.		
		f. Four pins (43)	Install. Install carrier (42) onto fixture, using pin remover and installer adapter, and pin remover and installer spacer. Install pin installer J-25587-12 into fixture so that cutaway part will clear bosses of carrier (42) when pins (43) are pressed in. One at a time, place pins (43) on pilot ends of 3/4 inch guide pins. Press into carrier (42) until pin installer touches carrier	
		g. Four pins (43)	Swage. Remove carrier (42), pin remover and installer adapter, and pin remover and installer spacer from removing, installing and swaging fixture. Install bottom swaging tool holder into fixture. Install one swaging tool J-25587-23 into bottom swaging tool holder and one into fixture. Lubricate both ends of pins (43) with oil-soluble grease. Position carrier (42) rear end up on fixture. Use support block J-25587-3 to level carrier while lower swaging tool is supporting lower end of pin (43). One pin at a time, apply pressure gradually (about three tons) to swage ends of pins (43)	

4-4. TRANSMISSION (CONT)

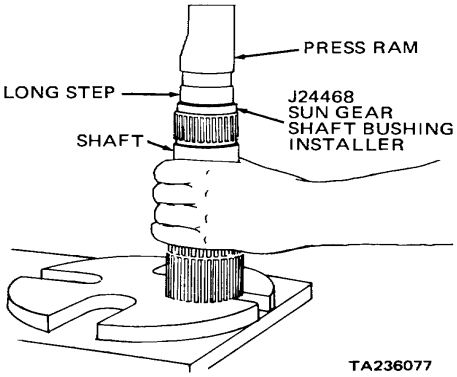
b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
16 (cont)			against carrier (42), as shown. Pinion set (28) must rotate freely and have 0.008-0.031 inch end play. Remove carrier from fixture	
				
17	Shaft (4)	New lube orifice plug (22)	Install	If old lube orifice plug (22) was removed. Use main and output shaft orifice installer. Install small-orificed end first. Press in until front of plug is recessed 0.140-0.180 inch below front end of shaft (4)
18	Center sun gear shaft assembly (8)	Two new spring pins (9)	Install	If old spring pins (9) were removed. Split in pin must be toward an adjacent spline tooth. Press in until outer end of pin (9) is flush with, to 0.010 inch below, top of spline teeth

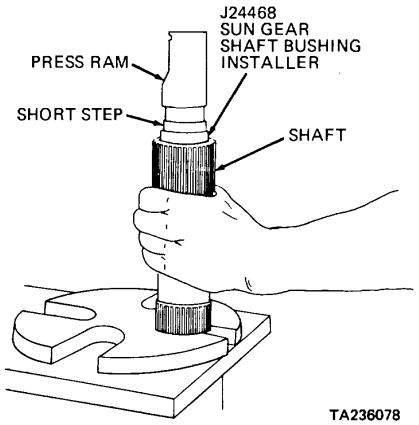
4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
19 (cont)	Shaft and bushings	a. New front bushing	Install	If old bushing (11) was removed. Use sun gear shaft bushing installer. Use proper step, as shown. Front bushing (11) should be installed to depth of 0.400-0.420 inch in shaft (12)
		b. New rear bushing (11)	Install	If old bushing (11) was removed. Use sun gear shaft bushing installer. Use proper step, as shown. Rear bushing (11) should be installed to depth of 0.650-0.670 inch in shaft (12)



b. New rear bushing (11) Install



4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
19 (cont)		c. Both bushings (11)	Bore	Use lathe to bore bushings (11) to 1.5640 to 1.5655 inches diameter. Bores must be concentric with outside diameter of shaft (12) within 0.002 inch
20	Rear planetary(27) carrier (26)	Bearing assembly	Install	If bearing assembly (27) was removed and rear planetary carrier assembly (26) was not repaired
21	Drum (13)	a. Rear planetary carrier assembly (26)	Install	Drum front side down
		b. Internal snap ring (25)	Install	
22	Gear (23)	a. Gear (20)	Install	Into rear of gear (23)
		b. Snap ring (24)	Install	
23	Gear (20)	Shaft (4)	Install	Into front of gear (20)
24	Shaft (4)	External snap ring (21)	Install	
25	Drum (13) attached parts	a. Shaft (4) and	Install	Gear (20) must sit against rear planetary carrier assembly (26)
26	Shaft (4)	a. Roller bearing race (15)	Install	Position drum (13) so that front of shaft (4) is up. Roller bearing race (15) inner lip up. Retain with oil-soluble grease
		b. Bearing assembly (14)	Install	Coat first with oil-soluble grease
27	Drum (13)	a. Center planetary carrier assembly (18)	Install	Pinion set (40) first
		b. Gear (17)	Install	Outer splines first
		c. Internal snap ring (16)	Install	

4-4. TRANSMISSION (CONT)

b. Main Shaft and Gear Unit Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
27 (cont)		d. Center sun gear shaft assembly (8)	Install	Larger diameter first. To sit on bearing assembly (14)
28	Front planetary carrier assembly (6)	Thrust washer (7) on rear hub	Install	Retain with oil-soluble grease
29	Drum (13) carrier assembly (6)	Front planetary	Install	
30	Front sun gear (3)	Thrust washer (5) on rear hub	Install	Retain with oil-soluble grease
31	Center sun gear shaft(3) assembly (8)	Front sun gear splines of front sun gear (3) match with locations of spring pins (9)	Install	Be sure that missing internal
32	Main shaft and gear unit assembly	a. Thrust washer (2)	Install	Retain with oil-soluble grease
		b. Thrust washer (1)	Install	Retain with oil-soluble grease

NOTE

For installation into transmission, refer to paragraph 4-4e.

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly.

This task covers: a. Removal b. Disassembly c. Cleaning d. Inspection e. Reassembly f. Installation

INITIAL SETUP

Tools
No. 2 Common Organizational Maintenance Tool Kit
- Flat tip screwdriver
- Hand hammer
- Hand cold chisel
- Machinist's steel rule
- Safety glasses

Retaining ring pliers
Arbor press
Forward and fourth clutch spring compressor J-6438-01
Forward clutch gage J-26913
Shim stock, 10 pieces, 3/32 by 0.020 by 3 inches

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C4-41
Automatic transmission fluid	Item 8, Appendix C
Oil-soluble grease	Item 9, Appendix C
Hook type seal ring	FSCM 73342 PN 6839163
Five forward clutch discs	FSCM 73342 PN 6834370
Lip type ring	FSCM 73342 PN 6833981
Hook type seal rings	FSCM 73342 PN 6833999
Lip type ring	FSCM 73342 PN 8623121

Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
	Oil pump and front support group removed from transmission.

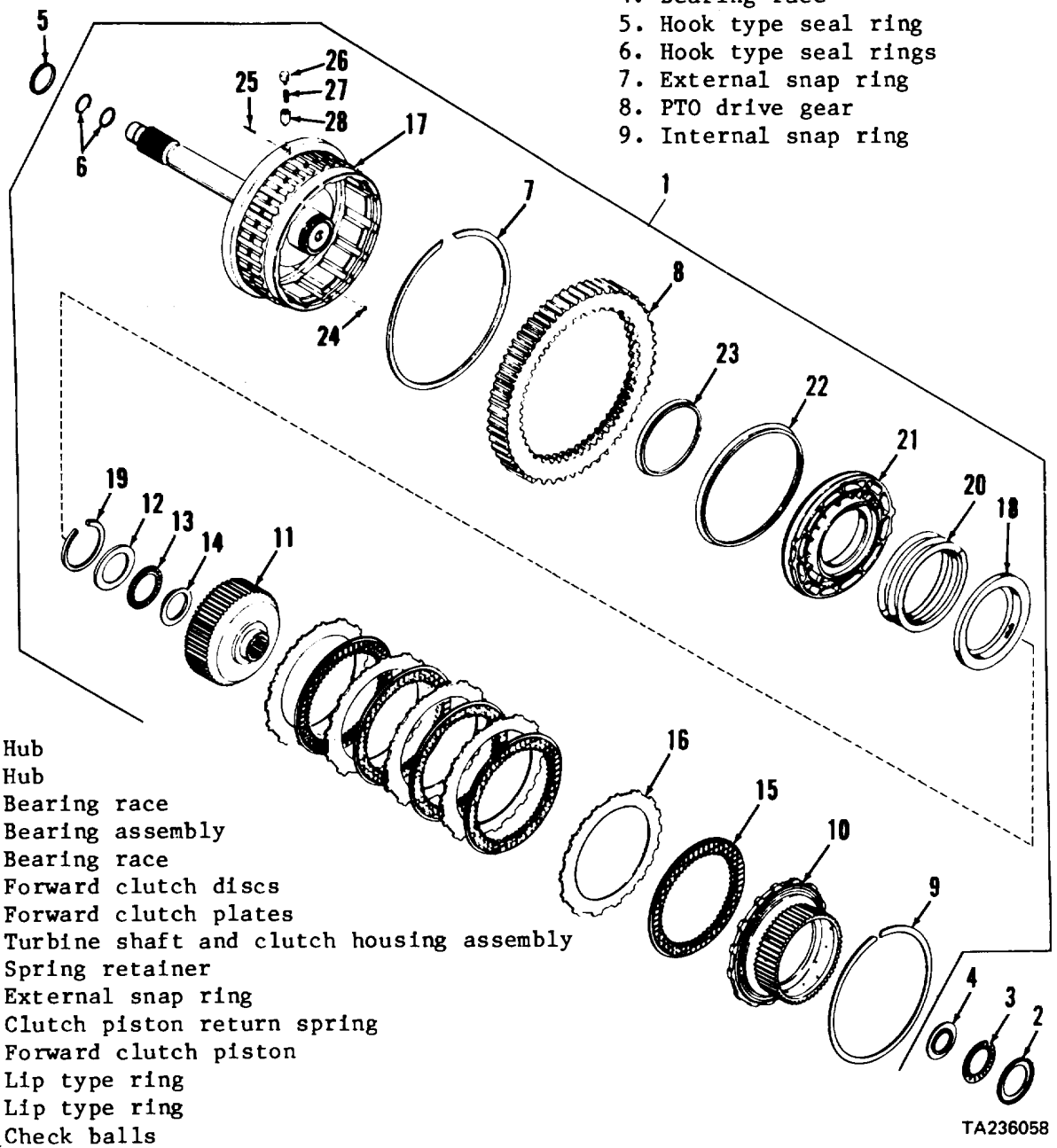
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	Forward clutch and shaft assembly (1)	Remove	Grasp and lift
DISASSEMBLY				
2	Forward clutch and shaft assembly (1)	a. Bearing race (2), bearing assembly (3), and bearing race (4)	Remove	
		b. Hook type seal ring (5)	Remove	Discard

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

KEY

1. Forward clutch and shaft assembly
2. Bearing race
3. Bearing assembly
4. Bearing race
5. Hook type seal ring
6. Hook type seal rings
7. External snap ring
8. PTO drive gear
9. Internal snap ring
10. Hub
11. Hub
12. Bearing race
13. Bearing assembly
14. Bearing race
15. Forward clutch discs
16. Forward clutch plates
17. Turbine shaft and clutch housing assembly
18. Spring retainer
19. External snap ring
20. Clutch piston return spring
21. Forward clutch piston
22. Lip type ring
23. Lip type ring
24. Check balls
25. Pin
26. Valve plug
27. Valve spring
28. Centrifugal valve

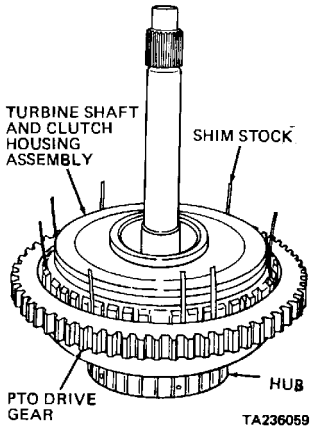


TA236058

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

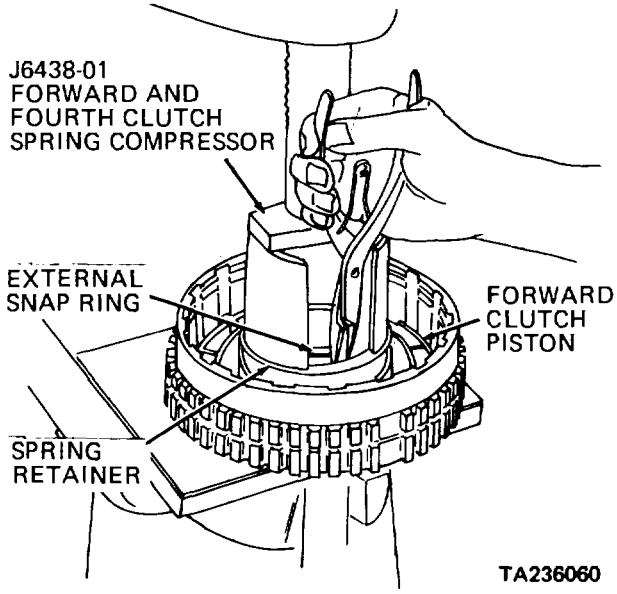
STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		c. Two hook type seal rings (6)	Remove	Discard
		d. External snap ring (7)	Compress	Position forward clutch and shaft assembly (1) shaft downward through hole in work table. Locate external snap ring gap. At cutout nearest gap, press external snap ring into housing groove. Slip piece of shim stock between snap ring and PTO drive gear (8). Repeat on other side of external snap ring gap. Working around PTO drive gear (8), continue to compress external snap ring and insert pieces of shim stock at three inch intervals, as shown
		e. PTO drive gear (8)	Remove	
		f. External snap ring (7)	Remove	
		g. Internal snap ring (9)	Remove	
		h. Hub (10)	Remove	
		i. Hub (11)	Remove	
		j. Bearing race (12), bearing assembly (13), and bearing race (14)	Remove	



4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		k. Five forward clutch discs (15) and five forward clutch plates (16)	Remove	Discard five forward clutch discs (15) only
		l. Turbine shaft and clutch housing assembly (17)	Place in press	
		m. Spring retainer (18)	Depress	Use forward and fourth clutch spring compressor, as shown



		n. External snap ring (19)	Remove	As shown, step 2m
		o. Spring retainer (18) and clutch piston return spring	Remove	Remove forward and fourth clutch spring compressor from press
3	Forward(20) clutch piston (21)	Lip type ring (22)	Remove	Discard

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4	Turbine shaft and clutch housing assembly (17)	a. Lip type ring (23)	Remove	Return turbine shaft and clutch housing assembly (17) to work table. Discard lip type ring (23)
		b. Two check balls (24)	Remove	Only if inspection shows replacement is necessary. Remove staked metal from bores to free check balls (24)
		c. Pin (25)	Remove	Depress valve plug (26)
		d. Valve plug (26) and valve spring (27)	Remove	
		e. Centrifugal valve (28)	Remove	

CLEANING

WARNING'

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

WARNING

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
5		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt, grease, and old lubricant. Dry thoroughly, using clean cloths or moisture-free compressed air. Don't dry bearing assemblies (3 and 13) with compressed air
INSPECTION				
6		a. Bearing assemblies (3 and 13)	Inspect	Insert into respective bearing races (2 and 4; 12 and 14) and check for smooth operation. If you notice roughness or binding, replace part
		b. Clutch piston return spring (20)	Inspect	Replace if bent, broken, or permanently set
		c. PTO drive gear (8)	Inspect	Check for broken teeth, cracks, distortion, or other damage. If you find any of these conditions, replace part
		d. Valve plug (26), valve spring (27), and centrifugal valve (28)	Inspect	Inspect for worn, bent, broken or distorted condition. If any of these conditions is found, replace part. Be sure that replacement part has same color coding as part replaced. Valve plug (26), valve spring (27), and centrifugal valve (28) must have same color coding
		e. Two check balls (24)	Inspect	Replace if they don't move freely in bores. See step 4b
		f. All other parts	Inspect	Inspect for worn, bent, broken, or distorted condition. If you find any of these conditions, replace part

4-4. TRANSMISSION (CONT)

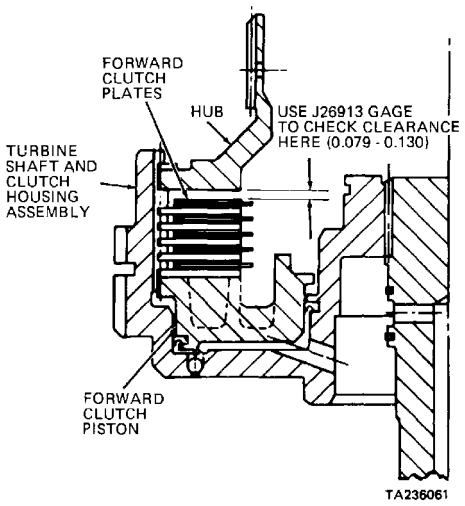
c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
7	Turbine shaft and clutch housing assembly (17)	a. Centrifugal valve (28)	Install	Conical end first
		b. Valve spring (27) and valve plug (26)	Position	
		c. Pin (25)	Install	Depress valve plug (26)
		d. Two new check balls (24)	Install	Position turbine shaft and clutch housing assembly (17) with shaft downward through hole in work table. Install new check balls (24) if old check balls were removed. Place check balls in bores. Stake each bore at three equally spaced places. Check balls must move when installed
		e. New lip type ring (23)	Install	Lubricate with automatic transmission fluid. Install so that lip faces fluid pressure side of forward clutch piston (21)
8	Forward clutch piston (21)	New lip type ring (22)	Install	Lubricate with transmission fluid. Install so that lip faces fluid pressure side of forward clutch piston (21)
9	Turbine shaft and clutch housing assembly (17)	a. Forward clutch piston (21)	Install	Be sure not to distort lip type rings (22 and 23)
		b. Five forward clutch plates (16) and five new forward clutch discs (15)	Install	Soak all forward clutch discs (15) in automatic transmission fluid for at least two minutes before installation. Install all forward clutch discs and plates (15 and 16) alternately, as shown in exploded view
		c. Hub (10)	Install	
		d. Internal snap ring (9)	Install	

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
10	Forward clutch clearance check	Clearance between hub (10) and top forward clutch disc (15)	Measure	Hold hub (10) up against internal snap ring (9), as shown. Insert forward clutch gage. When correct clearance is achieved, first step of forward clutch gage will fit, second step will not. If clearance is excessive, replace parts in following order to achieve correct clearance: 1) Any or all of forward clutch plates (16); 2) Hub (10). If clearance is still excessive, install thicker forward clutch piston (21). If clearance is insufficient, install thinner forward clutch piston (21). After installing any part, recheck clearance



NOTE

Parts removed in steps 11a through 11c below should be saved for reinstallation.

11	Turbine shaft and clutch housing (17)	a. Internal snap ring (9)	Remove	
		b. Hub (10)	Remove	
		c. 10 forward clutch discs and plates (15 and 16)	Remove	

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		d. Clutch piston return spring (20) and spring retainer (18)	Position	Place turbine shaft and clutch housing assembly (17) in press
		e. External snap ring (19)	Position	
		f. Spring retainer (18)	Depress	Use forward and fourth clutch spring compressor, as shown
		g. External snap ring (19)	Install	As shown, step 11f. Remove forward and fourth clutch spring compressor
		CAUTION		
		Use oil-soluble grease to retain bearing races (12 and 14) and bearing assembly (13). Movement of these parts off center will cause improper installation of, and extensive damage to, forward clutch and shaft assembly (1).		
		h. Bearing race (12)	Install	Position turbine shaft and clutch housing assembly shaft downward through hole in work table. Install bearing race (12) outer lip first
12	Hub (11)	a. Bearing race (14)	Install	Flat side first
		b. Bearing assembly (13)	Install	
13	Turbine shaft and clutch housing assembly (17)	a. Hub (11)	Install	Outer splines first
		b. Five forward clutch plates (16) and five forward clutch discs (15)	Install	Plates removed in step 11c. Install alternately, as shown in exploded view
		c. Hub (10)	Install	Hub (10) removed in step 1lb

4-4. TRANSMISSION (CONT)

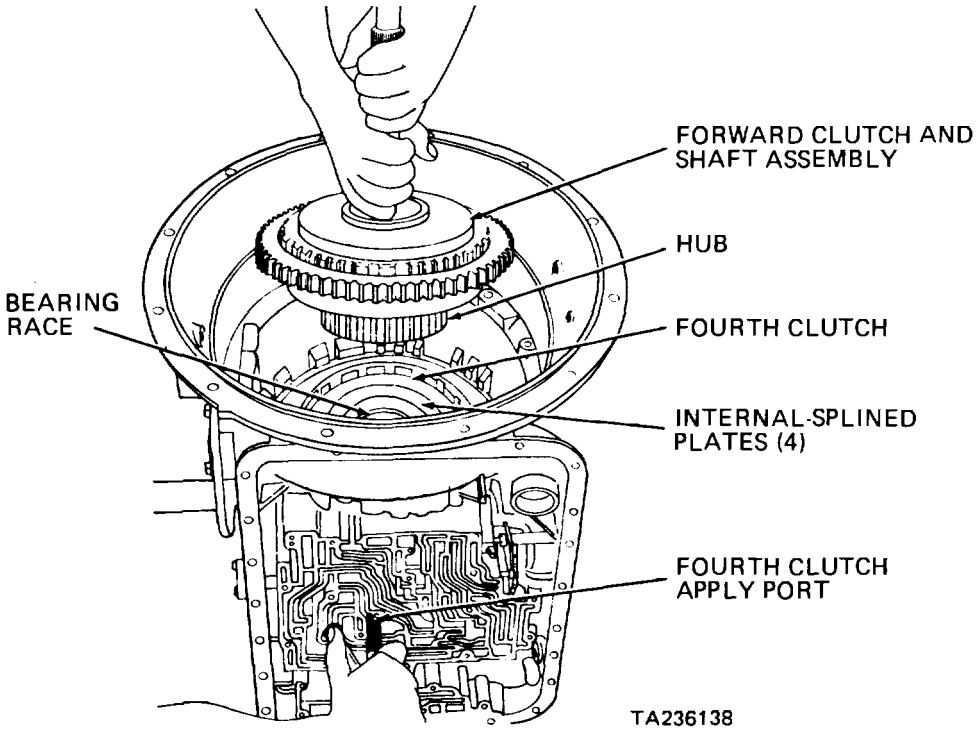
c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
13 (cont)		d. Internal snap ring (9)	Install	Internal snap ring removed in step 11a
		e. External snap ring (7)	Install	
		f. PTO drive gear (8)	Install	Chamfered inside diameter first. Engage with external snap ring (7)
		NOTE Retain bearing races (2 and 4) and bearing assembly (3) with oil-soluble grease.		
		g. Bearing race (4)	Install	Flat side first
		h. Bearing assembly (3)	Install	
		i. Bearing race (2)	Install	Outer lip first
		NOTE Retain hook type seal rings (5 and 6) with oil-soluble grease.		
		j. Two new hook type seal rings (6)	Install	Invert forward clutch and shaft assembly (1)
		k. New hook type seal ring (5)	Install	
INSTALLATION				
		NOTE To ease installation of forward clutch and shaft assembly (1) in step 14, aline fourth clutch plates in transmission and direct compressed air into fourth clutch apply port. Compressed air will apply fourth clutch and keep fourth clutch plates from moving while inserting forward clutch and shaft assembly (1).		

4-4. TRANSMISSION (CONT)

c. Forward Clutch and Shaft Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
14	Transmis-sion	Forward clutch and shaft assembly (1)	Install	Be sure bearing races (2 and 4) and bearing assembly (3) are securely retained on hub (11). If bearing race (2) will not adhere, place it on fourth clutch assembly hub in transmission. Lower forward clutch and shaft assembly (1), engaging splines on hub (10) with fourth clutch plates. When correctly installed, front surface of forward clutch and shaft assembly (1) is about 1/2 inch behind forward edge of PTO opening



4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly.

This task covers: a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Flat tip screwdriver
Hand hammer
Hand cold chisel
Safety glasses
Retaining ring pliers
Forward and fourth clutch spring compressor J-6438-01
Clutch spring compressor base J-24204-2
Fourth clutch gage J-26917

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
4-4c	Forward clutch and turbine shaft group removed from transmission.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Automatic transmission fluid	Item 8, Appendix C
Oil-soluble grease	Item 9, Appendix C
Four fourth clutch discs	FSCM 73342 PN 6834370
Ring	FSCM 73342 PN 6833981
Ring	FSCM 73342 PN 8623121

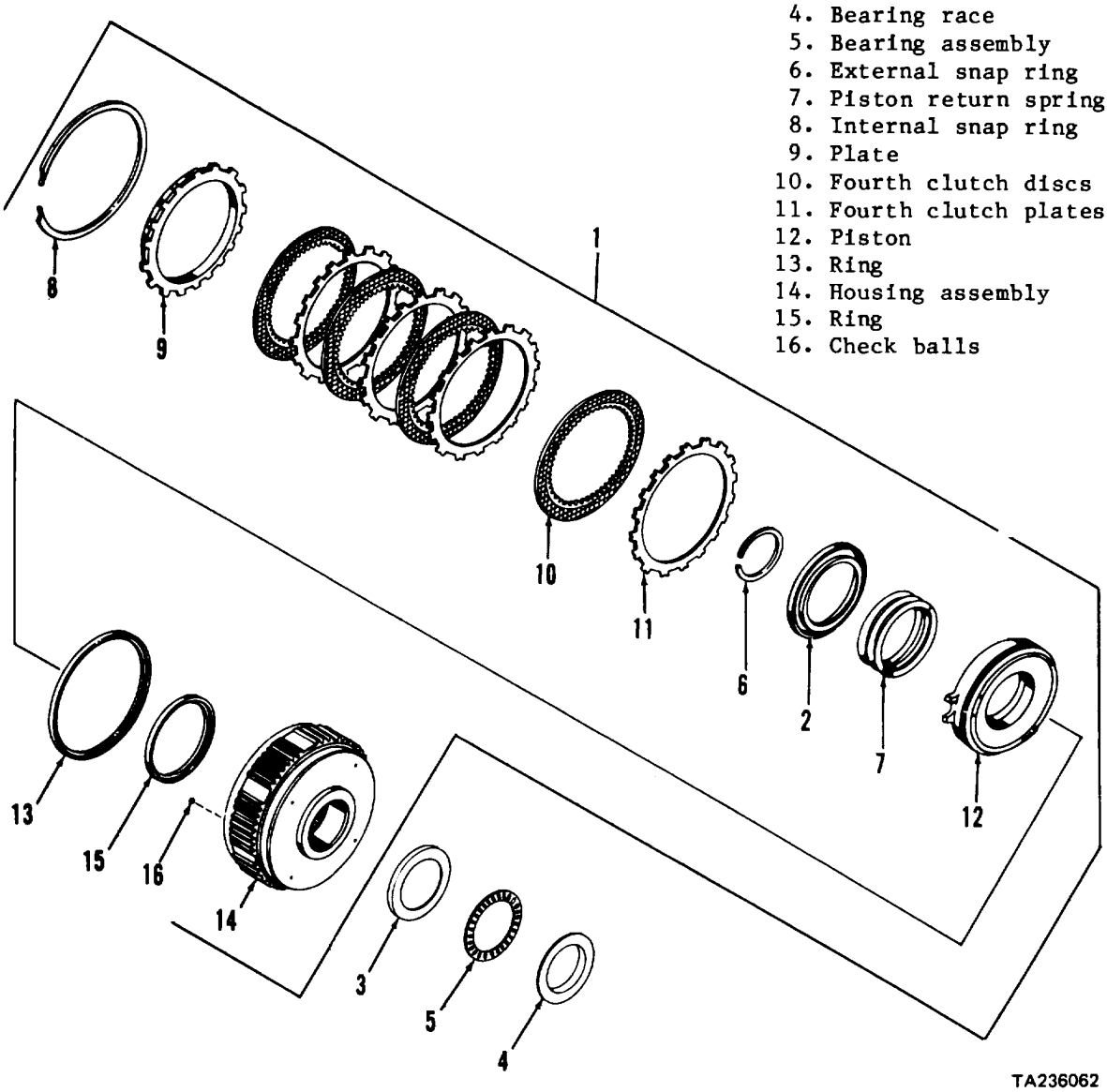
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	Fourth clutch assembly (1)	Remove	Grasp spring retainer (2) and lift. Remove to work table
DISASSEMBLY				
2	Fourth clutch assembly (1)	a. Two bearing races (3 and 4) and bearing assembly (5)	Remove	You may need to remove bearing race (4) from center support hub in transmission

4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

KEY

1. Fourth clutch assembly
2. Spring retainer
3. Bearing race
4. Bearing race
5. Bearing assembly
6. External snap ring
7. Piston return spring
8. Internal snap ring
9. Plate
10. Fourth clutch discs
11. Fourth clutch plates
12. Piston
13. Ring
14. Housing assembly
15. Ring
16. Check balls

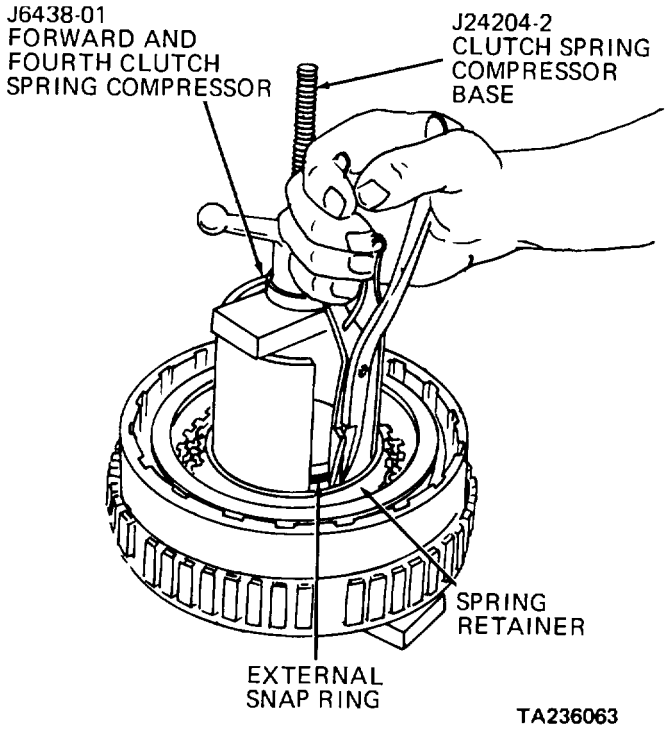


TA236062

4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		b. Spring retainer (2)	Depress	Use forward and fourth clutch spring compressor and clutch spring compressor base, as shown



		c. External snap ring (6)	Remove	As shown, step 2b
		d. Spring retainer (2) and piston return spring (7)	Remove	Remove forward and fourth clutch spring compressor and clutch spring compressor base
		e. Internal snap ring (8)	Remove	
		f. Plate (9)	Remove	
		g. Eight fourth clutch discs and plates (10 and 11)	Remove	Discard four fourth clutch discs (10) only. Reuse only if new fourth clutch discs aren't available
		h. Piston (12)	Remove	
3	Piston (12)	Ring (13)	Remove	Discard

4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
4	Housing assembly (14)	a. Ring (15) b. Four check balls (16)	Remove Remove	Discard Only if inspection shows replacement is necessary. Remove staked metal from bores to free check balls (16)
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

WARNING

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

5		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and and move up and down to remove all dirt, grease, and old lubricant. Dry thoroughly, using clean cloths

4-4. TRANSMISSION (CONT)

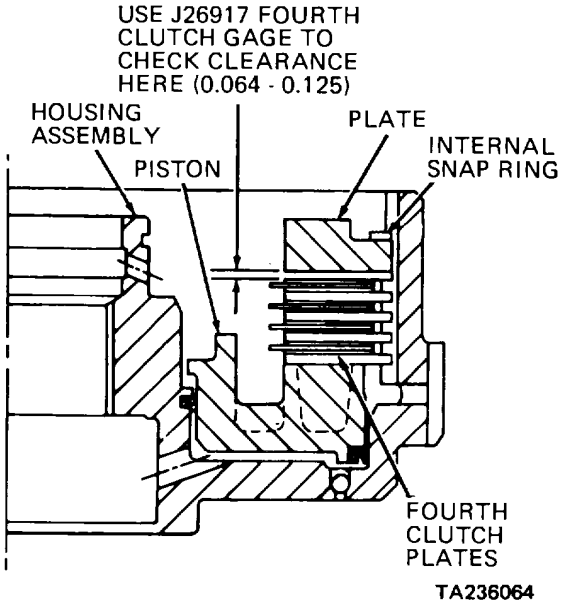
d. Fourth Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
5 (cont)				or moisture-free compressed air. Don't dry bearing assembly (5) with compressed air
INSPECTION				
6		a. Bearing assembly (5)	Inspect	Insert into bearing races (3 and 4) and check for smooth operation. If you notice roughness or binding, replace part
		b. Piston return spring (7)	Inspect	Replace if bent, broken, or permanently set
		c. All other parts	Inspect	Inspect for worn, bent, broken, or distorted condition. If you find any of these conditions, replace part
REASSEMBLY				
7	Housing assembly (14)	a. Four new check balls (16)	Install	If old check balls (16) were removed. Place check balls in bores. Stake each bore at three equally spaced places. Check balls must move when installed
		b. New ring (15)	Install	Lubricate with automatic transmission fluid. Install so that lip faces fluid pressure side of piston (12)
8	Piston (12)	a. New ring (13)	Install	Lubricate with automatic transmission fluid. Install so that lip faces fluid pressure side of piston (12)
9	Housing assembly (14)	a. Piston (12)	Install	Be sure not to distort rings (13 and 15)

4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

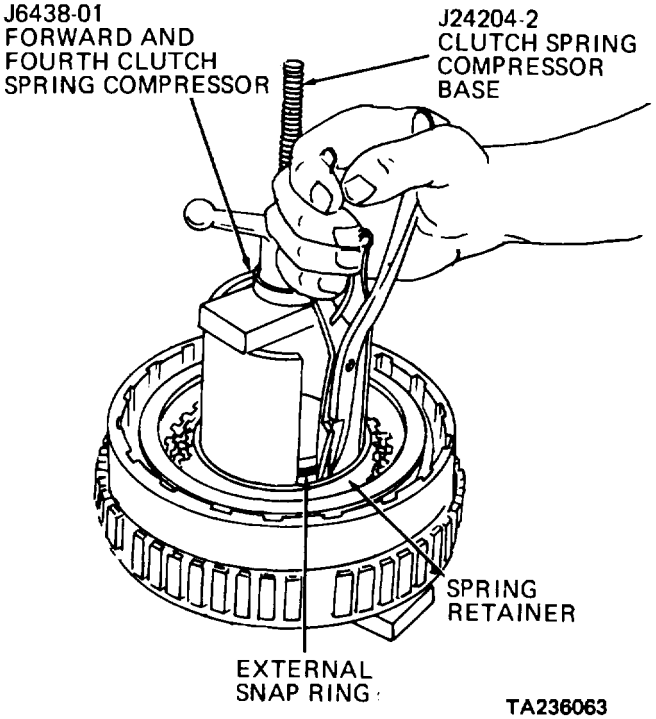
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
9 (cont)		b. Four fourth clutch plates (11) and four new fourth clutch discs (10)	Install	Soak all fourth clutch discs (10) in automatic transmission fluid for at least two minutes before installation. Install all fourth clutch plates and discs (10
		c. Plate (9)	Install	
		d. Internal snap ring (8)	Install	
10	Fourth clutch clearance check	Clearance between plate (9) and top fourth clutch disc (10)	Measure	As shown. Insert fourth clutch gage. When correct clearance is achieved, first step of fourth clutch gage will fit, second step will not. If clearance is excessive, replace parts in following order to achieve correct clearance: 1) Any or all of fourth clutch plates (11); 2) Plate (9). If clearance is still excessive, install thicker piston (12). If clearance is insufficient, install thinner piston (12). After installing any part, recheck clearance
11	Housing assembly (14)	a. Piston return spring (7) and spring retainer (2)	Position	



4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		b. External snap ring (6)	Position	
		c. Spring retainer (2)	Depress	Use forward and fourth clutch spring compressor and clutch spring compressor base, as shown



	d. External snap ring (6)	Install	As shown, step 11c. Remove forward and fourth clutch spring compressor and clutch spring compressor base

NOTE

Use oil-soluble grease to retain bearing races (3 and 4) and bearing assembly (5).

4-4. TRANSMISSION (CONT)

d. Fourth Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		e. Bearing race (3)	Install	Outer lip first
		f. Bearing assembly (5)	Install	
		g. Bearing race (4)	Install	Flat side up
INSTALLATION				
		NOTE To ease installation of fourth clutch assembly (1) in step 12, aline third clutch plates in transmission.		
12	Transmission	Fourth clutch assembly (1)	Install	Be sure bearing races (3 and 4) and bearing assembly (5) are securely retained on housing assembly (14). If bearing race (4) will not adhere, place it on center support hub in transmission. Grasp spring retainer (2) and lower fourth clutch assembly (1) onto center support hub, engaging splines on housing assembly (14) with third clutch plates

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies.

This task covers:
a. Removal
(1) Third clutch, center support, and second clutch assemblies
(2) Main shaft and gear unit assembly
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation
(1) Main shaft and gear unit assembly
(2) Third clutch, center support, and second clutch assemblies

INITIAL SETUP

Tools
No. 1 Common Organizational Maintenance Tool Kit
Socket wrench handle, 1/2 inch drive
Socket wrench set, 1/2 inch drive
Torque wrench, 1/2 inch drive, 175 pounds foot capacity
Flat tip screwdriver
Safety glasses
0-1 inch micrometer
Arbor press
Center support lifter J-24455
Gear unit lifter J-24454
Hoist
Sun lamp
Diagonal cutting pliers
Center support bushing installer J-24794
Lock ring installer J-24453
Compressor base J-24475-1
Compressor bar J-24475-2
Two capscrews 3/8-16 by 1-1J4 inches
Center bolt J-23717-1
Snapring gage J-24208-4
Second clutch gage J-26915
Third clutch gage J-26916

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Transmission oil	Item 8, Appendix C
Oil-soluble grease	Item 9, Appendix C
Three third clutch discs	FSCM 73342 PN 6835720
Seal rings	FSCM 73342 PN 6836772
Lip type seal rings	FSCM 73342 PN 6833986
Oil filter	FSCM 73342 PN 23010654
Ring seal	FSCM 73342 PN 6761244
Capscrew	FSCM 73342 PN 23013398
Washer	FSCM 73342 PN 9422847
Three discs	FSCM 73342 PN 6835720
Five rings	FSCM 73342 PN 9414220
Ring	FSCM 73342 PN 6834354
Lip type seal rings	FSCM 73342 PN 6883035

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

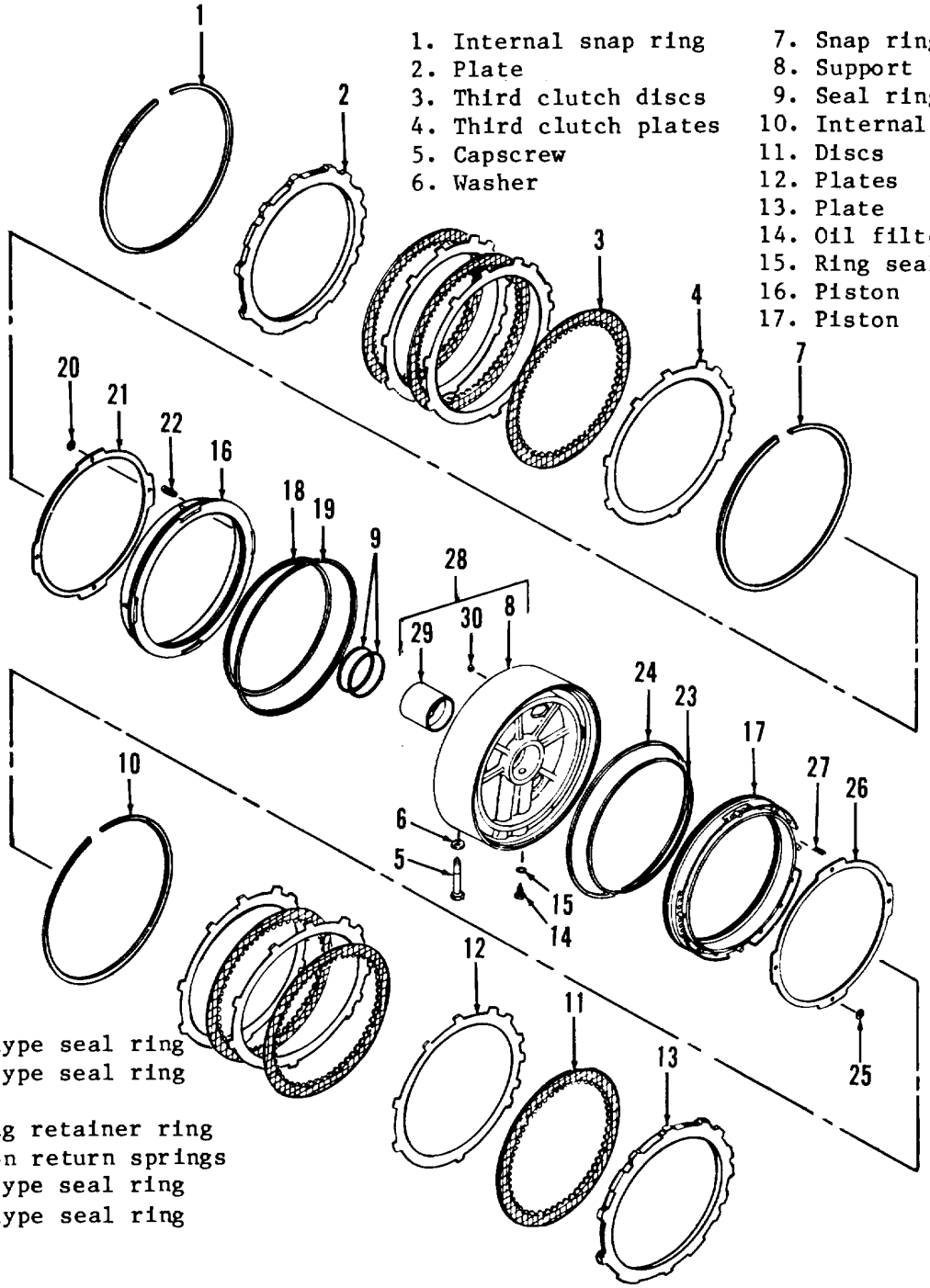
Paragraph	Condition Description
4-4d	Fourth clutch assembly removed from transmission.

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

KEY

1. Internal snap ring
2. Plate
3. Third clutch discs
4. Third clutch plates
5. Capscrew
6. Washer
7. Snap ring
8. Support
9. Seal rings
10. Internal snap ring
11. Discs
12. Plates
13. Plate
14. Oil filter
15. Ring seal
16. Piston
17. Piston
18. Lip type seal ring
19. Lip type seal ring
20. Rings
21. Spring retainer ring
22. Piston return springs
23. Lip type seal ring
24. Lip type seal ring
25. Rings
26. Ring
27. Piston return springs
28. Bushing and center support
29. Bushing
30. Check ball



TA236065

4-4. TRANSMISSION (CONT)

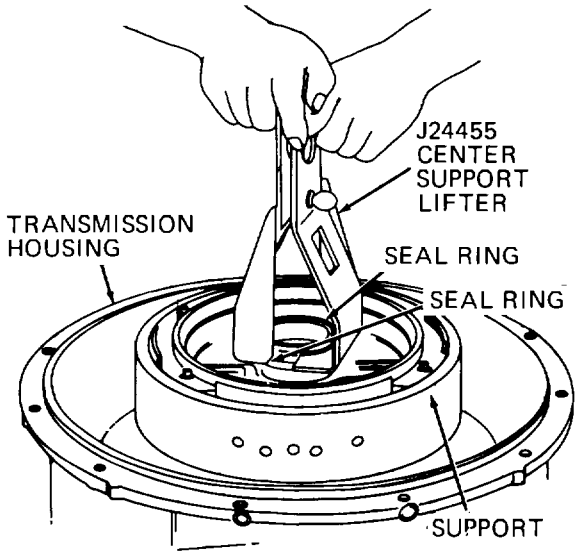
e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	a. Internal snap ring (1)	Remove	
		b. Plate (2)	Remove	
		c. Three third clutch discs (3) and third clutch plates (4)	Remove	Discard third clutch discs (3) only. Reuse only if new third clutch discs (3) aren't available
		d. Capscrew (5) and washer (6)	Remove	From bottom center of transmission. Discard capscrew (5)
		e. Snap ring (7)	Remove	

CAUTION

Center support fits tightly into transmission. If necessary to ease removal, heat the transmission housing slightly. A sun lamp, or a current of warm air is enough. Don't use torch, or you will distort transmission housing. If you feel center support binding during removal, tap down and lift again.

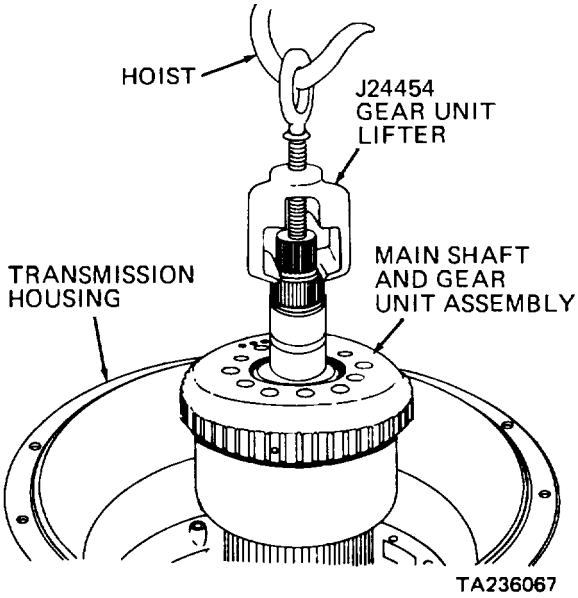
		f. Support (8) and attached parts	Remove	Attach center support lifter into recess between seal rings (9) on support hub, as shown. Lift up. Remove to work table



TA236066

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont.)

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)		g. Main shaft and gear unit assembly		Remove Attach gear unit lifter behind splines of main shaft and gear unit assembly, as shown. Attach hoist to ring on gear unit lifter and remove main shaft and gear unit assembly. Set aside on work table. Refer to paragraph 4-4b for exploded view and repair instructions
				
		h. Internal snap ring (10)	Remove	
		i. Three discs (11) and plates (12)	Remove	Discard discs (11) only. Reuse only if new discs (11) aren't available
		j. Plate (13)	Remove	
2	Support (8)	a. Oil filter (14) and ring seal (15)	Remove	Discard both
		b. Pistons (16 and 17)	Remove	
3	Piston (16)	a. Lip type seal ring (18)	Remove	Discard
		b. Lip type seal ring (19)	Remove	Discard

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
3 (cont)		c. Four rings (20)	Remove	Only if inspection shows piston (16) or attached parts must be replaced. Cut rings (20) off with diagonal cutting pliers to prevent damage to piston projections
		d. Spring retainer ring (21)	Remove	
		e. 20 piston return springs (22)	Remove	
		NOTE		
		Repeat step 3 for piston (17), lip type seal rings (23 and 24), four rings (25), ring (26), and 20 piston return springs (27).		
4	Bushing and center support (28)	a. Two seal rings (9)	Remove	Discard
		b. Bushing (29)	Remove	Only if inspection shows replacement is necessary. Mark location of bushing notch in relation to support (8). Press out
		c. Check ball (30)	Remove	
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

4-4. TRANSMISSION (CONT)

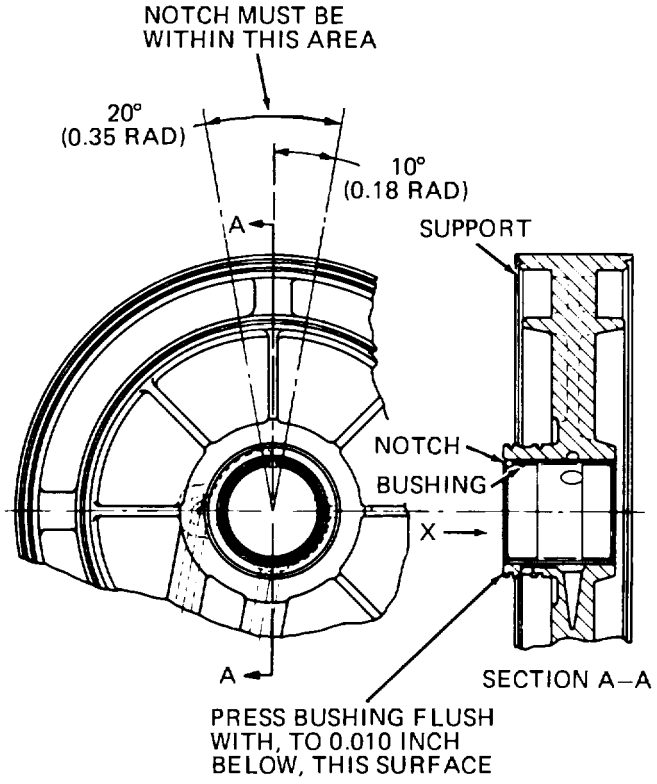
e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
5		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt and old lubricant. Dry thoroughly with compressed air or with clean, dry, lintless cloths
INSPECTION				
6		a. Bushing (29)	Inspect	Inspect for scoring, galling, other wear. Replace if necessary. See step 4b
		b. Pistons (16 and 17) and attached parts	Inspect	Inspect for worn, bent, or broken condition, especially projections on pistons (16 and 17). If you notice any of these conditions, replace part. See steps 3c-e
		c. All other parts	Inspect	Inspect for worn, bent, or broken condition. If you notice any of these conditions, replace part
REASSEMBLY				
7	Support (8)	a. New check ball (30)	Install	If old check ball (30) was removed

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
7 (cont)		b. New bushing (29)	Install	If old bushing (29) was removed. Press in as shown. Use center support bushing installer. New bushing (29) requires no reaming

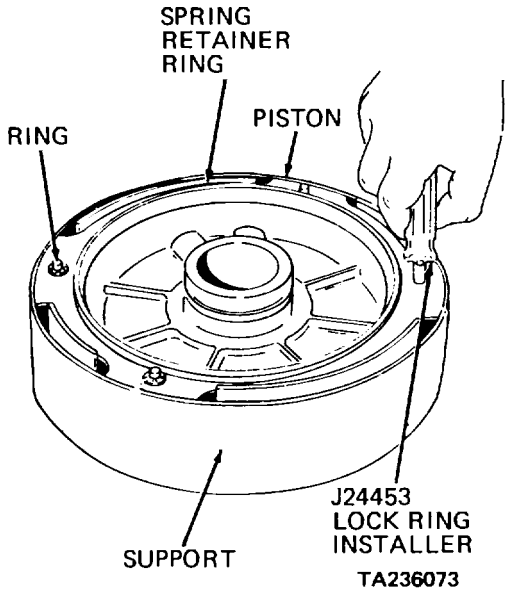


c	Piston (16)	Install	If piston (16) and attached parts were disassembled earlier
d	20 piston return springs (22)	Install	
e	Spring retainer ring (21)	Install	

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
7 (cont)		f. Four new rings (20)	Install	Use lock ring installer. As you install rings (20), compress piston return springs (22) by forcing spring retainer ring (21) down into cavity. This will push piston (16) to bottom of cavity, assuring correct clutch clearance later



		g. Piston (16)	Remove	
8	Piston (16)	a New lip type seal ring (19)	Install	Lubricate first with oil-soluble grease. Lip must face piston cavity of support (8)
		b New lip type seal ring (18)	Install	Lubricate first with oil-soluble grease. Lip must face piston cavity of support (8)

NOTE

Repeat steps 7c-f and 8 for piston (17), 20 piston return springs (27), ring (26), four new rings (25), and new lip type seal rings (23 and 24).

4-4. TRANSMISSION (CONT)

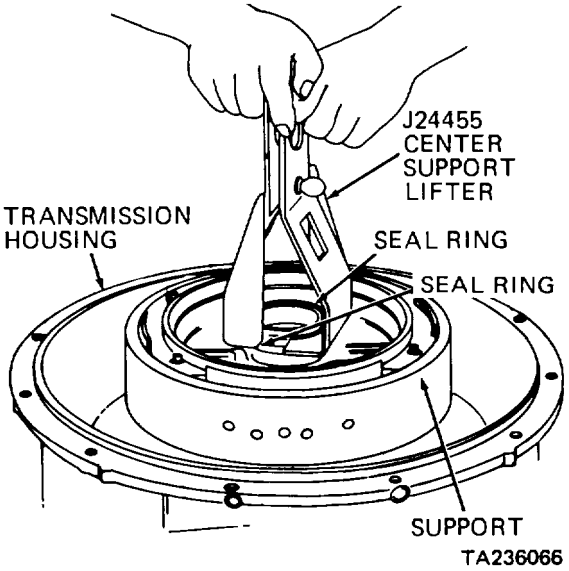
e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
9	Support (8)	a	Piston (17)	Install	
		b	New oil filter (14) and new ring seal (15)	Install	Closed end of cone first. Be sure ring seal (15) seats against shoulder of bushing and center support (28)
INSTALLATION					
			NOTE		
			Before final installation, measurement must be taken to determine correct snap ring (7) to be used Also, second clutch clearance must be checked To do these, remaining assemblies must be removed from transmission housing.		
10	Transmis-sion	a	First clutch assembly	Remove	Para 4-4f
		b	Governor and rear cover assembly	Remove	Para 4-4k
		c	Low planetary, low clutch, and adapter housing as-semblies	Remove	Para 4-4g
		d	Plate (13)	Install	Transmission positioned torque converter end up
		e	Three new discs (11) and three plates (12)	Install	Soak new discs (11) in trans-mission fluid for at least two minutes first. Install alternately, as shown in exploded view
		f.	Internal snap ring (10)	Install	

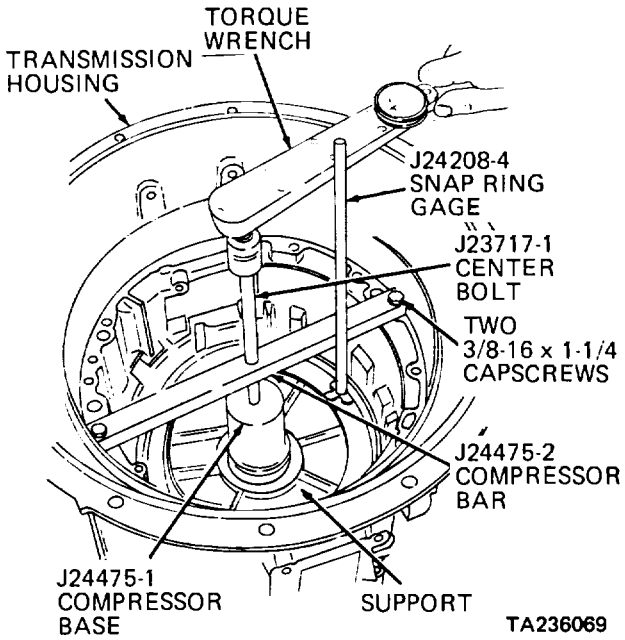
4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
10		g. Support (8)	Install	Attach center support lifter into recess between seal ring grooves on support hub, as shown. Lower support (8) into transmission making sure that threaded hole in support (8) alines with hole for capscrew (5) in transmission. Seat support (8) firmly against internal snap ring (10). Remove center support lifter.



		h. New capscrew (5) and washer (6)	Install	Finger tight only
		i. Support (8)	Compress	Install compressor base over hub of support (8), as shown. Install compressor bar and center bolt, as shown. Use two capscrews. Apply five pounds foot torque to center bolt



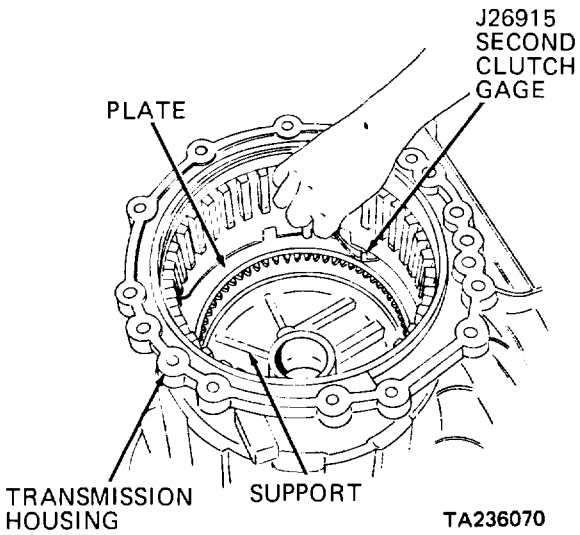
4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
10 (cont)		j. Clearance between top of support (8) and top of snap ring groove in transmission	Measure	Use snapping gage, as shown, step 10f. Select correct snap ring (7) as listed

Measured Clearance (Inch)	Snap Ring Thickness (Inch)	Snap Ring Color
0.150-0.154	0.148-0.150	Blue
0.154-0.157	0.152-0.154	Yellow
0.157-0.160	0.155-0.157	Green
0.160-0.164	0.158-0.160	Red

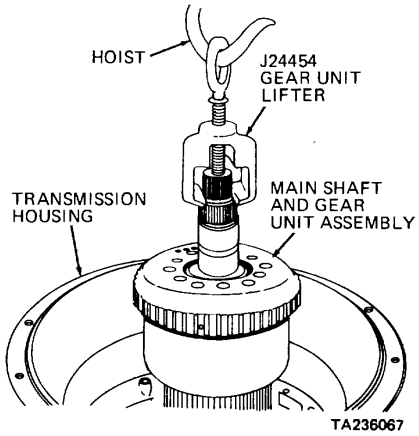
		k. Selected snap ring (7)	Install	Then remove center bolt, cap-screws, compressor bar, and compressor base
11	Second clutch clearance check	Clearance between plate (13) and transmission housing	Measure	Turn transmission output end up. Use second clutch gage, as shown. If required clearance of 0.049-0.111 inch is achieved, first step of clutch gage will fit, second step won't. If clearance is not correct, remove discs (11) and plates (12) and measure total thickness. Replace any or all plates (12) to achieve correct clearance. A thinner or thicker plate (13) is also available



4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch

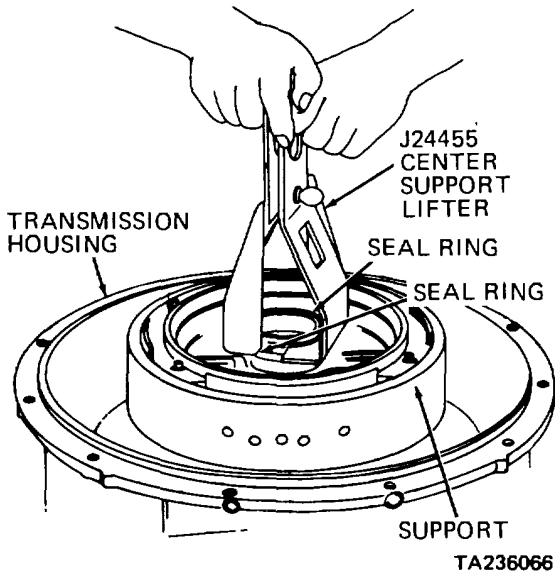
STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
12	Transmis-sion	a Low planetary, low clutch, and adapter housing assemblies	Install	Repair first, if necessary. Para 4-4g
		b Governor and rear cover assembly	Install	Repair first, if necessary. Para 4-4k
		c Center support and second clutch assemblies	Remove	Turn transmission torque converter end up. Refer to steps d-f, h-j. Keep center support and second clutch assemblies together for later installation
		d First clutch assembly	Install	Repair first, if necessary. Para 4-4f
		e Main shaft and gear unit assembly	Install	Repair first, if necessary. Para 4-4b Be sure that thrust washer is retained with oil-soluble grease to rear of main shaft and gear unit assembly. Attach gear unit lifter behind splines, as shown. Attach hoist to ring on gear unit lifter and lower into transmission. Be sure main shaft and gear unit assembly is fully seated against first clutch assembly and all gears and splines are engaged



4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
12 (cont)		f. Plate (13)	Install	Same plate removed in step 12c
		g. Three discs (11) and plates (12)	Install	Same discs and plates removed n step 12c. Install alternately, as shown in exploded view
		h. Internal snap ring (10)	Install	Then check to be sure thrust washer is in place on front of main shaft and gear unit assembly
13	Support (8)	Piston (16)	Install	Be sure not to distort lip type seal rings (18 and 19)
14	Transmis-sion	a. Bushing and center sup-port (28), and attached parts	Install	Attach center support lifter into recess between seal ring grooves on support hub, as shown. Lower support (8) into transmission, making sure that threaded hole in support (8) alines with hole for capscrew (5) in transmission. Also, be sure that gap in internal snap ring (10) is between any two tangs on ring (26). Seat support (8) firmly against internal snap ring (10). Remove center support lifter

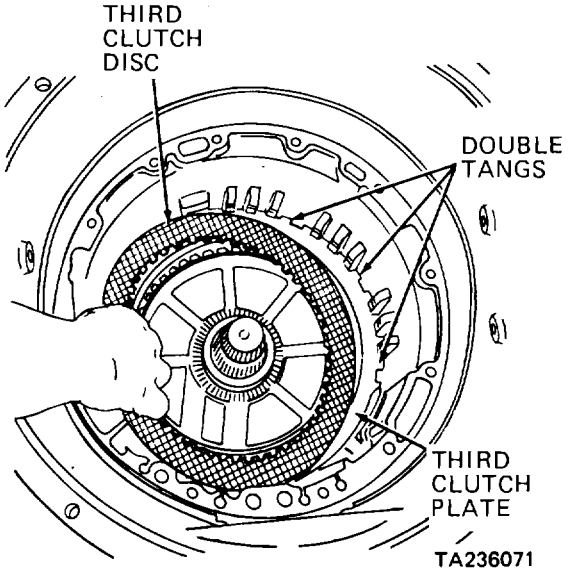


		b. Capscrew (5) and washer (6)	Install	Same capscrew and washer removed in step 12c. Finger tight only

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
14 (cont)		c Snap ring (7)	Install	Snap ring (7) selected in step 10j. Place gap between any two tangs on spring retainer ring (21)
		d Capscrew (5)	Tighten	To 39-46 pounds foot
15	Bushing and center support (28)	Two new seal rings (9)	Install	Retain with oil-soluble grease
16	Transmis-sion	a Three third clutch plates (4) and three new third clutch discs (3)	Install	Soak third clutch discs (3) in transmission fluid for at least two minutes first. Install alternately, as shown in exploded view. Insert clutch plates (4) so that three sets of double tangs are positioned as shown below

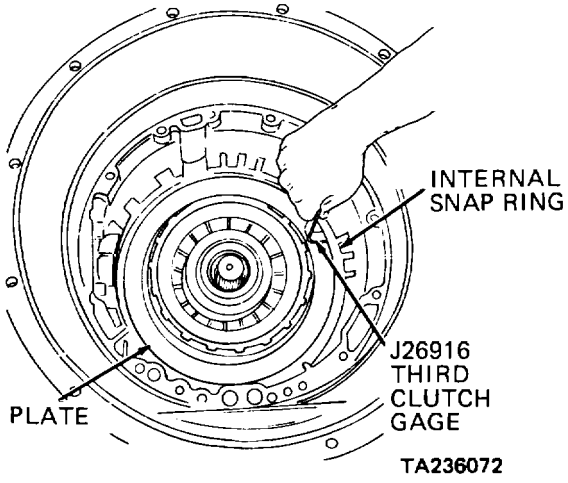


		b Plate (2)	Install
		c Internal snap ring (1)	Install

4-4. TRANSMISSION (CONT)

e. Third Clutch, Center Support, and Second Clutch Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
17	Third clutch clearance check	Clearance between internal snap ring (1) and plate (2)	Measure	Use third clutch gage, as shown. If required clearance of 0.050-0.114 is achieved, first step of third clutch gage will fit, second step won't. If clearance is not correct, remove third clutch plates (4) and third clutch discs (3) and measure total thickness. Replace any or all third clutch plates (4) to achieve correct clearance. A thinner or thicker plate (2) is also available



4-4. TRANSMISSION (CONT)

f. First Clutch Assembly.

This task covers: a. Removal b. Cleaning c. Inspection d. Installation

INITIAL SETUP

Tools
No. 2 Common Organizational Maintenance Tool Kit
Socket wrench handle, 1/2 inch drive
Socket wrench set, 1/2 inch drive
Flat tip screwdriver
Safety glasses
Retaining ring pliers
First clutch gage J-26914
0-1 inch micrometer

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
4-4e	Third clutch, center support, and second clutch assemblies removed from transmission; main shaft and gear unit assembly removed from transmission.

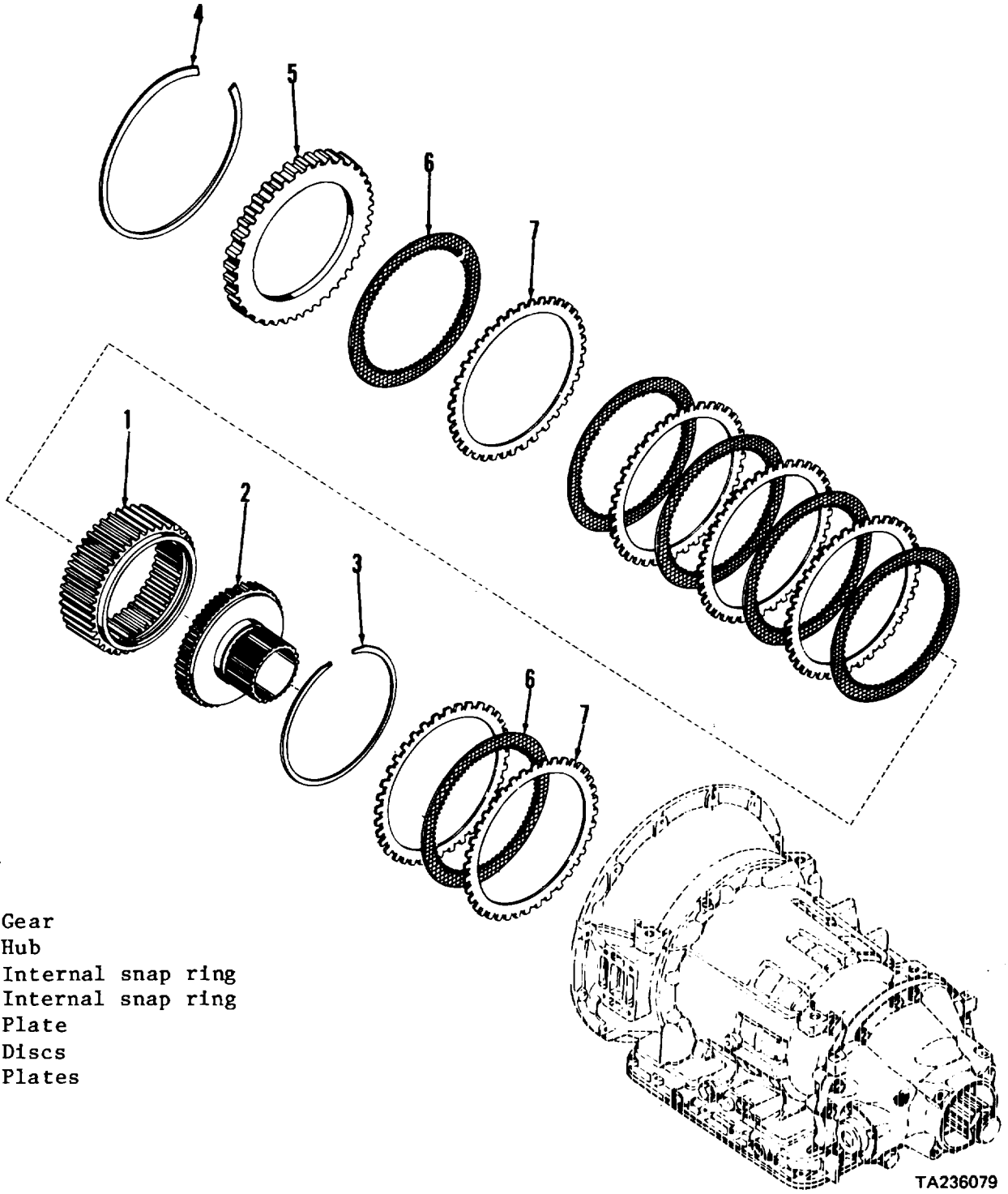
Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Transmission fluid	Item 8, Appendix C
Oil-soluble grease	Item 9, Appendix C
Discs	FSCM 73342 P/N 6835687

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	Assembly consisting of gear (1), hub (2), and internal snap ring (3)	Remove	
2	Gear (1)	a Internal snap ring (3)	Remove	Only if inspection shows replacement of parts is necessary
		b Hub (2)	Remove	
3	Transmission	a Internal snap ring (4)	Remove	
		b Plate (5)	Remove	
		c Six discs (6) and six plates (7)	Remove	Discard six discs (6) only. Reuse only if new discs aren't available

4-4. TRANSMISSION (CONT)

f. First Clutch Assembly (cont).



KEY

1. Gear
2. Hub
3. Internal snap ring
4. Internal snap ring
5. Plate
6. Discs
7. Plates

4-4. TRANSMISSION (CONT)

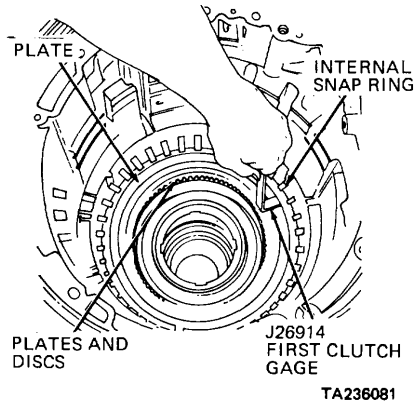
f. First Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.			
4		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt and old lubricant. Dry thoroughly with clean, dry, lintless cloths or with compressed air
INSPECTION				
5		a. Gear (1) and hub (2)	Inspect	Inspect for worn, bent or broken condition. Look for galling and damaged teeth. Replace part if necessary
		b. All other parts	Inspect	Inspect for worn, bent, or broken condition. Examine for deep scratches. If you notice any of these conditions, replace part

4-4. TRANSMISSION (CONT)

f. First Clutch Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
6	Gear (1)	a. Hub (2)	Install	If removed earlier
		b. Internal snap ring (3)	Install	If removed earlier
7	Transmission	a. Assembly consisting of gear (1), hub (2), and internal snap ring (3)	Install	Be sure that splines on hub (2) engage splines on low sun gear in adapter housing. Also be sure that thrust washer is properly positioned on hub of adapter housing
		b. Six plates (7) and six new discs (6)	Install	Soak discs (6) in clean transmission fluid for at least two minutes before installation. Install plates (7) and discs (6) alternately, as shown in exploded view
		c. Plate (5)	Install	Flat side first
		d. Internal snap ring (4)	Install	
8	First clutch clearance check	Clearance between internal snap ring (4) and plate (5)	Measure	Use first clutch gage, as shown. If the correct clearance of 0.074-0.147 inch is achieved, first step of gage will fit, second step won't. If clearance isn't correct; remove discs (6) and plates (7) and measure total thickness. Replace any or all plates (7) to achieve correct clearance. Thinner and thicker plates (5) are also available



4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 2 Common Organizational Maintenance Tool Kit
- Flat tip screwdriver
- Sharpening stone
- Twist drill set
- Socket head screw key set
- Retaining ring pliers
- Safety glasses

Thickness gage
Lathe
Depth micrometer
Arbor press
Drill press
Low and first clutch spring compressor J-24452
Clutch spring compressor base J-24204-2
Removing, installing and swaging fixture J-25587-1
Pin remover J-25587-16
Six 5/8 inch loading pins J-25587-20
Six 5/8 inch guide pins J-25587-49
Pin installer J-25587-8
Bottom swaging tool holder J-25587-17
Two swaging tools J-25587-25
Support block J-25587-3
Low planetary bushing installer J-24472
Two adapter housing guide screws J-1927-1

Materials/Parts
Cleaning solvent — Item 1, Appendix C
Clean cloths — Item 2, Appendix C
Transmission fluid — Item 8, Appendix C
Oil-soluble grease — Item 9, Appendix C
Discs — FSCM 73342 P/N 6835720
Adapter housing gasket — FSCM 73342 P/N 6837442
Lip type seal ring FSCM 73342 P/N 6883035
Two lip type seal rings — FSCM 73342 P/N 6883031
Lip type seal ring FSCM 73342 P/N 6883033

Personnel Required
Automotive Repairer MOS 63H

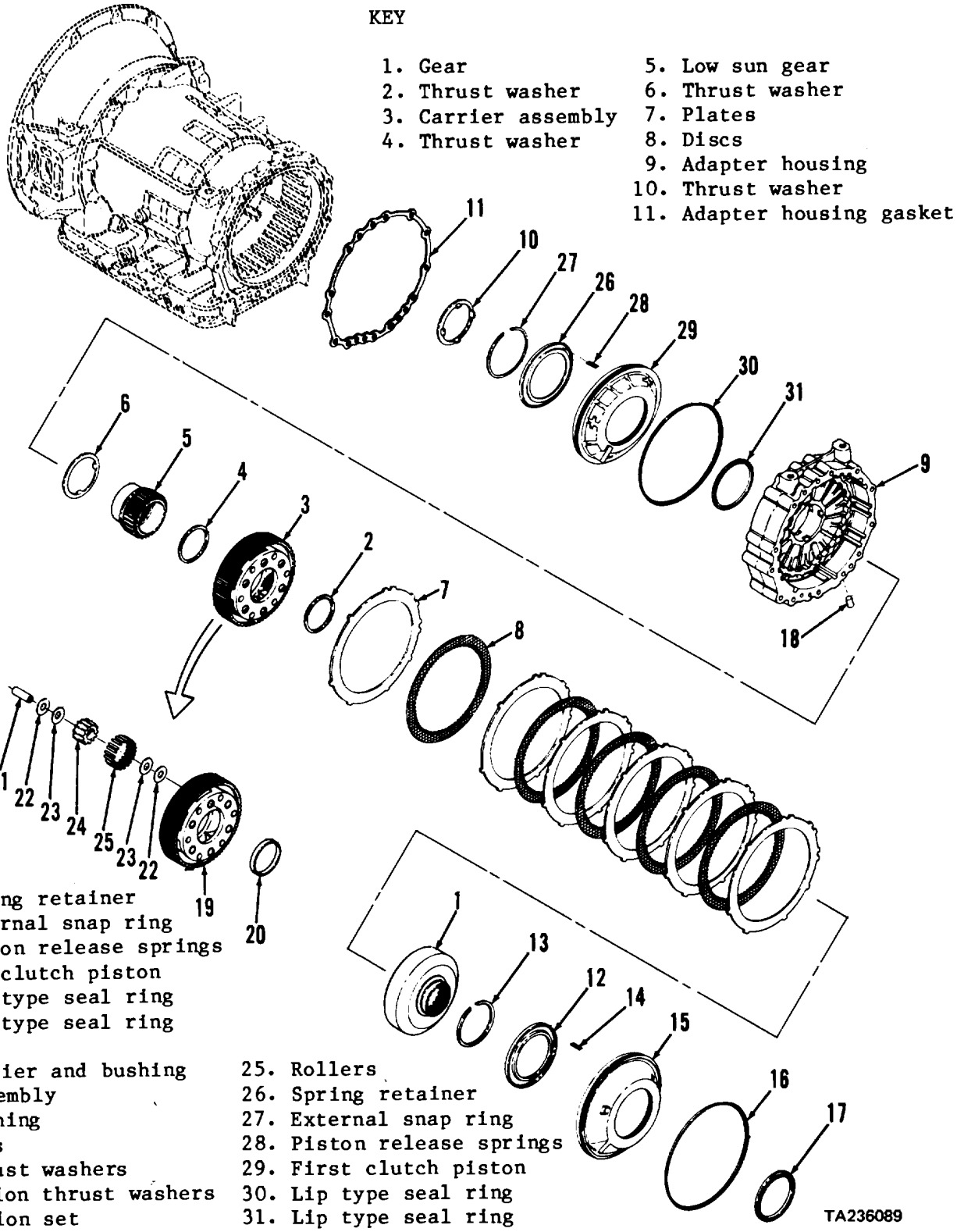
Equipment Condition

Paragraph	Condition Description
4-4k	Governor and rear cover assembly removed from transmission.

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	Gear (1)	Remove	
2	Gear (1)	Thrust washer (2)	Remove	
3	Transmission	Carrier assembly (3)	Remove	

4-4. TRANSMISSION (CONT)

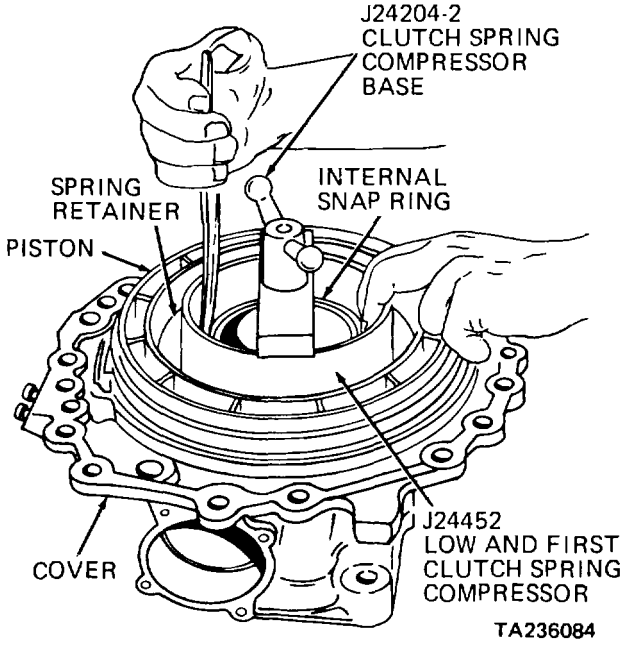
g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).



4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
4	Carrier assembly (3)	Thrust washer (4)	Remove	
5	Trans-mission	a. Low sun gear (5)	Remove	
		b. Thrust washer (6)	Remove	
		c. Six plates (7) and five discs (8)	Remove	Discard discs (8) only. Reuse only if new discs aren't available
		d. Adapter housing (9)	Remove	From transmission
6	Adapter housing (9)	Thrust washer (10)	Remove	
7	Trans-mission	Adapter housing gasket (11)	Remove	Discard
DISASSEMBLY				
8	Rear cover assembly	a. Spring retainer (12)	Depress	Place low and first clutch spring compressor on spring retainer, as shown. Install clutch spring compressor base and tighten screw



4-4. TRANSMISSION (CONT)

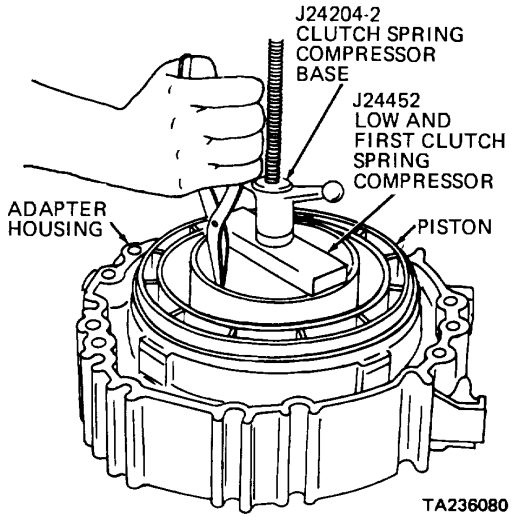
g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8 (cont)		b. External snap ring (13)	Remove	As shown, step 8a Remove clutch spring compressor base and low and first clutch spring compressor
		c Spring retainer (12)	Remove	
		d 26 piston release springs (14)	Remove	
		e Low clutch piston (15)	Remove	
9	Low clutch piston (15)	a Lip type seal ring (16)	Remove	Discard
		b Lip type seal ring (17)	Remove	Discard
		NOTE Disassemble carrier assembly (3) only if inspection shows replacement of parts is necessary.		
10	Carrier and bushing assembly (19)	a. Bushing (20)	Remove	Press out
		b. Six pins (21)	Remove. Use drill press and drill bit slightly smaller than diameter of pins (21). Drill into rear ends of pins (21). Do not drill into carrier and bushing assembly (19). Place removing, installing and swaging fixture on arbor press. Place carrier and bushing assembly (19) on fixture, drilled ends of pins (21) up. Install pin remover into fixture. Press pins (21) from carrier and bushing assembly (19). Remove carrier and bushing assembly (19) from arbor press	

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
10 (cont)		c. 12 thrust washers (22), 12 pinion thrust washers (23), pinion set (matched set of six pinions) (24), and 114 rollers (25)	Remove	
11	Adapter housing (9)	a. Plug (18)	Remove	
		b. Spring retainer (26)	Depress	Adapter housing on work table, piston up, as shown. Install low and first clutch spring compressor. Attach clutch spring compressor base and tighten base screw
		c. External snap ring (27)	Remove	As shown, step 11b. Remove clutch spring compressor base and low and first clutch spring compressor
		d. Spring retainer (26)	Remove	
		e. 26 piston release springs (28)	Remove	



4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
11 (cont)		f. First clutch piston (29)	Remove	
12	First clutch piston (29)	a. Lip type seal ring (30)	Remove	Discard
		b. Lip type seal ring (31)	Remove	Discard
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

13		a. All parts, except adapter housing (9)	Clean	Use cleaning solvent P-D-680. Immerse in solvent and move up and down to remove all dirt and old lubricant. Dry thoroughly with compressed air or with clean, dry, lintless cloths

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
13 (cont)		b. Adapter housing (9)	Clean	Wipe with clean cloths moistened with cleaning solvent P-D-680. Remove all dirt and old lubricant. Dry thoroughly with compressed air or with clean, dry, lintless cloths
INSPECTION				
14		a. Carrier assembly (3)	Inspect	Inspect for worn, overheated, or contaminated condition. Inspect rollers (25) for roughness and binding in operation. Check end play of pinion set (24) by inserting thickness gage between carrier and bushing assembly (19) and thrust washers (22). End play must be 0.008 to 0.031 inch. Inspect bushing (20) for galling and scratches. If you notice any defective conditions, replace part. Replace entire pinion set (24) if any individual pinion is damaged. Refer to step 10
		b. Gear (1) and low sun gear (5)	Inspect	Inspect for cracks, distortion, and wear. Inspect teeth and splines for wear, pitting, nicks, cracks or scores. Remove small nicks with suitable sharpening stone. Replace if necessary
		c. Adapter housing (9)	Inspect	Inspect for cracks, distortion, and wear. Inspect gasket surfaces for scratches, other wear. Replace if necessary
		d. Piston release springs (14	Inspect	Replace if broken, bent, or permanently set and 28)

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
14 (cont)		e. All other parts	Inspect	Inspect for worn, cracked, bent or broken condition. If any of these conditions are noted, replace part
REASSEMBLY				
		NOTE		
		If carrier assembly (3) was disassembled, start with step 15. Otherwise, proceed to step 16.		
15	Carrier and bushing assembly (19)	a. 114 rollers (25), twelve thrust washers (22), and twelve pinion thrust washers (23)	Lubricate	Use oil-soluble grease
		b. Six groups, each consisting of two thrust washers (22), two pinion thrust washers (23), pinion (24), and 19 rollers (25)	Assemble. Insert 5/8 inch loading pins into pinions (24). Install rollers (25) around 5/8 loading pins. Install pinion thrust washers (23) and thrust washers (22) as shown in exploded view	
		c. Six groups, each consisting of two thrust washers (22), two pinion thrust washers (23), pinion (24), and 19 rollers (25)	Install	Carrier and bushing assembly (19) rear end up
		d. Six 5/8 inch guide pins	Install	Larger diameters first. Push out 5/8 inch loading pins

4-4. TRANSMISSION (CONT)

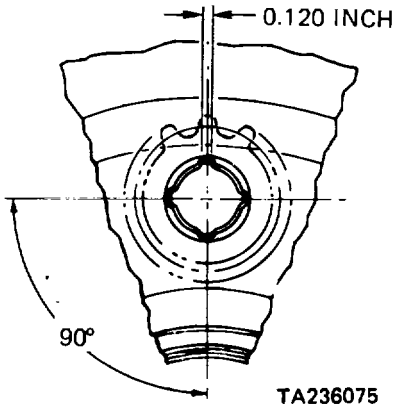
g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
15 (cont)				

CAUTION

In following step, don 't put any pressure on carrier and bushing assembly (19), or you will distort it.

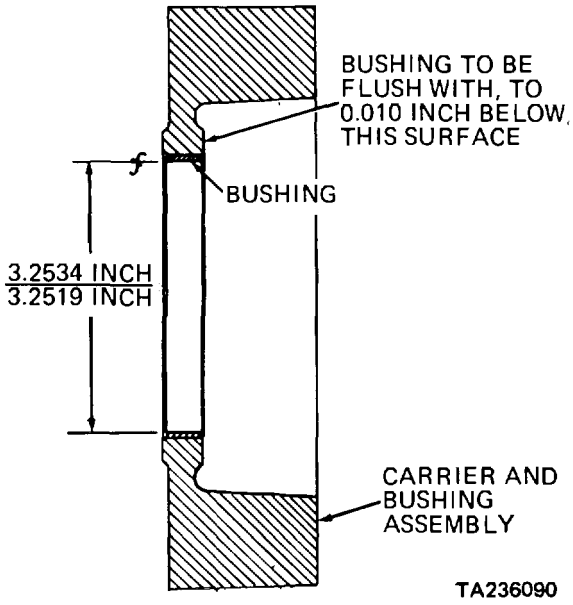
		e. Six pins (21)	Install. Install removing, installing and swaging fixture onto arbor press. Install carrier and bushing assembly (19) onto fixture. Install pin installer into fixture, so that cutaway part will clear bosses of carrier and bushing assembly (19) when pins (21) are pressed in. One at a time, place pins (21) on pilot ends of 5/8 guide pins. Press into carrier and bushing assembly (19) until pin installer touches carrier and bushing assembly
		f. Six pins (21)	Swage. Remove carrier and bushing assembly (19) from removing, installing and swaging fixture. Install bottom swaging tool holder into fixture. Install one swaging tool into bottom swaging tool holder and one into fixture. Lubricate both ends of pins (21) with oil-soluble grease. Position carrier and bushing assembly (19) rear end up on fixture. Use support block to level carrier and bushing assembly while lower swaging tool is supporting lower end of pin (21). One pin at a time, apply pressure gradually (about three tons) to swage ends of pins against carrier and bushing assembly (19), as shown. Pinion set (24) must rotate freely and have end play of 0.008 to 0.031 inch. Remove carrier and bushing assembly (19) from fixture. Remove bottom swaging tool holder and removing, installing and swaging fixture from arbor press



4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
15 (cont)		g. New bushing (20)	Install	If old bushing (20) was removed. Use low planetary bushing installer to press bushing (20) into carrier and bushing assembly (19) to dimension shown

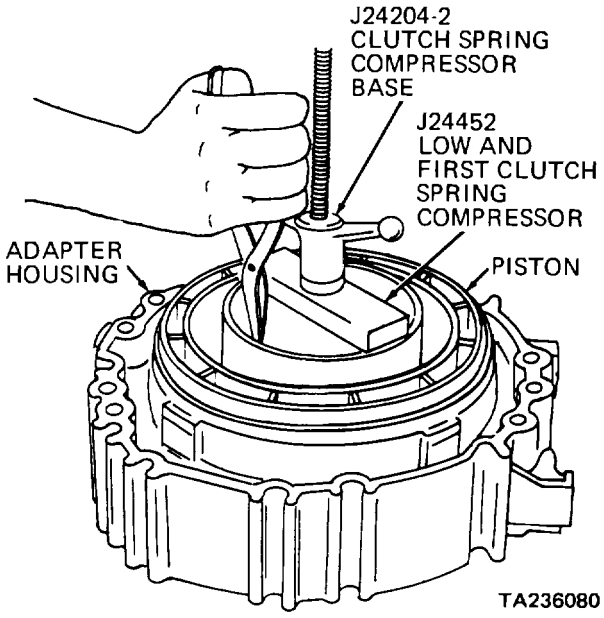


		h. Bushing (20)	Bore	Use lathe to bore bushing (20) to diameter shown, step 15g. Bushing bore must be square with surface of carrier and bushing assembly (19) within 0.001 inch
16	First clutch piston (29)	a. New lip type seal ring (31)	Install	Lubricate with oil-soluble grease. Be sure .lip faces fluid pressure side of first clutch piston (29)
		b. New lip type seal ring (30)	Install	Lubricate with oil-soluble grease. Be sure lip faces fluid pressure side of first clutch piston (29)
17	Adapter housing (9)	a. Plug (18)	Install	Tight enough to prevent leaks
		b. First clutch piston (29)	Install	Aline lug on first clutch piston (29) with recess in adapter housing (9). Be sure not to distort lip type seal rings (30 and 31)

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
17 (cont)		c. 26 piston release springs (28)	Install	
		d. Spring retainer (26)	Install	Cupped side first
		e. External snap ring (27)	Position	
		f. Spring retainer (26)	Depress	Install low and first clutch spring compressor, as shown. Attach clutch spring compressor base and tighten base screw

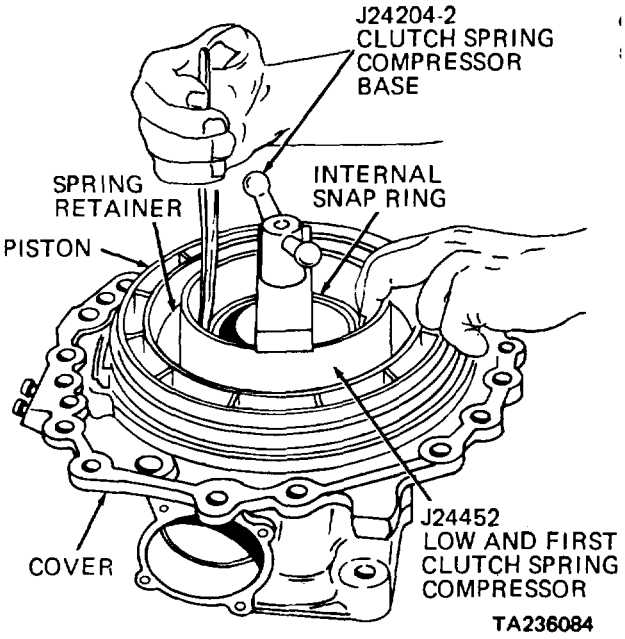


	g. External snap ring (27)	Install	As shown, step 17f. Remove clutch spring compressor base and low and first clutch spring compressor. Turn adapter housing piston side down on work table
	h. Six plates (7) and five new discs (8)	Install	Soak discs in clean transmission fluid for at least two minutes before installation. Install alternately, as shown in exploded view

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

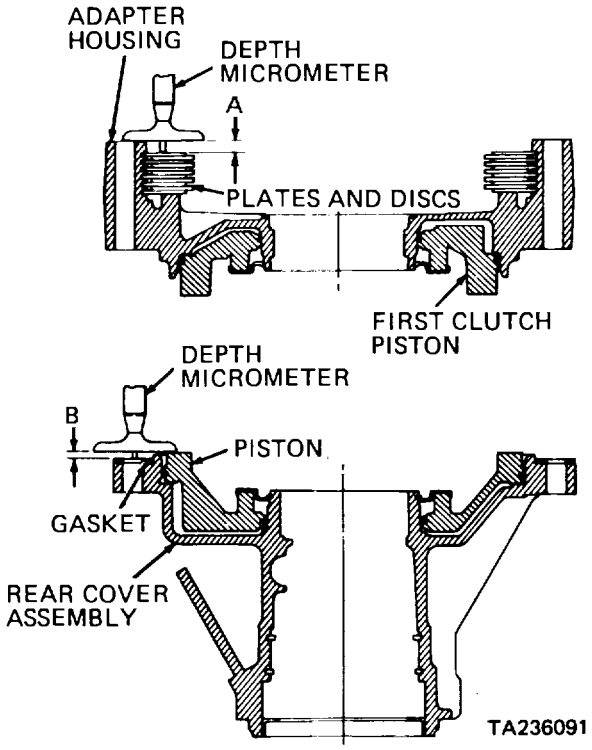
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
18	Low clutch piston (15) (17)	a. New lip type seal ring	Install	Lubricate with transmission fluid. Install so that lip faces fluid pressure side of low clutch piston (15)
		b. New lip type seal ring (16)	Install	Lubricate with transmission fluid. Install so that lip faces fluid pressure side of low clutch piston (15)
19	Rear cover assembly	a. Low clutch piston (15)	Install	Rear cover assembly front side up. Be sure not to distort lip type seal rings (16 and 17)
		b. 26 piston release springs (14)	Install	
		c. Spring retainer (12)	Install	Cupped side first
		d. External snap ring (13)	Position	
		e. Spring retainer (12)	Depress	Place low and first clutch spring compressor on spring retainer (12), as shown. Install clutch spring compressor base and tighten screw.



4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
19 (cont)	f.	External snap ring (13)	Install	As shown, step 19e. Remove clutch spring compressor base and low and first clutch spring compressor
		g. Rear cover assembly gasket	Install	Refer to para 4-4k for exploded view of governor and rear cover assembly
20	Low clutch clearance check (7)	Clearance between piston (15) and top plate	Measure, as shown. Use depth micrometer to measure and record distance A (top of adapter housing (9) to top plate (7)). Press firmly with hand on plates and discs(7 and 8) at point of measurement. Use depth micrometer to measure and record distance B (top of piston (15) to top of rear cover assembly gasket). For clearance, subtract B from A. Clearance must be 0.081 to 0.139 inch. Clearance closer to minimum dimension will mean longer clutch pack life. If necessary, replace any or all plates (7) to achieve correct clearance	



4-4. TRANSMISSION (CONT)

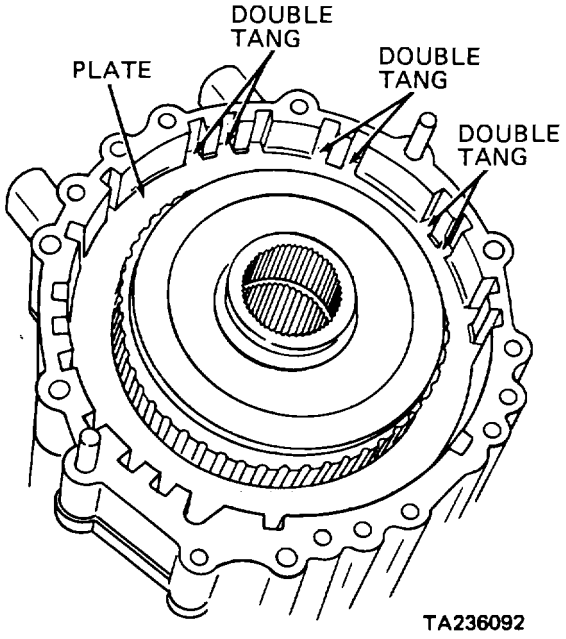
g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
20 (cont)		**NOTE** It may be necessary to choose a low clutch piston (15) with a different thickness to achieve correct clearance if adapter housing (9) or rear cover was replaced.		
21	Adapter housing	Six plates (7) and five discs (8)	Remove	Keep together for later reinstallation
INSTALLATION				
22	Transmission	New adapter housing gasket (11)	Install	
23	Adapter housing (9)	Thrust washer (10)	Install	Retain with oil-soluble grease
24	Transmission	Adapter housing (9)	Install	Use two adapter housing guide screws to maintain adapter housing gasket alignment
25	Adapter housing (9)	a Thrust washer (6) b Low sun gear (5)	Install Install	
26	Carrier assembly (3)	Thrust washer (4)	Install	Retain with oil-soluble grease
27	Low sun gear (5)	Carrier assembly (3)	Install	
28	Gear (1)	Thrust washer (2)	Install	Retain with oil-soluble grease
29	Carrier assembly (3)	Gear (1)	Install	Be sure thrust washer (4) is centered in carrier assembly (3)

4-4. TRANSMISSION (CONT)

g. Low Planetary, Low Clutch, and Adapter Housing Assemblies (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
30	Adapter housing (9)	Six plates (7) and five discs (8)	Install	Same plates (7) and discs (8) removed in step 21 Install alternately, as shown in exploded view Position three sets of double tangs on plates (7) as shown If plates (7) are not positioned properly, they will move under load



NOTE
Refer to para 4-4k for installation of governor and rear cover assembly.

4-4. TRANSMISSION (CONT)

h. Modulated Lockup Valve Assembly.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e Reassembly
f. Installation

INITIAL SETUP:

Tools
No. 2 Common Organizational Maintenance Tool Kit
- Socket wrench handle, 1/2 inch drive
- Socket wrench set, 1/2 inch drive
- Flat tip screwdriver
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Safety glasses

Valve body adjusting ring tool J-24314

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-41c	Transmission oil filter removed.

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Crocus cloth	Item 12, Appendix C

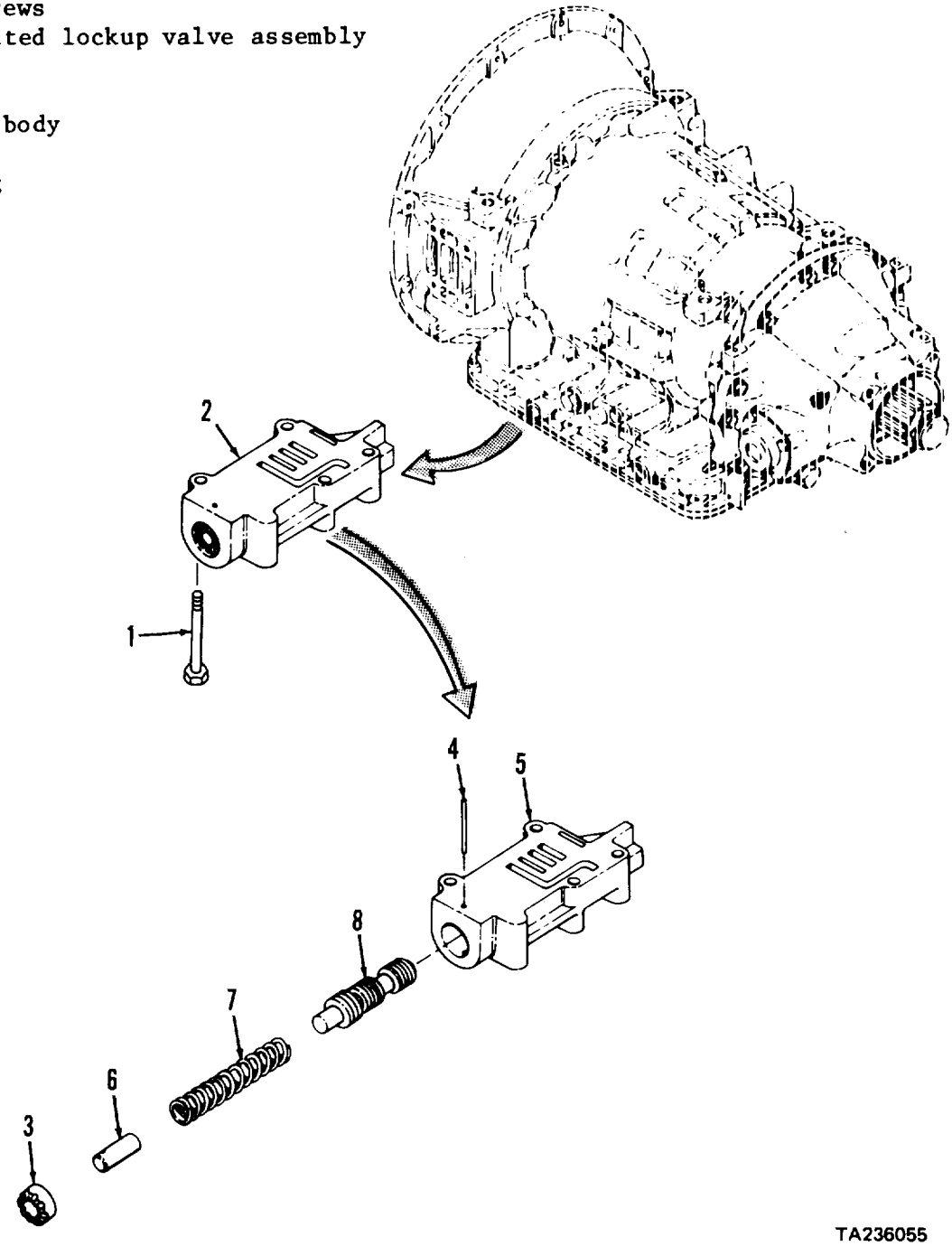
STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	a Three capscrews (1)	Remove	Hold modulated lockup valve assembly (2) firmly while removing last capscrew (1)
		b Modulated lock-up valve assembly (2)	Remove	
DISASSEMBLY				
		NOTE Before disassembly, note position of ring (3) in relation to pin (4). During reassembly, ring (3) must be installed in same position, or transmission will not operate properly.		
2	Valve body (5)	a Pin (4)	Remove	Depress ring (3) with screwdriver

4-4. TRANSMISSION (CONT)

h. Modulated Lockup Valve Assembly (cont).

KEY

1. Capscrews
2. Modulated lockup valve assembly
3. Ring
4. Pin
5. Valve body
6. Stop
7. Spring
8. Valve



TA236055

4-4. TRANSMISSION (CONT)

h. Modulated Lockup Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
2 (cont)		b Ring (3), stop (6), and spring (7)	Remove	
		c Valve (8)	Remove	
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using clean- ing solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

3	All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt, grease, and old lubricant. Dry thor- oughly using clean, dry, lintless cloths or moisture-free compressed air	

4-4. TRANSMISSION (CONT)

h. Modulated Lockup Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
INSPECTION					
4		a	Valve body (5)	Inspect	Inspect oil passages and valve bore for cleanliness. If not perfectly clean, reclean Inspect for burrs. Deburr with crocus cloth if necessary Inspect valve bore for cracks, wear, damage and distortion. Replace if necessary
		b	Valve (8)	Inspect	Inspect for wear, damage and distortion; if any of these conditions are observed, replace valve
		c	Spring (7)	Inspect	Replace if cracked, worn, distorted, broken or permanently set
		d	All other parts	Inspect	Inspect for wear, damage, cracks, and distortion; replace part if any of these conditions are observed
REASSEMBLY					
5	Valve body (5)	a	Valve (8)	Install	Smaller diameter first
		b	Spring (7)	Install	
		c	Stop (6)	Install	Undrilled end first
		d	Ring (3)	Position	
		e	Pin (4)	Install	Depress ring (3) Pin (4) must go through stop (6) and retain ring (3) Be sure that ring (3) is in same position as before disassembly Use valve body adjusting ring tool, if necessary
INSTALLATION					
6	Transmission	a	Modulated lockup valve assembly (2)	Position	
		b	Three capscrews (1)	Install	Tighten to 9-11 pounds foot torque

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e Reassembly
f. Installation

INITIAL SETUP:

Tools
No 2 Common Organizational Maintenance Tool Kit
- Socket wrench handle, 1/2 inch drive
- Socket wrench set, 1/2 inch drive
- Flat tip screwdriver
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Safety glasses

Valve body adjusting ring tool J-24314

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
2-41c	Transmission oil filter removed.

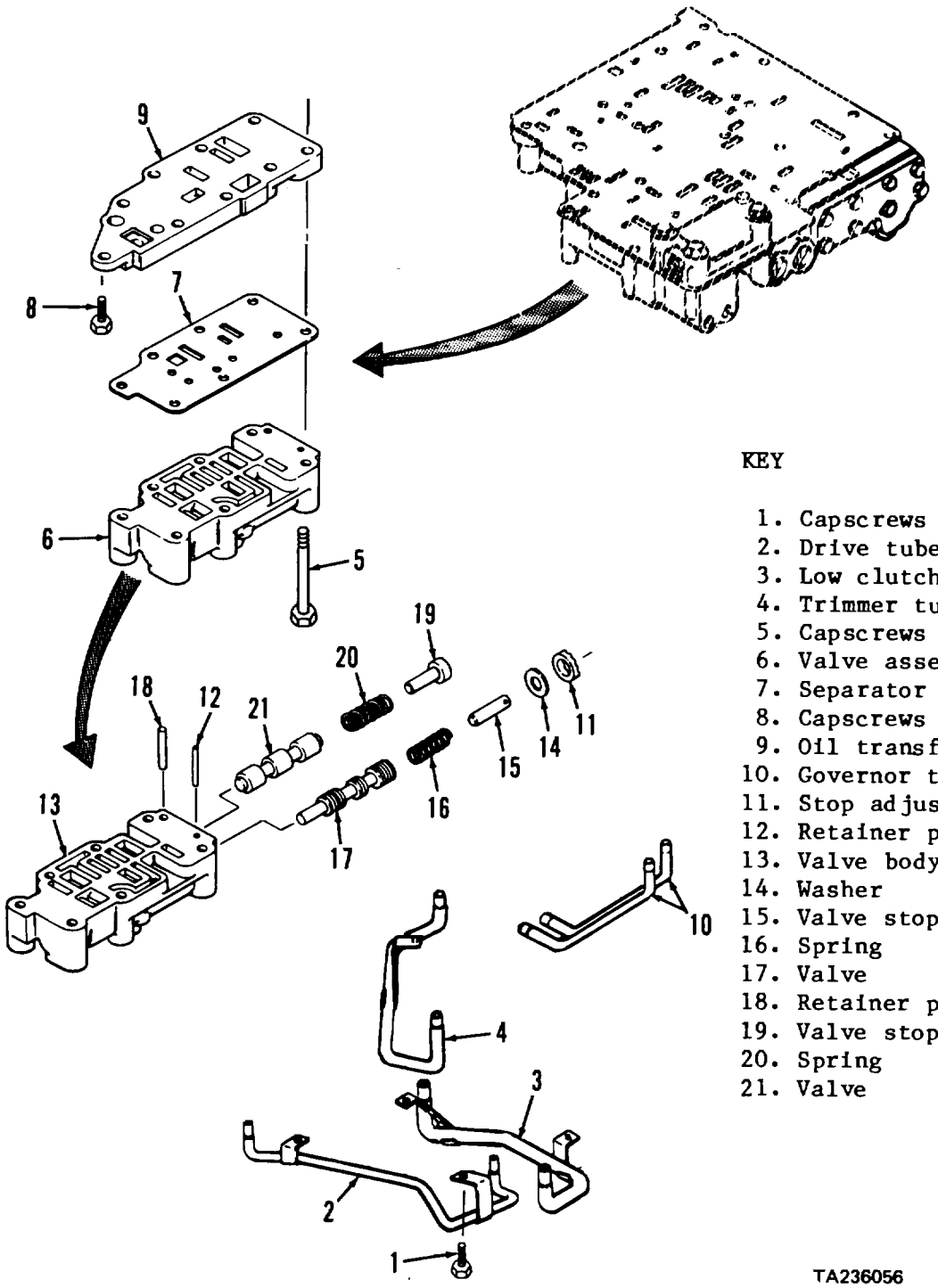
Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Crocus cloth	Item 12, Appendix C

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Control valve body	a Five capscrews (1)	Remove	
		b Low clutch tube (3)	Remove	
		c Trimmer tube (4)	Remove	
		d Drive tube (2)	Remove	
2	Transmis-sion	a Seven cap-screws (5)	Remove	
		b Valve assem-bly (6)	Remove	
		c Separator plate (7)	Remove	
		d Two capscrews (8)	Remove	
		e Oil transfer plate (9) and two gov-ernor tubes (10)	Remove	As an assembly

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly (cont).



KEY

1. Capscrews
2. Drive tube
3. Low clutch tube
4. Trimmer tube
5. Capscrews
6. Valve assembly
7. Separator plate
8. Capscrews
9. Oil transfer plate
10. Governor tubes
11. Stop adjusting ring
12. Retainer pin
13. Valve body
14. Washer
15. Valve stop
16. Spring
17. Valve
18. Retainer pin
19. Valve stop
20. Spring
21. Valve

TA236056

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
		NOTE		
		Before disassembly, note position of stop adjusting ring (11) in relation to retainer pin (12). During reassembly, stop adjusting ring (11) must be installed in same position, or transmission will not operate properly.		
3	Valve body (13)	a Retainer pin (12)	Remove	Depress stop adjusting ring (11)
		b Stop adjusting ring (11), washer (14), valve stop (15), and spring (16)	Remove	
		c Valve (17)	Remove	
		d Retainer pin (18)	Remove	Depress valve stop (19)
		e Valve stop (19) and spring (20)	Remove	
		f Valve (21)	Remove	
CLEANING				
		WARNING		
		Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.		

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING		
		Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
4		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all dirt, grease, and old lubricant. Dry thoroughly using clean cloths or moisture-free compressed air
INSPECTION				
5	a	Valve body (13)	Inspect	Inspect oil passages and valve bore for cleanliness If not perfectly clean, reclean. Inspect for burrs Deburr with crocus cloth if neces-sary Inspect valve bores for cracks, wear, damage and distortion Replace if necessary
	b	Valves (17 and 21)	Inspect	Inspect for wear, damage and distortion; if any of these conditions are observed, replace valve
	c	Springs (16 and 20)	Inspect	Replace if cracked, worn, distorted, broken or per-manently set
	d	All other parts	Inspect	Inspect for wear, damage, cracks, and distortion; replace part if any of these conditions are observed

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
6	Valve body (13)	a Valve (21)	Install	Into longer bore
		b Spring (20) and valve stop (19)	Position	
		c Retainer pin (18)	Install	Depress valve stop (19)
		d Valve (17)	Install	Stem end first
		e Spring (16), valve stop (15), washer (14), and stop adjusting ring (11)	Position	
		f Retainer pin (12)	Install	Depress stop adjusting ring (11) Retainer pin (12) must go through valve stop (15) and retain stop adjusting ring (11) Be sure that stop adjusting ring (11) is in same position as before disassembly Use valve body adjusting ring tool, if necessary
INSTALLATION				
7	Transmission	a Oil transfer plate (9) and two governor tubes (10)	Position	As an assembly Be sure governor tubes are securely installed into control valve body holes
		b Two capscrews (8)	Install	Don't tighten at this time
		c Seven capscrews (5)	Install	Temporarily, to aline oil transfer plate (9)
		d Two capscrews (8)	Tighten	To 9-11 pounds foot
		e Seven capscrews (5)	Remove	
		f Separator plate (7)	Position	
		g Valve assembly (6)	Position	
		h Seven capscrews (5)	Install	Don't tighten at this time

4-4. TRANSMISSION (CONT)

i. Low Shift Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
INSTALLATION (cont)					
8	Control valve body	a	Drive tube (2)	Position	Seat firmly in bores
		b	Trimmer tube (4)	Position	Seat firmly in bores
		c	Low clutch tube (3)	Position	Seat firmly in bores
		d	Five capscrews (1)	Install	Don't tighten at this time
9	Transmis-sion	a	18 capscrews (1)	Tighten	Working from center outward, tighten all capscrews holding control valve body to transmission Tighten to 9-11 pounds foot
		b	Seven capscrews (5)	Tighten	To 9-11 pounds foot

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e Reassembly
f. Installation

INITIAL SETUP:

Tools
No 2 Common Organizational Maintenance Tool Kit
Socket wrench handle, 1/2 inch drive
Socket wrench set, 1/2 inch drive
Flat tip screwdriver
Torque wrench, 1/2 inch drive, 175 pounds foot capacity
Safety glasses
Valve body adjusting ring tool J-24314
Small parts bins

Personnel Required
Automotive Repairer MOS 63H

Equipment Condition
Paragraph Condition Description

4-4h Modulated lockup valve assembly removed.
4-4i Low shift valve assembly removed.

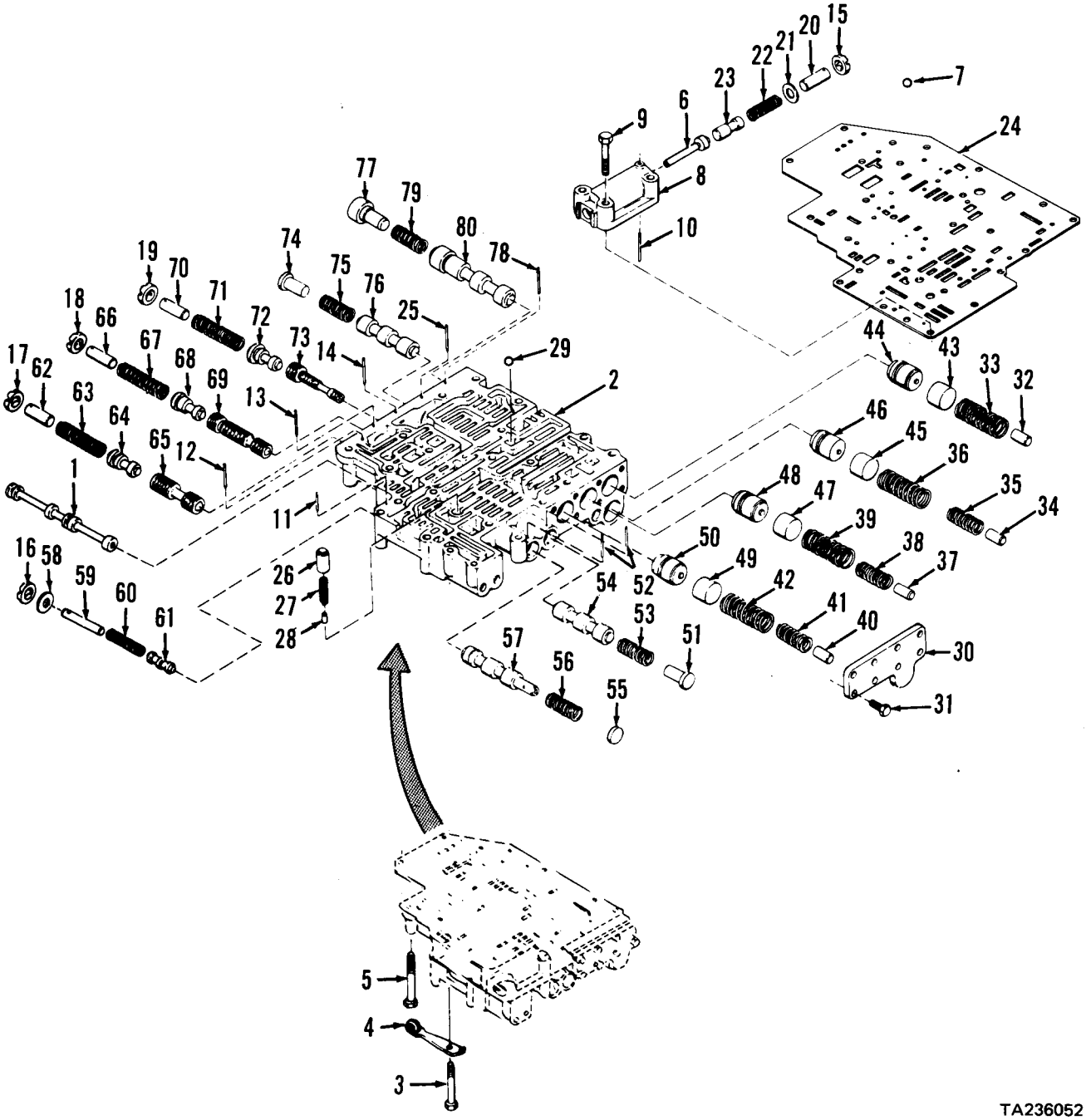
Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Oil-soluble grease	Item 9, Appendix C
Crocus cloth	Item 12, Appendix C
Rubber band	Item 13, Appendix C
Small identification tags	Item 14, Appendix C

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Transmission	a Valve (1)	Retain	Use rubber band to secure to pad on control valve body (2), as shown, step lg
		b Capscrew (3)	Remove	
		c Roller and spring (4)	Remove	
		d Two top capscrews (5)	Loosen	Use to support control valve body (2) while removing other capscrews (5)
		e Remaining capscrews (5)	Remove	
		f Two top capscrews (5)	Remove	Hold control valve body (2) firmly

J4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).



4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

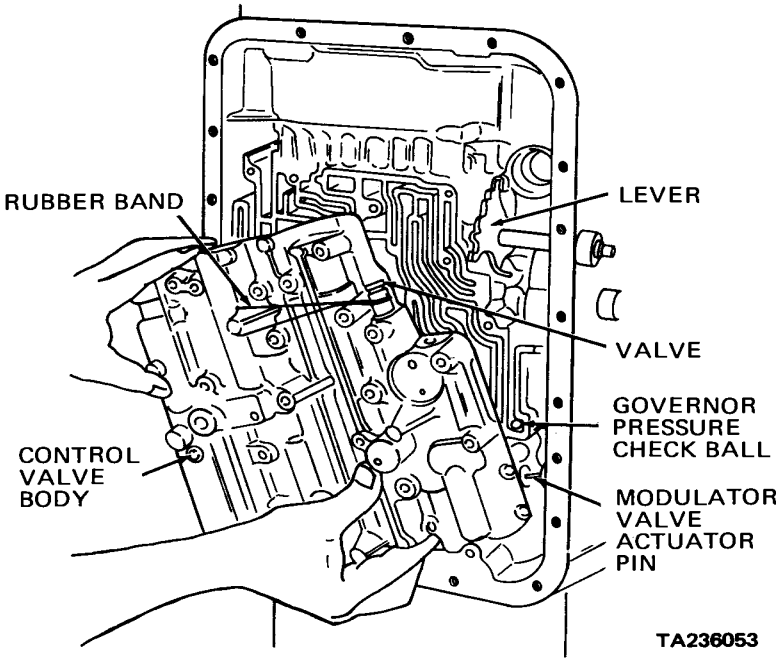
KEY

1	Valve
2	Control valve body
3	Capscrew
4	Roller and spring
5	Capscrews
6	Modulator valve actuator pin
7	Governor pressure check ball
8	Modulator valve body
9	Capscrews
10	Retainer pin
11	Retainer pin
12	Retainer pin
13	Retainer pin
14	Retainer pin
15	Spring adjusting ring
16	Spring adjusting ring
17	Spring adjusting ring
18	Spring adjusting ring
19	Spring adjusting ring
20	Valve stop pin
21	Washer
22	Modulator valve spring
23	Modulator spring
24	Separator plate kit
25	Retainer pin
26	Priority valve
27	Spring
28	Valve stop pin
29	Check ball
30	Trimmer cover
31	Capscrews
32	Valve stop
33	Outer spring
34	Valve stop
35	Inner spring
36	Outer spring
37	Valve stop
38	Inner spring
39	Outer spring
40	Valve stop
41	Inner spring
42	Outer spring
43	Trimmer plug
44	Third clutch valve
45	Trimmer plug
46	First clutch valve
47	Trimmer plug
48	Second clutch trimmer valve
49	Trimmer plug
50	Fourth clutch trimmer valve
51	Valve stop
52	Retainer pin
53	3-4 relay valve spring
54	3-4 relay valve
55	Spacer
56	2-3 relay valve spring
57	2-3 relay valve
58	Washer
59	Valve stop pin
60	Spring
61	Valve
62	Valve stop
63	2-3 shift spring
64	2-3 modulator valve
65	2-3 shift valve
66	Valve stop
67	3-4 shift spring
68	3-4 modulator valve
69	3-4 shift valve
70	Valve stop
71	4-5 shift spring
72	4-5 modulator valve
73	4-5 shift valve
74	Valve stop
75	4-5 relay spring
76	4-5 relay valve
77	Trimmer regulator stop
78	Straight pin
79	Trimmer regulator spring
80	Trimmer regulator valve

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL (cont)				
1 (cont)	g	Control valve body (2)	Remove	In downward and outward direction to clear modulator valve actuator pin (6) from housing, as shown. Do not lose governor pressure check ball (7). Place control valve body (2) on work bench, modulator valve body (8) up



h	Governor pressure check ball (7)	Remove	Note location for reassembly	

DISASSEMBLY

CAUTION

Many springs in the control valve body (2) look alike. Don't mistake one for another. If the wrong spring is put into a valve bore, the transmission will not operate properly. As you remove each spring, carefully tag it with its item number for correct reassembly.

4-4. TRANSMISSION (CONT)I

j. Control Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
DISASSEMBLY (cont)					
2	Modulator valve body (8)	a	Three capscrews (9)	Remove	
		b	Modulator valve body (8)	Remove	
			NOTE		
	Before removing retainer pins (10, 11, 12, 13 and 14), carefully note or sketch the position of spring adjust- ing rings (15, 16, 17, 18 and 19). It is very important that these spring adjusting rings are reinstalled later in the same positions. If not, transmission shift points will change.				
3	Modulator valve body (8)	a	Retainer pin (10)	Remove	Depress spring adjusting ring (15)
		b	Spring adjust- ing ring (15), valve stop pin (20), washer (21), modulator valve spring (22), modula- tor valve (23), and mod- ulator valve actuator pin (6)	Remove	
4	Control valve body (2)	a	Separator plate kit (24)	Remove	Slide lengthwise to remove from retainer pin (25)
		b	Priority valve (26), spring (27), and valve stop pin (28)	Remove	
		c	Check ball (29)	Remove	Note location for reassembly
		d	Control valve body (2)	Reposition	Turn flat side down on wood table or on wood blocks
5	Trimmer cover (30)	a	Eight capscrews (31)	Remove	Trimmer cover (30) is spring loaded and must be held firmly while removing capscrews (31)

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
DISASSEMBLY (cont)					
5 (cont)		b	Trimmer cover (30)	Remove	
		c	Valve stop (32) and outer spring (33)	Remove	
		d	Valve stop (34), inner spring (35), and outer spring (36)	Remove	
		e	Valve stop (37), inner spring (38), and outer spring (39)	Remove	
		f	Valve stop (40), inner spring (41), and outer spring (42)	Remove	
		g	Trimmer plug (43) and third clutch valve (44)	Remove	
		h	Trimmer plug (45) and first clutch valve (46)	Remove	
			Trimmer plug (47) and second clutch trimmer valve (48)	Remove	
		j	Trimmer plug (49) and fourth clutch trimmer valve (50)	Remove	

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
		NOTE		
		To remove any retainer pin it may be necessary to grasp the control valve body (2) and tap it lightly on a block of wood while depressing the valve and spring assembly behind retainer pin. This will help dislodge the retainer pins.		
6	Valve stop (51)	a Retainer pin (52)	Remove	Depress valve stop (51)
		b Valve stop (51) and 3-4 relay valve spring (53)	Remove	
		c 3-4 relay valve (54)	Remove	
7	Spacer (55)	a Retainer pin (52)	Remove	Depress spacer (55)
		b Spacer (55) and 2-3 relay valve spring (56)	Remove	
		c 2-3 relay valve (57)	Remove	
8	Spring adjusting ring (16)	a Retainer pin (11)	Remove	Depress spring adjusting ring (16)
		b Spring adjusting ring (16), washer (58), and valve stop pin (59)	Remove	
		c Spring (60)	Remove	
		d Valve (61)	Remove	
9	Control valve body (2)	Valve (1)	Remove	Remove rubber band and slide out

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
10	Spring adjusting ring (17)	a Retainer pin (12)	Remove	Depress spring adjusting ring ring (17)
		b Spring adjusting ring (17), valve stop (62), and 2-3 shift spring (63)	Remove	
		c 2-3 modulator valve (64)	Remove	
		d 2-3 shift valve (65)	Remove	
11	Spring adjusting ring (18)	a Retainer pin (13)	Remove	Depress spring adjusting ring (18)
		b Spring adjusting ring (18), valve stop (66), and 3-4 shift spring (67)	Remove	
		c 3-4 modulator valve (68)	Remove	
		d 3-4 shift valve (69)	Remove	
12	Spring adjusting ring (19)	a Retainer pin (14)	Remove	Depress spring adjusting ring (19)
		b Spring adjusting ring (19), valve stop (70), and 4-5 shift spring (71)	Remove	
		c 4-5 modulator valve (72)	Remove	
		d 4-5 shift valve (73)	Remove	
13	Valve stop (74)	a Retainer pin (25)	Remove	Depress valve stop (74)
		b Valve stop (74) and 4-5 relay spring (75)	Remove	

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
DISASSEMBLY (cont)					
13 (cont)		c	4-5 relay valve (76)	Remove	
14	Trimmer regulator stop (77)	a	Straight pin (78)	Remove	Depress trimmer regulator stop (77)
		b	Trimmer regulator stop (77), and trimmer regulator spring (79)	Remove	
		c	Trimmer regulator valve (80)	Remove	

CLEANING

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using clean- ing solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
15		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in cleaning solvent and move slowly up and down until parts are thoroughly cleaned Dry parts thoroughly using compressed air or clean cloths
INSPECTION				
16		a Control valve body (2)	Inspect	Inspect all oil passages for cleanliness If not perfectly clean, reclean. Inspect for burrs Deburr if necessary Inspect valve bores for cracks, wear, damage and distortion Replace if necessary
		b All valves	Inspect	Inspect for wear, damage and distortion; if any of these conditions are observed, replace part
		c All springs	Inspect	Replace if cracked, worn, distorted, broken, or permanently set
		d Check balls (7 and 29)	Inspect	Inspect for flat or out of round condition, cracks, or other damage. Replace if any any of these conditions are observed
		e Separator plate kit (24)	Inspect	Inspect for broken, bent, or scratched condition Replace if necessary
		f All other parts	Inspect	Inspect for wear, damage, cracks, and distortion; replace part if any of these conditions are observed

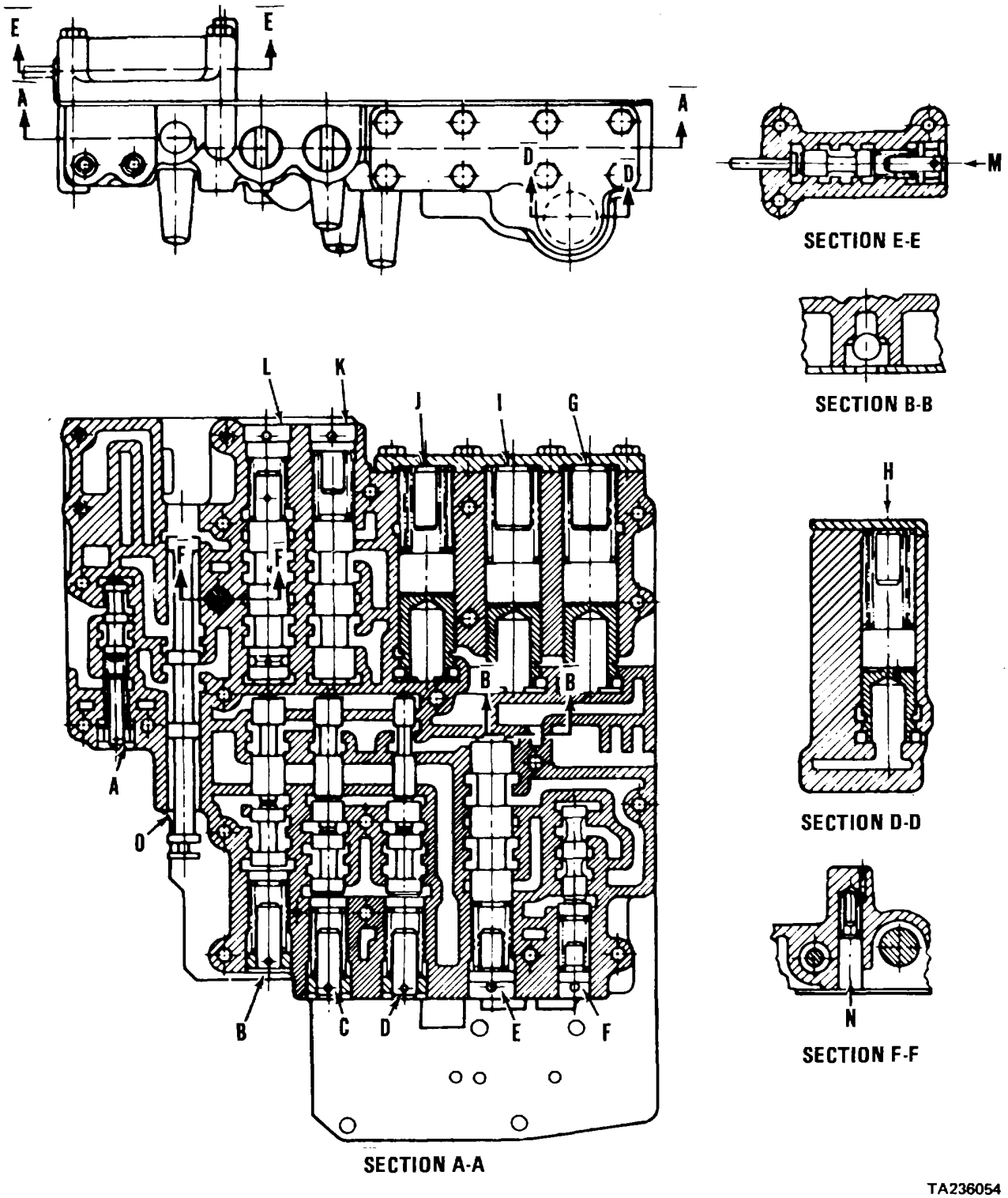
4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
		NOTE		
		Check position of all valves, springs, plugs and other parts before installation. Install all spring adjusting rings (15, 16, 17, 18, and 19) in positions they held before disassembly. If necessary to achieve original positions, use valve body adjusting ring tool. Other- wise, transmission will not operate properly. All valves, when dry, should move freely in their bores. Refer to illustration on following page for valve bore positions. Control valve body (2) is shown flat side down.		
17	Bore A	a Valve (61)	Install	
		b Spring (60)	Install	
		c Valve stop pin (59), washer (58), and spring adjust- ing ring (16)	Position	
		d Retainer pin (11)	Install	Depress spring adjusting ring (16). Retainer pin (11) must go through valve stop pin (59) and retain spring ad- justing ring (16)
18	Bore B	a 2-3 shift valve (65)	Install	Shorter land first
		b 2-3 modulator valve (64)	Install	Smaller end first
		c 2-3 shift spring Position (63), valve stop (62), and spring adjusting ring (17)		
		d Retainer pin (12)	Install	Depress spring adjusting ring (17). Retainer pin (12) must go through valve stop (62) and retain spring adjusting ring (17)
19	Bore C	a 3-4 shift valve (69)	Install	Smaller end first

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).



4-4. TRANSMISSIQN (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
19 (cont)		b	3-4 modulator valve (68)	Install	Smaller end first
		c	3-4 shift spring (67), valve stop (66), and spring adjusting ring (18)	Position	
		d	Retainer pin (13)	Install	Depress spring adjusting ring (18) .Retainer pin must go through valve stop (66) and retain spring adjusting ring (18)
20	Bore D	a	4-5 shift valve (73)	Install	Smaller end first
		b	4-5 modulator valve (72)	Install	Smaller end first
		c	4-5 shift spring (71), valve stop (70), and spring adjusting ring (19)	Position	
		d	Retainer pin (14)	Install	Depress spring adjusting ring (19). Retainer pin (14) must go through valve stop (70) and retain spring adjusting ring (19)
21	Bore E	a	4-5 relay valve (76)	Install	
		b	4-5 relay spring (75) and valve stop (74)	Position	
		c	Retainer pin (25)	Install	Depress valve stop (74)
22	Bore F	a	Trimmer regulator valve (80)	Install	Smaller end first

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION		ITEM	ACTION	REMARKS
REASSEMBLY (cont)					
22 (cont)		b	Trimmer regulator spring (79) and trimmer regulator stop (77)	Position	
		c	Straight pin (78)	Install	Depress trimmer regulator stop (77)
23	Bore G	a	Third clutch valve (44)	Install	Open end first
		b	Trimmer plug (43), outer spring (33), and valve stop (32)	Install	
24	Bore H	a	First clutch valve (46)	Install	Open end first
		b	Trimmer plug (45), outer spring (36), inner spring (35), and valve stop (34)	Install	
25	Bore I	a	Second clutch trimmer valve (48)	Install	Open end first
		b	Trimmer plug (47), outer spring (39), inner spring (38), and valve stop (37)	Install	
26	Bore J	a	Fourth clutch trimmer valve (50)	Install	Open end first
		b	Trimmer plug (49), outer spring (42),	Install	

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
26 (cont)		inner spring (41), and valve stop (40)		
27	Outer springs (33, 36, 39, and 42)	a Trimmer cover (30)	Position	Press against springs
		b Eight capscrews (31)	Install	Tighten to 9-11 pounds foot
28	Bore K	a 3-4 relay valve (54)	Install	
		b 3-4 relay valve spring (53) and valve stop (51)	Position	
		c Retainer pin (52)	Install	Depress valve stop (51)
29	Bore L	a 2-3 relay valve (57)	Install	Larger end first
		b 2-3 relay valve spring (56) and spacer (55)	Position	
		c Retainer pin (52)	Install	Depress spacer (55)
30	Modulator valve body (8), bore M	a Modulator valve actuator pin (6)	Install	Smaller end first
		b Modulator valve (23)	Install	Longer end first
		c Modulator valve spring (22), washer (21), valve stop pin (20), and spring adjusting ring (15)	Position	
		d Retainer pin (10)	Install	Depress spring adjusting ring (15) Retainer pin must go through valve stop pin (20) and retain spring adjusting ring (15)

4-4. TRANSMISSION (CONT)

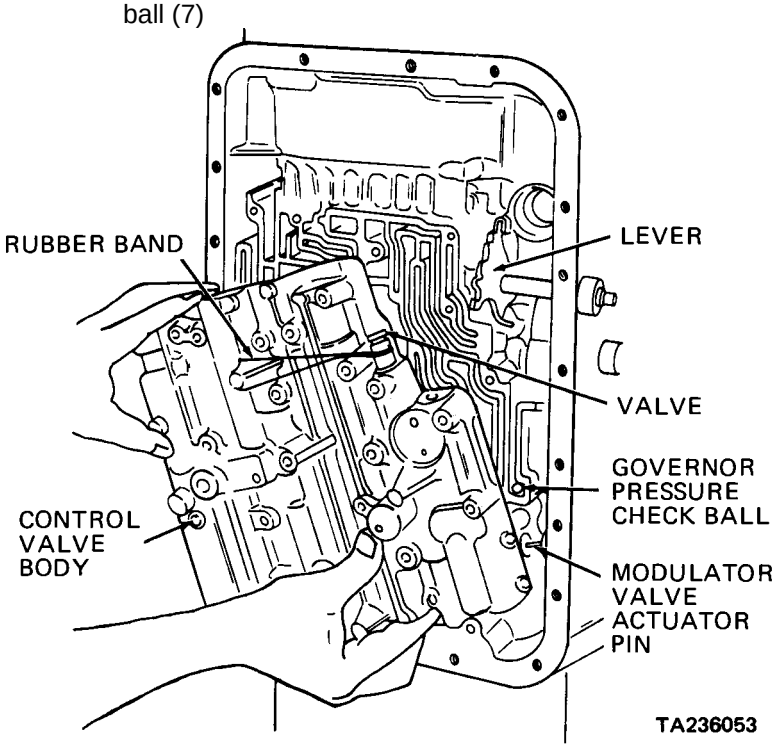
j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
31	Control valve body (2)	Check ball (29)	Install	In original position. See section B-B of illustration. Retain with oil-soluble grease
32	Bore N	a Valve stop pin (28) and spring (27)	Install	
		b Priority valve (26)	Install	Open end first
33	Control valve body (2)	Separator plate kit (24)	Position	Aline bolt holes. Slide slot onto retainer pin (25)
34	Separator plate kit (24)	a Modulator valve body (8)	Position.	Aline bolt holes
		b Three capscrews (9)	Install	Double check alinement of bolt holes in separator plate kit (24) and control valve body (2) Tighten to 9-11 pounds foot
35	Bore 0	Valve (1)	Install	Drilled end first. Secure with rubber band to pad on control valve body (2)

4-4. TRANSMISSION (CONT)

j. Control Valve Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION				
36	Transmission	a Governor pressure check ball (7)	Install	In original position, as shown



		b Control valve body (2)	Position	Be sure to insert modulator valve actuator pin (6) into bore in housing, as shown
		c Capscrews (5)	Install	Do not tighten at this time
		d Valve (1)	Position	Remove rubber band. Engage groove with pin on lever
		e Roller and spring (4)	Position	Engage with any notch on lever
		f Capscrew (3)	Install	Tighten to 9-11 pounds foot

NOTE

Final tightening of capscrews (5) is done after installation of low shift valve (paragraph 4-4i). Testing and adjustment (paragraphs 3-17a and 3-17b) are done after transmission is installed in vehicle.

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly.

This task covers:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e Reassembly
f. Installation

INITIAL SETUP:

Tools

No. 2 Common Organizational Maintenance Tool Kit
- Socket wrench handle, 1/2 inch drive
- Socket wrench set, 1/2 inch drive
- Flat tip screwdriver
- Hand hammer
- Mechanical puller kit
- Safety glasses
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Sharpening stone
- Retaining ring pliers

Brass drift
Lifting tool
Hoist
Arbor press
Bearing and gear remover J-22912-01
Output shaft oil seal and dust shield remover assembly J-24171
Low and first clutch spring compressor J-24452
Clutch spring compressor base for low, first, fourth clutches J-24204-2
Rear bearing installer J-24447
Output shaft oil seal installer J-24620
Dust shield installer J-24198
Main and output shaft orifice installer J-24369
Output shaft bearing installer J-24451
Driver handle J-8092
Steel sleeve (2.375 I.D by 2.875 O.D. by 1.750 inches long)
Driver handle J-24202-4
Adapter housing guide screws J-1927-1

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Light machine oil	Item 7, Appendix C
Transmission fluid	Item 8, Appendix C
Non-hardening sealant	Item 10, Appendix C
Gasket	FSCM 73342 PN 6837442
Governor service kit	FSCM 73342 PN 6880353
Governor cover gasket	FSCM 73342 PN 23011670
Governor weight pins	FSCM 73342 PN 8623232
Oil seal	FSCM 73342 PN 6773311
Dust shield	FSCM 73342 PN 6757563
Governor filter kit	FSCM 73342 PN 6884749
Governor filter	FSCM 73342 PN 6882687
0-ring seal	FSCM 73342 PN 6882689

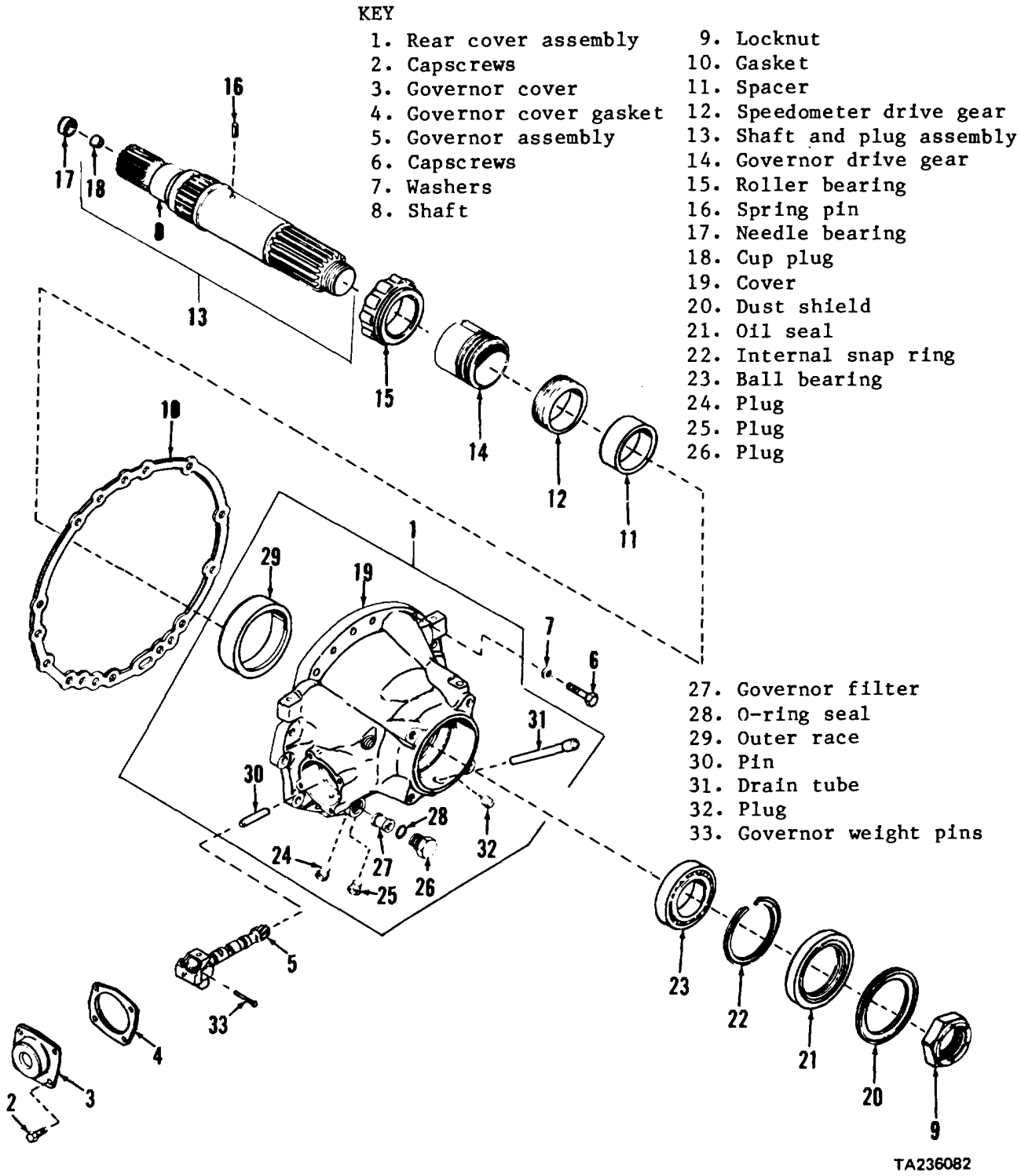
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
3-17c(2)	Transmission removed from vehicle.

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).



4-4. TRANSMISSION (CONT)

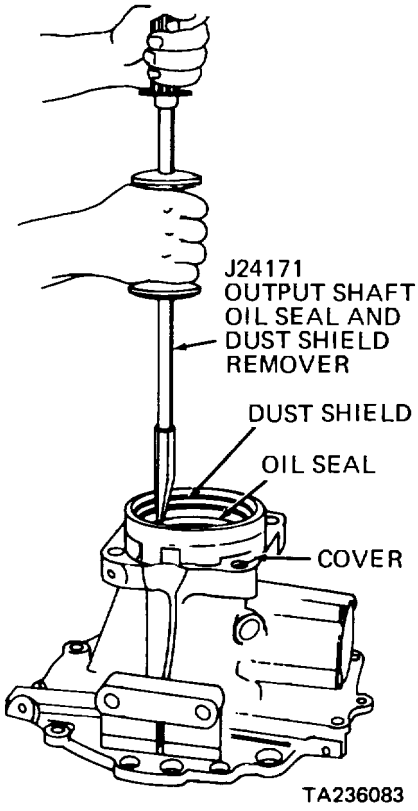
k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Rear cover assembly (1)	a. Four capscrews (2)	Remove	
		b. Governor cover (3)	Remove	
		c. Governor cover gasket (4)	Remove	Discard
		d. Governor assembly (5)	Remove	
2	Transmission (6) and washers (7)	a. 14 capscrews	Remove	
		b. Rear cover assembly (1)	Remove	Attach lifting tool and hoist to shaft (8) behind locknut (9). Lift from adapter housing and place on work table
		c. Gasket (10)	Remove	Discard
3	Rear cover assembly (1) attached parts	a. Locknut (9)	Remove	
		b. Shaft (8) and	Remove	
4	Shaft (8)	a. Spacer (11)	Remove	
		b. Speedometer drive gear (12)	Remove	
DISASSEMBLY				
5	Shaft and plug gear (14) assembly (13)	a. Governor drive	Remove	Place shaft and plug assembly (13) on arbor press, small end up. Install bearing and gear remover so that flat side of plates contact front edge of governor drive gear teeth. Press shaft down
		b. Spring pin (16)	Remove	
		c. Roller bearing (15) if necessary	Remove	Use bearing and gear remover
		d. Needle bearing (17)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5 (cont)		e. Cup plug (18)	Remove	Only if inspection shows replacement is necessary
6	Cover (19)	a. Dust shield (20)	Remove	Use output shaft oil seal and dust shield remover assembly, as shown. Discard

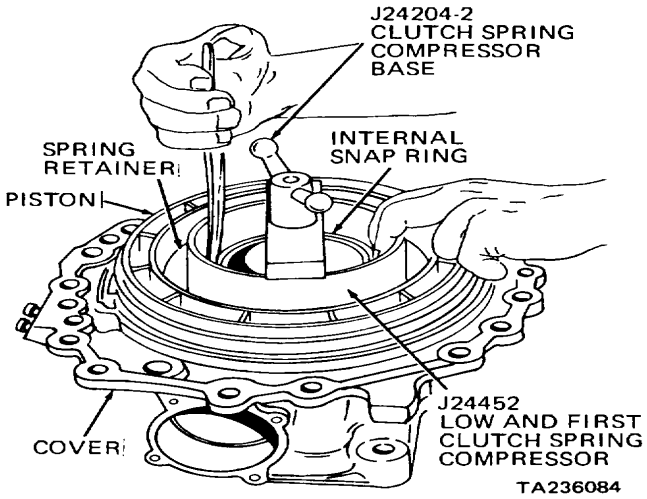


	b. Oil seal (21)	Remove	Use output shaft oil seal and dust shield remover assembly as shown above. Discard
	c. Internal snap ring (22)	Remove	

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
6 (cont)		**WARNING**		
		Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to you Seek medical attention immediately if you get chips in your eyes. Always wear safety goggle hammering.		
		d. Ball bearing (23)	Remove	Use hammer and brass drift against outer race
		e. Spring retainer	Depress	Refer to para 4-4g for exploded view of, and repair instructions for, low clutch components. Place low and first clutch spring compressor on spring retainer, as shown. Install clutch spring compressor base and tighten screw
		f. External snap ring	Remove	As shown, step 6e. Remove clutch spring compressor base and low and first clutch spring compressor
		g. Spring retainer	Remove	
		h. 26 piston release springs	Remove	
		i. Piston	Remove	
		j. Plug (24)	Remove	
		k. Plug (25)	Remove	



4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
6 (cont)		l. Plug (26)	Remove	
		m. Governor filter (27)	Remove	Discard
		n. O-ring seal (28)	Remove	Discard
		o. Outer race (29)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit
		p. Pin (30)	Remove	Only if inspection shows replacement is necessary
		q. Drain tube (31)	Remove	Only if inspection shows replacement is necessary
		r. Plug (32)	Remove	Only if inspection shows replacement is necessary
7	Governor assembly (5)	Two governor weight pins (33)	Remove	Only if governor service kit, consisting of two governor weight pins (33) and governor cover gasket (4) is available. Follow directions in governor service kit for disassembly of governor assembly (5)
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
		WARNING Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
8		a. All parts, except cover (19), roller bearing (15), ball bearing (23), and needle bearing (17)	Clean	Use cleaning solvent P-D-680. Immerse in solvent and move up and down to remove all dirt and old lubricant. Dry thoroughly with compressed air or with clean, dry, lintless cloths
		b. Cover (19)	Clean	Wipe with clean cloths moistened with cleaning solvent P-D-680. Remove all dirt and old lubricant. Dry thoroughly with compressed air or with clean, dry, lintless cloths
		c. Roller bearing (15), ball bearing (23), and needle bearing (17)	Clean	Use cleaning solvent P-D-680. Immerse bearings in cleaning solvent and slowly move up and down. Remove bearings from cleaning solvent and strike larger side of cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning solvent and repeat above operation until bearings are thoroughly clean. Dry thoroughly' with clean, dry, lintless cloths

4-4. TRANSMISSION (CONT)

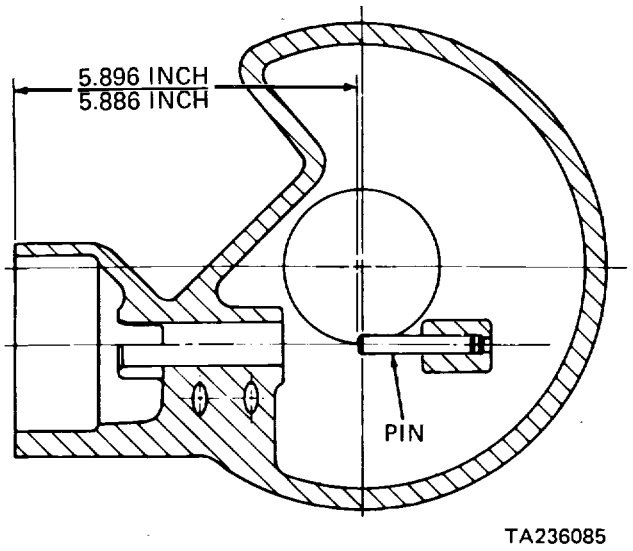
k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION				
9		a. Roller bearing (15), outer race (29), ball bearing (23), and needle bearing (17)	Inspect	Inspect for wear, chipping, or nicks. Inspect for roughness or binding in operation. Replace if necessary. If defects are found in either roller bearing (15) or outer race (29), replace both as a matched set. After inspection, dip bearings in clean, light machine oil and wrap in clean, lintless cloth for protection until installed
		b. Shaft (8)	Inspect	Inspect splines for wear, pitting, nicks, cracks or scores. Remove small nicks with suitable sharpening stone. Inspect shaft for bent, sprung, or twisted condition; replace if necessary
		c. All other parts	Inspect	Inspect for worn, cracked, bent or broken condition. If any of these conditions are noted, replace part
REASSEMBLY				
10	Governor assembly (5)	Two new governor weight pins (33)	Install	Follow directions in governor service kit for reassembly of governor assembly
11	Cover (19)	a. Plug (24)	Install	Tight enough to prevent leaks
		b. Plug (25)	Install	Tight enough to prevent leaks
		c. New plug (32)	Install	If old plug (32) was removed. Tighten enough to prevent leaks
		d. New governor filter (27)	Install	Open end first
		e. New O-ring seal (28)	Install	
		f. Plug (26)	Install	Tight enough to prevent leaks

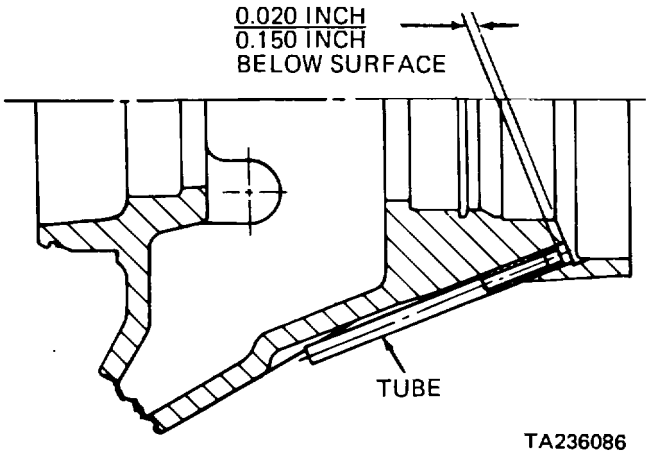
4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		g. New pin (30)	Install	If old pin (30) was removed. Install to dimension shown. It is critical to be accurate about pin's location and concentricity with governor bore



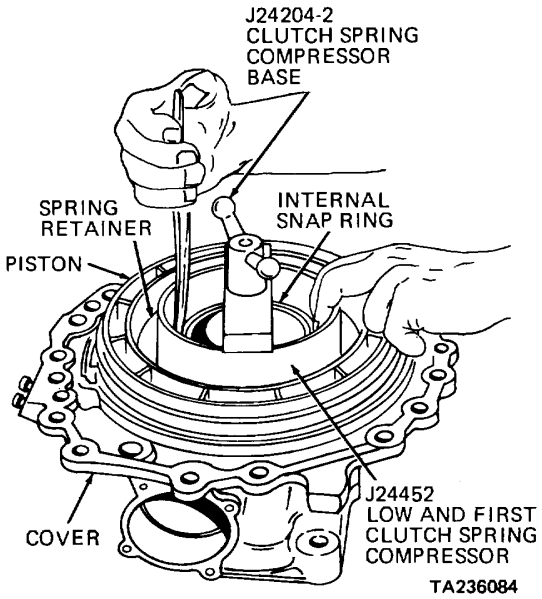
		h. New drain tube (31)	Install	If old drain tube (31) was removed. Press tube in to dimension shown



4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		i. Piston	Install	Refer to para 4-4g for exploded view of low clutch components. Be sure lip type seal rings are lubricated with transmission fluid. Install carefully, being sure not to distort lip type seal rings
		j. 26 piston release springs	Install	
		k. Spring retainer	Install	Cupped side first
		l. External snap ring	Position	
		m. Spring retainer	Depress	Place low and first clutch spring compressor on spring retainer, as shown. Install clutch spring compressor base and tighten screw

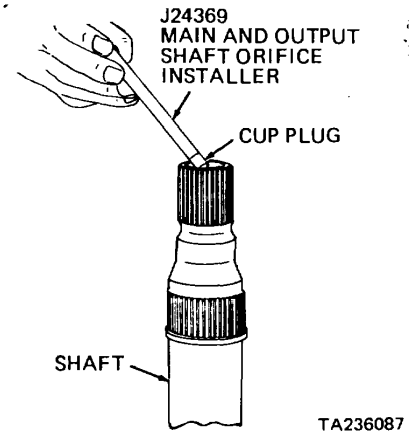


		n. External snap ring	Install	As shown, step 11m. Remove clutch spring compressor base and low and first clutch spring compressor
		o. Ball bearing (23)	Install	Use rear bearing installer to seat firmly against cover (19)

4-4. TRANSMISSION (CONT)

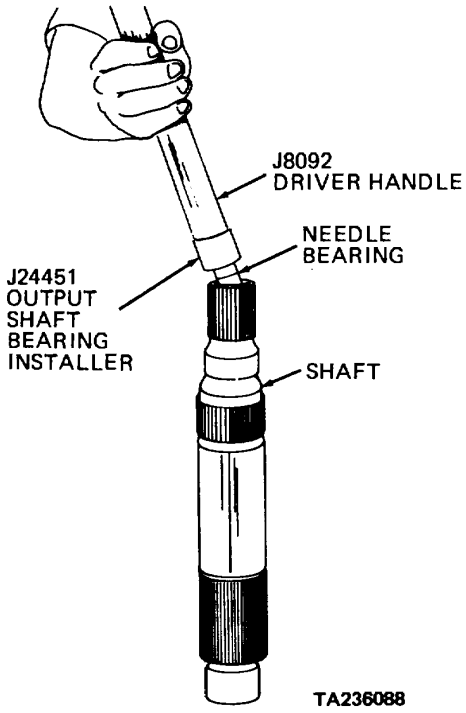
k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
11 (cont)		p. Internal snap ring (22)	Install	Beveled side toward rear of transmission
		q. New oil seal (21)	Install	Coat outer edge with non-hardening sealant. Place on utput shaft oil seal installer, spring-loaded side away from installer. Drive oil seal (21) into bore until its rear surface is 1.03 to 1.07 inch below rear face of cover (19)
		r. New dust shield (20)	Install	Place onto dust shield installer, concave side first. Coat outer edge with non-hardening sealant. Drive dust shield (20) into bore until it is flush with, to 0.040 inch below, rear face of cover (19)
		s. New outer race (29)	Install	If old outer race (29) was removed. Install, inner lip first, until front of outer race (29) is 0.080 to 0.090 inch below front surface of bore
12	Shaft (8)	a. New cup plug (18)	Install	If old cup plug (18) was removed. Place on end of main and output shaft orifice installer. Install into shaft (8) as shown



4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		b. New needle bearing (17)	Install	If old needle bearing (17) was removed. Place on end of output shaft bearing installer, numbered end of bearing facing installer. Attach driver handle J-8092 to installer. Install needle bearing (17) as shown
				
		c. Roller bearing (15)	Install	Place shaft (8) on arbor press, small end down. Place roller bearing (15), chamfered end first, onto shaft. Install steel sleeve, rear bearing installer, and driver handle J-24202-4. Press roller bearing against shoulder on shaft. Remove driver handle J-24202-4, rear bearing installer, and steel sleeve

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12 (cont)		d. Spring pin (16)	Install	Press in until it extends 0.150 to 0.170 inch above surface
		e. Governor drive gear (14)	Install	Slot first. Aline slot with spring pin (16). Place rear bearing installer over shaft next to governor drive gear (14). Install driver handle J-24202-4 and press governor drive gear into place
INSTALLATION				
13	Adapter housing	Shaft and plug assembly (13)	Install	Into low planetary gear
14	Shaft and plug assembly (13)	a. Speedometer drive gear (12)	Install	
		b. Spacer (11)	Install	
15	Adapter housing	a. New gasket (10)	Install	
		b. Rear cover assembly (1)	Install	First install two adapter housing guide screws. Then lower rear cover assembly onto adapter housing
		c. 12 capscrews (6) and washers (7)	Install	Do not tighten at this time
		d. Two remaining capscrews (6) and washers (7)	Install	First remove two adapter housing guide screws. Do not tighten at this time
		e. 14 capscrews (6)	Tighten	Tighten two capscrews (6) 180 degrees apart to 33 pounds foot. Move about 90 degrees around adapter housing and repeat procedure. Tighten remaining opposite pairs of capscrews to 33 pounds foot. Repeat entire procedure, tightening all capscrews to 67-80 pounds foot

4-4. TRANSMISSION (CONT)

k. Governor and Rear Cover Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
16	Rear cover assembly (1)	a. Governor assembly (5)	Install	
		b. New governor cover gasket (4) and governor cover (3)	Position	
		c. Four capscrews (2)	Install	Tighten to 15-20 pounds foot
		d. Locknut (9)	Install	Be sure all threads are clean. Loosely install several turns to prevent loss before installation of output flange

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly.

This task covers:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Reassembly
f. Installation

INITIAL SETUP

Tools
No. 2 Common Organizational Maintenance Tool Kit
- Socket wrench handle, 1/2 inch drive
- Socket wrench set, 1/2 inch drive
- Torque wrench, 1/2 inch drive, 175 pounds foot capacity
- Straightedge
- Thickness gage
- Measuring scale
- Hand hammer
- Retaining ring pliers
- Mechanical puller kit
- Safety glasses

Hoist
Arbor press
Sun lamp
Front support lifter assembly J-24473
Valve pin remover J-24412-2
Slide hammer J-6125-1
Pressure regulator and lockup spring compressor J-24459
Centering band J-24461
Soft headed mallet
Oil seal installer J-26912
Driver handle J-24202-4
Front support bearing installer J-24457
Driver handle J-8092
Valve pin installer J-24458
Two headless guide screws J-24315-1
Bushing installer J-24648

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Oil-soluble grease	Item 9, Appendix C
Nonhardening sealant	Item 10, Appendix C
Oil seal	FSCM 73342 PN 6881597
Valve guide	FSCM 73342 PN 6834410
Gasket	FSCM 73342 PN 6837602
Seal ring	FSCM 73342 PN 6834525

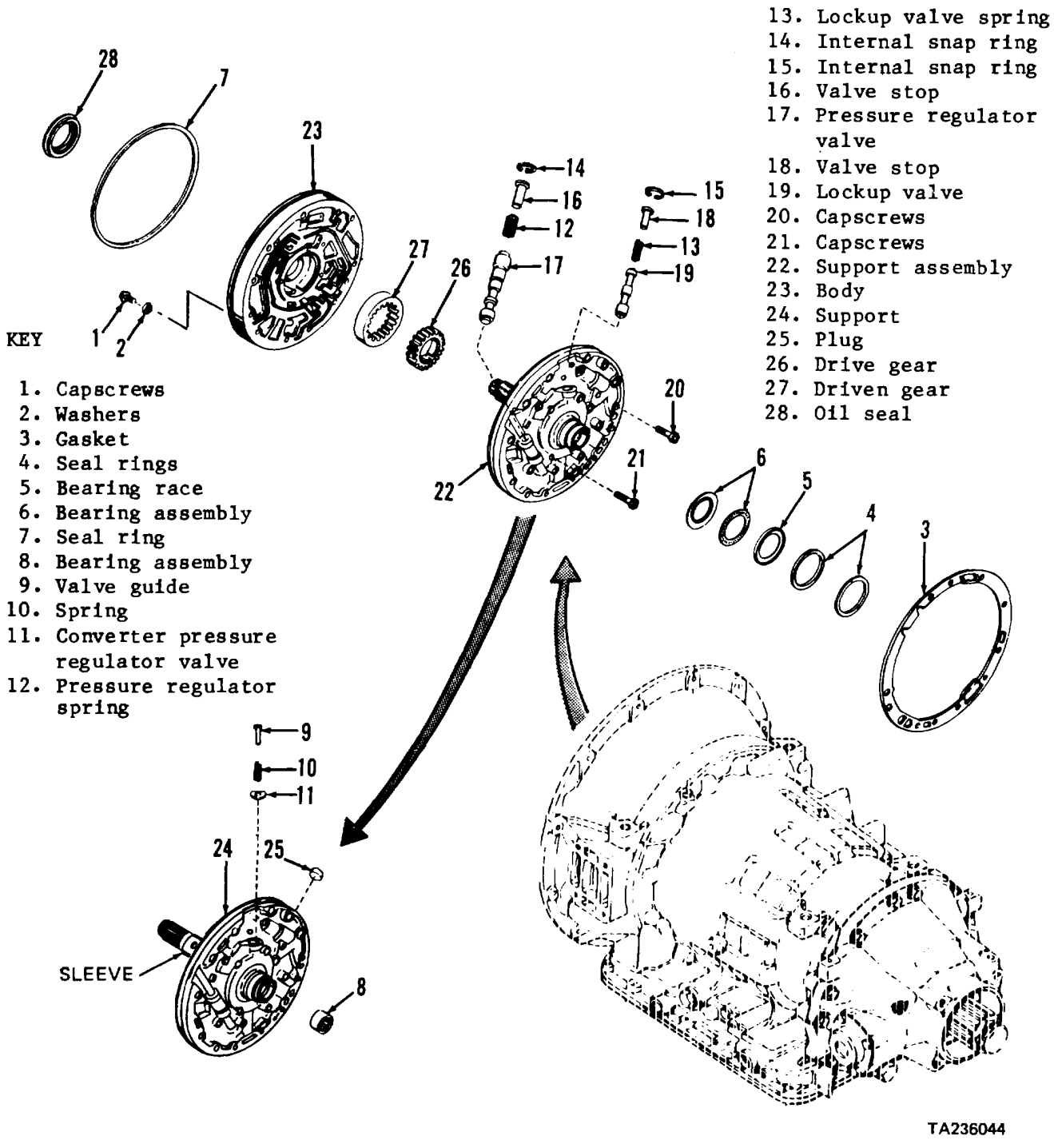
Personnel Required
Automotive Repairer MOS 63H

Equipment Condition

Paragraph	Condition Description
3-17d	Torque converter removed.

4-4. TRANSMISSION (CONT)

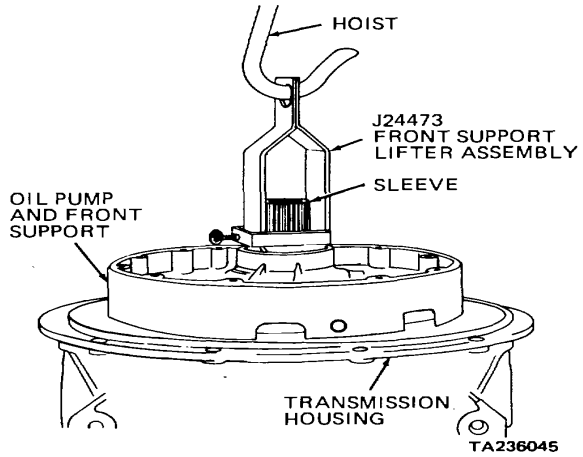
1. Oil Pump and Front Support Assembly (cont).



4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REMOVAL				
1	Oil pump and front support	Capscrews (1) and washers (2)	Remove	
2	Trans-mission	Oil pump and front support group	Remove	Firmly attach front support lifter assembly as shown. Attach a hoist to lifter assembly and carefully lift oil pump and front support. Oil pump and front support group fit tightly in transmission and may bind when housing is cold. Use sun lamp or draft of warm air to heat housing if necessary. If oil pump and front support group bind, tap down and lift again. Place on table. Remove lifter assembly



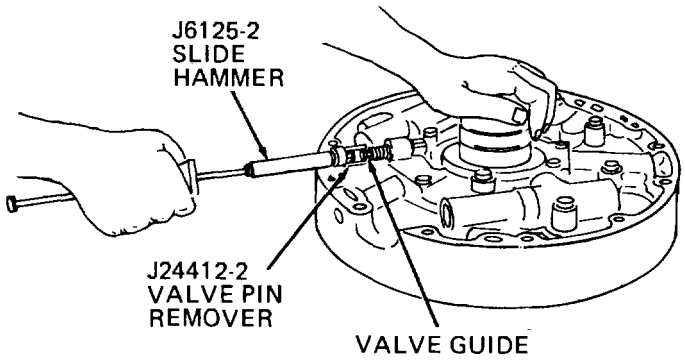
DISASSEMBLY

3	Oil pump and front support (4) group	a. Gasket (3)	Remove	Discard
		b. Two seal rings	Remove	
		c. Bearing race (5) and bearing assembly (6)	Remove	From support- assembly (22) or transmission
		d. Seal ring (7)	Remove	Discard
		e. Bearing assembly (8)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)		f. Valve guide (9)	Remove	Only if parts replacement is necessary. Attach valve pin remover to head of valve guide (9) as shown. Attach slide hammer and remove. Discard valve guide (9)



		g. Spring (10) and converter pressure regulator valve (11)	Remove	Only if replacement is necessary

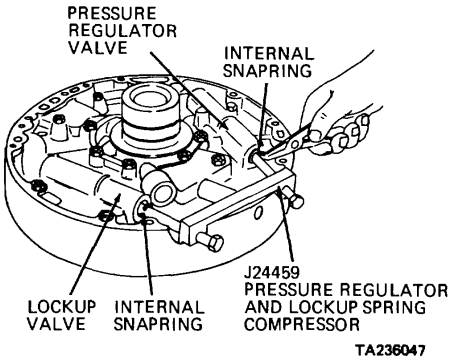
WARNING

Pressure regulator spring (12) and lockup valve spring 4-137 (13) in step 3h-j are under about 65 pounds compression. If instructions are not followed carefully, springs may injure you. If injured, seek medical attention immediately.

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
3 (cont)	compressor compressor	h. Internal snap rings (14 and 15)	Remove	Attach pressure regulator and and lockup spring as shown. Tighten screw to remove all pressure from internal snap rings (14 and 15). Remove internal snap rings. Carefully remove screws on spring compressor. Remove spring compressor
		i. Valve stop (16), pressure regulator spring (12), and pressure regulator valve (17)	Remove	
		j. Valve stop (18), lockup valve spring (13), and lockup valve (19)	Remove	
		k. 14 capscrews (20 and 21)	Remove	
		l. Support assembly (22) and body (23)	Separate	
4	Support (24)	Plug (25)	Remove	If necessary to replace parts



4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5	Body (23)	a. Drive gear (26) and driven gear (27)	Remove	
		b. Oil seal (28)	Remove	Discard
CLEANING				
		WARNING Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately. Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.		
6		All parts	Clean	Use cleaning solvent P-D-680. Immerse parts in solvent and move up and down to remove all old lubricant, dirt, and grease. Dry thoroughly with clean, lintless cloths or moisture-free compressed air

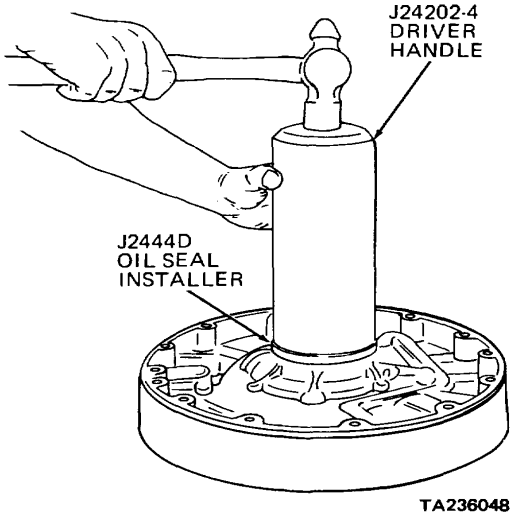
4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION				
7		a. Support (24) and sleeve	Inspect	Do not separate. If you feel movement between support (24) and sleeve, or if sleeve is damaged, replace sleeve and support (24) as an assembly
		b. Body (23), drive gear (26), and driven gear (27)	Inspect	Replace all three parts if any one is damaged. Position body (23) flat side up and install drive gear (26) and driven gear (27) into it. Place straightedge across body and gears. Check with thickness gage for clearance between straightedge and each gear. If clearance is is more than 0.0024 inch, replace gears. If clearance ' is still more than 0.0024 inch, replace body (23), ve gear (26), and driven gear (27) as a unit
		c. Pressure regulator spring (12) and lock-up valve spring (13)	Inspect	Replace if cracked, worn, distorted, broken or permanently set
		d. Pressure regulator valve (17) and lock-up valve (19) replace part	Inspect	Inspect for wear, damage, bent or broken condition and distortion; if any of these conditions are observed,
		e. Capscrews (1, 20, and 21)	Inspect	Replace any capscrews that are bent or have damaged threads
		f. Bearing assemblies (6 and 8)	Inspect	Replace if bearing binds or drags
		g. All other parts	Inspect	Inspect for wear, damage, cracks, and distortion; replace part if any of these conditions are observed

4-4. TRANSMISSION (CONT)

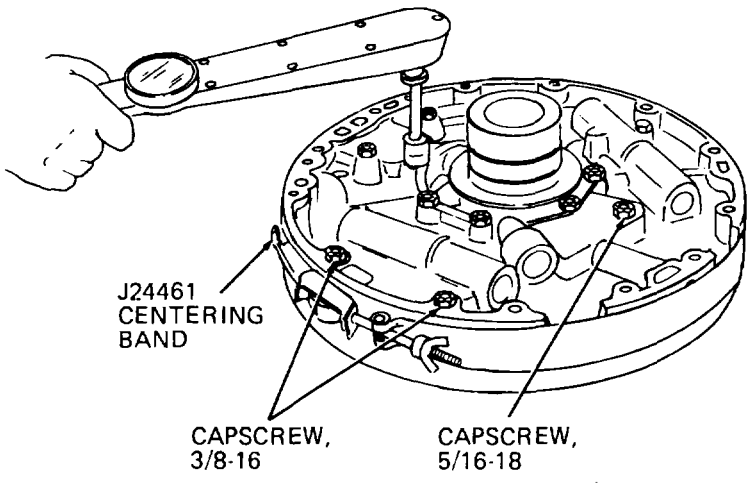
1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY				
		NOTE If oil seal installer is not available for step 8 below, press oil seal (28) 0.050-0.070 inch below front surface of body (23).		
8	Body (23)	New oil seal (28)	Install	Place oil seal (28) on oil seal installer with spring loaded lip facing away from tool. Attach driver handle. Coat outside oil seal diameter with nonhardening sealant. Drive oil seal (28) into body (23) as shown. Remove oil seal installer and apply oil-soluble grease to inside of seal
				
9	Support (24)	New plug (25)	Install	If removed during disassembly. Press to shoulder of support (24)
10	Oil pump and front support group	Body (23)	Position	Front side down on table
11	Body (23)	a. Drive gear (26) and driven gear (27)	Install	
		b. Support (24)	Position	Line up bolt holes in body (23) and support (24)

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
12	Oil pump and front support group	a. Two capscrews (20 and 21)	Install	180 degrees apart. Tighten one or two threads
		b. Centering band	Install	Around body (23) and support, as shown



TA236049

	c. Remaining capscrews (20 and 21)	Install	Be sure centering band is tight. Fit between body (23) and support (24) must be perfectly smooth. Tighten 12 5/16-18 capscrews (21) to 17-20 pounds foot. Tighten 3/8-16 capscrews (20) to 36-43 pounds foot

NOTE

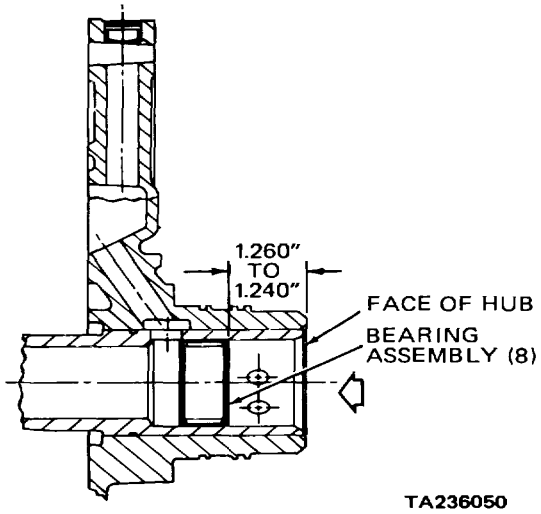
4-142 If bearing installer is not available for step 13 below, press bearing assembly (8), numbered end up, into sleeve until it is 1.240-1.260 inches from face of hub, as shown.

4-4. TRANSMISSION (CONT)

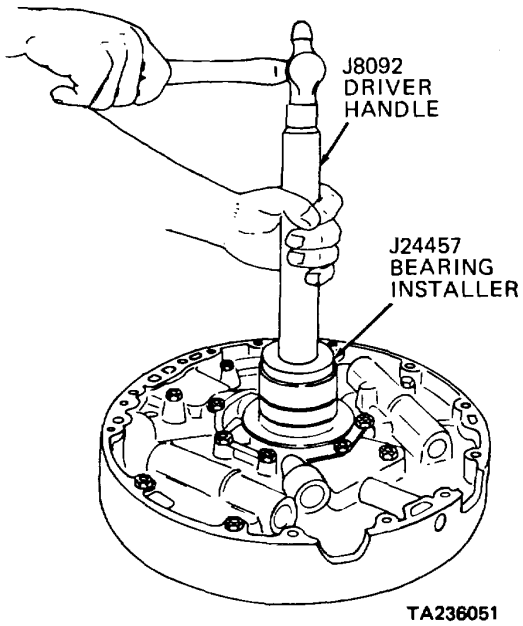
1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS

REASSEMBLY



13	Sleeve	New bearing assembly (8)	Install	If original was removed. Numbered end up. Use front support bearing installer and driver handle, as shown. Bearing assembly must not move while withstanding a 200 pound load in direction indicated by arrow in drawing for note above



4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14	Oil pump and front support group	a. Lockup valve (19), lockup valve spring (13), and valve stop (18)	Install	
		b. Pressure regulator valve (17), pressure regulator spring (12), and valve stop (16)	Install	
		c. Internal snap rings (14 and 15)	Install	Attach pressure regulator and lockup spring compressor as shown in step 3h. Place internal snap rings (14 and 15) onto compressor screws before compressing lockup valve spring (13) and pressure regulator spring (12). Compress springs and install snap rings. Remove compressor

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if you get metal chips in your eyes. Always wear safety goggles when hammering.

NOTE

If valve pin installer is not available for step 14d, drive in valve guide (9) to extend 1.16-1.20 inches beyond finished surface.

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
14 (cont)		d. Converter pressure regulator valve (11), spring (10), and valve guide (9)	Install	Place valve guide (9) onto valve pin installer. Place converter pressure regulator valve (11) and spring (10) onto valve guide (9). Install by striking end of valve pin installer with hammer
		e. Seal ring (7)	Install	Lubricate first with oil-soluble grease. Be sure seal ring (7) is not twisted
INSTALLATION				
15	Transmission housing	a. Gasket (3)	Install	Be sure that seal rings at bottom of turbine shaft are retained with oil-soluble grease
16	Oil pump and front support group	a. Bearing assembly (6) and bearing race (5)	Install	Retain with oil-soluble grease
		b. Two seal rings (4)	Install	
17	Transmission housing	Two headless guide screws	Install	
18	Sleeve	Front support lifter and hoist assembly	Attach	As shown, step 2
19	Transmission housing	a. Oil pump and front support group	Install	Line up all holes. Lower onto two headless guide screws. Remove front support lifter assembly
		b. 10 capscrews (1) and washers (2)	Install	Hand tight

4-4. TRANSMISSION (CONT)

1. Oil Pump and Front Support Assembly (cont).

STEP	LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (cont)				
19 (cont)		c. Two headless guide screws	Remove	
		d. Two remaining capscrews (1) and washers (2)	Install	Hand tight
		e. 12 capscrews (1) and washers (2)	Tighten	Tighten first two capscrews 180 degrees apart to 15 pounds foot. Move about 90 degrees around capscrew circle and repeat with next capscrew pair. Tighten rest of capscrew pairs. Repeat entire process, tightening all to 24-32 pounds foot

4-5. DIFFERENTIAL

This task covers:
a. Disassembly
b. Cleaning
c. Inspection
d. Reassembly
e. Adjustment

INITIAL SETUP

Tools
Automotive Mechanic's Tool Kit
Diagonal cutting pliers
Center punch
Socket wrench set, 1/2 inch drive
No. 1 Common Organizational Maintenance Tool Kit
Twist drill set
Socket wrench set, 3/4 inch drive
Fixed open end wrench set
Safety glasses
Torque wrench, 1/2 inch drive, 175 pounds foot capacity
Torque wrench, 3/4 inch drive, 600 pounds foot capacity
Mechanical puller kit
No. 2 Common Organizational Maintenance Tool Kit
Hand hammer
Flat tip screwdriver
Socket wrench handle, 1/2 inch drive
Electric portable drill, 1/2 inch
Pry bars (2)
Dial indicator
Arbor press
Differential repair stand
FSCM 78500 PN 3-11546
Yoke holding tool

Materials/Parts

Cleaning solvent	Item 1, Appendix C
Clean cloths	Item 2, Appendix C
Chassis grease	Item 3, Appendix C
Emery cloth	Item 4, Appendix C
Soft lock wire	Item 5, Appendix C
Axle lubricant	Item 6, Appendix C
Light machine oil	Item 7, Appendix C
Linseed oil	Item 46, Appendix C
Red lead	Item 47, Appendix C
Cotter pins	FSCM 78500 PN 1199R2176
Oil seal	FSCM 78500 PN A1805S149
Gasket	FSCM 78500 PN 2808Z728

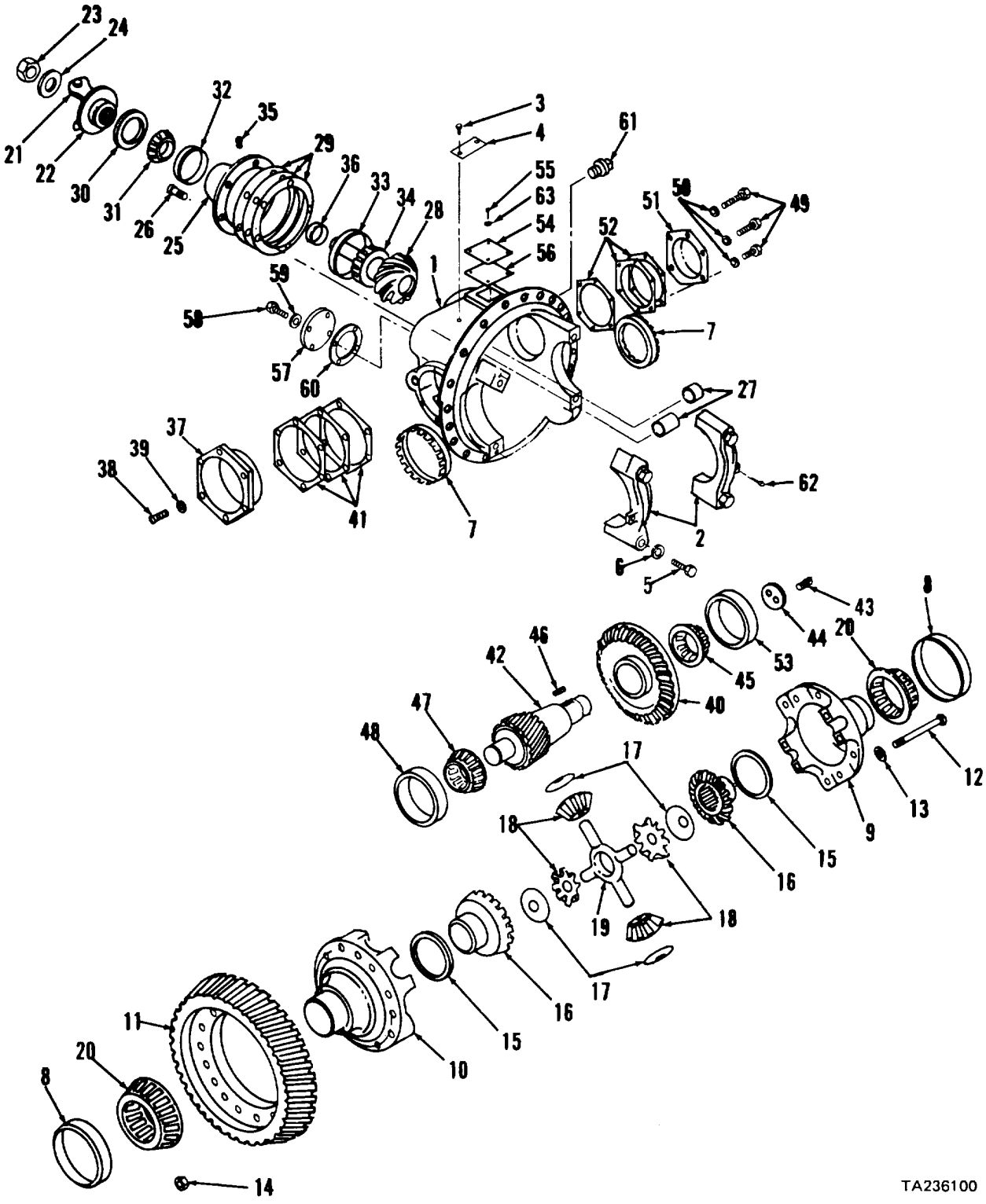
Personnel Required
Two Automotive Repairers MOS 63H

Equipment Condition

Paragraph	Condition Description
3-19b	Differential removed from axle and mounted in repair stand.

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY				
1	Differential carrier housing (1)	a. Differential bearing cap (2)	Mark	Use center punch and hammer to identify one differential bearing cap (2) and differential carrier housing (1) for proper reassembly
		b. Two tacks (3)	Remove	Only if necessary for replacement
		c. Plate (4)	Remove	

4-5. DIFFERENTIAL (CONT)



TA236100

4-5. DIFFERENTIAL(CONT)

KEY

1. Differential carrier housing
2. Differential bearing caps (2)
3. Tacks (2)
4. Plate
5. Capscrews (4)
6. Washers (4)
7. Adjusting nuts (2)
8. Bearing cups (2)
9. Case half
10. Case half
11. Helical spur gear
12. Capscrews (12)
13. Washers (12)
14. Nuts (12)
15. Side gear thrust washers (2)
16. Side gears (2)
17. Thrust washers (4)
18. Pinions (4)
19. Spider
20. Bearings (2)
21. Yoke
22. Slinger
23. Nut
24. Washer
25. Bearing cage
26. Capscrews (7)
27. Bushings (2)
28. Drive pinion
29. Shims (AR)
30. Oil seal
31. Outer bearing
32. Outer bearing cup
33. Inner bearing cup
34. Inner bearing
35. Fill plug
36. Bearing spacer
37. Cross shaft bearing cage
38. Capscrews (6)
39. Lock washers (6)
40. Drive gear
41. Shims (AR)
42. Cross shaft
43. Capscrews (2)
44. Bearing retainer
45. Bearing
46. Key
47. Bearing
48. Bearing cup
49. Capscrews (6)
50. Lock washers (6)
51. Cross shaft cover
52. Shims (AR)
53. Bearing cup
54. Inspection hole cover
55. Capscrews (4)
56. Gasket
57. Front cover
58. Capscrews (4)
59. Lock washers (4)
60. Gasket
61. Fill plug
62. Cotter pins (2)
63. Lock washers (4)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		d. Two cotter pins (62)	Remove	
		e. Four capscrews (5) and washers (6)	Remove	
		f. Two differential bearing caps (2)	Remove	
		g. Two adjusting nuts (7)	Remove	
		h. Two bearing cups (8)	Remove	
		i. Differential case and gear assembly	Lift out	Insert bar through differential case and gear assembly

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
1 (cont)		**NOTE** Removal of bushings (27) is not required. These bushings are for a two-speed shaft which is not installed in this differential carrier.		
2	Differential case and gear assembly	a. Case halves (9 and 10)	Mark	Use punch to mark for correct alinement during reassembly
		b. 12 capscrews (12), washers (13), and nuts (14)	Remove	Cut lock wire first
		c. Helical spur gear (11)	Remove	
		d. Case halves (9 and 10)	Separate	
		e. Two side gear thrust washers (15), two side gears (16), four thrust washers (17), four pinions (18), and spider (19)	Remove	
3	Differential case halves (9 and 10)	Two bearings (20)	Remove	Remove only if inspection shows replacement is necessary. Use mechanical puller kit
4	Yoke (21)	Nut (23) and washer (24)	Remove	Use yoke holding tool
5	Bearing cage (25)	a. Seven capscrews (26)	Remove	

WARNING

Do not strike hardened steel pieces with steel hammer. Metal chips could cause serious injury to your eyes. Seek medical attention immediately if metal chips get in your eyes. Always wear safety glasses when hammering.

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
5 (cont)		b. Bearing cage (25)	Remove	If bearing cage (25) is not free, tap loose using hammer and brass drift on inner face of drive pinion (28) or use puller screws in holes provided
		c. Shims (29)	Remove	Wire together
		d. Drive pinion (28)	Remove	Press from bearing cage (25)
		e. Yoke (21)	Remove	
		f. Oil seal (30)	Remove	Discard
		g. Outer bearing (31)	Remove	
		h. Outer bearing cup (32)	Remove	Only if inspection shows outer bearing (31) should be replaced. Press from bearing cage (25)
		i. Inner bearing cup (33)	Remove	Only if inspection shows inner bearing (34) should be replaced. Press from bearing cage (25)
		j. Fill plug (35)	Remove	Only if inspection shows replacement is necessary
		k. Slinger (22)	Remove	From yoke (21) only if damaged
6	Drive pinion (28)	a. Bearing spacer (36)	Remove	Retain for reassembly
		b. Inner bearing (34)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit to remove from drive pinion (28)
7	Cross shaft bearing cage (37)	a. Six capscrews (38) and lock washers (39)	Remove	
		b. Cross shaft bearing cage (37)	Remove	With pry bar between back of drive gear (40) and carrier housing (2)
		c. Shims (41)	Remove	Wire together

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
8	Differential(42) carrier housing (1)	Cross shaft	Remove	Shift left, tilt, and lift out drive gear side first
9	Cross shaft (42)	a. Two capscrews (43)	Remove	
		b. Bearing retainer (44)	Remove	
10	Drive gear (40) and bearing (45)	Cross shaft (42) and key (46)	Remove	Press out. Don't lose key (46)
11	Cross shaft (42)	Bearing (47)	Remove	Remove if necessary for replacement. Use mechanical puller kit
12	Cross shaft bearing cage (37)	Bearing cup (48)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit
13	Differential carrier housing (1) cover (51) and shims (52)	a. Six capscrews (49) and lock washers (50)	Remove	Only if necessary to remove cross shaft cover (51)
		b. Cross shaft to bearing cup (53). Wire shims together	Remove	Only if necessary for access
		c. Bearing cup (53)	Remove	Only if inspection shows replacement is necessary. Use mechanical puller kit
14	Inspection hole cover (54)	a. Four capscrews (55) and lock washers (63)	Remove	
		b. Inspection hole cover (54) and gasket (56)	Remove	Discard gasket
15	Front cover (57)	a. Four capscrews (58) and lock washers (59)	Remove	

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY (cont)				
15 (cont)		b. Front cover (57) and gasket (60)	Remove	Discard gasket
16	Differential carrier housing (1)	Fill plug (61)	Remove	Remove only if necessary
CLEANING				

WARNING

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air immediately, and get medical attention. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water immediately, and obtain medical aid immediately.

Compressed air must not exceed 30 psi. Wear safety glasses when drying parts with compressed air. Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

17		a. Bearings (31 and 45)	Clean	Use cleaning solvent P-D-680. Soak in cleaning solvent; then remove and strike flat of bearing against block of wood to dislodge solidified lubricant particles. Dry with clean, soft, lintless, absorbent cloths. Don't use compressed air to dry bearings

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
CLEANING (cont)				
17 (cont)		b. Differential carrier housing (1) and helical spur gear (11)	Clean	Use clean cloths moistened with dry cleaning solvent P-D-680. Dry with compressed air
		c. All other parts	Clean	Use cleaning solvent P-D-680. Immerse in solvent and move up and down to remove all old lubricant and dirt. Dry with clean, soft, lint-less, absorbent cloths or with compressed air. Don't use compressed air on any bearings
INSPECTION				
18		a. Bearings (20, 31, 34, 45, and 47), bearing cups (8, 32, 33, 48, and 53)	Inspect	Check for wear, pitting, or damage; replace part if any of these conditions are observed. See steps 3, 5h-i, 6b, and 11 through 13
		b. Drive pinion (28)	Inspect	Check gear teeth and splines for nicked, cracked, broken, scored, or worn condition. Remove burrs or nicks with soft hone or crocus cloth. Replace badly damaged or worn part
		NOTE Drive pinion (28) and drive gear (40) must be replaced as a matched set.		
		c. Two adjusting nuts (7)	Inspect	Check for wear, damage and nicks. Check threads for damage. If any of these conditions are observed, replace part

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
18 (cont)		d. Bearing cage (25) and differential carrier housing (1)	Inspect	Check for cracks, breaks, burrs, and damage to machined surfaces. Remove burrs and minor surface irregularities with soft hone or crocus cloth. Replace cracked or damaged parts
		e. Yoke (21)	Inspect	Check for cracks, burrs, twisted splines, and other damage. Remove burrs with soft hone or crocus cloth. Replace part if cracked or splines badly twisted
		f. Helical spur gear (11), side gears (16), and pinions (18)	Inspect	Inspect for wear, damage, cracks, pits and scoring. Inspect gear teeth and pinion bushings for wear, cracks and damage. If any of these conditions are observed, replace part
		NOTE Helical spur gear (11) and cross shaft (42) must be replaced as a matched set. Pinions (18) and side gears (16) must be replaced as a set.		
		g. Case halves (9 and 10), spider (19), and thrust washers (17)	Inspect	Inspect for wear, cracks, pits, scoring, damage and distortion. If any of these conditions are observed, replace part
		NOTE Replace thrust washers (17) in sets; combination of old and new thrust washers will result in premature failure.		
		h. All other parts	Inspect	Inspect for wear, damage, cracks, pits and distortion. If any of these conditions are observed, replace part

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
INSPECTION (cont)				
		NOTE		
		Immediately after performing inspection, coat all parts with light oil to prevent corrosion.		
REASSEMBLY				
		NOTE		
		Lubricate all parts and inner walls of differential case (9 and 10) with axle lubricant (refer to current lubrication order). Torque limits given apply to parts coated with machine oil; for dry parts, increase torques 10 percent; for parts coated with axle lubricant, decrease torques 10 percent.		
19	Differential(61) carrier housing (1)	a. Fill plug	Install	If fill plug (61) was removed. Tighten to 35 pounds foot
		b. New gasket (60) and front cover (57)	Position	
		c. Four capscrews (58) and lock washers (59)	Install	Tighten to 35-50 pounds foot
		d. New gasket (56) and inspection hole cover (54)	Position	
		e. Four capscrews (55) and lock washers (63)	Install	Tighten to 35-50 pounds foot
		f. New bearing cup (53)	Press on	If old bearing cup (53) was removed
		g. Correct shims (52) and cross shaft cover (51)	Position	If removed earlier
		h. Six capscrews (49) and lock washers (50)	Install	If removed earlier. Tighten capscrews (49) to 130-165 pounds foot. If cross shaft cover (51) wasn't removed, double check torque values

4-5. DIFFERENTIAL (CONT)

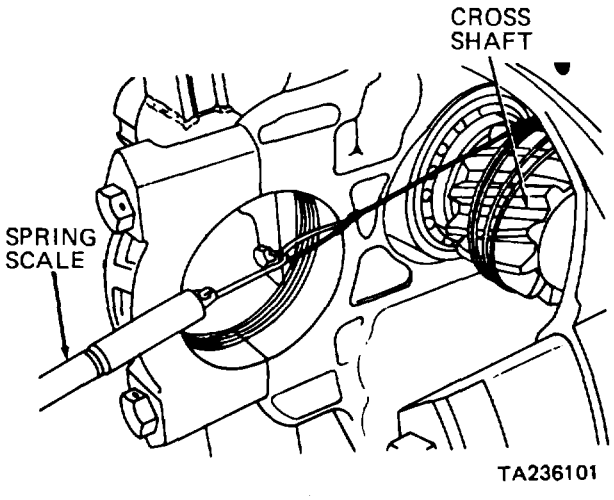
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
20	Drive gear (40)	Cross shaft (42) and key (46)	Install	Press in, with key (46) in line with keyway
21	Cross shaft (42)	a. New bearing (47)	Install	If old bearing (47) was removed. Press onto end opposite drive gear (40)
		b. Bearing (45)	Install	Press onto drive gear (40) end
		c. Bearing retainer (44)	Position	
		d. Two capscrews (43)	Install	Tighten to 130-165 pounds foot
22	Cross shaft bearing cage (37)	New bearing cup (48)	Install	If old bearing cup was removed. Press in
23	Differential carrier housing (1)	a. Bearings (45 and 47) and bearing cups (48 and 53)	Lubricate	With light machine oil
		b. Cross shaft (42)	Install	Tilt to put end opposite drive gear (40) in first
		c. Shims (41)	Position	Be sure you install same shims removed earlier. Aline all holes
		d. Cross shaft bearing cage (37)	Install	Tap with soft mallet
		e. Six capscrews (38) and lock washers (39)	Install	Tighten to 130-165 pounds foot

NOTE

Rotate cross shaft (42) several times before checking bearing preload to assure full bearing contact.

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
24	Cross shaft (42)	Pound scale preload	Check bearing	Pull horizontally on soft wire wrapped around cross shaft (42) as shown



NOTE

Example: If cross shaft (42) spur gear has diameter of 4 inches, radius would be 2 inches. 5 pounds pull on scale would equal 10 pounds inch bearing preload torque. Use rotating, not starting torque. Add shims (41) on side opposite drive gear (40) to reduce preload. Subtract shims (41) to increase preload. Correct preload torque is 5-15 pounds inch.

25	Drive pinion (28)	New inner bearing (34)	Install	If old bearing (34) was removed. Press onto drive pinion shaft (28)
26	Bearing cage (25)	a. New outer bearing cup (32)	Install	If old outer bearing cup (32) was removed. Press firmly against bearing cage shoulder. Lubricate with light oil
		b. New inner bearing cup (33)	Install	If old inner bearing cup (33) was removed. Press firmly against bearing cage shoulder. Lubricate with light oil
		c. Drive pinion (28)	Position	

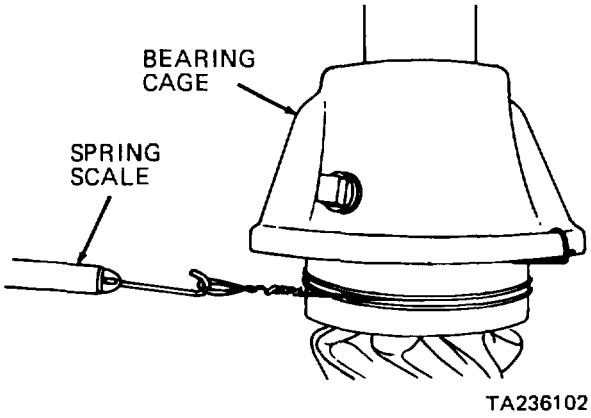
4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
26 (cont)		d. Bearing spacer (36)	Install	Onto drive pinion (28) shaft, bevel side toward shaft shoulder
		e. Outer bearing (31)	Install	Press onto drive pinion

NOTE

While still in press, rotate bearing cage (25) several times to assure normal bearing contact.

	f. Pound scale pinion (28) bearing preload	Check drive	Pull horizontally on soft wire wrapped around bearing cage (25) as shown, while bearing cage is still in press, under 14 tons of pressure



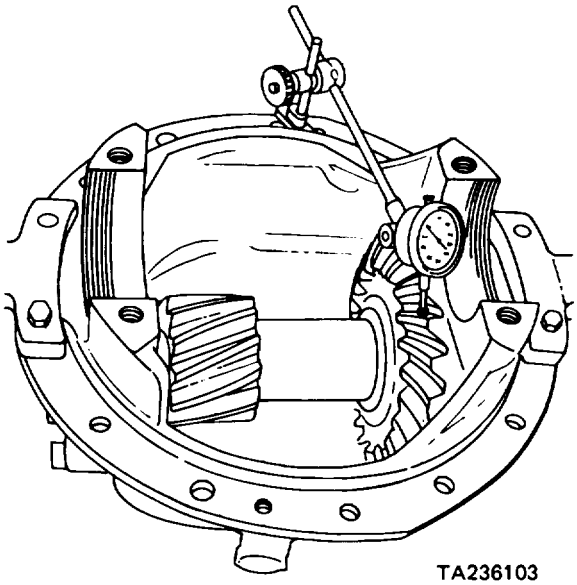
NOTE

You can also check preload with yoke (21) installed and nut (23) tightened to 800-1100 pounds foot. Example: Assume bearing cage (25) diameter is 6 inches; radius would be 3 inches. Five pounds pull on scale would equal 15 pounds inch bearing preload torque. Use rotating, not starting torque. Use thinner bearing spacer (36) to increase or thicker spacer to decrease bearing preload if turning torque is not within 5-15 pounds inch. Remove bearing cage (25) from press.

	g. Oil seal (30)	Install	Coat outer edge with non-hardening sealer and press firmly against bearing cage (25)

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
26 (cont)		h. Slinger (22)	Install	Fill with chassis grease and position on yoke (21)
		i. Yoke (21)	Install	Press firmly against outer bearing (31)
27	Differential carrier housing (1)	a. Shims (29) and bearing cage (25)	Position	Install same shims removed earlier. Be sure oil passage holes in differential carrier housing (2), shims (29), and bearing cage (25) line up
		b. Capscrews (26)	Install	Tighten to 130-165 pounds foot
		c. Plate (4) and two tacks (3)	Install	
28	Yoke (21)	Nut (23) and washer (24)	Install	Hold yoke (21) with tool. Tighten nut (23) to 800-1100 pounds foot
29	Drive gear backlash check	a. Drive gear (40) lash between drive gear (40) and drive pinion (28)	Check back-	Attach dial indicator as shown. Record reading. If necessary adjust as described in step 29b

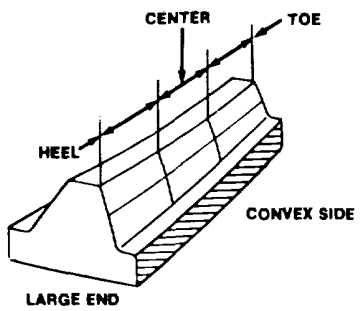


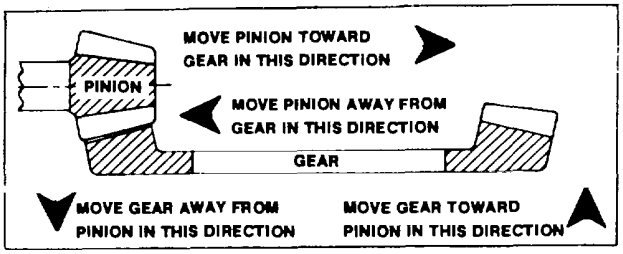
TA236103

4-5. DIFFERENTIAL (CONT)

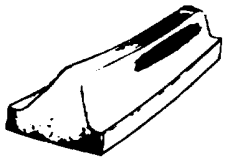
STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
29 (cont)		b. Shims (41 and 52)	Adjust backlash	Adjust to 0.020-0.026 inch. To move drive gear (40) away from drive pinion (28), take shims (41) from pack under cross shaft bearing cage (37) and add to pack under cross shaft cover (51). To move drive gear (40) toward drive pinion (28), switch shims in opposite direction. Remove dial indicator
		NOTE		
		Used gear sets develop wear patterns. Do not adjust backlash too close, or wear patterns will overlap. Check by rotating drive gear (40). If there is overlap, rotation will be rough. Adjust backlash to get smooth rotation. New gear sets should rotate smoothly within backlash specification.		
30	Gear tooth contact check contact	a. Drive gear teeth	Paint and check tooth	Coat about 12 teeth with mixture of red lead and linseed oil. Rotate drive gear (40) through one complete revolution in each direction. Compare tooth pattern against following
		b. Shims (29, 41, and 52) contact	Adjust gear tooth	If necessary. To move drive pinion (28) away from drive gear (40), add shims (29) under bearing cage (25). To move drive pinion toward drive gear, remove shims from bearing cage. See step 38b to move drive gear (40) away from or toward drive pinion (28). Obtain correct tooth contact pattern without changing backlash. See step 29

4-5. DIFFERENTIAL (CONT)



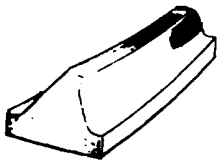


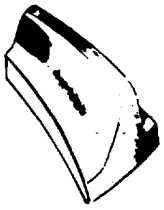
ALL CONTACT BEARINGS SHOWN BELOW ARE ON RIGHT HAND SPIRAL RING GEAR — THE DRIVE IS ON THE CONVEX SIDE OF THE TOOTH.



CONDITION 1

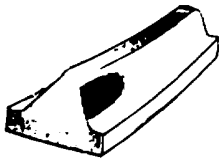
TYPICAL PREFERRED BEARING ON BOTH SIDES OF TOOTH WHILE UNDER A LIGHT LOAD





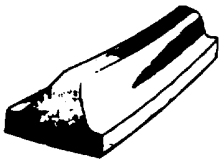
CONDITION 2

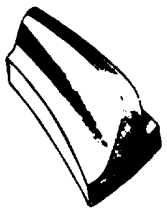
TOE BEARING ON BOTH SIDES OF TOOTH-GEAR SET NOISY. TO MOVE BEARING TOWARD HEEL INCREASE BACKLASH WITHIN LIMITS BY MOVING GEAR AWAY FROM PINION.



CONDITION 3

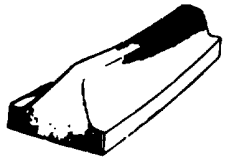
HEEL BEARING ON BOTH SIDES OF TOOTH-GEAR SET NOISY AND COULD RESULT IN EARLY GEAR FAILURE. TO MOVE BEARING TOWARD TOE DECREASE BACKLASH WITHIN LIMITS BY MOVING GEAR TOWARD PINION.

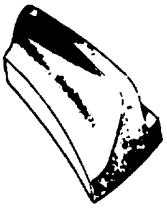




CONDITION 4

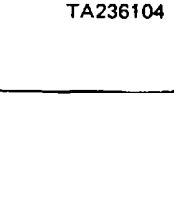
LOW BEARING ON GEAR AND HIGH BEARING ON PINION. CORRECT BY PULLING PINION AWAY FROM GEAR. INCREASE MOUNTING DISTANCE BY ADDING SHIMS BETWEEN BEARING CAGE AND DIFFERENTIAL HOUSING.





CONDITION 5

HIGH BEARING ON GEAR AND LOW BEARING ON PINION. CORRECT BY MOVING PINION IN TOWARD GEAR. DECREASE MOUNTING DISTANCE BY REMOVING SHIMS FROM BETWEEN BEARING CAGE AND DIFFERENTIAL HOUSING.



BACKLASH

BACKLASH SHOULD BE MEASURED WITH A DIAL INDICATOR RIGIDLY MOUNTED WITH THE STEM PERPENDICULAR TO THE TOOTH SURFACE AT THE EXTREME HEEL.

TA236104

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
31	Differential case and gear assembly	a. All parts and case (9 and 10) inner walls	Lubricate	Axle lubricant
		b. Side gear thrust washer (15) and side gear (16)	Install	In case half (10)
		c. Helical spur gear (11)	Position	On case half (10)
32	Spider (19)	Four pinions (18) and thrust washers (17)	Install	
33	Case half (10)	Spider (19)	Install	
34	Spider (19)	Side gear (16) and side gear thrust washer (15)	Install	
35	Case half (10)	a. Case half (9)	Position	Aline mating marks
		b. Four capscrews (12), washers (13), and nuts (14)	Install	Equally spaced around case half (9). Check assembly for free rotation
		c. Remaining capscrews (12), washers (13), and nuts (14)	Install	Tighten all capscrews (12) to 150-190 pounds foot and install lock wire
36	Case halves (9 and 10)	New bearings (20)	Press on	If old bearings (20) were removed

CAUTION

In step 37, adjusting nuts (7) are cross threaded if differential bearing caps (2) do not seat properly. Remove caps and reposition adjusting nuts. If you force caps into place, you will cause irreparable damage to differential carrier housing (1).

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
37	Differential carrier housing (1)	a. Two bearing cups (8), two adjusting nuts (7), and differential bearing caps (2)	Position	
		b. Four capscrews (5) and four washers (6)		Tighten to 470-550 pounds foot
		c. Bearing cups (8)	Check fit	Must be hand press fit in bores. Use emery cloth, if necessary. Use blued bearing cup to check fit as you go
		d. Differential bearing caps (2)	Remove	
		e. Bearings (20) and bearing cups (8)	Lubricate	With axle lubricant
38	Bearings (20)	Bearing cups (8)	Install	
39	Differential carrier housing (1)	a. Differential case and gear assembly	Install	Place bar through differential case and gear assembly and position assembly in differential carrier housing
		b. Adjusting nuts (7)	Insert	Turn hand tight against bearing cups (8)

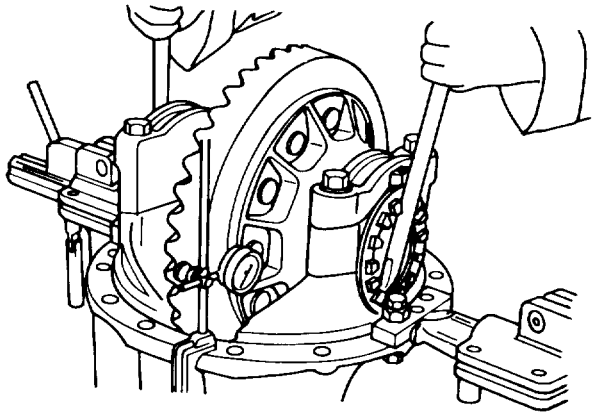
CAUTION

In step 39c, adjusting nuts (7) are cross threaded if differential bearing caps (2) do not seat properly. Remove caps and reposition adjusting nuts. If you force caps into place, you will cause irreparable damage to differential carrier housing (1).

		c. Differential bearing caps (2)	Position	Tap lightly into position

4-5. DIFFERENTIAL (CONT)

STEP	LOCATION	ITEM	ACTION	REMARKS
REASSEMBLY (cont)				
39 (cont)		d. Four capscrews (5), and washers (6)	Install	Tighten to 470-550 pounds foot
		e. Helical spur gear (11)	Position	Line up with cross shaft (42) spur pinion by turning adjusting nuts (7)
ADJUSTMENT				
40	Differential bearing preload (7)	a. Adjusting nuts	Tighten	Attach dial indicator and tighten adjusting nuts (7) as shown to get 0.000 inch end play in bearings (20). Rotate several times to get proper bearing contact



TA236105

b. Adjusting nuts (7)	Set bearing preload	Tighten each adjusting nut (7) one notch from 0.000 inch end play position
c. Four capscrews (5)	Check torque	Tighten to 470-550 pounds foot
d. Two new cotter pins (62)	Install	

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists all forms and publications pertinent to the major item materiel and associated equipment.

A-2. FORMS

DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Form 2404	Equipment Inspection and Maintenance Work Sheet
DD Form 6	Packaging Improvement Report
SF 368	Quality Deficiency Report

A-3. FIELD MANUALS

FM 5-20	Camouflage
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0 degrees F to -65 degrees F)
FM 21-11	First Aid for Soldiers
FM 21-40	Chemical, Biological, Radiological, and Nuclear Defense
FM 21-305	Manual for Wheeled Vehicle Driver
FM 31-70	Basic Cold Weather Manual
FM 31-71	Northern Operations
FM 43-2	Metal Body Repair and Related Operations
FM 55-30	Driver Selection and Training (Wheeled Vehicles)
FM 90-6	Mountain Operations

A-4. TECHNICAL BULLETINS

TB 43-0209	Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment
TB 43-0210	Army Oil Analysis Program
TB 740-97-1	Preparation for Shipment
TB 740-97-2	Preservation for Shipment and Storage (US Army)
TB 750-651	Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling System

A-5. TECHNICAL MANUALS

TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 9-214	Inspection, Care, and Maintenance of Antifriction Bearings
TM 9-237	Welding Theory and Application
TM 9-247	Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Materiels Including Chemicals
TM 9-2320-285-10	Operator's Manual: Truck Tractor, Yard Type, M878A1
TM 9-2320-285-24P	Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List: Truck Tractor Yard Type, M878A1

A-5. TECHNICAL MANUALS (CONT)

TM 9-2610-200-20	Organizational Care, Maintenance and Repair: Pneumatic Tires, Inner Tubes, and Radial Tires
TM 9-2815-205-34	Direct Support and General Support Maintenance Manual: Engine, Diesel (Detroit Diesel Series 6V53T)
TM 9-2815-205-34P	Direct Support and General Support Maintenance Repair Parts and Special Tools List: Engine, Diesel (Detroit Diesel Series 6V53T)
TM 9-6140-200-14	Operation and Organizational Maintenance Manual for Lead Acid Storage Batteries
TM 9-8000	Principles of Automotive Vehicles
TM 38-230-1	Packaging of Material
TM 38-230-2	Preservation and Packaging
TM 38-236	Preparation for Air Shipment
TM 55-2200-001-12	Block and Rail Transport
TM 740-90-1	Administrative Storage of Equipment
TM 743-200-1	Storage of Material Handling Equipment
TM 743-200-2	Storage Modernization
TM 743-200-3	Storage MHE Equipment
TM 750-244-6	Procedures for Destruction of Tank Automotive Equipment to Prevent Enemy Use
TM 750-254	Cooling Systems: Tactical Vehicles

A-6. MISCELLANEOUS PUBLICATIONS

AR 385-40	Accident Reporting and Records
AR 385-55	Prevention of Motor Vehicle Accidents
DA Pam 738-750	The Army Maintenance Management System (TAMMS)
LO 9-2320-285-12	Lubrication Order: Truck Tractor, Yard Type, M878A1
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army

APPENDIX B
MAINTENANCE ALLOCATION CHART
Section I. INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (i.e., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

B-2. MAINTENANCE FUNCTIONS (CONT)

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment and components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column 1 Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2 Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3 Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II (CONT)

d. Column 4 - Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C.....Operator/crew
O.....Organizational maintenance
F .....Direct support maintenance
H.....General support maintenance

e. Column 5 - Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6 - Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. Column 1 - Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2 - Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3 - Nomenclature. Name or identification of the tool or test equipment.

d. Column 4 - National Stock Number. The National stock number of the tool or test equipment.

e. Column 5 - Tool Number. The manufacturer’s part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

a. Column 1 - Reference Code. The code recorded in column 6, Section II.

b. Column 2 - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK TRACTOR, YARD TYPE M878A1

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
01	ENGINE								
0100	Engine	Inspect	0.1					1	
		Service	0.5						
		Adjust			2.5				
		Replace			12				
		Repair				32.7			
	Engine Mount	Inspect			0.1				
		Replace			2.0				
0101	Block, Cylinder	Inspect			0.1			1	
		Replace				2.0			
		Repair				4.0			
	Heads, Cylinder	Replace				10.1			
		Repair				12.0			
0102	Crankshaft	Inspect				0.3		1	
		Replace				20.0			
		Repair				8.0			
	Damper, Vibration	Replace			4.5				
	Bearings, Main	Inspect				1.0			
	Replace					6.0			
	Seals, Main	Replace			7.2				
0103	Flywheel	Replace				6.9		1	
		Repair				1.0			
	Flywheel Housing	Replace				9.5			
		Repair				1.5			
0104	Pistons and Connecting Rods								
	Pistons	Replace				16.0			
	Connecting Rods	Replace				16.0			

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
0105	Valves and Tappets	Adjust			1.5			1	
		Replace				4.0			
	Timing Gears	Replace				3.5			
	Arm, Rocker	Replace				2.5			
	Camshafts	Replace				12.5			
	Bearings	Replace				4.0			
0106	Oil Pump and Front Cover	Replace				3.5	1		
		Repair				2.0			
	Filter, Oil	Service		0.5					
		Replace		1.0					
	Lines and Filter, External	Service			0.5				
		Replace			1.0				
	Repair				1.0				
	Cooler, Oil	Inspect			0.5				
		Test			1.0				
		Replace			3.0				
		Repair				11.5			
	Dipstick and Tube	Replace		0.1					
	Oil Pan	Replace			2.0				
	Oil Inlet Tube	Replace			2.5				
	Valve, Regulator and Relief	Replace			0.2				
	Valve, Breather	Service			0.2				
0108	Manifolds	Replace			2.0			1	
0109	Accessory Drive, Alternator	Replace		1.0				1	
		Repair		2.0					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
03	FUEL SYSTEM								
0301	Injector Assembly, Fuel	Test			2.0	2.01			
		Replace			1.0				
		Repair			1.5				
	Rack, Fuel Injector	Adjust			1.0				
		Replace			1.3				
0302	Pump Assembly, Fuel	Test		0.5				1	
		Replace		1.5					
		Repair			1.0				
	Fuel Crossover Lines	Replace			1.0				
0304	Air Cleaner Assembly	Service		0.1				1	
		Replace		1.0					
		Repair			1.0				
	Air Cleaner	Replace Restriction Indicator		1.0					
0305	Air Inlet	Replace		1.0				1	
	Blower, Gear Driven	Replace			6.0				
		Repair				4.0			
	Turbocharger	Replace			2.0				
		Repair				3.0			
0306	Tank, Fuel	Service	0.2					1	
		Replace		3.0					
		Repair		1.5					
	Lines and Fittings, Fuel	Inspect	0.1						
		Replace		1.0					
0308	Governor	Adjust			1.0			1	
		Replace			6.0				
		Repair				2.0			
0309	Filters, Fuel	Service	0.2					1	
		Replace		0.3					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
0311	Ether Kit, Engine Starting	Service Replace		0.3 1.0				1	
0312	Accelerator and Throttle Linkage	Adjust Replace Repair		0.3 0.5 0.5				1	
04	EXHAUST								
0401	Exhaust Pipes	Replace		1.5				1	
	Muffler	Replace		2.0					
05	COOLING SYSTEM								
0501	Radiator	Test Service Replace Repair	0.2	0.1	8.0 4.0			1	
	Heat Exchanger	Replace Repair		3.0	4.0				
0502	Shroud, Fan	Replace Repair			1.51 1.0				
0503	Thermostats	Test Replace		0.2 1.5				1	
	Water Manifold	Replace		1.0					
	Filter, Coolant	Service Replace		0.3 1.0					
	Hoses	Replace		0.5					
0504	Pump, Water	Replace Repair		2.5 2.0				1	
	Seal, Water	Replace		2.0					
0505	Fan	Replace		1.5				1	
	Belts, Fan Drive	Adjust Replace		0.2 1.7					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
	Fan Drive Assembly	Replace		1.5					
		Repair			2.0				
06	ELECTRICAL SYSTEM								
0601	Alternator	Test		1.0				1	
		Replace		1.3					
		Repair			2.0				
	Belts, Drive	Adjust		0.3					
		Replace		1.4					
0603	Starter	Test		1.4				1	
		Replace		2.0					
		Repair			3.0				
	Cable	Replace		1.5					
	Solenoid and Circuit Breaker	Test		0.4					
		Replace		1.5					
0607	Instrument Panel	Replace		1.5				1	
		Repair			3.0				
	Circuit Breaker	Test		0.5					
		Replace		2.0					
0608	Switches	Test		0.4				1	
		Replace		0.5					
	Turn Signal Control	Replace		0.4					
		Repair		0.6					
	Engine Warning Kit	Test		0.5					
		Replace		1.0					
	Water Level Warning Kit	Test		0.4					
		Replace		0.5					
		Repair			1.0				
	Inverter, 12-to-24 Volt	Test		0.5					
		Replace		1.0					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
0609	Headlights	Test	0.1					1	
		Adjust		0.2					
		Replace		0.4					
	Tail, Park, Turn, and Marker Lights	Test	0.1						
		Replace		0.3					
	Trailer Light Circuits	Test		0.5					
		Replace		1.0					
	Flood Lights	Test	0.1						
		Replace		0.3					
0610	Sending Units and Switches	Replace		0.5				1	
0611	Horn and Relay	Adjust		0.5				1	
		Test	0.1						
		Replace		1.0					
	Switch, Horn	Replace		0.5					
0612	Batteries	Test		0.6				1	
		Service	0.5						
		Replace		0.4					
	Cables, Battery	Replace		0.4					
	Box, Battery	Replace		1.0					
		Repair		1.0					
0613	Wiring Harness	Test		2.5				1	
		Replace			10.0				
		Repair		2.8					
07	TRANSMISSION								
0708	Torque Converter	Replace			10.0			1	
		Repair				6.0			
0710	Transmission	Test			0.5			1	
		Adjust			0.9				
		Service		0.2					
		Replace			6.5				
		Repair				16.0			

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
	Mount, Transmis-sion	Replace Repair		2.0 1.0					
	Shift Linkage	Adjust Replace Repair		1.0 2.0 1.0					
	Shift Lock	Repair		1.0					
	Modulator Cable Assembly	Replace Repair		1.0	 1.0				
0721	Filter	Replace		0.5				1	
09	PROPELLER SHAFTS								
0900	Shaft Assembly and U-Joints	Service Replace		0.2 1.0				1	
10	FRONT AXLE								
1000	Axle Assembly	Service Replace Repair		1.0	 6.0 8.0			1	
	Hub and Drum	Replace		1.0					
	Bearings and Seals	Replace		1.6					
	Steering Knuckle	Service Replace		0.1	 0.7				
11	REAR AXLE								
1100	Axle Assembly	Service Replace		1.0	 6.0			1	
	Axle Shaft, Hub, and Drum	Replace		8.0					
	Bearings and Seals	Replace		1.6					
1102	Differential	Service Replace Repair		1.0	 9.0	 9.0			

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
12	BRAKES								
1202	Service Brakes	Adjust		0.5				1	
		Replace		3.0					
		Repair		4.0					
1206	Linkage, Mechanical	Adjust		1.0				1	
		Replace			3.0				
		Repair			2.0				
1208	Lines and Fittings, Air	Replace		2.2				1	
		Repair		1.6					
	Reservoirs, Air	Service	0.1						
		Replace		1.1					
	Switch, Low Air Pressure	Test		0.5					
		Replace		1.0					
	Brake Air Chambers	Adjust		0.5					
		Replace		2.0					
		Repair		2.2					
	Treadle Valve	Replace			2.0				
		Repair			3.0				
	Valve, Air Control	Replace			2.0				
		Repair			2.0				
	Hand Brake Control	Replace			2.0				
		Repair			2.0				
1209	Air Compressor Assembly Including Belts	Service		0.2				1	
		Adjust		1.0					
		Replace		3.0					
		Repair			1.0				
	Air Strainer	Service		0.4					
		Replace		0.4					
	Alcohol Evaporator	Service	0.1						
		Replace		2.0					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
	Governor, Air Compressor	Adjust		0.3					
		Replace		0.5					
		Repair			1.0				
1211	Lines and Couplings, Trailer Brakes	Inspect	0.1					1	
		Replace		1.0					
		Repair		1.5					
	Hose Tender	Replace		1.0					
		Repair		0.3					
13	WHEELS								
1311	Hub Assembly	Service		1.0				1	
		Adjust		0.5					
		Replace		1.0					
	Drum	Replace		2.0					
		Repair			3.0				
	Bearings and Seals	Replace		1.6					
1313	Tires	Service	0.3					1	
		Replace		2.1					
		Repair		1.3					
14	STEERING								
1401	Wheel, Steering	Replace		0.5				1	
	Column, Steering	Replace			4.0				
		Repair			3.5				
	Universal Joint	Replace			2.5				
	Tie Rod	Align			0.3				
		Replace			1.5				
	Power Steering Gear	Adjust			0.5				
		Test			0.5				
		Replace			6.8				
		Repair			8.0				
	Linkage and Ball Sockets	Replace			2.0				

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
1410	Hydraulic Pump, Steering	Test Replace Repair			0.2 3.0 3.0			1	
1411	Lines and Fittings, Hydraulic Steering	Replace Repair		0.6 1.0				1	
	Hydraulic Filter and Reservoir	Service Replace		0.5 1.0					
15	FRAME AND TOWING ATTACHMENTS								
1501	Grille, Frame	Replace		0.5				1	
1503	Shackles and Hooks, Tow	Replace		0.5				1	
1504	Spare Tire Mount	Replace Repair		1.0 1.0				1	
1506	Fifth Wheel	Service Replace Repair		0.2	 3.0 2.0			1	
	Unlatch Cylinder	Replace			1.0				
	Unlatch Valve	Replace Repair			1.5 1.0				
	Platform and Latch, Boom	Replace		1.0					
16	SPRINGS AND SHOCK ABSORBERS								
1601	Springs and Spring Seats	Service Replace		0.2	 4.0			1	
1604	Shock Absorbers	Replace		1.8				1	
18	BODY AND CAB								
1801	Cab Mounts	Replace			3.0			1	

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) EQUIPMENT	(6) TOOLS AND REMARKS
	Panel and Engine Shroud	Replace Repair		0.5 	 0.3				
	Door	Replace Repair		2.0 	 6.0				
	Guard, Rear Window	Replace Repair		0.3 0.5					
1802	Side Step	Replace		0.5				1	
	Windshield	Replace			1.2				
1806	Seat Belt and Seat	Replace Repair		0.5 	 1.5			1	
1808	Tool Box	Replace		0.3				1	
22	ACCESSORY ITEMS								
2202	Arm and Wiper	Replace		0.2				1	
	Windshield Wiper Motor and Switch	Replace		1.0					
	Windshield Washer and Motor	Service Replace	0.2 	 0.5					
	Mirrors, Rearview	Adjust Replace	0.1 	 0.3					
	Sun Visor	Replace Repair		0.3 0.5					
	First Aid Kit	Replace		0.3					
	Air Horn and Valve	Adjust Replace Repair		0.2 1.0 1.0					
2207	Heater, Personnel	Replace Repair		2.0 	 2.0			1	
	Heaters, Winterization	Replace Repair		2.0 2.0					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	Junction Box	Replace		1.0					
2210	Plates, Data and Instruction	Replace		0.5				1	
24	HYDRAULIC AND FLUID SYSTEMS								
2401	Hydraulic Pump, Fifth Wheel	Replace Repair	4.0		2.0			1	
	Power Take-off	Replace Repair			2.0 4.0				
2402	Fifth Wheel Control Valve	Adjust Replace Repair			1.0 2.0 3.0			1	
	Pump, Cab Tilt	Replace Repair		2.0	 3.0				
2403	Hydraulic Control Lever and Linkage, Fifth Wheel	Adjust Replace Repair		1.0 2.0 1.0				1	
	Filters, Hydraulic	Service Replace		0.5 1.0					
2404	Hydraulic Cylinder, Cab Tilt	Inspect Replace Repair	0.1		 2.0 2.0			1	
	Latches, Hydraulic Safety Bar	Replace Replace			1.0 1.0				
2406	Lines and Fittings	Replace		1.0				1	
2407	Hydraulic Cylinders, Fifth Wheel	Inspect Replace Repair	0.1		 1.0 2.0			1	
2408	Reservoir, Hydraulic	Service Replace	0.2	 2.0				1	

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
47	GAGES. NON-ELECTRIC								
4701	Shaft, Speedometer	Replace			0.5			1	
	Tachometer	Replace			0.5				
4702	Gages, Pressure	Replace			0.5			1	
4703	Hourmeter	Replace			1.0			1	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TRUCK TRACTOR, YARD TYPE M878A1

(1) TOOL OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
	Unless otherwise noted, all maintenance functions can be accomplished with the tools contained in the following tool sets. No special tools are required.			
1	F	Shop Equipment, Contact Maintenance: Truck Mounted	4940-00-294-9518	LIN T10138
	F	Shop Equipment, General Purpose Repair: Semitrailer Mounted	4940-00-287-4894	LIN T10549
	O, F	Shop Equipment, Organizational Repair: Light Truck Mounted	4940-00-294-9516	LIN T13152
	F	Tool Kit, Automotive Fuel and Electrical System Repair	4910-00-754-0655	LIN W32456
	O, F, H	Tool Kit, Auto Maintenance: Org. Maintenance Common No. 1	4910-00-754-0654	LIN W32593
	O, F, H	Tool Kit, Auto Maintenance: Org. Maintenance Common No. 2	4910-00-754-0650	LIN W32730
	O, F, H	Tool Kit, Automotive Maintenance: Light Weight	5180-00-177-7033	LIN W33004

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS - Continued

(1) TOOL OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
	F, H	Tool Kit, Master Mechanic: Equipment Maintenance and Repair	5180-00-699-5273	LIN W45060
	F, H	Wrench Set, Socket: 3/4" Drive Hex Type	5130-00-357-5135	LIN Y75239
	F, H	Wrench, Torque: 3/4" Drive 100-500 lb-ft Capacity	5120-00-542-5577	LIN Y84966
	F, H	Shop Equipment, Fuel and Electrical System Engine	4910-00-754-0714	LIN T30414
	F, H	Shop Set, Fuel and Electrical System Supplemental No. 2	4910-00-390-7775	LIN T30688
	F	Test Set, Diesel Injector	4910-00-317-8265	LIN V73742
	O, F, H	Shop Equipment, Automotive Maintenance and Repair: Org. Supplemental No. 1 Less Power	4910-00-754-0653	LIN W32867
	F, H	Shop Equipment, Machine Shop	3740-00-754-0708	LIN T15644
	F, H	Tool Kit, Machinist	5280-00-511-1950	LIN W44512
	O, F	Shop Equipment, Welding	3740-00-357-7268	LIN T16714
	O, F	Tool Kit, Body and Fender Repair	5180-00-754-0643	LIN W33689

Section IV. REMARKS

Reference Code	Remarks
A	All repair and replacement of parts performed by organizational maintenance limited to authorized items listed in Maintenance Allocation Chart.

APPENDIX C
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists expendable consumable maintenance supplies you will need to operate and maintain the M878A1 yard tractor. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the Materials/Parts portion of Initial Setup to identify the material (e.g., "Clean cloths, Item 2, Appendix C").

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column 3 - National Stock Number. This is the National stock number assigned I to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
1	C		SOLVENT: Dry Cleaning P-D-680, Type II (81348)	
		6850-00-264-9038	5 GAL CAN	EA
		6850-00-285-8012	55 GAL DRUM	EA
2	C	7920-00-205-1711	RAGS, COTTON: Wiping	BL
3	O		GAA, GREASE, AUTOMOTIVE AND ARTILLERY MIL-G-10924 (81349)	
		9150-00-065-0029	2-1/4 OZ TUBE	EA
		9150-00-935-1017	14 OZ CARTRIDGE EA	
		9150-00-190-0904	1 LB CAN	EA
		9150-00-190-0905	5 LB CAN	EA
		9150-00-190-0907	35 LB CAN	EA
4	O		CLOTH, ABRASIVE: Al-oxide, jean-cloth-backing, closed coat, 9 x 11 sh, 50-sh sheave (81348) P-C-451A, Type a, Class 1	
		5350-00-192-5047	GRIT NO. 80 (GR 1/0)	EA
		5350-00-192-5049	GRIT NO. 120 (GR 3/0)	EA
		5350-00-192-5051	GRIT NO. 180 (GR 5/0)	EA
5	O	9505-00-087-3956	WIRE, LOCK: Cs, Zinc Ctd, 0.020 Dia MS20995F20 (96906)	SL
6	O	9150-01-035-5395	OIL, HYPOID: SAE 95W/140 MIL-L-2105 (81349) 5 Gal Can	EA
7	O		OIL, LUBRICATING: General Purpose, MIL-L-644 (81349)	
		9150-00-273-2389	4 OZ CAN	EA
		9150-00-231-6689	1 QT CAN	EA
		9150-00-281-2060	55 GAL DRUM	EA
8	O		FLUID, AUTOMATIC TRANSMISSION: Dexron II	
		9150-00-698-2382	1 QT CAN	EA
		9150-00-657-4959	5 GAL CAN	EA
9	F	9150-00-250-0926	GREASE, OIL-SOLUBLE: Petrolatum VV-P-236 (81348)	EA
10	O		SEALANT, NON-HARDENING: Permatex No 2 MIL-S-45180 Type II (81349)	
		8030-00-252-3391	11 Oz Tube	EA
		8030-00-873-4792	1 Qt Container	EA
11	O	8040-00-109-2481	ADHESIVE: Weatherstrip, Black 8011 (04963) 5 Oz Tube	EA
12	O	5350-00-221-0872	CLOTH, ABRASIVE: Crocus, ferric oxide and quartz, jean-cloth-backing, exposed coat, 9 x 11 sh, 50-sh sheave (81348) P-C-458, 42-C-20420-50	EA
13	H	7510-00-243-3437	BANDS, RUBBER: ZZ-R-001415 (81348)	EA
14	O	7530-00-082-2661	LABELS, PAPER: Pressure-sensitive Adhesive UU-L-001644 (81348)	EA

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
15	F		GREASE: Lubriplate Compound 907 (77640 PN 045113), or	
			Mobil Temp 1 or 2 (77640 PN 045231)	EA
16	0	9150-00-663-9795	GREASE, WHEEL BEARING: MIL-G-18709 (81349) 6.5 Lb Can	EA
17	F		LUBRICANT: Grease, Barium-base (06853 Spec. BW-204-M, PN 240176)	EA
18	F	8030-00-181-8372	SOLVENT, DEGREASING: Locquic Primer MIL-S-22473 Grade T (81349) 6 Oz Can	EA
19	F	8030-01-142-3131	SEALANT, STUD: MIL-S-46163 Type II Grade 0 (80244)	EA
20	F		SEALANT, HYDRAULIC: Loctite No 569 56931 (05972) 50 ml Bottle	EA
21	F	7510-00-558-1305	TAPE, PRESSURE-SENSITIVE ADHESIVE: Cellophane and Cellulose Acetate L-T-90 (81348)	RL
22	C		OIL, HYDRAULIC: Petroleum Base, MIL-H-5606 (81349)	
		9150-00-252-6383	1 QT CAN	EA
		9150-00-223-4134	1 GAL CAN	EA
		9150-00-265-9408	55 GAL DRUM	EA
23	F	8030-01-109-8208	SEALANT, STUD LOCK: Loctite No 86 (05972) MIL-S-22473 Grade AVV (81349)	EA
24	C		OIL, LUBRICATING, ENGINE: MIL-L-2104 (81349)	
		9150-00-188-9858	SAE 30, 5 GAL CAN	EA
		9150-00-188-9859	SAE 30, 55 GAL DRUM	EA
		9150-00-188-9860	SAE 40, 5 GAL CAN	EA
		9150-00-188-9861	SAE 40, 55 GAL DRUM	EA
25	C		ANTIFREEZE, ENGINE: Ethylene Glycol, Inhibited O-A-548 (81348)	
		6850-00-243-1992	1 GAL CAN	EA
		6850-00-644-1409	55 GAL DRUM	EA
26	O	9150-00-140-4434	GREASE: Lubriplate Mag 1 087-056 (92739)	EA
27	C		DETERGENT: General Purpose P-D-220 (81348)	
		7930-00-559-9616	1 GAL	EA
		7930-00-559-9617	5 GAL	EA
28	0	7510-01-026-4661	TAPE, PRESSURE-SENSITIVE ADHESIVE: Masking UU-T-00106 (81348)	RL
29	O	8030-01-014-5869	SEALANT, THREAD: MIL-STD-46163 (81349) 50 ml Bottle	EA

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
30	0		ALCOHOL: Denatured O-E-760 Grade III (81348)	
		6810-00-201-0907	5 GAL CAN	EA
		6810-00-201-0904	55 GAL DRUM	EA
31	O	8135-00-634-3292	TAPE, PRESSURE-SENSITIVE ADHESIVE: Waterproof PPP-T-0066 Type IV (81348)	RL
32	O	7510-00-419-9564	INK, MARKING STENCIL: Opaque (porous and non-porous surfaces) TT-I-1795 (81348)	EA
33	0	8010-00-246-6112	THINNER, PAINT: Mineral Spirits, Volatile, 'Odorless' TT-T-291 (81348)	EA
34	0		GREASE, HIGH TEMPERATURE: Cup	EA
35	F		GREASE, PNEUMATIC: Dow Corning 55-M MIL-I-4343 (81349)	
			291126 (06853) 1/4 Oz Tube	EA
			291127 (06853) 2 Oz Tube	EA
36	O	6810-00-249-9354	SULFURIC ACID, ELECTROLYTE: O-S-801 Class III (81348) 1 Gal	EA
37	0	5970-00-644-3167	INSULATION TAPE, ELECTRICAL: Pressure-sensitive adhesive, plastic, general purpose HH-I-595 (81348)	RL
38	O	8030-00-753-4953	COMPOUND, ANTISEIZE: MIL-A-13881 (81349)	EA
39	C		ALCOHOL, METHYL: Methanol O-M-232 (81348)	
		6810-00-597-3608	1 GAL CAN	EA
		6810-00-275-6010	5 GAL CAN	EA
		6810-00-224-8353	55 GAL DRUM	EA
40	0	8040-01-168-0440	ADHESIVE, AIR-DRYING: Silicone rubber MIL-A-25457 (81349)	EA
41	0	3439-00-965-0066	SOLDER: SN 60 lead-tin alloy QQ-S-571 (81348)	SL
42	C	6810-01-127-4246	ALCOHOL: Isopropyl TT-I-735 (81348)	EA
43	O	8030-00-889-3534	TAPE, ANTISEIZE: tetrafluoroethylene, with dispenser MIL-T-27730 (81349)	RL
44	O	9150-00-261-7899	OIL, PENETRATING: VV-P-216 (81348)	EA
45	C	9140-00-286-5294	FUEL, DIESEL: Type DF2 to -20 degrees F VV-F-800 (81348)	BL
46	H	8010-00-152-3245	LINSEED OIL: Mixture, thinned TT-L-190 (81348)	EA
47	H	8010-00-239-5725	RED LEAD: TT-R-191 (81348)	EA

APPENDIX D
TORQUE LIMITS

D-1. GENERAL

This appendix provides general torque limits for fasteners. Special torque values are indicated in the maintenance procedures for applicable components. The general torque values given in this appendix shall be used when specific torque values are not indicated in the maintenance procedures.

D-2. TORQUE LIMITS

Torque limits are listed in table D-1 for dry fasteners and in table D-2 for wet fasteners. Dry fasteners are defined as fasteners on which no lubricants are applied to the threads; wet fasteners are defined as fasteners on which special graphited or moly-disulphide greases or other extreme pressure lubricants are applied to the threads. Table D-3 lists minimum breakaway torque values for locknuts.

Table D-1. Torque Limits for Dry Fasteners

SIZE		TORQUE			
		SAE GRADE NO. 5		SAE GRADE NO. 8	
INCHES	MILLIMETERS	POUNDS FOOT	NEWTON METERS	POUNDS FOOT	NEWTON METERS
1/4	6.35	9- 11	12.2- 14.9	12- 15	16.3- 20.3
5/16	7.94	17- 20	23.1- 27.8	24- 29	32.5- 39.3
3/8	9.53	35- 42	47.5- 57.0	45- 54	61.0- 73.2
7/16	11.11	54- 64	73.2- 86.8	70- 84	94.9- 113.9
1/2	12.70	80- 96	108.5- 130.2	110- 132	149.2- 179.0
9/16	14.29	110- 132	149.2- 179.0	160- 192	217.0- 260.4
5/8	15.88	150- 180	203.4- 244.1	220- 264	298.3- 358.0
3/4	19.05	270- 324	366.1- 439.3	380- 456	515.3- 518.3
7/8	22.23	400- 480	542.4- 650.9	600- 720	813.6- 976.3
1	25.40	580- 696	786.5- 943.8	900-1080	1220.4-1464.5
1-1/8	25.58	800- 880	1084.8-1193.3	1280-1440	1735.7-1952.8
1-1/4	31.75	1120-1240	1518.7-1681.4	1820-2000	2467.9-2712.0
1-3/8	34.93	1460-1680	1979.8-2278.1	2380-2720	3227.3-3688.3
1-1/2	38.10	1940-2200	2630.6-2983.2	3160-3560	4285.0-4827.4

Table D-2. Torque Limits for Wet Fasteners

SIZE		TORQUE			
		SAE GRADE NO. 5		SAE GRADE NO. 8	
INCHES	MILLIMETERS	POUNDS FOOT	NEWTON METERS	POUNDS FOOT	NEWTON METERS
1/4	6.35	8- 10	10.8- 13.6	11- 13	14.9- 18.3
5/16	7.94	15- 18	20.4- 25.1	21- 26	29.2- 35.3
3/8	9.53	31- 38	42.8- 51.6	40- 48	55 - 65.9
7/16	11.11	48- 57	65.9- 78.2	63- 75	85.6- 102.6
1/2	12.70	72- 86	97.9- 117.6	99- 119	134.6- 161.8
9/16	14.29	99- 119	134.6- 161.8	144- 173	195.8- 235.2
5/8	15.88	135- 162	183.6- 220.3	198- 237	269.2- 323
3/4	19.05	243- 291	330.4- 396.4	342- 410	465.1- 557.6
7/8	22.23	360- 432	489.6- 587.5	540- 648	734.4- 881.2
1	25.40	522- 626	709.9- 851.3	810- 972	1101.6-1321.9
1-1/8	25.58	720- 792	979.2-1077.1	1152-1296	1566.7-1762.5
1-1/4	31.75	1008-1116	1370.8-1517.7	1638-1800	2227.6-2448
1-3/8	34.93	1314-1512	1787 -2056.3	2142-2448	2430.3-3329.2
1-1/2	38.10	1746-1980	2374.5-2692.8	2844-3204	3867.8-4357.4

Table D-3. Locknut Breakaway Torque Values

THREAD SIZE	MINIMUM BREAK-AWAY TORQUE (POUNDS INCH)
10-32	2.0
1l4-28	3.5
5/16-24	6.5
3/8-24	9.5
7/16-20	14.0
1/2-20	18.0
9/16-18	24.0
5/8-18	32.0
3/4-16	50.0
7/8-14	70.0
1-12	90.0
1-1/8-12	117.0
1-1/4-12	143.0

NOTE

To determine breakaway torque, thread locknut onto screw or bolt until at least two threads stick out. Locknut shall not make contact with a mating part. Stop the locknut. Torque necessary to begin turning locknut again is the breakaway torque. Do not reuse locknuts that do not meet minimum breakaway torque.

APPENDIX E
ELECTRICAL, HYDRAULIC, AND PNEUMATIC DIAGRAMS

Section I. INTRODUCTION

E-1. GENERAL

This appendix contains hydraulic diagrams, a pneumatic diagram, and an electrical diagram. Also included in this appendix is a description of how to use the electrical diagram as an aid to troubleshooting (section II). Section III contains the diagrams (figures E-2 thru E-7).

E-2. DIAGRAMS

The hydraulic diagrams are located in figures E-2 thru E-5. Figure E-3 shows the hydraulic oil flow when the fifth wheel is raised. Figure E-4 shows the hydraulic oil flow when the fifth wheel is lowered. The pneumatic diagram is located in figure E-6, and the electrical diagram is located in figure E-7.

Section II. HOW TO USE ELECTRICAL SCHEMATIC AS AN AID TO TROUBLESHOOTING

E-3. OVERVIEW

a. Figure E-7, your Electrical Diagram, is designed to help you understand the electrical circuits associated with this vehicle. It is generally referred to as a "schematic" and uses "symbols" to represent real components. It is not drawn to scale (as in a blueprint) nor does the location of the symbols represent actual location of components in the vehicle. It is a simple "picture" of how the circuits and components are connected together.

b. To quickly find a malfunction or trouble in the electrical system and repair it requires an understanding of how the system operates and a method for checking it out. "Troubleshooting" provides the "method" for check out procedures and your technical manual (Troubleshooting tables and schematics) provides the "operating principles".

E-4. TROUBLESHOOTING

Troubleshooting is the systematic (step-by-step) isolation of a malfunction or trouble to the faulty component, harness connector, or wire. It is a guide that helps develop a routine or "way" of finding troubles in any electrical system or circuit. As you become more familiar with this vehicle and gain experience, you will find ways to shorten these procedures and decrease down time. BEFORE you attempt to make any repairs or checks, do the following:

E-4. TROUBLESHOOTING (CONT)

a. Find out how the system works under normal conditions and how to operate it.

b. Make sure the malfunction or trouble reported to you "really" exists. ("Dead batteries" could end up as a "failure to start" because of a faulty neutral start switch or the transmission shift lever not fully engaged in neutral.) Try to duplicate the trouble so you can be sure you're on the right track.

c. Check troubleshooting index for most likely cause, then identify the circuit that is malfunctioning.

d. Study the electrical schematic to learn which components, harnesses, or wires could contribute to or cause the malfunction.

NOTE

Remember, when tracing circuits on the electrical diagram, that you should always start at the positive (+) side of the batteries. Current will flow outward from that point through the circuits and return to the negative (-) side of the batteries by way of ground wires and the vehicle frame.

e. Make necessary tests and checks to isolate circuit or component as outlined in the troubleshooting section of this technical manual.

f. Make repairs, if you're sure. If not, continue to isolate the malfunction, or ask for help from your supervisor.

g. After repairs, make sure everything has been reconnected and tightened.

h. Make operational checks to verify that the system or circuit is functioning properly again.

E-5. TROUBLESHOOTING LOGIC TREE

Figure E-1 is a Troubleshooting logic tree. It is designed to help you develop a quick logical way of approaching an electrical troubleshooting problem.

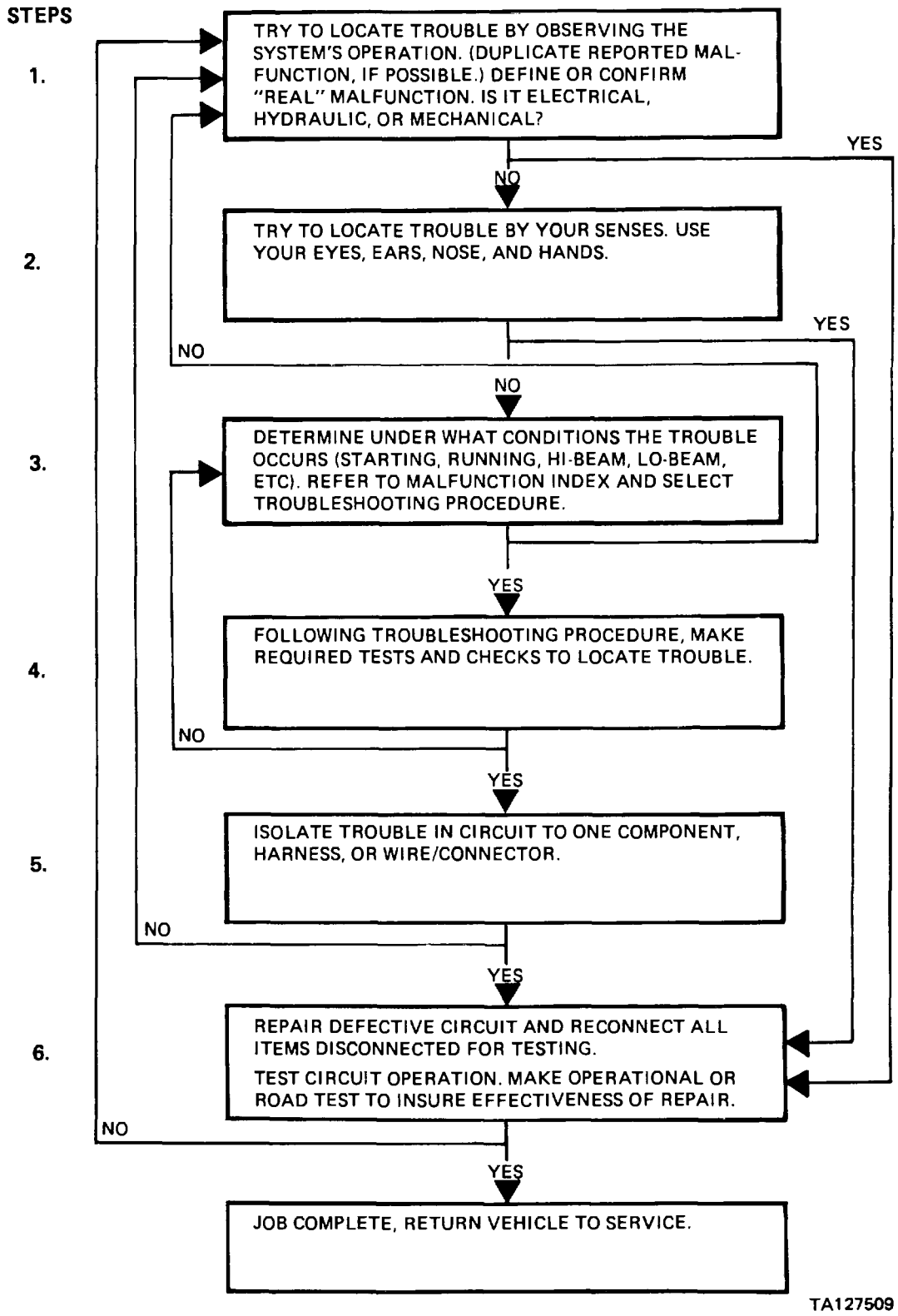


Figure E-1. Logic Tree Troubleshooting Technique.

Section III. DIAGRAMS

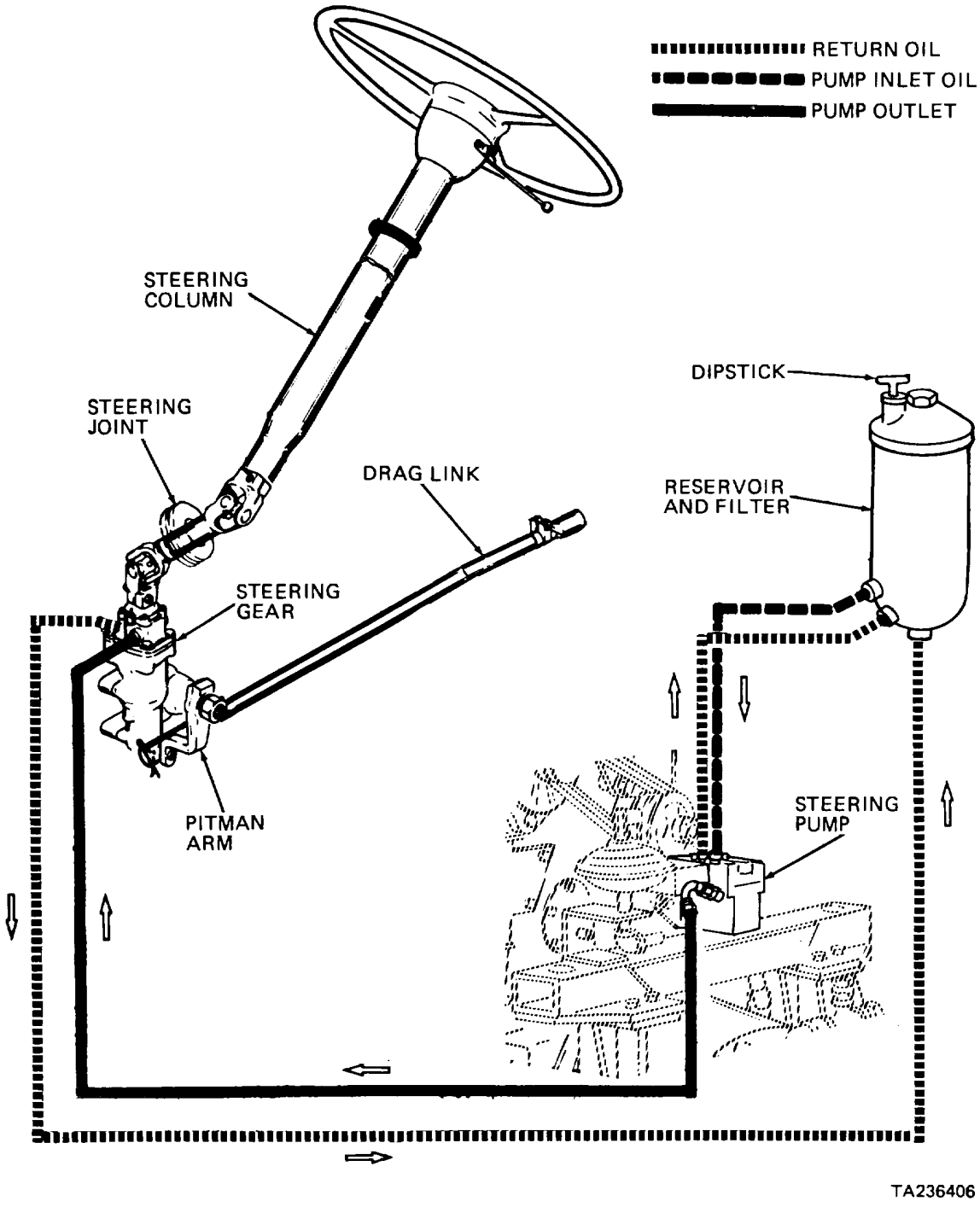


Figure E-2. Power Steering Hydraulic Diagram.

1. Hydraulic Pump
2. Hydraulic Control Valve
3. Hydraulic Cylinder
4. Velocity Fuse
5. Bleed Valve
6. Suction Line Filter
7. Return Line Filter and Relief Valve
8. Hydraulic Reservoir

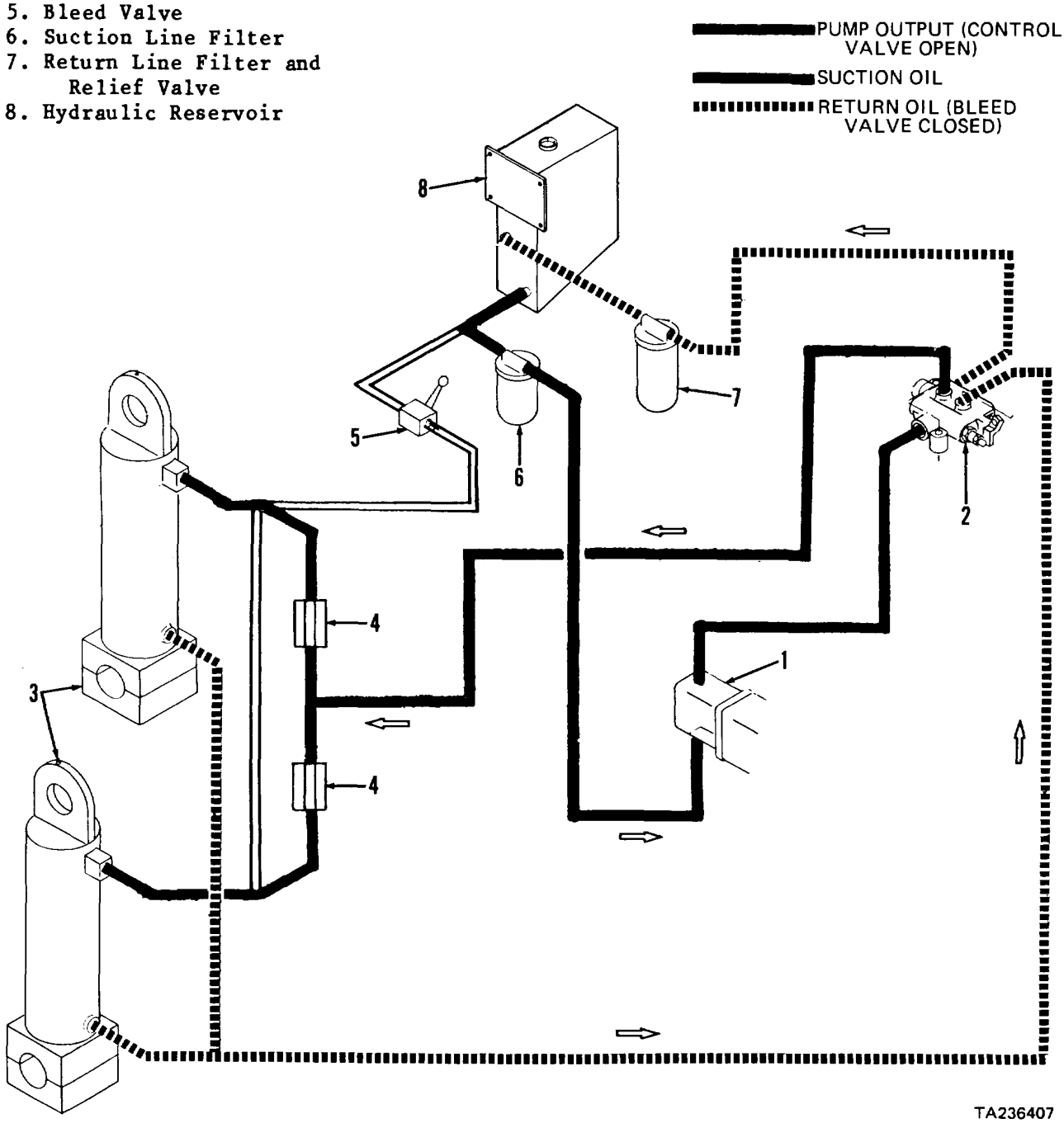


Figure E-3. Fifth Wheel Hydraulic Diagram (raising).

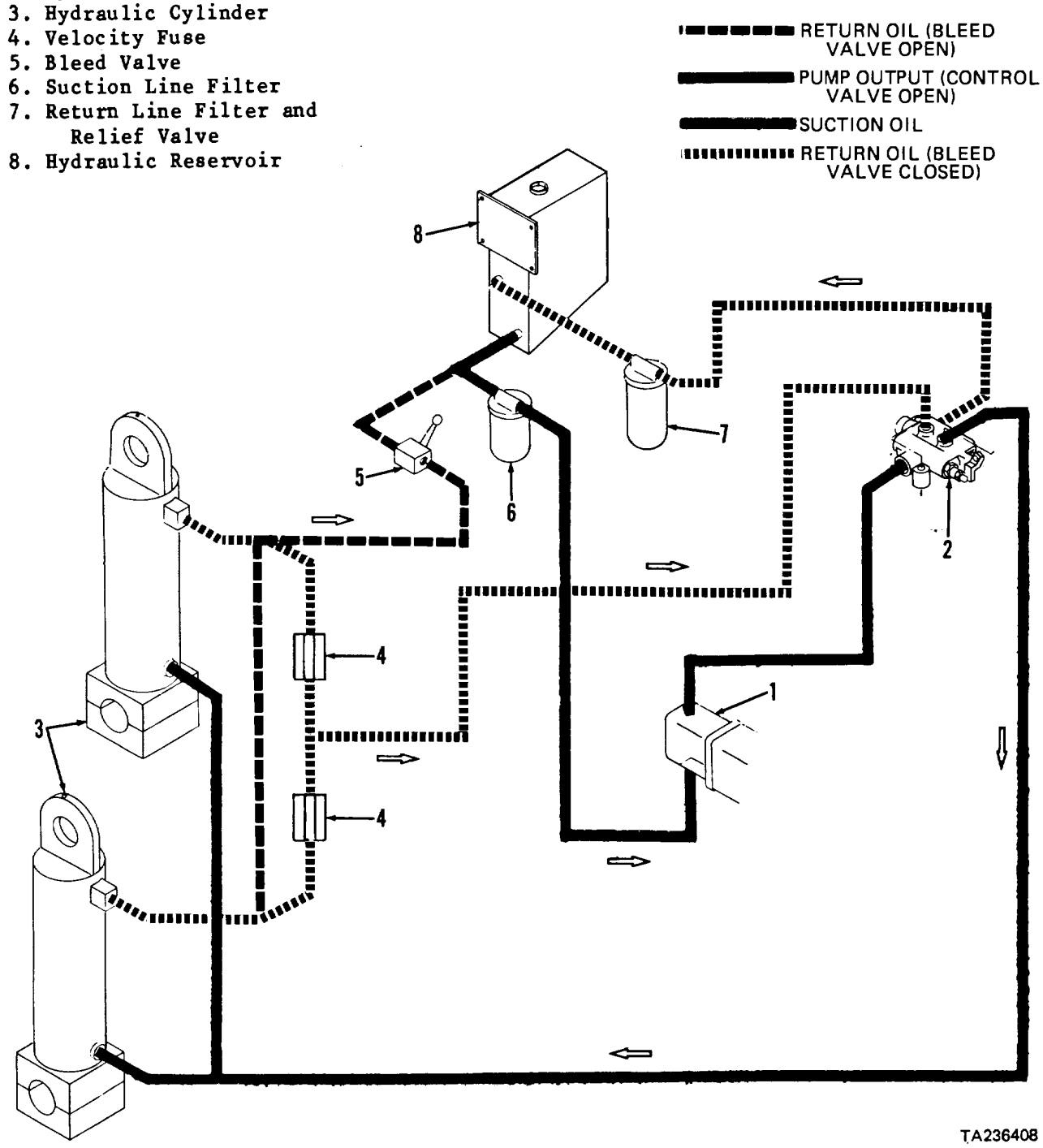


Figure E-4. Fifth Wheel Hydraulic Diagram (lowering).

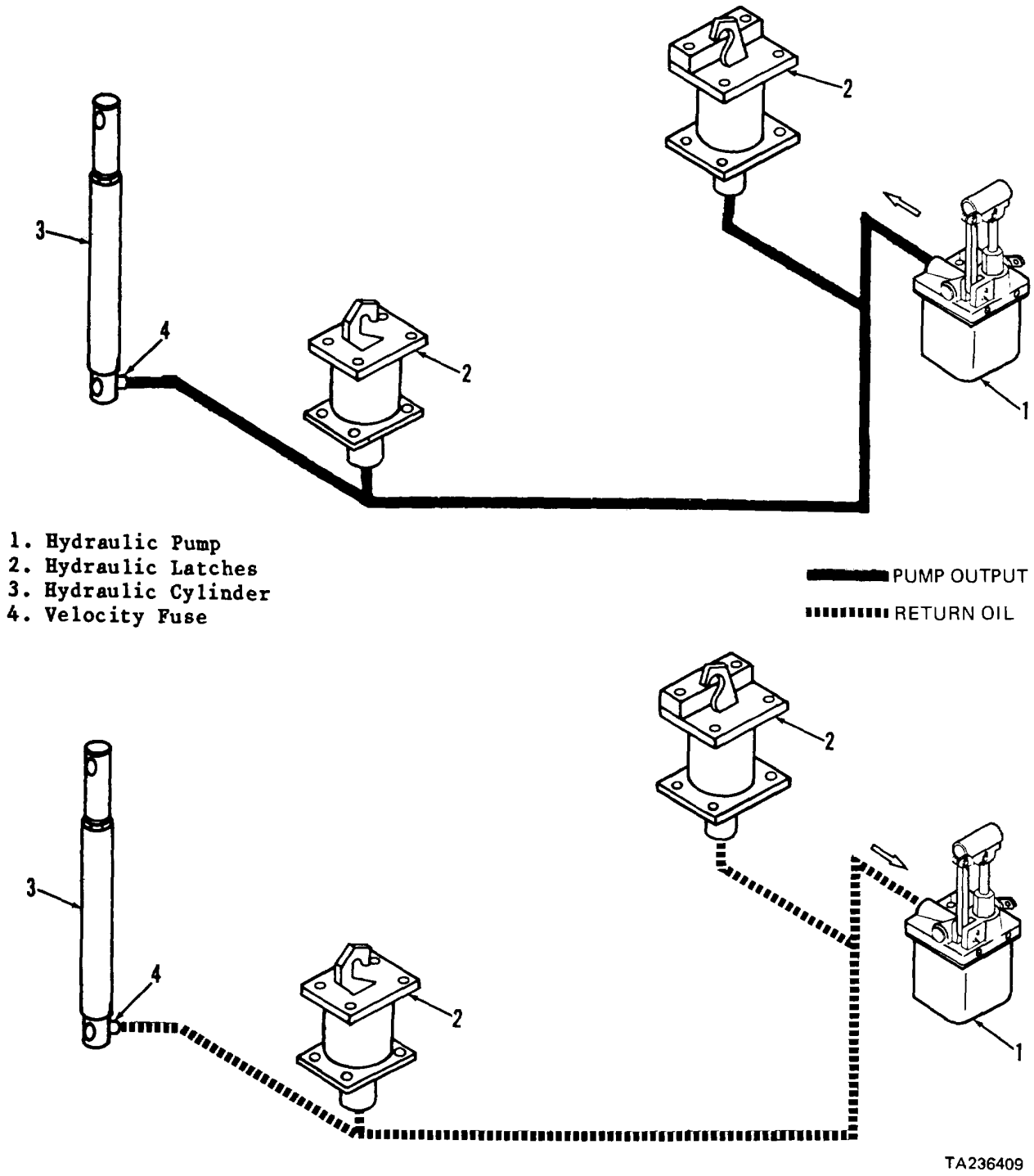


Figure E-5. Cab Tilt Hydraulic Diagram.

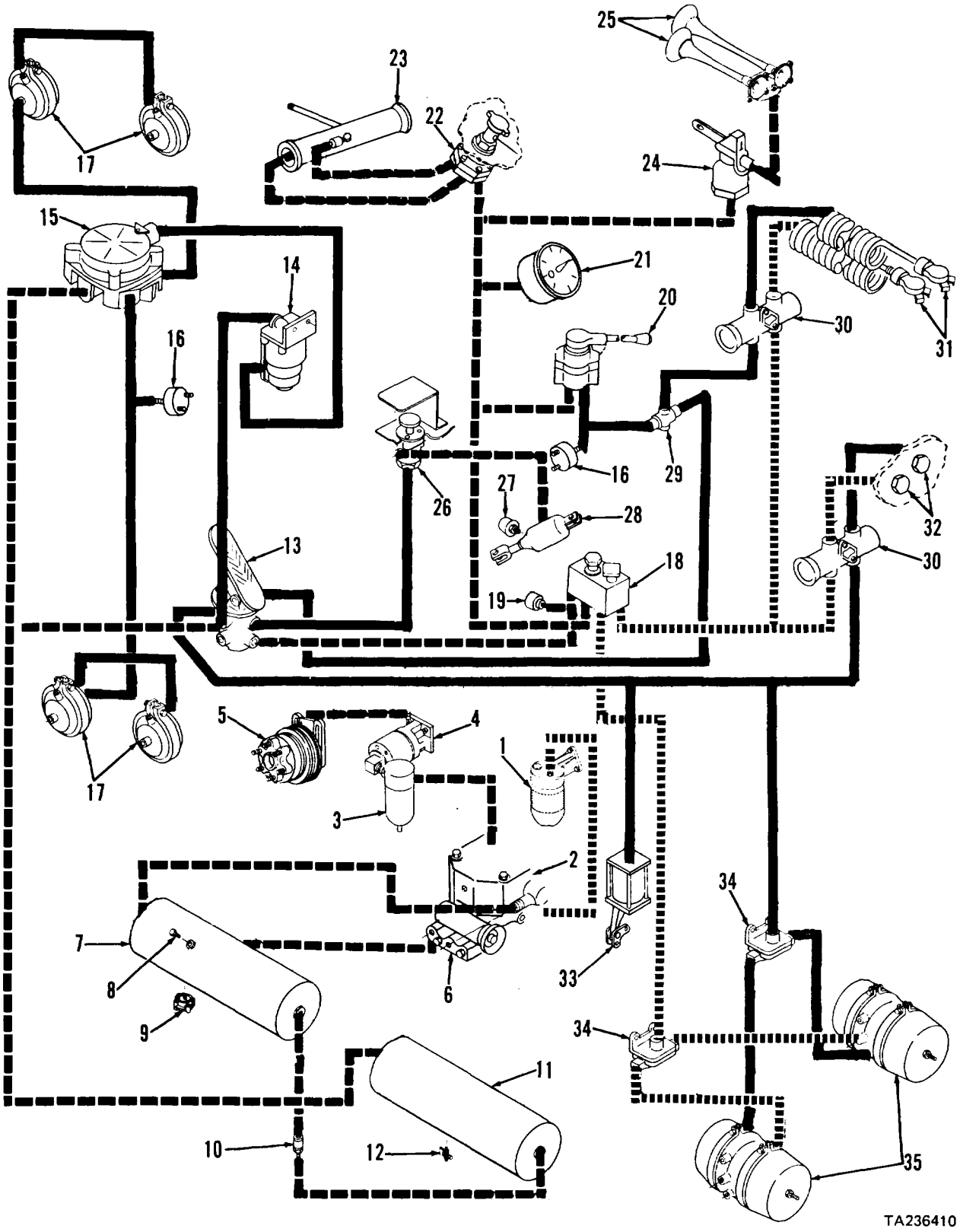
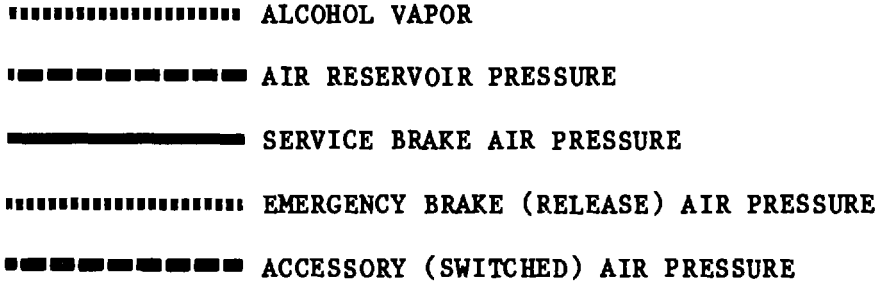


Figure E-6. Pneumatic Diagram.



1. Alcohol Evaporator
2. Air Compressor
3. Filter
4. Solenoid
5. Fan Drive
6. Governor
7. Supply Reservoir
8. Safety Valve
9. Automatic Drain Valve
10. Check Valve
11. Service Reservoir
12. Draincock
13. Brake Treadle Valve
14. Ratio Reducing Valve
15. Relay Valve
16. Brake Light Switches
17. Front Axle Brake Air Chambers
18. Air Control Valve
19. Low Air Pressure Switch
20. Trailer Hand Brake Control Valve
21. Air Pressure Gage
22. Windshield Wiper Control
23. Windshield Wiper Motor
24. Air Horn Valve
25. Air Horn
26. Fifth Wheel Unlatch Valve
27. Filter
28. Fifth Wheel Unlatch Cylinder
29. Double Check Valve
30. Tractor Protection Valves
31. Gladhand Connectors
32. Plugs
33. Transmission Shift Lockout Cylinder
34. Quick Release Valves
35. Rear Axle Brake Air Chambers

APPENDIX F
GLOSSARY

ABBREVIATIONS

A ..... Annually
ACC ..... Accessories
AMP ..... Ampere
AR ..... Army Regulation
AR ..... As required
ATTN ..... Attention
B ..... Biennially
BAT ..... Battery
BL ..... Bulk
BLK ..... Black
BLU ..... Blue
BRN ..... Brown
CC ..... Cubic centimeter
CONT ..... Continued
DA ..... Department of the Army
DD ..... Department of Defense
DED ..... Diesel engine driven
DMWR ..... Depot maintenance work requirements
EA ..... Each
EIR ..... Equipment improvement recommendation
EQPT ..... Equipment
F ..... Fahrenheit
FM ..... Field Manual
FSCM ..... Federal Supply Code for Manufacturers
GAA ..... Grease, Automotive and Artillery
GAL ..... Gallon
GND ..... Ground
GRA ..... Gray
GRN ..... Green
GVW ..... Gross vehicle weight
H ..... Hours
I.D ..... Inside diameter
IGN ..... Ignition
LB ..... Pound
LIN ..... Line item number
LO ..... Lubrication order
MAC ..... Maintenance Allocation Chart
MI ..... Miles
MOS ..... Military Occupational Specialty
MPH ..... Miles per hour
MTOE ..... Modified table of organization and equipment
N ..... Neutral
NATO ..... North Atlantic Treaty Organization
NO ..... ,Number
NSN ..... National stock number

GLOSSARY-Continued

O.D ..... Outside diameter
ORG ..... Orange
oz ..... Ounce
PARA ..... Paragraph
PMCS ..... Preventive maintenance checks and services
PN ..... Part Number
PRESS ..... Pressure
PSI ..... Pounds per square inch
PT ..... Pint
PTO ..... Power take-off
Q ..... Quarterly
QA ..... Quality assurance
QC ..... Quality control
QT ..... Quart
R ..... Reverse
REF ..... Reference
RPM ..... Revolutions per minute
RPSTL ..... Repair parts and special tools list
S ..... Semiannually
SAE ..... Society of Automotive Engineers
SB ..... Service bulletin
SF ..... Standard Form
SMR ..... Source, Maintenance, and Recoverability Code
ST ..... Starter
TAMMS ..... The Army Maintenance Management System
TB ..... Technical Bulletin
TEMP ..... Temperature
TM ..... Technical Manual
TMDE ..... Test, Measurement, and Diagnostic Equipment
U/M ..... Unit of measure
V ..... Volt
Vac ..... Volt (alternating current)
Vdc ..... Volt (direct current)
VIO ..... Violet
WET ..... White
YEL ..... Yellow

APPENDIX G
ILLUSTRATED LIST OF MANUFACTURED ITEMS

G-1. INTRODUCTION

This appendix includes complete instructions for making items authorized to be manufactured or fabricated by organizational and direct support maintenance. A part number index in alpha-numeric order is provided for cross referencing the part number of the item to be manufactured to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are listed by NSN in a tabular list on the illustration.

G-2. MANUFACTURED ITEMS PART NUMBER INDEX

PART NUMBER	FIGURE	PART NUMBER	FIGURE	PART NUMBER	FIGURE
000069541-22	G-1	004857167-36	G-1	011612678-61	G-1
000670454-130	G-1	004857167-40	G-1	011647803-12	G-1
001002589-36	G-1	004857167-47	G-1	011647803-24	G-1
001101947-8	G-1	008174451-28	G-1	011647803-80	G-1
001101947-26	G-1	008174451-40	G-1	011666205-2.5	G-1
001101947-30	G-1	008174451-49	G-1	011666205-18	G-1
001101947-78	G-1	008174451-50	G-1	011792936-16	G-1
001135484-39	G-1	008174451-53	G-1	011792936-27	G-1
001135484-41	G-1	008174451-327	G-1	011792936-28	G-1
001770102-10	G-1	010144915-33	G-1	011792936-33	G-1
003174824-22	G-1	010144915-35	G-1	011792937-16	G-1
004211279-6	G-1	010144915-42	G-1	011792937-27	G-1
004211279-55	G-1	010703394-37	G-1	011792937-71	G-1
004434746-27	G-1	010703394-49	G-1	011792938-34	G-1
004434746-32	G-1	010703394-65	G-1	011792938-123	G-1
004434746-84	G-1	010748373-42	G-1	011792939-12	G-1
004434746-120	G-1	010748373-52	G-1	011792939-21	G-1
004512727-24	G-1	011612678-5	G-1	011792939-45	G-1
004512727-55	G-1	011612678-20	G-1	011792939-53	G-1
004644421-5	G-1	011612678-28	G-1	011792939-55	G-1
004644421-14	G-1	011612678-32	G-1	011792940-60	G-1
004644421-15	G-1	011612678-38	G-1	011792940-136	G-1
004644421-16	G-1	011612678-42	G-1	011805152-34	G-1
004857167-16	G-1	011612678-60	G-1		

G-3. MANUFACTURED ITEMS ILLUSTRATIONS

Figure G-1, a simplified line drawing, illustrates all items authorized to be manufactured or fabricated by organizational and direct support maintenance personnel. All dimensions and information necessary for manufacture are included. The Part Number column of the table lists the part numbers of the items to be manufactured, and the Description column describes the items. The Dimension and Materials columns provide information on the size of each item and the material from which it shall be manufactured.

ILLUSTRATED LIST OF MANUFACTURED ITEMS - Continued

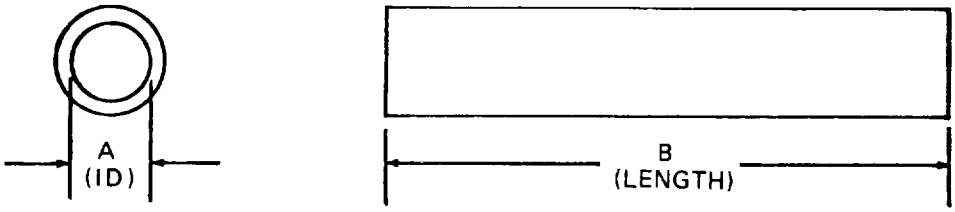


Figure G-1. Manufactured Items.

Part Number	Description	Dimension (Inches)		NSN
		A	B	
000069541-22	Hose, Power Steering Pump	0.62	22	4720-00-006-9541
000670454-130	Hose, Steering Gear Box	0.41	130	4720-00-067-0454
001002589-36	Copper Tubing, Evaporator	0.12	36	4710-00-100-2589
001101947-26	Hose, Front Brake Chamber	0.62	26	4720-00-110-1947
001101947-30	Hose, Xmsn Oil Filter	0.62	30	4720-00-110-1947
001101947-30	Hose, Xmsn Oil Cooler	0.62	30	4720-00-110-1947
001101947-78	Hose, Xmsn Oil Filter	0.62	78	4720-00-110-1947
001101947-8	Hose, Supply Air Tank	0.62	8	4720-00-110-1947
001135484-39	Hose, Protection Valve	0.50	39	4720-00-113-5484
001135484-41	Hose, Brake Treadle Valve	0.50	41	4720-00-113-5484
001770102-10	Hose, Control Valve Supply	0.37	10	4720-00-177-0102
003174824-22	Hose, Power Steering Pump	0.31	22	4720-00-317-4824
004211279-6	Hose, Protective Wrap	1.50	6	4720-00-421-1279
004211279-55	Hose, Protective Wrap	1.50	55	4720-00-421-1279
004434746-120	Hose, Restriction Indicator	0.25	120	4720-00-443-4746
004434746-27	Hose, Air Pressure Gage	0.25	27	4720-00-443-4746
004434746-32	Hose, Air Pressure Gage	0.25	32	4720-00-443-4746
004434746-84	Hose, Air Horn Valve	0.25	84	4720-00-443-4746
004512727-24	Hose, Fuel Tank	0.50	24	4720-00-451-2727
004512727-55	Hose, Fuel Pump	0.50	55	4720-00-451-2727
004644421-5	Hose, Xmsn Sampling Valve	0.19	5	4720-00-464-4421
004644421-14	Hose, Xmsn Sampling Valve	0.19	14	4720-00-464-4421
004644421-15	Hose, Engine Sampling Valve	0.19	15	4720-00-464-4421
004644421-16	Hose, Xmsn Sampling Valve	0.19	16	4720-00-464-4421
004857167-16	Hose, Engine Fuel Supply	0.31	16	4720-00-485-7167
004857167-36	Hose, Fuel Tank	0.31	36	4720-00-485-7167
004857167-40	Hose, Fuel Pump	0.31	40	4720-00-485-7167
004857167-47	Hose, Engine Fuel Supply	0.31	47	4720-00-485-7167
008174451-28	Hose, Front Brake Chamber	0.31	28	4720-00-817-4451
008174451-327	Hose, Unlatch Cylinder	0.31	327	4720-00-817-4451
008174451-40	Hose, Double Check Valve	0.31	40	4720-00-817-4451
008174451-49	Hose, Ratio Reducing Valve	0.31	49	4720-00-817-4451
008174451-50	Hose, Air Control Valve	0.31	50	4720-00-817-4451

ILLUSTRATED LIST OF MANUFACTURED ITEMS - Continued

Part Number	Description	Dimension (Inches)		NSN
		A	B	
008174451-53	Hose, Quick Release Valve	0.31	53	4720-00-817-4451
010144915-33	Hose, Hand Brake Control	0.37	33	4720-01-014-4915
010144915-35	Hose, Air Control Valve	0.37	35	4720-01-014-4915
010144915-42	Hose, Unlatch Valve	0.37	42	4720-01-014-4915
010703394-37	Hose, Air Tank Check Valve	0.62	37	4720-01-070-3394
010703394-49	Hose, Relay Valve	0.62	49	4720-01-070-3394
010703394-65	Hose, Service Air Tank	0.62	65	4720-01-070-3394
010748373-42	Hose, Engine Oil Pan	0.31	42	4720-01-074-8373
010748373-52	Hose, Engine Oil Filter	0.31	52	4720-01-074-8373
011612678-20	Heater Hose, Silicone	0.62	20	4720-01-161-2678
011612678-28	Heater Hose, Silicone	0.62	28	4720-01-161-2678
011612678-32	Heater Hose, Silicone	0.62	32	4720-01-161-2678
011612678-38	Heater Hose, Silicone	0.62	38	4720-01-161-2678
011612678-42	Heater Hose, Silicone	0.62	42	4720-01-161-2678
011612678-5	Heater Hose, Silicone	0.62	5	4720-01-161-2678
011612678-60	Heater Hose, Silicone	0.62	60	4720-01-161-2678
011612678-61	Heater Hose, Silicone	0.62	61	4720-01-161-2678
011647803-12	Hose, Windshield Washer	0.19	12	4720-01-164-7803
011647803-24	Hose, Windshield Washer	0.19	24	4720-01-164-7803
011647803-80	Hose, Windshield Washer	0.19	80	4720-01-164-7803
011666205-18	Hose, Radiator Inlet	2.25	18	4720-01-166-6205
011666205-2.5	Hose, Radiator Inlet	2.25	2.5	4720-01-166-6205
011792936-16	Nylon Tubing, Orange	0.50	16	4720-01-179-2936
011792936-27	Nylon Tubing, Orange	0.50	27	4720-01-179-2936
011792936-28	Nylon Tubing, Orange	0.50	28	4720-01-179-2936
011792936-33	Nylon Tubing, Orange	0.50	33	4720-01-179-2936
011792937-16	Nylon Tubing, Blue	0.50	16	4720-01-179-2937
011792937-27	Nylon Tubing, Blue	0.50	27	4720-01-179-2937
011792937-71	Nylon Tubing, Blue	0.50	71	4720-01-179-2937
011792938-123	Nylon Tubing, Orange	0.37	123	4720-01-179-2938
011792938-34	Nylon Tubing, Orange	0.37	34	4720-01-179-2938
011792939-12	Nylon Tubing, Blue	0.37	12	4720-01-179-2939
011792939-21	Nylon Tubing, Blue	0.37	21	4720-01-179-2939
011792939-45	Nylon Tubing, Blue	0.37	45	4720-01-179-2939
011792939-53	Nylon Tubing, Blue	0.37	53	4720-01-179-2939
011792939-55	Nylon Tubing, Blue	0.37	55	4720-01-179-2939
011792940-136	Nylon Tubing, Red	0.50	136	4720-01-179-2940
011792940-60	Nylon Tubing, Red	0.50	60	4720-01-179-2940
011805152-34	Nylon Tubing, Red	0.37	34	4720-01-180-5152

ALPHABETICAL INDEX

ALPHABETIC INDEX - Continued

ALPHABETICAL INDEX - Continued

ALPHABETICAL INDEX - Continued

ALPHABETICAL INDEX - Continued

ALPHABETICAL INDEX - Continued

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

MILDRED E. HEDBERG
Brigadier General, United States Army
The Adjutant General

Distribution: To be distributed in accordance with DA Form 12-38, Organizational Direct Support and General Support Maintenance Manual Requirements for Truck, Tractor, Yard Type, 4X2, M878A1 (w/5th wheel).

* U.S. GOVERNMENT PRINTING OFFICE: 1985-554-019/20177

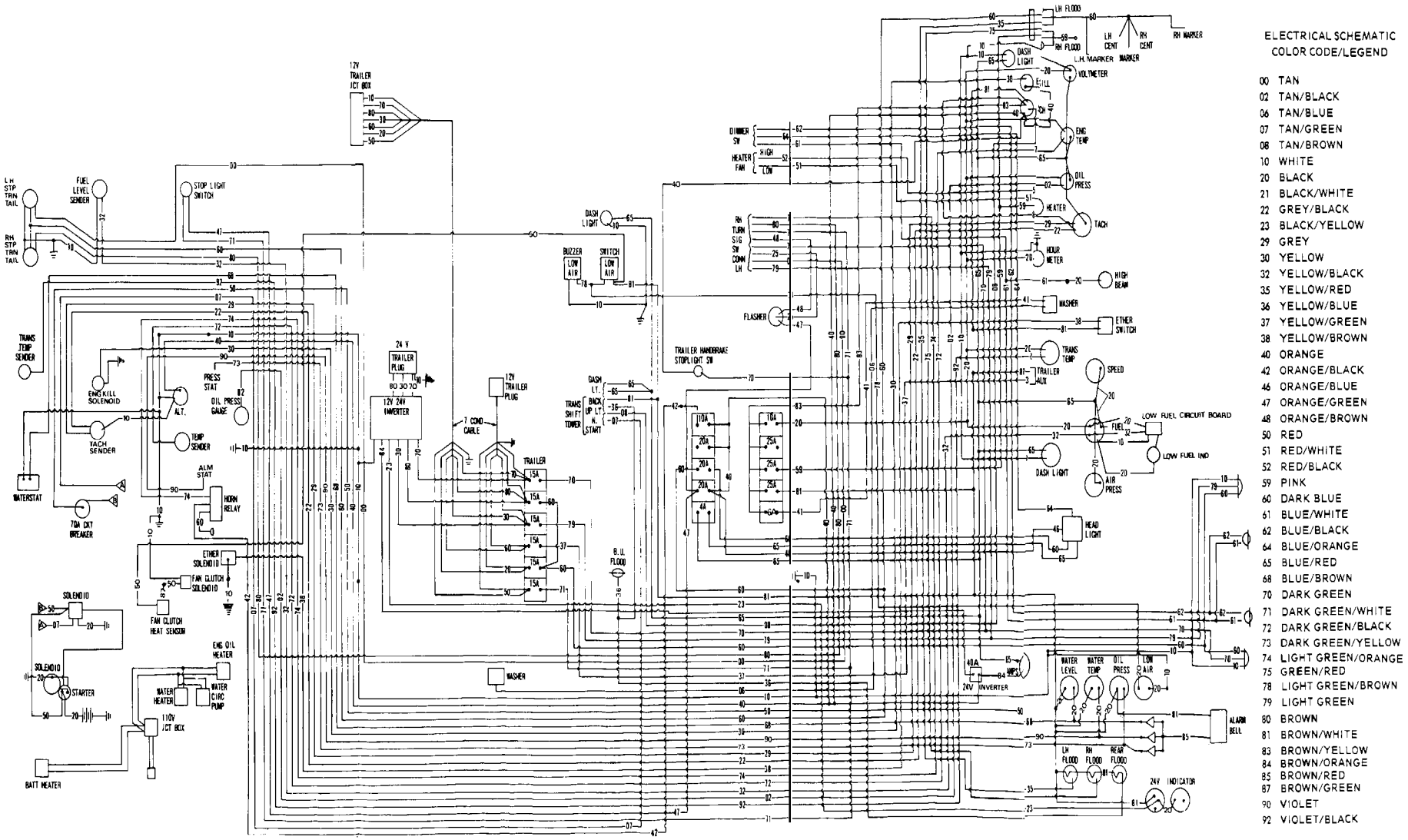


FIGURE FO-1. Electrical Diagram.

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ▸ ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches

1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches

1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches

1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet

1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches

1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces

1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

5/9 (°F -32) = °C

212° Fahrenheit is equivalent to 100° Celsius

90° Fahrenheit is equivalent to 32.2° Celsius

32° Fahrenheit is equivalent to 0° Celsius

9/5 C° +32 = F°

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces

1 Kilogram = 1,000 Grams = 2.2 Lb.

1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621