TM 9-2320-211-34-1

T.O. 36A12-1C-422-2-1

TECHNICAL MANUAL

VOLUME 1 OF 2

TROUBLE SHOOTING

DIRECT SUPPORT AND GENERAL SUPPORT LEVEL

5-TON, 6X6, M39 SERIES TRUCKS

(MULTIFUEL)

TRUCK, CHASSIS: M40A2C, M61A2, M6A2; TRUCK, CARGO: M54A2, M54A2C, M55A2; TRUCK, DUMP: M51A2; TRUCK, TRACTOR: M52A2; TRUCK, WRECKER, MEDIUM: 543a2

NOTE:

THE STYLE OF THIS TM IS EXPERIMENTAL. IT IS BEING TRIED BY THE ARMY ONLY ON A LIMITED BASIS

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

FEBRUARY 1981

WARNING

EXHAUST GASES CAN BE DEADLY

Exposure to exhaust gases produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.

Carbon monoxide occurs in the exhaust fumes of fuel burning heaters and internal combustion engines, and becomes dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to insure the safety of personnel whenever fuel burning heater(s) or engine of any vehicle is operated for maintenance purposes or tactical use.

Do not operate heater or engine of vehicle in an enclosed area unless it is adequately ventilated.

Do not idle engine for long periods without maintaining adequate ventilation in personnel compartments.

Do not drive any vehicle with inspection plates or cover plates removed unless necessary for maintenance purposes.

Be alert at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, immediately ventilate personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; do not permit physical exercise; if necessary, administer artificial respiration.

If exposed, seek prompt medical attention for possible delayed onset of acute lung congestion. Administer oxygen if available.

The best defense against exhaust gas poisoning is adequate ventilation.

WARNING

Serious or fatal injury to personnel may result
if the following instructions are not complied with.

Dry cleaning solvent is flammable. Do not use near an open flame. Keep a fire extinguisher nearby when solvent is used. Use only in well-ventilated places. Failure to do this may result in injury to personnel and damage to equipment.

Eye shields must be worn when using compressed air. Eye injury can occur if eye shields are not used.

Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking may cause a fire. Keep a fire extinguisher close by.

Fuel coming out of an injector nozzle under pressure can go through the skin. This can cause blood poisoning. Keep hands away from injector nozzle when doing the next step.

TM 9-2320-211-34-1
T.O. 36A12-1C-422-2-1

TECHNICAL MANUAL
NO. 9-2320-211-34-1
TECHNICAL ORDER
NO. 36A12-lC-422-2-1

DEPARTMENTS OF THE ARMY
AND
THE AIR FORCE
WASHINGTON, DC, 25 February 1981

TECHNICAL MANUAL

VOLUME 1 OF 2

TROUBLESHOOTING

DIRECT SUPPORT AND GENERAL SUPPORT LEVEL

5-TON, 6X6, M39 SERIES TRUCKS (MULTIFUEL)

Model		NSN without Winch	NSN with Winch
Truck, Chassis	M40A2C	2329-00-969-4114	
	M61A2	2320-00-055-9264	2320-00-965-0321
	M63A2	2320-00-226-6251	2320-00-285-3757
Truck, Cargo	M54A2	2320-00-055-9266	2320-00-055-9265
	M54A2C	2320-00-926-0874	2320-00-926-0874
	M55A2	2320-00-073-8476	2320-00-055-9259
Truck, Dump	M51A2	2320-00-055-9262	2320-00-055-9263
Truck, Tractor	M52A2	2320-00-055-9260	2320-00-055-9261
Truck, Wrecker, Medium	M543A2		2320-00-055-9258

Current as of 25 Jul 80.

*This manual together with TM 9-2320-211-34-2-1, 25 February 1981; TM 9-2320 -21-34 -2-2, 25 February 1981; TM 9-2320-211-34-2-3, 25 February 1981 and TM 9-2320-211-34-2-4, 25 February 1981 supersedes so much of TM 9-2320-211-35, 13 September 1964 as pertains to multifuel vehicles including all changes.

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedure, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: commander, US Army Tank-Automotive Command. TTN: DRSTA-MB. Warren. Michigan 48090. A reply will be furnished to you.

TABLE OF CONTENTS

VOLUME 1 OF 2

		Paragraph	Page
CHAPTER 1.	GENERAL INFORMATION		
	Scope	1-1	1-1
	Organization	1-2	1-1
	Troubleshooting Approach	1-3	1-1
CHAPTER 2.	TROUBLESHOOTING APPROACH		
	General Approach	2-1	2-1
	Troubleshooting Index	2-2	2-1
	Test Equipment Procedures Index	2-3	2-1
	Troubleshooting Roadmaps	2-4	2-1
	Fault Symptom Index	2-5	2-1
	Sample Troubleshooting Procedure	2-6	2-1
CHAPTER 3.	TROUBLESHOOTING INDEX		
	General	3-1	3-1
	Index	3-2	3-1
CHAPTER 4.	TEST EQUIPMENT PROCEDURES INDEX		
	General	4-1	4-1
	Index	4-2	4-1
CHAPTER 5.	TROUBLESHOOTING ROADMAPS		
	General	5-1	5-1
	Roadmaps	5-2	5-1
CHAPTER 6.	FAULT SYMPTOM INDEXES		
	General	6-1	6-1
	Indexes	6-2	6-1
CHAPTER 7.	SAMPLE TROUBLESHOOTING PROCEDURES		
	General	7-1	7-1
	Sample Detailed Procedures	7-2	7-1
CHAPTER 8.	ENGINE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	8-1	8-1
	Equipment Items Not Covered	8-2	8-1
CHAPTER 9.	ENGINE SYSTEM TEST PROCEDURES		
	General	9-1	9-1
	Test Set-up	9-2	9-1
	Test Procedure	9-3	9-1
CHAPTER 10.	FUEL SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	10-1	10-1
	Equipment Items Not Covered	10-2	10-1

TABLE OF CONTENTS-CONT

		Paragraph	Page
CHAPTER 11.	FUEL SYSTEM SUPPORT DIAGRAMS		
	General	1-1	11-1
CHAPTER 12.	FUEL SYSTEM TEST PROCEDURES		
	General	12-1	12-1
	Test Set-Up	12-2	12-1
	Test Procedure	12-3	12-1
CHAPTER 13.	COOLING SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	13-1	13-1
	Equipment Items Not Covered	13-2	13-1
CHAPTER 14.	ELECTRICAL SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	14-1	14-1
	Equipment Items Not Covered	14-2	14-1
CHAPTER 15.	ELECTRICAL SYSTEM TEST PROCEDURES		
	Test Procedures	15-1	15-1
CHAPTER 16.	FRONT AXLE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	16-1	16-1
	Equipment Items Not Covered	16-2	16-1
CHAPTER 17.	FRONT AXLE SYSTEM TEST PROCEDURES		
	General	17-1	17-1
	Test Set-Up	17-2	17-1
	Test Procedure	17-3	17-1
CHAPTER 18.	REAR AXLE SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	18-1	18-1
	Equipment Items Not Covered	18-2	18-1
CHAPTER 19.	STEERING SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	19-1	19-1
	Equipment Items Not Covered	19-2	19-1
CHAPTER 20.	FRONT WINCH SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	20-1	20-1
	Equipment Items Not Covered	20-2	20-1
CHAPTER 21.	REAR WINCH SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	21-1	21-1
	Equipment Items Not Covered	21-2	21-1
CHAPTER 22.	M543A2 WRECKER SYSTEM TROUBLESHOOTING		
	Equipment Items Covered	22-1	22-1
	Equipment Items Not Covered	22-2	22-1
CHAPTER 23.	M543A2 WRECKER SYSTEM TEST PROCEDURES		
	General	23-1	23-1
	Test Set-Up	23-2	23-1
	Test Procedure	23-3	23-1
CHAPTER 24.	DEEP WATER FORDING SYSTEM TROUBLE-SHOOTING		
	Equipment Items Covered	24-1	24-1
	Equipment Items Not Covered	24-2	24-1

VOLUME 2 OF 2

Part 1 of 4

CHAPTER 1. GENERAL MAINTENANCE INFORMATION
CHAPTER 2. ENGINE SYSTEM GROUP MAINTENANCE

TABLE OF CONTENTS-CONT

		Paragraph	Page
Section I.	Scope		2-1
Section II.	Engine Assembly		2-1
Section III.	Crankcase, Block, and Cylinder Head		2-30
Section IV.	Crankshaft		2-37
Section V.	Flywheel.		2-57
Section VI.	Valves , Camshaft, and Timing System		2-76
Section VII.	Engine Lubricating System.		2-106
Section VIII.	Manifolds		2-144
CHAPTER 3.	CLUTCH SYSTEM GROUP MAINTENANCE		
Section I.	Scope.		3-1
Section II.	Clutch Assembly		3-1
CHAPTER 4.	FUEL SYSTEM GROUP MAINTENANCE		
Section I.	Scope		4-1
Section II.	Fuel Injector		4-1
Section III.	Turbocharger		4-26
Section IV.	Fuel Tanks		4-26
Section V.	Cold Start System		4-31
CHAPTER 5.	COOLING SYSTEM GROUP MAINTENANCE		
Section I.	Scope		5-1
Section II.	Radiator.		5-1
Section III.	Water Pump		5-1
Section IV.	Fan Assembly		5-7
CHAPTER 6.	ELECTRICAL SYSTEM GROUP MAINTENANCE		
Section I.	Scope		6-1
Section II.	Charging System.		6-1
Section III.	Starting System		6-4
Section IV.	Instrument Panel		6-14
Section V.	Lighting System		6-17
Section VI.	Horn Assembly		6-19
Section VII.	Battery System		6-27
Section VIII.	Cab and Chassis Wiring Harnesses		6-28
CHAPTER 7.	TRANSMISSION SYSTEM GROUP MAINTENANCE		
Section I.	Scope		7-1
Section II.	Transmission Assembly		7-1
CHAPTER 8.	TRANSMISSION TRANSFER SYSTEM GROUP MAINTENANCE		
Section I.	Scope.		8-1
Section II.	Transmission Transfer Assembly		8-1
Section III.	Transmission Transfer Controls and Linkages.		8-103
CHAPTER 9.	FRONT AXLE GROUP MAINTENANCE		
Section I.	Scope		9-1
Section II.	Front Axle Assembly		9-1
Section III.	Differential Carrier Assembly		9-14
Section IV.	Steering Mechanism		9-85
CHAPTER 10.	REAR AXLE GROUP MAINTENANCE		
Section I.	Scope		10-1
Section II.	Rear Axle Assemblies		10-1

TABLE OF CONTENTS-CONT

Part 2 of 4

		Paragraph	Page
CHAPTER 11.	BRAKE SYSTEM GROUP MAINTENANCE		
Section I.	Scope		11-1
Section II.	Handbrake and Service		11-1
Section III.	Hydraulic Brake System		11-18
CHAPTER 12.	WHEEL SYSTEM GROUP MAINTENANCE		
Section I.	Scope		12-1
Section II.	Tires		12-1
CHAPTER 13.	STEERING SYSTEM GROUP MAINTENANCE		
Section I.	Scope		13-1
Section II.	Mechanical Steering Gear		13-1
Section III.	Power Steering Gear Assembly		13-9
Section IV.	Steering Hydraulic System		13-76
Section V.	Steering System Valves		13-94
CHAPTER 14.	FRAME AND TOWING ATTACHMENTS GROUP MAINTENANCE		
Section I.	Scope		14-1
Section II.	Frame Assembly		14-1
Section III.	Pintles		14-55
Section IV.	Fifth Wheel Assembly		14-59
CHAPTER 15.	SPRINGS AND TORQUE AND STABILIZER RODS GROUP MAINTENANCE		
Section I.	Scope		15-1
Section II.	Springs		15-1
Section III.	Torque and Stabilizer Rods		15-27
CHAPTER 16.	BODY, CAB, AND HOOD GROUP MAINTENANCE		
Section I.	Scope		16-1
Section II.	Body, Cab, and Hood Components		16-1
Section III.	Fenders, Running Boards, and Windshield Assembly		16-85
Section IV.	Seats		16-156
Section V.	Tool and Stowage Boxes		16-176
Section VI.	Cargo Bodies		16-194
Section VII.	Special Purpose Bodies		16-268

Part 3 of 4

CHAPTER 17.	WINCH, HOIST, CRANE, AND POWER TAKEOFF ASSEMBLIES GROUP MAINTENANCE		
Section I.	Scope		17-1
Section II.	Winch, Hoist, and Crane Assemblies		17-1
Section III.	Power Takeoff and Swivel Valve Assemblies		17-774

TABLE OF CONTENTS-CONT

Part 4 of 4

		Paragraph	Page
CHAPTER 18.	BODY ACCESSORY ITEMS GROUP MAINTENANCE		
Section I.	Scope		18-1
Section II.	Canvas Accessory Items		18-1
CHAPTER 19.	MAINTENANCE OF MATERIAL USED IN CONJUNCTION WITH MAJOR ITEMS		
Section I.	Scope		19-1
Section II.	Winterization Kits		19-1
Section III.	Special Purpose Kits		19-169

CHAPTER 1

GENERAL INFORMATION

1-1. SCOPE. This volume shows you how to do troubleshooting at the direct support level of maintenance. The amount of troubleshooting you can do is based on what the Maintenance Allocation Chart says you can fix. Because of this, the only trouble symptoms you will find here are those that could be caused by faulty things you can fix.

1-2. ORGANIZATION . When you do PMCS, or when you drive the truck and find that something is wrong, write down what is wrong. Then check the fault symptom index to see if the trouble (fault symptom) you noted is in the index. If it is, you can do troubleshooting to find the fault and fix it.

1-3. TROUBLESHOOTING APPROACH. In order to find out what is causing the problem in the truck, you must use a good approach. A good approach just means a way of doing troubleshooting so you can find the problem and not get confused or lost. The following chapter describes how you can use the materials in this volume to troubleshoot with a good approach.

CHAPTER 2

TROUBLESHOOTING APPROACH

2-1. GENERAL APPROACH. This chapter gives you instructions on how to use the troubleshooting material to help you find and fix the trouble. In every system of the truck there can be faults or problems which will cause certain symptoms. Symptoms can be such things as unusual noise, vibration or even complete failure of a system. This volume gives information for each system on which you can do troubleshooting to find faults and fix them. Before you troubleshoot a system, you should look at the troubleshooting indexes which will lead you to the information you need to help make your troubleshooting faster and easier. If you follow the instructions the right way, you will find those troubles you can fix. But, if you fix something and the trouble is still there, it means there is more than one trouble. If this happens, start all over again to find the other trouble.

2-2. TROUBLESHOOTING INDEX. The troubleshooting index, and instructions on how to use it are in chapter 3. Go to this index first because it tells you where to find troubleshooting roadmaps, fault symptom indexes, summary troubleshooting charts and support diagrams for each system.

2-3. TEST EQUIPMENT PROCEDURES INDEX. The test equipment procedures index, and instructions on how to use it are in chapter 4. This index tells you where to find electrical and mechanical tests which you can use to do your troubleshooting. It also tells you what equipment you will need to do the tests. If you have a STE/ICE (Simplified Test Equipment/Internal Combustion Engine) Set (NSN 4910-00-124-2554), you may use it, where applicable, to do your troubleshooting. Refer to TM 9-4910-571-12 & P.

2-4. TROUBLESHOOTING ROAD MAPS. Troubleshooting roadmaps for each system are in chapter 5. If the system is made up of subsystems, these subsystems are also on the roadmap. Under the subsystem is a list of things which are the most likely causes of a fault symptom in that subsystem. If you have enough skill, you can troubleshoot these things on the truck without using the detailed troubleshooting procedures. So if you know enough about the truck to work on your own, use the roadmap for the system with the problem before you check the fault symptom index.

2-5. FAULT SYMPTOM INDEX. Fault symptom indexes and instructions on how to use them are in chapter 6. For each system of the truck, there is an index which gives you a list of the fault symptoms for that system. The index also tells you where to find the detailed troubleshooting procedures and what resources (tools/people) you need to do each procedure.

2-6. SAMPLE TROUBLESHOOTING PROCEDURE. A sample troubleshooting procedure is in chapter 7. This sample procedure will help you see the way detailed troubleshooting procedures are to be used.

CHAPTER 3

TROUBLESHOOTING INDEX

3-1. GENERAL. This chapter has a troubleshooting index which covers every system of the truck on which you can do troubleshooting. The index tells you where to find all the other information you need to do your troubleshooting procedures.

3-2. INDEX. The troubleshooting index (figure 3-1) is divided into five columns that list systems, troubleshooting roadmaps, fault symptoms, summary troubleshooting procedures, and system support diagrams. The following breakdown tells you what is in each column.

a. System Column. This column gives a list of systems on the truck for which troubleshooting can be done at the direct support maintenance level.

b. Troubleshooting Roadmaps Column. This column tells you where to find the troubleshooting roadmap for each listed system. These roadmaps are given in chapter 5.

c. Fault Symptom Index Column. This column tells you where to find the troubleshooting fault symptom index for each listed system. Fault symptom indexes are given in chapter 6.

d. Summary Troubleshooting Procedures Column. This column tells you where to find the summary troubleshooting procedure for each listed system. Some systems do not have summary troubleshooting procedures, so the column will be left blank for those systems.

e. System Support Diagrams Column. This column tells you where to find support diagrams for each listed system. Some systems do not have support diagrams, so the column will be left blank for those systems.

	SYSTEM	TROUBLE-SHOOTING ROADMAPS	FAULT SYMPTOM INDEXES	SUMMARY TROUBLE-SHOOTING PROCEDURES	SYSTEM SUPPORT DIAGRAMS
1	ENGINE	Figure 5-1	Table 6-1		
2	FUEL	Figure 5-2	Table 6-2		Figure 11-1
3	COOLING	Figure 5-3	Table 6-3		
4	ELECTRICAL	Figure 5-4	Table 6-4		
5	FRONT AXLE	Figure 5-5	Table 6-5		
6	REAR AXLE	Figure 5-6	Table 6-6		
7	STEERING	Figure 5-7	Table 6-7		
8	FRONT WINCH	Figure 5-8	Table 6-8		
9	REAR WINCH	Figure 5-9	Table 6-9		
10	M543A2 WRECKER	Figure 5-10	Table 6-10		
11	DEEP WATER FORDING	Figure 5-11	Table 6-11		

TA 120895

Figure 3-1. Troubleshooting Index

CHAPTER 4

TEST EQUIPMENT PROCEDURES INDEX

4-1. GENERAL. This chapter has a test equipment procedures index which tells you where to find the tests you need to do your troubleshooting.

4-2. INDEX. The test equipment procedures index is divided into three columns that list test equipment, tests, and figure numbers. The following breakdown tells you what is in each column.

a. Test Equipment Column. This column tells you what kind of equipment you need to do your troubleshooting tests.

b. Tests Column. This column tells you what tests are given in this manual. Next to each piece of test equipment are listed the tests that you can do with that equipment. This column also gives troubleshooting tests which can be done without using test equipment.

c. Figure Column. This column tells you where you can find the tests in this manual.

TEST EQUIPMENT		TESTS	FIGURE
1	COMPRESSION TESTER GAGE	Engine Cylinder Compression	9-1
2	MULTIMETER AN/URM-105C	Refer to TM 9-2320-211-20	
3	DIAL INDICATOR GAGE	Steering Knuckle End Play	17-1
4	OIL PRESSURE TEST SET	Power Steering Pump Pressure	19-1
		Power Cylinder Pressure	19-1
5	PRESSURE GAGE	Swing Motor Swivel valve pressure	23-1
6		Fuel Injector Nozzle	12-1
7			
8			

TA 120896

Figure 4-1. Test Equipment Procedures Index

CHAPTER 5

TROUBLESHOOTING ROADMAPS

5-1. GENERAL. This chapter gives troubleshooting roadmaps for every system of the truck for which you have detailed troubleshooting procedures. Figures 5-1 through 5-11 cover all the roadmaps for the detailed procedures.

5-2. ROADMAPS. Each roadmap gives a list of things which are most likely to cause a fault symptom in a system or subsystem. At least one of the items listed will be found to be bad when you do the detailed troubleshooting procedures for that system.

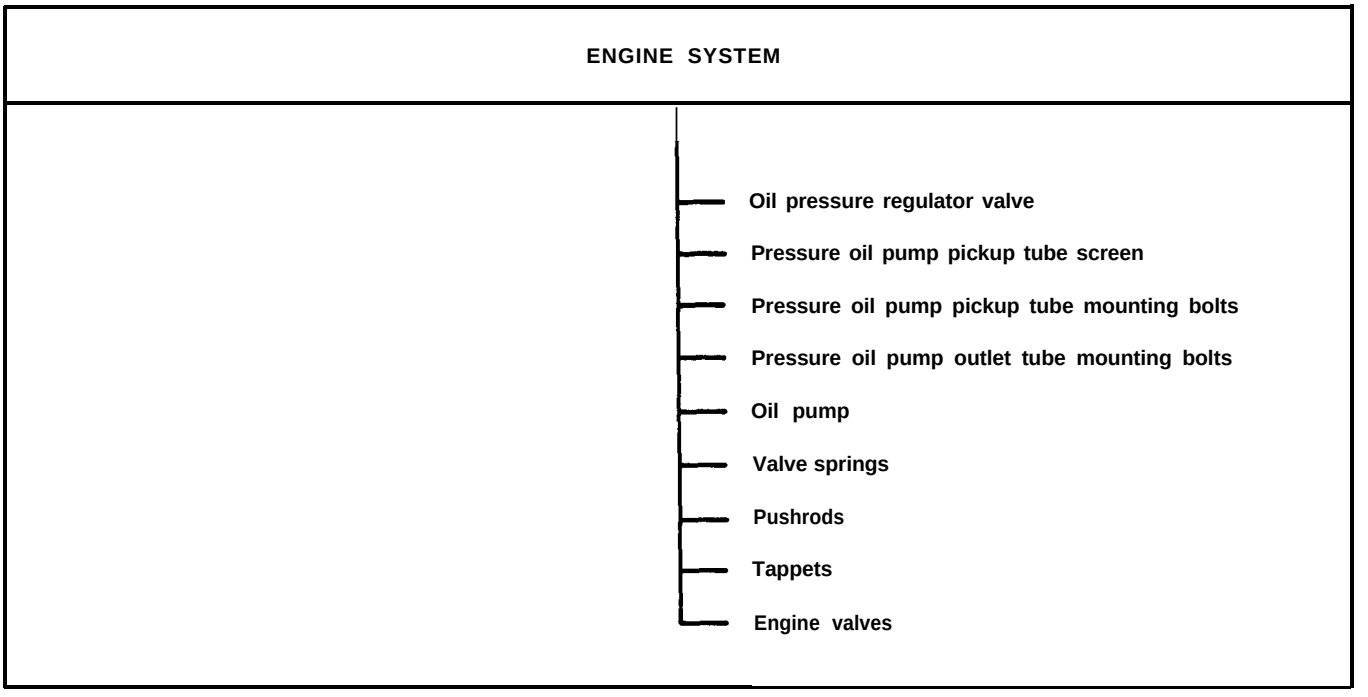


Figure 5-1. Troubleshooting Roadmap, Engine System

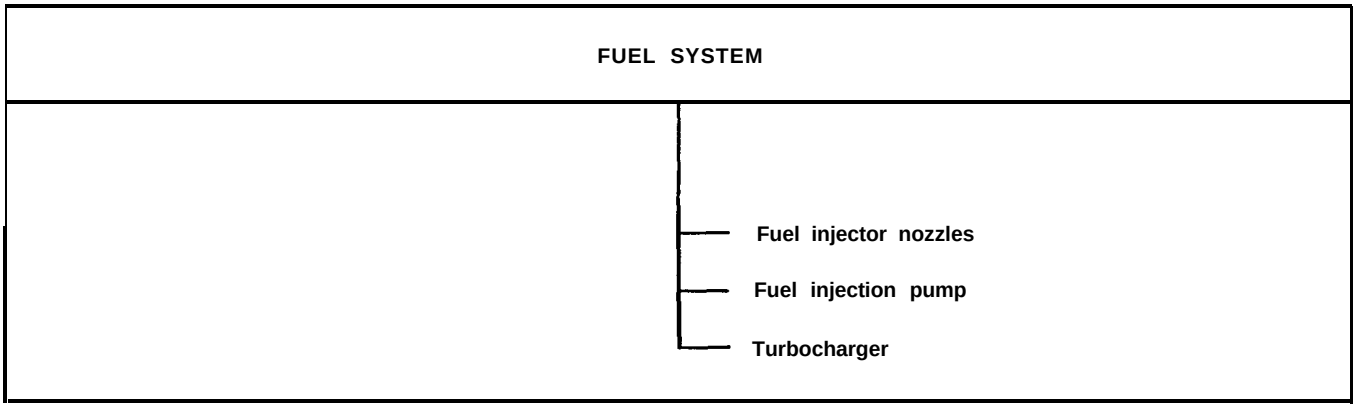


Figure 5-2. Troubleshooting Roadmap, Fuel System

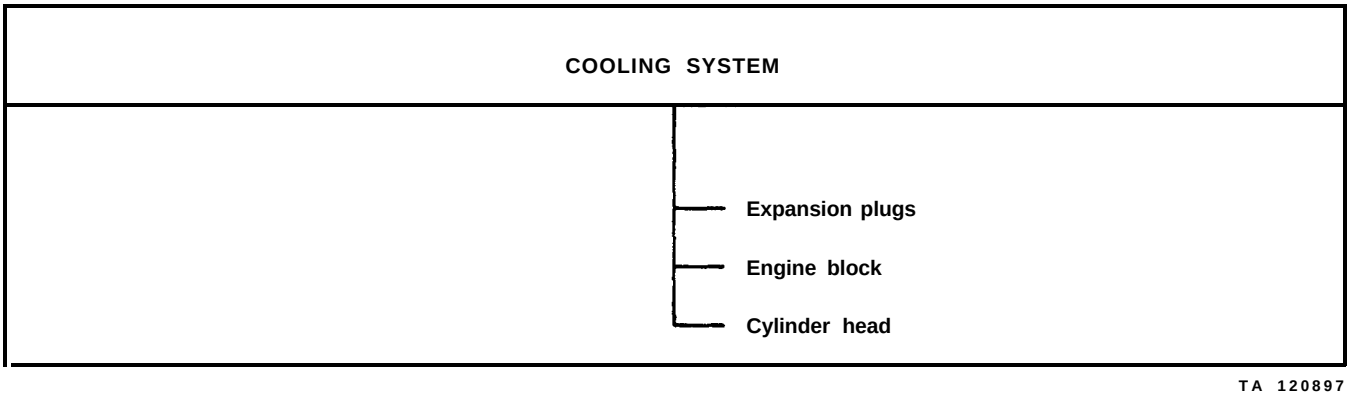


Figure 5-3. Troubleshooting Roadmap, Cooling System

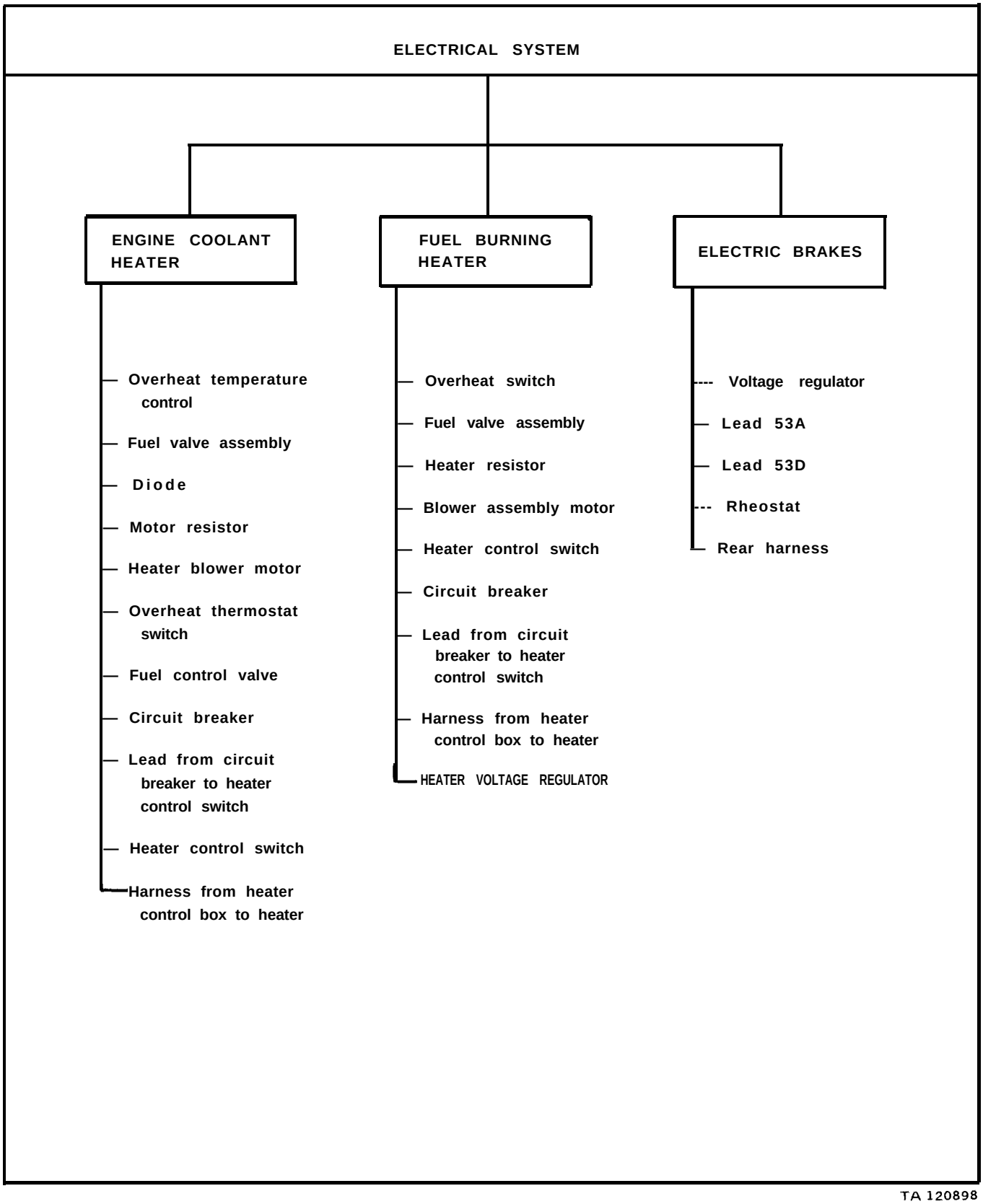


Figure 5-4. Troubleshooting Roadmap, Electrical System

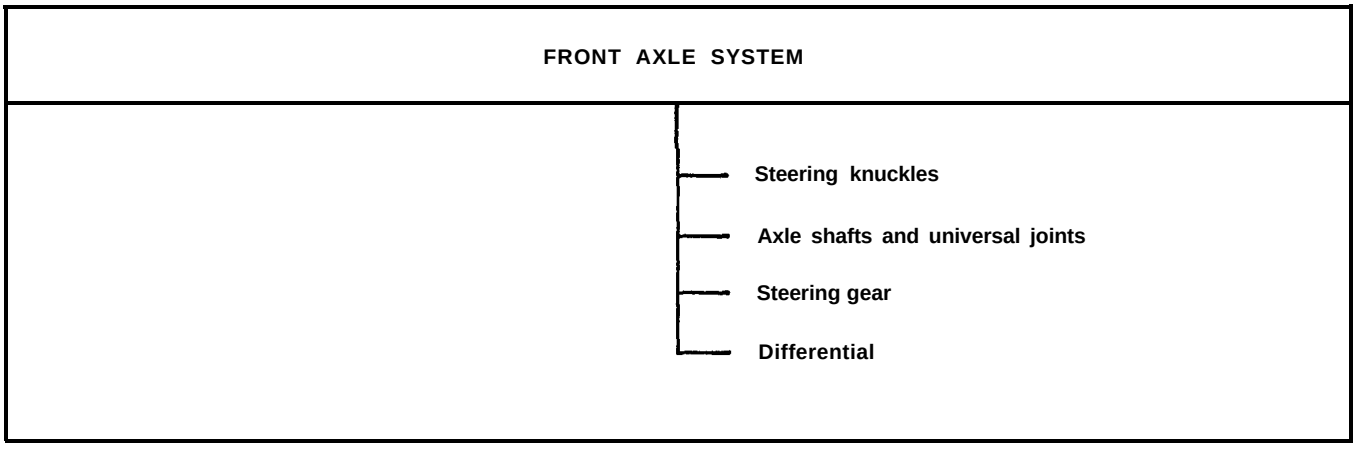


Figure 5-5. Troubleshooting Roadmap, Front Axle System

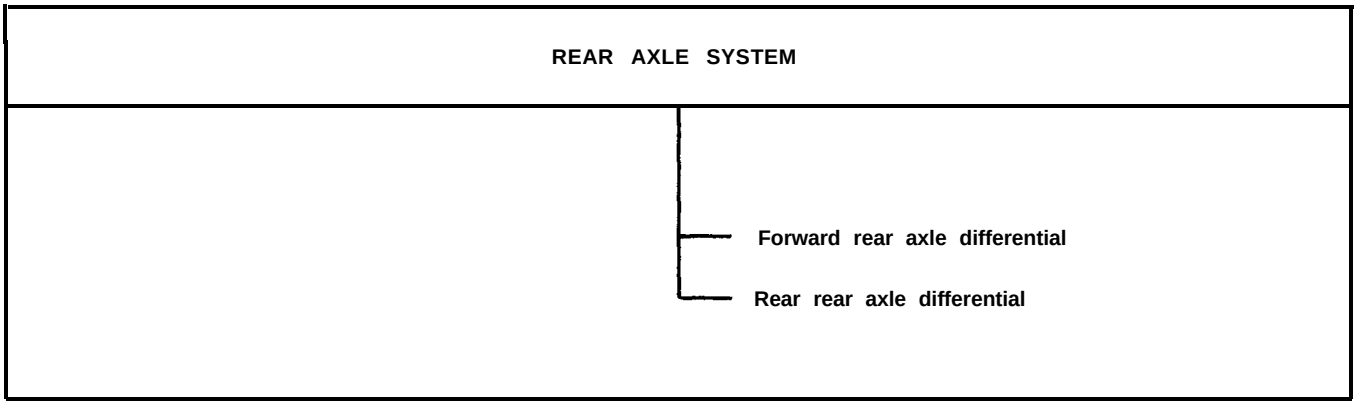


Figure 5-6. Troubleshooting Roadmap, Rear Axle System

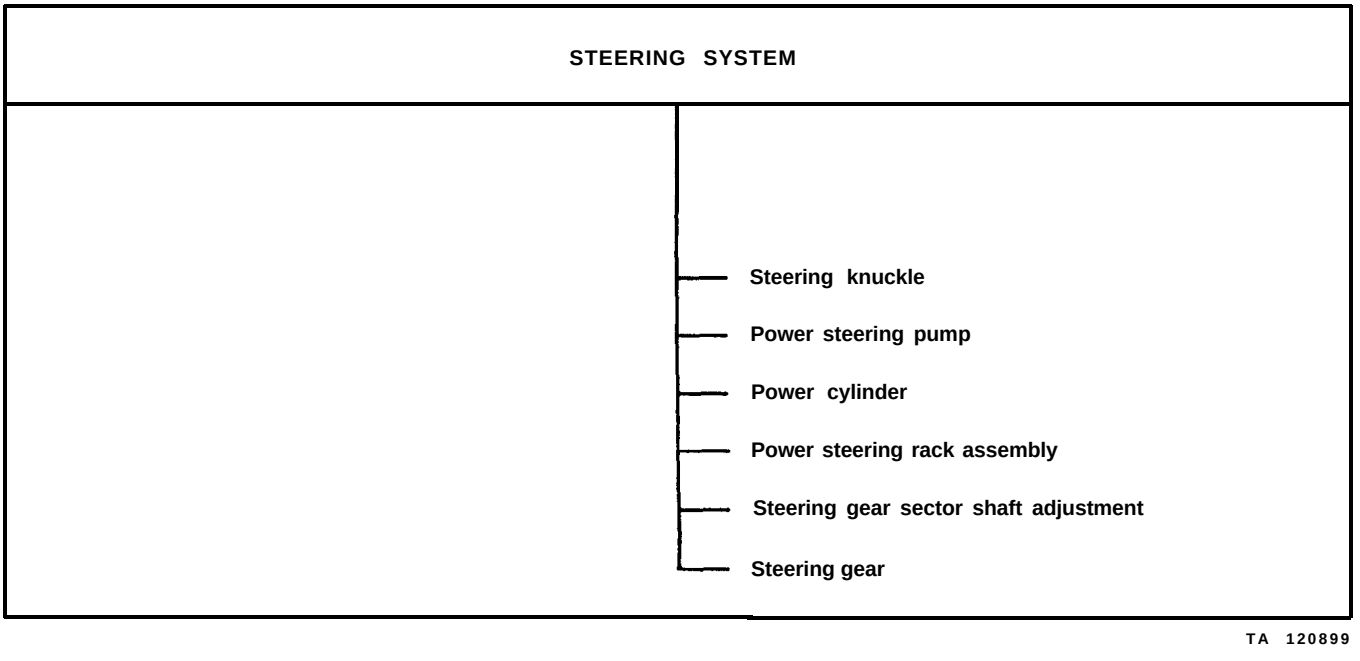


Figure 5-7. Troubleshooting Roadmap, Steering System

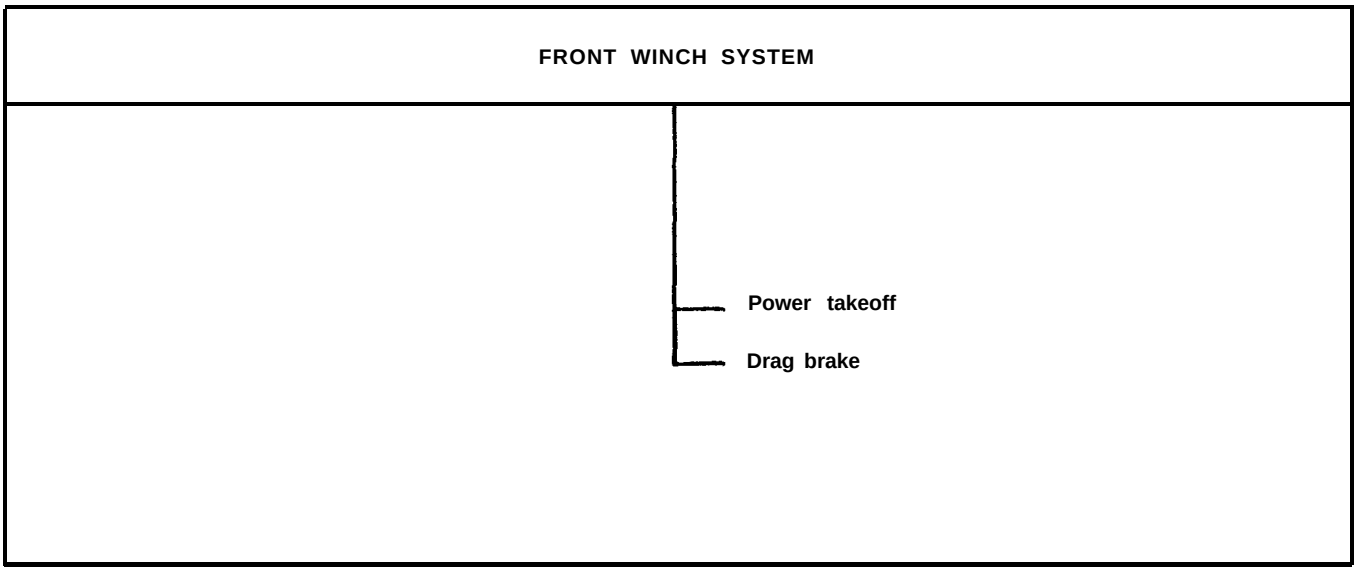


Figure 5-8. Troubleshooting Roadmap, Front Winch System

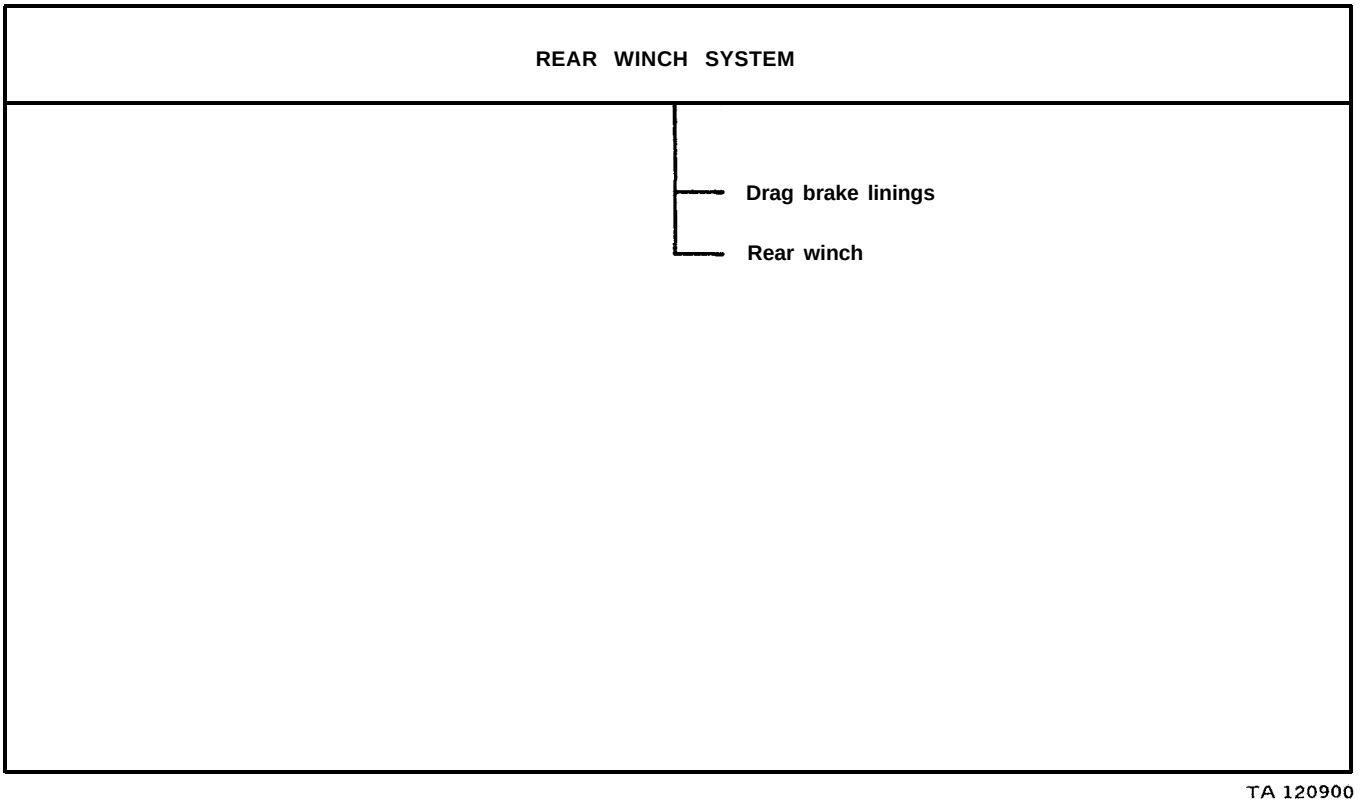


Figure 5-9. Troubleshooting Roadmap, Rear Winch System

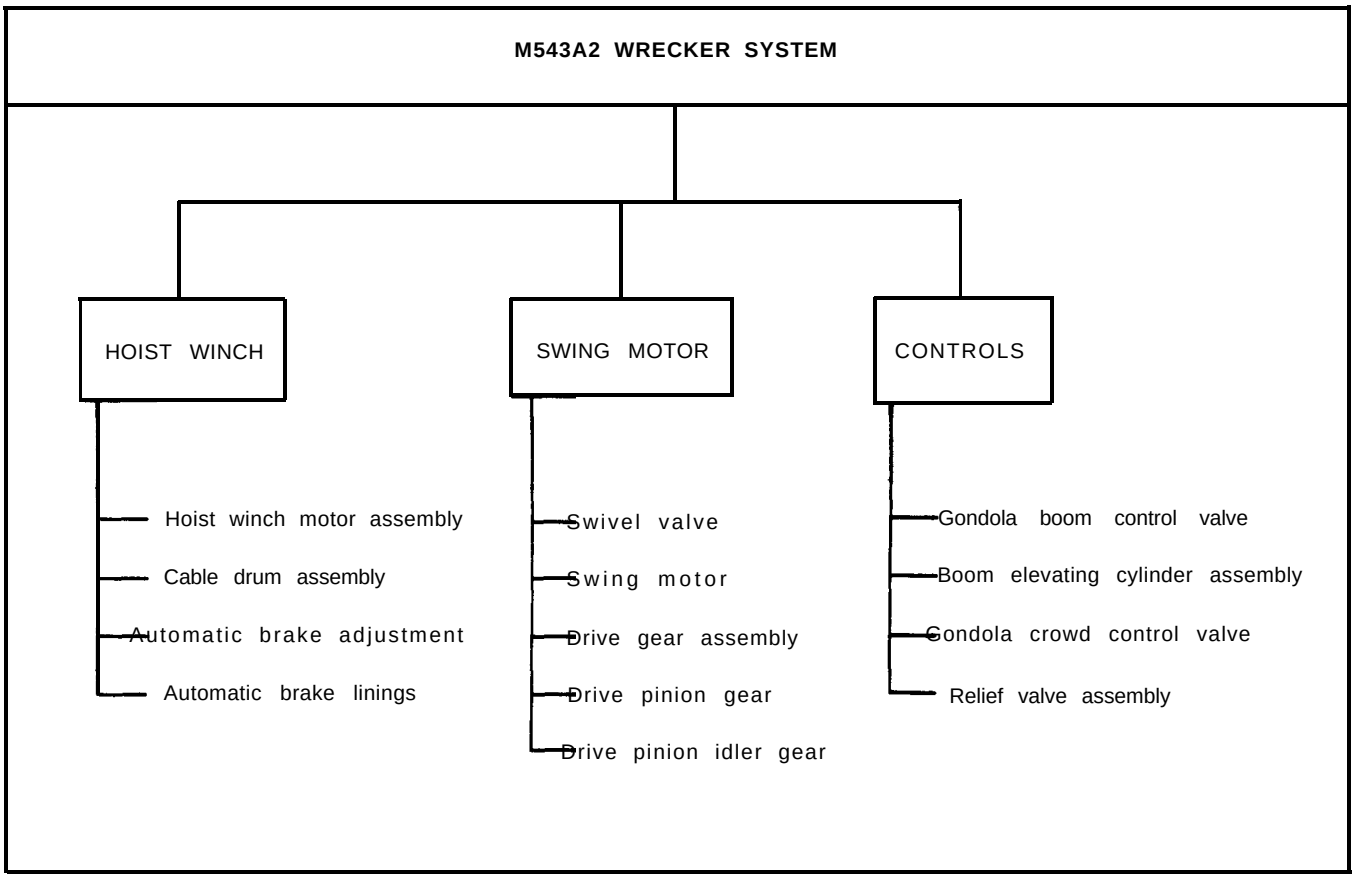


Figure 5-10. Troubleshooting Roadmap, M543A2 Wrecker System

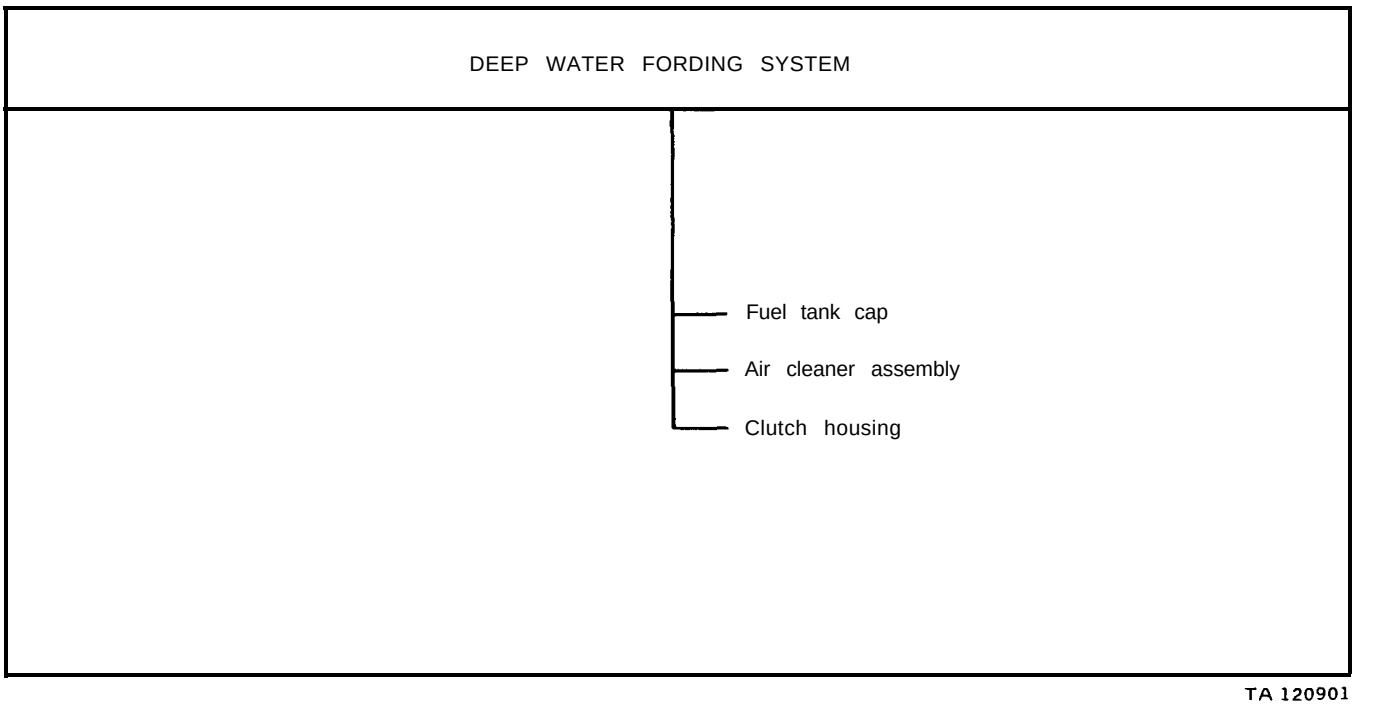


Figure 5-11. Troubleshooting Roadmap, Deep Water Fording System

CHAPTER 6

FAULT SYMPTOM INDEXES

6-1. GENERAL. This chapter gives troubleshooting fault symptom indexes for every system of the truck for which you have detailed troubleshooting procedures. These indexes are in table form (tables 6-1 through 6-11) which gives you a quick way to check what material you have to use to do your troubleshooting.

6-2. INDEXES . Each index is divided into columns which give you information you need to help you do troubleshooting procedures. The following breakdown tells you what is in each column.

a. Subsystem Column. If the main system is divided into subsystems, the subsystems will be listed in this column.

b. Symptom Column. This column lists the symptoms, or problems for which detailed troubleshooting procedures are given.

c. Summary Column. This column tells you where to find the summary troubleshooting procedures for each symptom.

d. Detailed Column. This column tells you where to find the detailed troubleshooting procedure for each symptom.

e. Persons Column. This column tells you how many people are needed to do the troubleshooting procedure.

f. Special Tools Column. Any tools needed to do the troubleshooting procedure which are not included in your common tool kit are listed in this column.

g. Standard Tools Column. A dot in this column means that tools found in your common tool kit are needed to do the troubleshooting procedure.

h. Materials Column. This column tells you what materials are needed to do the troubleshooting procedure. These materials and how they will be issued will be decided by your maintenance officer.

i. Time Column. This column tells you how much time you will need to do the detailed troubleshooting procedure. The time will be decided by your maintenance officer.

FAULT SYMPTOM INDEX

TABLE 6-1. ENGINE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Low oil pressure	—	Figure 8-1	1	—	•		
—	2. Engine runs rough	—	Figure 8-2	1	Checking cylinder compression gage assembly	•		
—	3. Hard starting	—	Figure 8-3	1	Checking cylinder compression gage assembly	•		

FAULT SYMPTOM INDEX

TABLE 6-2. FUEL SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Engine cranks but does not start	—	Figure 10-1	2	—	•		
—	2. Engine runs rough and lacks power	—	Figure 10-2	1	—	•		
—	3. Poor fuel mileage	—	Figure 10-3	1	—	•		

TA 120902

FAULT SYMPTOM INDEX

TABLE 6-3. COOLING SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Engine temperature gage reads above 195° F while running	—	Figure 13-1	1	—	•		

FAULT SYMPTOM INDEX

TABLE 6-4. ELECTRICAL SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D					
					TEST EQUIPMENT				
		SUMMARY	DETAILED		MULTIMETER	HYDROMETER	STANDARD TOOLS	MATERIALS	TIME
ENGINE COOLANT HEATER	1. Engine coolant heater overheats and continues burning		Figure 14-1		•		•		
	2. Engine coolant heater does not give off enough heat	—	Figure 14-2		•		•		
	3. Engine coolant heater does not start	—	Figure 14-3		•		•		
FUEL BURNING HEATER	4. Fuel burning heater overheats and continues burning	—	Figure 14-4		•		•		
	5. Fuel burning heater does not give off enough heat	—	Figure 14-5		•				
	6. Fuel burning heater does not start	—	Figure 14-6		•		•		
ELECTRIC BRAKES	7. When hydraulic brakes are applied, towed load does not have enough braking action	—	Figure 14-7		•				

TA 120903

FAULT SYMPTOM INDEX

TABLE 6-5. FRONT AXLE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED		TEST EQUIPMENT		MATERIALS	TIME
					SPECIAL TOOLS	STANDARD TOOLS		
—	1. Front axle makes noise	—	Figure 16-1	1	Dial indicator	•		
—	2. Shimmy	—	Figure 16-2	1	Dial indicator	•		

FAULT SYMPTOM INDEX

TABLE 6-6. REAR AXLE SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT		MATERIALS	TIME
					SPECIAL TOOLS	STANDARD TOOLS		
—	1. Rear axle makes noise	—	Figure 18-1	1	—	•		
—	2. Too much backlash when driving	—	Figure 18-2	1	—	•		

TA 120904

TABLE 6-7. STEERING SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Hard steering	—	Figure 19-1	2	Power steering oil pressure test set		•	
—	2. Shimmy	—	Figure 19-2	1	—		•	

TABLE 6-8. FRONT WINCH SYSTEM

SUBSYSTEM	SYMTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Winch does not pull load	—	Figure 20-1	1	—	•		
—	2. Winch does not hold load	—	Figure 20-2	1	—	•		
—	3. Winch drum spins too fast when unwinding cable	—	Figure 20-3	1	—	•		

TA 120905

TABLE 6-9. REAR WINCH SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
					TEST EQUIPMENT			
		SUMMARY	DETAILED	PERSONS	SPECIAL TOOLS	STANDARD TOOLS	MATERIALS	TIME
—	1. Winch does not hold load	—	Figure 21-1	1	—	•		

TA 120906

TABLE 6-10. M543A2 WRECKER SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
HOIST WINCH	1. Hoist winch does not pull load	—	Figure 22-1	1	—	•		
	2. Hoist winch pulls load slowly	—	Figure 22-2	1	—	•		
	3. Hoist winch does not hold load	—	Figure 22-3	1	—	•		
	4. Jerky operation as hoist winch pulls load	—	Figure 22-4	1	—	•		
SWING MOTOR	5. Crane does not swing	—	Figure 22-5	2	Pressure gage	•		
	6. Crane swings slowly	—	Figure 22-6	2	Pressure gage	•		
	7. Jerky operation as crane swings	—	Figure 22-7	2	Pressure gage	•		
CONTROLS	8. Boom comes down too fast	—	Figure 22-8	1	—	•		
	9. Boom does not extend or extends and retracts slowly	—	Figure 22-9	1	—	•		
	10. Jerky operation as boom extends or retracts	—	Figure 22-10	1	—	•		

TA 120907

TABLE 6-11. DEEP WATER FORDING SYSTEM

SUBSYSTEM	SYMPTOM	TS PROCEDURE		RESOURCES REQ'D				
		SUMMARY	DETAILED	PERSONS	TEST EQUIPMENT: SPECIAL TOOLS	TEST EQUIPMENT: STANDARD TOOLS	MATERIALS	TIME
	1. Engine stalls while fording		Figure 24-1	1	—	•		
	2. Clutch slips after leaving water		Figure 24-2	1	—	•		

TA 120908

CHAPTER 7

SAMPLE TROUBLESHOOTING PROCEDURES

7-1. GENERAL. This chapter gives a sample troubleshooting procedure. The purpose of the sample procedure is to help you see how detailed troubleshooting procedures, test equipment procedures, and summary troubleshooting procedures are used to find faults in a system.

7-2. SAMPLE DETAILED PROCEDURE. (See figure 7-1.) The sample detailed procedure given is the fuel system troubleshooting procedure for the symptom, STARTER MOTOR WILL NOT CRANK ENGINE. This symptom is one you will have when you try to start your truck and certain parts on the truck are not working correctly. In each numbered box, instructions are given which tell you what to do, and how to do it. A large dot is placed next to the "what-to-do" instructions, and small dots next to the "how-to-do-it" instructions.

a. Box number 1 gives general instructions on getting the truck ready before you start to troubleshoot.

b. Box number 2 gives fault isolation test instructions. In this case you are told to check starting system circuit for loose, burned, or broken leads and connections. These tests or checks, are often referred to in detailed troubleshooting procedures to help you find the problem and fix it. After you do the tests or checks you read the question at the bottom of box number 2. If the starter system is not okay, the answer to the question is (NO), so you go to the next box.

c. Box number 3 gives you a corrective action. In this case the fault is burned or broken leads or connectors. The corrective action is what you do to fix the fault, which is to replace any burned or broken leads or connectors. If the engine still doesn't start after you do this, it could mean that there are other faults in the system. When this happens, go back to the beginning of the procedure and do each step again until you find the other faults.

d. Sometimes the corrective actions given for a fault will tell you what to do to fix the fault, but will not give you detailed instructions on how to fix it. Instead, you will be told to refer to another volume in this manual for these instructions. Box number 4 is an example of this.

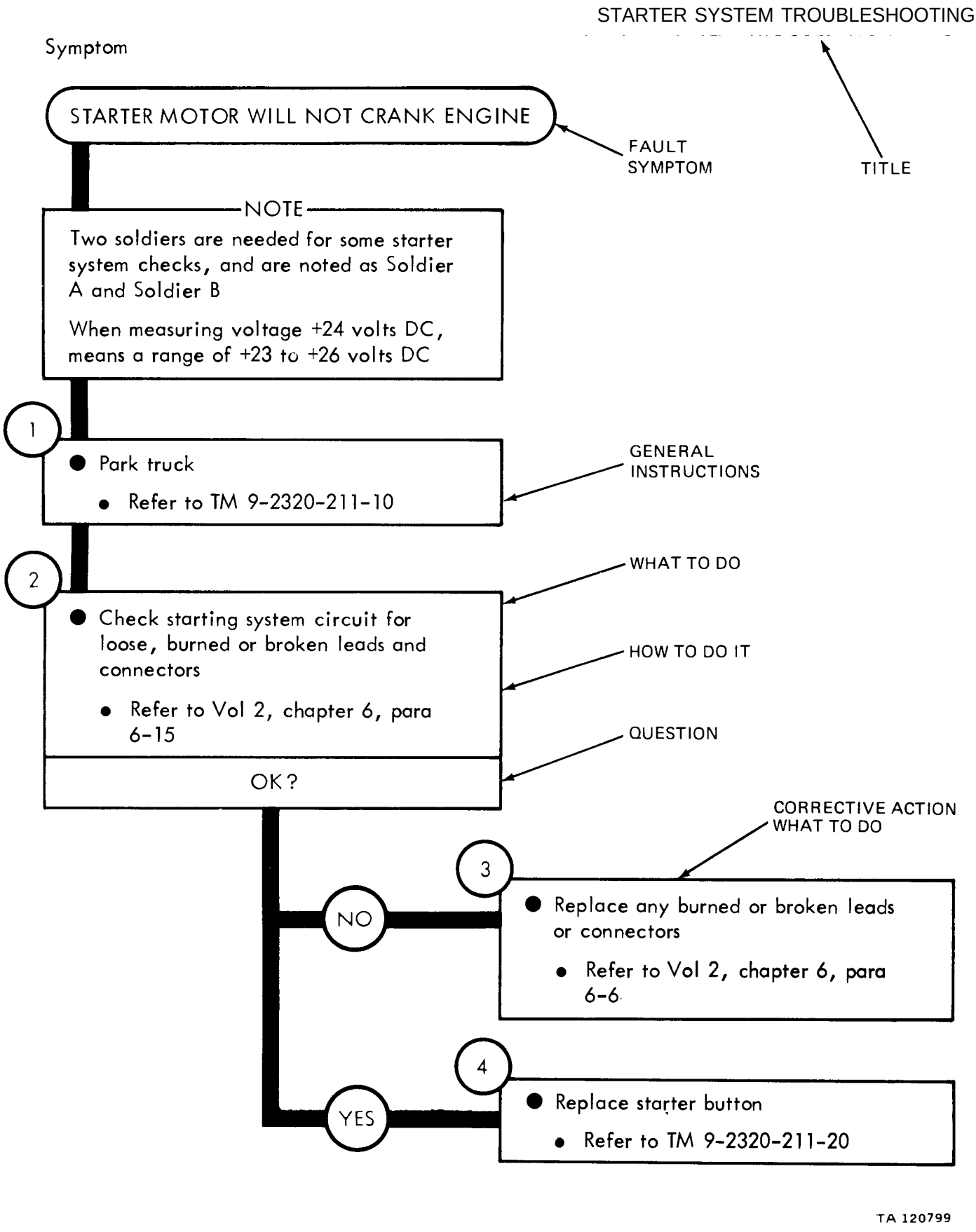


Figure 7-1. Sample Troubleshooting Procedure

CHAPTER 8

ENGINE SYSTEM TROUBLESHOOTING

8-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Engine System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

8-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

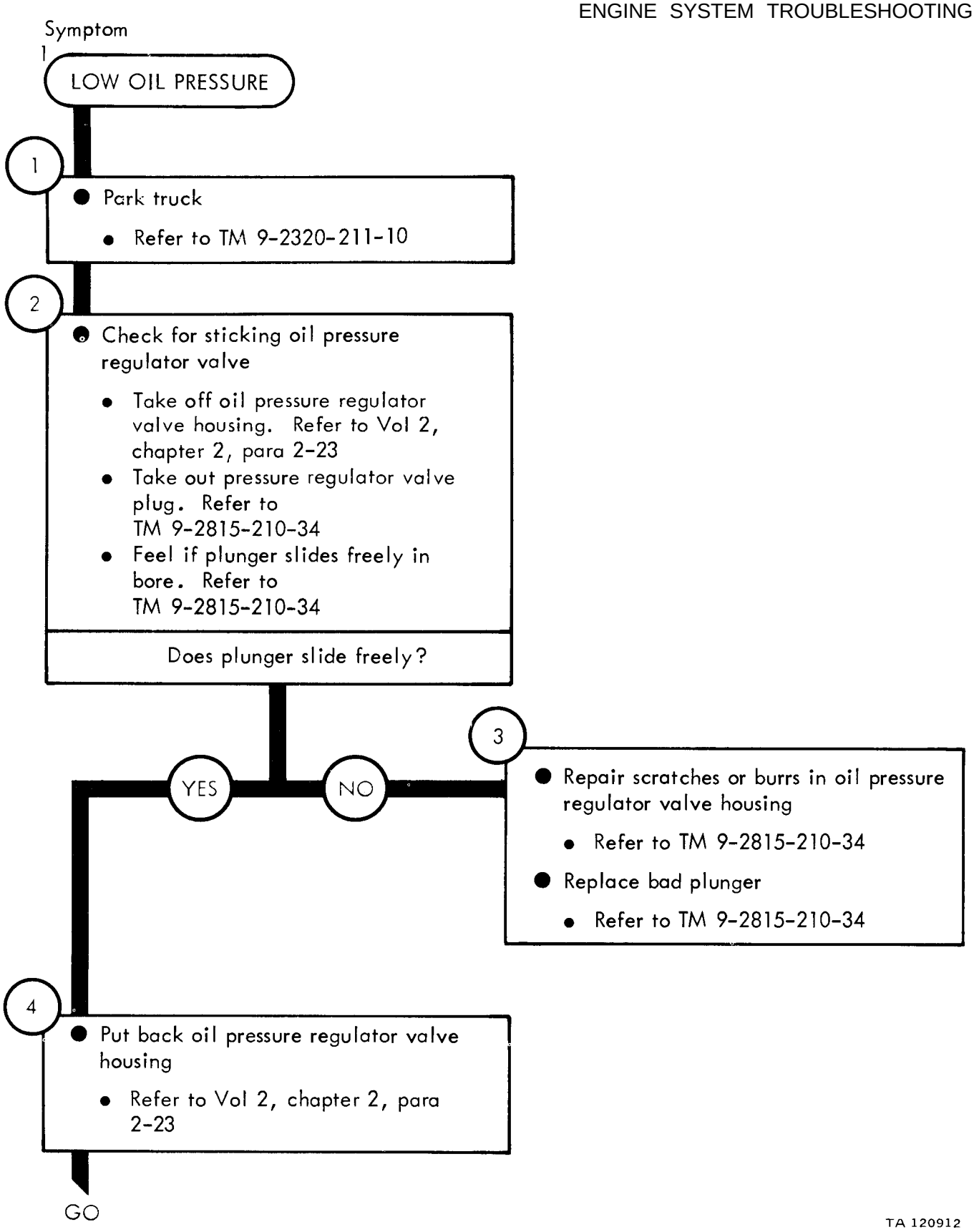


Figure 8-1 (Sheet 1 of 4)

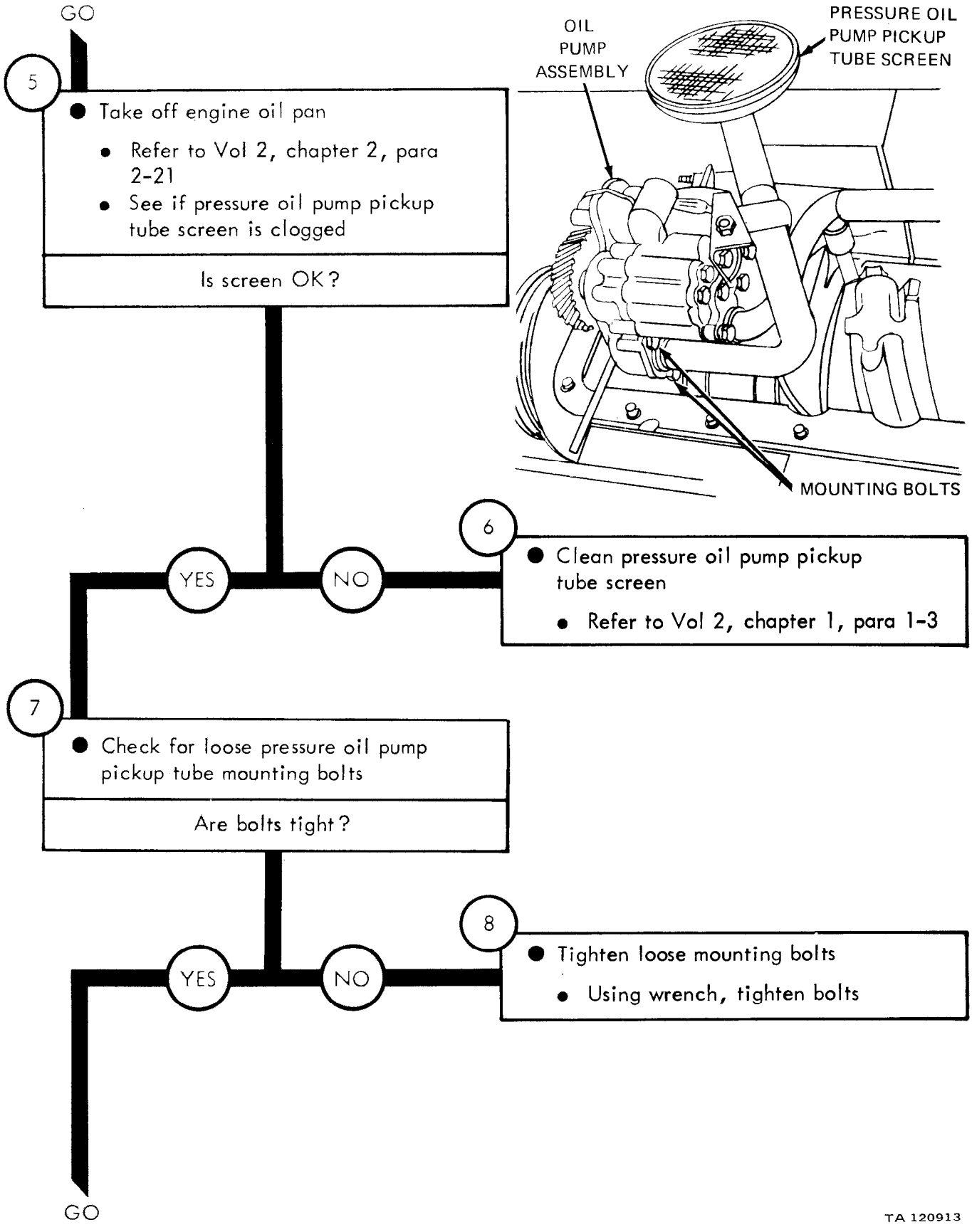


Figure 8-1 (Sheet 2 of 4)

GO

9

- Check for loose pressure oil pump outlet tube mounting bolts at oil pump and engine block

Are mounting bolts tight?

YES

NO

10

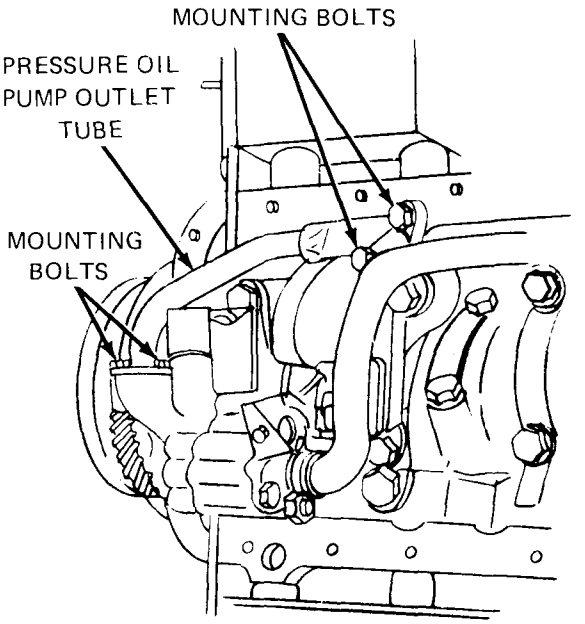
- Tighten loose mounting bolts

11

- Replace oil pump
  - Refer to Vol 2, chapter 2, para 2-20
- Put back oil pan
  - Refer to Vol 2, chapter 2, para 2-21
- Fill crankcase with correct amount of engine oil
  - Refer to LO 9-2320-211-12
- Start engine
  - Refer to TM 9-2320-211-10

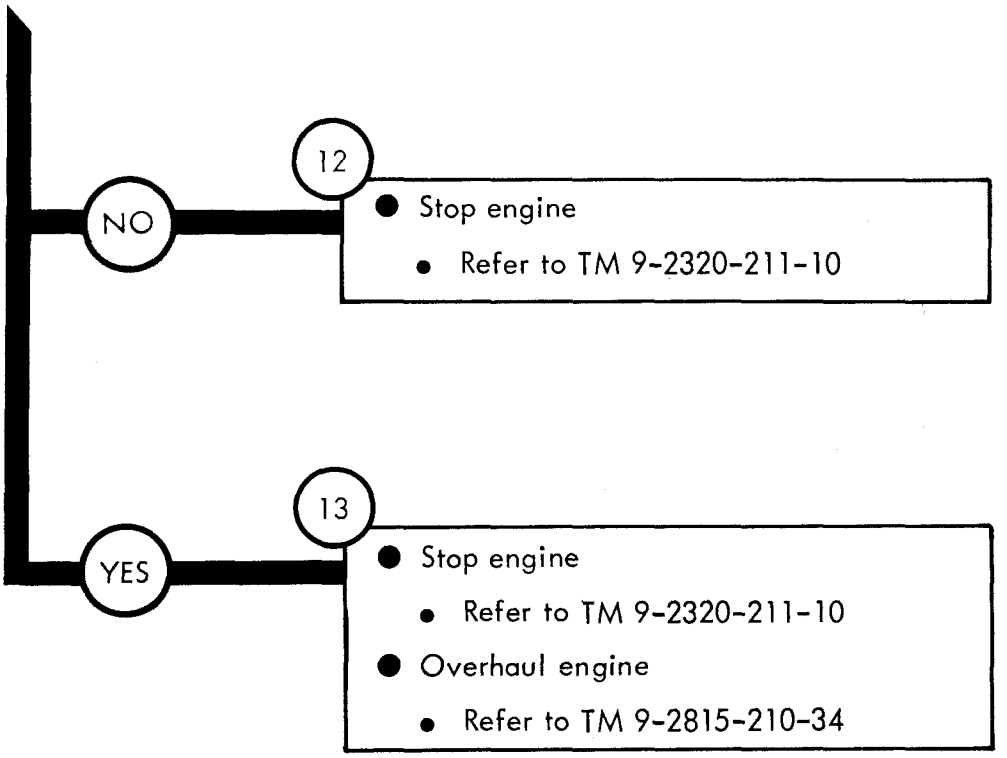
Is oil pressure still low?

GO



TA 120914

Figure 8-1 (Sheet 3 of 4)



TA 120915

Figure 8-1 (Sheet 4 of 4)

Symptom

2 ENGINE RUNS ROUGH

1
- Park truck
  - Refer to TM 9-2320-211-10

2
- Take off engine cylinder head rocker covers
  - Refer to TM 9-2320-211-10

3
- Check valve springs and pushrods
  - Look for broken valve springs
  - Look for bent pushrods

Are valve springs and pushrods OK?

YES

NO

4
- Replace broken valve springs
  - Refer to TM 9-2815-210-34
- Replace bent push rods
  - Refer to Vol 2, chapter 2, para 2-14

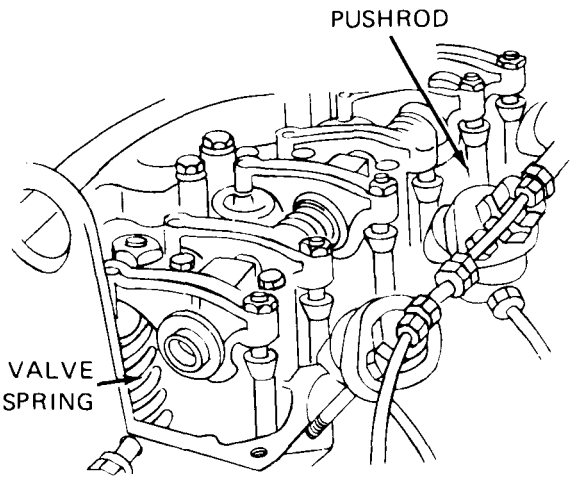


Figure 8-2 (Sheet 1 of 2)

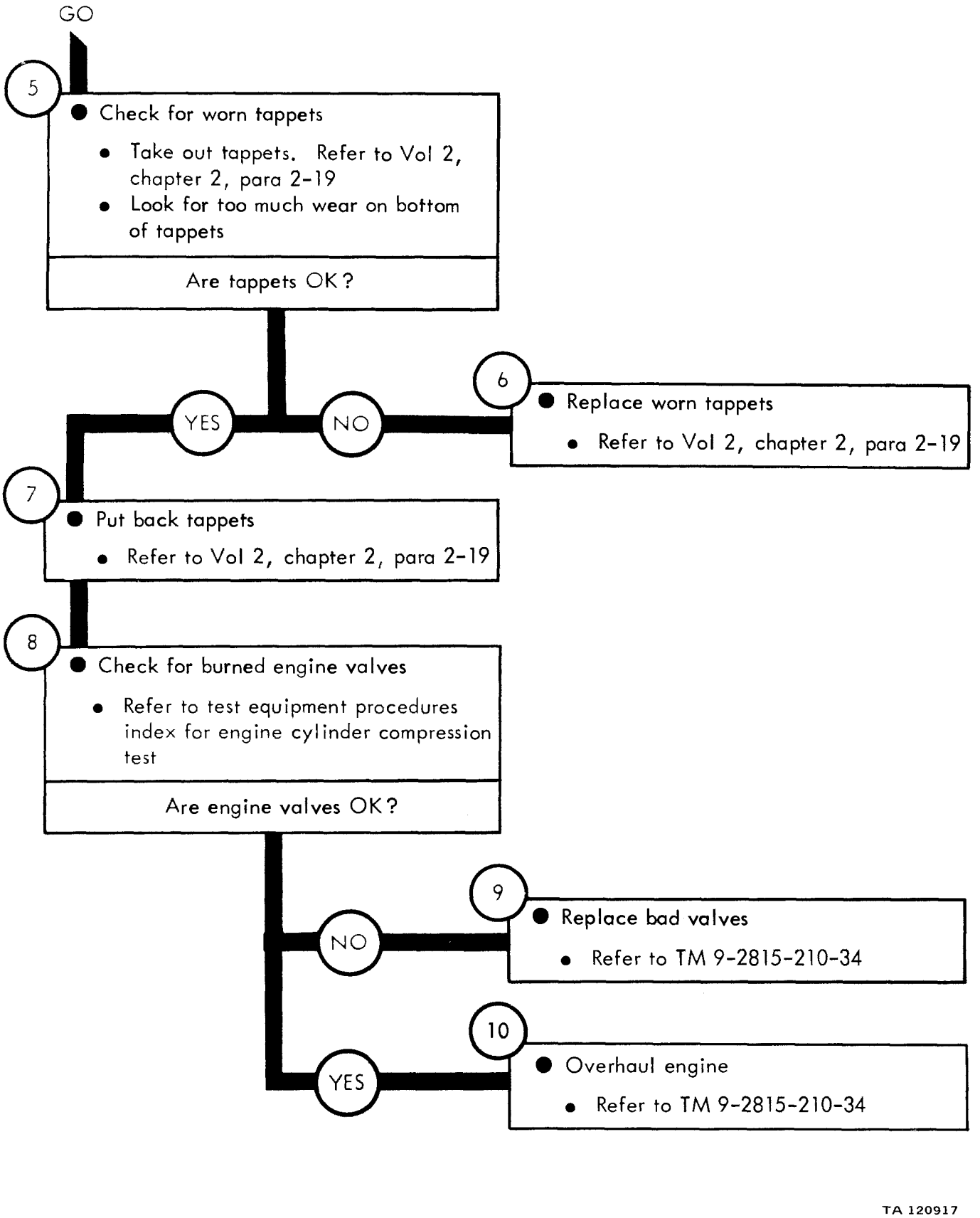


Figure 8-2 (Sheet 2 of 2)

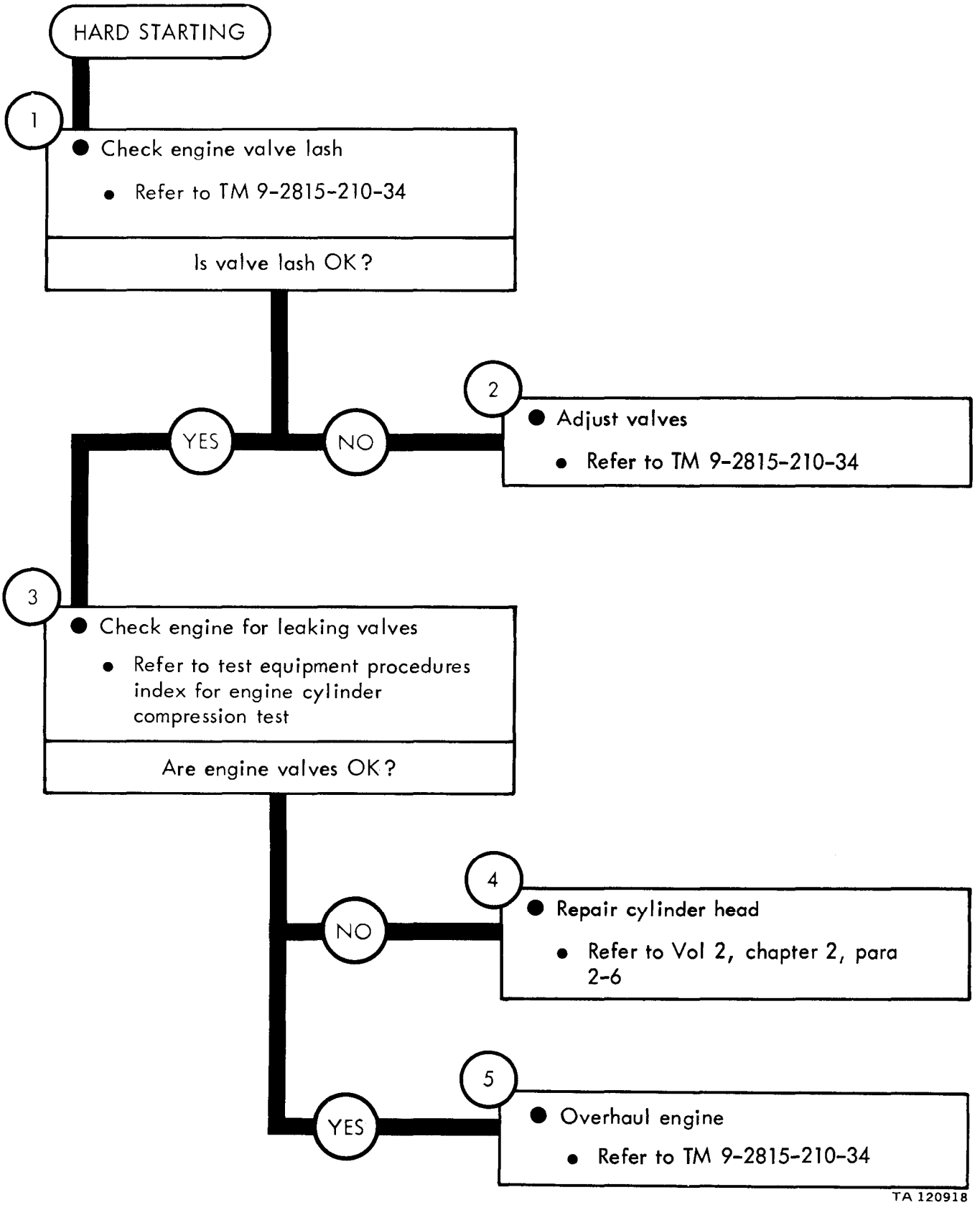

HARD STARTING
1
● Check engine valve lash
• Refer to TM 9-2815-210-34
Is valve lash OK?
YES
NO
2
● Adjust valves
• Refer to TM 9-2815-210-34
3
● Check engine for leaking valves
• Refer to test equipment procedures index for engine cylinder compression test
Are engine valves OK?
NO
4
● Repair cylinder head
• Refer to Vol 2, chapter 2, para 2-6
YES
5
● Overhaul engine
• Refer to TM 9-2815-210-34
TA 120918

Figure 8-3

CHAPTER 9

ENGINE SYSTEM TEST PROCEDURES

9-1. GENERAL. This chapter gives test procedures for the tests given in chapter 8, for the Engine System.

9-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

9-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

ENGINE CYLINDER COMPRESSION TEST

1
- Start engine and warm up to operating temperature
  - Refer to TM 9-2320-211-10
- Turn off engine
  - Refer to TM 9-2320-211-10

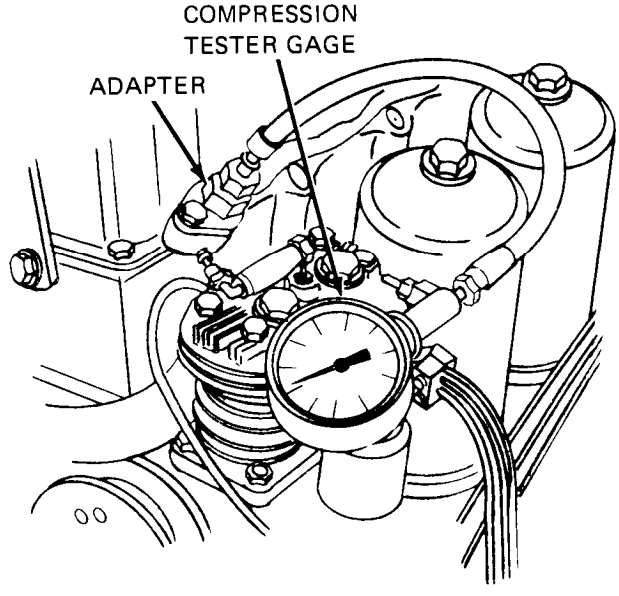
2
- Take out all 6 fuel injector nozzle and holder assemblies
  - Refer to Vol 2, chapter 4, para 4-3

3
- Put compression gage onto number one fuel injector opening in cylinder head
  - Using new fuel injector nozzle to head gasket, put on adapter
  - Put compression gage onto adapter

4
- Crank engine for 5 seconds
  - Refer to TM 9-2320-211-10

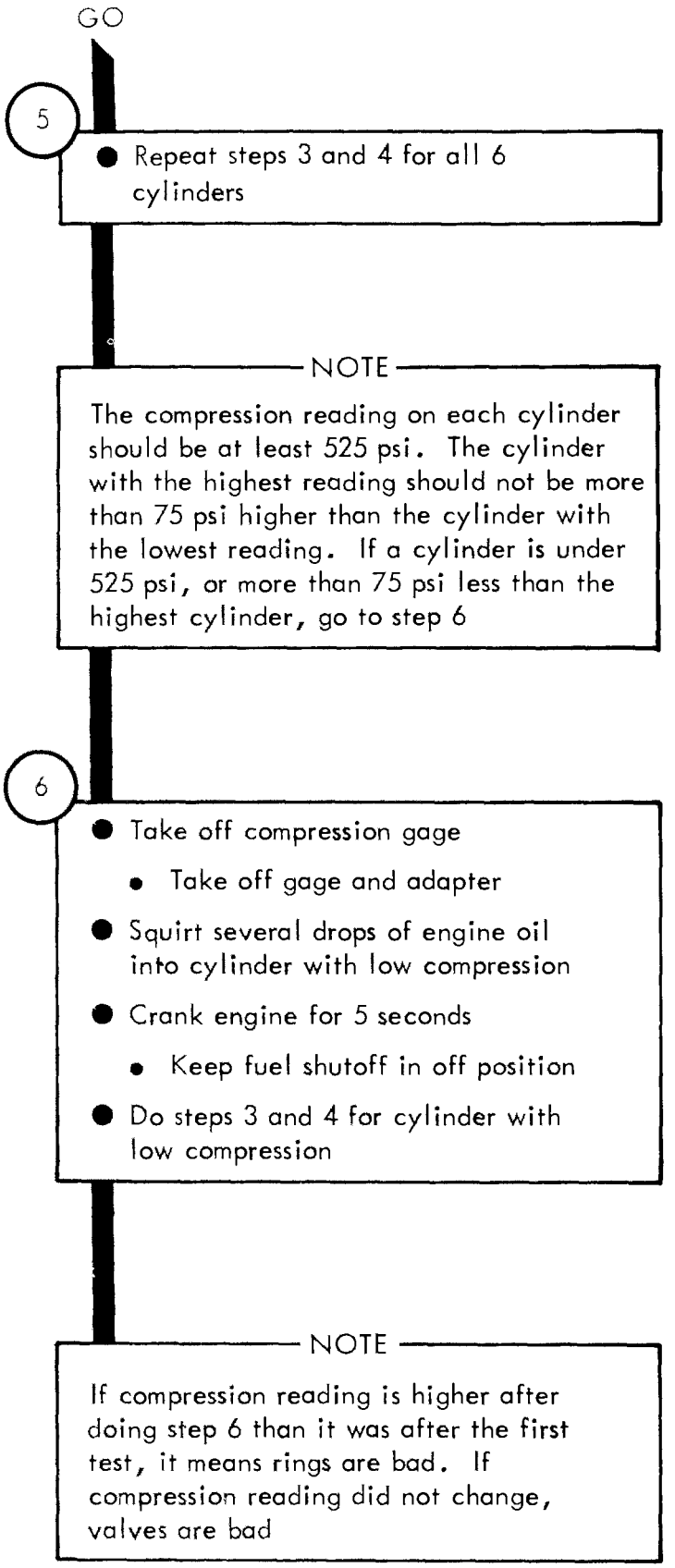
  Note: Keep fuel shutoff in off position
  - Read compression from gage and write down reading

GO



TA 120919

Figure 9-1 (Sheet 1 of 2)



TA 120920

Figure 9-1 (Sheet 2 of 2)

CHAPTER 10

FUEL SYSTEM TROUBLESHOOTING

10-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Fuel System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

10-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

Symptom

ENGINE CRANKS BUT DOES NOT START

WARNING

Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking may cause a fire. Keep a fire extinguisher close by

NOTE

The following procedure will need the use of two soldiers. The lead soldier will be called Soldier A. The helper will be called Soldier B

1

- Check for fuel supply from fuel injection pump

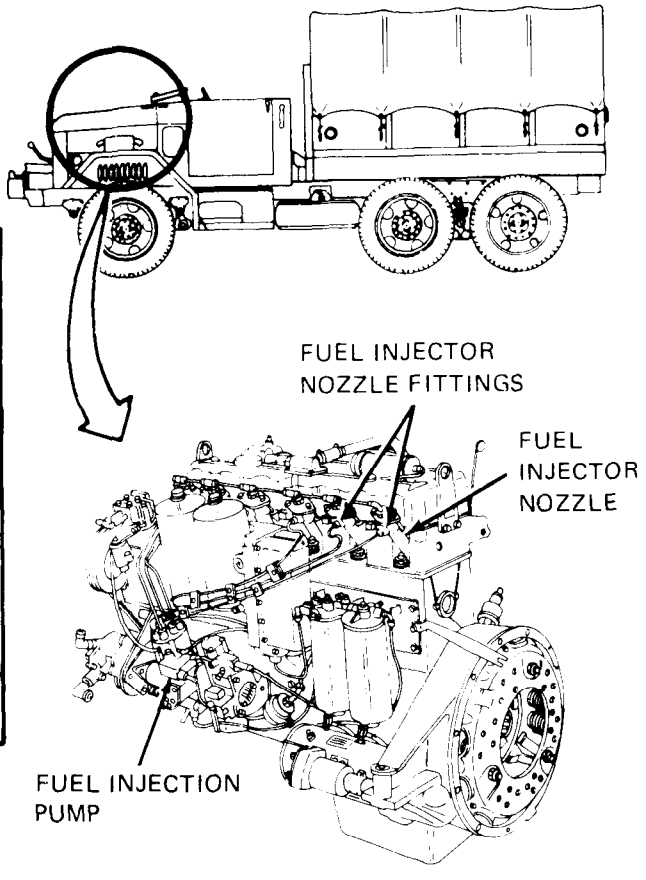
SOLDIER A • Loosen one fuel injector nozzle fitting but do not take it off

SOLDIER B • Crank engine for 5 seconds. Refer to TM 9-2320-211-10

SOLDIER A • See if fuel comes out of fuel injector nozzle fitting

Does fuel come out of fitting?

GO



TA 120921

Figure 10-1 (Sheet 1 of 3)

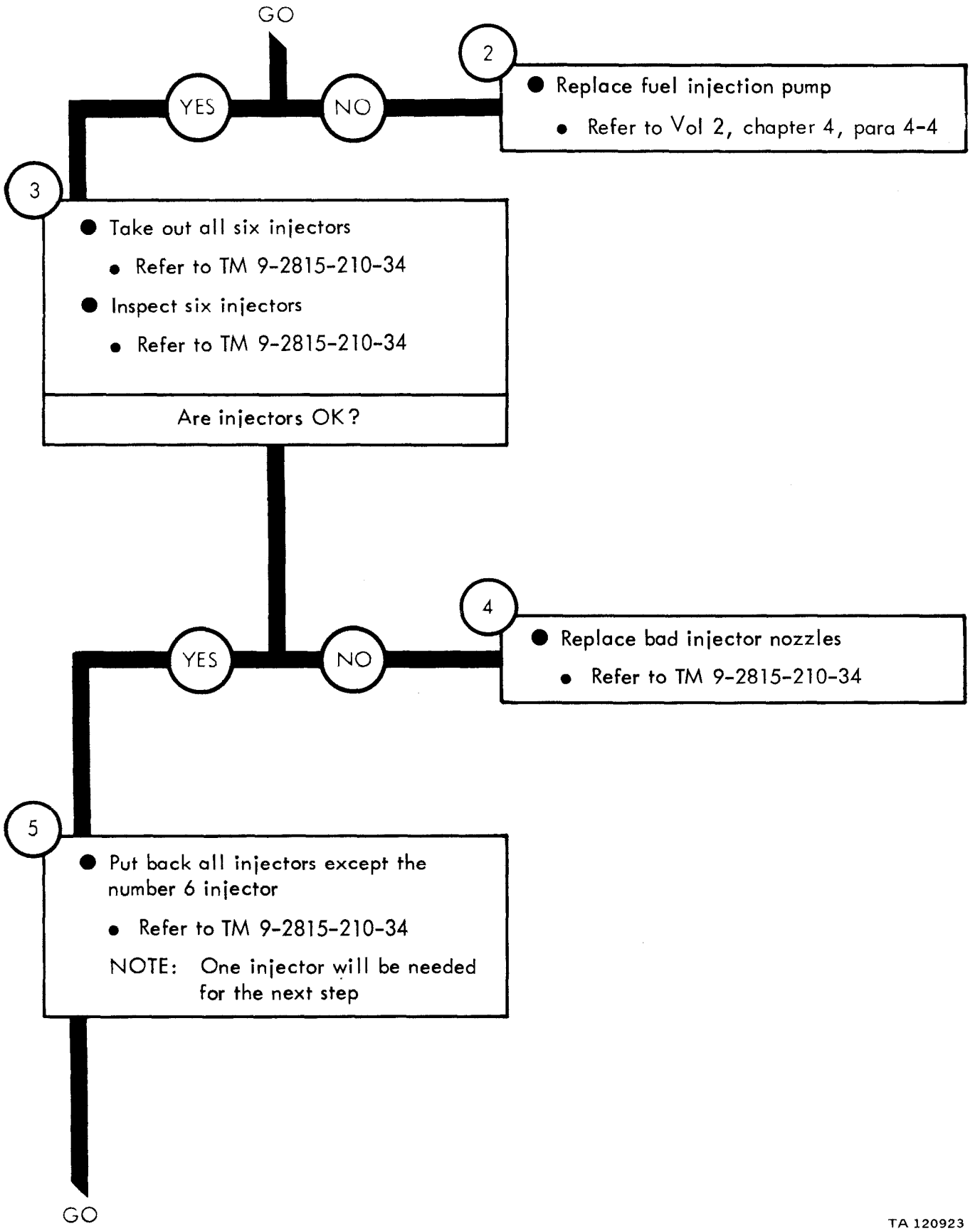


Figure 10-1 (Sheet 2 of 3)

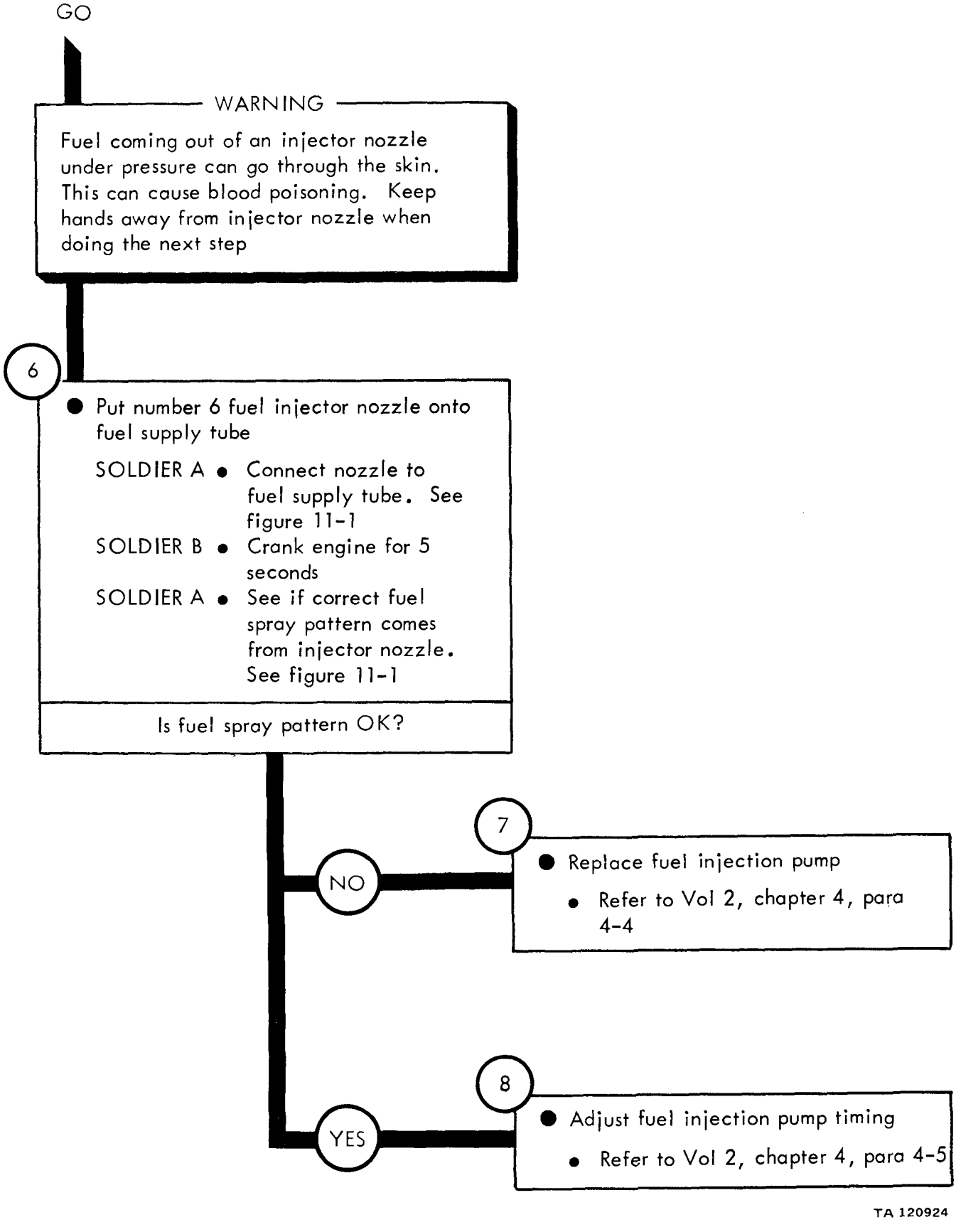


Figure 10-1 (Sheet 3 of 3)

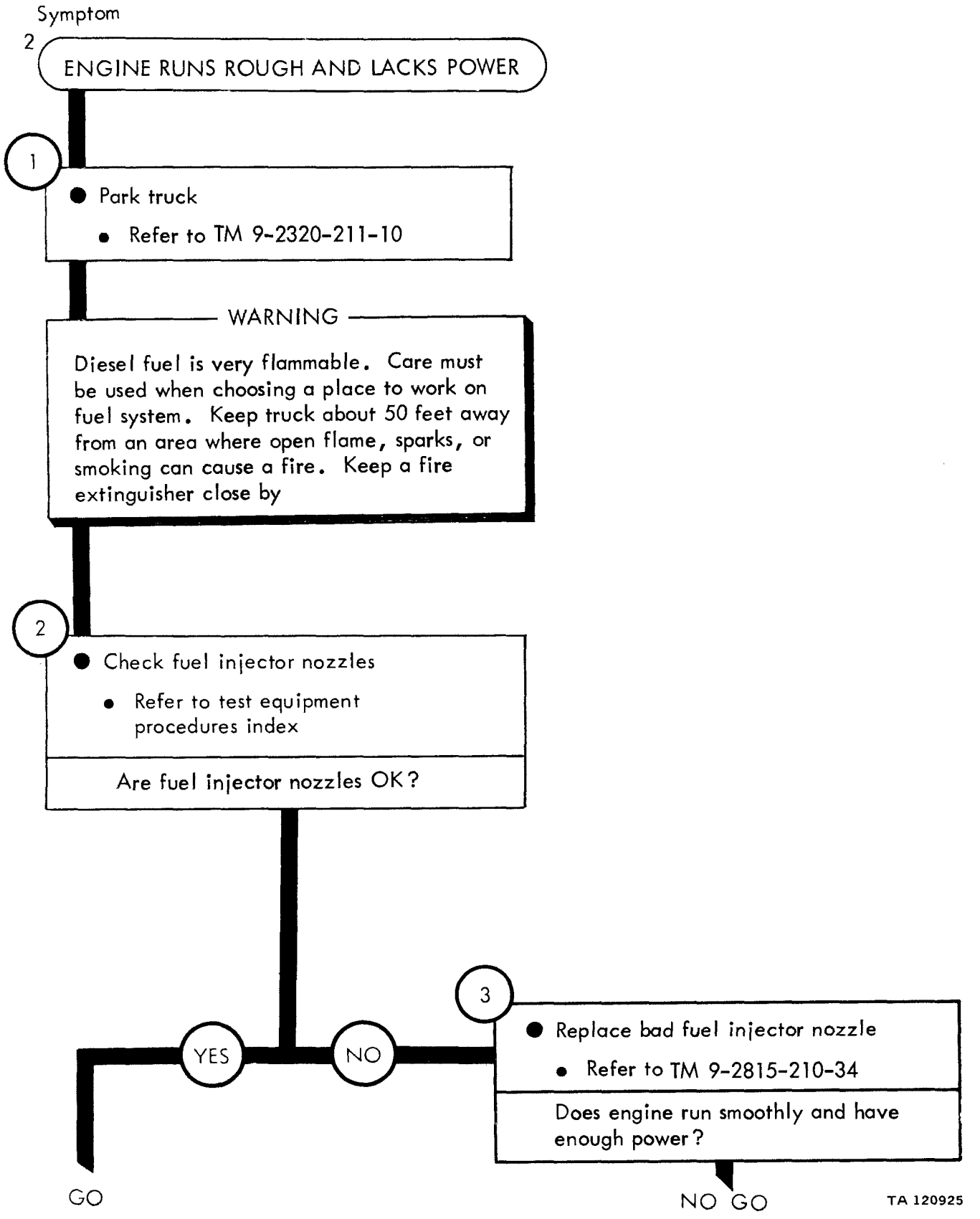
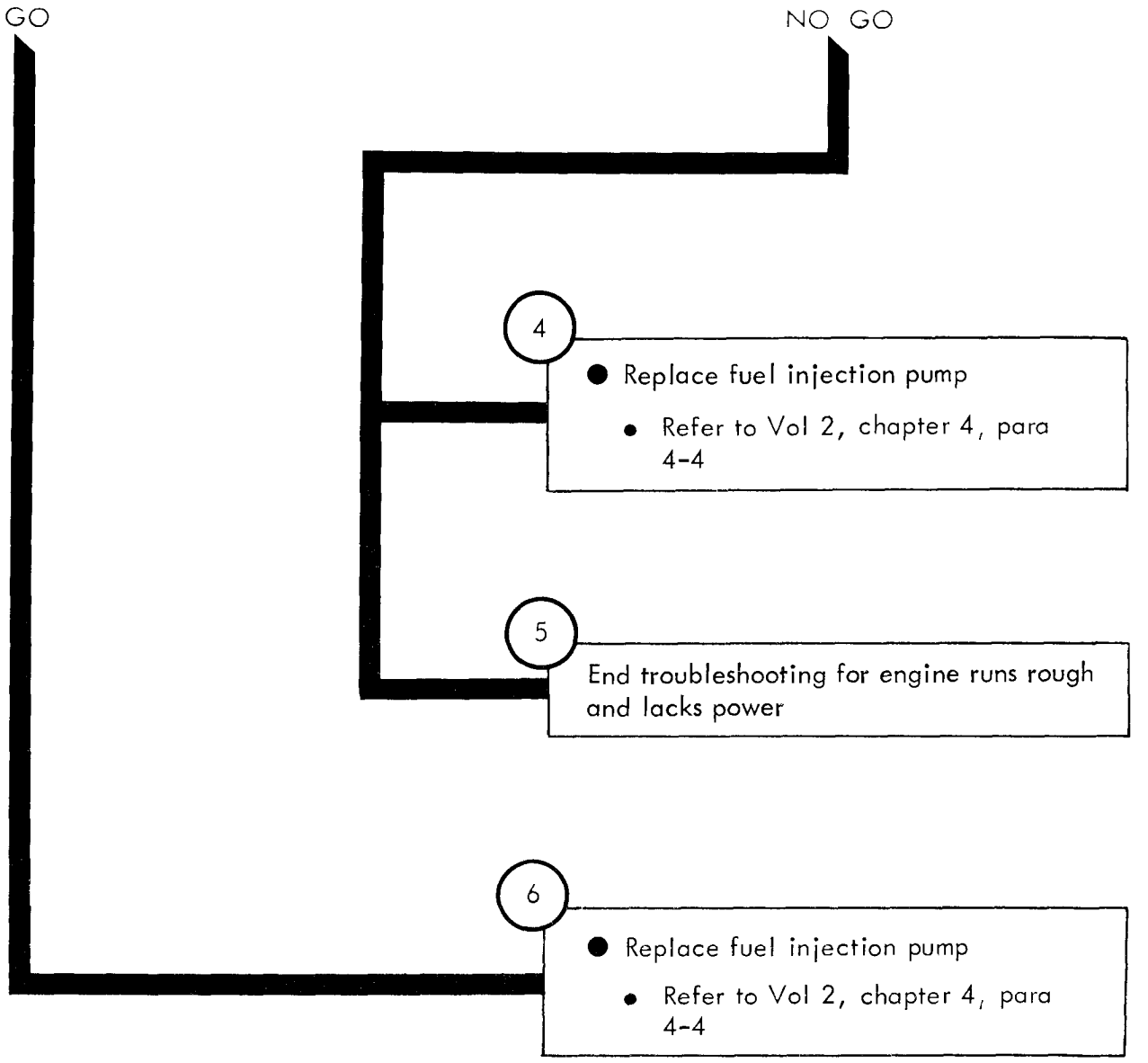


Figure 10-2 (Sheet 1 of 2)



TA 120926

Figure 10-2 (Sheet 2 of 2)

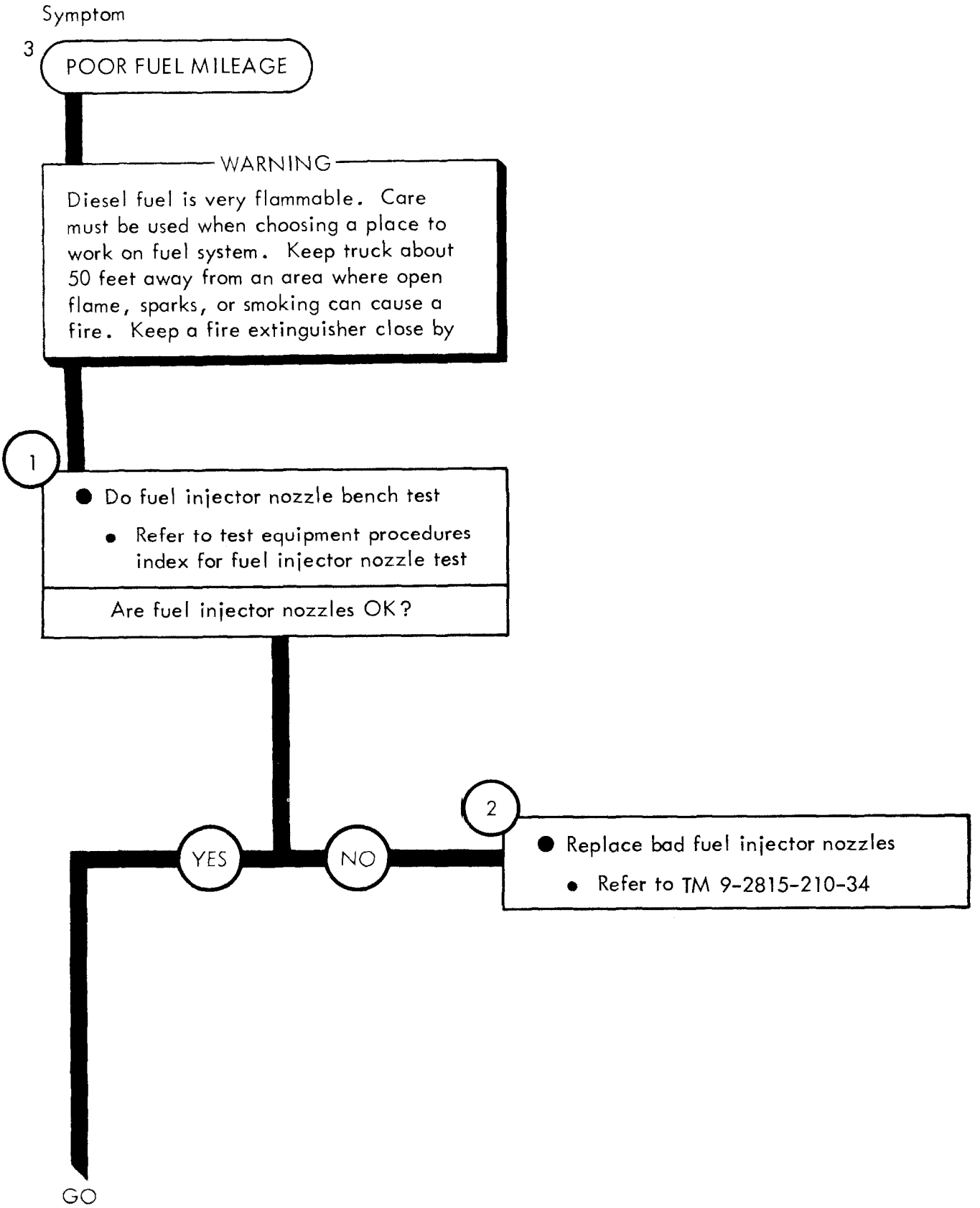


Figure 10-3 (Sheet 1 of 3)

GO

3

- Retighten fuel injector nozzles

NOTE

The next step is done only on the LDT - 465 - IC turbocharged engine. For engines without turbocharger, go to step 7

4

- Check turbocharger for sticking shaft and bent or broken impeller blades
  - Take off turbocharger air cleaner to impeller air tube. Refer to TM 9-2320-211-20
  - Turn turbocharger impeller by hand several times
  - Feel for sticking impeller shaft

  Note: Impeller should turn freely with no rubbing or sticking
  - See if impeller blades are bent or broken

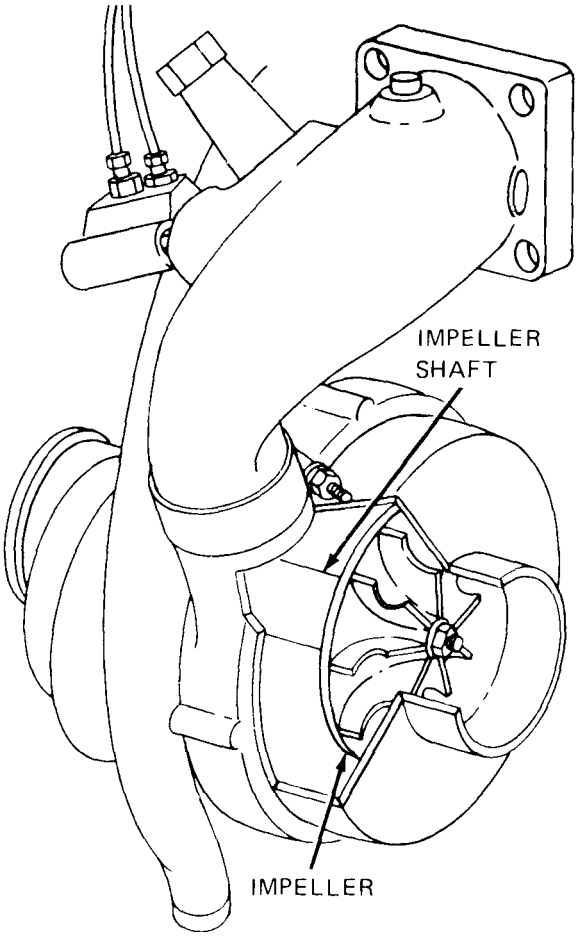
Is turbocharger OK?

NO

5

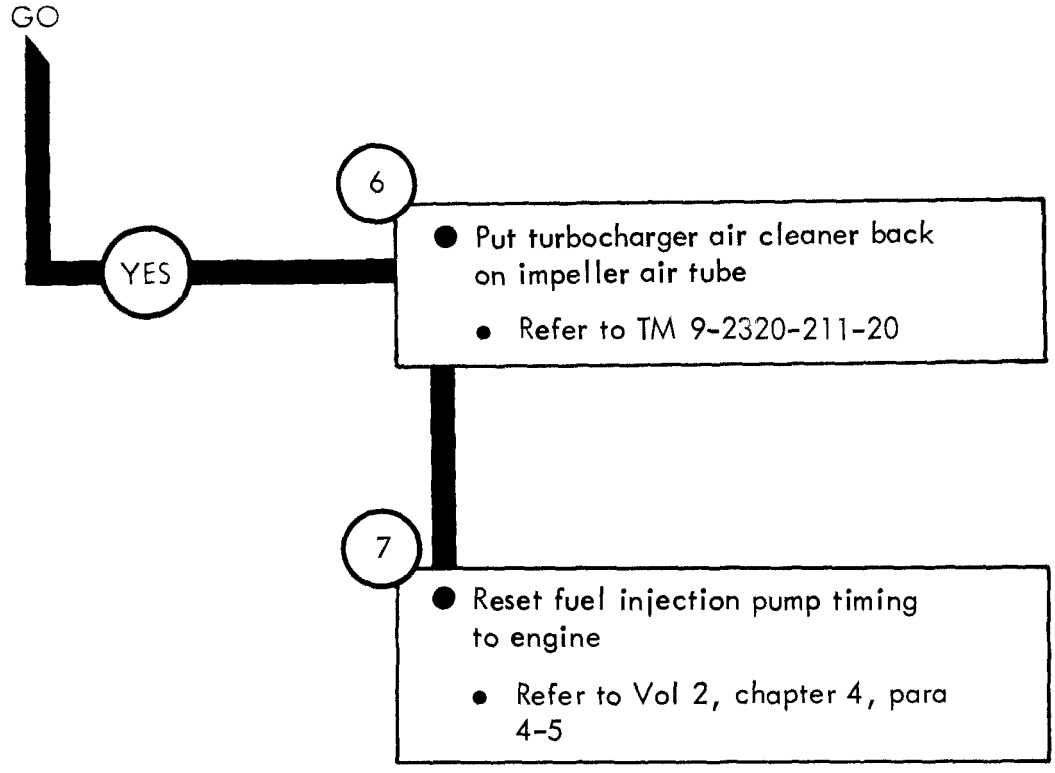
- Replace turbocharger
  - Refer to TM 9-2815-210-34

GO



TA 120928

Figure 10-3 (Sheet 2 of 3)



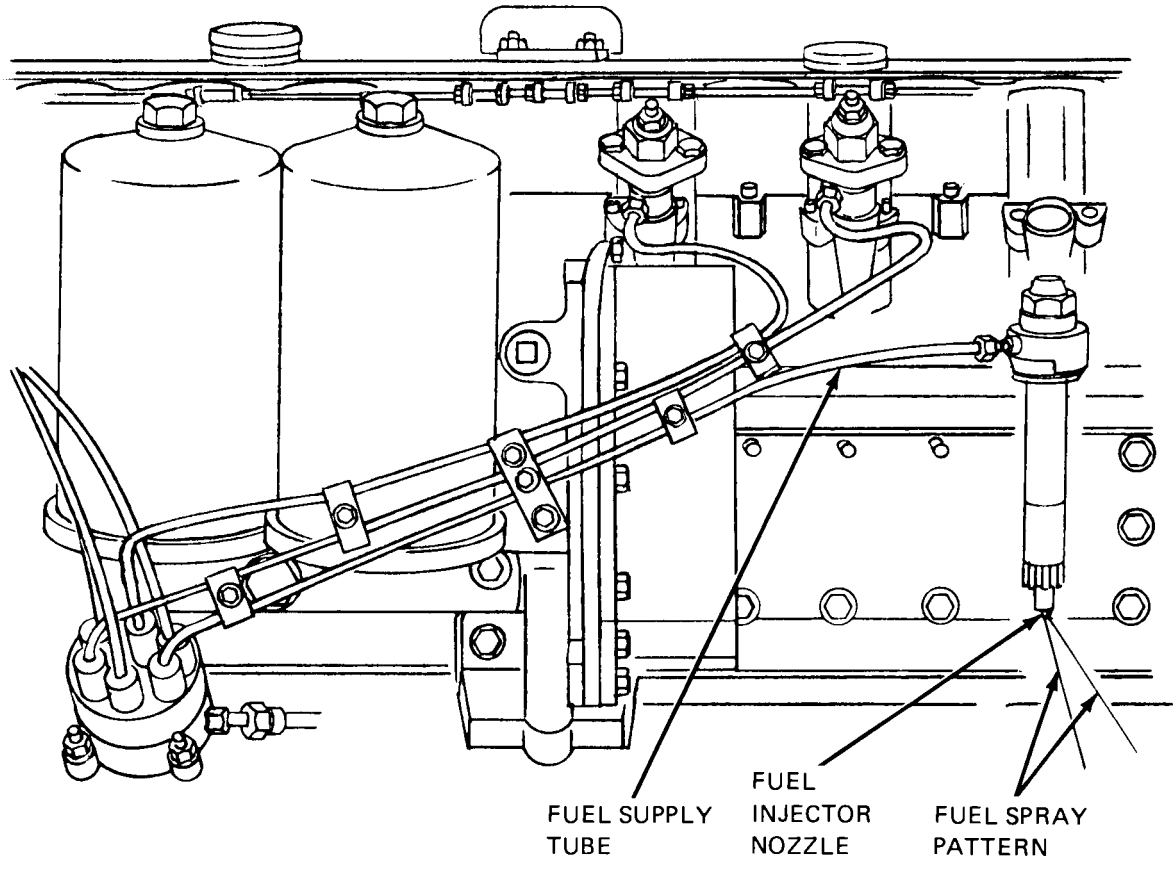
TA 120929

Figure 10-3 (Sheet 3 of 3)

CHAPTER 11

FUEL SYSTEM SUPPORT DIAGRAMS

11-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 10. Figure 3-1 is a complete listing of all support diagrams used in this manual.



TA 120930

Figure 11-1. Fuel Injectors and Fuel Lines

CHAPTER 12

FUEL SYSTEM TEST PROCEDURES

12-1. GENERAL. This chapter gives test procedures for the tests given in chapter 10, for the Fuel System.

12-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

12-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

FUEL INJECTOR NOZZLE TEST

1

- Start and warm up engine
  - Refer to TM 9-2320-211-10

WARNING

Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel system. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by

NOTE

Put rag under line fittings before loosening to catch any fuel which drips out

2

- Loosen fuel injector nozzle fitting of one fuel injector nozzle and see if engine runs rougher

  Note: If engine runs rougher the injector nozzle is OK

- Tighten fuel injector nozzle fitting

  Note: Do procedure for each fuel injector nozzle fitting

3

- Stop engine
  - Refer to TM 9-2320-211-10

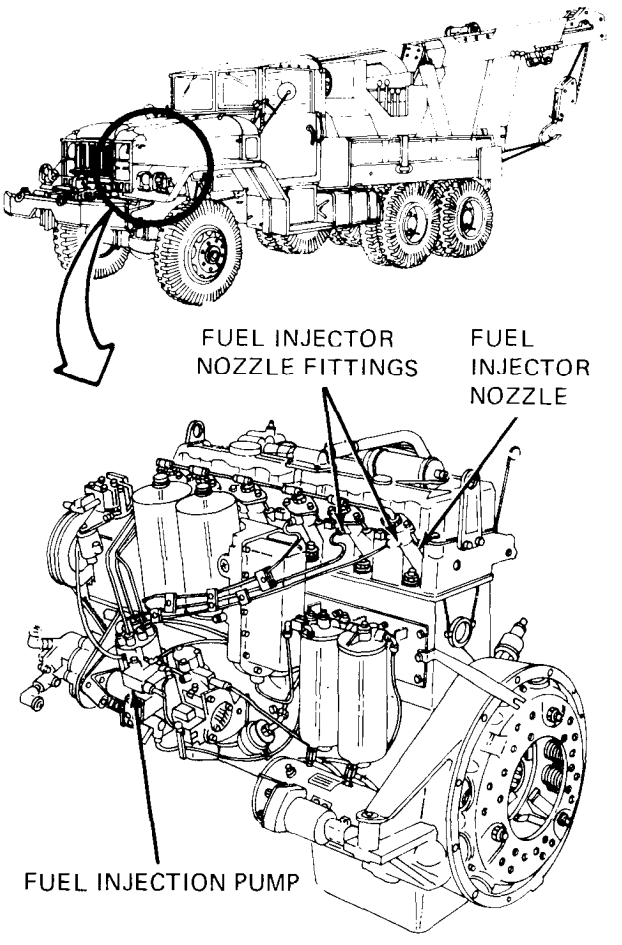


Figure 12-1

CHAPTER 13

COOLING SYSTEM TROUBLESHOOTING

13-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Cooling System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

13-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

COOLING SYSTEM TROUBLSHOOTING

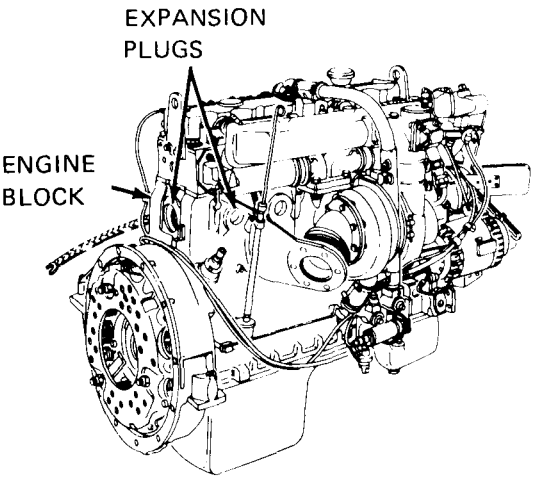
Symptom

1 ENGINE TEMPERATURE GAGE READS ABOVE 195°F WHILE RUNNING

1
- Park truck
  - Refer to TM 9-2320-211-10

2
- Check expansion plugs for water leaks
  - Look for signs of rust or water stains coming from expansion plugs
  - Look for cracks in engine block around expansion plugs

Are expansion plugs and engine block OK?



YES

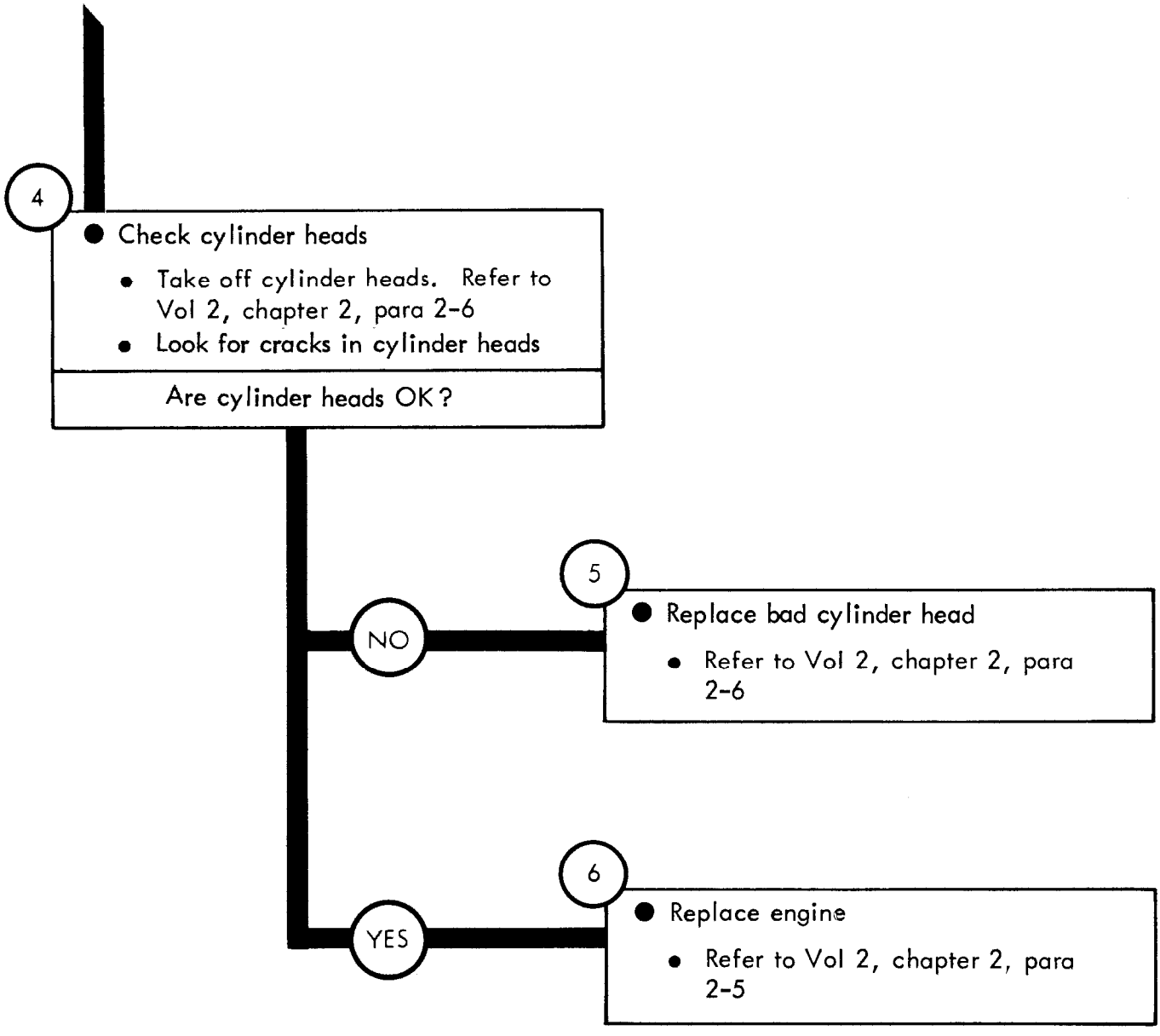
NO

3
- Replace bad expansion plugs
  - Refer to TM 9-2815-210-34
- Replace cracked engine block
  - Refer to TM 9-2815-210-34

GO

TA 120932

Figure 13-1 (Sheet 1 of 2)



TA 120933

Figure 13-1 (Sheet 2 of 2)

CHAPTER 14

ELECTRICAL SYSTEM TROUBLESHOOTING

14-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Electrical System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

14-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

Symptom 1

ENGINE COOLANT HEATER OVERHEATS AND CONTINUES BURNING

NOTE

When measuring voltage +24 volts DC means a range of +23 to +26 volts DC

1

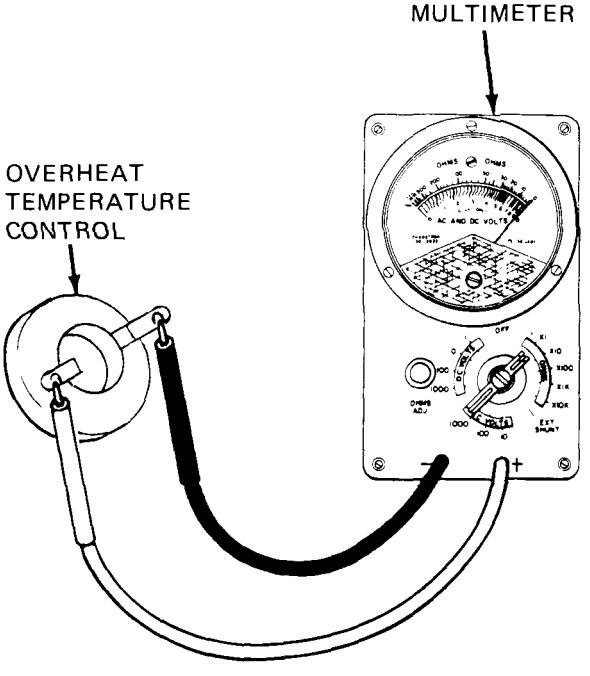
- Park truck
  - Refer to TM 9-2320-211-10

2

- Check overheat temperature control for continuity
  - Take out overheat temperature control Refer to Vol 2, chapter 19, para 19-19
  - Set multimeter to check continuity. Refer to TM 9-2320-211-20
  - Put multimeter - lead on contact of overheat temperature control
  - Put multimeter + lead on other end of overheat temperature control
  - Read multimeter. Multimeter should measure zero ohms

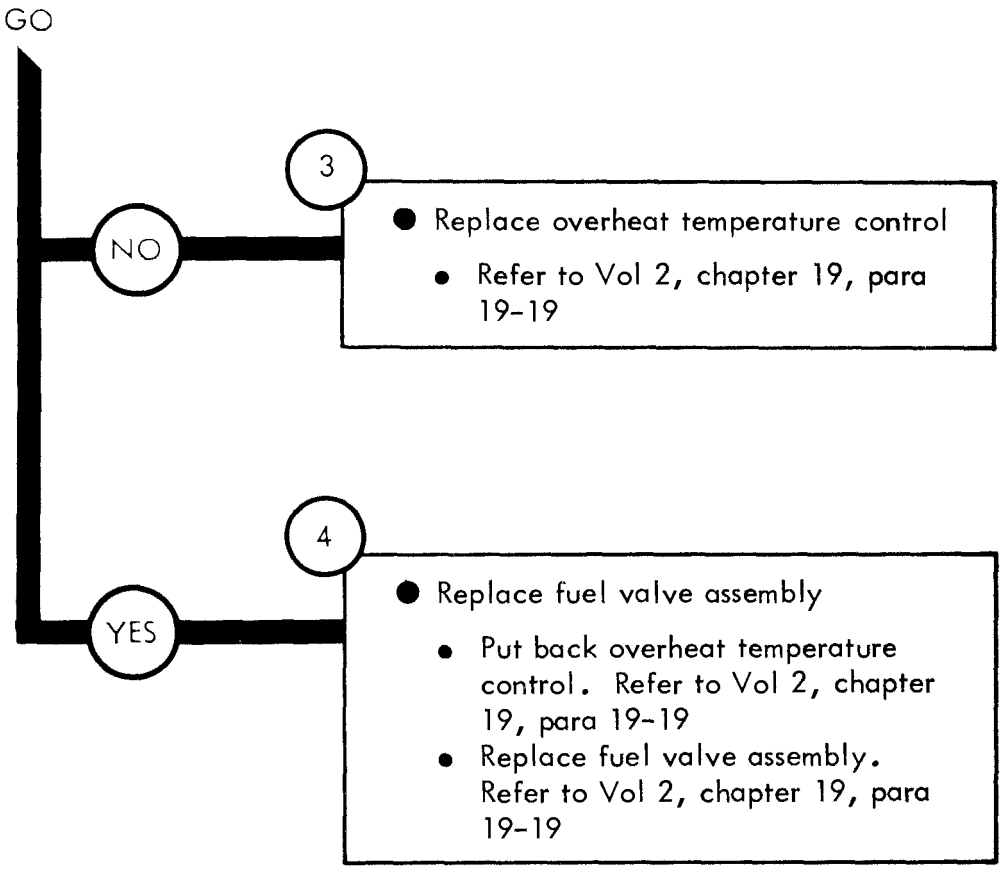
Does multimeter measure zero ohms?

GO



TA 120934

Figure 14-1 (Sheet 1 of 2)



TA 120935

Figure 14-1 (Sheet 2 of 2)

Symptom

2 ENGINE COOLANT HEATER DOES NOT GIVE OFF ENOUGH HEAT

NOTE

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

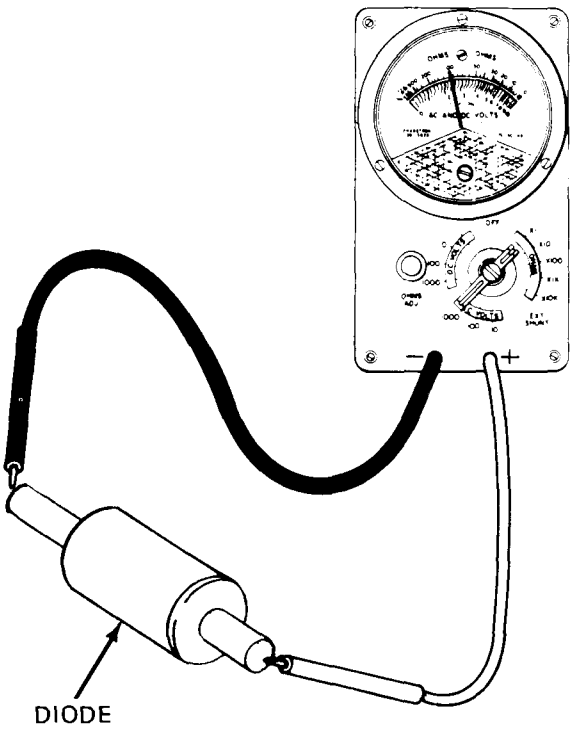
1

- Park truck
  - Refer to TM 9-2320-211-10

2

- Check diode for resistance
  - Remove diode from holder. Refer to Vol 2, chapter 19, para 19-19
  - Set multimeter to measure resistance
  - Put multimeter - lead on one end of diode
  - Put multimeter + lead on other end of diode

GO



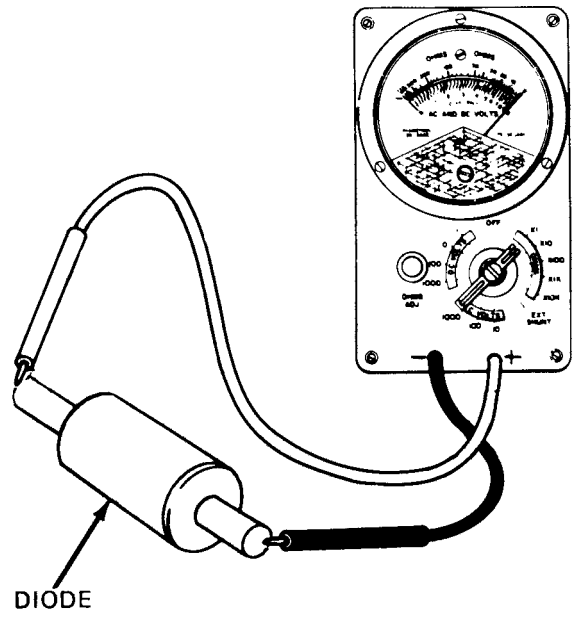
TA 120936

Figure 14-2 (Sheet 1 of 6)

GO

- Read multimeter
- Place multimeter - lead where + lead was and + lead where - lead was in last test
- Read multimeter. Multimeter should have measured resistance in one test and no resistance in the other test

Did both resistance tests check out OK?



YES

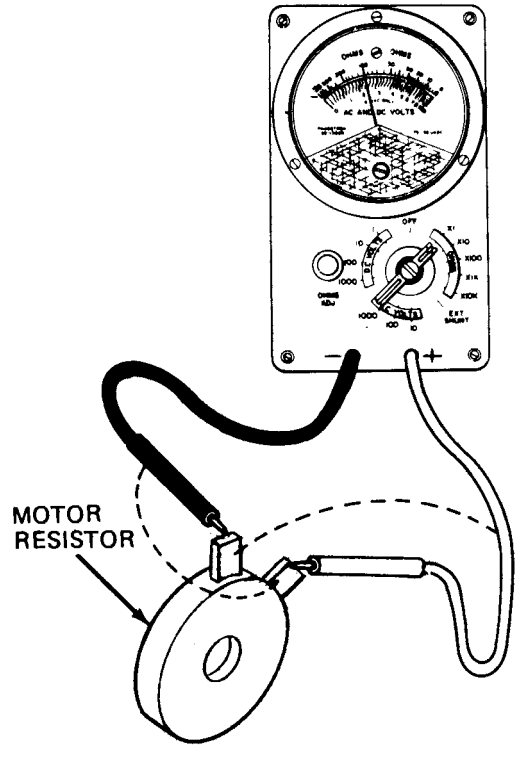
NO

- Replace diode
  - Refer to Vol 2, chapter 19, para 19-19

4

- Check resistance of motor resistor
  - Pull leads off both contacts of motor resistor. Refer to Vol 2, chapter 19, para 19-19. Put multimeter + lead on one contact of resistor
  - Put multimeter - lead on one other contact of resistor
  - Read multimeter. Multimeter should measure zero ohms
  - Put multimeter - lead on contact where multimeter + lead was and + lead where - lead was for last test
  - Read multimeter. Multimeter should measure zero ohms

Did multimeter measure zero ohms for both tests?



GO

TA 120937

Figure 14-2 (Sheet 2 of 6)

GO

YES

NO

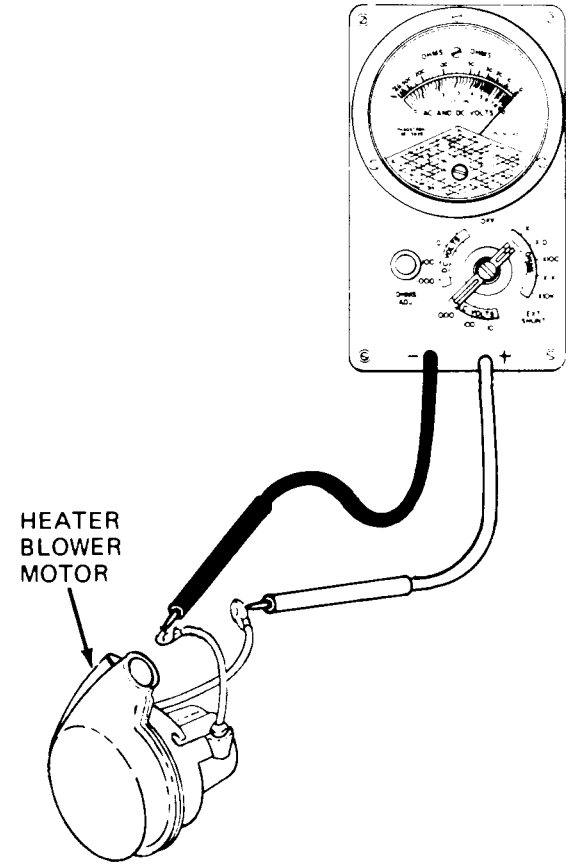
5

- Replace motor resistor
  - Refer to TM 9-2320-211-20

6

- Check heater blower motor continuity
  - Disconnect heater blower motor leads. Refer to Vol 2, chapter 19, para 19-19
  - Set multimeter to measure continuity. Refer to multimeter test procedures in TM 9-2320-211-20
  - Put multimeter - lead on one lead of blower motor
  - Put multimeter + lead on other lead of blower motor
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



YES

NO

7

- Replace heater blower motor
  - Refer to Vol 2, chapter 19, para 19-19

GO

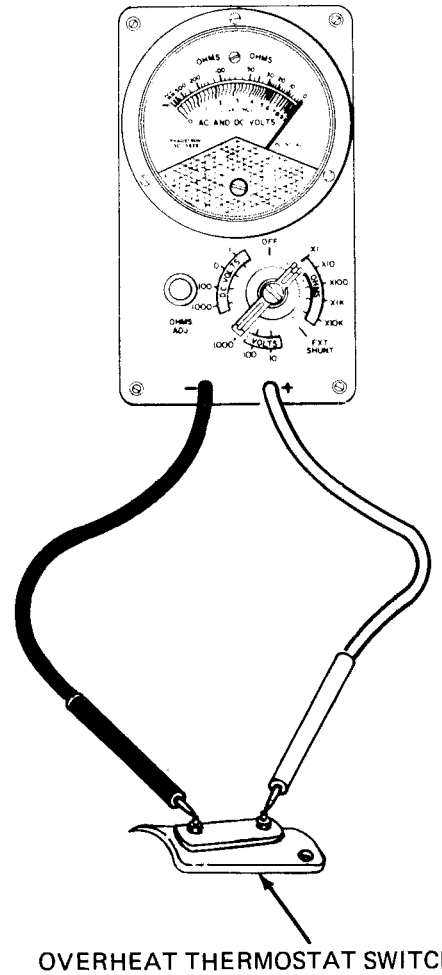
TA 120938

Figure 14-2 (Sheet 3 of 6)

8

- Check overheat thermostat switch for continuity
  - Put heater back together. Refer to Vol 2, chapter 19, para 19-19
  - Take out overheat thermostat switch. Refer to Vol 2, chapter 19, para 19-19
  - Put multimeter - lead on contact of switch and + lead on other end of switch
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



YES

NO

9

- Replace overheat thermostat switch
  - Refer to Vol 2, chapter 19, para 19-19

GO

TA 120939

Figure 14-2 (Sheet 4 of 6)

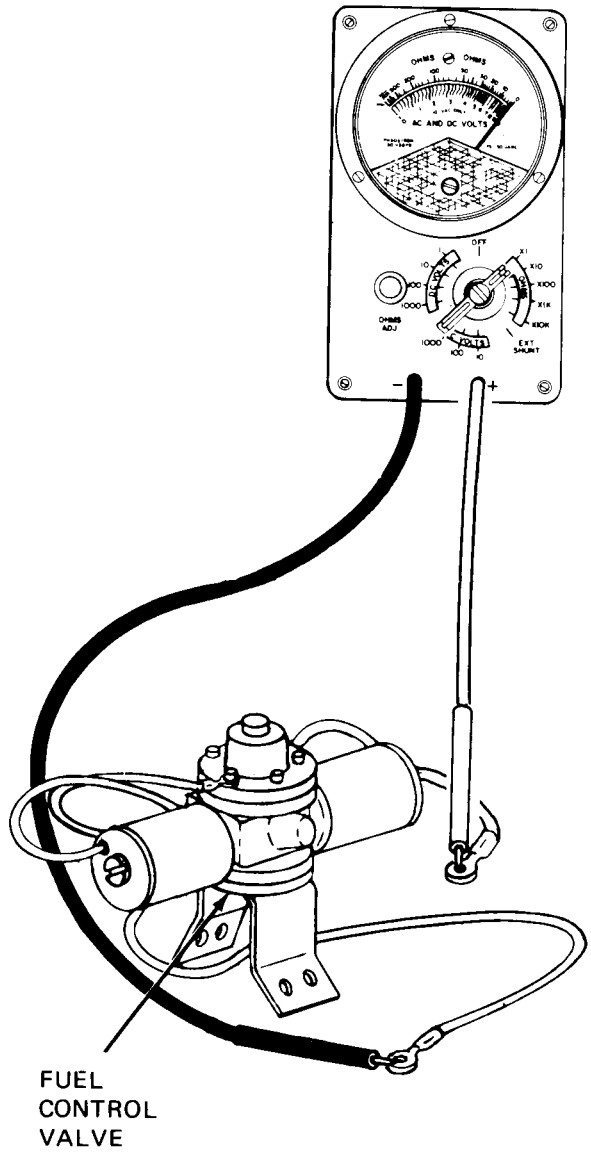
GO

10

- Check for +24 volts DC through fuel control valve
  - Start heater. Refer to TM 9-2320-211-20
  - Set multimeter to measure +24 volts DC
  - Put multimeter - lead on fuel control valve lead at terminal strip
  - Put multimeter + lead on fuel control valve lead at overheat thermostat switch
  - Read multimeter. Multimeter should measure +24 volts DC?

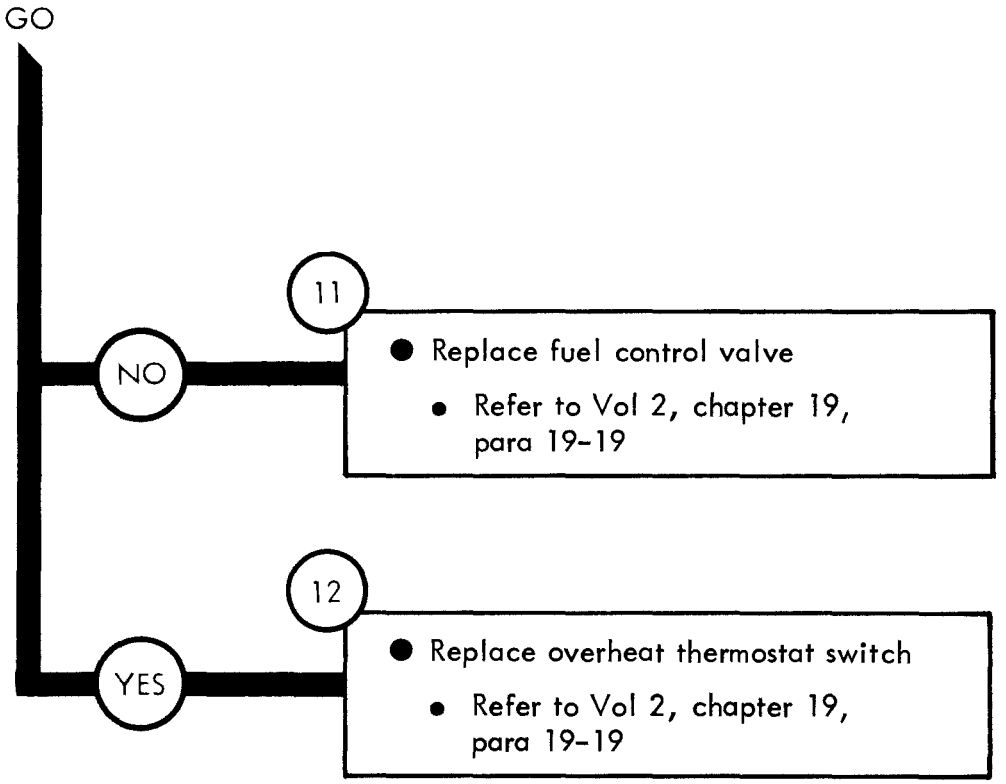
Does multimeter measure +24 volts DC?

GO



TA 120940

Figure 14-2 (Sheet 5 of 6)



TA 120941

Figure 14-2 (Sheet 6 of 6)

Symptom 3

ENGINE COOLANT HEATER DOES NOT START

NOTE

When checking voltage, +24 volts DC means a range of +23 to +26 volts DC

1

- Park truck
  - Refer to TM 9-2320-211-10

2

- Check for +24 volts DC through control box circuit breaker
  - Take cover off control box. Refer to TM 9-2320-211-20
  - Set multimeter to measure +24 volts DC.
  - Put multimeter + lead on other contact of circuit breaker
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

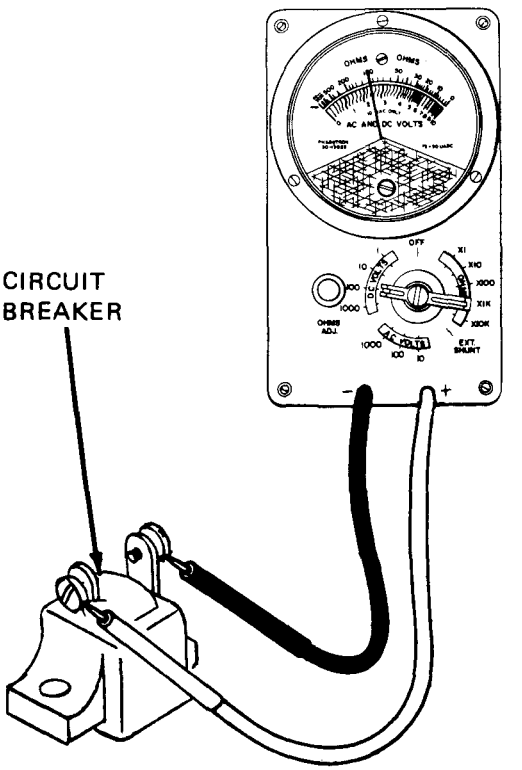
YES

NO

3

- Replace circuit breaker
  - Refer to TM 9-2320-211-20

GO



TA 120942

Figure 14-3 (Sheet 1 of 5)

GO

4

- Check for +24 volts DC to control switch
  - Put multimeter + lead on lead from circuit breaker at heater control switch
  - Put multimeter - lead on a good ground
  - Read multimeter. Multimeter should measure +24 volts DC

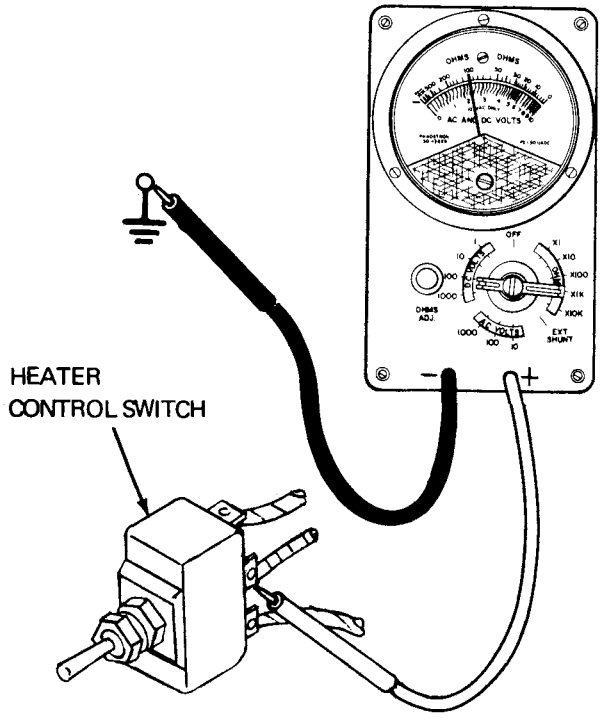
Does multimeter measure +24 volts DC?

YES

NO

5

- Repair or replace lead from circuit breaker to heater control switch
  - Refer to TM 9-2320-211-20

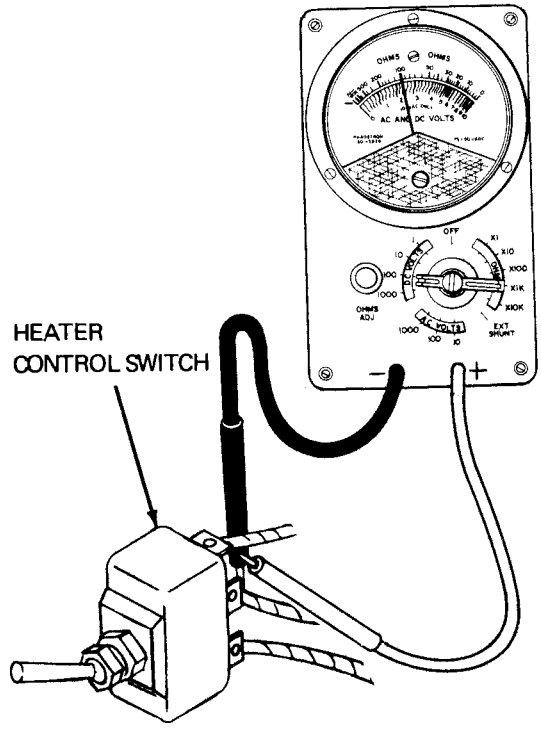


6

- Check for +24 volts DC through heater control switch when set to start
  - Put multimeter - lead on contact 14 of heater control switch and + lead on contact 21
  - Place heater control switch to start and hold it there
  - Read multimeter while switch is held at start
  - Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO



TA 120943

Figure 14-3 (Sheet 2 of 5)

GO

YES

NO

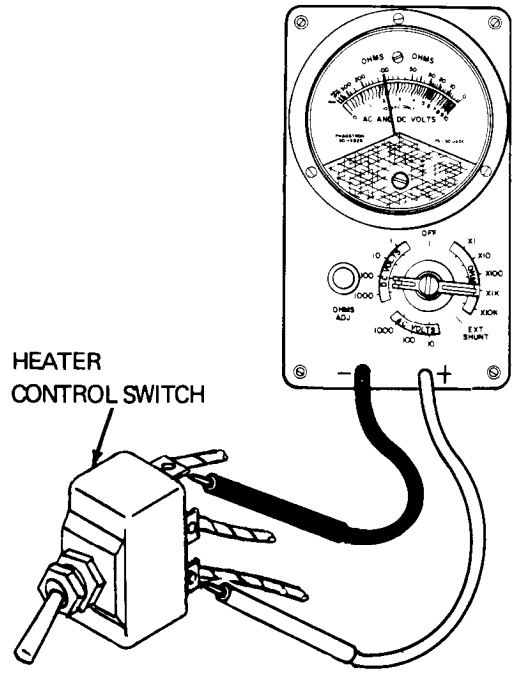
7

- Replace heater control switch
  - Refer to TM 9-2320-211-20

8

- Check for +24 volts through heater control switch when set to RUN
  - Set heater control switch to RUN
  - Put multimeter - lead on contact 16 of heater control switch and + lead on contact 19
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?



YES

NO

9

- Replace heater control switch
  - Refer to TM 9-2320-211-20

GO

TA 120944

Figure 14-3 (Sheet 3 of 5)

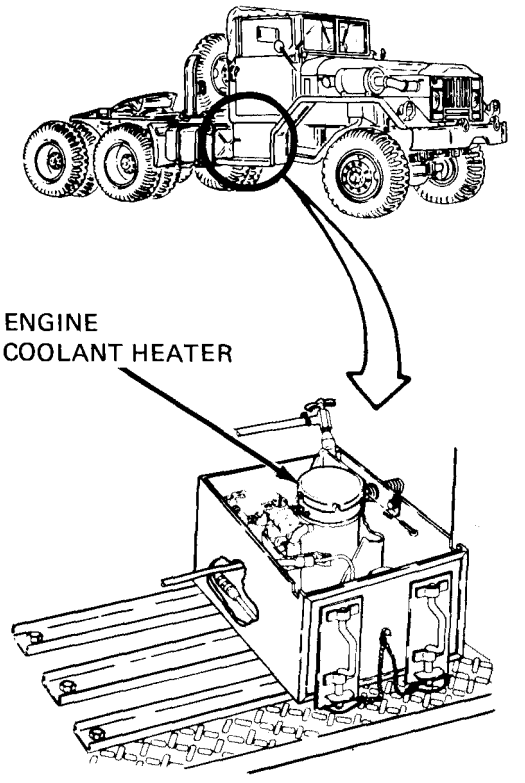
GO

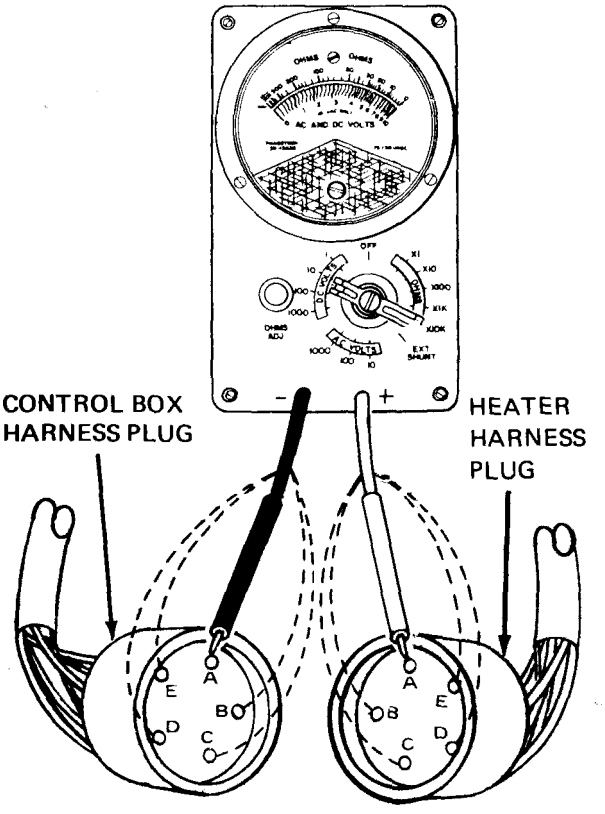
- Check harness from heater control box to heater for continuity
  - Set heater control switch to OFF
  - Unscrew and take off harness plug from control box receptacle
  - Unscrew and take off harness plug from heater
  - Set multimeter to measure continuity

- Place multimeter - lead on control box harness plug contact A
- Place multimeter + lead on heater harness plug contact A
- Read multimeter. Multimeter should indicate continuity
- Do this test for contacts B, C, D, and E of both harness plugs
- Read multimeter after each contact tested. Multimeter should measure zero ohms for each test

Does multimeter measure zero ohms for each contact tested ?

GO





TA 120945

Figure 14-3 (Sheet 4 of 5)

GO

YES

NO

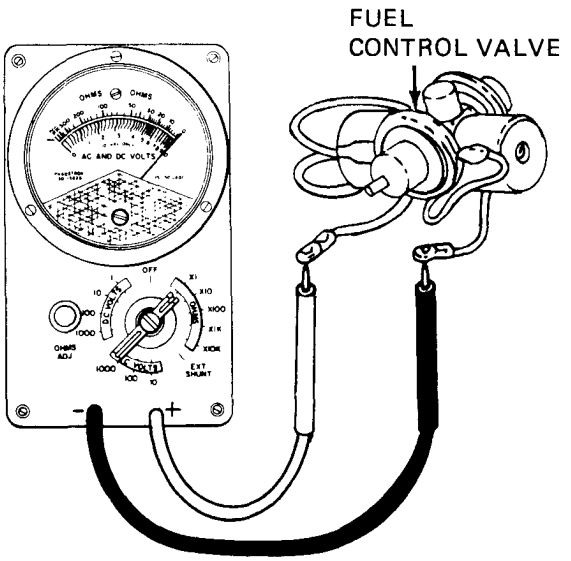
11

- Repair or replace harness from heater control box to heater
  - Refer to Vol 2, chapter 19, para 19-13

12

- Check fuel control valve for continuity
  - Take fuel control valve leads off overheat thermostat switch and terminal strip
  - Put multimeter - lead on one fuel control valve lead contact and + lead on other lead contact
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



NO

13

- Replace fuel control valve
  - Refer to Vol 2, chapter 19, para 19-19

YES

14

- Replace heater voltage regulator
  - Put fuel control valve leads back on overheat thermostat switch and terminal strip
  - Replace heater voltage regulator. Refer to TM 9-2320-211-20

TA 120946

Figure 14-3 (Sheet 5 of 5)

Symptom 4

FUEL BURNING HEATER OVERHEATS AND CONTINUES BURNING

NOTE

When measuring voltage +24 volts DC means a range of +23 to +26 volts DC

1

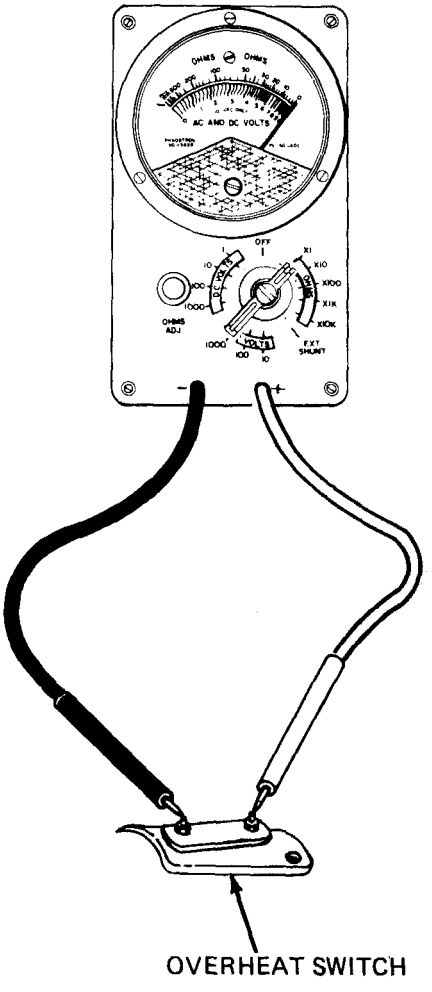
- Park truck
  - Refer to TM 9-2320-211-10

2

- Check overheat switch for continuity
  - Take out overheat switch. Refer to Vol 2, chapter 19, para 19-9
  - Set multimeter to check continuity
  - Put multimeter - lead on contact of overheat switch and + lead on other end of overheat switch
  - Read multimeter. Multimeter should measure zero ohms

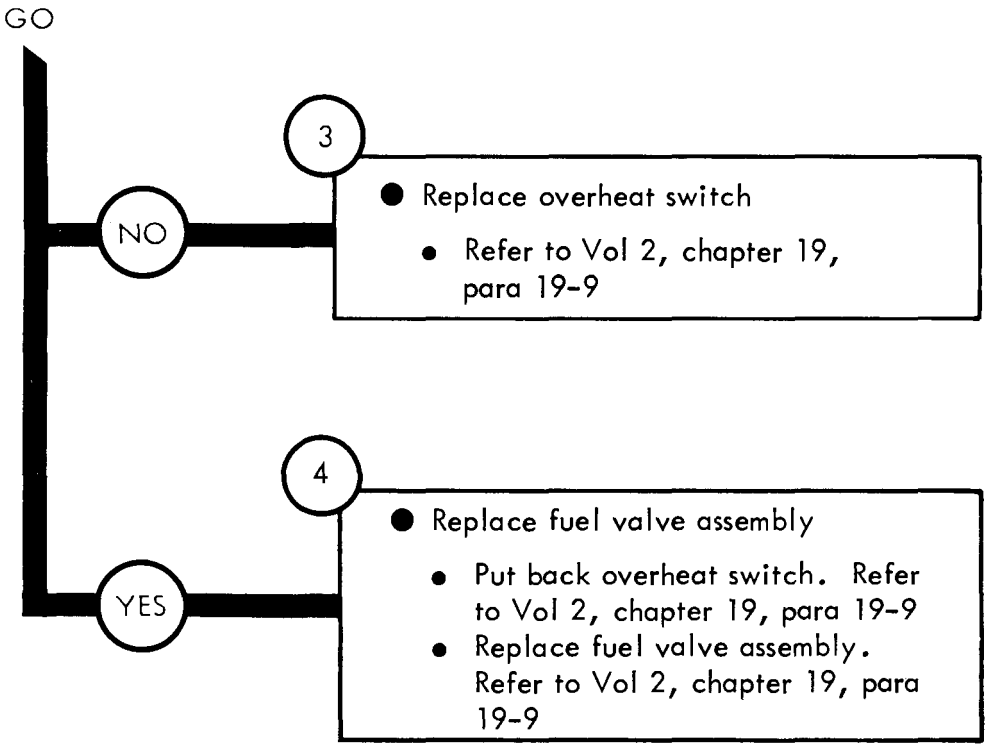
Does multimeter measure zero ohms?

GO



TA 120947

Figure 14-4 (Sheet 1 of 2)



TA 120948

Figure 14-4 (Sheet 2 of 2)

Symptom

5 FUEL BURNING HEATER DOES NOT GIVE OFF ENOUGH HEAT

NOTE

When checking voltage +24 volts DC means a range of +23 to +26 volts DC

1

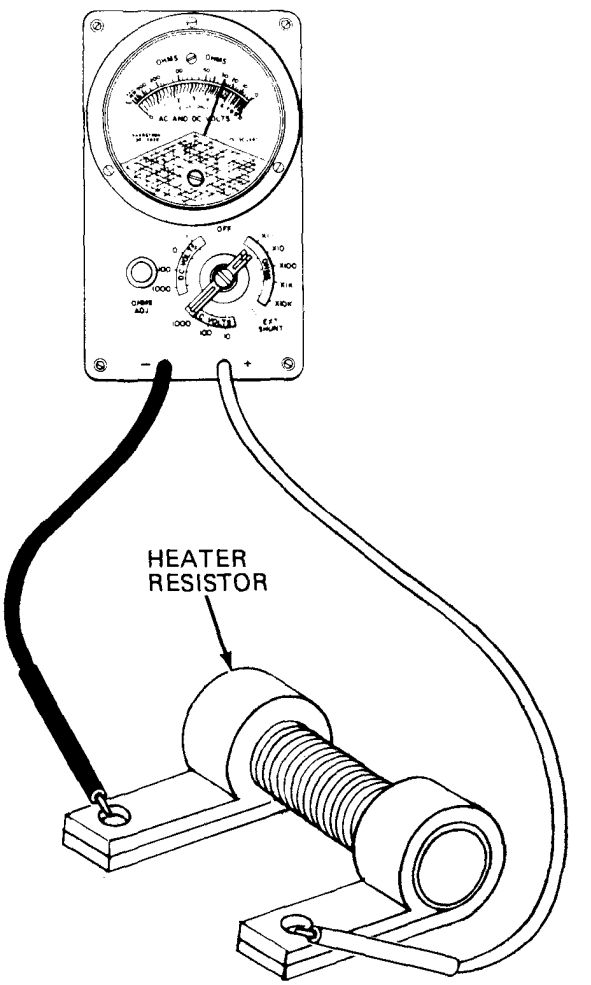
- Park truck
  - Refer to TM 9-2320-211-10

2

- Check resistance of heater resistor
  - Pull lead off both contacts of heater resistor
  - Set multimeter to measure resistance
  - Put multimeter - lead on one contact of resistor and + lead on other contact of heater resistor
  - Read multimeter. Multimeter should measure resistance
  - Put multimeter - lead on contact where multimeter + lead was and multimeter + lead where multimeter - lead was for last test. Multimeter should measure resistance

Did multimeter measure resistance for both tests?

GO



TA 120949

Figure 14-5

GO

YES

NO

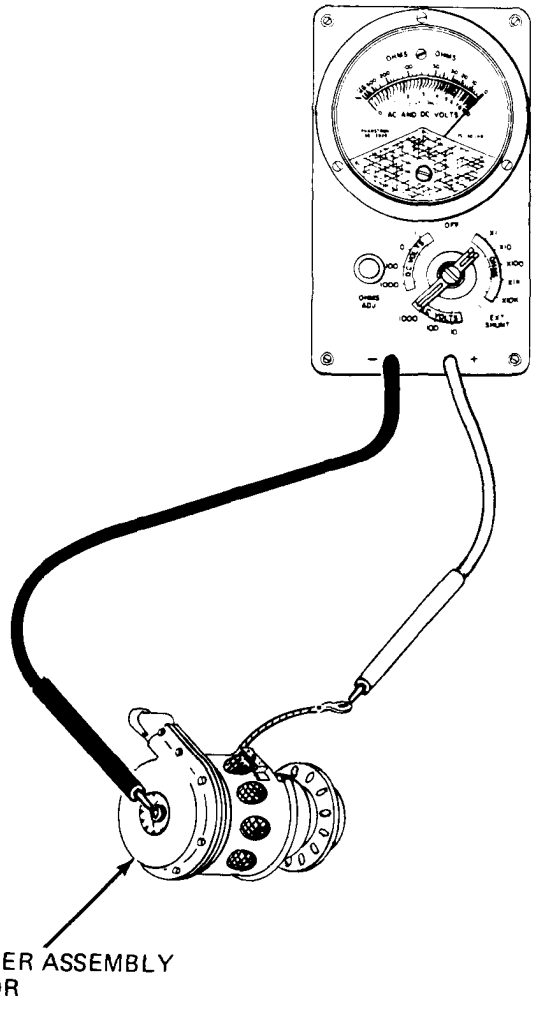
3

- Replace heater resistor
  - Refer to TM 9-2320-211-20

4

- Check blower assembly motor for continuity
  - Take off blower assembly motor lead. Refer to Vol 2, chapter 19, para 19-9
  - Set multimeter to check continuity
  - Put multimeter - lead on blower motor case
  - Put multimeter + lead on lead contact of blower motor
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



YES

NO

5

- Replace blower assembly motor
  - Refer to Vol 2, chapter 19, para 19-9

GO

TA 120950

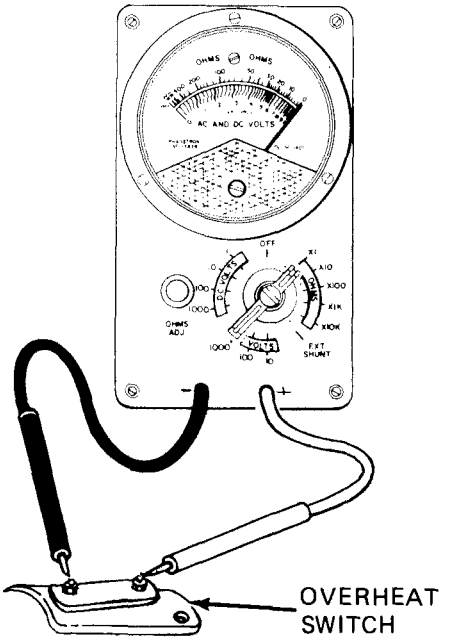
Figure 14-5 (Sheet 2 of 4)

GO

6

- Check overheat switch for continuity
  - Put heater back together. Refer to Vol 2, chapter 19, para 19-9
  - Put multimeter - lead on contact of overheat switch and + lead on other end of overheat switch
- Read multimeter, multimeter should measure zero ohms

Does multimeter measure zero ohms?



YES

NO

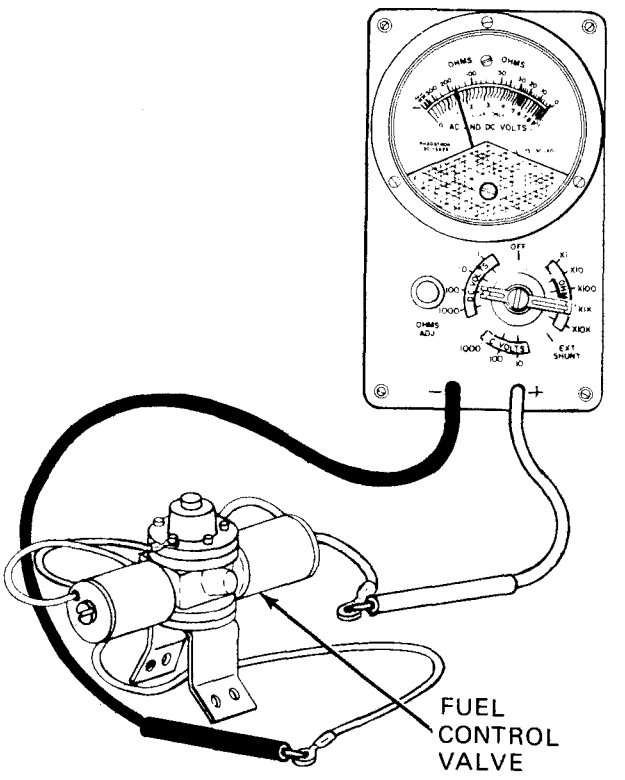
7

- Replace overheat thermostat switch
  - Refer to Vol 2, chapter 19, para 19-9

8

- Check for +24 volts through fuel valve assembly
  - Start heater. Refer to TM 9-2320-211-10
  - Set multimeter to measure +24 volts DC
  - Put multimeter - lead on fuel valve assembly lead at terminal strip
  - Put multimeter + lead on fuel valve assembly lead at overheat switch
  - Read multimeter, multimeter should measure +24 volts DC

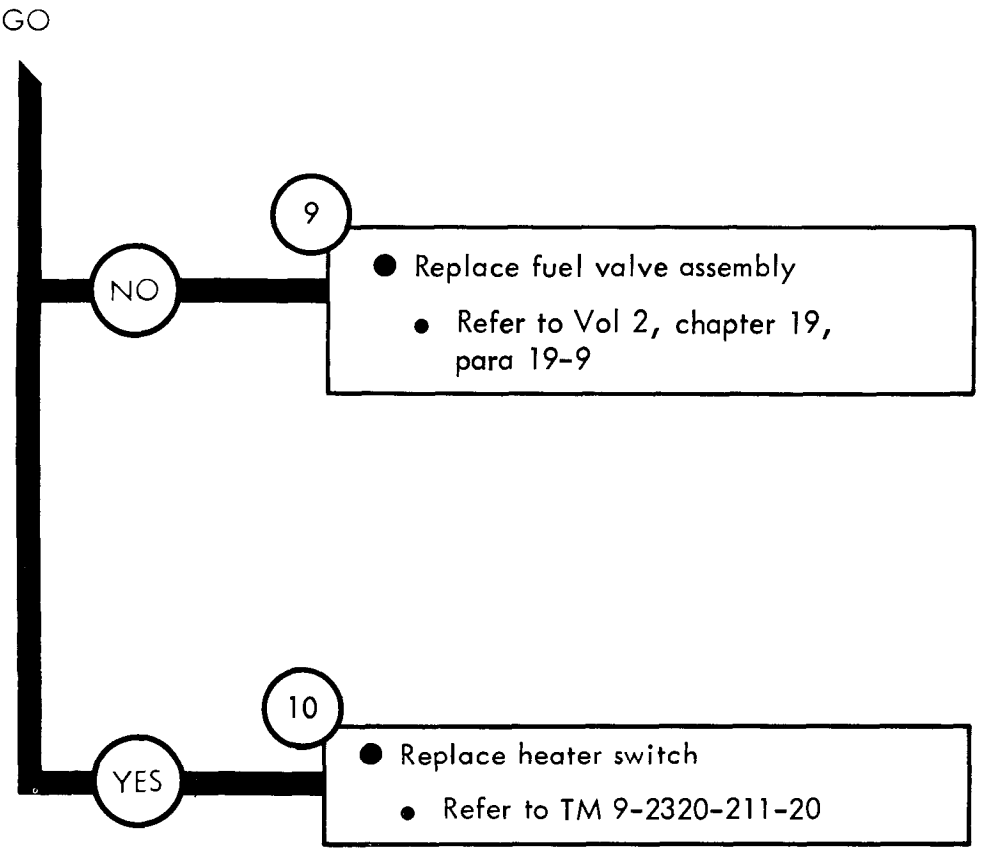
Does multimeter measure +24 volts?



GO

TA 120951

Figure 14-5 (Sheet 3 of 4)



TA 120952

Figure 14-5 (Sheet 4 of 4)

Symptom 6

FUEL BURNING HEATER DOES NOT START

NOTE

When measuring voltage +24 volts DC means a range of +23 to +26 volts DC

1

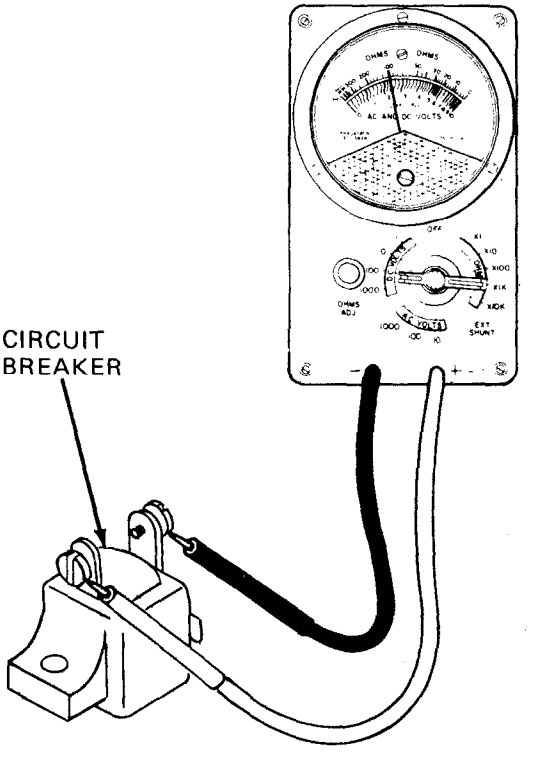
- Park truck
  - Refer to TM 9-2320-211-10

2

- Check for +24 volts DC through control box circuit breaker
  - Take off control box cover. Refer to TM 9-2320-211-20
  - Set multimeter to measure +24 volts DC
  - Put multimeter - lead on one contact of circuit breaker
  - Put multimeter + lead on other contact of circuit breaker
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO



TA 120953

Figure 14-6 (Sheet 1 of 6)

YES

NO

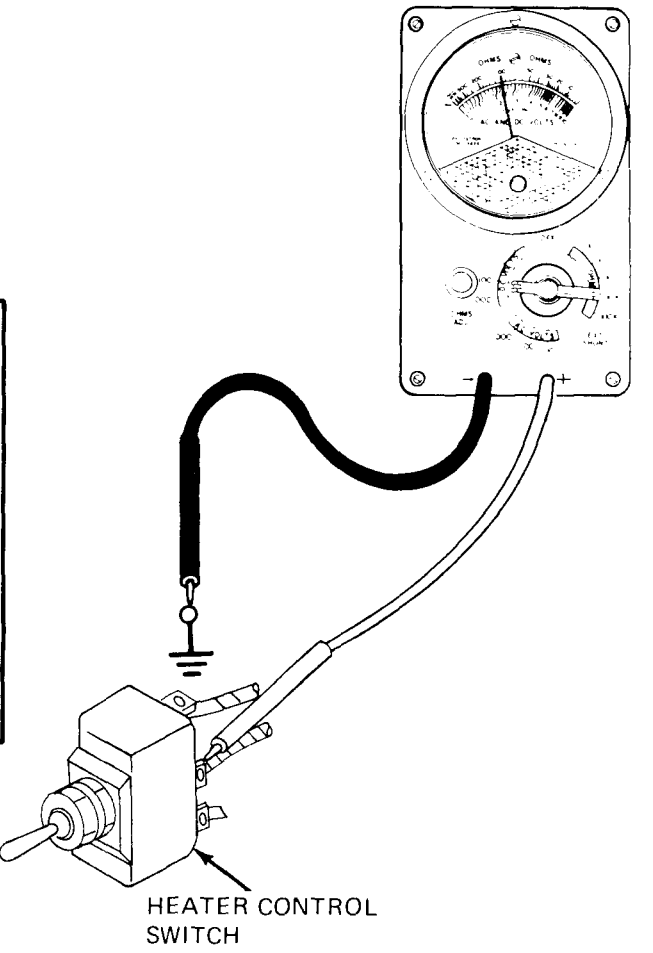
3

- Replace circuit breaker
  - Refer to TM 9-2320-211-20

4

- Check for +24 volts DC to control switch
  - Put multimeter - lead on a good ground
  - Put multimeter + lead on load from circuit breaker at heater control switch
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?



YES

NO

5

- Repair or replace lead from circuit breaker to heater control switch
  - Refer to TM 9-2320-211-20

GO

TA 120954

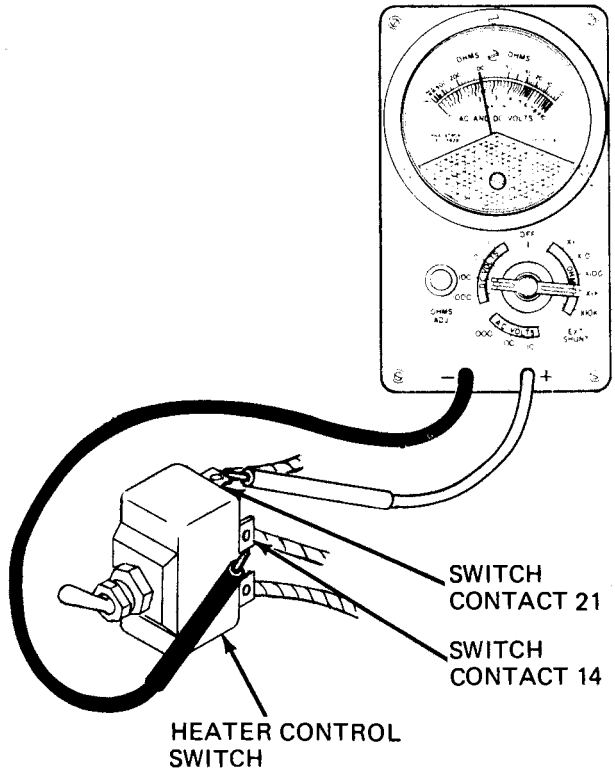
Figure 14-6 (Sheet 2 of 6)

GO

6

- Check for +24 volts DC through heater control switch when set to start
  - Put multimeter - lead on contact 14 of heater control switch and + lead on contact 21
  - Place heater control switch to START and hold it there
  - Read multimeter while switch is held at start
  - Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?



YES

NO

7

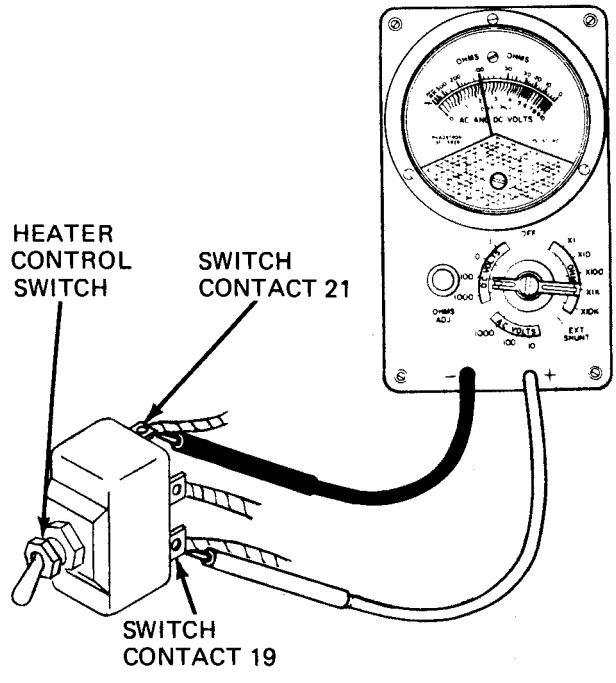
- Replace heater control switch
  - Refer to TM 9-2320-211-20

8

- Check for +24 volts through heater control switch when set to RUN
  - Set heater control switch to RUN.
  - Put multimeter - lead on contact 21 of heater control switch and + lead on contact 19
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO



TA 120955

Figure 14-6 (Sheet 3 of 6)

YES

NO

9

- Replace heater control switch
  - Refer to TM 9-2320-211-20

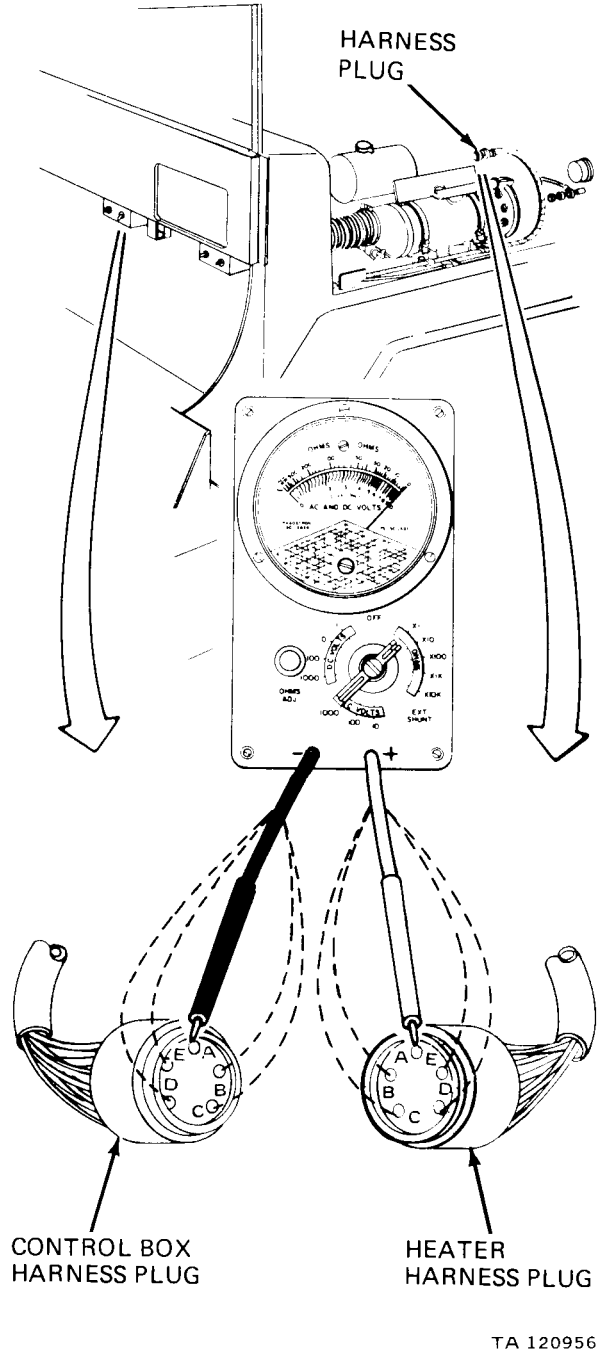
10

- Check harness from heater control box to heater for continuity
  - Set heater control switch to OFF
  - Unscrew and take off harness plug from heater
  - Set multimeter to check continuity
  - Place multimeter - lead on control box harness plug contact A

- Place multimeter + lead on heater harness plug contact A
- Read multimeter. Multimeter should indicate continuity
- Do this test for contacts B, C, D, and E of both harness plugs
- Read multimeter after each contact is tested. Multimeter should measure zero OHMS for each contact tested

Does multimeter measure zero OHMS for each contact tested?

GO



TA 120956

Figure 14-6 (Sheet 4 of 6)

11

- Repair or replace harness from heater control box to heater
  - Refer to Vol 2, chapter 19, para 19-9

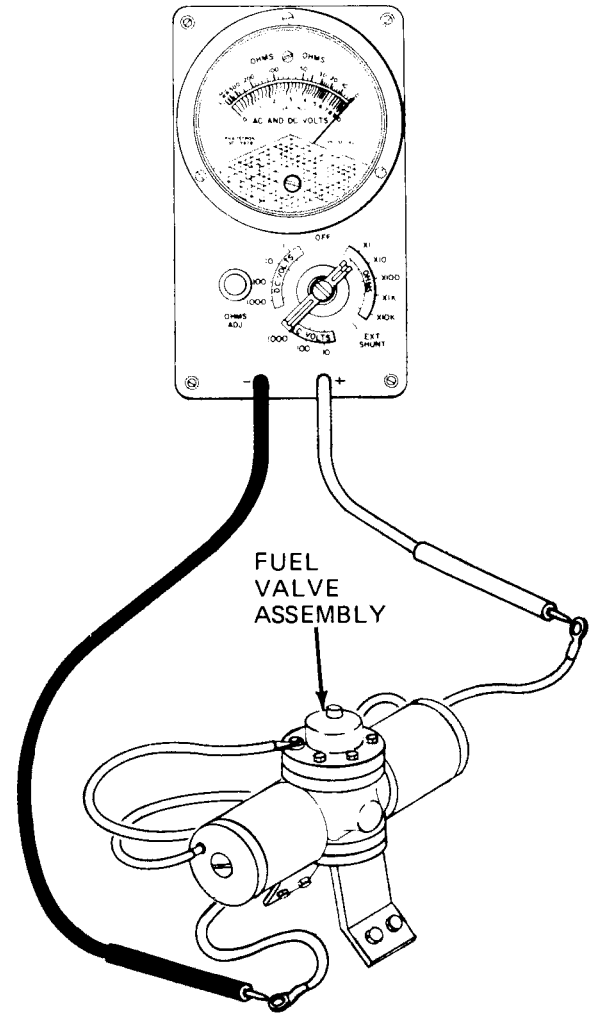
YES

NO

12

- Check fuel valve assembly for continuity
  - Take fuel valve assembly leads off overheat switch and terminal strip. Refer to Vol 2, chapter 19, para 19-9
  - Put multimeter - lead on one fuel assembly valve lead contact and + lead on other lead contact
  - Read multimeter. Multimeter should measure zero ohms

Does multimeter measure zero ohms?



13

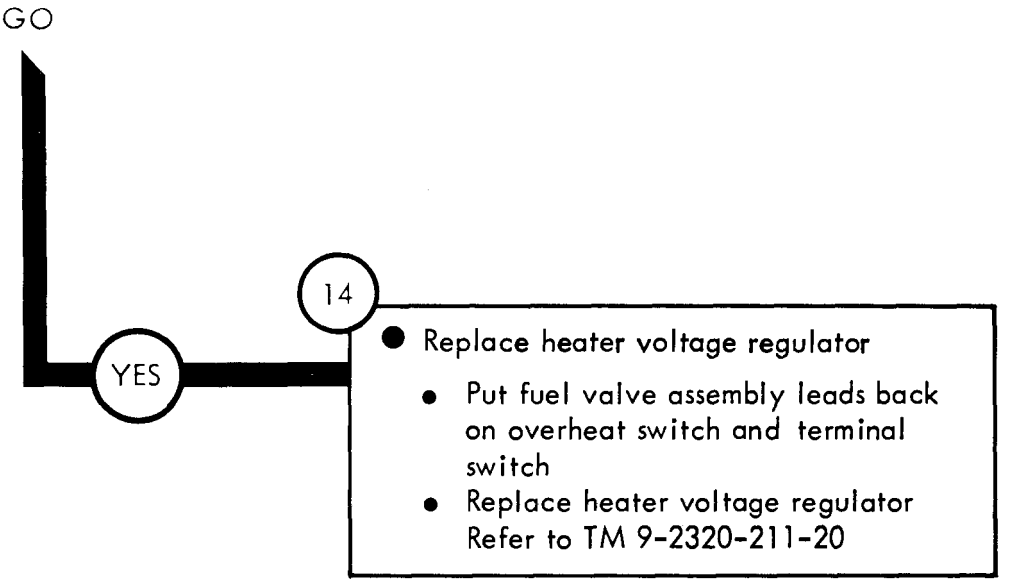
- Replace fuel valve assembly
  - Refer to Vol 2, chapter 19, para 19-9

NO

GO

TA 120957

Figure 14-6 (Sheet 5 of 6)



TA 120958

Figure 14-6 (Sheet 6 of 6)

Symptom

7 WHEN HYDRAULIC BRAKES ARE APPLIED, TOWED LOAD DOES NOT HAVE ENOUGH BRAKING ACTION

NOTE

Two soldiers are needed for some electric brake test and are noted as Soldier A and Soldier B
When measuring voltage +24 volts DC means a range of +23 to +26 volts DC

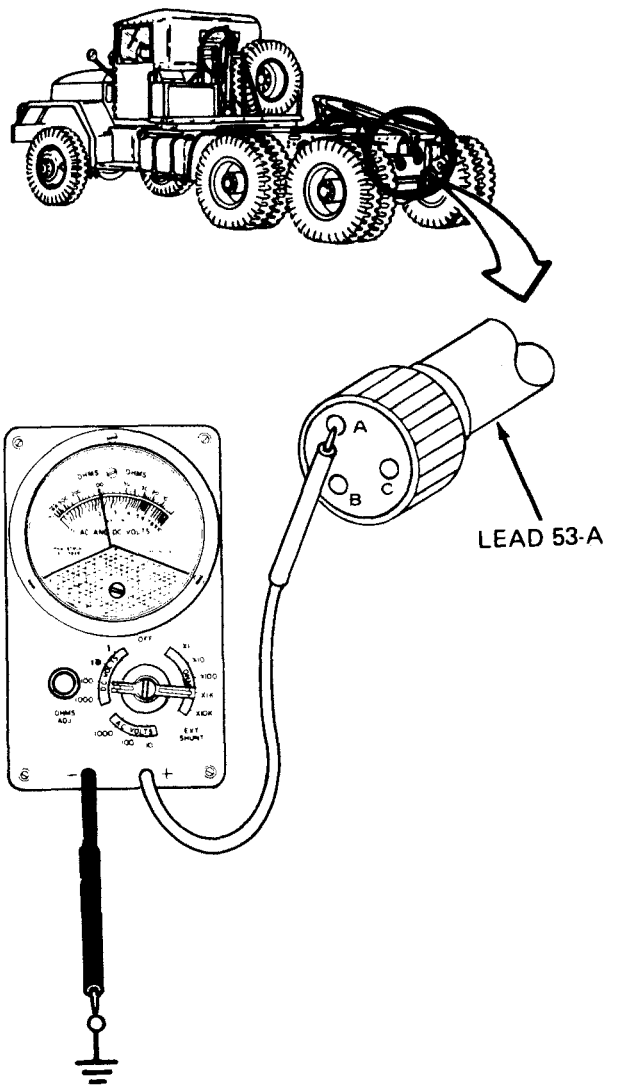
1 ● Park truck
- Refer to TM 9-2320-211-10

2 ● Check for +24 volts DC to controller assembly
- Start engine refer to TM 9-2320-211-10
- Unscrew and take off harness plug from controller assembly receptacle
- Set rheostat to highest setting
- Set multimeter to measure +24 volts DC

- Put multimeter - lead on a good ground
- Put multimeter + lead on lead 53A contact of harness plug
- Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

GO



TA 120959

Figure 14-7 (Sheet 1 of 8)

GO

YES

NO

3

- Check for +24 volts DC at lead 53
  - Take off harness plug from voltage regulator

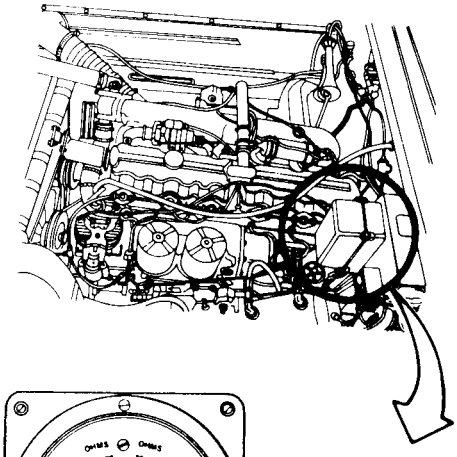
  Note: If you are troubleshooting an electrical brake kit remove lead 53 from starter solenoid + terminal and test for +24 volts DC at contact

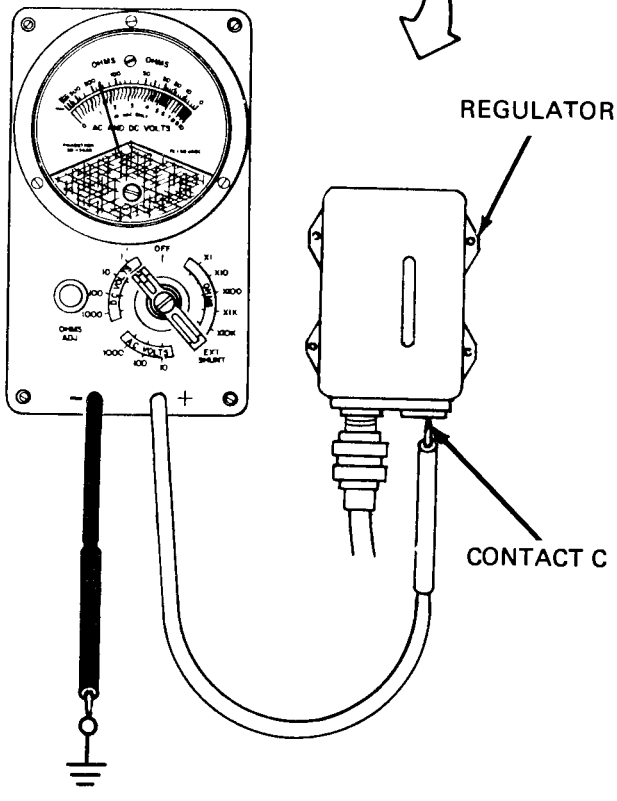
  - Set multimeter to read +24 volts DC
  - Put multimeter - lead on a good ground
  - Put multimeter + lead on contact C of voltage regulator
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?

4

- Go to step 11





NO GO

TA 120960

Figure 14-7 (Sheet 2 of 8)

NO GO

5

NO

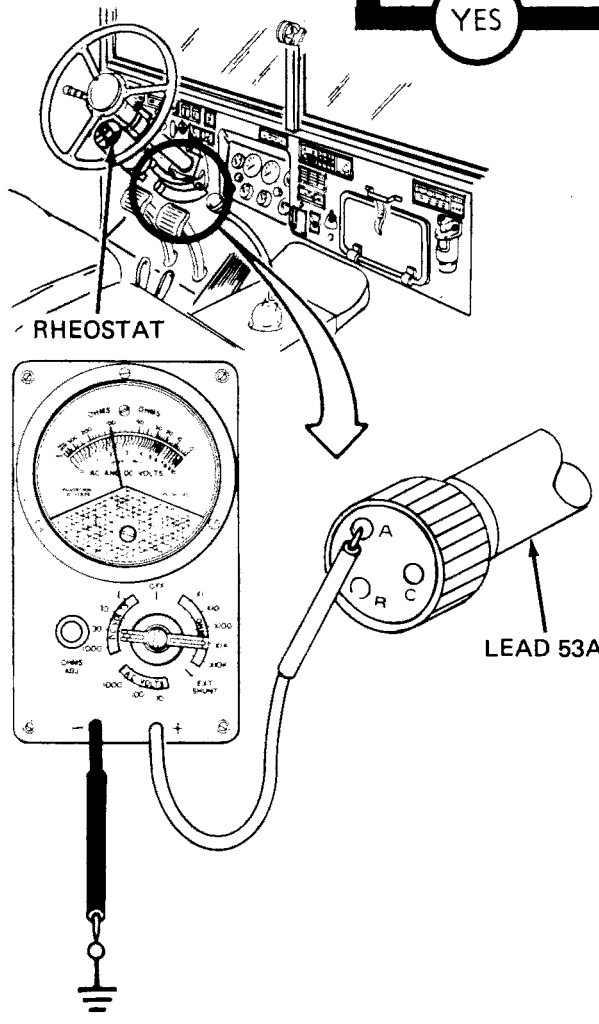
- Repair or replace voltage regulator
  - Stop engine. Refer to TM 9-2320-211-10
  - Repair or replace voltage regulator. Refer to TM9-2320-211-20

6

YES

- Check for +24 volts to lead 53A
  - Take lead 53A off rheostat
  - Put multimeter - lead on a good ground
  - Put multimeter + lead on lead 53A contact
  - Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC?



NO GO

TA 120961

Figure 14-7 (Sheet 3 of 8)

NO GO

7

NO

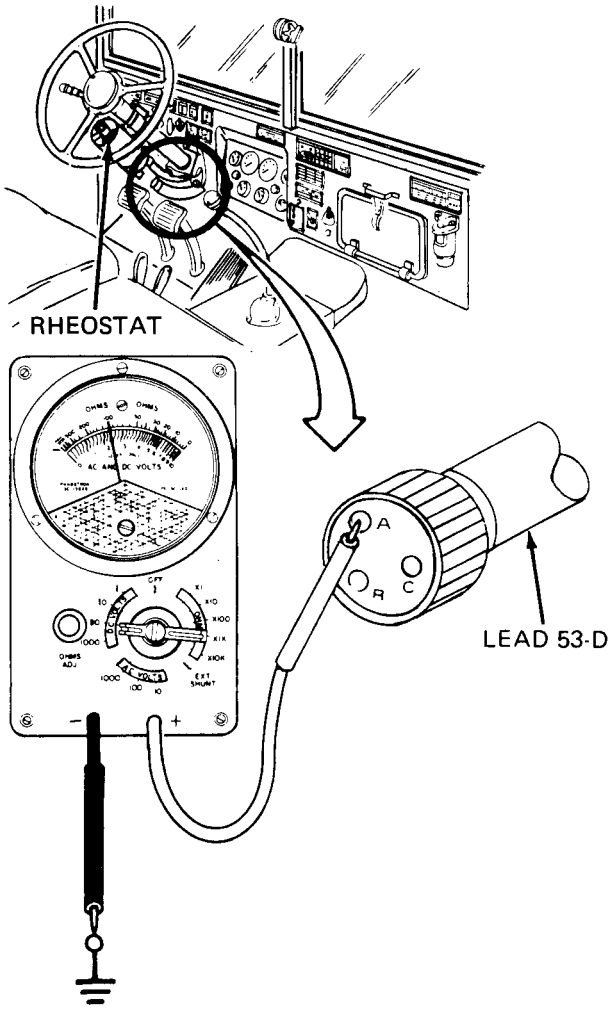
- Repair or replace lead 53A
  - Stop engine refer to TM 9-2320-211-10
  - Repair or replace lead 53A. Refer to TM9-2320-211-20

8

YES

- Check for +24 volts DC to rheostat
  - Take off lead 53D from rheostat
  - Put multimeter + lead on lead 53D contact
  - Put multimeter - lead on a good ground
  - Read multimeter. Multimeter should measure +24 volts DC

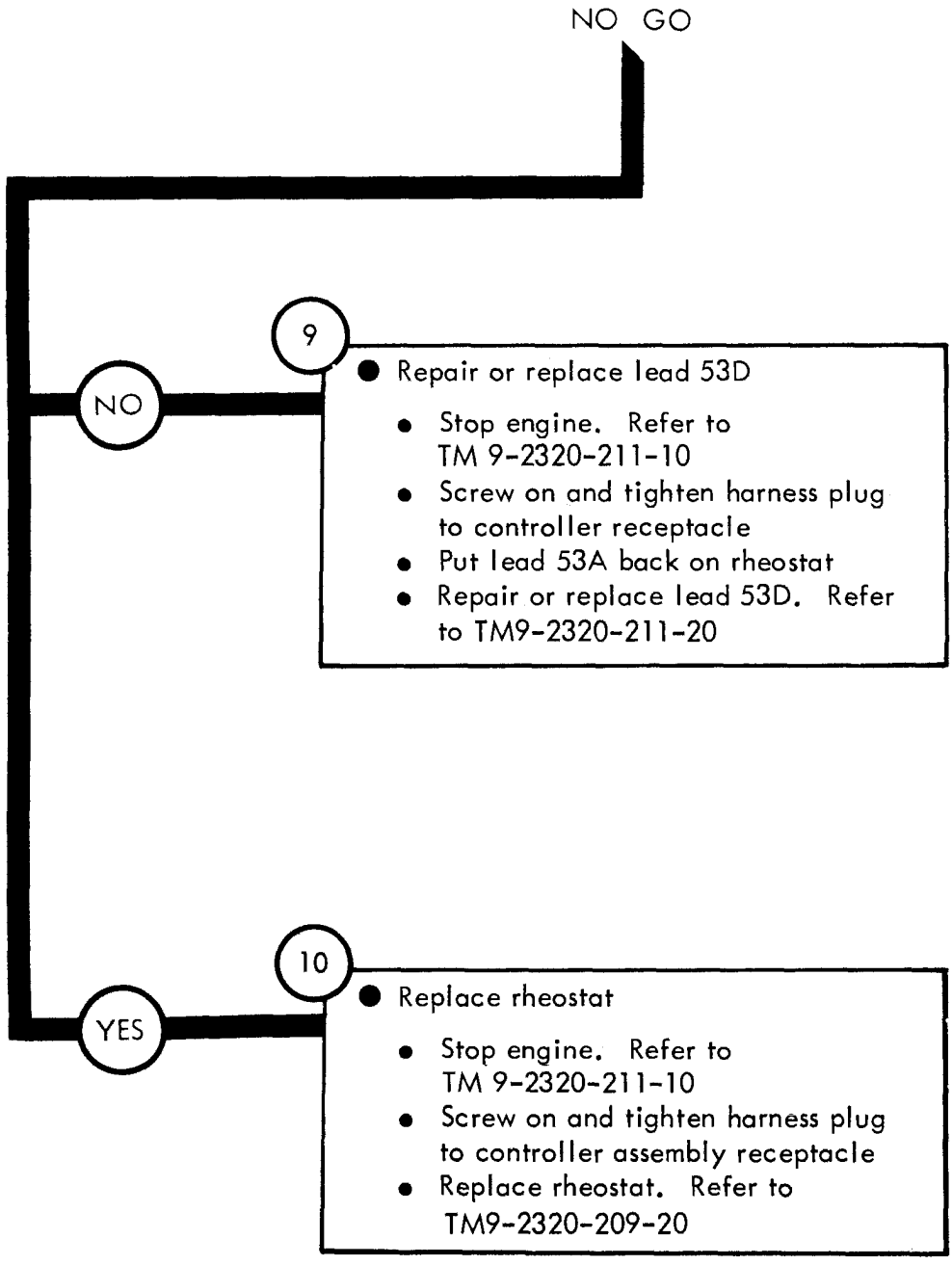
Does multimeter measure +24 volts DC?



NO GO

TA 120962

Figure 14-7 (Sheet 4 of 8)



TA 120963

Figure 14-7 (Sheet 5 of 8)

From step 4

11

- Check for +24 volts DC through controller assembly

SOLDIER B:
- Put a jumper wire from harness plug contact A to controller assembly receptacle contact A
- Put multimeter + lead on contact B of controller assembly receptacle
- Put multimeter - lead on a good ground and keep it there

SOLDIER A:
- Step on brake pedal and hold it down

SOLDIER B:
- While soldier A steps on brake pedal read multimeter. Multimeter should measure +24 volts DC

- With Soldier A still holding down brake pedal put multimeter + lead on controller assembly contact C
- Read multimeter. Multimeter should measure +24 volts DC

Does multimeter measure +24 volts DC for both tests?

GO

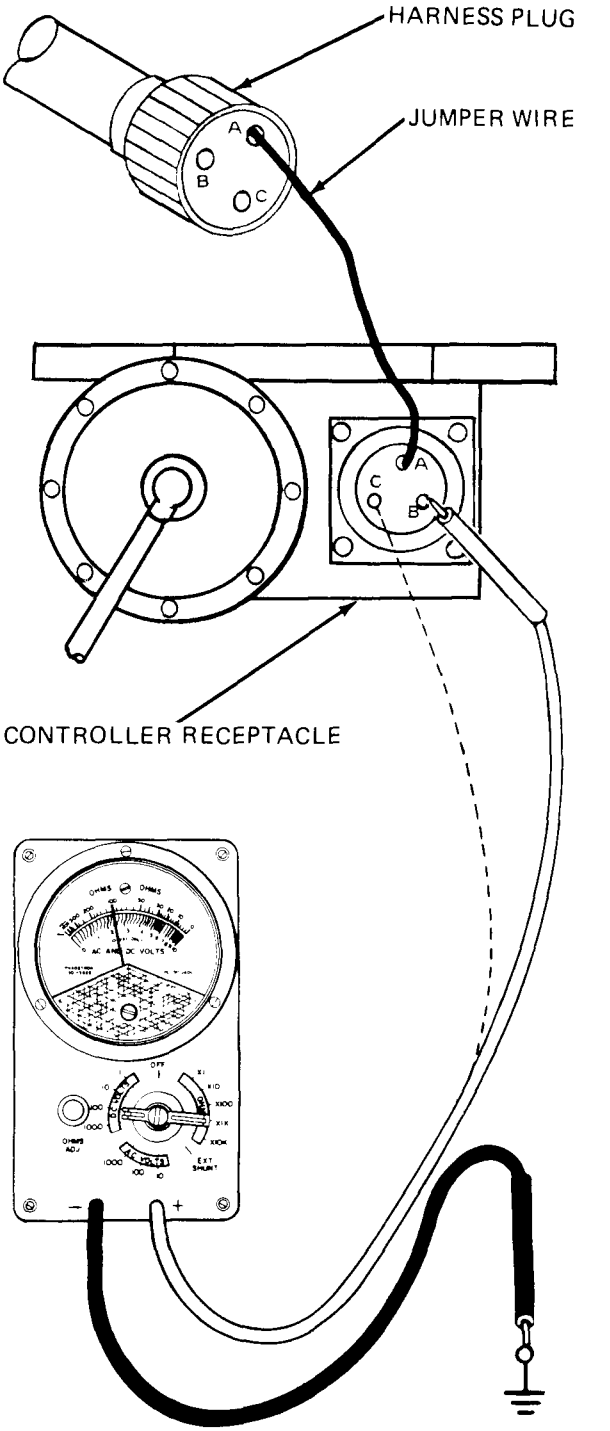


Figure 14-7 (Sheet 6 of 8)

GO

YES

NO

12

- Do fault isolation procedure for trailer brakes do not work when pedal is pressed and hand control valve is used
  - Refer to TM 9-2320-211-20

13

- Check for +24 volts DC to trailer receptacle

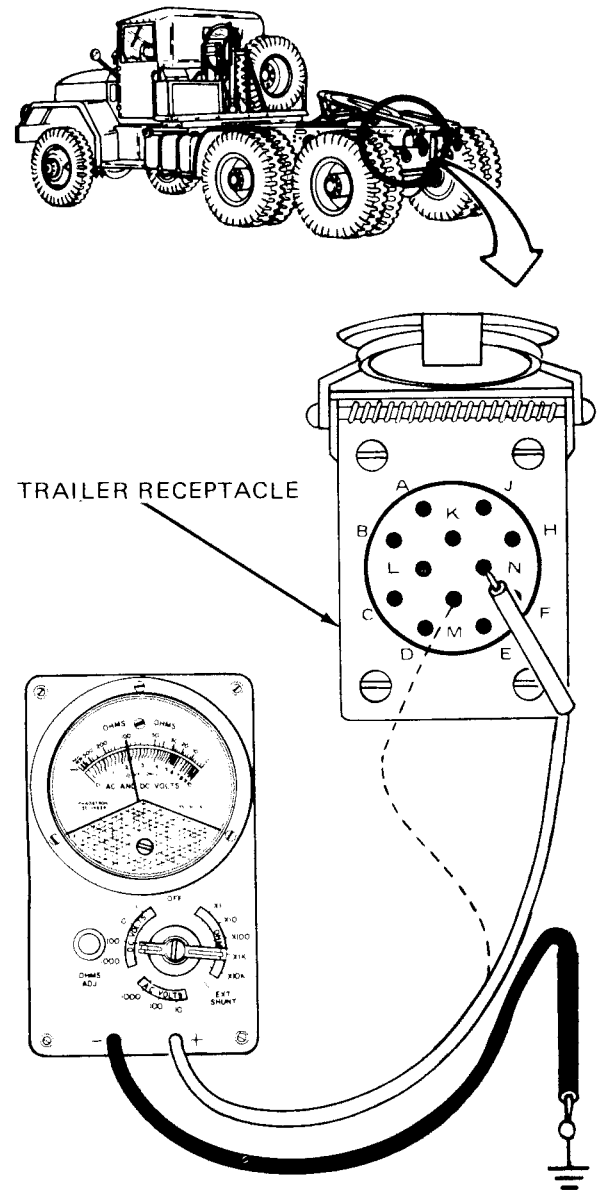
SOLDIER B:
- Take jumper wire from contact A of harness plug and controller assembly receptacle
- Screw in and tighten harness plug to controller receptacle
- Put multimeter + lead in contact N of trailer receptacle
- Put multimeter - lead on a good ground and keep it there

SOLDIER A:
- Step on brake pedal and hold it down

SOLDIER B:
- Read multimeter while Soldier A steps on brake pedal. Multimeter should read +24 volts DC
- With Soldier A still holding down brake pedal put multimeter + lead on contact M of trailer receptacle
- Read multimeter. Multimeter should measure +24 volts DC

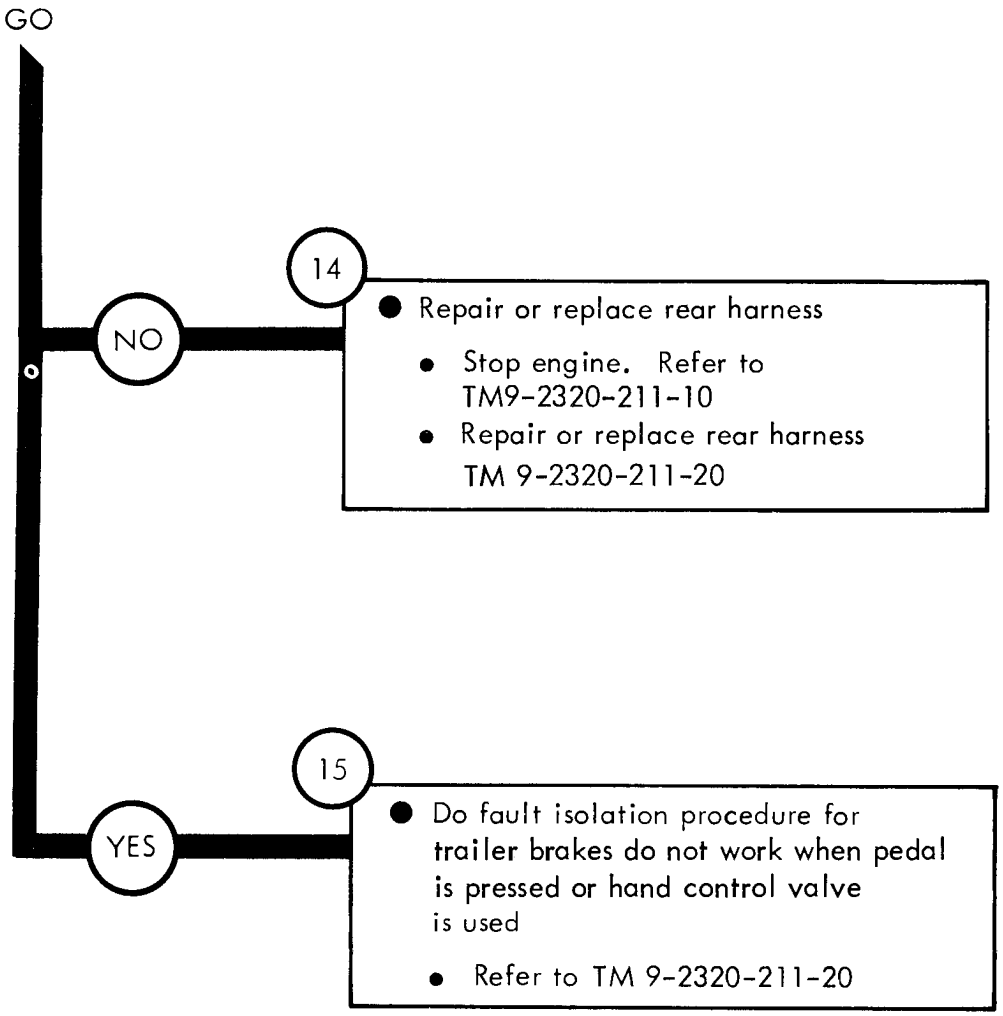
Does multimeter measure +24 volts DC for both tests?

GO



TA 120965

Figure 14-7 (Sheet 7 of 8)



TA 120966

Figure 14-7 (Sheet 8 of 8)

CHAPTER 15

ELECTRICAL SYSTEM TEST PROCEDURES

15-1. TEST PROCEDURES. Test procedures for the electrical system consist of procedures for using voltmeters. Refer to TM 9–2320-209-20 for these procedures.

CHAPTER 16

FRONT AXLE SYSTEM TROUBLESHOOTING

16-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Front Axle System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

16-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

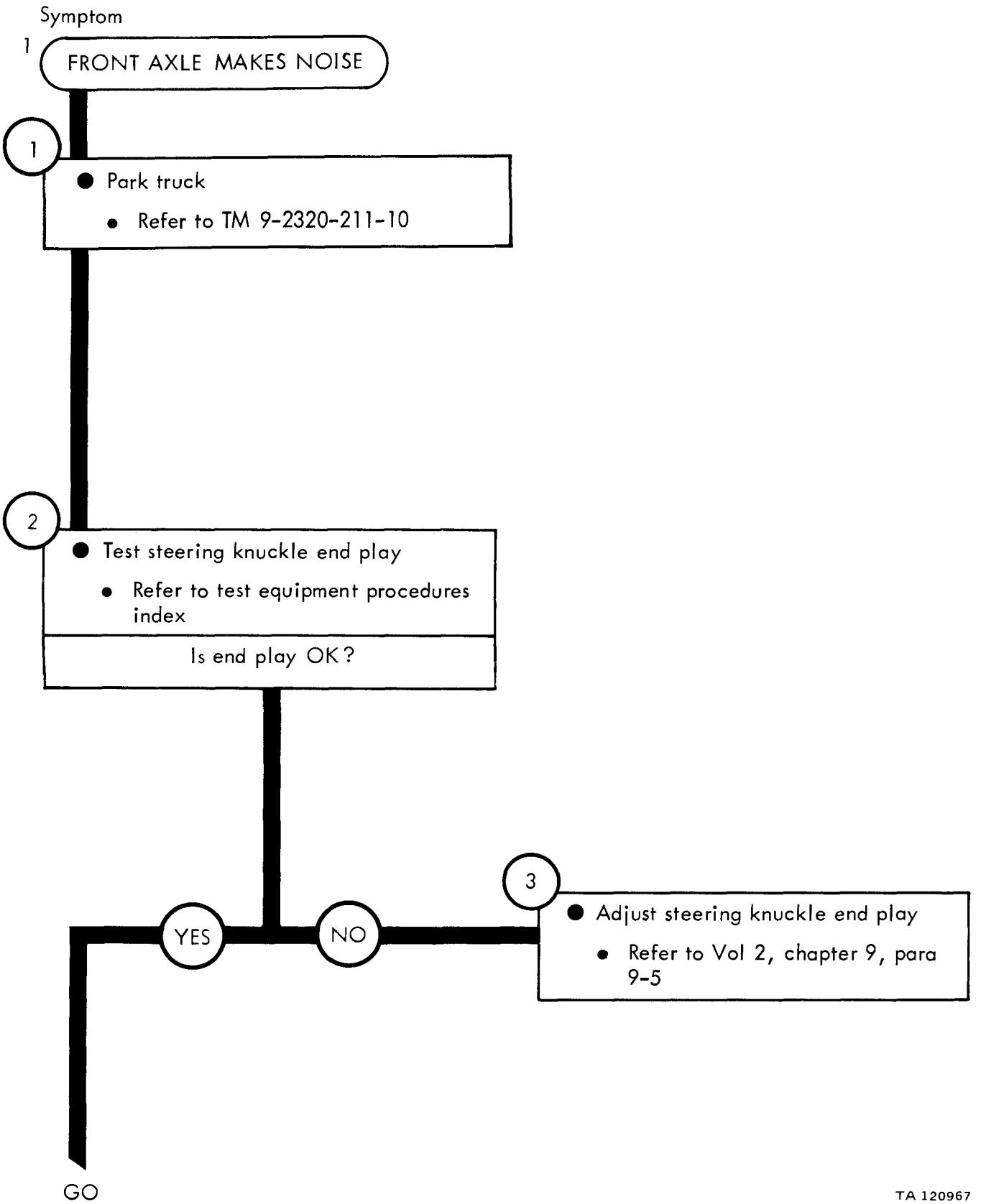


Figure 16-1 (Sheet 1 of 2)

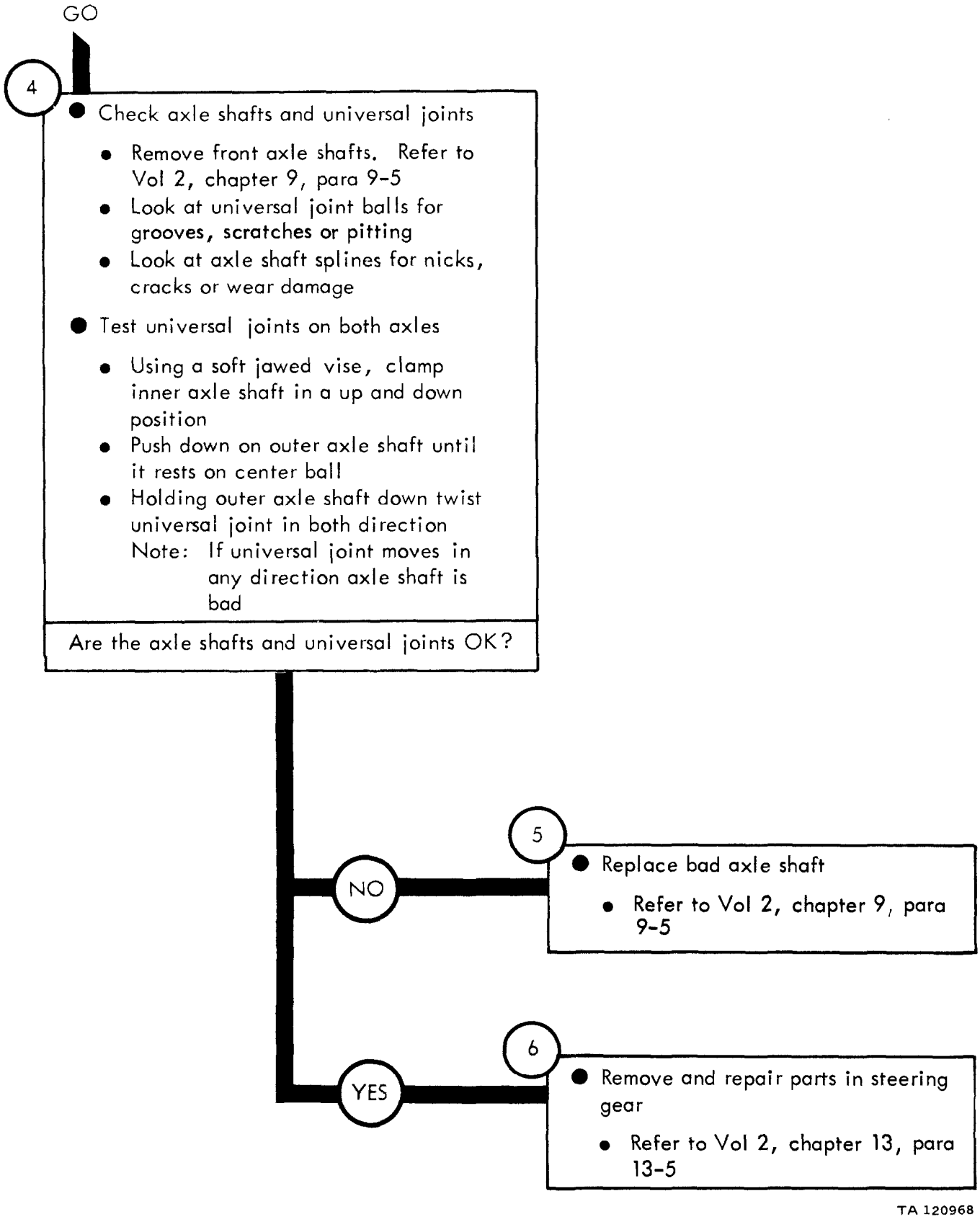


Figure 16-1 (Sheet 2 of 2)

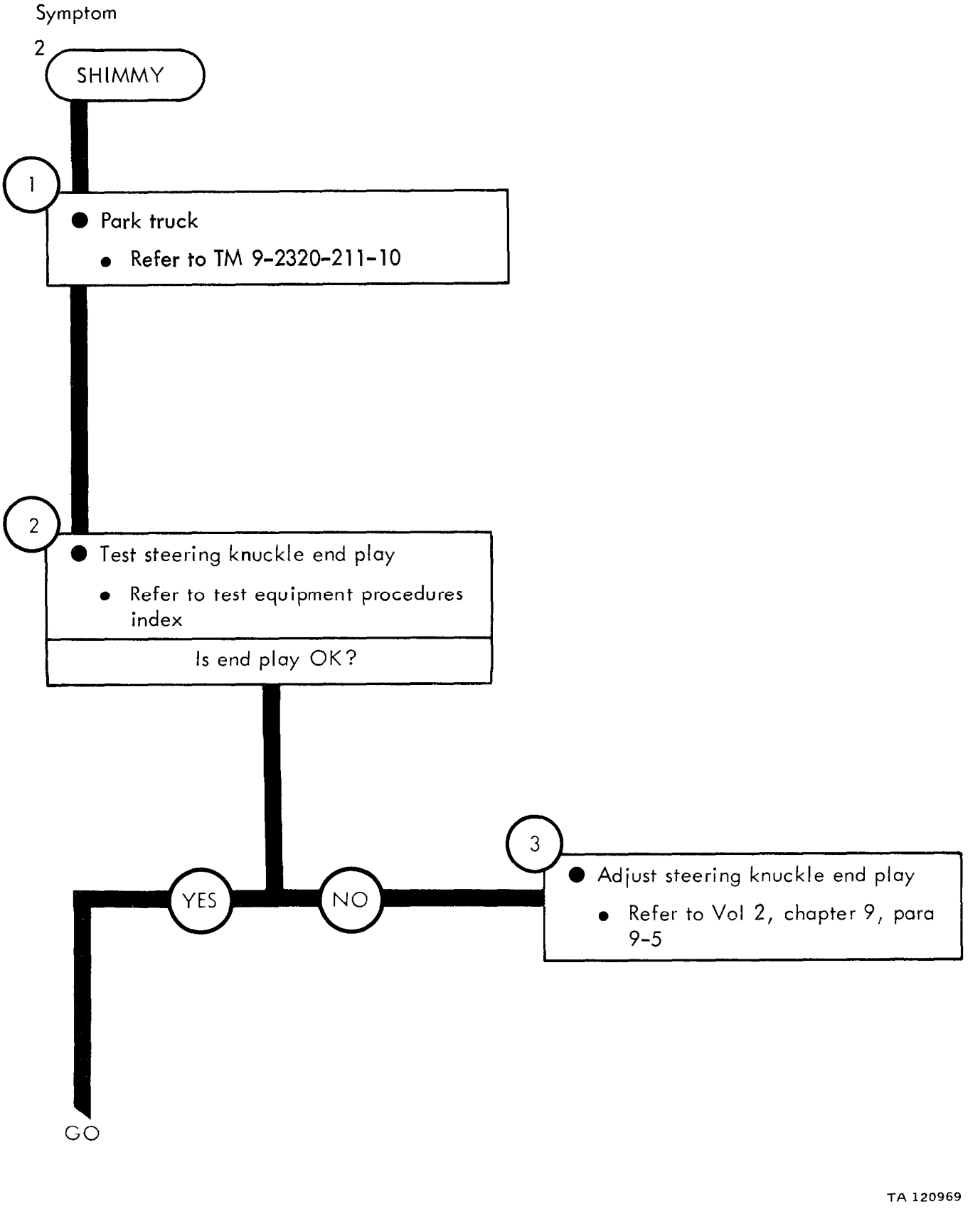


Figure 16-2 (Sheet 1 of 2)

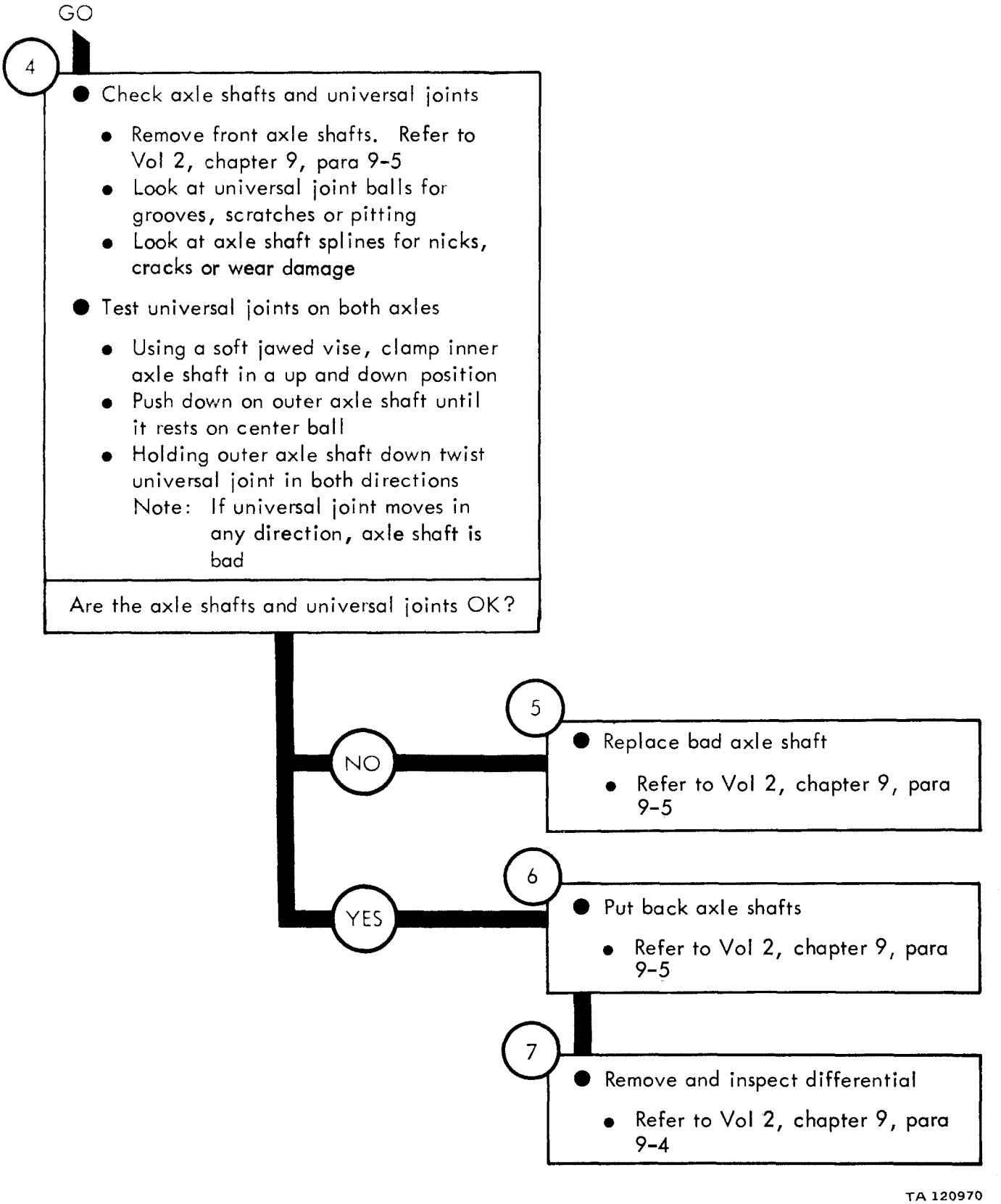


Figure 16-2 (Sheet 2 of 2)

CHAPTER 17

FRONT AXLE SYSTEM TEST PROCEDURES

17-1. GENERAL. This chapter gives test procedures for the tests given in chapter 16, for the Front Axle System.

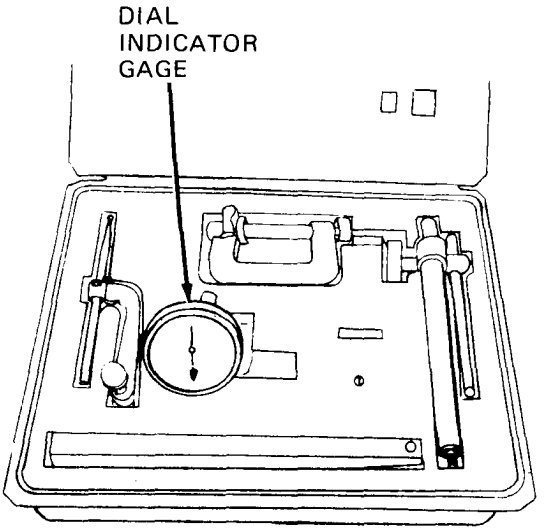
17-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

17-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

GENERAL INSTRUCTIONS

1

- Check dial indicator and accessories
  - Gage - Look to see that glass and needle are not broken
  - Accessories - Look to see that all mounting accessories are in case and not damaged



STEERING KNUCKLE END PLAY TEST - To measure steering knuckle end play

NOTE

Steering knuckle end play should be checked on both wheels

GO

TA 120971

Figure 17-1 (Sheet 1 of 2)

GO

1

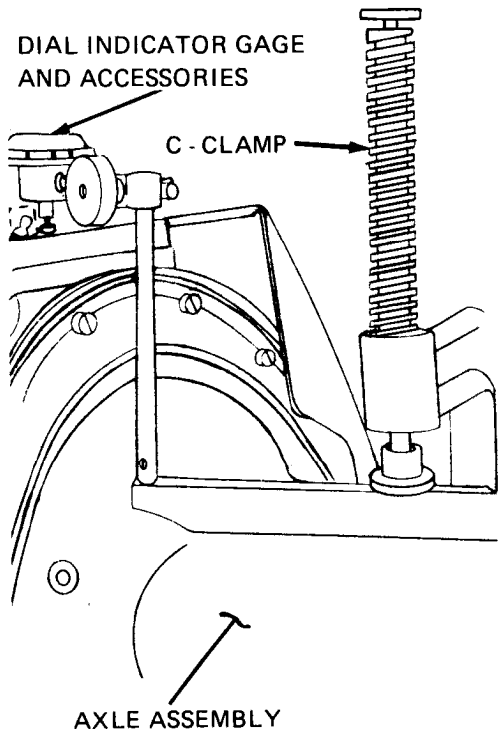
- Set up dial indicator as follows
  - Assemble dial indicator and clamp it to axle assembly using a six-inch C clamp
  - Set moveable pointer of dial indicator on steering knuckle arm just behind grease fitting

2

- Test steering knuckle end play as follows
  - Set moveable pointer on dial indicator to 0
  - Using jack, raise front wheel off ground. Refer to TM 9-2320-211-10
  - Look at dial indicator to see if reading is between 0.005 and 0.013 inch

3

- Take dial indicator off of axle
  - Unscrew C-clamp and take off gage
  - Take apart dial indicator accessories and put back in case



TA 120972

Figure 17-1 (Sheet 2 of 2)

CHAPTER 18

REAR AXLE SYSTEM TROUBLESHOOTING

18-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Rear Axle System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

18-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

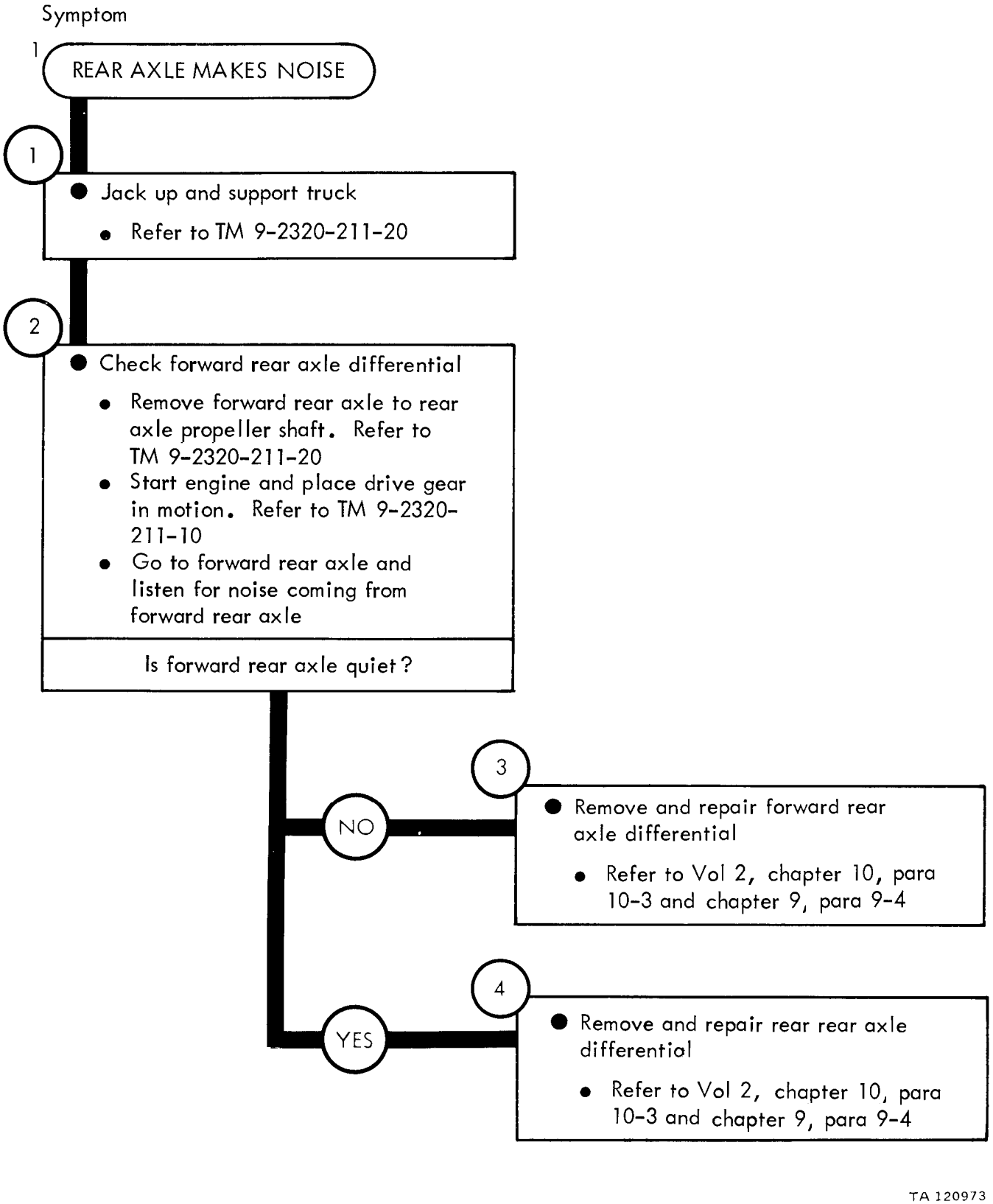

Symptom
1
REAR AXLE MAKES NOISE
1
Jack up and support truck
Refer to TM 9-2320-211-20
2
Check forward rear axle differential
Remove forward rear axle to rear axle propeller shaft. Refer to TM 9-2320-211-20
Start engine and place drive gear in motion. Refer to TM 9-2320-211-10
Go to forward rear axle and listen for noise coming from forward rear axle
Is forward rear axle quiet?
NO
3
Remove and repair forward rear axle differential
Refer to Vol 2, chapter 10, para 10-3 and chapter 9, para 9-4
YES
4
Remove and repair rear rear axle differential
Refer to Vol 2, chapter 10, para 10-3 and chapter 9, para 9-4
TA 120973

Figure 18-1

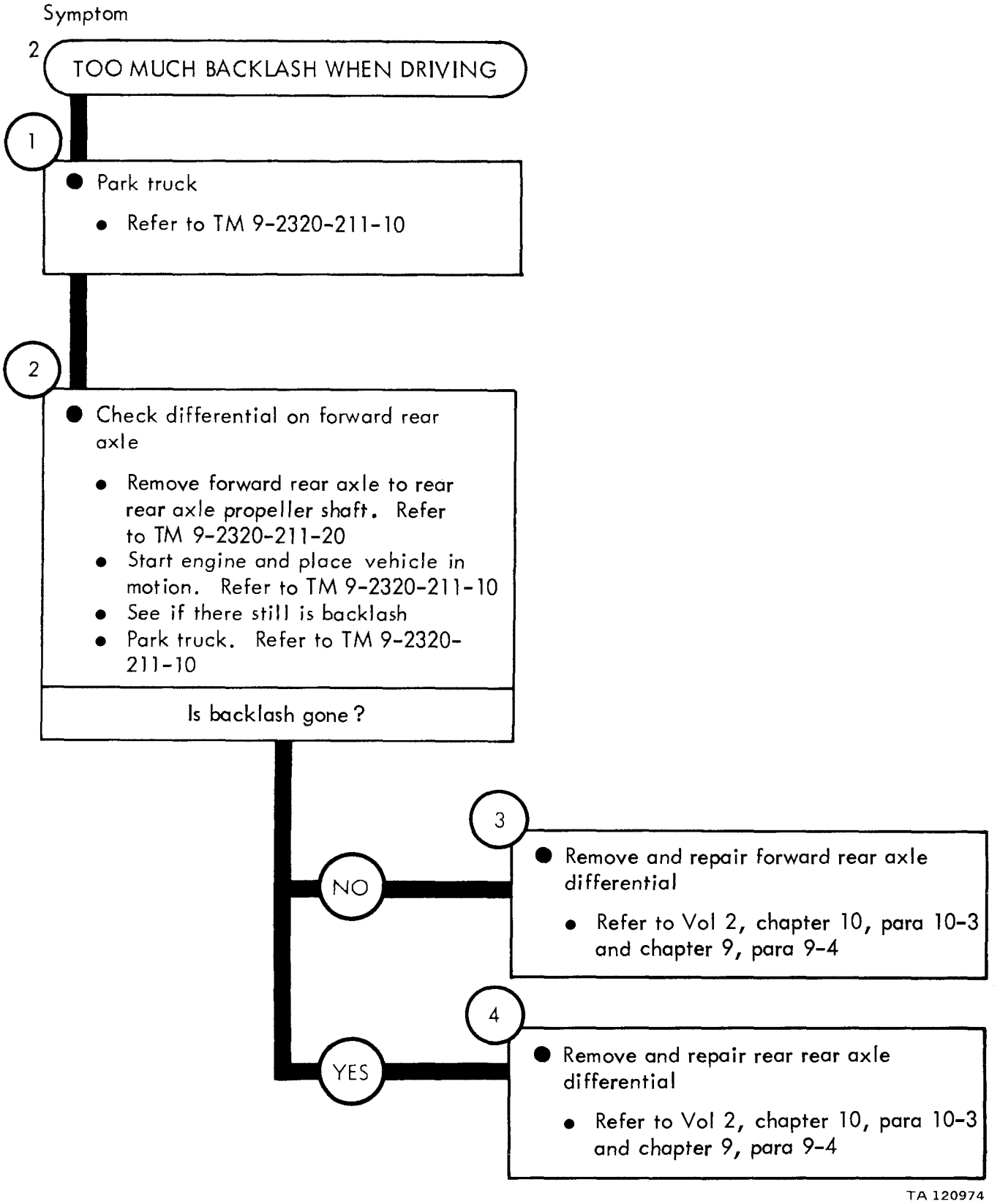

Symptom
2
TOO MUCH BACKLASH WHEN DRIVING
1
Park truck
Refer to TM 9-2320-211-10
2
Check differential on forward rear axle
Remove forward rear axle to rear rear axle propeller shaft. Refer to TM 9-2320-211-20
Start engine and place vehicle in motion. Refer to TM 9-2320-211-10
See if there still is backlash
Park truck. Refer to TM 9-2320-211-10
Is backlash gone?
NO
3
Remove and repair forward rear axle differential
Refer to Vol 2, chapter 10, para 10-3 and chapter 9, para 9-4
YES
4
Remove and repair rear rear axle differential
Refer to Vol 2, chapter 10, para 10-3 and chapter 9, para 9-4
TA 120974

Figure 18-2

CHAPTER 19

STEERING SYSTEM TROUBLESHOOTING

19-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Steering System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

19-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

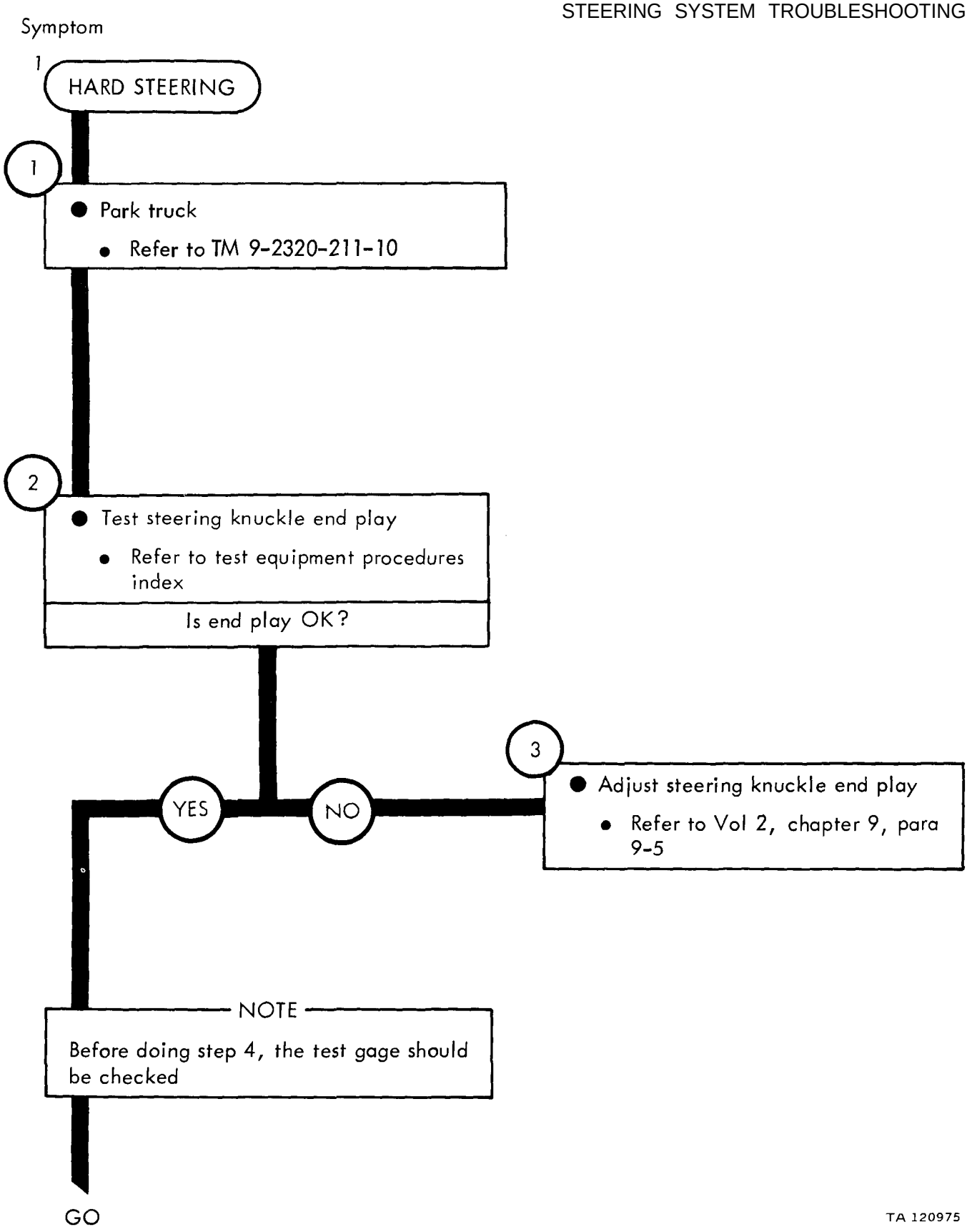
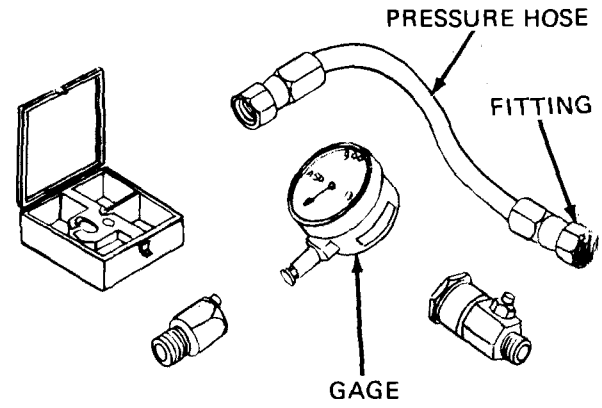


Figure 19-1 (Sheet 1 of 7)

GO

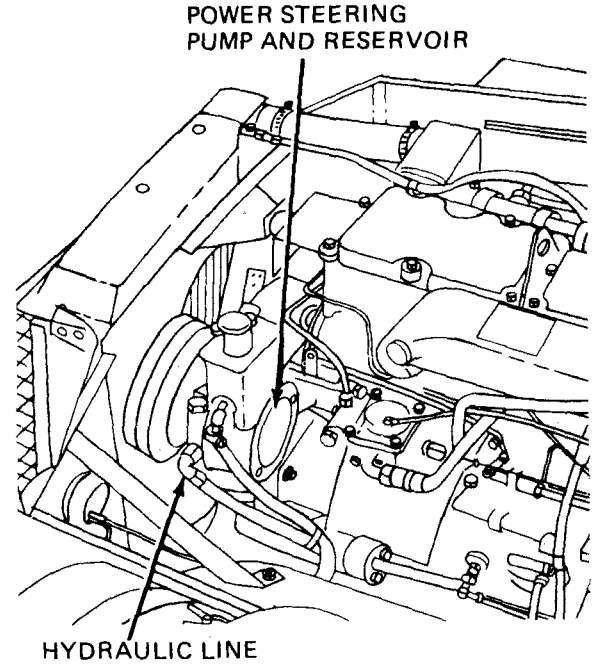
4

- Check power steering oil pressure test set before using
  - Gage - Look to see that the glass and needle are not broken
  - Pressure hose - Look to see that there are no holes, cracks, or sharp bends
  - Fittings - Feel if fittings are tight on both ends. Look to see that the input end is dirt free



5

- Set up pressure test on power steering pump
  - Put a can, or bucket, under power steering pump
  - Unscrew and take off hydraulic line from power steering pump and put lines in can or bucket
  - Put test set on power steering pump fitting and tighten
  - Put hydraulic line on test set adapter and tighten
  - Remove can or bucket from under pump and fill power steering fluid reservoir. Refer to LO 9-2320-211-12



TA 120976

GO

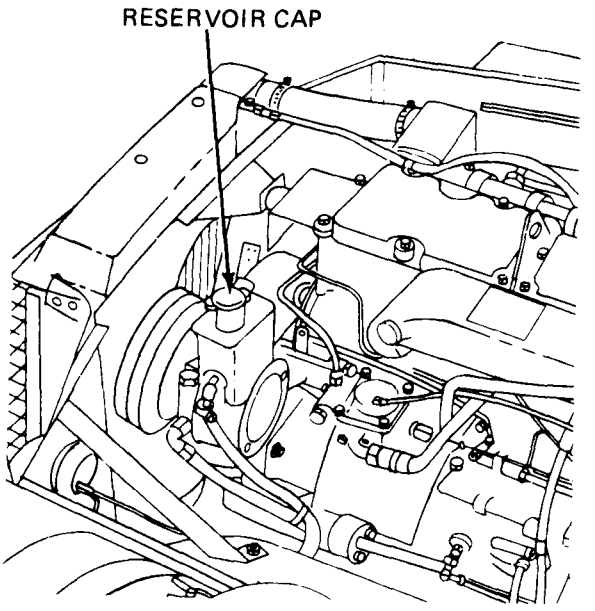
Figure 19-1 (Sheet 2 of 7)

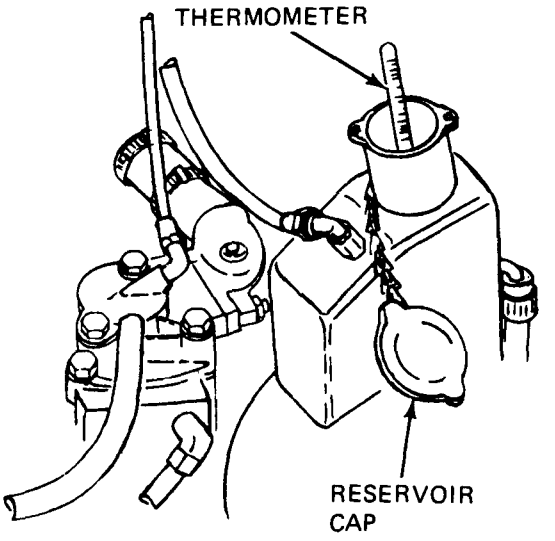
GO

6

- Set power steering system to operating temperature
  - Start engine, and let it run at idle speed. Refer to TM 9-2320-211-10
  - Take off power steering pump reservoir cap
  - Put a thermometer in reservoir
  - Let engine run until thermometer shows a temperature range of 120 to 150°F

    Note: When power steering oil reaches temperature range take out thermometer. Put back reservoir cap and tighten





NOTE

The next step will need the use of two soldiers. The lead soldier will be called Soldier A, and the helper will be called Soldier B

GO

TA 120977

Figure 19-1 (Sheet 3 of 7)

GO

7

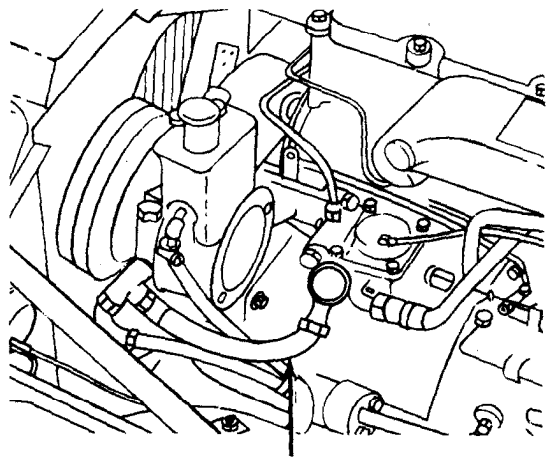
- Do power steering pump pressure test

SOLDIER B • Go to drivers seat and wait for instructions from Soldier A

SOLDIER A • Go to test gage and tell Soldier B to turn the wheel all the way to lock position

Note: Pressure during turning should be between 300 and 500 psi Pressure between 800 to 900 psi at full lock When steering wheel is stopped in any direction, the pressure will return to 0 psi

Are pressure readings OK?



TEST SET

YES

NO

8

- Remove test set from power steering pump
  - Refer to step 9
- Replace power steering pump
  - Refer to Vol 2, chapter 13, para 13-7

NOTE

Before doing step 10, test set must be removed from power steering pump

TA 120978

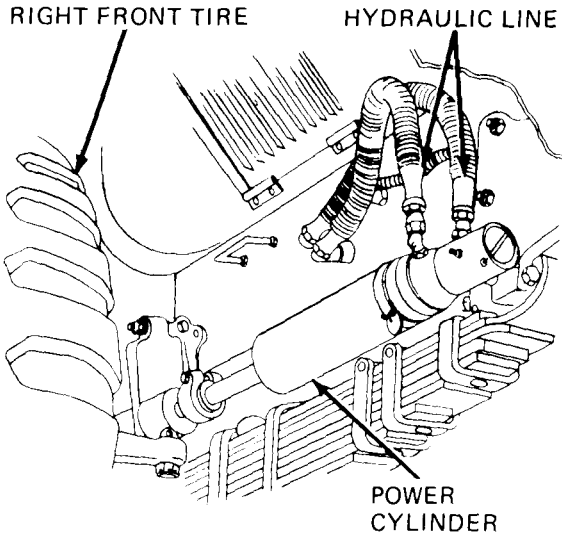
GO

Figure 19-1 (Sheet 4 of 7)

GO

9

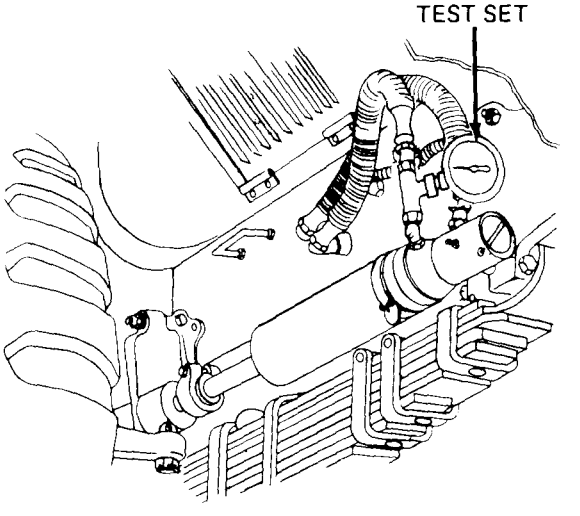
- Remove test set from power steering pump
  - Put a can, or bucket, under power steering pump
  - Unscrew and take off hydraulic line from test set, and put in can or bucket
  - Unscrew and take off test set from power steering pump
  - Screw hydraulic line on power steering pump, and tighten
  - Take can, or bucket, out from under power steering pump



10

- Set up pressure test on power cylinder
  - Put a can, or bucket, under power cylinder
  - Unscrew and take off hydraulic line from power cylinder and put fitting end in a can or bucket

    Note: This test will have to be done to both hydraulic lines going to power cylinder
  - Put test set on power cylinder and tighten
  - Put hydraulic line on adapter and tighten
  - Fill power steering fluid reservoir Refer to LO 9-2320-211-12
- Set power steering system to operating temperature
  - Refer to step 6



GO

TA 120979

Figure 19-1 (Sheet 5 of 7)

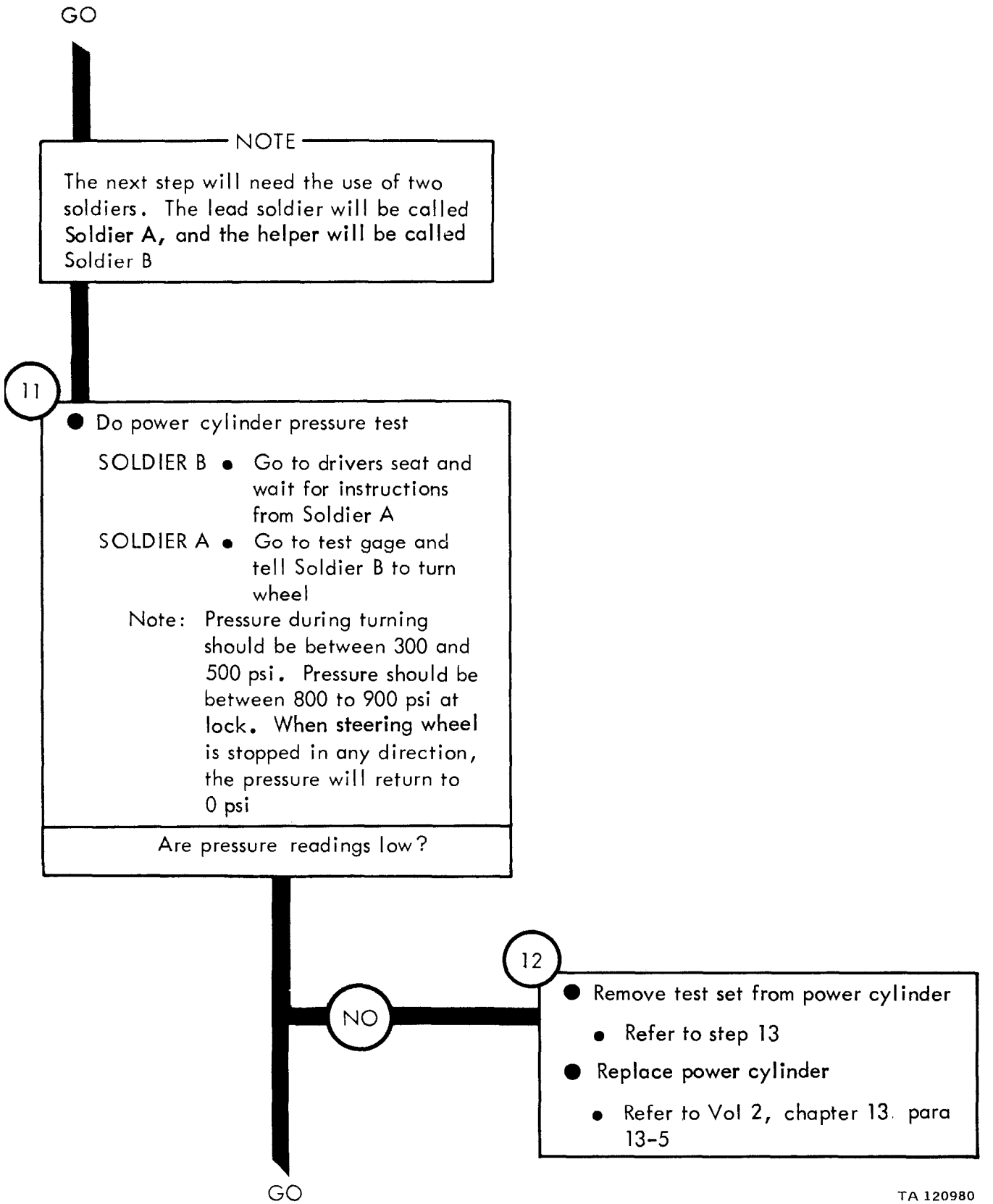


Figure 19-1 (Sheet 6 of 7)

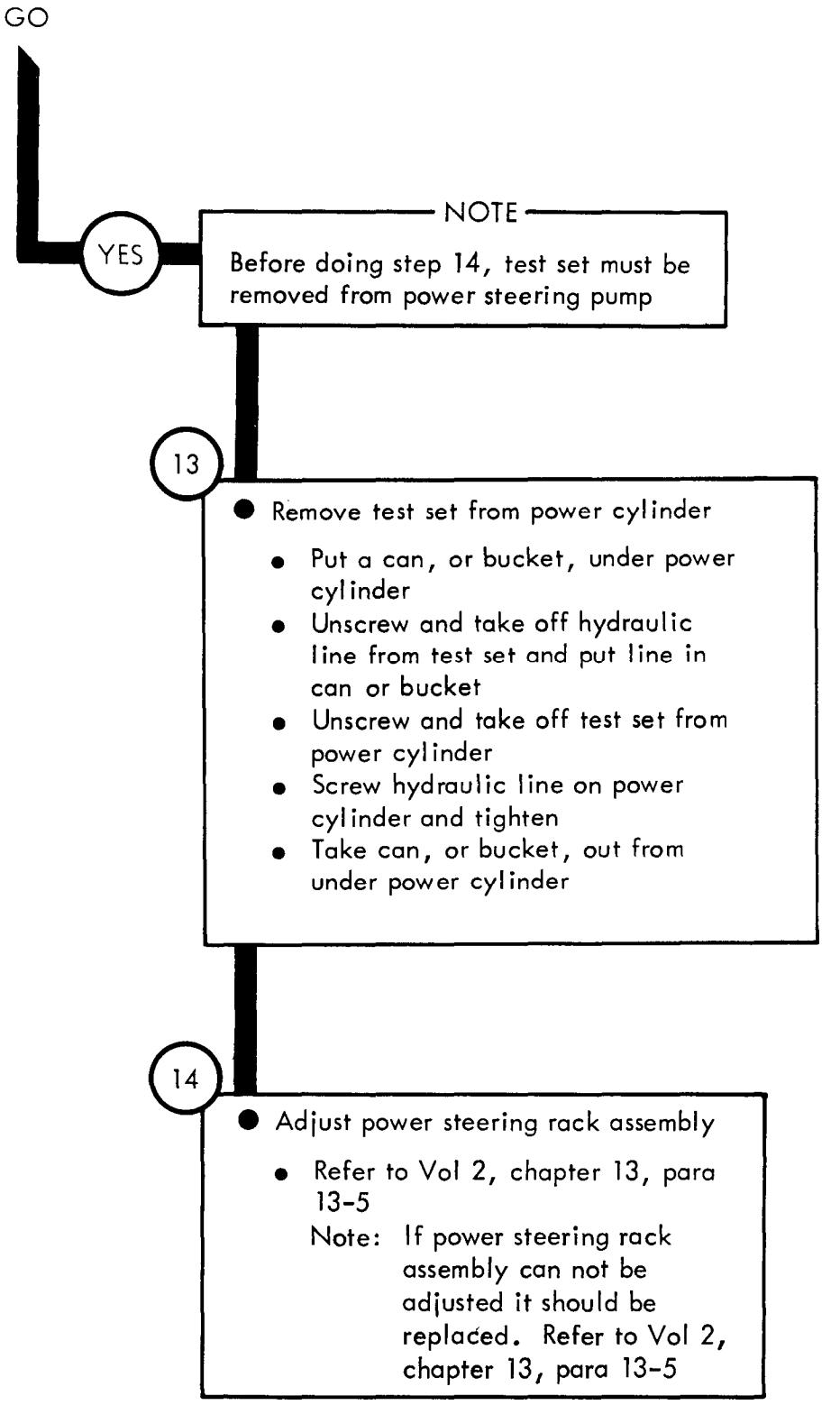


Figure 19-1 (Sheet 7 of 7)

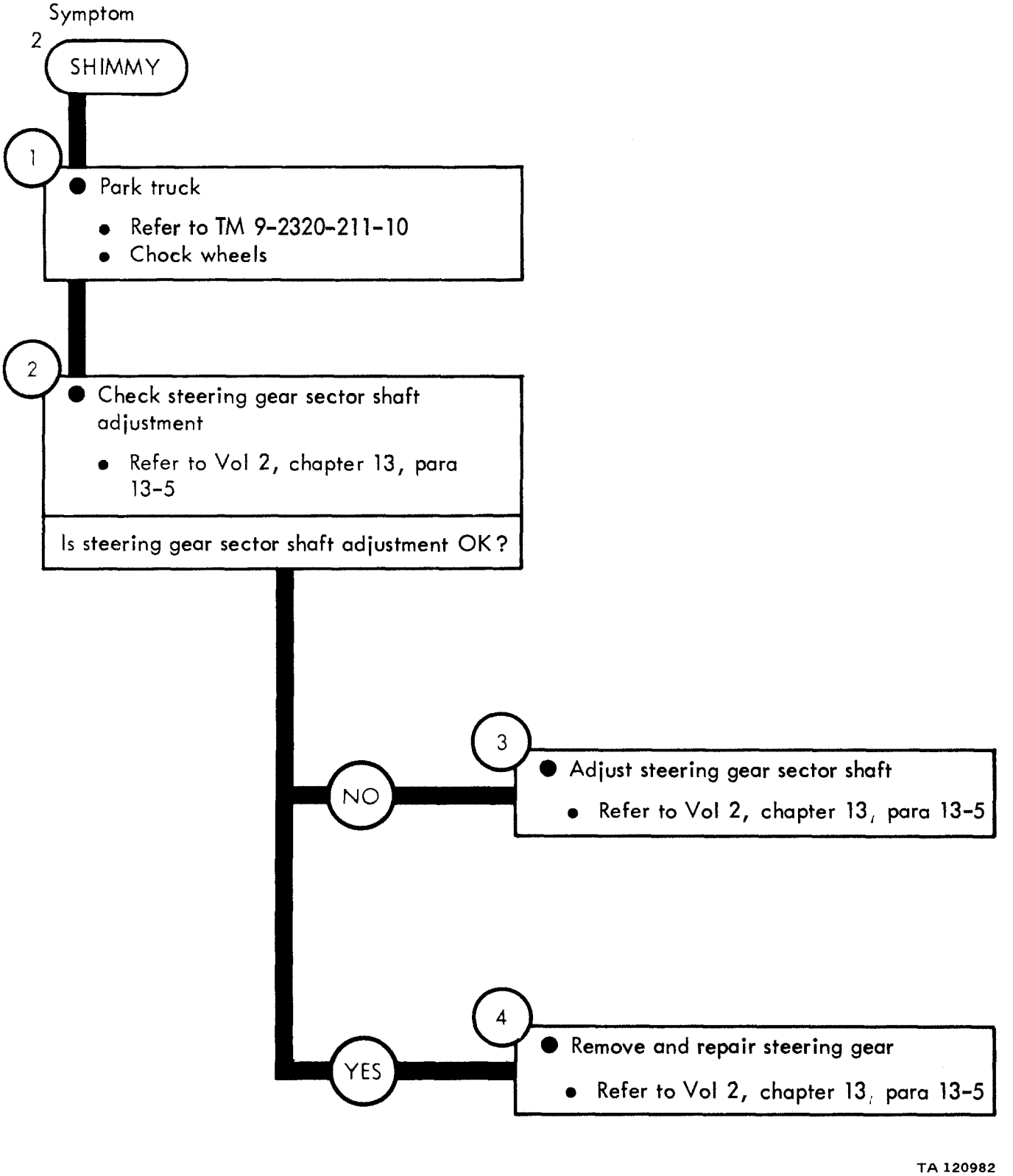

Symptom
2
SHIMMY
1
Park truck
Refer to TM 9-2320-211-10
Chock wheels
2
Check steering gear sector shaft adjustment
Refer to Vol 2, chapter 13, para 13-5
Is steering gear sector shaft adjustment OK?
NO
3
Adjust steering gear sector shaft
Refer to Vol 2, chapter 13, para 13-5
YES
4
Remove and repair steering gear
Refer to Vol 2, chapter 13, para 13-5
TA 120982

Figure 19-2

CHAPTER 20

FRONT WINCH SYSTEM TROUBLESHOOTING

20-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Front Winch System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

20-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

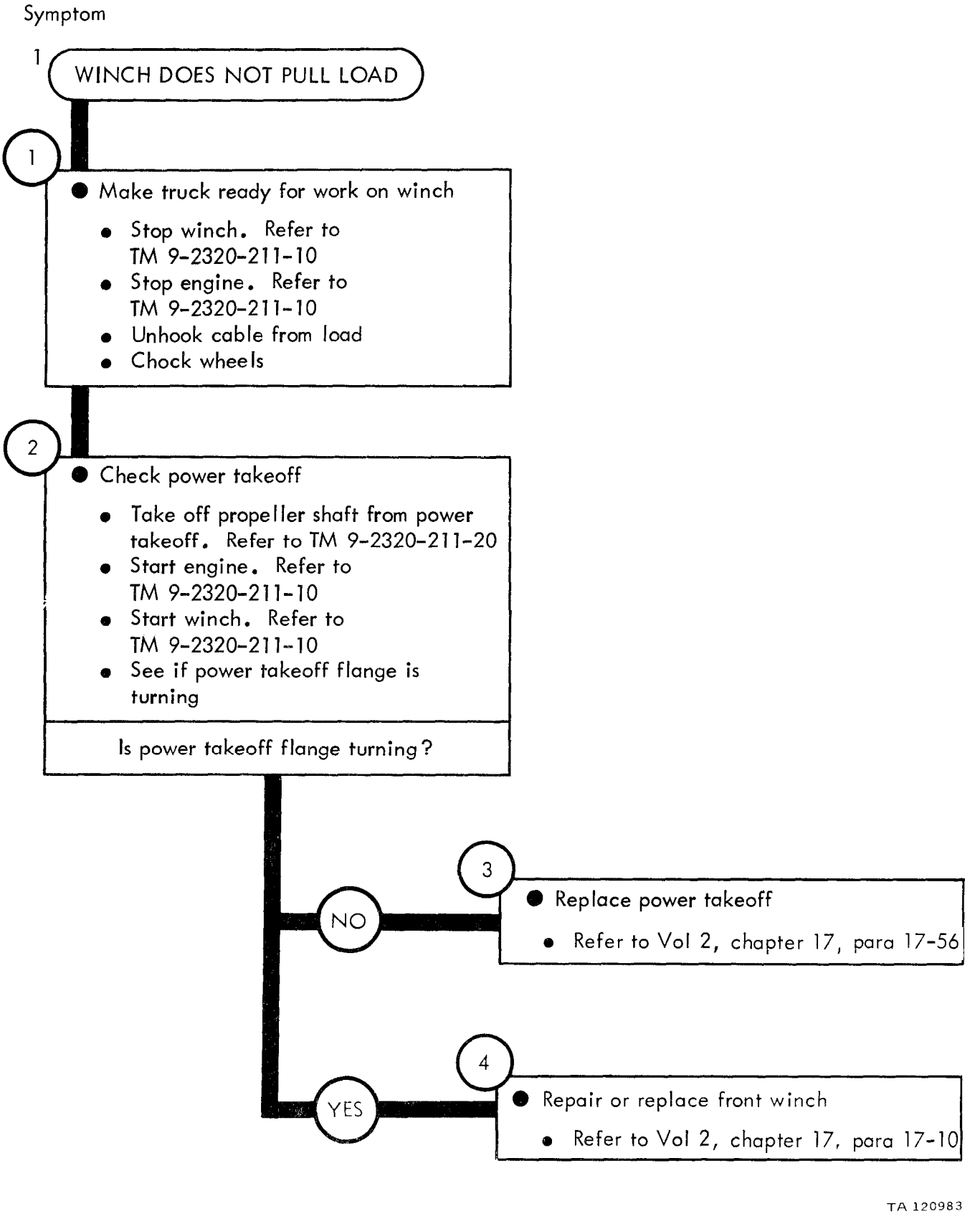

Symptom
1
WINCH DOES NOT PULL LOAD
1
Make truck ready for work on winch
Stop winch. Refer to TM 9-2320-211-10
Stop engine. Refer to TM 9-2320-211-10
Unhook cable from load
Chock wheels
2
Check power takeoff
Take off propeller shaft from power takeoff. Refer to TM 9-2320-211-20
Start engine. Refer to TM 9-2320-211-10
Start winch. Refer to TM 9-2320-211-10
See if power takeoff flange is turning
Is power takeoff flange turning?
NO
3
Replace power takeoff
Refer to Vol 2, chapter 17, para 17-56
YES
4
Repair or replace front winch
Refer to Vol 2, chapter 17, para 17-10
TA 120983

Figure 20-1

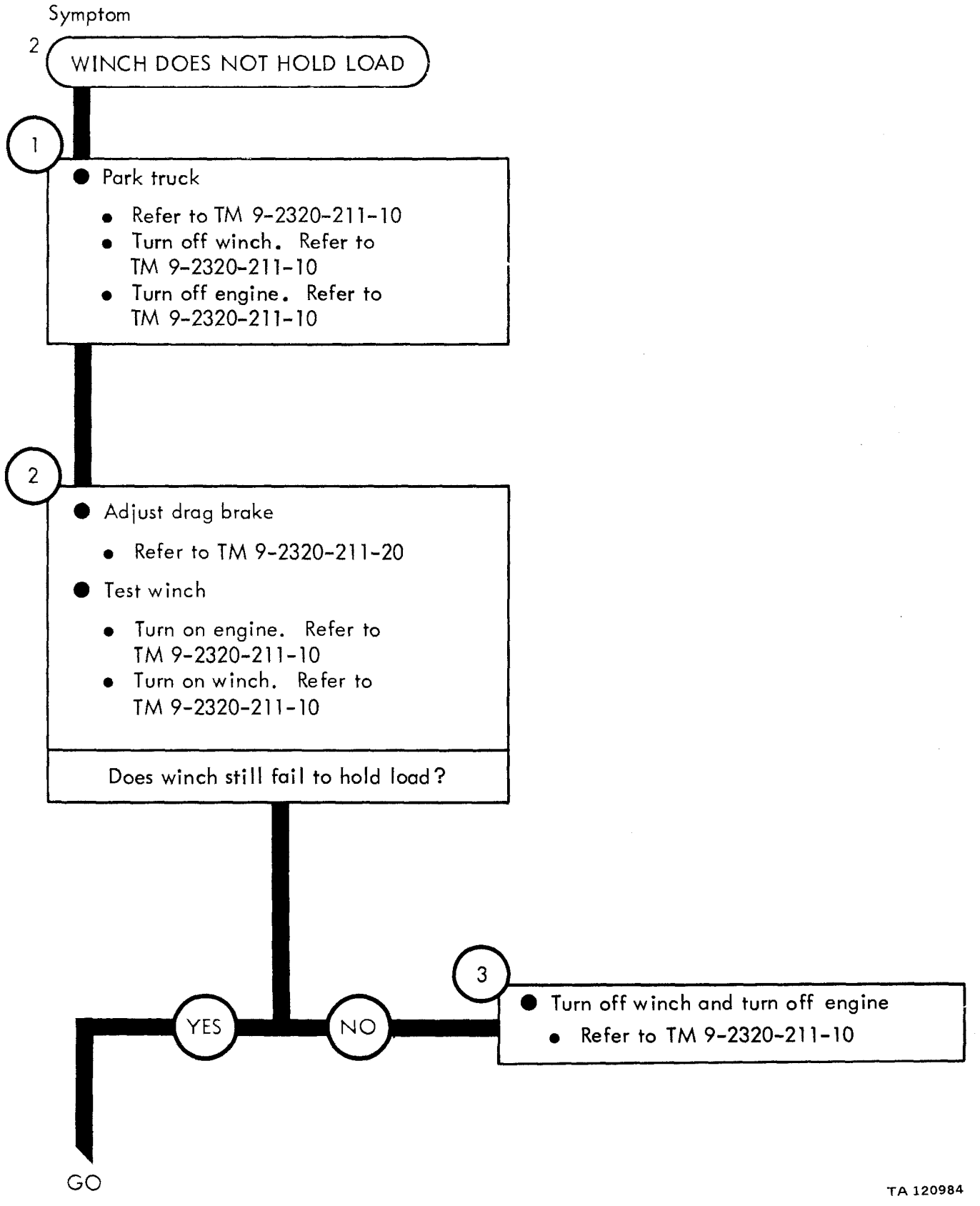


Figure 20-2 (Sheet 1 of 2)

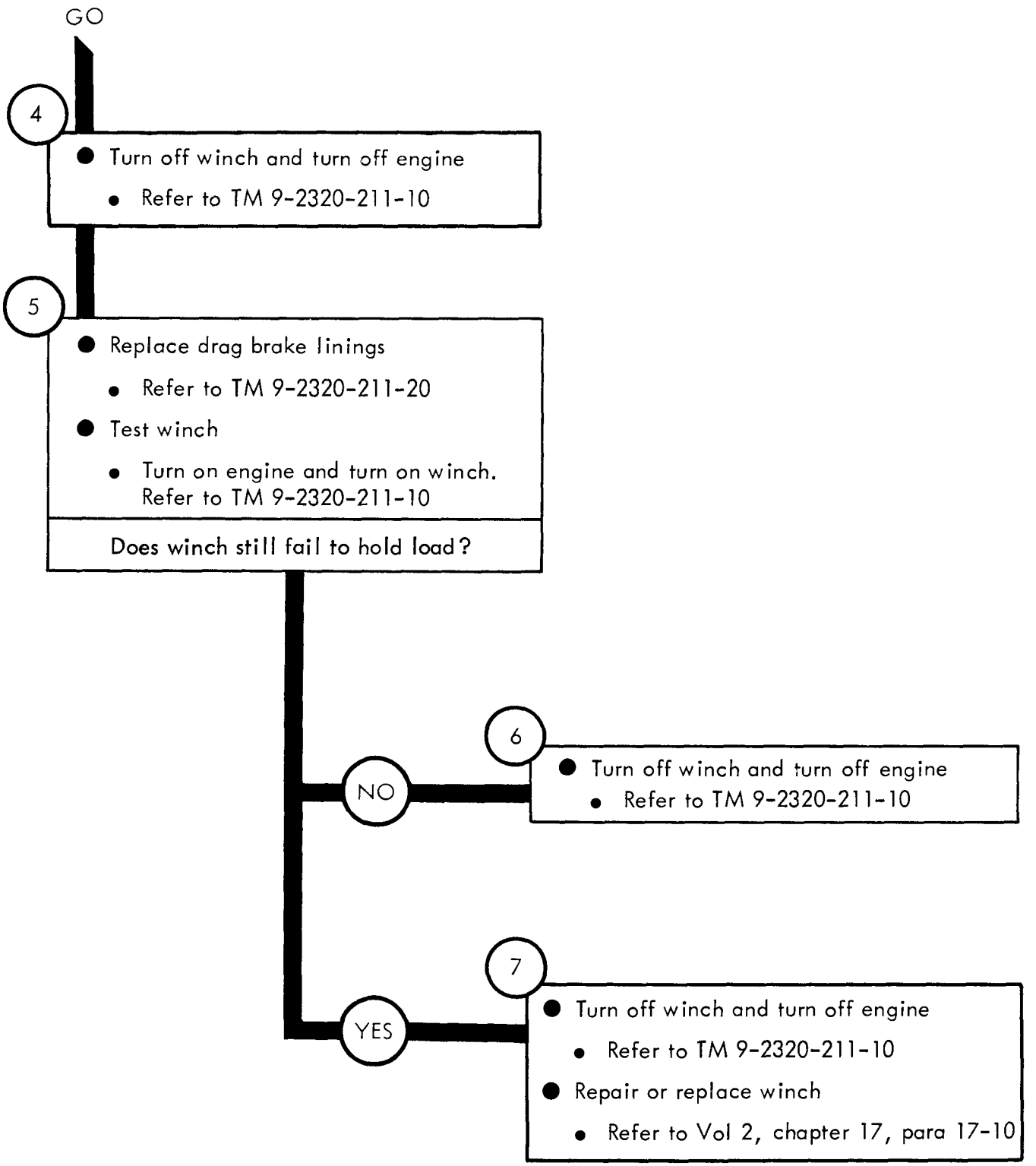


Figure 20-2 (Sheet 2 of 2)

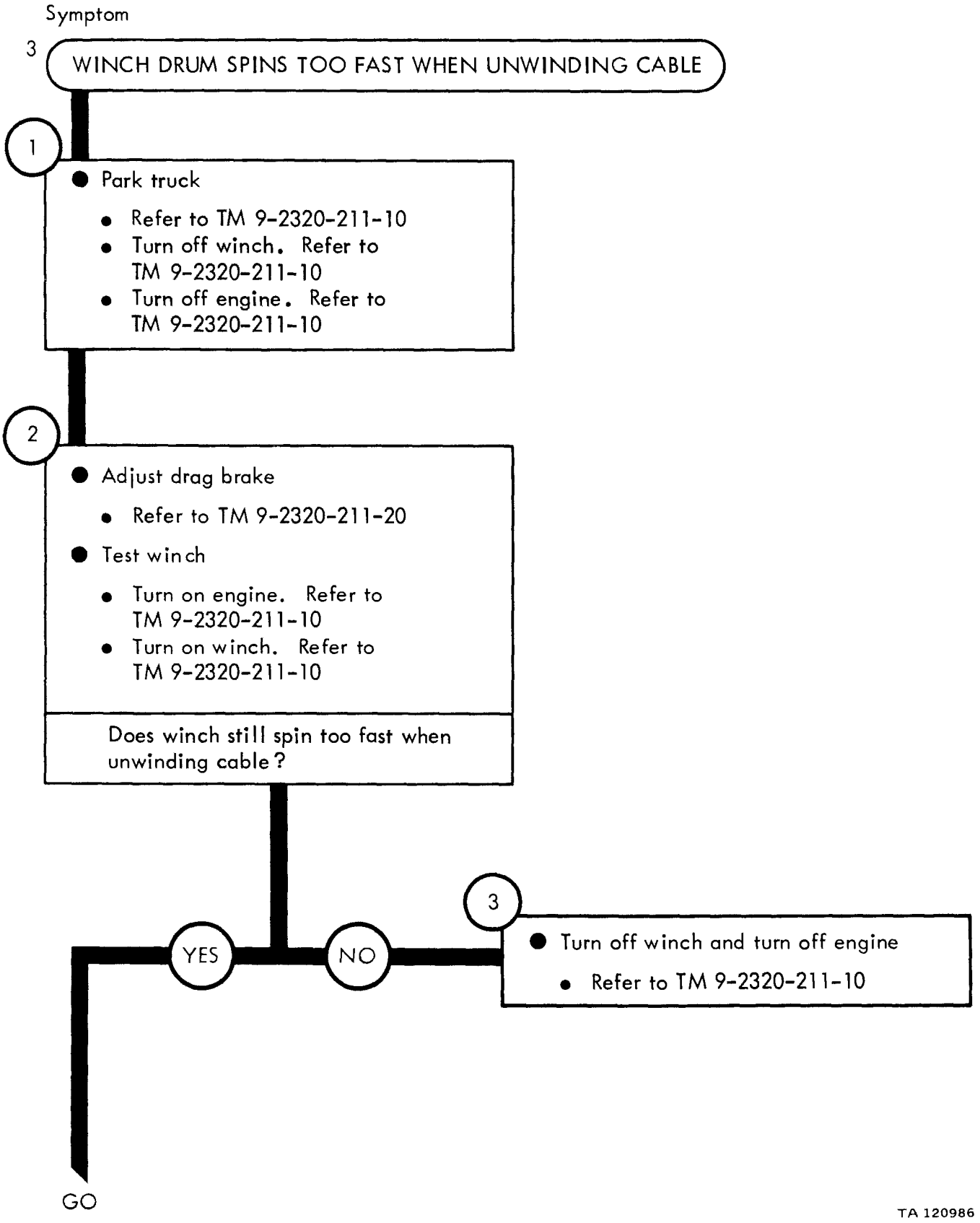


Figure 20-3 (Sheet 1 of 2)

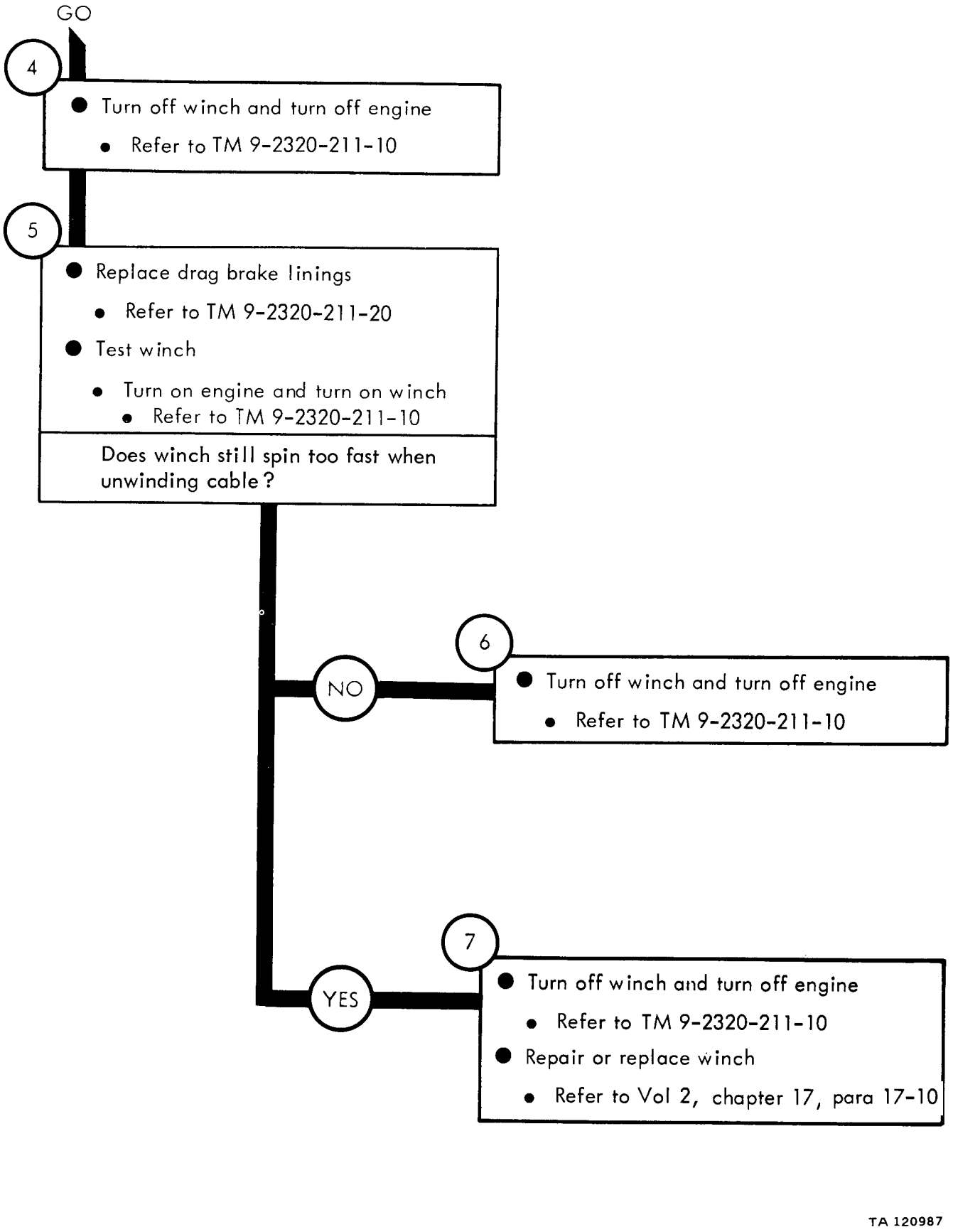


Figure 20-3 (Sheet 2 of 2)

CHAPTER 21

REAR WINCH SYSTEM TROUBLESHOOTING

21-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Rear Winch System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

21-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

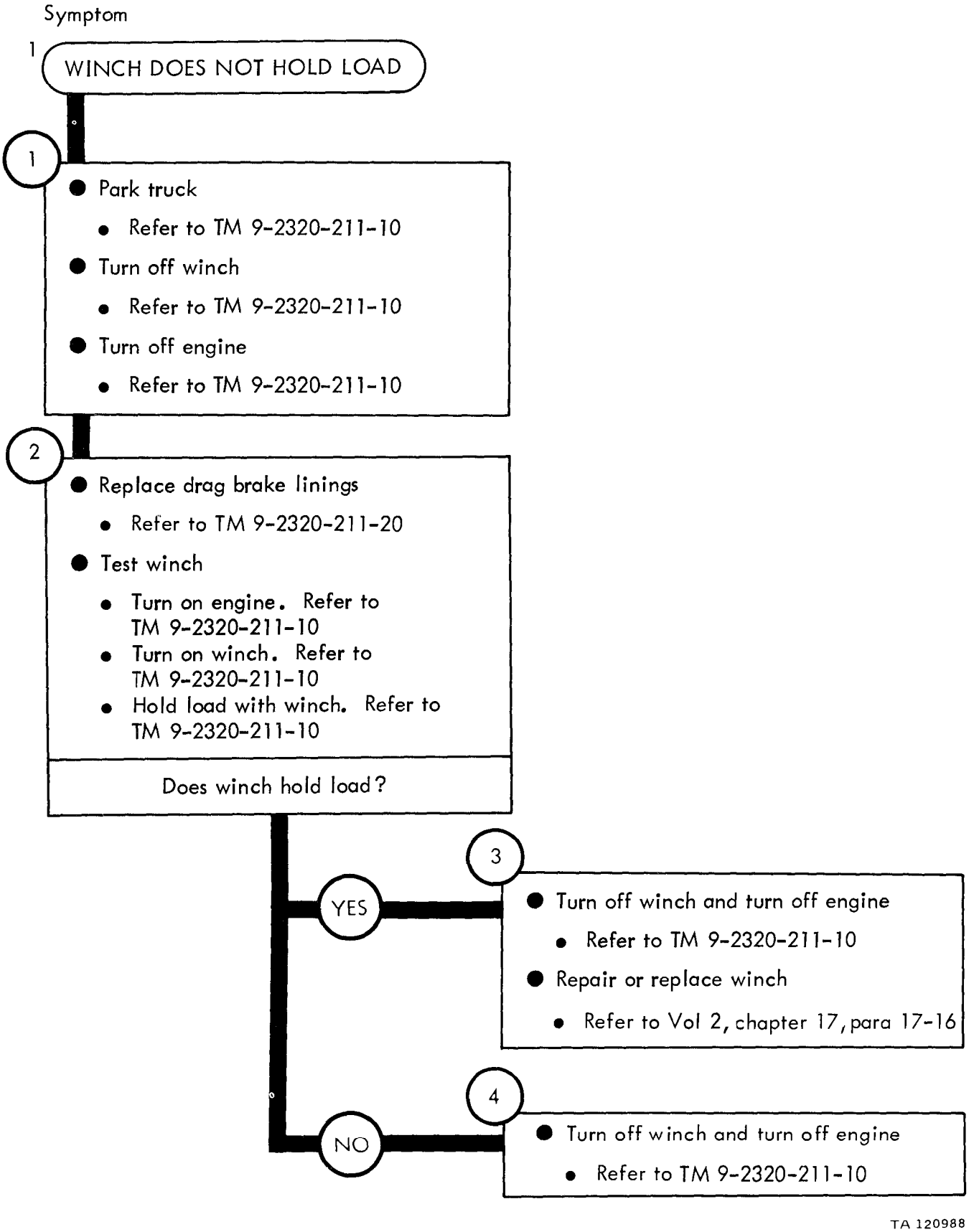

Symptom
1
WINCH DOES NOT HOLD LOAD
1
Park truck
Refer to TM 9-2320-211-10
Turn off winch
Refer to TM 9-2320-211-10
Turn off engine
Refer to TM 9-2320-211-10
2
Replace drag brake linings
Refer to TM 9-2320-211-20
Test winch
Turn on engine. Refer to TM 9-2320-211-10
Turn on winch. Refer to TM 9-2320-211-10
Hold load with winch. Refer to TM 9-2320-211-10
Does winch hold load?
YES
3
Turn off winch and turn off engine
Refer to TM 9-2320-211-10
Repair or replace winch
Refer to Vol 2, chapter 17, para 17-16
NO
4
Turn off winch and turn off engine
Refer to TM 9-2320-211-10
TA 120988

Figure 21-1

CHAPTER 22

M543A2 WRECKER SYSTEM TROUBLESHOOTING

22-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the M543A2 Wrecker System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

22-20 EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

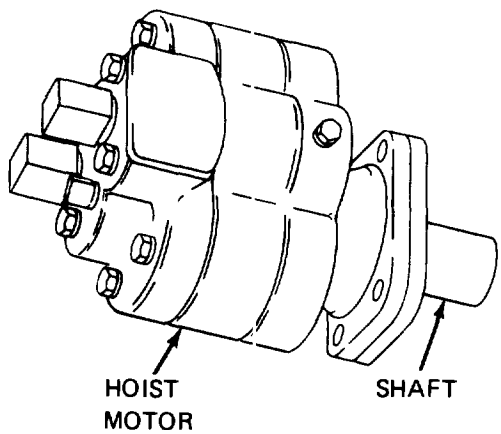
Symptom

1 HOIST WINCH DOES NOT PULL LOAD

1
- Make truck ready for work on wrecker
  - Remove load
  - Park truck. Refer to TM 9-2320-211-10
  - Chock wheels

2
- Check hoist winch motor assembly
  - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-18
  - Feel for a loose or broken shaft
  - Feel if shaft turns freely

Is motor OK?



NO

3
- Repair or replace hoist winch motor assembly
  - Refer to Vol 2, chapter 17, para 17-18

YES

4
- Remove and repair cable drum assembly
  - Refer to Vol 2, chapter 17, para 17-18

TA 120989

Figure 22-1

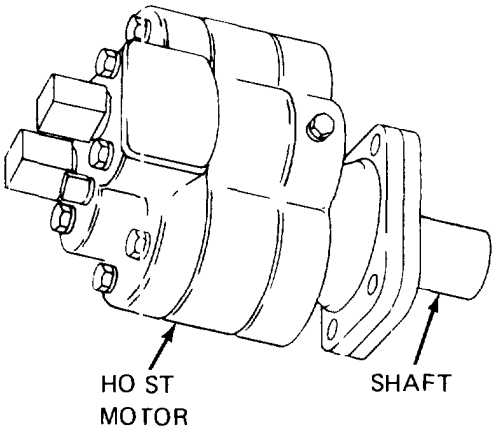
Symptom 2

HOIST WINCH PULLS LOAD SLOWLY

1. ● Make truck ready for work on wrecker
   - Remove load
   - Park truck. Refer to TM 9-2320-211-10
   - Chock wheels

2. ● Check hoist winch motor assembly
   - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-18
   - Feel for a loose shaft
   - Feel if shaft turns freely

Is motor OK?



NO

3. ● Repair or replace hoist winch motor assembly
   - Refer to Vol 2, chapter 17, para 17-18

YES

4. ● Remove and repair cable drum assembly
   - Refer to Vol 2, chapter 17, para 17-18

TA 120990

Figure 22-2

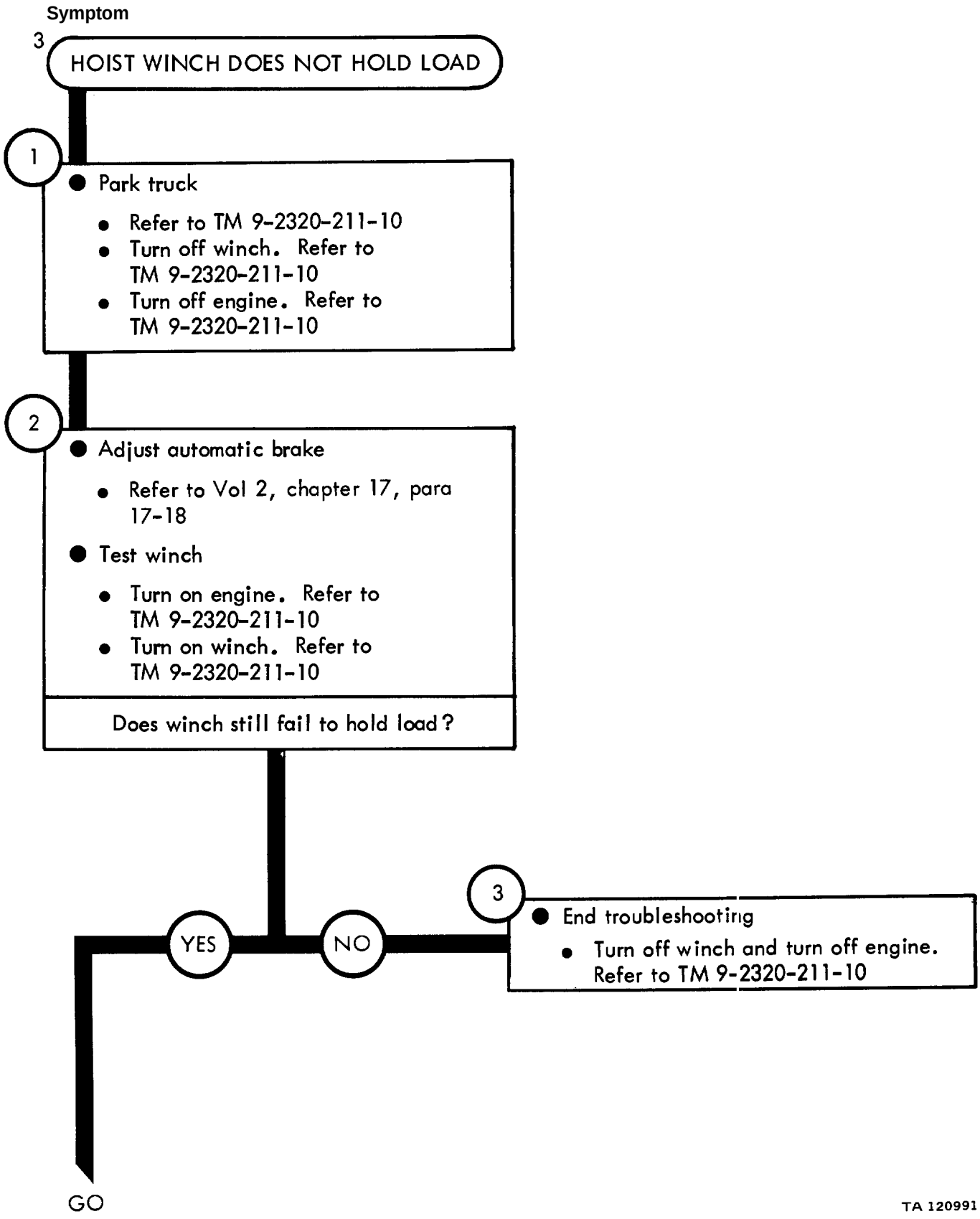


Figure 22-3 (Sheet 1 of 2)

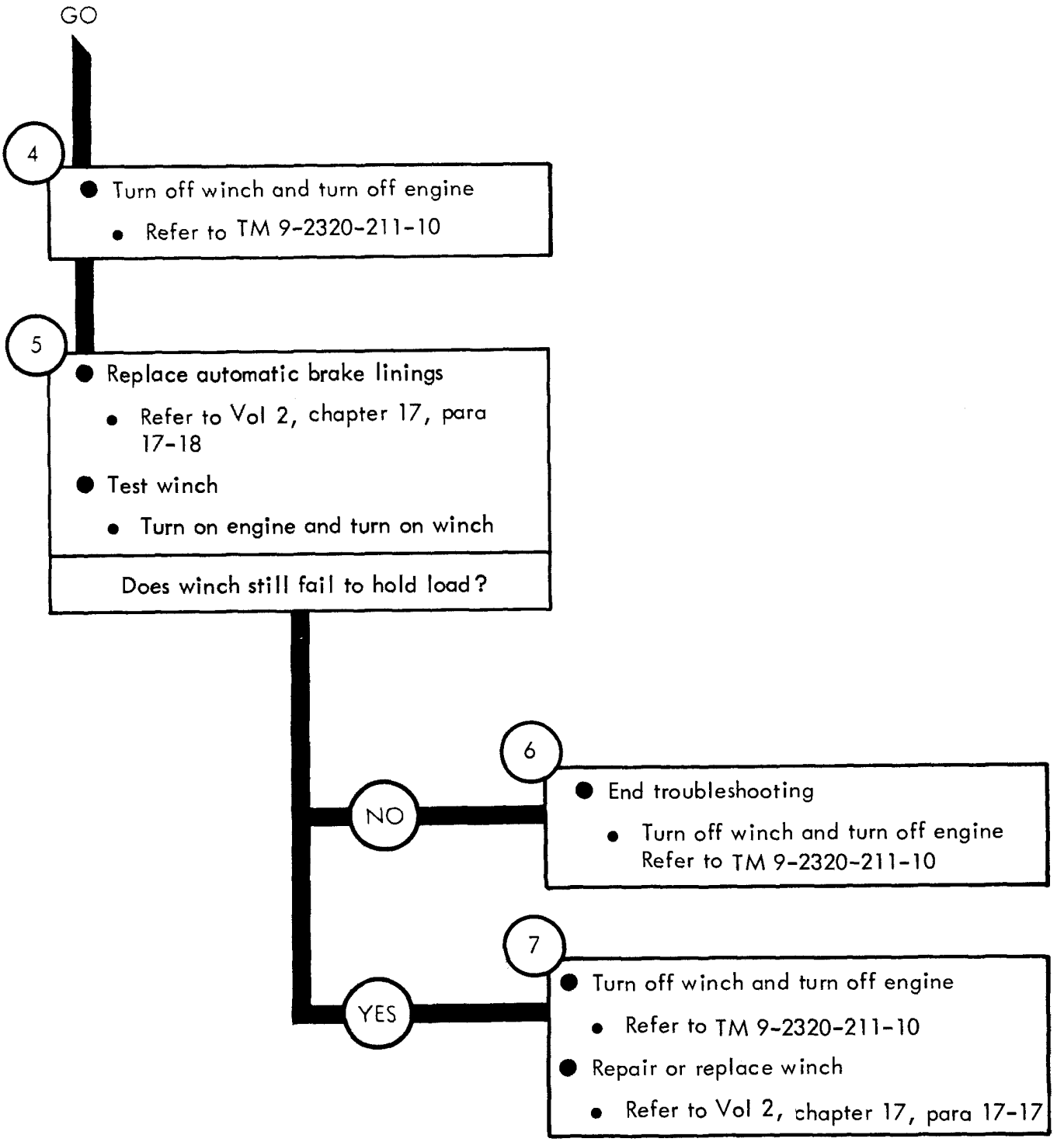


Figure 22-3 (Sheet 2 of 2)

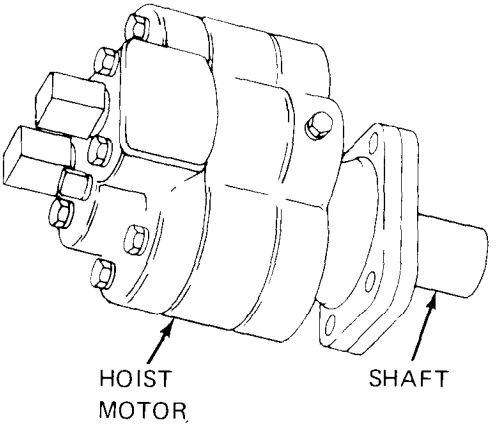
Symptom 4

JERKY OPERATION AS HOIST WINCH PULLS LOAD

1. ● Make truck ready for work on wrecker
   - Remove load
   - Park truck. Refer to TM 9-2320-211-10
   - Chock wheels

2. ● Check hoist winch motor assembly
   - Remove hoist winch motor. Refer to Vol 2, chapter 17, para 17-17
   - Feel if shaft turns

Is motor OK?



NO

3. ● Repair or replace hoist winch motor assembly
   - Refer to Vol 2, chapter 17, para 17-17

YES

4. ● Remove and repair cable drum assembly
   - Refer to Vol 2, chapter 17, para 17-18

TA 120993

Figure 22-4

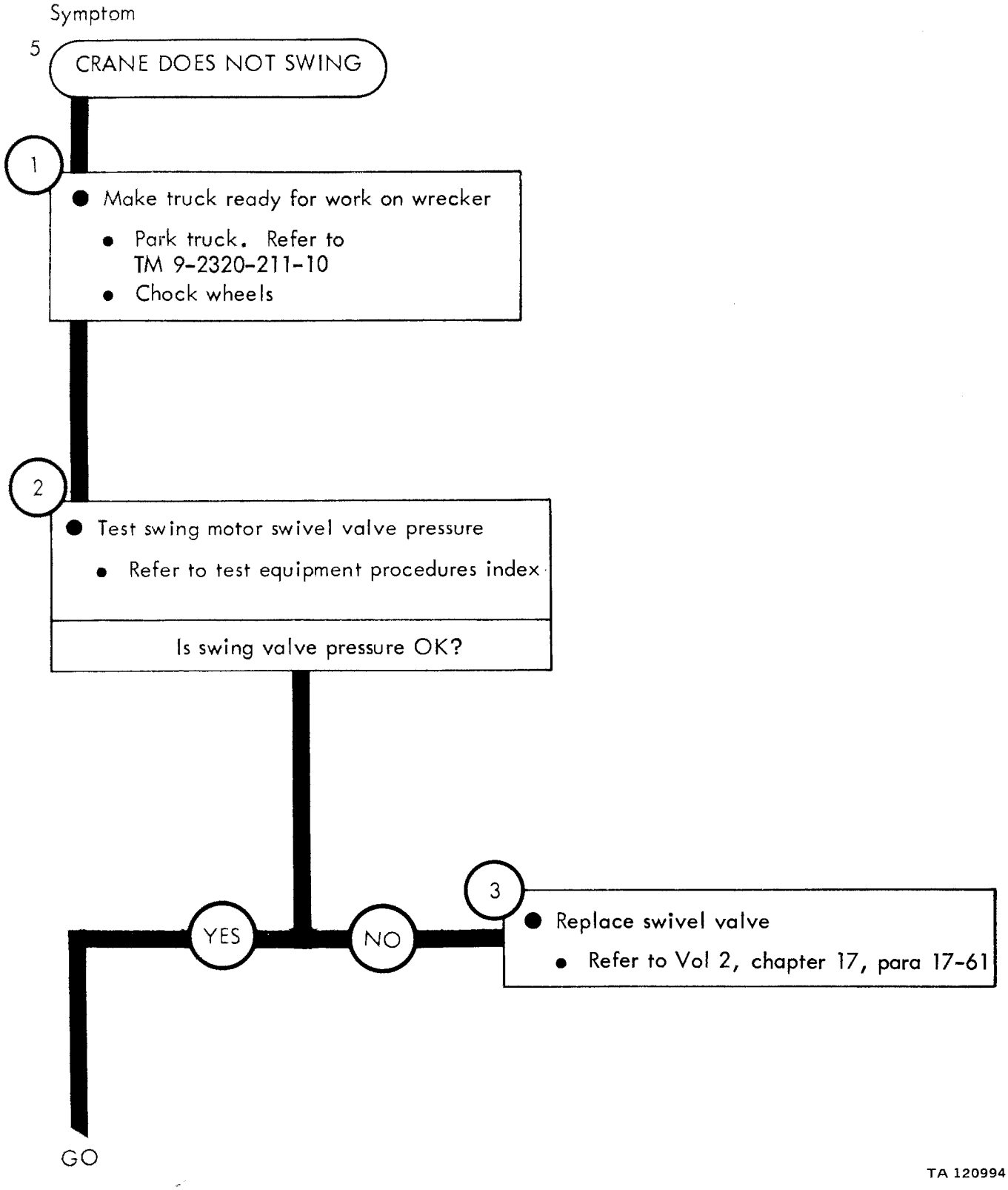


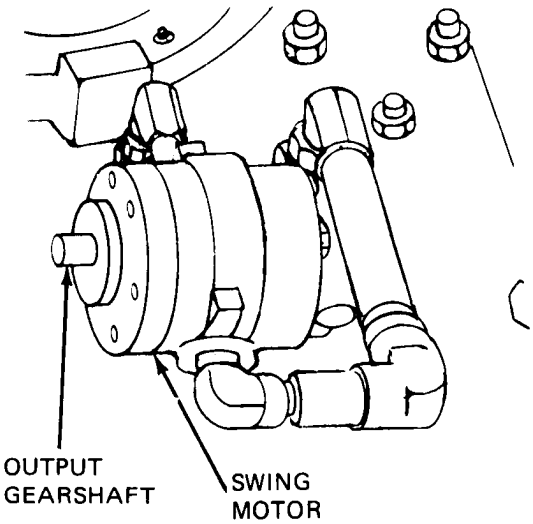
Figure 22-5 (Sheet 1 of 2)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-36
  - Look to see if swing motor output gearshaft is broken
  - Feel for a loose or broken output gearshaft
  - Start engine and operate swing motor. Refer to TM 9-2320-211-10
  - See if output gearshaft turns

Is swing motor OK?



NO

5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-36

YES

6

- Repair or replace drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-36
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-36

TA 120995

Figure 22-5 (Sheet 2 of 2)

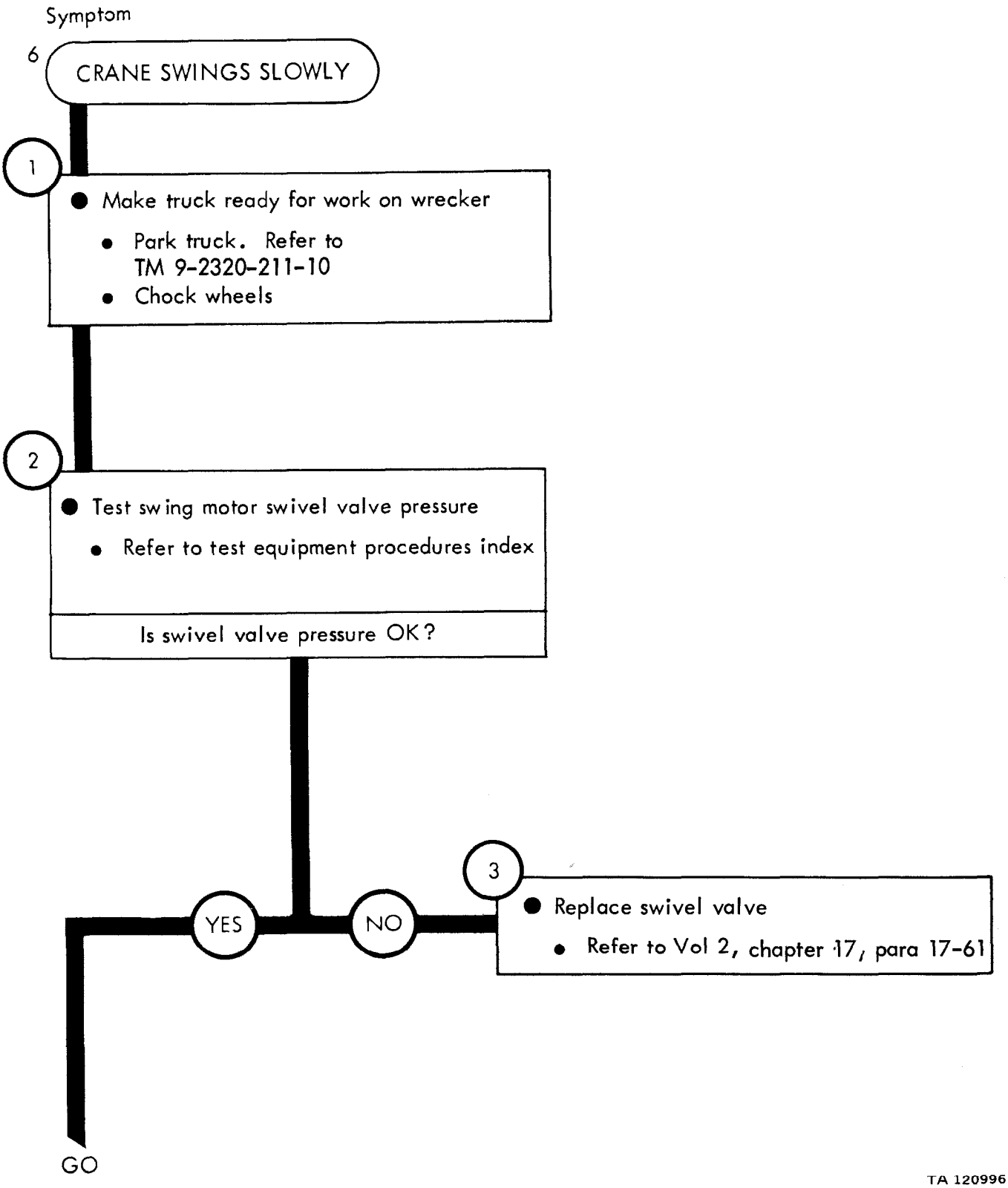


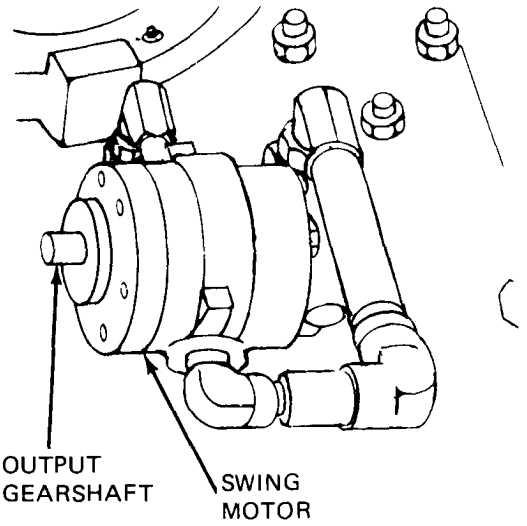
Figure 22-6 (Sheet 1 of 2)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-36
  - Feel for a loose output gearshaft
  - Start engine and operate swing motor. Refer to TM 9-2320-211-10
  - See if output gearshaft turns slowly or binds

Is swing motor OK?



NO

5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-36

YES

6

- Repair or replace drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-36
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-36

TA 120997

Figure 22-6 (Sheet 2 of 2)

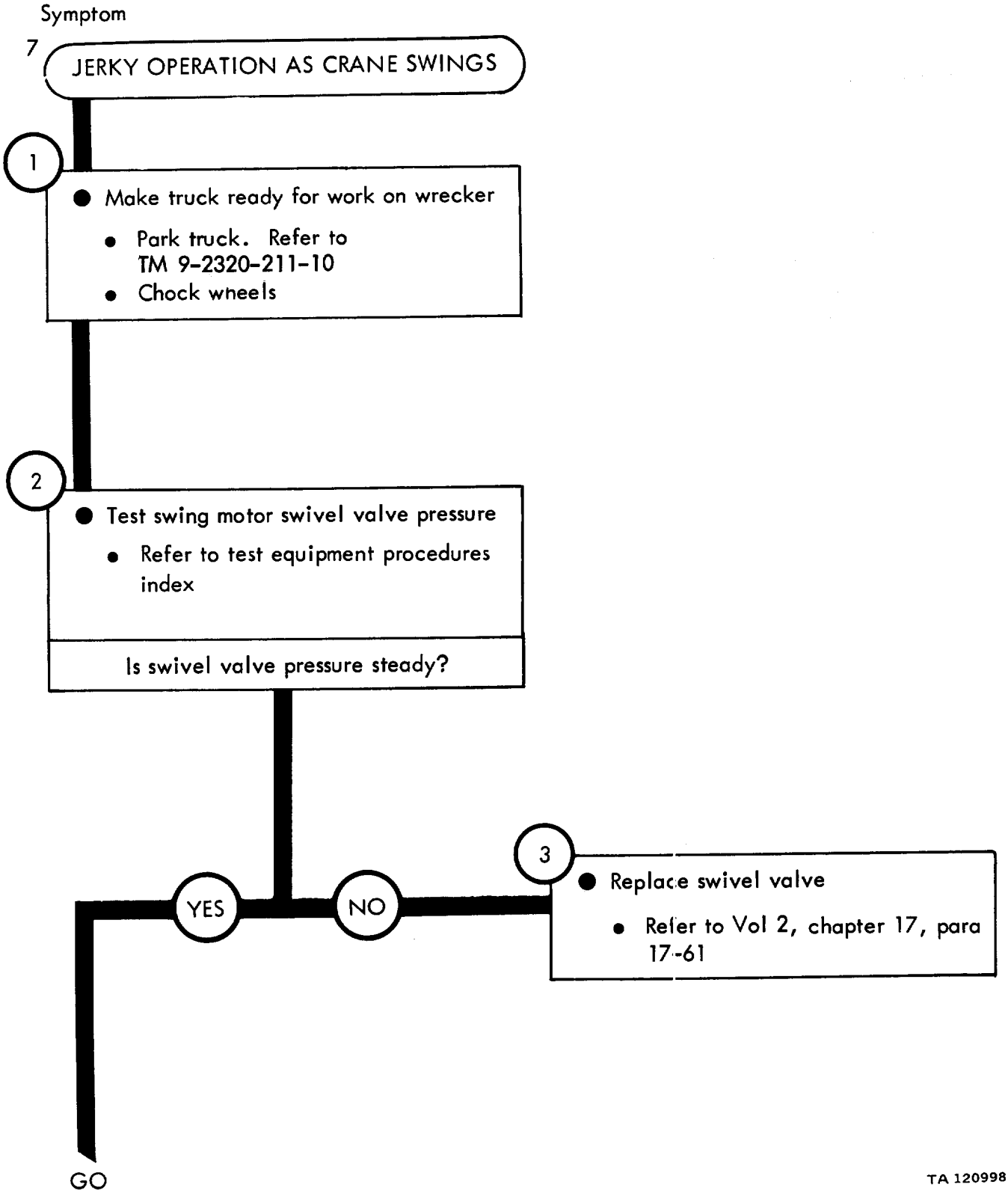


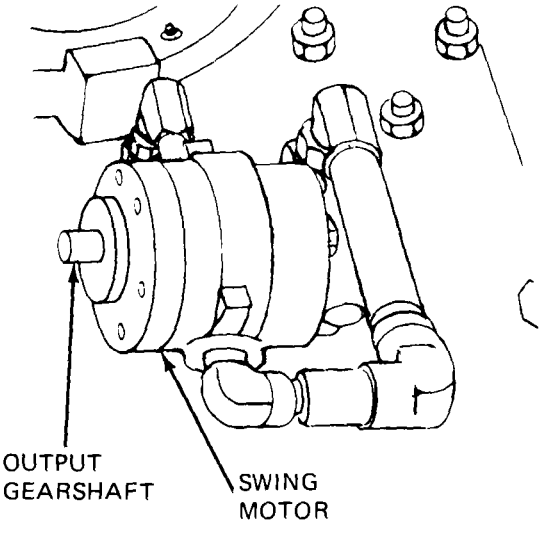
Figure 22-7 (Sheet 1 of 4)

GO

4

- Check swing motor
  - Remove drive gear assembly. Refer to Vol 2, chapter 17, para 17-36
  - Start engine and operate swing motor. Refer to TM 9-2320-211-10
  - See if output gearshaft turns steadily

Does swing motor turn steadily?



YES

NO

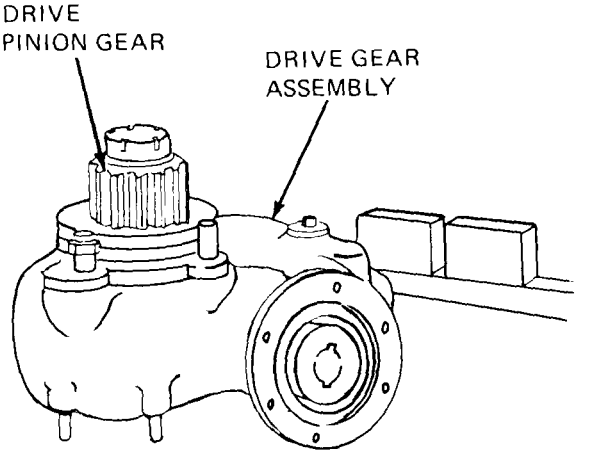
5

- Repair, or replace swing motor
  - Refer to Vol 2, chapter 17, para 17-36

6

- Check drive pinion gear in drive gear assembly
  - Look for teeth missing or broken on drive pinion gear

Is drive pinion gear OK?



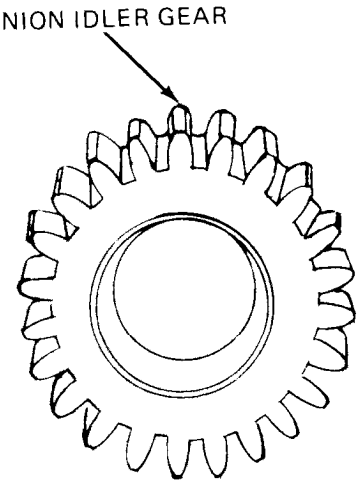
GO

TA 120999

Figure 22-7 (Sheet 2 of 4)

GO

NO GO



7

- Replace drive pinion gear
  - Refer to Vol 2, chapter 17, para 17-34
- Check drive pinion idler gear
  - Remove pinion idler gear. Refer to Vol 2, chapter 17, para 17-34
  - Look for missing teeth on gear

Is drive pinion idler gear OK?

YES

8

- Put back drive pinion idler gear
  - Refer to Vol 2, chapter 17, para 17-34
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-34
- Put back swing motor
  - Refer to Vol 2, chapter 17, para 17-36

NO

9

- Replace drive pinion idler gear
  - Refer to Vol 2, chapter 17, para 17-34
- Put back drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-34
- Put back swing motor
  - Refer to Vol 2, chapter 17, para 17-36

GO

TA 121000

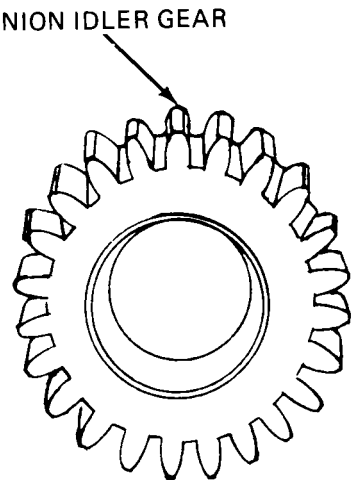
Figure 22-7 (Sheet 3 of 4)

GO

10

- Check drive pinion idler gear
  - Remove pinion idler gear. Refer to Vol 2, chapter 17, para 17-34
  - Look for missing teeth on gear

Is drive pinion idler gear OK?



YES

NO

11

Refer to step 9

12

- Take apart and inspect for bad parts in drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-34

Are parts inside drive gear OK?

NO

13

- Replace bad parts in drive gear assembly
  - Refer to Vol 2, chapter 17, para 17-34

YES

14

- Put drive gear assembly back together
  - Refer to Vol 2, chapter 17, para 17-34
- Replace pivot post ring gear
  - Refer to Vol 2, chapter 17, para 17-34

TA 121001

Figure 22-7 (Sheet 4 of 4)

Symptom 8

BOOM COMES DOWN TOO FAST

1
- Stop boom
  - Refer to TM 9-2320-211-10

2
- Check gondola boom control valve
  - Take out boom control valve. Refer to Vol 2, chapter 17, para 17-51
  - Look for cracks, dents, or chips in casing

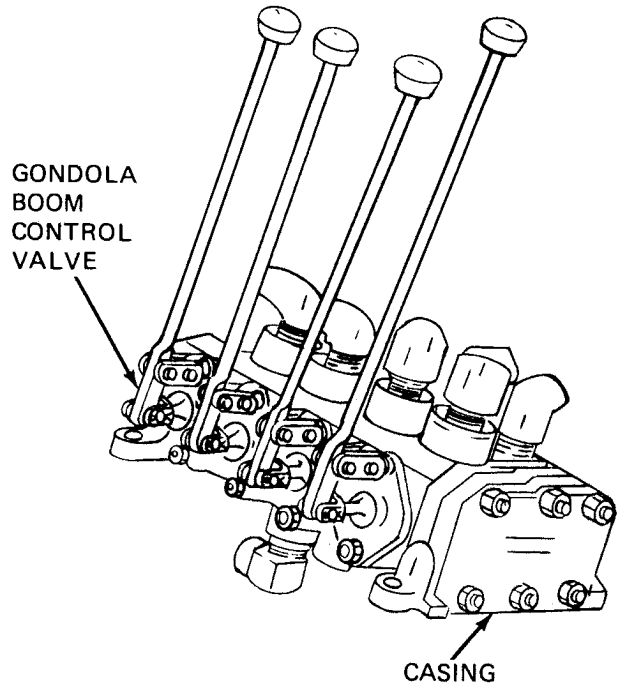
Is boom control valve OK?

NO

3
- Replace boom control valve
  - Refer to Vol 2, chapter 17, para 17-51

YES

4
- Repair or replace boom elevating cylinder assembly
  - Refer to Vol 2, chapter 17, para 17-42



TA 121002

Figure 22-8

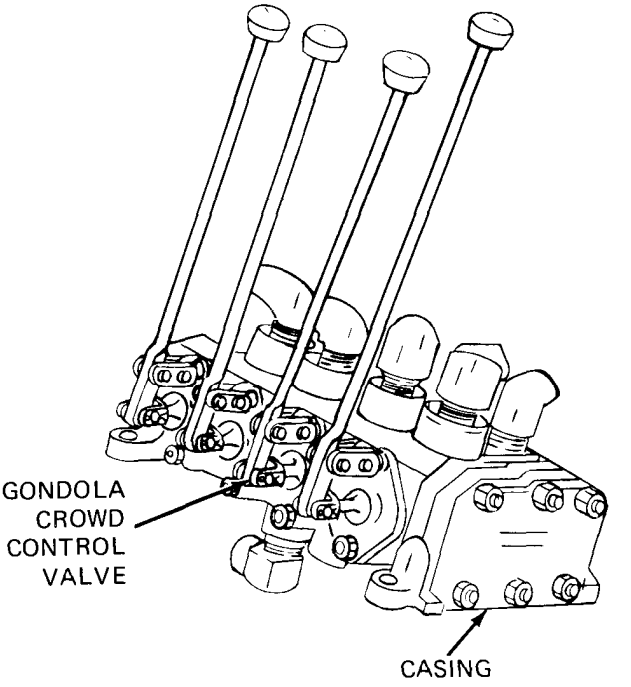
Symptom

9 BOOM DOES NOT EXTEND OR EXTENDS AND RETRACTS SLOWLY

1
- Turn off boom
  - Refer to TM 9-2320-211-10
- Take load off boom

2
- Check gondola crowd control valve
  - Take out control valve bank assembly. Refer to Vol 2, chapter 17, para 17-51
  - Feel for hydraulic oil leakage
  - Look for cracked casing

Is gondola crowd control valve OK?



NO

3
- Repair or replace gondola crowd control valve
  - Refer to Vol 2, chapter 17, para 17-51

YES

4
- Put back control valve bank assembly
  - Refer to Vol 2, chapter 17, para 17-51
- Repair or replace boom crowd cylinder assembly
  - Refer to Vol 2, chapter 17, para 17-41

TA 121003

Figure 22-9

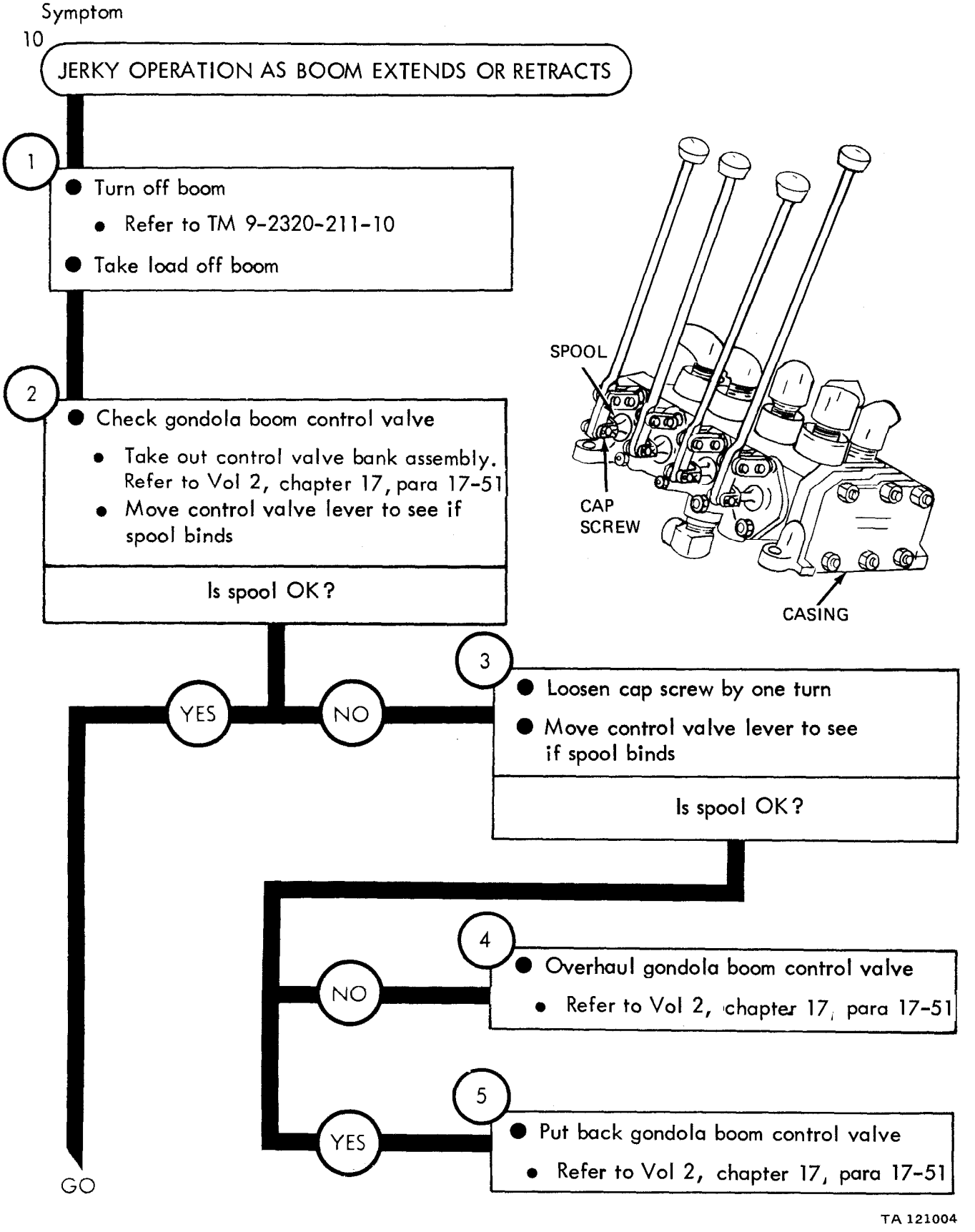
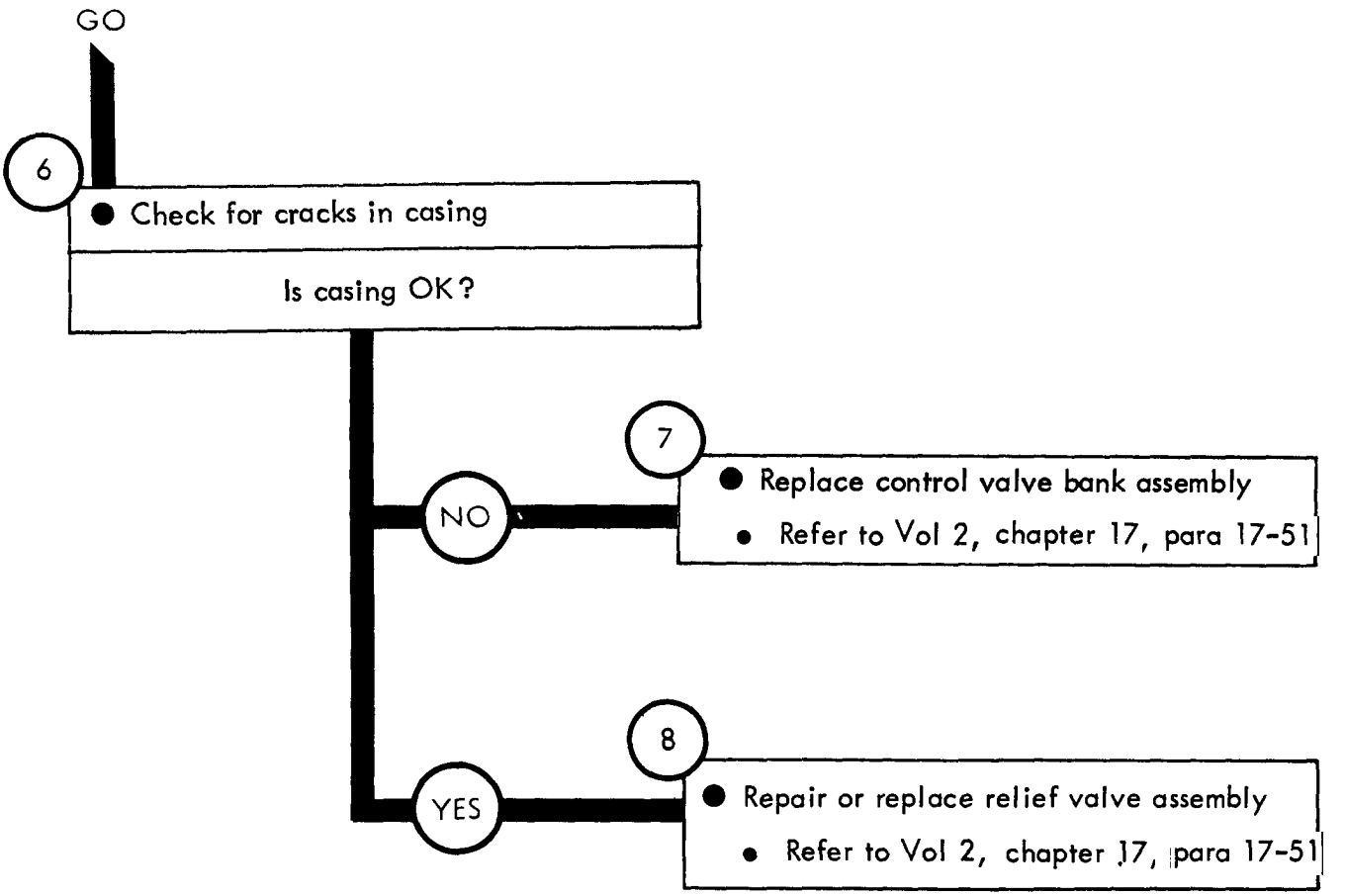


Figure 22-10 (Sheet 1 of 2)



TA 121005

Figure 22-10 (Sheet 2 of 2)

CHAPTER 23

M543A2 WRECKER SYSTEM TEST PROCEDURES

23-1. GENERAL. This chapter gives test procedures for the tests given in chapter 22, for the M543A2 Wrecker System.

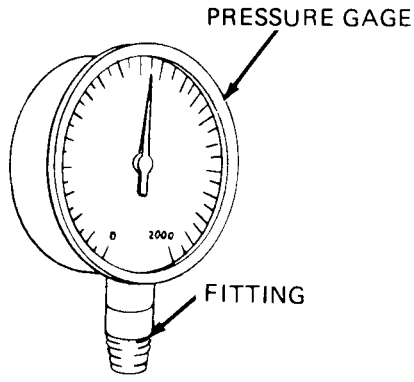
23-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

23-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

GENERAL INSTRUCTIONS

1

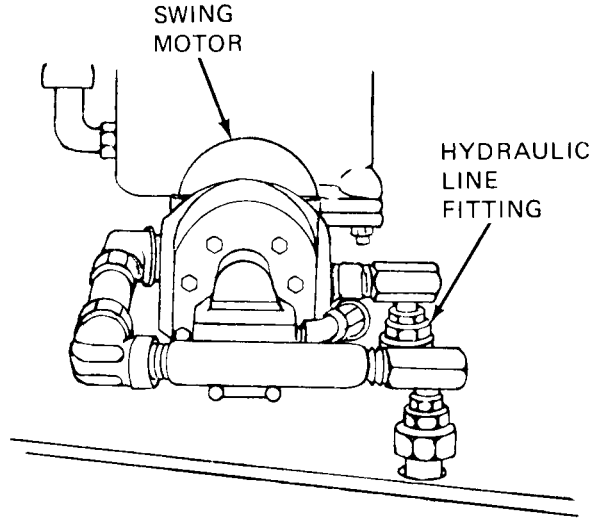
- Check pressure gage before using
  - Gage - make sure that glass and needle are not broken
  - Fitting - make sure fitting is tight on gage. See if fitting end is dirt free



SWING MOTOR SWIVEL VALVE PRESSURE TEST - To check output pressure from swivel valve to swing motor

1

- Set up gage as follows
  - Unscrew and take off hydraulic line fitting to swing motor
  - Screw in suitable T-fitting adapter and tighten
  - Screw in test gage and tighten
  - Screw in hydraulic line and tighten



GO

TA 121006

Figure 23-1 (Sheet 1 of 3)

GO

NOTE

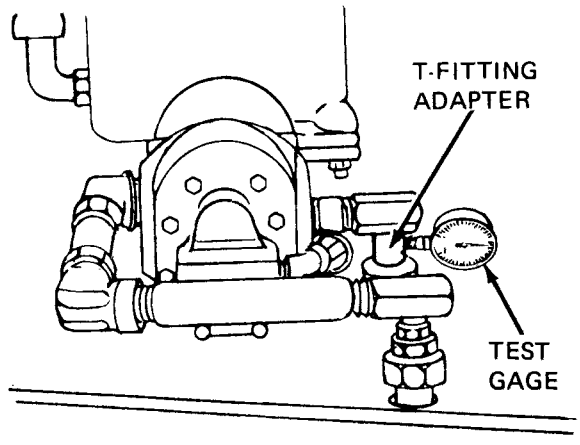
The next step will need the use of two soldiers. The lead soldier will be called Soldier A, and the helper will be called Soldier B

2

- Test pressure from swivel valve to swing motor

SOLDIER B
- Start engine and engage wrecker crane drive. Refer to TM 9-2320-211-10
- Go to gondola and wait for instructions from SOLDIER A

SOLDIER A:
- Look at pressure gage
- Tell SOLDIER B to swing boom



GO

TA 121007

Figure 23-1 (Sheet 2 of 3)

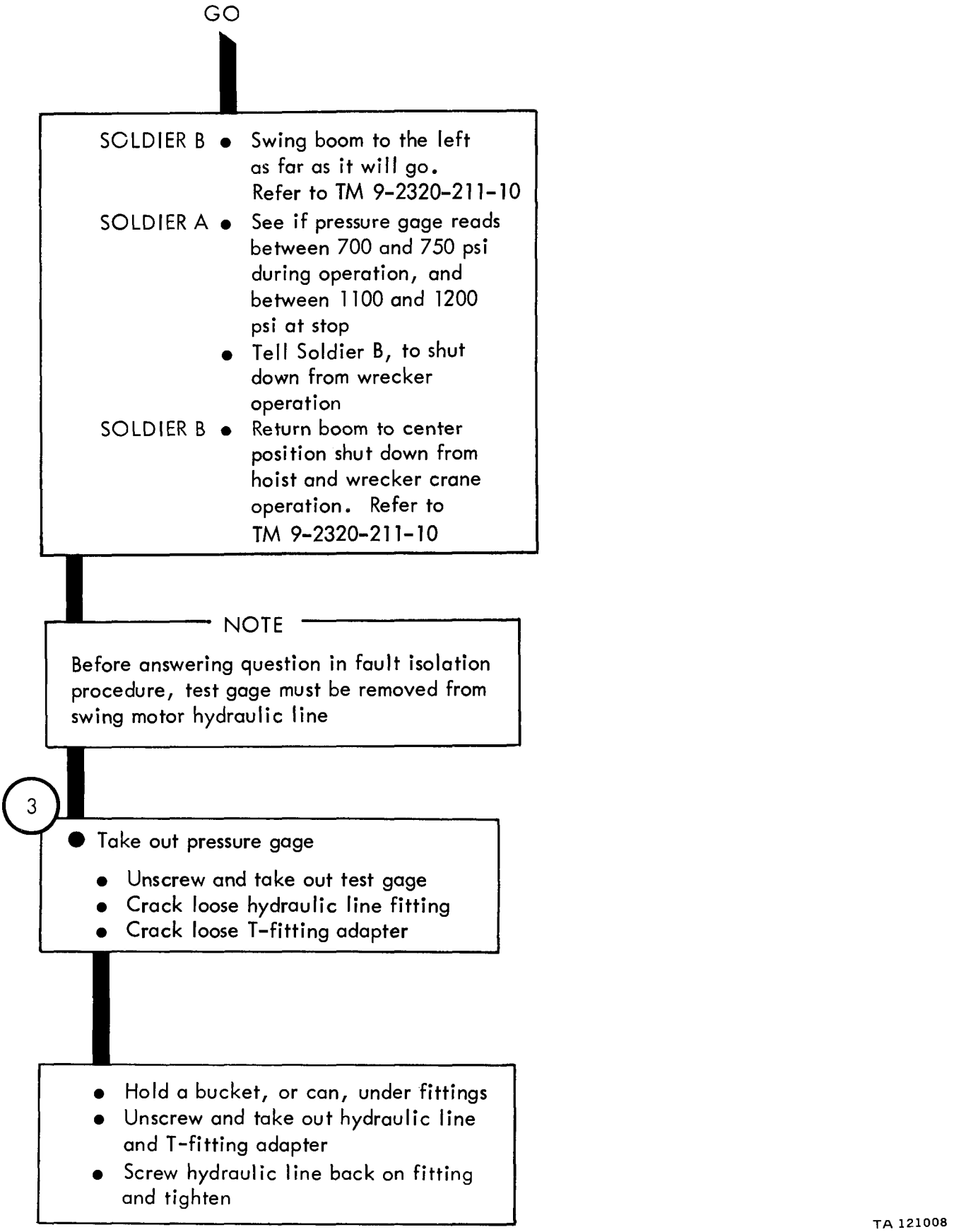


Figure 23-1 (Sheet 3 of 3)

CHAPTER 24

DEEP WATER FORDING SYSTEM TROUBLESHOOTING

24-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the Deep Water Fording System, for which there are authorized corrective maintenance tasks at the direct support and general support maintenance level.

24-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the direct support and general support maintenance level are covered in this chapter.

Symptom

1 ENGINE STALLS WHILE FORDING

1

- Park truck
  - Refer to TM 9-2320-211-10

CAUTION

Do not start engine after truck has been removed from water. If water has entered engine assembly serious damage may occur if engine is started. Engine must be overhauled. Refer to direct support maintenance

2

- Check for water in fuel
  - Hold a can or bucket under fuel filter/water separator drain valve
  - Open fuel filter/water separator drain valve
  - Fill the can half way
  - Tighten fuel filter/water separator drain valve
  - Look for signs of water in diesel fuel in can

Is diesel fuel OK?

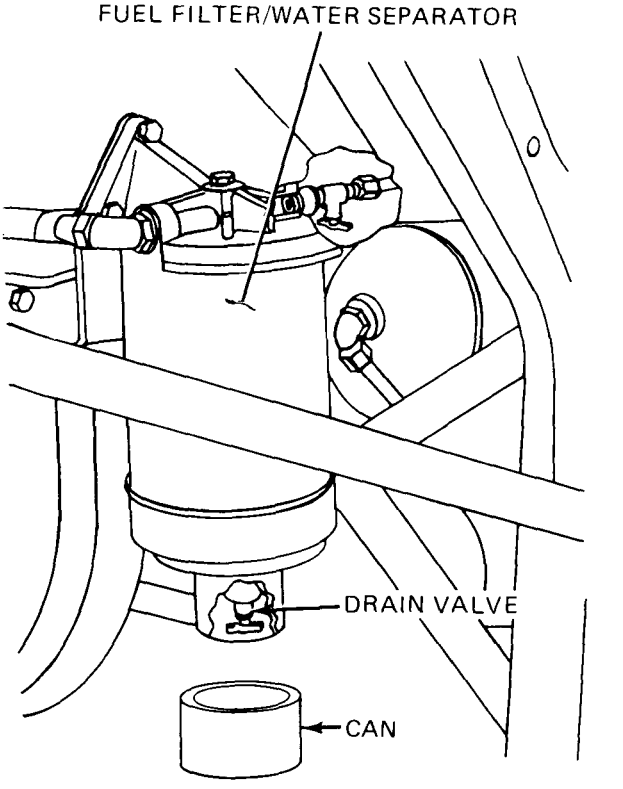
YES

GO

NO

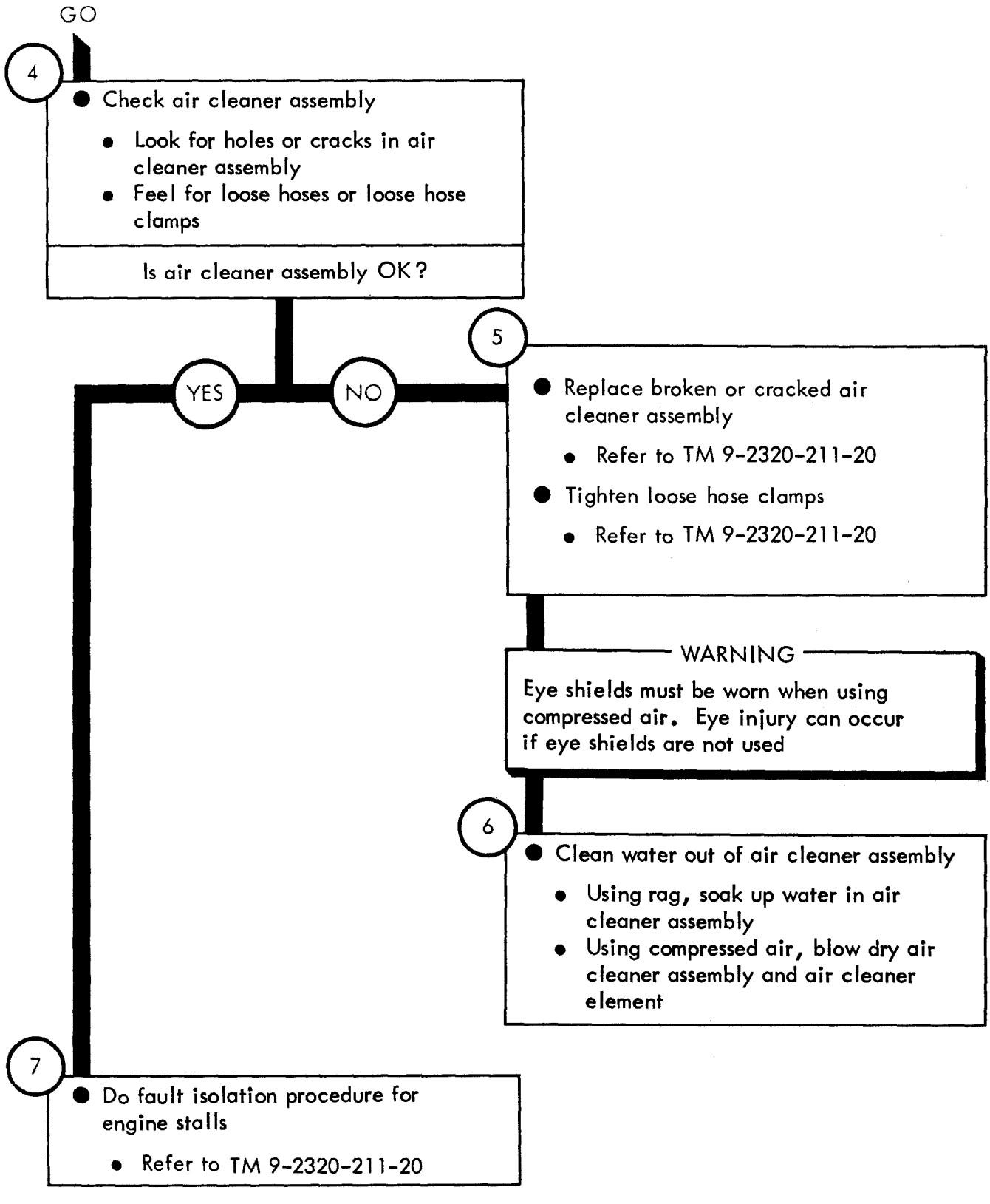
3

- Replace bad diesel fuel
  - Refer to TM 9-2320-211-10
- Replace fuel tank cap
  - Refer to TM 9-2320-211-10



TA 121009

Figure 24-1 (Sheet 1 of 2)



TA 121010

Figure 24-1 (Sheet 2 of 2)

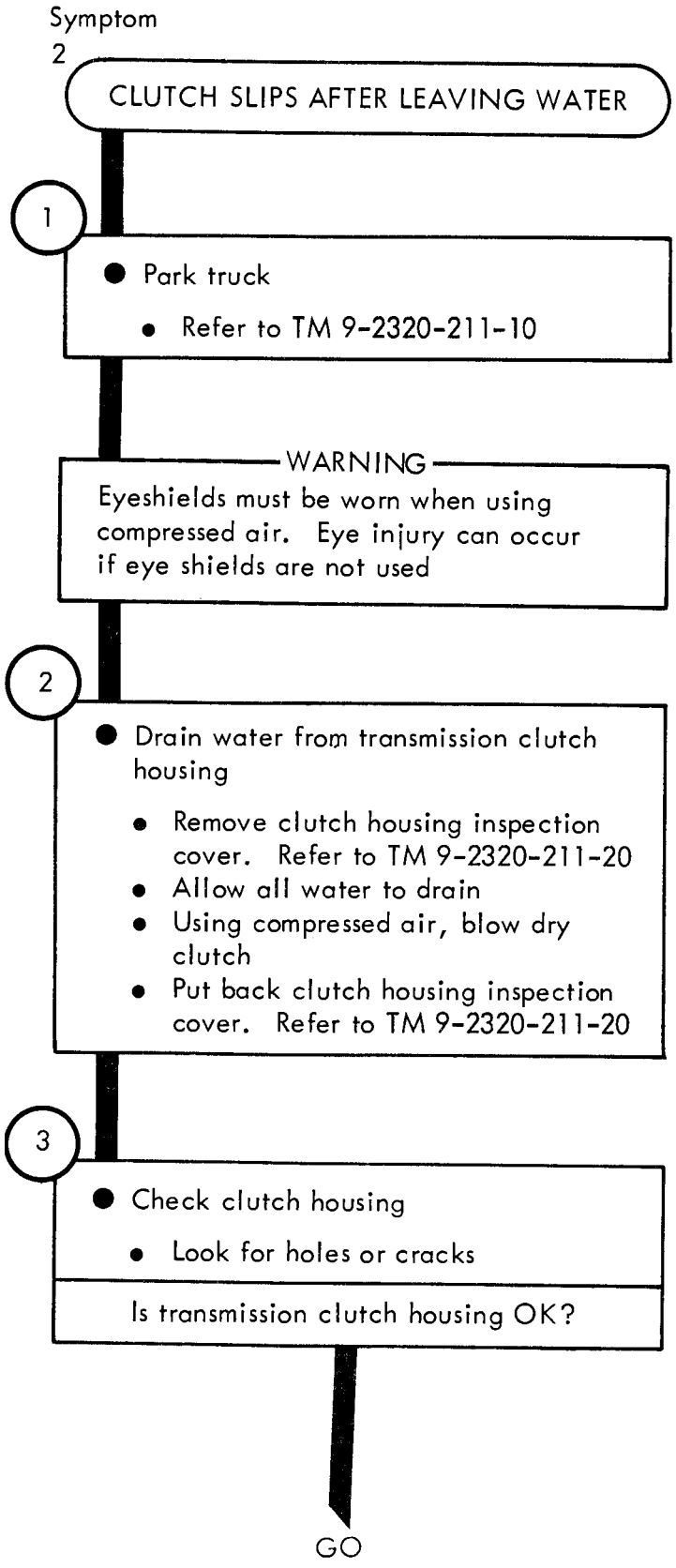
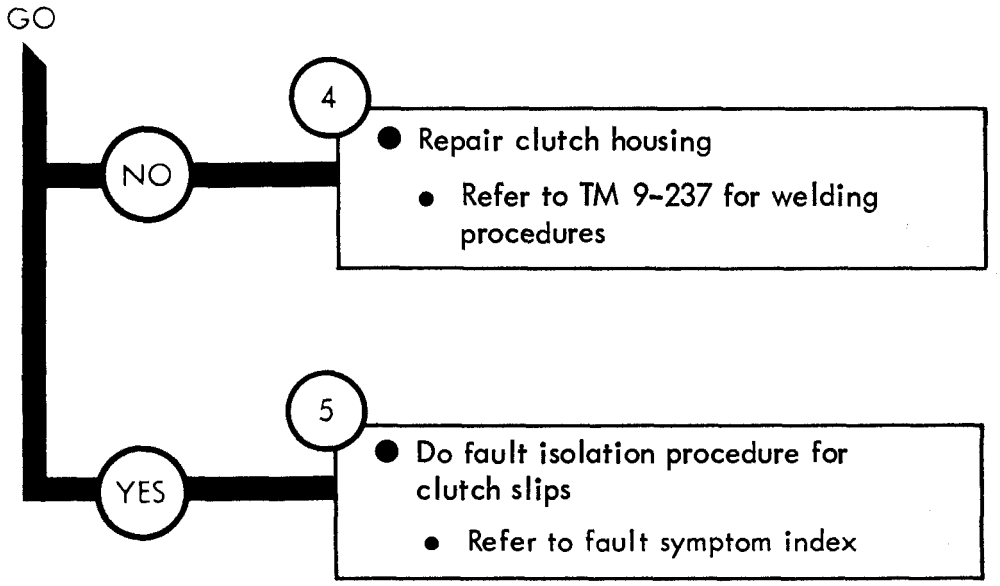


Figure 24-2 (Sheet 1 of 2)



TA 121012

Figure 24-2 (Sheet 2 of 2)

By Order of the Secretaries of the Army and the Air Force:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

LEW ALLEN, JR., General, USAF
Chief of Staff

Official:

VAN L. CRAWFORD, JR., Colonel, USAF
Director of Administration

Distribution:

To be distributed in accordance with DA Form 12-38, Direct and General Support Maintenance requirements for 5-Ton Truck Chassis: 5-Ton, 6x6, M39A2.

*U.S. Government Printing Office: 1992-311-831/44893

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
CDR, 1st Bn, 65th ADA
Attn: SP4 Jane Idone
Key West, FL 33040

DATE SENT
Date sent in

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-211-34-1	25 Feb 1981	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6-2			6-1
8-6		8-2 (Sheet 1 of 2)	
14-10		14-3 (Sheet 1 of 5)	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Symptom 2, detailed procedure refers to figure 8-3. Should refer to figure 8-2.

Change illustration callouts.
Reason: callouts for PUSHROD and VALVE SPRING are reversed.

Put NOTE before Box ① to read "When checking voltage, +24 volts DC means a range of +23 to +26 volts DC"

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SP4 Jane Idone Autovon 222-2224

SIGN HERE
Jane Idone

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

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

SAMPLE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



THEN. . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-211-34-1	25 Feb 1981	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

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

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

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
TM 9-2320-211-34-1	25 Feb 1981	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

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

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



THEN. . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2320-211-34-1	25 Feb 1981	DIR. & GEN. SUPPORT TROUBLESHOOTING MANUAL

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

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-Automotive Command
ATTN: DRSTA-MB
Warren, MI 48090

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

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 = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

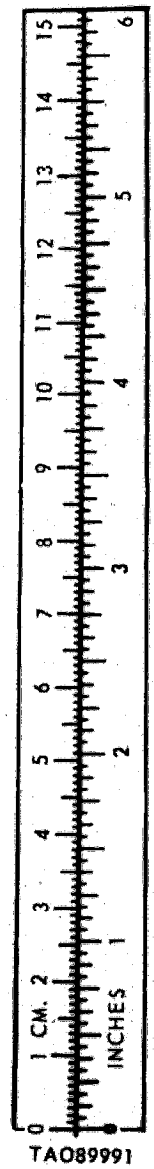
TEMPERATURE

$5/9\,(^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\,C^0 + 32 = F^0$

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



PIN: 048077-00

This fine document...

Was brought to you by me:



Liberated Manuals -- free army and government manuals

Why do I do it? I am tired of sleazy CD-ROM sellers, who take publicly available information, slap “watermarks” and other junk on it, and sell it. Those masters of search engine manipulation make sure that their sites that sell free information, come up first in search engines. They did not create it... They did not even scan it... Why should they get your money? Why are not letting you give those free manuals to your friends?

I am setting this document FREE. This document was made by the US Government and is NOT protected by Copyright. Feel free to share, republish, sell and so on.

I am not asking you for donations, fees or handouts. If you can, please provide a link to liberatedmanuals.com, so that free manuals come up first in search engines:

<A HREF=http://www.liberatedmanuals.com/>Free Military and Government Manuals</A>

- Sincerely
  Igor Chudov
  http://igor.chudov.com/
- Chicago Machinery Movers