TM 9-2320-209-20-2-2

T.O. 36A12-1B-1092-1-2

TECHNICAL MANUAL

VOLUME 2 OF 3

PART 2 OF 2

TROUBLESHOOTING

ORGANIZATIONAL LEVEL

21/2-TON, 6X6, M44A1 AND M44A2 SERIES TRUCKS

(MULTIFUEL)

TRUCK, CARGO: M35A1, M35A2, M35A2C, M36A2; TRUCK, TANK, FUEL: M49A1C, M49A2C; TRUCK, TANK, WATER: M50A1, M50A2, M50A3; TRUCK, VAN, SHOP: M109A2, M109A3; TRUCK, REPAIR SHOP: M185A2, M185A3; TRUCK, TRACTOR: M275A1, M275A2; TRUCK, DUMP: M342A2; TRUCK, MAINTENANCE PIPELINE CONSTRUCTION: M756A2; TRUCK, MAINTENANCE, EARTH BORING AND POLESETTING: M764

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

MAY 1981

WARNING

Engine cooling system runs under pressure and at very high temperatures. If filler cap is taken off before pressure is set free, scalding coolant will blow out. Due to high temperature of coolant bad burns can occur if contact is made with skin.

Do not touch any part of the exhaust system while engine is running. You can get badly burned. If the engine has just been shut off, wait until the exhaust system has time to cool down before doing any work.

Because of their higher power, 24 volt systems are more dangerous than 6 or 12 volt systems. Do not let a hot wire touch metal parts of the truck at any time. Flash testing by striking a hot wire against a ground will cause an arc that can destroy the lead connector and possibly the lead itself.
Accidental contact of metal tools between positive (+) battery or starter terminal will cause burns on the hand, damaged tools, truck electrical components and batteries. The battery can explode spraying acid and sharp fragments that can cause serious or fatal injuries.

Only properly trained personnel should perform test on 115 volt system. The voltage present in 115 volt system can cause severe or fatal electric shock.

Take off battery ground cable before working near or touching fan. This will make sure that the engine will not be started by accident. Use a rag when touching fan blades because edges on blades can cause cuts.

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

TECHNICAL MANUAL
NO. 92320-209-20-2-2
TECHNICAL ORDER
NO. 36A12-1B-1092-1-2

DEPARTMENTS OF THE ARMY
AND
THE AIR FORCE
Washington, DC, 27 May 1981

TECHNICAL MANUAL

VOLUME 2 OF 3

PART 2 OF 2

TROUBLESHOOTING

ORGANIZATIONAL LEVEL

21/2-TON, 6X6, M44A1 AND M44A2 SERIES TRUCKS

(MULTIFUEL)

Model		NSN without Winch	NSN with Winch
Truck, Cargo	M35A1	2320-00-542-5633	2320-00-542-5634
	M35A2	2320-00-077-1616	2320-00-077-1617
	M35A2C	2320-00-926-0873	2320-00-926-0875
	M36A2	2320-00-077-1618	2320-00-077-1619
Truck, Tank, Fuel	M49A1C	2320-00-440-3349	2320-00-440-3346
	M49A2C	2320-00-077-1631	2320-00-077-1632
Truck, Tank, Water	M50A1	2320-00-440-8307	2320-00-440-8305
	M50A2	2320-00-077-1633	2320-00-077-1634
	M50A3	2320-00-937-4036	2320-00-937-5264
Truck, Van, Shop	M109A2	2320-00-440-8313	2320-00-440-8308
	M109A3	2320-00-077-1636	2320-00-077-1637
Truck, Repair Shop	M185A2	4940-00-987-8799	
	M185A3	4940-00-077-1638	4940-00-077-1639
Truck, Tractor	M275A1	2320-00-446-2479	
	M275A2	2320-00-077-1640	2320-00-077-1641
Truck, Dump	M342A2	2320-00-077-1643	2320-00-077-1644
Truck, Maintenance, Pipeline Construction	M756A2		2320-00-904-3277
Truck, Maintenance, Earth Boring and Polesetting	M764		2320-00-937-5980

*This manual, together with TM 9-2320-209-20-1, 27 May 1981; TM 9-2320-209-20-2-1, 27 May 1981; TM 9-2320-209-20-3-1, 27 May 1981; TM 9-2320-20 9-20-3-2, 27 May 1981; TM 9-2320-209-20-3-3, 27 May 1981; and TM 9-2320-209-20-3-4, 27 May 1981, supersedes TM 9-2320-209-20-1, 31 August 1978.

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

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

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CHAPTER 26

ELECTRICAL SYSTEM TROUBLESHOOTING SUMMARY

26-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 25 for the electrical system.

26-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

ELECTRICAL SYSTEM TROUBLESHOOTING SUMMARY

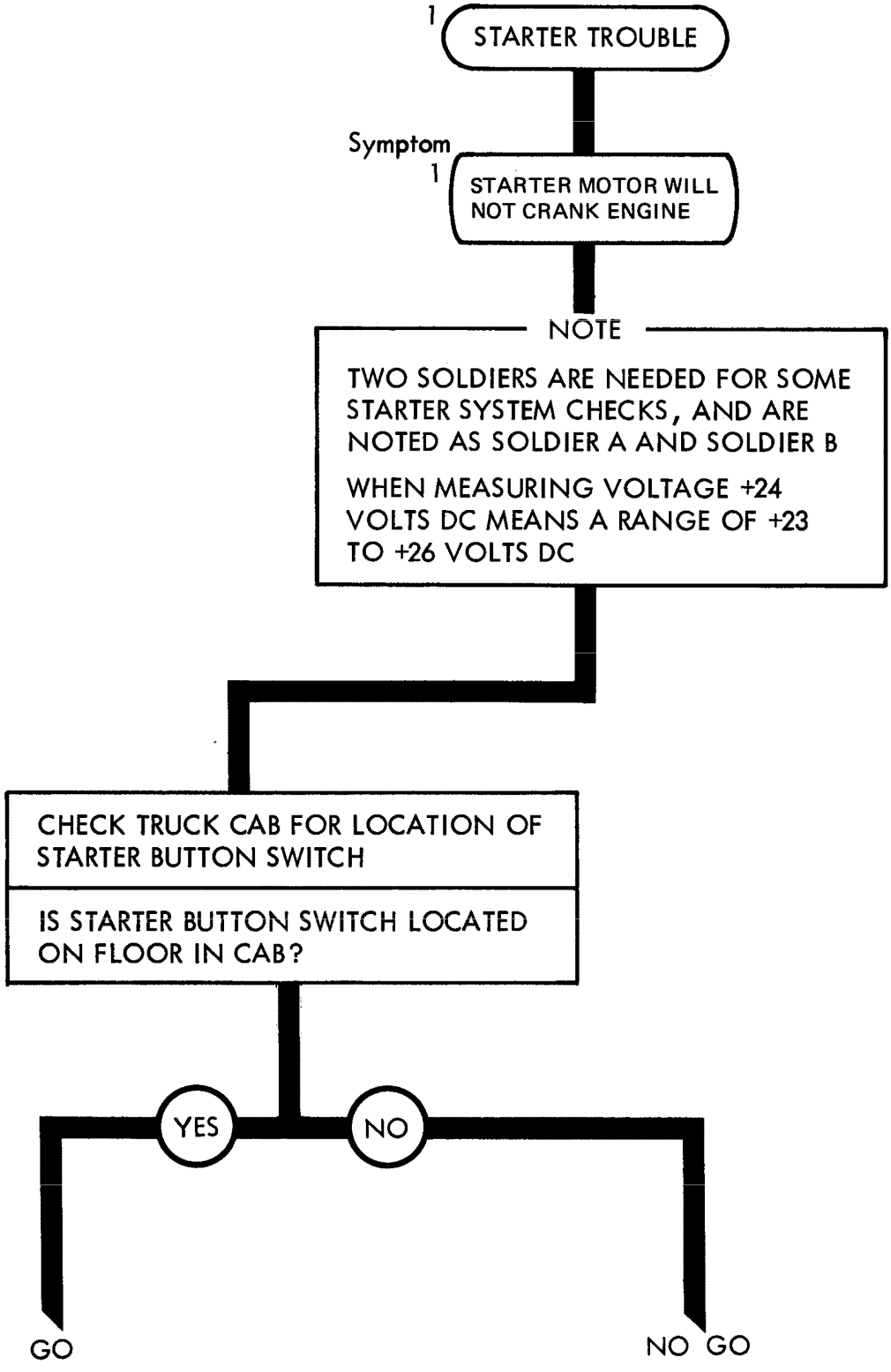
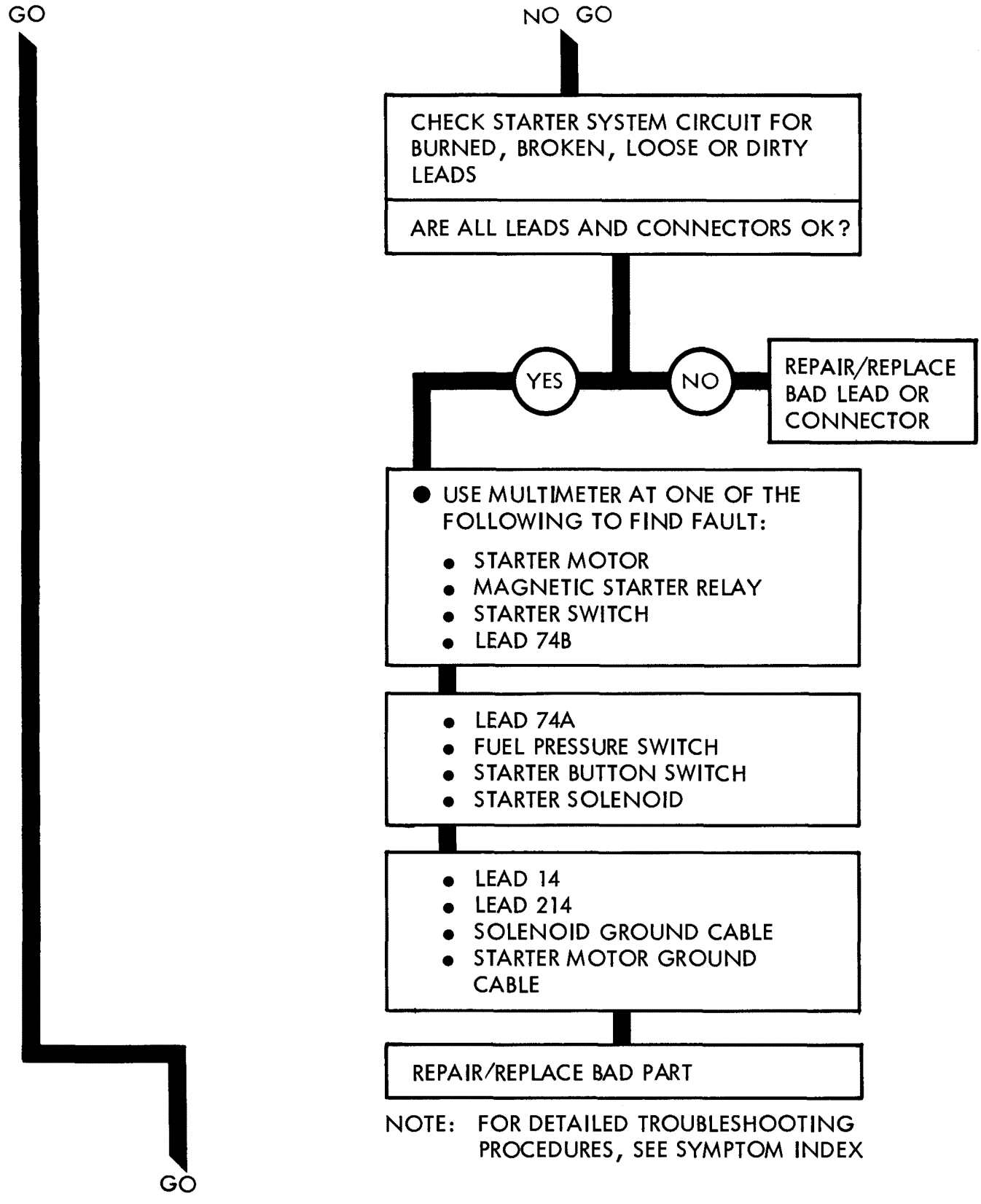
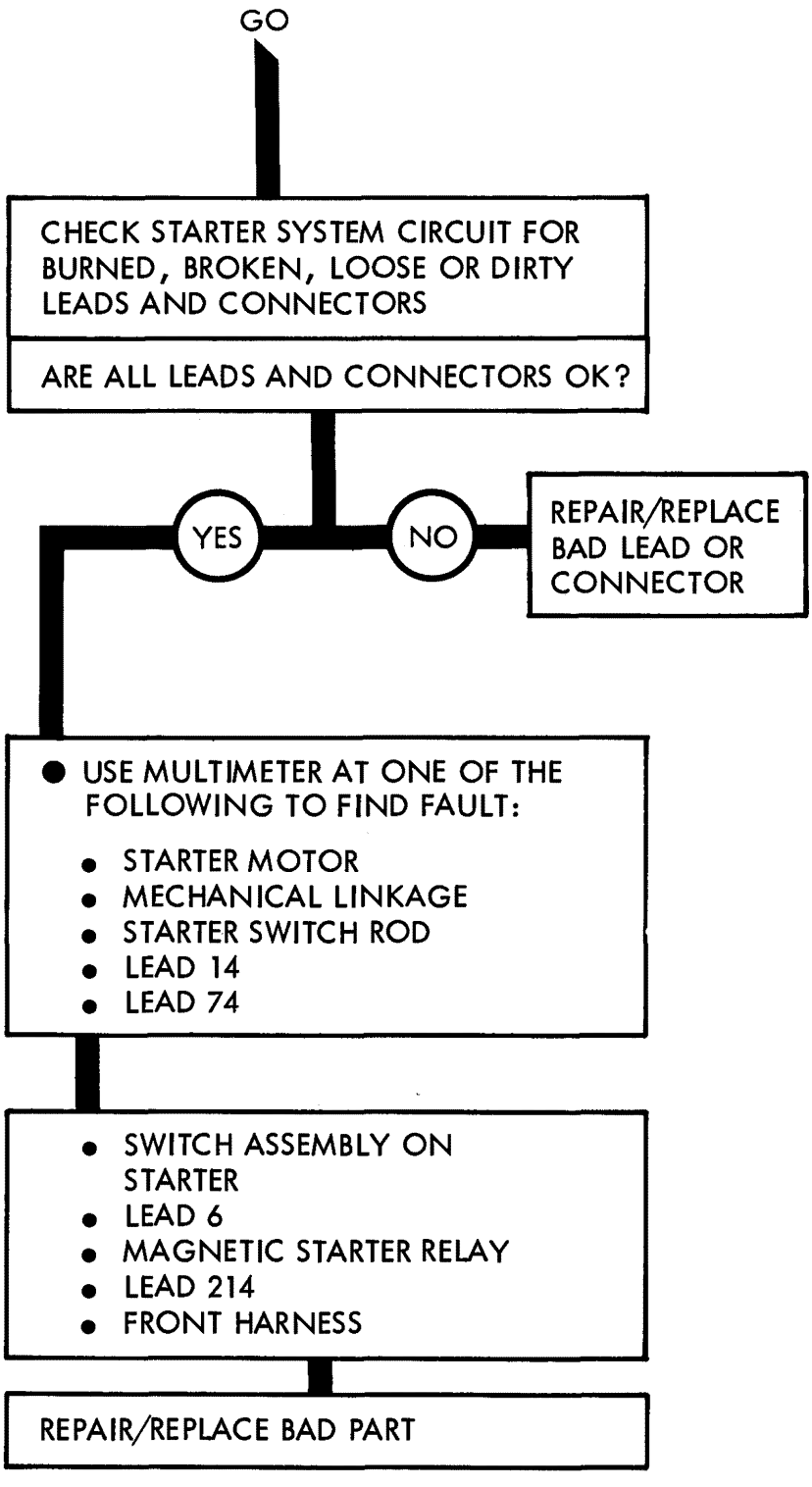


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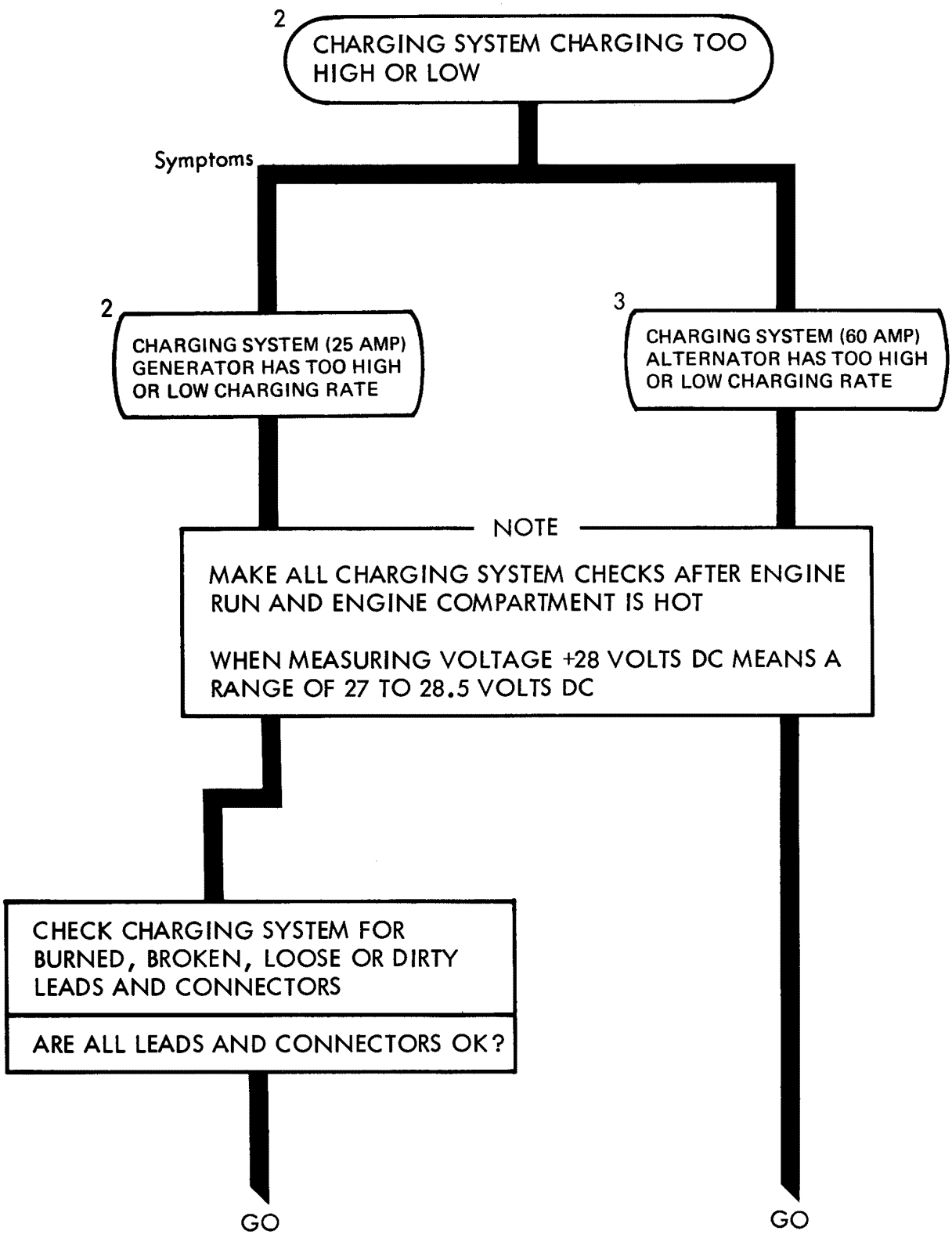
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NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

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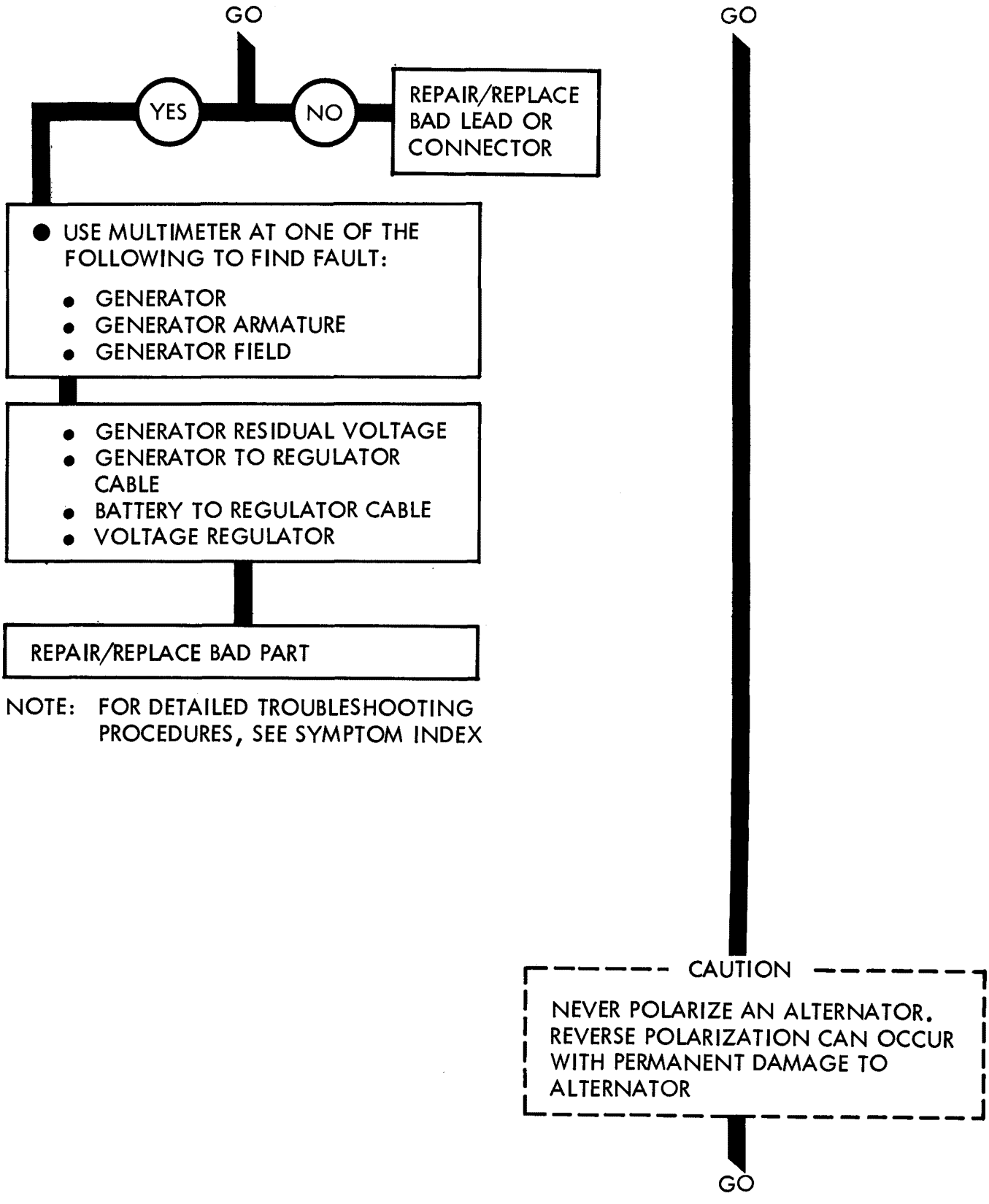
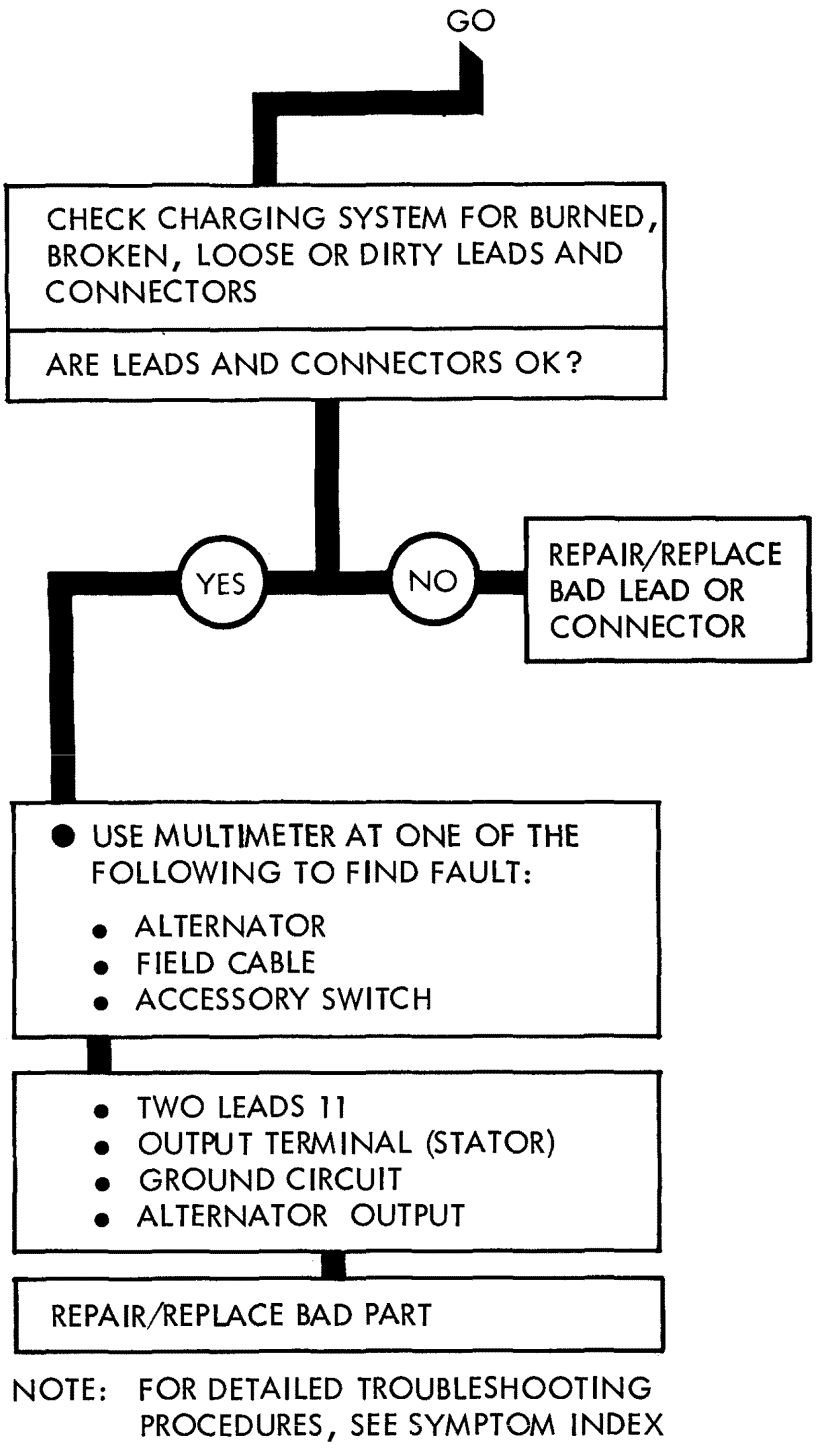


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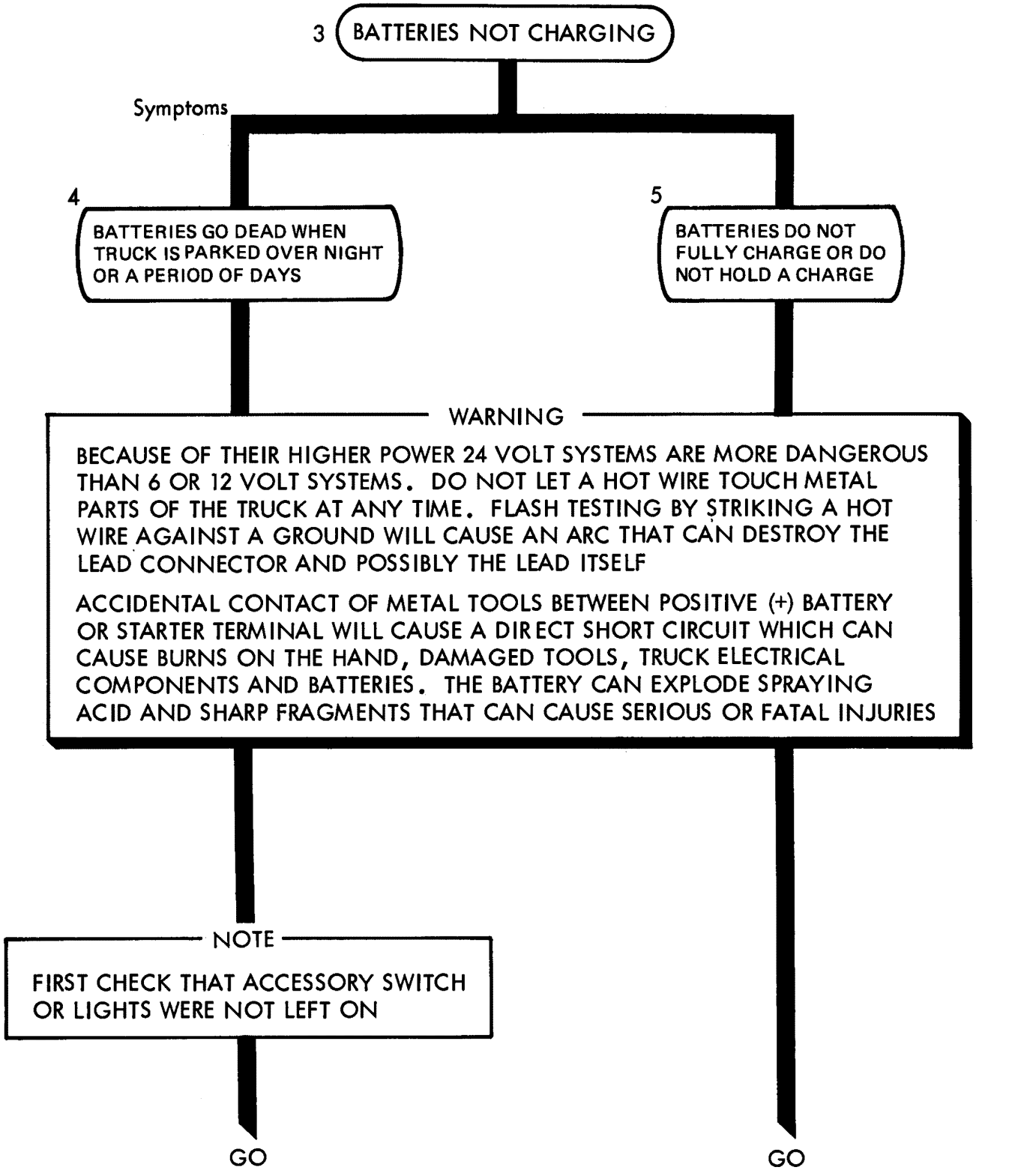
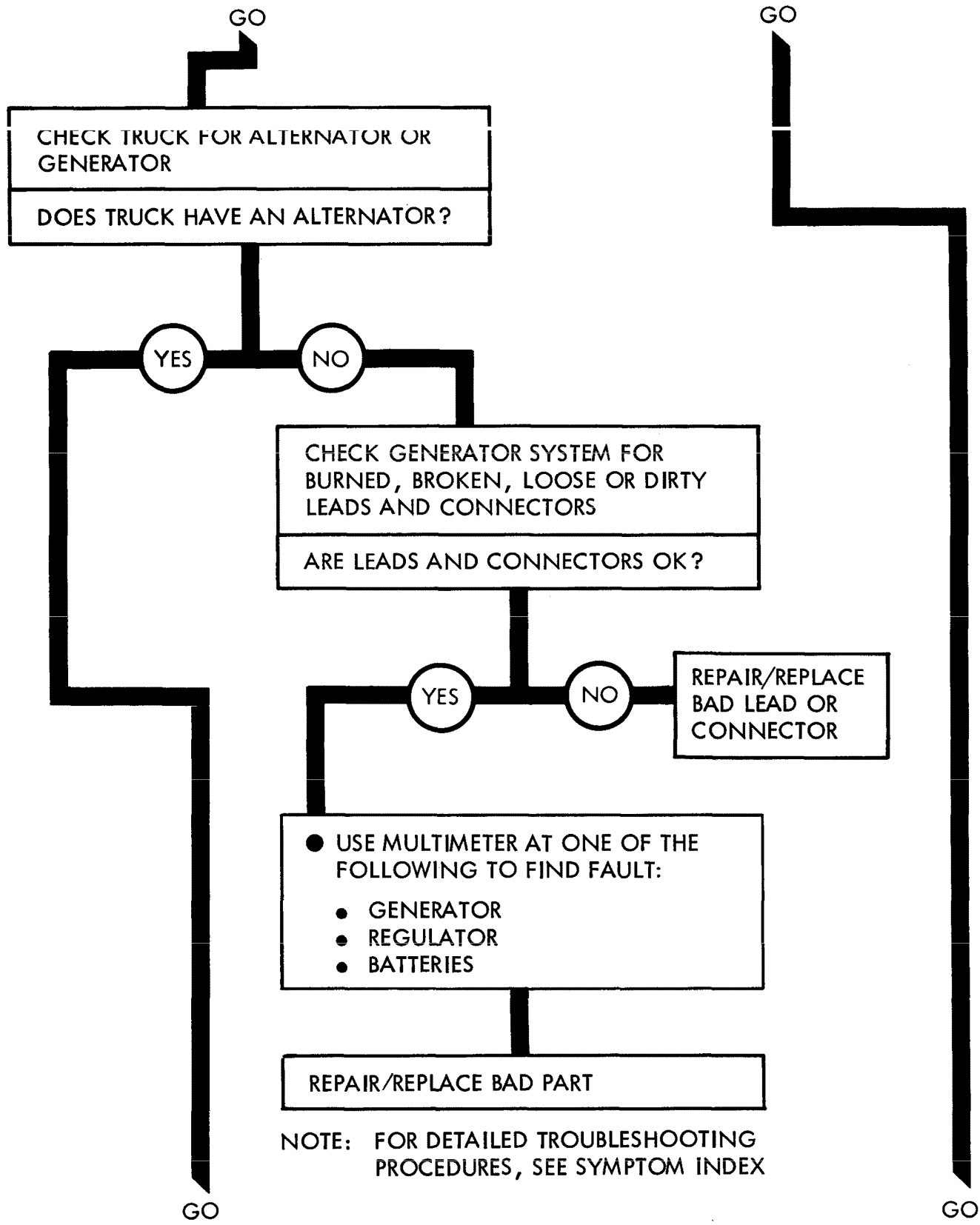


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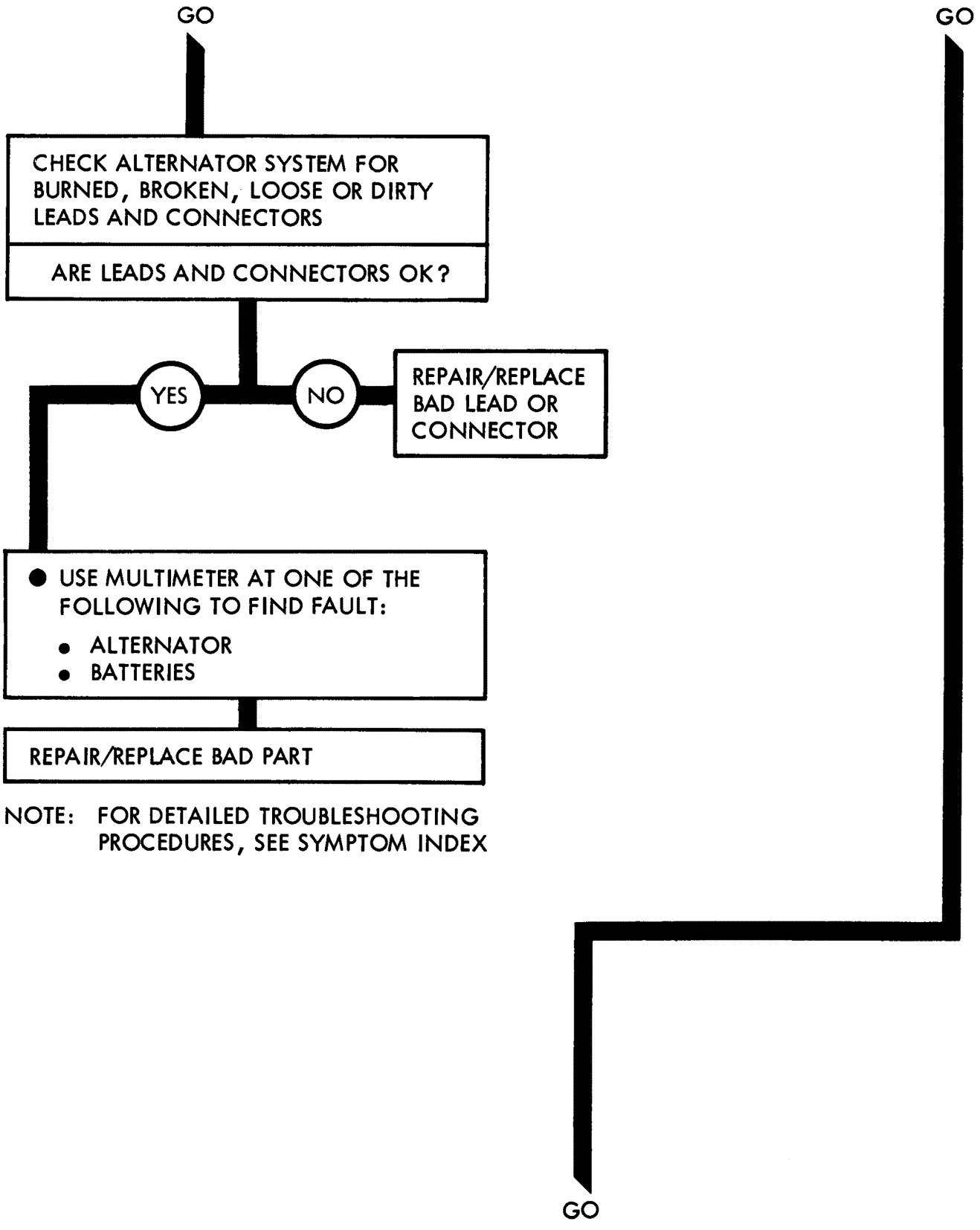
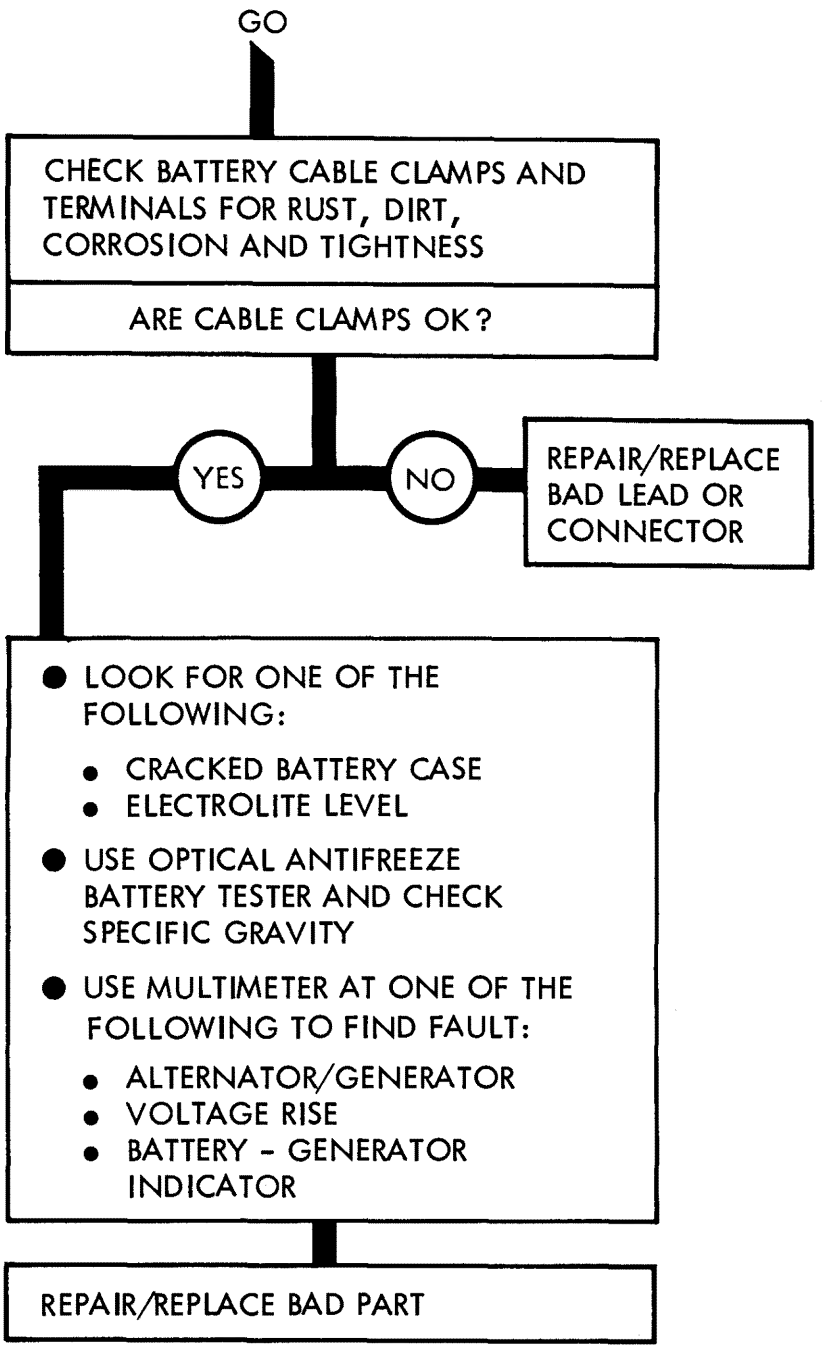


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NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

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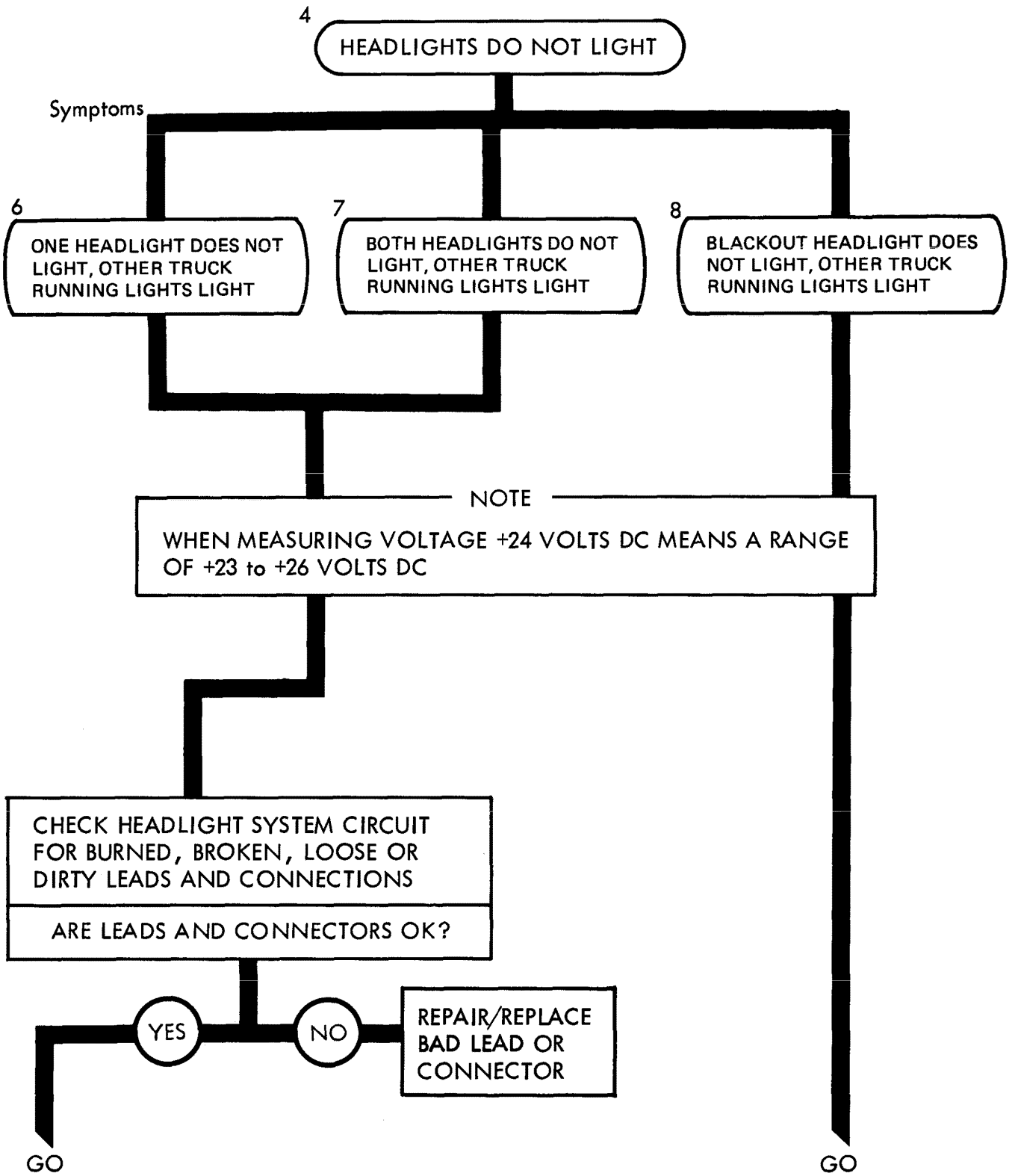
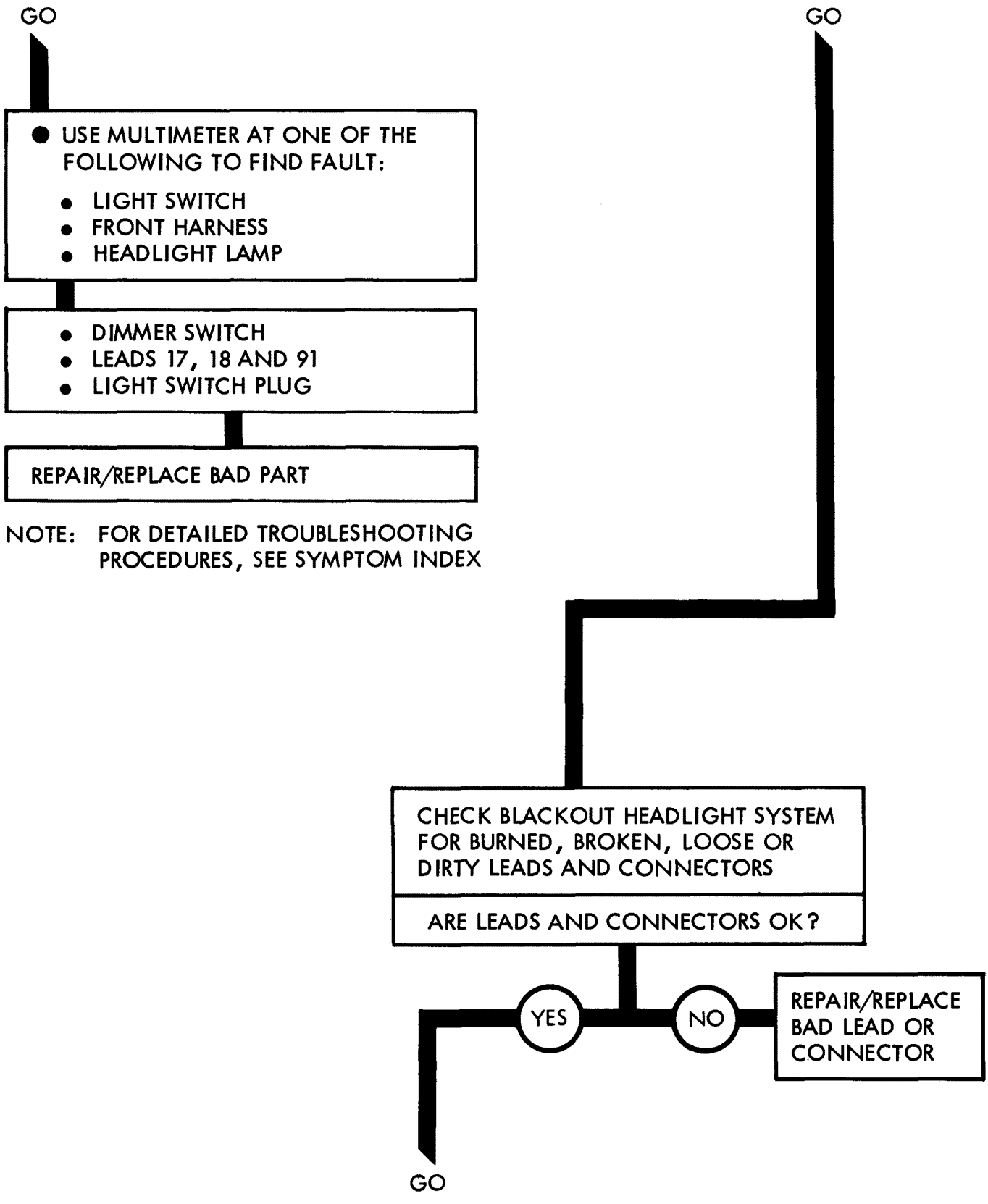
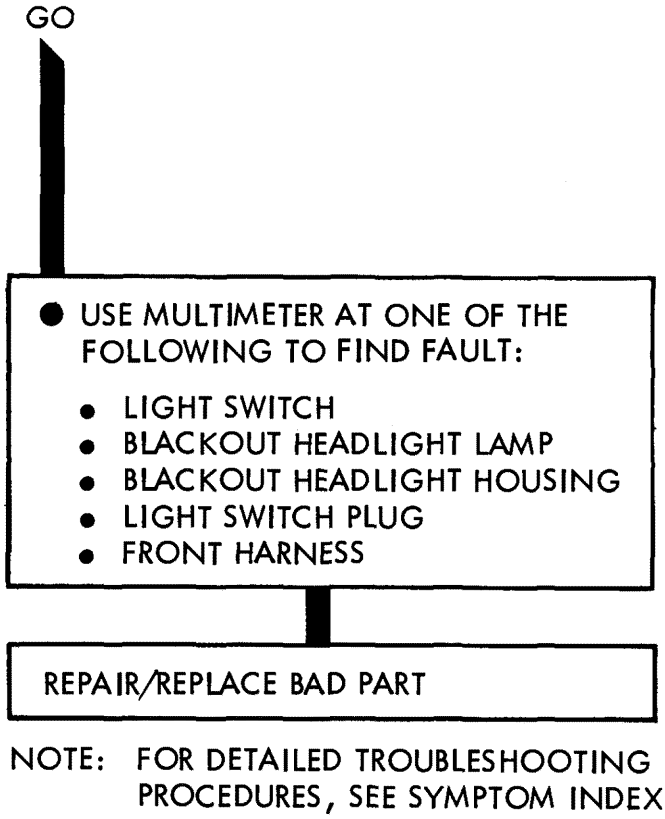


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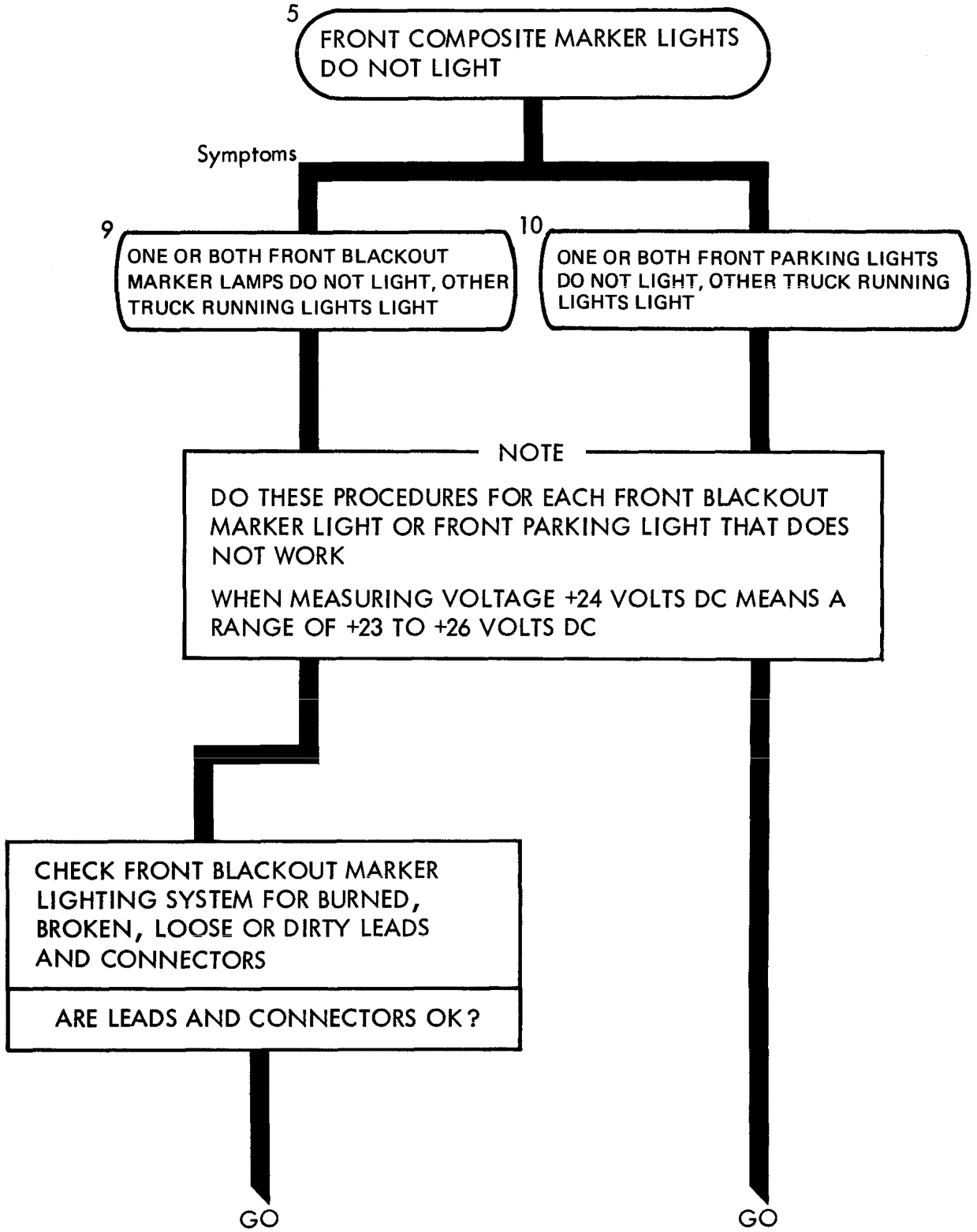
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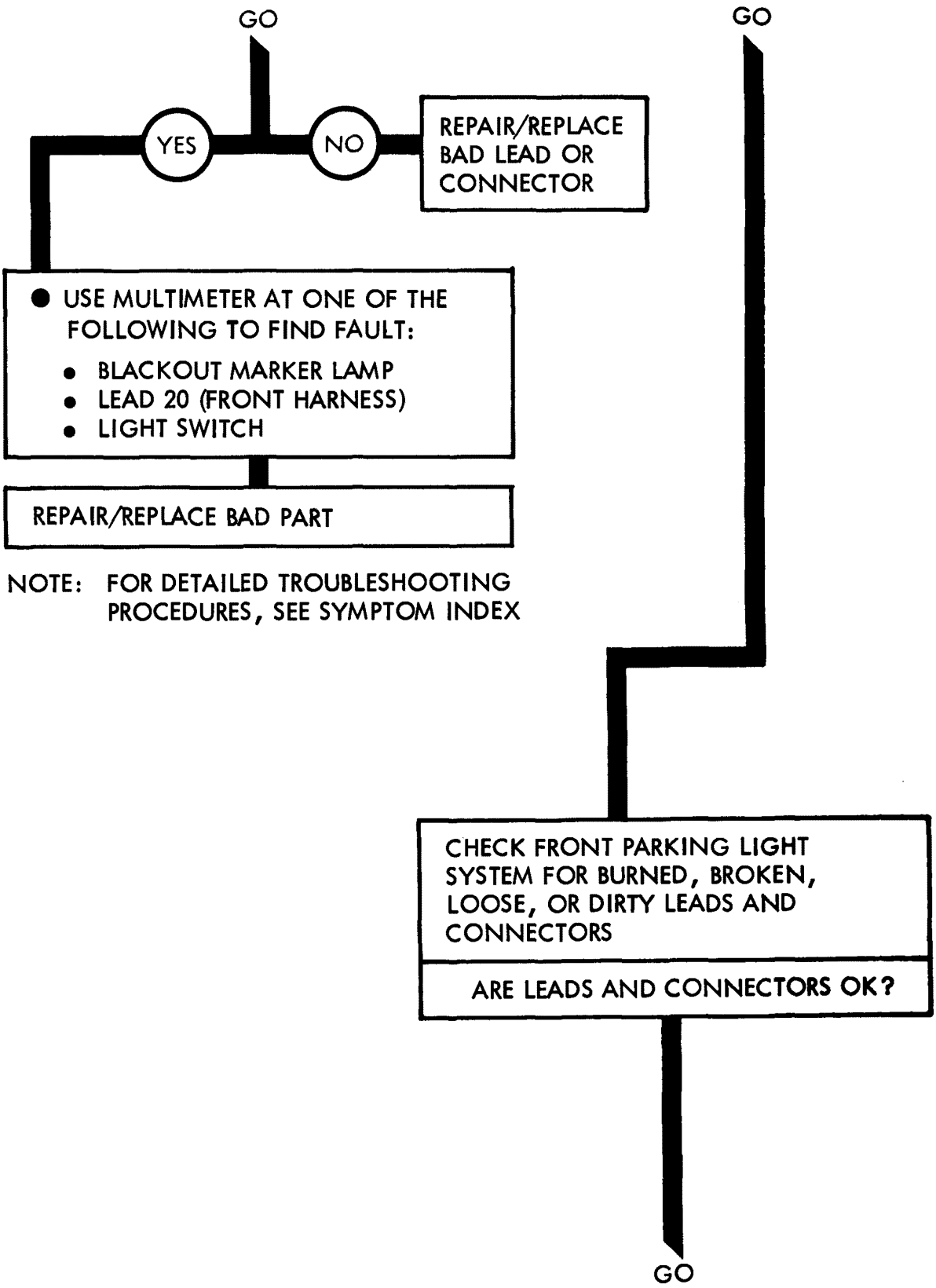
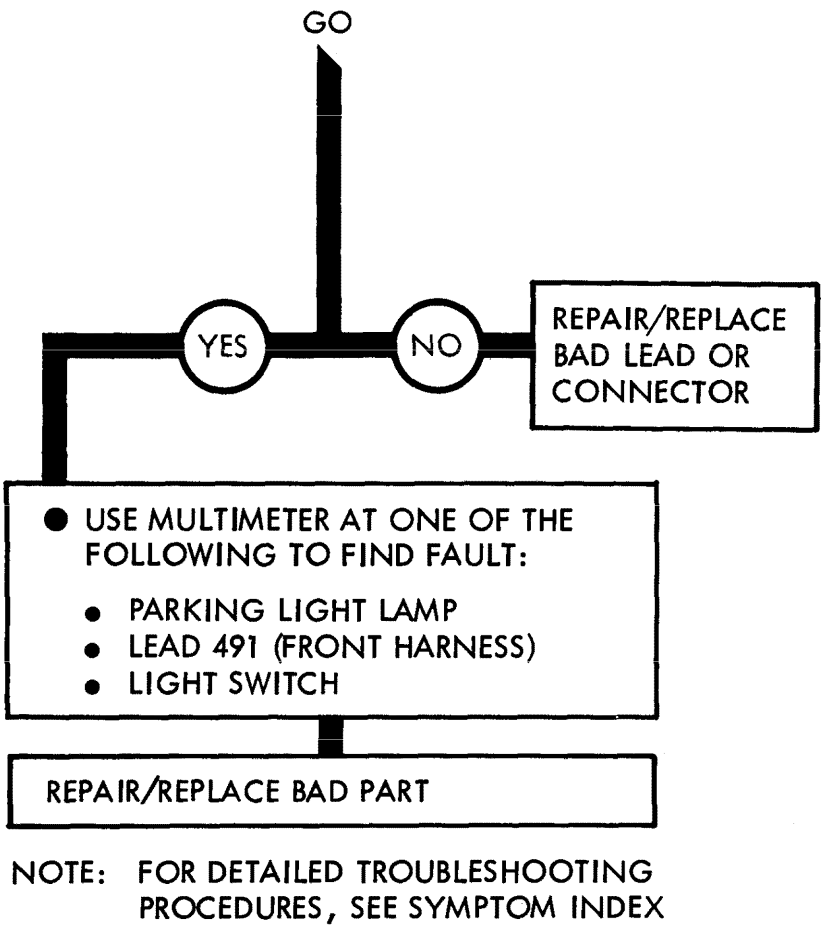


Figure 26-5 (Sheet 2 of 3)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

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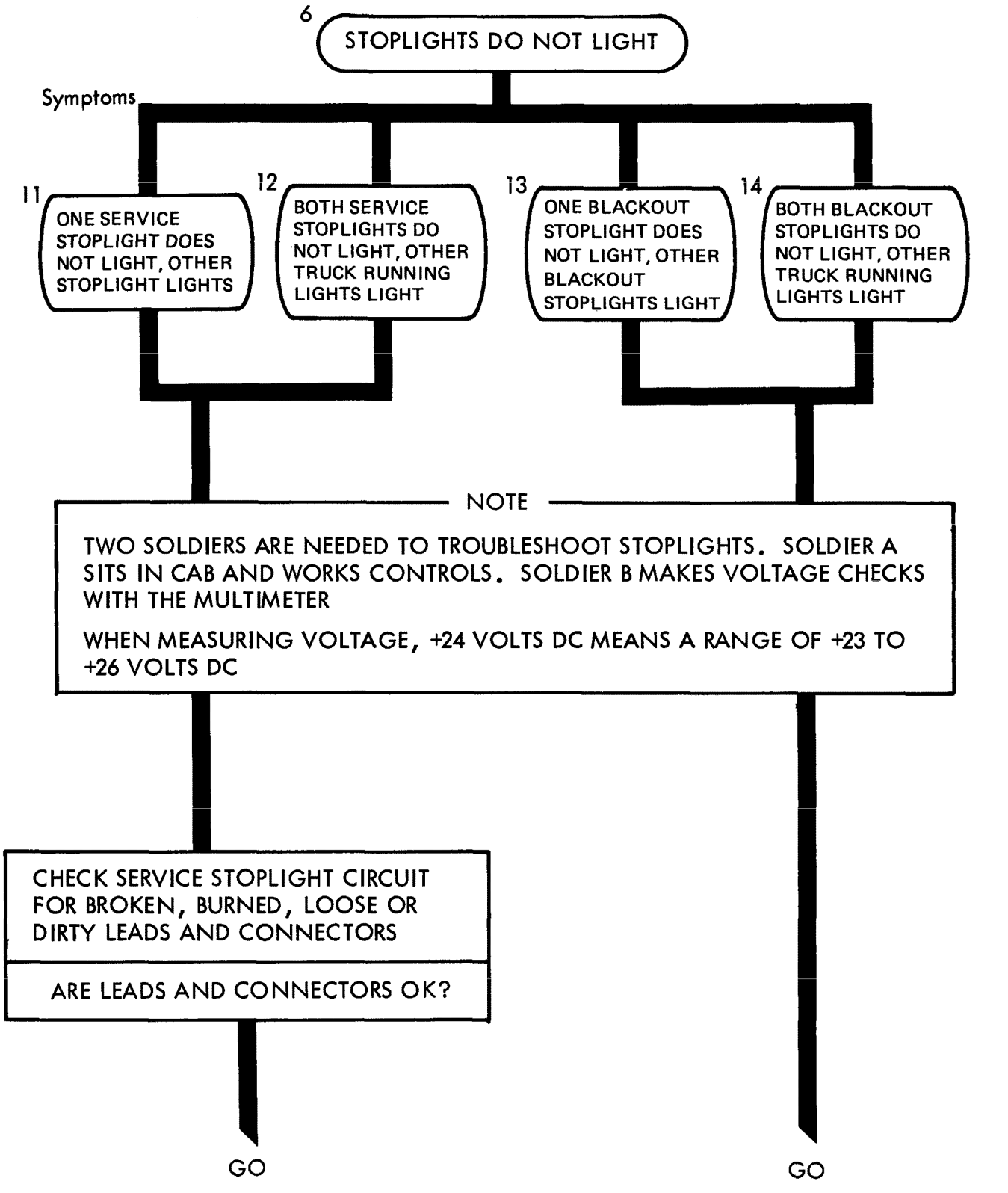
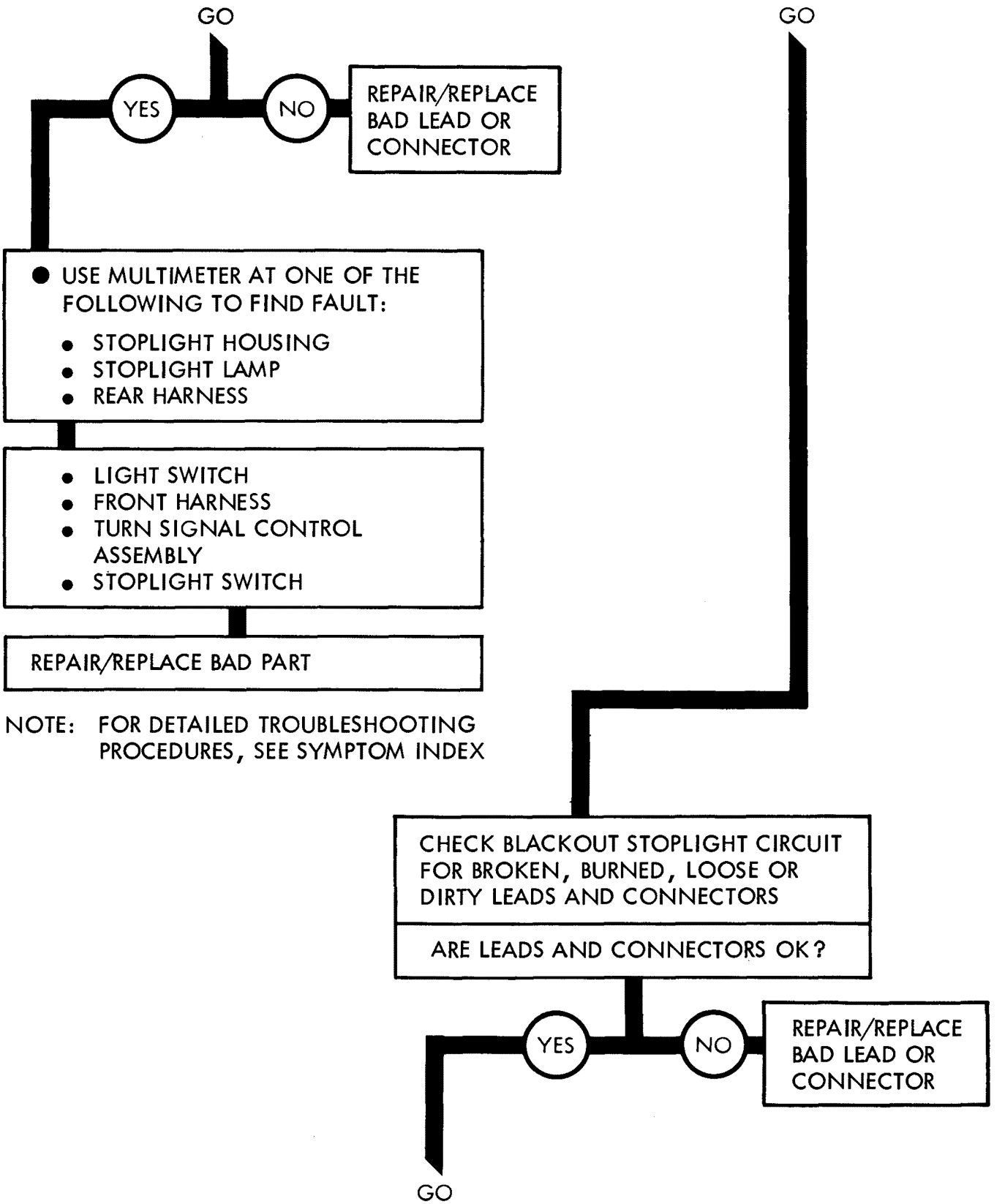
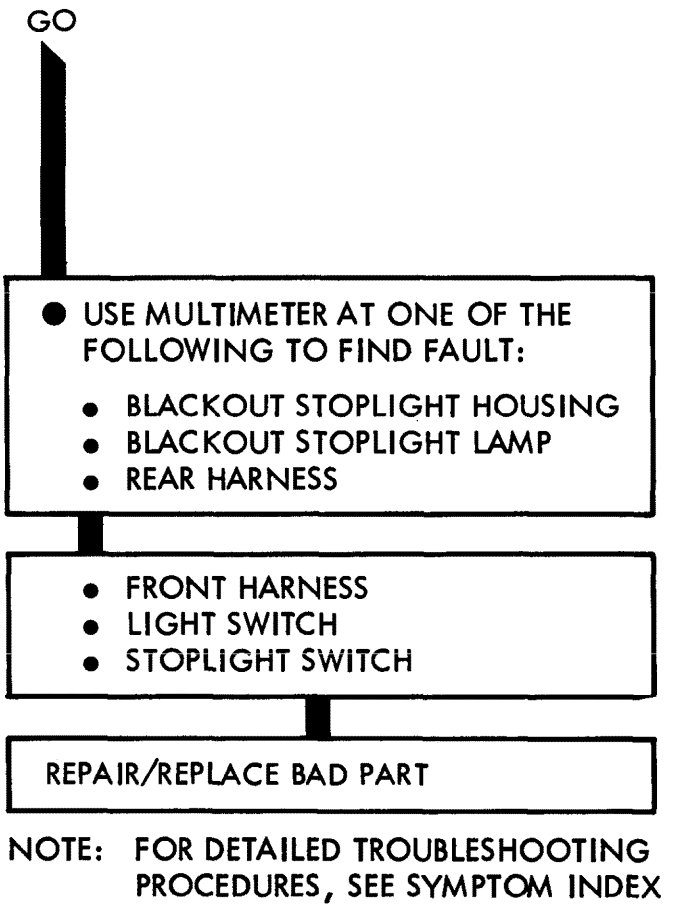


Figure 26-6 (Sheet 1 of 3)



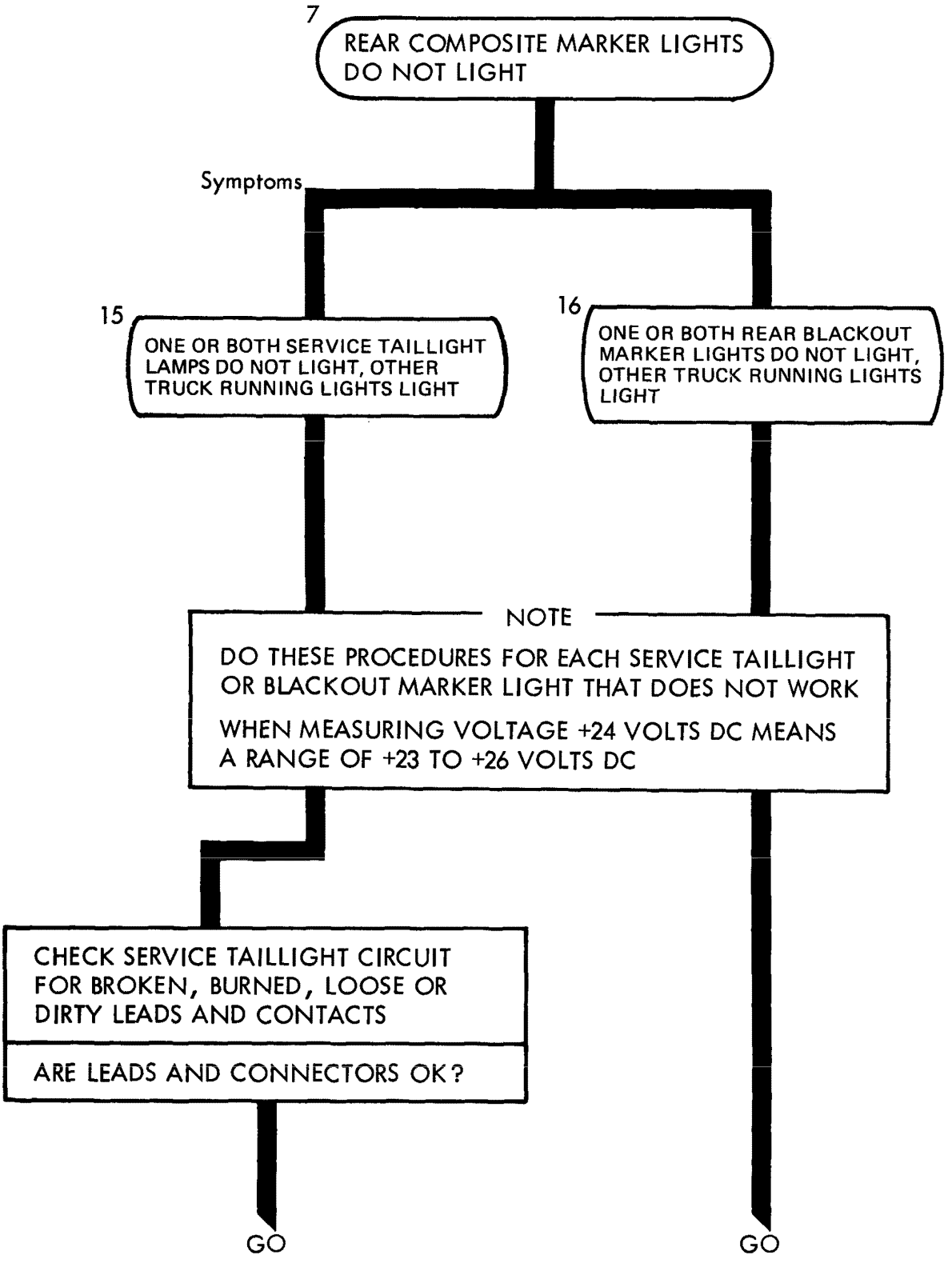
TA 114615

Figure 26-6 (Sheet 2 of 3)



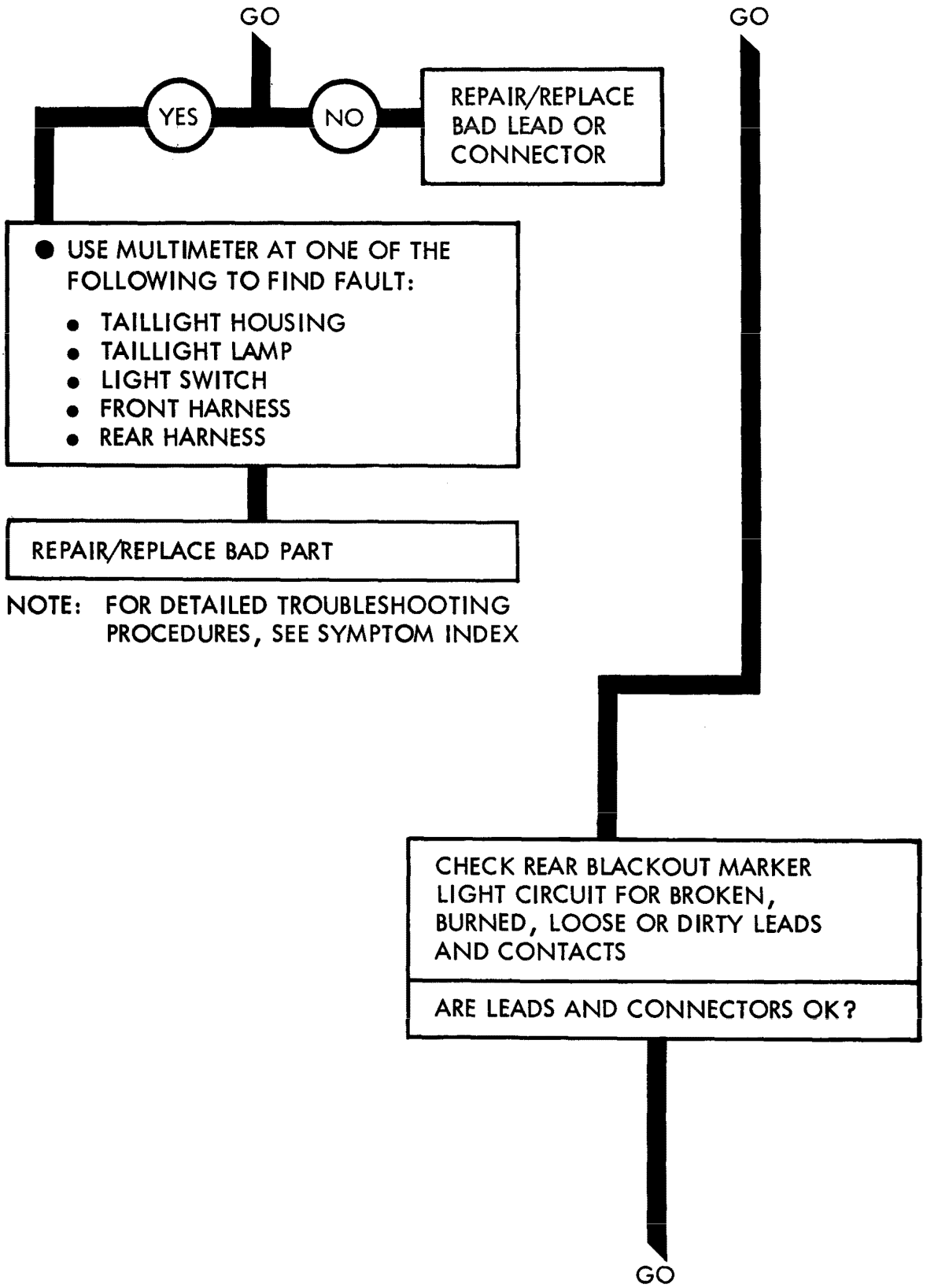
TA 114616

Figure 26-6 (Sheet 3 of 3)



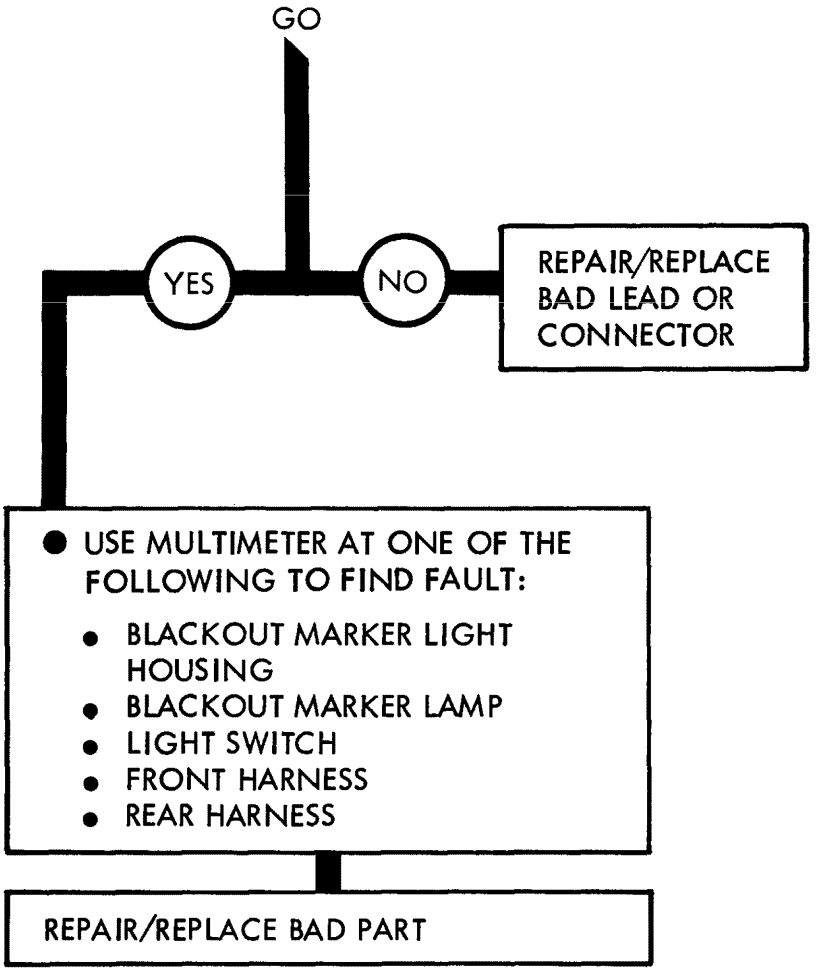
TA 114617

Figure 26-7 (Sheet 1 of 3)



TA 114610

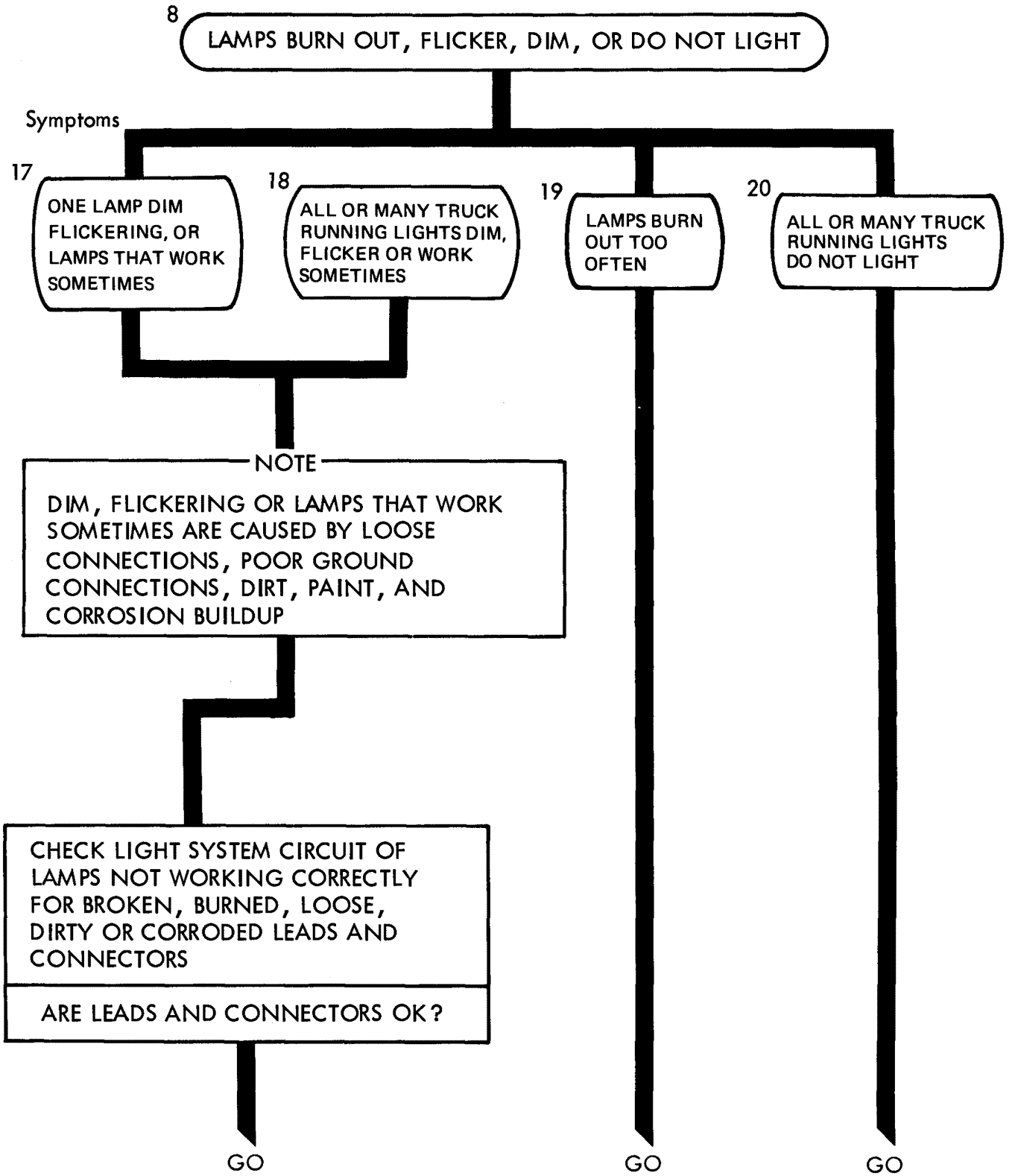
Figure 26-7 (Sheet 2 of 3)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

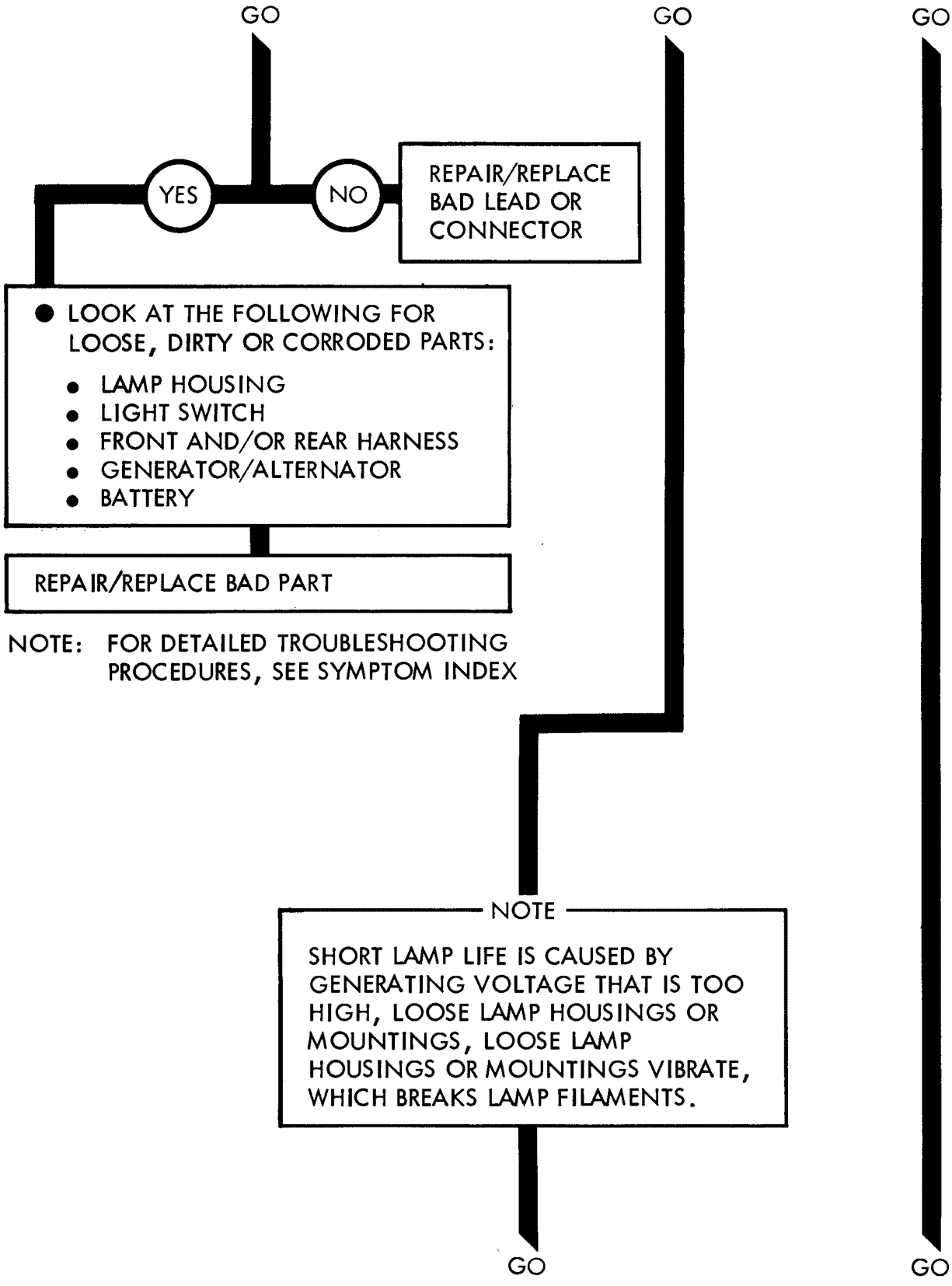
TA 114619

Figure 26-7 (Sheet 3 of 3)



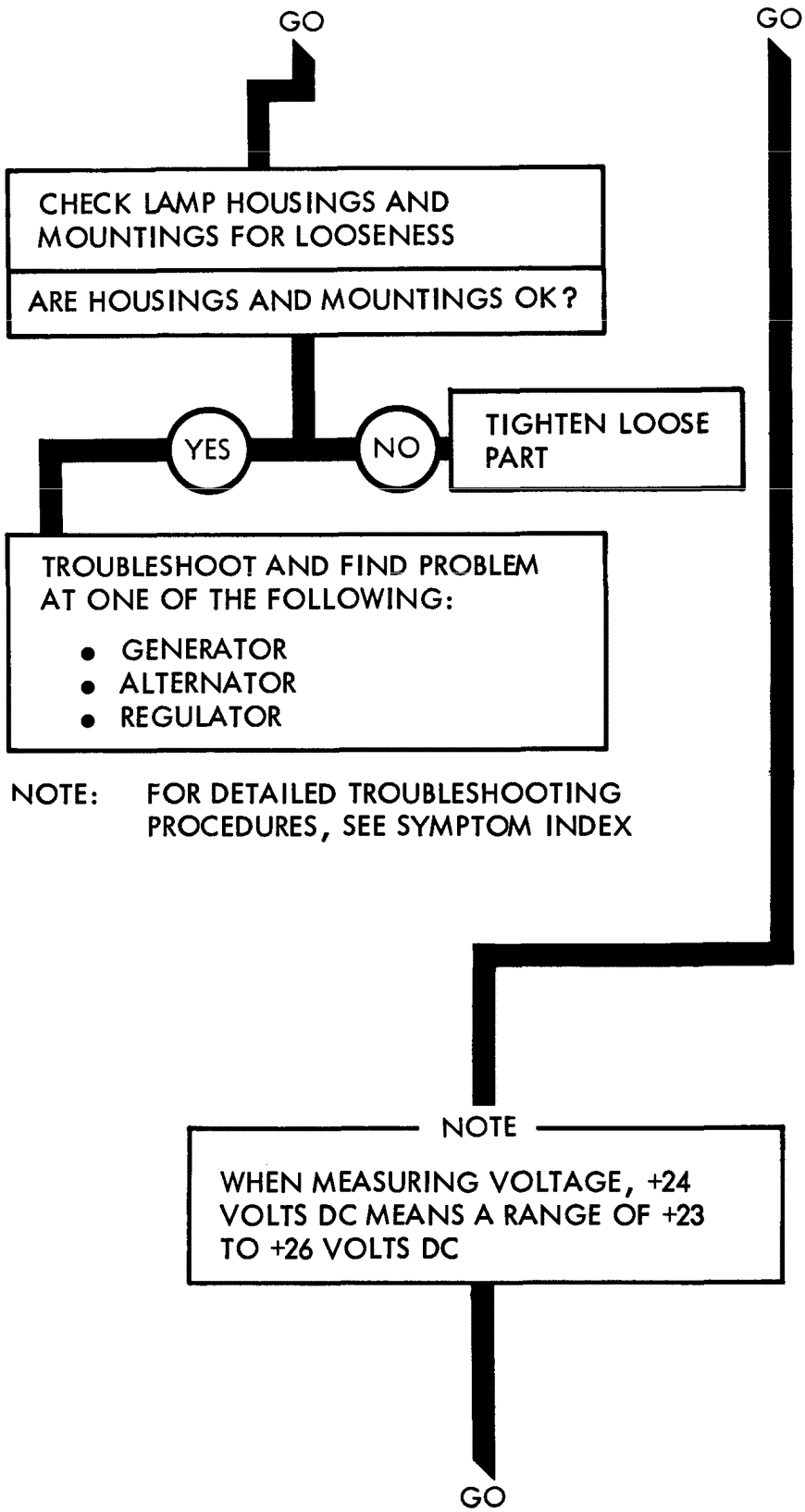
TA 114620

Figure 26-8 (Sheet 1 of 4)



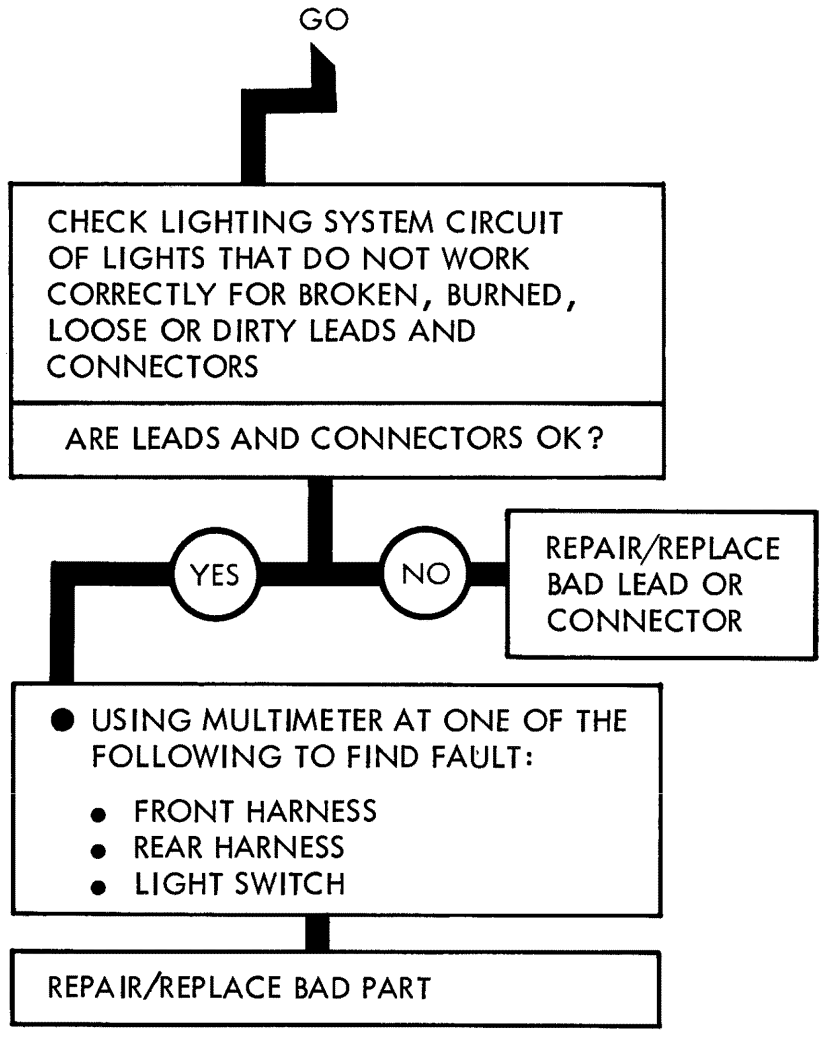
TA 114621

Figure 26-8 (Sheet 2 of 4)



TA 114622

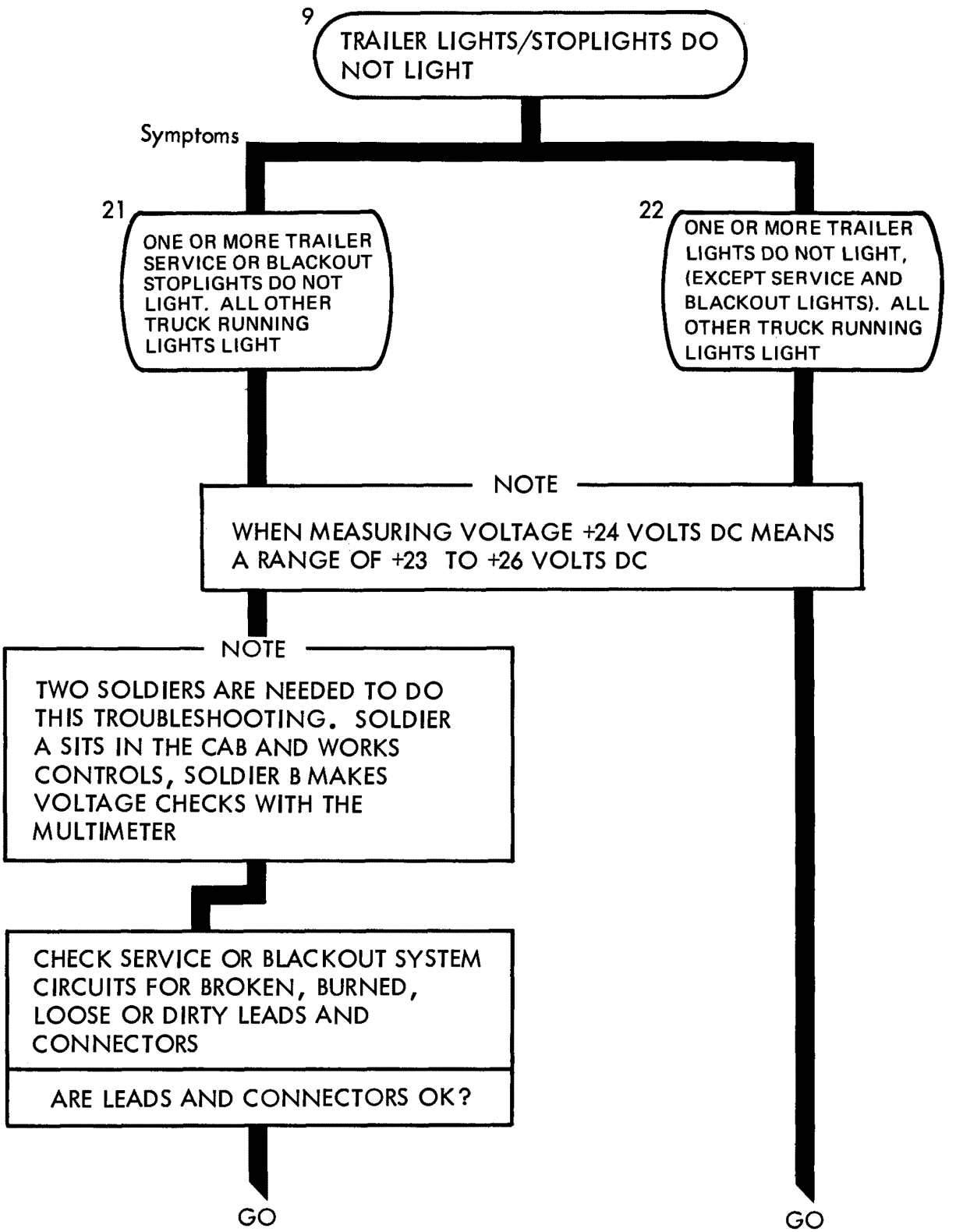
Figure 26-8 (Sheet 3 of 4)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

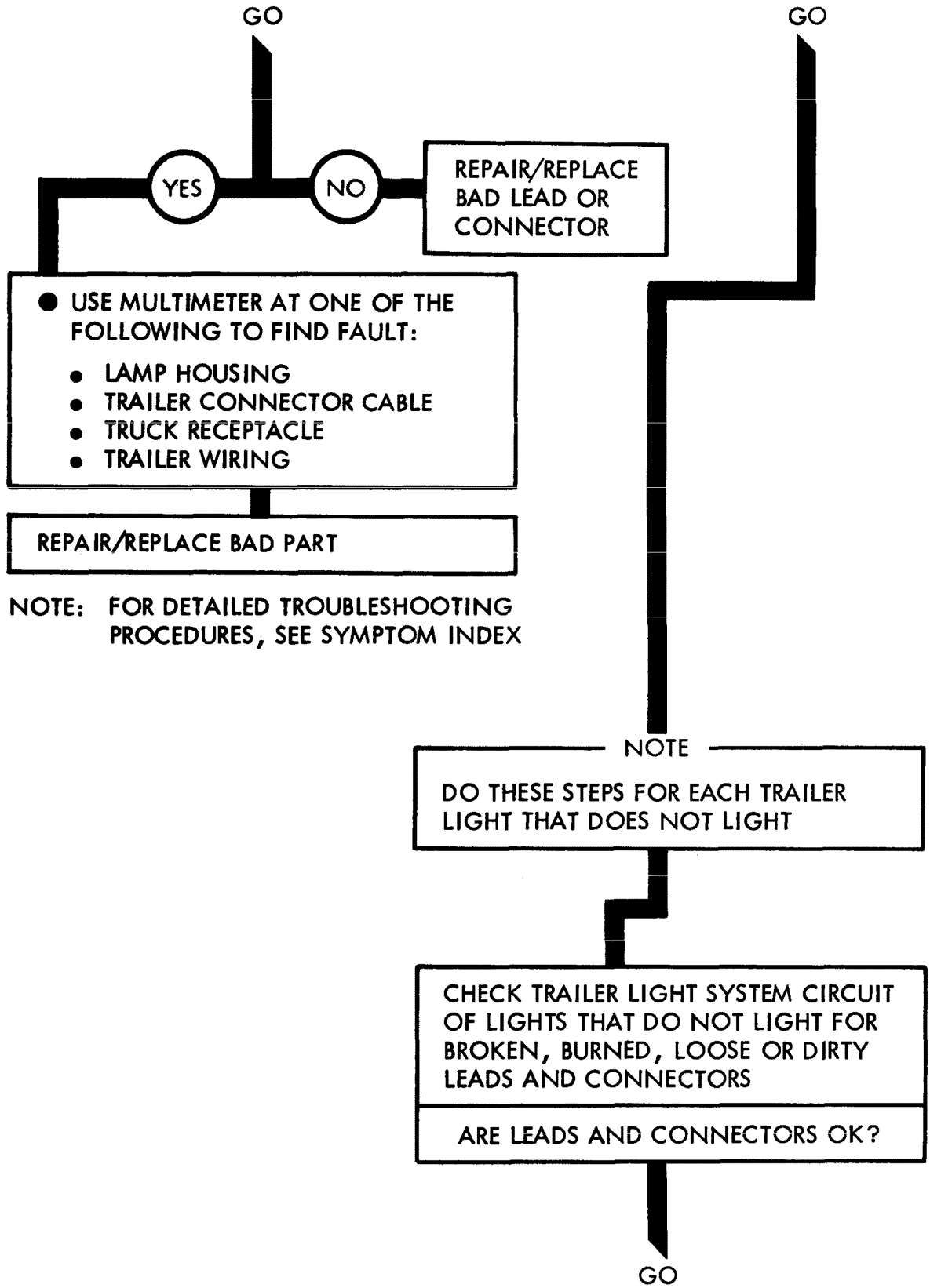
TA 114623

Figure 26-8 (Sheet 4 of 4)



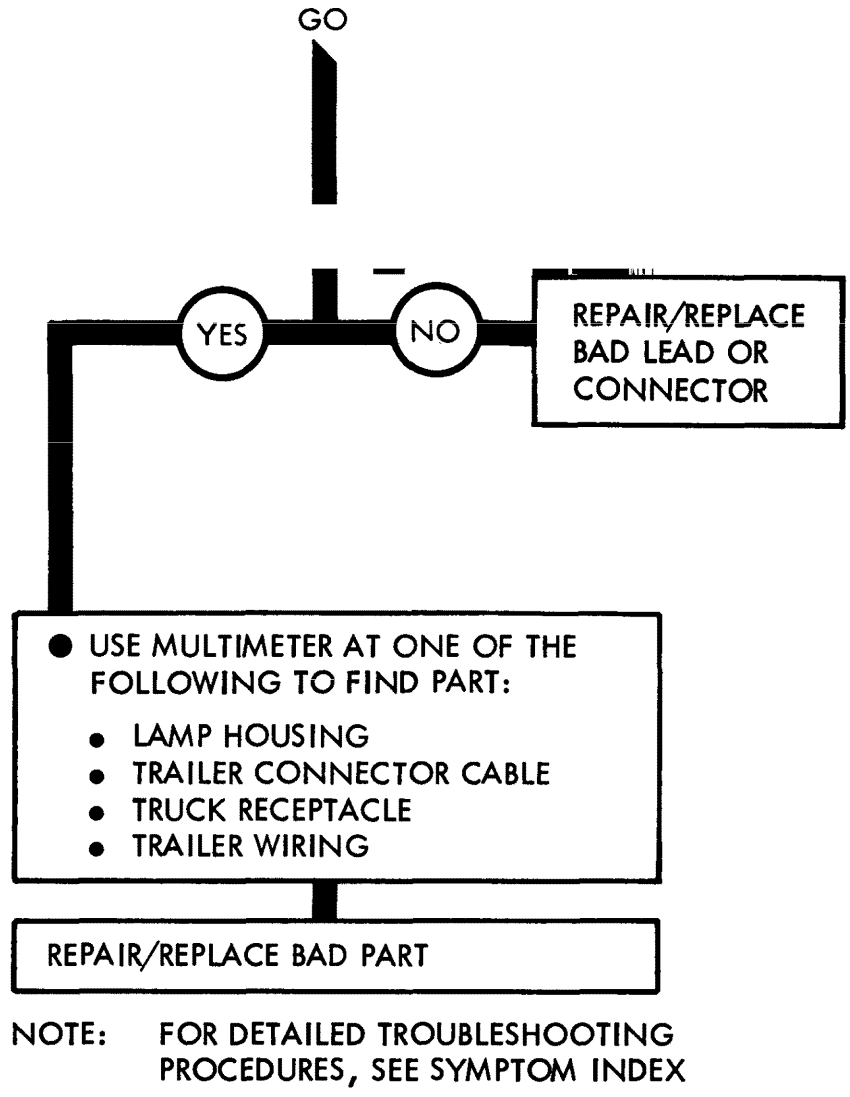
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Figure 26-9 (Sheet 1 of 3)



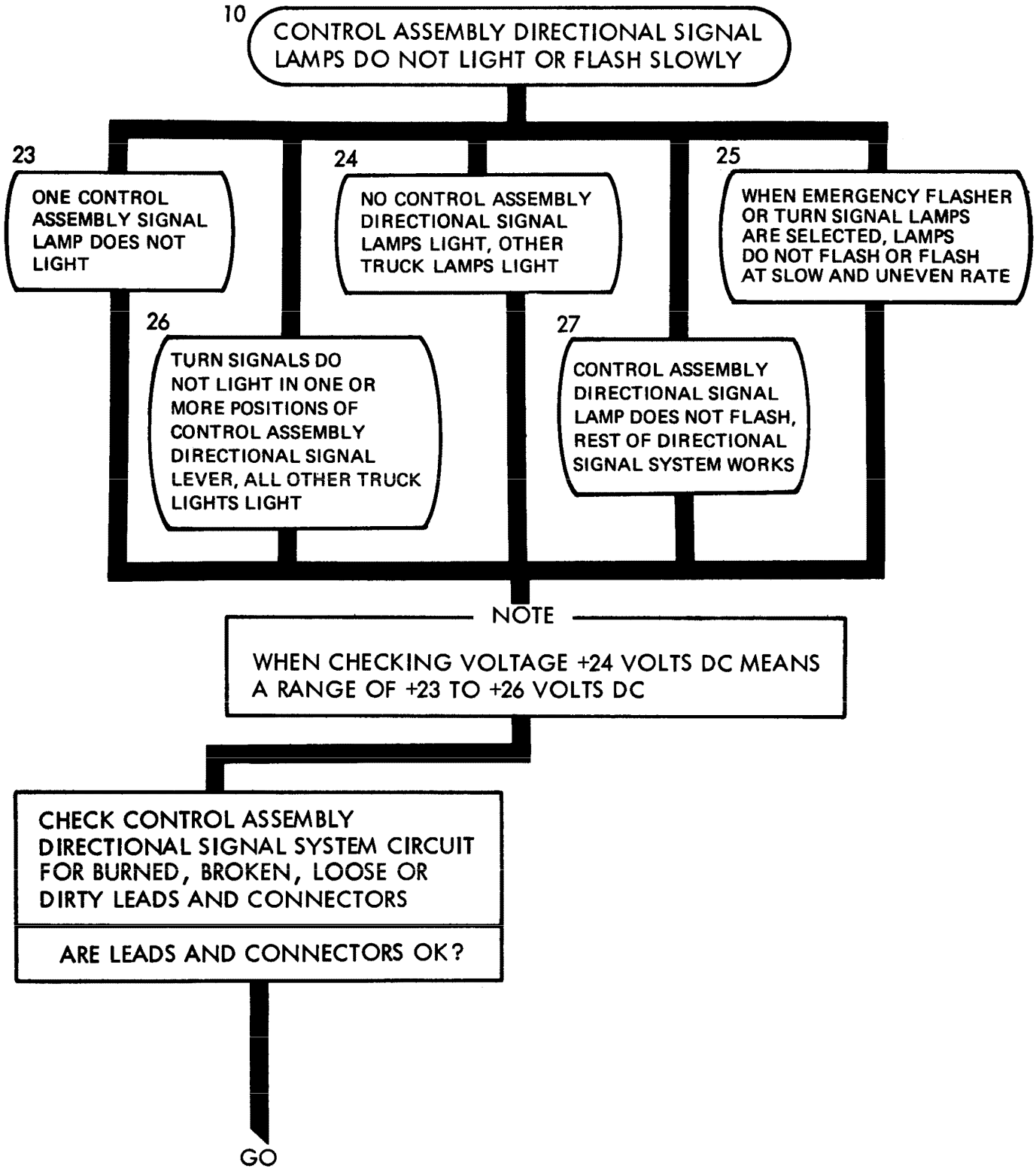
TA 114625

Figure 26-9 (Sheet 2 of 3)



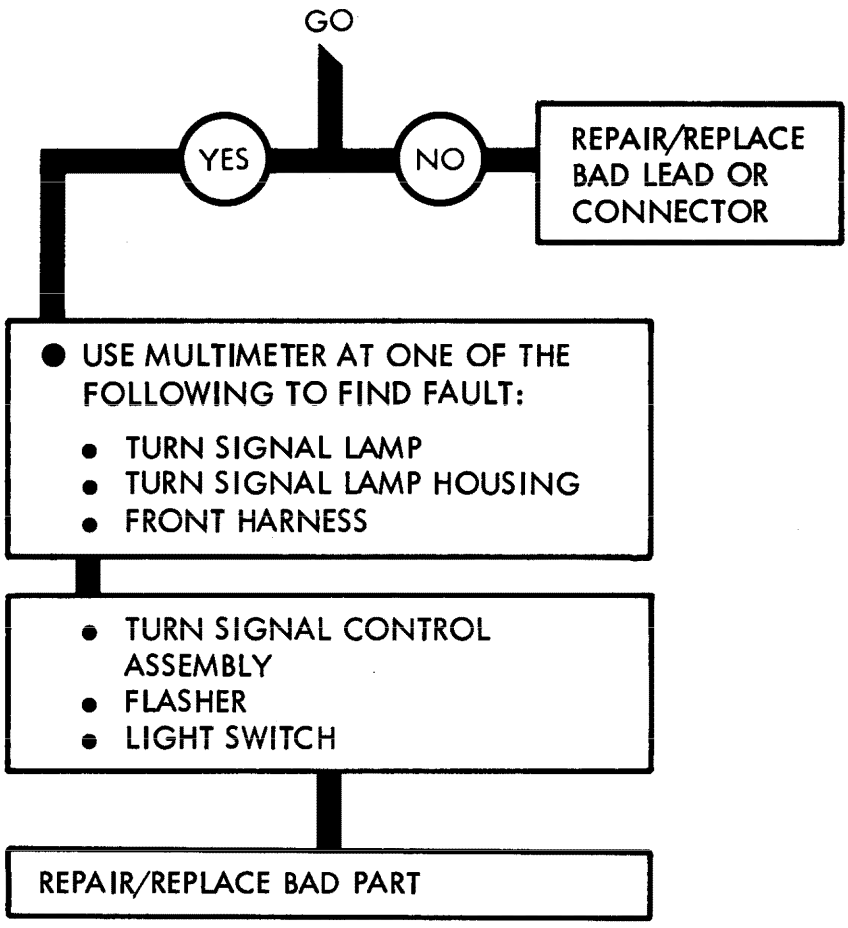
TA 114626

Figure 26-9 (Sheet 3 of 3)



TA 114627

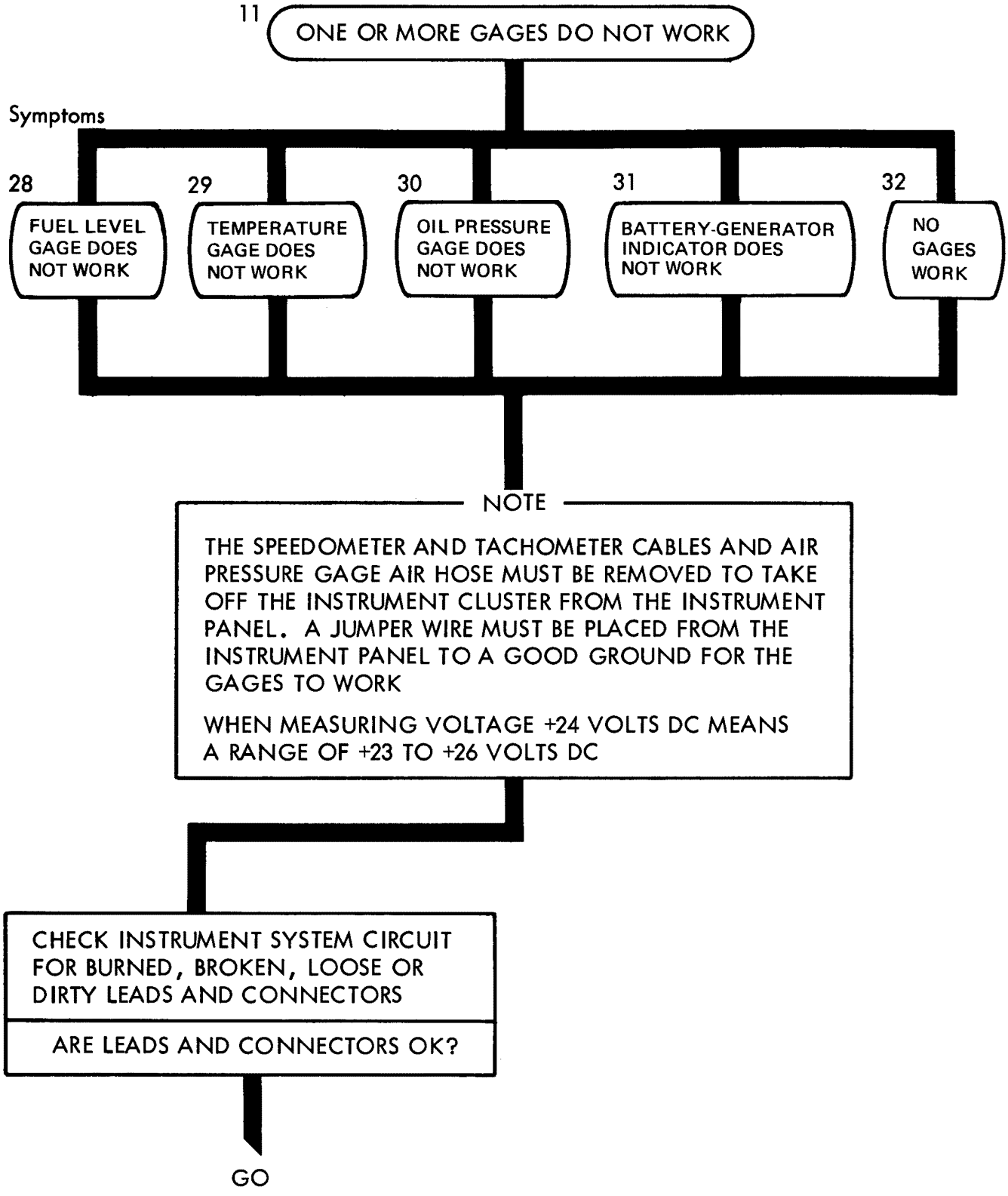
Figure 26-10 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

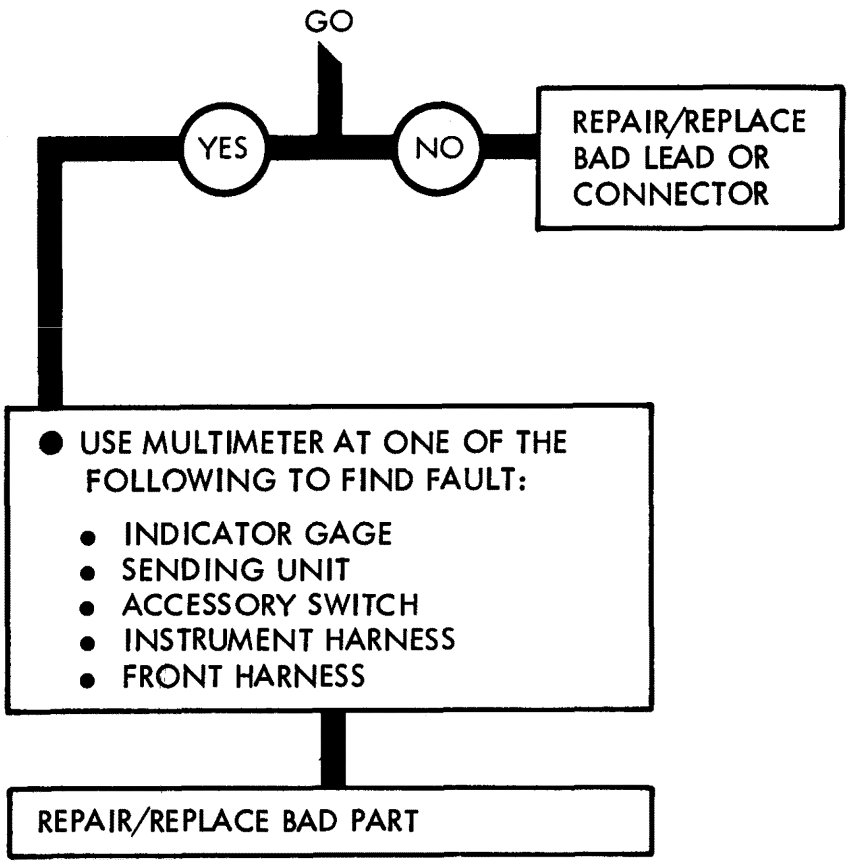
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Figure 26-10 (Sheet 2 of 2)



TA 114629

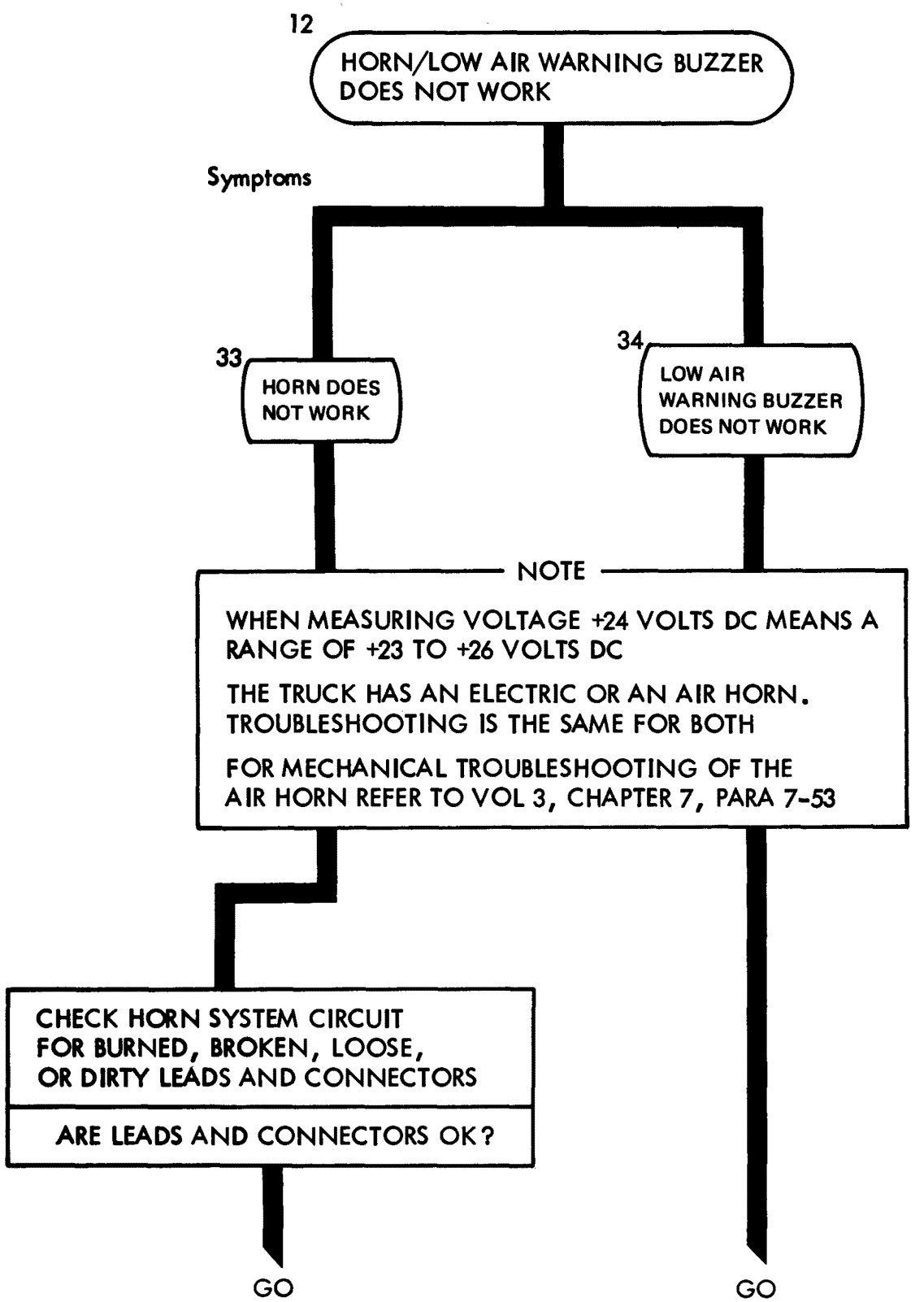
Figure 26-11 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

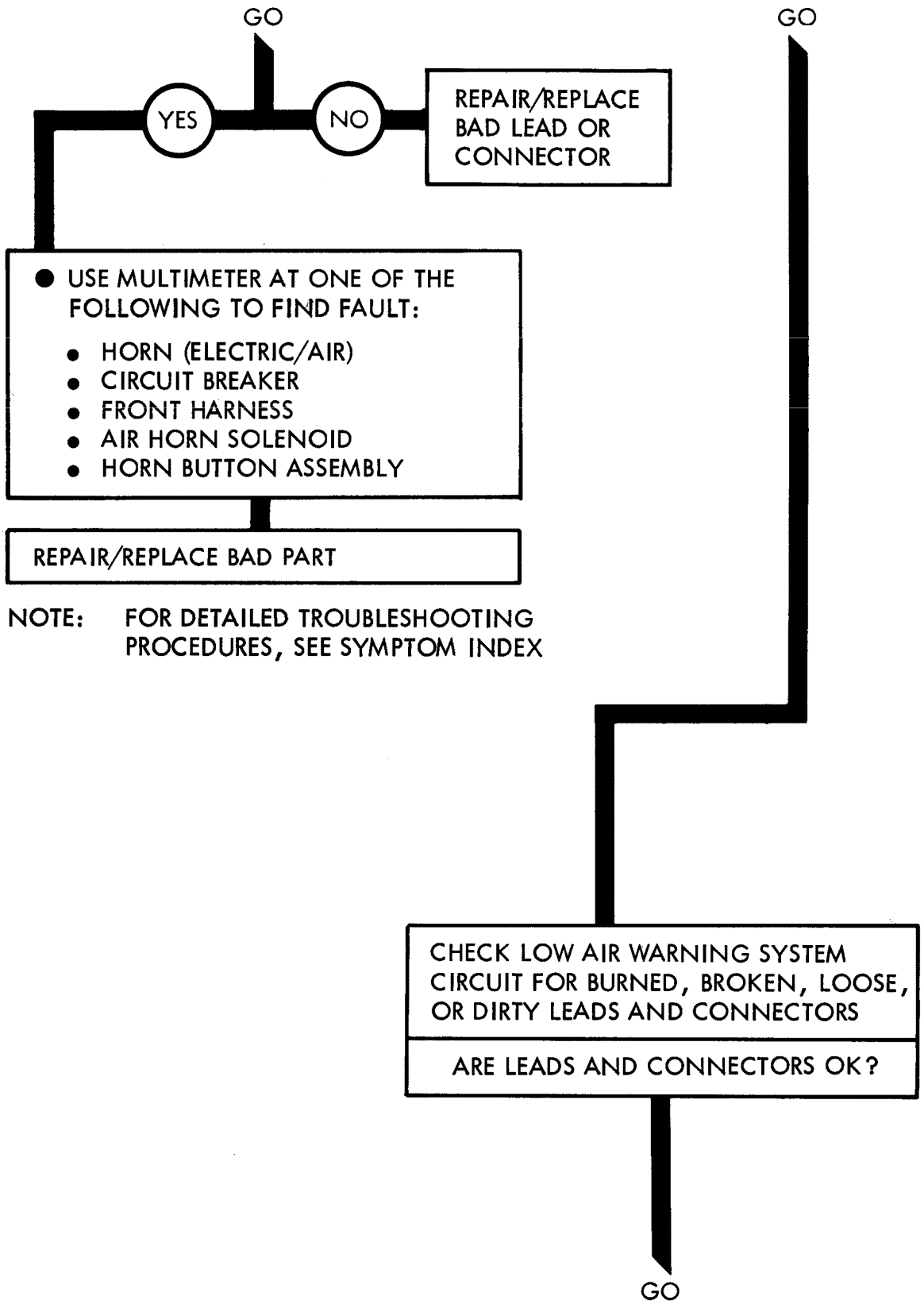
TA 114630

Figure 26-11 (Sheet 2 of 2)



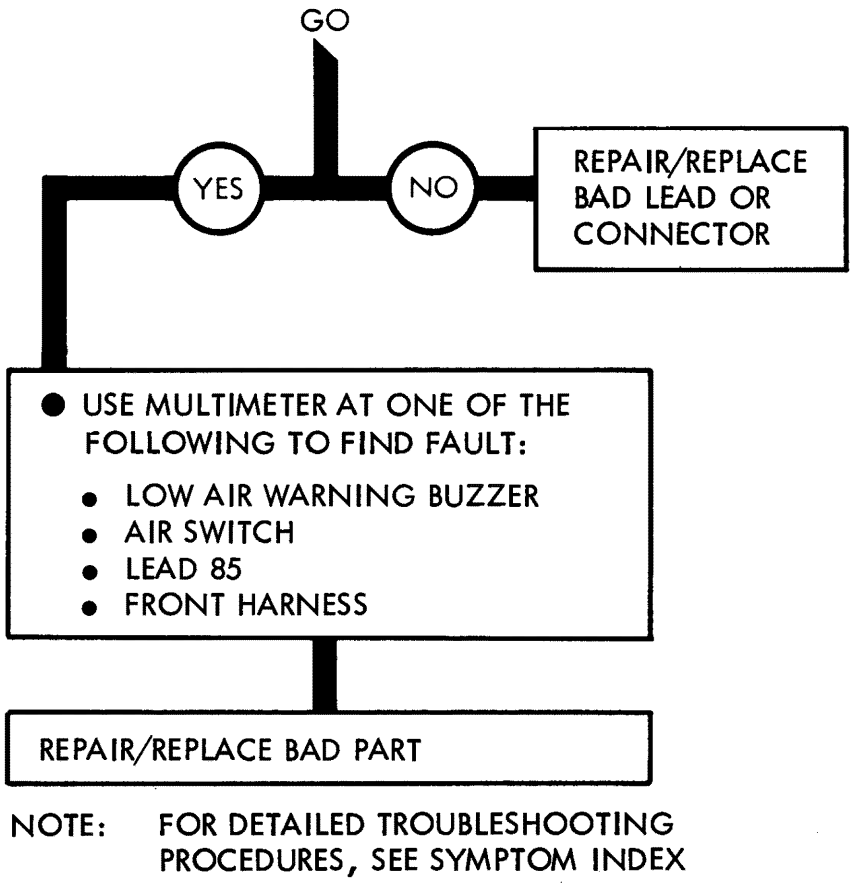
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Figure 26-12 (Sheet 1 of 3)



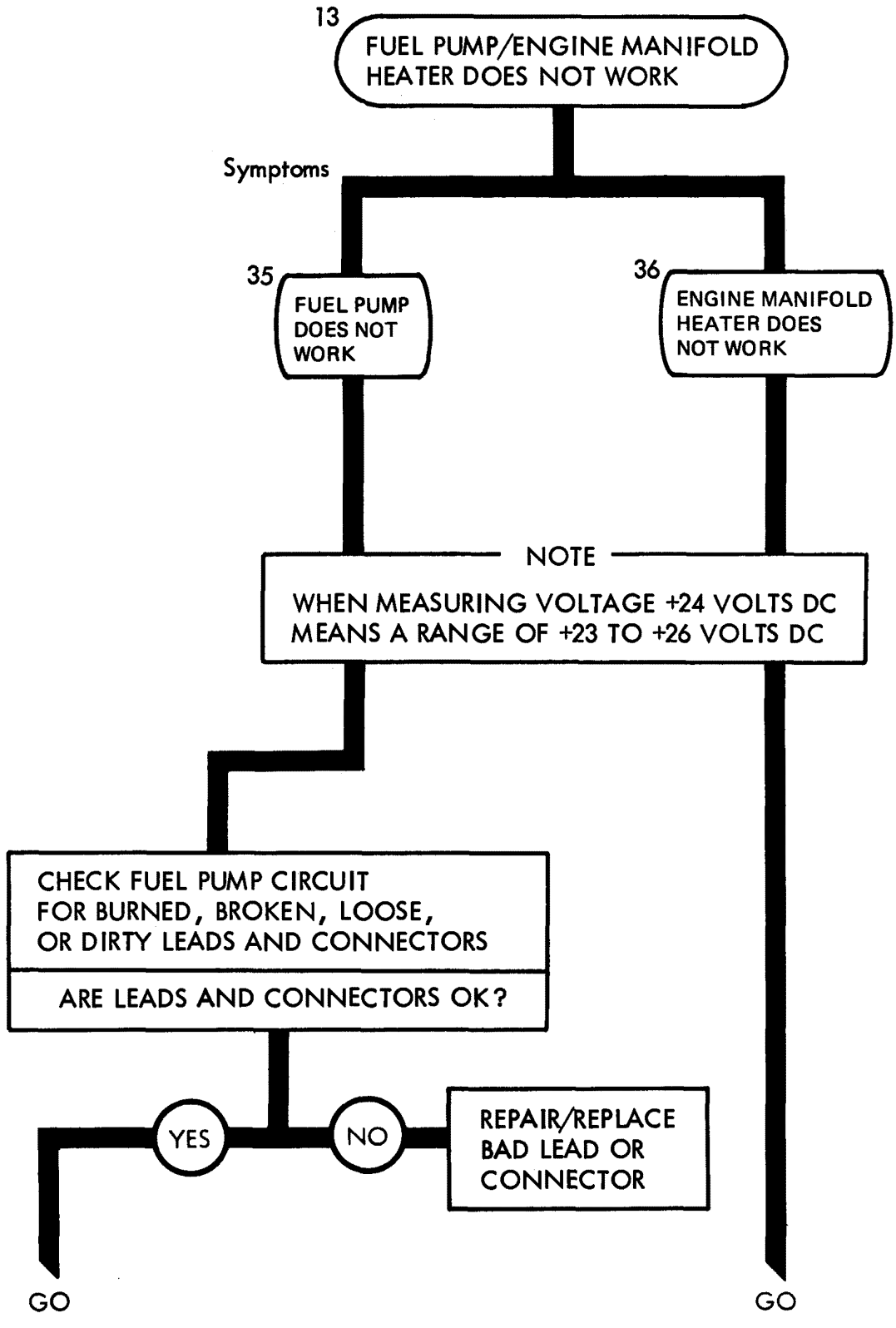
TA 114632

Figure 26-12 (Sheet 2 of 3)



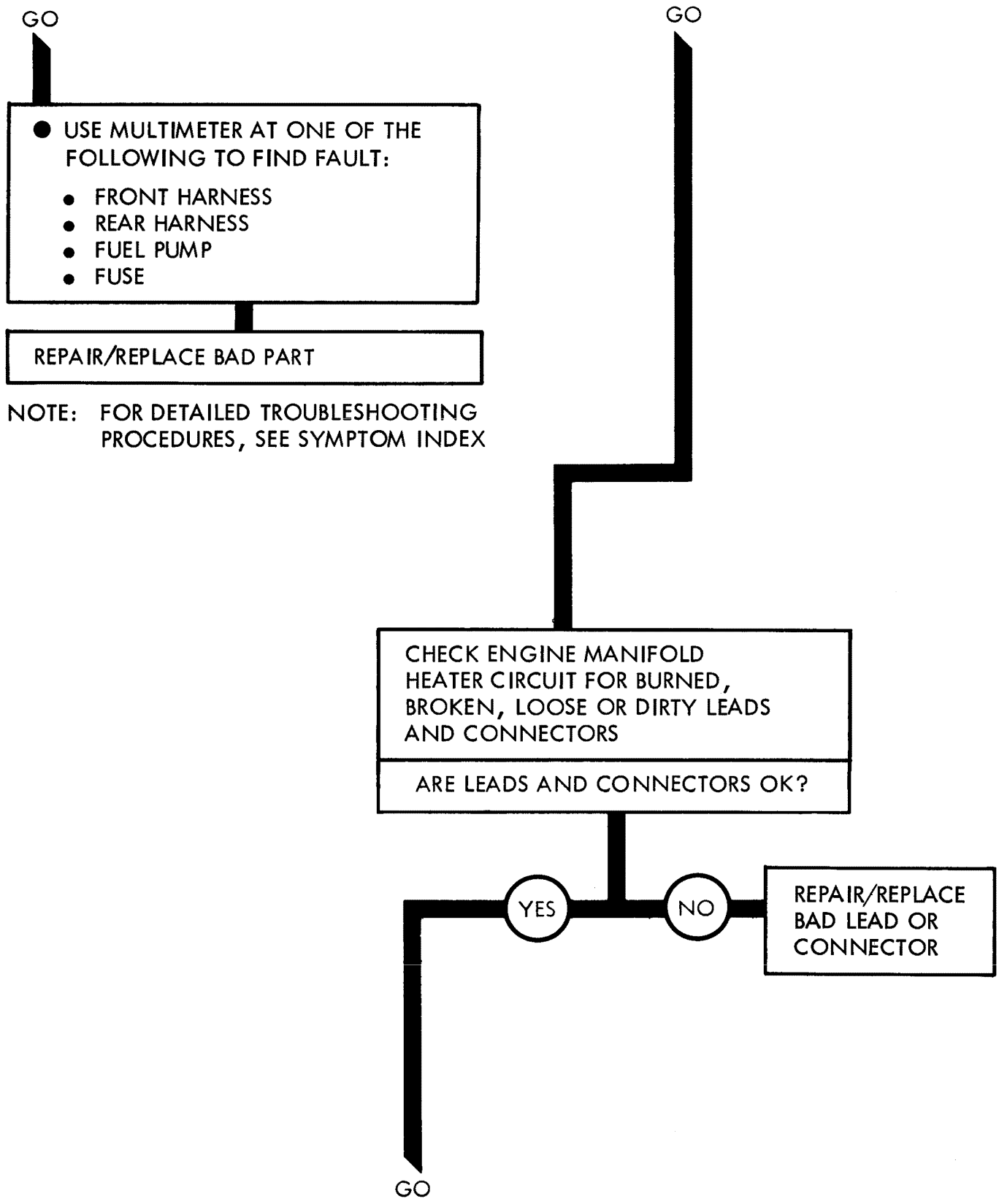
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Figure 26-12 (Sheet 3 of 3)



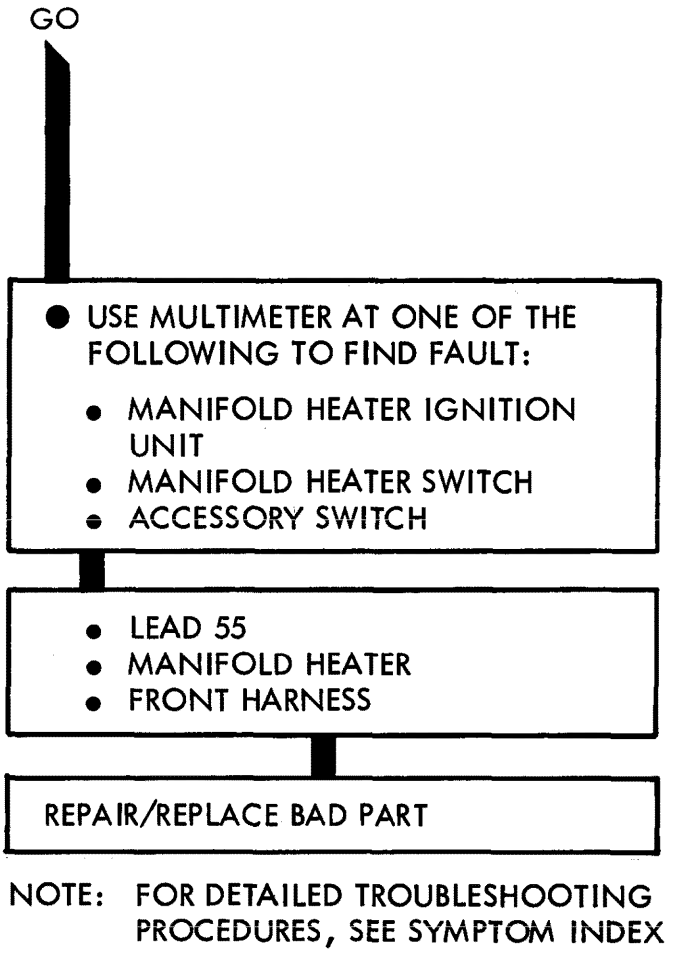
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Figure 26-13 (Sheet 1 of 3)



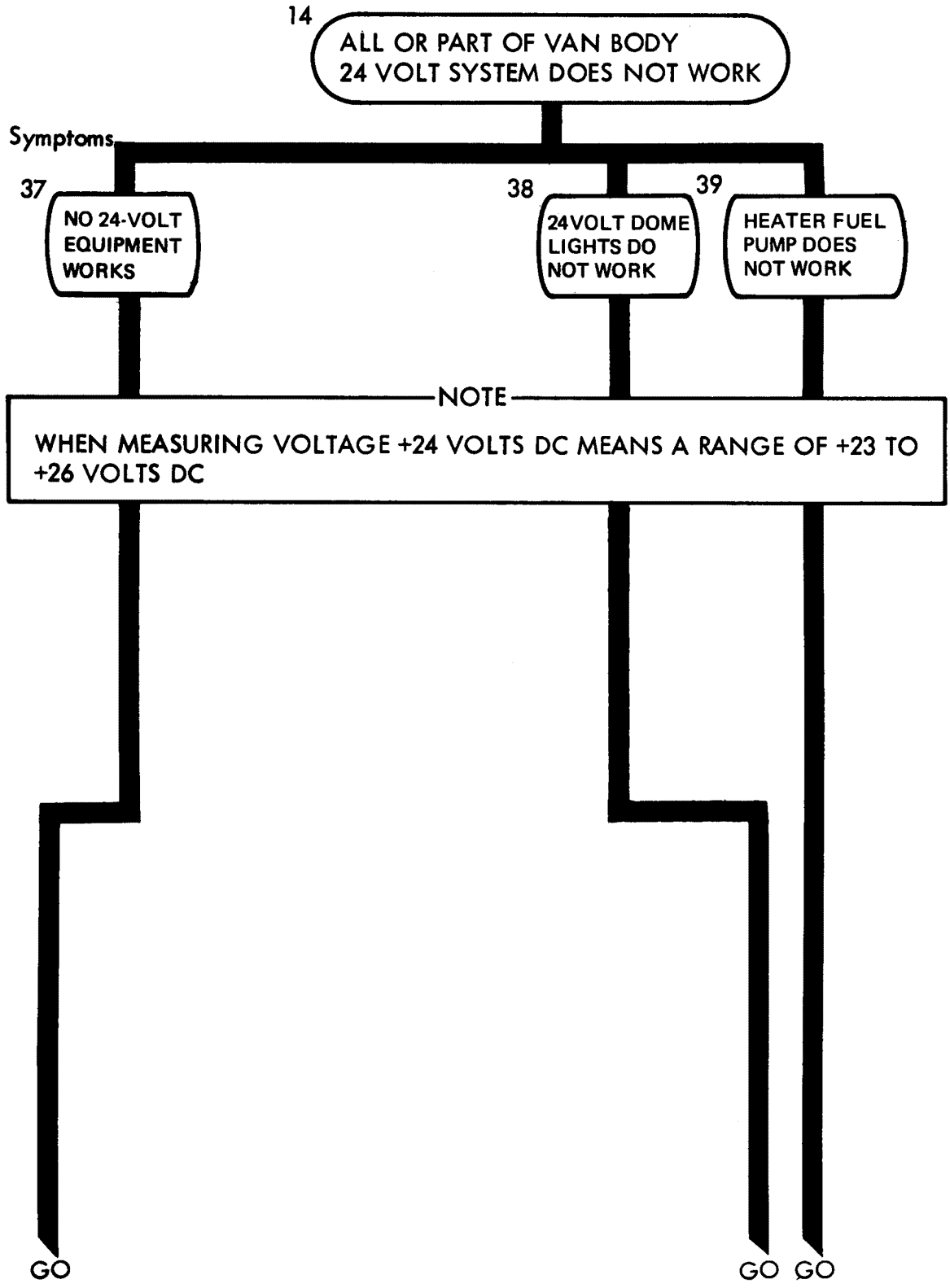
TA 114635

Figure 26-13 (Sheet 2 of 3)



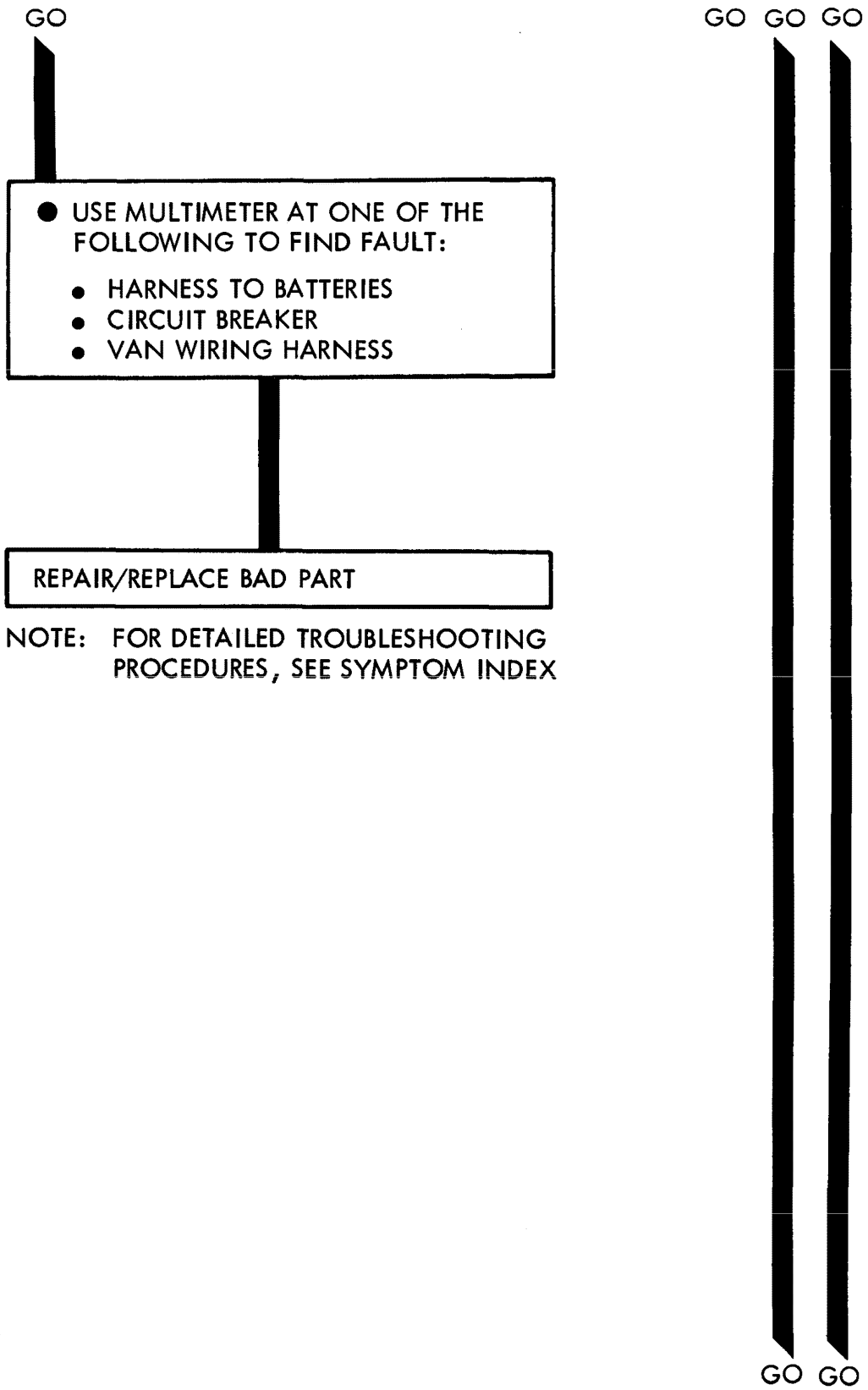
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Figure 26-13 (Sheet 3 of 3)



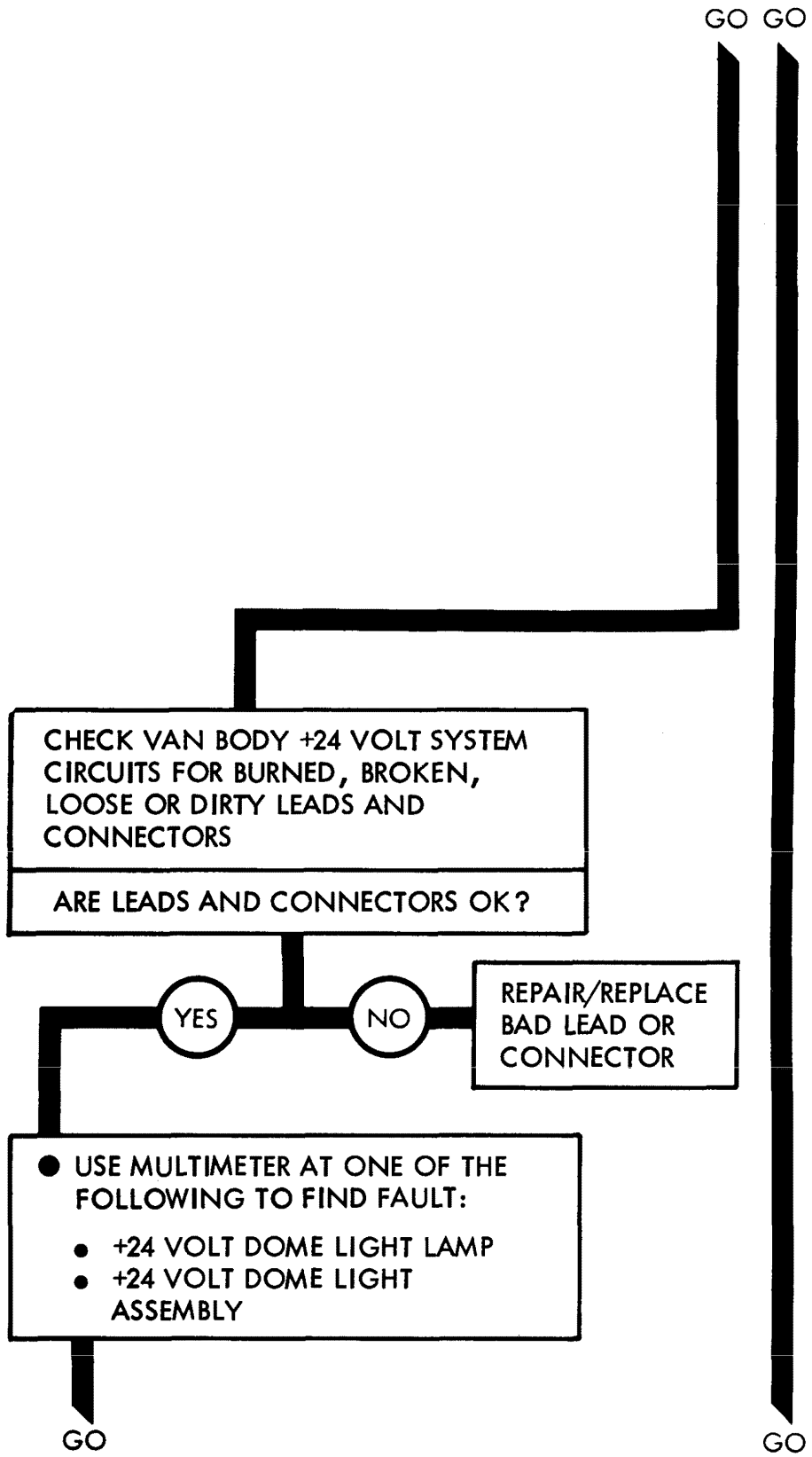
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Figure 26-14 (Sheet 1 of 5)



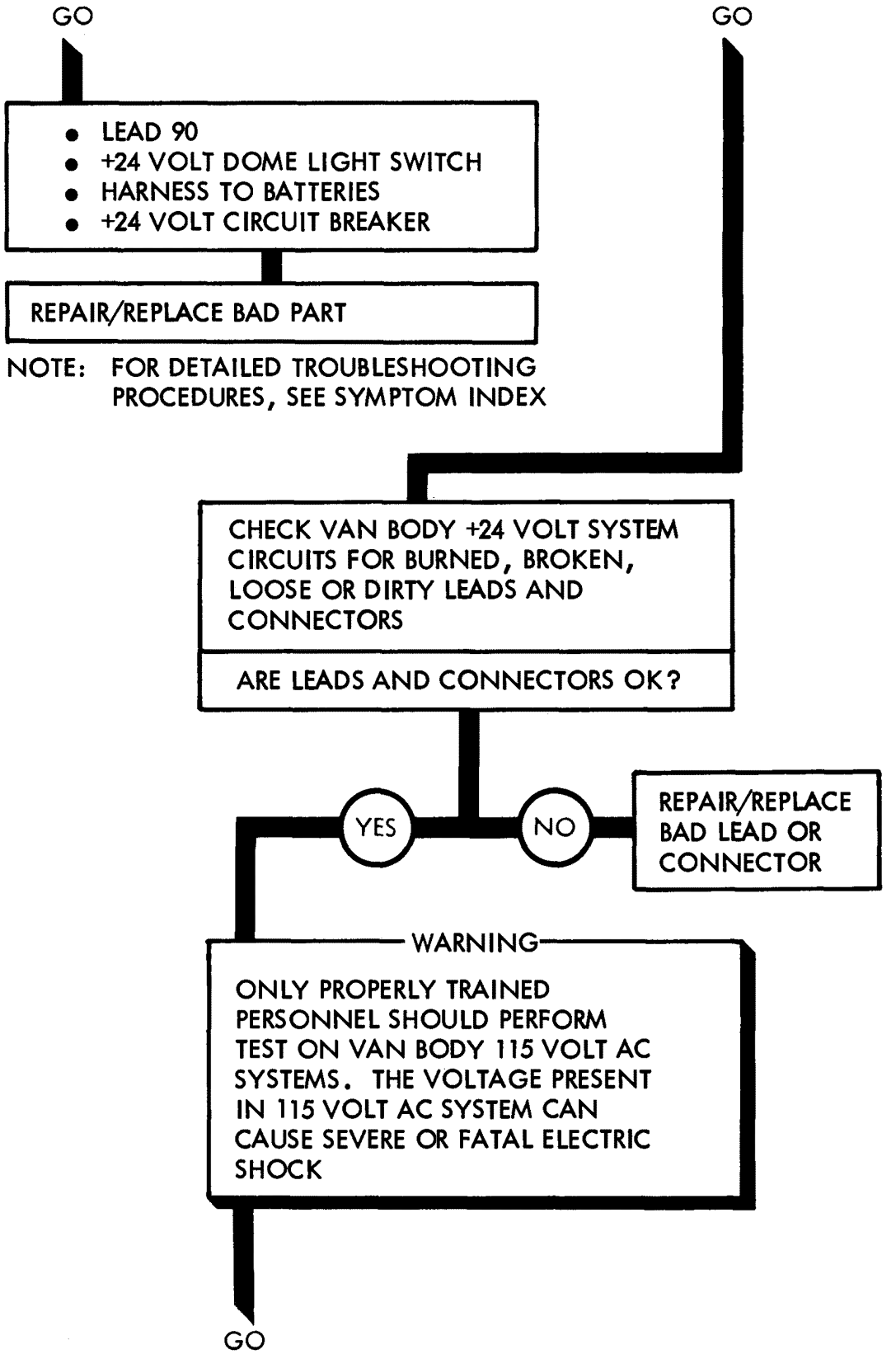
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Figure 26-14 (Sheet 2 of 5)



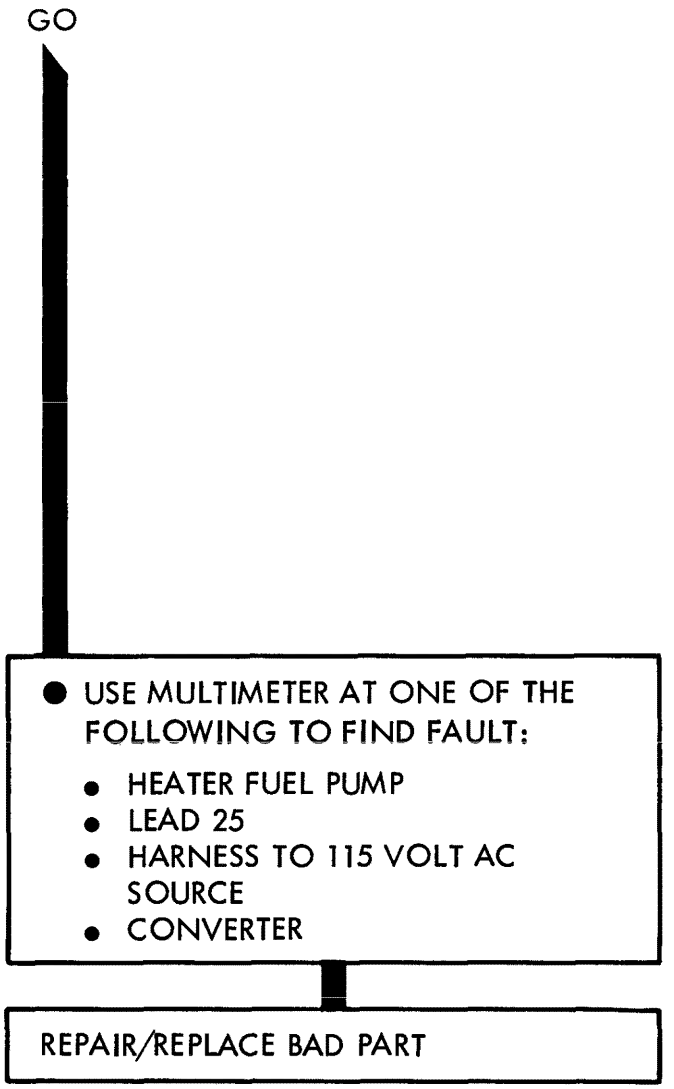
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Figure 26-14 (Sheet 3 of 5)



TA 114640

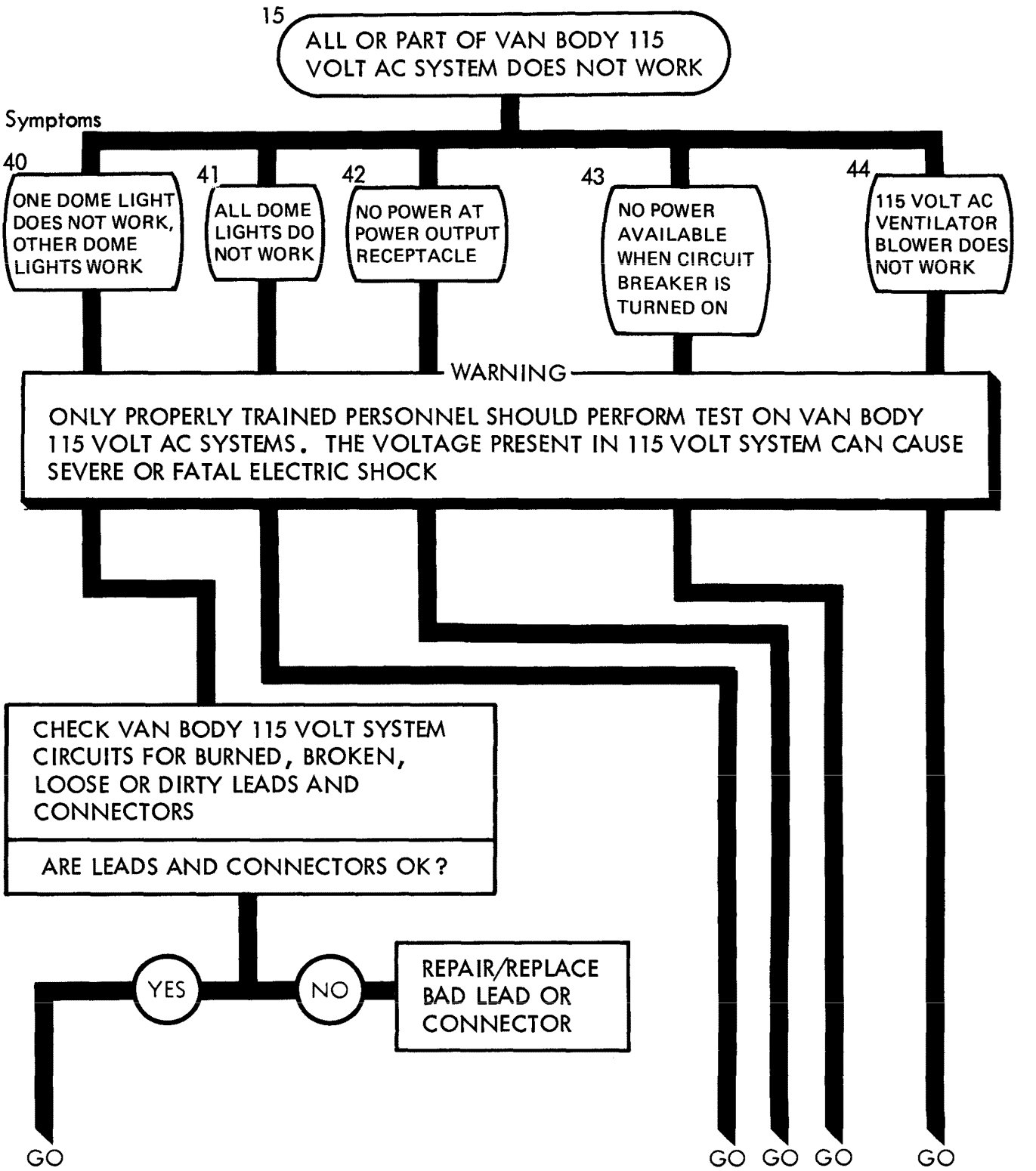
Figure 26-14 (Sheet 4 of 5)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

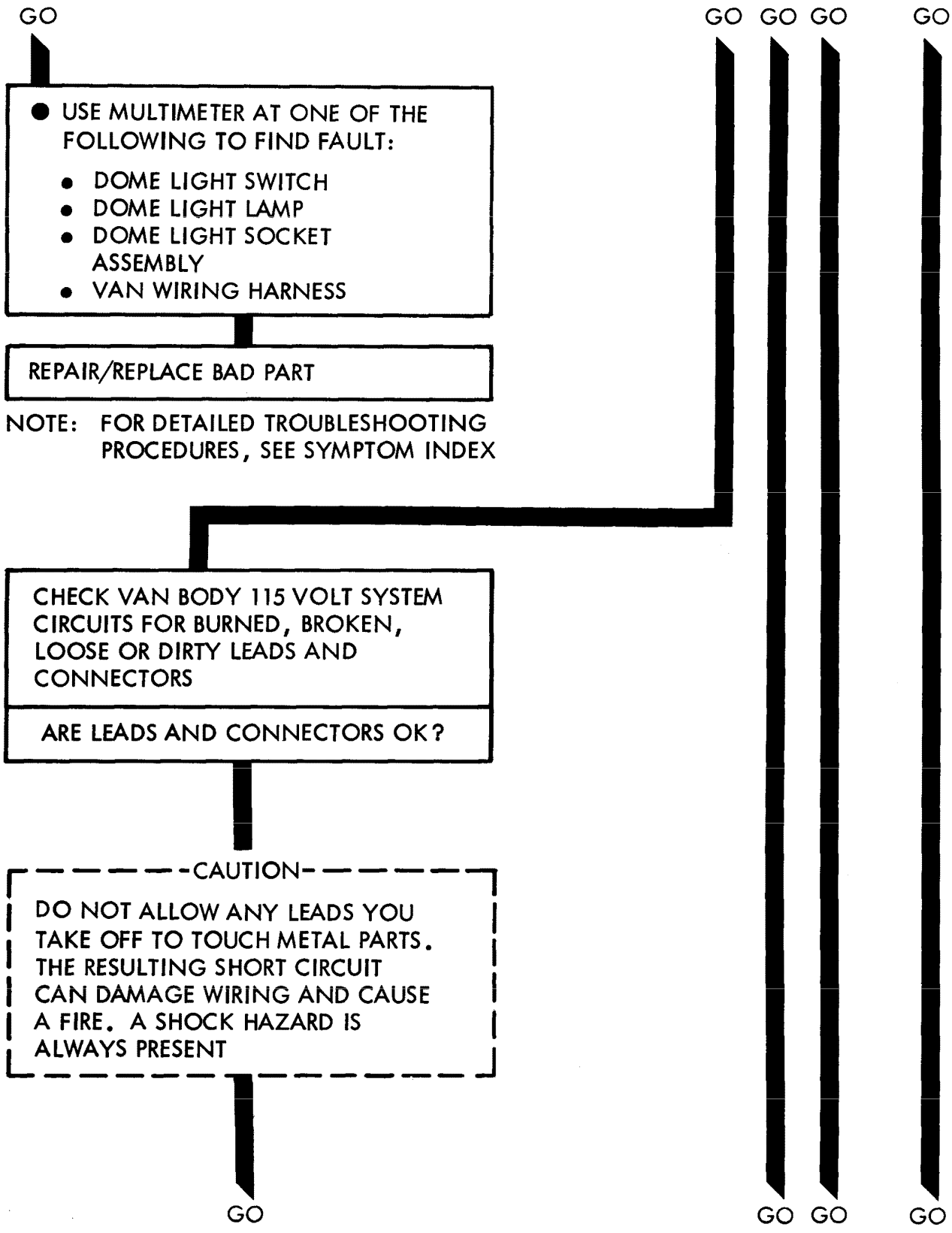
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Figure 26-14 (Sheet 5 of 5)



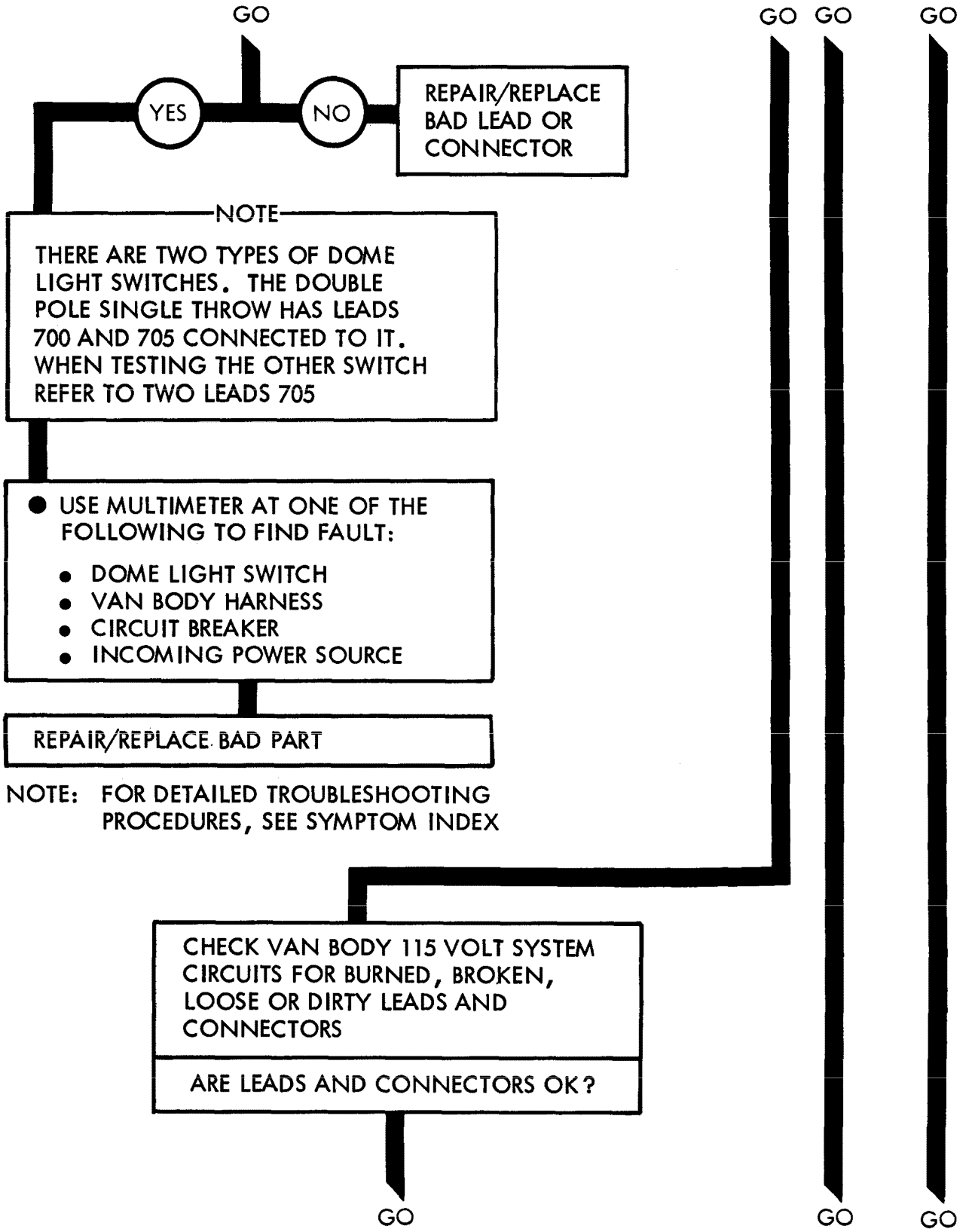
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Figure 26-15 (Sheet 1 of 6)



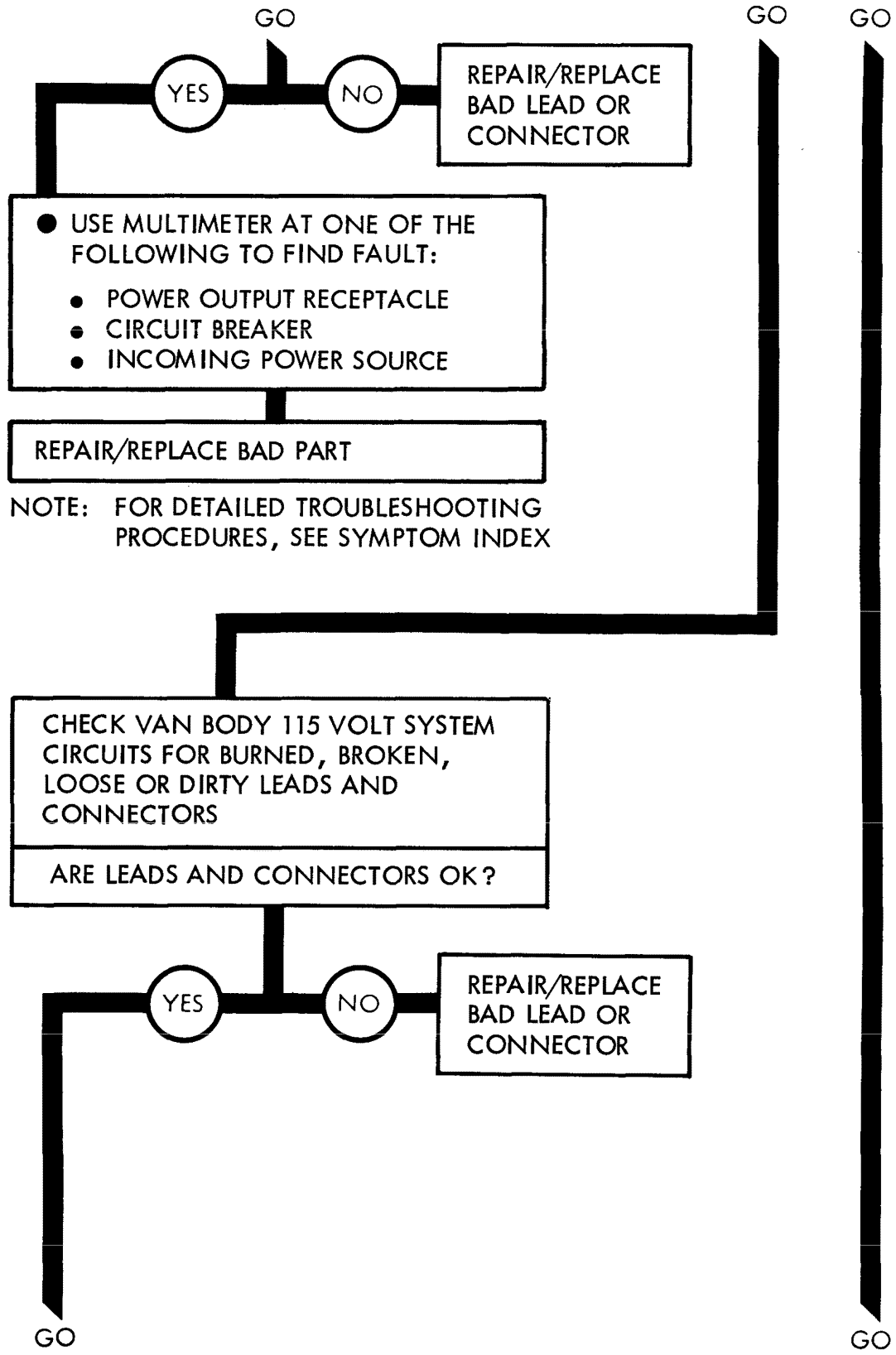
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Figure 26-15 (Sheet 2 of 6)



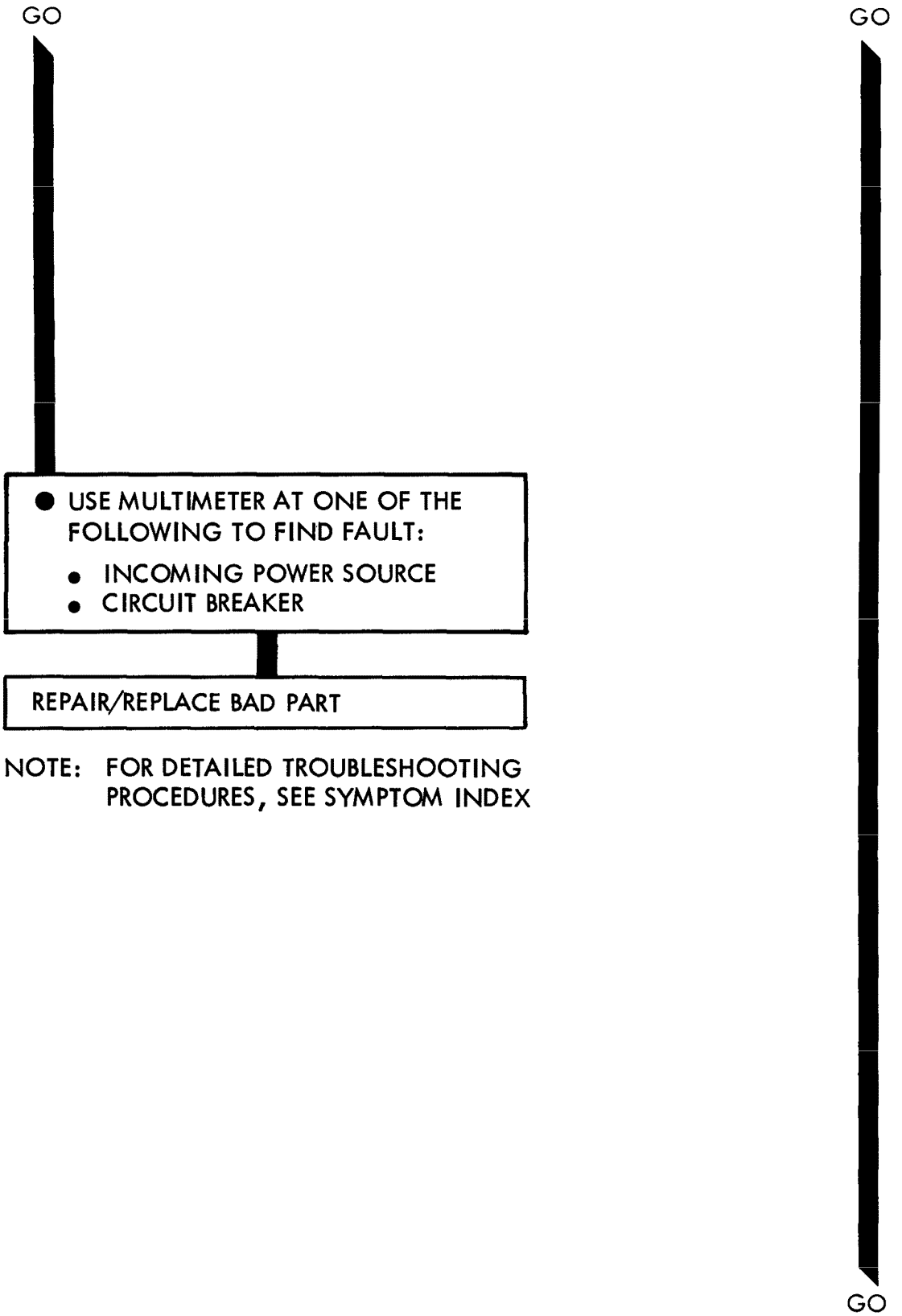
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Figure 26-15 (Sheet 3 of 6)

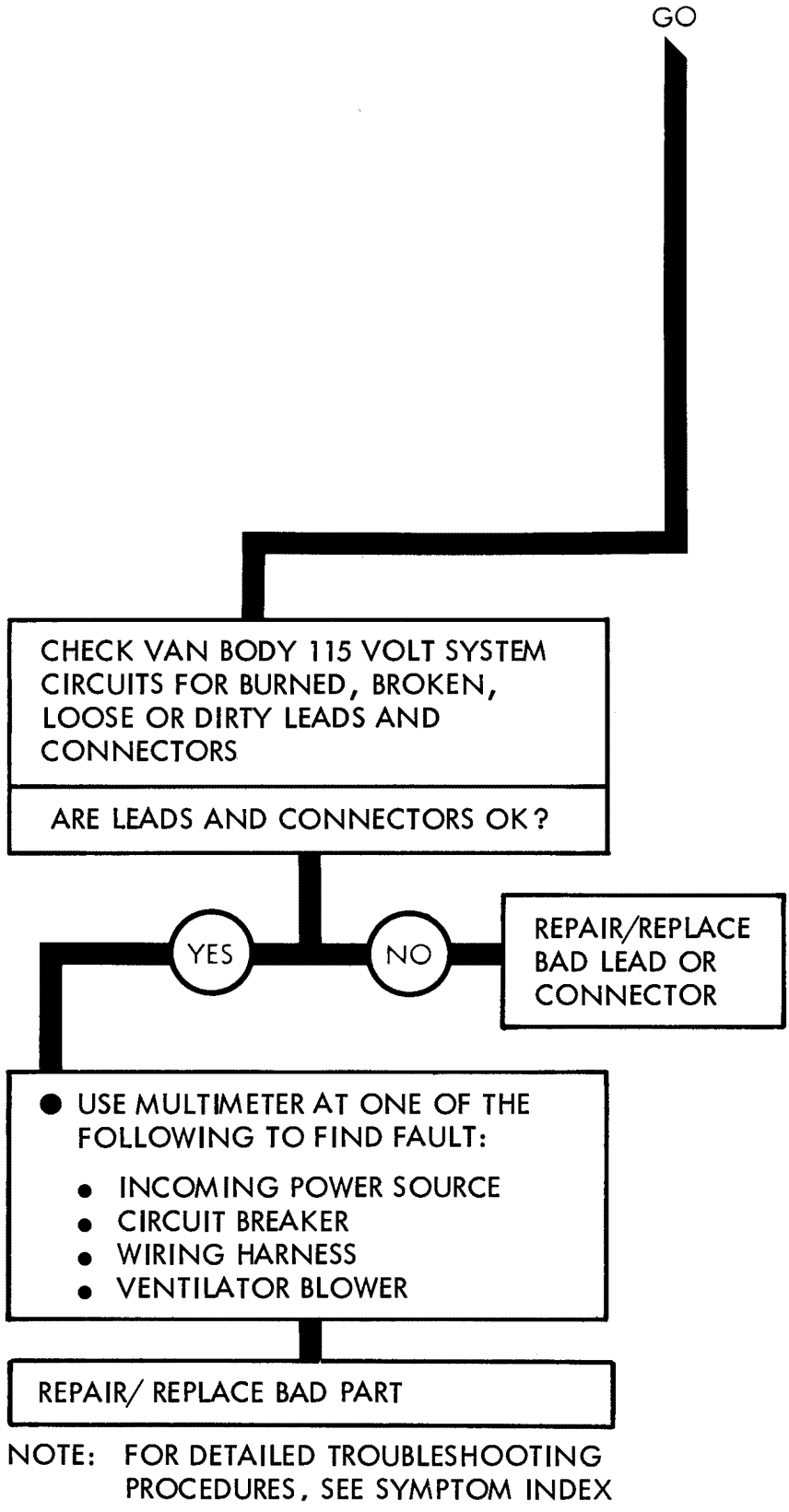


TA 114645

Figure 26-15 (Sheet 4 of 6)

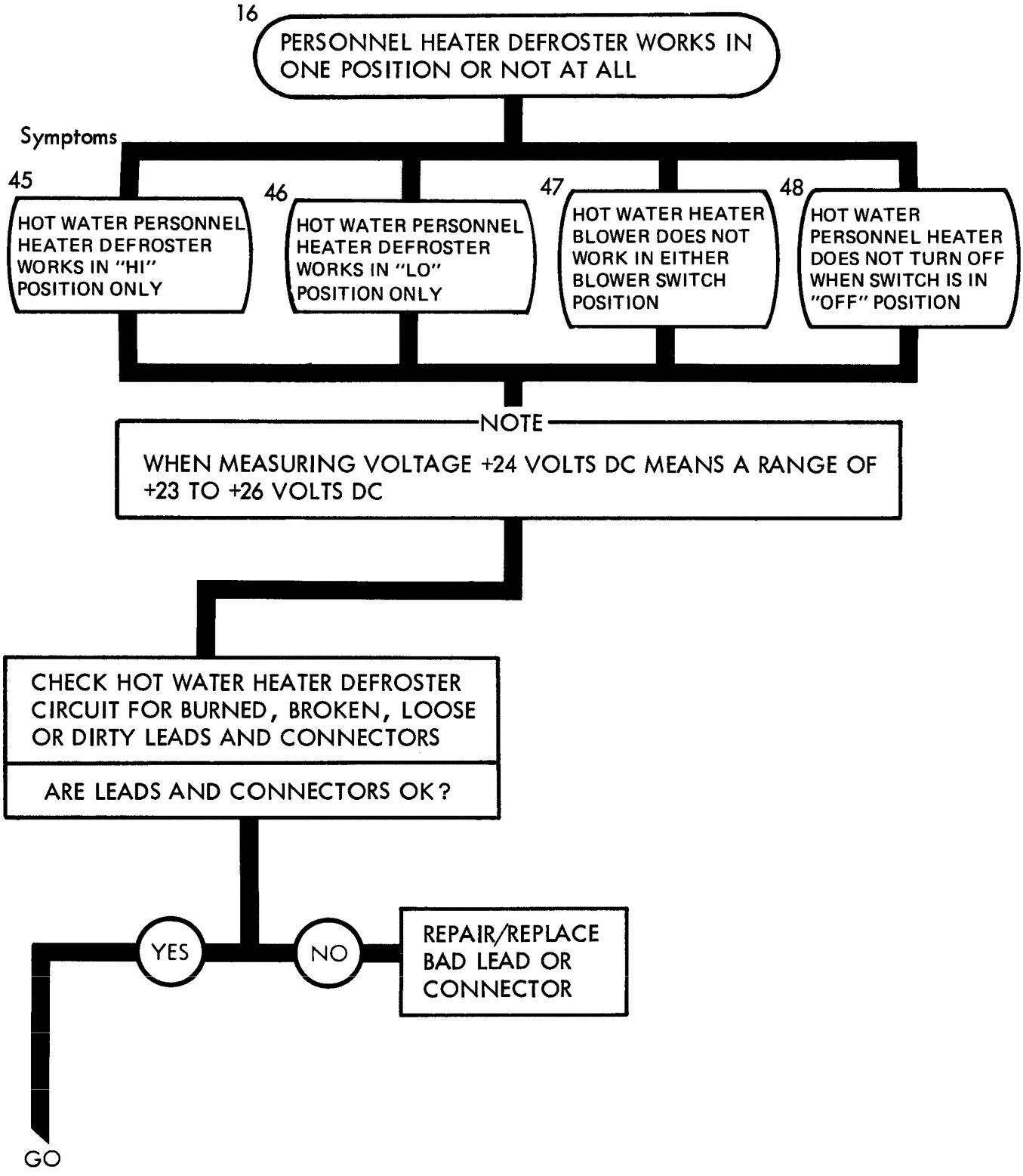

GO
GO
● USE MULTIMETER AT ONE OF THE FOLLOWING TO FIND FAULT:
• INCOMING POWER SOURCE
• CIRCUIT BREAKER
REPAIR/REPLACE BAD PART
NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX
GO

TA 114646



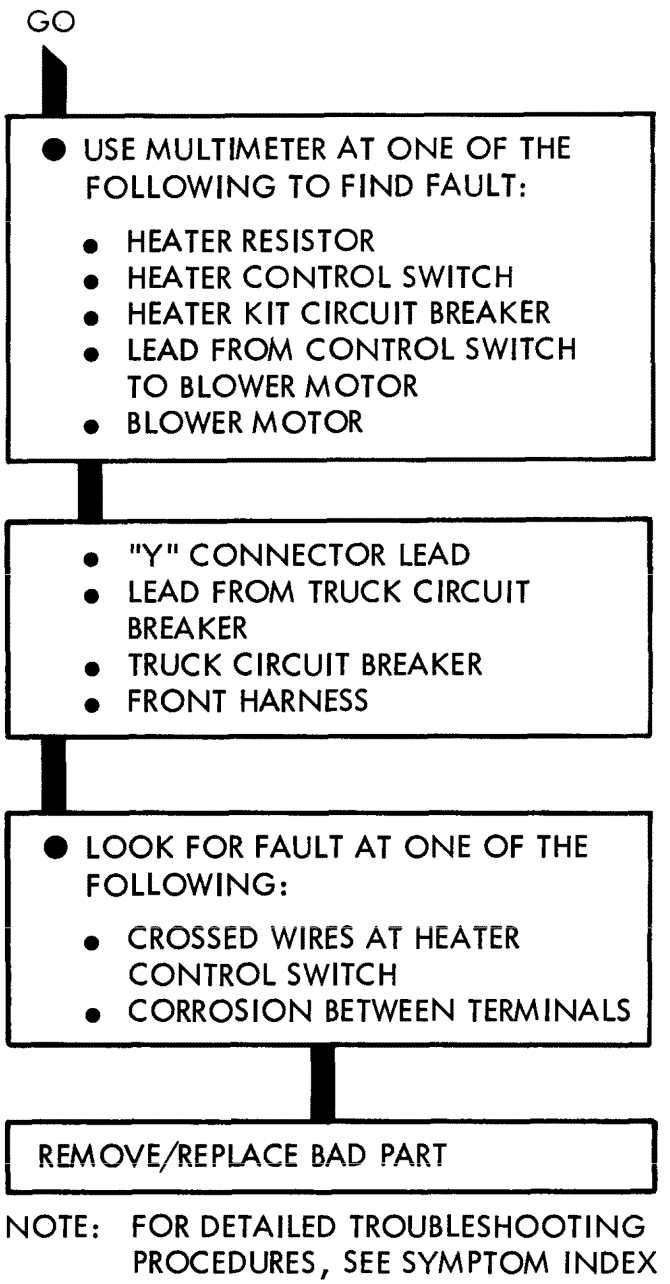
TA 114647

Figure 26-15 (Sheet 6 of 6)



TA 114648

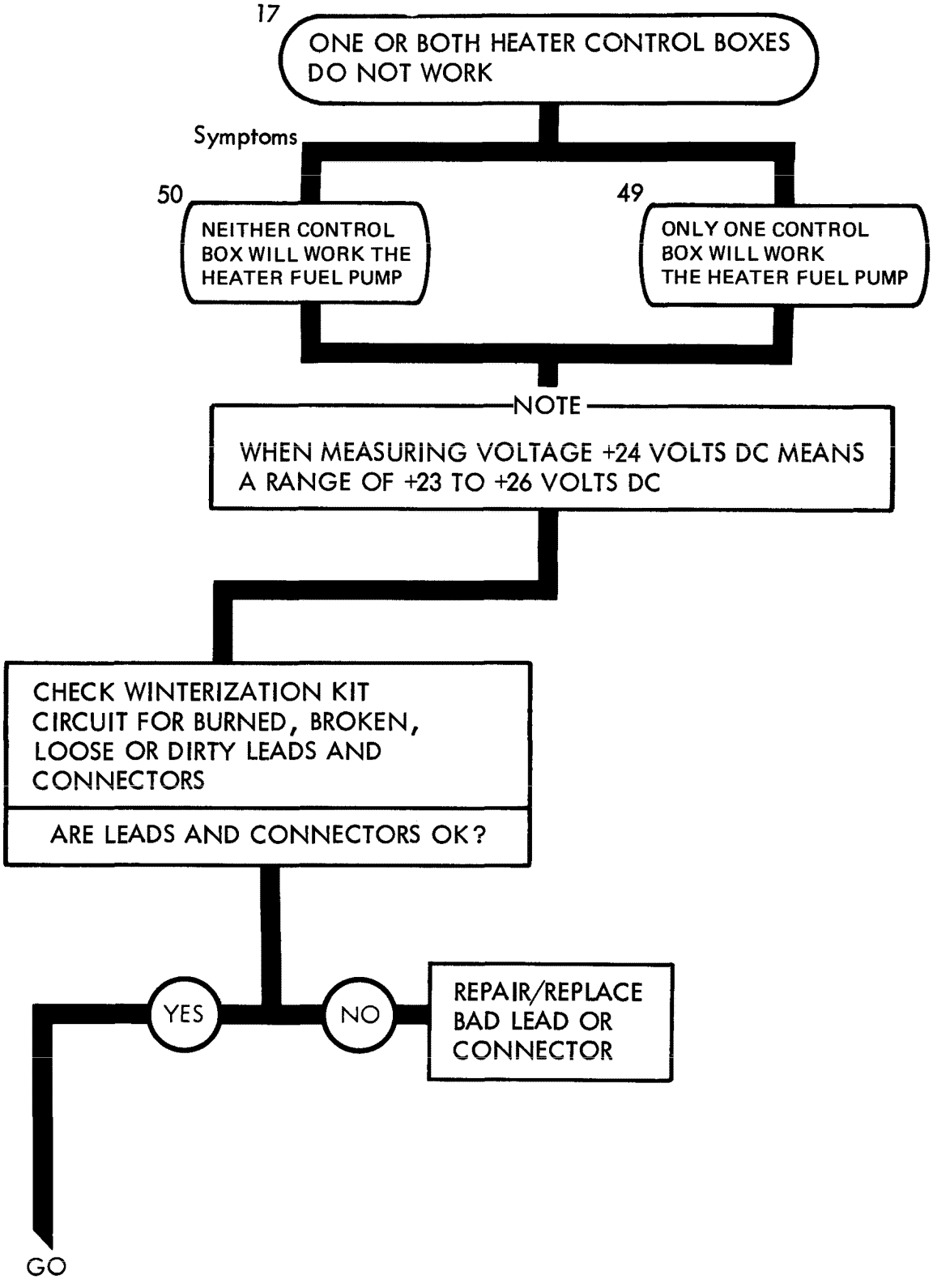
Figure 26-16 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

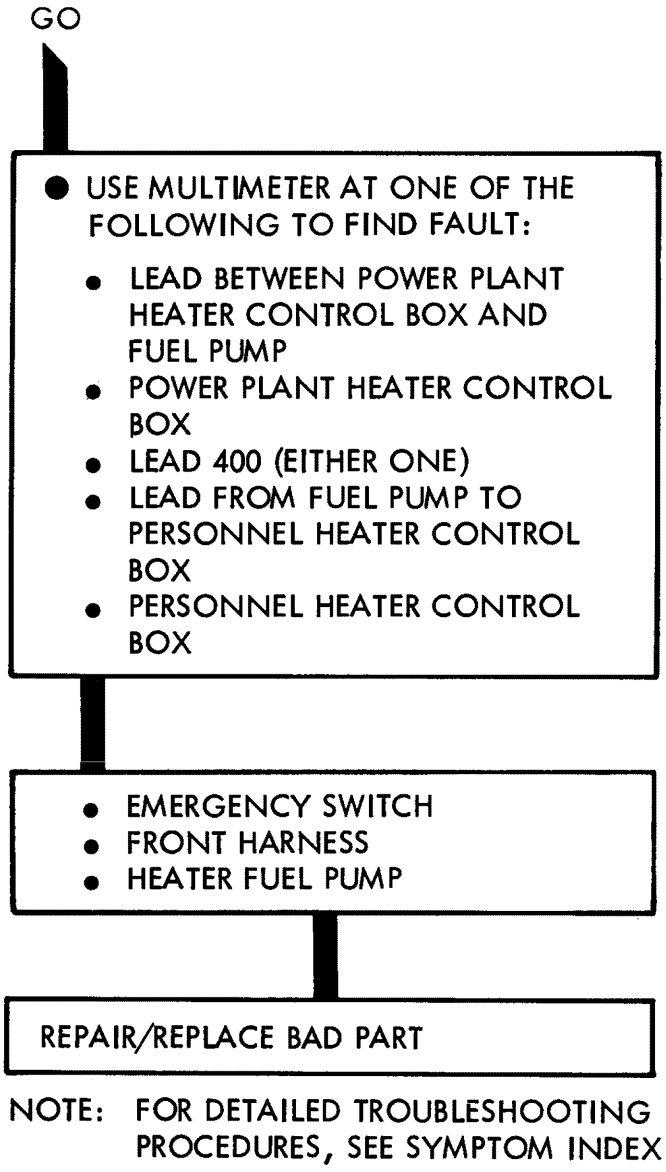
TA 114649

Figure 26-16 (Sheet 2 of 2)



TA 114650

Figure 26-17 (Sheet 1 of 2)



TA 114651

Figure 26-17 (Sheet 2 of 2)

CHAPTER 27

ELECTRICAL SYSTEM SUPPORT DIAGRAMS

27-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 25. Table 3-1 is a complete listing of all support diagrams used in this manual.

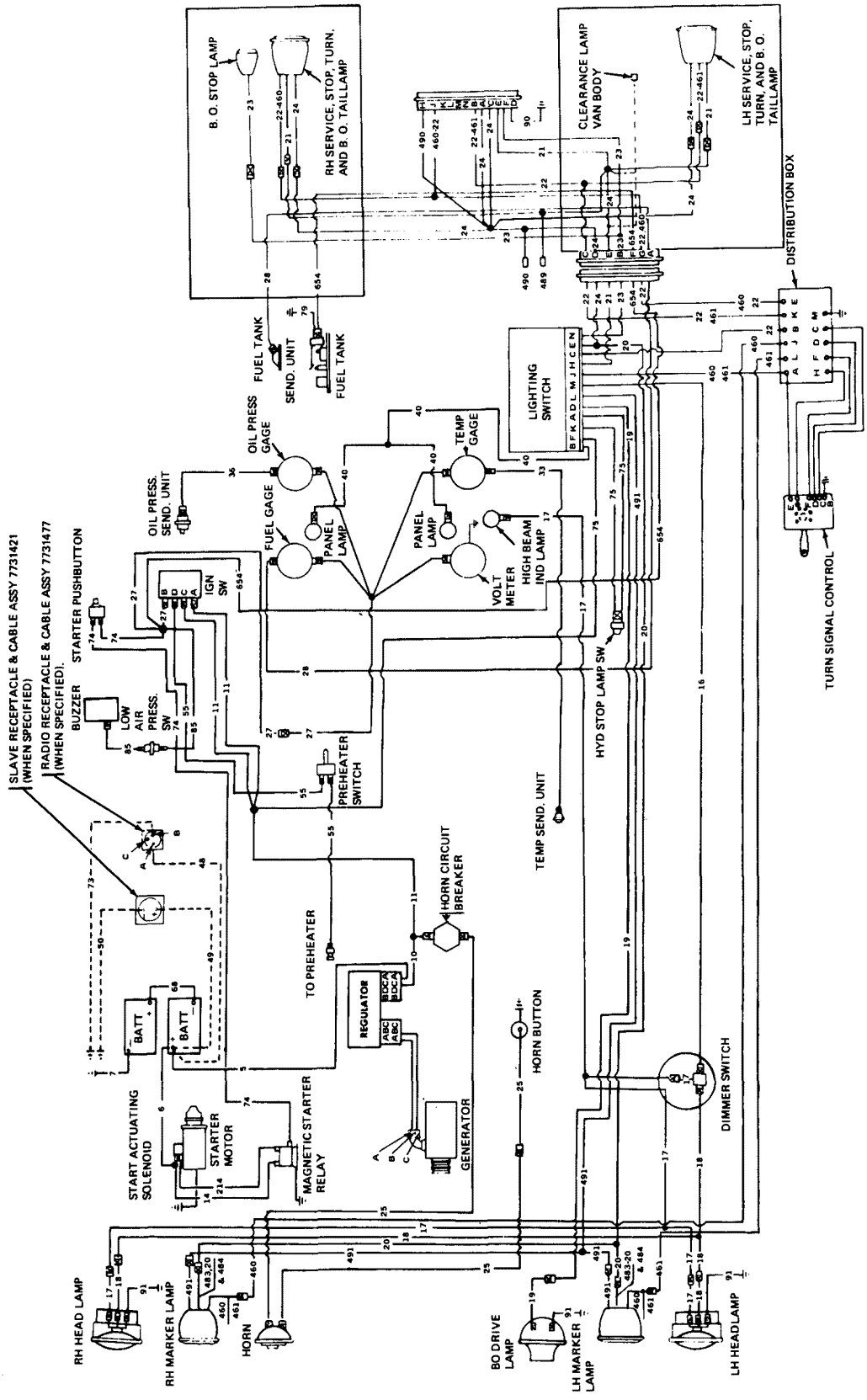
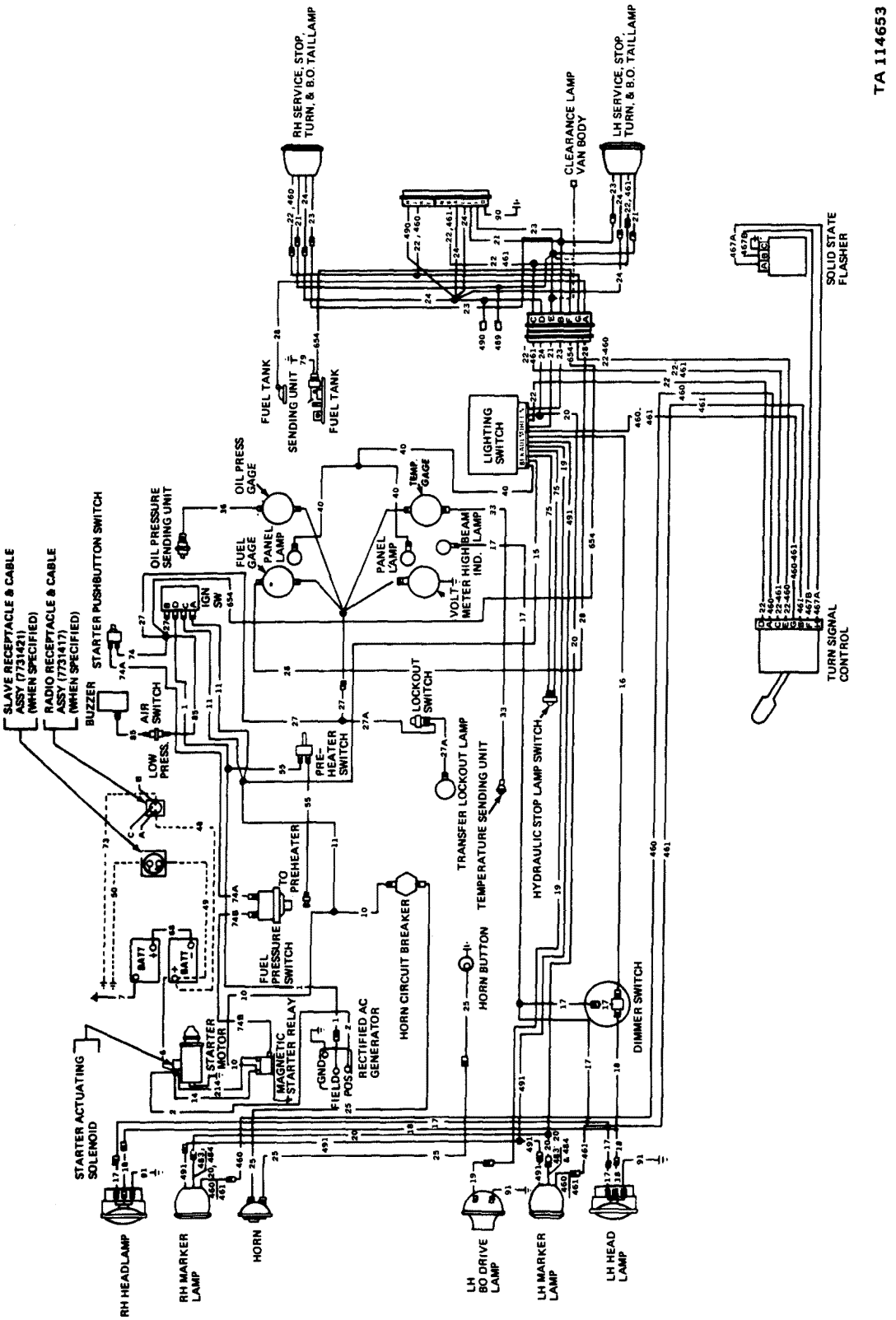


Figure 27-1. Electrical Wiring Diagram



TA 114653

Figure 27-2. Electrical Wiring Diagram

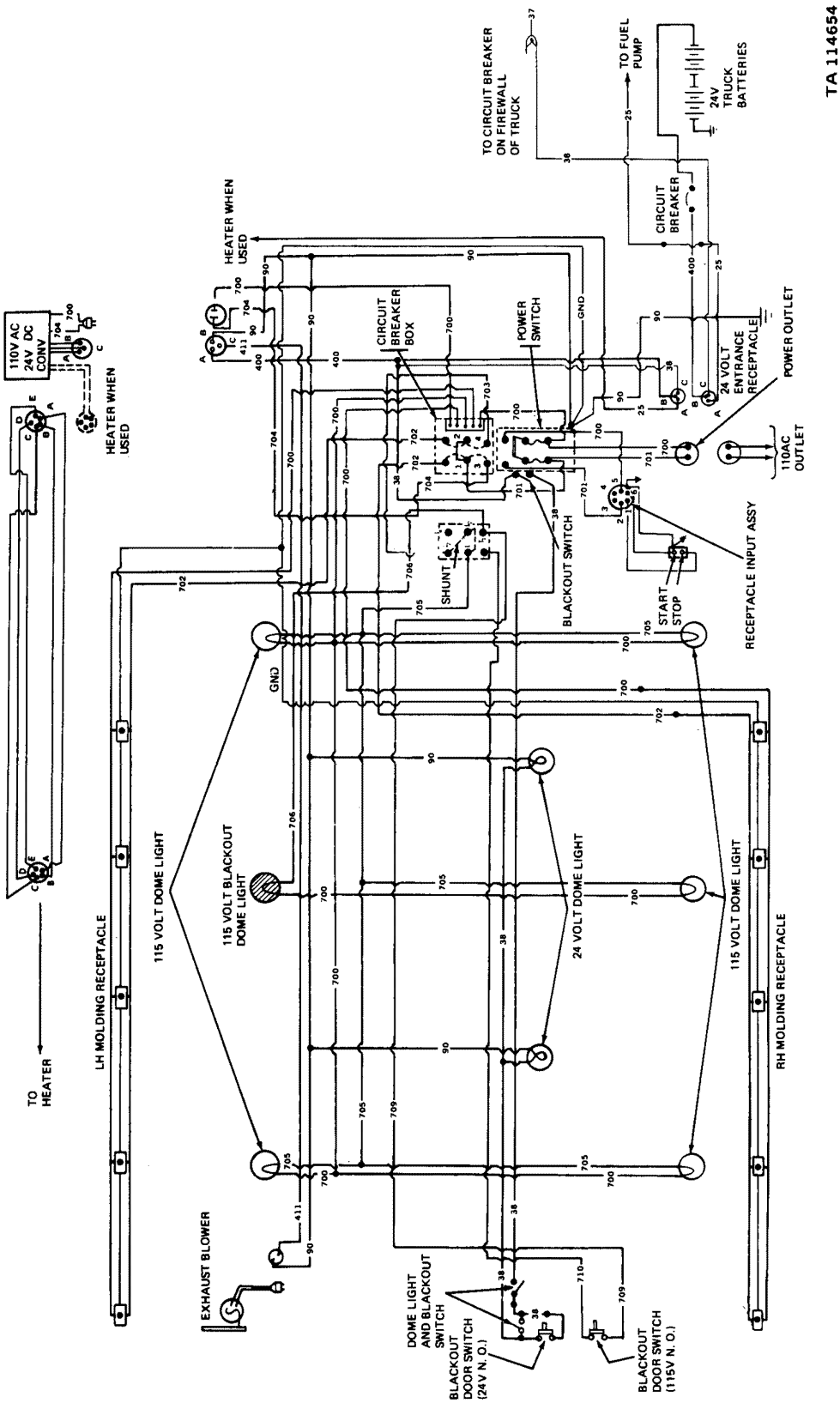


Figure 27-3. Electrical Wiring Diagram

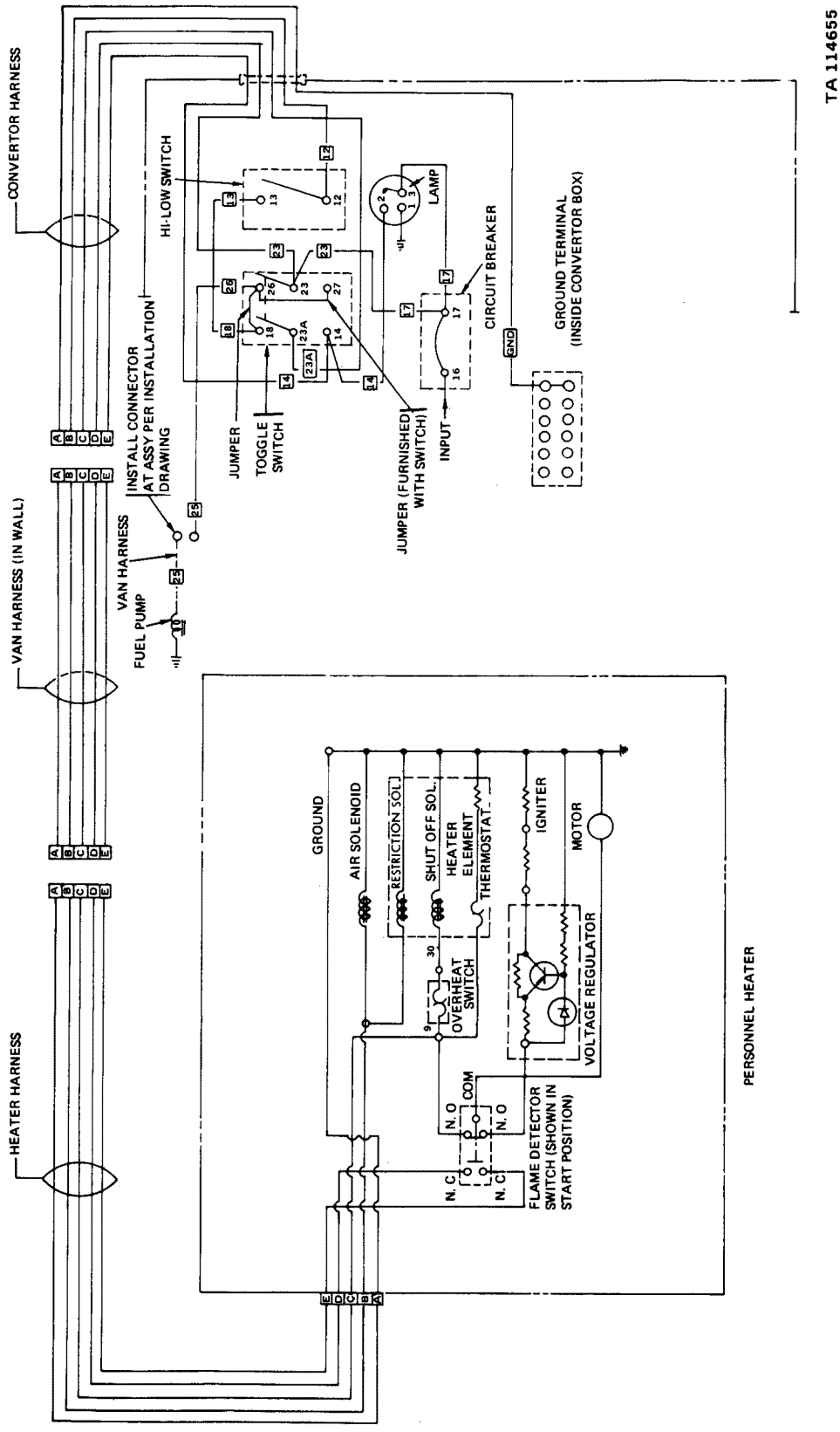


Figure 27-4. Electrical Wiring Diagram

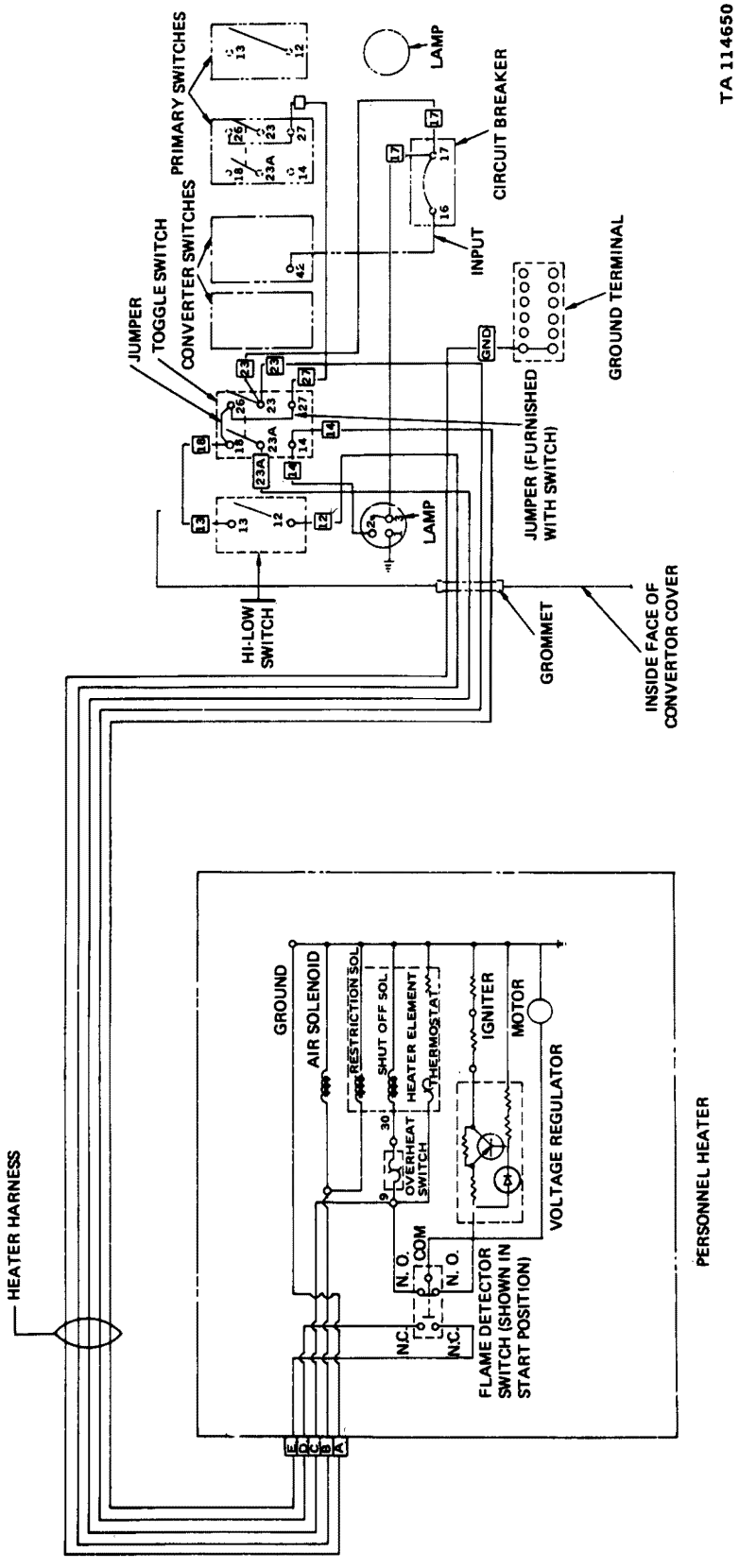


Figure 27-5. Electrical Wiring Diagram

CHAPTER 28

MULTIMETER TEST PROCEDURES

28-1. GENERAL. This chapter gives test procedures for the multimeter trouble-shooting.

28-2. 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.

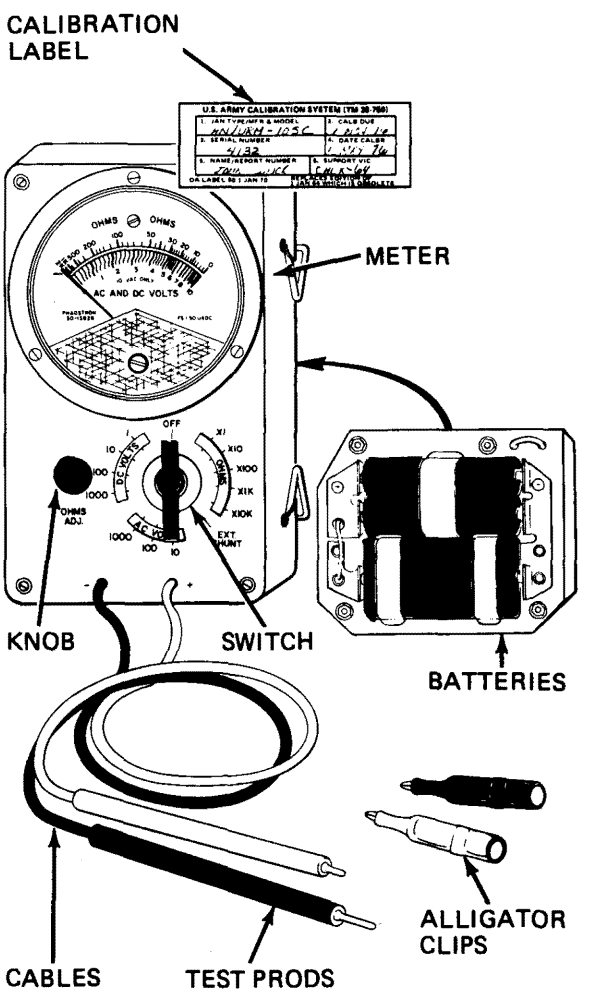
28-3. TEST PROCEDURE. Detailed step-by-step instructions, in flow chart form, are given for each test. The procedure calls out the type of test and the condition of the truck system for each part of testing. The step-by-step test will lead you to the bad component or to a fault symptom within a related system. Reference is made to the fault symptom index, chapter 6, if the test shows a fault in another system.

MULTIMETER AN/URM-105C TEST PROCEDURES

GENERAL INSTRUCTIONS

- Check that multimeter is ready for use
  - Calibration label - Check to be sure multimeter has been calibrated in the last 12 months.
  - Meter - Glass and pointer not broken. Pointer should be resting over zero mark at left side of scales.
  - Batteries - Not corroded or leaking. Put in right.

- Cables - No cuts, sharp kinks or bad fraying.
- Test prods - Tight on cable, tip free of paint or anything that might be an insulator.
- Switch and knob - Work freely without binding or scraping.
- Alligator clips - Free of paint or anything that might be an insulator.



TA 114658

Figure 28-1

1

DC VOLTAGE TEST - To measure battery voltage, charging system output, and voltage drops at various test points.

1

- Set up selector switch

  Note: The highest truck DC voltage that is measured is about 28 volts. Therefore, the selector switch is never set to 1000 DC VOLTS

- See table to find out setting of selector switch. Table shows switch setting when normal value of measured voltage is known or unknown

IF NORMAL VALUE OF VOLTAGE BEING MEASURED IS THIS:	SET SELECTOR SWITCH TO:
0 TO 0.8 VOLTS	1 DC VOLTS
0.8 TO 8 VOLTS	10 DC VOLTS
8 TO 80 VOLTS	100 DC VOLTS
UNKNOWN	100 DC VOLTS

TS 260-20-356

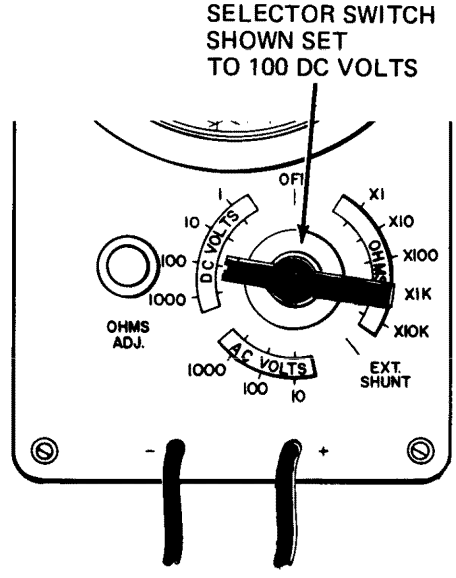
- Set selector switch to setting you picked

  Note: The OHMS ADJ knob is not used for DC voltage tests

NOTE

When you need to turn on power before measuring DC voltage, the fault isolation procedures gives the turn-on instructions.

GO



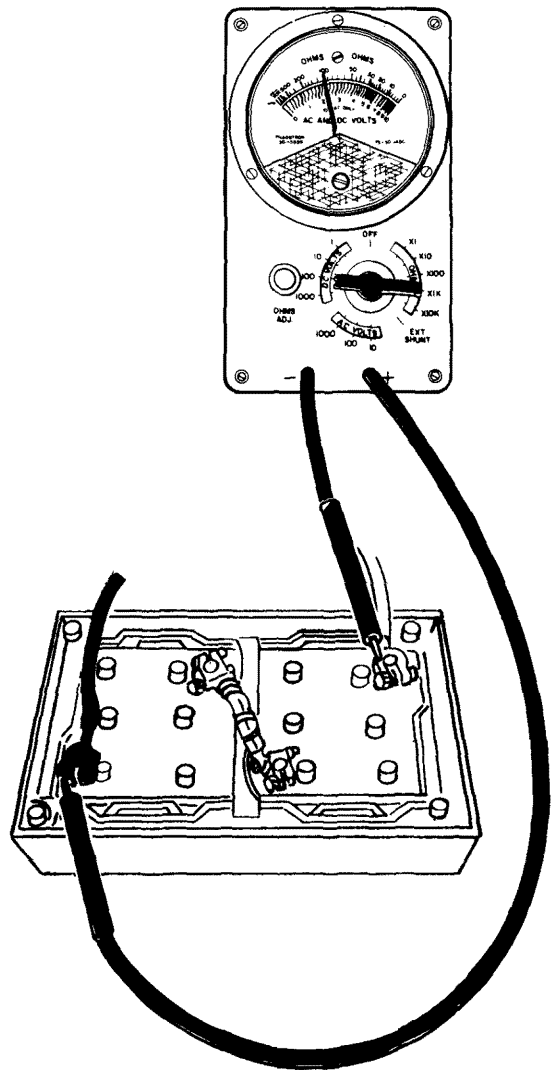
TA 114659

Figure 28-2 (Sheet 1 of 5)

GO

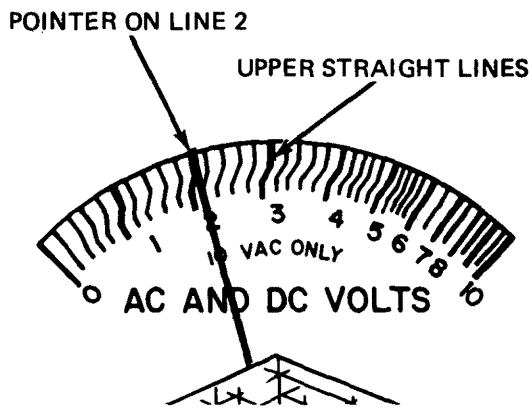
2

- Put multimeter leads across (in parallel with) circuit being measured:
  - Put test prod of black lead (-) on negative terminal of circuit being measured.
  - Put test prod of red lead (+) on positive terminal of circuit being measured.



3

- If pointer falls exactly on a numbered line read multimeter as follows:
  - Read upper straight lines of AC AND DC VOLTS scale. See which straight line pointer is on.



TA 114660

GO

Figure 28-2 (Sheet 2 of 5)

GO

SELECTOR SWITCH SETTING	INSTRUCTION
1 DC VOLTS	DIVIDE BY 10
10 DC VOLTS	USE AS IS
100 DC VOLTS	MULTIPLY BY 10

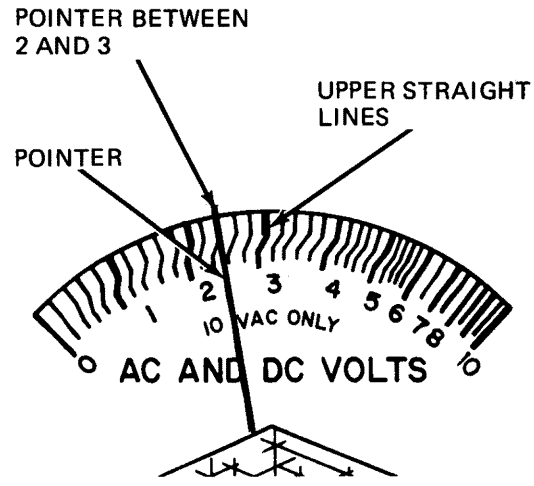
TS 260-20-360

- Get multimeter reading as follows:

Step A	Step B	Step C	Step D
Read selector switch setting.	From table, pick instruction that is listed next to selector switch setting	See what numbered line pointer is on.	Do the instruction you picked in step B to the number in step C
Example: 100 DC VOLTS	Multiply by 10	2	10 x 2 = 20 volts DC

4

- If pointer is between numbered lines read multimeter as follows:
  a. Look at upper straight lines of AC AND DC VOLTS scale. See which two numbered lines the pointer is between. Take smaller number: 2



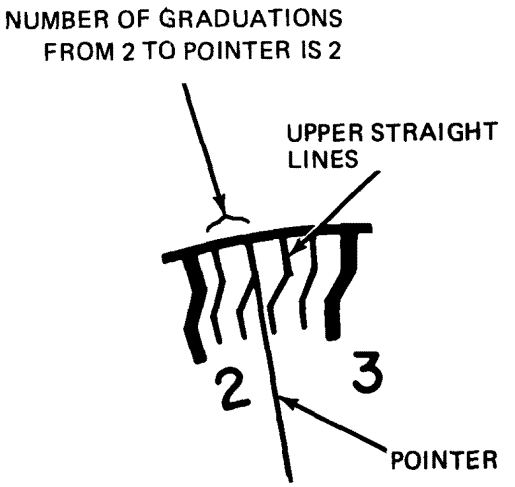
GO

TA 114661

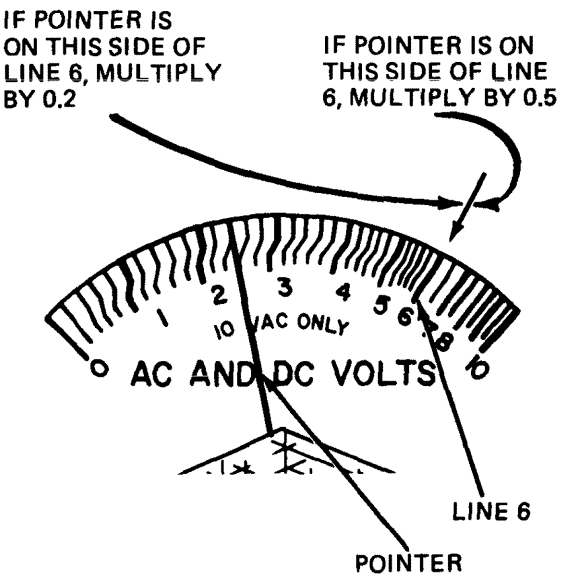
Figure 28-2 (Sheet 3 of 5)

GO

b. Count number of graduations from smaller number to pointer: 2



c. Multiply number from step b by either 0.2 or 0.5 as shown in figure: 0.2 X 0.2 = 0.4



d. Add number from step a to number from step c: 2 + 0.4 = 2.4

GO

TA 114662

Figure 28-2 (Sheet 4 of 5)

GO

SELECTOR SWITCH	INSTRUCTION
1 DC VOLTS	DIVIDED BY 10
10 DC VOLTS	USE AS IS
100 DC VOLTS	MULTIPLY BY 10

e. Get multimeter reading as follows:

	Step A	Step B	Step C	Step D
	Read selector switch setting.	From table, pick instruction that is listed next to selector switch setting.	See what step 4d number is.	Do the instruction you picked in step B to the number in step C.
Example:	100 DC VOLTS	Multiply by 10	2.4	10 x 2.4=24 volts DC

5

- Make circuit normal again:
  - Take both test prods off measured circuit.

Figure 28-2 (Sheet 5 of 5)

2

AC VOLTAGE TEST - To measure van input and operating voltages.

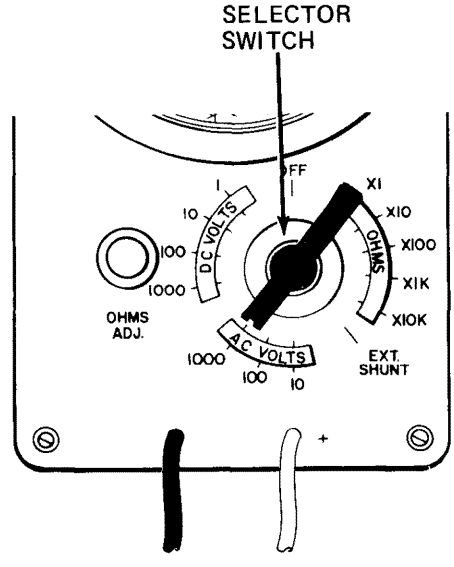
1

- Set up multimeter:

Note: The truck AC voltages measured are 208 and 120 volts. Therefore, only the 1000 AC VOLTS selector switch position is used.

- Set selector switch to 1000AC VOLTS.

Note: The OHMS ADJ knob is not used for AC voltage tests.



GO

Figure 28-3 (Sheet 1 of 5)

GO

NOTE

When you need to turn on power before measuring AC voltage, the fault isolation procedure gives the turn-on instructions.

2

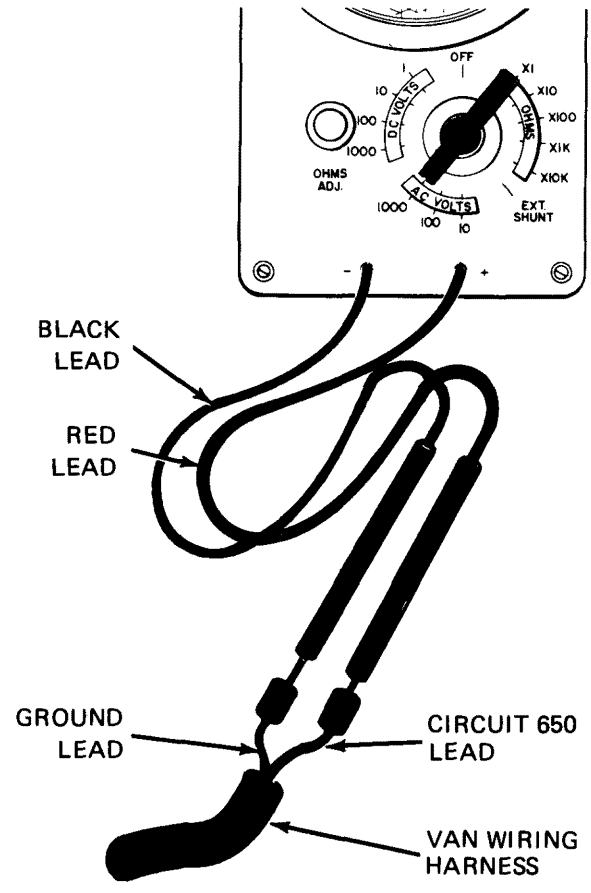
- Put multimeter leads across (in parallel with) circuit being measured:

  Note: In AC voltage measurement you can hook up the test lead connections to the circuit either way. You will still get correct multimeter readings and no damage will be done to the multimeter. But, when one side of the circuit is electrical ground, it is a good idea to put the black lead on electrical ground

- Put test prod of black lead on ground side or one side of circuit being measured. Put test prod of red lead on other side of circuit being measured.

GO

NOTE: MULTIMETER SHOWN MEASURING 120 VOLTS AC VAN CEILING LIGHT VOLTAGE



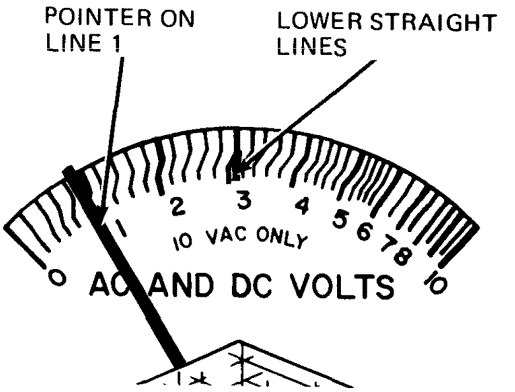
TA 114664

Figure 28-3 (Sheet 2 of 5)

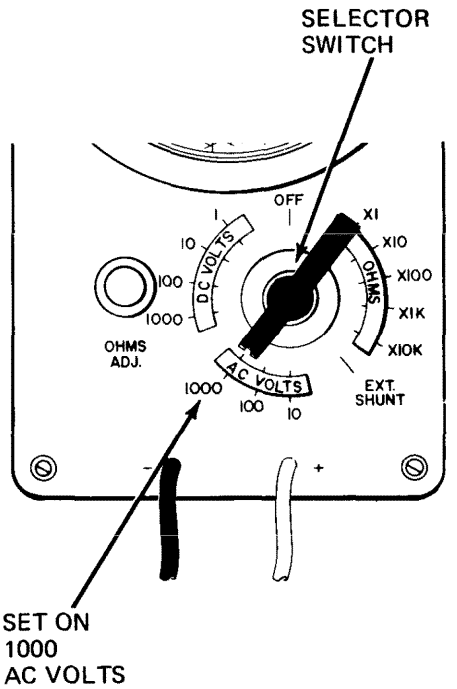
GO

3

- If pointer falls exactly on a numbered line read multimeter as follows:
  - Read lower straight lines of AC AND DC VOLTS scale. See which straight line pointer is on: 1



- For 1000 AC VOLTS setting, multiply pointer line number by 100 to get multimeter reading: 1 X 100 = 100 volts AC.



GO

TA 114665

Figure 28-3 (Sheet 3 of 5)

GO

4

- If pointer is between numbered lines read multimeter as follows:

  a. Look at lower straight lines of AC AND DC VOLTS SCALE. See which two numbered lines the pointer is between. Take smaller number: 1

b. Count number of graduations from smaller number to pointer: 1

c. Multiply number from step b by either 0.2 or 0.5 as shown in figure: 1 X 0.2 = 0.2

d. Add number from step a to number from step c: 1 + 0.2 = 1.2

GO

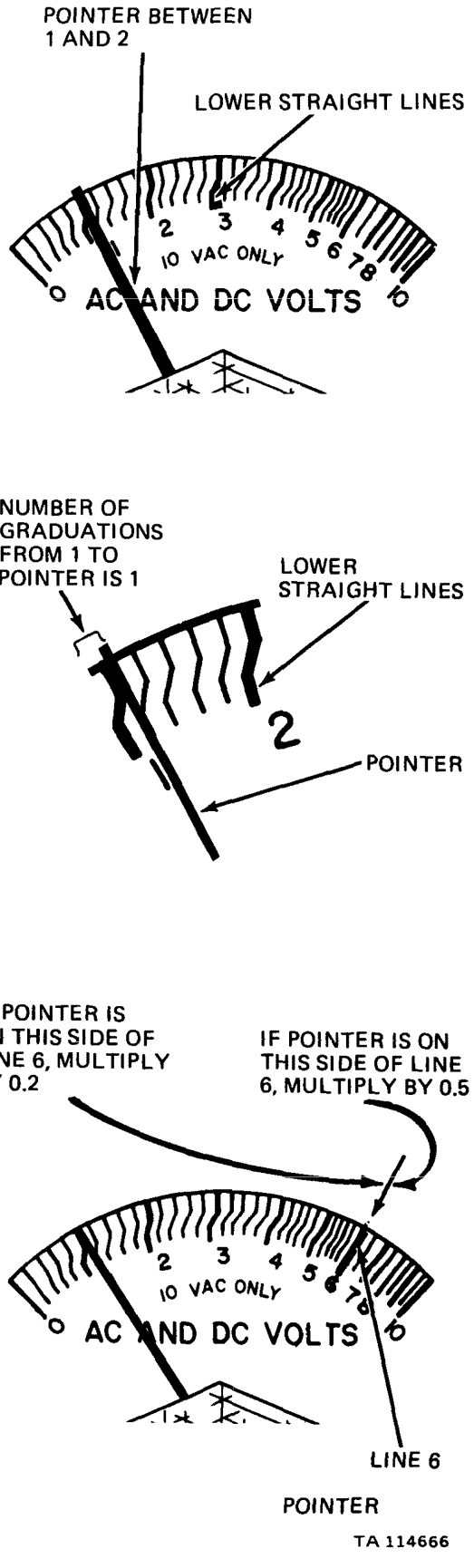


Figure 28-3 (Sheet 4 of 5)

GO

e. For 1000 AC VOLTS setting, multiply step d number by 100 to get multimeter reading: 1.2 X 100 = 120 volts AC.

5

- Make circuit normal again.
  - Take both test prods off measured circuit.

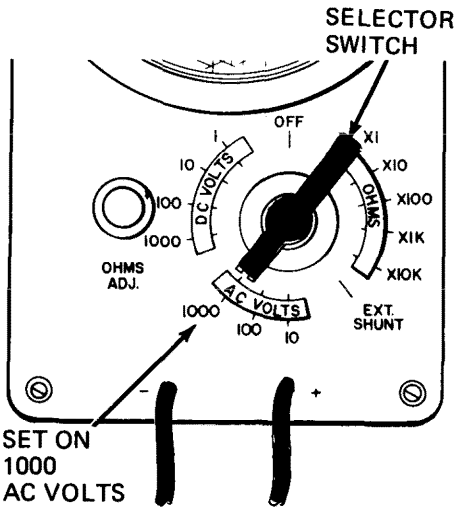


Figure 28-3 (Sheet 5 of 5)

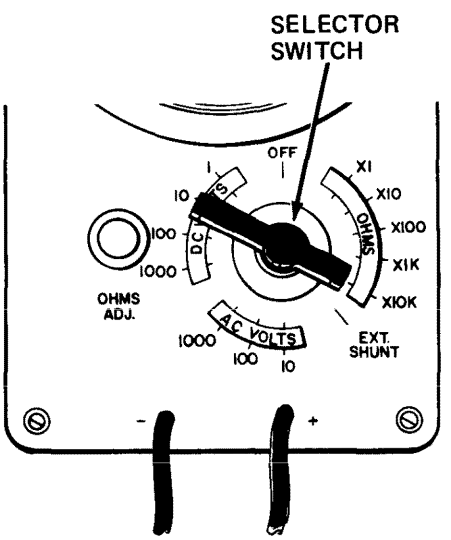
3

RESISTANCE TEST - To measure resistance of temperature sending unit and blower motor resistor.

1

- Set up multimeter:
  - Set selector switch to OHMS X10K.

GO



TA 114667

Figure 28-4 (Sheet 1 of 10)

GO

NOTE

Detailed steps for making the truck parts ready for resistance test are in the fault isolation procedures. The steps given here are typical.

2

- Make tested part ready for resistance test:

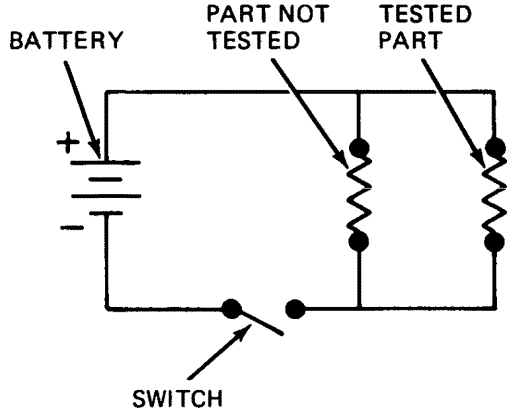
CAUTION

If power totested part is not turned off, multimeter will be damaged.

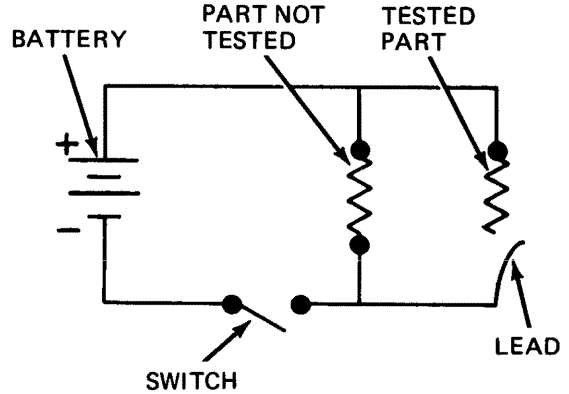
- Turn off power to tested part.

- Take off one lead from tested part.

GO



NOTE: TAKING OFF ONE LEAD TAKES TESTED PART OUT OF CIRCUIT



NOTE: TAKING OFF ONE LEAD TAKES TESTED PART OUT OF CIRCUIT

TA 114668

Figure 28-4 (Sheet 2 of 10)

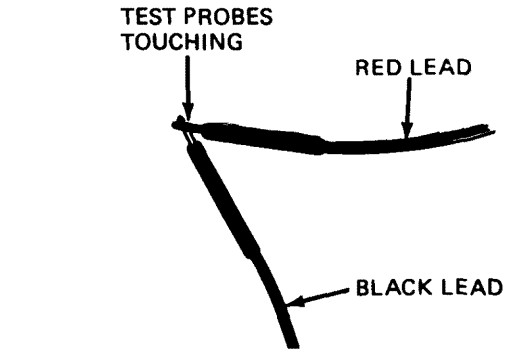
GO

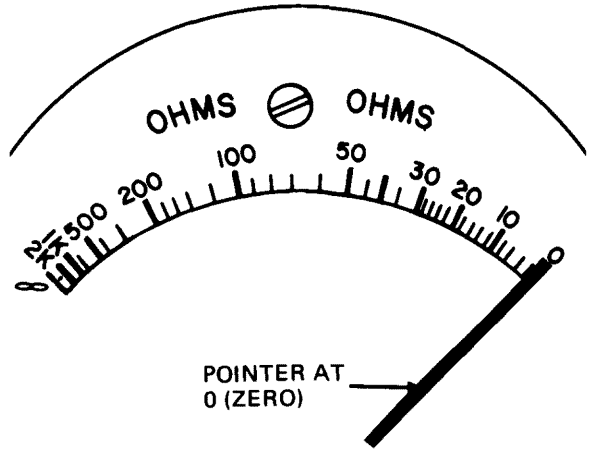
3

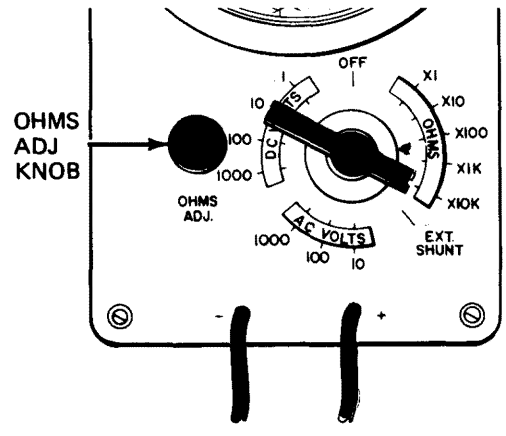
- Zero the multimeter
  - Take off multimeter leads from tested part.
  - Touch multimeter test probes together.

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ADJ knob to move pointer to 0.

GO







TA 114669

Figure 28-4 (Sheet 3 of 10)

GO

4

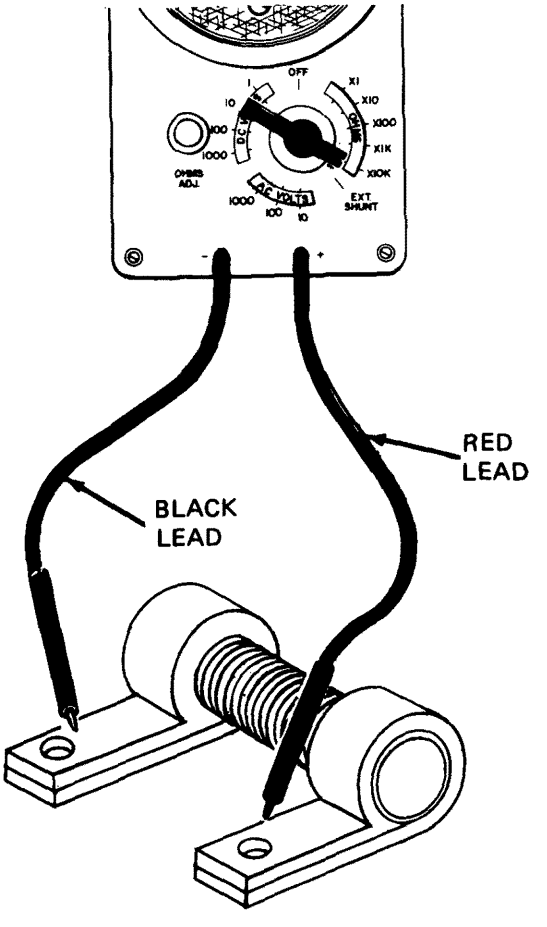
- Put multimeter leads across tested part:
  - Put black test prod on one terminal of tested part
  - Put red test prod on other terminal of test part

NOTE

Zero the multimeter each time you turn the selector switch knob to another position. (See step 3.)

GO

NOTE: MULTIMETER SHOWN MEASURING RESISTANCE OF A COLD START RESISTOR.



RESISTOR UNDER TEST

TA 114670

Figure 28-4 (Sheet 4 of 10)

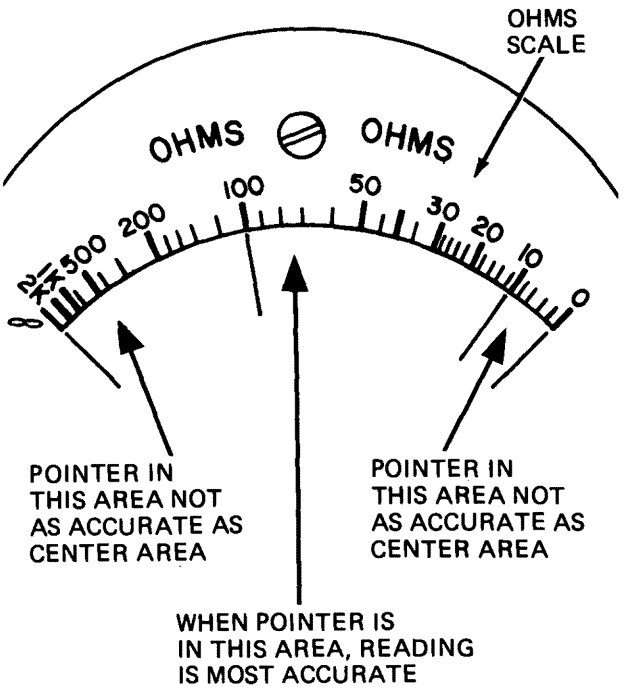
GO

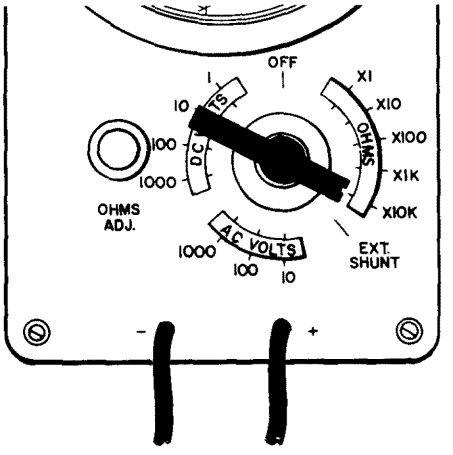
5

- Get the most accurate multimeter reading as follows

  Note: The closer the multimeter pointer is to the center of the OHMS scale, the more accurate the reading.

- Note position of pointer on OHMS scale. Turn selector switch knob to left while looking at pointer. Try to find selector switch knob position that gives most centered pointer position.





NOTE: MOVING SELECTOR SWITCH KNOB TO LEFT MOVES POINTER TO LEFT

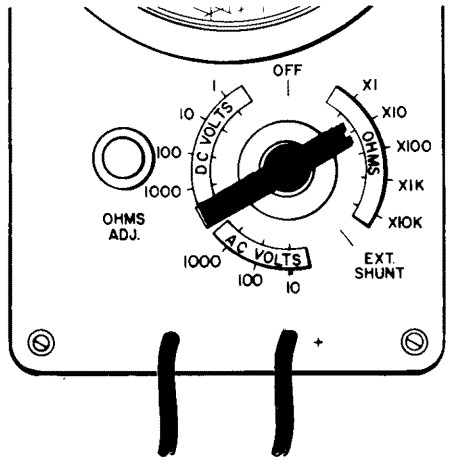
GO

TA 114671

Figure 28-4 (Sheet 5 of 10)

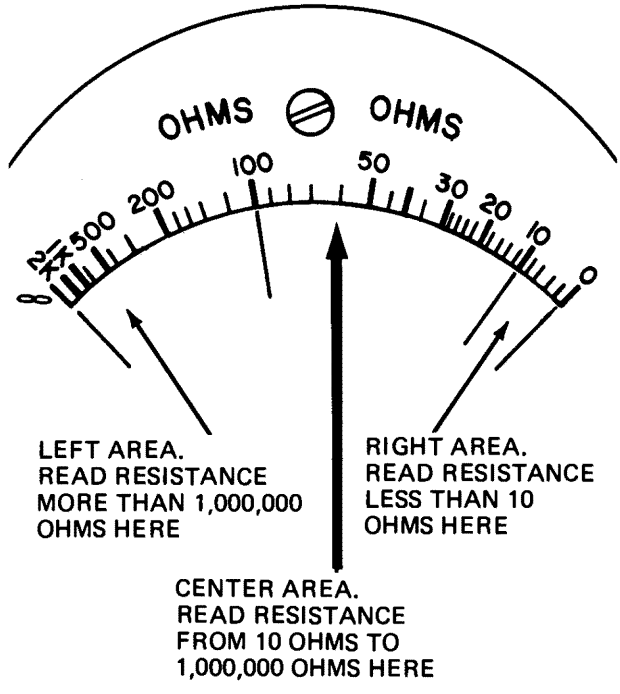
GO

- You may overshoot most centered pointer position. If you do, turn selector switch knob to right to put pointer in most centered position.



NOTE: MOVING SELECTOR SWITCH KNOB TO RIGHT MOVES POINTER TO RIGHT

- Pointer will stay in right area if resistance is less than 10 ohms. Pointer will stay in left area if resistance is more than 1,000,000 ohms.
- Leave selector switch in position that puts pointer in most centered position.



GO

TA 114672

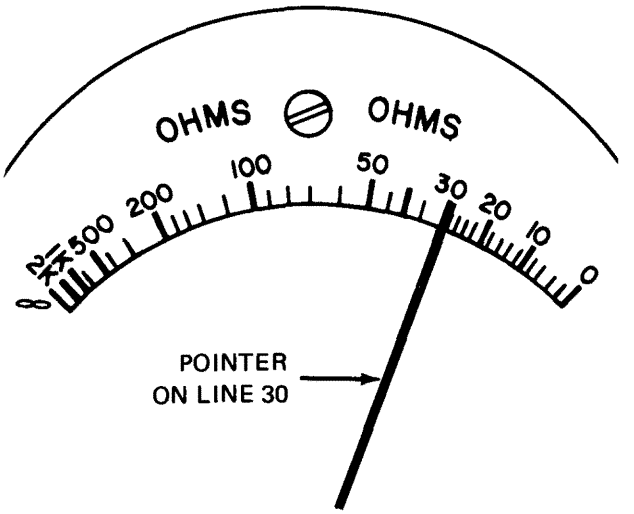
Figure 28-4 (Sheet 6 of 10)

GO

6

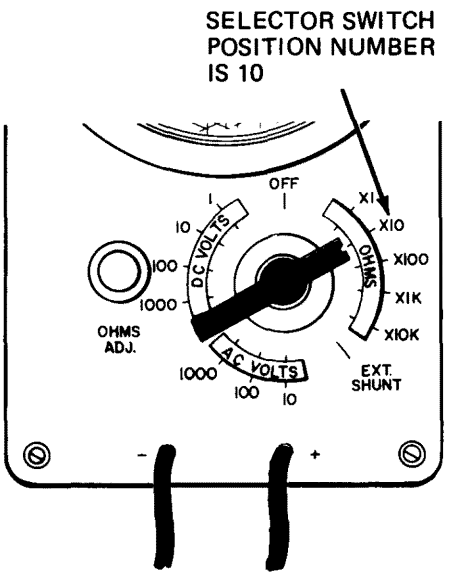
- If pointer falls exactly on a numbered line read multimeter as follows:

  a. Look at OHMS scale and see which numbered line pointer is on: 30



  b. See what selector switch position number is: 10

  c. Multiply number from step a by number from step b to get multimeter reading:
  30 X 10 = 300 ohms



GO

TA 114673

Figure 28-4 (Sheet 7 of 10)

GO

7

- If pointer is between numbered lines read multimeter as follows:

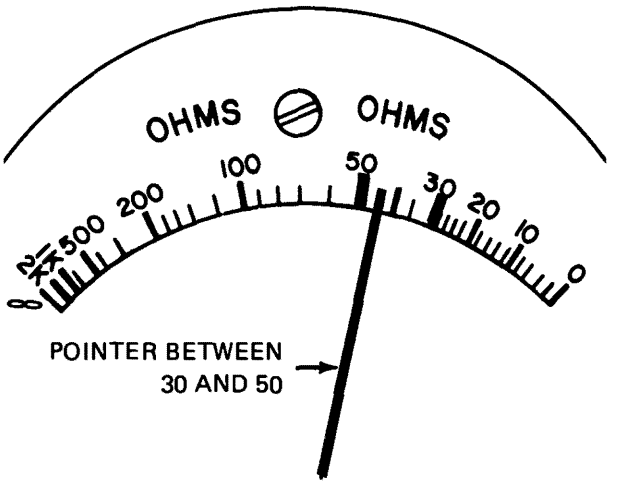
  a. Look at OHMS scale and see which two numbers the pointer is between. Subtract smaller number from larger number to get span: 50 - 30 = 20

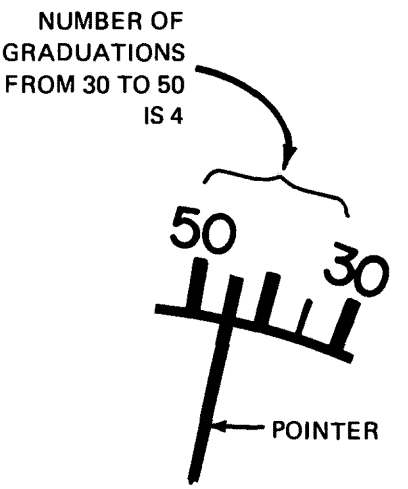
b. Count number of graduations from smaller number to larger number: 4

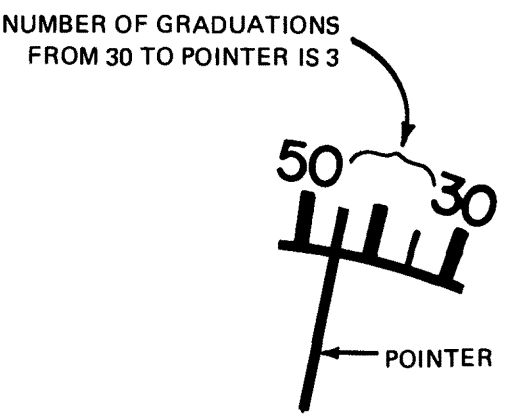
c. Divide span (step a) by number of graduations (step b) to get value of each graduation: 20 ÷ 4 = 5

d. Count number of graduations from smaller number to pointer: 3

GO







TA 114674

Figure 28-4 (Sheet 8 of 10)

GO

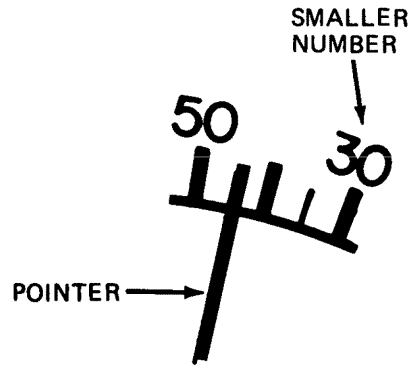
8

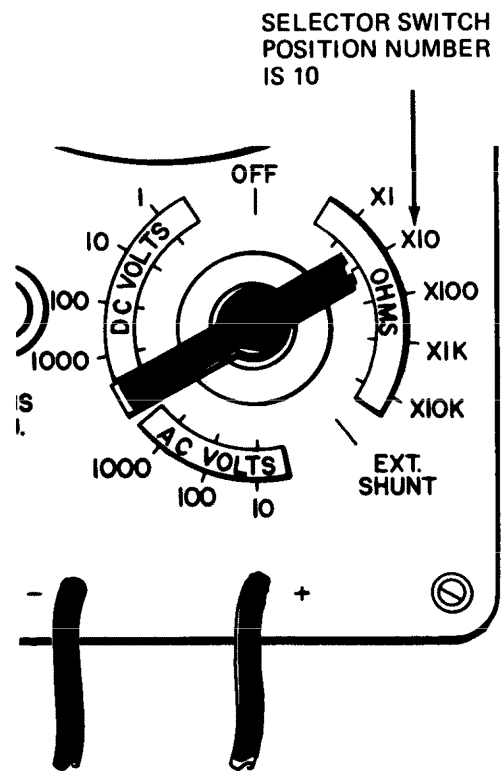
a. Multiply number from step 7d by value from step 7c to get total value of graduations: 3 X 5 = 15

b. Add total value of graduations (step a) to smaller number to get scale reading: 15 + 30 = 45.

c. Multiply scale reading (step b) by selector switch position number to get multimeter reading: 45 X 10 = 450 ohms.

GO





TA 114675

Figure 28-4 (Sheet 9 of 10)

GO

9

- Put isolated tested part back in circuit
  - Take off both test prods from across tested part.
  - Put lead back on tested part.

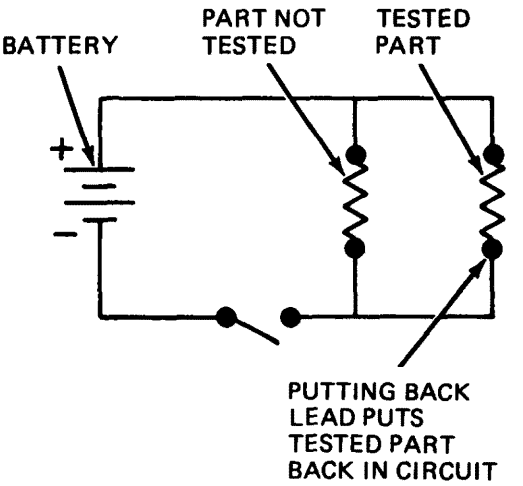


Figure 28-4 (Sheet 10 of 10)

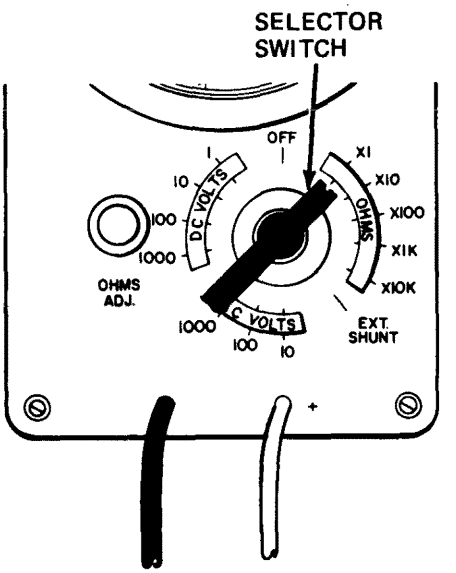
4

CONTINUITY TEST - To check for breaks in a circuit, such as switch, lamp or electrical cable circuits.

1

- Set up multimeter
  - Set selector switch to OHMS X1.

GO



TA 114676

Figure 28-5 (Sheet 1 of 4)

GO

NOTE

Detailed steps for making the truck circuits ready for continuity tests are in the fault isolation procedures. The steps given here are typical.

2

- Make tested circuit ready for continuity test:

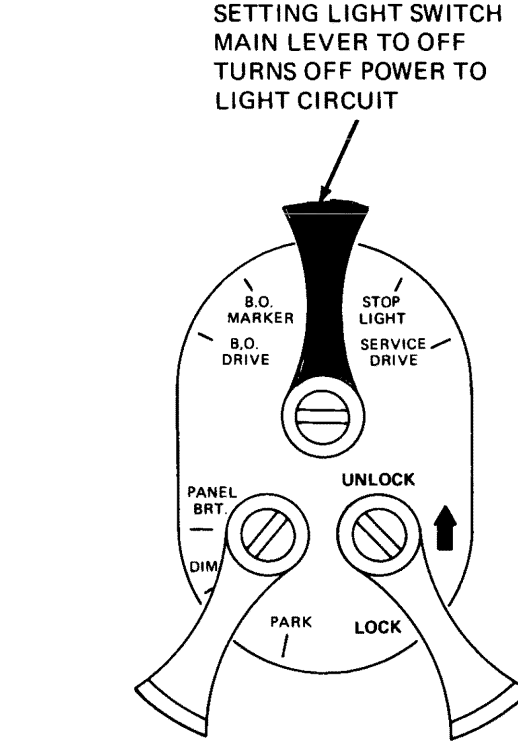
CAUTION

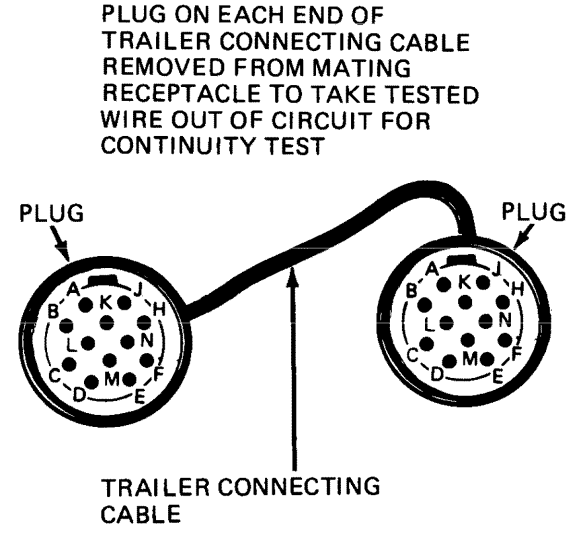
If power to tested part is not turned off, multimeter will be damaged.

- Turn off power to tested circuit.

- Take tested wire out of circuit.

GO





TA 114677

Figure 28-5 (Sheet 2 of 4)

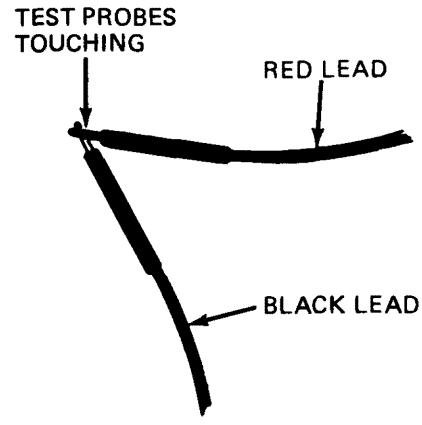
GO

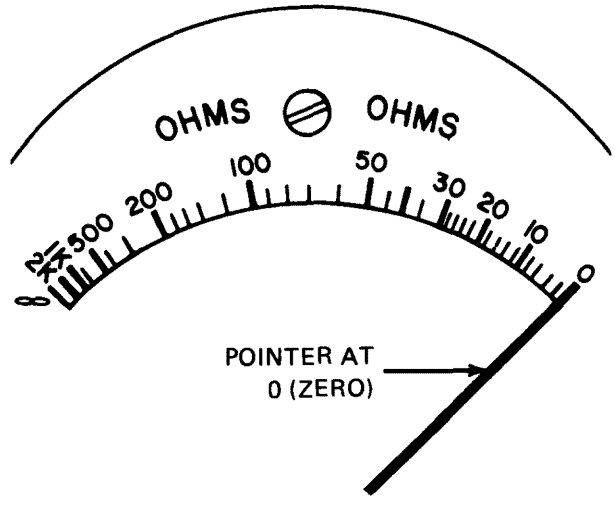
3

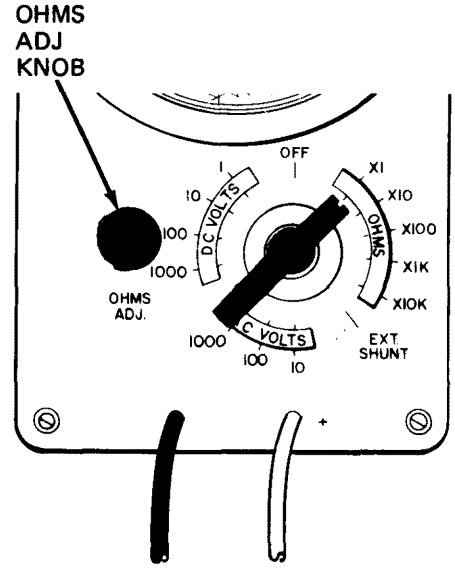
- Zero the multimeter
  - Touch multimeter test probes together.

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ADJ knob to move pointer to 0.

GO







TA 114678

Figure 28-5 (Sheet 3 of 4)

GO

4

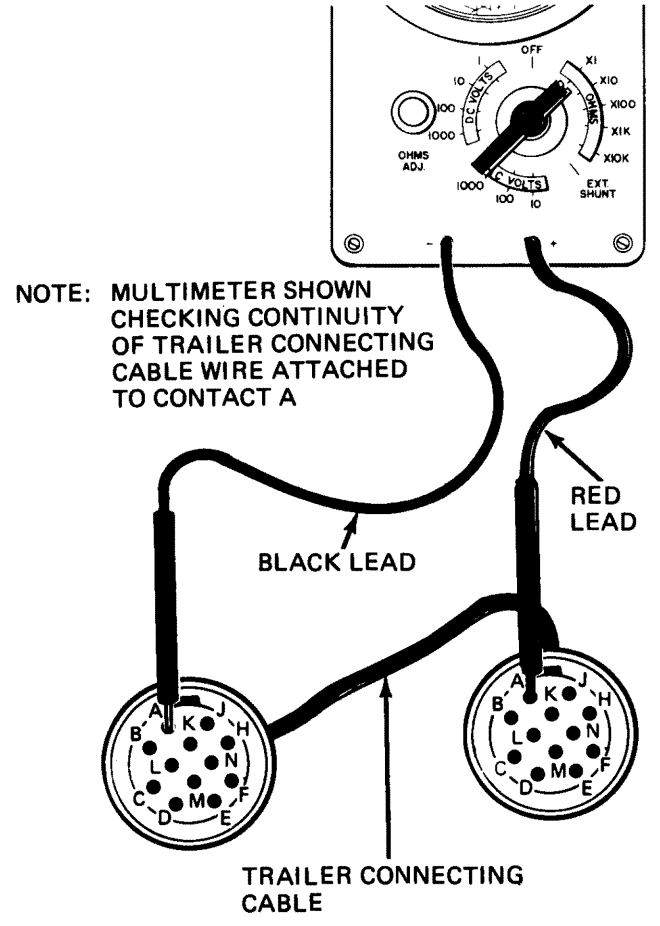
- Put multimeter leads across tested circuit
  - Put test prod of black lead (-) on one contact of tested circuit.
  - Put test prod of red lead (+) on other contact of tested circuit.

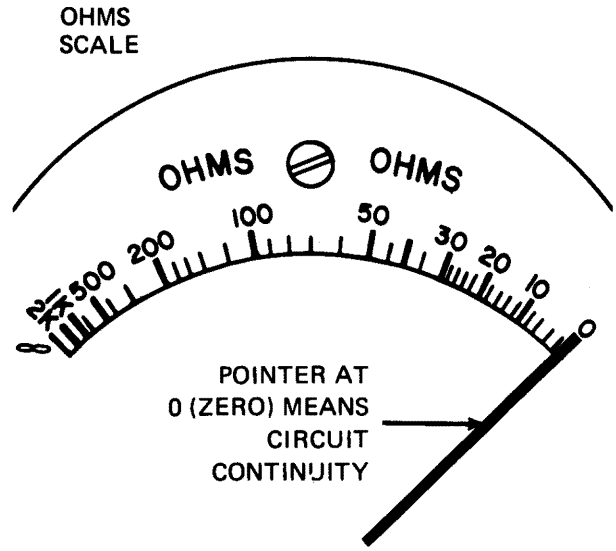
5

- Read multimeter
  - Look at multimeter OHMS scale. For continuity, pointer should be all the way to far right over 0 (zero).
  - If pointer stays all the way to left, tested circuit is open. If pointer jumps or flickers, tested circuit has a loose connection.

6

- Put tested circuit back in operation
  - Take off both test prods from tested circuit.
  - Put back any plugs or other parts previously removed to take tested wire out of circuit.





TA 114679

Figure 28-5 (Sheet 4 of 4)

5 SHORT TEST - To check for shorts in electrical cables.

NOTE

A short (or short circuit) happens when two circuits that should not be connected have metal-to-metal contact with each other. A short also happens when a circuit that should not touch electrical ground has metal-to-metal contact with ground.

1

- Set up multimeter
  - Set selector switch to OHMS X10K.

NOTE

Detailed steps for making the truck circuits ready for short test are in the fault isolation procedures. The steps given here are typical.

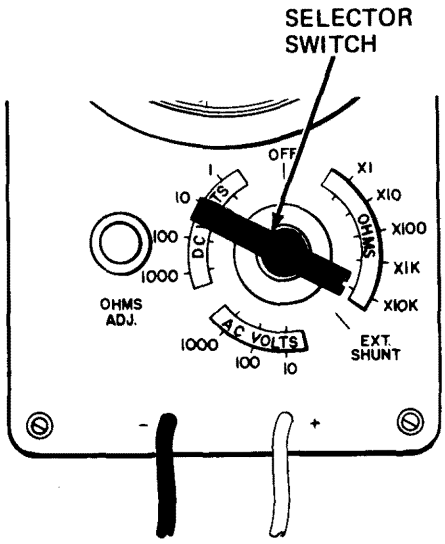
2

- Make tested circuits ready for short test:

CAUTION

If power to tested part is not turned off, multimeter will be damaged

GO



TA 114680

Figure 28-6 (Sheet 1 of 5)

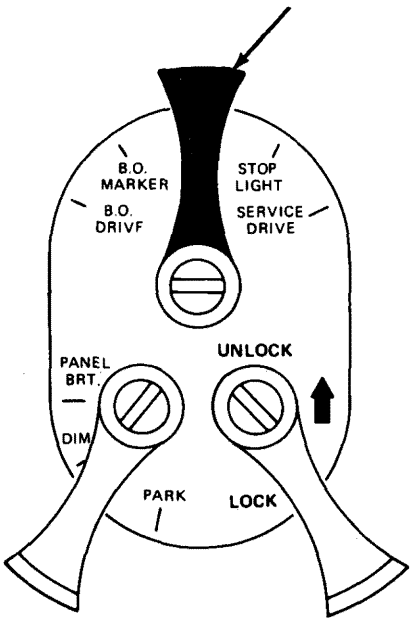
GO

- Turn off power to tested circuit.

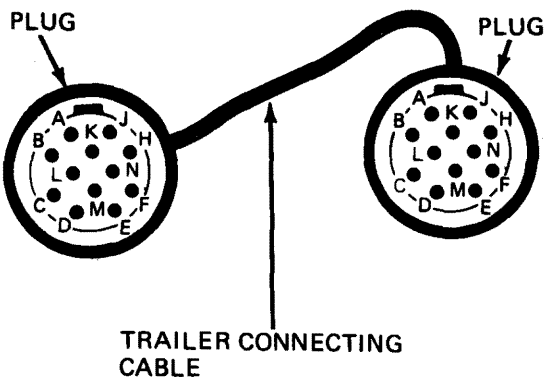
- Take tested wire out of circuit

GO

SETTING LIGHT SWITCH MAIN LEVER TO OFF TURNS OFF POWER TO LIGHT CIRCUITS.



PLUG ON EACH END OF TRAILER CONNECTING CABLE REMOVED FROM MATING RECEPTACLE TO TAKE TESTED WIRE OUT OF CIRCUIT FOR SHORT TEST



TA 114681

Figure 28-6 (Sheet 2 of 5)

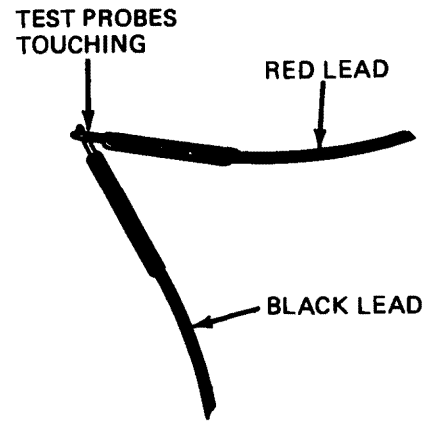
GO

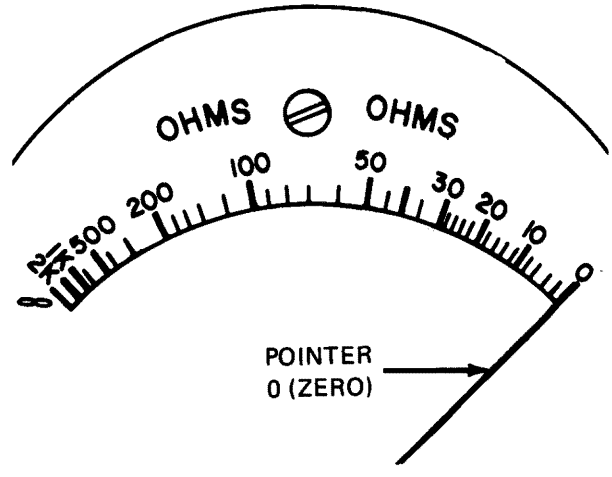
3

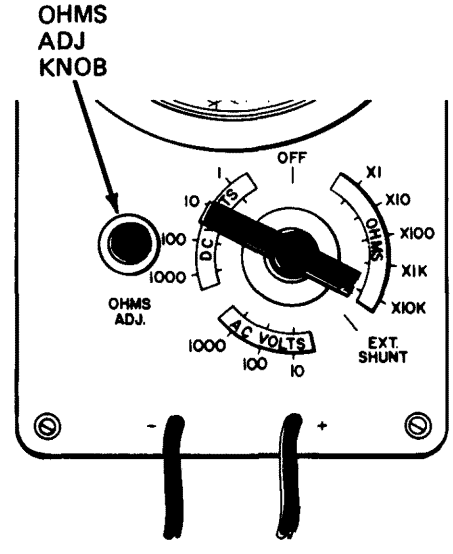
- Zero the multimeter
  - Touch multimeter test probes together.

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ADJ knob to move pointer to 0.

GO







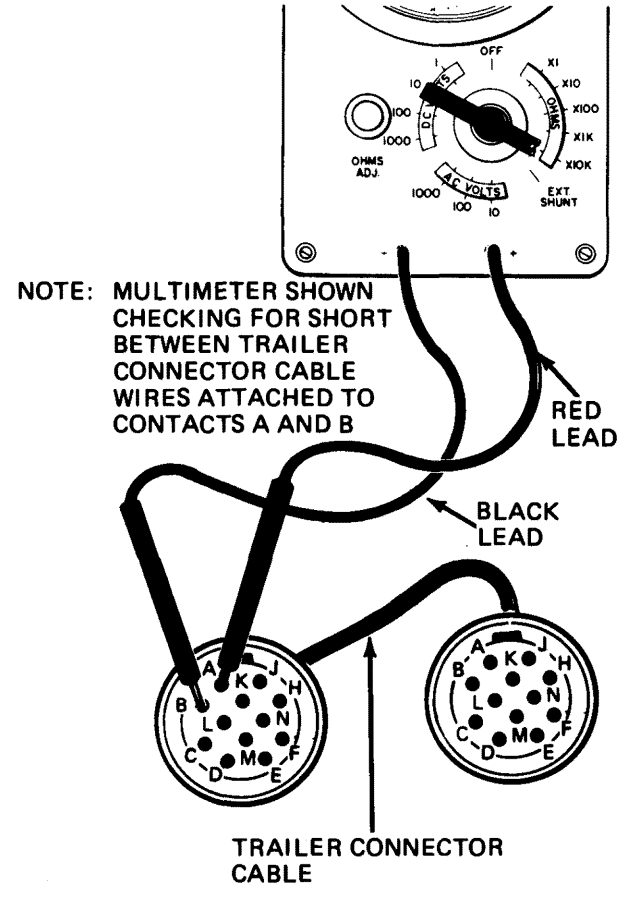
TA 114682

Figure 28-6 (Sheet 3 of 5)

GO

4

- Put multimeter leads across tested circuit
  - To test for short between two wires, put test probes on contacts of both wires.



GO

TA 114683

Figure 28-6 (Sheet 4 of 5)

GO

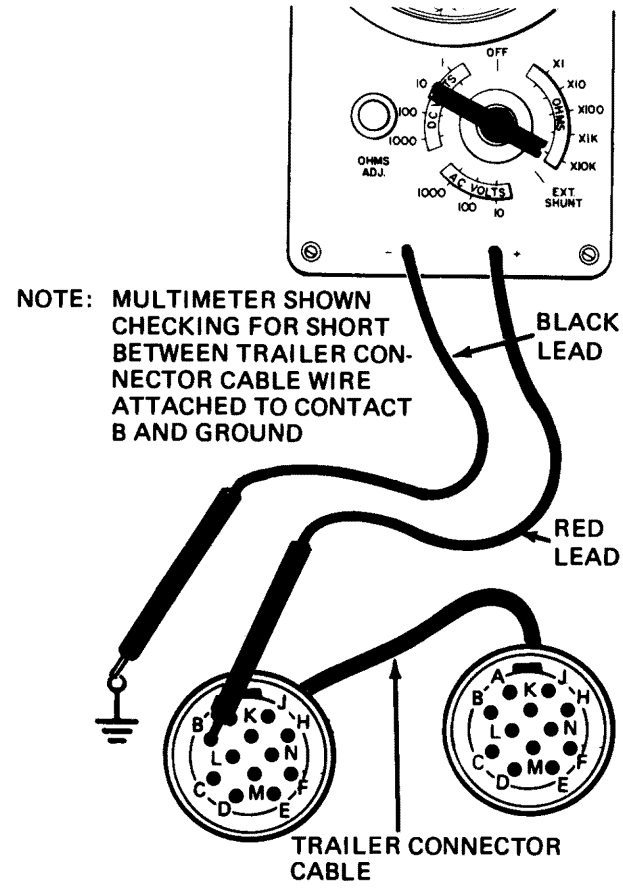
- To test for short between a wire and ground, put test probes on wire contact and ground.

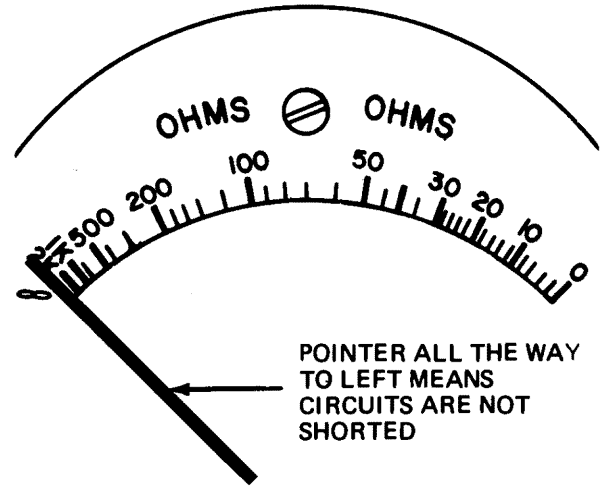
5

- Read multimeter
  - Look at multimeter OHMS scale. If pointer stays all the way to far left without moving, circuits are not shorted.
  - If pointer moves all the way to far right over 0 (zero), circuits are shorted. If pointer jumps or flickers, circuits are sometimes shorted.

6

- Put tested circuit back in operation
  - Take off test prods from contacts and ground.
  - Put back any plugs or other parts previously removed to take tested wire out of circuit.





TA 114684

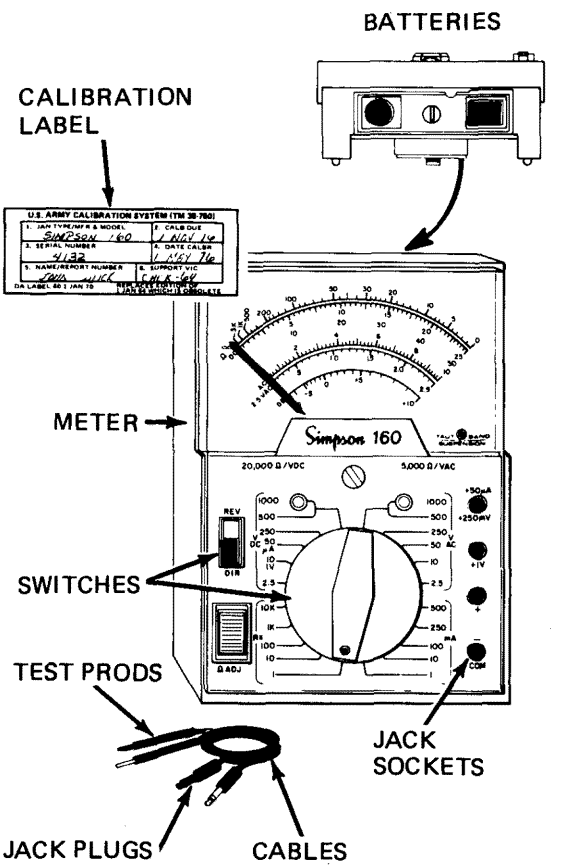
Figure 28-6 (Sheet 5 of 5)

MULTIMETER SIMPSON 160 TEST PROCEDURES

GENERAL INSTRUCTIONS

- Check that multimeter is ready for use:
  - Calibration label - Check to be sure multimeter has been calibrated in the last 12 months
  - Meter - Glass and pointer not broken. Pointer should be resting over zero mark at left side of scales
  - Jack sockets - Open and dirt free
  - Batteries - Not corroded or leaking Put in right

- Cables - No cuts, sharp kinks or bad fraying
- Jack plugs - Tight on cable, prods clean
- Test prods - Tight on cable, tip free of paint or anything that might be an insulator
- Switches - Work freely without binding or scraping



TA 114685

Figure 28-7

1

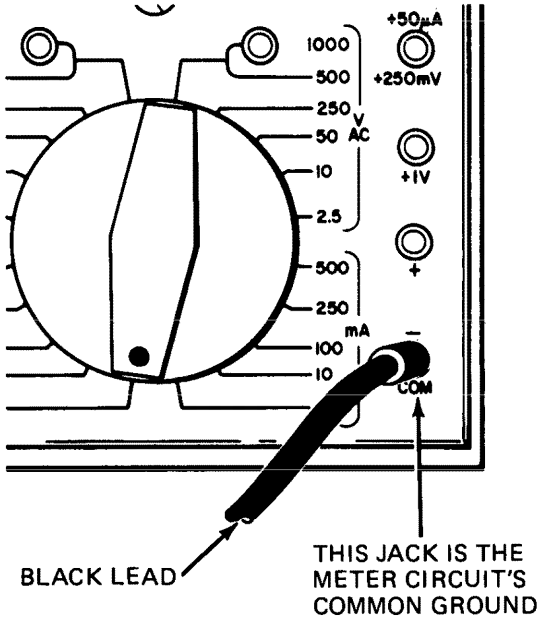
DC VOLTAGE TEST - To measure battery voltage, charging system output, and voltage drops at various test points

1

- Set up multimeter test leads:
  - Put jack plug of black (-) test lead into COM - jack

    Note: The highest truck DC voltage that is measured is about 28 volts. Therefore, the multimeter red (+) lead is never put into the 1000 VDC jack
  - See table to find out which jack to put red (+) lead into. Table shows which jack to use when normal value of measured voltage is known or unknown

GO



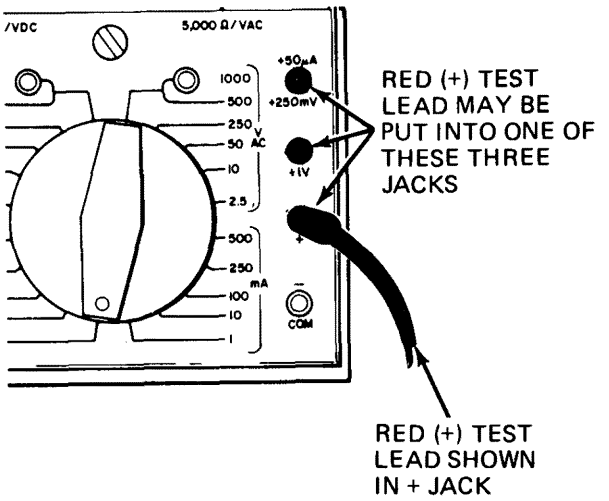
IF NORMAL VALUE OF VOLTAGE BEING MEASURED IS THIS:	PUT RED LEAD INTO THIS JACK ON RIGHT SIDE OF MULTIMETER:
0 TO 230 MILLIVOLTS	+50 μA +250mV
230 MILLIVOLTS TO 0.8 VOLTS	+1V
0.8 TO 2 VOLTS	+
2 TO 8 VOLTS	+
8 TO 40 VOLTS	+
UNKNOWN	+

TA 114686

Figure 28-8 (Sheet 1 of 13)

GO

- Put jack plug of red (+) test lead into jack receptacle you picked on right side of multimeter

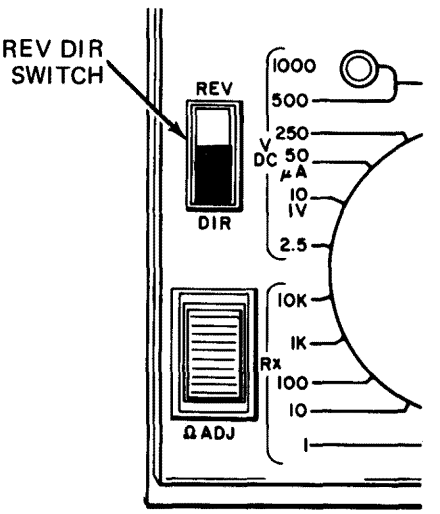


2

- Set up multimeter switches:

  Note: The Ω ADJ knob is not used for DC voltage tests

  - Set REV DIR switch to DIR



- See table to find out setting of function/range switch. Table shows switch setting when normal value of measured voltage is known or unknown

IF NORMAL VALUE OF VOLTAGE BEING MEASURED IN THIS:	SET FUNCTION/RANGE SWITCH TO:
0 TO 230 MILLIVOLTS	50 μA
230 MILLIVOLTS TO 0.8 VOLTS	10 1V
0.8 TO 2 VOLTS	2.5
2 TO 8 VOLTS	10 1V
8 TO 40 VOLTS	50 μA
UNKNOWN	50 μA

GO

TA 114687

Figure 28-8 (Sheet 2 of 13)

GO

- Set function/range switch to setting you picked

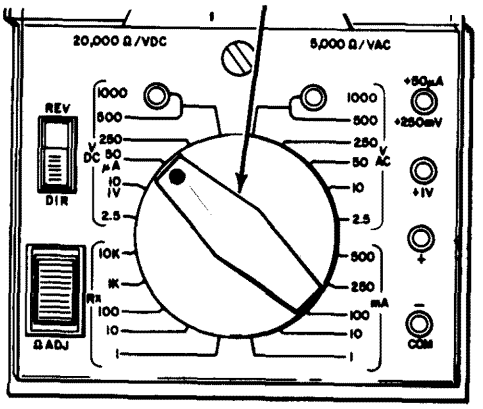
NOTE

When you need to turn on power before measuring DC voltage, the fault isolation procedure gives the turn-on instructions

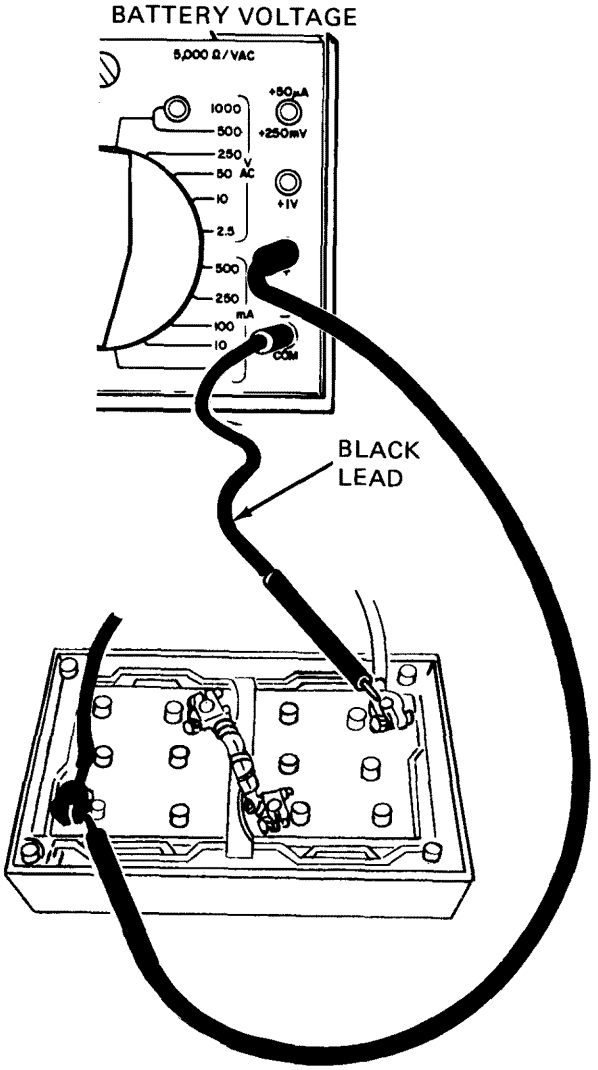
3

- Put multimeter leads across (in parallel with) circuit being measured
  - Put test prod of black lead (-) on negative terminal of circuit being tested
  - Put test prod of red lead (+) on positive terminal of circuit being measured

GO



NOTE: MULTIMETER SHOWN MEASURING +24 VOLTS DC BATTERY VOLTAGE

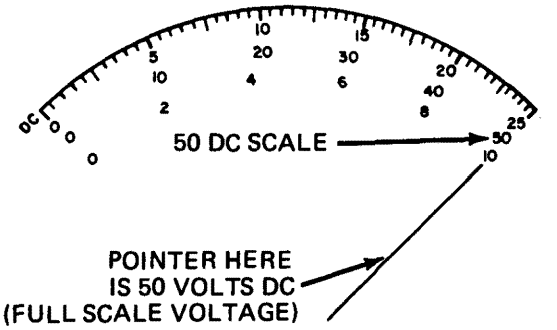


TA 114688

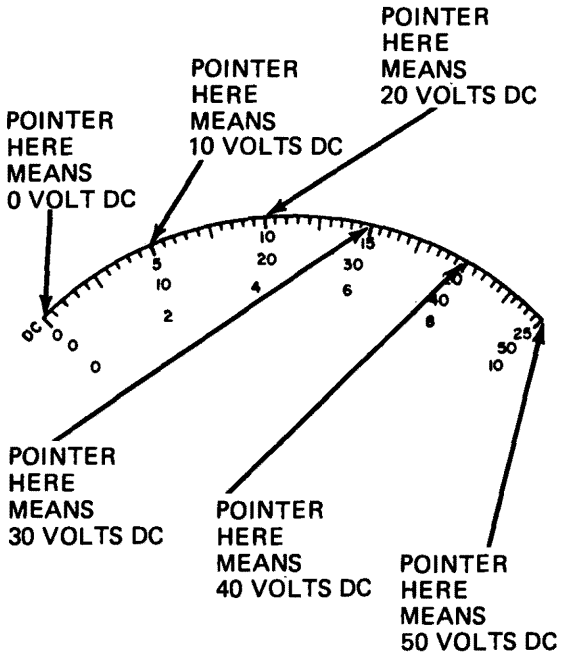
Figure 28-8 (Sheet 3 of 13)

4

- If normal value of voltage being measured is 8 to 40 Volts or unknown, read multimeter as follows:
  - Use 50 DC scale. Full scale voltage is 50 volts DC



- Read each numbered line as shown



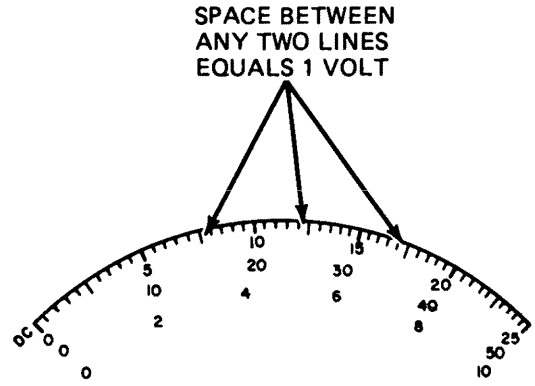
GO

TA 114689

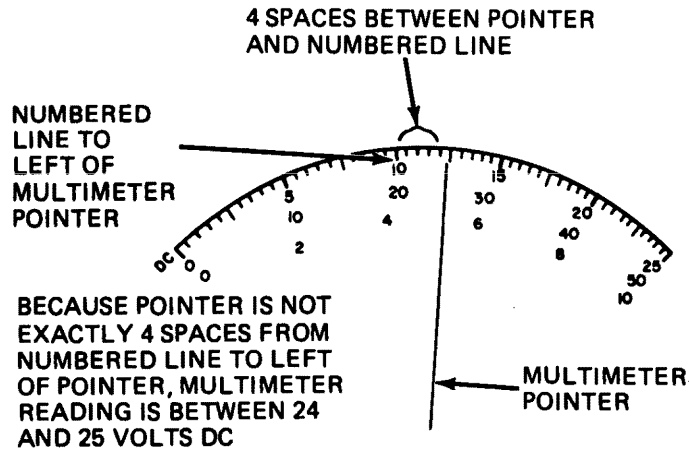
Figure 28-8 (Sheet 4 of 13)

GO

- Each space between lines equals 1 volt



TS 260-20-305



- Get multimeter reading as follows:

	Step A	Step B	Step C
	Read first numbered line to left of pointer.	Count number of spaces between pointer and numbered line to left of pointer.	Add numbers from steps A and B.
Example:	20	4	20 + 4 = 24 volts DC

GO

TA 114690

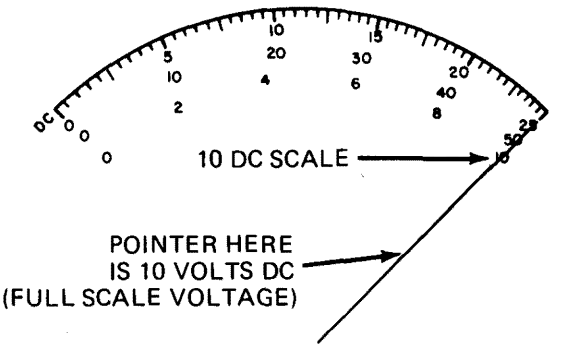
Figure 28-8 **(Sheet 5 of 13)**

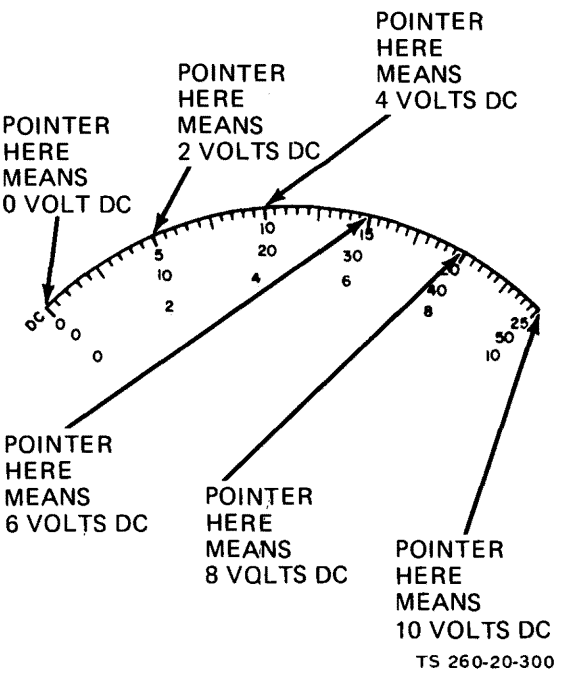
GO

5

- If normal value of voltage being measured is 2 to 8 Volts, read multimeter as follows:
  - Use 10 DC scale. Full scale voltage is 10 volts DC

- Read each numbered line as shown



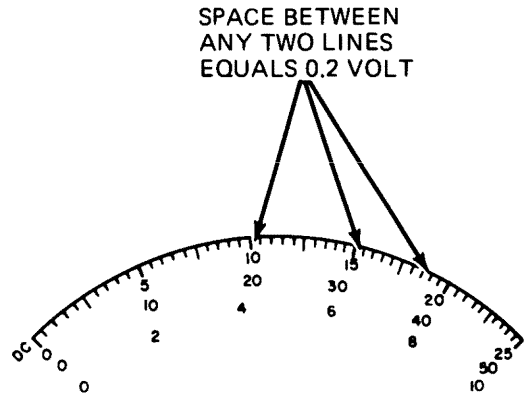


TA 114691

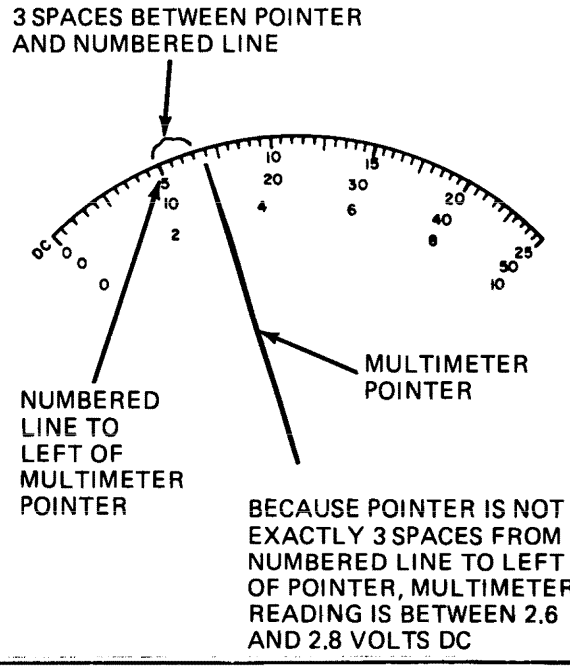
Figure 28-8 (Sheet 6 of 13)

GO

- Each space between lines equals 0.2 volt



TS 260-20-301



- Get multimeter reading as follows:

Step A	Step B	Step C	Step D
Read first numbered line to left of pointer.	Count number of spaces between pointer and first numbered line to left of pointer.	Multiply number from step B by 0.2.	Add numbers from steps A and C.
Example: 2	3	3 x 0.2 = 0.6	2 + 0.6 = 2.6 volts DC

GO

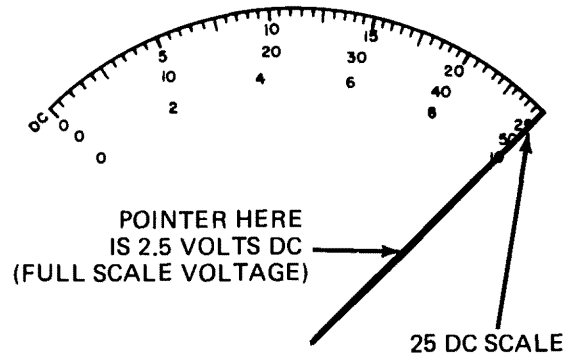
TA 114692

Figure 28-8 (Sheet 7 of 13)

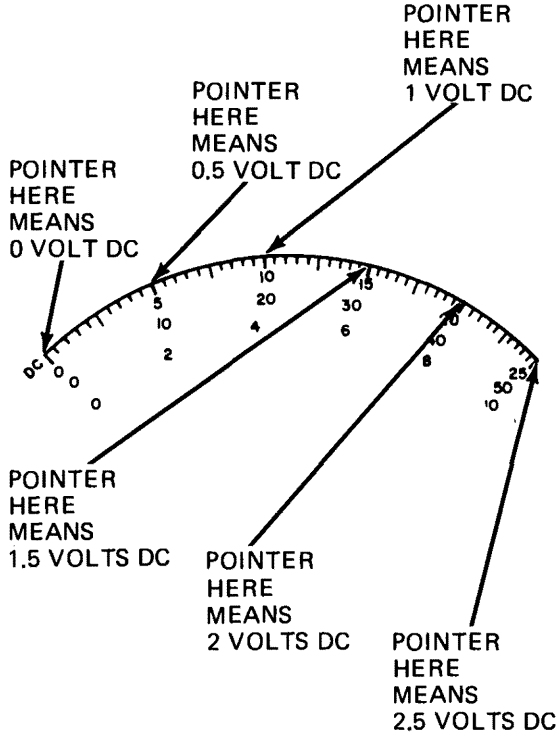
GO

6

- If normal value of voltage being measured is 0.8 to 2 volts, read multimeter as follows:
  - Use 25 DC scale. Full scale voltage is 2.5 volts DC



- Read each numbered line as shown



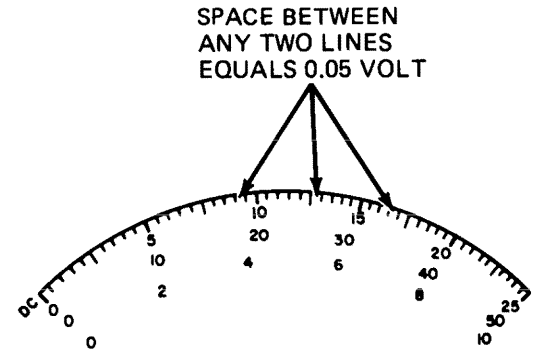
GO

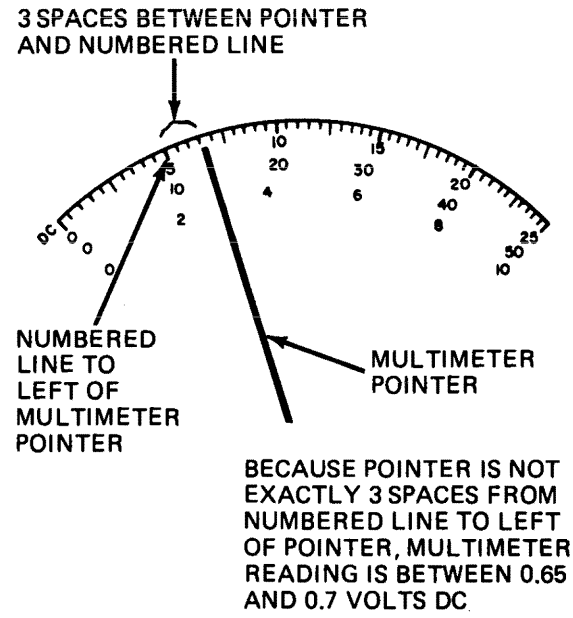
TA 114693

Figure 28-8 (Sheet 8 of 13)

GO

- Each space between lines equals 0.05 volt





- Get multimeter reading as follows:

Step A	Step B	Step C	Step D
Read first numbered line to left of pointer. Divide number by 10.	Count number of spaces between pointer and first numbered line to left of pointer.	Multiply number from step B by 0.05.	Add numbers from steps A and C.
Example: 0.5	3	3 x 0.05 = 0.15	0.5 + 0.15 = 0.65 volt DC

GO

TA 114694

Figure 28-8 (Sheet 9 of 13)

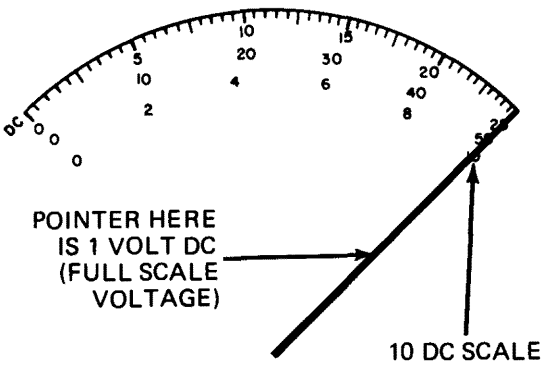
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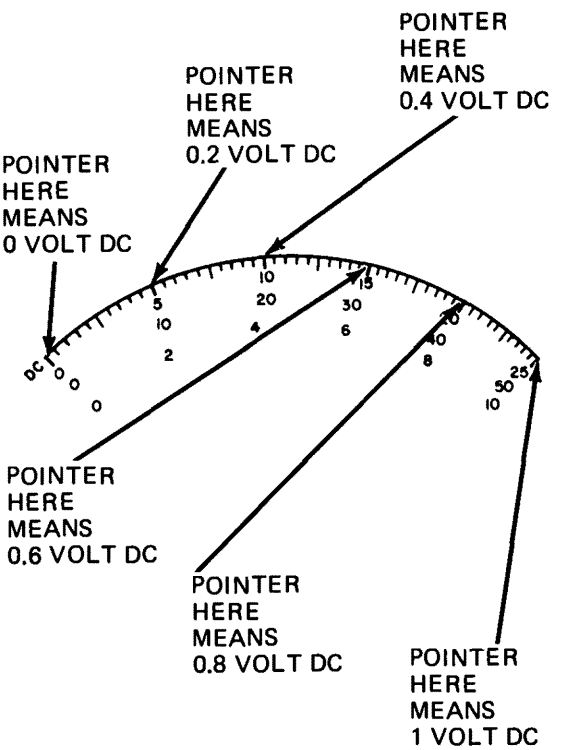
7

- If normal value of voltage being measured is 230 millivolts to 0.8 volts, read multimeter as follows:
  - Use 10 DC scale. Full scale voltage is 1 volt DC

- Read each numbered line as shown

GO



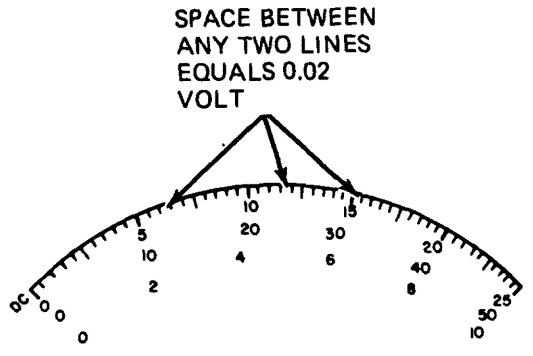


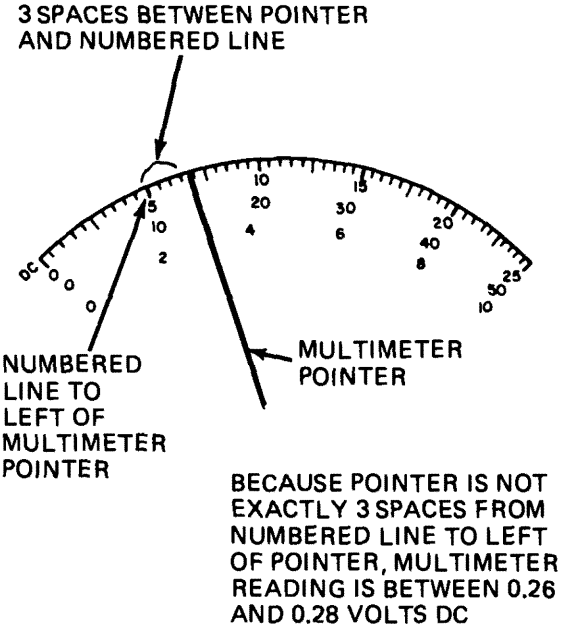
TA 114695

Figure 28-8 (Sheet 10 of 13)

GO

- Each space between lines equals 0.02 volt





- Get multimeter reading as follows:

Step A	Step B	Step C	Step D
Read first numbered line to left of pointer. Divide number by 10.	Count number of spaces between pointer and first numbered line to left of pointer.	Multiply number from step B by 0.02.	Add numbers from steps A and C.
Example: 0.2	3	3 x 0.02 = 0.06	0.2 + 0.06 = 0.26 volt DC

GO

TA 114696

Figure 28-8 (Sheet 11 of 13)

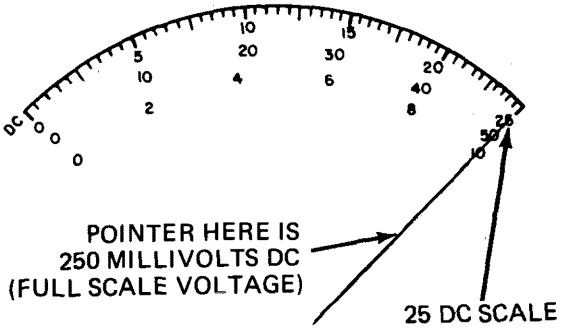
GO

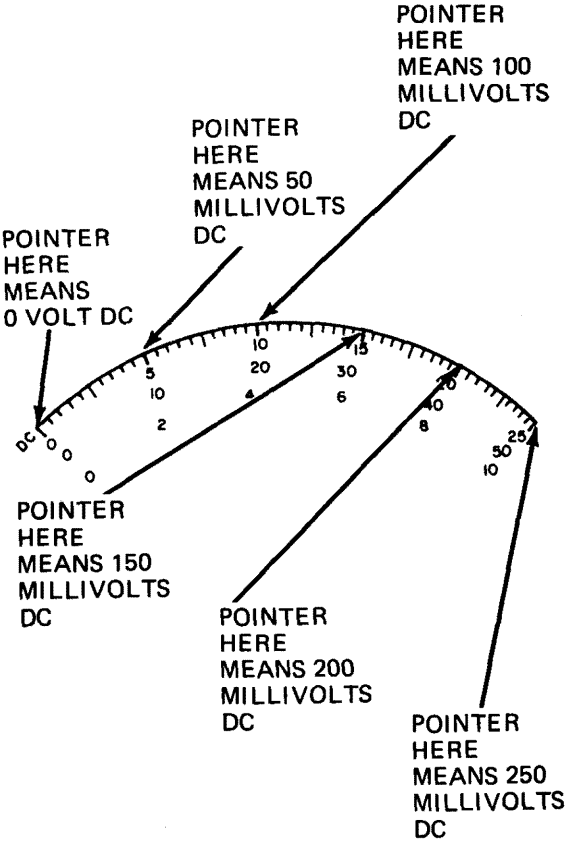
8

- If normal value of voltage being measured is 0 to 230 millivolts, read multimeter as follows:
  - Use 25 DC scale. Full scale voltage is 250 millivolts DC

- Read each numbered line as shown

GO



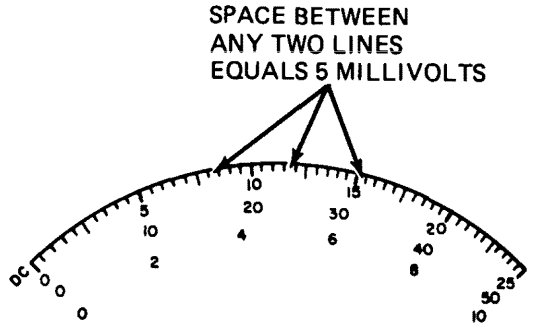


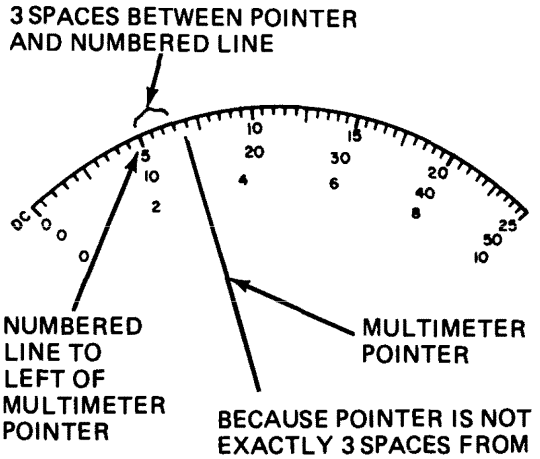
TA 114697

Figure 28-8 (Sheet 12 of 13)

GO

- Each space between lines equals 5 millivolts





- Get multimeter reading as follows:

	Step A	Step B	Step C	Step D
	Read first numbered line to left of pointer.	Count number of spaces between pointer and first numbered line to left of pointer.	Multiply number from step B by 5	Add numbers from steps A and C.
Example:	50	3	3 x 5 = 15	50 + 15 = 65 millivolts DC

9

- Make circuit normal again.
  - Take both test prods off measured circuit

TA 114698

Figure 28-8 (Sheet 13 of 13)

2 AC VOLTAGE TEST - To measure van input and operating voltages

1

- Set Up Multimeter As Follows:

  Note: The truck AC voltages measured are 208 and 120 volts. Therefore, only the 250 VAC function/range switch position is used

  - Set function/range switch to 250 VAC
  - Set REV DIR switch to DIR

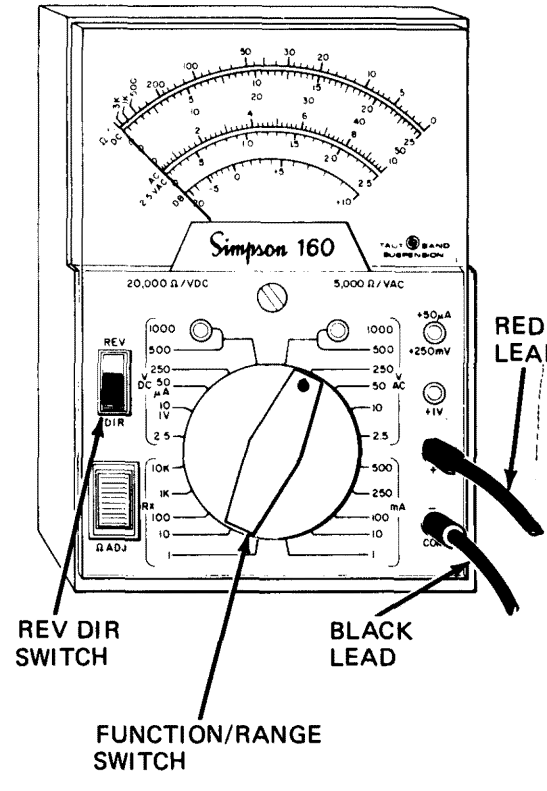
    Note: The Ω ADJ knob is not used for DC voltage tests

  - Put jack plug of black test lead into COM - jack receptacle
  - Put jack plug of red test lead into + jack receptacle

NOTE

When you need to turn on power before measuring AC voltage, the fault isolation procedure gives the turn-on instructions

GO



TA 114699

Figure 28-9 (Sheet 1 of 4)

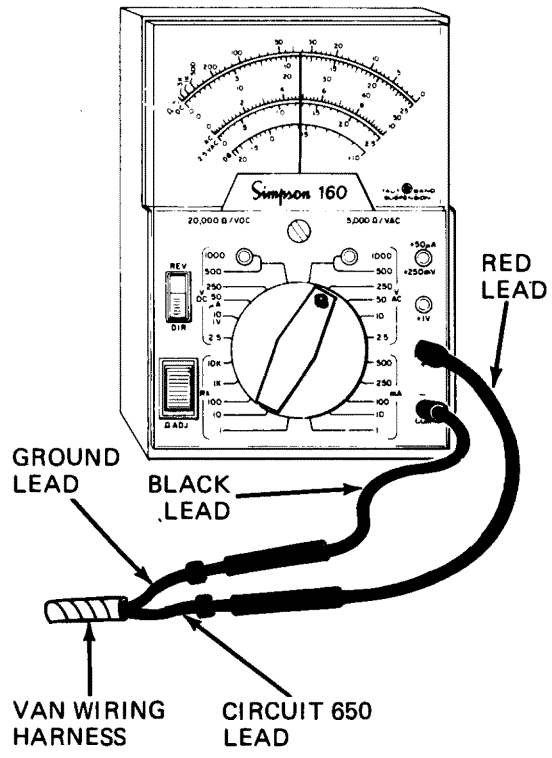
GO

2

- Put multimeter lead across (in parallel with) circuit being measured

  Note: In AC voltage measurement you can hook up the test lead connections to the circuit either way. You will still get correct multimeter readings and no damage will be done to the multimeter. But, when one side of the circuit is electrical ground, it is a good idea to put the black lead on electrical ground.

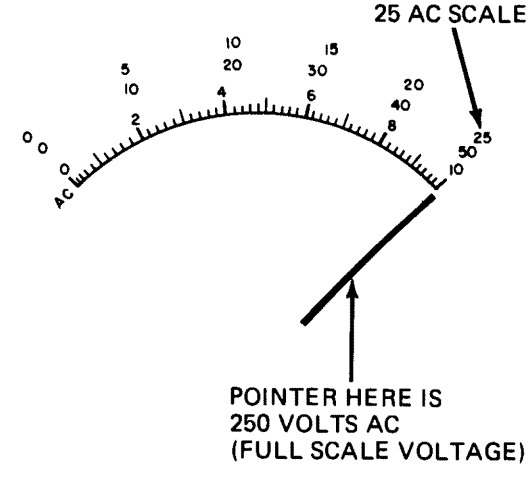
  - Put test prod of black lead on ground side or one side of the circuit being tested. Put test prod of red lead on other side of circuit being measured



NOTE: MULTIMETER SHOWN MEASURING 120 VOLTS AC VAN CEILING LIGHT VOLTAGE.

3

- Read multimeter
  - Use 25 AC scale. Full scale voltage is 250 volts AC



GO

TA 114700

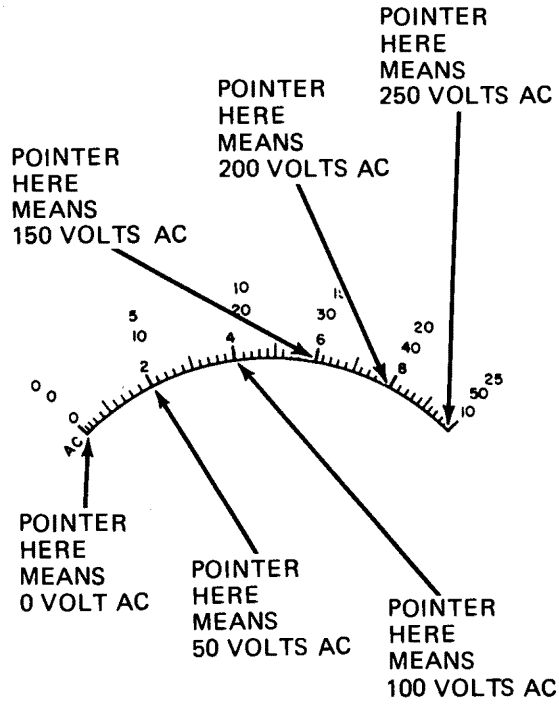
Figure 28-9 (Sheet 2 of 4)

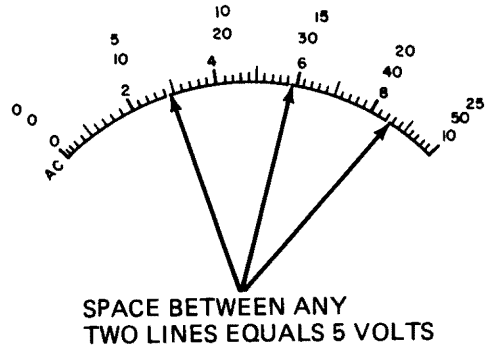
GO

- Read each numbered line as shown

- Each space between lines equals 5 volts

GO

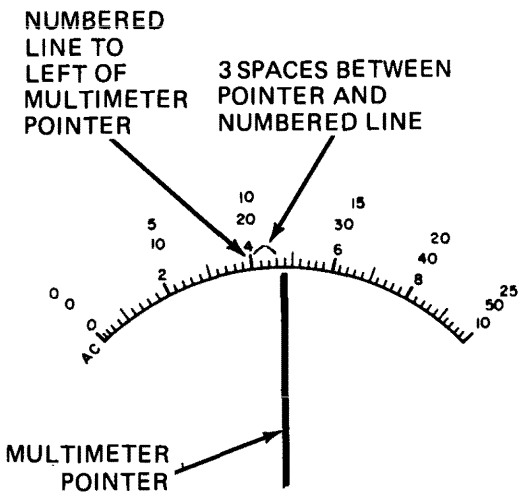




TA 114701

Figure 28-9 (Sheet 3 of 4)

GO



BECAUSE POINTER IS NOT EXACTLY 3 SPACES FROM NUMBERED LINE TO LEFT OF POINTER, MULTIMETER READING IS BETWEEN 115 AND 120 VOLTS AC

- Get multimeter reading as follows:

Step A	Step B	Step C	Step D
Read first numbered line to left of pointer. Multiply number by 10.	Count number of spaces between pointer and first numbered line to left of pointer.	Multiply number from step B by 5.	Add numbers from steps A and C.
Example: 100	3	3 x 5 = 15	100 + 15 = 115 volts AC

4

- Make circuit normal again
  - Take both test prods off measured circuit

TA 114702

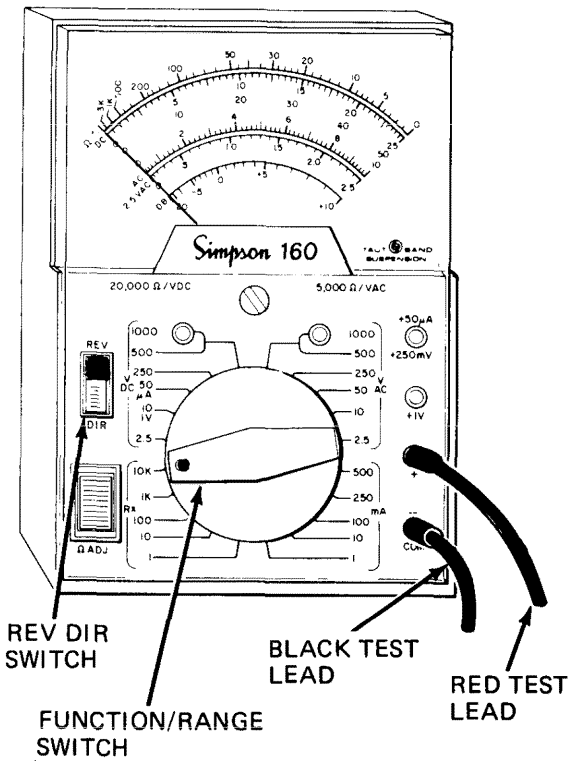
Figure 28-9 (Sheet 4 of 4)

3

RESISTANCE TEST- To measure resistance of temperature sending unit and blower motor resistor

1

- Set up multimeter:
  - Set REV DIR switch to REV
  - Set function/range switch to 10K
  - Put jack plug of black test lead into COM - jack receptacle
  - Put jack plug of red test lead into + jack



NOTE

Detailed steps for making the truck parts ready for resistance test are in the fault isolation procedures. The steps given here are typical

2

- Make tested part ready for resistance test

GO

TA 114703

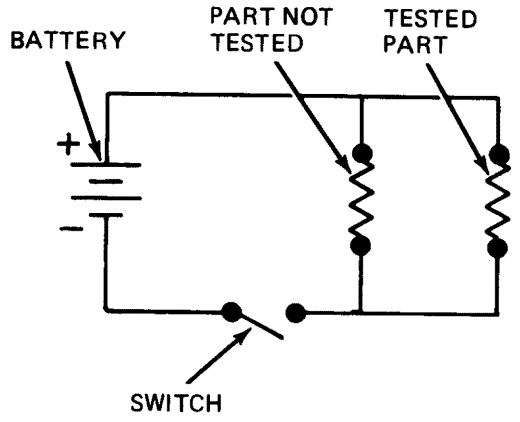
Figure 28-10 (Sheet 1 of 10)

GO

CAUTION

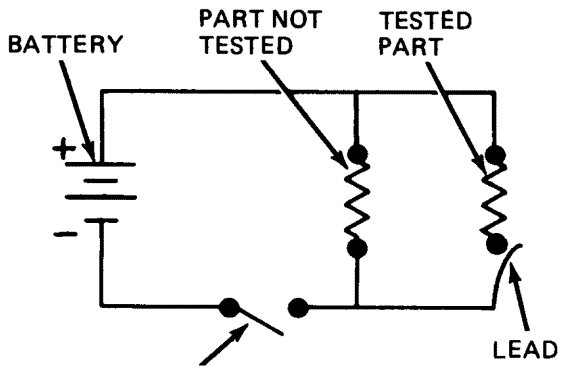
If power to tested part is not turned off, multimeter will be damaged

- Turn off power to tested part



NOTE: OPENING SWITCH TURNS OFF POWER TO TESTED PART.

- Take off one lead from tested part



NOTE: TAKING OFF ONE LEAD TAKES TESTED PART OUT OF CIRCUIT.

GO

TA 114704

Figure 28-10 (Sheet 2 of 10)

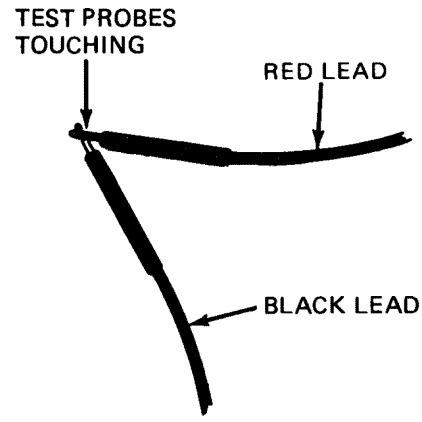
GO

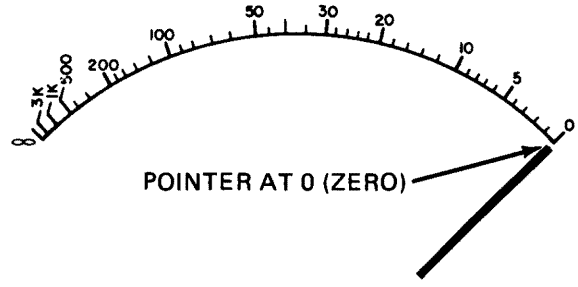
3

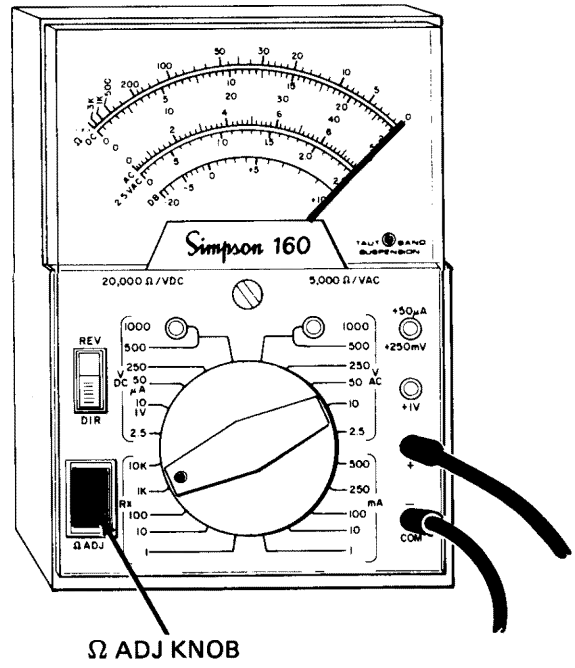
- Zero the multimeter:
  - Touch multimeter test probes together

- While touching multimeter test probes together look at ohms scale. Pointer should be at 0 (zero). If it is not, turn Ω ADJ knob to move pointer to 0

GO







TA 114705

Figure 28-10 (Sheet 3 of 10)

GO

4

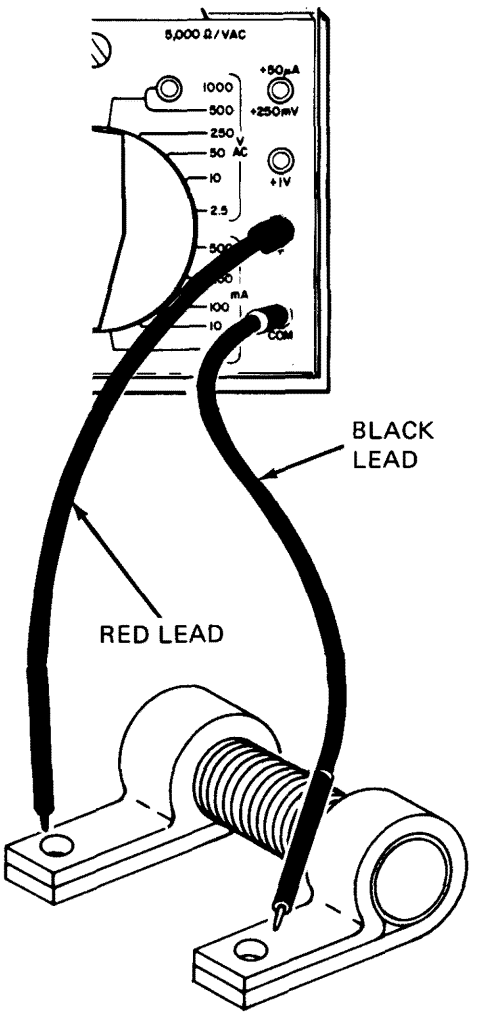
- Put multimeter leads across tested part
  - Put one test prod on one terminal of tested part
  - Put other test prod on other terminal of tested part

NOTE

Zero the multimeter each time you turn the function/range switch knob to another position. (See step 3)

GO

NOTE: MULTIMETER SHOWN MEASURING RESISTANCE OF A COLD START RESISTOR.

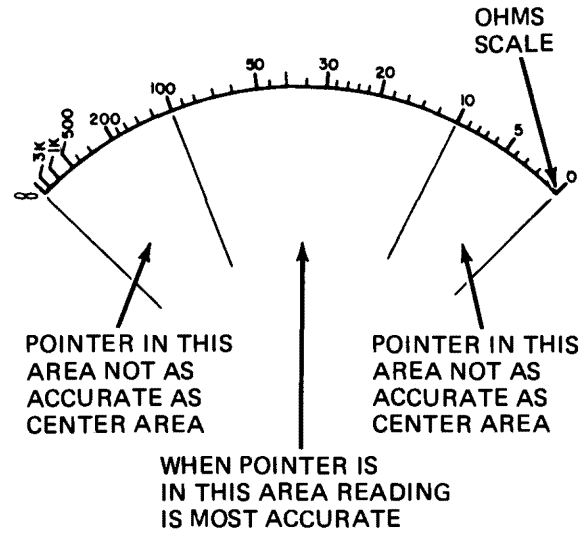


RESISTOR UNDER TEST

TA 114706

Figure 28-10 (Sheet 4 of 10)

GO

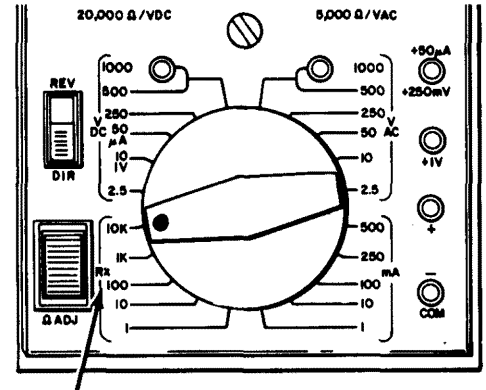


5

- Get the most accurate multimeter reading as follows:

  Note: The closer the multimeter pointer is to the center of the ohms scale, the more accurate the reading.

- Note position of pointer on ohms scale. Turn function/range knob to left while looking at pointer. Try to find function/range switch knob position that gives most centered pointer position



NOTE: MOVING FUNCTION/ RANGE SWITCH KNOB TO LEFT MOVES POINTER TO LEFT

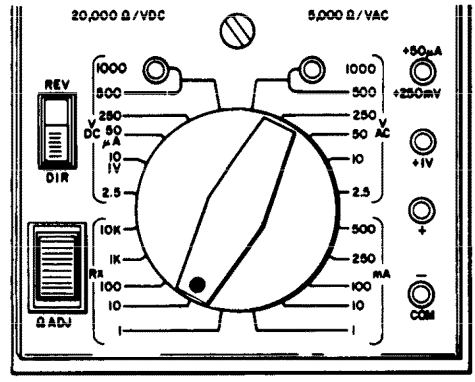
TA 114707

GO

Figure 28-10 (Sheet 5 of 10)

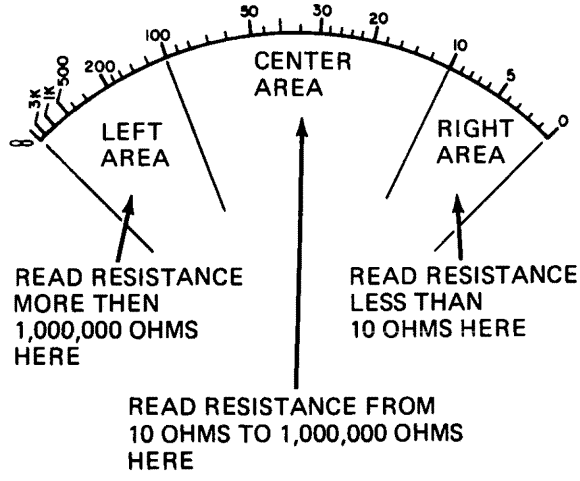
GO

- You may overshoot most centered pointer position. If you do, turn function/range switch knob to right to put pointer in most centered position



NOTE: MOVING FUNCTION/ RANGE SWITCH KNOB TO RIGHT MOVES POINTER TO RIGHT

- Pointer will stay in right area if resistance is less than 10 ohms. Pointer will stay in left area if resistance is more than 1,000,000 ohms
- Leave function/range switch in position that puts pointer in most centered position



GO

TA 114708

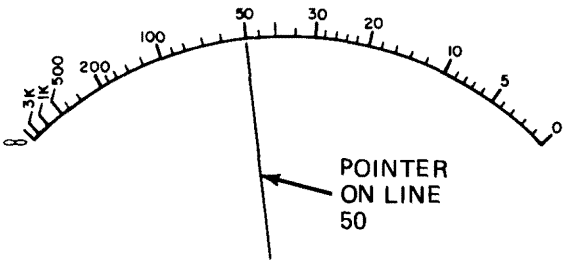
Figure 28-10 (Sheet 6 of 10)

GO

6

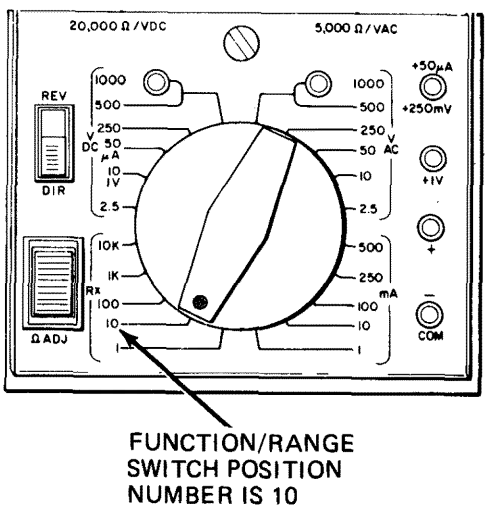
- If pointer falls exactly on a numbered line read multimeter as follows:

  a. Look at ohms scale and see which numbered line pointer is on: 50



b. See what function/range switch position number is: 10

c. Multiply number from step a by number from step b to get multimeter reading: 50 X 10 = 500 ohms



GO

TA 114709

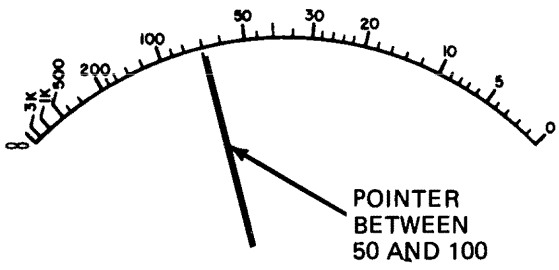
Figure 28-10 (Sheet 7 of 10)

GO

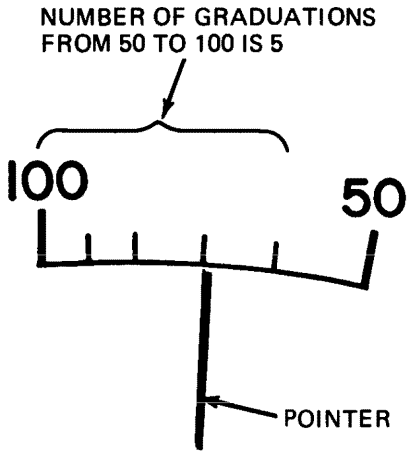
7

- If pointer is between numbered lines read multimeter as follows:

  a. Look at ohms scale and see which two numbers the pointer is between. Subtract smaller number from larger number to get span: 100 - 50 = 50

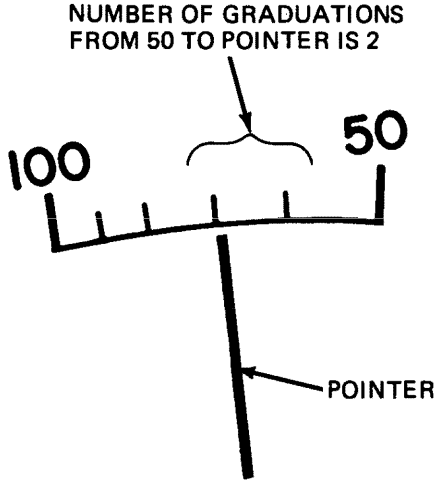


b. Count number of graduations from smaller number to larger number: 5



c. Divide span (step a) by number of graduations (step b) to get value of each graduation: 50 ÷ 5 = 10

d. Count number of graduations from smaller number to pointer: 2



GO

TA 114710

Figure 28-10 (Sheet 8 of 10)

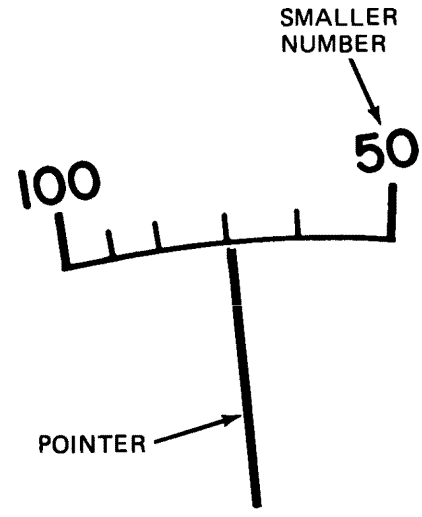
GO

e. Multiply number from step 7d by value from step 7c to get total value of graduations:

2 x 10 = 20

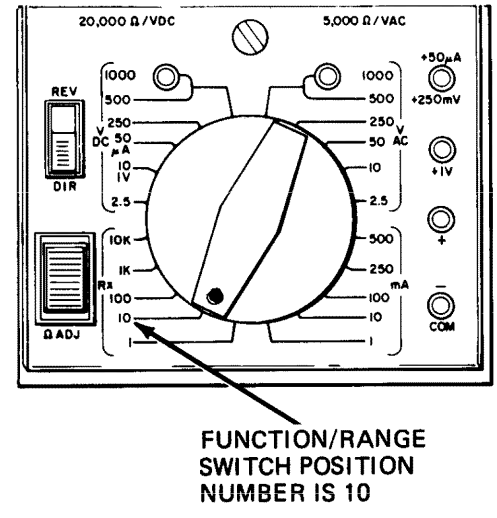
f. Add total value of graduations (step e) to smaller number to get scale reading:

20 + 50 = 70



g. Multiply scale reading (step f) by function/range switch position number to get multimeter reading:

70 x 10 = 700 ohms



GO

TA 114711

Figure 28-10 (Sheet 9 of 10)

GO

8

- Put tested part back in circuit
  - Take off both test prods from across tested part
  - Put lead back on tested part

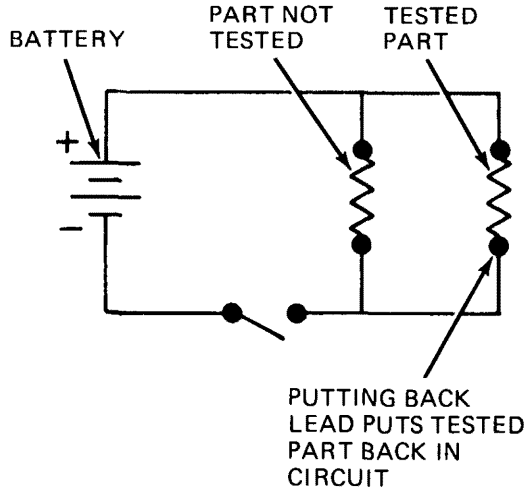


Figure 28-10 (Sheet 10 of 10)

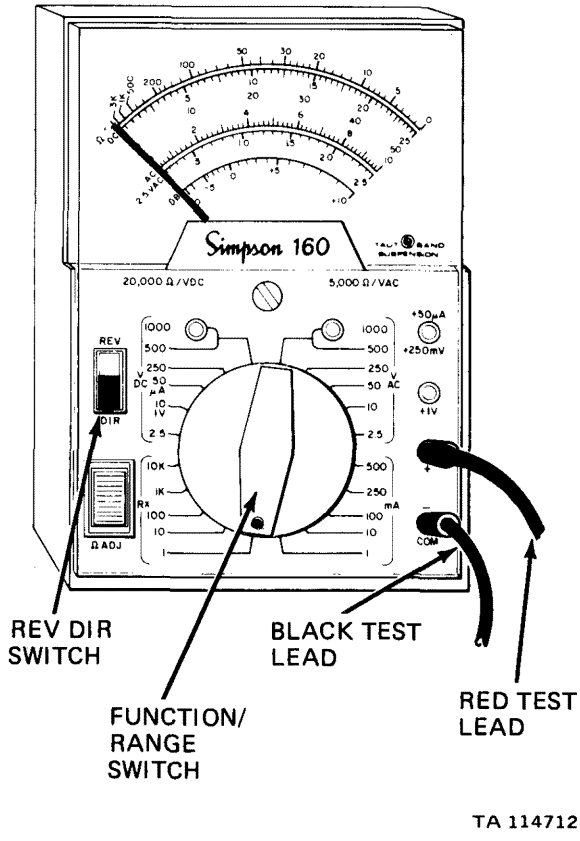
4

CONTINUITY TEST - To check for breaks in a circuit, such as switch, lamp or electrical cable circuits

1

- Set up mulitimeter
  - Set REV DIR switch to DIR
  - Set function/range switch to RX1
  - Put jack plug of black (-) test lead into COM - jack
  - Put jack plug of red (+) test lead into + jack

GO



TA 114712

Figure 28-11 (Sheet 1 of 6)

GO

NOTE

Detailed steps for making the truck circuits ready for continuity tests are in the fault isolation procedures. The steps given here are typical

2

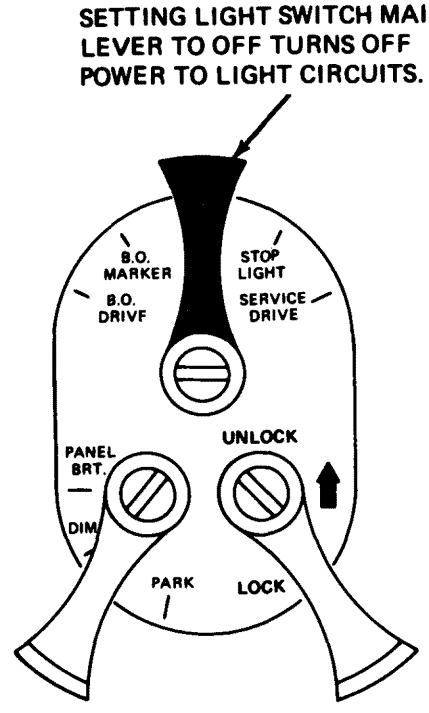
- Make tested circuit ready for continuity test

CAUTION

If power to tested circuit is not turned off, multimeter will be damaged.

- Turn off power to tested circuit

GO

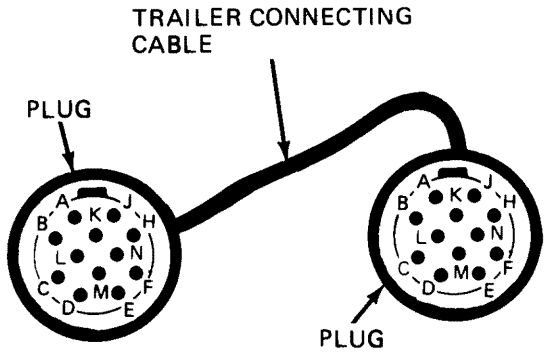


TA 114713

Figure 28-11 (Sheet 2 of 6)

GO

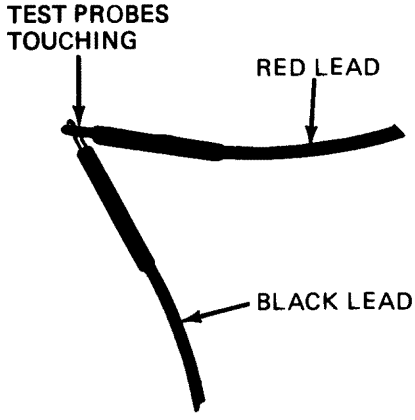
- Take plug on each end of trailer connecting cable off mating receptacle



TAKING CABLE PLUGS OFF MATING RECEPTACLES LETS YOU TEST CONTINUITY OF CABLE WIRES

3

- Zero the multimeter
  - Touch multimeter test probes together



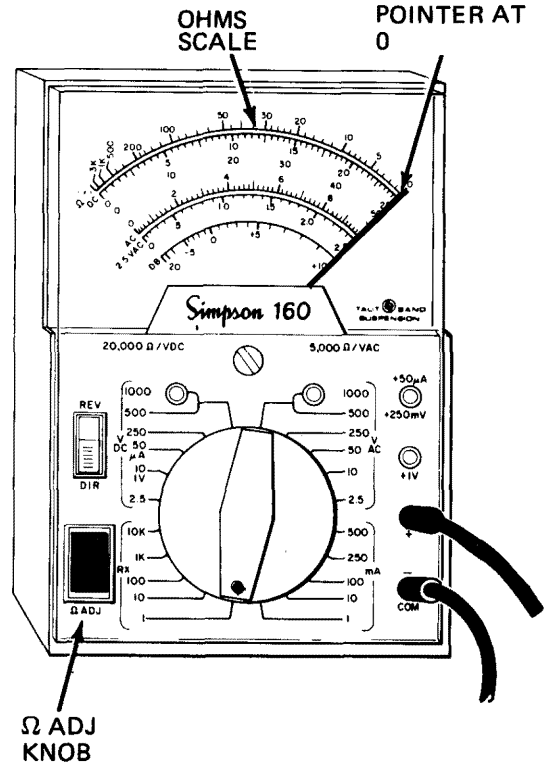
GO

TA 114714

Figure 28-11 (Sheet 3 of 6)

GO

- While touching multimeter test probes together look at ohms scale. Pointer should be at 0 (zero). It it is not, turn Ω ADJ knob to move pointer to 0



GO

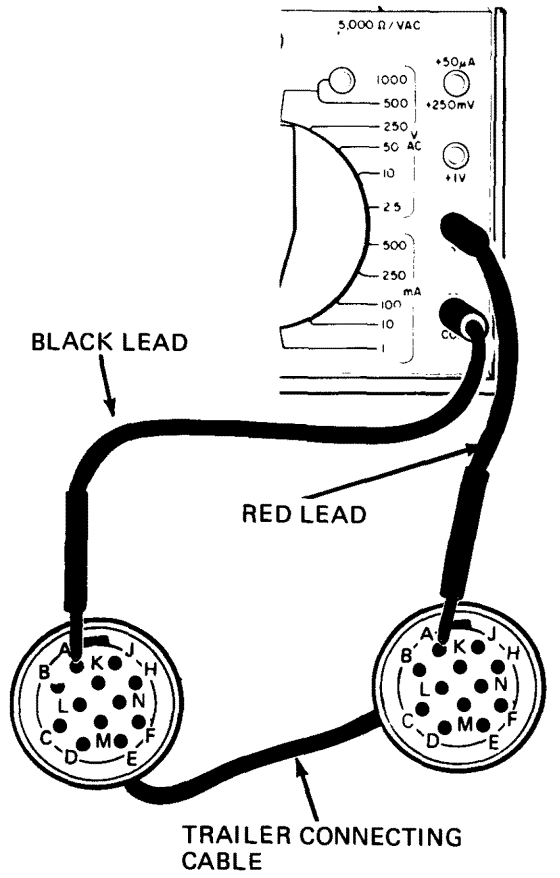
TA 114715

Figure 28-11 (Sheet 4 of 6)

GO

4

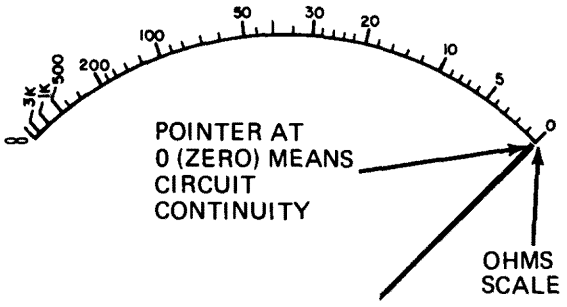
- Put multimeter leads across tested circuit
  - Put test prod of black lead (-) on one contact of tested circuit
  - Put test prod of red lead (+) on other contact of tested circuit



NOTE: MULTIMETER SHOWN CHECKING CONTINUITY OF TRAILER CONNECTING CABLE WIRE ATTACHED TO CONTACT A.

5

- Read multimeter
  - Look at multimeter ohms scale. For continuity, pointer should be all the way to far right over 0 (zero)
  - If pointer stays all the way to left, tested circuit is open. If pointer jumps or flickers, tested circuit has a loose connection



GO

TA 114716

Figure 28-11 (Sheet 5 of 6)

GO

6

- Put tested circuit back in operation
  - Take off both test prods from contacts of tested circuit
  - Put back any plugs or other parts previously removed to test continuity

Figure 28-11 (Sheet 6 of 6)

5 SHORT TEST - To check for shorts in electrical cables

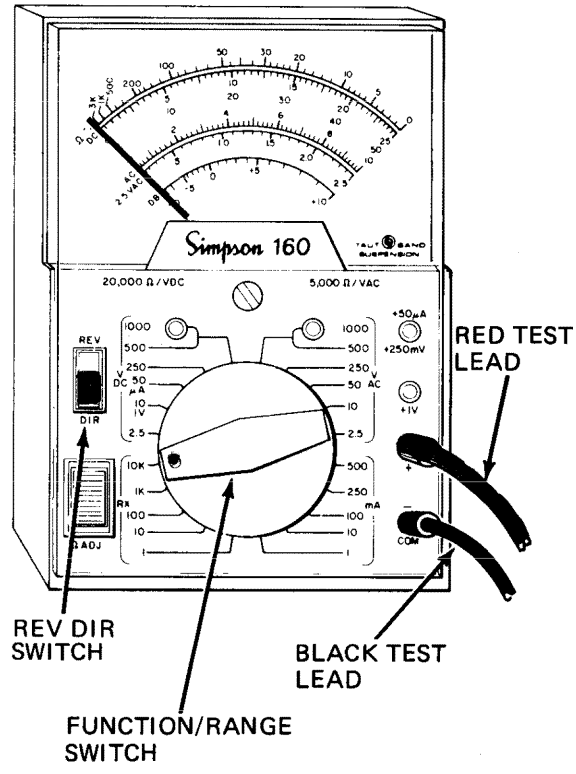
NOTE

A short (or short circuit) happens when two circuits that should not be connected have metal-to-metal contact with each other. A short also happens when a circuit that should not touch electrical ground has metal-to-metal contact with ground

1

- Set up multimeter
  - Set REV DIR switch to DIR
  - Set function/range switch to RX10K
  - Put jack plug of black (-) test lead into COM - jack
  - Put jack plug of red (+) test lead into + jack

GO



TA 114717

Figure 28-12 (Sheet 1 of 7)

GO

NOTE

Detailed steps for making the truck circuits ready for short test are in the fault isolation procedures. The steps given here are typical

2

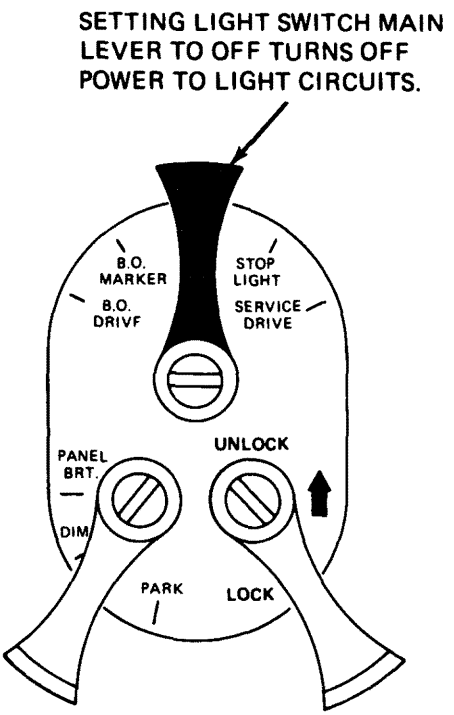
- Make tested circuit ready for short test

CAUTION

If power to tested circuit is not turned off, multimeter will be damaged.

- Turn off power to tested circuit

GO



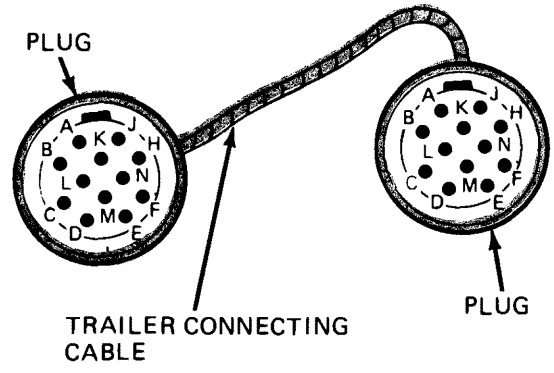
TA 114718

Figure 28-12 (Sheet 2 of 7)

GO

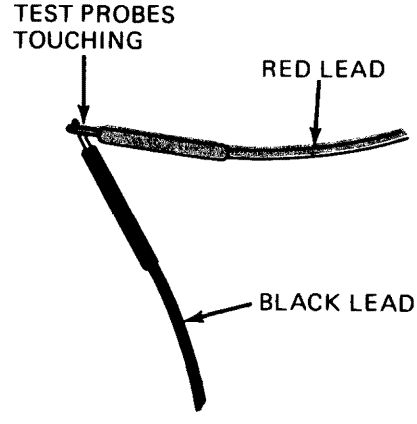
- Take plug on each end of trailer connecting cable off mating receptacle

TAKING CABLE PLUGS OFF MATING RECEPTACLES LETS YOU TEST CABLE WIRES FOR SHORTS



3

- Zero the multimeter
  - Touch multimeter test probes together



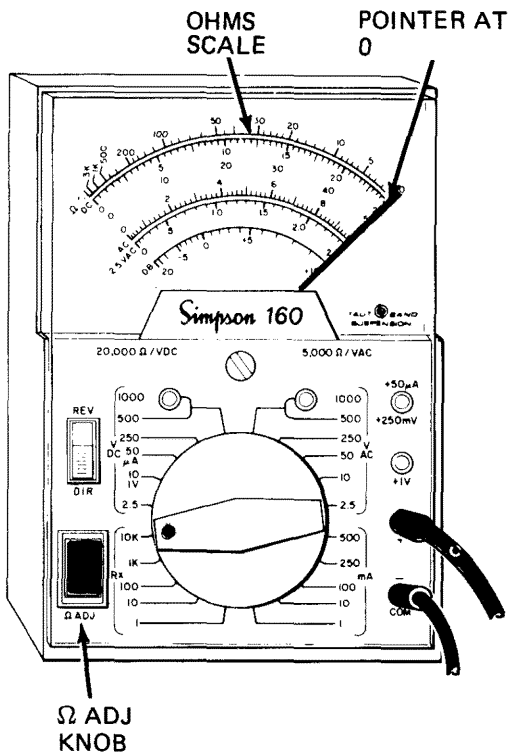
GO

TA 114719

Figure 28-12 (Sheet 3 of 7)

GO

- While touching multimeter test probes together look at ohms scale. Pointer should be at 0 (zero). If it is not, turn Ω ADJ knob to move pointer to 0



GO

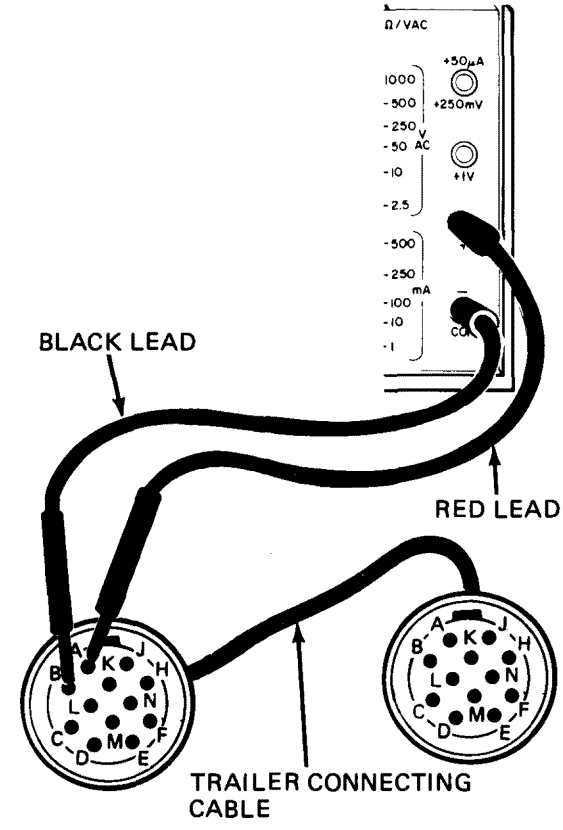
TA 114720

Figure 28-12 (Sheet 4 of 7)

GO

4

- Put multimeter leads across tested circuits
  - To test for short between two circuits, put test probes on contacts of both circuits



NOTE: MULTIMETER SHOWN CHECKING FOR SHORT BETWEEN TRAILER CONNECTOR CABLE WIRES ATTACHED TO CONTACTS A AND B.

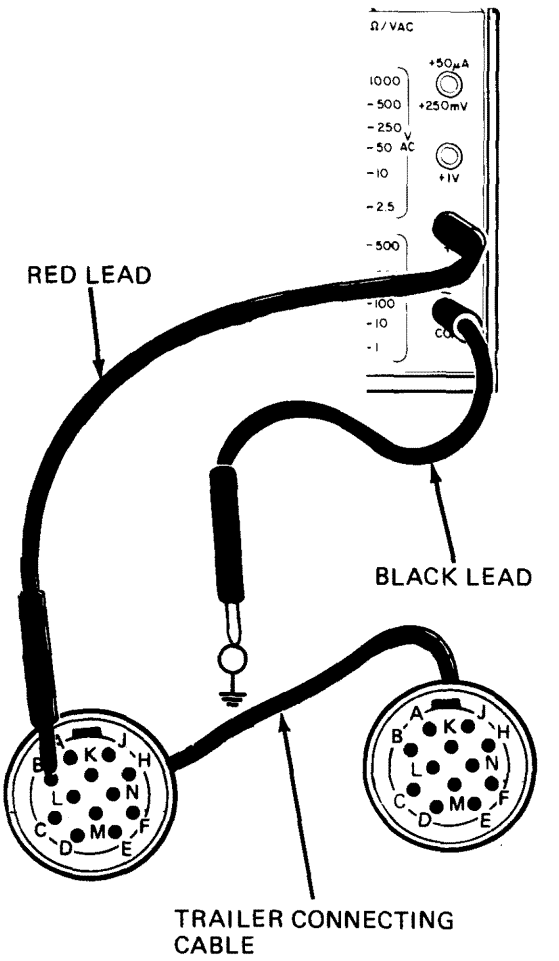
GO

TA 114721

Figure 28-12 (Sheet 5 of 7)

GO

- To test for short between a circuit and ground, put one test probe on circuit contact and other test probe on ground



NOTE: MULTIMETER SHOWN CHECKING FOR SHORT BETWEEN TRAILER CONNECTOR CABLE WIRE ATTACHED TO CONTACT B AND GROUND.

GO

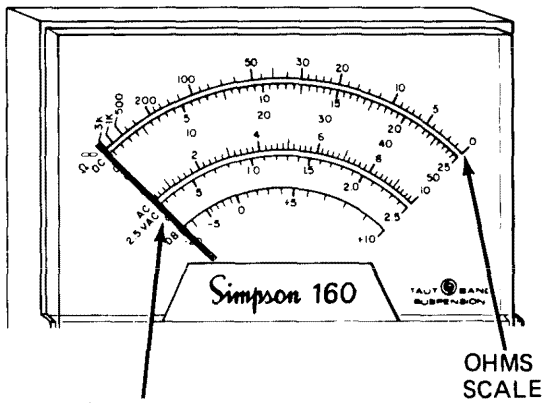
TA 114722

Figure 28-12 (Sheet 6of 7)

GO

5

- Read multimeter
  - Look at multimeter ohms scale. If pointer stays all the way to far left without moving, circuits are not shorted
  - If pointer moves all the way to far right over 0 (zero), circuits are shorted. If pointer jumps or flickers, circuits are sometimes shorted



6

- Put tested circuit back in operation
  - Take off both test prods from contacts of tested circuit and from ground
  - Put back any plugs or other parts previously removed to test for shorts

TA 114723

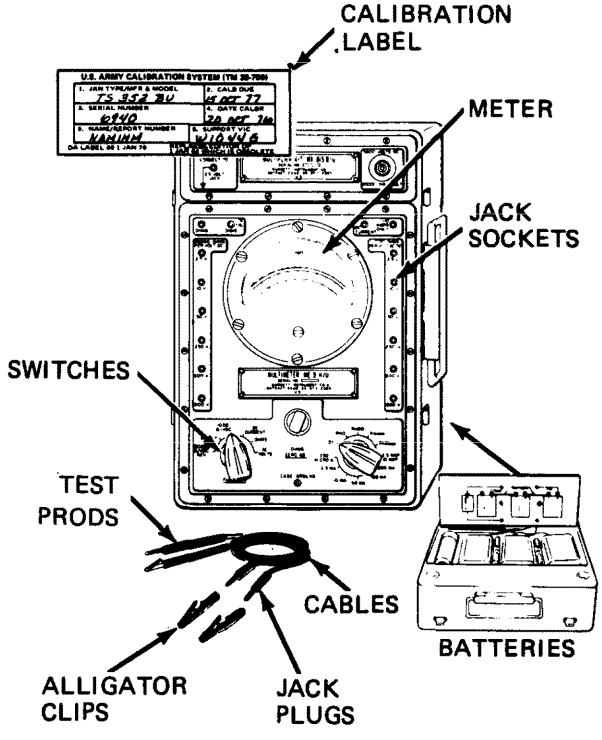
Figure 28-12 (Sheet 7 of 7)

MULTIMETER TS-352B/U TEST PROCEDURES

GENERAL INSTRUCTIONS

- Check that multimeter is ready to use
  - Calibration label - Check to be sure multimeter has been calibrated in the last 12 months.
  - Meter - Glass and pointer not broken. Pointer should be resting over zero mark at left side of scales.
  - Jack sockets - Open and dirt free
  - Batteries - Not corroded or leaking Put in right

- Cables - No cuts, sharp kinks or bad fraying.
- Jack plugs - Tight on cable, prods clean.
- Test prods - Tight on cable, tip free of paint or anything that might be an insulator.
- Switches - Work freely without binding or scraping.
- Alligator clips - free of paint or anything that might be an insulator



TA 114724

Figure 28-13

1

DC VOLTAGE TEST - To measure battery voltage, charging system output, and voltage drops at various test points

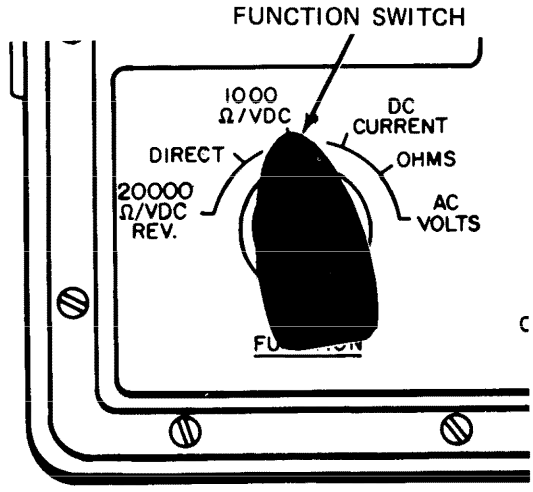
1

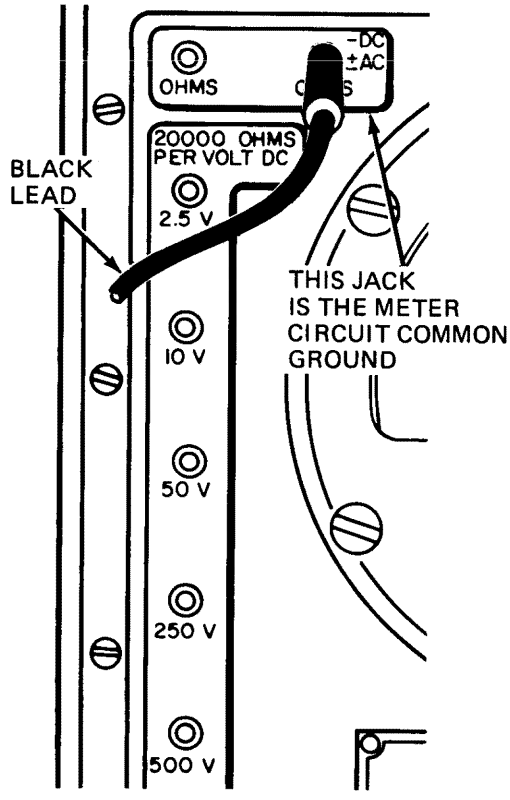
- Set up multimeter FUNCTION switch and black test lead

Note: The range switch and OHMS ZERO ADJ knob are not used for DC voltage tests.

- Set FUNCTION switch to 1000 Ω / VDC.
- Put jack plug of black (-) test lead into -DC ± AC OHMS jack

GO





TA 114725

Figure 28-14 (Sheet 1 of 9)

GO

2

- Set up red test lead

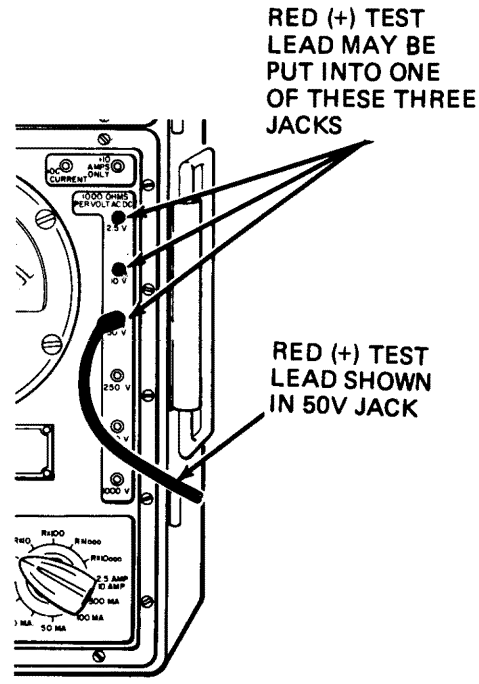
  Note: The highest truck DC voltage that is measured is about 28 volts. Therefore, the multimeter red (+) lead is never put into the 250V, 500V, and 1000V jacks

- See table to find out which jack to put red (+) lead into. Table shows which jack to use when normal value of measured voltage is known or unknown.

THE JACK USED IS ALWAYS MARKED HIGHER THAN THE VOLTAGE YOU WANT TO MEASURE

IF NORMAL VALUE OF VOLTAGE BEING MEASURED IS THIS:	PUT RED LEAD INTO THIS JACK ON RIGHT SIDE OF MULTIMETER:
0 TO 2 VOLTS	2.5V
2 TO 8 VOLTS	10V
8 TO 40 VOLTS	50V
UNKNOWN	50V

- Put jack plug of red (+) test lead into jack you picked on right side of multimeter. The jacks are in the 1000 OHMS PER VOLT AC DC column of multimeter



NOTE

When you need to turn on power before measuring DC voltage, the fault isolation procedure gives the turn-on instructions.

GO

TA 114726

Figure 28-14 (Sheet 2 of 9)

GO

3

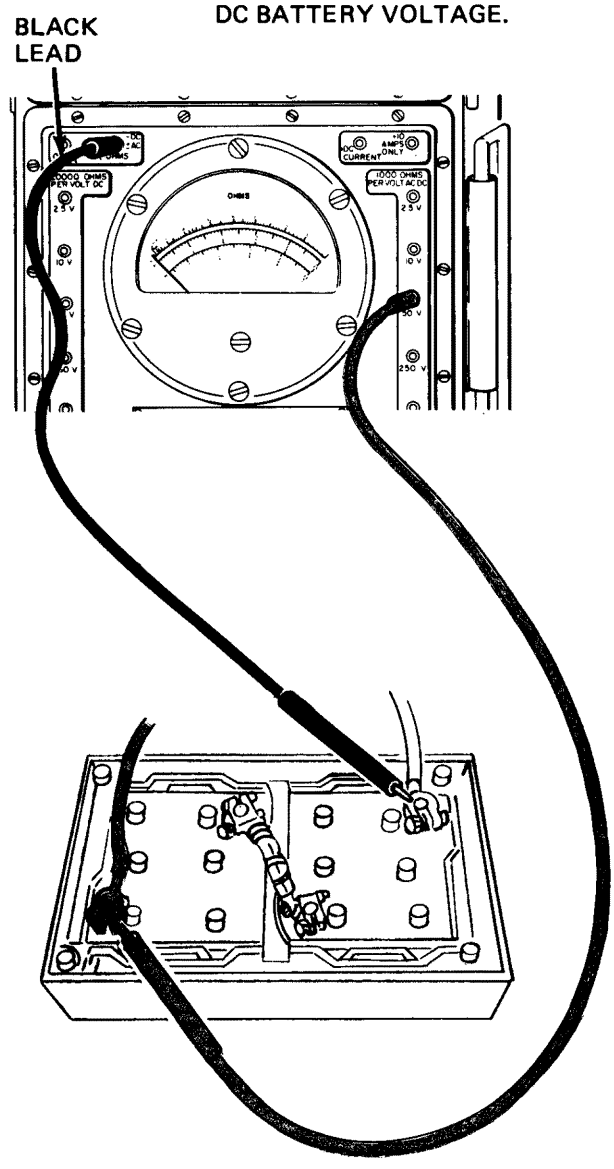
- Put multimeter leads across (in parallel with) circuit being measured
  - Put test prod of black lead (-) on negative terminal of circuit being measured
  - Put test prod of red lead (+) on positive terminal of circuit being measured.

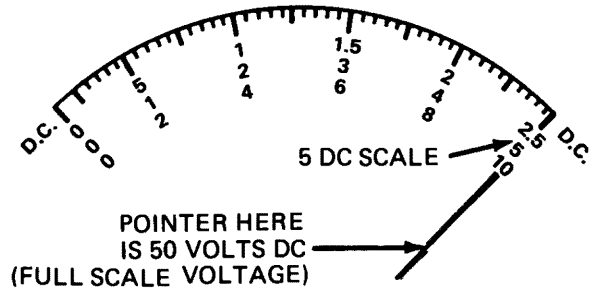
4

- If multimeter red test lead is on 50V jack, read multimeter as follows
  - Use 5DC scale. Full scale voltage is 50 volts DC

GO

NOTE: MULTIMETER SHOWN MEASURING +24 VOLTS DC BATTERY VOLTAGE.





TA 114727

Figure 28-14 (Sheet 3 of 9)

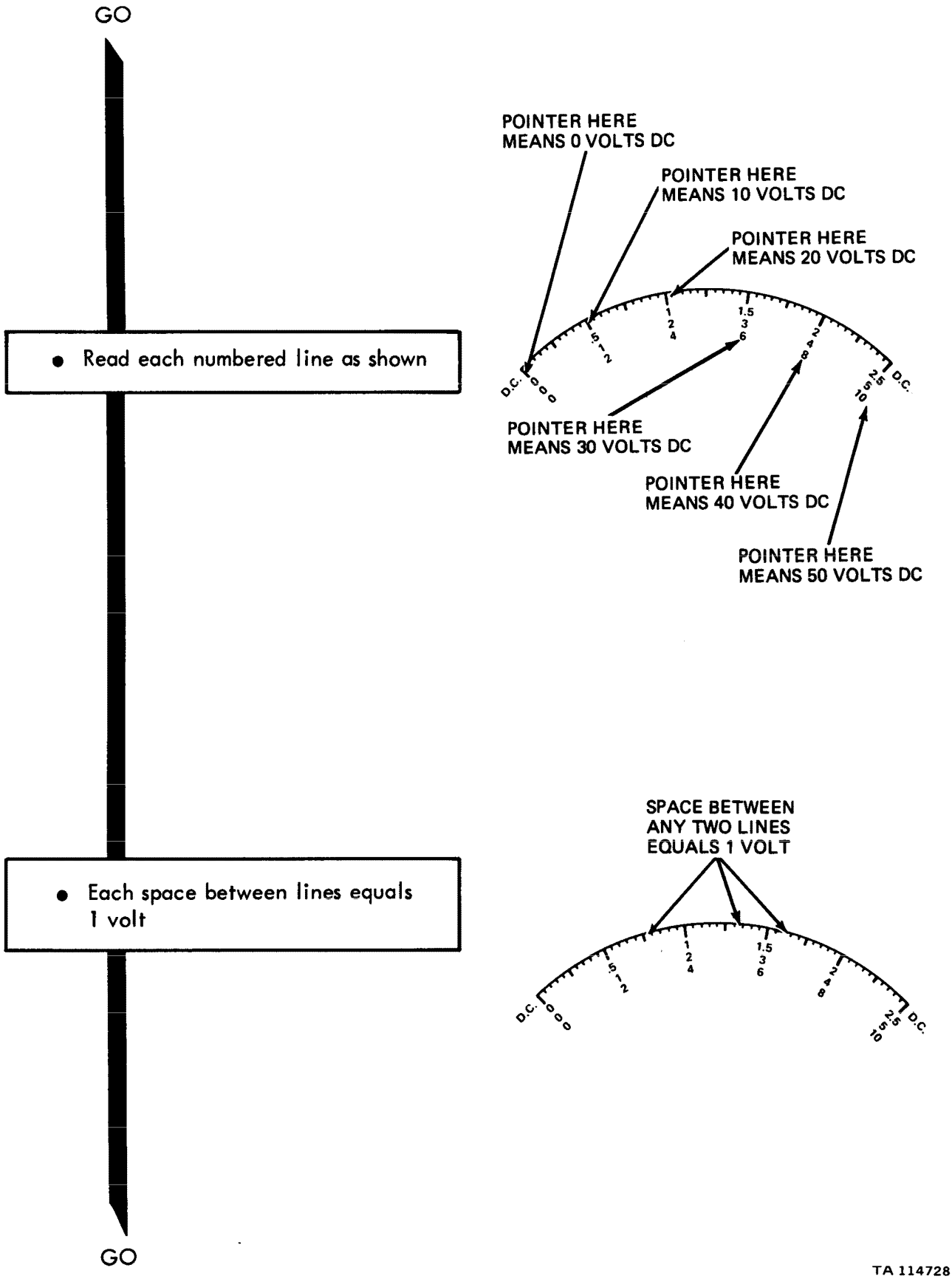
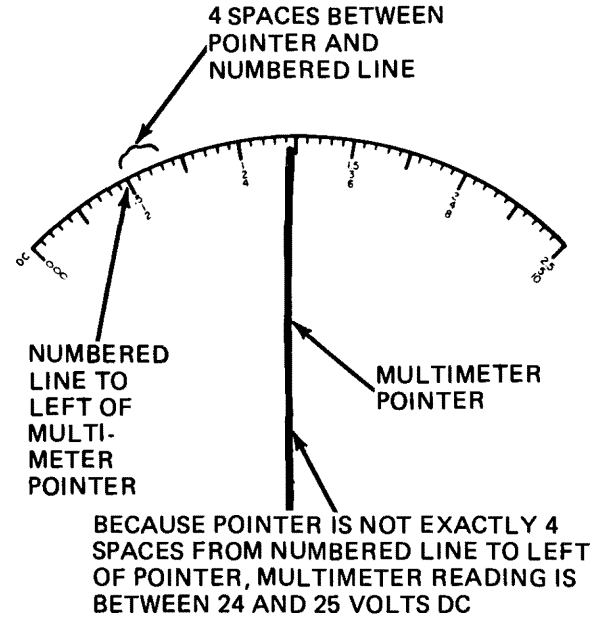


Figure 28-14 (Sheet 4 of 9)

GO



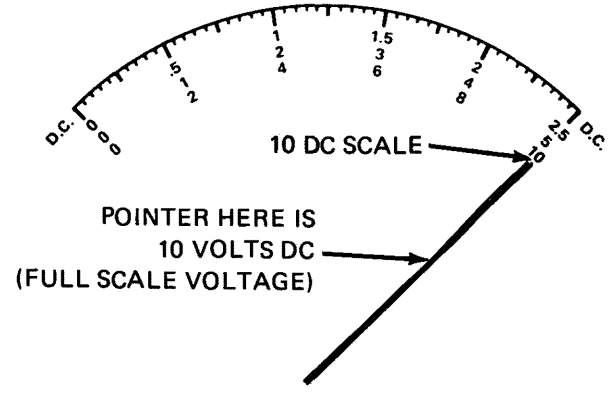
- Get multimeter reading as follows

Step A	Step B	Step C
Read first numbered line to left of pointer. Multiply number by 10.	Count number of spaces between pointer and first numbered line to left of pointer.	Add the numbers from steps A and B.

Example: 2 x 10 = 20 + 4 = 24 volts DC

5

- If multimeter red test lead is in 10 V jack, read multimeter as follows
  - Use 10 DC scale. Full scale voltage is 10 volts DC



GO

TA 114729

Figure 28-14 (Sheet 5 of 9)

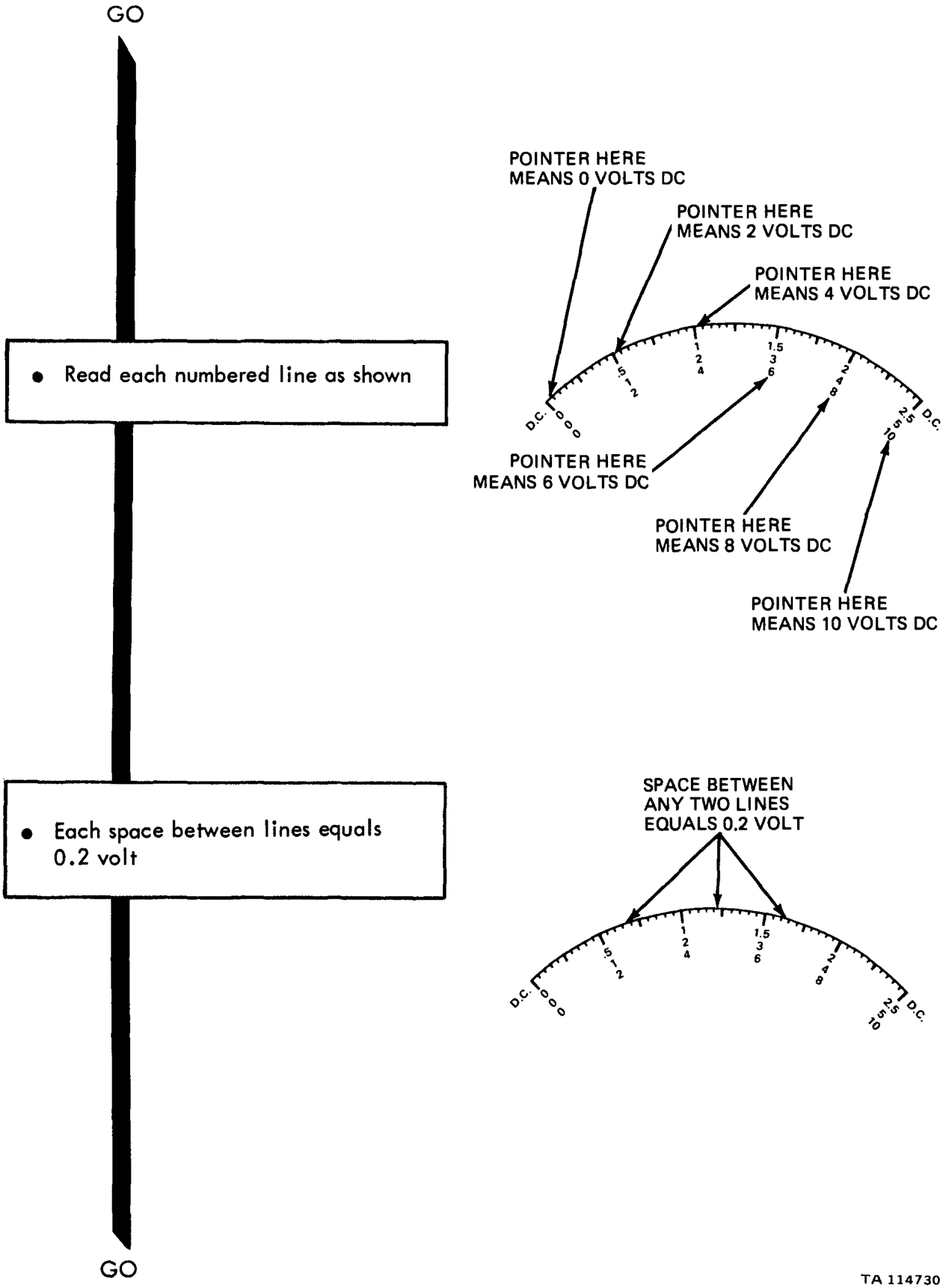
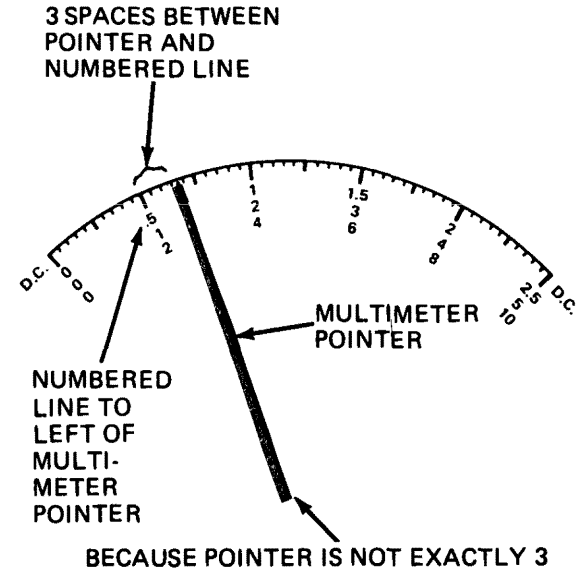


Figure 28-14 (Sheet 6 of 9)

GO

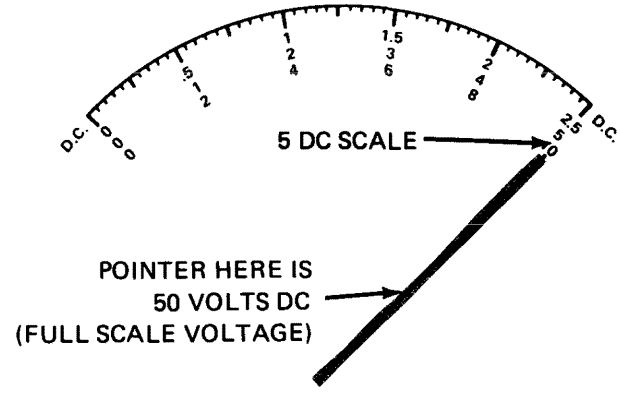


- Get multimeter reading as follows:

Step A	Step B	Step C
Read first numbered line to left of pointer.	Count number of spaces between pointer and first numbered line to left of pointer. Multiply number of spaces by 0.2.	Add the numbers from steps A and B.
Example 2 +	0.2 x 3 = 0.6	= 2.6volts DC

6

- If multimeter red test lead is in 50V jack, read multimeter as follows:
  - Use 5 DC scale. Full scale voltage is 50 volts DC



GO

TA 114731

Figure 28-14 (Sheet 7 of 9)

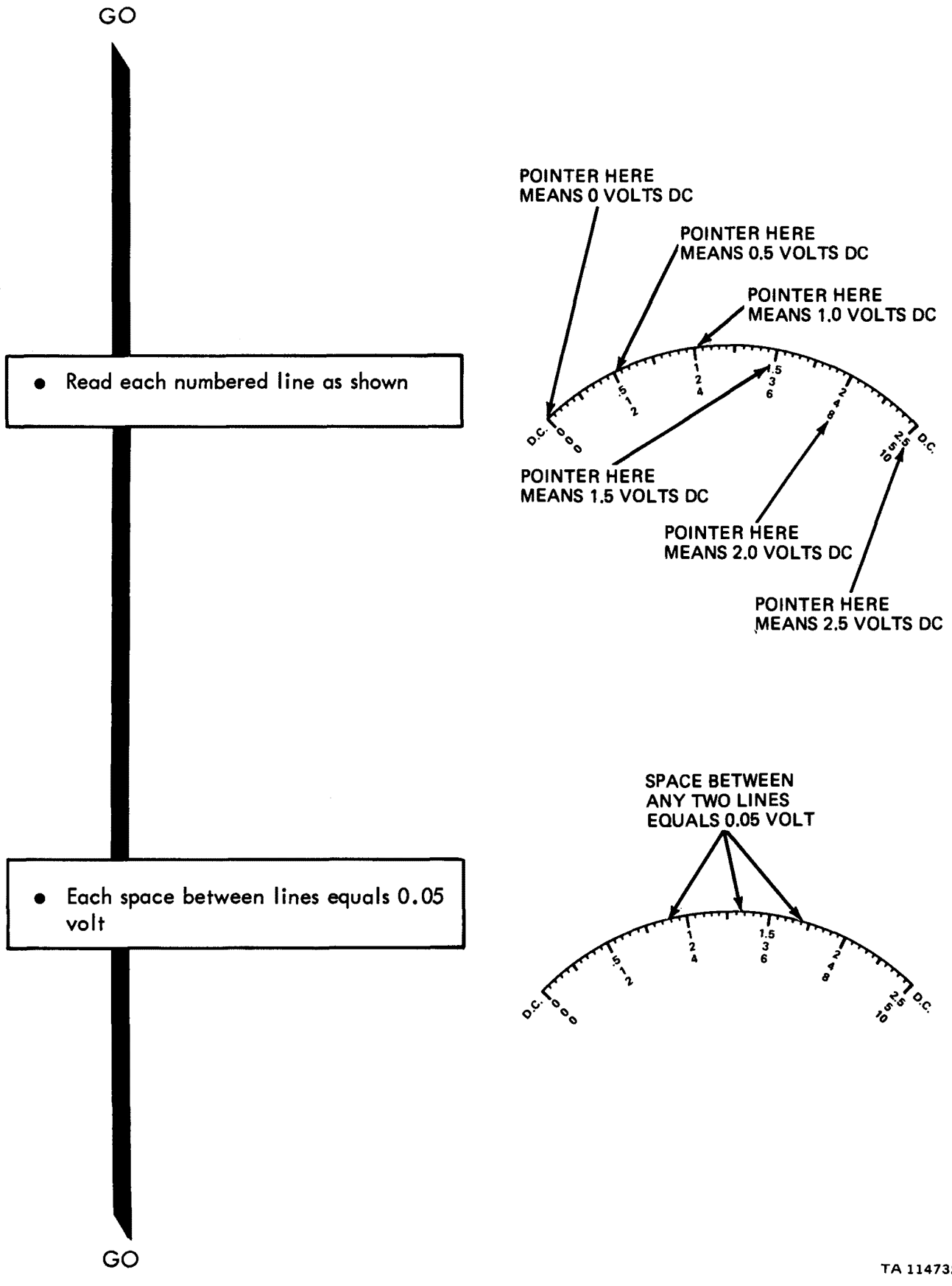
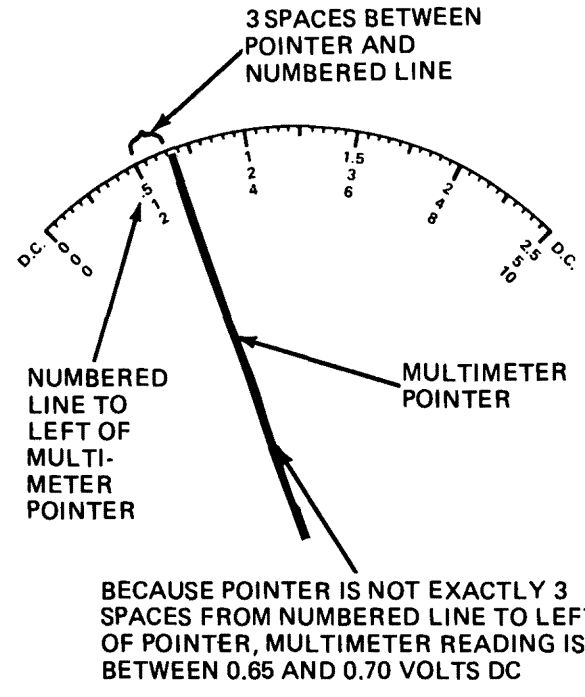


Figure 28-14 (Sheet 6 of 9)

GO



- Get multimeter reading as follows:

Step A	Step B	Step C
Read first numbered line to left of pointer.	Count number of spaces between pointer and first numbered line to left of pointer. Multiply number of spaces by 0.05.	Add the numbers from steps A and B.

Example: 0.5 + 0.05 x 3 = 0.15 = 0.65 volts DC

7

- Make circuit normal again
  - Take both test prods off measured circuit

TA 114733

Figure 28-14 (Sheet 9 of 9)

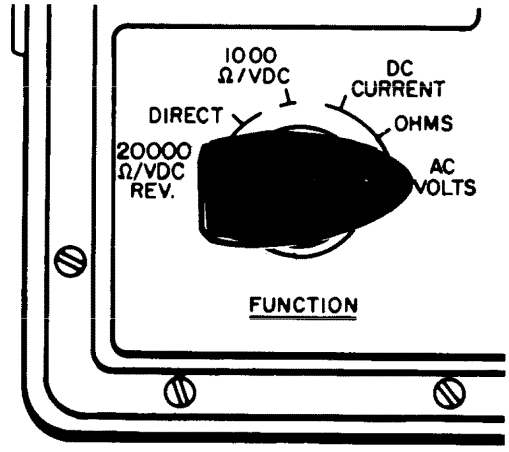
2 AC VOLTAGE TEST - To measure van input and operating voltages

1

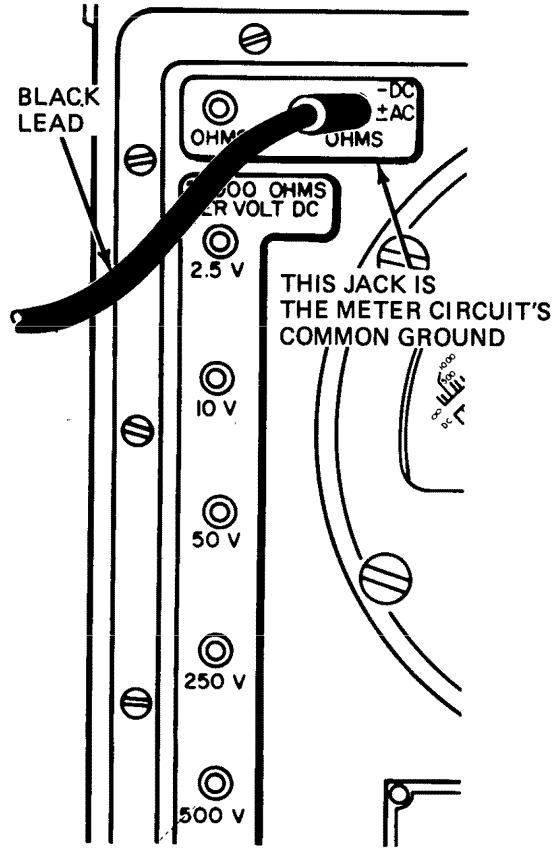
- Set up multimeter as follows

  Note: The range switch and OHMS ZERO ADJ knob are not used for AC voltage tests

- Set FUNCTION switch to AC VOLTS



- Put jack plug of black test lead into -DC ±AC OHMS jack



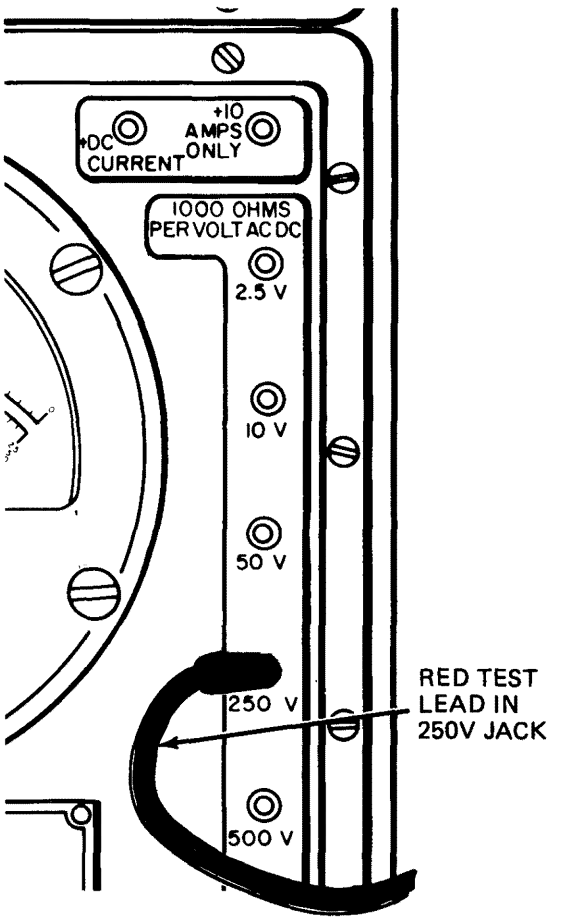
GO

TA 114734

Figure 28-15 (Sheet 1 of 5)

- Put jack plug of red test lead into 250 V jack on right side of multimeter. The jack is in the 1000 OHMS PER VOLT AC DC column

  Note: The truck AC voltages measured are 208 and 120 volts. Therefore, the multimeter red lead is never put into the 2.5 V, 10 V, 50 V, 500 V, and 1000 V jacks



NOTE

When you need to turn on power before measuring AC voltage, the fault isolation procedure gives the turn-on instructions.

GO

TA 114735

Figure 28-15 (Sheet 2 of 5)

GO

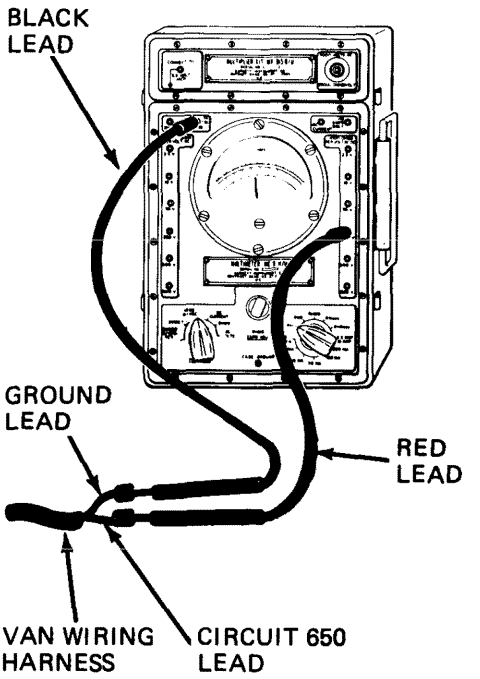
2

- Put multimeter leads across (in parallel with) circuit being measured

  Note: In AC voltage measurement you can hook up the test lead connections to the circuit either way. You will still get correct multimeter readings and no damage will be done to the multimeter. But, when one side of the circuit is electrical ground, it is a good idea to put the black lead on electrical ground

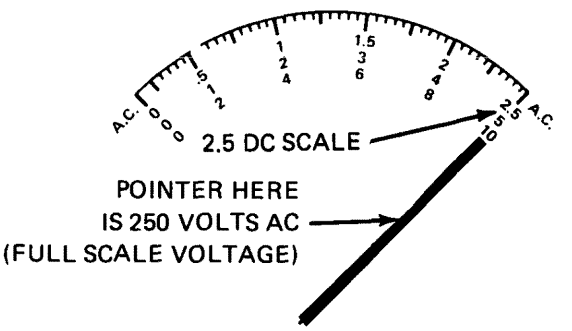
  - Put test prod of black lead on ground side or one side of circuit being measured. Put test prod of red lead on other side of circuit being measured

NOTE: MULTIMETER SHOWN MEASURING 120 VOLTS AC VAN CEILING LIGHT VOLTAGE.



3

- Read multimeter
  - Use 2.5 AC scale. Full scale voltage is 250 volts AC



GO

TA 114736

Figure 28-15 (Sheet 3 of 5)

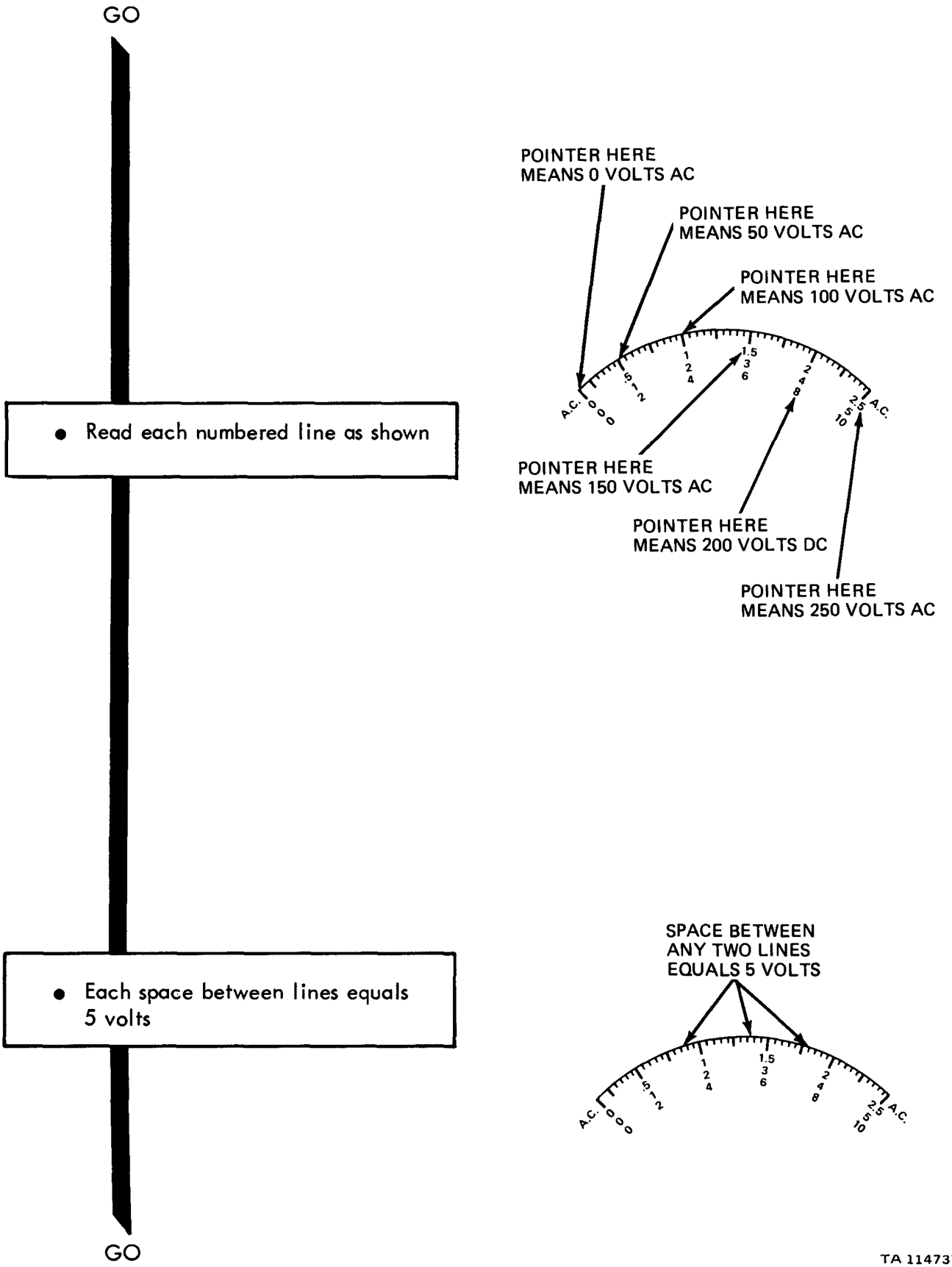
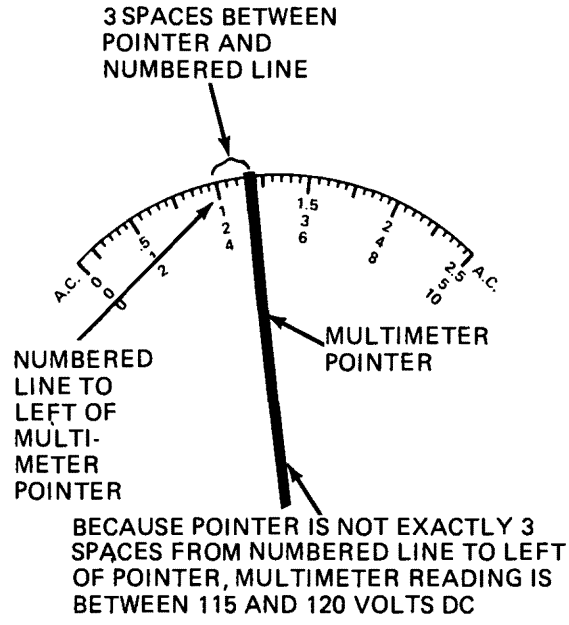


Figure 28-15 (Sheet 4 of 5)

GO



- Get multimeter reading as follows:

Step A	Step B	Step C
Read first numbered line to left of pointer. Multiply number by 100.	Count number of spaces between pointer and first numbered line to left of pointer. Multiply number of spaces by 5.	Add the numbers from steps A and B.

Example: 1 x 100 = 100 + 5 x 3 = 15 = 115 volts AC

4

- Make circuit normal again
  - Take both test prods off measured circuit

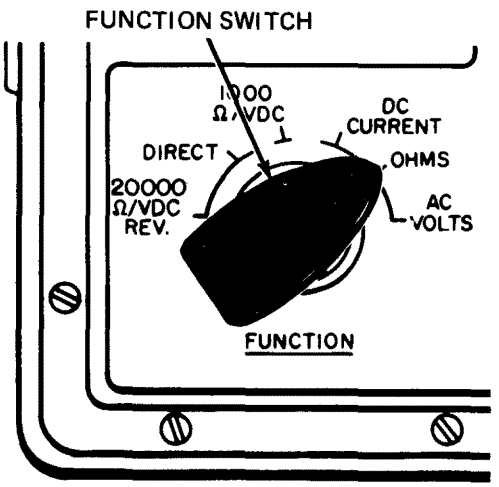
TA 114738

Figure 28-15 (Sheet 5 of 5)

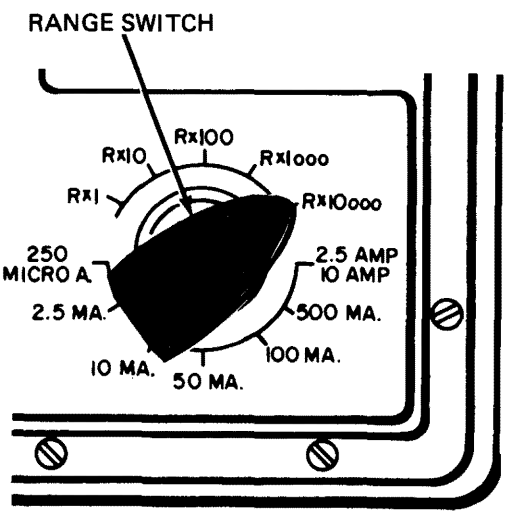
3 RESISTANCE TEST - To measure resistance of cold start resistors, temperature sending unit, and blower motor resistor

1

- Set up multimeter
  - Set FUNCTION switch to OHMS



- Set range switch to RX10000



GO

TA 114739

Figure 28-16 (Sheet 1 of 10)

GO

- Put jack plug of black (-) test lead into -DC ±AC OHMS jack
- Put jack plug of red (+) test lead into OHMS jack.

NOTE

Detailed steps for making the truck parts ready for resistance test are in the fault isolation procedures. The steps given here are typical

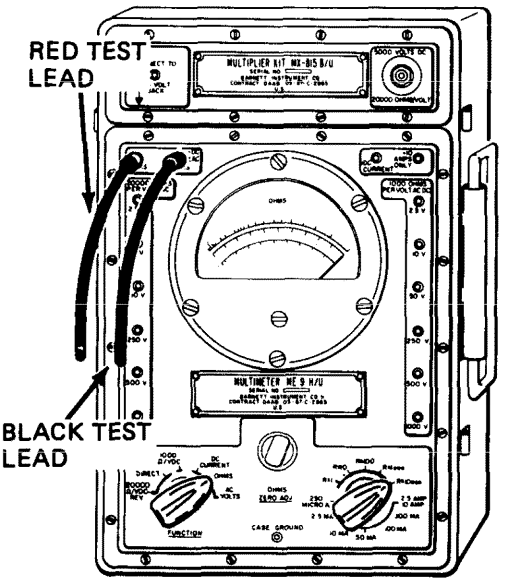
2

- Make tested part ready for resistance test

CAUTION

If power to tested part is not turned off, multimeter will be damaged

GO

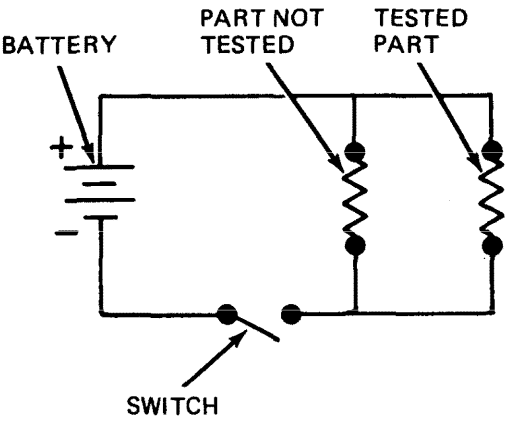


TA 114740

Figure 28-16 (Sheet 2 of 10)

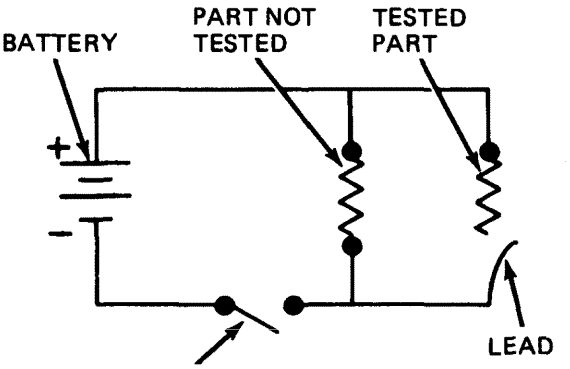
GO

- Turn off power to tested part



NOTE: OPENING SWITCH TURNS OFF POWER TO TESTED PART.

- Take off one lead from tested part



NOTE: TAKING OFF ONE LEAD TAKES TESTED PART OUT OF CIRCUIT.

GO

TA 114741

Figure 28-16 (Sheet 3 of 10)

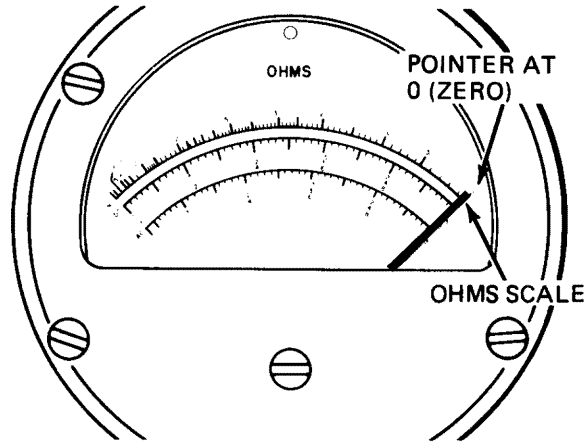
GO

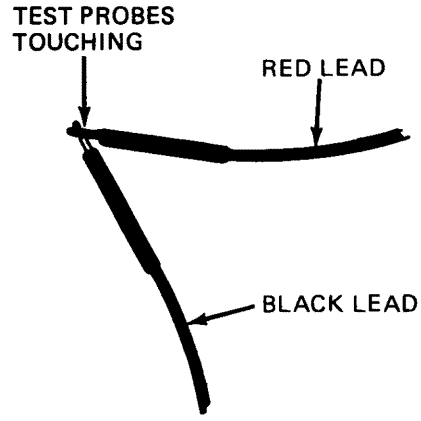
3

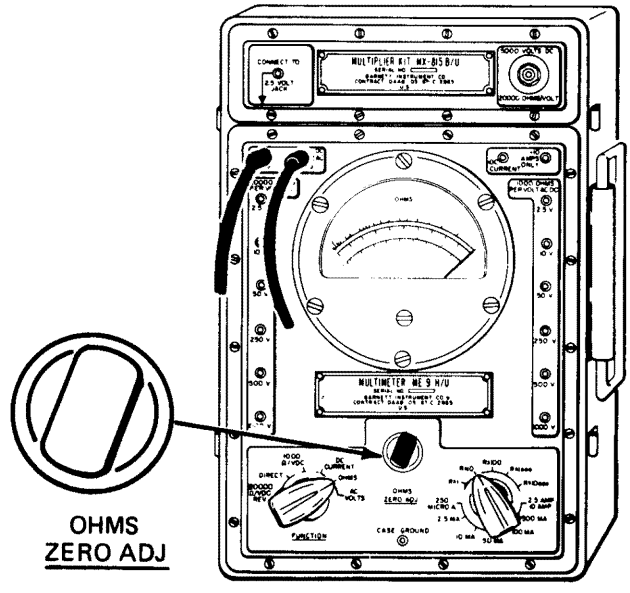
- Zero the multimeter
  - Touch multimeter test probes together

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ZERO ADJ knob to move pointer to 0.

GO







TA 114742

Figure 28-16 (Sheet 4 of 10)

GO

4

- Put multimeter leads across tested part
  - Put one test prod on one terminal of tested part
  - Put other test prod on other terminal of tested part

NOTE

Zero the multimeter each time you turn the range switch knob to another position. (See step 3)

5

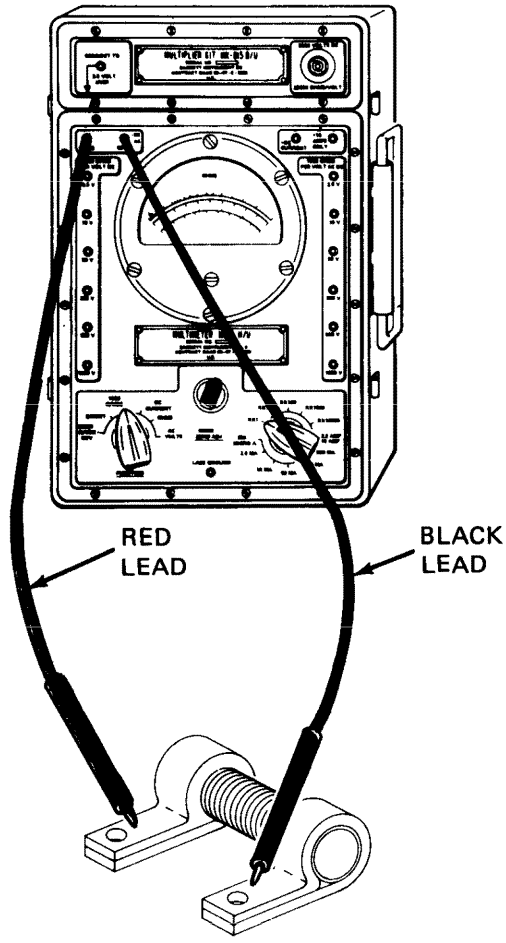
- Get the most accurate multimeter reading as follows

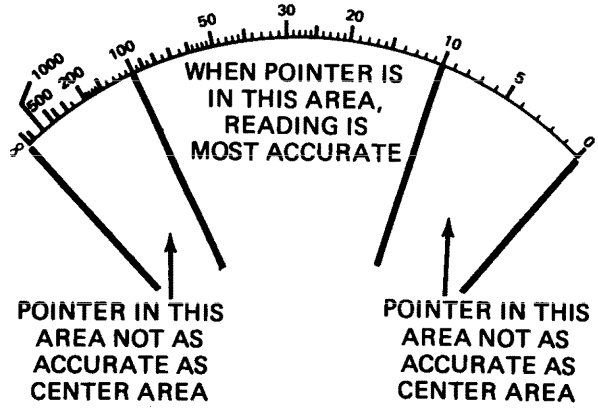
  Note: The closer the multimeter pointer is to the center of the OHMS scale, the more accurate the reading

  - Note position of pointer on OHMS scale. Turn range switch knob to left while looking at pointer. Try to find range switch knob position that gives most centered pointer position

GO

NOTE: MULTIMETER SHOWN MEASURING RESISTANCE OF A COLD START RESISTOR





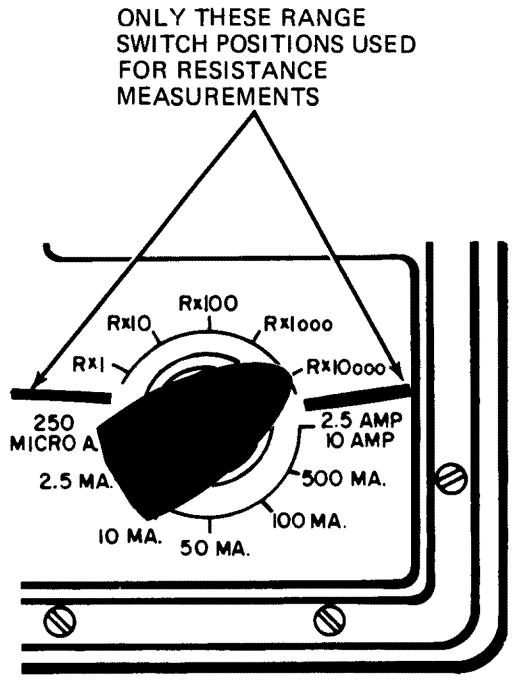
TA 114743

Figure 28-16 (Sheet 5 of 10)

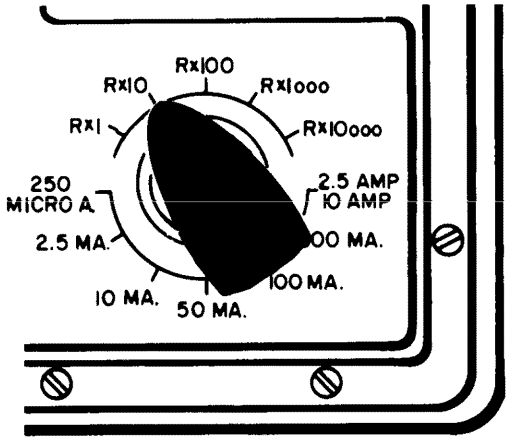
GO

- You may overshoot most centered pointer position. If you do, turn range switch knob to right to put pointer in most centered position

GO



NOTE: MOVING RANGE SWITCH KNOB TO LEFT MOVES POINTER TO LEFT.



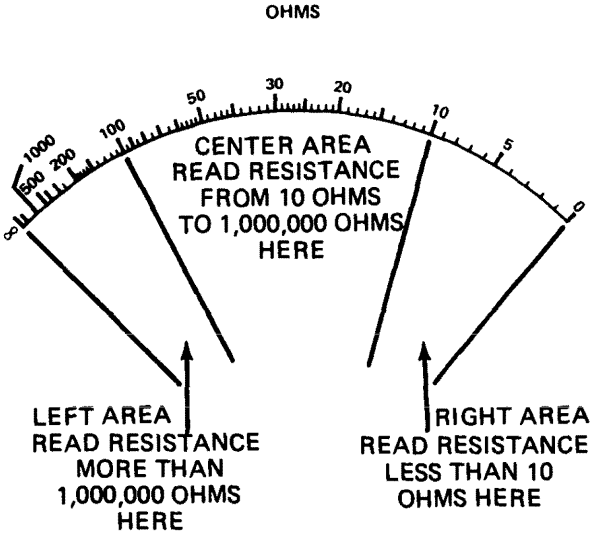
NOTE: MOVING RANGE SWITCH KNOB TO RIGHT MOVES POINTER TO RIGHT.

TA 114744

Figure 28-16 (Sheet 6 of 10)

GO

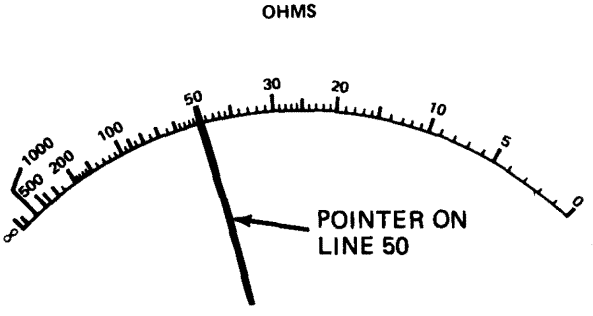
- Pointer will stay in right area if resistance is less than 10 ohms. Pointer will stay in left area if resistance is more than 1,000,000 ohms
- Leave range switch in position that puts pointer in most centered position



6

- If pointer falls exactly on a numbered line read multimeter as follows:

  a. Look at OHMS scale and see which numbered line pointer is on: 50



  b. See what range switch position number is: 10

  c. Multiply number from step a by number from step b to get multimeter reading:
  50 X 10 = 500 Ohms

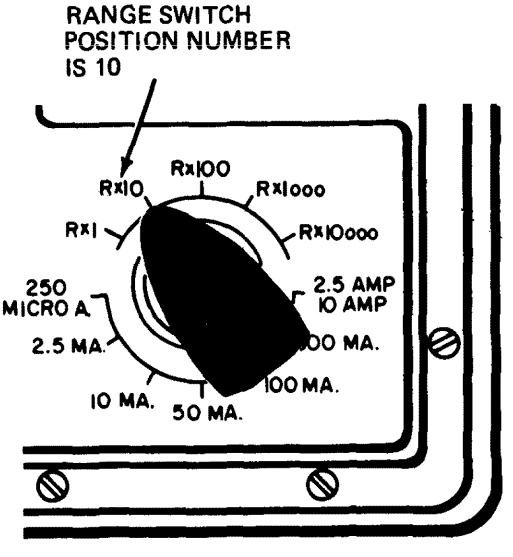


Figure 28-16 (Sheet 7 of 10)

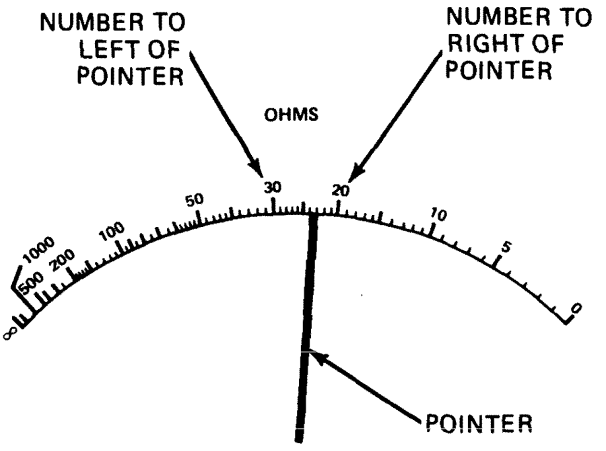
GO

7

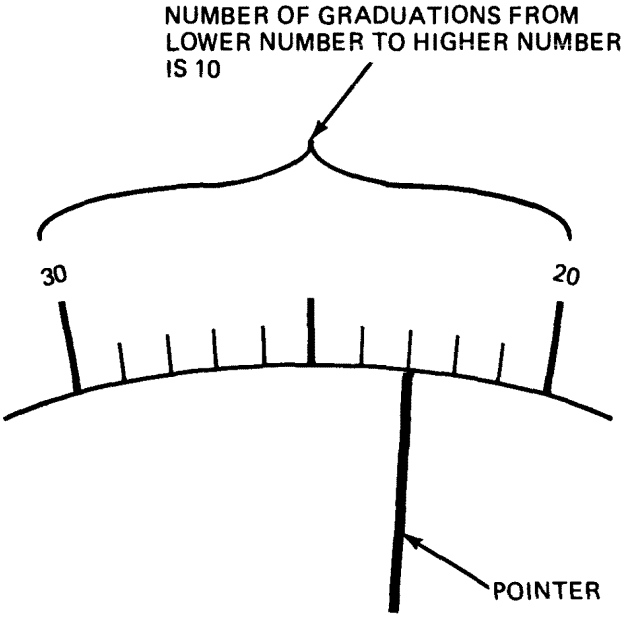
- If pointer falls between numbered lines read multimeter as follows

  a. Look at OHMS scale and note the numbers to left and right of pointer: 30 and 20

  b. Subtract lower number from higher number: 30 - 20 = 10



c. Count number of graduations from lower number to higher number. (If pointer is to left of number 50, count only the longer graduations): 10



GO

TA 114746

Figure 28-16 (Sheet 8 of 10)

GO

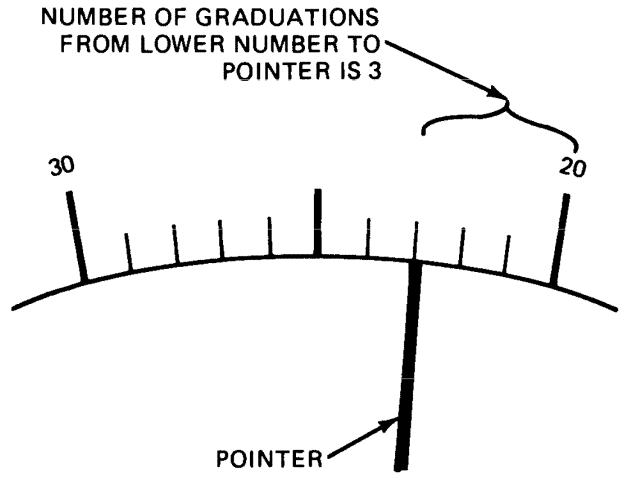
d. Divide number from step b by number of graduations counted from step c: 10 ÷ 10 = 1

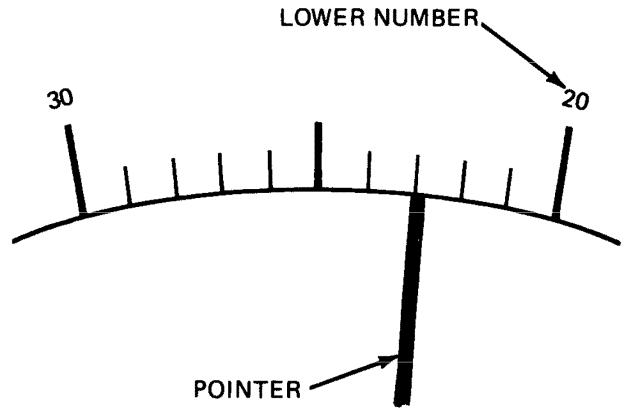
e. Count number of graduations from lower number to pointer. (If pointer is to left of number 50, count only the longer graduations): 3

f. Multiply number of graduations counted in step e by answer from step d: 3 X 1 = 3

g. Add answer from step f to lower number to get scale reading: 3 + 20 = 23

GO



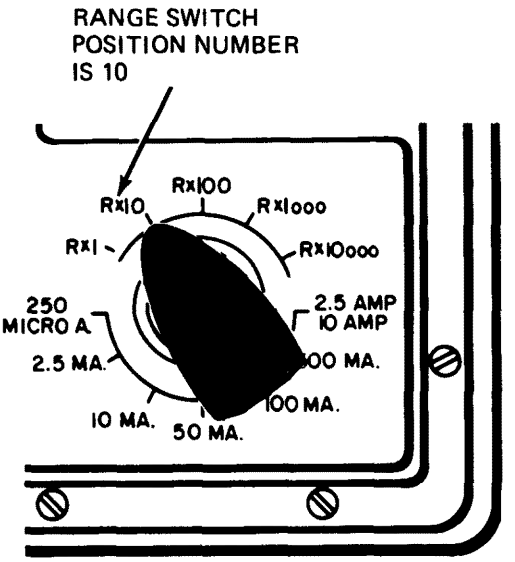


TA 114747

Figure 28-16 (Sheet 9 of 10)

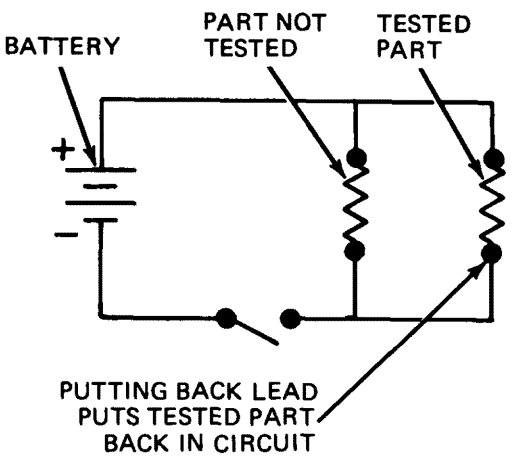
GO

h. Multiply scale reading (step g) by range switch position number to get multimeter reading:
23 x 10 = 230 ohms



8

- Put tested part back in circuit:
  - Take off both test prods from across tested part
  - Put lead back on tested part



TA 114748

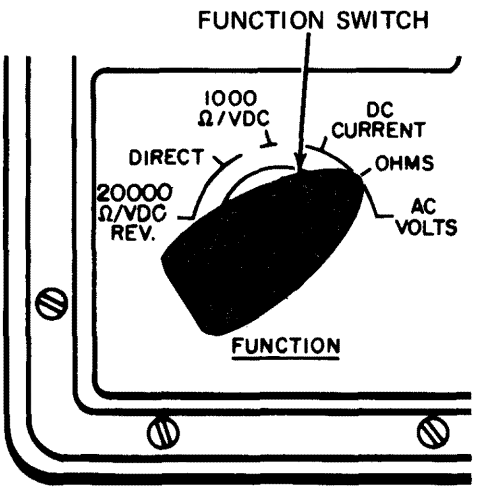
Figure 28-16 (Sheet 10 of 10)

Test

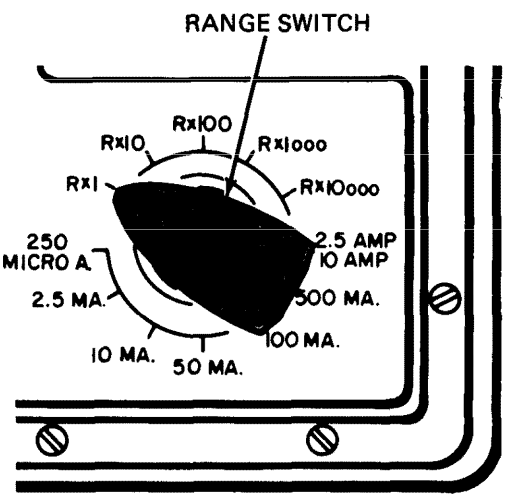
4 CONTINUITY TEST - To check for breaks in a circuit, such as switch, lamp or electrical cable circuits

1

- Set up multimeter
- Set FUNCTION switch to OHMS



- Set range switch to RX1.



GO

TA 114749

Figure 28-17 (Sheet 1 of 6)

GO

- Put jack plug of black (-) test lead into -DC ±AC OHMS jack
- Put jack plug of red (+) test lead into OHMS jack

NOTE

Detailed steps for making the truck circuits ready for continuity tests are in the fault isolation procedures. The steps given here are typical.

2

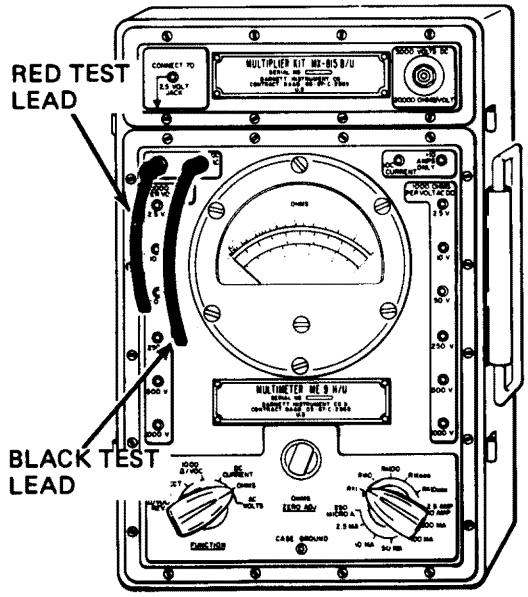
- Make tested circuit ready for continuity test

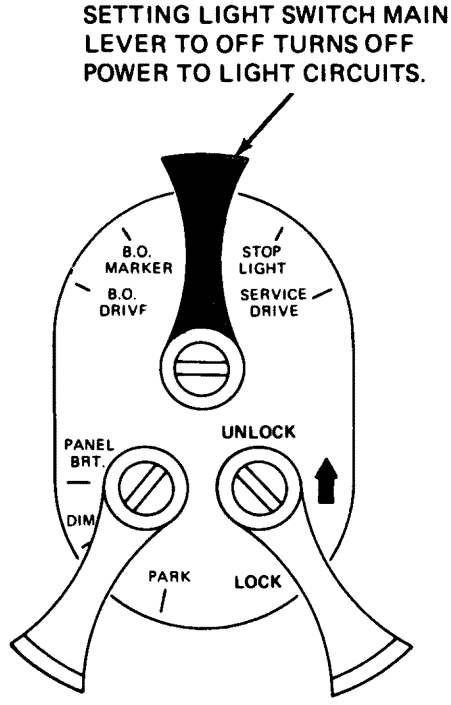
CAUTION

If power to tested circuit is not turned off, multimeter will be damaged.

- Turn off power to tested circuit

GO





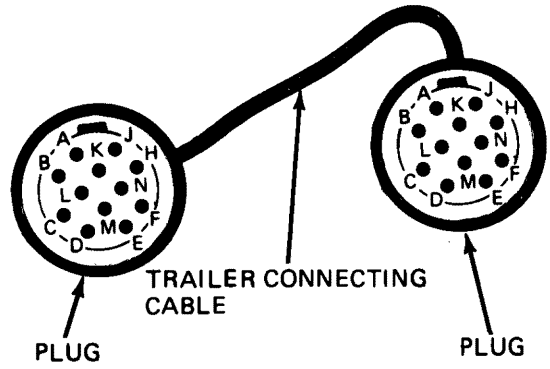
TA 114750

Figure 28-17 (Sheet 2 of 6)

GO

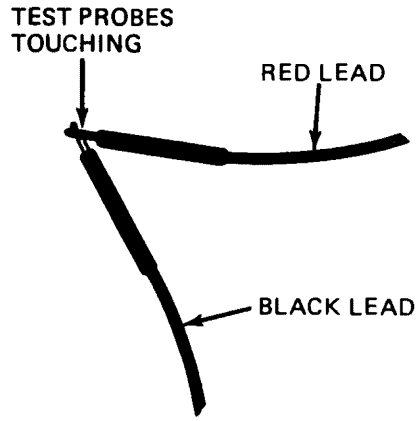
- Take plug on each end of trailer connecting cable off mating receptacle.

TAKING CABLE PLUGS OFF MATING RECEPTACLES LETS YOU TEST CONTINUITY OF CABLE WIRES



3

- Zero the multimeter
  - Touch multimeter test probes together



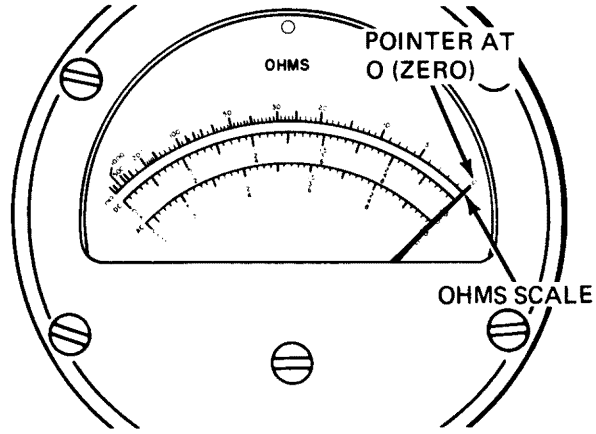
GO

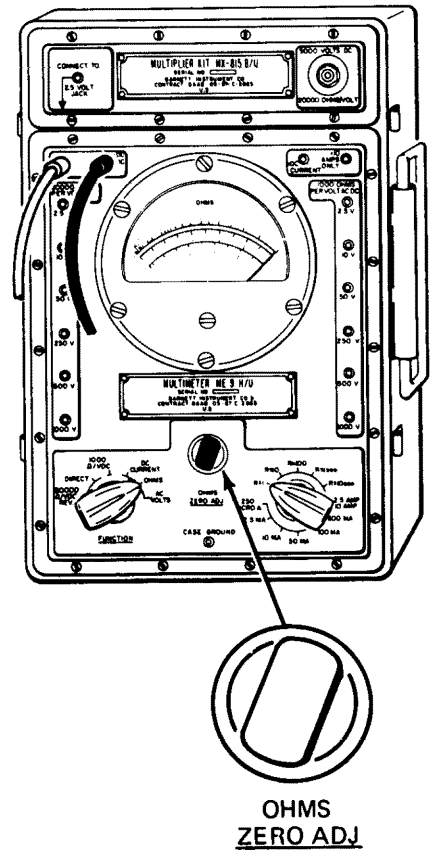
TA 114751

Figure 28-17 (Sheet 3 of 6)

GO

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ZERO ADJ knob to move pointer to 0





GO

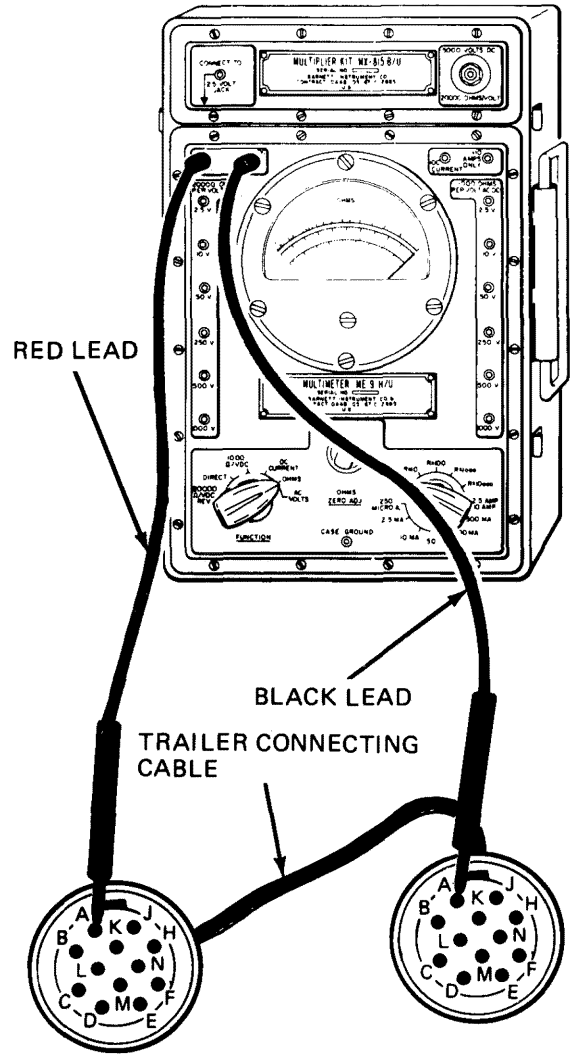
TA 114752

Figure 28-17 (Sheet 4 of 6)

GO

4

- Put multimeter leads across tested circuit
  - Put test prod of black lead (-) on one contact of tested circuit
  - Put test prod of red lead (+) on other contact of tested circuit



NOTE: MULTIMETER SHOWN CHECKING CONTINUITY OF TRAILER CONNECTING CABLE WIRE ATTACHED TO CONTACT A.

GO

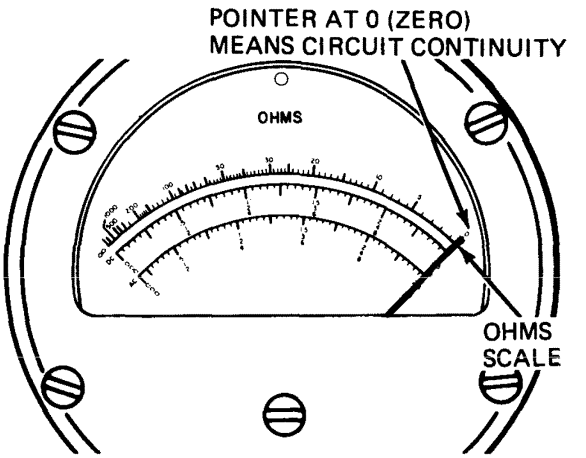
TA 114753

Figure 28-17 (Sheet 5 of 6)

GO

5

- Read multimeter
  - Look at multimeter OHMS scale. For continuity, pointer should be all the way to far right over 0 (zero)
  - If pointer stays all the way to left, tested circuit is open. If pointer jumps or flickers, tested circuit has a loose connection



6

- Put tested circuit back in operation
  - Take off both test prods from contacts of tested circuit
  - Put back any plugs or other parts previously removed to test continuity

Figure 28-17 (Sheet 6 of 6)

5 SHORT TEST - To check for shorts in electrical cables

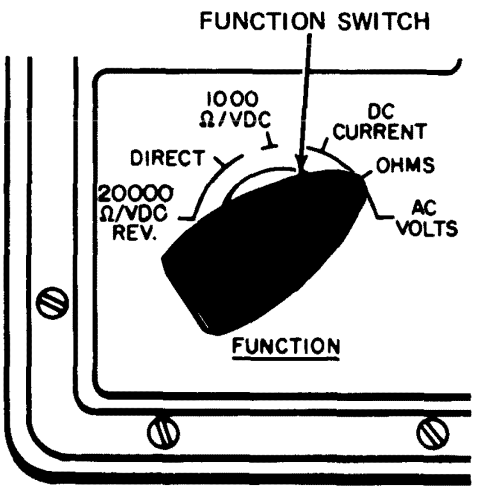
NOTE

A short (or short circuit) happens when two circuits that should not be connected have metal-to-metal contact with each other. A short also happens when a circuit that should not touch electrical ground has metal-to-metal contact with ground

1

- Set up multimeter
  - Set FUNCTION switch to OHMS

GO

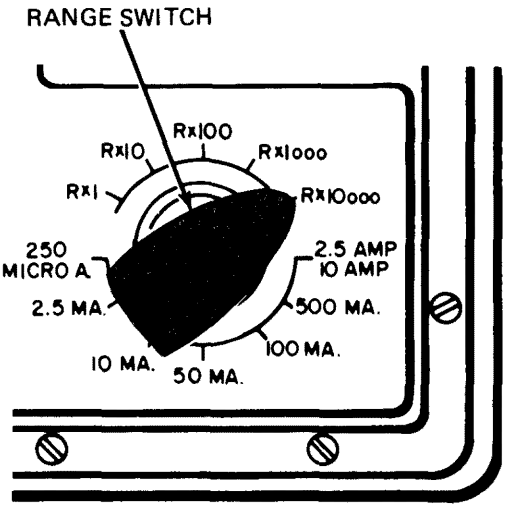


TA 114754

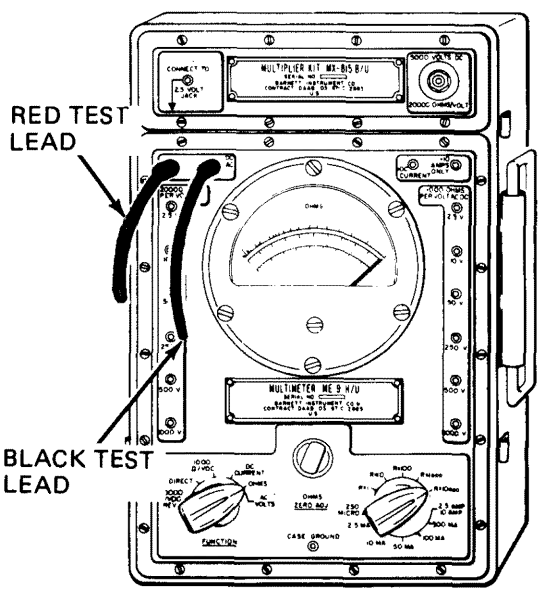
Figure 28-18 (Sheet 1 of 8)

GO

- Set range switch to RX10000



- Put jack plug of black (-) test lead into -DC ±AC OHMS jack.
- Put jack plug of red (+) test lead into OHMS jack



GO

TA 114755

Figure 28-18 (Sheet 2 of 8)

GO

NOTE

Detailed steps for making the truck circuits ready for short test are in the fault isolation procedures. The steps given here are typical

2

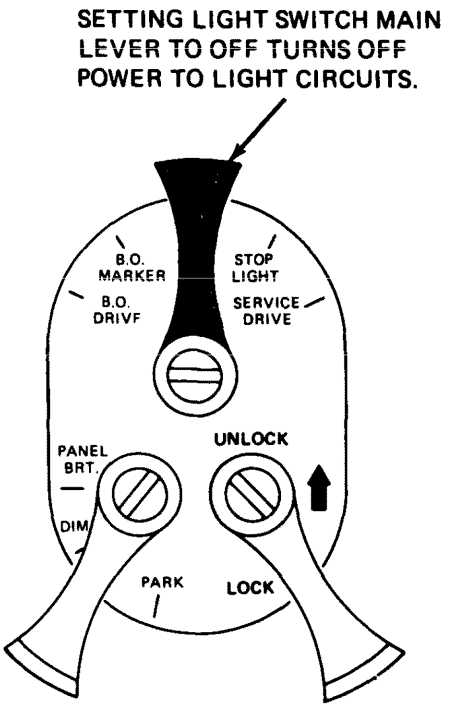
- Make tested circuits ready for short test

CAUTION

If power to tested circuits is not turned off, multimeter will be damaged

- Turn off power to tested circuit

GO



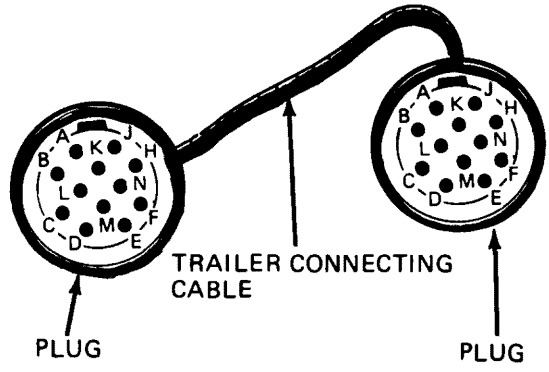
TA 114756

Figure 28-18 (Sheet 3 of 8)

GO

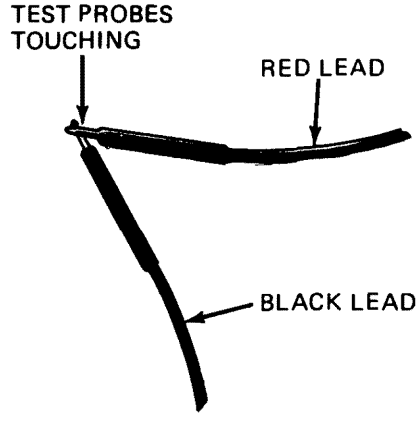
- Take plug on each end of trailer connecting cable off mating receptacle

TAKING CABLE PLUGS OFF MATING RECEPTACLES LETS YOU TEST CABLE WIRES FOR SHORTS



3

- Zero the multimeter:
  - Touch multimeter test probes together



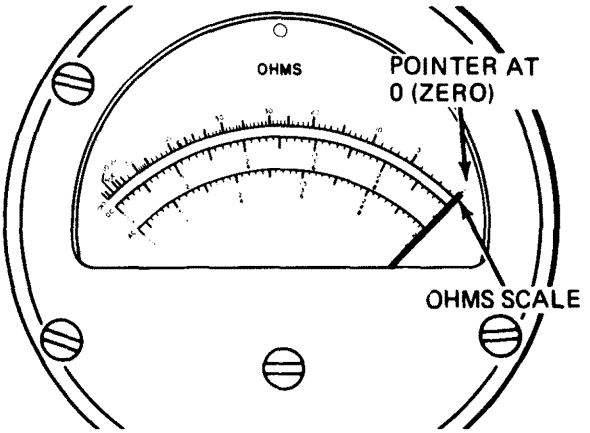
GO

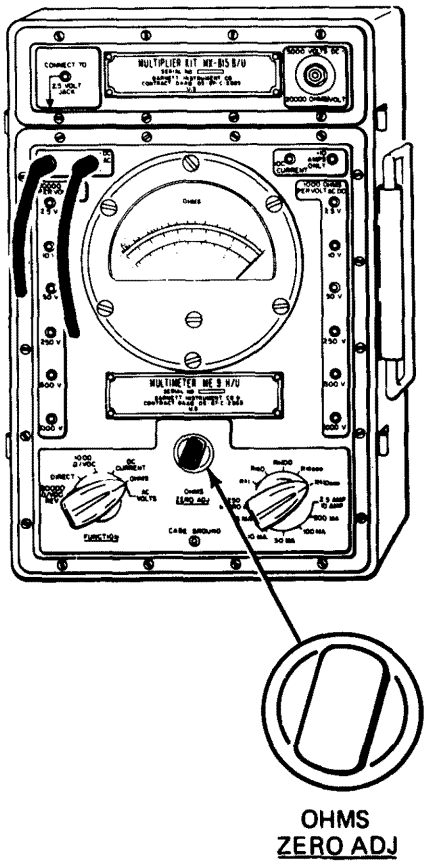
TA 114757

Figure 28-18 (Sheet 4 of 8)

GO

- While touching multimeter test probes together look at OHMS scale. Pointer should be at 0 (zero). If it is not, turn OHMS ZERO ADJ knob to move pointer to 0





GO

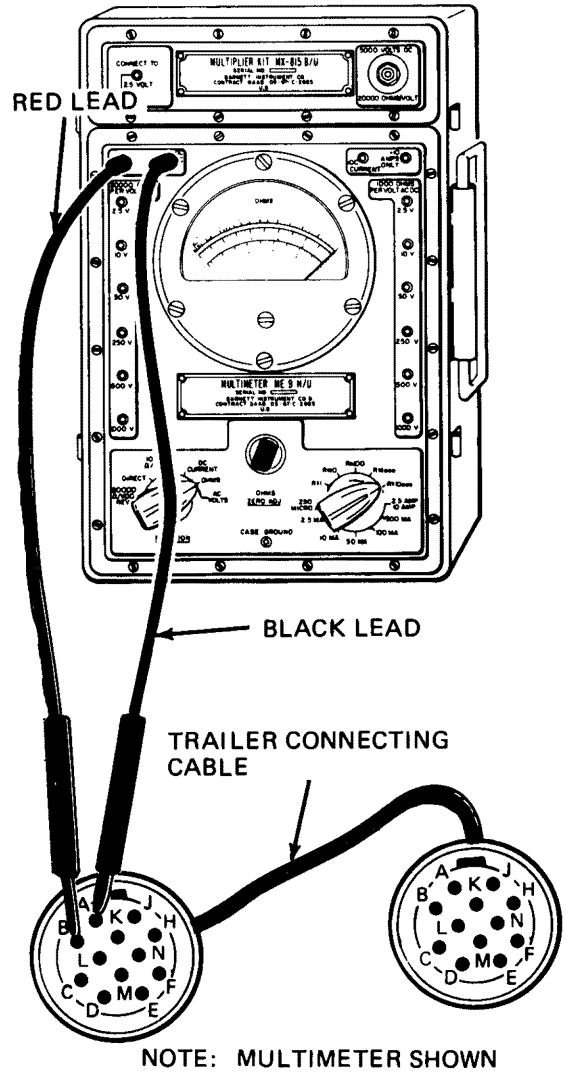
TA 114758

Figure 28-18 (Sheet 5 of 8)

GO

4

- Put multimeter leads across tested circuits
  - To test for short between two circuits, put test probes on contacts of both circuits



NOTE: MULTIMETER SHOWN CHECKING FOR SHORT BETWEEN TRAILER CONNECTOR CABLE WIRES ATTACHED TO CONTACTS A AND B.

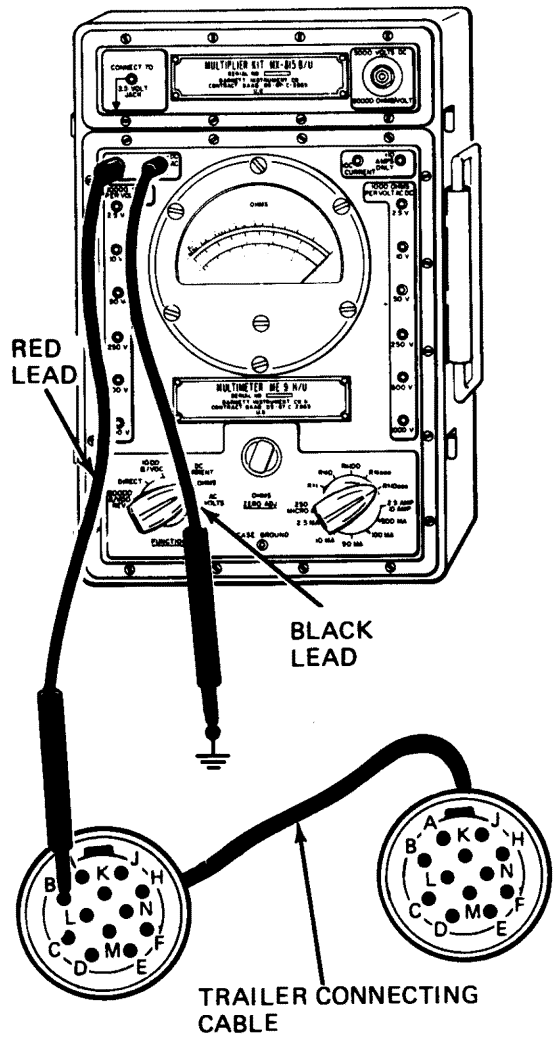
GO

TA 114759

Figure 28-18 (Sheet 6 of 8)

GO

- To test for short between a circuit and ground, put one test probe on circuit contact and other test probe on ground



NOTE: MULTIMETER SHOWN CHECKING FOR SHORT BETWEEN TRAILER CONNECTOR CABLE WIRE ATTACHED TO CONTACT B AND GROUND.

GO

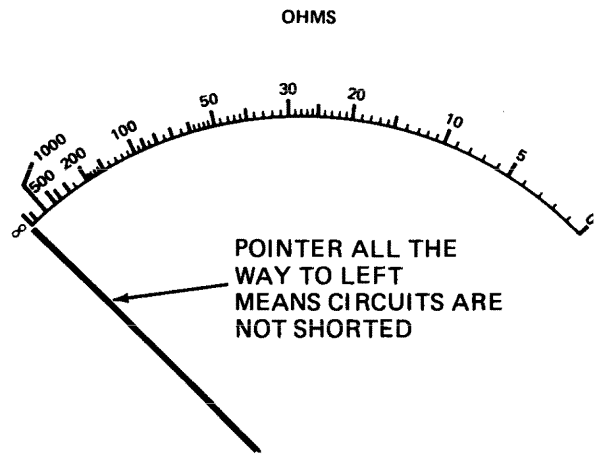
TA 114760

Figure 28-18 (Sheet 7 of 8)

GO

5

- Read multimeter
  - Look at multimeter OHMS scale. If pointer stays all the way to far left without moving, circuits are not shorted
  - If pointer moves all the way to far right over 0 (zero), circuits are shorted. If pointer jumps or flickers, circuits are sometimes shorted



6

- Put tested circuit back in operation
  - Take off both test prods from contacts of tested circuit and from ground
  - Put back any plugs or other parts previously removed to test for shorts

TA 114761

Figure 28-18 (Sheet 8 of 8)

CHAPTER 29

OPERATING AND PRELIMINARY PROCEDURES

29-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment operating and preliminary procedures for the system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

29-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

GENERAL INFORMATION

NOTE

When making light switch main lever selections from OFF to any ON position except B. O. MARKER, unlock switch must be lifted to UNLOCK position

To activate brake lights (service or blackout) air pressure in system must be up

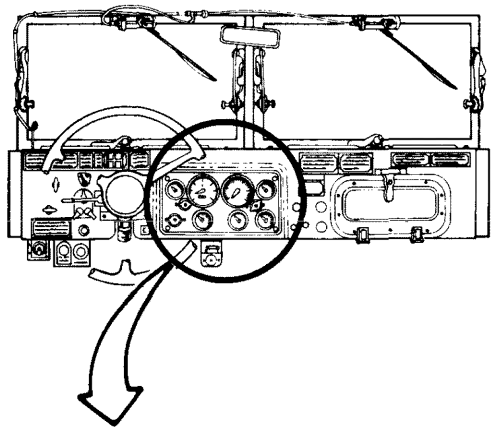
The condition of the batteries should always be checked before troubleshooting any system in the truck

The truck has two 12 volt DC batteries connected in series, to furnish 24 volts DC to the electrical system which uses a negative (-) ground and positive (+) power feed to the electrical components

To test the condition of batteries, set BATTERY SWITCH to ON. (Do not start engine)

The battery indicator should be in position as shown in view A

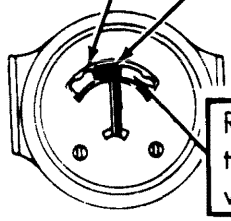
Start engine and run at 1200 RPM. See view B



Readings here indicate a dead battery. Could be undercharged, a short in electrical system or battery is worn out or defective

NORMAL READING

View A



Reading here indicates that battery is nearly worn out

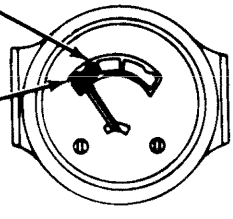
Engine running at 1200 RPM for several minutes, and pointer rests in this area, means battery is not charging. Refer to generator (alternator) system. Refer to troubleshooting index.

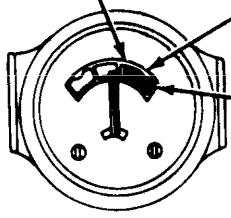
With all electrical units off, run engine to maximum charging rate. If voltage regulator is properly set, pointer will fall in top half of green section

Engine running at maximum charging speed long enough to charge battery, with all electrical units turned on, pointer should stay in green section. If not, voltage regulator is set too low, or battery is worn out

Readings here show battery was recently charged at high rate (overcharged)

View B





Overcharge section. Check for maladjusted or defective voltage regulator. Refer to troubleshooting index.

TA 114762

Figure 29-1

CHAPTER 30

ELECTRICAL SYSTEM CHECKOUT PROCEDURES

30-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

INDICATOR GAGE CHECKOUT

CHECK INDICATOR GAGE

1

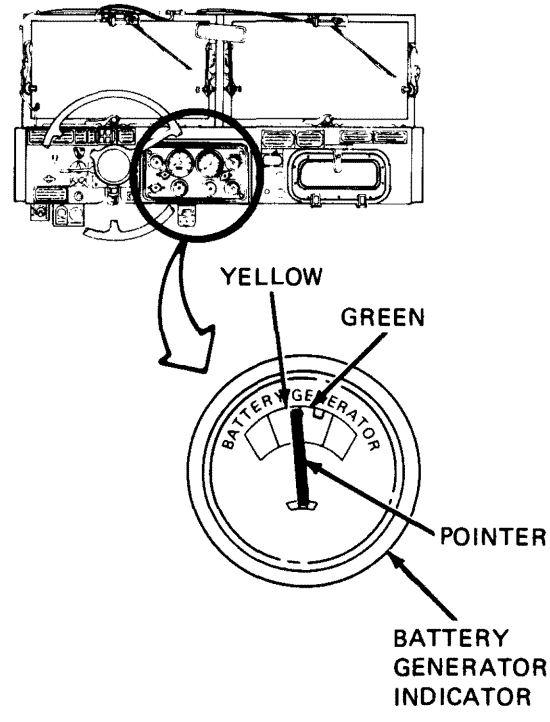
- Park truck
  - Refer to TM 9-2320-209-10

2

- Check that battery-generator indicator works
  - Set ACCESSORY switch to ON
  - Look at battery-generator indicator. Pointer should be at mid yellow and low green

Is battery-generator indicator OK?

GO



TA 114763

Figure 30-1 (Sheet 1 of 6)

GO

YES

NO

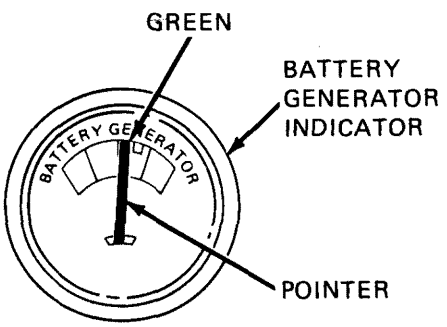
3

- Troubleshoot indicator gage subsystem
  - Set ACCESSORY switch to OFF
  - Troubleshoot indicator gage subsystem. Refer to troubleshooting index for electrical system

4

- Check that battery-generator indicator shows voltage output
  - Start engine. Refer to TM 9-2320-209-10
  - Look at battery-generator indicator. Pointer should be in green area

Is battery-generator indicator OK?



GO

TA 114764

Figure 30-1 (Sheet 2 of 6)

GO

YES

NO

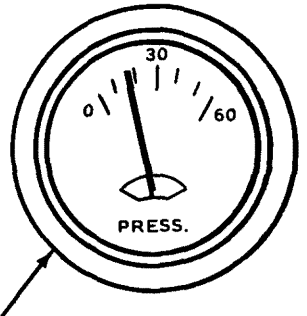
5

- Troubleshooting indicator gage subsystem
  - Stop engine. Refer to TM 9-2320-209-10
  - Troubleshoot indicator gage subsystem. Refer to fault symptom index for electrical system

6

- Check that oil pressure gage works
  - Look at oil pressure gage. At idle, pointer must be at 10 psi minimum, and 40 psi maximum at 2,600 RPM

Is oil pressure gage OK?



OIL PRESSURE GAGE

GO

TA 114765

Figure 30-1 (Sheet 3 of 6)

GO

YES

NO

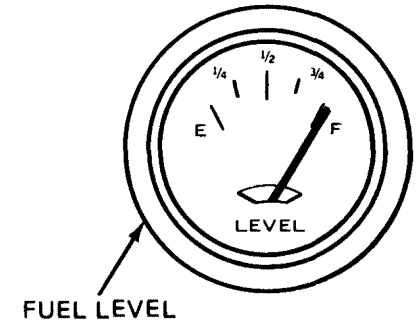
7

- Troubleshoot oil pressure gage
  - Stop engine. Refer to TM 9-2320-209-10
  - Troubleshoot oil pressure gage. Refer to fault symptom index

8

- With fuel tank full check that fuel level indicator gage works
  - Look at fuel level indicator gage. Pointer should be on F

Is indicator gage OK?



FUEL LEVEL INDICATOR GAGE

GO

TA 114766

Figure 30-1 (Sheet 4 of 6)

GO

9

YES

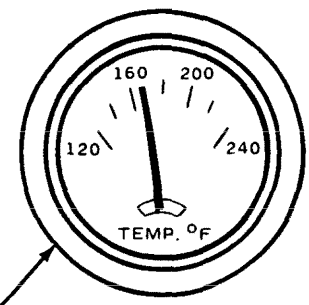
NO

- Troubleshoot fuel level gage subsystem
  - Stop engine. Refer to TM 9-2320-209-10
  - Troubleshoot fuel level indicator gage subsystem. Refer to fault symptom index for electrical system

10

- Check that temperature gage works
  - Look at temperature gage. Pointer should be between 160°F and 180°F when engine is warmed up

Is temperature gage OK?

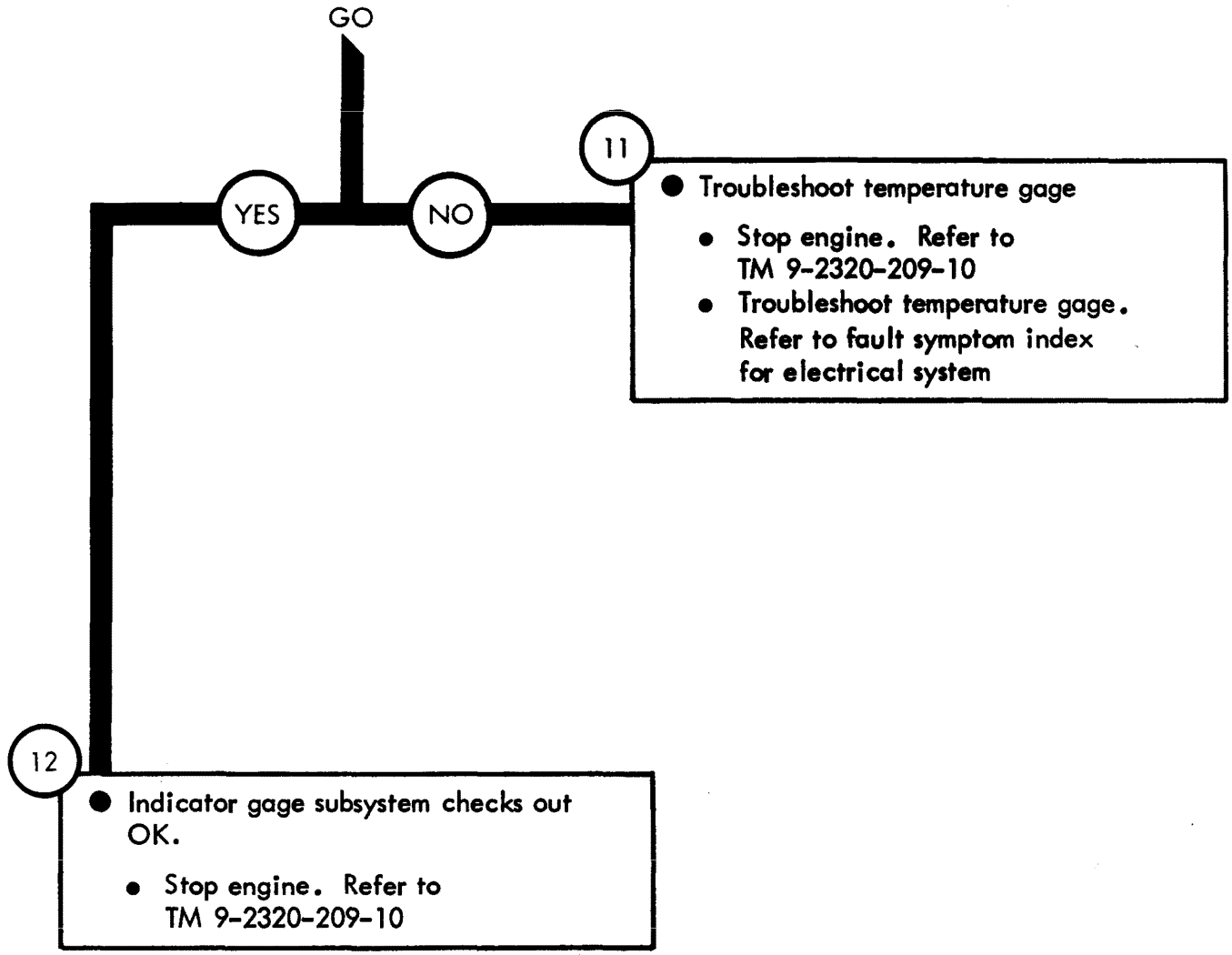


TEMPERATURE GAGE

GO

TA 114767

Figure 30-1 (Sheet 5 of 6)



TA 114768

Figure 30-1 (Sheet 6 of 6)

CHECK IF ALL LIGHTS WORK

NOTE

Two soldiers are needed to checkout lighting subsystem and are noted as Soldier A and Soldier B

Check TM 9-2320-209-10 to see which lights go on for each position of light switch levers

1

- Park truck
  - Refer to TM 9-2320-209-10

2

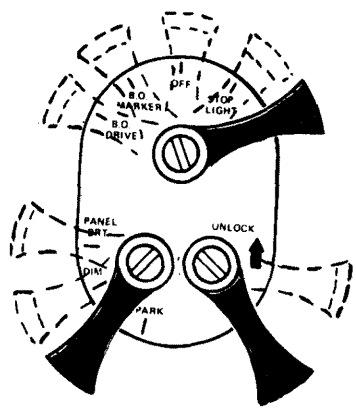
- Check if all lights work

SOLDIER A
- Move light switch levers to lights being tested
- Tell Soldier B which lights are being tested

SOLDIER B
- Look at each light being tested
- Write down if light works or not

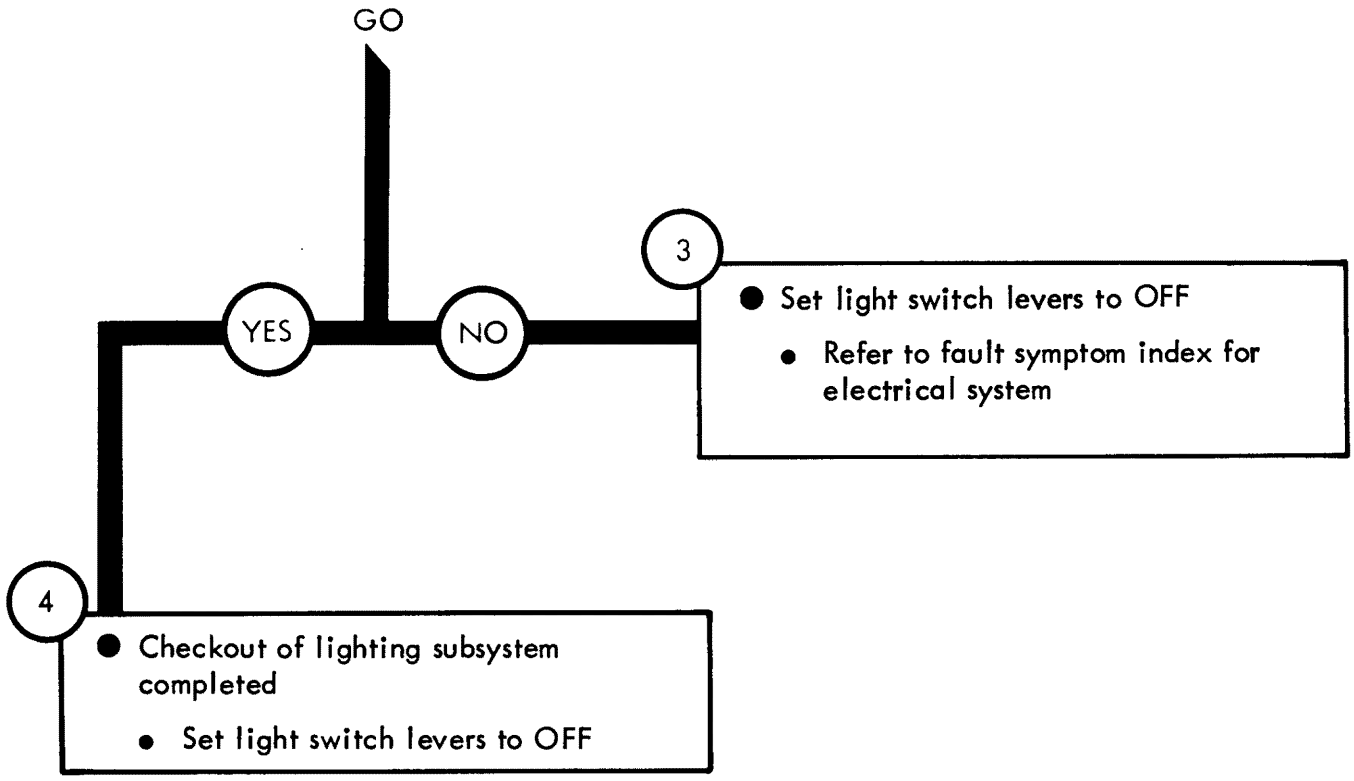
Do all lights work?

GO



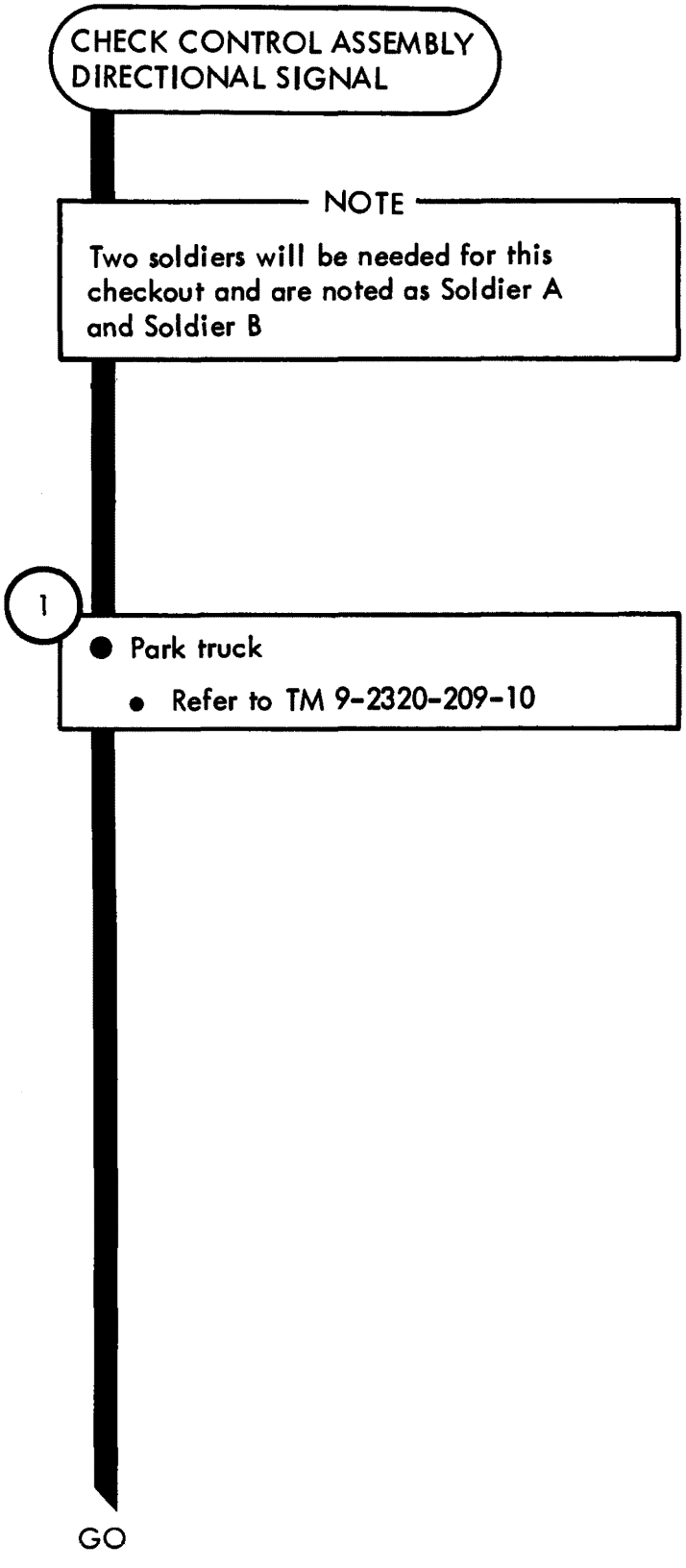
TA 114769

Figure 30-2 (Sheet 1 of 2)



TA 114770

Figure 30-2 (Sheet 2 of 2)



TA 114771

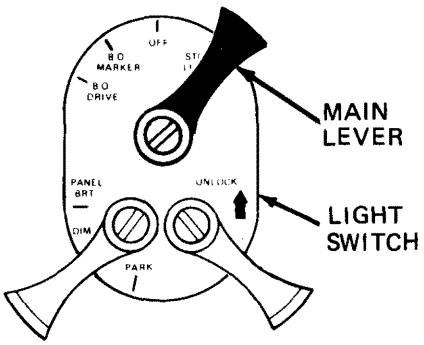
Figure 30-3 (Sheet 1 of 5)

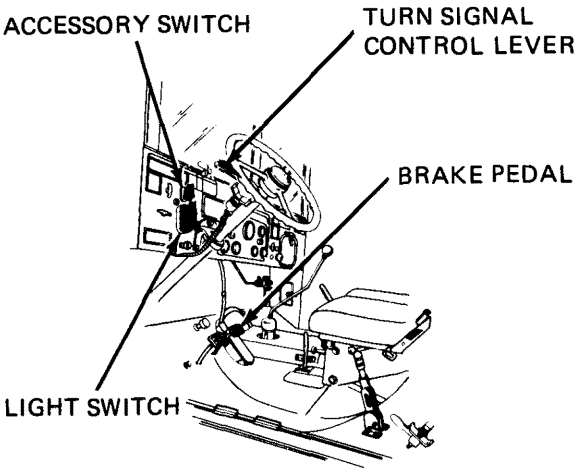
GO

2

- Check that hazard warning lights work

SOLDIER A
- Set light switch main lever to STOPLIGHT
- Set turn signal control arm to hazard warning position
- Check that turn signal control lamp flashes 1 to 2 times per second

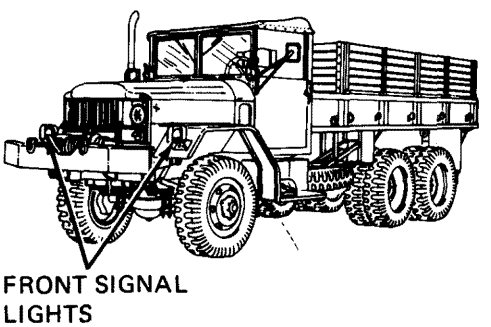


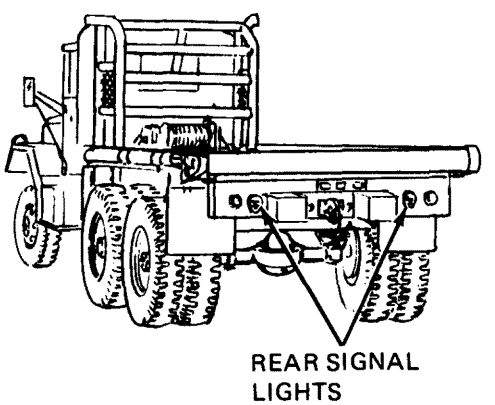


SOLDIER B
- Check that two front signal lamps and two rear signal lamps flash together at 1 to 2 times per second

SOLDIER A
- Step on brake pedal and hold it down
- Check that turn signal control arm lamp flashes 1 to 2 time per second

SOLDIER B
- While Soldier A holds down brake pedal check that rear turn signal lamps flash 1 to 2 times per second





Do hazard warning lamps checkout OK?

GO

TA 114772

Figure 30-3 (Sheet 2 of 5)

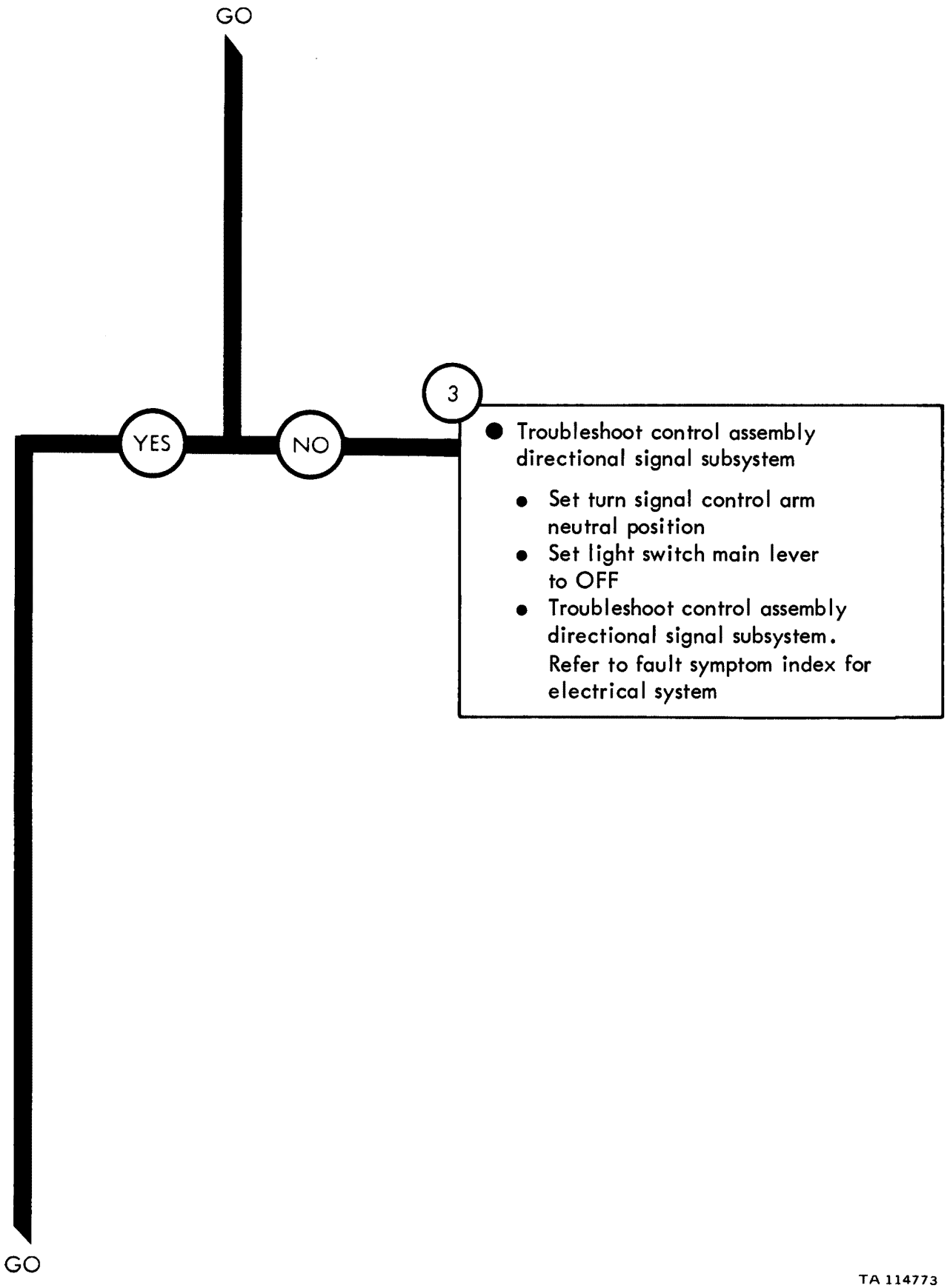


Figure 30-3 (Sheet 3 of 5)

GO

4

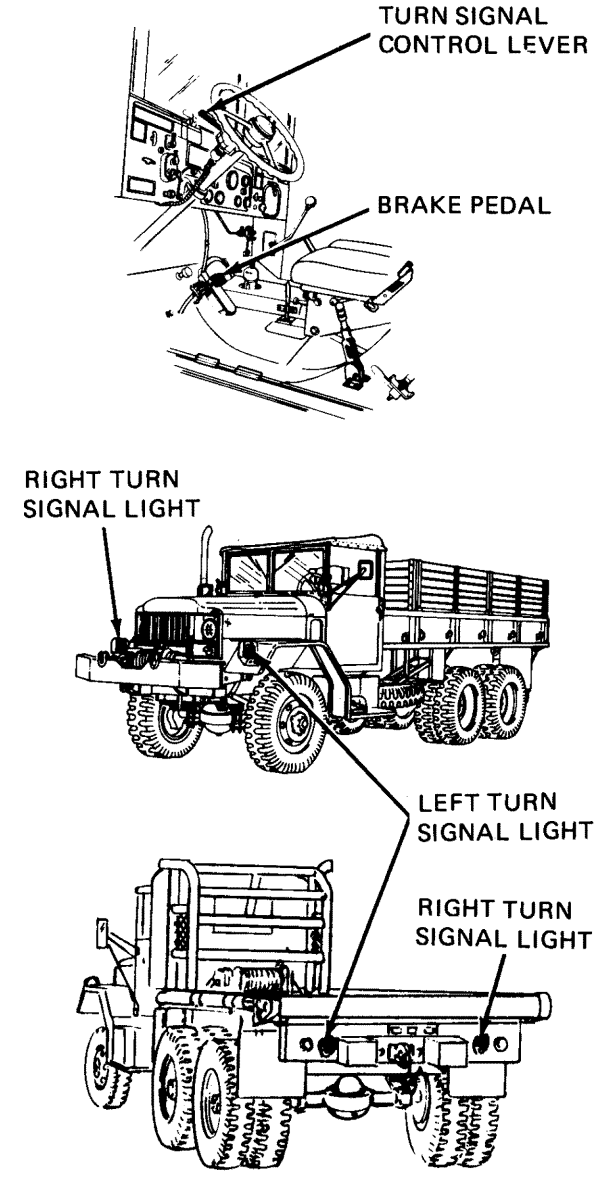
- Check that turn signal control lamps light

SOLDIER A • Set turn signal control arm to left turn
SOLDIER B • Check that front and rear left turn signals work
SOLDIER A • Step on brake pedal and hold it down
SOLDIER B • Check that left turn signal flashes with brake on

SOLDIER A • Keep brake pedal held down and set turn signal control arm to right turn
SOLDIER B • Check that right rear turn signal works with brake on
SOLDIER A • Release brake pedal
SOLDIER B • Check that right rear and front turn signal lights work

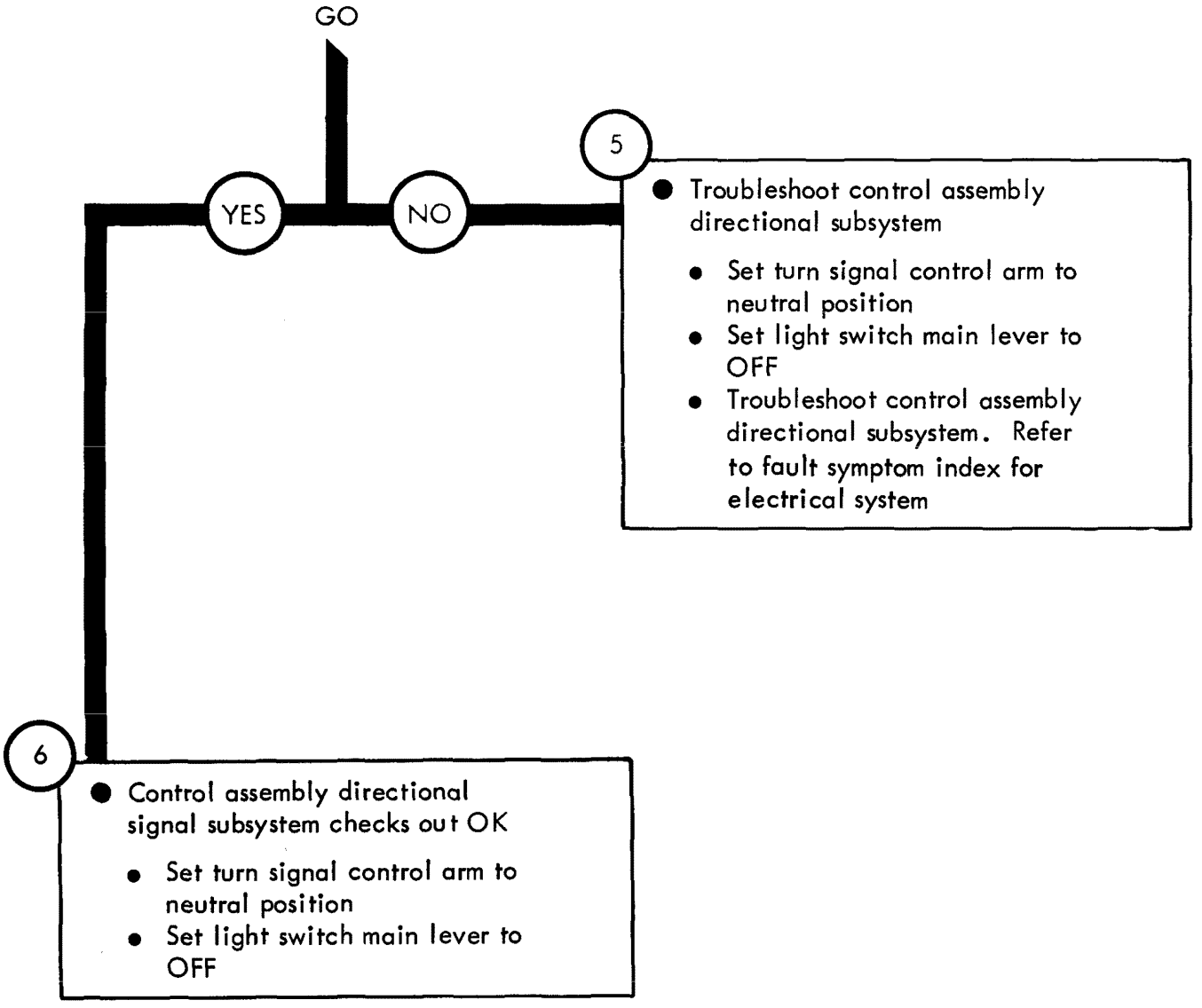
Do all turn signal lights work OK?

GO



TA 114774

Figure 30-3 (Sheet 4 of 5)



TA 114775

Figure 30-3 (Sheet 5 of 5)

CHAPTER 31

TRANSMISSION SYSTEM TROUBLESHOOTING

31-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the transmission system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

31-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

TRANSMISSION TROUBLESHOOTING

Symptom

1 TRANSMISSION LEAKS OIL

1
- Make truck ready for work on transmission
  - Park truck. Refer to TM 9-2320-209-10

2
- Check transmission casing
  - Look for a cracked or broken casing

Is casing OK?

YES

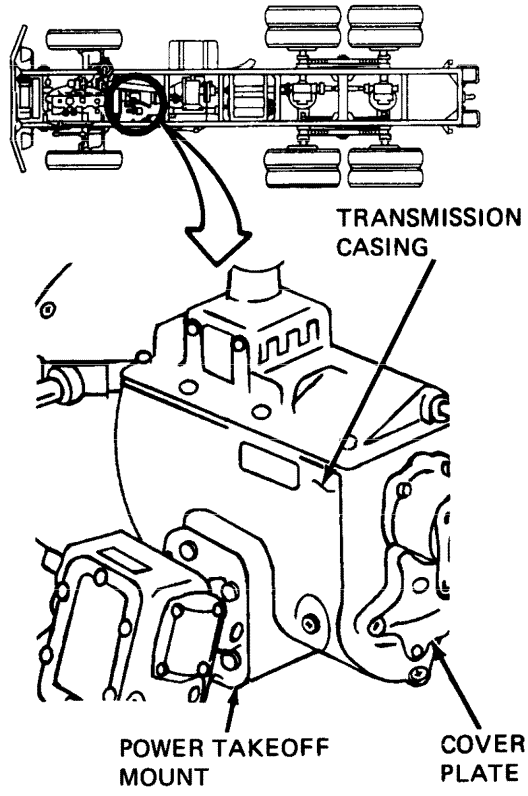
NO

3
- Replace cracked or broken casing
  - Tell direct support maintenance

4
- Check transmission cover plates and power takeoff mount
  - Look for signs of oil leaking from cover plate and power takeoff mount

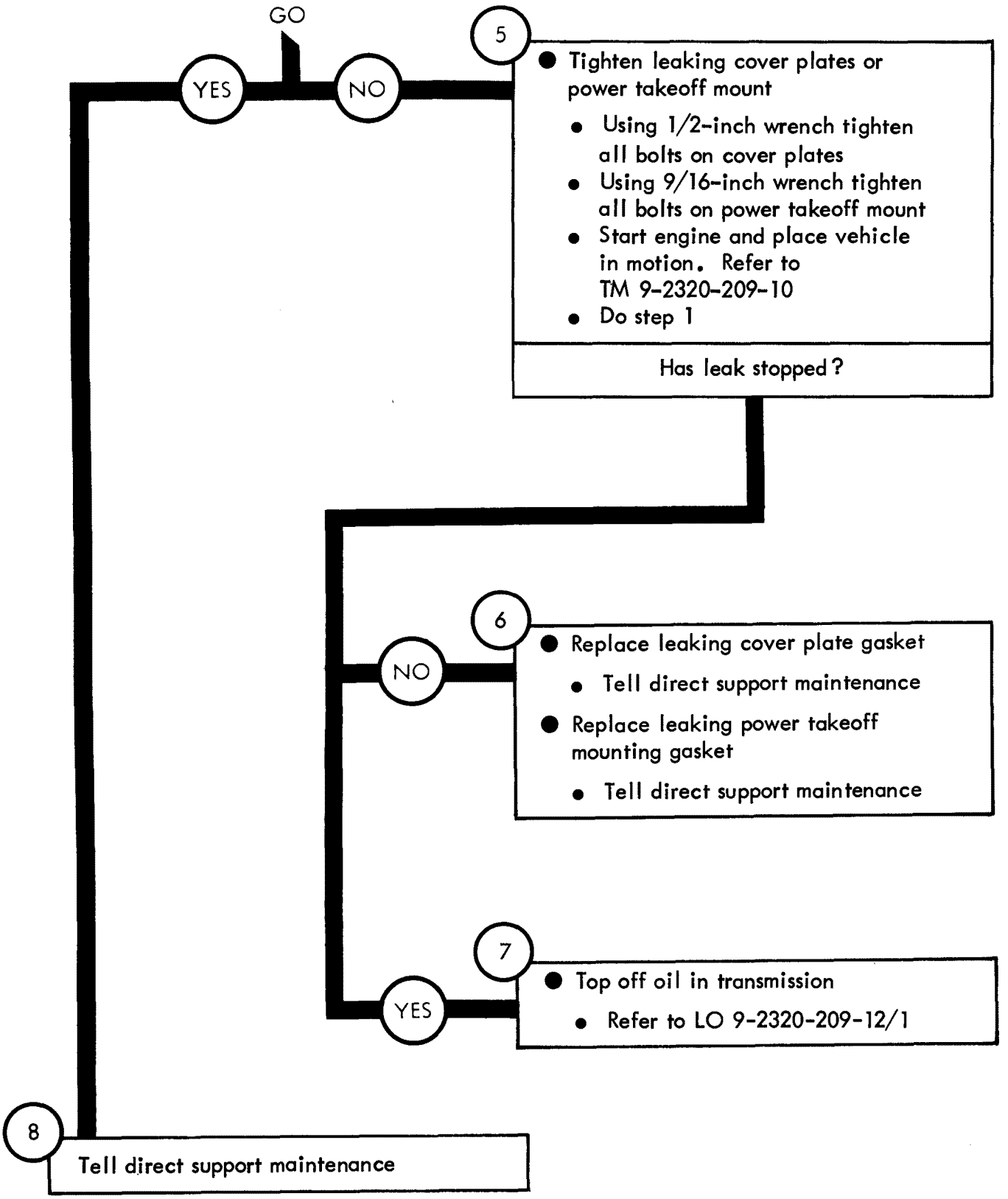
Are cover plates and power takeoff mount OK?

GO



TA 114776

Figure 31-1 (Sheet 1 of 2)



TA 114777

Figure 31-1 (Sheet 2 of 2)

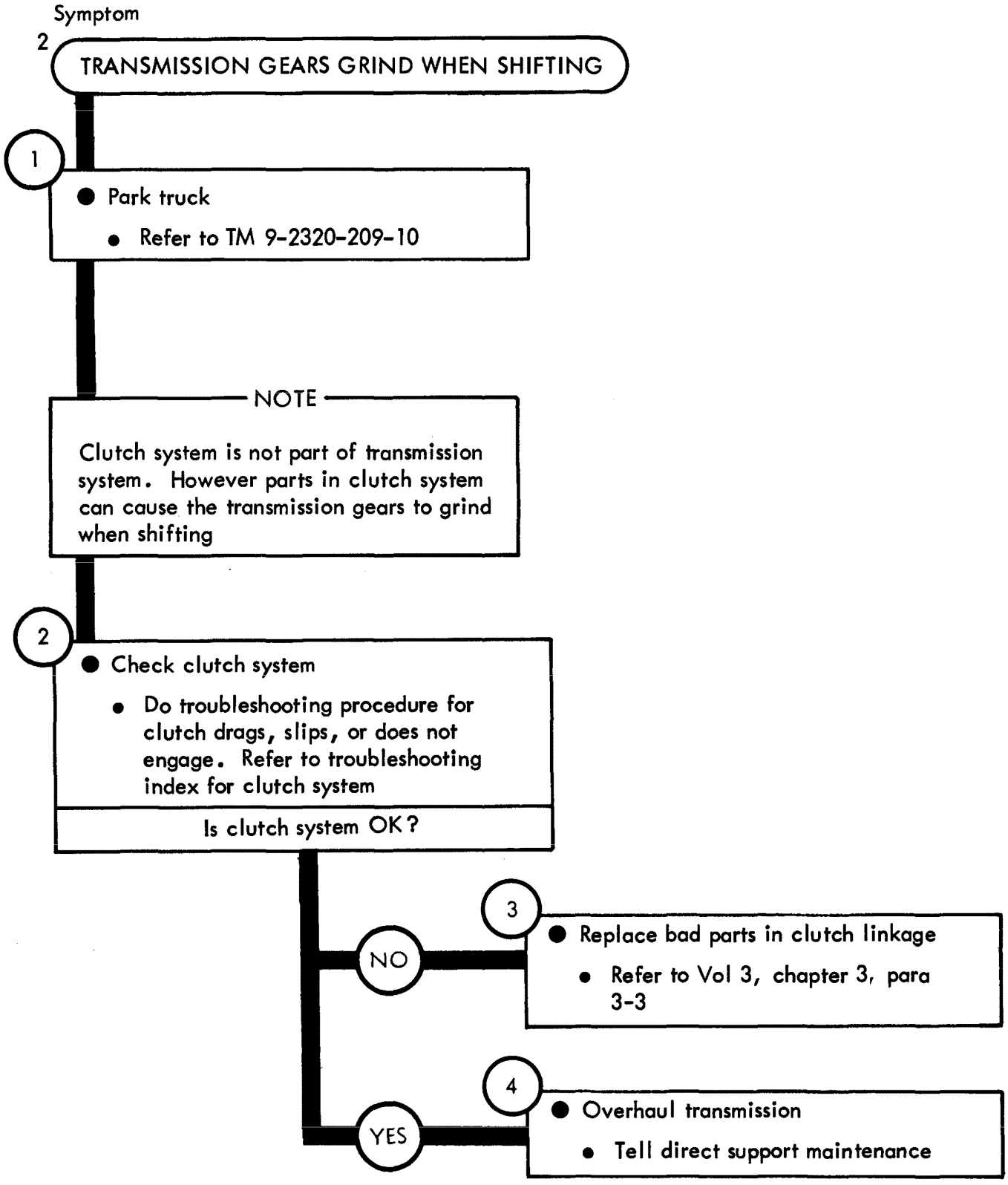

Symptom
2
TRANSMISSION GEARS GRIND WHEN SHIFTING
1
● Park truck
• Refer to TM 9-2320-209-10
NOTE
Clutch system is not part of transmission system. However parts in clutch system can cause the transmission gears to grind when shifting
2
● Check clutch system
• Do troubleshooting procedure for clutch drags, slips, or does not engage. Refer to troubleshooting index for clutch system
Is clutch system OK?
NO
3
● Replace bad parts in clutch linkage
• Refer to Vol 3, chapter 3, para 3-3
YES
4
● Overhaul transmission
• Tell direct support maintenance
TA 114778

Figure 31-2

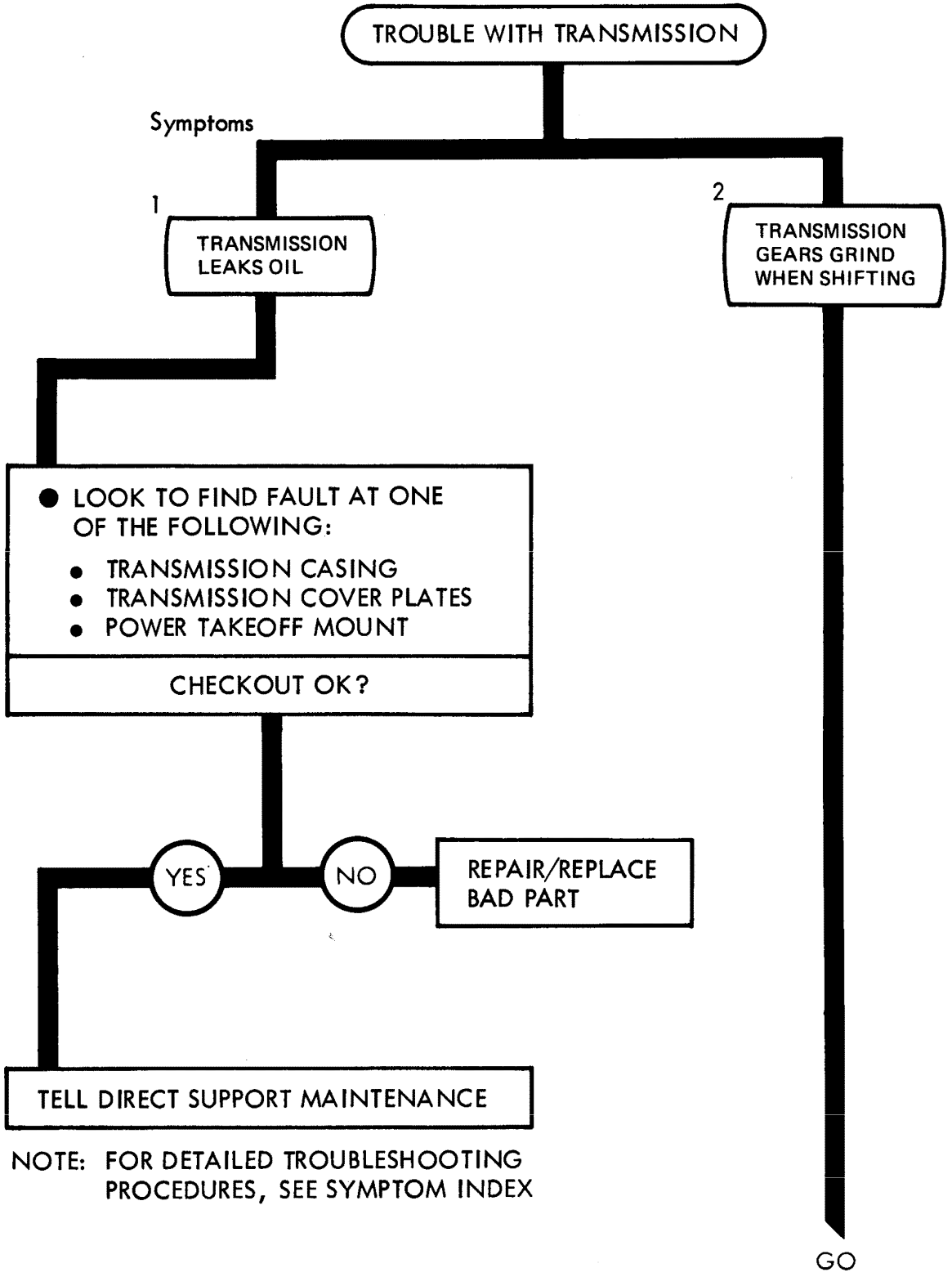
CHAPTER 32

TRANSMISSION SYSTEM TROUBLESHOOTING SUMMARY

32-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 31 for the transmission system.

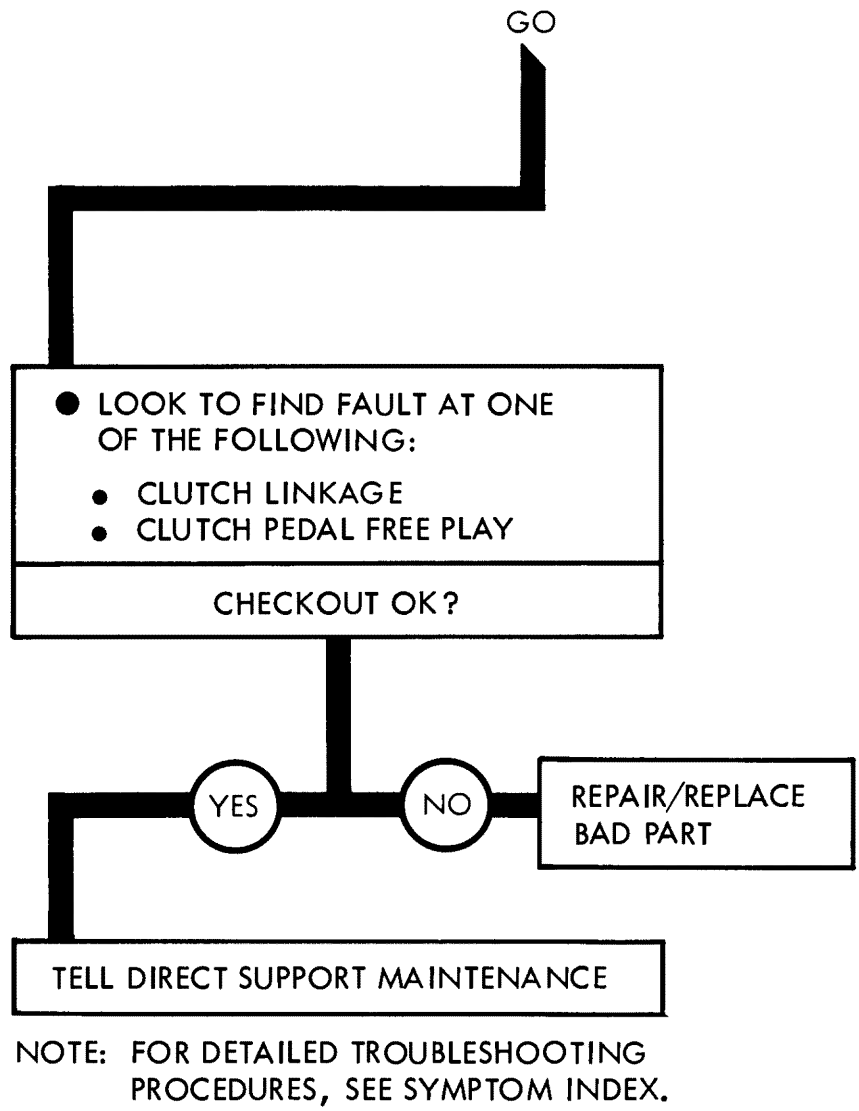
32-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

TRANSMISSION SYSTEM TROUBLESHOOTING SUMMARY



TA 114779

Figure 32-1 (Sheet 1 of 2)



TA 114780

Figure 32-1 (Sheet 2 of 2)

CHAPTER 33

TRANSFER SYSTEM TROUBLESHOOTING

33-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the transfer system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

33-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

TRANSFER SYSTEM TROUBLESHOOTING

Symptom

1 TRANSFER LEAKS OIL

1

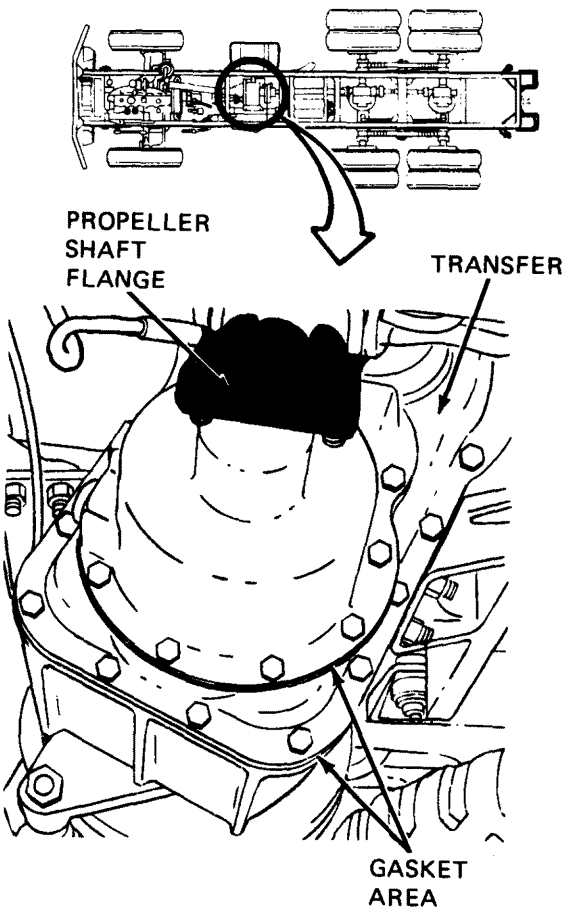
- Make truck ready for work on transfer
  - Park truck. Refer to TM 9-2320-209-10

2

- Check transfer gaskets, seals, and casing
  - Crawl under truck
  - Look for a cracked or broken casing
  - Look for signs of gear oil leaking from gaskets
  - Look at propeller shaft flanges to see if gear oil is leaking from seals

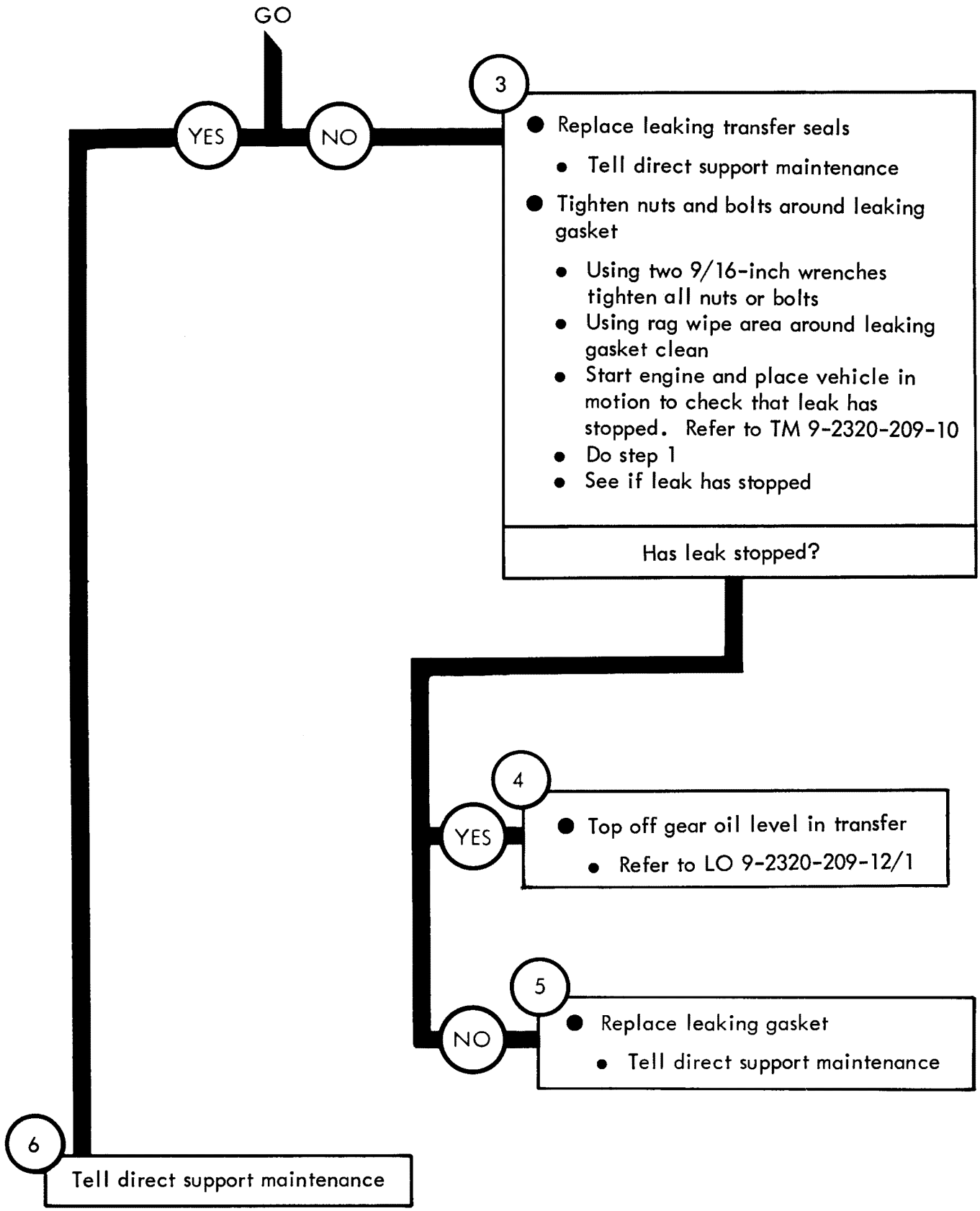
Are gaskets and seals OK, and casing not cracked or broken?

GO



TA 114781

Figure 33-1 (Sheet 1 of 2)



TA 114782

Figure 33-1 (Sheet 2 of 2)

Symptom

2 TRANSFER IS HARD TO SHIFT, OR POPS OUT OF GEAR

1
- Make truck ready for work on transfer
  - Park truck. Refer to TM 9-2320-209-10

2
- Check for bent transfer linkage
  - Remove cab tunnels. Refer to Vol 3, chapter 18, para 18-5
  - Look closely for signs of bent linkage

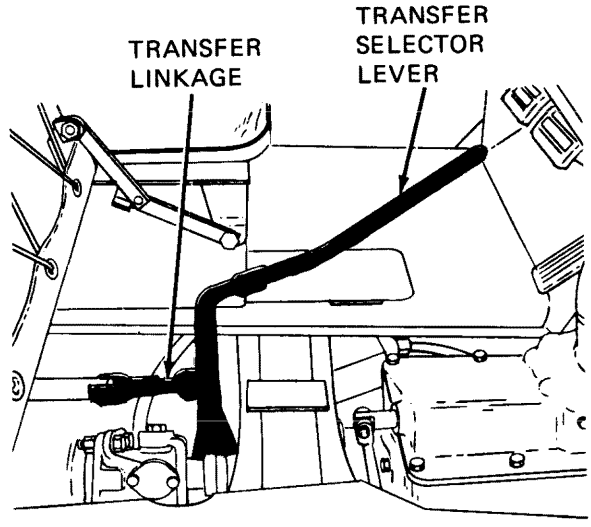
Is linkage OK?

YES

NO

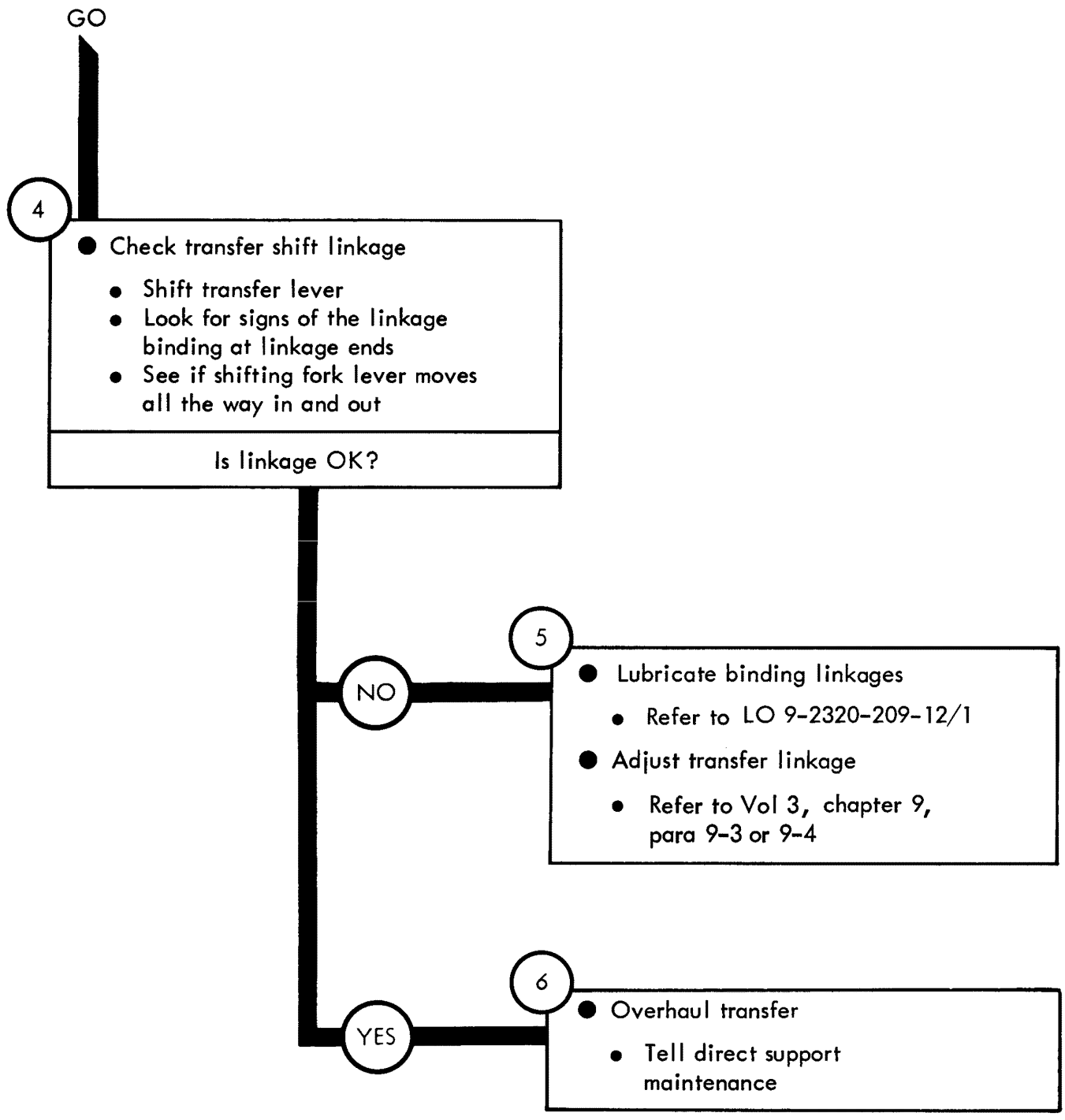
3
- Replace bent transfer linkage
  - Refer to Vol 3, chapter 9, para 9-3 or 9-4

GO



TA 114783

Figure 33-2 (Sheet 1 of 2)



TA 114784

Figure 33-2 (Sheet 2 of 2)

Symptom

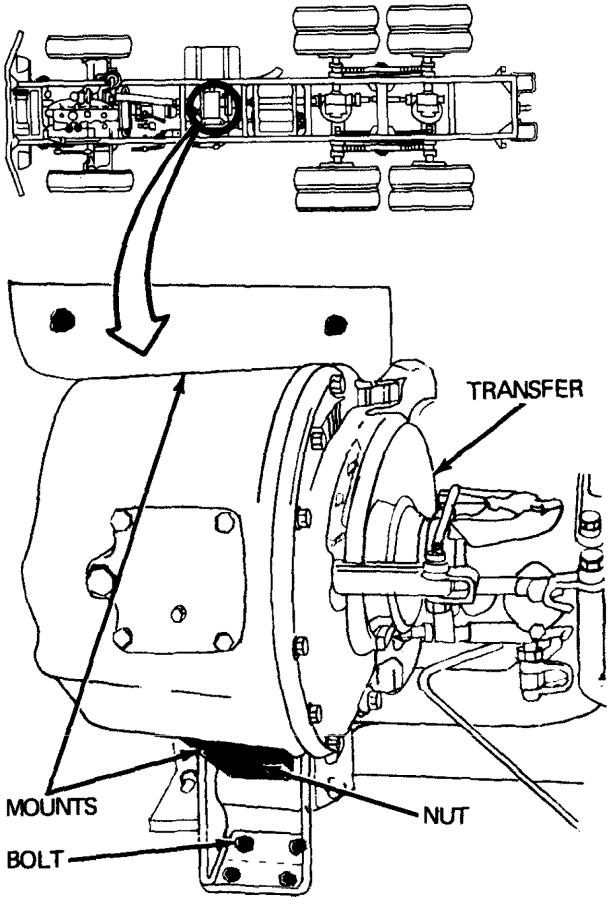
3 CLUNKING NOISE HEARD DURING ACCELERATION ON TRUCKS M36A2 AND M342A2

1 ● Make truck ready for work on propeller shafts
- Park truck. Refer to TM 9-2320-209-10

2 ● Check transfer mounts
- Crawl under truck
- Look for signs that the transfer is shifted to position
- Look for a broken transfer mount
- Look for missing transfer mounting nuts or bolts
- Feel for loose transfer mount nuts

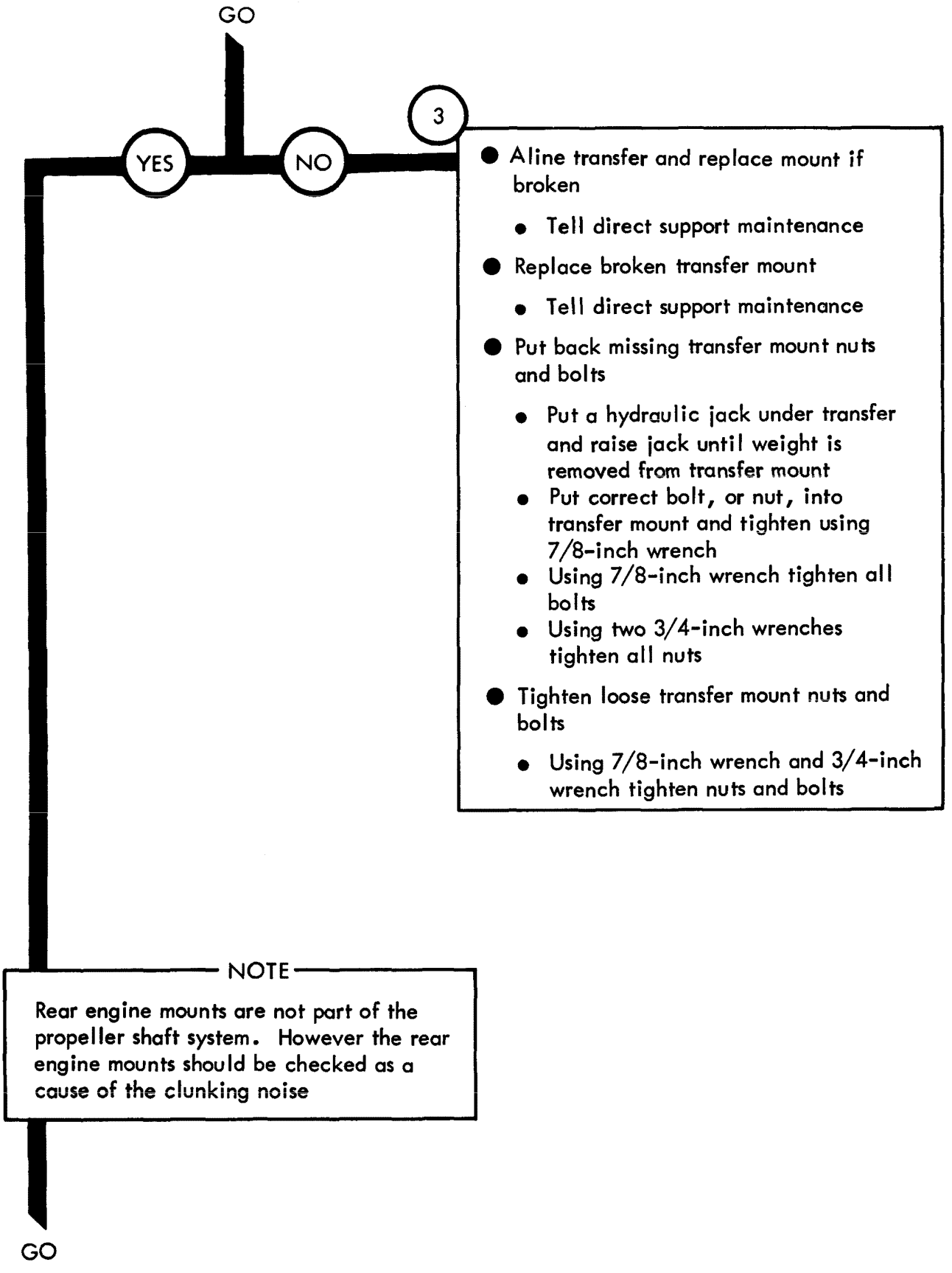
Are transfer mounts OK?

GO



TA 114785

Figure 33-3 (Sheet 1 of 5)



TA 114786

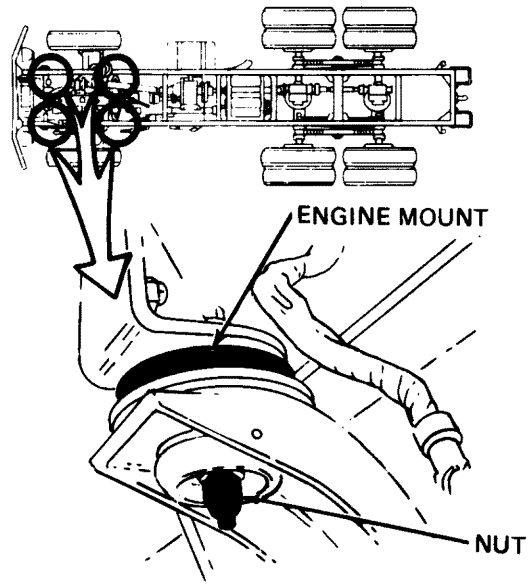
Figure 33-3 (Sheet 2 of 5)

GO

4

- Check rear engine mounts
  - Look for a broken engine mount
  - Look for a missing engine mount nut
  - Using 15/16-inch wrench feel for a loose nut

Are engine mounts OK?

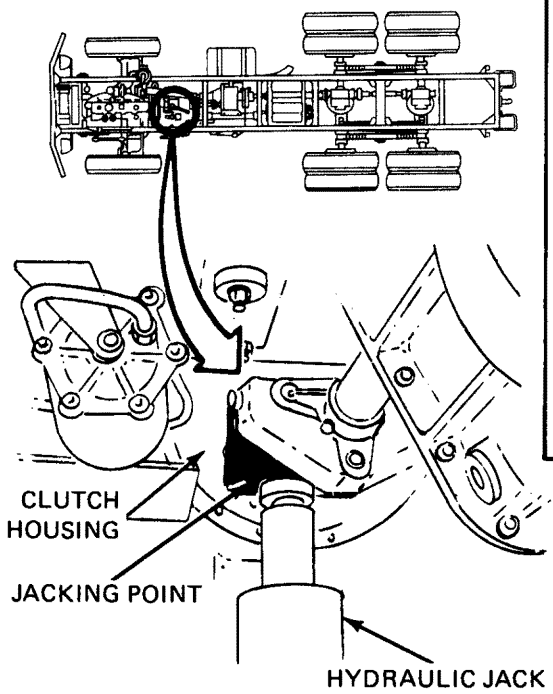


YES

NO

5

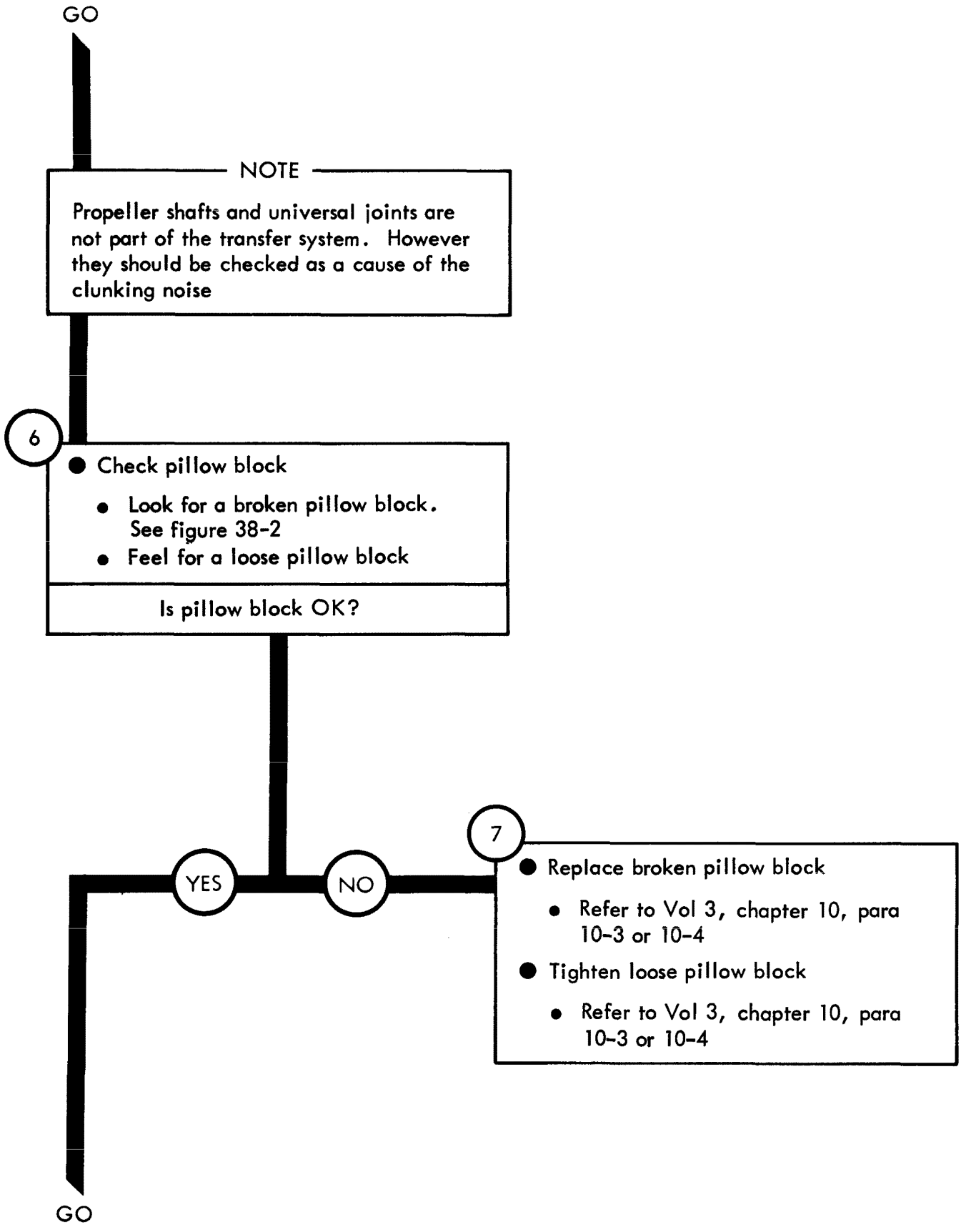
- Replace broken engine mount
  - Refer to Vol 3, chapter 2, para 2-4
- Put back missing engine mount nut
  - Put a hydraulic jack under jacking point and raise jack until weight is removed from engine mount
  - Put correct nut onto engine mount and screw on until hand tight
  - Using two 7/8-inch wrenches tighten engine mount
- Tighten loose engine mount nut
  - Using two 7/8-inch wrenches tighten engine mount



GO

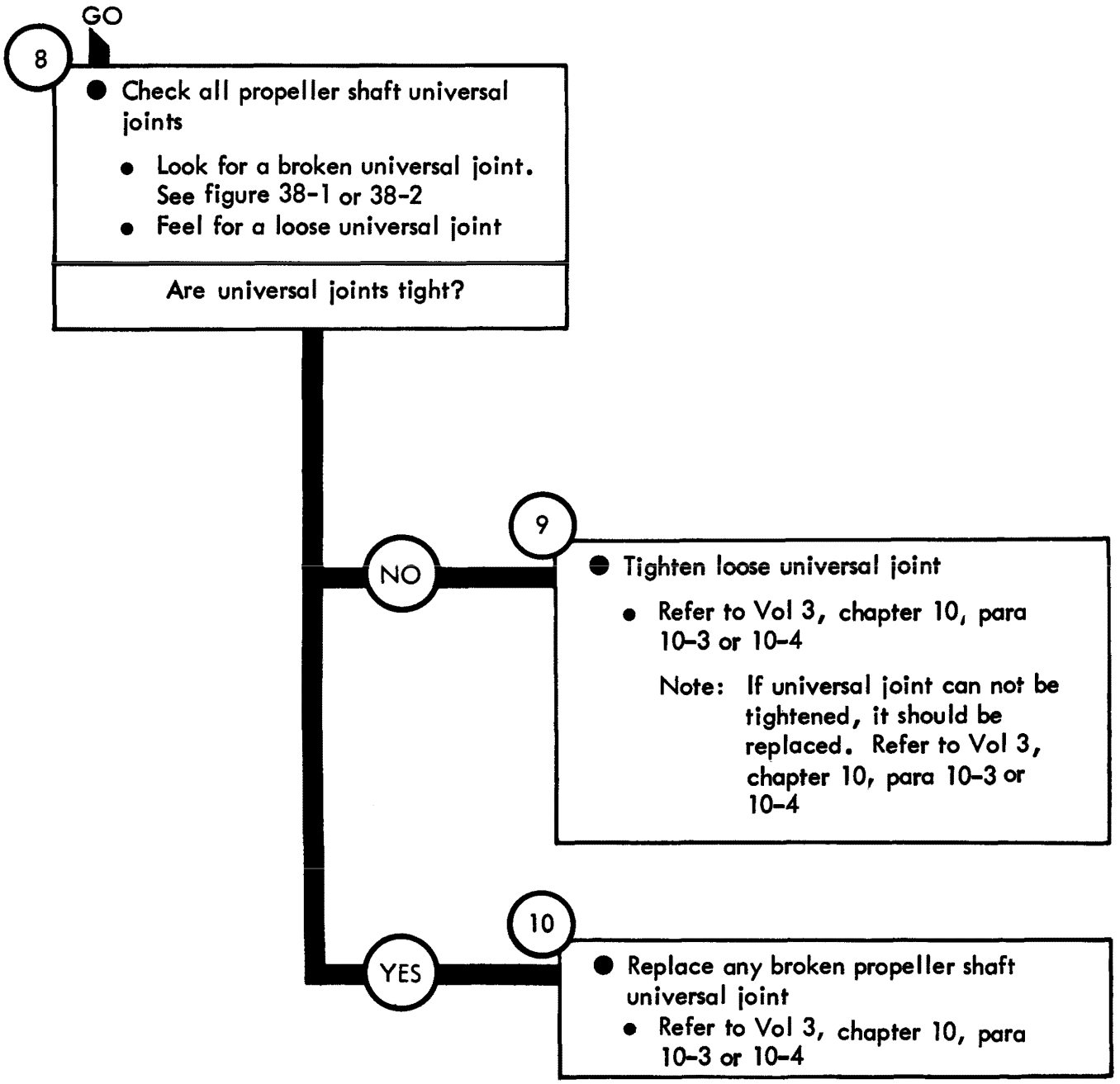
TA 114787

Figure 33-3 (Sheet 3 of 5)



TA 114788

Figure 33-3 (Sheet 4 of 5)



TA 114789

Figure 33-3 (Sheet 5 of 5)

Symptom

4 CLUNKING NOISE HEARD DURING ACCELERATION ON ALL TRUCKS EXCEPT M36A2 AND M342A2

1

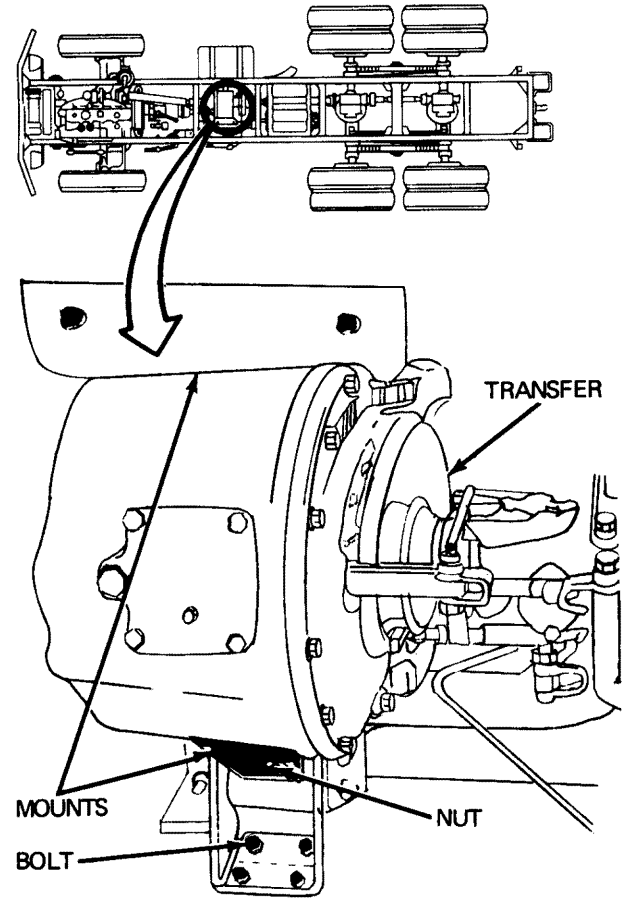
- Make truck ready for work on propeller shafts
  - Park truck. Refer to TM 9-2320-209-10

2

- Check transfer mounts
  - Crawl under truck
  - Look for signs that the transfer shifted its position
  - Look for a broken transfer mount
  - Look for missing transfer mounting nuts or bolts
  - Feel for loose transfer mount nuts

Are transfer mounts OK?

GO



TA 114790

Figure 33-4 (Sheet 1 of 4)

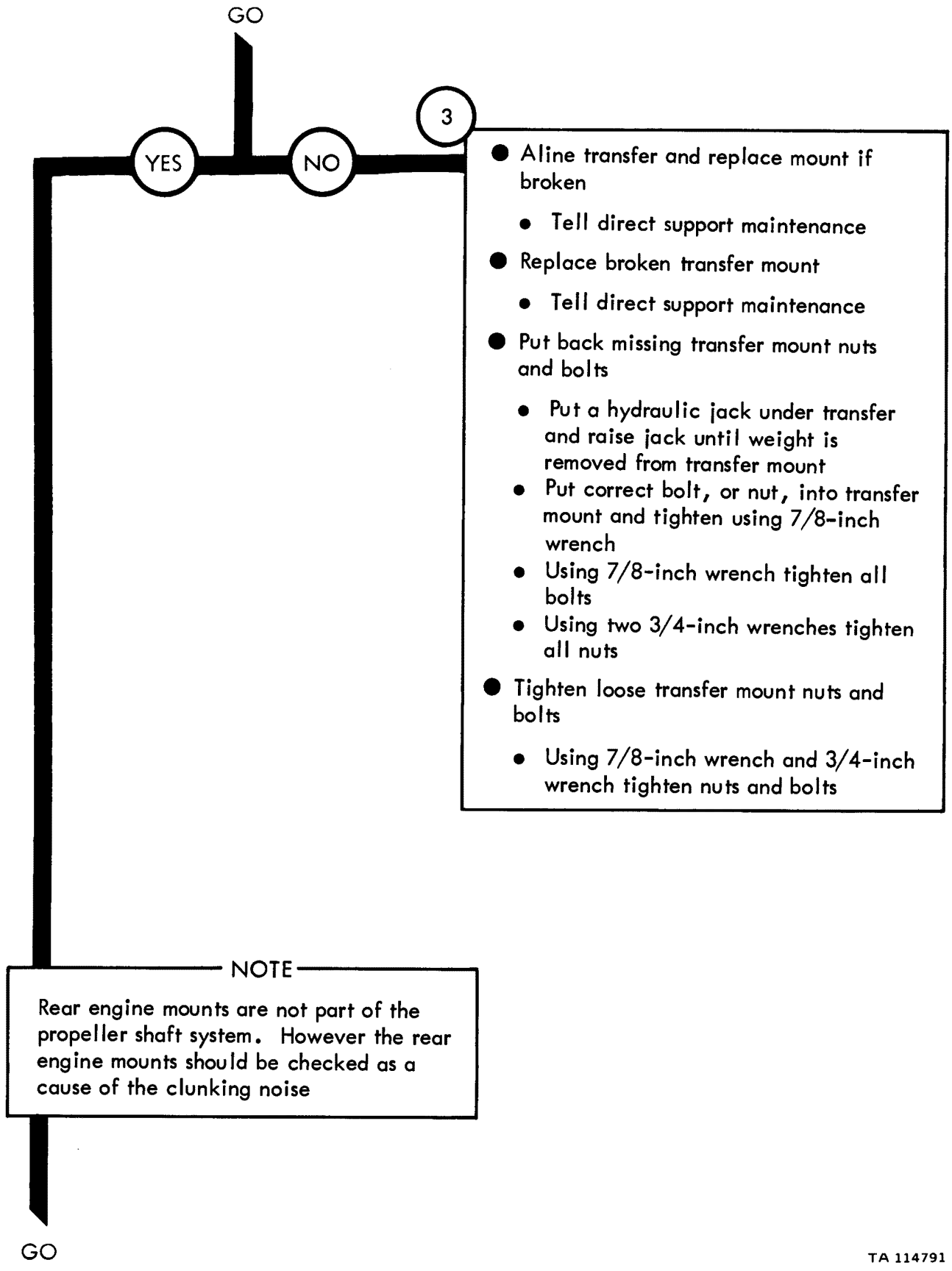


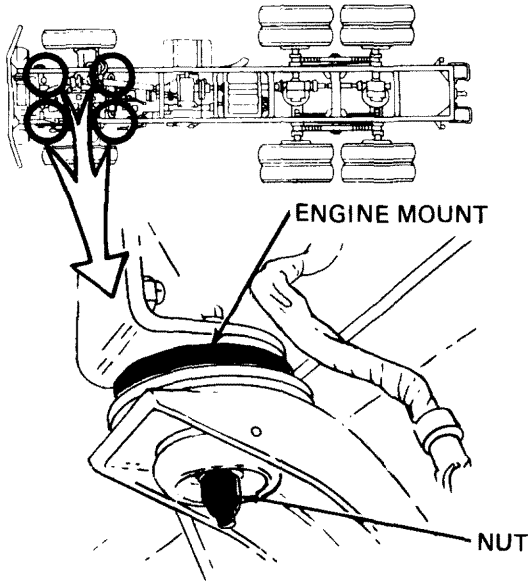
Figure 33-4 (Sheet 2 of 4)

GO

4

- Check rear engine mounts
  - Look for a broken engine mount
  - Look for a missing engine mount nut
  - Using 15/16-inch wrench feel for a loose nut

Are engine mounts OK?

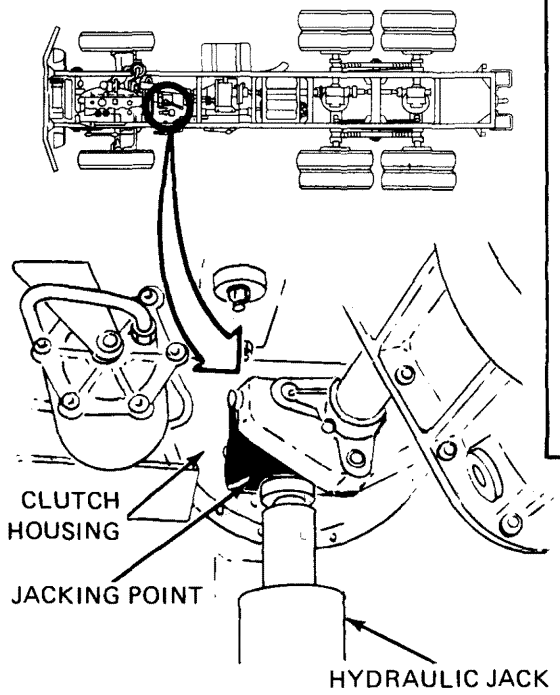


YES

NO

5

- Replace broken engine mount
  - Refer to Vol 3, chapter 2, para 2-4
- Put back missing engine mount nut
  - Put a hydraulic jack under jacking point and raise jack until weight is removed from engine mount
  - Put correct nut onto engine mount and screw on until hand tight
  - Using two 7/8-inch wrenches tighten engine mount
- Tighten loose engine mount nut
  - Using two 7/8-inch wrenches tighten engine mount



GO

Figure 33-4 (Sheet 3 of 4)

TA 114792

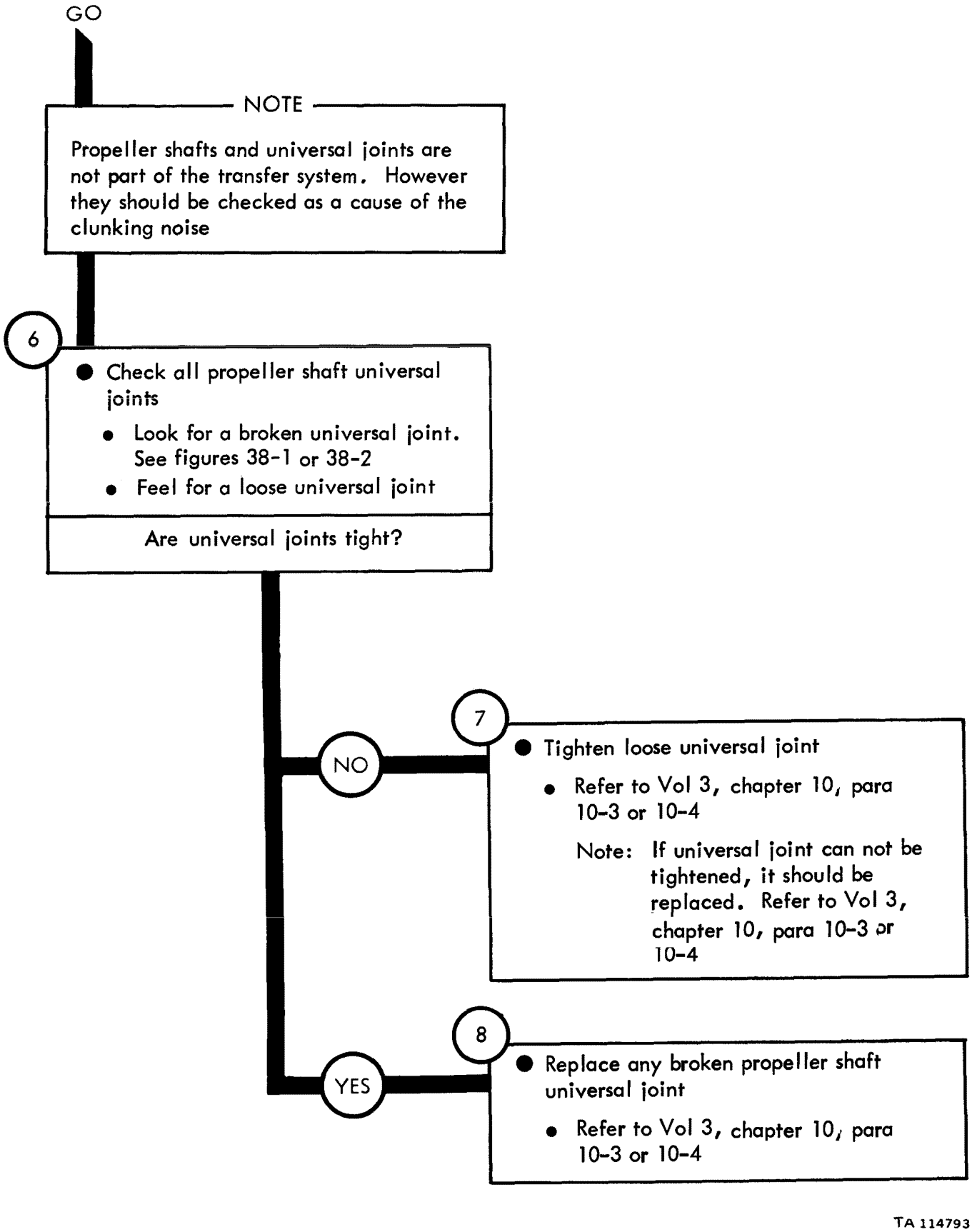


Figure 33-4 (Sheet 4 of 4)

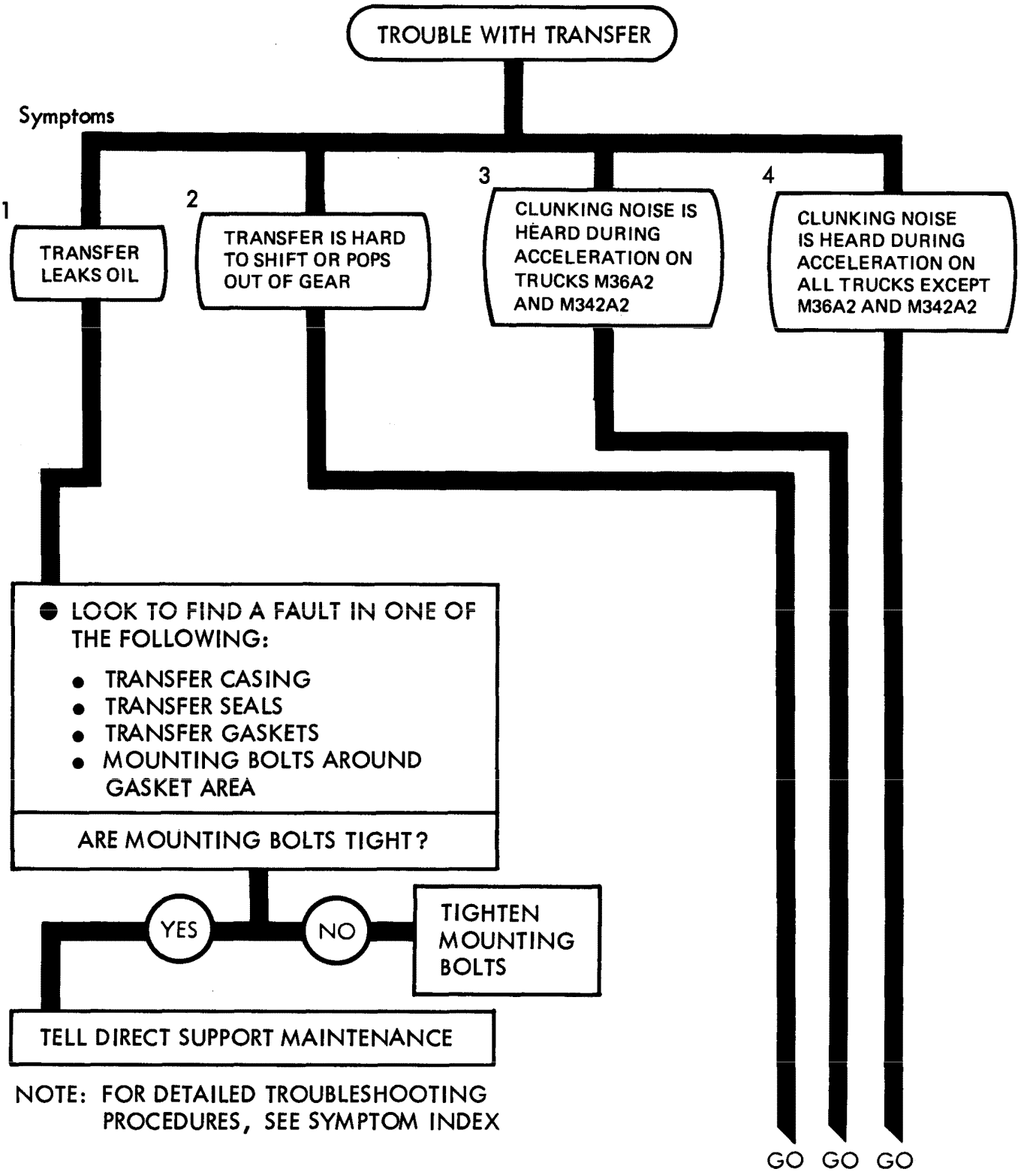
CHAPTER 34

TRANSFER SYSTEM TROUBLESHOOTING SUMMARY

34-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 33 for the transfer system.

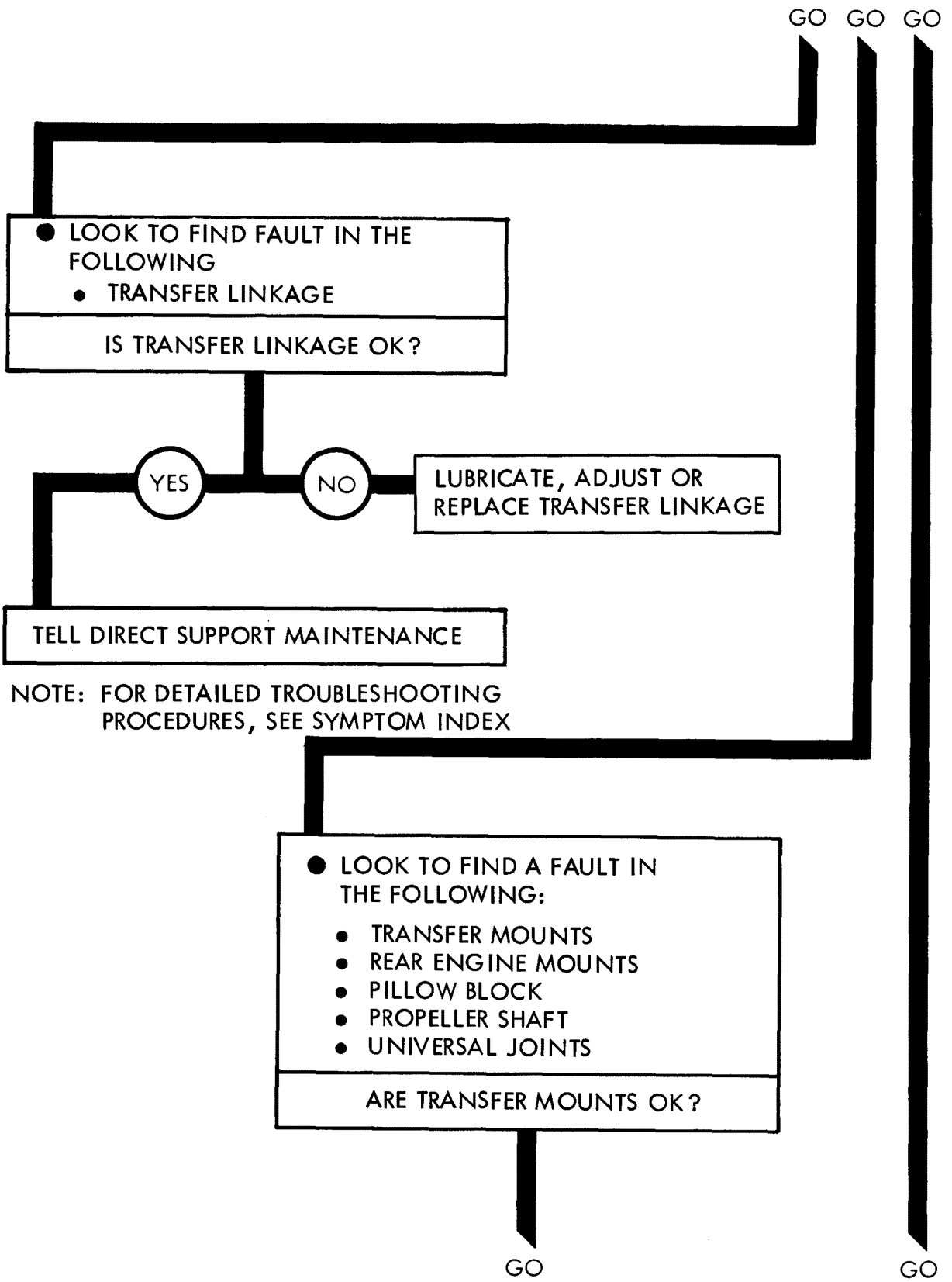
34-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample trouble-shooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

TRANSFER SYSTEM TROUBLESHOOTING SUMMARY



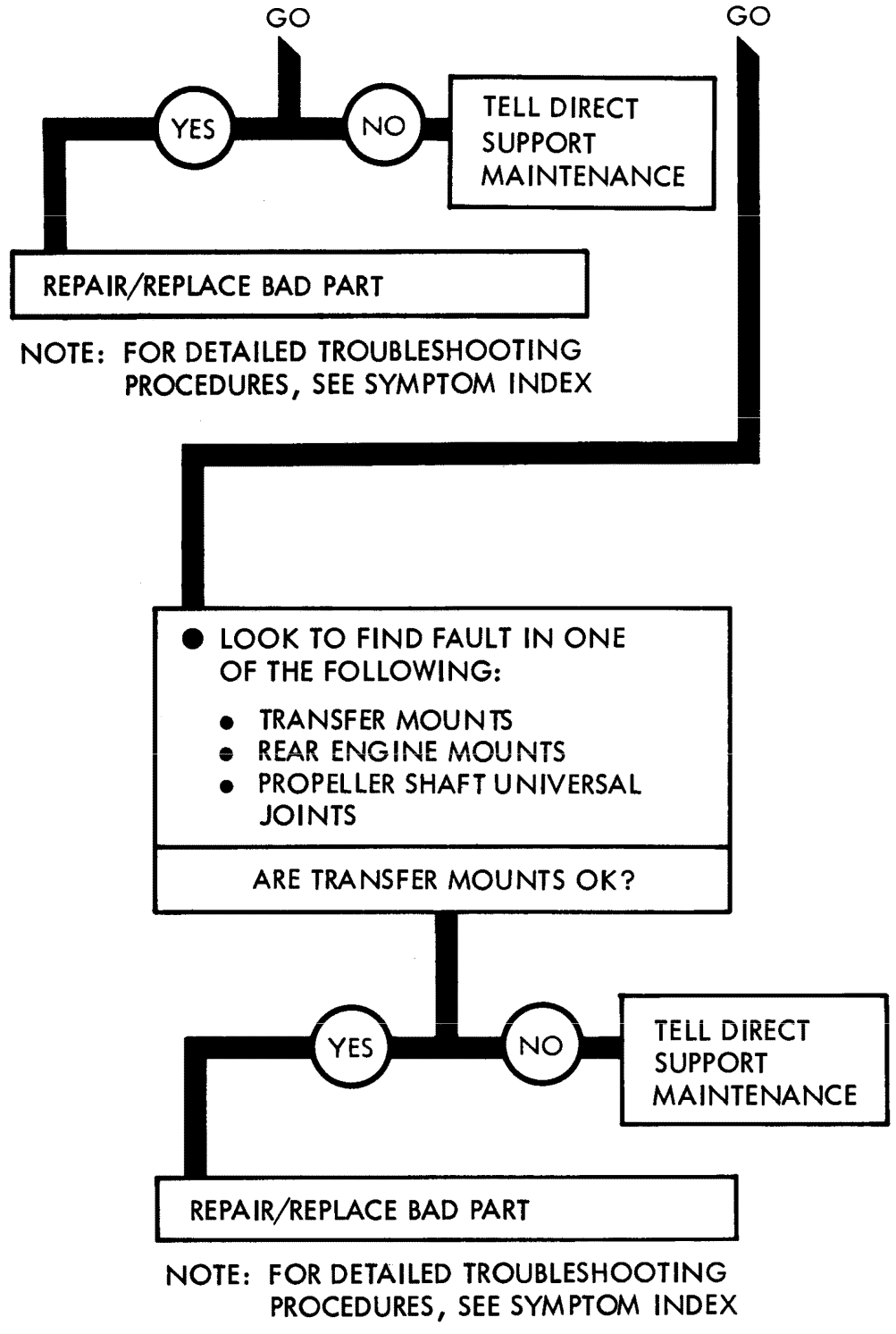
TA 114794

Figure 34-1 (Sheet 1 of 3)



TA 114795

Figure 34-1 (Sheet 2 of 3)



TA 114796

Figure 34-1 (Sheet 3 of 3)

CHAPTER 35

TRANSFER SYSTEM CHECKOUT PROCEDURES

35-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

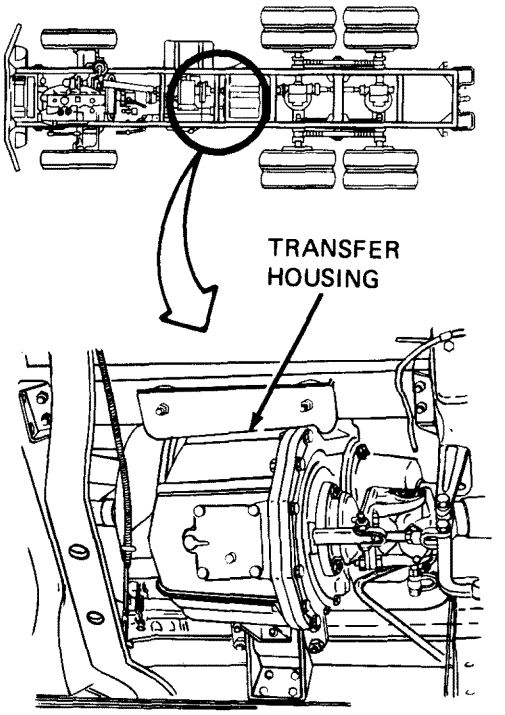
TRANSFER SYSTEM CHECKOUT

CHECK TRANSFER SYSTEM

1

- Check transfer housing for oil leaks
  - Park truck and chock wheels. Refer to TM 9-2320-209-10
  - Get under truck and look at transfer housing

Is transfer housing free of oil?



YES

NO

2

- Do fault isolation procedure for transfer leaks oil
  - Refer to fault symptom index

3

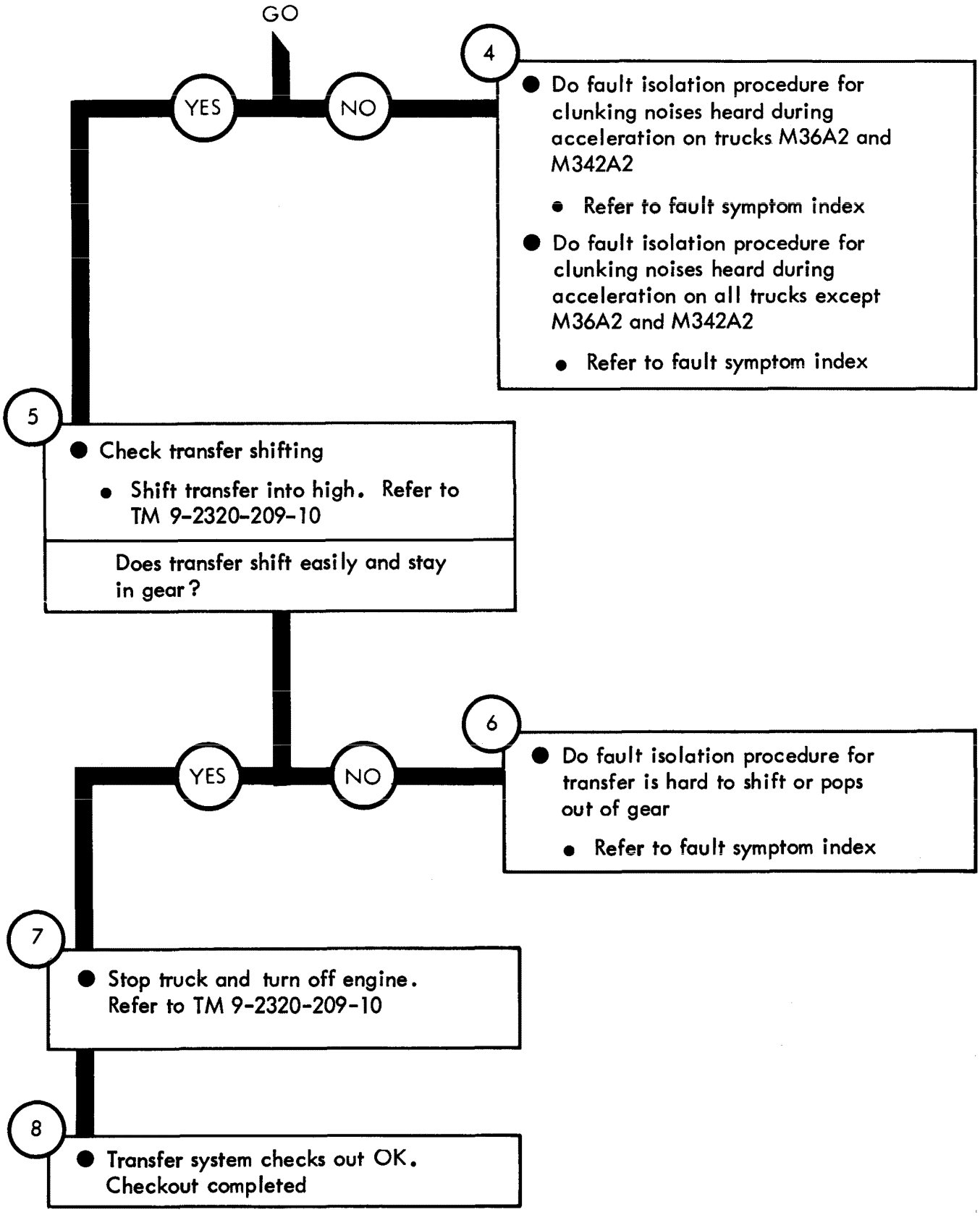
- Check transfer system for noises
  - Unchock wheels and start engine. Refer to TM 9-2320-209-10
  - Put transmission into first gear, transfer to low, and drive forward. Refer to TM 9-2320-209-10
  - Listen for clunking noises from transfer

Is transfer quiet?

GO

TA 114797

Figure 35-1 (Sheet 1 of 2)



TA 114798

Figure 35-1 (Sheet 2 of 2)

CHAPTER 36

PROPELLER SHAFT SYSTEM TROUBLESHOOTING

36-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the propeller shaft system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

36-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

Symptom

1 CLUNKING NOISE HEARD DURING ACCELERATION ON TRUCKS M36A2 AND M342A2

1

- Make truck ready for work on propeller shafts
  - Park truck. Refer to TM9-2320-209-10
  - Chock wheels

NOTE

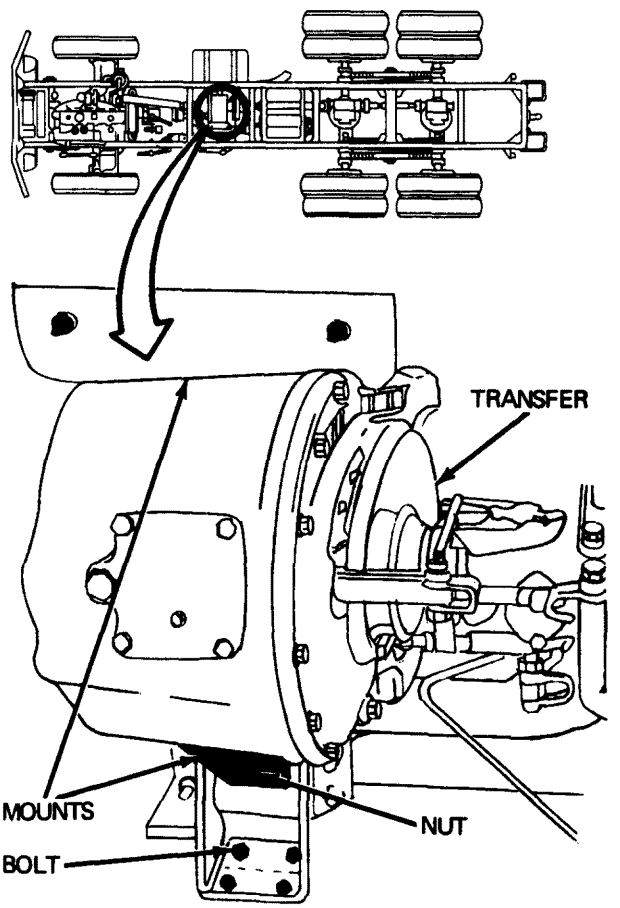
Transfer mounts are not part of the propeller shaft system. However they should be checked as a cause of the clunking noise

2

- Check transfer mounts
  - Crawl under truck
  - Look for signs that the transfer shifted its position
  - Look for a broken transfer mount
  - Look for missing transfer mounting nuts or bolts
  - Feel for loose transfer mount nuts

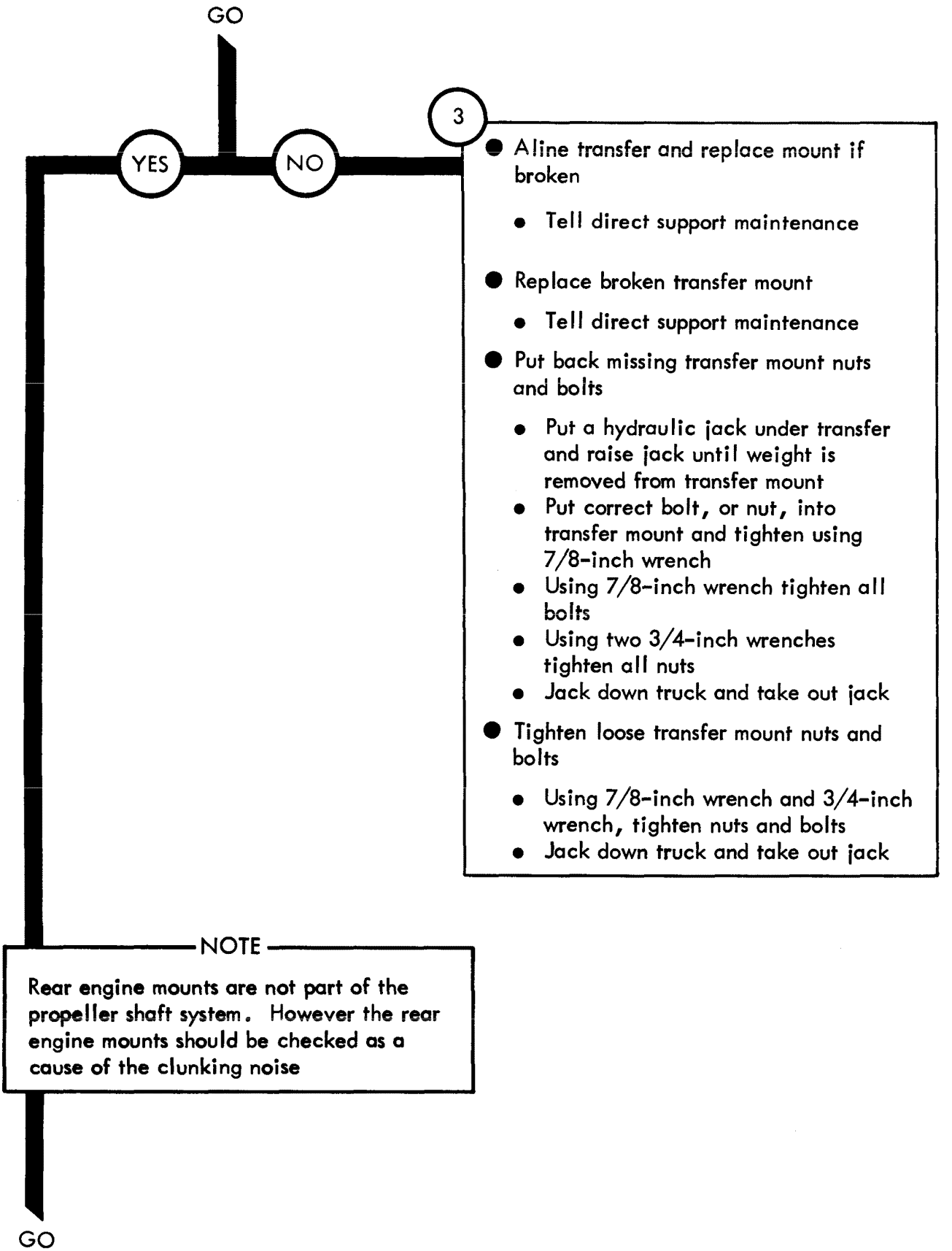
Are transfer mounts OK?

GO



TA 114799

Figure 36-1 (Sheet 1 of 5)



TA 114800

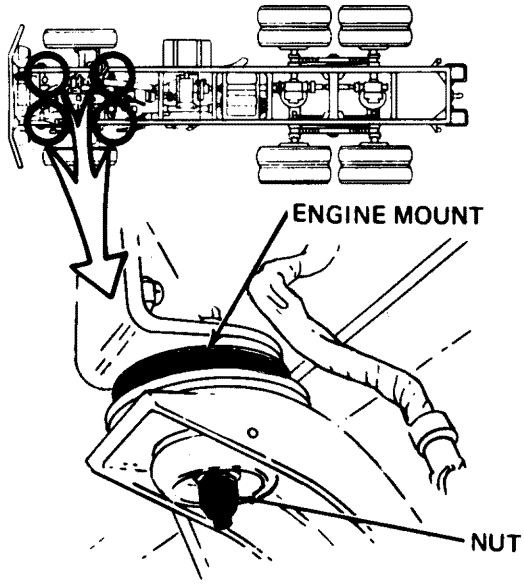
Figure 36-1 (Sheet 2 of 5)

GO

4

- Check rear engine mounts
  - Look for a broken engine mount
  - Look for a missing engine mount nut
  - Using 15/16-inch wrench feel for a loose nut

Are engine mounts OK?

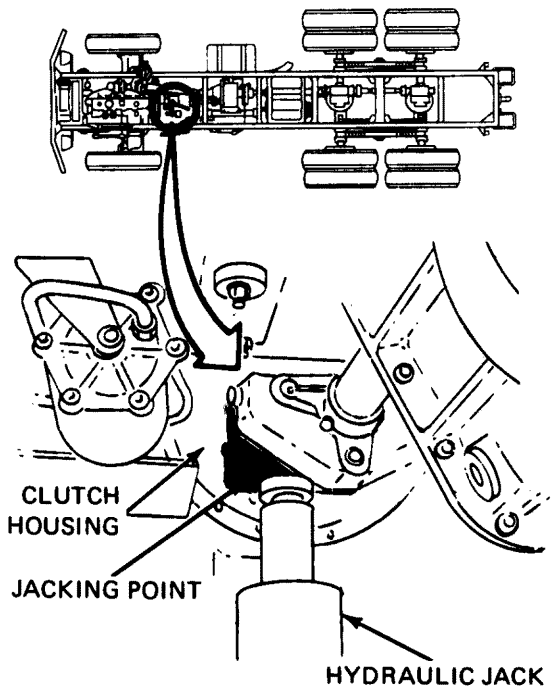


YES

NO

5

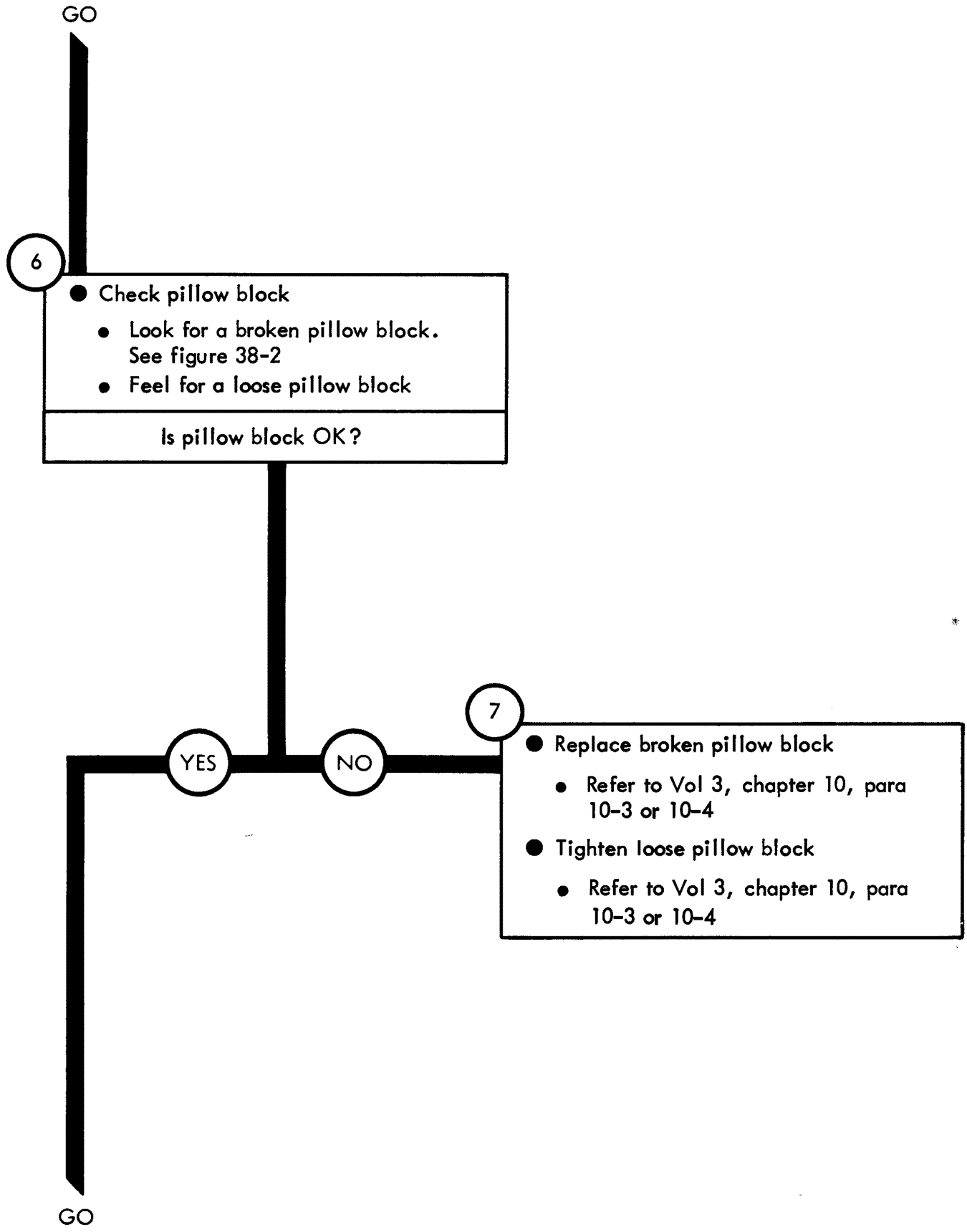
- Replace broken engine mount
  - Refer to Vol 3, chapter 2, para 2-4
- Put back missing engine mount nut
  - Put a hydraulic jack under jacking point and raise jack until weight is removed from engine mount
  - Put correct nut onto engine mount and screw on until hand tight
  - Using two 7/8-inch wrenches tighten engine mount
- Tighten loose engine mount nut
  - Using two 7/8-inch wrenches tighten engine mount



GO

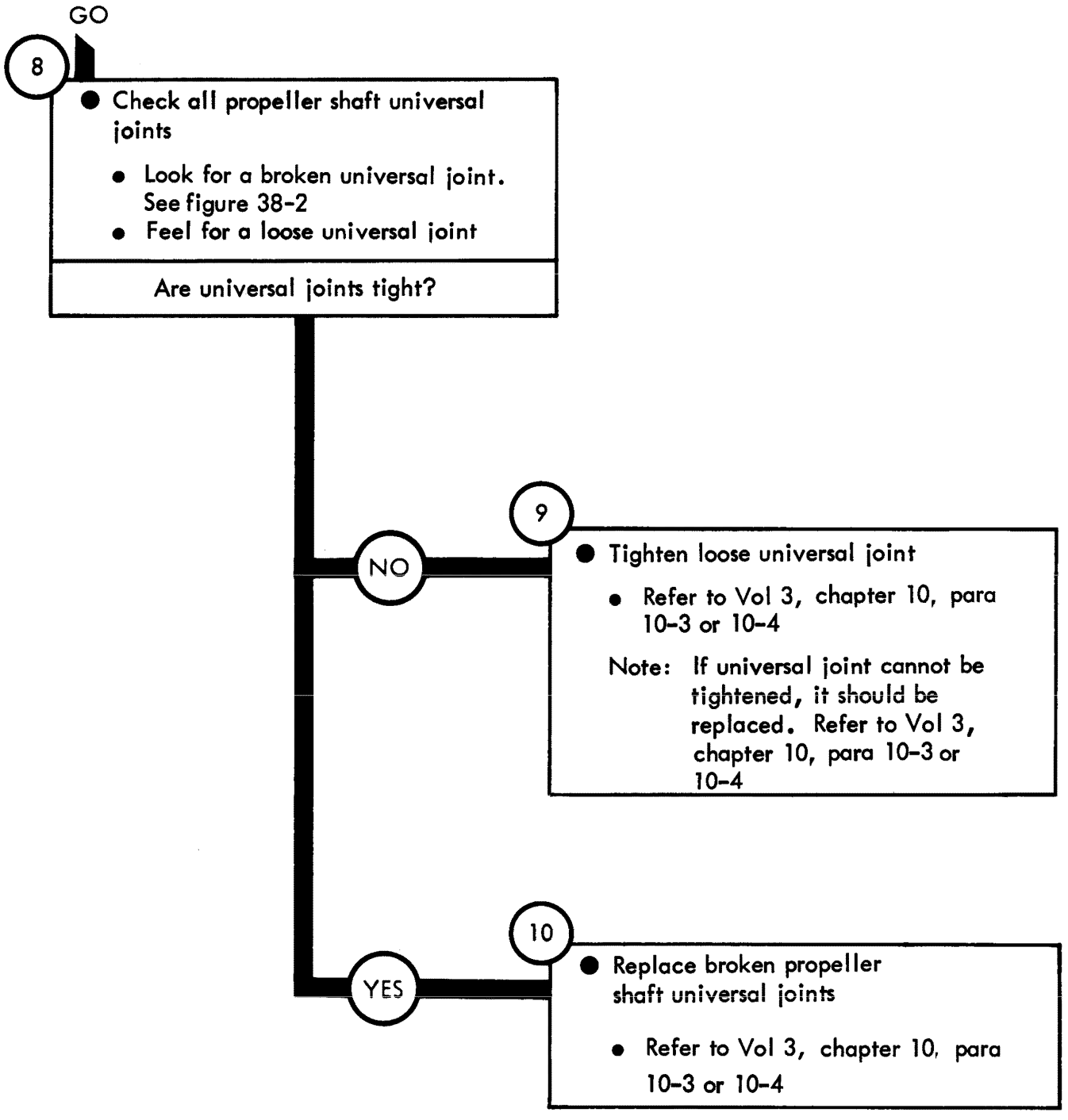
TA 114801

Figure 36-1 (Sheet 3 of 5)



TA 114802

Figure 36-1 (Sheet 4 of 5)



TA 114803

Figure 36-1 (Sheet 5 of 5)

Symptom 2

CLUNKING NOISE HEARD DURING ACCELERATION ON ALL TRUCKS EXCEPT M36A2 AND M342A2

1

- Make truck ready for work on propeller shafts
  - Park truck. Refer to TM 9-2320-209-10

NOTE

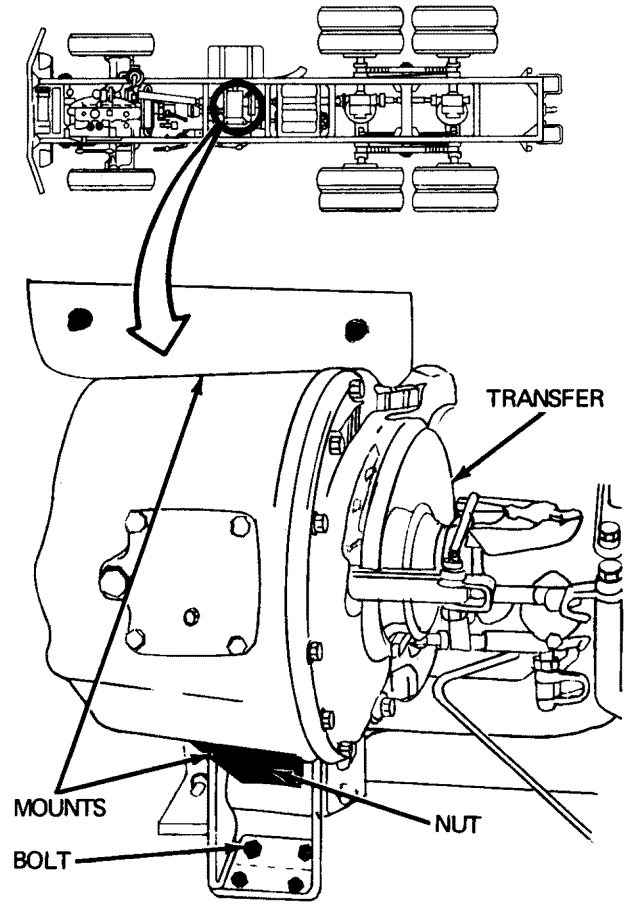
Transfer mounts are not part of the propeller shaft system. However the transfer mounts should be checked as a cause of the clunking noise

2

- Check transfer mounts
  - Crawl under truck
  - Look for signs that the transfer shifted its position
  - Look for a broken transfer mount
  - Look for missing transfer mounting nuts or bolts
  - Feel for loose transfer mount nuts

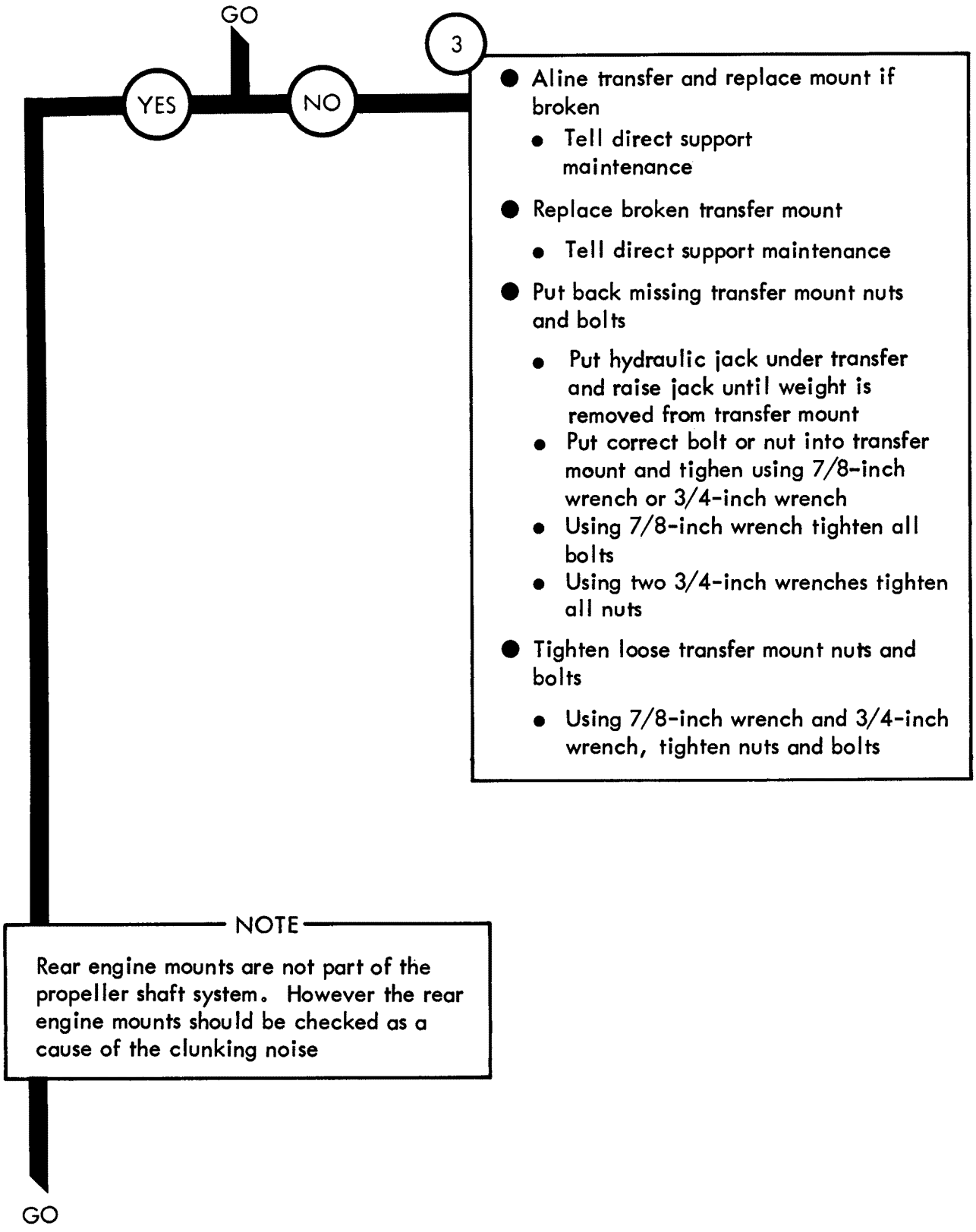
Are transfer mounts OK?

GO



TA 114804

Figure 36-2 (Sheet 1 of 4)



TA 114805

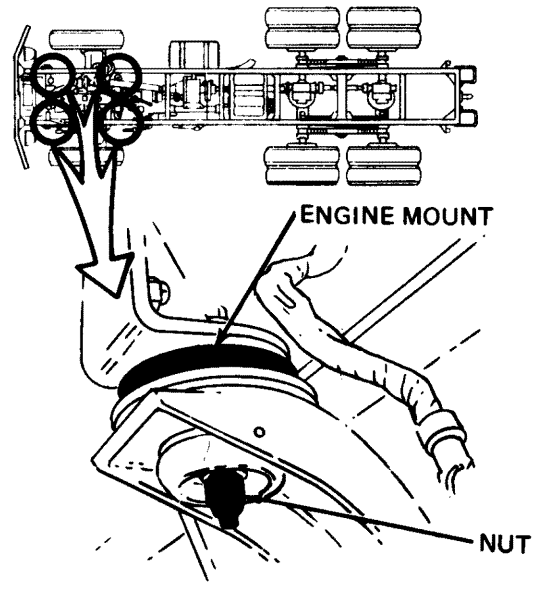
Figure 36-2 (Sheet 2 of 4)

GO

4

- Check rear engine mounts
  - Look for a broken engine mount
  - Look for a missing engine mount nut
  - Using 15/16-inch wrench feel for a loose nut

Are engine mounts OK?

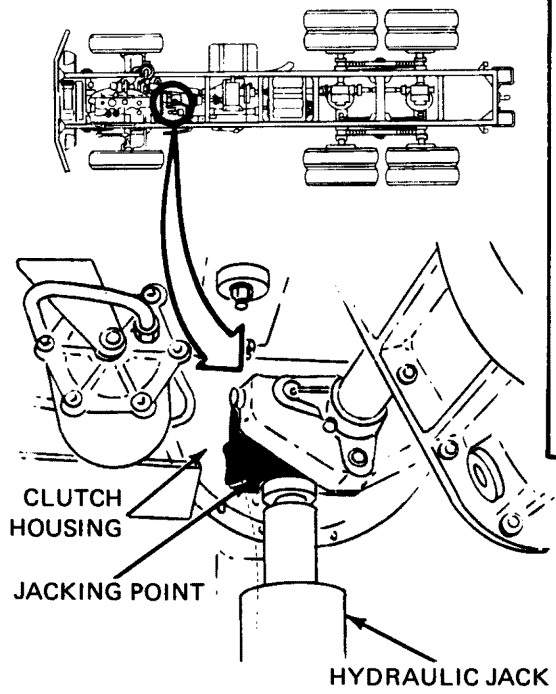


YES

NO

5

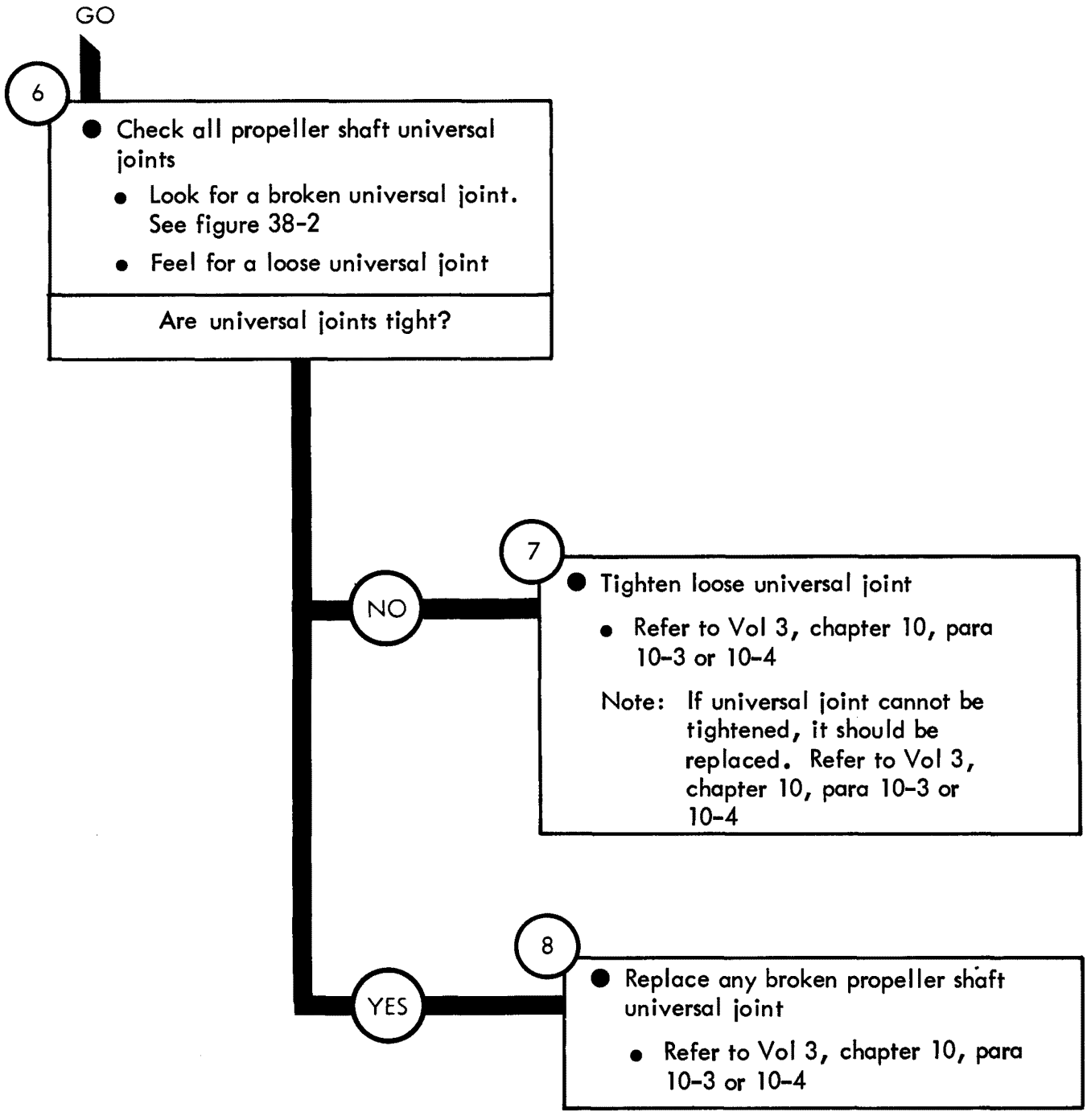
- Replace broken engine mount
  - Refer to Vol 3, chapter 2, para 2-4
- Put back missing engine mount nut
  - Put a hydraulic jack under jacking point and raise jack until weight is removed from engine mount
  - Put correct nut onto engine mount and screw on until hand tight
  - Using two 7/8-inch wrenches tighten engine mount
- Tighten loose engine mount nut
  - Using two 7/8-inch wrenches tighten engine mount



GO

TA 114806

Figure 36-2 (Sheet 3 of 4)



TA 114807

Figure 36-2 (Sheet 4 of 4)

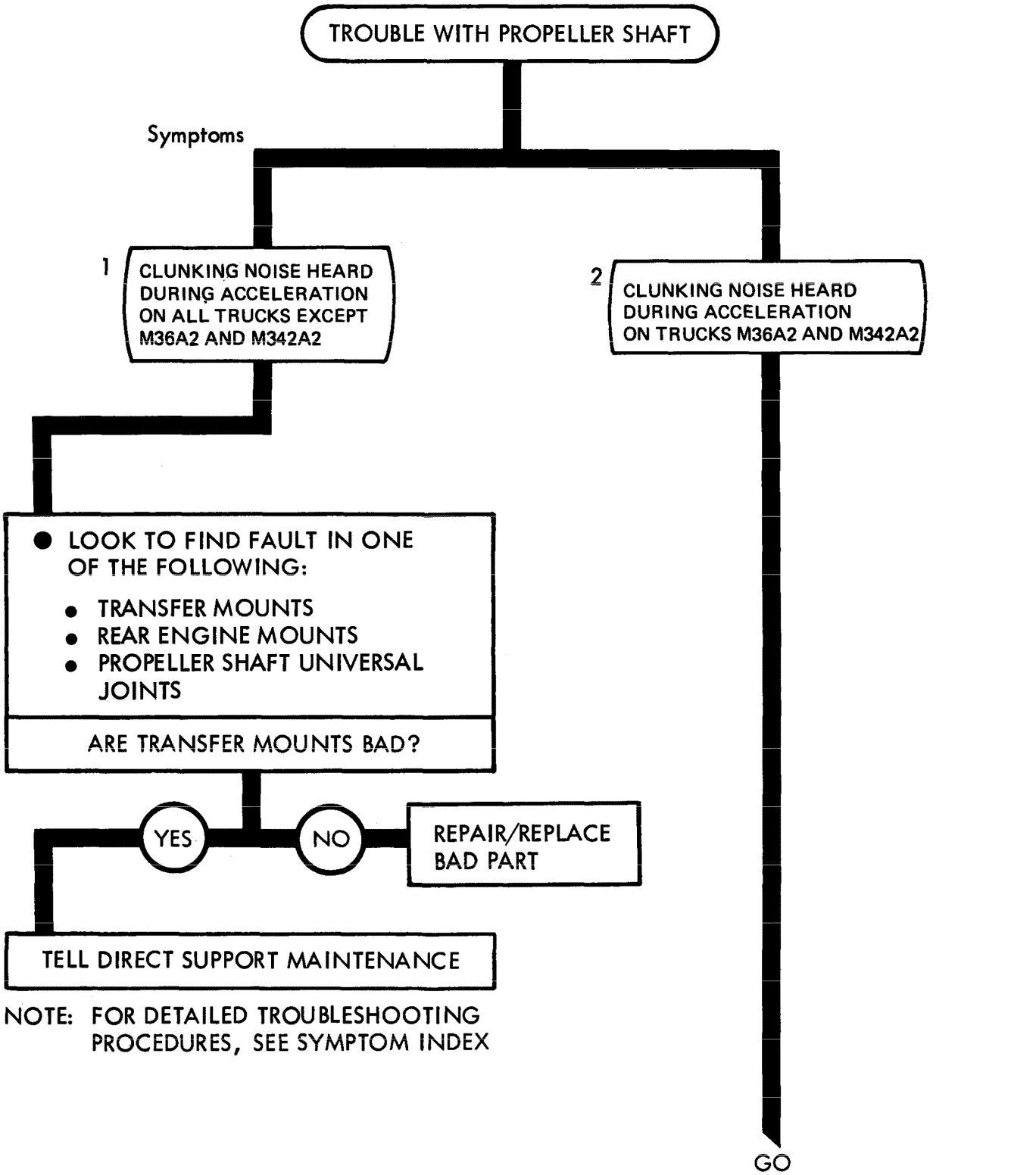
CHAPTER 37

PROPELLER SHAFT SYSTEM TROUBLESHOOTING SUMMARY

37-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 36 for the propeller shaft system.

37-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

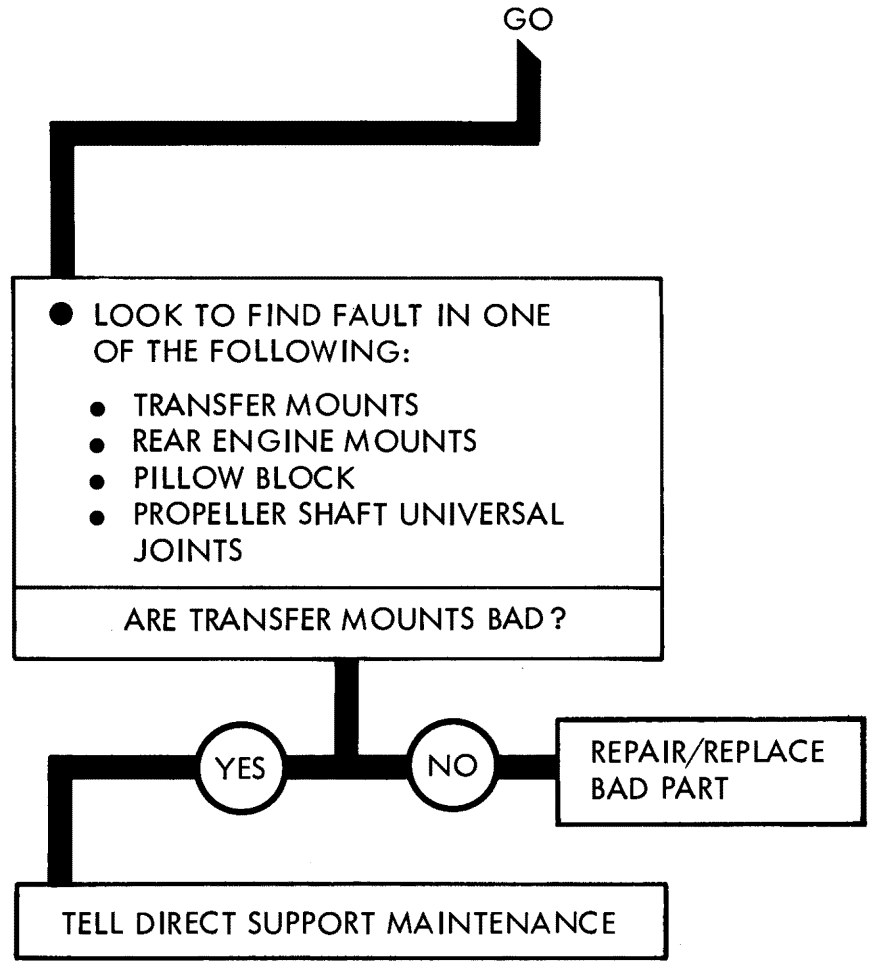
PROPELLER SHAFT SYSTEM TROUBLESHOOTING SUMMARY



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 114808

Figure 37-1 (Sheet 1 of 2)



TA 114809

Figure 37-1 (Sheet 2 of 2)

CHAPTER 38

PROPELLER SHAFT SYSTEM SUPPORT DIAGRAMS

38-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 36. Table 3-1 is a complete listing of all support diagrams used in this manual.

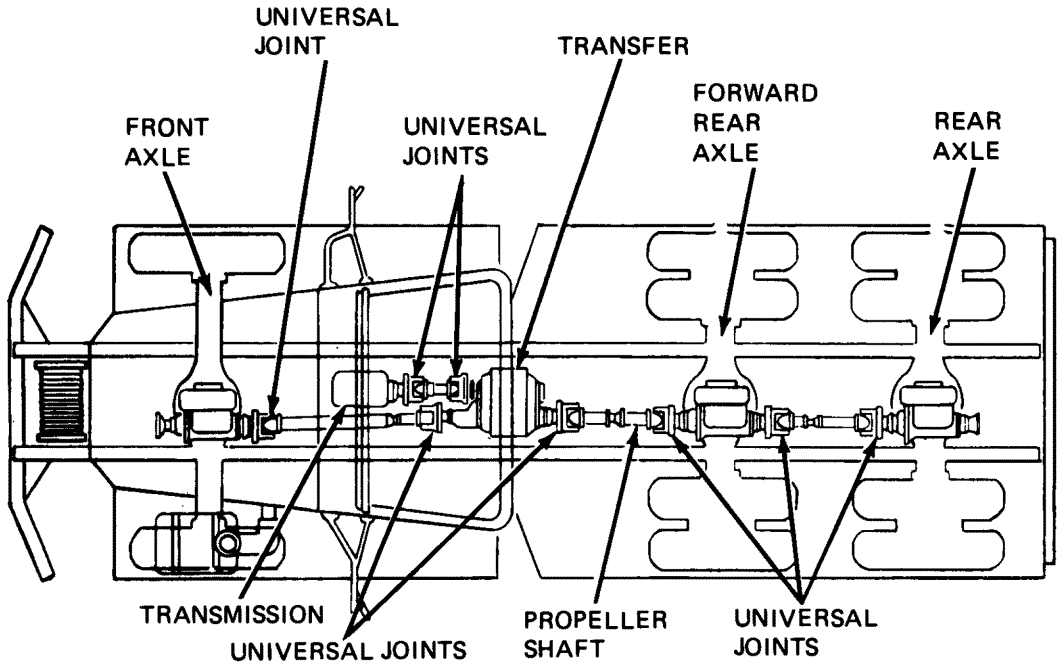


Figure 38-1. Propeller Shaft System Support Diagram

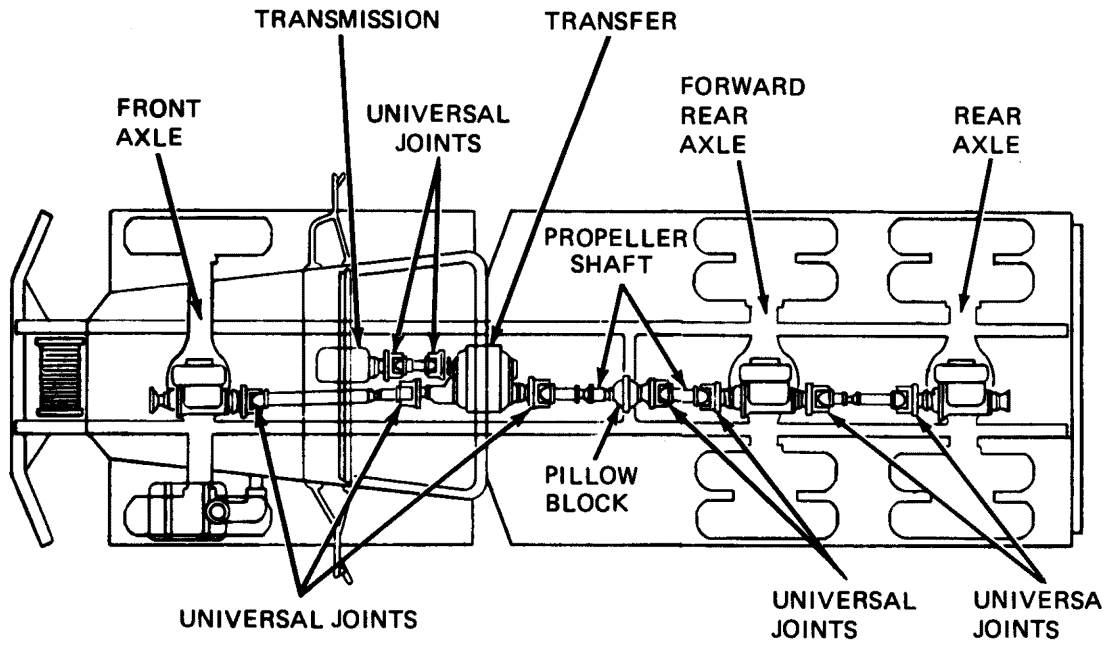


Figure 38-2. Propeller Shaft System Support Diagram

CHAPTER 39

FRONT AXLE SYSTEM TROUBLESHOOTING

39-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the front axle system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

39-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

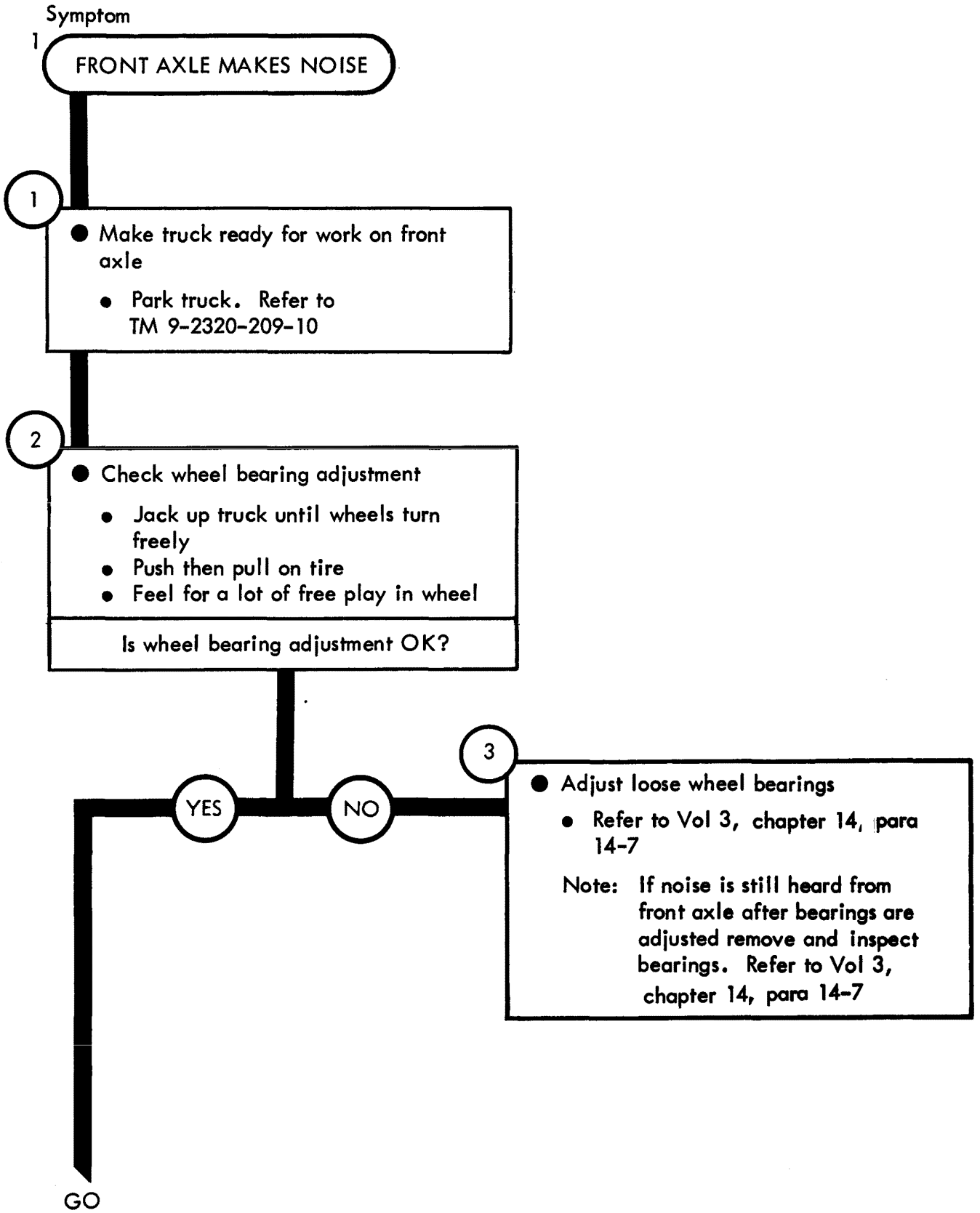
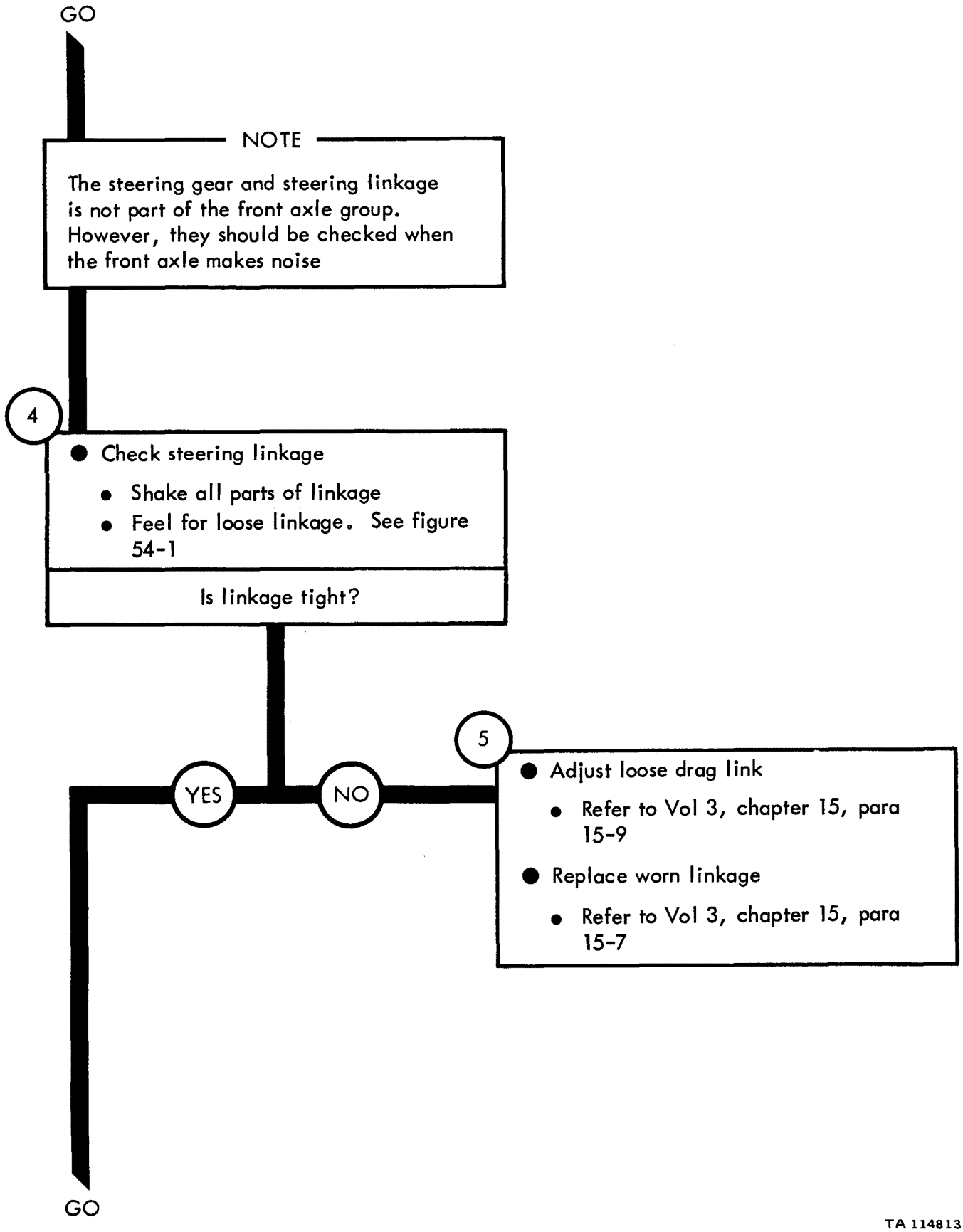
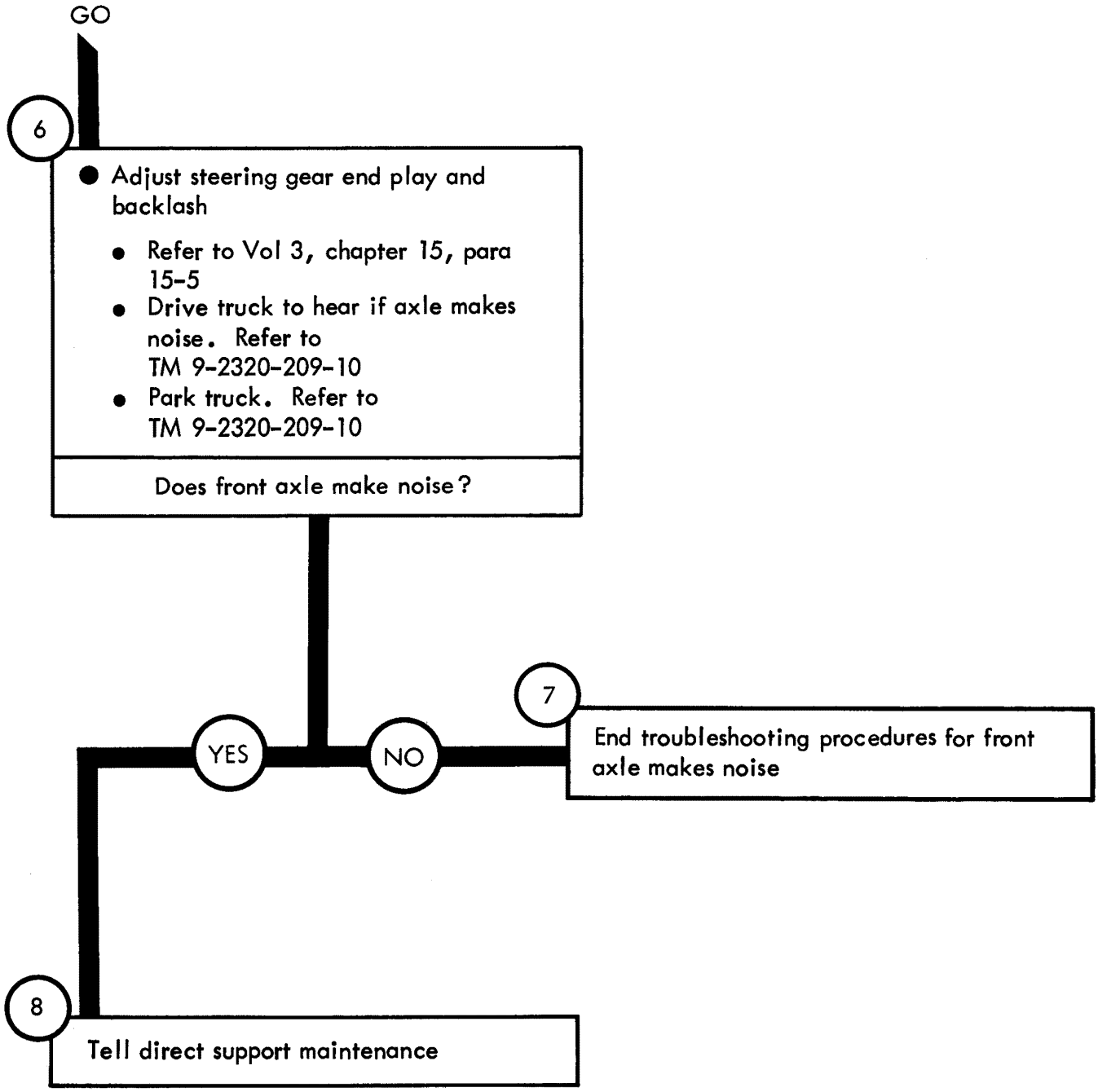


Figure 39-1 (Sheet 1 of 3)



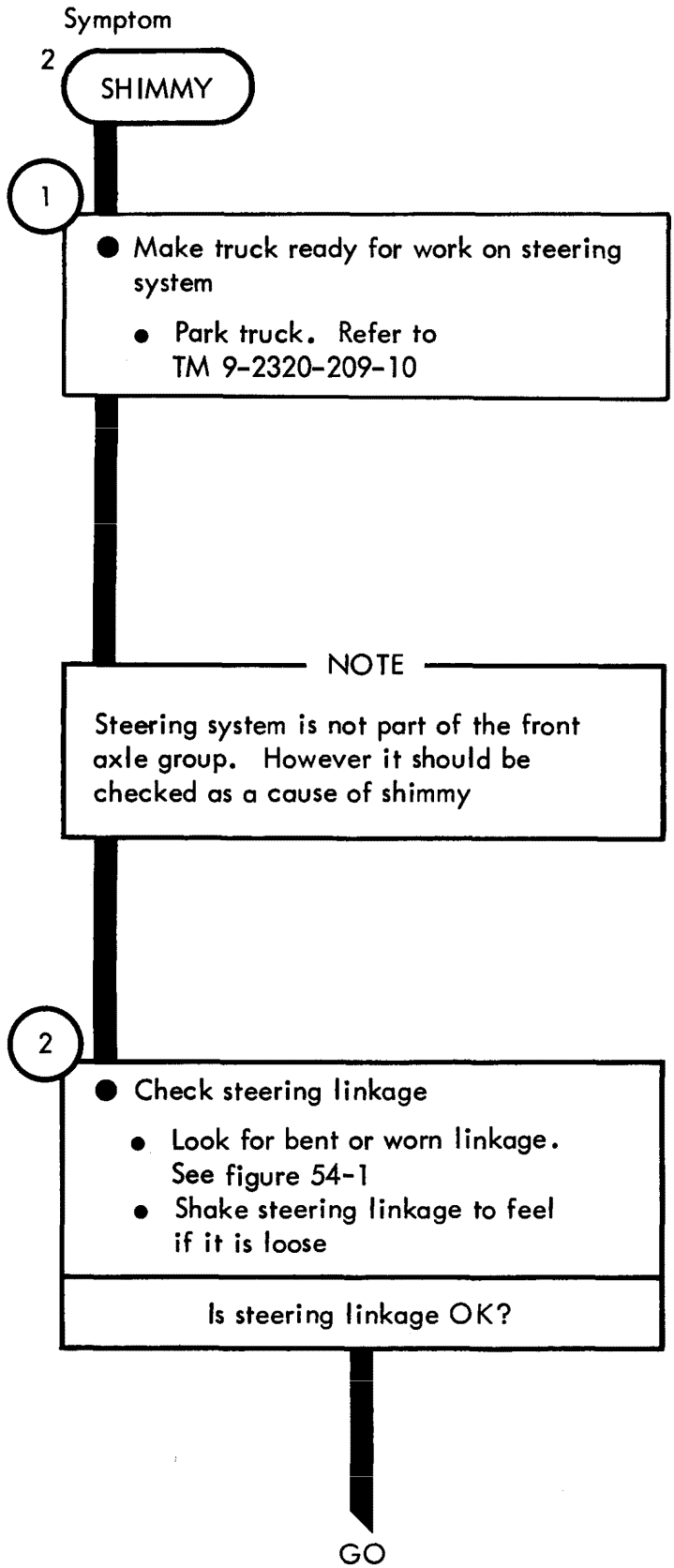
TA 114813

Figure 39-1 (Sheet 2 of 3)



TA 114814

Figure 39-1 (Sheet 3 of 3)



TA 114815

Figure 39-2 (Sheet 1 of 4)

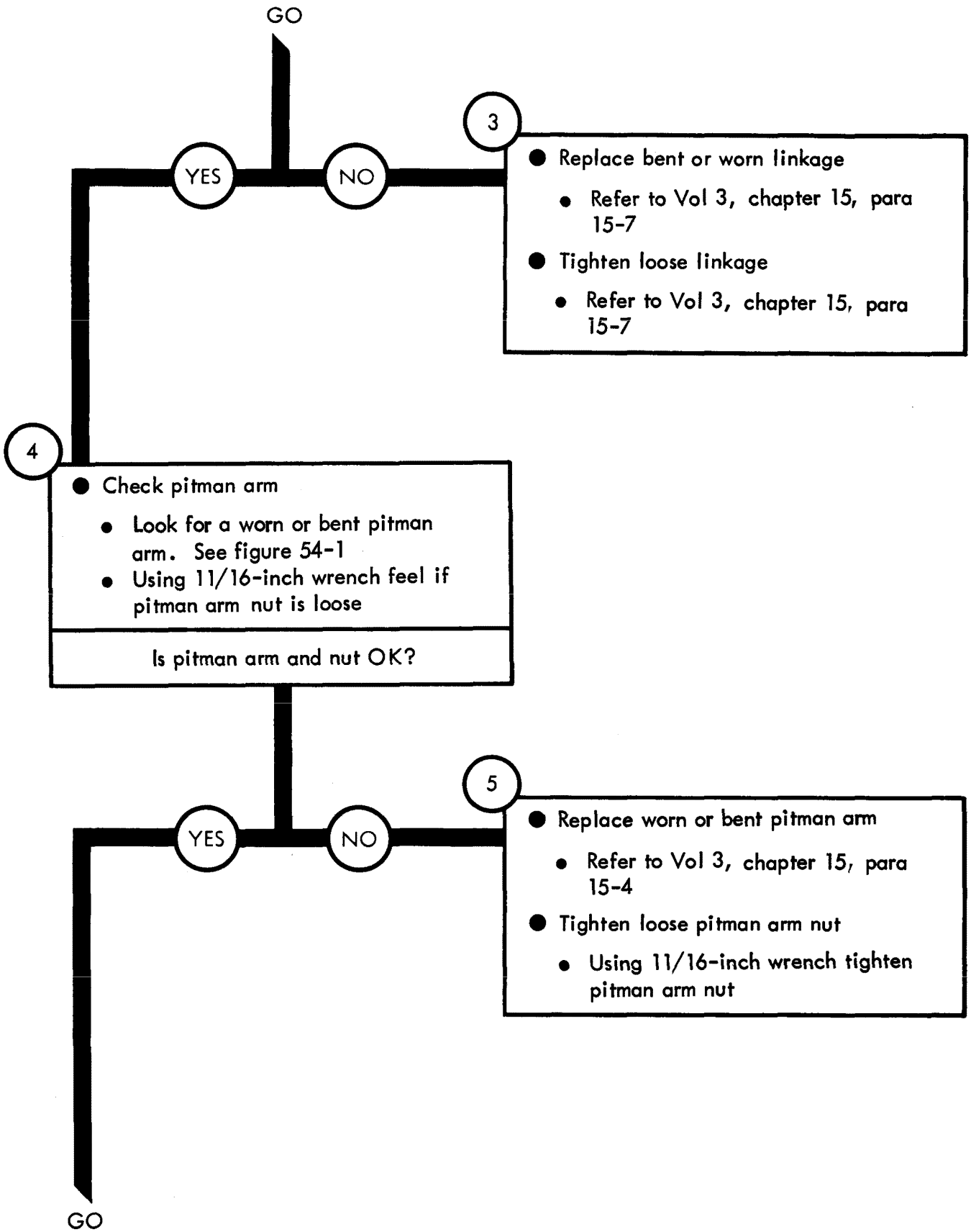
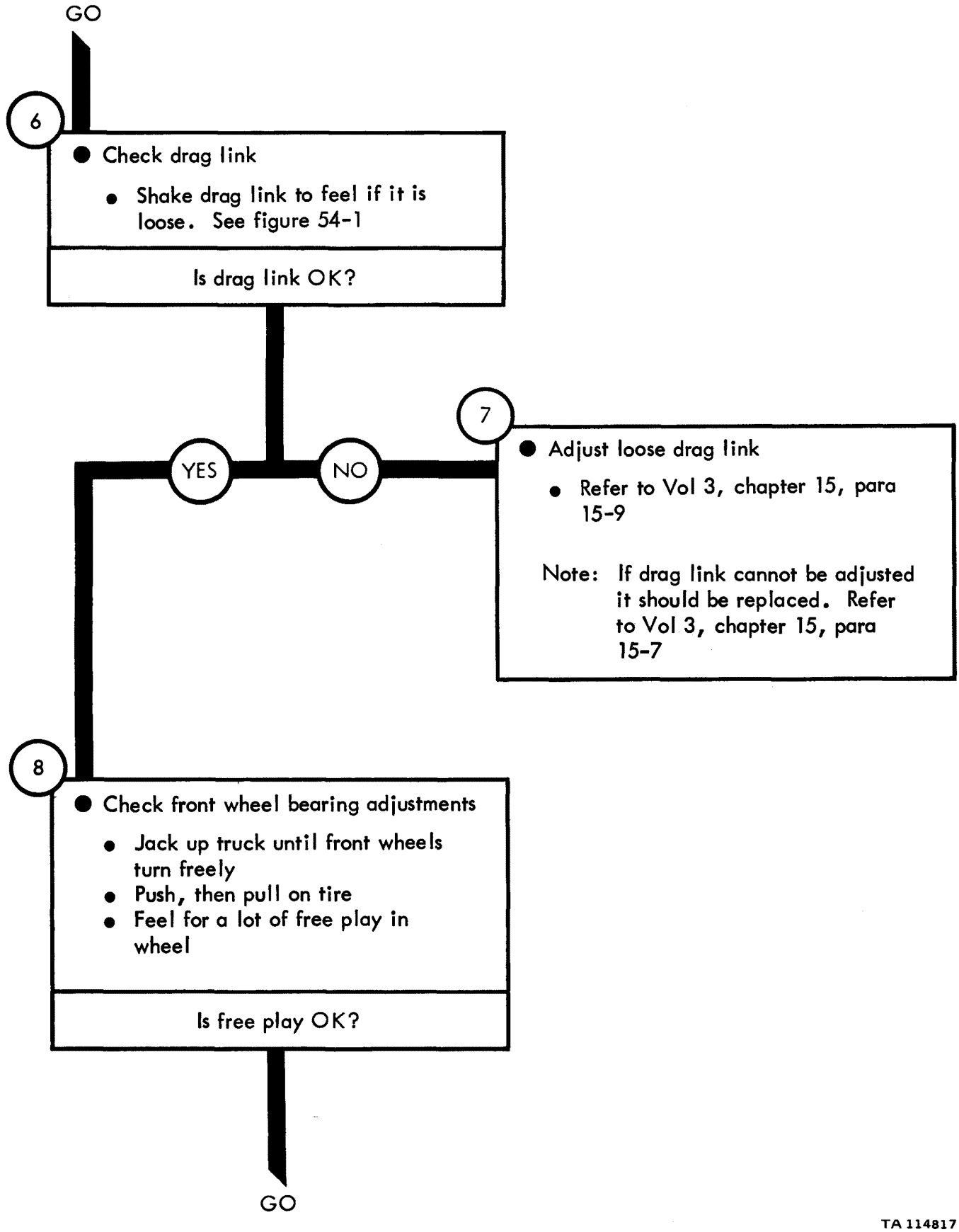
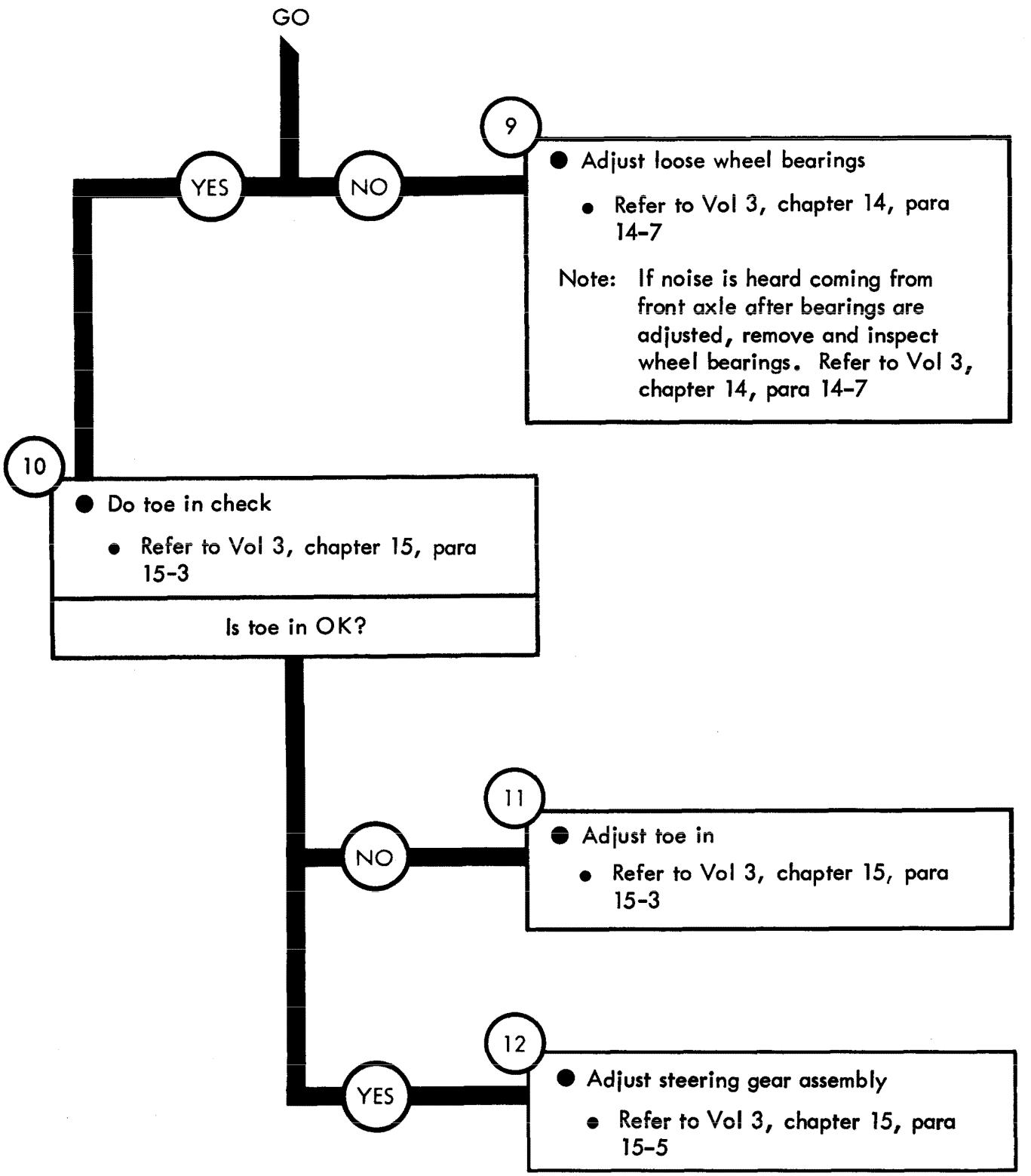


Figure 39-2 (Sheet 2 of 4)



TA 114817

Figure 39-2 (Sheet 3 of 4)



TA 114818

Figure 38-2 (Sheet 4 of 4)

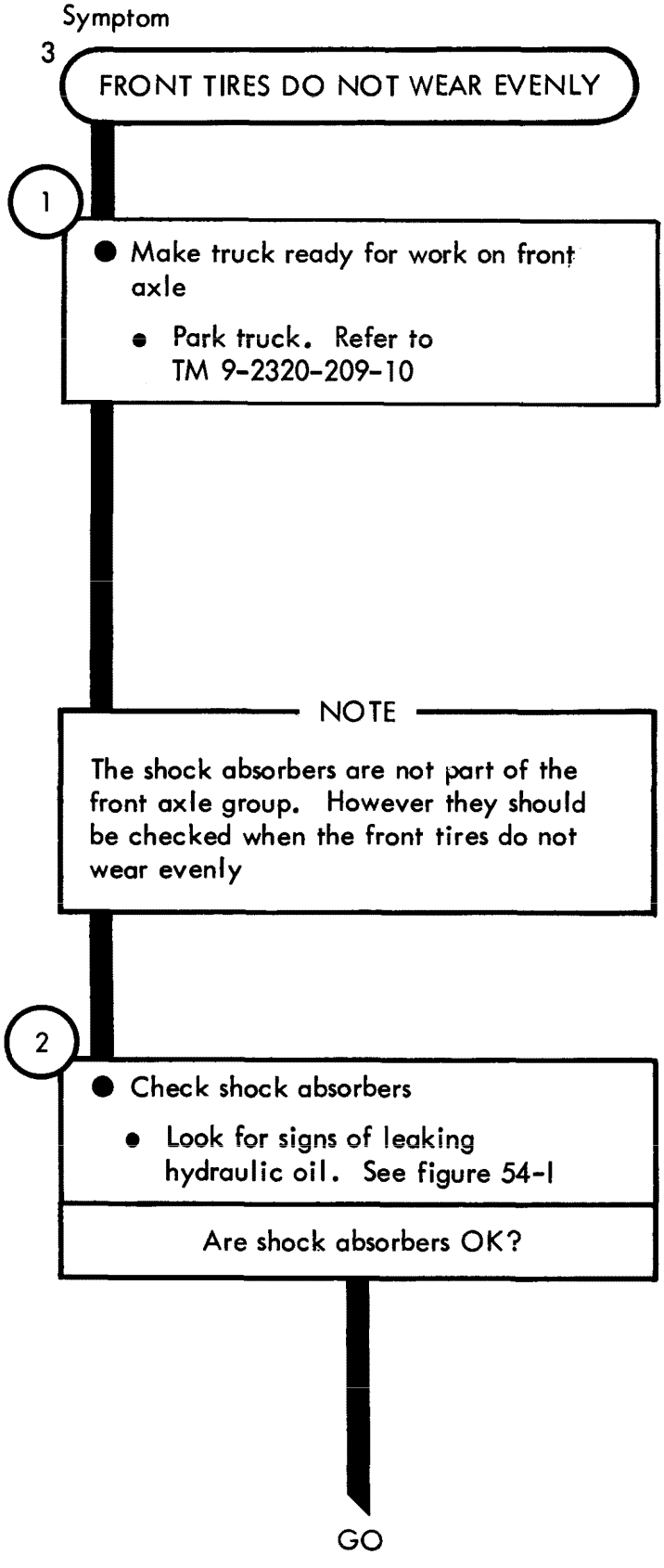


Figure 39-3 (Sheet 1 of 3)

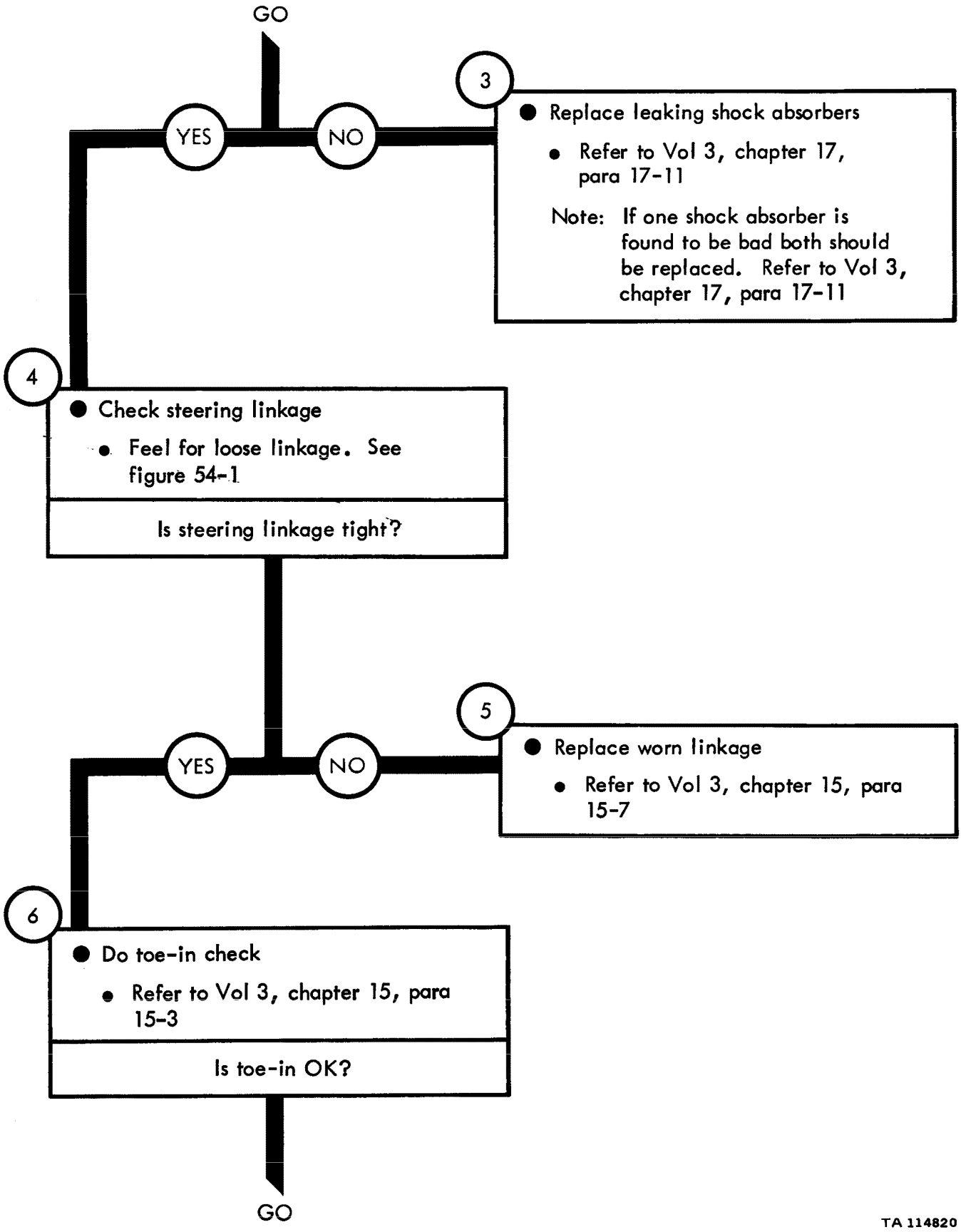
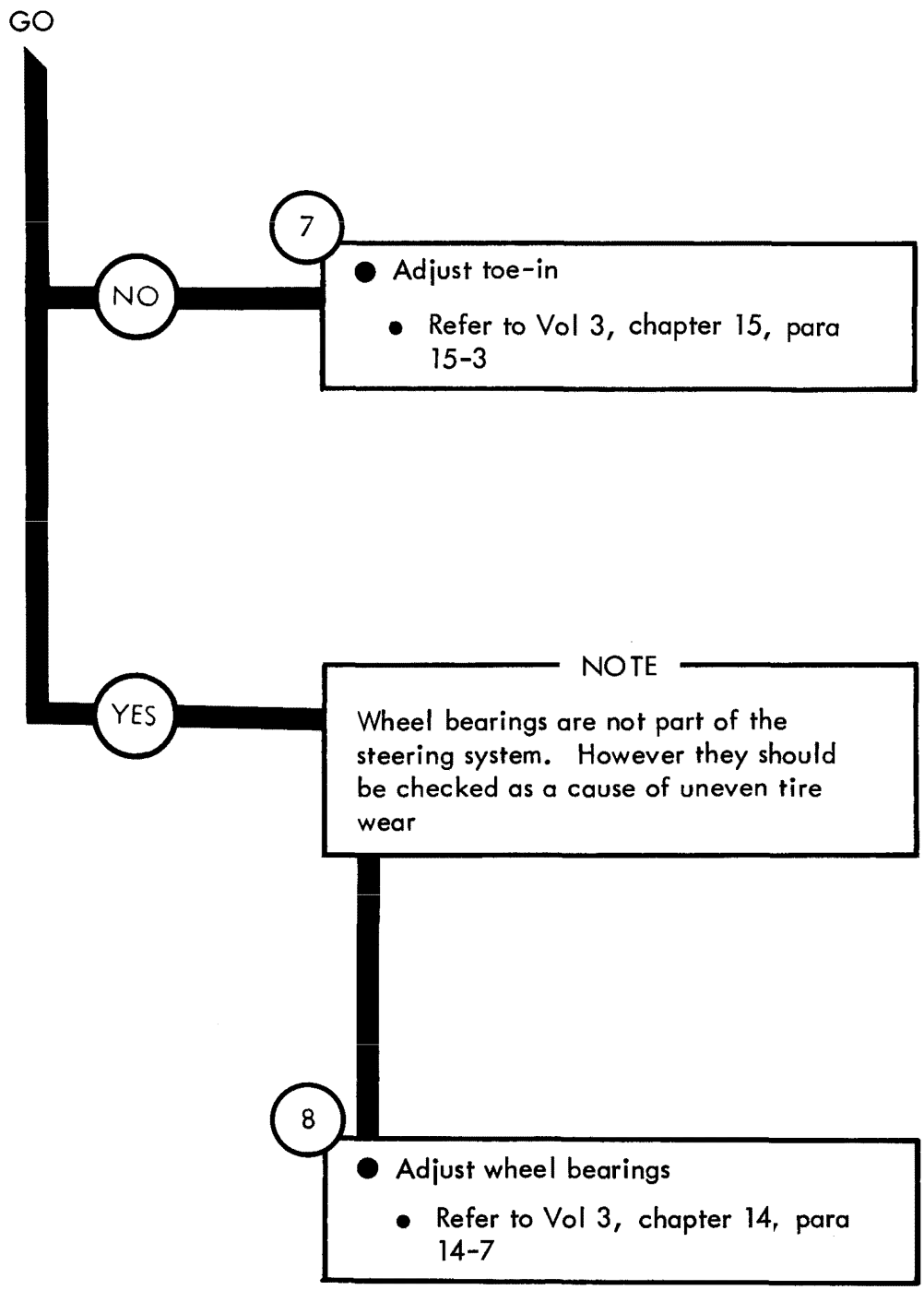


Figure 39-3 (Sheet 2 of 3)



TA 114821

Figure 39-3 (Sheet 3 of 3)

CHAPTER 40

FRONT AXLE SYSTEM TROUBLESHOOTING SUMMARY

40-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 39 for the front axle system.

40-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

FRONT AXLE SYSTEM TROUBLESHOOTING SUMMARY

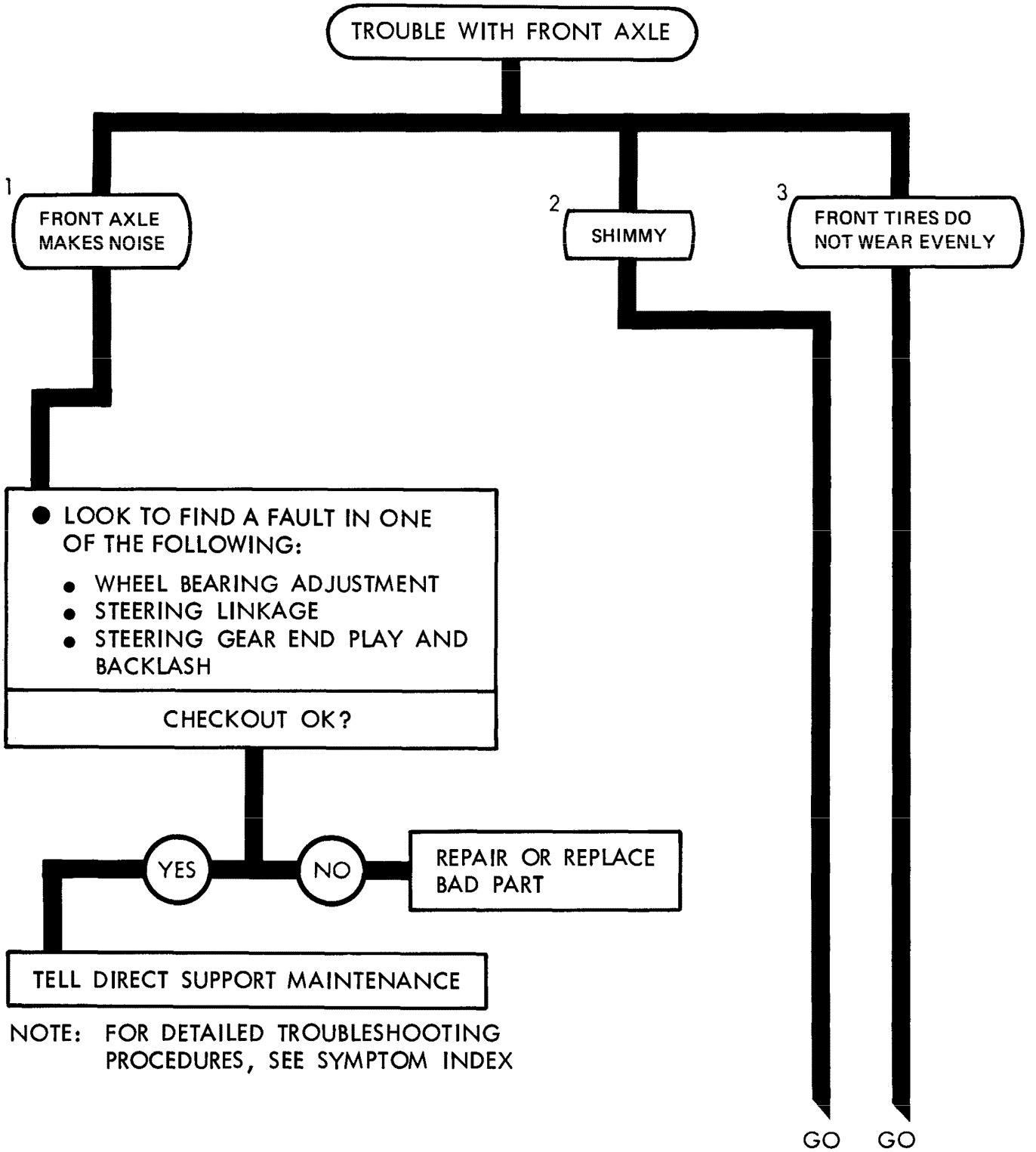


Figure 40-1 (Sheet 1 of 3)

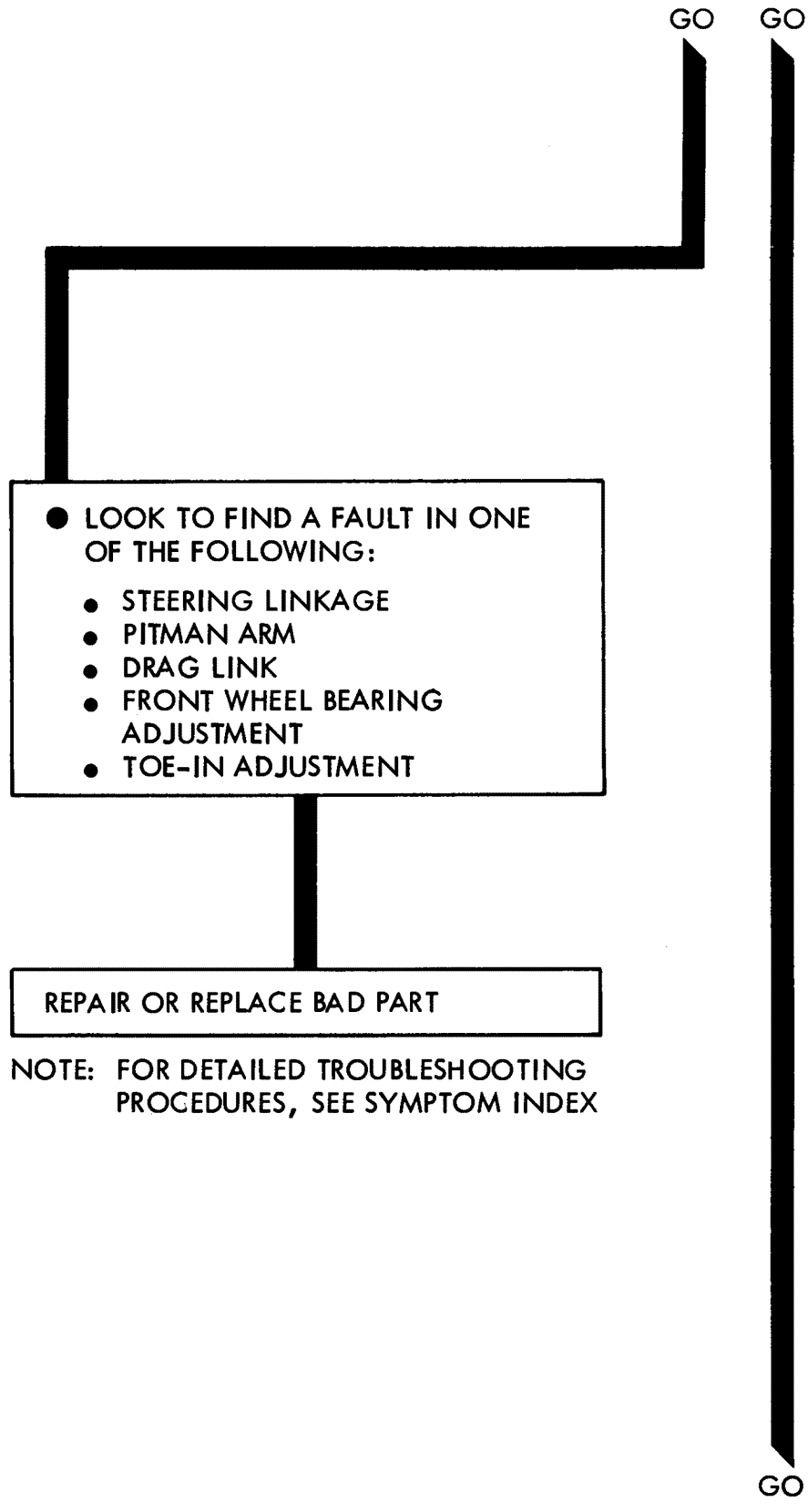


Figure 40-1 (Sheet 2 of 3)

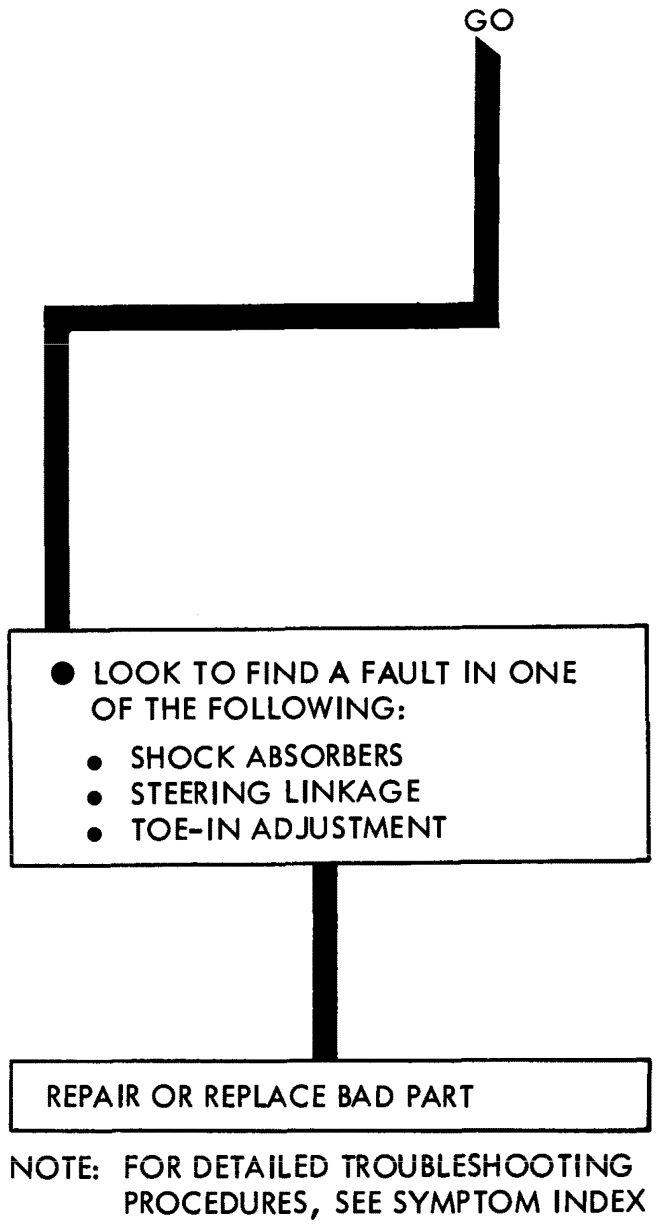


Figure 40-1 (Sheet 3 of 3)

CHAPTER 41

FRONT AXLE SYSTEM CHECKOUT PROCEDURES

41-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

FRONT AXLE SYSTEM CHECKOUT

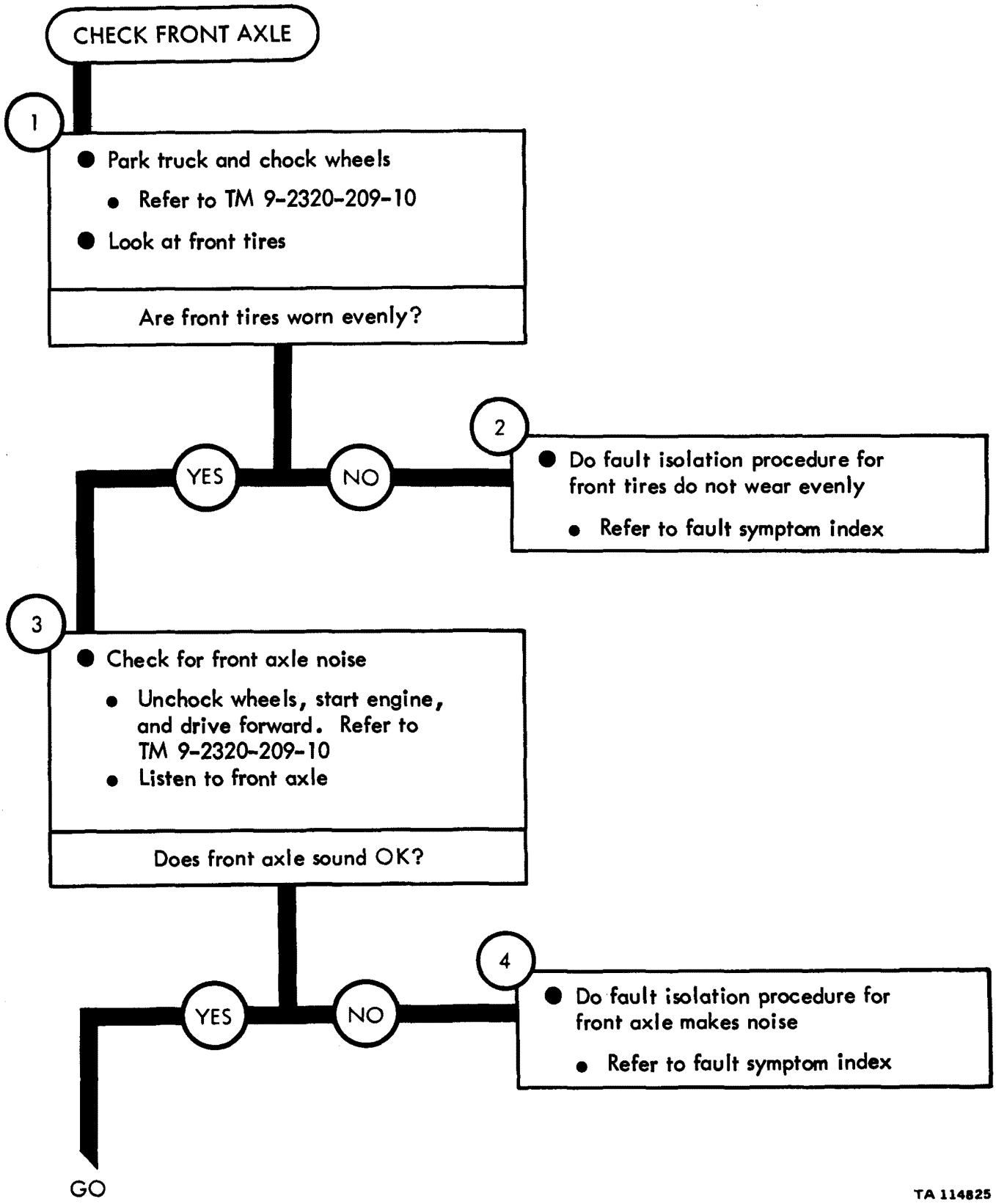
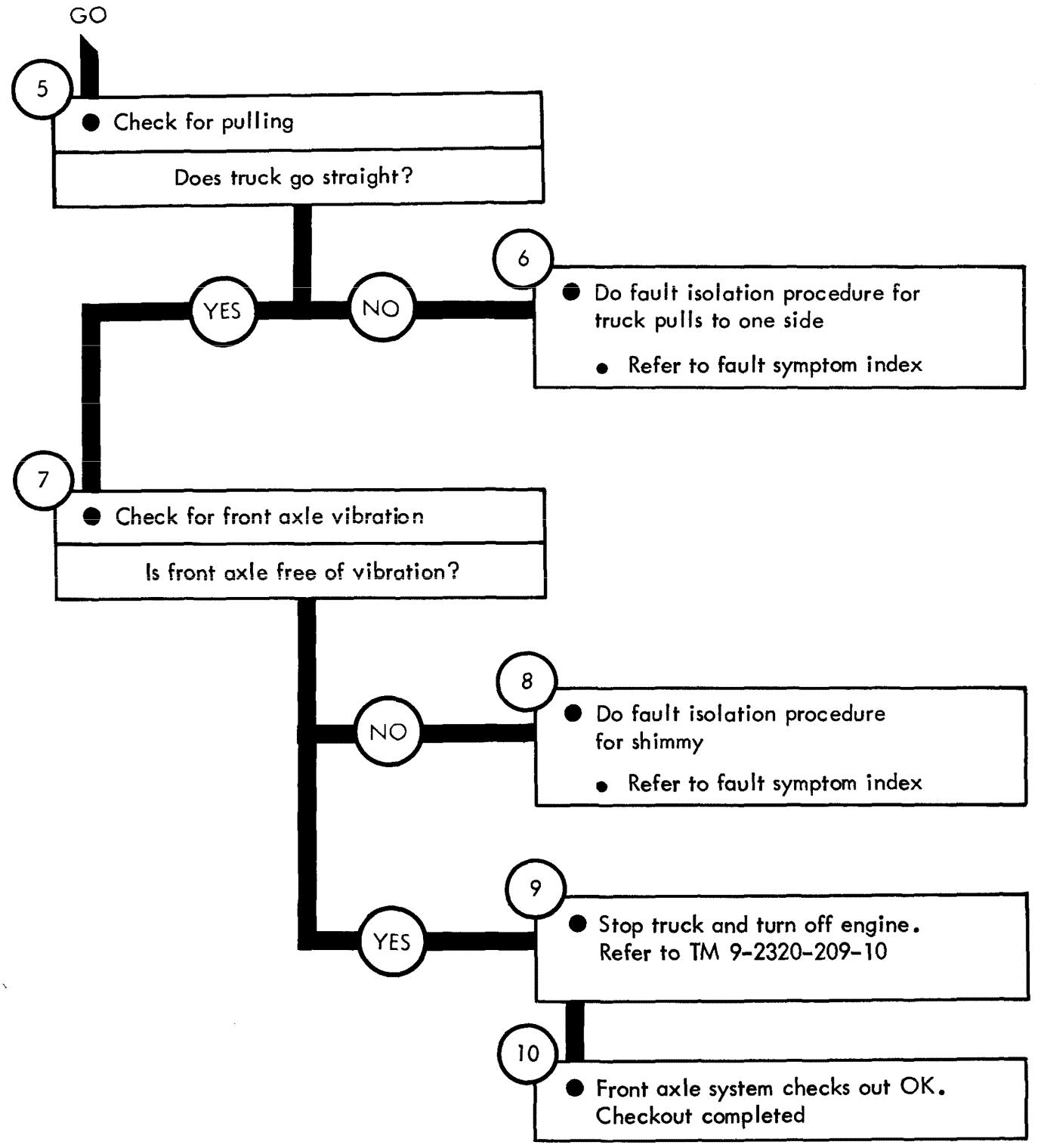


Figure 41-1 (Sheet 1 of 2)



TA 114826

Figure 41-1 (Sheet 2 of 2)

CHAPTER 42

REAR AXLE SYSTEM TROUBLESHOOTING

42-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the rear axle system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

42-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

Symptom

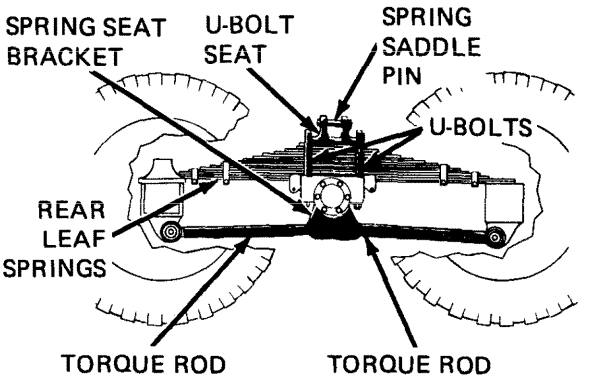
REAR AXLE MAKES NOISE

1

- Park truck
  - Refer to TM 9-2320-209-10

NOTE

Torque rods and spring seats are not part of the rear axle group. However, they should be checked as a cause of the rear axle making noise



2

- Check torque rods
  - Shake torque rods
  - Look for free play at torque rod ends

Are torque rods OK?

YES

NO

3

- Replace worn torque rod ends
  - Refer to Vol 3, chapter 17, para 17-12

GO

TA 114827

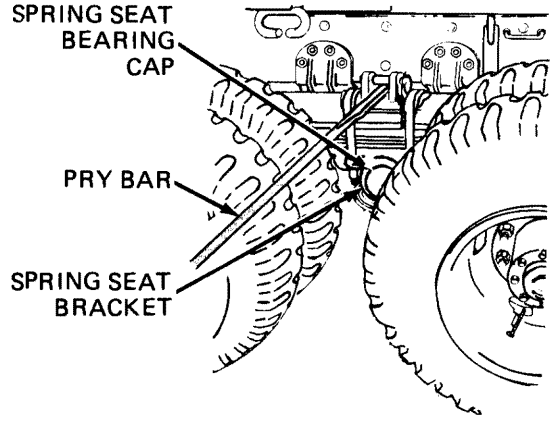
Figure 42-1 (Sheet 1 of 4)

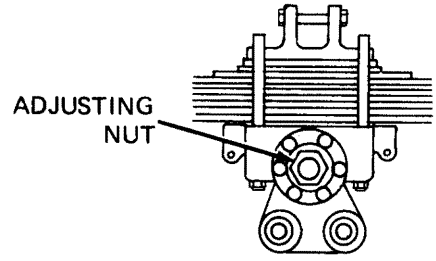
GO

4

- Check spring seat bearing free play
  - Jack up and support truck so that wheels are off ground. Refer to TM 9-2320-209-10
  - Take off spring seat bearing cap. Refer to Vol 3, chapter 17, para 17-10
  - Put pry bar between spring saddle pin and U-bolt seat
  - Push bar up and down and look for too much movement in adjusting nut

Is adjusting nut OK?





YES

NO

5

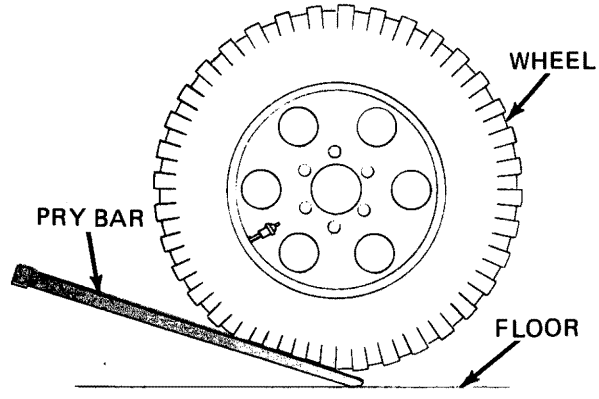
- Tighten adjusting nut
  - Refer to Vol 3, chapter 17, para 17-10

6

- Check wheel bearing adjustment
  - Slide a pry bar under rear wheels

    NOTE: Bar is used as a lever to push up on the tire using the floor for support
  - Push up on tire and feel for a lot of free play in wheel

Is wheel bearing adjustment OK?



GO

TA 114828

Figure 42-1 (Sheet 2 of 4)

GO

YES

NO

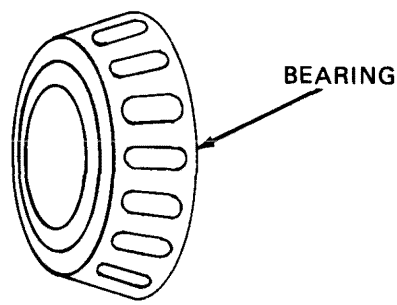
7

- Adjust loose rear wheel bearings
  - Refer to Vol 3, chapter 14, para 14-10

8

- Check rear wheel bearing on wheel that is noisy
  - Remove rear brake hub and drum assembly. Refer to Vol 3, chapter 14, para 14-9
  - Look at wheel bearings for signs of scorching, melting or metal discoloring

Note: If wheel bearing is found to be OK, put it back. Refer to Vol 3, chapter 14, para 14-9. Then do step 8, for the wheel next to it.



Is wheel bearing OK?

NO

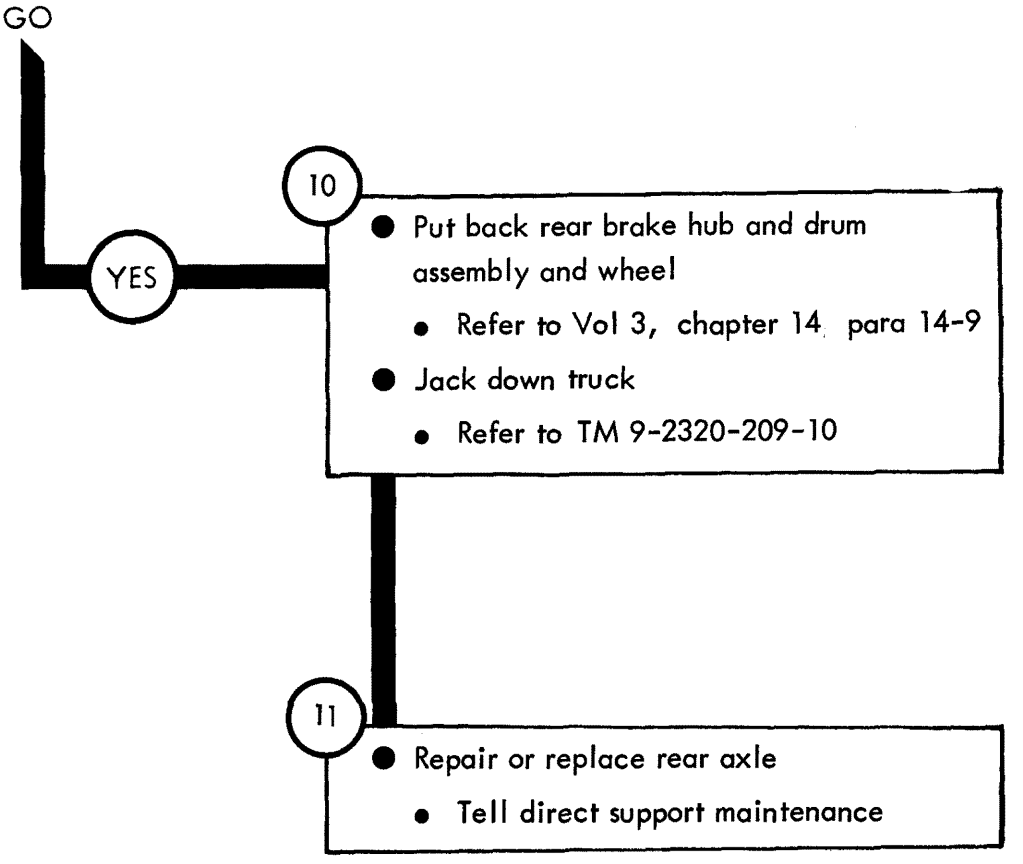
9

- Replace bad wheel bearing
  - Refer to Vol 3, chapter 14, para 14-10

GO

TA 114829

Figure 42-1 (Sheet 3 of 4)



TA 114830

Figure 42-1 (Sheet 4of 4)

CHAPTER 43

REAR AXLE SYSTEM SUPPORT DIAGRAMS

43-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 42. Table 3-1 is a complete listing of all support diagrams used in this manual.

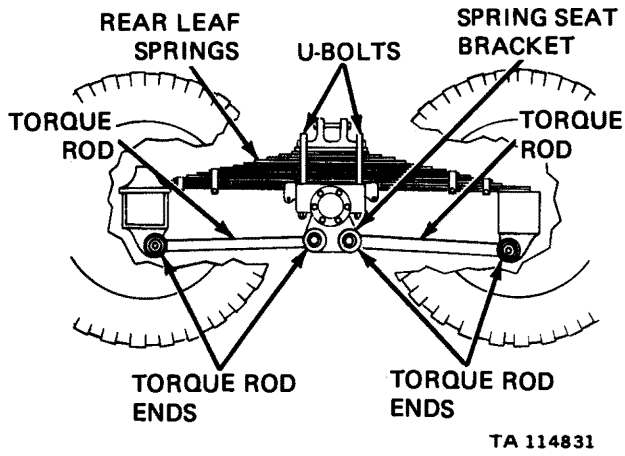


Figure 43-1. Rear Axle Support Diagram

CHAPTER 44

BRAKE SYSTEM TROUBLESHOOTING

44-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the brake system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

44-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

BRAKE SYSTEM TROUBLESHOOTING

Symptom

BRAKE PEDAL PRESSURE IS SPONGY

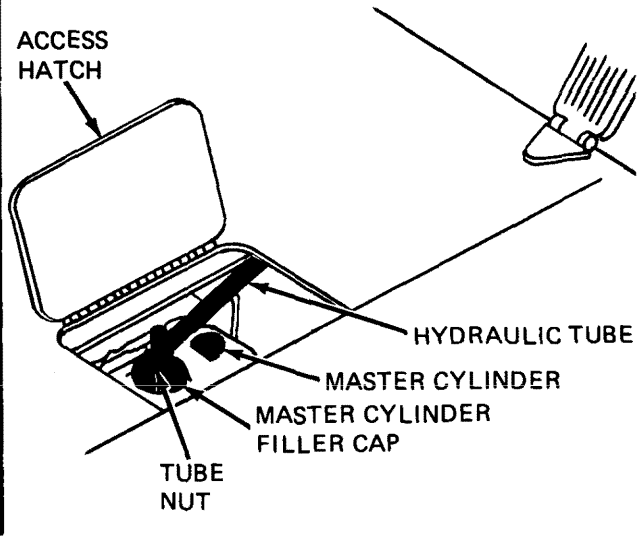
1

- Make truck ready for work on brake system
  - Park truck. Refer to TM 9-2320-209-10

2

- Check hydraulic brake fluid in master cylinder
  - Open master cylinder access hatch
  - Using 3/8-inch open end wrench, unscrew tube nut and take off hydraulic tube
  - Using 3/4-inch open end wrench, unscrew and take off master cylinder filler cap
  - Using a flashlight, shine light into master cylinder reservoir to see if fluid level is low

Is the hydraulic brake fluid level OK?



YES

NO

3

- Test master cylinder
  - Refer to test equipment procedures index for master cylinder leakage test

Is master cylinder OK?

GO

GO

TA 114832

Figure 44-1 (Sheet 1 of 7)

GO

GO

4

YES

- Bleed service brake system
  - Refer to Vol 3, chapter 13, para 13-15 or 13-16

5

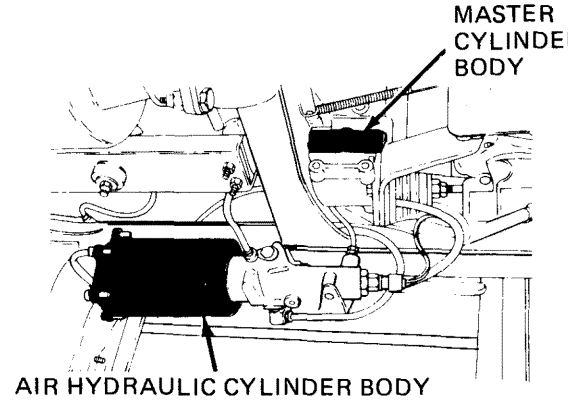
NO

- Replace master cylinder
  - Refer to Vol 3, chapter 13, para 13-12

6

- Check master cylinder
  - Crawl under truck
  - Look for leaks coming from cylinder body

Is master cylinder OK?



7

YES

NO

- Replace leaking master cylinder
  - Refer to Vol 3, chapter 13, para 13-12

GO

TA 114833

Figure 44-1 (Sheet 2 of 7)

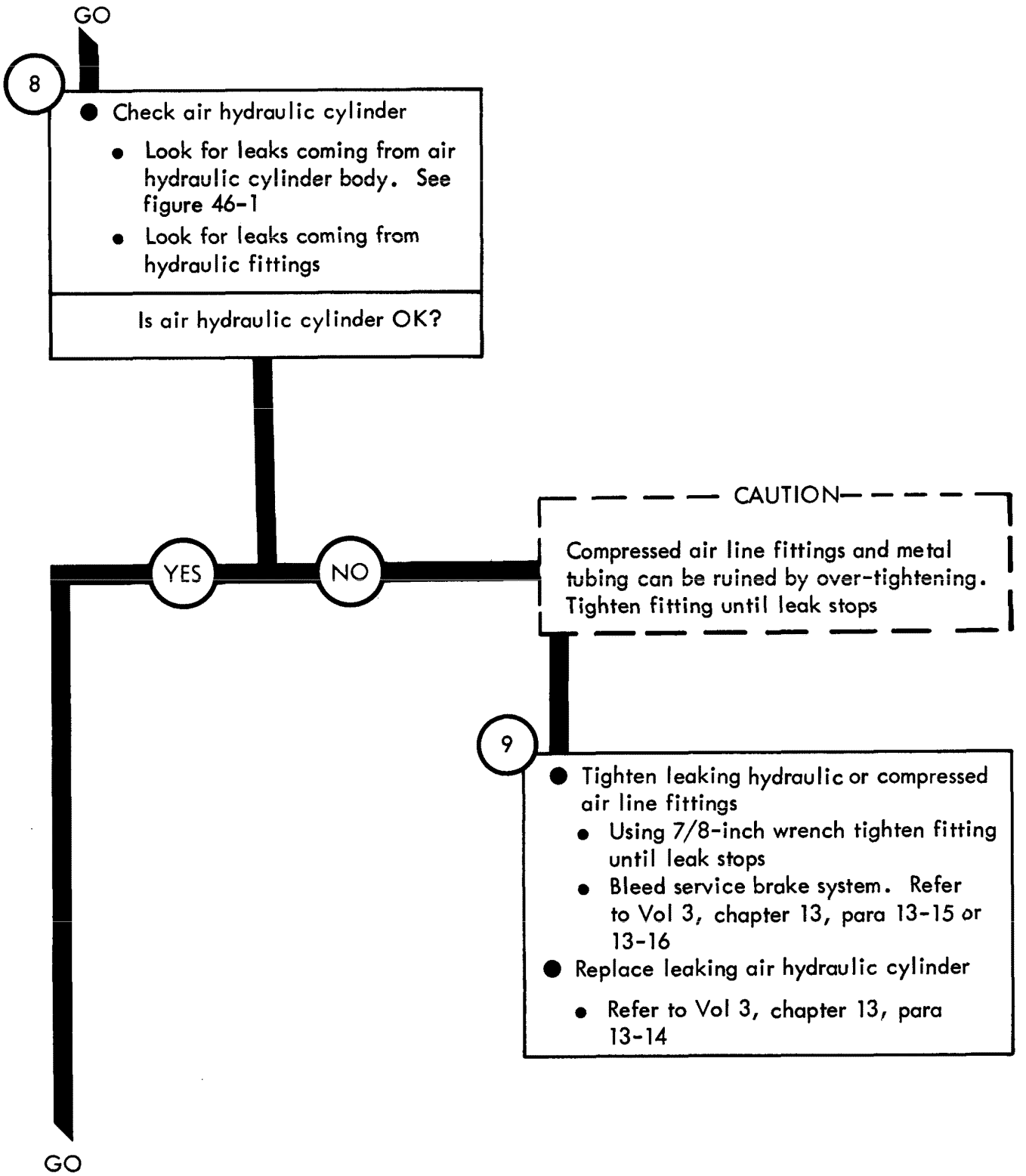
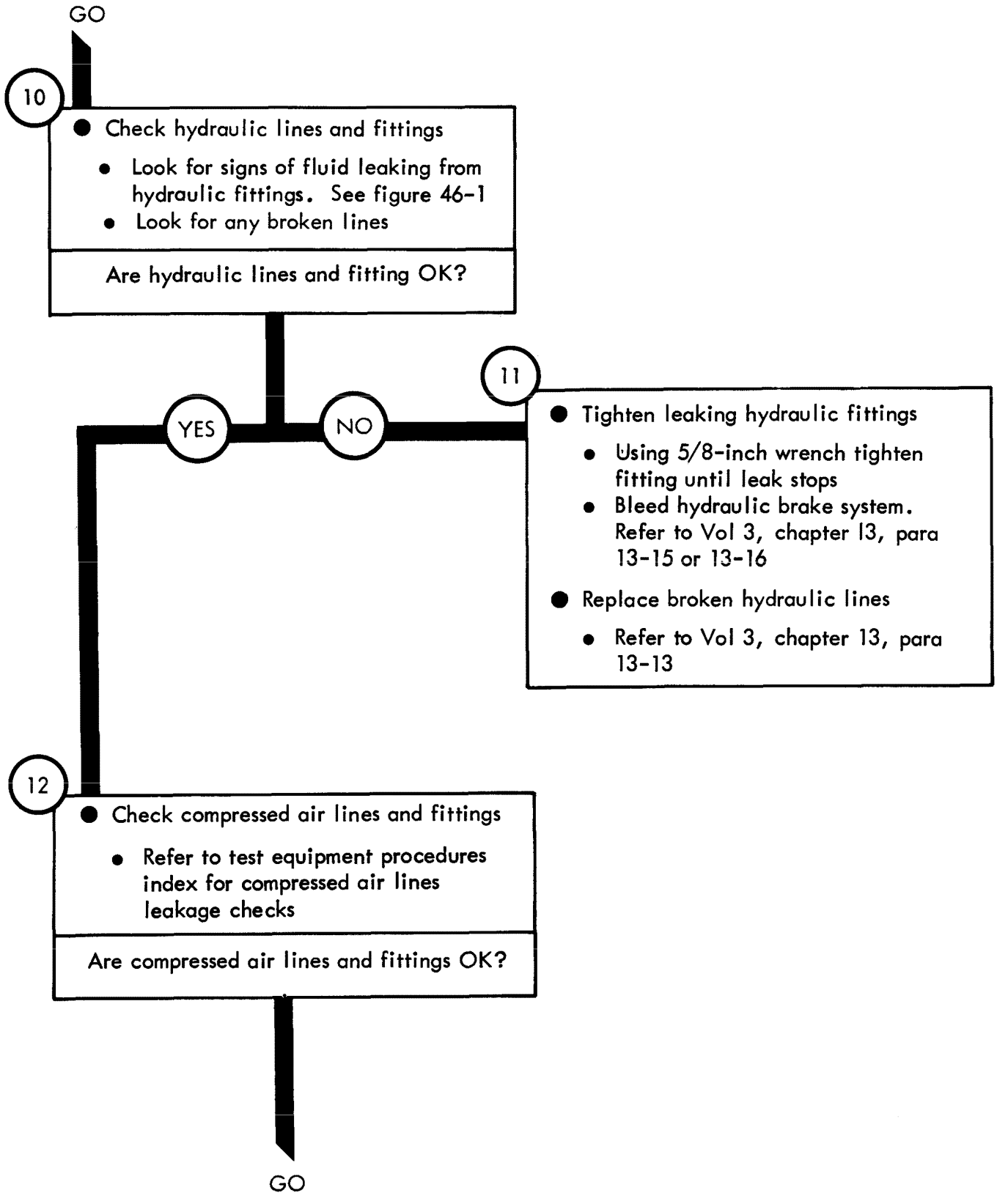


Figure 44-1 (Sheet 3 of 7)



TA 114835

Figure 44-1 (Sheet 4 of 7)

GO

YES

NO

CAUTION

Fittings and metal tubing can be ruined by overtightening. Tighten fitting until leak stops

13

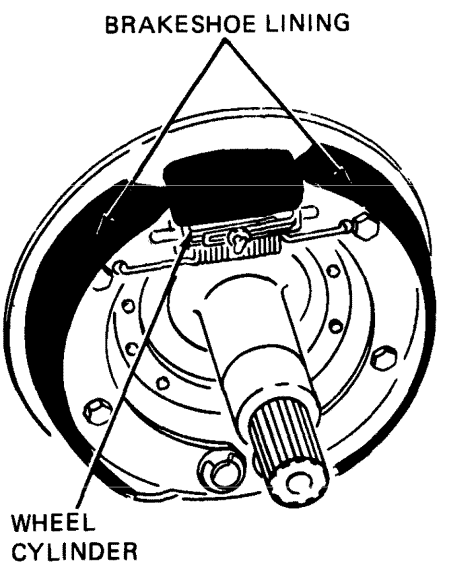
- Replace broken or crushed compressed air lines
  - Refer to Vol 3, chapter 13, para 13-21
- Tighten leaking compressed air line fittings
  - Using 7/8-inch wrench tighten fitting until leak stops
  - Do soap suds test again to be sure fitting is tight

14

- Check service brakeshoe lining
  - Take off brake drum. Refer to Vol 3, Chapter 14, para 14-4 and 14-9
  - Look at brakeshoe linings to see if they are worn
- Check wheel cylinders
  - Look for leaks

Are brakeshoe linings and wheel cylinder OK?

GO



TA 114836

Figure 44-1 (Sheet 5 of 7)

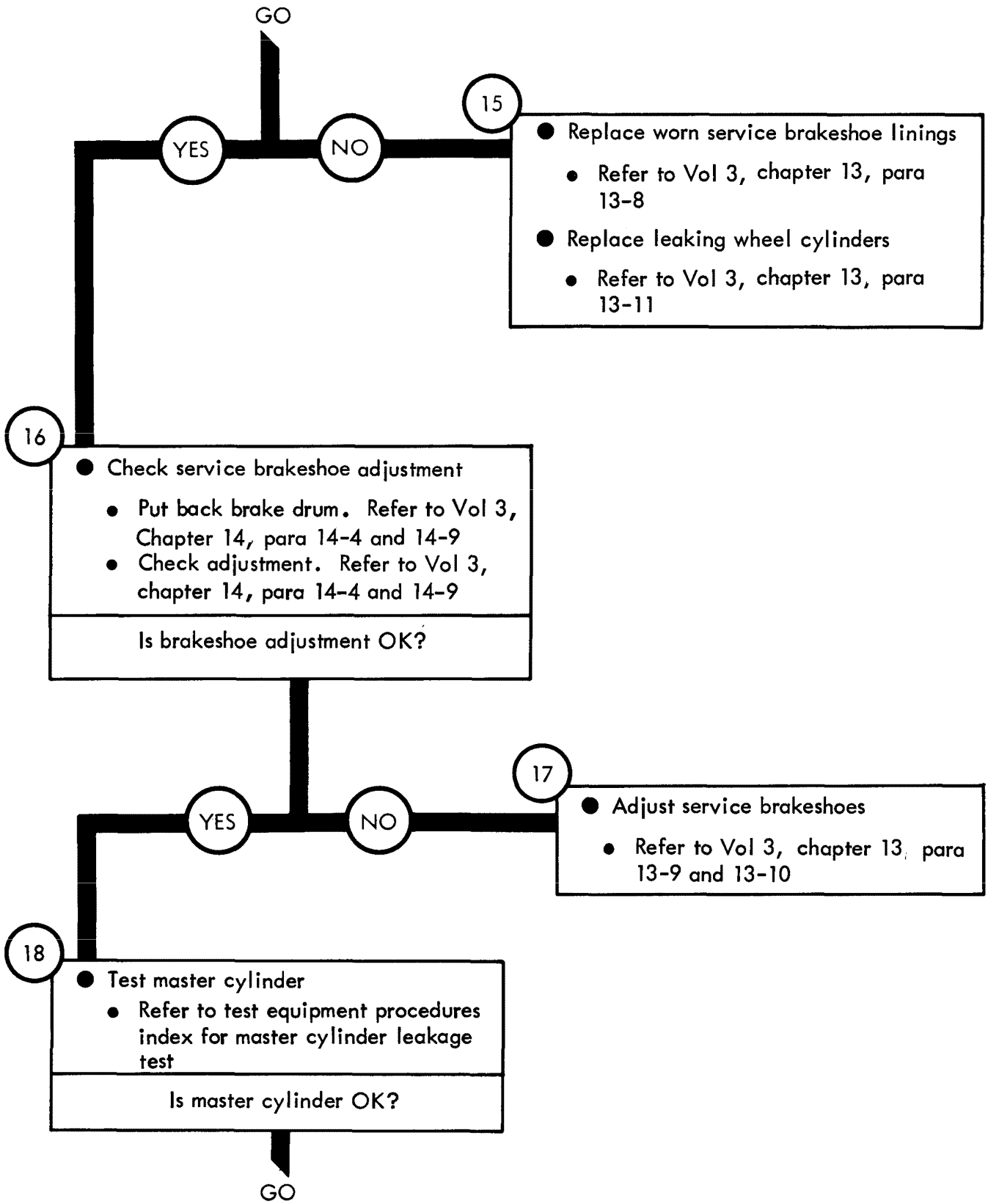
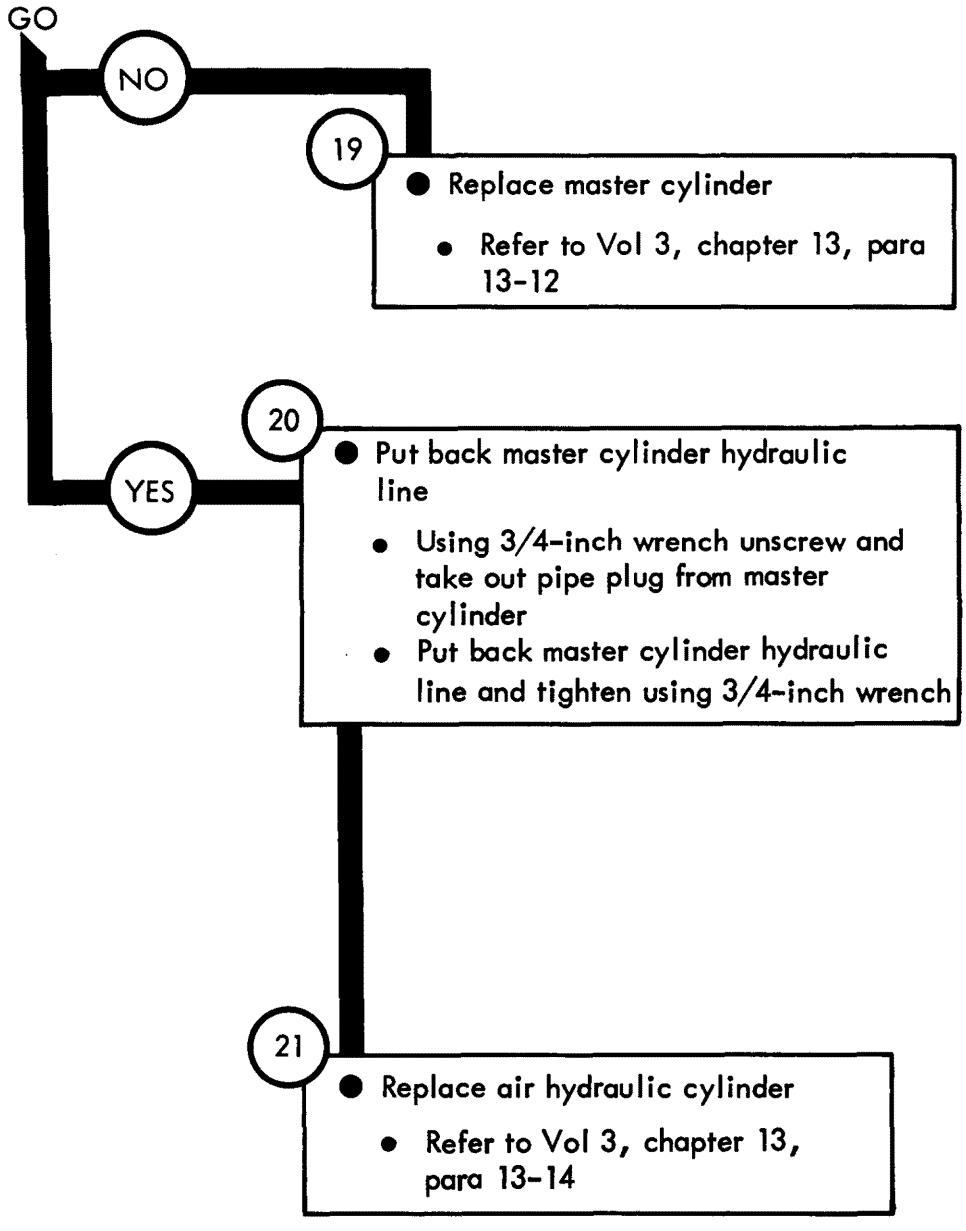


Figure 44-1 (Sheet 6 of 7)



TA 114838

Figure 44-1 (Sheet 7 of 7)

2 Symptom

NO BRAKING ACTION

1

- Make truck ready for work on brake system
  - Park truck. Refer to TM 9-2320-209-10

2

- Check master cylinder
  - Look for leaks coming from cylinder body

Is master cylinder OK?

YES

NO

3

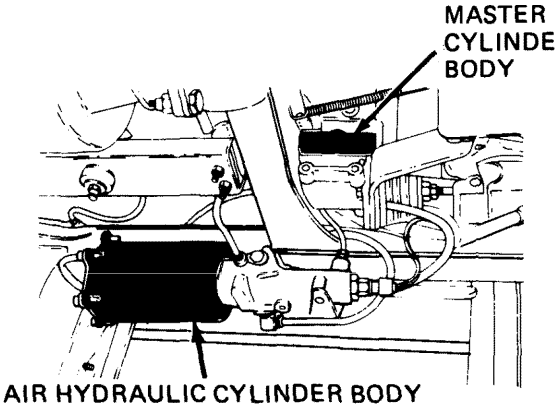
- Replace leaking master cylinder
  - Refer to Vol 3, chapter 13, para 13-12

4

- Check air hydraulic cylinder
  - Look for leaks coming from air hydraulic cylinder body. See figure 46-1

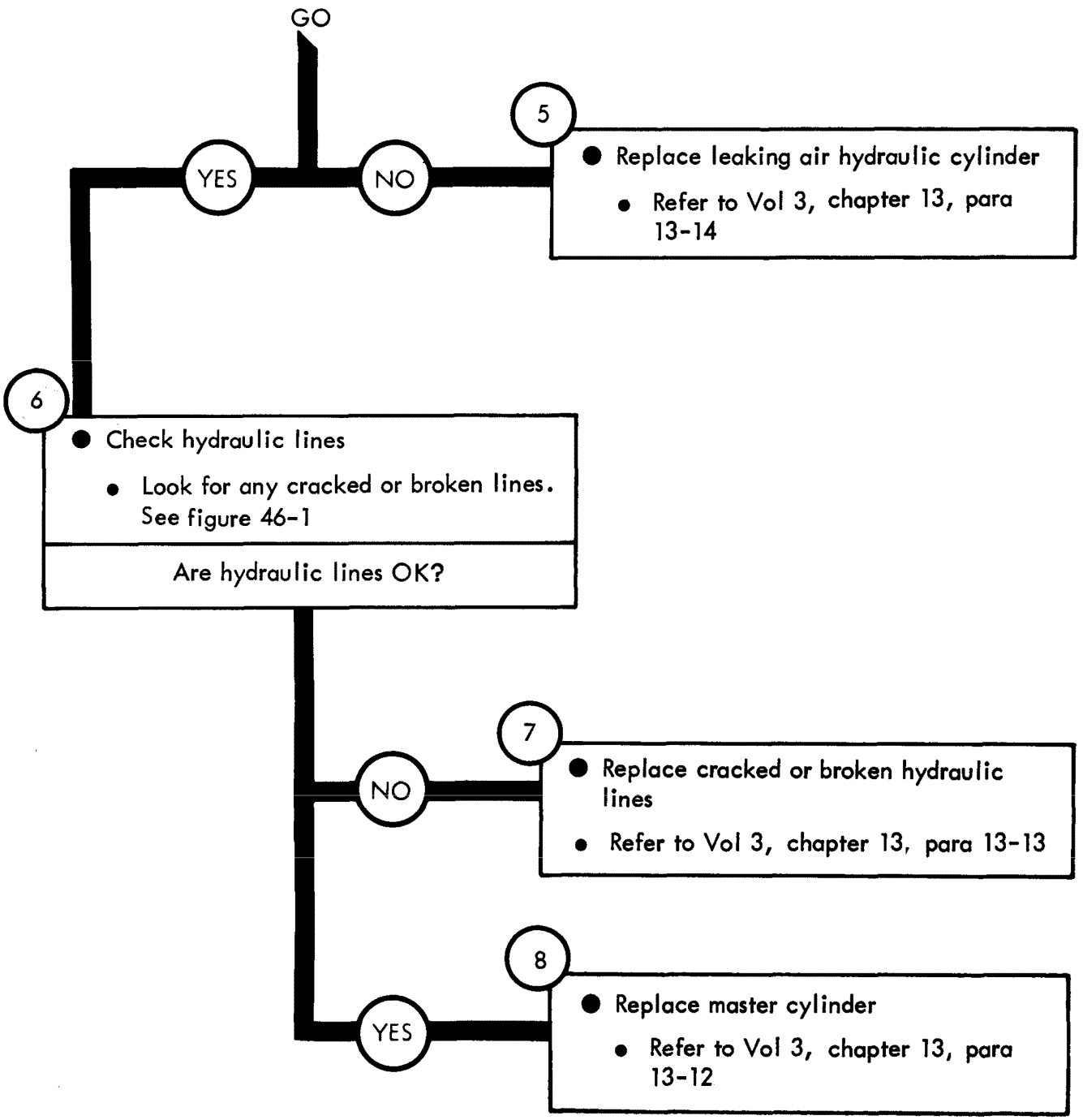
Is air hydraulic cylinder OK?

GO



TA 114839

Figure 44-2 (Sheet 1 of 2)



TA 114840

Figure 44-2 (Sheet 2 of 2)

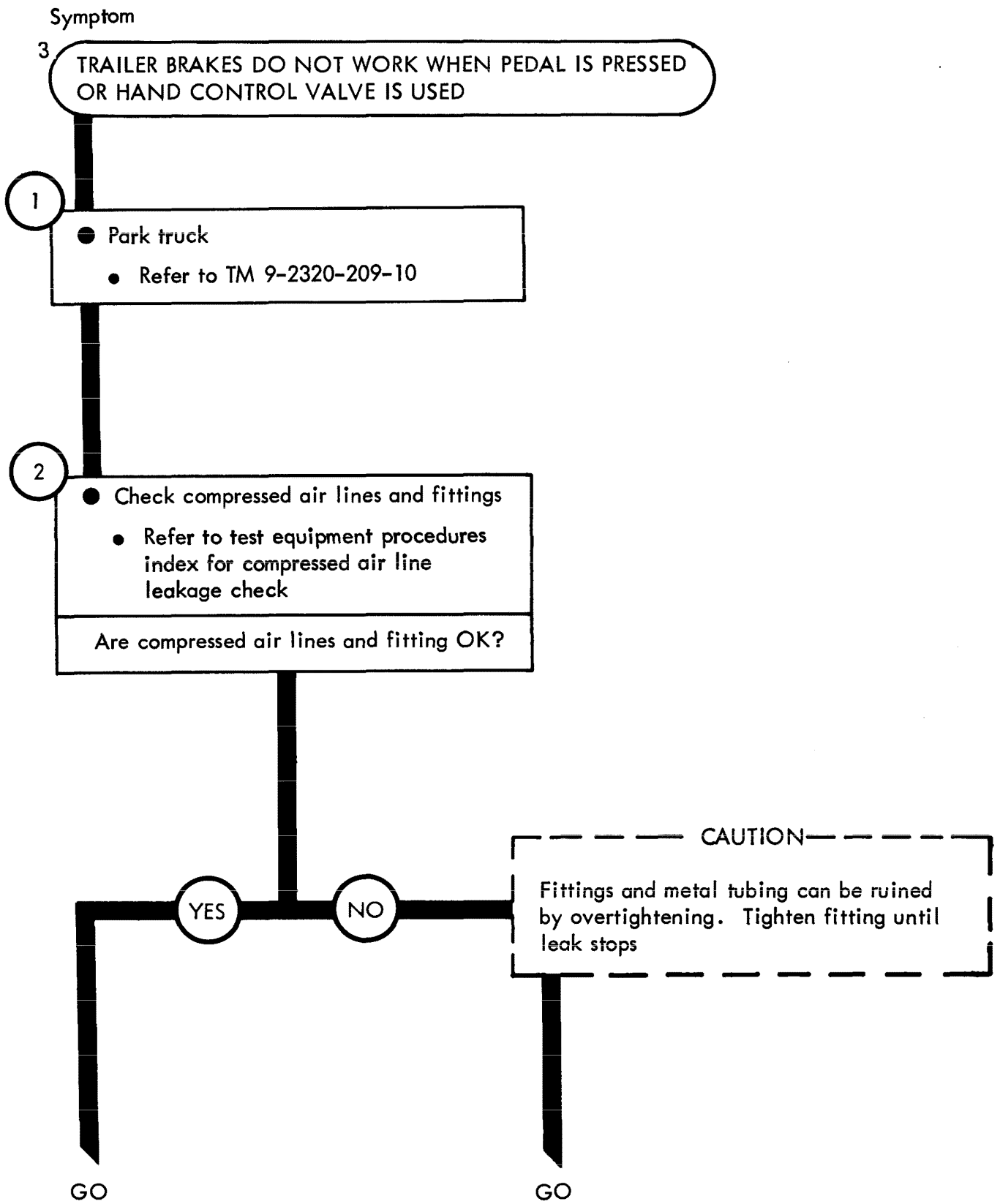


Figure 44-3 (Sheet 1 of 2)

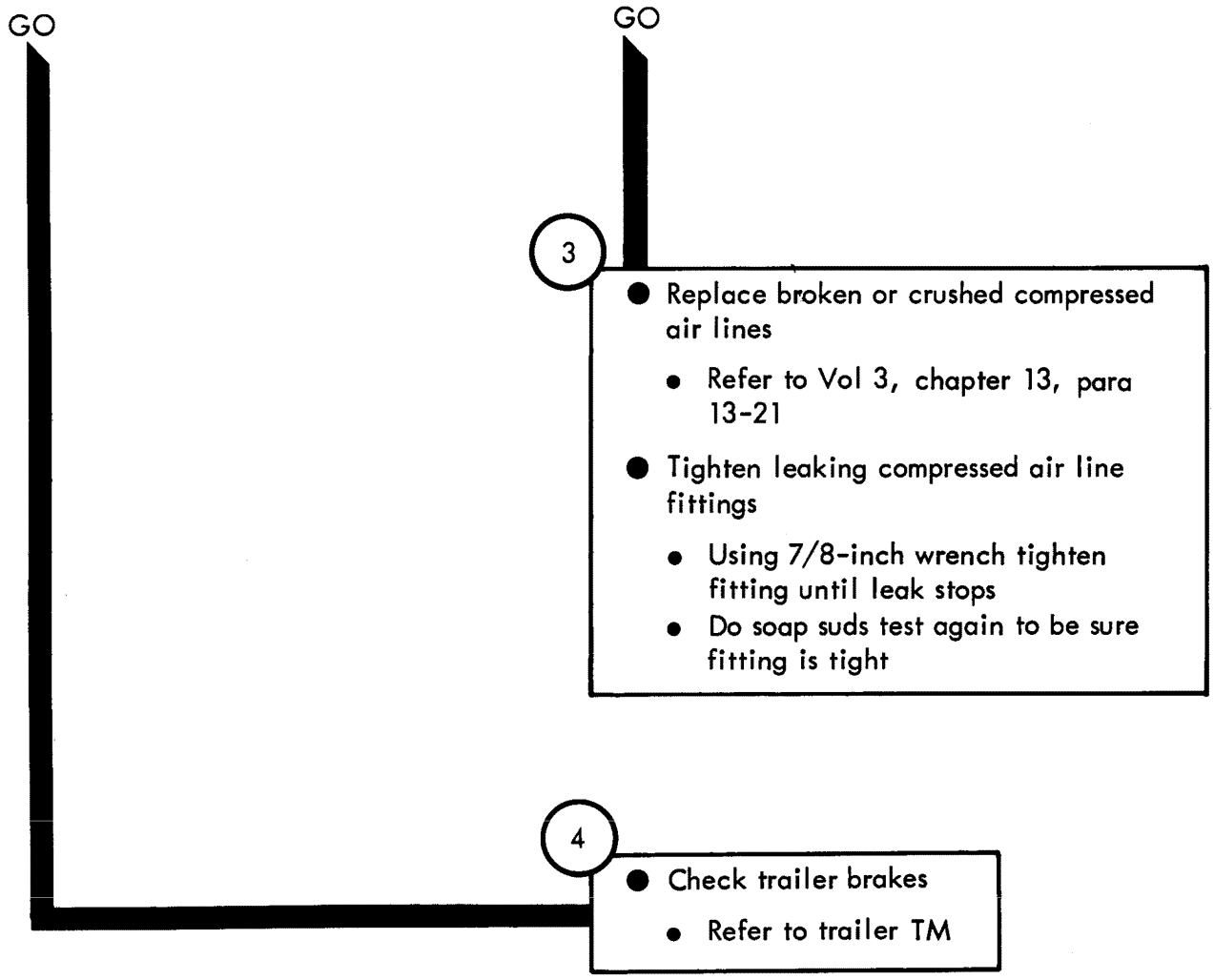


Figure 44-3 (Sheet 2 of 2)

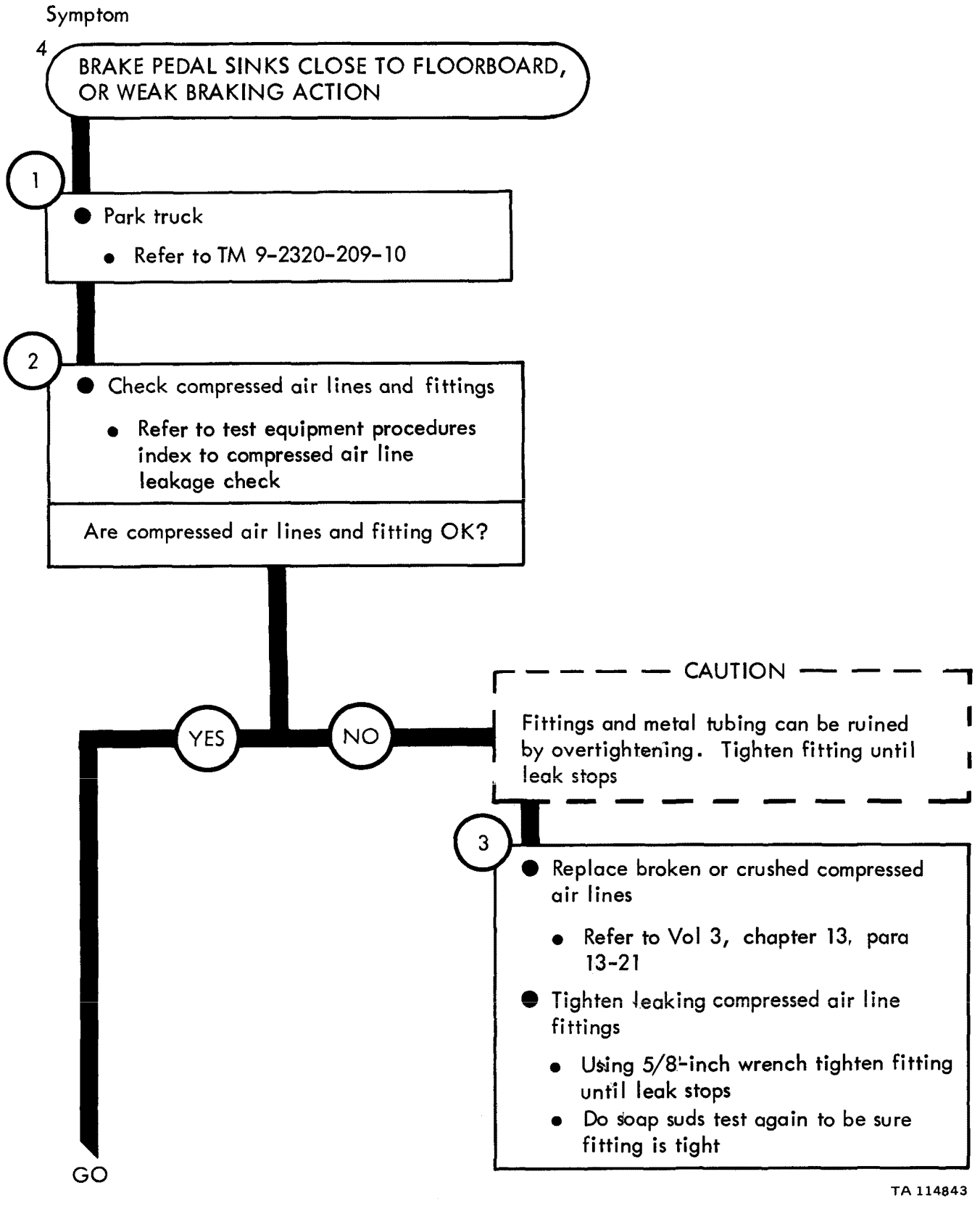


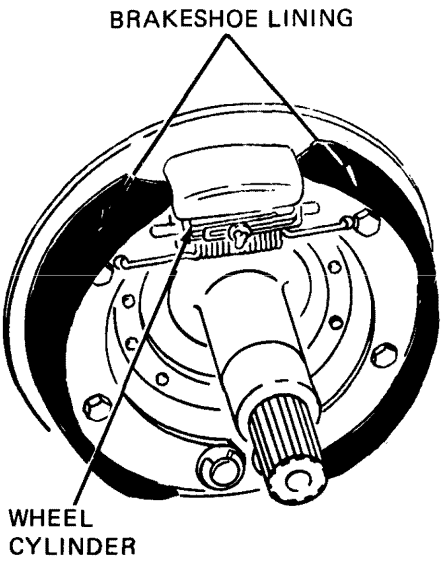
Figure 44-4 (Sheet 1 of 3)

GO

4

- Check service brakeshoe lining
  - Take off brake drum. Refer to Vol 3, chapter 14, para 14-4 and 14-9
  - Look at brakeshoe linings to see if they are worn
- Check wheel cylinders
  - Look for leaks

Are brakeshoe linings and wheel cylinder OK?



YES

NO

5

- Replace worn service brakeshoe linings
  - Refer to Vol 3, chapter 13, para 13-8
- Replace a leaking wheel cylinder
  - Refer to Vol 3, chapter 13, para 13-11

6

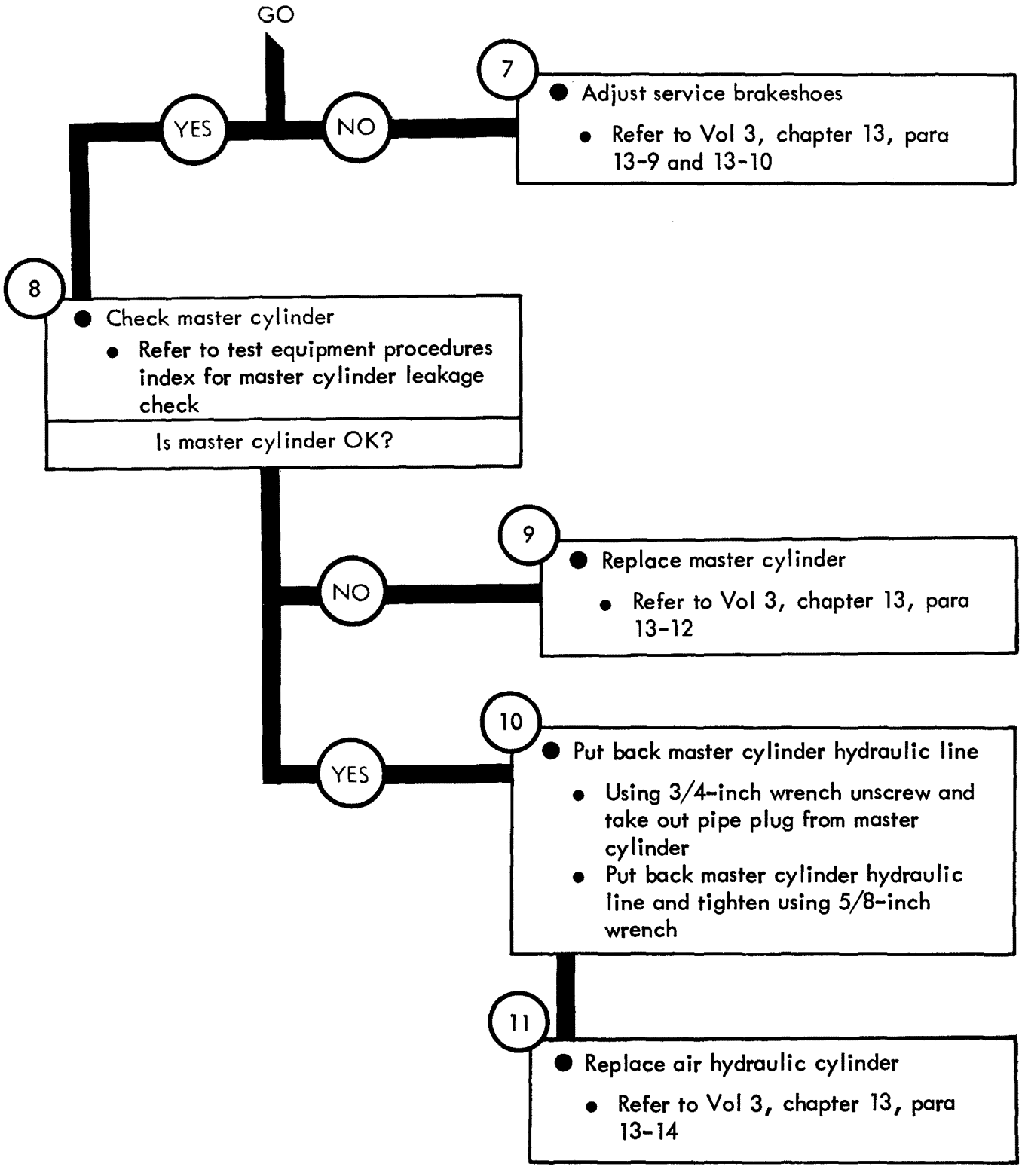
- Check service brakeshoe adjustment
  - Put back brake drum. Refer to Vol 3, chapter 14, para 14-4 and 14-9
  - Check brakeshoe adjustment. Refer to Vol 3, chapter 13, para 13-9 and 13-10

Is brakeshoe adjustment OK?

GO

TA 114844

Figure 44-4 (Sheet 2 of 3)



TA 114845

Figure 44-4 (Sheet 3 of 3)

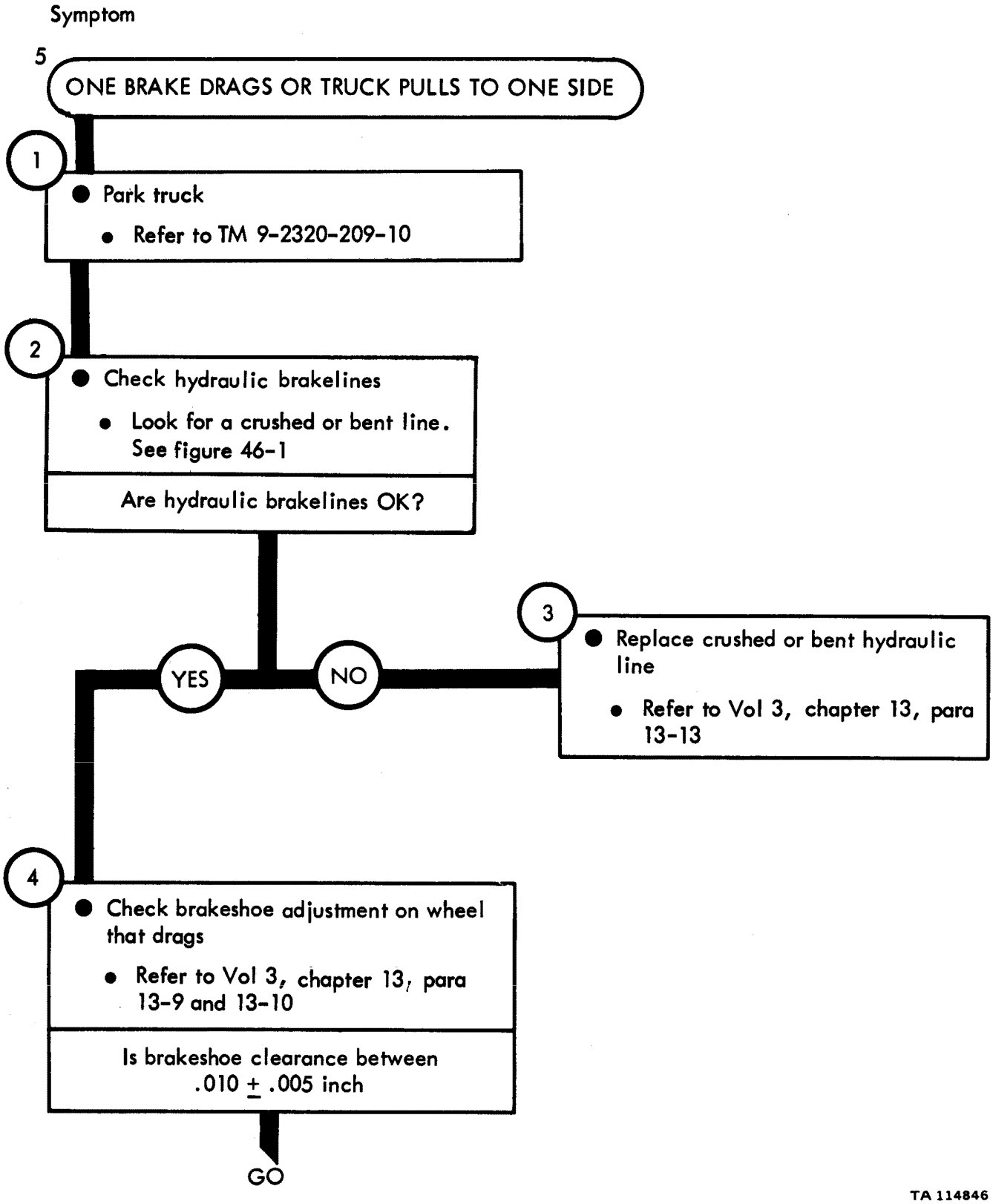


Figure 44-5 (Sheet 1 of 3)

GO

YES

NO

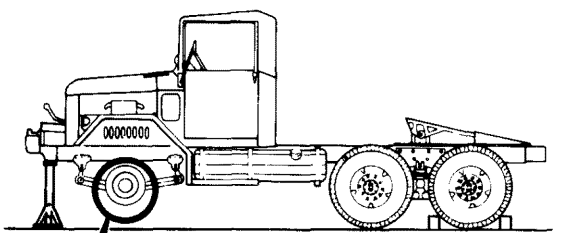
NOTE

If a set of brakeshoes is not adjusted right, check and adjust all brakeshoes. Doing this will make sure that none of the other brakes will drag

5

- Adjust brakeshoes
  - Refer to Vol 3, chapter 13, para 13-9 and 13-10

    Note: If brakeshoes do not adjust or brake still drags do instruction box 6

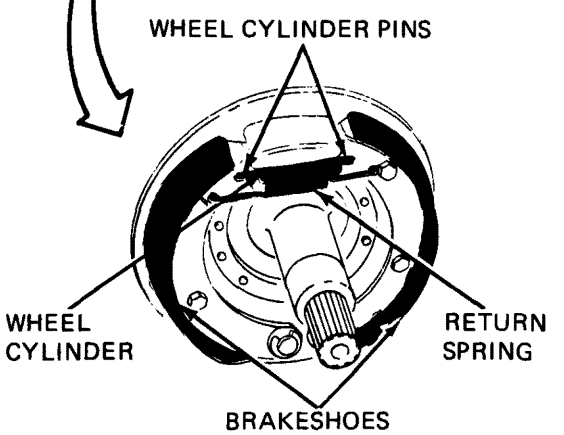


6

- Check brakeshoe return spring
  - Take off brake drum. Refer to Vol 3, chapter 14, para 14-3
  - Look for broken return spring
  - Look for signs of a stretched return spring

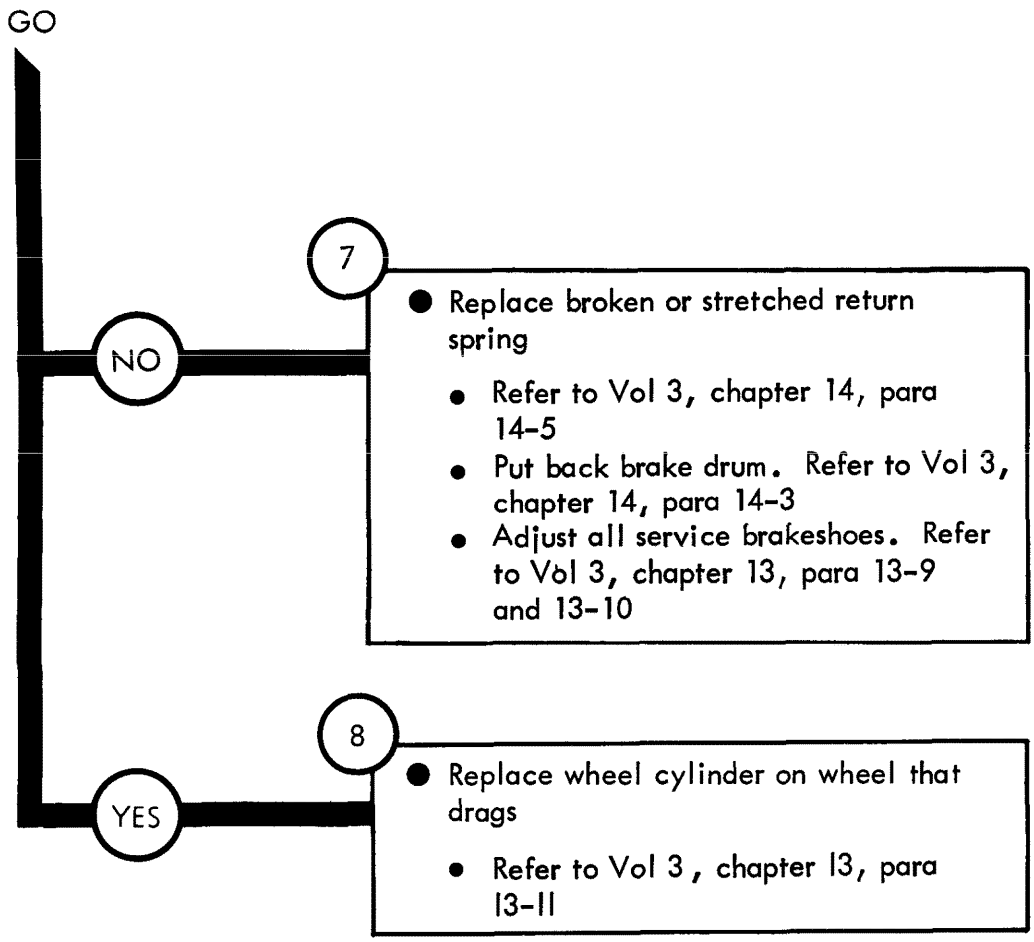
Is return spring OK?

GO



TA 114847

Figure 44-5 (Sheet 2 of 3)



TA 114848

Figure 44-5 (Sheet 3 of 3)

Symptom 6

BRAKES DRAG

1. ● Park truck
   - Refer to TM 9-2320-209-10

2. ● Check brake pedal free play
   - Slowly push down on brake pedal
   - Feel if pedal travels freely 1/4 or 1/2-inch before brake pressure is felt

   Is pedal free play OK?

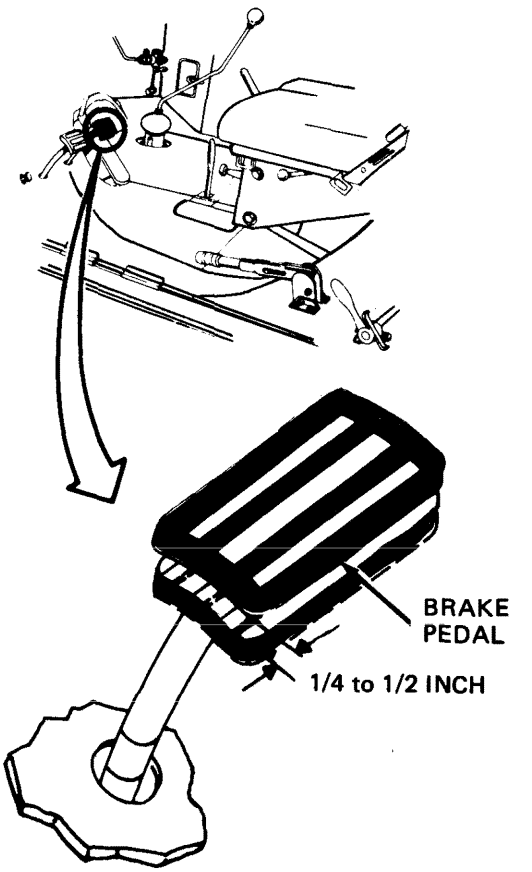
YES / NO

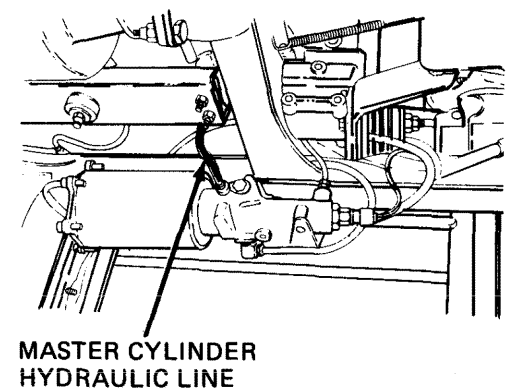
3. ● Adjust brake pedal free play
   - Refer to Vol 3, chapter 13, para 13-19

4. ● Check master cylinder hydraulic line
   - Look for a crushed or kinked line. See figure 46-1

   Is hydraulic line OK?

GO





TA 114849

Figure 44-6 (Sheet 1 of 5)

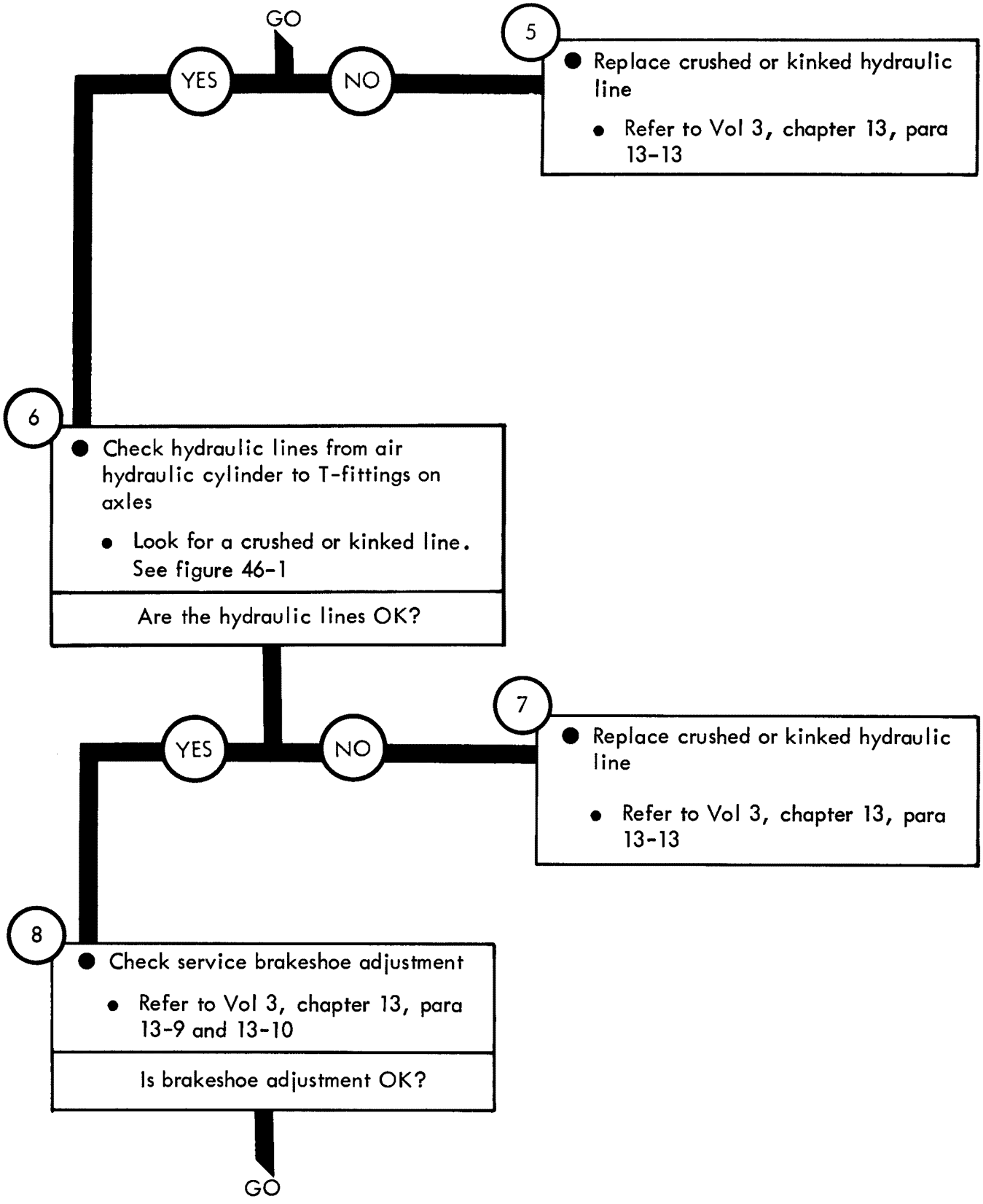


Figure 44-6 (Sheet 2 of 5)

GO

YES

NO

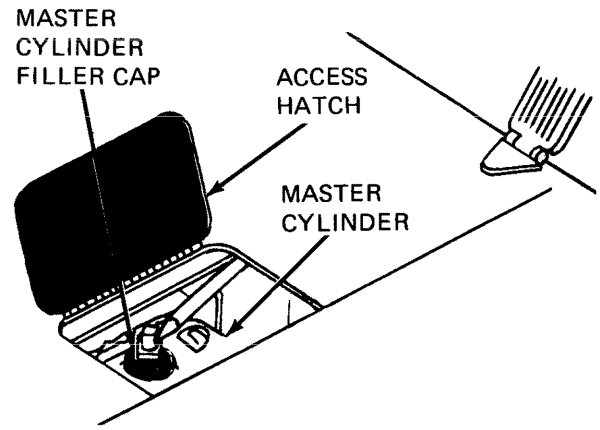
9

- Adjust service brakeshoes
  - Refer to Vol 3, chapter 13, para 13-9 and 13-10

10

- Check hydraulic brake fluid in master
  - Open master cylinder access hatch
  - Using 1-inch wrench unscrew and takeoff master cylinder filter cap
  - Using a flashlight, shine light into master cylinder reservoir
  - Look for signs of oil or dirt mixed in with hydraulic fluid

Is hydraulic fluid OK?

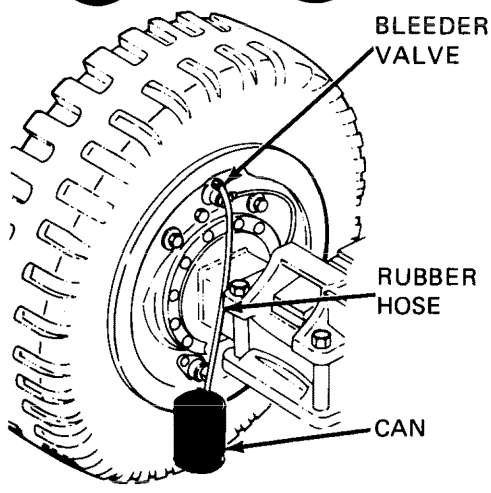


YES

NO

11

- Replace hydraulic fluid
  - Remove master cylinder. Refer to Vol 3, chapter 13, para 13-12
  - Remove air hydraulic cylinder. Refer to Vol 3, chapter 13, para 13-14
  - Drain hydraulic fluid from master and hydraulic cylinders and clean using Dry Cleaning Solvent Type II (SD-2) P-D-680
  - Put a rubber hose end on each wheel cylinder bleeder valve
  - Place other end of the hoses in cans

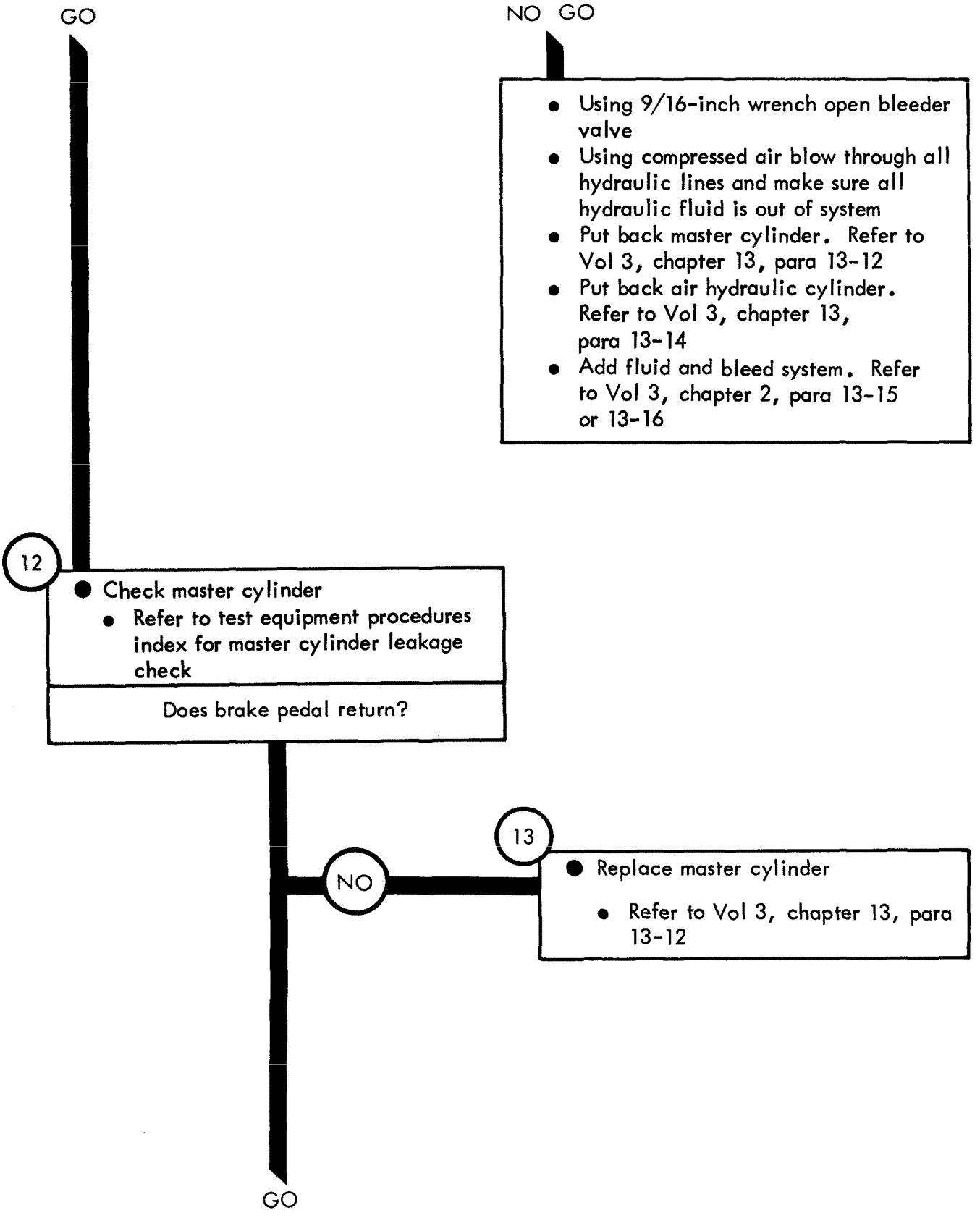


GO

NO GO

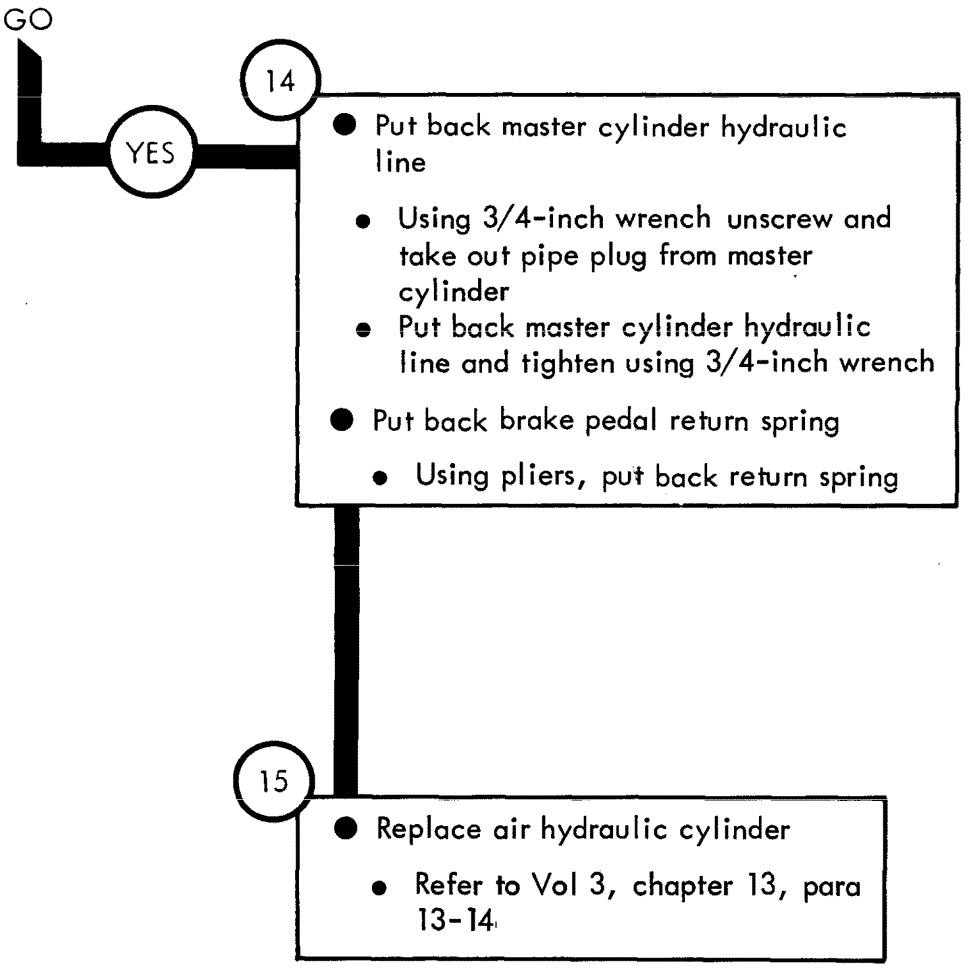
TA 114851

Figure 44-6 (Sheet 3 of 5)



TA 114852

Figure 44-6 (Sheet 4 of 5)



TA 114853

Figure 44-6 (Sheet 5 of 5)

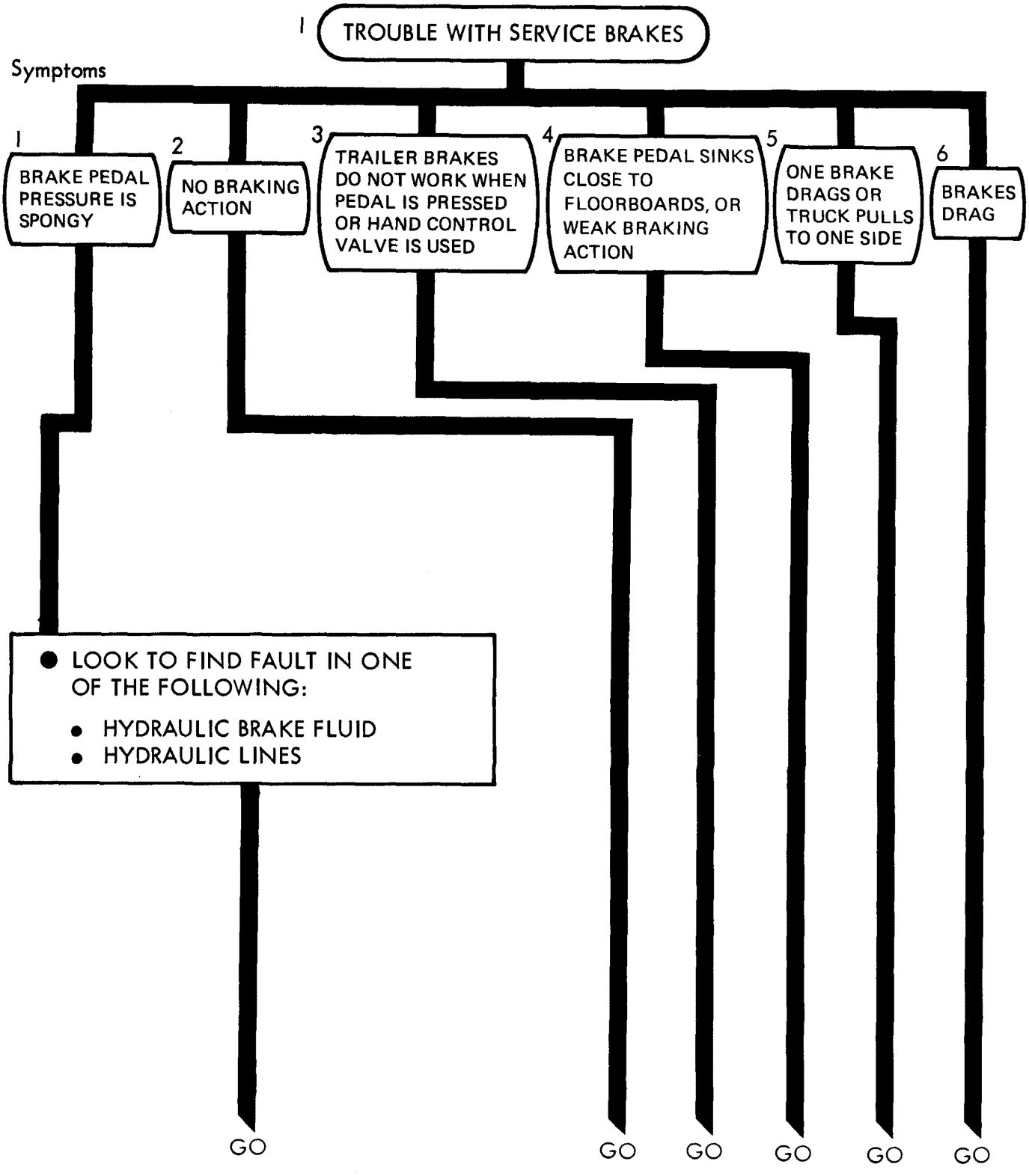
CHAPTER 45

BRAKE SYSTEM TROUBLESHOOTING SUMMARY

45-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 44 for the brake system.

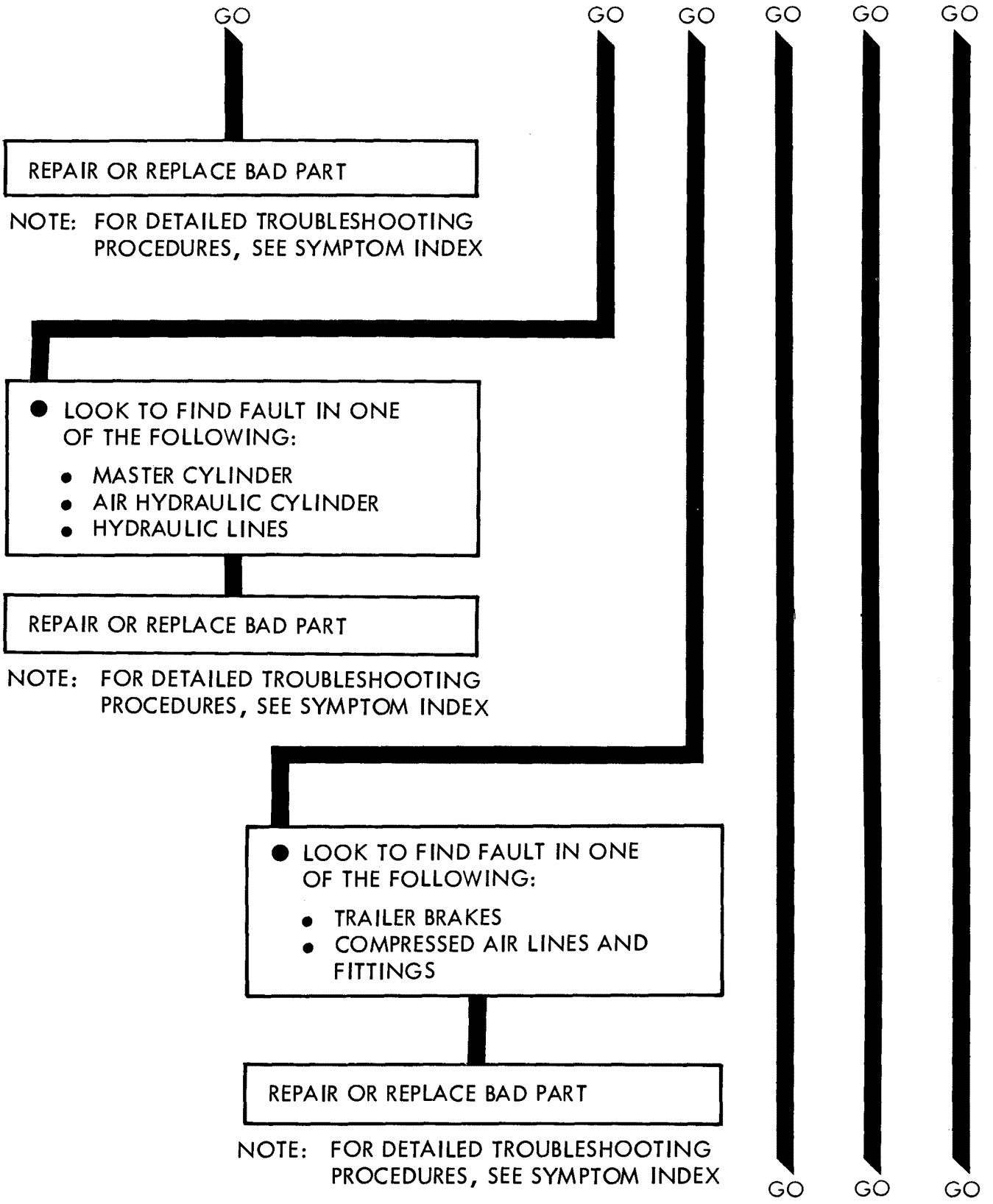
45-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

BRAKE SYSTEM TROUBLESHOOTING SUMMARY



TA 114854

Figure 45-1 (Sheet 1 of 4)



TA 114855

Figure 45-1 (Sheet 2 of 4)

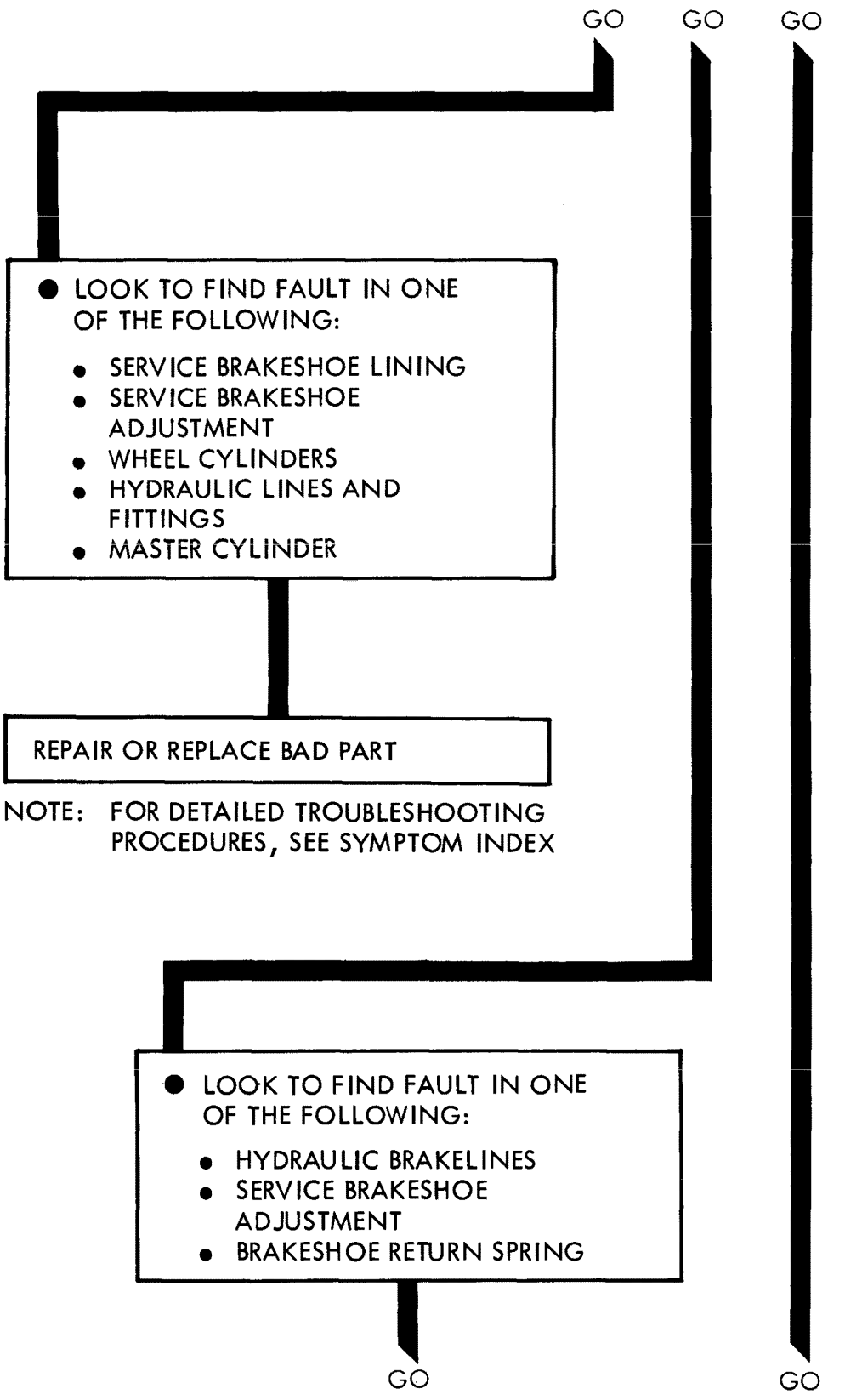
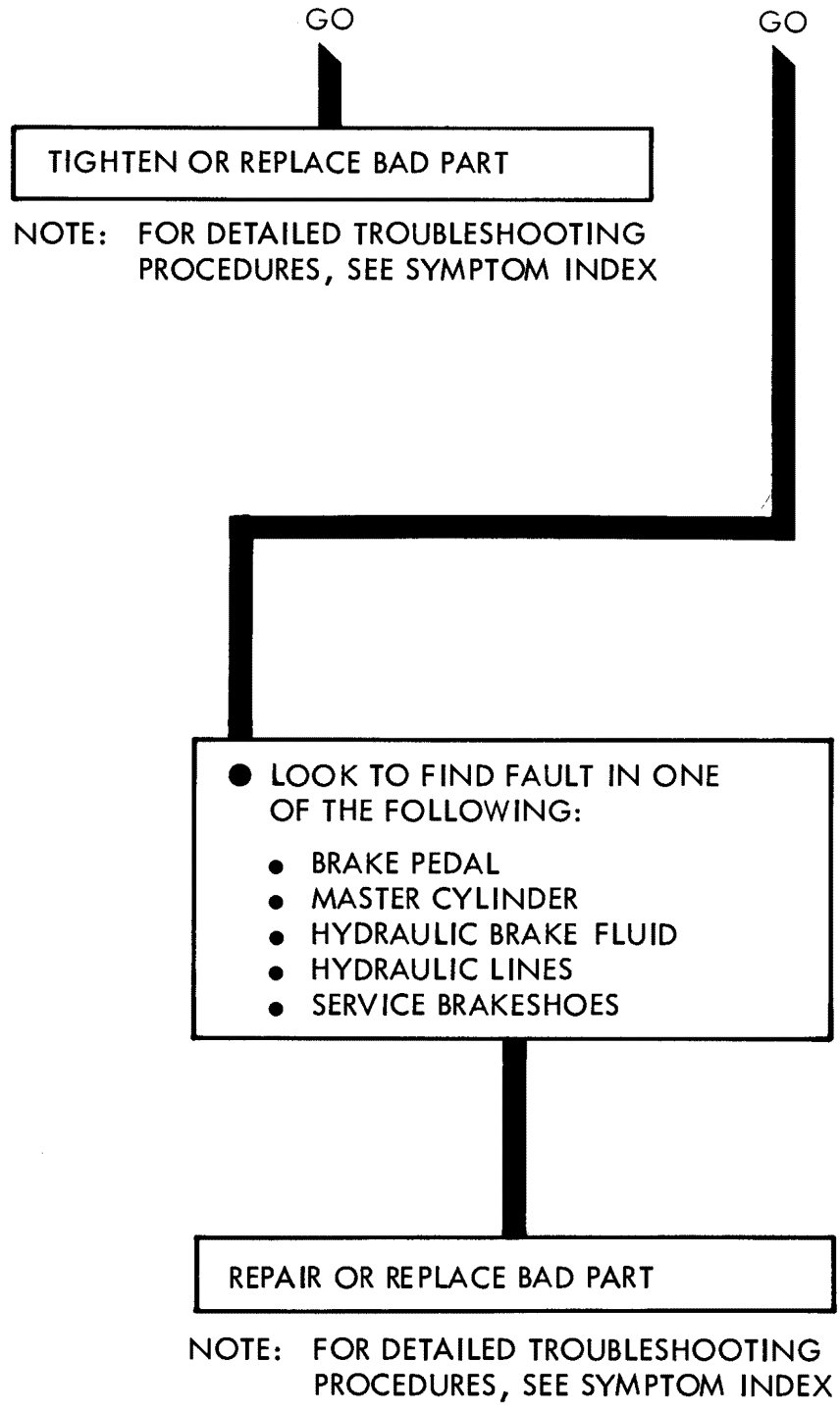
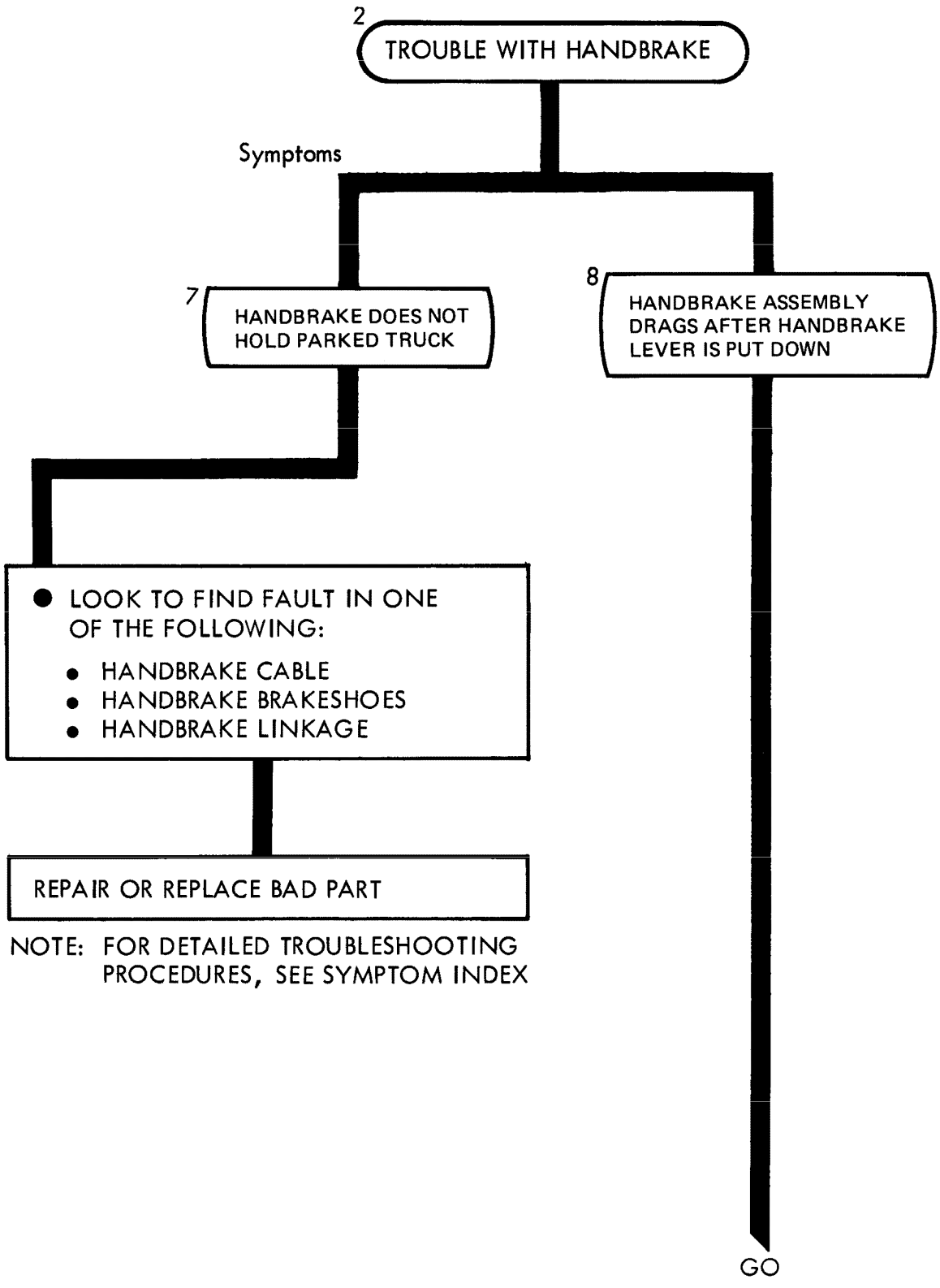


Figure 45-1 (Sheet 3 of 4)



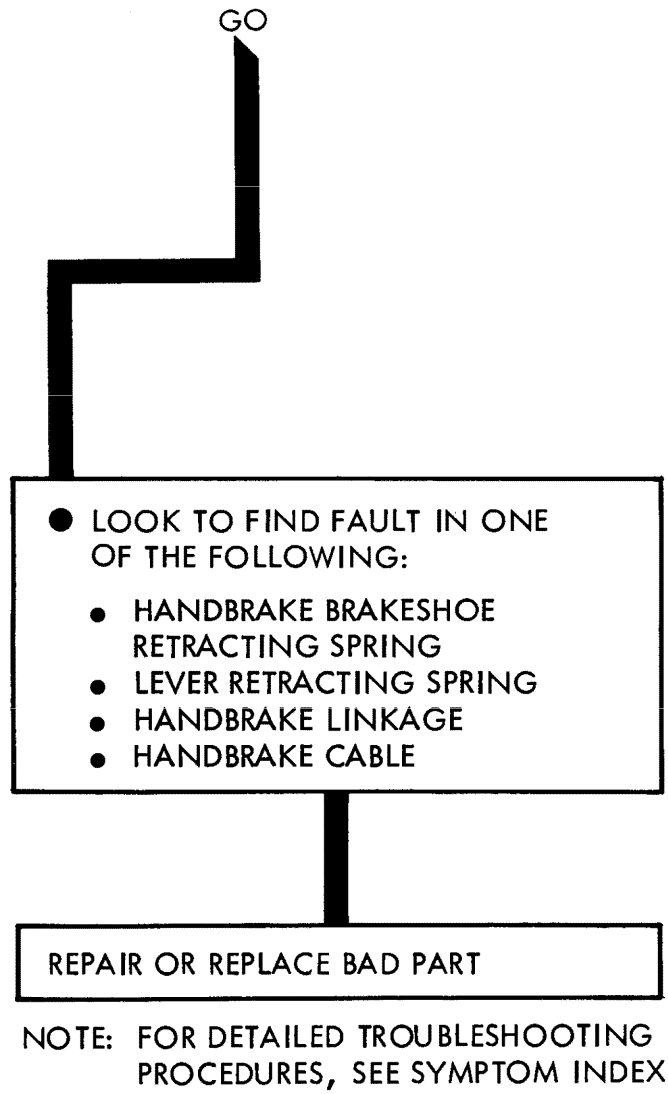
TA 114857

Figure 45-1 (Sheet 4 of 4)



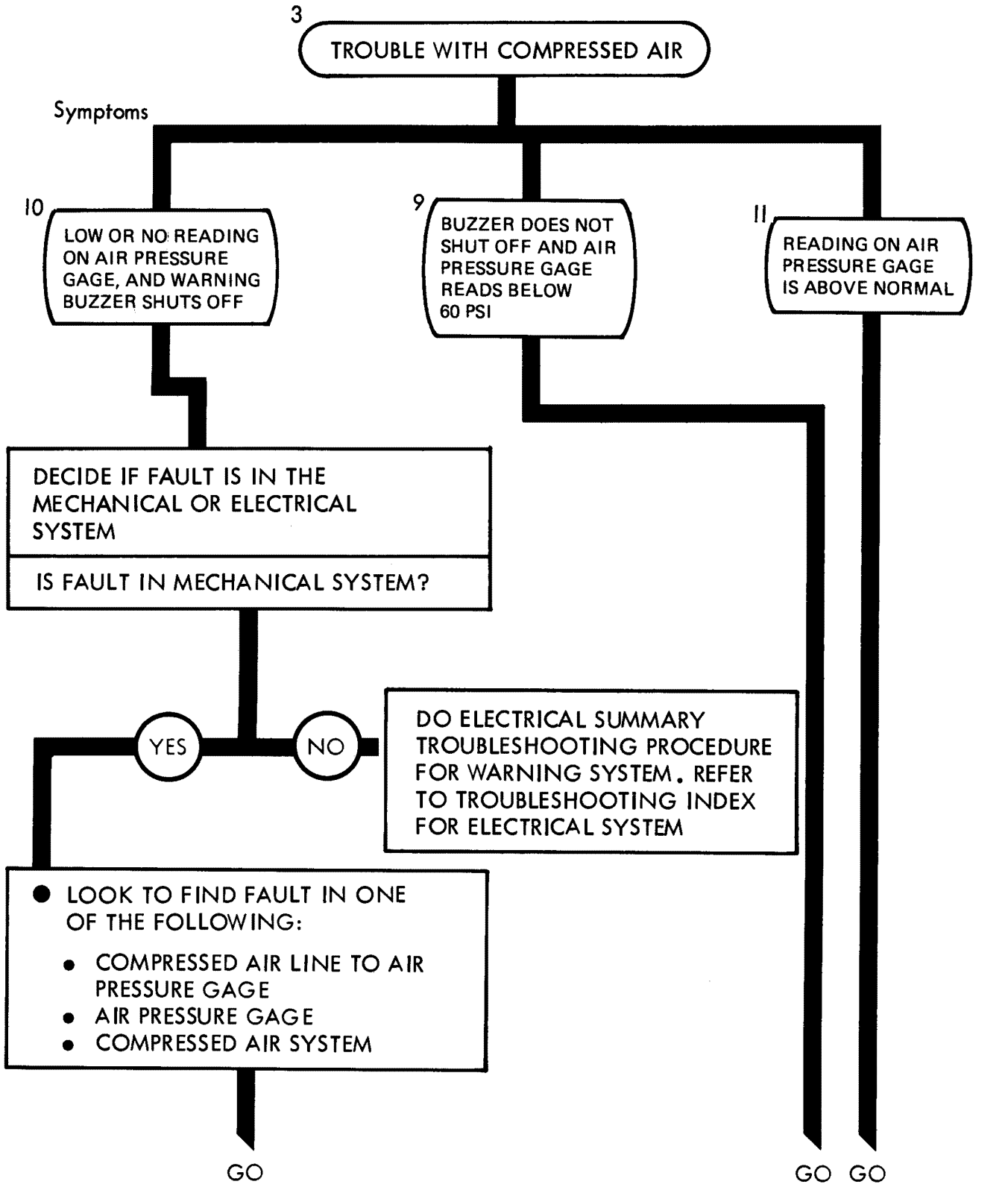
TA 114858

Figure 45-2 (Sheet 1 of 2)

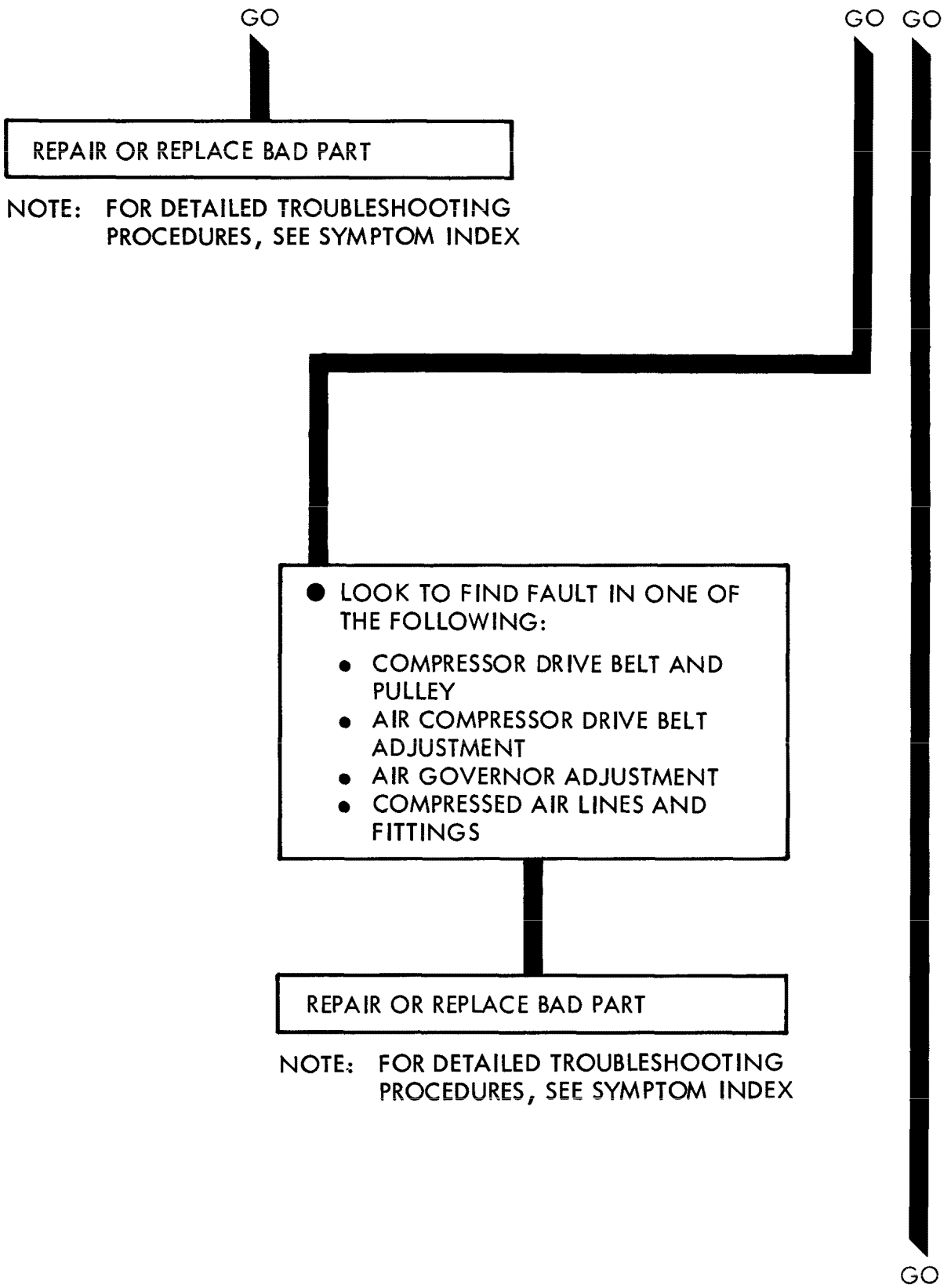


TA 114859

Figure 45-2 (Sheet 2 of 2)

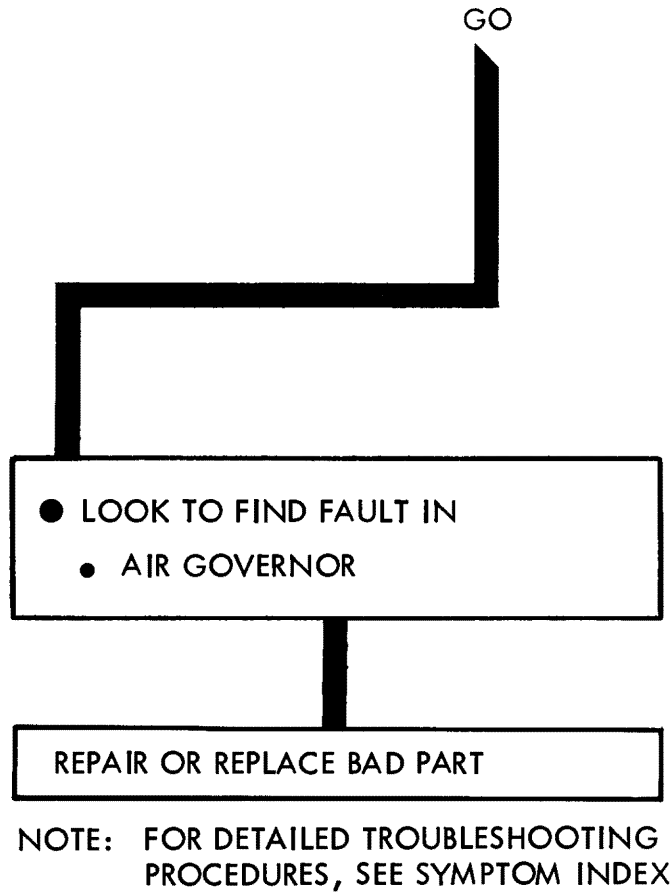


Figre 45-3 (Sheet 1 of 3)



TA 114861

Figure 45-3 (Sheet 2 of 3)



TA 114862

Figure 45-3 (Sheet 3 of 3)

CHAPTER 46

BRAKE SYSTEM SUPPORT DIAGRAMS

46-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 44. Table 3-1 is a complete listing of all support diagrams used in this manual.

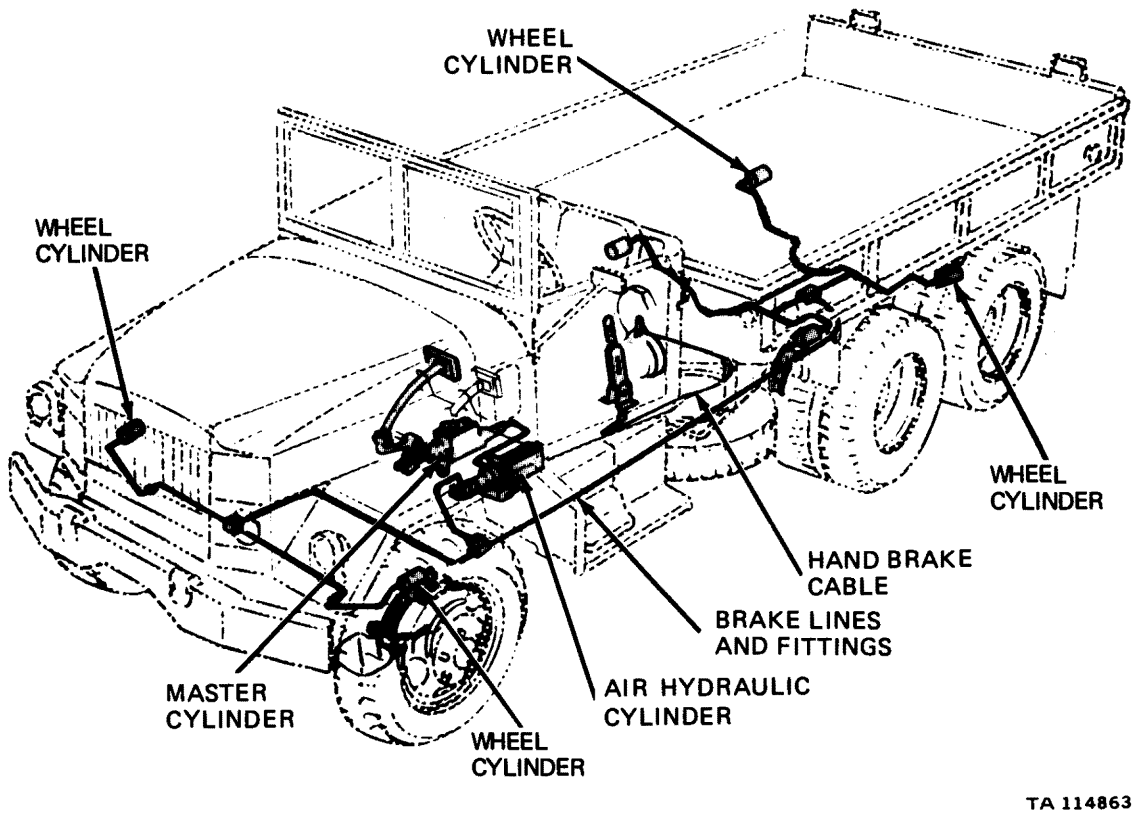


Figure 46-1. Brake System Support Diagram

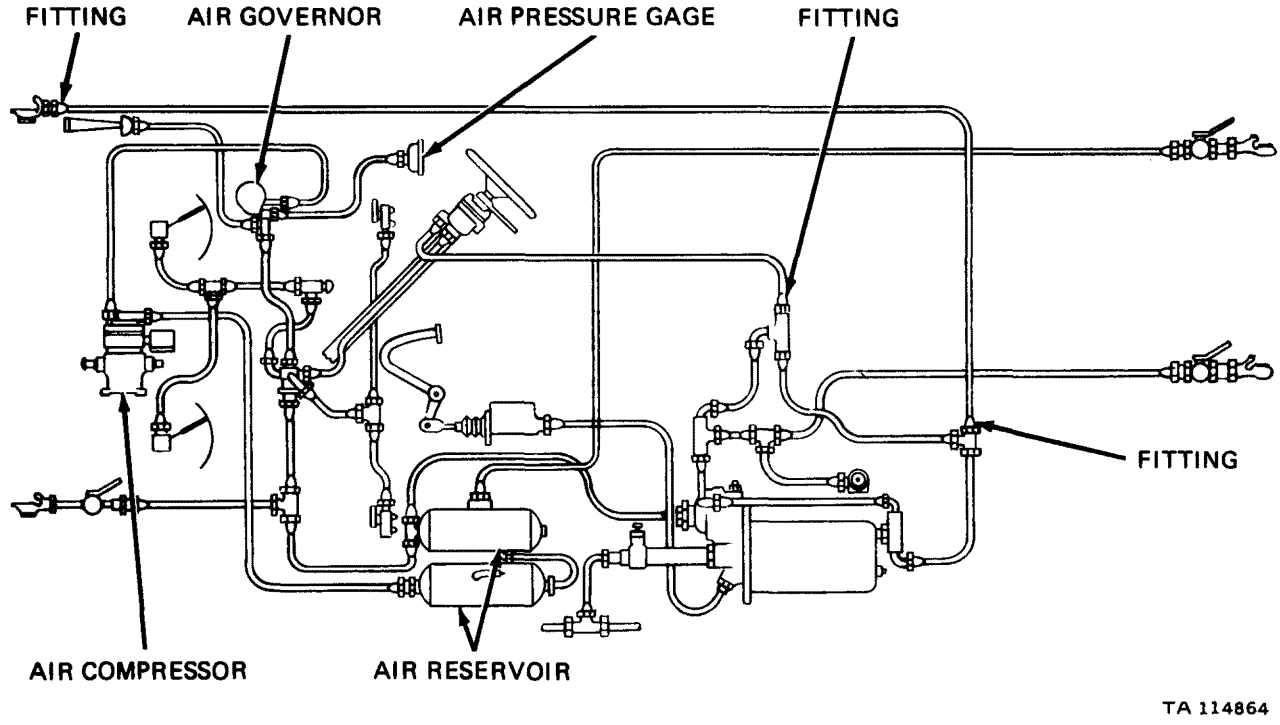


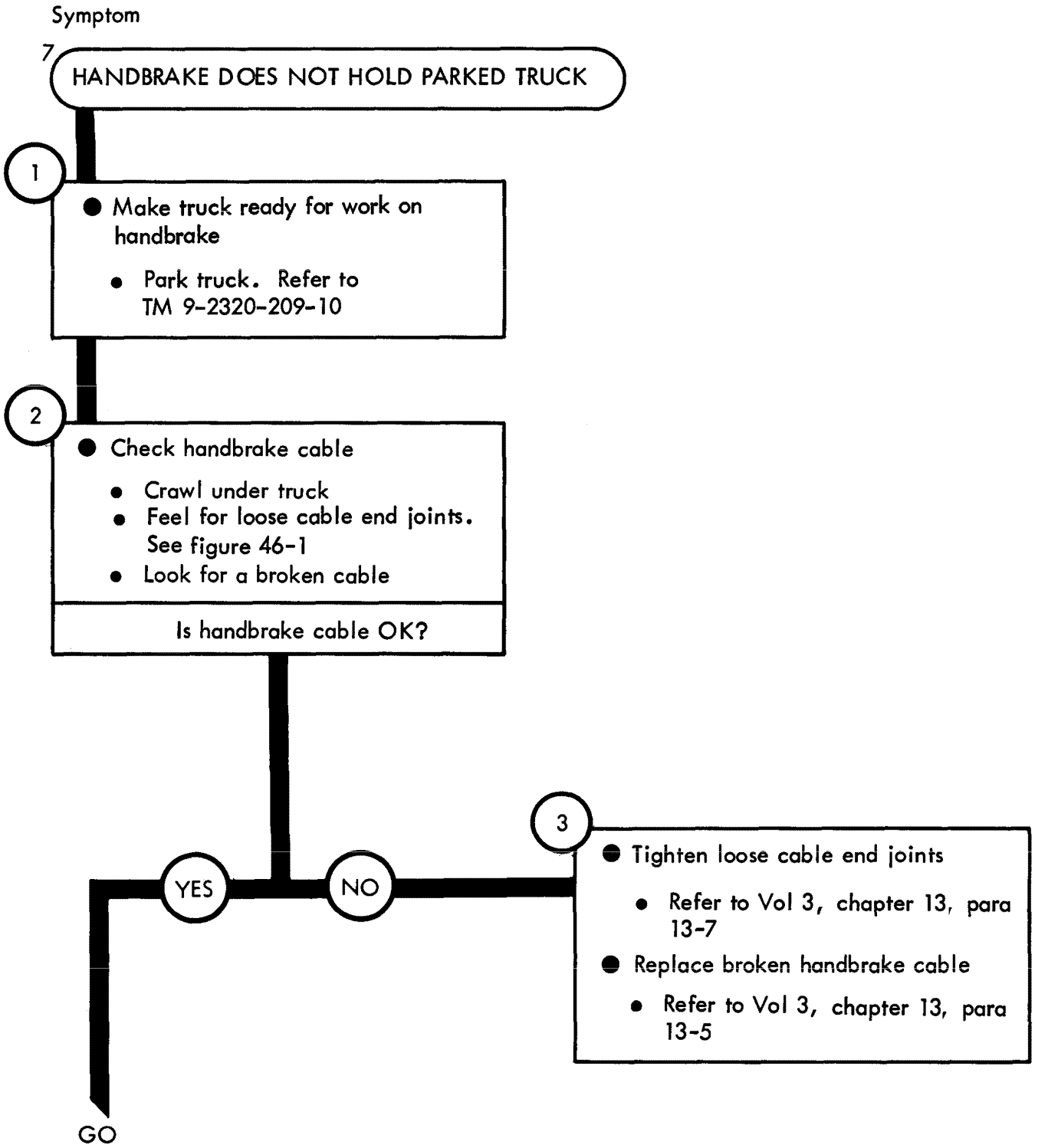
Figure 46-2. Compressed Air Subsystem Support Diagram

CHAPTER 47

HANDBRAKE SUBSYSTEM TROUBLESHOOTING

47-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the handbrake subsystem, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

47-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.



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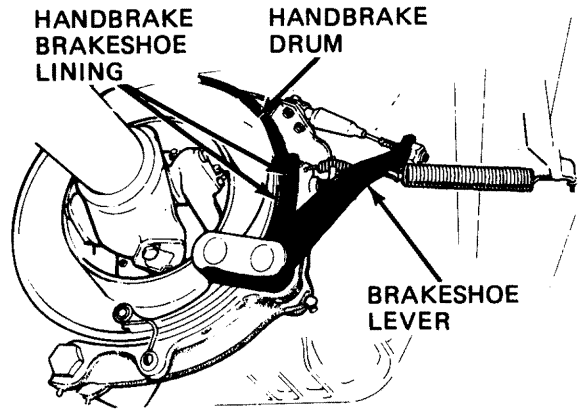
Figure 47-1 (Sheet 1 of 3)

GO

4

- Check brakeshoes on handbrake assembly
  - Look for oil on linings or drum
  - Look for worn linings
  - Feel if brakeshoes are loose

Are the brakeshoe linings and drum OK?



YES

NO

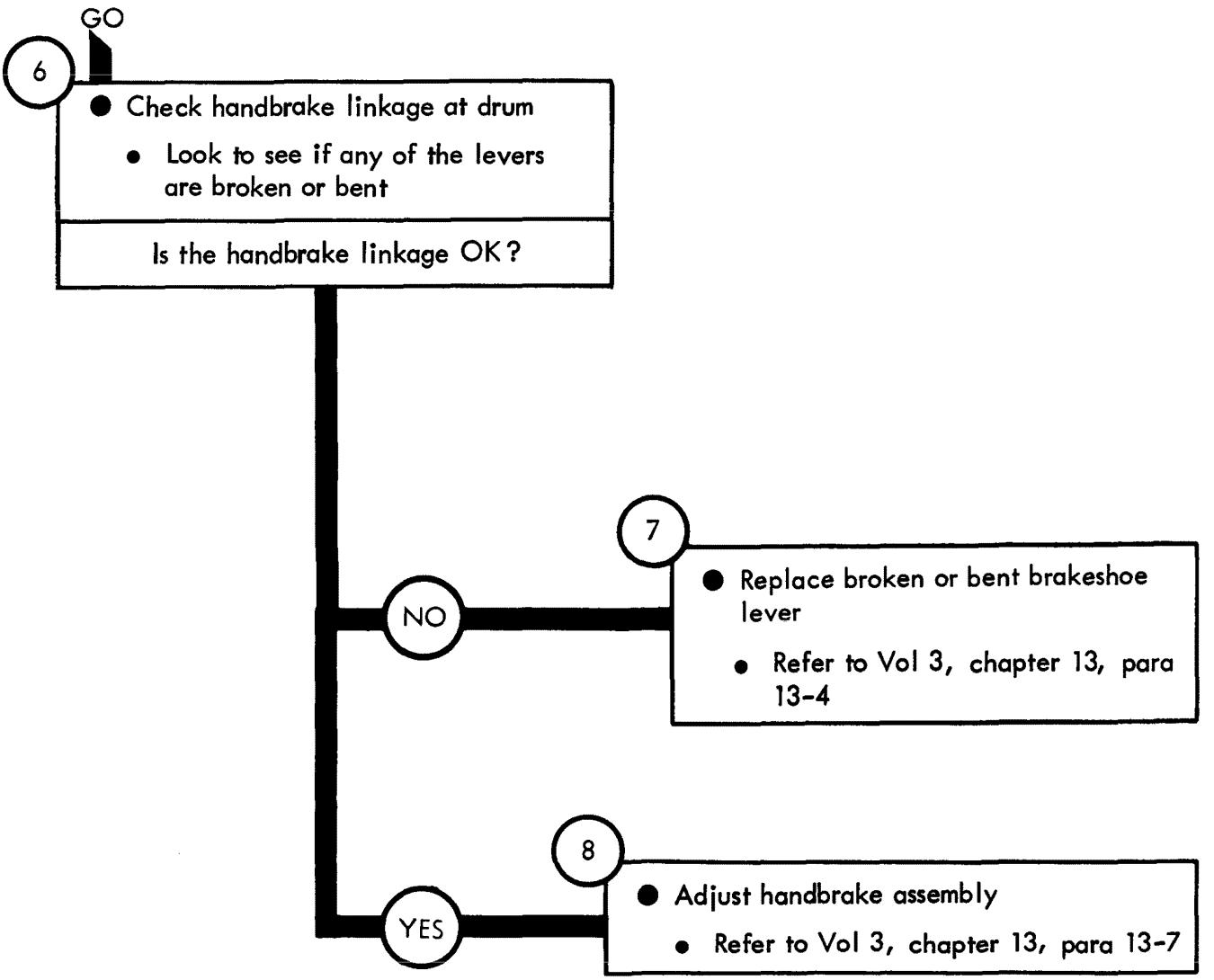
5

- Clean oily handbrake drum
  - Using dry cleaning solvent, type II (SD-2) Fed Spec P-D-680, on a rag wipe drum surface clean of oil
  - Wait about 30 minutes before doing next step
- Replace worn or oily brakeshoes
  - Refer to Vol 3, chapter 13, para 13-4
- Tighten loose brakeshoes
  - Refer to Vol 3, chapter 13, para 13-4

GO

TA 114866

Figure 47-1 (Sheet 2 of 3)



TA 114867

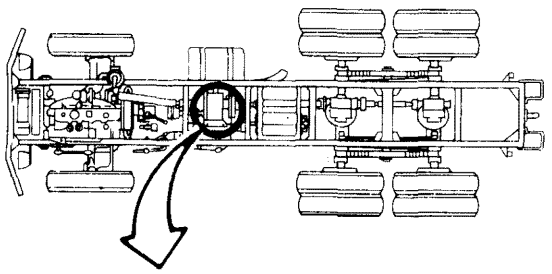
Figure 47-1 (Sheet 3 of 3)

Symptom

8 HANDBRAKE ASSEMBLY DRAGS AFTER HANDBRAKE LEVER HAS BEEN PUT DOWN

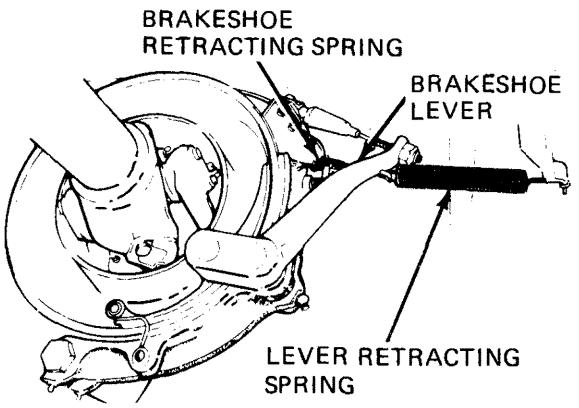
1

- Make truck ready for work on brake system
  - Park truck. Refer to TM 9-2320-209-10



2

- Check brakeshoe retracting spring, and lever retracting spring at rear of transfer
  - Crawl under truck
  - Look for retracting springs that have come off mount
  - Look for worn or broken retracting spring



Are retracting springs OK?

YES

GO

NO

3

- Put back retracting spring that has come off mount
  - Using pliers stretch spring and hook on mounting eye
- Replace worn or broken hook on mounting eye brakeshoe retracting spring
  - Refer to Vol 3, chapter 13, para 13-4
- Replace worn or broken lever retracting spring
  - Refer to Vol 3, chapter 13, para 13-4

TA 114868

Figure 47-2 (Sheet 1 of 2)

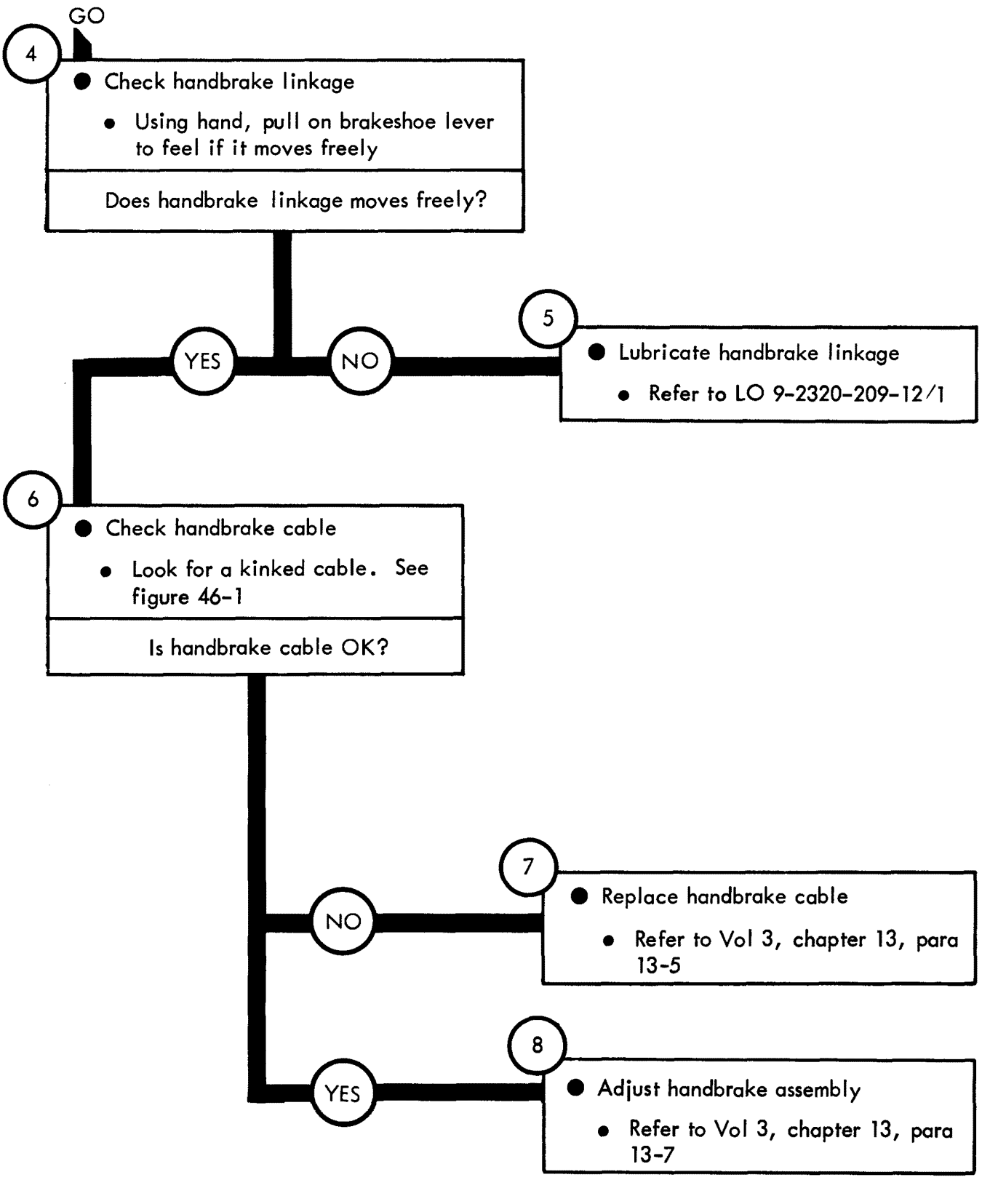


Figure 47-2 (Sheet 2 of 2)

CHAPTER 48

COMPRESSED AIR SUBSYSTEM TROUBLESHOOTING

48-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the compressed air subsystem, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

48-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

Symptom 9

BUZZER DOES NOT SHUT OFF AND AIR PRESSURE GAGE READS BELOW 60 PSI

1

- Park truck
  - Refer to TM 9-2320-209-10

2

- Check air compressor drive belt and pulley
  - Take off battery ground cable. Refer to Vol 3, chapter 7, para 7-58
  - Look for a broken belt
  - Look for signs of oil on belt and compressor pulley
- Check air compressor drive belt adjustment
  - Refer to Vol 3, chapter 13,para 13-34

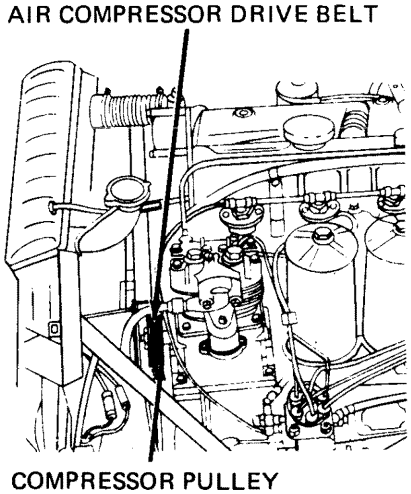
Is air compressor drive belt OK?

YES → GO

NO → 3

- Adjust loose drive belt
  - Refer to Vol 3, chapter 13. para 13-34
- Replace broken or oily belt
  - Refer to Vol 3, chapter 13. para 13-34

Note: If compressor pulley is found oily, the leak should be fixed and pulley cleaned



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Figure 48-1 (Sheet 1 of 3)

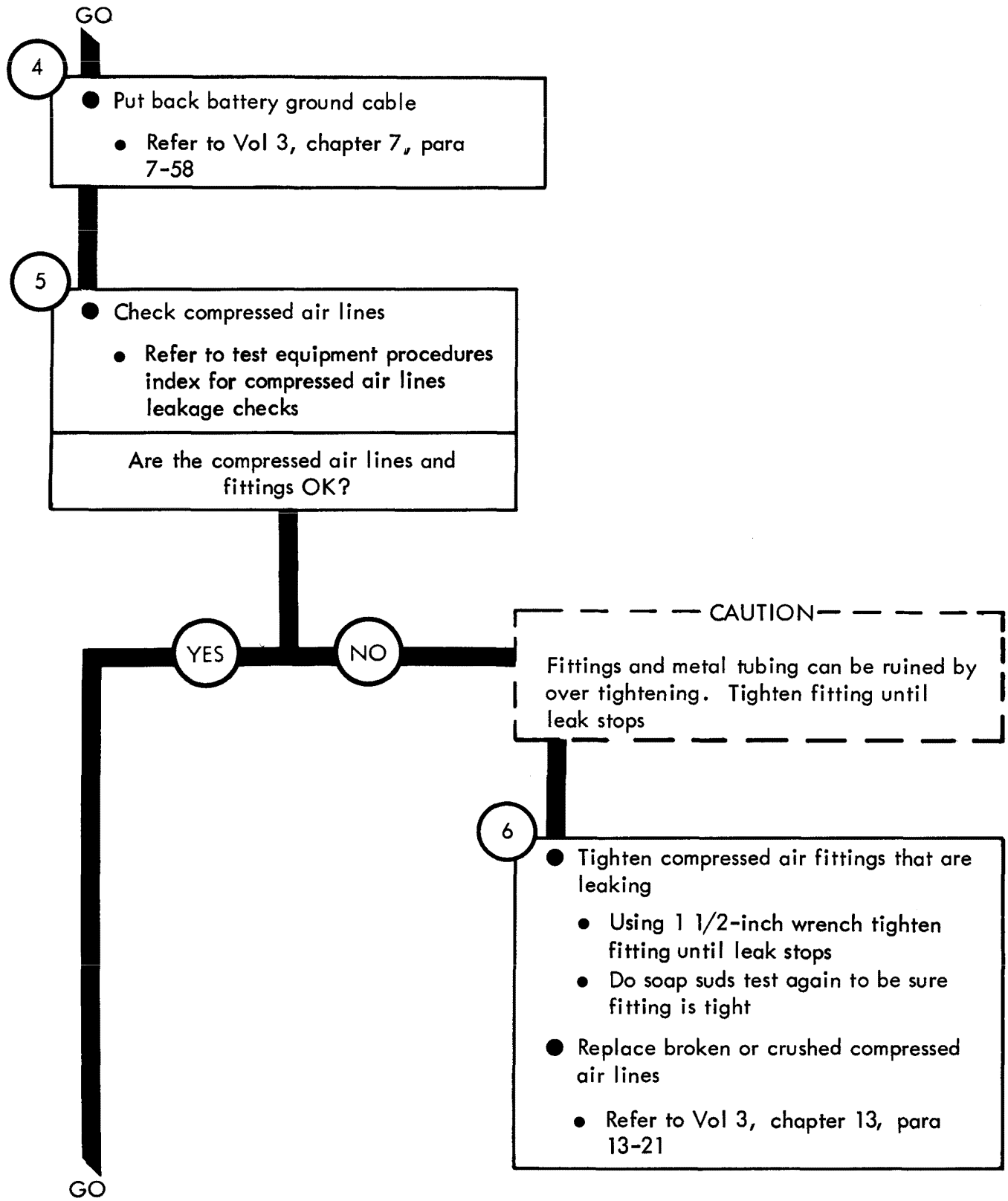


Figure 48-1 (Sheet 2 of 3)

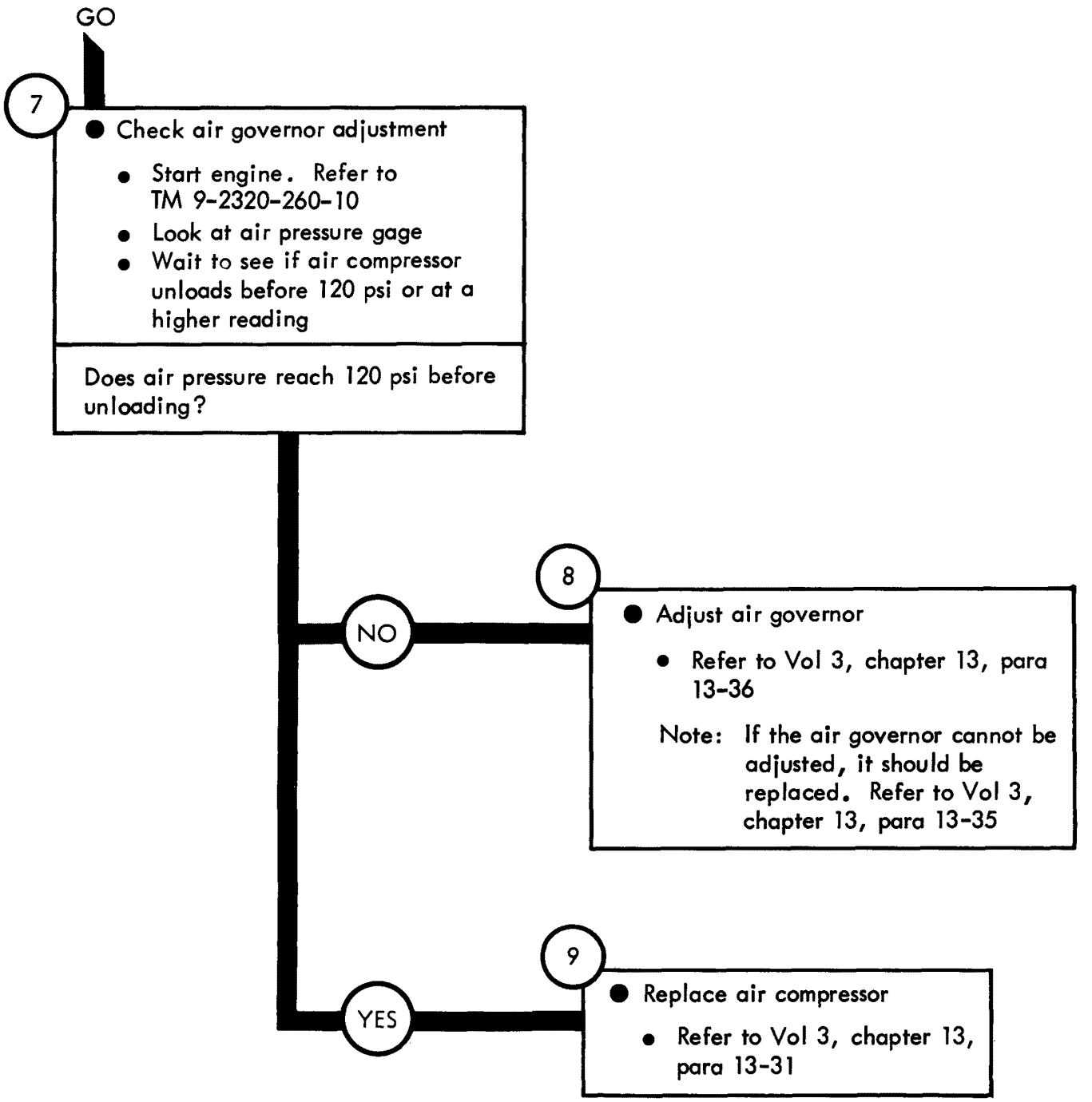


Figure 48-1 (Sheet 3 of 3)

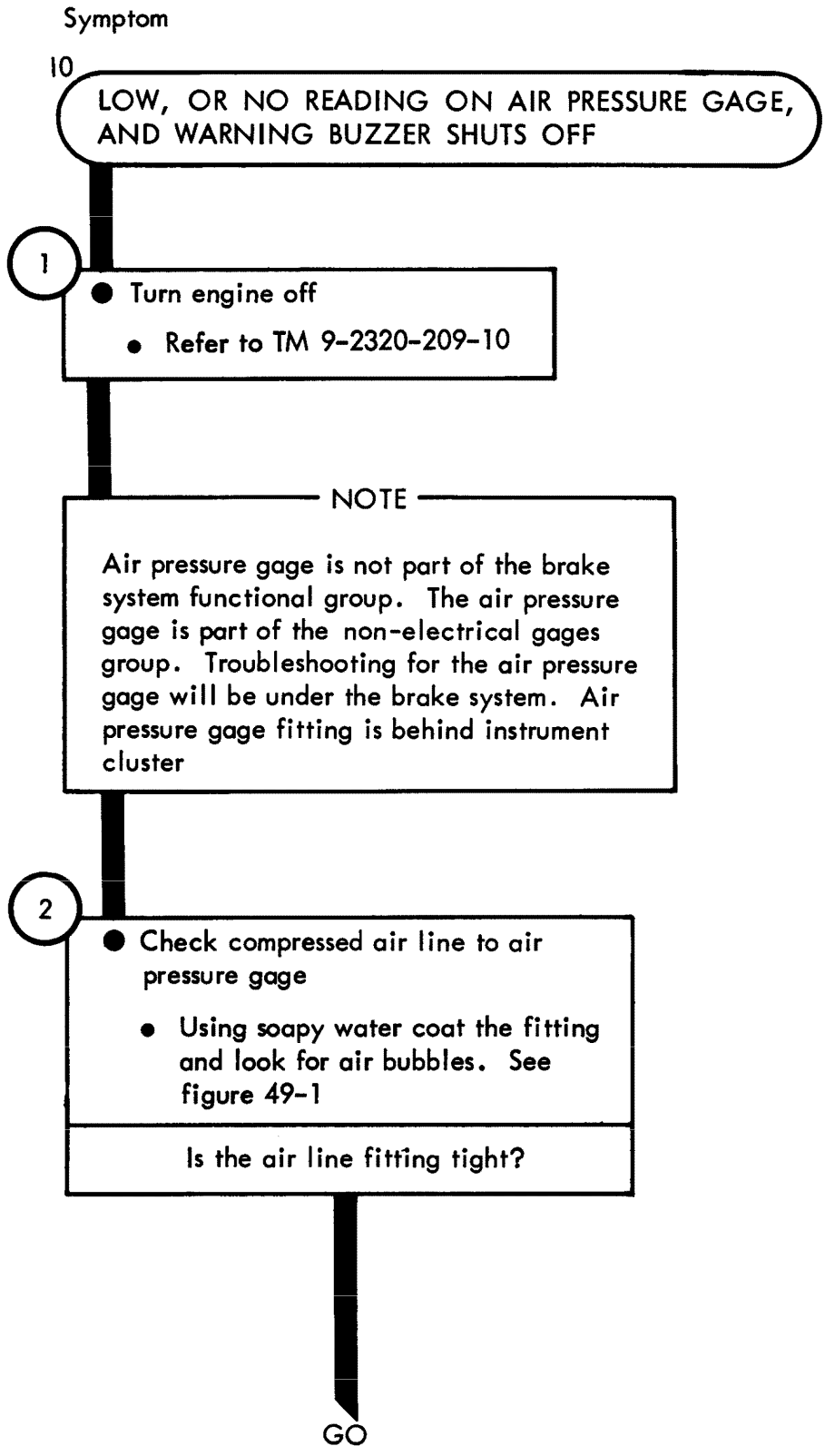


Figure 48-2 (Sheet 1 of 2)

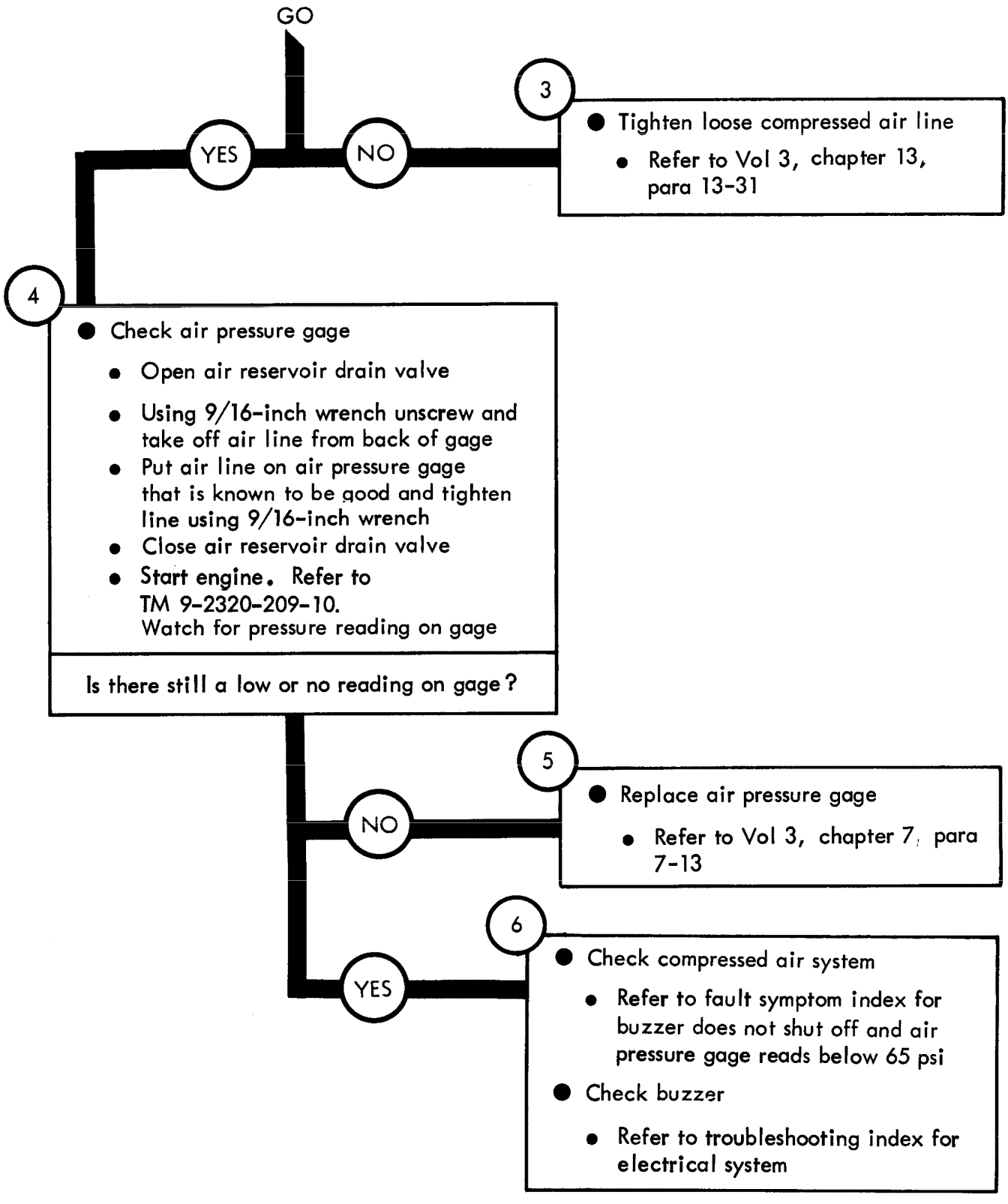


Figure 48-2 (Sheet 2 of 2)

Symptom II

READING ON AIR PRESSURE GAGE IS ABOVE NORMAL

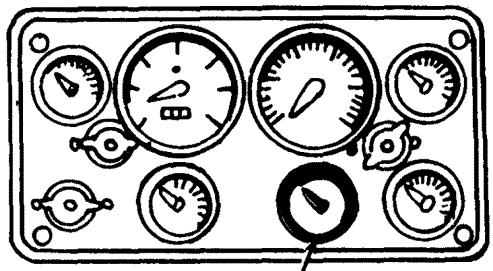
1

- Park truck
  - Refer to TM 9-2320-209-10

2

- Check air governor adjustment
  - Start engine. Refer to TM 9-2320-209-10
  - Look at air pressure gage
  - Wait to see if air compressor unloads before 120 psi or at a high reading

Is adjustment OK?



AIR PRESSURE GAGE

NO

3

- Adjust air governor
  - Refer to Vol 3, chapter 13, para 13-36

Note: If the air governor can not be adjusted, it should be replaced. Refer to Vol 3, chapter 13, para 13-35

YES

4

- Replace air compressor
  - Refer to Vol 3, chapter 13, para 13-31

TA 114875

Figure 48-3

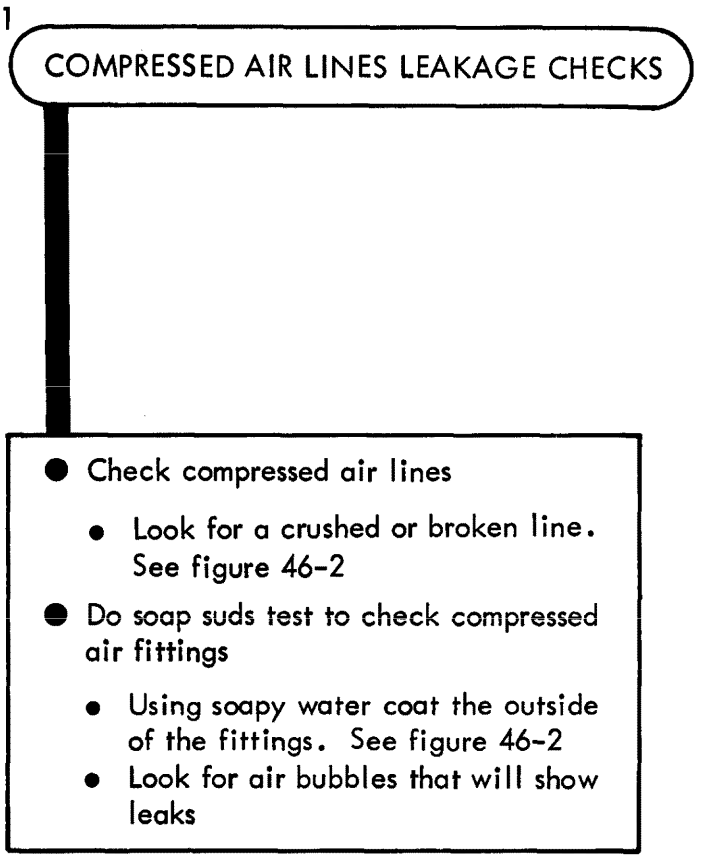
CHAPTER 49

BRAKE SYSTEM TEST PROCEDURES

49-1. GENERAL. This chapter gives test procedures for the tests given in chapter 44, for the brake system.

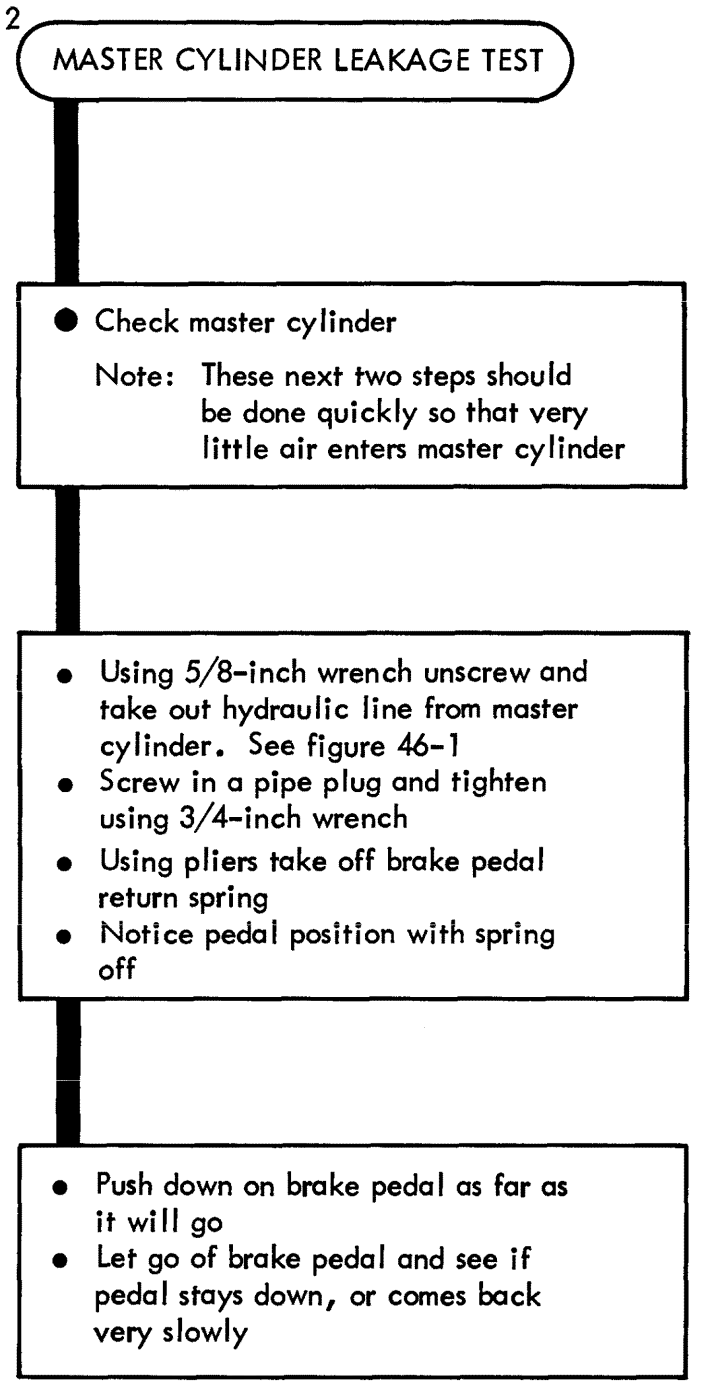
49-2. TEST SET-UP. Instructions for setup of test equipment and parts to be tested are given before the test procedures. Illustrations are used, when needed, to show you how to hook up the test equipment to the part to be tested.

49-3. 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.



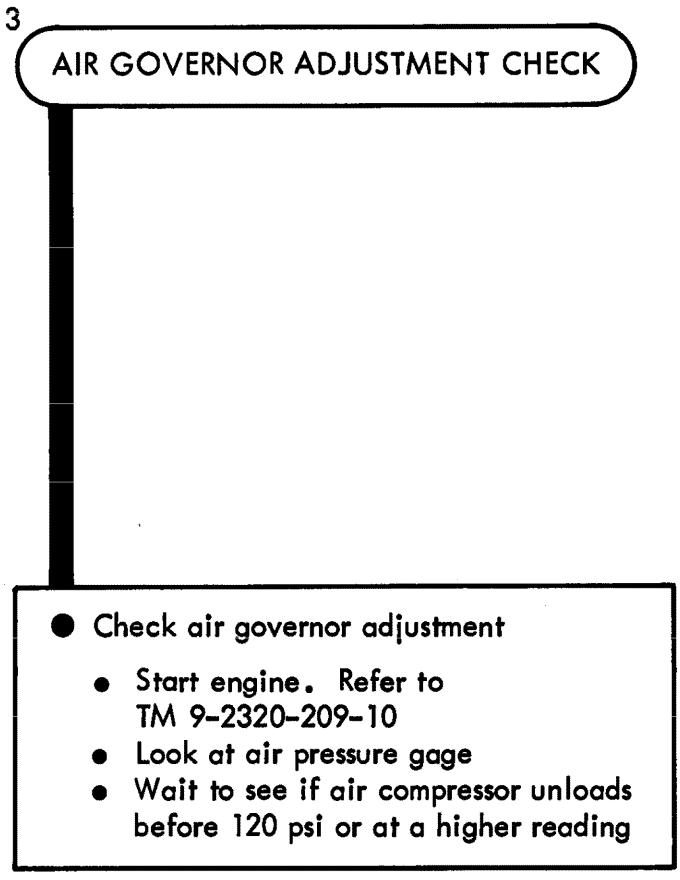
TA 114876

Figure 49-1



TA 114877

Figure 49-2



TA 114878

Figure 49-3

CHAPTER 50

BRAKE SYSTEM CHECKOUT PROCEDURES

50-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

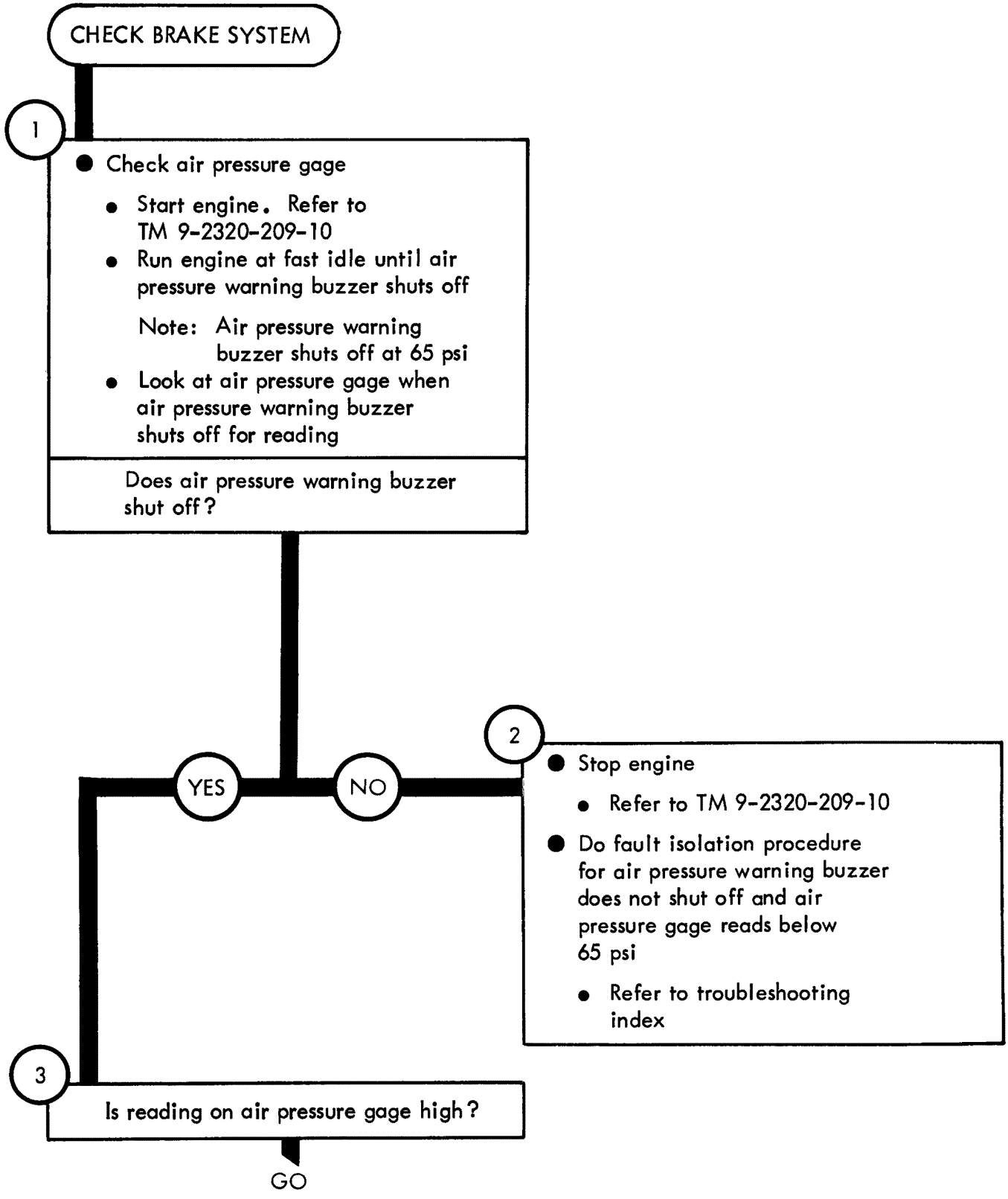
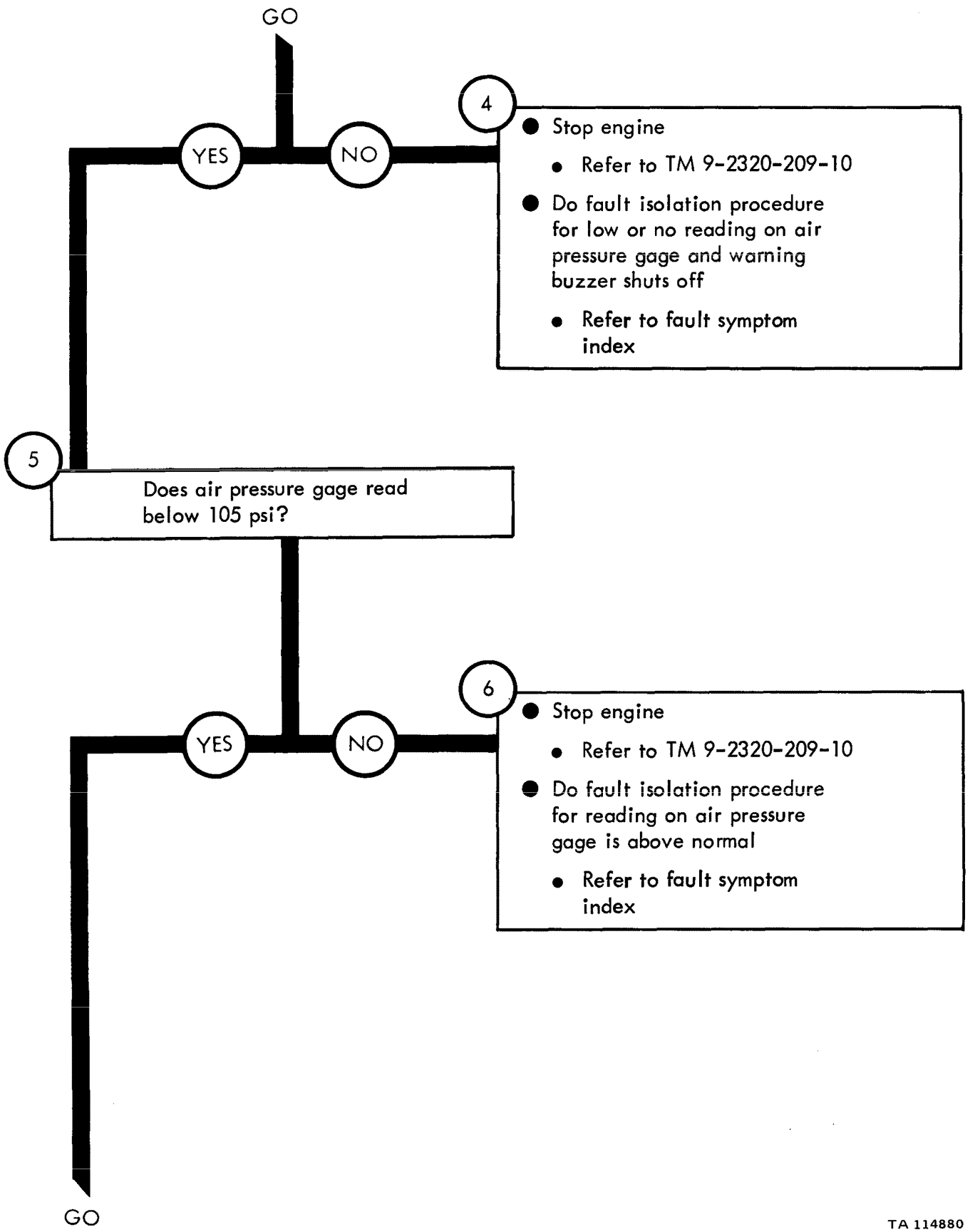


Figure 50-1 (Sheet 1 of 7)



TA 114880

Figure 50-1 (Sheet 2 of 7)

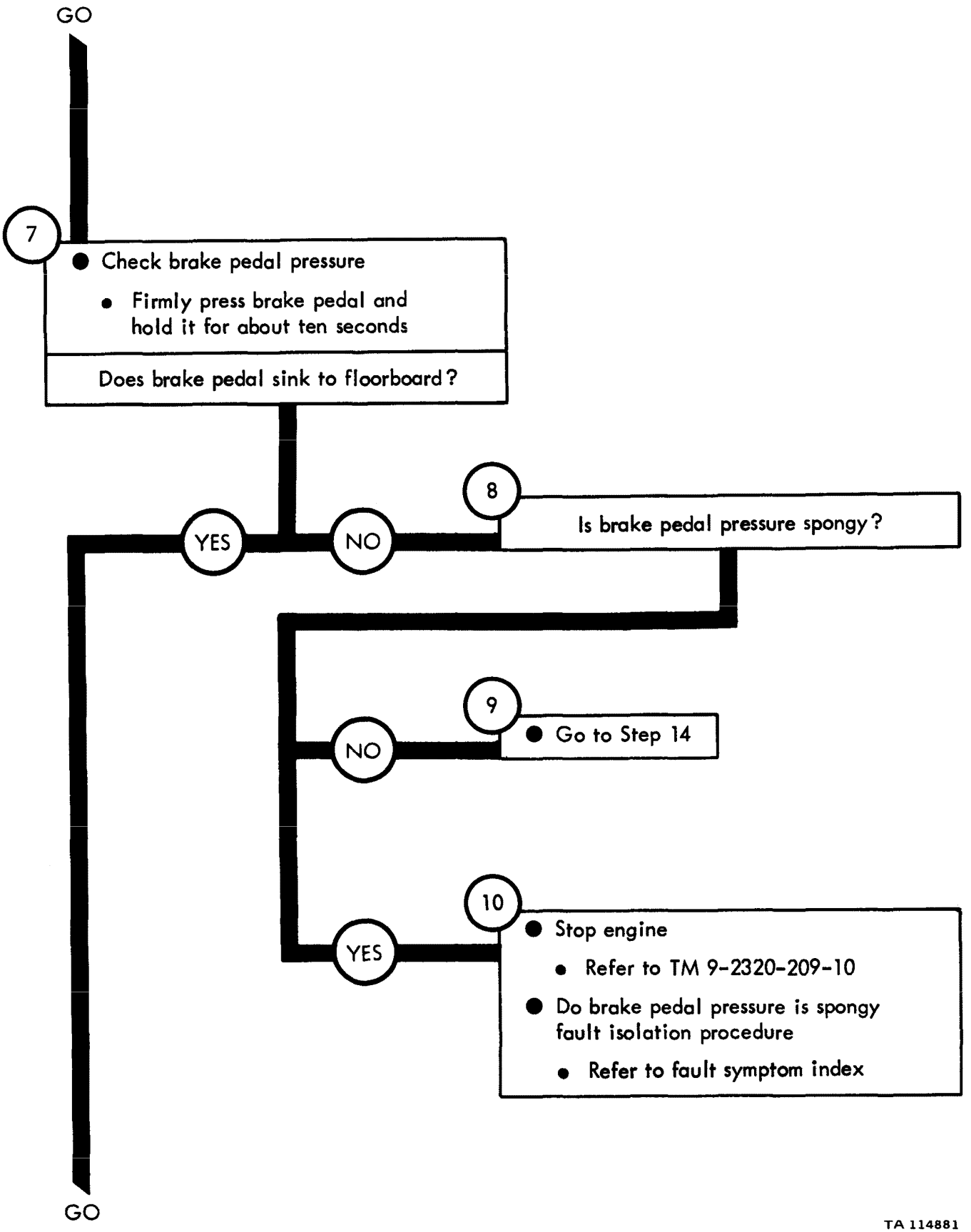
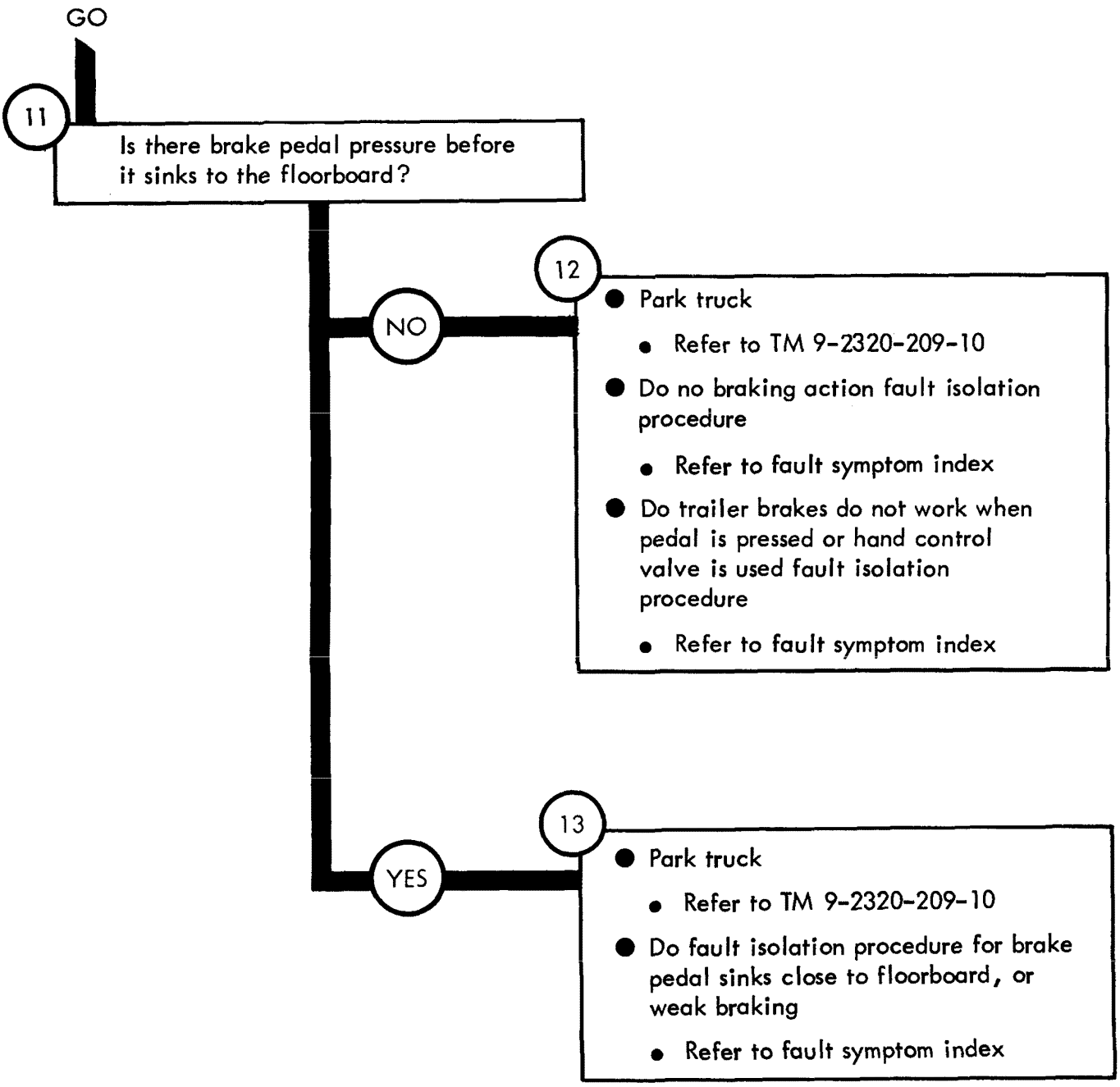


Figure 50-1 (Sheet 3 of 7)



TA 114882

Figure 50-1 (Sheet 4 of 7)

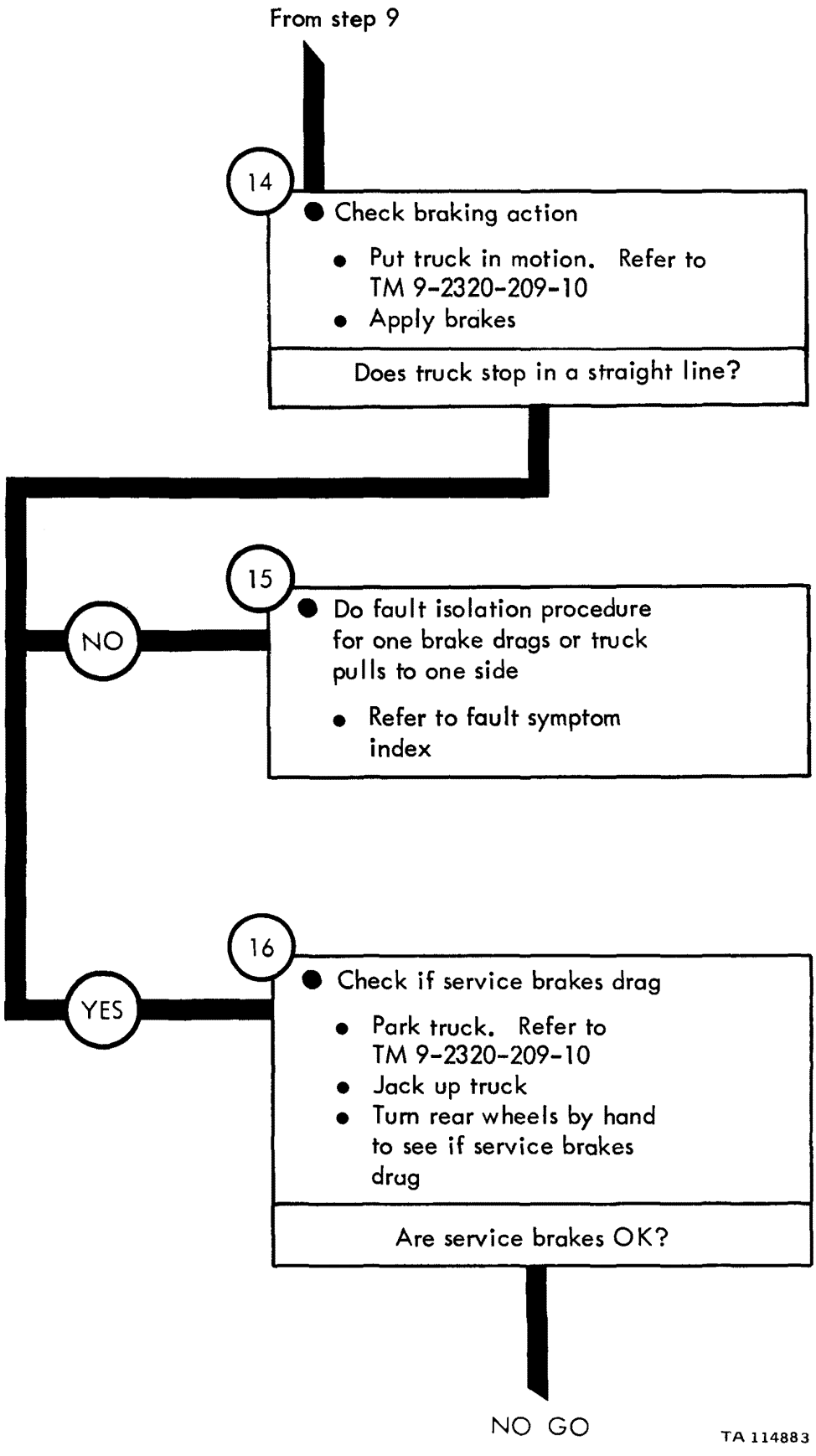


Figure 50-1 (Sheet 5 of 7)

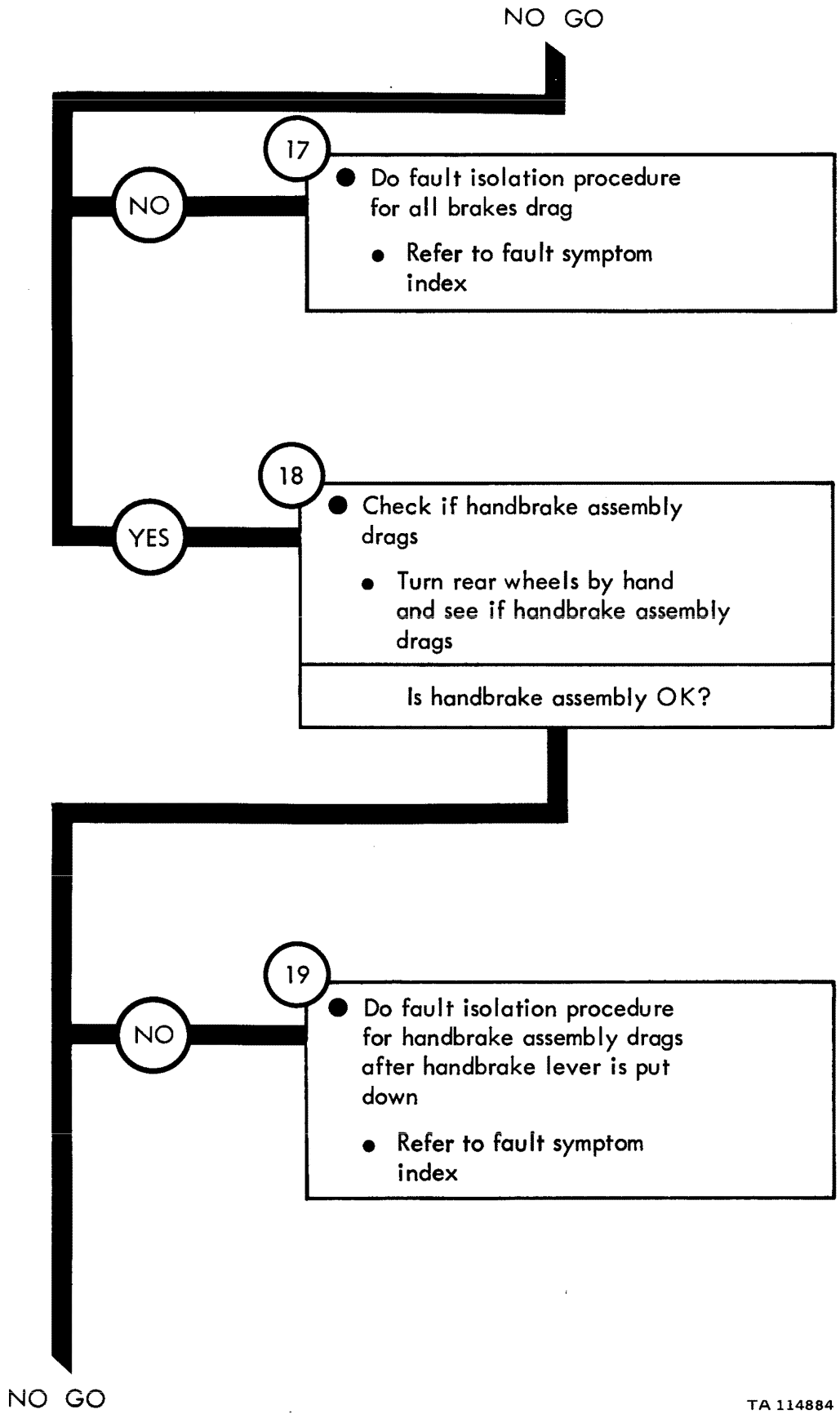


Figure 50-1 (Sheet 6 of 7)

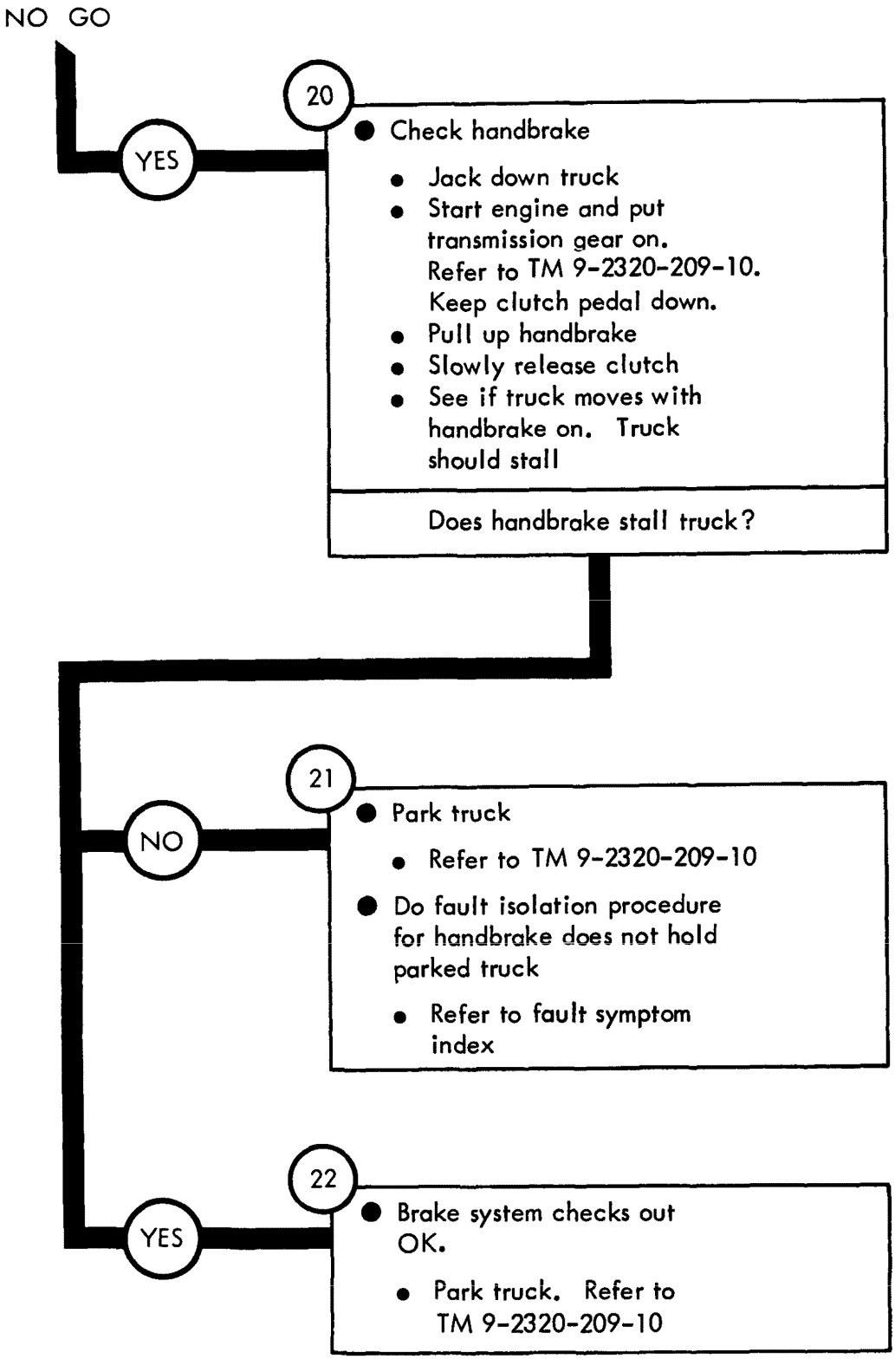


Figure 50-1 (Sheet 7 of 7)

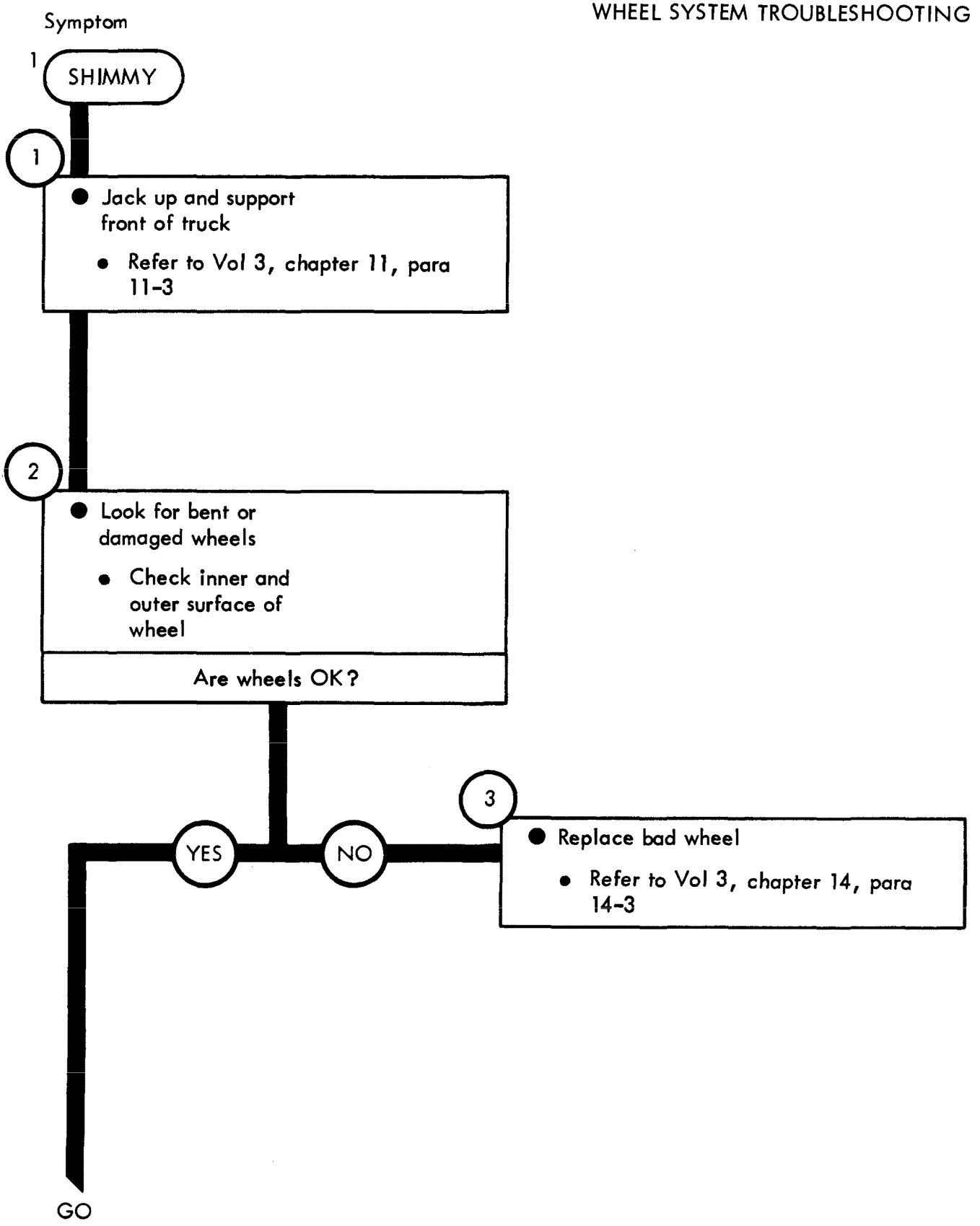
CHAPTER 51

WHEEL SYSTEM TROUBLESHOOTING

51-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the wheel system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

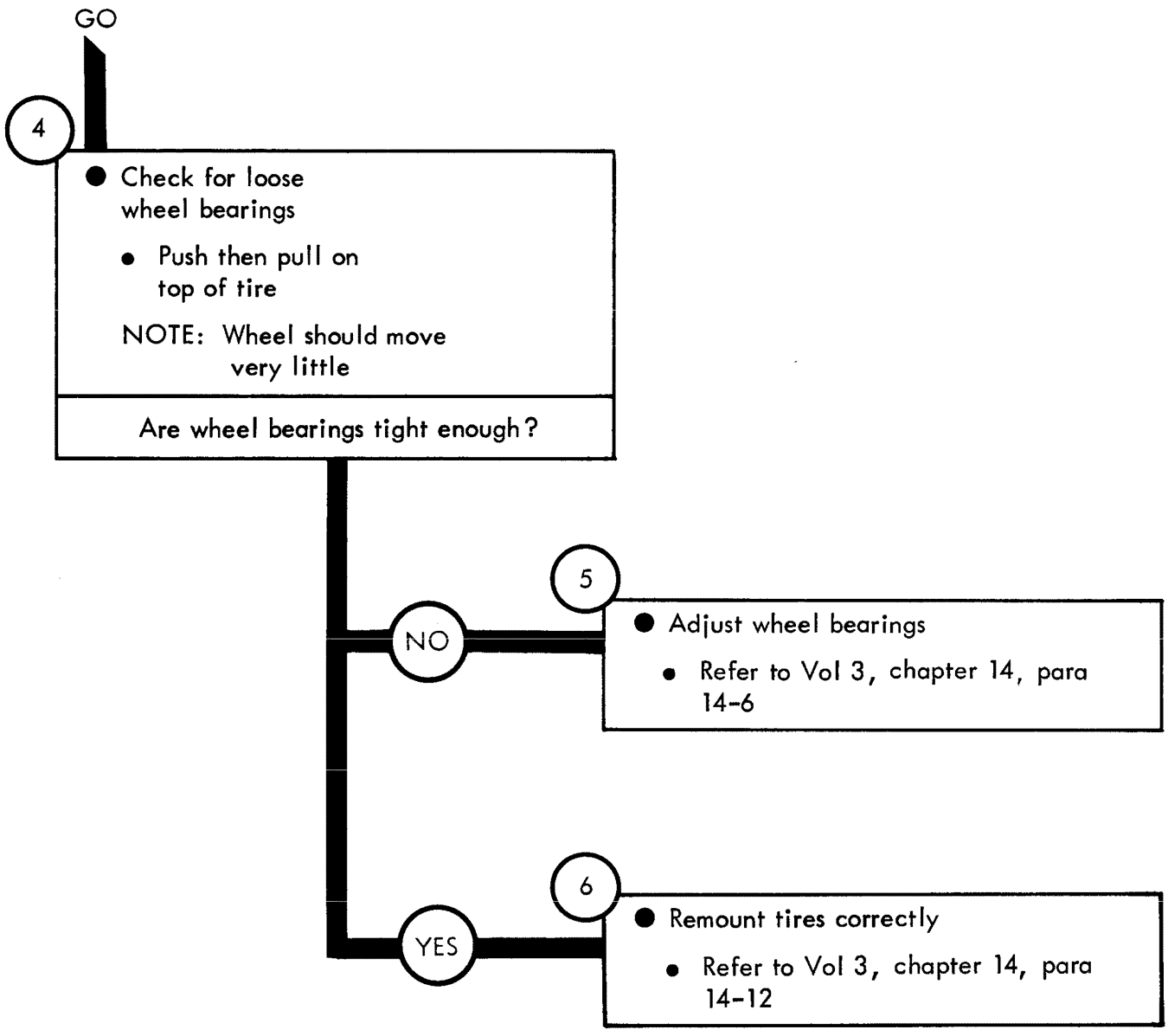
51-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

WHEEL SYSTEM TROUBLESHOOTING



TA 114886

Figure 51-1 (Sheet 1 of 2)



TA 114887

Figure 51-1 (Sheet 2 of 2)

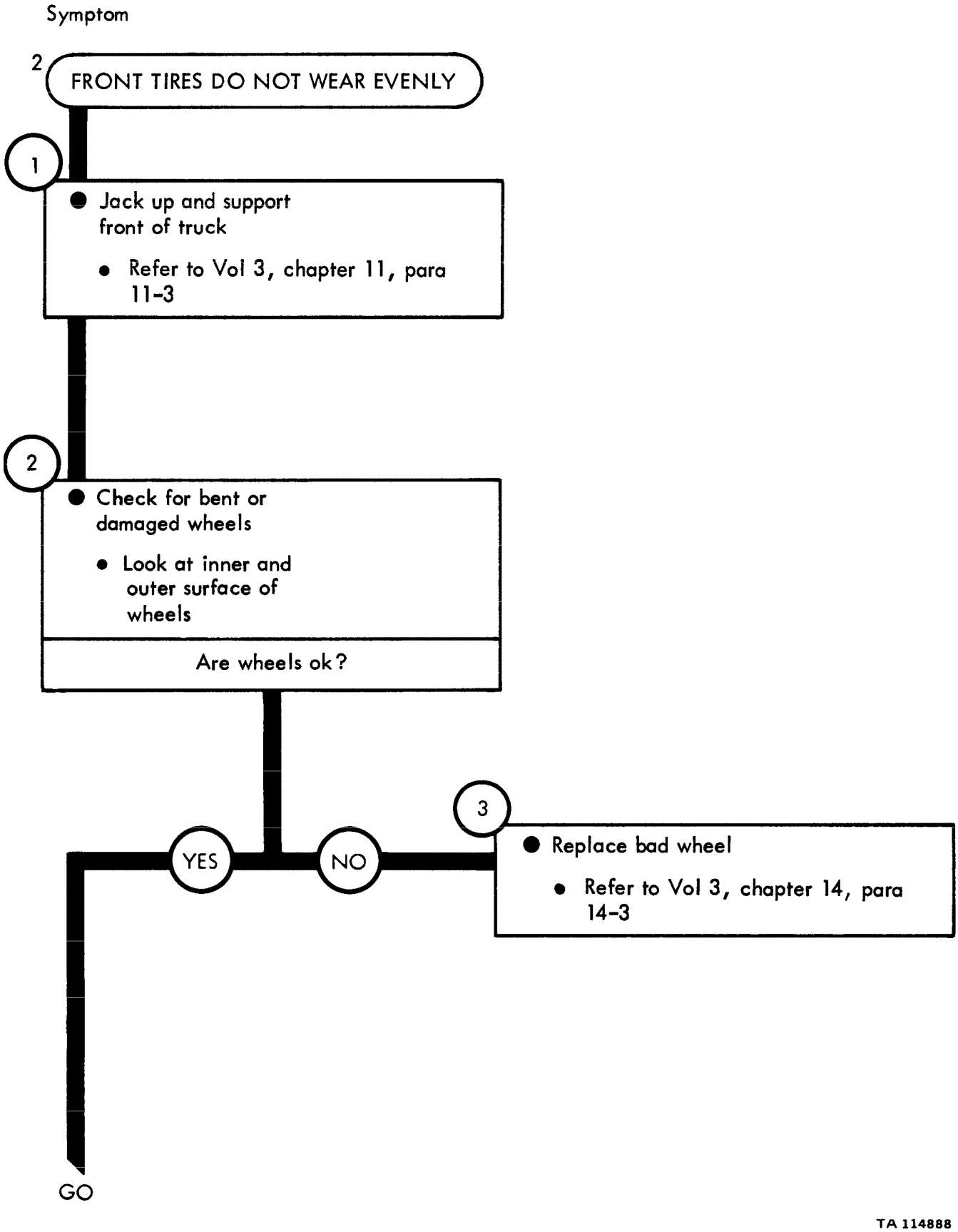
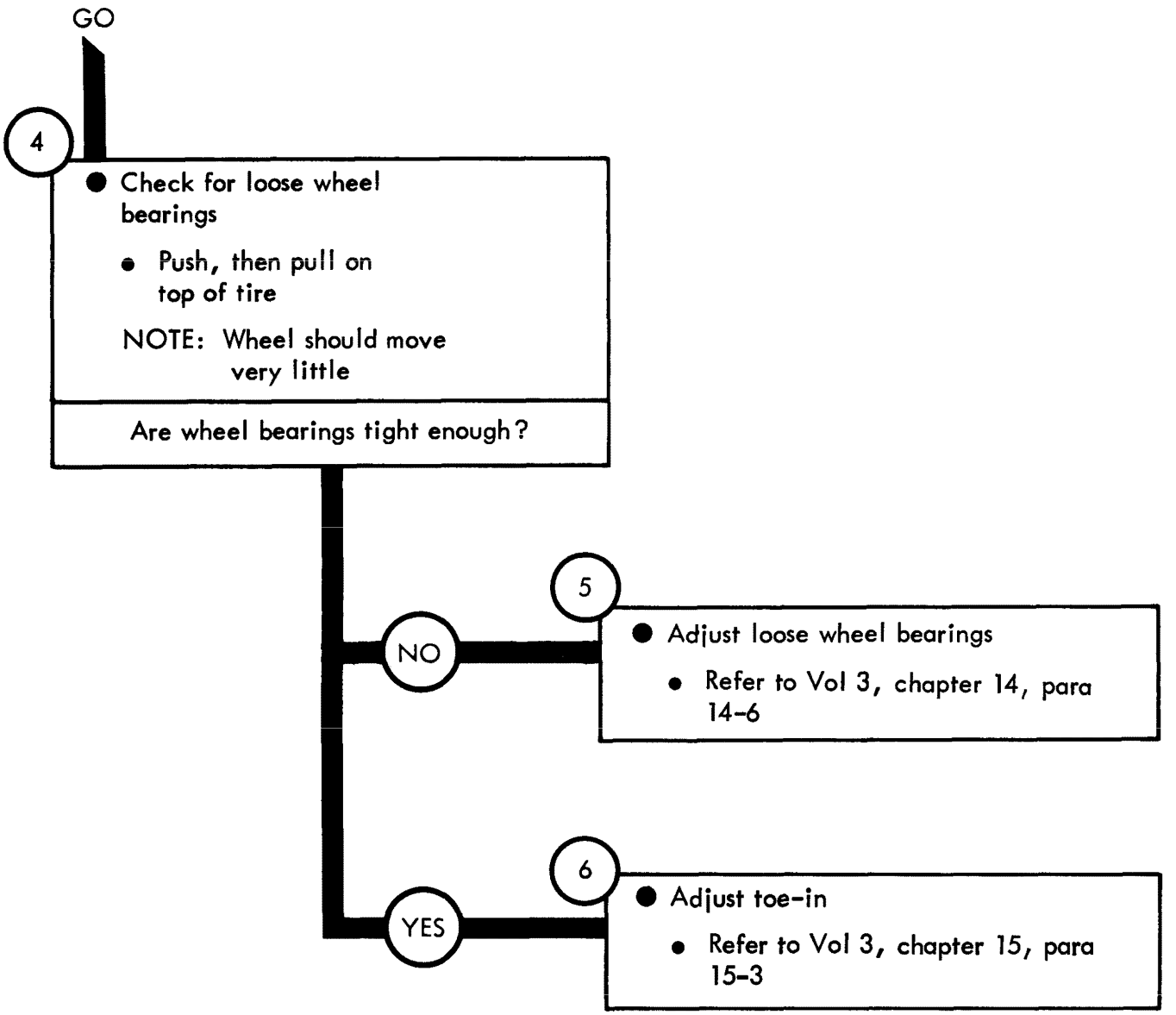


Figure 51-2 (Sheet 1 of 2)



TA 114889

Figure 51-2 (Sheet 2 of 2)

CHAPTER 52

STEERING SYSTEM TROUBLESHOOTING

52-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the steering system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

52-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

Symptom

1 HARD STEERING

1

- Make truck ready for work on steering system
  - Park truck. Refer to TM 9-2320-209-10

2

- Check steering column
  - Using 9/16-inch wrench turn column bracket clamp bolt two turns to the left
  - See if steering column changes its position from side to side

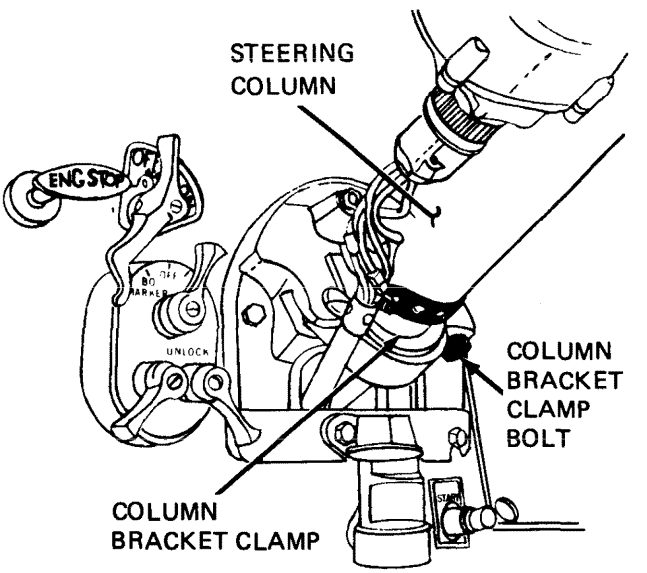
Does steering column stay in position?

NO

3

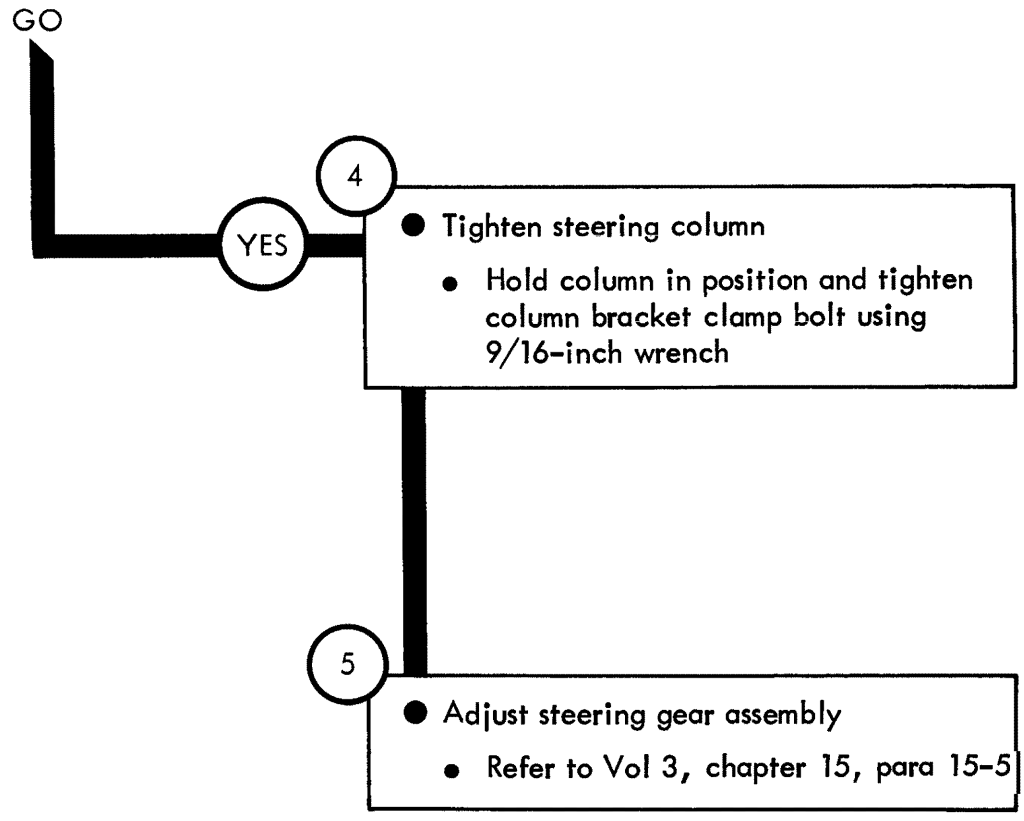
- Adjust steering column
  - Using 9/16-inch wrench turn column bracket clamp bolt-two more turns to the left
  - Hold column in position and tighten column bracket clamp bolt using 9/16-inch wrench

GO



TA 114890

Figure 52-1 (Sheet 1 of 2)



TA 114891

Figure 52-1 (Sheet 2 of 2)

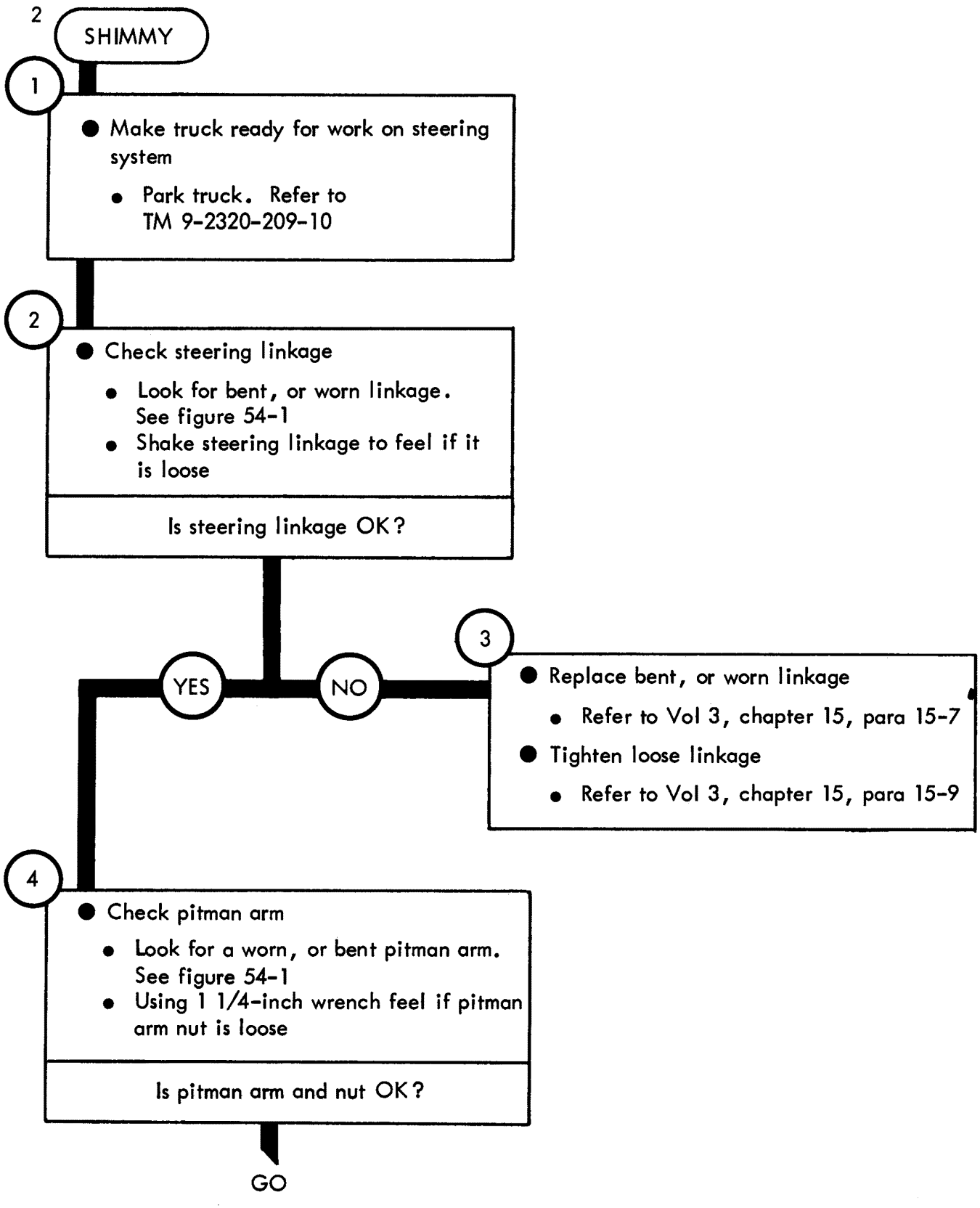


Figure 52-2 (Sheet 1 of 4)

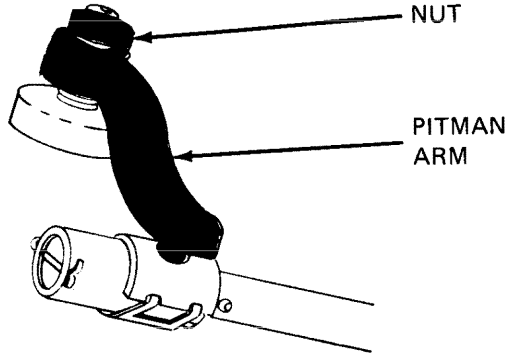
GO

YES

NO

5

- Replace worn, or bent pitman arm
  - Refer to Vol 3, chapter 15, para 15-4
- Tighten loose pitman arm nut
  - Using 1 1/4-inch wrench tighten pitman arm nut



6

- Check drag link
  - Shake drag link to feel if it is loose. See figure 54-1

Is drag link OK?

GO

TA 114893

Figure 52-2 (Sheet 2 of 4)

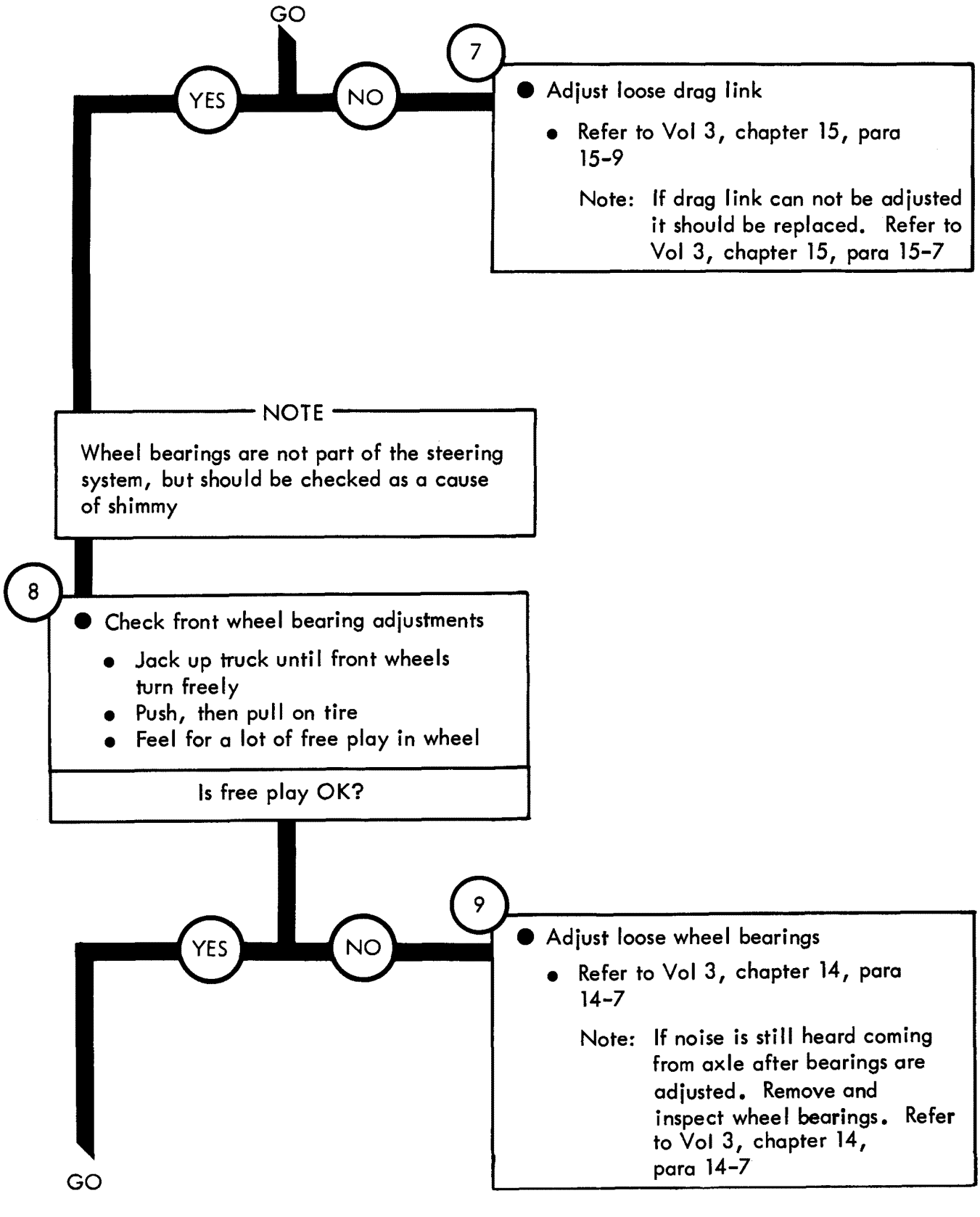
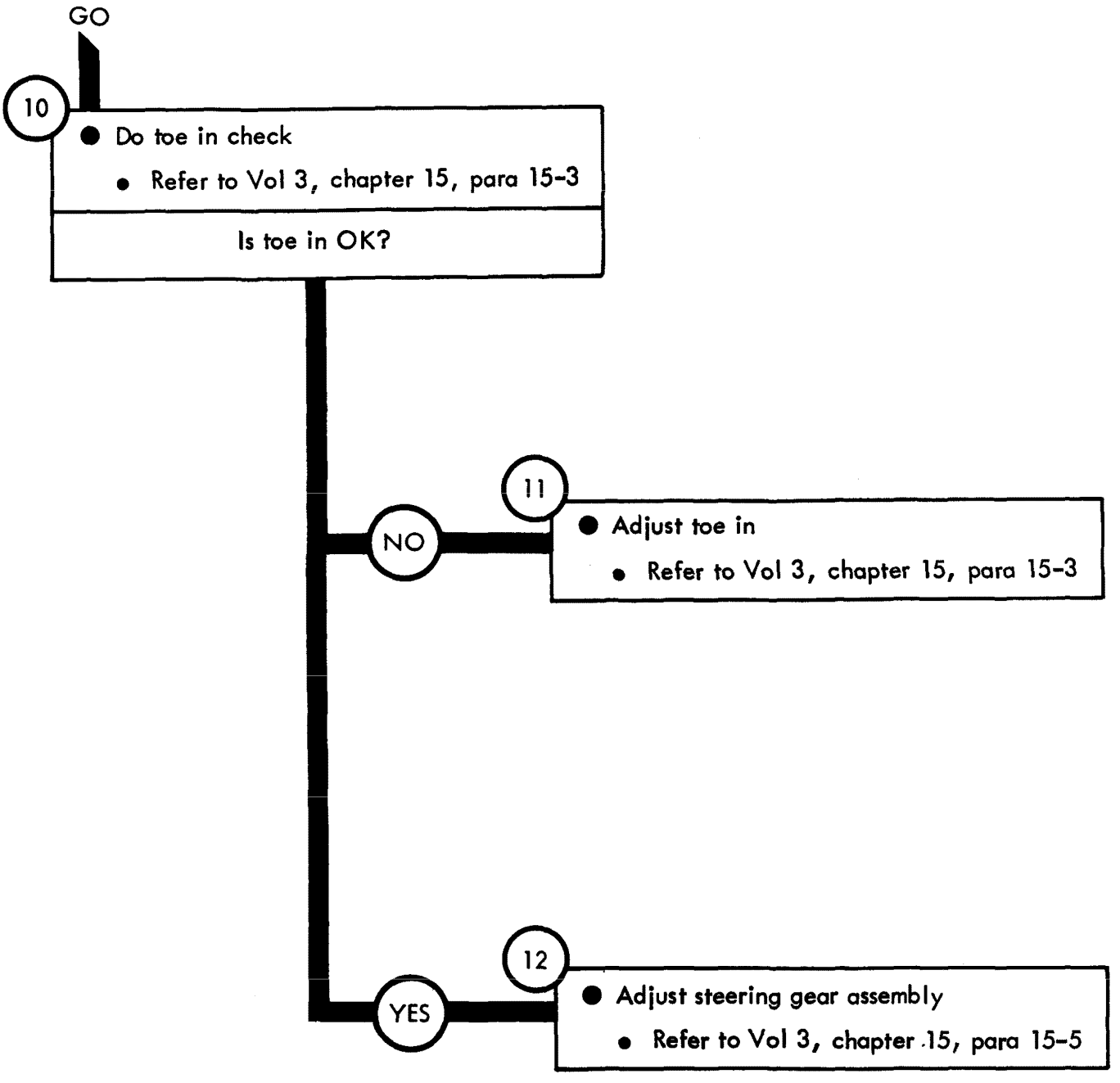


Figure 52-2 (Sheet 3 of 4)



TA 114895

Figure 52-2 (Sheet 4 of 4)

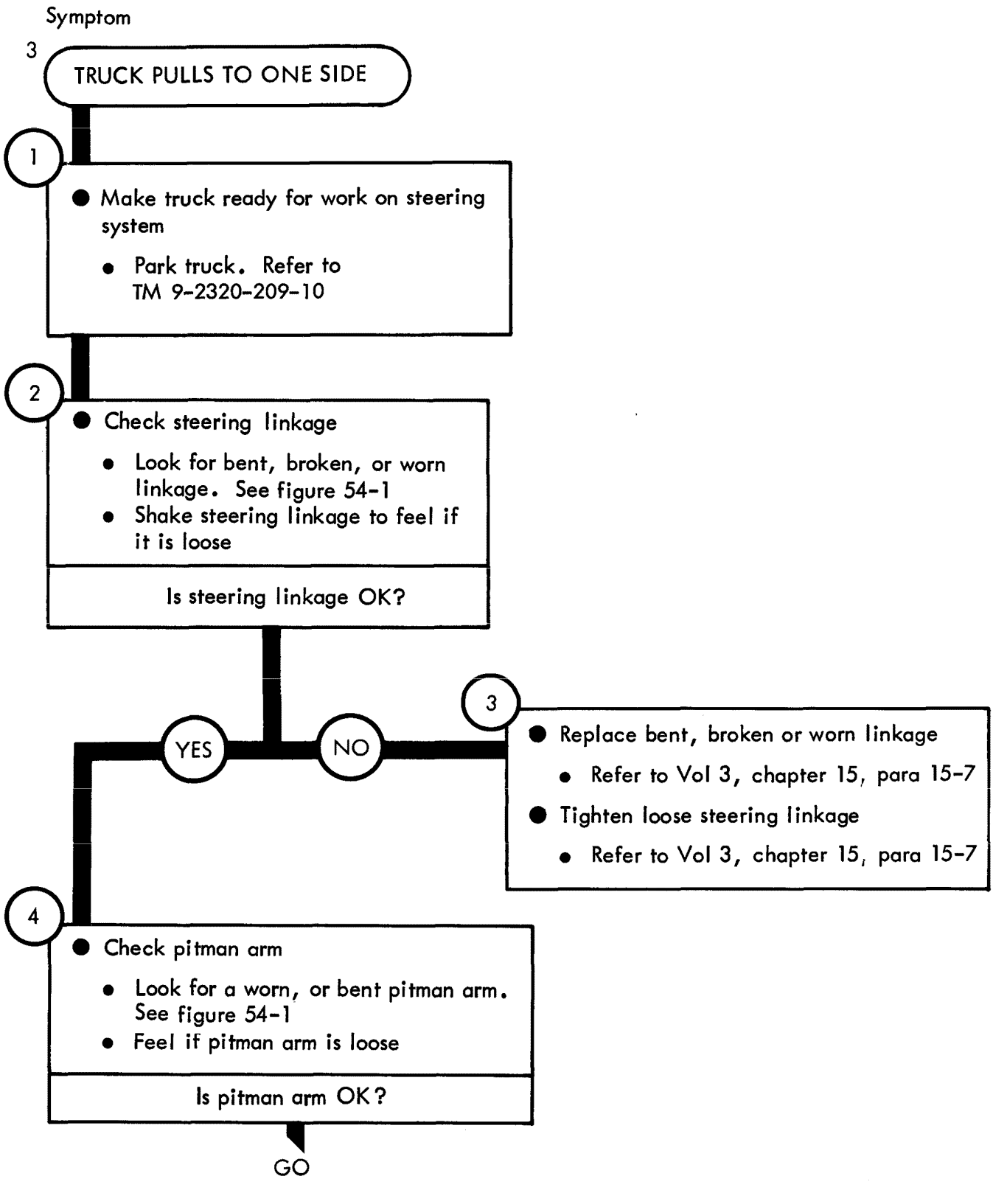
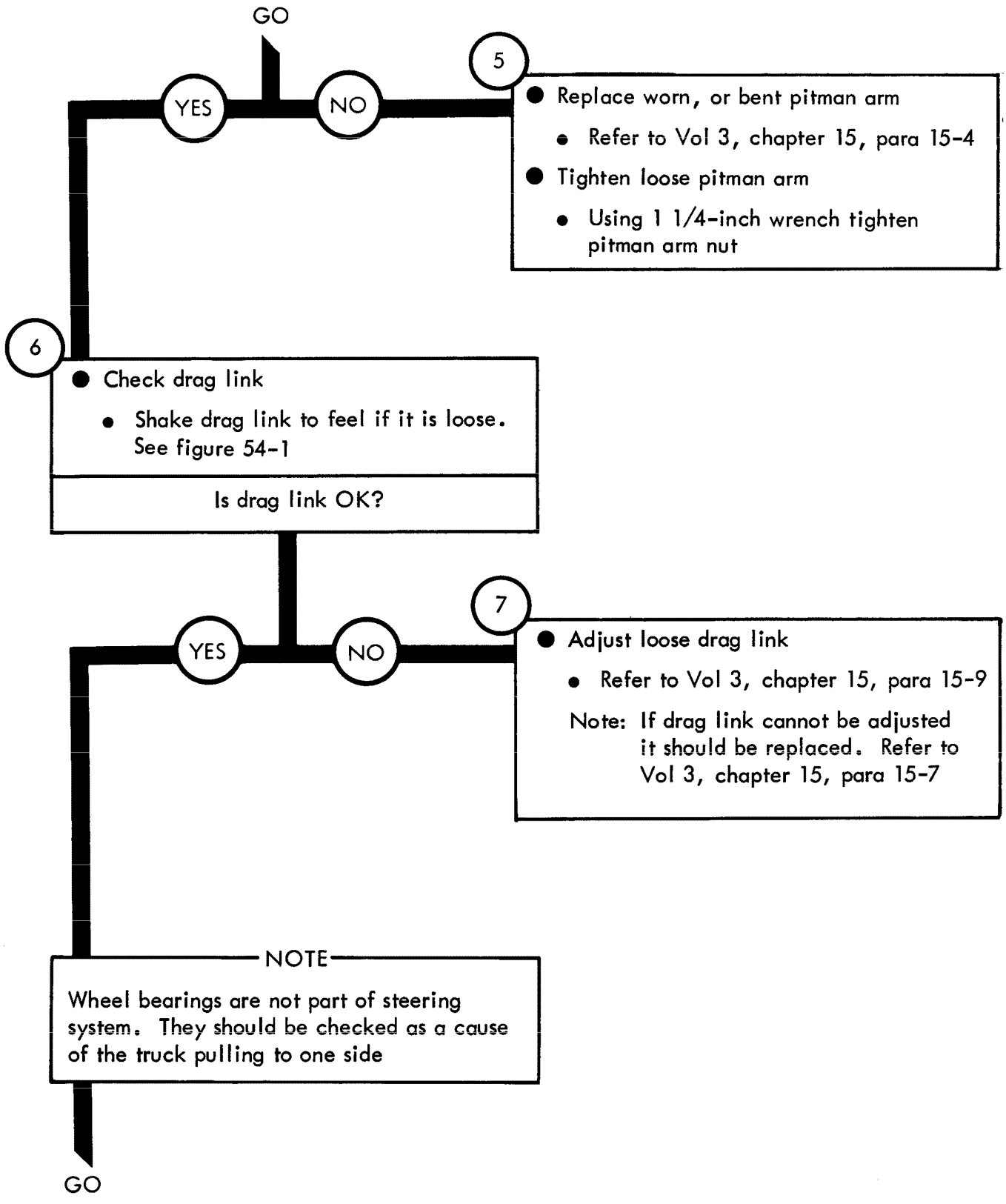


Figure 52-3 (Sheet 1 of 3)



TA 114897

Figure 52-3 (Sheet 2 of 3)

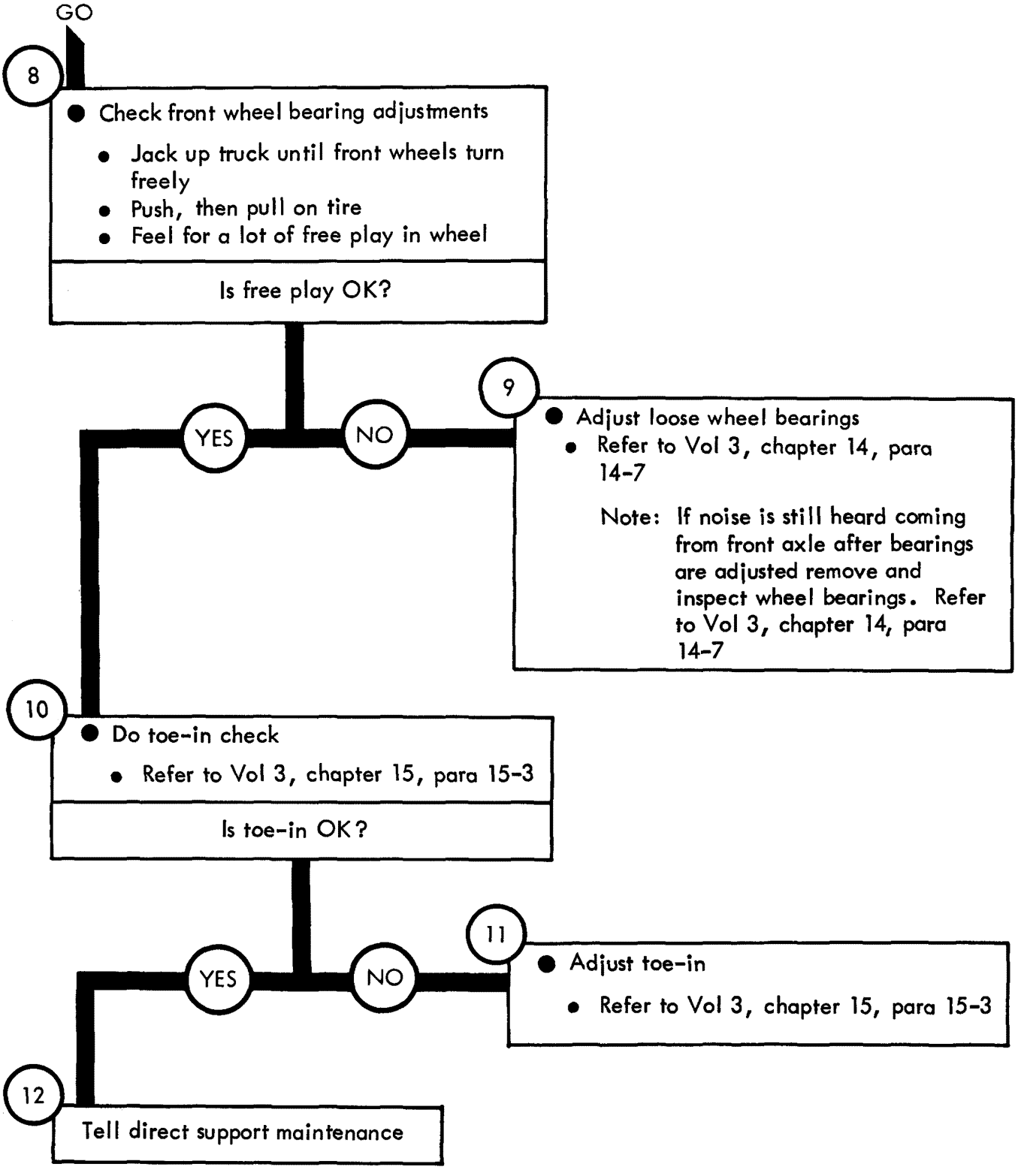
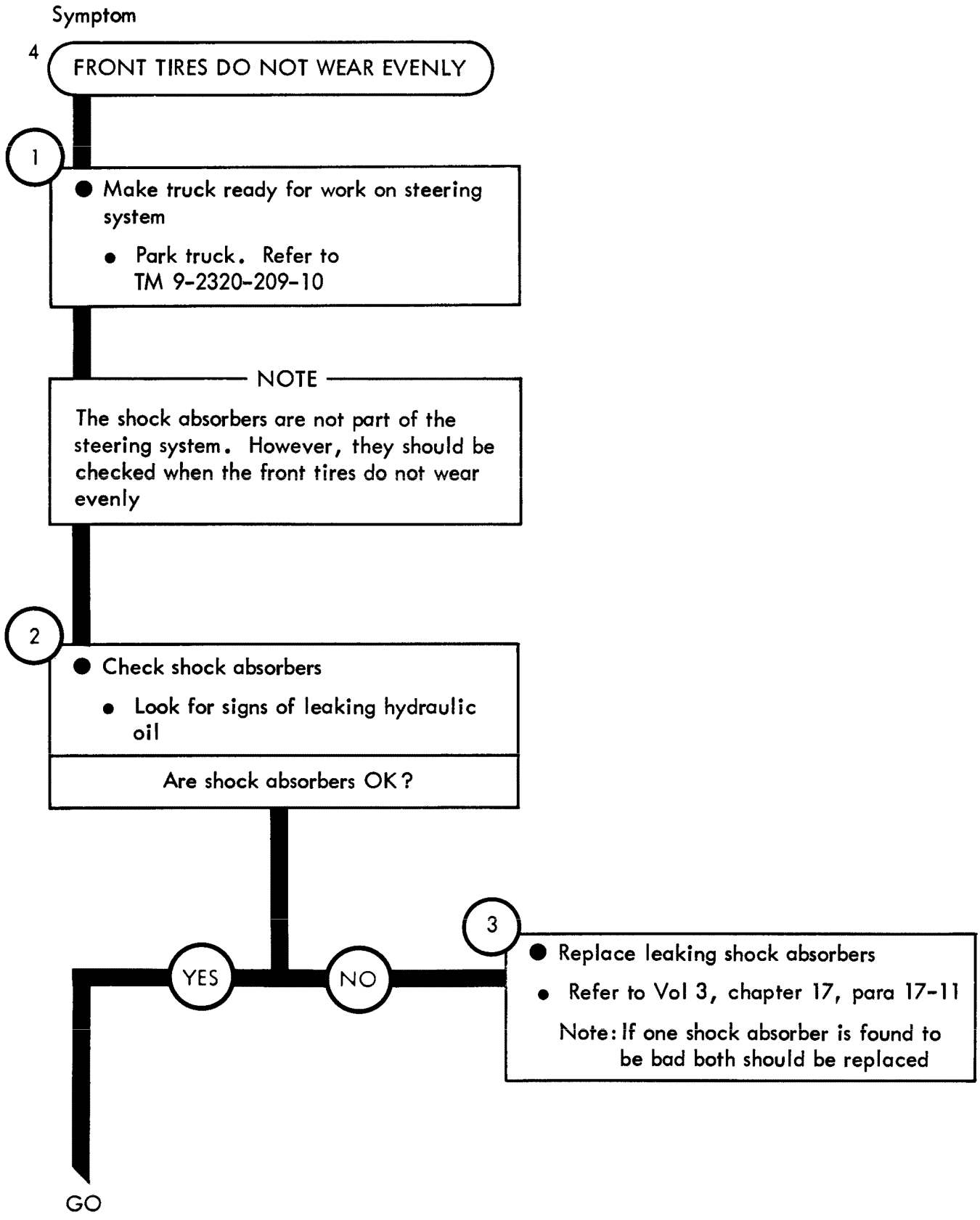


Figure 52-3 (Sheet 3 of 3)



TA 114899

Figure 52-4 (Sheet 1 of 2)

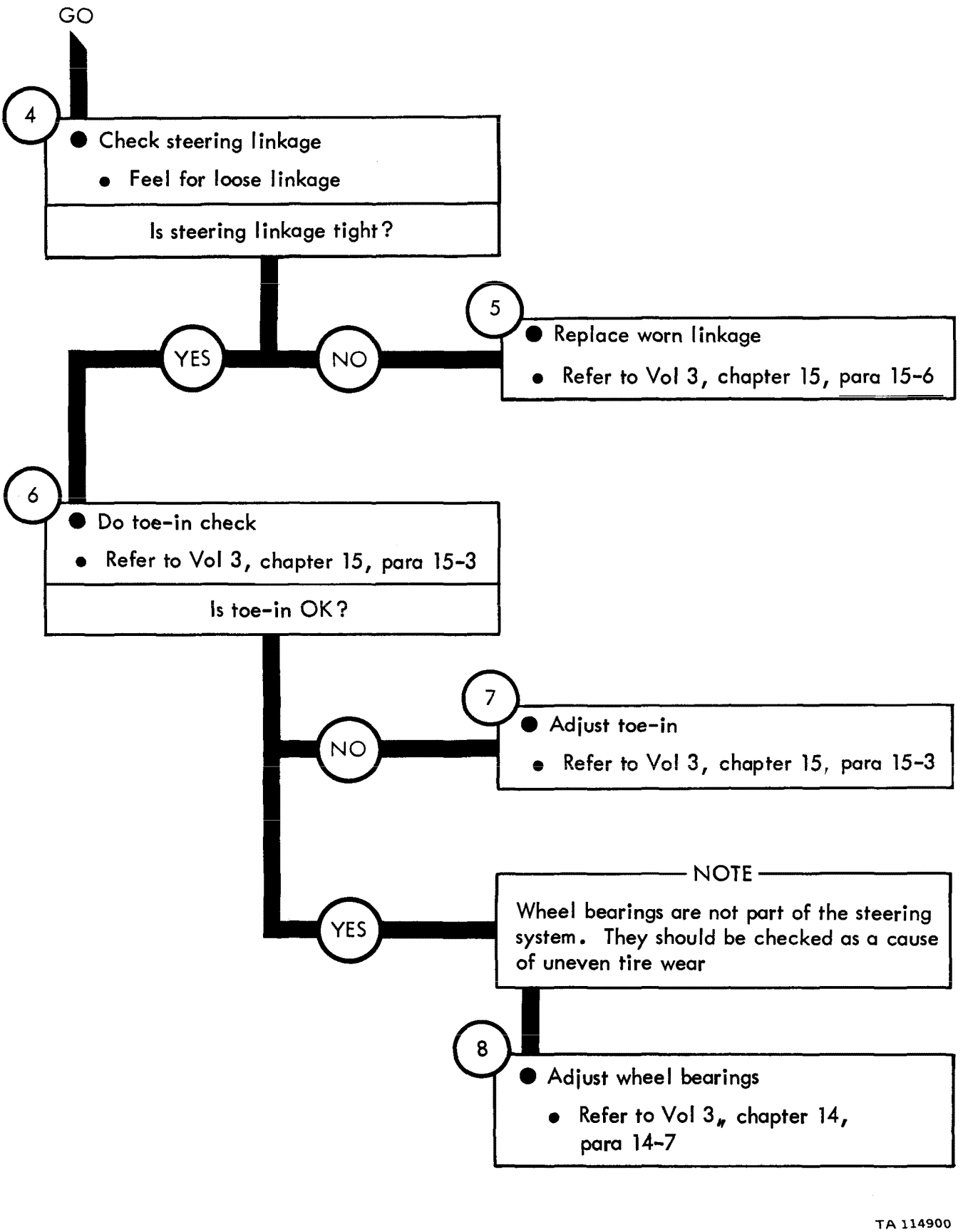


Figure 52-4 (Sheet 2 of 2)

CHAPTER 53

STEERING SYSTEM TROUBLESHOOTING SUMMARY

53-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 52 for the steering system.

53-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how -to-do-it" instructions. Warnings, cautions, and notes are given where needed.

STEERING SYSTEM TROUBLESHOOTING SUMMARY

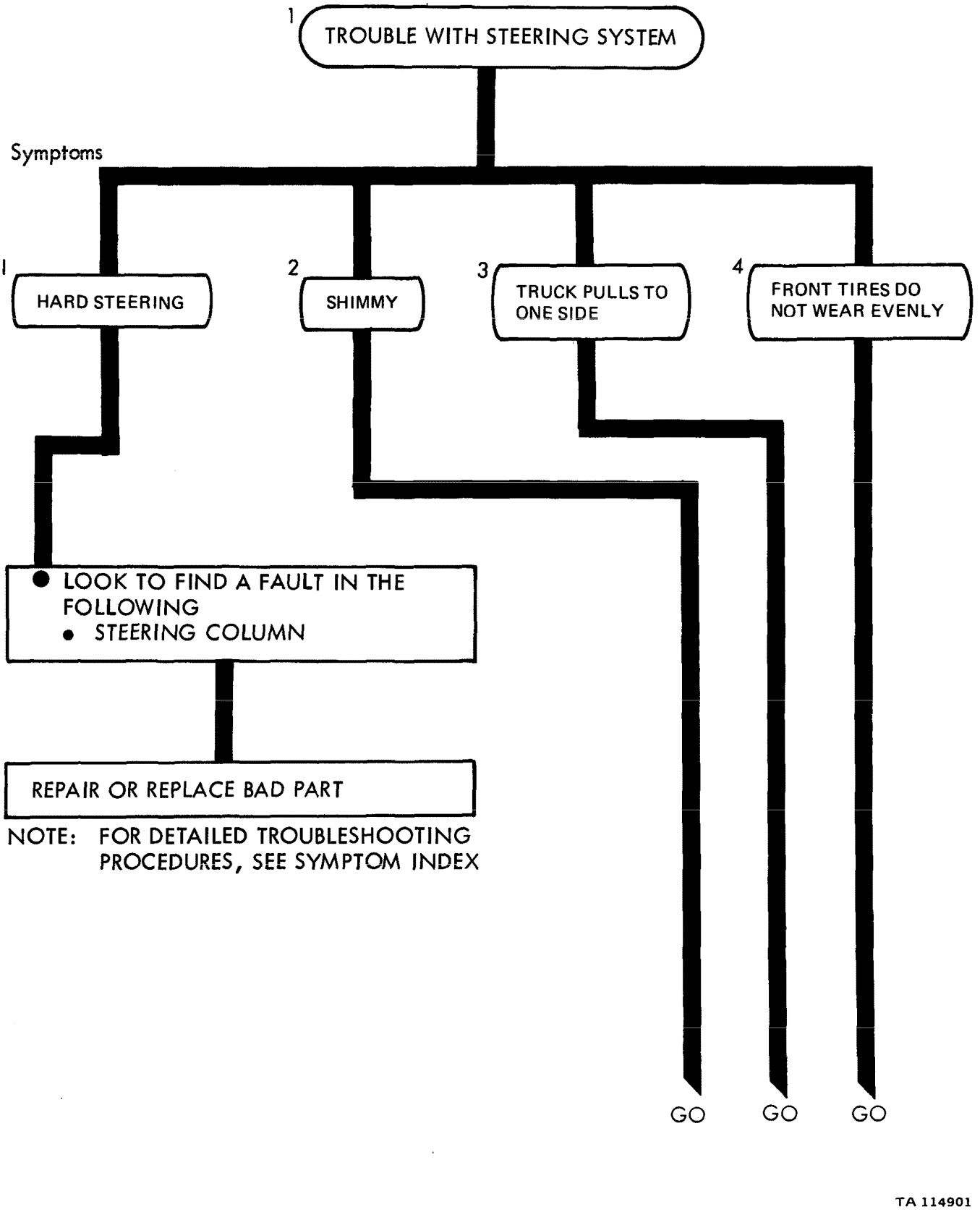
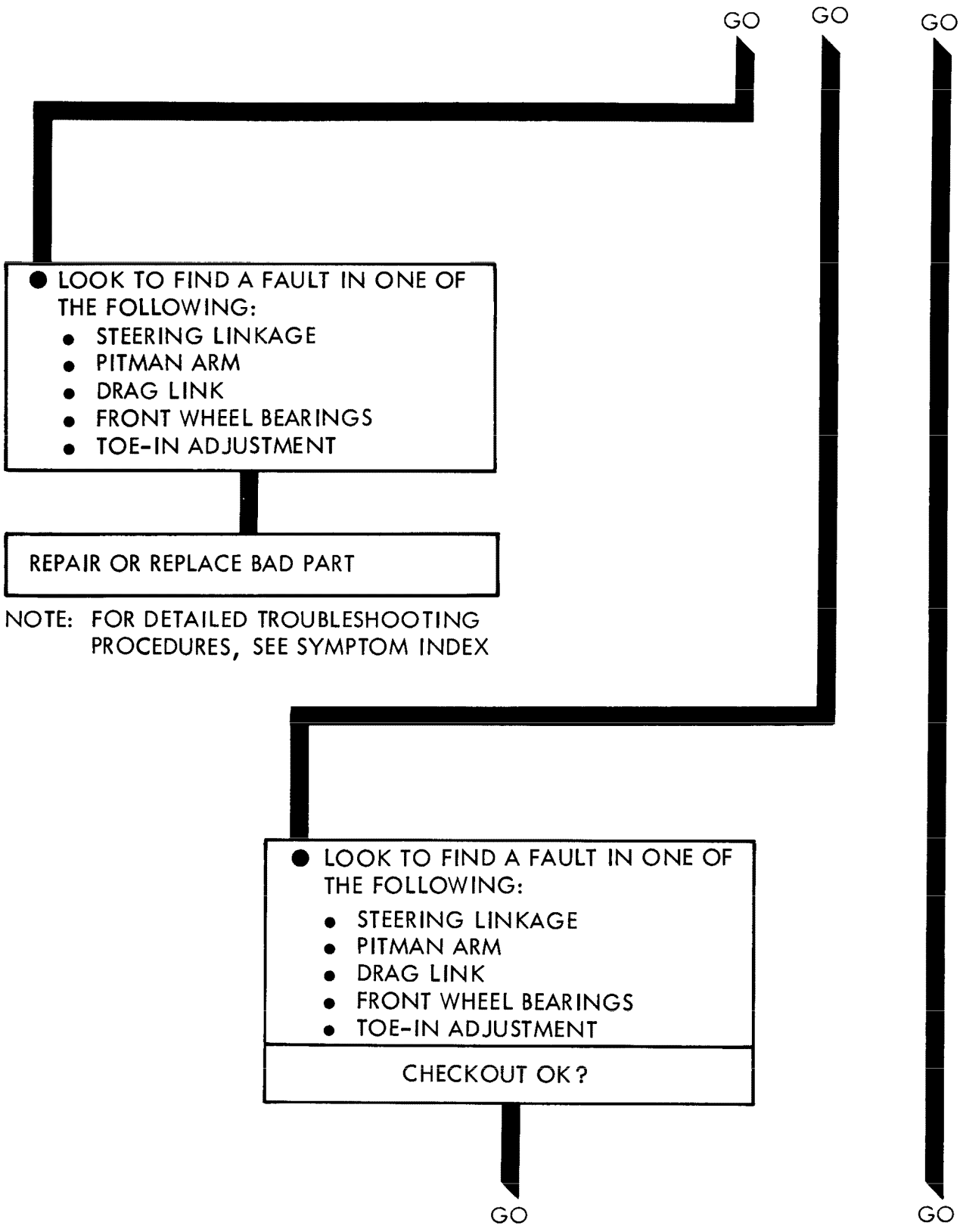


Figure 53-1 (Sheet 1 of 3)



TA 114902

Figure 53-1 (Sheet 2 of 3)

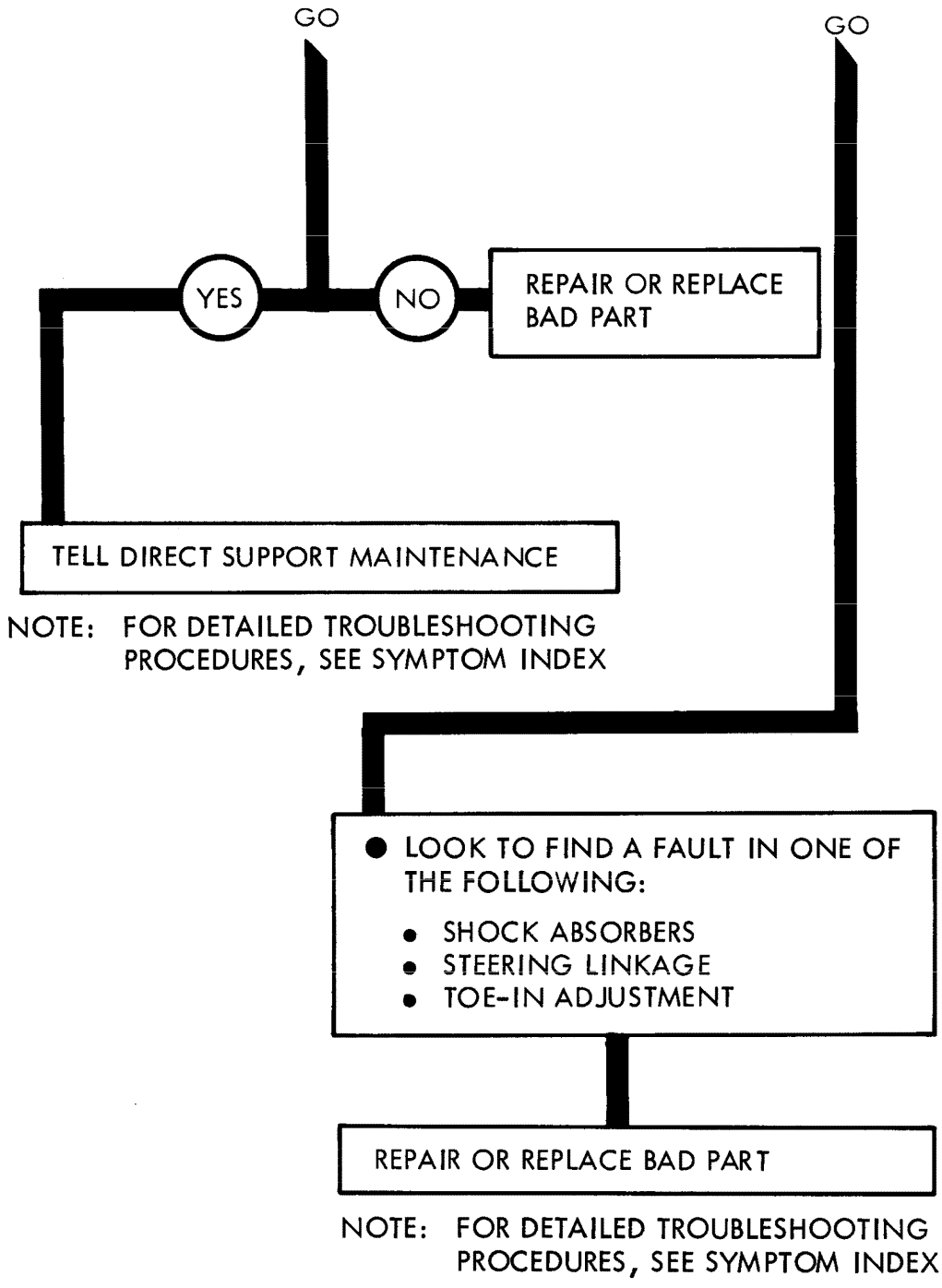


Figure 53-1 (Sheet 3 of 3)

CHAPTER 54

STEERING SYSTEM SUPPORT DIAGRAMS

54-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 52. Table 3-1 is a complete listing of all support diagrams used in this manual.

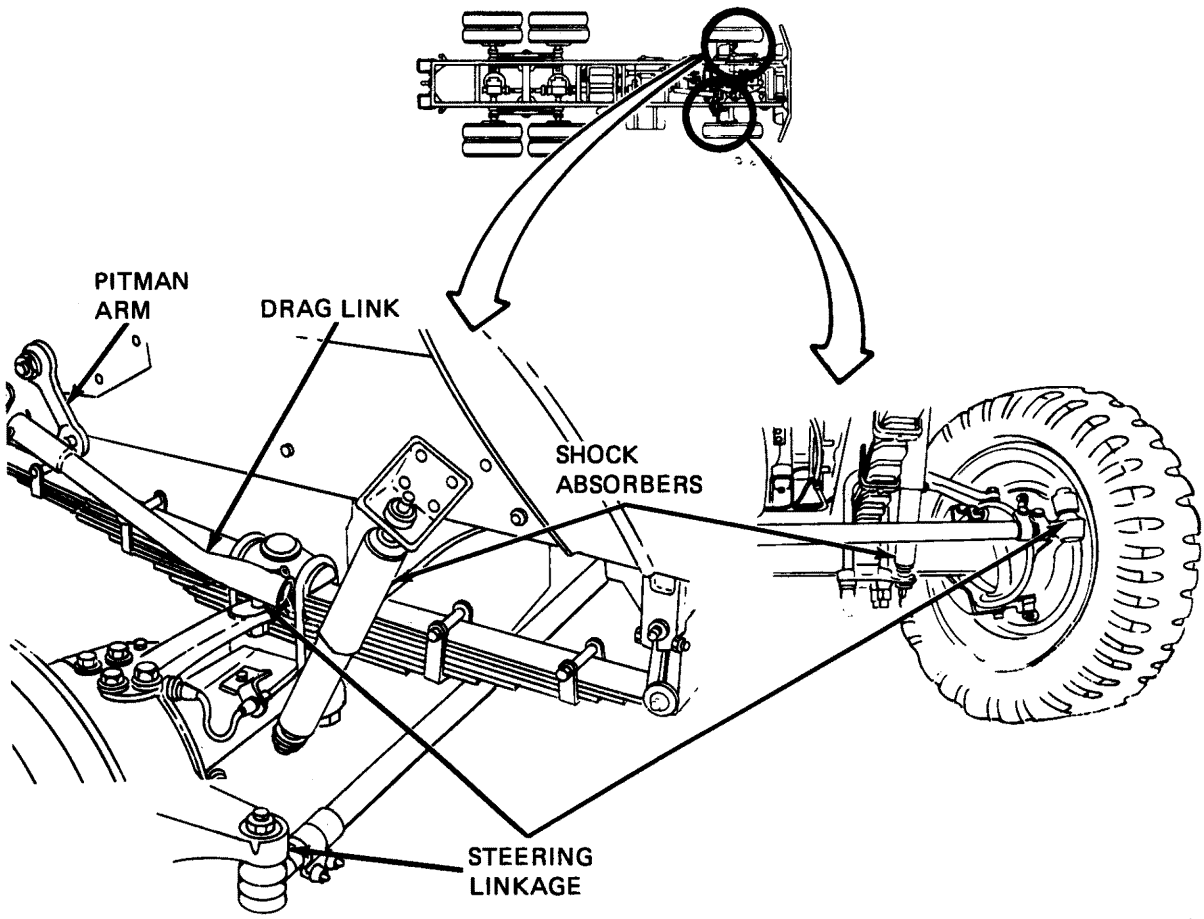


Figure 54-1. Steering System Support Diagram

CHAPTER 55

SPRING AND SHOCK ABSORBERS SYSTEM TROUBLESHOOTING

55-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the springs and shock absorbers system, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

55-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

SPRINGS AND SHOCK ABSORBERS TROUBLESHOOTING

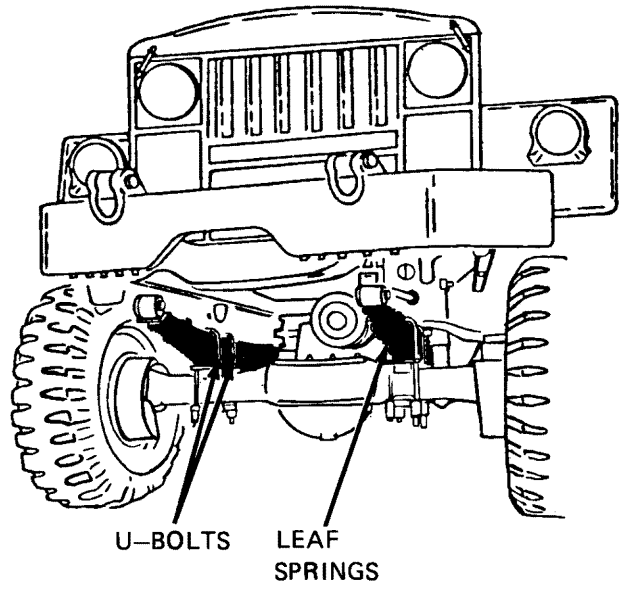
Symptom

TRUCK LEANS TO ONE SIDE

1. ● Make truck ready for work on springs
   - Park truck. Refer to TM 9-2320-209-10

2. ● Check front and rear leaf springs
   - Look for broken springs

   Are springs OK?

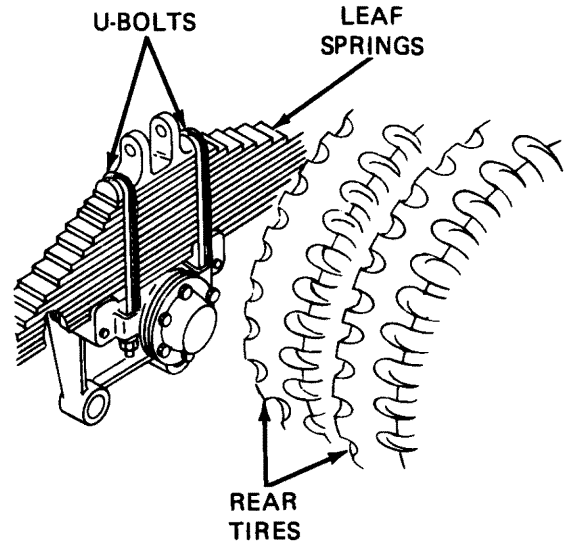


YES / NO

3. ● Replace broken leaf springs
   - Refer to Vol 3, chapter 17, para 17-4 and 17-7

4. ● Check front and rear U-bolts
   - Look for broken U-bolts

   Are U-bolts OK?



GO

TA 114905

Figure 55-1 (Sheet 1 of 2)

GO

YES

NO

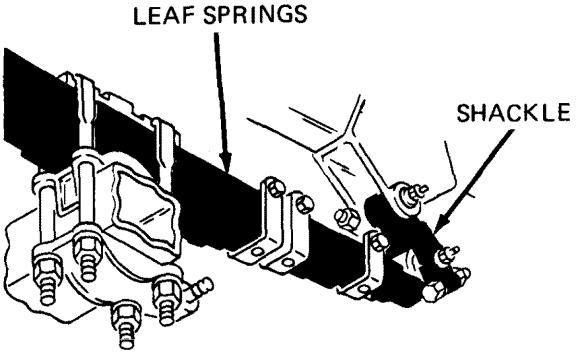
5

- Replace broken U-bolts
  - Refer to Vol 3, chapter 17, para 17-3 and 17-6

6

- Check front and rear leaf spring shackles
  - Look for broken shackles

Are shackles OK?



YES

NO

7

- Replace broken shackles
  - Refer to Vol 3, chapter 17, para 17-4 and 17-7

8

Tell direct support maintenance

TA 114906

Figure 55-1 (Sheet 2 of 2)

Symptom 2

REAR AXLE MAKES NOISE

1

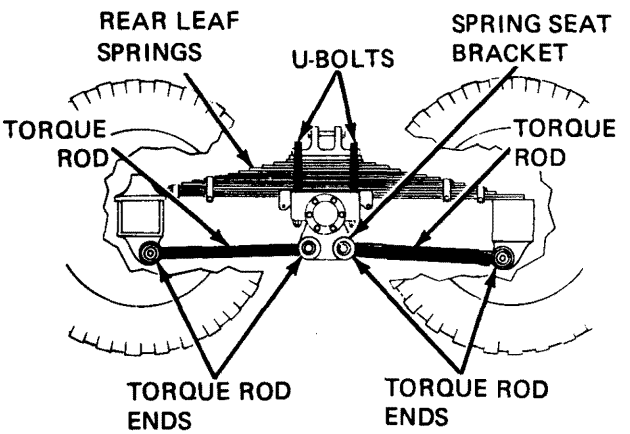
- Park truck
  - Refer to TM 9-2320-209-10

2

- Check torque rods
  - Shake torque rods
  - Look for free play at torque rod ends

Are torque rods OK?

GO



TA 114907

Figure 55-2 (Sheet 1 of 5)

GO

YES

NO

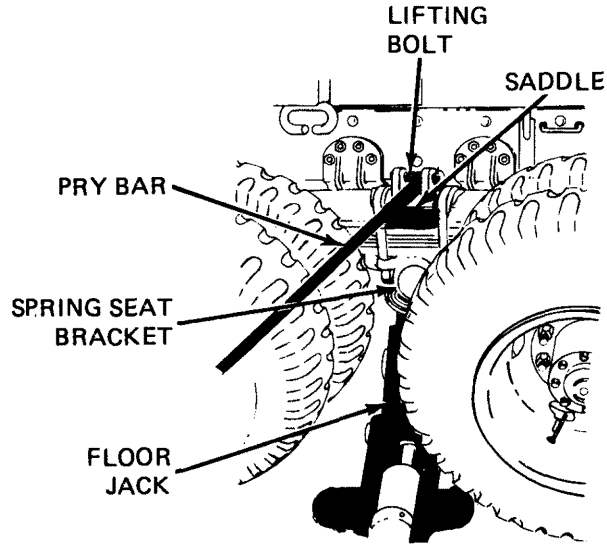
3

- Replace worn torque rod ends
  - Refer to Vol 3, chapter 17, para 17-12

4

- Check spring seat bearing free play
  - Put floor jack under spring seat bracket
  - Raise until wheels come off ground
  - Put pry bar between saddle lifting bolt and saddle
  - Move bar up and down and look for free play in spring seat housing

Is spring seat bearing free play OK?



GO

TA 114908

Figure 55-2 (Sheet 2 of 5)

GO

YES

NO

5

- Adjust spring seat bearing
  - Refer to Vol 3, chapter 17, para 17-10

NOTE

Wheel bearings are not part of the spring and shock absorber group. However they should be checked for a cause of the rear axle making noise

6

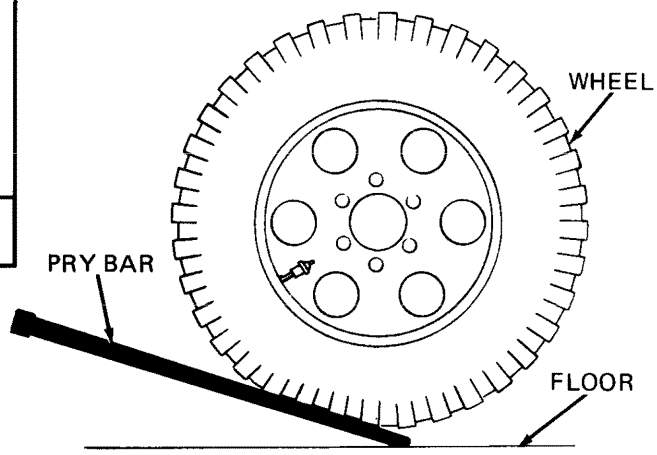
- Check wheel bearing adjustment
  - Slide a pry bar under rear wheels

NOTE: Bar is used as a lever to move the tire using the ground for support

  - Move the pry bar up and down and feel for a lot of free play in wheel

Is wheel bearing adjustment OK?

GO



TA 114909

Figure 55-2 (Sheet 3 of 5)

GO

YES

NO

7

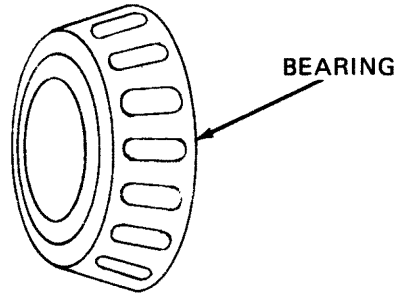
- Adjust loose rear wheel bearings
  - Refer to Vol 3, chapter 14, para 14-10

8

- Check rear wheel bearing on wheel that is noisy
  - Remove rear hub and brake drum assembly. Refer to Vol 3, chapter 14, para 14-9
  - Look at wheel bearings for signs of scorching, melting or metal discoloring

Note: If wheel bearing is found to be OK, put it back. Refer to Vol 3, chapter 14, para 14-9. Then do step 8, for the wheel next to it

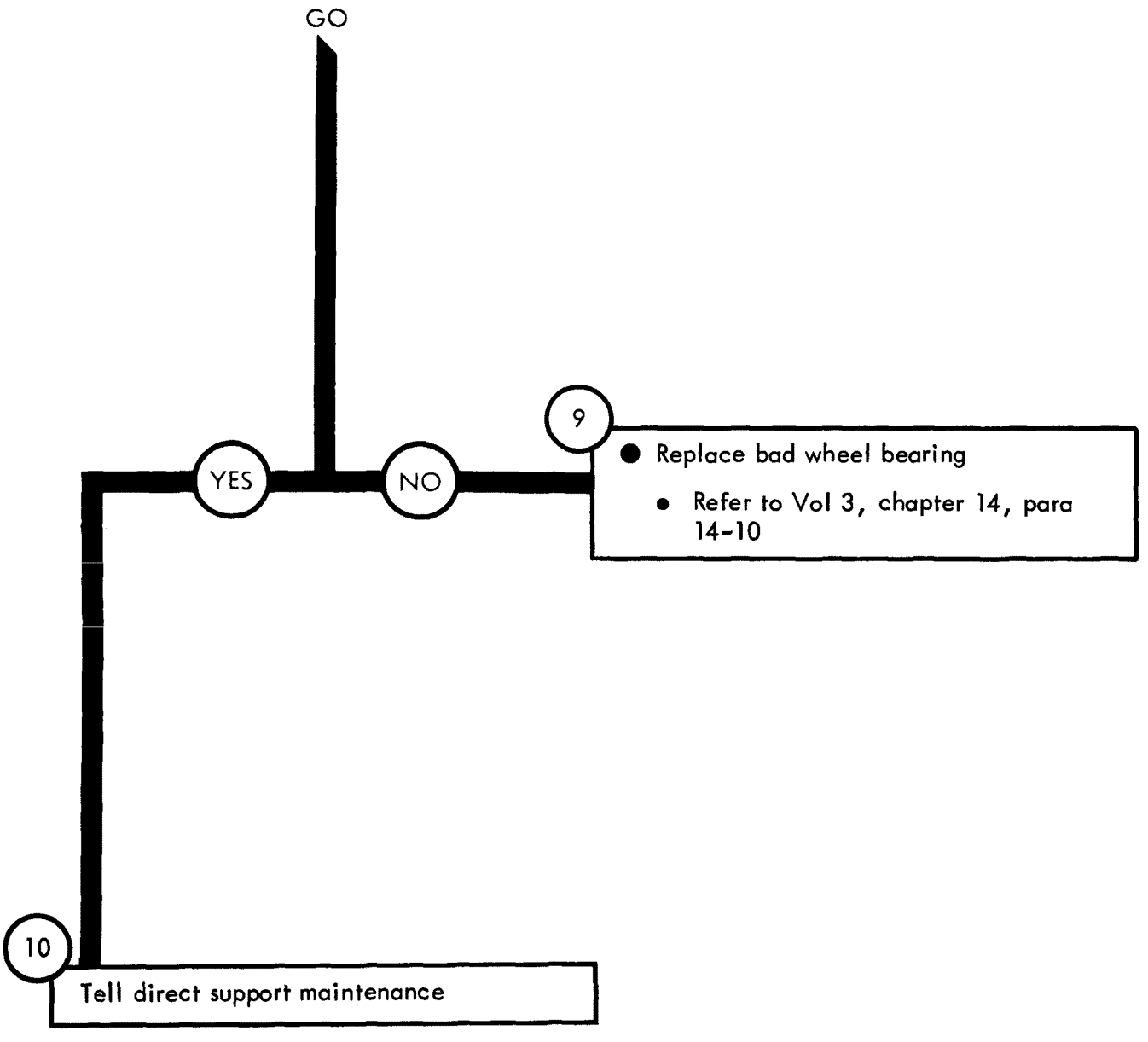
Is wheel bearing OK?



GO

TA 114910

Figure 55-2 (Sheet 4 of 5)



TA 114911

Figure 55-2 (Sheet 5 of 5)

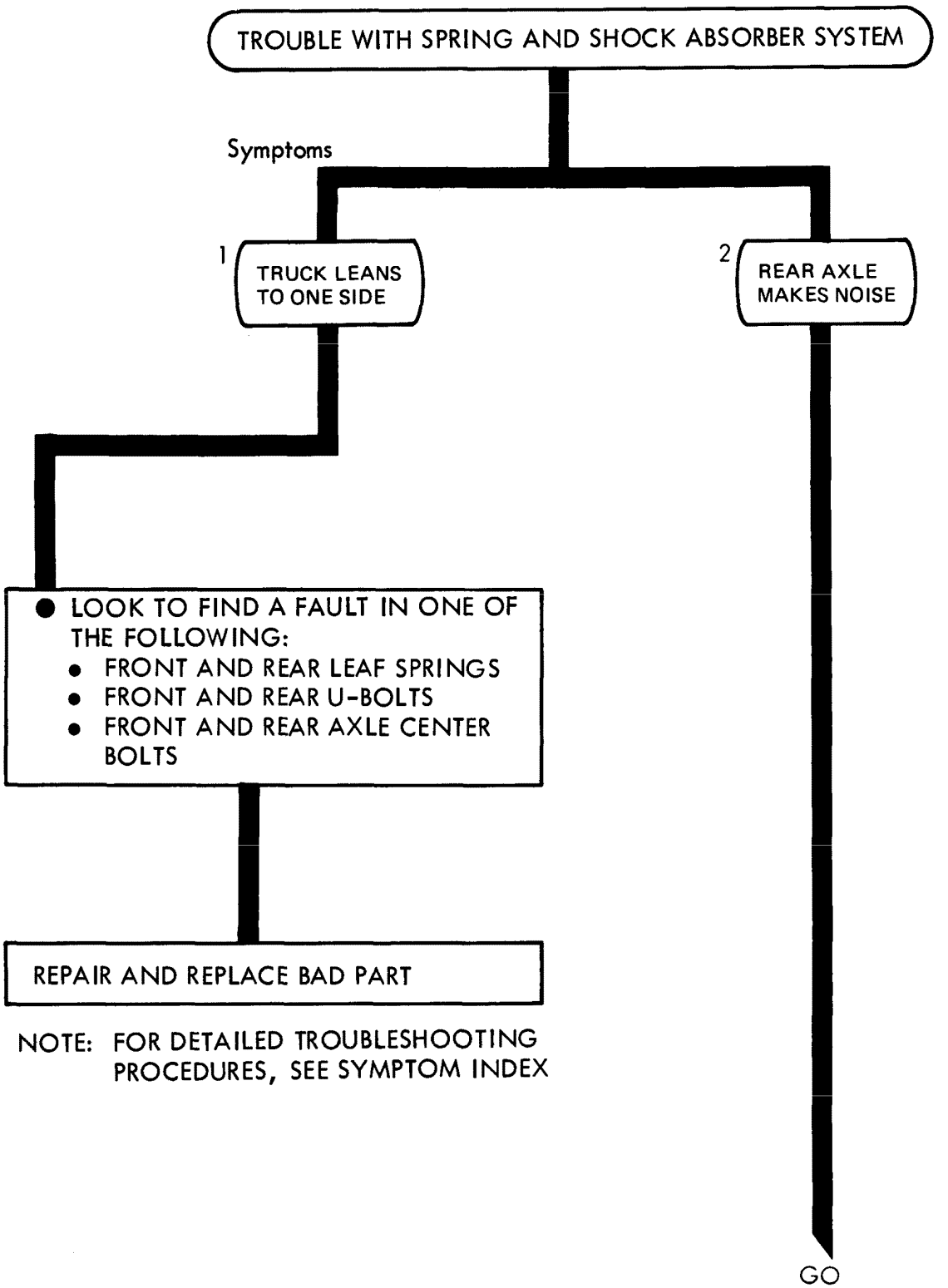
CHAPTER 56

SPRING AND SHOCK ABSORBERS SYSTEM TROUBLESHOOTING SUMMARY

56-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 55 for the springs and shock absorbers system.

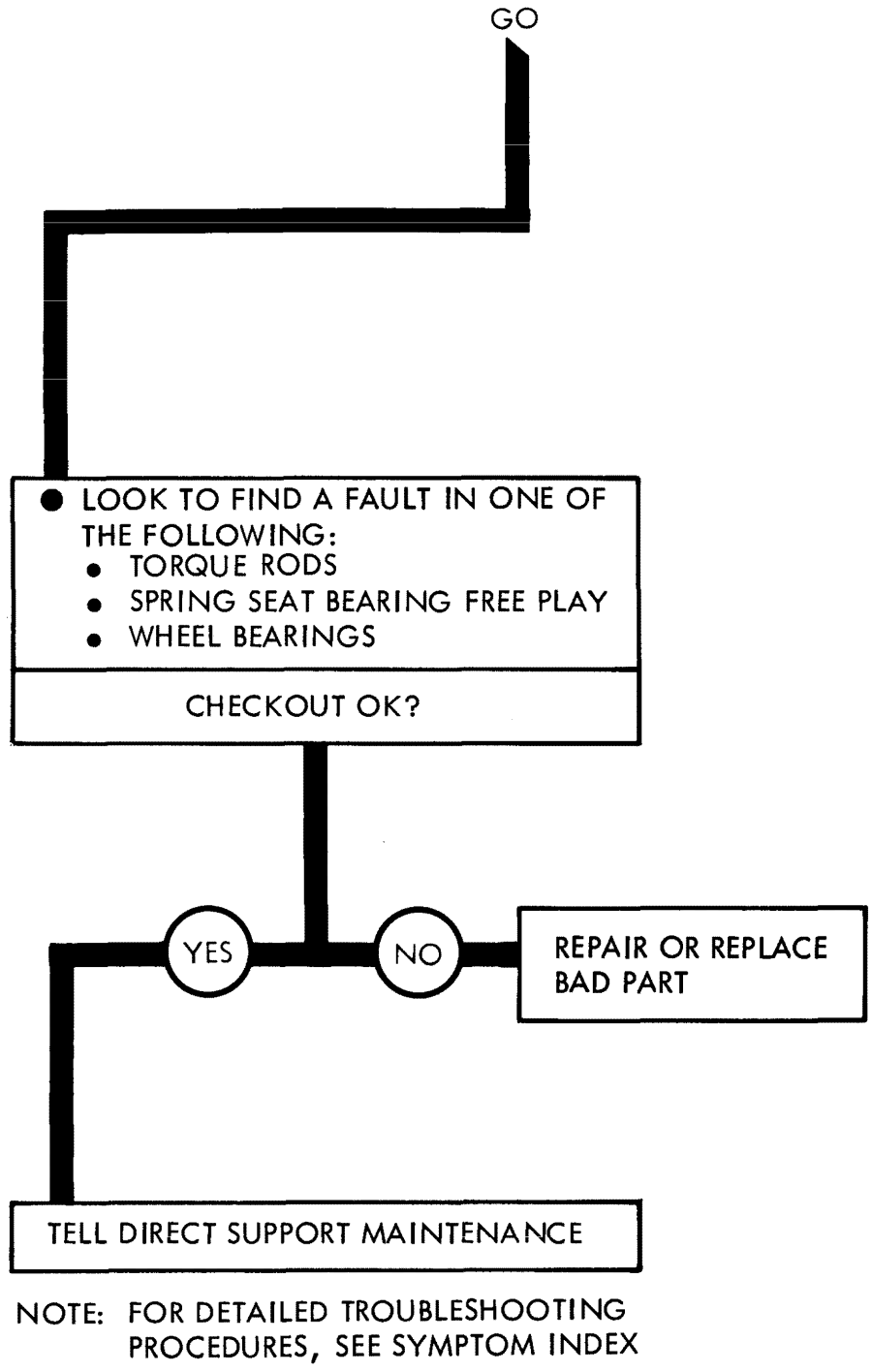
56-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

SPRING AND SHOCK ABSORBERS TROUBLESHOOTING SUMMARY



TA 114912

Figure 56-1 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 114913

Figure 56-1 (Sheet 2 of 2)

CHAPTER 57

DUMP BODY TROUBLESHOOTING

57-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the dump body, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

57-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

DUMP BODY TROUBLESHOOTING

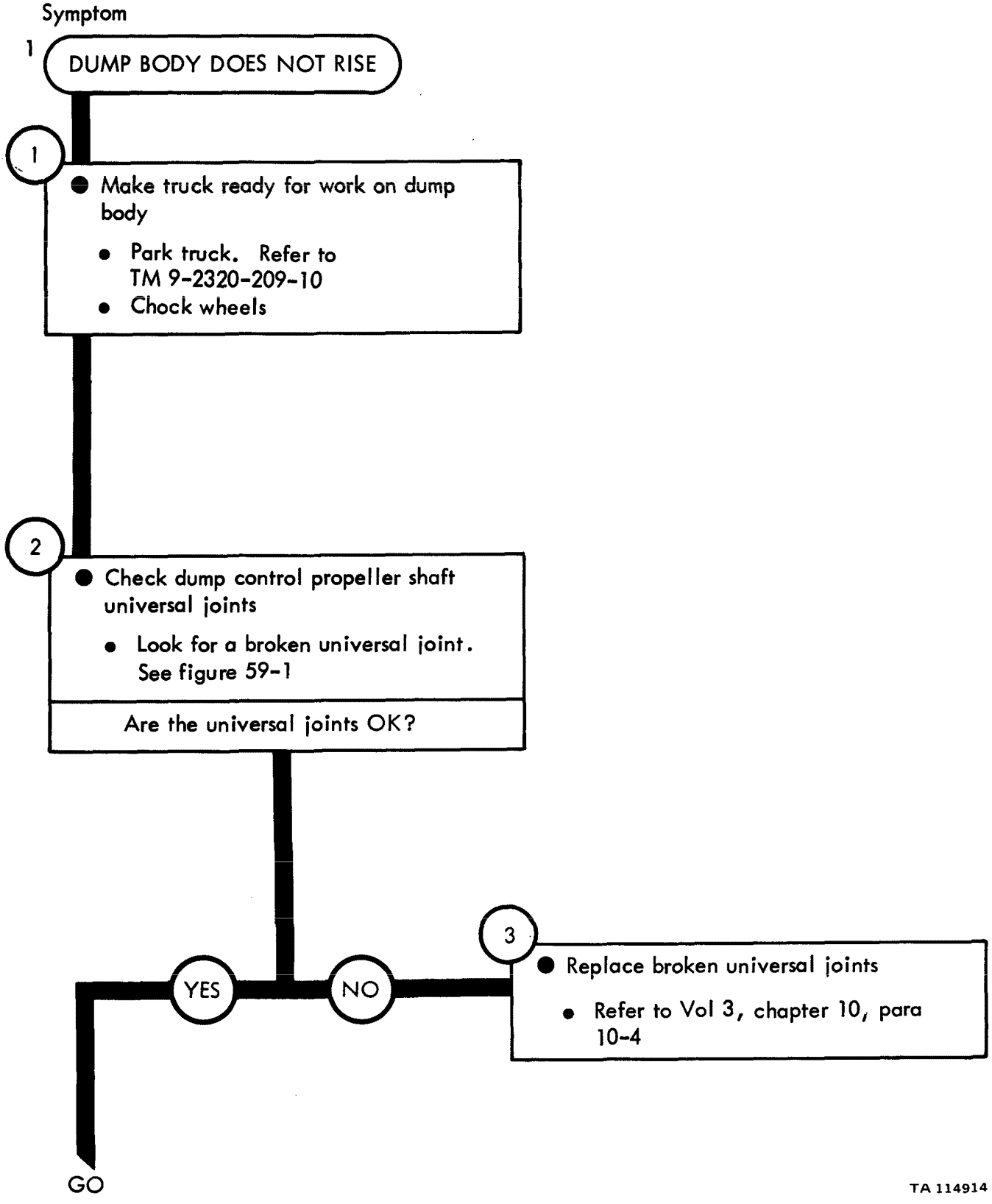


Figure 57-1 (Sheet 1 of 4)

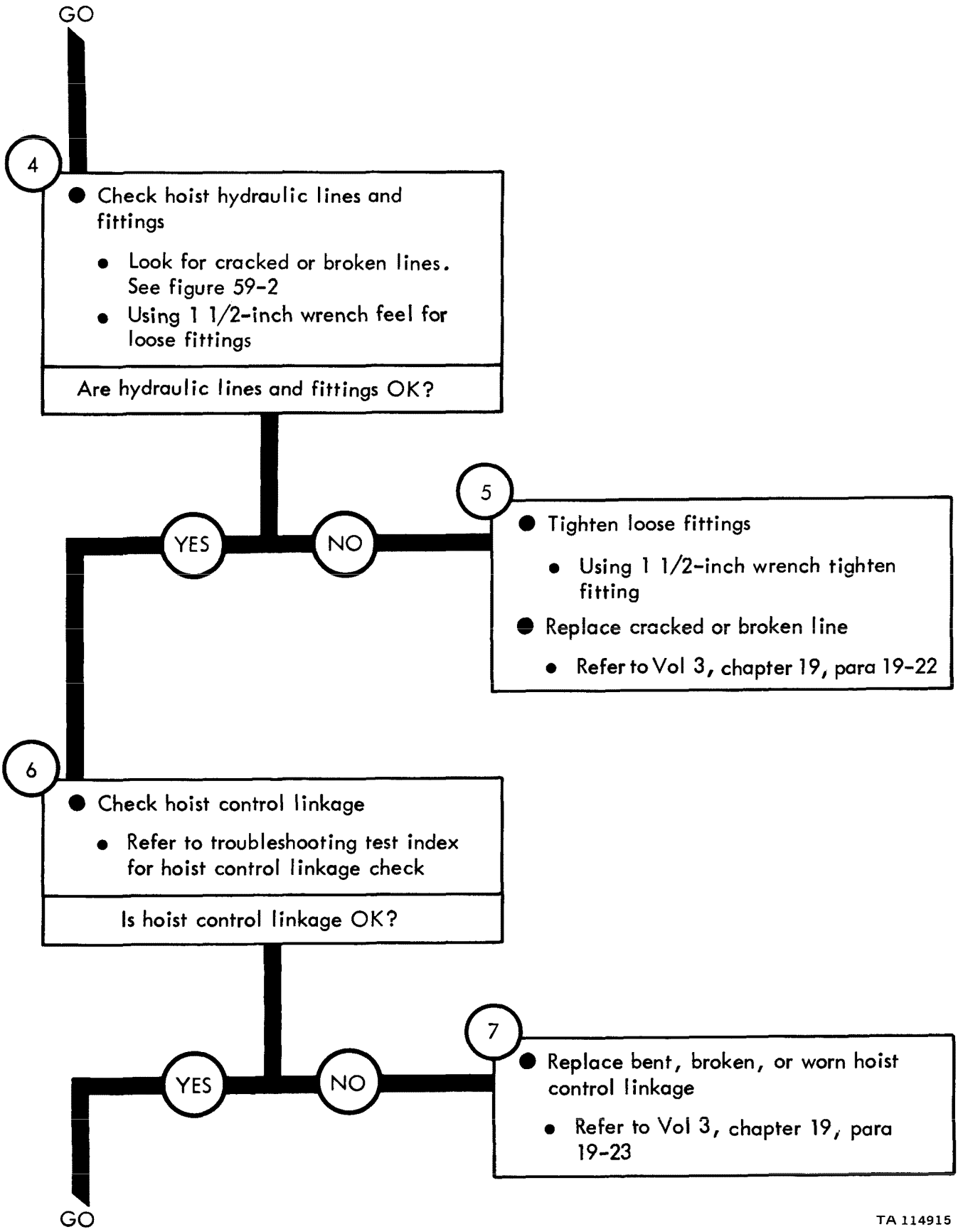


Figure 57-1 (Sheet 2 of 4)

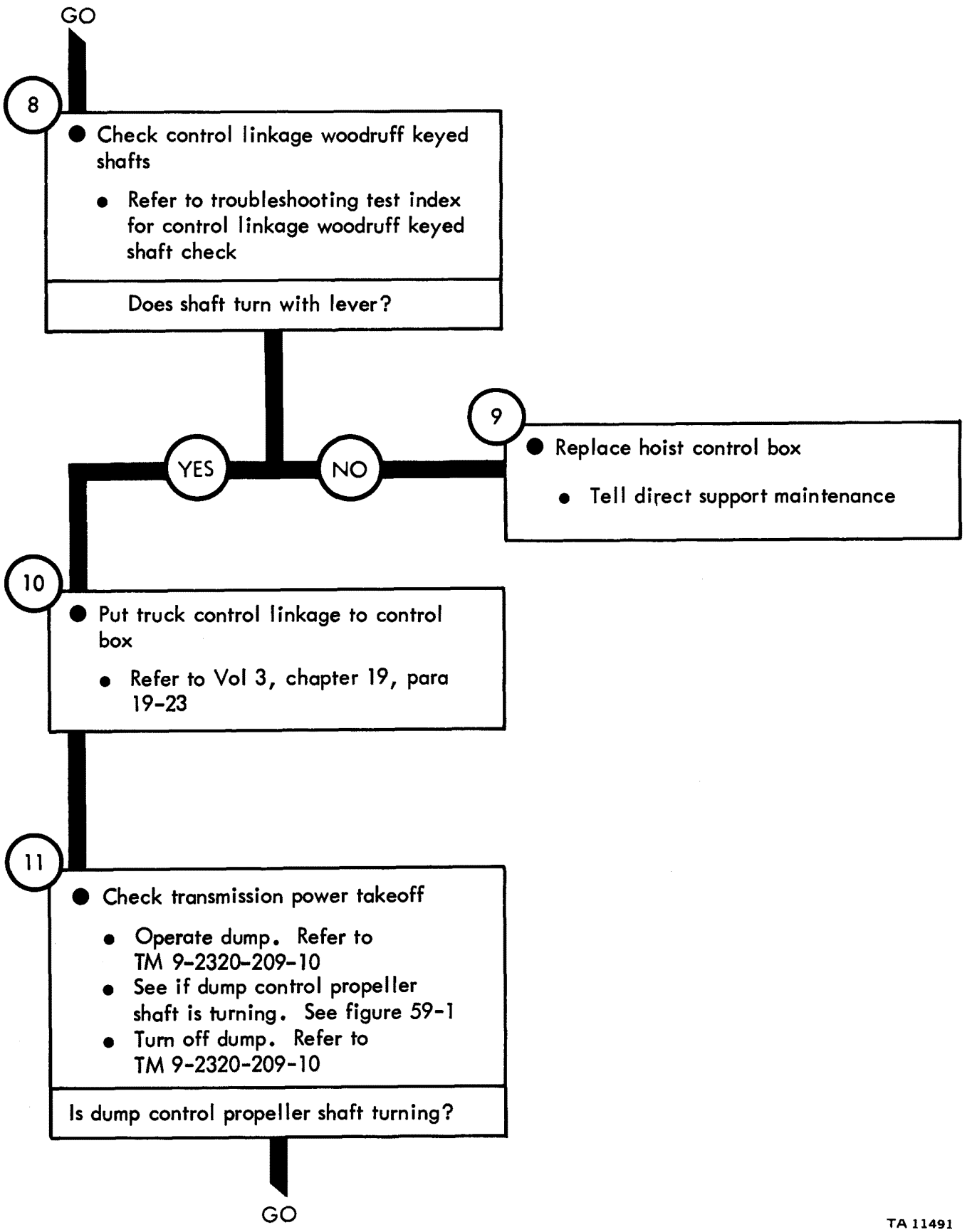
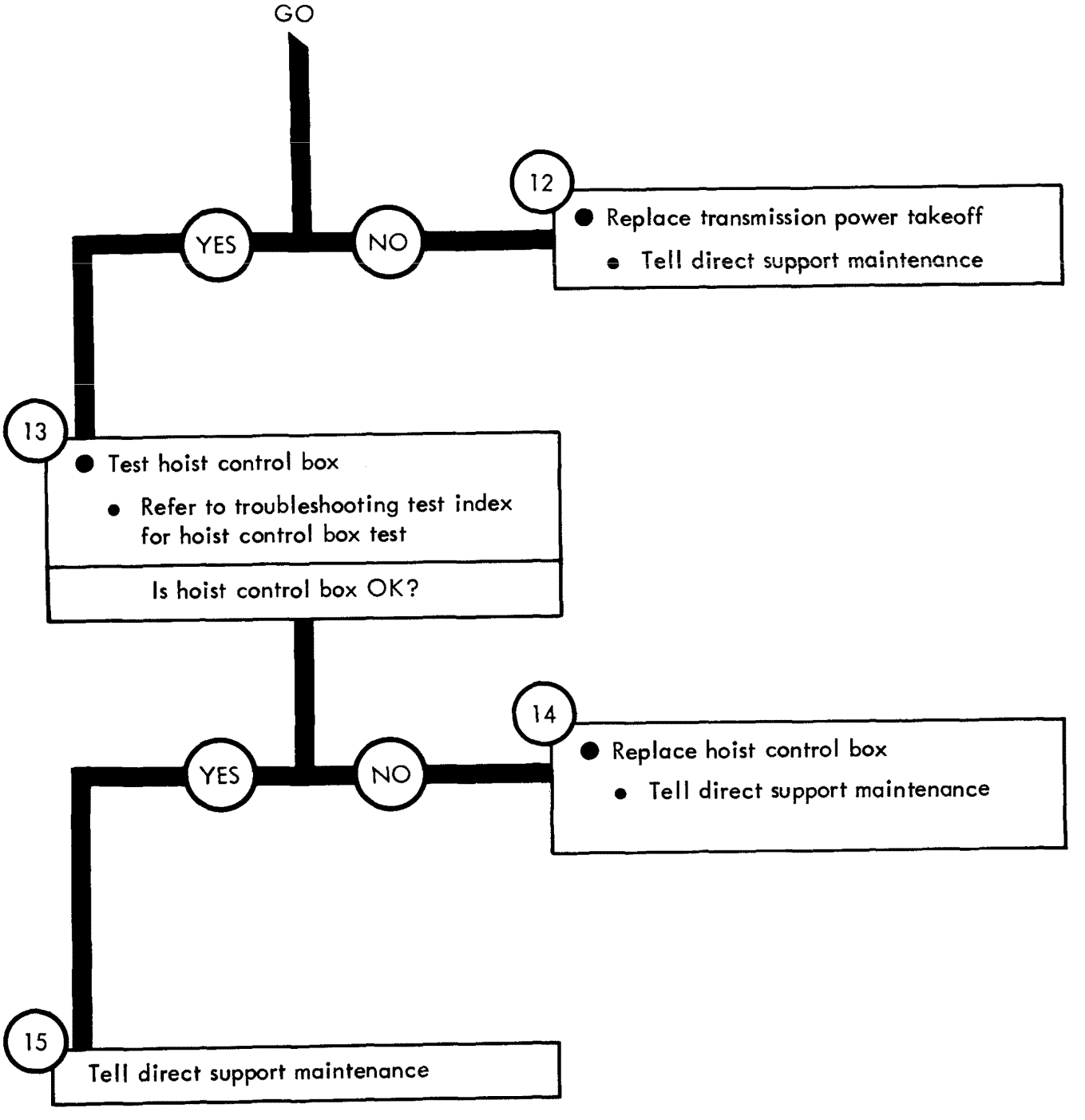


Figure 57-1 (Sheet 3 of 4)



TA 114917

Figure 57-1 (Sheet 4 of 4)

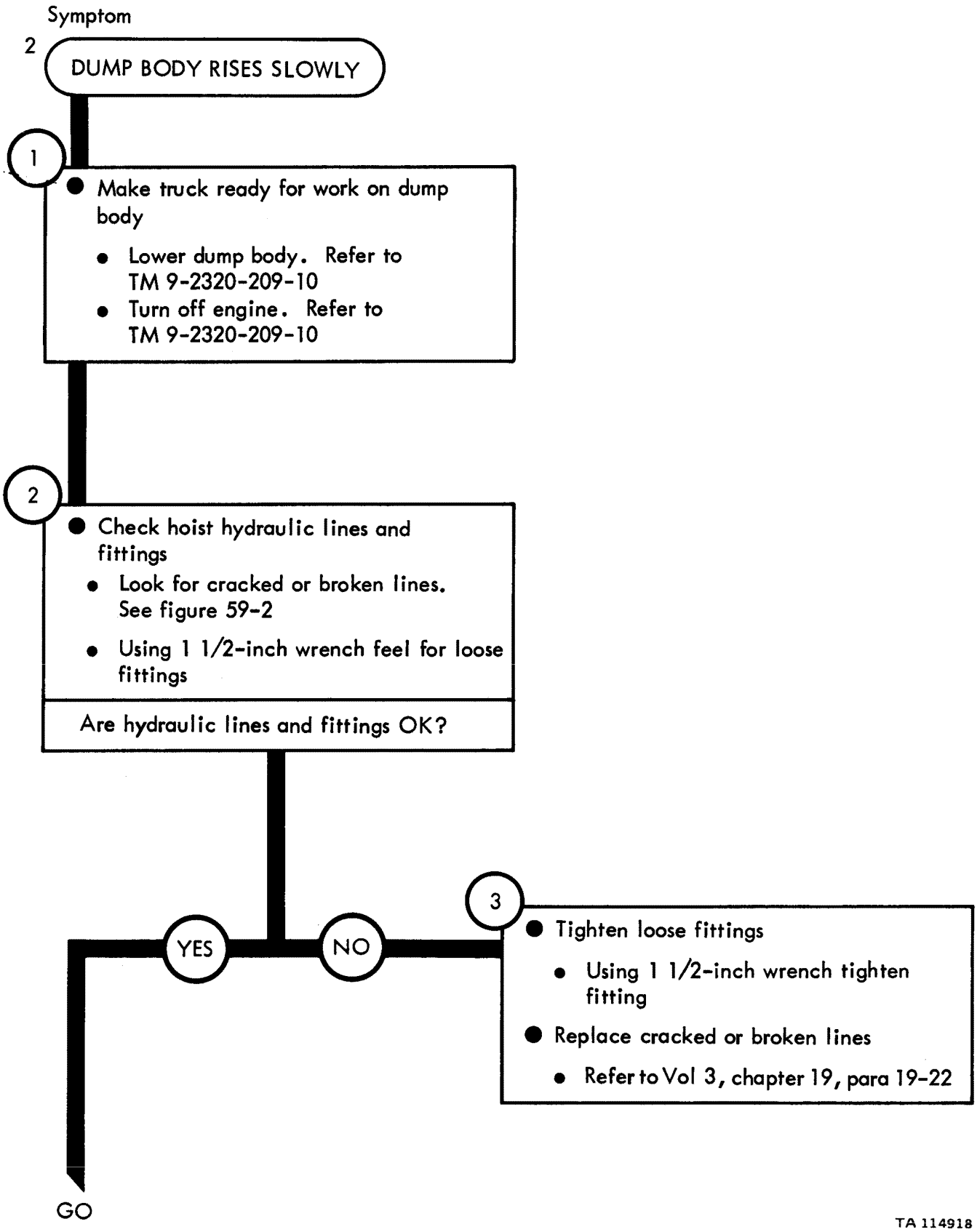


Figure 57-2 (Sheet 1 of 2)

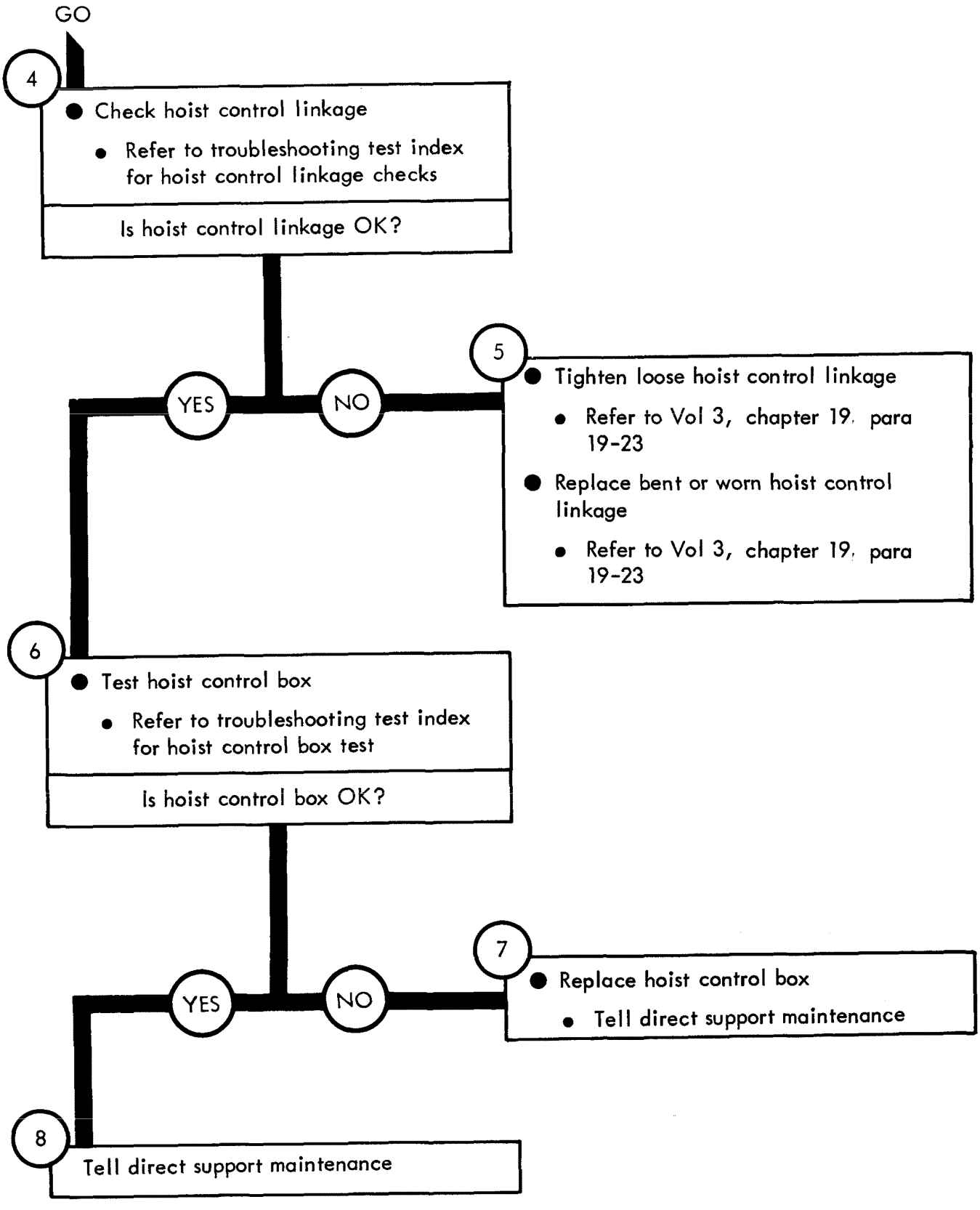


Figure 57-2 (Sheet 2 of 2)

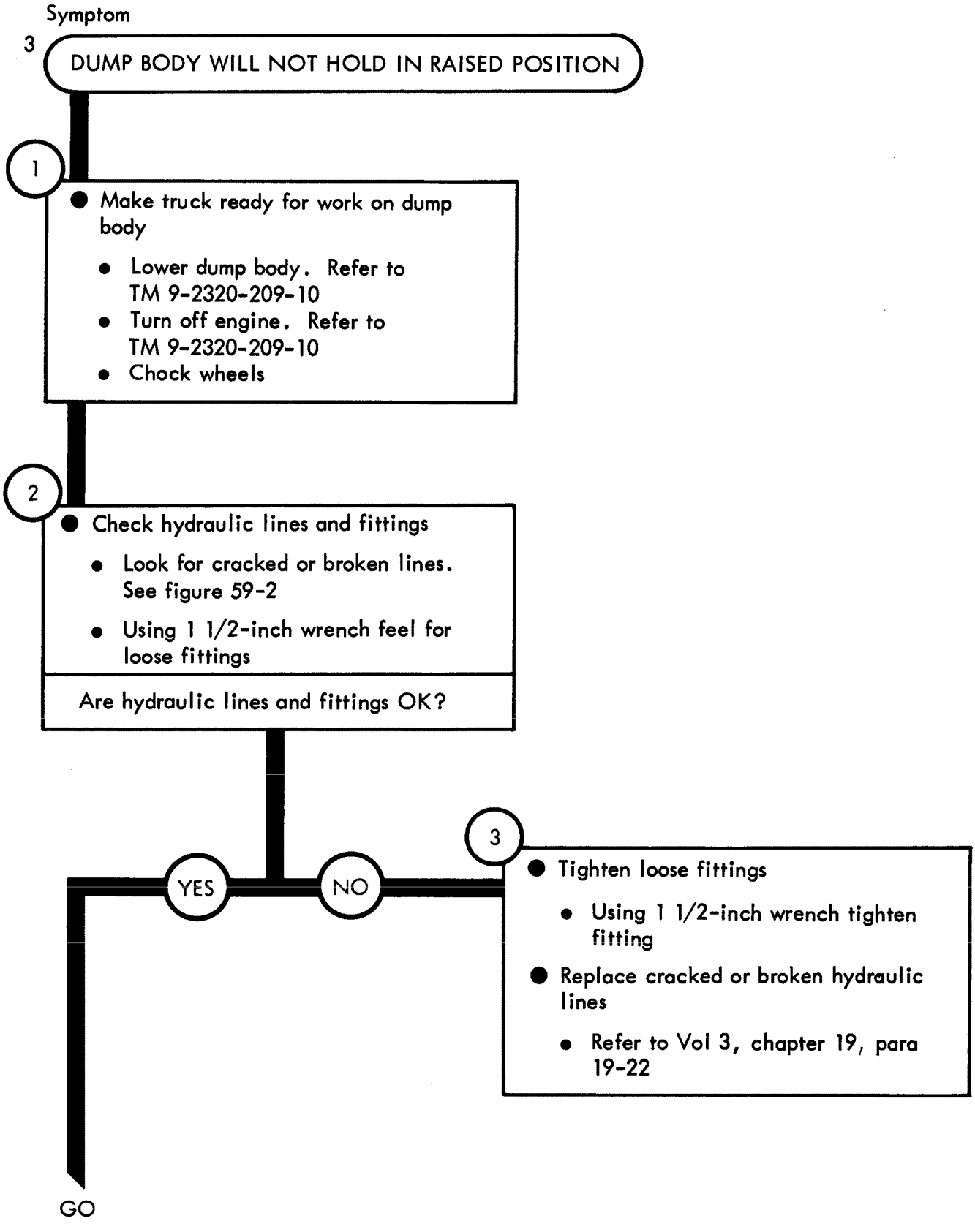
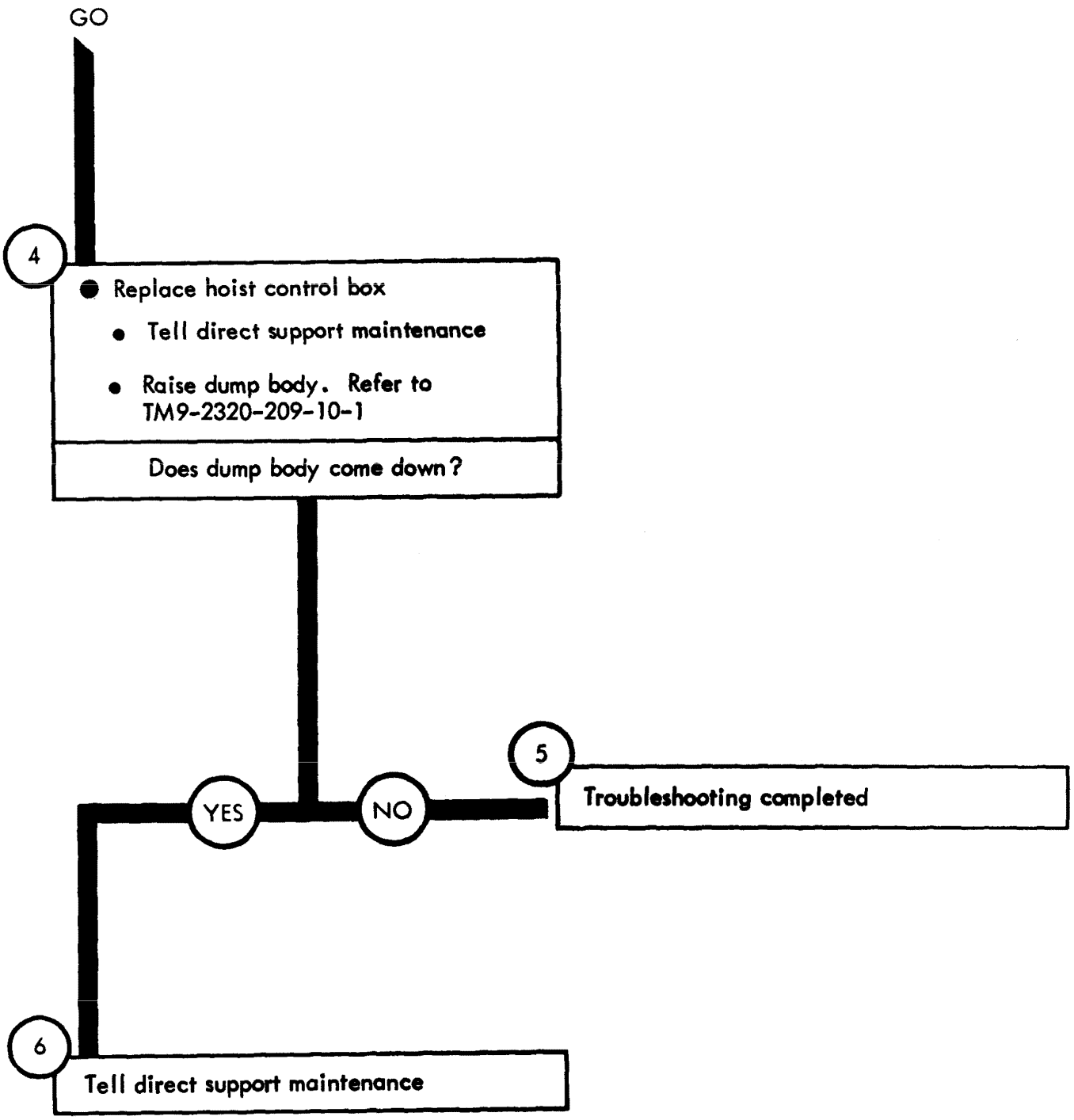


Figure 57-3 (Sheet 1 of 2)



TA 114921

Figure 57-3 (Sheet 2 of 2)

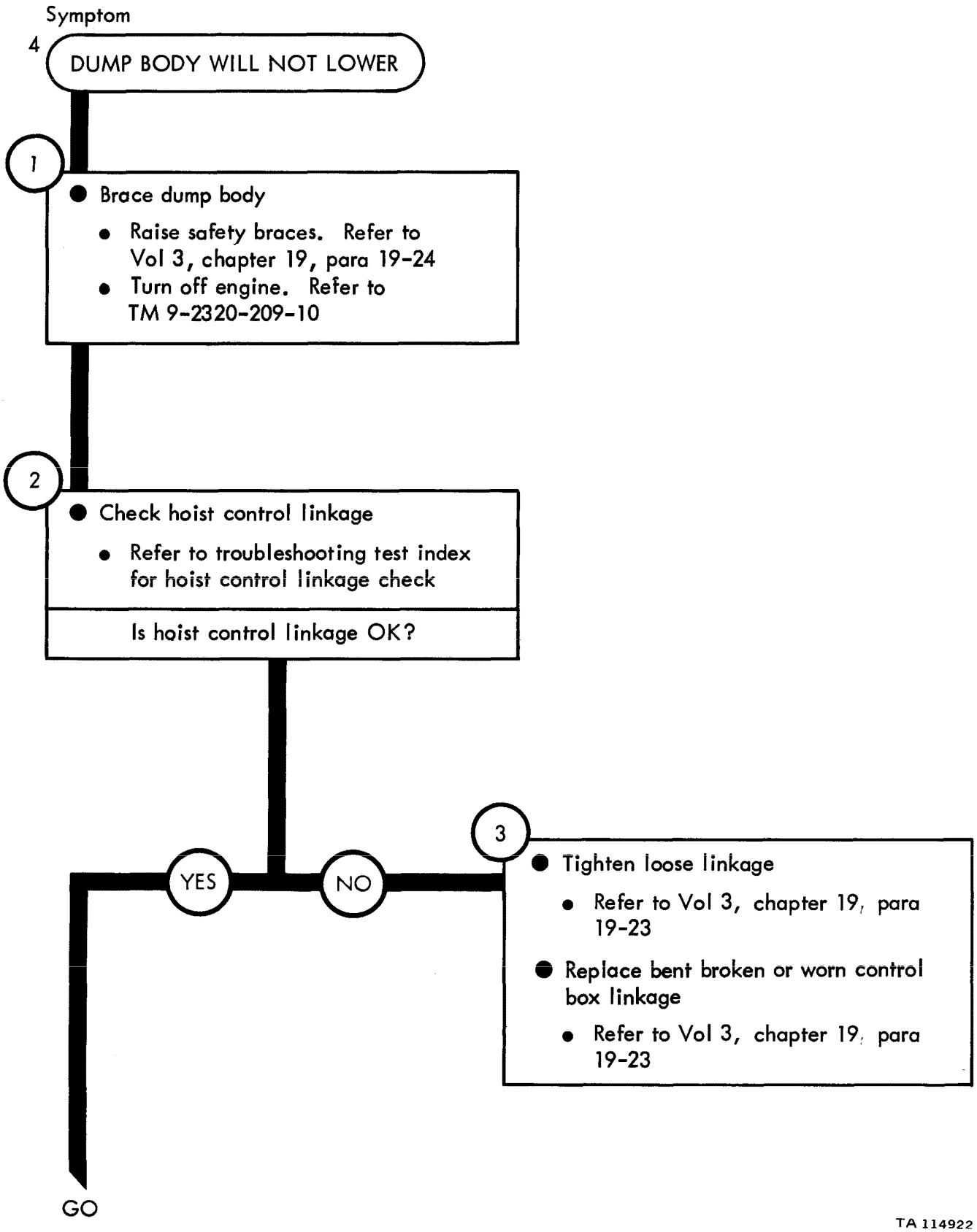
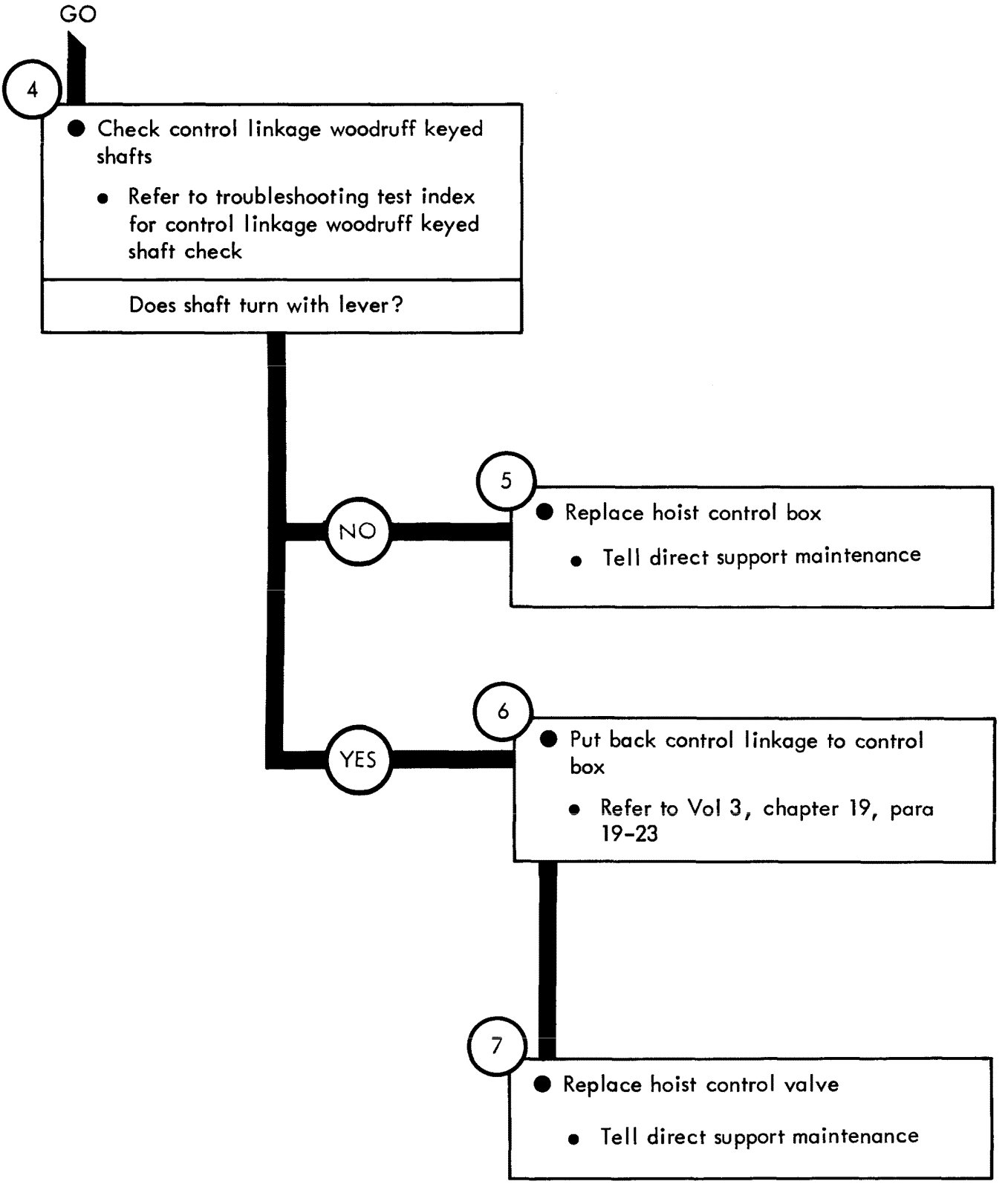


Figure 57-4 (Sheet 1of 2)



TA 114923

Figure 57-4 (Sheet 2 of 2)

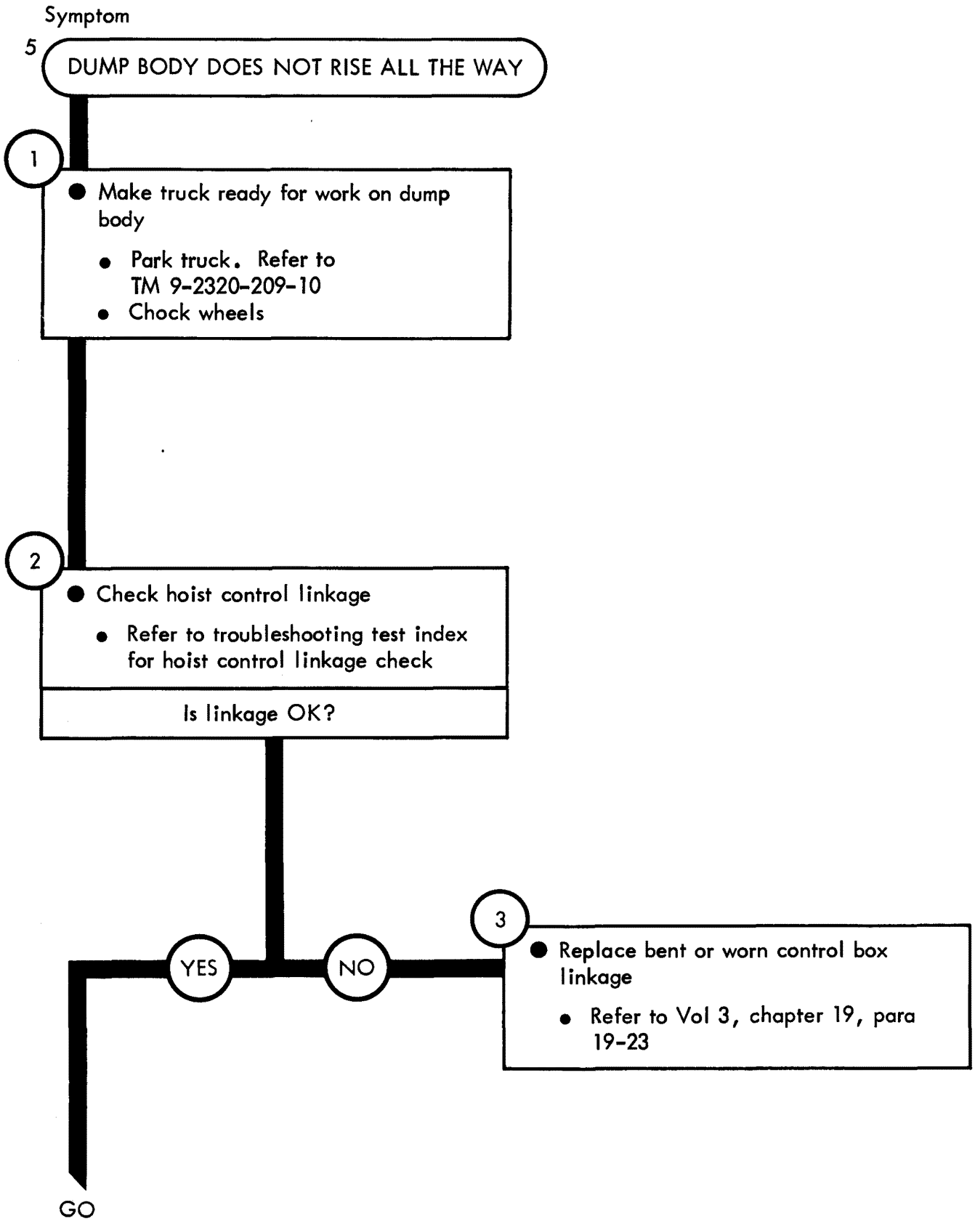
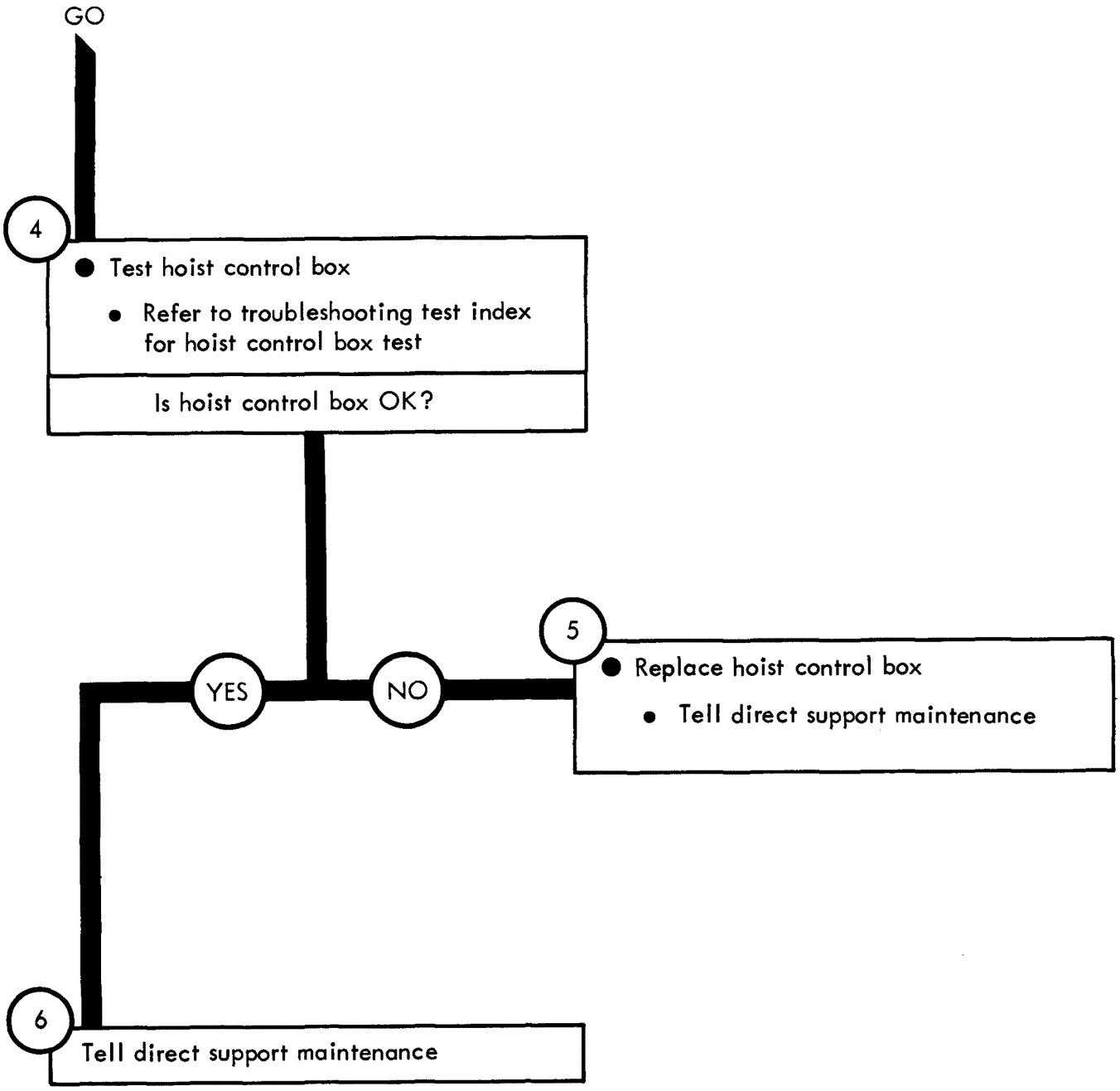
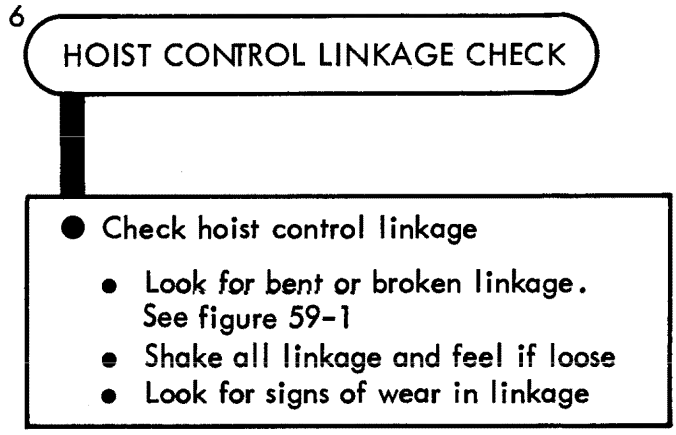


Figure 57-5 (Sheet 1 of 2)



TA 114925

Figure 57-5 (Sheet 2 of 2)



TA 114926

Figure 57-6

7 HOIST CONTROL BOX TEST

NOTE

This test will need the use of two soldiers. The lead soldier will be called Soldier A and the helper will be called Soldier B

- Test hoist control box as follows

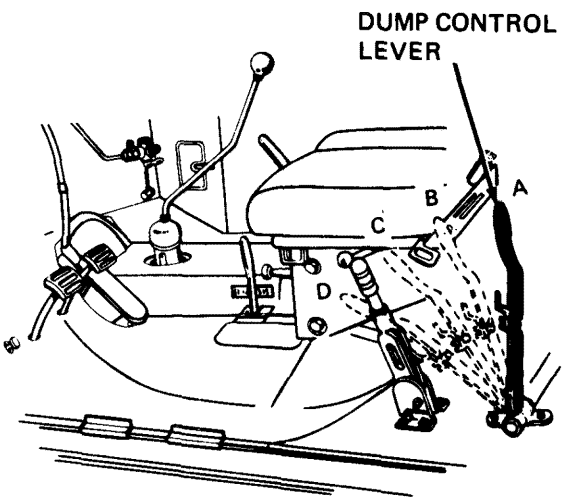
SOLDIER B:
- Sit in drivers seat and wait for instructions from SOLDIER A

SOLDIER A:
- Crawl under truck
- Tell SOLDIER B to move dump control lever to position B

SOLDIER B:
- Take off lock and move dump control lever forward to position B

SOLDIER A:
- See if power takeoff rod moves toward front of truck. See figure 59-1

GO



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Figure 57-7 (Sheet 1 of 2)

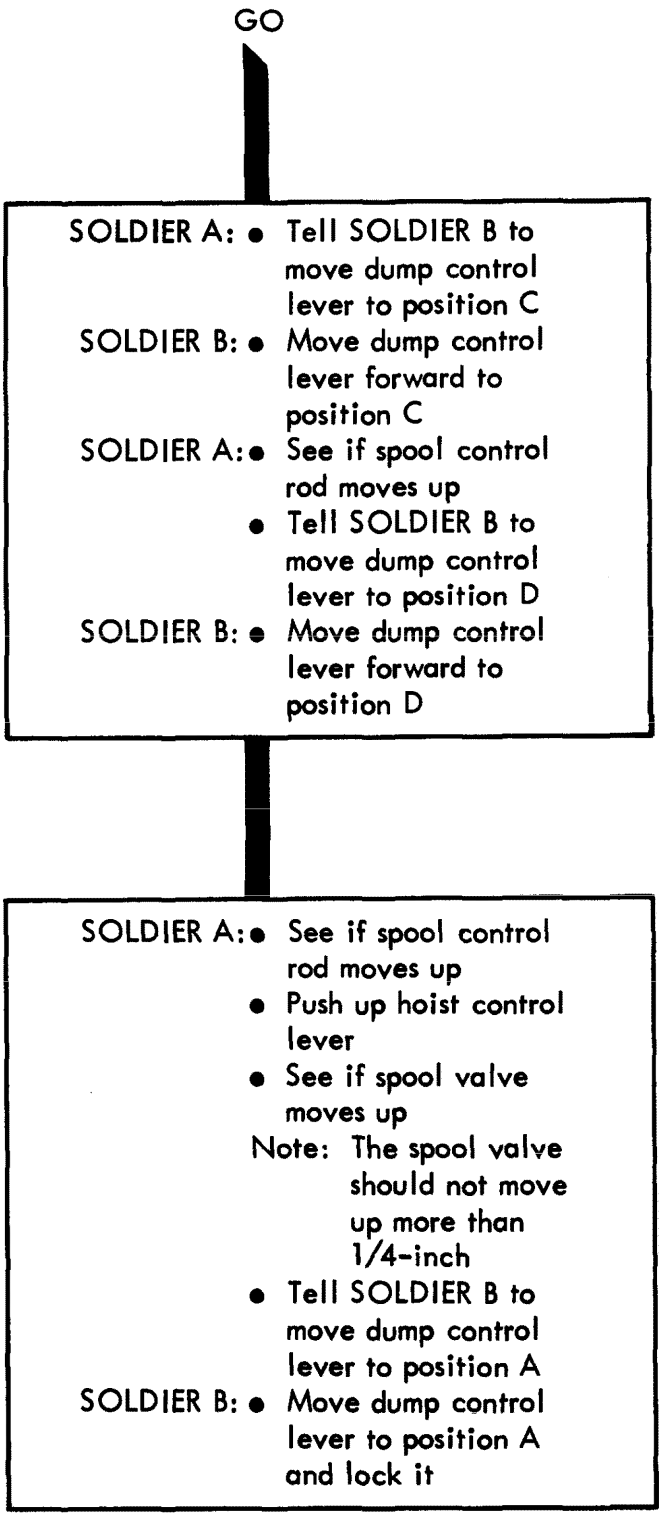
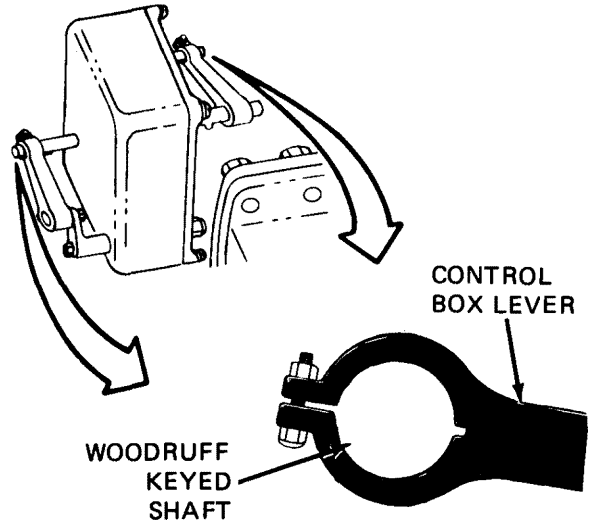


Figure 57-7 (Sheet 2 of 2)

8 CONTROL LINKAGE WOODRUFF KEYED SHAFT CHECK

- Check control linkage woodruff keyed shafts
  - Take off control linkage at control box. Refer to Vol 3, chapter 19, para 19-23

  Note: Control linkage is attached to a control box lever on the control box. This lever is attached to control box by a woodruff keyed shaft. This shaft is visible where the control box lever attaches to the shaft
  - Move control box levers and see if shaft turns with lever



TA 114929

Figure 57-8

CHAPTER 58

DUMP BODY TROUBLESHOOTING SUMMARY

58-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 57 for the dump body.

58-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

DUMP BODY TROUBLESHOOTING SUMMARY

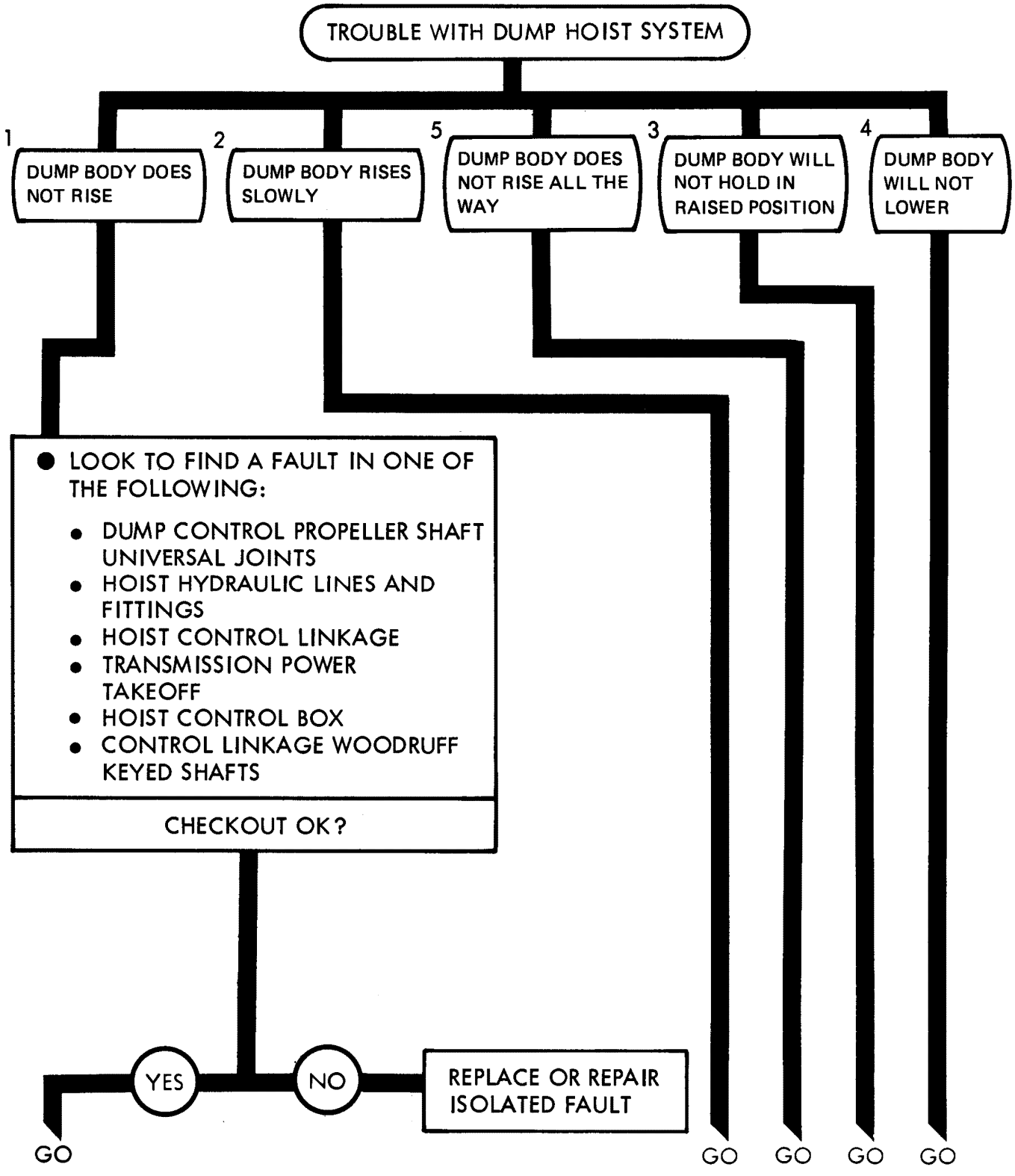
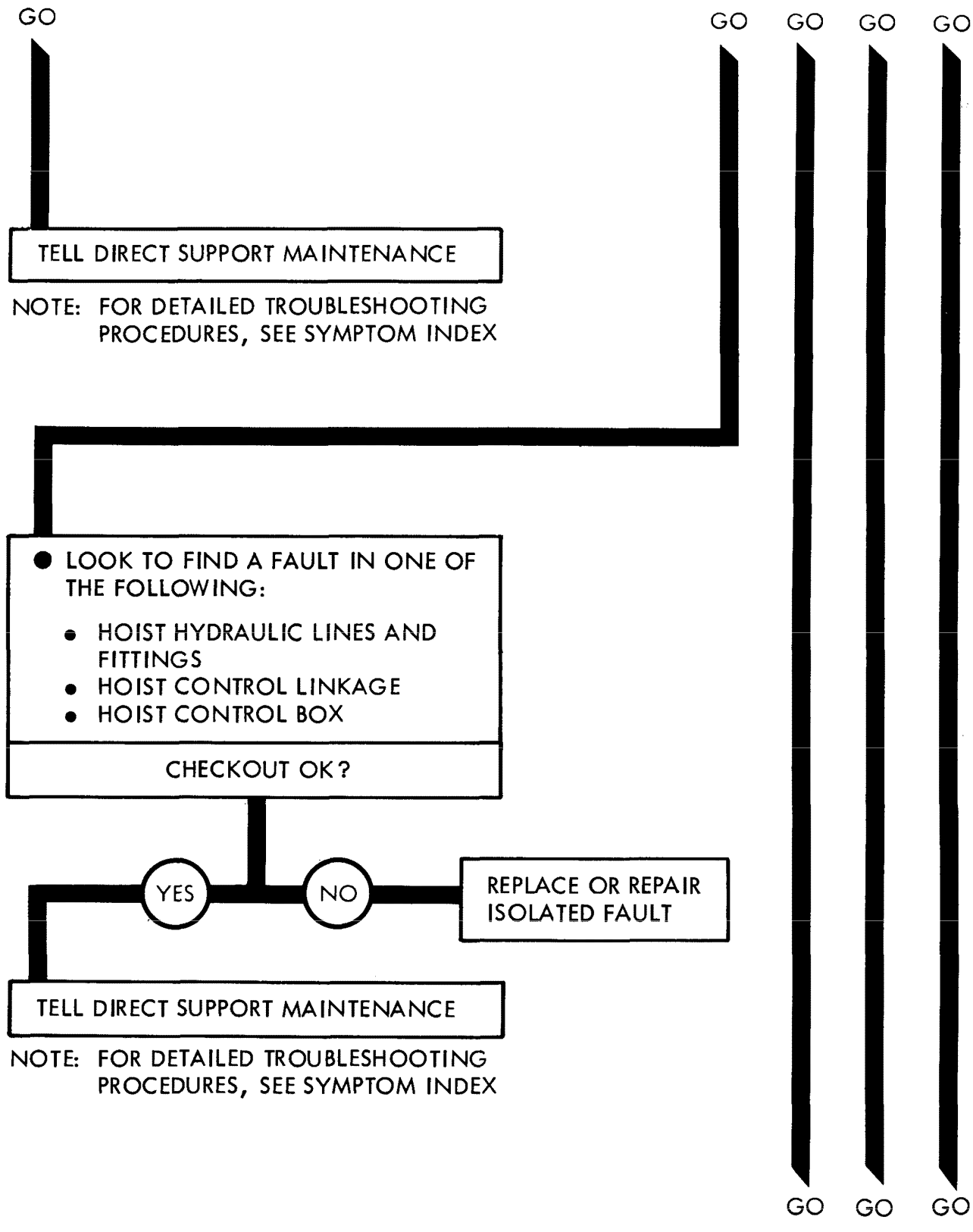


Figure 58-1 (Sheet 1 of 4)



TA 114931

Figure 58-1 (Sheet 2 of 4)

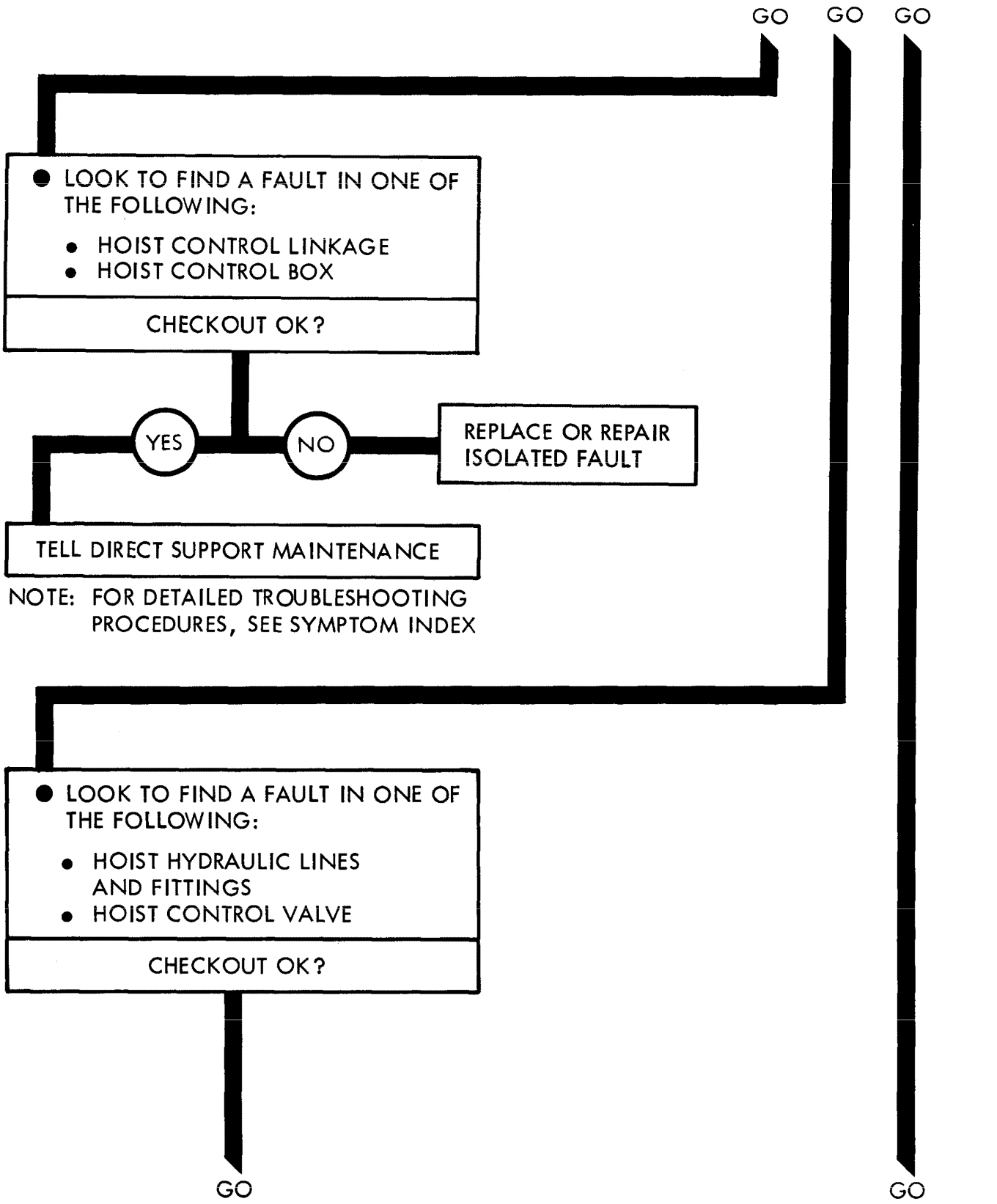
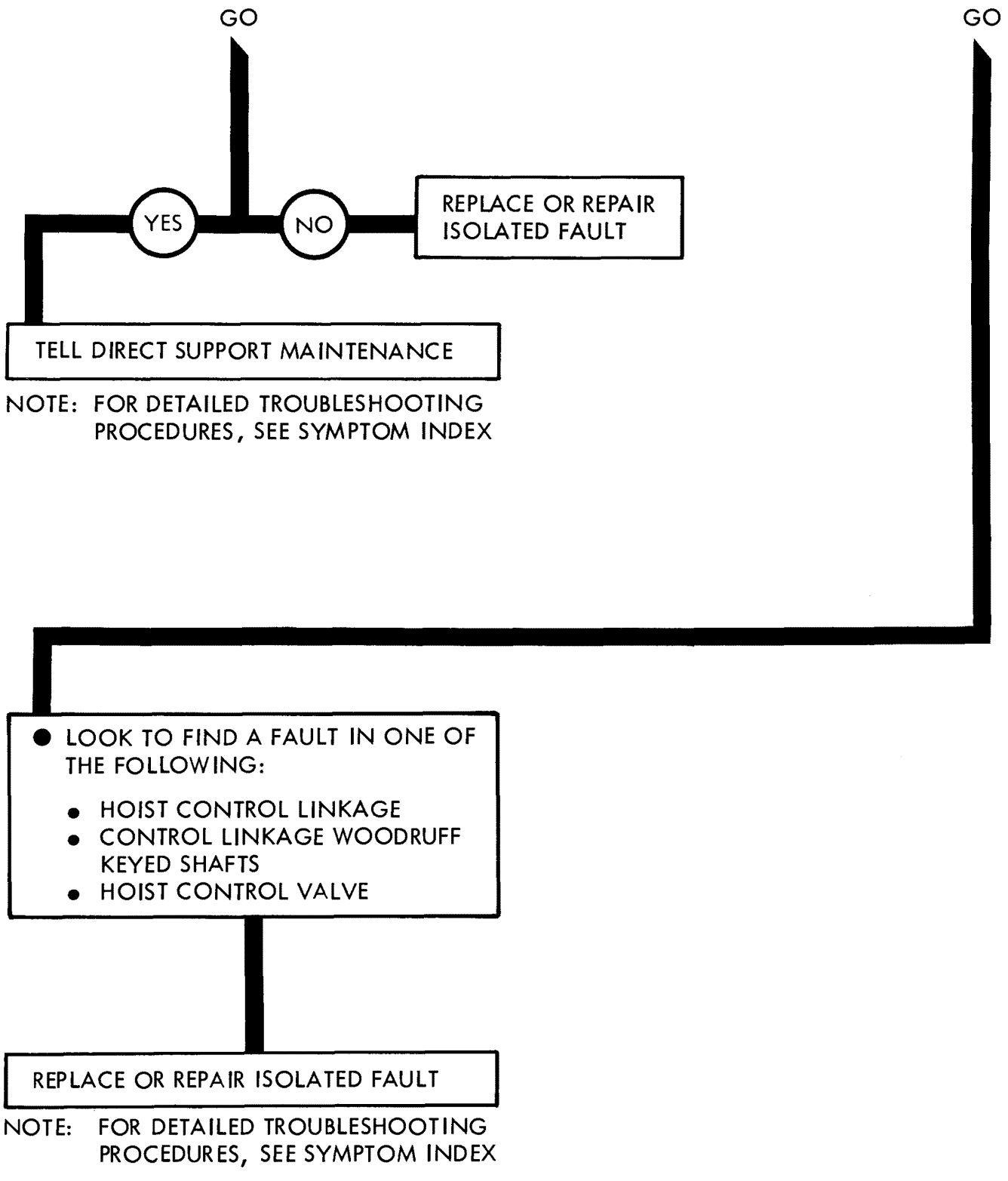


Figure 58-1 (Sheet 3 of 4)



TA 114933

Figure 58-1 (Sheet 4 of 4)

CHAPTER 59

DUMP BODY SUPPORT DIAGRAMS

59-1 GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 57. Table 3-1 is a complete listing of all support diagrams used in this manual.

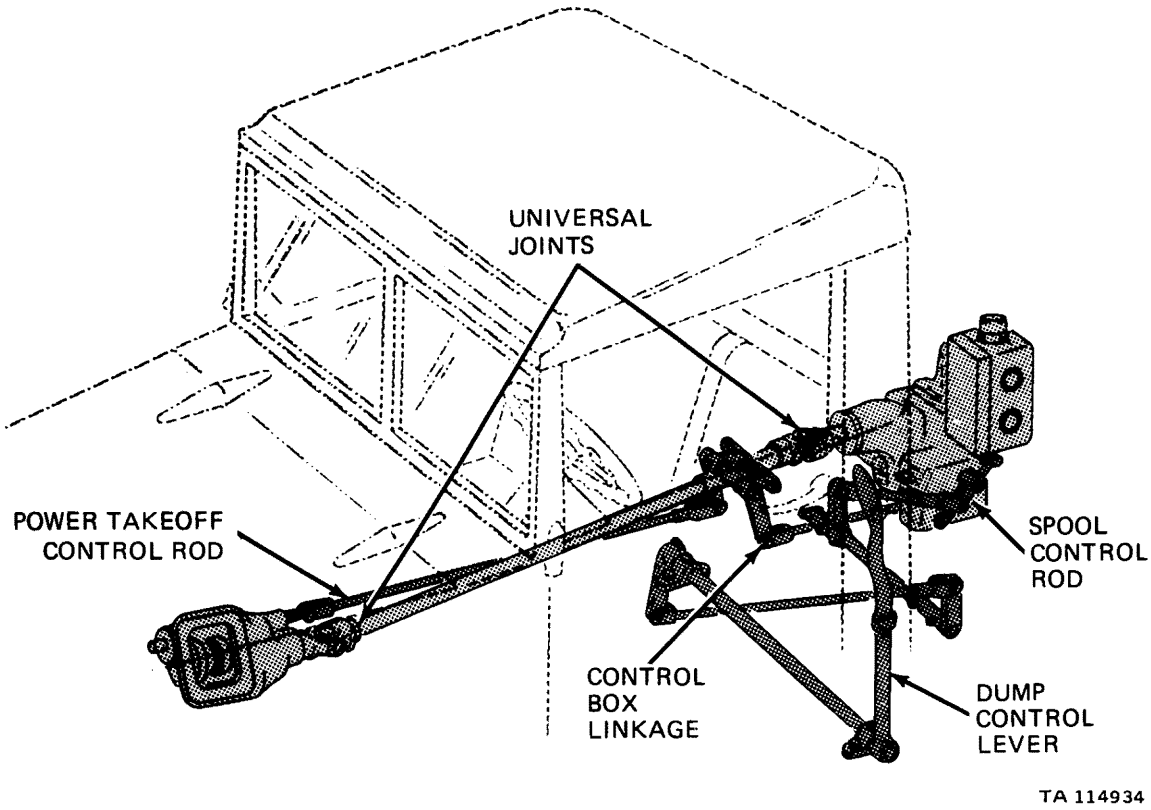


Figure 59-1. Support Diagram

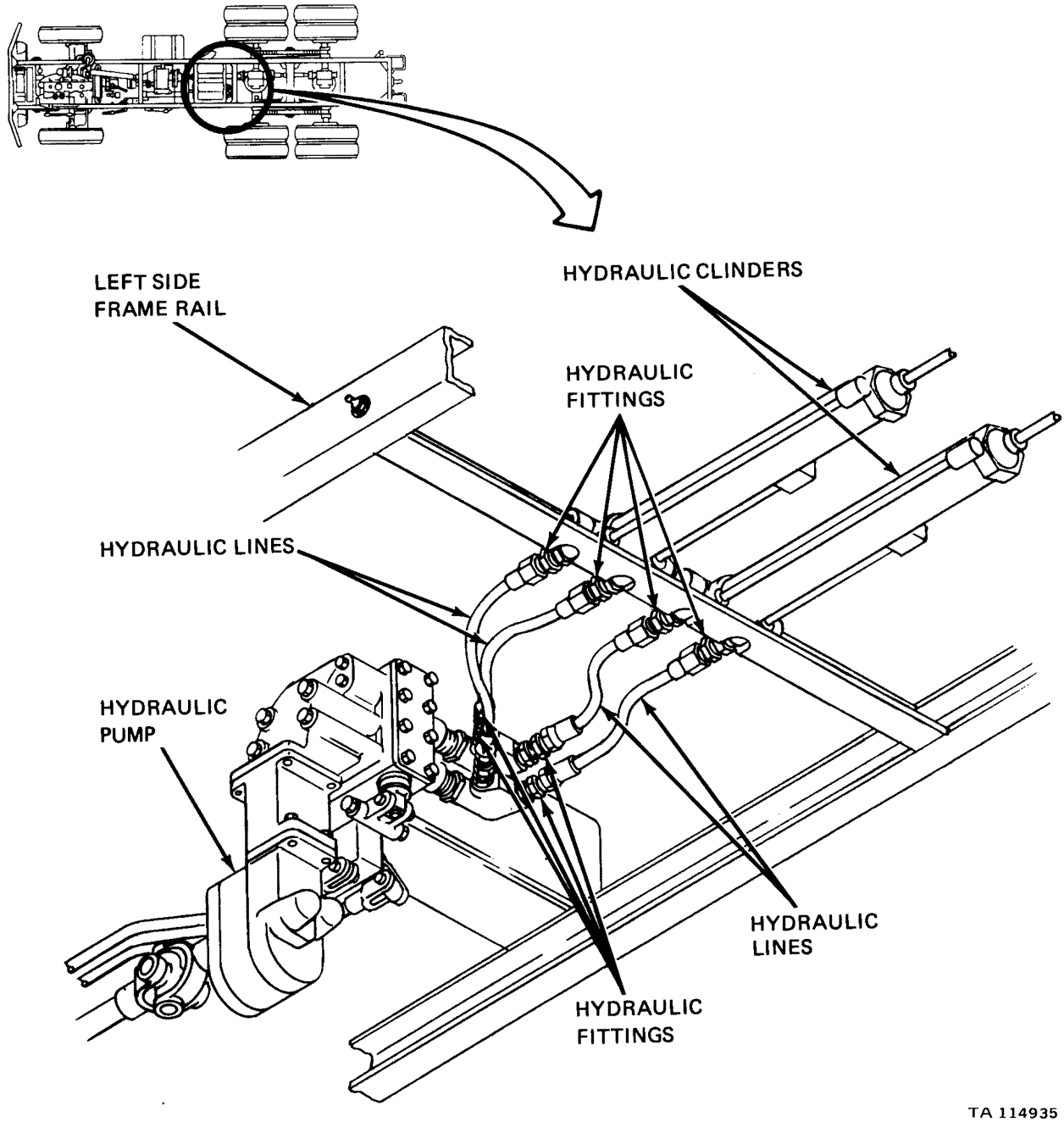


Figure 59-2. Support Diagram

CHAPTER 60

DUMP BODY CHECKOUT PROCEDURES

60-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not checkout.

DUMP BODY CHECKOUT

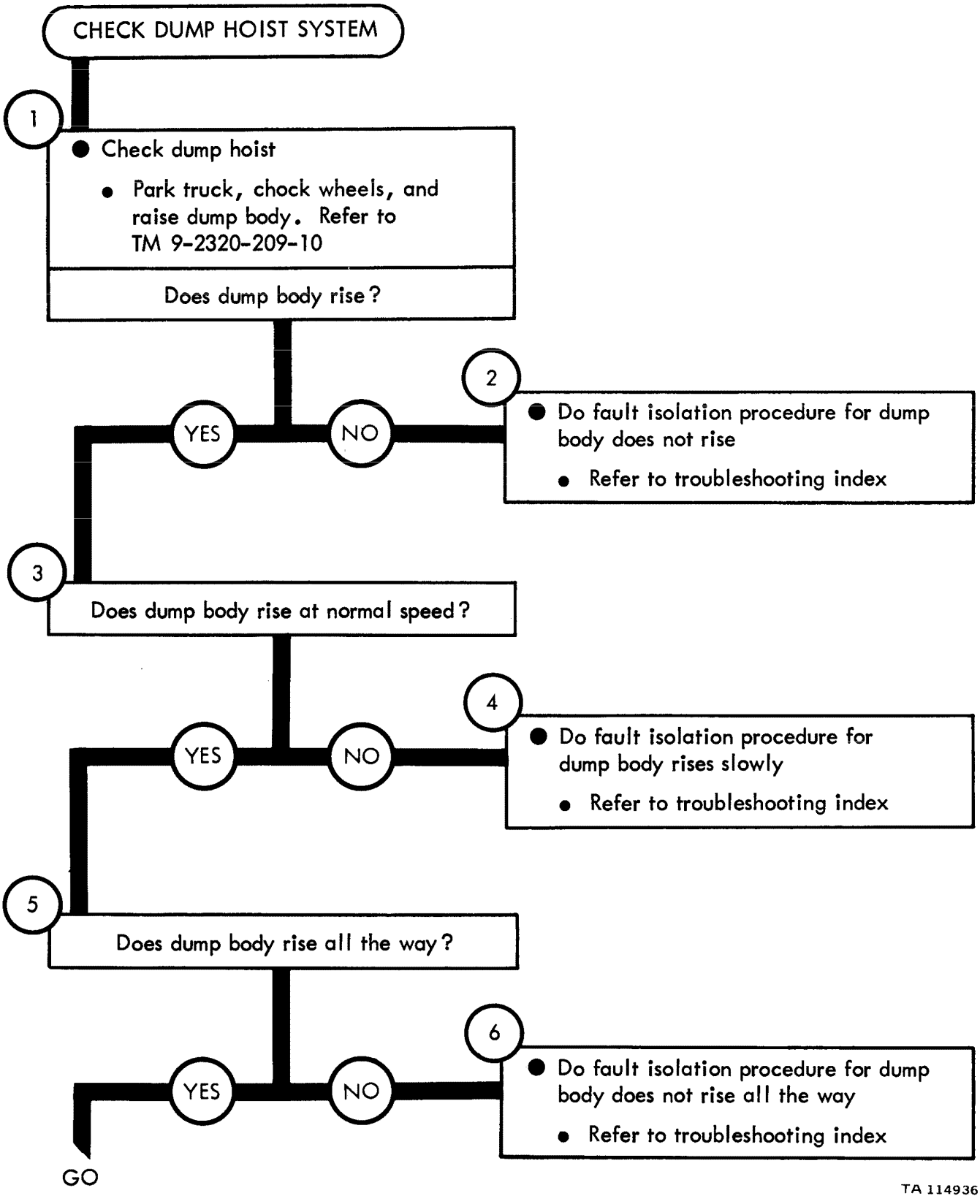


Figure 60-1 (Sheet 1 of 2)

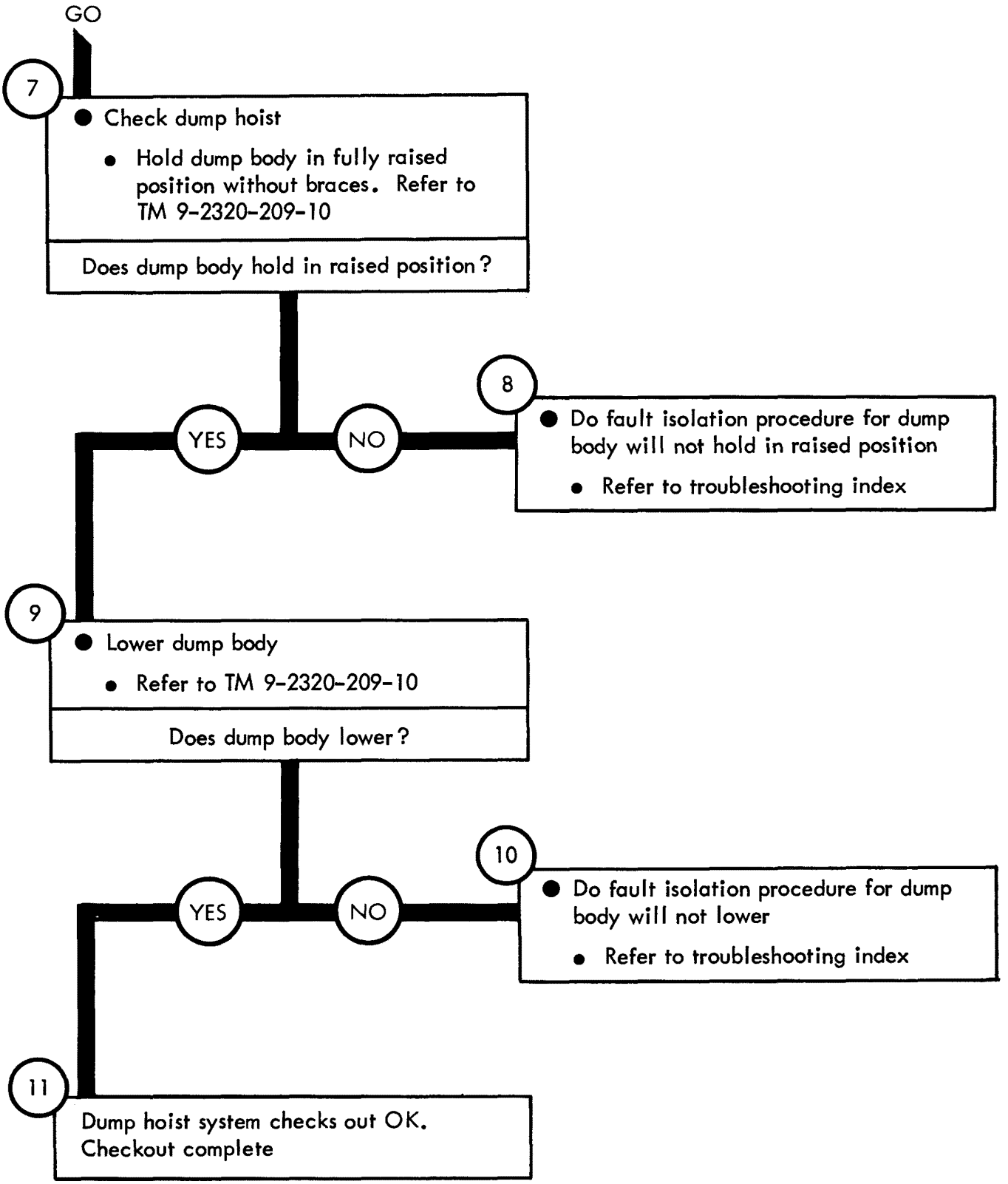


Figure 60-1 (Sheet 2 of 2)

CHAPTER 61

WATER TANK BODY TROUBLESHOOTING

61-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the water tank body, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

61-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

WATER TANK BODY TROUBLESHOOTING

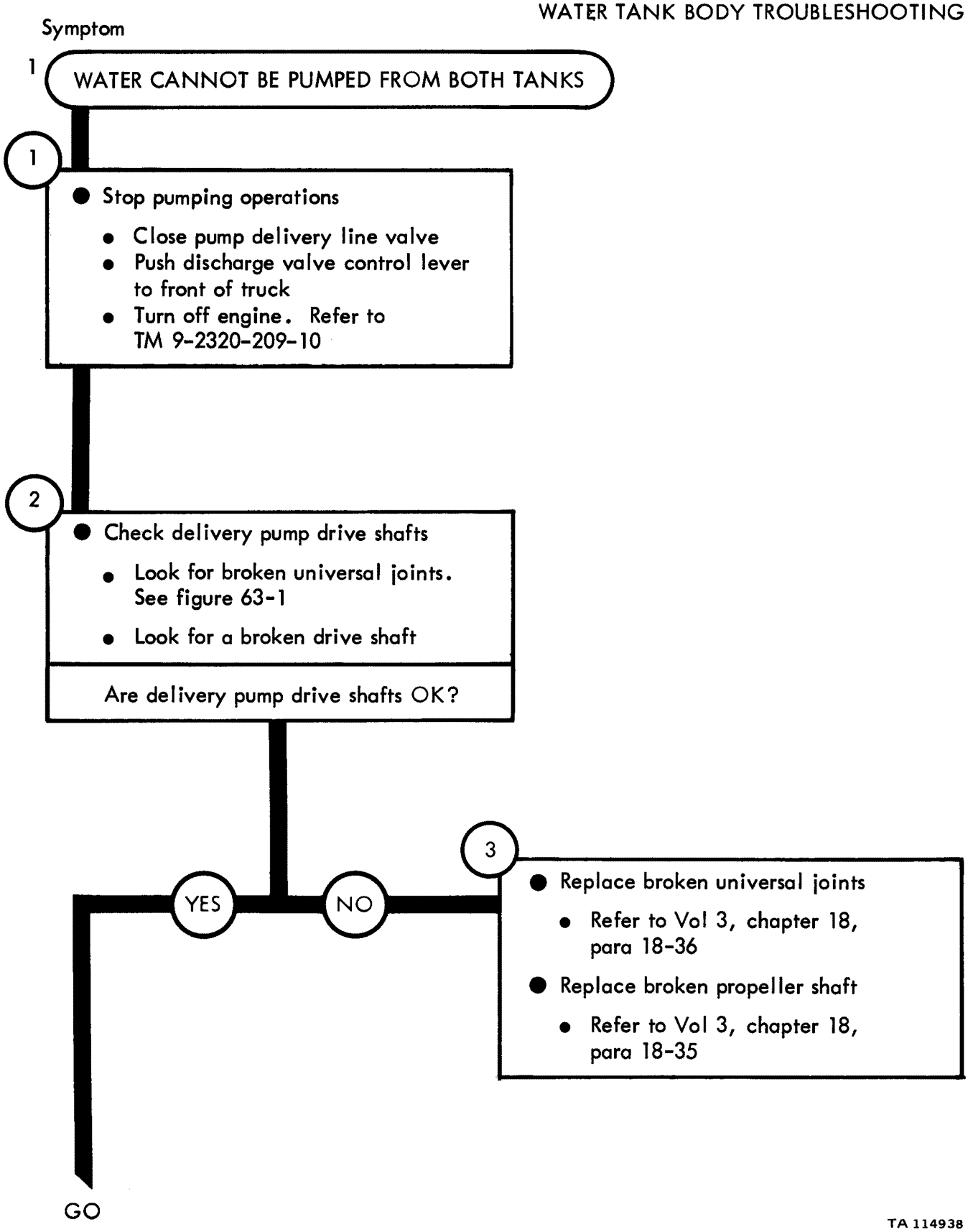
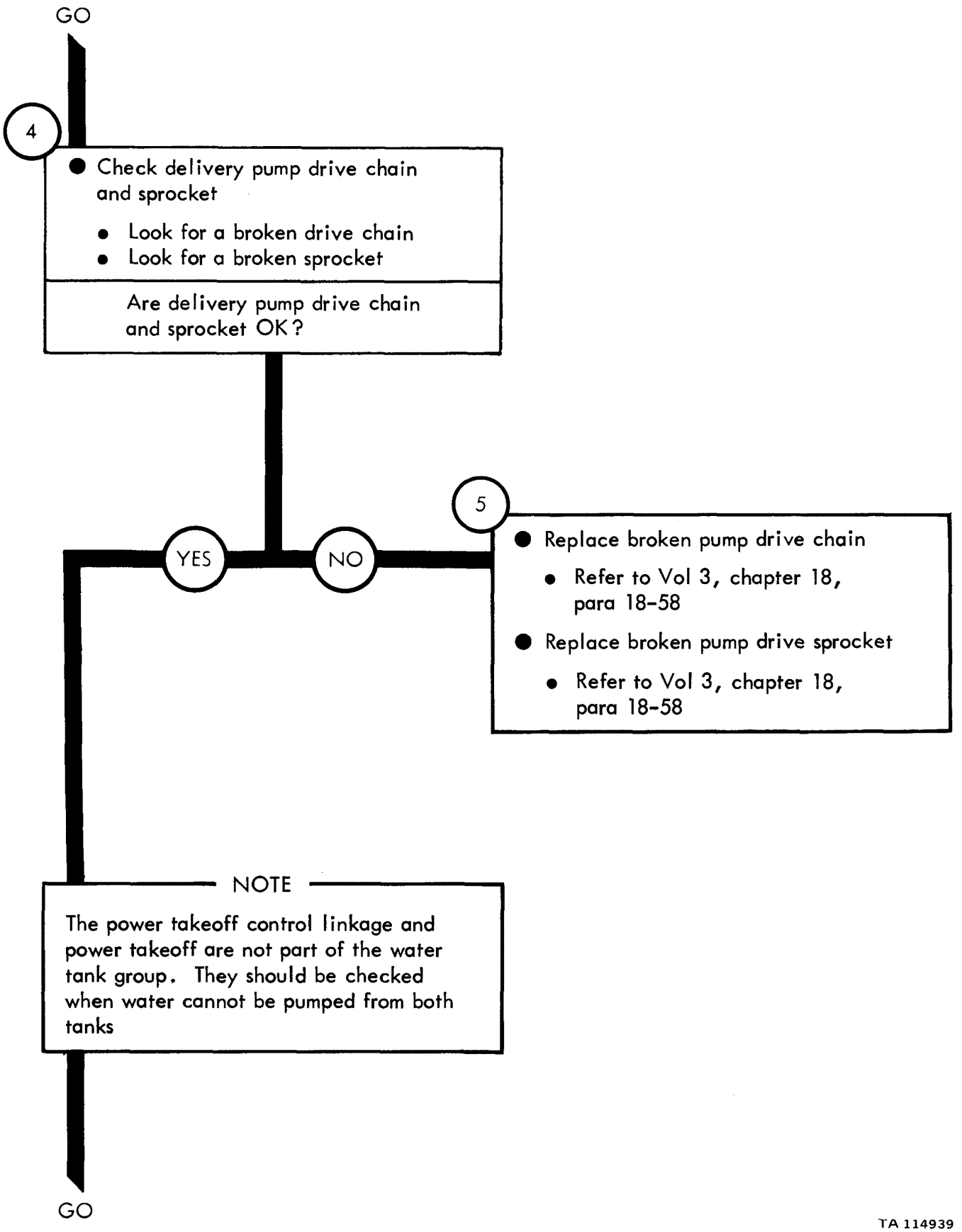


Figure 61-1 (Sheet 1 of 4)



TA 114939

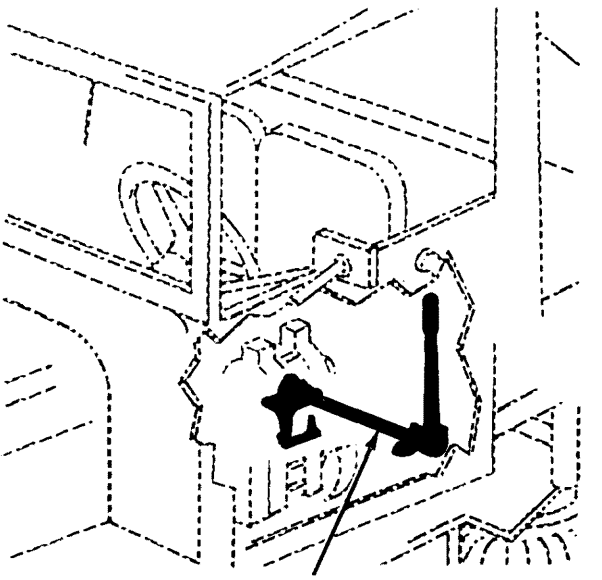
Figure 61-1 (Sheet 2 of 4)

GO

6

- Check power takeoff control linkage
  - Look for bent or broken linkage

Is power takeoff control linkage OK?



TS 209-20-74

YES

NO

7

- Replace bent or broken power takeoff linkage
  - Refer to Vol 3, chapter 19, para 19-25

8

- Check power takeoff
  - Do pump operations. Refer to TM 9-2320-209-10
  - See if delivery pump drive shaft is turning
  - Stop pump and engine. Refer to TM 9-2320-209-10

Is delivery pump drive shaft turning?

YES

NO

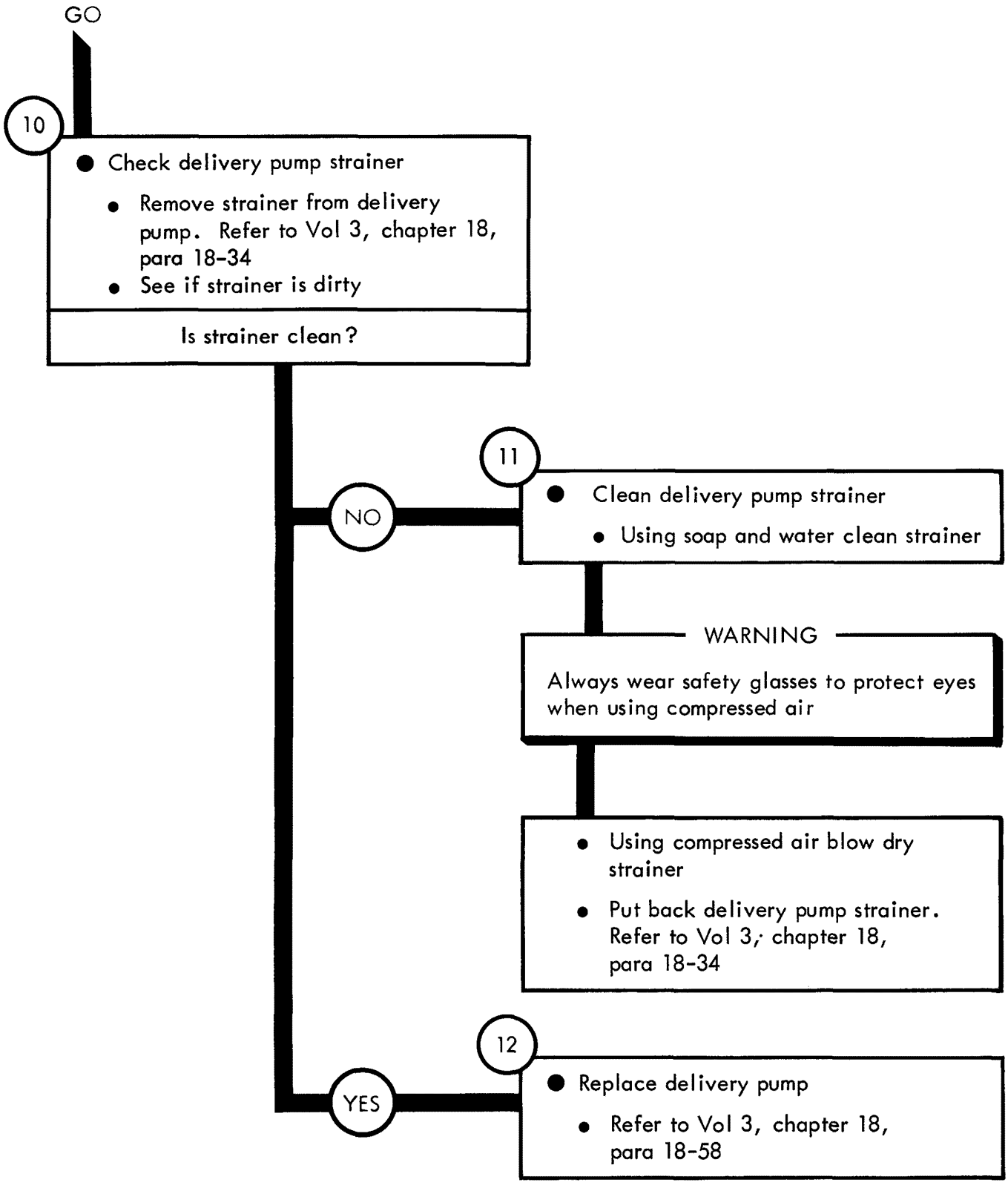
9

- Replace power takeoff
  - Tell direct support maintenance

GO

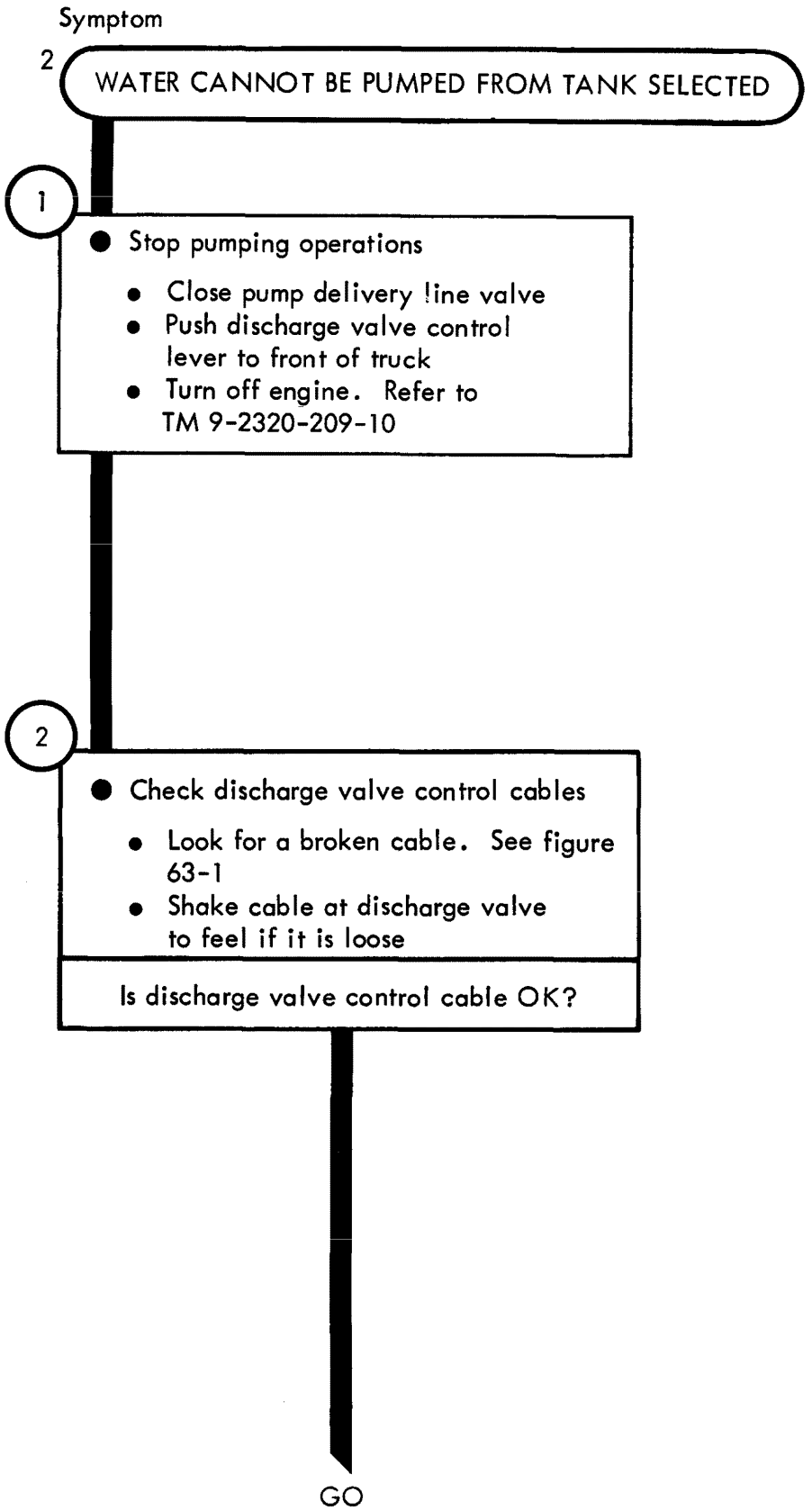
TA 114940

Figure 61-1 (Sheet 3 of 4)



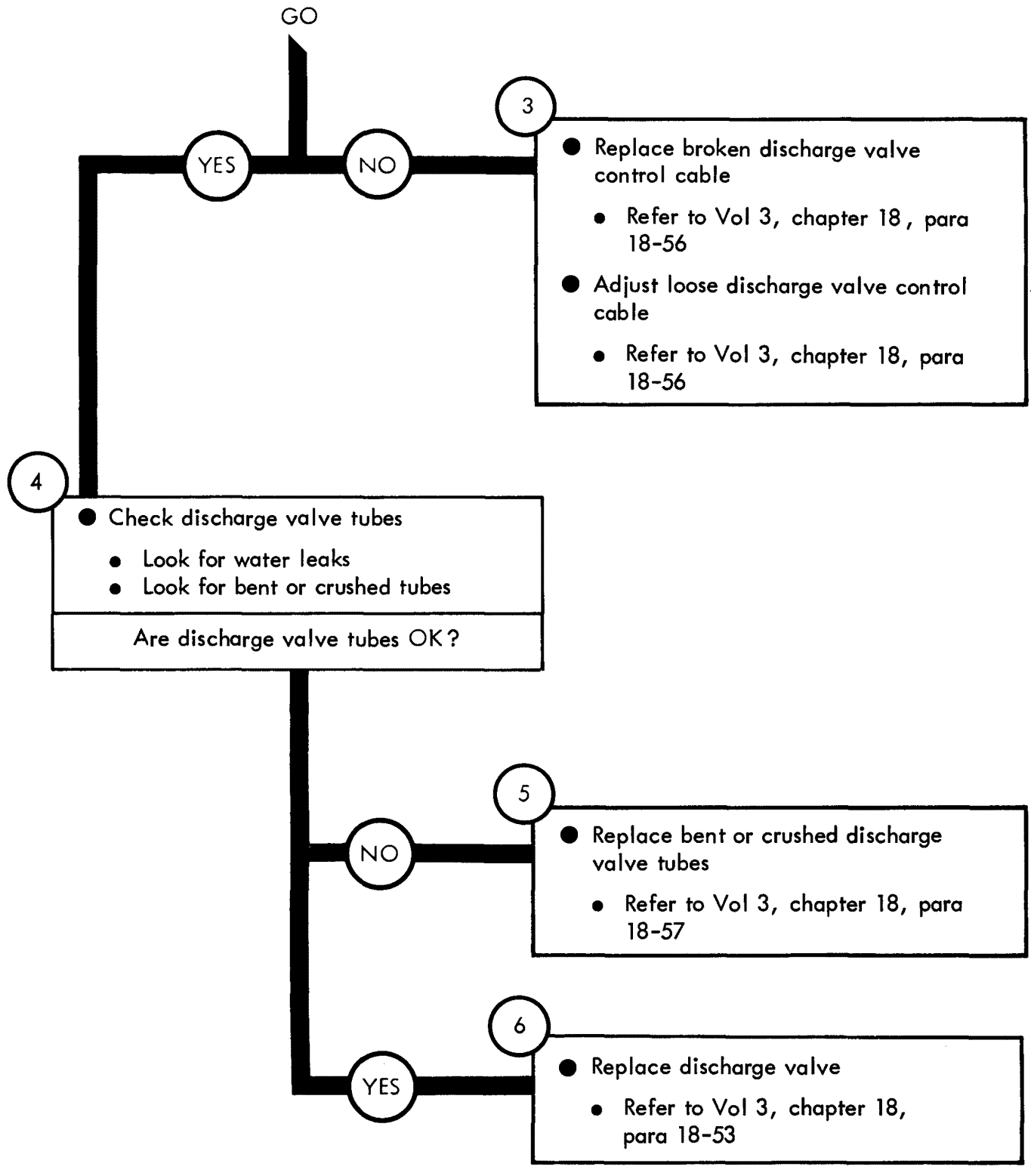
TA 114941

Figure 61-1 (Sheet 4 of 4)



TA 114942

Figure 61-2 (Sheet 1 of 2)



TA 114943

Figure 61-2 (Sheet 2 of 2)

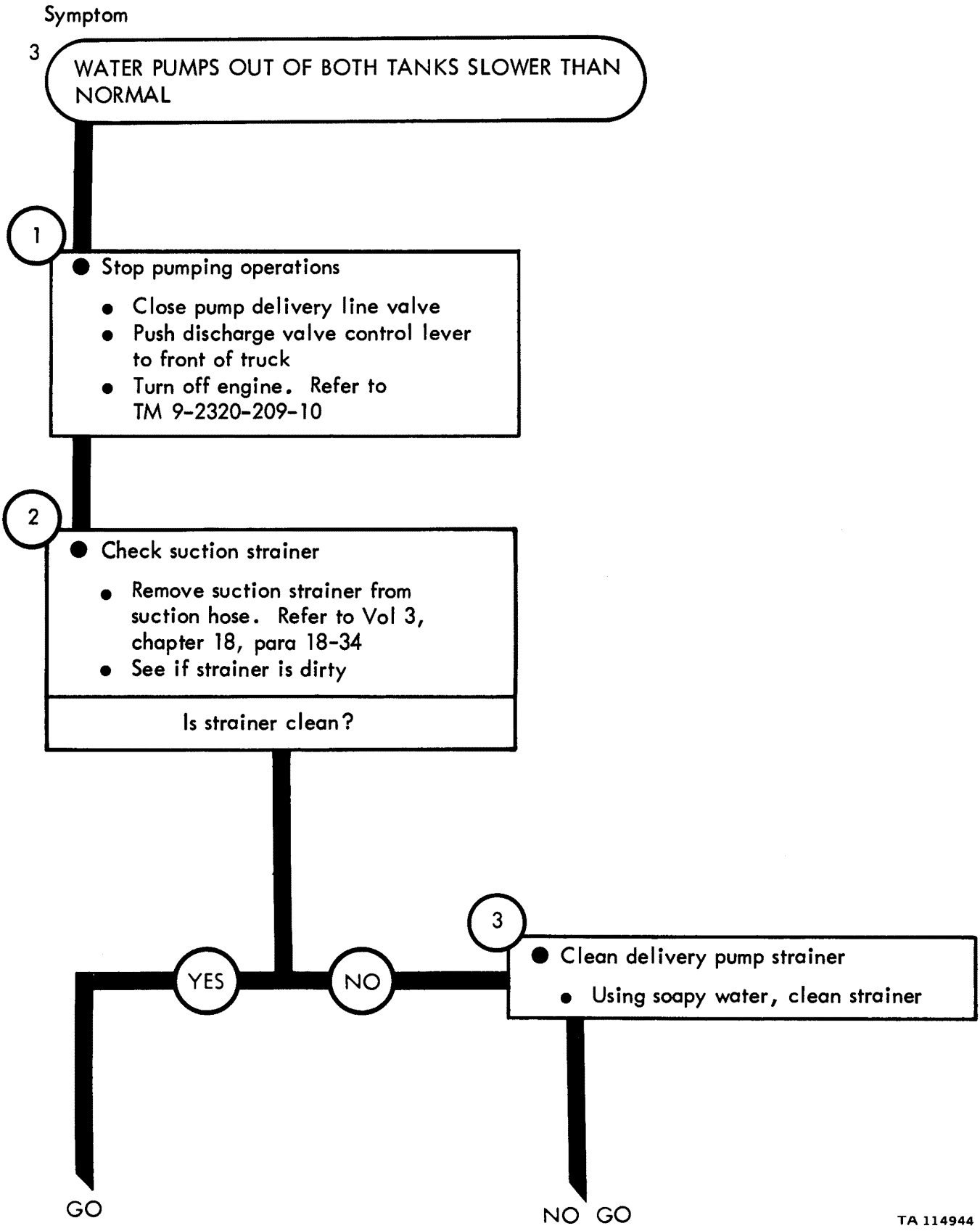


Figure 61-3 (Sheet 1 of 3)

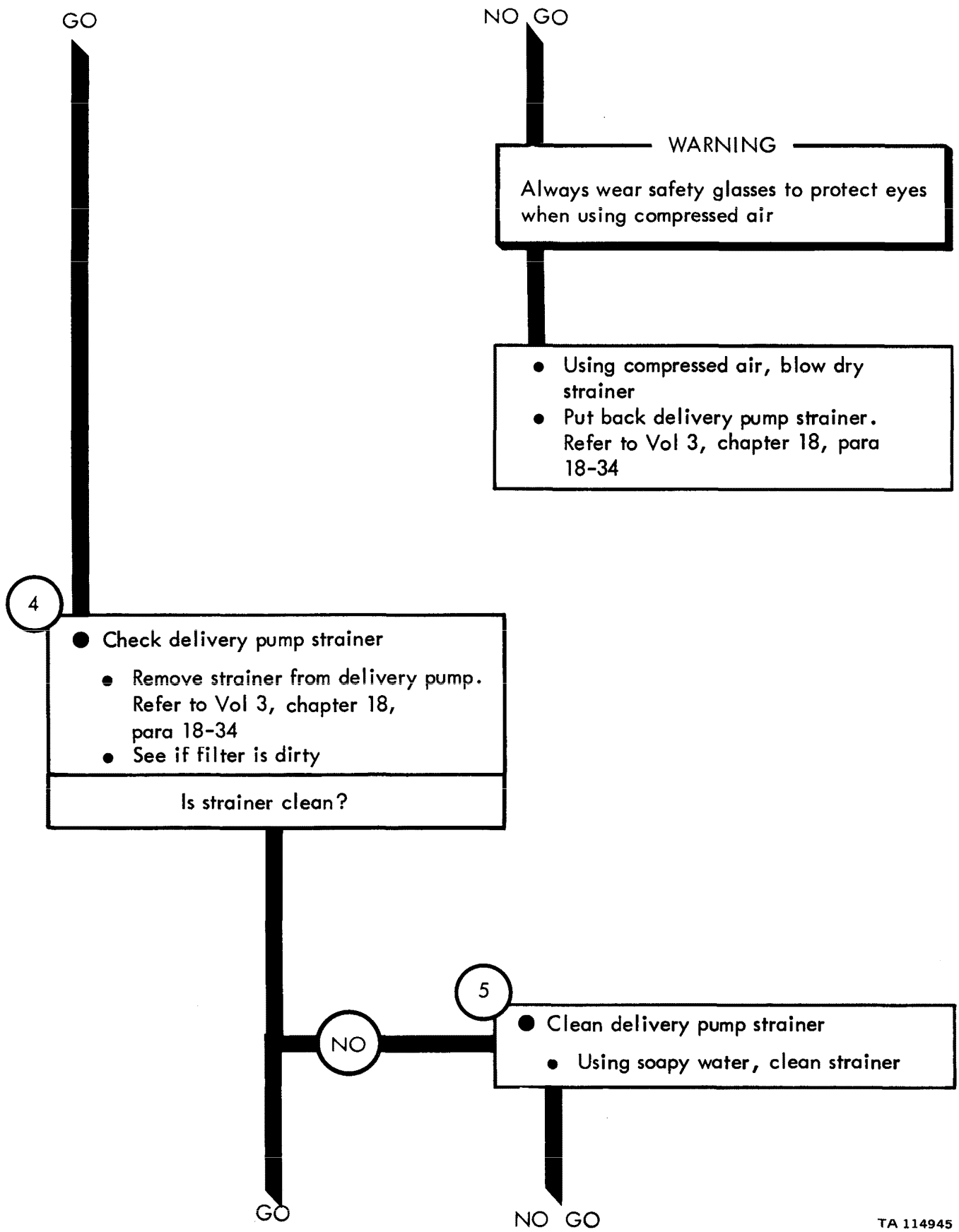
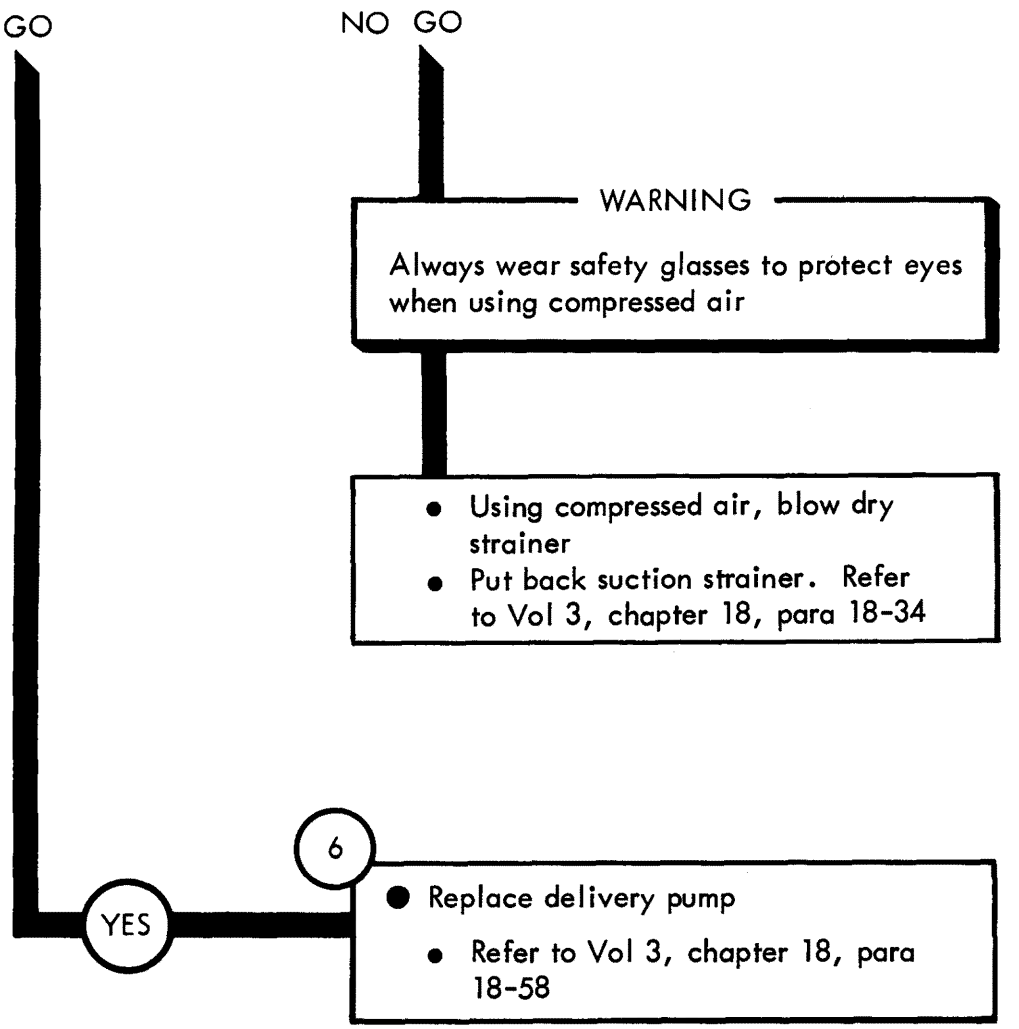
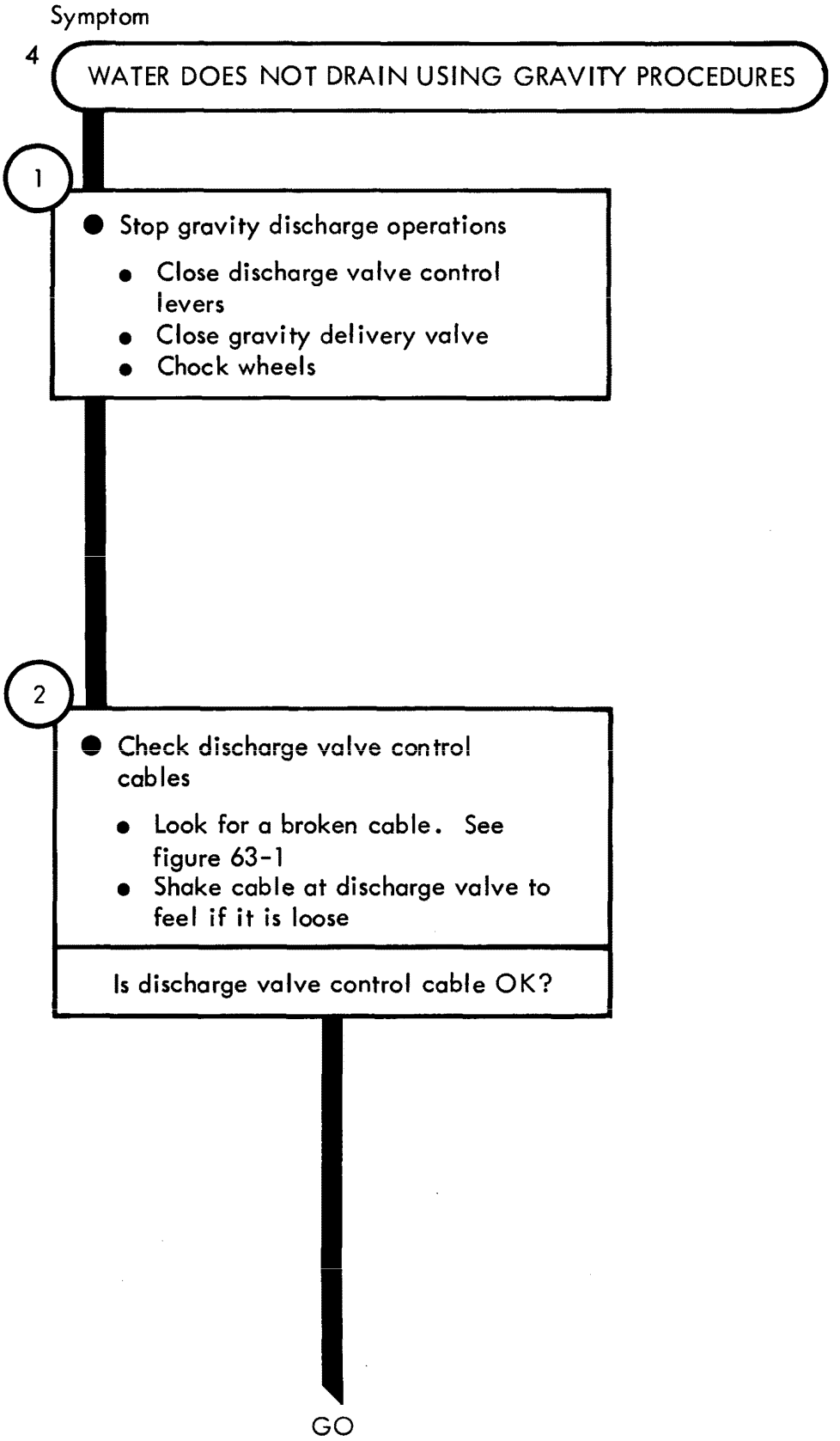


Figure 61-3 (Sheet 2 of 3)



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Figure 61-3 (Sheet 3 of 3)



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Figure 61-4 (Sheet 1 of 2)

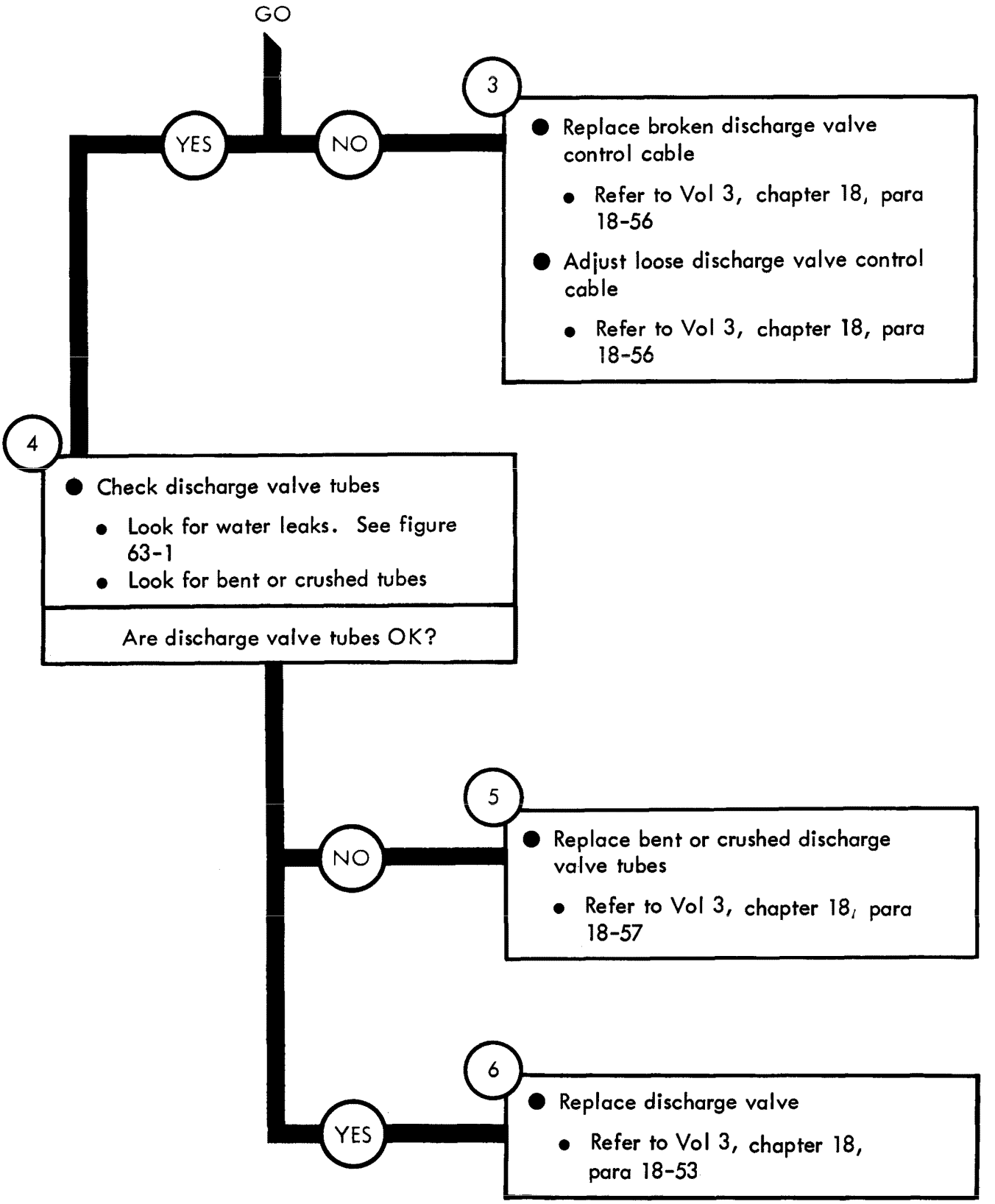
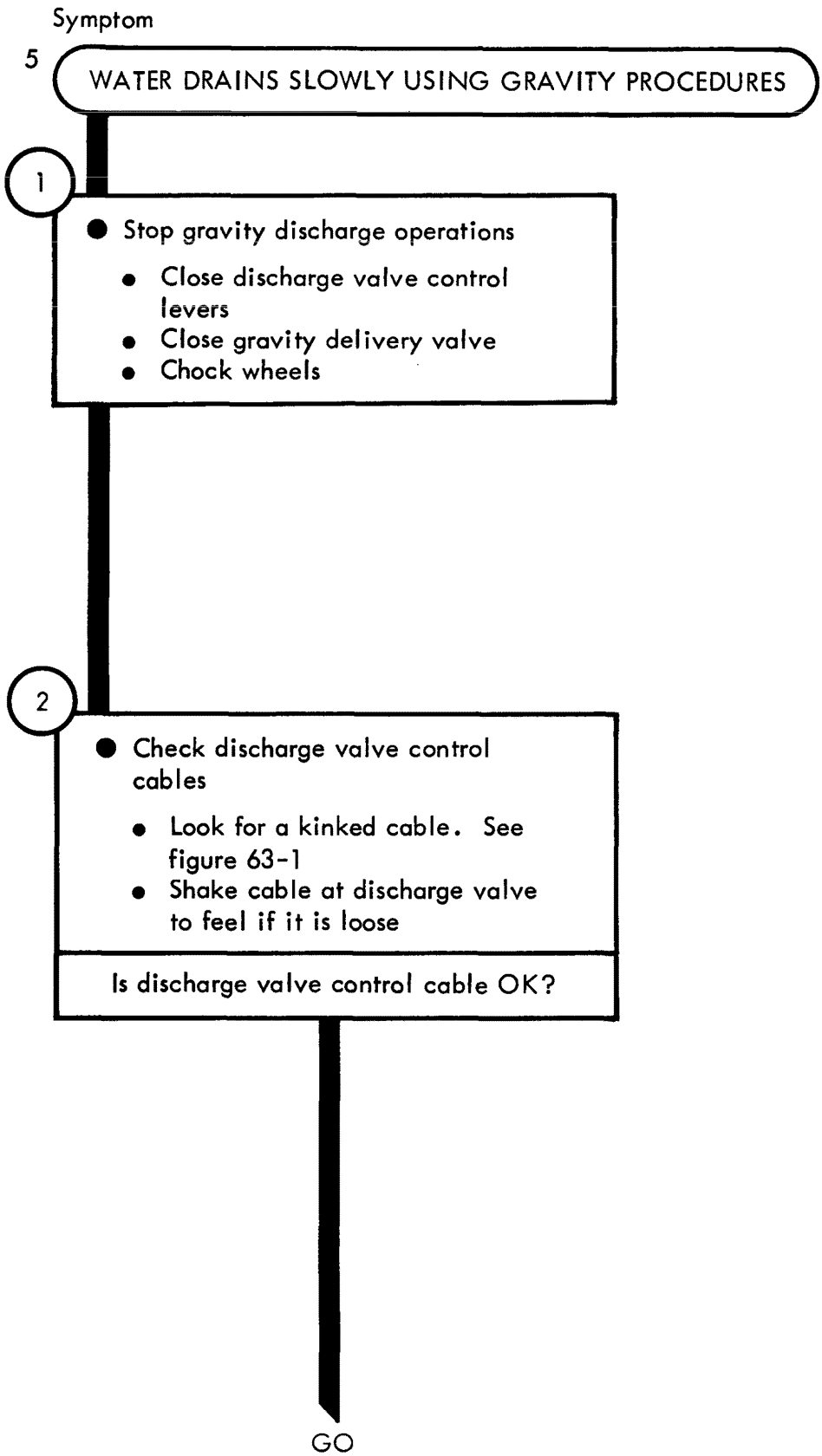
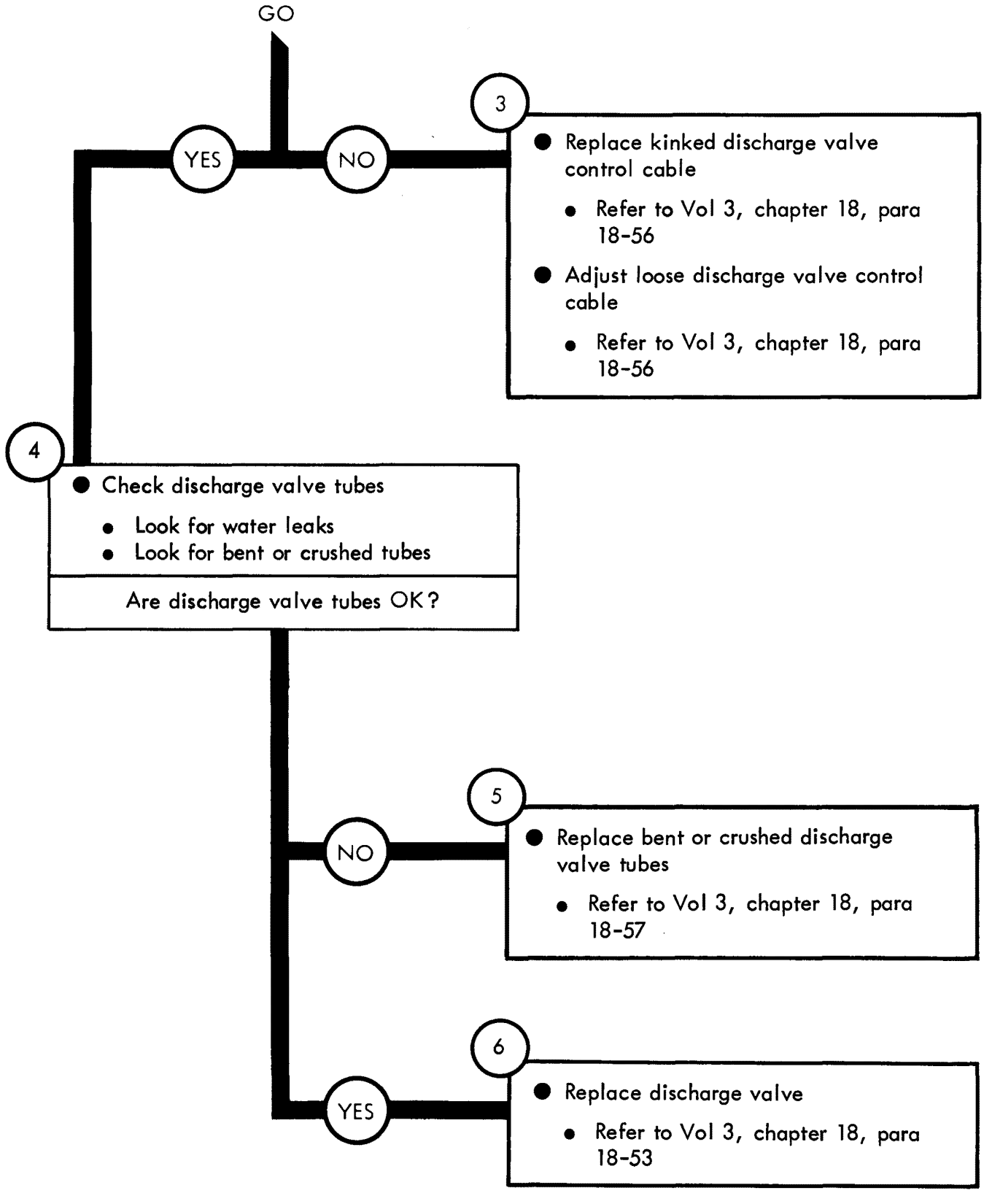


Figure 61-4 (Sheet 2 of 2)



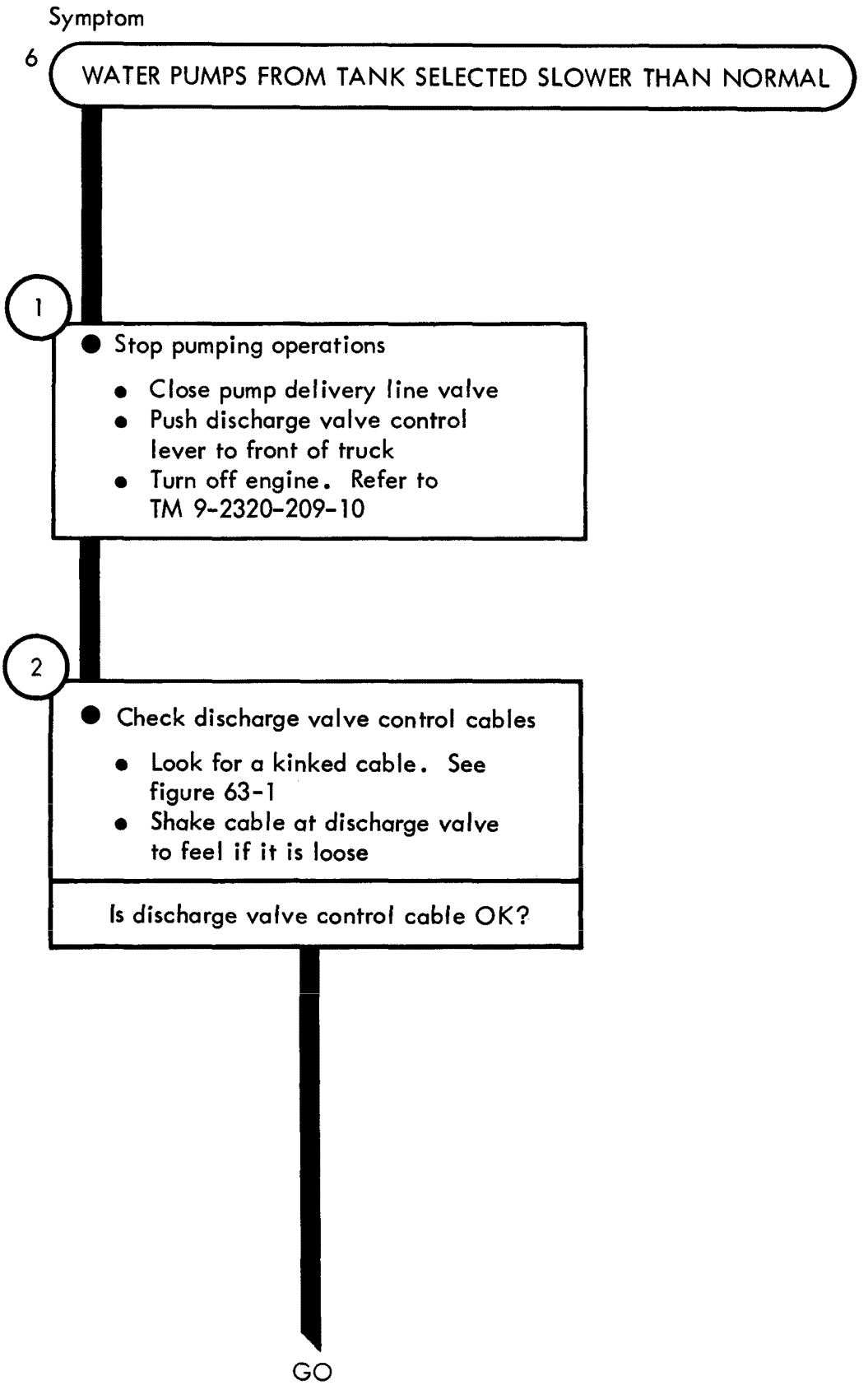
TA 114949

Figure 61-5 (Sheet lof 2)



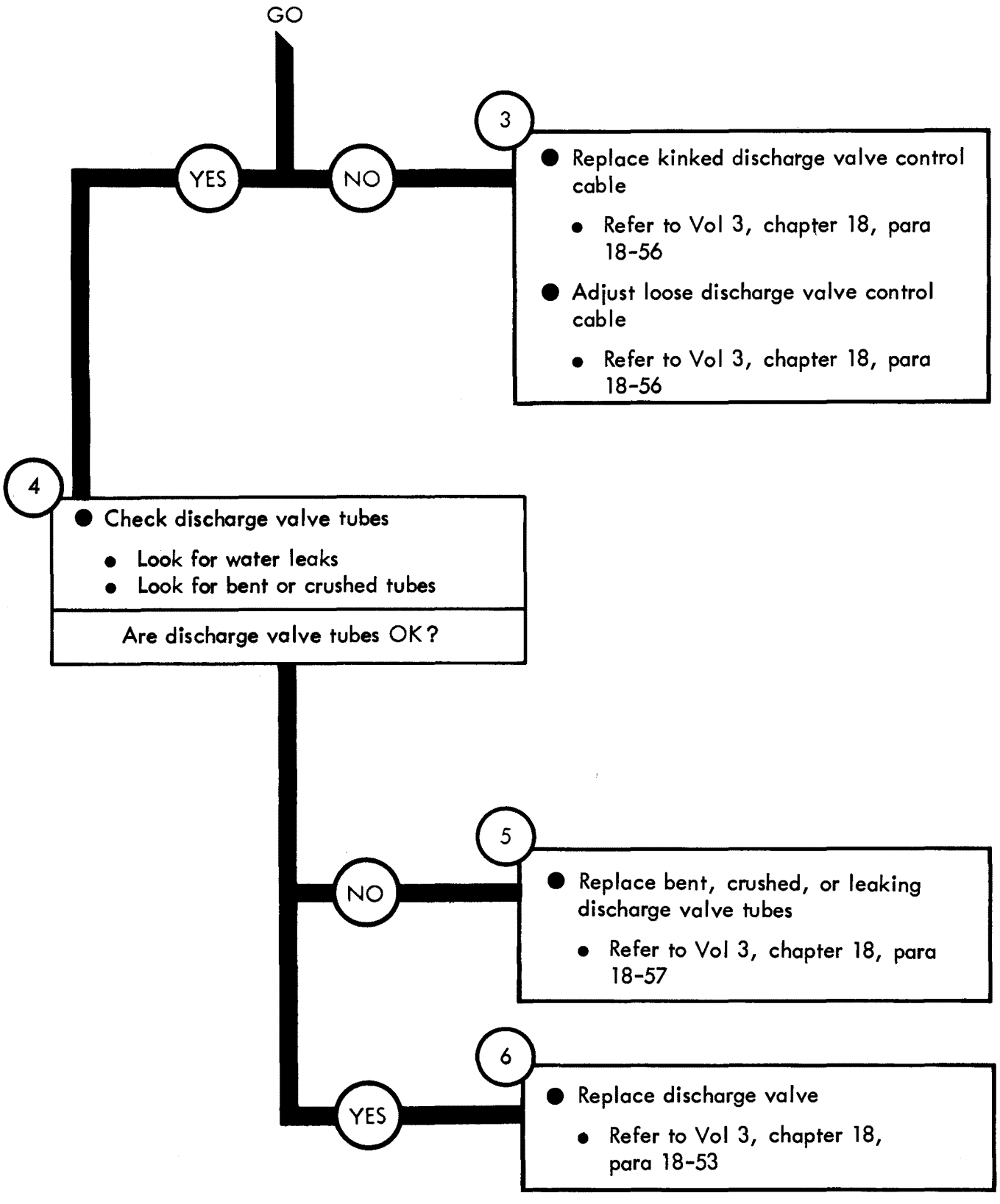
TA 114950

Figure 61-5 (Sheet 2 of 2)



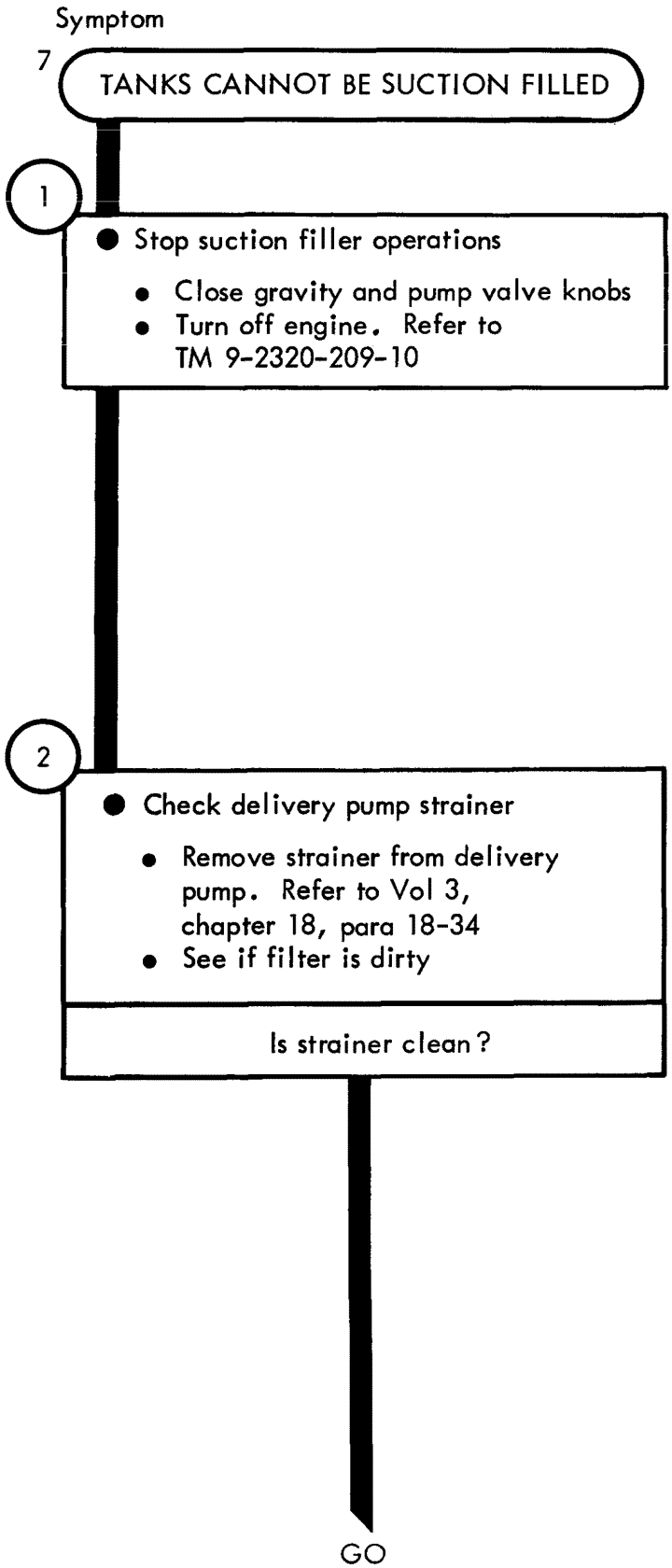
TA 114951

Figure 61-6 (Sheet 1 of 2)



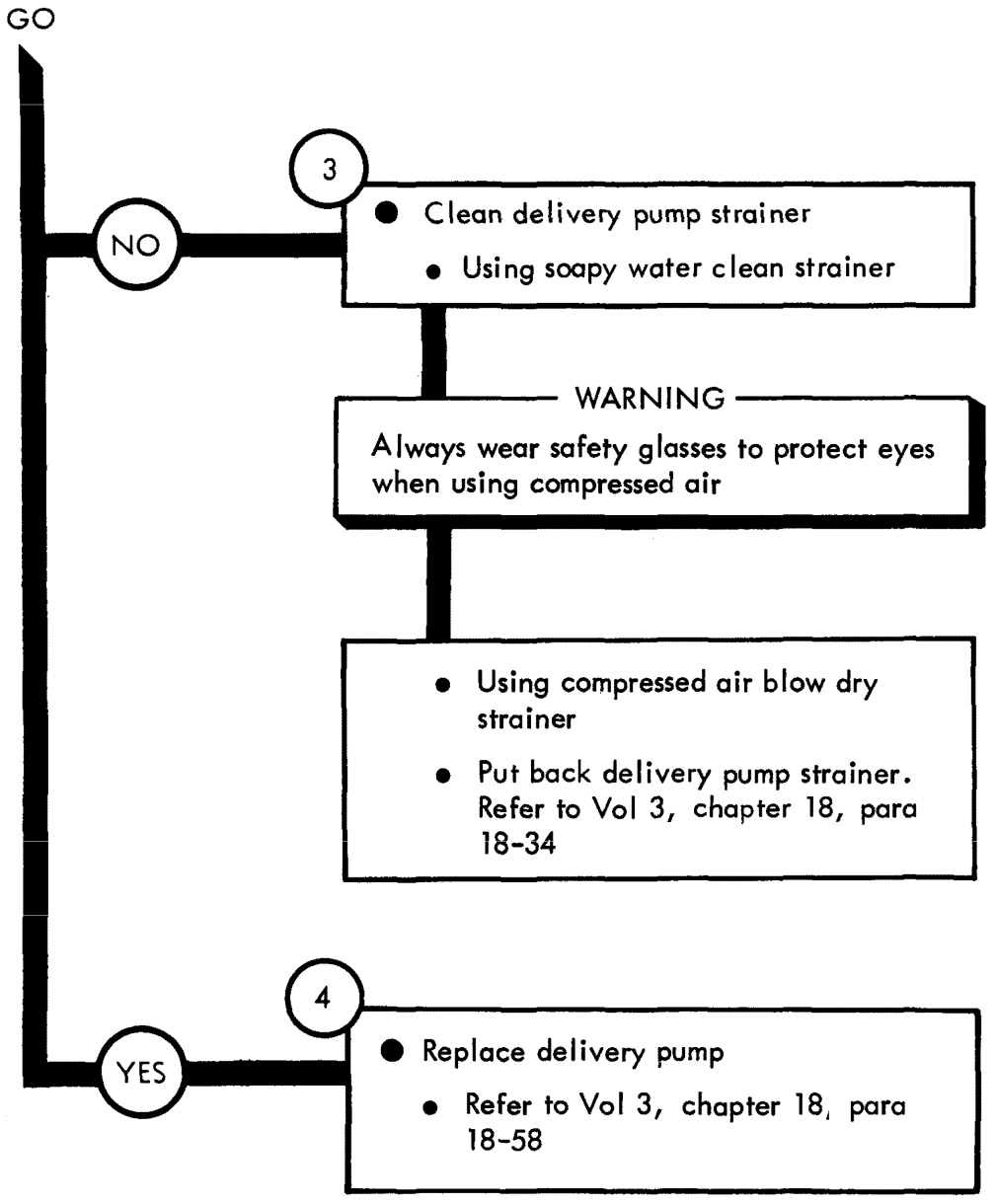
TA 114952

Figure 61-6 (Sheet 2of 2)



TA 114953

Figure 61-7 (Sheet 1 of 2)



TA 114954

Figure 61-7 (Sheet 2 of 2)

CHAPTER 62

WATER TANK BODY TROUBLESHOOTING SUMMARY

62-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 61 for the water tank body.

62-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

WATER TANK BODY TROUBLESHOOTING SUMMARY

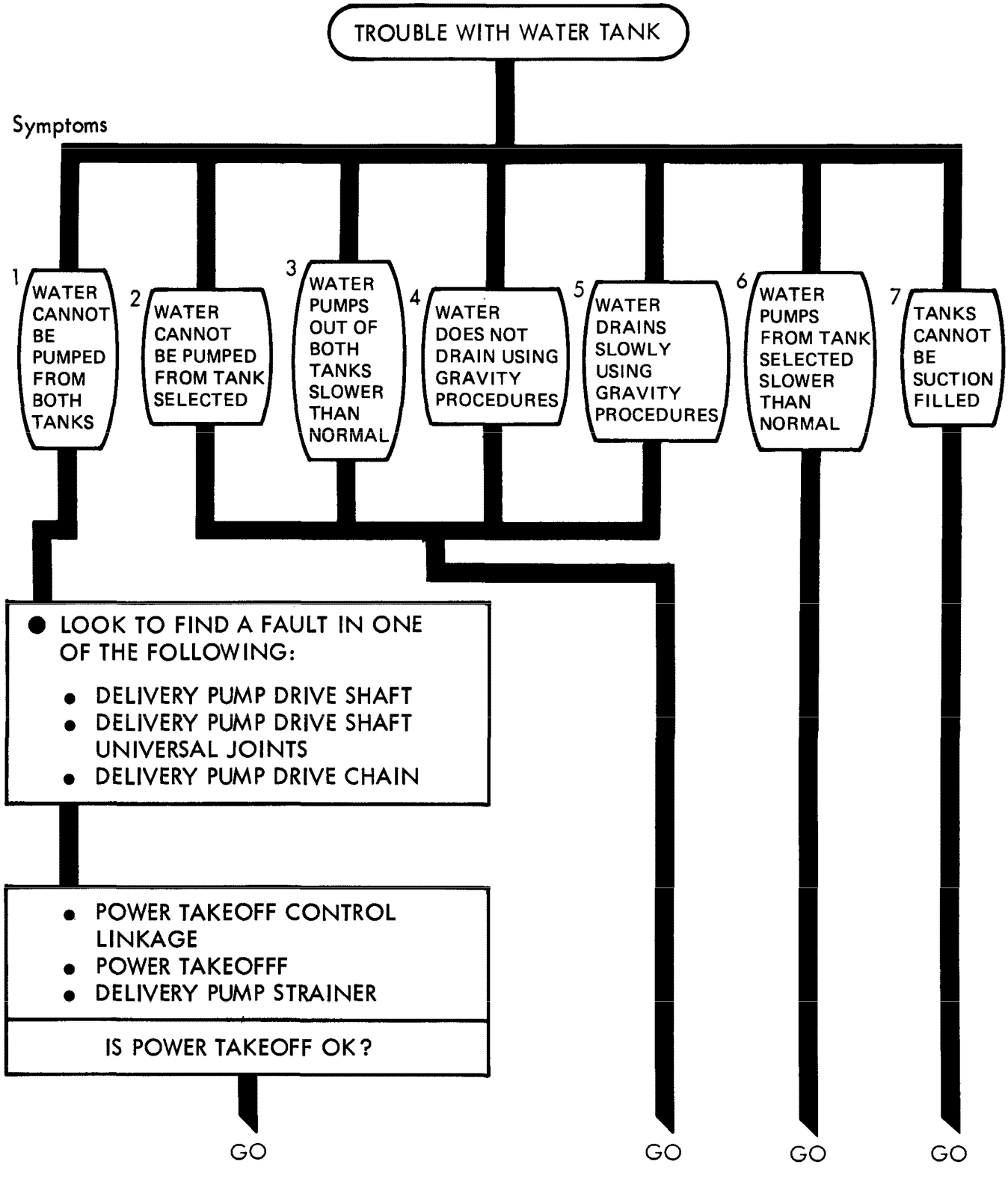
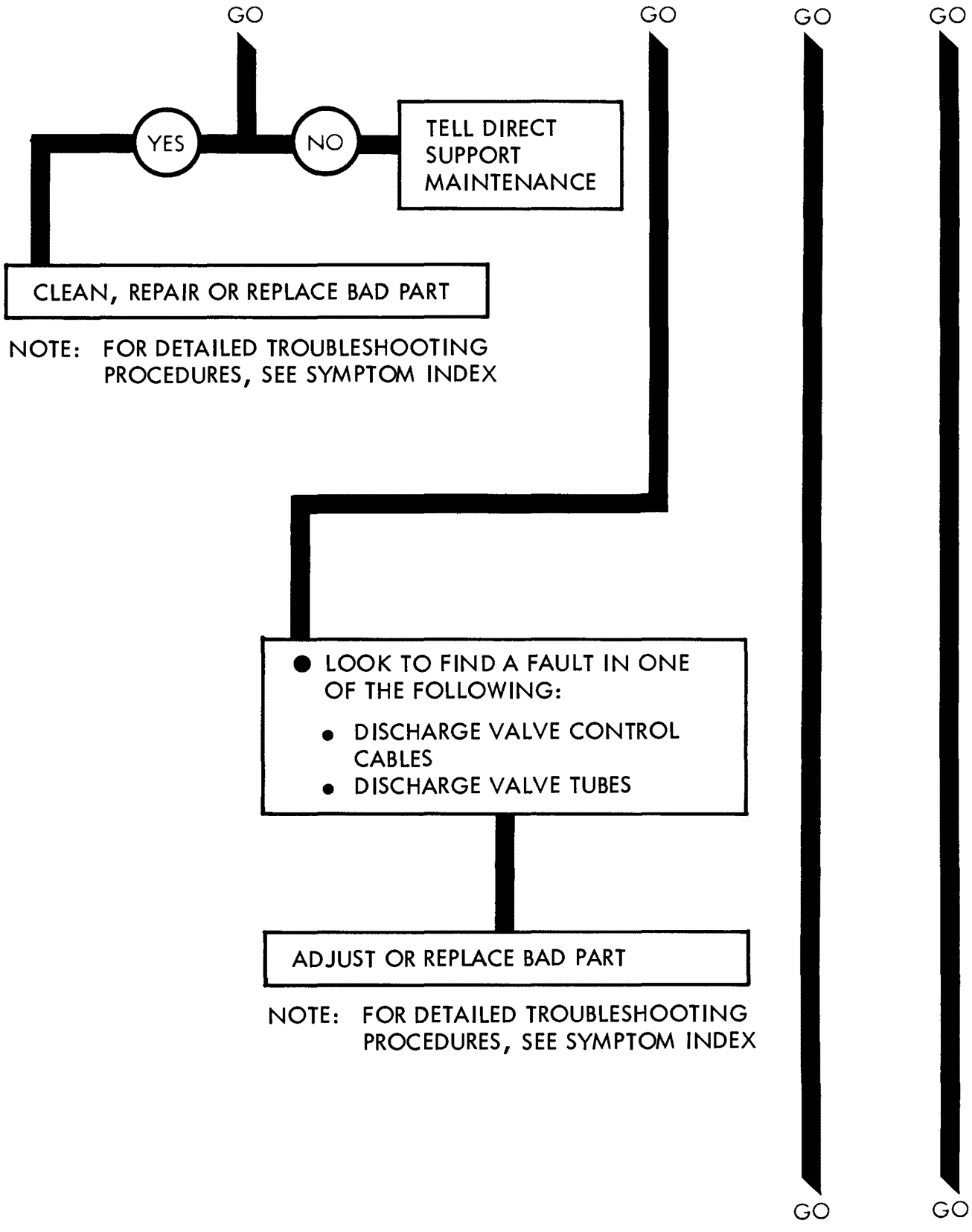


Figure 62-1 (Sheet 1 of 3)



TA 114956

Figure 62-1 (Sheet 2 of 3)

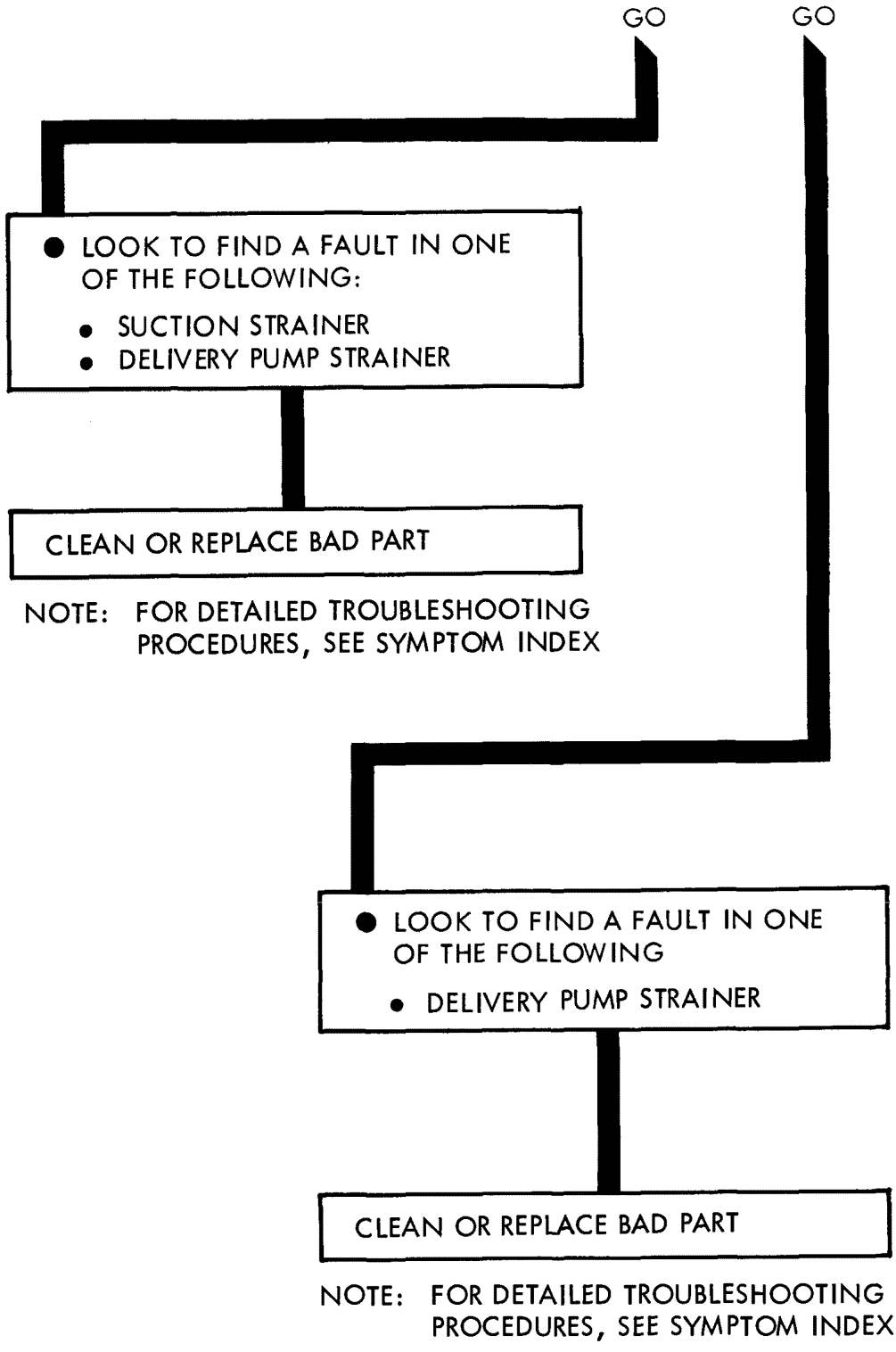


Figure 62-1 (Sheet 3 of 3)

CHAPTER 63

WATER TANK BODY SUPPORT DIAGRAMS

63-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 61. Table 3-1 is a complete listing of all support diagrams used in this manual.

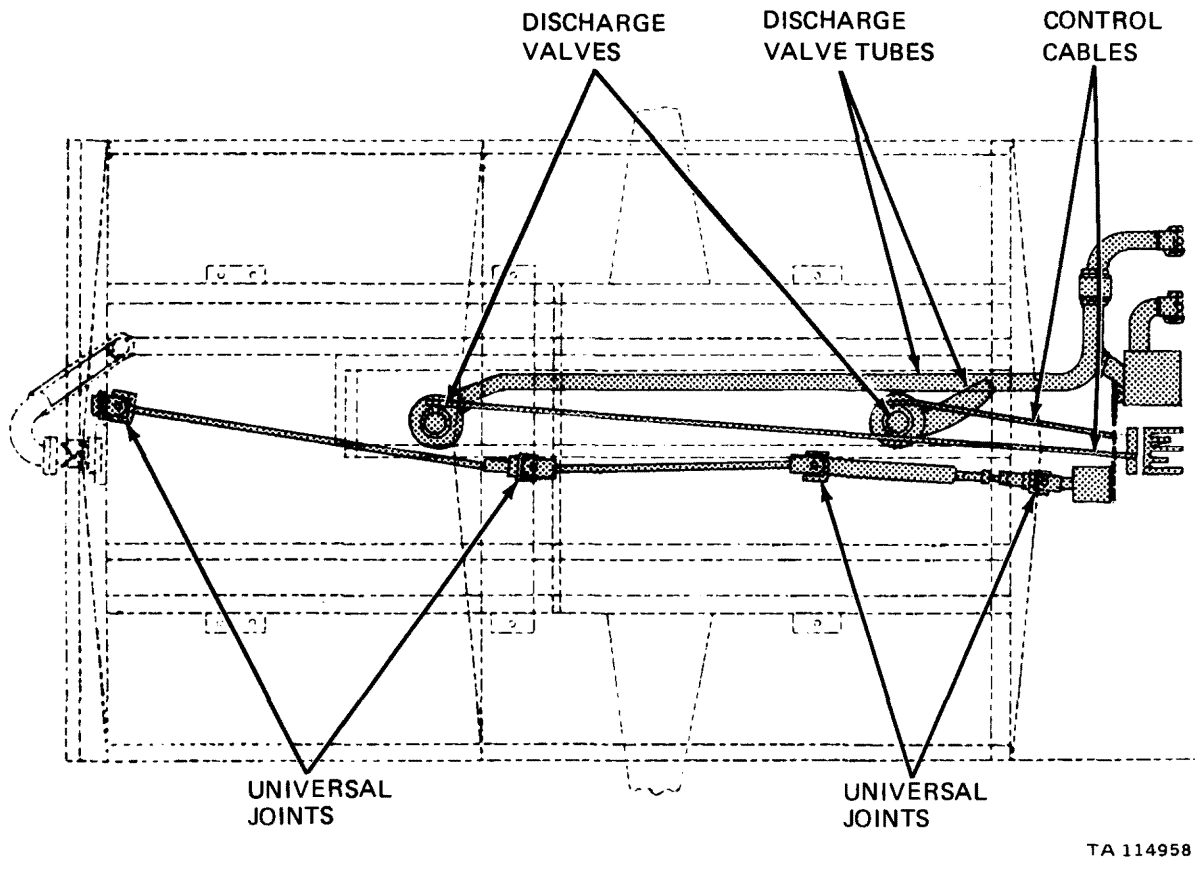
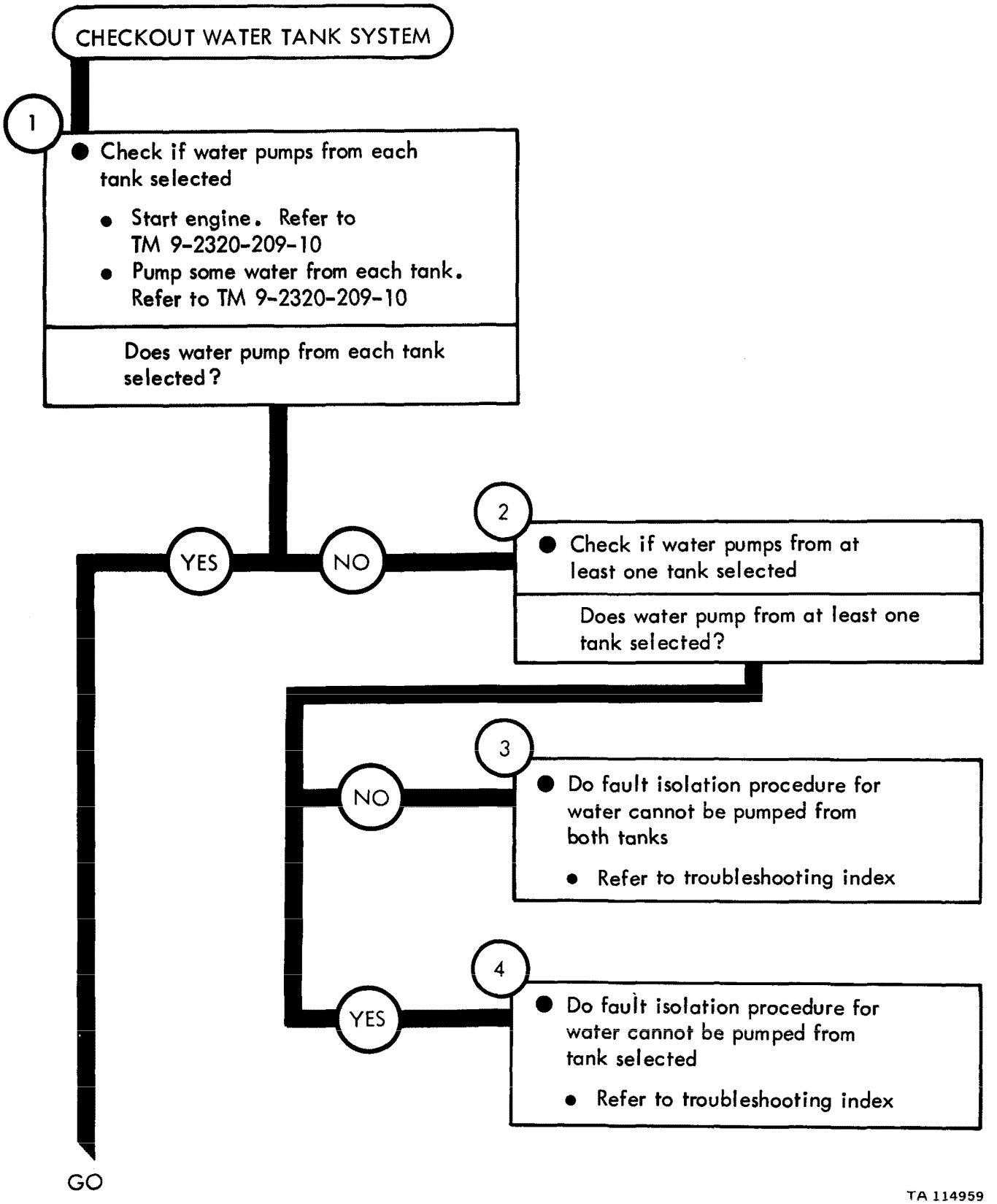


Figure 63-1. Water Tank Body Support Diagram

CHAPTER 64

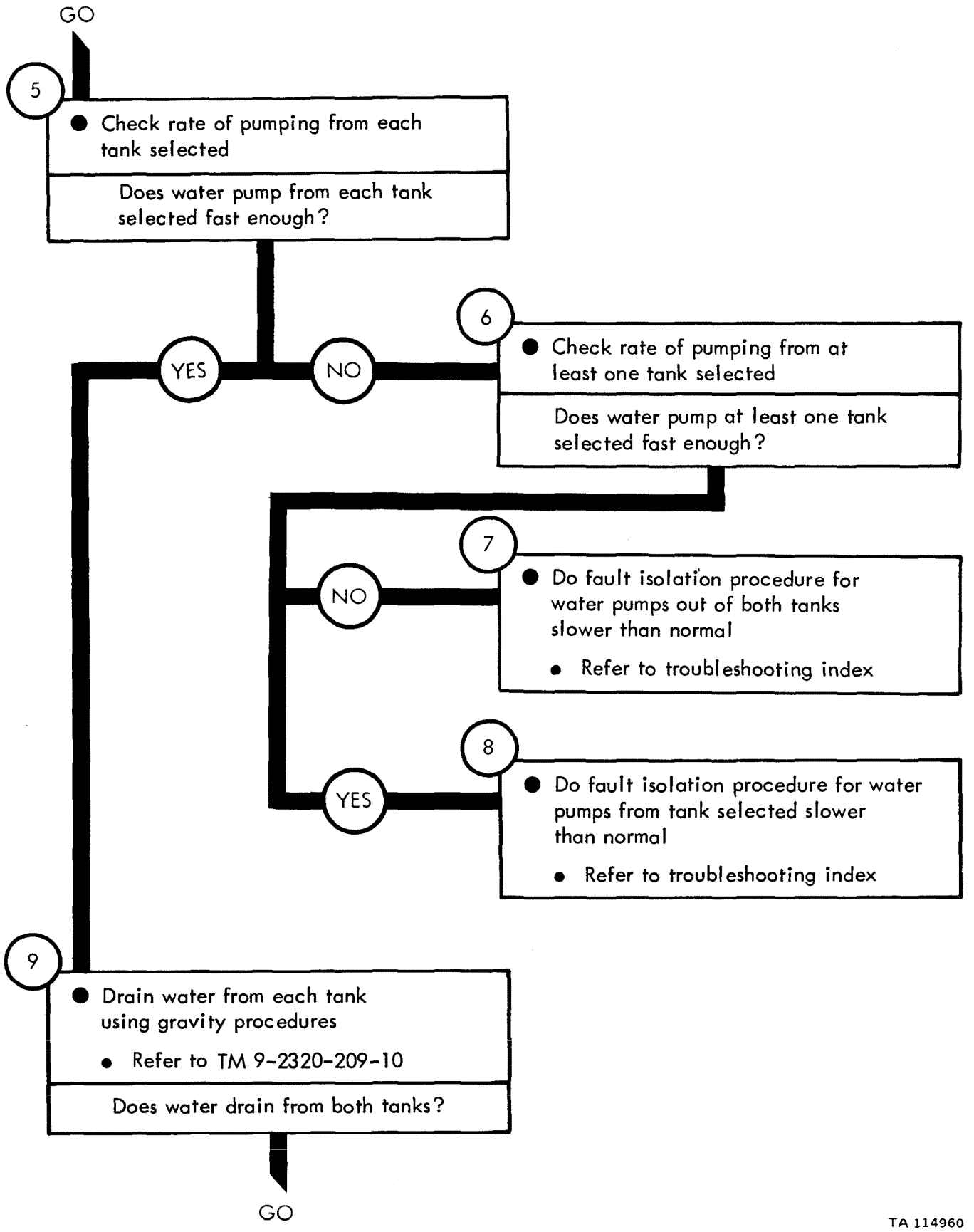
WATER TANK BODY CHECKOUT PROCEDURES

64-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not checkout.



TA 114959

Figure 64-1 (Sheet 1 of 4)



TA 114960

Figure 64-1 (Sheet 2 of 4)

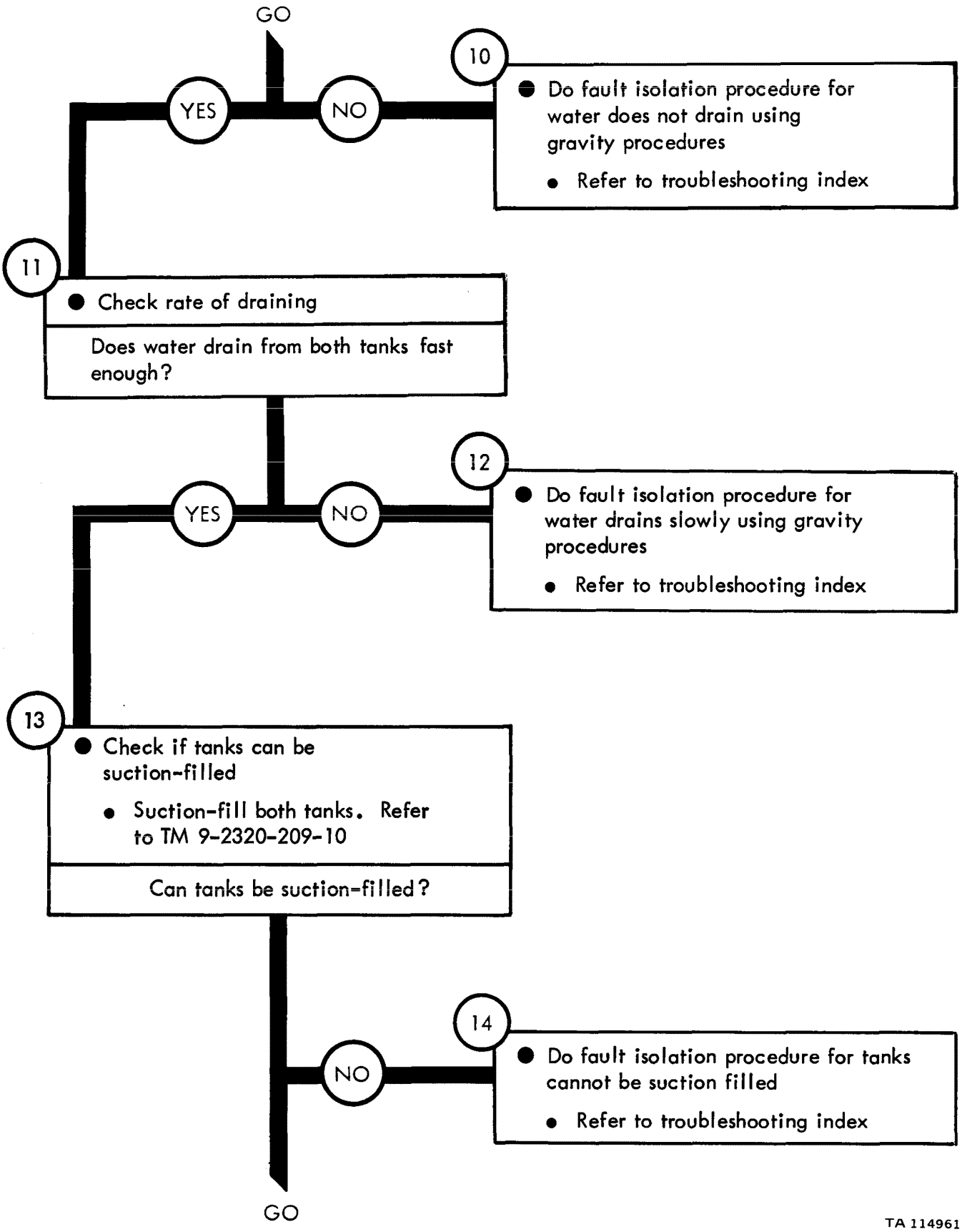
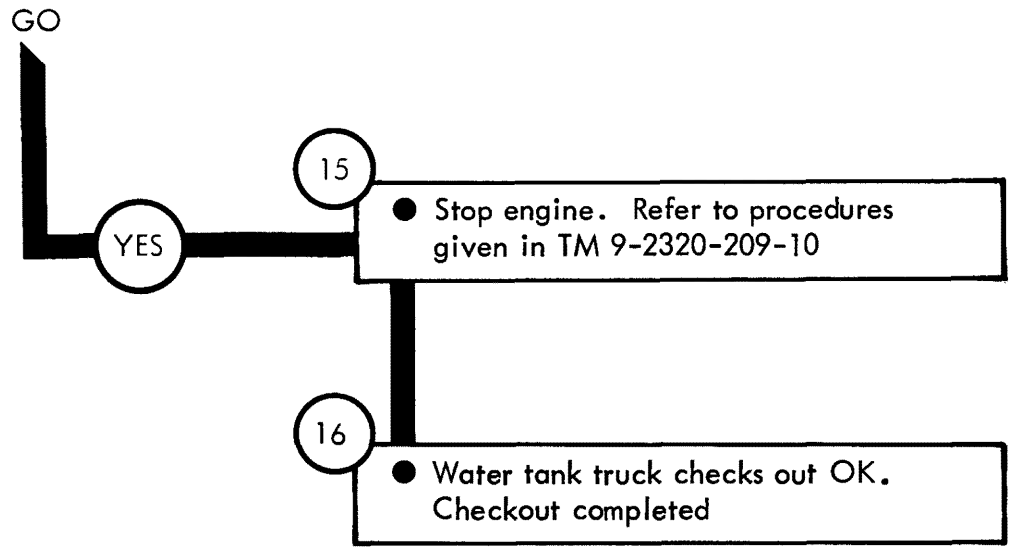


Figure 64-1 (Sheet 3 of 4)



TA 114962

Figure 64-1 (Sheet 4 of 4)

CHAPTER 65

FUEL TANK BODY (TRUCK M49A1C) TROUBLESHOOTING

65-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the fuel tank body M49A1C, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

65-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

FUEL TANK BODY M49A1C TROUBLESHOOTING

Symptom

1 FUEL DOES NOT PUMP OUT OF TANKS

1

- Make truck ready for work on pumping system
  - Park truck. Refer to TM 9-2320-209-10

WARNING

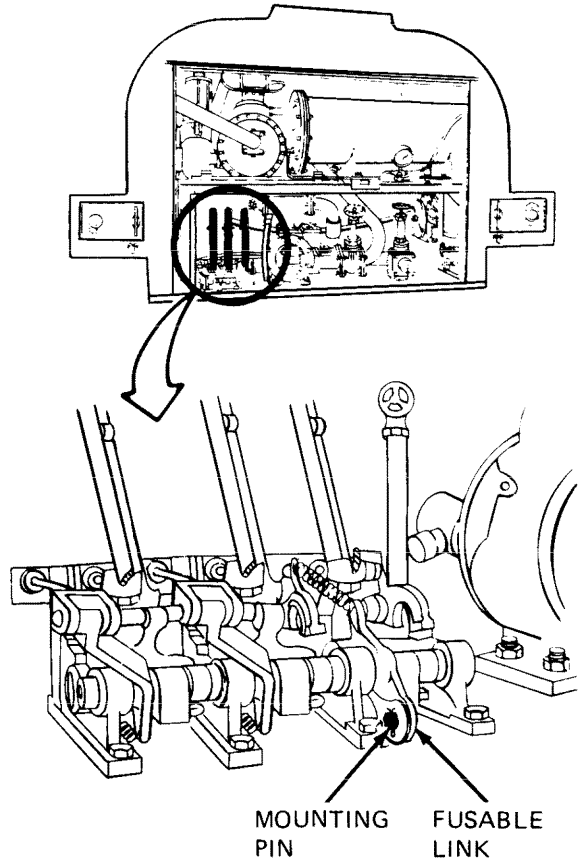
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel tanker. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher close by

2

- Check fusible link
  - See if link has come off mounting pin
  - Look for a broken link

Is fusible link OK?

GO



TA 114963

Figure 65-1 (Sheet 1 of 5)

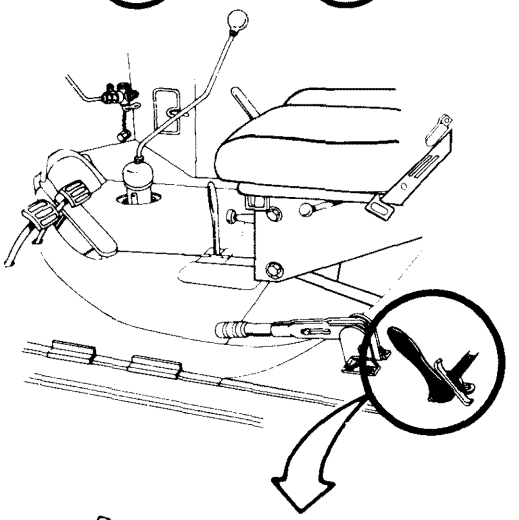
GO

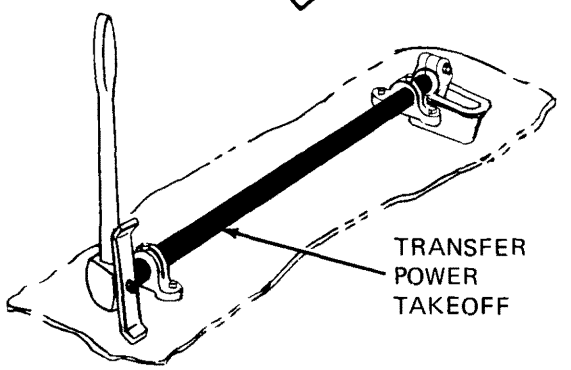
YES

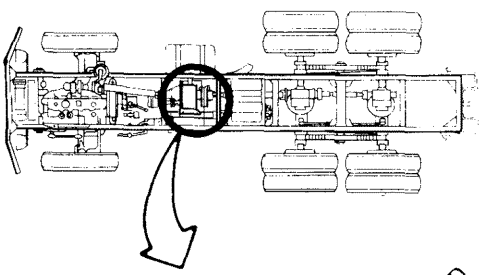
NO

3

- Put back fusible link that has come off mount
  - Slide link over mounting pin
  - Put cotter pin through hole in mounting pin and bend ends around using needle nose pliers
- Replace broken fusible link
  - Refer to Vol 3, chapter 18, para 18-30



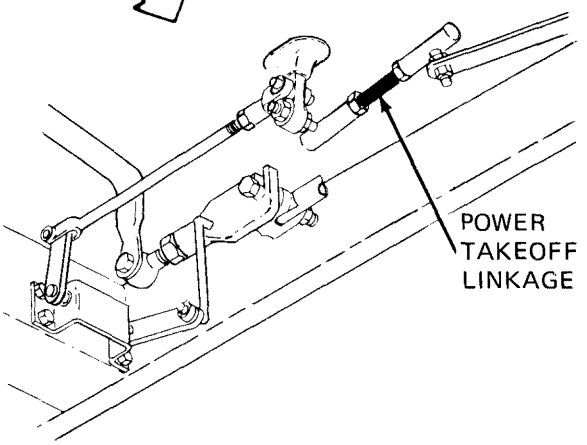




4

- Check power takeoff linkage
  - Look for loose, bent or broken linkage
  - Crawl under truck
  - Feel for loose, bent or broken linkage

Is power takeoff linkage OK?



GO

TA 114964

Figure 65-1 (Sheet 2 of 5)

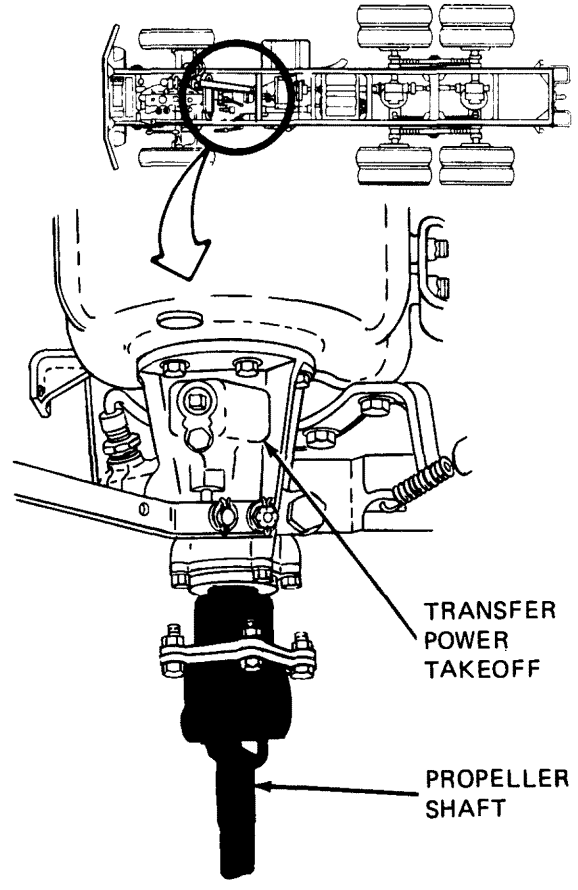
GO

YES

NO

5

- Adjust loose linkage
  - Refer to Vol 3, chapter 19, para 19-25
- Replace bent or broken linkage
  - Refer to Vol 3, chapter 19, para 19-25



6

- Check power takeoff
  - Start engine and turn on power takeoff. Refer to TM 9-2320-209-10
  - Crawl under truck
  - Look to see if propeller shaft is turning at power takeoff

Is shaft turning?

YES

NO

7

Tell direct support maintenance

8

- Shut off engine and turn off power takeoff
  - Refer to TM 9-2320-209-10

GO

TA 114965

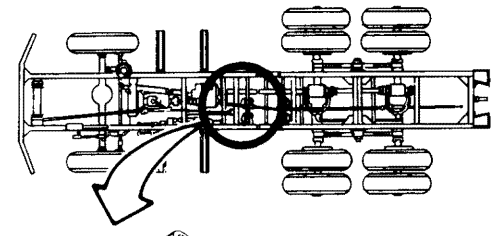
Figure 65-1 (Sheet 3 of 5)

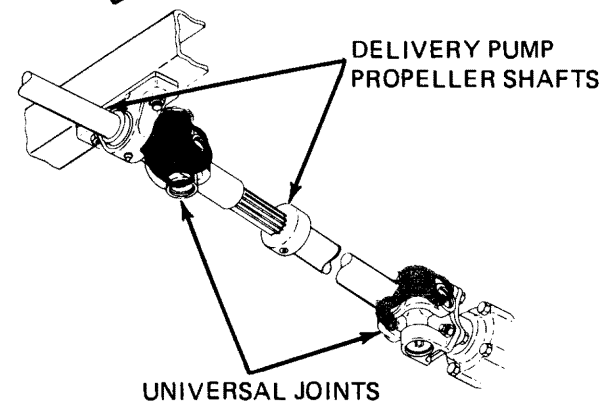
GO

9

- Check delivery pump propeller shafts
  - Look for broken universal joints
  - Look for a broken propeller shaft

Are delivery pump drive shafts OK?





YES

NO

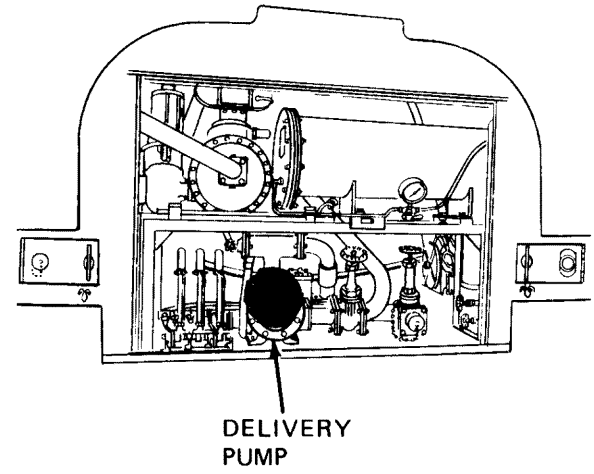
10

- Replace broken universal joint
  - Refer to Vol 3, chapter 18, para 18-36
- Replace broken drive shaft
  - Refer to Vol 3, chapter 18, para 18-35

11

- Check delivery pump
  - Turn pump on. Refer to TM9-2320-209-10
  - Listen for noise from pump
  - Put hand on pump
  - Feel for a lot of vibration

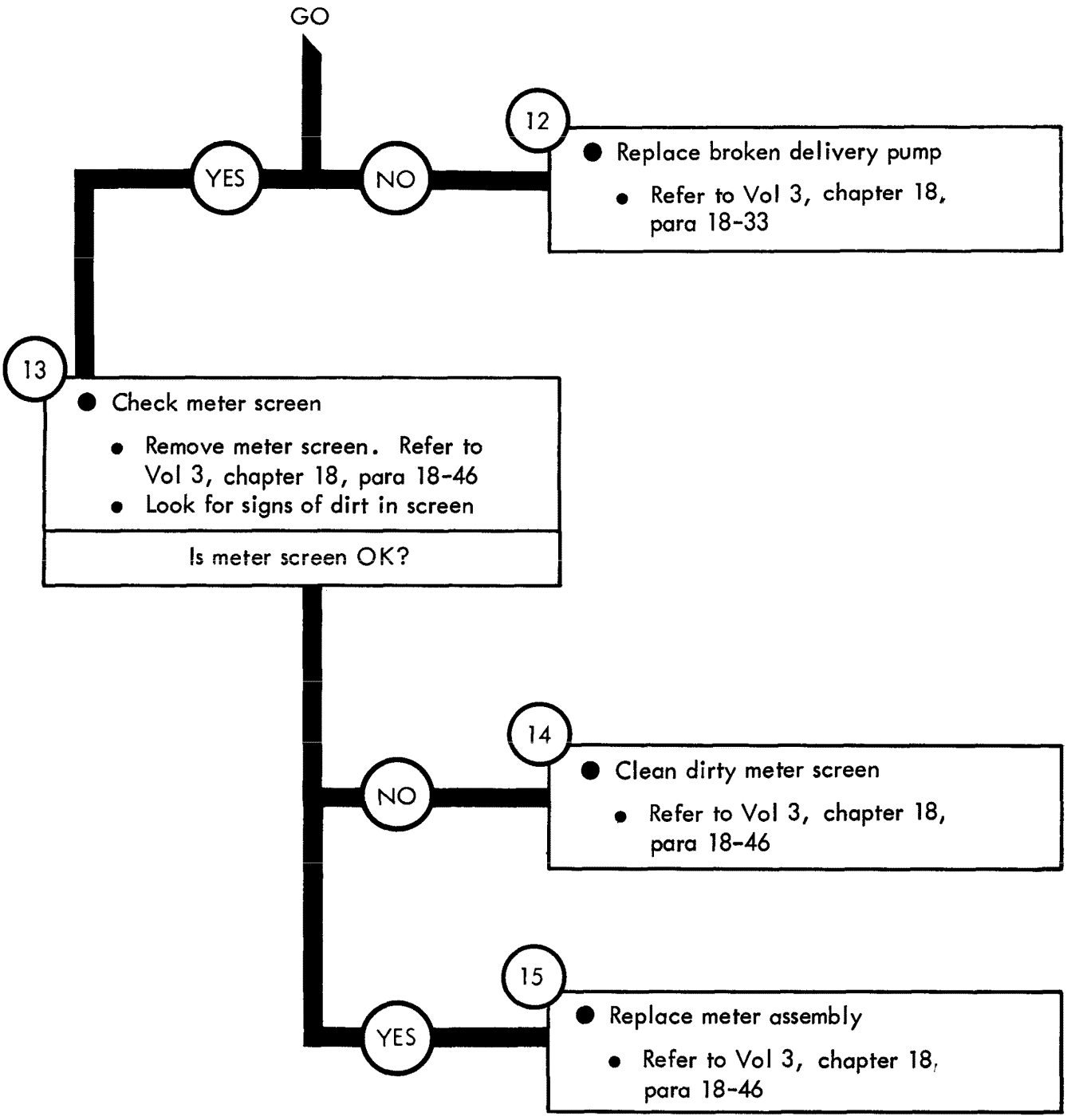
Is delivery pump OK?



GO

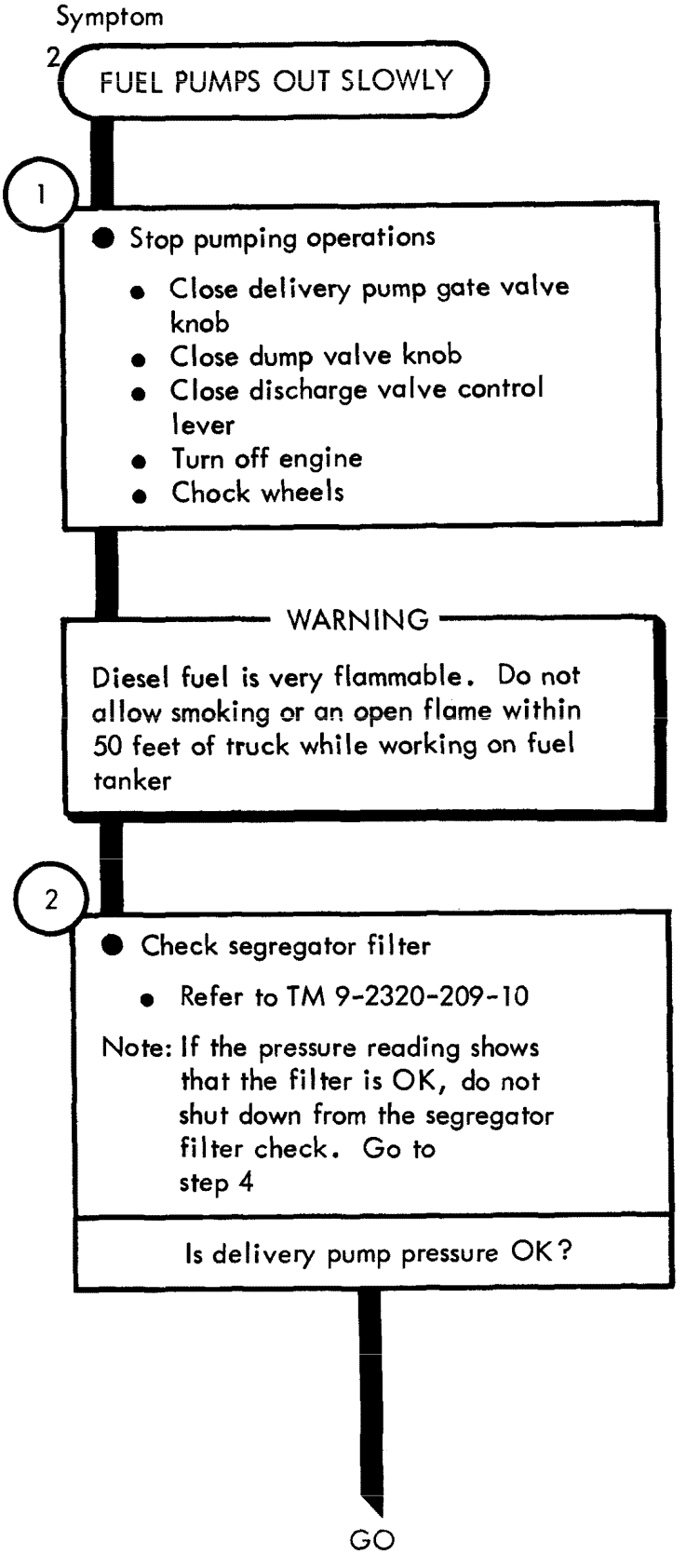
TA 114966

Figure 65-1 (Sheet 4 of 5)



TA 114967

Figure 65-1 (Sheet 5 of 5)



TA 114968

Figure 65-2 (Sheet 1 of 3)

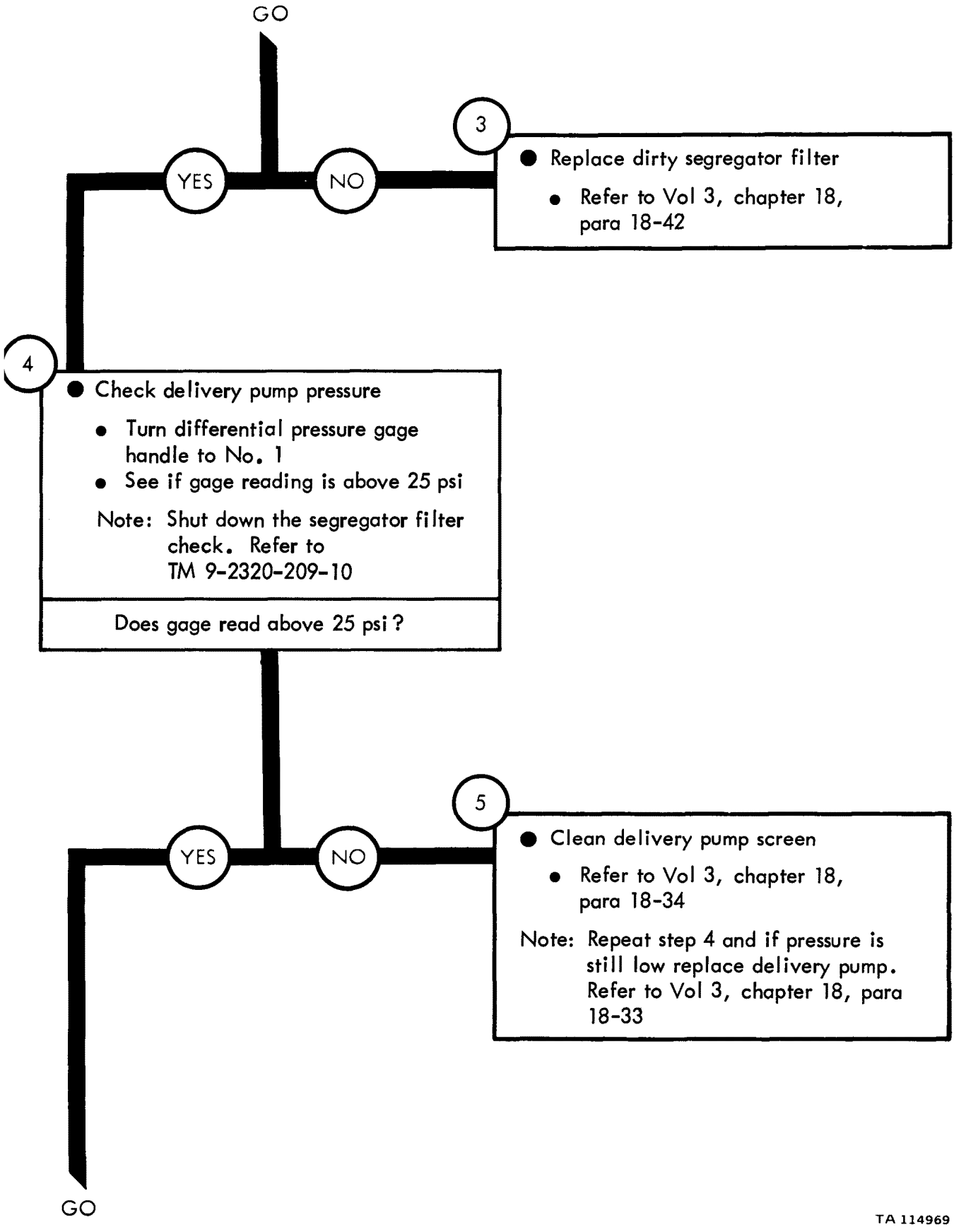
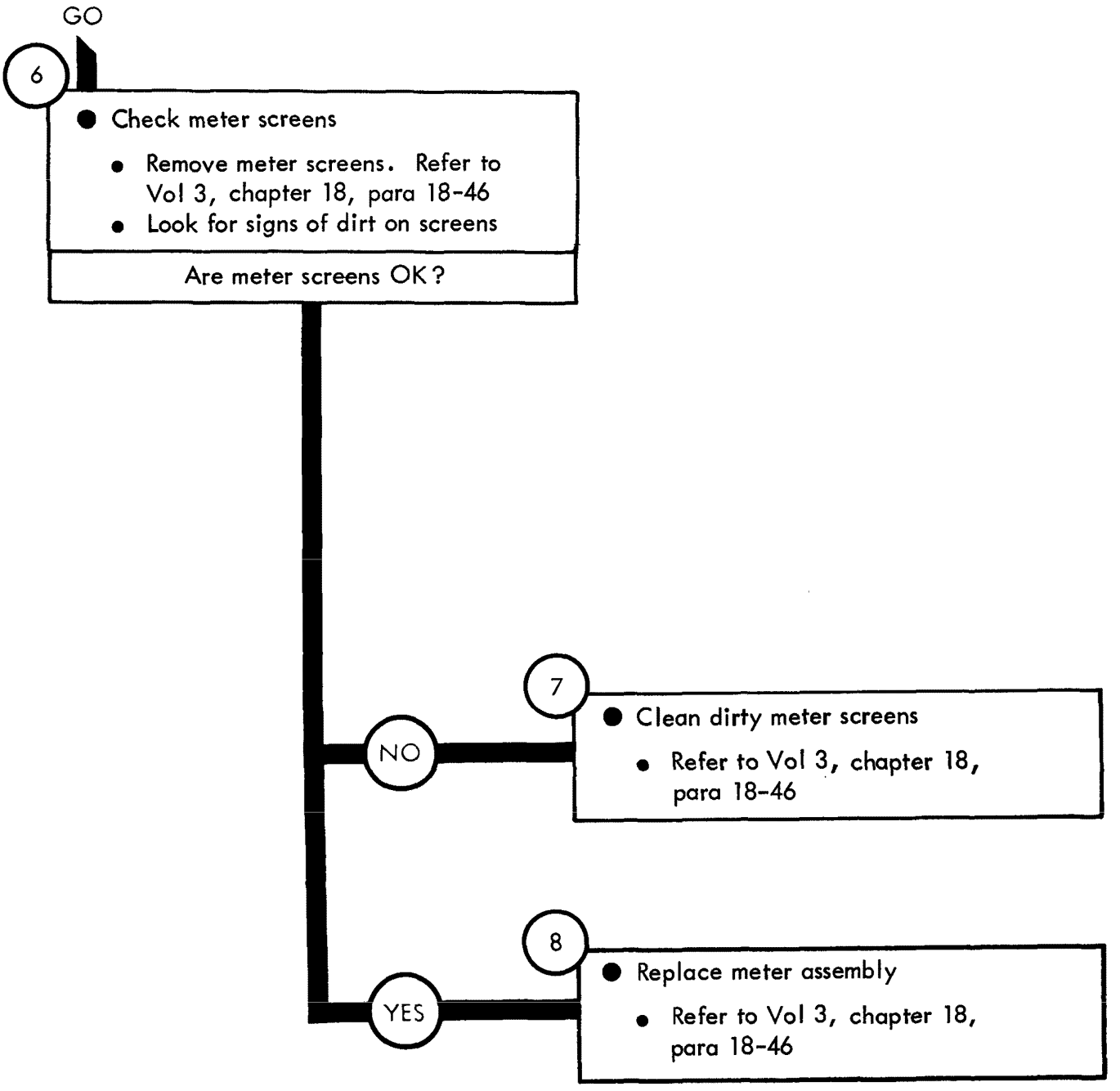
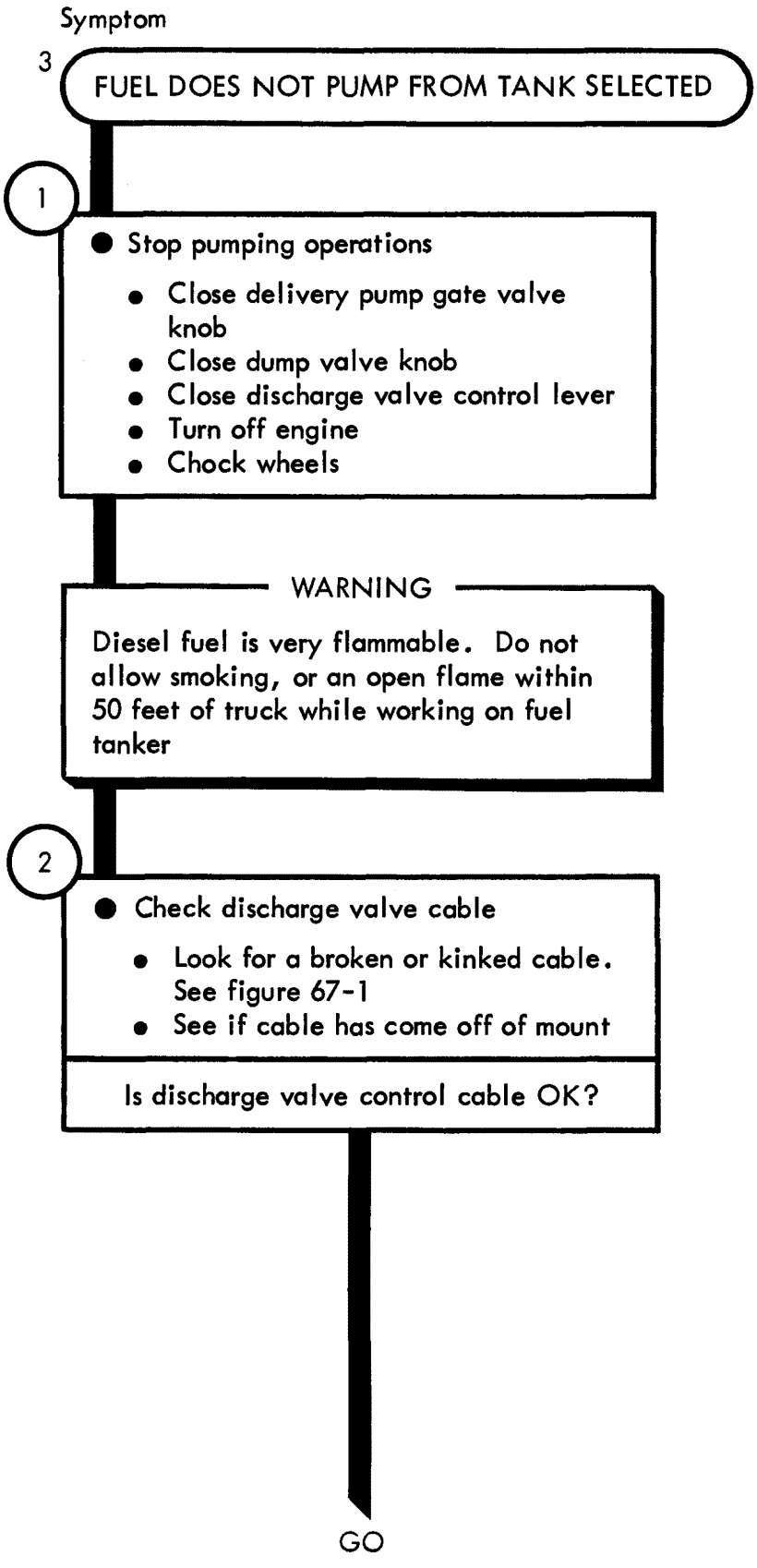


Figure 65-2 (Sheet 2 of 3)



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Figure 65-2 (Sheet 3 of 3)



TA 114971

Figure 65-3 (Sheet 1 of 3)

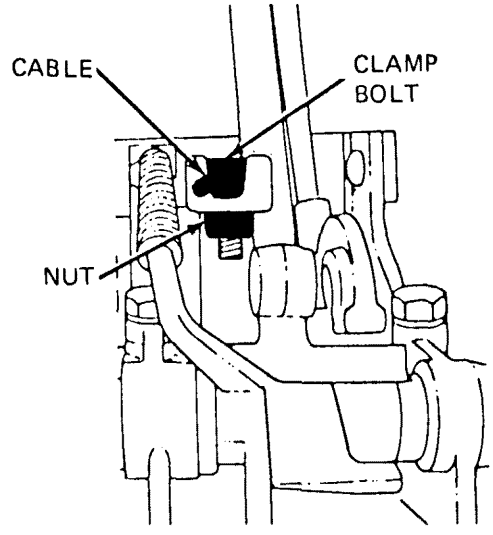
GO

YES

NO

3

- Put back cable that has come off of control lever
  - Make sure valve and control lever are in OFF positions
  - Using 5/8-inch wrench loosen nut
  - Slide cable end through clamp bolt and using pliers hold end tightly
  - Tighten nut using 5/8-inch wrench
  - Adjust cable. Refer to Vol 3, chapter 18, para 18-25 or 18-27
- Replace broken discharge valve control cable
  - Refer to Vol 3, chapter 18, para 18-25 or 18-27



4

- Check discharge valve tubes
  - Look for fuel leaks. See figure 67-1
  - Look for bent, crushed or broken tubes

Are discharge valve tubes OK?

YES

NO

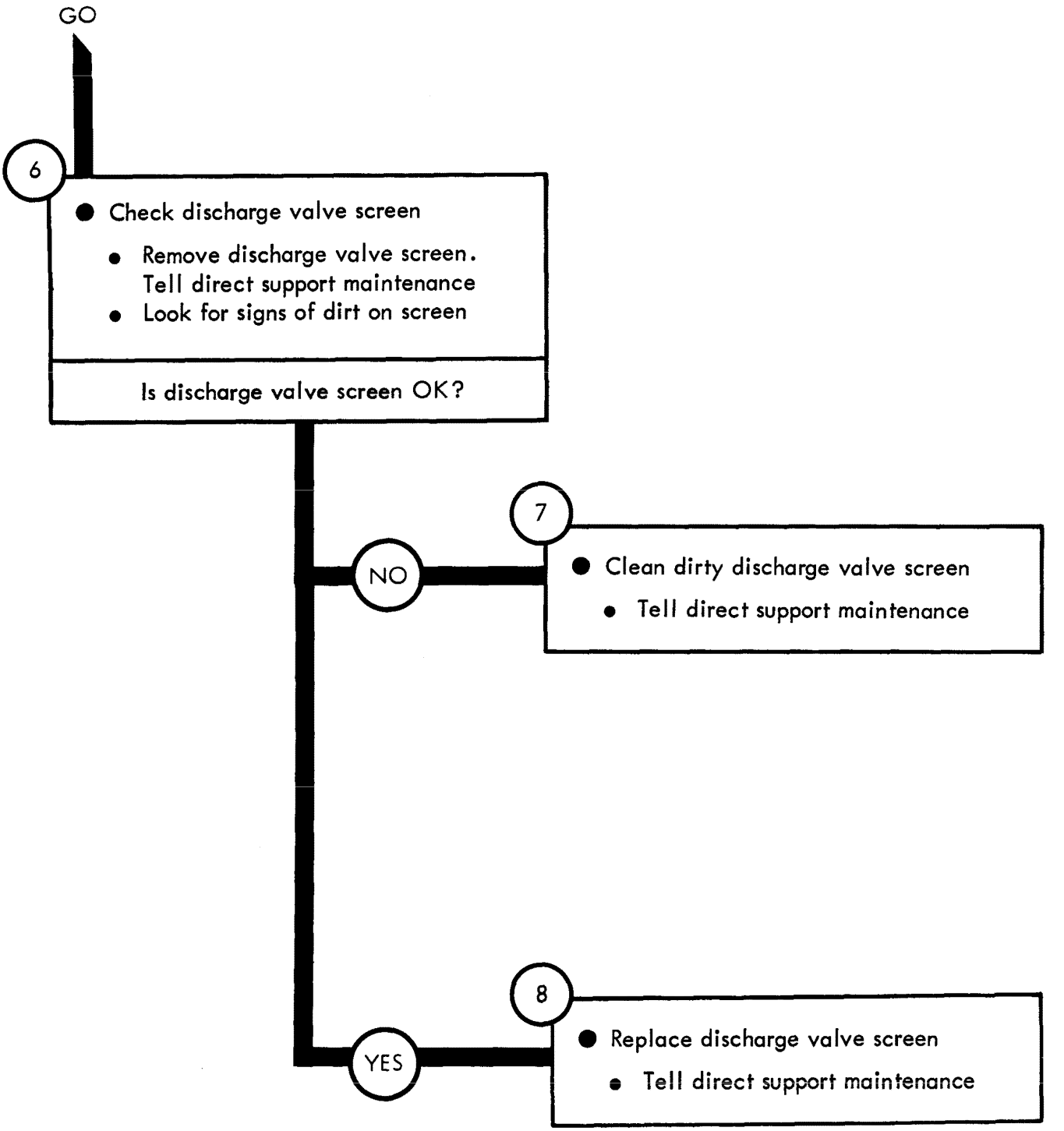
5

- Replace leaking, bent, crushed or broken discharge valve tubes
  - Refer to Vol 3, chapter 18, para 18-21

GO

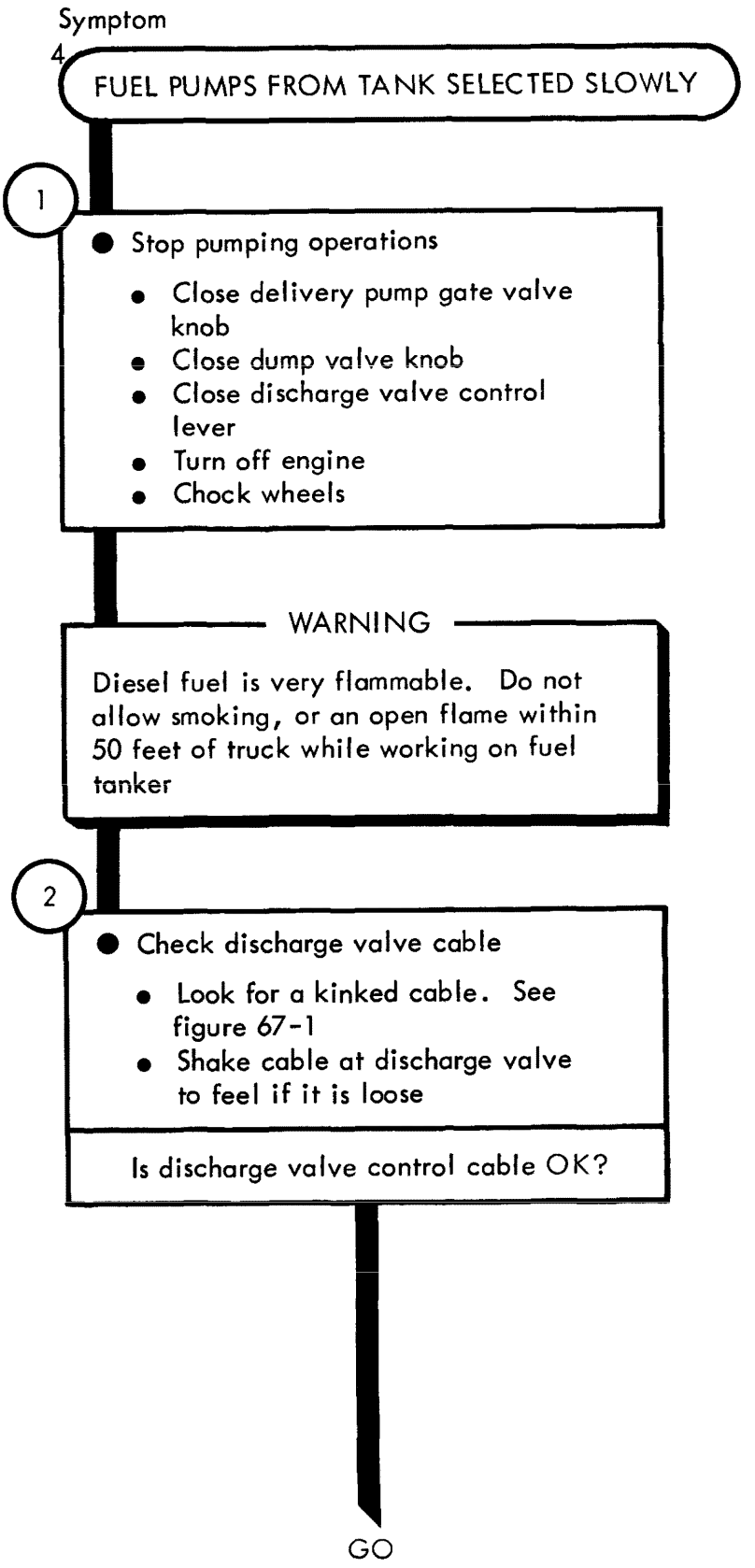
TA 114972

Figure 65-3 (Sheet 2 of 3)



TA 114973

Figure 65-3 (Sheet 3 of 3)



TA 114974

Figure 65-4 (Sheet 1 of 3)

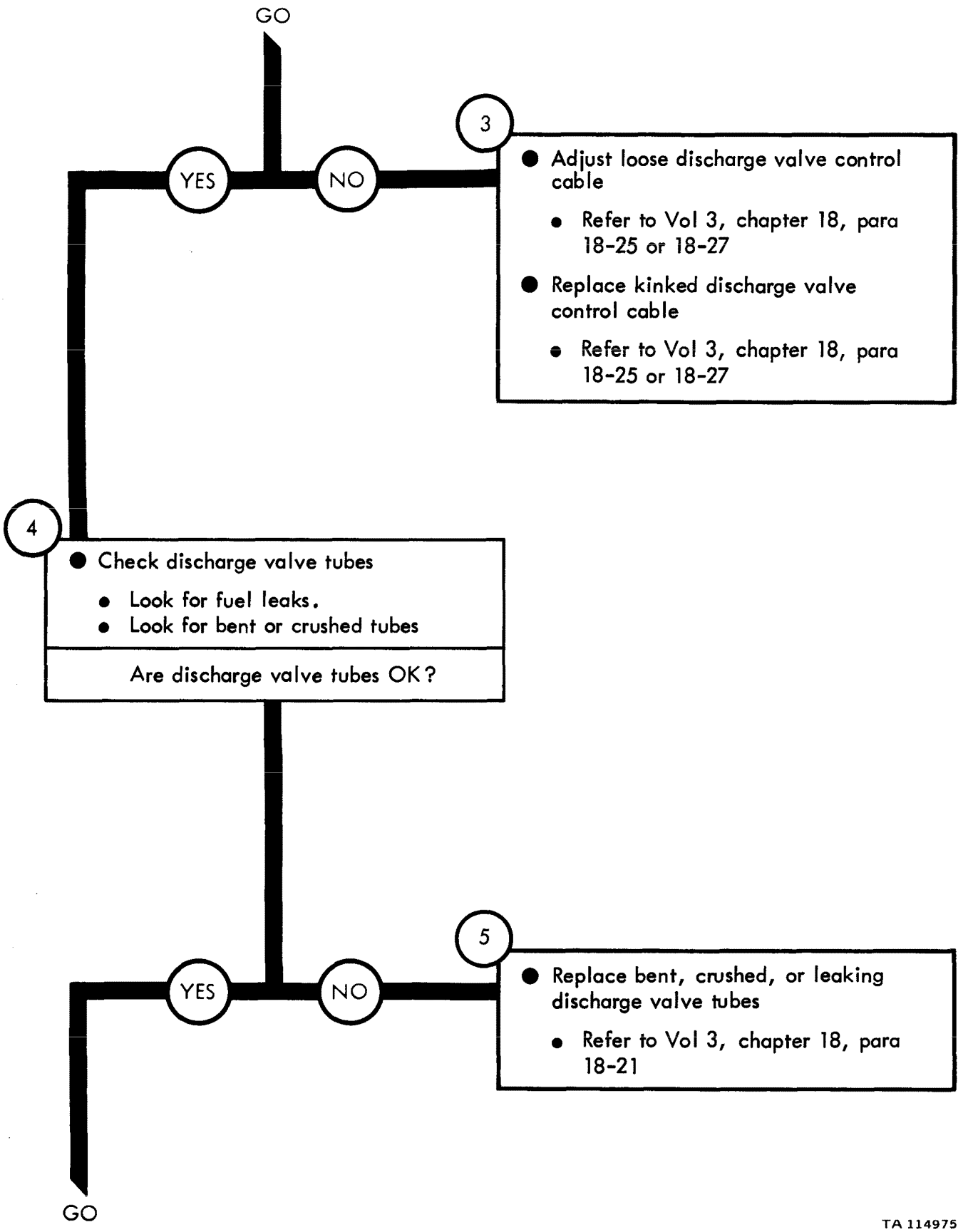
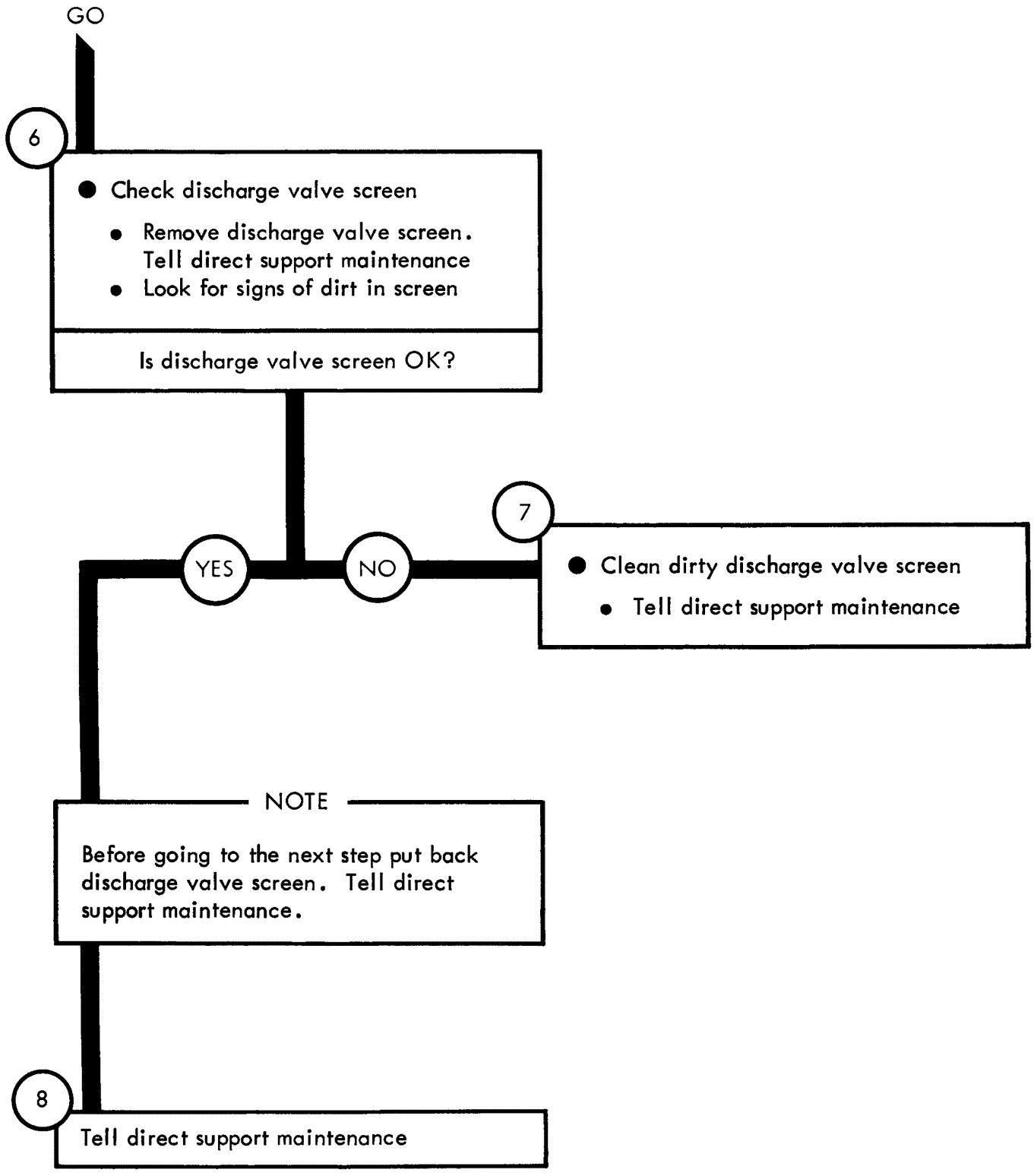
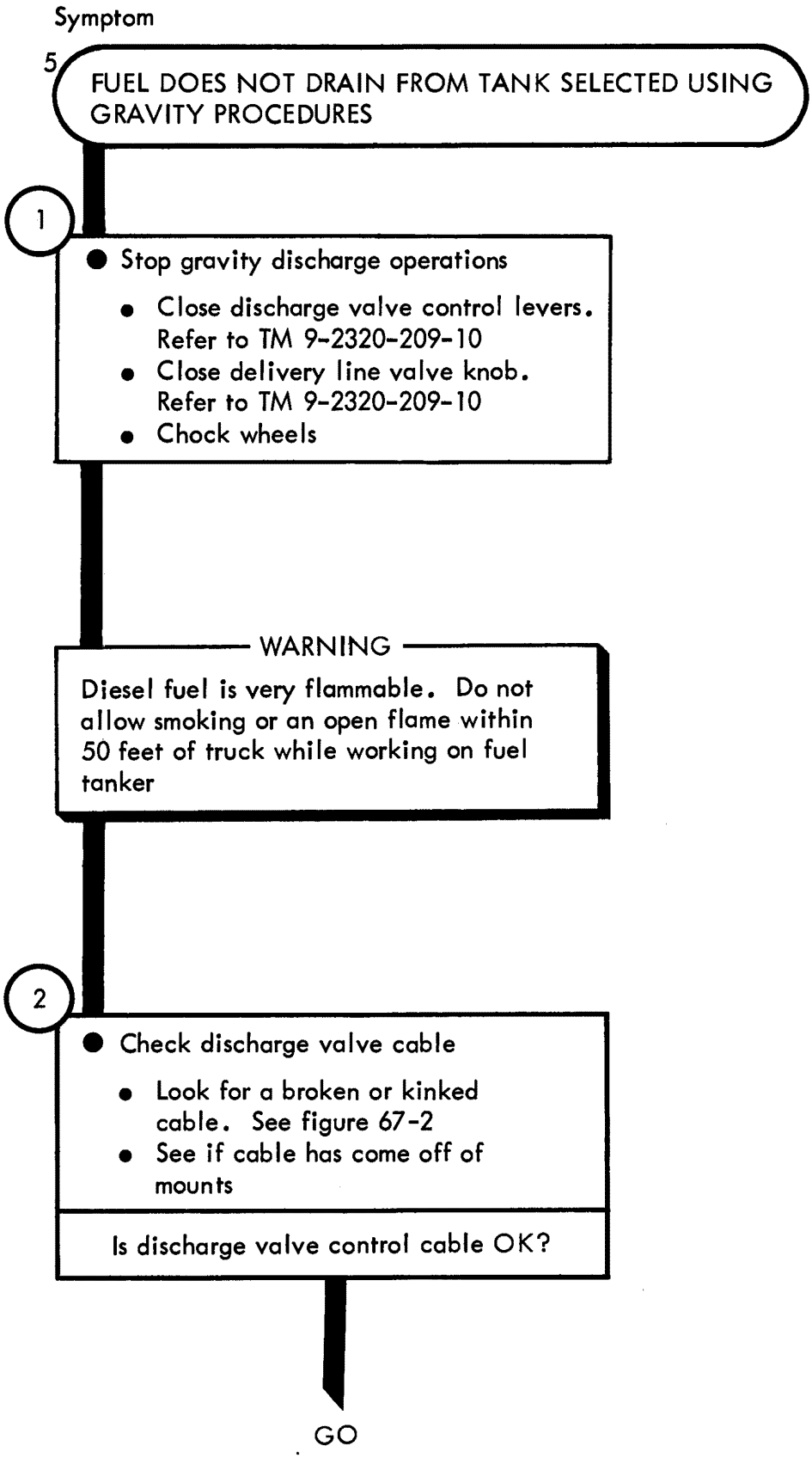


Figure 65-4 (Sheet 2 of 3)



TA 114976

Figure 65-4 (Sheet 3 of 3)



TA 114977

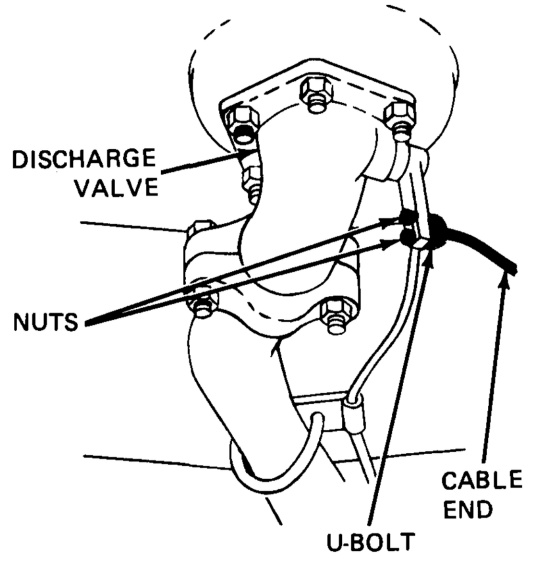
Figure 65-5 (Sheet 1 of 3)

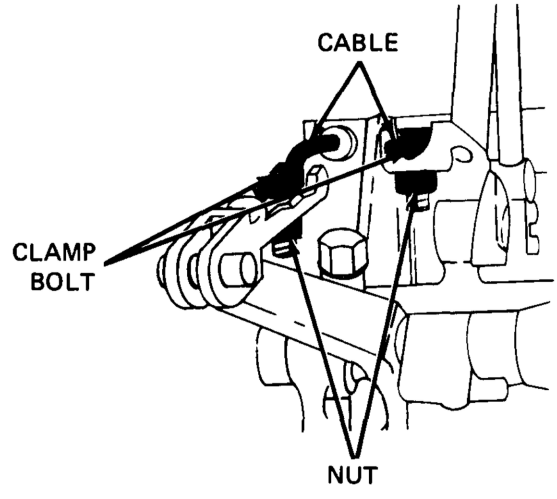
GO

YES

NO

3





- Put back cable that has come off of discharge valve
  - Make sure valve and control levers are in OFF positions. Refer to TM 9-2320-209-10
  - Using 1/2-inch wrench loosen two nuts on U-bolt
  - Slide cable end through U-bolt and using pliers hold end tightly
  - Tighten two nuts on U-bolt using 1/2-inch wrench
  - Adjust cables. Refer to Vol 3, chapter 18, para 18-25 or 18-27
- Put back cable that has come off control lever
  - Make sure valve and control lever are in OFF positions. Refer to TM 9-2320-209-10
  - Using 5/8-inch wrench loosen nut
  - Slide cable end through clamp bolt and using pliers hold end tightly
  - Tighten nut using 5/8-inch wrench
  - Adjust cables. Refer to Vol 3, chapter 18, para 18-25 or 18-27

Ž Replace broken discharge valve control cable

- Refer to Vol 3, chapter 18, para 18-25 or 18-27

GO

TA 114978

Figure 65-5 (Sheet 2 of 3)

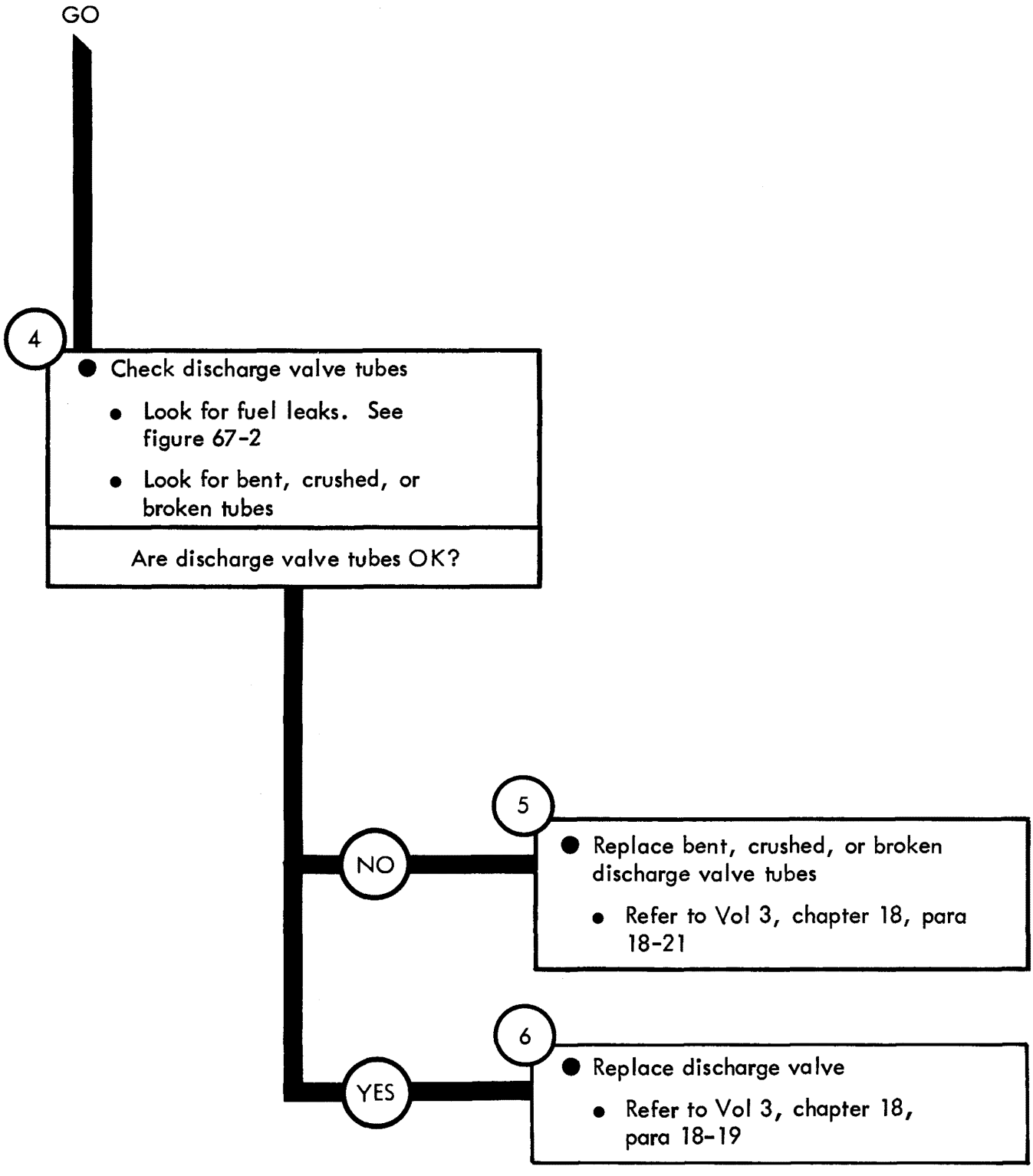
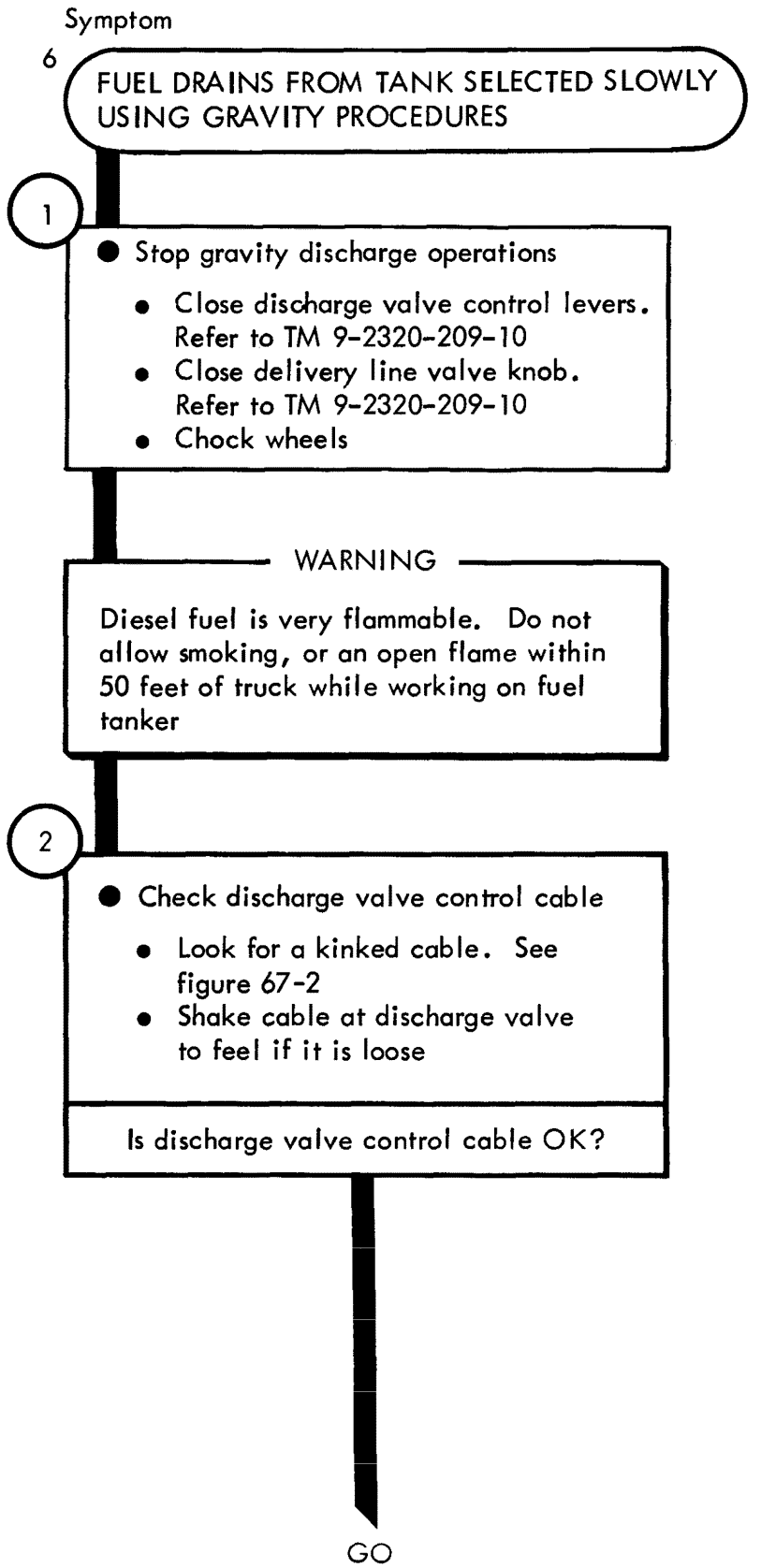


Figure 65-5 (Sheet 3 of 3)



TA 114980

Figure 65-6 (Sheet 1 of 3)

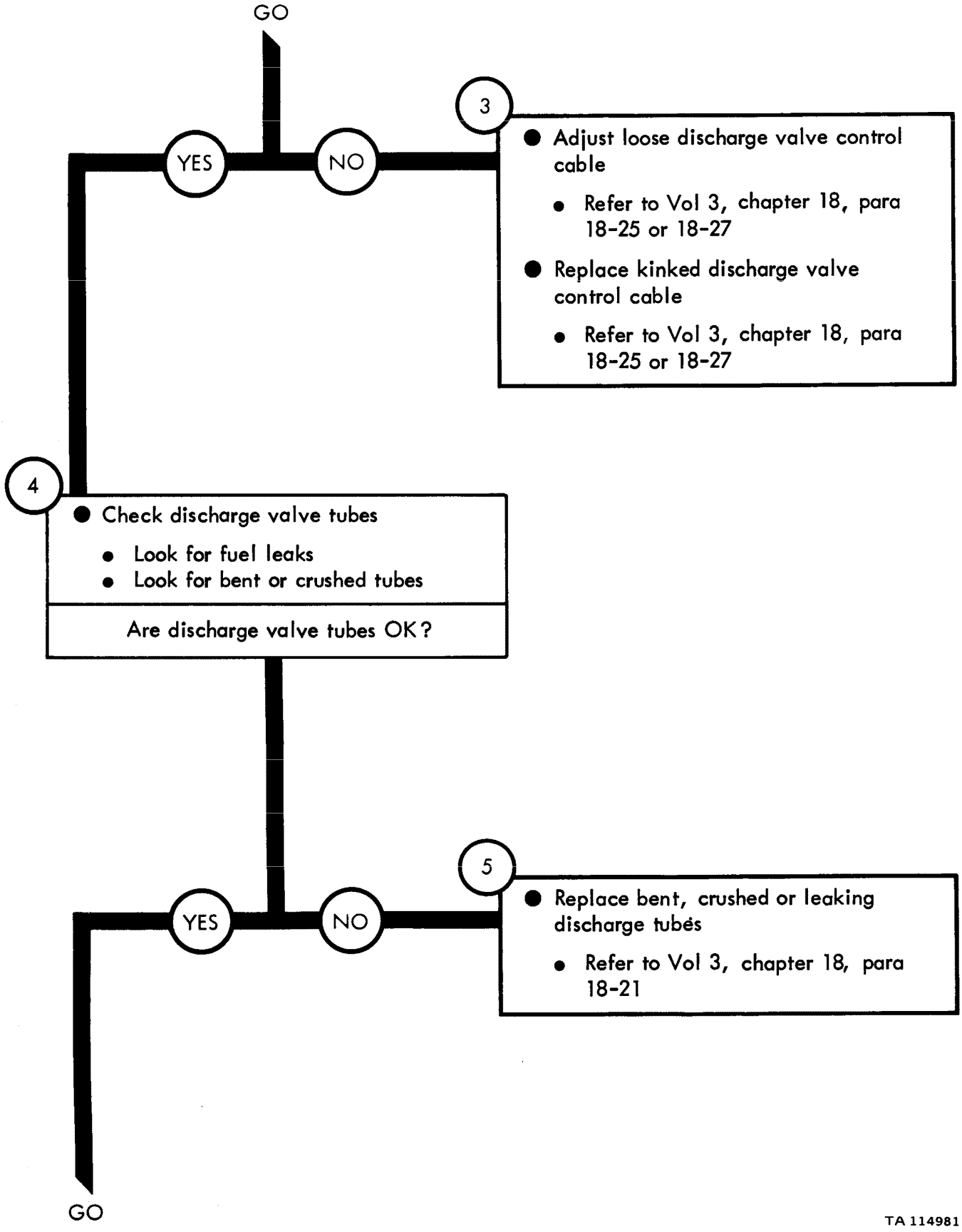
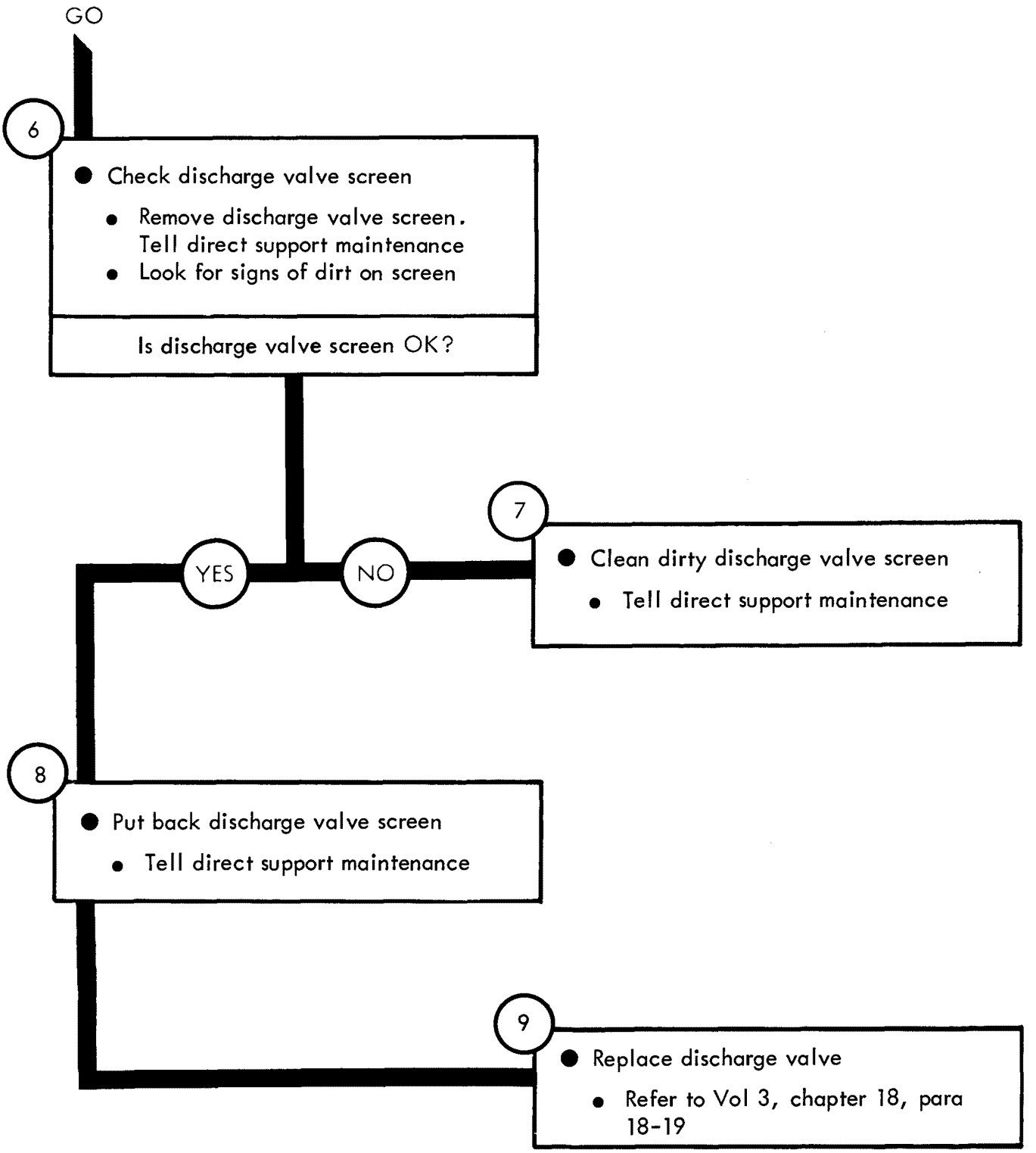


Figure 65-6 (Sheet 2 of 3)



TA 114982

Figure 65-6 (Sheet 3 of 3)

Symptom 7

TANKS CANNOT BE FILLED BY SUCTION

1

- Make truck ready for work on suction system
  - Park truck. Refer to TM 9-2320-209-10

WARNING

be used when choosing a place to work on fuel tanks. 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

2

- Check fusible link
  - See if link has come off mounting pin
  - Look for a broken link

Is fusible link OK?

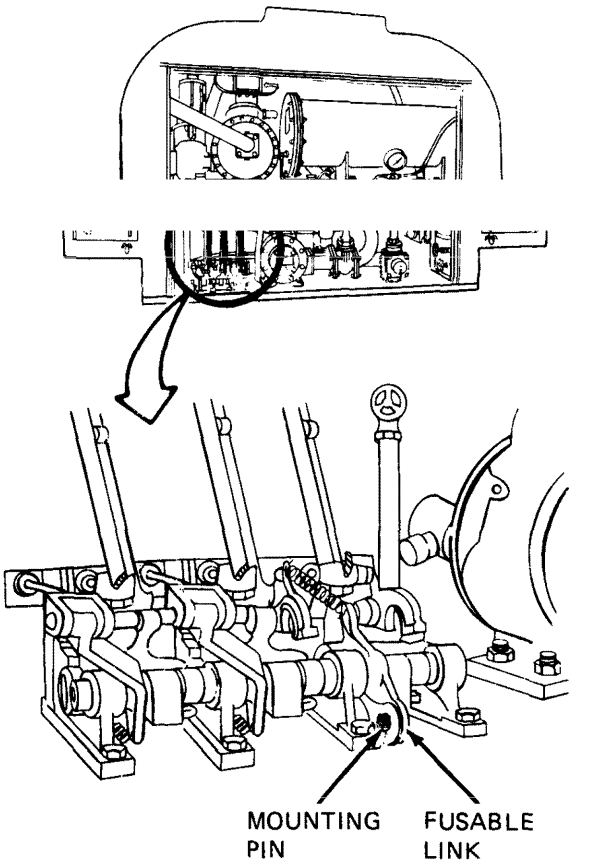
YES

NO

3

- Put back fusible link that has come off mounting pin
  - Slide link over mounting pin
  - Put cotter pin through hole in mounting pin and bend ends around using needle nose pliers
- Replace broken fusible link
  - Refer to Vol 3, chapter 18, para 18-30

GO



TA 114983

Figure 65-7 (Sheet 1 of 6)

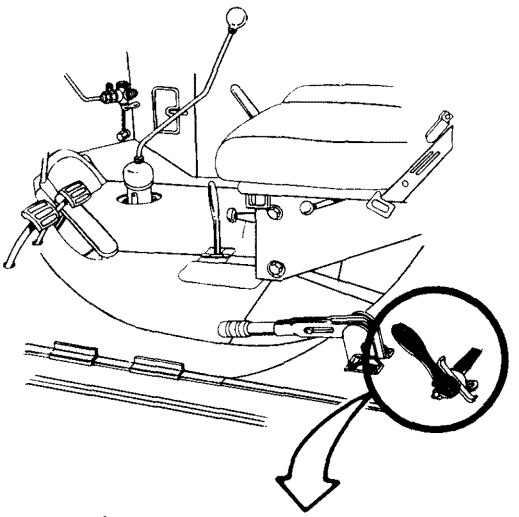
GO

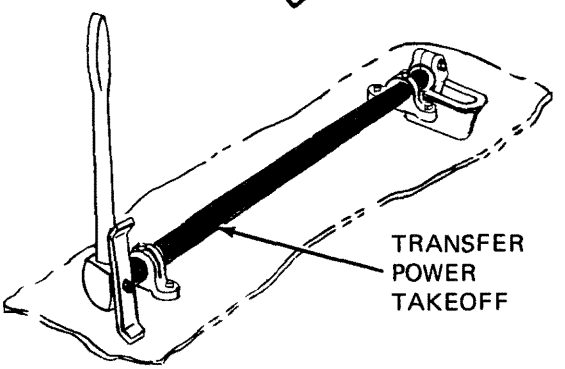
4

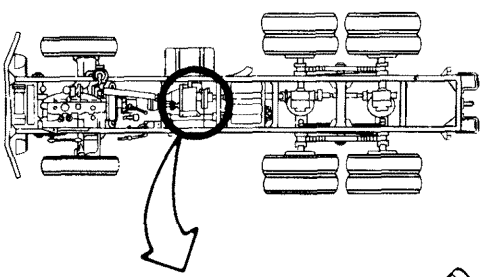
- Check power takeoff linkage
  - Look for loose, bent or broken linkage
  - Crawl under truck
  - Feel for loose, bent or broken linkage

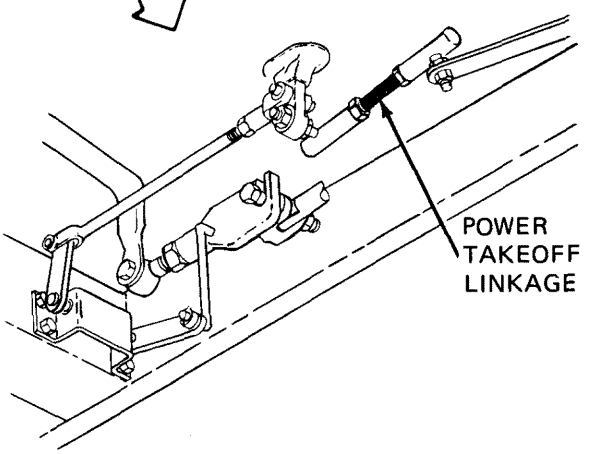
Is power takeoff linkage OK?

GO









TA 114984

Figure 65-7 (Sheet 2 of 6)

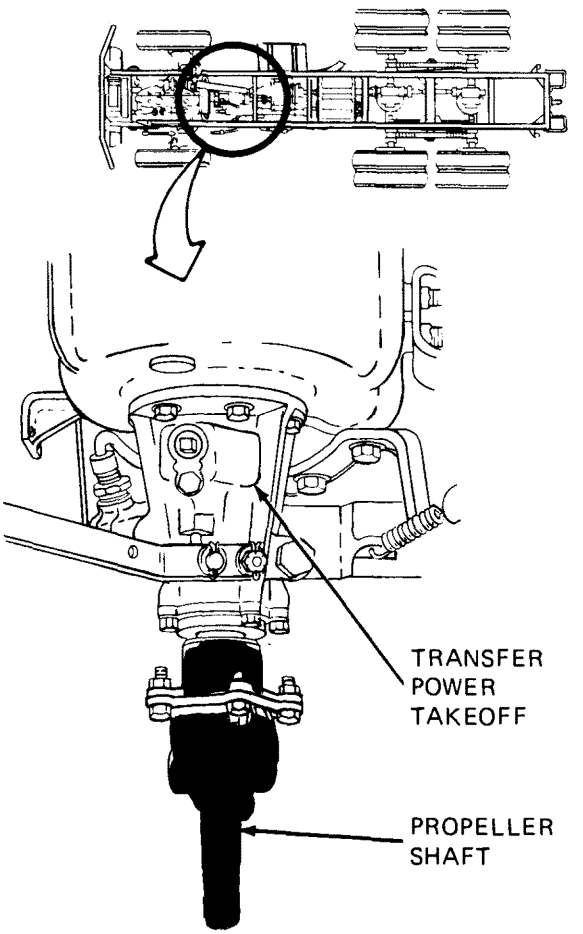
GO

YES

NO

5

- Adjust loose linkage
  - Refer to Vol 3, chapter 19, para 19-25
- Replace bent or broken linkage
  - Refer to Vol 3, chapter 19, para 19-25



6

- Check power takeoff
  - Start engine and turn on power takeoff. Refer to TM 9-2320-209-10
  - Crawl under truck
  - Look to see if propeller shaft is turning at power takeoff

Is shaft turning?

YES

NO

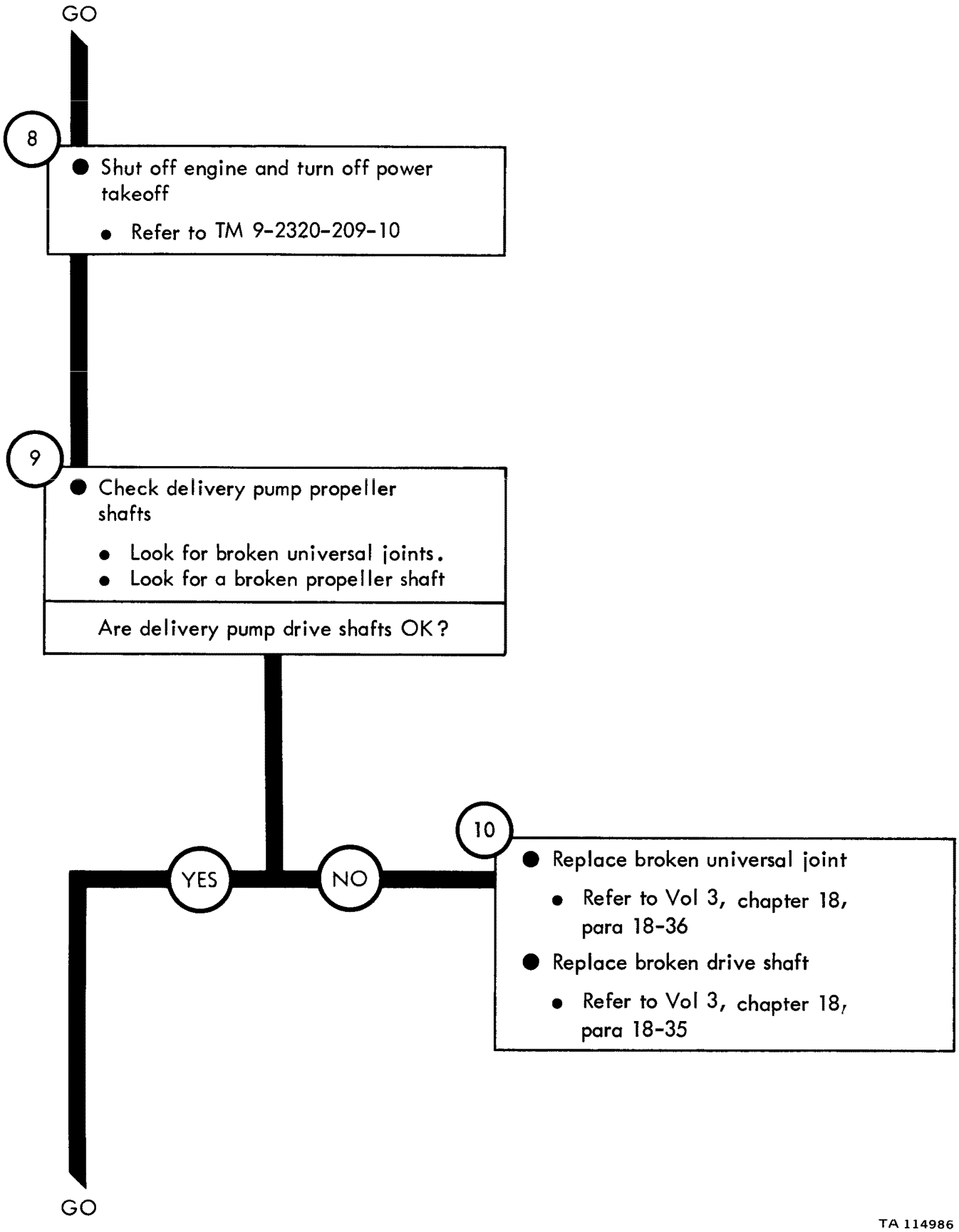
7

Tell direct support maintenance

GO

TA 114985

Figure 65-7 (Sheet 3 of 6)



TA 114986

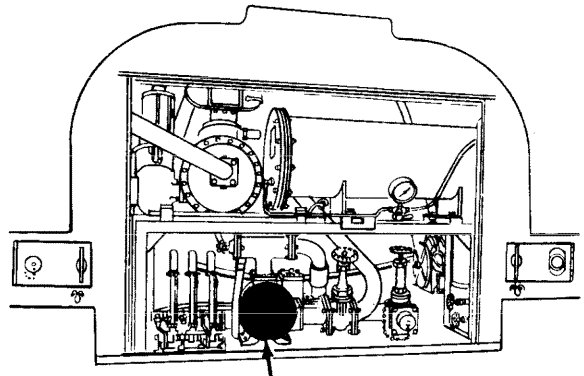
Figure 65-7 (Sheet 4 of 6)

GO

11

- Check delivery pump
  - Turn pump on. Refer to TM 9-2320-209-10
  - Listen for noise from pump
  - Put hand on pump
  - Feel for a lot of vibration

Is delivery pump OK?



YES

NO

12

- Replace broken delivery pump
  - Refer to Vol 3, chapter 18, para 18-33

13

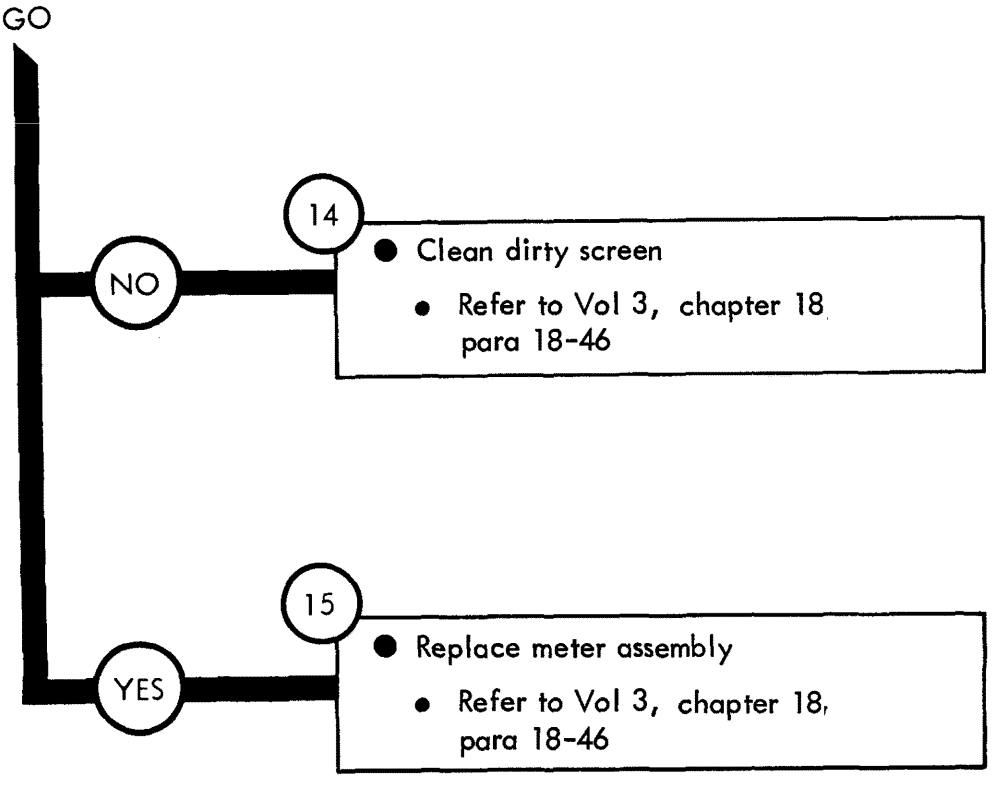
- Check meter screen
  - Remove meter screen. Refer To Vol 3, chapter 18, para 18-46
  - Look for signs of dirt in screen

Is meter screen OK?

GO

TA 114987

Figure 65-7 (Sheet 5 of 6)



TA 114988

Figure 65-7 (Sheet 6 of 6)

CHAPTER 66

FUEL TANK BODY (TRUCK M49A1C) TROUBLESHOOTING SUMMARY

66-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 65 for the fuel tank body (M49A1C).

66-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how -to-do-it" instructions. Warnings, cautions, and notes are given where needed.

FUEL TANK BODY M49A1C TROUBLESHOOTING SUMMARY

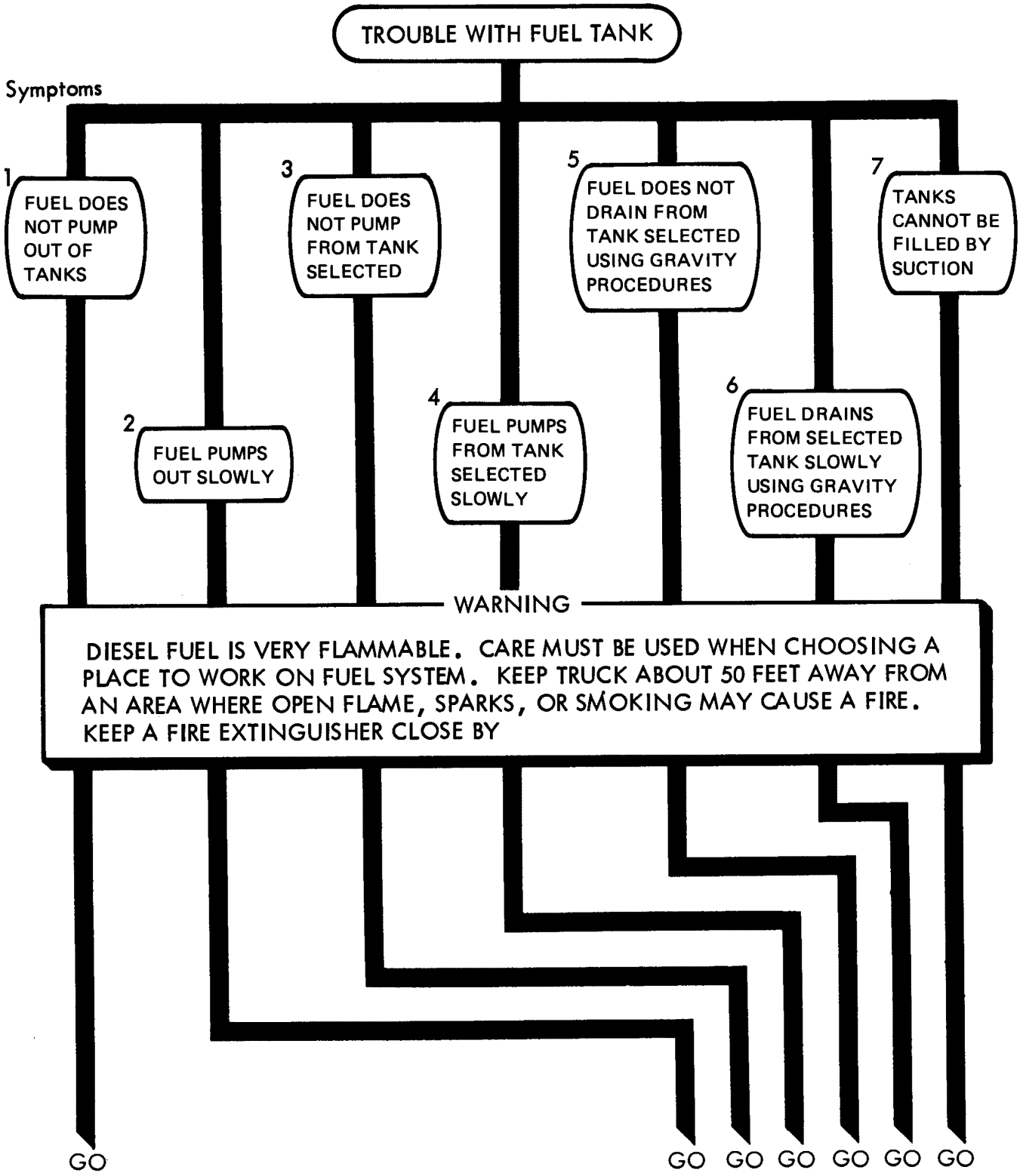
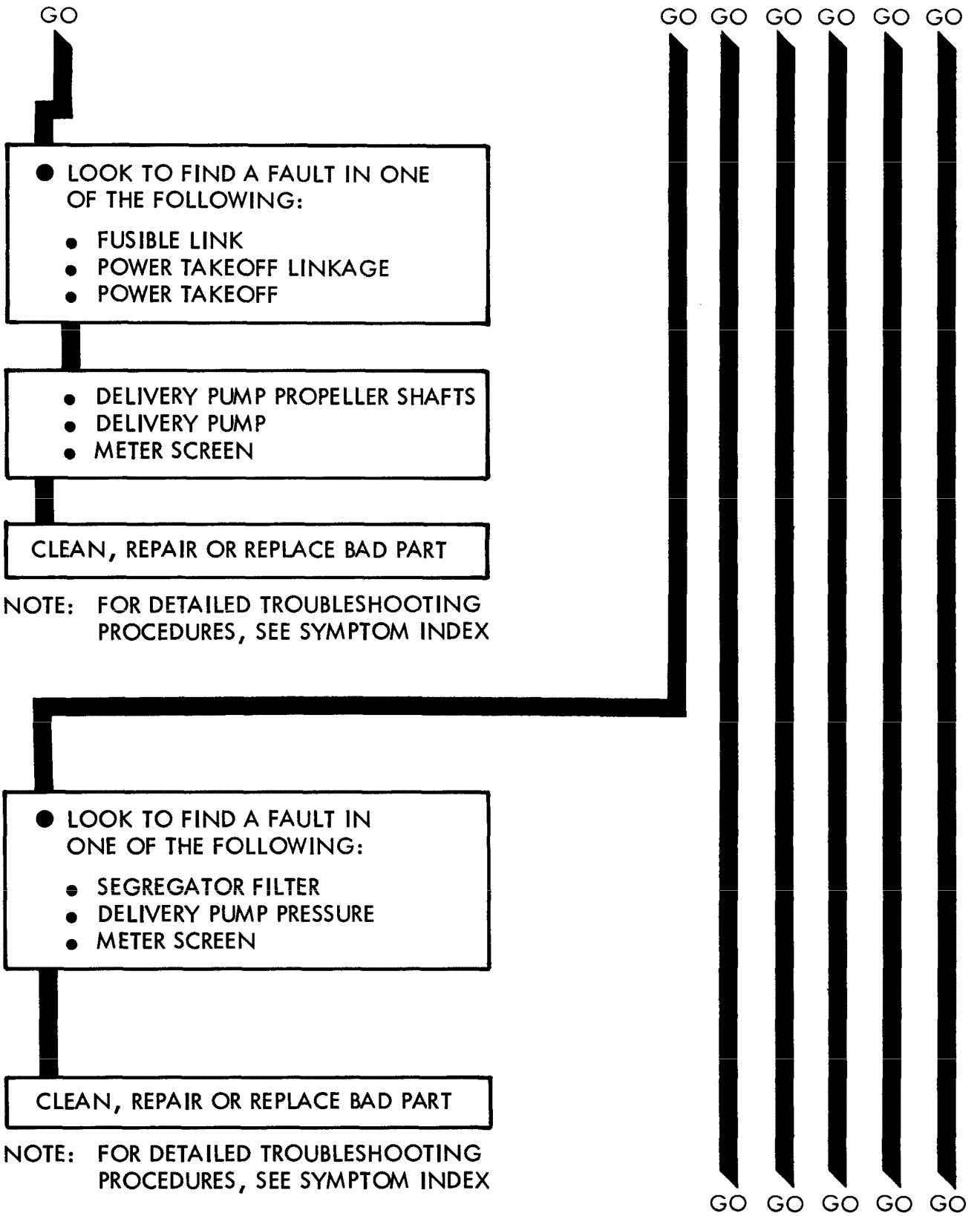


Figure 66-1 (Sheet 1 of 5)



TA 114989b

Figure 66-1 (Sheet 2 of 5)

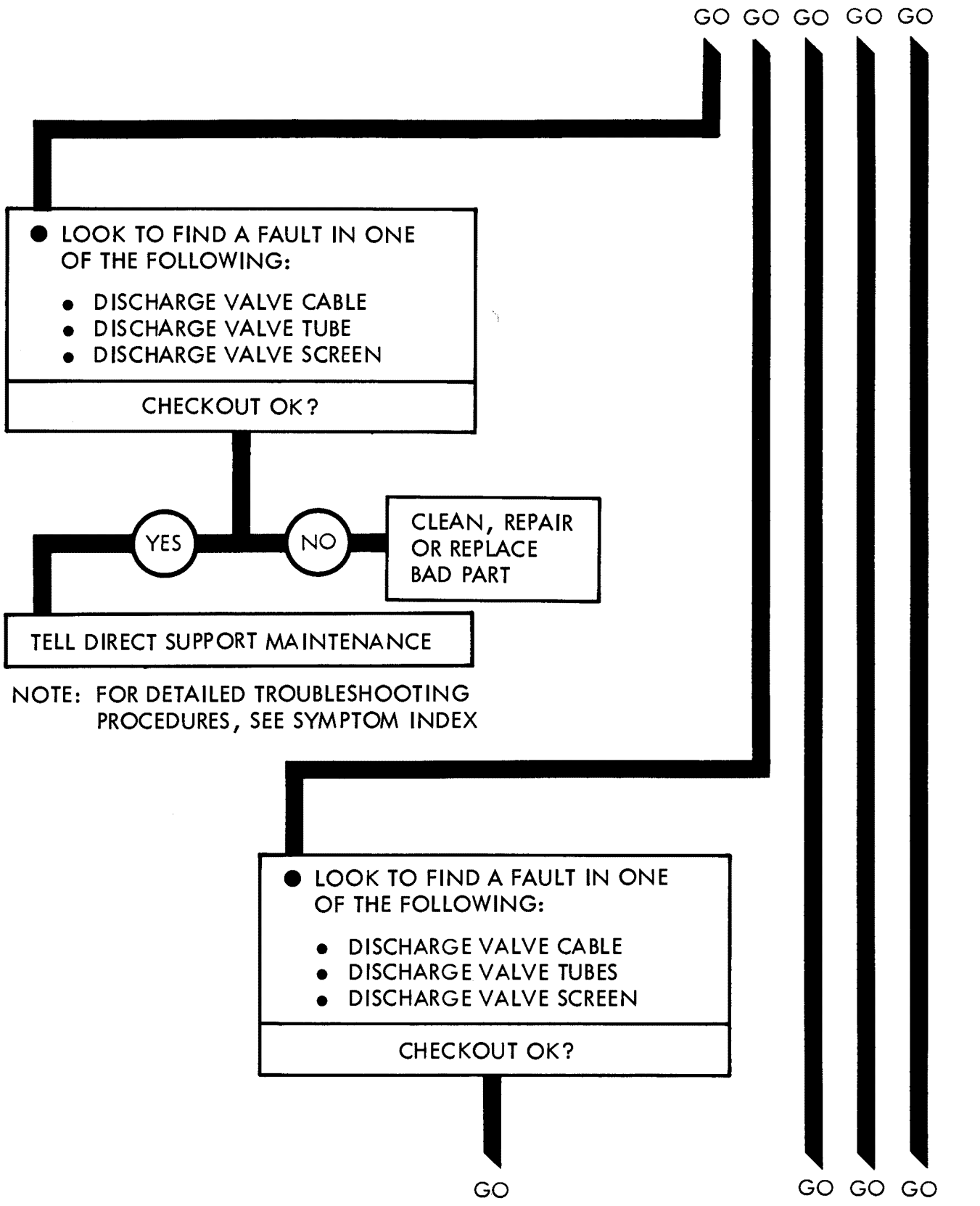


Figure 66-1 (Sheet 3 of 5)

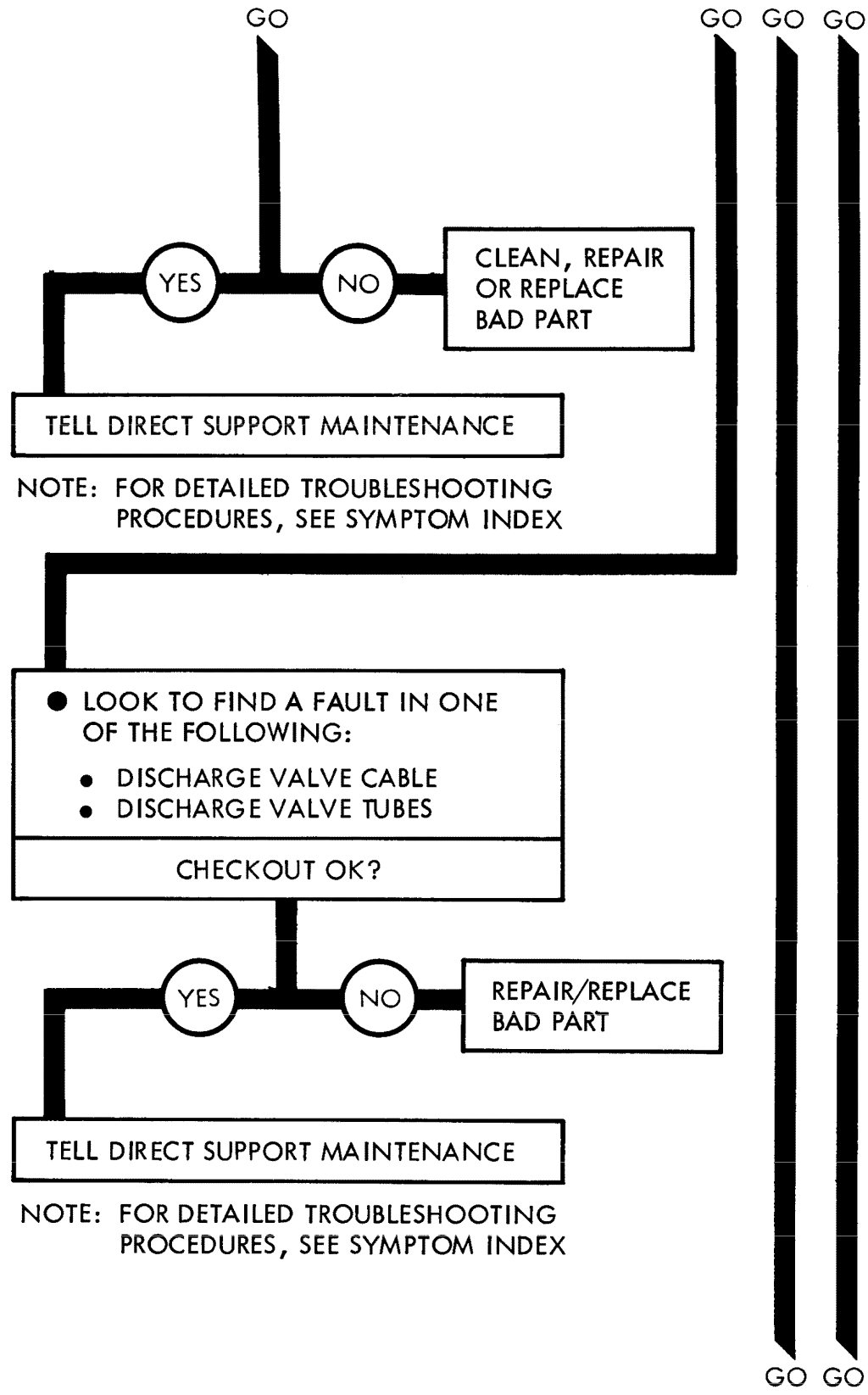


Figure 66-1 (Sheet 4 of 5)

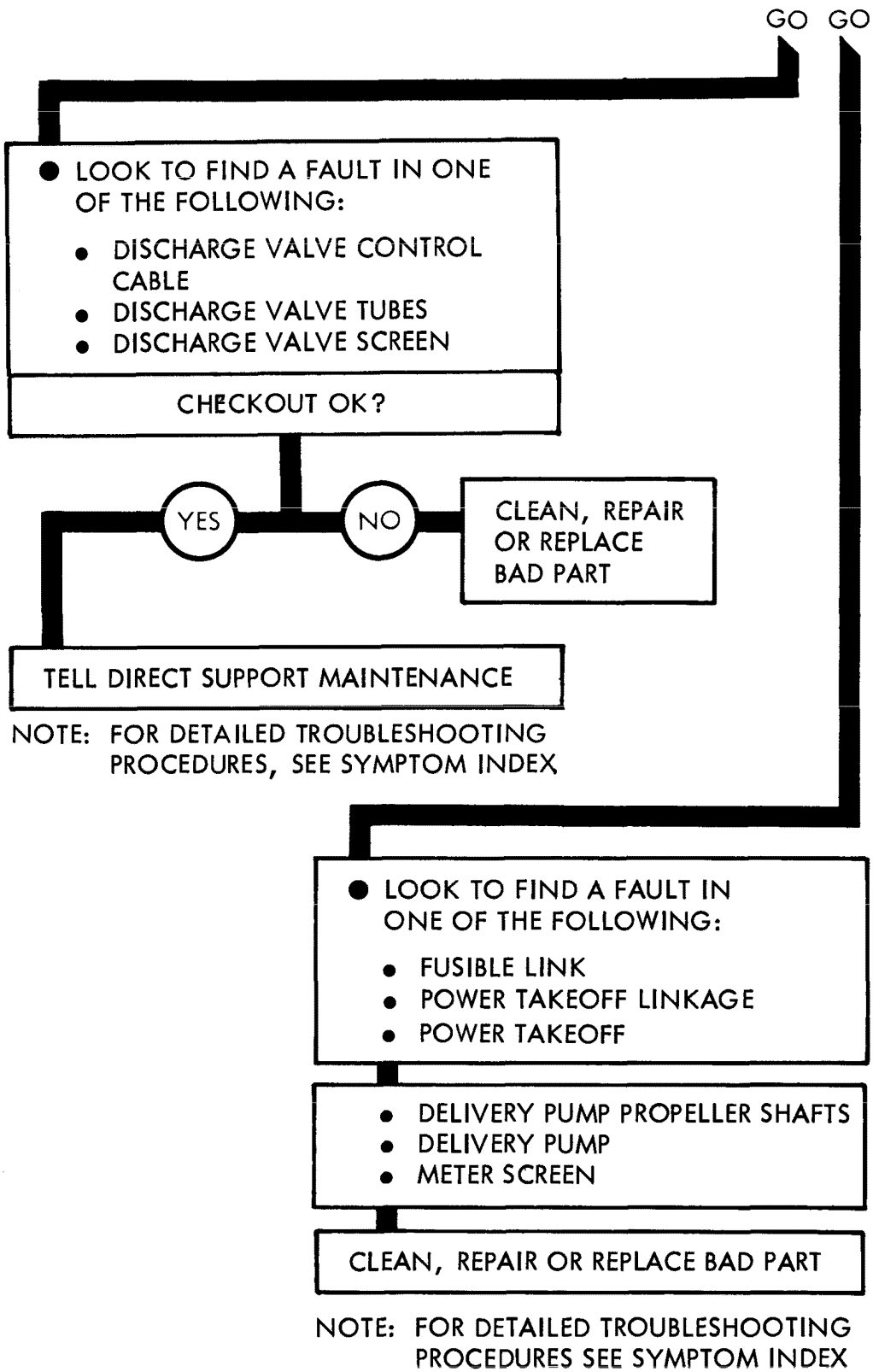


Figure 66-1 (Sheet 5 of 5)

CHAPTER 67

FUEL TANK BODY (TRUCK M49A1C) SUPPORT DIAGRAMS

67-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 65. Table 3-1 is a complete listing of all support diagrams used in this manual.

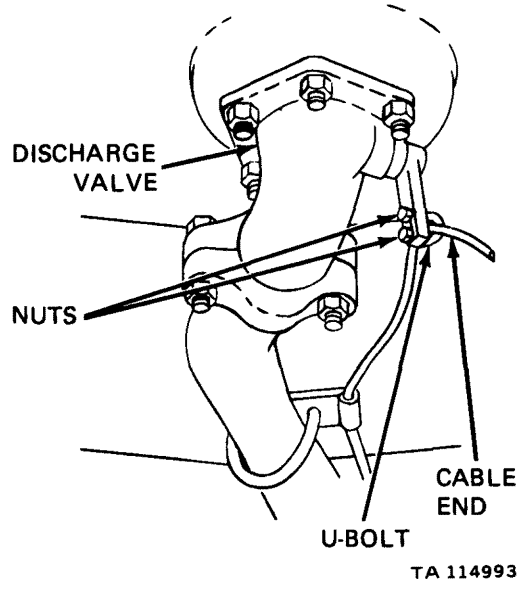


Figure 67-1. Fuel Tank Body (M49A1C) Support Diagram

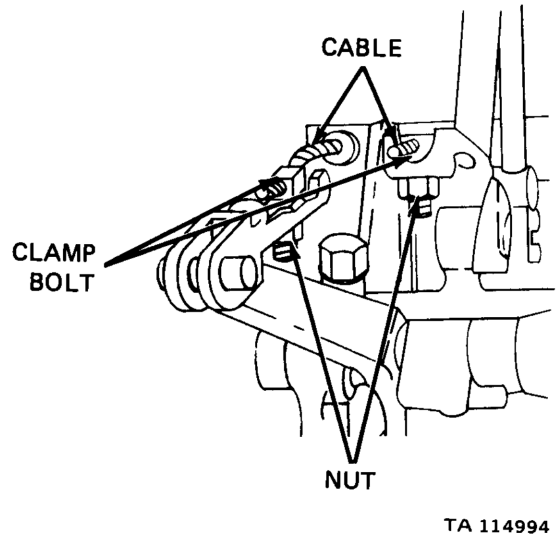


Figure 67-2. Fuel Tank Body (M49A1C) Support Diagram

CHAPTER 68

FUEL TANK BODY (TRUCK M49A1C) CHECKOUT PROCEDURES

68-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and refering to the fault symptom index when the system does not checkout.

FUEL TANK BODY M49A1C CHECKOUT

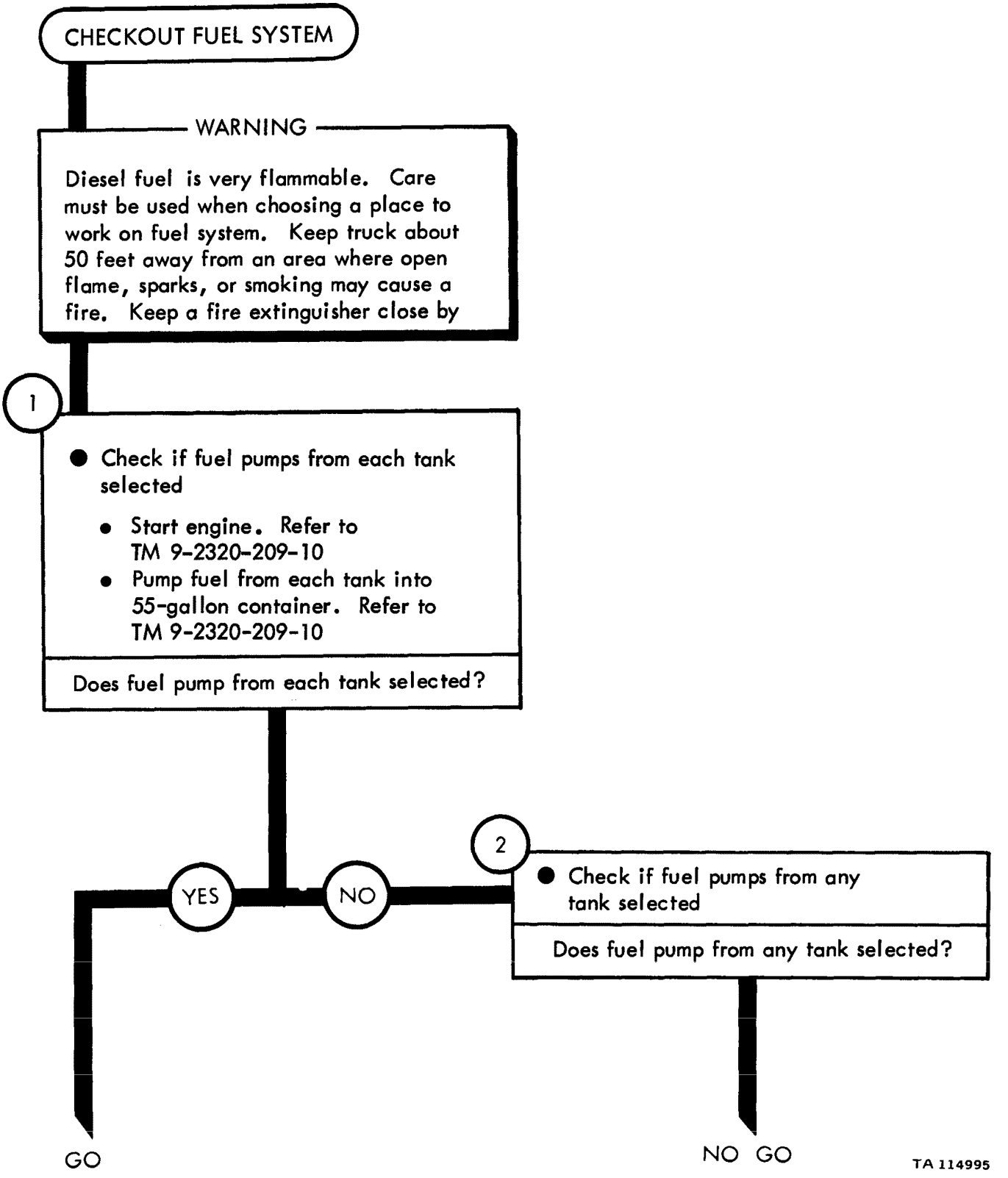


Figure 68-1 (Sheet 1 of 4)

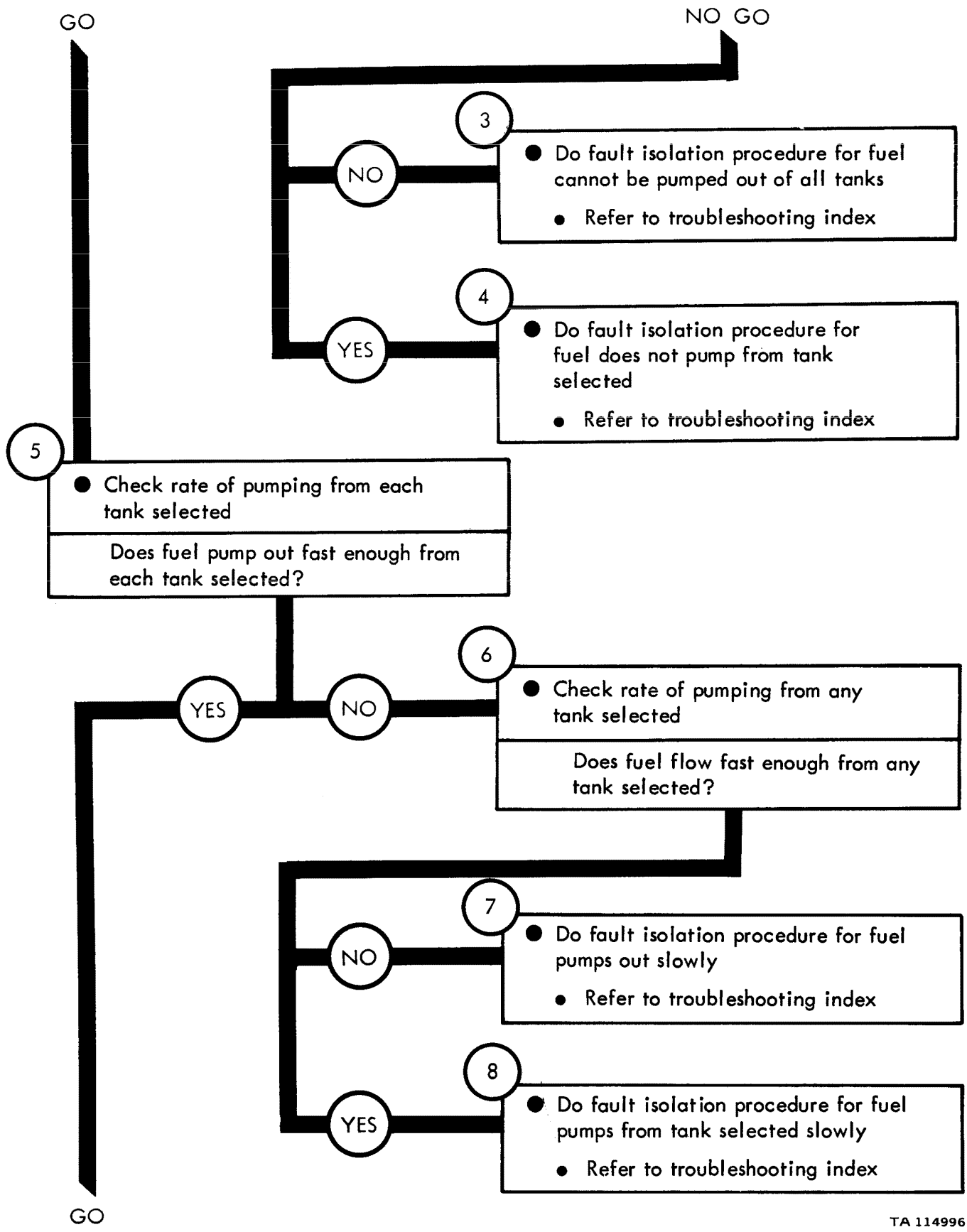


Figure 68-1 (Sheet 2 of 4)

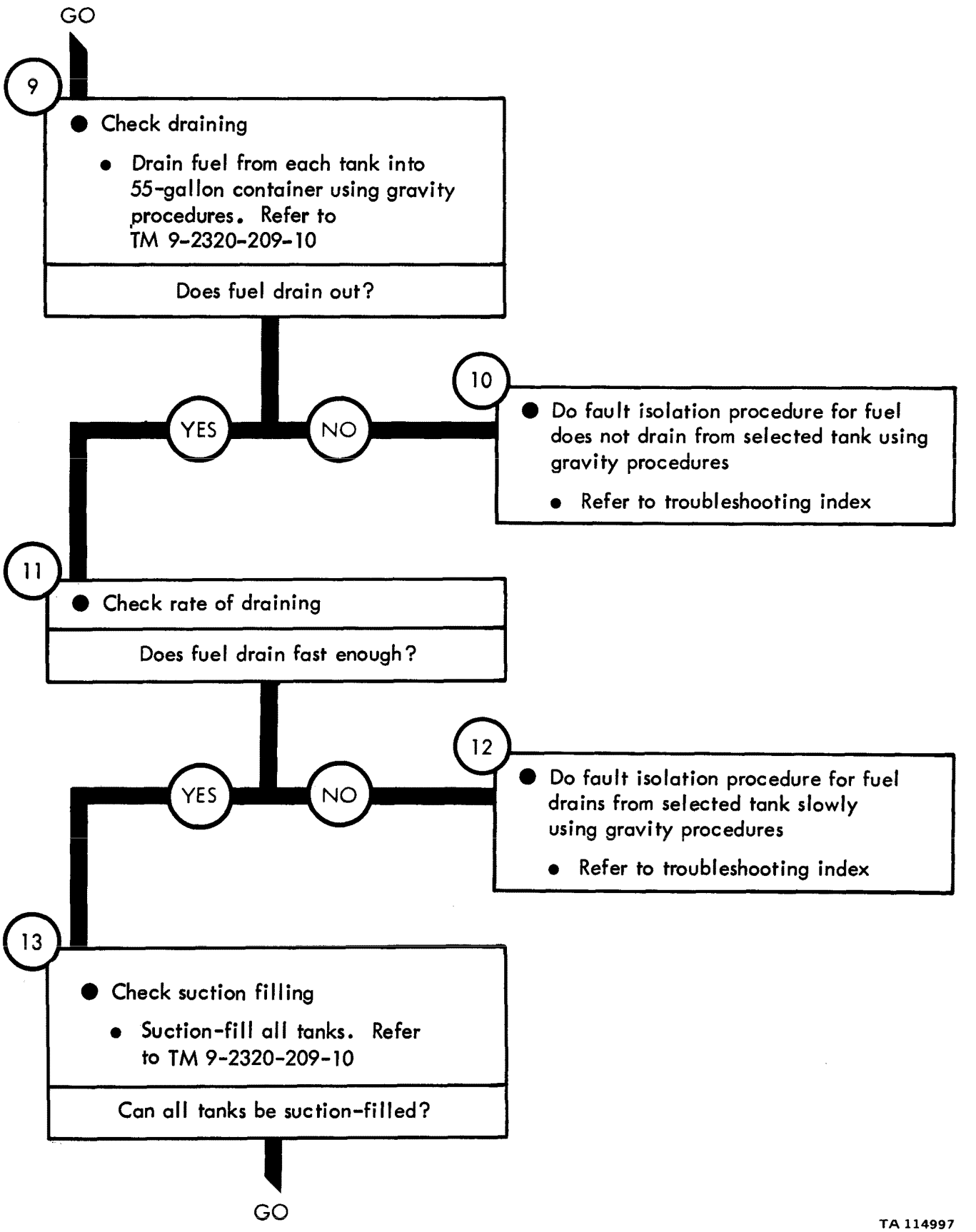
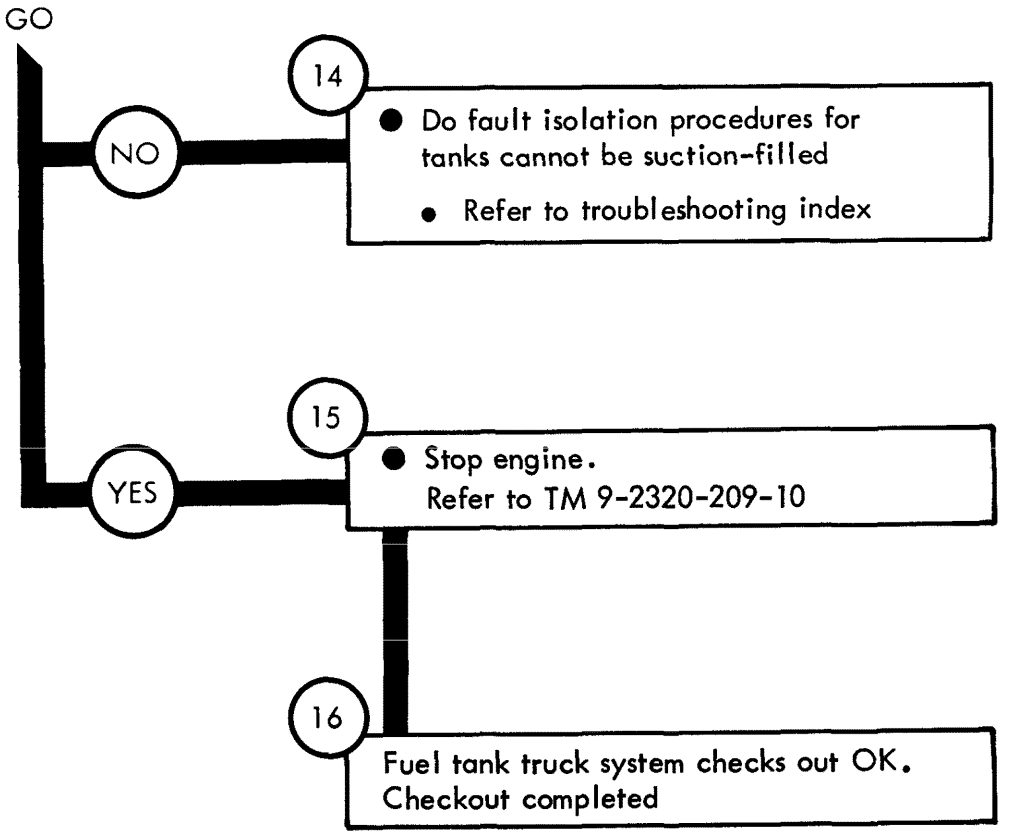


Figure 68-1 (Sheet 3 of 4)



TA 114998

Figure 68-1 (Sheet 4 of 4)

CHAPTER 69

FUEL TANK BODY (TRUCK M49A2C) TROUBLESHOOTING

69-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the fuel tank body M49A2C, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

69-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

FUEL TANK BODY M49A2C TROUBLESHOOTING

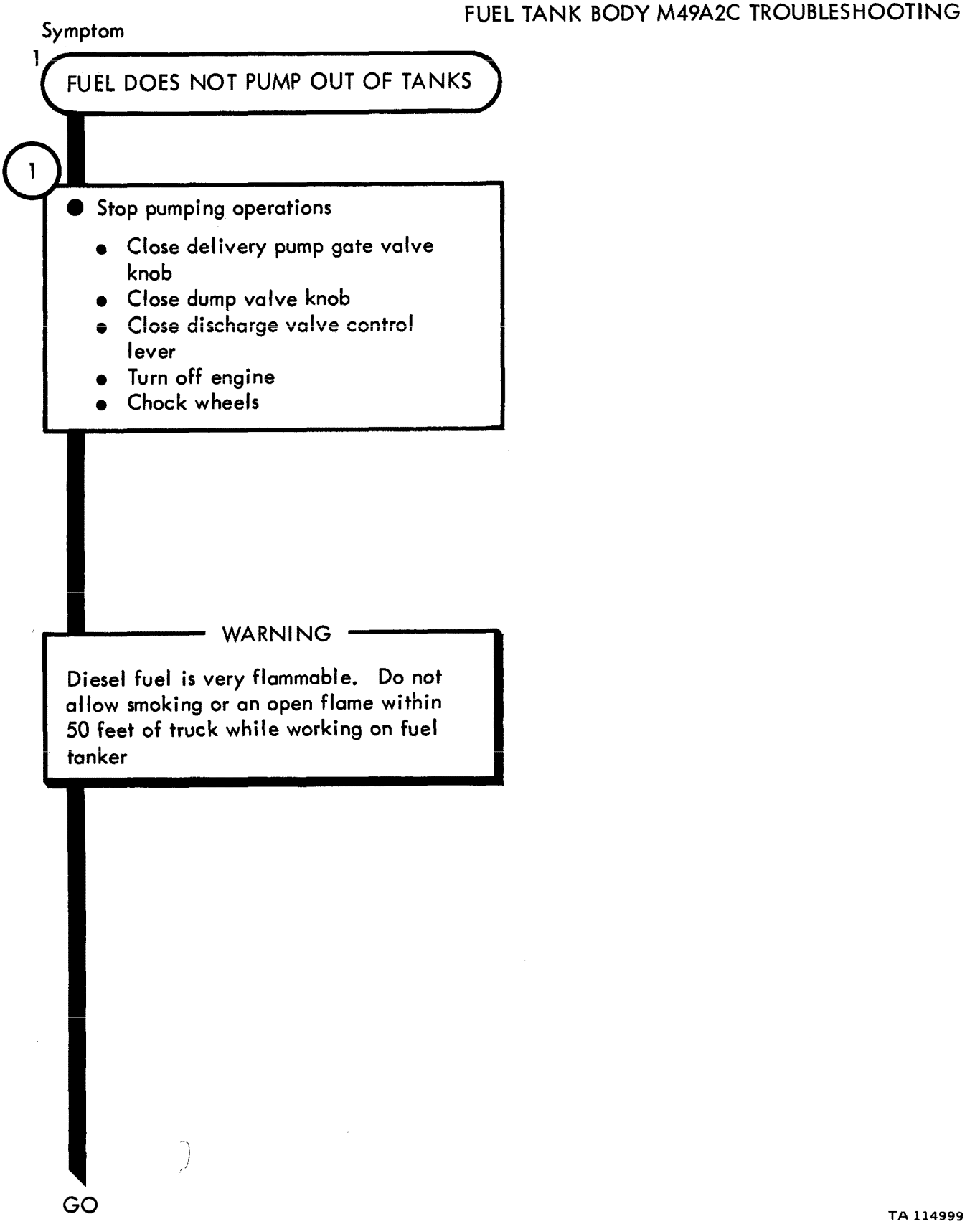


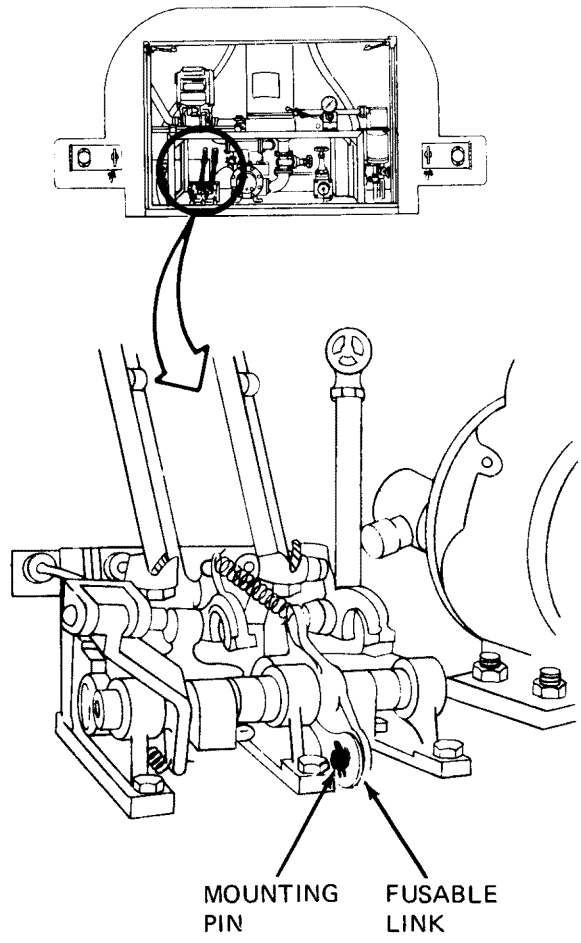
Figure 69-1 (Sheet 1 of 4)

GO

2

- Check fusible link
  - See if link has come off mounting pin
  - Look for a broken link

Is fusible link OK?



YES

NO

3

- Put back fusible link that has come off mounting pin
  - Slide link over mounting pin
  - Put cotter pin through hole in mounting pin and bend ends around using needle nose pliers
- Replace broken fusible link
  - Refer to Vol 3, chapter 18, para 18-30

GO

TA 115000

Figure 69-1 (Sheet 2 of 4)

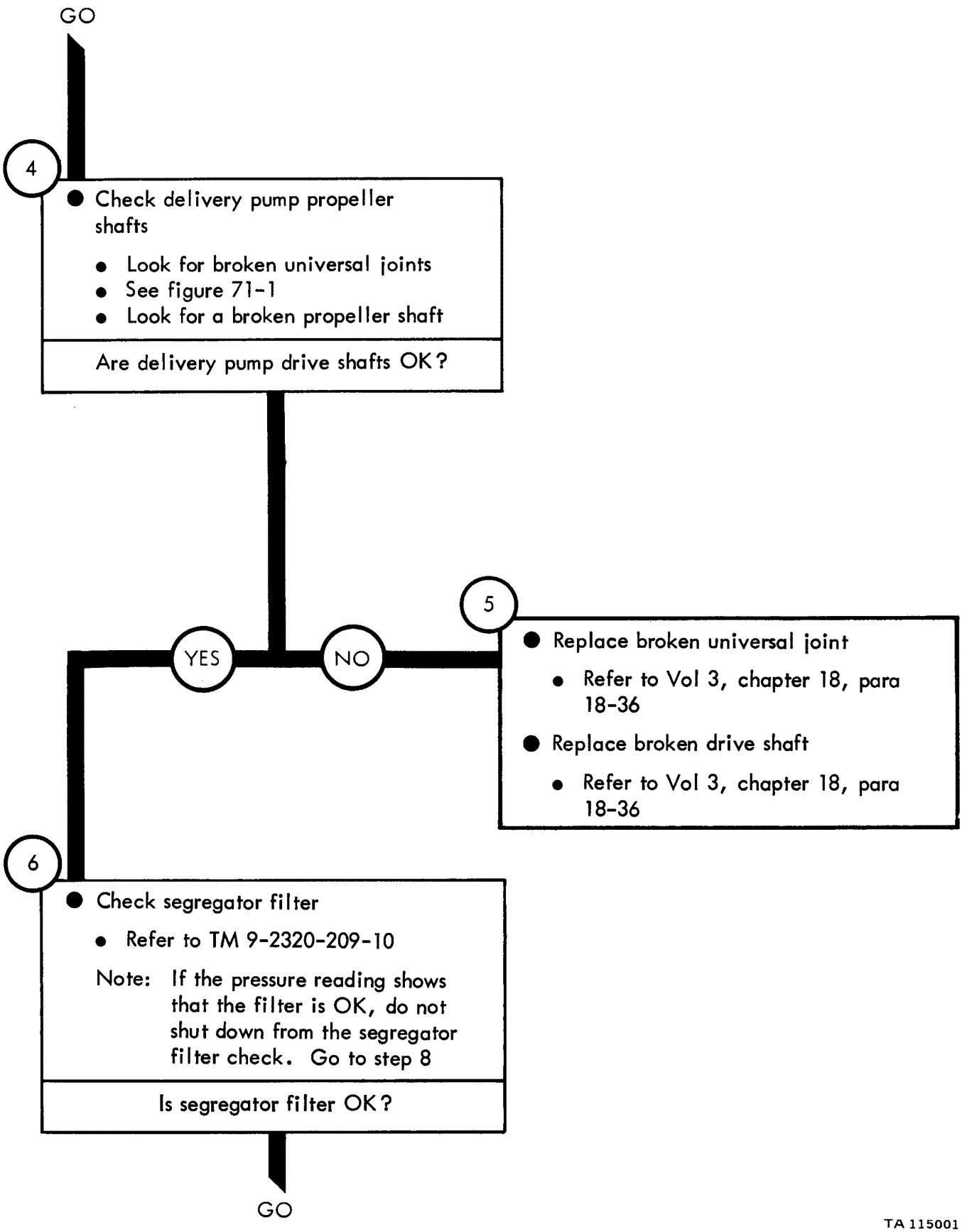
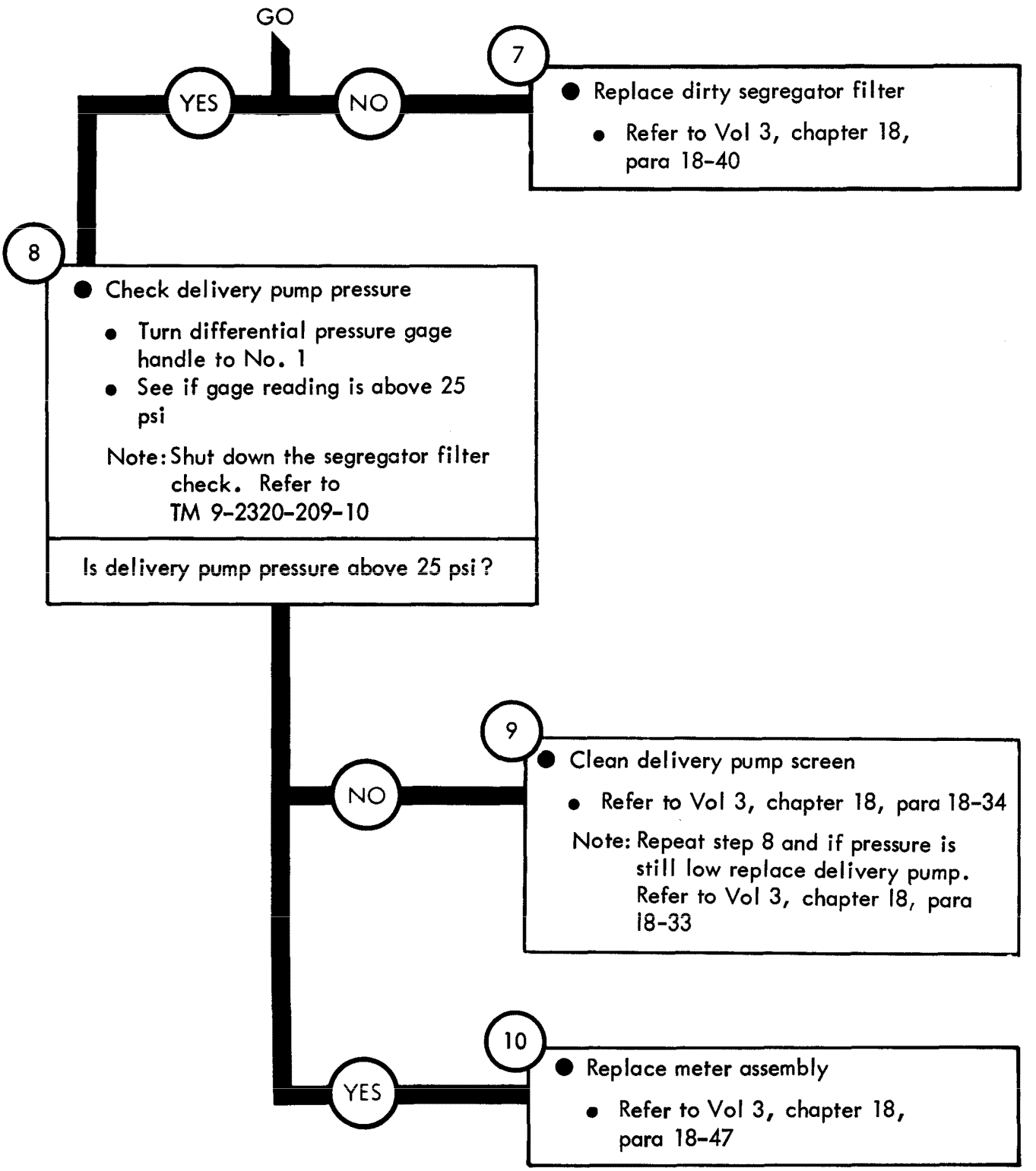


Figure 69-1 (Sheet 3 of 4)



TA 115002

Figure 69-1 (Sheet 4 of 4)

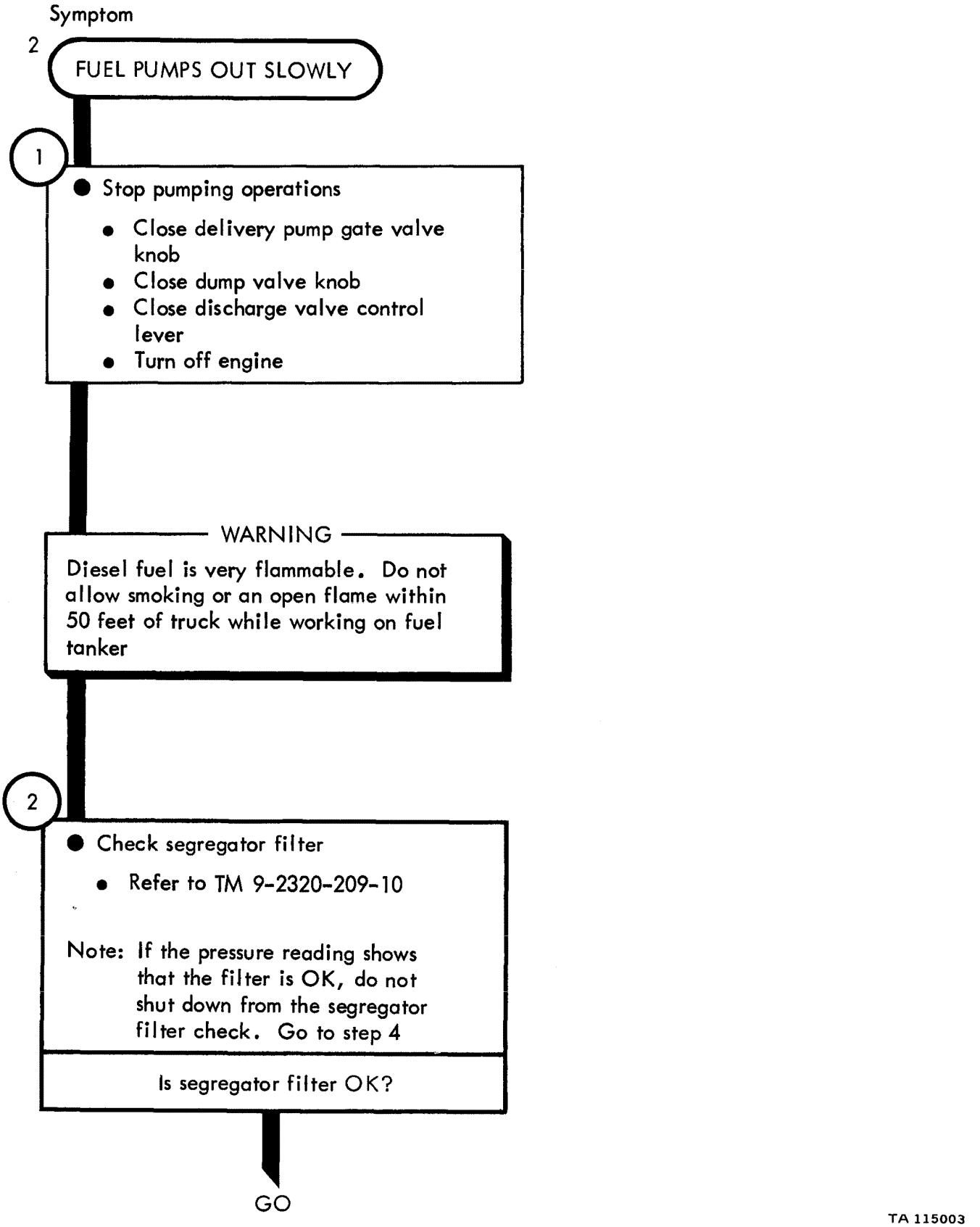


Figure 69-2 (Sheet 1 of 2)

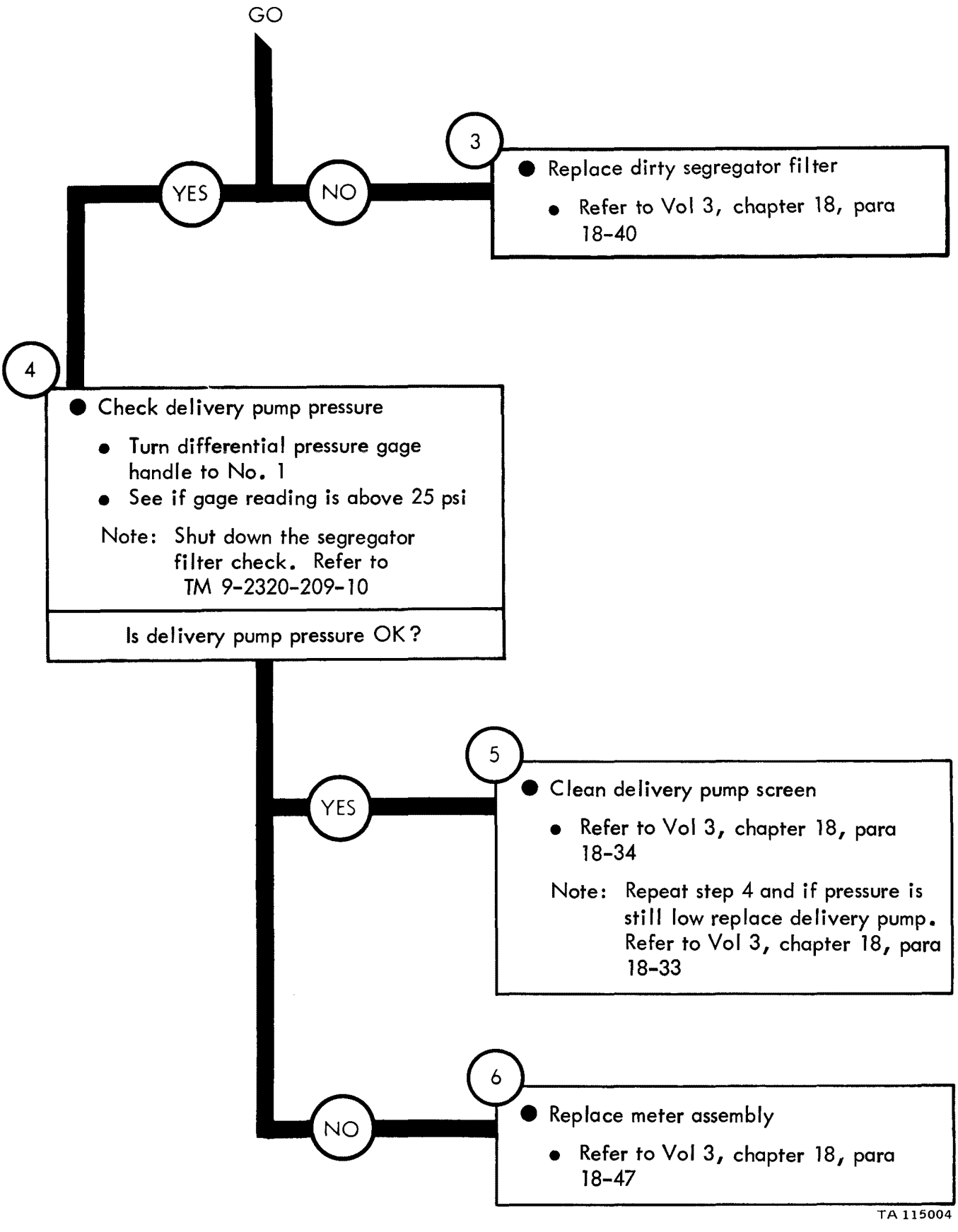
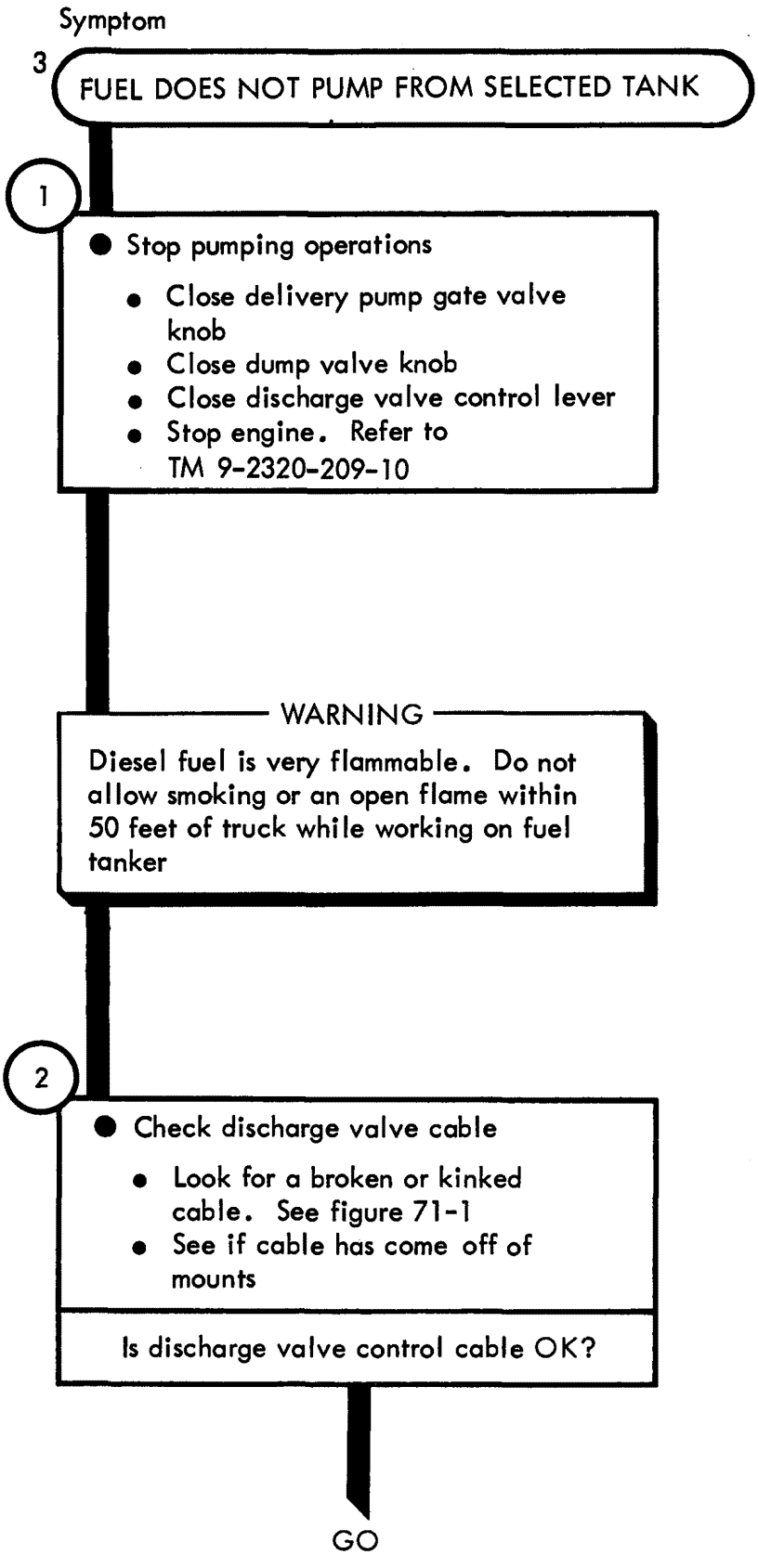


Figure 69-2 (Sheet 2 of 2)



TA 115005

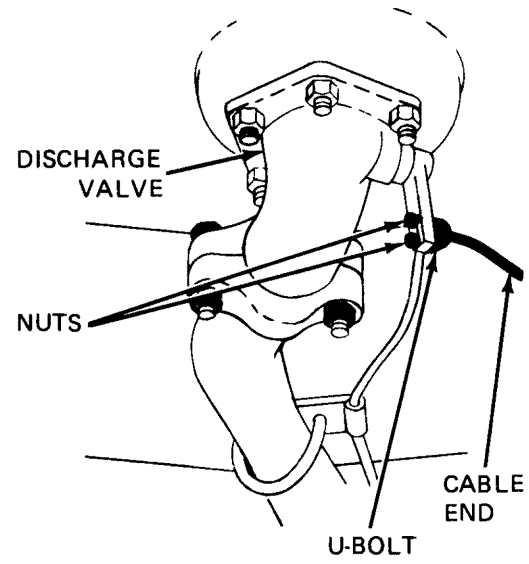
Figure 69-3 (Sheet 1 of 3)

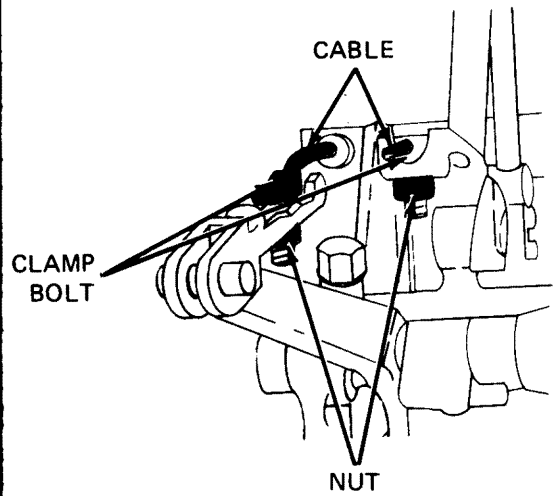
GO

3

YES

NO



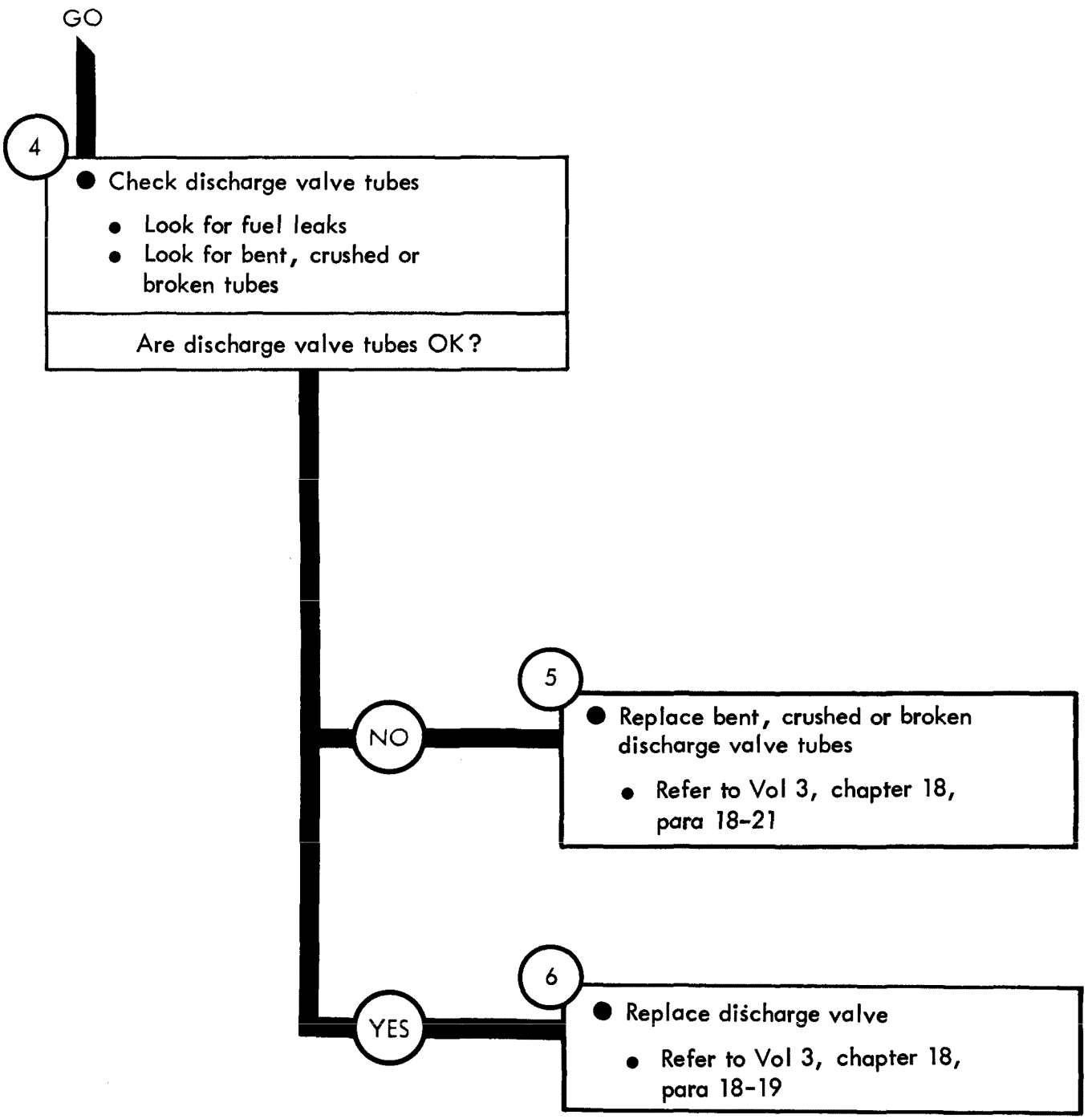


- Put back cable that has come off of discharge valve
  - Make sure valve and control levers are in OFF positions
  - Using 1/2-inch wrench loosen two nuts on U-bolt
  - Slide cable end through U-bolt and using pliers hold end tightly
  - Tighten two nuts on U-bolt using 1/2-inch wrench
  - Adjust cables. Refer to Vol 3, chapter 18, para 18-26, or 18-29
- Put back cable that has come off control lever
  - Make sure valve and control lever are in OFF positions
  - Using 5/8-inch wrench loosen nut
  - Slide cable end through clamp bolt and using pliers hold end tightly
  - Tighten nut using 5/8-inch wrench
  - Adjust cables. Refer to Vol 3, chapter 18, para 18-26, or 18-29
- Replace broken discharge valve control cable
  - Refer to Vol 3, chapter 18, para 18-26, or 18-29

GO

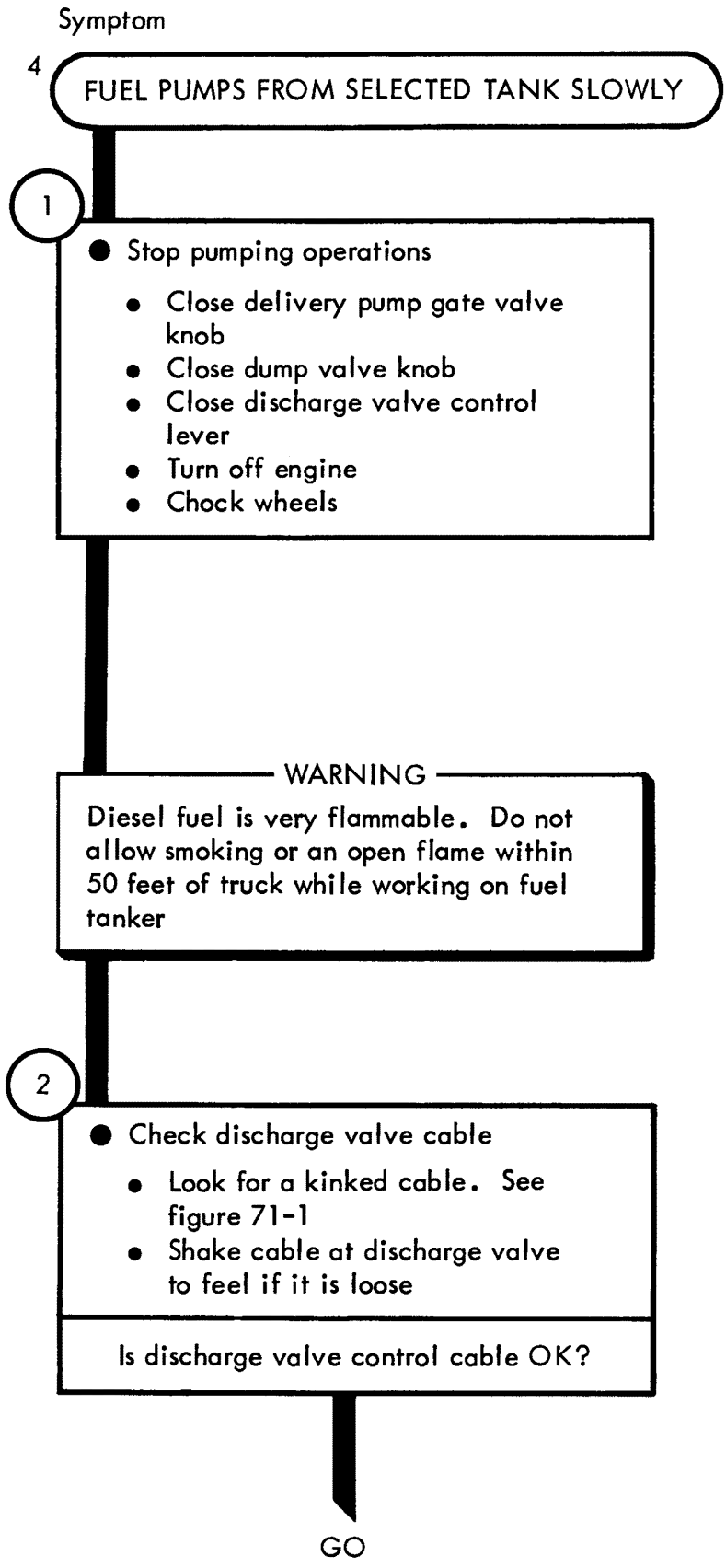
TA 115006

Figure 69-3 (Sheet 2 of 3)



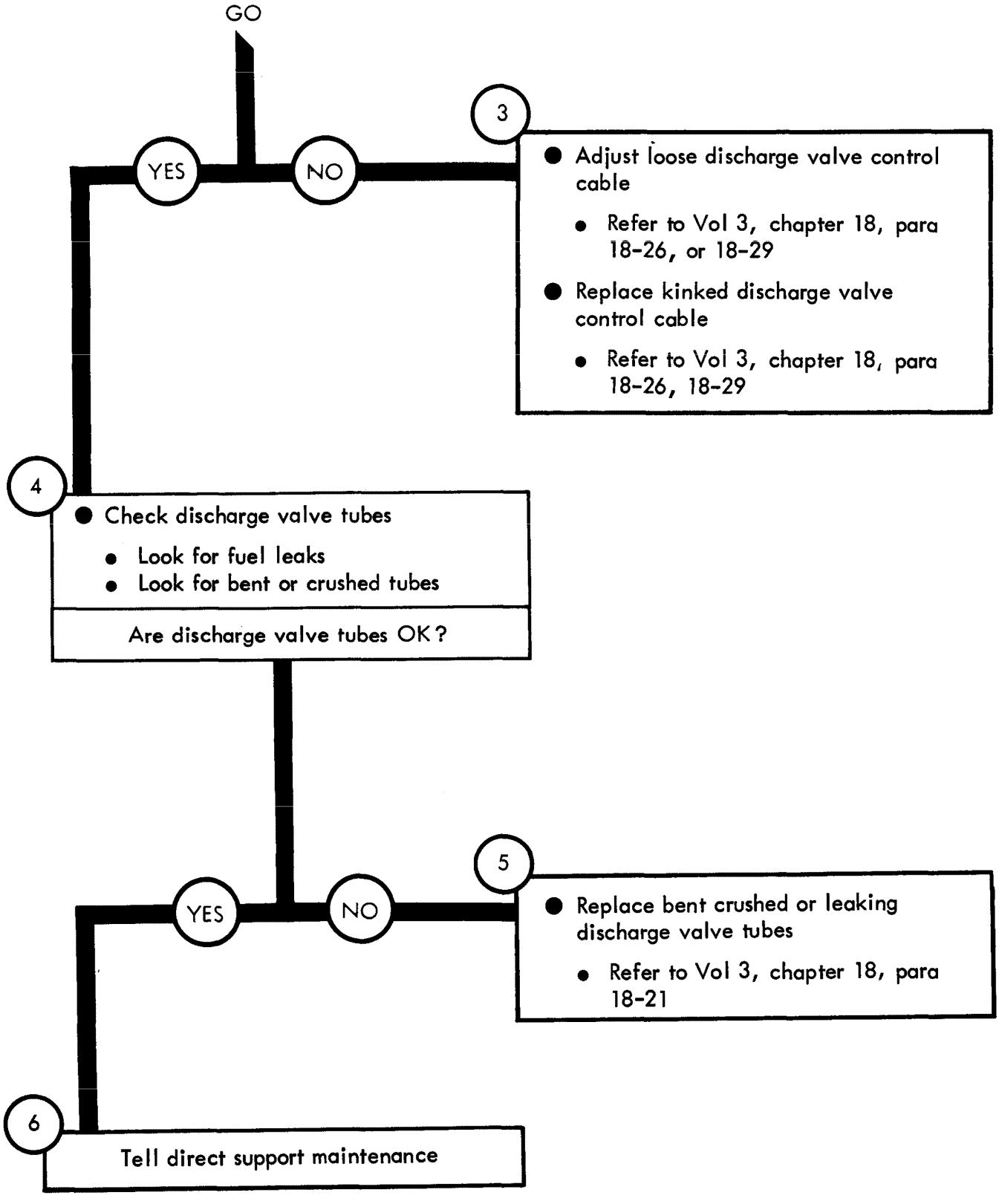
TA 115007

Figure 69-3 (Sheet 3 of 3)



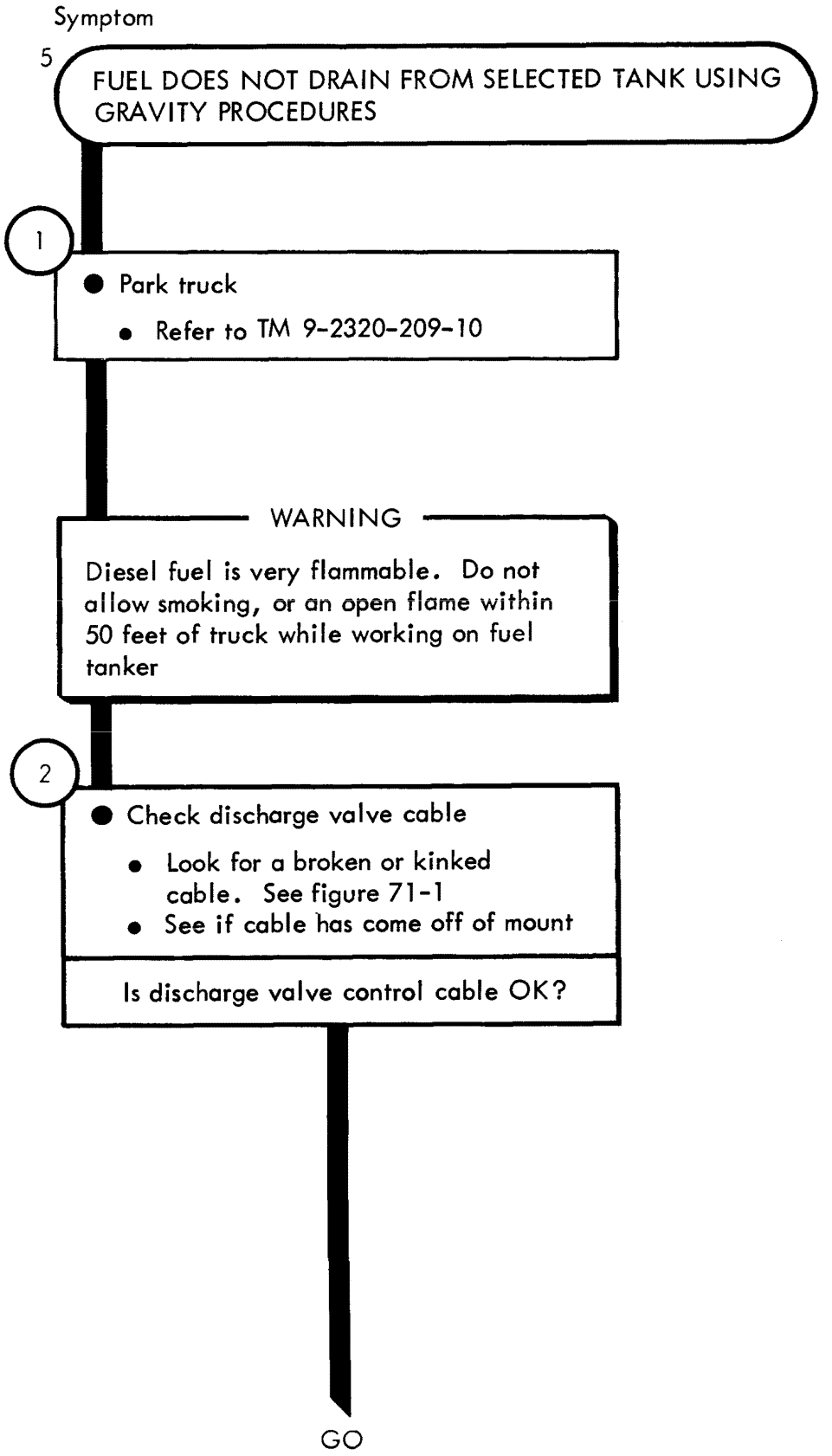
TA 115008

Figure 69-4 (Sheet 1 of 2)



TA 115009

Figure 69-4 (Sheet 2 of 2)



TA 115010

Figure 69-5 (Sheet 1 of 3)

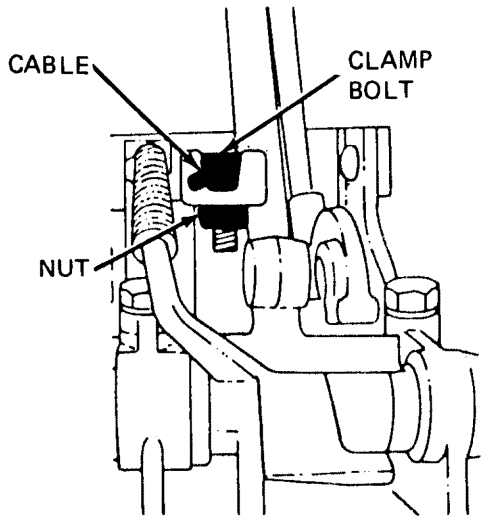
GO

YES

NO

3

- Put back cable that has come off of control lever
  - Make sure valve and control lever are in OFF positions
  - Using 5/8-inch wrench loosen nut
  - Slide cable end through clamp bolt and using pliers hold end tightly
  - Tighten nut using 5/8-inch wrench
  - Adjust cable. Refer to Vol 3, chapter 18, para 18-26, 18-28 or 18-29
- Replace broken discharge valve control cable
  - Refer to Vol 3, chapter 18, para 18-26, or 18-29



4

- Check discharge valve tubes
  - Look for fuel leaks
  - Look for bent, crushed or broken tubes

Are discharge valve tubes OK?

YES

NO

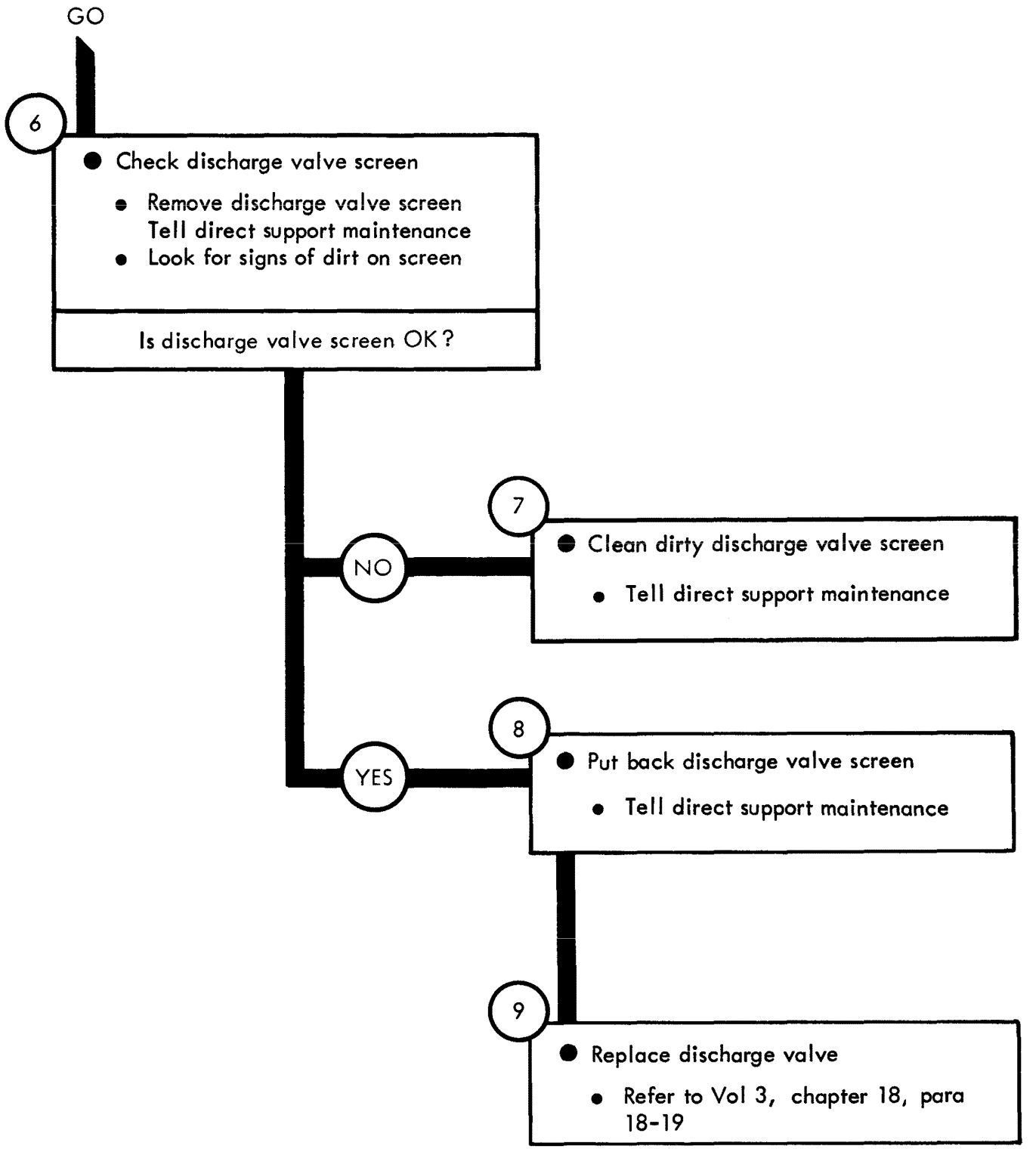
5

- Replace leaking, bent, crushed or broken discharge valve tubes
  - Refer to Vol 3, chapter 18, para 18-21

GO

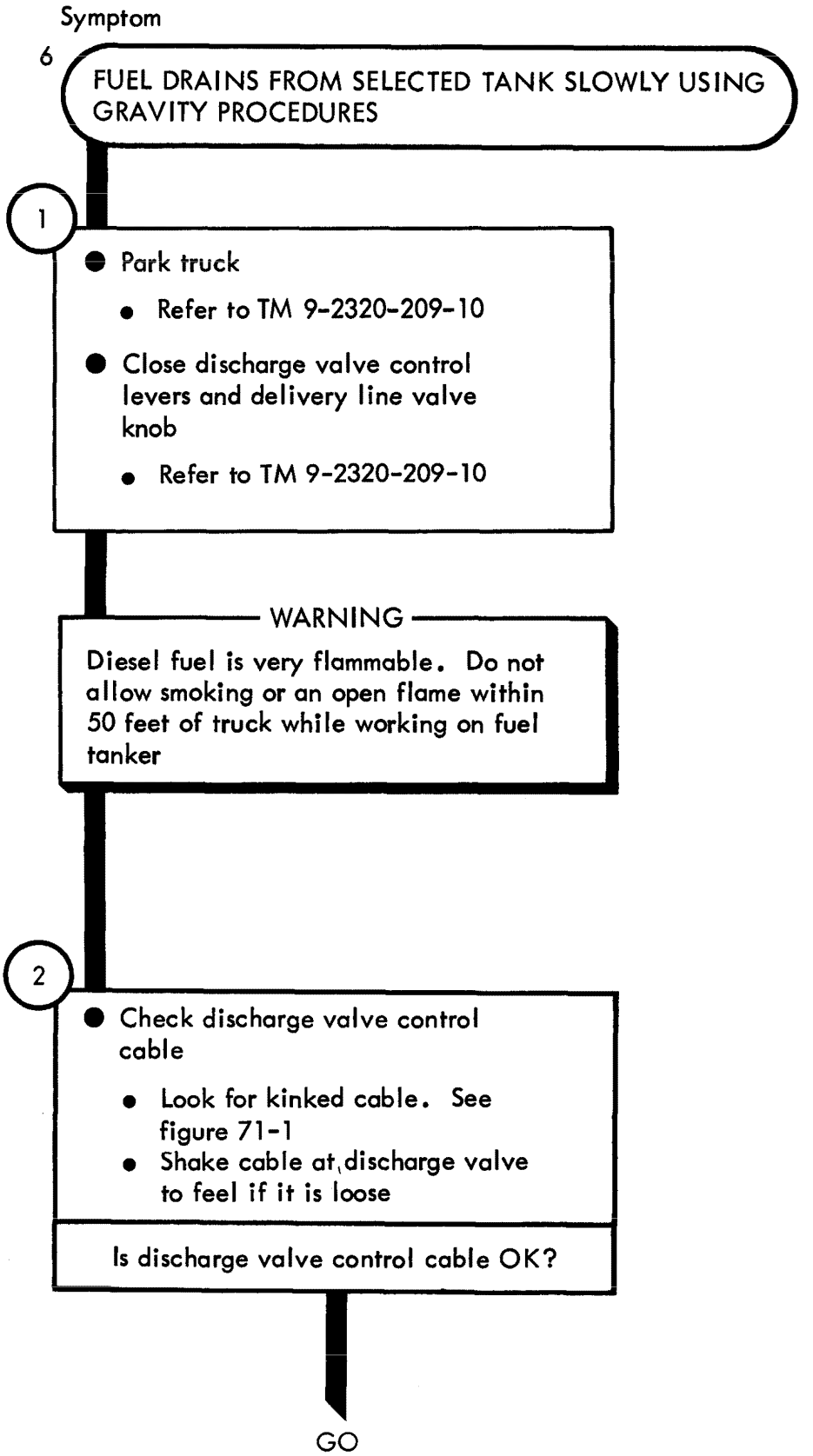
TA 115011

Figure 69-5 (Sheet 2 of 3)



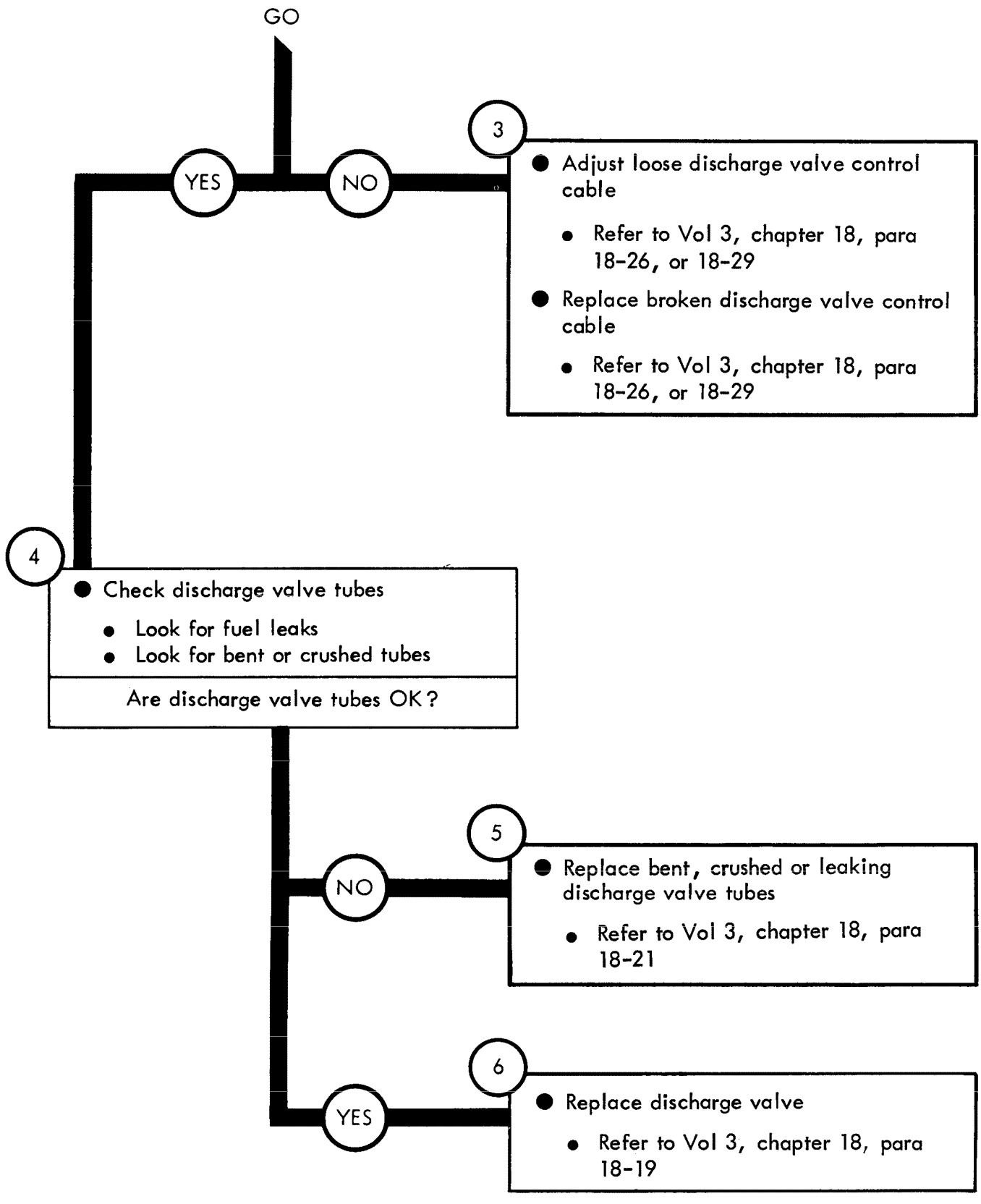
TA 115012

Figure 69-5 (Sheet 3 of 3)



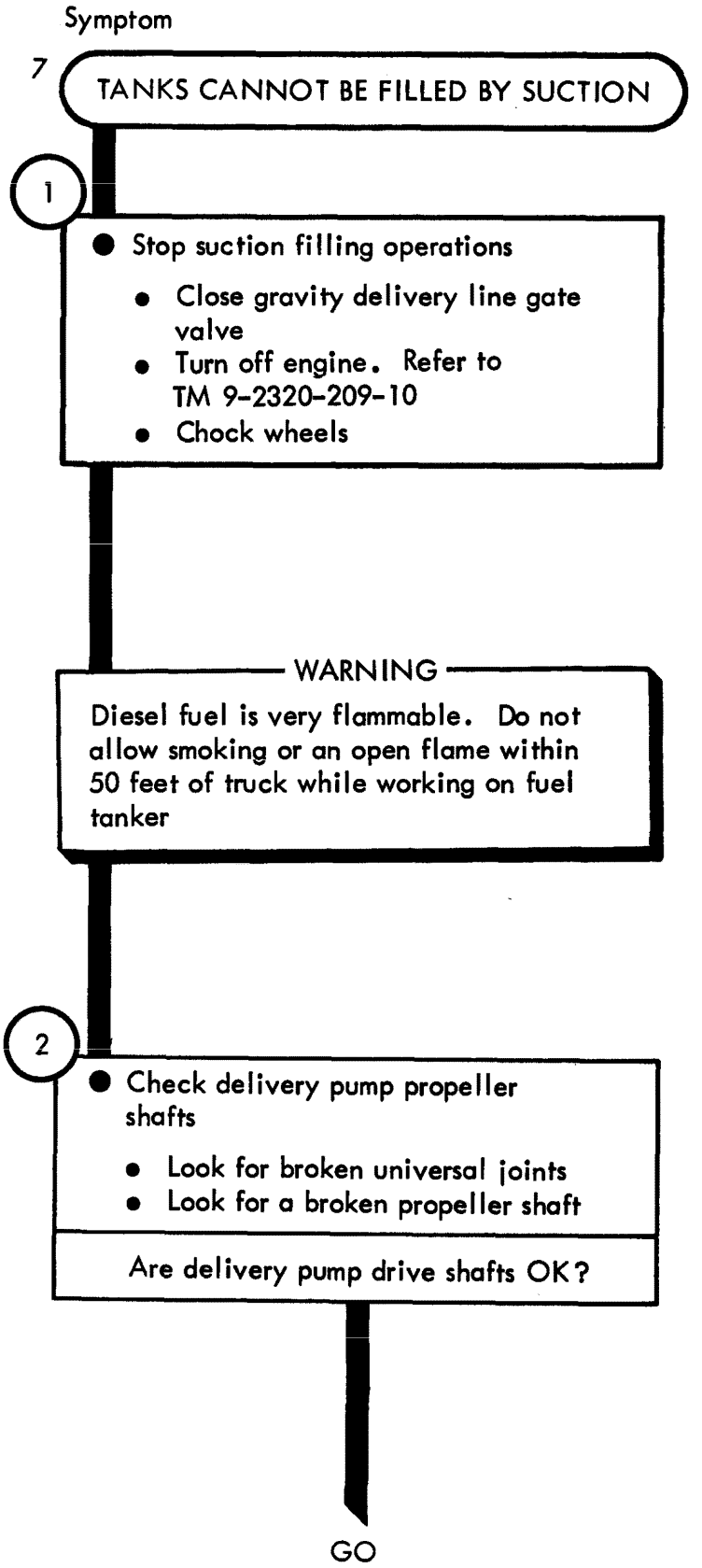
TA 115011

Figure 69-6 (Sheet 1 of 2)



TA 115014

Figure 69-6 (Sheet 2 of 2)



TA 115015

Figure 69-7 (Sheet 1 of 3)

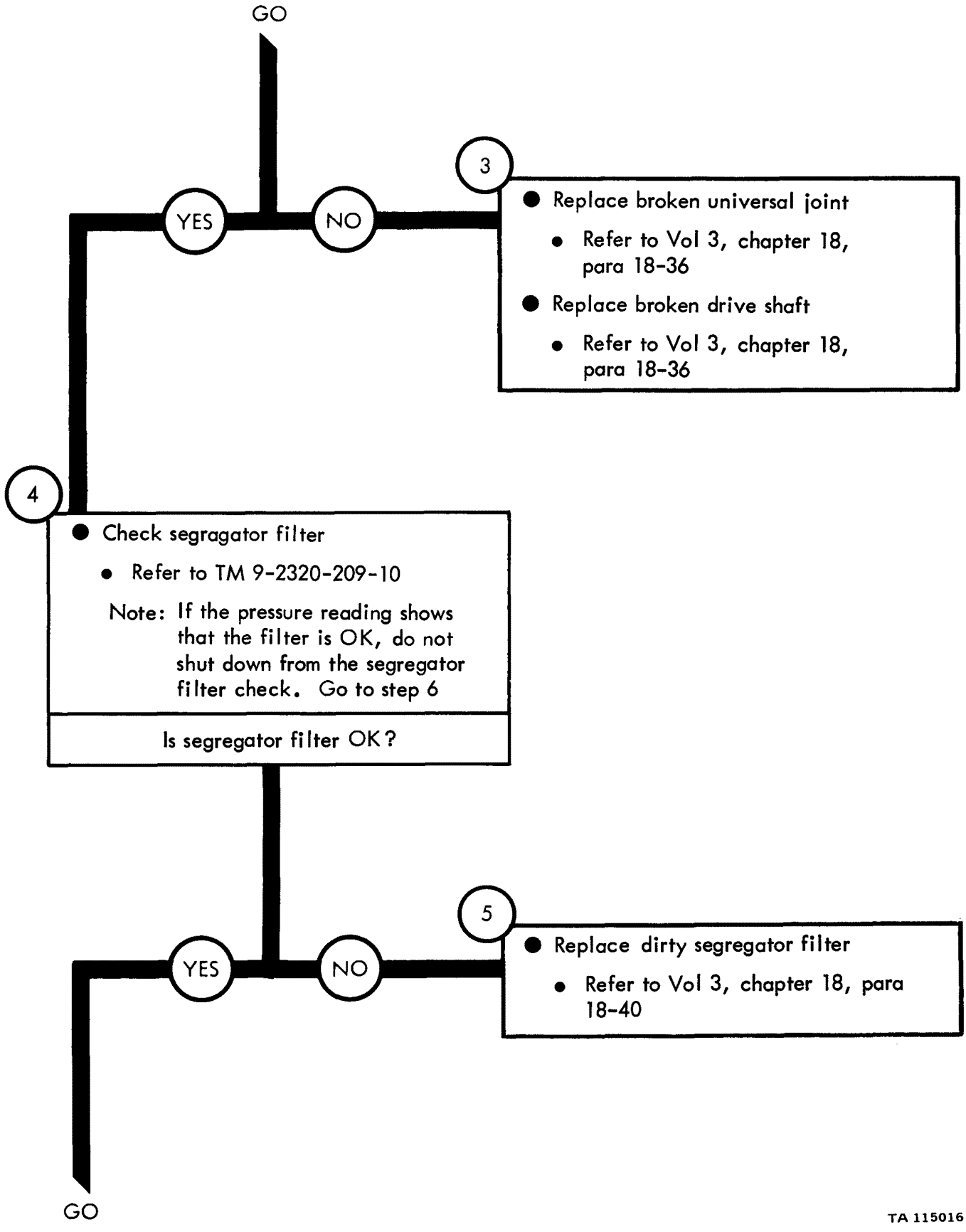
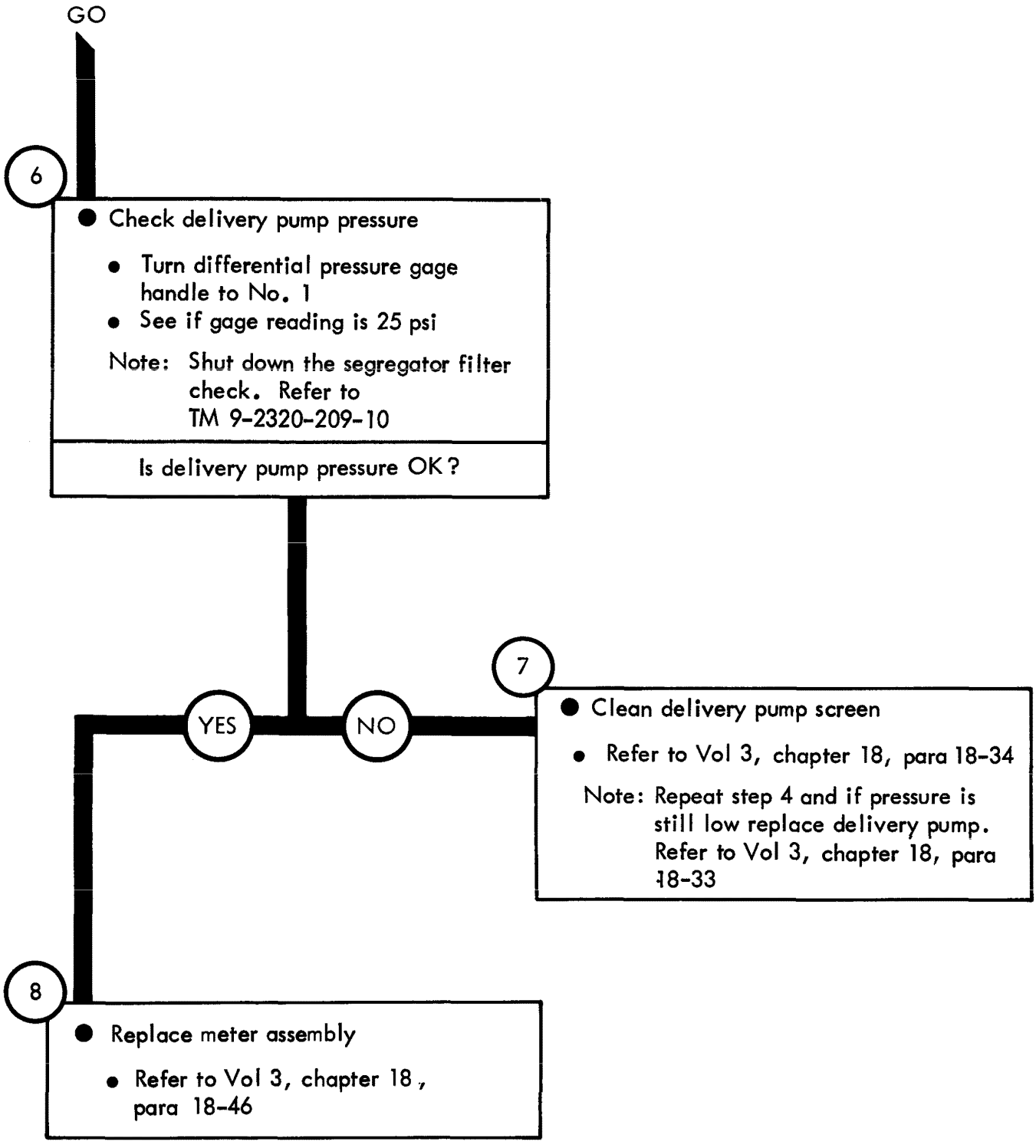


Figure 69-7 (Sheet 2 of 3)



TA 115017

Figure 69-7 (Sheet 3 of 3)

CHAPTER 70

FUEL TANK BODY (TRUCK M49A2C) TROUBLESHOOTING SUMMARY

70-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 69 for the fuel tank body (M49A2C).

70-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

FUEL TANK BODY, M49A2C TROUBLESHOOTING SUMMARY

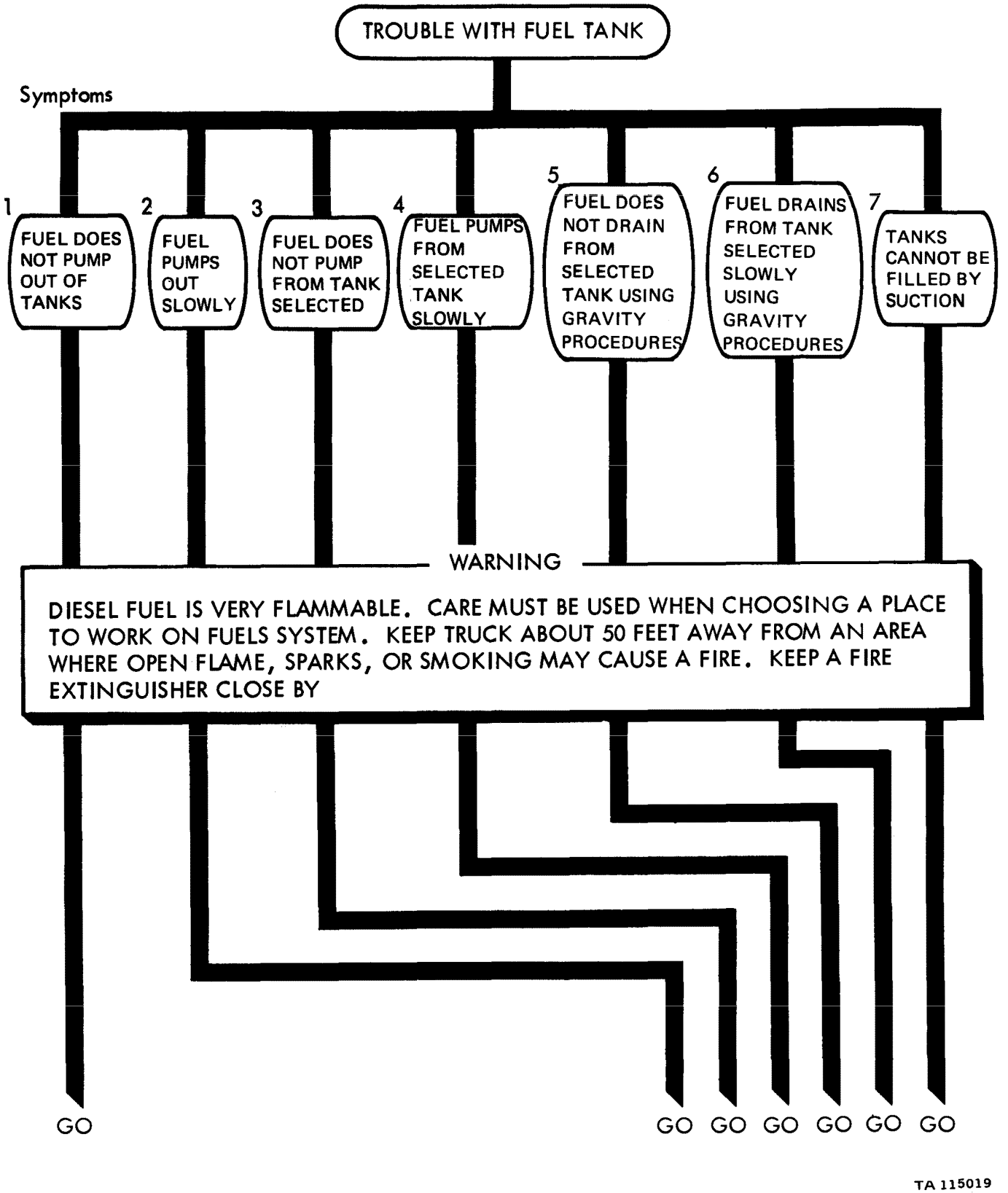
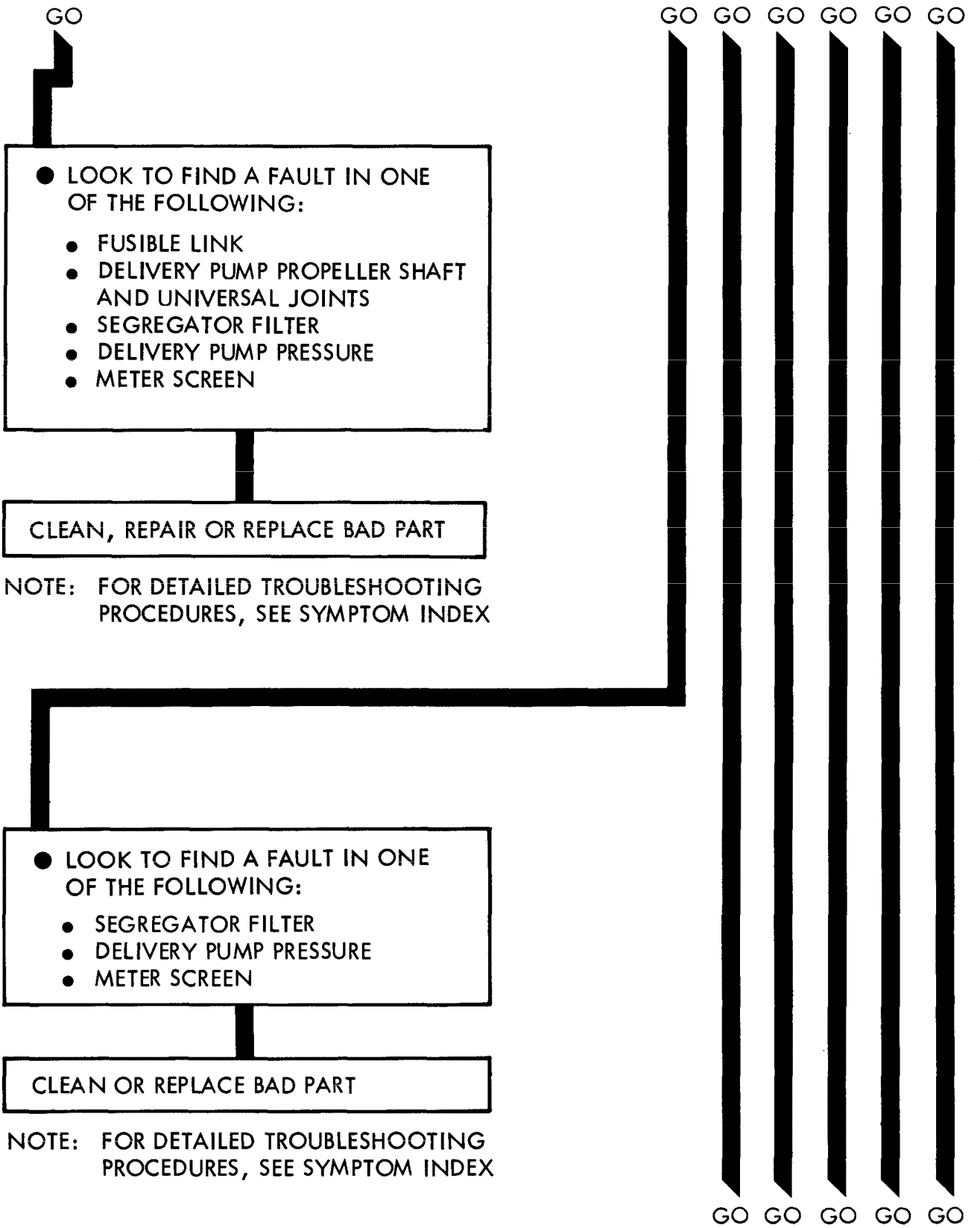
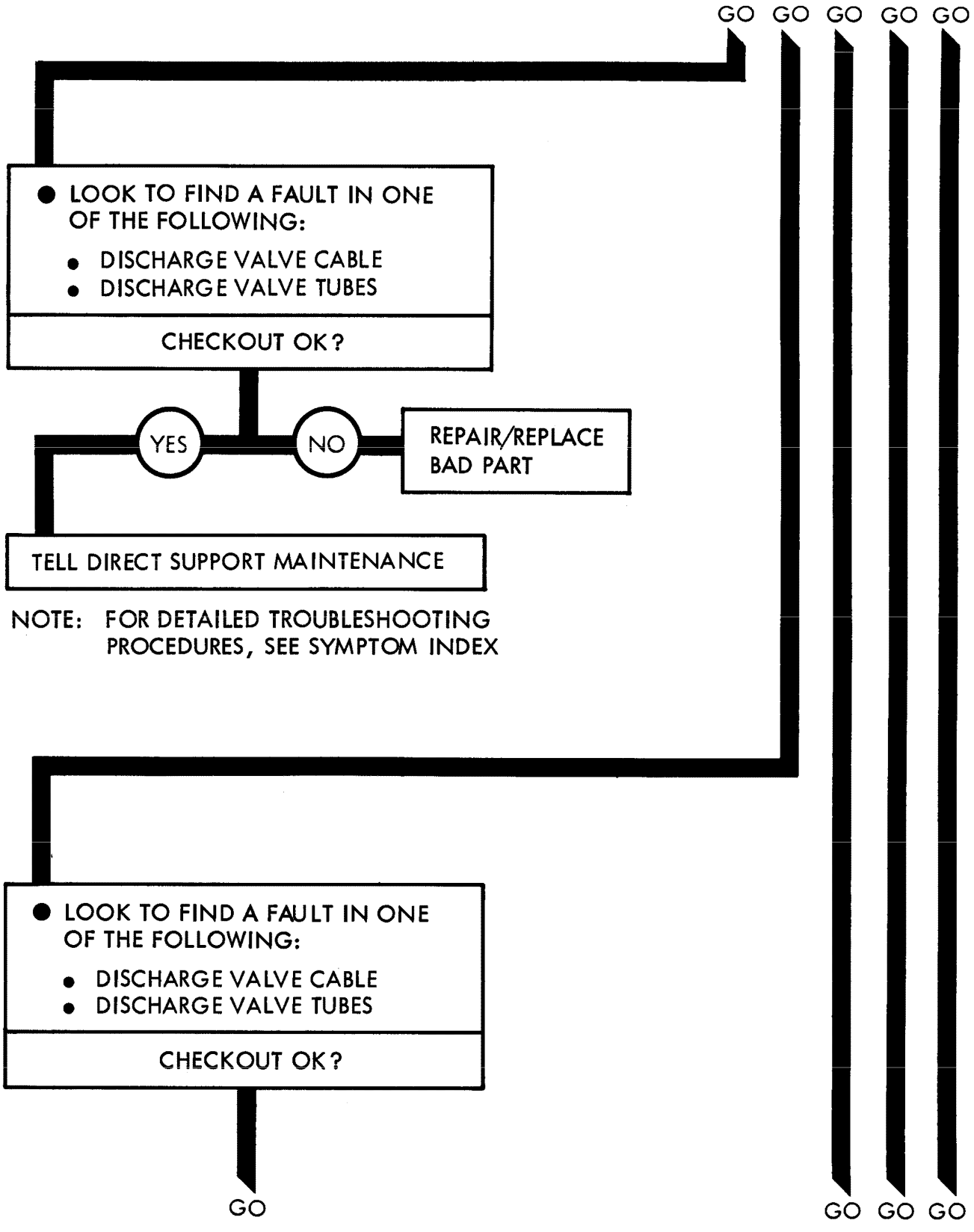


Figure 70-1 (Sheet 1 of 6)



TA 115020

Figure 70-1 (Sheet 2 of 6)



TA 115021

Figure 70-1 (Sheet 3 of 6)

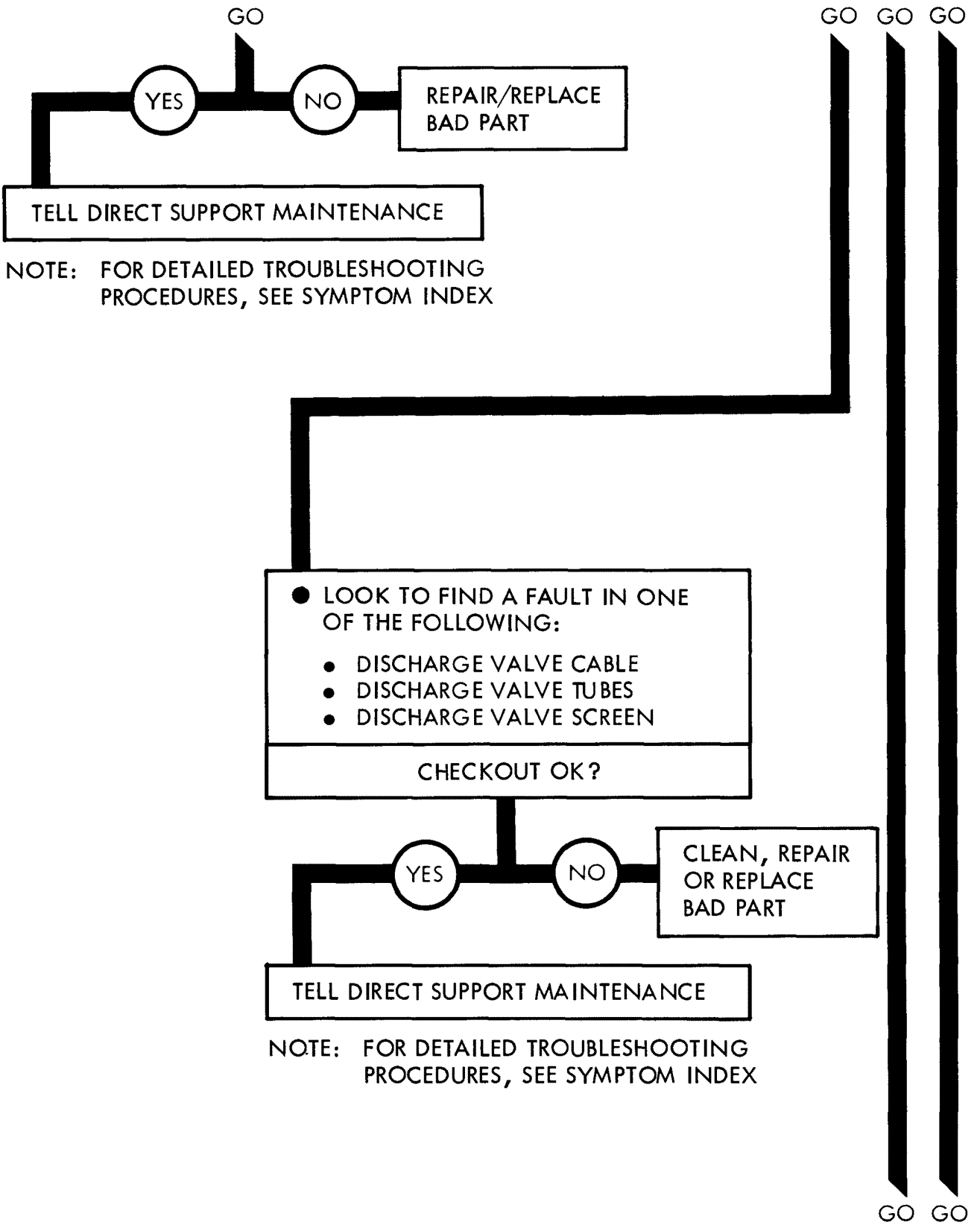


Figure 70-1 (Sheet 4 of 6)

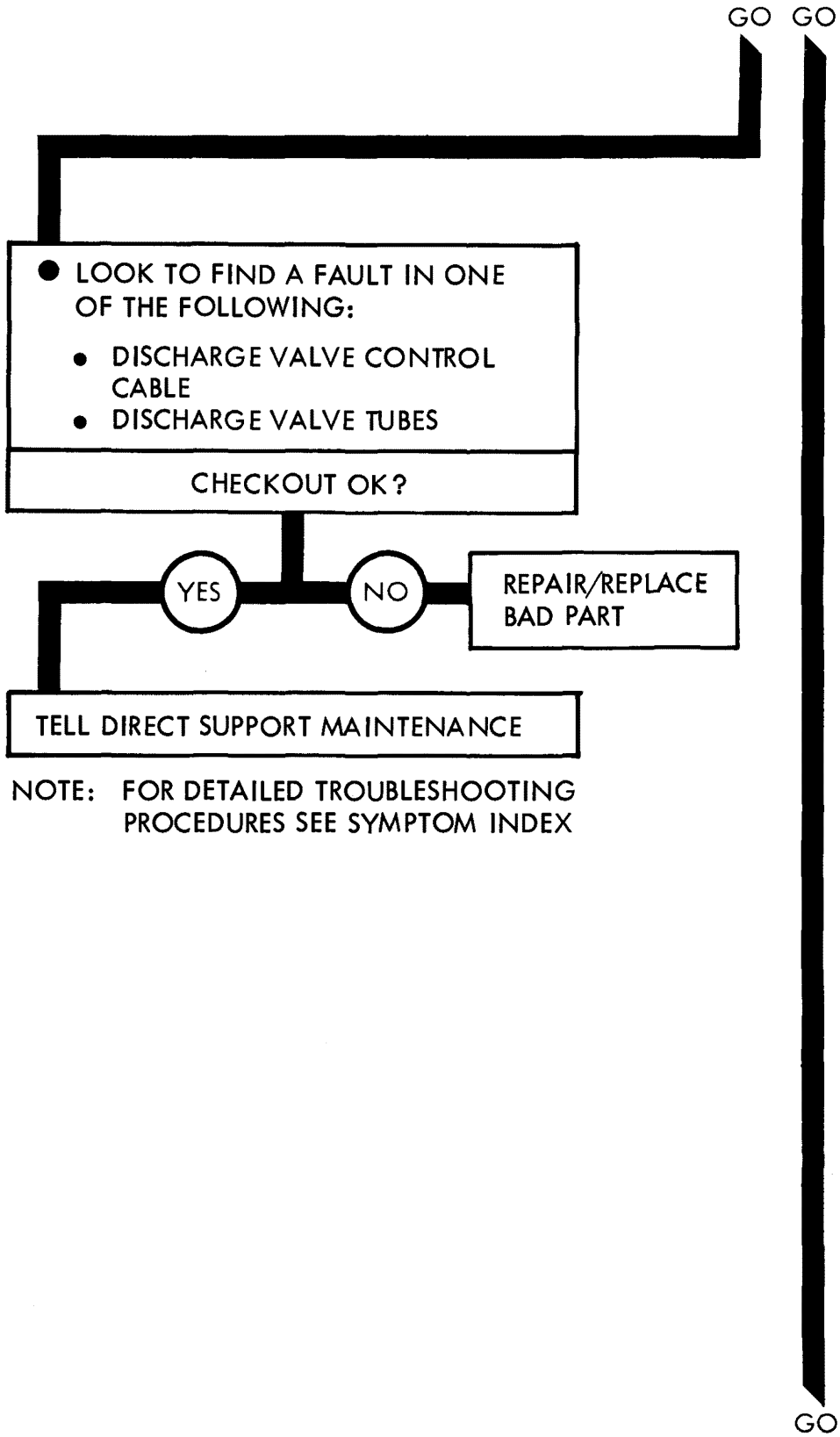
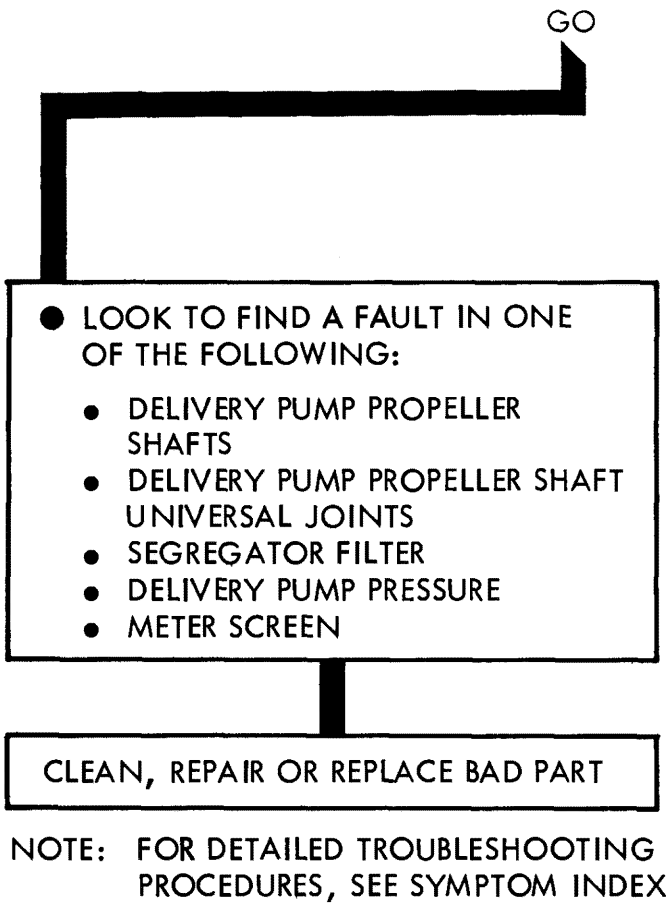


Figure 70-1 (Sheet 5 of 6)



TA 115024

Figure 70-1 (Sheet 6 of 6)

CHAPTER 71

FUEL TANK BODY (TRUCK M49A2C) SUPPORT DIAGRAMS

71-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 69. Table 3-1 is a complete listing of all support diagrams used in this manual.

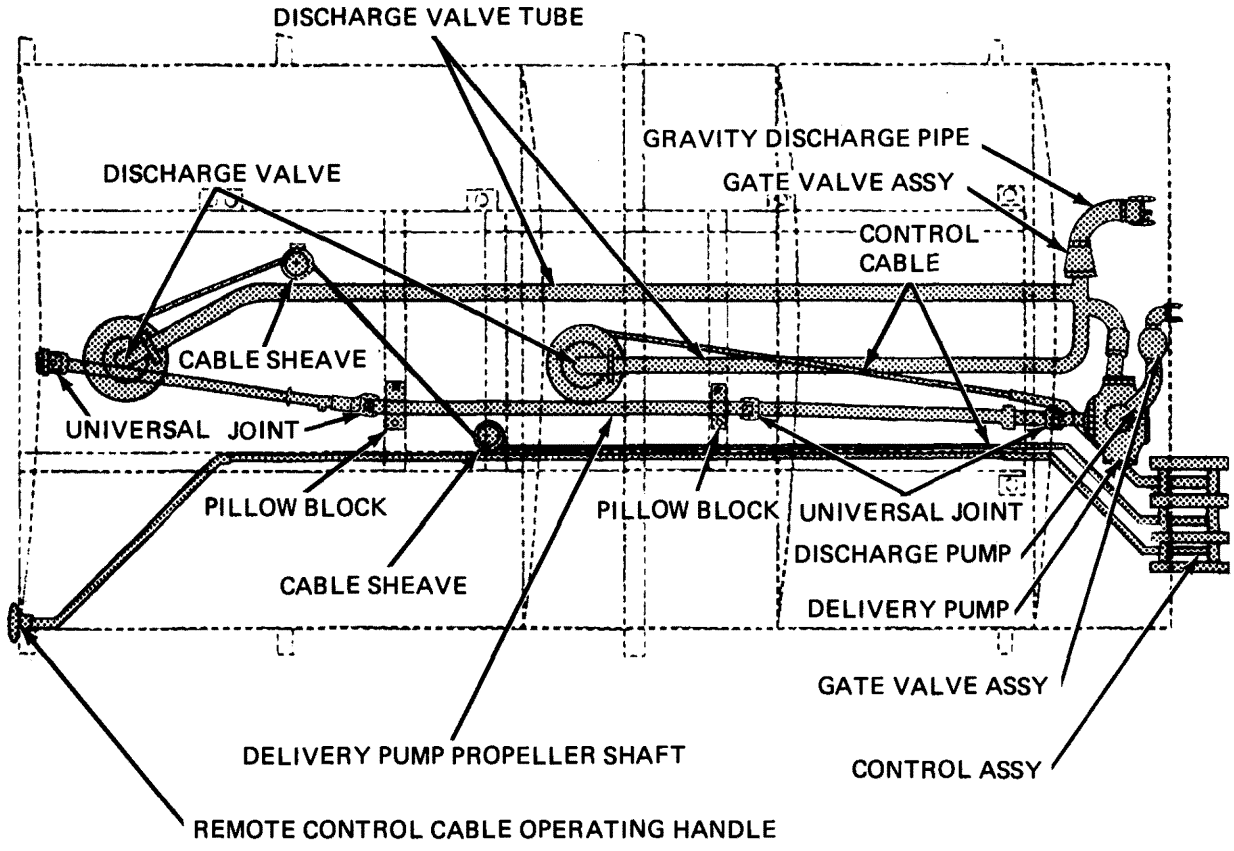


Figure 71-1. Fuel Tank Body (M49A2C) Support Diagram

CHAPTER 72

FUEL TANK BODY (TRUCK M49A2C) CHECKOUT PROCEDURES

72-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

FUEL TANK BODY, M49A2C CHECKOUT

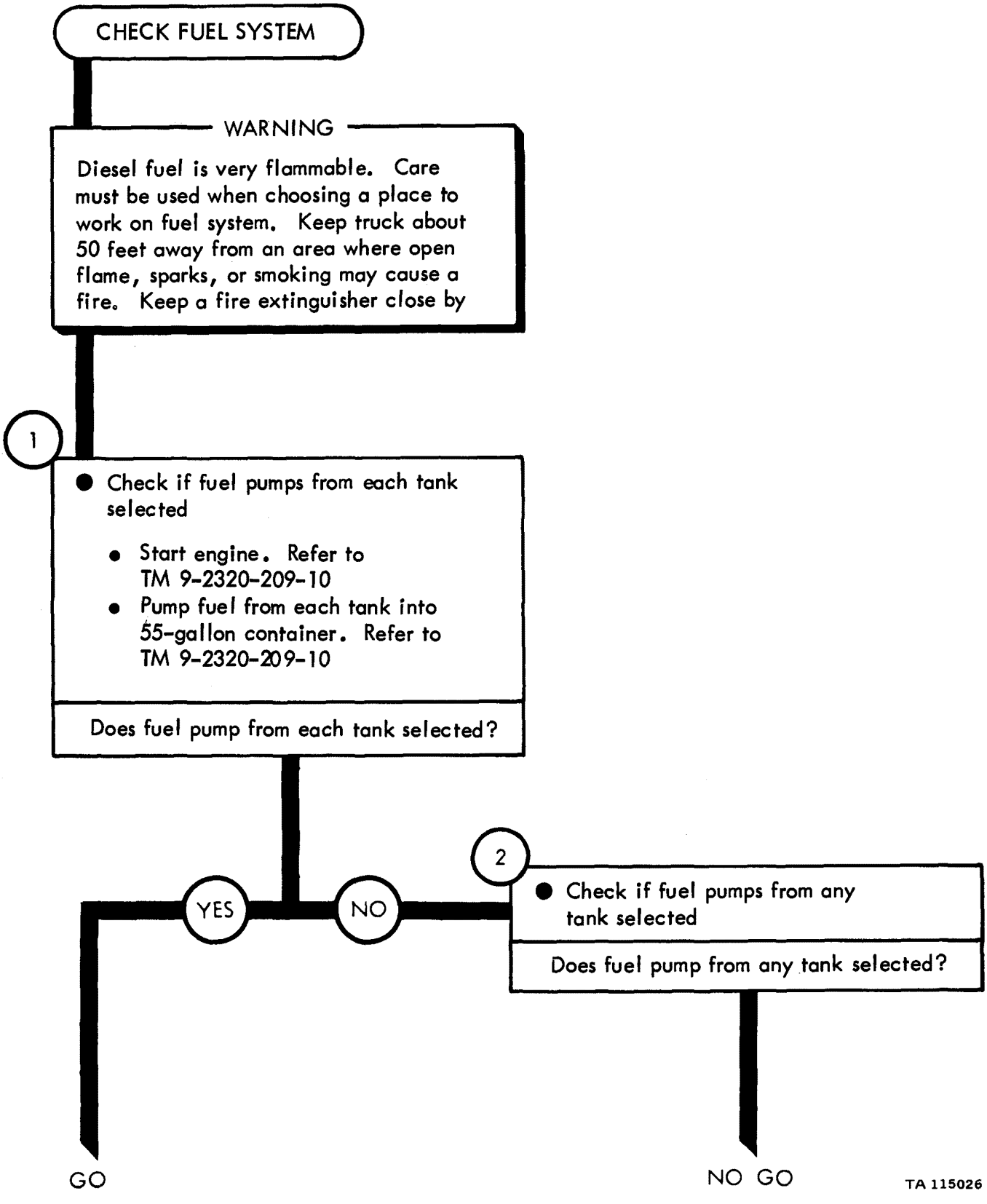
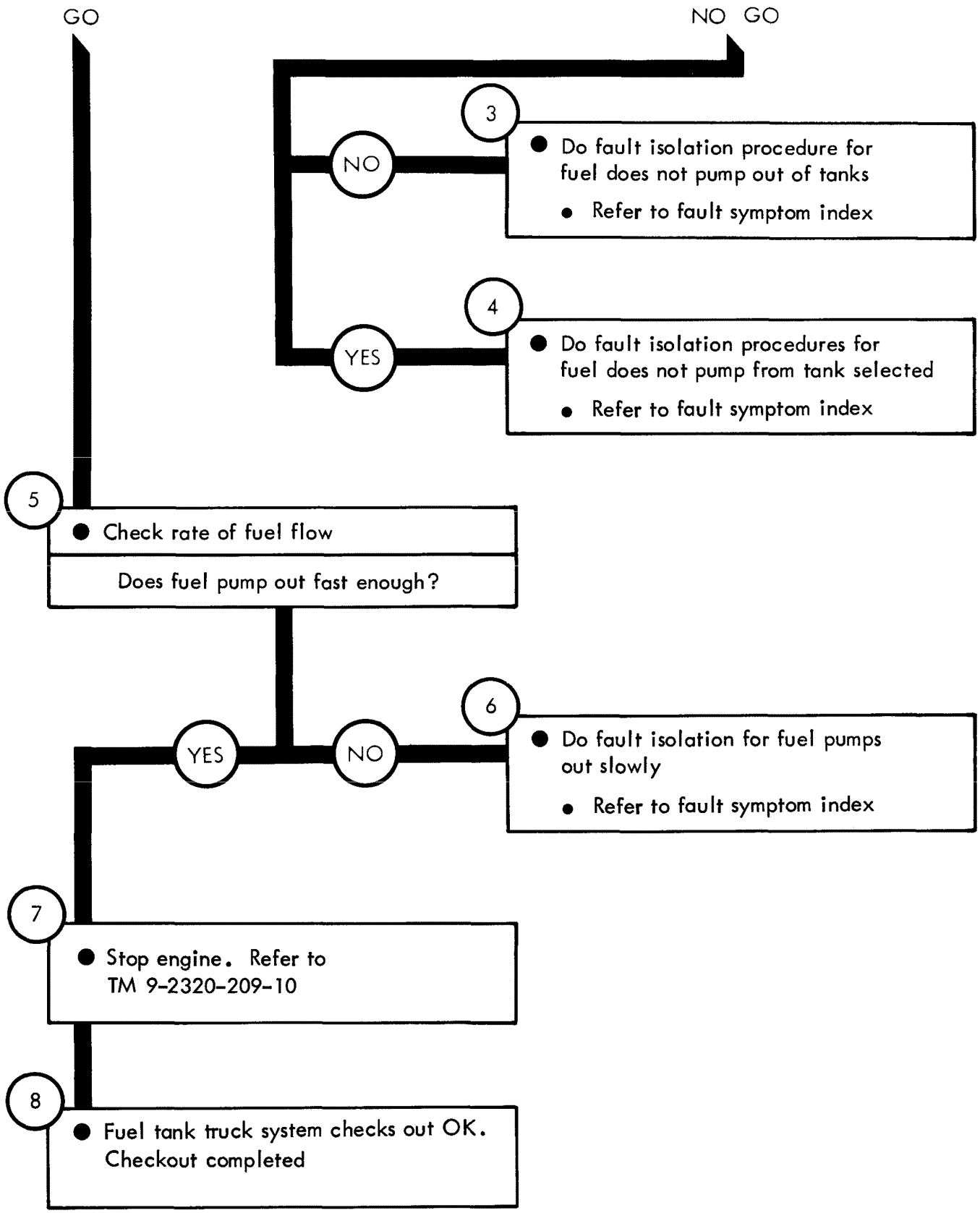


Figure 72-1 (Sheet 1 of 2)



TA 115027

Figure 72-1 (Sheet 2 of 2)

CHAPTER 73

EARTH BORING MACHINE TROUBLESHOOTING

73-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the earth boring machine M764, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

73-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

EARTH BORING MACHINE, M764 TROUBLESHOOTING

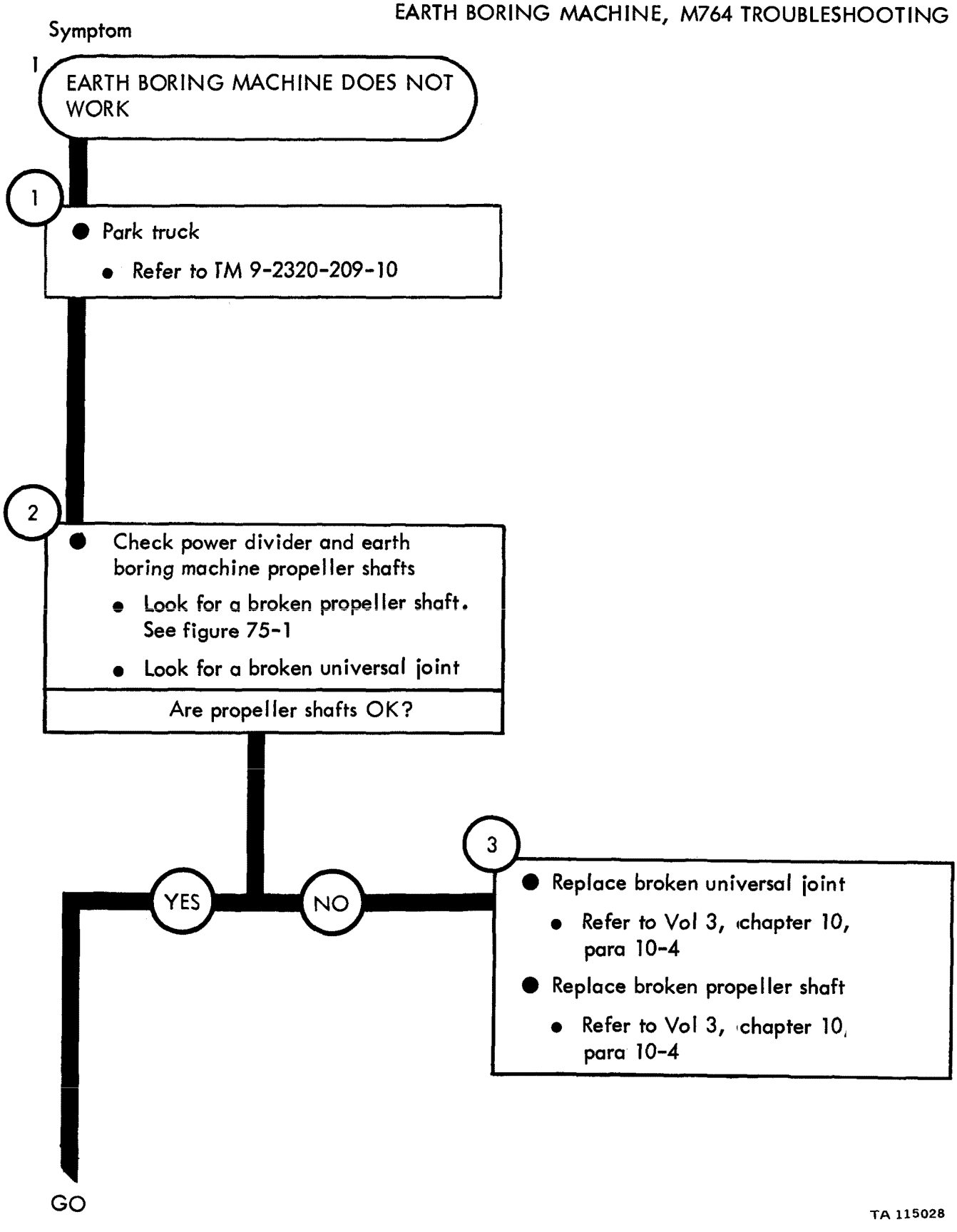


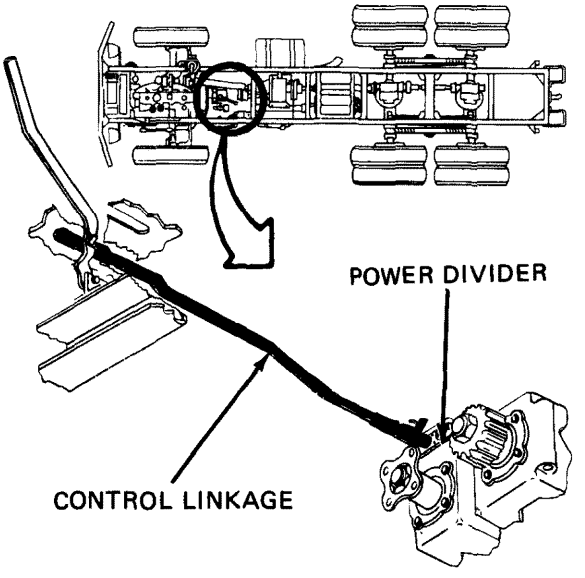
Figure 73-1 (Sheet 1 of 2)

GO

4

- Check power divider and power takeoff control linkage
  - Look for bent or broken linkage
  - Shake all linkage to feel if loose

Is linkage OK?



YES

NO

5

- Replace bent or broken linkage
  - Refer to Vol 3, chapter 19, para 19-26
- Replace worn linkage
  - Refer to Vol 3, chapter 19, para 19-26

6

Tell direct support maintenance

TA 115029

Figure 73-1 (Sheet 2 of 2)

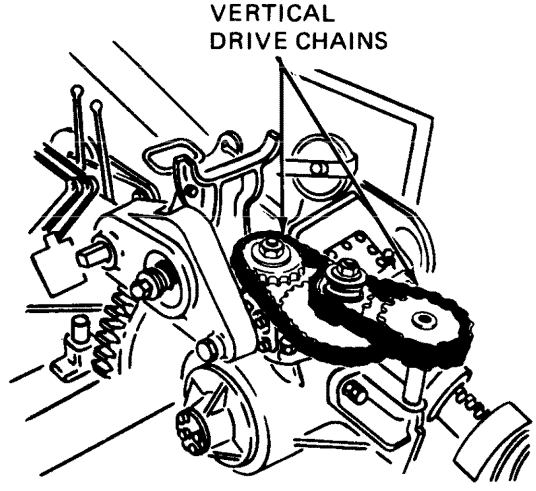
Symptom

2 EARTH BORING MACHINE CANNOT BE MOVED VERTICALLY

1
- Stop earth boring operations
  - Refer to TM 9-2320-209-10

2
- Check vertical drive chains
  - Remove chain cover. Refer to Vol 3, chapter 18, para 18-79
  - Look for a broken chain

Are drive chains OK?



YES

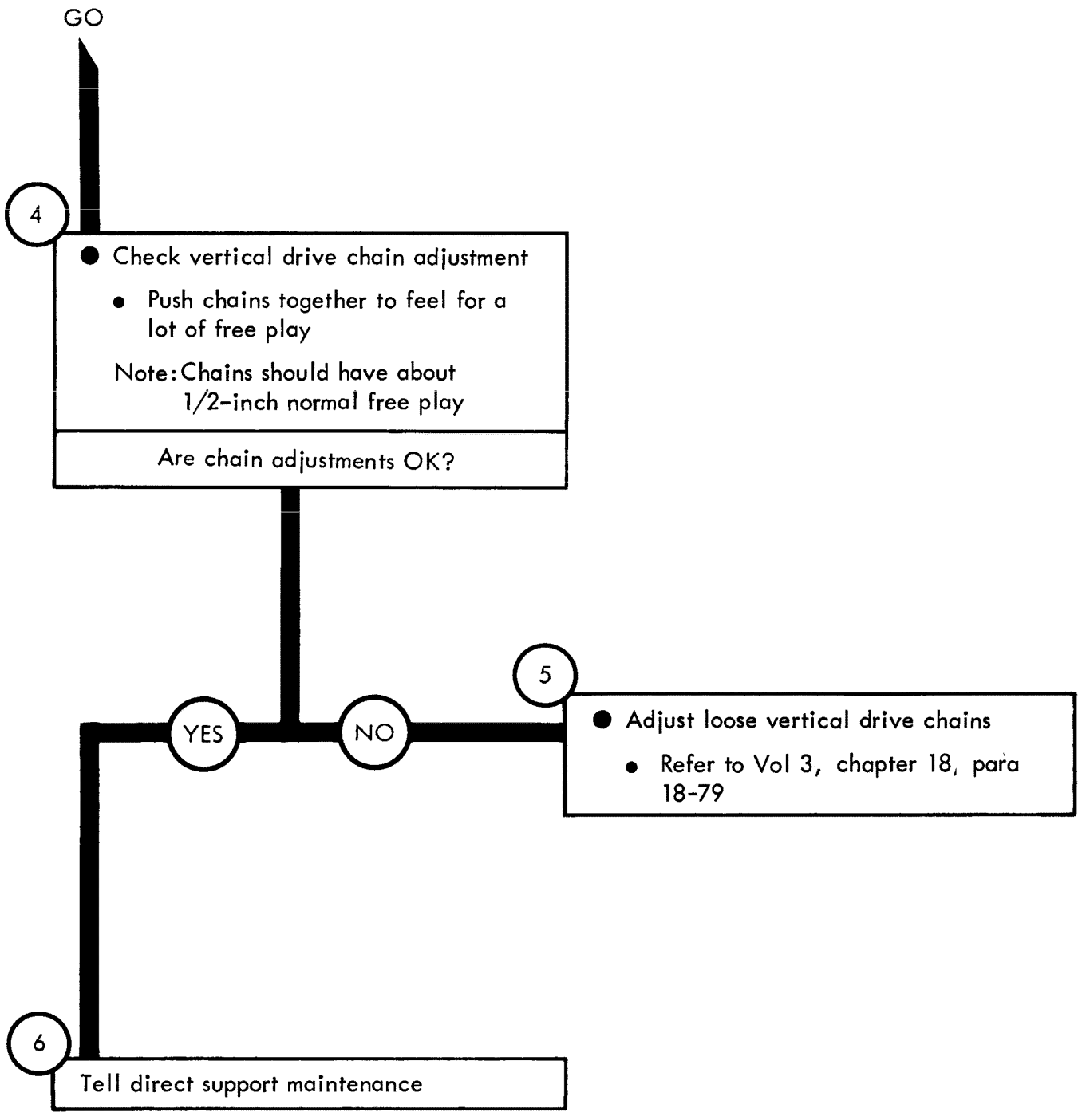
NO

3
- Replace broken drive chains
  - Refer to Vol 3, chapter 18, para 18-79

GO

TA 115030

Figure 73-2 (Sheet 1 of 2)



TA 115031

Figure 73-2 (Sheet 2 of 2)

Symptom

3 EARTH BORING MACHINE CANNOT BE MOVED HORIZONTALLY

1
- Stop earth boring operations
  - Refer to TM 9-2320-209-10

2
- Check horizontal drive chains
  - Remove chain cover. Refer to Vol 3, chapter 18, para 18-78
  - Look for a broken chain

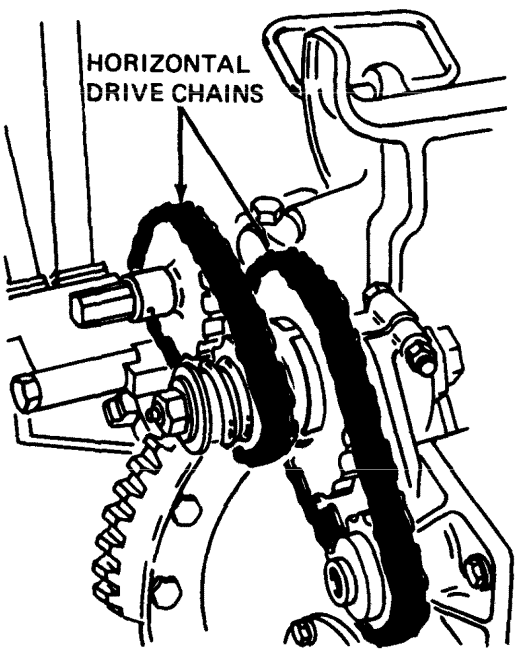
Are drive chains OK?

YES

NO

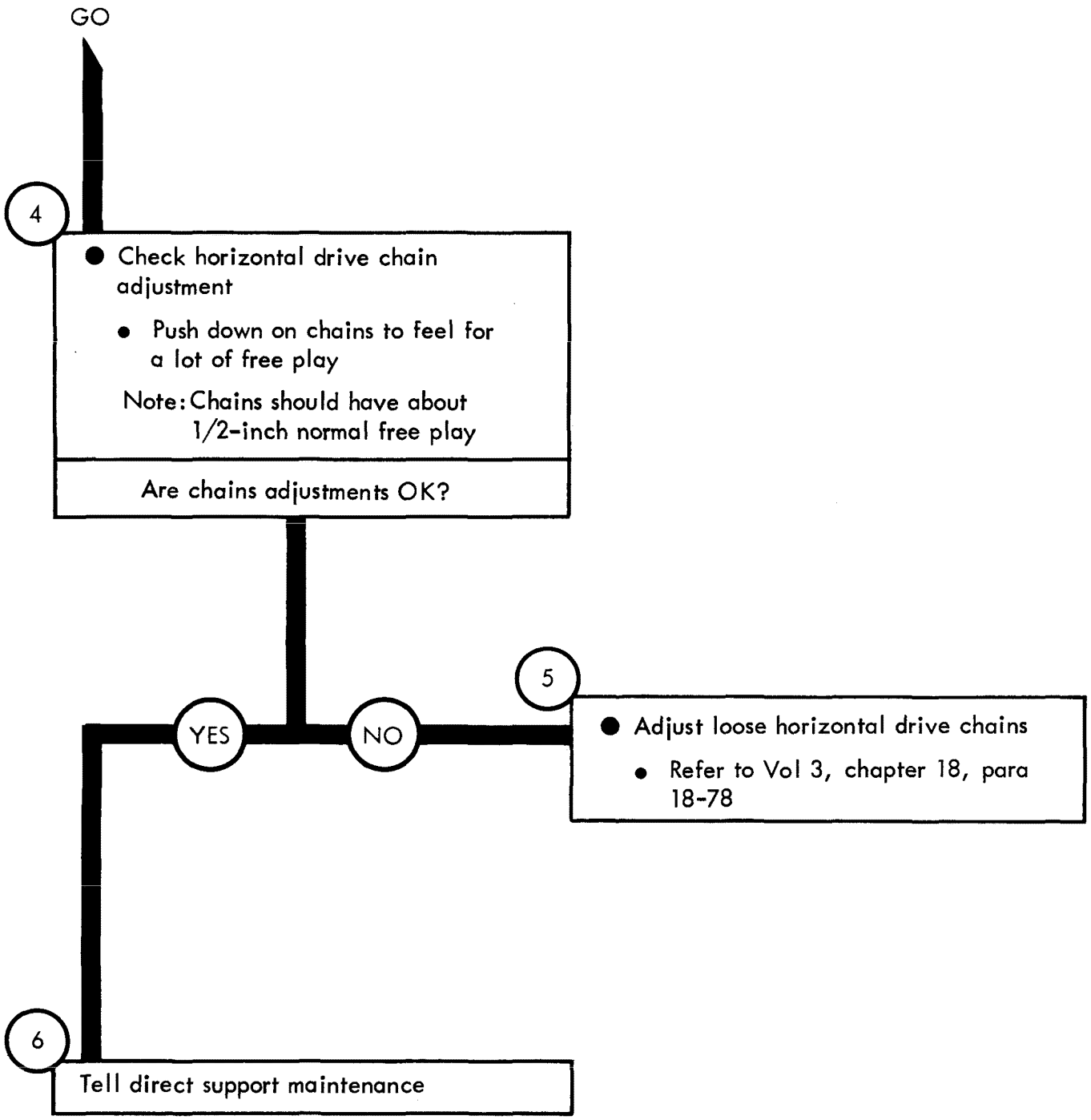
3
- Replace broken drive chains
  - Refer to Vol 3, chapter 18, para 18-78

GO



TA 115032

Figure 73-3 (Sheet 1 of 2)



TA 115033

Figure 73-3 (Sheet 2 of 2)

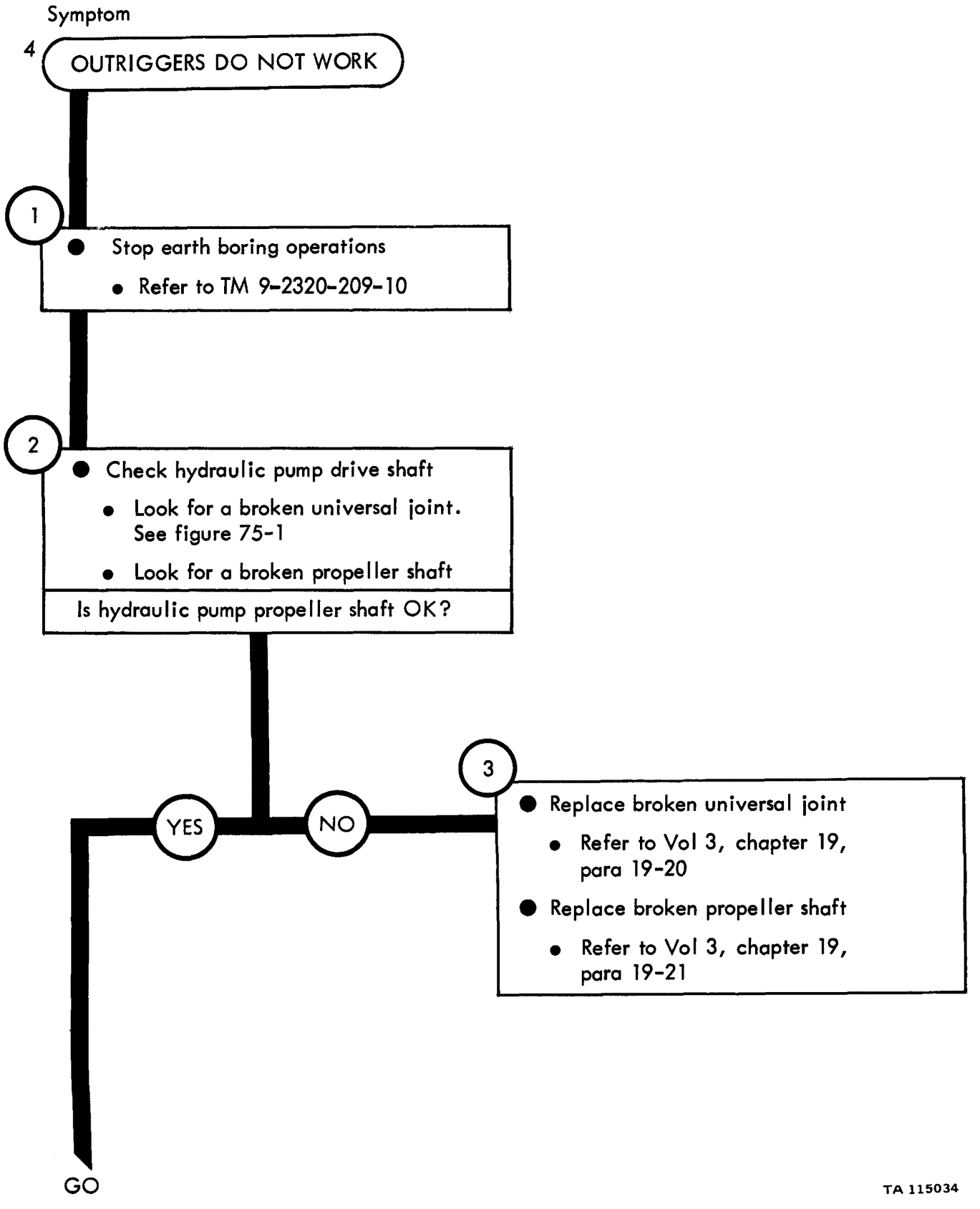
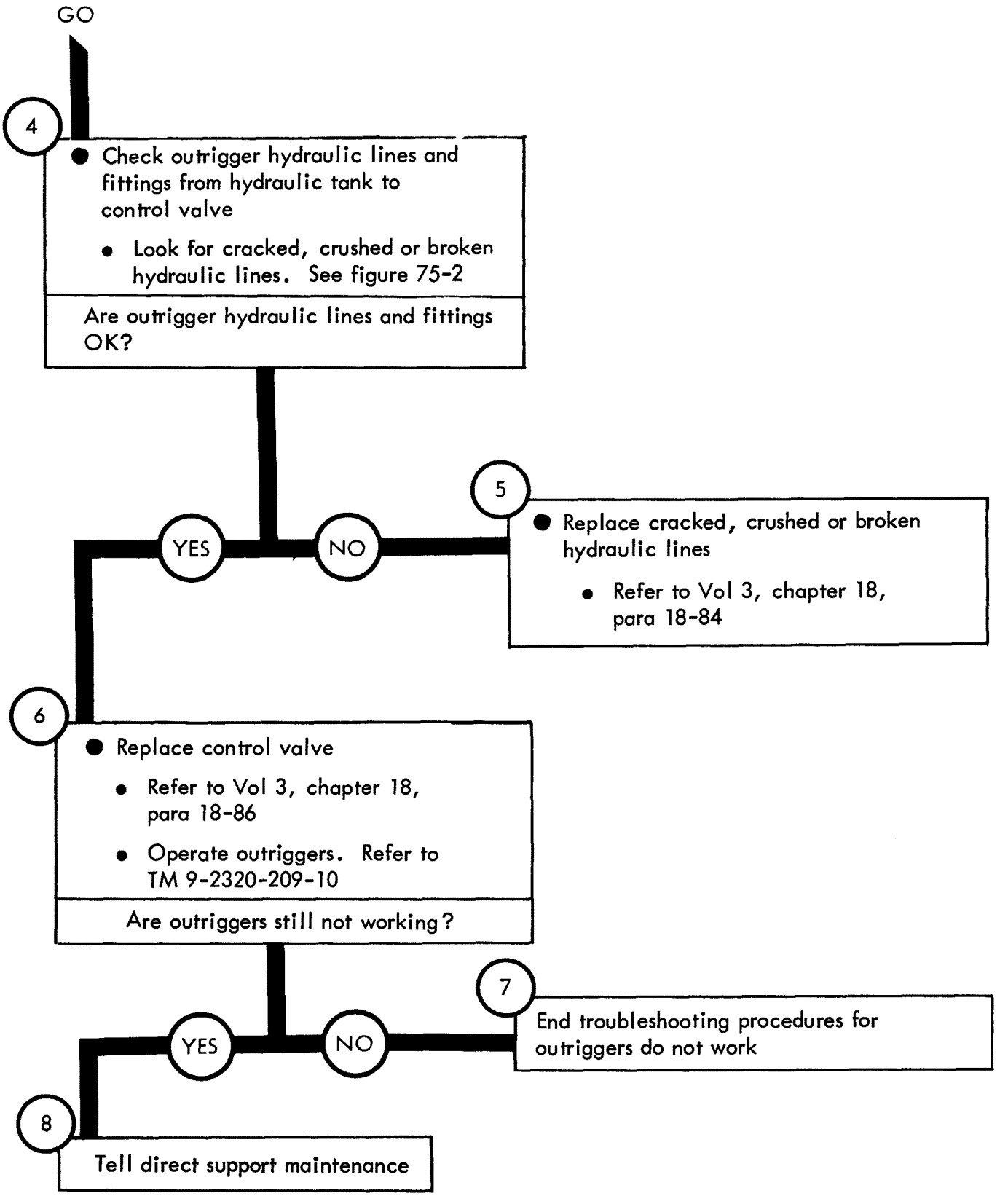


Figure **73-4 (Sheet 1 of 2)**



TA 115035

Figure 73-4 (Sheet 2 of 2)

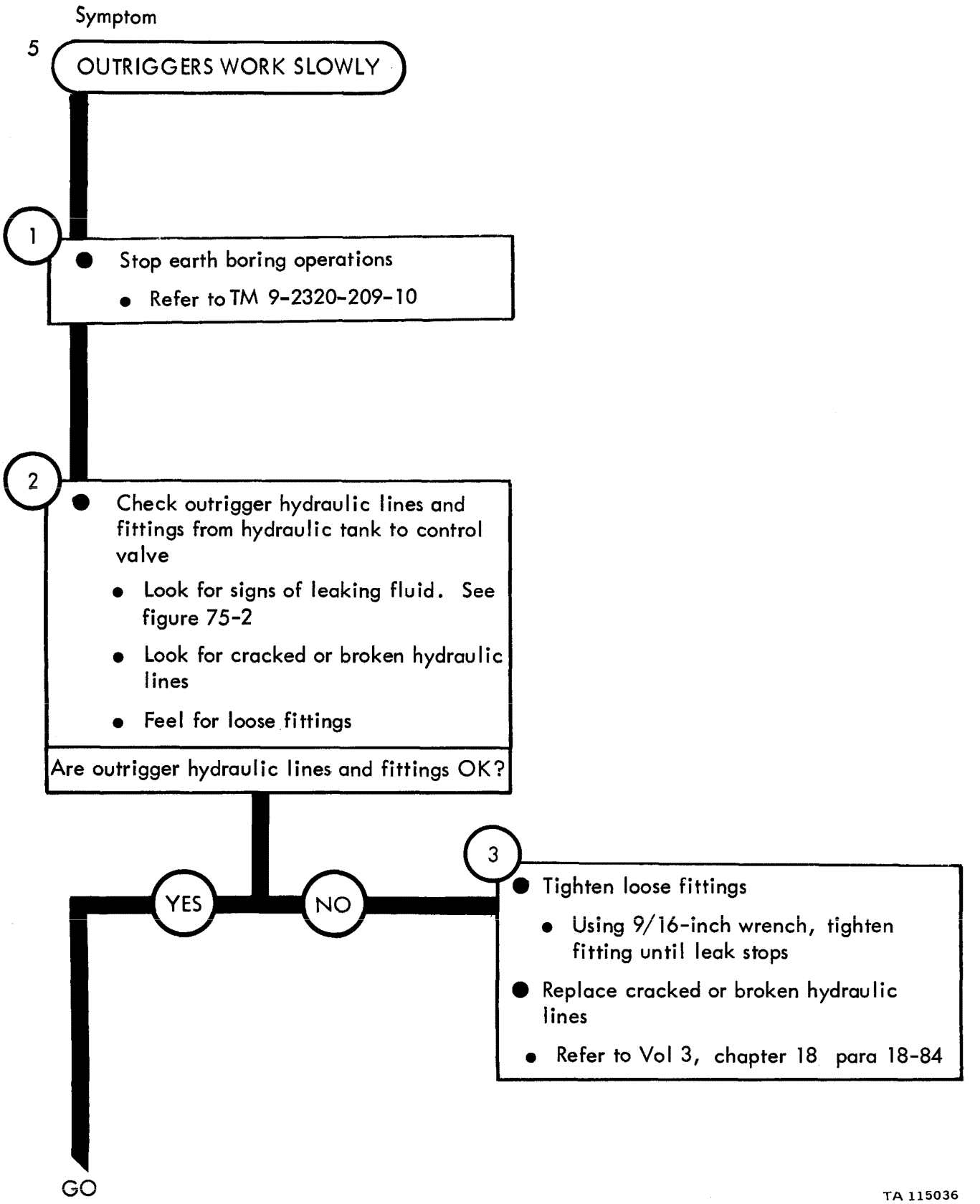
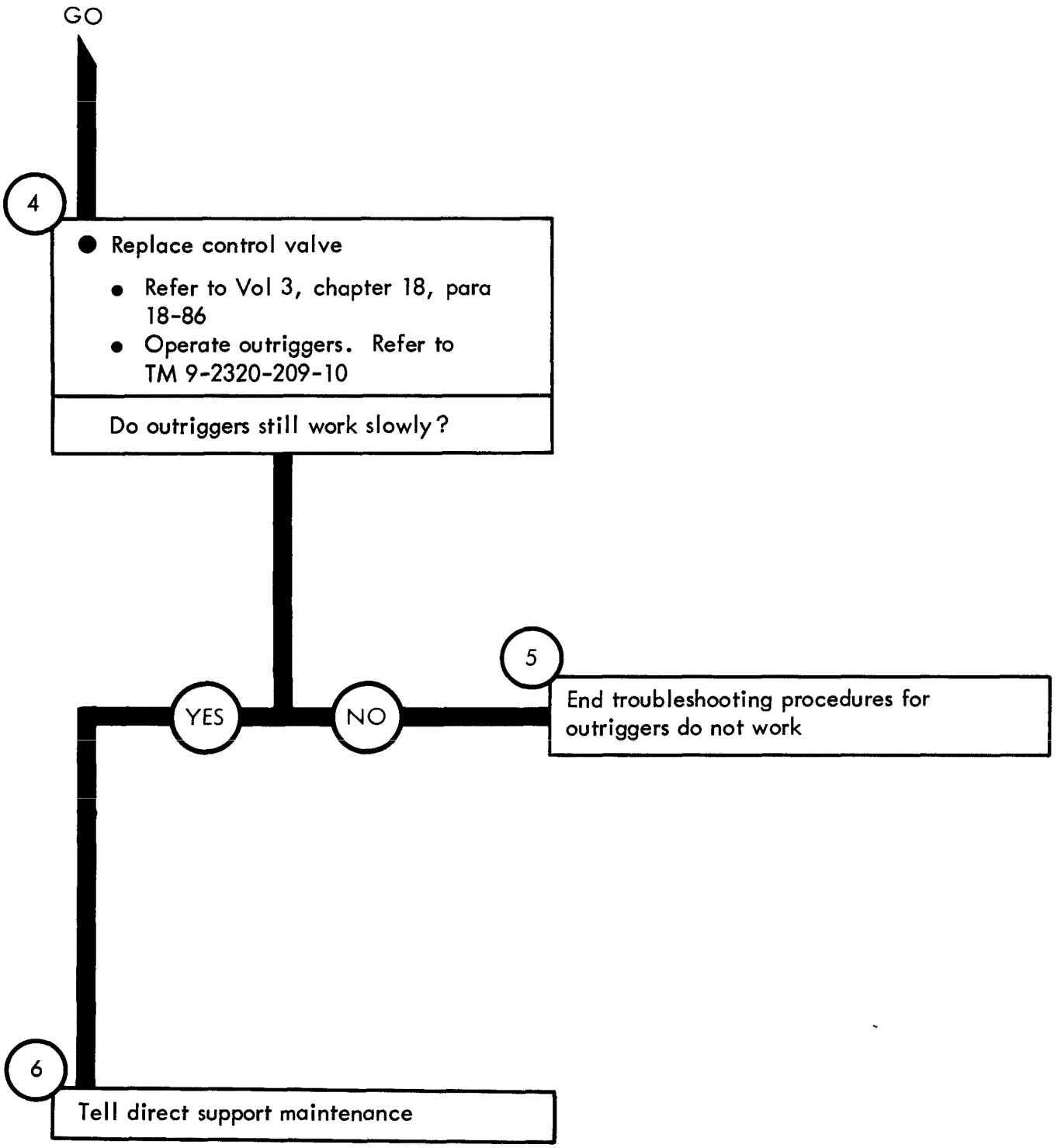


Figure 73-5 (Sheet 1 of 2)



TA 115037

Figure 73-5 (Sheet 2 of 2)

CHAPTER 74

EARTH BORING MACHINE TROUBLESHOOTING SUMMARY

74-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 73 for the earth boring machine (M764).

74-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

EARTH BORING MACHINE, M764 TROUBLESHOOTING SUMMARY

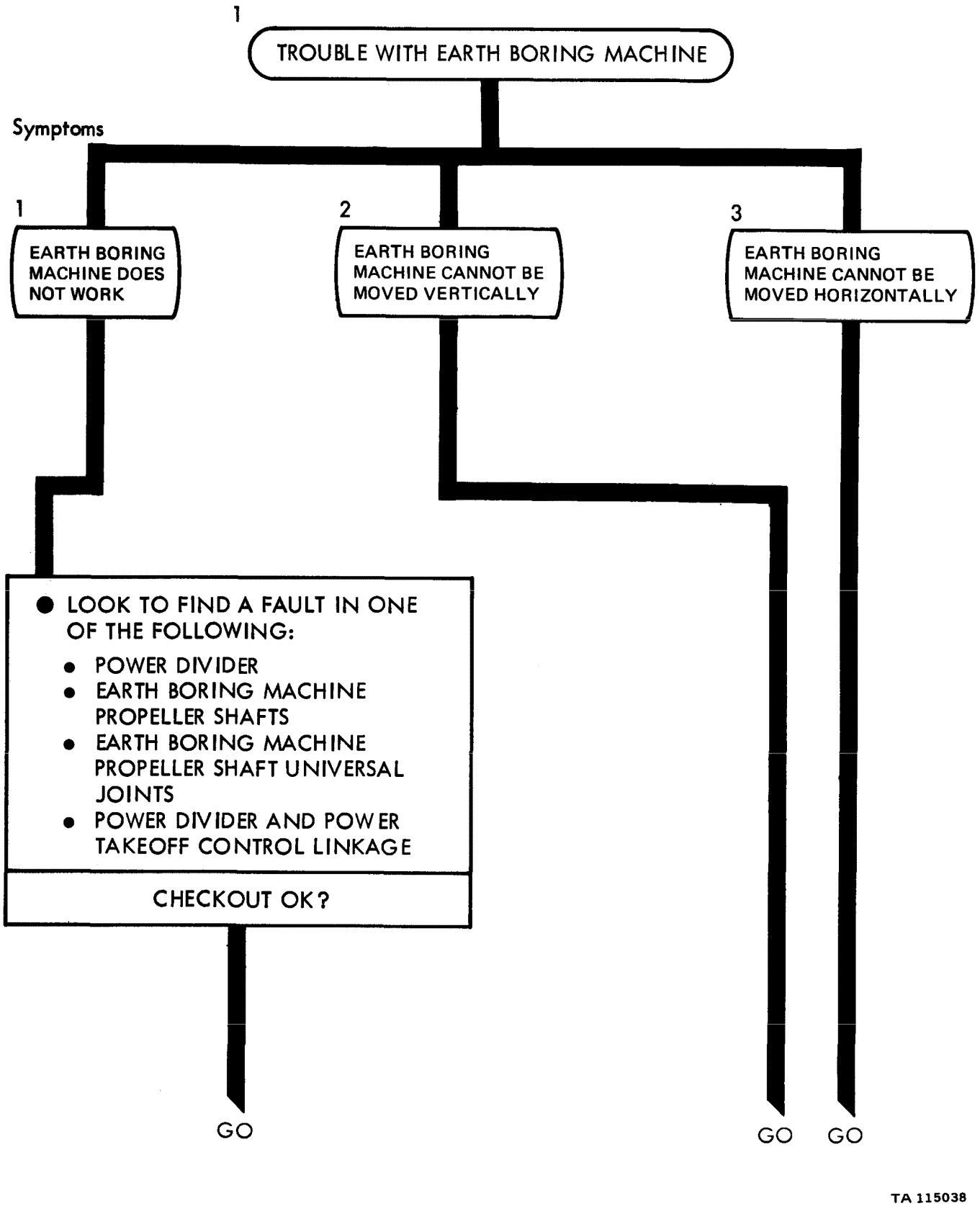
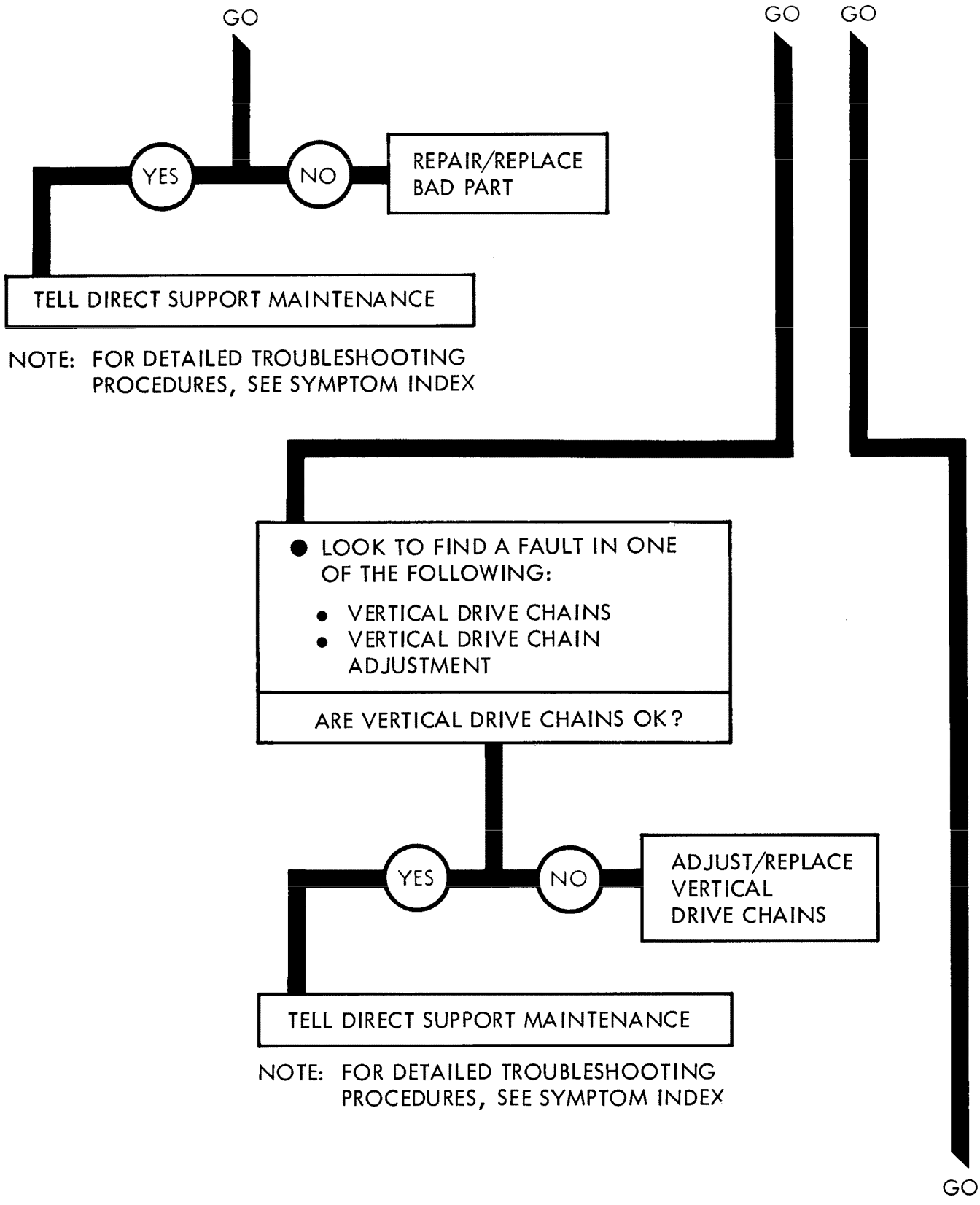
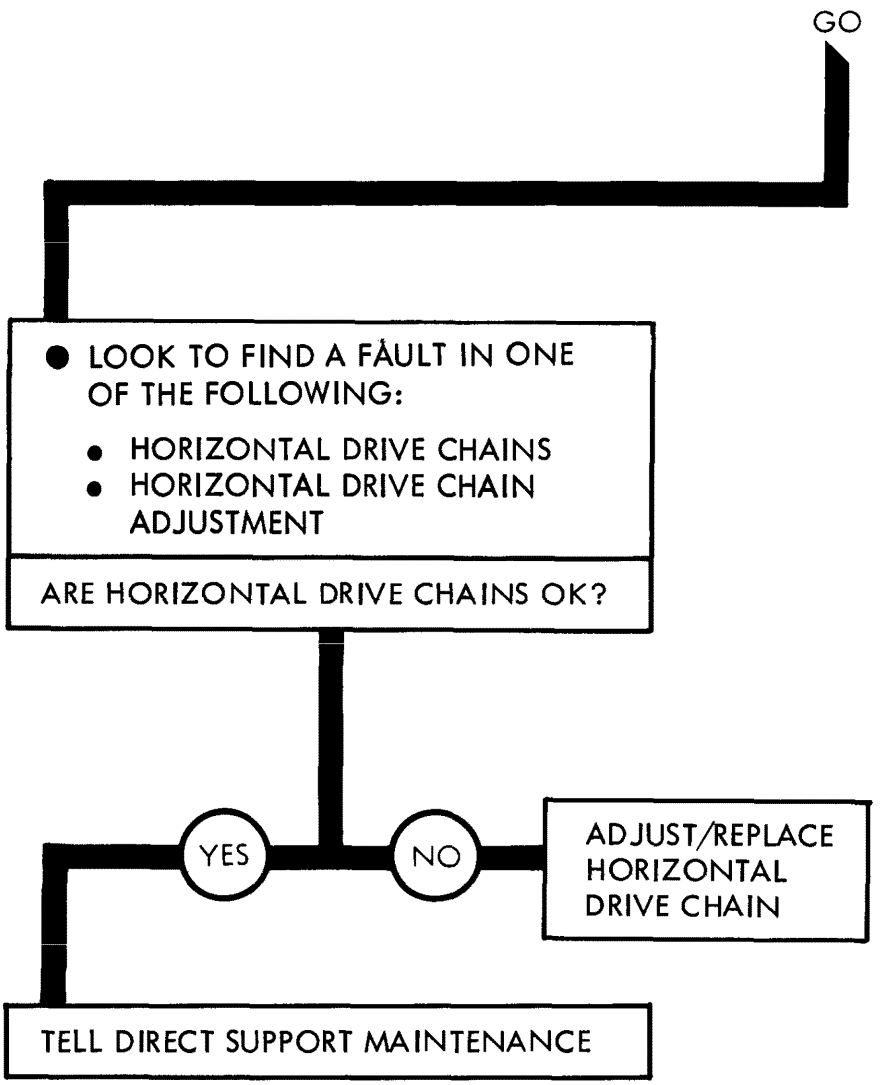


Figure 74-1 (Sheet 1 of 3)



TA 115039

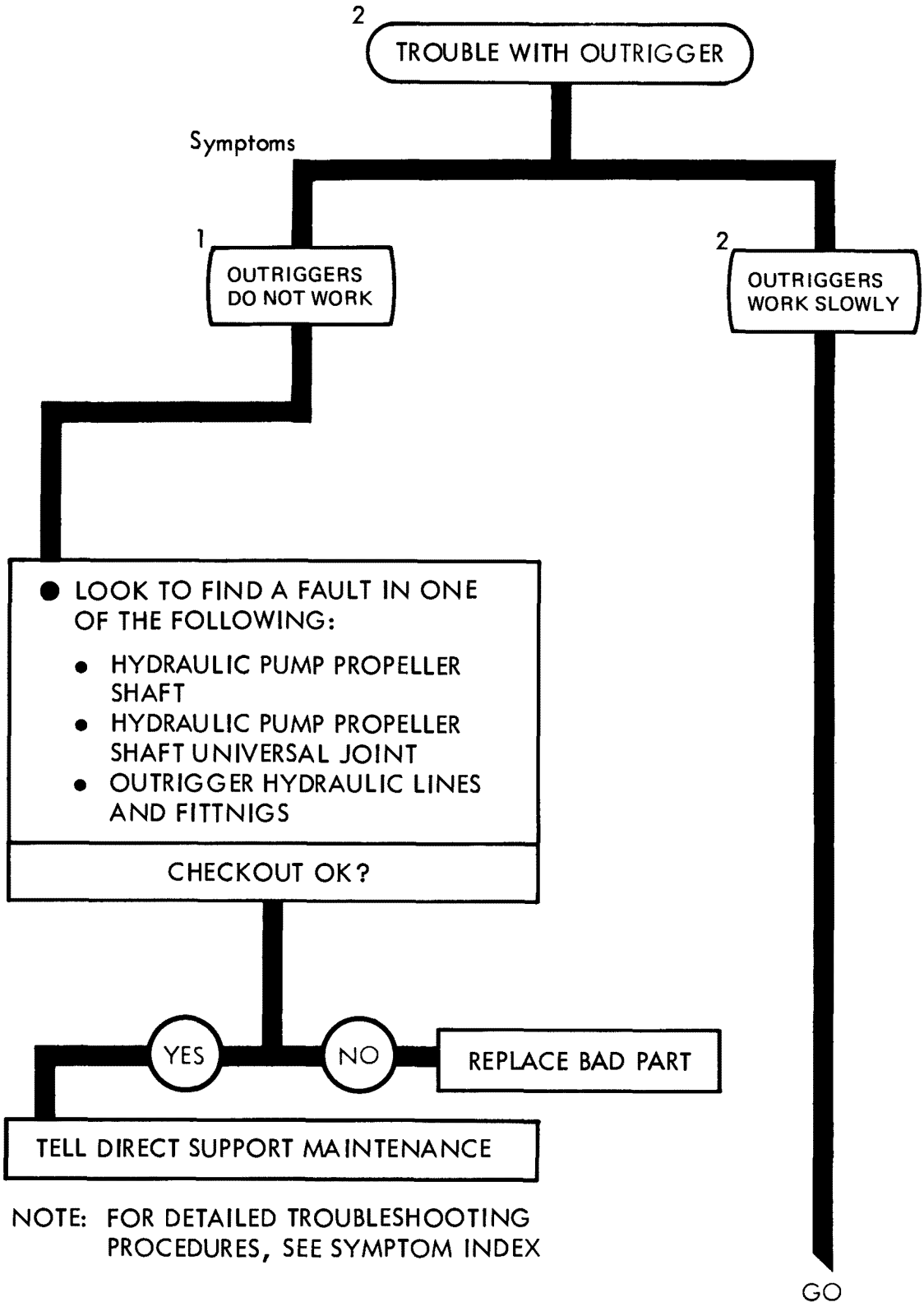
Figure 74-1 (Sheet 2 of 3)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

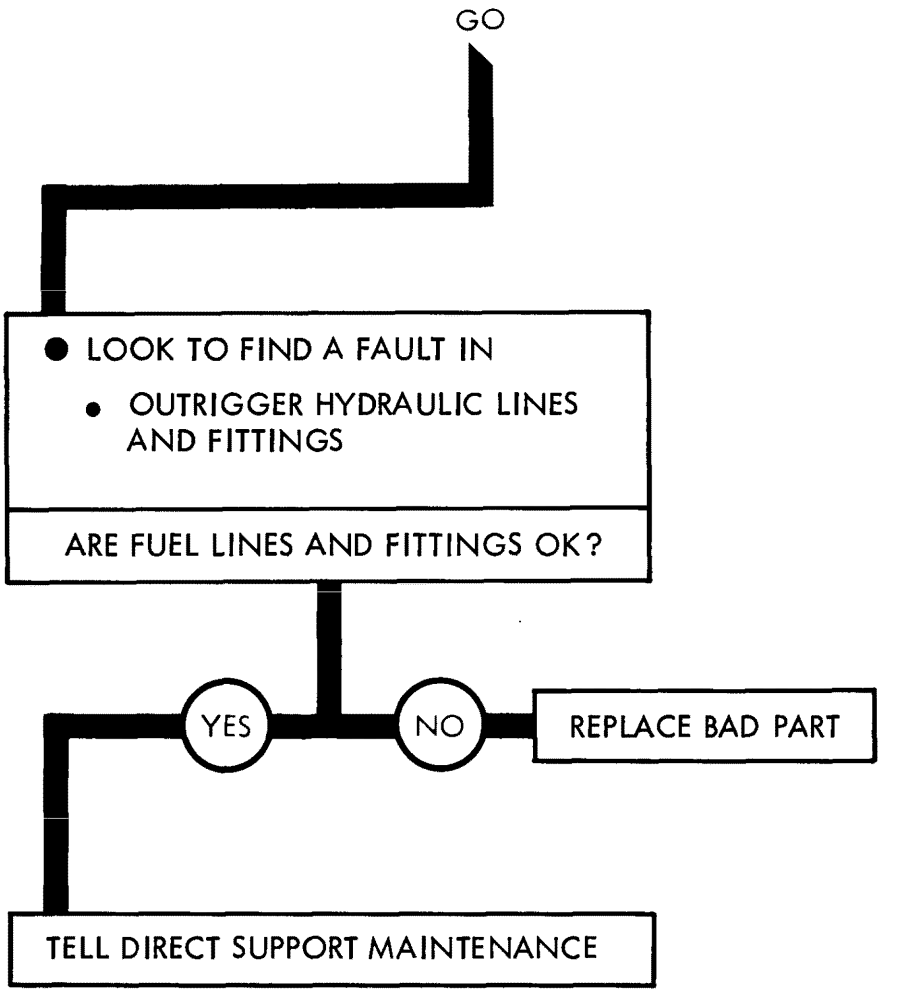
TA 115040

Figure 74-1 (Sheet 3 of 3)



TA 115041

Figure 74-2 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 115042

Figure 74-2 (Sheet 2 of 2)

CHAPTER 75

EARTH BORING MACHINE SUPPORT DIAGRAMS

75-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 73. Table 3-1 is a complete listing of all support diagrams used in this manual.

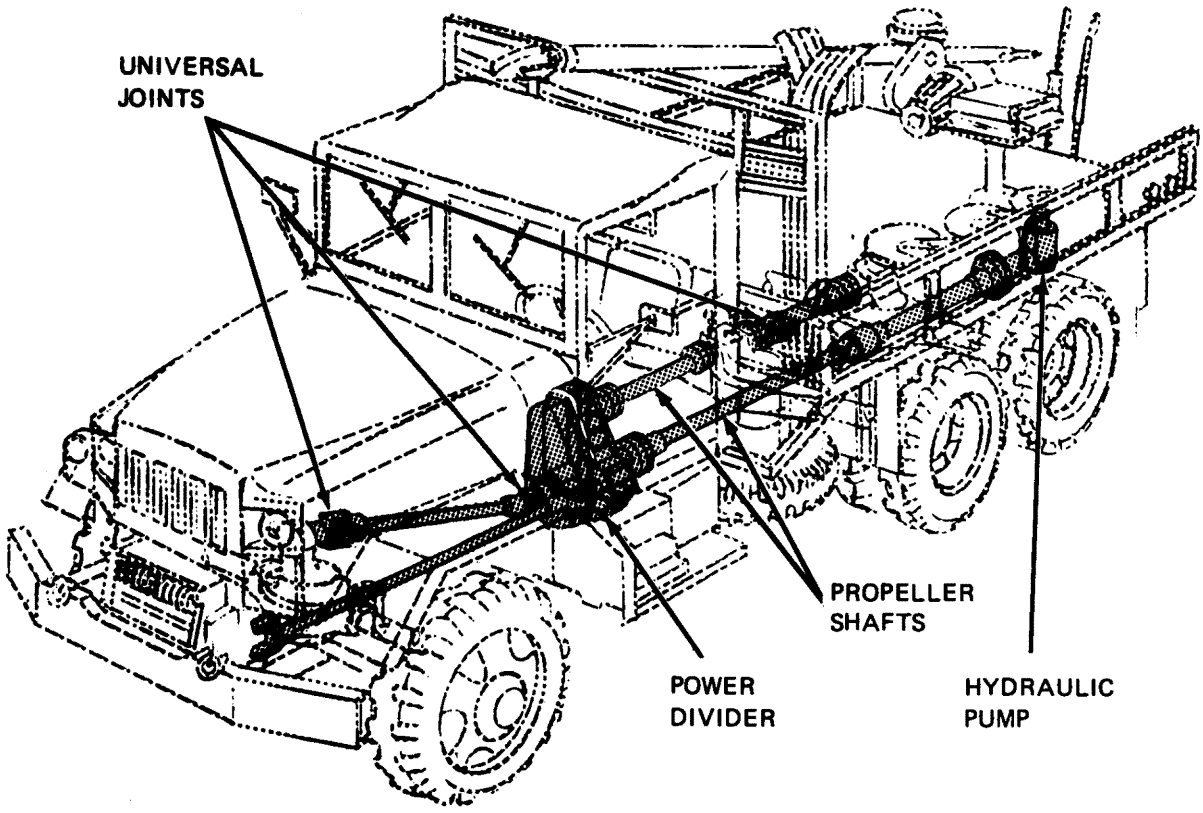


Figure 75-1. Earth Boring Machine (M764) Support Diagram

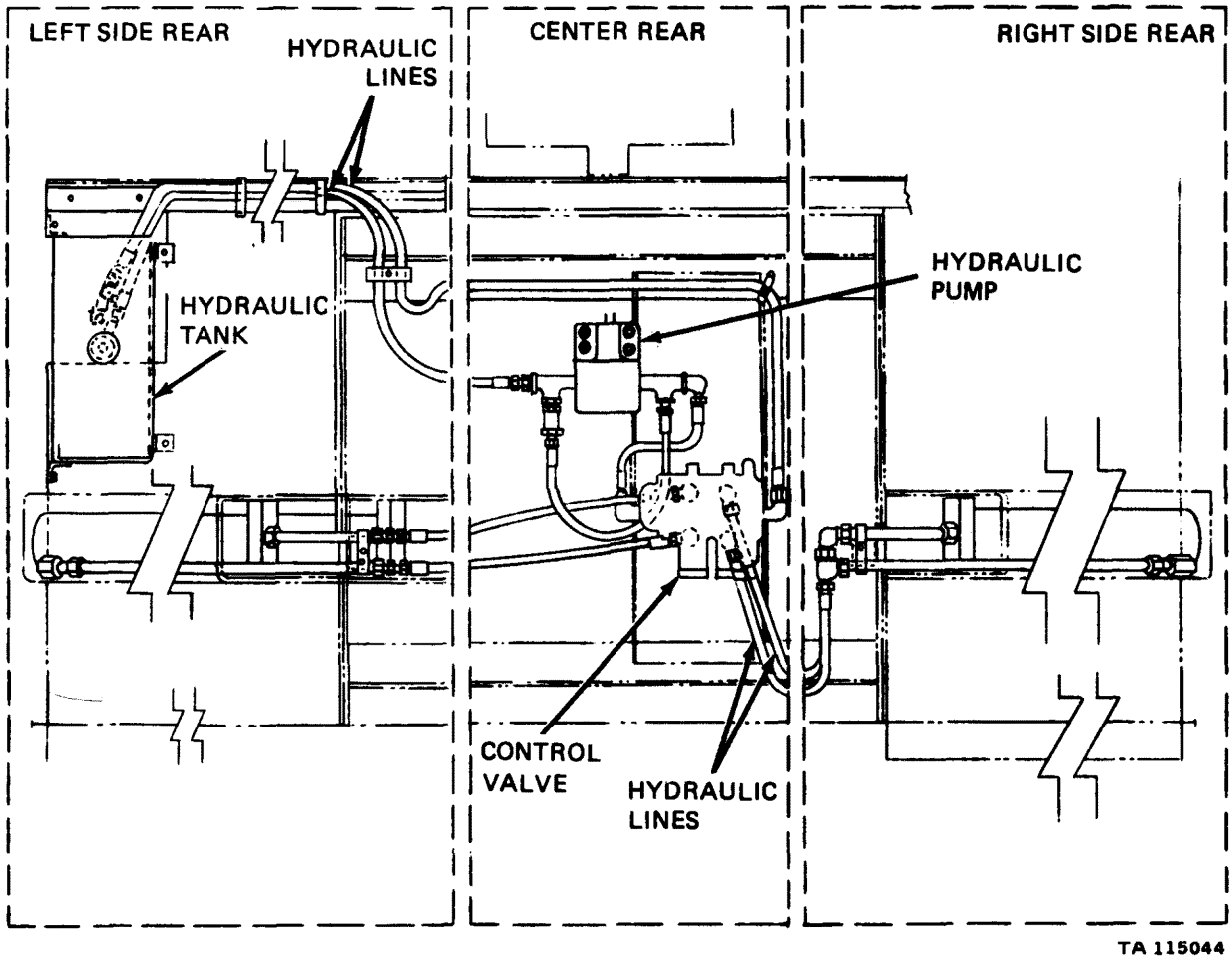


Figure 75-2. Earth Boring Machine (M764) Support Diagram

CHAPTER 76

EARTH BORING MACHINE CHECKOUT PROCEDURES

76-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not checkout.

EARTH BORING MACHINE, M764 CHECKOUT

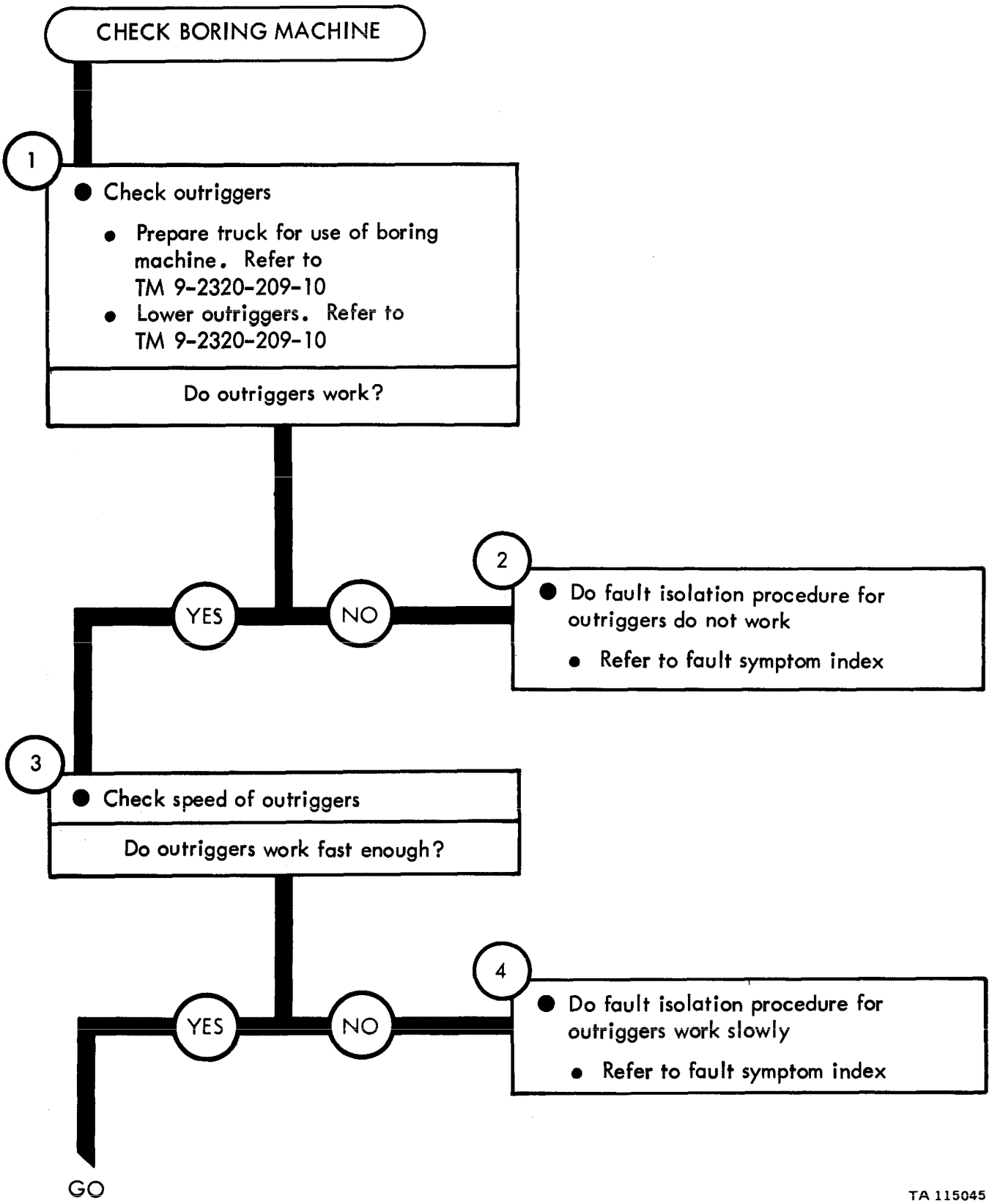


Figure 76-1 (Sheet 1 of 3)

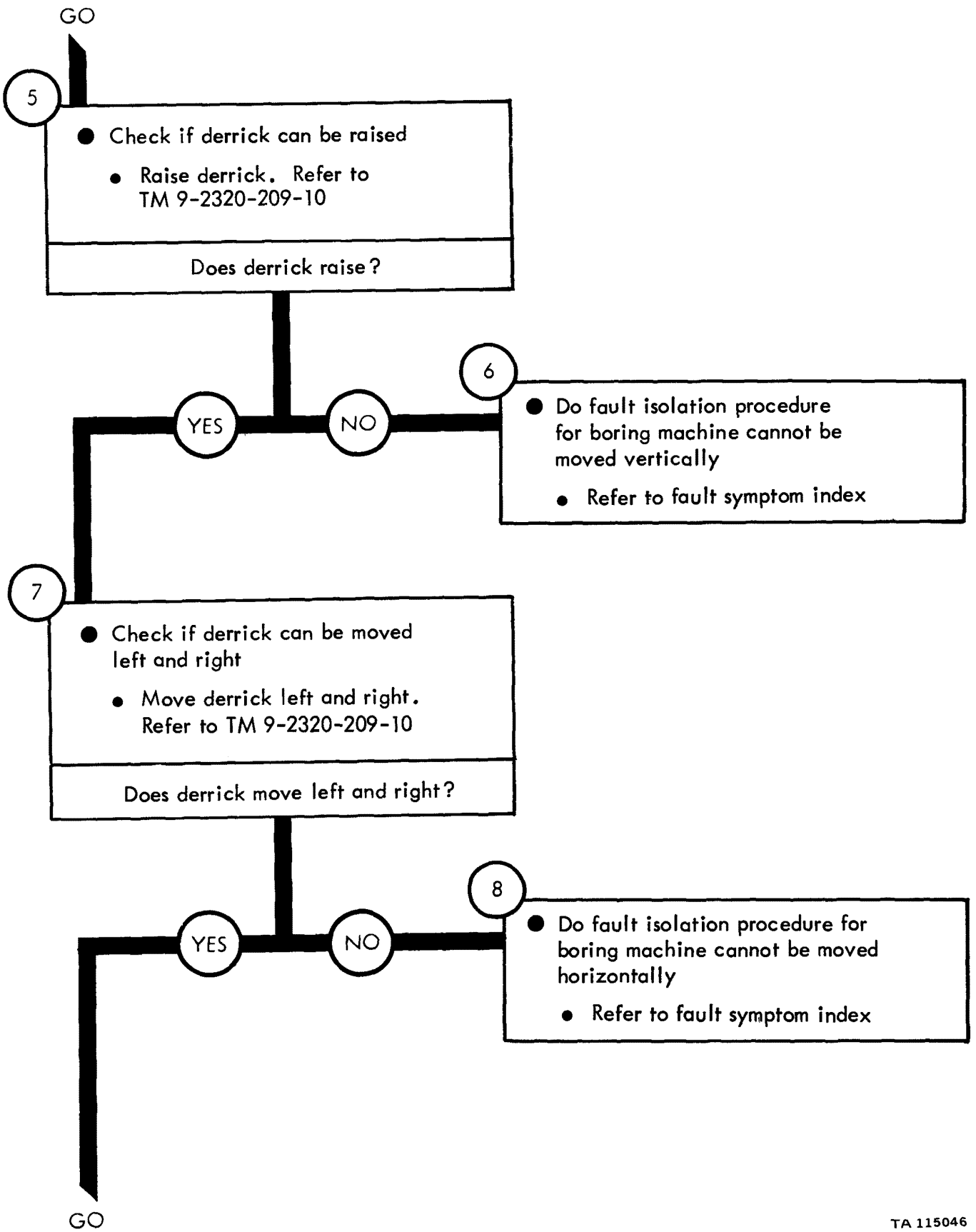


Figure 76-1 (Sheet 2 of 3)

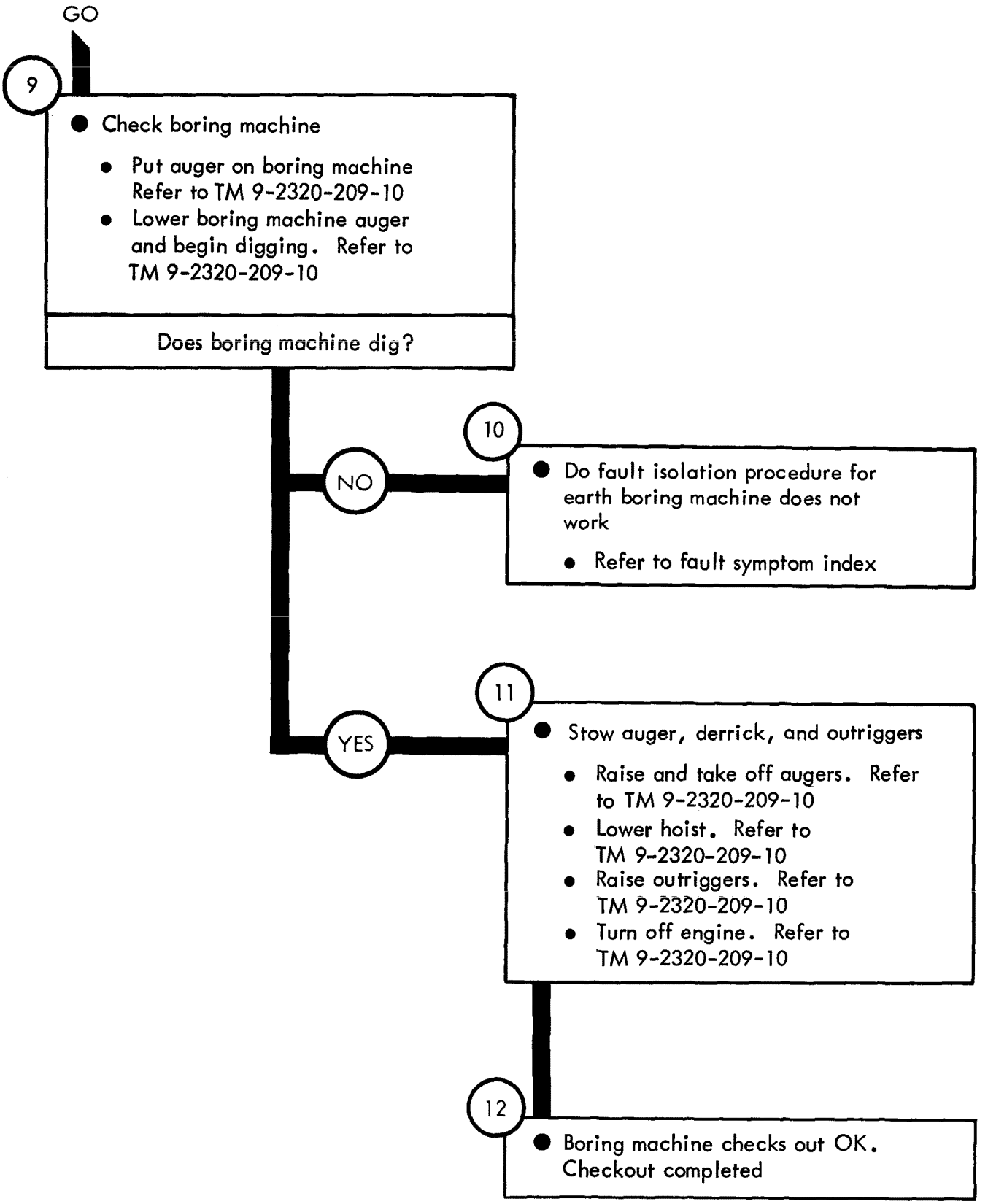


Figure 76-1 (Sheet 3 of 3)

CHAPTER 77

FRONT WINCH TROUBLESHOOTING

77-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the front winch, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

77-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

FRONT WINCH TROUBLESHOOTING

Symptom

1 WINCH DOES NOT PULL LOAD

1

- Make truck body ready for work on front winch
  - Stop winch. Refer to TM 9-2320-209-10
  - Stop engine. Refer to TM 9-2320-209-10
  - Unhook cable from load
  - Chock wheels

2

- Check front winch drive shaft
  - Look for a broken universal joint
  - Look for a broken drive shaft

Is front winch drive shaft OK?

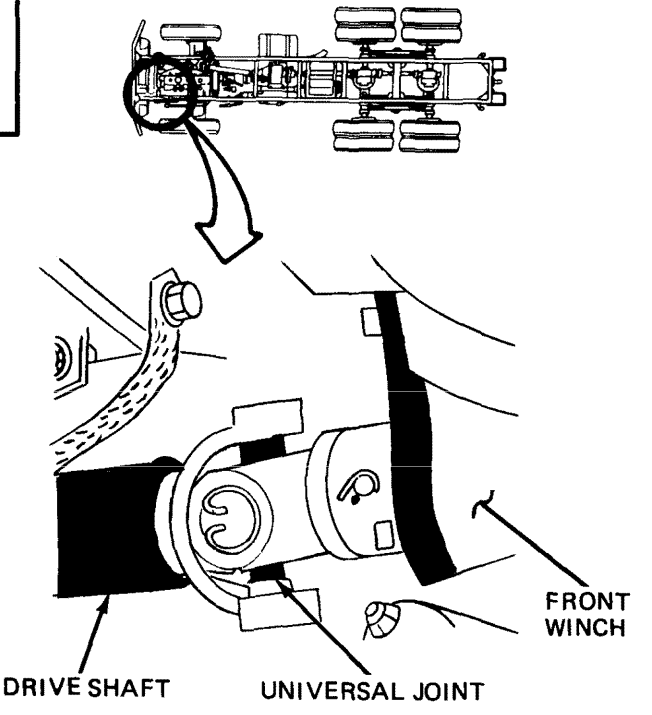
YES

NO

3

- Replace broken universal joint
  - Refer to Vol 3, chapter 10, para 10-5
- Replace broken drive shaft
  - Refer to Vol 3, chapter 19, para 19-5

GO



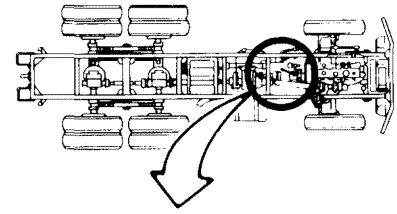
TA 115048

Figure 77-1 (Sheet 1 of 2)

GO

NOTE

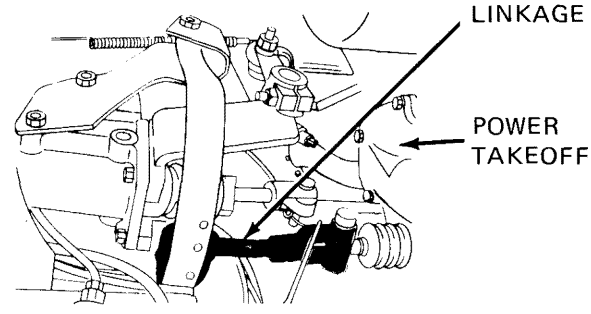
The power takeoff control linkage is not part of the front winch. However, it should be checked when the winch will not pull a load



4

- Check power takeoff control linkage
  - Look for bent or broken linkage
  - Shake linkage to feel if it is loose

Is power takeoff control linkage OK?



YES

NO

5

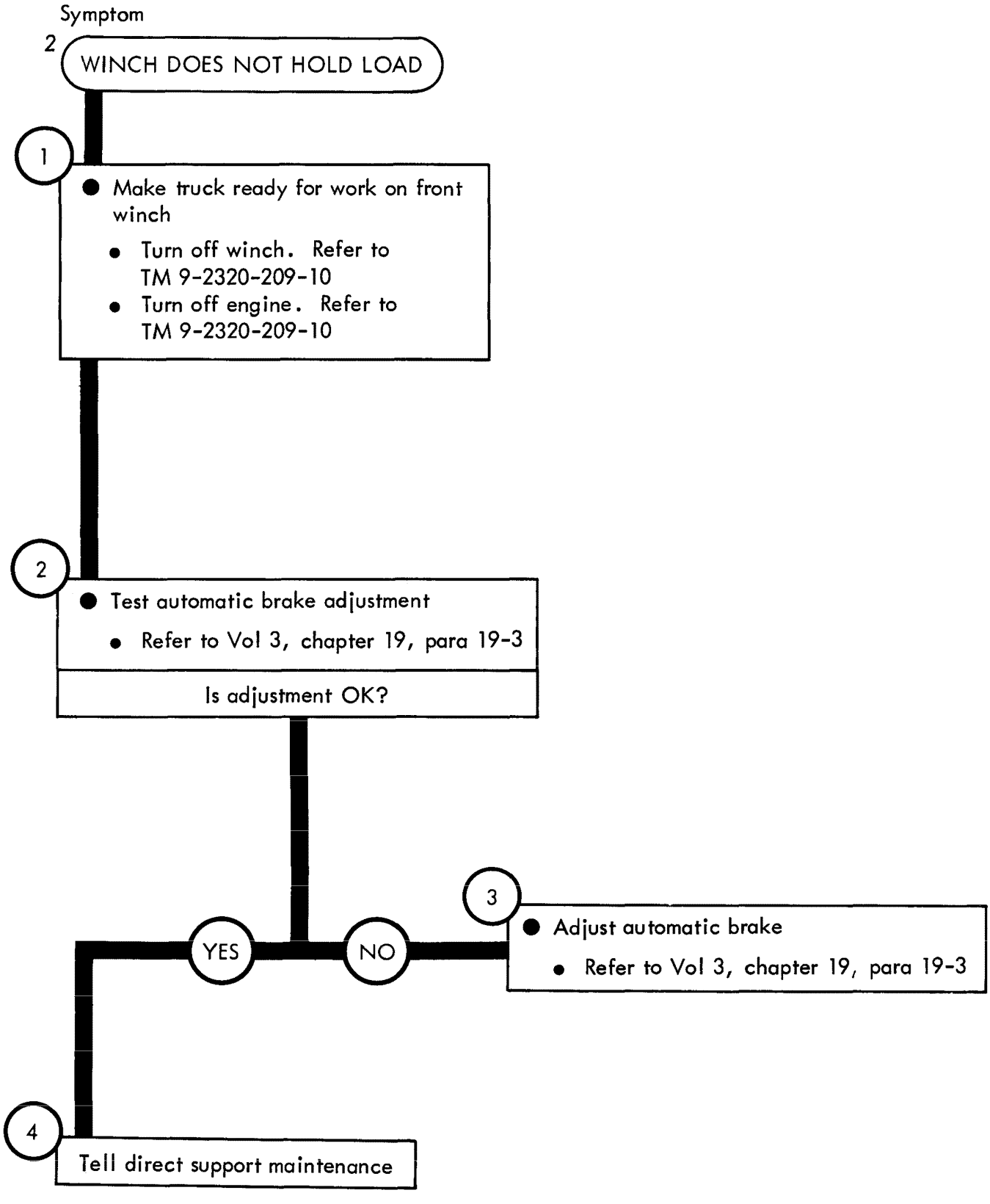
- Replace bent or broken linkage
  - Refer to Vol 3, chapter 19, para 19-25
- Adjust loose linkage
  - Refer to Vol 3, chapter 19, para 19-25

6

Tell direct support maintenance

TA 115049

Figure 77-1 (Sheet 2 of 2)



TA 115050

Figure 77-2

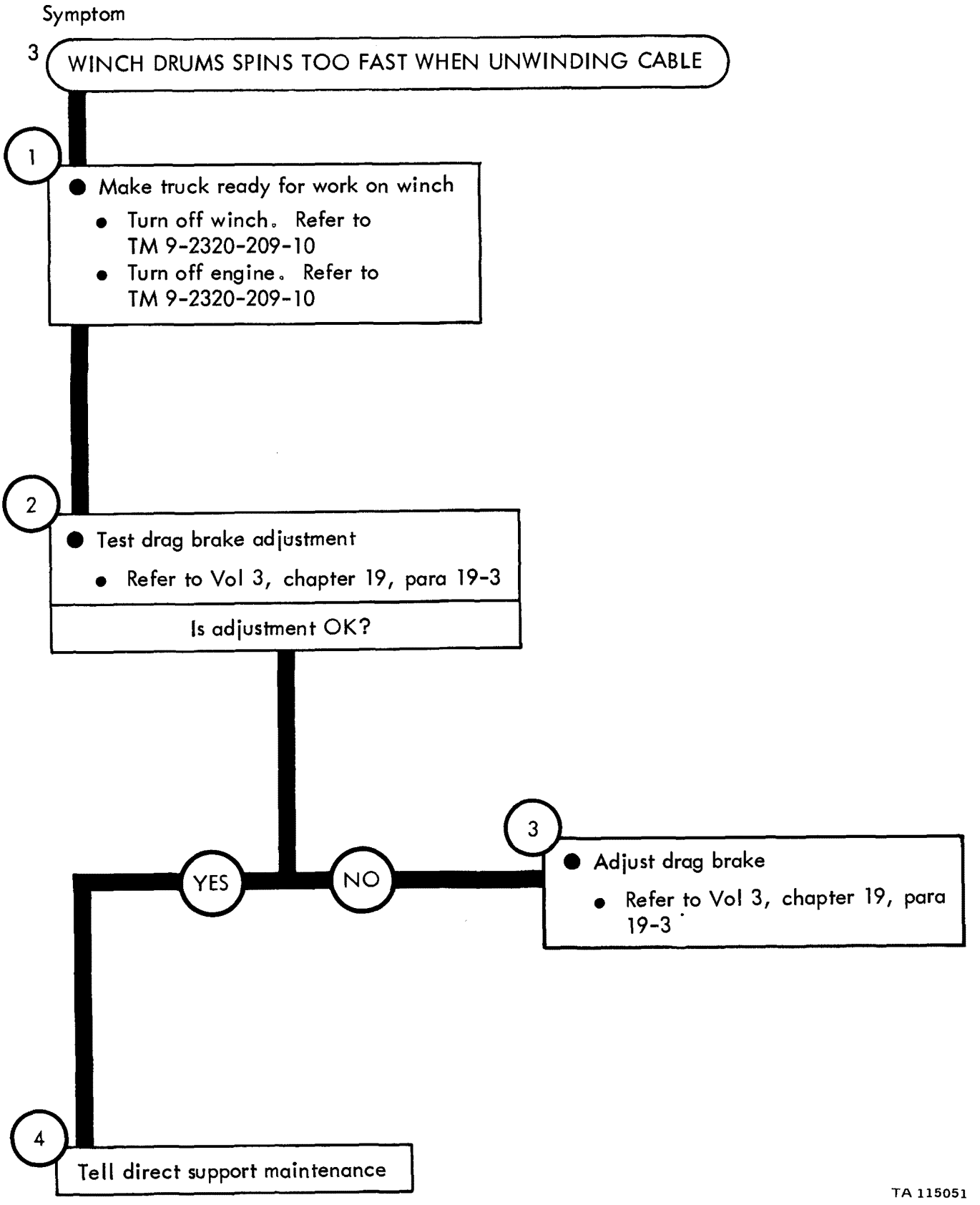

Symptom
3
WINCH DRUMS SPINS TOO FAST WHEN UNWINDING CABLE
1
● Make truck ready for work on winch
• Turn off winch. Refer to TM 9-2320-209-10
• Turn off engine. Refer to TM 9-2320-209-10
2
● Test drag brake adjustment
• Refer to Vol 3, chapter 19, para 19-3
Is adjustment OK?
YES
NO
3
● Adjust drag brake
• Refer to Vol 3, chapter 19, para 19-3
4
Tell direct support maintenance
TA 115051

Figure 77-3

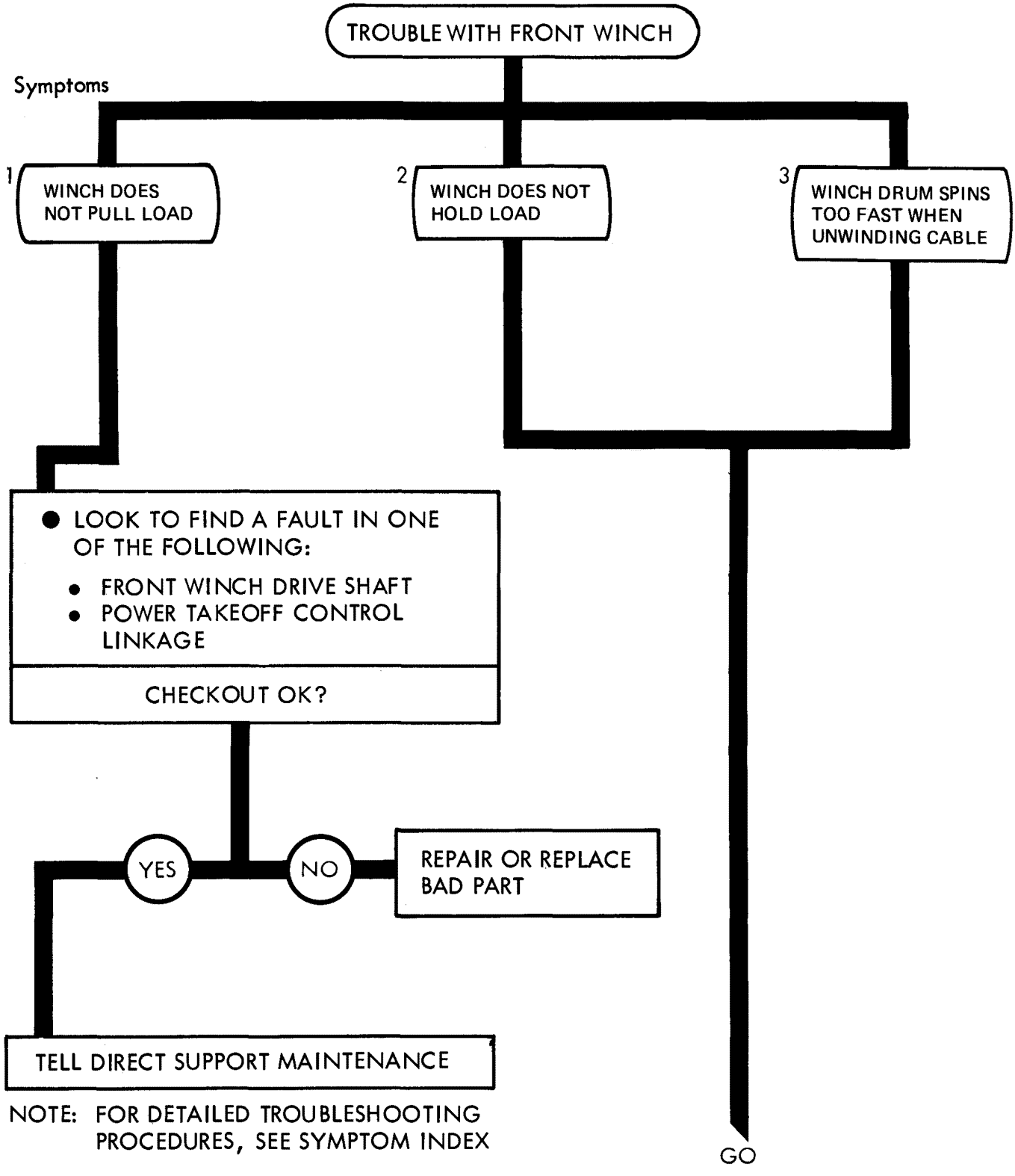
CHAPTER 78

FRONT WINCH TROUBLESHOOTING SUMMARY

78-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 77 for the front winch.

78-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

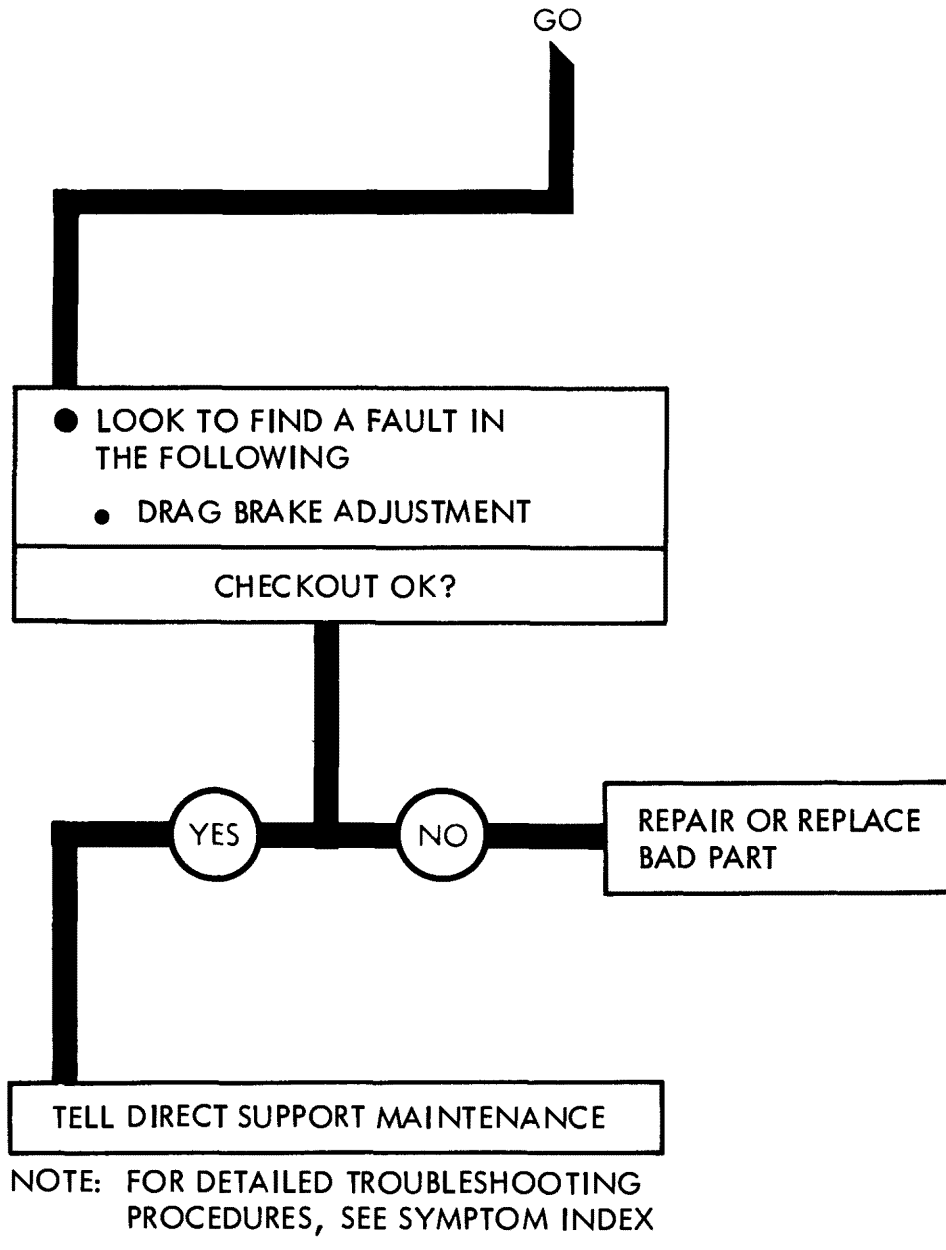
FRONT WINCH TROUBLESHOOTING SUMMARY



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 115052

Figure 78-1 (Sheet 1 of 2)



TA 115053

Figure 78-1 (Sheet 2 of 2)

CHAPTER 79

FRONT WINCH CHECKOUT PROCEDURES

79-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

FRONT WINCH CHECKOUT

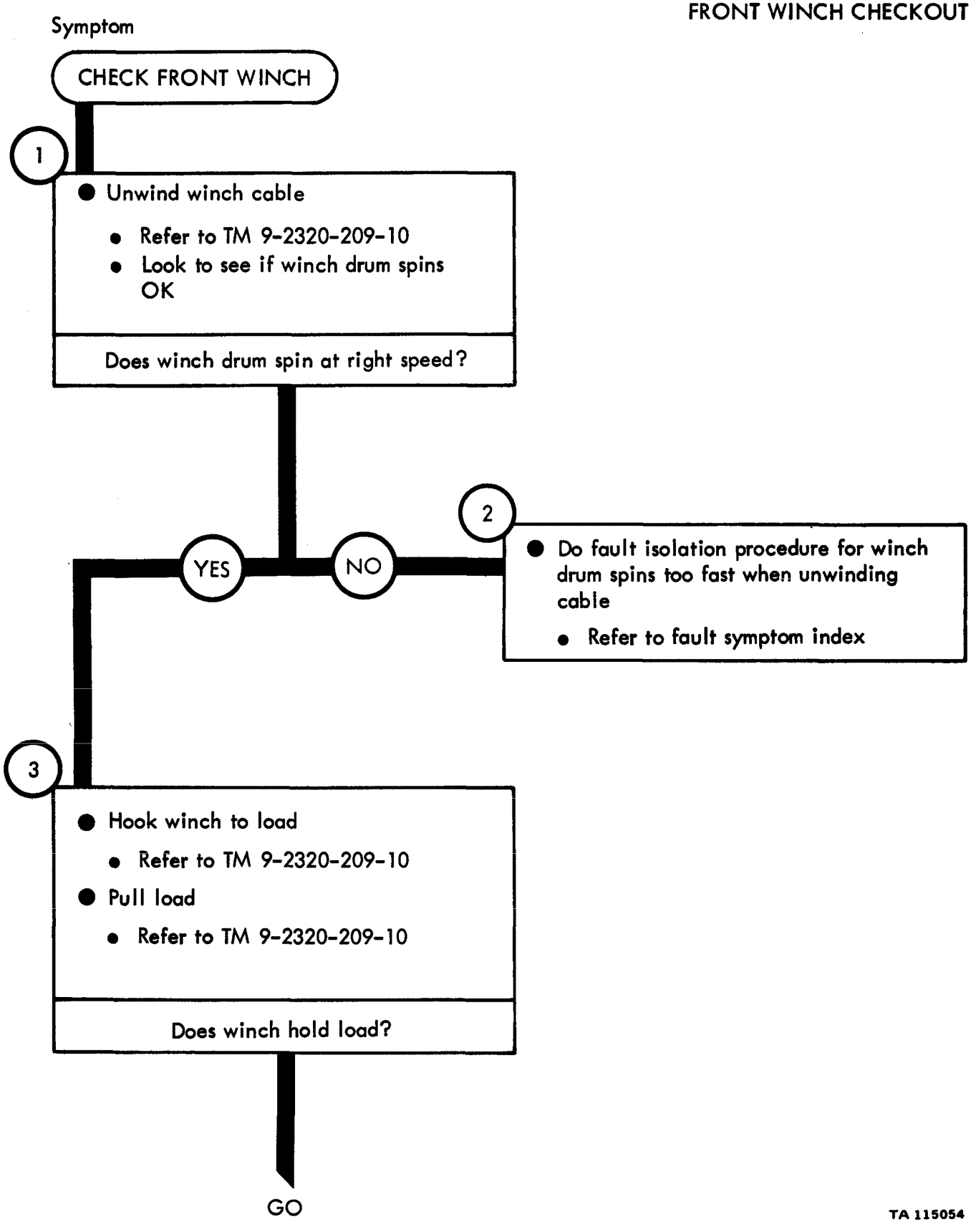
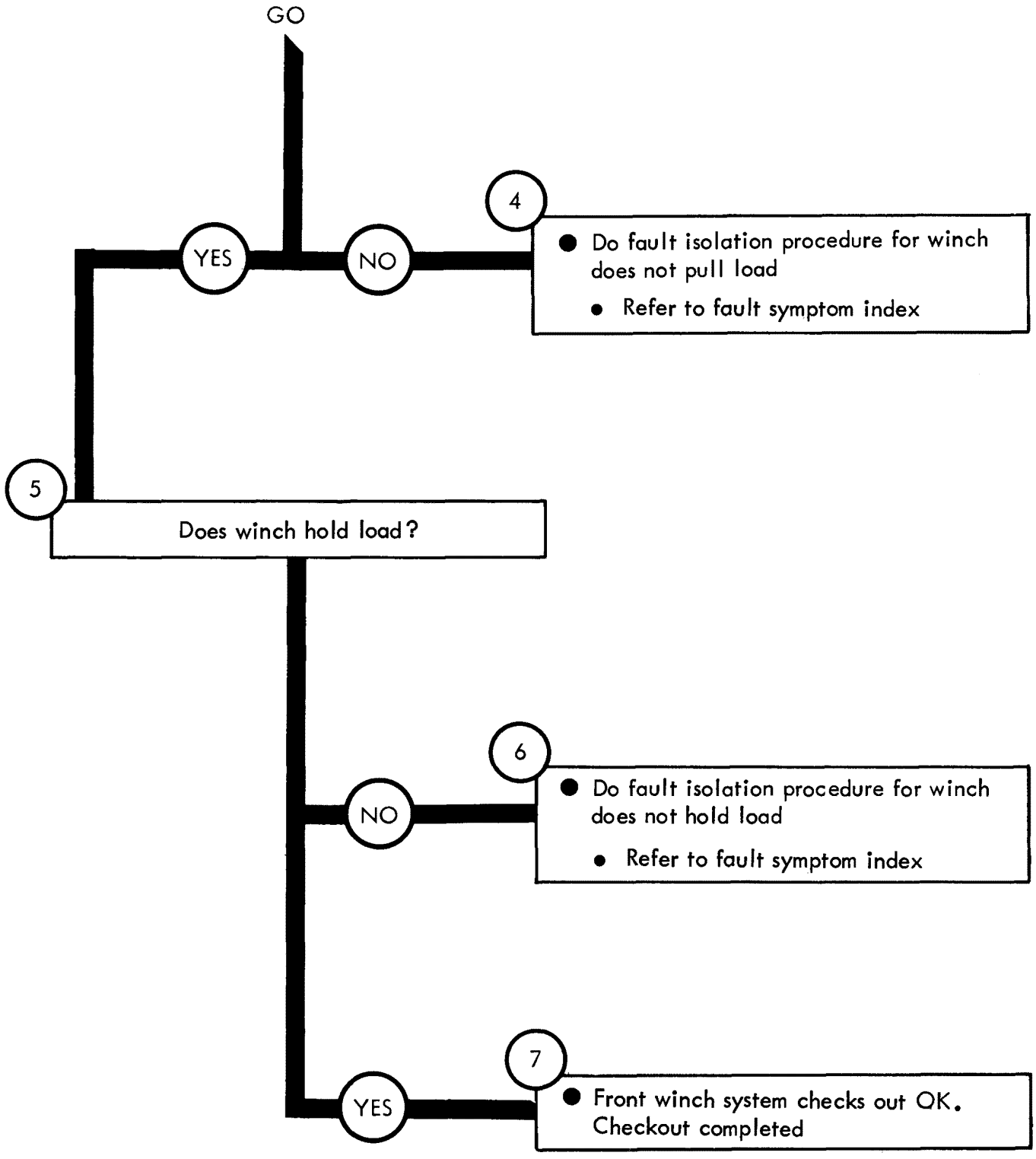


Figure 79-1 (Sheet 1 of 2)



TA 115055

Figure 79-1 (Sheet 2 of 2)

CHAPTER 80

EARTH BORING MACHINE REAR WINCH TROUBLESHOOTING

80-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the earth boring machine rear winch, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

80-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

EARTH BORING MACHINE REAR WINCH TROUBLESHOOTING

Symptom

1 WINCH DOES NOT PULL LOAD

1

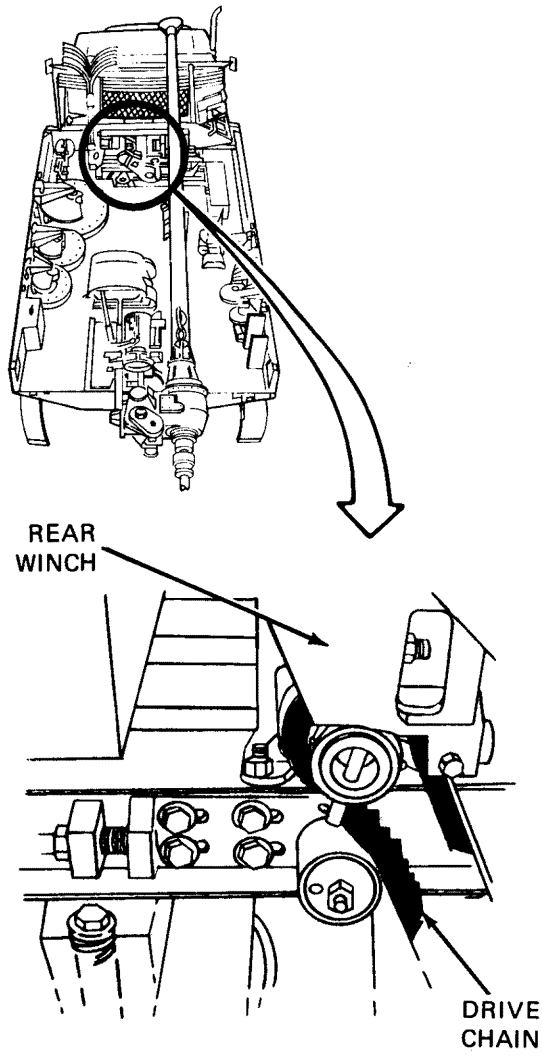
- Park truck
  - Refer to TM 9-2320-209-10
  - Turn off winch. Refer to TM 9-2320-209-10
  - Turn off engine. Refer to TM 9-2320-209-10

2

- Check winch drive chain
  - Look for broken chain

Is winch drive chain OK?

GO



TA 115056

Figure 80-1 (Sheet 1 of 4)

GO

YES

NO

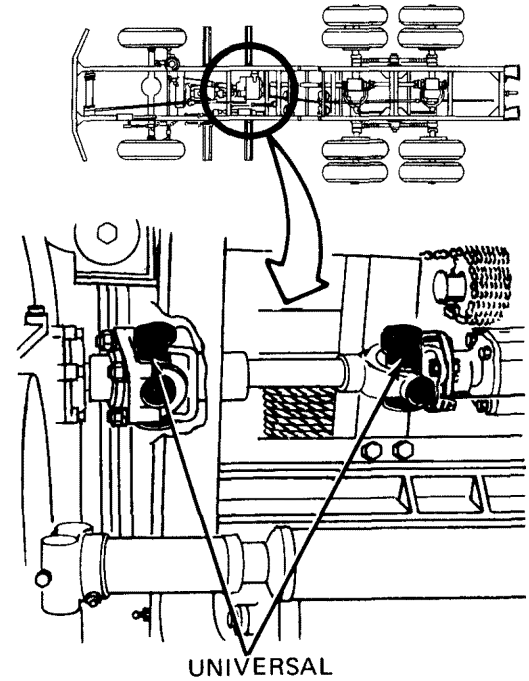
3

- Replace broken drive chain
  - Refer to Vol 3, chapter 19, para 19-13

4

- Check power takeoff drive shaft universal joints
  - Crawl under truck
  - Look for a broken universal joint
  - Feel for a loose universal joint

Are universal joints OK?



YES

NO

5

- Replace broken universal joint
  - Refer to Vol 3, chapter 10, para 10-5
- Tighten loose universal joint
  - Refer to Vol 3, chapter 10, para 10-5

GO

TA 115057

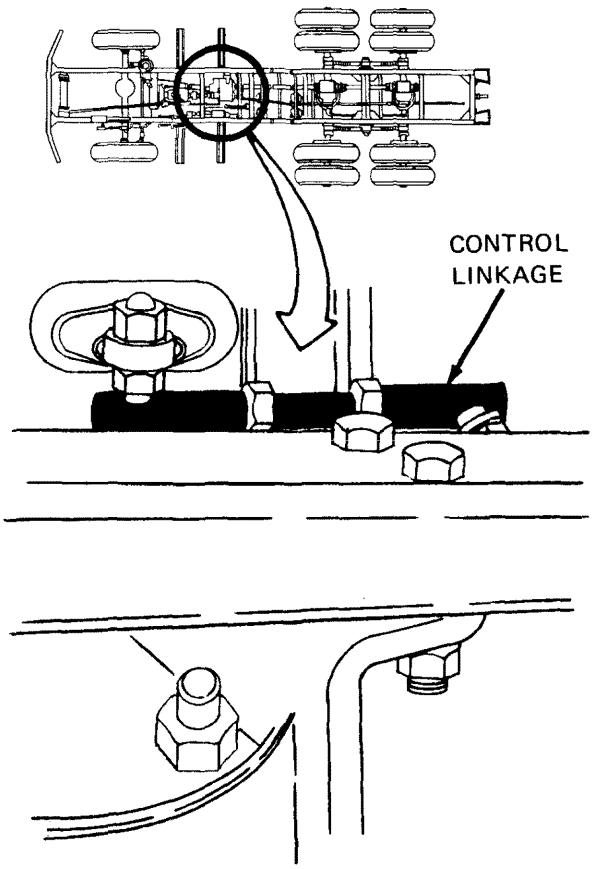
Figure 80-1 (Sheet 2 of 4)

GO

6

- Check power takeoff control linkage
  - Look for bent or broken linkage
  - Shake linkage and feel if loose

Is power takeoff control linkage OK?



YES

NO

7

- Replace bent, broken or worn linkage
  - Refer to Vol 3, chapter 19, para 19-25
- Tighten loose linkage
  - Refer to Vol 3, chapter 19, para 19-25

GO

TA 115058

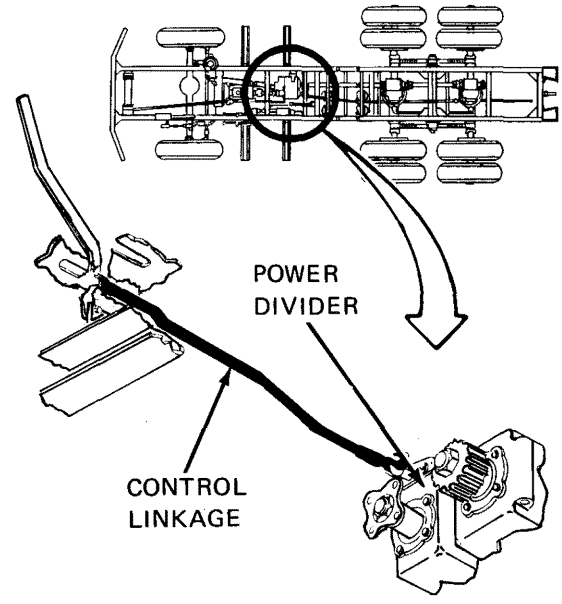
Figure 80-1 (Sheet 3 of 4)

GO

8

- Check power divider control linkage
  - Look for bent or broken linkage
  - Shake linkage and feel if loose

Is power divider control linkage OK?



YES

NO

9

- Replace bent or broken power divider control linkage
  - Refer to Vol 3, chapter 19, para 19-26
- Tighten loose power divider linkage
  - Refer to Vol 3, chapter 19, para 19-26

10

Tell direct support maintenance

TA 115059

Figure 80-1 (Sheet 4 of 4)

Symptom

2 WINCH DRUM DOES NOT ENGAGE

1

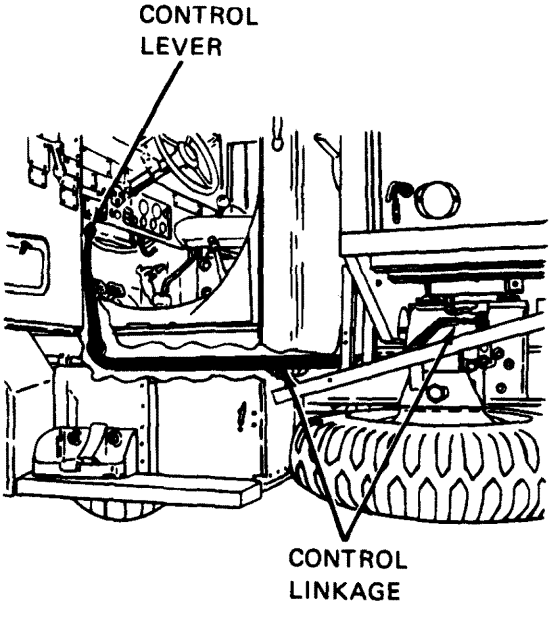
- Park truck
  - Refer to TM 9-2320-209-10
  - Turn off winch. Refer to TM 9-2320-209-10
  - Turn off engine. Refer to TM 9-2320-209-10

2

- Check winch control lever shift
  - Move control lever to feel if it moves freely
  - Feel for loose or sluggish movement

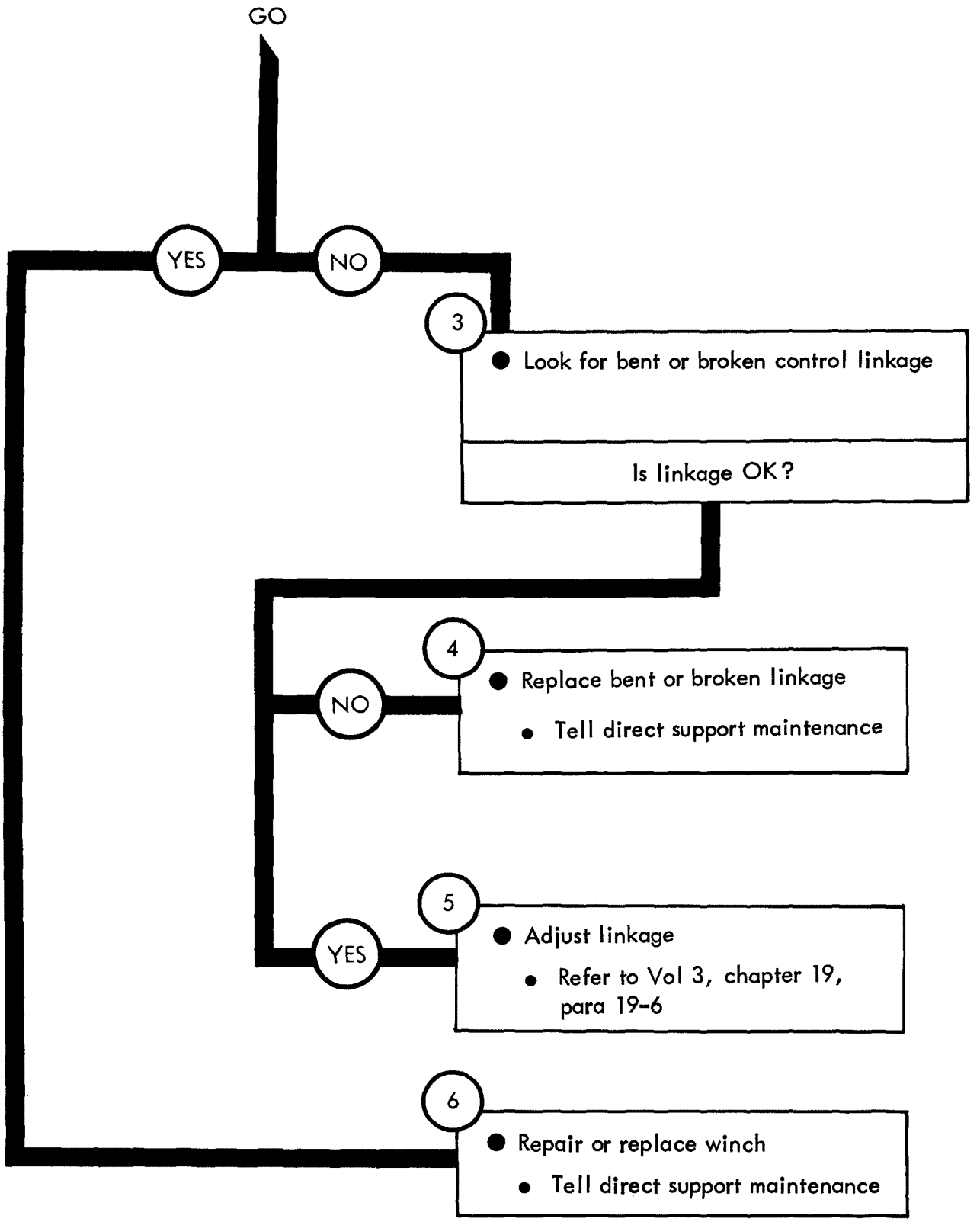
Does control lever shift OK?

GO



TA 115060

Figure 80-2 (Sheet 1 of 2)



TA 115061

Figure 80-2 (Sheet 2 of 2)

CHAPTER 81

PIPELINE CONSTRUCTION TRUCK REAR WINCH TROUBLESHOOTING

81-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the pipeline construction truck rear winch, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

81-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

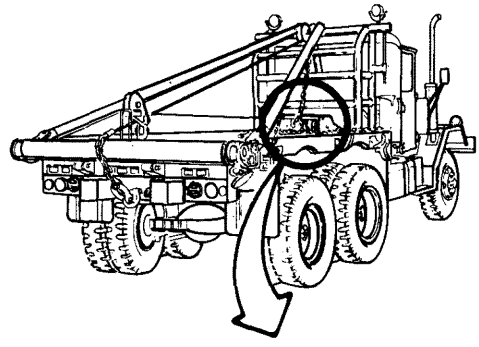
PIPELINE CONSTRUCTION TRUCK REAR WINCH TROUBLESHOOTING

Symptom

1 WINCH DOES NOT PULL LOAD

1

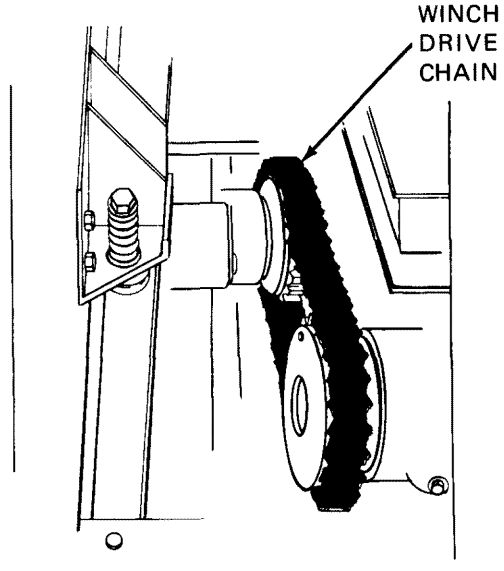
- Make truck ready for work on rear winch
  - Turn off winch. Refer to TM 9-2320-209-10
  - Turn off engine. Refer to TM 9-2320-209-10



2

- Check winch drive chain
  - Look for a broken chain

Is winch drive chain OK?



YES

NO

3

- Replace broken drive chain
  - Refer to Vol 3, chapter 19, para 19-13

GO

TA 115062

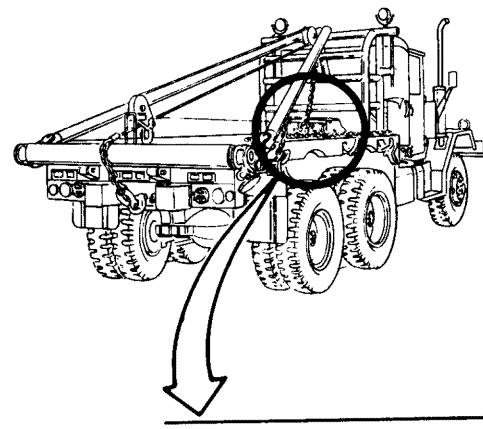
Figure 81-1 (Sheet 1 of 5)

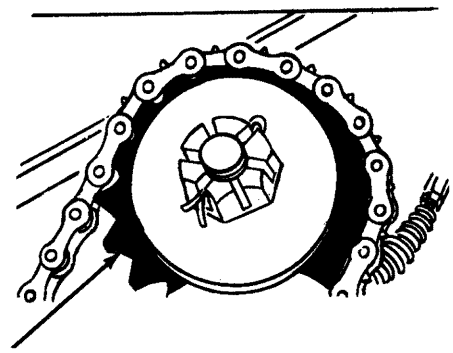
GO

4

- Check power takeoff drive chain sprocket
  - Move two gin poles out of the way Refer to TM 9-2320-209-10
  - Look for bent or broken sprocket teeth
  - Feel for loose sprocket

Is sprocket OK?





POWER TAKEOFF DRIVE CHAIN SPROCKET

YES

NO

5

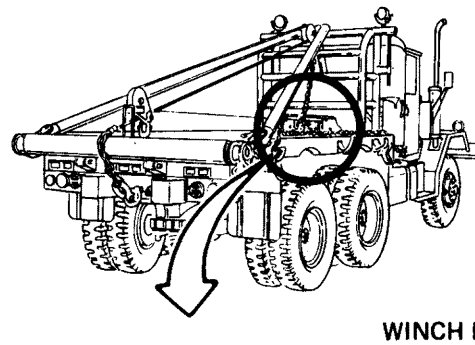
- Replace drive chain sprocket
  - Refer to Vol 3, chapter 19, para 19-8

GO

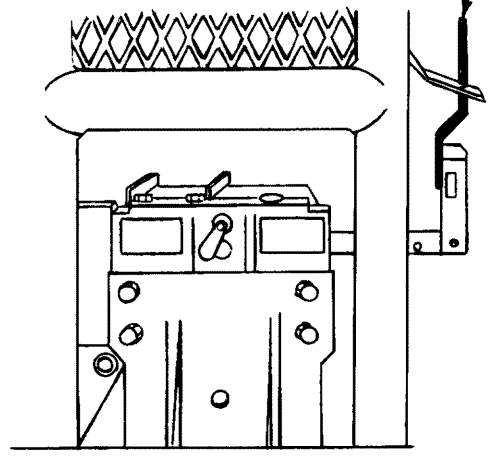
TA 115063

Figure 81-1 (Sheet 2 of 5)

GO



WINCH DRUM CLUTCH LEVER



6

- Check winch drum clutch lever
  - Feel for loose or broken lever assembly

Is winch drum clutch lever OK?

YES

NO

7

- Replace winch drum clutch lever assembly
  - Refer to Vol 3, chapter 19, para 19-9

GO

TA 115064

Figure 81-1 (Sheet 3 of 5)

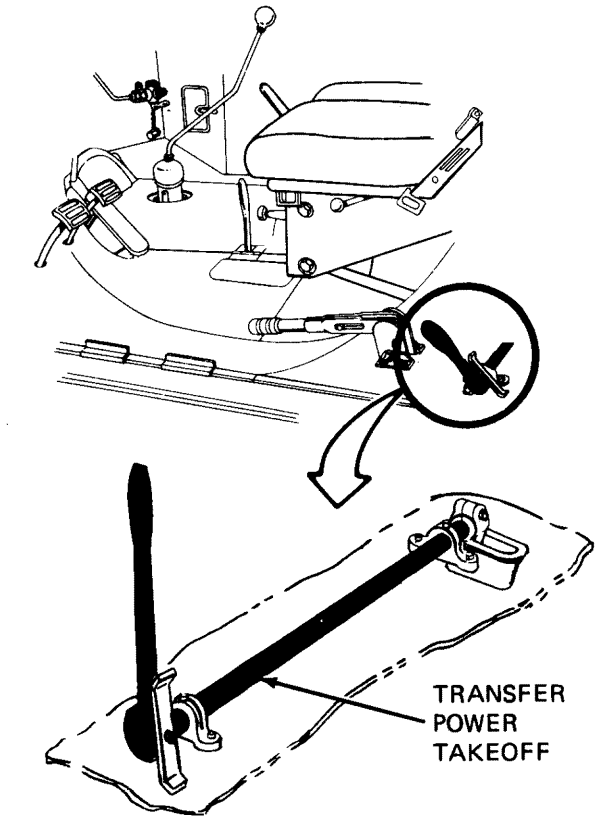
GO

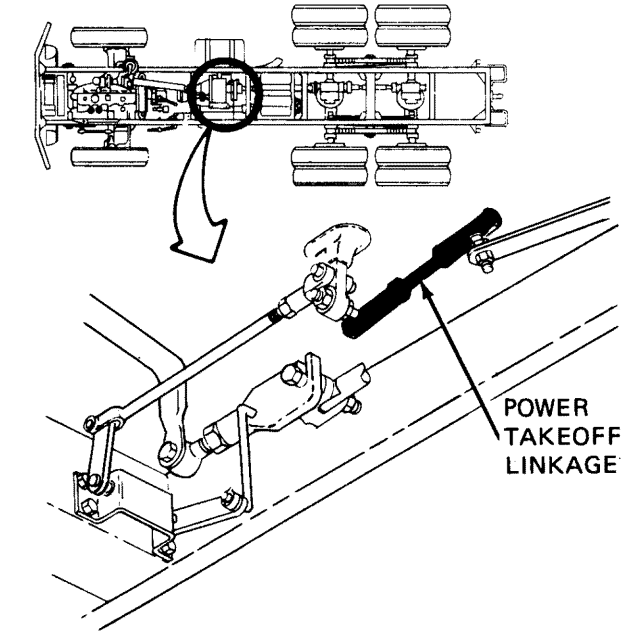
8

- Check power takeoff control linkage
  - Look for bent or broken linkage
  - Crawl under truck
  - Shake linkage and feel if it is loose

Is power control linkage OK?

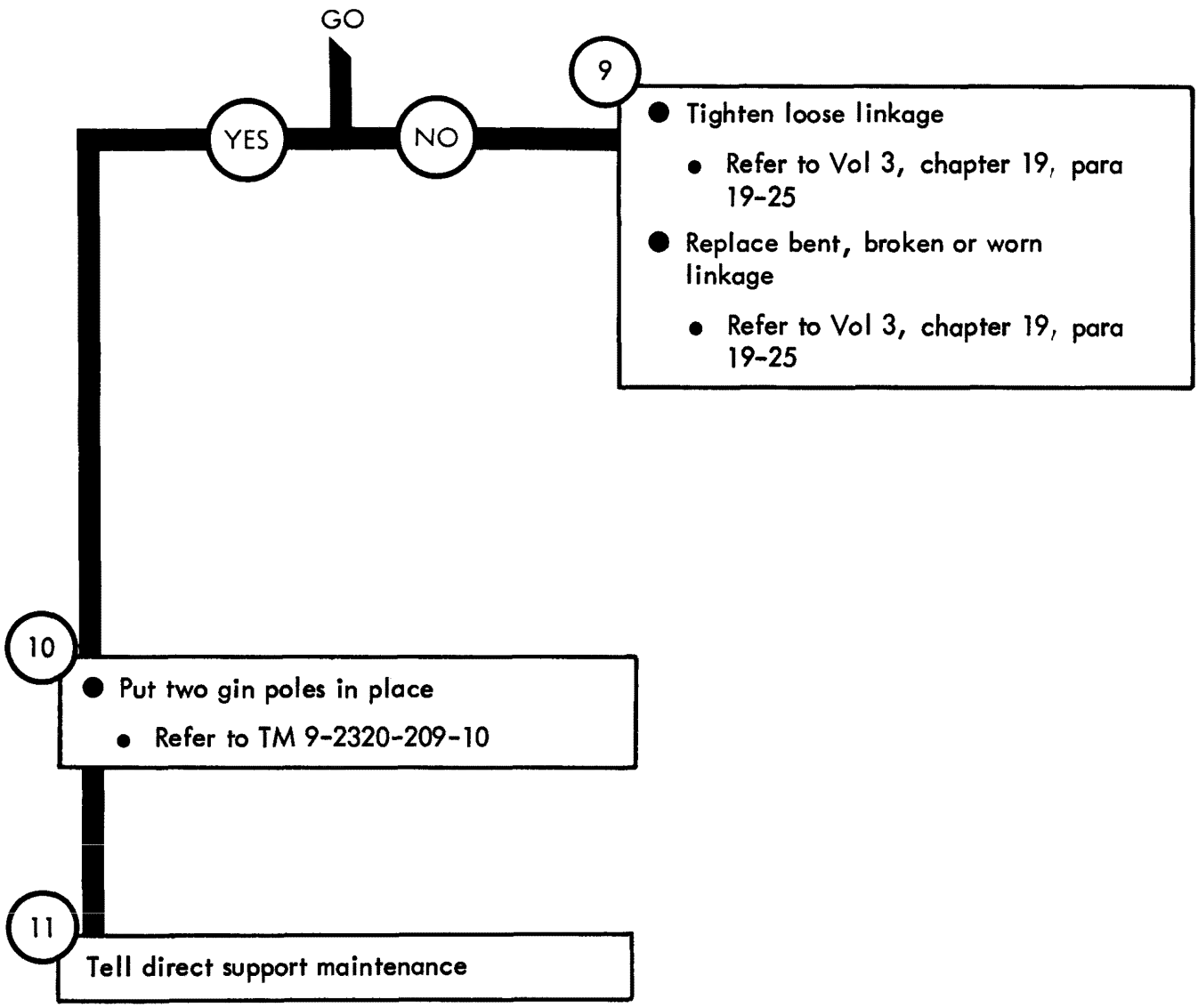
GO





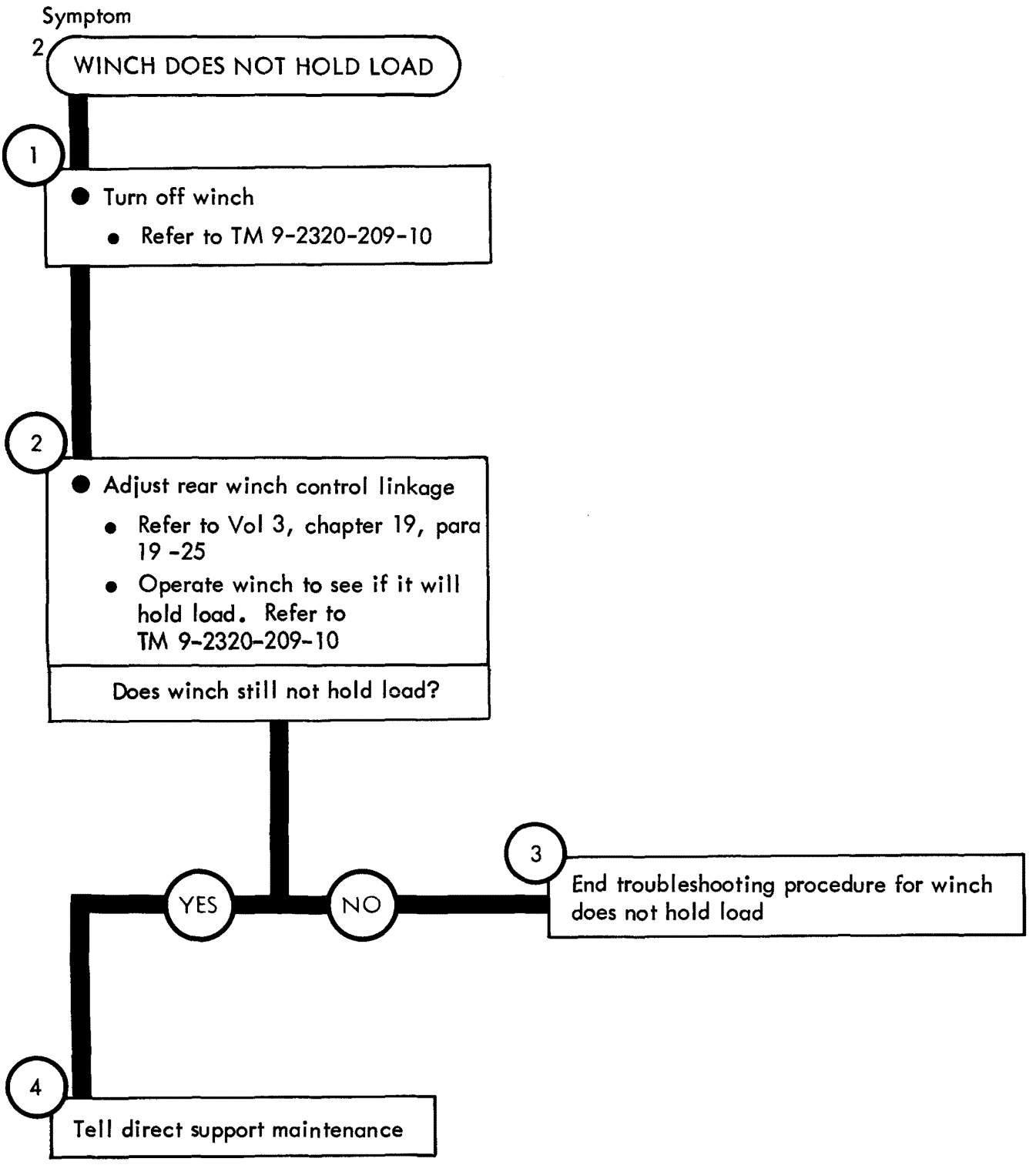
TA 115065

Figure 81-1 (Sheet 4 of 5)



TA 115066

Figure 81-1 (Sheet 5 of 5)



TA 115067

Figure 81-2

CHAPTER 82

ENGINE COOLANT HEATER TROUBLESHOOTING

82-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the engine coolant heater, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

82-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

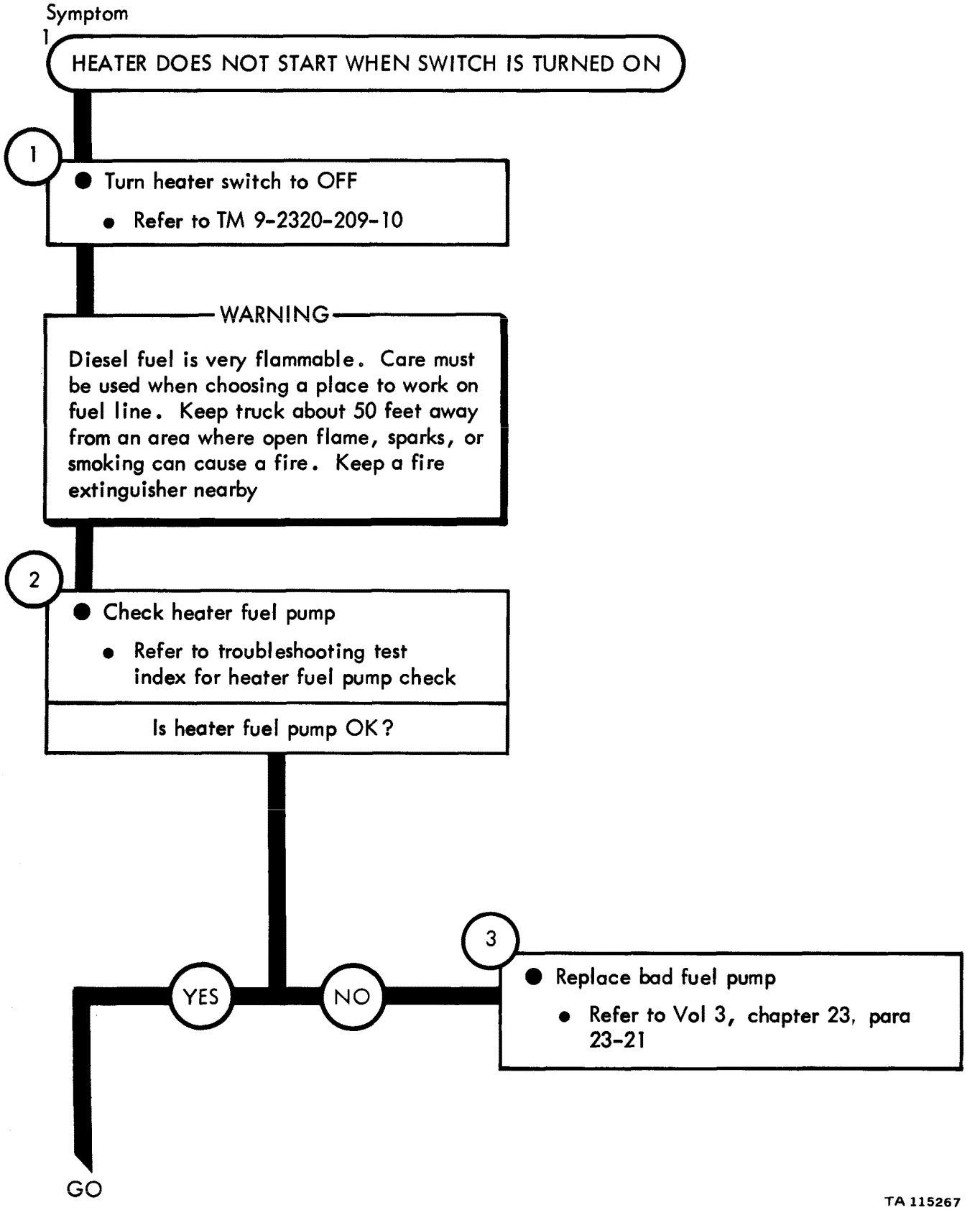
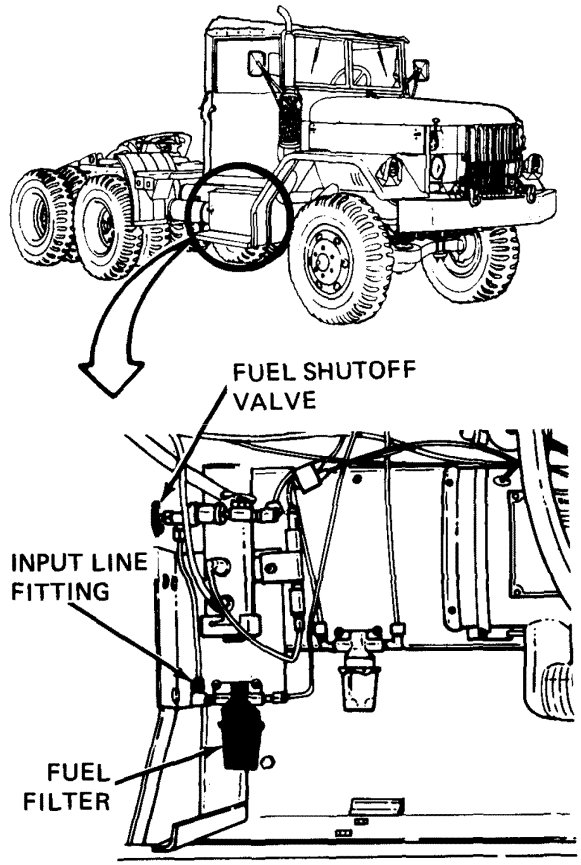


Figure 82-1 (Sheet 1 of 2)

GO

4

- Put back fuel filter inlet line fitting
  - Screw fitting onto fuel filter and tighten using 7/16-inch wrench
- Turn fuel shut off valve on



5

- Check heater electrical system
  - Refer to fault symptom index

Is heater electrical system OK?

NO

6

- Replace bad electrical parts
  - Tell direct support maintenance

YES

7

- Replace power plant heater
  - Tell direct support maintenance

TA 115069

Figure 82-1 (Sheet 2 of 2)

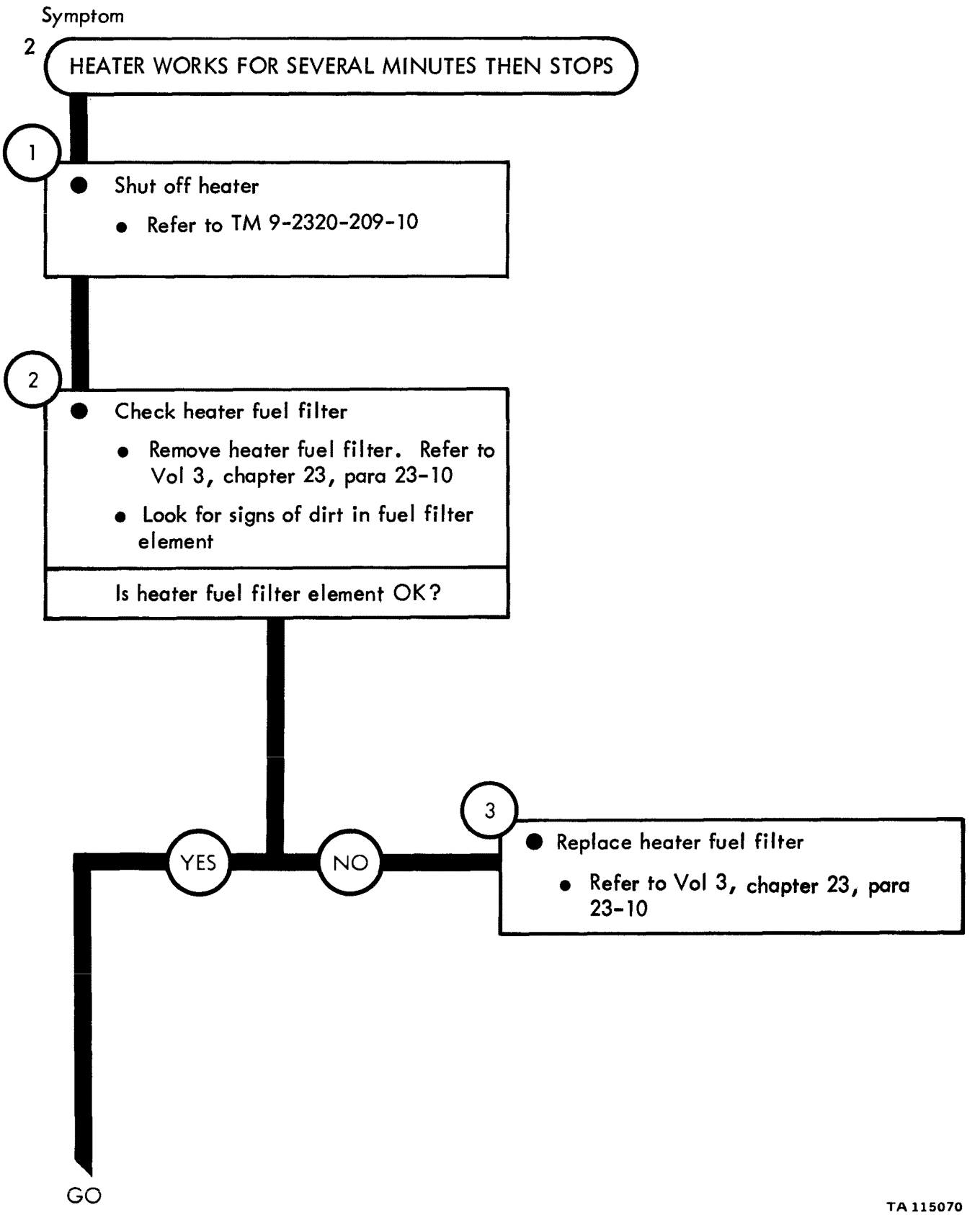


Figure 82-2 (Sheet 1 of 3)

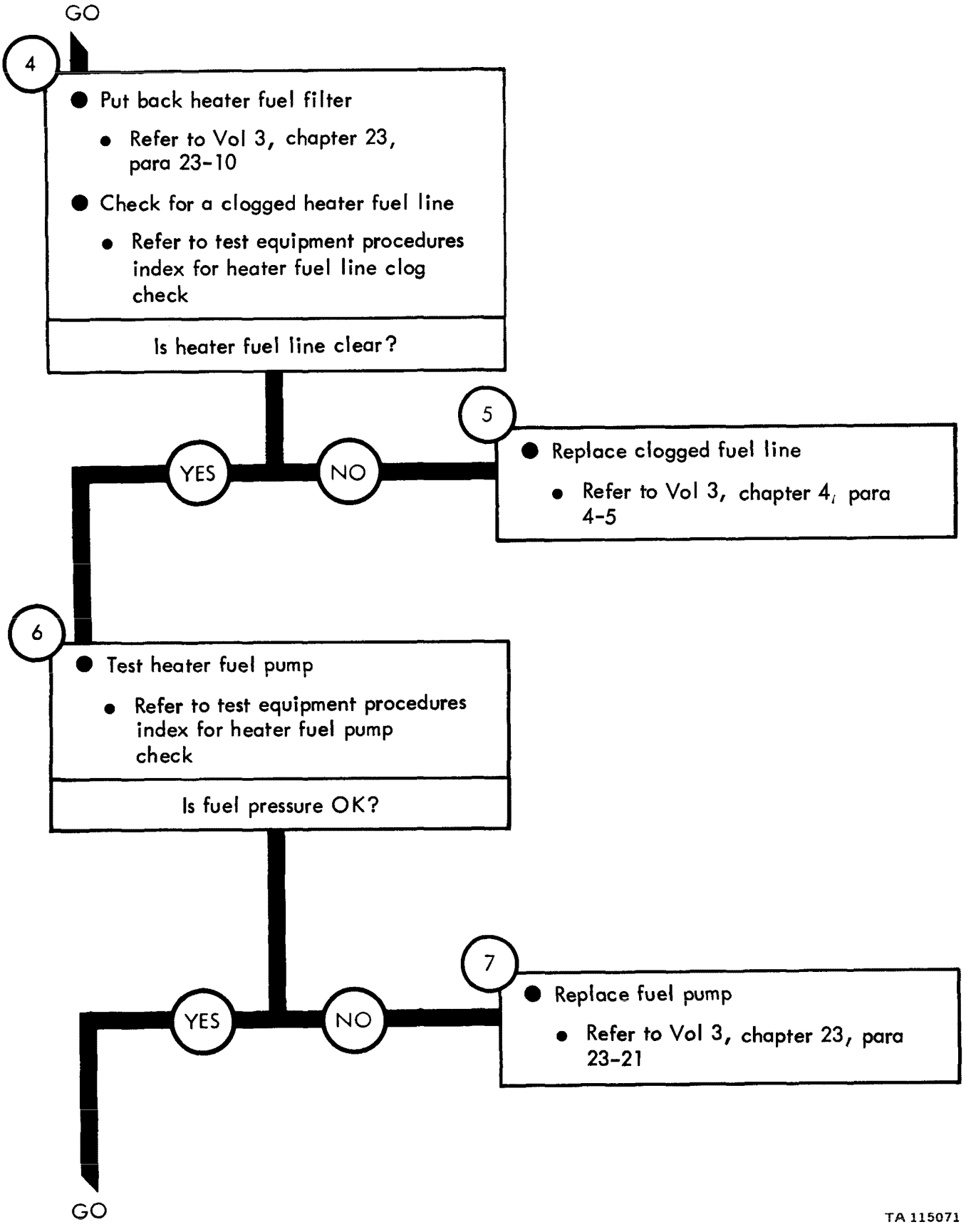
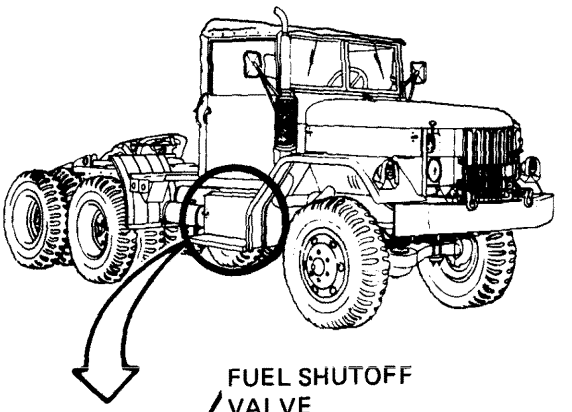


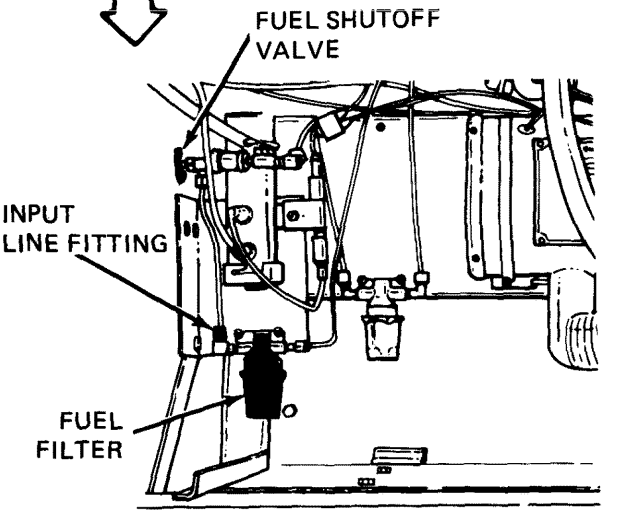
Figure 82-2 (Sheet 2 of 3)

GO

8

- Put back fuel filter inlet line fitting
  - Screw fitting onto fuel filter and tighten using 7/16-inch wrench
- Turn fuel shutoff valve on





9

- Check heater electrical system
  - Refer to fault symptom index

Is heater electrical system OK?

NO

10

- Replace bad electrical parts
  - Tell direct support maintenance

YES

11

- Replace power plant heater
  - Tell direct support maintenance

TA 115072

Figure 82-2 (Sheet 3 of 3)

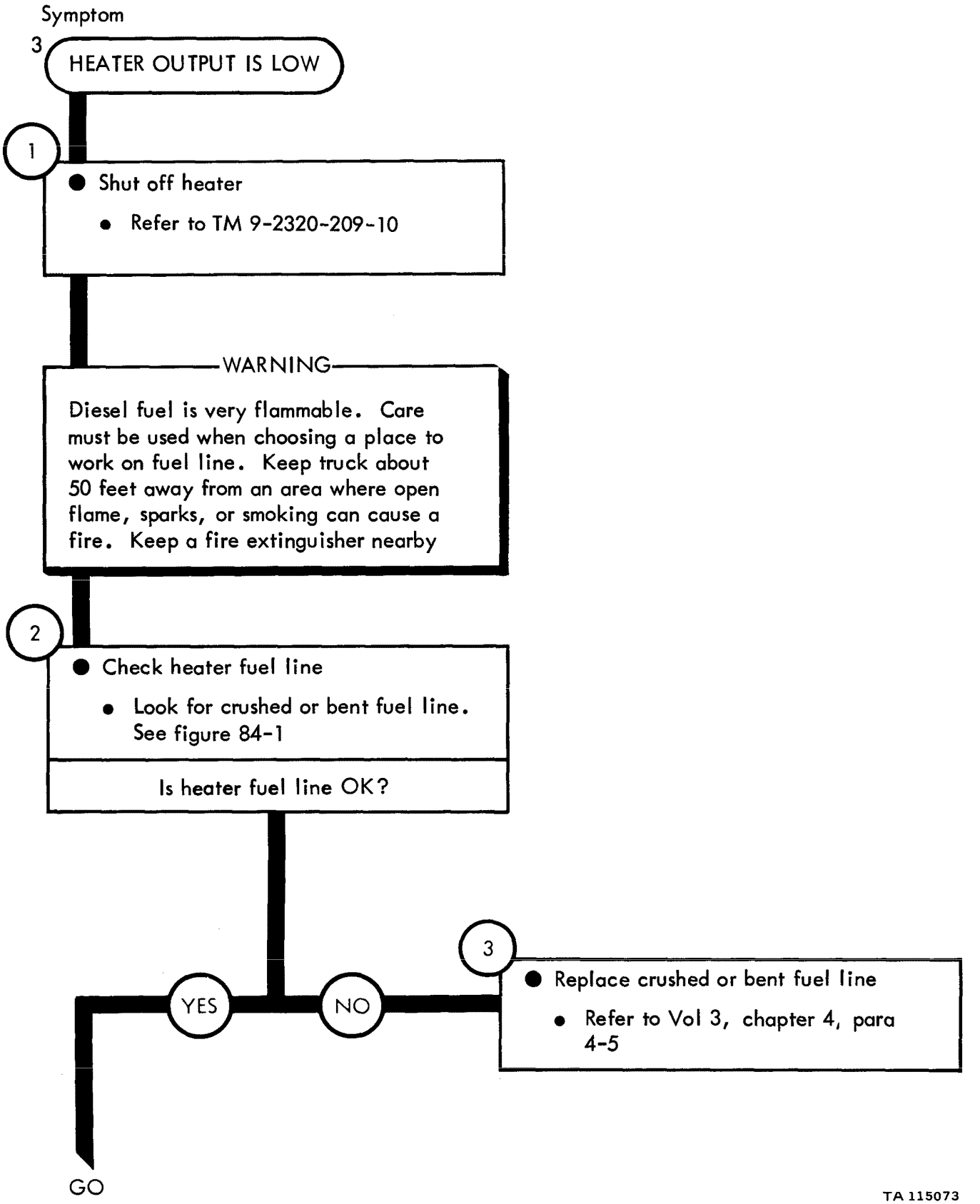


Figure 82-3 (Sheet 1 of 3)

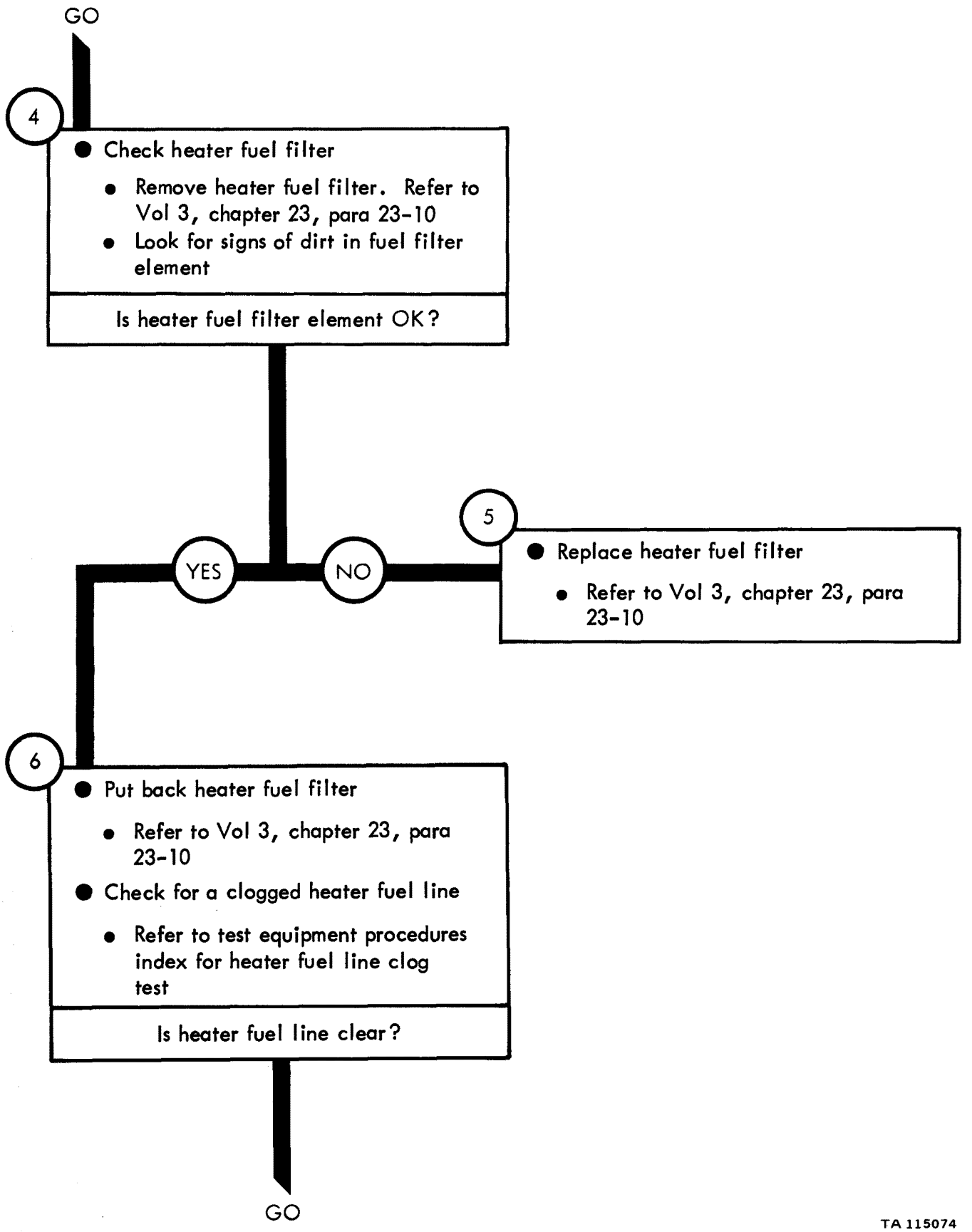
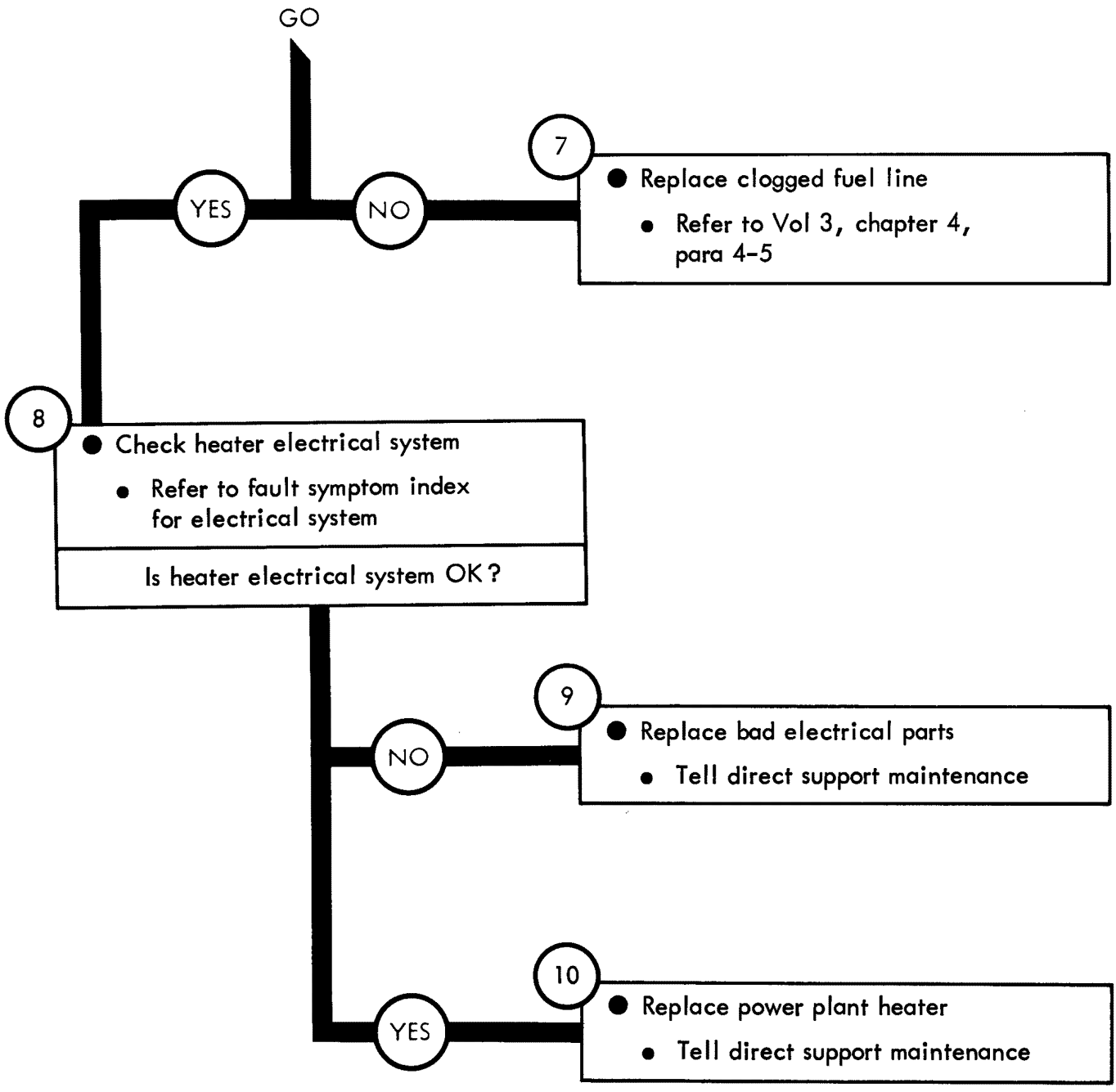


Figure 82-3 (Sheet 2 of 3)



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Figure 82-3 (Sheet 3 of 3)

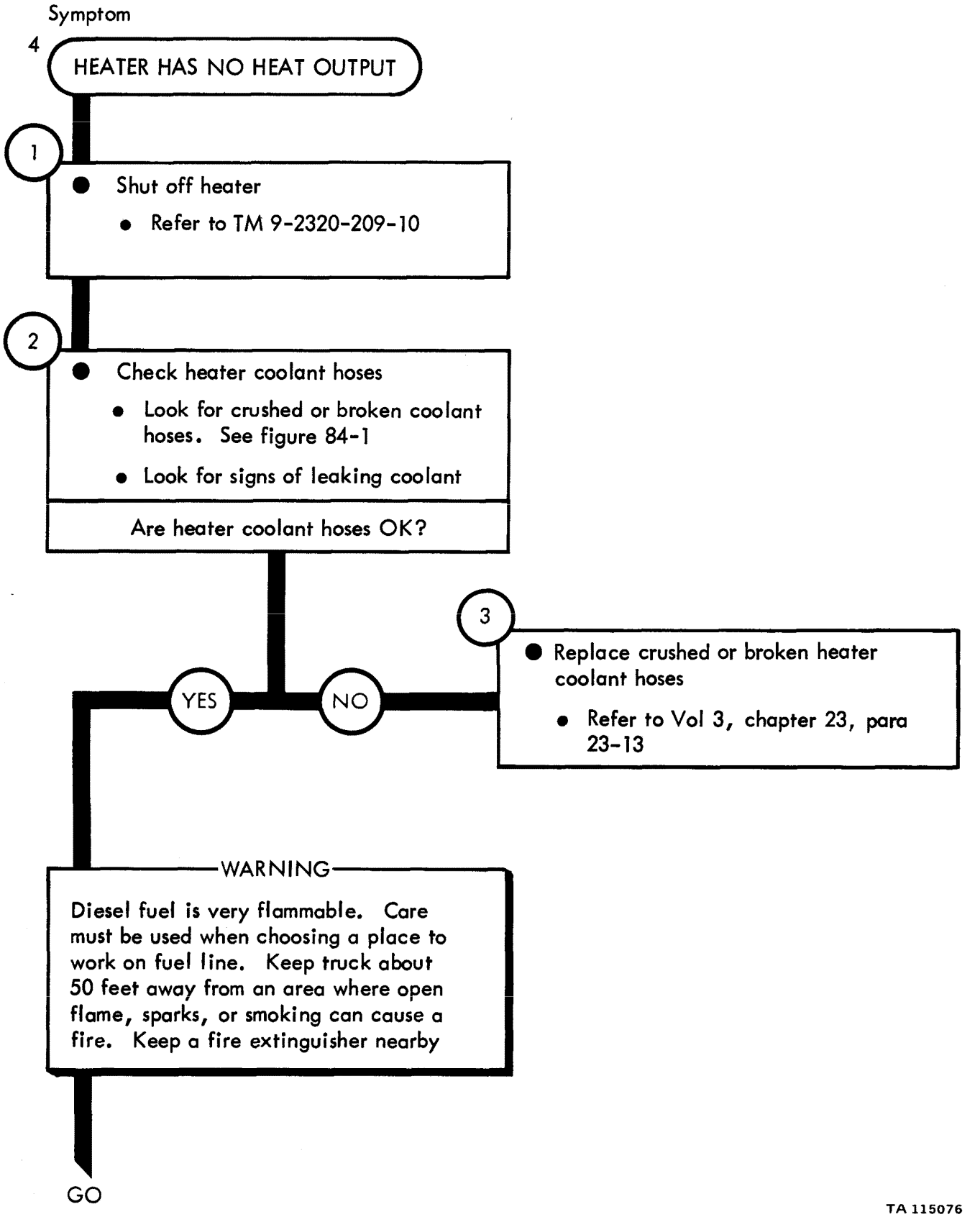


Figure 82-4 (Sheet 1 of 3)

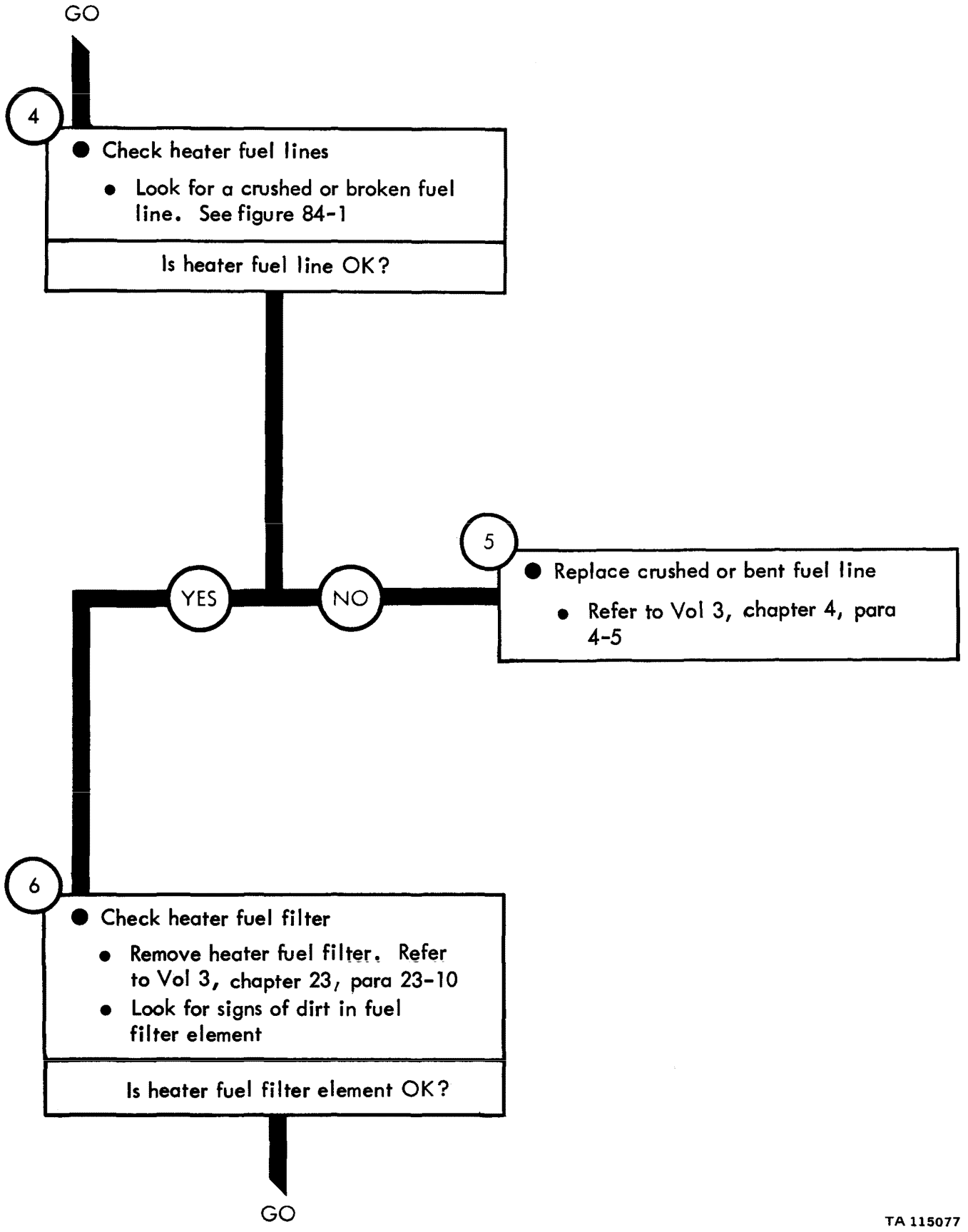


Figure 82-4 (Sheet 2 OI 3)

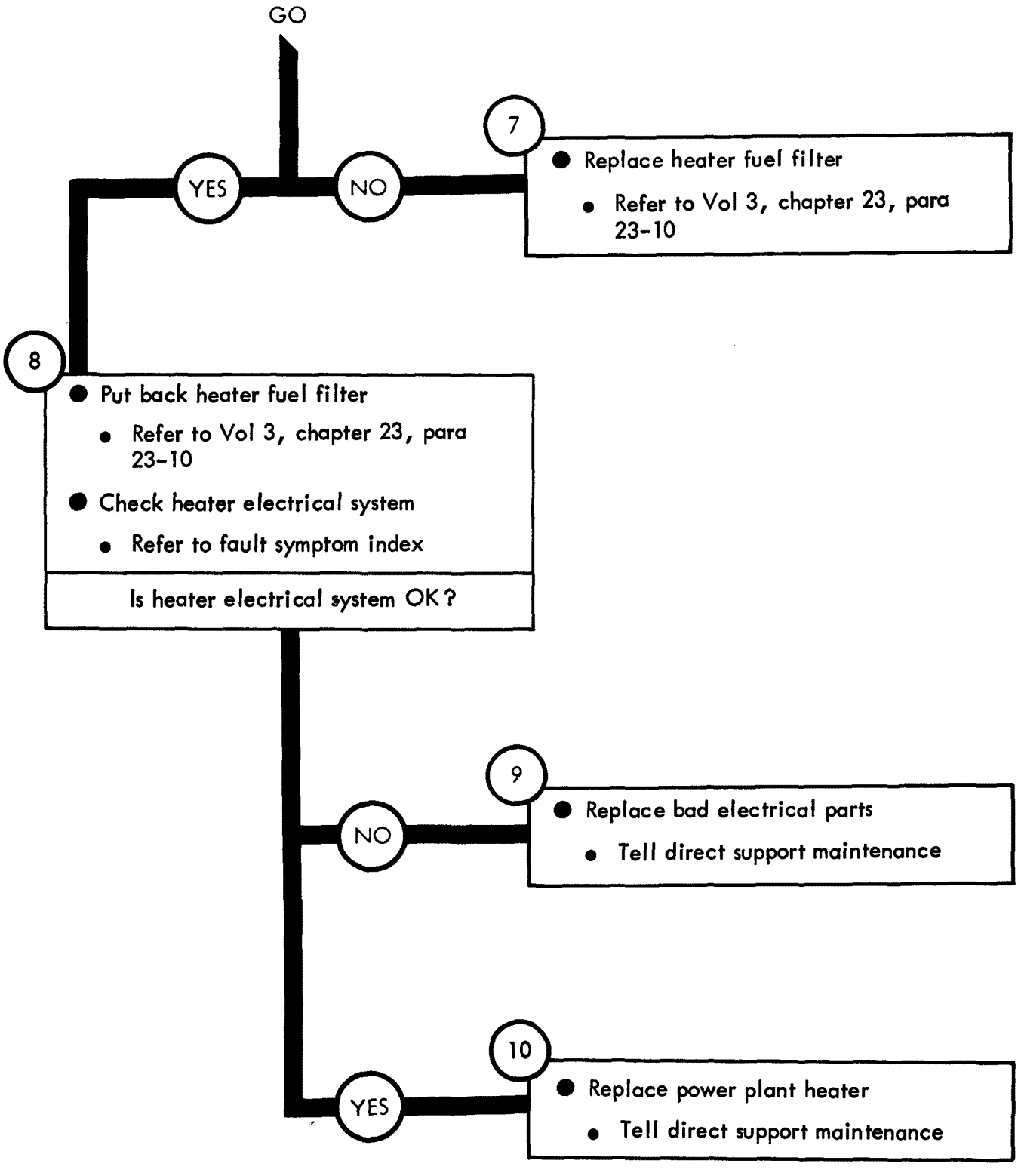


Figure 82-4 (Sheet 3 of 3)

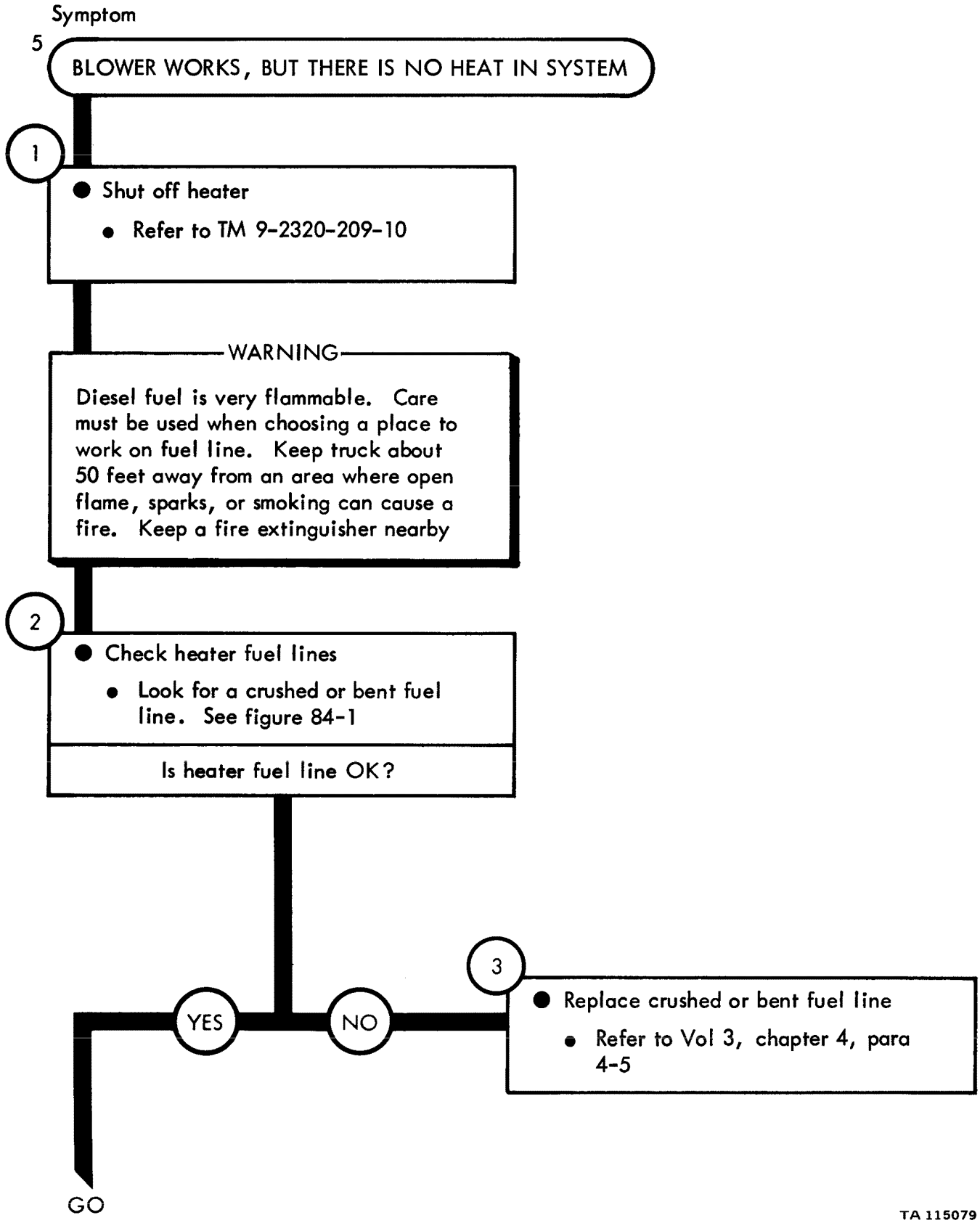


Figure 82-5 (Sheet 1 of 4)

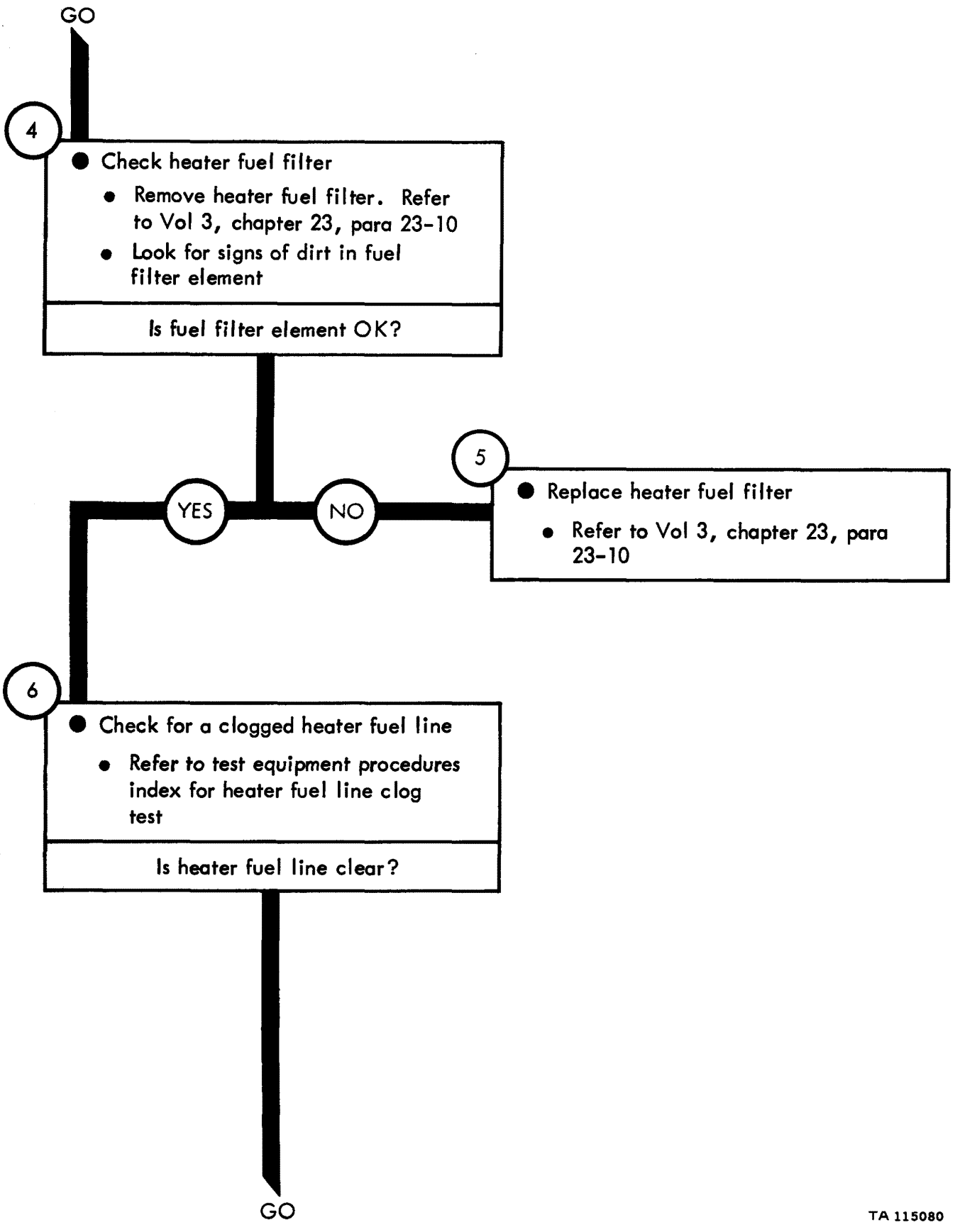


Figure 82-5 (Sheet 2 of 4)

GO

YES

NO

7

- Replace clogged fuel line
  - Refer to Vol 3, chapter 4, para 4-5

8

- Test heater fuel pump
  - Refer to test equipment procedures index for heater fuel pump test

Is fuel pressure OK?

YES

NO

9

- Replace fuel pump
  - Refer to Vol 3, chapter 23, para 23-21

10

- Put back fuel filter inlet line fitting
  - Screw fitting onto fuel filter and tighten using 7/16-inch wrench
- Turn fuel shut off valve on

GO

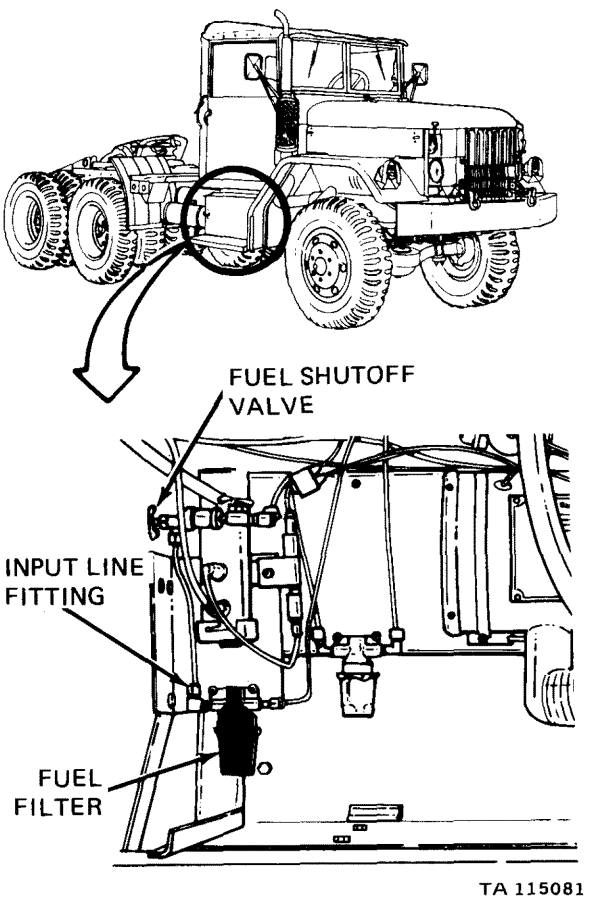
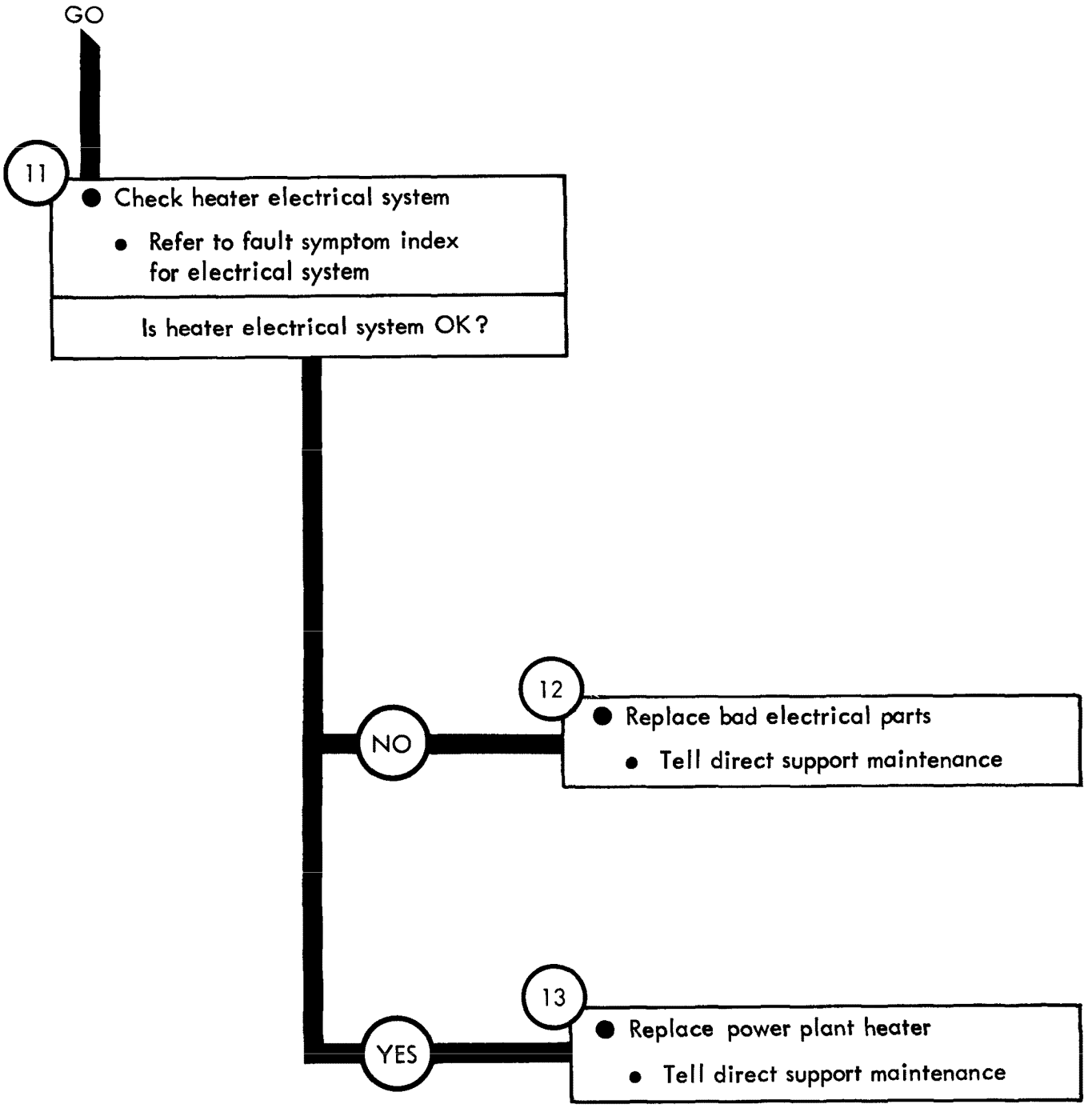


Figure 82-5 (Sheet 3 of 4)



TA 115082

Figure 82-5 (Sheet 4 of 4)

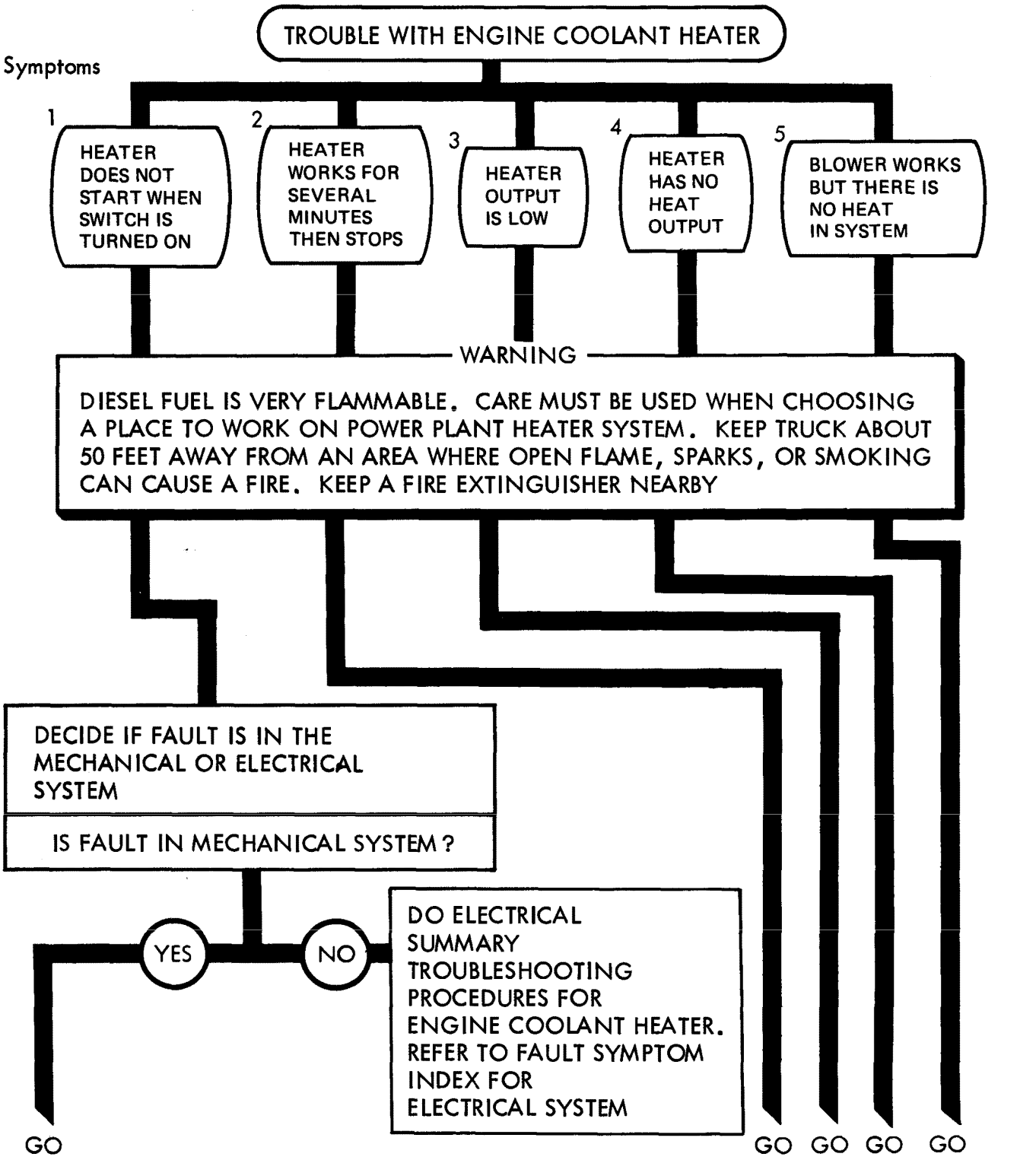
CHAPTER 83

ENGINE COOLANT HEATER TROUBLESHOOTING SUMMARY

83-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 82 for the engine coolant heater.

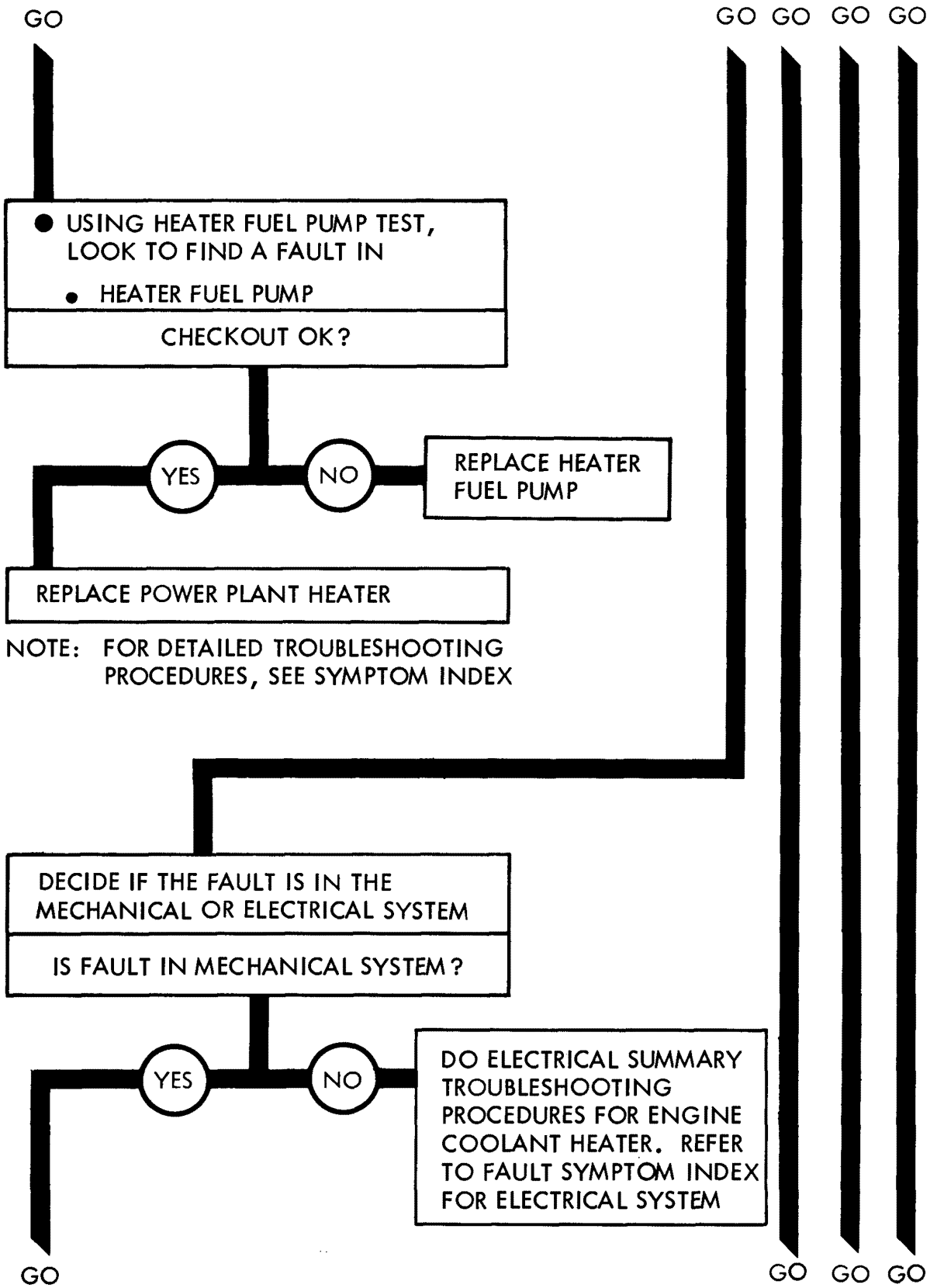
83-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

ENGINE COOLANT HEATER TROUBLESHOOTING SUMMARY



TA 115085

Figure 83-1 (Sheet 1 of 6)



TA 115086

Figure 83-1 (Sheet 2 of 6)

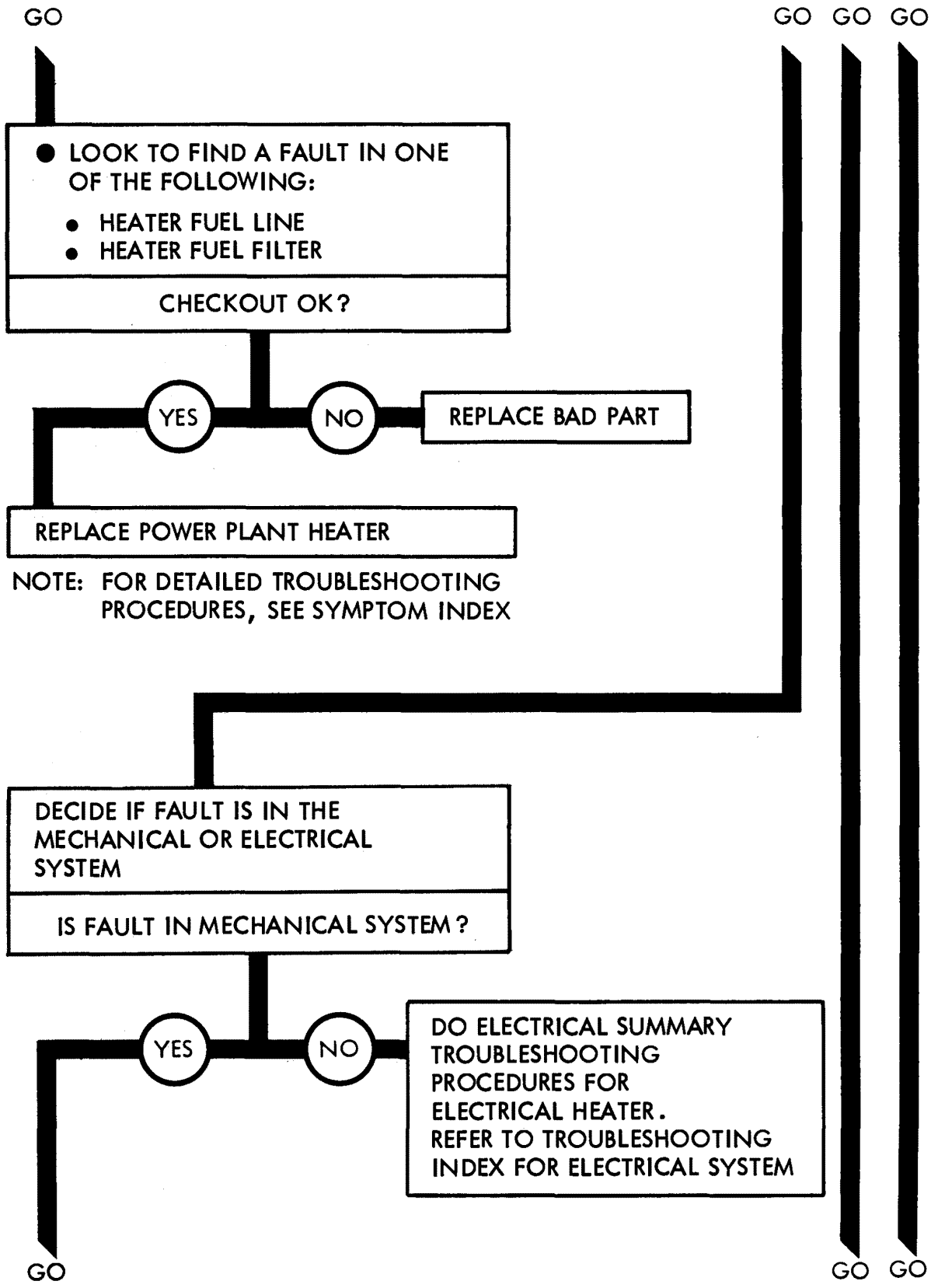
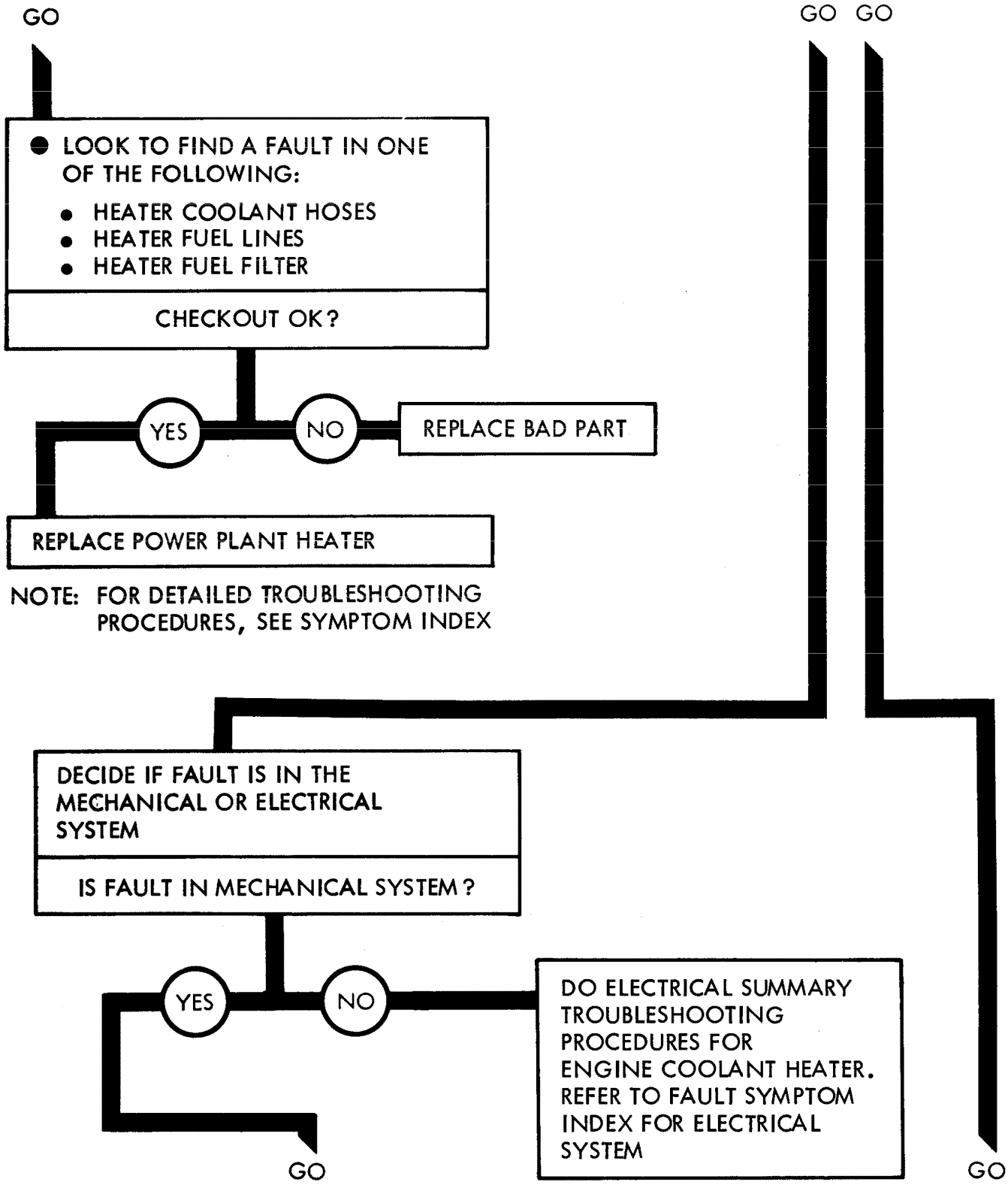


Figure 83-1 (Sheet 3 of 6)



TA 115088

Figure 83-1 (Sheet 4 of 6)

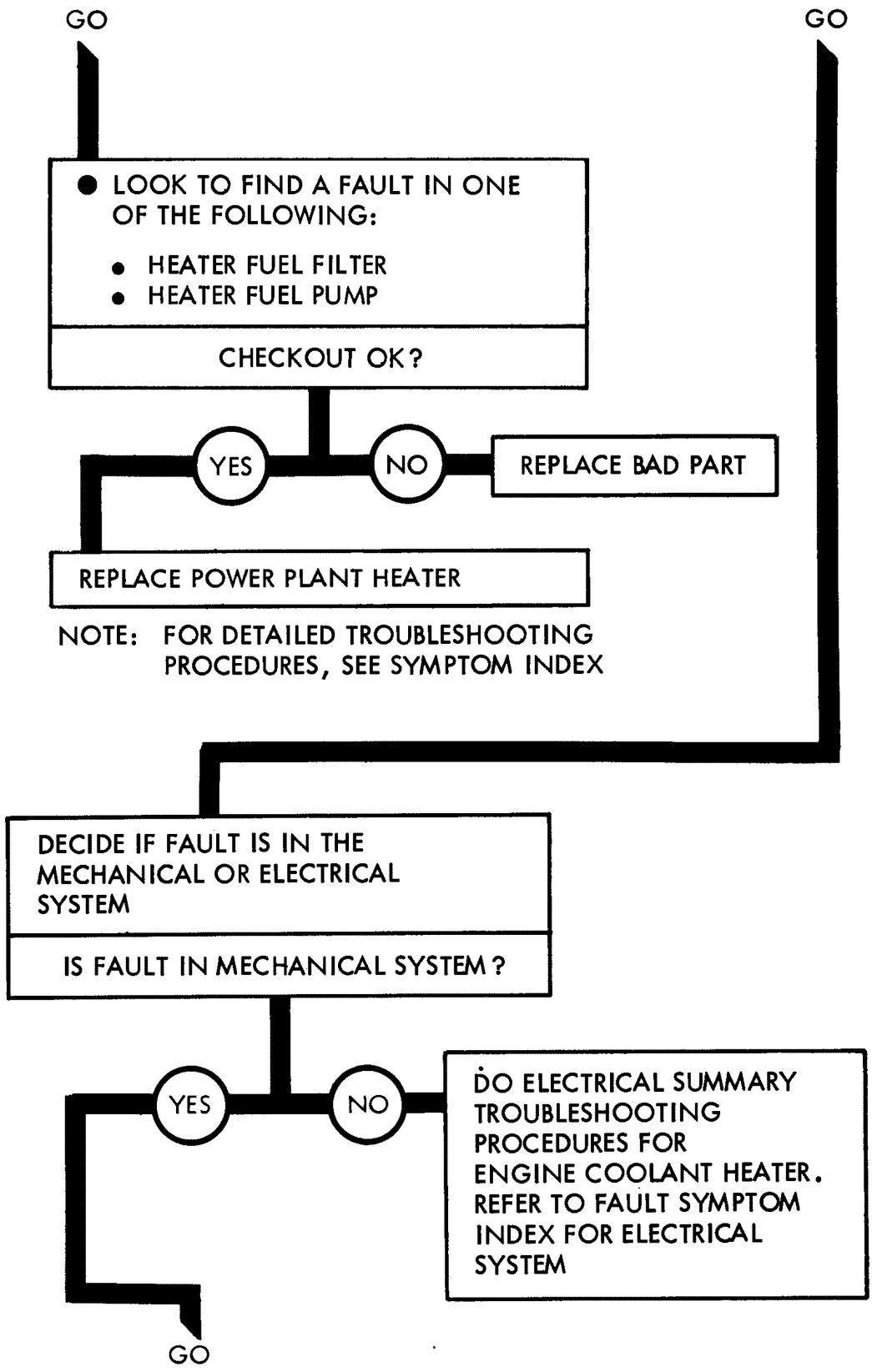
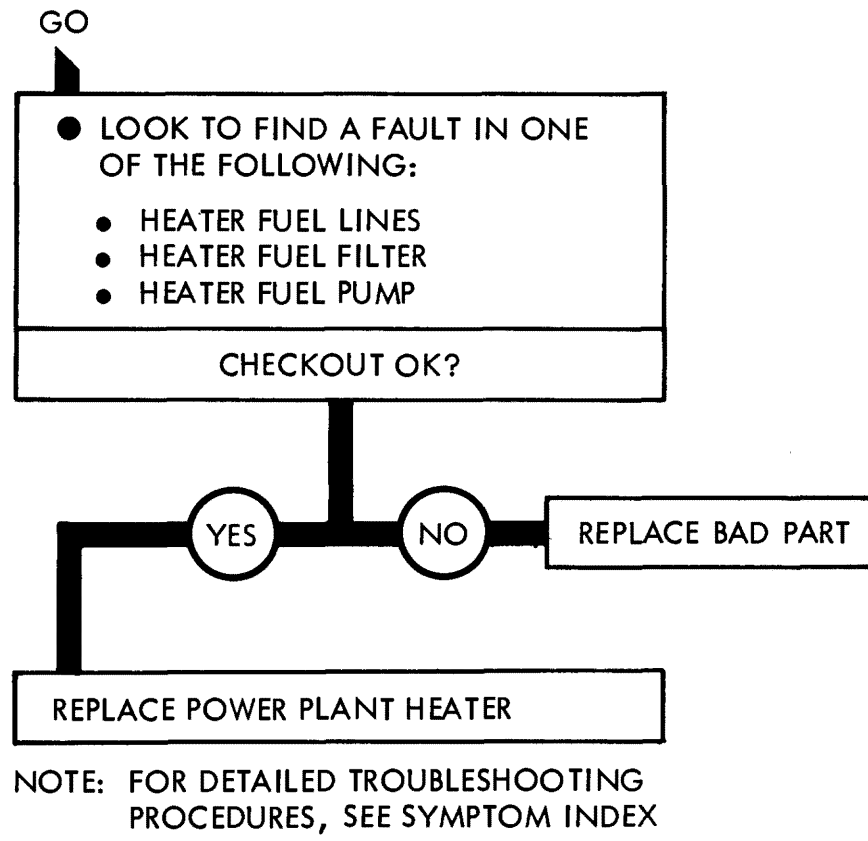


Figure 83-1 (Sheet 5 of 6)



TA 115090

Figure 83-1 (Sheet 6 of 6)

CHAPTER 84

ENGINE COOLANT HEATER SUPPORT DIAGRAMS

84-1. GENERAL. This chapter gives the diaqrams you need when doing trouble-shooting procedures in chapter 82. Table 3-1 is a complete listing of all support diagrams used in this manual.

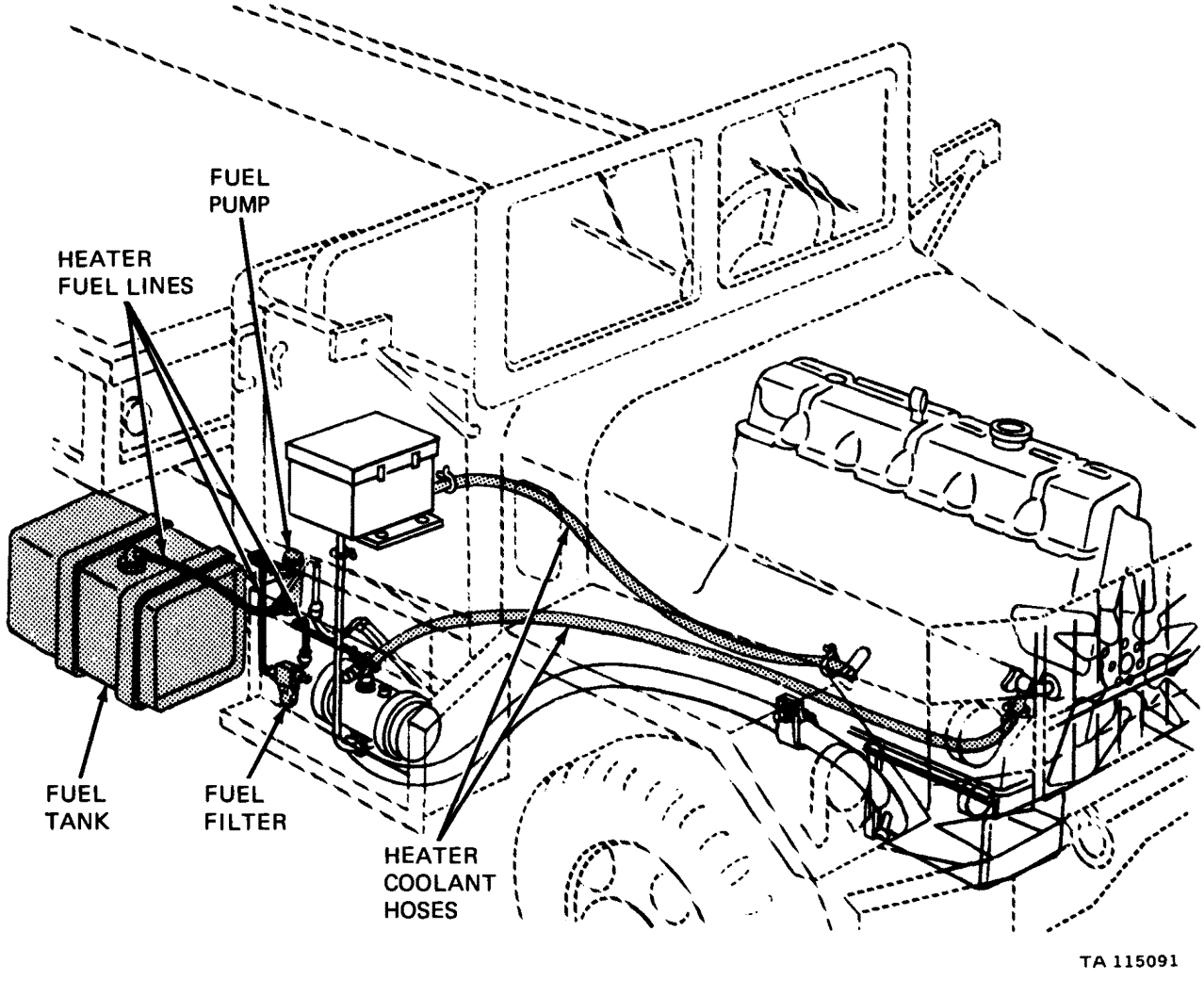


Figure 84-1. Engine Coolant Heater Support Diagram

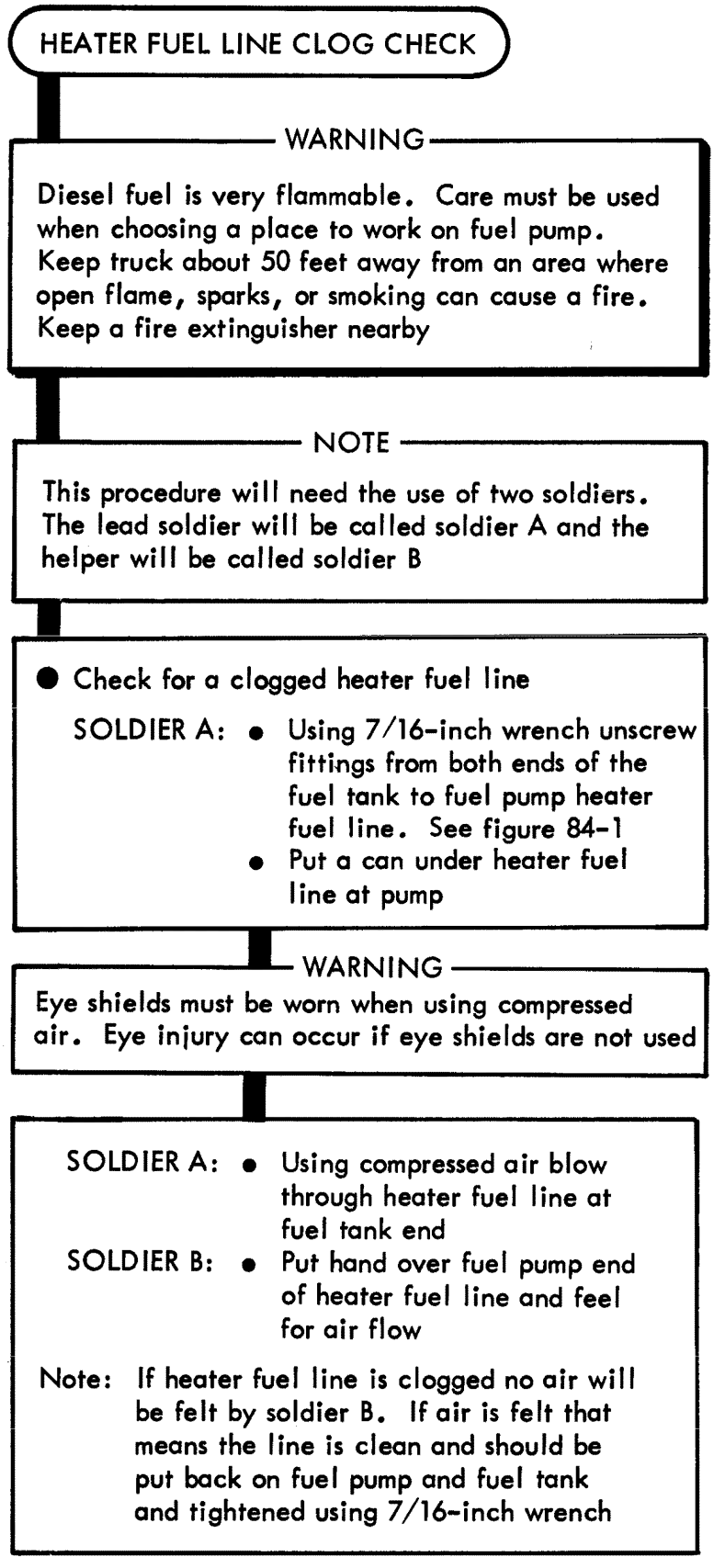
CHAPTER 85

ENGINE COLANT HEATER TEST PROCEDURES

85-1. GENERAL. This chapter gives test procedures for the tests given in chapter 82, for the engine coolant heater.

85-2. 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.

85-3. 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.



TA 115083

Figure 85-1

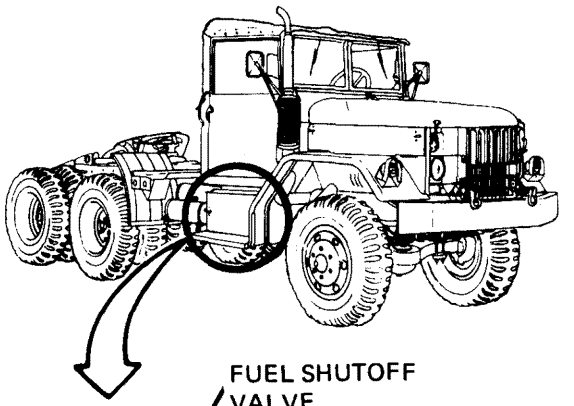
HEATER FUEL PUMP CHECK

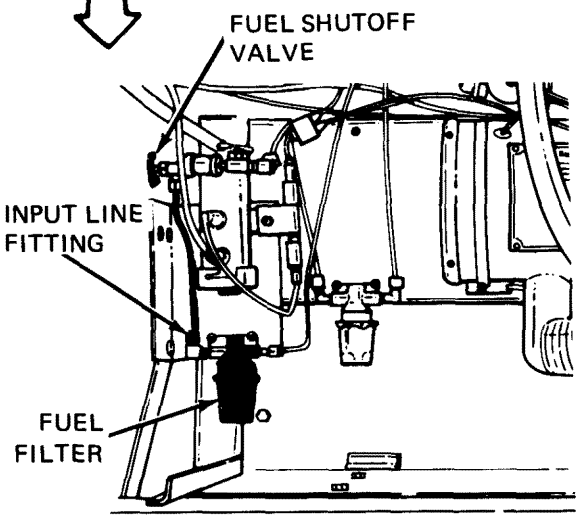
WARNING

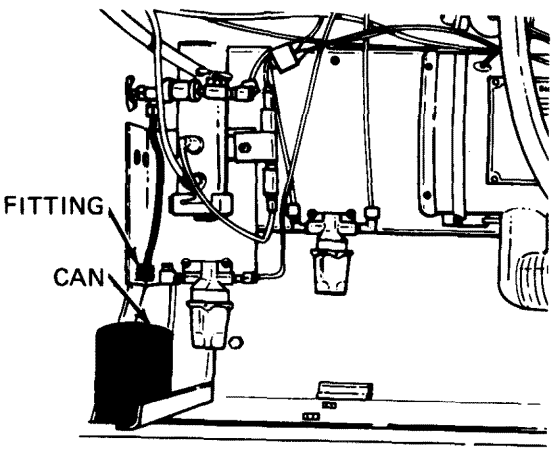
Diesel fuel is very flammable. Care must be used when choosing a place to work on fuel line. Keep truck about 50 feet away from an area where open flame, sparks, or smoking can cause a fire. Keep a fire extinguisher nearby

- Check heater fuel pump
  - Turn fuel shutoff valve off
  - Using 7/16-inch wrench unscrew fuel filter input line fitting
  - Point fitting end in can

- Start heater and let run for about 30 seconds. Refer to TM 9-2320-209-10
- Shut off heater. Refer to TM 9-2320-209-10
- Look for fuel in can







TA 115084

Figure 85-2

CHAPTER 86

ENGINE COOLANT HEATER CHECKOUT PROCEDURES

86-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not checkout.

ENGINE COOLANT HEATER CHECKOUT

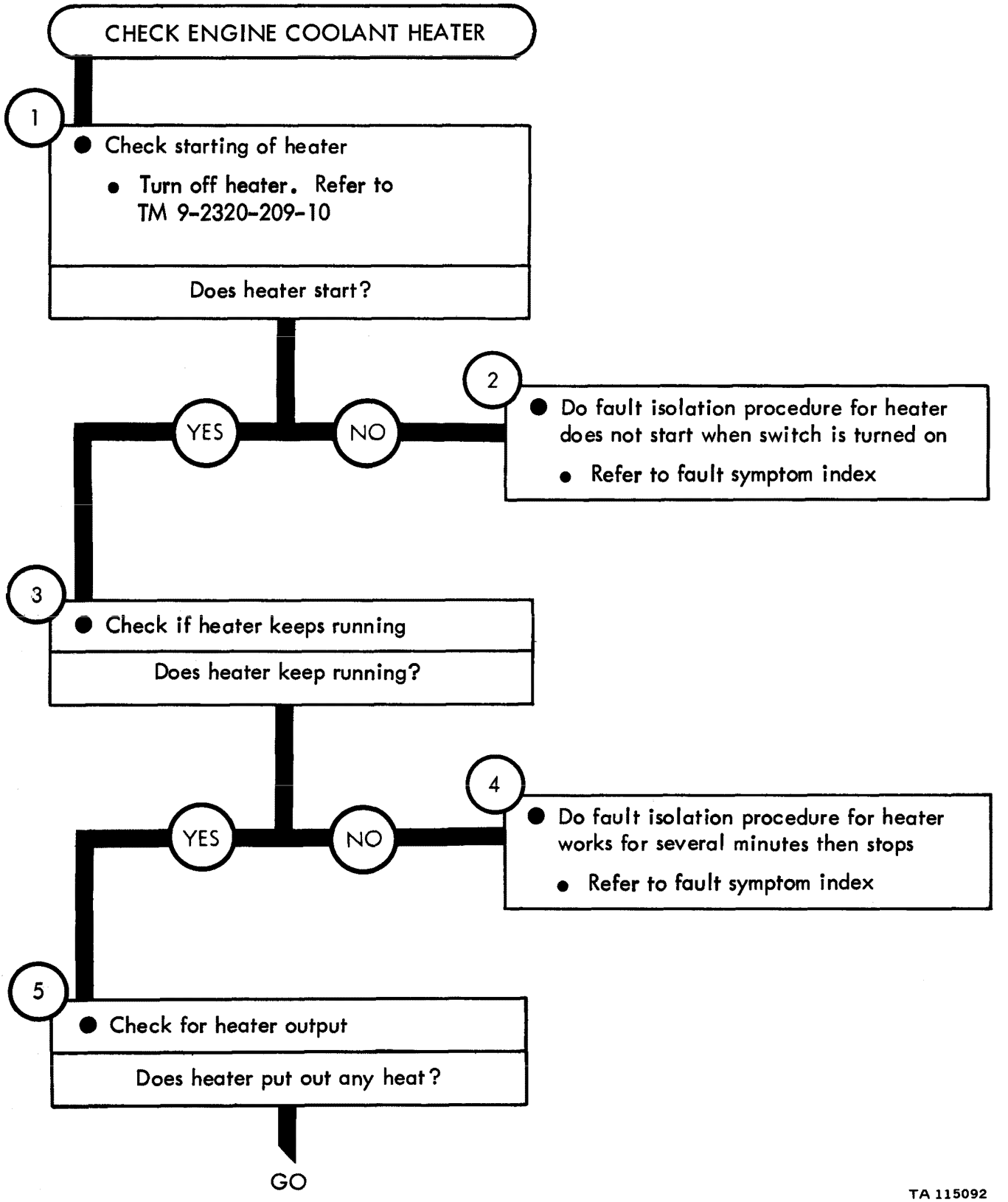


Figure 86-1 (Sheet 1 of 3)

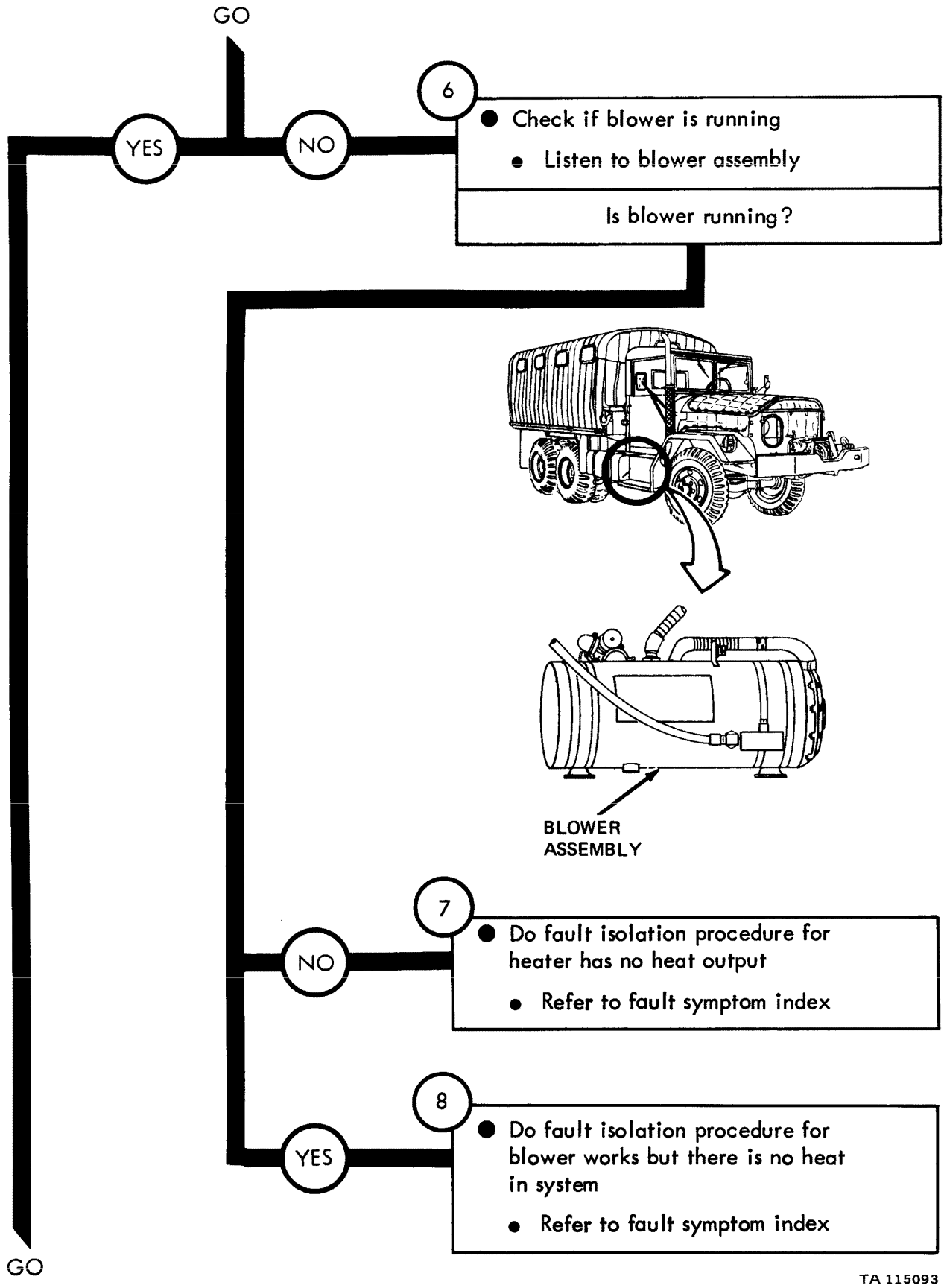
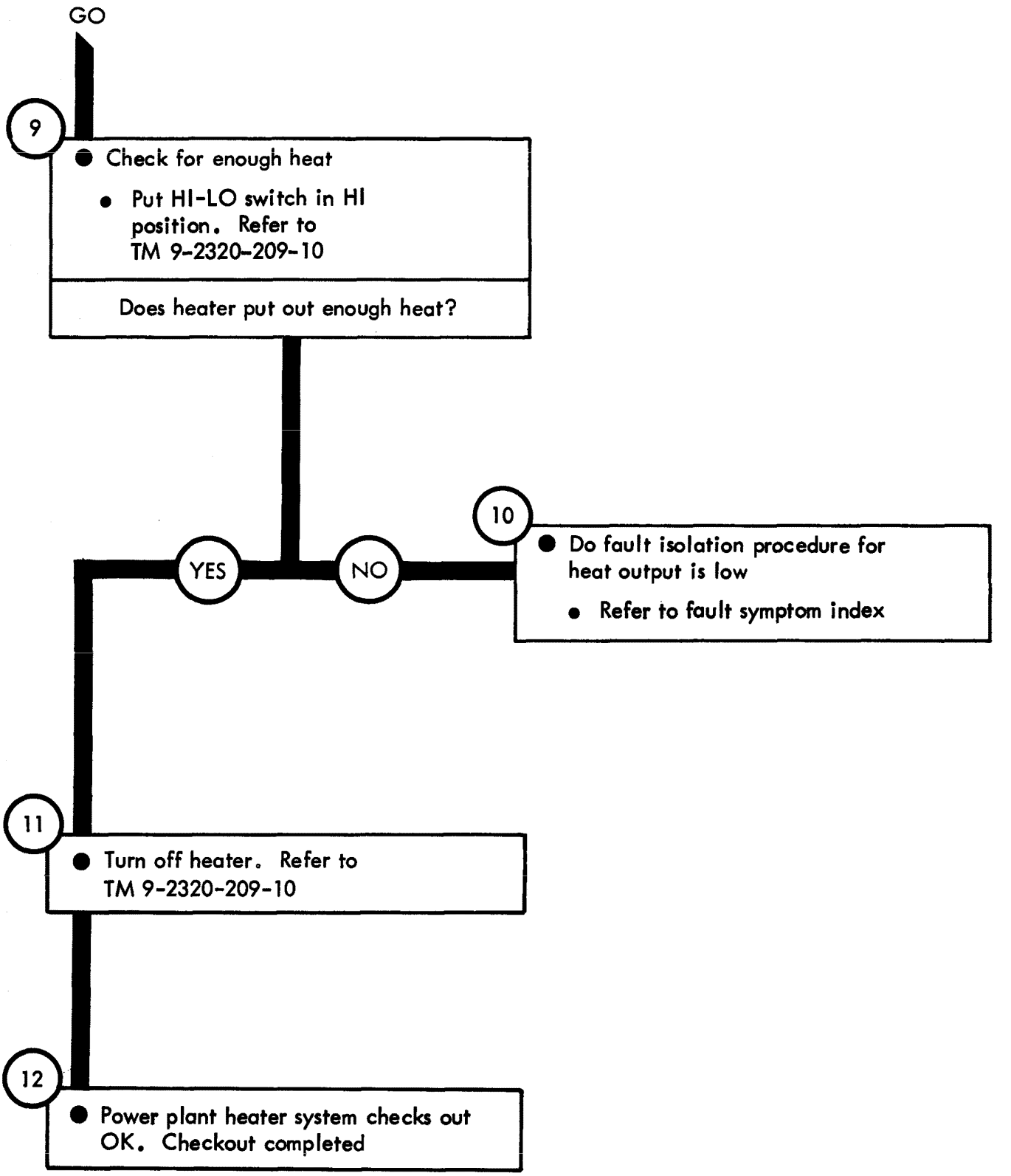


Figure 86-1 (Sheet 2 of 3)



TA 115094

Figure 86-1 (Sheet 3 of 3)

CHAPTER 87

FUEL BURNING PERSONNEL HEATER TROUBLESHOOTING

87-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the fuel burning personnel heater, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

87-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

FUEL BURNING PERSONNEL HEATER TROUBLESHOOTING

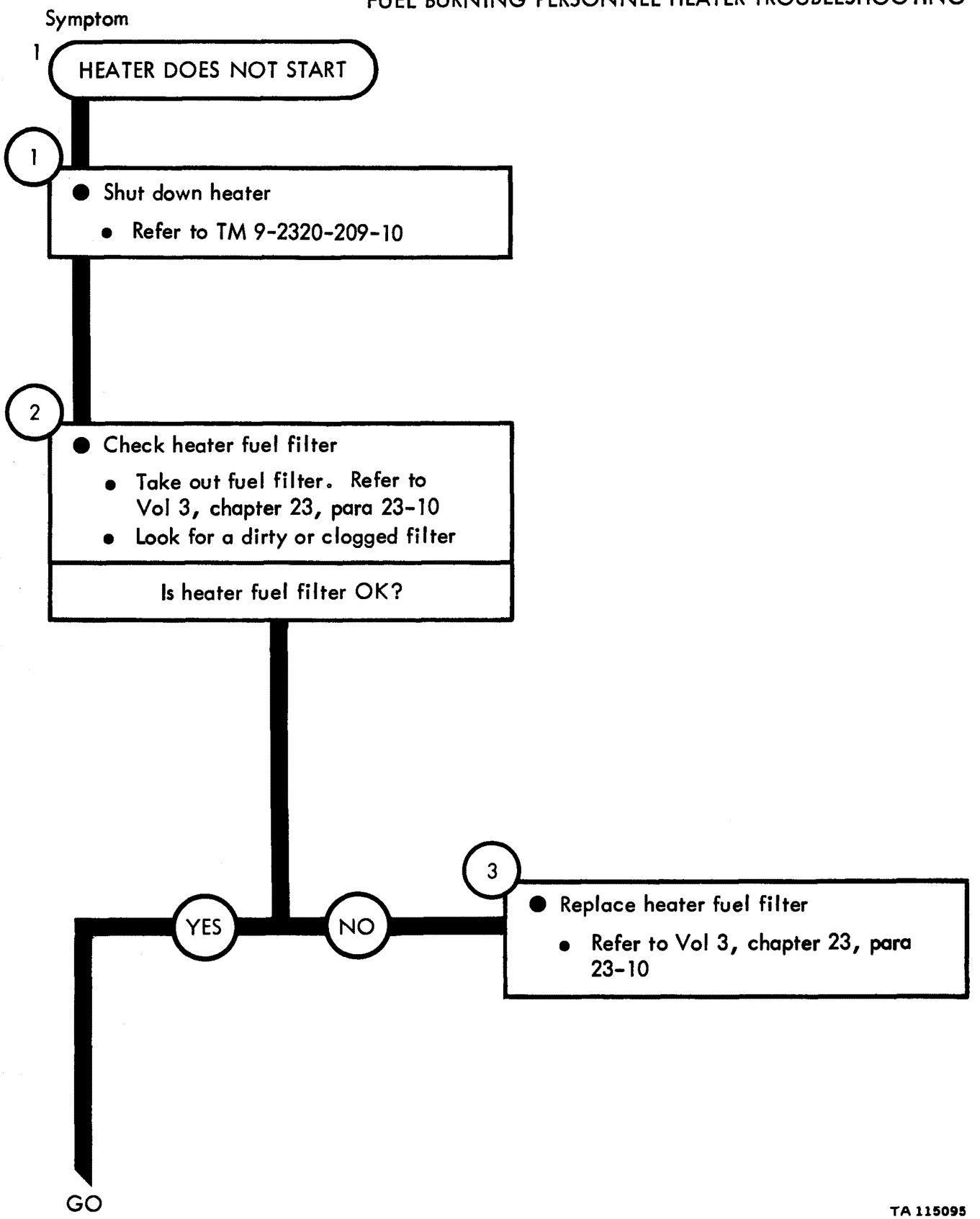
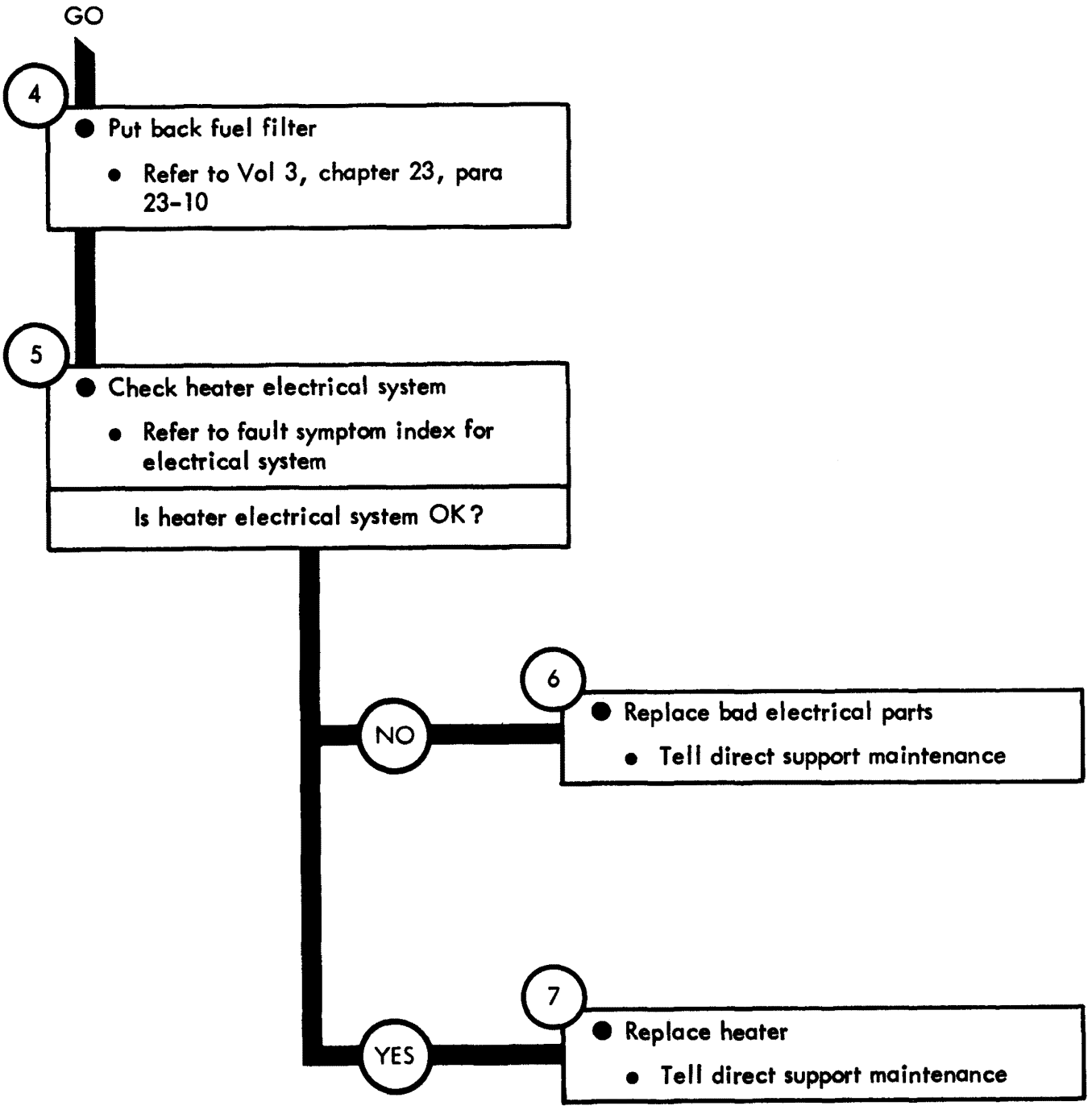


Figure 87-1 (Sheet 1 of 2)



TA 115096

Figure 87-1 (Sheet 2 of 2)

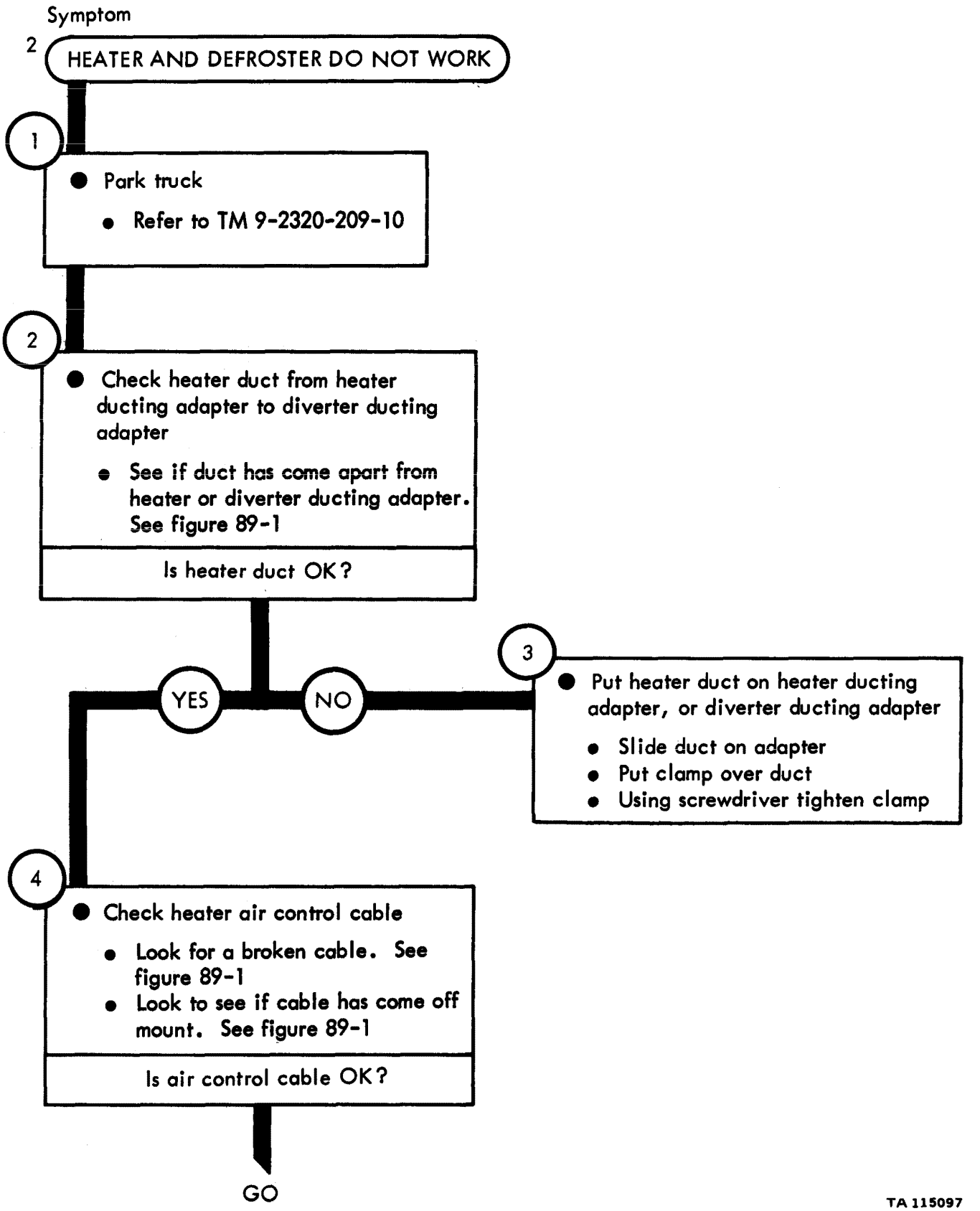


Figure 87-2 (Sheet 1 of 3)

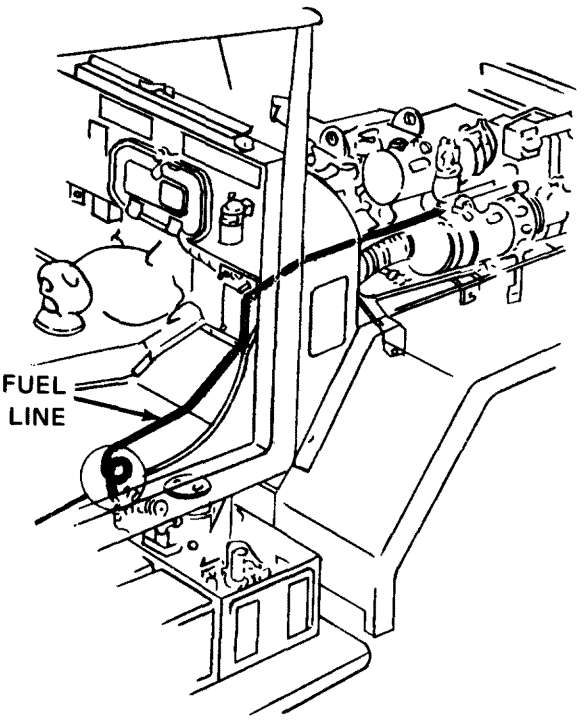
GO

YES

NO

5

- Put back cable that has come off mount
  - Refer to Vol 3, chapter 23, para 23-8
- Replace broken cable
  - Refer to Vol 3, chapter 23, para 23-8



6

- Check heater fuel line
  - Look for a crushed, cracked or broken fuel line

Is fuel line OK?

YES

NO

7

- Replace crushed, cracked or broken fuel line
  - Refer to Vol 3, chapter 4, para 4-5

GO

TA 115098

Figure 87-2 (Sheet 2 of 3)

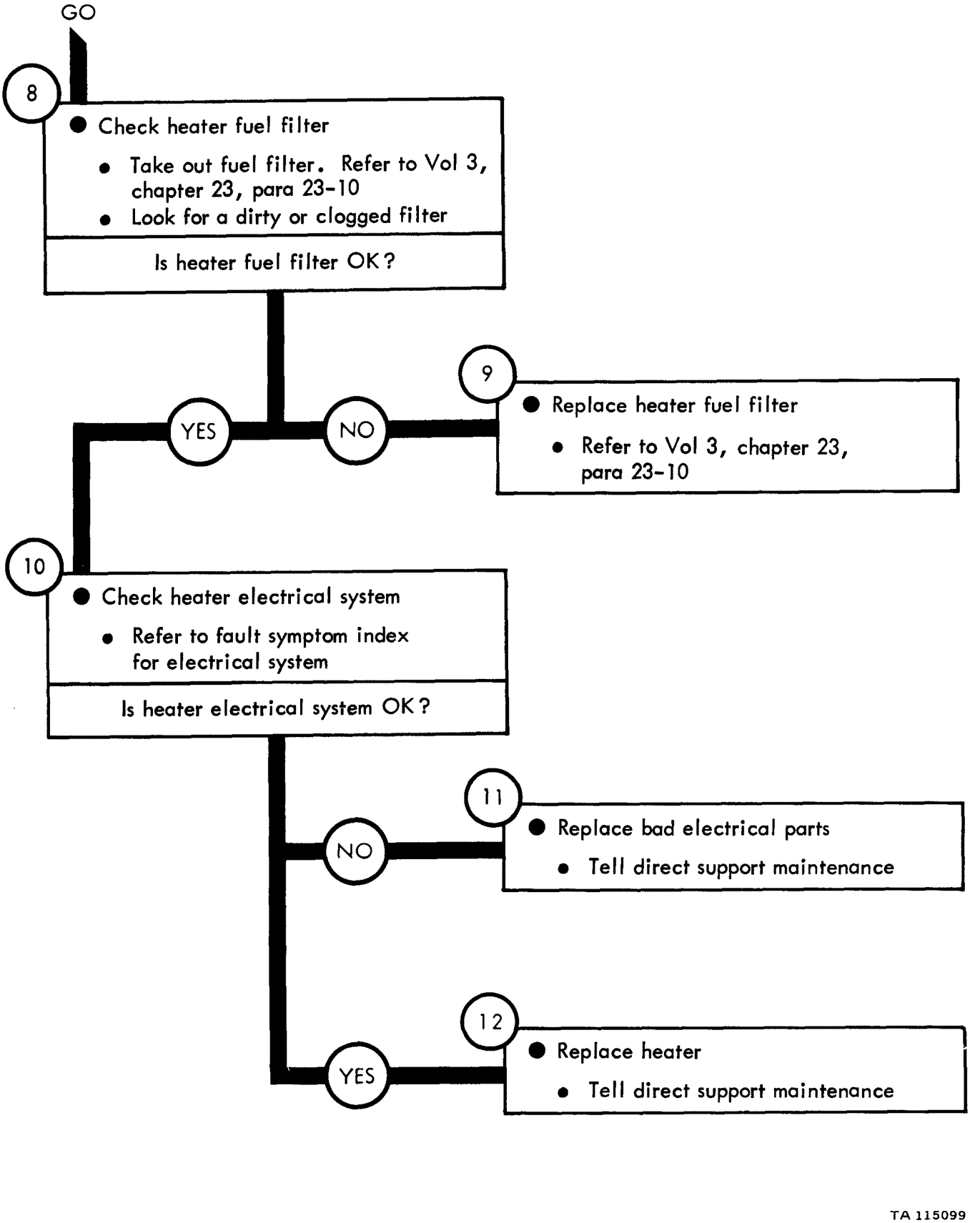


Figure 87-2 (Sheet 3 of 3)

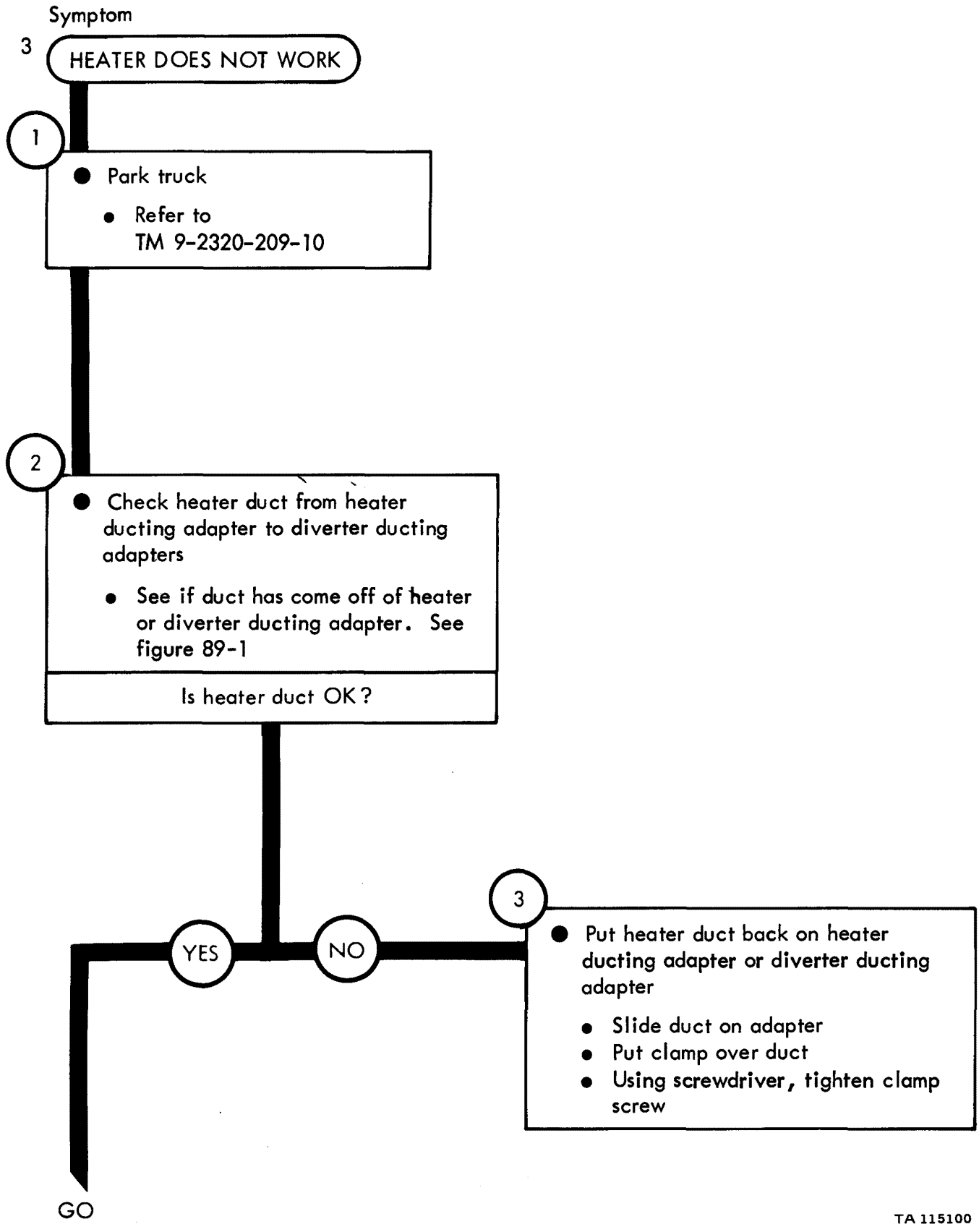
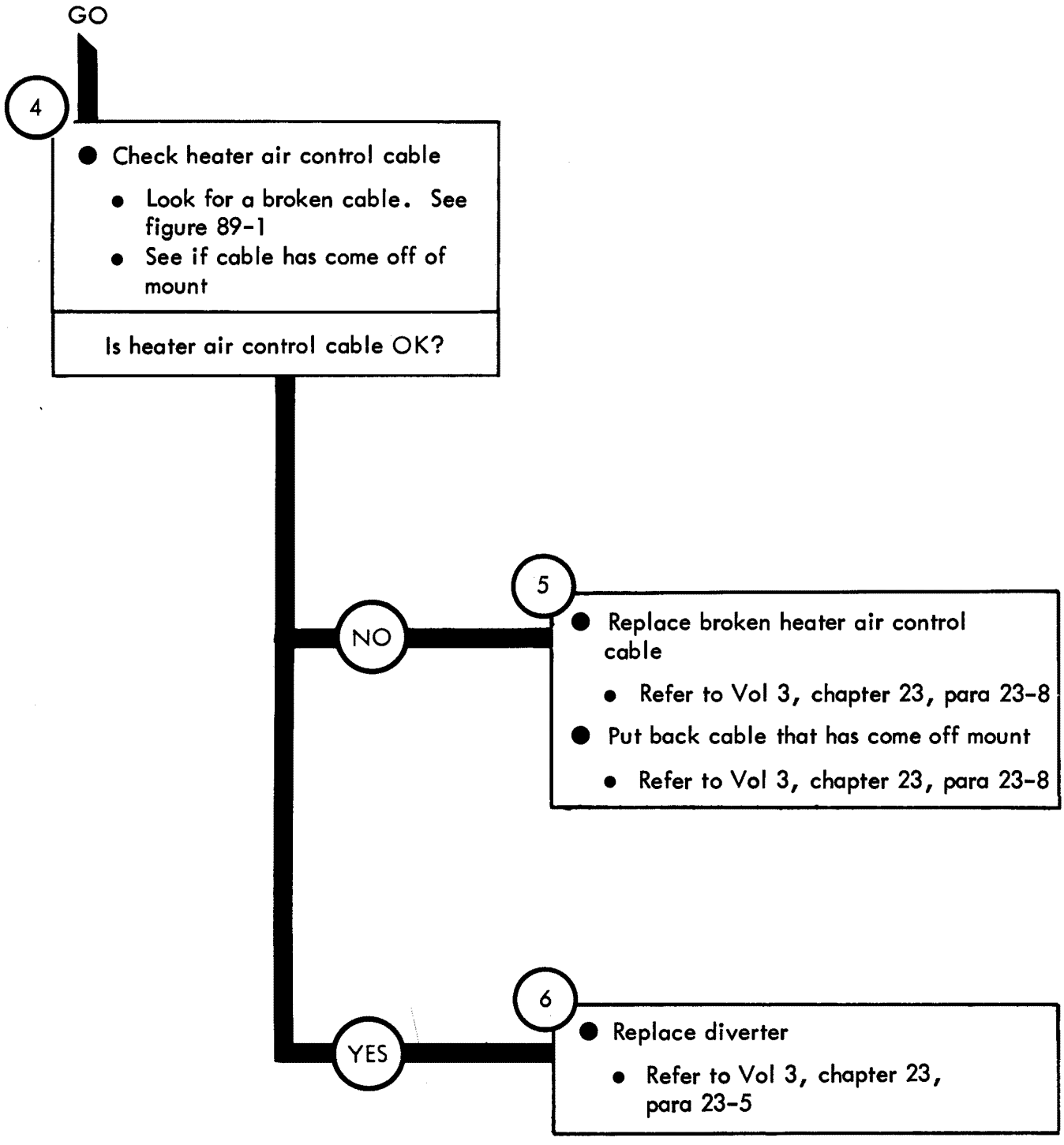


Figure 87-3 (Sheet 1 of 2)



TA 115101

Figure 87-3 (Sheet 2of 2)

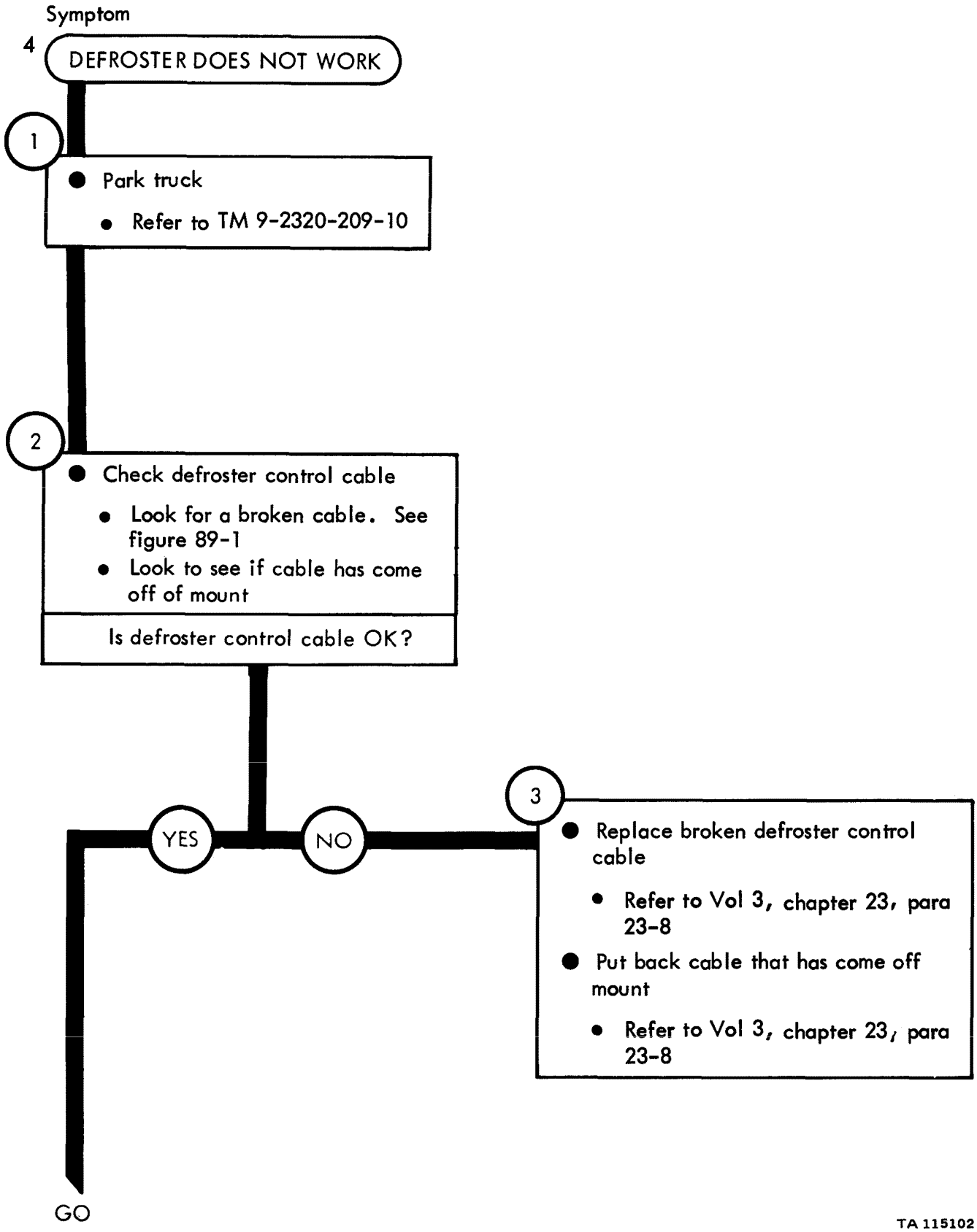
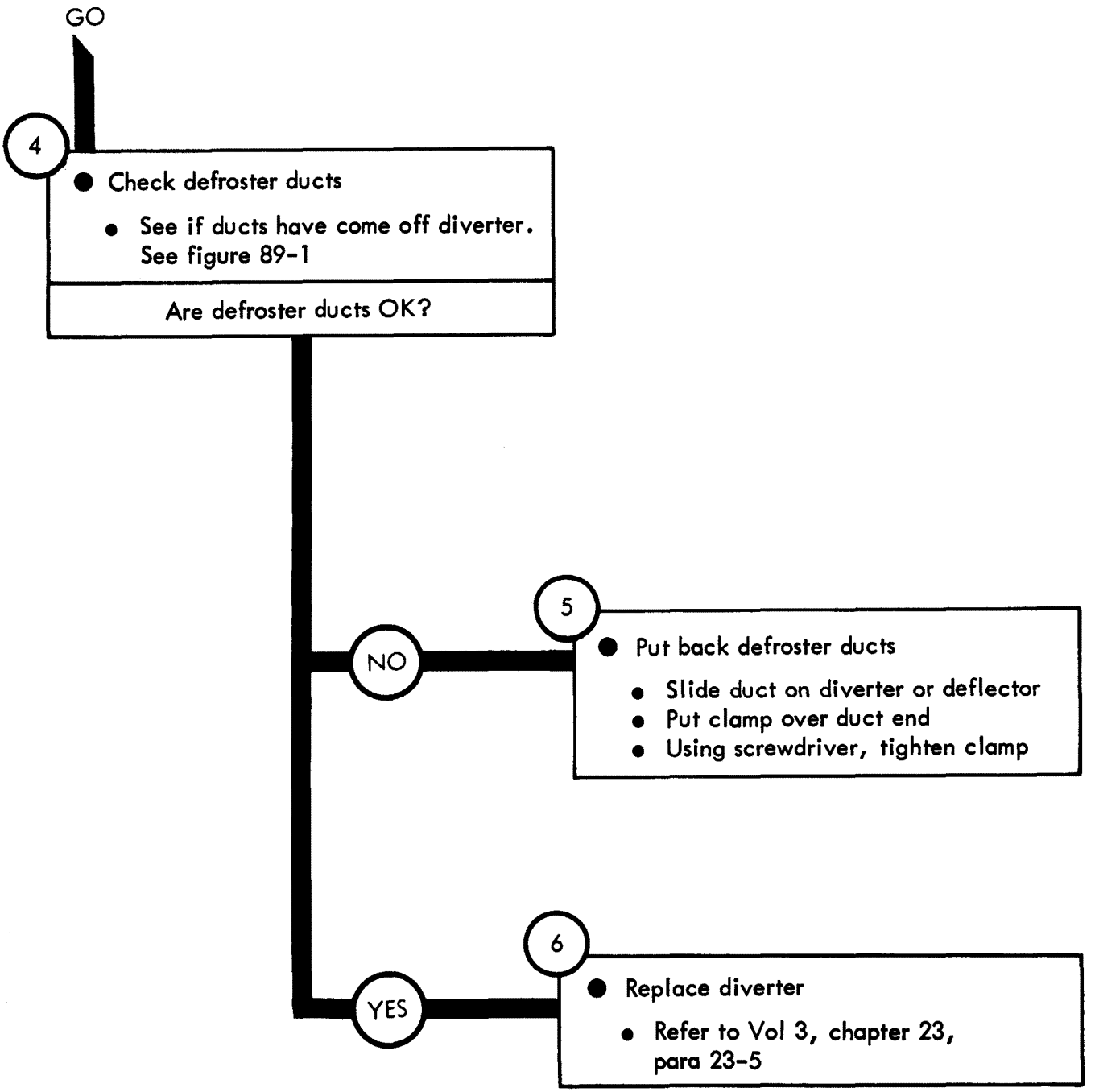


Figure 87-4 (Sheet 1 of 2)



TA 115103

Figure 87-4 (Sheet 2 of 2)

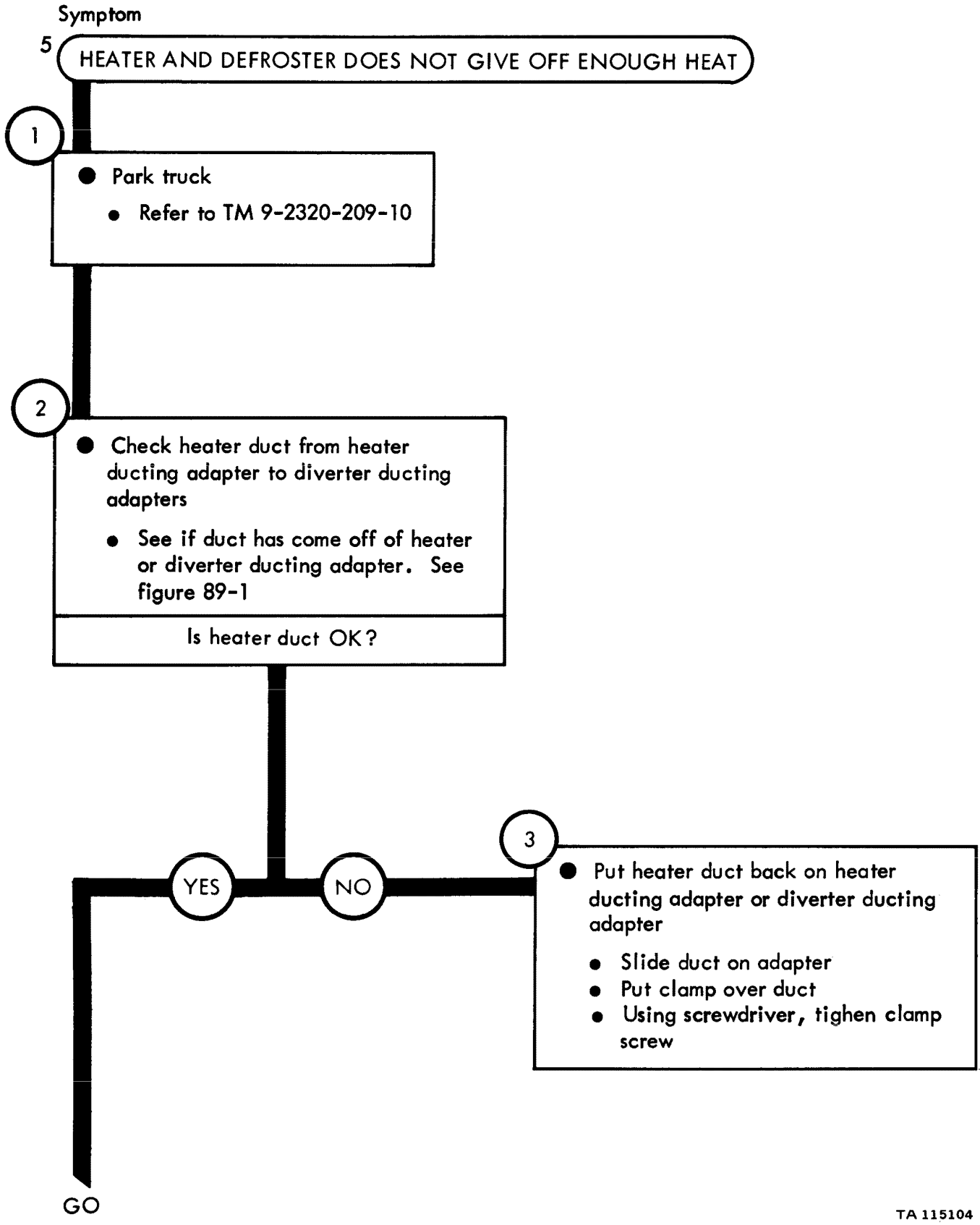


Figure 87-5 (Sheet 1 of 4)

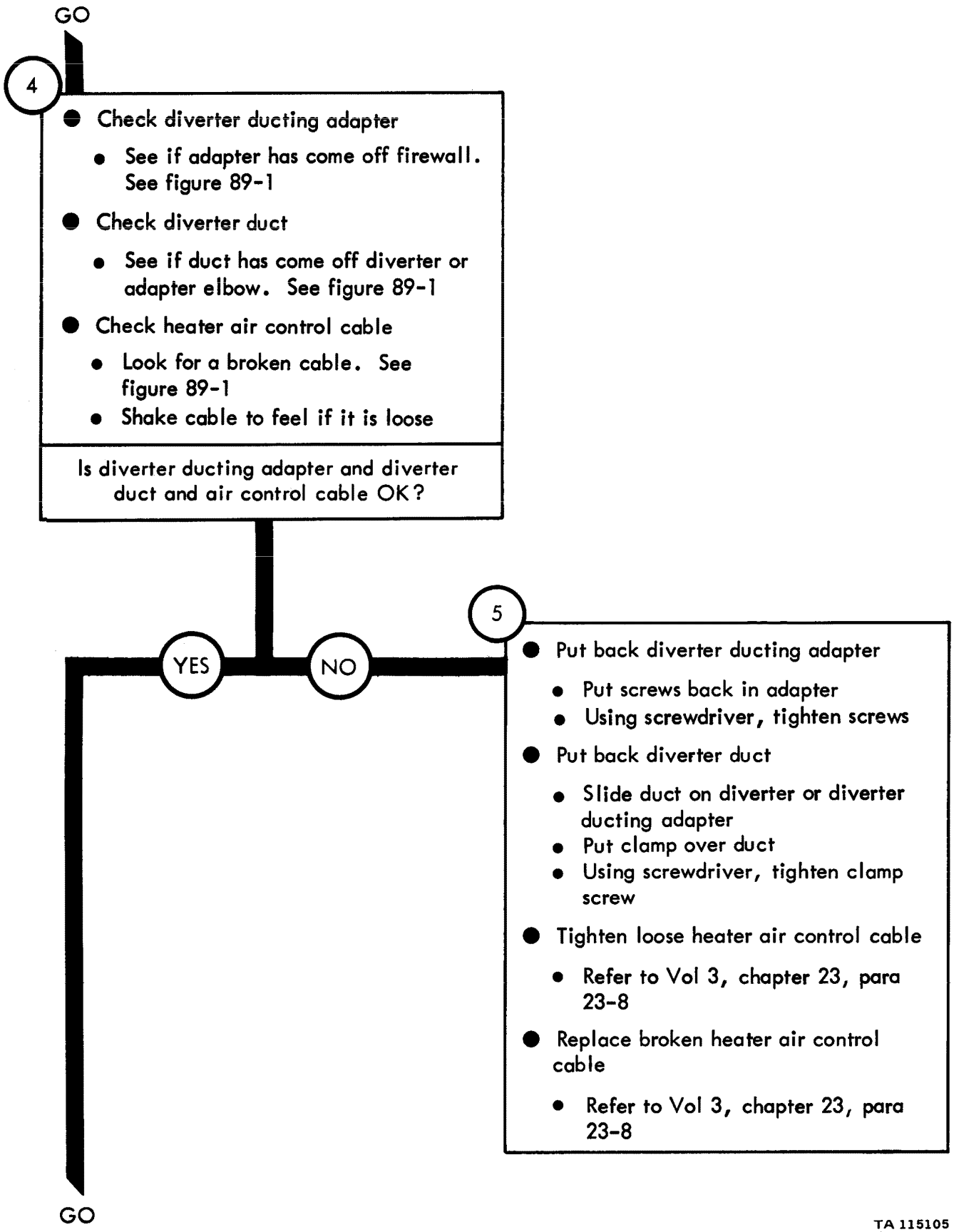


Figure 87-5 (Sheet 2 of 4)

GO

6

- Check defroster control cable
  - Look for a broken cable. See fig. 89-1
  - Shake cable to feel if it is loose

Is air control cable OK?

YES

NO

7

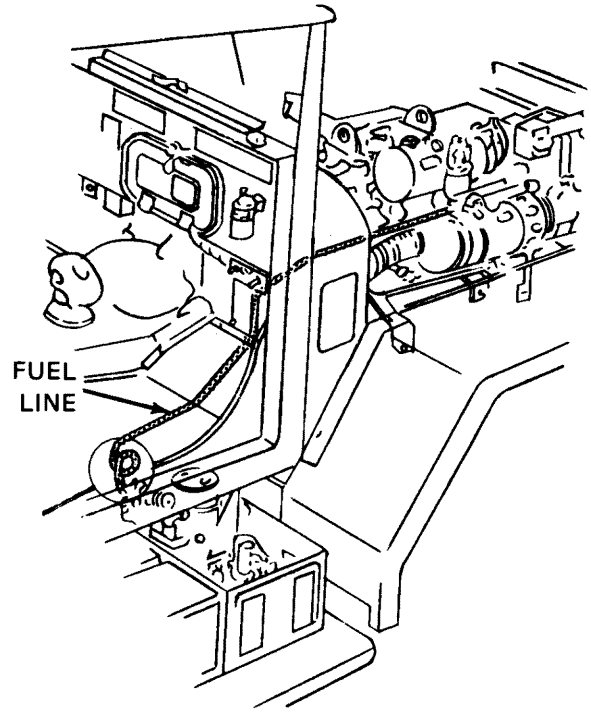
- Tighten loose cable
  - Refer to Vol 3, chapter 23, para 23-8
- Replace broken cable
  - Refer to Vol 3, chapter 23, para 23-8

8

- Check heater fuel line
  - Look for a crushed, cracked or broken fuel line

Is fuel line OK?

GO



TA 115106

Figure 87-5 (Sheet 3 of 4)

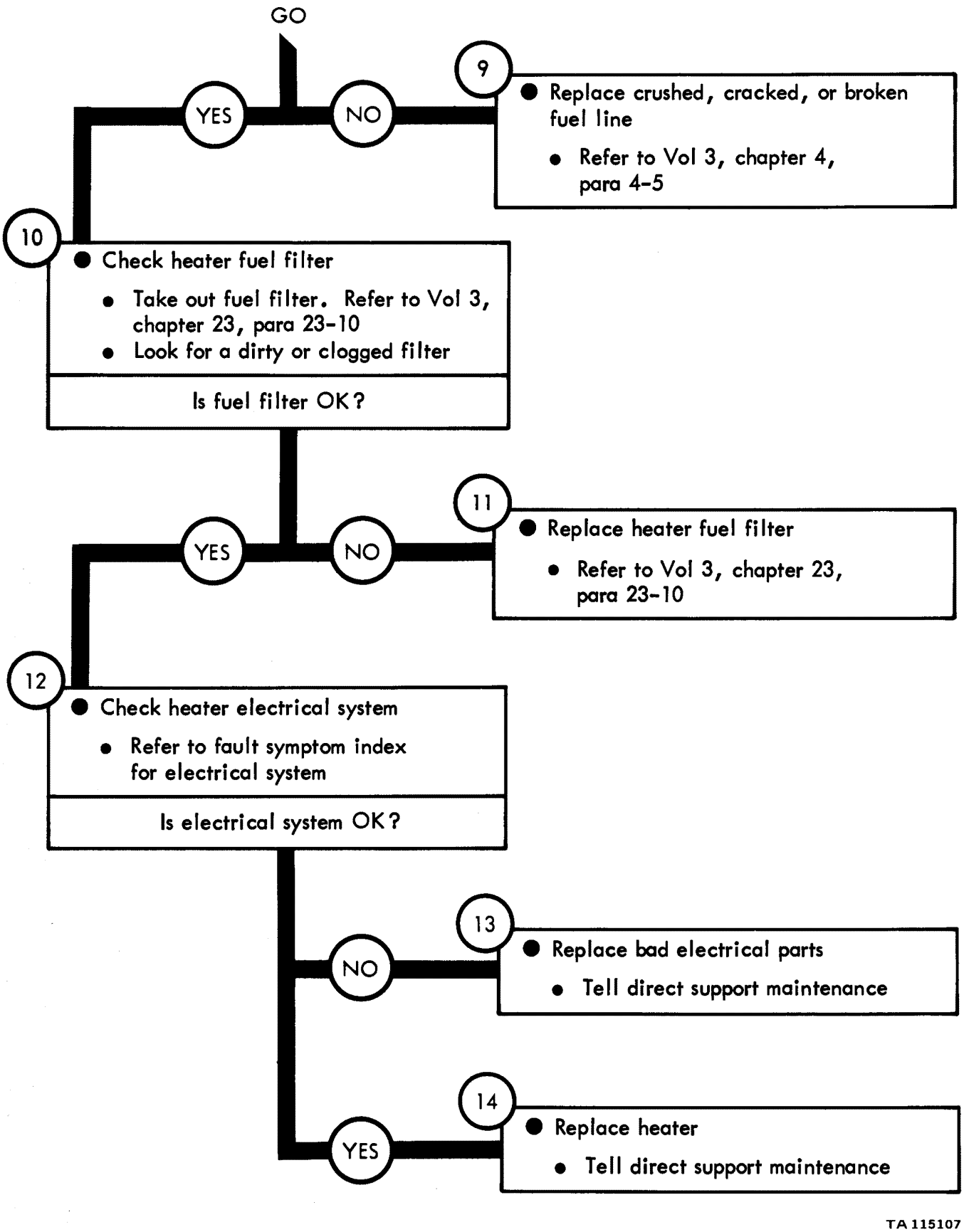


Figure 87-5 (Sheet 4 of 4)

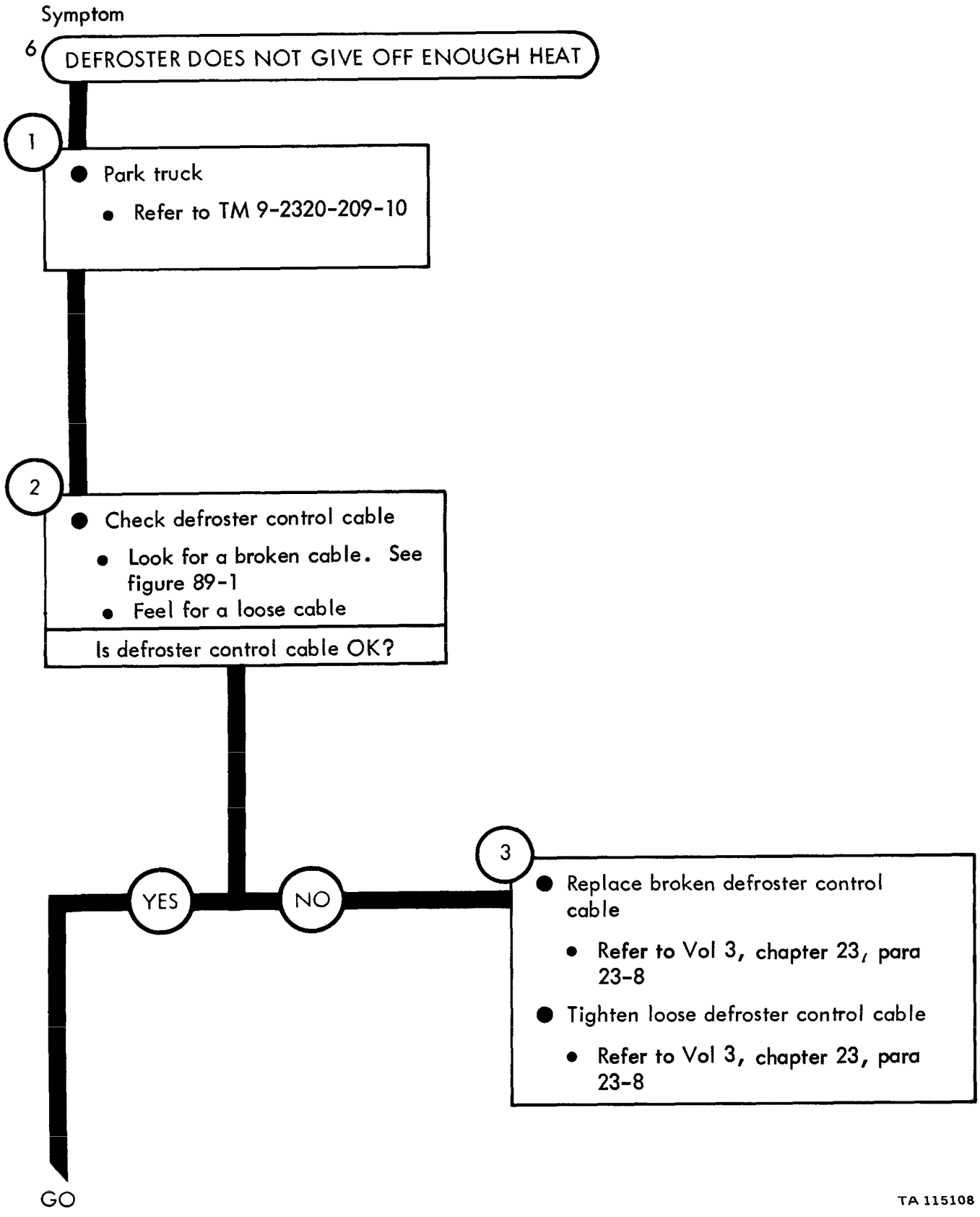


Figure 87-6 (Sheet 1 of 2)

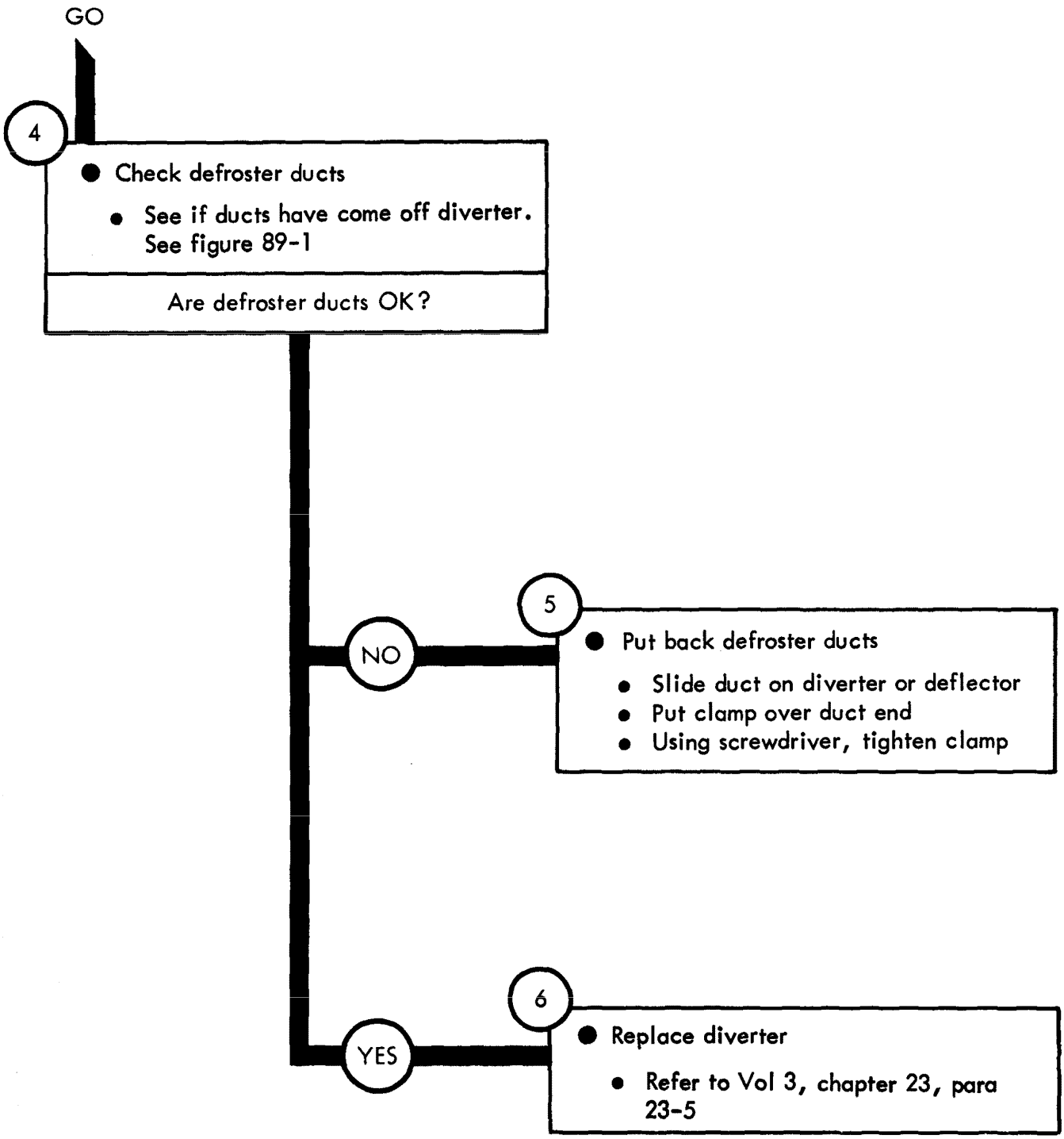


Figure 87-6 (Sheet 2 of 2)

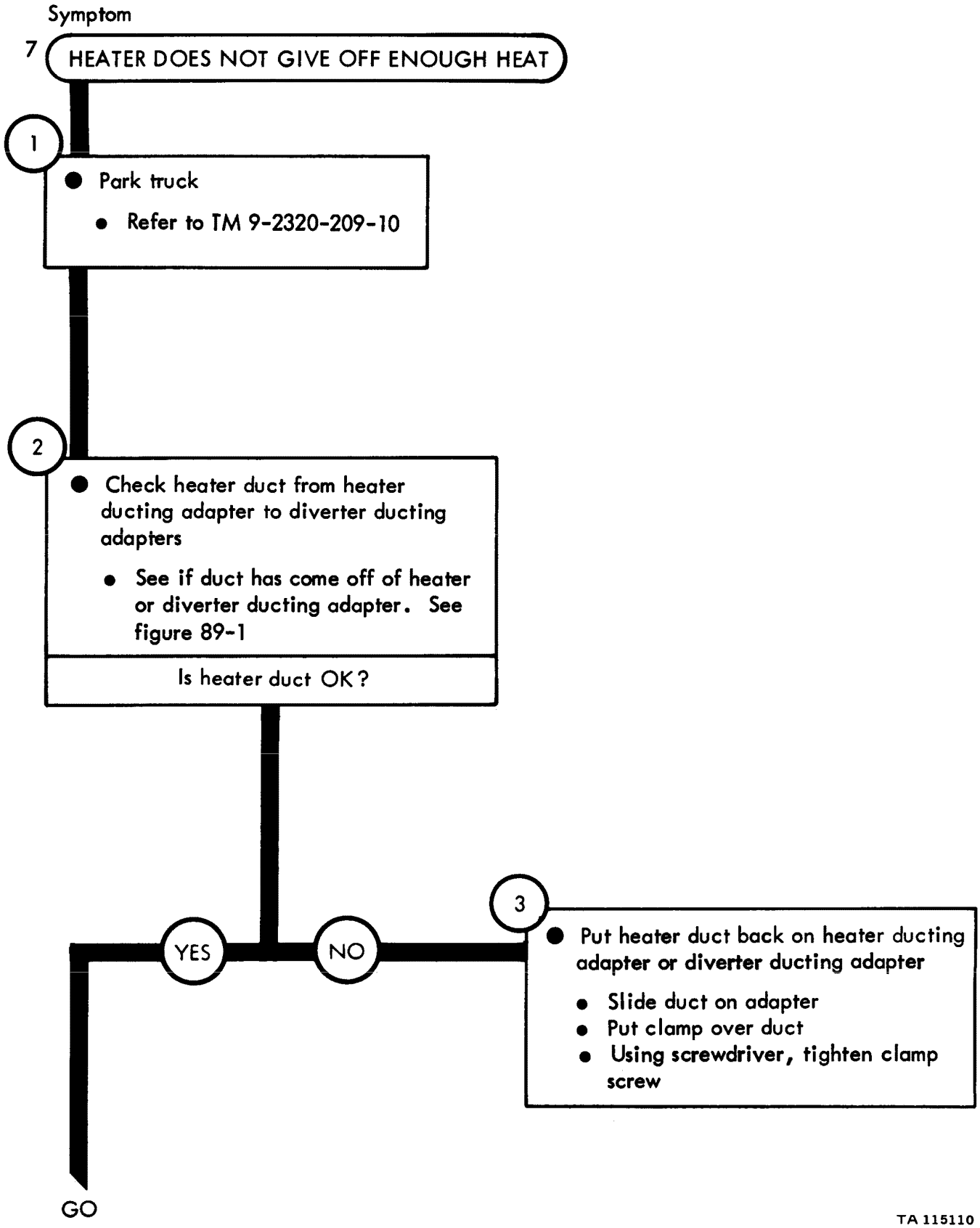


Figure 87-7 (Sheet 1 of 2)

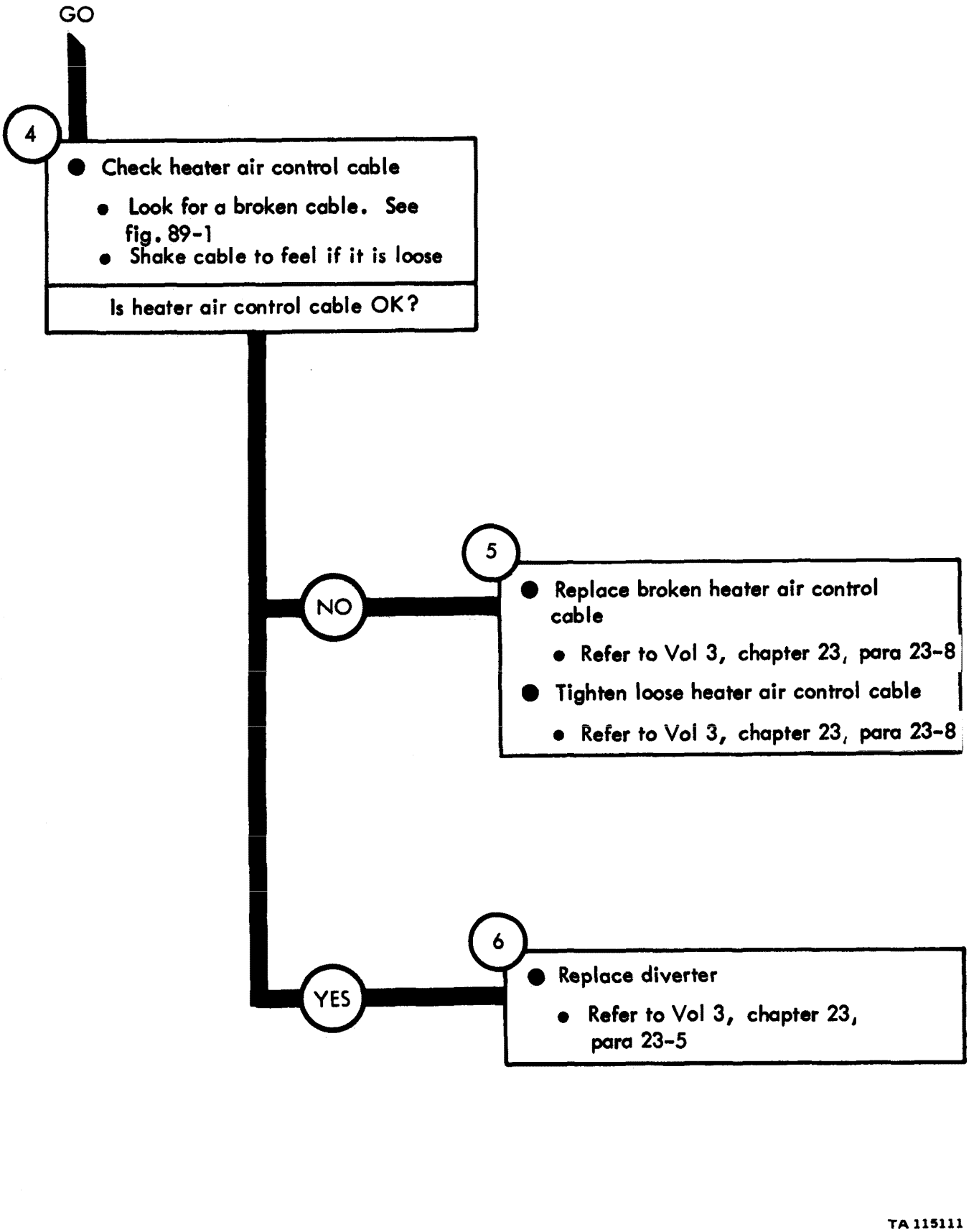


Figure 87-7 (Sheet 2 of 2)

CHAPTER 88

FUEL BURNING PERSONNEL HEATER TROUBLESHOOTING SUMMARY

88-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 87 for the fuel burning personnel heater.

88-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warninzs, cautions, and notes are tiven where needed.

FUEL BURNING PERSONNEL HEATER TROUBLESHOOTING SUMMARY

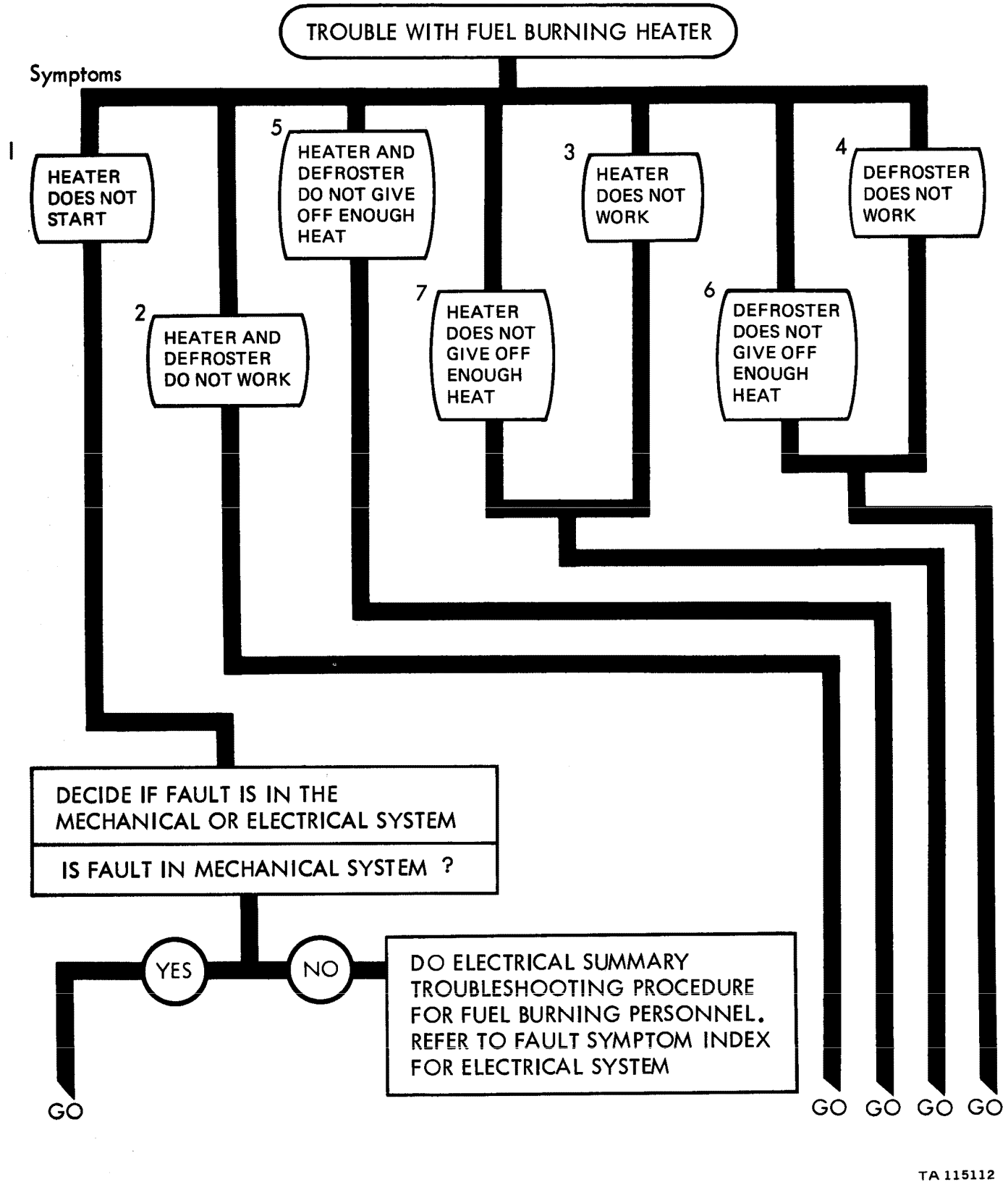


Figure 88-1 (Sheet 1 of 6)

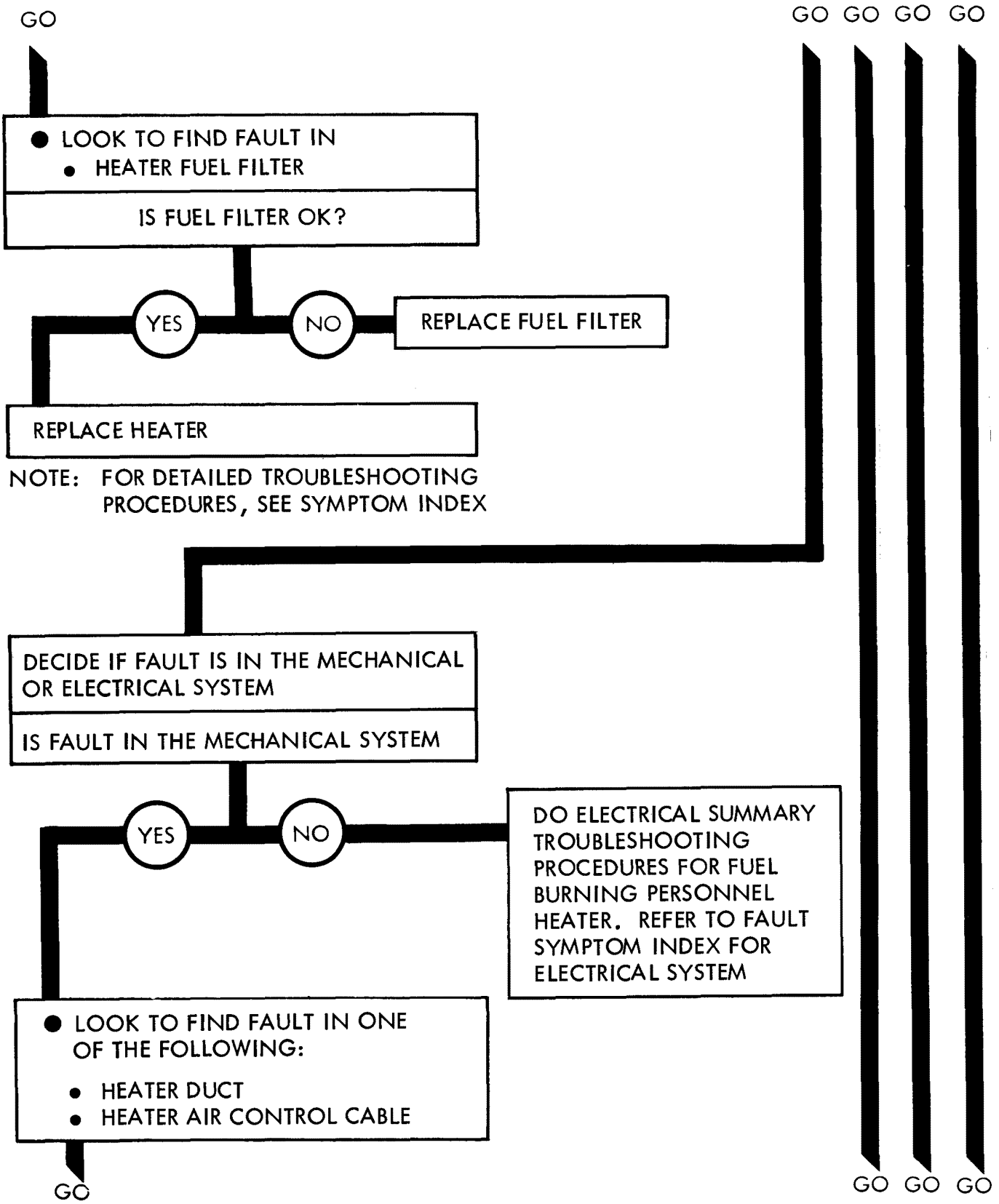


Figure 88-1 (Sheet 2 of 6)

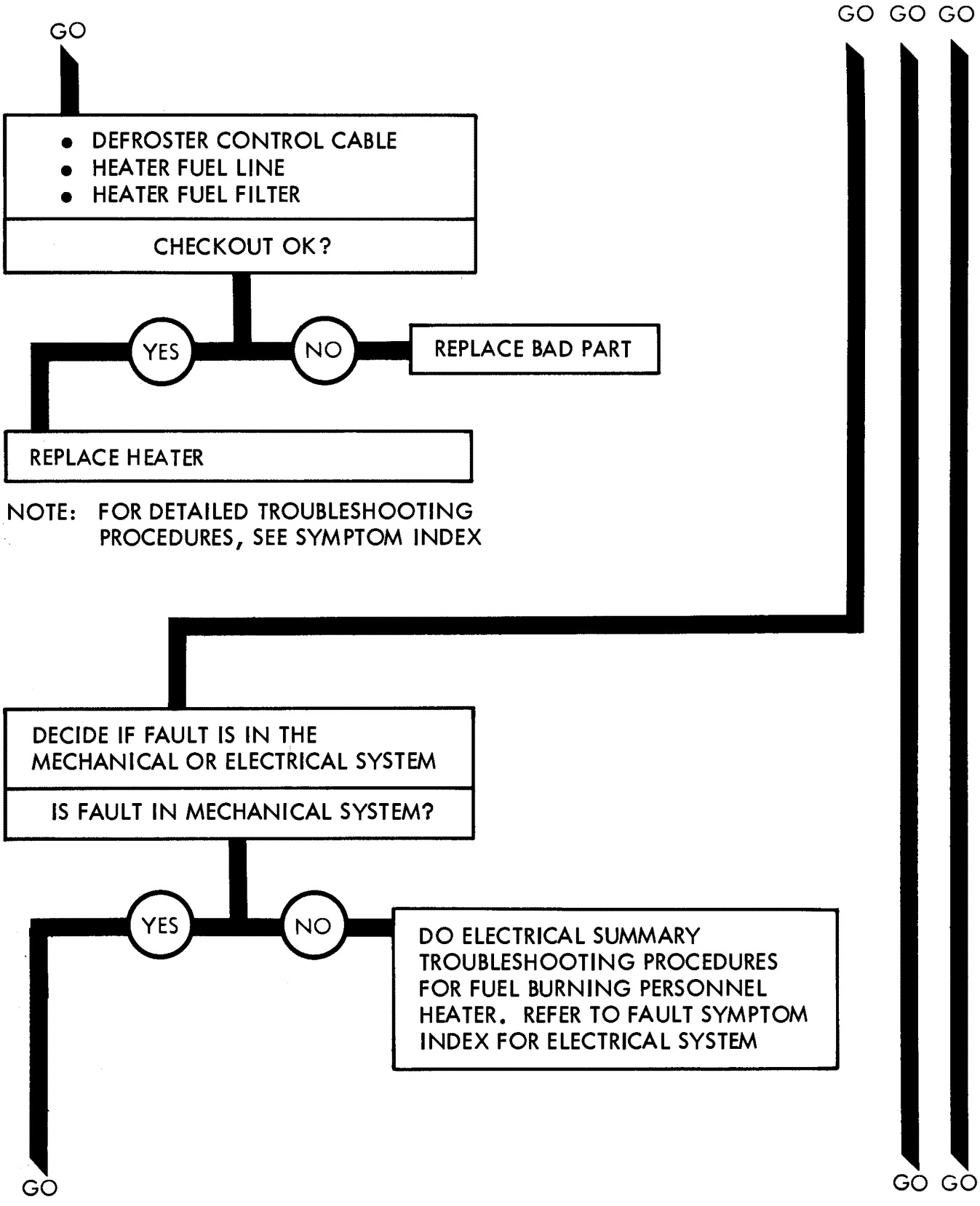
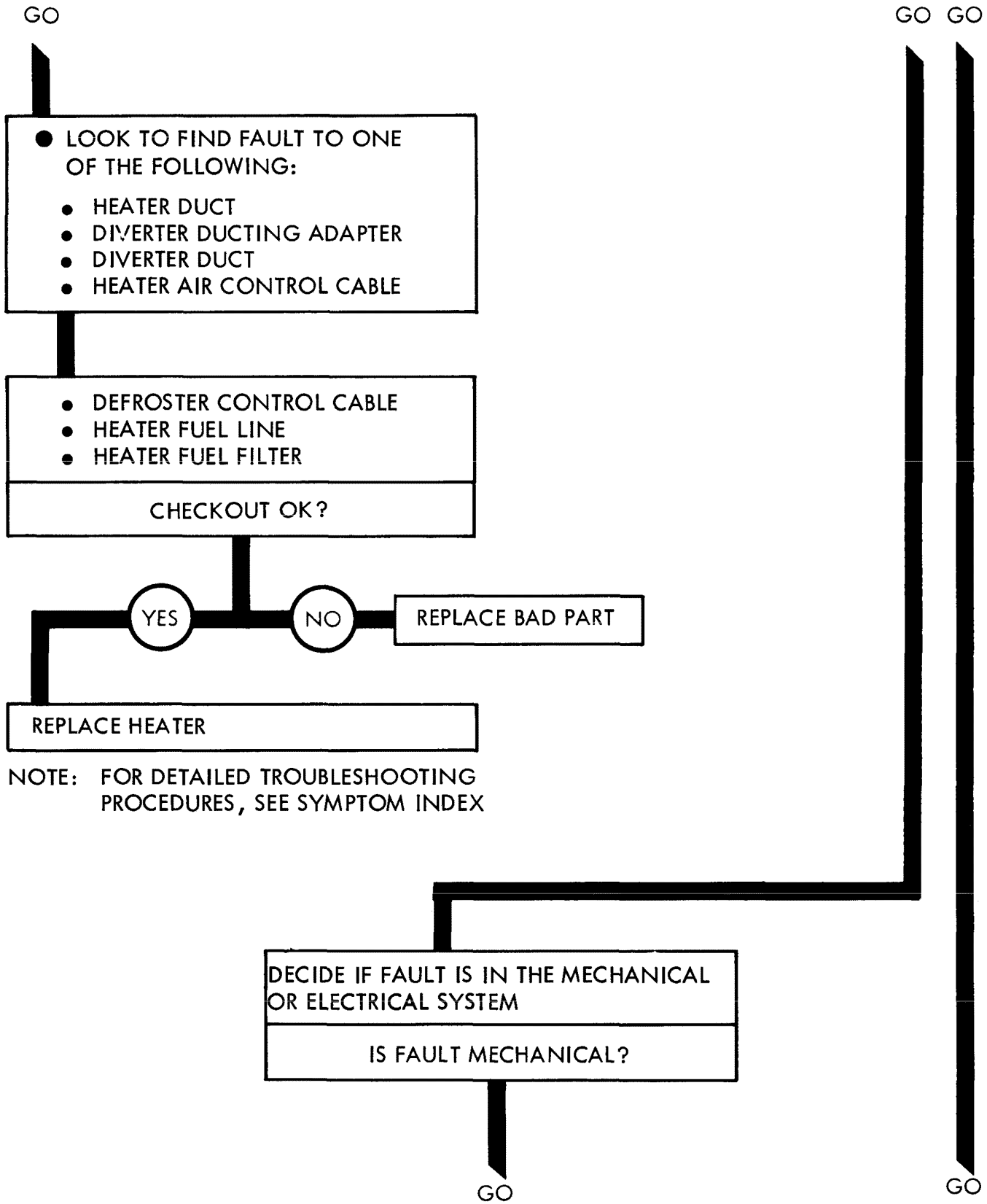
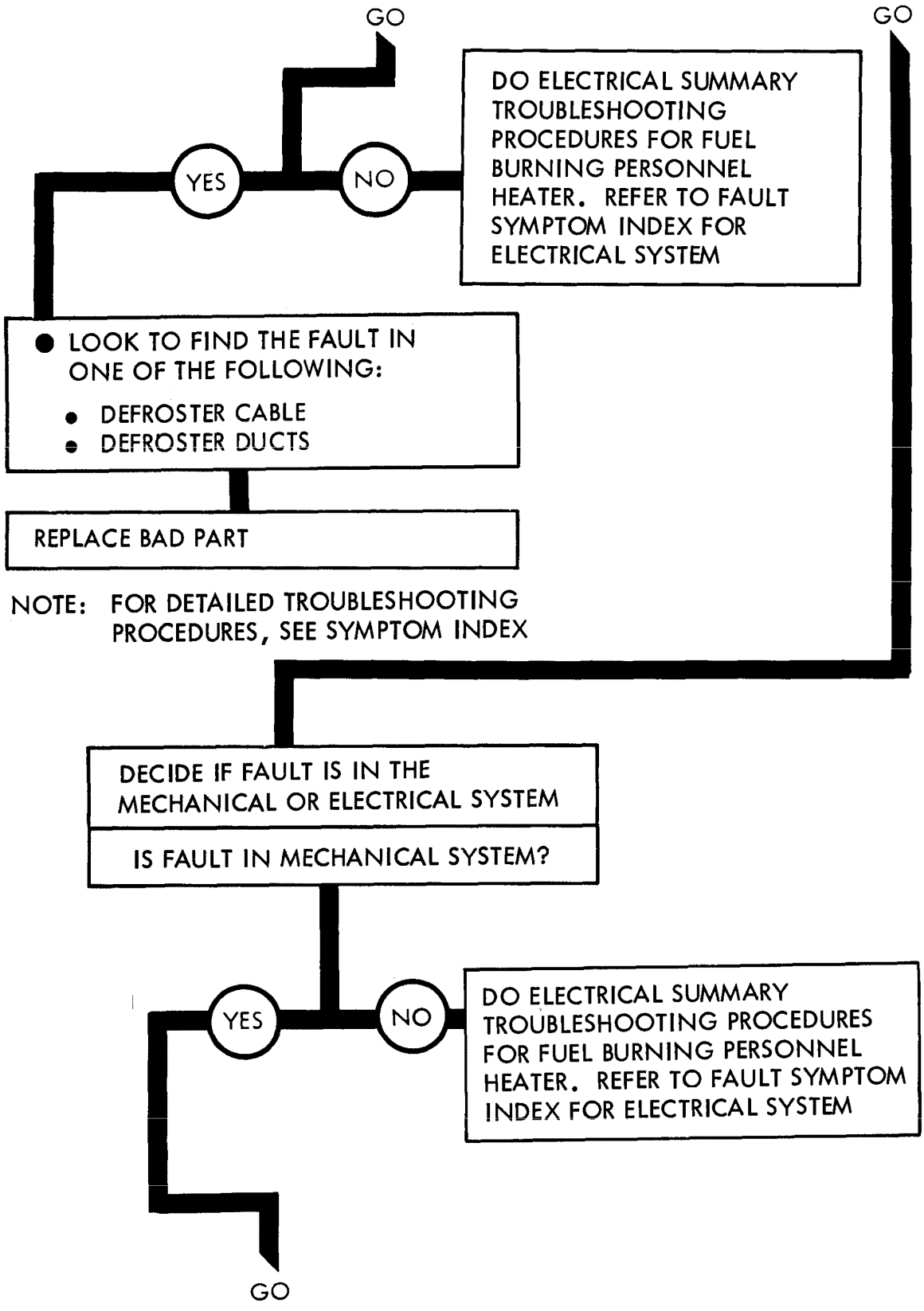


Figure 88-1 (Sheet 3 of 6)



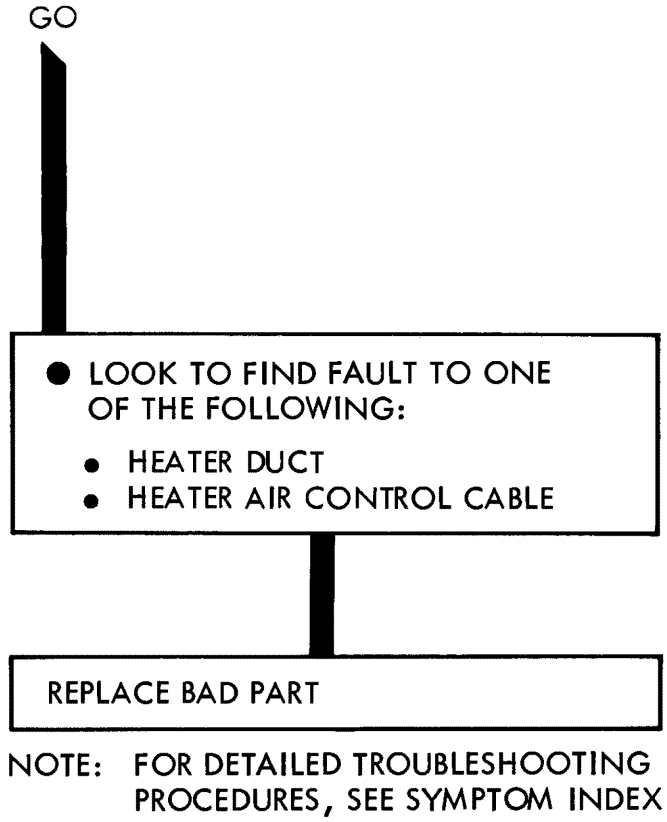
TA 115115

Figure 88-1 (Sheet 4 of 6)



TA 115116

Figure 88-1 (Sheet 5 of 6)



TA 115117

Figure 88-1 (Sheet 6 of 6)

CHAPTER 89

FUEL BURNING PERSONNEL HEATER SUPPORT DIAGRAMS

89-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 87. Table 3-1 is a complete listing of all support diagrams used in this manual.

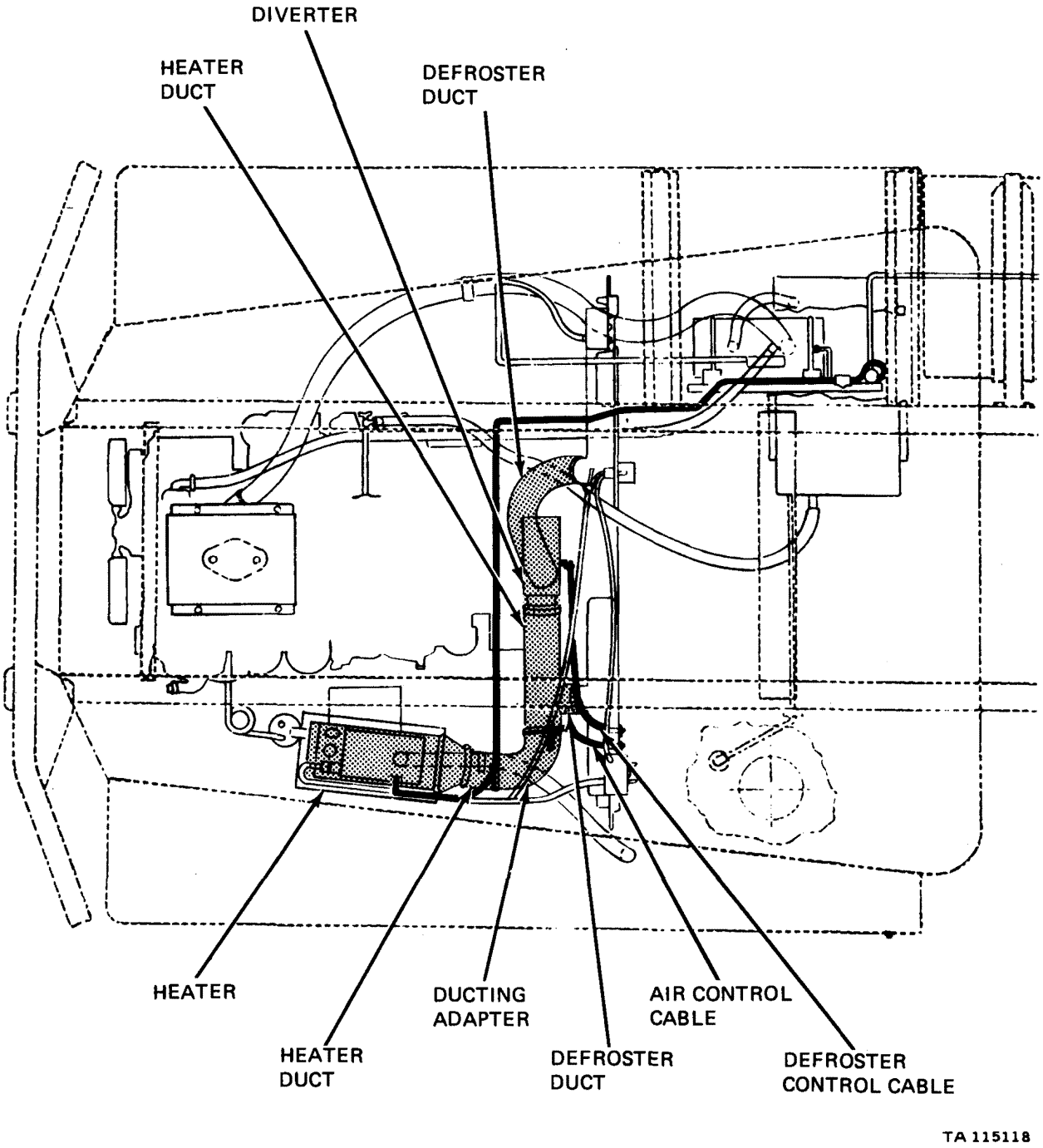


Figure 89-1. Fuel Burning Personnel Heater Support Diagram

CHAPTER 90

FUEL BURNING PERSONNEL HEATER CHECKOUT PROCEDURES

90-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

FUEL-BURNING PERSONNEL HEATER CHECKOUT

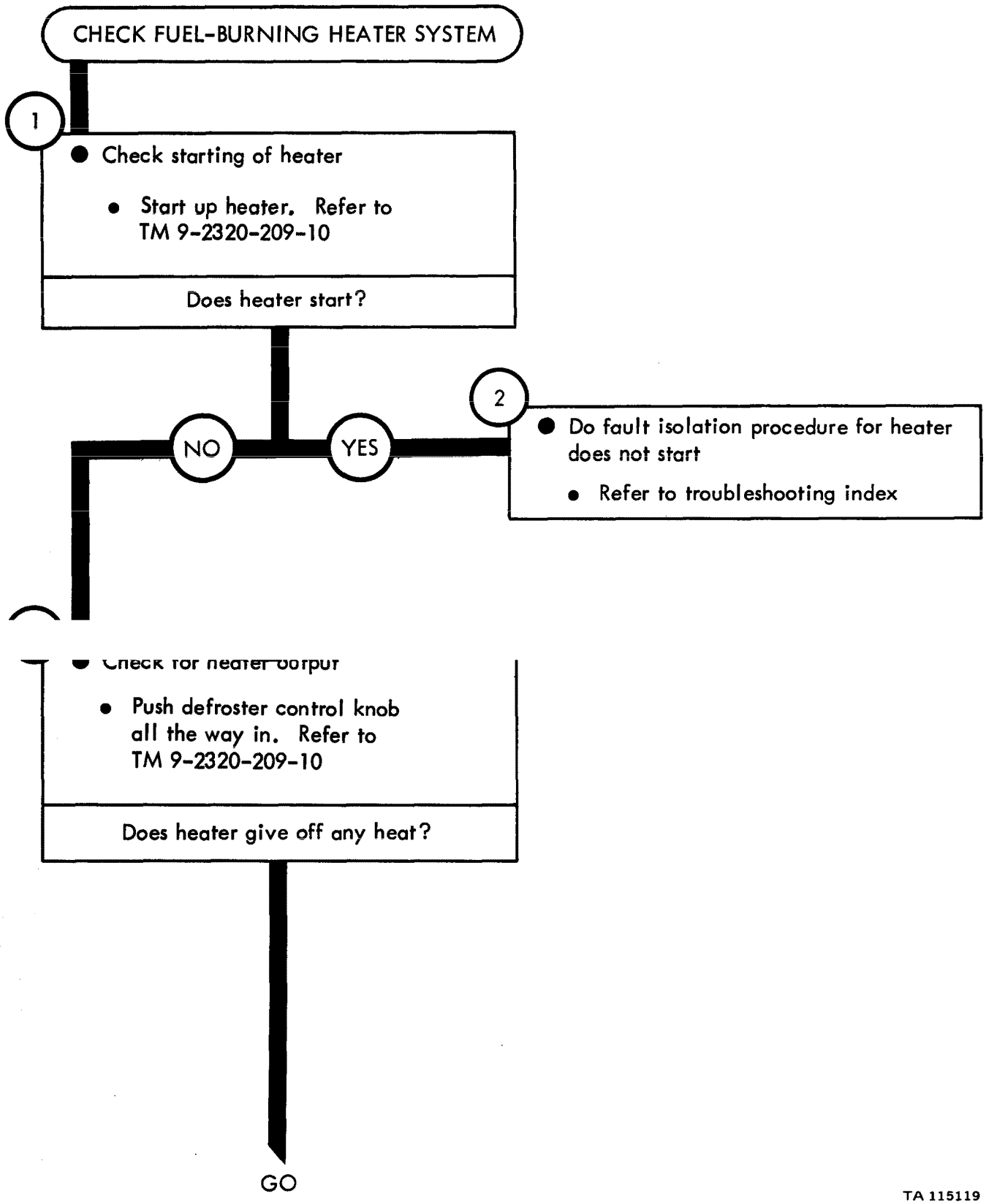
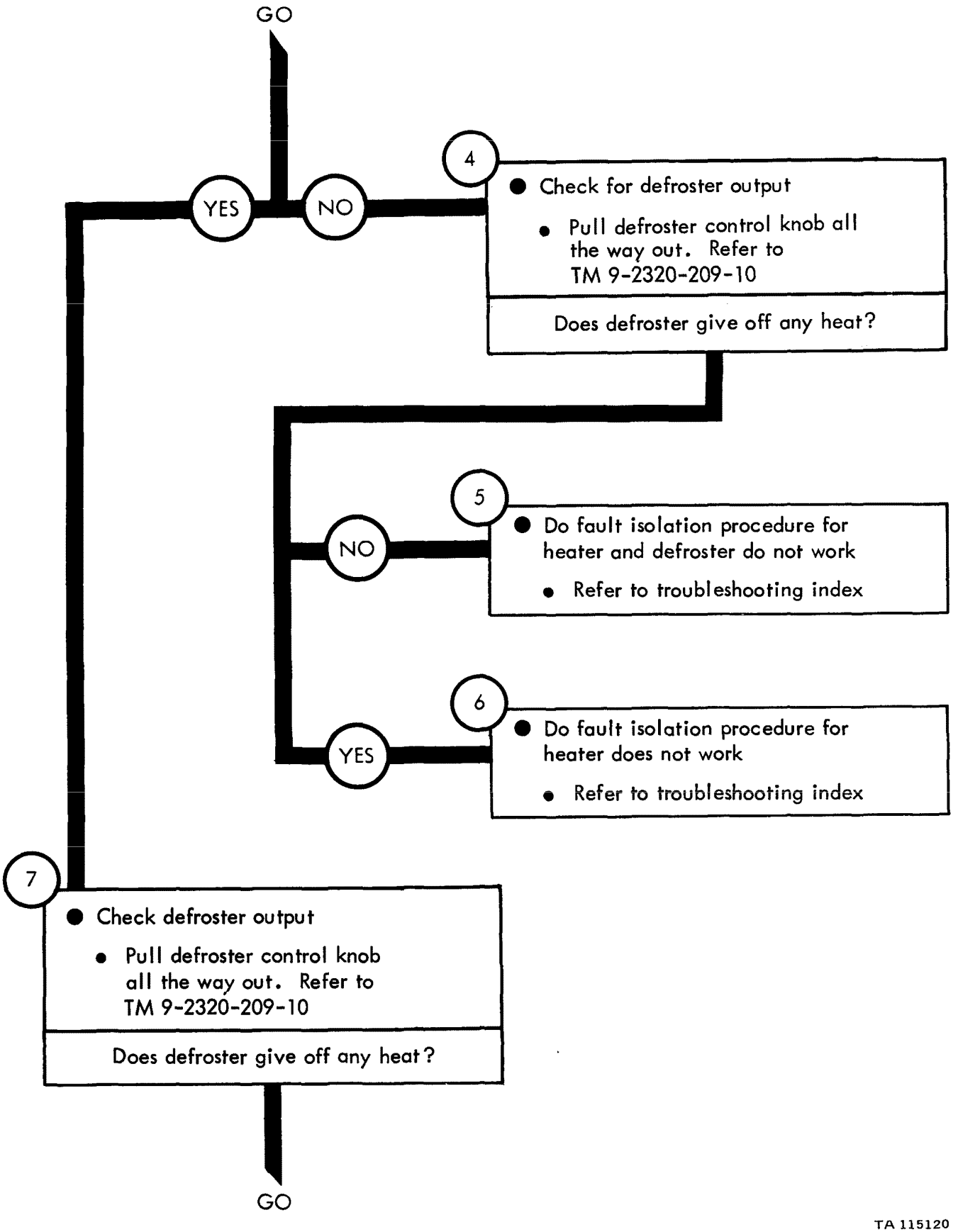


Figure 90-1 (Sheet 1 of 4)



TA 115120

Figure 90-1 (Sheet 2 of 4)

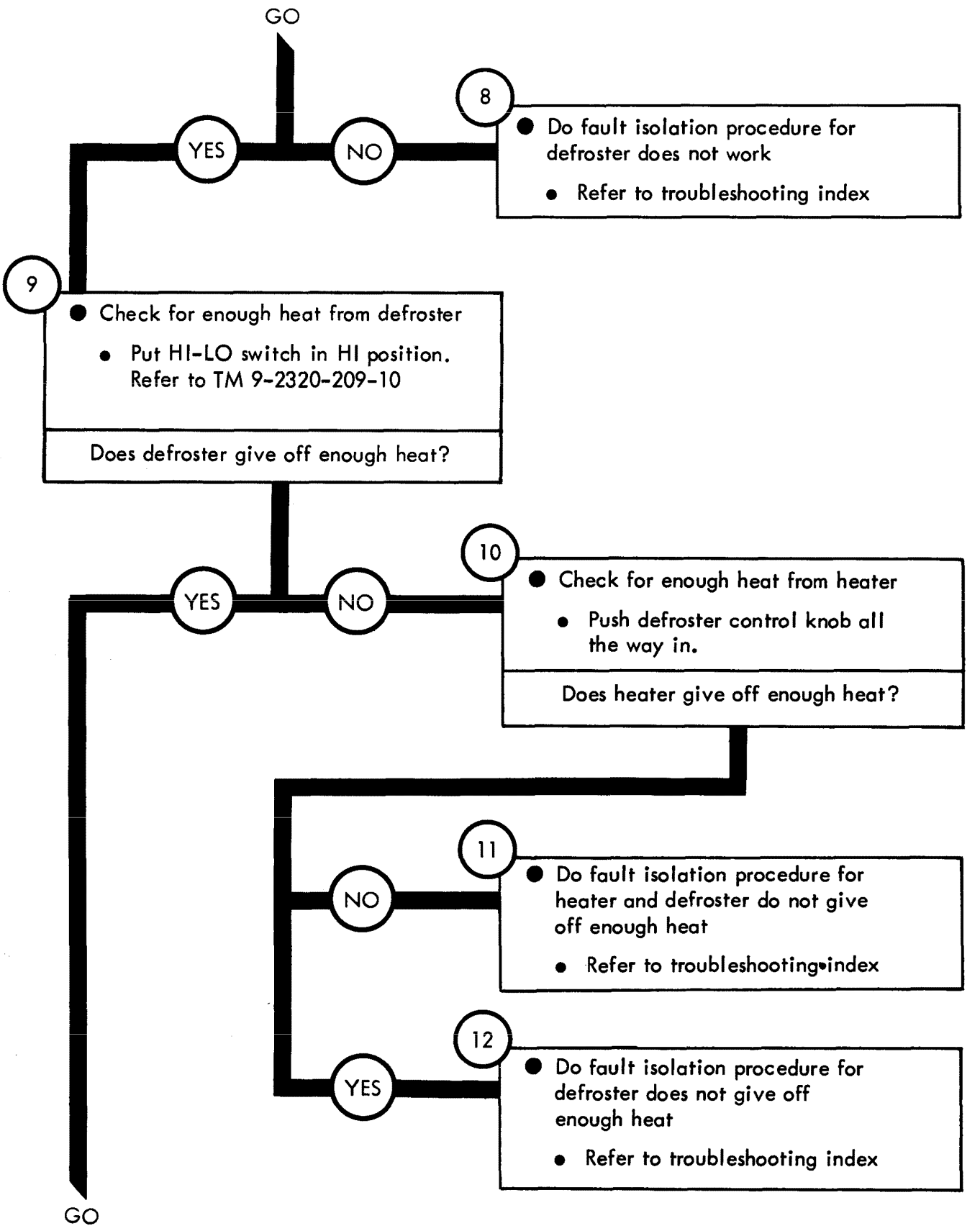
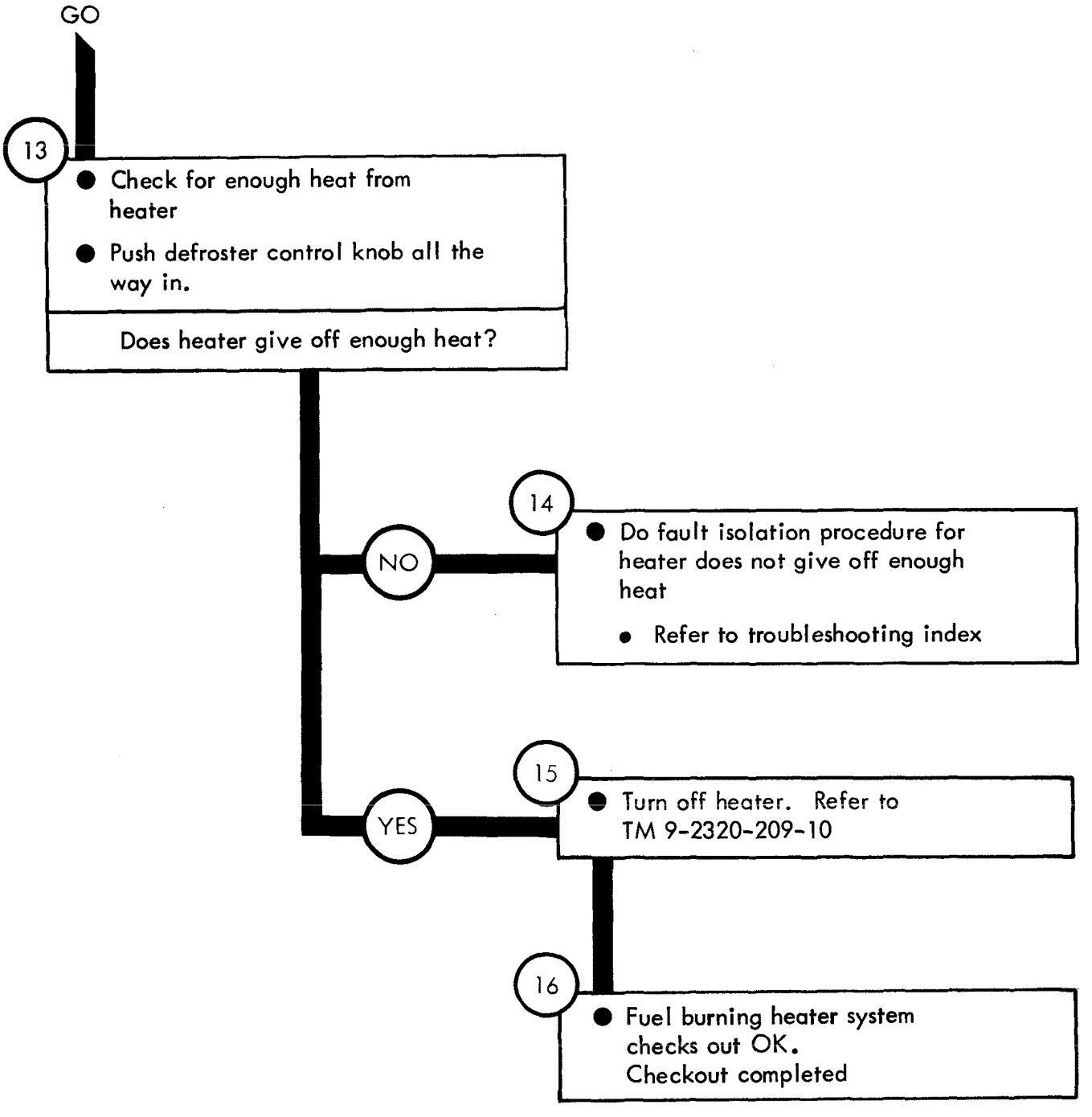


Figure 90-1 (Sheet 3 of 4)



TA 115122

Figure 90-1 (Sheet 4 of 4)

CHAPTER 91

HOT WATER HEATER TROUBLESHOOTING

91-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the hot water heater, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

91-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

HOT WATER HEATER TROUBLESHOOTING

Symptom

1 COOL OR COLD AIR AT OUTLETS AFTER ENGINE HAS REACHED OPERATING TEMPERATURE

1
- Park truck
  - Refer to TM 9-2320-209-10

2
- Check to see that shutoff cocks are fully open to the left
  - Open hood. Refer to TM 9-2320-209-10
  - Check if shutoff cocks are fully open to the left

Are shut off cocks fully open to left?

GO

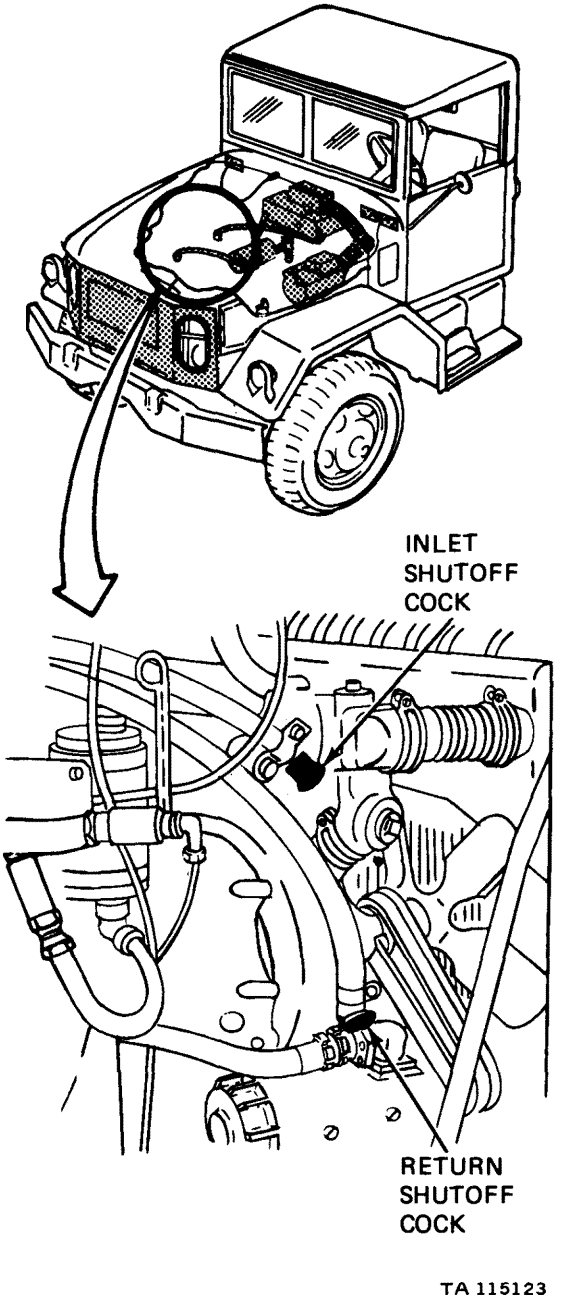


Figure 91-1 (Sheet 1 of 3)

GO

YES

NO

3

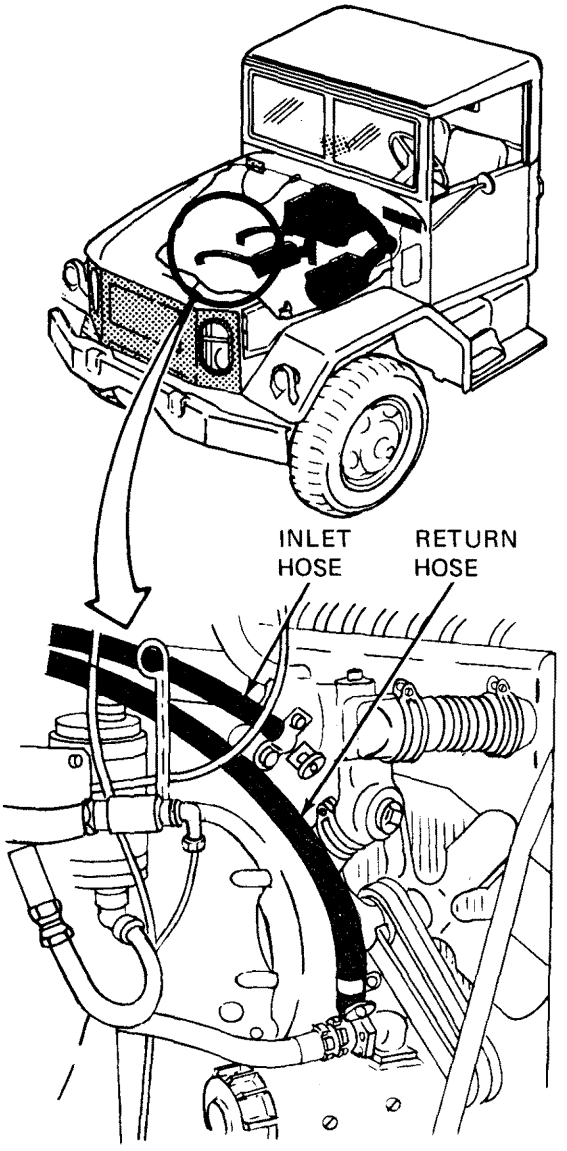
- Fully open shutoff cocks to left

4

- Check hot water hoses
  - Feel if hot water hoses are soft
  - See if hot water hoses have collapsed

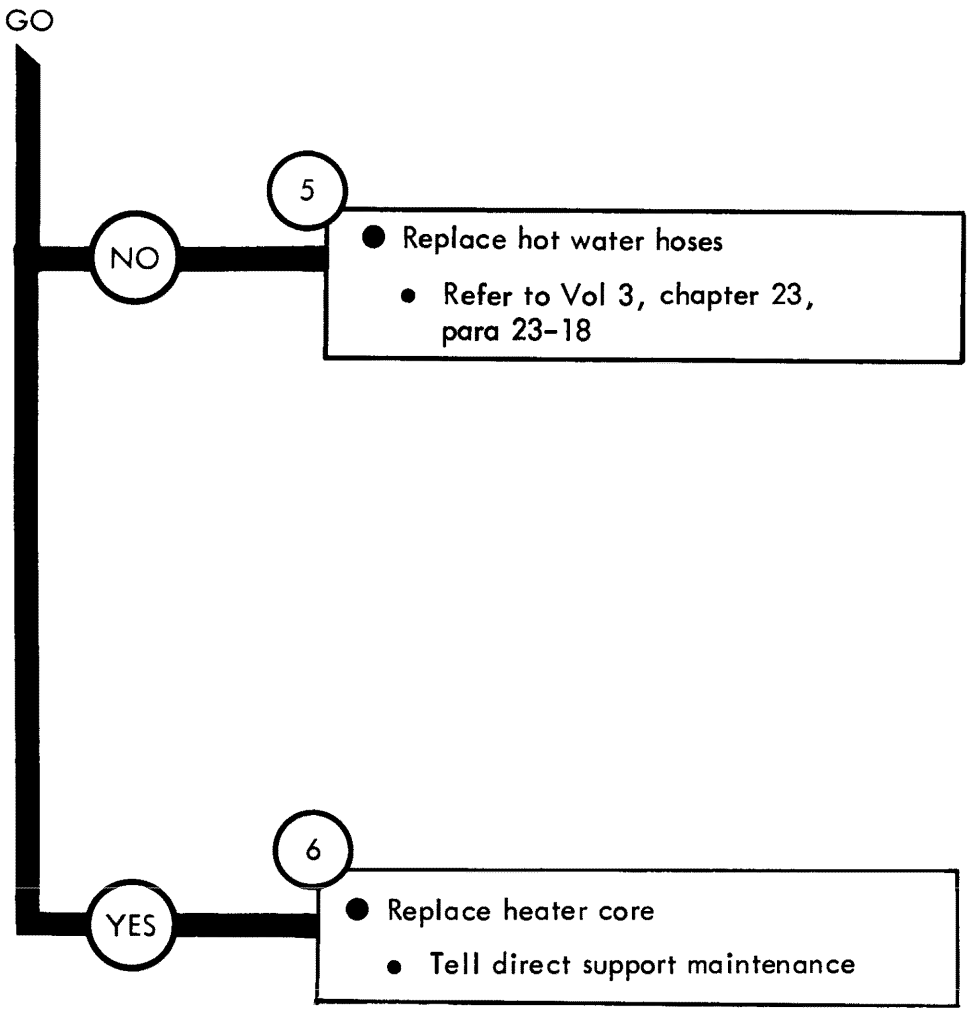
Are hot water heater hoses OK?

GO



TA 115124

Figure 91-1 (Sheet 2 of 3)



TA 115125

Figure 91-1 (Sheet 3 of 3)

Symptom

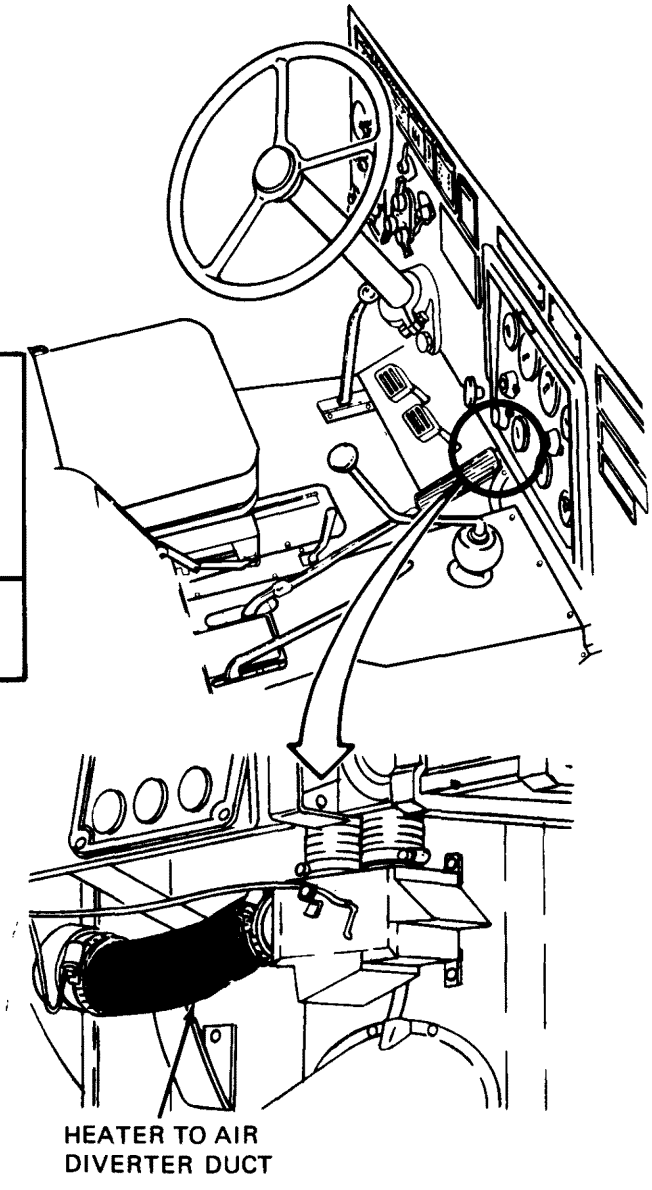
2 NO AIR FLOW AT HEAT OUTLET

1
- Park truck
  - Refer to TM 9-2320-209-10

2
- Check if heater to air diverter duct is hanging loose
  - Look under dash and check if heater to air diverter is hanging loose from heater or air diverter

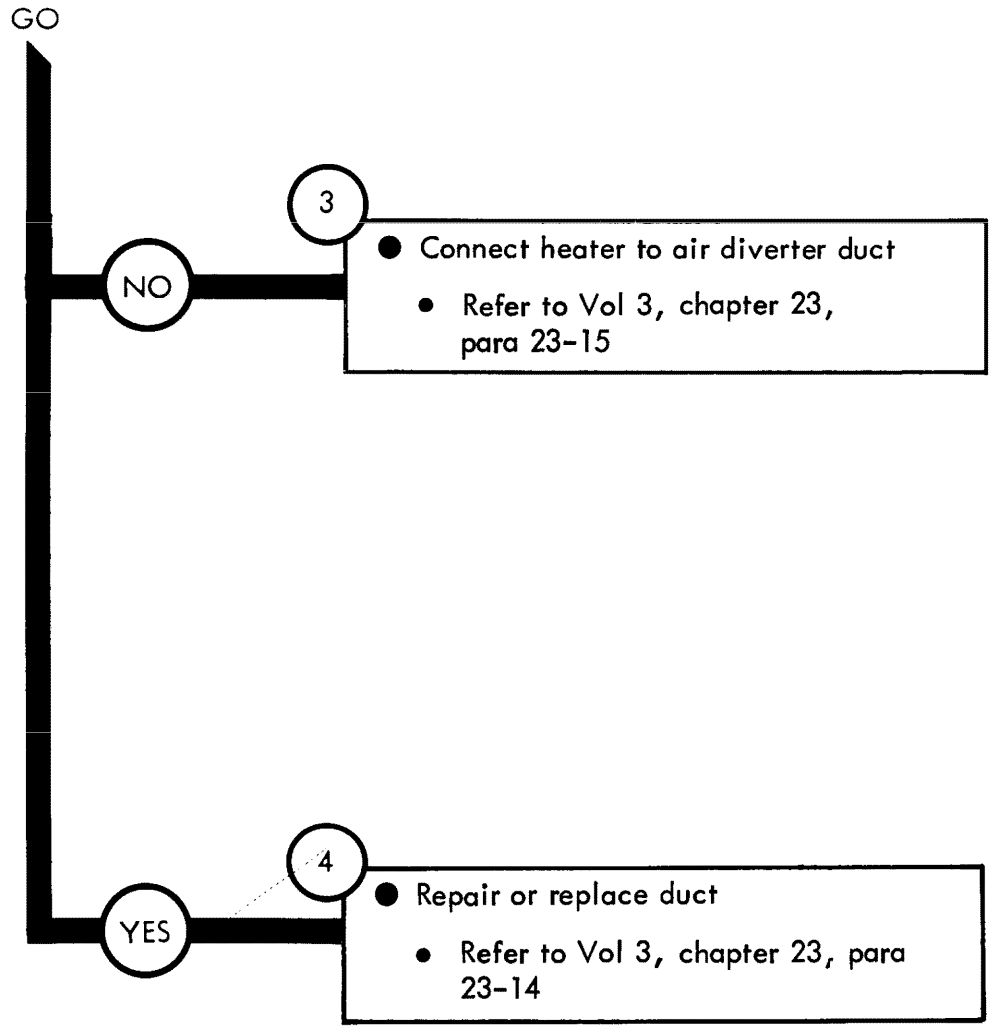
Is heater to air diverter duct attached to heater and air diverter?

GO



TA 115126

Figure 91-2 (Sheet 1 of 2)



TA 115127

Figure 91-2 (Sheet 2 of 2)

Symptom

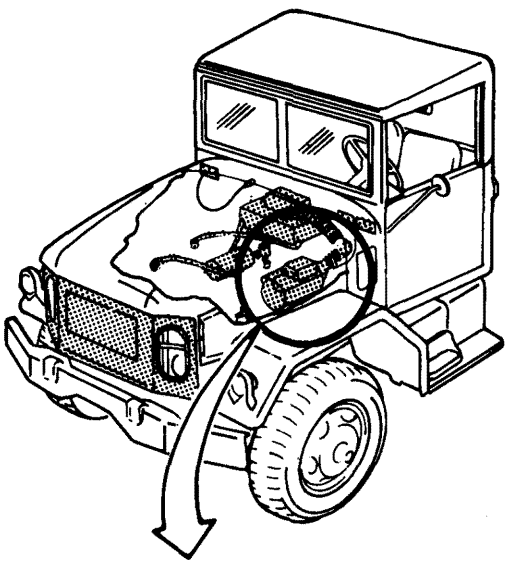
3 BLOWER MOTOR DOES NOT WORK

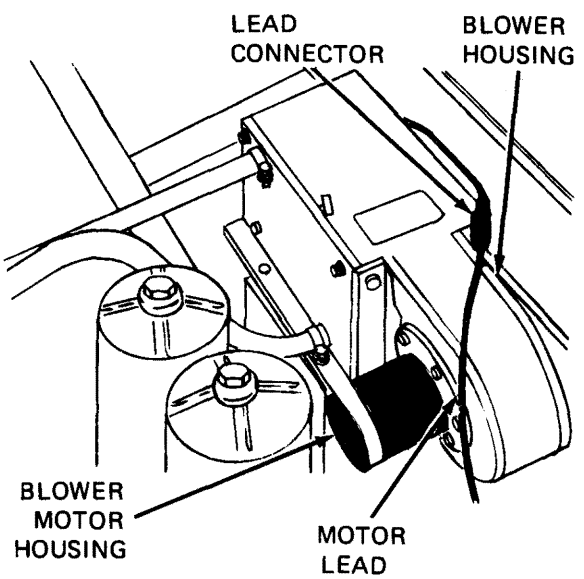
1
- Park truck
  - Refer to TM 9-2320-209-10

2
- Check if lead to blower motor is attached
  - Open hood. Refer to TM 9-2320-209-10
  - Check if lead to blower motor is attached

Is lead to blower motor attached?

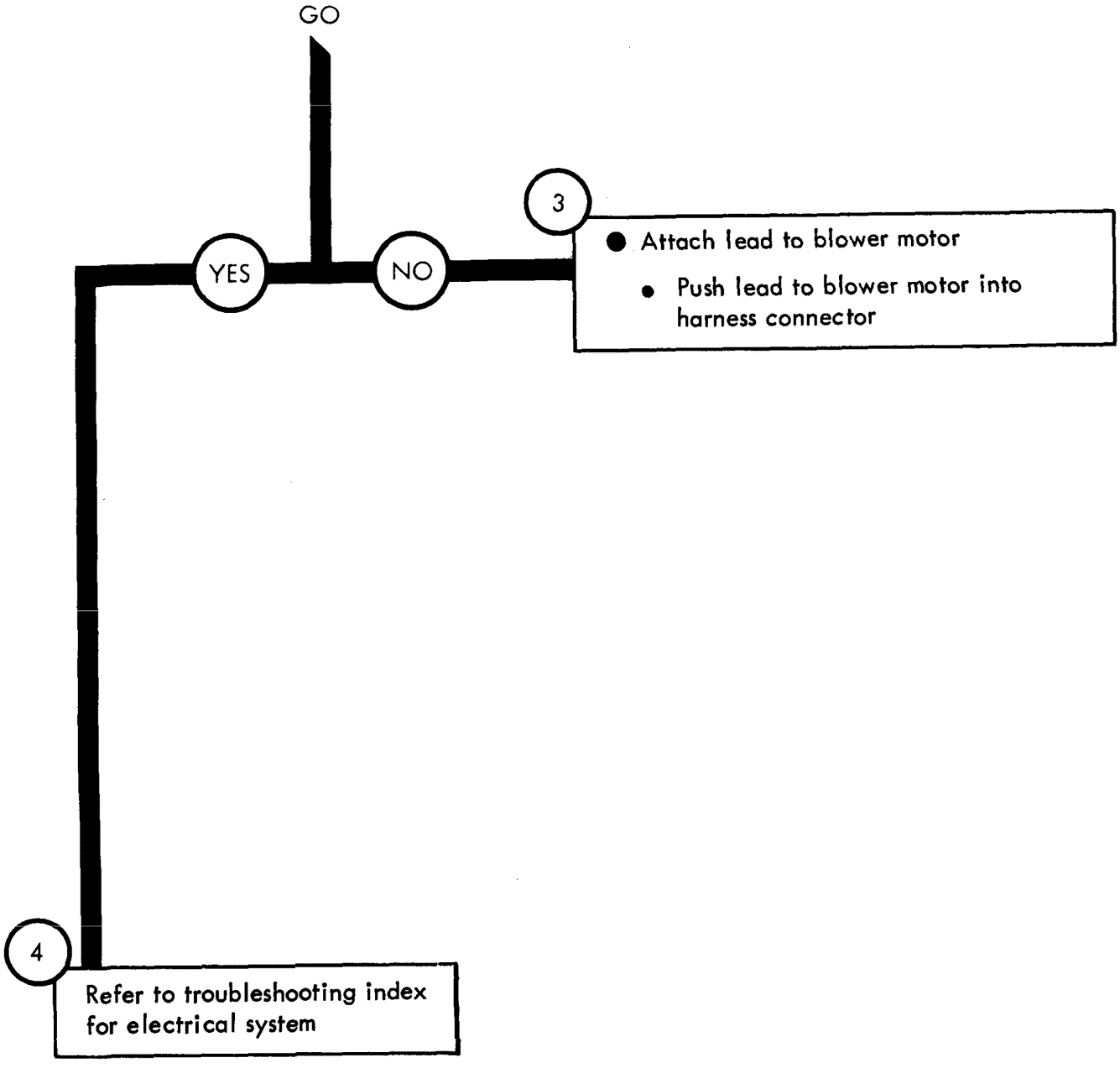
GO





TA 115128

Figure 91-3 (Sheet 1 of 2)



TA 115129

Figure 91-3 (Sheet 2 of 2)

Symptom

4 BLOWER MOTOR OPERATES ON HI ONLY

1

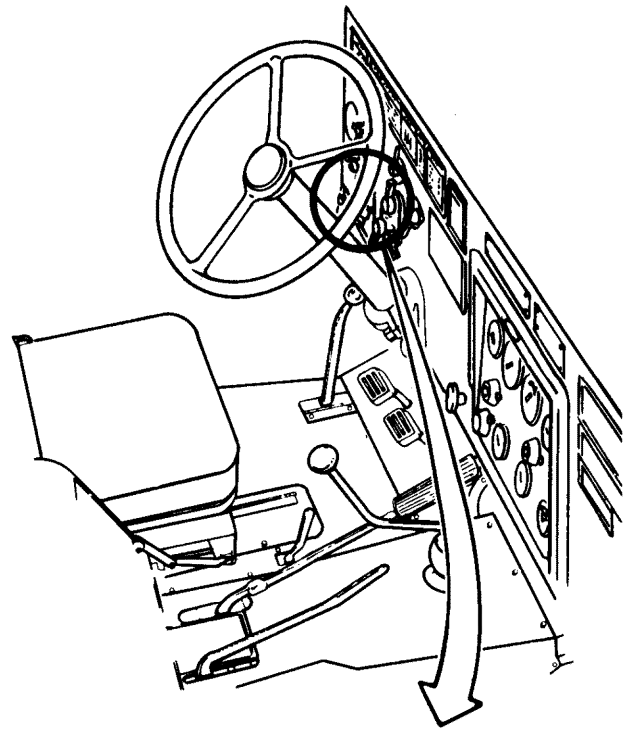
- Park truck
  - Refer to TM 9-2320-209-10

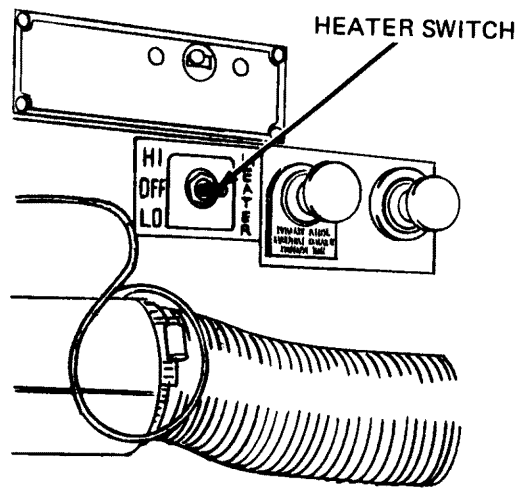
2

- Check if heater switch lead is attached
  - Look under dash panel and see if heater switch lead is attached

Is heater switch lead attached?

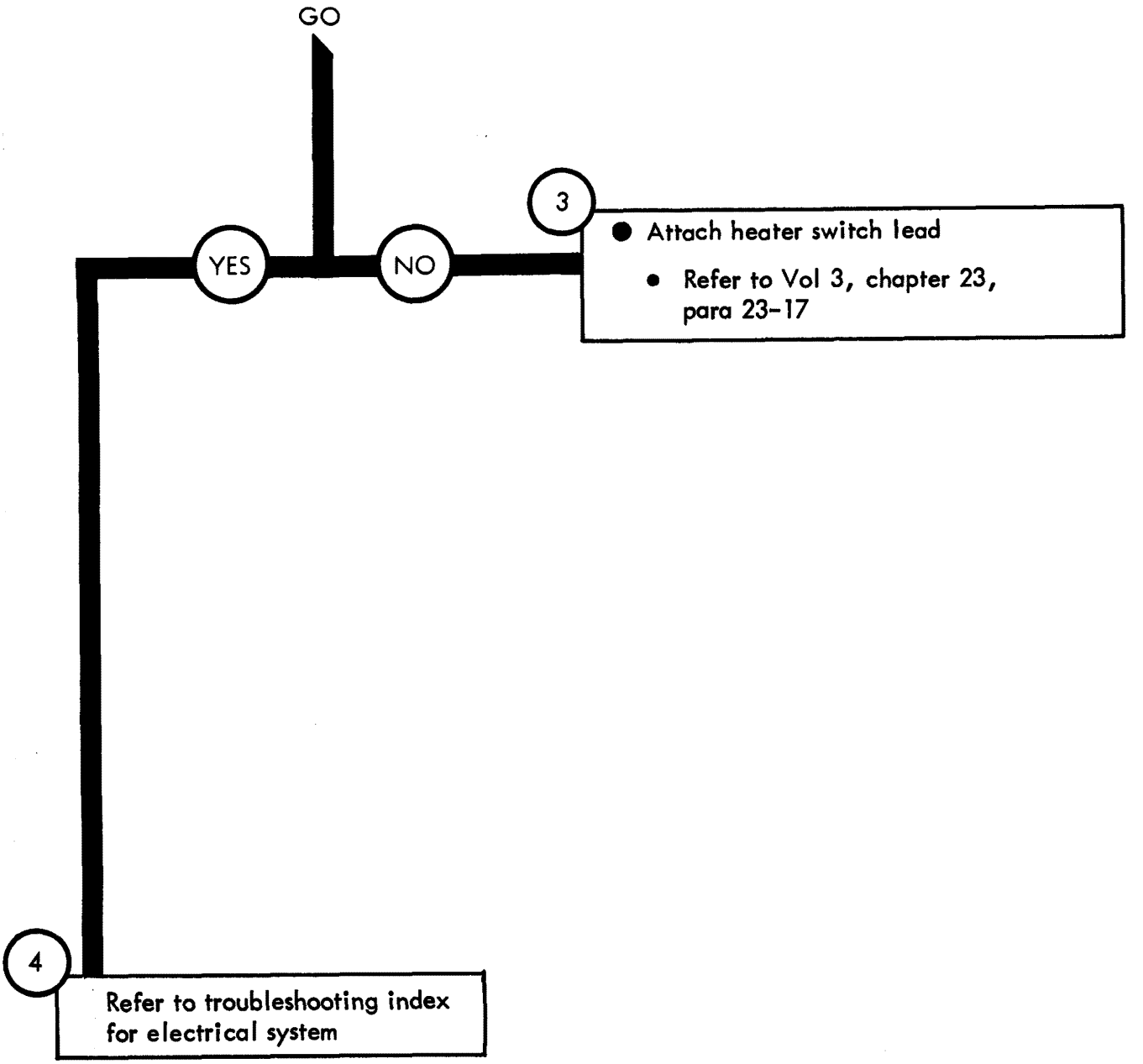
GO





TA 115130

Figure 91-4 (Sheet 1 of 2)



TA 115131

Figure 91-4 (Sheet 2 of 2)

Symptom 5

NO AIR FLOW AT DEFROSTER

1

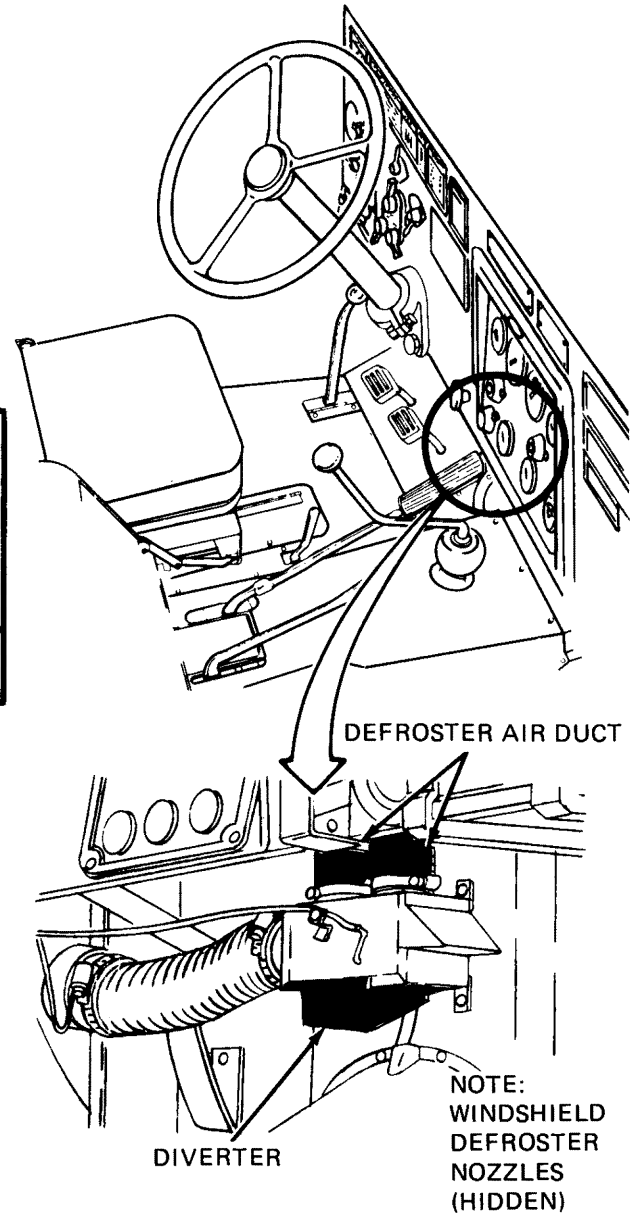
- Park truck
  - Refer to TM 9-2320-209-10

2

- Check if defroster air duct is hanging loose at windshield defroster nozzle
  - Under dash panel, look and see if defroster air duct is attached to nozzle

Is defroster air duct attached to nozzle?

GO



TA 115132

Figure 91-5 (Sheet 1 of 2)

GO

YES

NO

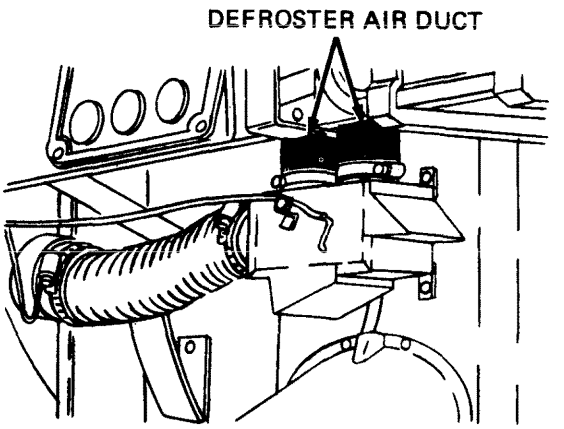
3

- Connect defroster duct to windshield defroster nozzle
  - Refer to Vol 3, chapter 23, para 23-14

4

- Check if defroster duct is hanging loose at air diverter
  - Under dash panel, look and see if defroster duct is attached to air diverter

Is defroster duct attached to air diverter?



NO

5

- Connect defroster duct to air diverter
  - Refer to Vol 3, chapter 23, para 23-14

6

- Repair or replace duct
  - Refer to Vol 3, chapter 23, para 23-14

YES

TA 115133

Figure 91-5 (Sheet 2 of 2)

Symptom 6

BLOWER MOTOR OPERATES ON LOW ONLY

1

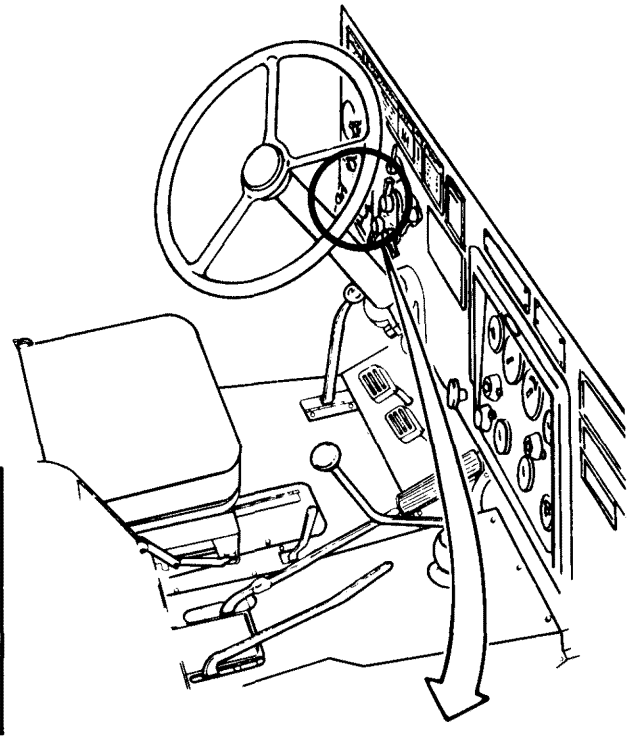
- Park truck
  - Refer to TM 9-2320-209-10

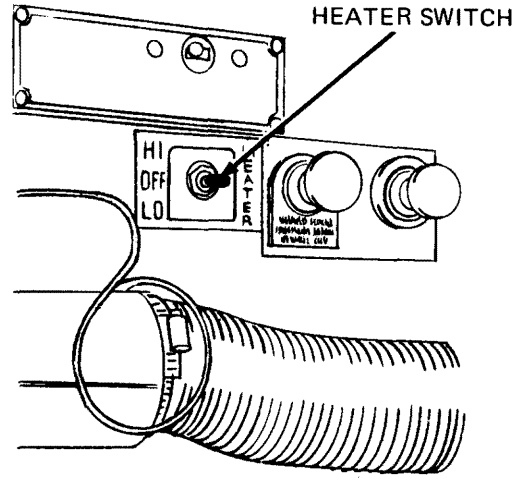
2

- Check if heater switch lead is attached
  - Look under dash panel and see if heater switch lead is attached

Is heater switch lead attached?

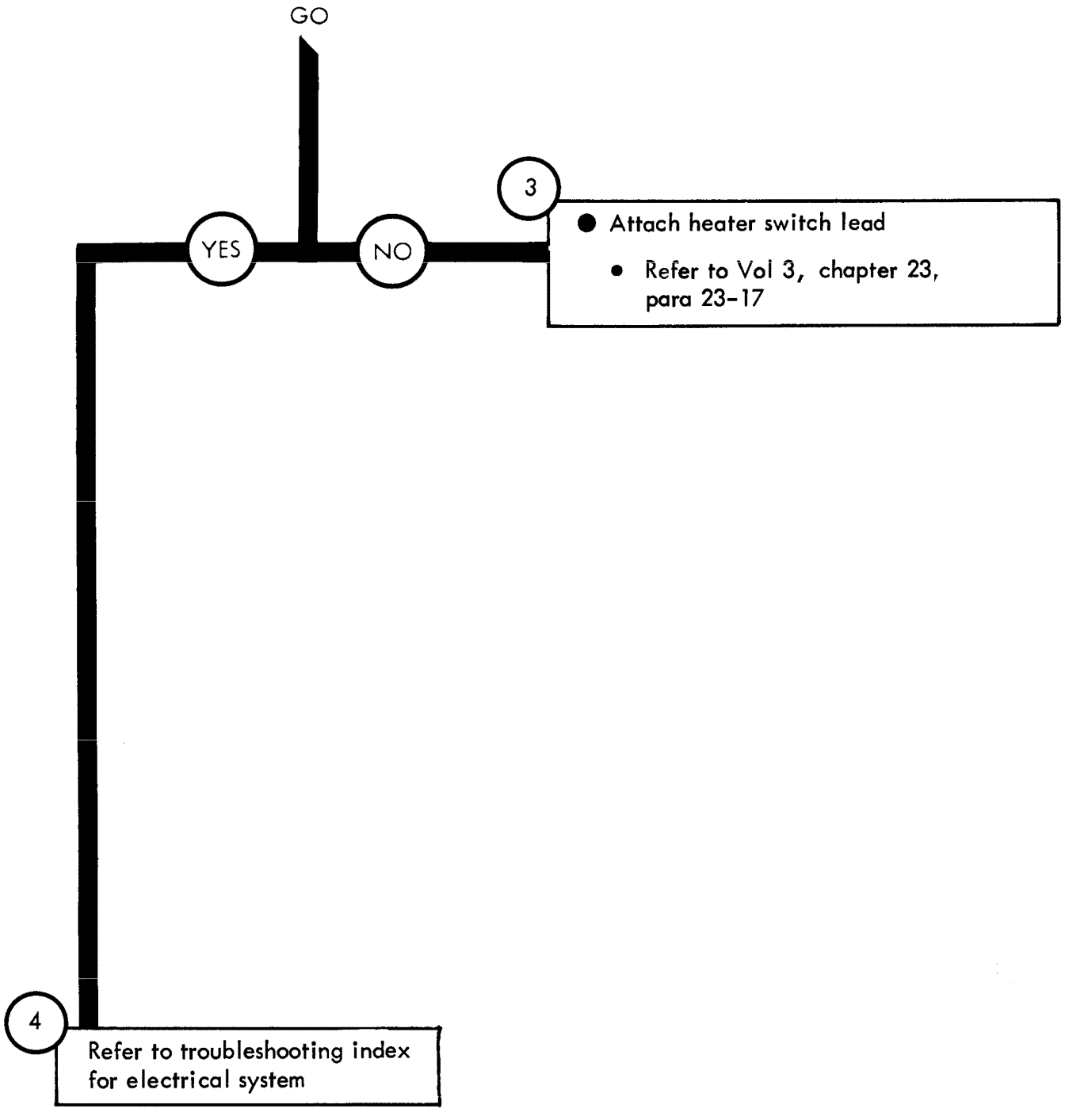
GO





TA 115134

Figure 91-6 (Sheet 1 of 2)



TA 115135

Figure 91-6 (Sheet 2 of 2)

Symptom

7 HEAT OUTPUT TOO LOW

1

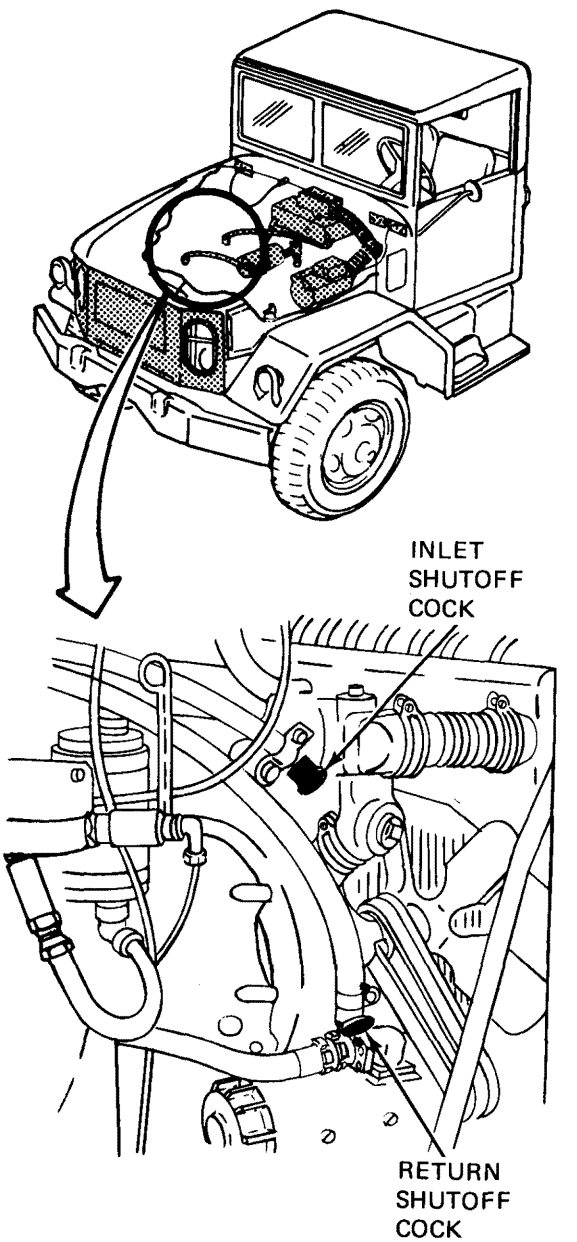
- Park truck
  - Refer to TM 9-2320-209-10

2

- Check if shut off cocks are fully open to the left
  - Open hood. Refer to TM 9-2320-209-10
  - Check if shutoff cocks are fully open to left

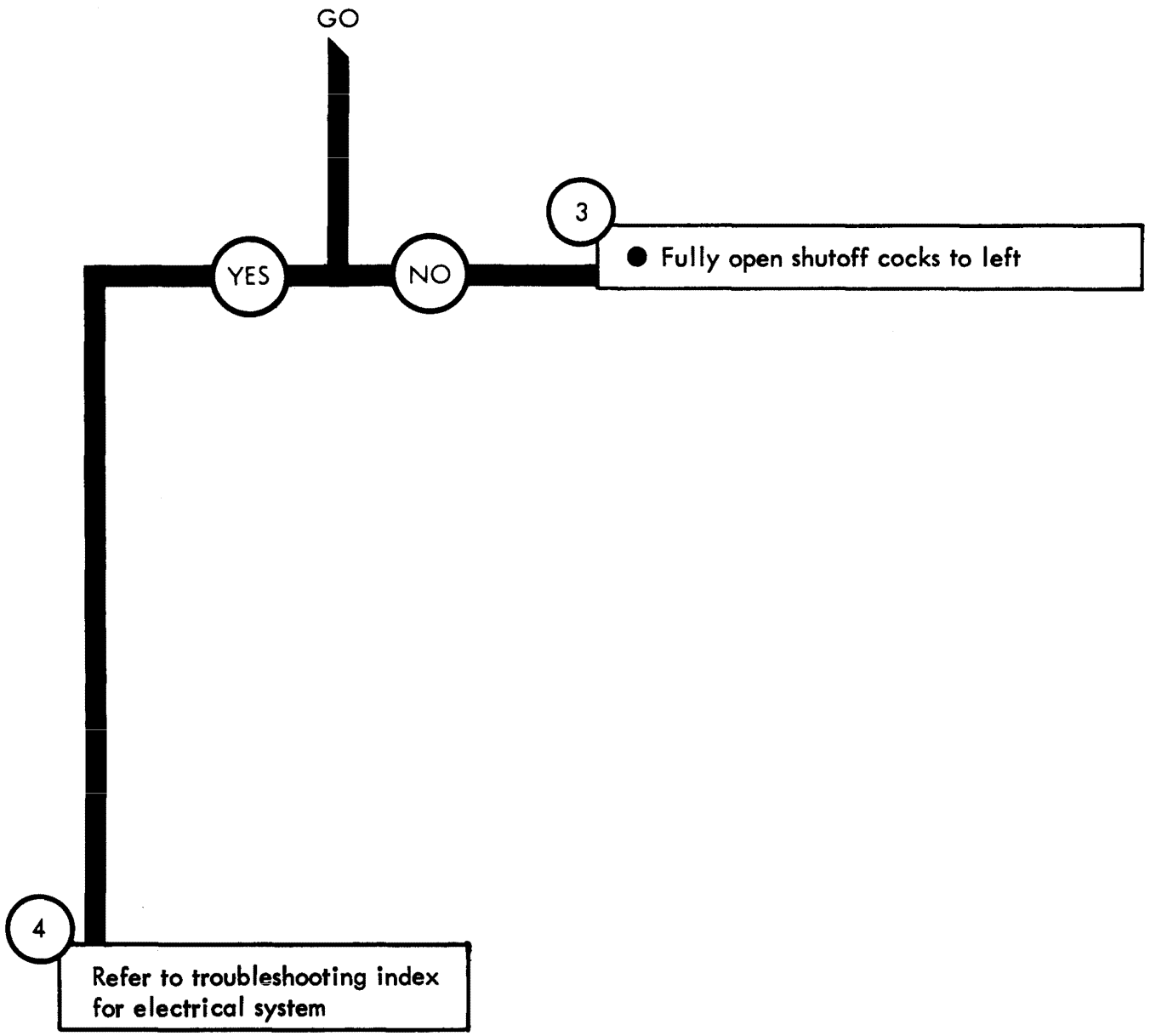
Are shutoff cocks fully open to left?

GO



TA 115136

Figure 91-7 (Sheet 1 of 2)



TA 115137

Figure 91-7 (Sheet 2 of 2)

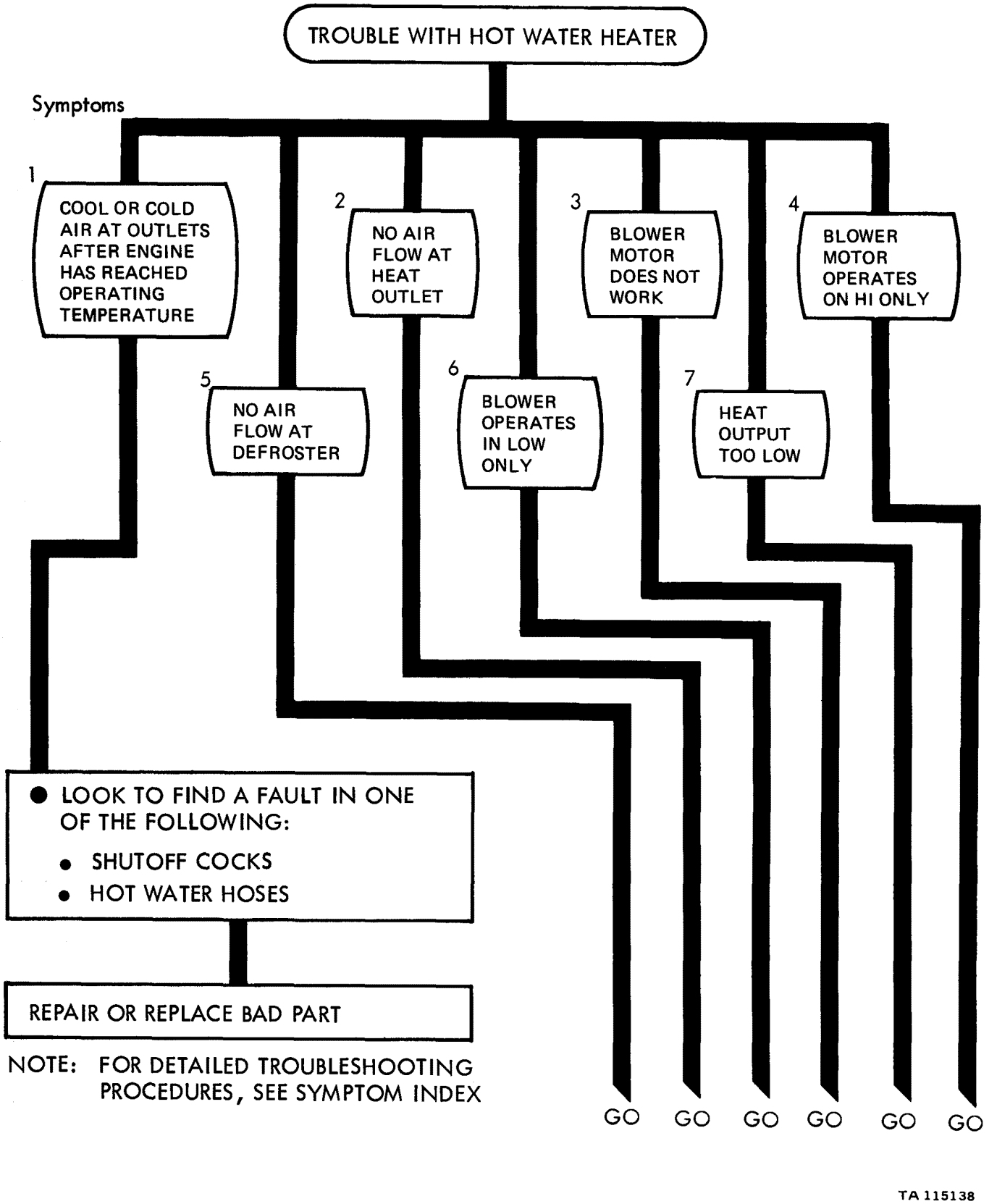
CHAPTER 92

HOT WATER HEATER TROUBLESHOOTING SUMMARY

92-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 91 for the hot water heater.

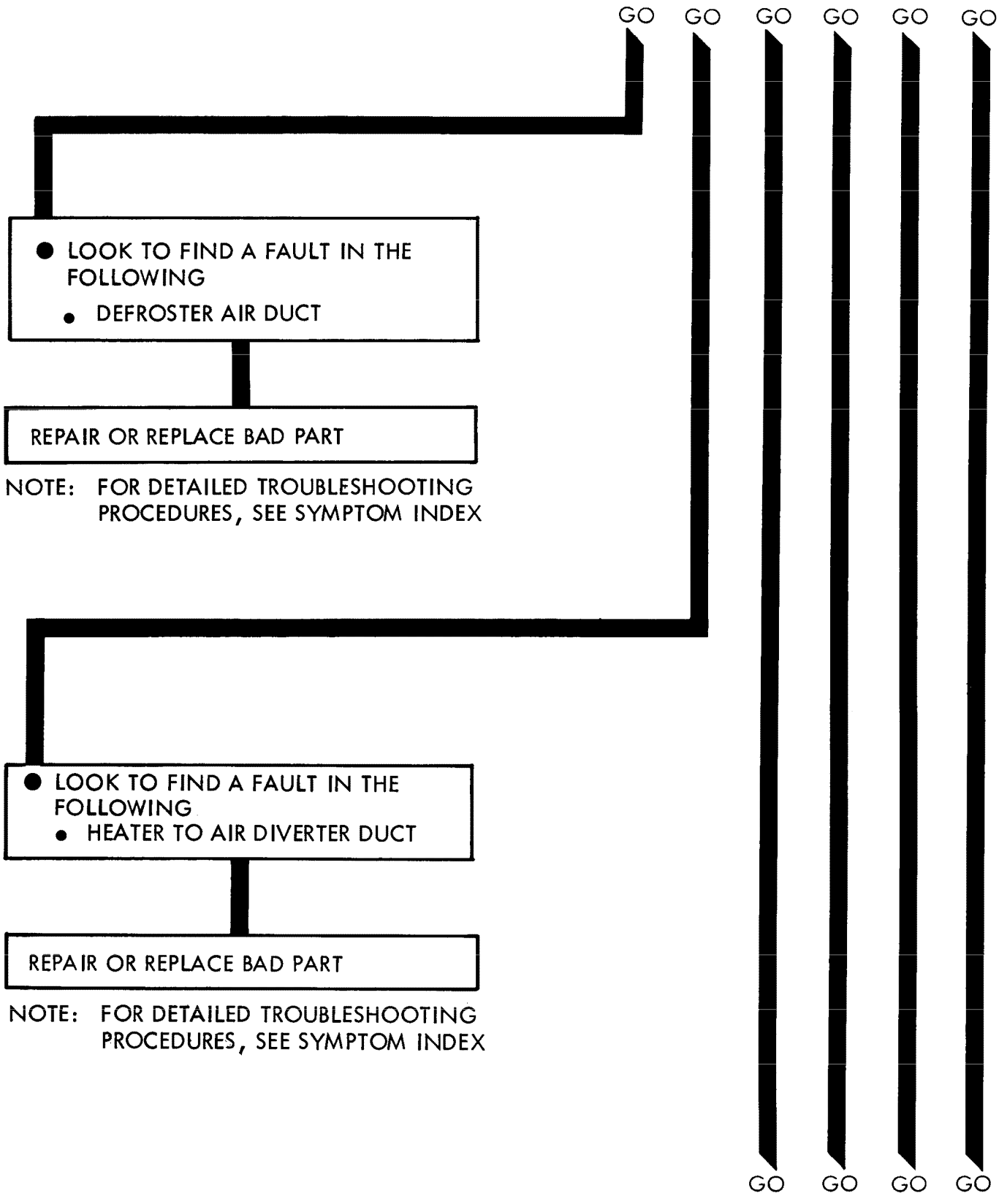
92-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how -to-do-it" instructions. Warnings, cautions, and notes are given where needed.

HOT WATER HEATER TROUBLESHOOTING SUMMARY



TA 115138

Figure 92-1 (Sheet 1 of 6)



TA 115139

Figure 92-1 (Sheet 2 of 6)

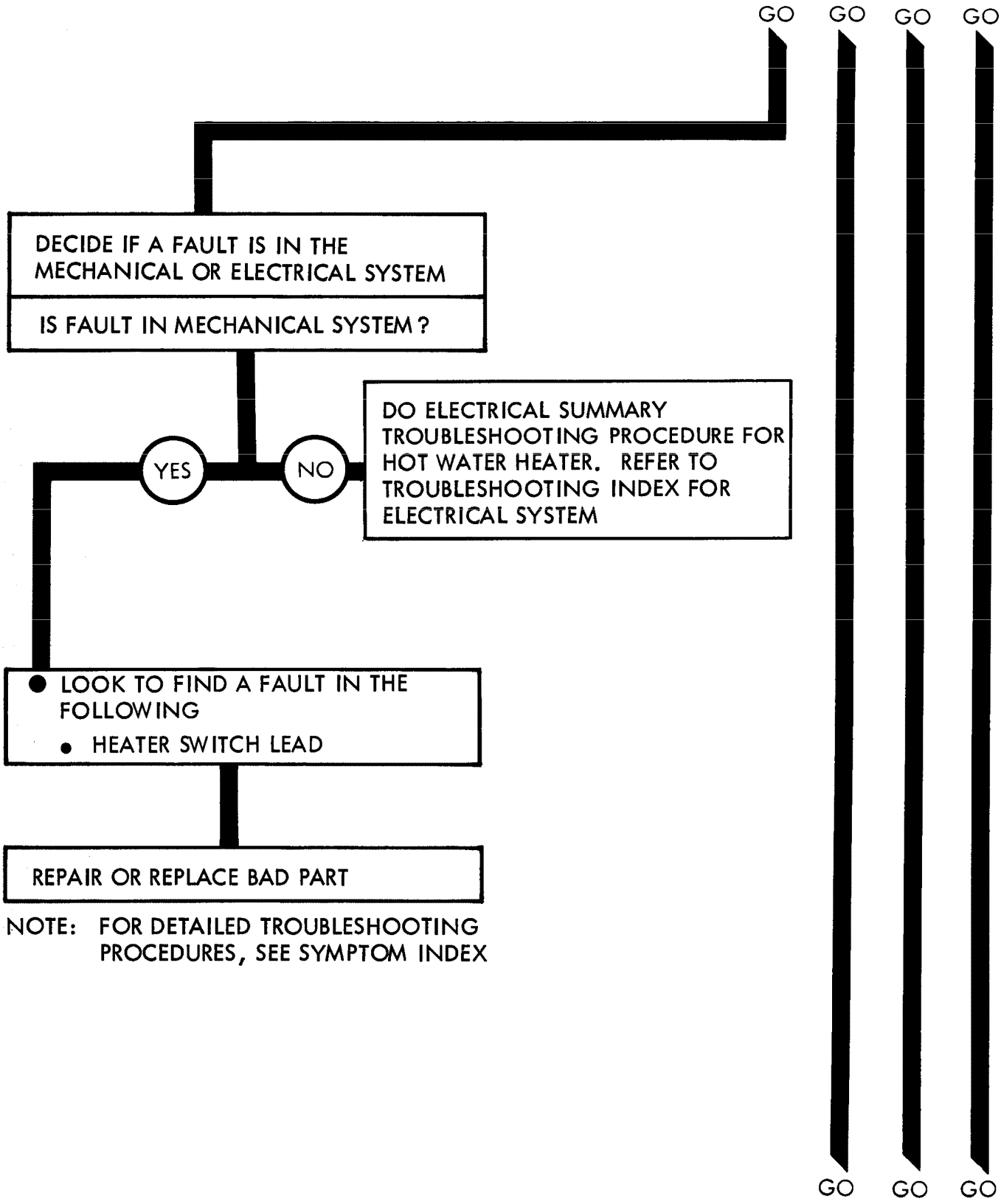
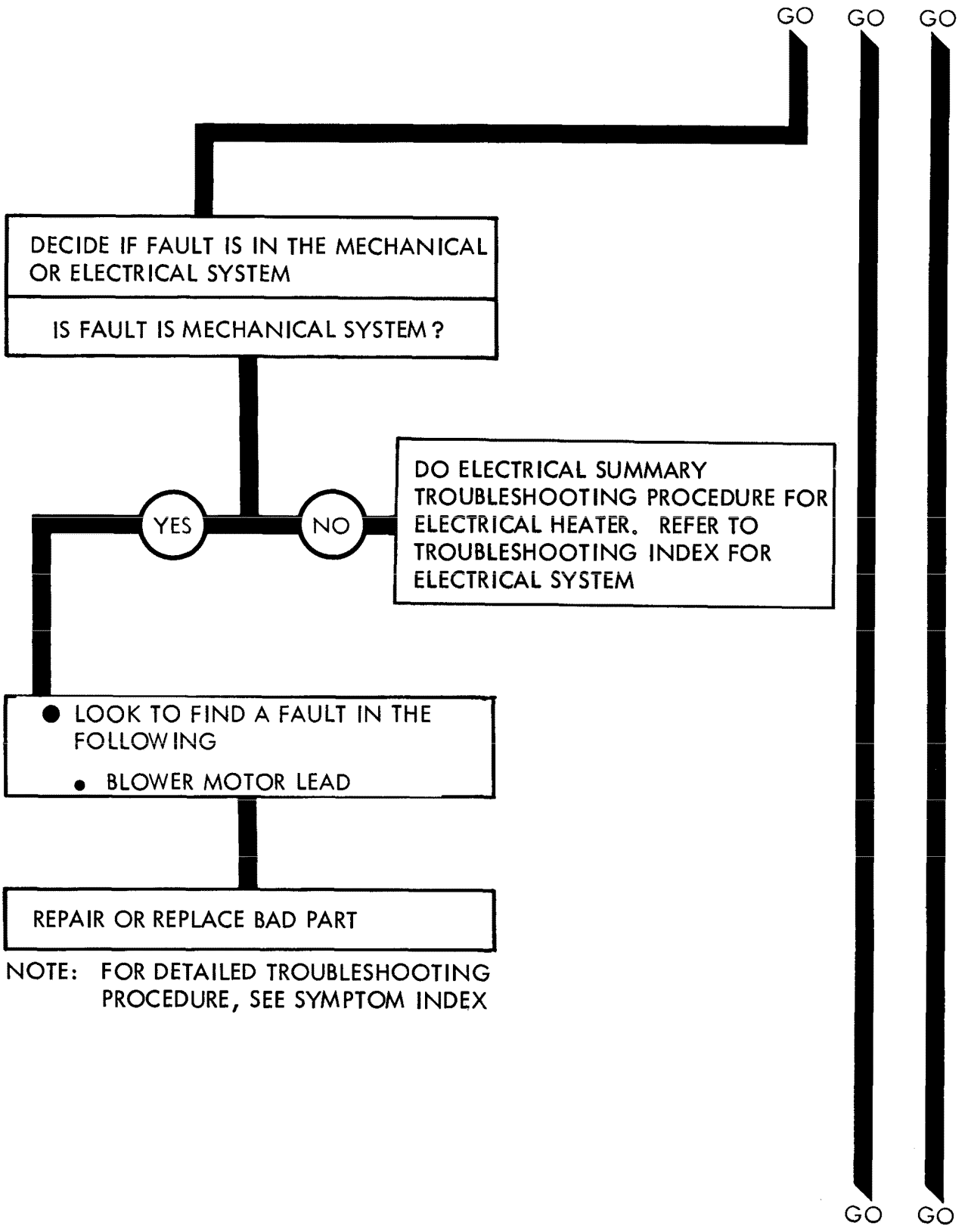


Figure 92-1 (Sheet 3 of 6)



TA 115141

Figure 92-1 (Sheet 4 of 6)

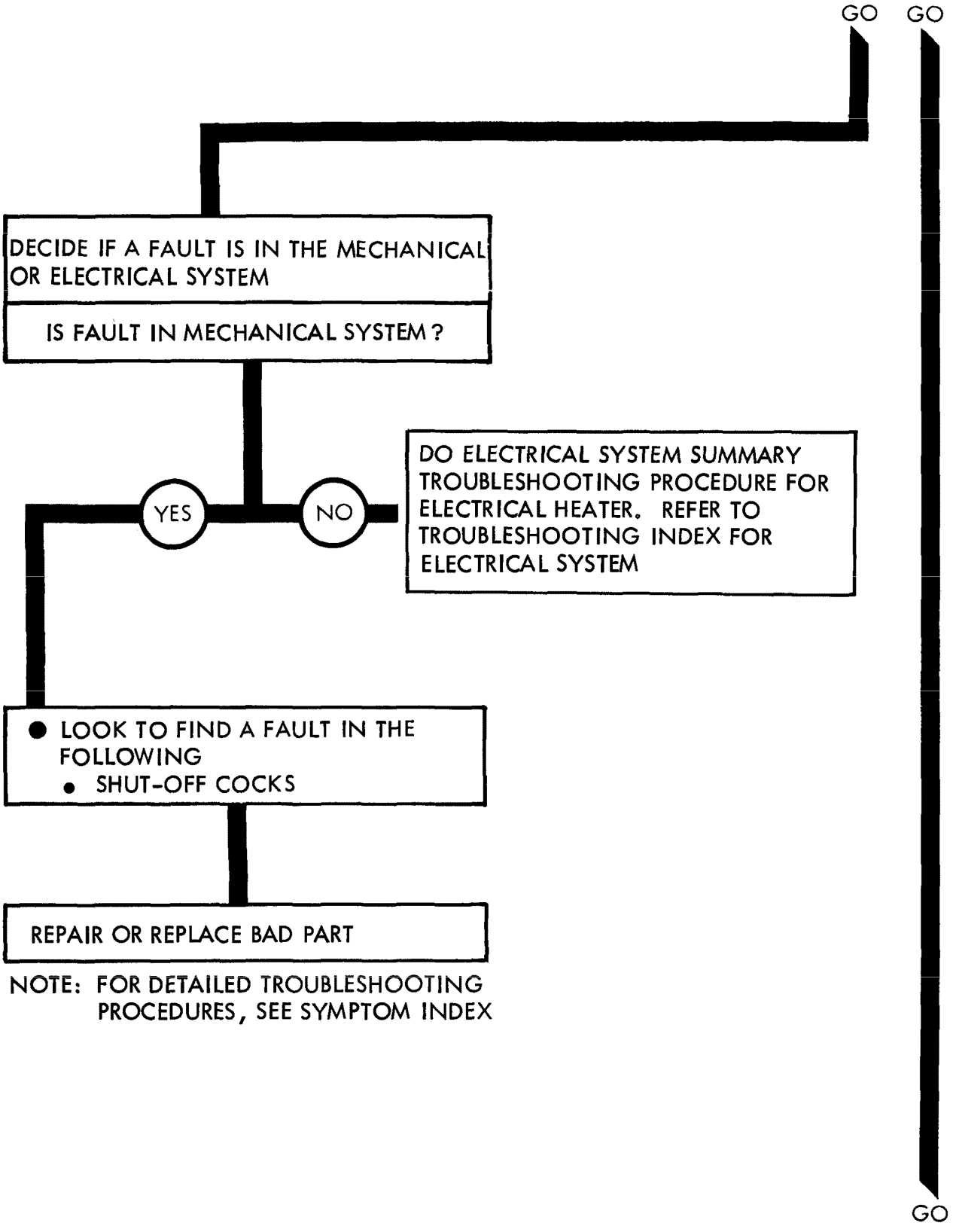
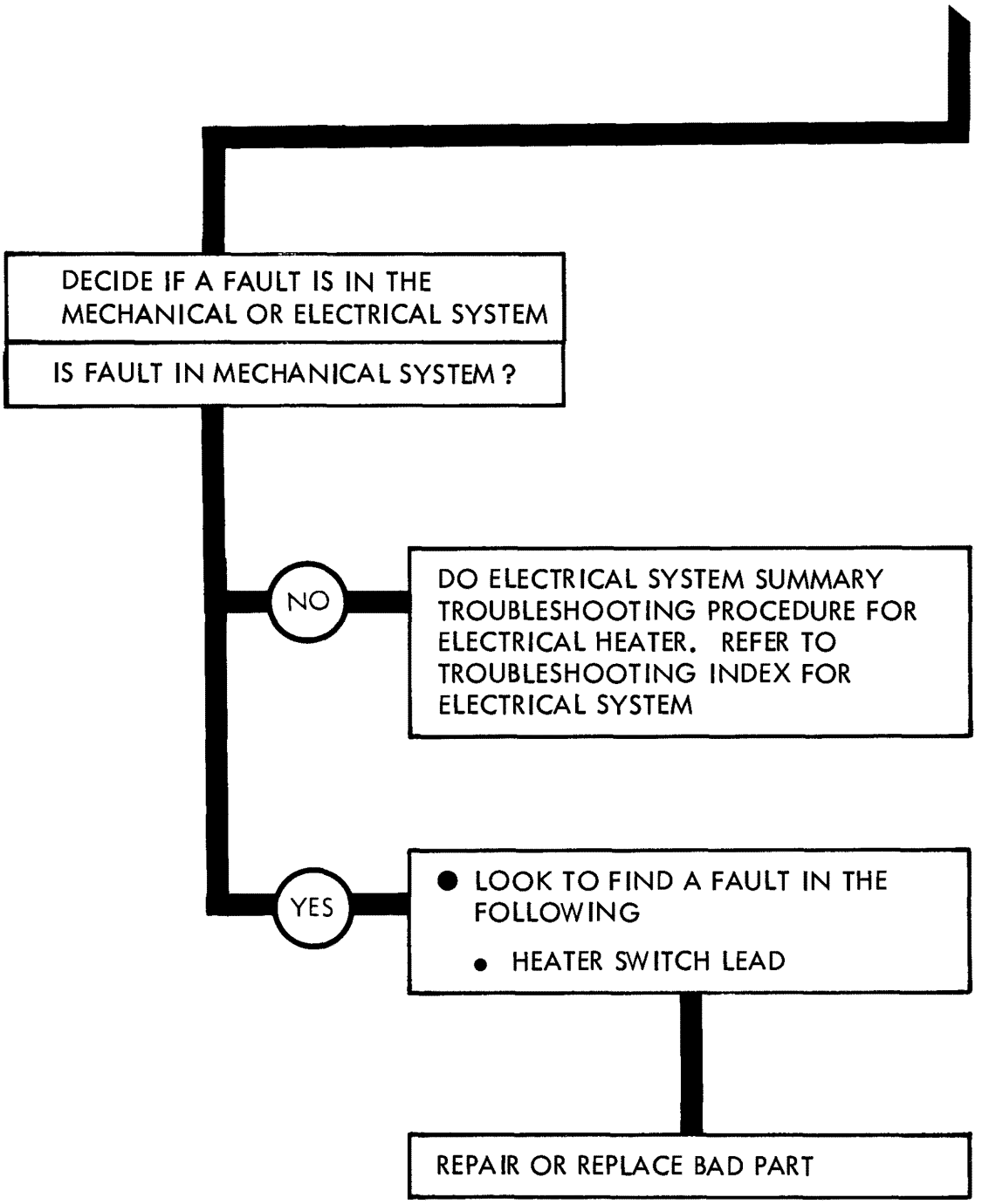


Figure 92-1 (Sheet 5 of 6)



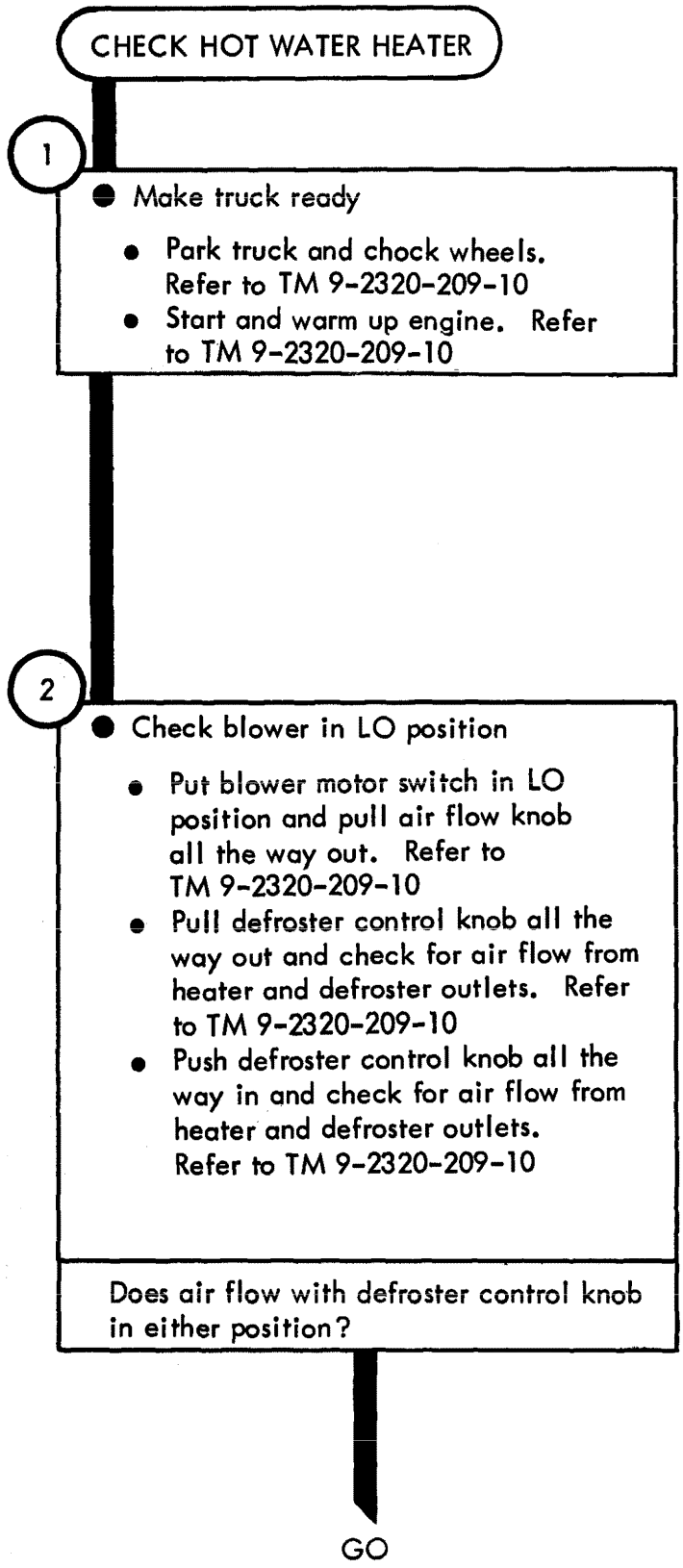
TA 115143

Figure 92-1 (Sheet 6 of 6)

CHAPTER 93

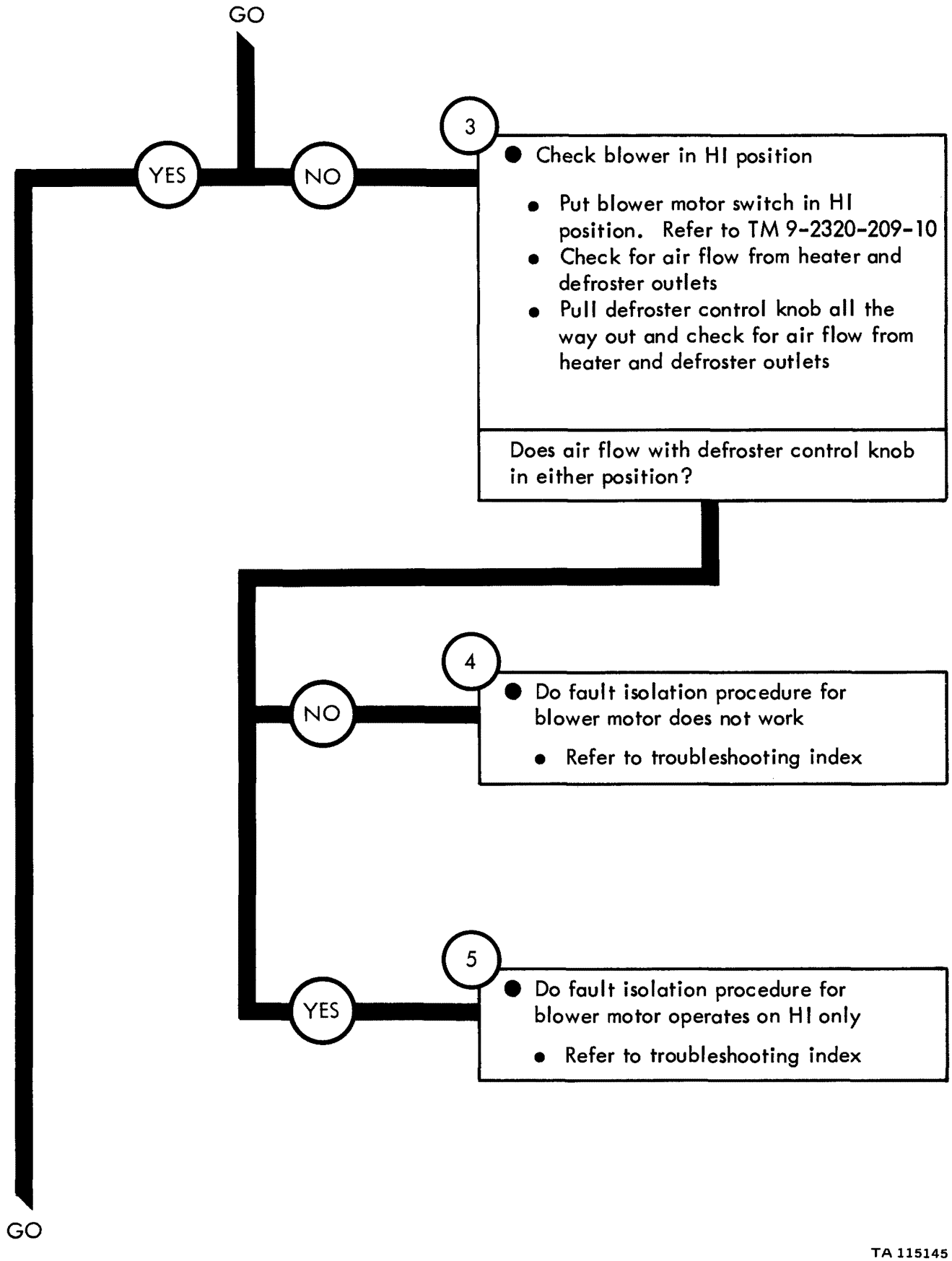
HOT WATER HEATER CHECKOUT PROCEDURES

93-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.



TA 115144

Figure 93-1 (Sheet 1 of 5)



TA 115145

Figure 93-1 (Sheet 2 of 5)

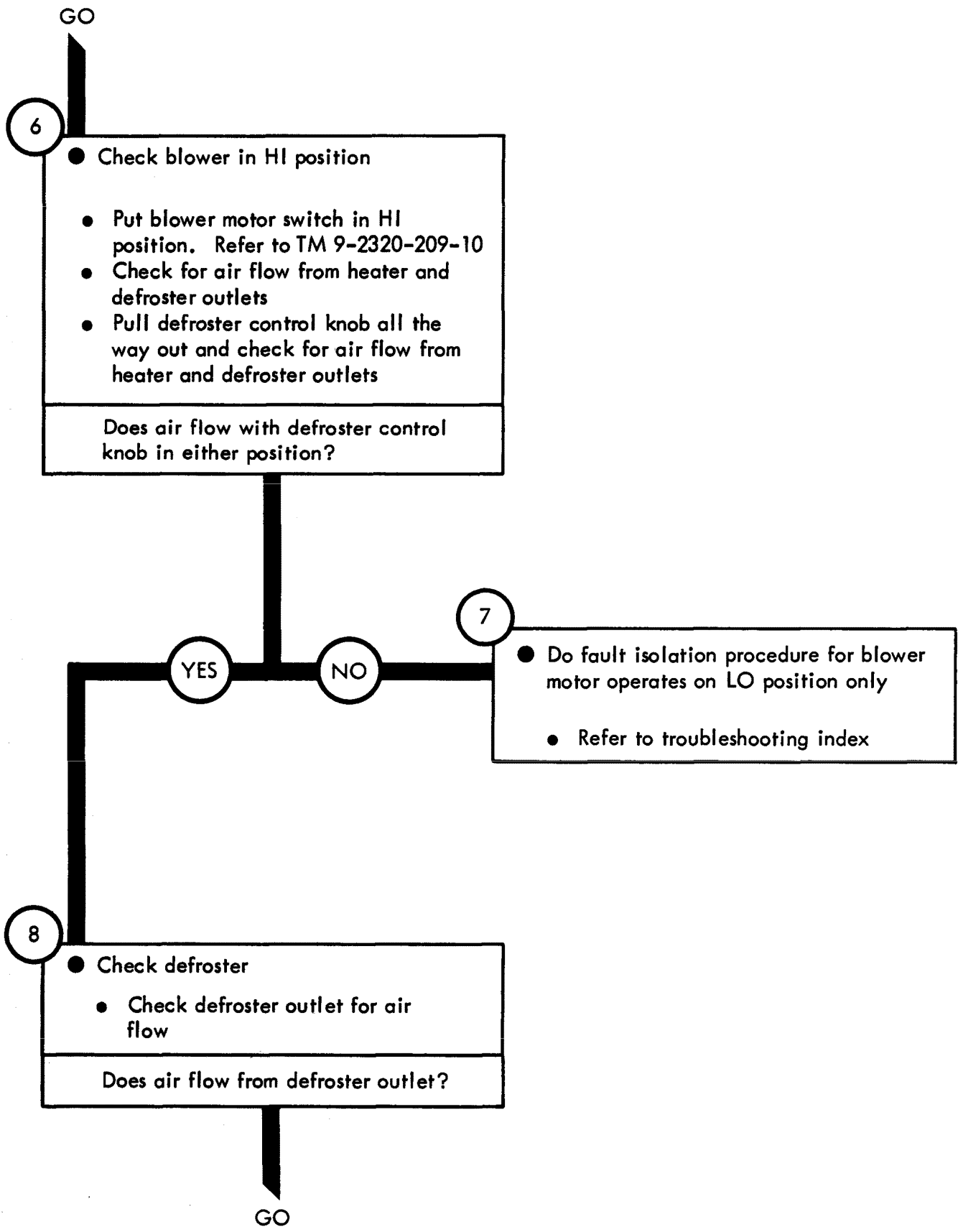
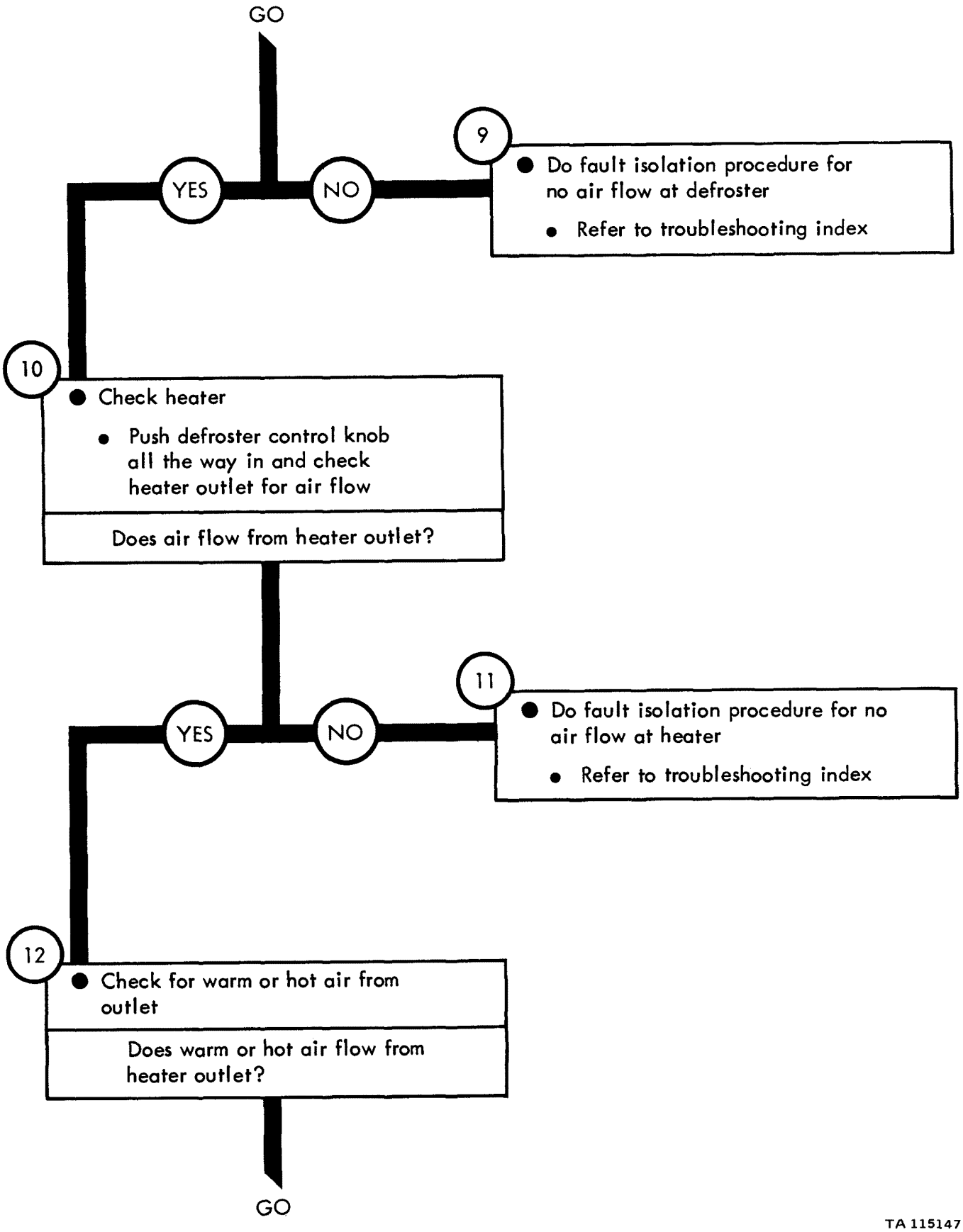


Figure 93-1 (Sheet 3 of 5)



TA 115147

Figure 93-1 (Sheet 4 of 5)

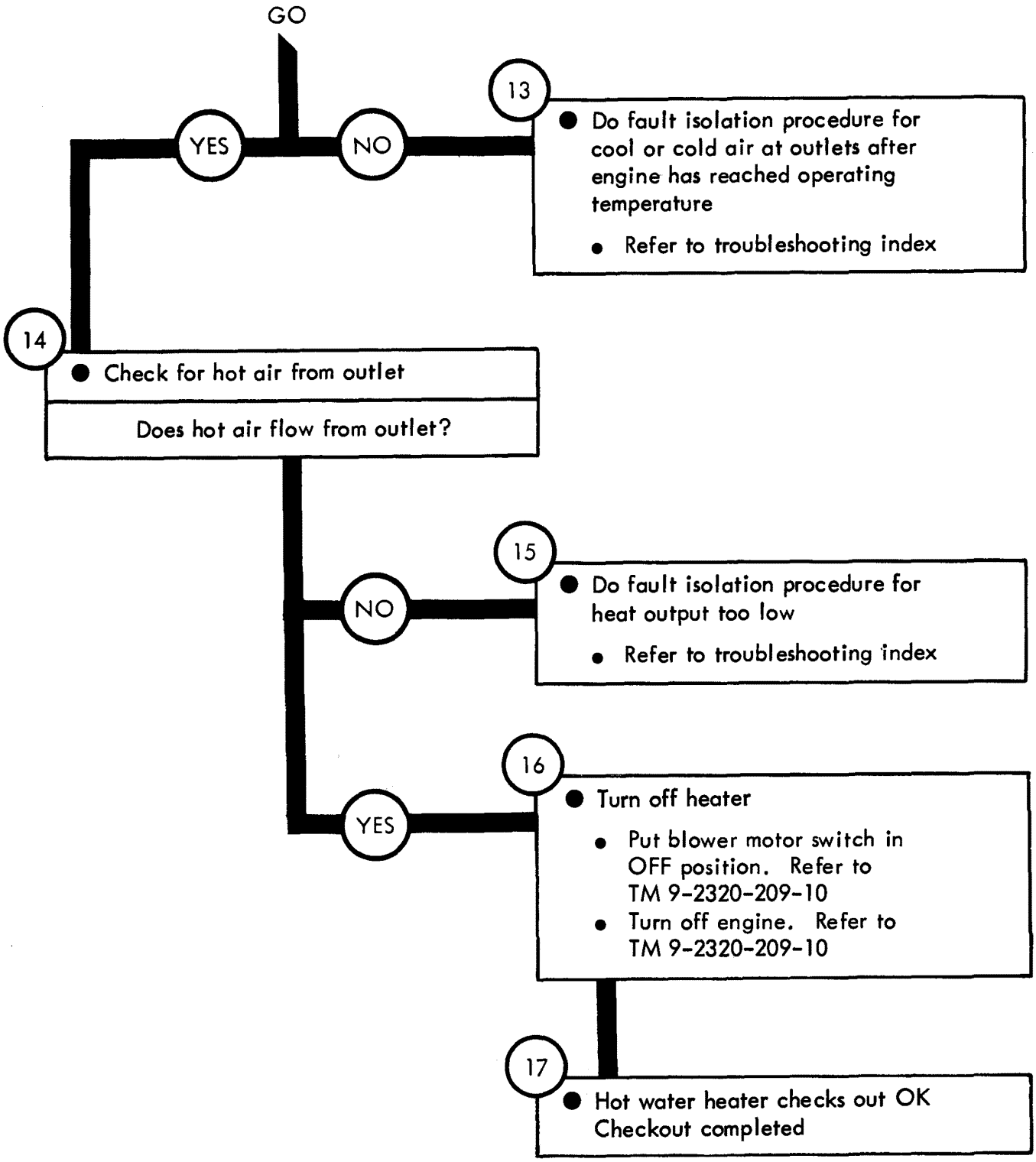


Figure 93-1 (Sheet 5 of 5)

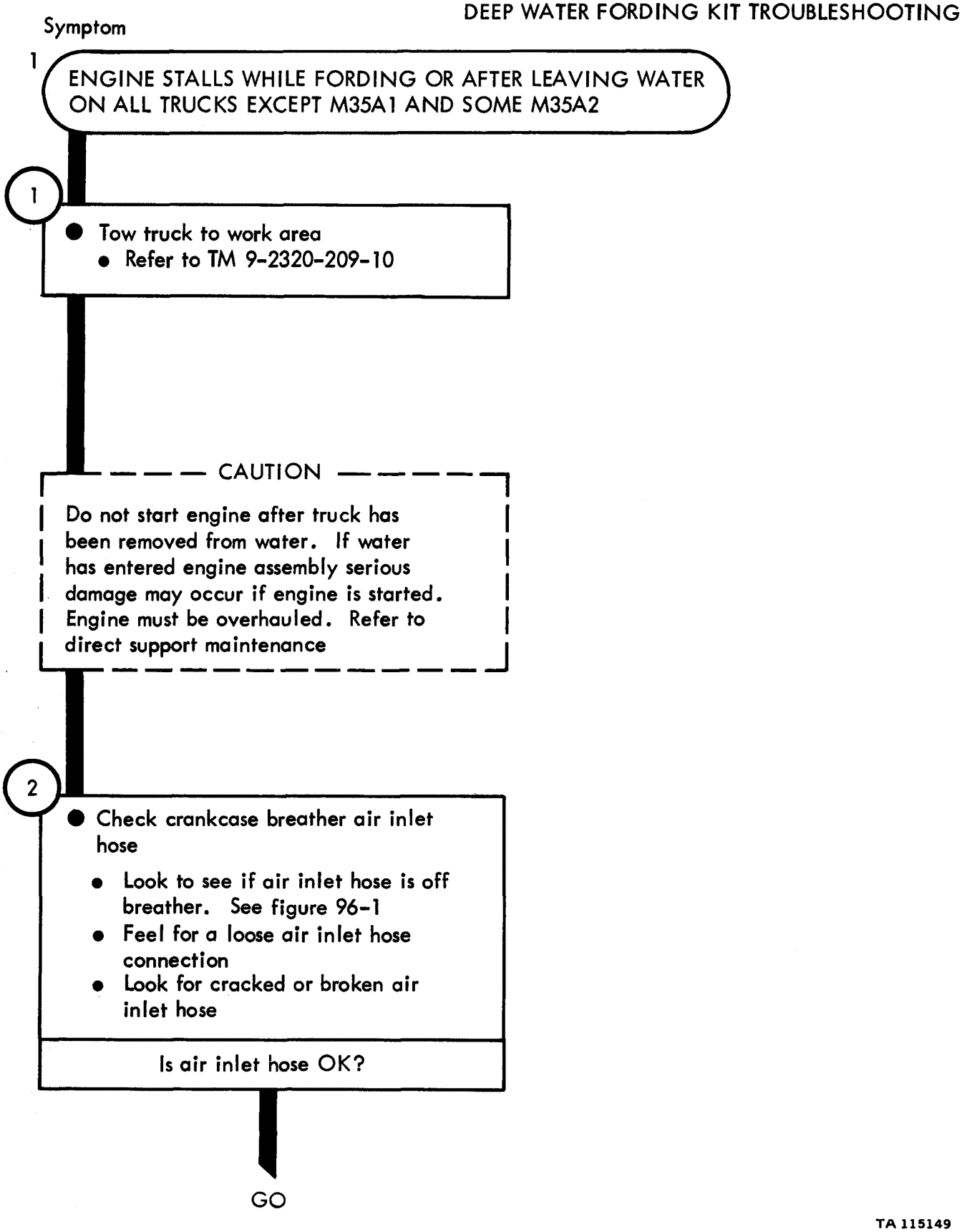
CHAPTER 94

DEEP WATER FORDING KIT TROUBLESHOOTING

94-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the deep water fording kit, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

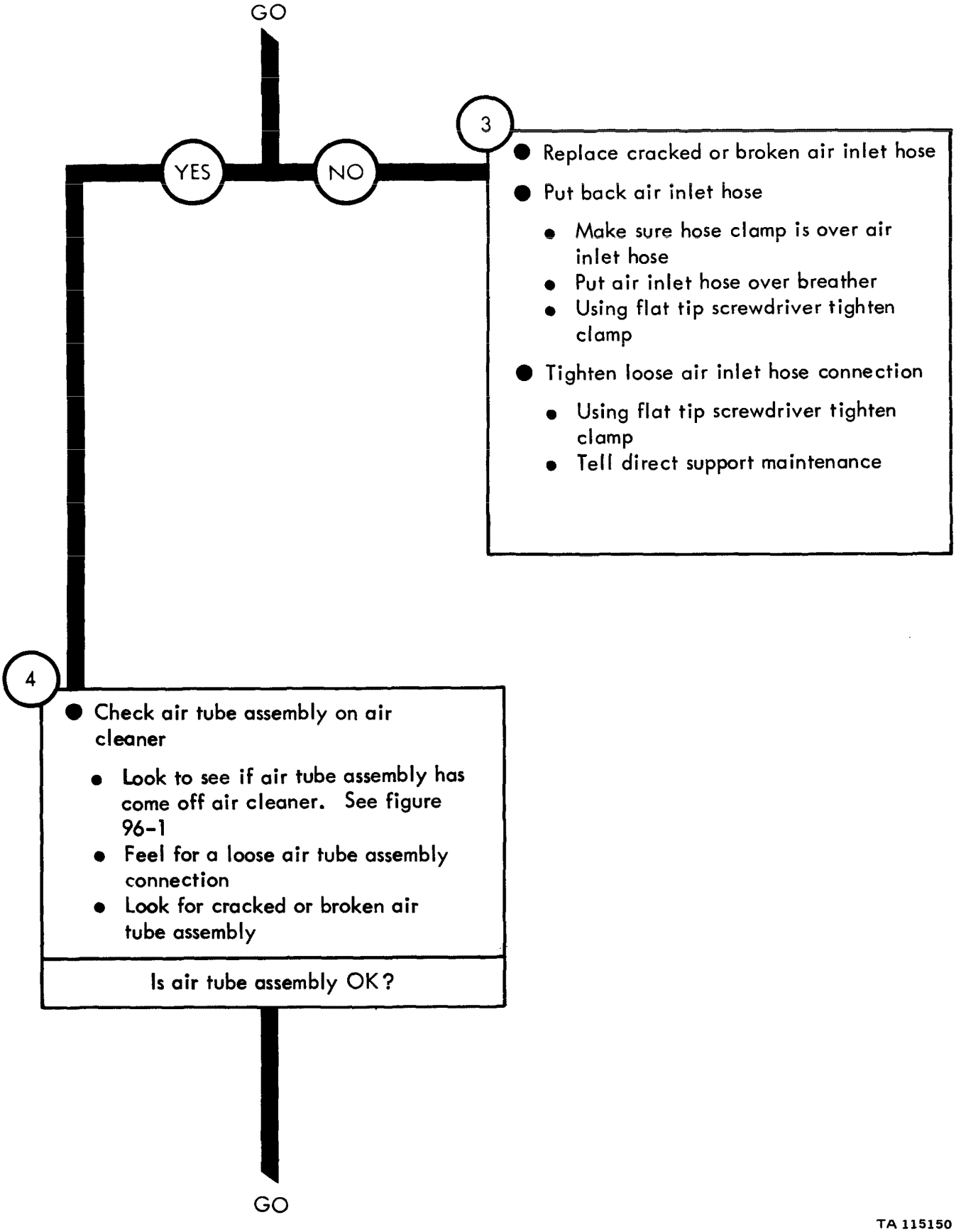
94-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

DEEP WATER FORDING KIT TROUBLESHOOTING



TA 115149

Figure 94-1 (Sheet 1 of 5)



TA 115150

Figure 94-1 (Sheet 2 of 5)

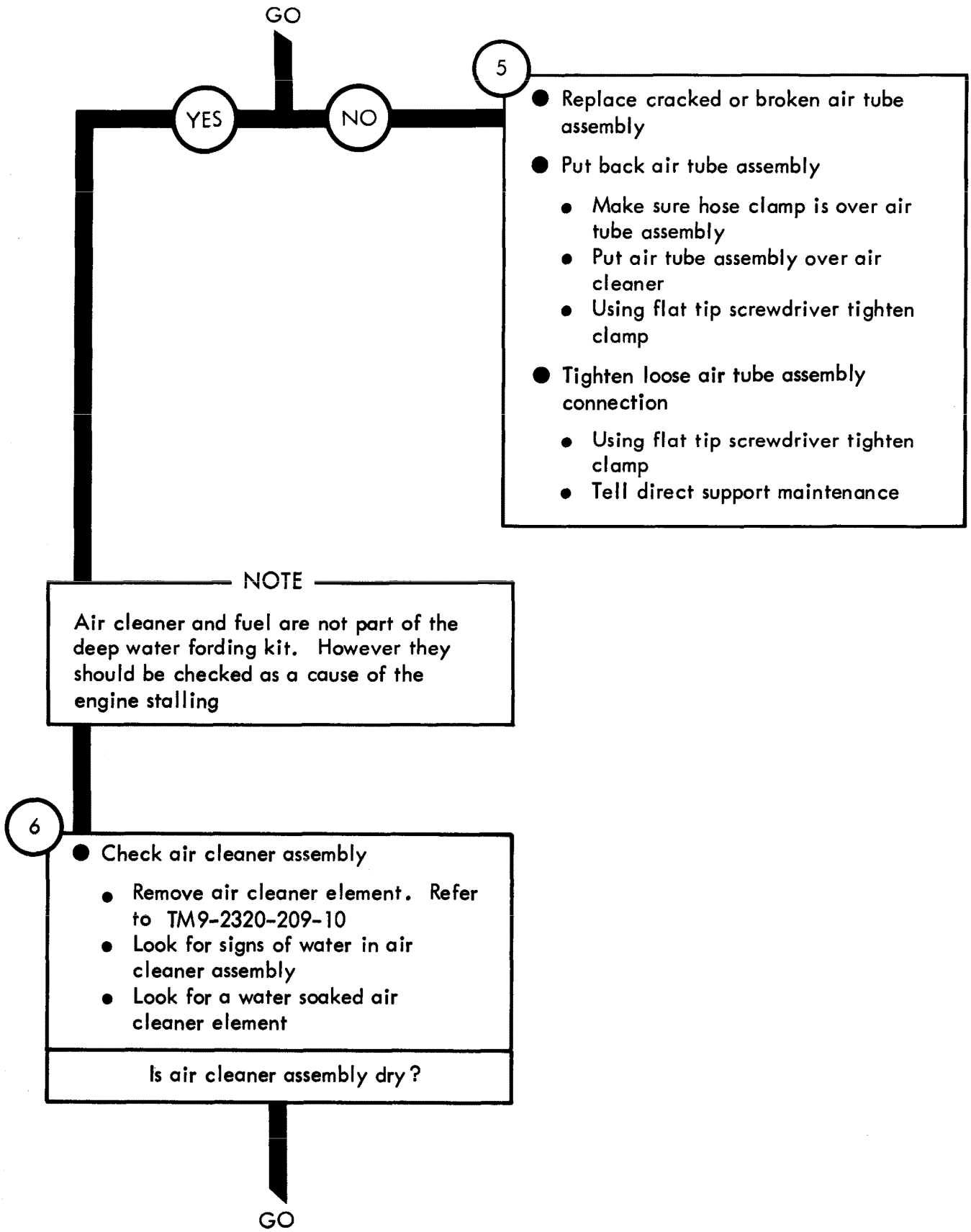


Figure 94-1 (Sheet 3 of 5)

GO

YES

NO

WARNING

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

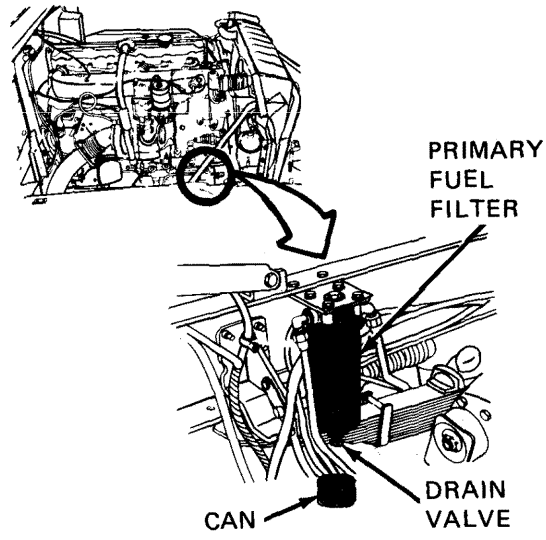
7

- Clean water out of air cleaner assembly
  - Using rag soak up water in air cleaner assembly
  - Using compressed air, blow dry
  - Replace water soaked air cleaner element. Refer to TM 9-2320-209-10

8

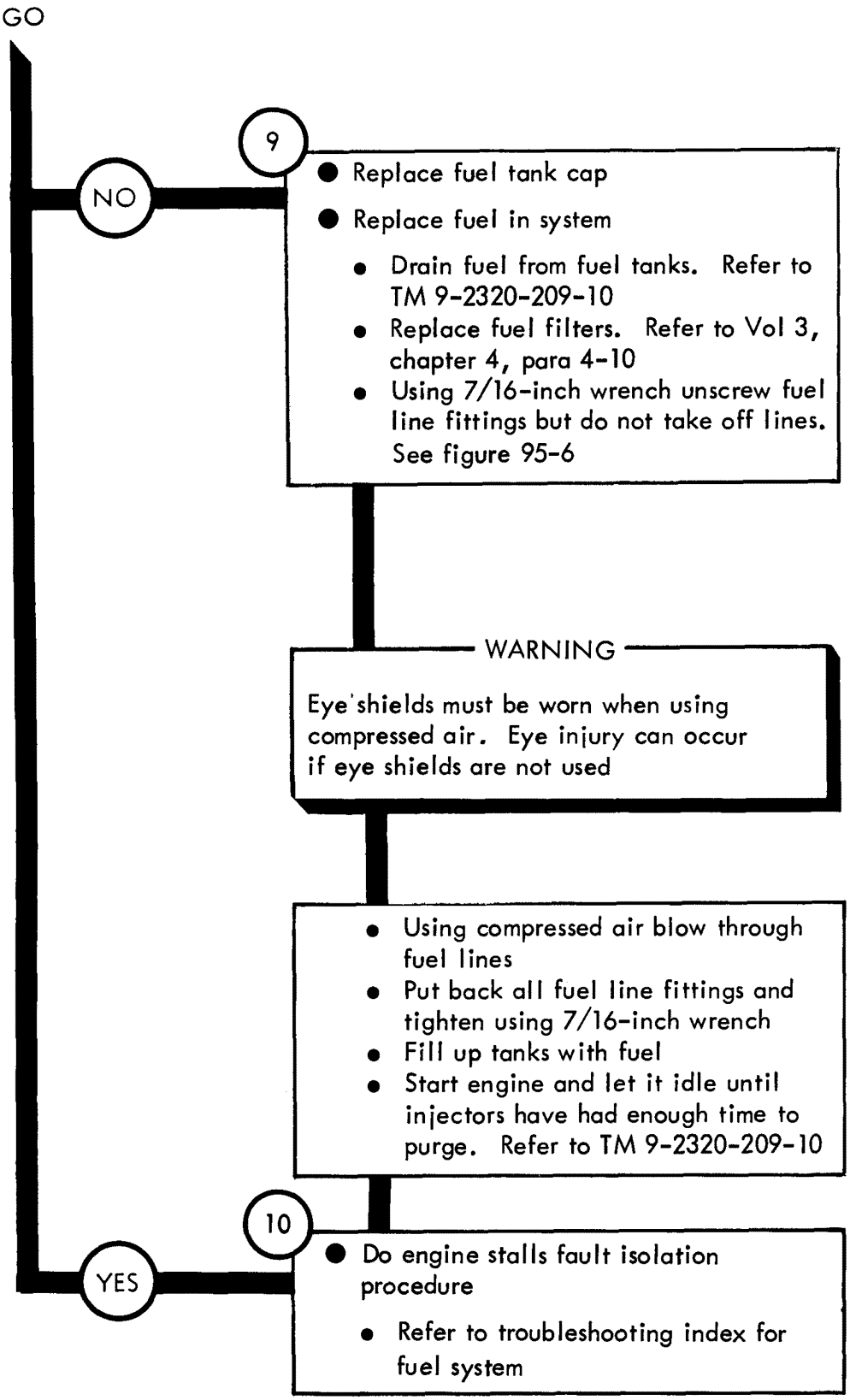
- Check for water in fuel
  - Put a can or bucket under primary fuel filter
  - Open drain valve and let can fill up half way
  - Look for signs of water in fuel

Is fuel OK?



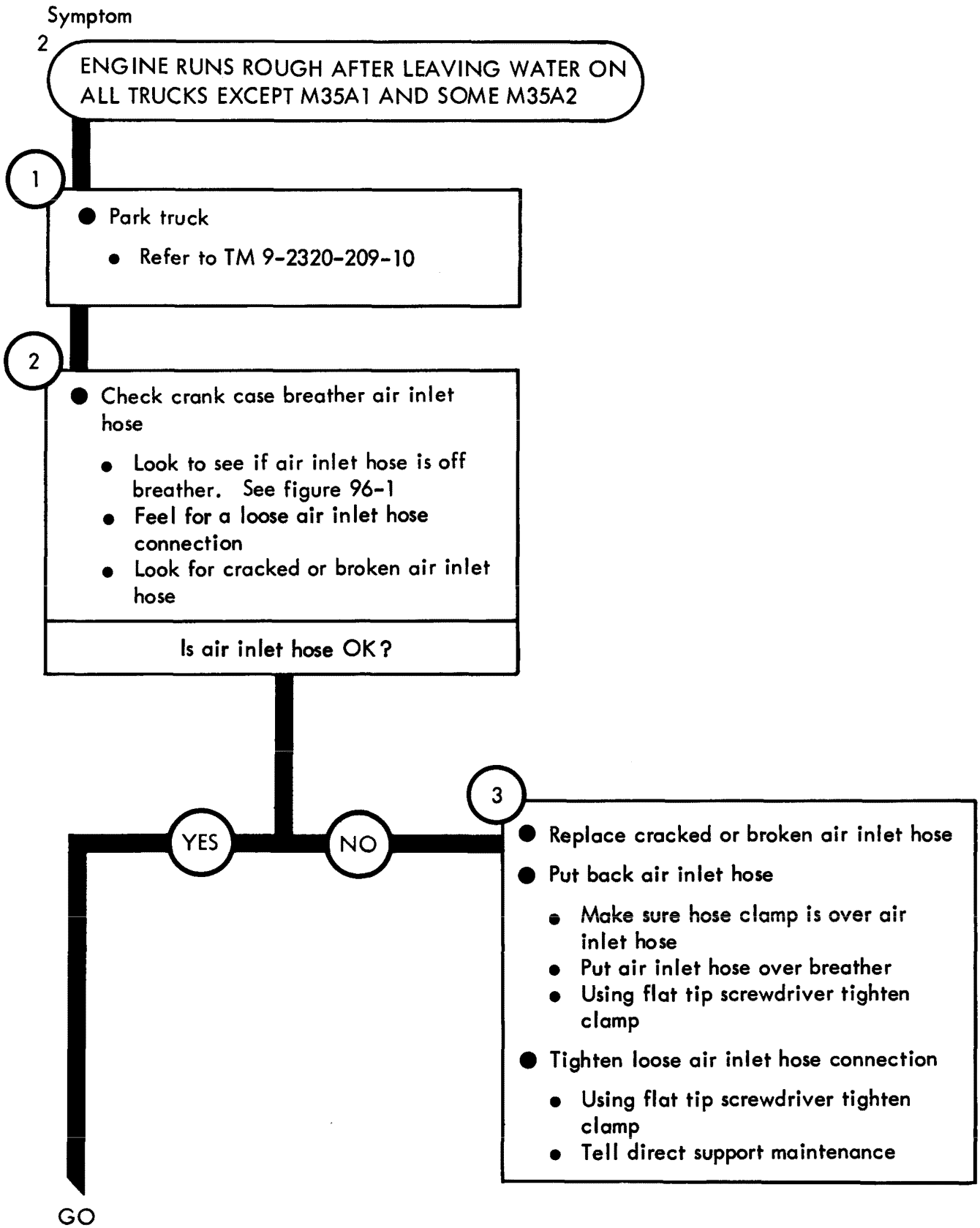
GO

Figure 94-1 (Sheet 4 of 5)



TA 115153

Figure 94-1 (Sheet 5 of 5)



TA 115159

Figure 94-2 (Sheet 1 of 2)

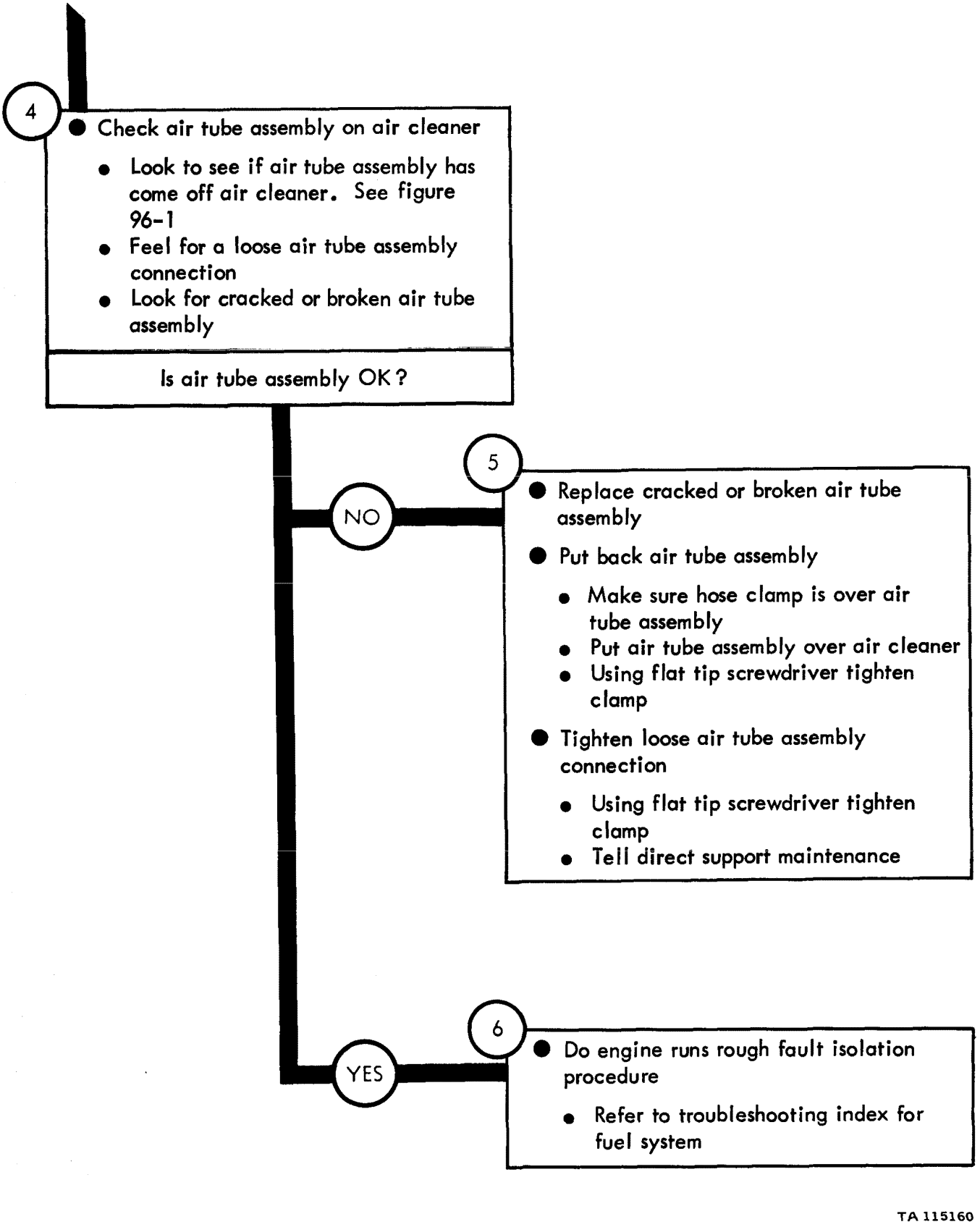
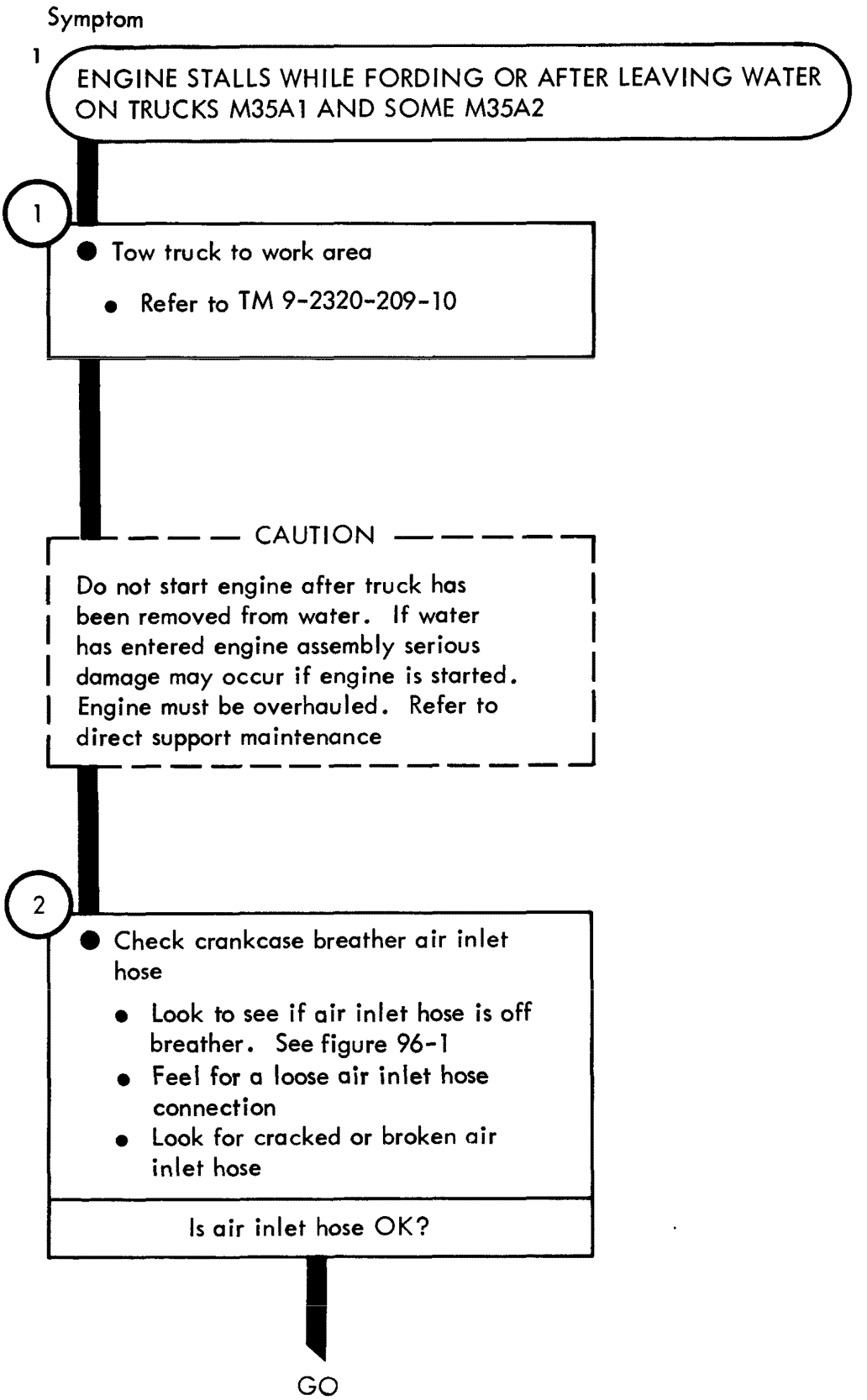
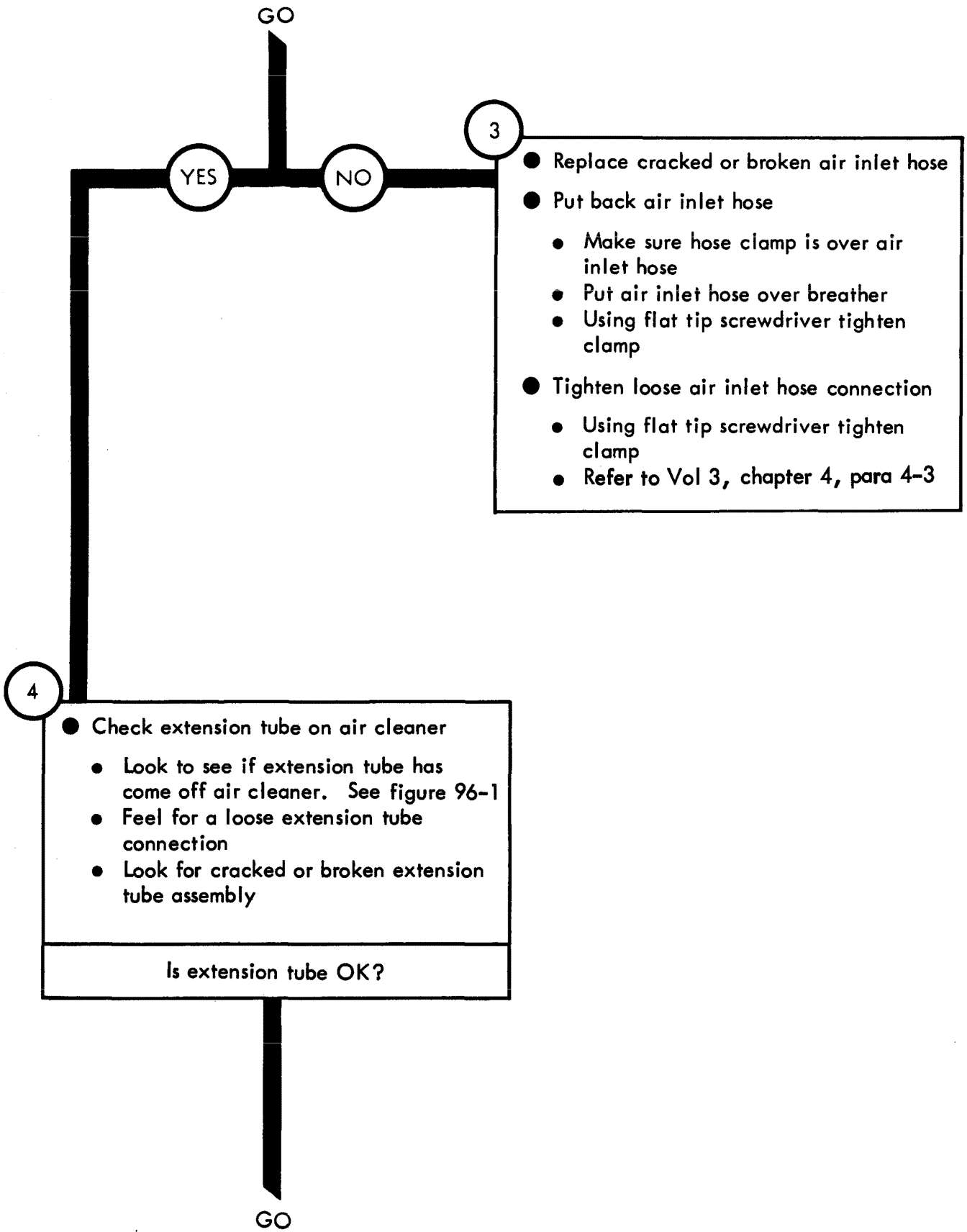


Figure 94-2 (Sheet 2 of 2)



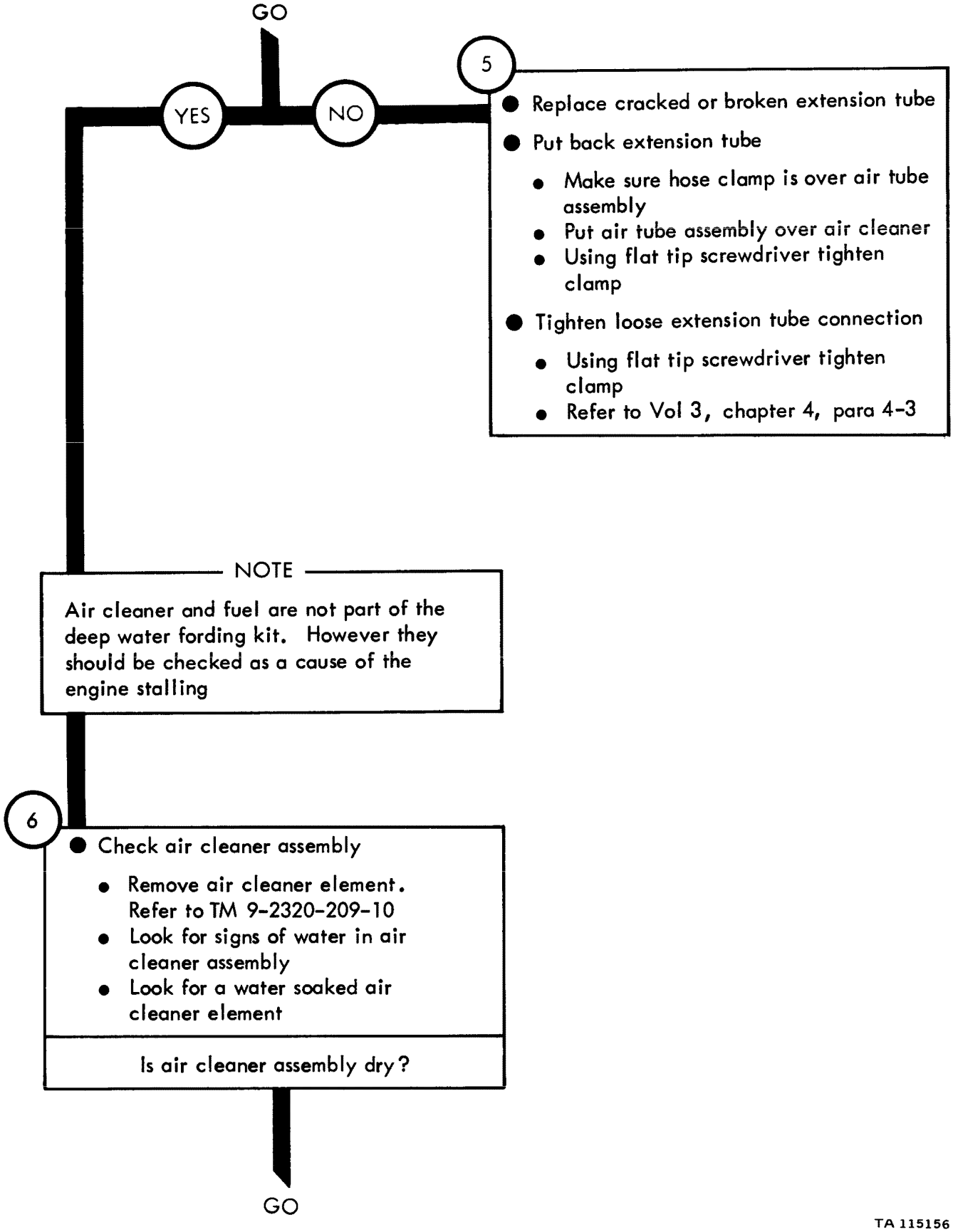
TA 115154

Figure 94-3 (Sheet 1 of 5)



TA 115155

Figure 94-3 (Sheet 2 of 5)



TA 115156

Figure 94-3 (Sheet 3 of 5)

GO

YES

NO

7

- Clean water out of air cleaner assembly
  - Using rag soak up water in air cleaner assembly

WARNING

Always wear safety glasses to protect eyes when using compressed air

- Using compressed air, blow dry
- Replace water soaked air cleaner element. Refer to TM 9-2320-209-10

NOTE

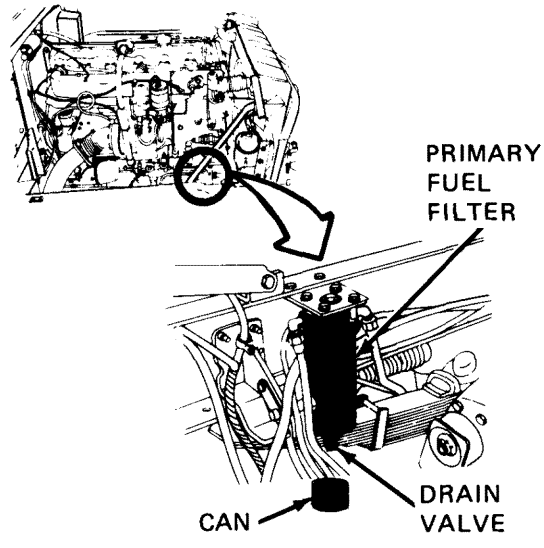
If all the steps have checked out OK, the engine should not have to be overhauled due to a fault of the deep water fording kit

8

- Check for water in fuel
  - Put a can or bucket under primary fuel filter
  - Open drain valve and let can fill up half way
  - Look for signs of water in fuel

Is fuel OK?

GO



TA 115157

Figure 94-3 (Sheet 4 of 5)

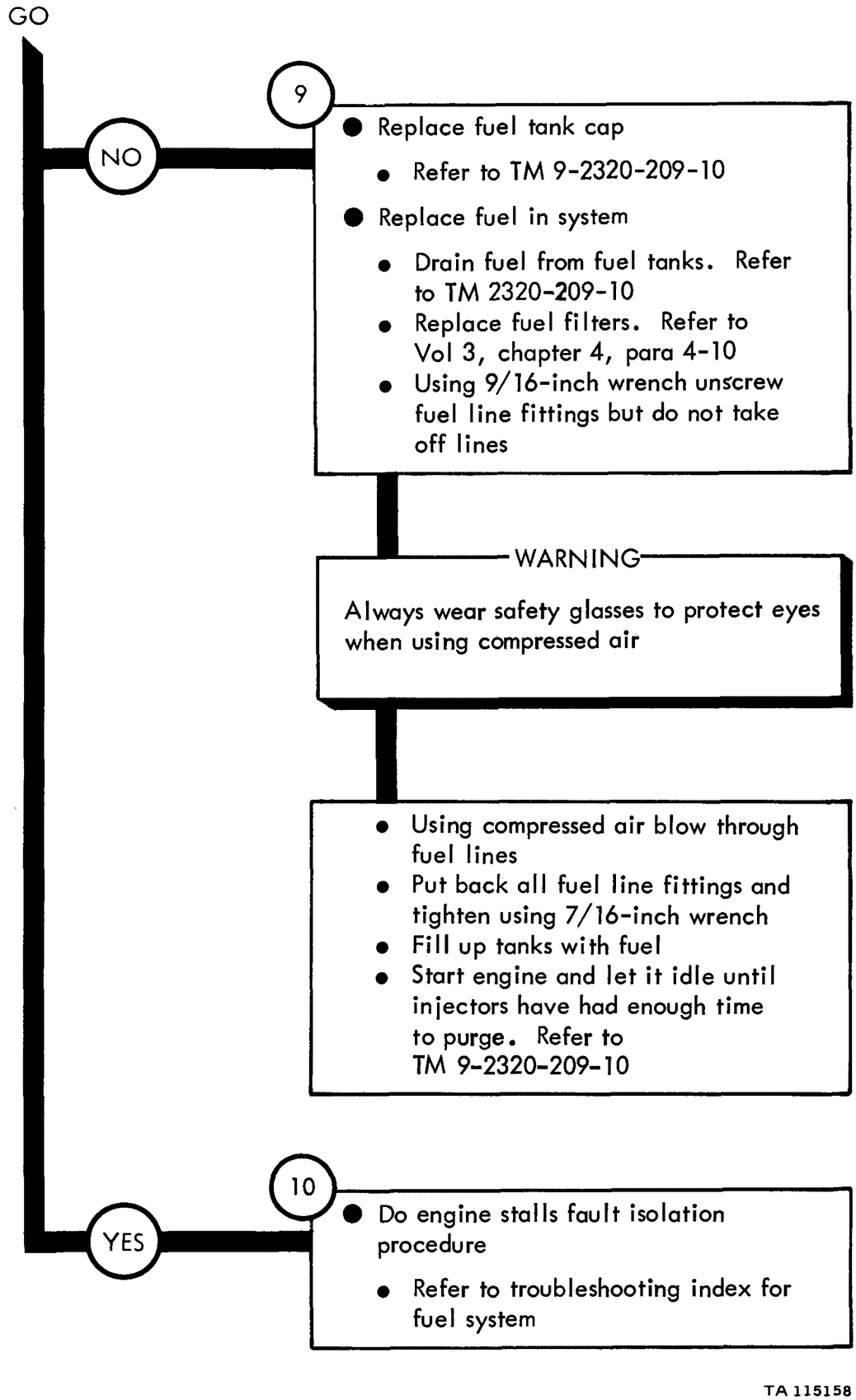
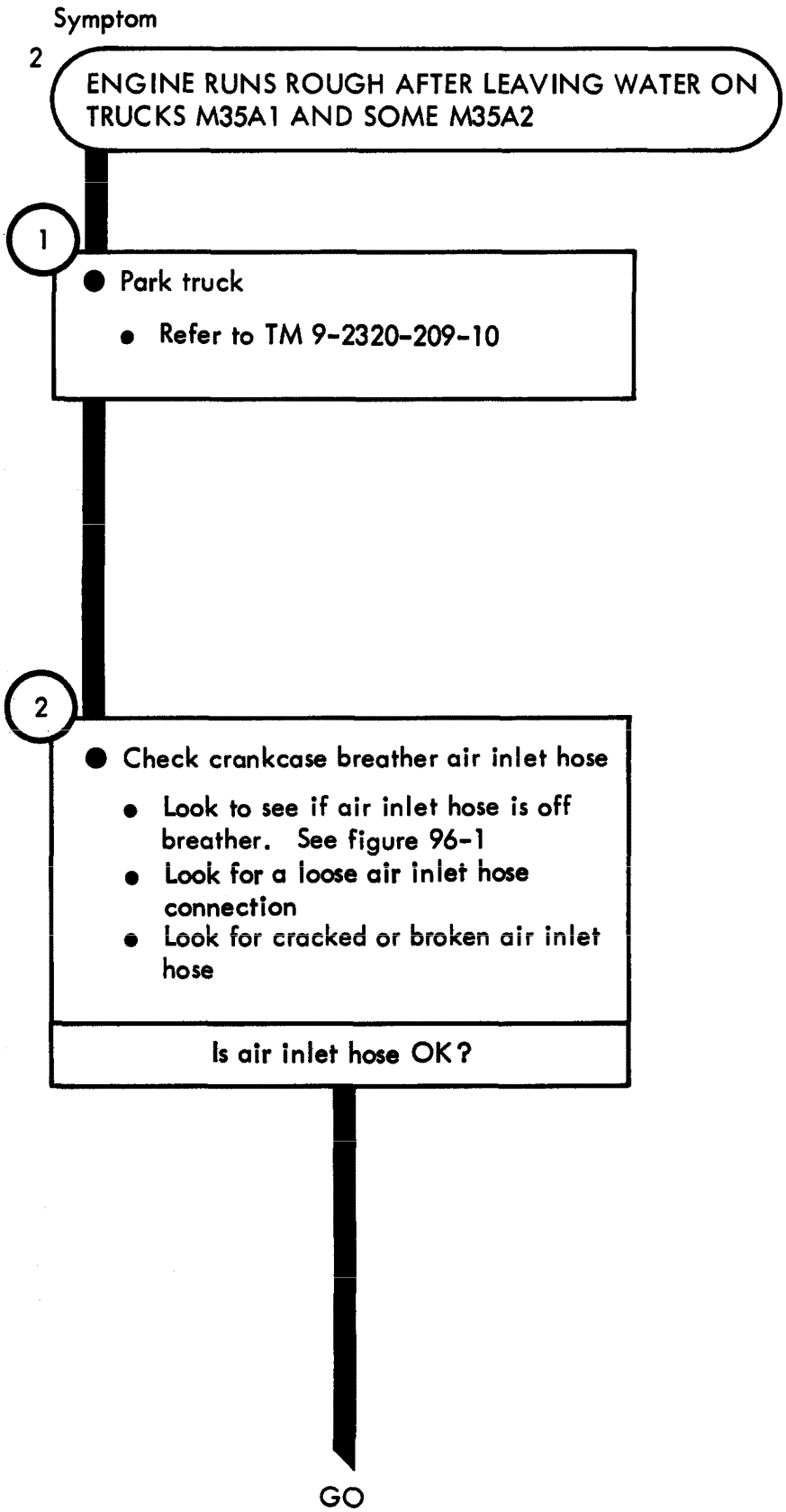
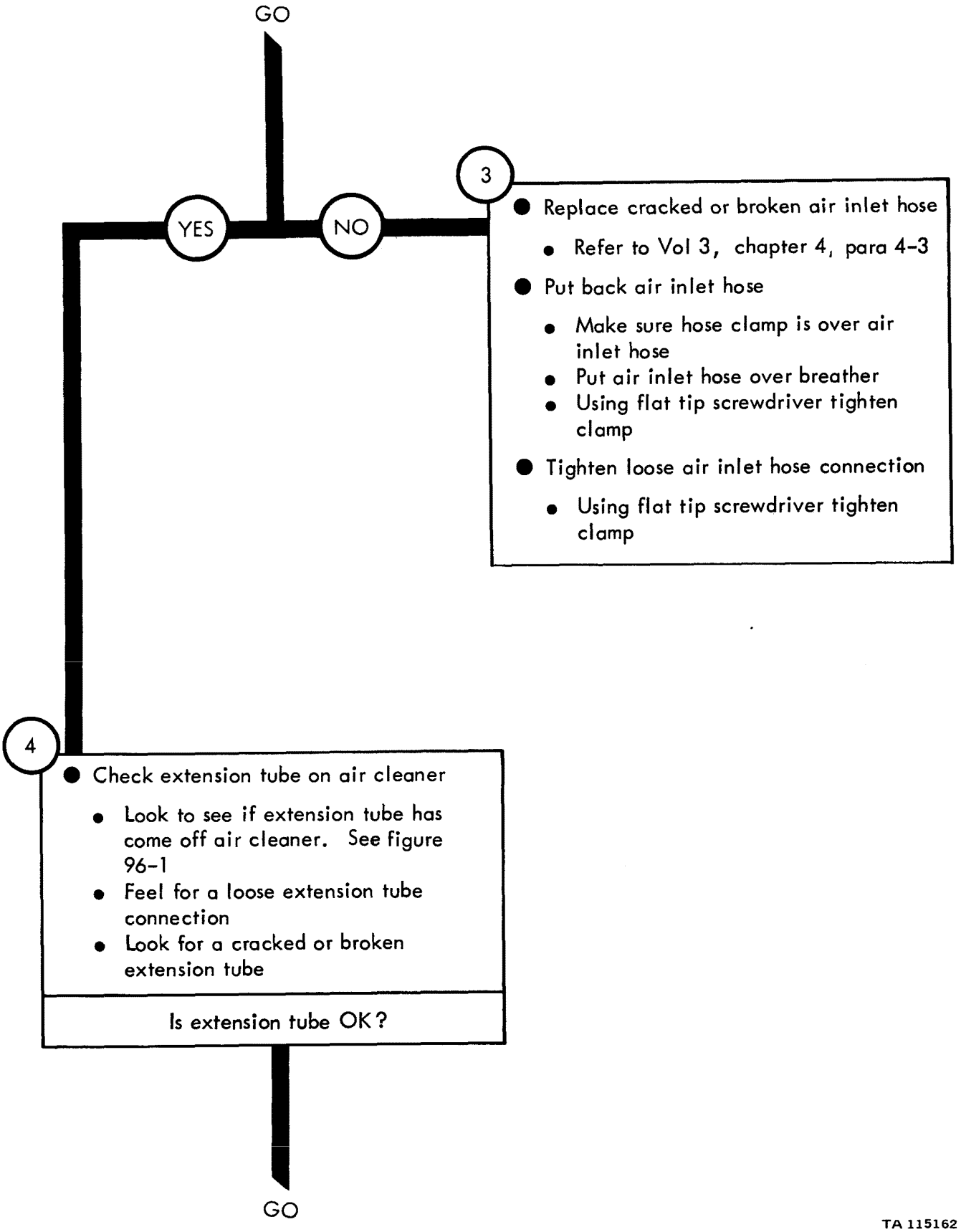


Figure 94-3 (Sheet 5 of 5)



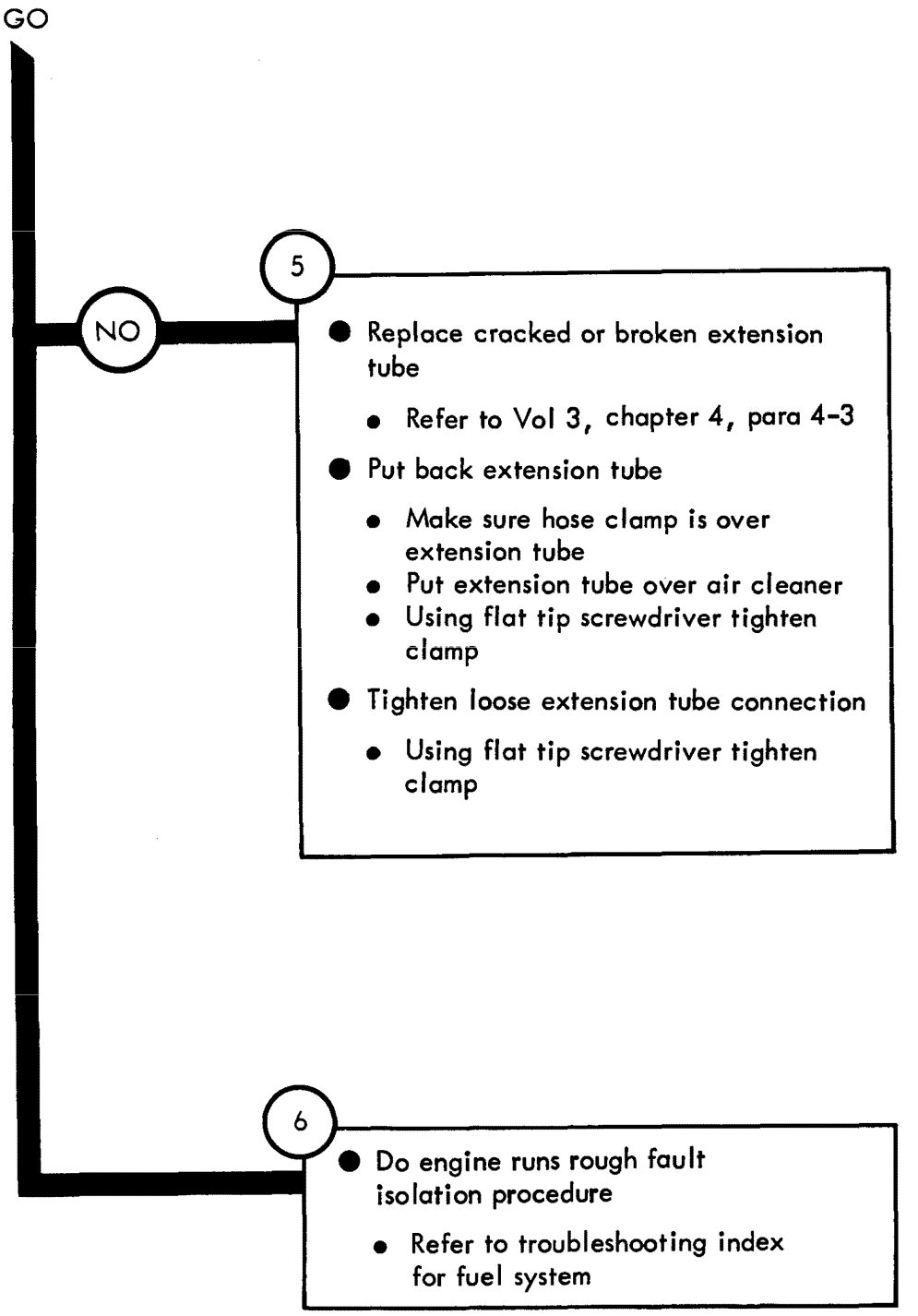
TA 115161

Figure 94-4 (Sheet 1 of 3)



TA 115162

Figure 94-4 (Sheet 2 of 3)



TA 115163

Figure 94-4 (Sheet 3 of 3)

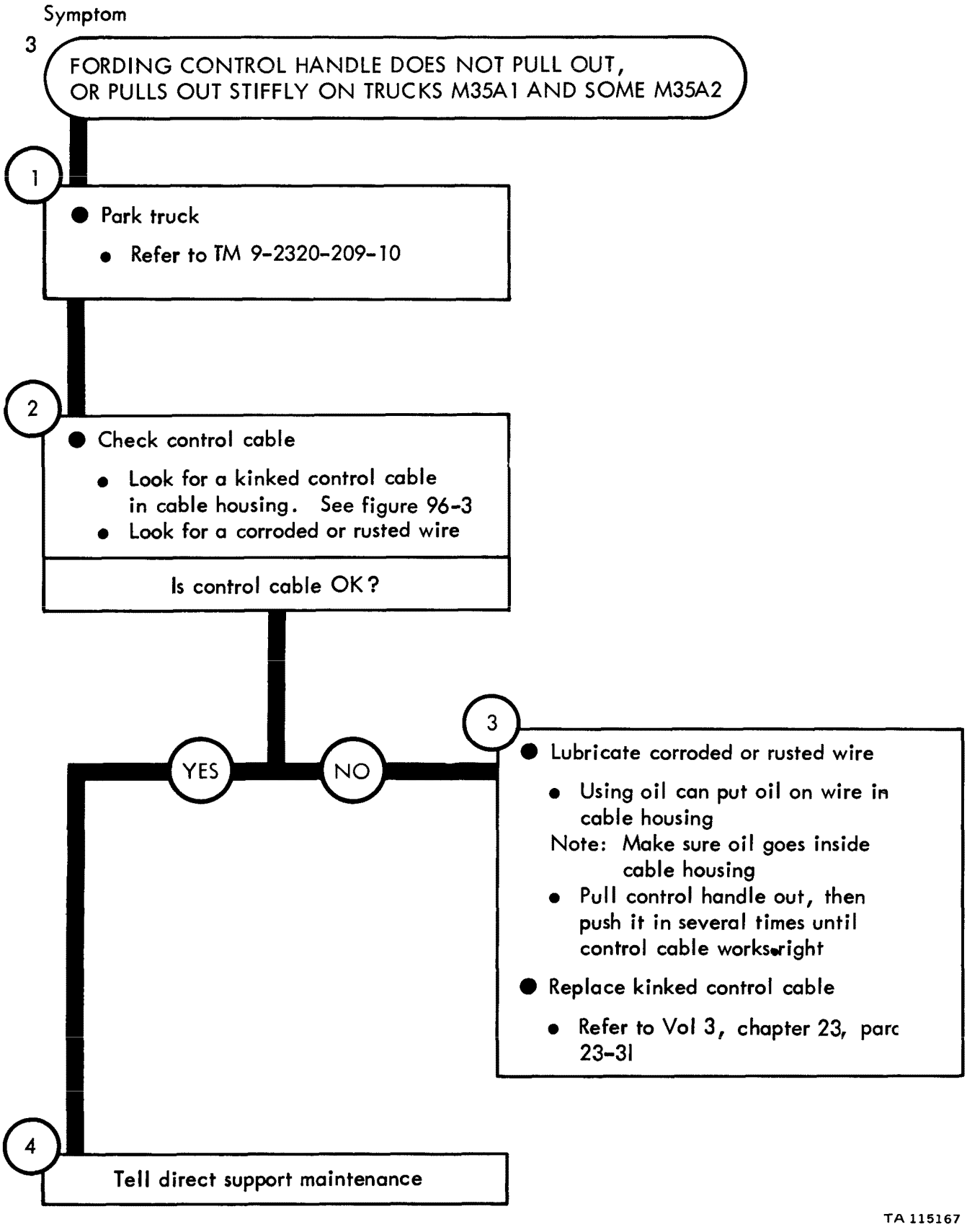

Symptom
3
FORDING CONTROL HANDLE DOES NOT PULL OUT, OR PULLS OUT STIFFLY ON TRUCKS M35A1 AND SOME M35A2
1
● Park truck
• Refer to TM 9-2320-209-10
2
● Check control cable
• Look for a kinked control cable in cable housing. See figure 96-3
• Look for a corroded or rusted wire
Is control cable OK?
YES
NO
3
● Lubricate corroded or rusted wire
• Using oil can put oil on wire in cable housing
Note: Make sure oil goes inside cable housing
• Pull control handle out, then push it in several times until control cable works right
● Replace kinked control cable
• Refer to Vol 3, chapter 23, parc 23-31
4
Tell direct support maintenance
TA 115167

Figure 94-5

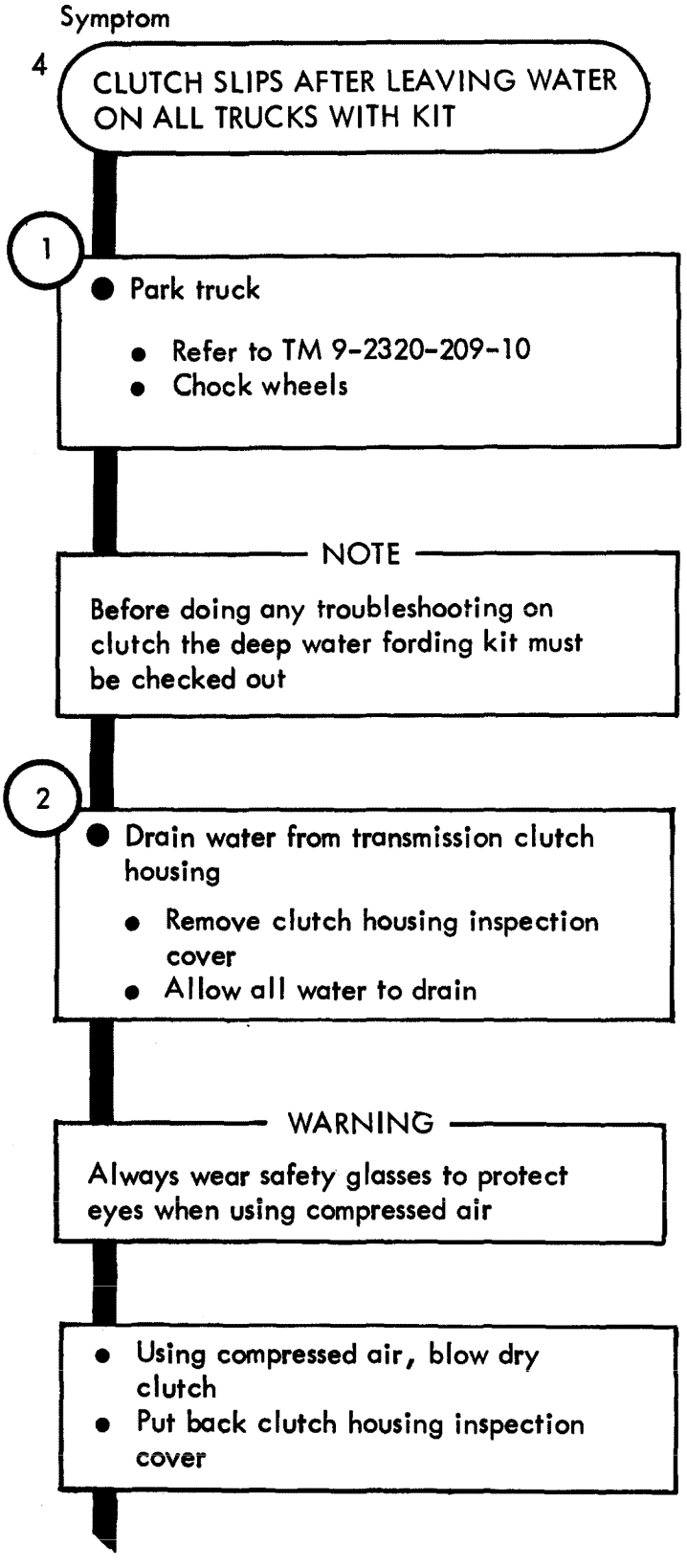


Figure 94-6 (Sheet 1 of 3)

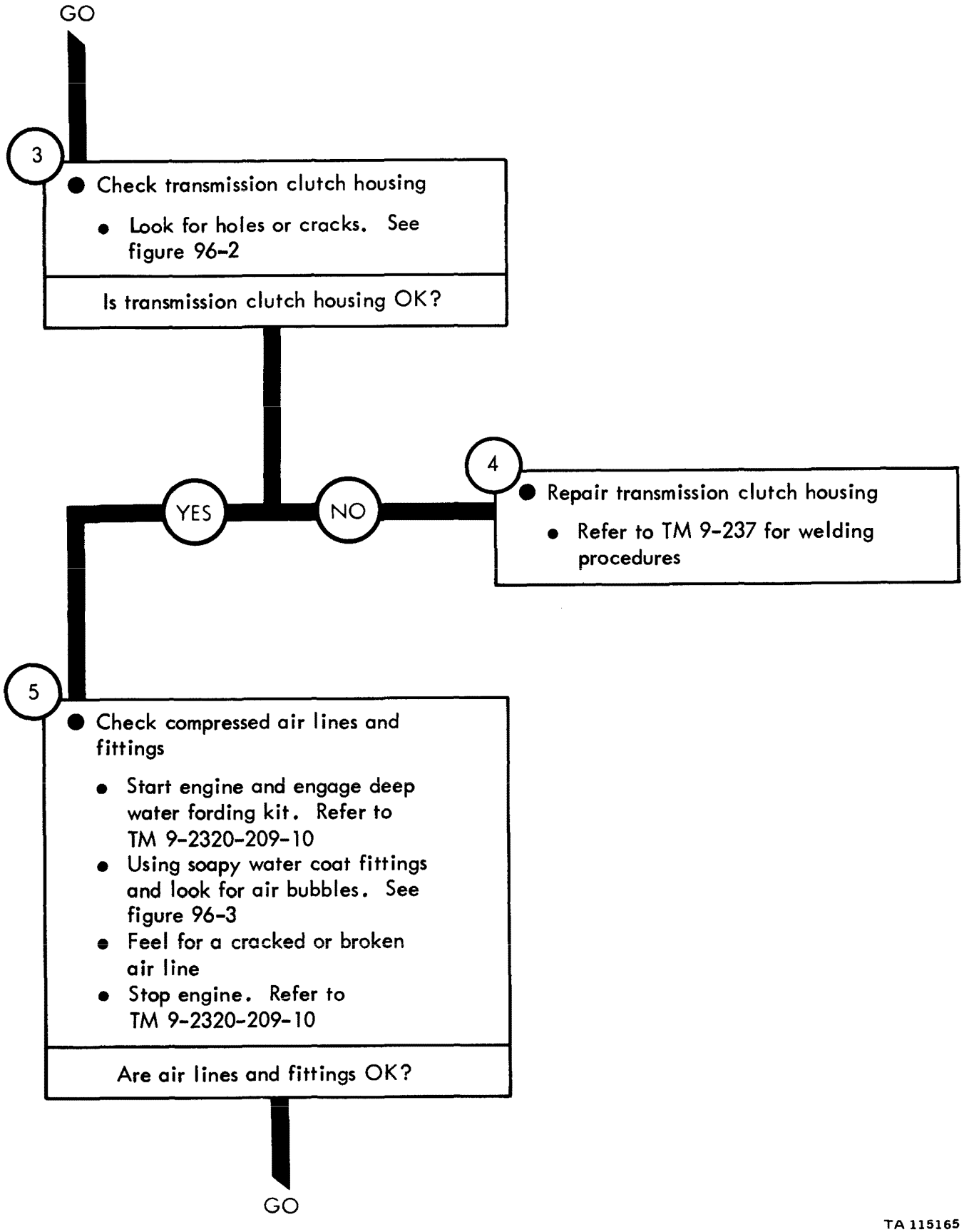
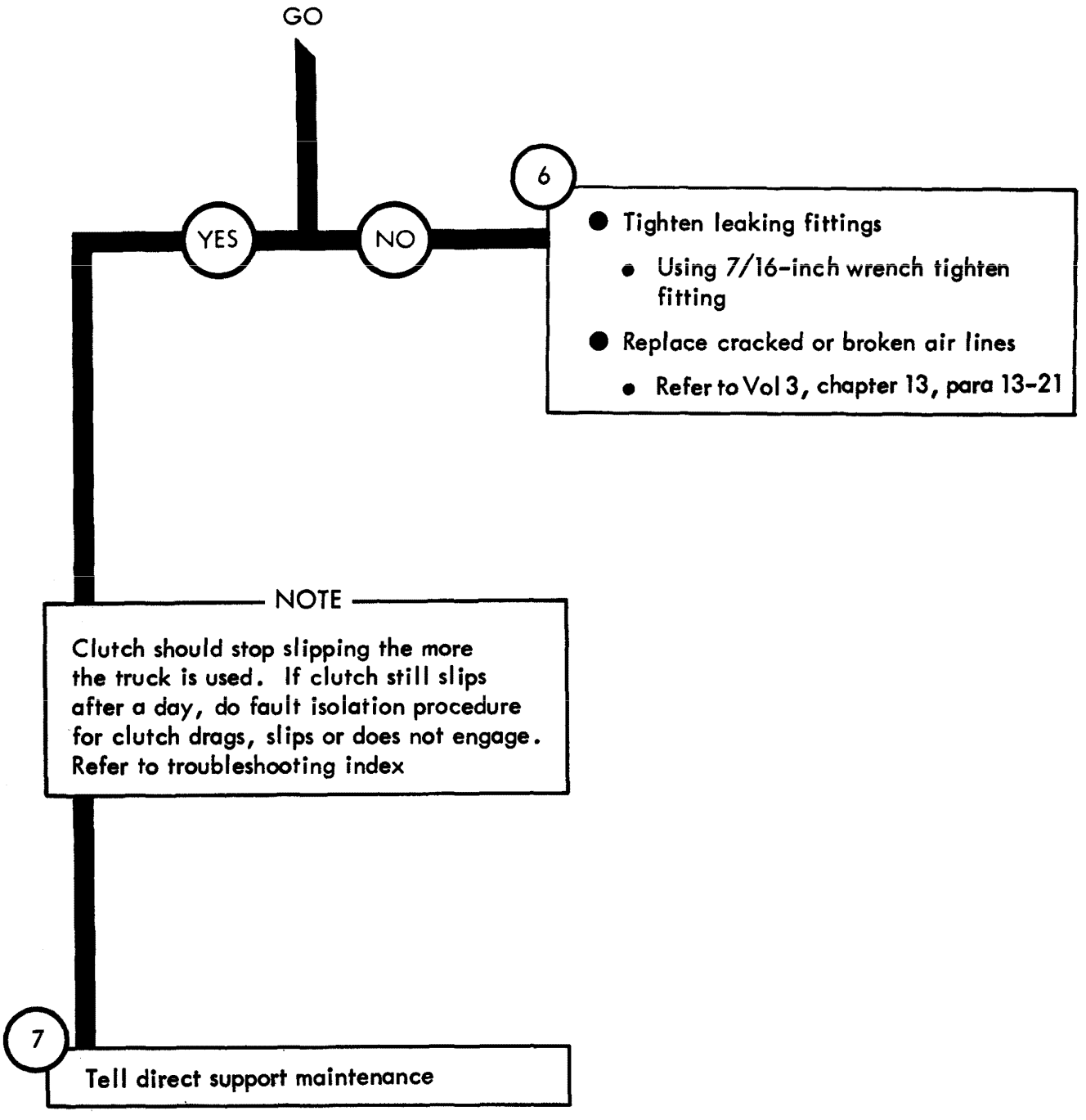
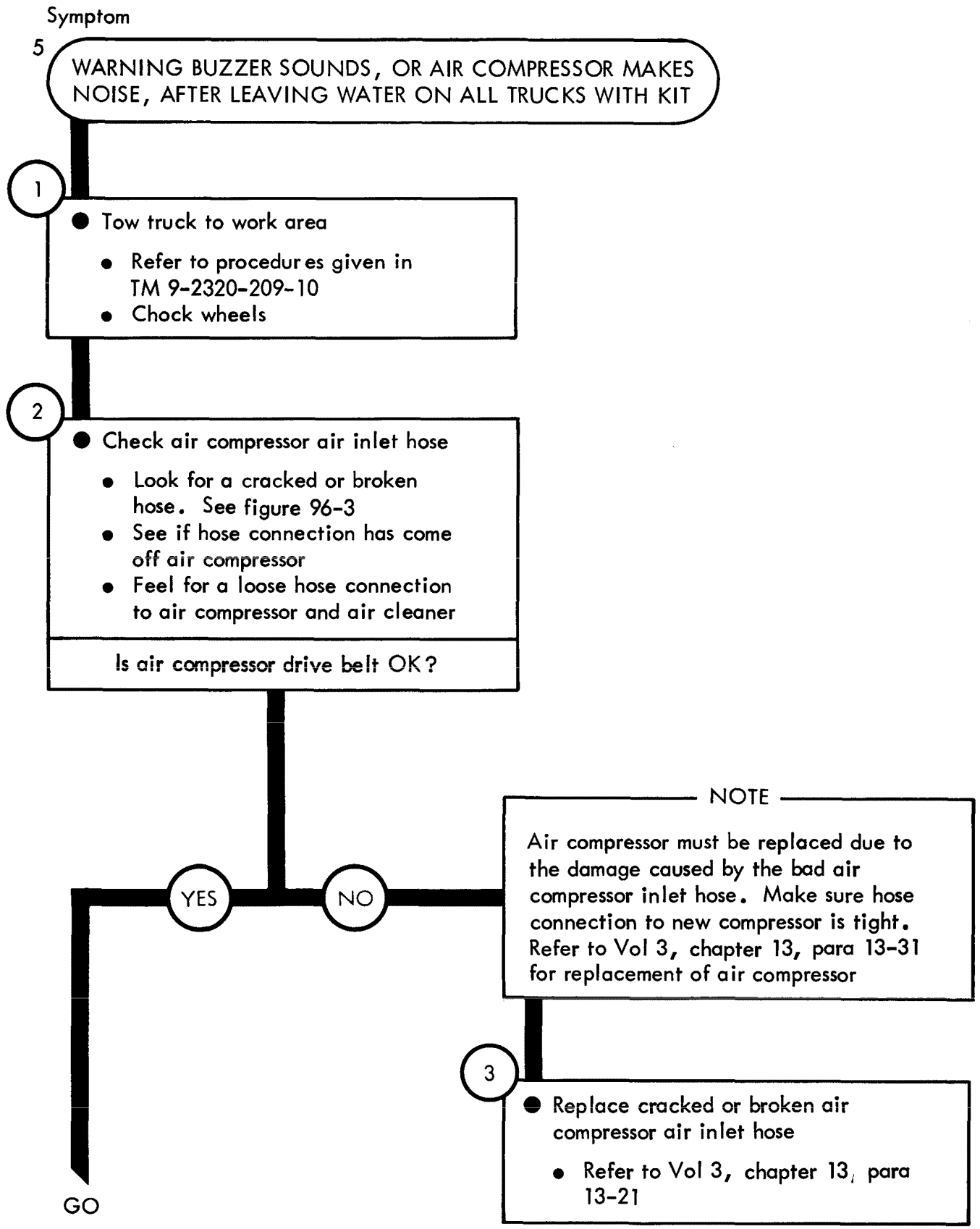


Figure 94-5 (Sheet 2 of 3)



TA 115166

Figure 94-6 (Sheet 3 of 3)



TA 115168

Figure 94-7 (Sheet 1 of 2)

GO

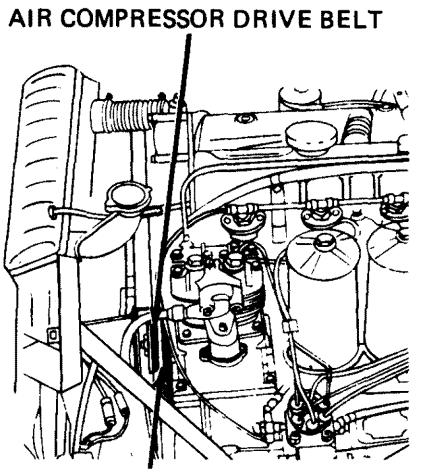
NOTE

Air compressor drive belt are not part of the deep water fording kit. However it should be checked as a cause of the warning buzzer sounding or the air compressor making noise

4

- Check air compressor drive belt
  - Take off battery ground cable. Refer to Vol 3, chapter 7, para 7-58
  - Look for signs of a slipping belt
  - Feel for a loose belt

Is air compressor drive belt OK?



YES

NO

5

- Adjust loose or slipping belt
  - Refer to Vol 3, chapter 13, para 13-34c

Note: If belt is too loose to be adjusted it should be replaced. Refer to Vol 3, chapter 13, para 13-34

6

- Replace air compressor
  - Refer to Vol 3, chapter 13, para 13-31

TA 115169

Figure 94-7 (Sheet 2 of 2)

CHAPTER 95

DEEP WATER FORDING KIT TROUBLESHOOTING SUMMARY

95-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 94 for the deep water fording kit.

95-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

DEEP WATER FORDING KIT ENGINE TROUBLESHOOTING SUMMARY

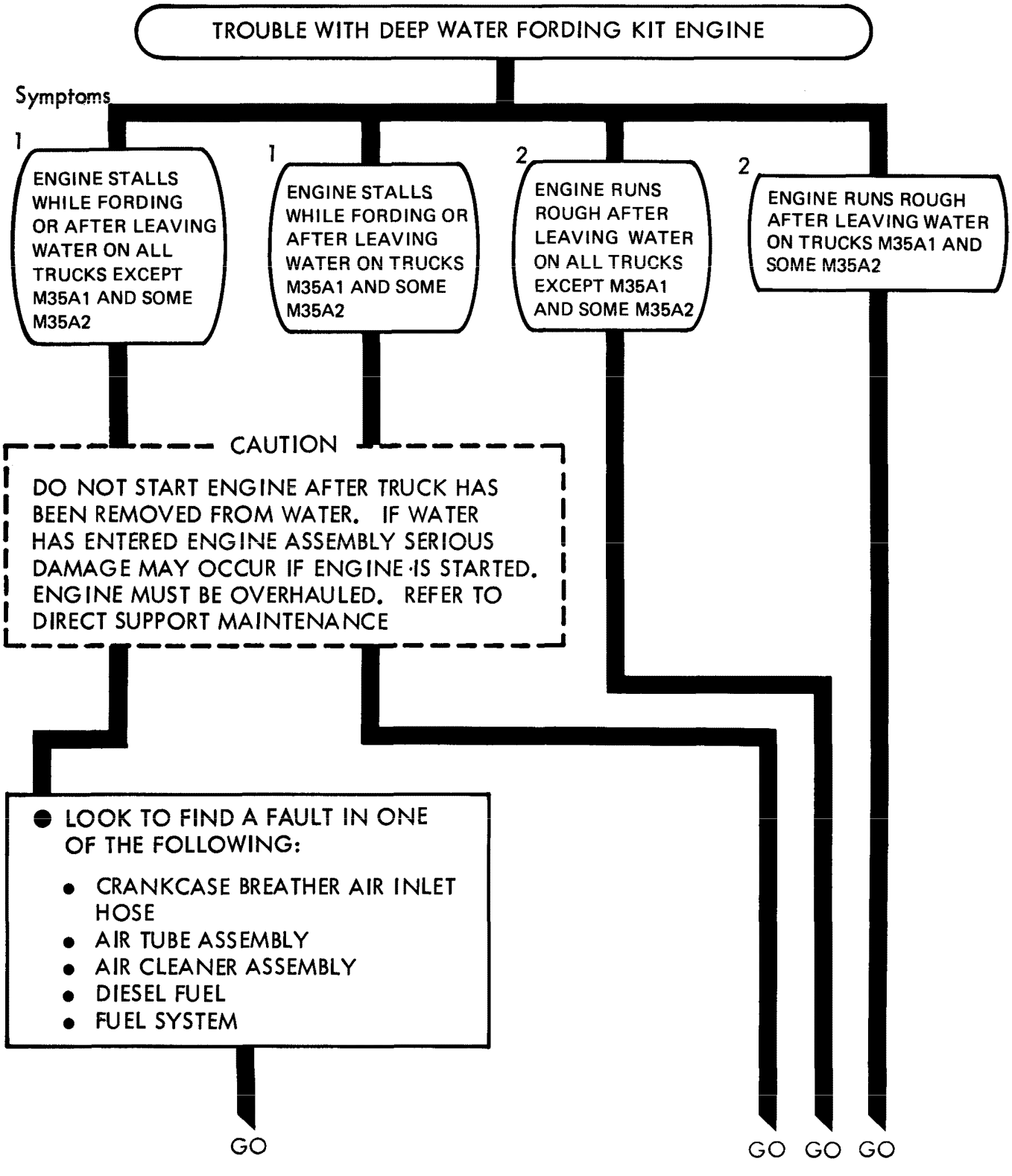
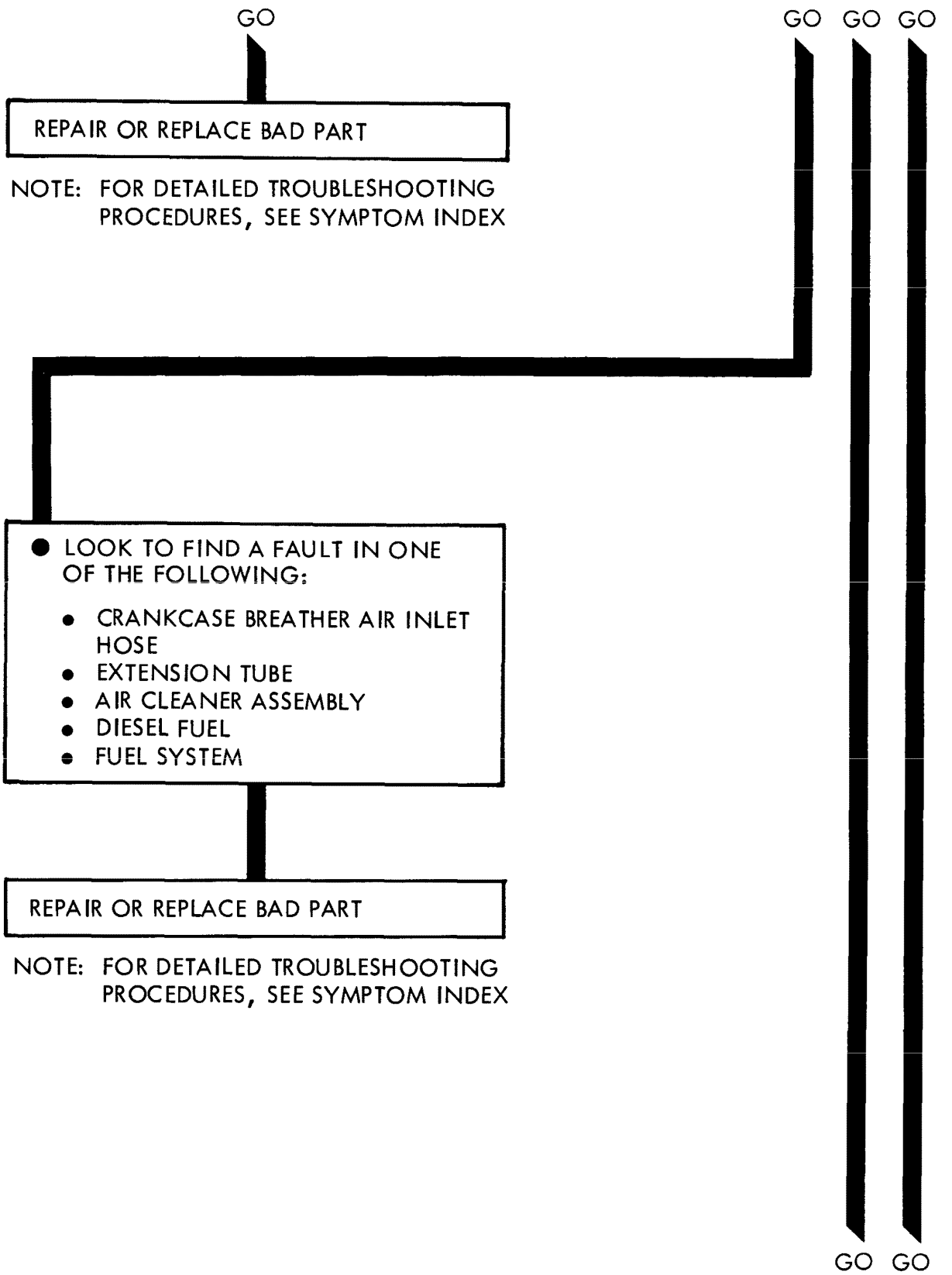


Figure 95-1 (Sheet 1 of 3)



TA 115171

Figure 95-1 (Sheet 2 of 3)

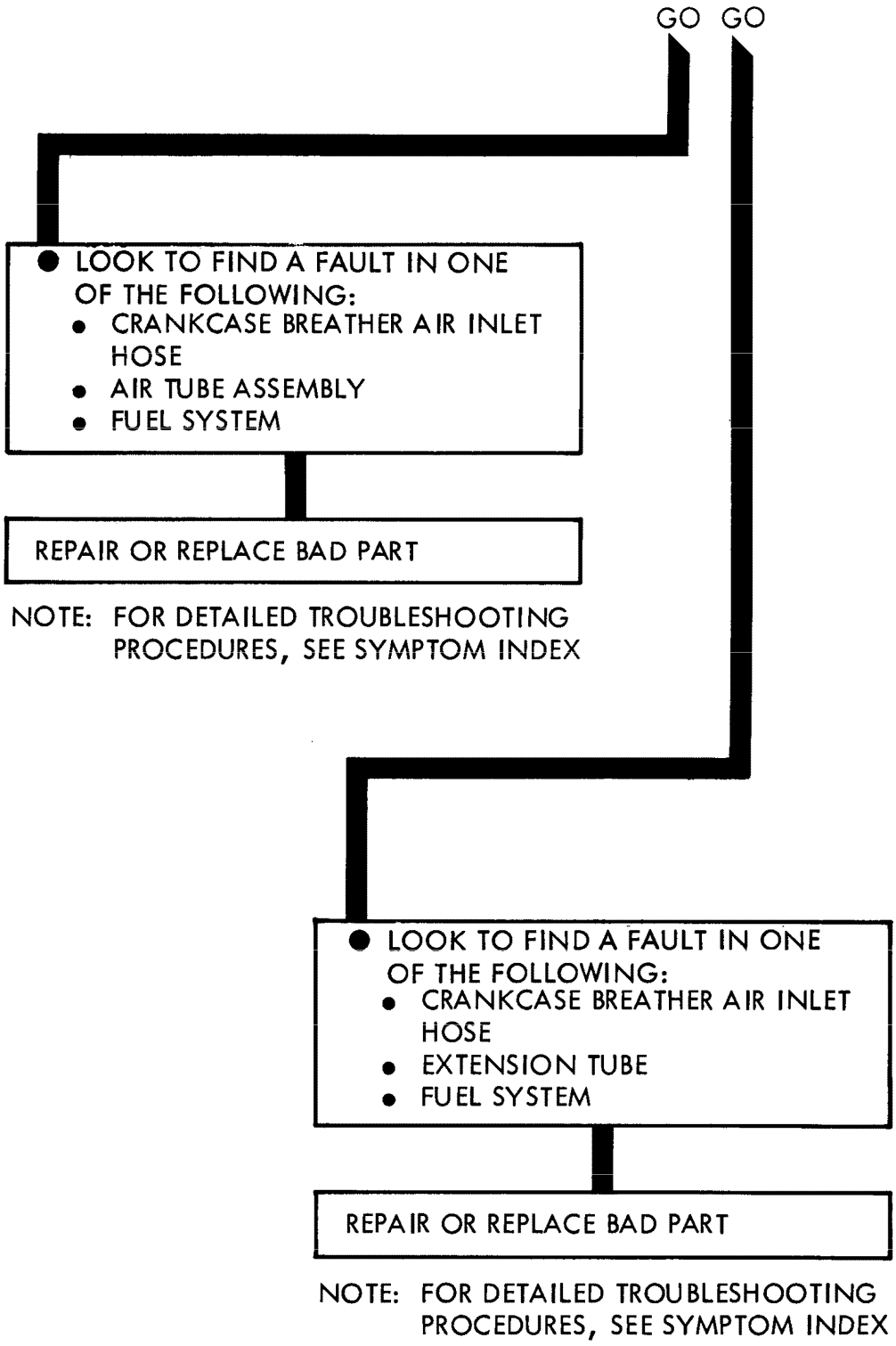
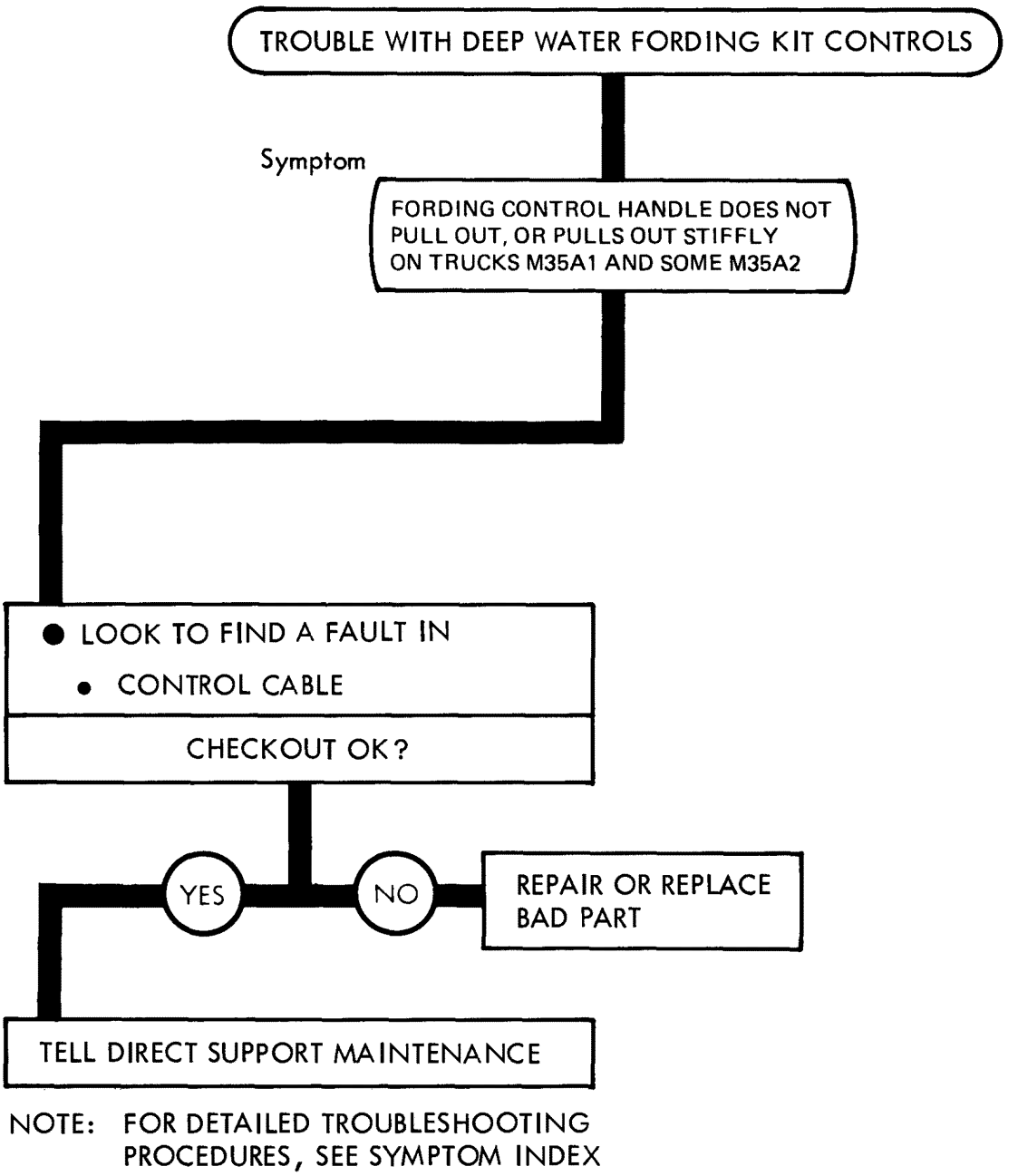


Figure 95-1 (Sheet 3 of 3)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 115173

Figure 95-2

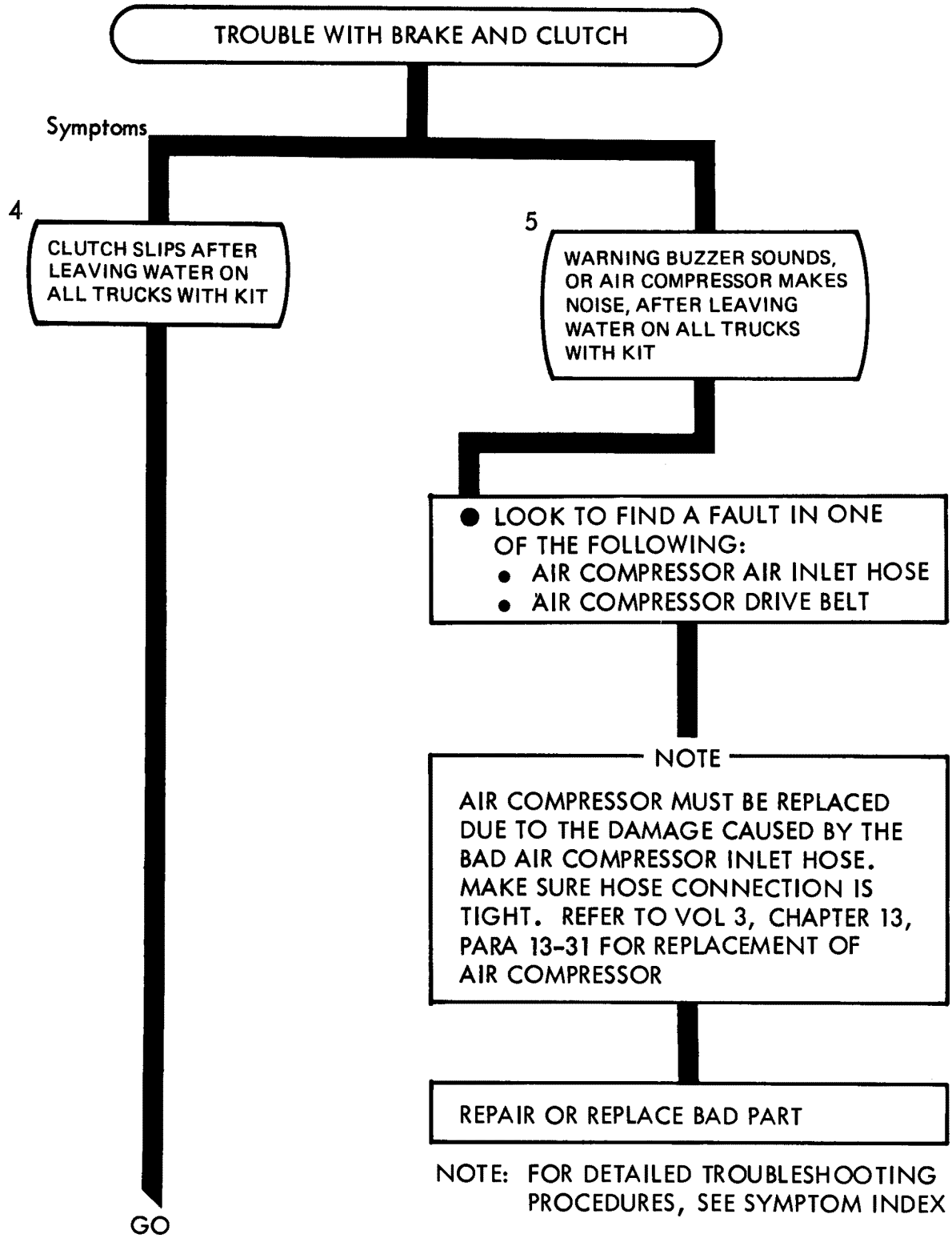
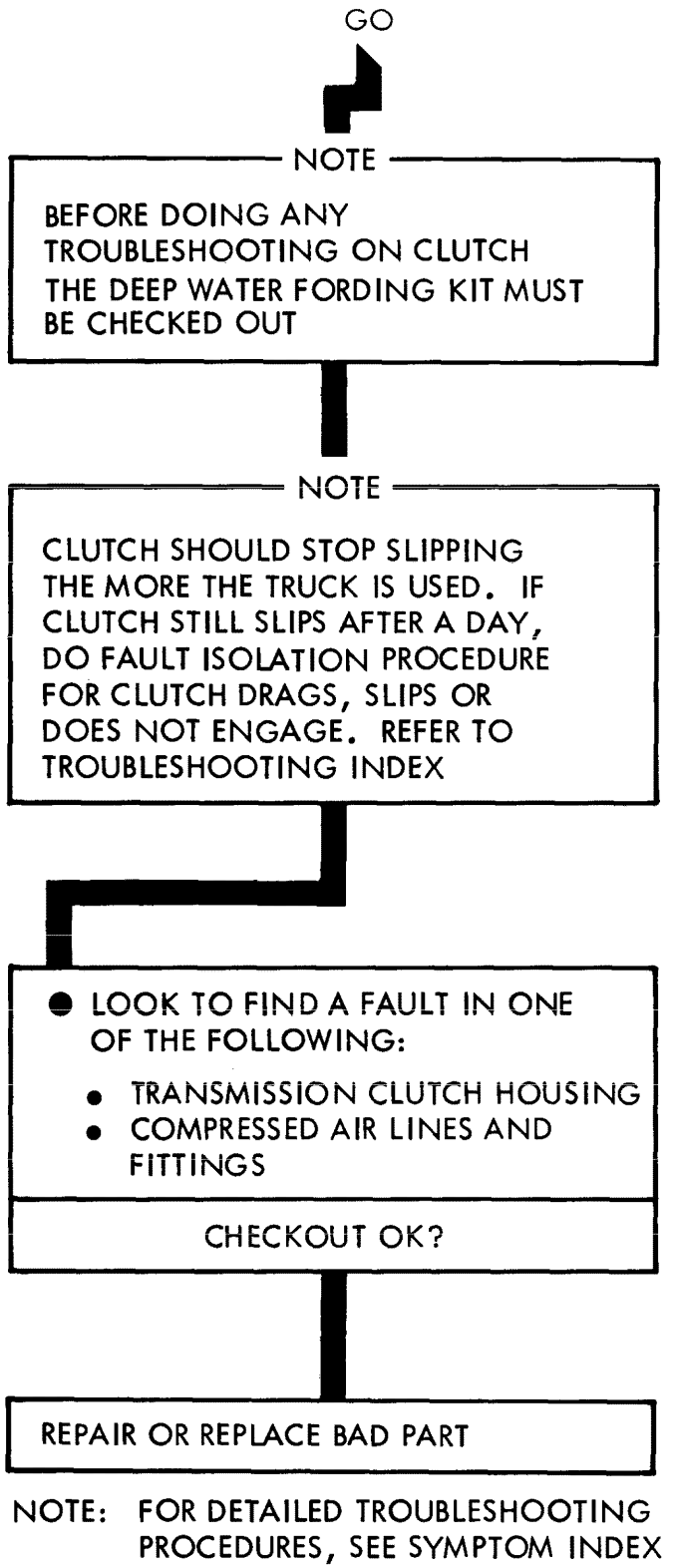


Figure 95-3 (Sheet 1 of 2)



NOTE: FOR DETAILED TROUBLESHOOTING PROCEDURES, SEE SYMPTOM INDEX

TA 115175

Figure 95-3 (Sheet 2 of 2)

CHAPTER 96

DEEP WATER FORDING KIT SUPPORT DIAGRAMS

96-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 94. Table 3-1 is a complete listing of all support diagrams used in this manual.

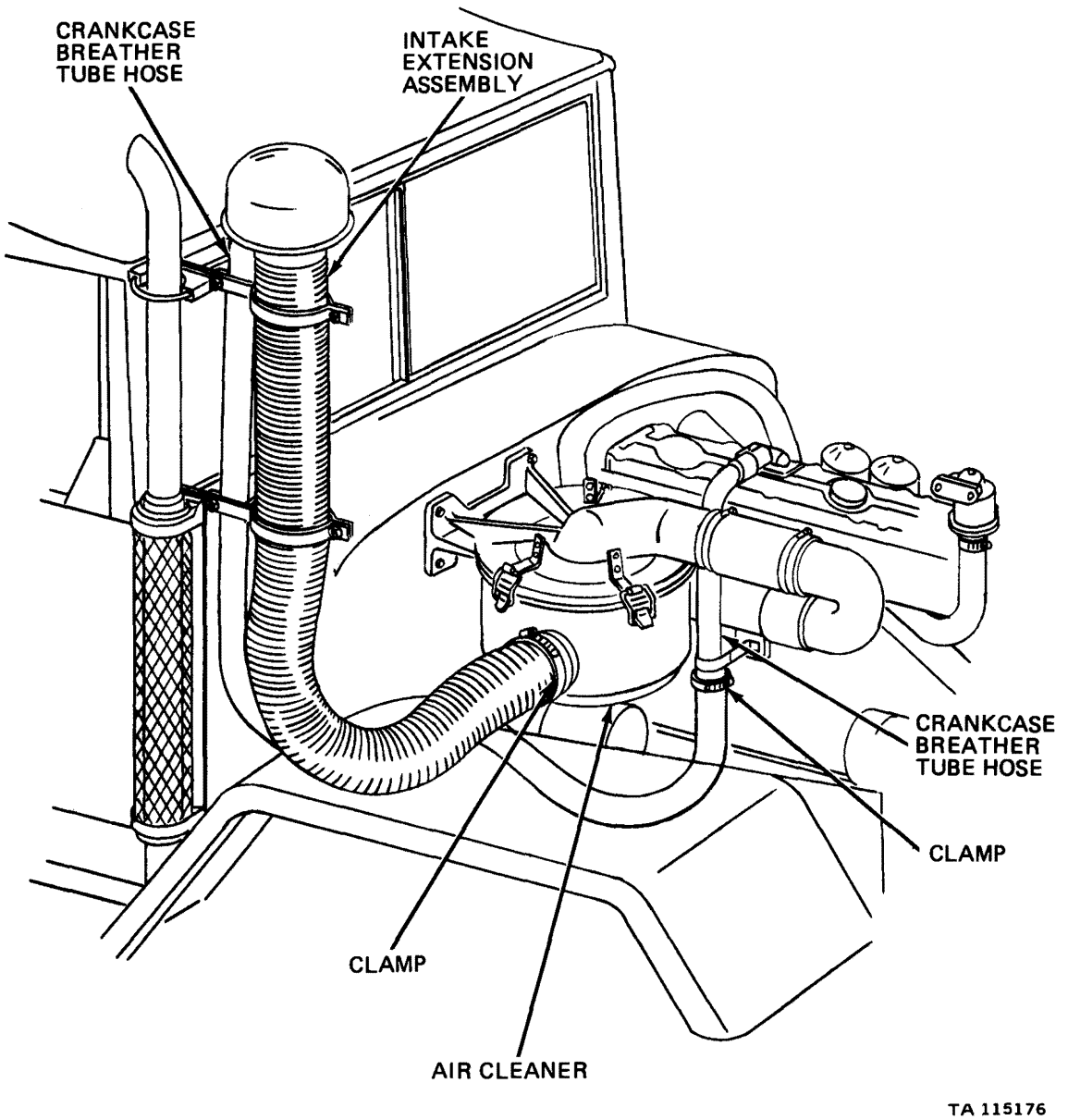
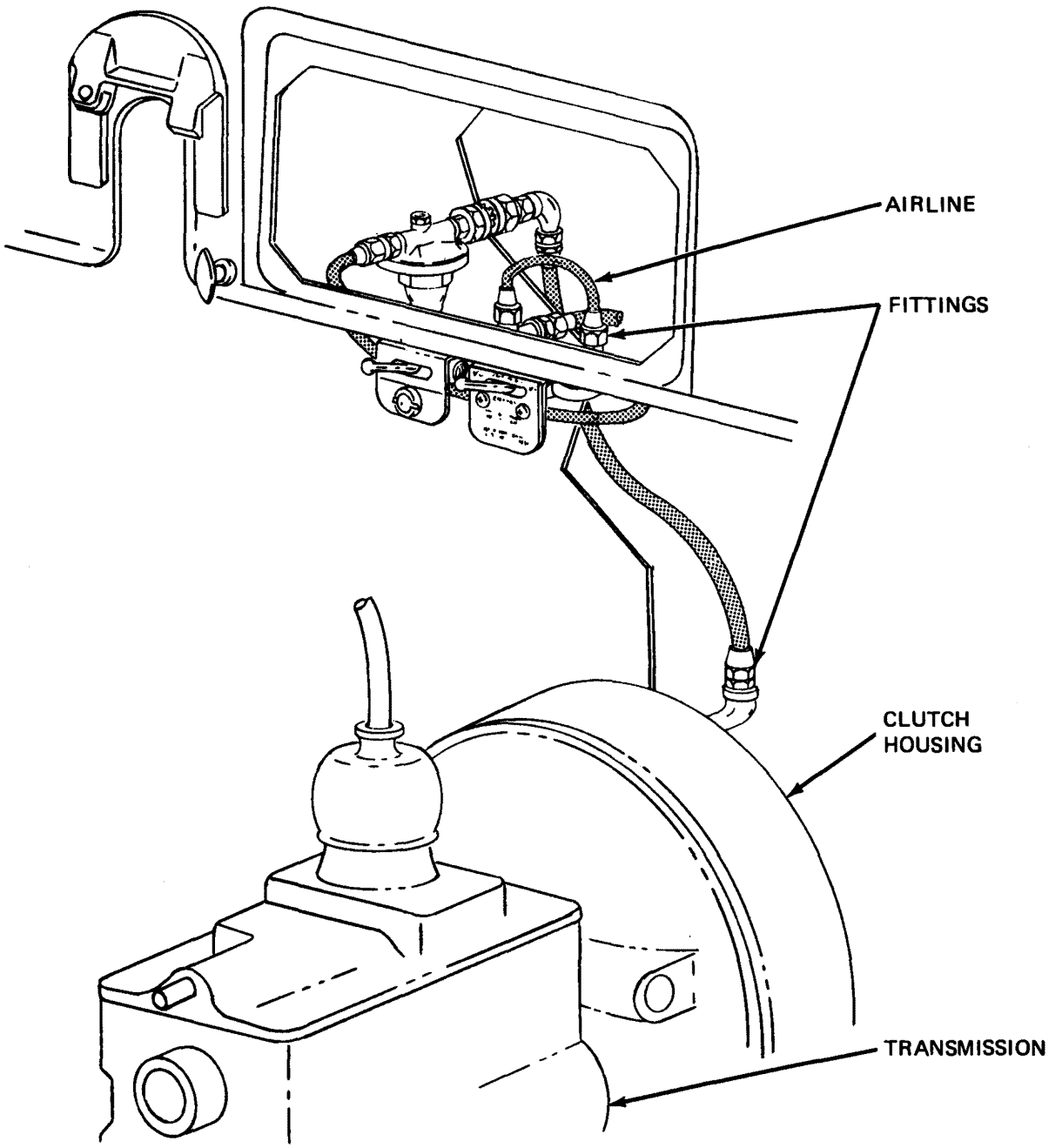


Figure 96-1. Deep Water Fording Kit Support Diagram



ON ALL TRUCKS EXCEPT M35A1 AND SOME M35A2

TA 115177

Figure 96-2. Deep Water Fording Kit Support Diagram

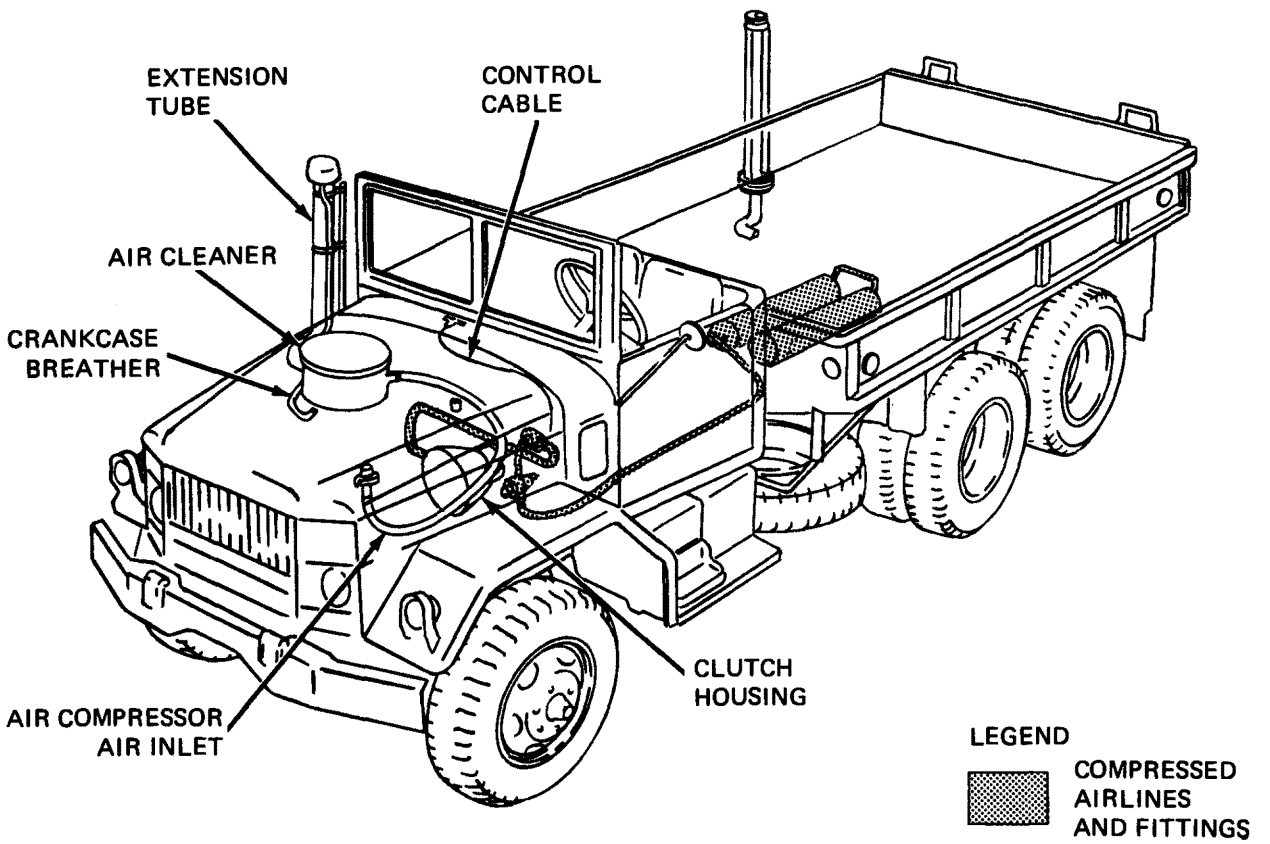


Figure 96-3. Deep Water Fording Kit Support Diagram

CHAPTER 97

DEEP WATER FORDING KIT CHECKOUT PROCEDURES

97-1. GENERAL. This chapter gives procedures for checking out the system after troubleshooting and repair have been done. Procedures are set up in flow chart form showing the checkout steps in order and referring to the fault symptom index when the system does not check out.

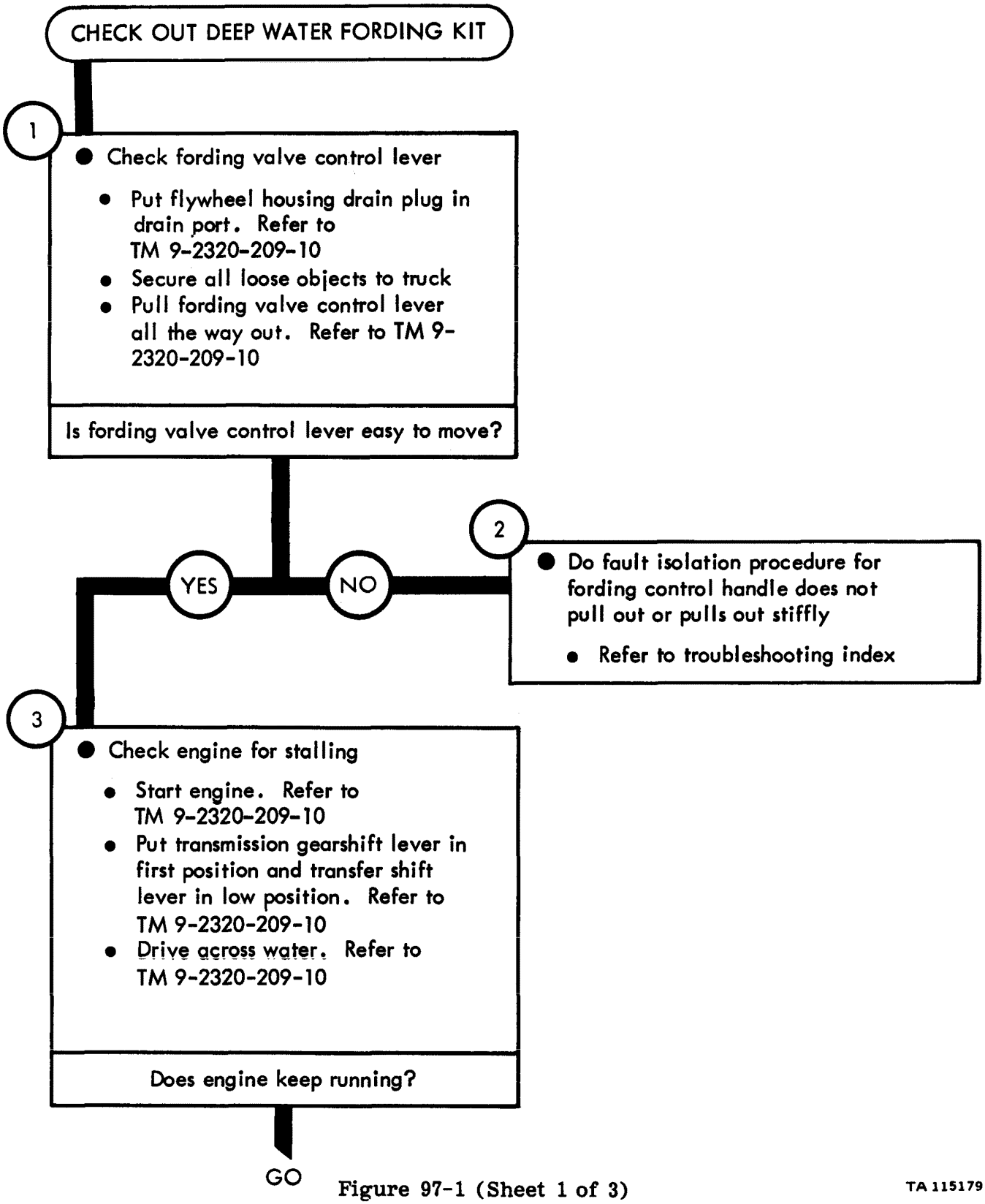


Figure 97-1 (Sheet 1 of 3)

TA 115179

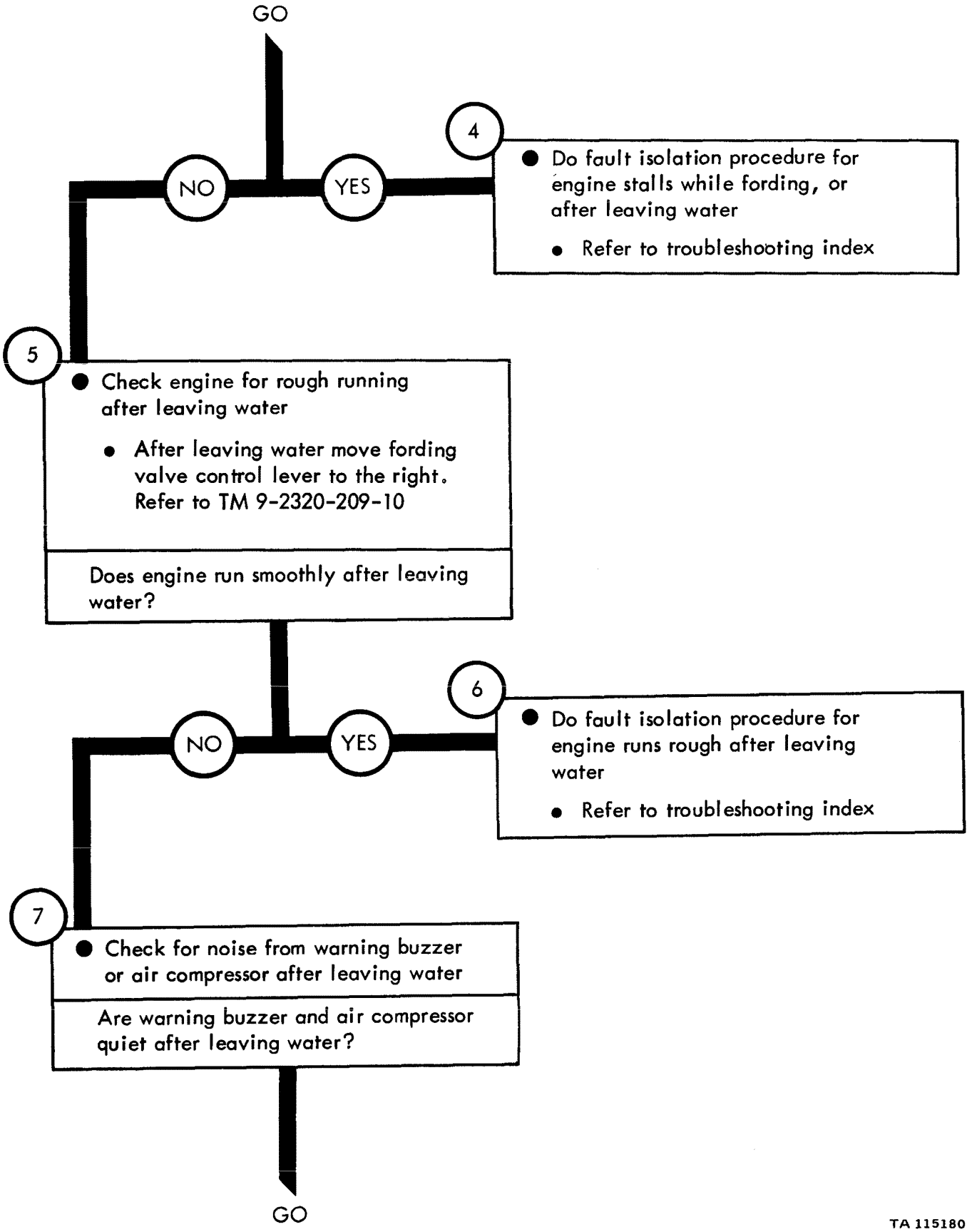
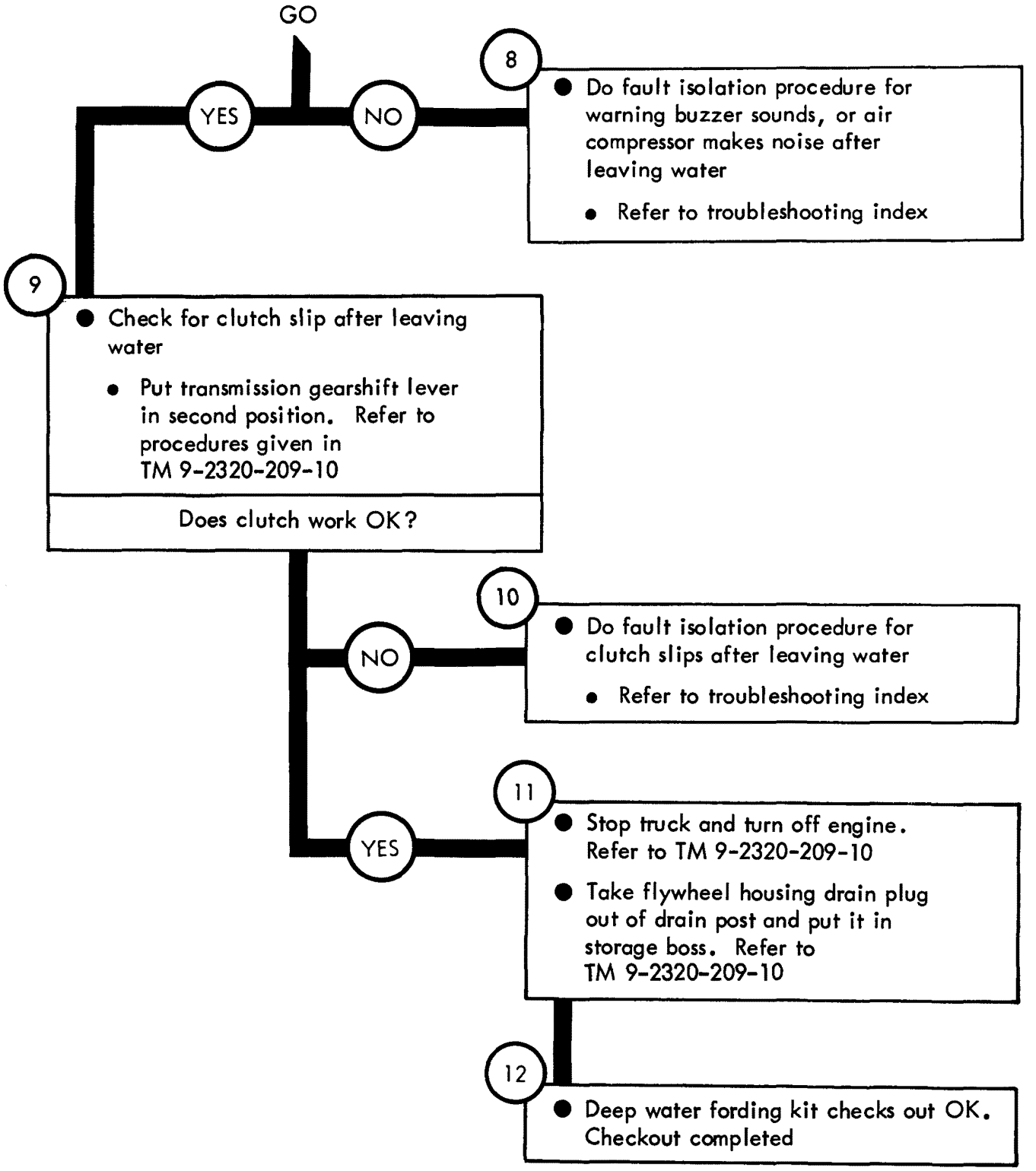


Figure 97-1 (Sheet 2 of 3)



TA 115181

Figure 97-1 (Sheet 3 of 3)

CHAPTER 98

NON-ELECTRICAL GAGES TROUBLESHOOTING

98-1. EQUIPMENT ITEMS COVERED. This chapter gives equipment troubleshooting procedures for the non-electrical gages, for which there are authorized corrective maintenance tasks at the organizational maintenance level.

98-2. EQUIPMENT ITEMS NOT COVERED. All equipment items for which corrective maintenance is authorized at the organizational maintenance level are covered in this chapter.

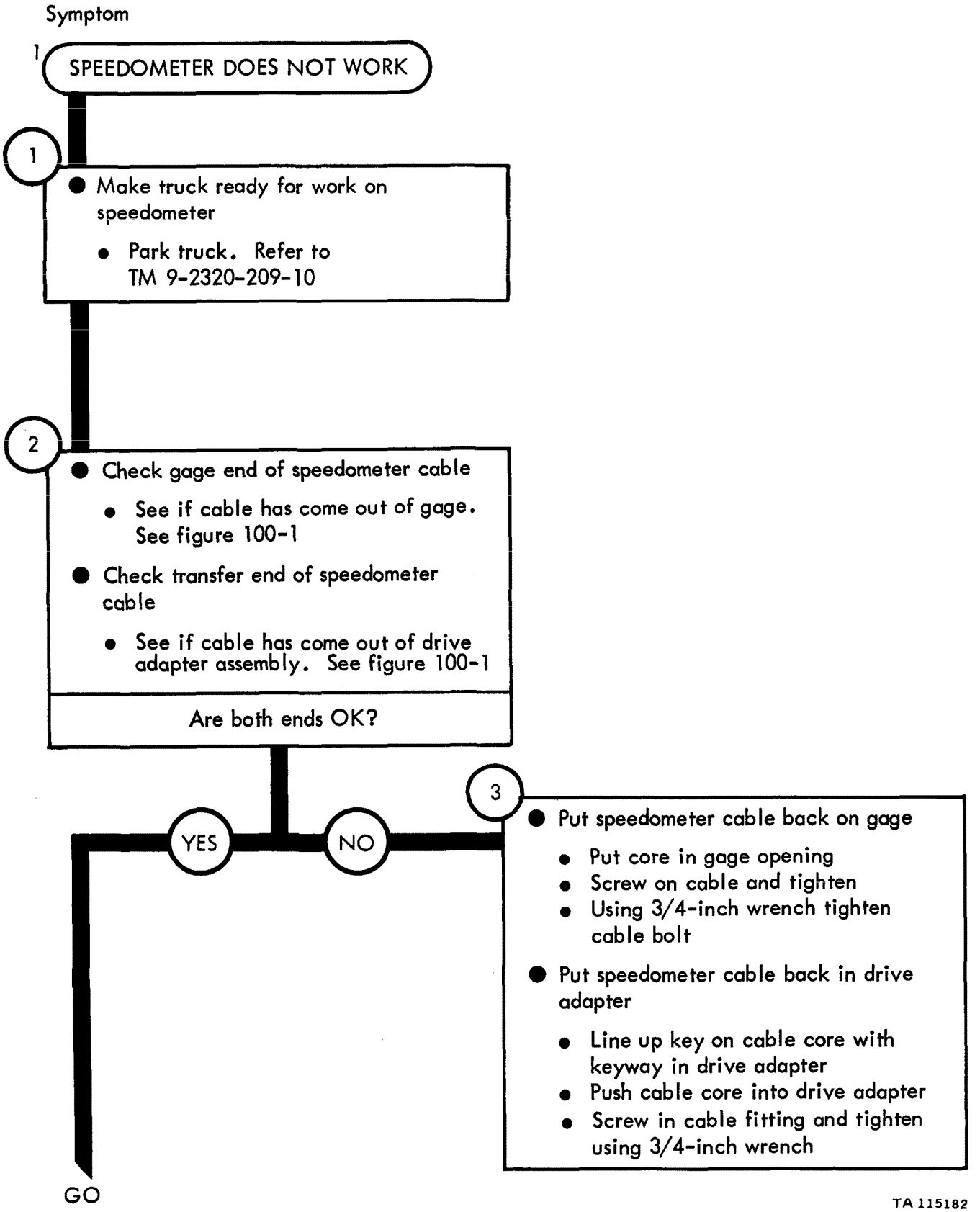


Figure 98-1 (Sheet 1 of 5)

GO

4

- Check speedometer cable housing
  - Look for a crushed, kinked or broken cable. See figure 100-1

Is speedometer cable housing OK?

YES — NO

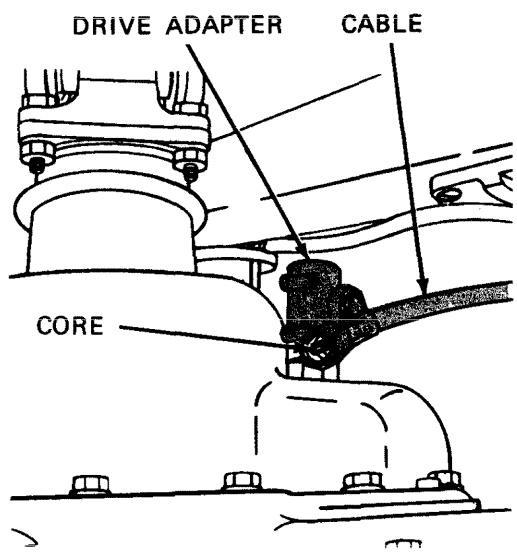
5

- Replace cable assembly
  - Refer to Vol 3, chapter 22, para 22-4

6

- Check cable core and cable key at drive adapter
  - Using 3/4-inch wrench, unscrew cable fitting and pull cable out of drive adapter. See figure 100-1
  - Look for a broken core or key

Are cable core and cable key OK?



YES — NO

7

- Replace cable core if core or key is broken
  - Refer to Vol 3, chapter 22, para 22-4

GO

TA 115183

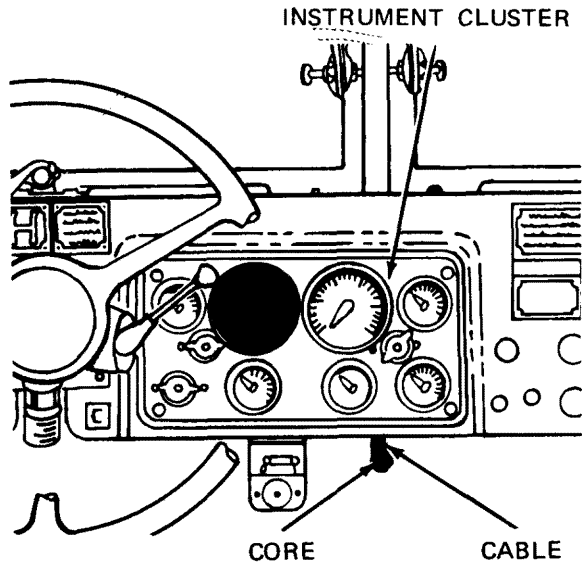
Figure 98-1 (Sheet 2 of 5)

GO

8

- Check cable core at speedometer assembly
  - Using 3/4-inch wrench, unscrew and pull out cable core from gage
  - Look for a broken core

Is cable core OK?



YES

NO

9

- Replace cable core if it is broken
  - Refer to Vol 3, chapter 22, para 22-4

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 115184

Figure 98-1 (Sheet 3 of 5)

GO

10

- Check speedometer cable as follows

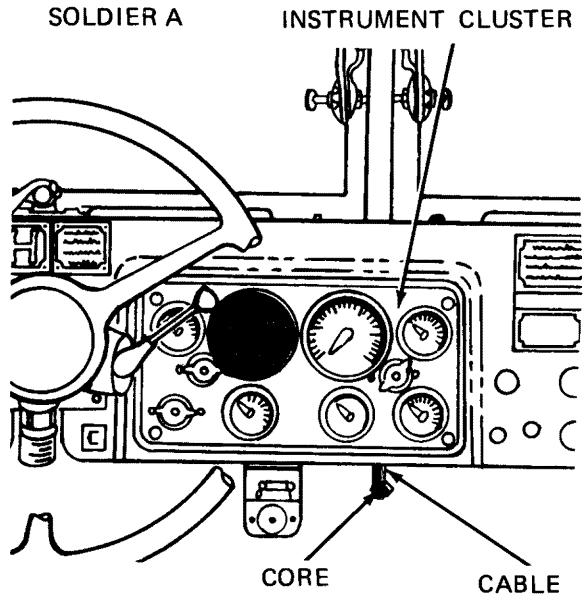
SOLDIER B:
- Crawl under transfer

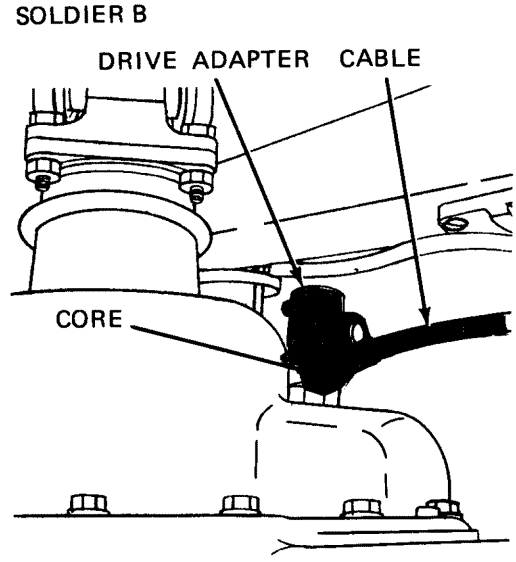
SOLDIER A:
- Go to driver's seat
- Tell SOLDIER B to turn speedometer core

SOLDIER B:
- Turn speedometer core

SOLDIER A:
- See if speedometer cable core turns

Does speedometer core turn?





YES

NO

11

- Replace speedometer cable assembly
  - Refer to Vol 3, chapter 22, para 22-4

GO

TA 115185

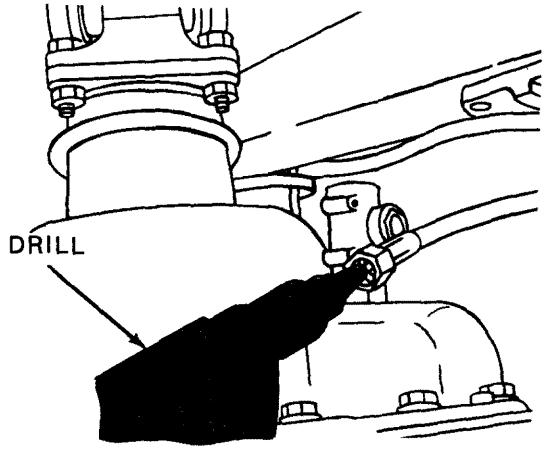
Figure 98-1 (Sheet 4 of 5)

GO

12

● Set up speedometer test

SOLDIER A:
- Put back core in speedometer gage opening
- Screw on cable fitting and tighten using 3/4-inch wrench
- Put a variable speed drill on drive adapter end of cable core



13

● Test speedometer

SOLDIER B:
- Watch speedometer

SOLDIER A:
- Run drill at a slow and steady speed for about 30 seconds

SOLDIER B:
- See if speedometer pointer moves

Does speedometer pointer move?

NO

14

● Replace speedometer gage assembly
- Refer to Vol 3, chapter 22, para 22-4

YES

15

● Replace speedometer drive adapter
- Refer to Vol 3, chapter 22, para 22-4

TA 115186

Figure 98-1 (Sheet 5 of 5)

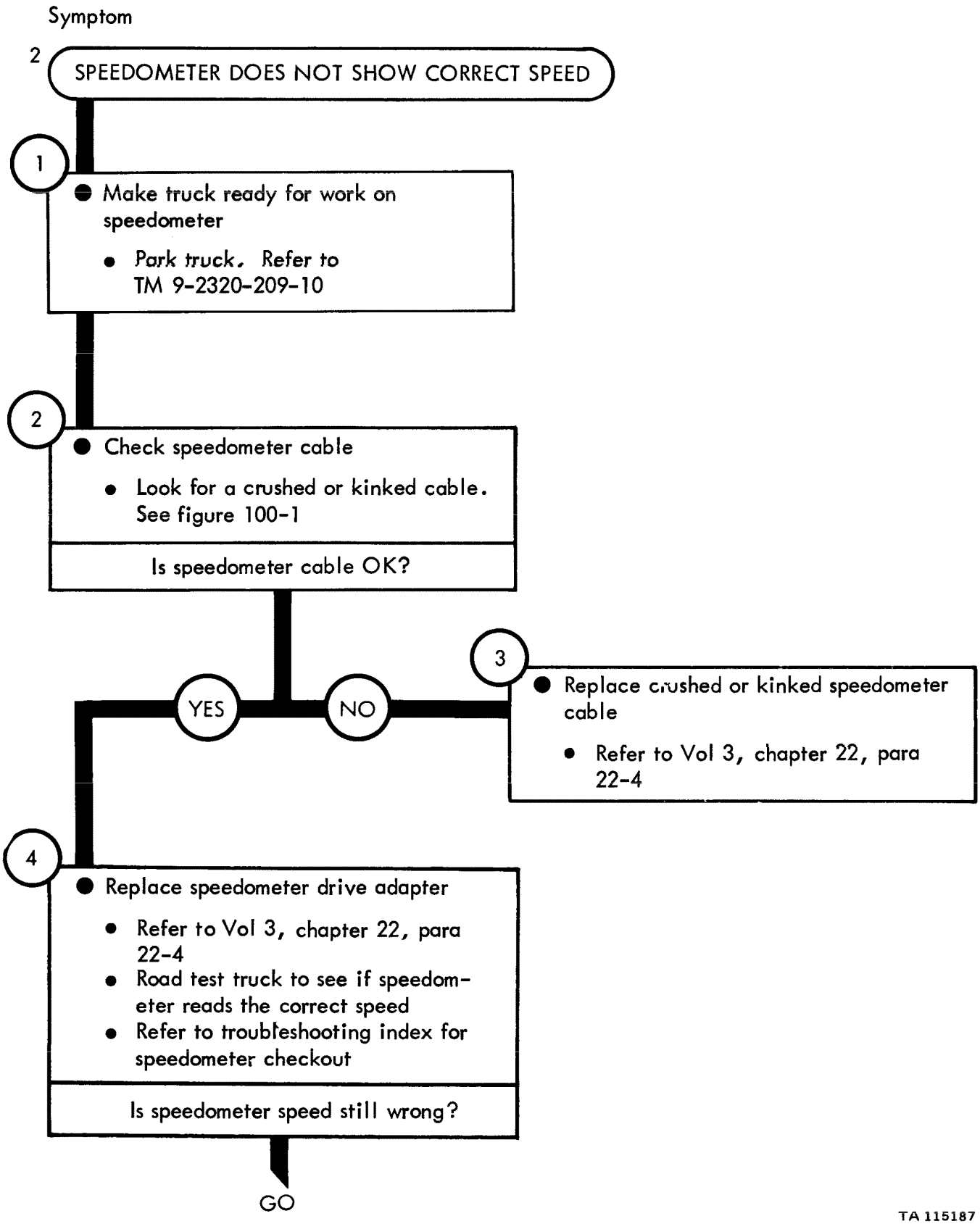
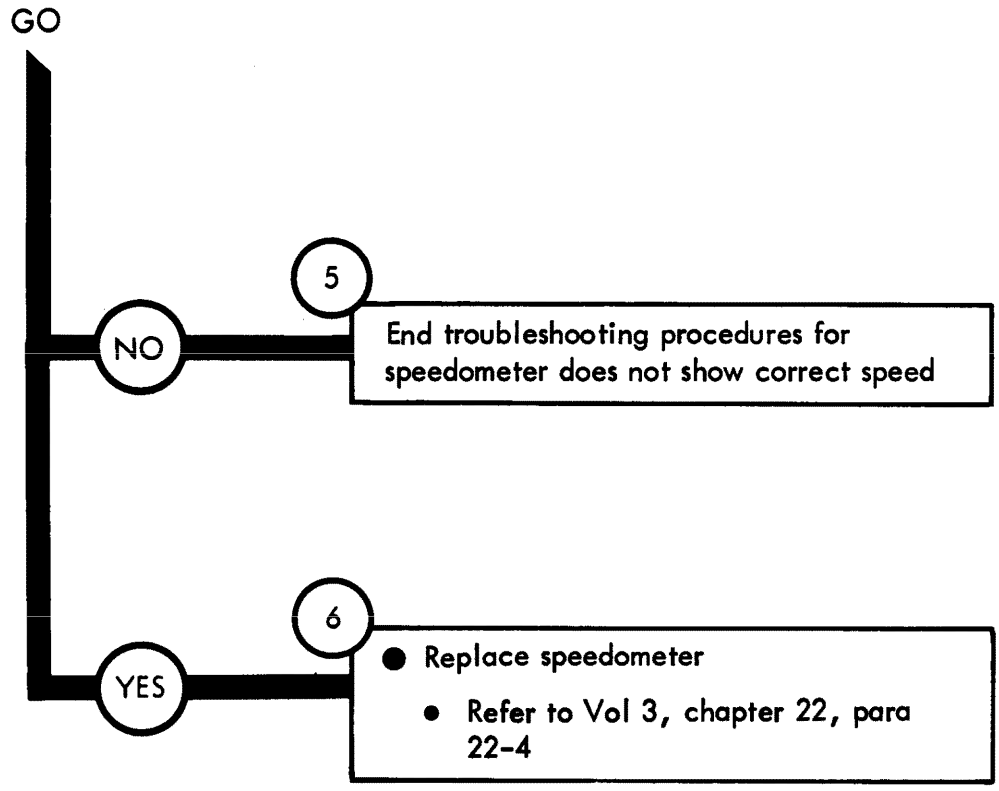


Figure 98-2 (Sheet 1 of 2)



TA 115188

Figure 98-2 (Sheet 2 of 2)

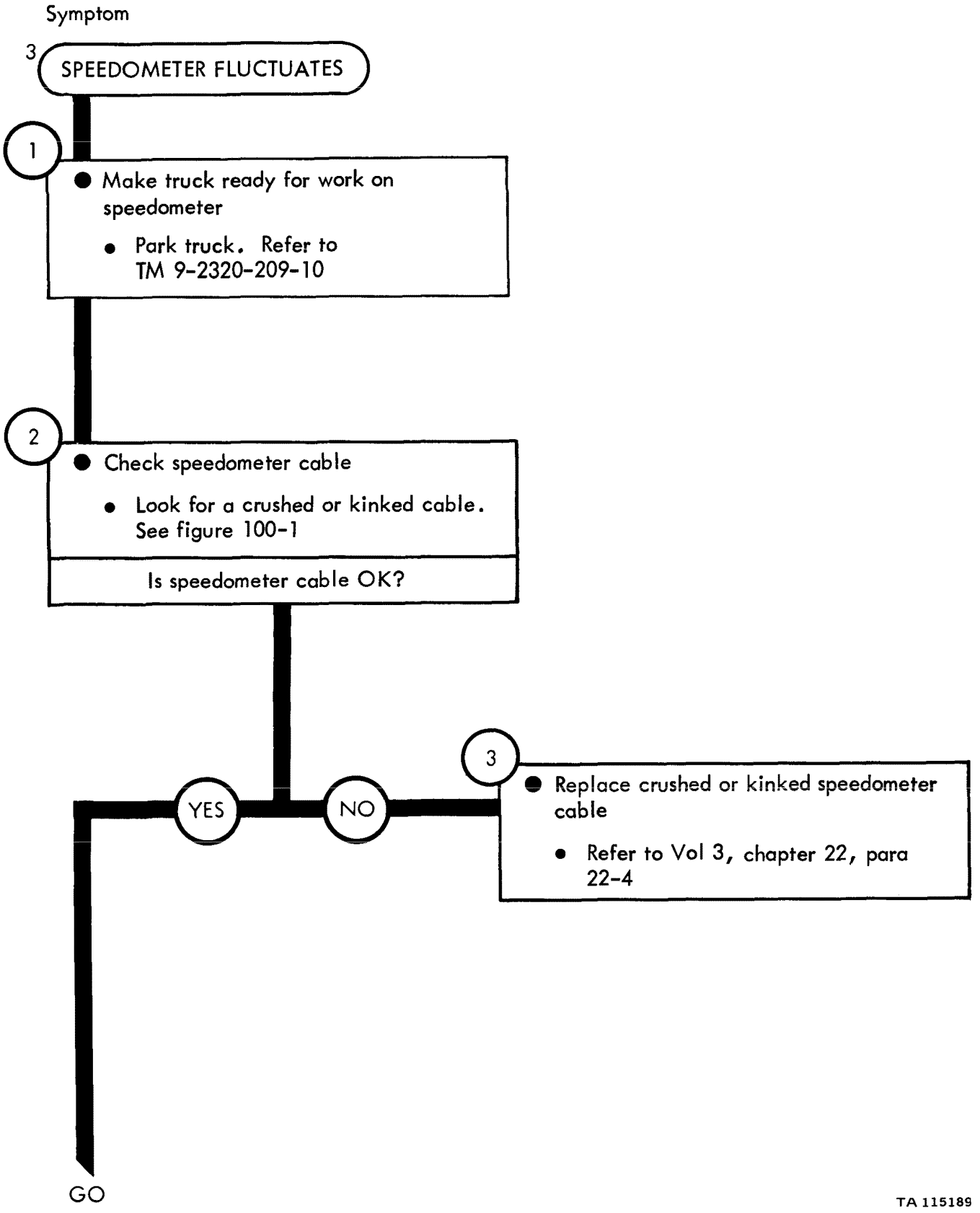
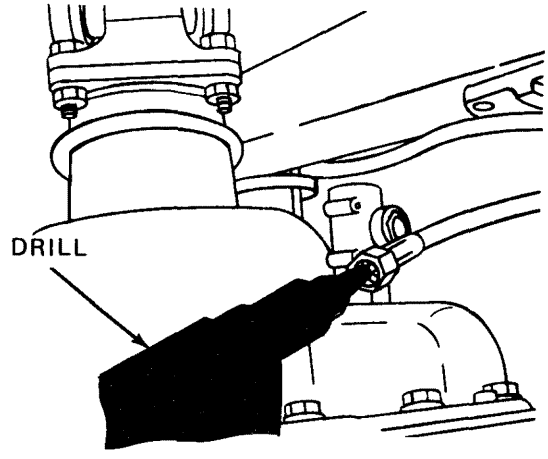


Figure 98-3 (Sheet 1 of 3)

GO

4

- Set up speedometer test
  - Using 3/4-inch wrench, unscrew and takeoff speedometer cable from drive joint assembly. See figure 100-1
  - Put a variable speed drill on cable core end



NOTE

This 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

5

- Test speedometer

SOLDIER B: • Go to driver's seat and watch speedometer

SOLDIER A: • Run drill at a slow and steady speed for about 30 seconds

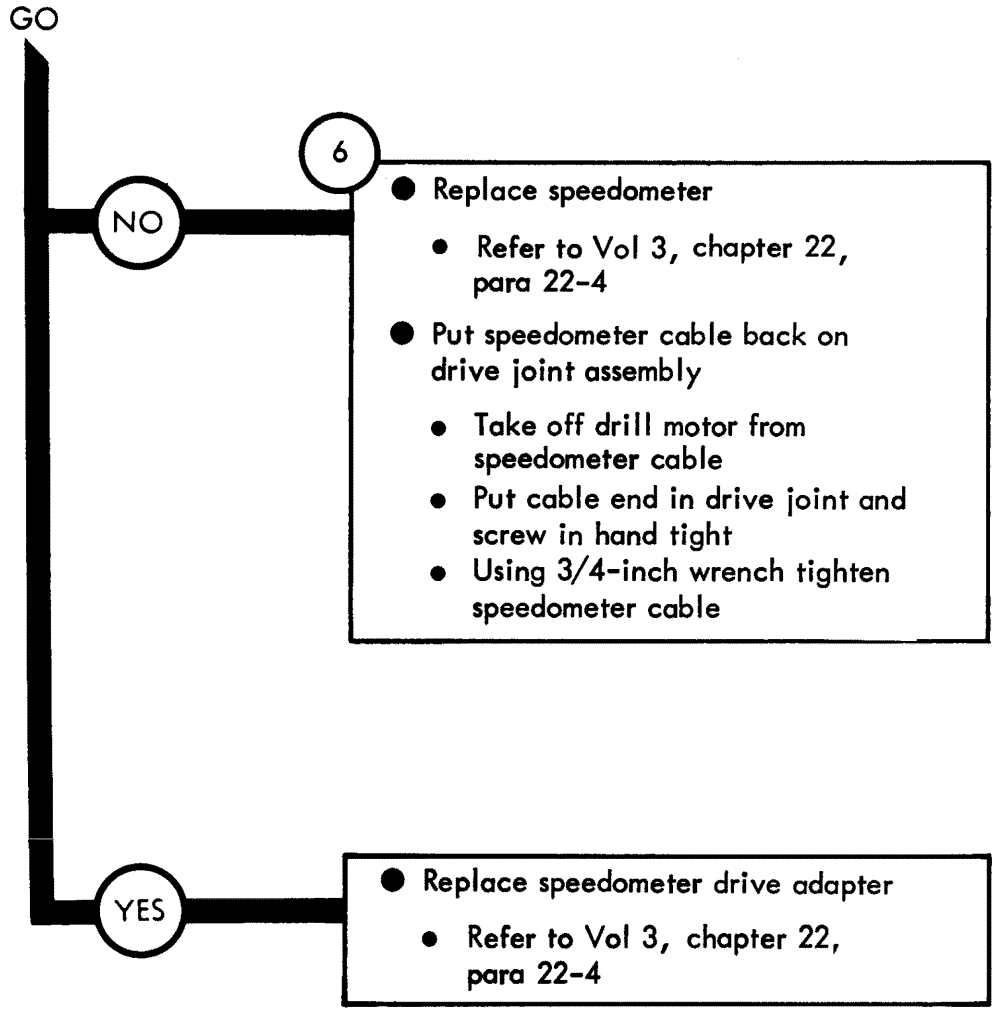
SOLDIER B: • See if speedometer pointer moves unevenly

Does speedometer run smoothly?

GO

TA 115190

Figure 98-3 (Sheet 2 of 3)



TA 115191

Figure 98-3 (Sheet 3 of 3)

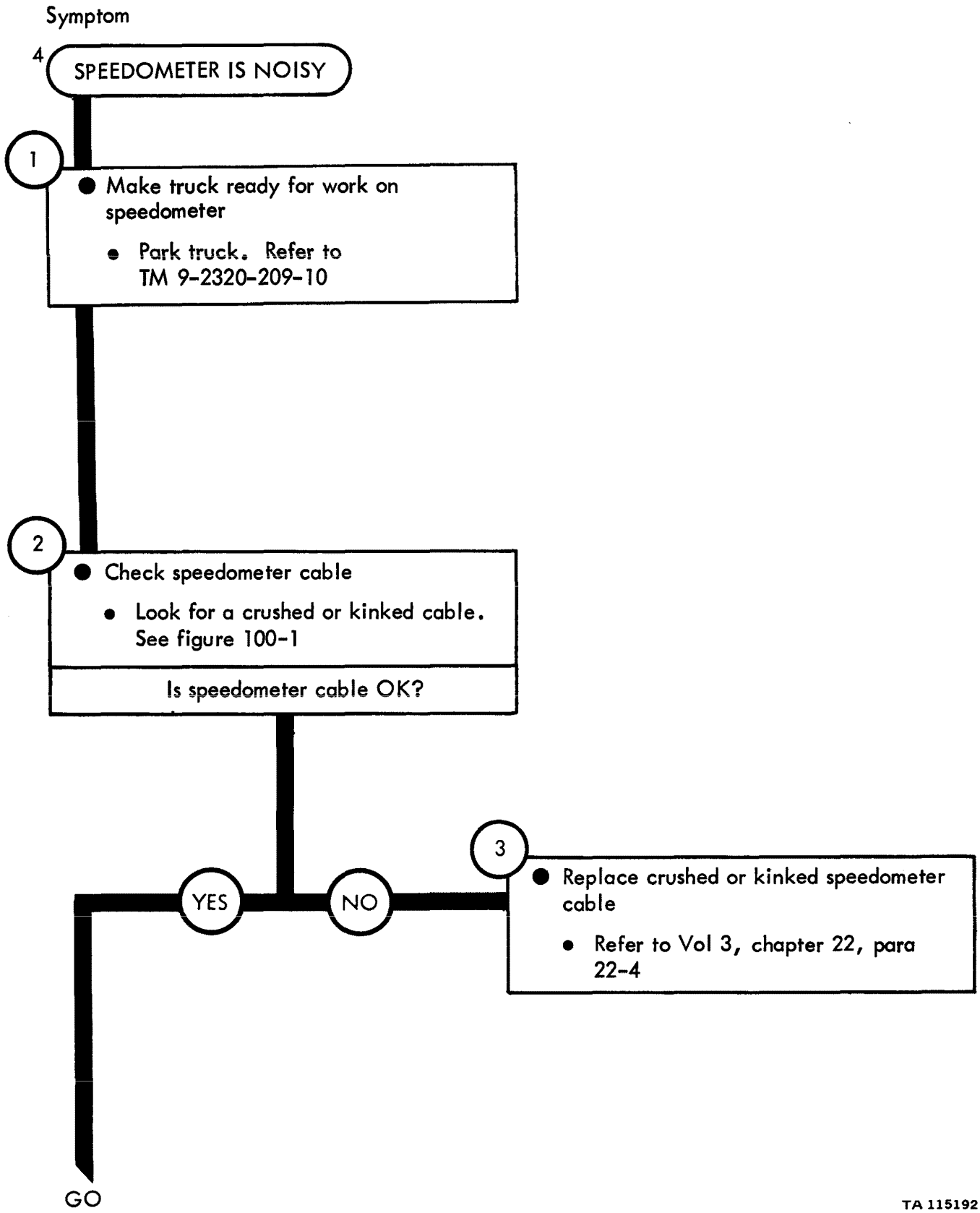
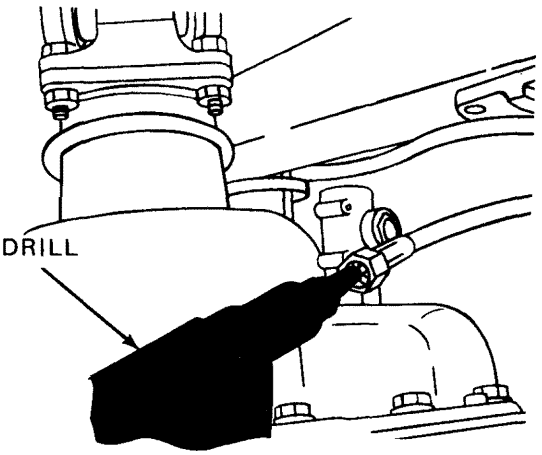


Figure 98-4 (Sheet 1 of 3)

GO

4

- Set up speedometer test
  - Using 3/4-inch wrench, unscrew and take off speedometer cable from drive joint assembly
  - Put a variable speed drill on cable core end



NOTE

This 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

5

- Test speedometer

SOLDIER B:
- Go to driver's seat and listen for noise coming from speedometer when drill is used

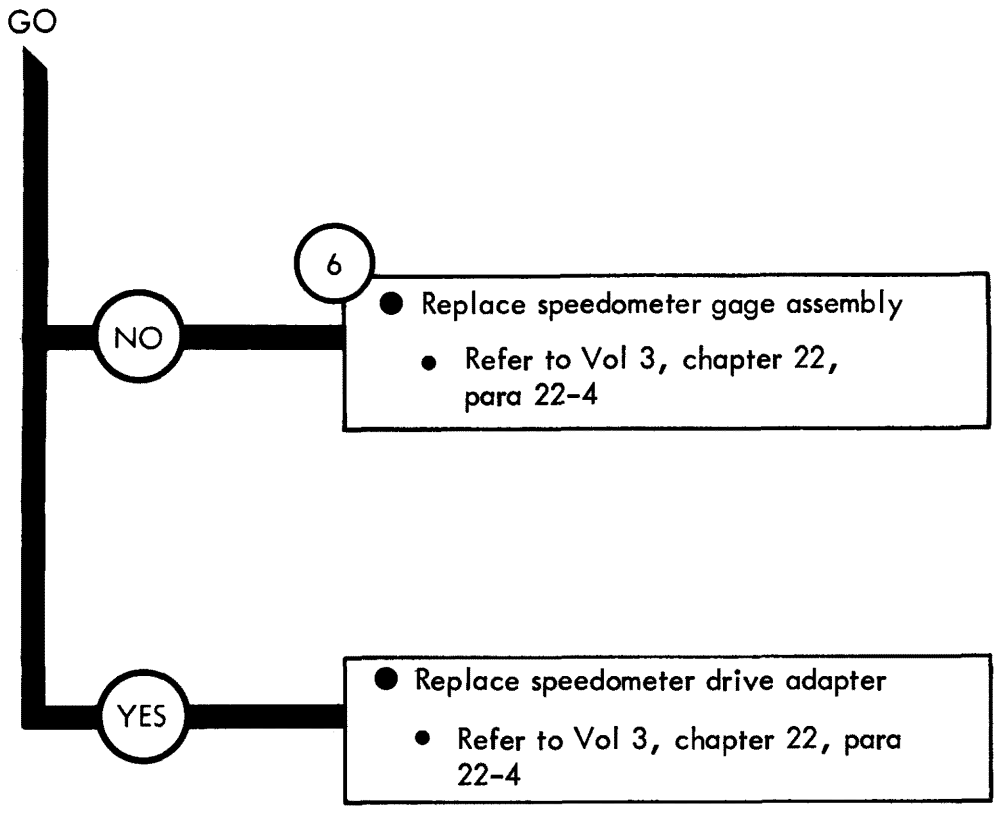
SOLDIER A:
- Run drill at a slow and steady speed for about 30 seconds

Is speedometer quiet?

GO

TA 115193

Figure 98-4 (Sheet 2 of 3)



TA 115194

Figure 98-4 (Sheet 3 of 3)

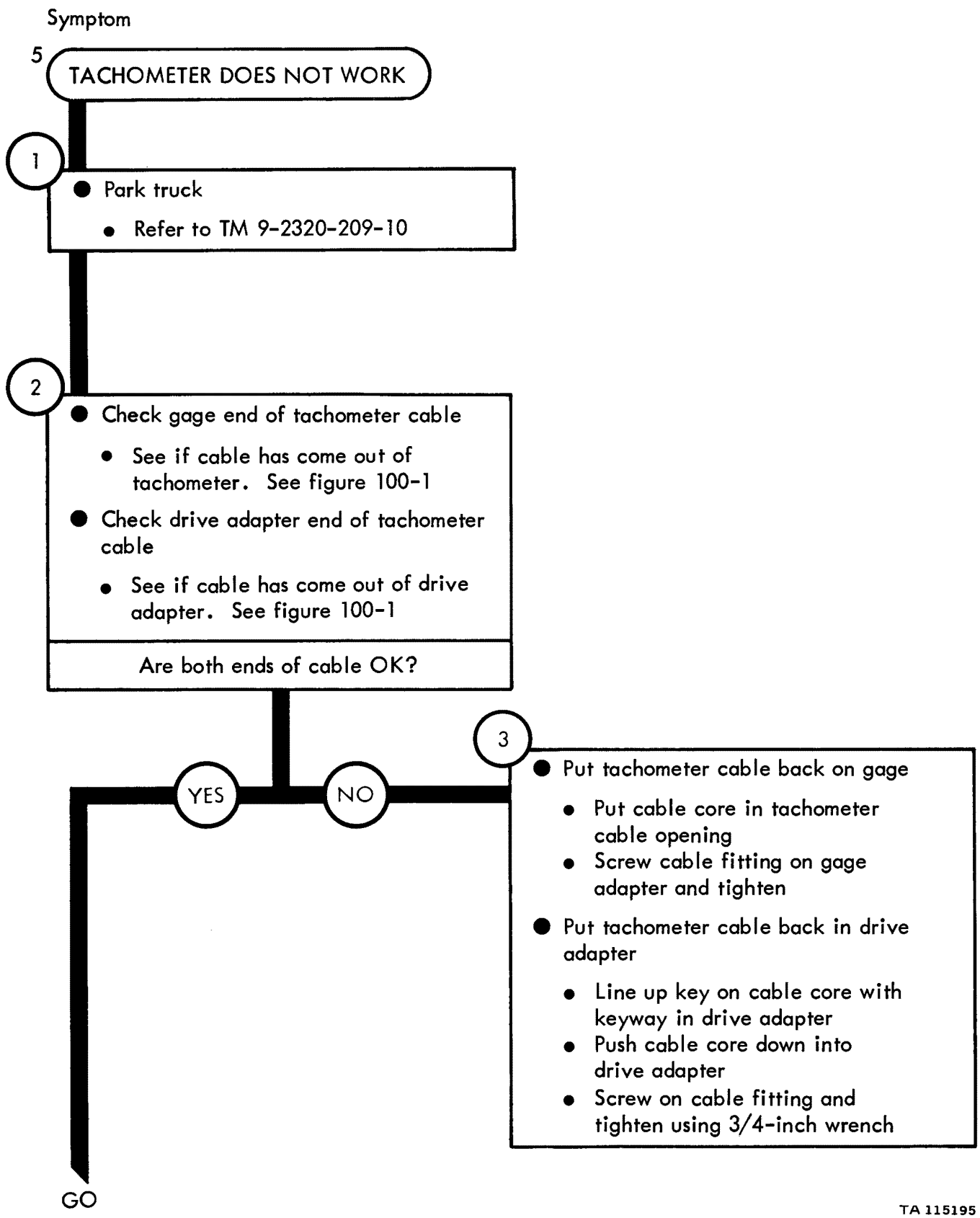


Figure 98-5 (Sheet 1 of 3)

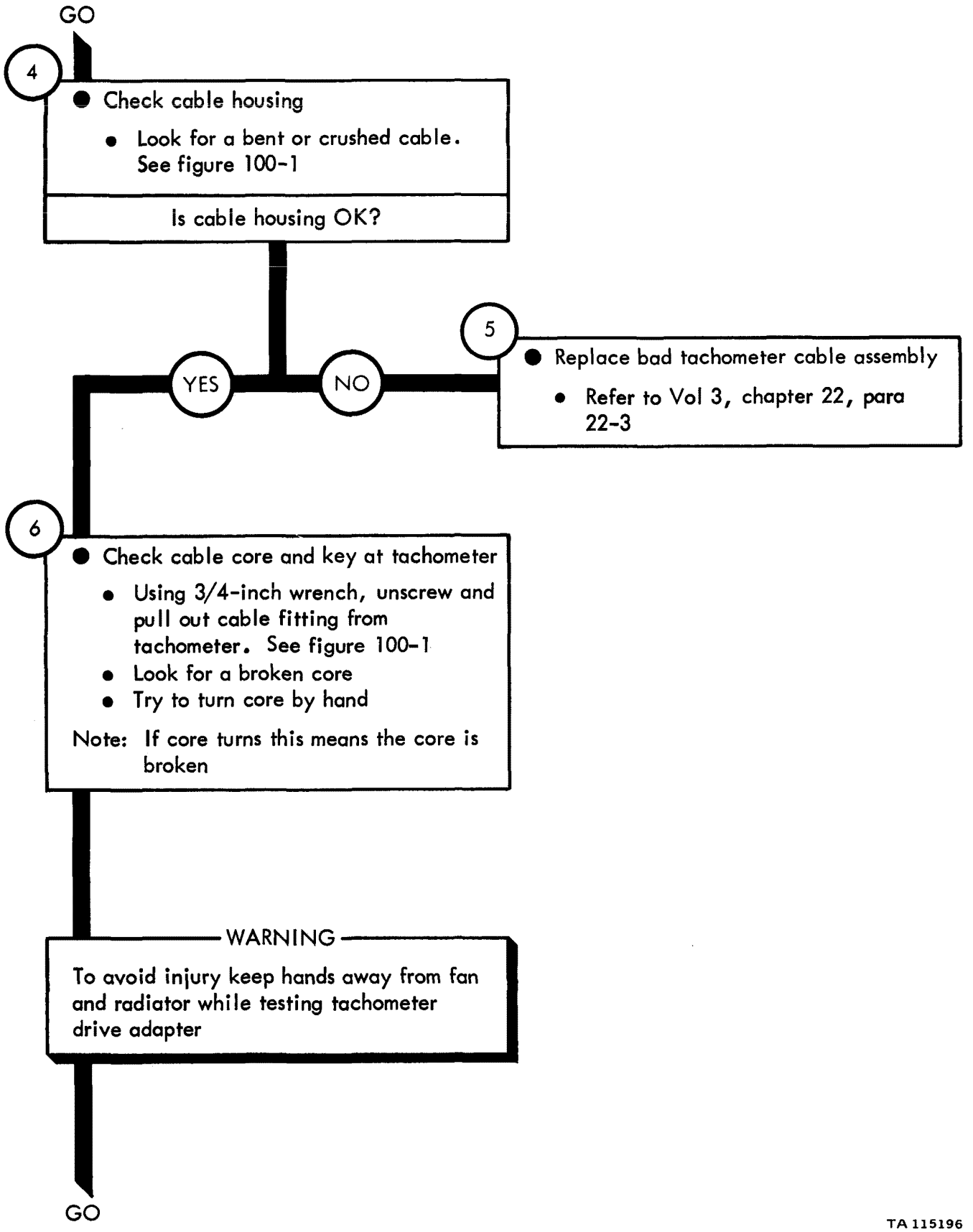
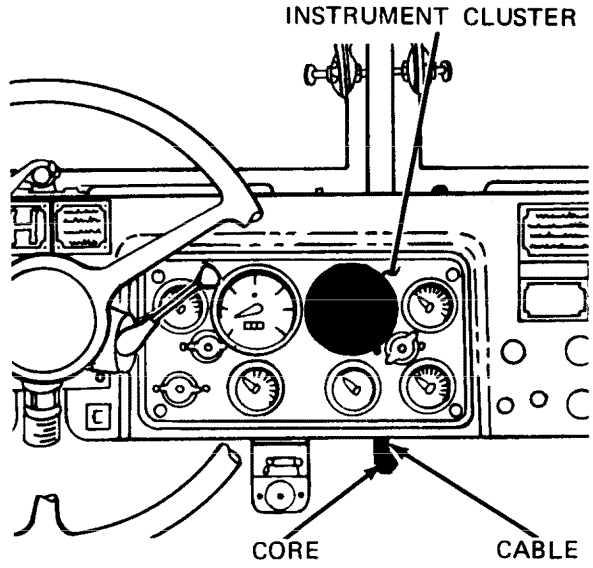


Figure 98-5 (Sheet 2 of 3)



7

- Test tachometer drive adapter
  - Start engine. Refer to TM 9-2320-209-10
  - Look at cable core
  - See if core is turning
  - Turn off engine. Refer to TM 9-2320-209-10

Is tachometer cable core and drive adapter OK?

NO

8

- Replace broken cable core
  - Refer to Vol 3, chapter 22, para 22-3
- Replace tachometer drive adapter if drive shaft does not turn
  - Refer to Vol 3, chapter 23, para 22-3

YES

9

- Put tachometer cable back in tachometer
  - Line up key on cable core with keyway in tachometer
  - Push cable core down into tachometer
  - Screw on cable fitting and tighten using 3/4-inch wrench

10

- Replace tachometer gage
  - Refer to Vol 3, chapter 22, para 22-3

TA 115197

Figure 98-5 (Sheet 3 of 3)

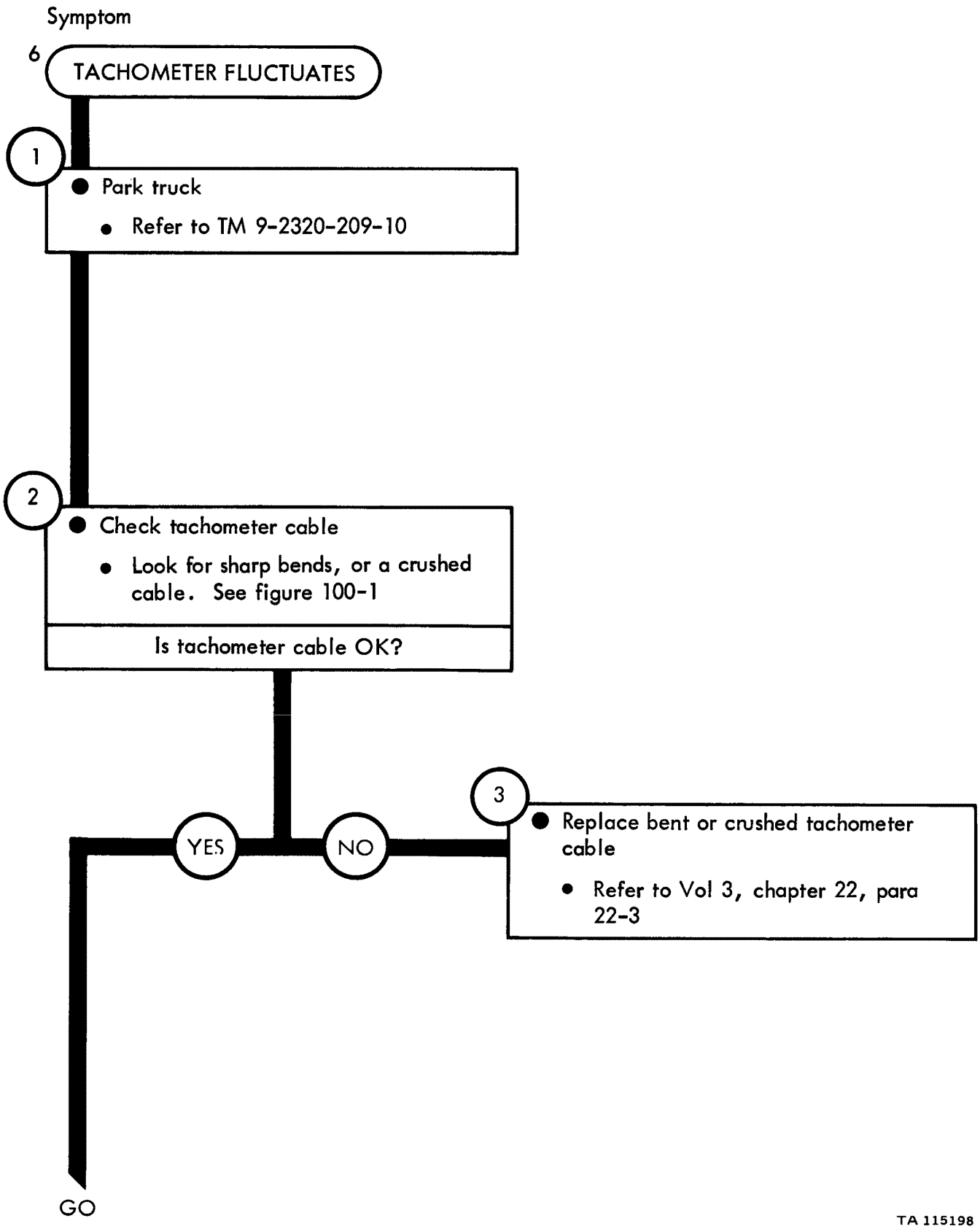


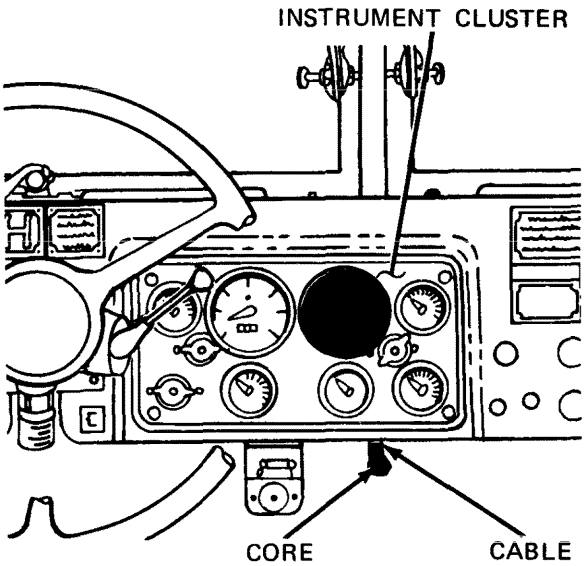
Figure 98-6 (Sheet 1 of 2)

GO

4

- Check tachometer drive adapter
  - Unscrew and pull out cable from tachometer. See figure 100-1
  - Let cable end hang down so that it is just below the instrument cluster
  - Start engine. Refer to TM 9-2320-209-10
  - Run engine at a steady speed and see if cable core turns at a steady speed
  - Turn off engine. Refer to TM 9-2320-209-10

Does cable turn at a steady speed?



NO

5

- Replace drive adapter
  - Refer to Vol 3, chapter 22, para 22-3

YES

6

- Replace tachometer gage
  - Refer to Vol 3, chapter 22, para 22-3

TA 115199

Figure 98-6 (Sheet 2 of 2)

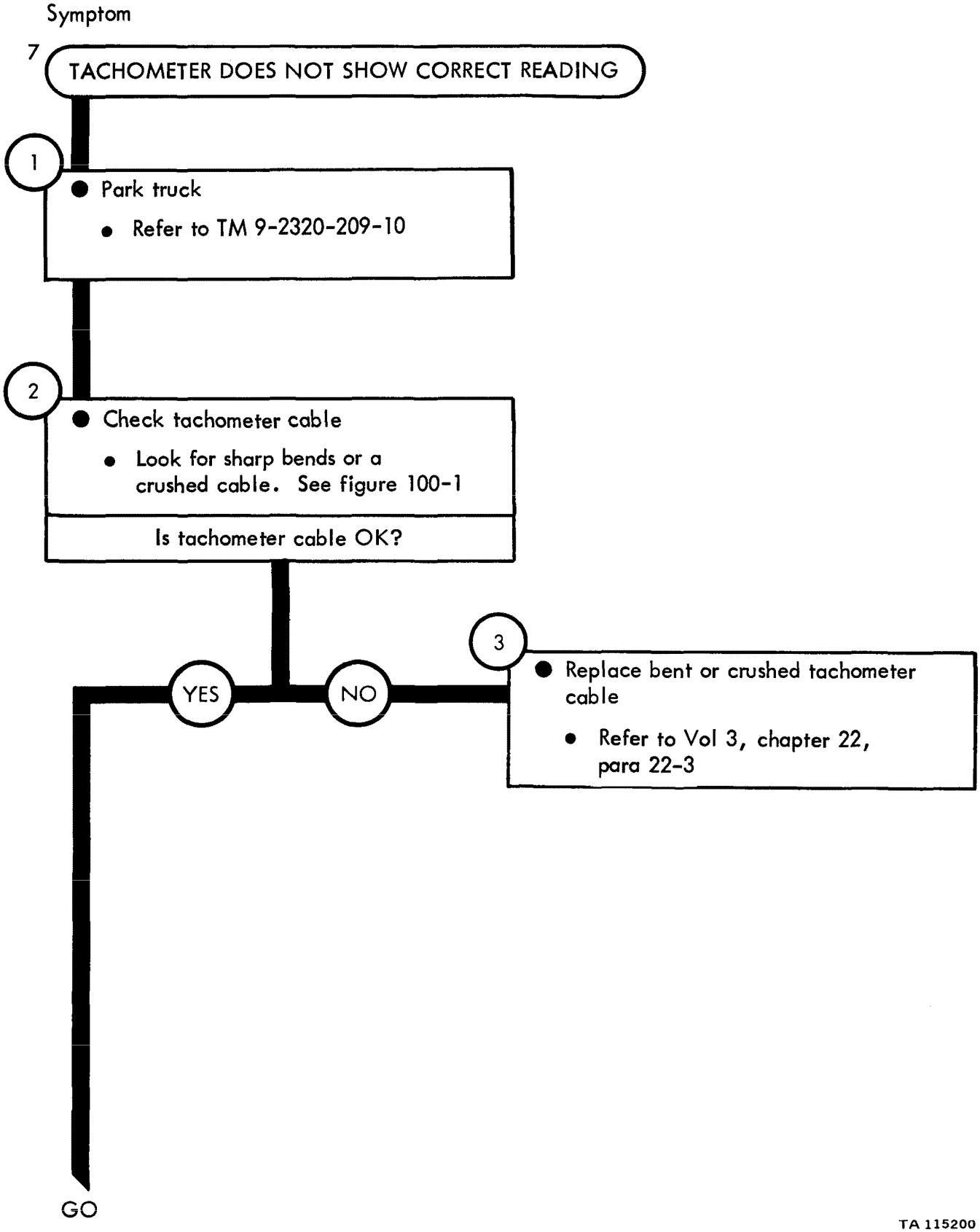


Figure 98-7 (Sheet 1 of 3)

GO

4

- Check tachometer
  - Start engine and place vehicle in motion. Refer to TM 9-2320-209-10
  - Run truck at 30 miles per hour and make a note of tachometer gage reading
  - Park truck. Refer to TM 9-2320-209-10
  - Unscrew and pull out cable fitting from tachometer. See figure 100-1
  - Screw cable fitting into another tachometer that is known to be good

NOTE

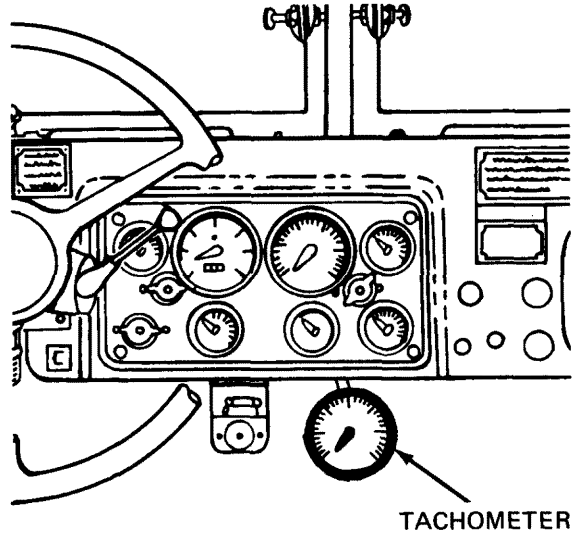
The next step will need the use of two soldiers. The lead soldier will be known as SOLDIER A and the helper will be called SOLDIER B

SOLDIER B:
- Sit in companion seat and hold tachometer being used for test

SOLDIER A:
- Start engine and place vehicle in motion. Refer to TM 9-2320-209-10
- Run truck at 30 miles per hour and make note of the reading on the tachometer being used for test
- Park truck. Refer to TM 9-2320-209-10
- Unscrew and pull out cable fitting from tachometer

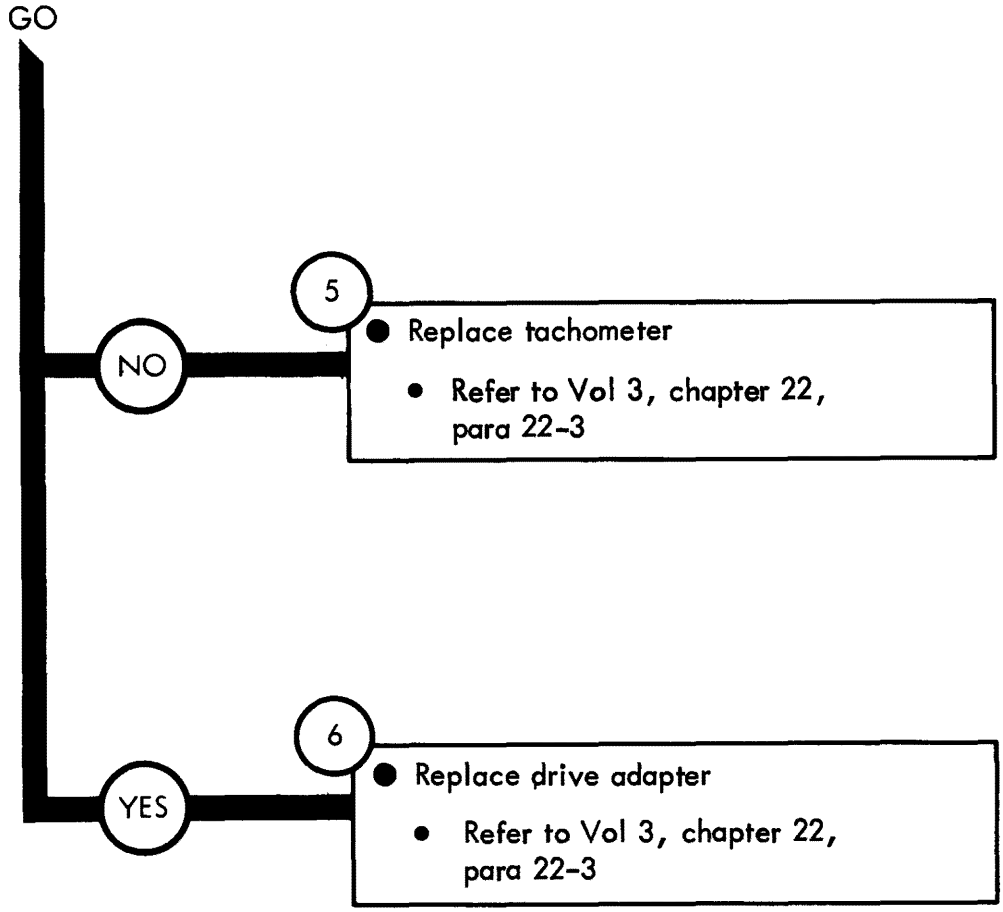
Are both tachometer readings the same?

GO



TA 115201

Figure 98-7 (Sheet 2 of 3)



TA 115202

Figure 98-7 (Sheet 3 of 3)

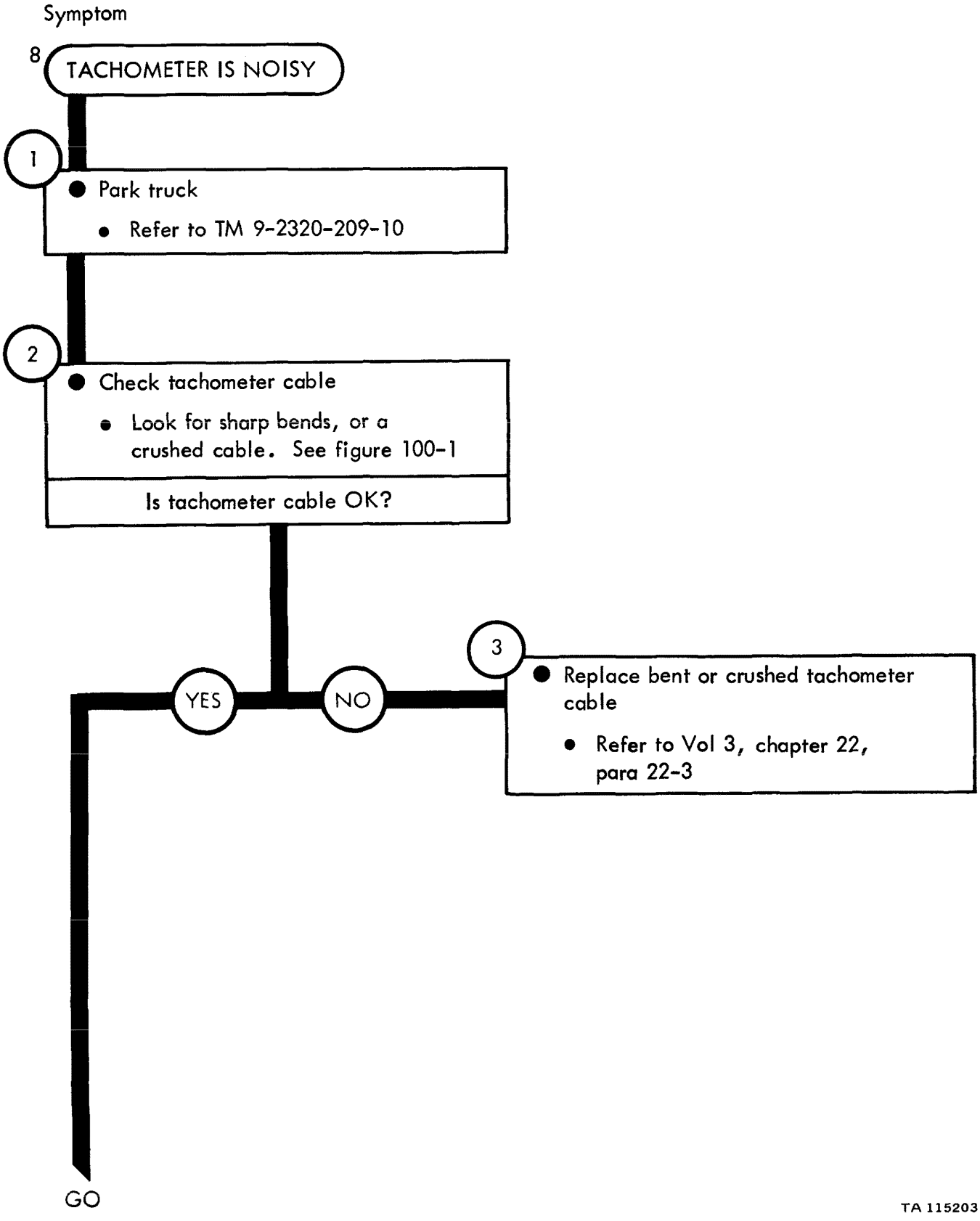


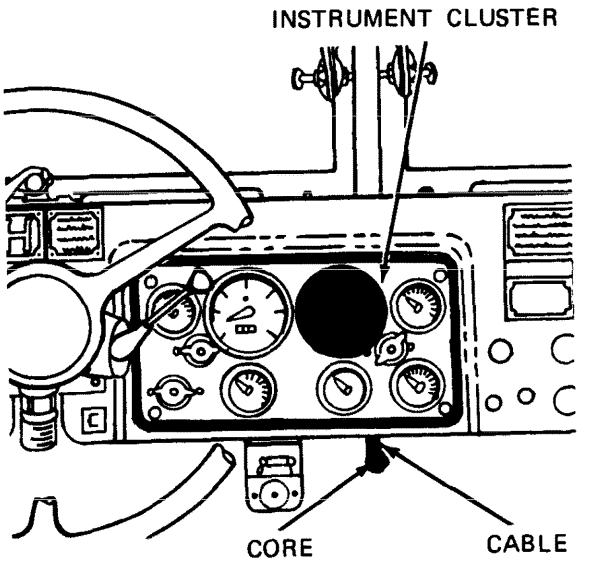
Figure 98-8 (Sheet 1 of 2)

GO

4

- Check tachometer drive adapter
  - Unscrew and pull out cable case from tachometer. See figure 100-1
  - Let cable end hang down so that it is just below the instrument cluster
  - Start engine. Refer to TM 9-2320-209-10
  - Run engine at a steady speed and listen for noise
  - Turn off engine. Refer to TM 9-2320-209-10

Is tachometer noise gone?



NO

5

- Replace drive adapter
  - Refer to Vol 3, chapter 22, para 22-3

YES

6

- Replace tachometer gage
  - Refer to Vol 3, chapter 22, para 22-3

TA 115268

Figure 98-8 (Sheet 2 of 2)

CHAPTER 99

NON-ELECTRICAL GAGES TROUBLESHOOTING SUMMARY

99-1. GENERAL. This chapter gives a summary of troubleshooting procedures given in chapter 98 for the nonelectrical gages.

99-2. PROCEDURES. The summary in this chapter covers all fault symptoms found in the detailed troubleshooting procedures. Chapter 7 outlines a sample troubleshooting procedure. The summary procedures are based on the "what-to-do" portions of the detailed procedures and do not include the "how-to-do-it" instructions. Warnings, cautions, and notes are given where needed.

NON-ELECTRICAL GAGES TROUBLESHOOTING SUMMARY

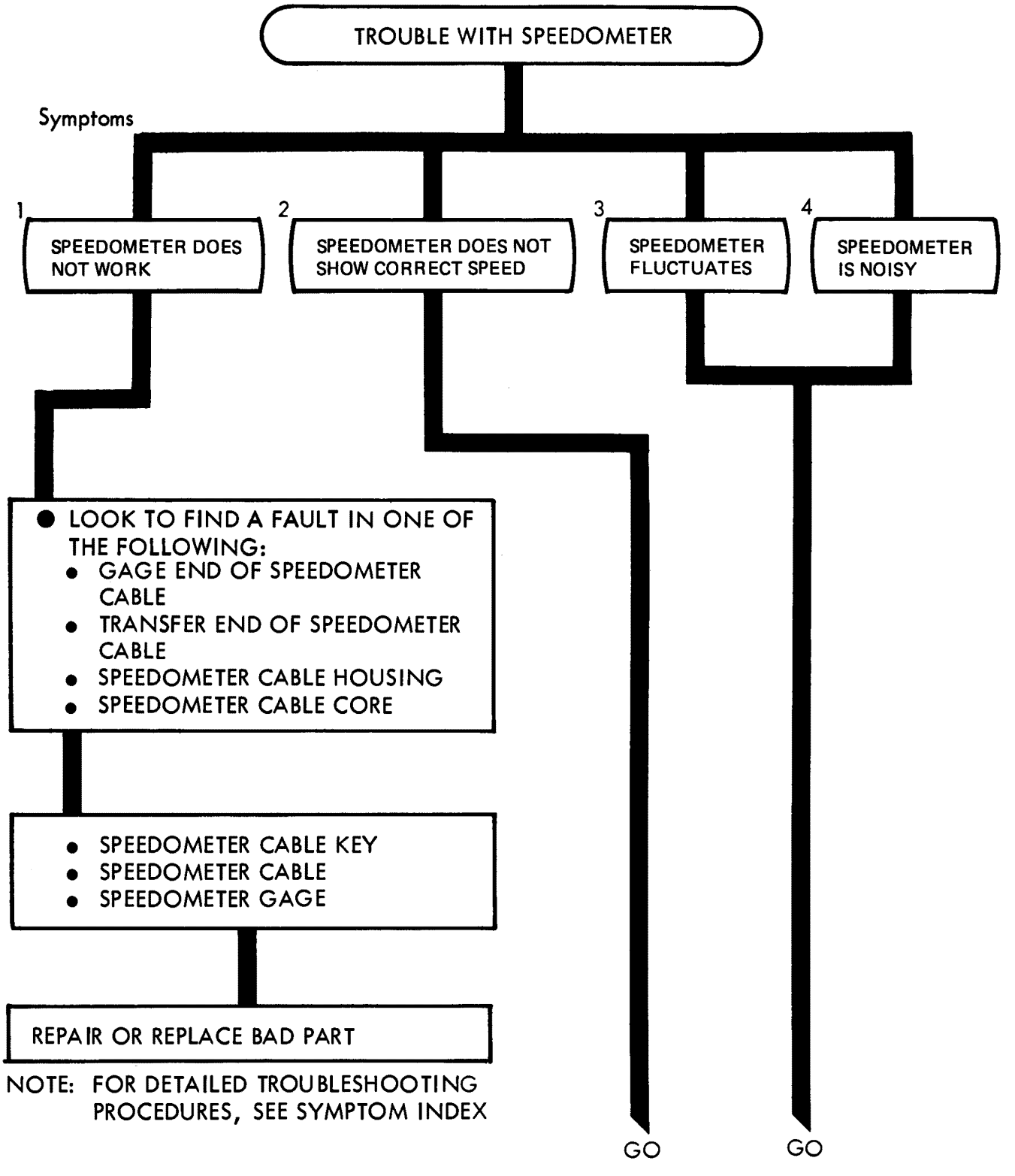
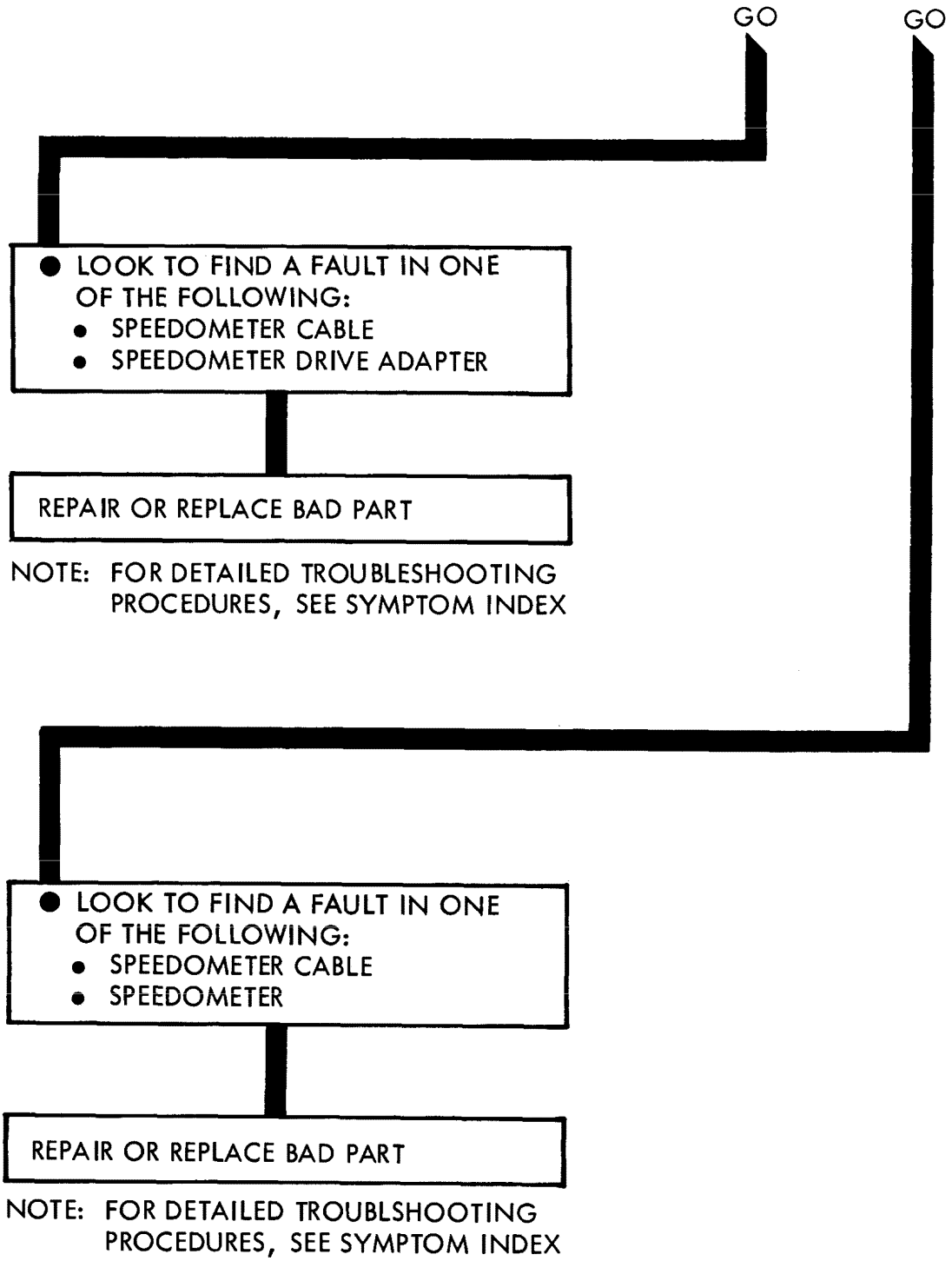


Figure 99-1 (Sheet 1 of 2)



TA 115205

Figure 99-1 (Sheet 2 of 2)

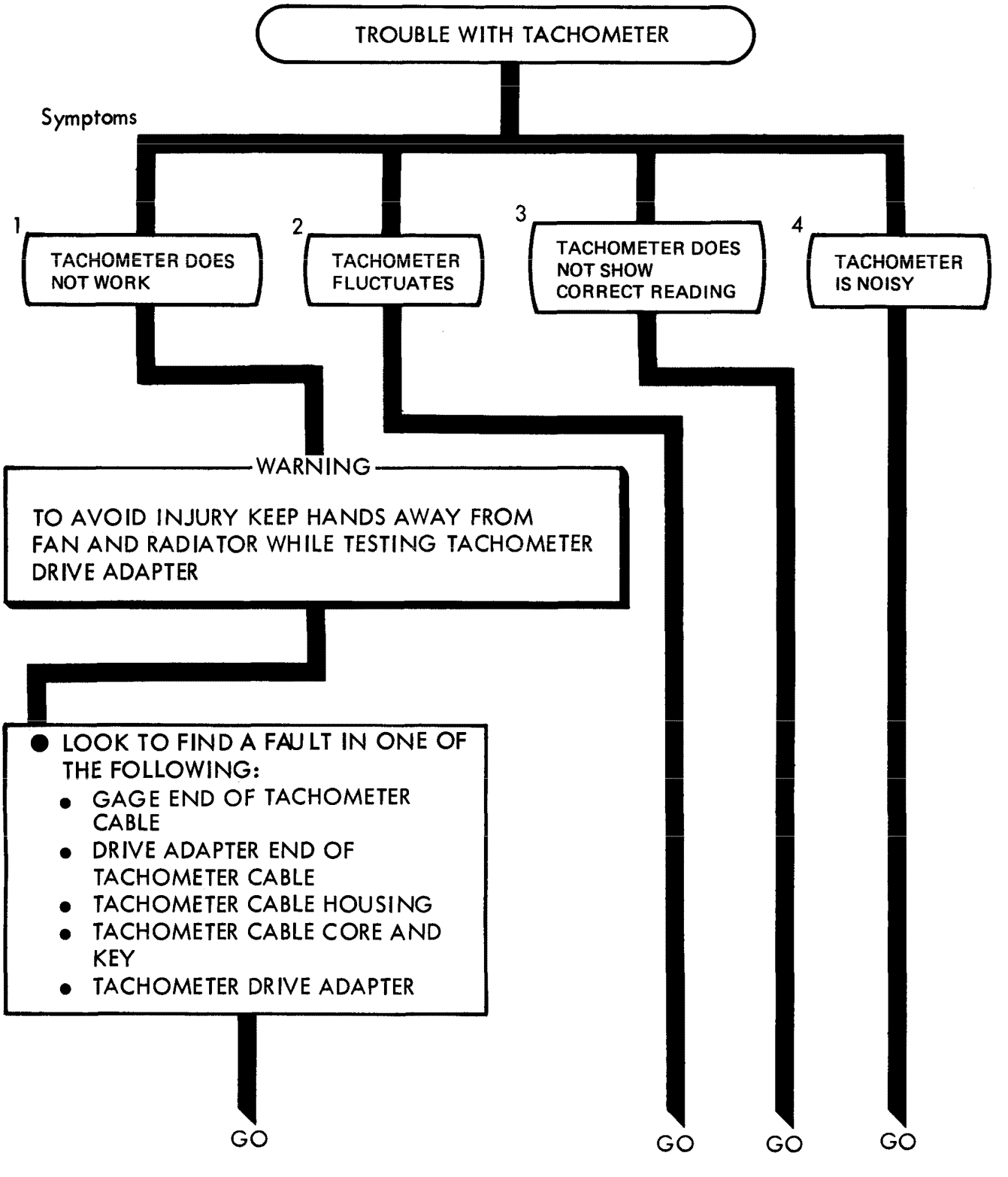


Figure 99-2 (Sheet 1 of 3)

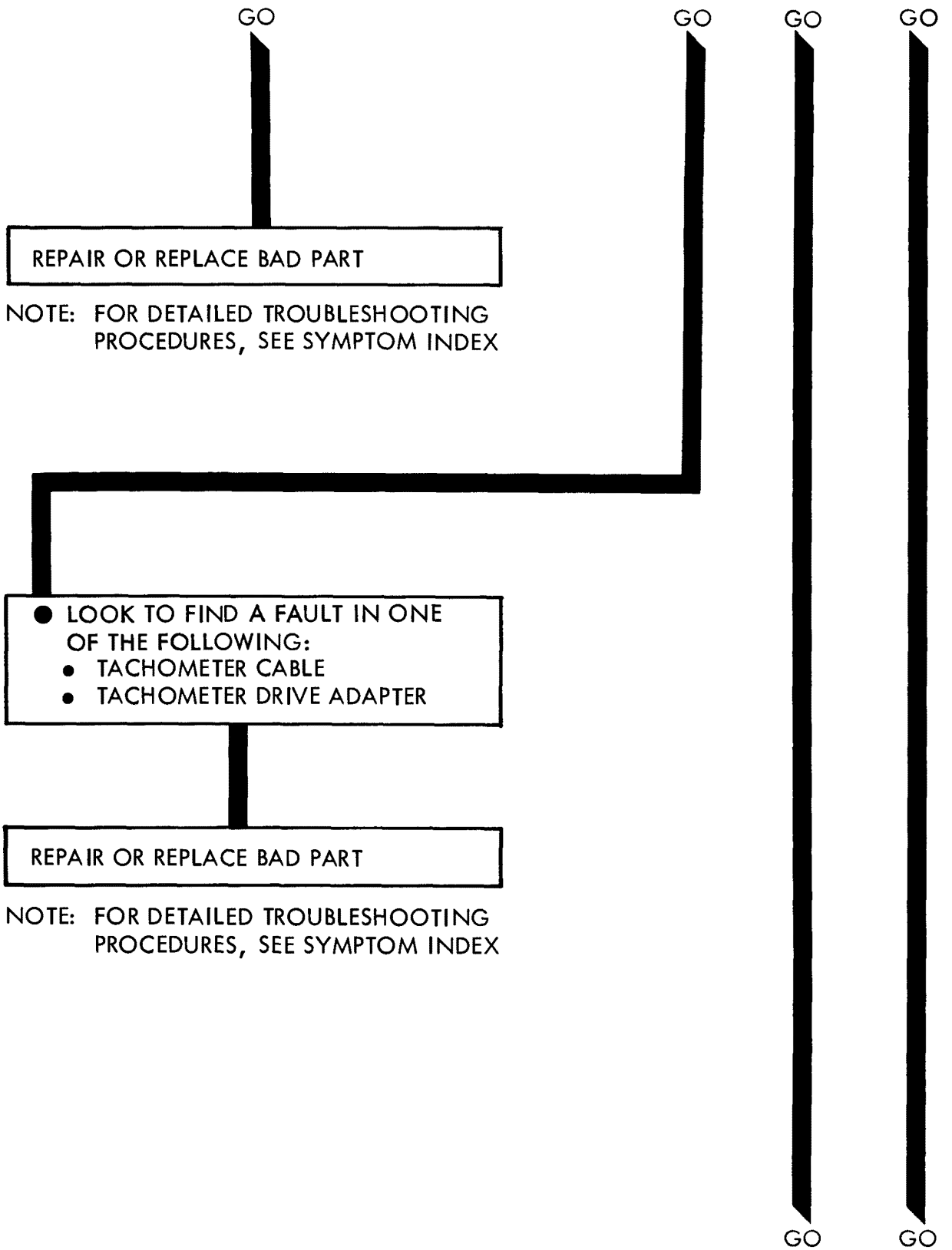


Figure 99-2 (Sheet 2 of 3)

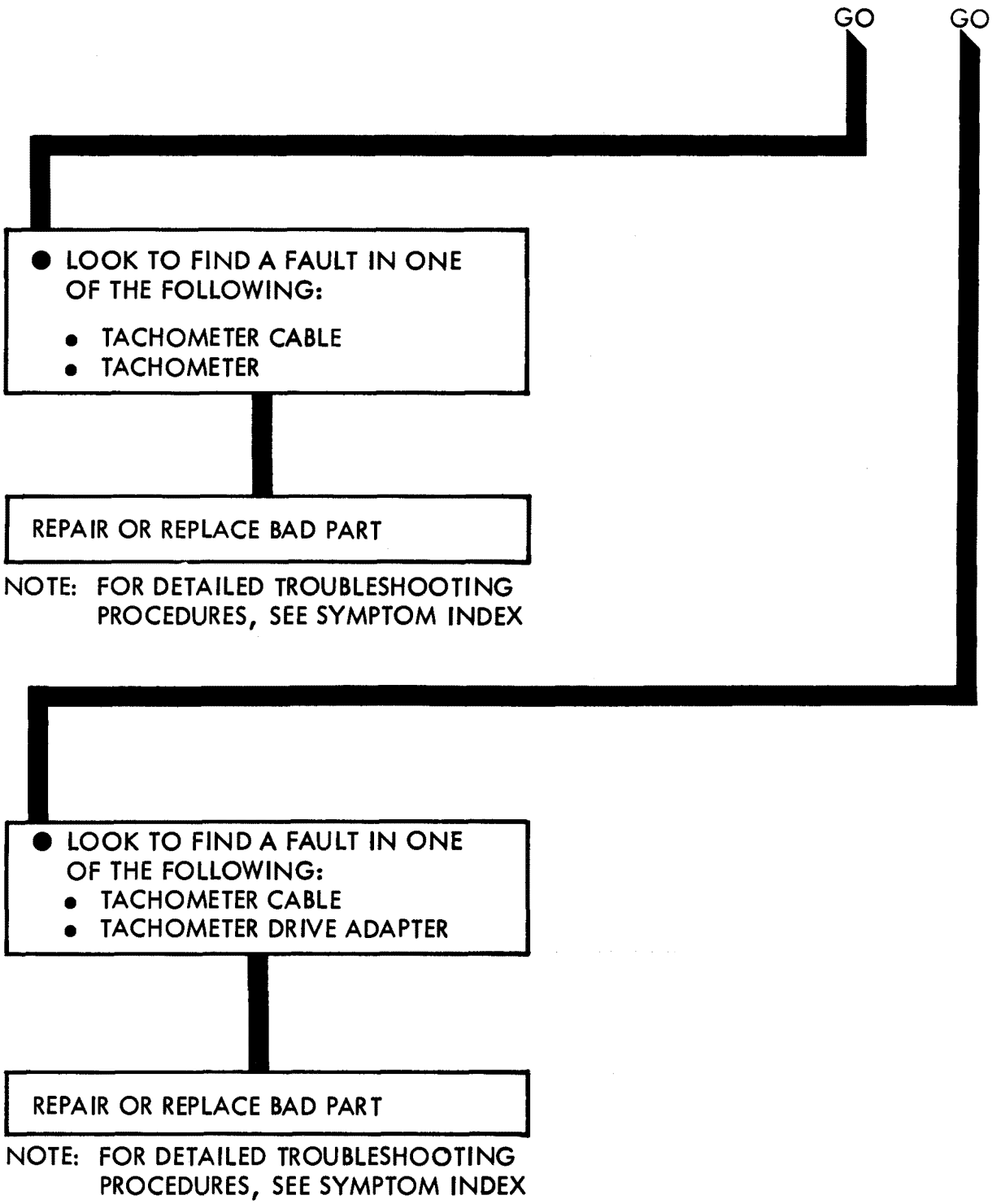


Figure 99-2 (Sheet 3 of 3)

CHAPTER 100

NON-ELECTRICAL GAGES SUPPORT DIAGRAMS

100-1. GENERAL. This chapter gives the diagrams you need when doing trouble-shooting procedures in chapter 98. Table 3-1 is a complete listing of all support diagrams used in this manual.

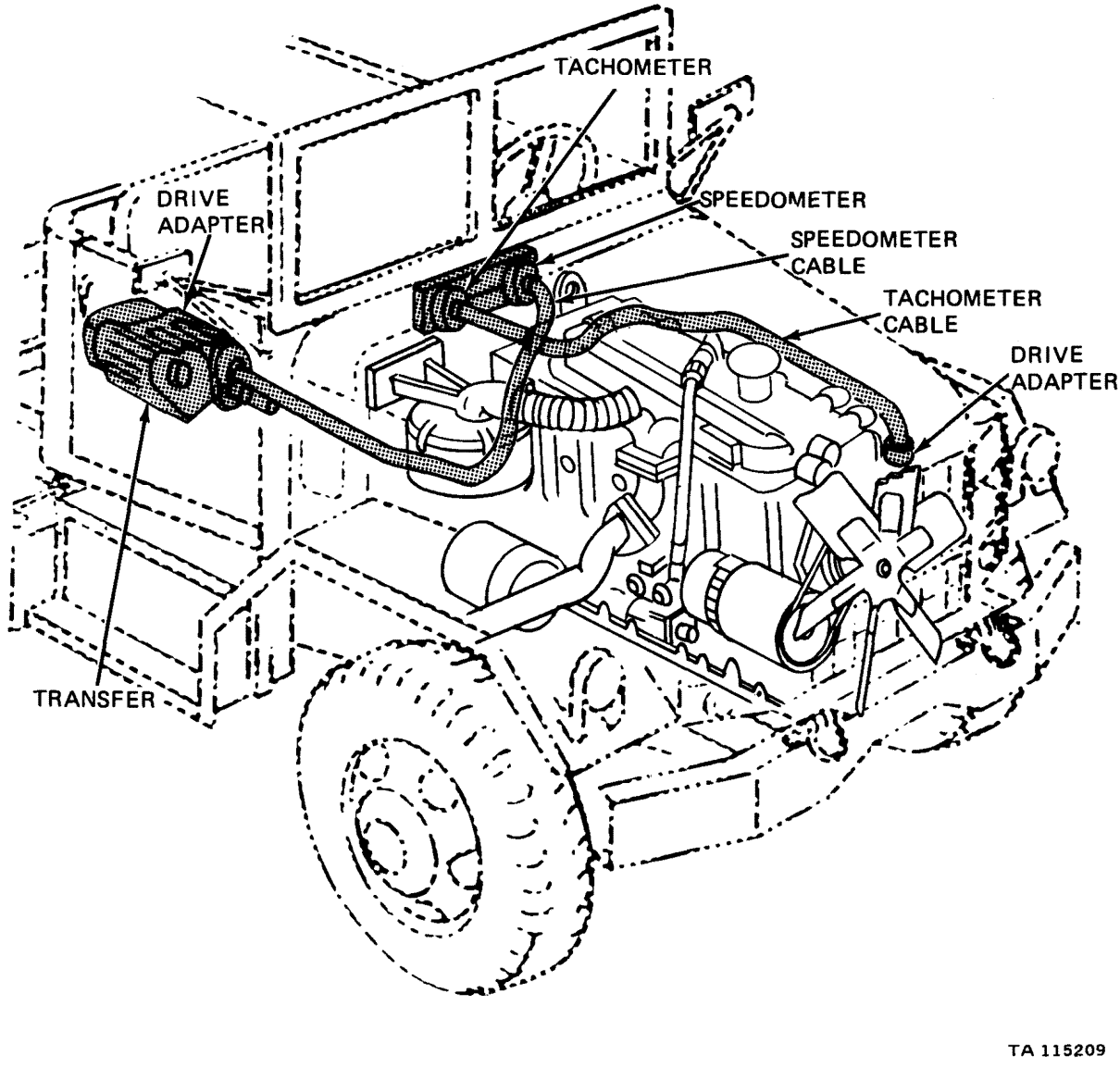


Figure 100-1. Non Electrical Gages Support Diagram

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91-15		91-7 (Sheet 1 of 2)	
97-2		97-1 (Sheet 1 of 3)	

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

Box ④, third sentence refers to figure 7-11. Should refer to figure 71-1.

Change illustration callouts. Reason: callouts for INLET SHUTOFF COCK and RETURN SHUTOFF COCK are reversed.

Box ③, fourth sentence reads "Put transmission gearshift lever in first position." Should read "Put transmission gearshift lever in first position and transfer shift lever in low position."

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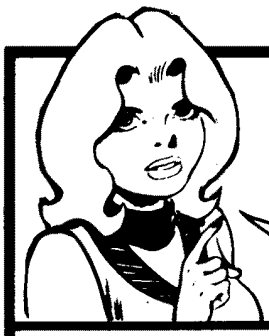
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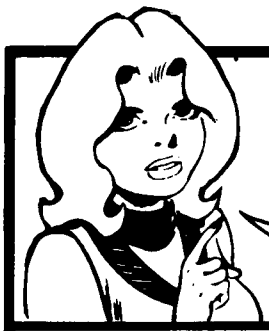
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THE METRIC SYSTEM AND EQUIVALENTS

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 Megogrom = 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

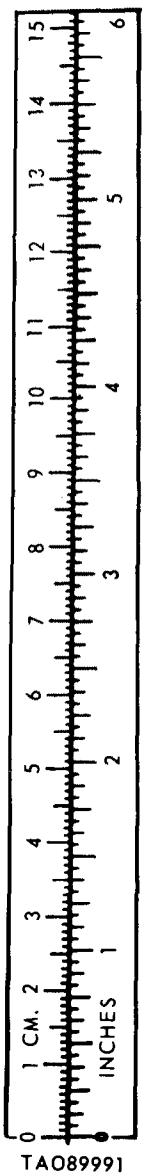
TEMPERATURE

$5/9\ (^0F - 32) = {}^0C$
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**



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