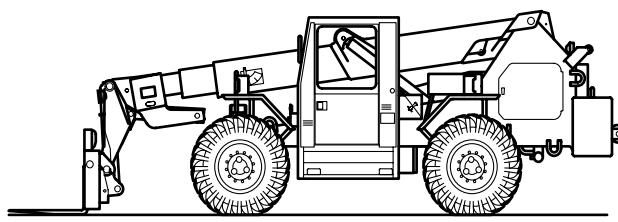


**TECHNICAL MANUAL**

**UNIT MAINTENANCE MANUAL**



**ALL TERRAIN LIFTER  
ARMY SYSTEM  
(ATLAS)**

**10,000 LB CAPACITY**

**NSN 3930-01-417-2886**

---

Approved for public release;  
distribution is unlimited.

---

<b>INTRODUCTION</b>	<b>1-1</b>
<b>UNIT MAINTENANCE INSTRUCTIONS</b>	<b>2-1</b>
<b>PMCS</b>	<b>2-3</b>
<b>TROUBLESHOOTING</b>	<b>2-25</b>
<b>ELECTRICAL SYSTEM TROUBLESHOOTING</b>	<b>2-34</b>
<b>MECHANICAL SYSTEM TROUBLESHOOTING</b>	<b>2-613</b>
<b>HYDRAULIC SYSTEM TROUBLESHOOTING</b>	<b>2-771</b>
<b>REFERENCES</b>	<b>A-1</b>
<b>MAINTENANCE ALLOCATION CHART (MAC)</b>	<b>B-1</b>
<b>EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST</b>	<b>C-1</b>
<b>ILLUSTRATED LIST OF MANUFACTURED ITEMS</b>	<b>D-1</b>
<b>TORQUE LIMITS</b>	<b>E-1</b>
<b>TOOL IDENTIFICATION LIST</b>	<b>F-1</b>
<b>ALPHABETICAL INDEX</b>	<b>Index-1</b>
<b>SCHEMATICS</b>	<b>SCHMTC-1</b>




**WARNING**

CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU.

Carbon monoxide is a colorless, odorless, DEADLY POISONOUS gas and, when breathed, deprives body of oxygen and causes SUFFOCATION. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure.

The following precautions MUST be followed to ensure personnel are safe whenever arctic heater or engine is operated for any purpose. Otherwise, injury to personnel may result.

- DO NOT operate arctic heater or vehicle engine in enclosed area without adequate ventilation.
- BE ALERT at all times during vehicle operation for exhaust symptoms. If symptoms are present, IMMEDIATELY EVACUATE AND VENTILATE the area. Treat affected personnel as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration as described in FM 4-25.1 and get medical attention.
- BE AWARE; neither the gas particulate filter unit nor field protection mask for nuclear-biological-chemical protection will protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.


**WARNING**

Fuel is very flammable and can explode easily. To avoid serious injury or death:

- Keep fuel away from open flame or any spark (ignition source).
- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on a fuel system.
- Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.
- Post signs that read “NO SMOKING WITHIN 50 FEET (15 m)” when working with open fuel, fuel lines or fuel tanks.


**WARNING**

- Do not smoke or allow flame or sparks in the vicinity while servicing, removing, or installing batteries. Never disconnect any charging unit circuit or battery circuit cable from battery when the charging unit is operating. Batteries generate hydrogen, a highly explosive gas. Severe personal injury could result.
- To avoid sparks when removing battery cables, always begin by removing negative battery cable first.

- Batteries are filled with acid electrolyte solution. Always wear protective clothing, rubber gloves, and eye protection when servicing, removing or installing batteries.
- Always check electrolyte level with engine stopped. Do not smoke when checking the battery. Do not use an exposed flame to check battery levels. Protect eyes when checking battery level.
- Do not overfill batteries so that water splashes acid from cell openings. Battery acid can cause skin irritation or burns.

**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi (20685 kPa) with engine OFF. ALWAYS relieve pressure in hydraulic hoses before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and attachment on ground, move control levers through all operating positions several times to relieve hydraulic pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious injury or death to personnel.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injury to personnel. Allow hydraulic oil to cool before disconnecting any hydraulic hoses.
- When working underneath boom, always support boom using blocks, jackstands, or other rigid and stable supports. Combined weight of boom and attachment is approximately 6300 lb (2857.63 kg). Failure to adequately support the boom could result in severe injury or death to personnel.

**WARNING**

- Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.
- NOTE: P-D-680 Type II is no longer in use and has been replaced by MIL-PRF-680 Type III.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

**WARNING**

Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when operating or working within 61 ft (19 m) of vehicle when engine is running. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time.

**WARNING**

Care must be exercised when lubricating front propeller U-joint and parking brake. Over lubrication could result in grease on the parking brake rotor and/or parking brake linings which could cause the brake to slip. Death or bodily injury to personnel could result.

**WARNING**

Use extreme care when lifting counterweight with forklift. Counterweights weigh 5800 lbs (2633.2 kg) and its center of gravity (CG) is off center. Never allow forks to tip forward. Always tie counterweight lifting eyes to the lifting forklift. Counterweight must be handled using another 10K ATLAS/10K carriage and lifted through lifting eyes located at the top of the counterweight. Keep hands or fingers out of holes for counterweight pins. Failure to comply could result in serious injury or death to personnel.



TECHNICAL MANUAL  
TM 10-3930-673-20-1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 30 September 2005

UNIT MAINTENANCE MANUAL  
FOR  
ALL TERRAIN LIFTER ARMY SYSTEM (ATLAS)  
10,000 LB CAPACITY  
(NSN 3930-01-417-2886)

TM 10-3930-673-20-1, dated 4 May 1998, is changed as follows:

1. Remove old pages and insert new pages.
2. New or changed material is indicated by a vertical bar in the margin.

Remove Pages	Insert Pages
<i>a thru c/(d blank)</i>	<i>a thru c/(d blank)</i>
<i>i and ii</i>	<i>A/B (blank)</i>
<i>2-1 and 2-2</i>	<i>i and ii</i>
<i>2-5 and 2-6</i>	<i>2-1 and 2-2</i>
<i>2-11 thru 2-14</i>	<i>2-5 and 2-6</i>
<i>2-17 thru 2-20</i>	<i>2-11 thru 2-14</i>
	<i>2-17 thru 2-20</i>
	<i>2-22.1/(2-22.2 blank)</i>
<i>2-23 and 2-24</i>	<i>2-23 thru 2-24.7/(2-24.8 blank)</i>
<i>2-27 and 2-28</i>	<i>2-27 and 2-28</i>
<i>2-31 thru 2-34</i>	<i>2-31 thru 2-34.4</i>
<i>2-397 and 2-398</i>	<i>2-397 and 2-398</i>
<i>2-613 and 2-614</i>	<i>2-613 and 2-614</i>
<i>2-769 thru 2-770</i>	<i>2-769 thru 2-770.5/(2-770.6 blank)</i>
<i>2-771 and 2-772</i>	<i>2-771 and 2-772</i>
<i>2-807 thru 2-812</i>	<i>2-807 thru 2-812</i>
<i>2-817 thru 2-822</i>	<i>2-817 thru 2-822</i>
<i>2-825 thru 2-832</i>	<i>2-825 thru 2-832</i>
<i>2-835 and 2-836</i>	<i>2-835 and 2-836</i>
<i>2-841 and 2-842</i>	<i>2-841 and 2-842</i>
<i>2-845 thru 2-850</i>	<i>2-845 thru 2-850</i>
<i>2-853 thru 2-858</i>	<i>2-853 thru 2-858</i>
	<i>2-865 thru 2-913/(2-914 blank)</i>
<i>A-1 and A-2</i>	<i>A-1 and A-2</i>
<i>B-1 thru B-24</i>	<i>B-1 thru B-24</i>
<i>C-1 thru C-4</i>	<i>C-1 thru C-4</i>
<i>Index-1 thru index-10</i>	<i>Index-1 thru index-10</i>

**Remove Pages**

*FP-5/(FP-6 blank) and FP-7/(FP-8 blank)  
Front Cover*

**Insert Pages**

*FP-5/(FP-6 blank) thru FP-7/(FP-8 blank)  
Front Cover*

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

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER  
*General, United States Army*  
*Chief of Staff*

Official:

  
SANDRA R. RILEY  
*Administrative Assistant to the  
Secretary of the Army  
0517810*

**DISTRIBUTION:**

To be distributed in accordance with the initial distribution number (IDN) 256416, requirements for TM 10-3930-673-20-1.

**LIST OF EFFECTIVE PAGES****NOTE**

A vertical line in the outer margins of the page indicates the portion of text affected by the change.

**Dates of issue for original and change pages are:**

Original - 4 May 1998

Change 1 - 30 September 2005

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 74 AND TOTAL NUMBER OF CHAPTERS IS 19 CONSISTING OF THE FOLLOWING:

<b>Page No</b>	<b>*Change No.</b>	<b>Page No.</b>	<b>*Change No.</b>	<b>Page No.</b>	<b>*Change No.</b>
Cover (Back blank) .....	1	2-772 .....	1	Sample 2028-2s .....	0
a .....	1	2-773 to 2-807 .....	0	Three Blank 2028-2s .....	0
b .....	0	2-808 to 2-812 .....	1	FP-1 to FP-3/(FP-4 blank)	0
c/(d blank) .....	1	2-813 to 2-817 .....	0	FP-5 to FP-7/(FP-8 blank)	1
A/(B blank).....	1	2-818 to 2-821 .....	1	FP-9/(FP-10 blank) .....	0
i .....	1	2-822 to 2-824 .....	0	Schmtc-1/(Schmtc-2	0
ii to xii/(xv blank) .....	0	2-825 to 8-829 .....	1	blank).....	
1-1 to 1-15/(1-16 blank) ..	0	2-830 .....	0	Metric Conversion Chart .	0
2-1 .....	1	2-831 .....	1	Back Cover .....	0
2-2 to 2-4.....	0	2-832 to 2-834 .....	0		
2-5.....	1	2-835 .....	1		
2-6 to 2-10.....	0	2-836 to 2-840 .....	0		
2-11 to 2-13.....	1	2-841 .....	1		
2-14 to 2-16.....	0	2-842 to 2-845 .....	0		
2-17 to 2-18.....	1	2-846 to 2-849 .....	1		
2-19.....	0	2-850 to 2-853 .....	0		
2-20.....	1	2-854 to 2-857 .....	1		
2-21 to 2-22.....	0	2-858 to 2-863/(2-864			
2-22.1/(2-22.2 blank)....	1	blank) .....	0		
2-23 to 2-24.7/(2-24.8 blank).....	1	2-865 to 2-913/(2-914 blank) .....	1		
2-25 to 2-26.....	0	A-1 to A-2 .....	1		
2-27 .....	1	B-1 .....	1		
2-28 to 2-31.....	0	B-2 to B-3 .....	0		
2-32 to 2-33.3 .....	1	B-4 to B-21 .....	1		
2-34 to 2-397.....	0	B-22 .....	0		
2-398.....	1	B-23 .....	1		
2-399 to 2-612.....	0	B-24 .....	0		
2-613.....	1	C-1 to C-4 .....	1		
2-614 to 2-769.....	0	D-1/(D-2 blank).....	0		
2-769.0 to 2-769.5/(2- 769.6 blank).....	1	E-1 to E-4 .....	0		
2-770 to 2-771.....	0	F-1 to F-3/(F-4 blank) .....	0		
		Index -1 to Index-10 .....	1		

\* Zero in this column indicates an original page.



**UNIT MAINTENANCE MANUAL**

FOR

**ALL TERRAIN LIFTER ARMY SYSTEM (ATLAS)**

**10,000 LB CAPACITY**

**NSN 3930-01-417-2886**

**REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any discrepancies or know a way to improve this TM, let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications) or DA Form 2028-2 located in the back of this manual to: Commander, US Army Tank-automotive and Armaments Command, Attn: AMSTA-AC-NML, Rock Island, IL 61299-7630. A reply will be furnished to you. You can also provide DA Form 2028-2 information to TACOM via datafax or e-mail. TACOM's datafax number is: DSN 793-0726 or (309) 782-0726. E-mail address: amsta-ac-nml@ria-ehm.2.army.mil.

**TABLE OF CONTENTS**

	<b>Page</b>
HOW TO USE THIS MANUAL .....	iv
CHAPTER 1 <b>INTRODUCTION</b> .....	1-1
Section I. General Information .....	1-1
Section II. Equipment Description .....	1-3
Section III. Technical Principles of Operation .....	1-7
CHAPTER 2 <b>UNIT MAINTENANCE INSTRUCTIONS</b> .....	2-1
Section I. Repair Parts, Special Tools, TMDE and Support Equipment .....	2-1
Section II. Service Upon Receipt .....	2-2
Section III. <b>Preventive Maintenance Checks and Services (PMCS)</b> .....	2-3
Section IV. <b>Troubleshooting</b> .....	2-25
CHAPTER 3 GENERAL MAINTENANCE PRACTICES .....	3-1
CHAPTER 4 <b>ENGINE MAINTENANCE</b> .....	4-1
CHAPTER 5 <b>FUEL SYSTEM MAINTENANCE</b> .....	5-1

## TABLE OF CONTENTS (CONT)

	<b>Page</b>
CHAPTER 6 EXHAUST SYSTEM MAINTENANCE .....	6-1
CHAPTER 7 COOLING SYSTEM MAINTENANCE .....	7-1
CHAPTER 8 ELECTRICAL SYSTEM MAINTENANCE .....	8-1
CHAPTER 9 TRANSMISSION MAINTENANCE .....	9-1
CHAPTER 10 PROPELLER AND DRIVE SHAFT MAINTENANCE .....	10-1
CHAPTER 11 FRONT AND REAR AXLE ASSEMBLY MAINTENANCE .....	11-1
CHAPTER 12 SERVICE AND PARKING BRAKE MAINTENANCE .....	12-1
CHAPTER 13 WHEEL AND TIRE MAINTENANCE .....	13-1
CHAPTER 14 STEERING SYSTEM MAINTENANCE .....	14-1
CHAPTER 15 FRAME AND TOWING ATTACHMENT MAINTENANCE .....	15-1
CHAPTER 16 BODY AND CAB MAINTENANCE .....	16-1
CHAPTER 17 BODY AND CHASSIS ACCESSORIES MAINTENANCE .....	17-1
CHAPTER 18 HYDRAULIC SYSTEM MAINTENANCE .....	18-1
CHAPTER 19 GAGES (NON-ELECTRICAL) MAINTENANCE .....	19-1
CHAPTER 20 SPECIAL KITS MAINTENANCE .....	20-1
CHAPTER 21 PREPARATION FOR STORAGE AND SHIPMENT .....	21-1
APPENDIX A REFERENCES .....	A-1
APPENDIX B MAINTENANCE ALLOCATION CHART (MAC) .....	B-1
Section I. Introduction .....	B-1
Section II. Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) .....	B-4
Section III. Tools and Test Equipment for All Terrain Lifter, Army System (ATLAS) .....	B-22
Section IV. Remarks for All Terrain Lifter, Army System (ATLAS) .....	B-24
APPENDIX C EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST .....	C-1
Section I. Introduction .....	C-1
Section II. Expendable/Durable Supplies and Materials List .....	C-2
APPENDIX D ILLUSTRATED LIST OF MANUFACTURED ITEMS .....	D-1
APPENDIX E TORQUE LIMITS .....	E-1

**TABLE OF CONTENTS (CONT)**

	<b>Page</b>
APPENDIX F <span style="border: 1px solid black; padding: 2px;">TOOL IDENTIFICATION LIST</span> .....	F-1
Section I. Introduction.....	F-1
Section II. Tool Identification List.....	F-2
<span style="border: 1px solid black; padding: 2px;">ALPHABETICAL INDEX</span> .....	Index-1
<span style="border: 1px solid black; padding: 2px;">SCHEMATICS</span> .....	SCHMTC-1

## HOW TO USE THIS MANUAL

### 1. ABOUT YOUR MANUAL

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

New features added to make this manual easier for you to use are:

- a. **Finding Information.** These include entry features such as the thumb indexing indicators on the cover and edge of the manual. Extensive troubleshooting guides for specific systems lead directly to step-by-step directions for problem solving and maintenance tasks.
- b. **Illustrations.** Many methods are used to make finding and fixing parts much easier. Locator illustrations with keyed text, exploded views, and cutaway diagrams make the information in this manual easier to understand and follow.
- c. **Keying Text With Illustrations.** Instructions/text are located together with figures that illustrate the specific task you are working on. In most cases, the task steps and figures are located side by side.

This TM is organized so that information and procedures needed to perform maintenance tasks are easily located. Take a few minutes to read through this How To Use part of the manual to learn how it is put together and how to find the information you need.

### 2. BEFORE YOU START

- a. Read and understand all warning and first aid data in the front of this manual. This data contains general shop safety practices not included in maintenance tasks.
- b. Read Chapter 1 to learn more about the ATLAS purpose, capabilities and features.

### 3. CONTENTS OF MANUAL

- a. This TM contains unit maintenance instructions at the intermediate level for the ATLAS. Included are principles of operation, fault isolation troubleshooting and corrective maintenance tasks as authorized by the Maintenance Allocation Chart (MAC).
- b. This TM is made up of:
  - (1) *Chapters.* There are 21 chapters.
    - (a) Chapter 1, Introduction. This chapter contains general ATLAS information, a description of the equipment, and technical principles of operation.
    - (b) Chapter 2, Unit Maintenance Instructions. This chapter contains instructions of interest to intermediate level maintenance technicians on tools, equipment, preventive maintenance and troubleshooting.
    - (c) Chapter 3, General Maintenance Practices. This chapter contains work safety instructions, cleaning and disassembly/assembly instructions, and inspection and repair instructions.
    - (d) Chapter 4, Engine Maintenance. This chapter contains maintenance procedures for various engine components.

## HOW TO USE THIS MANUAL (CONT)

- (e) Chapter 5, Fuel System Maintenance. This chapter contains maintenance procedures for various fuel system components.
  - (f) Chapter 6, Exhaust System Maintenance. This chapter contains procedures for the exhaust system components.
  - (g) Chapter 7, Cooling System Maintenance. This chapter contains maintenance procedures for the cooling system components.
  - (h) Chapter 8, Electrical System Maintenance. This chapter contains maintenance procedures for various electrical system components.
  - (i) Chapter 9, Transmission Maintenance. This chapter contains maintenance procedures for transmission components.
  - (j) Chapter 10, Propeller and Drive Shaft Maintenance. This chapter contains maintenance procedures for front and rear drive shaft components.
  - (k) Chapter 11, Front and Rear Axle Assembly Maintenance. This chapter contains maintenance procedures for the front and rear axle assemblies.
  - (l) Chapter 12, Service and Parking Brake Maintenance. This chapter contains maintenance procedures for the service and parking brakes.
  - (m) Chapter 13, Wheel and Tire Maintenance. This chapter contains maintenance procedures for the wheels and tires.
  - (n) Chapter 14, Steering System Maintenance. This chapter contains maintenance procedures for various steering system components.
  - (o) Chapter 15, Frame and Towing Attachment Maintenance. This chapter contains maintenance procedures for the frame and towing attachments.
  - (p) Chapter 16, Body and Cab Maintenance. This chapter contains maintenance procedures for body and cab components.
  - (q) Chapter 17, Body and Chassis Accessories Maintenance. This chapter contains maintenance procedures for the body and chassis accessories.
  - (r) Chapter 18, Hydraulic System Maintenance. This chapter contains maintenance procedures for various hydraulic system components.
  - (s) Chapter 19, Gages (Non-electrical) Maintenance. This chapter contains maintenance procedures for non-electrical gages.
  - (t) Chapter 20, Special Kits Maintenance. This chapter contains maintenance procedures for special kits.
  - (u) Chapter 21, Preparation for Storage and Shipment. This chapter contains storage and shipment information.
- (2) *Sections.* All chapters are further subdivided into sections. Sections allow for easier break-up of material. They are:

## HOW TO USE THIS MANUAL (CONT)

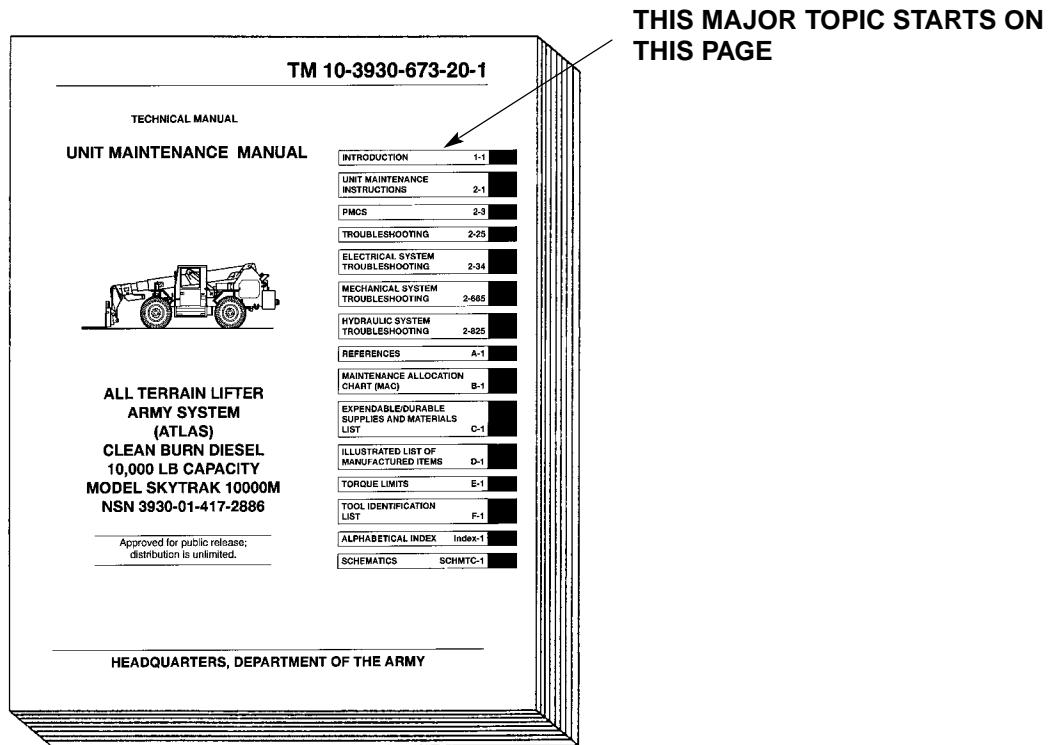
- (a) Chapter 1 has three sections: General Information, Equipment Description and Technical Principles of Operation.
  - (b) Chapter 2 has four sections: Repair Parts, Special Tools, TMDE and Support Equipment; Service Upon Receipt; Preventive Maintenance Checks and Services (PMCS); and Troubleshooting.
  - (c) Chapters 3 through 21 have one section each.
- (3) *Paragraphs*. Paragraphs make up sections. The paragraphs have the information needed to do the job properly. Each paragraph is the start of a major topic within the chapter.
- (4) *Pages*. Pages are numbered consecutively within each chapter. The first part is the chapter number followed by a dash and the consecutive page number. For example, page 3 of Chapter 2 is numbered 2-3.
- (5) *Appendices*. Appendices are found in the back of the manual. They provide reference information required for maintenance.
- (a) Appendix A, References. This appendix contains other information you may need to do your job.
  - (b) Appendix B, Maintenance Allocation Chart. This appendix designates overall authority and responsibility for maintenance functions on the ATLAS.
  - (c) Appendix C, Expendable/Durable Supplies and Materials List. This appendix contains information on expendable/durable items you need for maintenance.
  - (d) Appendix D, Illustrated List of Manufactured Items. This appendix contains information you need to make parts that are not procured.
  - (e) Appendix E, Torque Limits. This appendix provides general torque limits for different fasteners.
  - (f) Appendix F, Tool Identification List. This appendix lists the tools you need to operate and maintain the ATLAS.
- (6) *Index*. The index is located in the back of the manual. It lists topics in alphabetical order and references the paragraph numbers where information on the topic can be found.
- (7) *Schematics*. Schematic illustrations of the electrical and hydraulic systems.

## HOW TO USE THIS MANUAL (CONT)

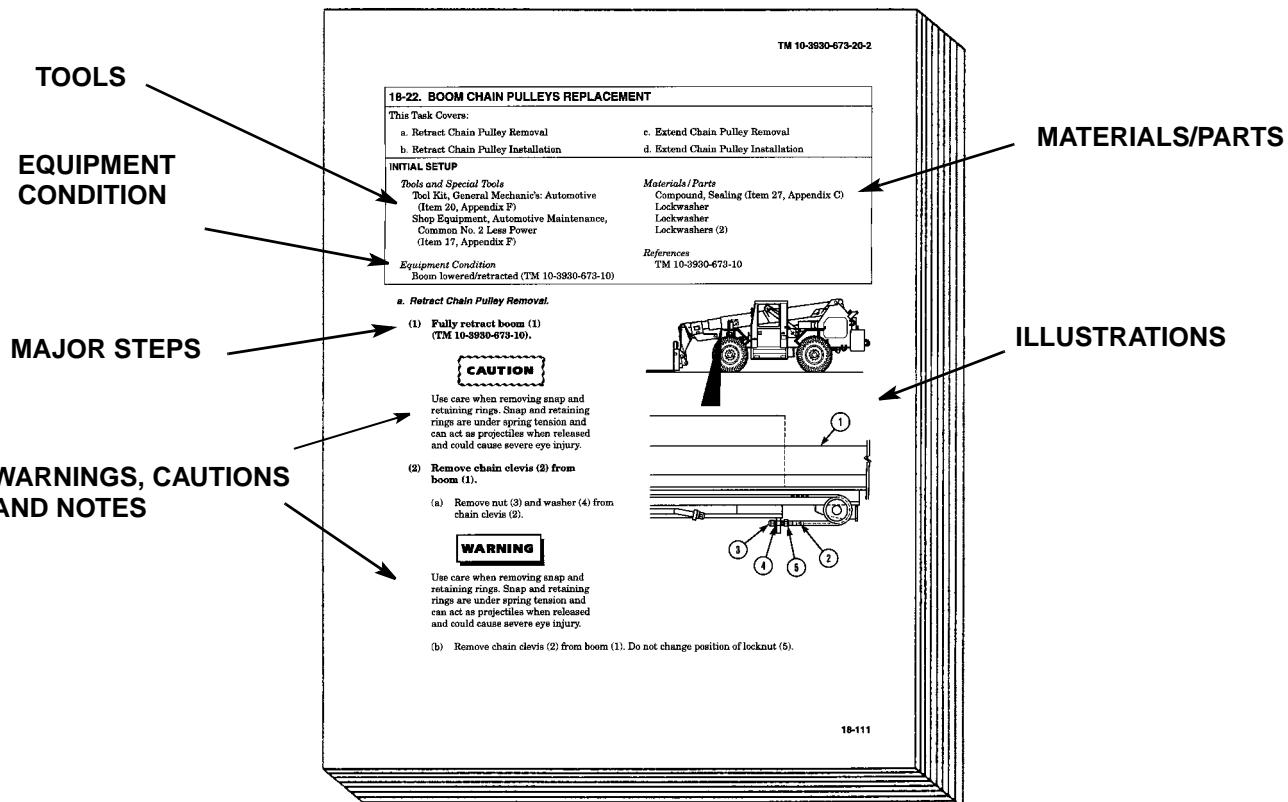
### 4. HOW TO FIND INFORMATION QUICKLY

- a. **Using the Front Cover.** The front cover of the manual has boxed titles for major topics. At the right side of each box is a blackened area. The blackened area matches black markings on the first page of that major topic in the manual. Fan the outer edge of the manual to find the topic material.
- b. **Using the Table of Contents.** The table of contents lists all chapters, appendices, sections and other important information in this manual and the page number where each starts. The boxed-in items in the table of contents correspond to the items listed on the front cover.
- c. **Using Chapter Indexes.** On the first page of each chapter is a numerical listing of all paragraphs in that chapter and the page number where each can be found.
- d. **Using Paragraph Numbers and Titles.** Paragraph numbers include the chapter number. The paragraph number appears before the title of the paragraph title line. Paragraphs that are longer than one page will have the paragraph number and title continued at the top of each following left-hand page.

## HOW TO USE THIS MANUAL (CONT)



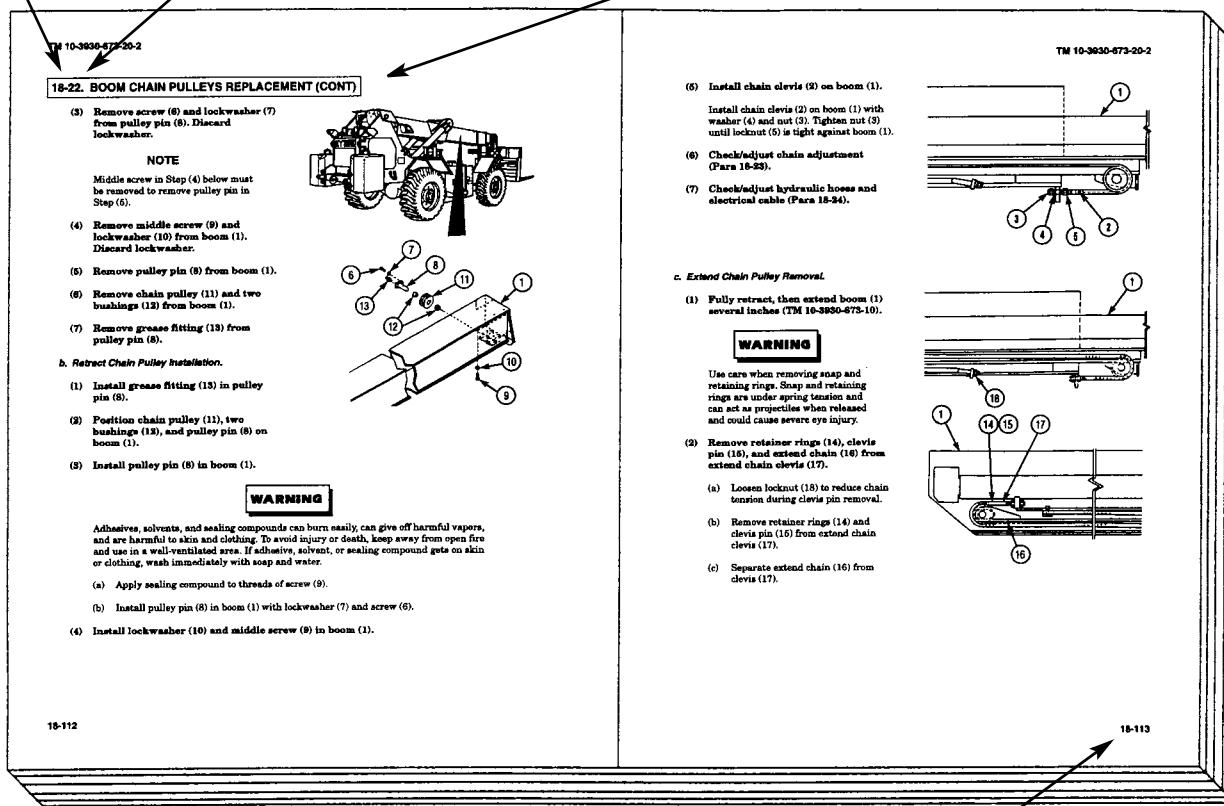
THIS MAJOR TOPIC STARTS ON  
THIS PAGE



## HOW TO USE THIS MANUAL (CONT)

**CHAPTER NUMBER**  
**PARAGRAPH NUMBER**

**PARAGRAPH TITLE CONTINUED**



## 5. HOW TO USE THE TROUBLESHOOTING CHARTS

Troubleshooting is divided into two parts, electrical and mechanical. An overall fault index is located at the beginning of the troubleshooting procedures and individual indexes are located at the beginning of each troubleshooting part. The fault index lists common problems that you may have with the ATLAS and the page number where each can be found.

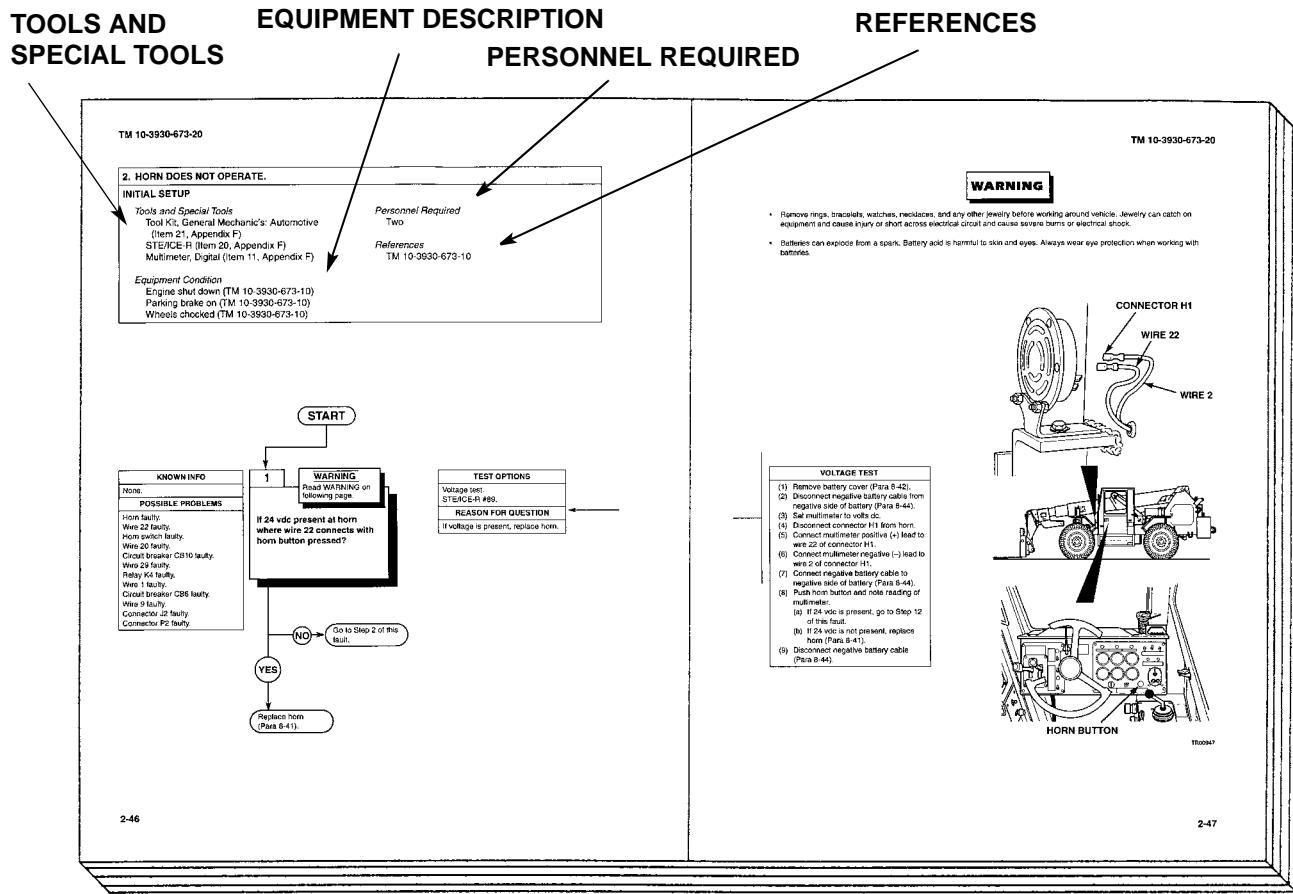
Troubleshooting procedures are divided into logic tree pages and test pages. A logic tree page is always a left-hand page facing the test page on the right. The logic tree page provides the sequence of steps required to isolate a fault to a failed component. All critical information for decision making is on the left-hand page.

A test page is always a right-hand page facing the logic tree page on the left. The test provides detailed instructions for testing the first component listed in the POSSIBLE PROBLEMS box. This test will also provide an answer for the question in the middle column. Note the arrow connecting the test on the right-hand page to the REASON FOR QUESTION. When possible, illustrations are included to provide visual details. Warnings, cautions, and notes contain additional information for testing.

Please refer to Introduction to Logic Tree Troubleshooting (Para 2-6) for additional troubleshooting instructions.

## 6. HOW TO USE A PROCEDURE

## HOW TO USE THIS MANUAL (CONT)



Each procedure consists of two parts, an initial setup table and a task section. You must familiarize yourself with the entire maintenance procedure before beginning the maintenance task.

The initial setup table contains all or some of the following headings:

- *Tools and Special Tools* - Describes tools needed to perform the procedure.
- *Test Equipment* - Describes test equipment needed to perform the procedure.
- *Equipment Condition* - Refers to other procedures that must be performed before attempting the procedure.
- *Materials/Parts* - Describes miscellaneous materials and parts needed to perform the procedure.
- *Personnel Required* - Describes quantity of personnel needed to perform the procedure.
- *References* - Lists manuals that may be needed to perform the procedures.

## 7. HOW TO FIND CRITICAL INFORMATION

## HOW TO USE THIS MANUAL (CONT)

Critical information in maintenance chapters has been highlighted for experienced technicians so that they may scan a task quickly and pick out the information needed without reading the entire task. This way, the level of detail needed by low-experienced technicians will not interfere with critical information.

Information of interest to experienced users is highlighted with bold letters. More detailed information is shown with roman letters.



# CHAPTER 1

## INTRODUCTION

<b>Para</b>	<b>Contents</b>	<b>Page</b>
Section I. General Information		
1-1.	Scope .....	1-1
1-2.	Maintenance Forms and Records.....	1-2
1-3.	Corrosion Prevention and Control (CPC) .....	1-2
1-4.	Destruction of Army Materiel to Prevent Enemy Use.....	1-2
1-5.	Preparation for Storage or Shipment.....	1-2
1-6.	Quality Assurance/Quality Control.....	1-2
1-7.	Official Nomenclature, Names, and Designations .....	1-2
1-8.	Reporting Equipment Improvement Recommendations (EIR'S) .....	1-2
1-9.	Equipment Improvement Report and Maintenance Digest (EIR MD) .....	1-3
Section II. Equipment Description		
1-10.	Equipment Characteristics, Capabilities, and Features .....	1-3
1-11.	Location and Description of Major Components .....	1-4
1-12.	Equipment Data.....	1-6
1-13.	Equipment Configuration .....	1-7
1-14.	Safety, Care, and Handling .....	1-7
Section III. Technical Principles of Operation		
1-15.	General.....	1-7
1-16.	Engine Fuel System.....	1-8
1-17.	Engine Lubrication System .....	1-9
1-18.	Engine Cooling System .....	1-10
1-19.	Transmission Lubrication and Cooling Systems .....	1-11
1-20.	Steering and Brake System .....	1-12
1-21.	Electrical System.....	1-13
1-22.	Hydraulic System.....	1-14

### Section I. GENERAL INFORMATION

#### **1-1. SCOPE**

**a. Type of Manual.** This manual contains unit maintenance instructions, at the organizational level, for the ATLAS.

**b. Model Number and Equipment Name.** The ATLAS (All Terrain Lifter Army System) Forklift Truck is equipped with a 6,000 lb or 10,000 lb lifting carriage.

**c. Purpose of Equipment.** The ATLAS is designed for loading and unloading munitions and other palletized items from transport vehicles and containers. The ATLAS is also designed for use as a standard rough terrain forklift.

**d. Special Limitations on Equipment.** The ATLAS has no special limitations. Normal limitations such as travel speed, lift capacity, etc., are discussed in Para 1-12.

#### **1-2. MAINTENANCE FORMS AND RECORDS**

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

### **1-3. CORROSION PREVENTION AND CONTROL (CPC)**

Corrosion Prevention and Control (CPC) of Army materials is a continuing concern. It is important that any corrosion problems with the forklift be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

While corrosion is typically associated with rusting of metals, corrosion can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as "corrosion, rust, deterioration, and cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in DA PAM 738-750.

### **1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE**

Demolition of materiel to prevent enemy use shall be in accordance with the requirement of TM 750-244-6 (Procedures for Destruction of Equipment to Prevent Enemy Use for U.S. Army).

### **1-5. PREPARATION FOR STORAGE OR SHIPMENT**

Refer to Chapter 21 for all storage and shipment instructions.

### **1-6. QUALITY ASSURANCE/QUALITY CONTROL**

Not applicable.

### **1-7. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS**

Refer to the nomenclature cross-reference list below. This listing gives nomenclature cross-references used in this manual. The common name is in the left column and the official name is in the right.

Common Name                    Official Nomenclature

ATLAS                                 All Terrain Lifter Army System Forklift Truck

### **1-8. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)**

If your ATLAS needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF368 (Product Quality Deficiency Report). Mail it to us at: Commander, US Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/MPA, Warren, MI 48397-5000. A reply will be furnished to you.

### **1-9. EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR MD)**

The quarterly Equipment Improvement Report and Maintenance Digest TB 43-0001-39 series, contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 43-0001-39 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWOs), warranties (if applicable), actions taken on some of your DA Forms 2028-2 (Recommended Changes to Publications), and advance information which will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to DA PAM 310-1, Consolidated Index of Army Publications and Blank Forms, and Appendix A, References, of this manual.

## Section II. EQUIPMENT DESCRIPTION

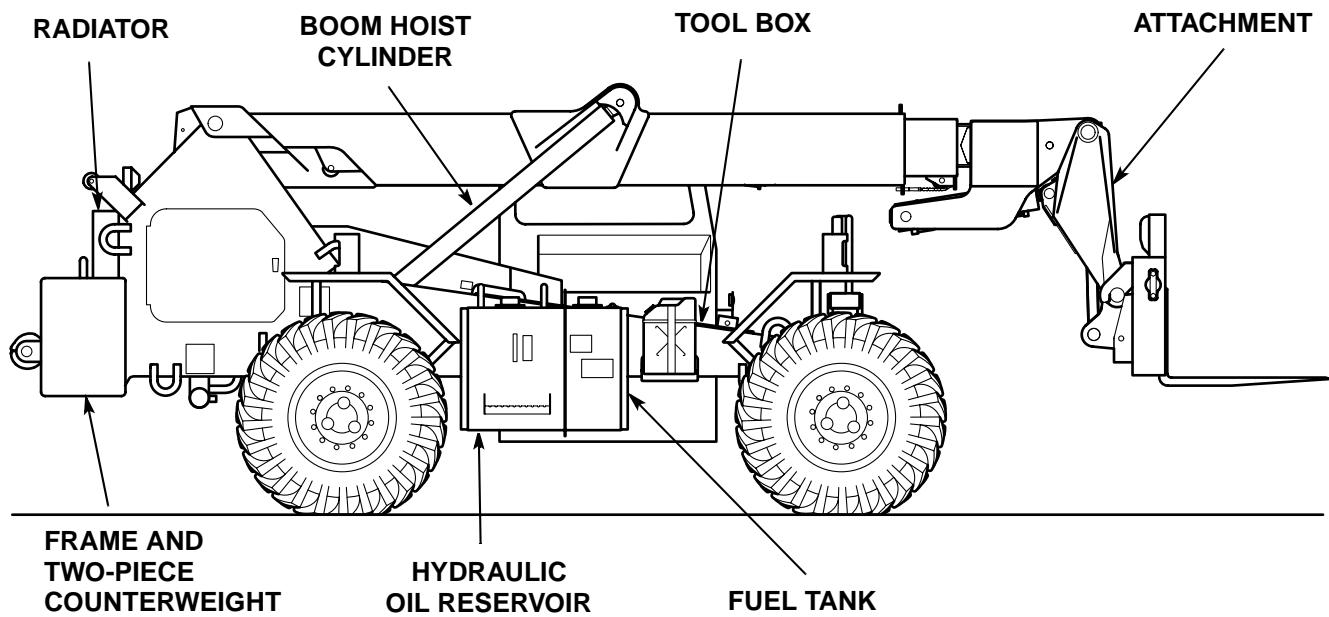
### **1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**

**a. Purpose.** The ATLAS is designed for loading and unloading munitions and other palletized items from transport vehicles and containers. Also, the ATLAS can be used as a forklift truck.

**b. Equipment Characteristics, Capabilities, and Features.**

- (1) The ATLAS can handle boxes, palletized ammunition loads, and other palletized items from transport vehicles and containers.
- (2) The vehicle frame can be tilted 9 degrees to left or right which allows vehicle to be level when traversing a sideslope.
- (3) The attachment can be raised to a nearly horizontal position for loading and unloading munitions.
- (4) The forks tilt, level, and sideshift to maneuver loads.
- (5) With 6K carriage, lifts loads of 6,000 lbs to a height of 28 ft. With 10K carriage, lifts loads of 4,000 lbs to a height of 27.5 ft, and 10,000 lbs to a height of 17 ft.
- (6) Can tow other vehicles weighing 34,000 pounds or less.
- (7) The operator can select one of three steering modes: two wheel, four wheel, and crab wheel.
- (8) The ATLAS is all weather operational.
- (9) Can ford in up to 36 inches of water.
- (10) The ATLAS can travel at a maximum speed of 23 mph over level ground with an evenly distributed load.

## 1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



### *a. Right Side View of the ATLAS.*

RADIATOR. Contains coolant which provides engine cooling.

BOOM HOIST CYLINDER. Raises and lowers the boom.

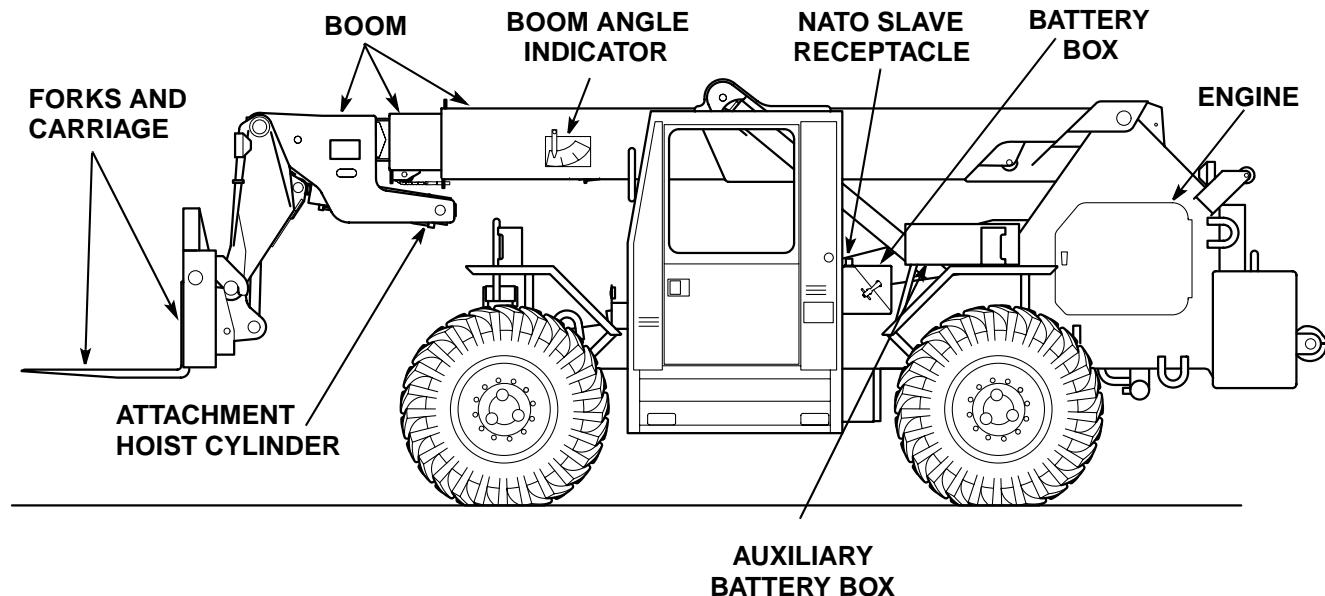
ATTACHMENT. The attachment is required for all forklift operations. The attachment can be raised to a nearly horizontal position, creating a low profile and extended reach configuration. This configuration is useful in loading and unloading munitions from transport vehicles and containers.

FUEL TANK. Contains diesel fuel or JP-8 for engine operation.

HYDRAULIC OIL RESERVOIR. Contains hydraulic fluid for the hydraulic system.

FRAME AND TWO-PIECE COUNTERWEIGHT. The frame is a heavy-duty design constructed of 1-3/16 in. thick steel plates. The frame is equipped with tie-down lugs meeting air transport specifications, tow lugs, a pintle hook, and a 5800 lb. two-piece counterweight. The counterweight is self removable so that axle loading can be adjusted to meet air transport requirements for some aircraft.

TOOL BOX. Storage area for tools and basic issue items.



**b. Left Side View of the ATLAS.**

**FORKS AND CARRIAGE.** Serve as an anchoring point of the forks. Importantly, the fork carriage is equipped with automatic fork leveling. Moving a switch will keep the forks level when raising or lowering the boom. ATLAS 6K carriage has a hinged or removable backrest. Remove the pins to tip it to the low profile position.

**BOOM.** The telescopic, three stage boom is constructed of welded high strength steel. The boom will retract or extend the reach and height of the forks.

**BOOM ANGLE INDICATOR.** Shows the angle of the boom relative to the horizon.

**NATO SLAVE RECEPTACLE.** Connection point for starting a disabled vehicle or for receiving starting assistance when disabled.

**BATTERY BOX.** Holds the batteries which provide current for the electric system.

**ENGINE.** Provides the necessary power to drive the transmission. The engine also contains sending units for the Simplified Test Equipment for Internal Combustion Engines (STE/ICE) diagnostics.

**ATTACHMENT HOIST CYLINDER.** Moves the attachment forward and back.

## 1-12. EQUIPMENT DATA

Table 1-1 lists data for the ATLAS.

***Table 1-1. Equipment Data***

**ENGINE:**

Model .....	6BT5.9-C165
Manufacturer .....	Cummins
Horsepower (* 2,500 rpm) .....	165 hp
Number of Cylinders .....	6
Displacement .....	359 in. <sup>3</sup>
Weight .....	930 lb
Maximum No Load rpm .....	2650 to 2750 rpm

**TRANSMISSION:**

Model .....	1723
Manufacturer .....	Funk
Powershift .....	3 speed forward and reverse
Speed Range .....	
First Gear .....	0-4 mph, level surface
Second Gear .....	0-8 mph, level surface
Third Gear .....	0-23 mph, level surface
Weight .....	846 lb

**AXLES AND BRAKES:**

Model (Front) .....	PSOC-205-HDB-231
Model (Rear) .....	PSOC-205-HDB-232
Manufacturer .....	Rockwell
Weight - Axle Assembly (Front or Rear) .....	1,650 lb

**DIMENSIONS AND WEIGHT:**

Vehicle Operational Weights .....	
With 6K carriage .....	31,300 lb
With 10K carriage .....	32,600 lb
Roading (both carriages) .....	33,500 lb
Boom Assembly Weight .....	5,165 lb
Inner Boom Weight .....	1,280 lb
Intermediate Boom Weight .....	.955 lb
Outer Boom Weight .....	1,950 lb
Boom Extend Cylinder .....	.600 lb
Max Length in Carry Position:	
With 6K carriage .....	324.2 in.
With 10K carriage .....	356.3 in.
Roading .....	356.3 in.
Width .....	100.2 in.
Max Height .....	.107 in.
Track Width (Tread) .....	.80.3 in.

**CAPACITIES:**

Fuel Tank .....	.44 gal
Cooling System .....	.8 gal
Hydraulic Oil Reservoir .....	.56.6 gal

**Table 1-1 Equipment Data (Cont)****CAPACITIES (CONT):**

Hydraulic System .....	75 gal
Engine Crankcase .....	15 qt
Engine Crankcase w/filter cap .....	15.3 qt
Transmission .....	5.5 gal
Transmission w/filter cap .....	5.75 gal

**MISCELLANEOUS:**

Max lift height with 6K carriage 6,000 lb (max height) .....	27 ft, 11.5 in.
Max lift height with 10K carriage 6,000 lb (max height) .....	27 ft, 8 in.
8,000 lb .....	24 ft, 9.5 in.
10,000 lb .....	16 ft, 11 in.
Boom Lift Angle (Maximum) .....	45 degrees
Max reach from load center to front tires with 6K carriage (4,000 lb @ 2 ft load center) .....	24 ft, 3.5 in.
Max reach from load center to front tires with 10K carriage (2,000 lb @ 4 ft load center) .....	26 ft, 4 in.
Max reach below grade with 6K carriage .....	33.3 in.
Max reach below grade with 10K carriage .....	36.8 in.
Ground Clearance .....	15.2 in. min
Curb to Curb Turning Circle (Diameter) .....	27 ft, 10 in.
Frame Oscillation .....	9 degrees to the left or right
Fording Depth (Freshwater) .....	3 ft
Travel Speed (Maximum) .....	23 mph

**1-13. EQUIPMENT CONFIGURATION**

The ATLAS is designed for loading and unloading munitions and other palletized items from transport vehicles and containers.

The ATLAS can also be used for many standard rough terrain forklift tasks. The ATLAS can load and unload single and double stacked pallets from 20 ft (6.1 m) long ISO shipping containers. Containers can be on the ground or on trailers.

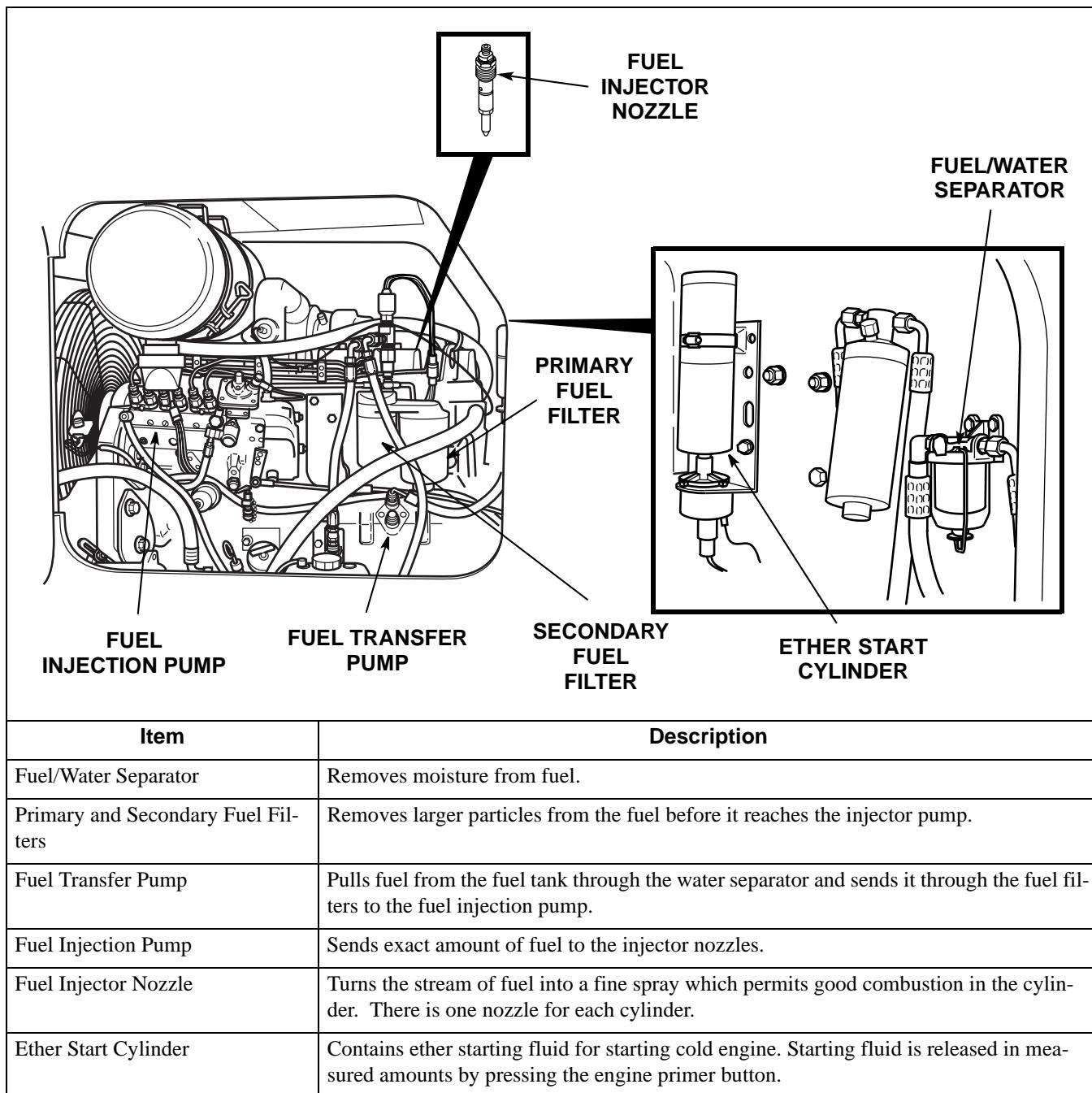
**1-14. SAFETY, CARE, AND HANDLING**

Correct servicing procedures must be followed to ensure the safety of technicians working on the ATLAS. Refer to the Safety Summary of this manual (Page a) for a list of safety precautions peculiar to this vehicle.

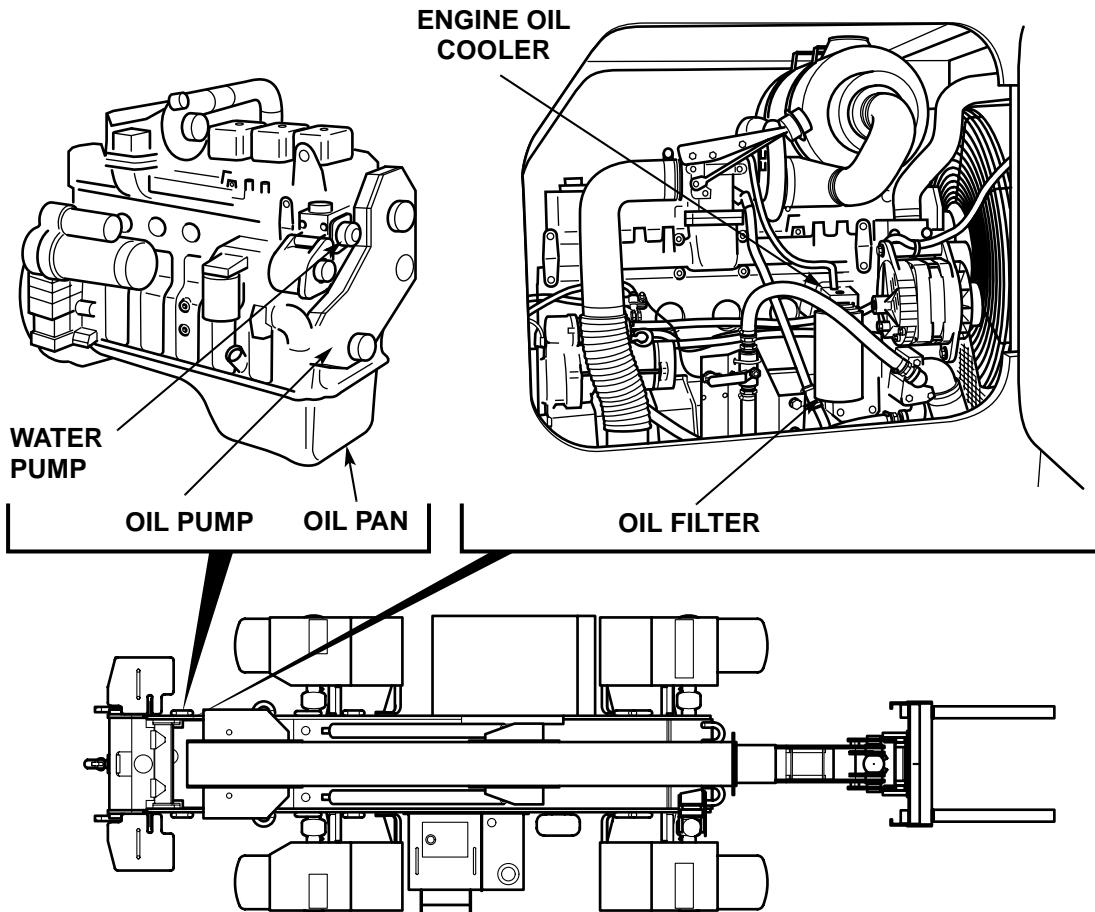
**Section III. TECHNICAL PRINCIPLES OF OPERATION****1-15. GENERAL**

This section explains how components of the ATLAS work together. A functional description is given for the fuel system, engine lubrication system, engine cooling system, transmission lubrication and cooling systems, steering and brake system, electrical system, and hydraulic system.

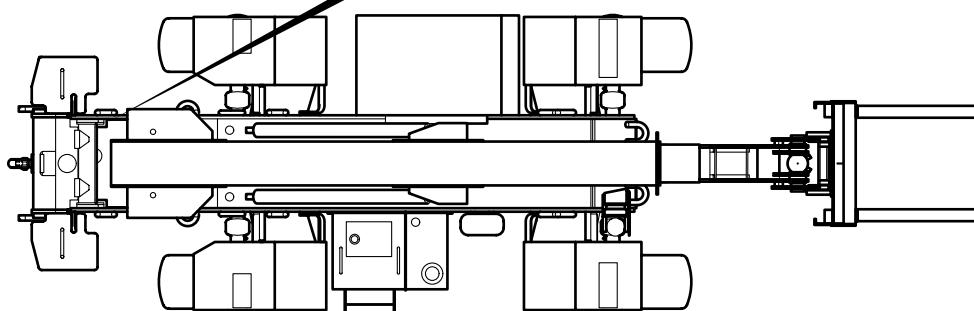
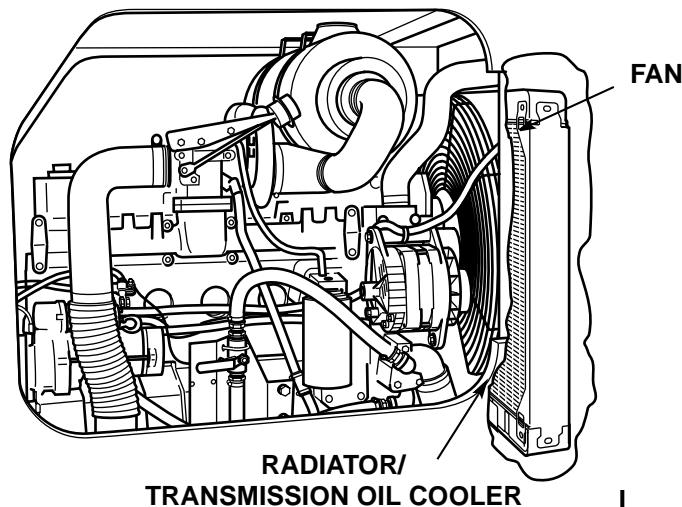
## 1-16. ENGINE FUEL SYSTEM



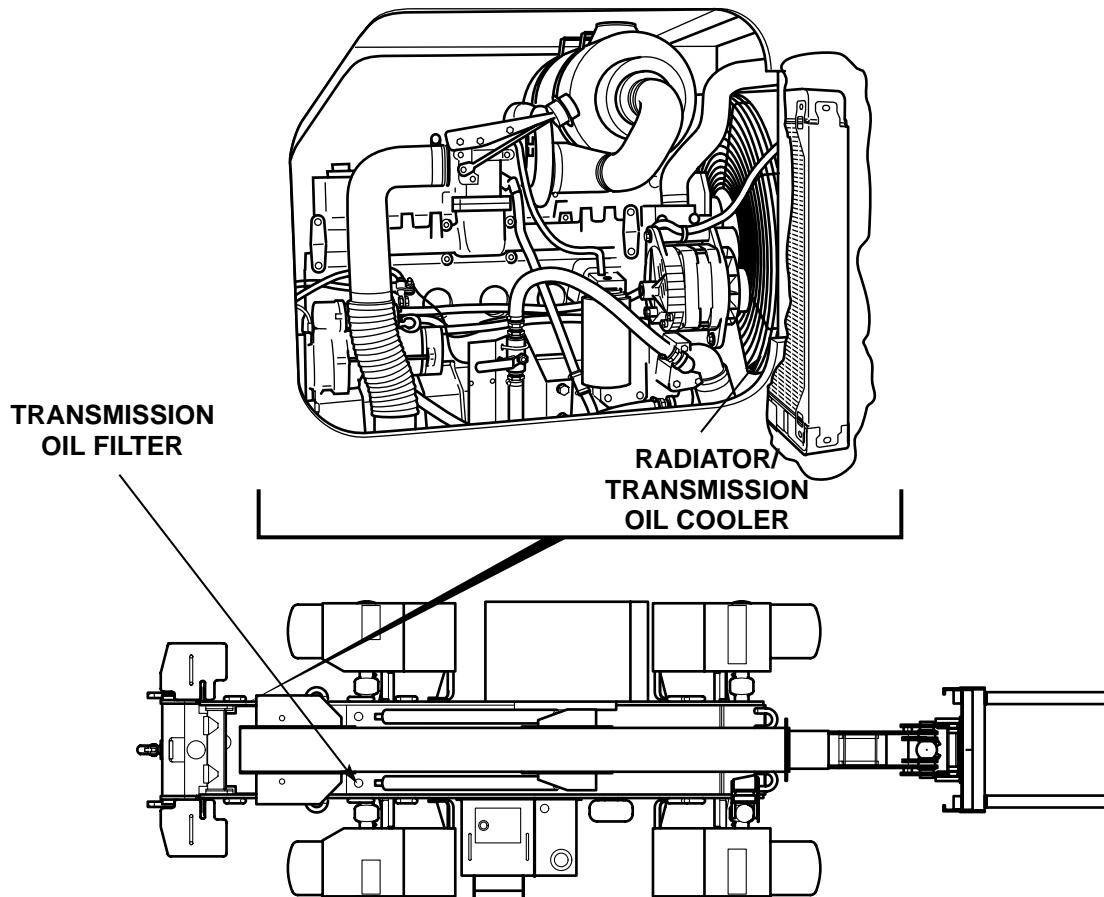
## 1-17. ENGINE LUBRICATION SYSTEM



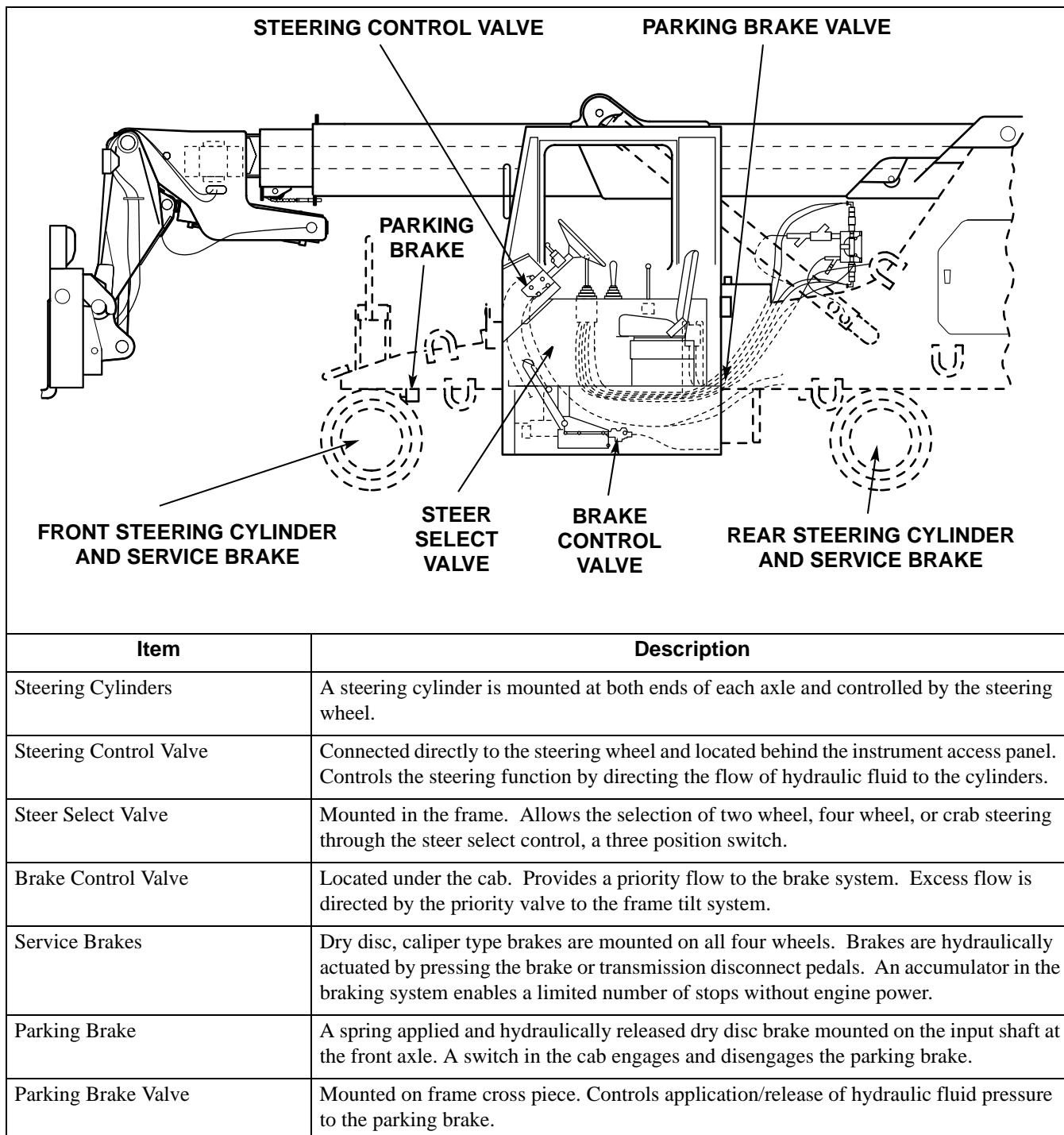
Item	Description
Oil Pump	Draws oil from the oil pan and sends it through the oil cooler, and then through the oil filter. From the filter, the oil enters the cylinder block to lubricate the engine and is then returned to the oil pan. From the filter, oil is also sent through the turbocharger and then returned to the oil pan.
Oil Pan	Contains the oil that lubricates moving parts in the engine.
Engine Oil Cooler	Engine oil flows through the plates of the oil cooler. As the oil warms, heat is transferred to the coolant which flows from the radiator. The coolant flows across the plates of the oil cooler.
Oil Filter	Removes particles from the oil which could cause damage to the internal parts of the engine.
Water Pump	Draws coolant from the radiator and sends it through the oil cooler cavity and cylinder block to cool the engine. The coolant then returns to the radiator.

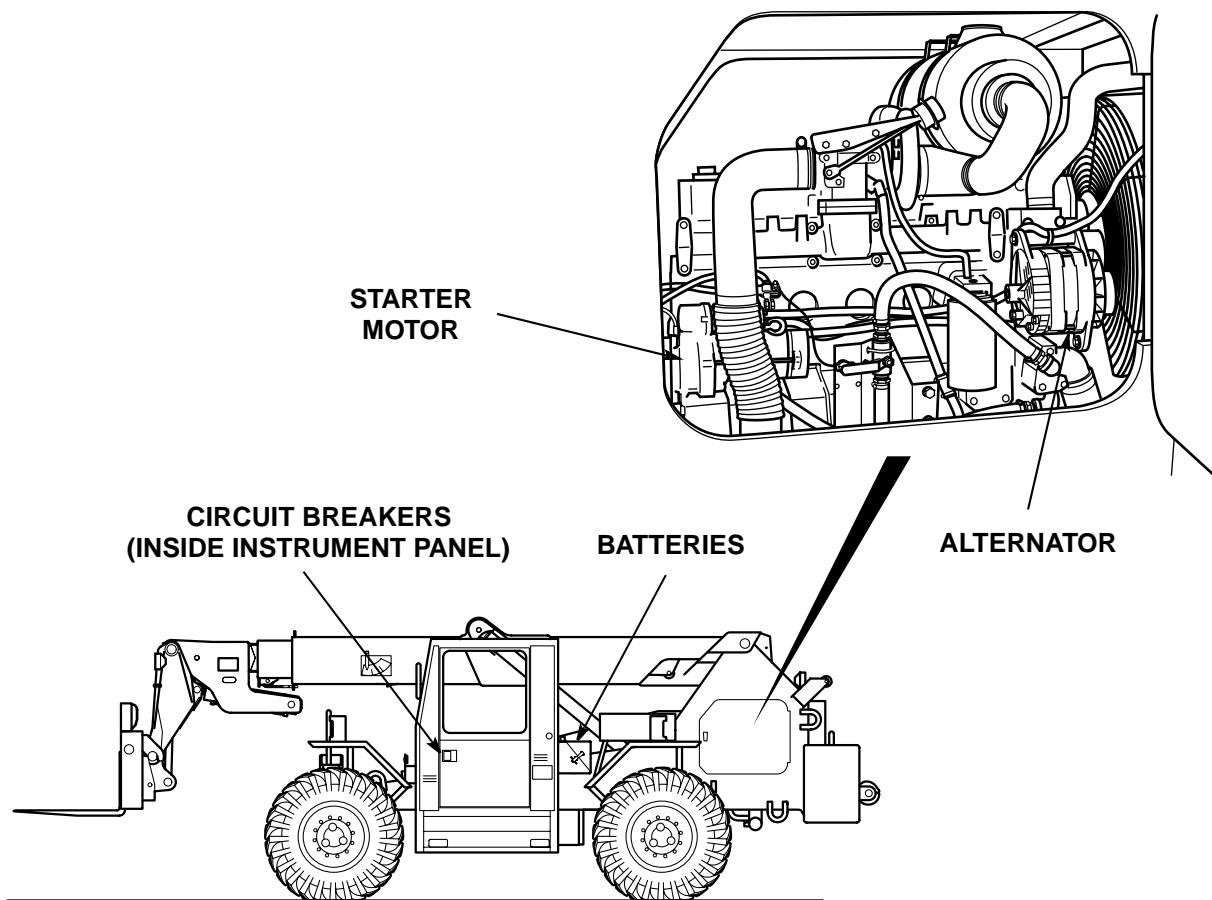
**1-18. ENGINE COOLING SYSTEM**

Item	Description
Fan	Turned by the engine drive belt, the fan creates air flow through the radiator to lower the temperature of the coolant as it passes through the radiator.
Radiator	ATLAS uses an overflow cooling system. The system is full when 2 quarts of coolant are visible in the overflow bottle. Coolant, which is added through a filler cap, circulates through the radiator to be cooled after leaving the cylinder block.

**1-19. TRANSMISSION LUBRICATION AND COOLING SYSTEMS**


<b>Item</b>	<b>Description</b>
Transmission Oil Filter	Located on vehicle right side, just above the boom hoist cylinder on the engine bulkhead. Removes particles in the oil which could damage internal components of the transmission. A pump inside the transmission produces oil flow through the filter, transmission, and oil cooler.
Transmission Oil Cooler	Located in the bottom of the radiator. Oil is drawn through the cooler by the transmission. Coolant from the radiator is circulated across the cooler to lower transmission oil temperature.

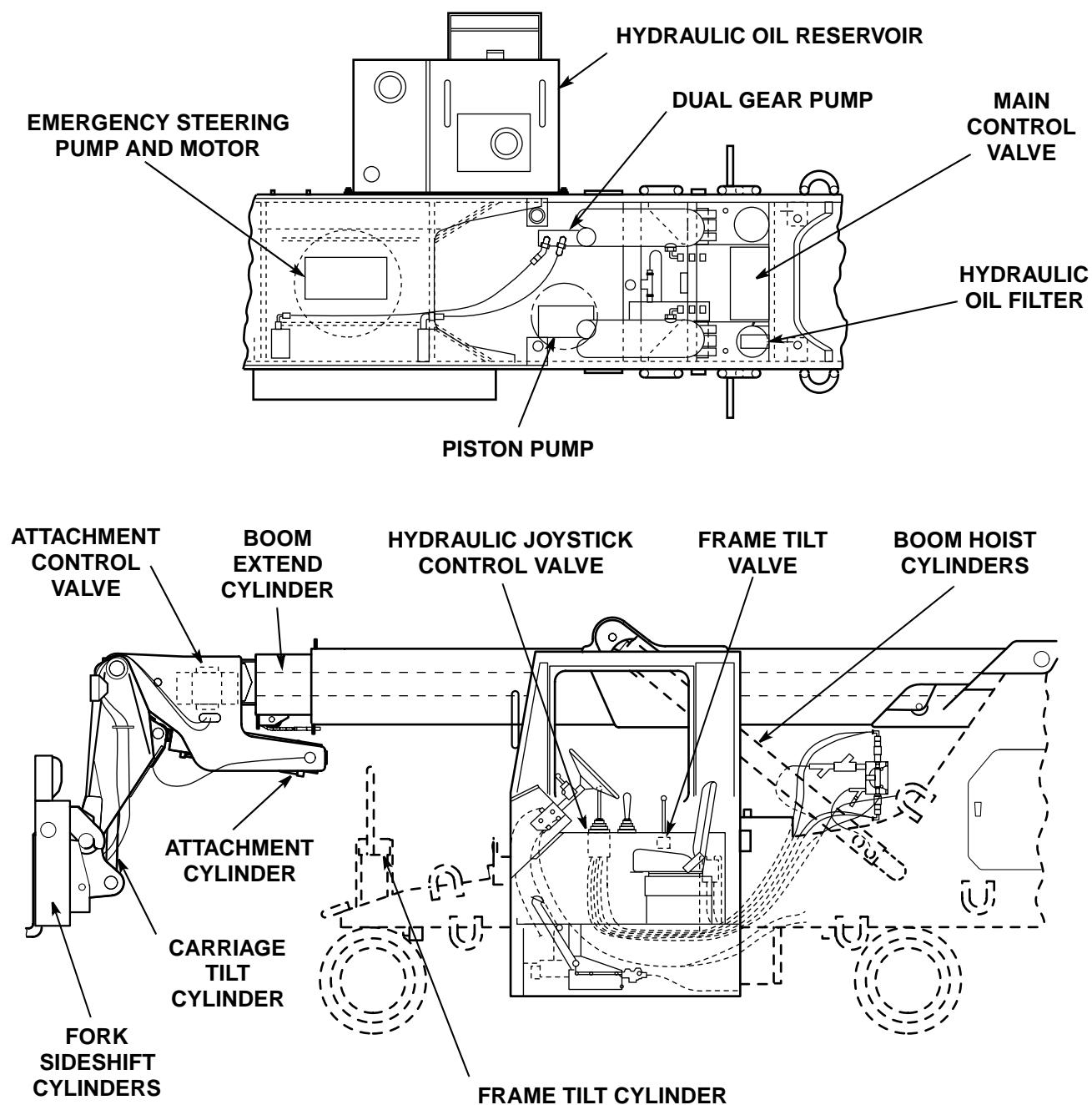
**1-20. STEERING AND BRAKE SYSTEM**

**1-21. ELECTRICAL SYSTEM**


<b>Item</b>	<b>Description</b>
Batteries	Provide power for the electrical circuits. Two 12 volt batteries are connected in series to provide starting power.
Alternator	The 24 volt, 70 amp alternator, an integral part of the charging circuit, provides current to charge the batteries when the engine is running.
Starter Motor	Part of the starting circuit, the starter motor is used to turn the engine flywheel fast enough to start the engine.
Circuit Breakers	Located inside instrument panel. Switches that open the battery circuit if there is a shorted, grounded wire or excessive current draw by a defective component in the corresponding circuit. When the circuit is open, no current will flow through the electrical system. Circuit breakers will automatically reset once they cool. If a breaker continually trips, the electrical system requires repair.

## 1-22. HYDRAULIC SYSTEM

CENTER TOP VIEW



<b>Item</b>	<b>Description</b>
Hydraulic Oil Reservoir	Contains oil for the entire hydraulic system.
Hydraulic Oil Filter	Removes smaller harmful particles from the oil before the oil returns to the reservoir.
Main Control Valve	Located on the engine compartment bulkhead of the main frame (near back of transmission). Operated by the hydraulic joystick control valve to control: boom hoist/lower and extend/retract.
Attachment Control Valve	Mounted on the attachment and controlled by an electrical joystick. Controls the three attachment functions: hoist/lowering, fork tilt, and fork sideshift.
Frame Tilt Valve	Mounted inside the console located to the right of the operator's seat. Controls the tilting of the vehicle frame. Operated by frame tilt control lever.
Hydraulic Joystick Control Valve	Located on the side console in the cab. Controls the following boom functions: raise, lower, extend, and retract.
Dual Gear Pump	Mounted to and driven by the transmission to supply hydraulic oil flow. This two section pump supplies hydraulic fluid for the following functions: boom hoist, boom extend, steering, brakes, and frame tilt.
Piston Pump	Mounted to and driven by the transmission. This pump supplies hydraulic fluid for the following functions: attachment hoist, fork tilt, left and right fork control, and side shift control.
Emergency Steering Pump and Motor	Located in the vehicle frame forward of the transmission. Supplies 5 gpm of emergency flow to the steering system whenever the starter-run control switch is on and there is a loss of hydraulic oil pressure. The pump is driven by an electric motor.
Fork Sideshift Cylinders	Two cylinders controlled by the electric joystick. Both cylinders can be operated at the same time to sideshift forks left or right or move forks together or apart. Cylinders can also be operated individually.
Carriage Tilt Cylinder	Operated by the electric joystick. Moving the lever to the right causes the cylinder to extend and the fork tips to lower. Moving the lever to the left causes cylinder to retract and the fork tips to raise.
Attachment Cylinder	This cylinder is controlled by the attachment control joystick. When the lever is pushed forward, the cylinder will retract. When the lever is pulled back, the cylinder will extend and raise the attachment.
Boom Extend Cylinder	This cylinder is controlled by the hydraulic joystick. Moving the lever to the right extends the cylinder. Moving the lever to the left retracts the cylinder.
Frame Tilt Cylinder	This cylinder is controlled by the frame tilt control joystick. When the lever is moved forward, the cylinder extends and tilts the vehicle to the left. Moving the lever back causes the cylinder to retract and tilt the frame to the right.
Boom Hoist Cylinders	Two cylinders controlled by the boom hoist control joystick. When the lever is moved forward, the cylinders retract and the boom lowers. Moving the lever backward causes the cylinders to extend and the boom to raise.



## CHAPTER 2

### UNIT MAINTENANCE INSTRUCTIONS

<b>Para</b>	<b>Contents</b>	<b>Page</b>
	Section I. Repair Parts, Special Tools, TMDE and Support Equipment	
2-1.	Common Tools and Equipment .....	2-1
2-2.	Special Tools, TMDE and Support Equipment .....	2-1
2-3.	Repair Parts .....	2-1
	Section II. Service Upon Receipt	
2-4.	Service Upon Receipt of Materiel .....	2-2
2-5.	Preliminary Servicing and Adjustment of Equipment .....	2-2
	Section III. Preventive Maintenance Checks and Services (PMCS)	
2-6.	General .....	2-3
2-7.	Organizational Preventive Maintenance Checks and Services .....	2-3
2-8.	Leakage Definitions for Unit PMCS .....	2-4
2-9.	Lubrication Instructions .....	2-5
2-10.	PMCS Column Description .....	2-5
2-10.1	PMCS Initial Setup .....	2-5
	Section IV. Troubleshooting	
2-11.	General .....	2-25
2-12.	Troubleshooting Procedures .....	2-25
2-13.	Introduction to Logic Tree Troubleshooting .....	2-25
2-14.	General Troubleshooting Instructions .....	2-27
2-15.	Electrical System Troubleshooting .....	2-34
2-16.	Mechanical System Troubleshooting .....	2-613
2-17.	Hydraulic System Troubleshooting .....	2-771

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

##### **2-1. COMMON TOOLS AND EQUIPMENT**

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

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

For authorized special tools, TMDE and support equipment refer to the RPSTL and maintenance allocation chart (Appendix B) pertaining to organizational maintenance for this equipment.

##### **2-3. REPAIR PARTS**

Repair parts are listed and illustrated in the repair parts and special tools list (RPSTL) TM 10-3930-673-24P covering organizational maintenance for this equipment.

## Section II. SERVICE UPON RECEIPT

### 2-4. SERVICE UPON RECEIPT OF MATERIEL

- a. Remove any plastic tape, wrapping paper or any other shipping and protective items.

**WARNING**

Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138° F (58° C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

- b. Clean any exposed metal parts coated with rust preventive compound. Remove compound with cleaning solvent.
- c. Read and follow all instructions contained in DD Form 1397 attached to the ATLAS.
- d. Inspect equipment for damage incurred during shipping. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.
- e. Check equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with DA Pam 738-750.
- f. Clean all exterior surfaces.
- g. Touch up any paint scratches.

### 2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM 10-3930-673-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in Table 2-1.
- c. Lubricate all points as shown in the TM 10-3930-673-10 PMCS and the TM 10-3930-673-20 PMCS regardless of interval.
- d. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 314, Preventive Maintenance Schedule and Record.
- e. Report all deficiencies on DA Form 2407 if the deficiencies appear to involve unsatisfactory design.
- f. Check that all decals and plates are on vehicle.
- g. Make sure vehicle is ready for operation; remove all warning tags.

### Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

#### 2-6. GENERAL

To make sure that your vehicle is ready for operation at all times, inspect it systematically so that you can discover any defects and have them corrected before they result in serious damage or failure. The charts on the next few pages contain your unit PMCS. The item numbers indicate the sequence of minimum inspection requirements. If you're operating the vehicle and notice something wrong which could damage the equipment if you continue operation, stop operation immediately.

Record all deficiencies and shortcomings, along with the corrective action taken, on DA Form 2404. The Item Number column is the source for the numbers used on the TM Number column on DA Form 2404.

#### 2-7. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

**a.** The item numbers of the table indicate the sequence of PMCS. Perform at intervals shown below:

- (1) Do your (W) PREVENTIVE MAINTENANCE weekly.
- (2) Do your (Q) PREVENTIVE MAINTENANCE quarterly (every three months).
- (3) Do your (S) PREVENTIVE MAINTENANCE semiannually (every six months).
- (4) Do your (A) PREVENTIVE MAINTENANCE annually (once every year).

**b.** If something doesn't work, troubleshoot it according to the instructions in this manual or notify your supervisor.

**c.** Always do your preventive maintenance in the same order, so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

**d.** If anything looks wrong and you can't fix it, write it down on your DA Form 2404. If you find something seriously wrong, report it to Direct Support Maintenance as soon as possible.

#### WARNING

- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138° F (58° C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield/ gloves, etc.) or injury to personnel could result.

(1) Keep it clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

## 2-7. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

(2) Bolts, nuts and screws: Check that they are not loose, missing, bent or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal or rust around bolt heads. Tighten any bolt, nut, or screw that you find loose.

(3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Direct Support.

(4) Electric wires and connectors: Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connections and make sure wires are in good condition.

(5) Hoses and fluid lines: Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten the fitting or connector. If something is broken or worn out, either correct it or report it to Direct Support Maintenance (see Maintenance Allocation Chart, Appendix B).

## 2-8. LEAKAGE DEFINITIONS FOR UNIT PMCS

It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them and REMEMBER - When in doubt, notify your supervisor.

### LEAKAGE DEFINITIONS FOR UNIT PMCS

Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

### CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When operating with Class I or II leaks, continue to check fluid levels as required on your PMCS.

### NOTE

Change the interval if your lubricants/elements are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours.

## 2-9. LUBRICATION INSTRUCTIONS

- a.** Lubrication instructions are contained in the PMCS table. All lubrication instructions are mandatory.
- b.** Engine and Transmission oil must be sampled at 50 hours of operation or 90 days, whichever occurs first, for Active Army Units. Reserve and National Guard activities will use 50 hours or 180 days, whichever occurs first, as prescribed interval. Hydraulic fluid will be sampled once a year. Sampling will be performed as prescribed by DA PAM 738-750.

## 2-10. PMCS COLUMN DESCRIPTION

- a.** Item Number - The order that PMCS should be performed, and also used as a source of item numbers for the TM Number column on DA Form 5988-E Equipment Inspection and Maintenance (Electronic) worksheet when recording results of PMCS.
- b.** Interval - Tells when each check is to be performed.
- c.** Item To Be Inspected - Lists the checks to be performed.
- d.** Procedures - Description of the procedure by which the check is to be performed.
- e.** During adverse weather or abnormal dusty conditions, lubrication may require daily servicing.
- f.** Lubricate axles, steering gear, propeller shafts, and towing pintle after fording operations.

### NOTE

Perform Operator PMCS prior to or in conjunction with Organizational PMCS if:

- There is a delay between the daily operation and the Organizational PMCS.
- Regular operator is not assisting/participating.

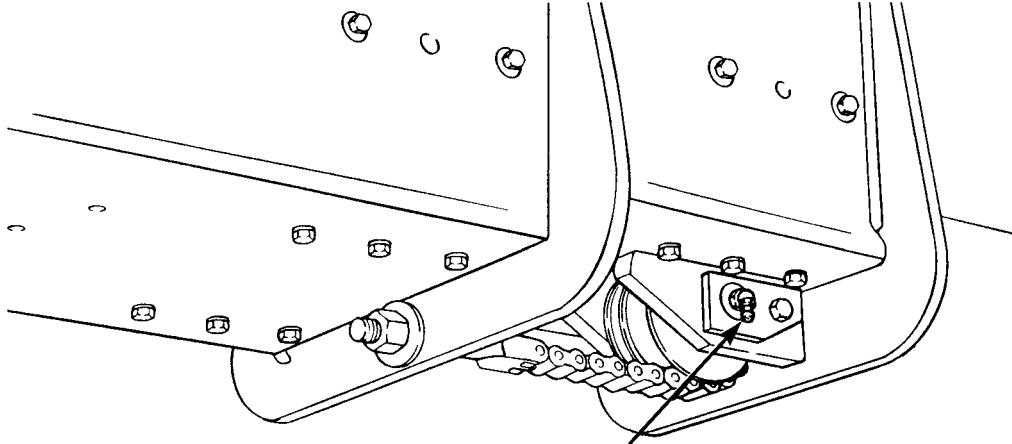
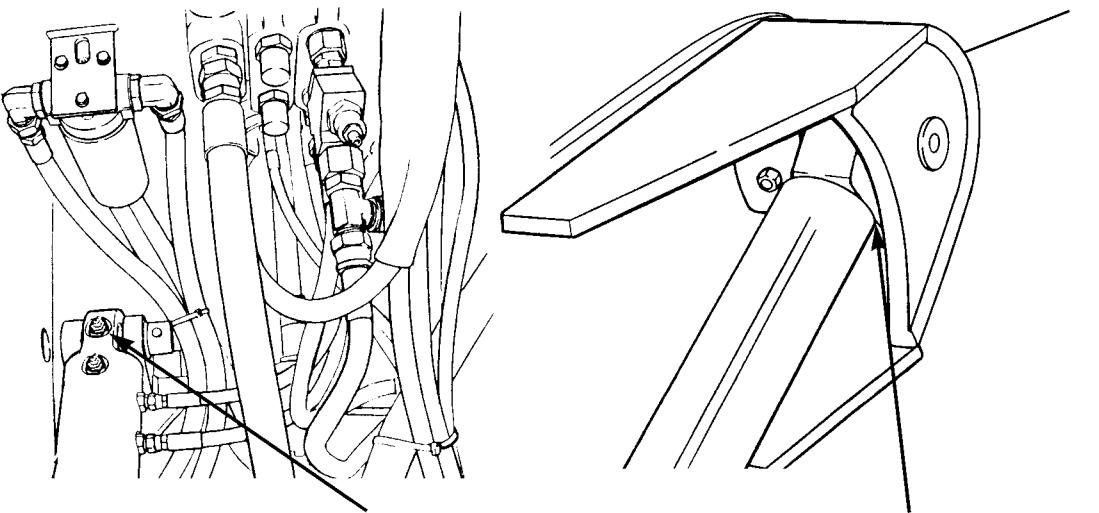
## 2-10.1 PMCS INITIAL SETUP

- a.** General - This paragraph lists tools, materials, and personnel required for Organizational PMCS and lubrication.
- b.** Tools.
  - (1) Shop equipment, common no. 1
  - (2) Tool kit, general mechanic's
- c.** Materials.
  - (1) Antifreeze
  - (2) Grease, GAA
  - (3) Oil, lubricating, OE/HDO-10, OE/HDO-15/40, OEA
  - (4) Oil lubricating, gear, GO-80/90
  - (5) Rags, wiping
- d.** Personnel.
  - (1) Driver/operator
  - (2) Mechanic

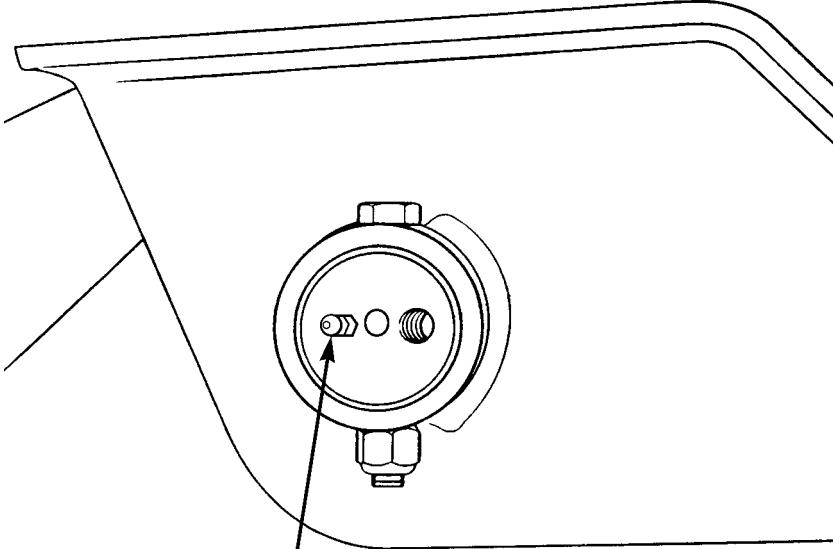
**Table 2-1. Unit Preventive Maintenance Checks and Services**

Item No.	Interval	<u>Location</u> <u>Item to Check/Service</u>	Procedure
			<p style="text-align: center;"><b>CAUTION</b></p> <p>The following new vehicle (break-in) maintenance is required on the ATLAS to prevent damage to the equipment and maintain the warranty.</p> <p>THE FOLLOWING ITEMS MUST BE CHANGED AFTER THE FIRST 20 HOURS OF OPERATION:</p> <ul style="list-style-type: none"> <li>– Transmission oil and transmission oil filter element (refer to Para 9-6).</li> </ul> <p>THE FOLLOWING ITEMS MUST BE CHANGED AFTER THE FIRST 50 HOURS OF OPERATION:</p> <ul style="list-style-type: none"> <li>– Planetary gear oil (refer to Para 11-3).</li> <li>– Differential oil (refer to Para 11-2).</li> <li>– Hydraulic oil filter element (refer to Para 18-27).</li> <li>– Engine oil and engine oil filter element (refer to Para 4-2).</li> </ul> <p>THE FOLLOWING ITEMS MUST BE CHECKED AND ADJUSTED IF NECESSARY AFTER THE FIRST 100 HOURS OF OPERATION:</p> <ul style="list-style-type: none"> <li>– Boom electrical cable tension (refer to Para 18-24).</li> <li>– Boom hydraulic hose tension (refer to Para 18-24).</li> </ul>

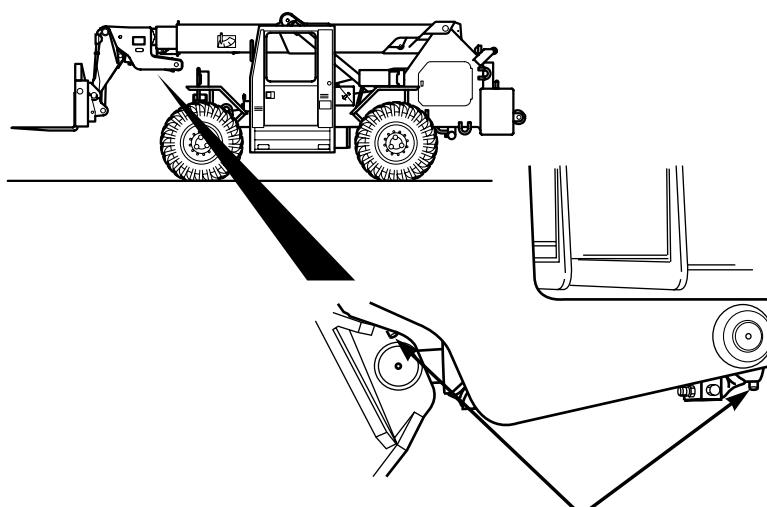
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
1		Boom Assembly Front	 <p><b>LUBE POINT (GAA)</b></p>
	Quarterly		<p>Lubricate boom retract chain sheave with GAA as required.</p>  <p><b>LUBE POINTS (GAA) (2 PLACES)</b>      <b>LUBE POINTS (GAA) (2 PLACES)</b></p>
	Weekly		<p>Lubricate boom hoist cylinder pins (4 places) with GAA as required. Raise boom to approximately 15° for access.</p>

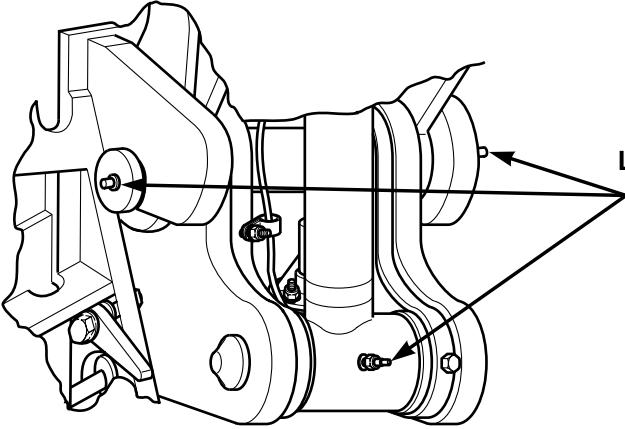
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	<u>Location</u> <u>Item to Check/Service</u>	Procedure
		 <b>LUBE POINTS (GAA) (2 PLACES)</b>	
2	Quarterly	Boom Chain	<p>Lubricate boom pivot pins (2 places) with GAA as required.</p> <p>Check boom chain tension. With the boom fully extended in a horizontal position, measure the retract chain sag at the middle of the intermediate boom section. Chain sag should be approximately 3-1/4 to 3-1/2 inches from the top of the chain to the bottom of the boom. Refer to Para 18-23 if chain requires adjustment.</p>
3	Quarterly	Boom Electrical Cable and Hydraulic Hoses	<p>Check cable and hose adjustment. Refer to Para 18-24 for adjustment procedures.</p>

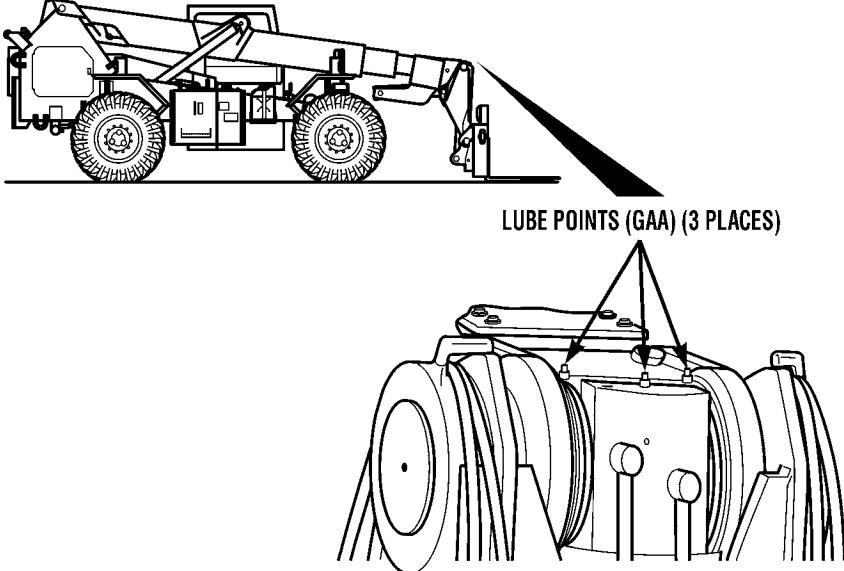
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
4	Weekly	Boom Hoist and Attachment	 <p><b>LUBE POINTS (GAA) (2 PLACES)</b></p> <p>Lubricate daily during periods of high cycling or high loading. Lubricate hoist cylinder pivot pins (2 places) with GAA as required.</p>

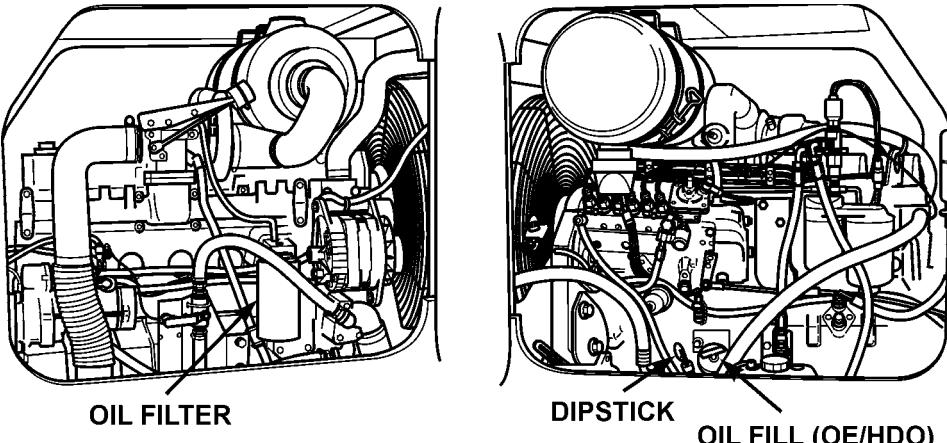
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	<u>Location</u> Item to Check/ Service	Procedure
	Weekly	 <b>LUBE POINTS (GAA) (3 PLACES)</b>	<p>Do not stand under the attachment and carriage assembly during lubrication servicing. Failure to comply may result in serious injury or death to personnel.</p> <p>Lubricate daily during periods of high cycling or high loading.</p> <p>Lubricate carriage tilt cylinder rod end pin with GAA as required. To access carriage lube points and tilt cylinder lower points, raise fork assembly 48 inches (122 cm) and tilt carriage assembly forward 90°. To access tilt cylinder rod end pin, place level fork/carriage assembly firmly on the ground.</p>

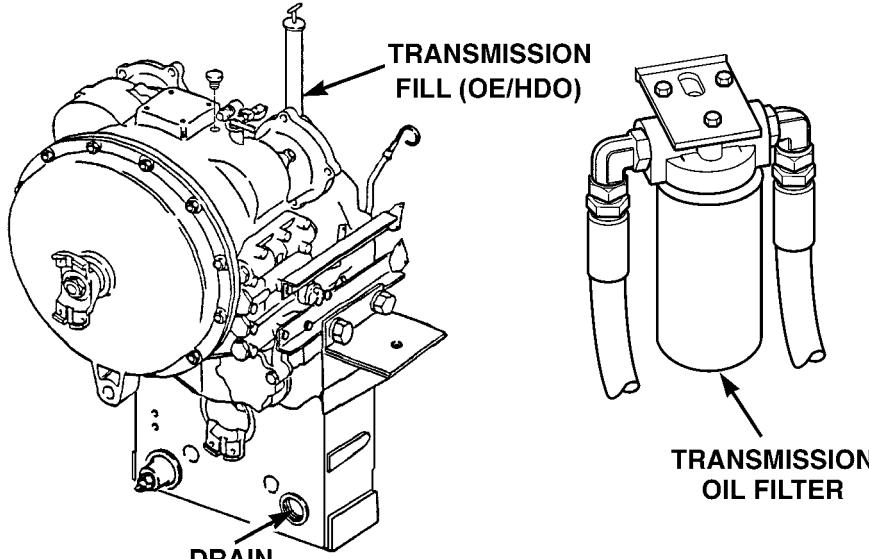
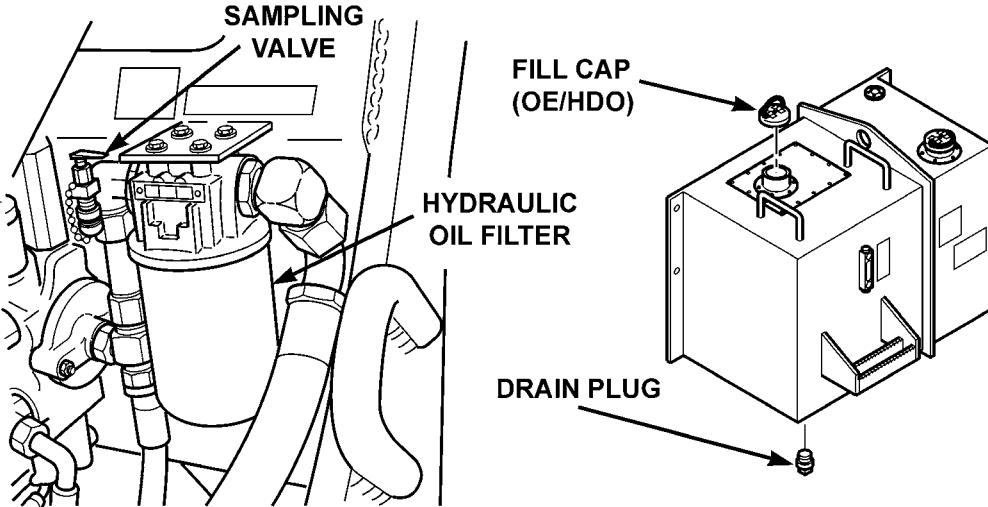
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
	Weekly	 <p>LUBE POINTS (GAA) (3 PLACES)</p>	<p>Lubricate daily during periods of high cycling or high loading.</p> <p>Lubricate attachment pivot pin with GAA as required.</p>
4.1	Weekly	Fork Shaft and Fork Wear Pad Sliding Surface	<p>Clean and lubricate as follows:</p> <ol style="list-style-type: none"> <li>Wipe exposed area of fork shaft and sliding surface of two wear pads with clean cloth. Use nylon bristle brush to remove any corrosion or dirt build-up.</li> <li>Apply light coat of teflon dry lube (Item 15.1, Appendix C). to fork shaft and wear pad sliding surface.</li> <li>Move forks left or right to expose remaining area of fork shaft.</li> <li>Apply dry lube to exposed area.</li> </ol>

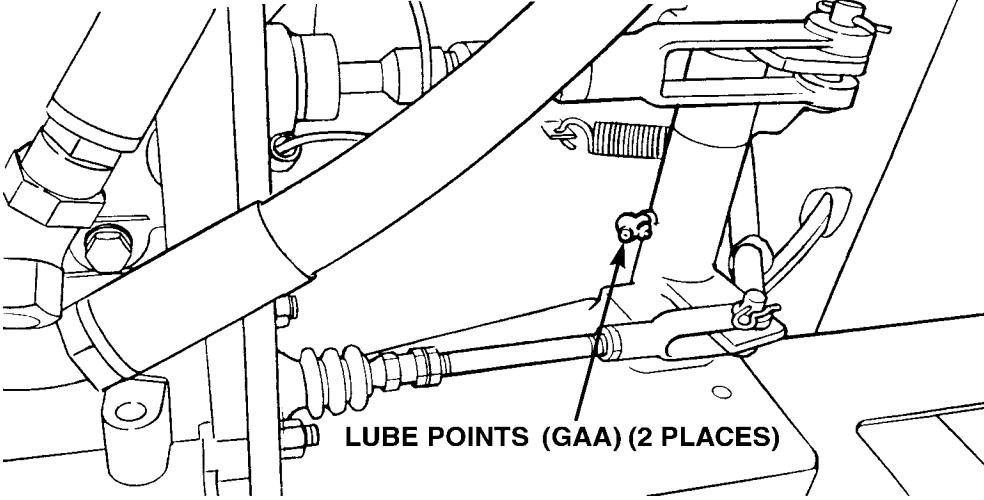
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
5	Quarterly	Wear Pad Screws  Fork Bushings and Wear Pads  Engine Assembly	<p>e. Move forks fully left and right several times.</p> <p>f. Apply another light coat of teflon dry lube to fork shaft and wear pad sliding surface.</p> <p>Check for loose, missing, bent or broken wear pad screws. Refer to Para 18-16 for correct tightening procedure.</p> <p>Check fork bushings and wear pads for excessive wear and obvious damage. Replace wear pads when worn to less than 3/8 of an inch. Refer to Para 18-17 for replacement instructions.</p>
6			 <p><b>OIL FILTER</b>                            <b>DIPSTICK</b>                            <b>OIL FILL (OE/HDO)</b></p>
7	Semiannually	LEFT SIDE  Engine Mounts	<p><b>LEFT SIDE</b></p> <p>Change engine oil based on the Army Oil Analysis Program (AOAP).</p> <p>Check engine drive belt for wear. Firmly press the belt midway between its longest span. Maximum deflection should be 3/8 to 1/2 inch. If drive belt is worn or stretched, refer to Para 7-9 for drive belt replacement. Drive belt tension is not adjustable.</p> <p>Check engine mounts for cracks, deterioration and damage.</p> <p><b>RIGHT SIDE</b></p>

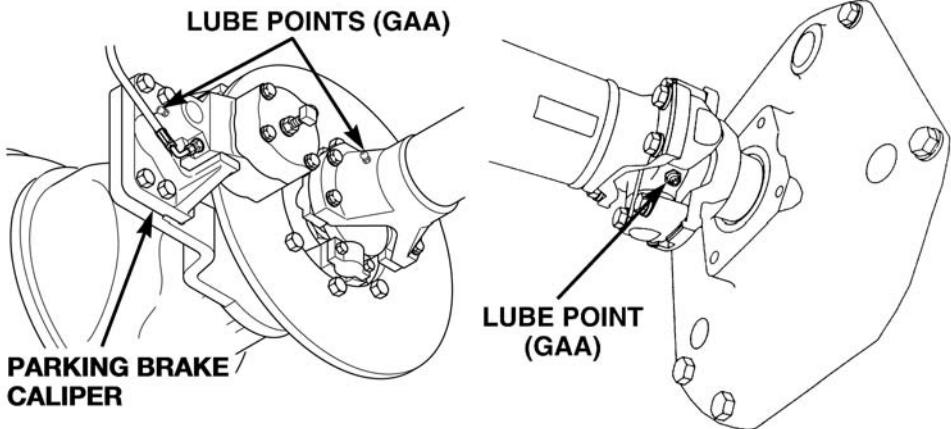
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
8	Semiannually	Transmission and Hydraulic System	 <p>Change transmission oil.</p>
	Annually		 <p>Change hydraulic system oil and hydraulic oil filter every 1000 hours of operation. Refer to Para 18-27 for filter procedure and Table 2-2 for oil SAE by expected temperature.</p>

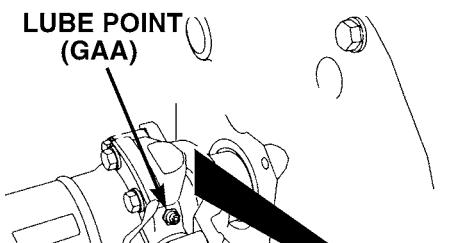
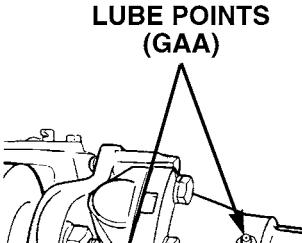
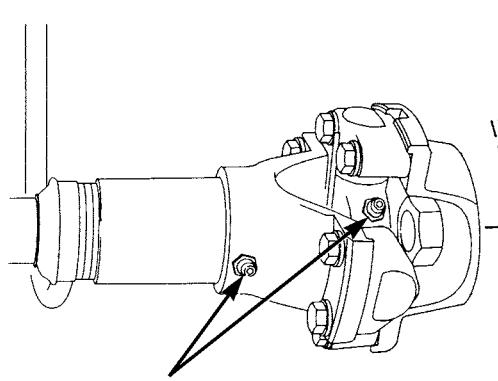
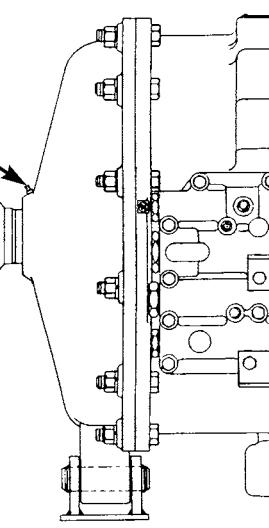
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
9	Daily	Batteries	<p style="text-align: center;"><b>WARNING</b></p> <p>Do not smoke or allow any flame or spark in the vicinity while checking or filling the batteries. The batteries generate hydrogen gas, a highly explosive gas. Severe personal injury could result.</p>
10	Daily	Service Brakes	<p>Test batteries to determine cell condition. Replace or add electrolyte (if necessary) and recharge. Refer to TM 9-6140-200-14.</p>
			 <p>LUBE POINTS (GAA) (2 PLACES)</p>
Weekly			<p>Lubricate brake pedal and transmission disconnect pedal countershaft with GAA as required. Lubrication points are under cab.</p>
Quarterly			<p>Check brake pads for wear. Pads should not be allowed to wear below 1/8 inch in thickness. Refer to Para 12-5 for wear pad replacement procedures.</p>
Quarterly			<p>Check brake rotors for grooves, discoloration, cracks, and warpage.</p>

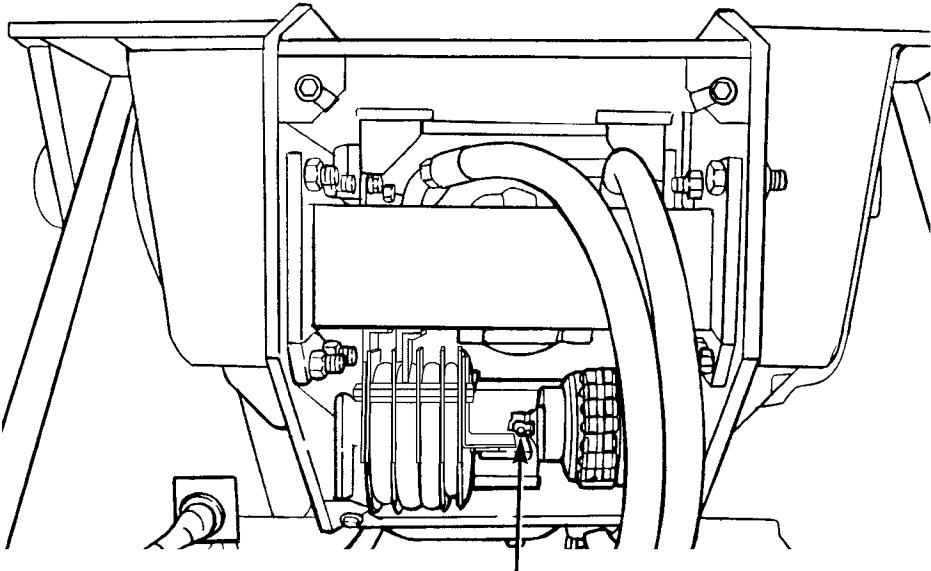
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
11		Propeller Shafts	<p><b>WARNING</b></p> <p>Care must be exercised when lubricating front propeller U-joint and parking brake. Over lubrication could result in grease on the parking brake rotor and/or parking brake linings which could cause the brake to slip. Death or bodily injury to personnel could result.</p> 
	Semiannually		<p>Lubricate front propeller shaft slip joint and u-joints (3 places) with GAA as required.</p> <p>Lubricate parking brake with GAA as required.</p>

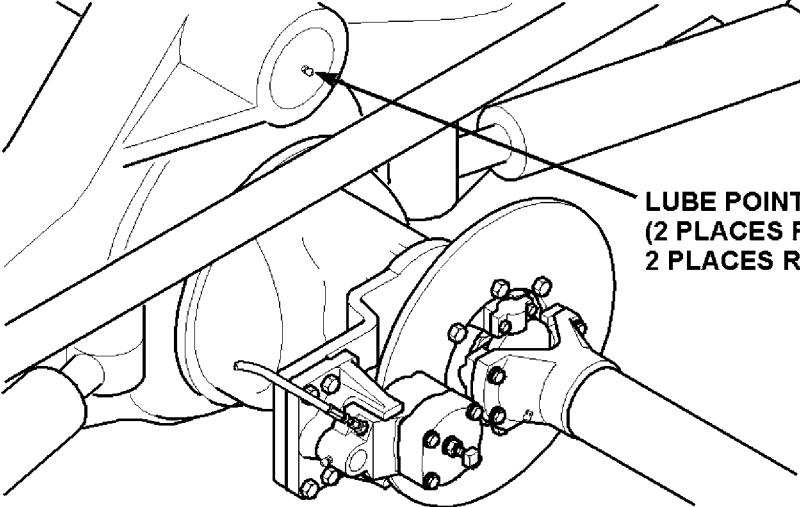
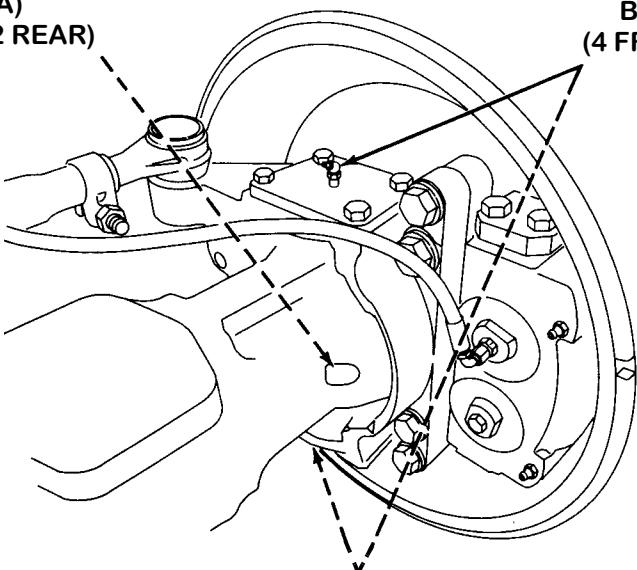
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
		 	<p>Lubricate rear propeller shaft slip joint and u-joints (3 places) with GAA as required.</p>
12	Quarterly	 	<p>Lubricate transmission input shaft bearing, slip joint, and u-joint (3 places) with GAA as required.</p> <p>Check all propeller shaft universal joints for excessive vibration or noise. Refer to Para 10-2 for replacement procedures.</p>

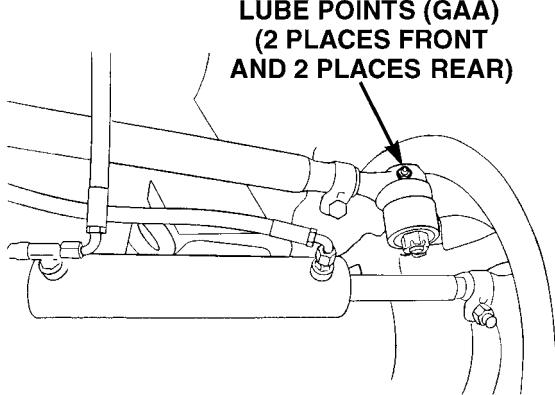
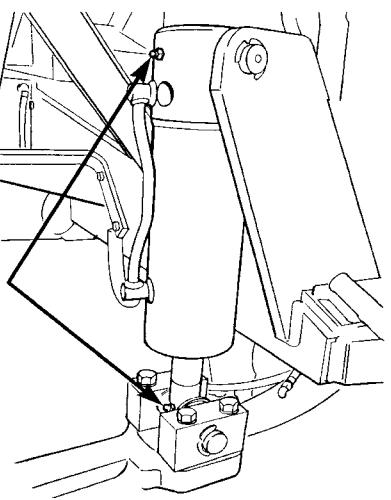
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
		 <p style="text-align: center;"><b>LUBE POINT (GAA)</b></p>	
13	Quarterly Semiannually	Truck, Forklift	Lubricate boom extend chain sheave with GAA as required. Remove rear boom cover and check all visible boom wear pads (front and rear). Refer to Para 18-20 for inspection procedures.
14	Annually	Coolant Mixture Check	Perform annual safety inspection in accordance with TB 43-0142, Safety Inspection and Testing of Lifting Devices.
15	Quarterly Semiannually	Fuel Filters	Check for 50-50 mix of ethylene glycol and clean water. Refer to MIL-A-46153. If necessary, drain and refill engine cooling system. Refer to Para 7-2.
16	Weekly	Wheels and Tires	Replace primary and secondary engine fuel filters. Refer to Para 5-15. Check wheel nuts for proper torque (330 +/- 5 lb-ft [637.2 +/- 7 Nm]). Check tires for proper inflation pressures (front tires: 65 psi, rear tires 65 psi).
17		Axe Carrier	

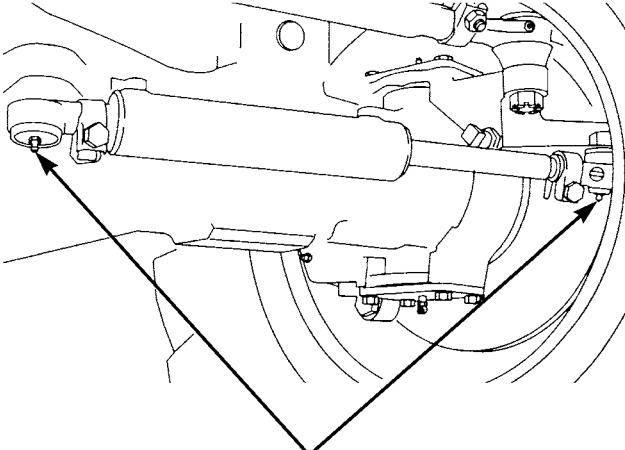
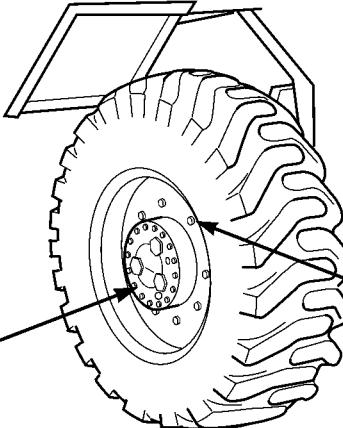
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
	Weekly	 <p>LUBE POINTS (GAA) (2 PLACES FRONT AND 2 PLACES REAR)</p>	<p>Lubricate axle carrier pins (2 front and 2 rear) with GAA as required.</p>
	Quarterly	 <p>LUBE POINT STEERING KNUCKLE U-JOINT (GAA) (2 FRONT AND 2 REAR)</p> <p>LUBE POINT STEERING KNUCKLE BEARINGS (GAA) (4 FRONT AND 4 REAR)</p>	<p>Lubricate steering knuckle bearing and u-joint (6 front and 6 rear) with GAA as required. Vehicle may have to be moved forward or backward to align grease fitting with access hole. If fitting is aligned with access hole but grease gun will not go on fitting, turn wheels right or left until grease gun fits.</p>

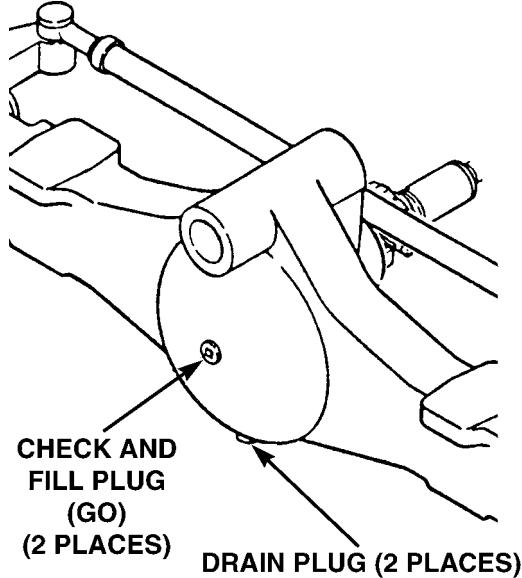
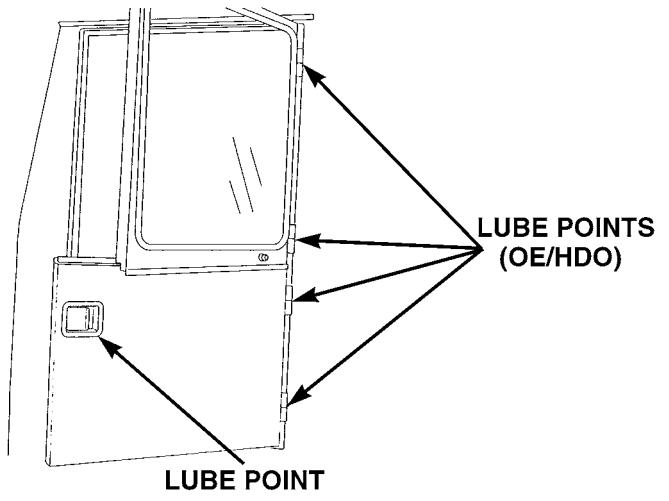
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	<u>Location</u> <b>Item to Check/Service</b>	Procedure
	Weekly	 <b>LUBE POINTS (GAA) (2 PLACES FRONT AND 2 PLACES REAR)</b>	Lubricate tie rod ends (4 places) with GAA as required.
	Weekly	 <b>LUBE POINTS (GAA)</b>	Lubricate frame tilt cylinder pins (2 places) with GAA as required.

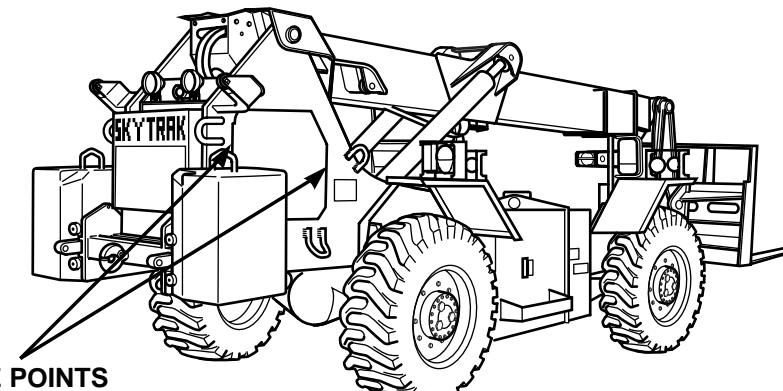
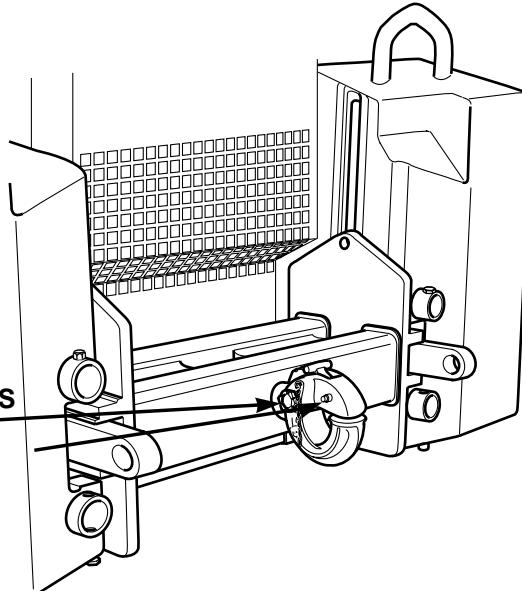
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
		 <p>LUBE POINTS (GAA) (8 PLACES)</p>	
	Weekly		<p>Lubricate steering cylinders (4 front and 4 rear) with GAA as required.</p>
		 <p>DRAIN AND FILL PLUG (GO) (4 PLACES)</p> <p>WHEEL NUTS (12 PLACES EACH WHEEL)</p>	
	Quarterly		<p>Lubricate planetary hubs (4 places). Refer to Table 2-2 for oil SAE by expected temperature.</p>
	Quarterly	Wheel Nuts	<p>Ensure all wheel nuts are installed and tightened to correct torque value of 330+/- 5 lb-ft (637.2 +/- 7 Nm).</p>

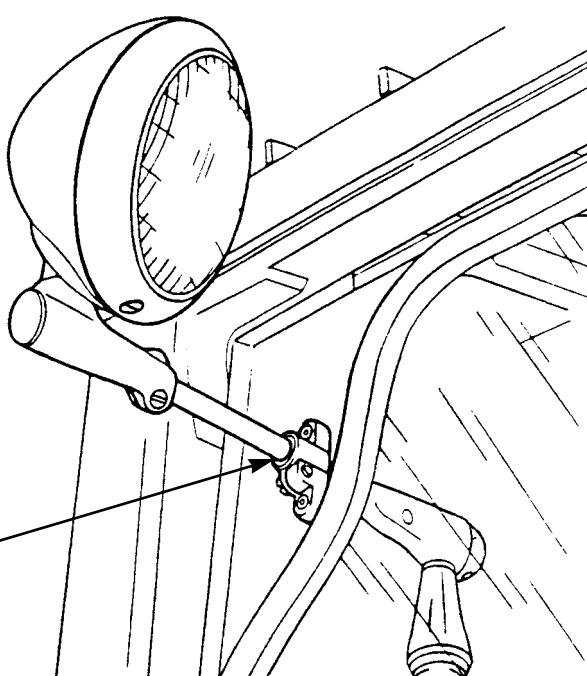
**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

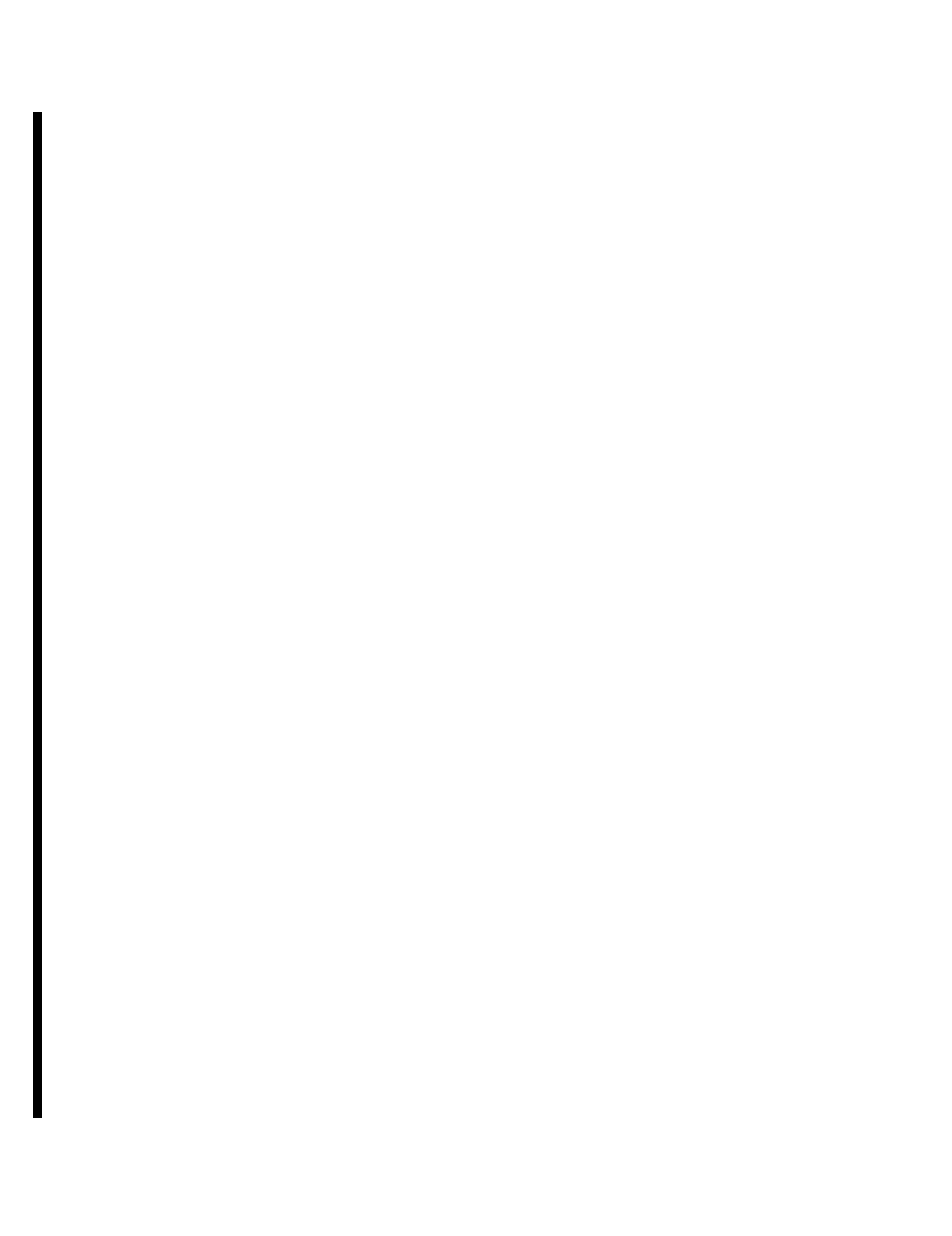
Item No.	Interval	Location Item to Check/ Service	Procedure
18	Quarterly	Body/Frame	 <p>Lubricate differential (front and rear). Check oil levels while vehicle is level. Oil should be to bottom of check and fill hole. Refer to Para 11-2 for procedure and Table 2-2 for oil SAE by expected temperature.</p>
	Weekly		 <p>Lubricate cab door hinges and latches with OE/HDO using a hand oiler as required.</p>

**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	Location Item to Check/ Service	Procedure
		 <p><b>LUBE POINTS (OE/HDO) (BOTH SIDES)</b></p>	<p>Weekly</p> <p>Lubricate engine access door hinges and latches with OE/HDO using a hand oiler as required.</p>
		 <p><b>LUBE POINTS (GAA)</b></p>	<p>Quarterly</p> <p>Lubricate towing pintle with GAA (2 places) as required.</p>

**Table 2-1. Unit Preventive Maintenance Checks and Services (Continued)**

Item No.	Interval	<u>Location</u> Item to Check/ Service	Procedure
	Quarterly	 <b>LUBE POINT (OE/HDO) (2 PLACES)</b>	Lubricate shaft and bushing of each of two spotlights with OE/HDO using hand oiler as required.



**Table 2-2. Lubricating Instructions**

KEY								
LUBRICANTS		CAPACITIES	EXPECTED TEMPERATURES				INTER-VALS	
Above -10°F (Above -23°C)	Below -10°F (Below -23°C)	Above +40°F (Above +4°C)	Below +40°F (Below +4°C)					
OE/HDO (MIL-L-2104)	LUBRICATING OIL, Engine	15 qt (14 l)		OE/HDO 15/40	OEA		Intervals given are in hours of normal operation  See LO 10-3930- 673-12	
	Engine Crankcase							
	Oil Can Points							
	Transmission	5.5 gal (20.8 l)	OE/HDO 10	OEA				
	Transmission Disconnect Master Cylinder	As Req.	OE/HDO 10	OEA				
	Hydraulic System	56.6 gal (214.2 l)			OE/HDO 10	OE/HDO 10		
	Oil, Engine, Arctic							
GO (MII-L-2105)	LUBRICATING OIL, Gear, Multipurpose	10.6 qt (10 l) (each)		GO 80/90	GO 80/90		For Arctic Operation Refer to FM 9-207	
	Differential							
	Planetary Hubs	2.7 qt (2.6 l) (each)			GO 80/90	GO 80/90		
GAA (MIL-G-10924)	TEFLON DRY LUBE, Fork Shaft and Fork Wear Pad Sliding Surface	As Req.	GAA  ALL TEMPERATURES					
	GREASE, Automotive and Artillery Carriage Tilt Cylinder & Carriage Pivot Pins	As Req.						
	MLRS Hoist Cylinder & MLRS Attachment Pivot Pins	As Req.						
	Propeller Shaft Slip Joints & U-Joints	As Req.						
	Tie Rod Ends	As Req.						
	Axle Carrier Pins	As Req.						
	Steering Knuckle Bearings & Joints	As Req.						

**Table 2-2. Lubricating Instructions (Continued)**

LUBRICANTS		CAPACITIES	EXPECTED TEMPERATURES				INTER-VALS
			Above -10°F (Above -23°C)	Below -10°F (Below -23°C)	Above +40°F (Above +4°C)	Below +40°F (Below +4°C)	
	Brake Pedal & Transmission Disconnect Pedal Counter Shaft	As Req.	GAA  ALL TEMPERATURES				For Arctic Operation Refer to FM 9-207
	Transmission Input Shaft Bearing, Slip Joint & U-Joint	As Req.					
	Boom Extend & Boom Retract Chain Sheaves	As Req.					
	Boom Pivot & Boom Hoist Cylinder Pins	As Req.					
	Frame Tilt Cylinder Pins	As Req.					
	Steering Cylinders	As Req.					

## NOTES

1. LUBRICATION. During adverse weather or abnormal dusty conditions, lubrication may require daily servicing.
2. The lubricating points for the brake pedal and transmission disconnect pedal counter shaft are located under the cab (GAA).
3. Lubricate all hinges and door latches with a hand oiler (OE/HDO).
4. Check the differential oil levels while vehicle is on a level surface. Oil should be to the bottom of the check and fill hole (GO or GAA).
5. Lubricate after fording operations (GAA).
6. **WARNING – Do not stand under the attachment and carriage assembly during lubrication services.** To lube the carriage lube points and tilt cylinder lower points, raise the fork assembly 48 in. (122 cm) and tilt the carriage assembly forward 90°. To lube the tilt cylinder's head pivot pin, place the level forks/ carriage firmly on the ground (GAA).
7. During adverse weather, dusty or sand conditions, change transmission oil and filter element at 250 hour intervals. For normal off-highway operation, for operation under rapid change in ambient temperature, or for operation in presence of chemical fumes, change at 375 hour intervals. Use MIL-L-2104 hydraulic transmission fluid when operating the vehicle in temperatures above -10°F (-23°C), and MIL-L-46167 transmission fluid when operating in temperatures below -10°F (-23°C).
8. To lube the steering knuckle joint, the vehicle may have to be moved forward or backwards to align grease fitting with access hole. If the fitting is aligned with the access hole but grease gun will not go on fitting, turn the wheels right or left until grease gun fits on grease fitting (GAA).
9. Raise the boom to approximately 15° to lubricate the boom hoist cylinder pins (GAA).
10. Drain hydraulic reservoir every 2000 hours. Change hydraulic oil filter and add oil (OE/HDO) to reservoir until oil is visible in sight gage. Operate hydraulic system and check oil level again.

## CHART A. ENGINE

EXPECTED TEMPERATURE																		
°F	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	-46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
OE/HDO - 10W/30																		
OEA																		
LUBRICANTS:    OE/HDO LUBRICATING OIL, ICE, TACTICAL (MIL-L-2104) OEA LUBRICATING OIL, ICE, ARCTIC (MIL-L-46167)																		
*See Note 2a																		

## CHART B. TRANSMISSION/HYDRAULIC

EXPECTED TEMPERATURE																		
°F	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	-46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
OE/HDO - 10																		
OEA																		
LUBRICANTS:    OE/HDO LUBRICATING OIL, ICE, TACTICAL (MIL-L-46152)																		
*See Notes 3a, 3b, and 3c																		

## CHART C. DIFFERENTIAL

EXPECTED TEMPERATURE																		
°F	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	-46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
GO - 80W/90																		
GO - 75																		
LUBRICANTS:    LUBRICATING OIL, GEAR, MULTIPURPOSE (MIL-L-2105)																		
*See Notes 5a through 5d																		

**LUBRICANT • INTERVAL****ENGINE DOOR HINGES**

Lubricate. (O)            OE/HDO            50HRS  
 (See Note 7a)

**CAB DOOR HINGES AND LATCHES**

Lubricate. (O)            OE/HDO            50HRS  
 (See Note 7a)

**FRAME TILT CYLINDERS**

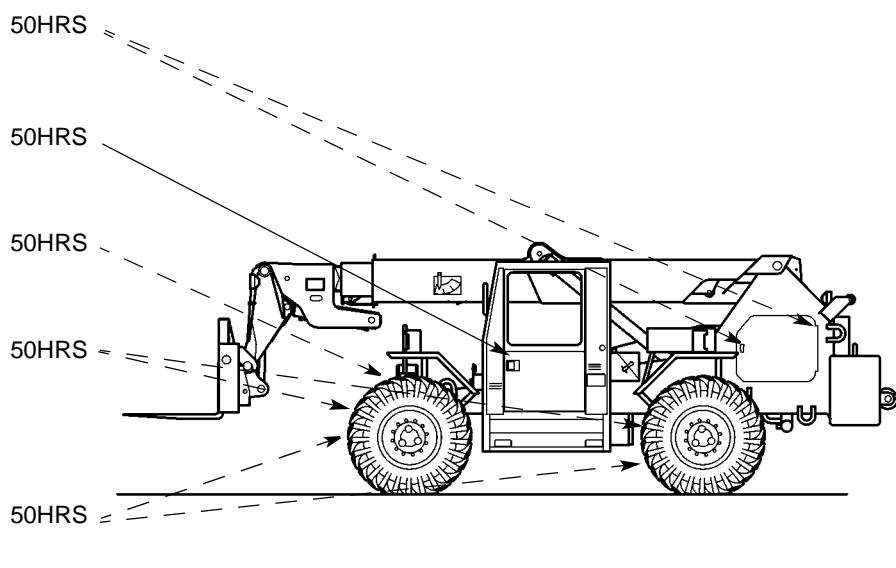
Lubricate. (O)            GAA  
 (See Notes 1a and 1c)

**STEERING CYLINDER**

Lubricate. (O)            GAA  
 (See Notes 1a and 6c)  
 (2 Places, 2 Front and  
 2 Rear)

**TIE ROD ENDS**

Lubricate. (O)            GAA  
 (See Notes 6b) (4  
 Places, 2 Front 2  
 Rear)

**ATTACHMENT PIVOT PIN**

Lubricate. (O)            GAA  
 (See Notes 1a and 1d)

**HOIST CYLINDER PIVOT PINS**

Lubricate. (O)            GAA  
 (See Notes 1a and 1d)

**CARRIAGE TILT CYLINDER**

Lubricate. (O)            GAA  
 (See Note 1c)  
 (3 Places)

**BOOM HOIST CYLINDER PINS**

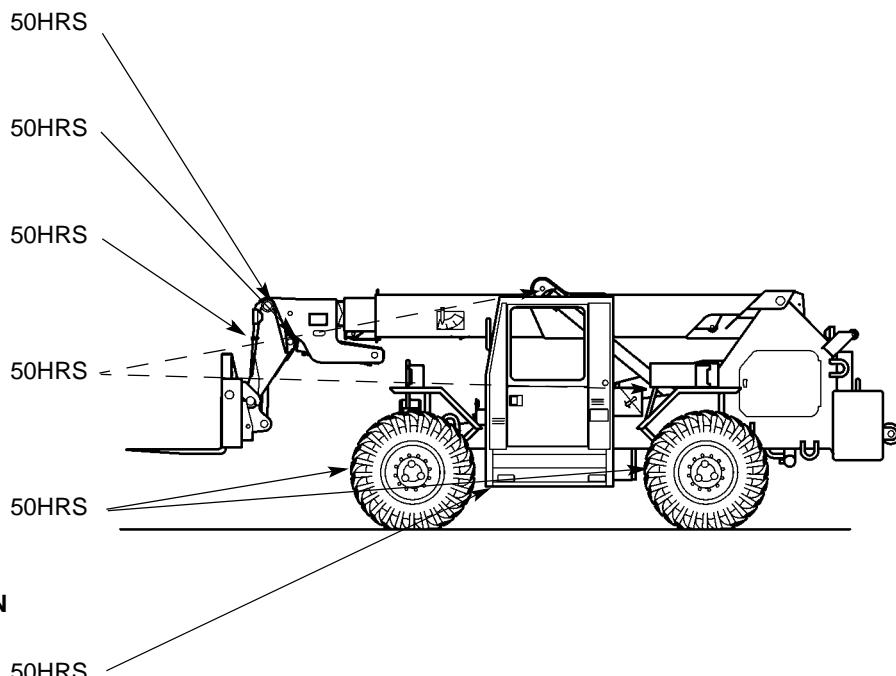
Lubricate. (O)            GAA  
 (See Note 1c)  
 (2 Places)

**AXLE CARRIER PINS**

Lubricate. (O)            GAA  
 (2 Front & 2 Rear)  
 (See Notes 1a and 1d)

**BRAKE PEDAL AND TRANSMISSION  
DISCONNECT PEDAL**

Lubricate. (O)            GAA            50HRS  
 (See Note 7b)



**BOOM PIVOT PINS**

Lubricate. (O) GAA  
 (2 Places) (See  
 Note 1d)

250HRS

250HRS

250HRS

250HRS

250HRS

250HRS

250HRS

2000HRS

250HRS

250HRS

250HRS

**BOOM EXTEND CHAIN SHEAVE**

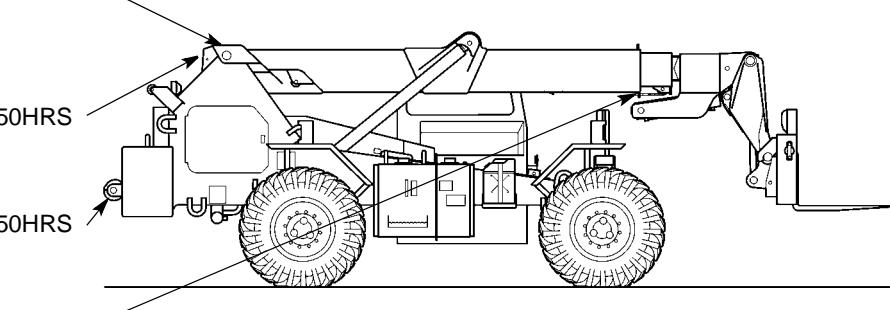
Lubricate. (O) GAA  
 (See Note 1b)

**TOWING PINTLE**

Lubricate. (O) GAA  
 (2 Places)

**BOOM RETRACT CHAIN SHEAVE**

Lubricate. (O) GAA  
 (See Note 1b)

**PLANETARY WHEEL ENDS**

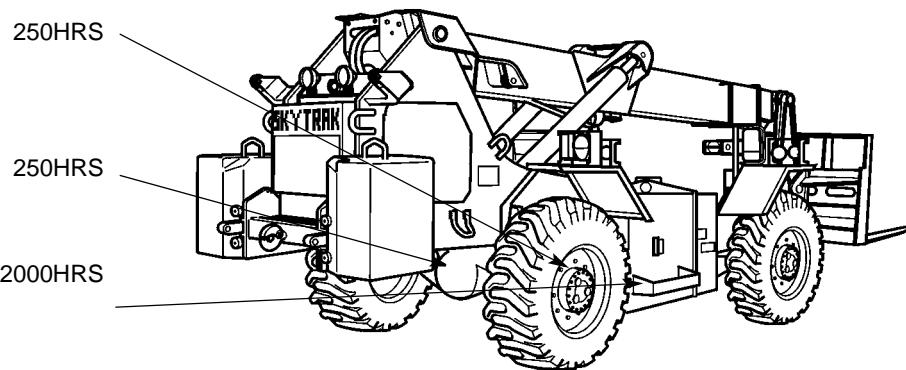
Lubricate. (O) 80W90  
 (4 Places) (See  
 Note 5d)

**DIFFERENTIAL FRONT AND REAR**

Lubricate. (O) 80W90  
 (See Note 5a)

**HYDRAULIC SYSTEM**

Lubricate. (O) OE/HDO  
 (See Notes 8a through 10  
 8d)

**TRANSMISSION AND TRANSMISSION FILTER**

Lubricate. (O) OE/HDO  
 (See Notes 3a, 3b and  
 3c)

250HRS

**TRANSMISSION INPUT SHAFT**

Lubricate. (O) GAA  
 (See Note 3d)

250HRS

**STEERING KNUCKLE**

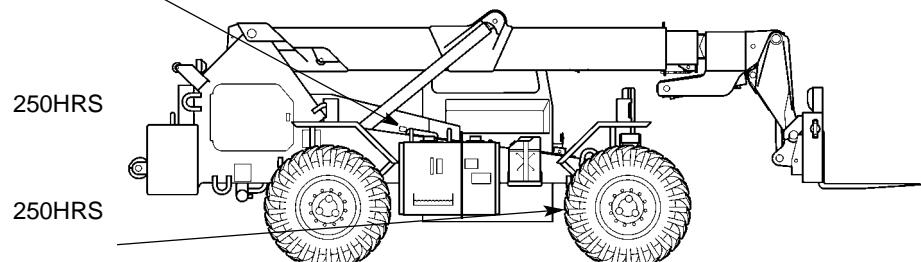
Lubricate. (O) GAA  
 (6 Front and 6 Rear)  
 (See Note 6a)

250HRS

250HRS

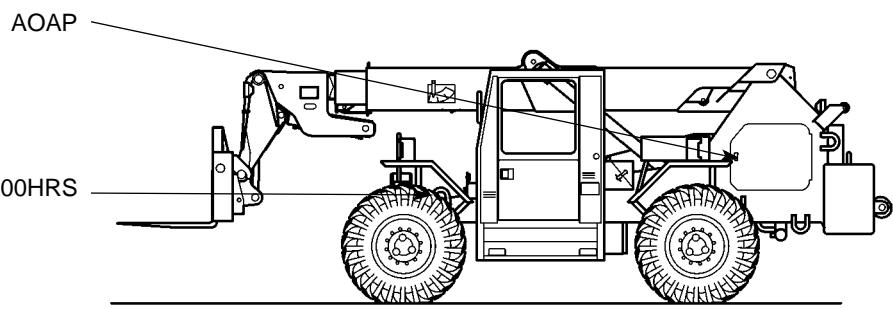
250HRS

250HRS



**ENGINE AND OIL FILTER**

Lubricate. (O) 10W30  
(See Notes 2a and 2b  
and 8a through 8d and  
View 22.)



**FRONT PROPELLER SHAFT**

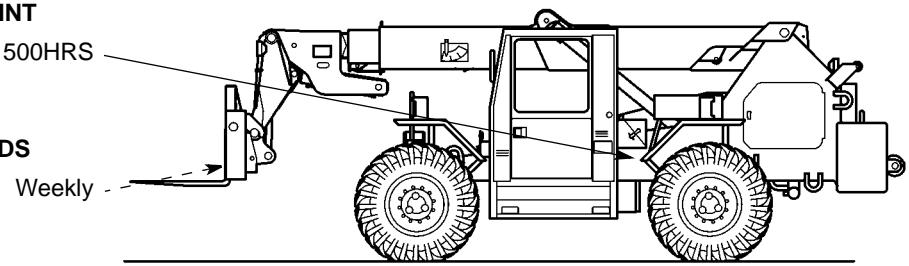
Lubricate. (O) GAA  
(See Note 5b and  
View 23.)

**PARKING BRAKE CALIPER**

Lubricate. (O) GAA  
(See Note 10 and  
View 23.)

**REAR PROPELLER SHAFT SLIP JOINT**

Lubricate. (O) GAA  
(3 Places) (See Note  
5c and View 24.)

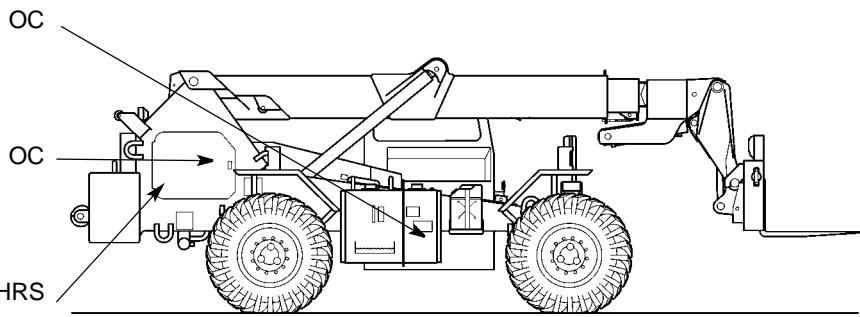


**FORK SHAFT AND FORK WEAR PADS**

Lubricate (O) DRY  
(See Note 11 and View LUBE  
28)

**FUEL TANK**

Drain Sediment. (O)  
(See Notes 4a, 4d and  
4e and View 25.)



**FUEL/WATER SEPARATOR**

Drain. (C)  
(See Note 4c and  
View 26.)

**FUEL FILTERS**

Change. (O)  
(See Note 4b and  
View 27.)

## NOTES

### 1. CHASSIS AND MAST.

**WARNING**

Do not start engine or move forklift when anyone is working on vehicle. Severe injury or death to personnel could result.

**WARNING**

Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working within 46 ft (14 m) of vehicle. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time.

### NOTE

If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove and clean fitting, install fitting, and grease again. If part still does not purge, refer to maintenance task for that component.

- a. Purgimg of Lubricant.** When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.
- b. Boom Chain Sheave and Chains.** Clean off dirt and debris before lubricating chains. Coat chains and connections liberally.
- c. Hoist Cylinder and Tilt Cylinder.** Apply grease with pneumatic grease gun only. Lubricate daily during periods of high cycling or high loading.
- d. Pivot Pins.** Apply grease with pneumatic grease gun only.

### 2. ENGINE.

- a. Crankcase.** Check oil level with forklift parked on level ground and the engine off and cool (TM 10-3930-673-10). Do not overfill crankcase. Refer to TM 10-3930-673-20-2, remove plug and drain crankcase. Change engine oil and filter based on Recommendation from The Army Oil Analysis Program.
- b. Engine Oil Filter.** After installing new filter, fill crankcase, operate engine five minutes, and check filter for leaks. Shut off engine, check crankcase level, and fill to FULL mark.

### 3. TRANSMISSION.

- a. **Transmission Housing.** Check oil level with forklift parked on level ground (TM 10-3930-673-10). After running engine for 2 minutes, check transmission oil level with engine running. Drain housing after running transmission in neutral until transmission temperature is between 160 and 190 degrees F (71.1 and 87.8 degrees C). Refer to TM 10-3930-673-20-2, remove plug and drain transmission and refilling.
- b. **Transmission Oil Filter.** After installing new filter, fill housing, operate engine five minutes, and check filter for leaks. Shut off engine, check housing level, and fill to FULL mark.
- c. **Transmission Strainer.** Refer to TM 10-3930-673-20-2, remove and clean the strainer after each oil change.
- d. **Transmission Input Shaft.** Lubricate transmission input shaft bearing, slip joint and u-joint (3 places) with GAA as required.

### 4. FUEL SYSTEM.

- a. **Fuel Tank Strainer.** Refer to TM 10-3930-673-20-2, remove fuel cap and strainer and clean with drycleaning solvent.
- b. **Fuel Filter.** Fill replacement filter with fuel, and refer to TM 10-3930-673-20-2 to bleed fuel system.
- c. **Fuel/Water Separator.** Clean canister during each filter change. Refer to TM 10-3930-673-10 for procedure.
- d. **Fuel Tank.** Drain fuel tank only when fuel is contaminated.
- e. **Fuel Tank.** To drain the fuel tank, remove drain plug from drain located on bottom of tank.

### 5. DRIVE AXLE.

- a. Initial oil change in new drive axles must be done after the first 100 hours of operation. Quarterly thereafter, check to ensure gear lube 80W90 is full to the bottom of the check and fill plug, fill accordingly.
- b. Lubricate front propeller shaft slip joint and u-joints (3 places) with GAA as required but at least semiannually.
- c. Lubricate rear propeller shaft slip joint and u-joints (3 places) with GAA as required but at least semiannually.
- d. Planetary wheel ends are filled from vendor. Rotate hub until oil level line is horizontal. Oil level should be filled to bottom of the inspection hole. Change after 2000 hours. Refer to TM 10-3039-673-20-2.

## 6. STEERING.

- a. Lubricate steering knuckle bearings and u-joint (6 front and 6 rear) with GAA as required or at least quarterly. Vehicle may have to be moved forward or backward to align grease fitting with access hole. If fitting is aligned with access hole but grease gun will not go on fitting, turn wheel right or left until grease gun fits.
- b. Lubricate tie rod ends (4 places) with GAA as required.
- c. Lubricate steering cylinders (2 front and 2 rear) with GAA as required.

## 7. OIL CAN POINTS.

- a. Lubricate doors, side panels, engine cover hinges, locks, and pivot points as required with hand oiler (OE/HDO). Lubricate door locks and latches with lubricant cleaner.
- b. Lubricate linkage at connections and friction points liberally.

## 8. HYDRAULIC SYSTEM.

- a. **Hydraulic Oil Check.** Check oil level with vehicle parked on level ground. Carriage must be fully lowered on the ground. Oil level is low when touching the bottom of tank strainer.
- b. **Hydraulic System Oil.** If hydraulic system oil becomes contaminated, immediately change oil and filter.
- c. **Hydraulic Tank.** Change hydraulic system oil and hydraulic oil filter after every 2000 hours of operation. Refer to TM 10-3930-673-20-2, remove plug and drain hydraulic tank.
- d. **Hydraulic Tank Strainer.** Refer to TM 10-3930-673-20-2, remove hydraulic cap and strainer. Check to ensure that no holes, tears or damage to the cap or strainer exist before refilling. Clean or replace as necessary.

## 9. BRAKE SYSTEM.

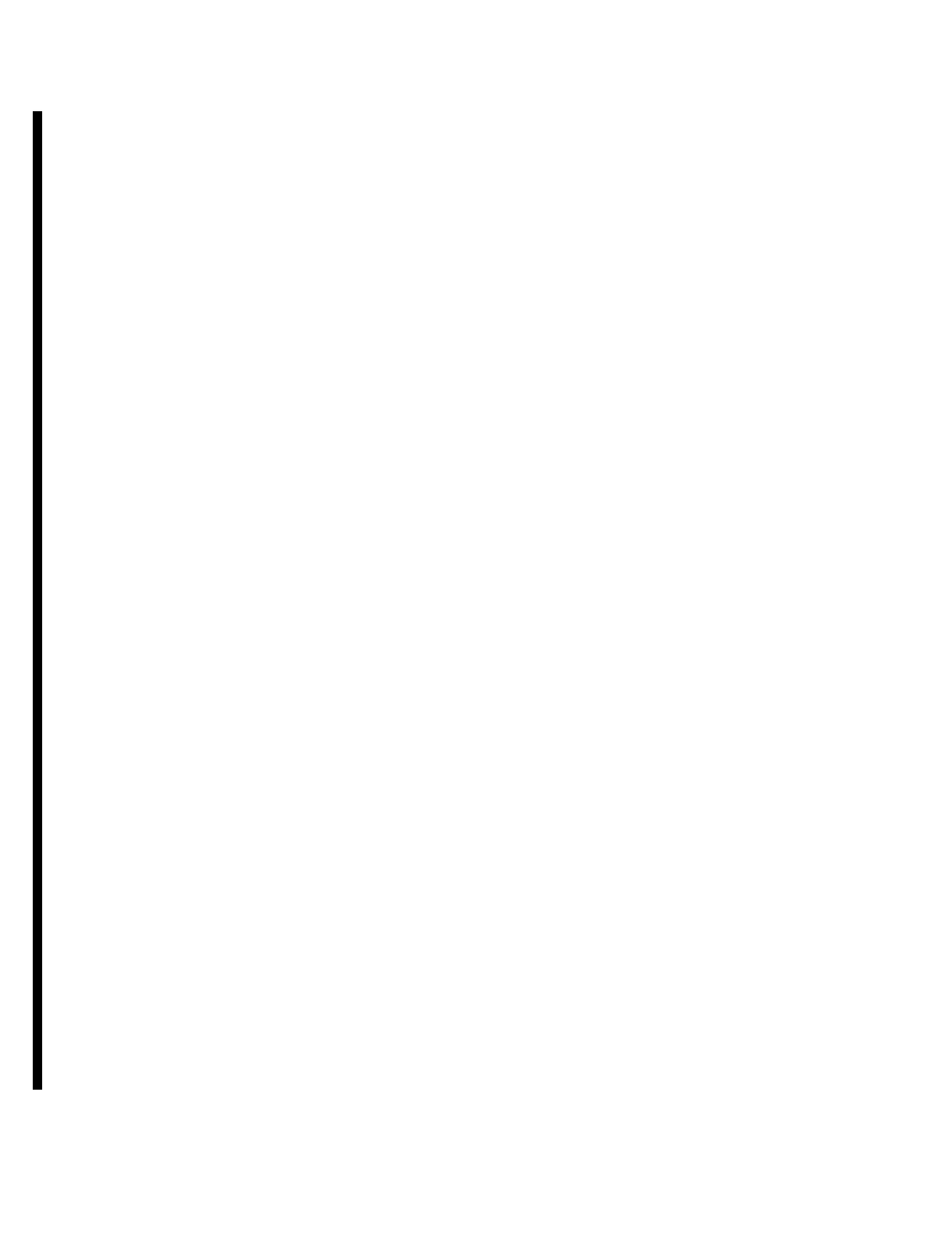
### **WARNING**

Care must be exercised when lubricating front propeller U-joint and parking brake. Over lubrication could result in grease on the parking brake rotor and/or parking brake linings which could cause the brake to slip. Death or bodily injury to personnel could result.

Park brake should be greased with GAA as required and at least semiannually.

## 10. FORK SHAFT AND FORK WEAR PADS.

Before applying teflon dry lube to fork shaft and fork wear pads, clean with dry rag. Remove any corrosion with nylon bristle brush. Do not use solvent or steam.



## Section IV. TROUBLESHOOTING

### 2-11. GENERAL

The Troubleshooting Fault Indexes (Table 2-4, Table 2-7, and Table 2-8) list the systems covered in this section. Refer to the individual System Fault Index tables for the most common failures experienced during operation of the forklift. Find the symptom that is closest to the symptom your forklift has and refer to that fault for the troubleshooting procedures. This manual cannot list all malfunctions that may occur, nor can it list all tests, inspections and corrective actions. Obvious mechanical failures and damage are not covered. If a malfunction is not listed or is not corrected by the corrective actions described, notify your supervisor.

### 2-12. TROUBLESHOOTING PROCEDURES

Troubleshooting is divided into three main sections:

**a. Electrical Troubleshooting, Para 2-15.** Para 2-15 details common electrical malfunctions which may occur during the operation of the ATLAS. This section includes troubleshooting procedures for the battery charging system, cab electrical components, attachment group, and other electrical subsystems. Table 2-4 lists the symptoms covered.

**b. Mechanical Troubleshooting, Para 2-16.** Para 2-16 details common mechanical malfunctions which may occur during the operation of the ATLAS. This section includes troubleshooting procedures for the engine, steering, and brakes. Table 2-7 lists the symptoms covered.

**c. Hydraulic Troubleshooting, Para 2-17.** Para 2-17 details common hydraulic malfunctions which may occur during the operation of the ATLAS. This section includes troubleshooting procedures for the hydraulic pumps, valves, and cylinders. Table 2-8 lists the symptoms covered.

### 2-13. INTRODUCTION TO LOGIC TREE TROUBLESHOOTING

**a. Page Layout.** Troubleshooting procedures are divided into logic tree pages and test pages.

(1) A logic tree page is always a left-hand page, facing the test page on the right. The logic tree page provides the sequence of steps required to isolate a fault to a failed component. All critical information for decision making is on the left-hand page. Each logic tree page contains the following information:

(a) **INITIAL SETUP** – This box is located only on the first logic tree page of a fault. INITIAL SETUP lists tools, materials, references, personnel and equipment needed to troubleshoot the fault.

(b) **KNOWN INFO** – This box is located in the top left-hand column. KNOWN INFO lists conditions and information that will eliminate specific components as the cause of the fault.

(c) **POSSIBLE PROBLEMS** – This box is located directly below KNOWN INFO. All of the system components that could cause a fault are listed in the POSSIBLE PROBLEMS box. The first component listed in the POSSIBLE PROBLEMS box is the one that will be tested at that step in the logic sequence. When one of the components is tested and found to be operational, it is entered at the bottom of the KNOWN INFO box as OK.

## 2-13. INTRODUCTION TO LOGIC TREE TROUBLESHOOTING (CONT)

(d) **QUESTION** – Each question, located in the middle column, refers to the first possible problem listed in POSSIBLE PROBLEMS. If the answer to the question is YES, proceed to the next step. If the answer is NO, follow the NO arrow to obtain directions for correcting the problem. If the step contains a WARNING or CAUTION message, a small shadow box is printed above the question. Text for WARNINGS and CAUTIONS is on the following right-hand page.

(e) **TEST OPTIONS** – This box is located in the right-hand column and lists the test(s) to be performed.

(f) **REASON FOR QUESTION** – This box is located directly below TEST OPTIONS. It explains the purpose for the question in the middle column.

(2) A test page is always a right-hand page, facing the logic tree page on the left. The test provides detailed instructions for testing the first component listed in the POSSIBLE PROBLEMS box. This test will also provide an answer for the question in the middle column. Note the arrow connecting the test on the right-hand page to the REASON FOR QUESTION. When possible, illustrations are included to provide visual details. Warnings, cautions, and notes contain additional information for testing.

### ***b. How to Begin Troubleshooting.***

(1) Determine the symptom or condition that indicates a problem or failure. Troubleshooting is divided into symptoms peculiar to a system or a component, for example: hydraulic system or engine. Refer to the Troubleshooting Fault Index (Table 2-3).

(2) Go to the referenced page to begin troubleshooting. Open the manual flat so both the left-hand and right-hand pages are displayed before you. The information on both pages is important to resolve the problem or failure. However, the experienced technician can follow the left-hand page instructions and refer to the right-hand page when necessary.

(3) Follow the diagnostic procedure. Answer question No. 1 on the left-hand page and follow the YES or NO path to either the remedy or the next question. If necessary, look on the right-hand page for test instructions and illustrations.

(4) Observe warnings, cautions and notes. The formatting symbols used in this manual for warnings, cautions and notes are as follows:

### **WARNING**

This is the symbol for a warning statement. If you see the word WARNING above a question on the left-hand page, look on the right hand page for the text of the message. WARNINGS describe a situation which could cause severe injury or death to personnel.

### **CAUTION**

This is the symbol for a caution statement. If you see the word CAUTION above a question on the left-hand page, look on the right-hand page for the text of the message. CAUTIONS describe a situation which could cause damage to equipment.

### **NOTE**

This is the symbol for a note. Notes are located directly above the test to which they refer. Notes provide additional information for performing a test.

**NOTE**

This is the symbol for a note. Notes are located directly above the test to which they refer. Notes provide additional information for performing a test.

- (5) Before taking any action to diagnose a malfunction, follow the guidelines below:
  - (a) Question the vehicle operator to obtain any information that might help you determine the cause of the problem.
  - (b) Use all your senses (especially your common sense) to observe and locate troubles.
  - (c) Never overlook the possibility that the problem could be of simple origin - you may be able to fix it with minor adjustments.
  - (d) Isolate the system where the malfunction occurs, then locate the defective component within the system.
  - (e) Use the test instruments specified to help you isolate the problem.

**2-14. GENERAL TROUBLESHOOTING INSTRUCTIONS****NOTE**

The troubleshooting makes use of the Simplified Test Equipment for Internal Combustion Engines-Reprogrammable (STE/ICE-R) and conventional methods for testing and fault isolation.

***a. Simplified Test Equipment for Internal Combustion Engines - Reprogrammable (STE/ICE-R).***

STE/ICE-R tests are incorporated into the standard troubleshooting test to aid in fault isolation. The STE/ICE-R acts as a conventional digital multimeter to measure voltage, current, and resistance. It can also measure pressure, speed, compression unbalance, engine power, and some specialized battery and starter evaluations. The STE/ICE-R is powered by the forklift battery. The complete system includes a test meter (VTM), cables, transit case, and technical publications. The STE/ICE-R can make TK mode measurements while connected to the batteries. STE/ICE-R tests are referenced. Certain tests require use of a transducer from the STE/ICE-R Additional Authorized List (AAL). For STE/ICE-R Vehicle System Diagnostic Checks, refer to Para 2-18.

***b. General Electrical Troubleshooting Procedures.*****WARNING**

Remove rings, bracelets, wristwatches, neck chains, etc., before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

**CAUTION**

Use proper sized test leads when checking for resistance, continuity, or voltage at connectors or damage to equipment can result.

**2-14. GENERAL TROUBLESHOOTING INSTRUCTIONS (CONT)****NOTE**

- The piece of electrical test equipment used will be referred to as the “multimeter.” The multimeter's red test lead will be referred to as the “positive (+) multimeter lead.” The multimeter's black test lead will be referred to as the “negative (-) multimeter lead.”
- If your multimeter does not operate in the way described in the following steps, learn how it operates before performing troubleshooting.
- Multimeter leads must remain in contact with the circuit being tested for a minimum of three seconds to obtain a reading.

## (1) Resistance and Continuity Measurements.

(a) Connect positive (+) multimeter lead to multimeter VOLT-OHM connector. Connect negative multimeter lead to multimeter COM connector. When the multimeter leads are separated or are measuring a circuit with no continuity, the multimeter will indicate “OL” (Over Limit) on its display. When multimeter leads are connected together, multimeter should display “0,” indicating a continuous circuit with no (zero) resistance.

(b) Set multimeter function/range switch to the desired ohm position. If the amount of the expected resistance is not known, set the switch to the highest range, then reduce until a satisfactory reading is obtained. If only continuity is to be checked, without regard to resistance, set the multimeter function/range switch to the highest ohm range.

(c) Always turn the main power switch to the OFF position before connecting multimeter leads to a circuit unless instructed to do otherwise in the troubleshooting procedure.

(d) Connect multimeter leads to the circuit being checked. The multimeter leads must only contact the point of measurement to ensure an accurate reading.

(e) Read the resistance value displayed on the multimeter.

(f) Disconnect multimeter leads from circuit.

(g) Turn off multimeter.

(2) Voltage Measurements. The forklift is equipped with a 24-volt electrical system. Troubleshooting procedures will reference 24 VDC measurements; however, these values can vary depending on battery conditions and if the engine is running or not. If battery voltages are below 12 VDC, charge batteries.

(a) Connect positive (+) multimeter lead to multimeter VOLT-OHM connector. Connect negative (-) multimeter lead to multimeter COM connector.

(b) Set the function/range switch to the setting closest to, but not below, 24 VDC. If multimeter is equipped with a DC-AC switch, set the switch to the DC position.

(c) Always turn the main power switch to the OFF position before connecting multimeter leads to a circuit unless instructed to do otherwise in the troubleshooting procedure.

(d) Connect the positive (+) multimeter lead to the circuit being tested. Connect the negative (-) multimeter lead to a known good ground.

(e) Set main power switch to the ON position and operate any other controls necessary to energize the circuit being tested.

(f) Read the voltage value displayed on the multimeter.

(g) Set the main power switch to the OFF position. Return other controls to their "at rest" positions.

(h) Disconnect multimeter leads from circuit.

(i) Turn off multimeter.

(3) General Relay Troubleshooting Procedure. The following general relay troubleshooting procedure applies to most relays that are pushed into a receptacle and do not require any attaching hardware.

(a) Pull relay out of receptacle just enough for the relay terminals to make contact with receptacle terminals. Leave about 1/4 to 3/8 in. (6.35 to 9.53 mm) space between the relay and the receptacle to insert a multimeter lead and make contact with the terminal listed in the troubleshooting test.

(b) Perform necessary test.

(4) General Wiring Harness Short Test. The following procedure applies to any wiring harness suspected of being shorted. Refer to electrical schematics during this procedure.

(a) Connect positive (+) multimeter lead to multimeter VOLT-OHM connector. Connect negative (-) multimeter lead to multimeter COM connector. When the multimeter leads are separated or are measuring a circuit with no continuity, the multimeter will indicate "OL" (Over Limit) on its display. When multimeter leads are connected together, multimeter should display "0," indicating a continuous circuit with no (zero) resistance. Wires in a harness that are not purposely joined or connected at a component should not have continuity (multimeter indicates "OL").

(b) Set multimeter function/range switch to the highest OHM range.

(c) Disconnect harness connector.

(d) Connect positive (+) multimeter lead to harness connector terminal of suspected wire.

(e) Connect negative (-) multimeter lead to each of the remaining harness connector terminals. If multimeter does not display "OL," and is displaying a resistance value of zero or higher, this indicates a continuous circuit. Refer to the electrical schematic before repairing wires or replacing wiring harness to determine that the wires making a continuous circuit are not purposely joined or are not connected intentionally at a component.

(f) Disconnect multimeter leads from connector.

(g) Turn off multimeter.

**2-14. GENERAL TROUBLESHOOTING INSTRUCTIONS (CONT)****c. Abbreviations and Commonly Used Terms.**

CB = circuit breaker

J = jack

K = relay

P = plug

VDC = volts direct current

**Table 2-3. Troubleshooting Index**

Fault No.	Description	Page No.
<b>ELECTRICAL SYSTEM FAULT INDEX</b>		
1	24 VDC circuits do not operate.....	2-36
2	Horn does not operate .....	2-46
3	Back-up alarm does not operate .....	2-64
4	Cab defroster fan(s) do not operate.....	2-86
5	Instrument panel gage lights do not operate .....	2-100
6	One or both headlights do not operate .....	2-120
7	Stoplight(s) do not operate .....	2-138
8	Taillight(s) do not operate .....	2-160
9	Parking lights do not operate.....	2-178
10	All turn signals do not operate .....	2-196
11	Left turn signal does not operate.....	2-212
12	Right turn signal does not operate.....	2-220
13	All floodlights do not operate .....	2-228
14	Front floodlight (or forward) does not operate .....	2-242
15	Boom floodlight does not operate.....	2-260
16	Rear floodlight does not operate .....	2-284
17	Blackout marker light(s) and/or taillight(s) do not operate.....	2-304
18	Blackout drive light(s) do not operate.....	2-322
19	Blackout stoplights do not operate .....	2-344
20	Parking brake indicator light does not operate .....	2-370
21	Low brake pressure indicator light does not operate.....	2-378
22	High water temp indicator light does not operate .....	2-386
23	Low oil pressure indicator does not operate .....	2-394
24	High transmission temperature indicator does not operate.....	2-402

**Table 2-3. Troubleshooting Index (Continued)**

Fault No.	Description	Page No.
<b>ELECTRICAL SYSTEM FAULT INDEX (CONTINUED)</b>		
25	Front windshield wipers do not operate .....	2-410
26	Rear windshield wipers do not operate.....	2-416
27	Front and rear windshield wipers do not operate .....	2-422
28	Windshield washer does not operate.....	2-436
29	Heater does not operate.....	2-442
30	Air conditioner does not operate.....	2-448
31	Cab blower does not operate.....	2-460
32	Fork auto-leveler does not operate .....	2-468
33	Electric joystick control does not operate.....	2-488
34	None of the gages operate.....	2-506
35	Voltmeter does not operate .....	2-518
36	Engine hour meter does not operate .....	2-530
37	Fuel gage does not operate .....	2-542
38	Temperature gage does not operate.....	2-550
39	Oil pressure gage does not operate .....	2-558
40	Transmission fluid temperature gage does not operate.....	2-566
41	Emergency steering pump does not operate .....	2-574
42	Steering select switch does not operate .....	2-590
43	Parking brake switch does not operate .....	2-598
<b>MECHANICAL SYSTEM TROUBLESHOOTING</b>		
1	Starter does not turn engine, turns engine slowly.....	2-614
2	Engine cranks but does not start .....	2-618
3	Engine starts but does not continue to run .....	2-626
4	Engine starts but idles roughly .....	2-634
5	Engine surges, changes speed.....	2-640
6	Engine runs roughly, misfires .....	2-644
7	Engine RPM does not reach rated speed .....	2-648
8	Engine produces excessive white exhaust smoke.....	2-652
9	Engine produces excessive black exhaust smoke.....	2-656
10	Engine produces excessive noise .....	2-662
11	Engine oil pressure below normal .....	2-666

**Table 2-3. Troubleshooting Index (Continued)**

Fault No.	Description	Page No.
<b>MECHANICAL SYSTEM FAULT INDEX (CONTINUED)</b>		
12	Engine oil pressure above normal .....	2-672
13	Engine water temperature below normal .....	2-678
14	Engine water temperature above normal .....	2-682
15	Transmission oil temperature above normal .....	2-692
16	Transmission disconnect slow or malfunctioning .....	2-700
17	Steering pulls to right or left .....	2-706
18	Service brakes chatter, are noisy .....	2-712
19	Brakes drag .....	2-716
20	Service brakes do not stop vehicle .....	2-718
21	Parking brake does not engage/disengage .....	2-724
22	Compression knocks .....	2-738
23	Loss of power .....	2-742
24	Engine does not shut off .....	2-752
25	Cab heater does not heat cab .....	2-756
26	Air conditioner does not cool cab .....	2-762
27	Arctic heater does not operate correctly .....	2-769.0
<b>HYDRAULIC SYSTEM TROUBLESHOOTING</b>		
1	Left hand fork sideshift cylinder does not operate .....	2-772
2	Right hand fork sideshift cylinder does not operate .....	2-780
3	Fork tilt cylinder does not operate .....	2-788
4	Attachment cylinder does not operate .....	2-796
5	Left and/or right hoist cylinders do not extend or retract .....	2-804
6	Boom extend cylinder slow or does not extend or retract .....	2-814
7	Left and right rear steering cylinders do not extend or retract .....	2-822
8	Left and right front steering cylinders do not extend or retract .....	2-832
9	Frame tilt cylinder does not extend or retract .....	2-842
10	Brake actuators (left and/or right rear and left and/or right front) do not operate correctly .....	2-850
11	Emergency steering pump does not operate .....	2-858
<b>STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK</b> .....		
		2-33

## 2-14.1. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK

(a) **General.** This section contains information and tests which may be used with STE/ICE-R (Simplified Test Equipment for Internal Combustion Engines-Reprogrammable) to locate malfunctions that may occur in the vehicle. The tests can be used during troubleshooting, corrective maintenance, and after routine adjustments.

### NOTE

Throughout this troubleshooting section, various STE/ICE-R test are referenced as part of the troubleshooting process. In many cases, there is a comparable MSD/SPORT test that can be performed in lieu of the STE/ICE-R test.

The STE/ICE-R system is primarily used in conjunction with the vehicle electrical system. The test cannot cover all possible malfunctions that may occur. If a particular malfunction is not discussed, refer to the troubleshooting tables.

### NOTE

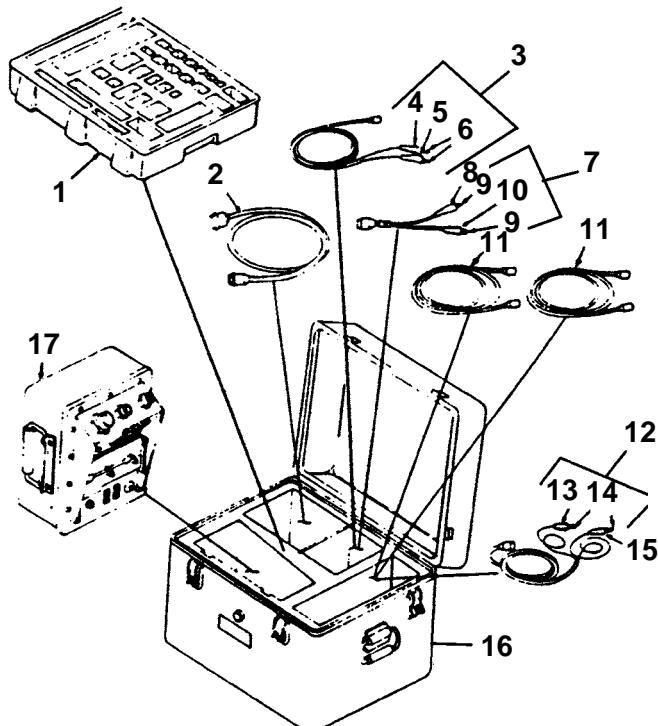
Refer to page 2-917 for a copy of the vehicle STE/ICE-R test card.

(b) **Description and Operation.** STE/ICE-R is portable and operates off of the vehicle's 24 volt system. The STE/ICE-R kit consists of the following items: Refer to the figures below and on page 2-866.

- Vehicle Test Meter (VTM)
- Transducer Kit (TK)
- Four Electrical Cables (W1, W2, W3, and W4)
- Transit Case
- Technical Publications

### STE/ICE-R KIT

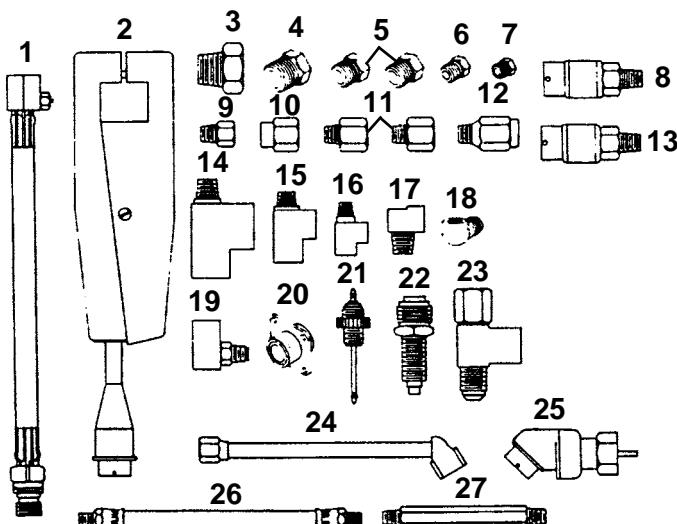
1. Tray, Transducer Kit
2. Cable Assembly, Power W1
3. Cable Assembly, Special W2
4. Shell, Electrical Connector
5. Shell, Electrical Connector
6. Clip, Electrical
7. Cable Assembly, Special W3
8. Shell, Electrical Connector
9. Clip, Electrical
10. Shell, Electrical Connector
11. Cable Assembly, Power W4
12. Cable Assembly, Power W5
13. Shell, Electrical Connector
14. Clip, Electrical
15. Shell, Electrical Connector
16. Case, Test Set
17. STE/ICE-R Test Meter



## 2-14.1. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

### TRANSDUCER KIT CONTENTS

1. Hose Assembly, TK10
2. Prod, Test TK11
3. Reducer, Pipe TK12
4. Reducer, Pipe TK13
5. Reducer, Pipe TK14
6. Plug, Pipe TK15
7. Plug, Pipe TK16
8. Transducer (Blue) 0 to 1,000 psi TK17
9. Adapter, Straight TK18
10. Reducer, Pipe TK19
11. Reducer, Pipe TK20
12. Dampener, Fluid TK21
13. Transducer (Red) -30 in. he to 25 psi TK22
14. Tee, Pipe TK23
15. Tee, Pipe TK24
16. Tee, TK25
17. Elbow, Pipe TK26
18. Elbow, Pipe TK27
19. Tee, Pipe to Tube TK28
20. Adapter, Connector TK29
21. Adapter, Connector TK30
22. Adapter, Speedometer, TK31
23. Tee, Pipe to Fuel Line TK32
24. Chuck, Inflating TK33
25. Tachometer, Pulse TK34
26. Hose Assembly TK35
27. Nipple, Pipe TK36



Refer to the manual provided with the STE/ICE-R kit for description and operation of the VTM and the TK.

(c) **STE/ICE-R Testing Procedures.** The vehicle test procedures consist of two test sequences; GO-Chain Sequences and NO-GO-Chain Sequences. A GO-Chain sequence is a logical sequence of tests performed to determine the general condition of the vehicle. If the vehicle fails any of the GO-Chain tests, the test will direct the user to a specific NO-GO test for further testing. The NO-GO tests are used to isolate what is wrong with the vehicle.

The GO and NO-GO-Chain Sequences are presented as an illustrated flowchart with test branching controlled by YES and NO decisions. Generally, a YES determination leads to the next test; a NO determination leads to NO-GO testing and corrective action.

When the VTM interfaces with the vehicle through the Diagnostic Connector Assembly (DCA) the test is titled DCA Mode Testing. If the VTM interfaces with the vehicle through the use of the transducer kit (TK), the test is titled TK Mode Testing. The DCA and TK testing modes can be used at the same time.

Always Follow The Following Rules When Using the GO-Chain Test Sequence:

- (1) Always start at GO1. Never enter the middle of a GO or NO-GO testing sequence unless directed by the flow chart.
- (2) Follow each instruction in a GO-Chain Test Sequence. Do not skip any instructions or procedures.
- (3) If a particular test is failed in a GO-Chain test sequence, proceed to the indicated NO-GO-Chain test sequence or to a higher level of maintenance.
- (4) After correcting a vehicle problem, repeat the testing beginning at GO1.
- (5) Each GO Chain testing sequence depends upon the completion of the previous test. Do not skip any tests.

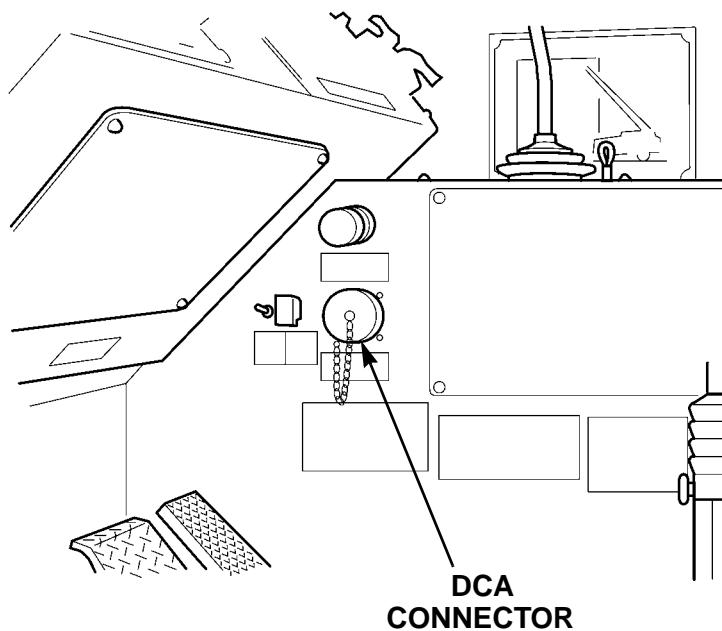
Use the GO, NO-GO flow charts for testing. As you become more familiar with the test procedures, you can use the Vehicle Test Cards as your sole reference. The flip cards on the VTM can also be used as you become familiar with the vehicle and STE/ICE-R equipment.

Prior to testing, make the following pre-test inspections:

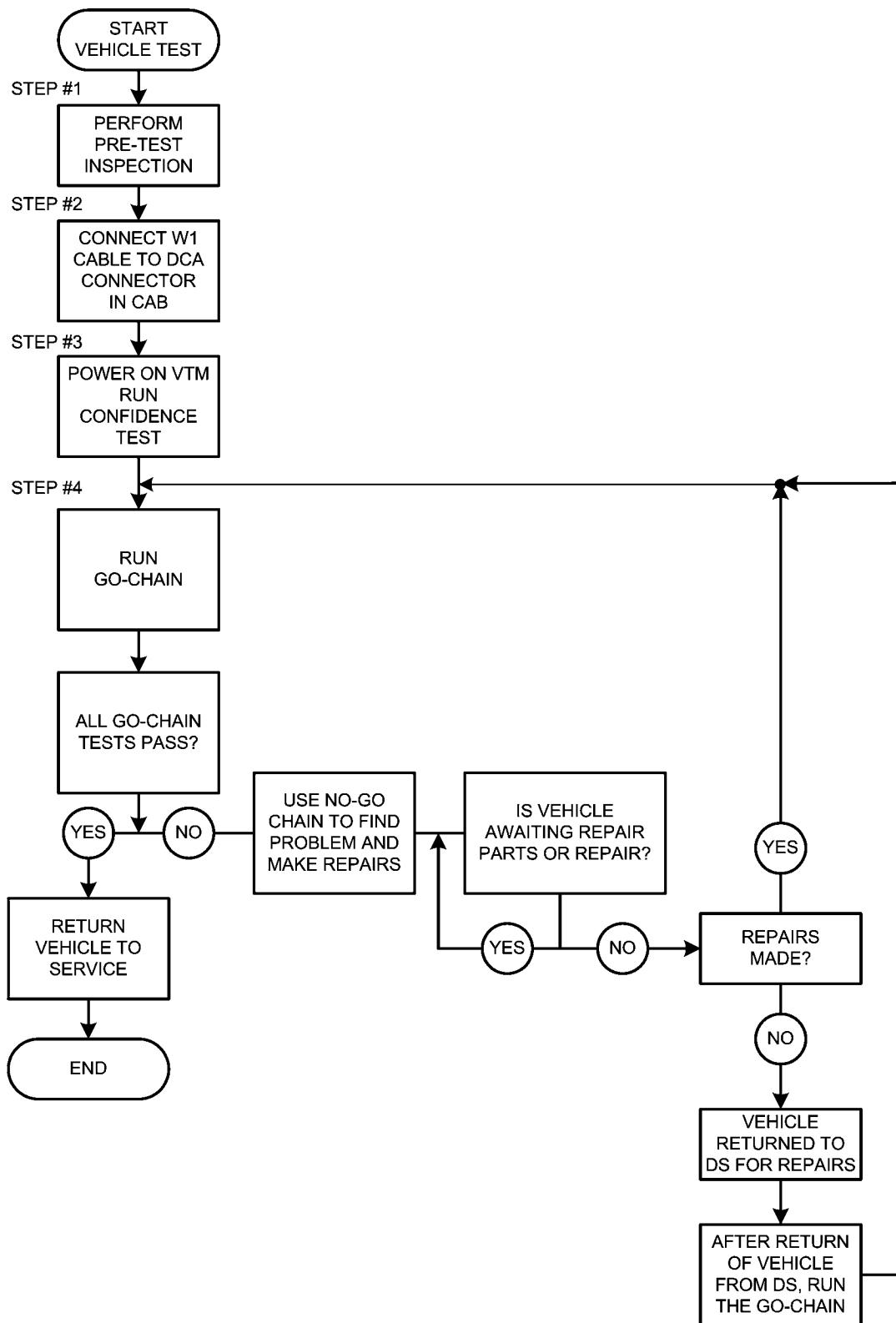
- Check drive belt for proper tension. Replace cracked or frayed belt.
- Check for proper engine oil level. Add oil as necessary.
- Check that the fuel tank has enough fuel for testing.
- Check for proper engine coolant level. Add coolant as necessary.
- Check that the batteries are in good condition. Check for low electrolyte level and add distilled water as required.
- Check that emergency steering pump is turned off when required by test.

#### VEHICLE DIAGNOSTIC CONNECTOR ASSEMBLY (DCA)

The DCA connector of the vehicle is located on the panel to the right of the vehicle operator. Refer to the figure below for vehicle DCA location.



## 2-14.1. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



**2-14.2. INTERNAL COMBUSTION ENGINE (ICE) TEST INFORMATION****(6) General Information.**

- (a) The Soldier's Portable On-system Repair Tool (SPORT) and the Maintenance Support Device (MSD) have preloaded computer based training. This training provides information on operation and maintaining the SPORT and MSD.
- (b) All before operation PMCS should be performed prior to use.
- (c) Information on connection to vehicles is provided in the Internal Combustion Engine (ICE) software.

**(7) SPORT-ICE.**

- (a) Power up the SPORT
- (b) Perform before operation PMCS
- (c) Select the icon labeled "ICE Testing" from the desktop to launch the ICE software.
- (d) SPORT- ICE main menu screen will be displayed. Select SPORT-ICE tests.
- (e) Select the appropriate vehicle from the "Vehicle Selection Menu." A screen indicating connection instructions will be displayed. Follow connection instructions and select OK. A screen listing all available vehicle ICE tests will be displayed.
- (f) Enter desired test number indicated in TM reference and follow all connection and testing instructions.

**(8) MSD-ICE.**

- (a) Power up the MSD
- (b) Perform before operation PMCS
- (c) Select the icon labeled "ICE Testing" from the desktop to launch the ICE software.
- (d) Select the appropriate tester hardware that you will be using.
- (e) ICE main menu screen will be displayed. Select ICE tests.
- (f) Select the appropriate vehicle from the "Vehicle Selection Menu." A screen indicating connection instructions will be displayed. Follow connection instructions and select OK. A screen listing all available vehicle ICE tests will be displayed.
- (g) Enter desired test number indicated in TM reference and follow all connection and testing instructions.

## 2-15. ELECTRICAL SYSTEM TROUBLESHOOTING

This paragraph covers electrical system troubleshooting. The Electrical System Fault Index, Table 2-4, lists faults for the electrical system of the ATLAS. Refer to schematics found at the end of this volume when performing test and corrective actions.

**Table 2-4. Electrical System Fault Index**

Fault Number	Description	Page No.
1	24 VDC circuits do not operate .....	2-36
2	Horn does not operate .....	2-46
3	Back-up alarm does not operate .....	2-64
4	Cab defroster fan(s) do not operate.....	2-86
5	Instrument panel gage lights do not operate.....	2-100
6	One or both headlights do not operate .....	2-120
7	Stoplight(s) do not operate .....	2-138
8	Taillight(s) do not operate.....	2-160
9	Parking lights do not operate .....	2-178
10	All turn signals do not operate .....	2-196
11	Left turn signal does not operate.....	2-212
12	Right turn signal does not operate .....	2-220
13	All floodlights do not operate.....	2-228
14	Front floodlight (or forward) does not operate.....	2-242
15	Boom floodlight does not operate.....	2-260
16	Rear floodlight does not operate.....	2-284
17	Blackout marker light(s) and/or taillight(s) do not operate .....	2-304
18	Blackout drive light(s) do not operate .....	2-322
19	Blackout stoplights do not operate .....	2-344
20	Parking brake indicator light does not operate .....	2-370
21	Low brake pressure indicator light does not operate .....	2-378
22	High water temp indicator light does not operate.....	2-386
23	Low oil pressure indicator does not operate .....	2-394
24	High transmission temperature indicator does not operate.....	2-402
25	Front windshield wipers do not operate .....	2-410
26	Rear windshield wipers do not operate.....	2-416
27	Front and rear windshield wipers do not operate .....	2-422
28	Windshield washer does not operate.....	2-436

***Table 2-4. Electrical System Fault Index***

Fault Number	Description	Page No.
29	Heater does not operate .....	2-442
30	Air conditioner does not operate .....	2-448
31	Cab blower does not operate .....	2-460
32	Fork auto-leveler does not operate .....	2-468
33	Electric joystick control does not operate .....	2-488
34	None of the gages operate .....	2-506
35	Voltmeter does not operate .....	2-518
36	Engine hour meter does not operate .....	2-530
37	Fuel gage does not operate .....	2-542
38	Temperature gage does not operate .....	2-550
39	Oil pressure gage does not operate .....	2-558
40	Transmission fluid temperature gage does not operate .....	2-566
41	Emergency steering pump does not operate .....	2-574
42	Steering select switch does not operate .....	2-590
43	Parking brake switch does not operate .....	2-598

**1. 24 VDC CIRCUITS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

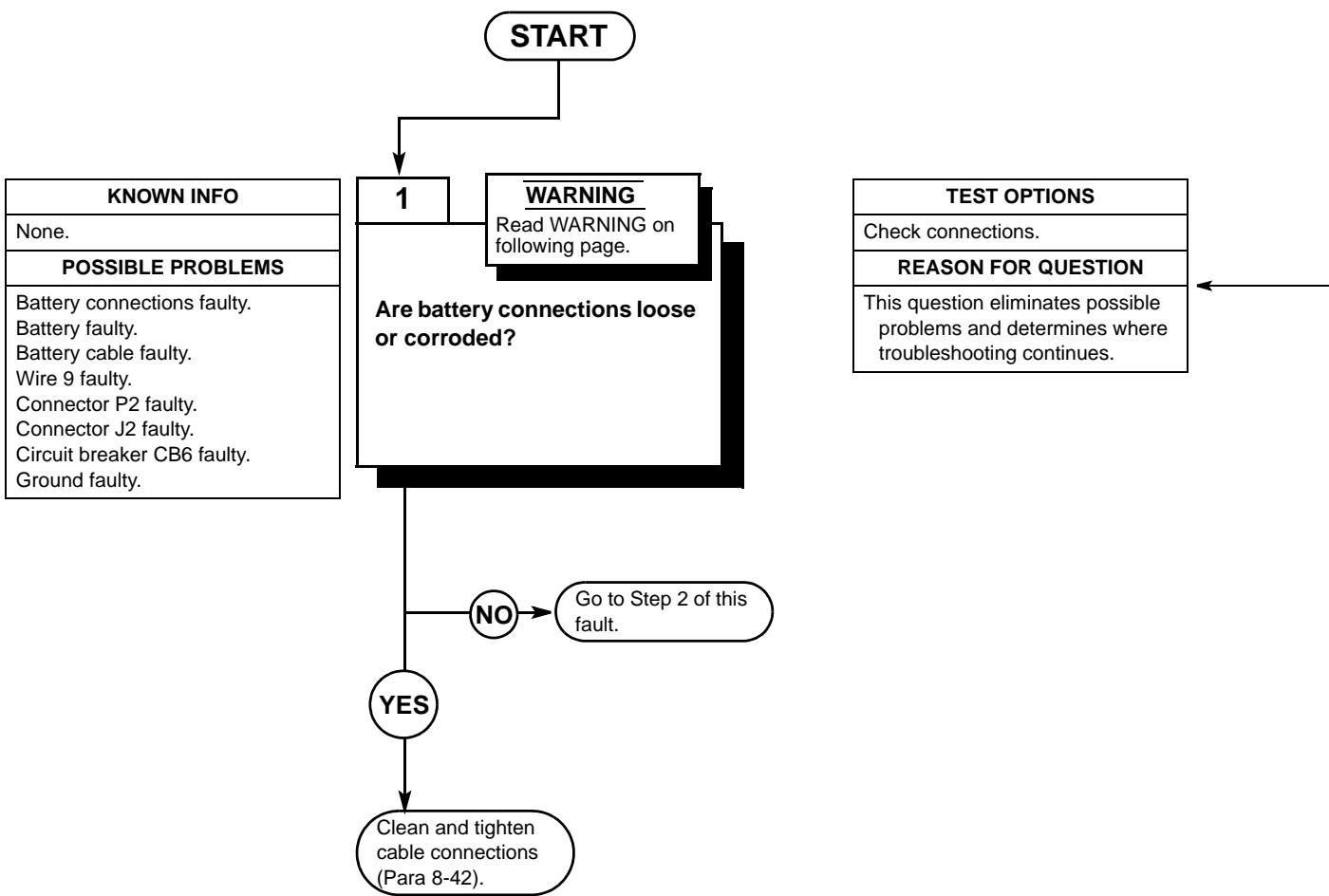
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

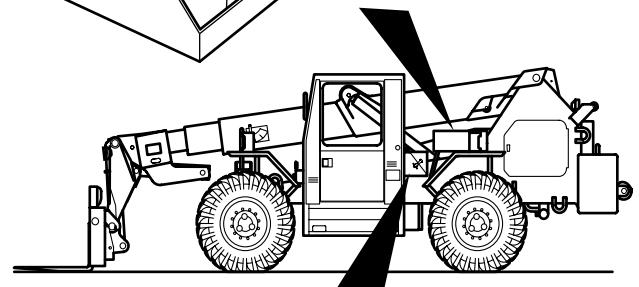
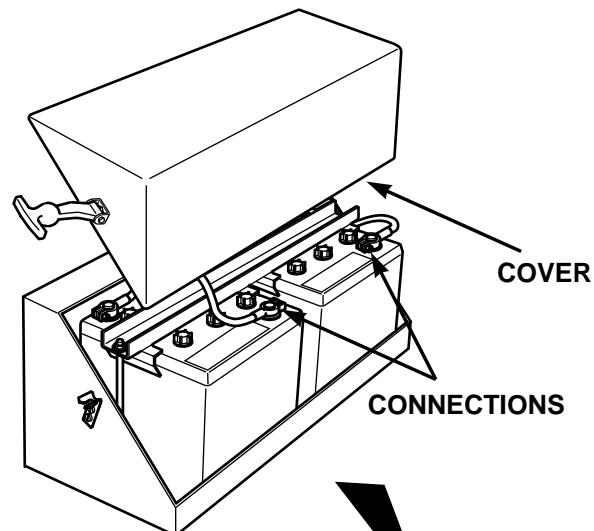
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

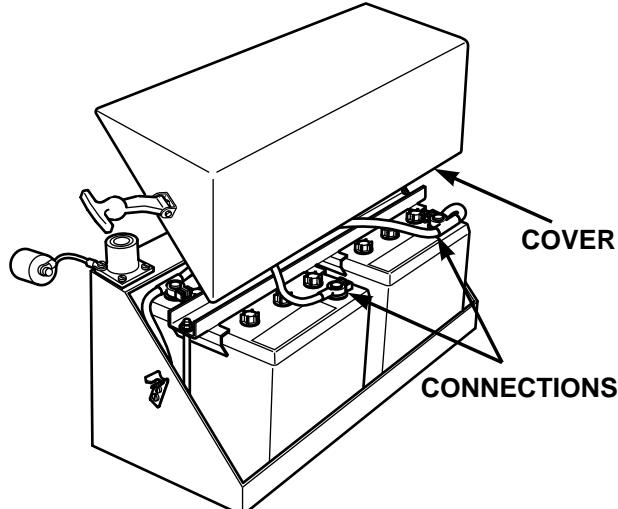


## WARNING

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

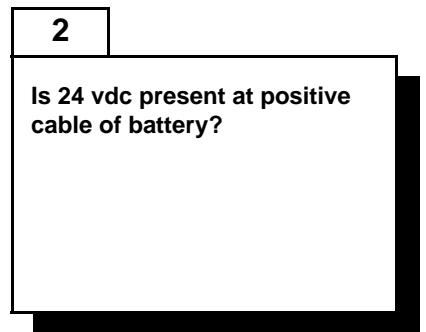


<b>CHECK CONNECTIONS</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Check for loose or corroded connections.
(a)	If loose or corroded, clean and tighten cable connections (Para 8-42).
(b)	If not loose or corroded, go to Step 2 of this fault.
(3)	Install battery cover (Para 8-42).

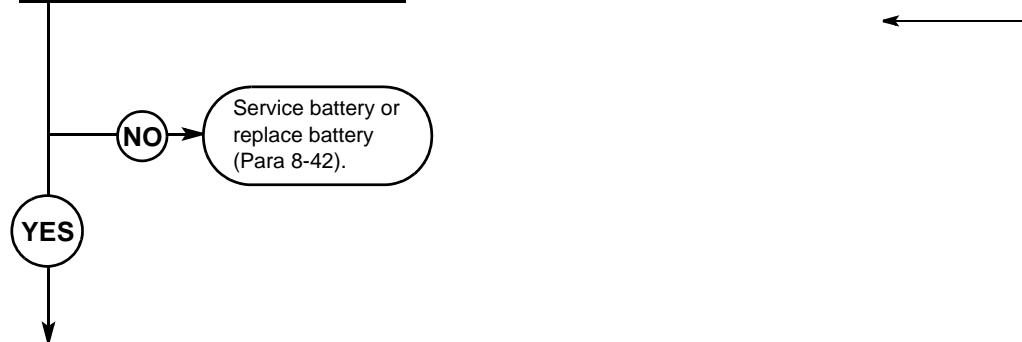


## 1. 24 VDC CIRCUITS DO NOT OPERATE (CONT.).

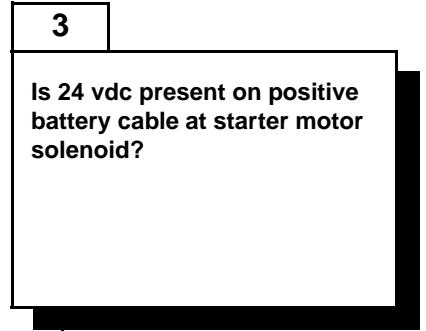
KNOWN INFO
Battery connections OK.
POSSIBLE PROBLEMS
Battery faulty. Battery cable faulty. Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Ground faulty.



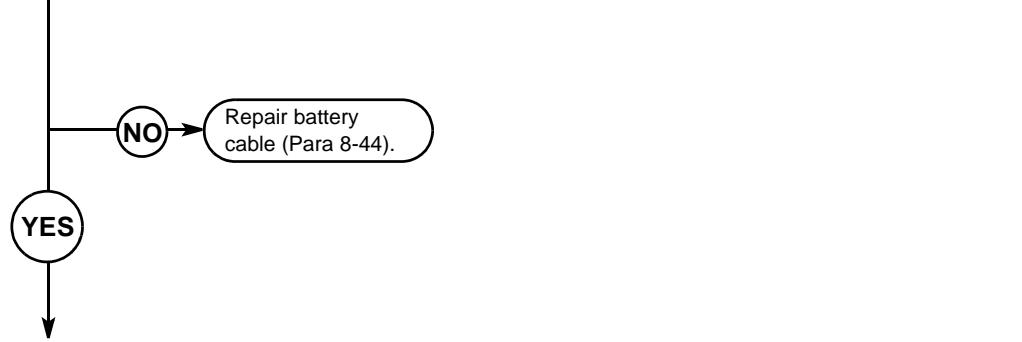
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, 24 vdc circuits will not operate.



KNOWN INFO
Battery connections OK.
Battery OK.
POSSIBLE PROBLEMS
Battery cable faulty. Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Ground faulty.

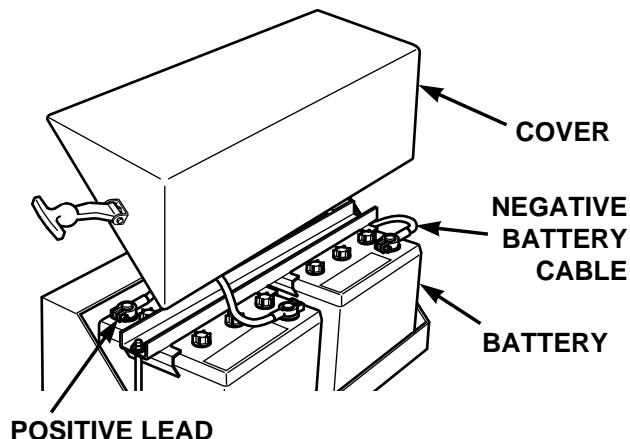


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, battery cable faulty.

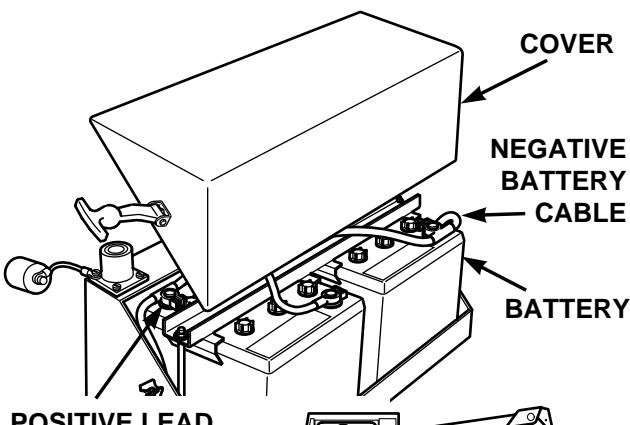
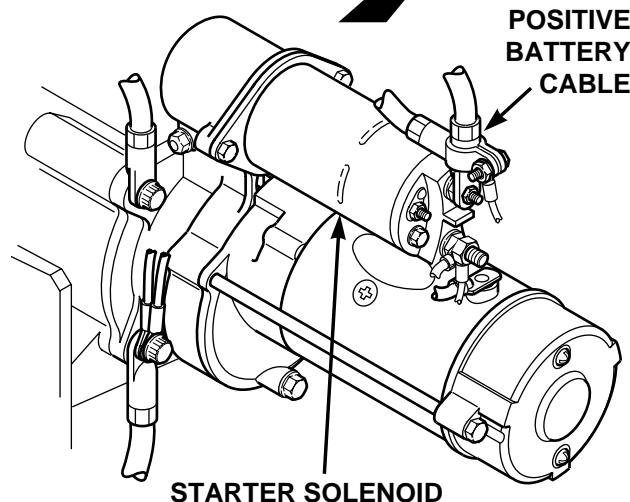
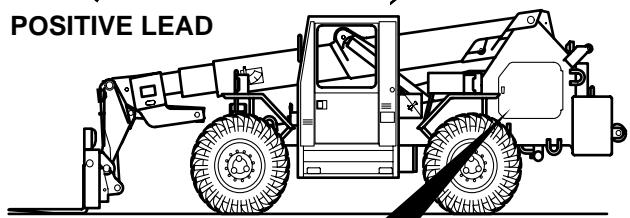


**VOLTAGE TEST**

- (1) Remove battery cover (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter negative lead (–) to known good ground.
- (4) Connect multimeter positive lead (+) to positive lead of battery.
  - (a) If 24 vdc is present, go to Step 3 of this fault.
  - (b) If 24 vdc is not present, service battery or replace battery (Para 8-42).

**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to starter motor solenoid where positive battery cable connects.
- (4) Connect multimeter negative lead (–) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 4 of this fault.
  - (b) If 24 vdc is not present, repair battery cable (Para 8-44).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-44).

**POSITIVE LEAD**

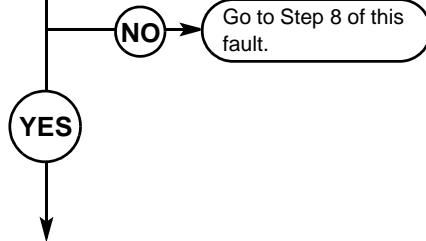
## 1. 24 VDC CIRCUITS DO NOT OPERATE (CONT.).

KNOWN INFO
Battery connections OK. Battery OK. Battery cable OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Ground faulty.

**4**

Is 24 vdc present on wire 9 at connector P2-1?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

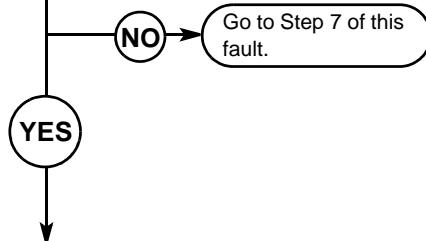


KNOWN INFO
Battery connections OK. Battery OK. Battery Cable OK. Connector P2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Ground faulty.

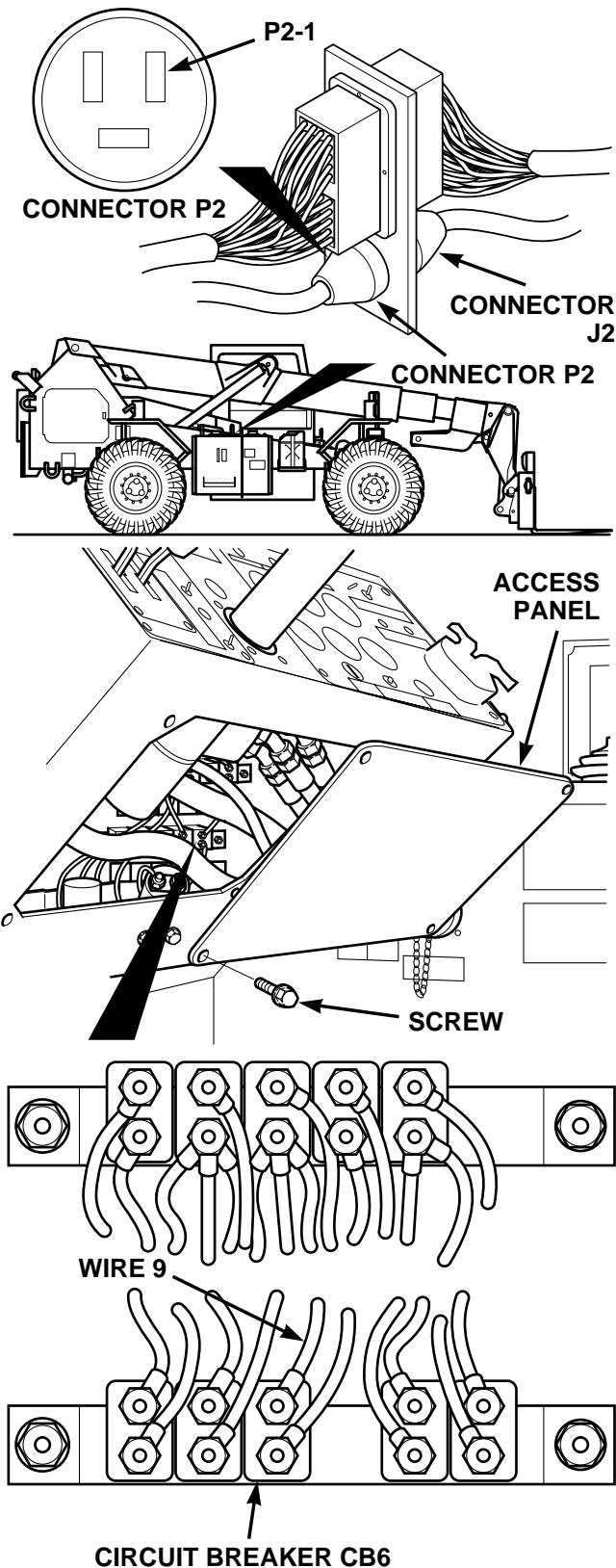
**5**

Is 24 vdc present on wire 9 at circuit breaker CB6?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.



<b>VOLTAGE TEST</b>	
(1)	Disconnect connector J2 from connector P2.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to connector P2-1.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 8 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(7)	Connect connector J2 to connector P2.



<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to wire 9 at circuit breaker CB6.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, go to Step 7 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-44).

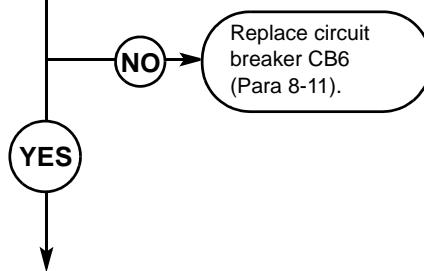
## 1. 24 VDC CIRCUITS DO NOT OPERATE (CONT.).

KNOWN INFO
Battery connections OK. Battery OK. Battery cable OK. Connector P2 OK. Connector J2 OK. Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Ground faulty.

**6**

Is 24 vdc present on wire 1 at circuit breaker CB6?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 faulty.

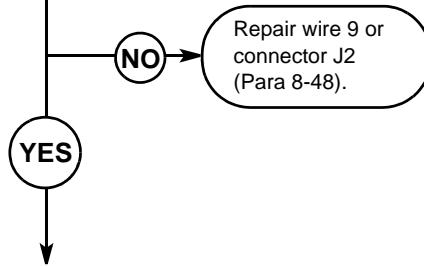


KNOWN INFO
Battery connections OK. Battery OK. Battery cable OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Ground faulty.

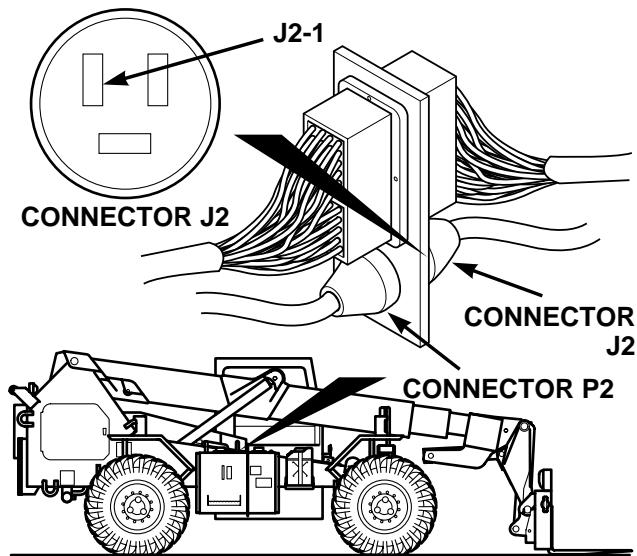
**7**

Is continuity present on wire 9 between circuit breaker CB6 and connector J2-1?

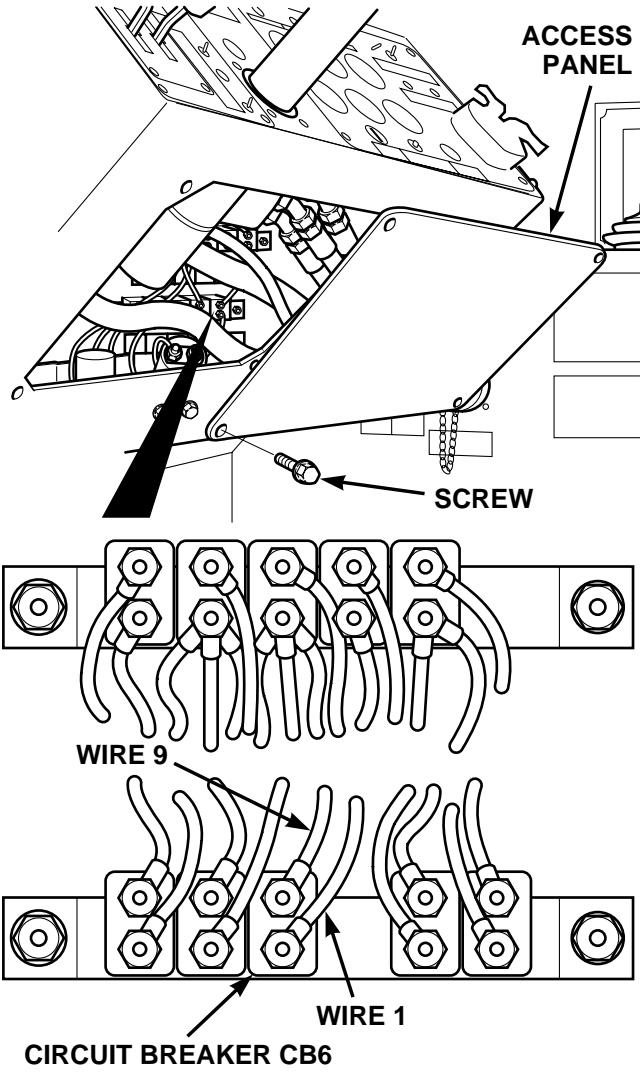
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector J2 faulty.



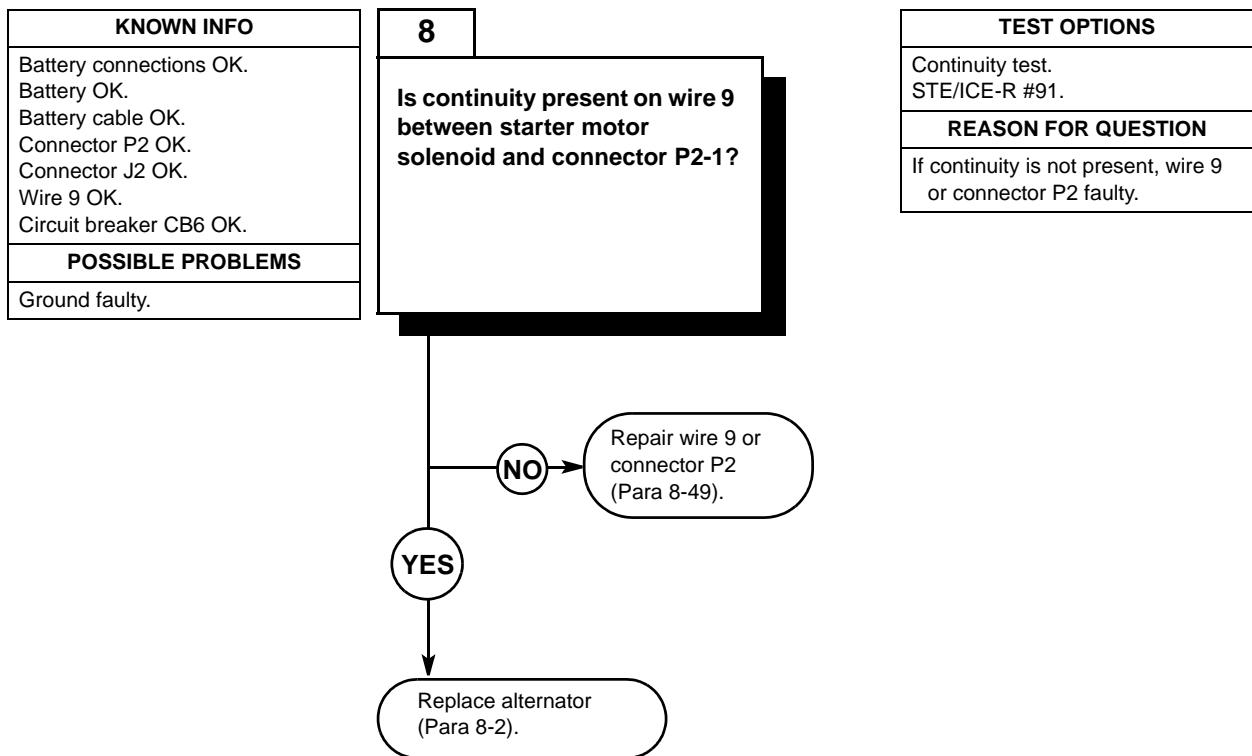
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 1 where wire 1 connects to circuit breaker CB6.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 7 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).



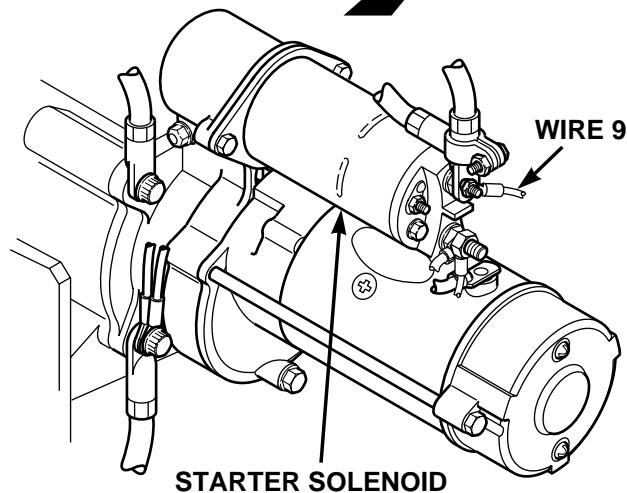
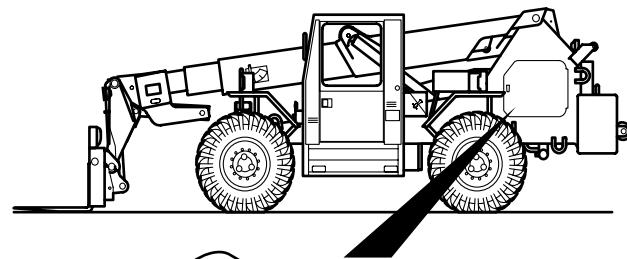
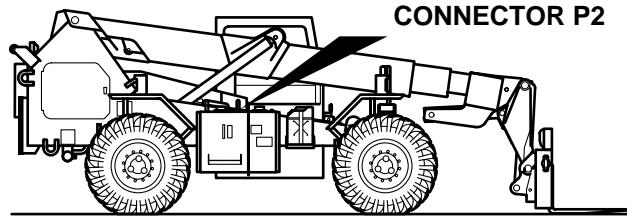
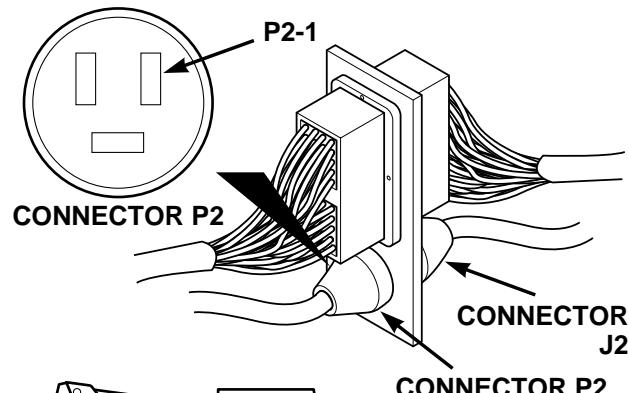
<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Disconnect connector J2 from connector P2.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to circuit breaker CB6.
(5)	Connect multimeter negative lead (-) to connector J2-1.
(a)	If continuity is present, go to Step 8 of this fault.
(b)	If continuity is not present, repair wire 9 or connector J2 (Para 8-48).
(6)	Install access panel and four screws to secure access panel.



## 1. 24 VDC CIRCUITS DO NOT OPERATE (CONT.).



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J2 from connector P2.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to starter motor solenoid.
(4)	Connect multimeter negative lead (-) to connector P2-1.
(a)	If continuity is present, replace alternator (Para 8-2).
(b)	If continuity is not present, repair wire 9 or connector P2 (Para 8-49).
(5)	Connect connector J2 to connector P2.
(6)	Connect negative battery cable to negative side of battery (Para 8-44).
(7)	Install battery cover (Para 8-42).



**2. HORN DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

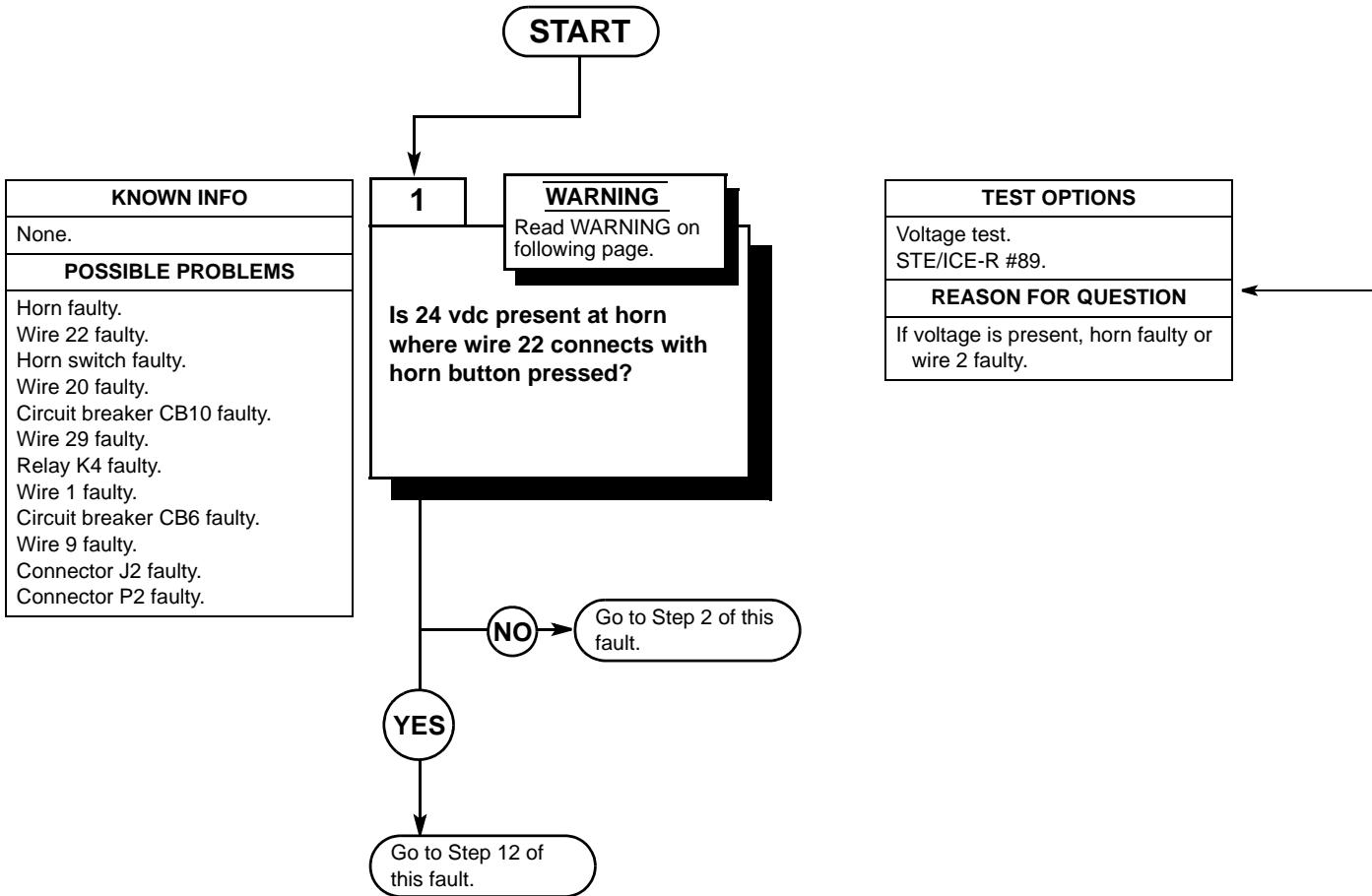
Two

*References*

TM 10-3930-673-10

*Equipment Condition*

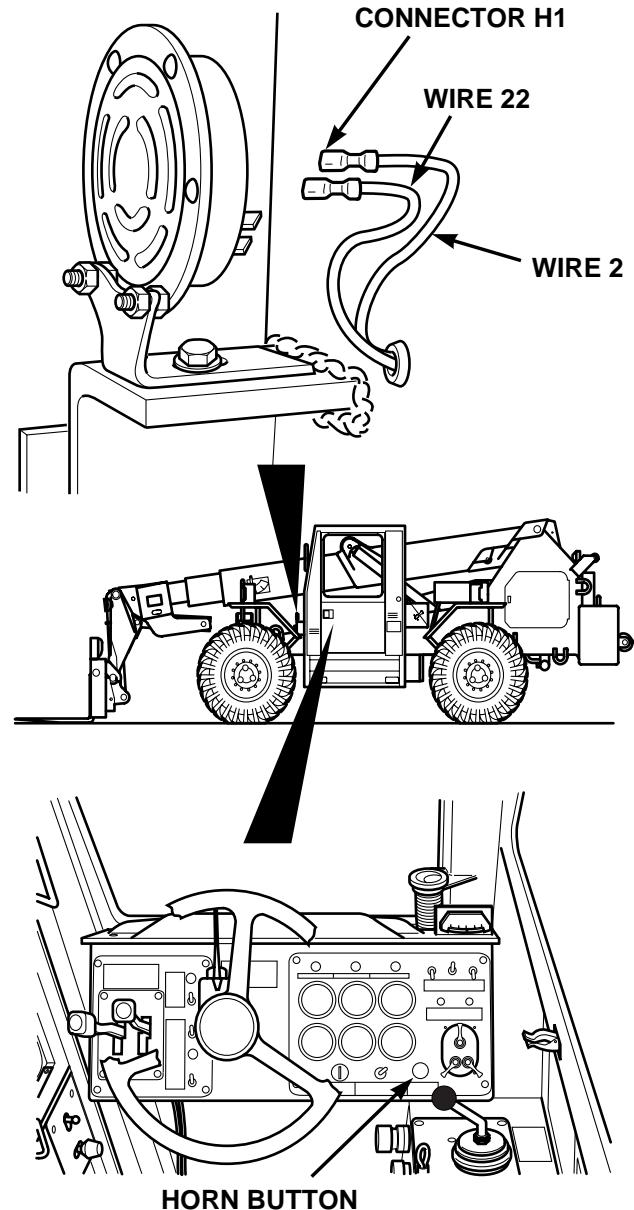
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

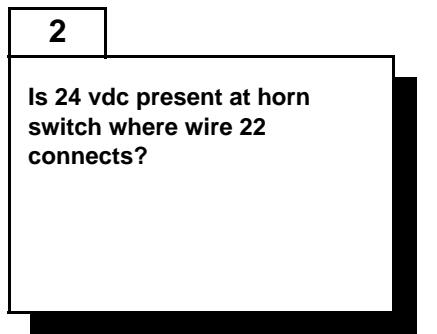
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(3)	Set multimeter to volts dc.
(4)	Disconnect connector H1 from horn.
(5)	Connect multimeter positive (+) lead to wire 22 of connector H1.
(6)	Connect multimeter negative (-) lead to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-44).
(8)	Push horn button and note reading of multimeter.
(a)	If 24 vdc is present, go to Step 12 of this fault.
(b)	If 24 vdc is not present, go to Step 2 of this fault.
(9)	Disconnect negative battery cable (Para 8-44).



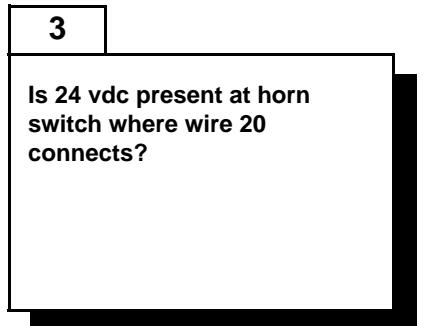
## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK.
POSSIBLE PROBLEMS
Wire 22 faulty. Horn switch Faulty. Wire 20 faulty. Circuit breaker CB10 faulty. Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, wire 22 faulty.

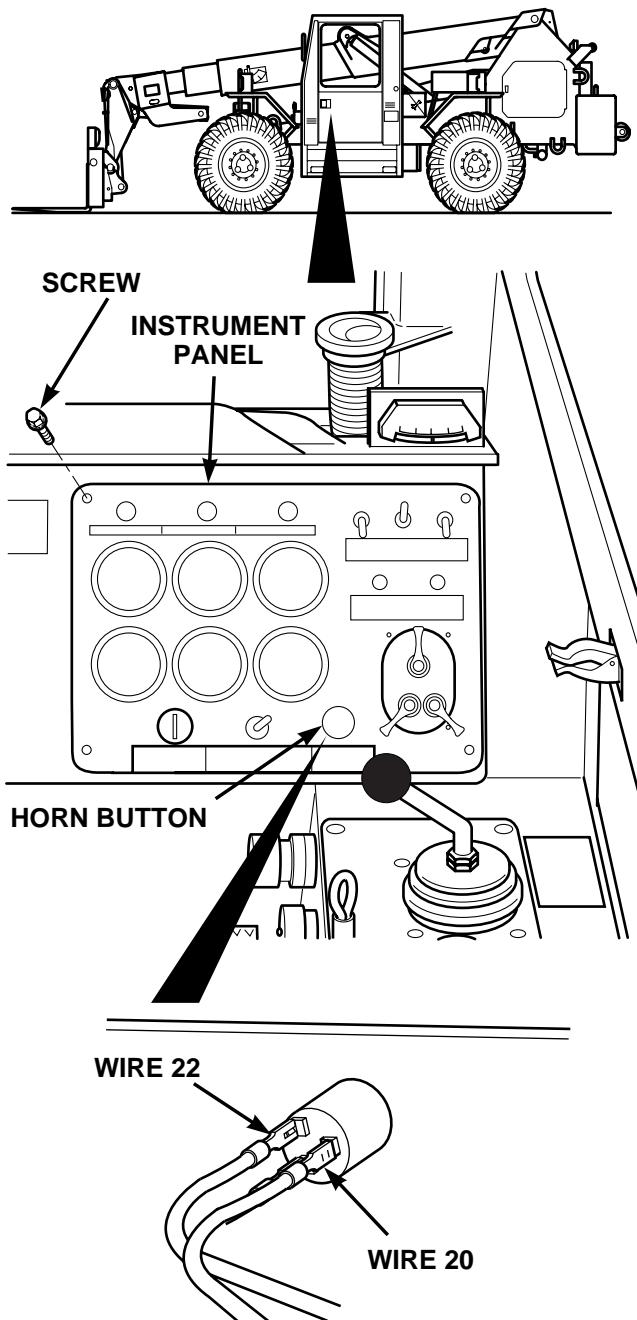
KNOWN INFO
Horn OK. Wire 22 OK.
POSSIBLE PROBLEMS
Horn switch Faulty. Wire 20 faulty. Circuit breaker CB10 faulty. Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, horn switch faulty.

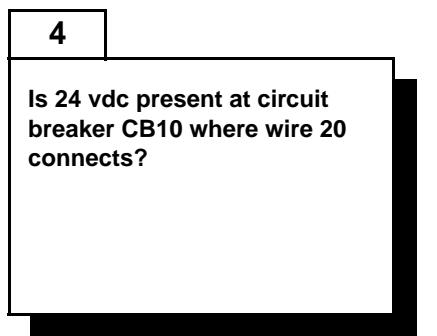
<b>VOLTAGE TEST</b>	
(1)	Remove four screws and instrument panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive (+) lead to horn switch where wire 22 connects.
(4)	Connect multimeter negative (-) lead to known good ground.
(5)	Connect negative battery cable (Para 8-44).
(6)	Press horn switch and note reading of multimeter.
(a)	If 24 vdc is not present, go to Step 3 of this fault.
(b)	If 24 vdc is present, repair wire 22 (Para 8-48).
(7)	Disconnect negative battery cable (Para 8-44).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to horn switch where wire 20 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable (Para 8-44).
(a)	If 24 vdc is not present, go to Step 4 of this fault.
(b)	If 24 vdc is present, replace horn switch (Para 8-7).
(5)	Disconnect negative battery cable (Para 8-44).
(6)	Install instrument panel and four screws.



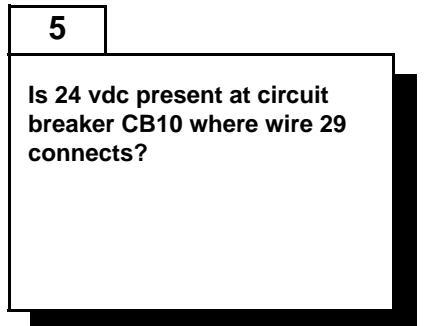
## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK.
POSSIBLE PROBLEMS
Wire 20 faulty. Circuit breaker CB10 faulty. Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, wire 20 faulty.

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK.
POSSIBLE PROBLEMS
Circuit breaker CB10 faulty. Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



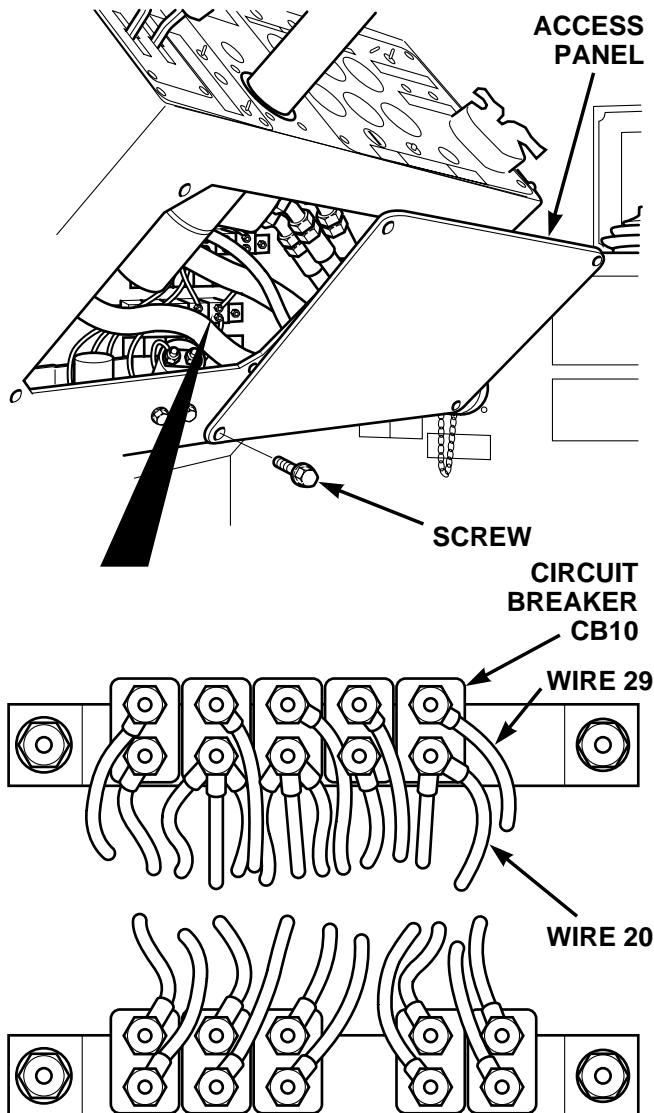
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, circuit breaker CB10 faulty.

**VOLTAGE TEST**

- (1) Remove four screws and access panel.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive (+) lead to circuit breaker CB10 where wire 20 connects.
- (4) Connect multimeter negative (-) lead to known good ground.
- (5) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 5 of this fault.
  - (b) If 24 vdc is present, repair wire 20 (Para 8-48).
- (6) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to circuit breaker CB10 where wire 29 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 6 of this fault.
  - (b) If 24 vdc is present, replace circuit breaker CB10 (Para 8-11).
- (5) Disconnect negative battery cable (Para 8-44).



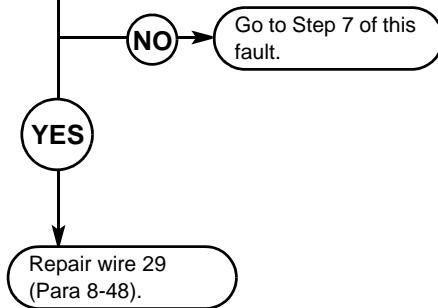
## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK.
POSSIBLE PROBLEMS
Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**6**

Is 24 vdc present at relay K4 where wire 29 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, wire 29 faulty.

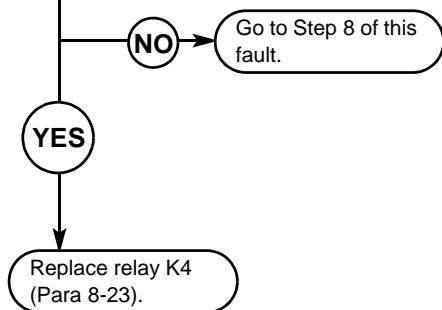


KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK.
POSSIBLE PROBLEMS
Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**7**

Is 24 vdc present at relay K4 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, relay K4 faulty.

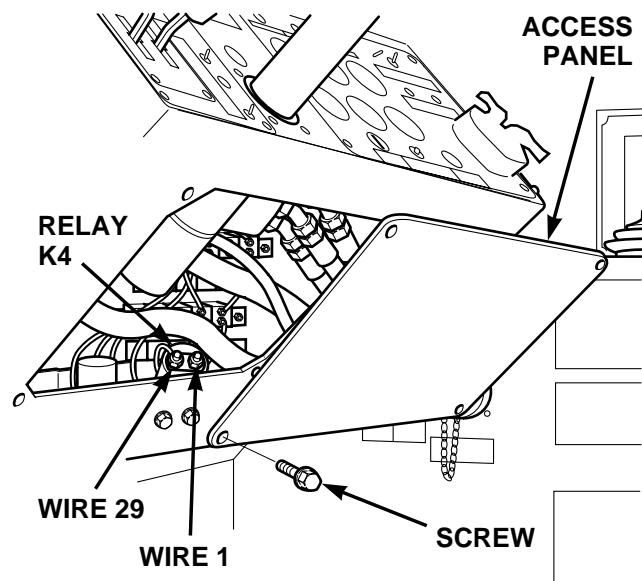


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K4 where wire 29 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 7 of this fault.
  - (b) If 24 vdc is present, repair wire 29 (Para 8-48).
- (5) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K4 where wire 1 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 8 of this fault.
  - (b) If 24 vdc is present, replace relay K4 (Para 8-23).
- (5) Disconnect negative battery cable (Para 8-44).



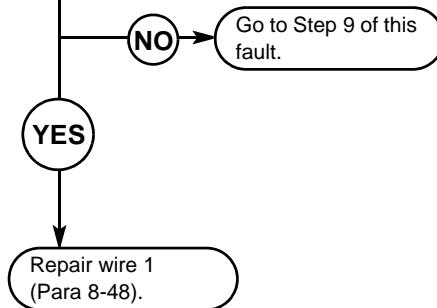
## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Circuit breaker CB6 faulty. Connector J2 faulty. Connector P2 faulty.

**8**

Is 24 vdc present at circuit breaker CB6 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, repair wire 1.

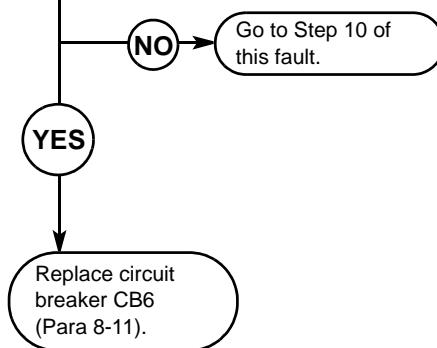


KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**9**

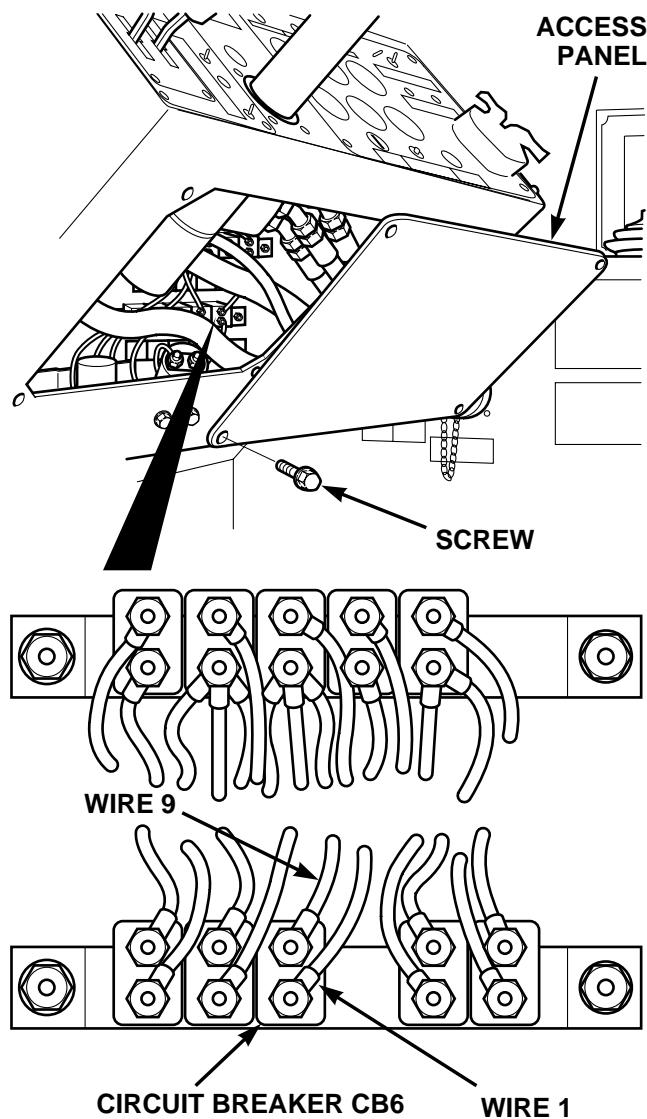
Is 24 vdc present at circuit breaker CB6 where wire 9 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, replace circuit breaker CB6.



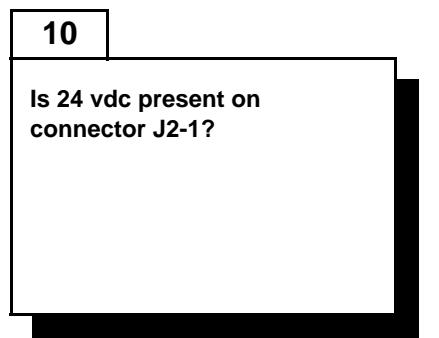
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable (Para 8-44).
(a)	If 24 vdc is not present, go to Step 9 of this fault.
(b)	If 24 vdc is present, repair wire 1 (Para 8-48).
(5)	Disconnect negative battery cable (Para 8-44).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to circuit breaker CB6 where wire 9 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable (Para 8-44).
(a)	If 24 vdc is not present, go to Step 10 of this fault.
(b)	If 24 vdc is present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable (Para 8-44).



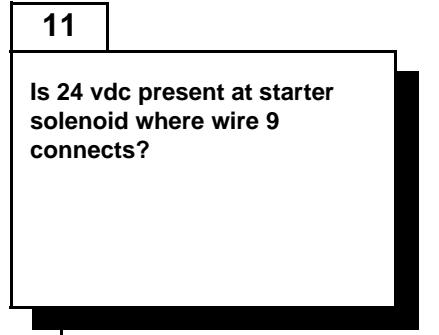
## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

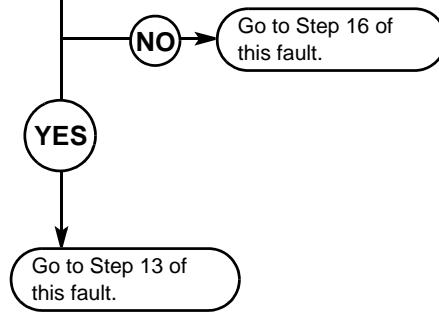


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

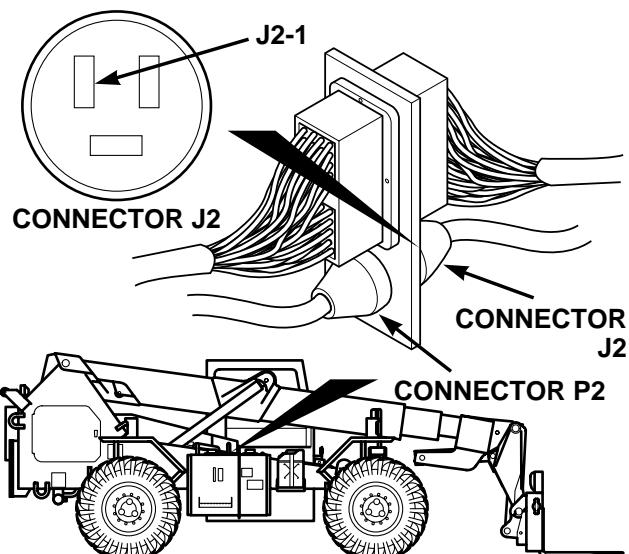


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

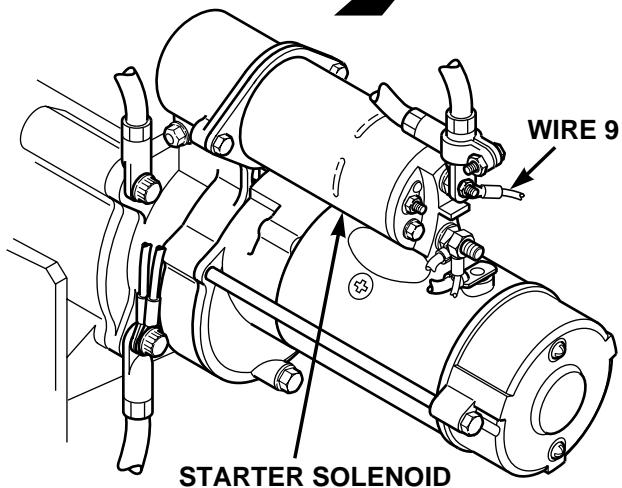
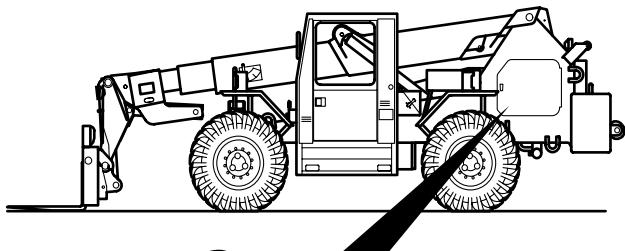


**VOLTAGE TEST**

- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive (+) lead to connector J2-1.
- (4) Connect multimeter negative (-) lead to known good ground.
- (5) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 11 of this fault.
  - (b) If 24 vdc is present, go to Step 15 of this fault.
- (6) Disconnect negative battery cable (Para 8-44).

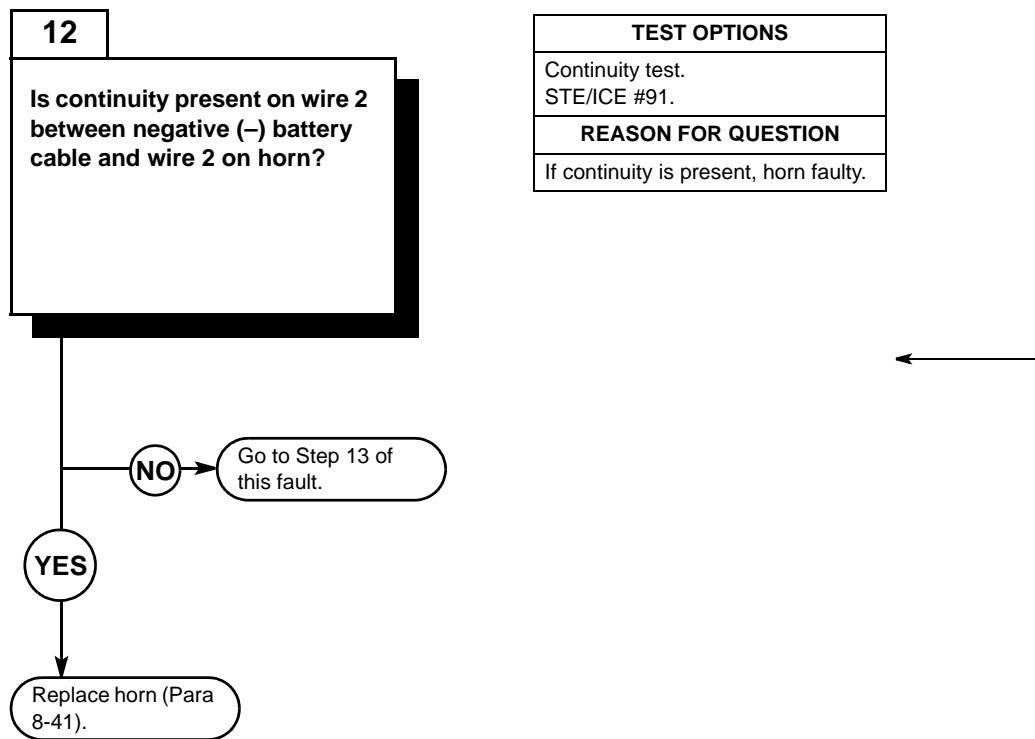
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) to starting motor solenoid where wire 9 connects.
- (3) Connect multimeter negative (-) to known good ground.
- (4) Connect negative battery cable (Para 8-44).
  - (a) If 24 vdc is not present, go to Step 13 of this fault.
  - (b) If 24 vdc is present, go to Step 16 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

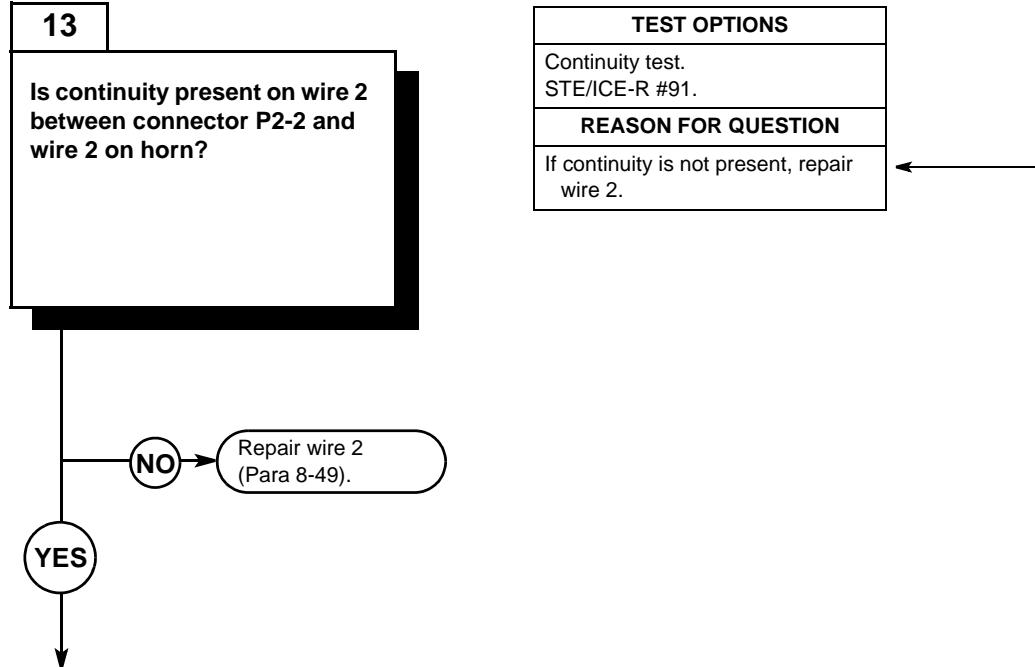


## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
None.
POSSIBLE PROBLEMS
Horn faulty. Wire 22 faulty. Horn switch faulty. Wire 20 faulty. Circuit breaker CB10 faulty. Wire 29 faulty. Relay K4 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty. Wire 2 faulty.

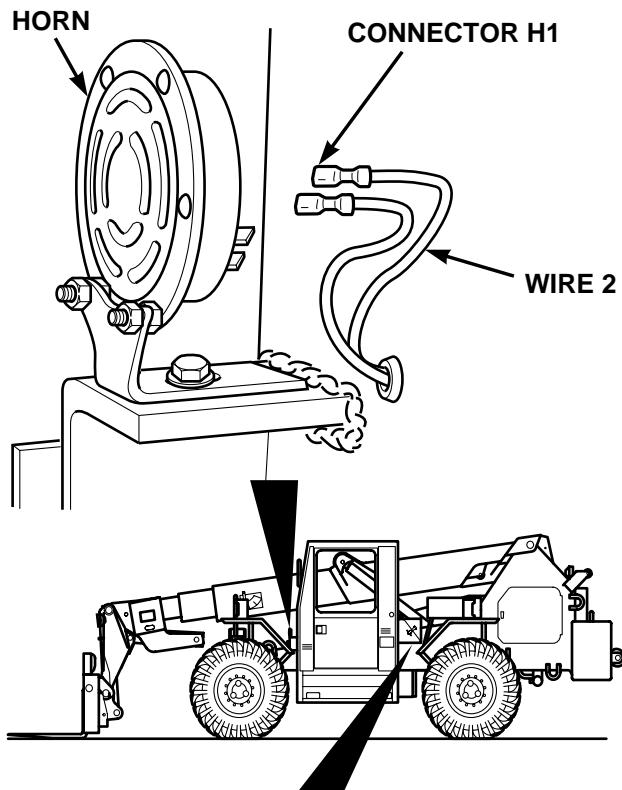


KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty. Wire 2 faulty.

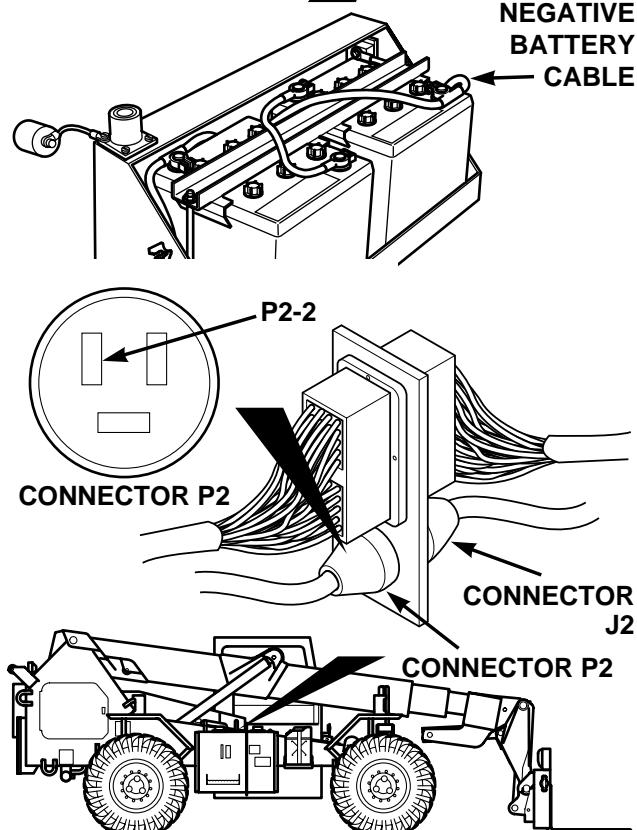


**CONTINUITY TEST**

- (1) Disconnect connector H1 from horn.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive (+) lead to wire 2 at horn.
- (4) Connect multimeter negative (-) lead to negative battery cable.
  - (a) If continuity is not present, go to Step 13 of this fault.
  - (b) If continuity is present, replace horn (Para 8-41).

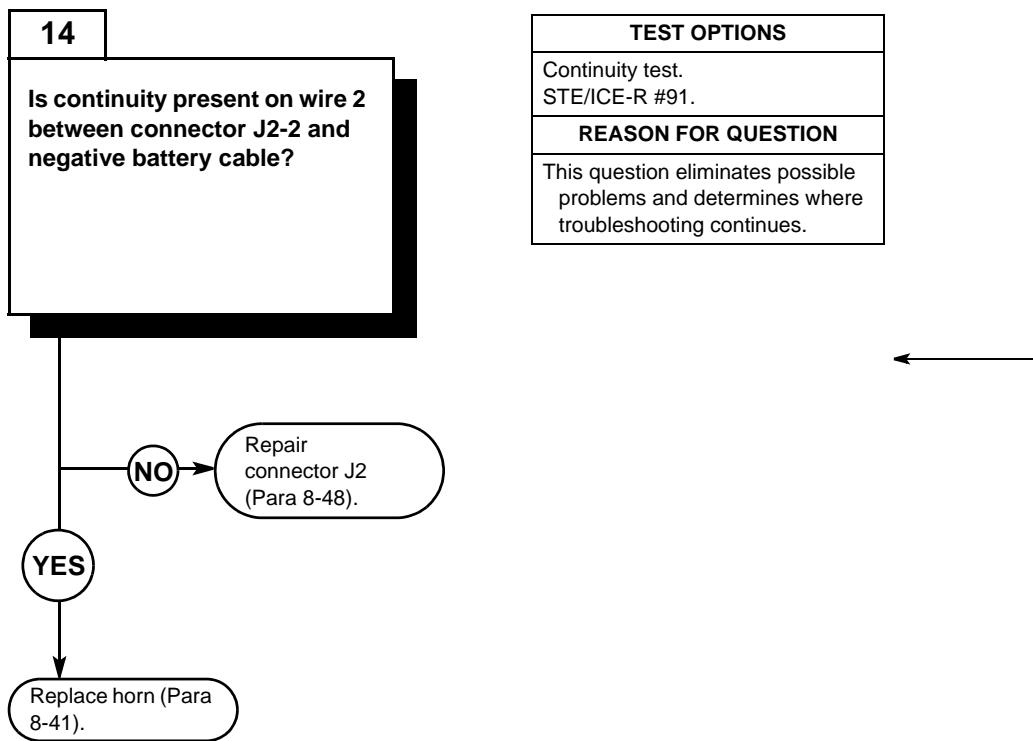
**CONTINUITY TEST**

- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive (+) lead to wire 2 at horn connector H1.
- (4) Connect multimeter negative (-) lead to connector P2-2.
  - (a) If continuity is not present, repair wire 2 (Para 8-49).
  - (b) If continuity is present, go to Step 14 of this fault.

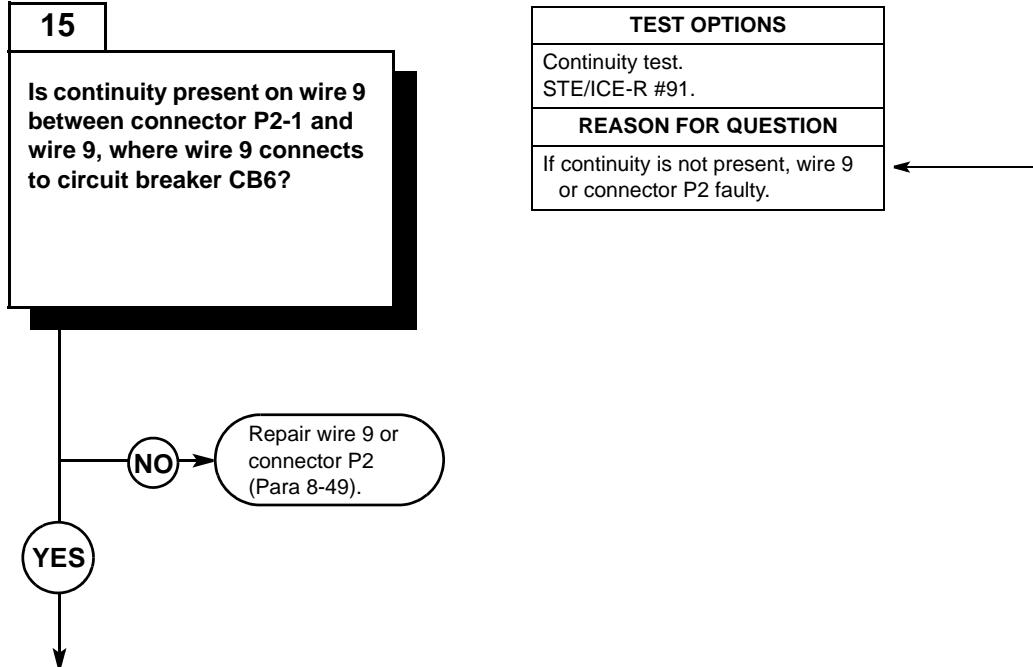


## 2. HORN DOES NOT OPERATE (CONT.).

KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK. Circuit breaker CB6 OK. Connector J2-1 OK. Connector P2-1 OK.
POSSIBLE PROBLEMS
Connector J2-2 faulty. Connector P2-2 faulty. Wire 2 faulty.

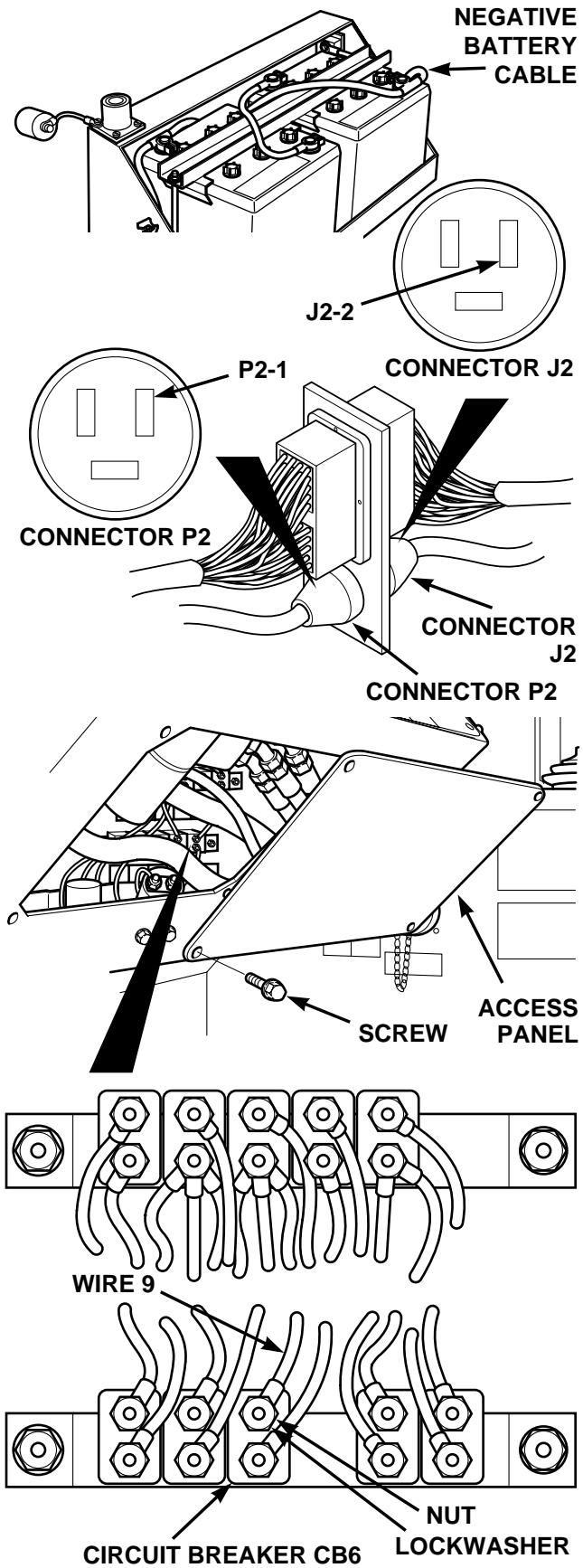


KNOWN INFO
Horn OK. Wire 22 OK. Horn switch OK. Wire 20 OK. Circuit breaker CB10 OK. Wire 29 OK. Relay K4 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Connector J2 faulty. Connector P2 faulty. Wire 9 faulty.

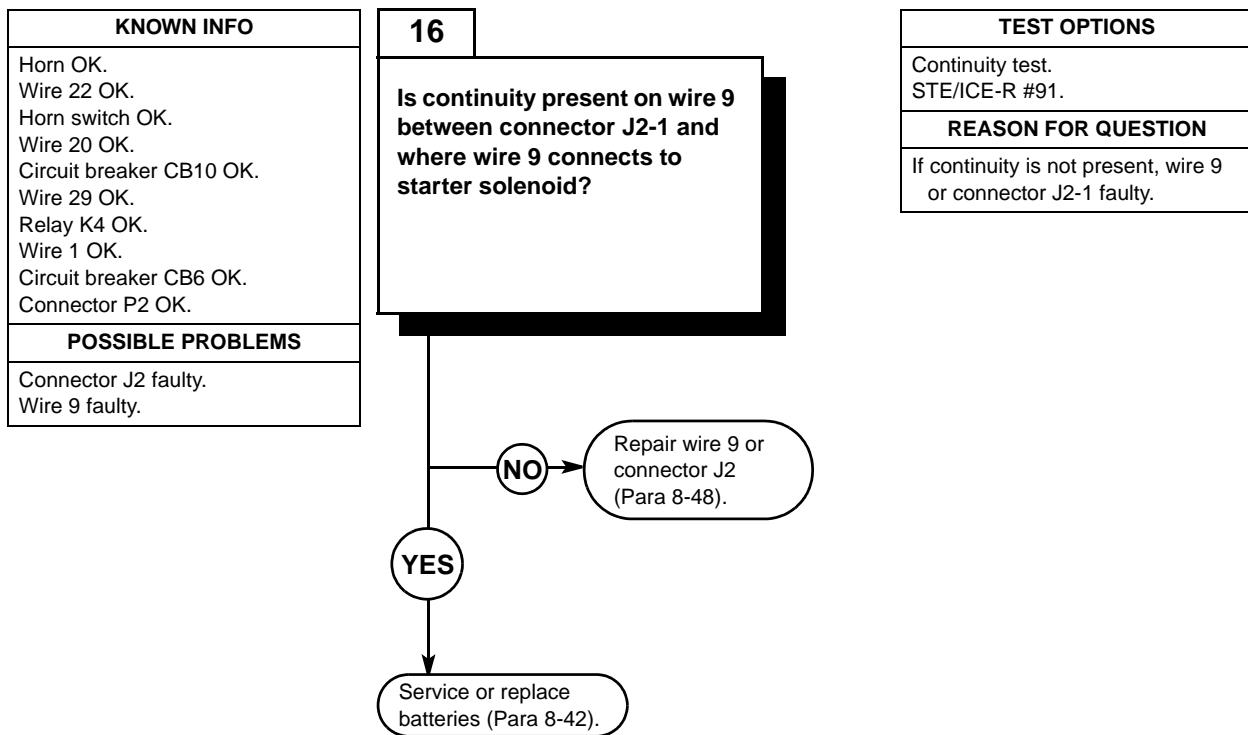


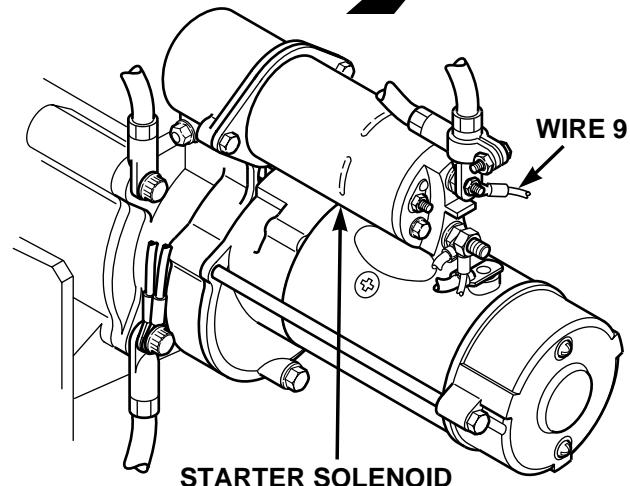
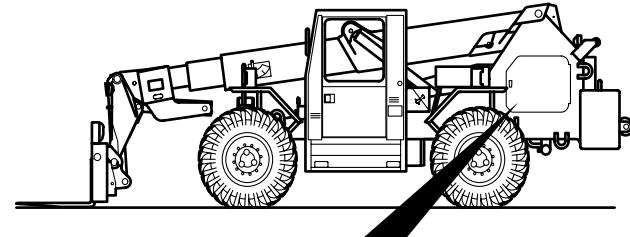
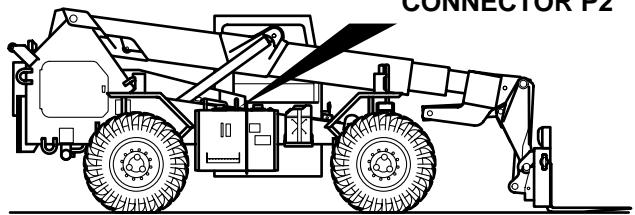
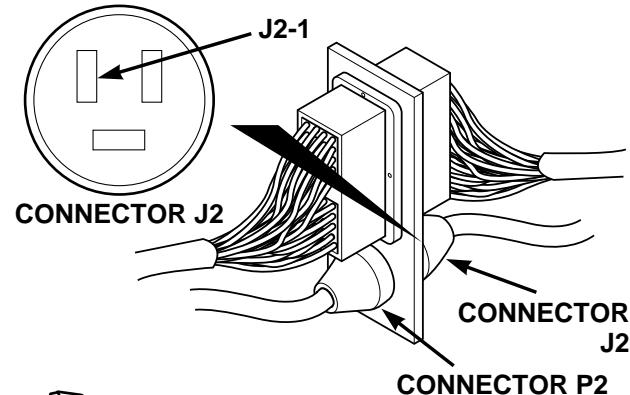
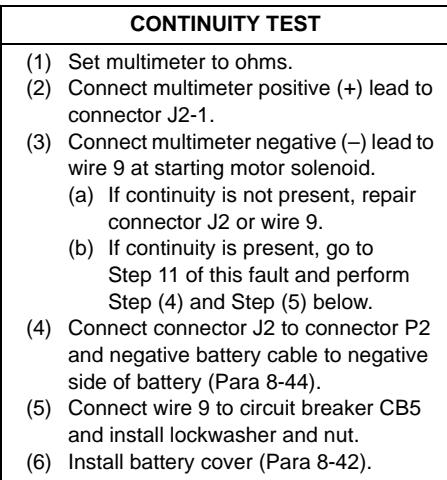
<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive (+) lead to connector J2-2.
(3)	Connect multimeter negative (-) lead to negative battery cable.
(a)	If continuity is not present, repair connector J2 and perform Step (4) below.
(b)	If continuity is present, replace horn and perform Step (4) below.
(4)	Connect connector J2 to connector P2 and negative battery cable to negative side of battery (Para 8-44).

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable (Para 8-44).
(2)	Disconnect connector J2 from connector P2.
(3)	Remove one nut and lockwasher from wire 9 at circuit breaker CB6.
(4)	Connect multimeter positive (+) lead to wire 9.
(5)	Connect multimeter negative (-) lead to connector P2-1.
(a)	If continuity is not present, repair wire 9 or connector P2 and perform Step (6) and Step (7) below.
(b)	If continuity is present, go to Step 16 of this fault.
(6)	Connect connector J2 to connector P2 and negative battery cable to negative side of battery (Para 8-44).
(7)	Connect wire 9 to circuit breaker CB6 and install lockwasher and nut.
(8)	Install access panel and four screws.



## 2. HORN DOES NOT OPERATE (CONT.).





**3. BACK-UP ALARM DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

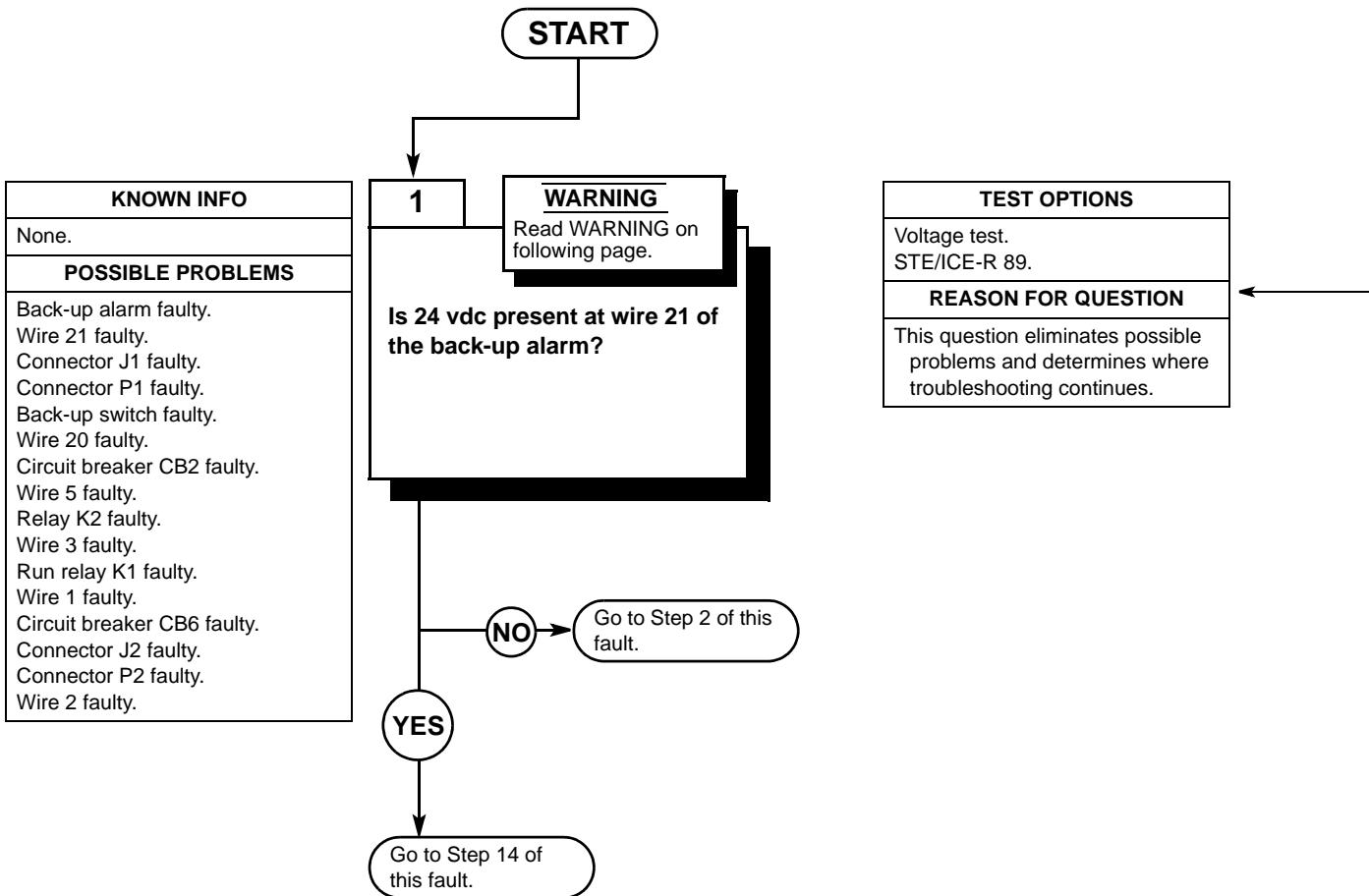
Two

*References*

TM 10-3930-673-10

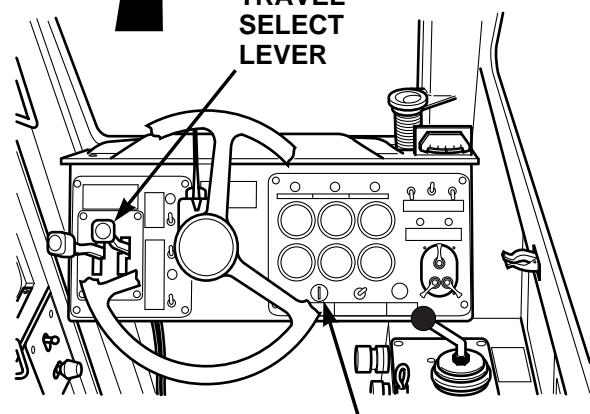
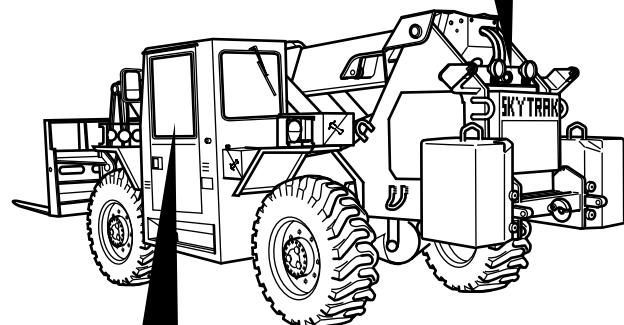
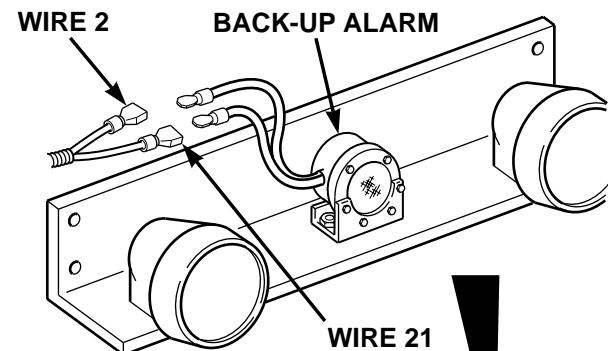
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Auxiliary fuel shut-off switch OFF  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



## WARNING

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

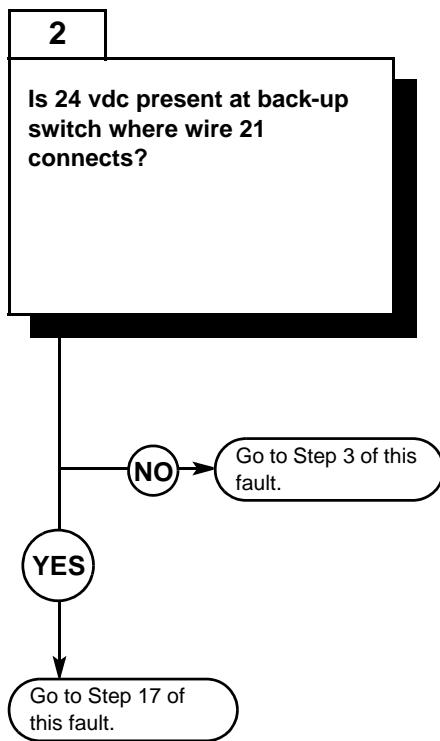


### VOLTAGE TEST

- (1) Remove battery cover (Para 8-44).
- (2) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (3) Disconnect wire 21 and wire 2 from back-up alarm.
- (4) Set multimeter to volts dc.
- (5) Connect multimeter positive (+) lead to known good ground.
- (6) Connect multimeter negative (-) lead to known good ground.
- (7) Connect negative battery cable (Para 8-44).
- (8) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (9) Place travel select lever in reverse "R" position (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 14 of this fault.
  - (b) If 24 vdc is not present, go to Step 2.
- (10) Place travel select lever in neutral "N" position (TM 10-3930-673-10).
- (11) Turn engine start switch to OFF position (TM 10-3930-673-10).

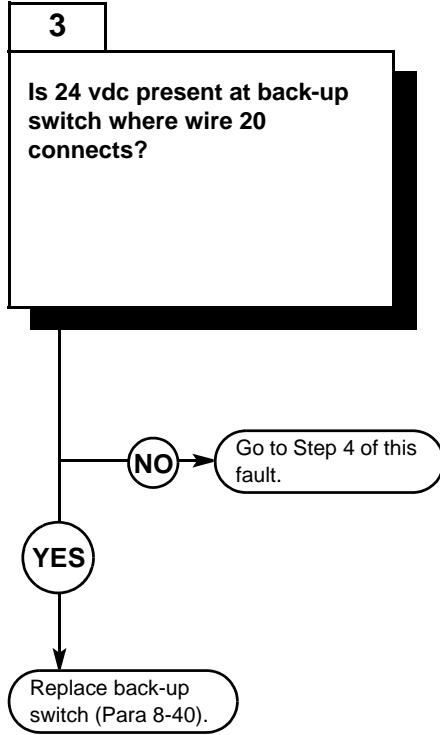
## 3. BACK-UP ALARM DOES NOT OPERATE (CONT.).

KNOWN INFO
Back-up alarm OK.
POSSIBLE PROBLEMS
Wire 21 faulty. Connector J1 faulty. Connector P1 faulty. Back-up switch faulty. Wire 20 faulty. Circuit breaker CB2 faulty. Wire 5 faulty. Relay K2 faulty. Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK.
POSSIBLE PROBLEMS
Back-up switch faulty. Wire 20 faulty. Circuit breaker CB2 faulty. Wire 5 faulty. Relay K2 faulty. Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Connector J2 faulty. Connector P2 faulty.



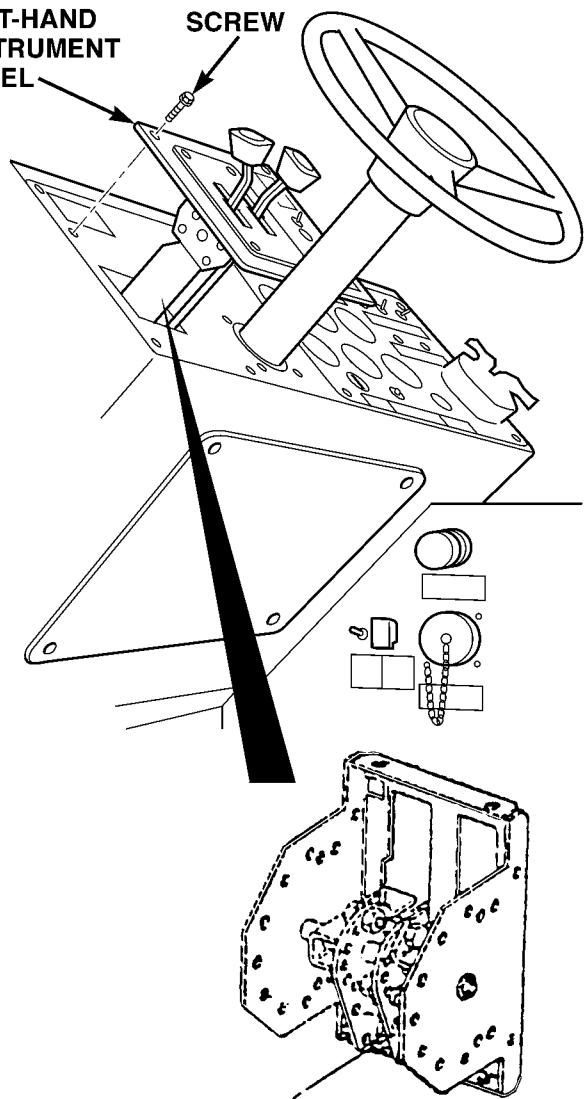
TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, back-up switch faulty.

**VOLTAGE TEST**

- (1) Remove four screws from left-hand instrument panel and lift selector panel out to get to back-up alarm switch.
- (2) Disconnect negative battery cable (Para 8-44).
- (3) Disconnect wire 21 from back-up switch.
- (4) Set multimeter to volts dc.
- (5) Connect multimeter positive (+) lead to wire 21 where wire 21 connects to back-up switch.
- (6) Connect multimeter negative (-) lead to known good ground.
- (7) Connect negative battery cable (Para 8-44).
- (8) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (9) Place travel select lever in reverse "R" position (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 17 of this fault.
  - (b) If 24 vdc is not present, go to Step 3 of this fault.
- (10) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (11) Place travel select lever in neutral "N" position (TM 10-3930-673-10).
- (12) Disconnect negative battery cable (Para 8-44).

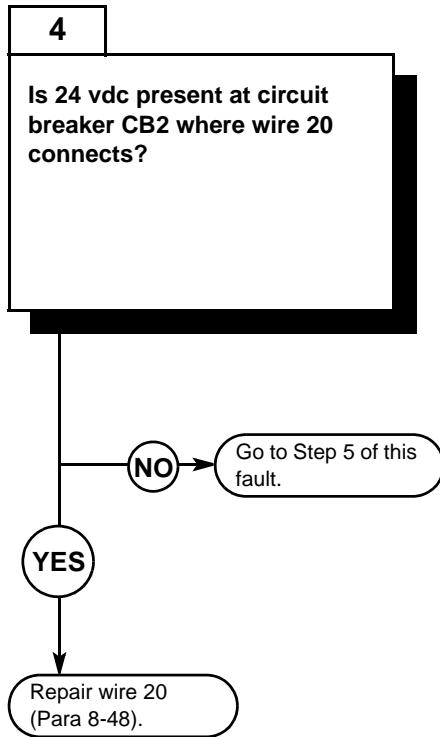
**VOLTAGE TEST**

- (1) Disconnect wire 20 from back-up switch.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive (+) lead to wire 20.
- (4) Connect multimeter negative (-) lead to known good ground.
- (5) Connect negative battery cable (Para 8-44).
- (6) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, replace back-up switch (Para 8-40).
  - (b) If 24 vdc is not present, go to Step 4 of this fault.
- (7) Turn engine start switch to OFF position engine start switch (TM 10-3930-673-10).
- (8) Disconnect negative battery cable (Para 8-44).

**LEFT-HAND INSTRUMENT PANEL****SCREW****WIRE 21****WIRE 20****SHOWN REMOVED FOR CLARITY****BACK-UP SWITCH**

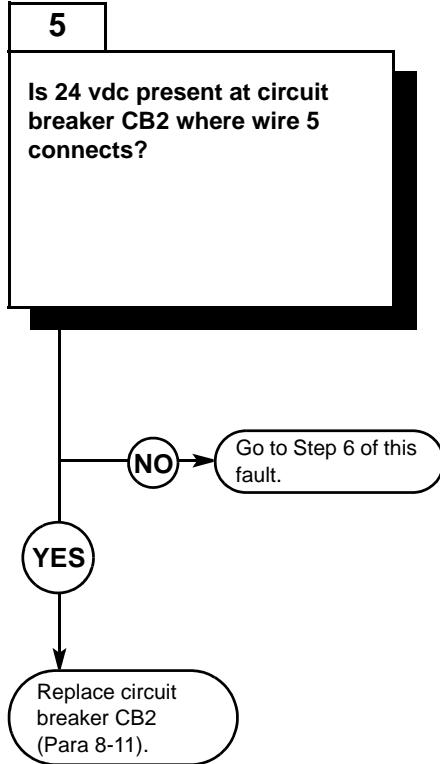
## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK.
POSSIBLE PROBLEMS
Wire 20 faulty. Circuit breaker CB2 faulty. Wire 5 faulty. Relay K2 faulty. Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Connector J2 faulty. Connector P2 faulty.



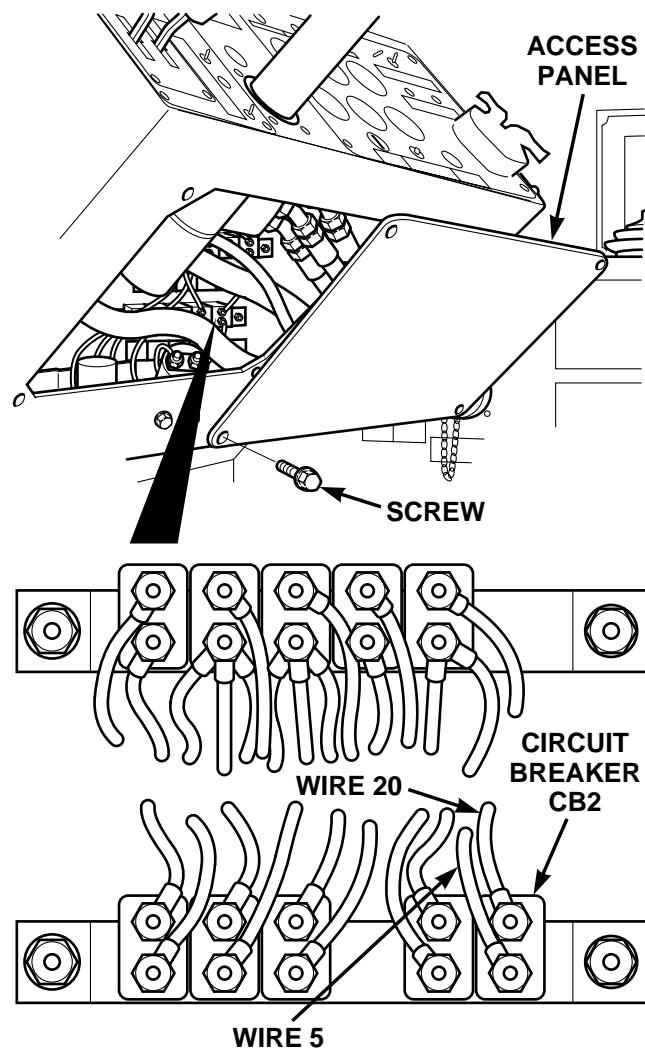
TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, wire 20 faulty.

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK.
POSSIBLE PROBLEMS



TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, circuit breaker CB2 faulty.

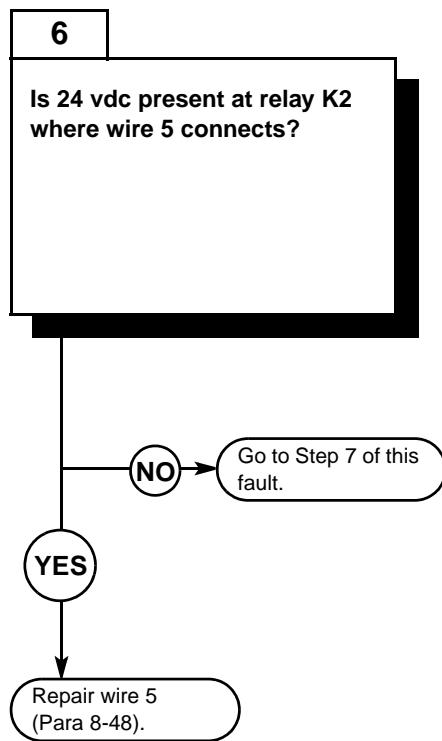
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Remove four screws and access panel.
(3)	Connect multimeter positive (+) lead to circuit breaker CB2 where wire 20 connects.
(4)	Connect multimeter negative (-) lead to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(6)	Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, repair wire 20 (Para 8-48).
(b)	If 24 vdc is not present, go to Step 5 of this fault.
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable (Para 8-44).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to circuit breaker CB2 where wire 5 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, replace circuit breaker CB2 (Para 8-11).
(b)	If 24 vdc is not present, go to Step 6 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable (Para 8-44).

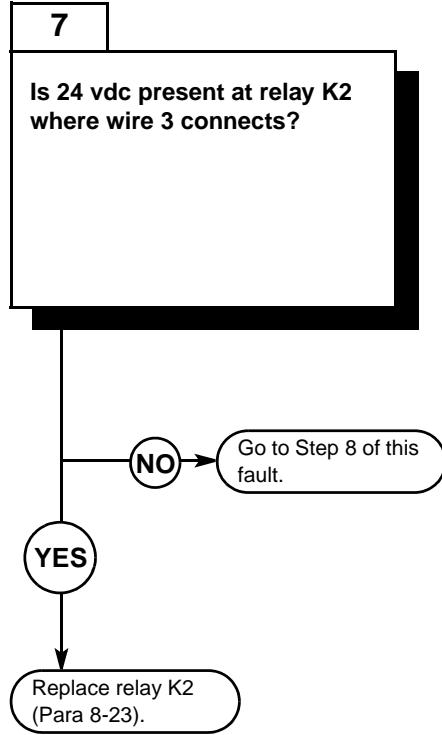
## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK.
POSSIBLE PROBLEMS
Wire 5 faulty. Relay K2 faulty. Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, wire 5 faulty.

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK.
POSSIBLE PROBLEMS
Relay K2 faulty. Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



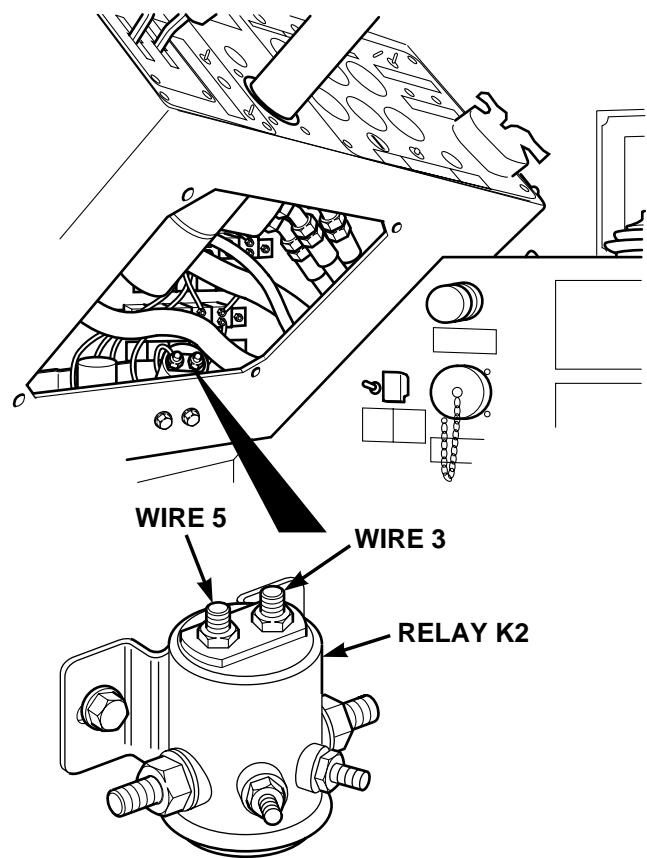
TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, relay K2 faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K2 where wire 5 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, repair wire 5 (Para 8-48).
  - (b) If 24 vdc is not present, go to Step 7 of this fault.
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K2 where wire 3 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, replace relay K2 (Para 8-23).
  - (b) If 24 vdc is not present, go to Step 8 of this fault.
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable (Para 8-44).

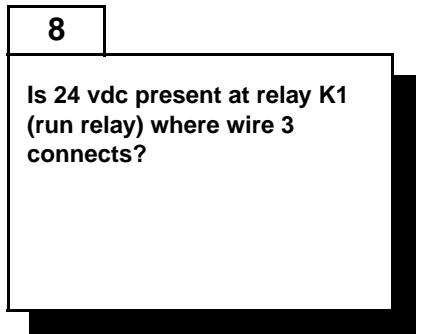


## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK.

POSSIBLE PROBLEMS
Wire 3 faulty. Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

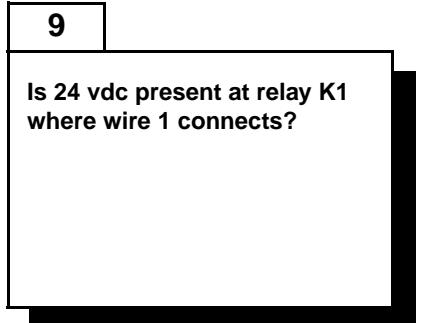


TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, wire 3 faulty.

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK. Wire 3 OK.

POSSIBLE PROBLEMS
Run relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



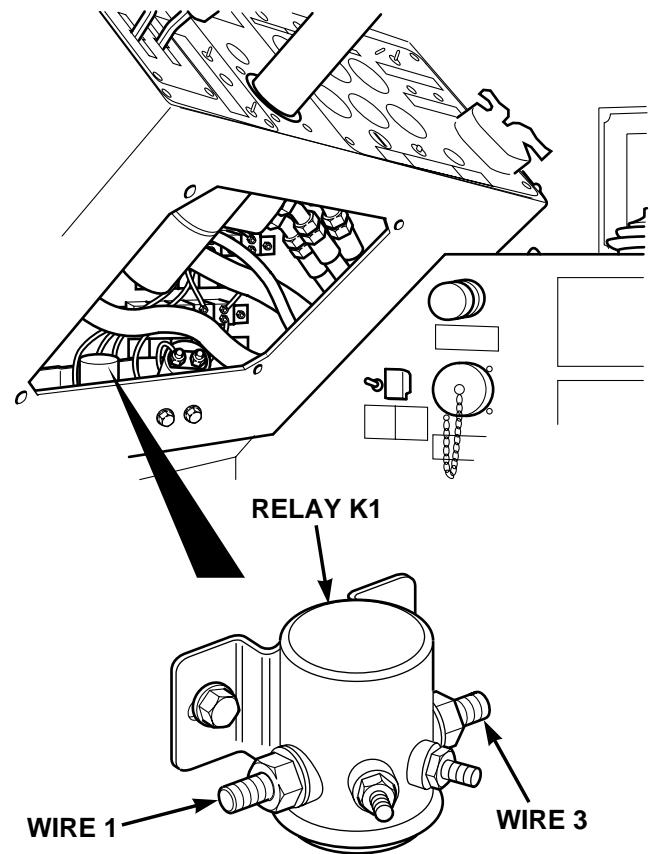
TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
If 24 vdc is present, relay K1 faulty.

**VOLTAGE TEST**

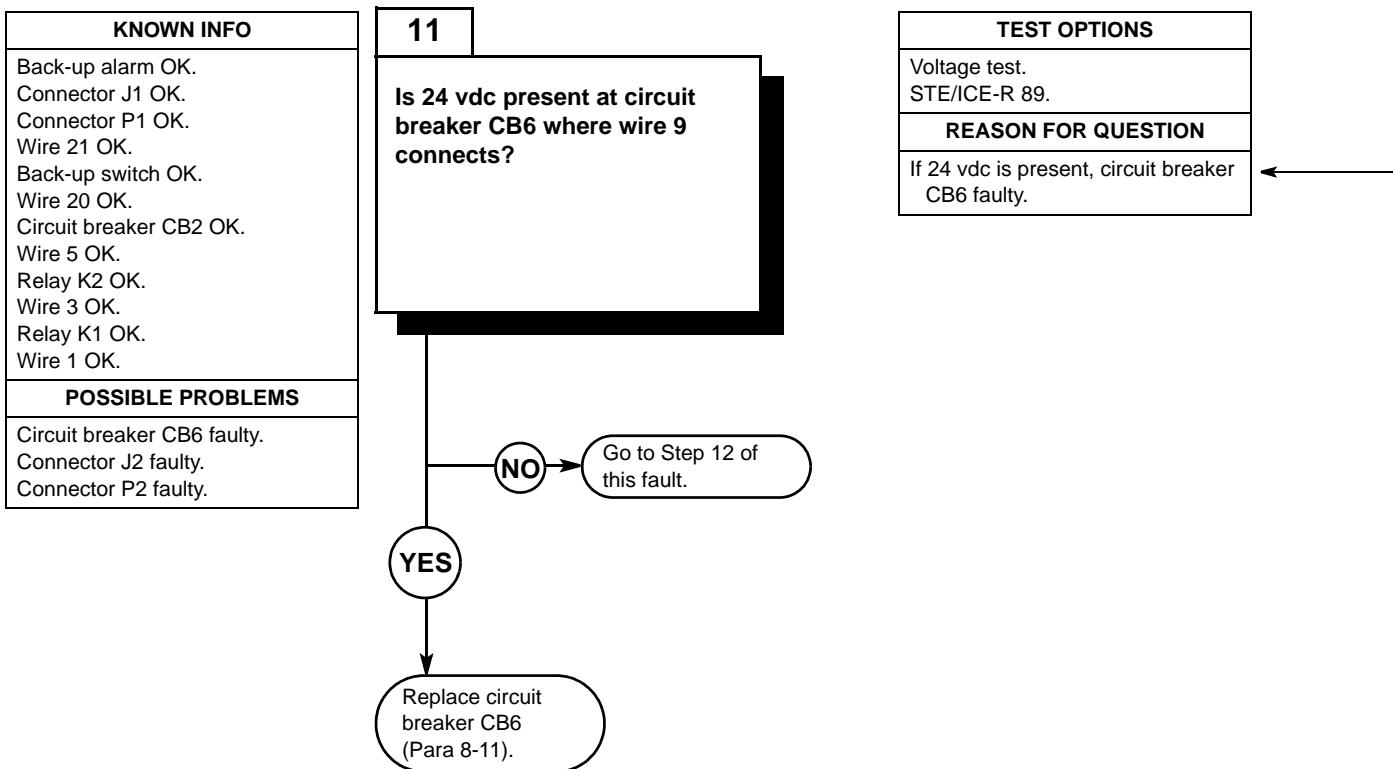
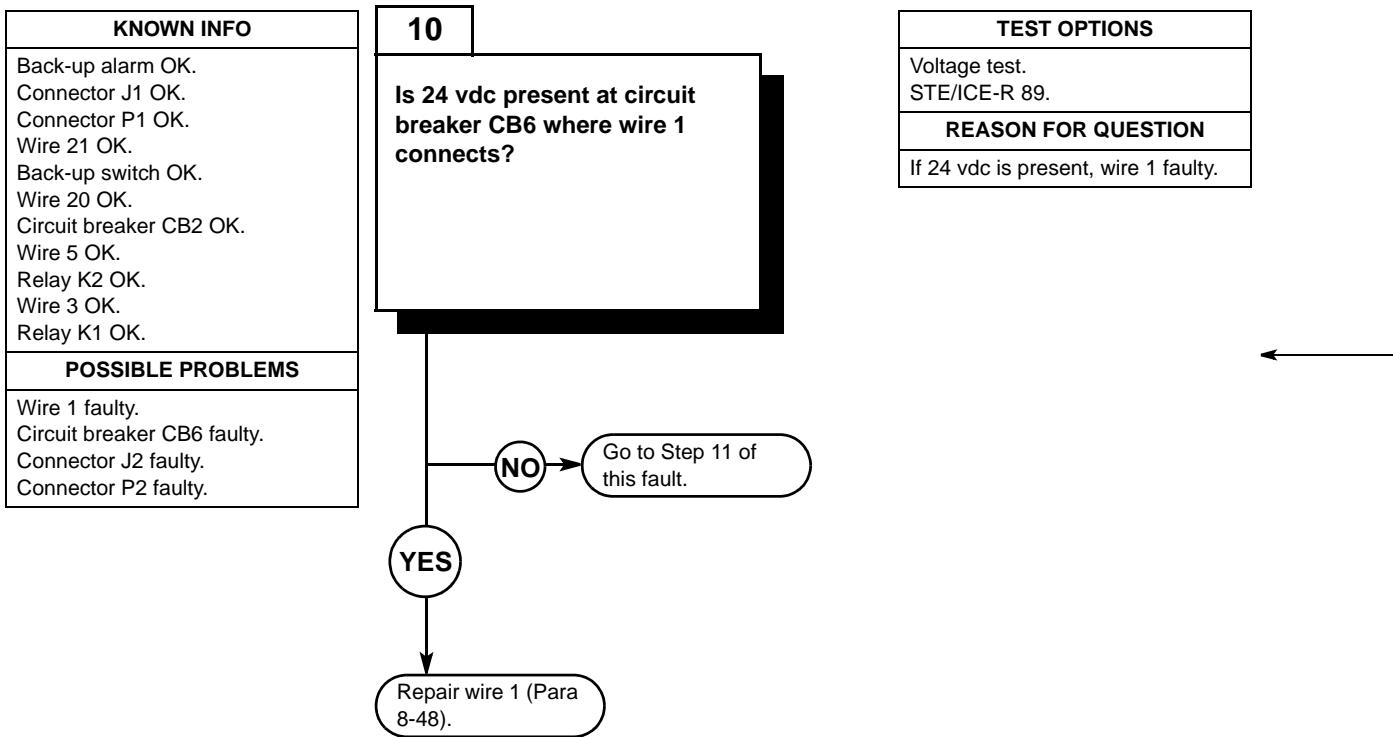
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K1 where wire 3 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, repair wire 3 (Para 8-48).
  - (b) If 24 vdc is not present, go to Step 9 of this fault.
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K1 where wire 1 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, replace relay K1 (Para 8-23).
  - (b) If 24 vdc is not present, go to Step 10 of this fault.
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable (Para 8-44).

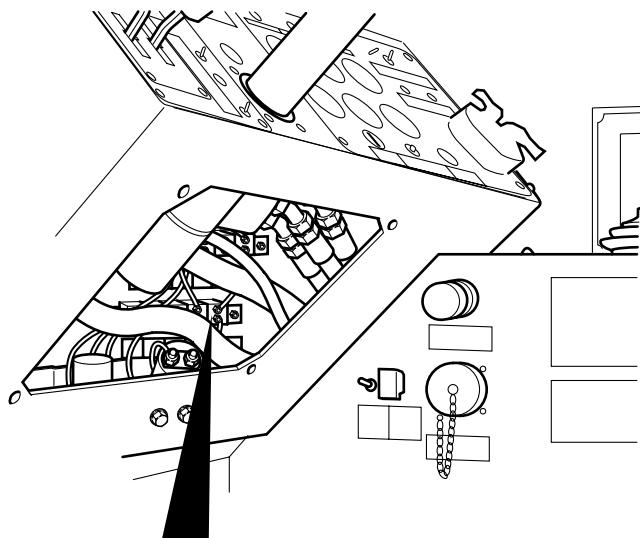


## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).

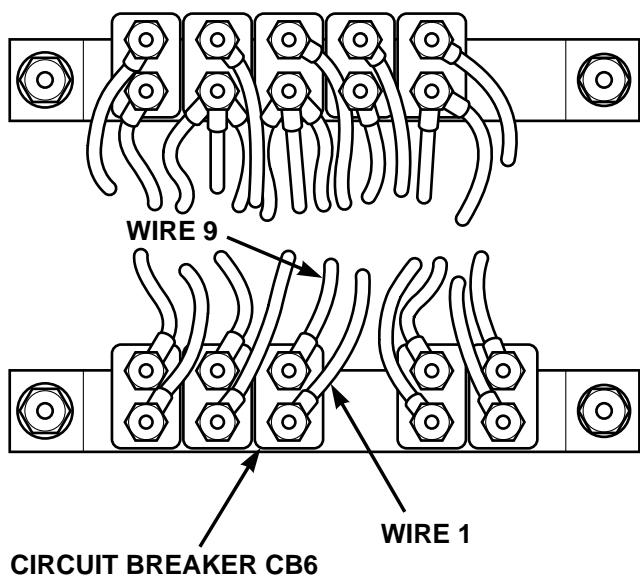


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to circuit breaker CB6 where wire 1 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, repair wire 1 (Para 8-48).
  - (b) If 24 vdc is not present, go to Step 11 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

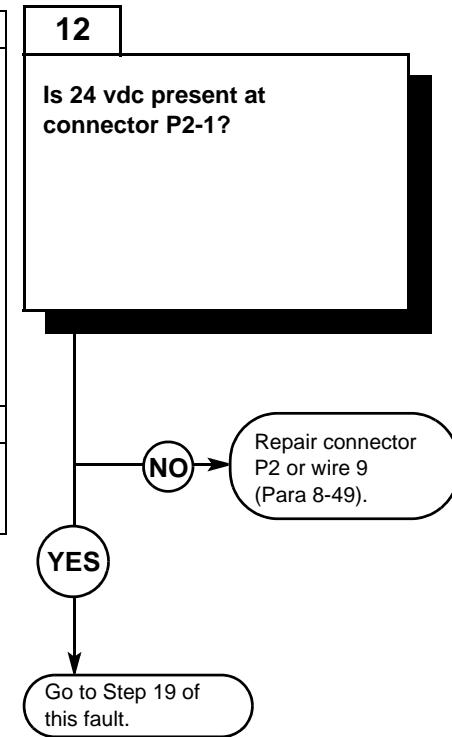
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to circuit breaker CB6 where wire 9 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, replace circuit breaker CB6 (Para 8-11).
  - (b) If 24 vdc is not present, go to Step 12 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

**CIRCUIT BREAKER CB6**

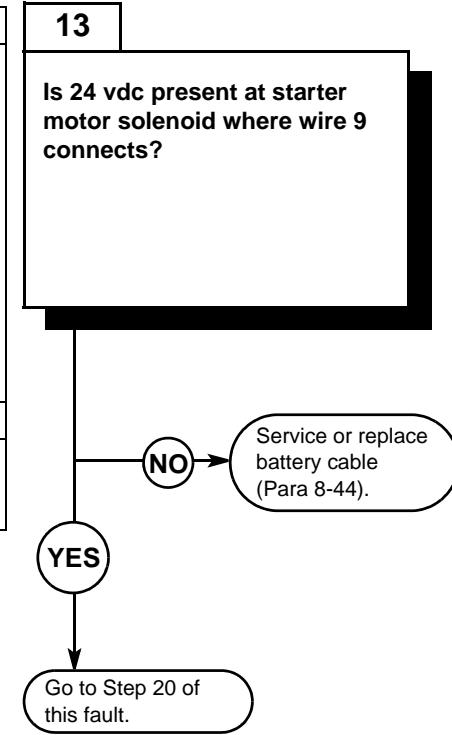
## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).

KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK. Circuit breaker CB6 OK.



TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

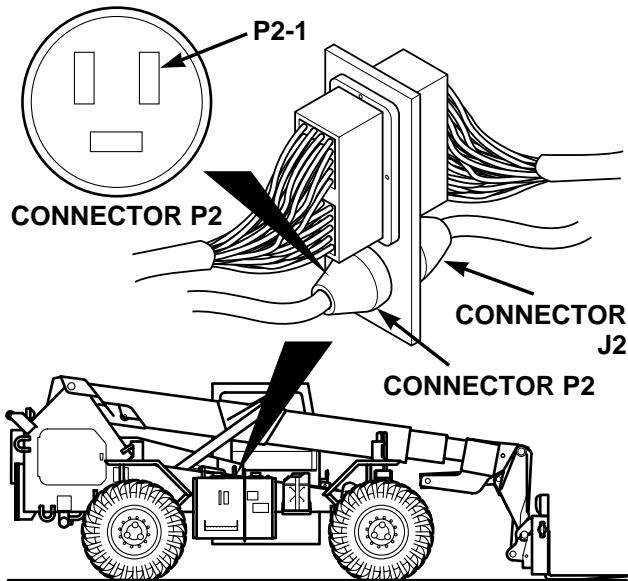
KNOWN INFO
Back-up alarm OK. Connector J1 OK. Connector P1 OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK. Circuit breaker CB6 OK.



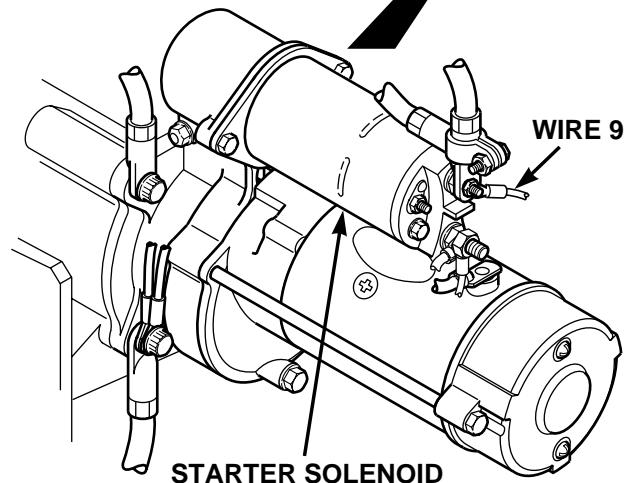
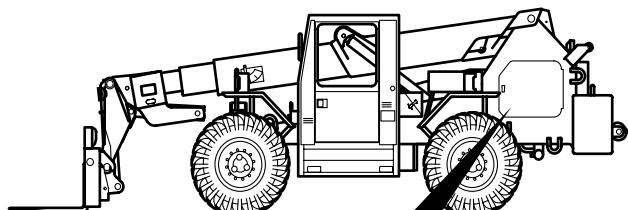
TEST OPTIONS
Voltage test. STE/ICE-R 89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

**VOLTAGE TEST**

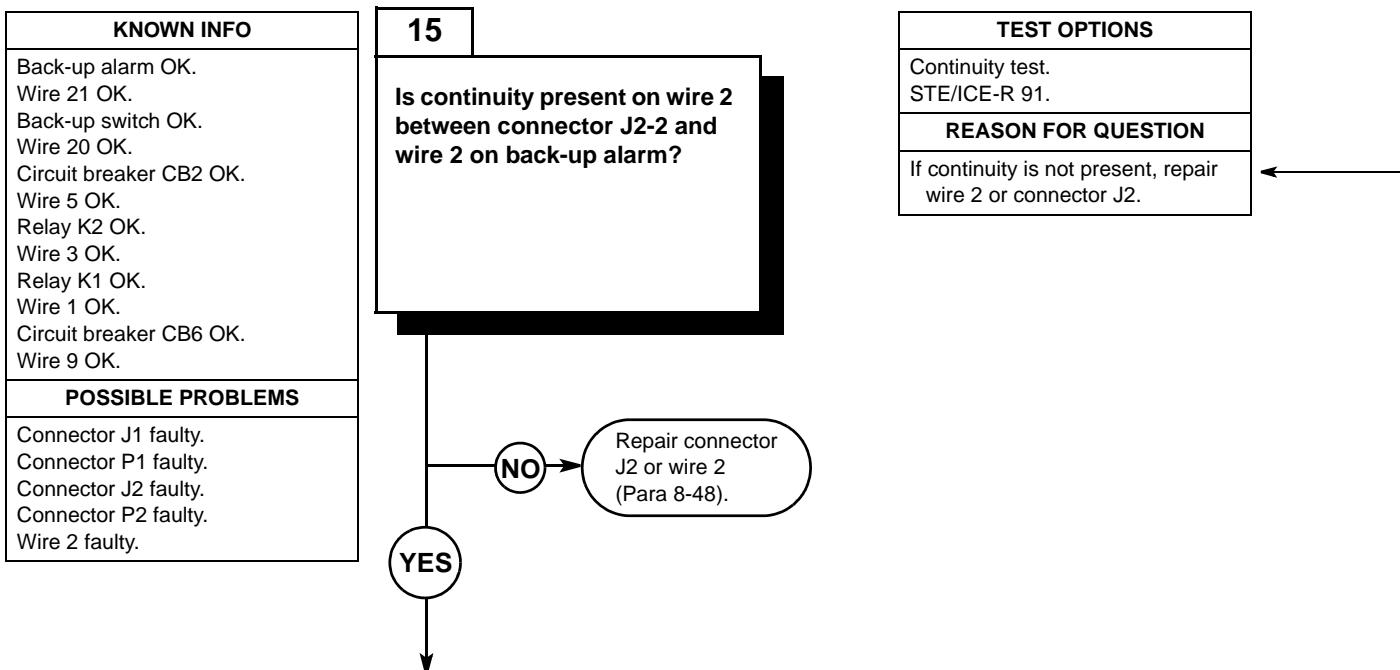
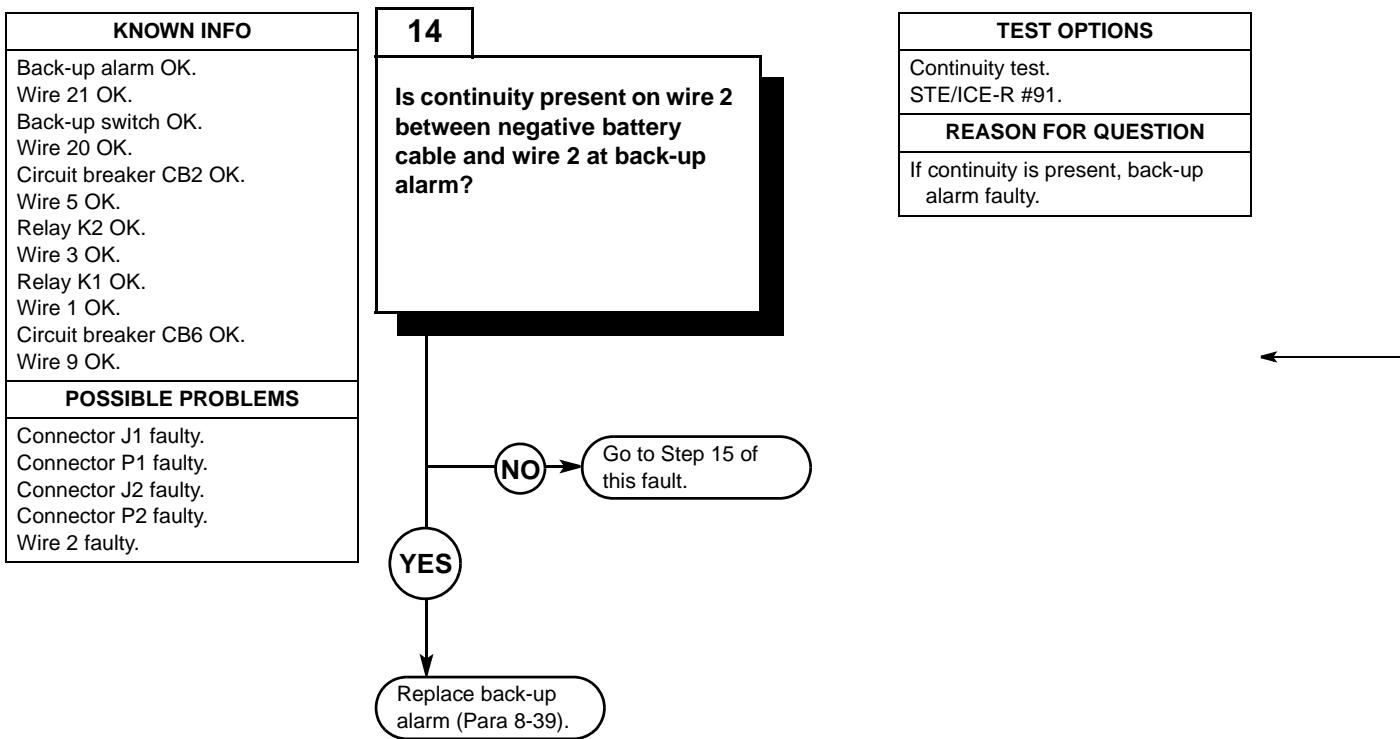
- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive (+) lead to connector P2-1.
- (4) Connect multimeter negative (-) lead to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 19 of this fault.
  - (b) If 24 vdc is not present, repair connector P2 or wire 9 (Para 8-49).
- (6) Connect connector J2 to connector P2.

**VOLTAGE TEST**

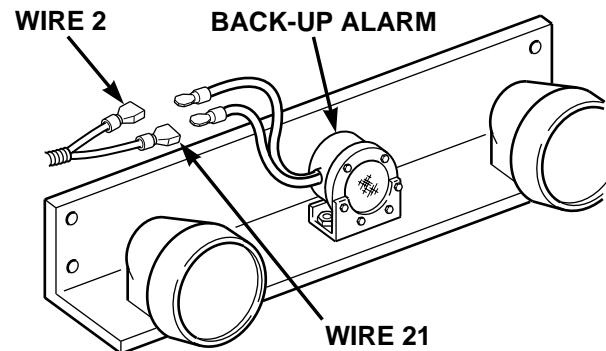
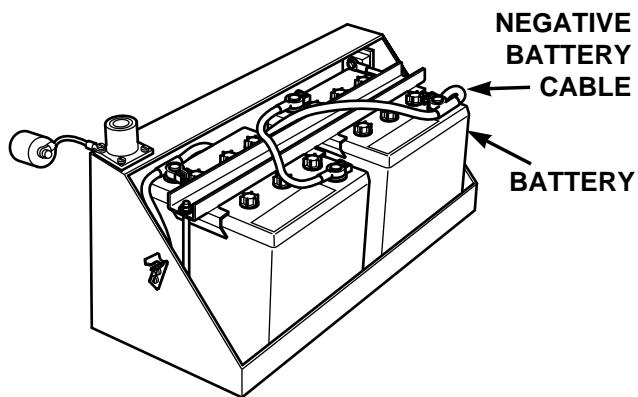
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to wire 9 where wire 9 connects to starter motor solenoid.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 20 of this fault.
  - (b) If 24 vdc is not present, service or replace battery cable (Para 8-44).
- (5) Disconnect negative battery cable (Para 8-44).



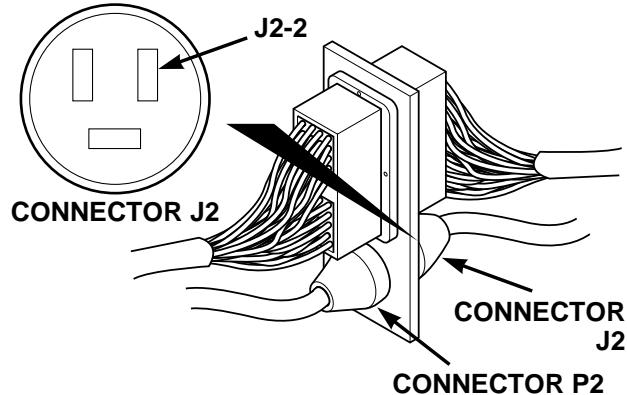
### **3. BACK-UP ALARM DOES NOT OPERATE (CONT.).**



<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive (+) lead to negative cable at battery.
(3)	Connect multimeter negative (-) lead to wire 2 at back of back-up alarm.
(a)	If continuity is present, replace back-up alarm (Para 8-39).
(b)	If continuity is not present, go to Step 15 of this fault.



<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Disconnect connector J2 from connector P2.
(3)	Connect multimeter positive (+) lead to connector J2-2.
(4)	Connect multimeter negative (-) lead to wire 2 where it connects to back-up alarm.
(a)	If continuity is present, go to Step 16 of this fault.
(b)	If continuity is not present, repair wire 2 or connector J2 (Para 8-48).

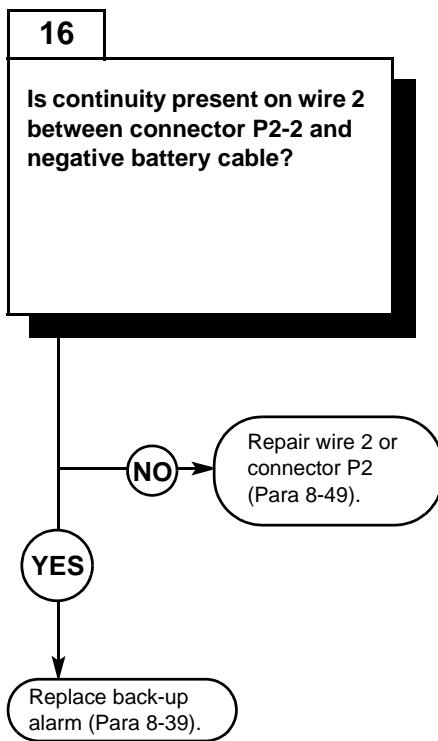


## 3. BACK-UP ALARM DOES NOT OPERATE (CONT.).

KNOWN INFO
Back-up alarm OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK. Wire 3 OK. Relay K1 OK. Circuit breaker CB6 OK. Wire 9 OK. Connector J2 OK.

POSSIBLE PROBLEMS
Connector P1 faulty. Connector J1 faulty. Connector J2 faulty. Connector P2 faulty. Wire 2 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R 91.

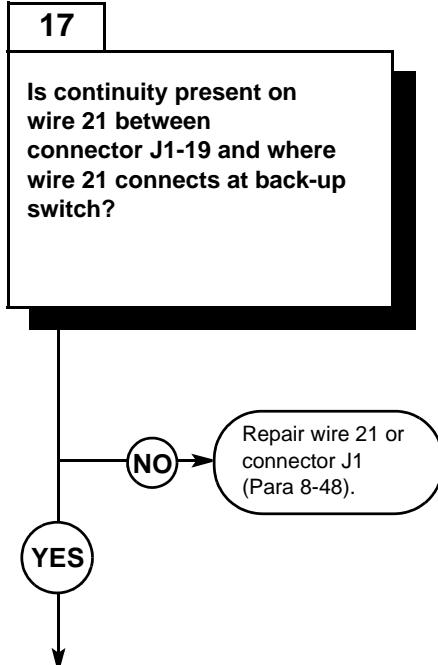
  

REASON FOR QUESTION
If continuity is not present, wire 2 or connector P2 faulty.

KNOWN INFO
Back-up alarm OK. Wire 21 OK. Back-up switch OK. Wire 20 OK. Circuit breaker CB2 OK. Wire 5 OK. Relay K2 OK. Wire 3 OK. Relay K1 OK. Circuit breaker CB6 OK. Wire 9 OK. Connector J2 OK. Connector P2 OK. Wire 2 OK.

POSSIBLE PROBLEMS
Connector J2 faulty. Connector P2 faulty. Wire 21 faulty.

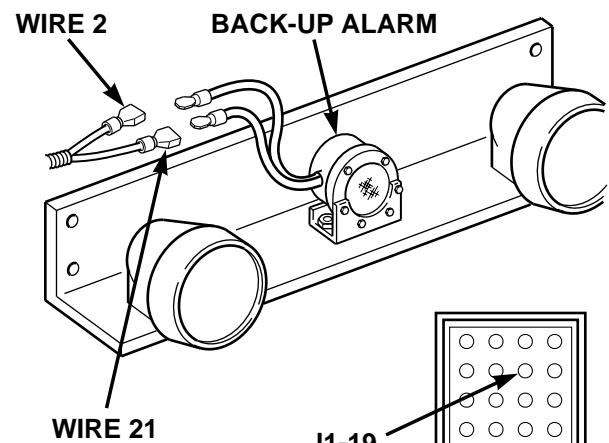
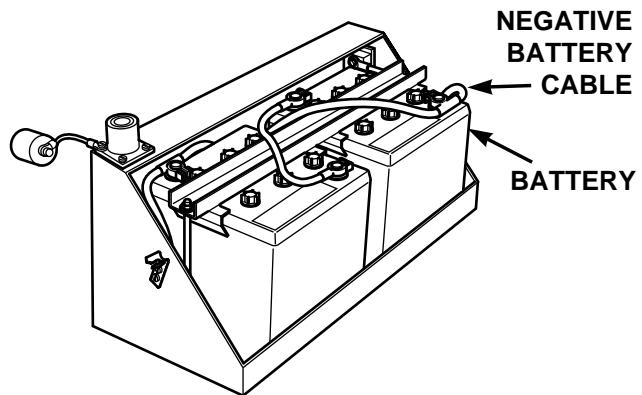


TEST OPTIONS
Continuity test. STE/ICE-R 91.

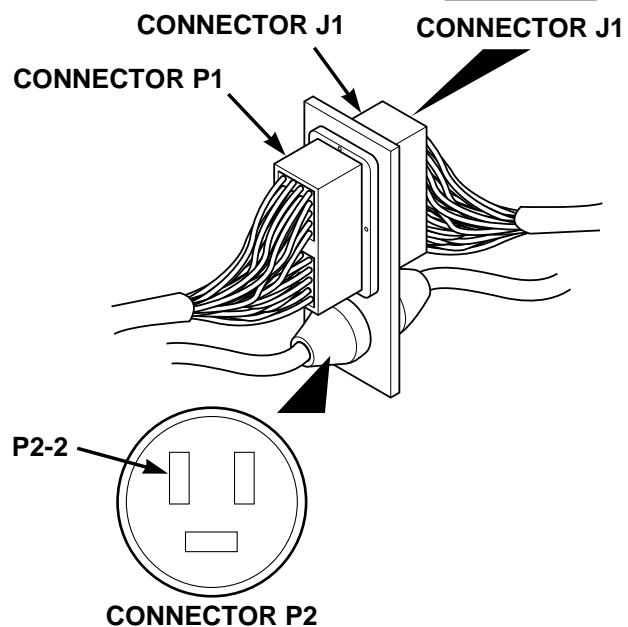
  

REASON FOR QUESTION
If continuity is not present, wire 21 or connector J1 faulty.

<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive (+) lead to negative battery cable.
(3)	Connect multimeter negative (-) lead to connector P2-2.
(a)	If continuity is present, replace back-up alarm (Para 8-39).
(b)	If continuity is not present, repair wire 2 or connector P2 (Para 8-49).
(4)	Connect connector J2 to connector P2.

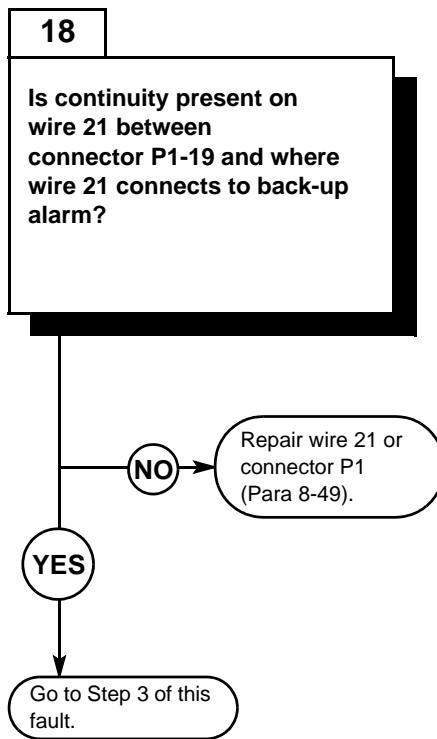


<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive (+) lead to connector J1-19.
(4)	Connect multimeter negative (-) lead to wire 21 where wire 21 connects to back-up switch.
(a)	If continuity is present, go to Step 18 of this fault.
(b)	If continuity is not present, repair wire 21 or connector J1 (Para 8-48).



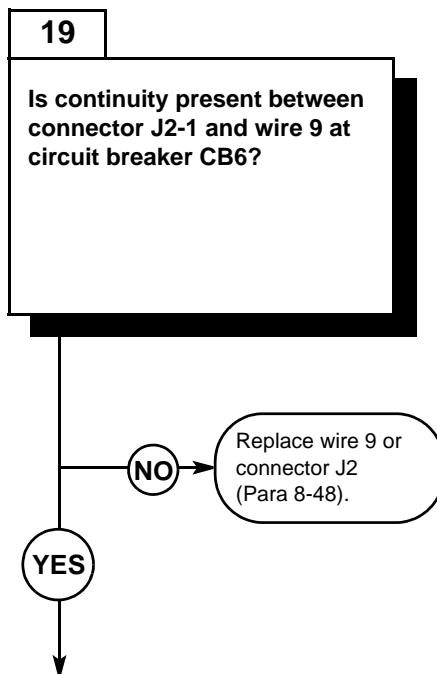
## 3. BACK-UP ALARM DOES NOT OPERATE (CONT.).

KNOWN INFO
Back-up alarm OK.
Wire 21 OK.
Back-up switch OK.
Wire 20 OK.
Circuit breaker CB2 OK.
Wire 5 OK.
Relay K2 OK.
Wire 3 OK.
Relay K1 OK.
Circuit breaker CB6 OK.
Wire 9 OK.
Connector J2 OK.
Connector P2 OK.
Wire 2 OK.
Connector J1 OK.
POSSIBLE PROBLEMS
Connector P1 faulty.
Wire 21 faulty.



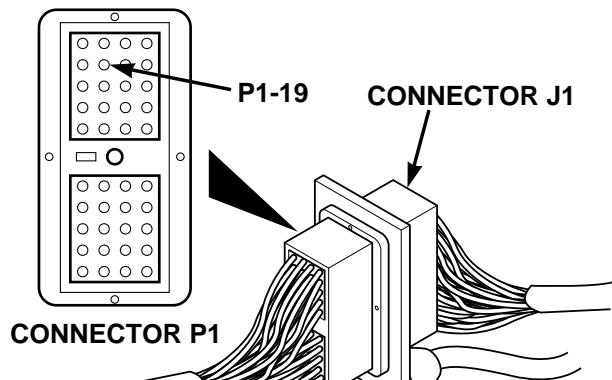
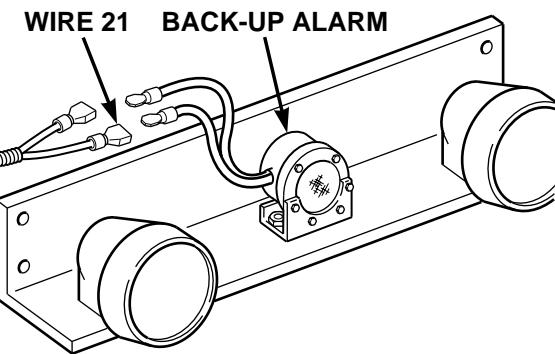
TEST OPTIONS
Continuity test.
STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 21 or connector P1 faulty.

KNOWN INFO
Back-up alarm OK.
Connector J1 OK
Wire 21 OK.
Back-up switch OK.
Wire 20 OK.
Circuit breaker CB2 OK.
Wire 5 OK.
Relay K2 OK.
Wire 3 OK.
Relay K1 OK.
Wire 1 OK.
Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Connector J2 faulty.
Connector P2 faulty.
Wire 9 faulty.



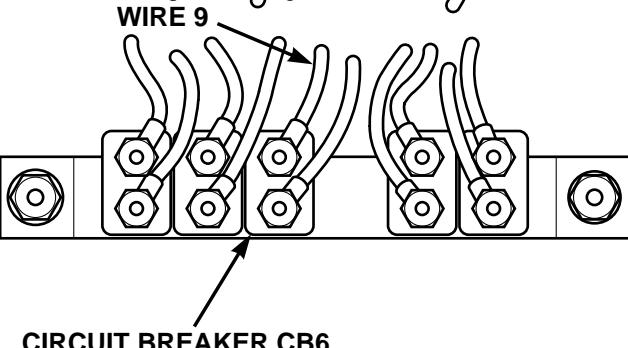
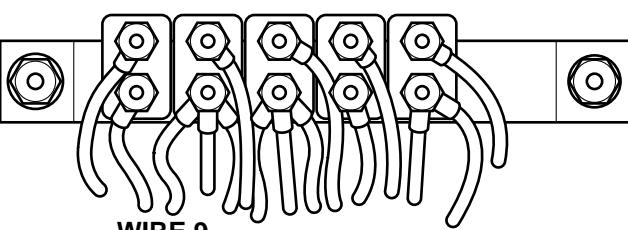
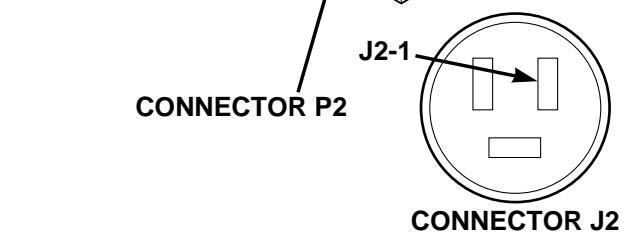
TEST OPTIONS
Continuity test.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector J2 faulty.

<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive (+) lead to connector P1-19.
(3)	Connect multimeter negative (-) lead to wire 21 where wire 21 connects at back-up alarm.
(a)	If continuity is present, go to Step 3 of this fault.
(b)	If continuity is not present, repair wire 21 or connector P1 (Para 8-49).
(4)	Connect connector J1 to connector P1.



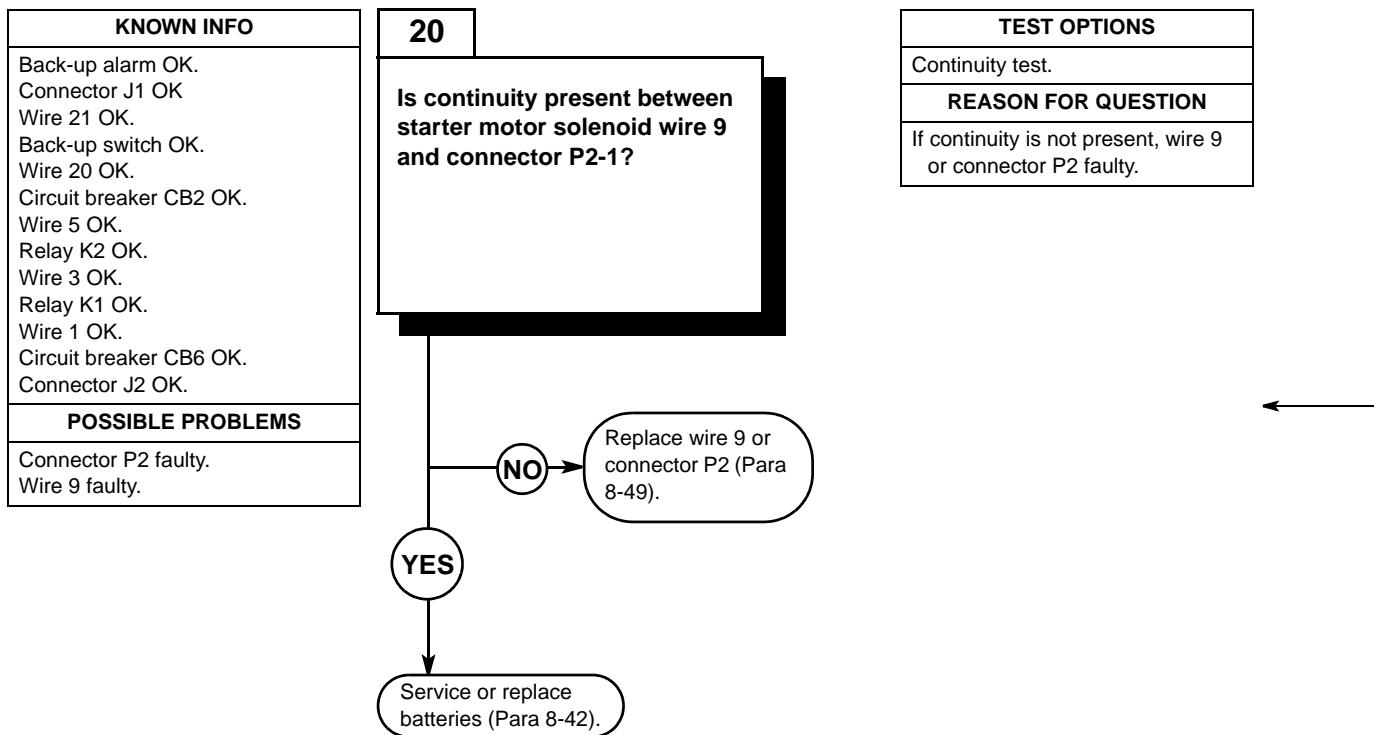
CONNECTOR P1

<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J2 from connector P2.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to connector J2-1.
(4)	Connect multimeter negative lead (-) to wire 9.
(a)	If continuity is present, go to Step 20 of this fault.
(b)	If continuity is not present, repair wire 9 or connector J2 (Para 8-48).
(5)	Install access panel and four screws to secure access panel.

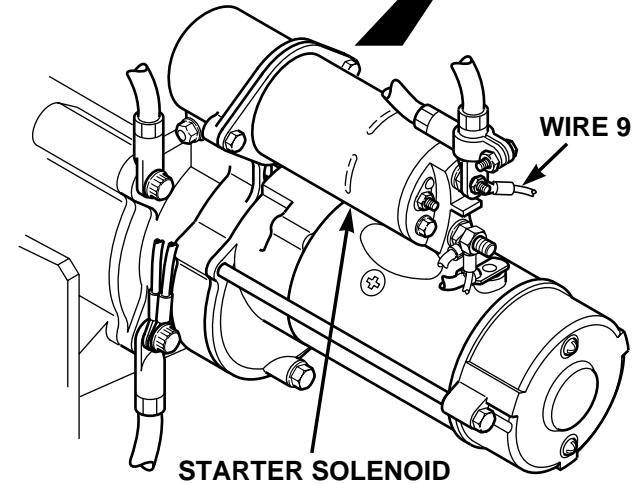
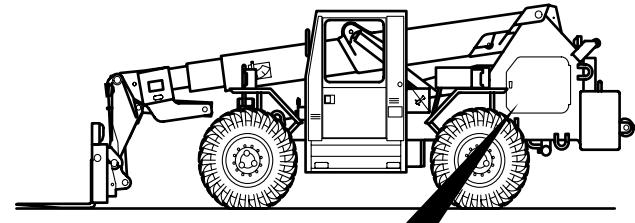
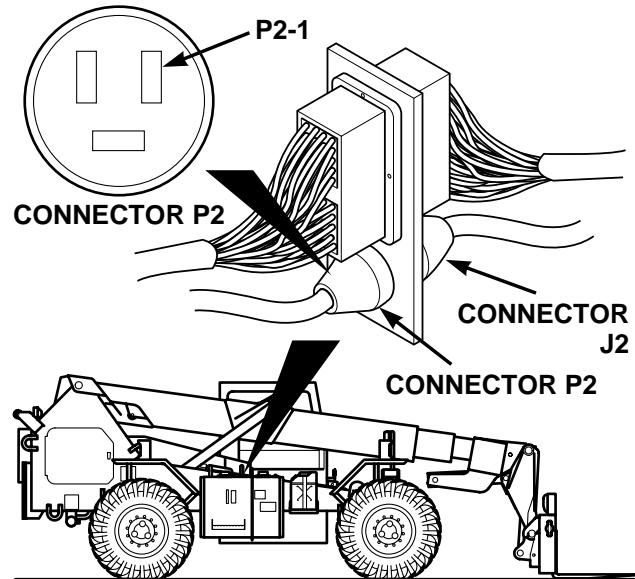


CIRCUIT BREAKER CB6

## 3. BACK-UP ALARM DOES NOT OPERATE (CONT).



<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive lead (+) to starter motor solenoid where wire 9 connects.
(3)	Connect multimeter negative lead (−) to connector P2-1.
(a)	If continuity is present, service or replace battery (Para 8-42).
(b)	If continuity is not present, repair wire 9 or connector P2 (Para 8-49).
(4)	Connect connector J2 to connector P2.
(5)	Install battery cover (Para 8-42).



**4. CAB DEFROSTER FAN(S) DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

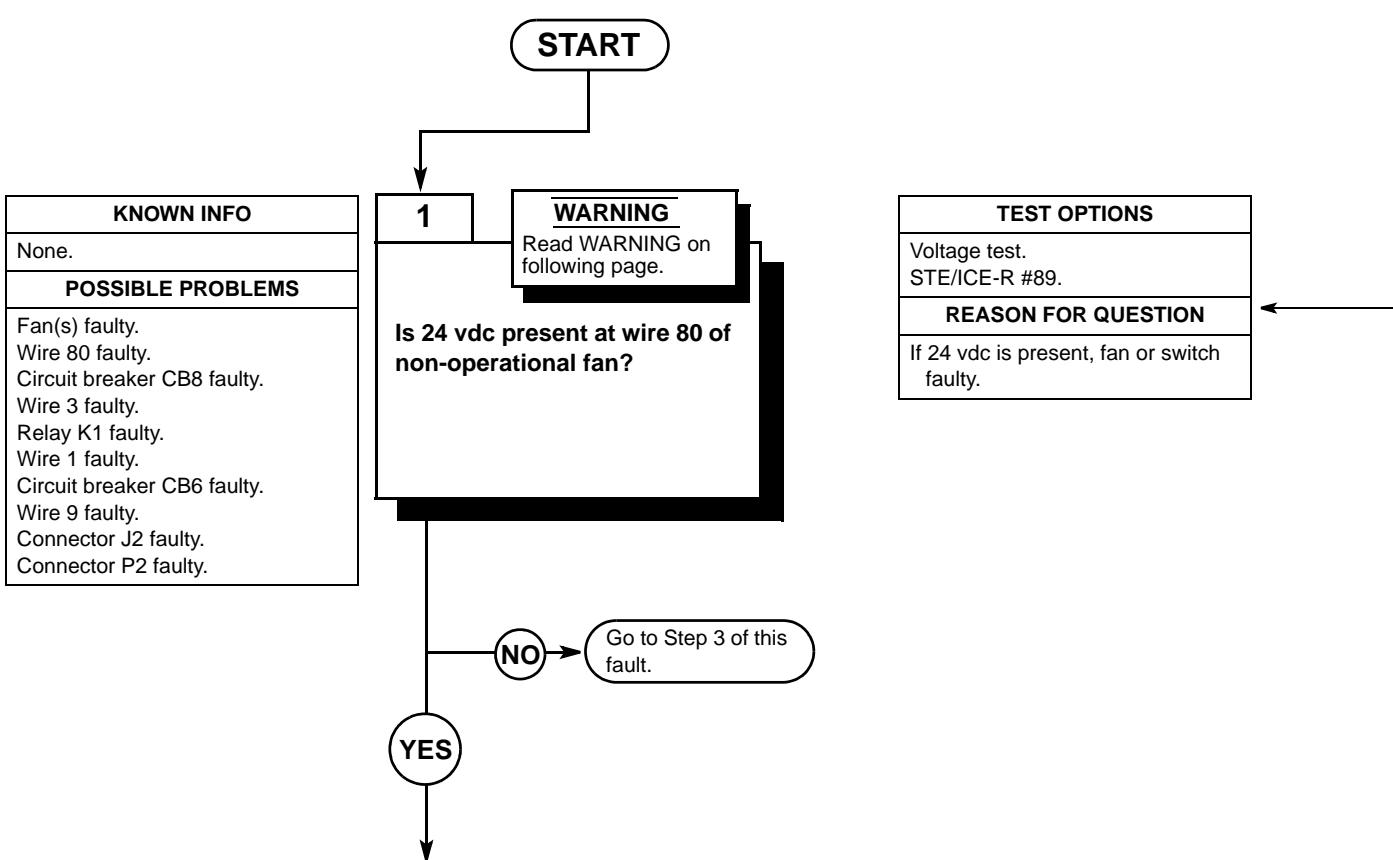
Two

*References*

TM 10-3930-673-10

*Equipment Condition*

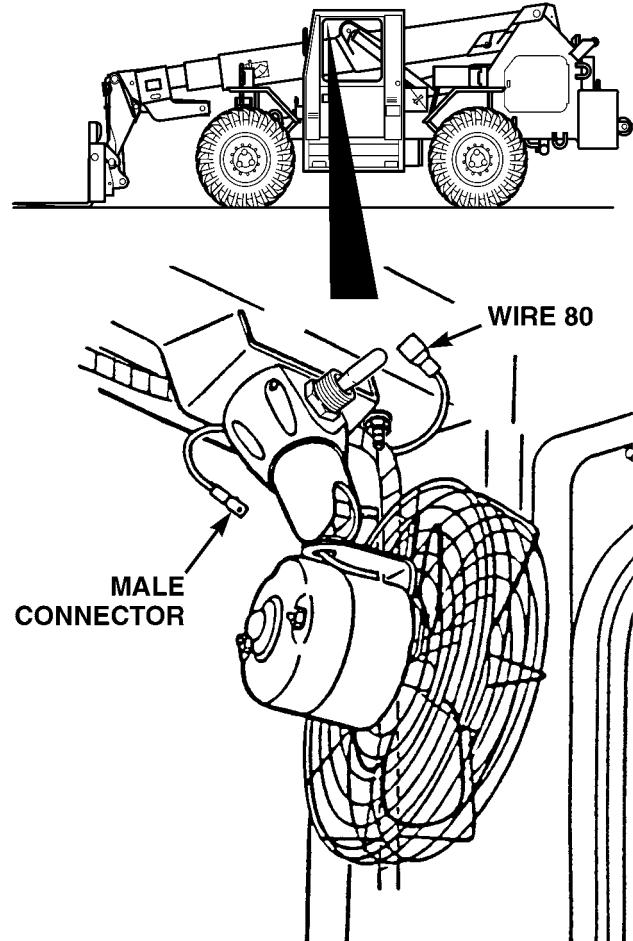
Engine shut down (TM 10-3930-673-10)  
 Auxiliary fuel shut-off switch OFF  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

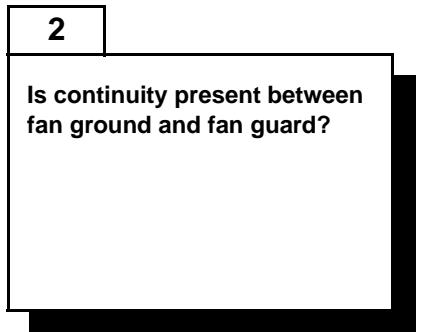
- Remove rings, bracelets, watches, necklace, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover(s) (Para 8-44).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(3)	Disconnect wire 80 female connector from male connector.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive (+) lead to wire 80 female end.
(6)	Connect multimeter negative (-) lead to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-44).
(8)	Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable (Para 8-44).



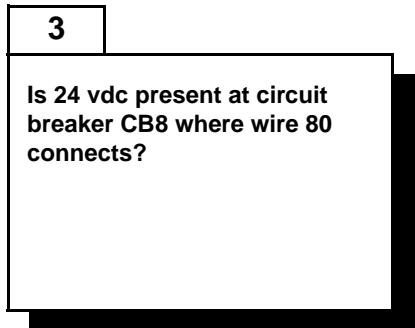
## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT.).

KNOWN INFO
None.
POSSIBLE PROBLEMS
Fan(s) faulty. Wire 80 faulty. Circuit breaker CB8 faulty. Wire 3 faulty. Relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, fan faulty.

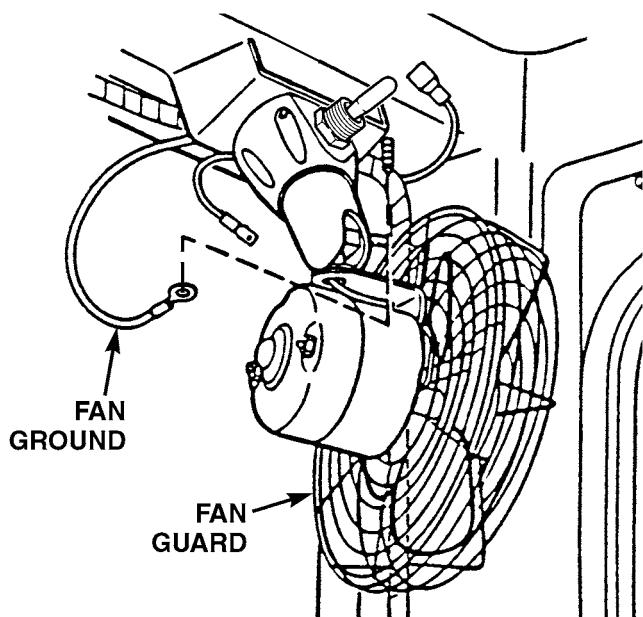
KNOWN INFO
Fan OK. Ground OK.
POSSIBLE PROBLEMS
Wire 80 faulty. Circuit breaker CB8 faulty. Wire 3 faulty. Relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



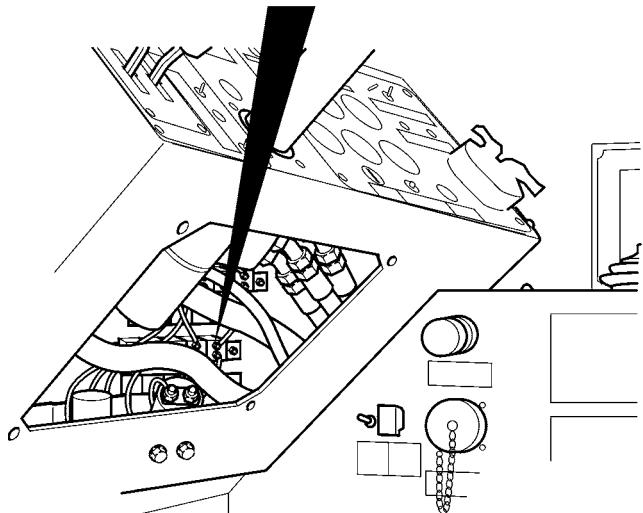
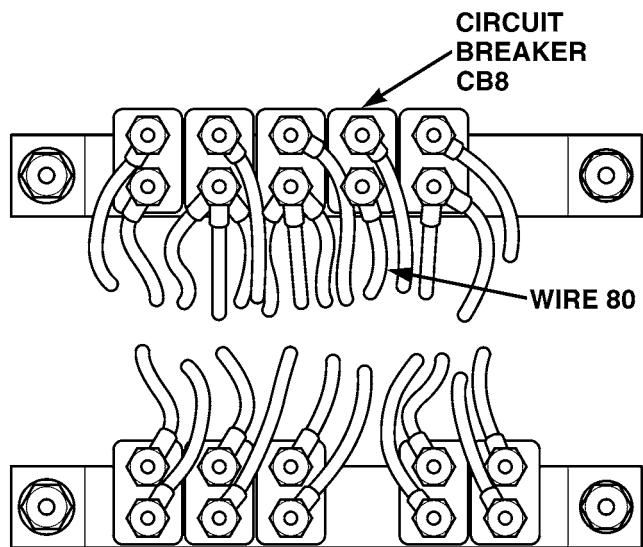
TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, wire 80 faulty.

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive (+) lead to fan ground.
- (3) Connect multimeter negative (-) lead to fan guard.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace faulty fan (Para 17-6).

**VOLTAGE TEST**

- (1) Remove four screws and access panel.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive (+) lead to circuit breaker CB8 where wire 80 connects.
- (4) Connect multimeter negative (-) lead to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
- (6) Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, repair wire 80 (Para 8-48).
  - (b) If 24 vdc is not present, go to Step 4 of this fault.
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable (Para 8-42).



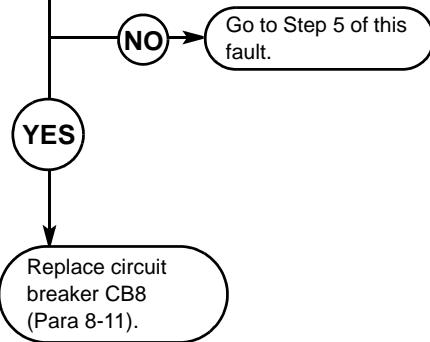
## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Fan OK. Ground OK. Wire 80 OK.
POSSIBLE PROBLEMS
Circuit breaker CB8 faulty. Wire 3 faulty. Relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**4**

Is 24 vdc present at circuit breaker CB8 where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, circuit breaker CB8 faulty.



←

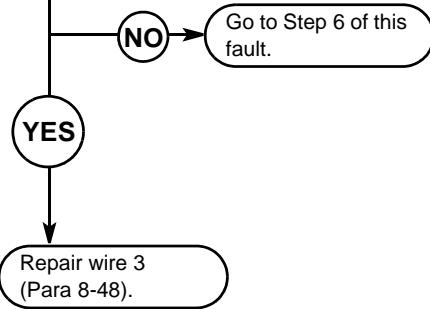
KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK.
POSSIBLE PROBLEMS

**5**

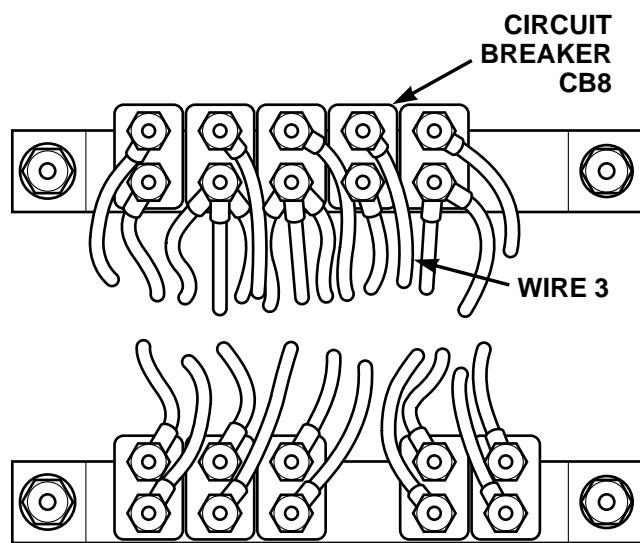
Is 24 vdc present at relay K1 (run relay) where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, wire 3 faulty.

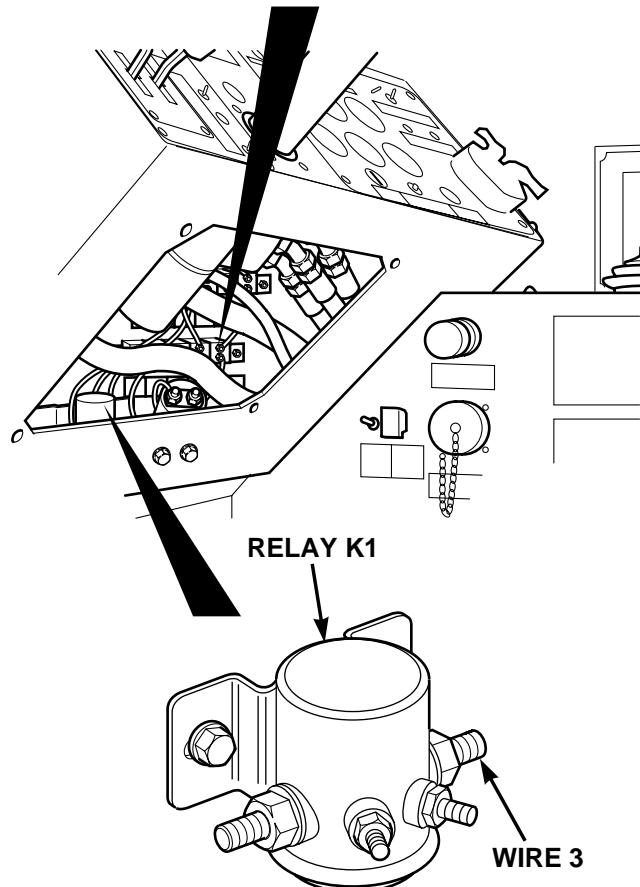
←



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to circuit breaker CB8 where wire 3 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, replace faulty circuit breaker CB8 (Para 8-11).
(b)	If 24 vdc is not present, go to Step 5 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable (Para 8-44).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive (+) lead to relay K1 where wire 3 connects.
(3)	Connect multimeter negative (-) lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch ON, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, repair wire 3 (Para 8-48).
(b)	If 24 vdc is not present, go to Step 6 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable (Para 8-44).



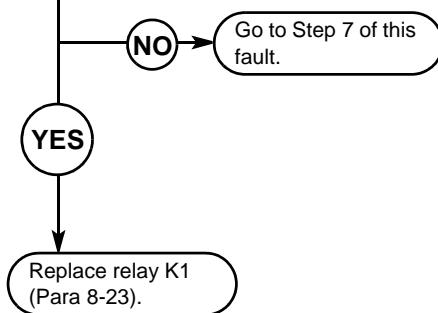
## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK.
POSSIBLE PROBLEMS
Relay K1 faulty. Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**6**

Is 24 vdc present at relay K1 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, relay K1 faulty.

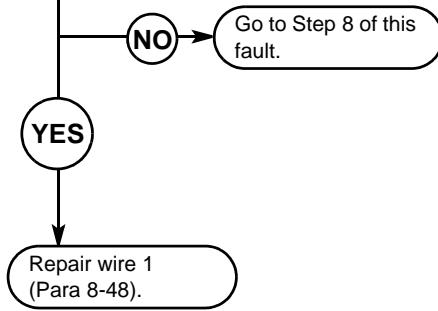


KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK. Relay K1 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**7**

Is 24 vdc present at circuit breaker CB6 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, wire 1 faulty.

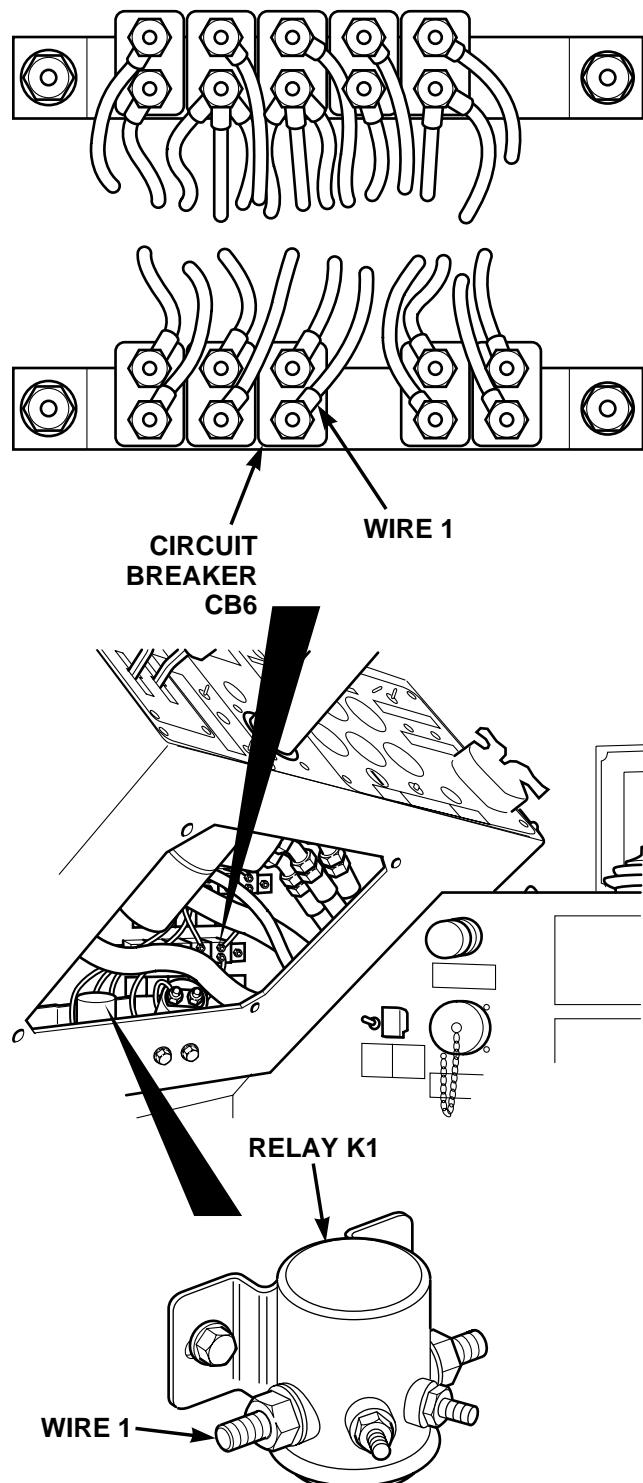


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to relay K1 where wire 1 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, replace relay K1 (Para 8-23).
  - (b) If 24 vdc is not present, go to Step 7 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to circuit breaker CB6 where wire 1 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, repair faulty wire 1 (Para 8-48).
  - (b) If 24 vdc is not present, go to Step 8 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).



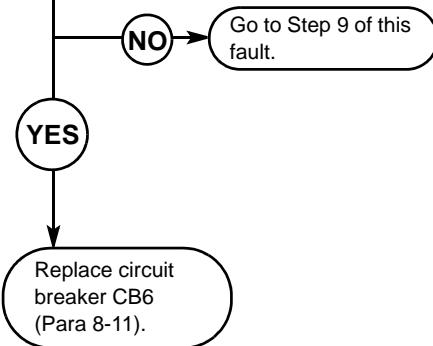
## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**8**

Is 24 vdc present at circuit breaker CB6 where wire 9 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is present, circuit breaker CB6 faulty.

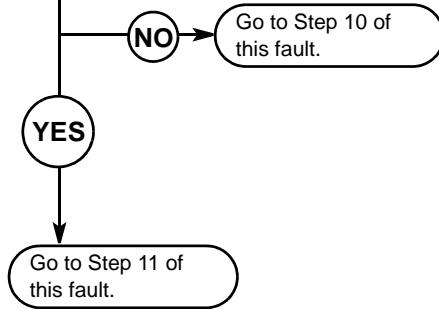


KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**9**

Is 24 vdc present at connector J2-1?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

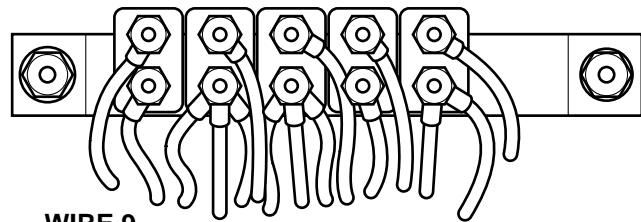
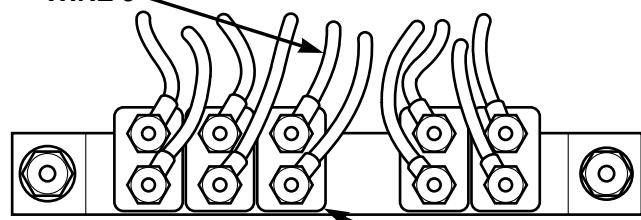
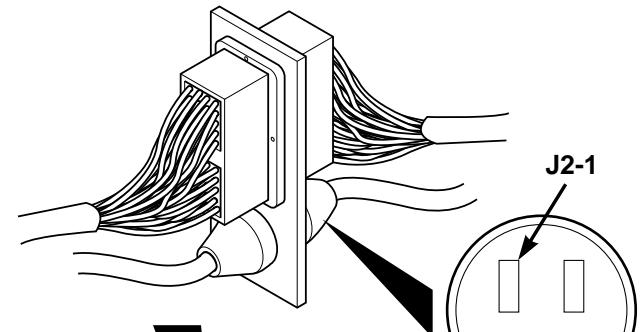
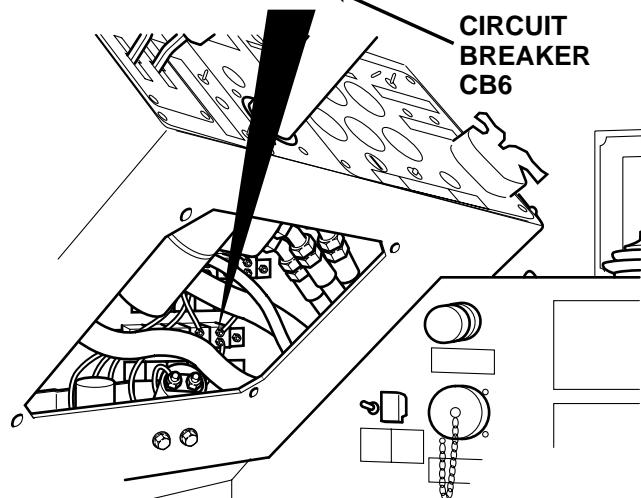
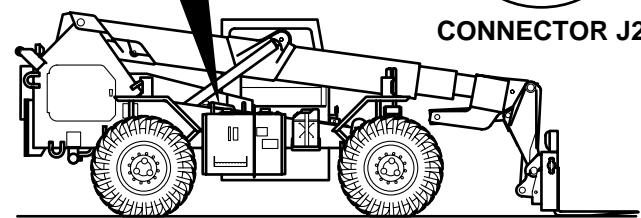


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to circuit breaker CB6 where wire 9 connects.
- (3) Connect multimeter negative (-) lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, replace circuit breaker CB6 (Para 8-11).
  - (b) If 24 vdc is not present, go to Step 9 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive (+) lead to connector J2-1.
- (3) Connect multimeter negative (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 11 of this fault.
  - (b) If 24 vdc is not present, go to Step 10 of this fault.
- (5) Disconnect negative battery cable (Para 8-44).

**WIRE 9****CIRCUIT BREAKER CB6****CONNECTOR J2**

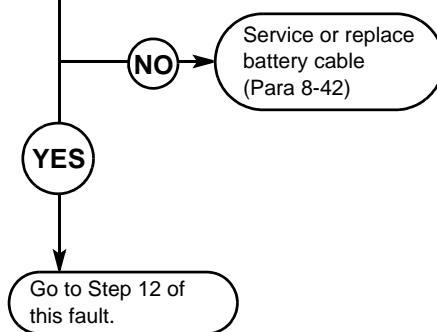
## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.

**10**

Is 24 vdc present at starter motor solenoid where wire 9 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.



←

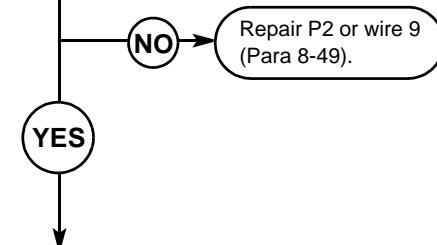
KNOWN INFO
Fan OK. Ground OK. Wire 80 OK. Circuit breaker CB8 OK. Wire 3 OK. Relay K1 OK. Wire 1 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector P2 faulty. Connector J2 faulty.

**11**

Is continuity present on wire 9 between connector P2-1 and wire 9, where wire 9 connects to starter motor solenoid?

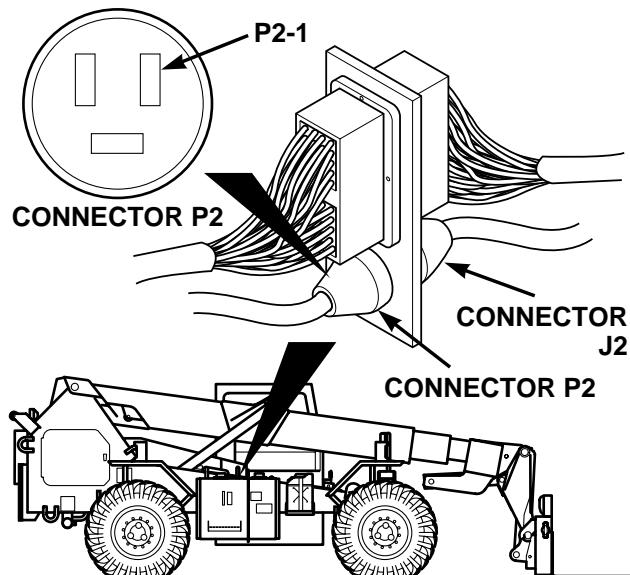
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector J2 faulty.

←

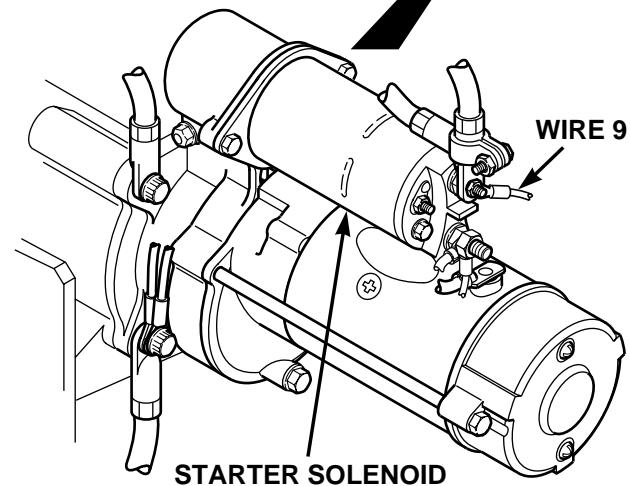
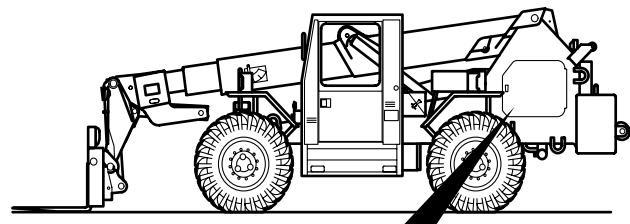


**VOLTAGE TEST**

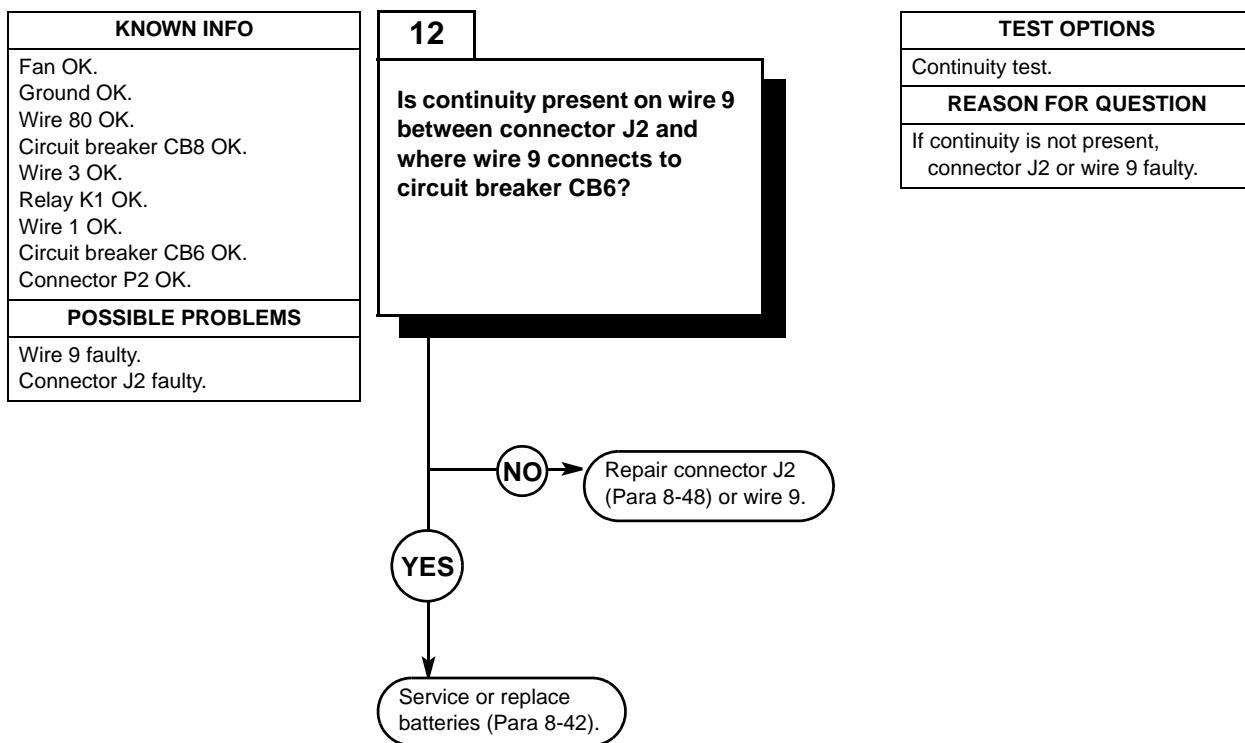
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead to starter motor solenoid where wire 9 connects.
- (3) Connect multimeter negative lead to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 12 of this fault.
  - (b) If 24 vdc is not present, service battery cable (Para 8-42).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).

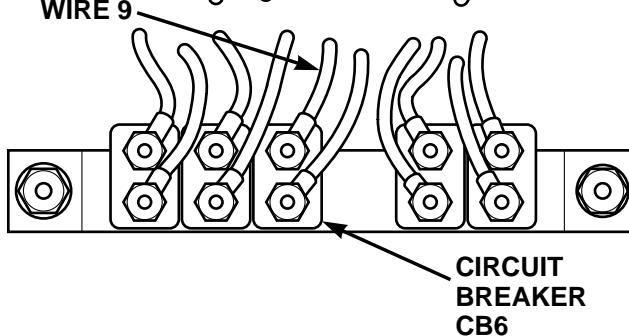
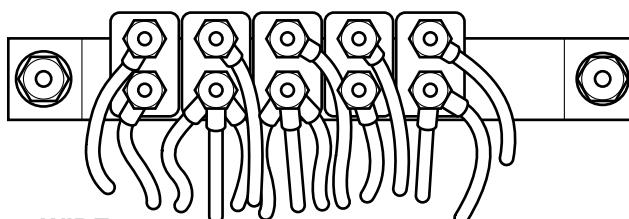
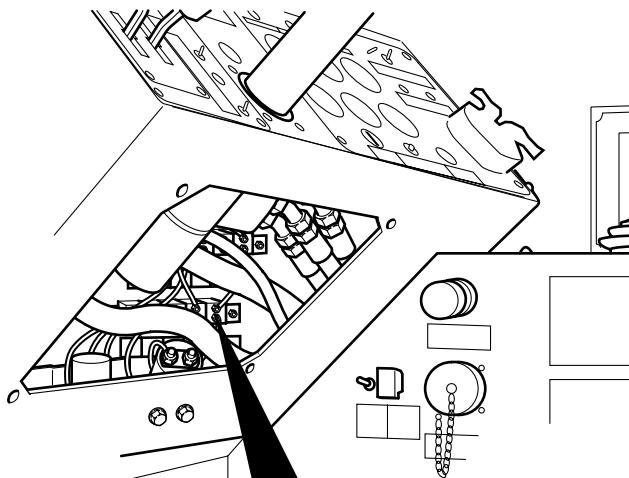
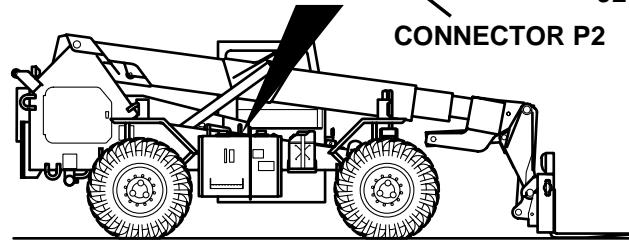
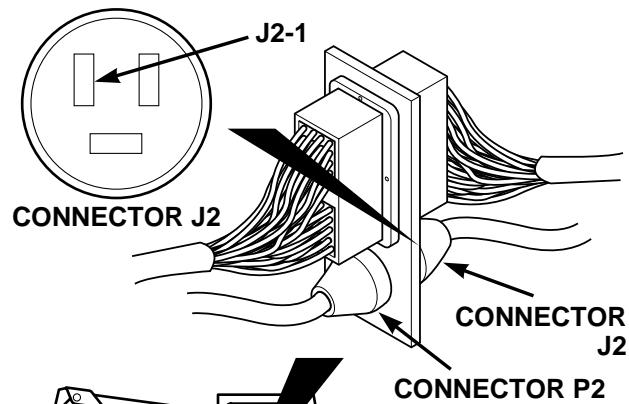
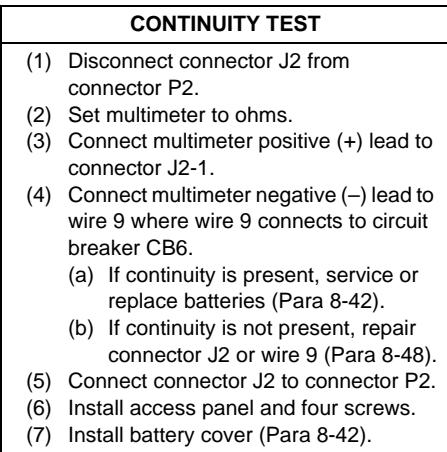
**CONTINUITY TEST**

- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive (+) lead to connector P2-1.
- (4) Connect multimeter negative (-) lead to wire 9 where it connects to starter motor solenoid.
  - (a) If continuity is present, go to Step 12 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).
- (5) Connect connector J2 to connector P2.



## 4. CAB DEFROSTER FAN(S) DO NOT OPERATE (CONT).





## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE.

### INITIAL SETUP

#### Tools and Special Tools

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

#### Personnel Required

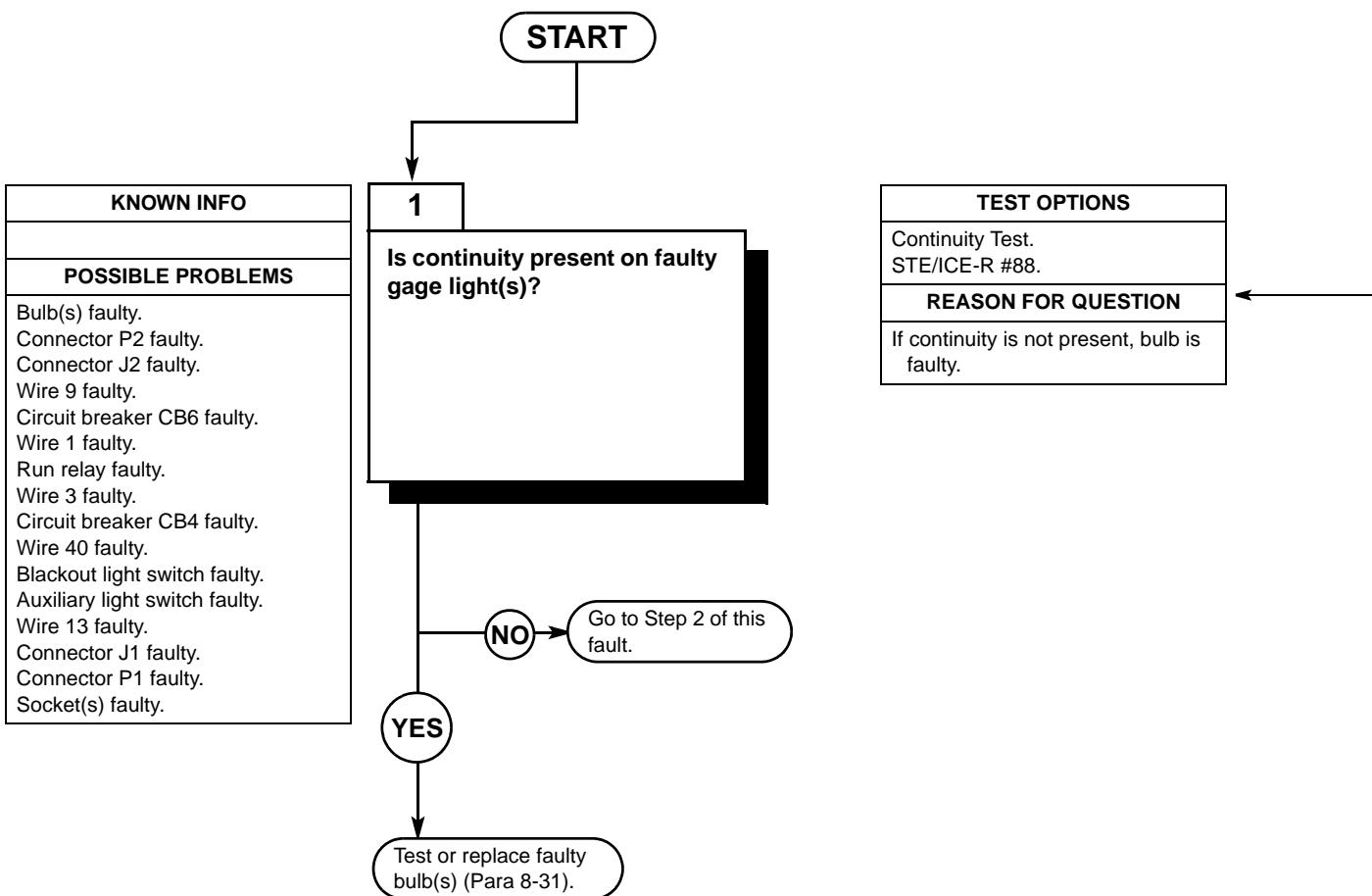
Two

#### References

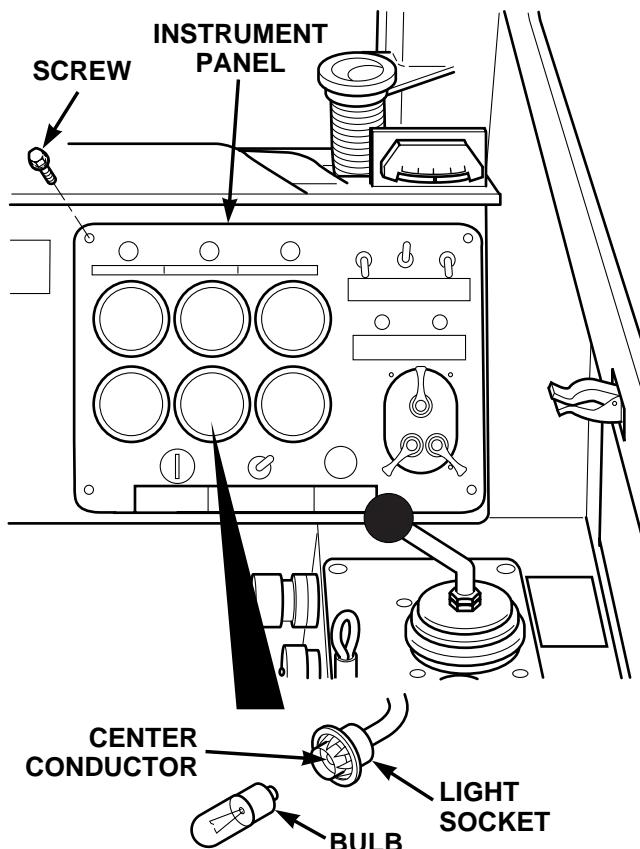
TM 10-3930-673-10  
 TM 9-4910-571-12&P

#### Equipment Condition

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

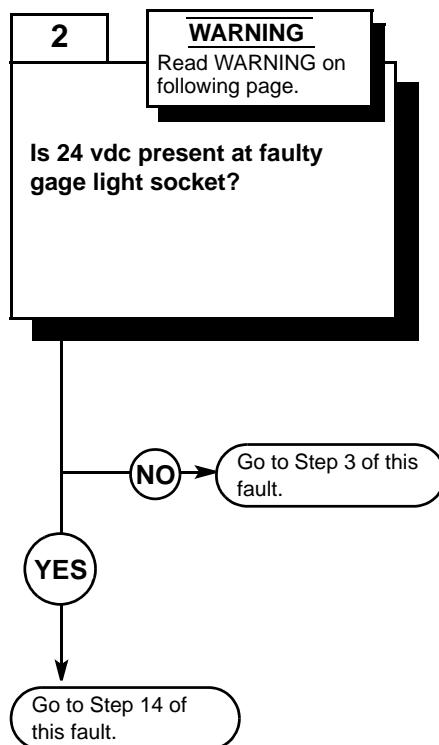


<b>CONTINUITY TEST</b>	
(1)	Remove four screws and instrument panel.
(2)	Raise instrument panel out to reach faulty bulb.
(3)	Remove bulb from faulty gage light (Para 8-6).
(4)	Set multimeter to ohms.
(5)	Connect multimeter positive lead (+) to center conductor.
(6)	Connect multimeter negative lead (-) to outside conductor ground.
(a)	If continuity is present, go to Step 2 of this fault.
(b)	If continuity is not present, replace the bulb (Para 8-6).



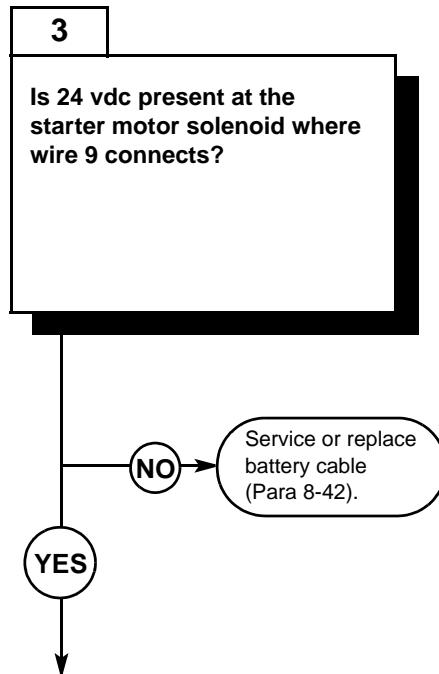
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



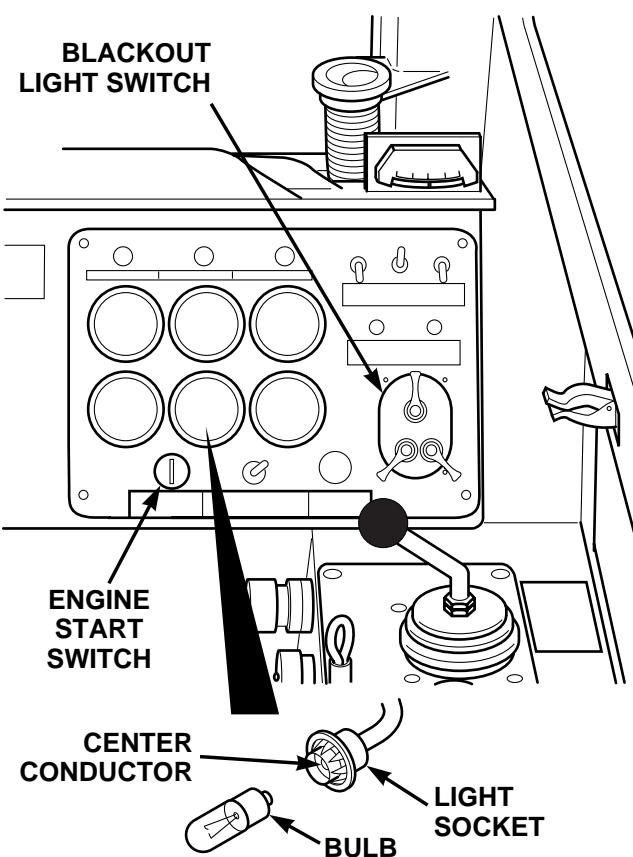
TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

**WARNING**

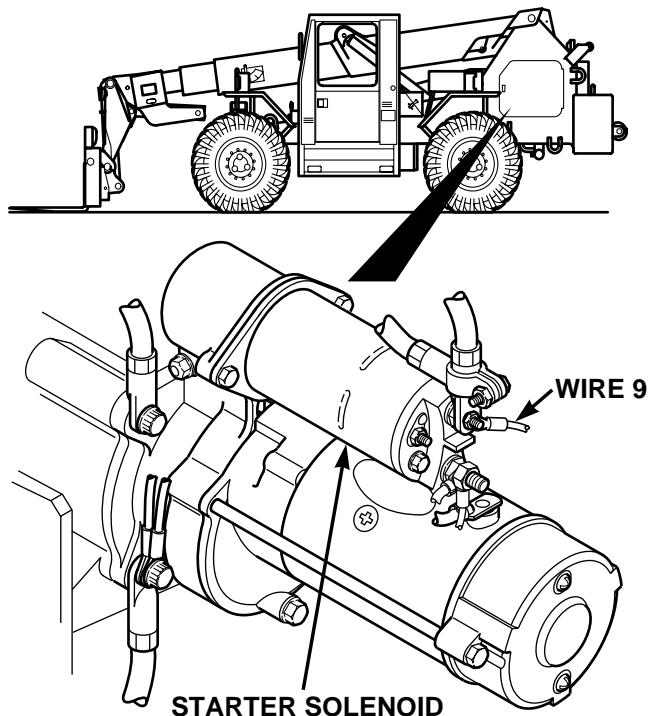
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

**VOLTAGE TEST**

- Set multimeter to volts dc.
- Connect multimeter positive lead (+) to center conductor of faulty socket.
- Connect multimeter negative lead (-) to known good ground.
- Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
  - If 24 vdc is present, go to Step 14 of this fault.
  - If 24 vdc is not present, go to Step 3 of this fault.
- Turn blackout light switch to OFF position (TM 10-3930-673-10).
- Turn engine start switch to OFF position (TM 10-3930-673-10).

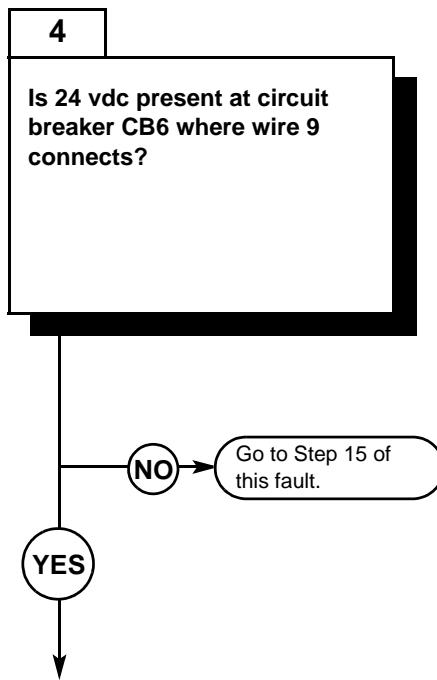
**VOLTAGE TEST**

- Remove battery covers (Para 8-42).
- Disconnect negative battery cable from negative side of battery (Para 8-44).
- Set multimeter to volts dc.
- Connect multimeter positive lead (+) to the starter motor solenoid where wire 9 connects.
- Connect multimeter negative lead (-) to known good ground.
- Connect negative battery cable to negative side of battery (Para 8-44).
  - If 24 vdc is present, go to Step 4 of this fault.
  - If 24 vdc is not present, service or replace battery cable (Para 8-42).
- Disconnect negative battery cable from negative side of battery (Para 8-44).



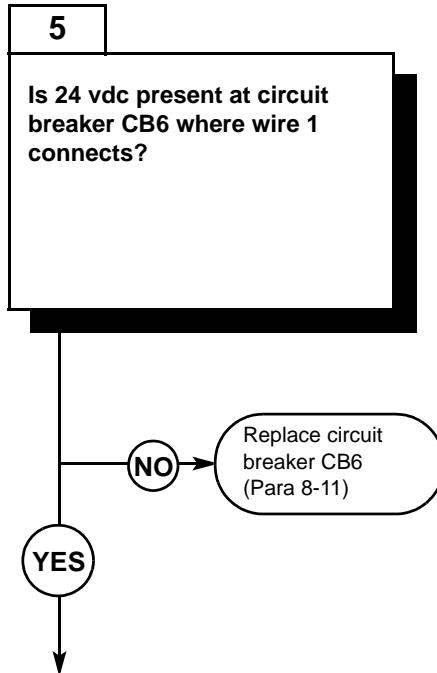
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

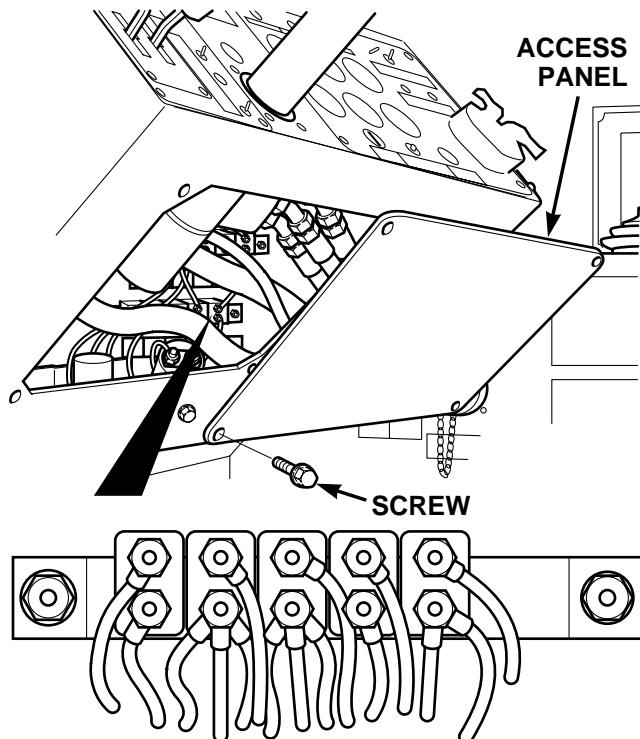
KNOWN INFO
Bulb(s) OK.
Connector P2 OK.
Connector J2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



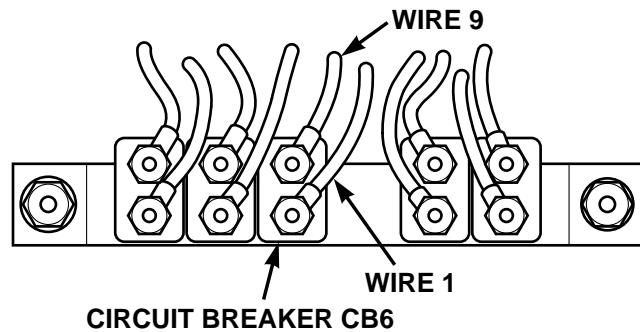
TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 is faulty.

**VOLTAGE TEST**

- (1) Remove four screws and access panel.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 5 of this fault.
  - (b) If 24 vdc is not present, go to Step 15 of this fault.
- (6) Disconnect negative battery cable from negative side of battery (Para 8-44).

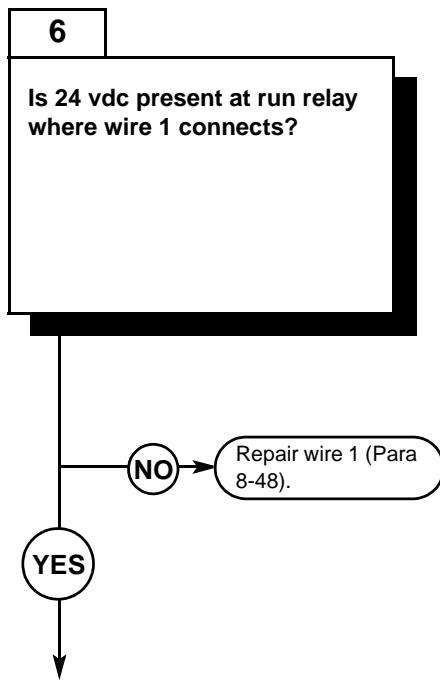
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect the multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to a known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 6 of this fault.
  - (b) If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).

**CIRCUIT BREAKER CB6**

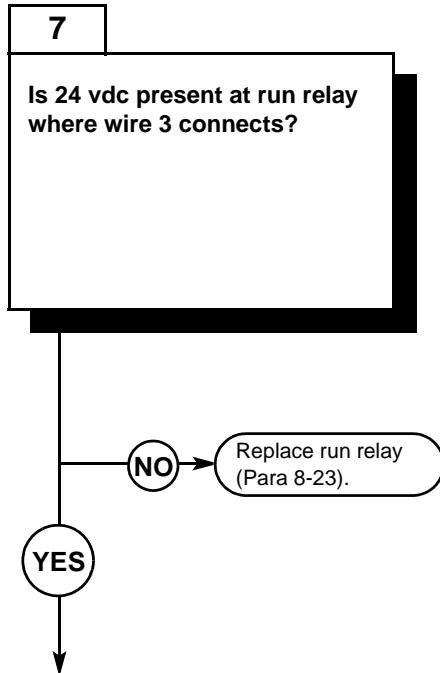
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, wire 1 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



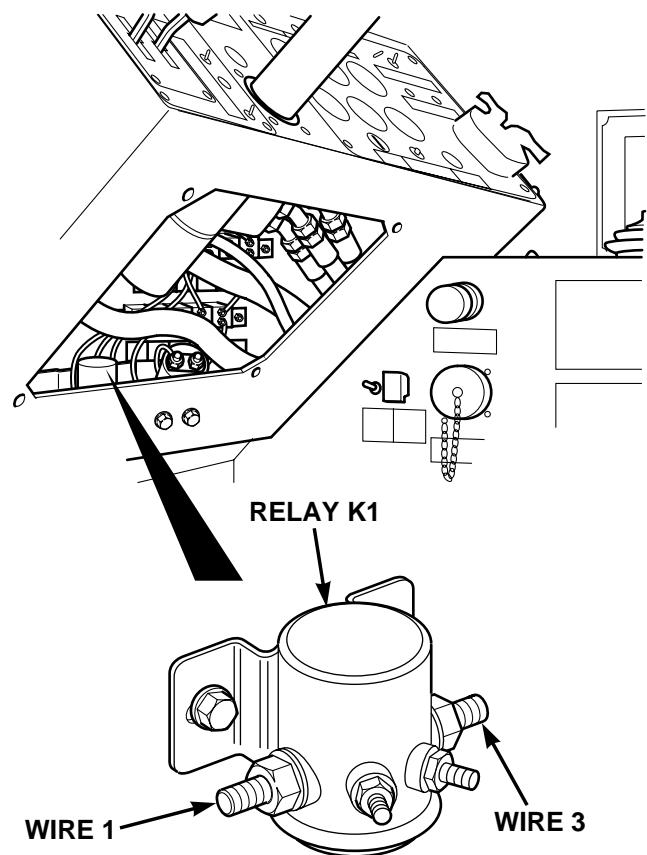
TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, run relay is faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to the run relay where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE
- (6) (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable from negative side of battery (Para 8-44).



## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

**8**

Is 24 vdc present at circuit breaker CB4 where wire 3 connects?

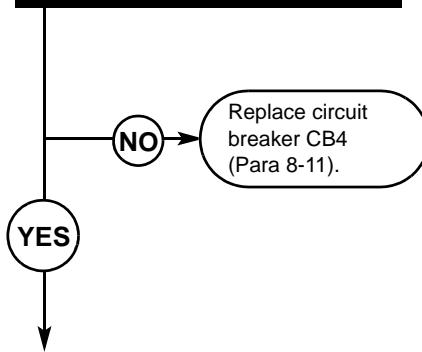


TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, wire 3 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Auxiliary light switch faulty. Wire 13 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

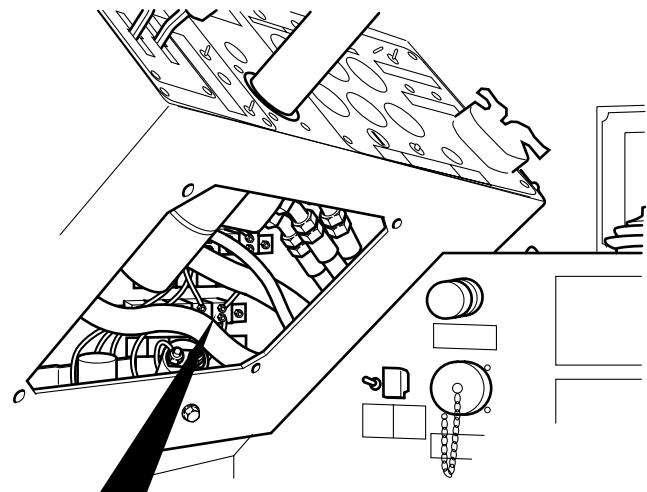
**9**

Is 24 vdc present at circuit breaker CB4 where wire 40 connects?

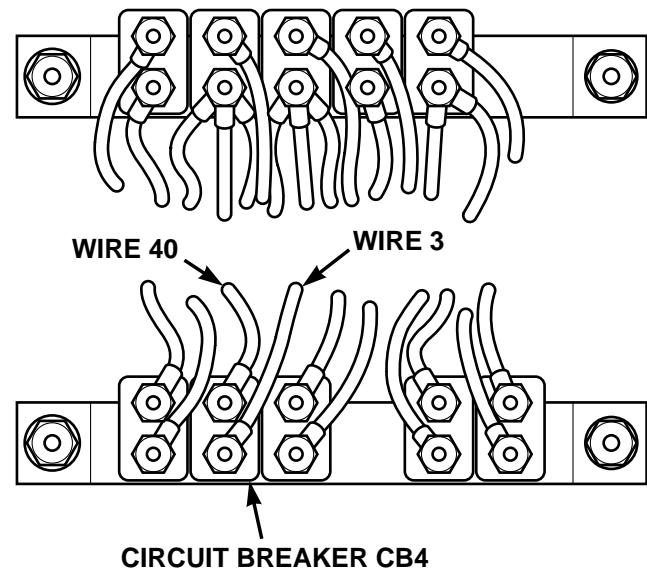


TEST OPTIONS
Voltage Test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 is faulty.

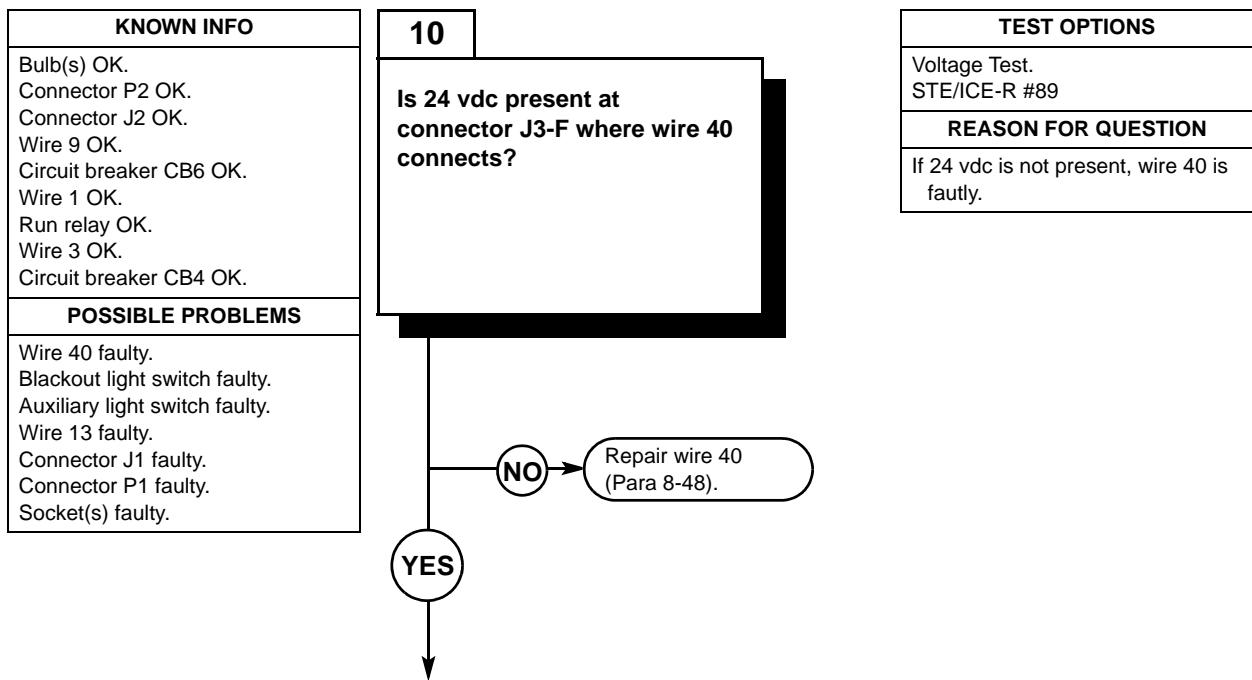
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (para 8-44).

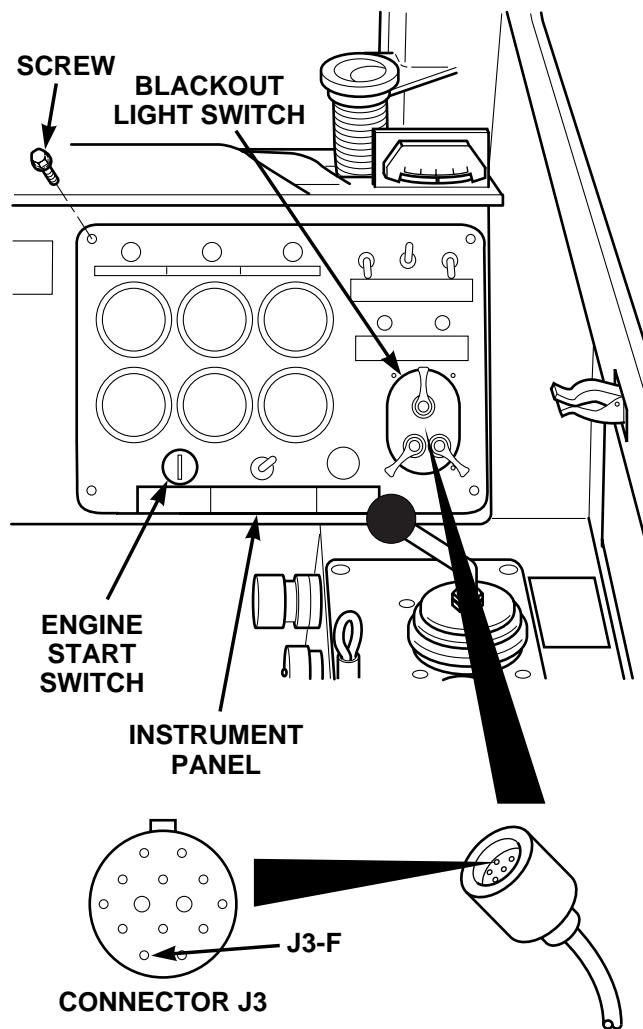
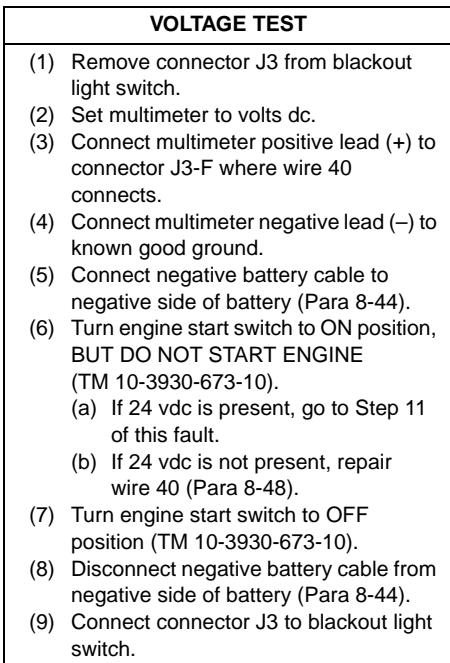


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (para 8-44).

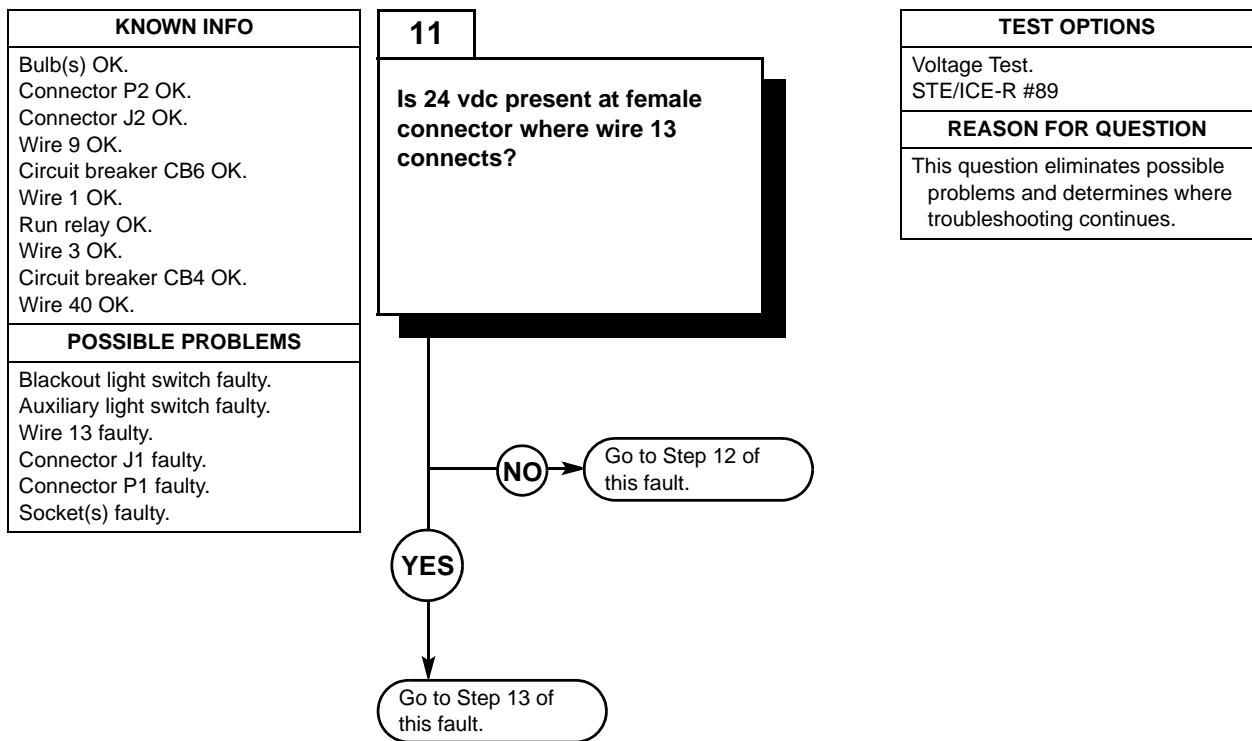


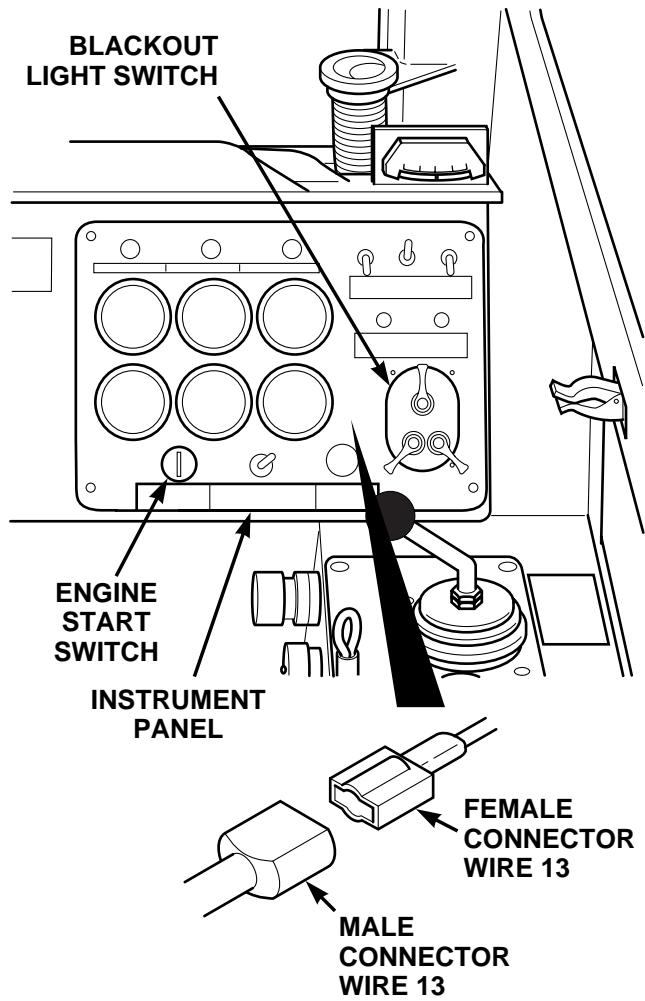
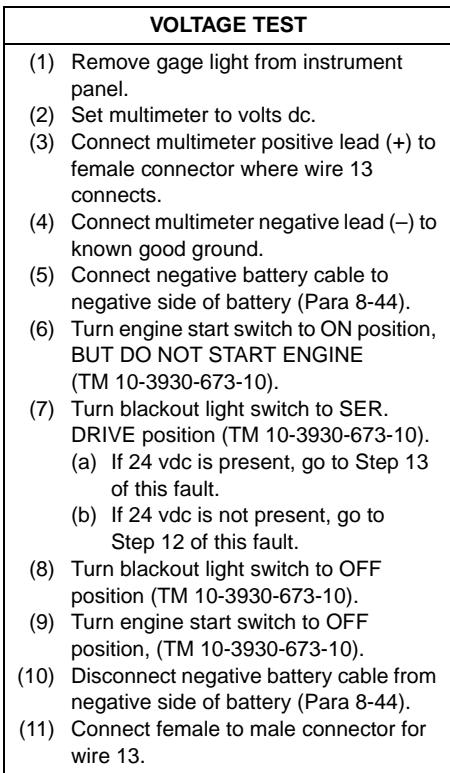
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).





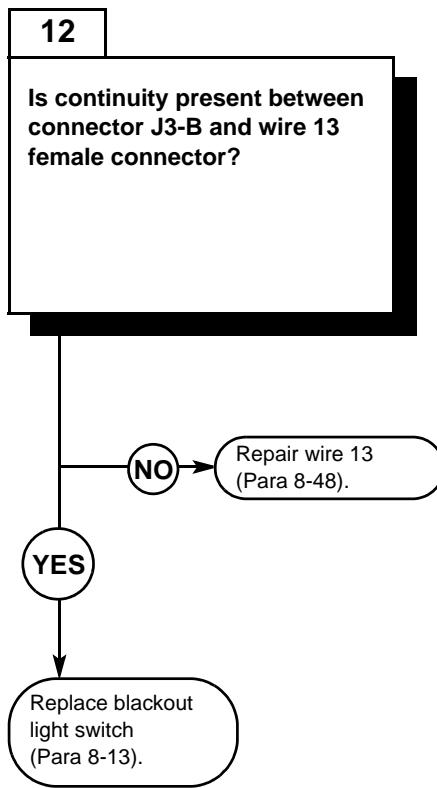
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).





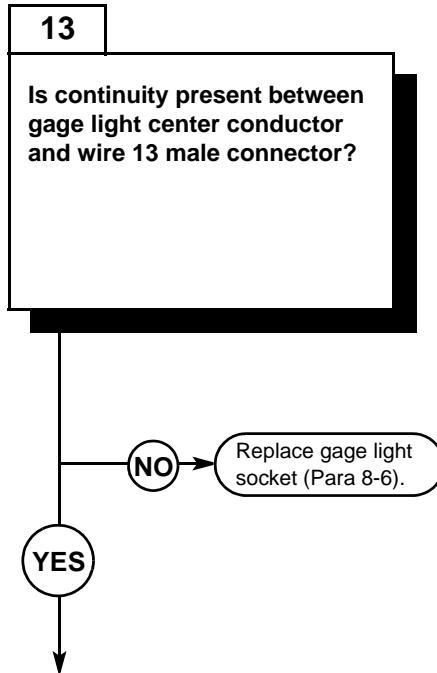
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Connector J1 OK.
Connector P1 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty.
Auxiliary light switch faulty.
Wire 13 faulty.
Socket(s) faulty.



TEST OPTIONS
Continuity Test. STE/ICE-R #88
REASON FOR QUESTION
If continuity is not present, blackout control switch or wire 13 are faulty.

KNOWN INFO
Bulb(s) OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Auxiliary light switch OK.
Wire 13 OK.
Connector J1 OK.
Connector P1 OK.
POSSIBLE PROBLEMS
Socket(s) faulty.



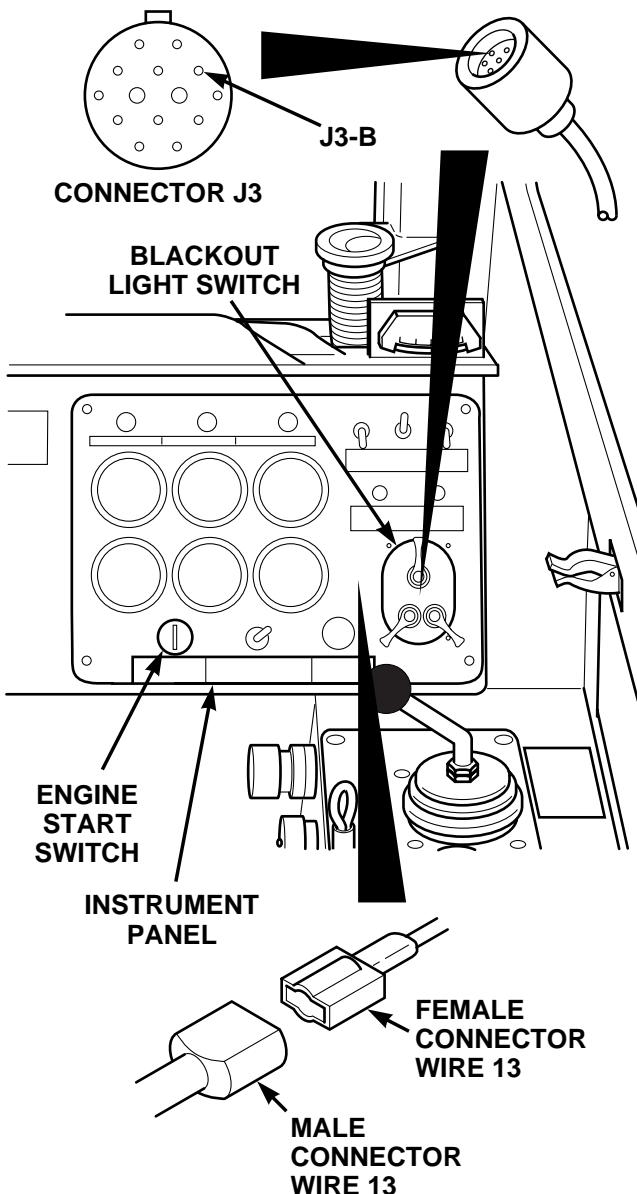
TEST OPTIONS
Continuity Test. STE/ICE-R #88
REASON FOR QUESTION
If continuity is not present, gage light socket is faulty.

**CONTINUITY TEST**

- (1) Remove connector J3 from blackout light switch.
- (2) Disconnect female from male connector on wire 13.
- (3) Set multimeter to ohms.
- (4) Connect multimeter positive lead (+) to connector J3-B where wire 13 connects.
- (5) Connect multimeter negative lead (-) to female connector of wire 13.
  - (a) If continuity is present, replace blackout light switch (Para 8-13).
  - (b) If continuity is not present, repair wire 13 (Para 8-48).
- (6) Connect connector J3 to blackout light switch.
- (7) Connect female to male connector of wire 13.

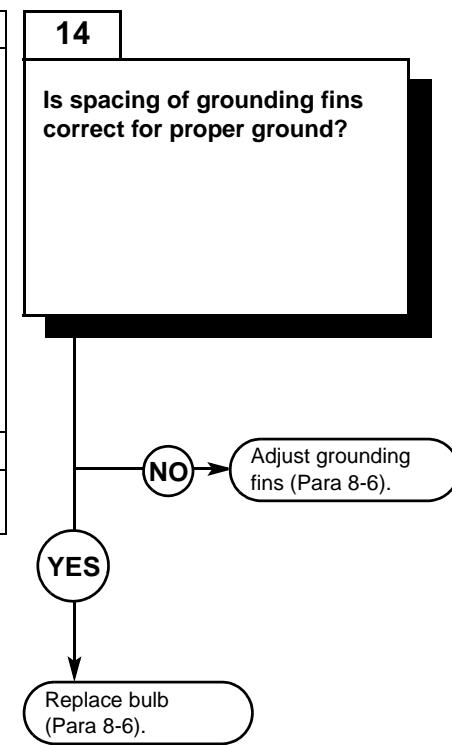
**CONTINUITY TEST**

- (1) Disconnect female from male connector on wire 13.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to socket center conductor where wire 13 connects.
- (4) Connect multimeter negative lead (-) to male connector of wire 13.
  - (a) If continuity is present, go to Step 14 of this fault.
  - (b) If continuity is not present, replace gage light socket (Para 8-6).
- (5) Connect female to male connector of wire 13.



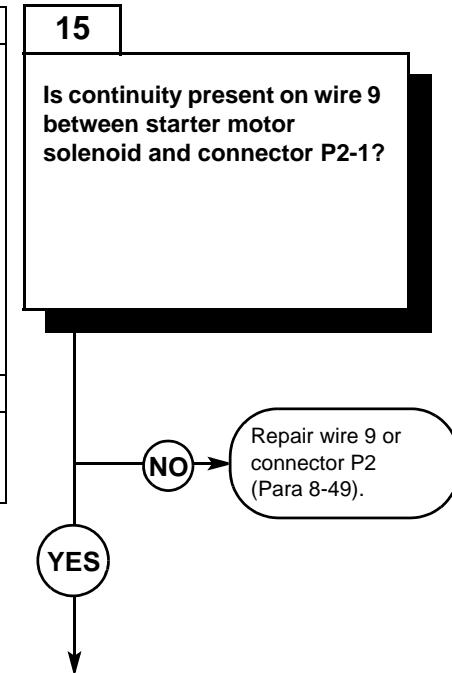
## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 13 OK. Connector J1 OK. Connector P1 OK.



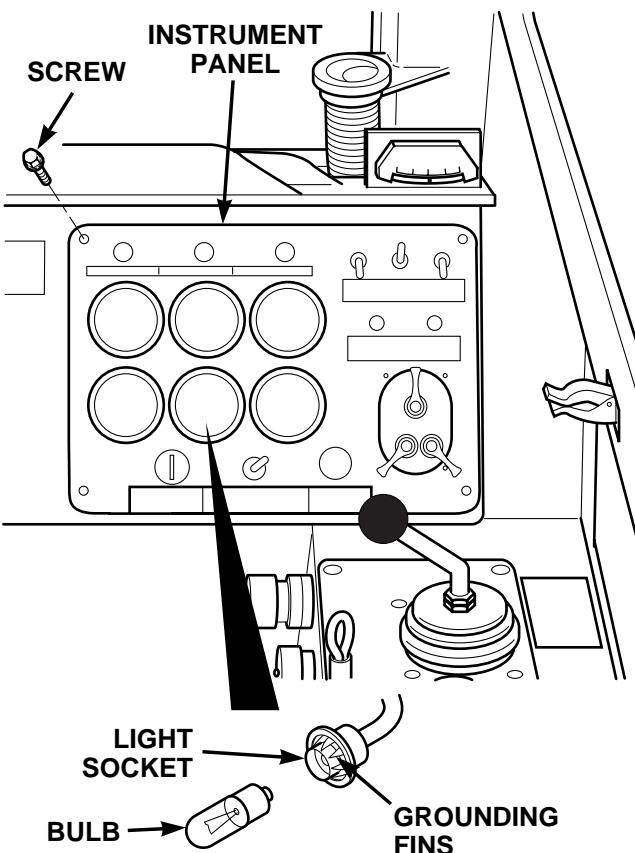
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If grounding fins are not evenly spread out and applying pressure to side of gage, adjust for proper fit for ground.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 13 OK. Socket(s) OK.

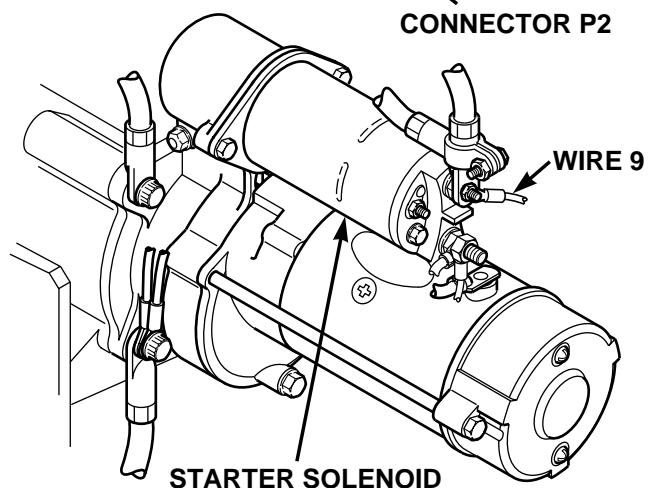
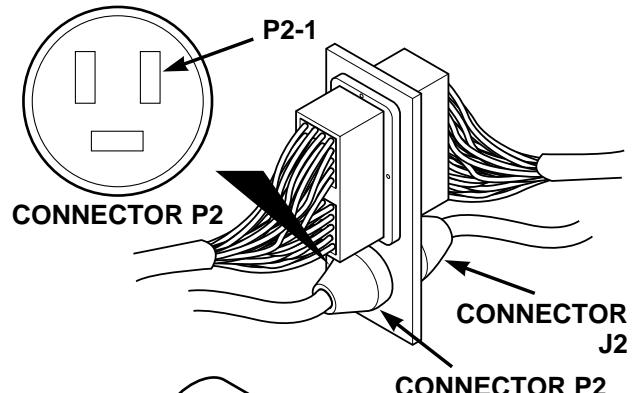


TEST OPTIONS
Continuity Test. STE/ICE-R #88
REASON FOR QUESTION
If continuity is not present, wire 9 or connector P2 are faulty.

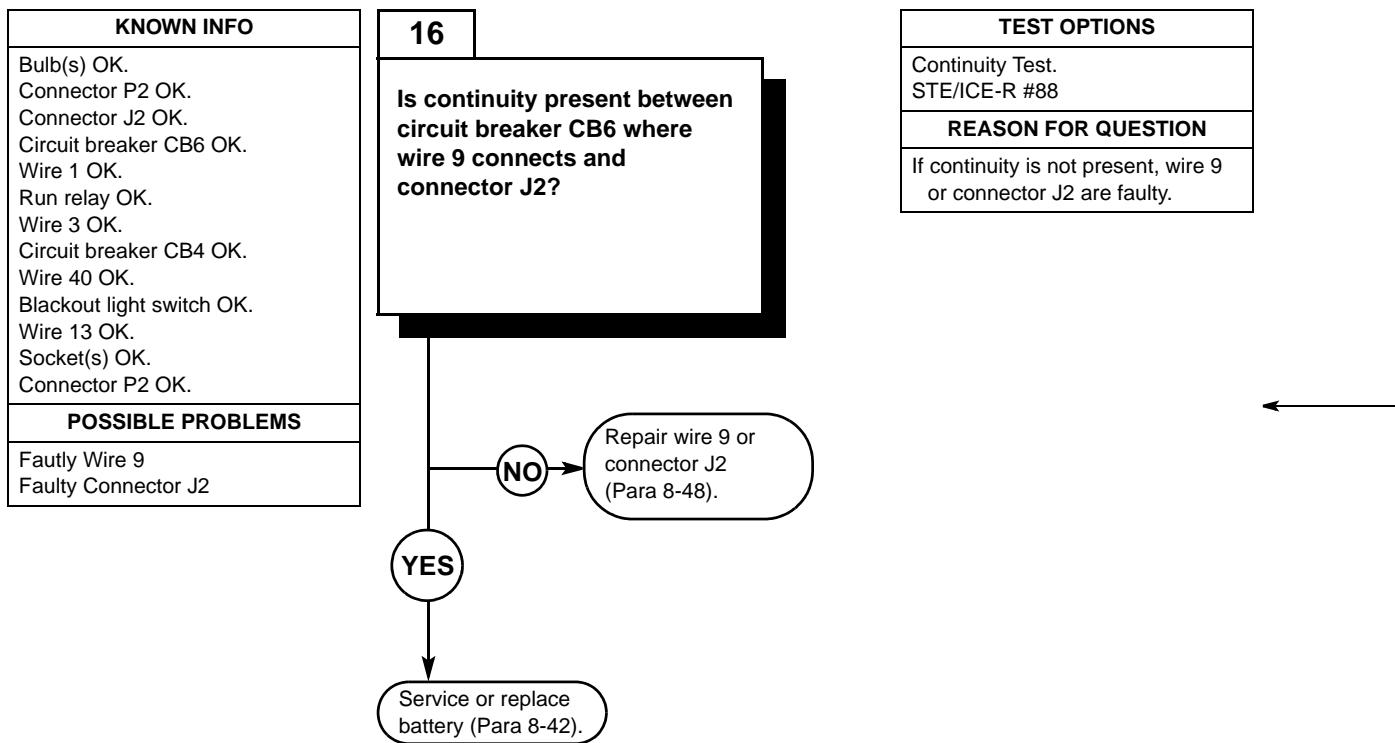
<b>VISUAL INSPECTION</b>	
(1)	Lift instrument panel out to remove gage light from gage.
(a)	If grounding fins fit properly, replace bulb (Para 8-6).
(b)	If grounding fins are not fitting properly, adjust by performing Steps (2) and (3) below.
(2)	Remove bulb from socket.
(3)	Use small common screwdriver to adjust ground fins inward or outward for proper fit.
(4)	Connect female to male connector.
(5)	Install gage light into gage.
(6)	Install instrument panel and four screws.

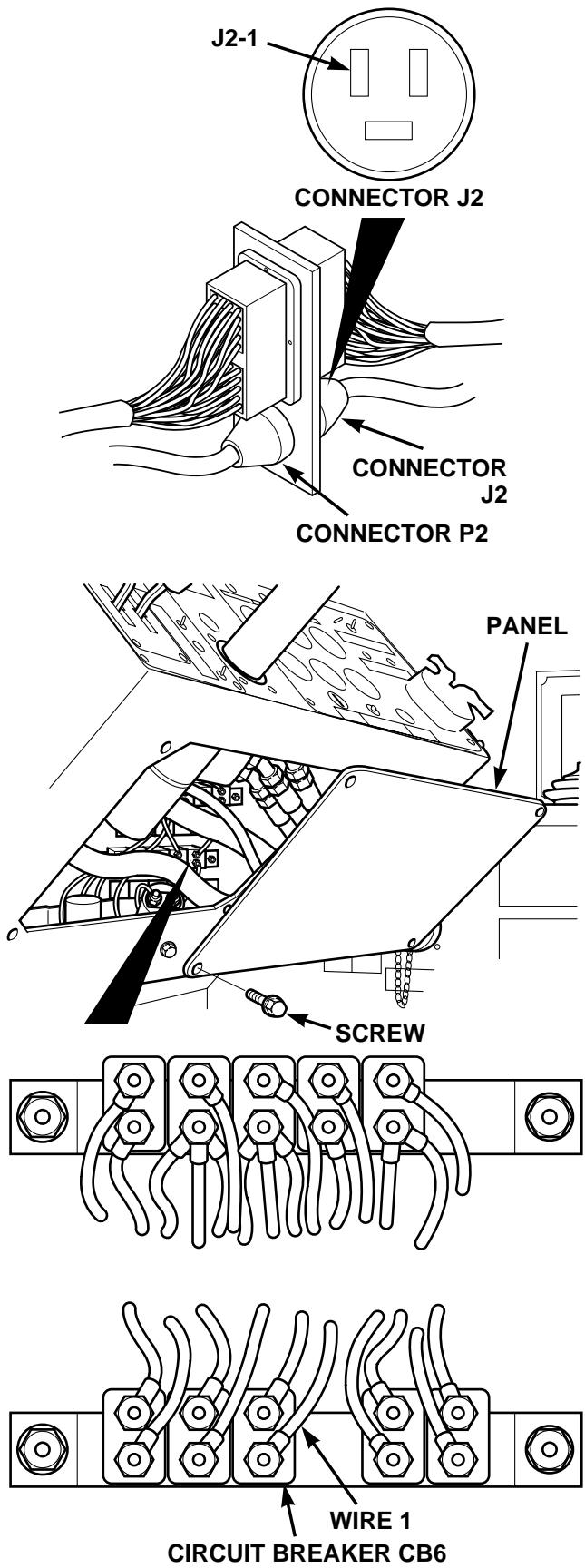
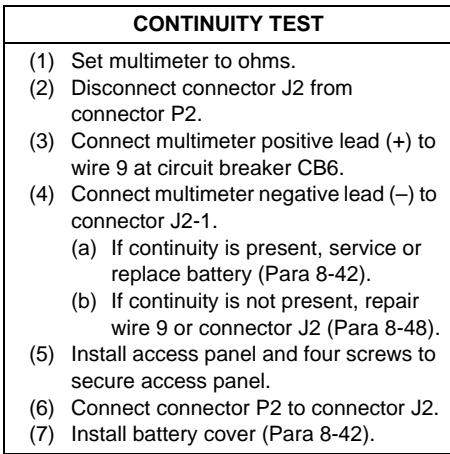


<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Disconnect connector J2 from connector P2.
(3)	Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
(4)	Connect multimeter negative lead (-) to connector P2-1.
(a)	If continuity is present, go to Step 16 of this fault.
(b)	If continuity is not present, repair wire 9 or connector P2 (Para 8-49).



## 5. INSTRUMENT PANEL GAGE LIGHTS DO NOT OPERATE (CONT.).





**6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

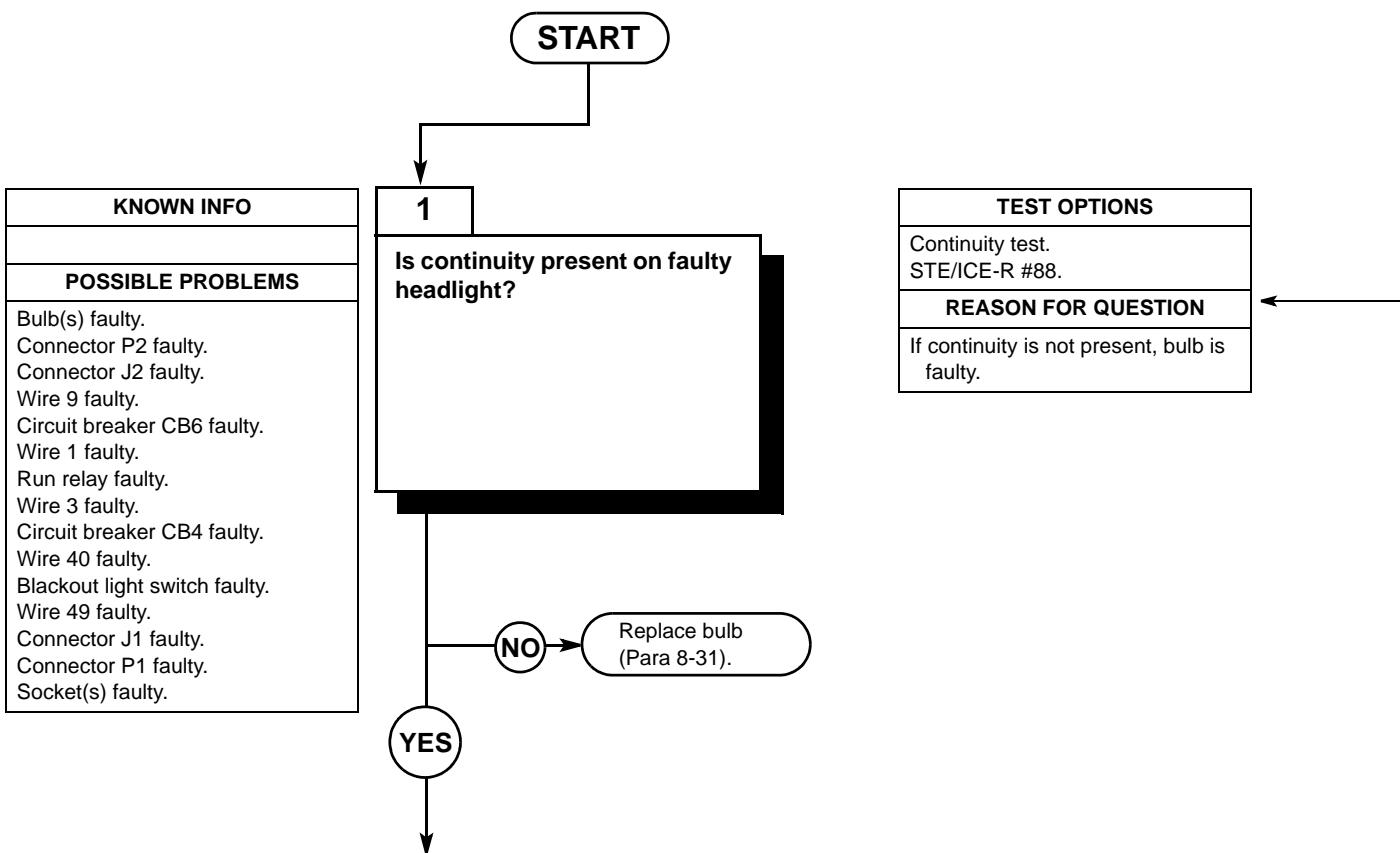
Two

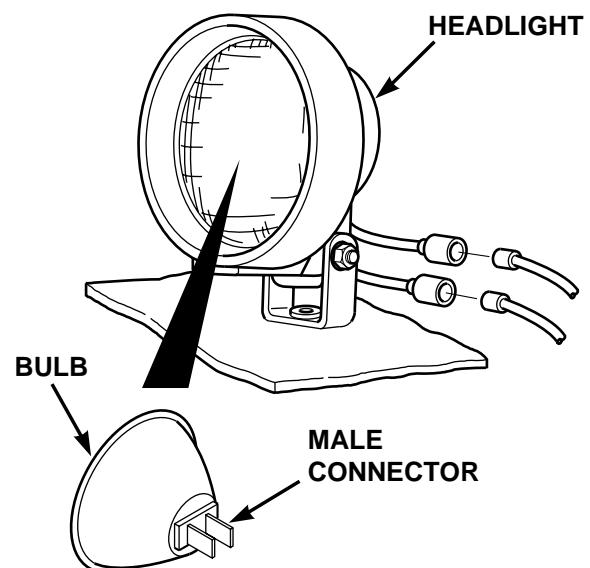
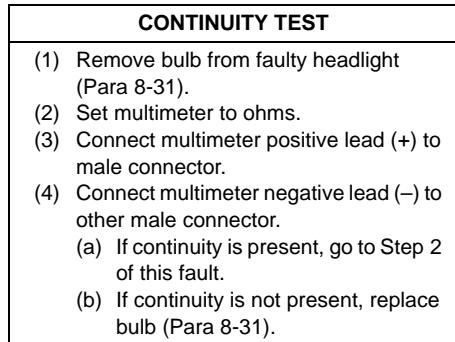
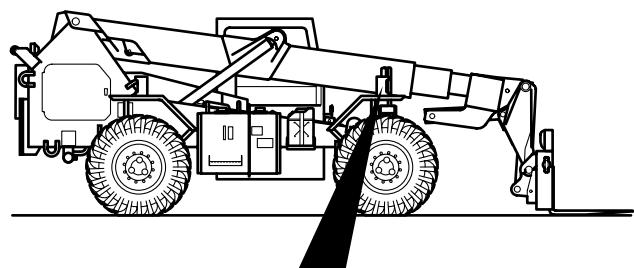
*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

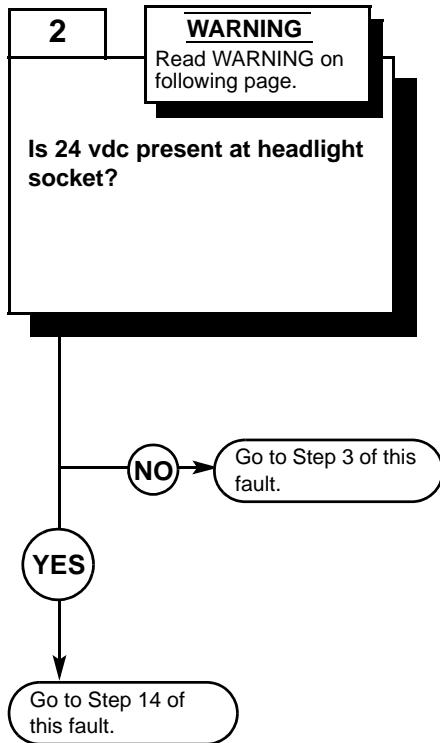
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)





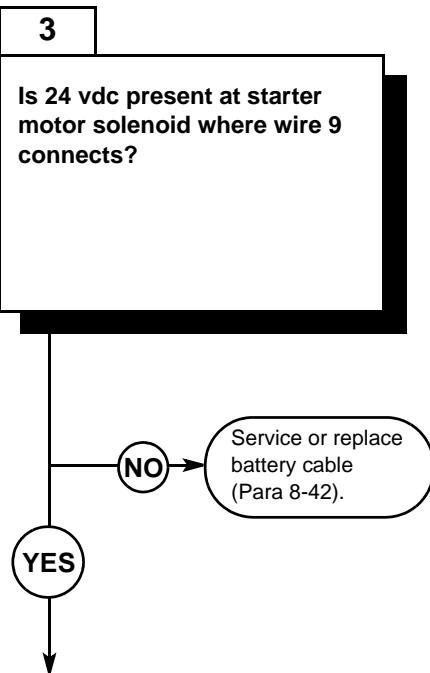
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

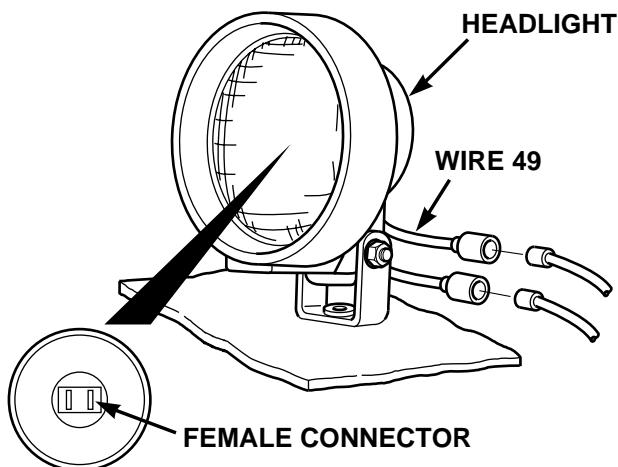
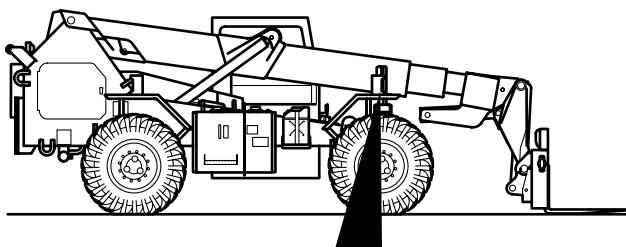


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, service or replace battery cable.

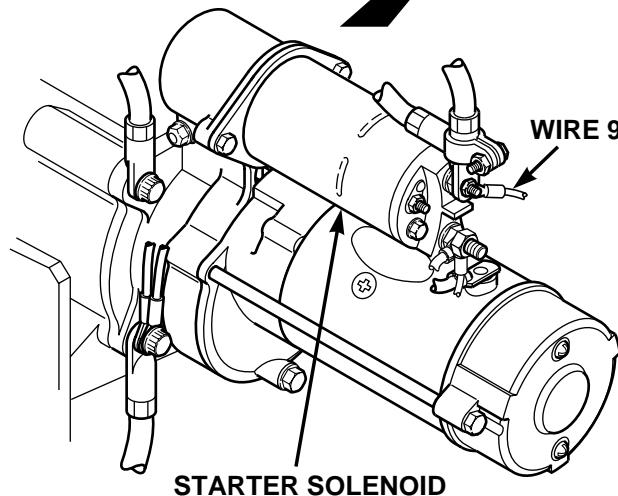
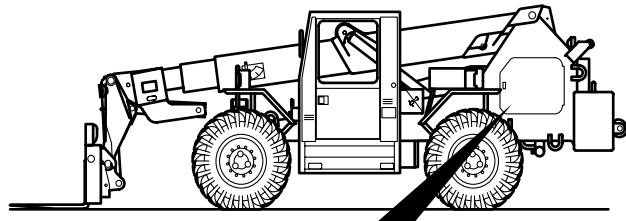
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to female connector of faulty socket where wire 49 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 14 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 3 of this fault.</li> </ul>
(6)	Turn blackout light switch OFF position (TM 10-3930-673-10).
(7)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

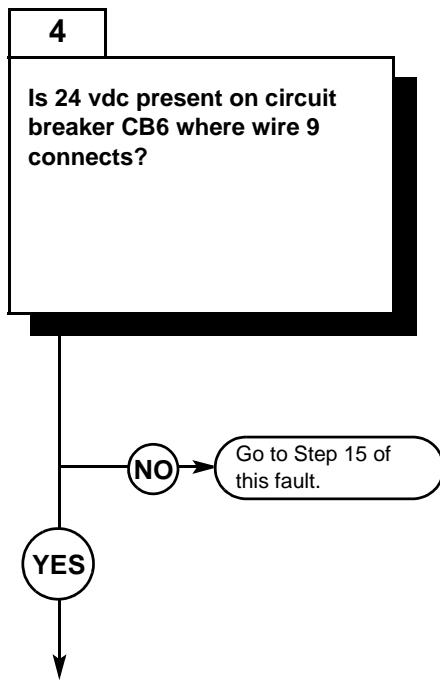


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 4 of this fault.</li> <li>(b) If 24 vdc is not present, service or replace battery cable (Para 8-42).</li> </ul>
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



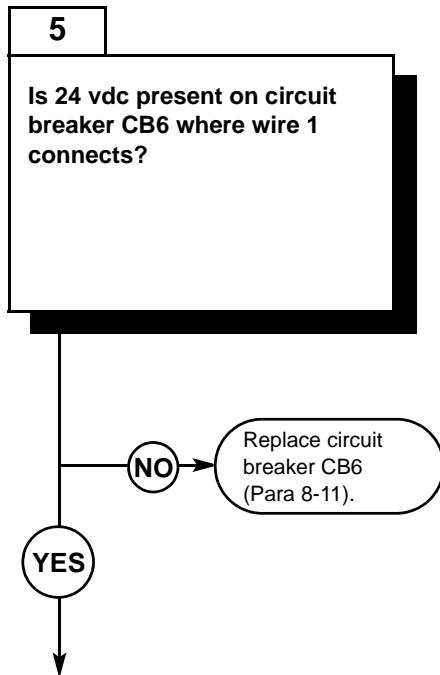
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



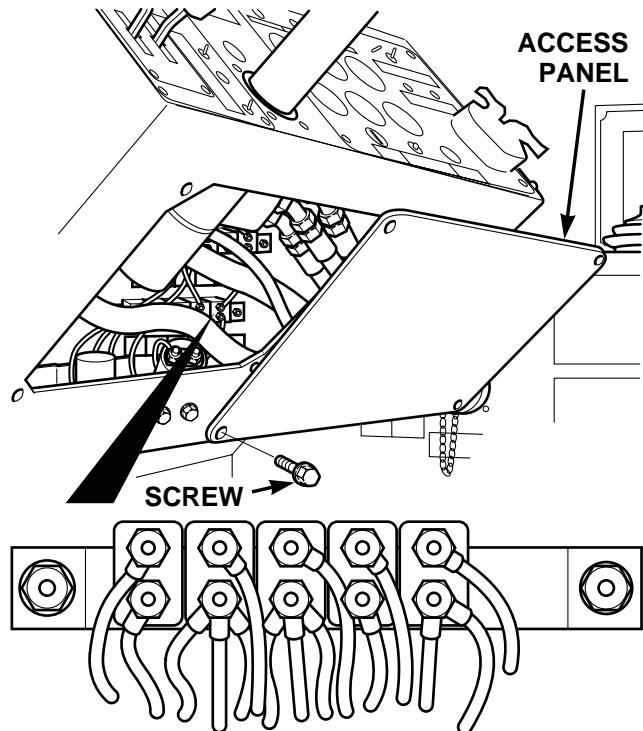
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

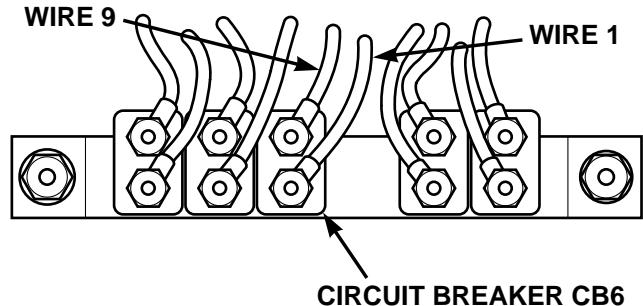


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 is faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 15 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).



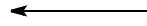
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

**6**

Is 24 vdc present at the run relay where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 is faulty.



KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

**7**

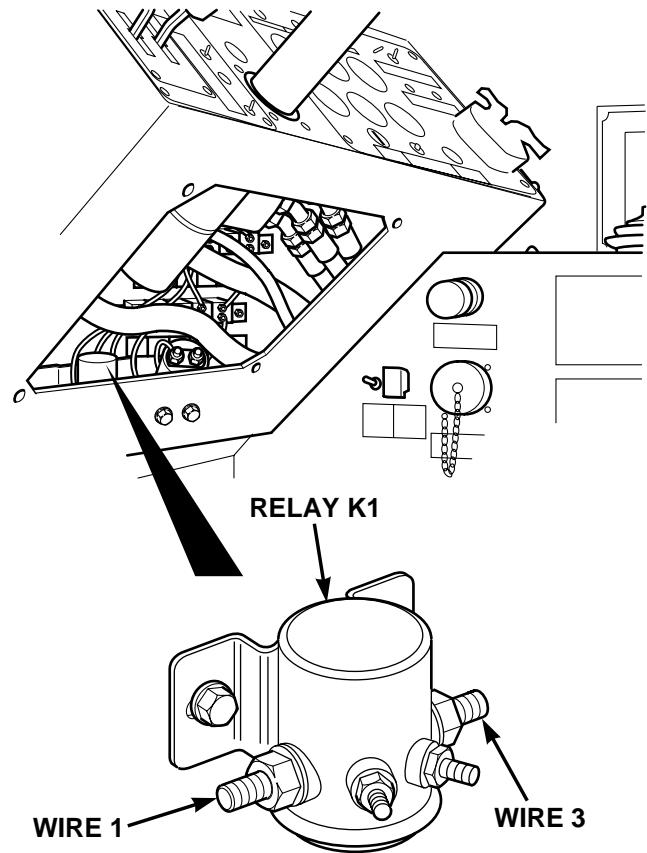
Is 24 vdc present at the run relay where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay is faulty.



**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).

## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

**8**

Is 24 vdc present at circuit breaker CB4 where wire 3 connects?



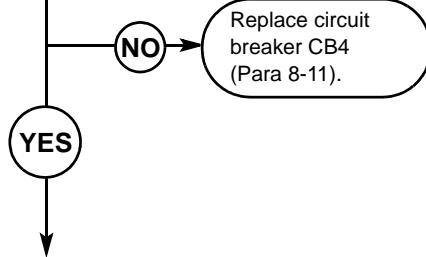
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 is faulty.



KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

**9**

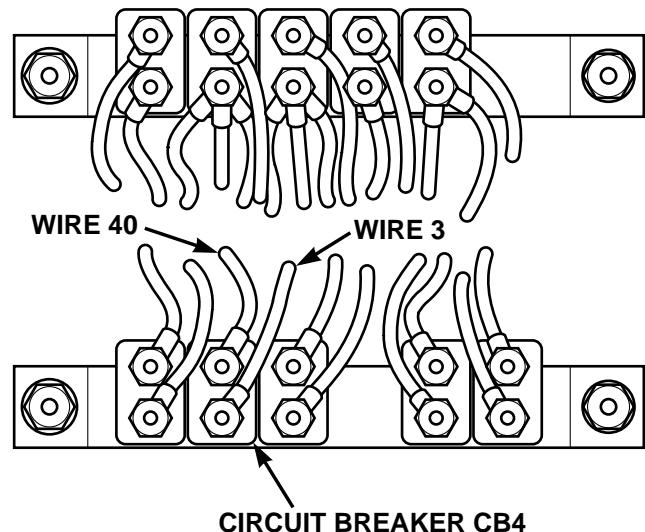
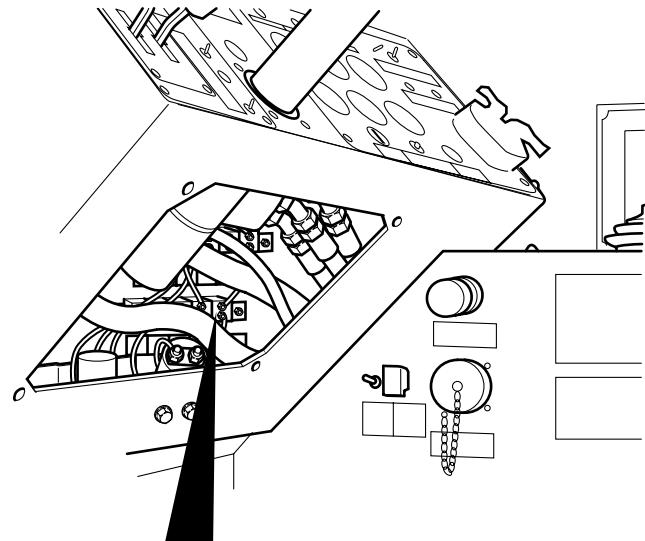
Is 24 vdc present at circuit breaker CB4 where wire 40 connects?



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 is faulty.



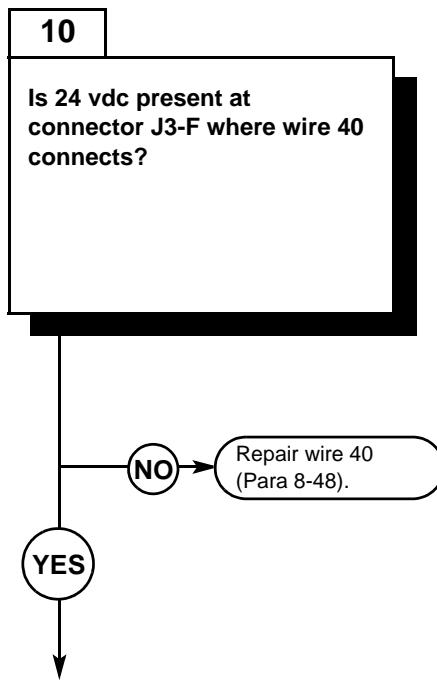
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

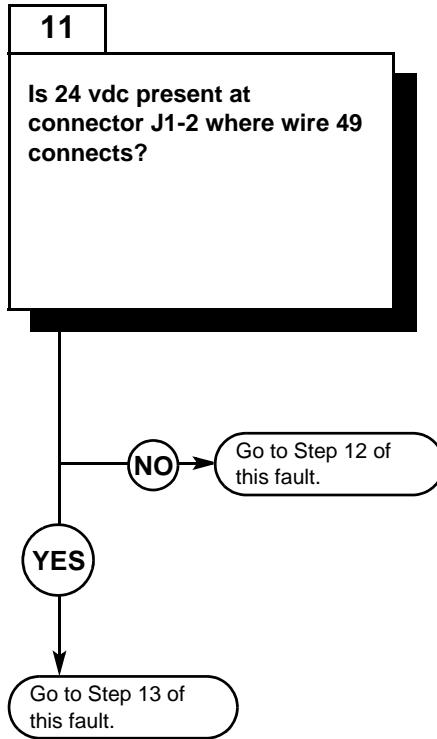
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK.
POSSIBLE PROBLEMS
Wire 40 faulty. Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



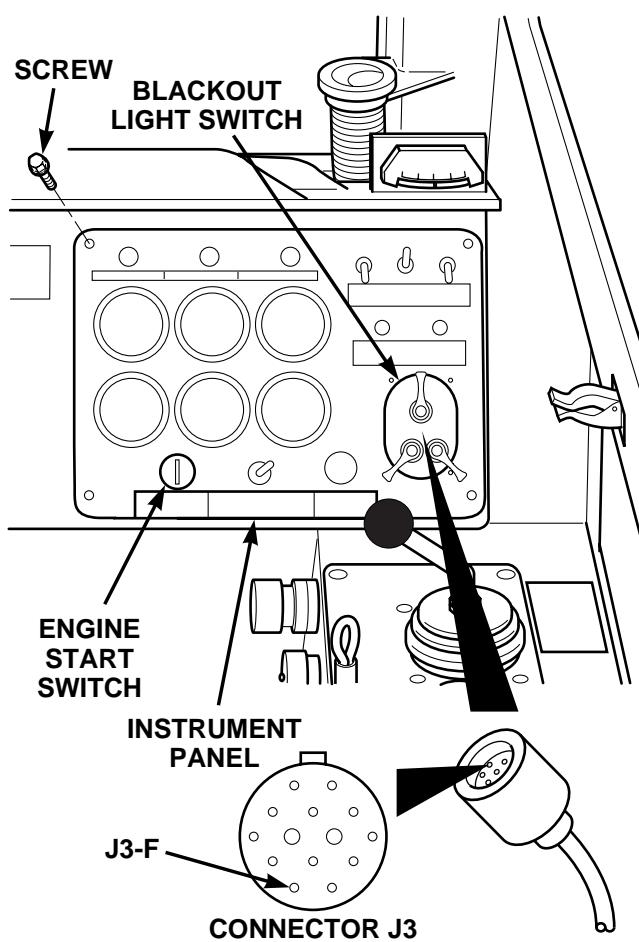
TEST OPTIONS
Voltage test. STE/ICE-R #88.
REASON FOR QUESTION
If 24 vdc is not present, wire 40 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

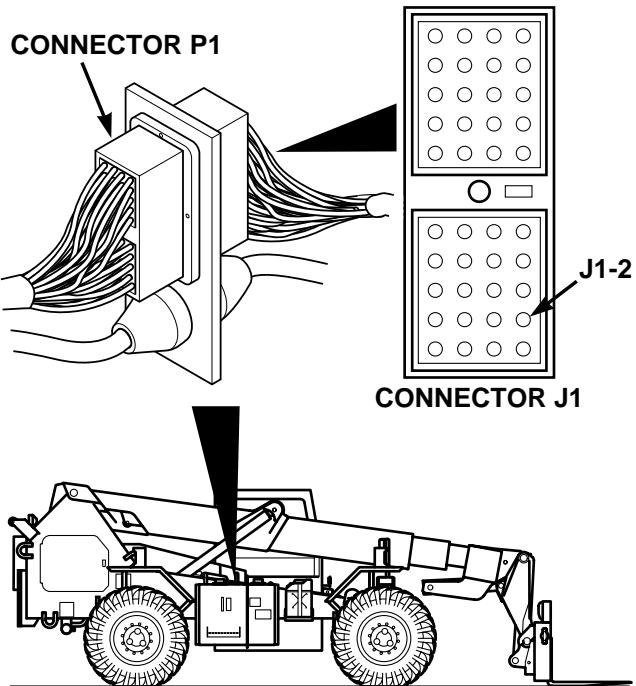


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout light switch or wire 49 are faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to connector J3-F where wire 40 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 40 (Para 8-48).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Lift instrument panel out to connect connector J3 to blackout light switch.
(11)	Install four screws to secure instrument panel.

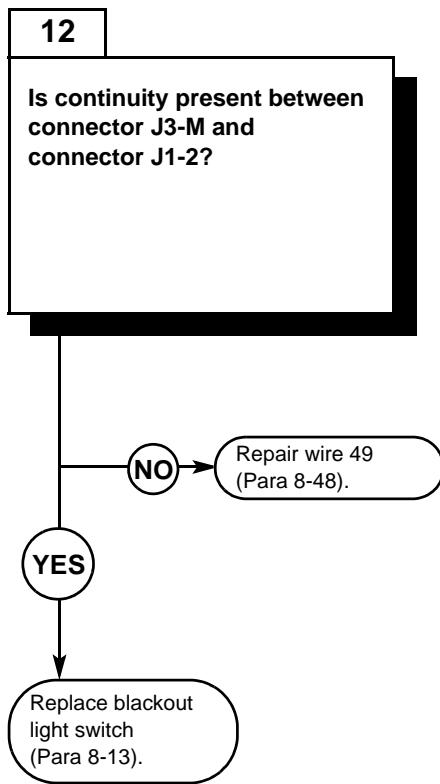


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-2 where wire 49 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



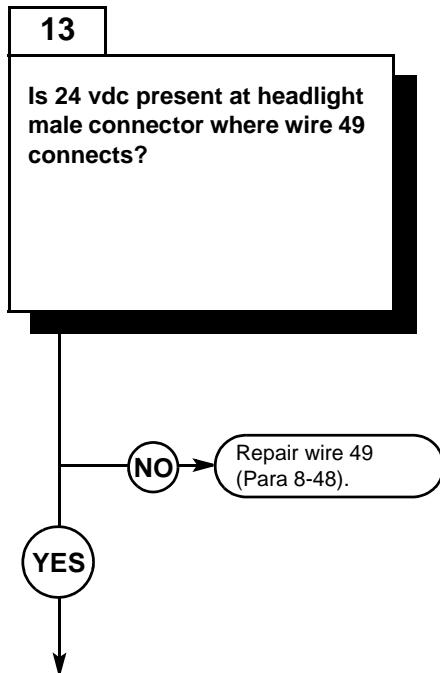
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



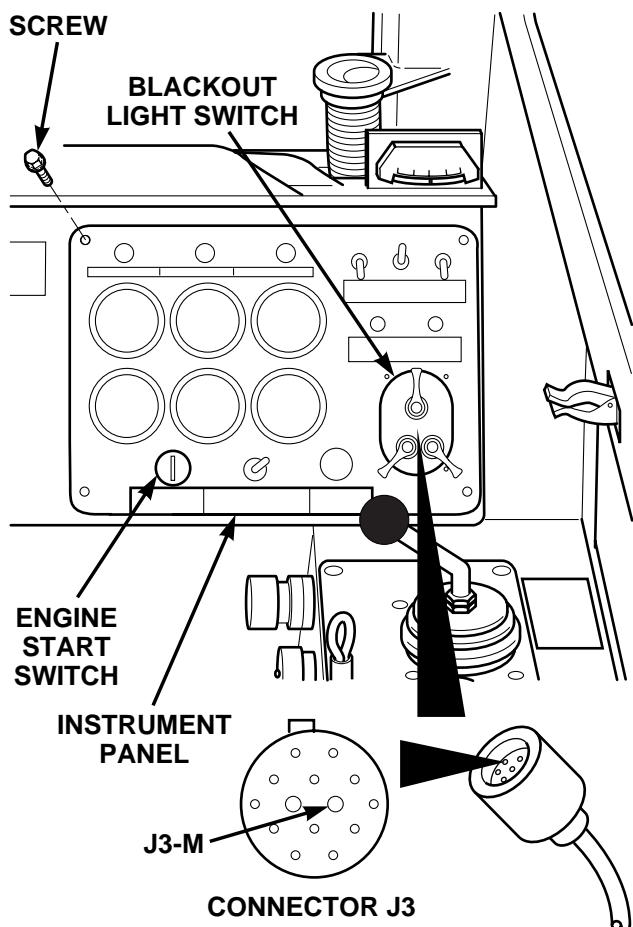
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, blackout light switch or wire 49 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK.
POSSIBLE PROBLEMS
Wire 49 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

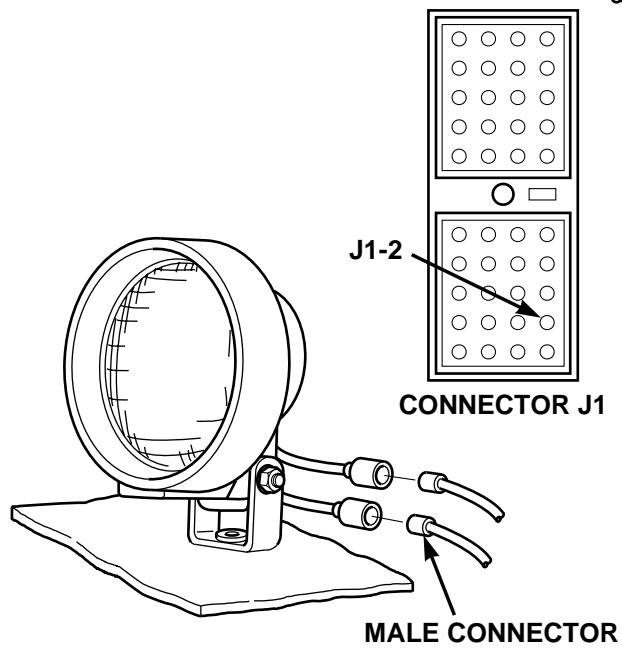


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 49 is faulty.

<b>CONTINUITY TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Disconnect connector J1 from connector P1.
(4)	Set multimeter to ohms.
(5)	Connect multimeter positive lead (+) to connector J3-M where wire 49 connects.
(6)	Connect multimeter negative lead (-) to connector J1-2 where wire 49 connects.
(a)	If continuity is present, replace blackout light switch (Para 8-13).
(b)	If continuity is not present, repair wire 49 (Para 8-48).
(7)	Lift instrument panel out to connect connector J3 to blackout light switch.
(8)	Connect connector J1 to connector P1.
(9)	Install four screws to secure instrument panel.

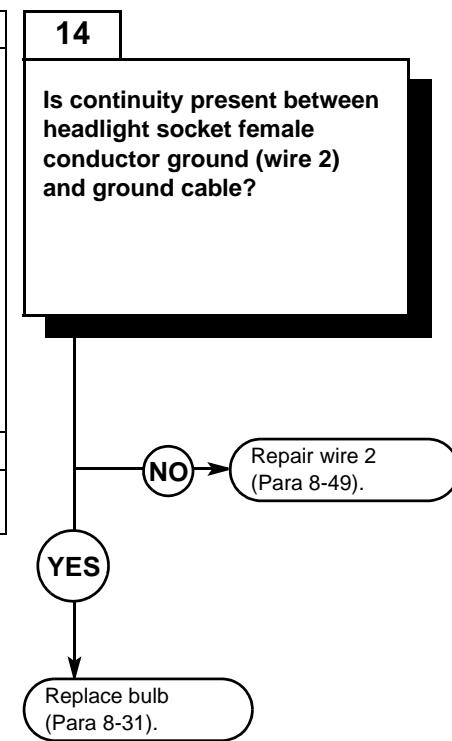


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to headlight male connector where wire 49 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, repair wire 49 (Para 8-48).
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



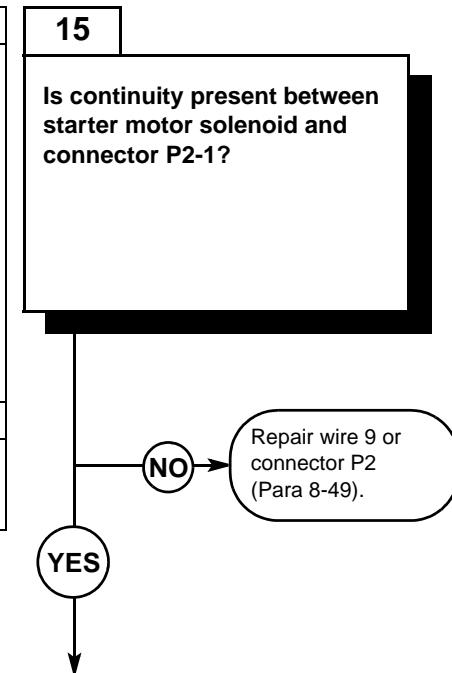
## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 49 OK. Connector J1 OK. Connector P1 OK.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present wire 2 ground or headlight socket is faulty.

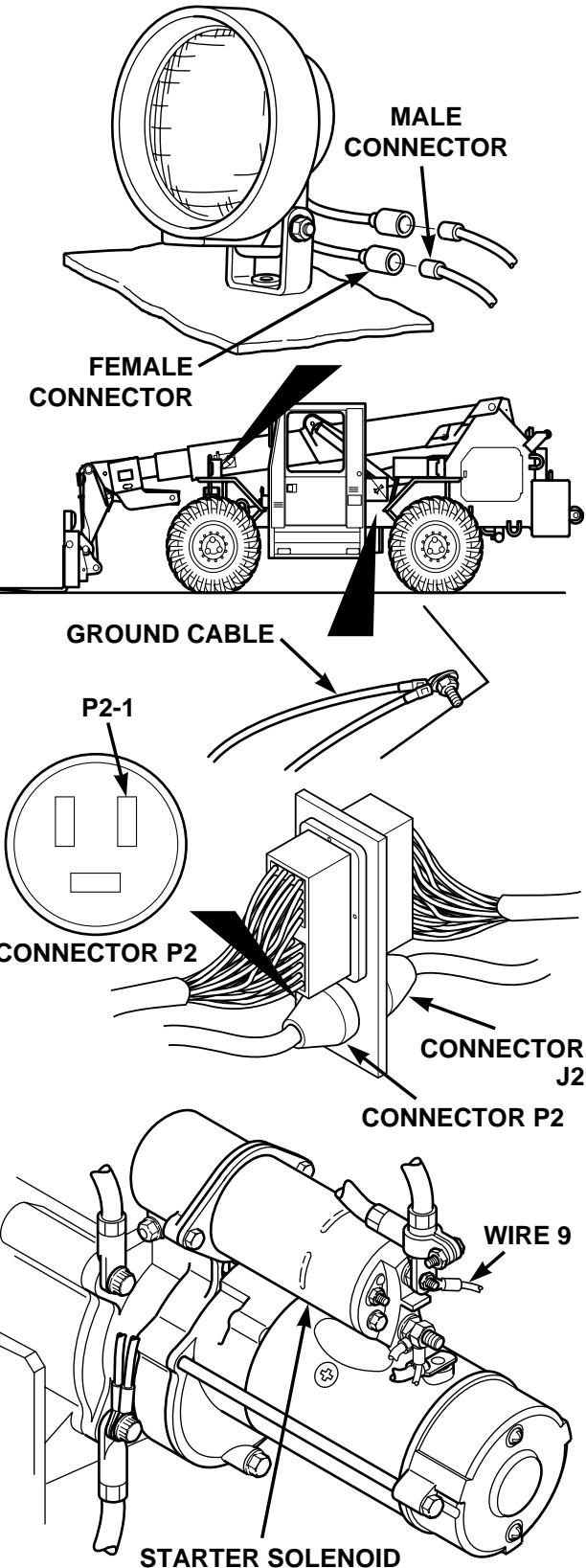
KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 49 OK. Socket(s) OK.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present wire 9 or connector P2 are faulty.

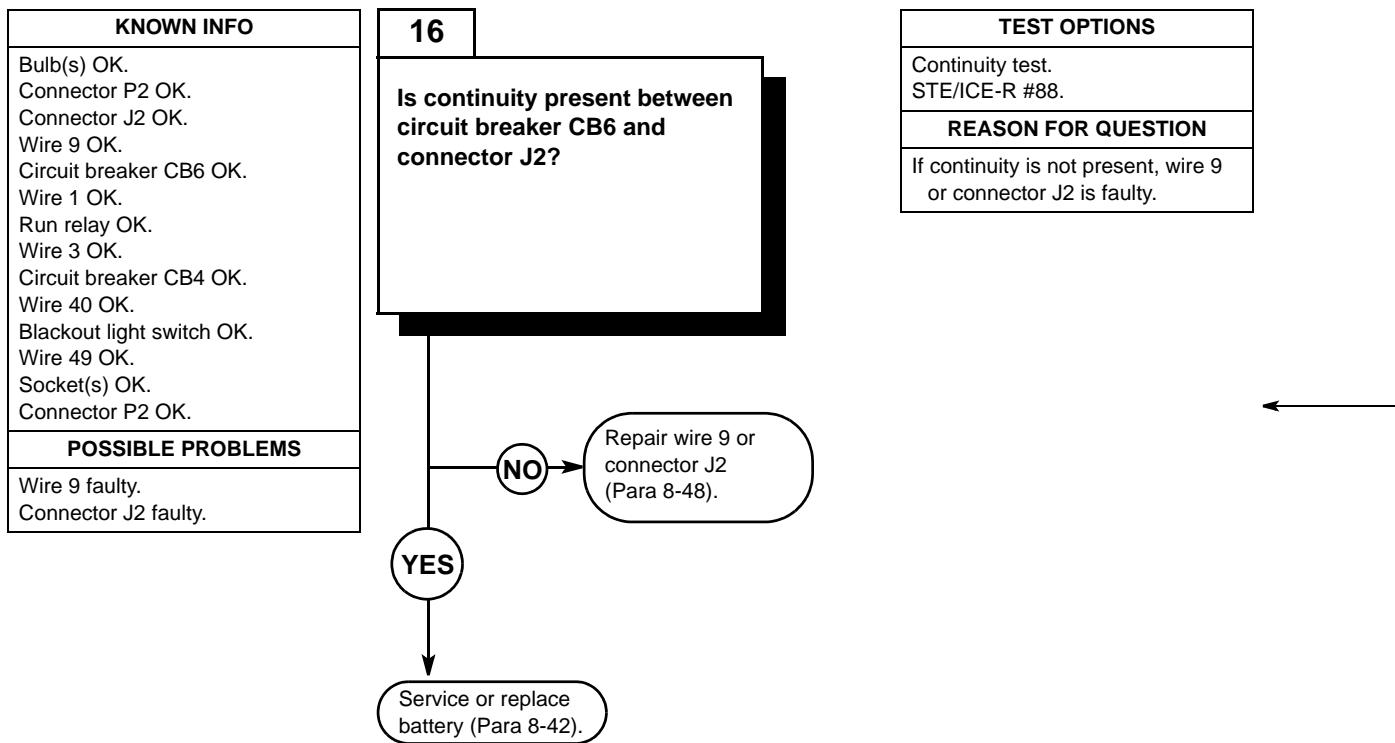
**CONTINUITY TEST**

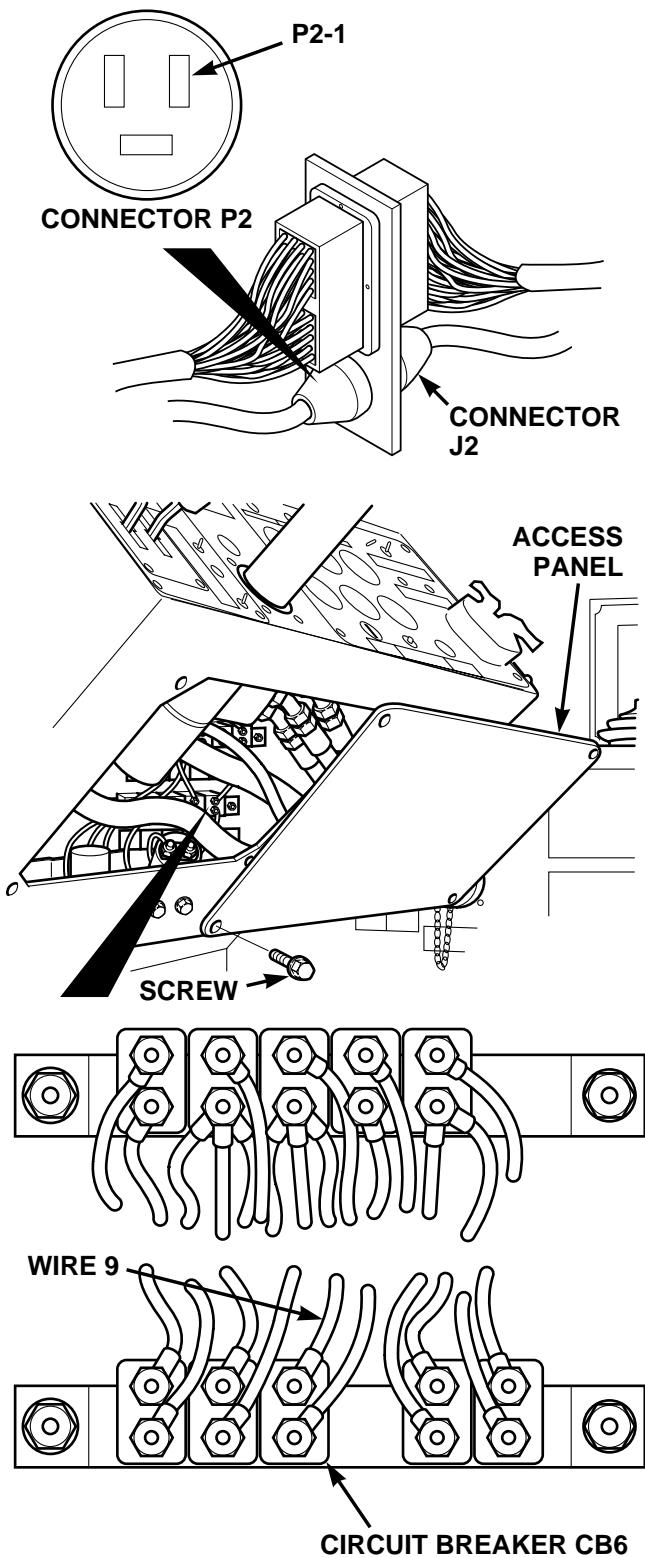
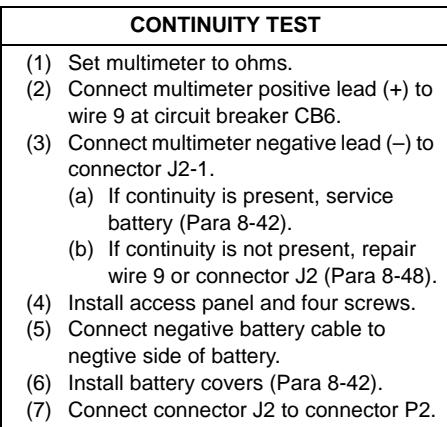
- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground female connector at headlight socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-31).
  - (b) If continuity is not present, repair wire 2 (Para 8-49).
- (5) Connect ground female connector to male connector.

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 16 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

## 6. ONE OR BOTH HEADLIGHTS DO NOT OPERATE (CONT).





**7. STOPLIGHT(S) DO NOT OPERATE.****INITIAL SETUP**

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

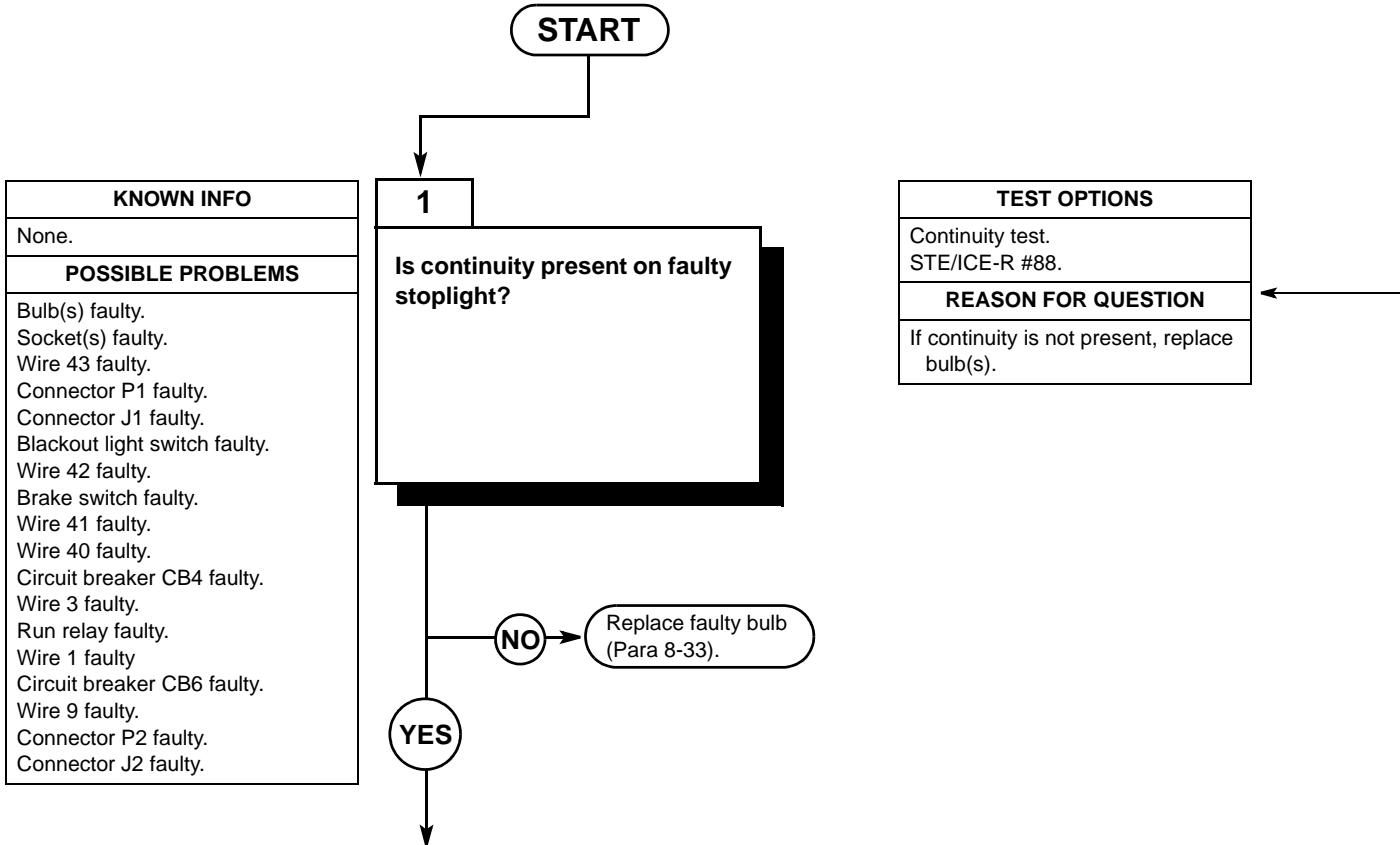
Two

*References*

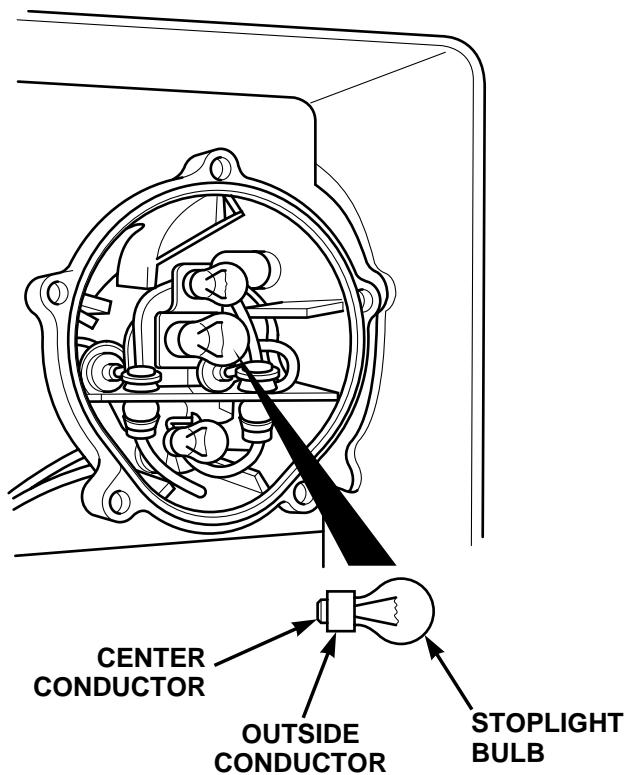
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

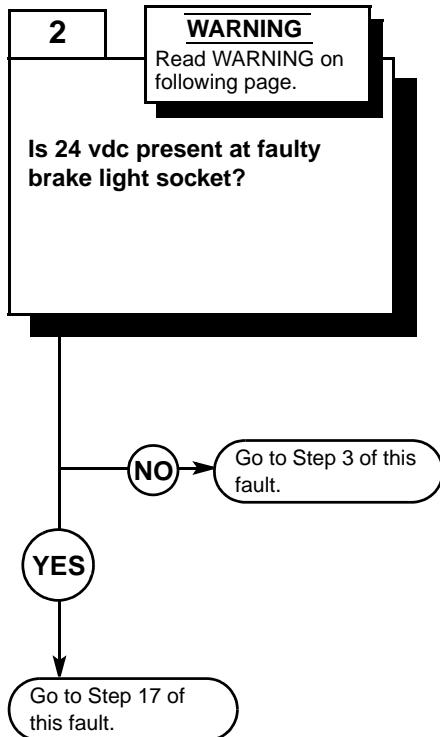


- CONTINUITY TEST**
- (1) Remove bulb from faulty stoplight (Para 8-33).
  - (2) Set multimeter to ohms.
  - (3) Connect multimeter positive lead (+) to center conductor of bulb.
  - (4) Connect multimeter negative lead (-) to outside conductor of bulb.
    - (a) If continuity is present, go to Step 2 of this fault.
    - (b) If continuity is not present, replace bulb (Para 8-33).



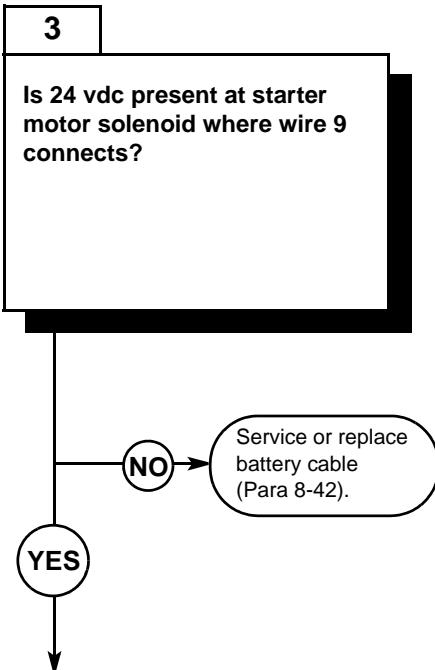
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

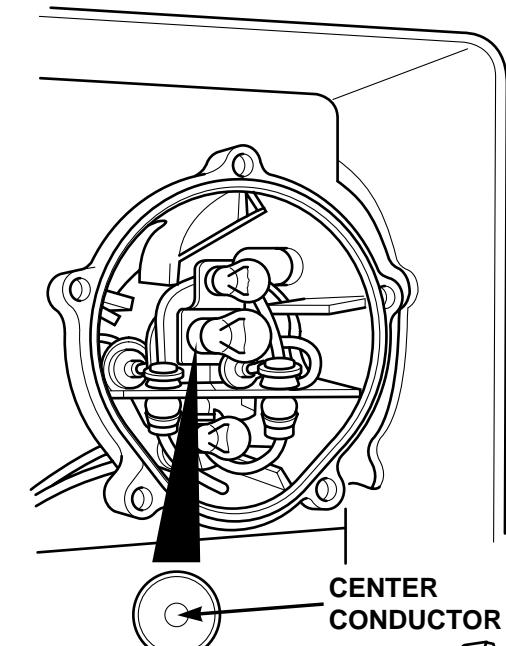


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

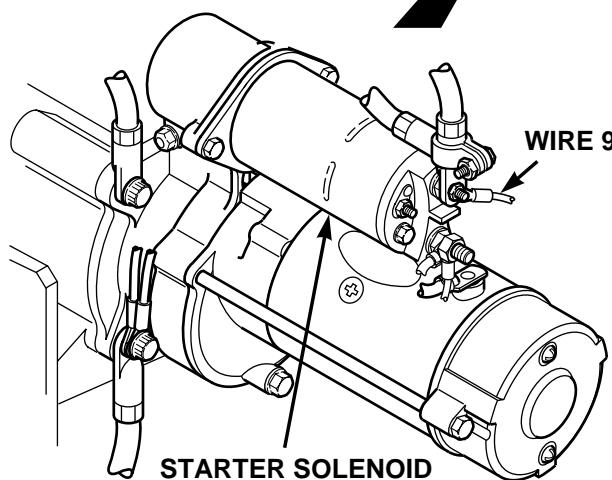
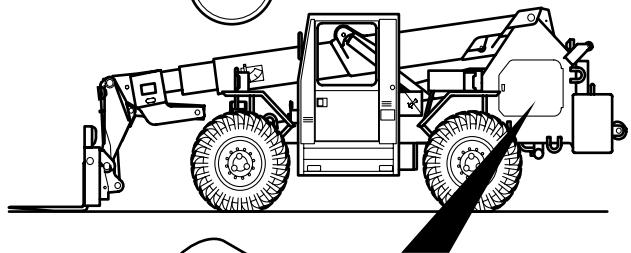
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(5)	Turn blackout light switch to STOP LIGHT position (TM 10-3930-673-10).
(6)	Depress brake pedal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 17 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 3 of this fault.</li> </ul>
(7)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(8)	Turn blackout light to OFF position (TM 10-3930-673-10).

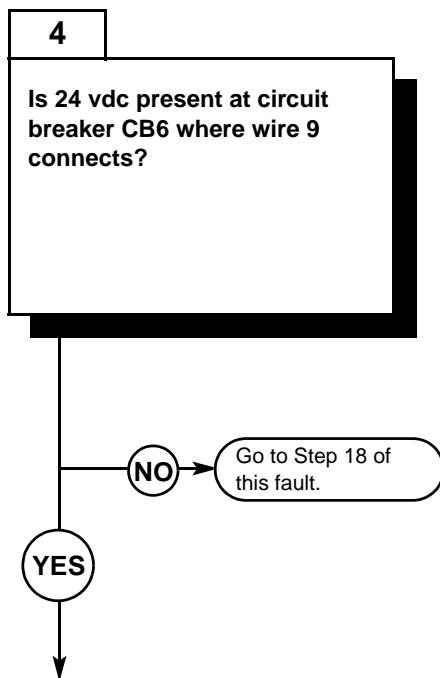


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to the starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 4 of this fault.</li> <li>(b) If 24 vdc is not present, service or replace battery cable (Para 8-42).</li> </ul>
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



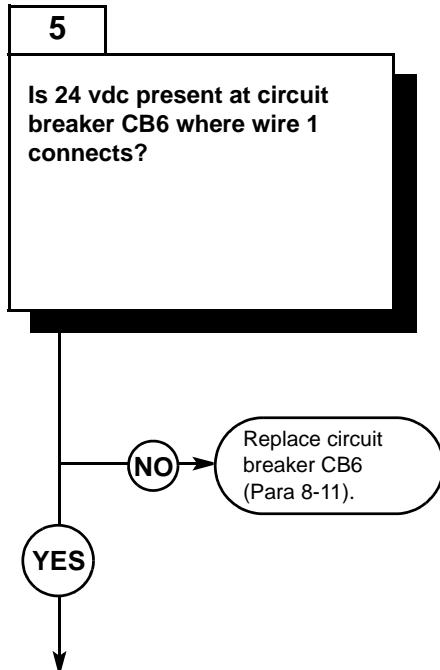
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



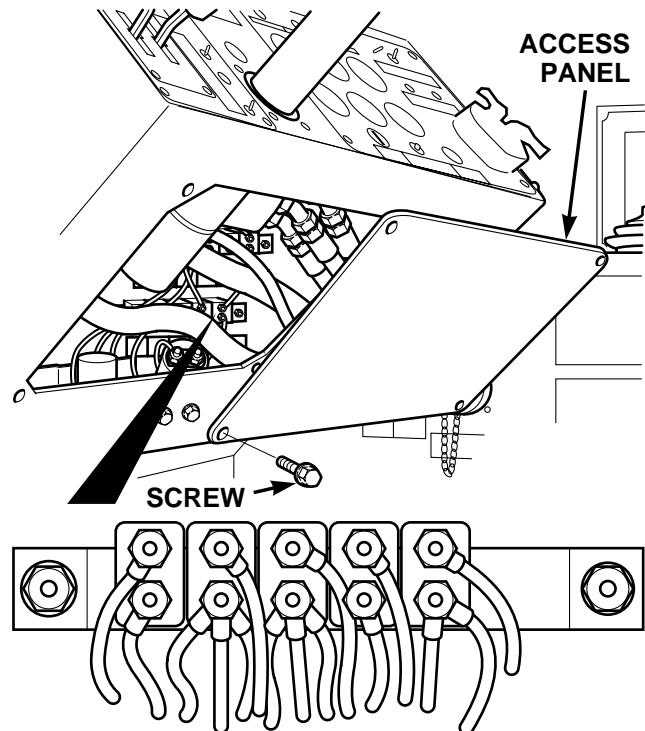
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 OK. Connector J2 OK. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

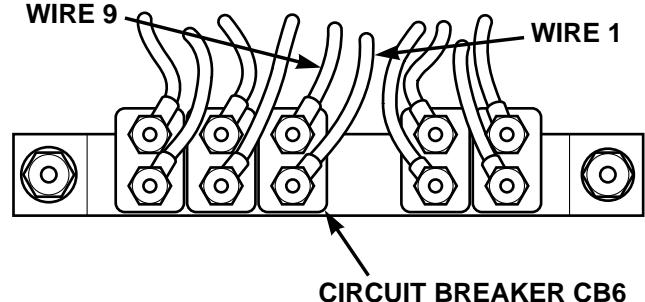


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Remove four screws and access panel.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 18 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

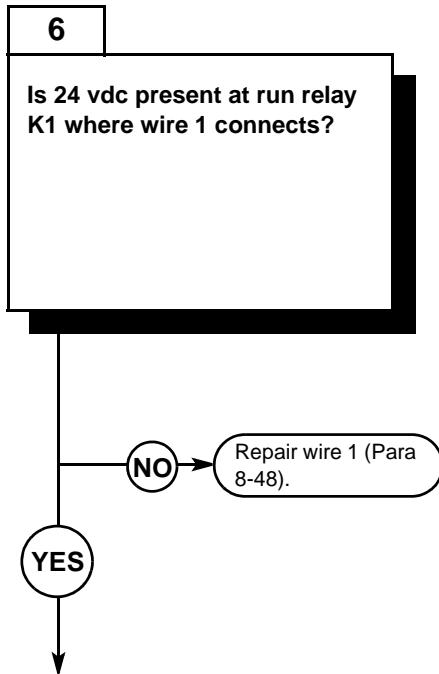


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).



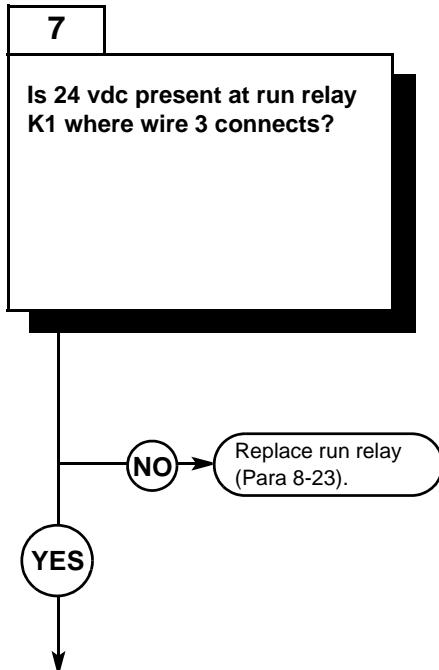
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



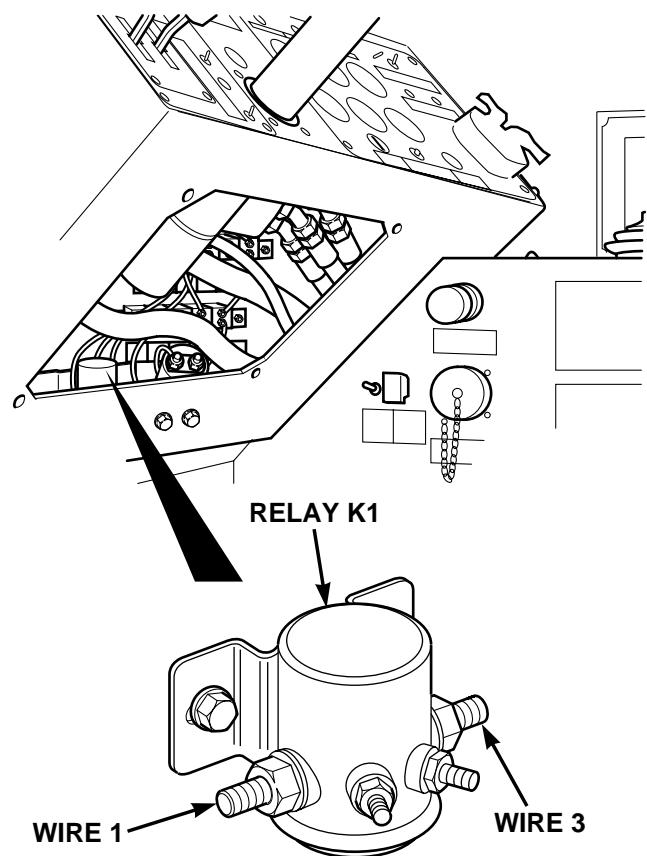
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

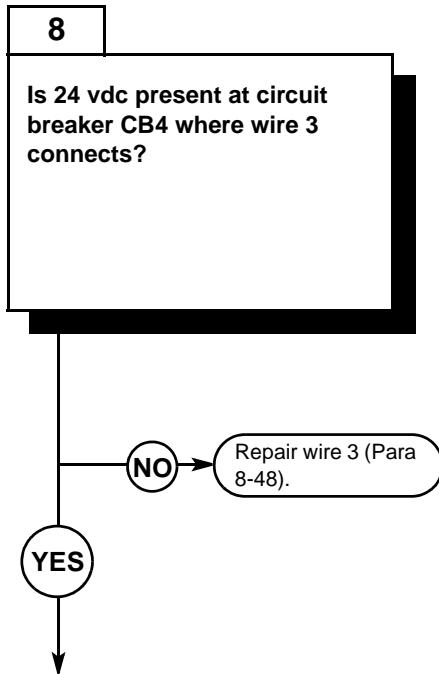
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to the run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).



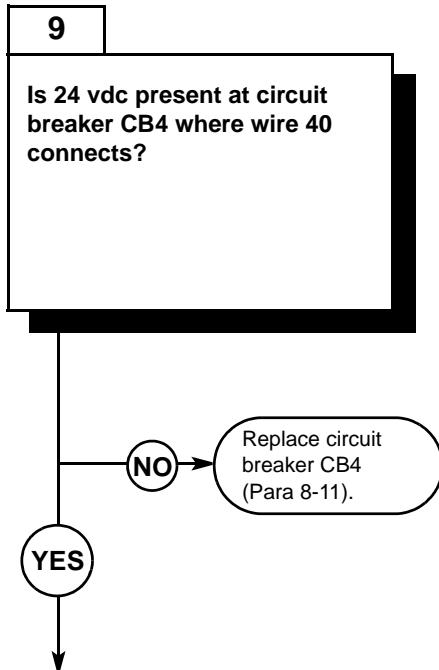
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



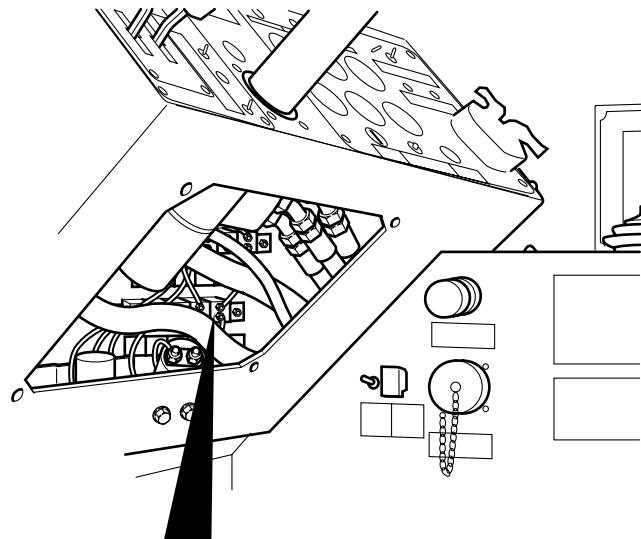
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

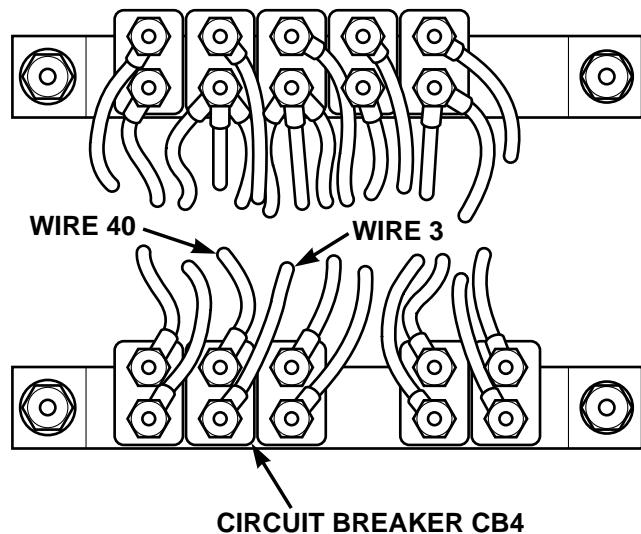


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 faulty.

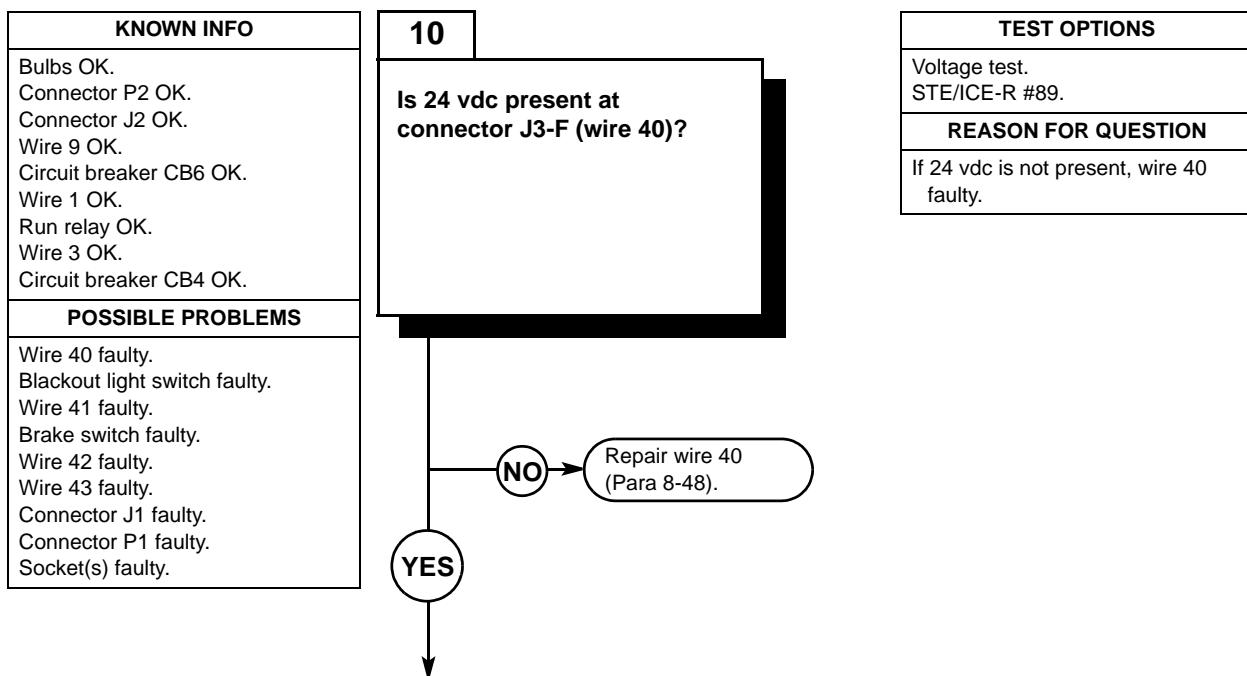
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

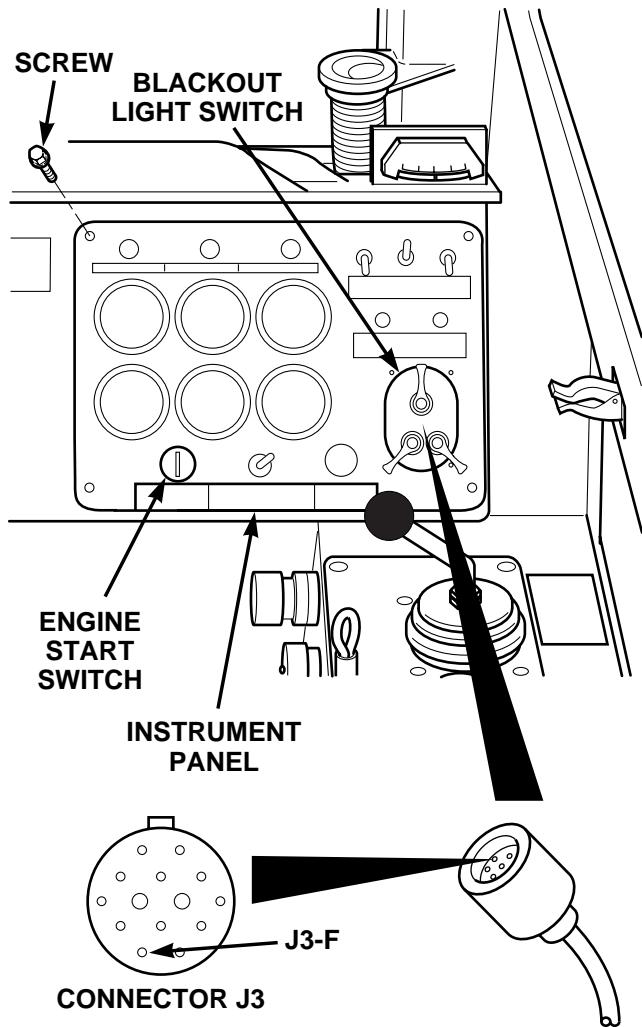
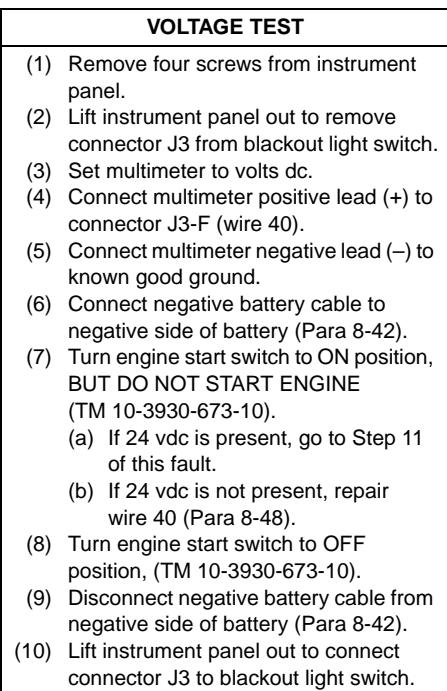


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



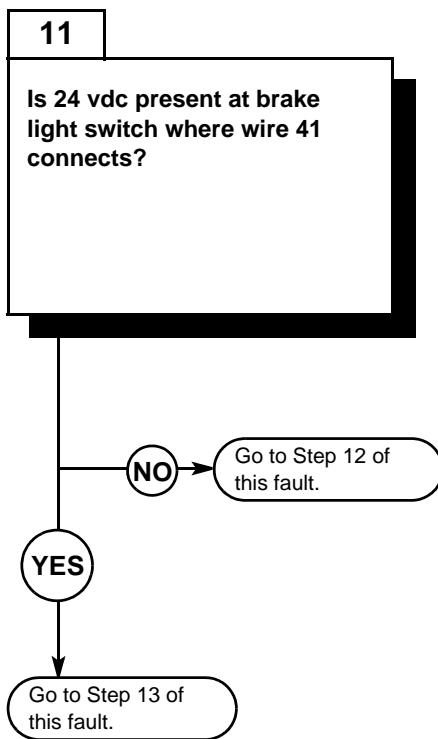
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).





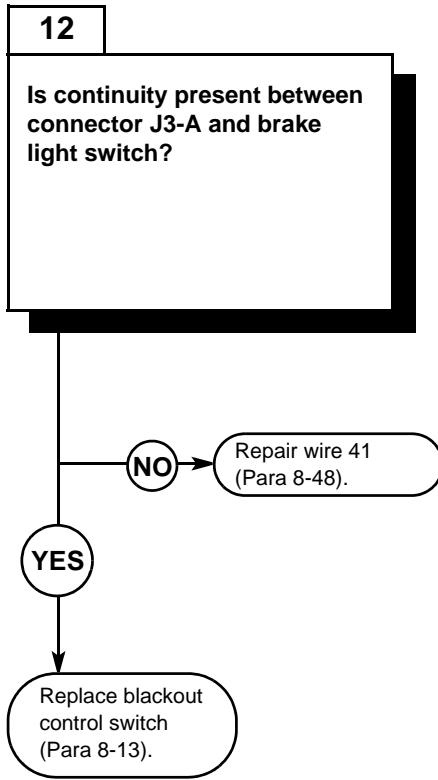
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



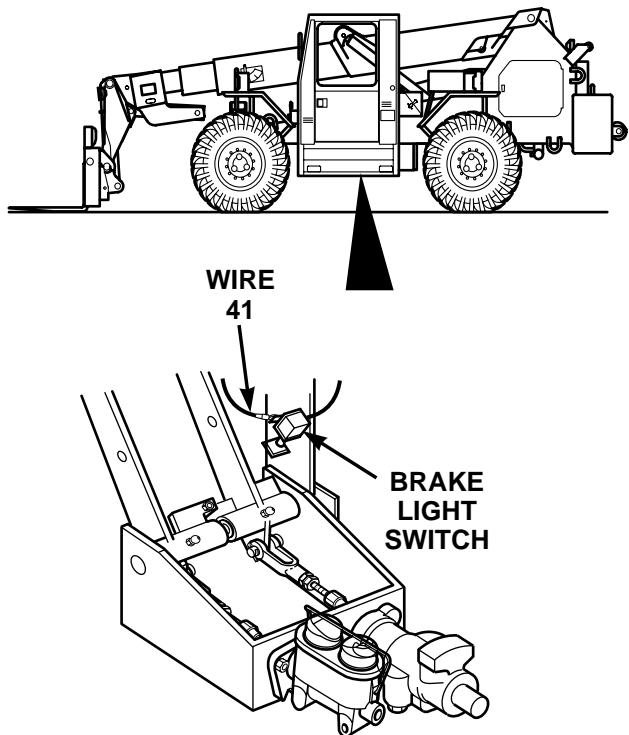
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout lighting switch or wire 41 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

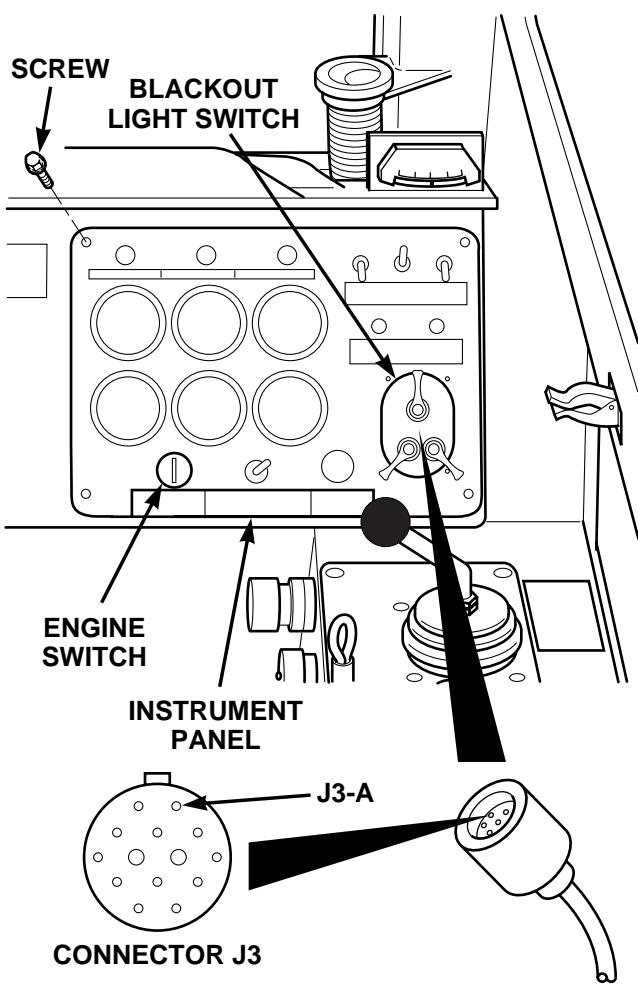


TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 41 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to brake switch where wire 41 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout lighting switch to BRAKE LIGHT position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(7)	Turn blackout lighting switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>CONTINUITY TEST</b>	
(1)	Lift instrument panel out to remove connector J3 from blackout light switch.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to connector J3-A (wire 41).
(4)	Connect multimeter negative lead (-) to brake light switch where wire 41 connects.
(a)	If continuity is present, replace blackout light switch (Para 8-13).
(b)	If continuity is not present, repair wire 41 (Para 8-48).
(5)	Lift instrument panel out to connect connector J3 to blackout light switch.
(6)	Install four screws to secure instrument panel.

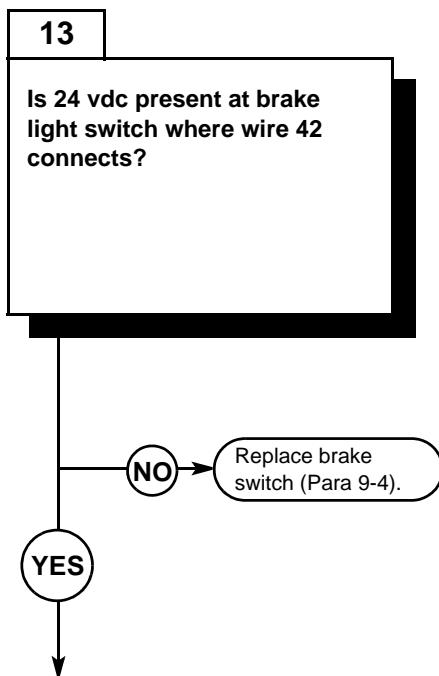


## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Blackout light switch OK.

POSSIBLE PROBLEMS
Brake switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

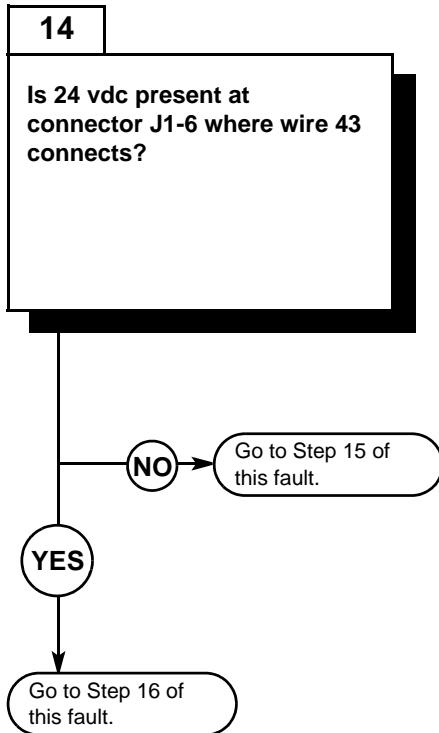


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, brake light switch faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Brake switch OK.

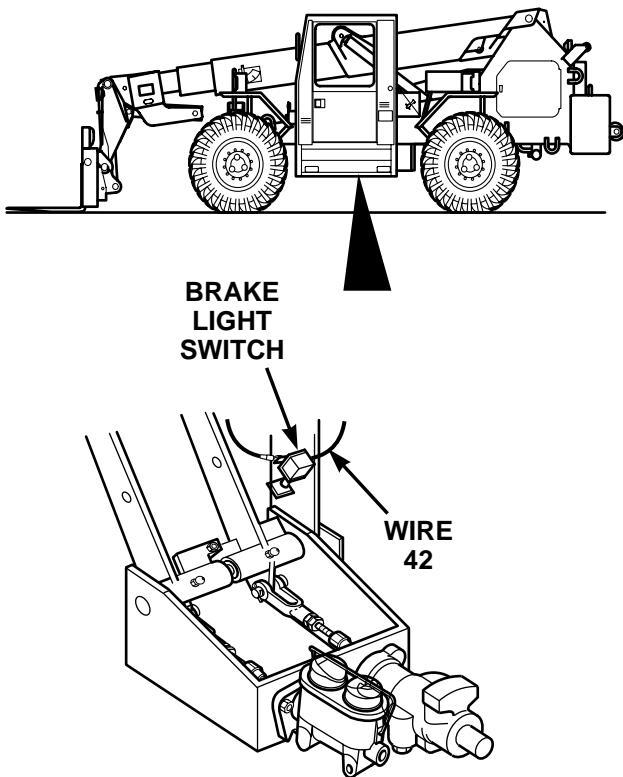
  

POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

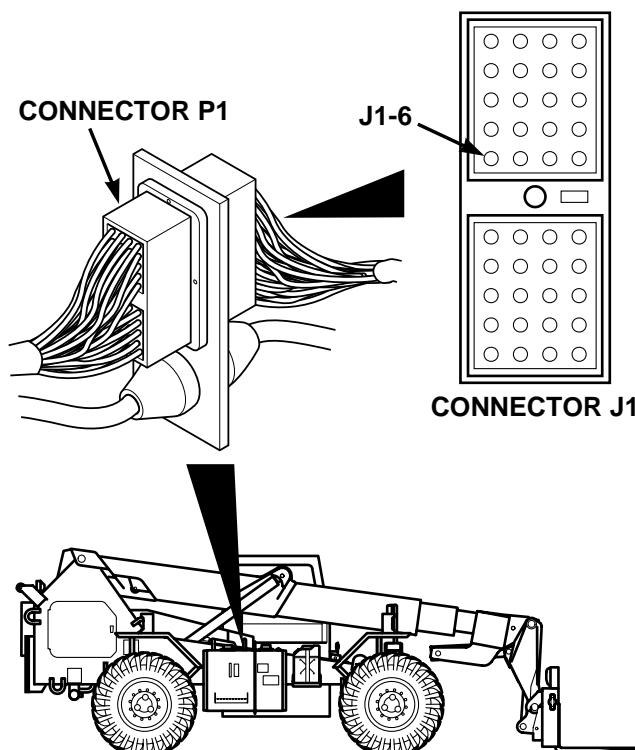


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout light switch or wire 43 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to brake light switch where wire 42 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to BRAKE LIGHT position (TM 10-3930-673-10).
(7)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, replace brake light switch (Para 8-17).
(8)	Turn blackout lighting switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-6 where wire 43 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to BRAKE LIGHT position (TM 10-3930-673-10).
(8)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 16 of this fault.
(b)	If 24 vdc is not present, go to Step 15 of this fault.
(9)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(10)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).

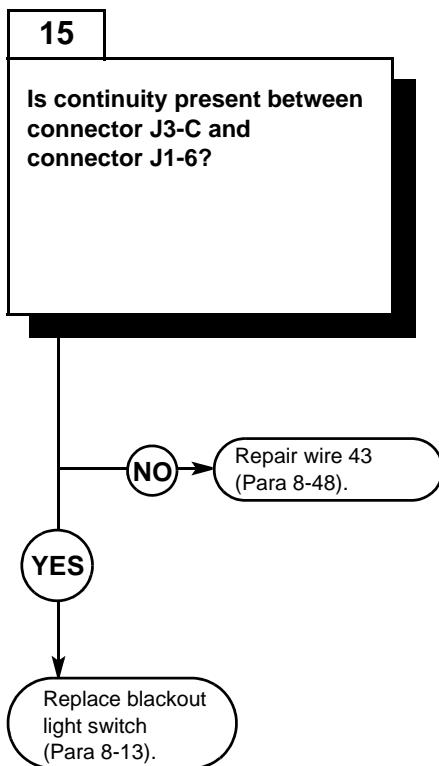


## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Brake switch OK.

POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 42 faulty. Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #88.

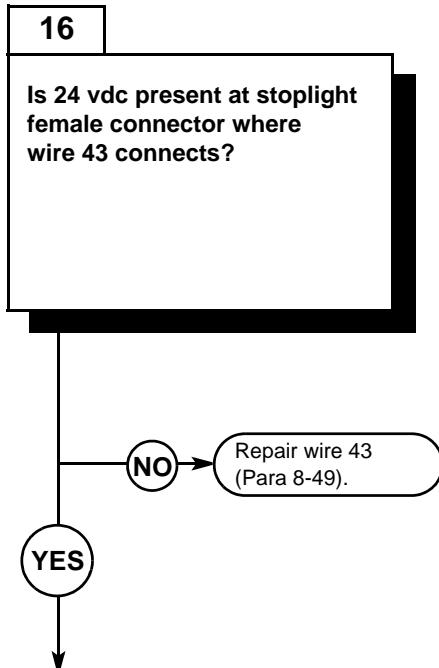
  

REASON FOR QUESTION
If continuity is not present, blackout light switch or wire 43 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Brake switch OK. Blackout light switch OK. Wire 42 OK.

POSSIBLE PROBLEMS
Wire 43 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



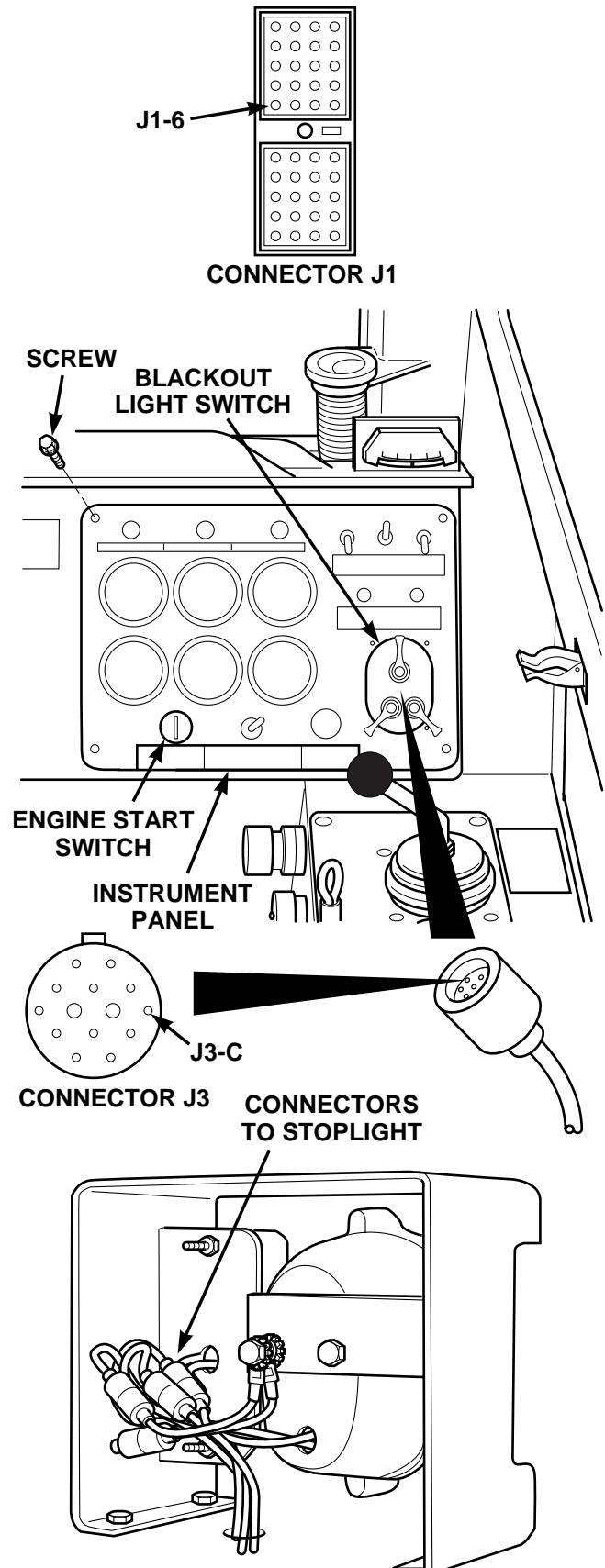
TEST OPTIONS
Voltage test. STE/ICE-R #89.

REASON FOR QUESTION
If 24 vdc is not present, wire 43 faulty.

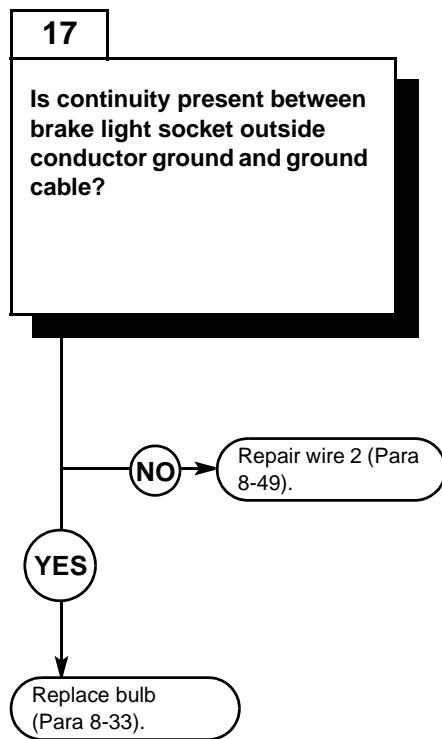
<b>CONTINUITY TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout lighting switch.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to connector J1-6 where wire 43 connects.
(5)	Connect multimeter negative lead (-) to blackout light switch J3-C where wire 43 connects.
(a)	If continuity is present, replace blackout lighting switch (Para 8-13).
(b)	If continuity is not present, repair wire 43 (Para 8-49).
(6)	Lift instrument panel out to connect connector J3 to blackout control switch.
(7)	Install four screws to secure instrument panel.
(8)	Connect connector J1 to connector P1.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to female connector where wire 43 connects to stoplight.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to BRAKE LIGHT position (TM 10-3930-673-10).
(7)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 17 of this fault.
(b)	If 24 vdc is not present, repair wire 43 (Para 8-49).
(8)	Turn blackout lightswitch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



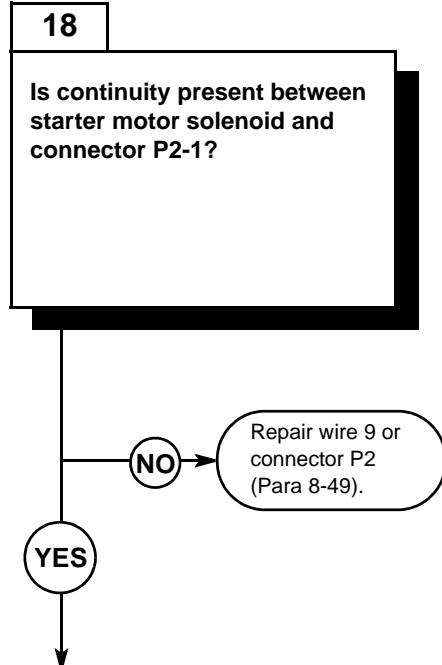
## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Wire 41 OK.
Brake switch OK.
Blackout light switch OK.
Wire 42 OK.
Wire 43 OK.
Connector J1 OK.
Connector P1 OK.
POSSIBLE PROBLEMS
Socket(s) faulty.
Ground faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 2, ground, or brake light socket faulty.

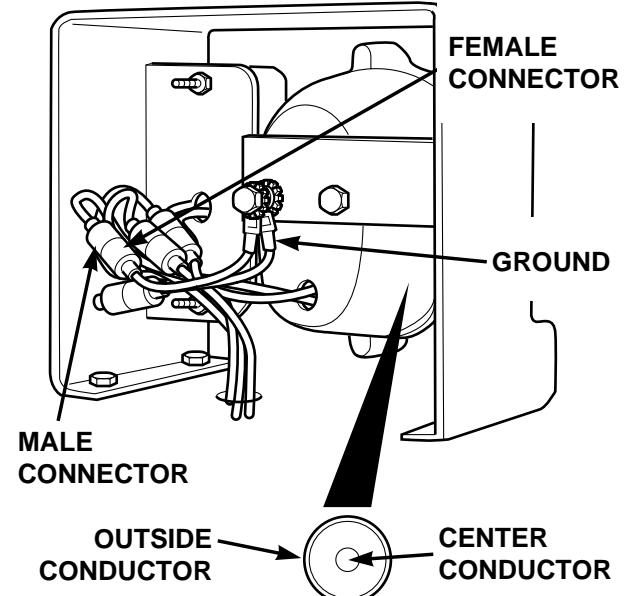
KNOWN INFO
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Wire 41 OK.
Brake switch OK.
Blackout light switch OK.
Wire 42 OK.
Wire 43 OK.
Connector J1 OK.
Connector P1 OK.
Socket(s) OK.
POSSIBLE PROBLEMS
Wire 9 faulty.
Connector J2 faulty.
Connector P2 faulty.



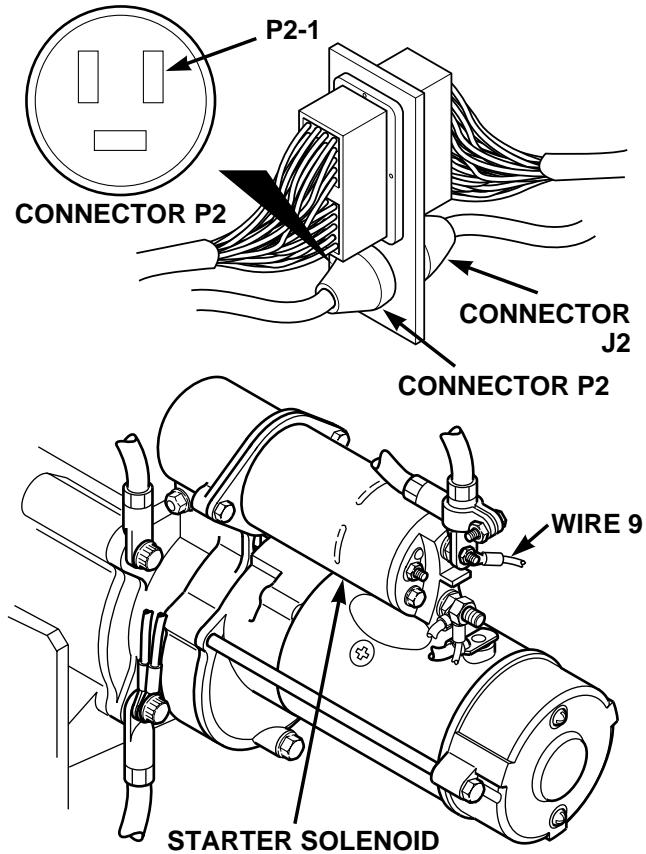
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONTINUITY TEST**

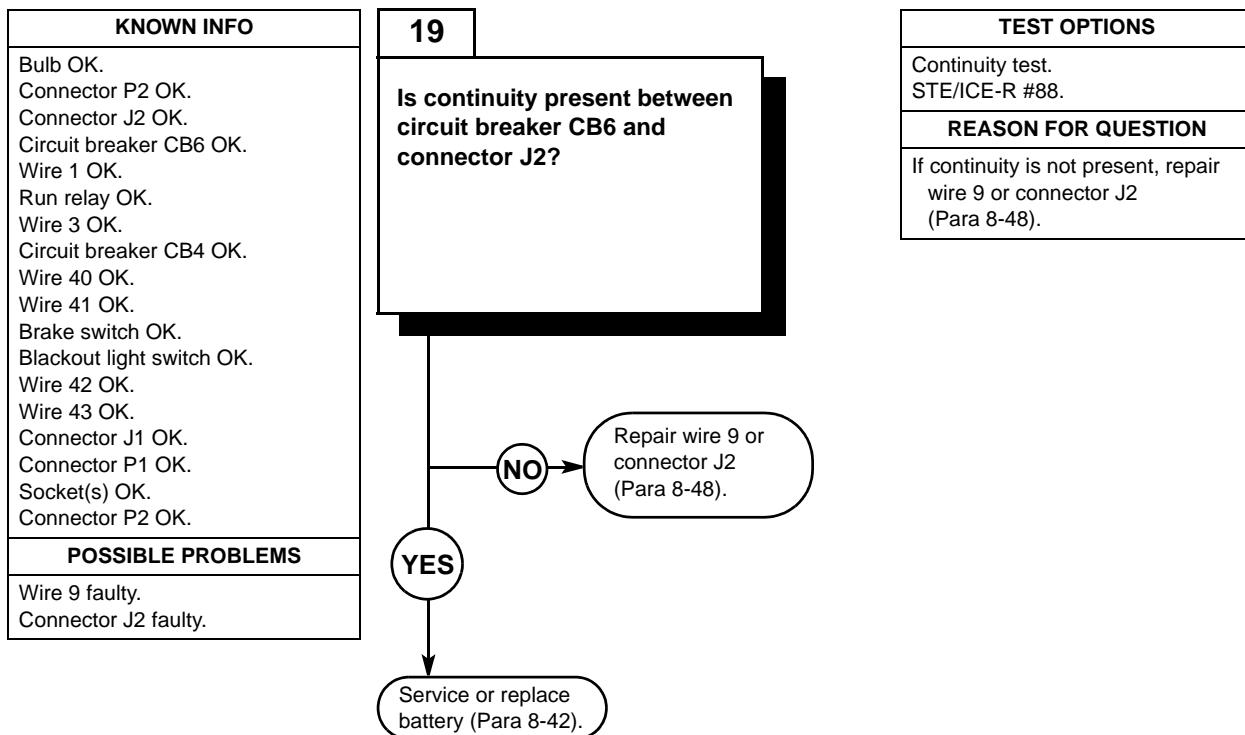
- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at brake light socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair wire 2 (Para 8-49) or replace brake light socket (Para 8-33).
- (5) Connect ground female connector to male connector.

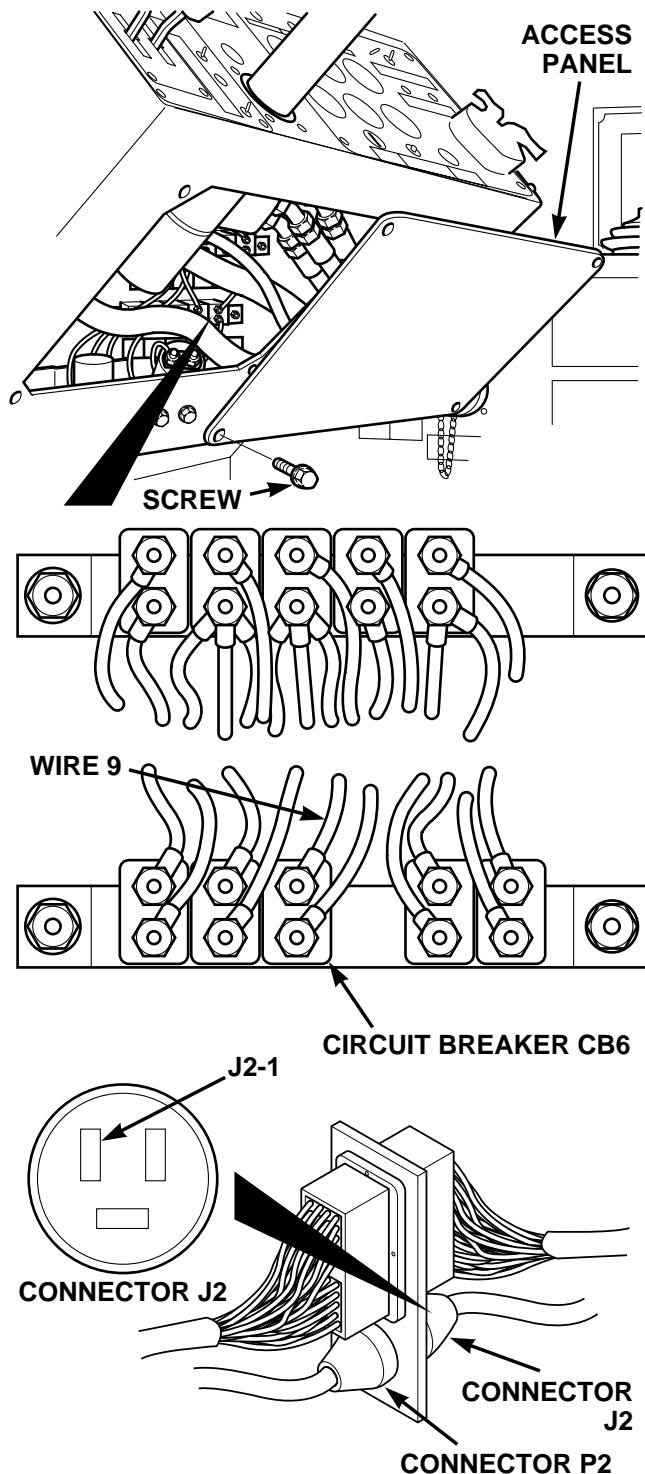
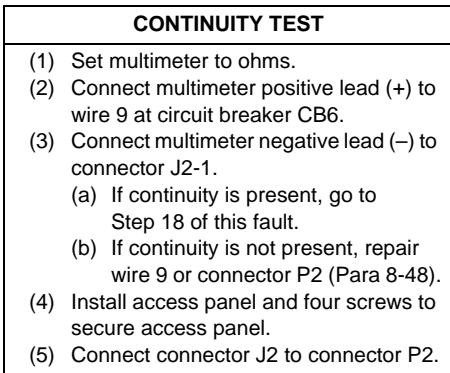
**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 19 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).



## 7. STOPLIGHT(S) DO NOT OPERATE (CONT.).





**8. TAILLIGHT(S) DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

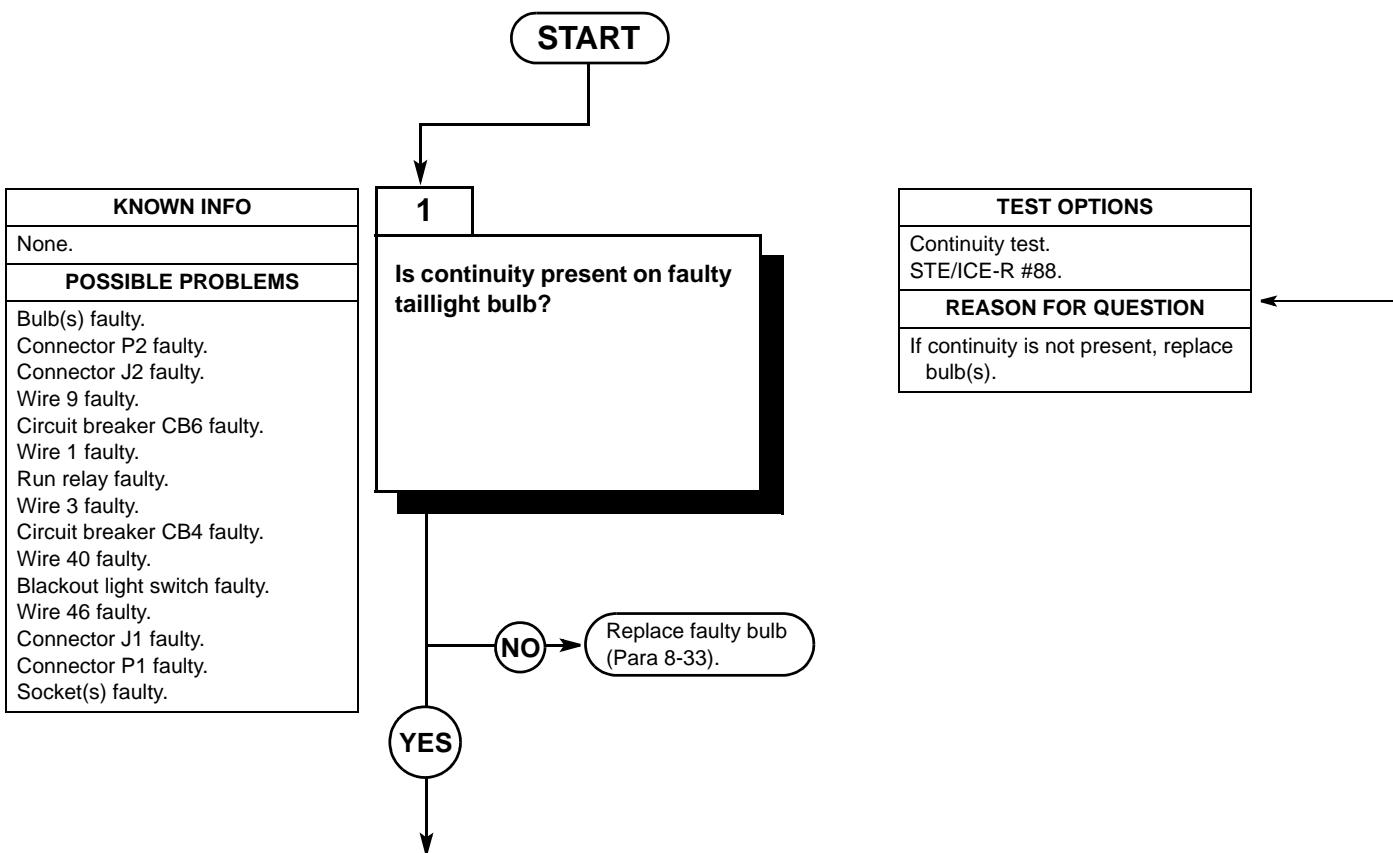
Two

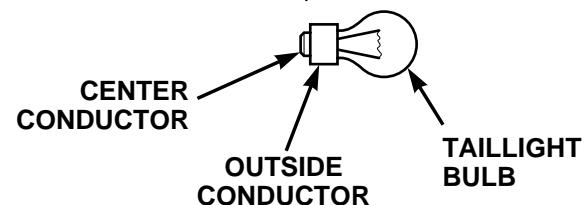
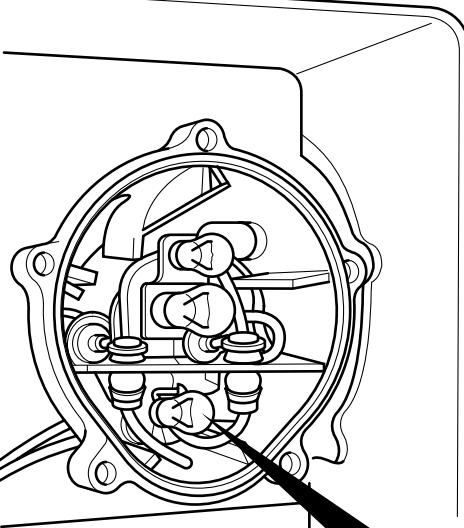
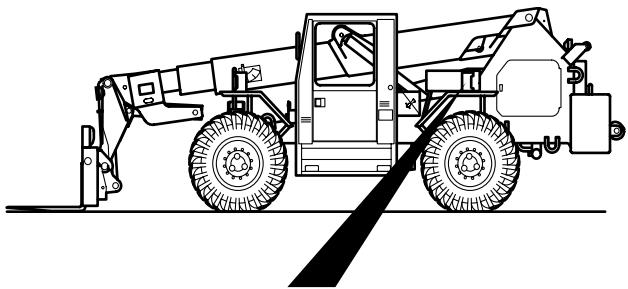
*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



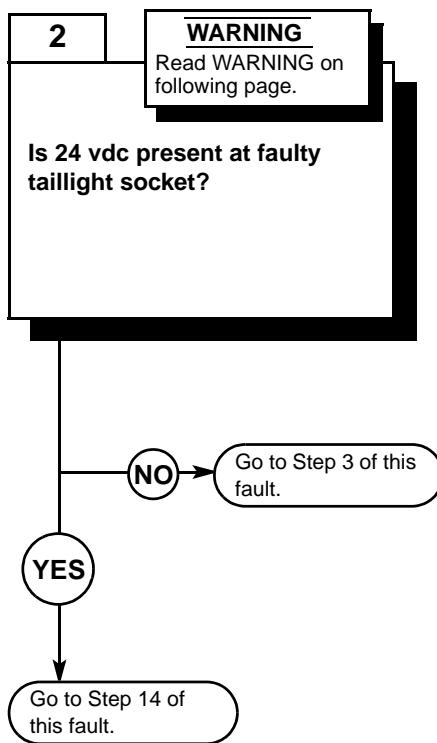


**CONTINUITY TEST**

- (1) Remove bulb from faulty taillight (Para 8-33).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to center conductor.
- (4) Connect multimeter negative lead (-) to outside conductor.
  - (a) If continuity is present, go to Step 2 of this fault.
  - (b) If continuity is not present, replace faulty bulb (Para 8-33).

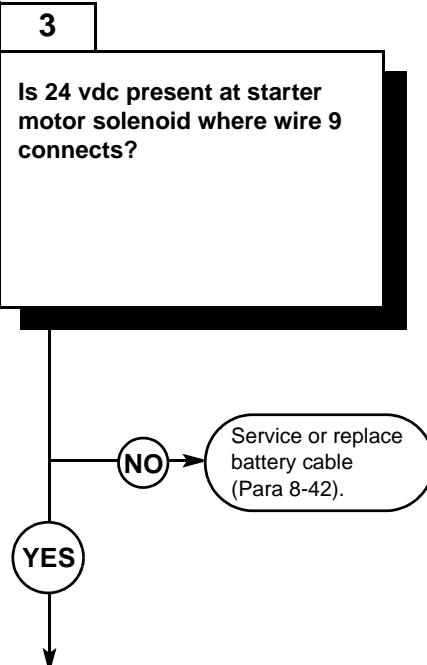
## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

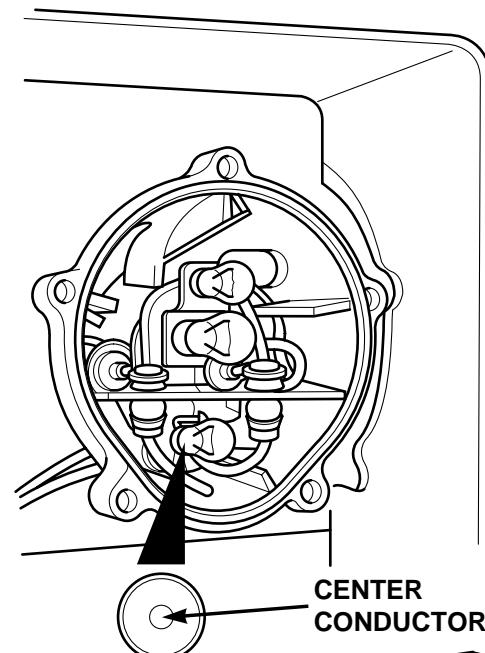


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

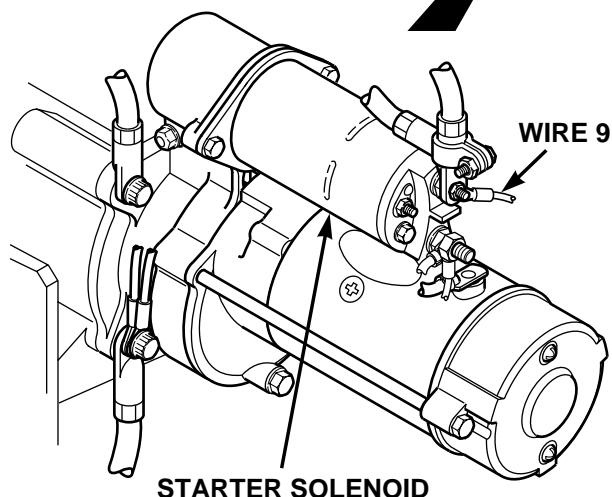
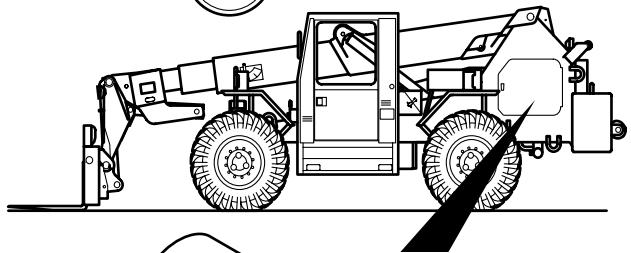
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

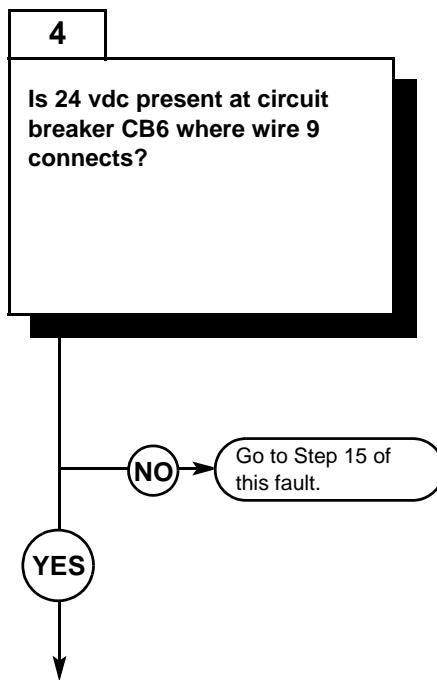


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, service or replace battery cable (Para 8-42).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



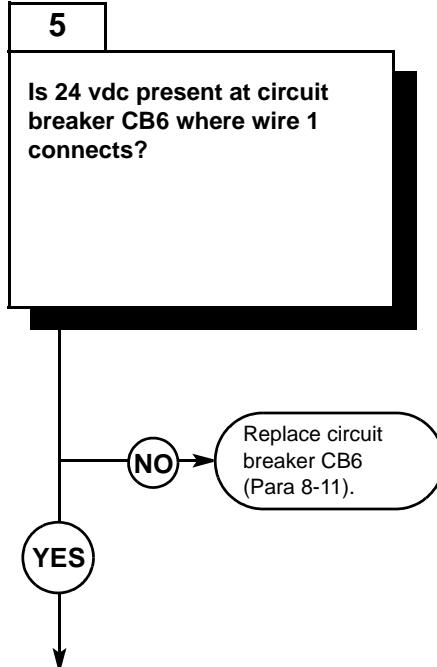
## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



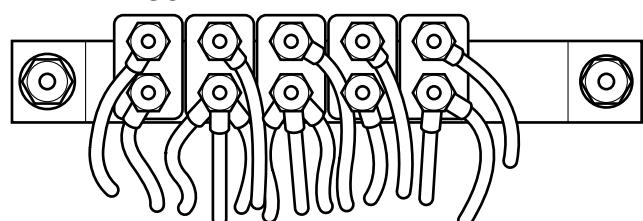
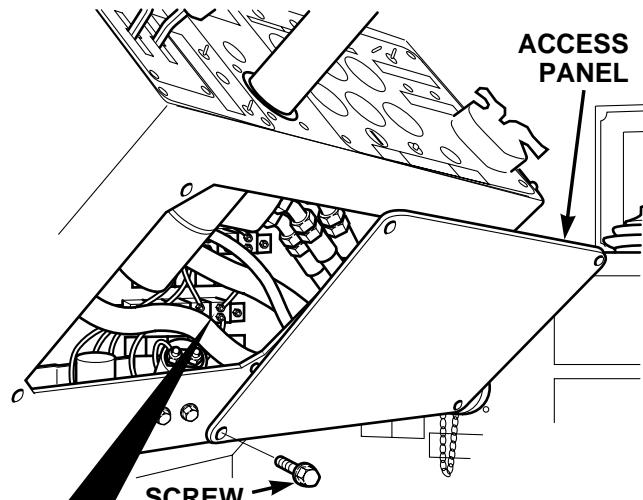
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 OK. Connector J2 OK. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

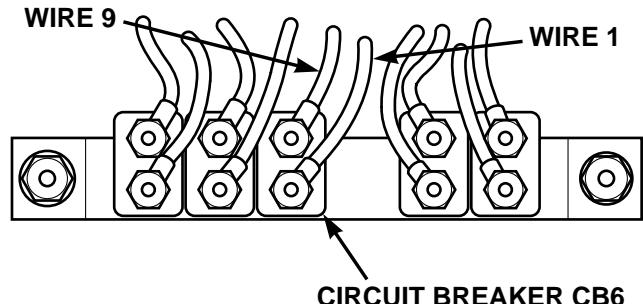


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Disconnect connector J2 from connector P2.
(4)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 15 of this fault.
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

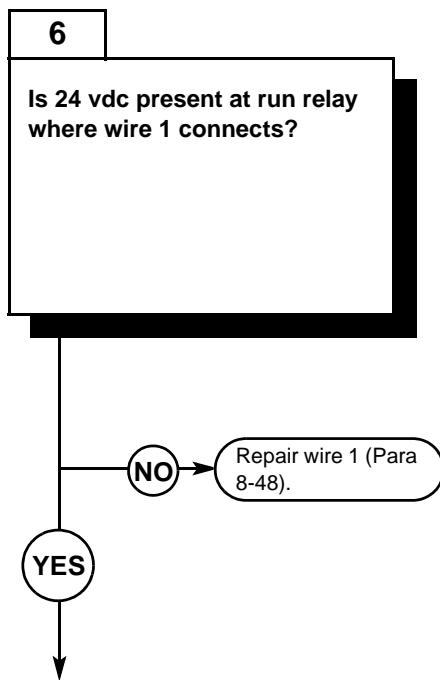


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).



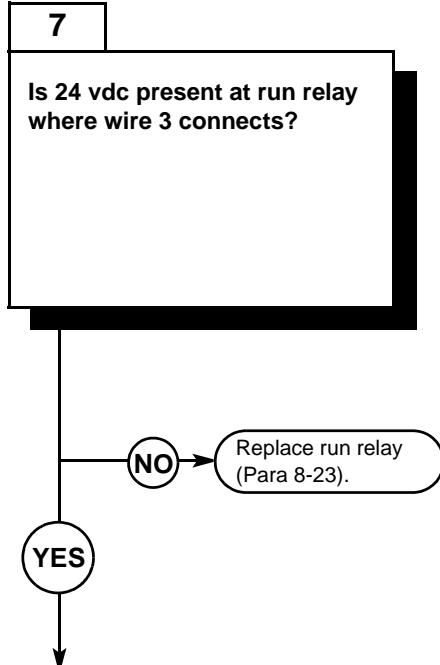
## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



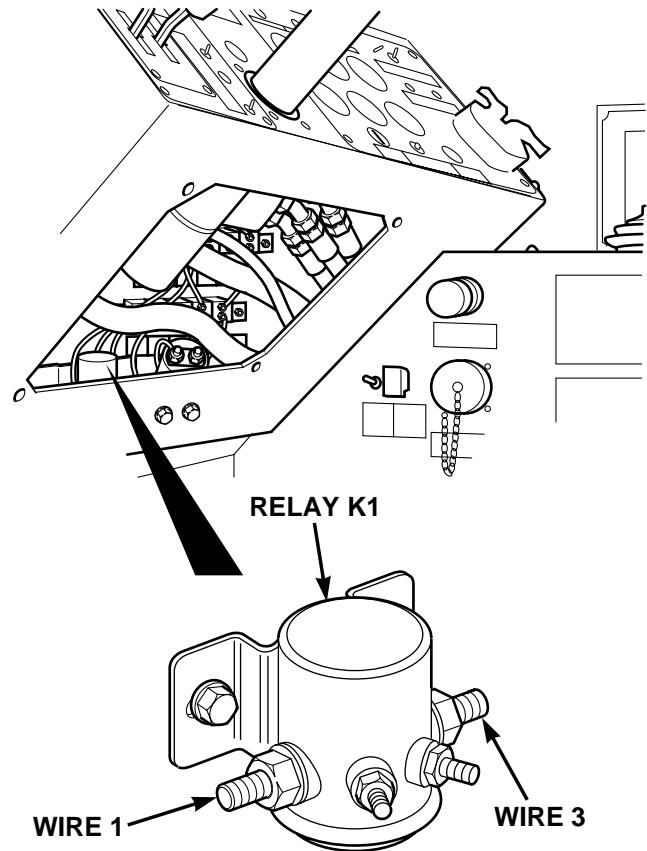
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

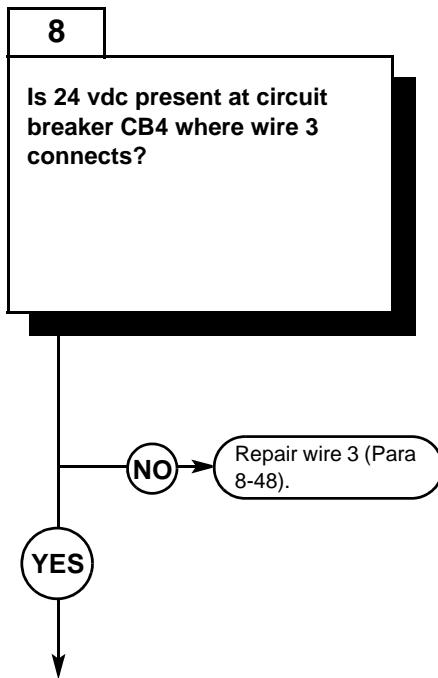
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



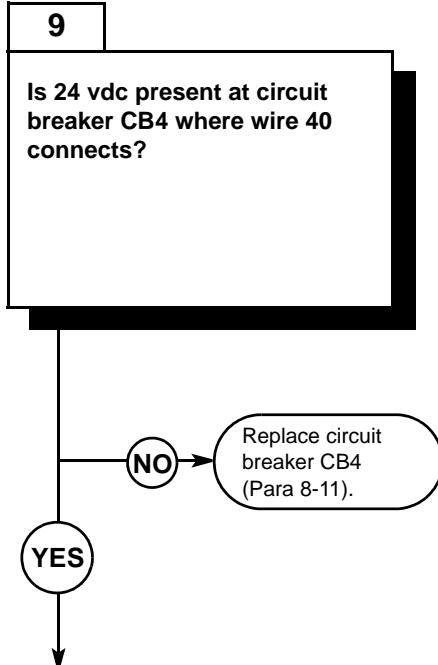
## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



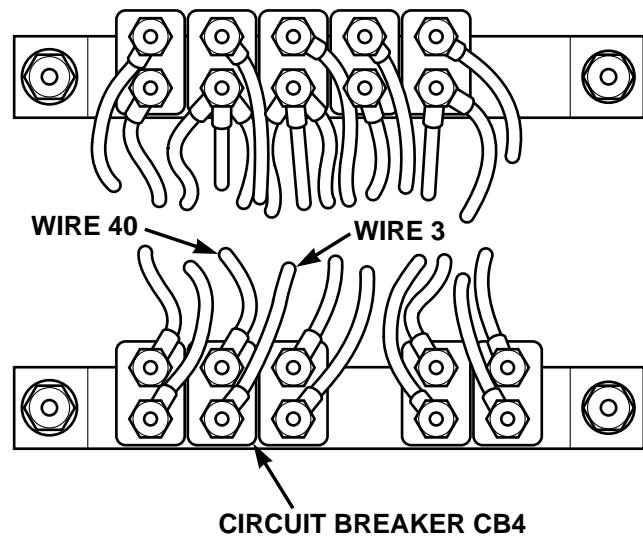
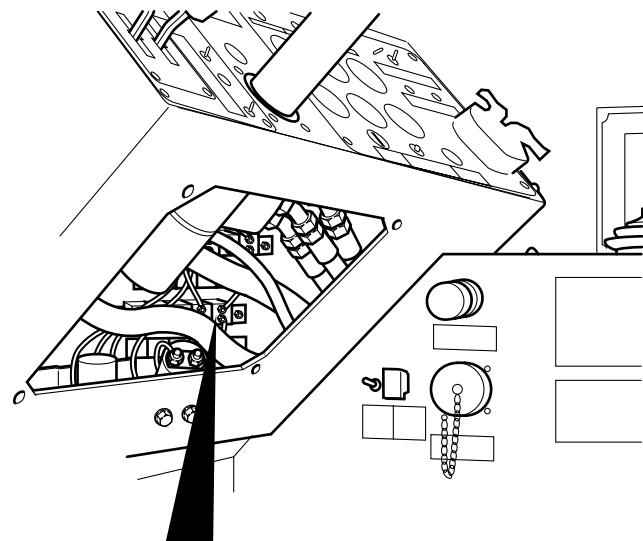
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



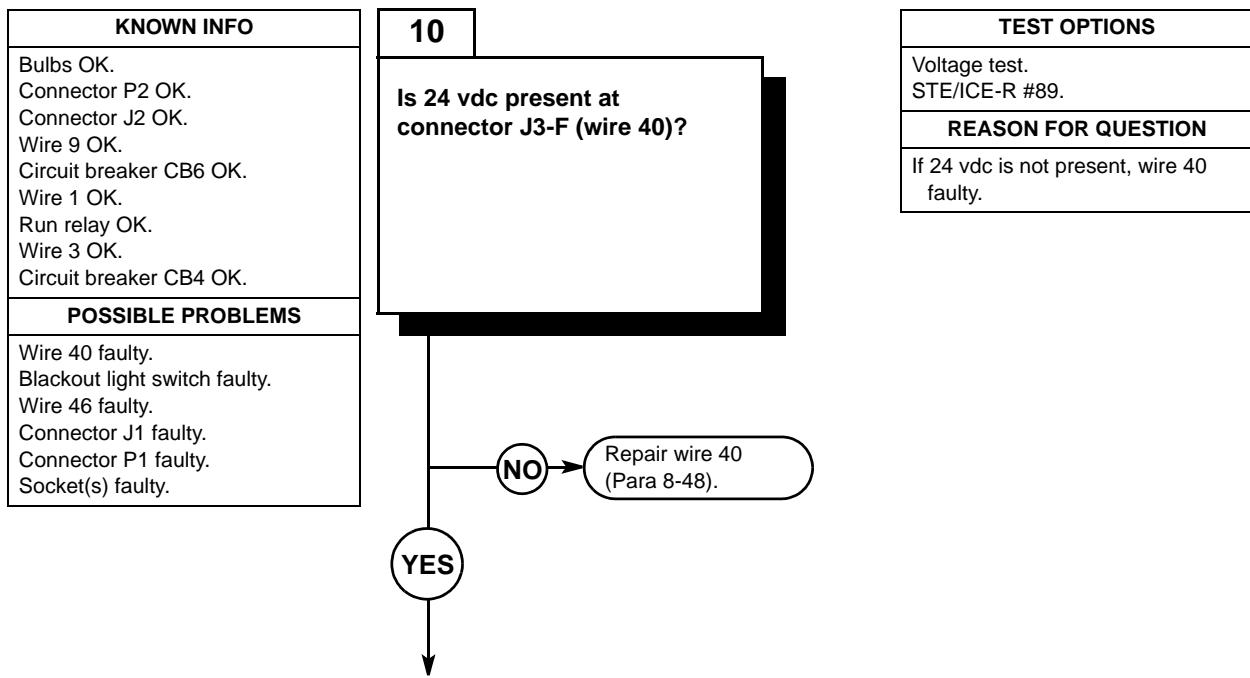
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

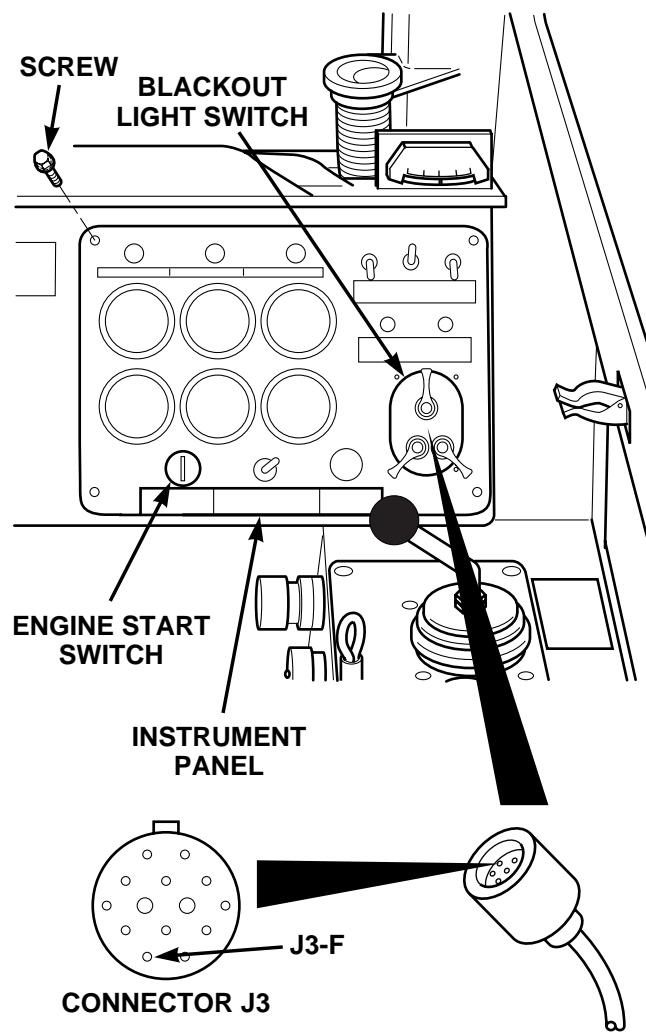


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to connector J3-F (wire 40).
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 40 (Para 8-48).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Lift instrument panel out to connect connector J3 to blackout light switch.
(11)	Install instrument panel and four screws.

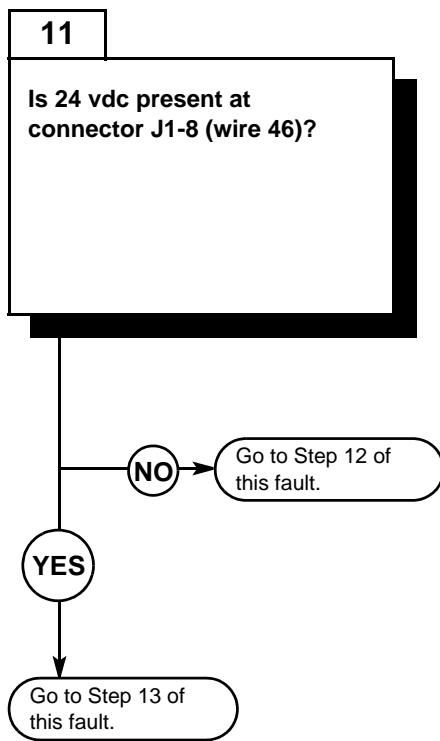


## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.

POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

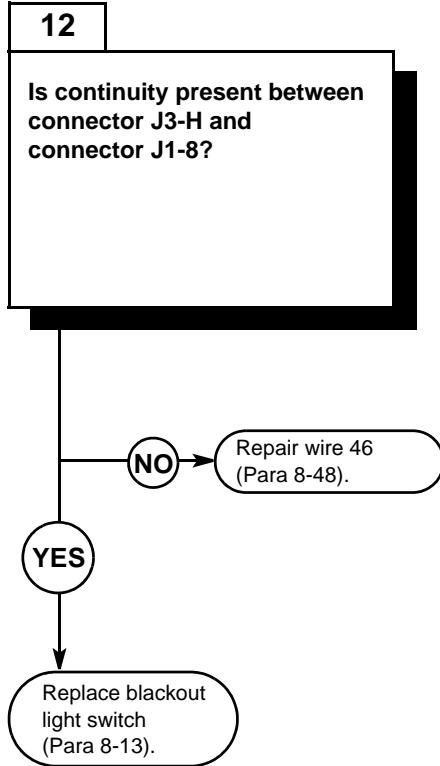


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout light switch or wire 46 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.

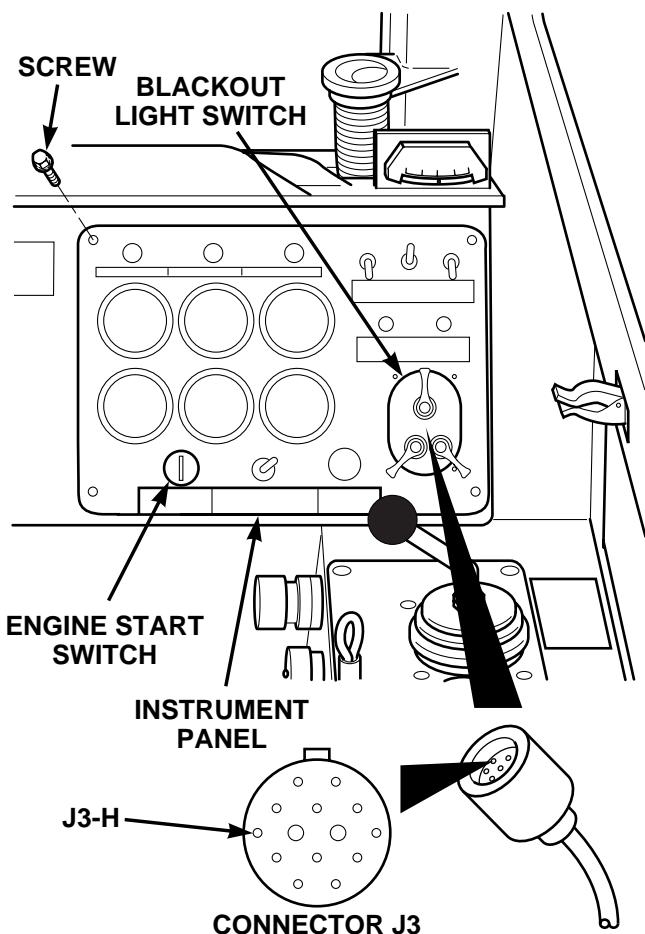
  

POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

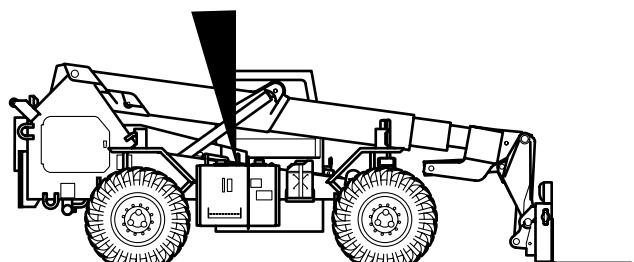
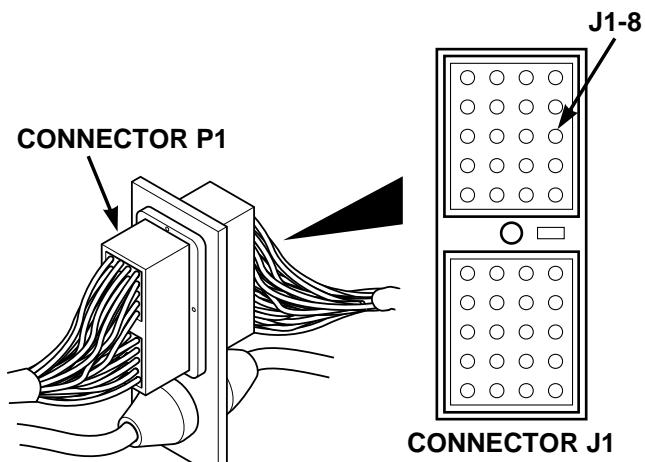


TEST OPTIONS
Continuity test. STE/ICER #88.
REASON FOR QUESTION
If continuity is not present, blackout control switch or wire 46 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-8 (wire 46).
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>CONTINUITY TEST</b>	
(1)	Remove four screws and instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Disconnect connector J1 from connector P1.
(4)	Set multimeter to ohms.
(5)	Connect multimeter positive lead (+) to connector J3-H (wire 46).
(6)	Connect multimeter negative lead (-) to connector J1-8 (wire 46).
(a)	If continuity is present, replace blackout light switch (Para 8-13).
(b)	If continuity is not present, repair wire 46 (Para 8-48).
(7)	Lift instrument panel out to connect connector J3 to blackout light switch.
(8)	Connect connector J1 to connector P1.
(9)	Install instrument panel and four screws.

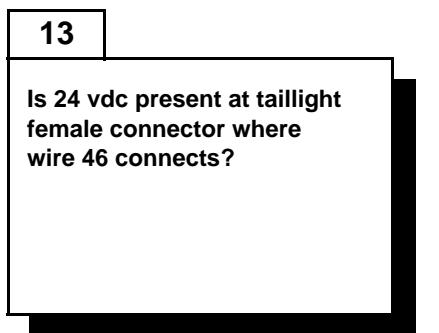


## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK.

POSSIBLE PROBLEMS
Wire 46 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.

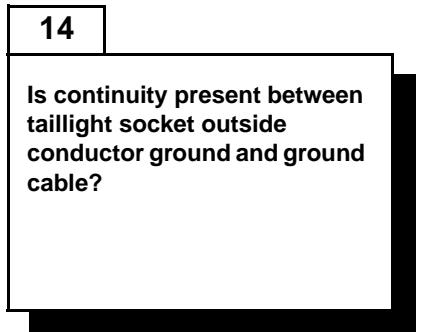
  

REASON FOR QUESTION
If 24 vdc is not present, wire 46 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 46 OK. Connector J1 OK. Connector P1 OK.

POSSIBLE PROBLEMS



TEST OPTIONS
Continuity test. STE/ICE-R #88.

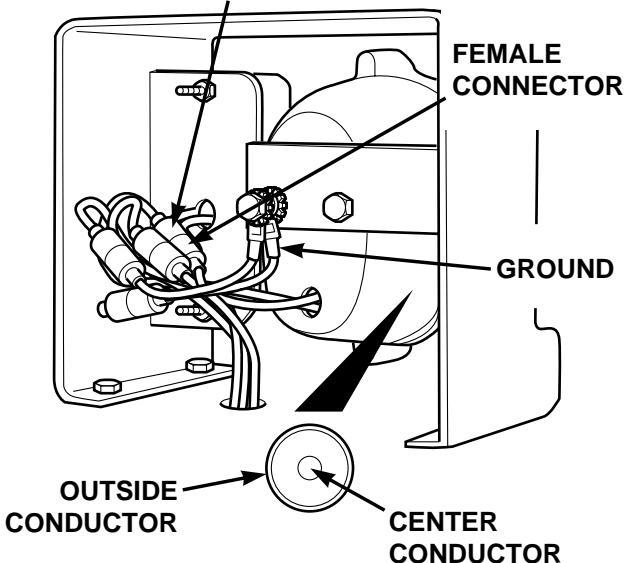
REASON FOR QUESTION
If continuity is not present, wire 2 ground or brake light socket faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to taillight female connector where wire 46 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 14 of this fault.
  - (b) If 24 vdc is not present, repair wire 46 (Para 8-48).
- (7) Turn blackout light switch to OFF position (TM 10-3930-673-10).
- (8) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (9) Disconnect negative battery cable from negative side of battery (Para 8-42).

**CONTINUITY TEST**

- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at taillight socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair wire 2 (Para 8-49) or replace blackout brake light socket (Para 8-13).

**MALE CONNECTOR**

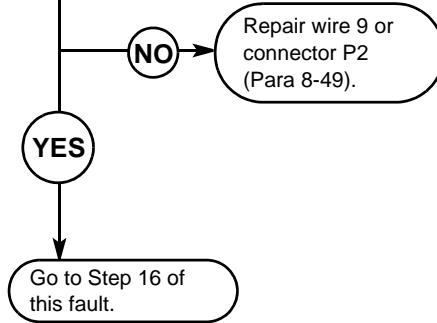
## 8. TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Wire 46 OK.
Socket(s) OK.
POSSIBLE PROBLEMS
Wire 9 faulty.
Connector J2 faulty.
Connector P2 faulty.

**15**

Is continuity present between starter motor solenoid and connector P2-1?

TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

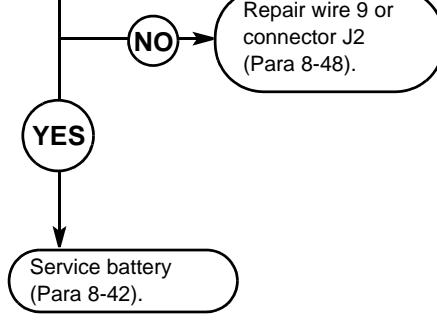


KNOWN INFO
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Wire 46 OK.
Socket(s) OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty.
Connector J2 faulty.

**16**

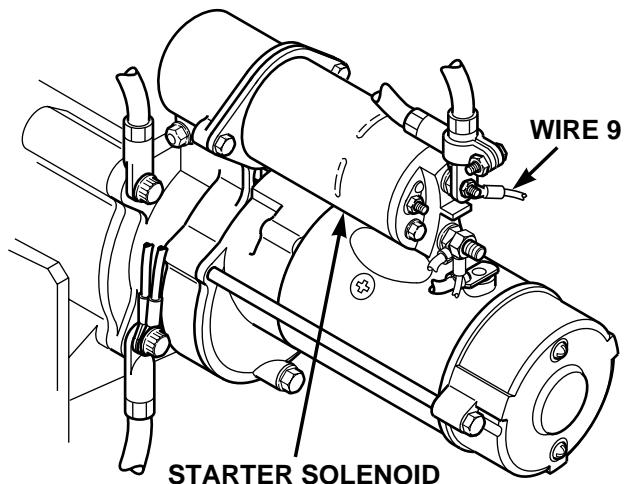
Is continuity present between circuit breaker CB6 and connector J2?

TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector J2 (Para 8-48).

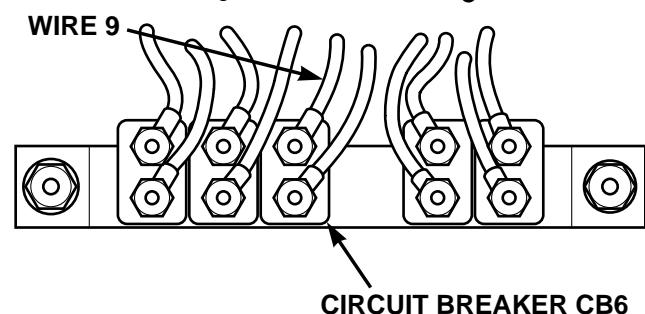
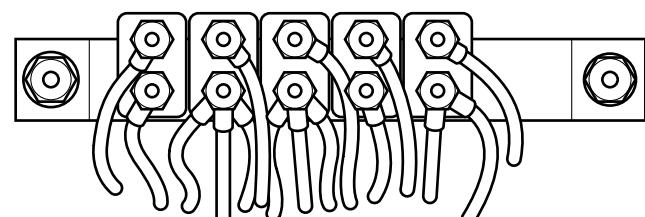
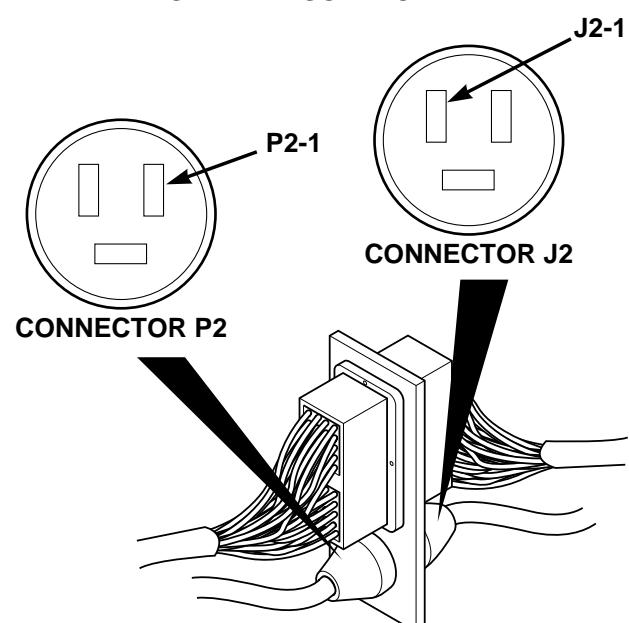


**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 16 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at circuit breaker CB6.
- (4) Connect multimeter negative lead (-) to connector J2-1.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, Repair wire 9 or connector J2 (Para 8-48).
- (5) Install access panel and four screws.
- (6) Connect negative battery cable to negative side of battery.
- (7) Install battery cover (Para 8-42).



**9. PARKING LIGHTS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

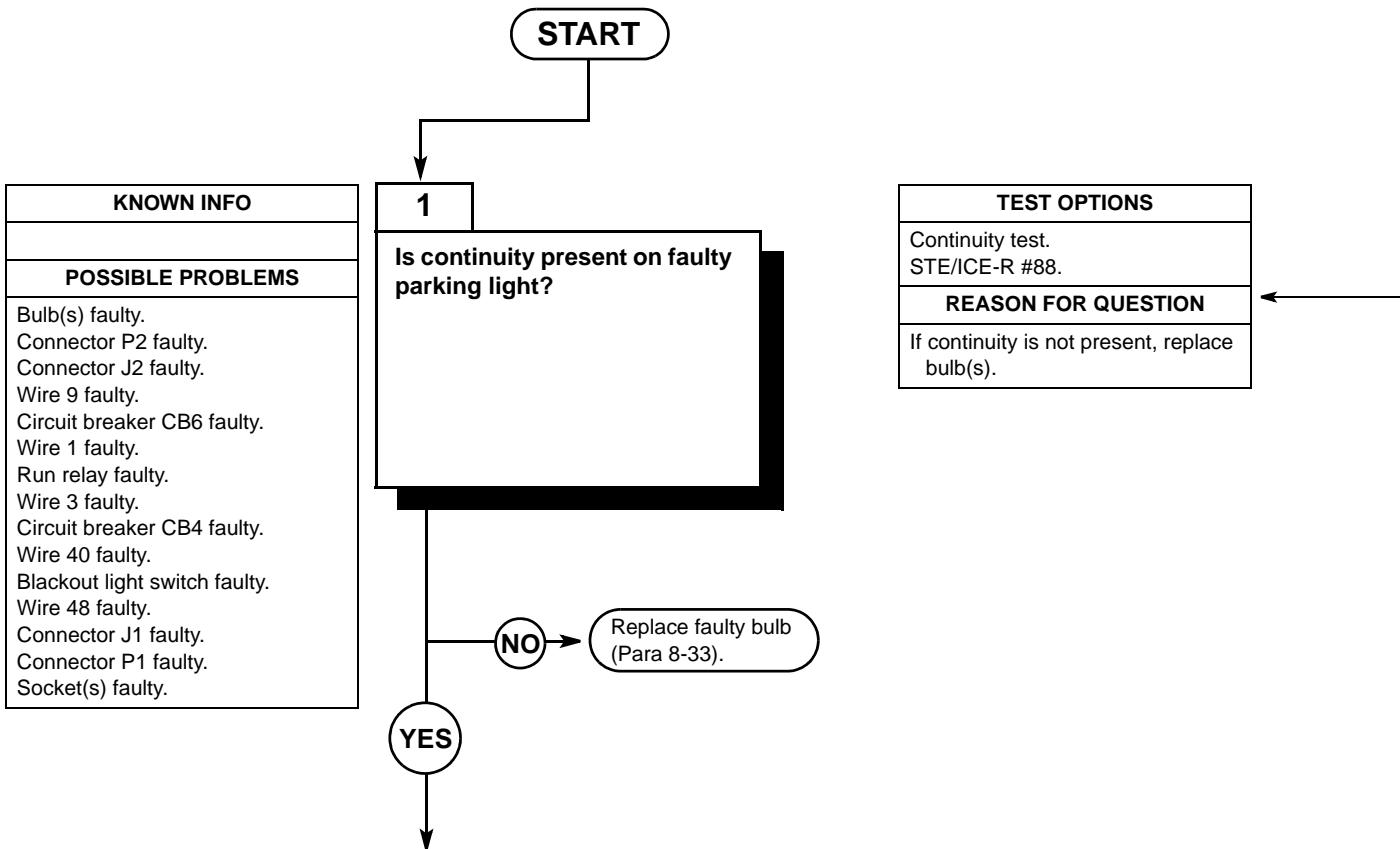
Two

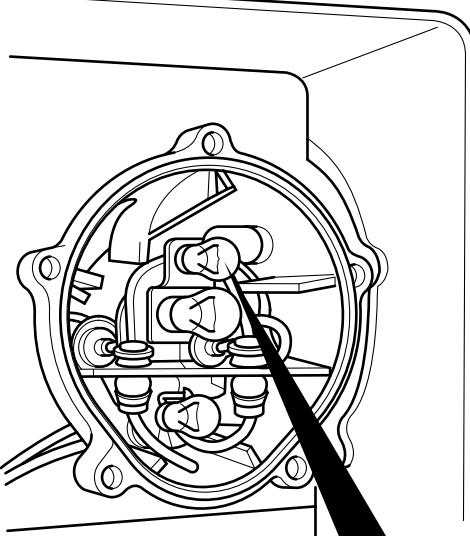
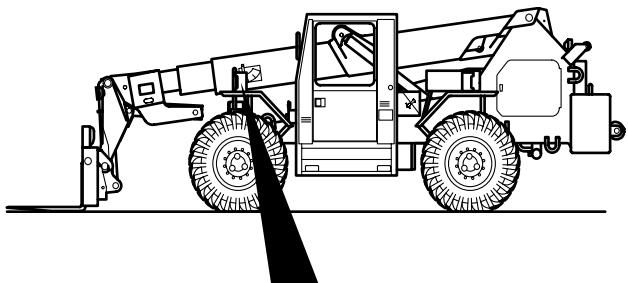
*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

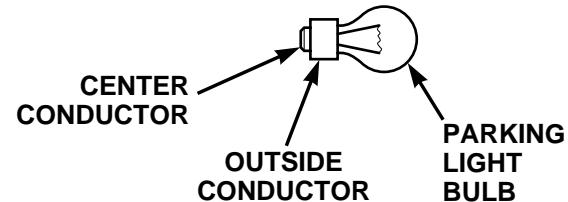
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)





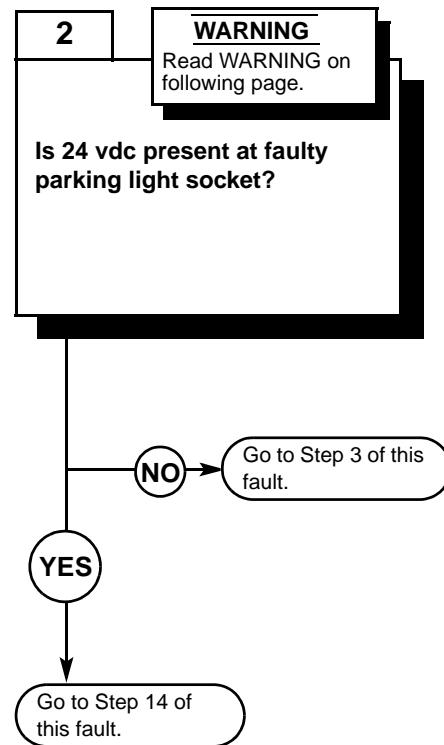
**CONTINUITY TEST**

- (1) Remove bulb from faulty parking light (Para 8-33).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to center conductor of bulb.
- (4) Connect multimeter negative lead (-) to outside conductor of bulb.
  - (a) If continuity is present, go to Step 2 of this fault.
  - (b) If continuity is not present, replace bulb (Para 8-33).



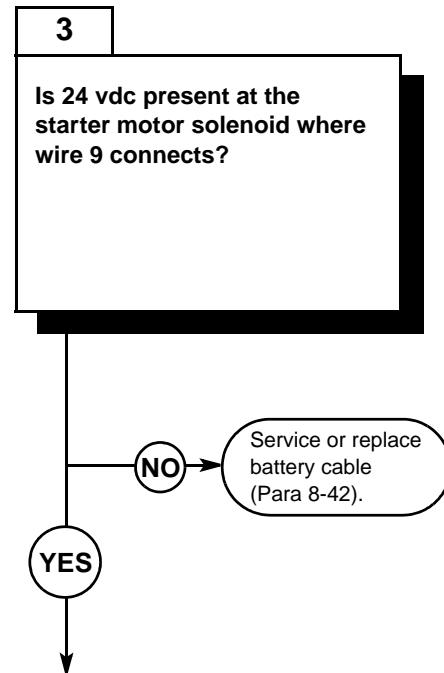
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

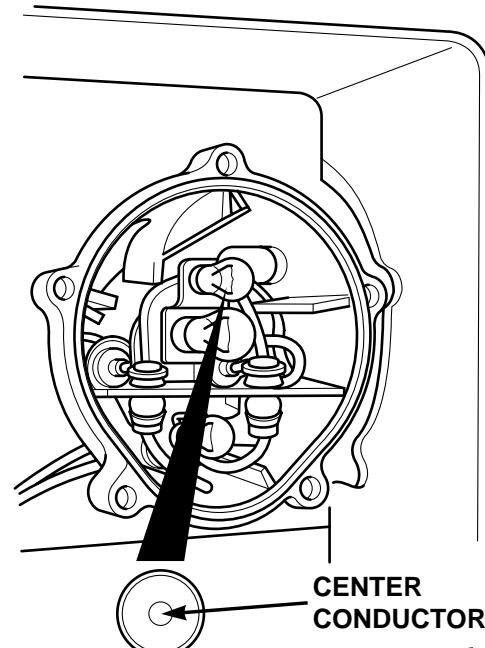


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

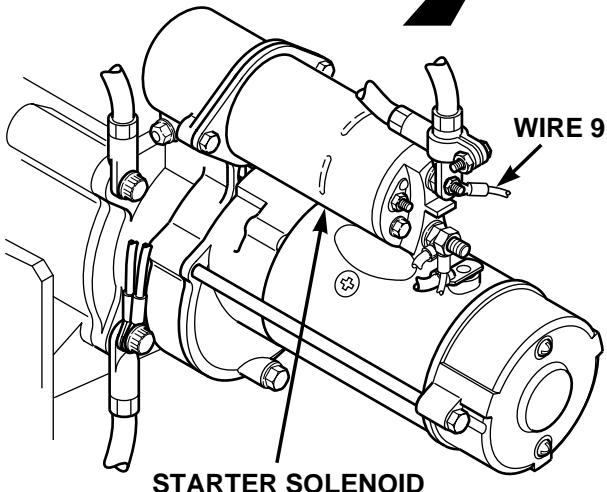
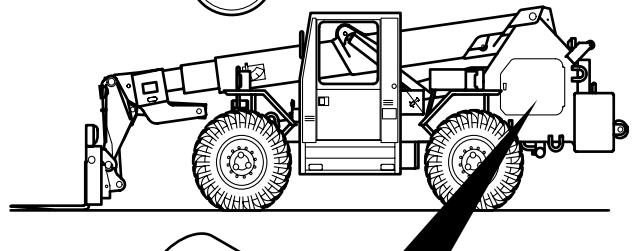
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(9)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(10)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

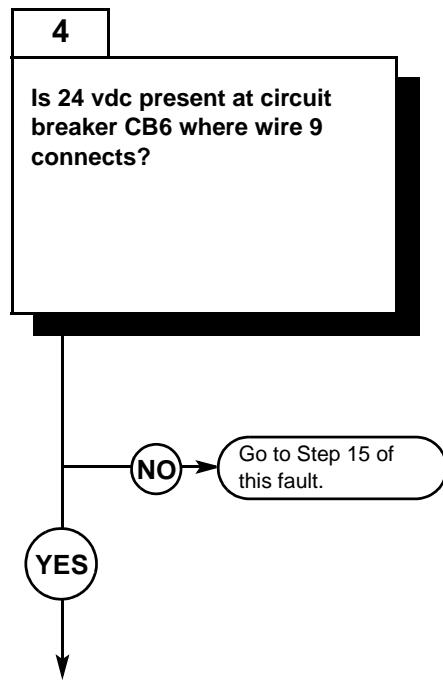


<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to the starter motor solenoid where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, service battery cable (Para 8-42).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).



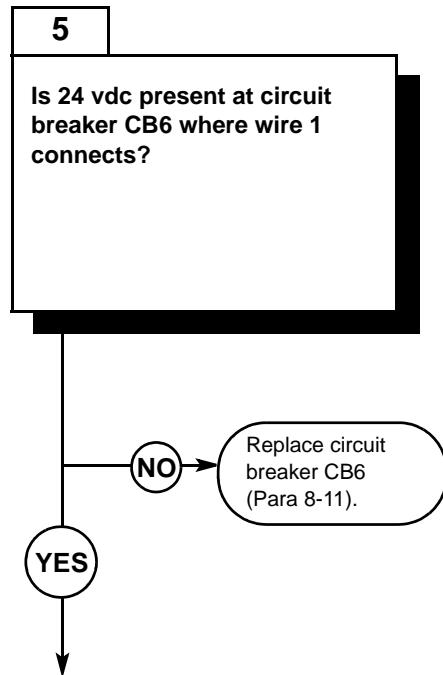
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



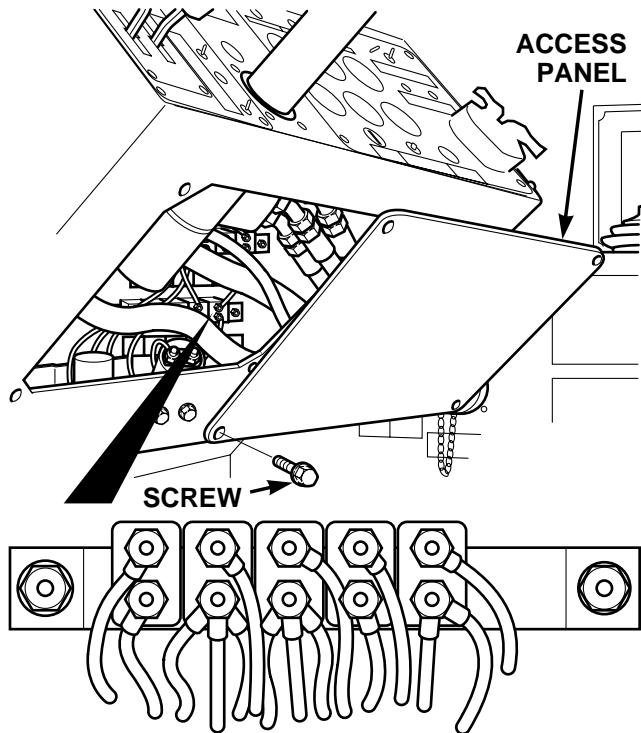
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb(s) OK.
POSSIBLE PROBLEMS
Connector P2 OK. Connector J2 OK. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

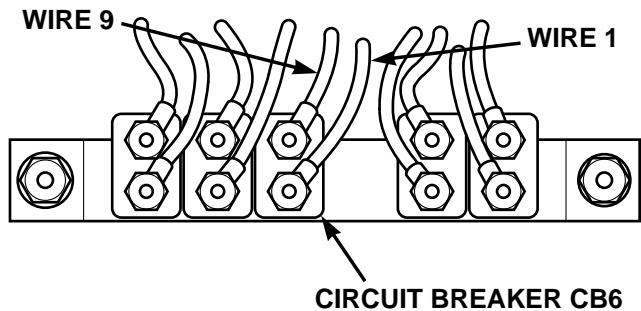


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 is faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 15 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

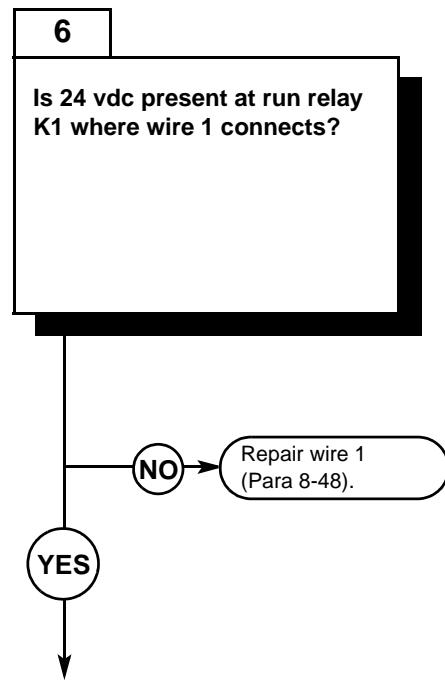


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect the multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).



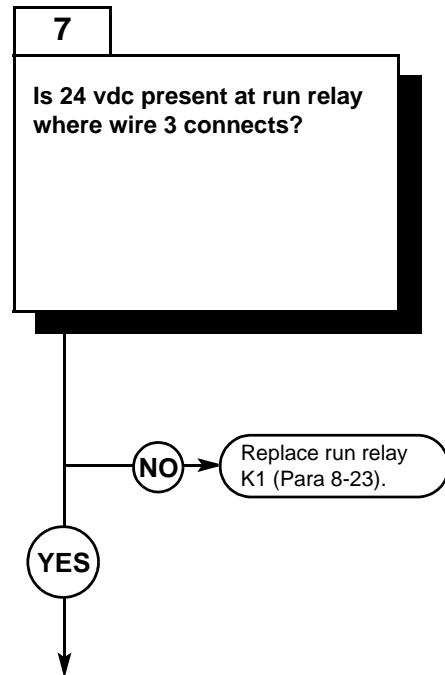
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



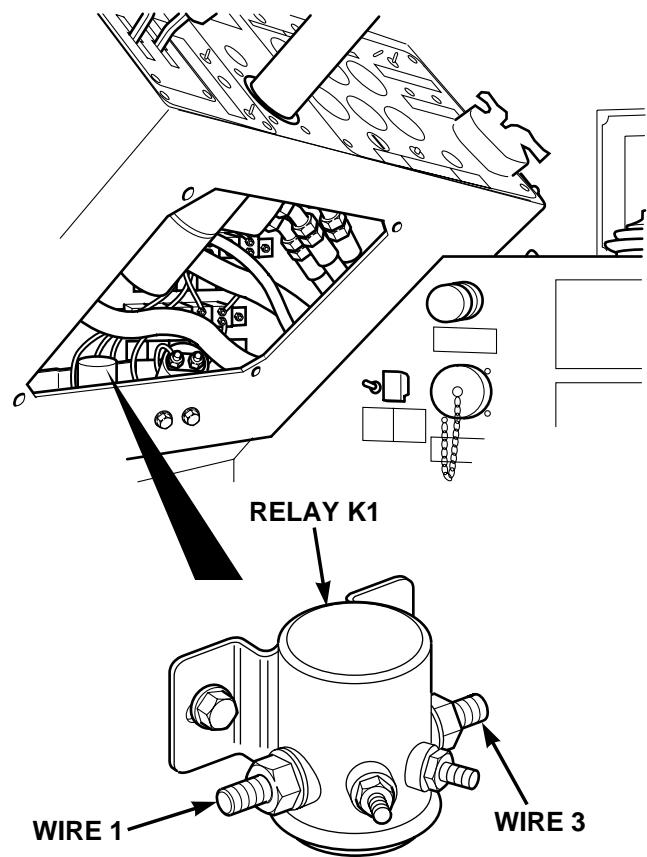
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay K1 is faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

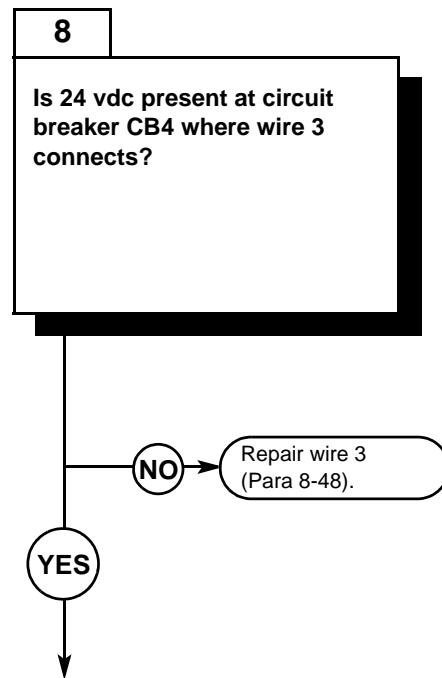
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



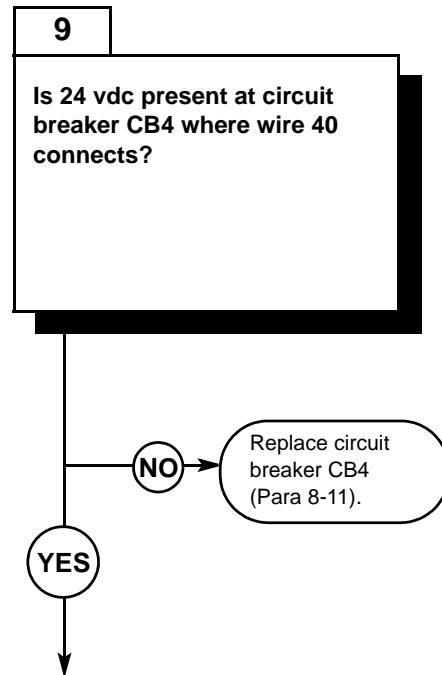
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



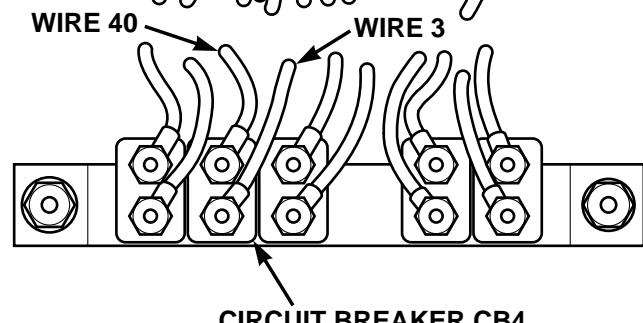
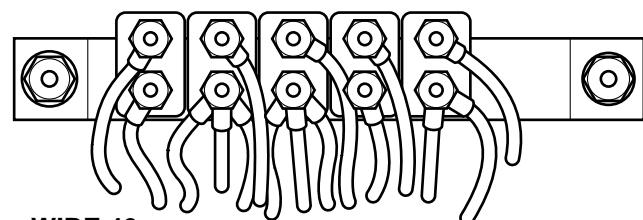
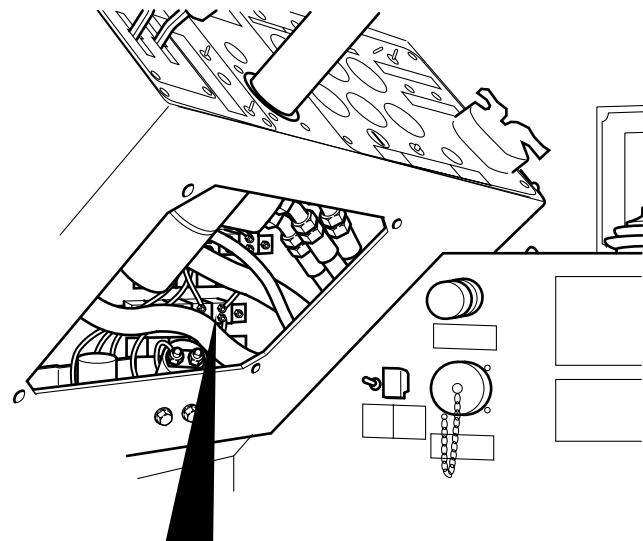
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 is faulty.

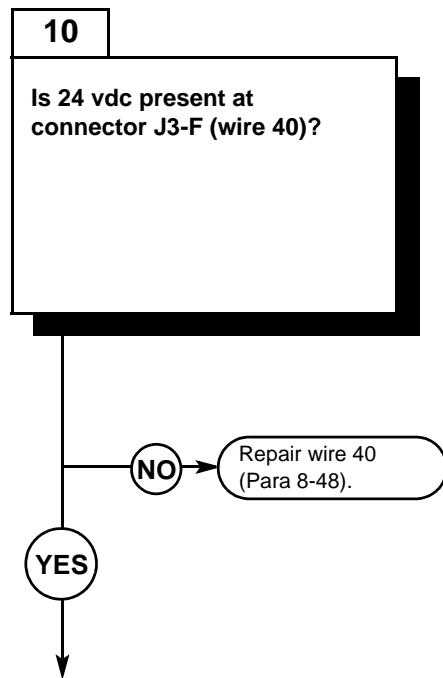
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

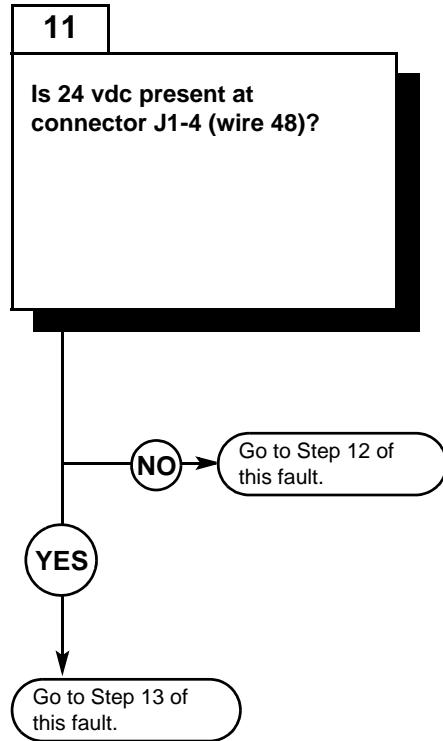
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK.
POSSIBLE PROBLEMS
Wire 40 faulty. Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



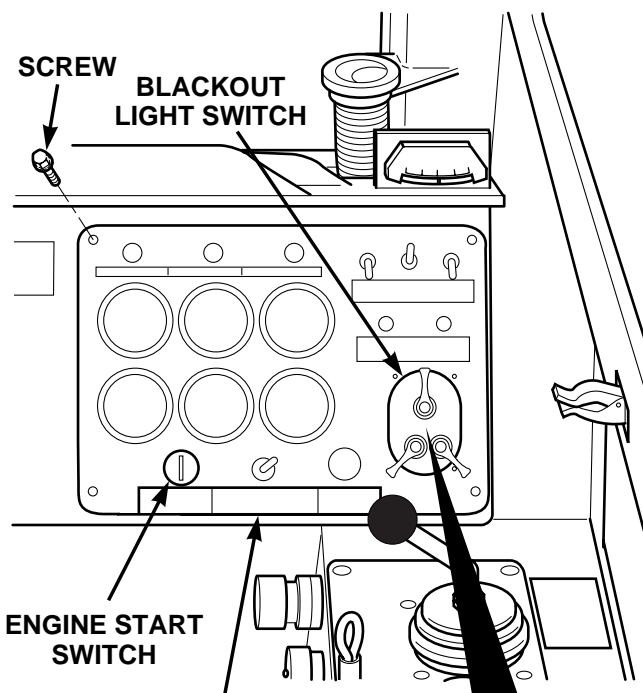
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 40 is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

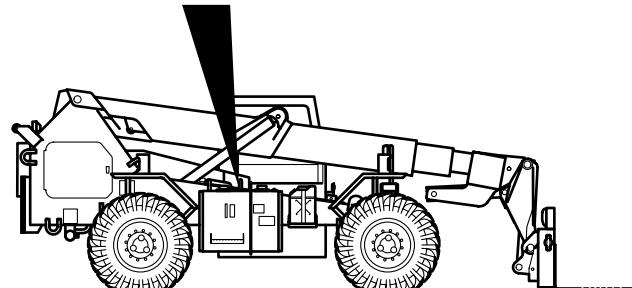
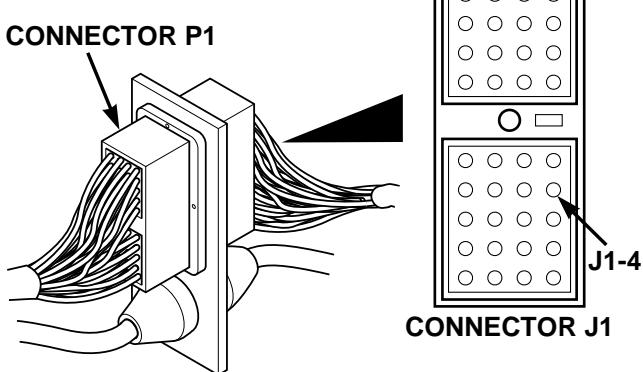
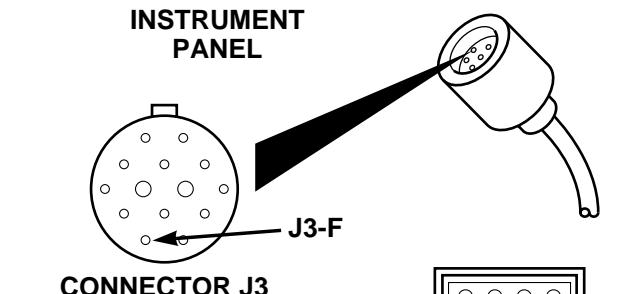


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout light switch or wire 48 are faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to connector J3-F (wire 40).
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 40 (Para 8-48).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Lift instrument panel out to connect connector J3 to blackout light switch.
(11)	Install instrument panel and four screws to secure instrument panel.

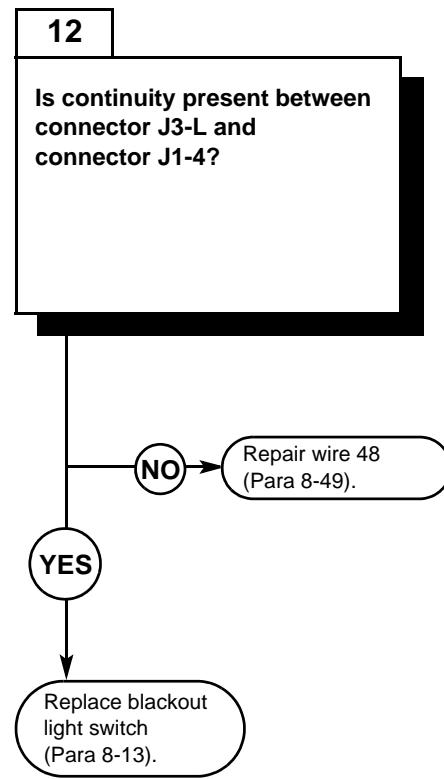


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-4 (wire 48).
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



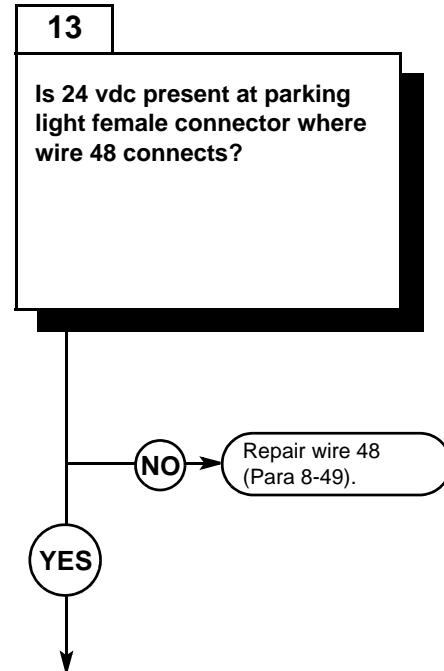
## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 48 is faulty.

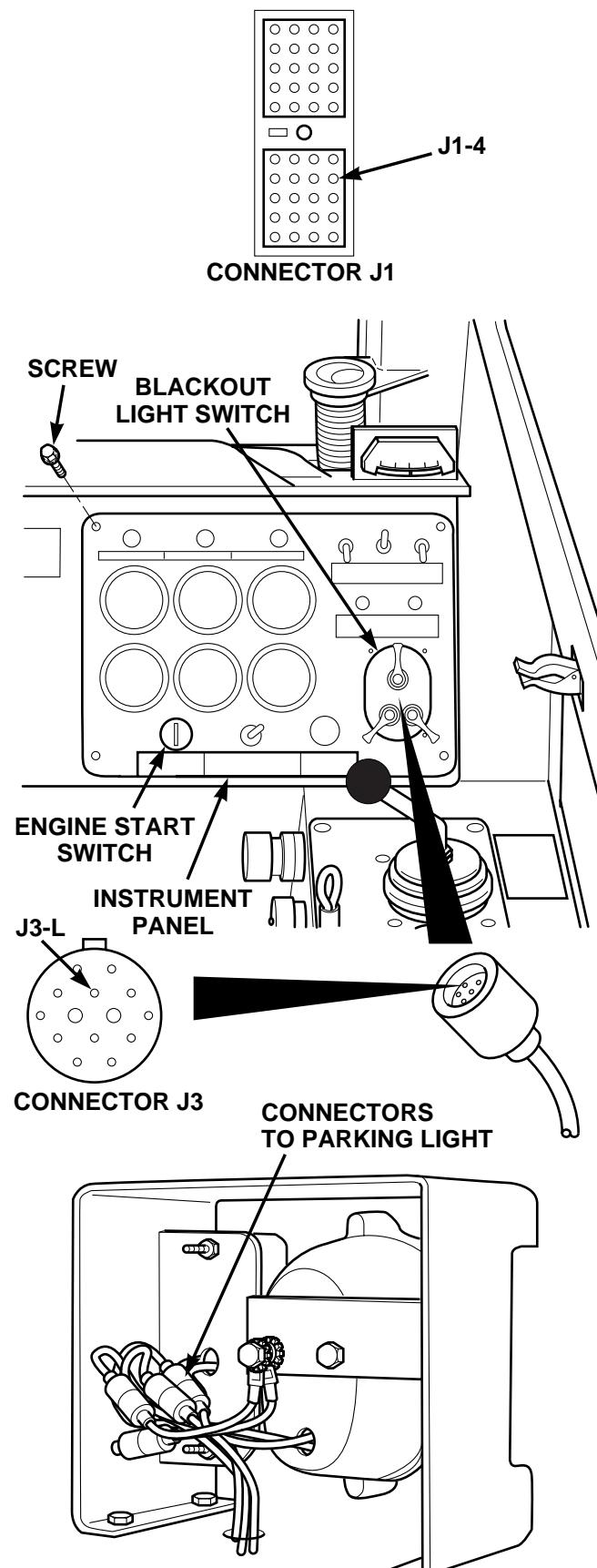
KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK.
POSSIBLE PROBLEMS
Wire 48 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 48 is faulty.

<b>CONTINUITY TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to connector J3-L (wire 48).
(5)	Connect multimeter negative lead (-) to connector J1-4 (wire 48).
(a)	If continuity is present, replace blackout light switch (Para 8-13).
(b)	If continuity is not present, repair wire 48 (Para 8-49).
(6)	Lift instrument panel out to connect connector J3 to blackout light switch.
(7)	Connect connector J1 to connector P1.
(8)	Install instrument panel and four screws to secure instrument panel.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to parking light female connector where wire 48 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to SER. DRIVE position (TM 10-3930-673-10). (a) If 24 vdc is present, go to Step 14 of this fault. (b) If 24 vdc is not present, repair wire 48 (Para 8-49).
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Connect female connector to male connector for parking light.

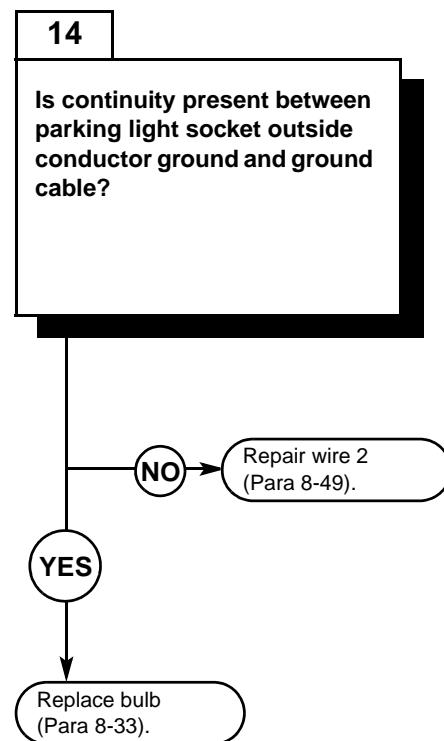


## 9. PARKING LIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 48 OK. Connector J1 OK. Connector P1 OK.

POSSIBLE PROBLEMS
Socket(s) faulty.

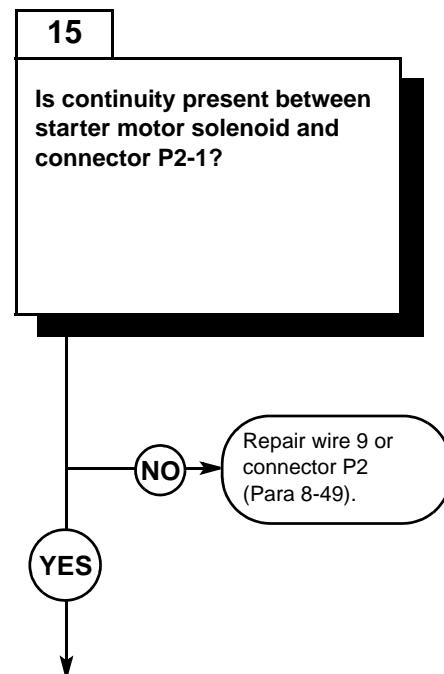


TEST OPTIONS
Continuity Test. STE/ICE-R #88
REASON FOR QUESTION
If continuity is not present, wire 2 ground or brake light socket is faulty.

KNOWN INFO
Bulb(s) OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 48 OK. Socket(s) OK.

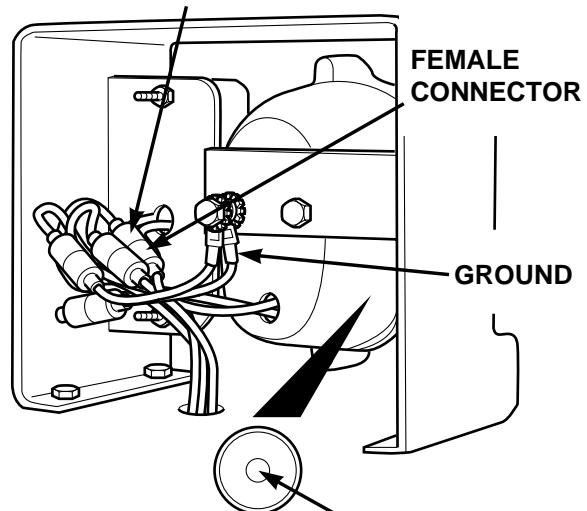
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J1 faulty. Connector P1 faulty.



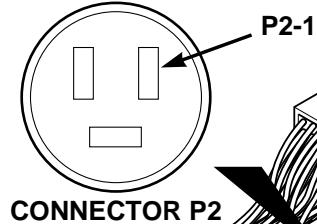
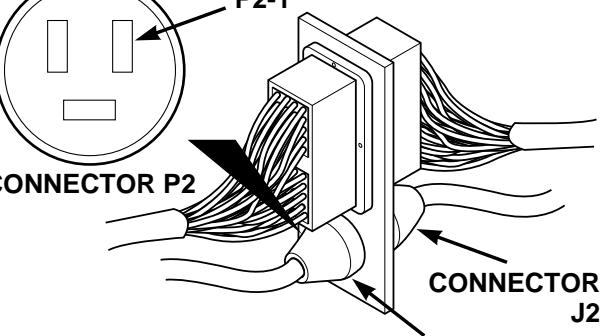
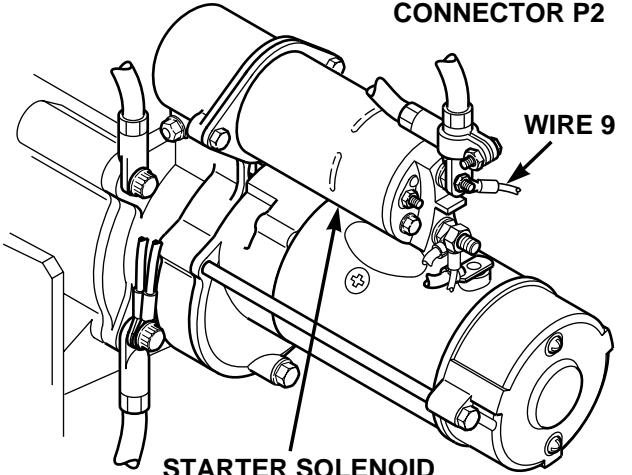
TEST OPTIONS
Continuity Test. STE/ICE-R #88
REASON FOR QUESTION
If continuity is not present, wire 9 or connector P2 is faulty.

**CONTINUITY TEST**

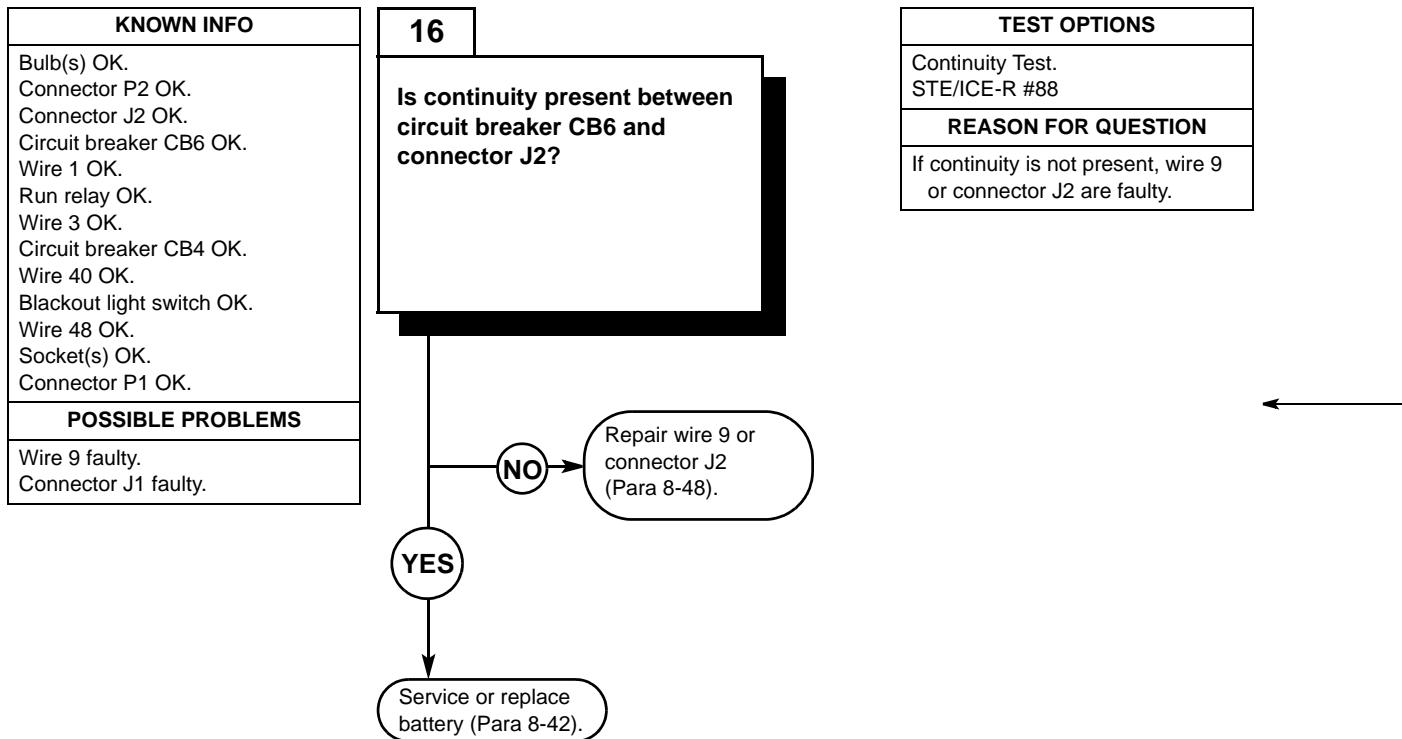
- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at parking light socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair wire 2 (Para 8-49).
- (5) Connect ground female connector to ground male connector.

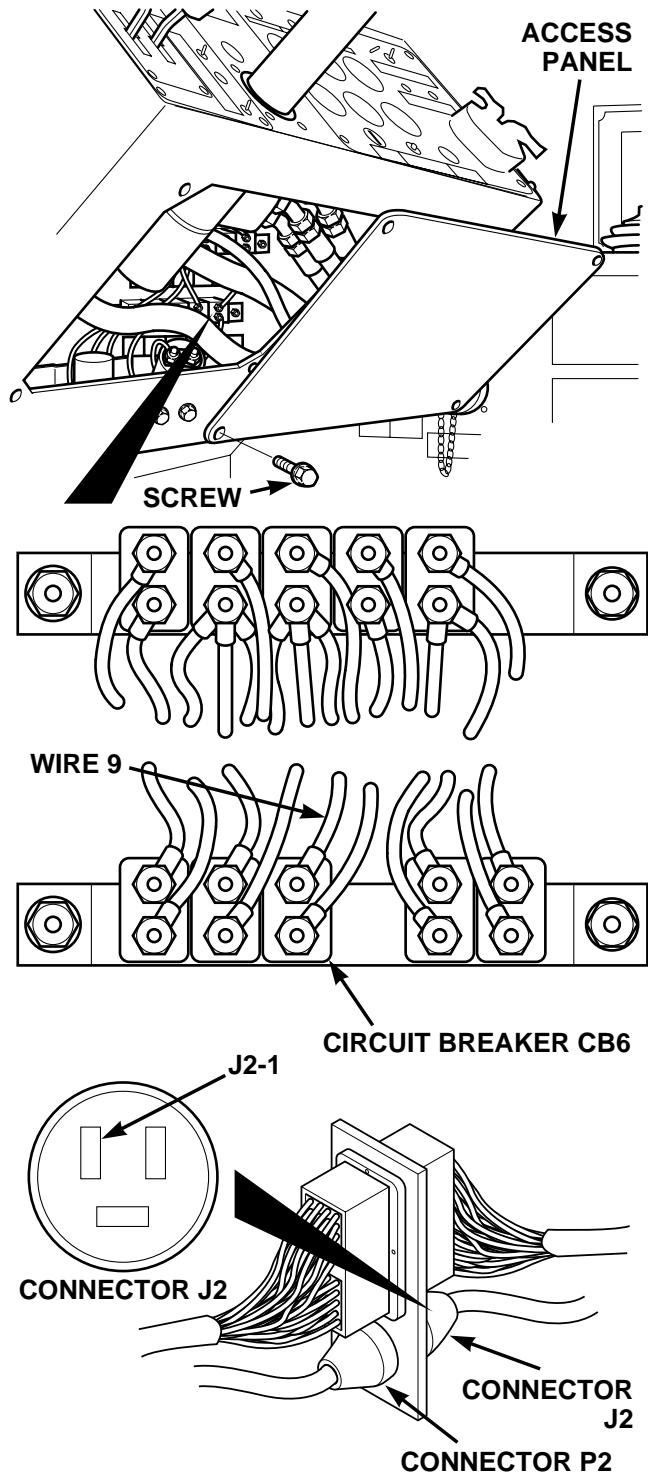
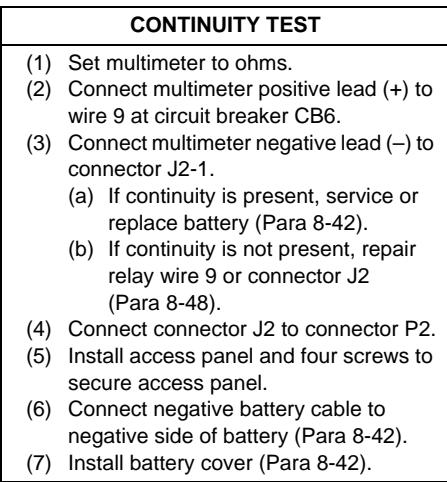
**MALE CONNECTOR****CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 16 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONNECTOR P2****CONNECTOR J2****WIRE 9**

## **9. PARKING LIGHTS DO NOT OPERATE (CONT.).**





**10. ALL TURN SIGNALS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

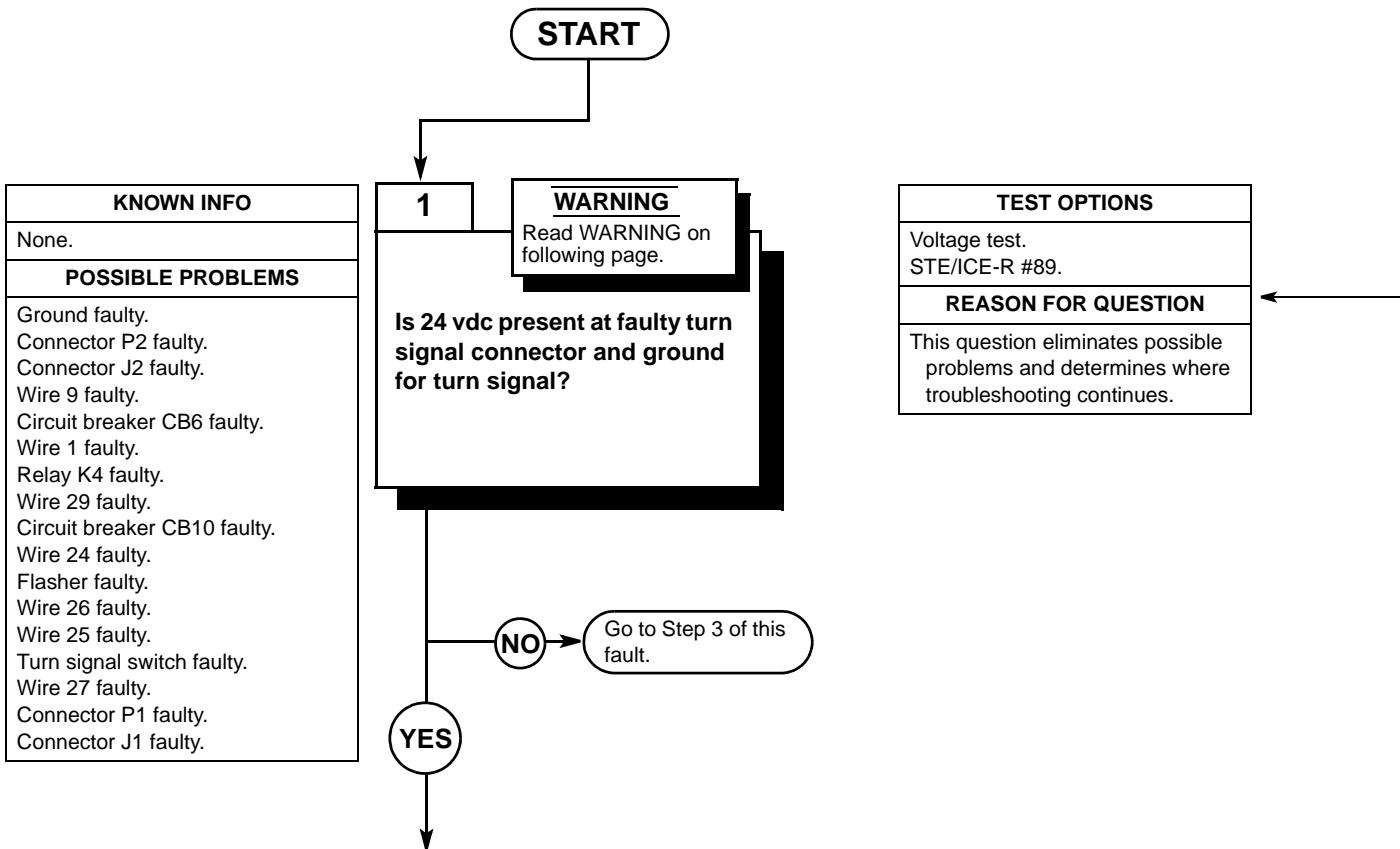
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

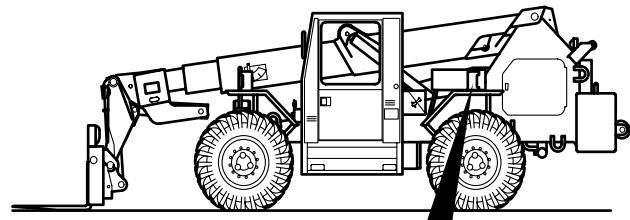
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

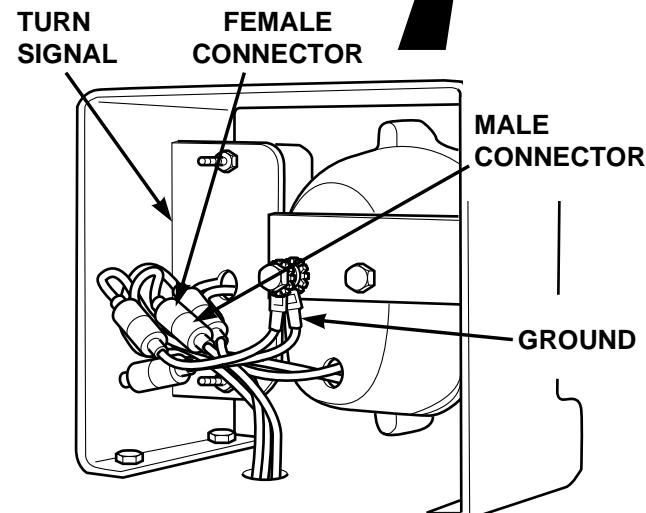


## WARNING

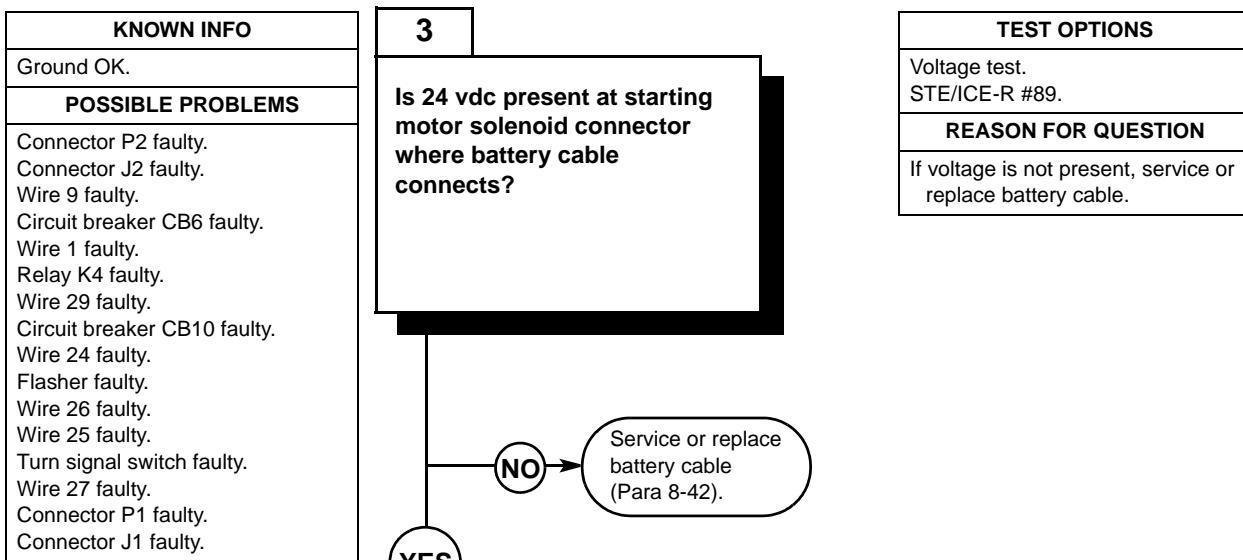
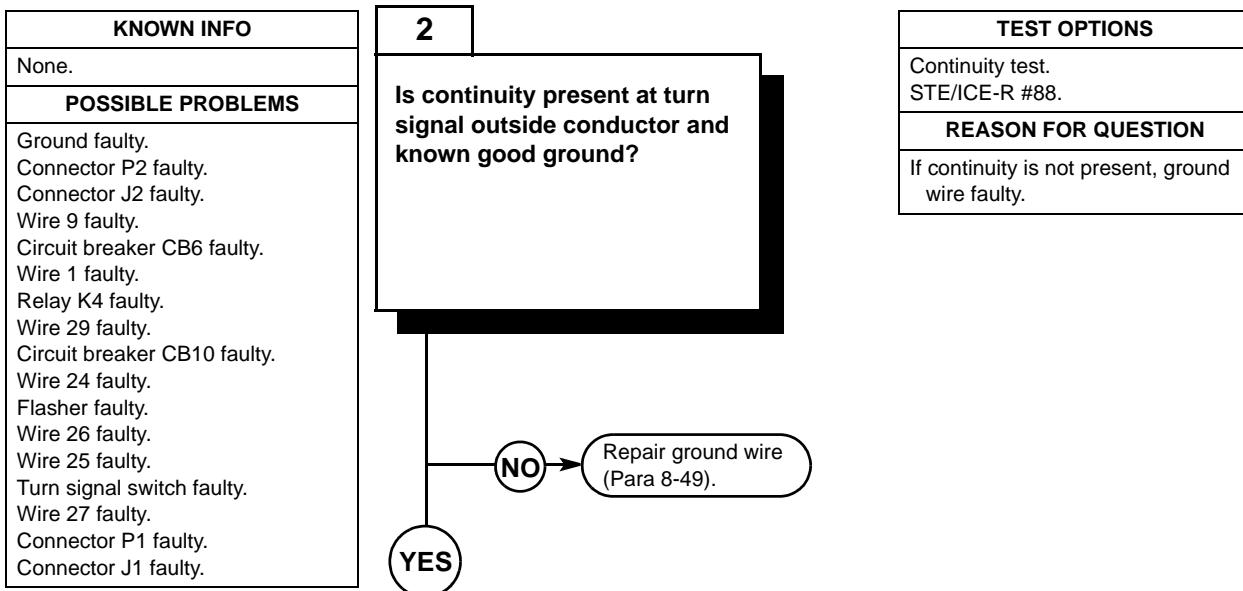
- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.



<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to female connector at faulty turn signal.
(5)	Connect multimeter negative lead (-) to ground for turn signal.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

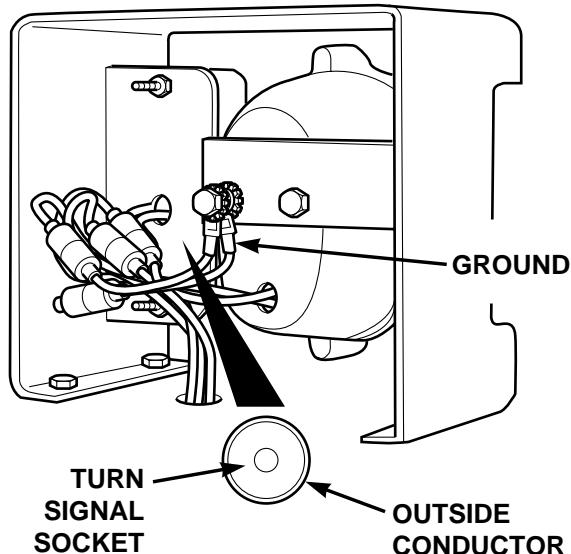


## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

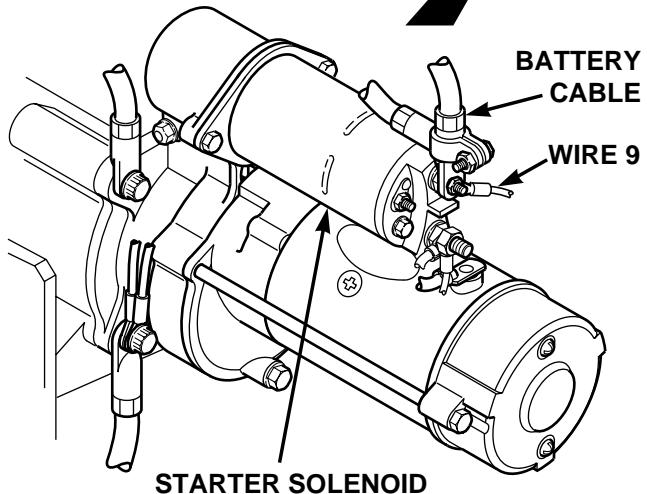
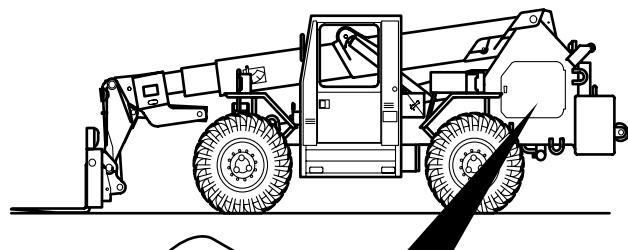


**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to outside conductor at faulty turn signal.
- (4) Connect multimeter negative lead (-) to turn signal ground.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair ground wire (Para 8-49).

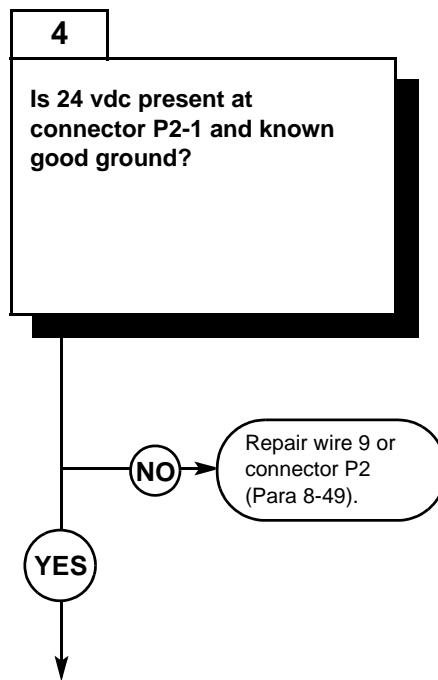
**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to starting motor solenoid where battery cable connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 4 of this fault.
  - (b) If 24 vdc is not present, go to service battery cable (Para 8-42).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-42).



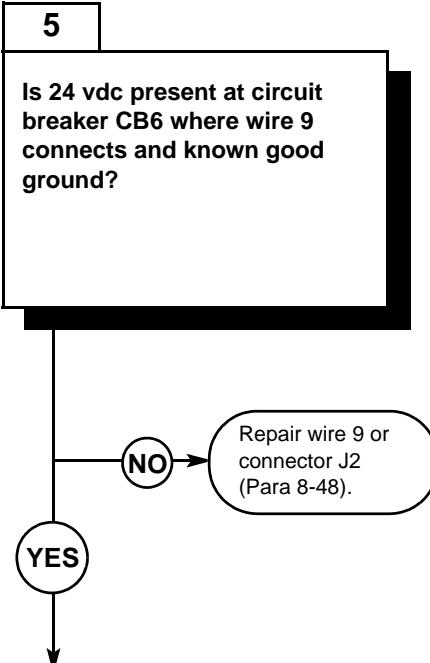
## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Relay K4 faulty. Wire 29 faulty. Circuit breaker CB10 faulty. Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



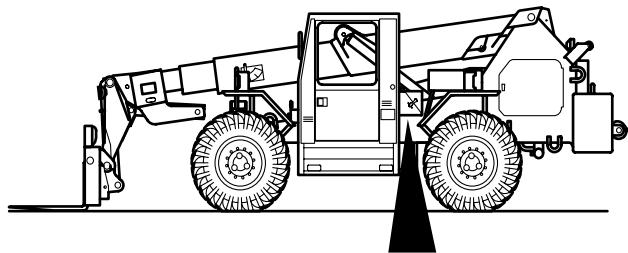
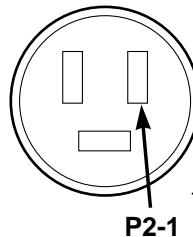
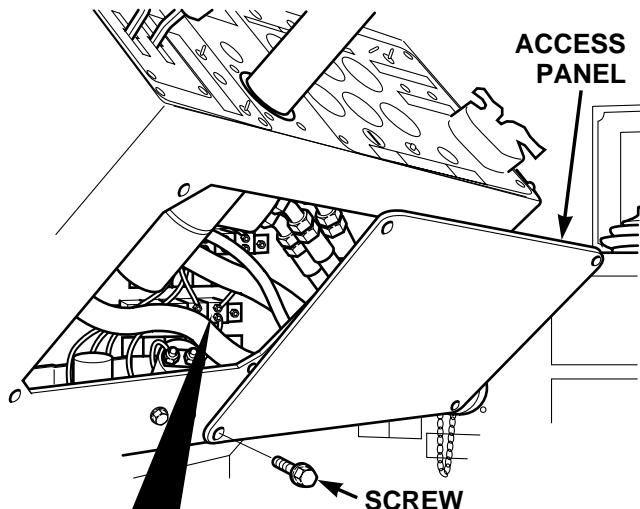
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at P2-1, wire 9 and/or connector P2 faulty.

KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 OK.
Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Relay K4 faulty. Wire 29 faulty. Circuit breaker CB10 faulty. Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

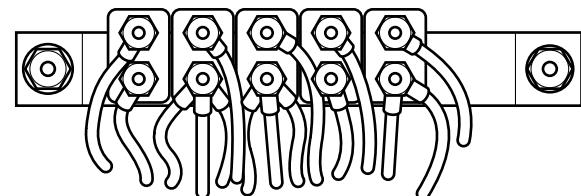
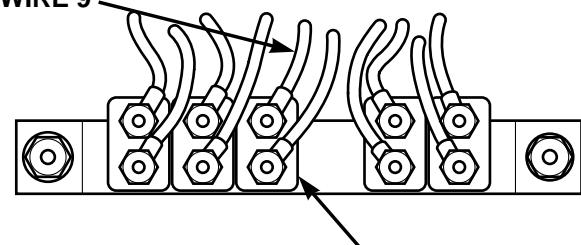


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at circuit breaker CB6, wire 9 and/or connector J2 faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to connector P2-1.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable from negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, repair wire 9 and/or connector P2 (Para 8-49).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

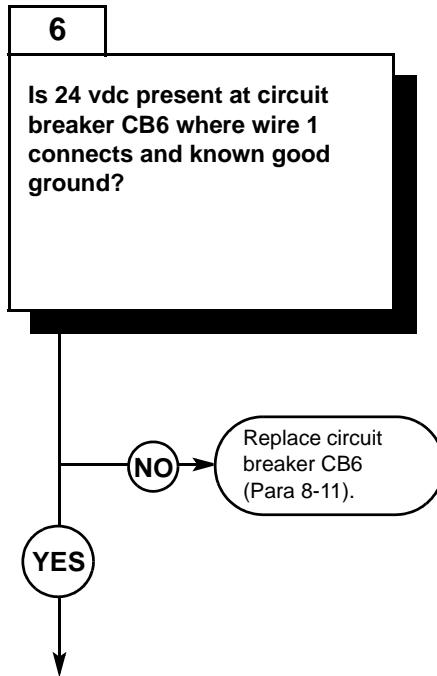
**CONNECTOR P2****CONNECTOR J2**

<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, repair wire 9 and/or connector J2 (Para 8-48).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

**WIRE 9****CIRCUIT BREAKER CB6**

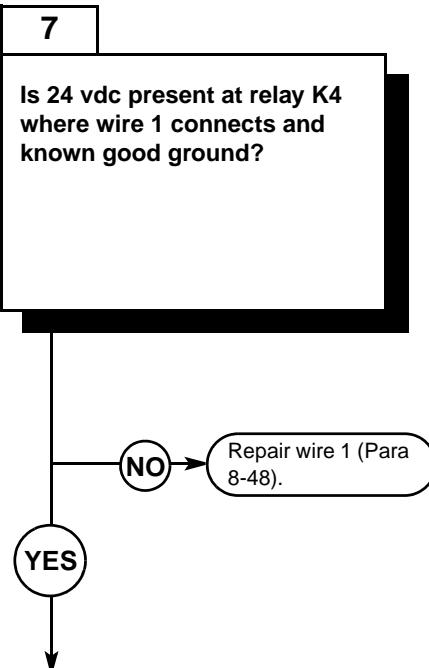
## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty.
Wire 1 faulty.
Relay K4 faulty.
Wire 29 faulty.
Circuit breaker CB10 faulty.
Wire 24 faulty.
Flasher faulty.
Wire 26 faulty.
Wire 25 faulty.
Turn signal switch faulty.
Wire 27 faulty.
Connector P1 faulty.
Connector J1 faulty.



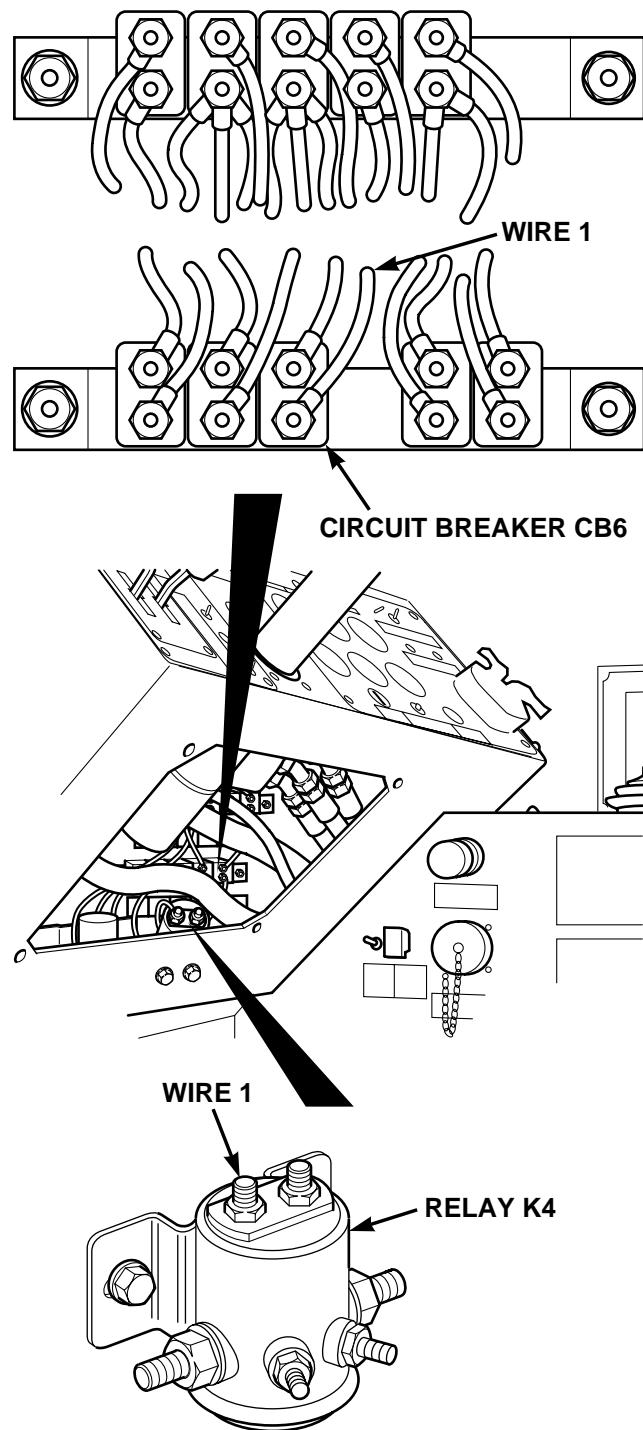
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at circuit breaker CB6 where wire 1 connects, circuit breaker CB6 faulty.

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty.
Relay K4 faulty.
Wire 29 faulty.
Circuit breaker CB10 faulty.
Wire 24 faulty.
Flasher faulty.
Wire 26 faulty.
Wire 25 faulty.
Turn signal switch faulty.
Wire 27 faulty.
Connector P1 faulty.
Connector J1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at relay K4 where wire 1 connects, wire 1 faulty.

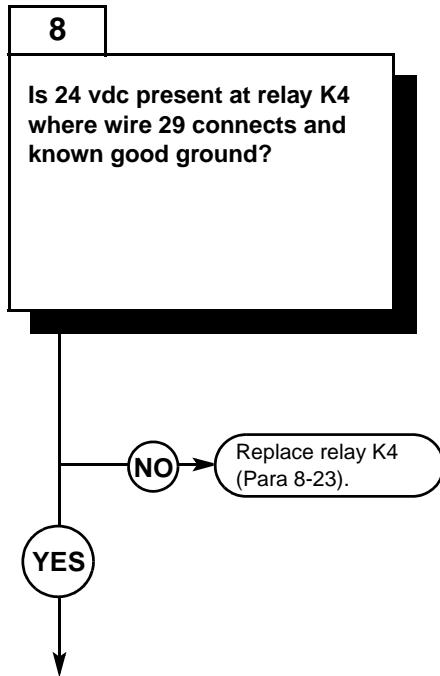
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 7 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to relay K4 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 8 of this fault.
(b)	If 24 vdc is not present, repair wire 1 (Para 8-48).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).

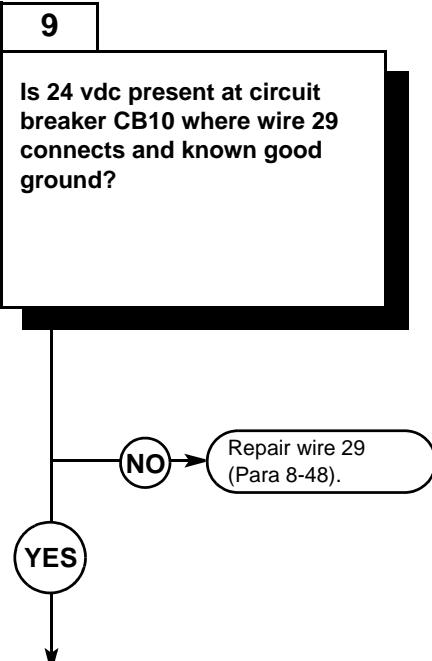
## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Relay K4 faulty. Wire 29 faulty. Circuit breaker CB10 faulty. Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



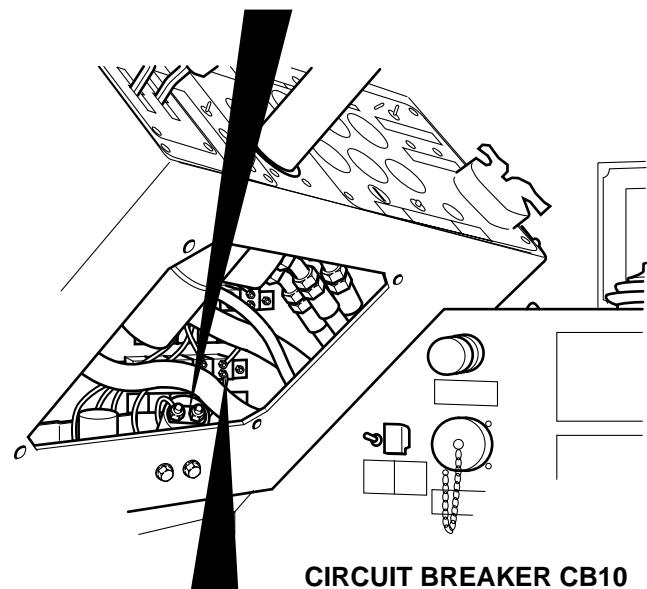
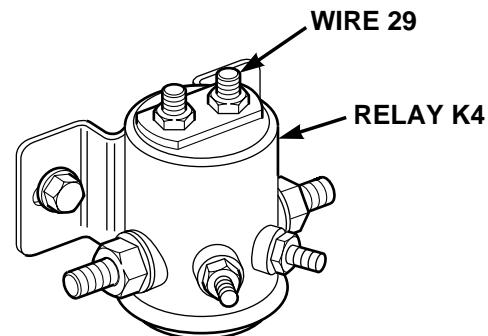
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at relay K4 where wire 29 connects, relay K4 faulty.

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Relay K4 OK.
POSSIBLE PROBLEMS
Wire 29 faulty. Circuit breaker CB10 faulty. Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

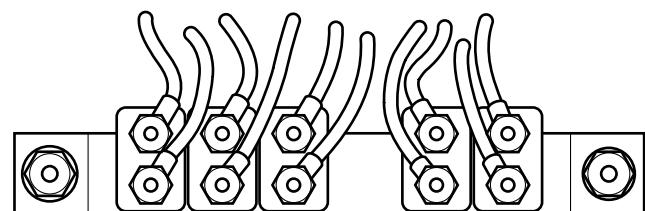
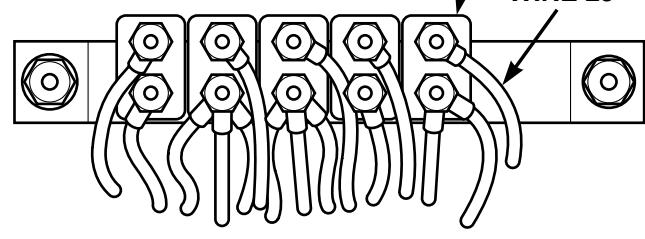


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at circuit breaker CB10 where wire 29 connects, wire 29 faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to relay K4 where wire 29 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, replace relay K4 (Para 8-23).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).

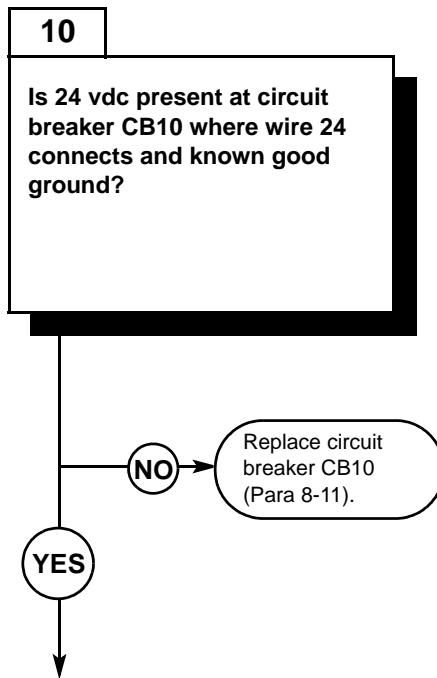


<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB10 where wire 29 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, repair wire 29 (Para 8-48).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).



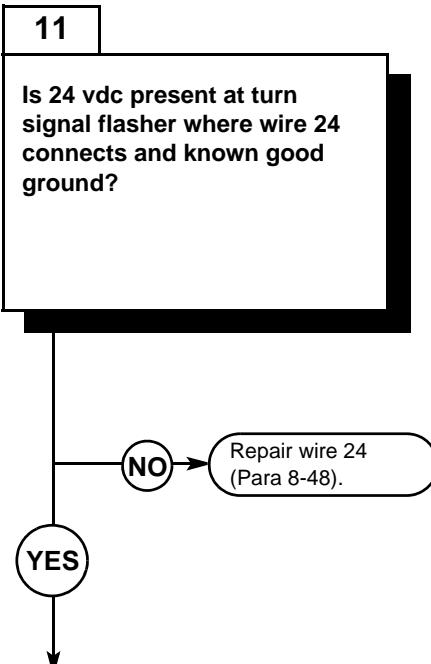
## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Relay K4 OK. Wire 29 OK.
POSSIBLE PROBLEMS
Circuit breaker CB10 faulty. Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



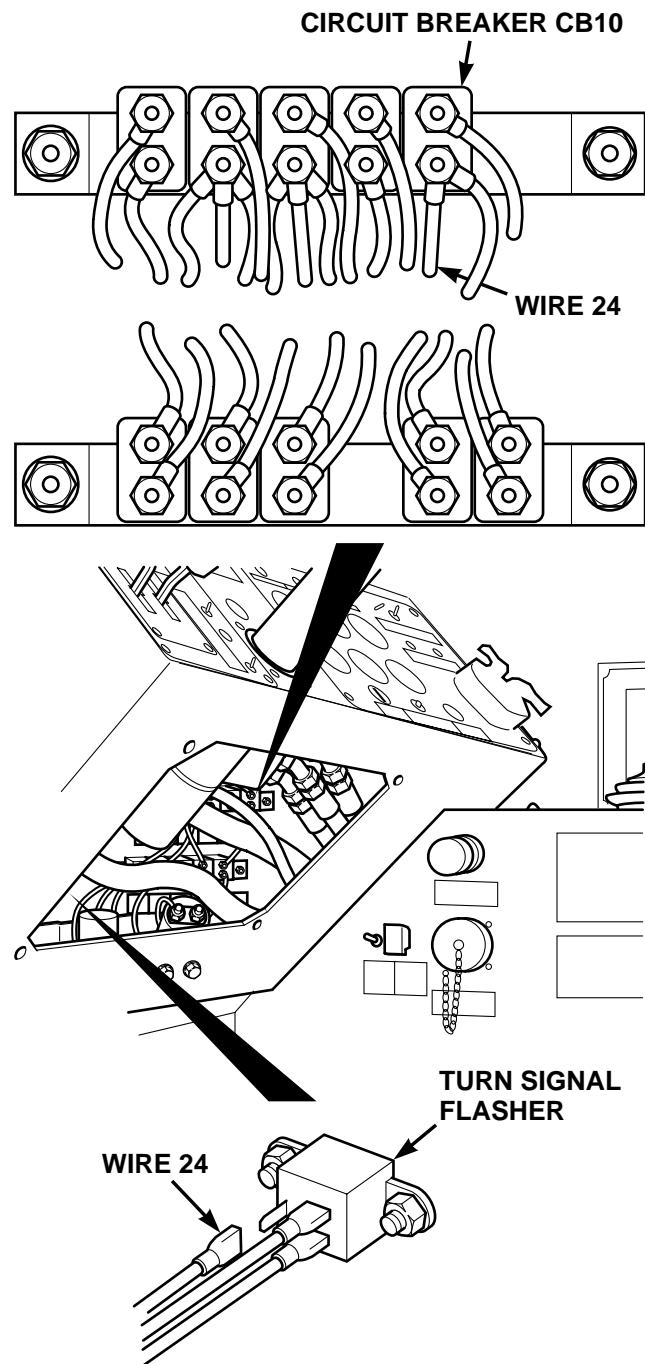
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at circuit breaker CB10 where wire 24 connects, circuit breaker CB10 faulty.

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Relay K4 OK. Wire 29 OK. Circuit breaker CB10 OK.
POSSIBLE PROBLEMS
Wire 24 faulty. Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal flasher where wire 24 connects, wire 24 faulty.

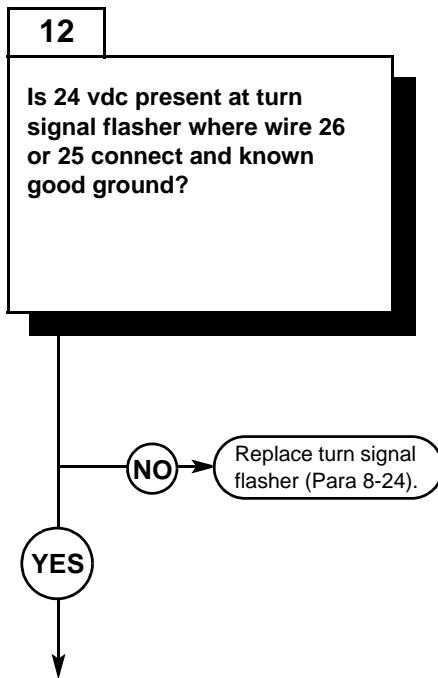
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB10 where wire 24 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB10 (Para 8-11).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal flasher where wire 24 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 12 of this fault.
(b)	If 24 vdc is not present, repair wire 24 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

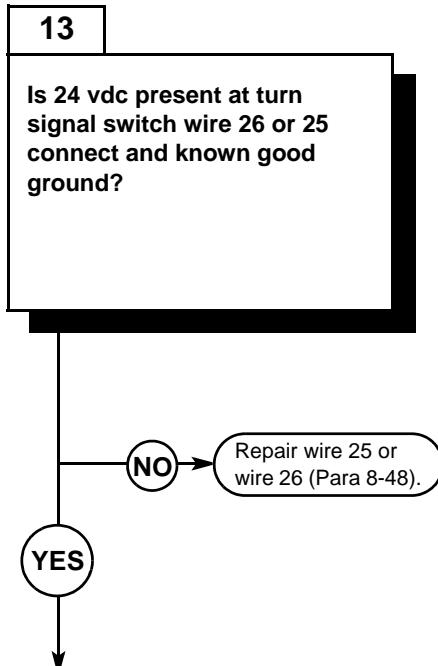
## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Relay K4 OK. Wire 29 OK. Circuit breaker CB10 OK. Wire 24 OK.
POSSIBLE PROBLEMS
Flasher faulty. Wire 26 faulty. Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal flasher where wire 26 or 25 connects, turn signal flasher faulty.

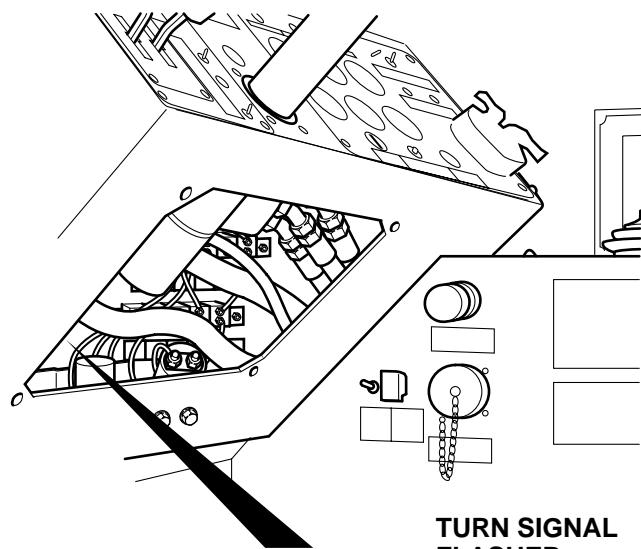
KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Relay K4 OK. Wire 29 OK. Circuit breaker CB10 OK. Wire 24 OK. Turn signal flasher OK.
POSSIBLE PROBLEMS
Wire 25 faulty. Wire 26 faulty. Turn signal switch faulty.



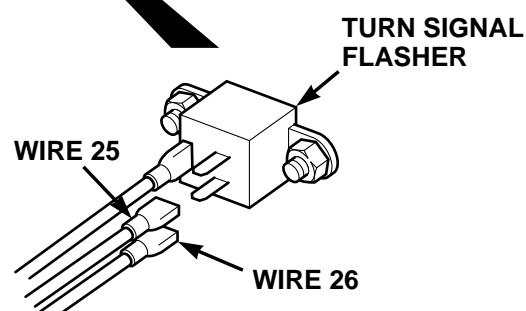
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal switch where wire 26 or 25 connects, wire 25 or wire 26 faulty.

**VOLTAGE TEST**

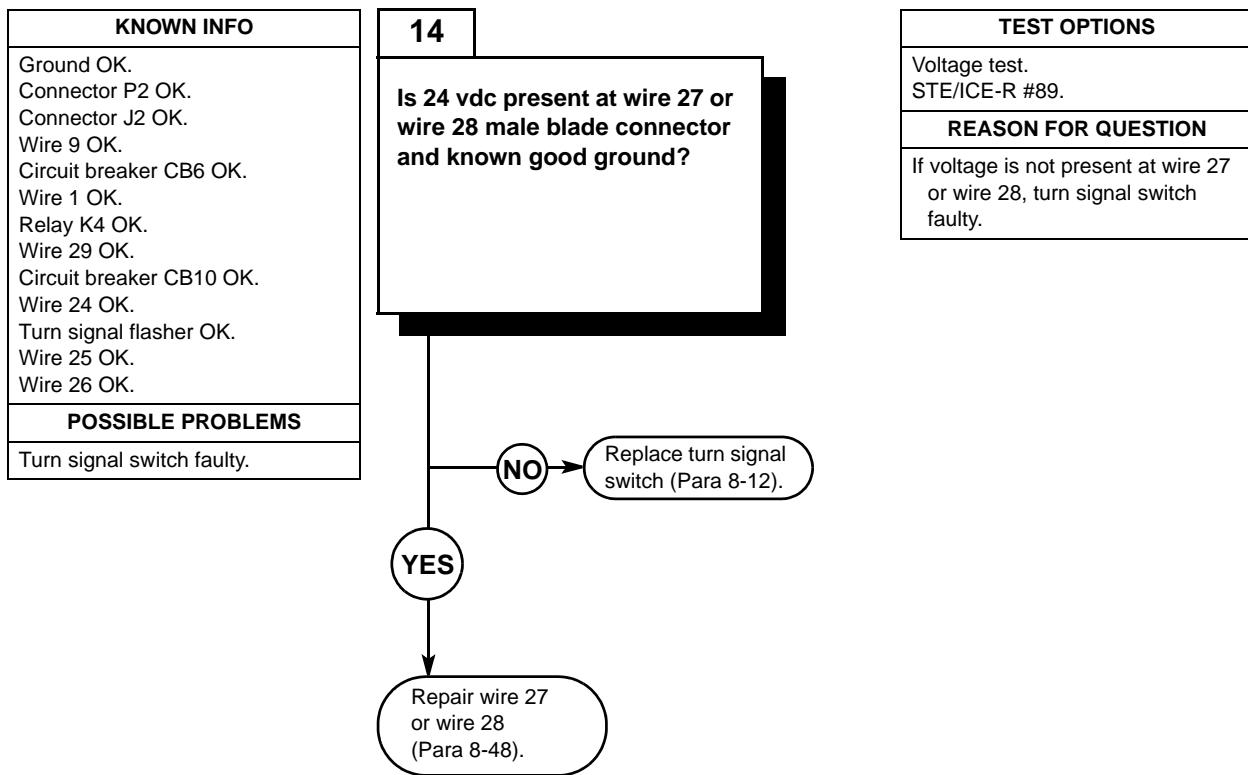
- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Disconnect wire 25 or 26 from turn signal flasher.
- (4) Connect multimeter positive lead (+) to male blade connector of flasher where wire 25 or wire 26 connect.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
- (7) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (8) Turn on turn signal for appropriate turn signal wire (right wire 26, left wire 25 [TM 10-3930-673-10]).  
 (a) If 24 vdc is present, go to Step 13 of this fault.  
 (b) If 24 vdc is not present, replace turn signal flasher (Para 8-24).
- (9) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (10) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (11) Connect wire 25 or 26 to turn signal flasher.

**VOLTAGE TEST**

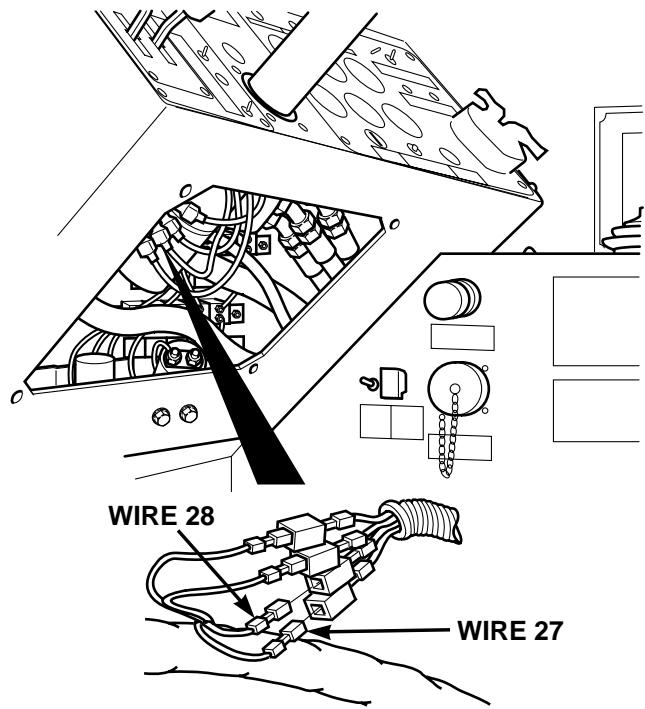
- (1) Set multimeter to volts dc.
- (2) Disconnect wire 25 or 26 from turn signal flasher.
- (3) Connect multimeter positive lead (+) to female blade receptacle of wire 25 or wire 26.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
- (6) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (7) Turn on turn signal for appropriate turn signal wire (right wire 26, left wire 25 [TM 10-3930-673-10]).  
 (a) If 24 vdc is present, go to Step 14 of this fault.  
 (b) If 24 vdc is not present, repair wire 25 or wire 26 (Para 8-48).
- (8) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (9) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (10) Connect wire 25 or 26 to turn signal flasher.

**TURN SIGNAL  
FLASHER**

## 10. ALL TURN SIGNALS DO NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Disconnect wire 27 or 28 from turn signal switch.
(4)	Connect multimeter positive lead (+) to male blade connector of wire 27 or wire 28.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(8)	Turn on turn signal for appropriate turn signal wire (right wire 28, left wire 27 [TM 10-3930-673-10]).
(a)	If 24 vdc is present, repair wire 27 or wire 28.
(b)	If 24 vdc is not present, replace turn signal switch (Para 8-12).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(11)	Connect wire 27 or 28 to turn signal switch.
(12)	Install access panel and four screws.
(13)	Connect negative battery cable to negative side of battery (Para 8-42).
(14)	Install battery cover (Para 8-42).



**11. LEFT TURN SIGNAL DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

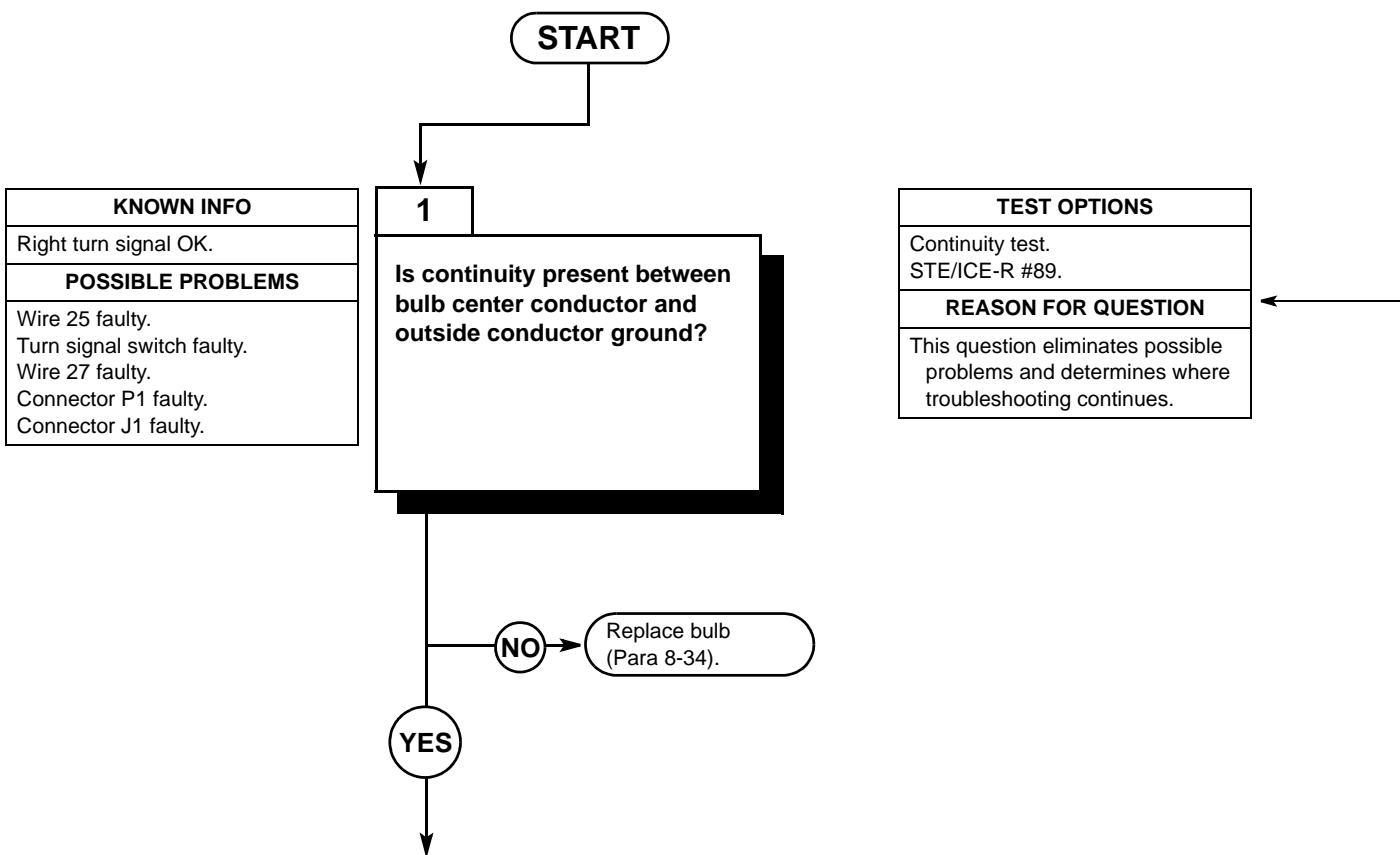
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

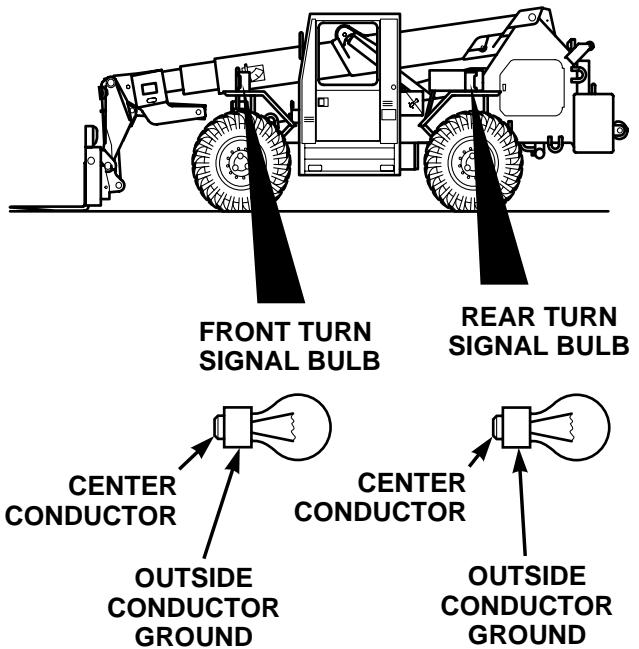
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



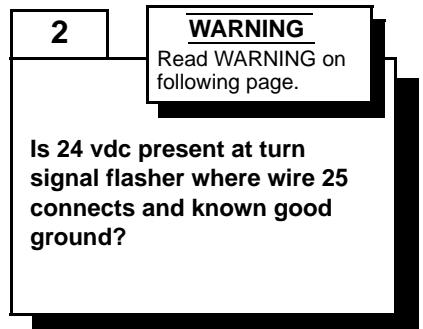
**CONTINUITY TEST**

- (1) Remove turn signal bulb from faulty turn signal assembly (Para 8-34).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to bulb center conductor.
- (4) Connect multimeter negative lead (-) to outside conductor ground.
  - (a) If continuity is present, go to Step 2 of this fault.
  - (b) If continuity is not present, replace bulb (Para 8-34).



## 11. LEFT TURN SIGNAL DOES NOT OPERATE (CONT).

KNOWN INFO
Right turn signal OK.
POSSIBLE PROBLEMS
Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

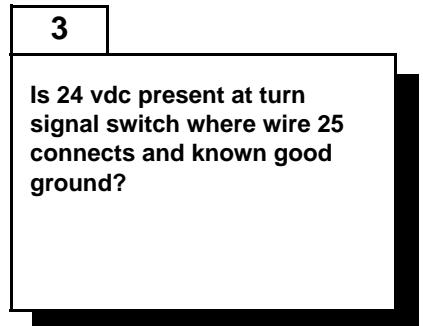


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

NO → Replace turn signal flasher (Para 8-24).

YES

KNOWN INFO
Right turn signal OK.
POSSIBLE PROBLEMS
Wire 25 faulty. Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal switch where wire 25 connects, wire 25 faulty.

NO → Repair wire 25 (Para 8-48).

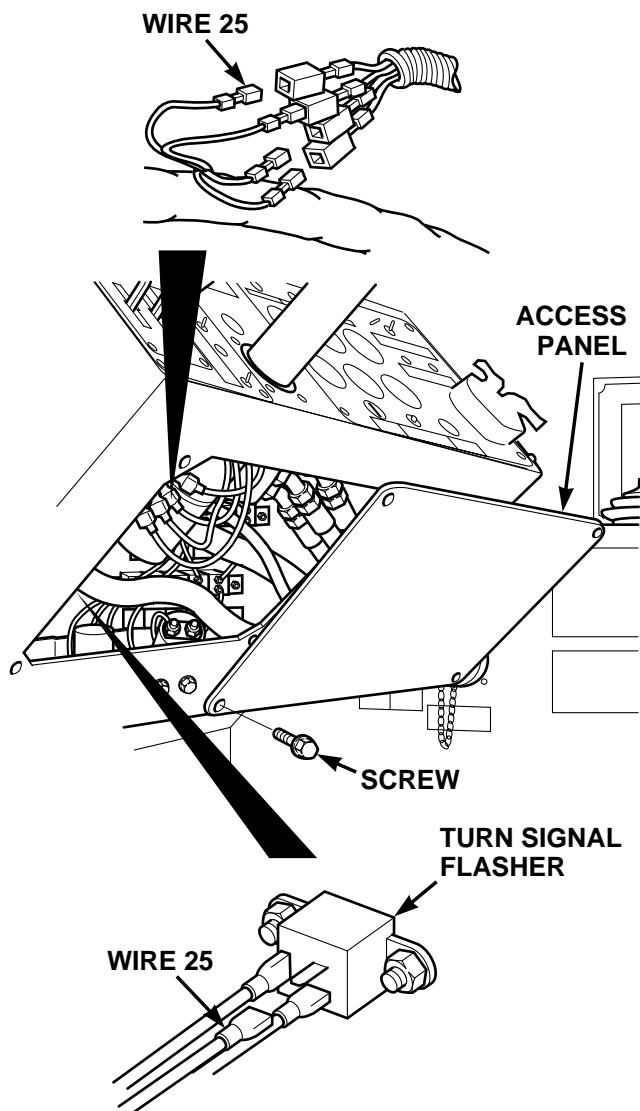
YES

**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws and access panel.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive lead (+) to turn signal flasher male blade connector where wire 25 connects.
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(9)	Turn ON left turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace turn signal flasher (Para 8-24).
(10)	Turn OFF left turn signal (TM 10-3930-673-10).
(11)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(12)	Disconnect negative battery cable from negative side of battery (Para 8-42).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal switch where wire 25 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn ON left turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, repair wire 25 (Para 8-48).
(7)	Turn OFF left turn signal (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



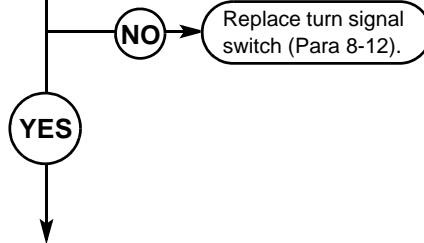
## 11. LEFT TURN SIGNAL DOES NOT OPERATE (CONT).

KNOWN INFO
Right turn signal OK. Wire 25 OK.
POSSIBLE PROBLEMS
Turn signal switch faulty. Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

**4**

Is 24 vdc present at turn signal switch where wire 27 connects and known good ground?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal switch where wire 27 connects, turn signal switch faulty.

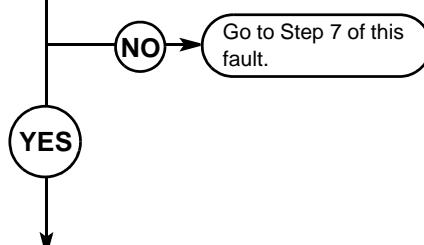


KNOWN INFO
Right turn signal OK. Wire 25 OK. Turn signal switch OK.
POSSIBLE PROBLEMS
Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

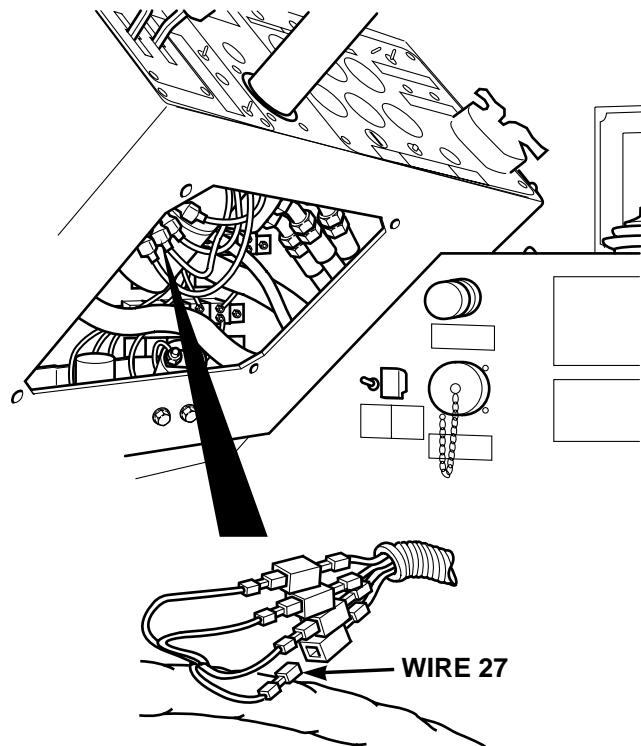
**5**

Is 24 vdc present at turn signal socket center conductor?

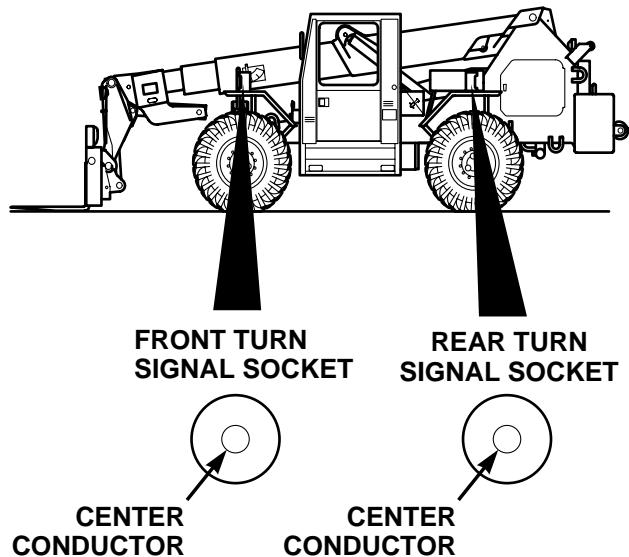
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.



<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to turn signal switch male blade connector where wire 27 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn ON left turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, replace turn signal switch (Para 8-12).
(8)	Turn OFF left turn signal (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).

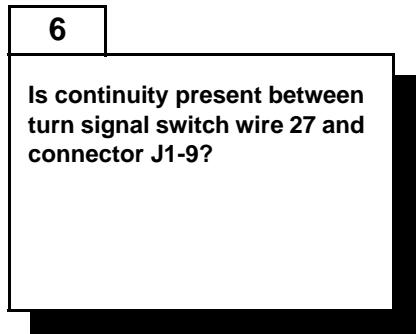


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal socket center conductor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn ON left turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, go to Step 7 of this fault.
(7)	Turn OFF left turn signal (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

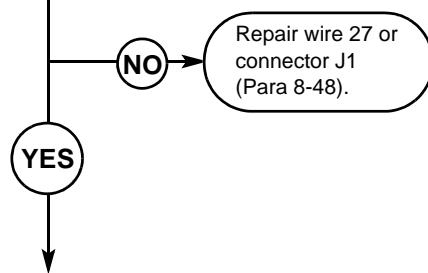


## 11. LEFT TURN SIGNAL DOES NOT OPERATE (CONT).

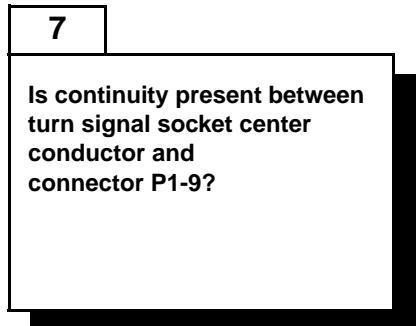
KNOWN INFO
Right turn signal OK. Wire 25 OK. Turn signal switch OK.
POSSIBLE PROBLEMS
Wire 27 faulty. Connector J1 faulty. Connector P1 faulty.



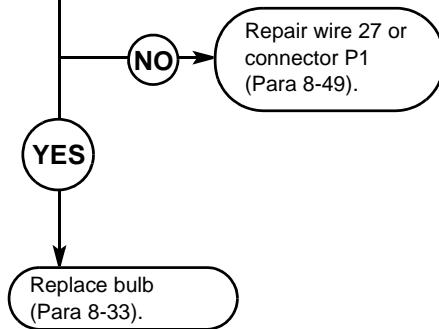
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair connector J1 or wire 27 (Para 8-48).



KNOWN INFO
Right turn signal OK. Wire 25 OK. Turn signal switch OK.
POSSIBLE PROBLEMS
Wire 27 faulty. Connector P1 faulty. Connector J1 faulty.

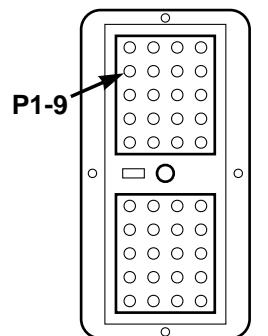
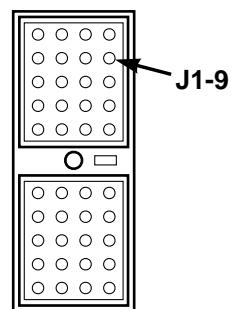
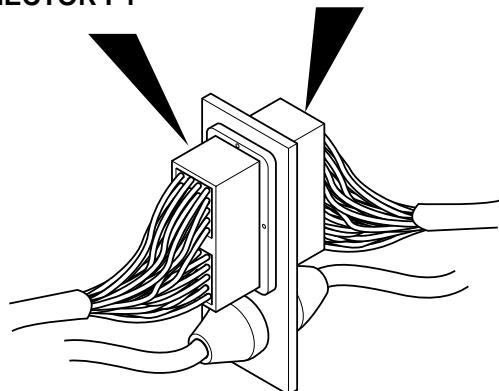


TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair connector P1 or wire 27 (Para 8-49).

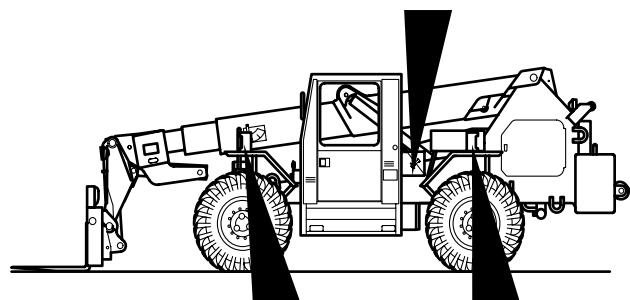
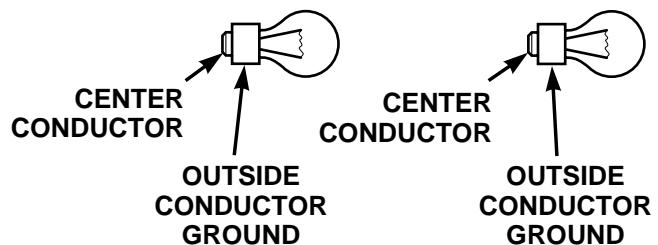


**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Disconnect connector J1 from connector P1.
- (4) Connect multimeter positive lead (+) to turn signal switch wire 27.
- (5) Connect multimeter negative lead (-) to connector J1-9.
  - (a) If continuity is present, go to Step 7 of this fault.
  - (b) If continuity is not present, repair connector J1 or wire 27 (Para 8-48).

**CONNECTOR P1****CONNECTOR J1****CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to turn signal socket center conductor.
- (4) Connect multimeter negative lead (-) to connector J1-9.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair connector P1 or wire 27 (Para 8-49).
- (5) Connect connector J1 to connector P1.
- (6) Install four screws to secure access panel.
- (7) Connect negative battery cable to negative side of battery (Para 8-42).
- (8) Install battery cover (Para 8-42).

**FRONT TURN SIGNAL BULB****REAR TURN SIGNAL BULB**

**12. RIGHT TURN SIGNAL DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

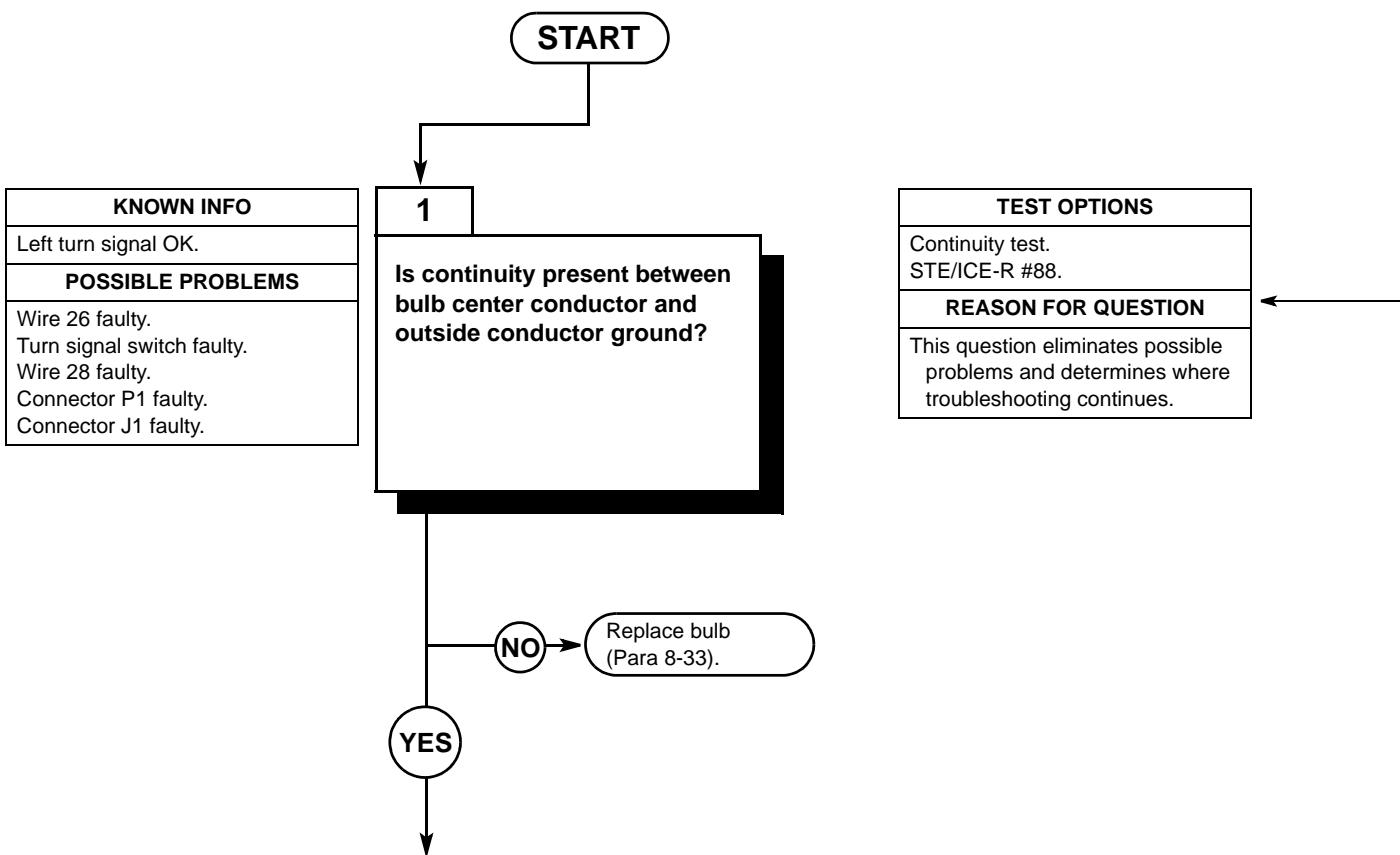
Two

*References*

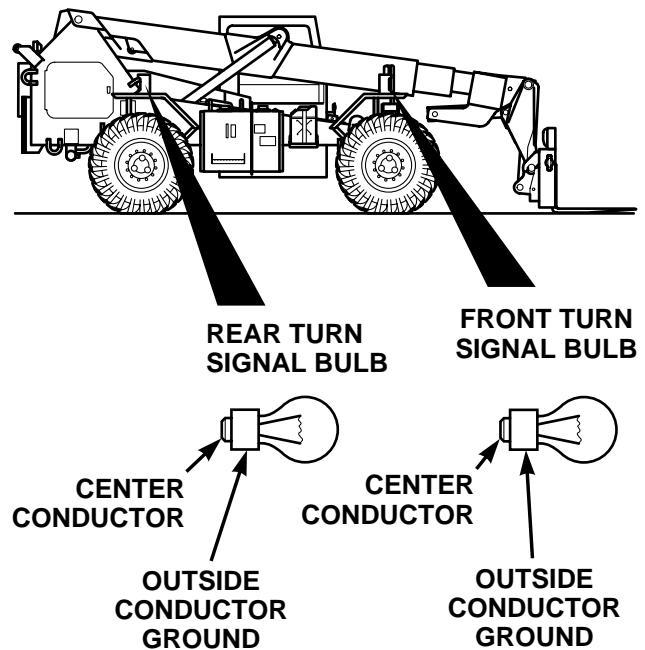
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

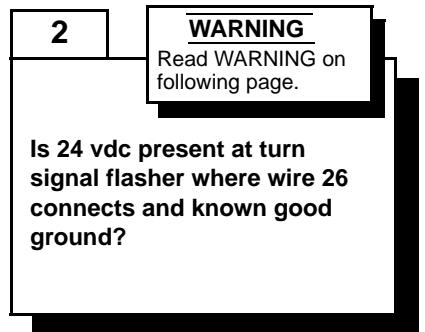


<b>CONTINUITY TEST</b>	
(1)	Remove turn signal bulb from faulty turn signal assembly (Para 8-33).
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to bulb center conductor.
(4)	Connect multimeter negative lead (-) to outside conductor ground. (a) If continuity is present, go to Step 2 of this fault. (b) If continuity is not present, replace bulb (Para 8-33).



## 12. RIGHT TURN SIGNAL DOES NOT OPERATE (CONT.).

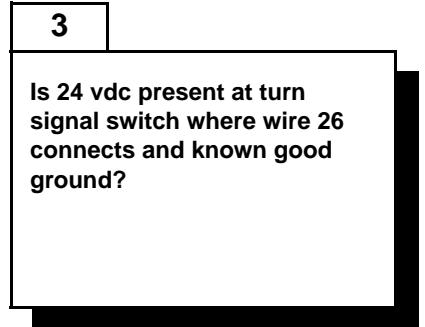
KNOWN INFO
Left turn signal OK.
POSSIBLE PROBLEMS
Wire 26 faulty. Turn signal switch faulty. Wire 28 faulty. Connector P1 faulty. Connector J1 faulty.



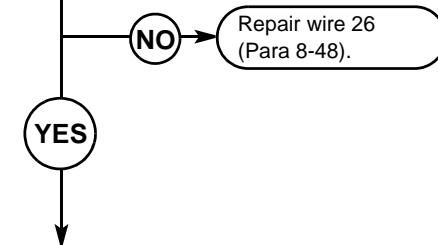
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.



KNOWN INFO
Left turn signal OK.
POSSIBLE PROBLEMS
Wire 26 faulty. Turn signal switch faulty. Wire 28 faulty. Connector P1 faulty. Connector J1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at turn signal switch where wire 26 connects, wire 26 faulty.

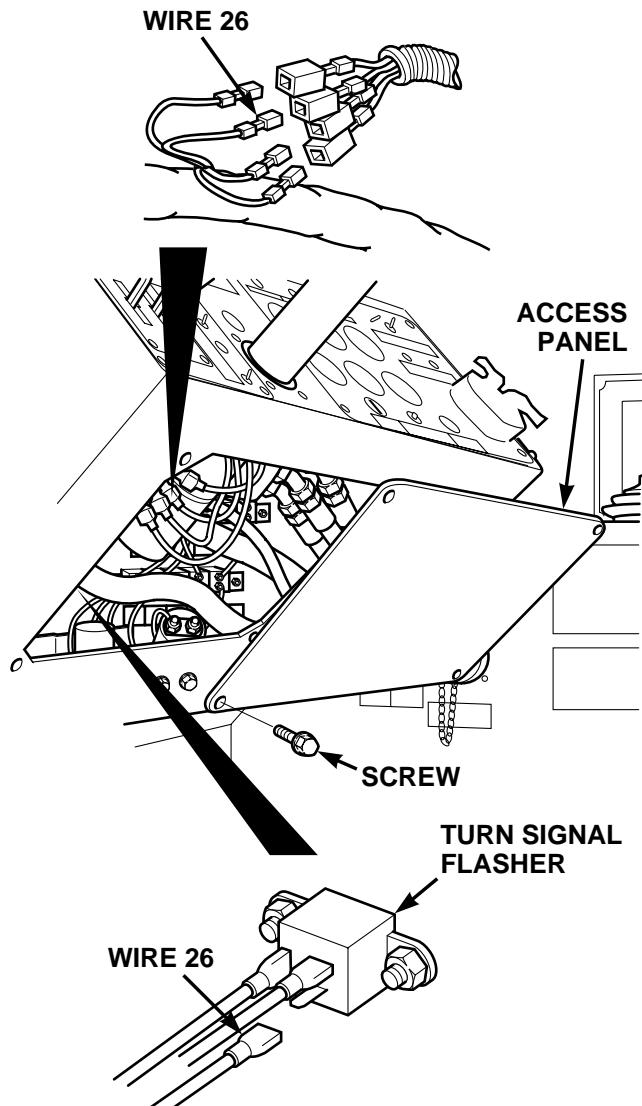


**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

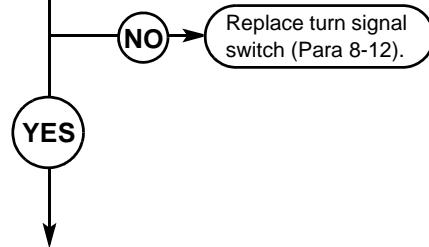
<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws and access panel.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive lead (+) to turn signal flasher male blade connector where wire 26 connects.
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(9)	Turn ON right turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace turn signal flasher (Para 8-24).
(10)	Turn OFF right turn signal (TM 10-3930-673-10).
(11)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(12)	Disconnect negative battery cable from negative side of battery (Para 8-42).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal switch where wire 26 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn ON right turn signal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, repair wire 26 (Para 8-48).
(7)	Turn OFF right turn signal (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

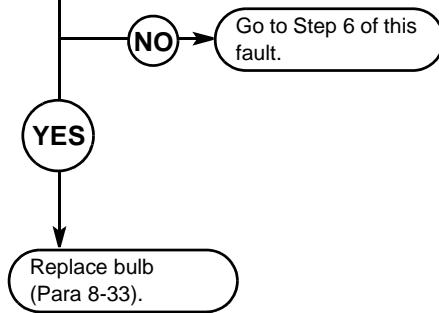


## 12. RIGHT TURN SIGNAL DOES NOT OPERATE (CONT.).

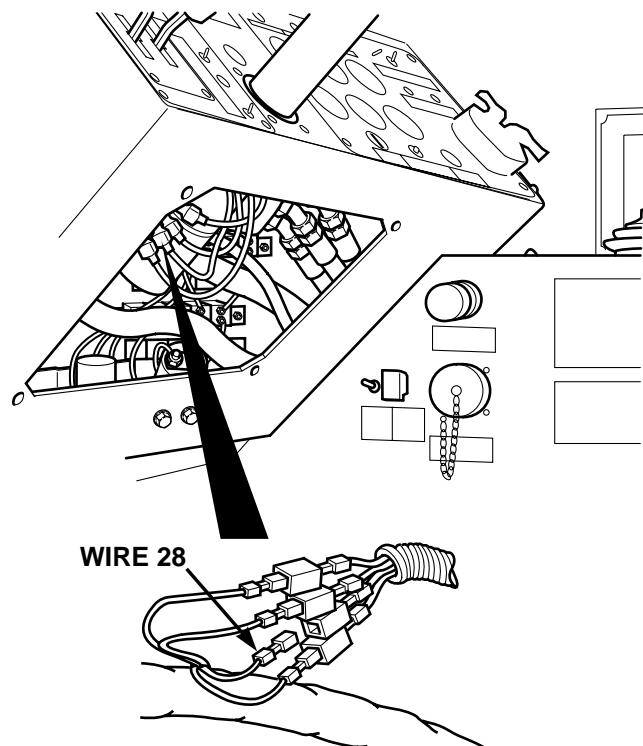
KNOWN INFO	4	TEST OPTIONS
Left turn signal OK. Wire 26 OK.	Is 24 vdc present at turn signal switch where wire 28 connects and known good ground?	Voltage test. STE/ICE-R #89.
POSSIBLE PROBLEMS		REASON FOR QUESTION
Turn signal switch faulty. Wire 28 faulty. Connector P1 faulty. Connector J1 faulty.		If voltage is not present at turn signal switch where wire 28 connects, turn signal switch faulty.



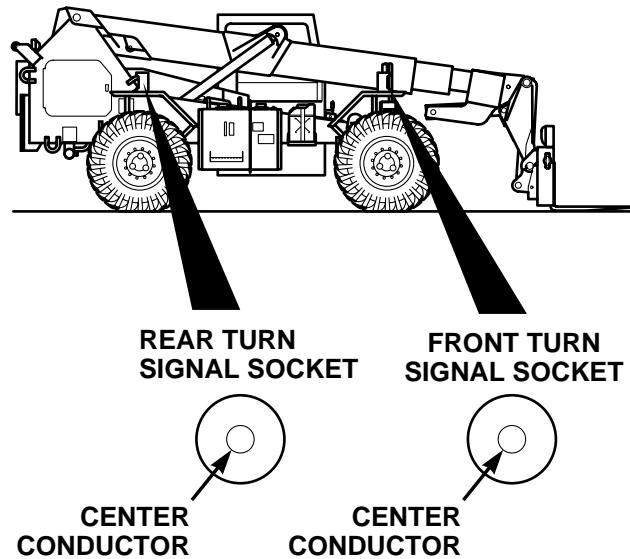
KNOWN INFO	5	TEST OPTIONS
Left turn signal OK. Wire 26 OK. Turn signal switch OK.	Is 24 vdc present at turn signal socket center conductor?	Voltage test. STE/ICE-R #89.
POSSIBLE PROBLEMS		REASON FOR QUESTION
Wire 28 faulty. Connector P1 faulty. Connector J1 faulty.		This question eliminates possible problems and determines where troubleshooting continues.



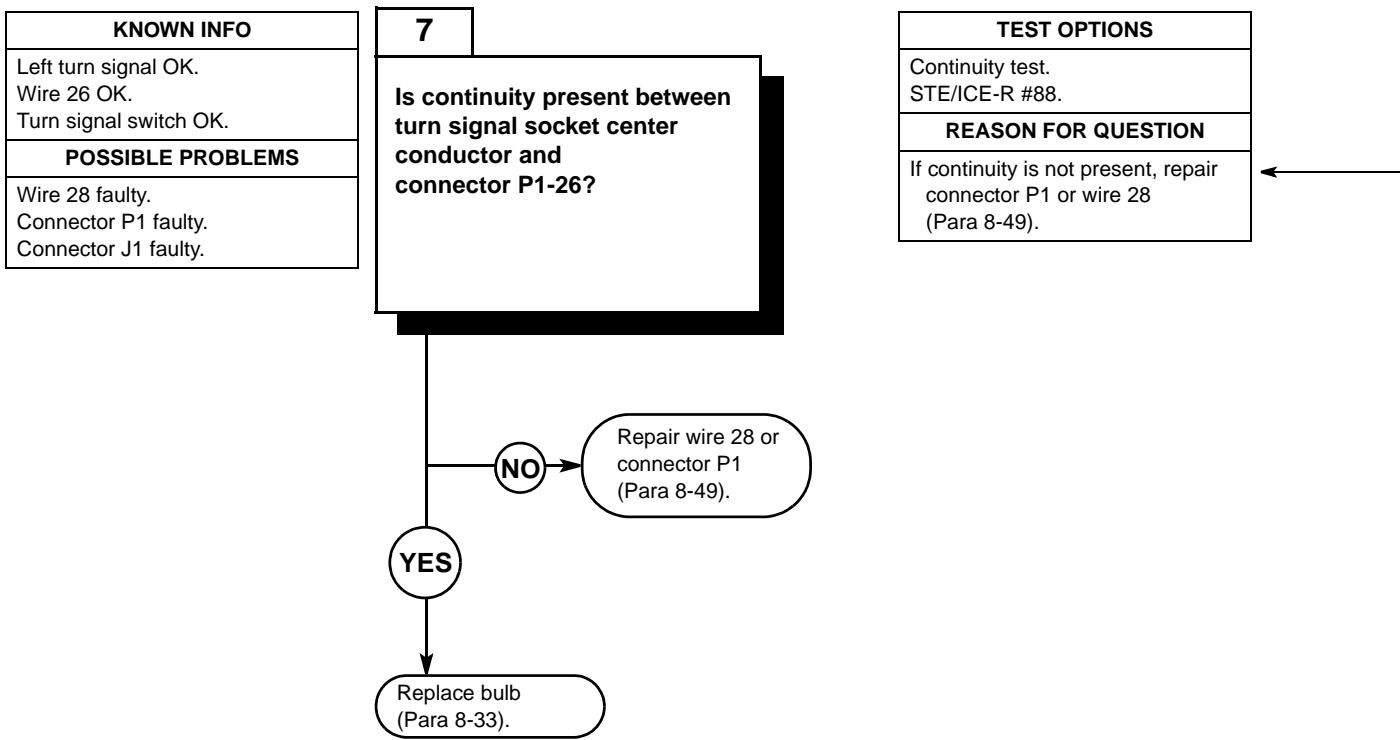
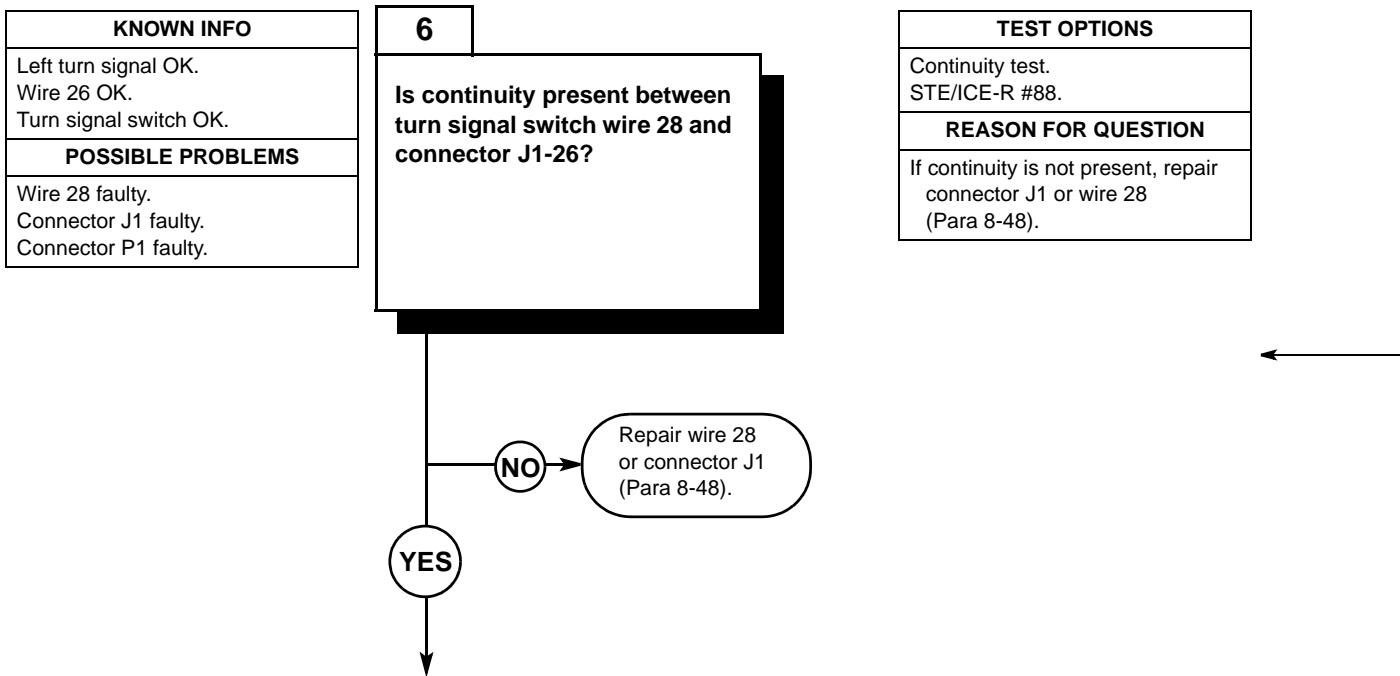
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal switch male blade connector where wire 28 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn ON right turn signal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 5 of this fault.</li> <li>(b) If 24 vdc is not present, replace turn signal switch (Para 8-12).</li> </ul>
(7)	Turn OFF right turn signal (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to turn signal socket center conductor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn ON right turn signal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, replace bulb (Para 8-33).</li> <li>(b) If 24 vdc is not present, go to Step 7 of this fault.</li> </ul>
(7)	Turn OFF right turn signal (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

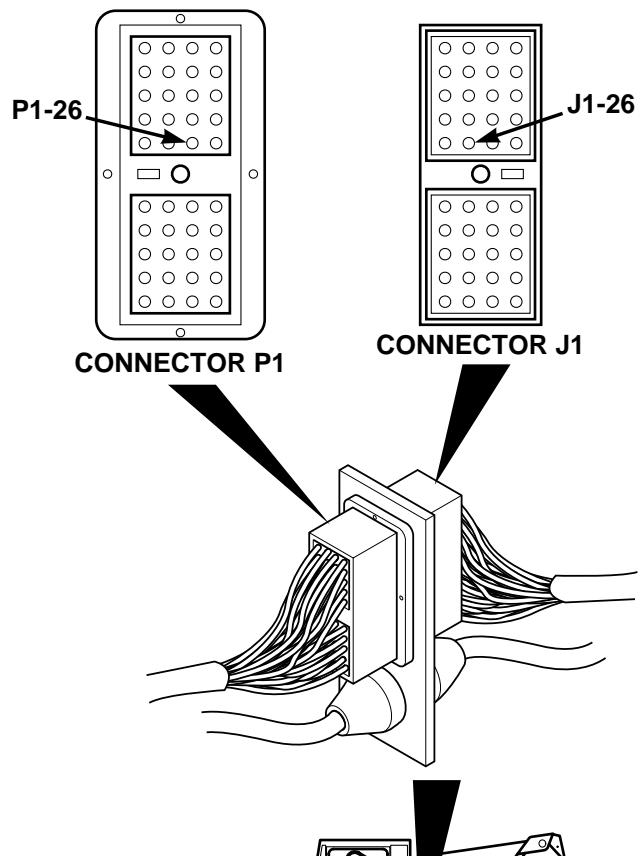


#### **12. RIGHT TURN SIGNAL DOES NOT OPERATE (CONT.).**

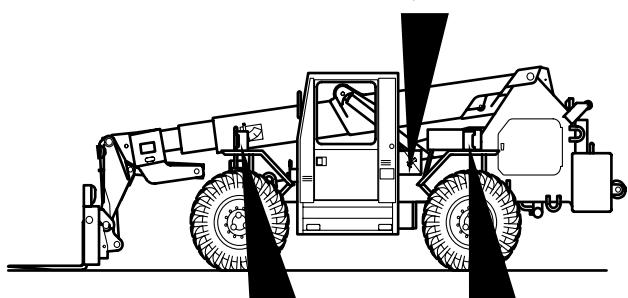
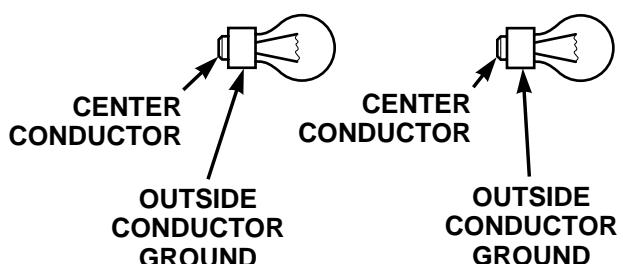


**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J1 from connector P1.
- (3) Connect multimeter positive lead (+) to turn signal switch wire 28.
- (4) Connect multimeter negative lead (-) to connector J1-26.
  - (a) If continuity is present, go to Step 7 of this fault.
  - (b) If continuity is not present, repair connector J1 or wire 28 (Para 8-48).

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to turn signal socket center conductor.
- (3) Connect multimeter negative lead (-) to connector P1-26.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair connector P1 or wire 28 (Para 8-49).
- (4) Connect connector J1 to connector P1.
- (5) Install four screws to secure access panel.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
- (7) Install battery cover (Para 8-42).

**FRONT TURN SIGNAL BULB****REAR TURN SIGNAL BULB**

**13. ALL FLOODLIGHTS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

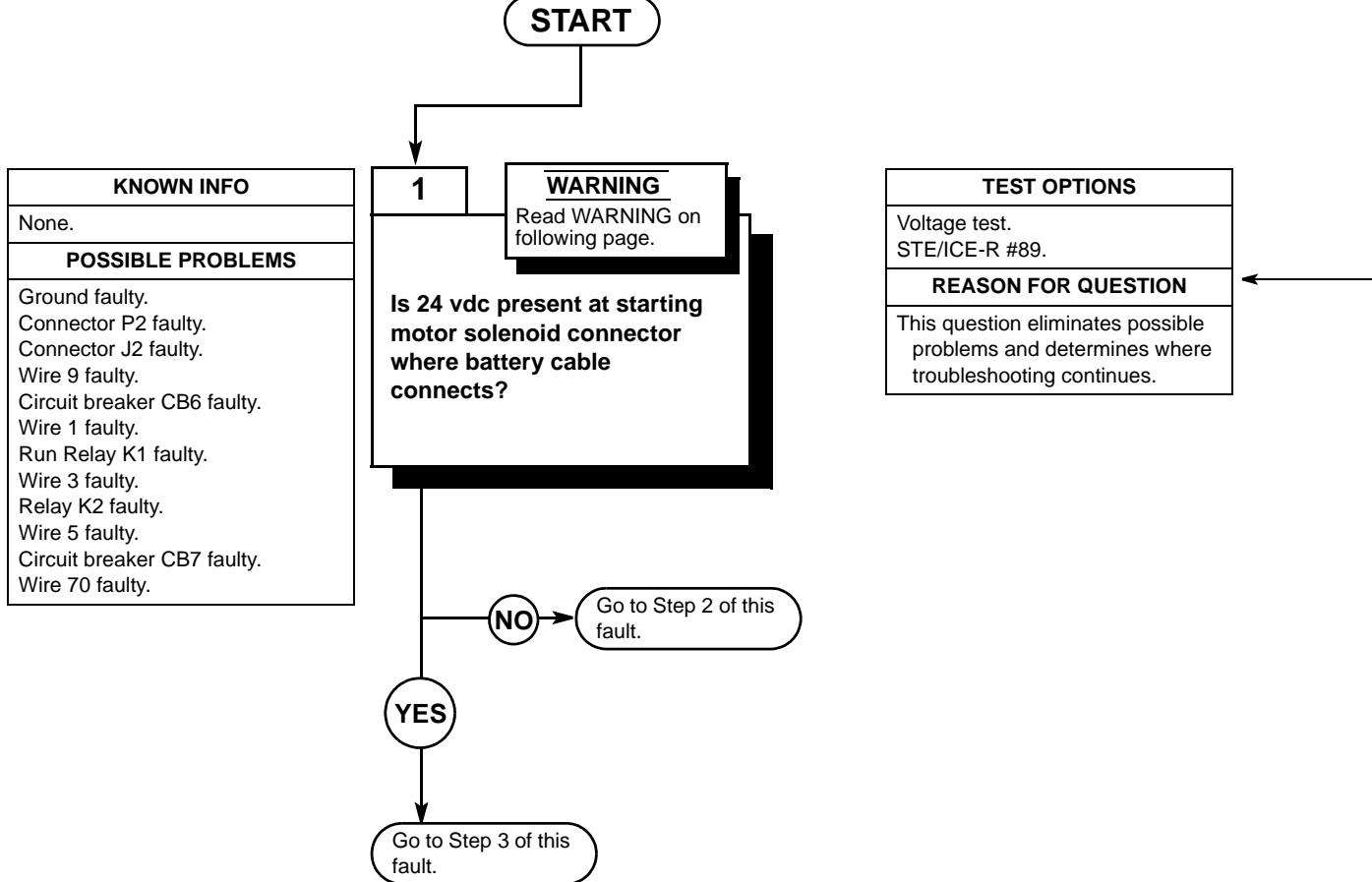
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

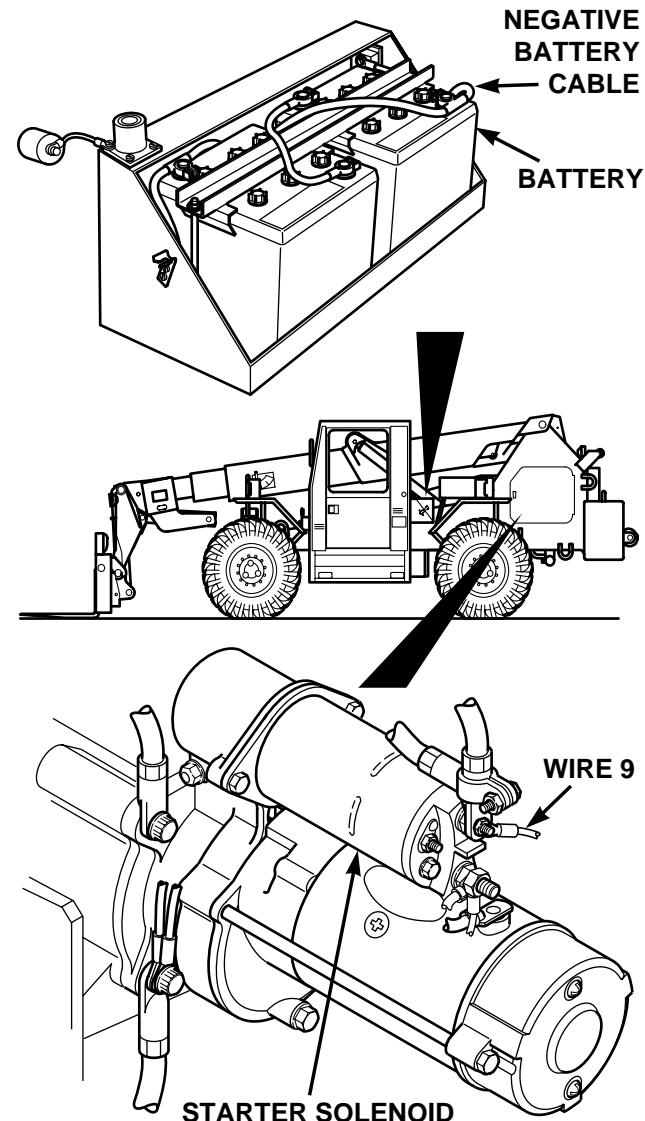
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

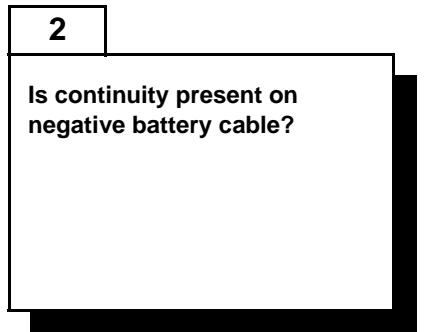
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to starting motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-44). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 3 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 2 of this fault.</li> </ul>
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).

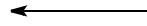
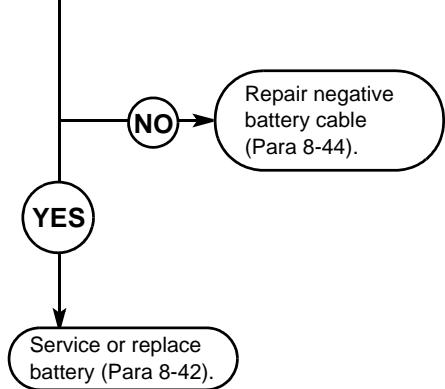


## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT.).

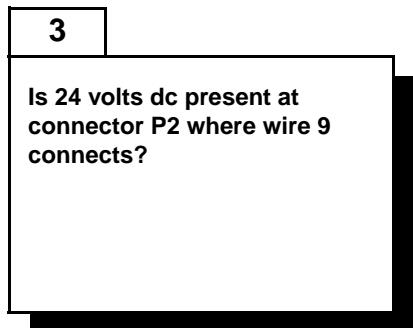
KNOWN INFO
None.
POSSIBLE PROBLEMS
Ground faulty. Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.



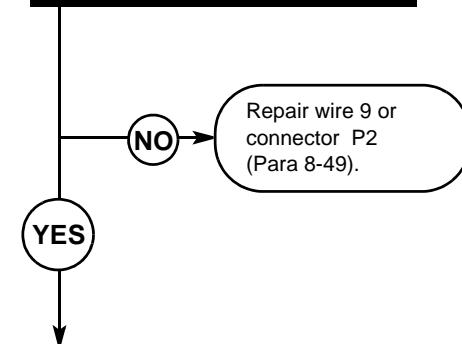
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, negative battery cable faulty.



KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

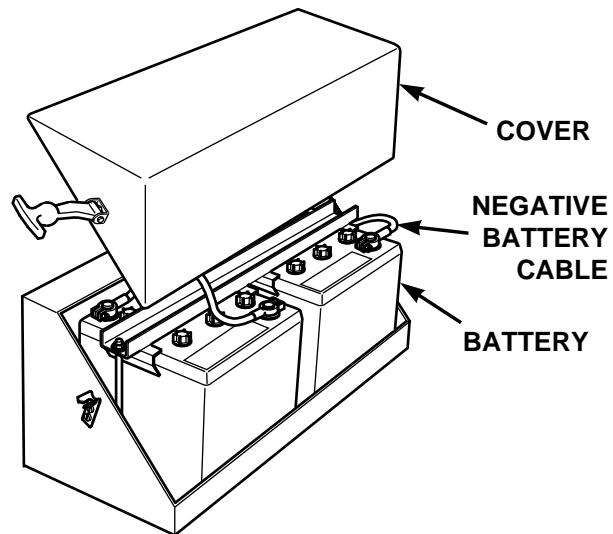


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present at P2-1, wire 9 or connector P2 (Para 8-49) faulty.

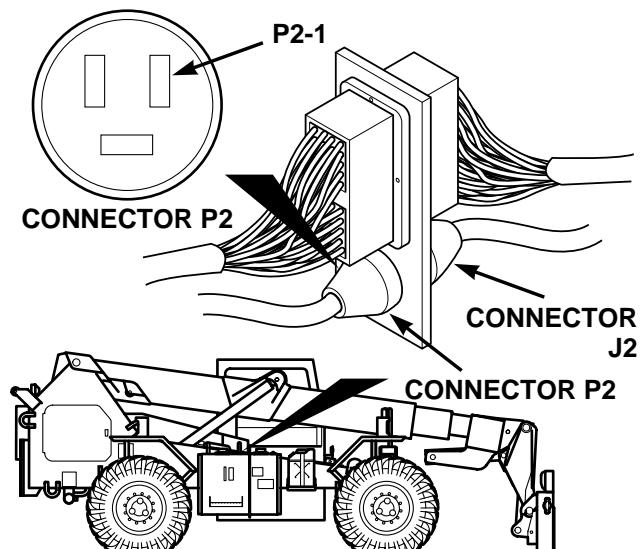


**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to end of negative battery cable.
- (4) Connect multimeter negative lead (-) to other end of negative battery cable.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, repair negative battery cable (Para 8-44).

**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (2) Disconnect connector J2 from connector P2.
- (3) Set multimeter to volts dc.
- (4) Connect multimeter positive lead (+) to connector P2-1 where wire 9 connects.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (3) (Para 8-44).
  - (a) If 24 vdc is present, go to Step 4 of this fault.
  - (b) If 24 vdc is not present, repair wire 9 or connector P2 (Para 8-49).
- (7) Connect connector J2 to connector P2.



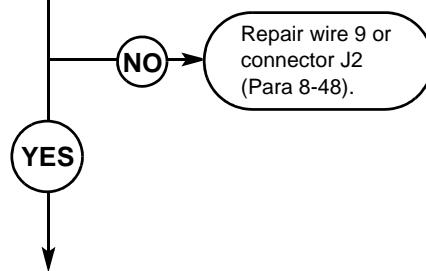
## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

**4**

Is 24 vdc present at circuit breaker CB6 where wire 9 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 faulty or connector J2 (Para 8-48).

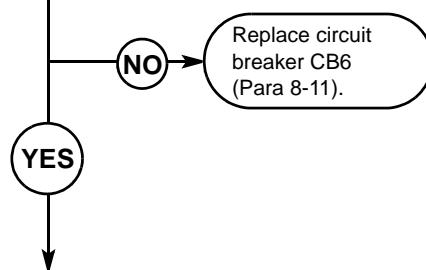


KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 1 faulty. Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

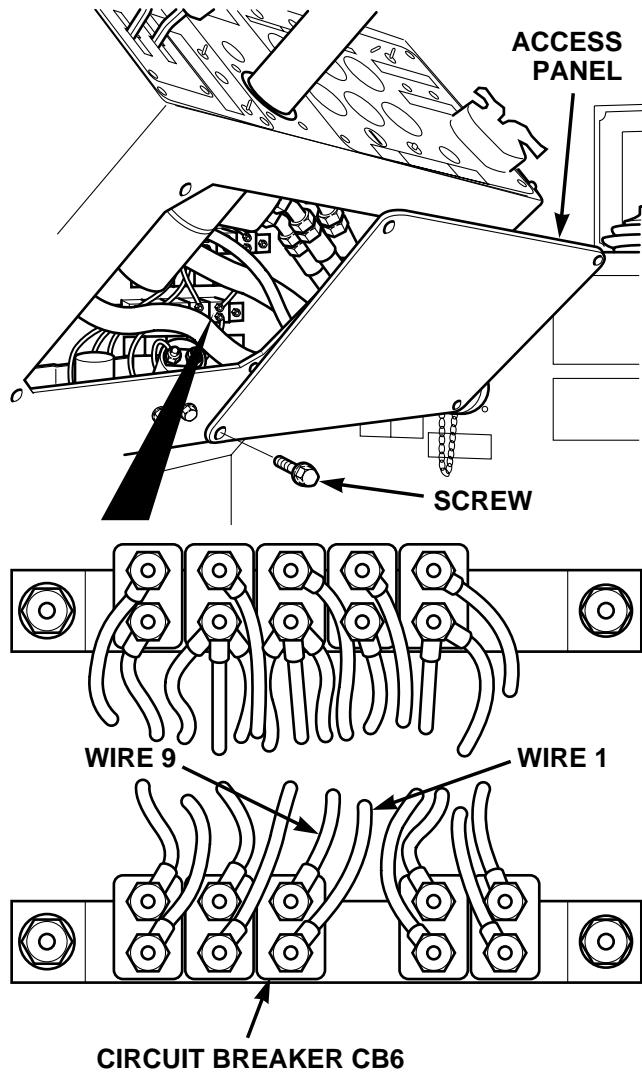
**5**

Is 24 vdc present at circuit breaker CB6 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 faulty.



<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Remove four screws and access panel.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, repair wire 9 or connector J2 (Para 8-48).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).

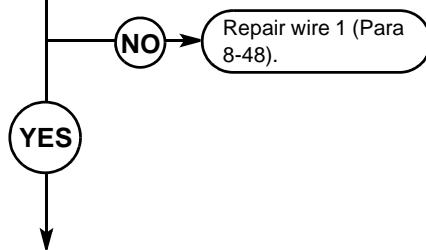
## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

**6**

Is 24 vdc present at run relay K1 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 faulty.

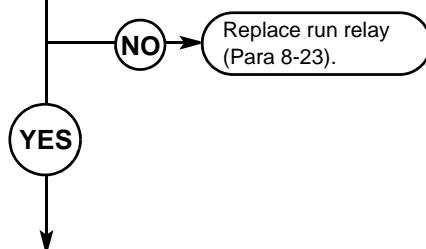


KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run Relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

**7**

Is 24 vdc present at run relay K1 where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay K1 faulty.

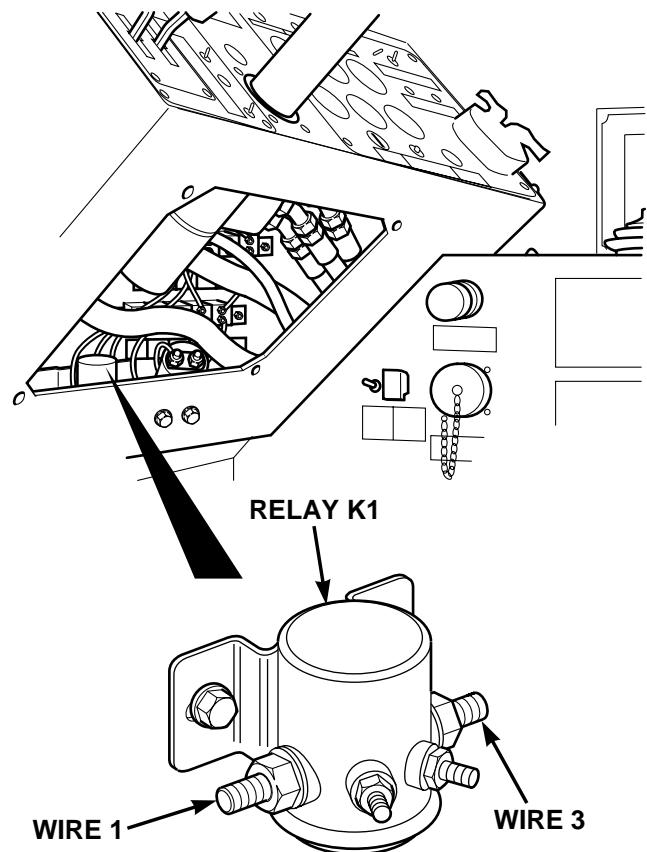


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable from negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).

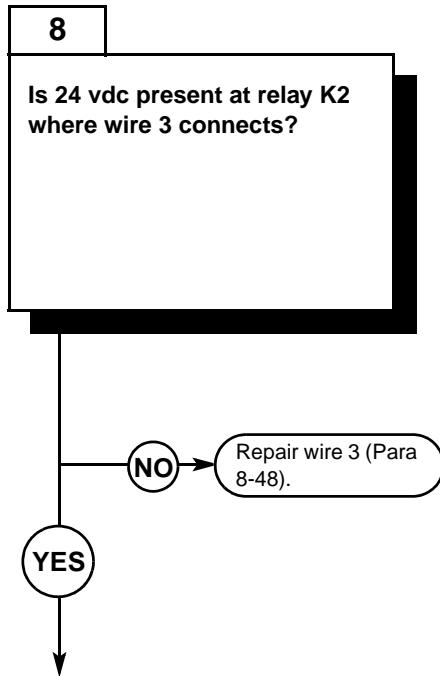
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).



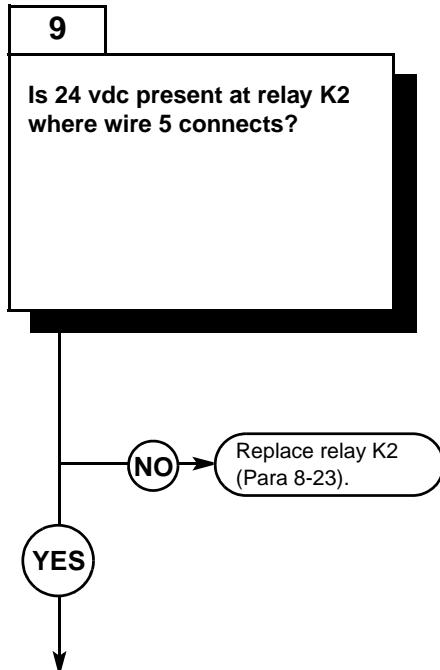
## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run Relay K1 OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 faulty.

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run Relay K1 OK. Wire 3 OK.
POSSIBLE PROBLEMS
Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.



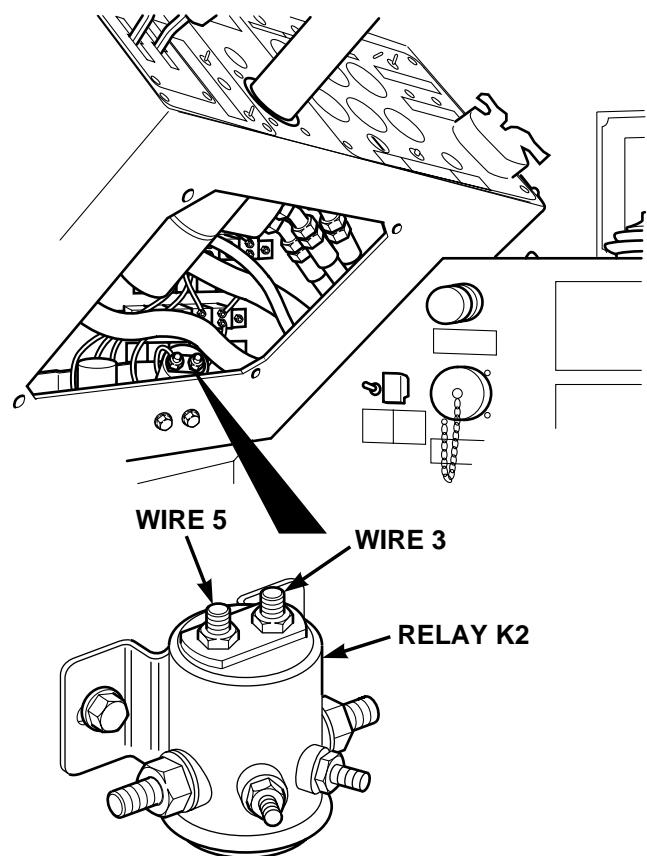
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, relay K2 faulty.

### VOLTAGE TEST

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to relay K2 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 9 of this fault.
  - (b) If 24 vdc is not present, repair wire 3 (Para 8-48).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).

### VOLTAGE TEST

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to relay K2 where wire 5 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 10 of this fault.
  - (b) If 24 vdc is not present, replace relay K2 (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).



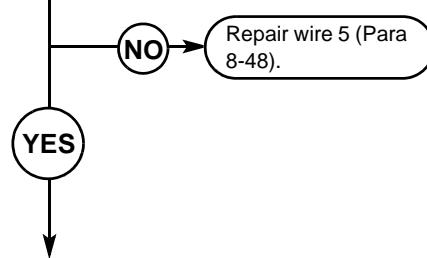
## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run Relay K1 OK. Wire 3 OK. Relay K2 OK.
POSSIBLE PROBLEMS
Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty.

**10**

Is 24 vdc present at circuit breaker CB7 where wire 5 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 5 faulty.

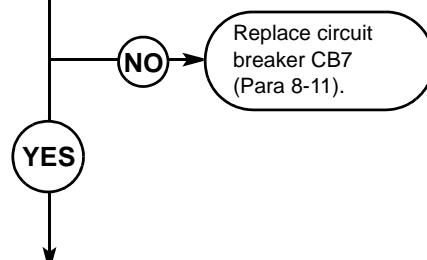


KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run Relay K1 OK. Wire 3 OK. Relay K2 OK. Wire 5 OK.
POSSIBLE PROBLEMS
Circuit breaker CB7 faulty. Wire 70 faulty.

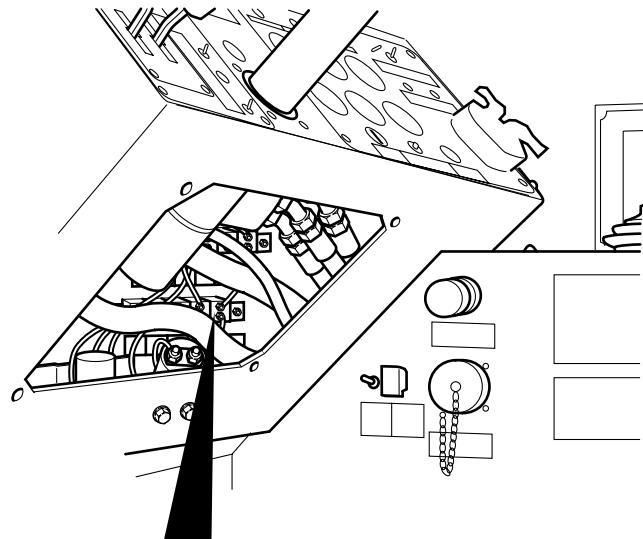
**11**

Is 24 vdc present at circuit breaker CB7 where wire 70 connects?

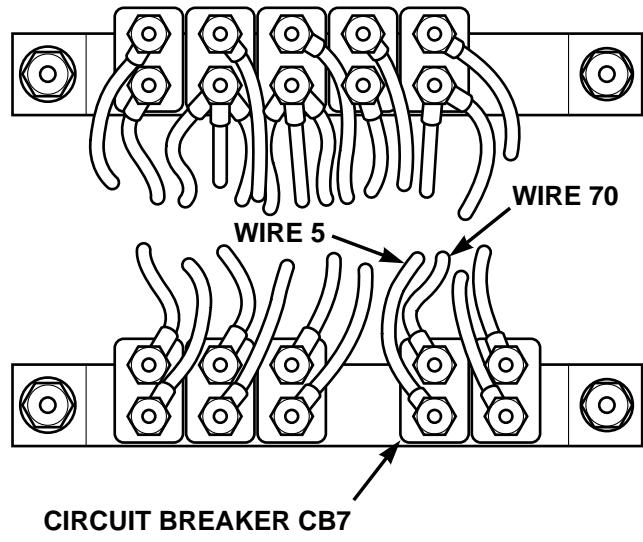
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB7 faulty.



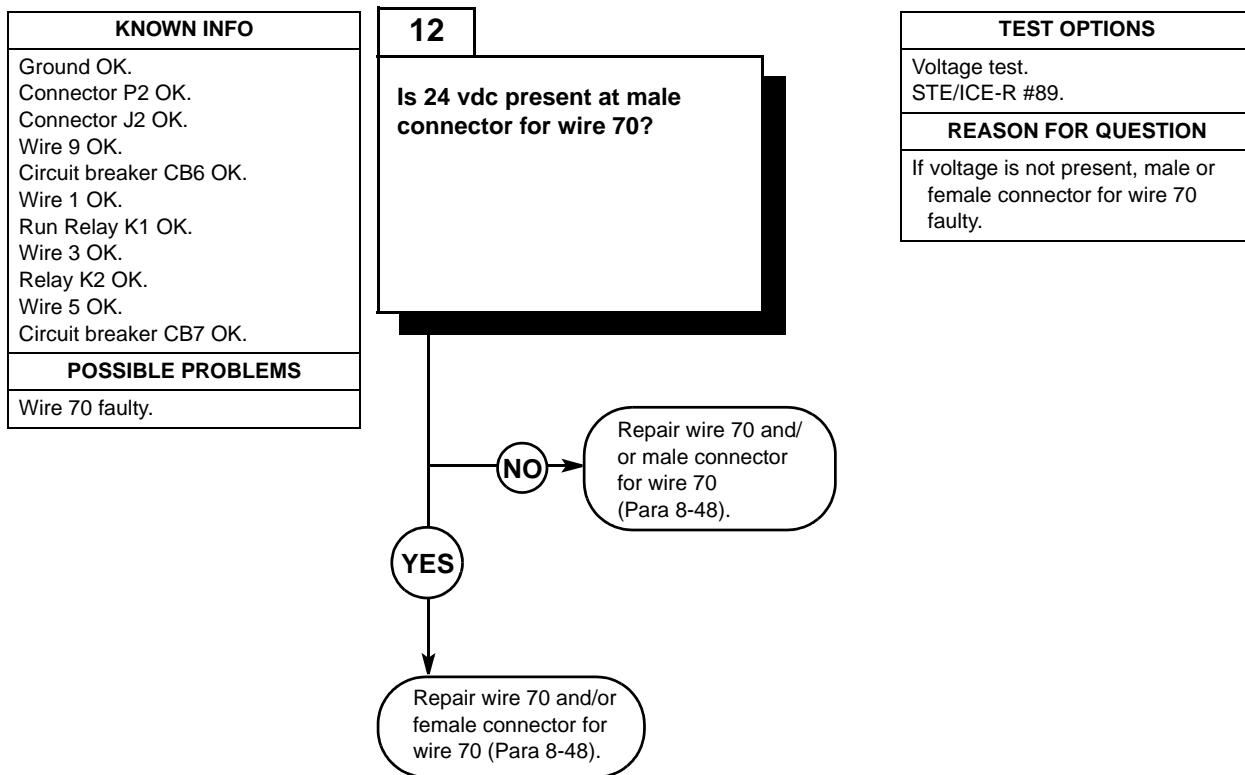
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 5 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 5 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



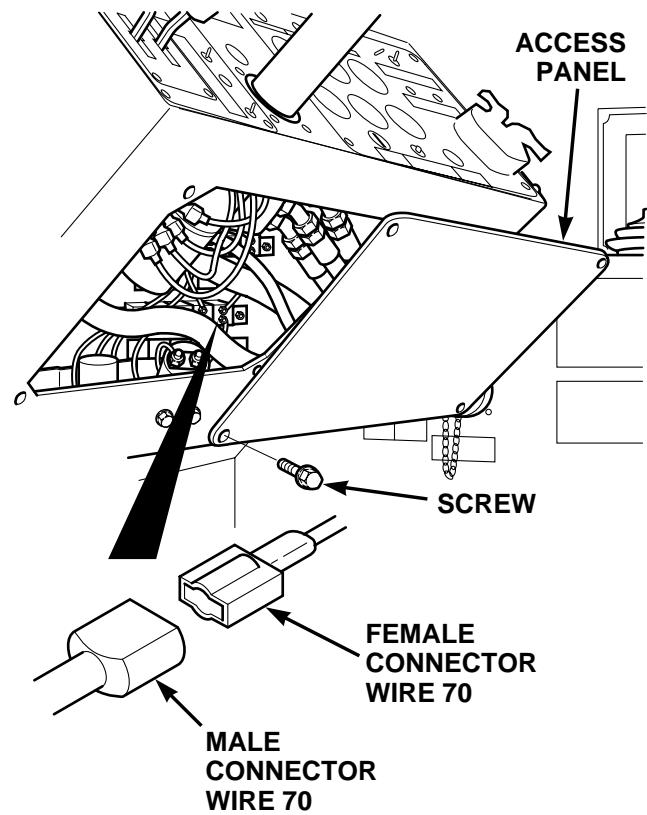
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 70 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 12 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB7 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



## 13. ALL FLOODLIGHTS DO NOT OPERATE (CONT).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to male connector for wire 70.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative batter cable from negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, repair wire 70 and/or female connector for wire 70 (Para 8-48).
(b)	If 24 vdc is not present, repair wire 70 and/or male connector for wire 70 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Install access panel and four screws to secure access panel.
(8)	Install battery cover (Para 8-42).



**14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

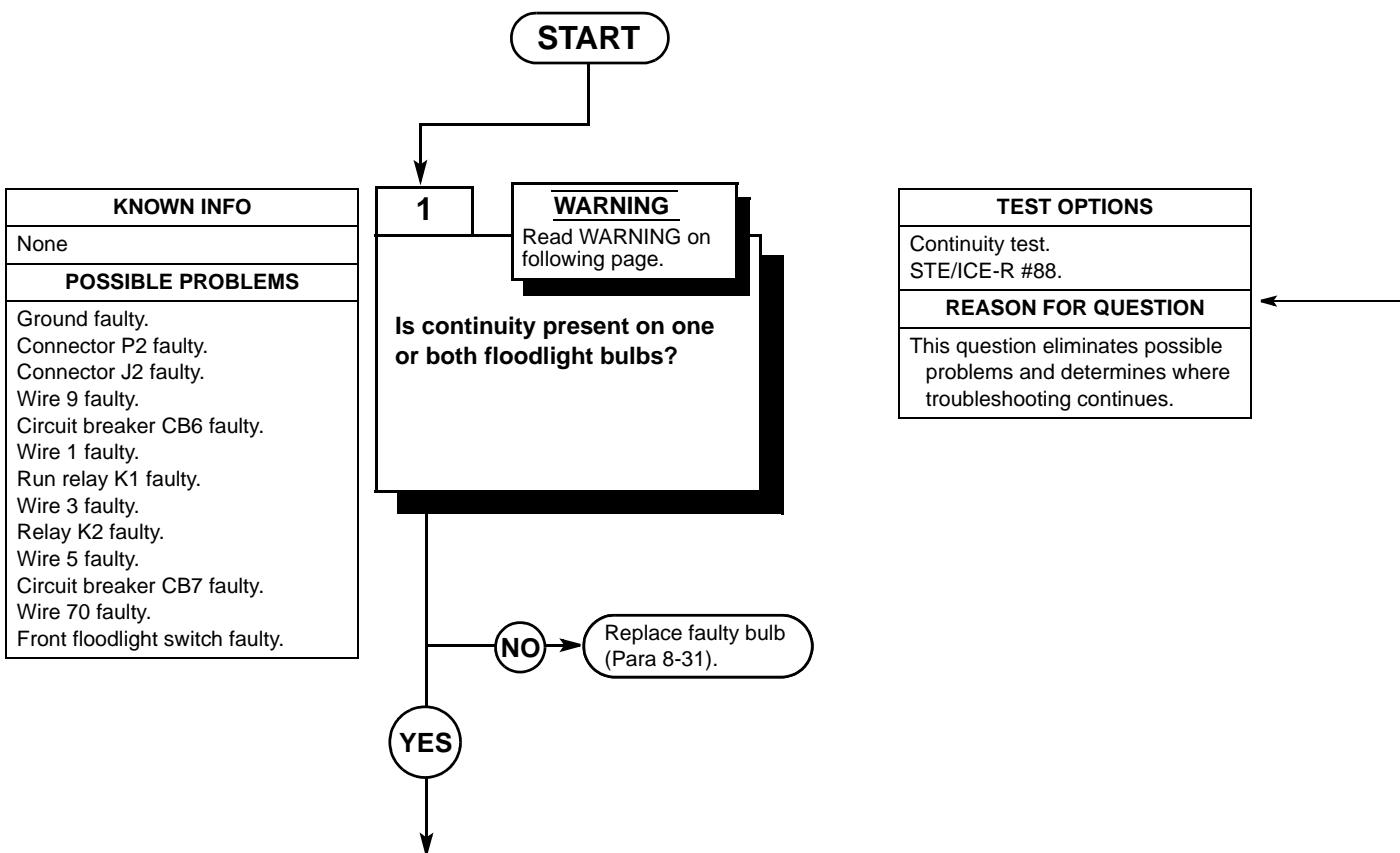
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

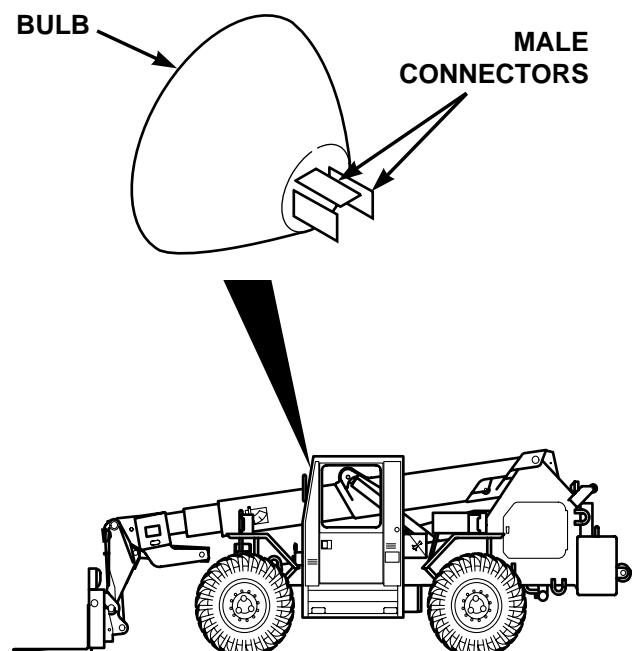
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



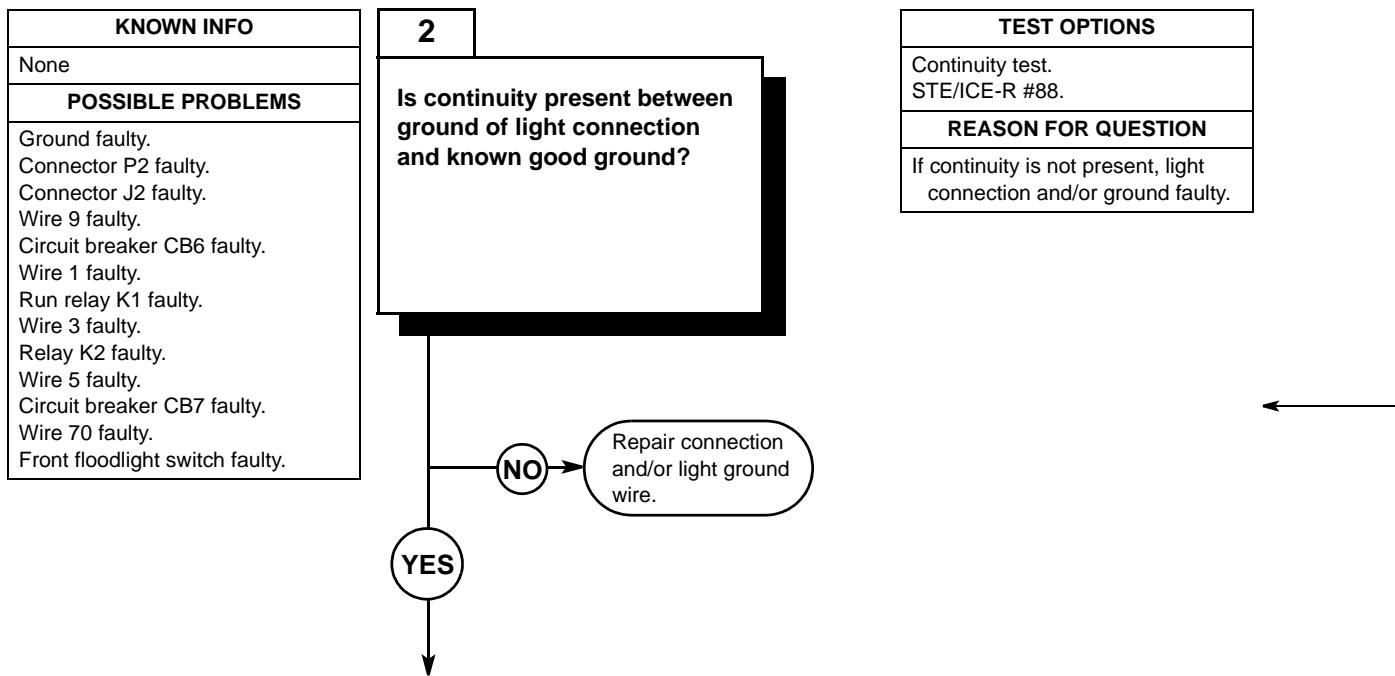
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

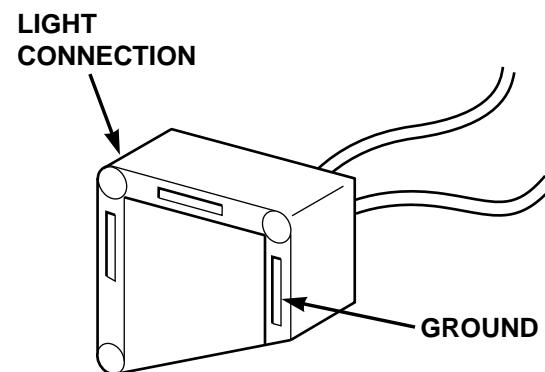
CONTINUITY TEST	
(1)	Remove bulb from faulty floodlight.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to male connector of bulb.
(4)	Connect multimeter negative lead (-) to other male connector of bulb. (a) If continuity is present, go to Step 2 of this fault. (b) If continuity is not present, replace faulty bulb (Para 8-31).



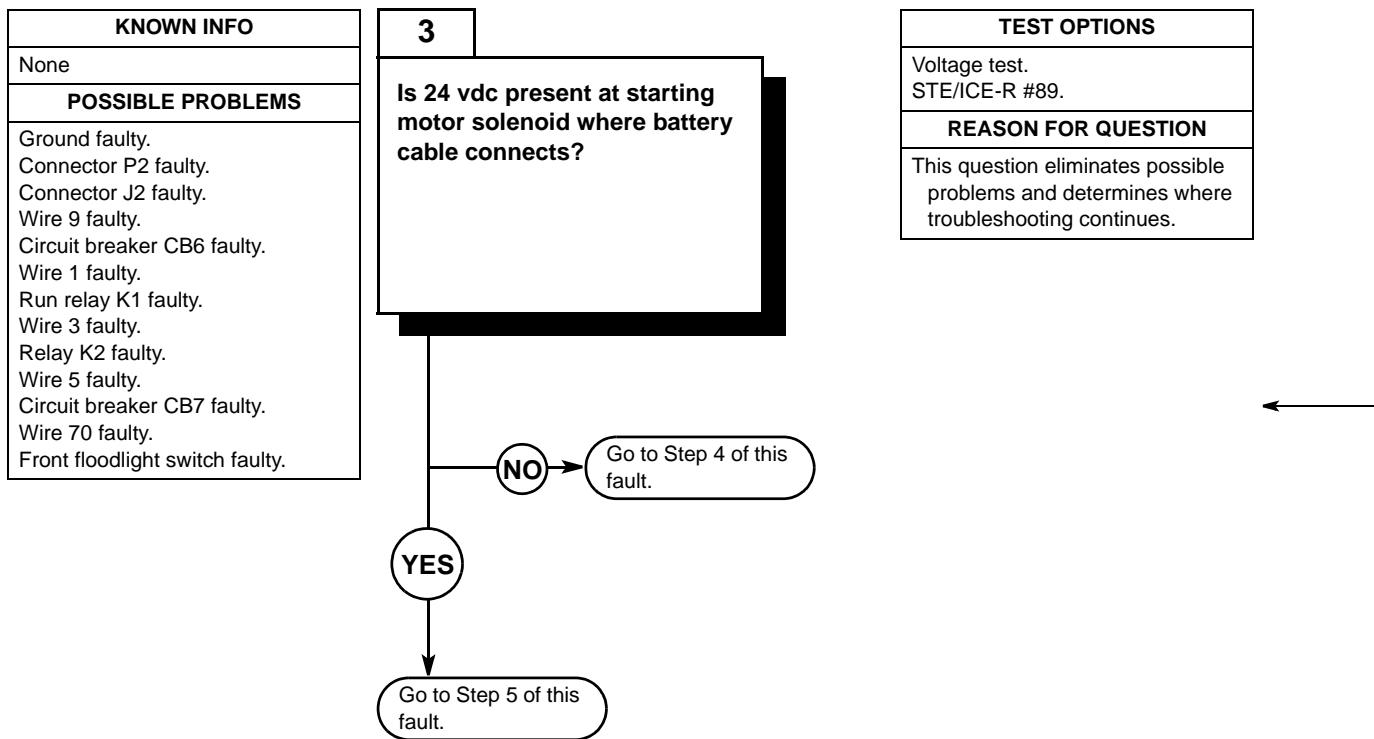
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT).



<b>CONTINUITY TEST</b>	
(1)	Remove bulb from faulty floodlight.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to ground of light connection.
(4)	Connect multimeter negative lead (-) to known good ground. (a) If continuity is present, go to Step 3 of this fault. (b) If continuity is not present, repair light connection and/or light ground wire.

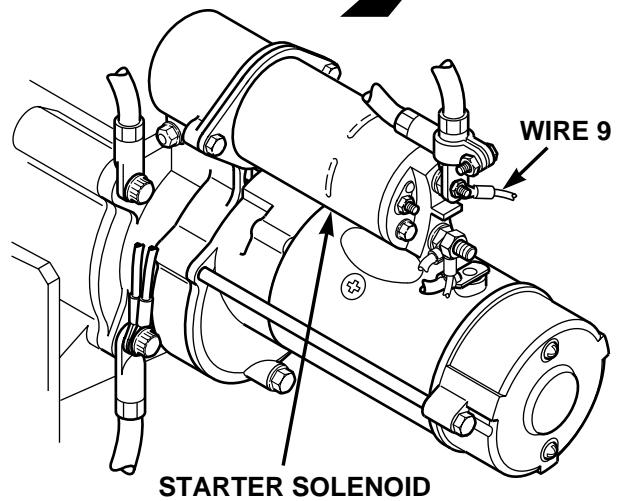
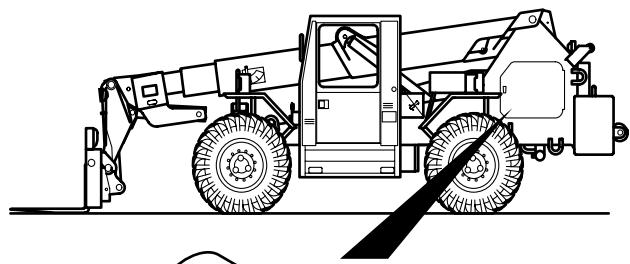


## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT).



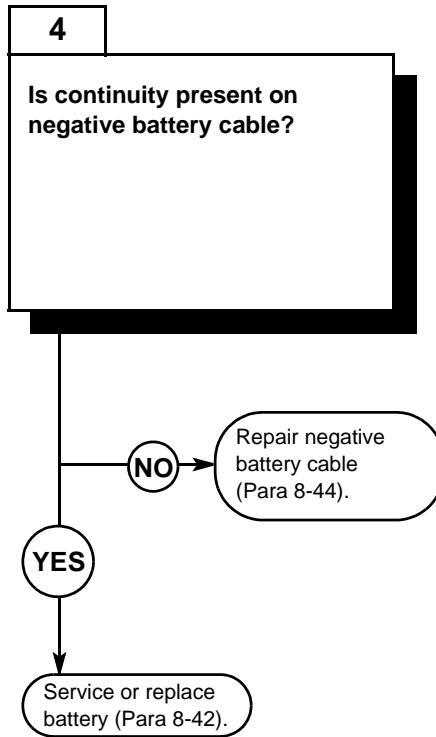
**VOLTAGE TEST**

- (1) Remove battery cover (Para 8-42).
- (2) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (3) Set multimeter to volts dc.
- (4) Connect multimeter positive lead (+) to starting motor solenoid where wire 9 connects.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 5 of this fault.
  - (b) If 24 vdc is not present, go to Step 4 of this fault.



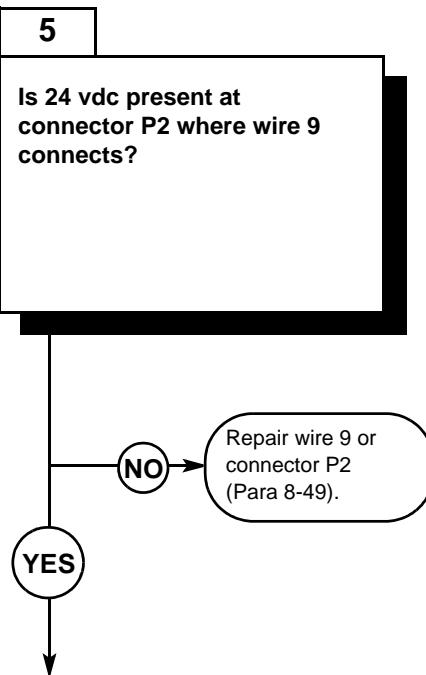
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT.).

KNOWN INFO
POSSIBLE PROBLEMS
Ground faulty. Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, negative battery cable is faulty.

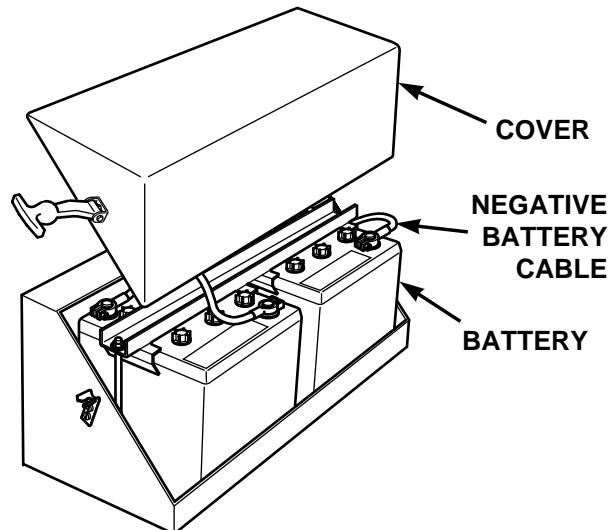
KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.



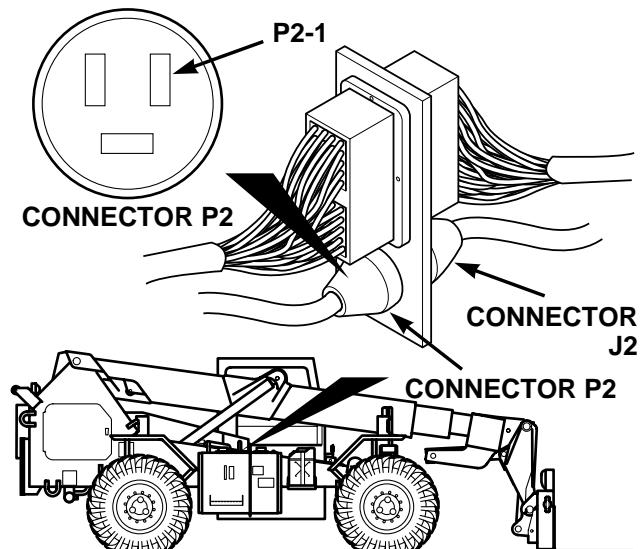
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector P2 is faulty.

**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to end of negative battery cable.
- (4) Connect multimeter negative lead (-) to other end of negative battery cable.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, replace negative battery cable (Para 8-44).

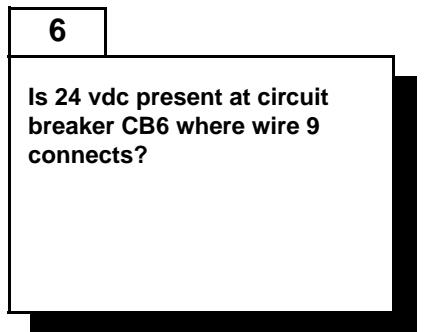
**VOLTAGE TEST**

- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to connector P2-1 where wire 9 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 6 of this fault.
  - (b) If 24 vdc is not present, repair wire 9 or connector P2 (Para 8-49).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (7) Connect connector J2 to connector P2.



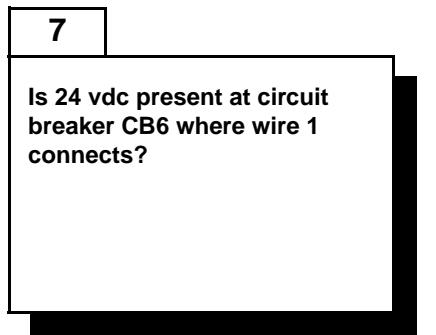
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Connector J2 faulty.
Wire 9 faulty.
Circuit breaker CB6 faulty.
Wire 1 faulty.
Run relay K1 faulty.
Wire 3 faulty.
Relay K2 faulty.
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Front floodlight switch faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector J2 are faulty.

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty.
Wire 1 faulty.
Run relay K1 faulty.
Wire 3 faulty.
Relay K2 faulty.
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Front floodlight switch faulty.



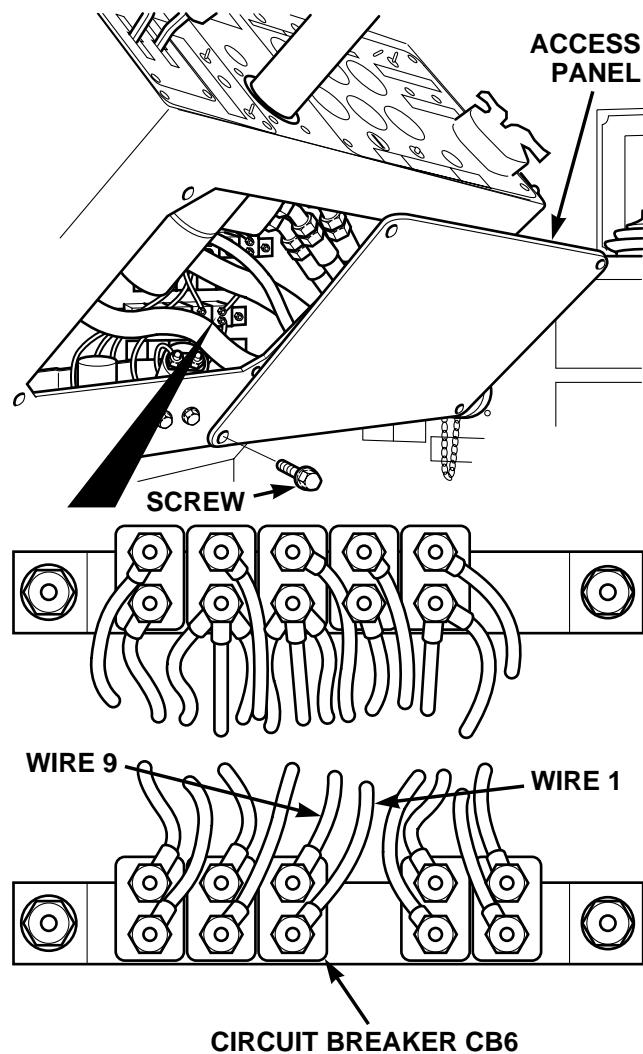
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 is faulty.

**VOLTAGE TEST**

- (1) Remove four screws and access panel.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 9 or connector J2 (Para 8-48).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).



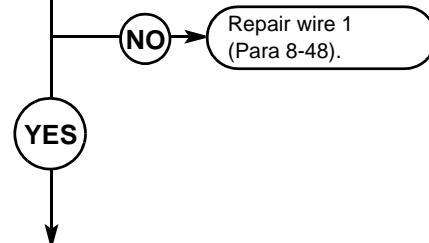
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.

**8**

Is 24 vdc present at run relay K1 where wire 1 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 faulty.

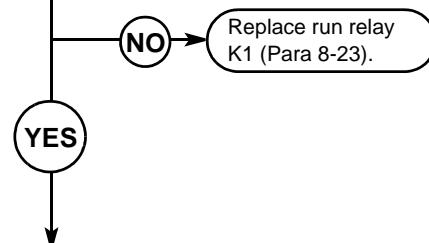


KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.

**9**

Is 24 vdc present at run relay K1 where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay K1 faulty.

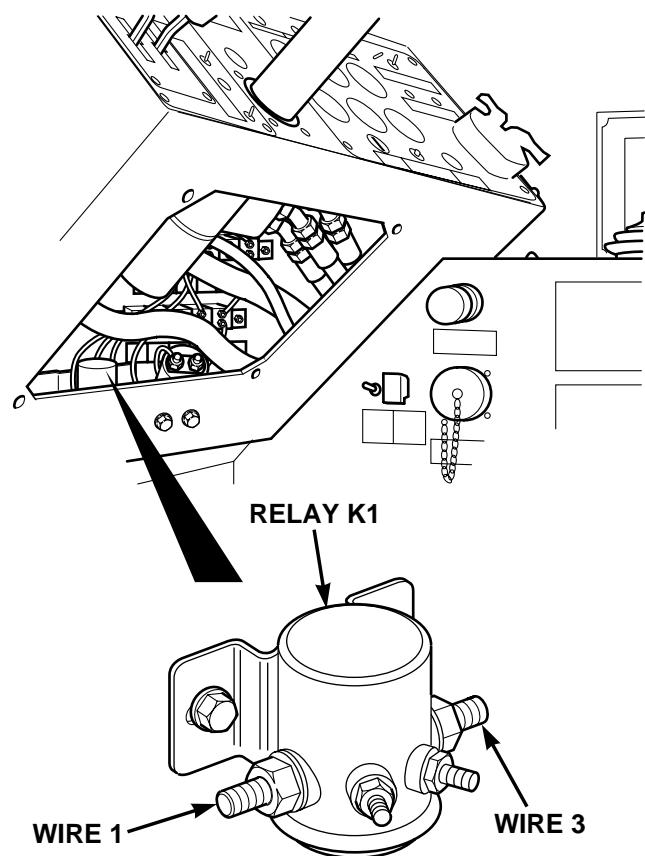


**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 9 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 10 of this fault.
  - (b) If 24 vdc is not present, replace run relay K1 (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).



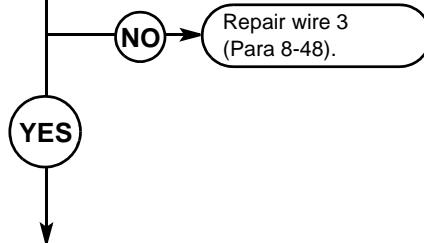
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.

**10**

Is 24 vdc present at relay K2 where wire 3 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 is faulty.

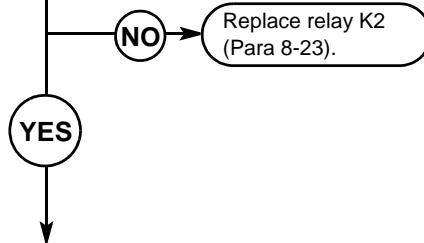


KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK. Wire 3 OK.
POSSIBLE PROBLEMS
Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Front floodlight switch faulty.

**11**

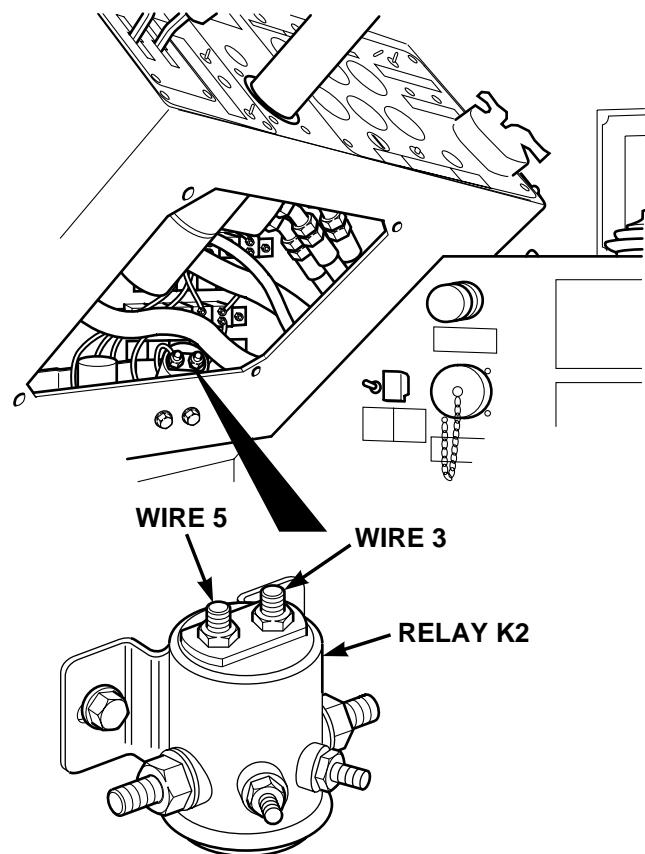
Is 24 vdc present at relay K2 where wire 5 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, relay K2 is faulty.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to relay K2 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to relay K2 where wire 5 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 12 of this fault.
(b)	If 24 vdc is not present, replace relay K2 (Para 8-23).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



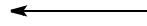
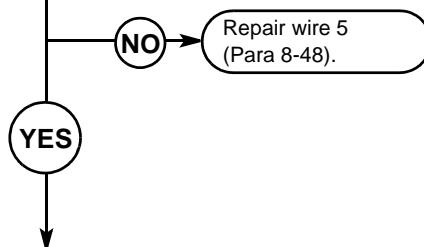
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
POSSIBLE PROBLEMS
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Front floodlight switch faulty.

**12**

Is 24 vdc present at circuit breaker CB7 where wire 5 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 5 is faulty.

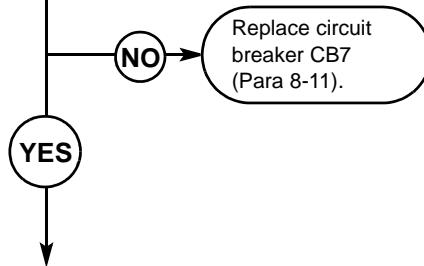


KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
Wire 5 OK.
POSSIBLE PROBLEMS
Circuit breaker CB7 faulty.
Wire 70 faulty.
Front floodlight switch faulty.

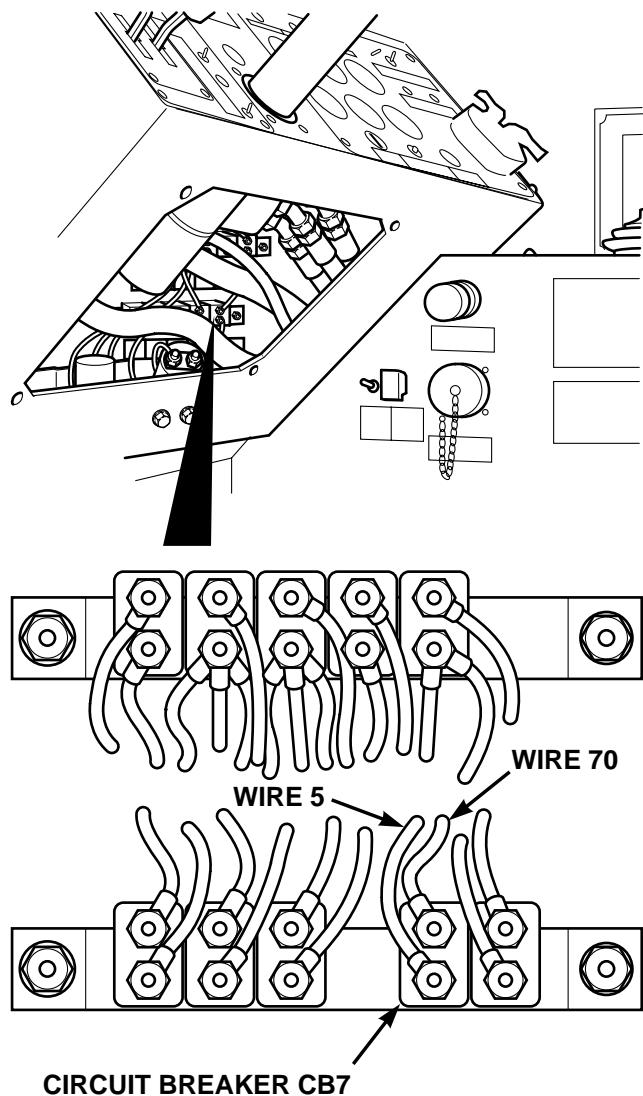
**13**

Is 24 vdc present at circuit breaker CB7 where wire 70 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB7 is faulty.



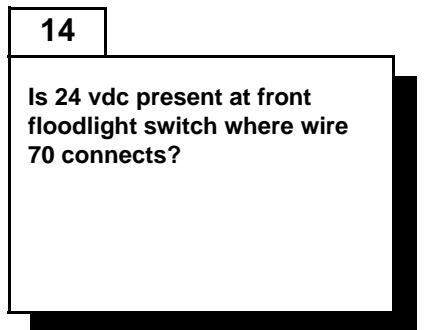
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 5 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, repair wire 5 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 70 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB7 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(8)	Install access panel and four screws to secure access panel.

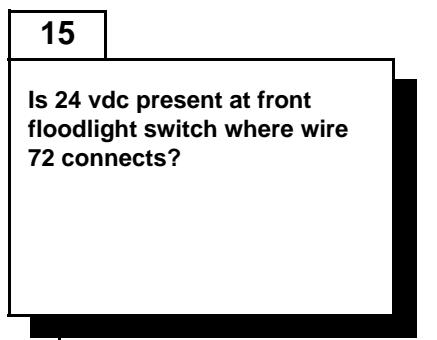
## 14. FRONT FLOODLIGHT (OR FORWARD) DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
Wire 5 OK.
Circuit breaker CB7 OK.
POSSIBLE PROBLEMS
Wire 70 faulty.
Front floodlight switch faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 70 is faulty.

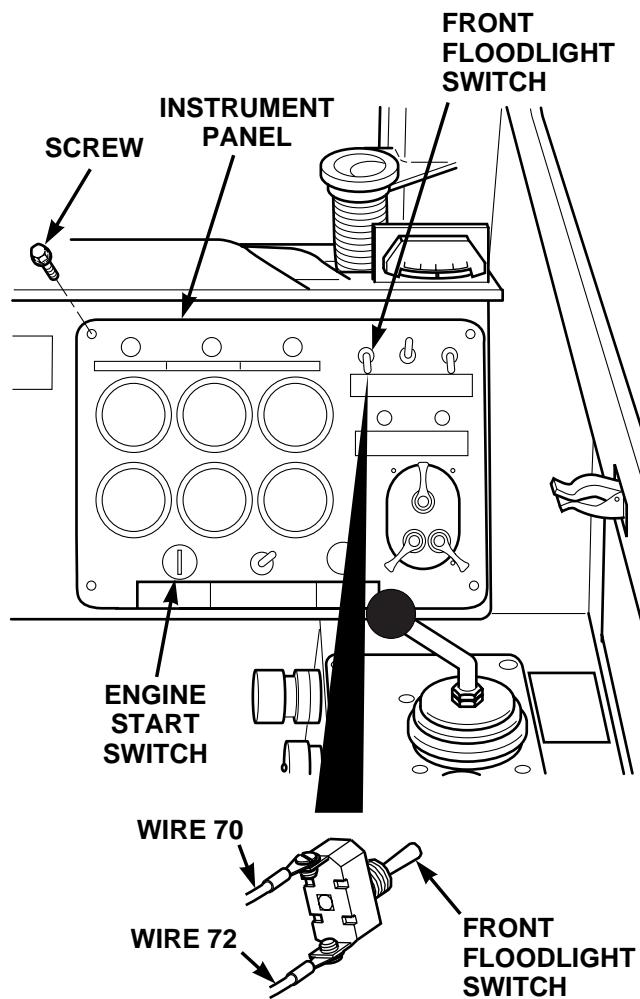
KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
Wire 5 OK.
Circuit breaker CB7 OK.
Wire 70 OK.
POSSIBLE PROBLEMS
Front floodlight switch faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, front floodlight switch is faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Remove four screws and instrument panel.
(3)	Lift instrument panel out to get to male connector at floodlight switch.
(4)	Connect multimeter positive lead (+) to male connector for wire 70.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-44).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 15 of this fault.</li> <li>(b) If 24 vdc is not present, repair wire 70 (Para 8-48).</li> </ul>
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-44).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Lift instrument panel out to get to front floodlight switch where wire 72 connects to front floodlight switch.
(3)	Connect multimeter positive lead (+) to front floodlight switch where wire 72 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, repair wire 72 (Para 8-48).</li> <li>(b) If 24 vdc is not present, replace floodlight switch (Para 8-7).</li> </ul>
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Install instrument panel and four screws to secure instrument panel.
(9)	Install battery cover (Para 8-42).



**15. BOOM FLOODLIGHT DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

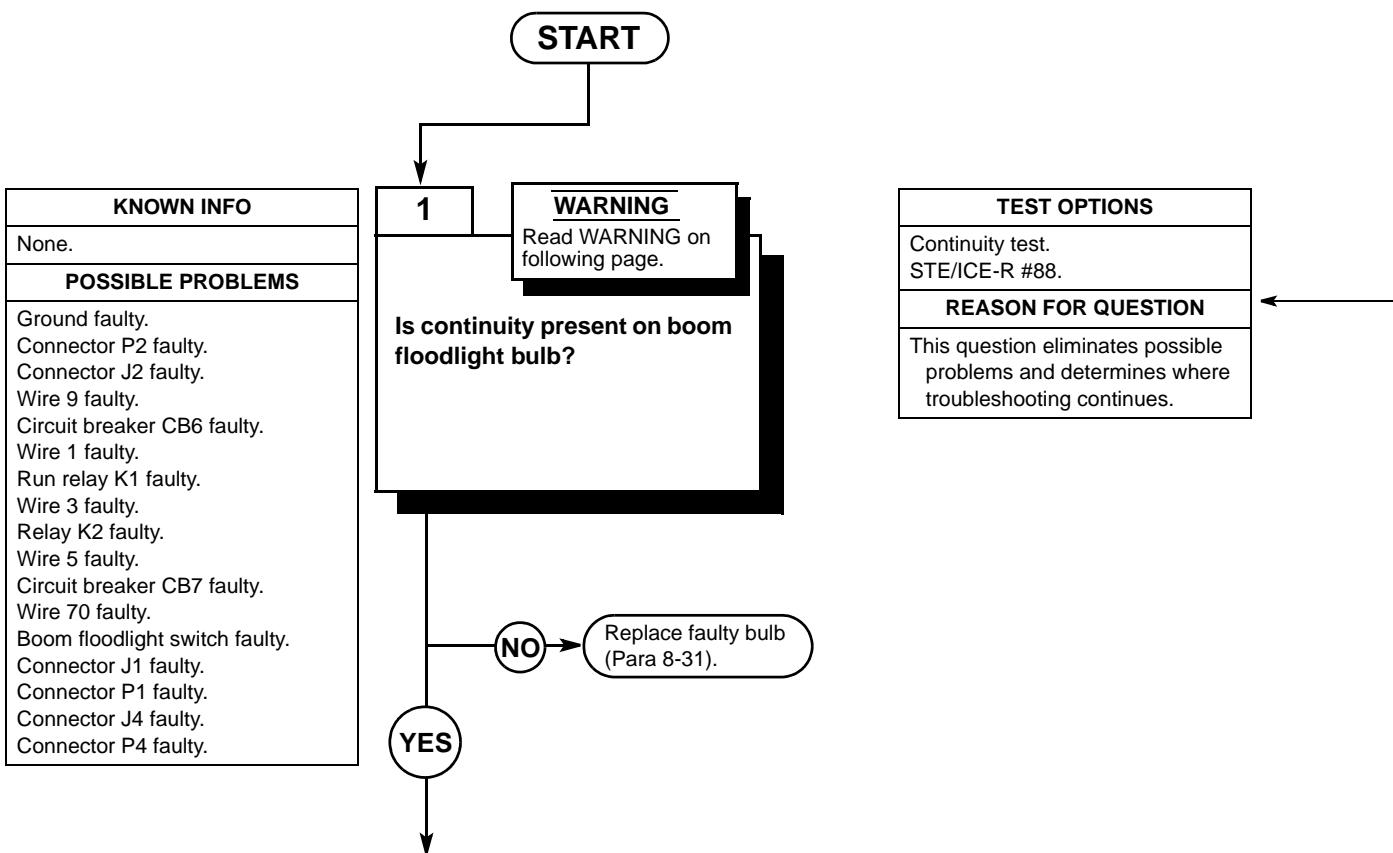
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

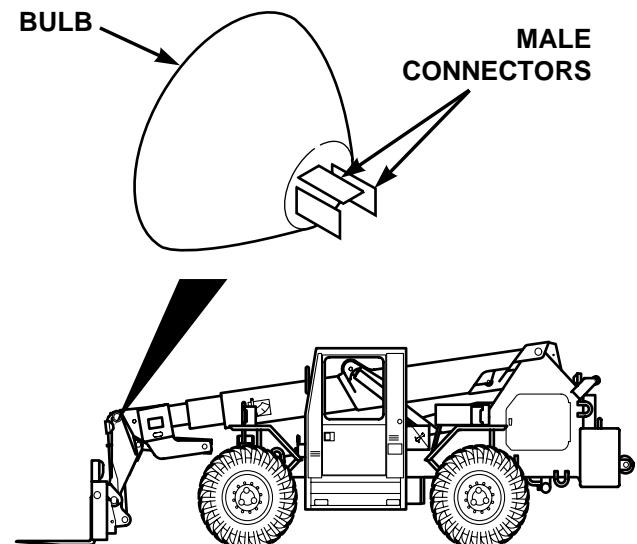
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



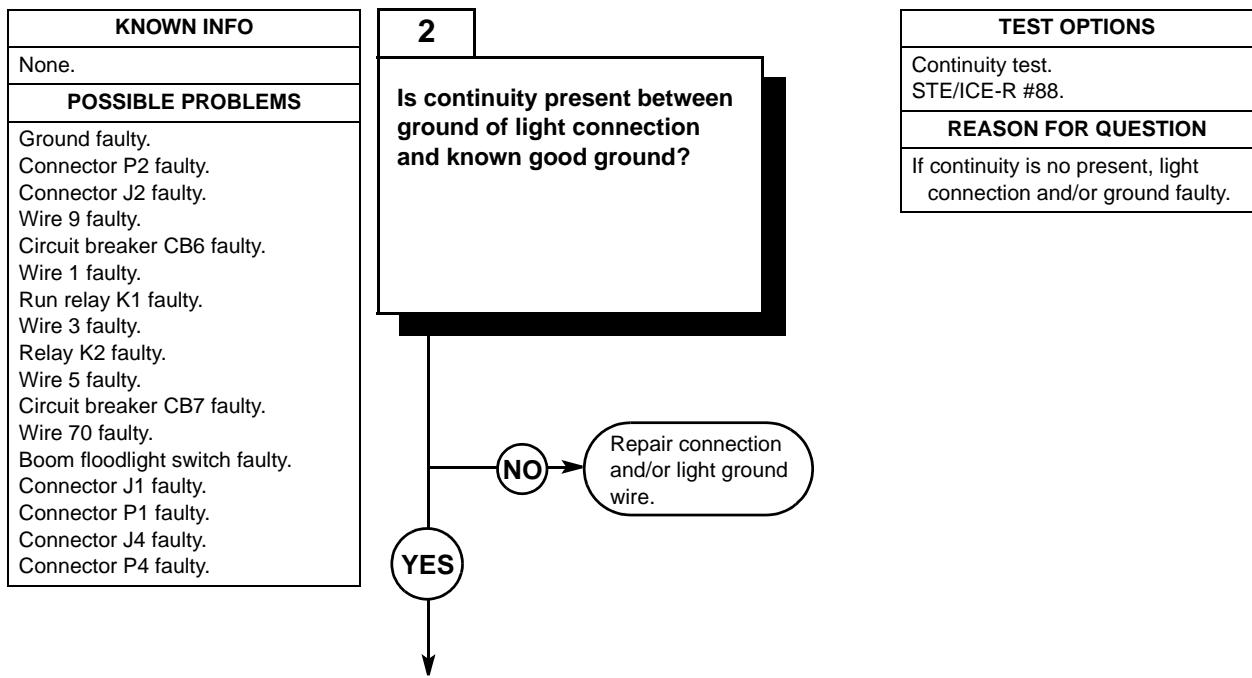
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

CONTINUITY TEST	
(1)	Remove bulb from boom floodlight.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to male connector of bulb.
(4)	Connect multimeter negative lead (-) to other male connector of bulb. (a) If continuity is present, go to Step 2 of this fault. (b) If continuity is not present, replace faulty bulb (Para 8-31).

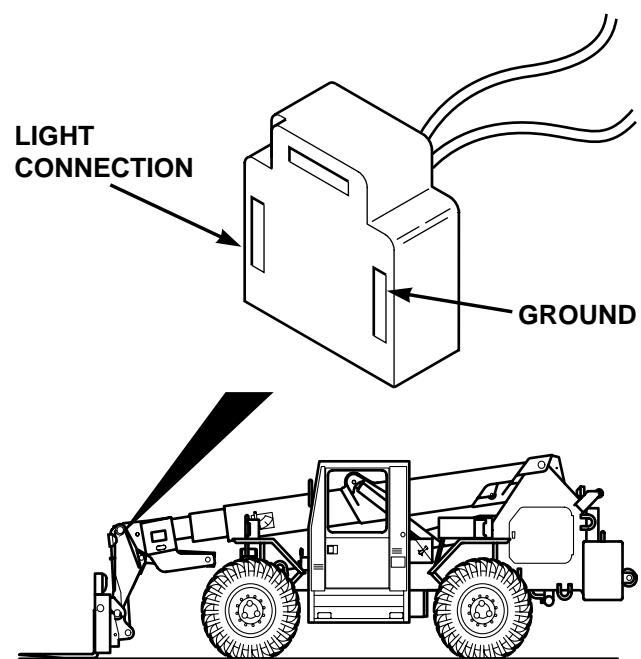


## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).



**CONTINUITY TEST**

- (1) Remove bulb from boom floodlight.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground of light connection.
- (4) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, repair light connection and/or light ground wire.

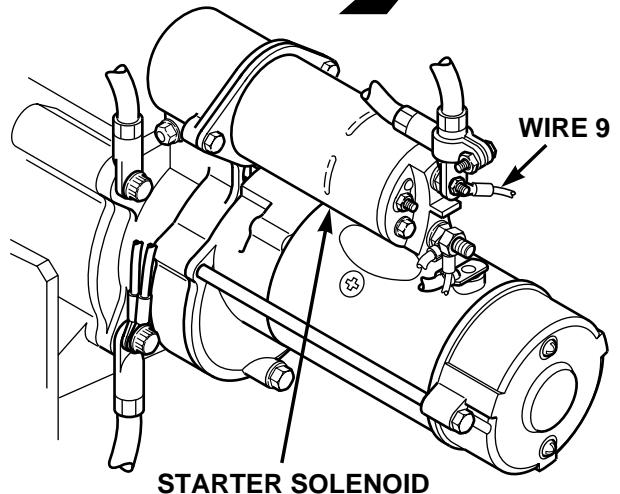
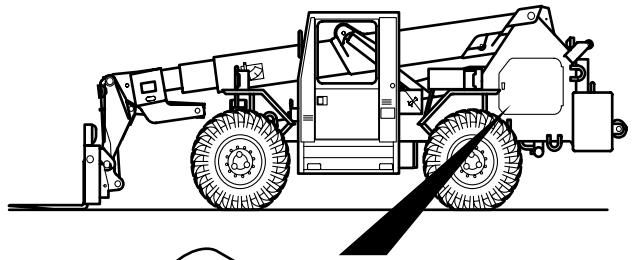


#### **15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).**

KNOWN INFO	3	TEST OPTIONS
None.		Voltage Test. STE/ICE-R #89.
POSSIBLE PROBLEMS	Is 24 vdc present at starting motor solenoid where battery cable connects?	REASON FOR QUESTION
Ground faulty. Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.	<pre>graph TD; Q[Is 24 vdc present at starting motor solenoid where battery cable connects?]; Q -- YES --&gt; S5[Go to Step 5 of this fault.]; Q -- NO --&gt; S4[Go to Step 4 of this fault.]</pre>	This question eliminates possible problems and determines where troubleshooting continues.

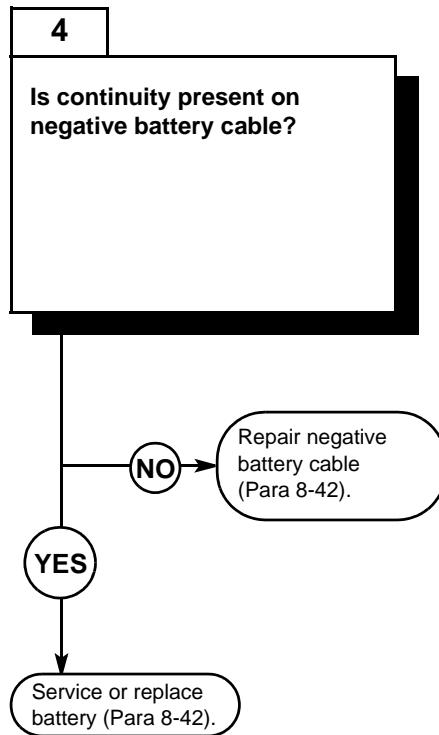
**VOLTAGE TEST**

- (1) Remove battery cover (Para 8-42).
- (2) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (3) Set multimeter to volts dc.
- (4) Connect multimeter positive lead (+) to starting motor solenoid where wire 9 connects.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 5 of this fault.
  - (b) If 24 vdc is not present, go to Step 4 of this fault.
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).

**STARTER SOLENOID**

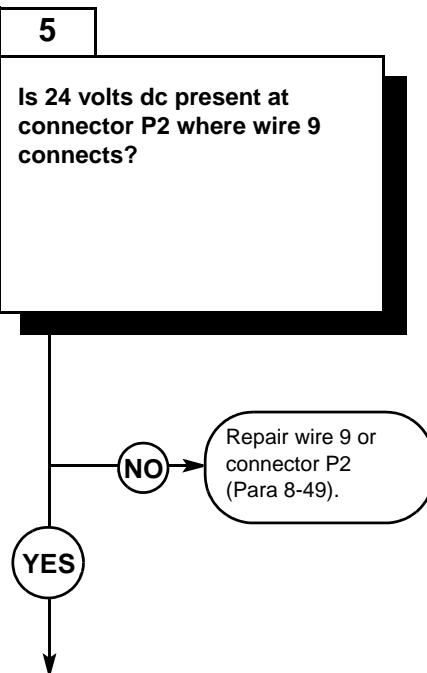
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
None.
POSSIBLE PROBLEMS
Ground faulty. Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



TEST OPTIONS
Continuity Test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, negative battery cable is faulty.

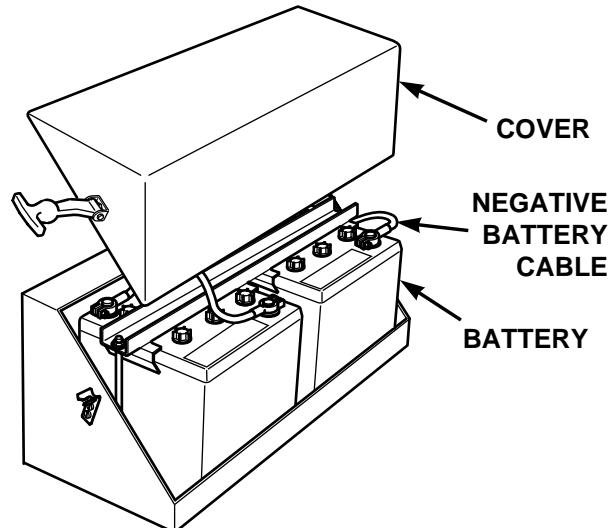
KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



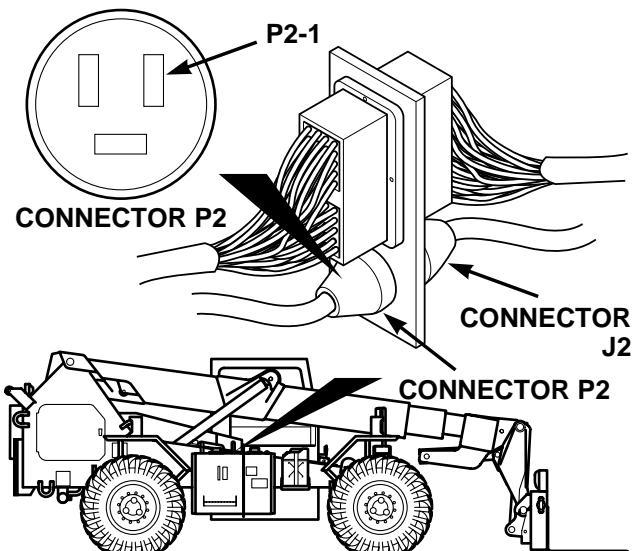
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector P2 are faulty.

**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to end of negative battery cable.
- (4) Connect multimeter negative lead (-) to other end of negative battery cable.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, repair negative battery cable (Para 8-44).

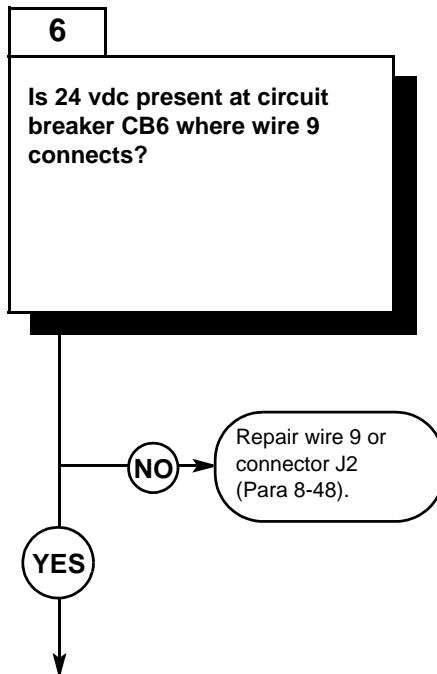
**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Disconnect connector J2 from connector P2.
- (3) Set multimeter to volts dc.
- (4) Connect multimeter positive lead (+) to connector P2-1 where wire 9 connects.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 6 of this fault.
  - (b) If 24 vdc is not present, repair wire 9 or connector P2 (Para 8-49).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (8) Connect connector J2 to connector P2.



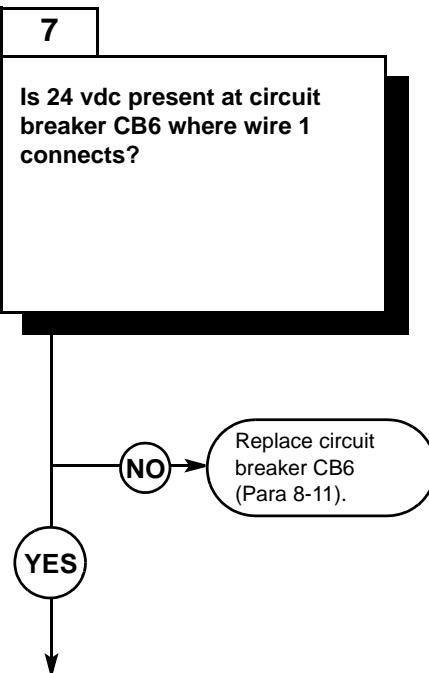
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Connector J2 faulty.
Wire 9 faulty.
Circuit breaker CB6 faulty.
Wire 1 faulty.
Run relay K1 faulty.
Wire 3 faulty.
Relay K2 faulty.
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Boom floodlight switch faulty.
Connector J1 faulty.
Connector P1 faulty.
Connector J4 faulty.
Connector P4 faulty.



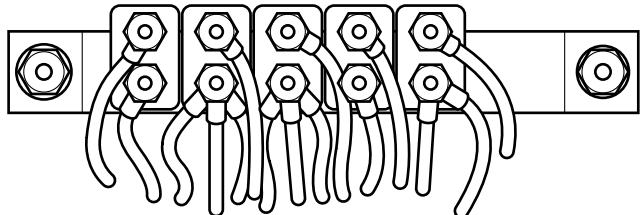
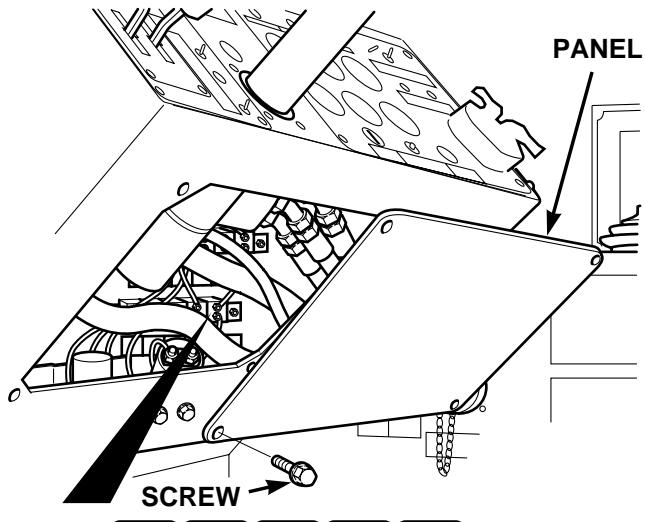
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector J2 are faulty.

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty.
Wire 1 faulty.
Run relay K1 faulty.
Wire 3 faulty.
Relay K2 faulty.
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Boom floodlight switch faulty.
Connector J1 faulty.
Connector P1 faulty.
Connector J4 faulty.
Connector P4 faulty.

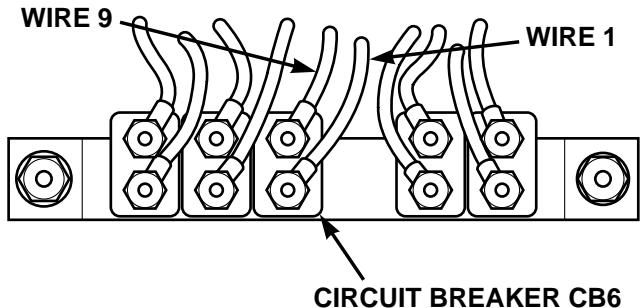


TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 is faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Remove four screws and access panel.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable from negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 7 of this fault.
(b)	If 24 vdc is not present, repair wire 9 or connector J2 (Para 8-48).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

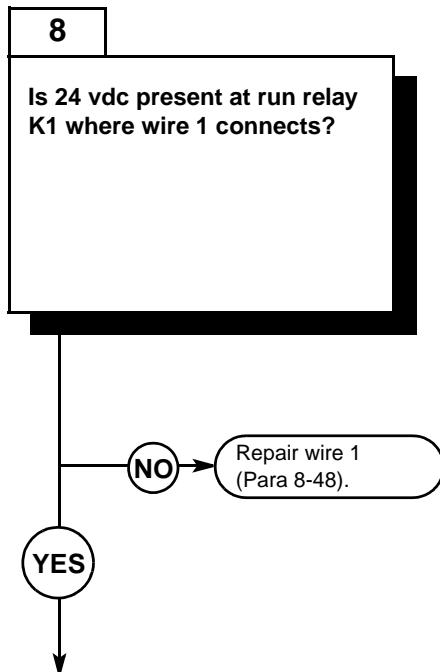


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable from negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 8 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).



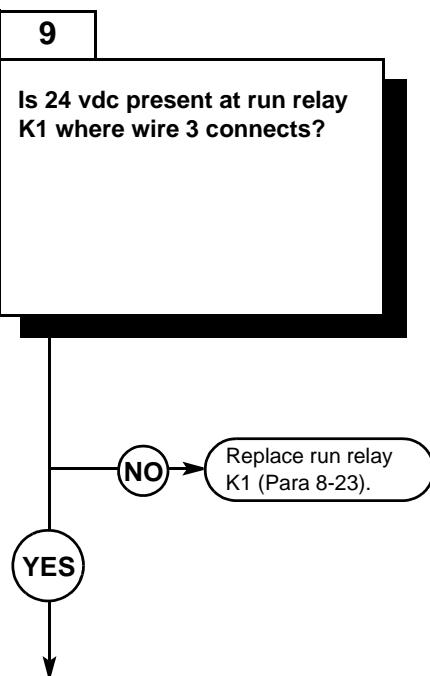
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 is faulty.

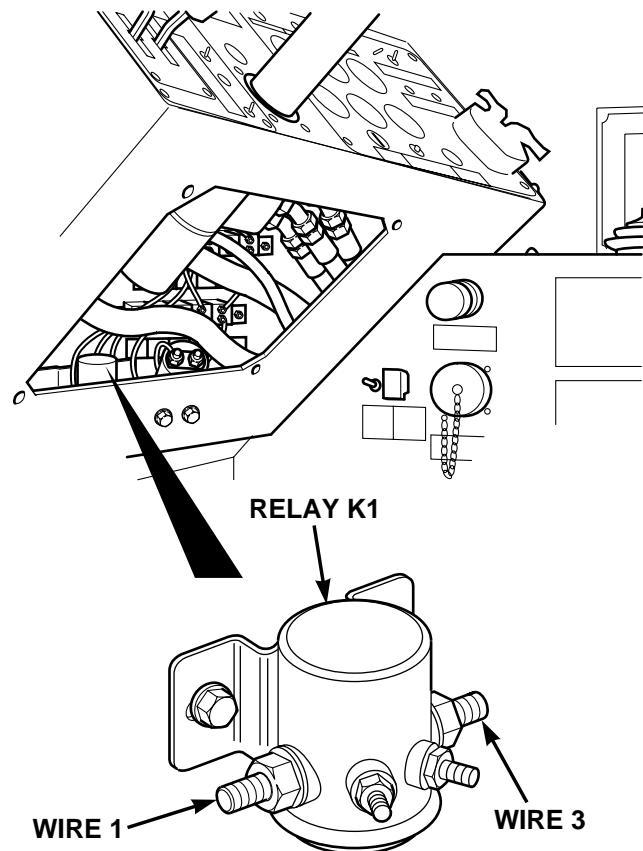
KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay K1 is faulty.

**VOLTAGE TEST**

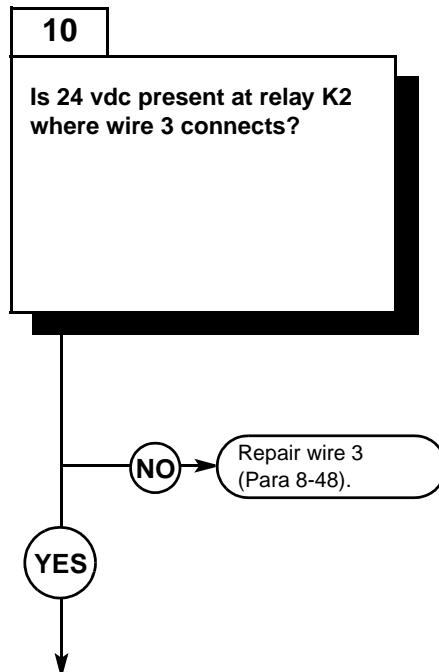
- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable from negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 9 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable from negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 10 of this fault.
  - (b) If 24 vdc is not present, replace run relay K1 (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).

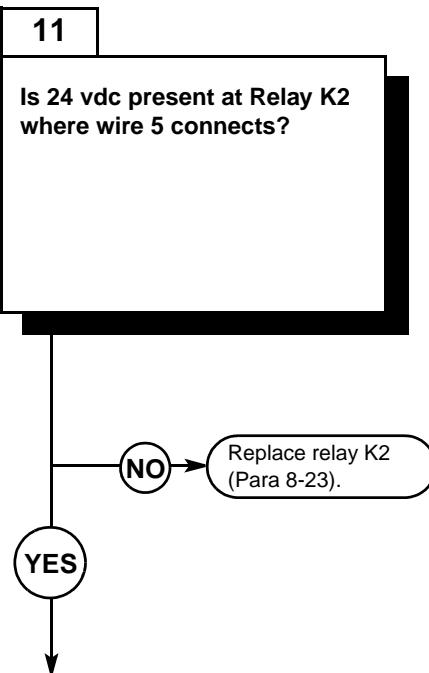
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 is faulty.

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK. Wire 3 OK.
POSSIBLE PROBLEMS
Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Boom floodlight switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty.



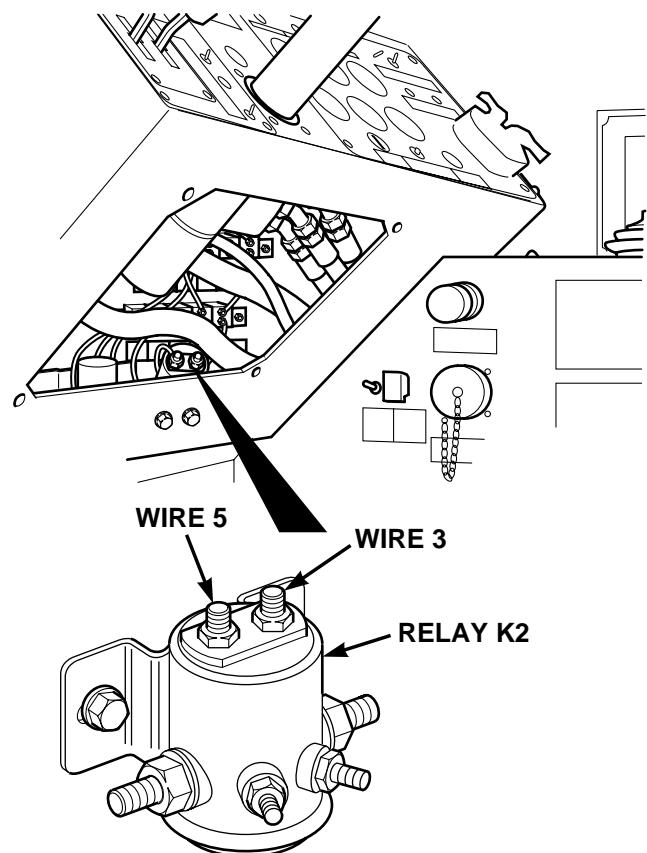
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, relay K2 is faulty.

**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to relay K2 where wire 3 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable from negative side of battery (Para 8-42).
- (6) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 11 of this fault.
  - (b) If 24 vdc is not present, repair wire 3 (Para 8-48).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable from negative side of battery (Para 8-42).

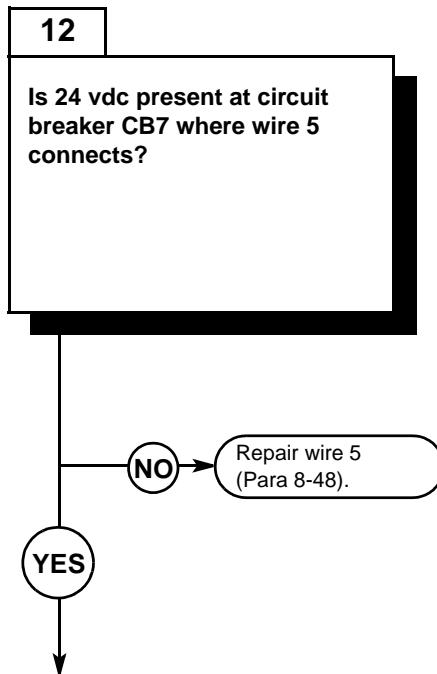
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to relay K2 where wire 5 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable from negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 12 of this fault.
  - (b) If 24 vdc is not present, replace relay K2 (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



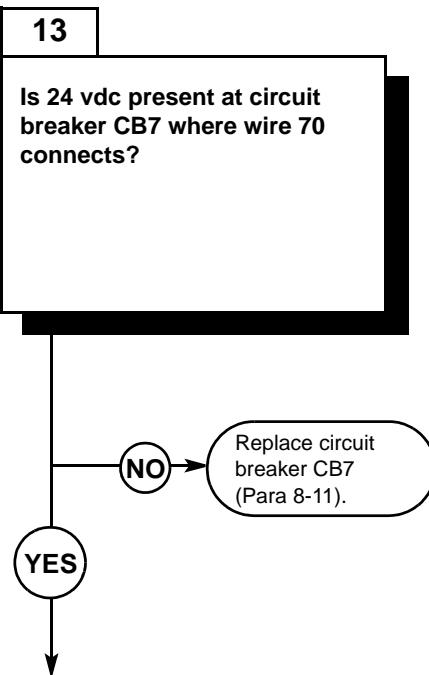
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
POSSIBLE PROBLEMS
Wire 5 faulty.
Circuit breaker CB7 faulty.
Wire 70 faulty.
Boom floodlight switch faulty.
Connector J1 faulty.
Connector P1 faulty.
Connector J4 faulty.
Connector P4 faulty.



TEST OPTIONS
Voltage Test STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 5 is faulty.

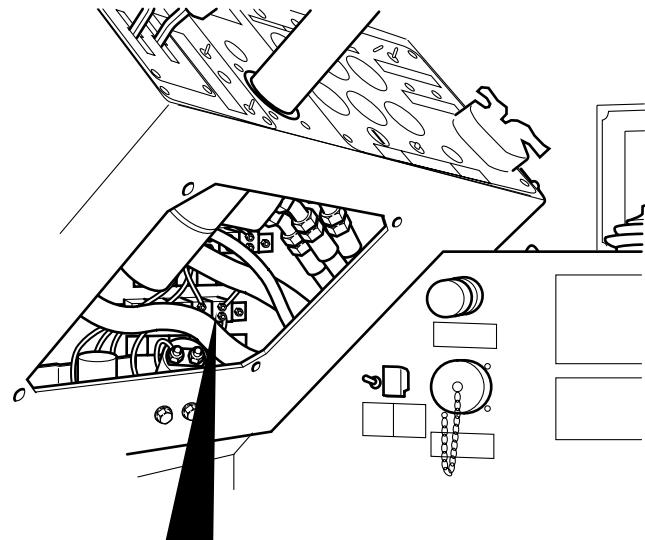
KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay K1 OK.
Wire 3 OK.
Relay K2 OK.
Wire 5 OK.
POSSIBLE PROBLEMS
Circuit breaker CB7 faulty.
Wire 70 faulty.
Boom floodlight switch faulty.
Connector J1 faulty.
Connector P1 faulty.
Connector J4 faulty.
Connector P4 faulty.



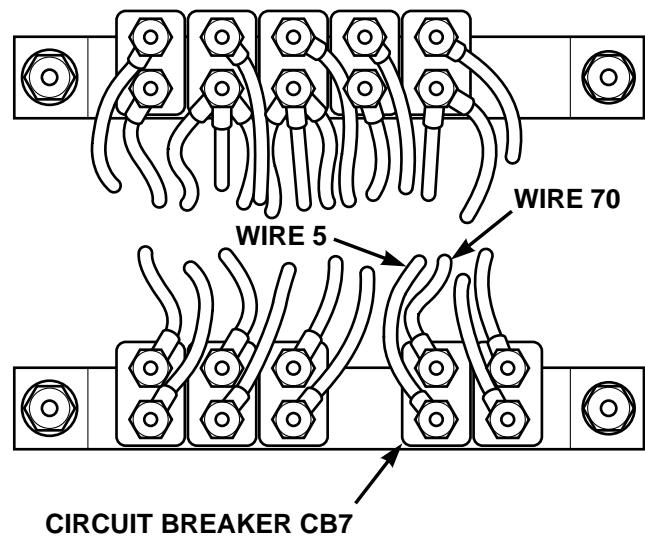
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB7 is faulty.

**VOLTAGE TEST**

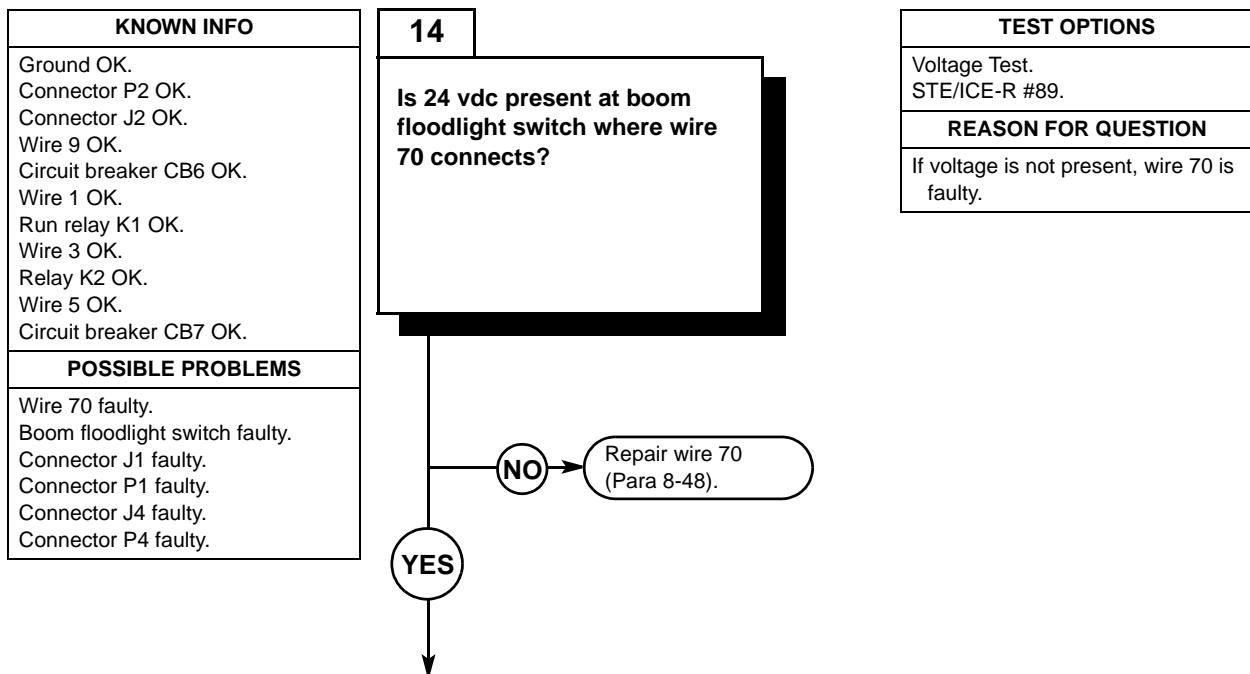
- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to circuit breaker CB7 where wire 5 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable from negative side of battery (Para 8-42).
- (6) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 13 of this fault.
  - (b) If 24 vdc is not present, repair wire 5 (Para 8-48).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

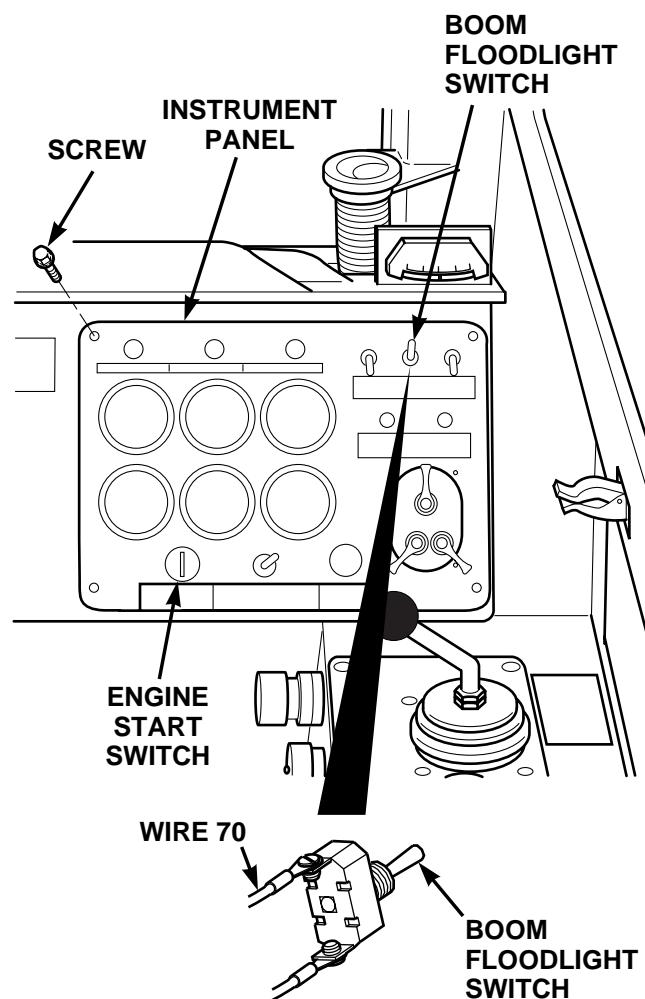
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to circuit breaker CB7 where wire 70 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable from negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 14 of this fault.
  - (b) If 24 vdc is not present, replace circuit breaker CB7 (Para 8-11).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (8) Install access panel and four screws.



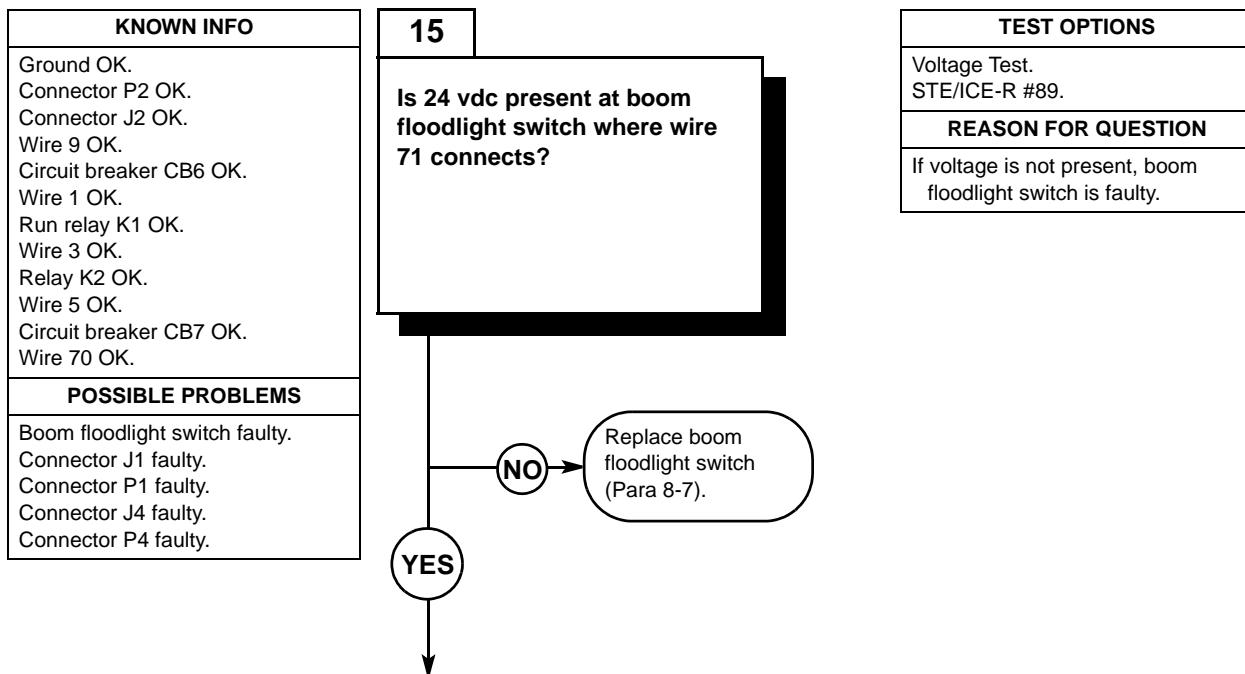
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT).



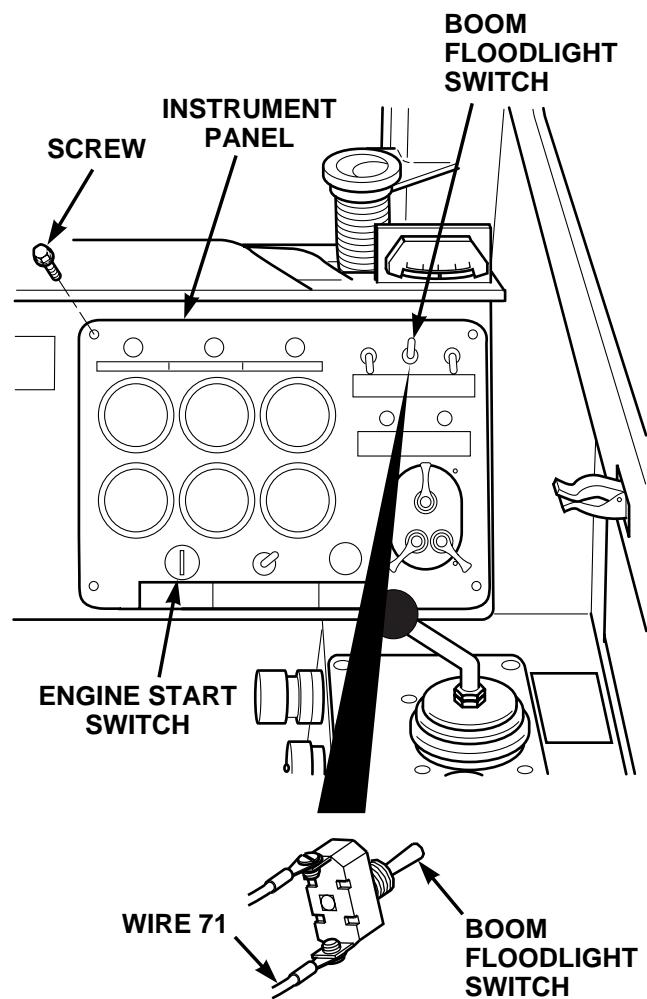
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Remove four screws and instrument panel.
(4)	Lift instrument panel out to get to boom floodlight switch.
(5)	Connect multimeter positive lead (+) to boom floodlight switch where wire 70 connects.
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable from negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(9)	Turn boom floodlight switch to ON position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 15 of this fault.
(b)	If 24 vdc is not present, repair wire 70 (Para 8-48).
(10)	Turn boom floodlight switch to OFF position (TM 10-3930-673-10).
(11)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(12)	Disconnect negative battery cable from negative side of battery (Para 8-42).



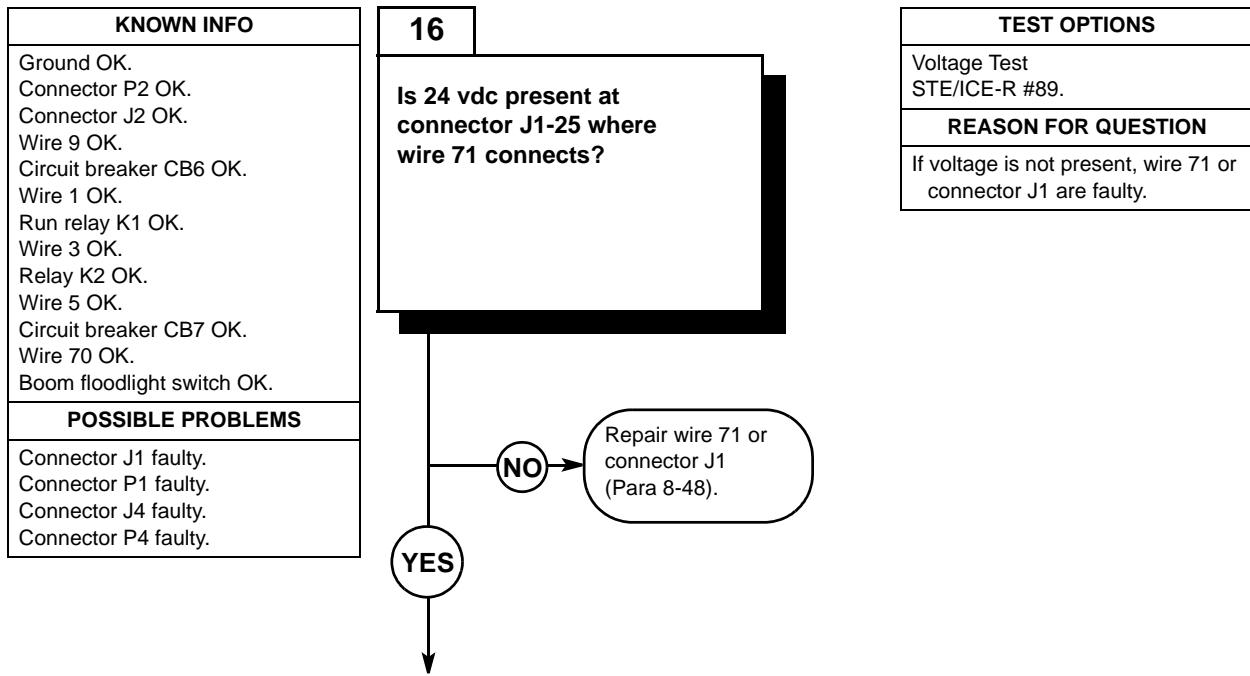
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).



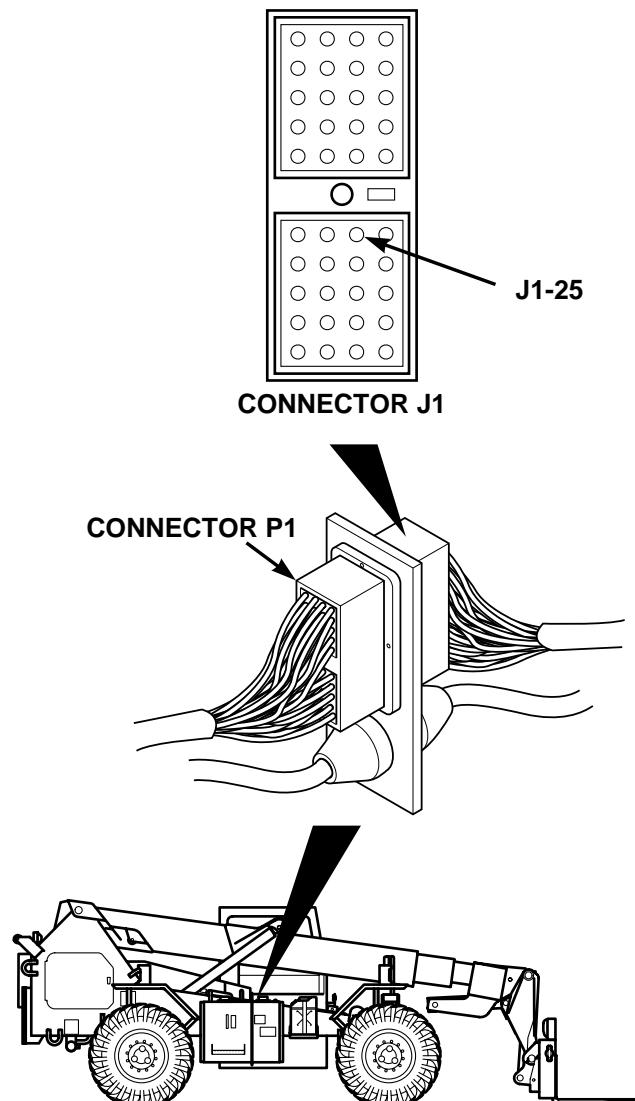
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Lift instrument panel out to get to boom floodlight switch where wire 71 connects.
(4)	Connect multimeter positive lead (+) to boom floodlight switch where wire 71 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable from negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 16 of this fault.
(b)	If 24 vdc is not present, replace boom floodlight switch (Para 8-7).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Install instrument panel and four screws.



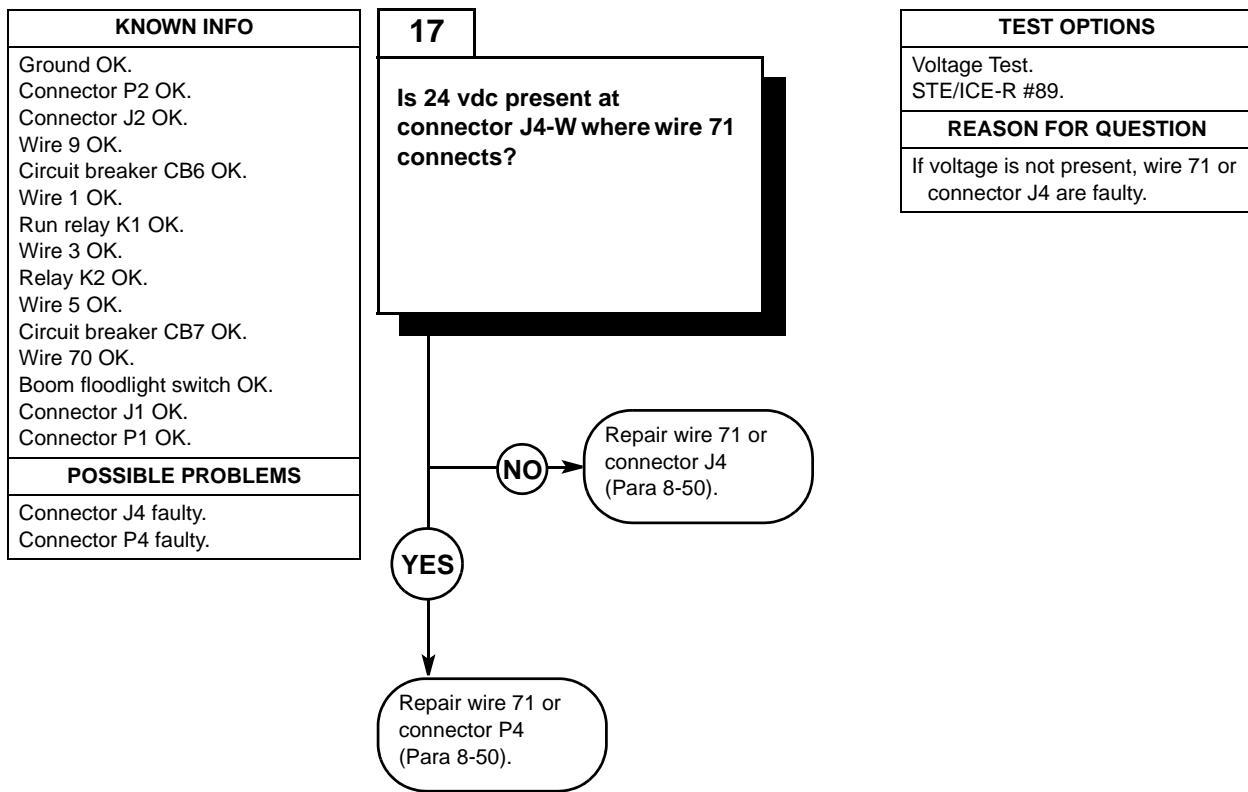
## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).



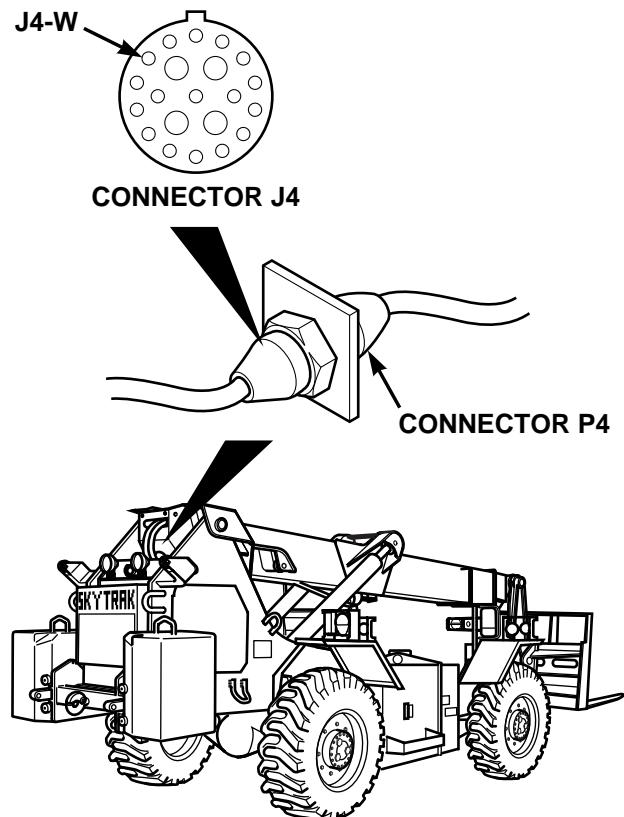
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Disconnect connector J1 from connector P1.
(4)	Connect multimeter positive lead (+) to connector J1-25 where wire 71 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable from negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(8)	Turn boom floodlight switch to ON position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 17 of this fault.
(b)	If 24 vdc is not present, repair wire 71 or connector J1 (Para 8-48).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



## 15. BOOM FLOODLIGHT DOES NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Disconnect connector J4 from connector P4.
(4)	Connect multimeter positive lead (+) to connector J4-W where wire 71 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable from negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(8)	Turn boom floodlight switch to ON position (TM 10-3930-673-10).
(a)	If 24 vdc is present, repair wire 71 or P4 connector (Para 8-50).
(b)	If 24 vdc is not present, repair wire 71 or connector J4 (Para 8-50).
(9)	Turn boom floodlight switch to OFF position (TM 10-3930-673-10).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(12)	Connect connector J4 to connector P4.
(13)	Connect negative battery cable to negative side of battery (Para 8-42).
(14)	Install battery cover (Para 8-42).



**16. REAR FLOODLIGHT DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

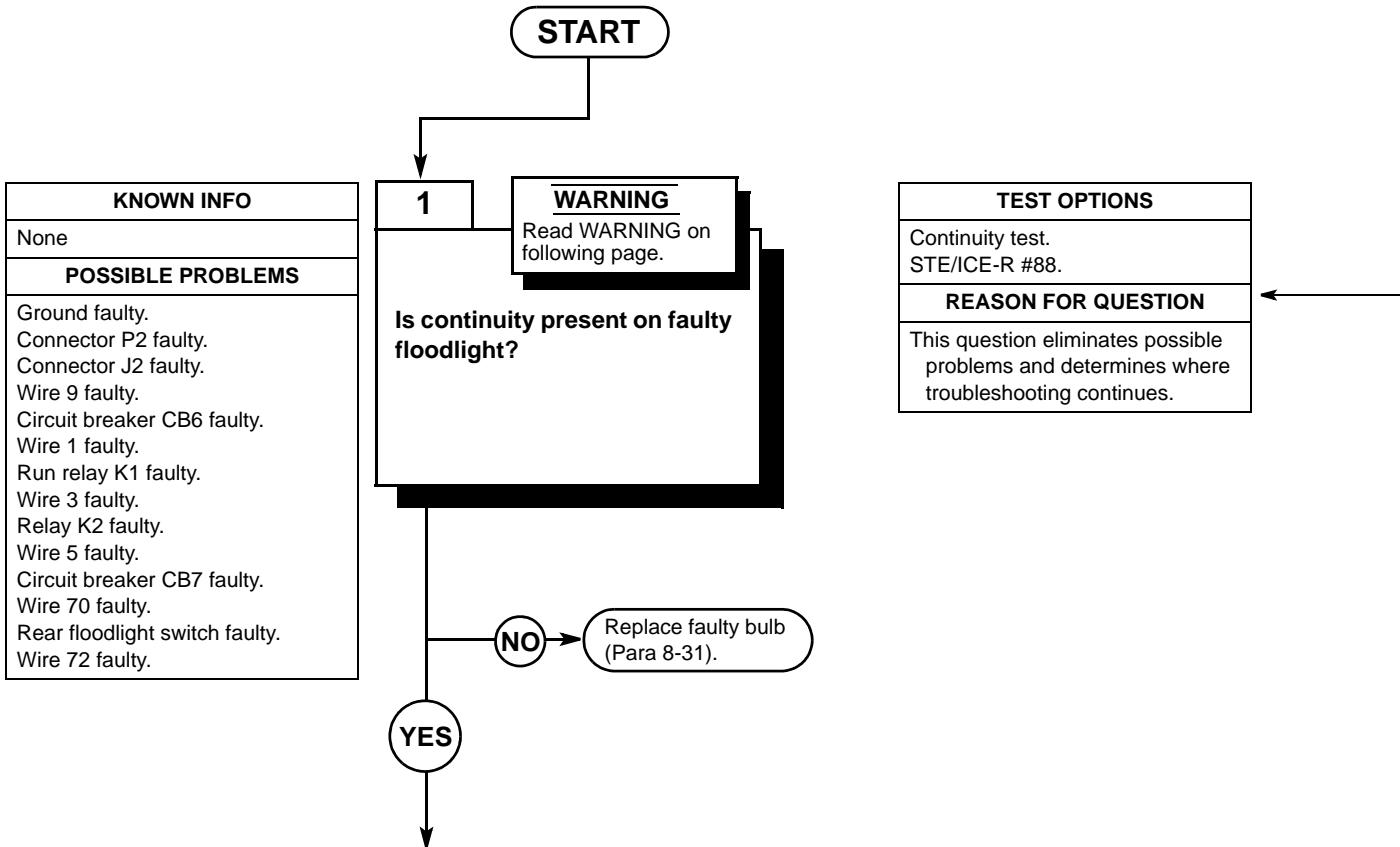
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

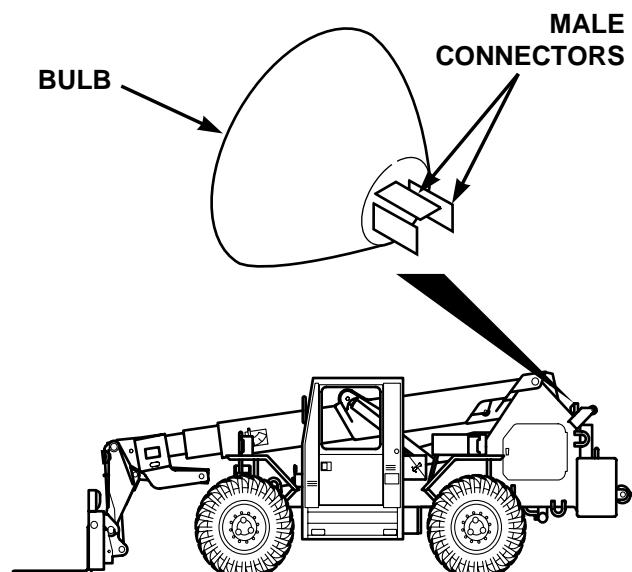
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



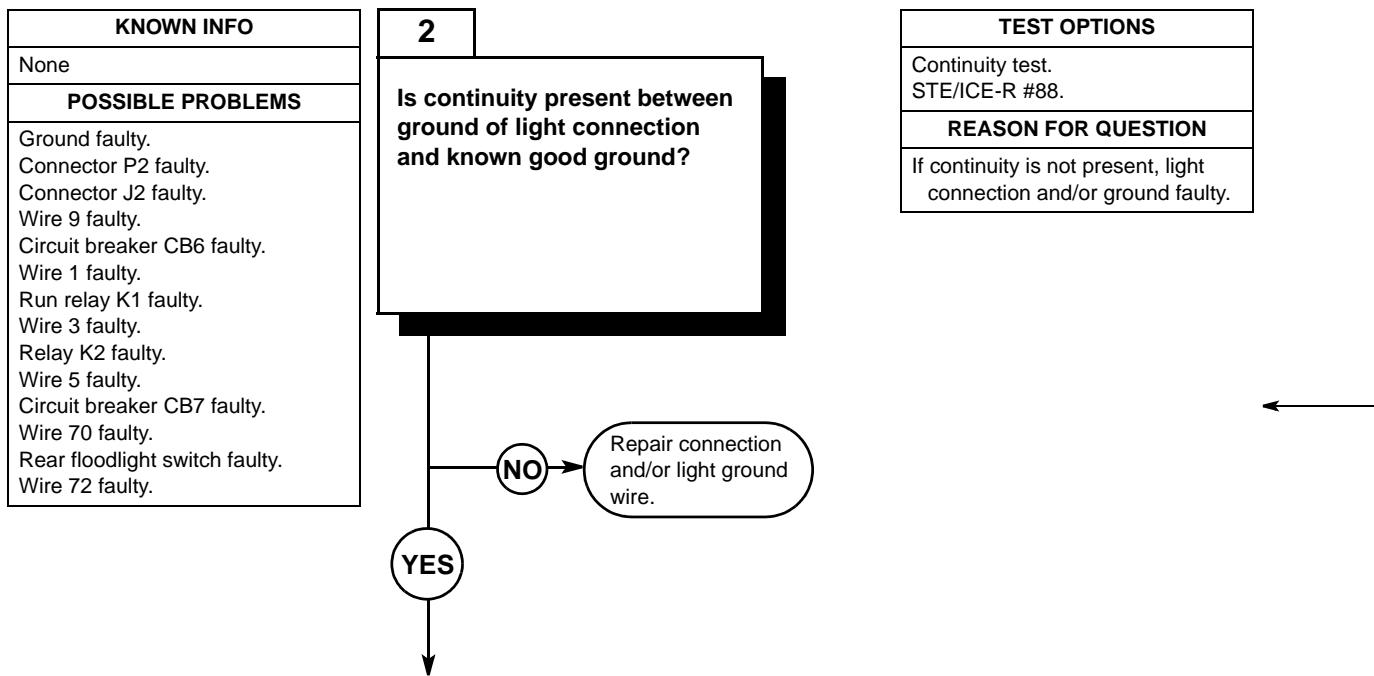
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>CONTINUITY TEST</b>	
(1)	Remove bulb from faulty floodlight.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to male connector of bulb.
(4)	Connect multimeter negative lead (-) to other male connector of bulb.
(a)	If continuity is present, go to Step 2 of this fault.
(b)	If continuity is not present, replace faulty bulb (Para 8-31).

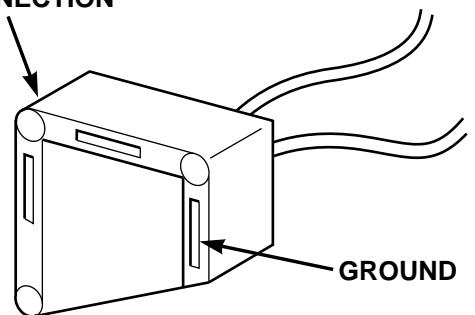


## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

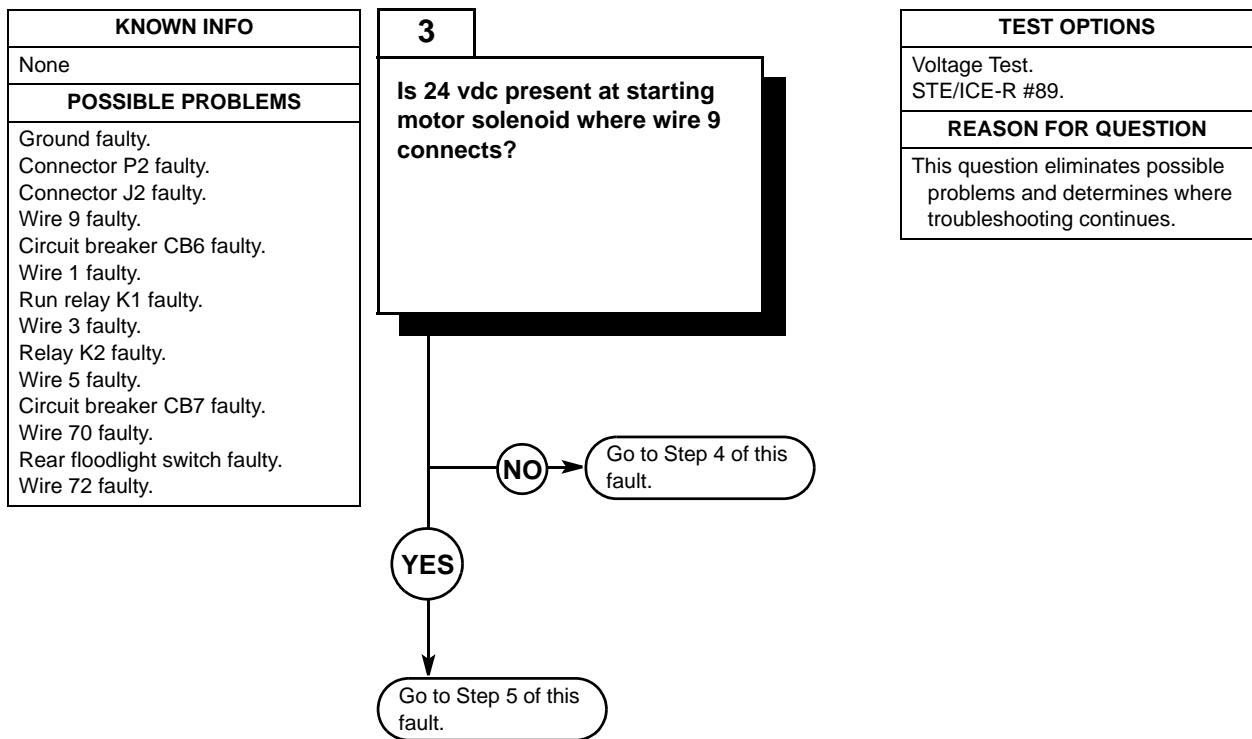


<b>CONTINUITY TEST</b>	
(1)	Remove bulb from faulty floodlight.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to ground of light connection.
(4)	Connect multimeter negative lead (-) to known good ground. (a) If continuity is present, go to Step 3 of this fault. (b) If continuity is not present, repair light connection and/or light ground wire.

**LIGHT  
CONNECTION**

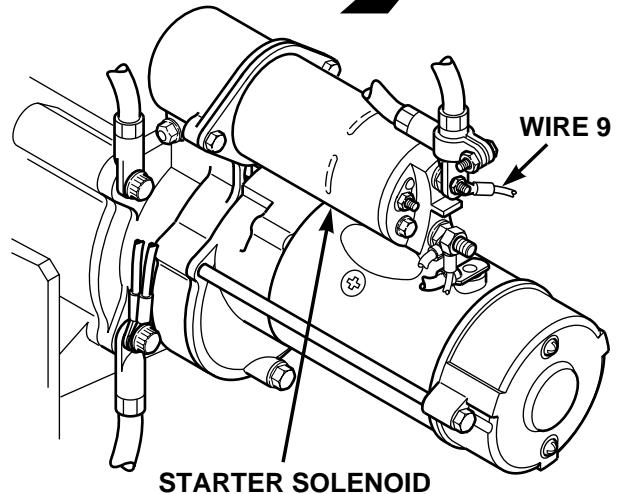
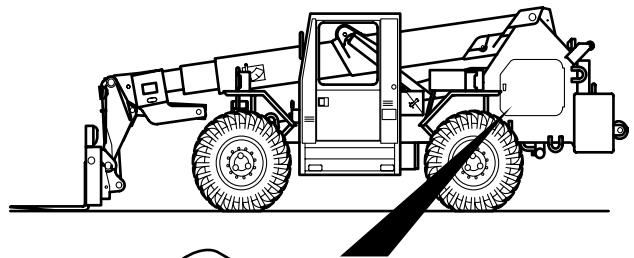


## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).



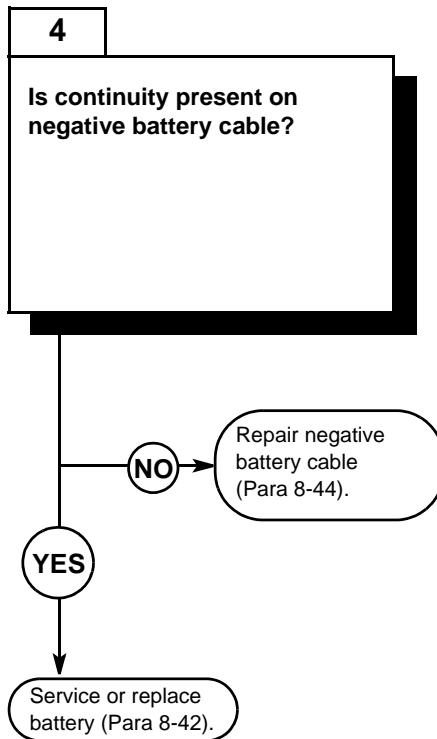
**VOLTAGE TEST**

- (1) Remove battery cover.
- (2) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (3) Set multimeter to volts dc.
- (4) Connect multimeter positive lead (+) to starting motor solenoid where wire 9 connects.
- (5) Connect multimeter negative lead (-) to known good ground.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 5 of this fault.
  - (b) If 24 vdc is not present, go to Step 4 of this fault.



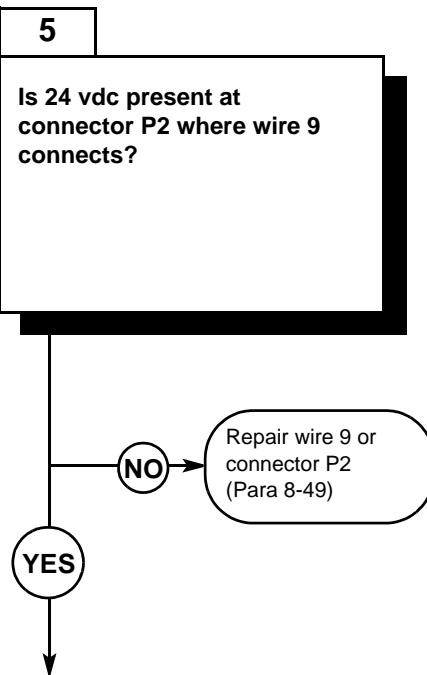
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

KNOWN INFO
POSSIBLE PROBLEMS
Ground faulty. Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Continuity Test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, negative battery cable is faulty.

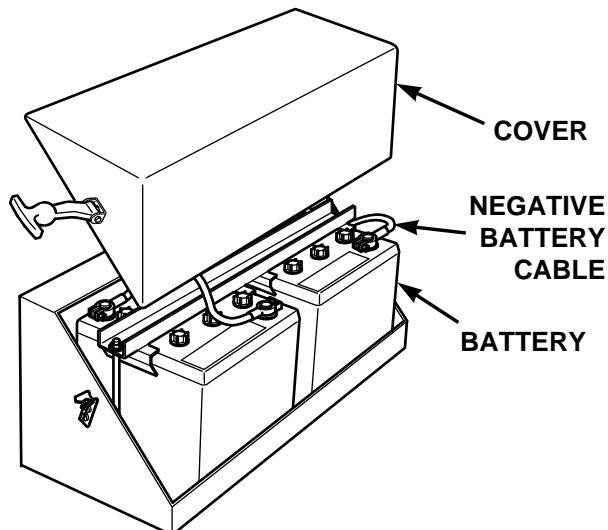
KNOWN INFO
Ground OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



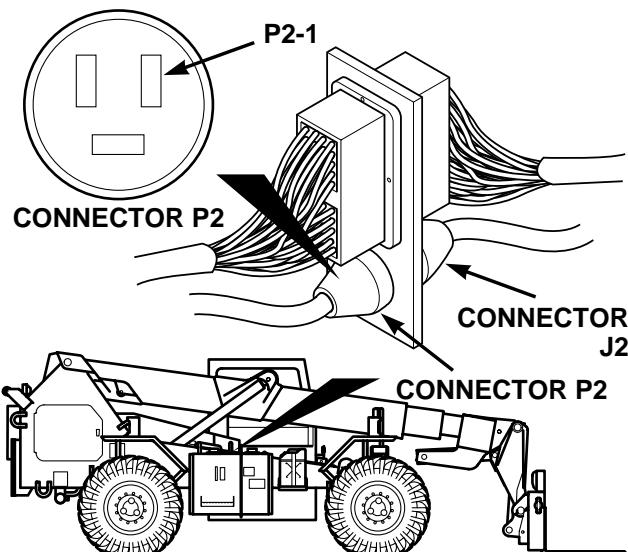
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector P2 is faulty.

**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to end of negative battery cable.
- (4) Connect multimeter negative lead (-) to other end of negative battery cable.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, repair negative battery cable (Para 8-44).

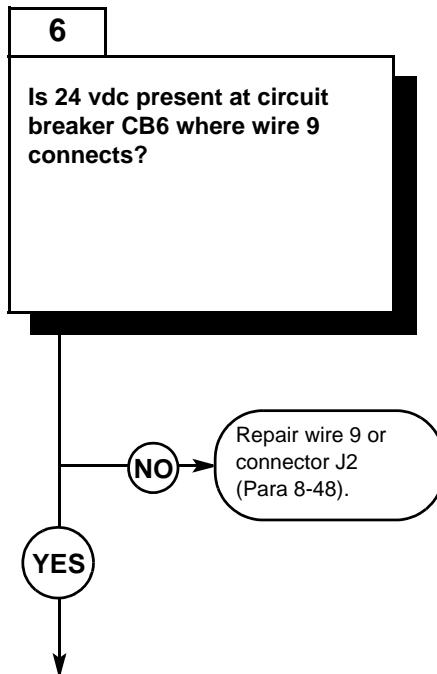
**VOLTAGE TEST**

- (1) Disconnect connector J2 from connector P2.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to connector P2-1 where wire 9 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 6 of this fault.
  - (b) If 24 vdc is not present, repair wire 9 or connector P2 (Para 8-49).
- (6) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (7) Connect connector J2 to connector P2.



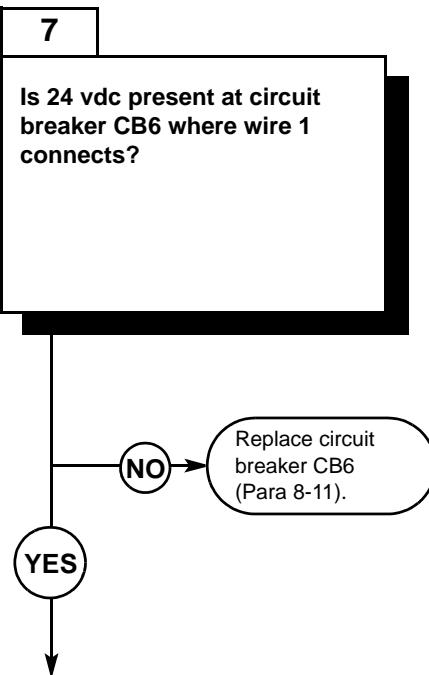
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



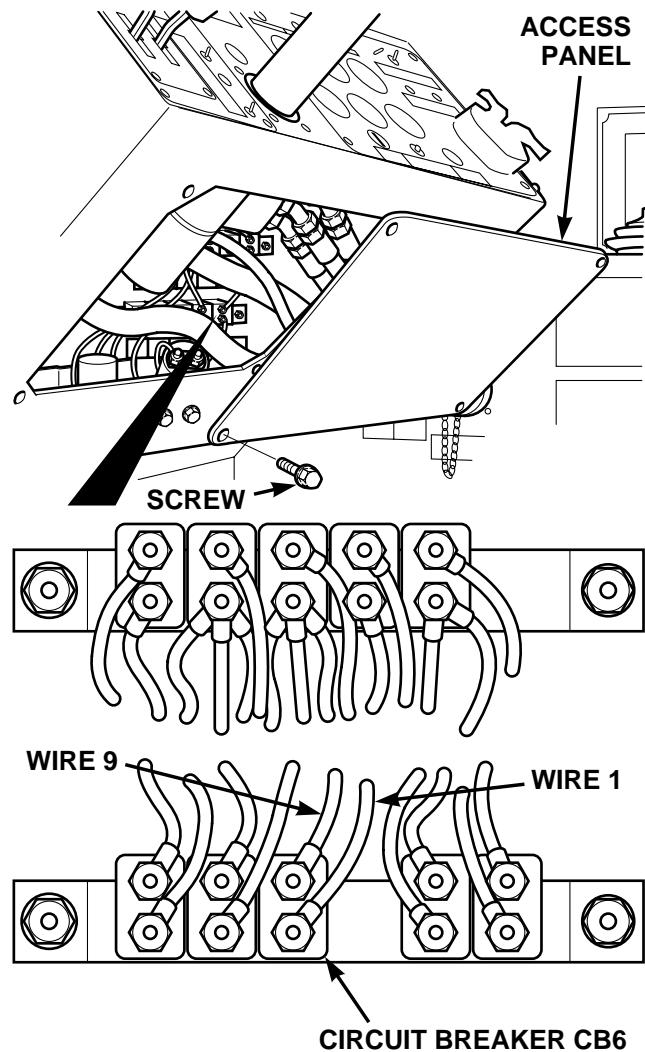
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector J2 is faulty.

KNOWN INFO
Ground OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 is faulty.

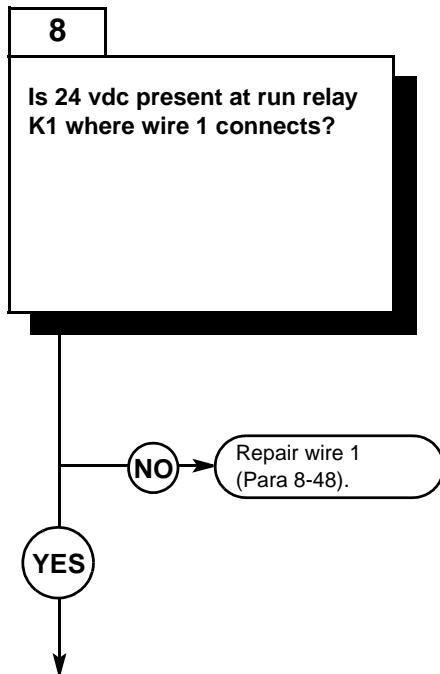
<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 7 of this fault.
(b)	If 24 vdc is not present, repair wire 9 or connector J2 (Para 8-48).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 8 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).

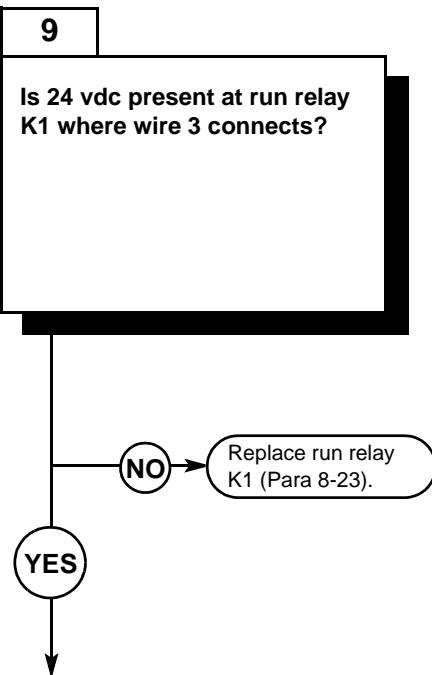
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 is faulty.

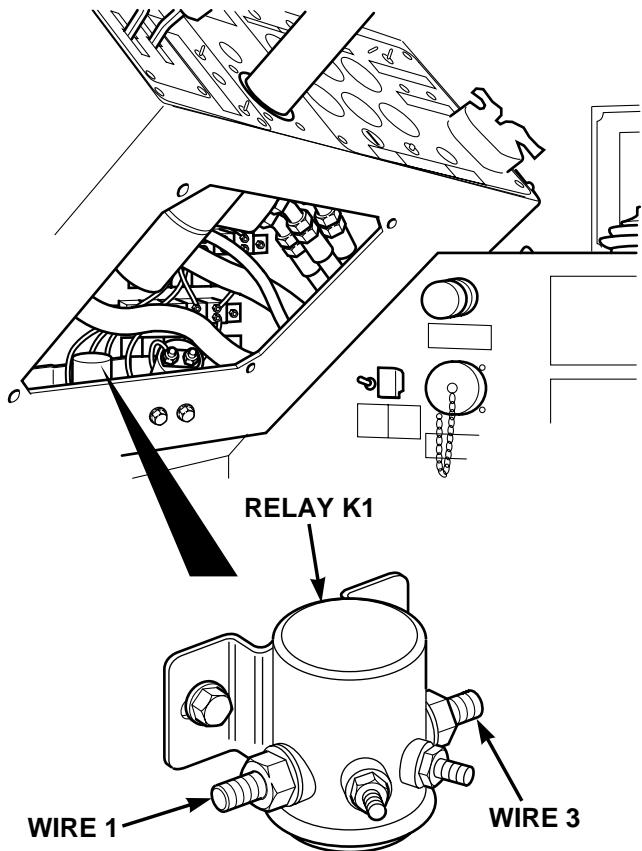
KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay K1 faulty. Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay K1 is faulty.

**VOLTAGE TEST**

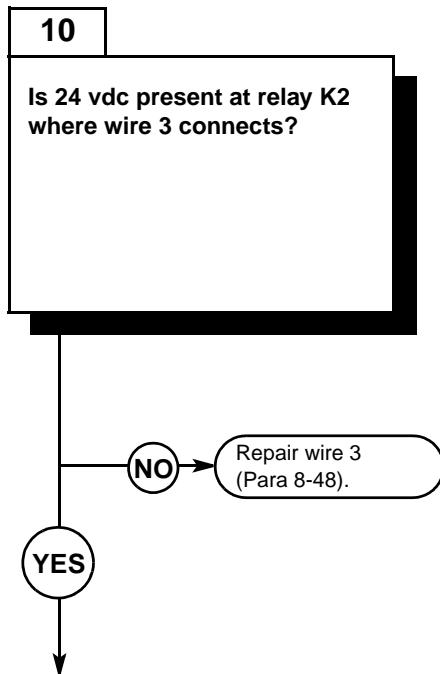
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 9 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 10 of this fault.
  - (b) If 24 vdc is not present, replace run relay K1 (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).

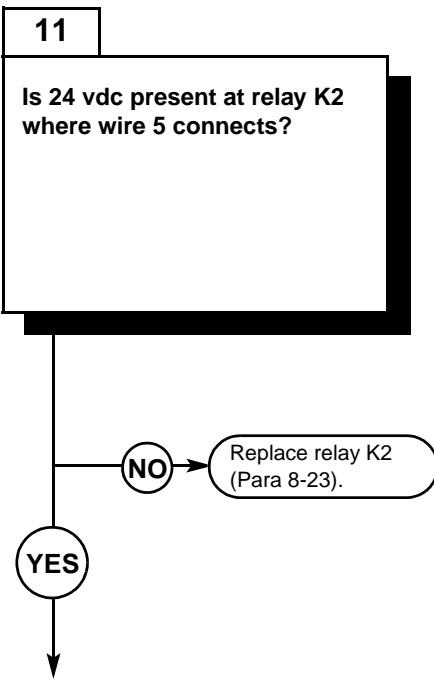
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



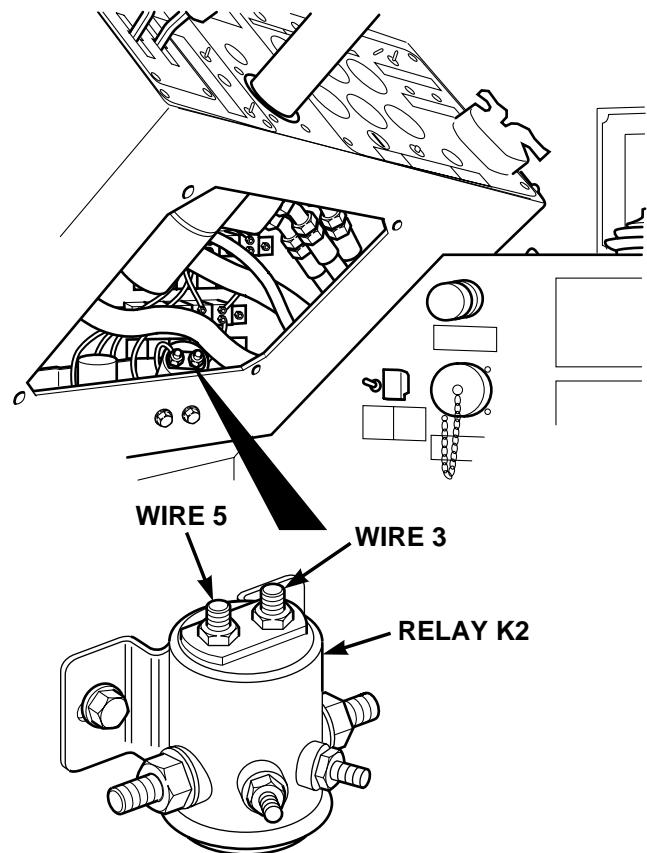
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 is faulty.

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK. Wire 3 OK.
POSSIBLE PROBLEMS
Relay K2 faulty. Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, relay K2 is faulty.

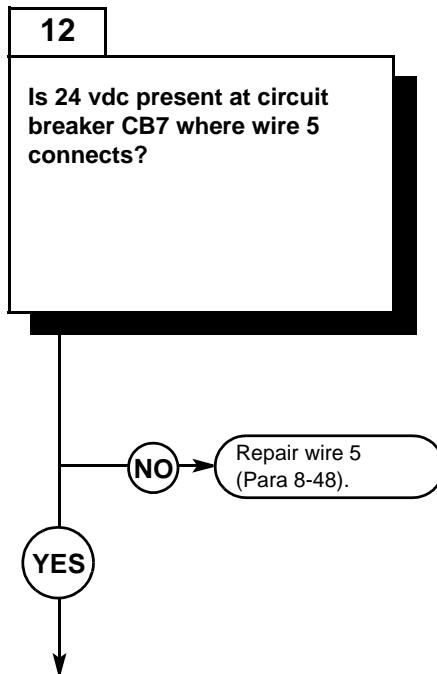
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to relay K2 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to relay K2 where wire 5 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 12 of this fault.
(b)	If 24 vdc is not present, replace relay K2 (Para 8-23).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

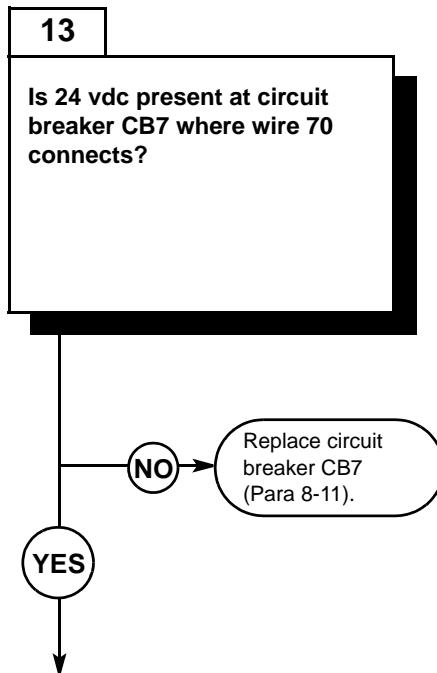
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).

KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK. Wire 3 OK. Relay K2 OK.
POSSIBLE PROBLEMS
Wire 5 faulty. Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 5 is faulty.

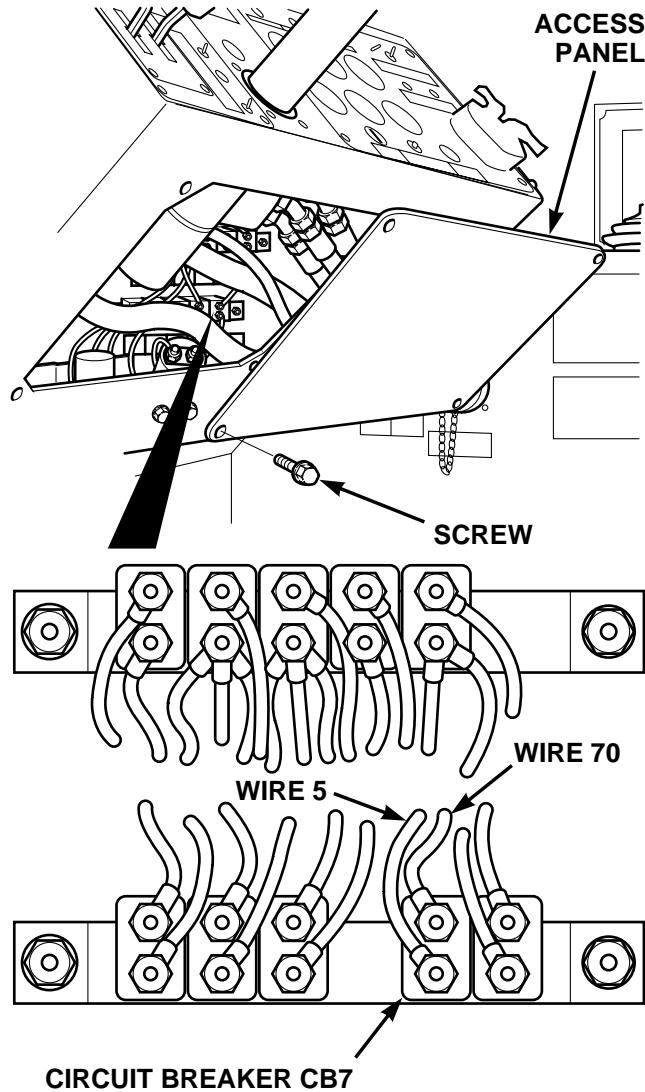
KNOWN INFO
Ground OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay K1 OK. Wire 3 OK. Relay K2 OK. Wire 5 OK.
POSSIBLE PROBLEMS
Circuit breaker CB7 faulty. Wire 70 faulty. Rear floodlight switch faulty. Wire 72 faulty.



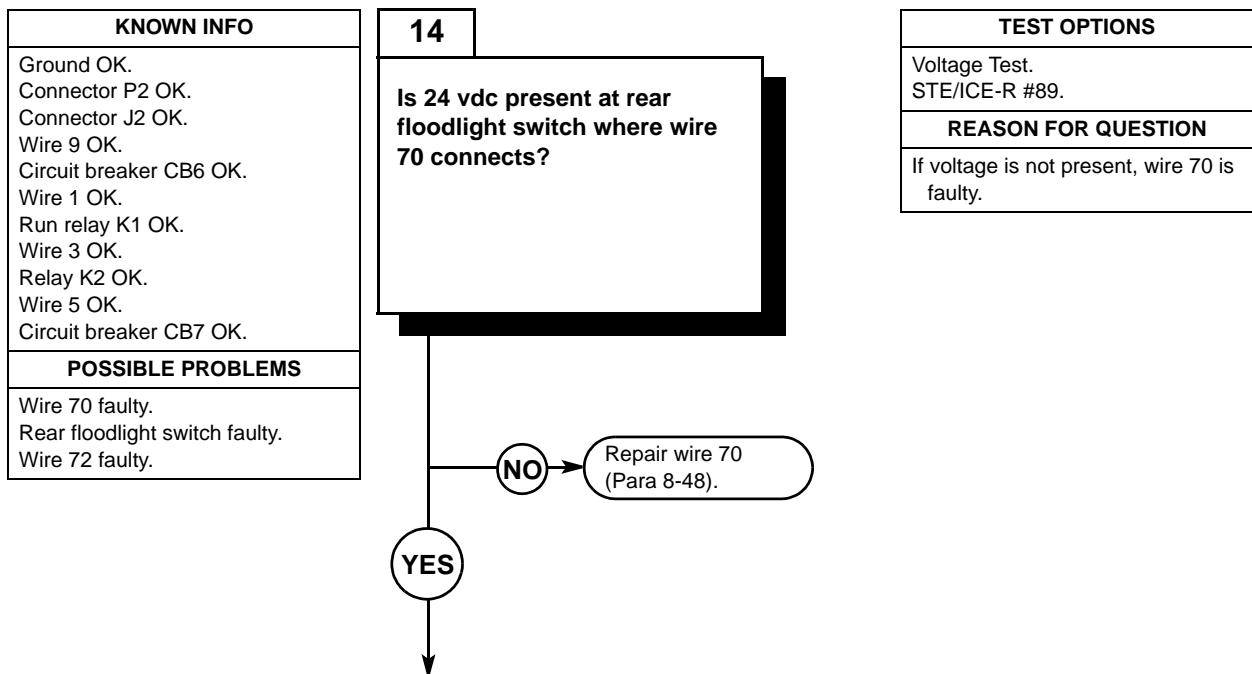
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB7 is faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 5 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, repair wire 5 (Para 8-48).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

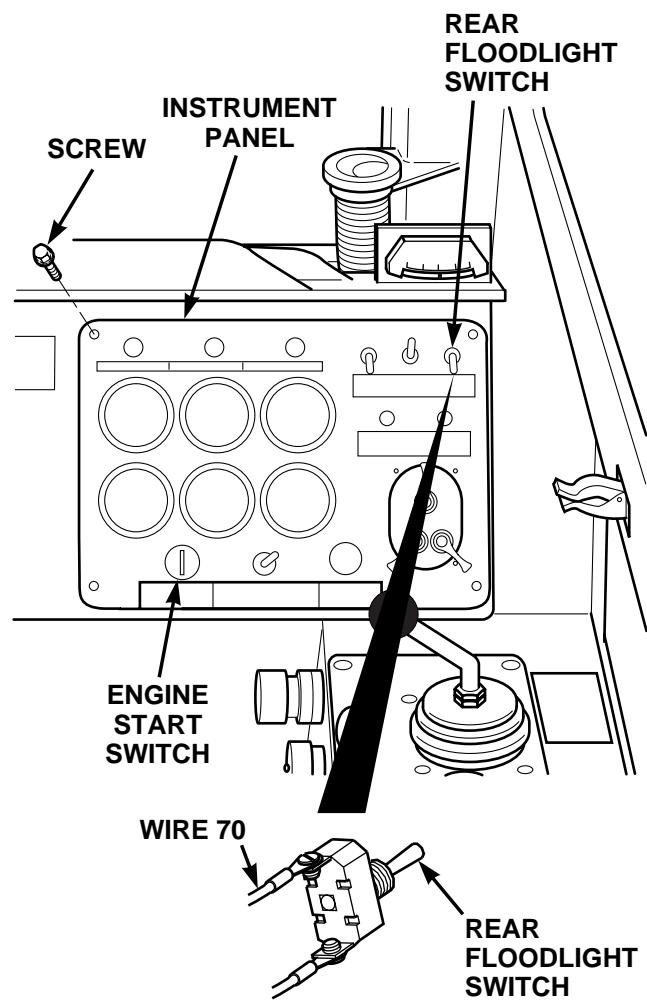
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB7 where wire 70 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB7 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(8)	Install access panel and four screws to secure access panel.



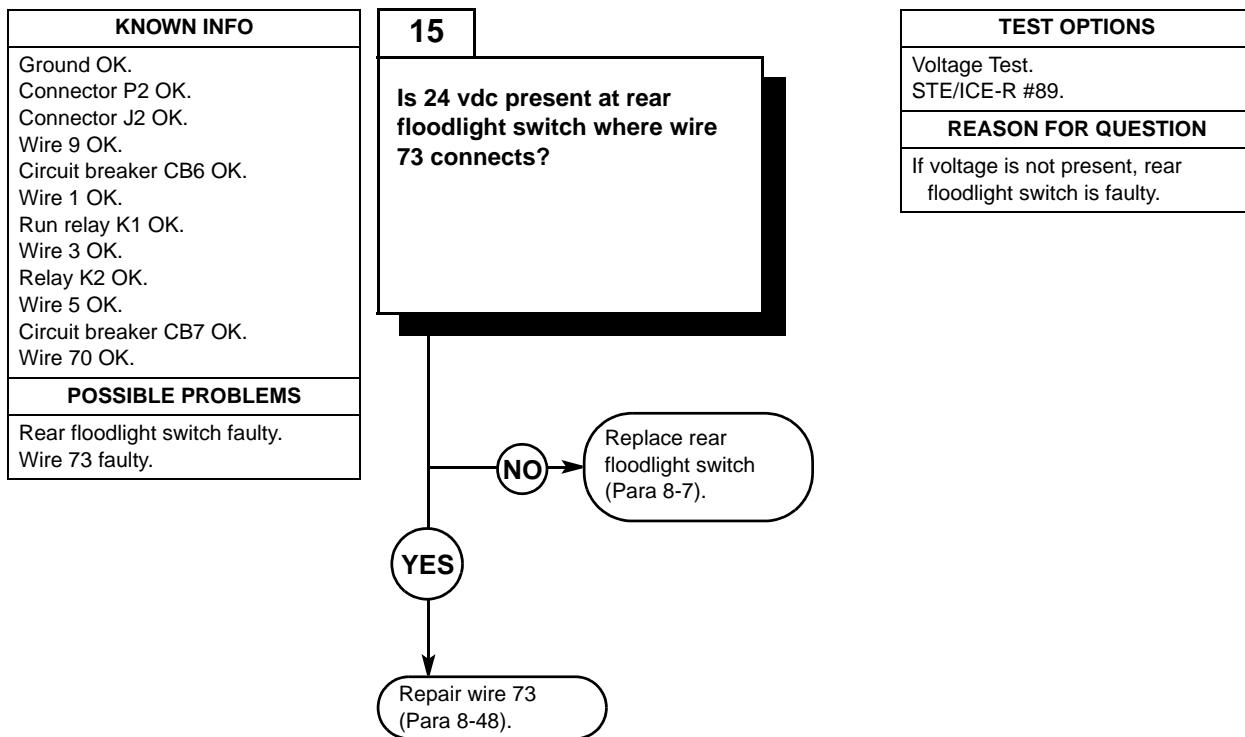
## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).



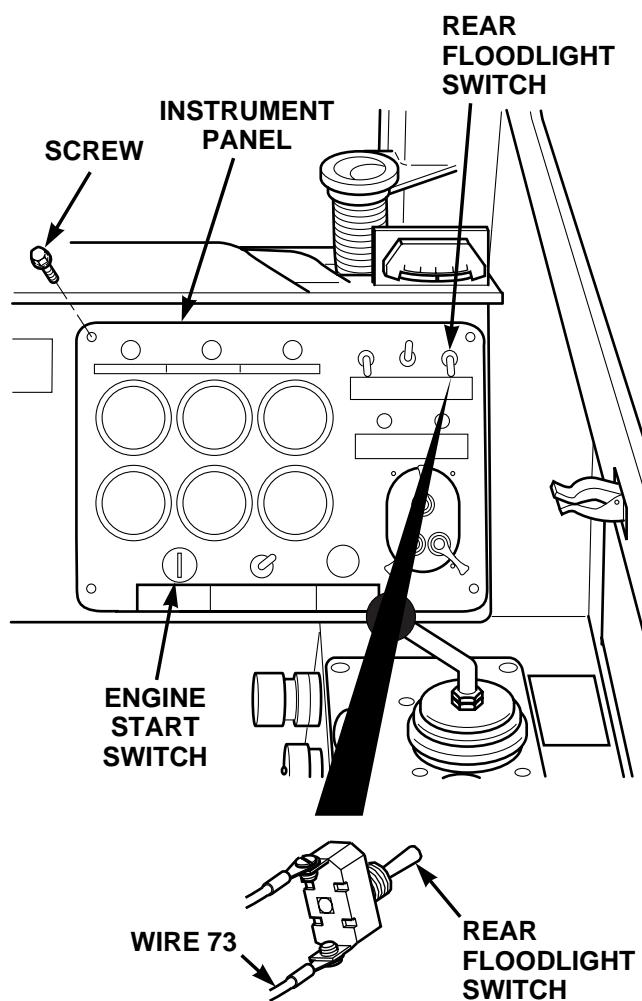
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Remove four screws from instrument panel.
(3)	Lift instrument panel out to get to rear floodlight switch where wire 70 connects.
(4)	Connect multimeter positive lead (+) to rear floodlight switch where wire 70 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 15 of this fault.
(b)	If 24 vdc is not present, repair wire 70 (Para 8-48).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



## 16. REAR FLOODLIGHT DOES NOT OPERATE (CONT).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Lift instrument panel out to get to rear floodlight switch where wire 73 connects.
(3)	Connect multimeter positive lead (+) to rear floodlight switch where wire 73 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn rear floodlight switch to ON position (TM 10-3930-673-10).
(a)	If 24 vdc is present, repair wire 73 (Para 8-48).
(b)	If 24 vdc is not present, replace rear floodlight switch (Para 8-7).
(8)	Turn rear floodlight switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Install four screws to secure instrument panel.
(11)	Install battery cover (Para 8-42).



**17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE.****INITIAL SETUP**

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

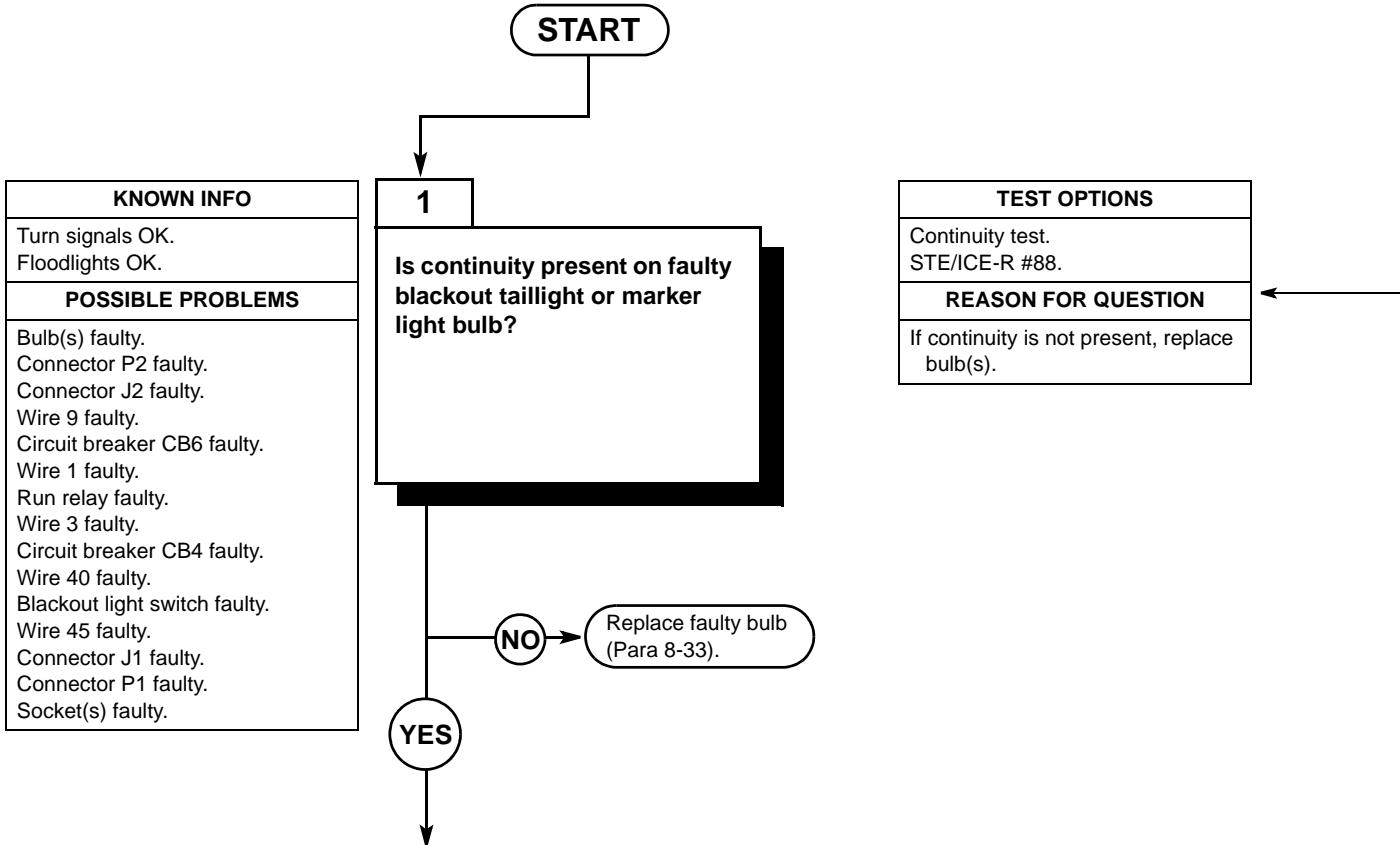
Two

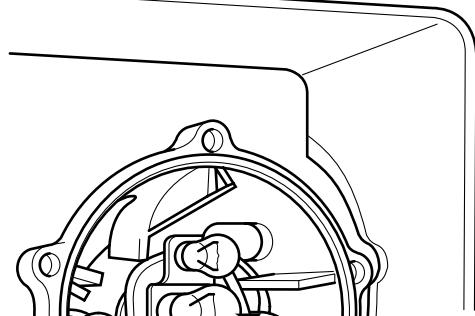
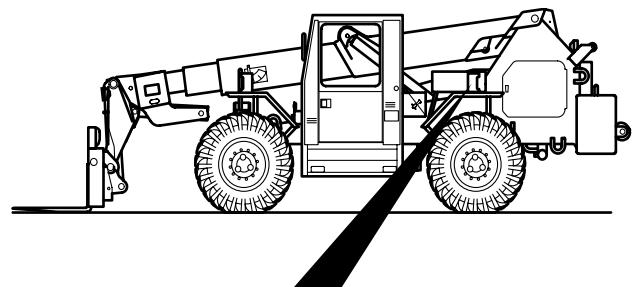
*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)





BLACKOUT  
MARKER  
LIGHT



BLACKOUT  
TAILLIGHT

CENTER  
CONDUCTOR

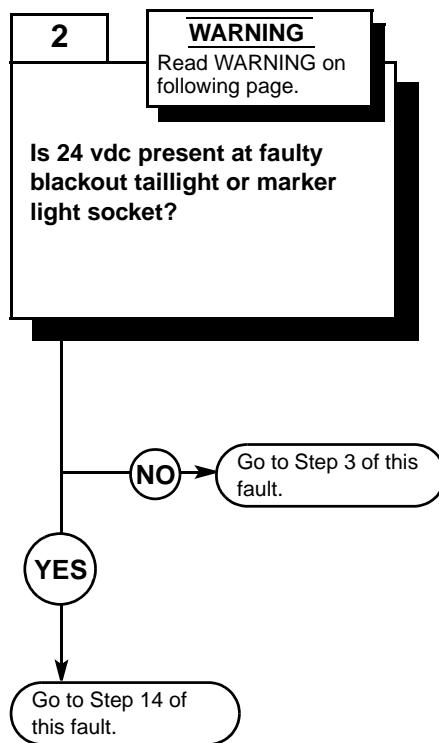
OUTSIDE  
CONDUCTOR

**CONTINUITY TEST**

- (1) Remove bulb from faulty blackout taillight or marker light (Para 8-33).
- (2) Set the multimeter to ohms.
- (3) Connect multimeter positive lead (+) to the center conductor.
- (4) Connect multimeter negative lead (-) to the outside conductor.
  - (a) If continuity is present, go to Step 2 of this fault.
  - (b) If continuity is not present, replace bulb (Para 8-33).

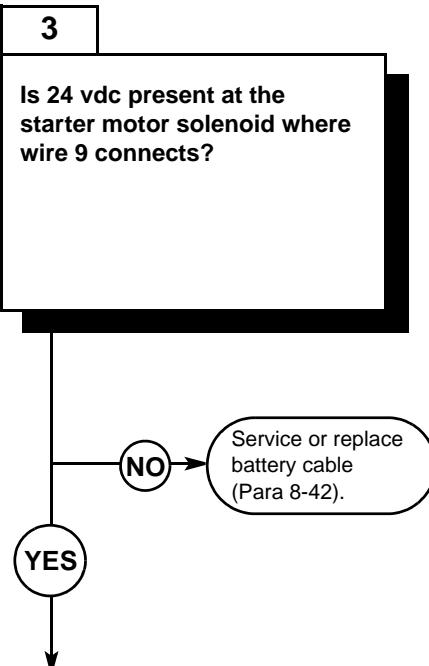
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Turn signals OK. Floodlights OK. Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Turn signals OK. Floodlights OK. Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

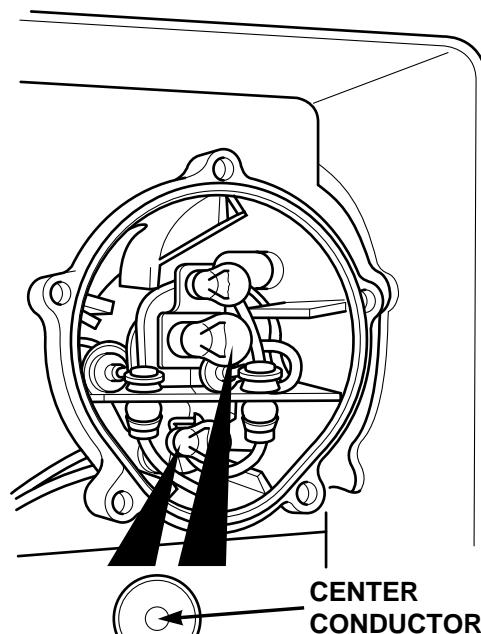


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

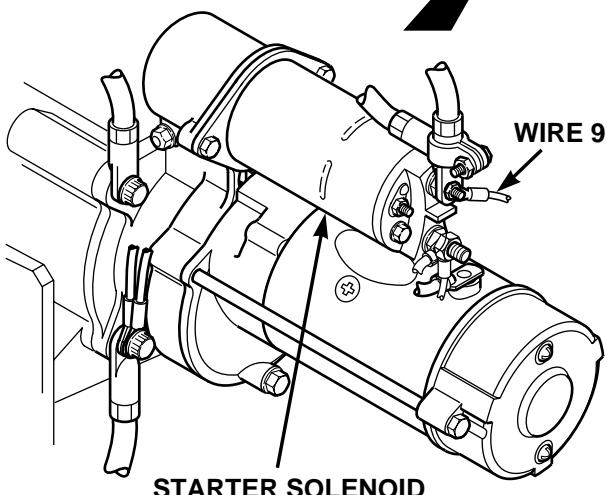
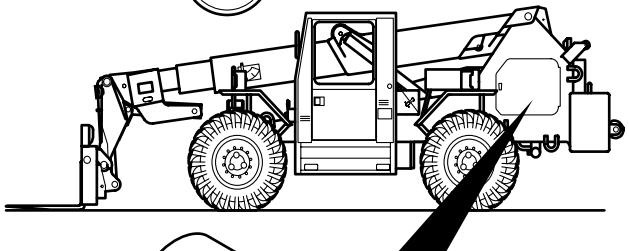
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn blackout light switch to BLACKOUT DRIVE position (TM 10-3930-673-10).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress brake pedal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 14 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 3 of this fault.</li> </ul>
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

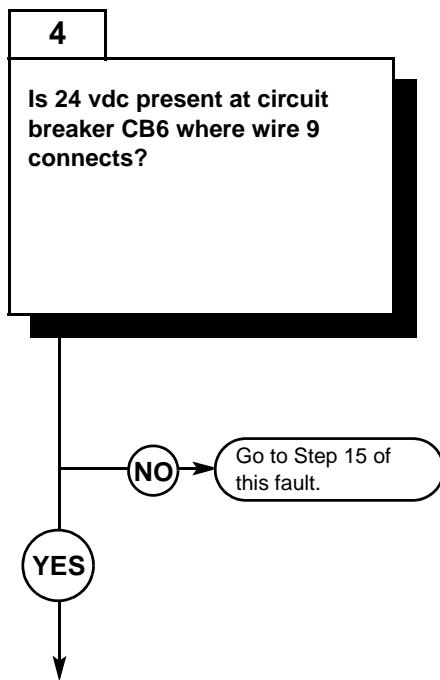


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to the starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 4 of this fault.</li> <li>(b) If 24 vdc is not present, service or replace battery cable (Para 8-42).</li> </ul>
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



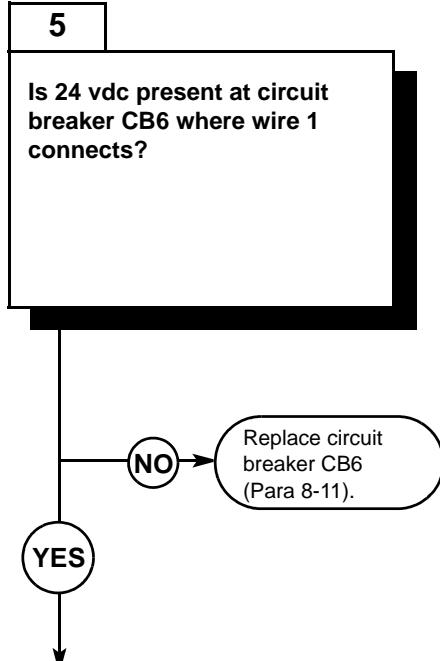
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Turn signals OK. Floodlights OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

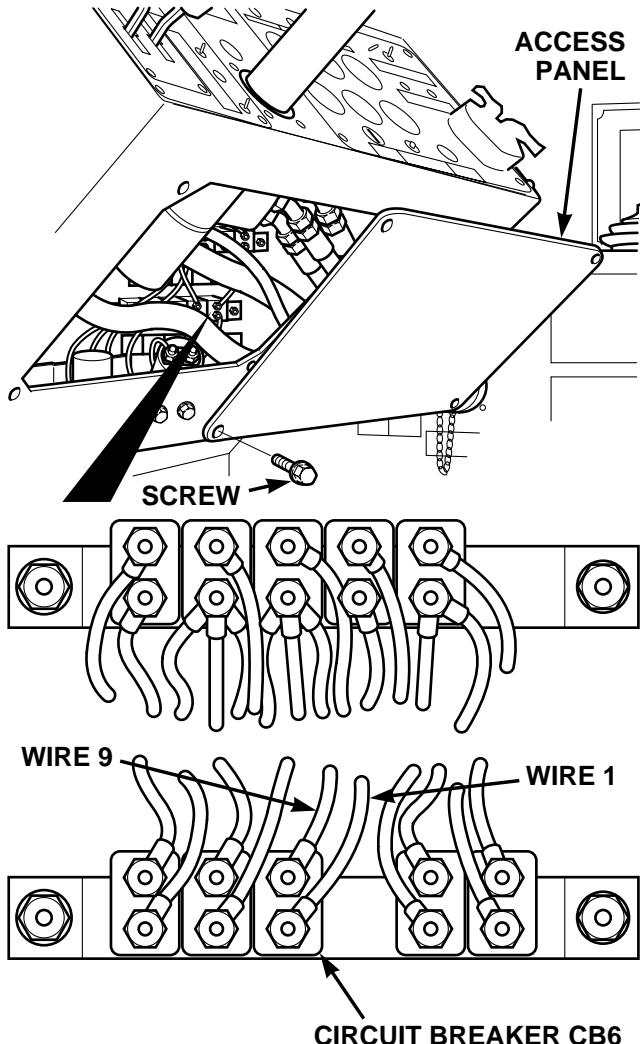
KNOWN INFO
Turn signals OK. Floodlights OK. Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 faulty.

**VOLTAGE TEST**

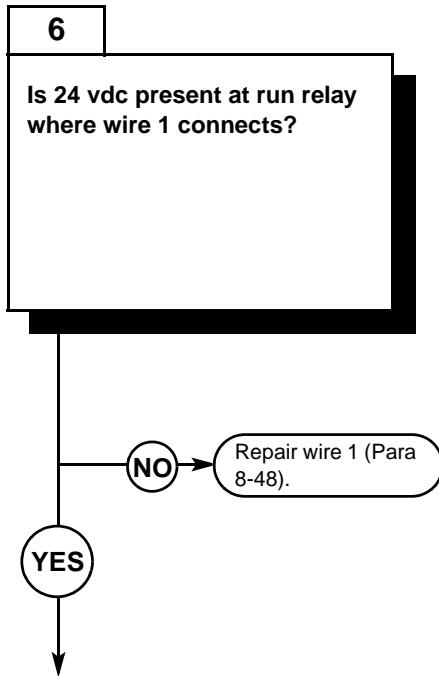
- (1) Remove four screws and access panel.
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 5 of this fault.
  - (b) If 24 vdc is not present, go to Step 15 of this fault.
- (6) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect the multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to a known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 6 of this fault.
  - (b) If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

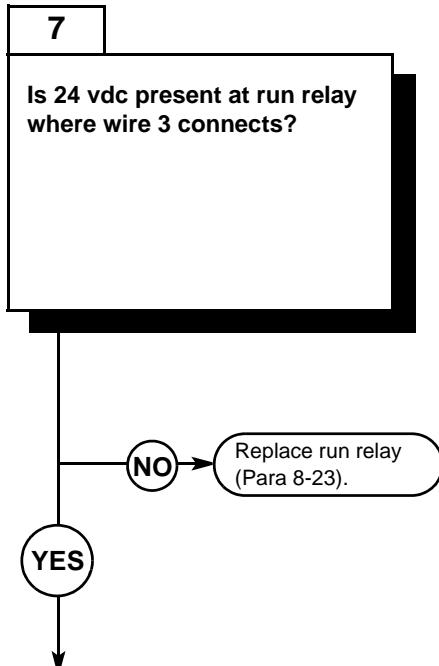
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Turn signals OK. Floodlights OK. Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 faulty.

KNOWN INFO
Turn signals OK. Floodlights OK. Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



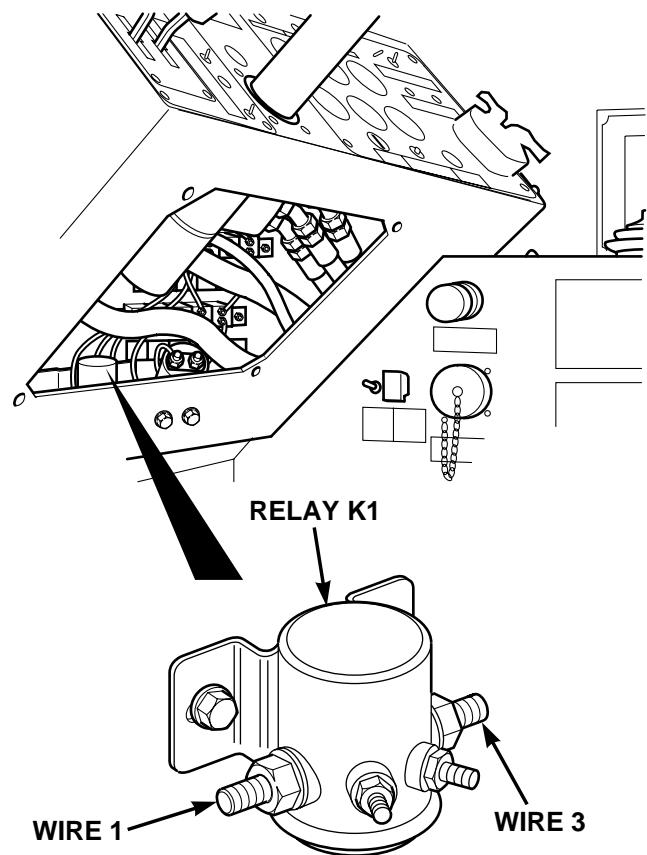
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

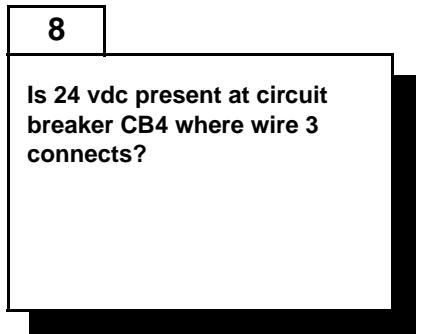
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to the run relay where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



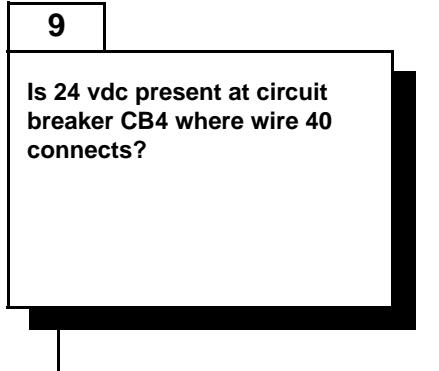
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Turn signals OK. Floodlights OK. Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



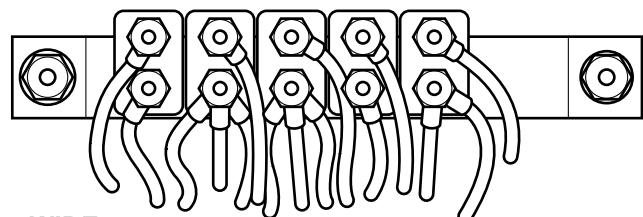
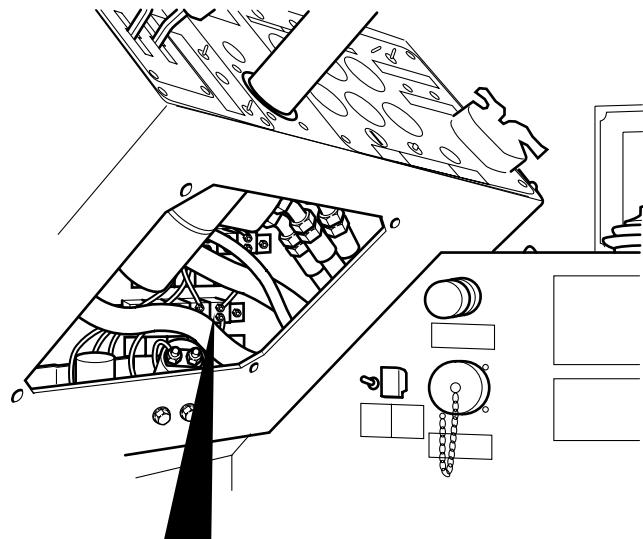
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 faulty.

KNOWN INFO
Turn signals OK. Floodlights OK. Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 45 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

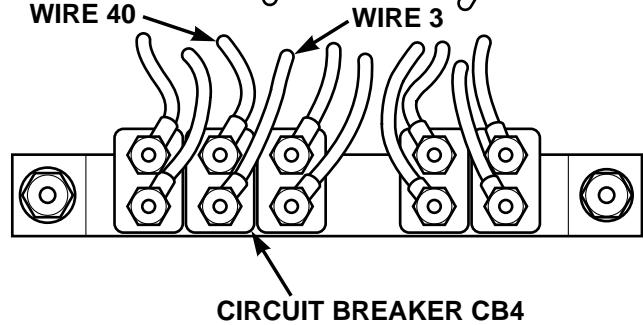


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 faulty.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

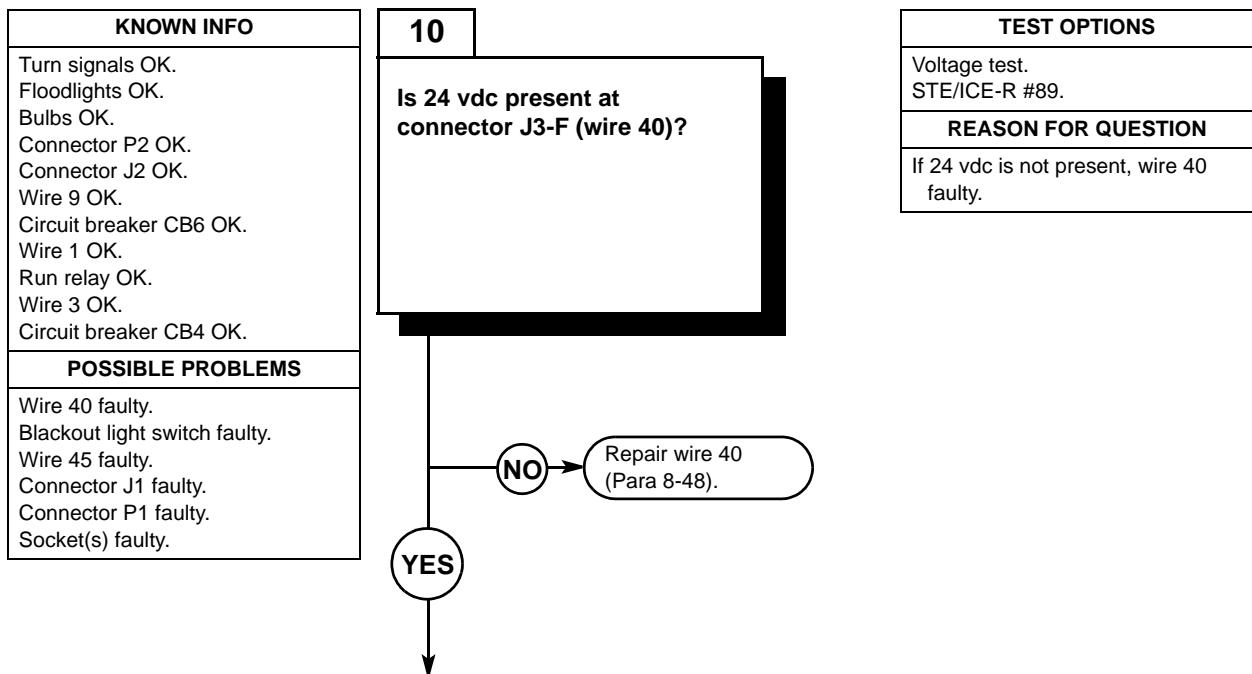


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

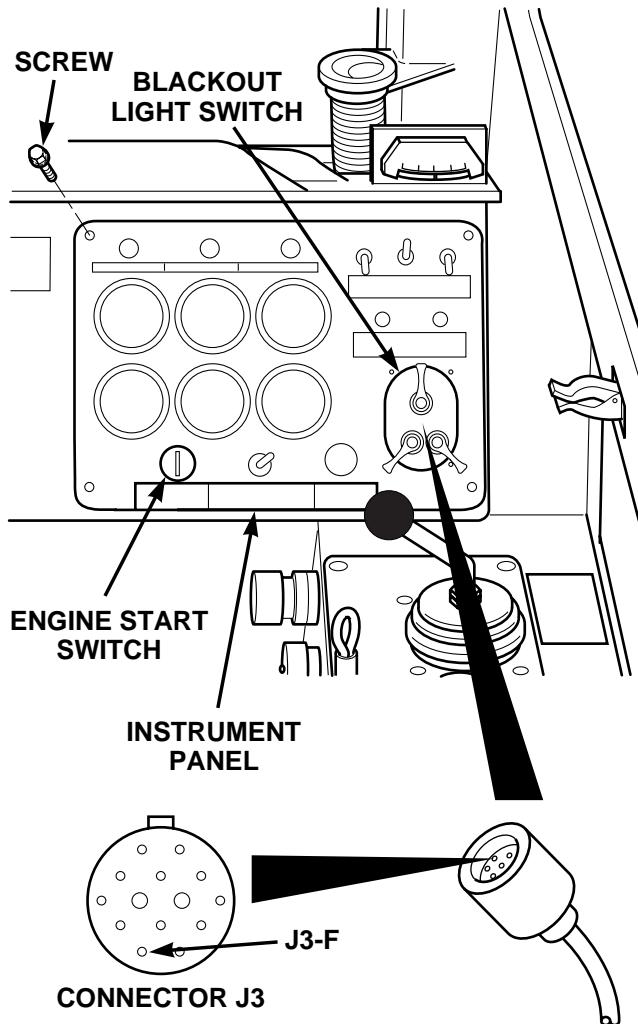


CIRCUIT BREAKER CB4

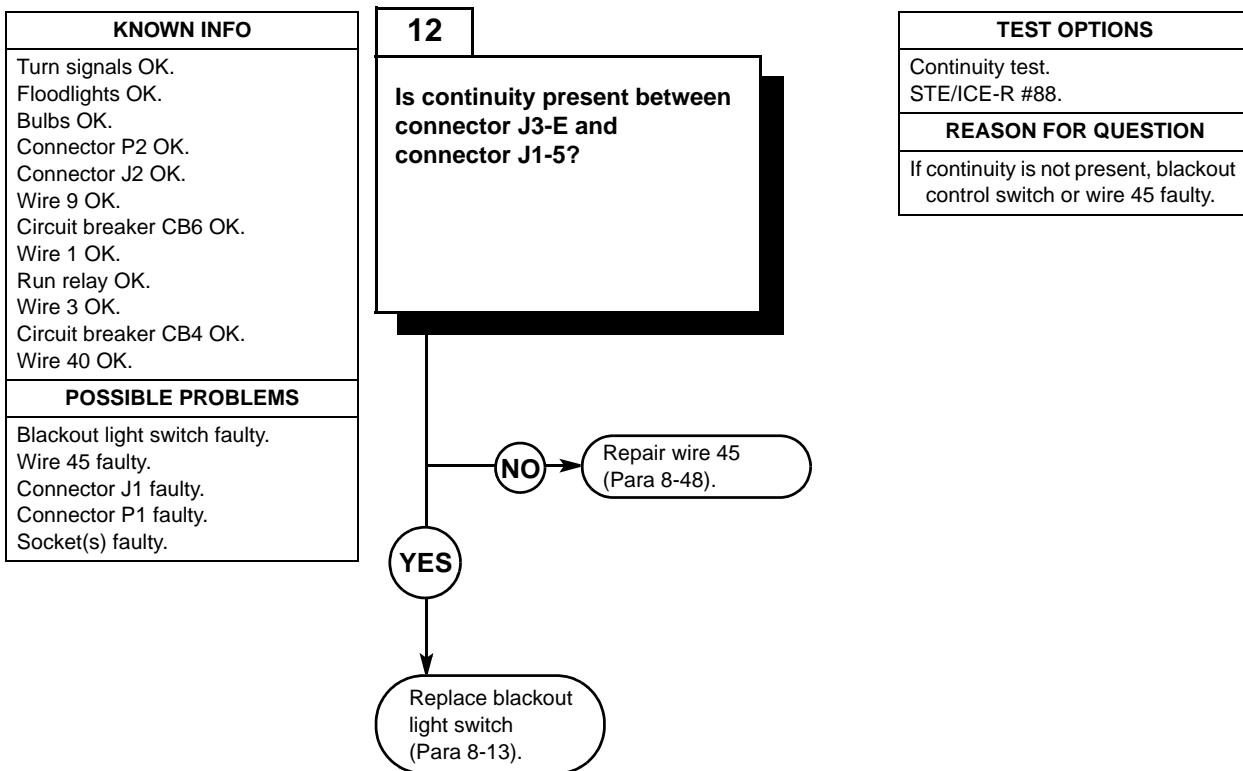
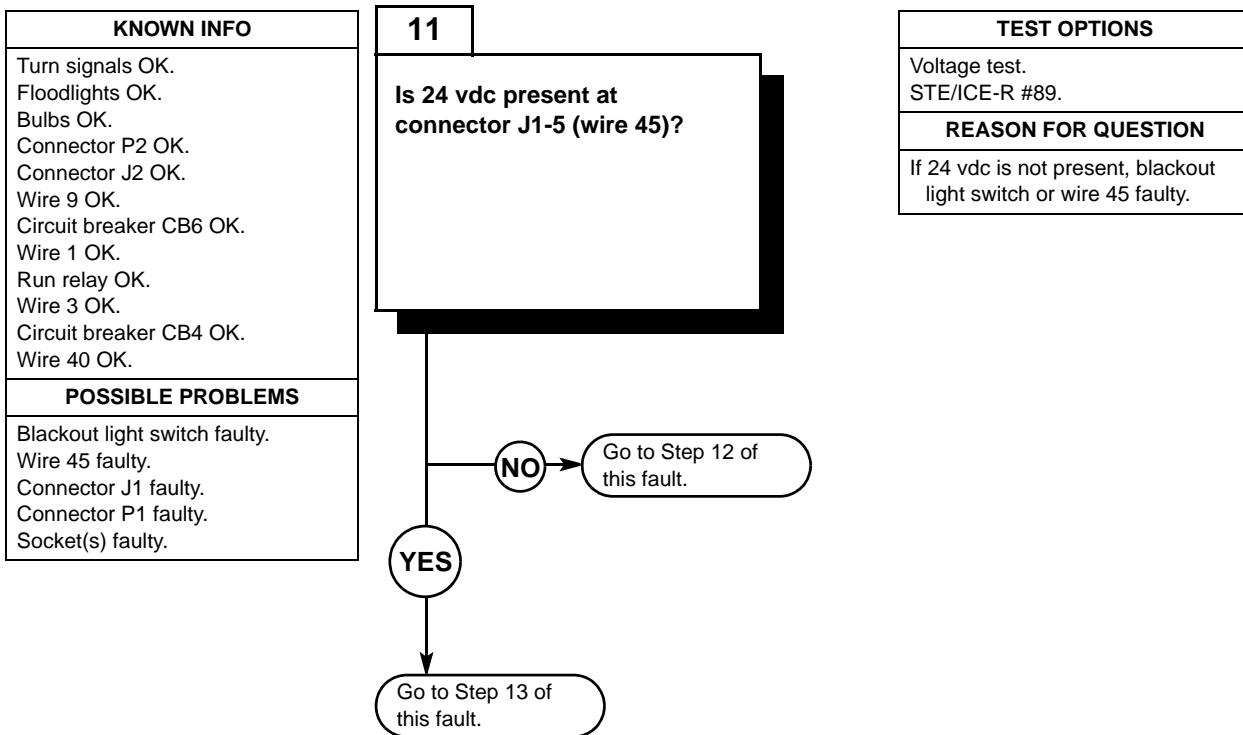
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT).



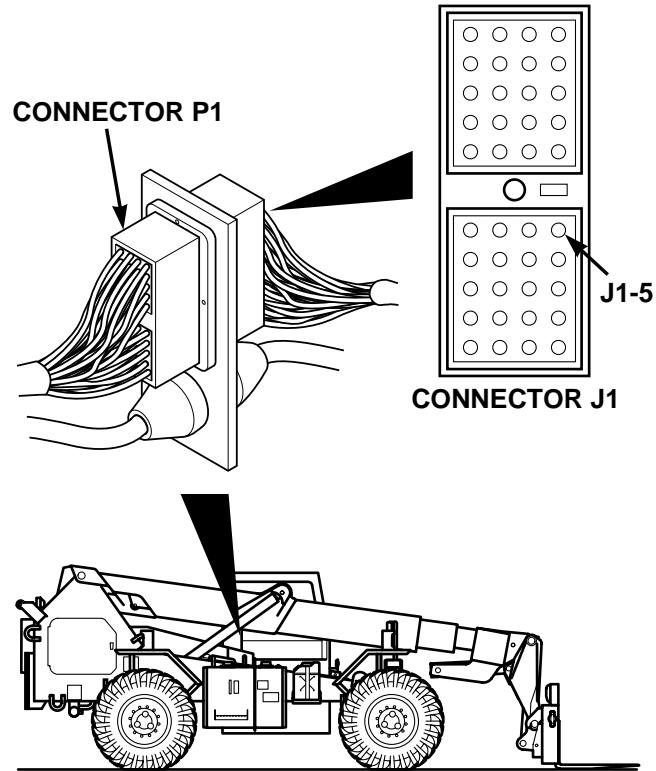
<b>VOLTAGE TEST</b>	
(1)	Remove four screws and instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to connector J3-F (wire 40).
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 11 of this fault.
(b)	If 24 vdc is not present, repair wire 40 (Para 8-48).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Lift instrument panel out to connect connector J3 to blackout light switch.
(11)	Install instrument panel and four screws.



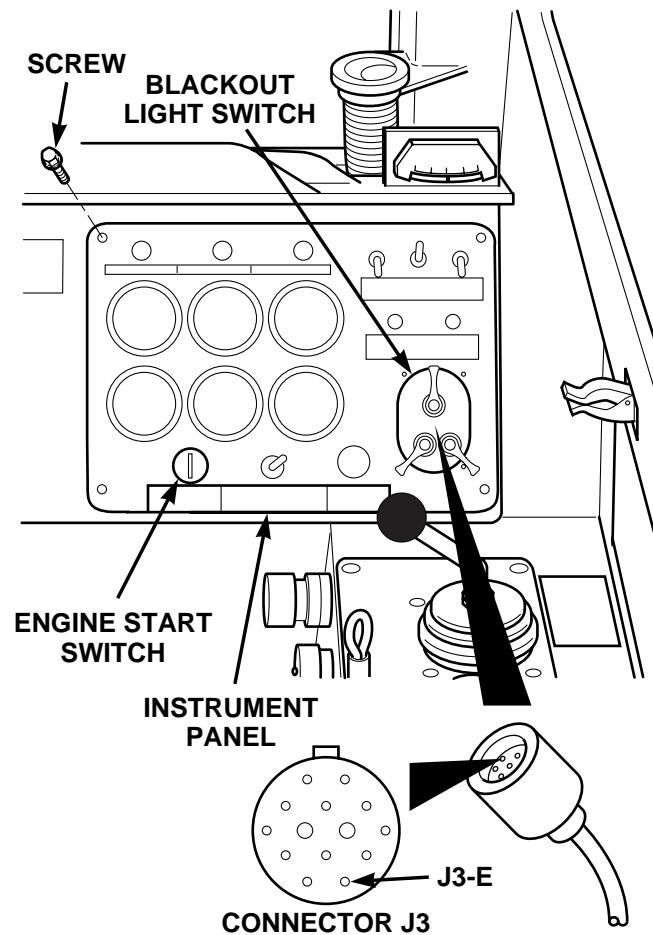
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-5 (wire 45).
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to B. O. MARKER position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).

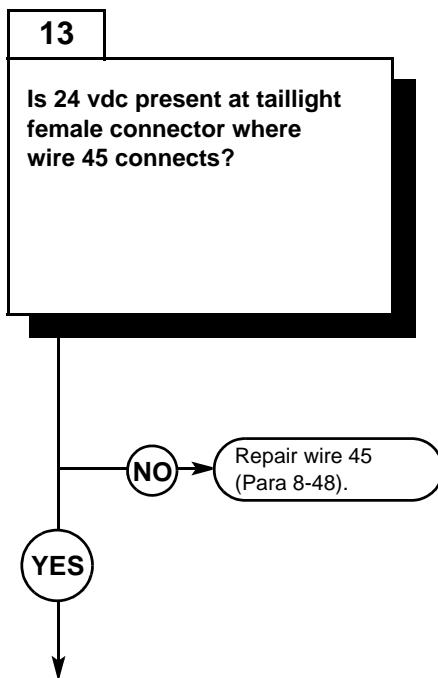


<b>CONTINUITY TEST</b>	
(1)	Remove four screws and instrument panel.
(2)	Lift instrument panel out to remove connector J3 from blackout light switch.
(3)	Disconnect connector J1 from connector P1.
(4)	Set multimeter to ohms.
(5)	Connect multimeter positive lead (+) to connector J3-E (wire 45).
(6)	Connect multimeter negative lead (-) to connector J1-5 (wire 45).
(a)	If continuity is present, replace blackout light switch (Para 8-13).
(b)	If continuity is not present, repair wire 45 (Para 8-48).
(7)	Lift instrument panel out to connect connector J3 to blackout light switch.
(8)	Connect connector J1 to connector P1.
(9)	Install instrument panel and four screws.



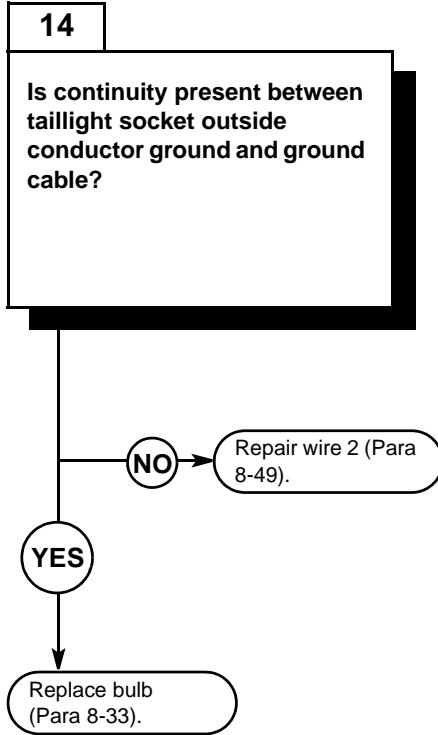
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Turn signals OK.
Floodlights OK.
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
POSSIBLE PROBLEMS
Wire 45 faulty.
Connector J1 faulty.
Connector P1 faulty.
Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 45 faulty.

KNOWN INFO
Turn signals OK.
Floodlights OK.
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Wire 9 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Wire 45 OK.
Connector J1 OK.
Connector P1 OK.
POSSIBLE PROBLEMS
Socket(s) faulty.
Ground faulty.



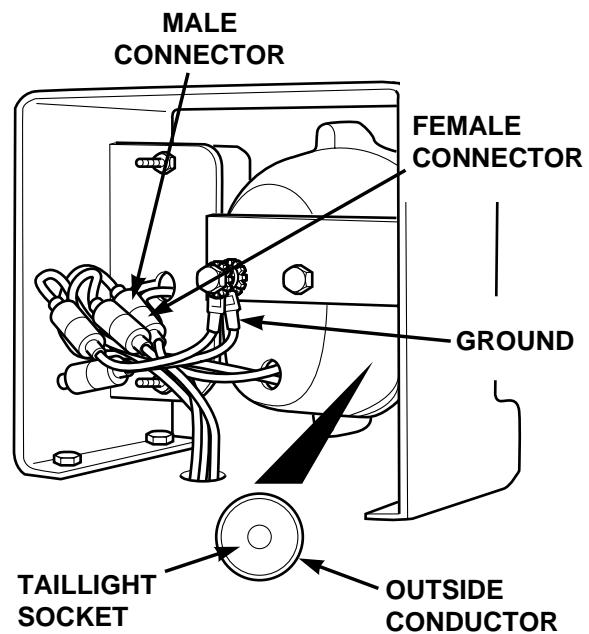
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 2 ground or brake light socket faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to tail light female connector where wire 45 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Turn blackout light switch to B. O. MARKER position (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 14 of this fault.
  - (b) If 24 vdc is not present, repair wire 45 (Para 8-48).
- (7) Turn blackout light switch to OFF position (TM 10-3930-673-10).
- (8) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (9) Disconnect negative battery cable from negative side of battery (Para 8-42).

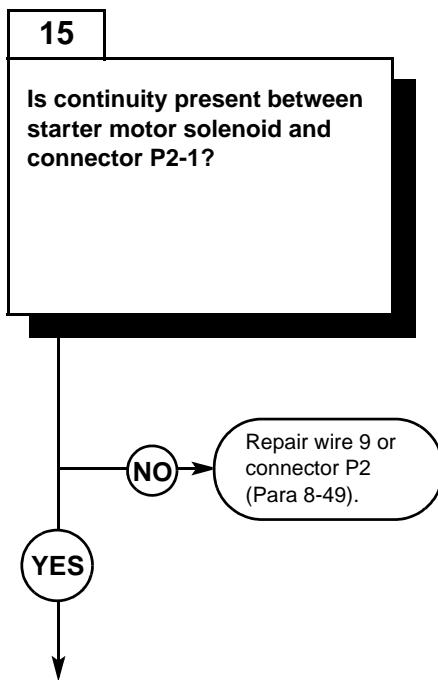
**CONTINUITY TEST**

- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at taillight socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair wire 2 (Para 8-49) or replace blackout tail or marker light socket (Para 8-33).



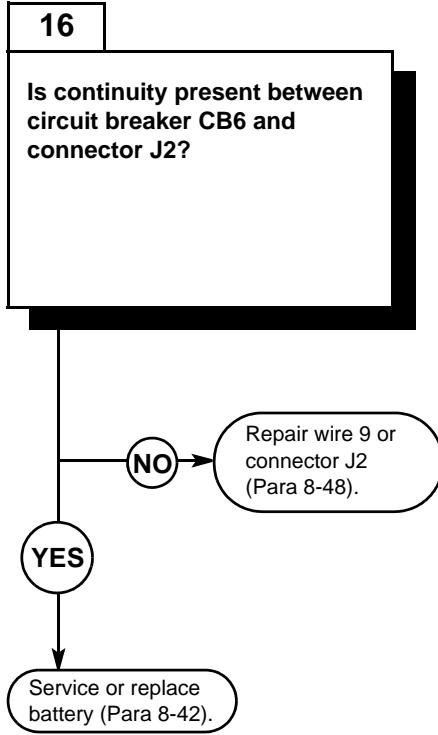
## 17. BLACKOUT MARKER LIGHT(S) AND/OR TAILLIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Turn signals OK.
Floodlights OK.
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Wire 45 OK.
Socket(s) OK.
POSSIBLE PROBLEMS
Wire 9 faulty.
Connector J2 faulty.
Connector P2 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

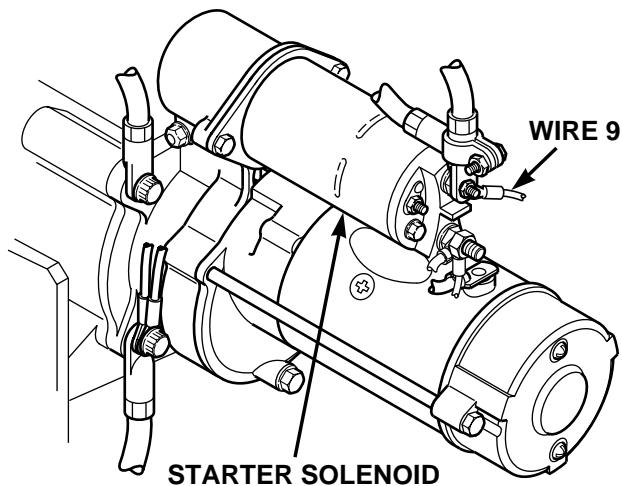
KNOWN INFO
Turn signals OK.
Floodlights OK.
Bulbs OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB4 OK.
Wire 40 OK.
Blackout light switch OK.
Wire 45 OK.
Socket(s) OK.
Connector P2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty.
Connector J2 faulty.



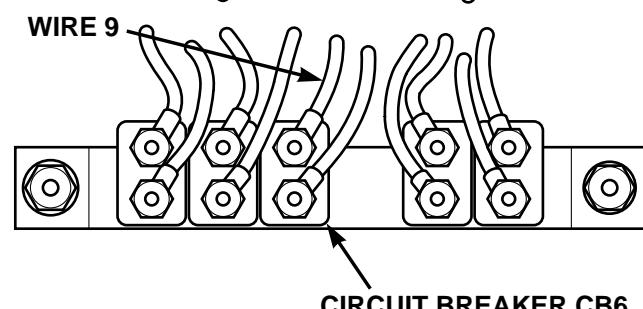
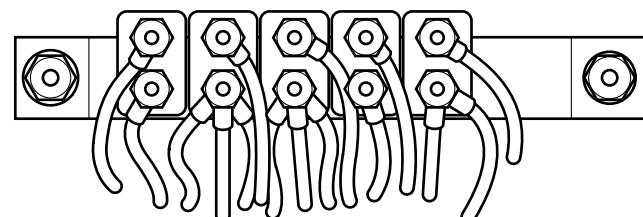
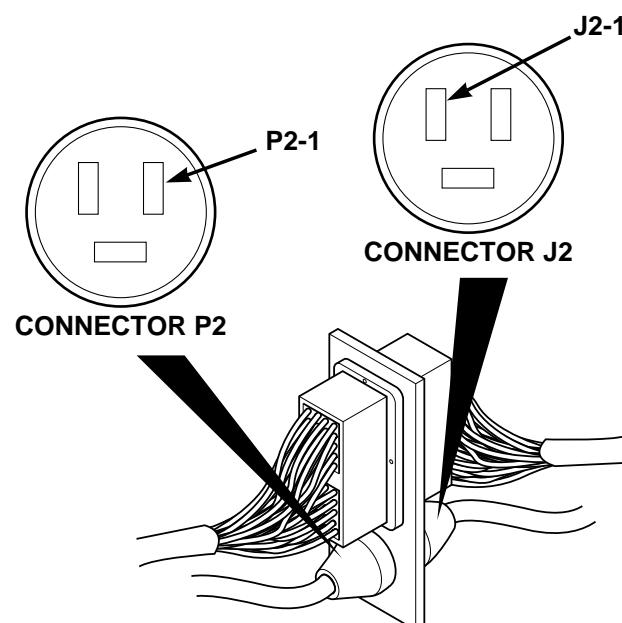
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector J2 (Para 8-48).

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 16 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at circuit breaker CB6.
- (4) Connect multimeter negative lead (-) to connector J2-1.
  - (a) If continuity is present, service or replace battery (Para 8-42).
  - (b) If continuity is not present, repair wire 9 or connector J2 (Para 8-48).
- (5) Install access panel and four screws.
- (6) Connect negative battery cable to negative side of battery (Para 8-42).
- (7) Install battery cover (Para 8-42).

**CIRCUIT BREAKER CB6**

**18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE.****INITIAL SETUP**

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

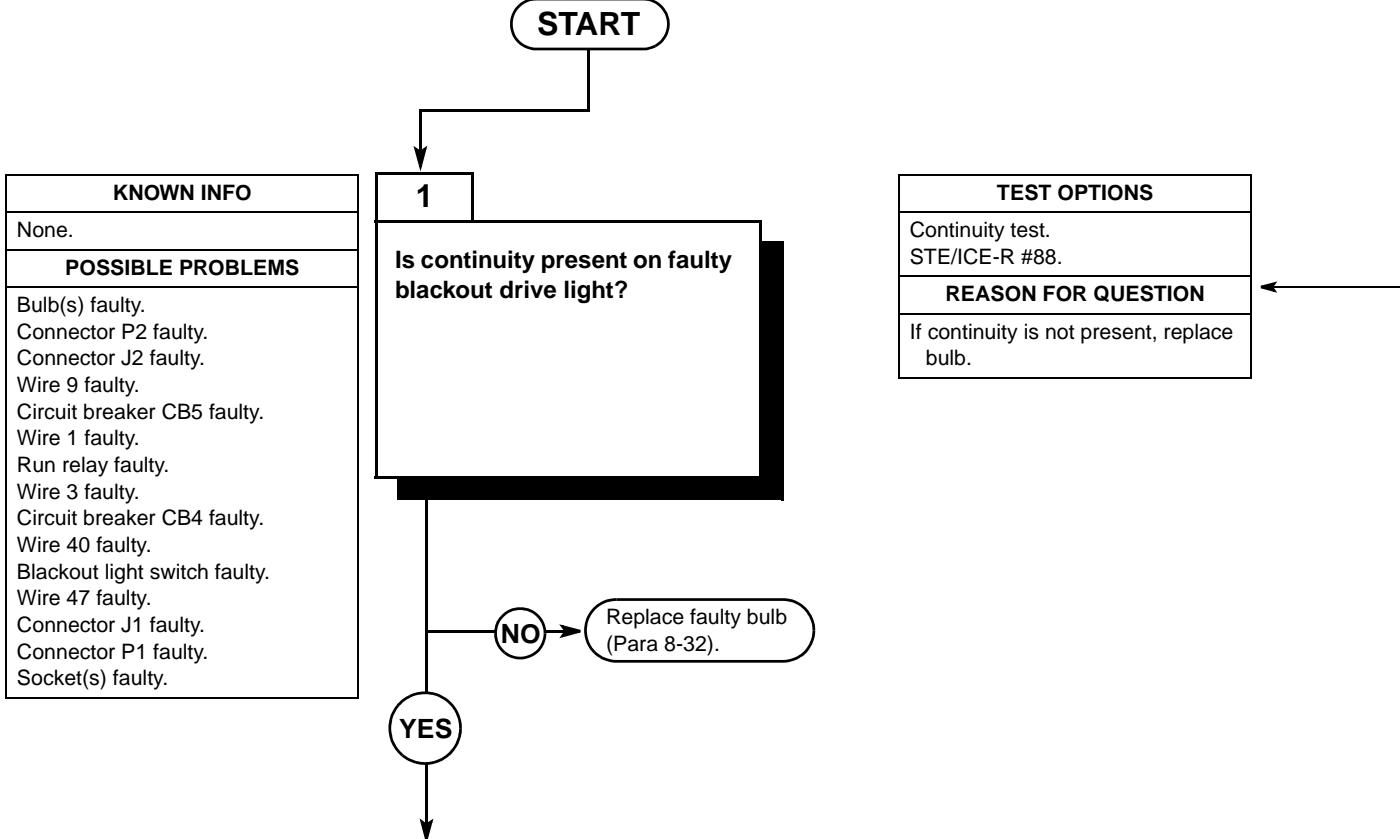
Two

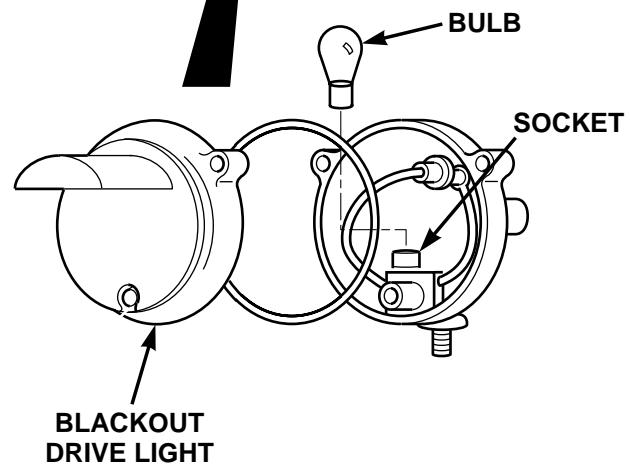
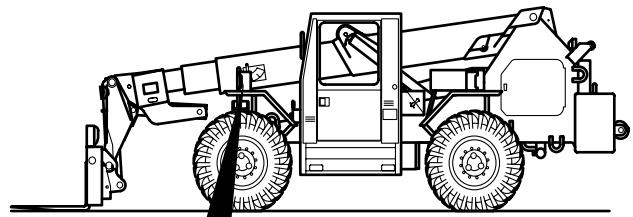
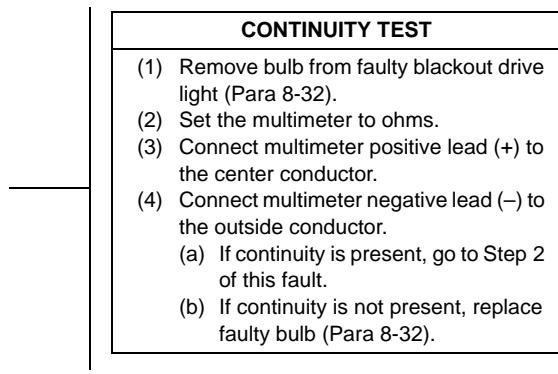
*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

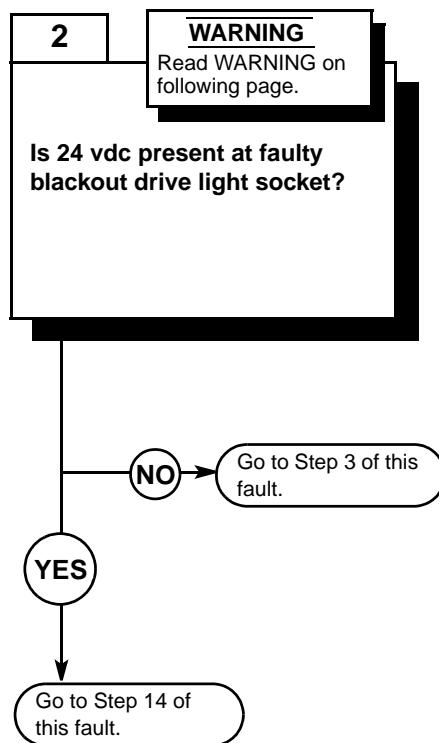
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)





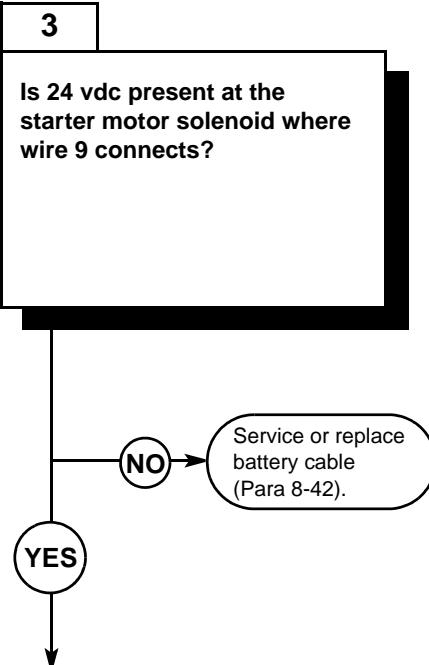
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB5 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB5 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

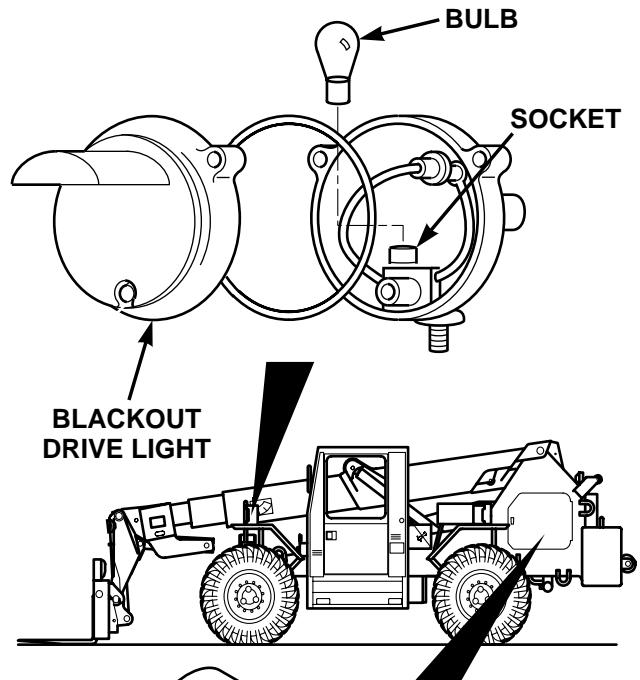


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

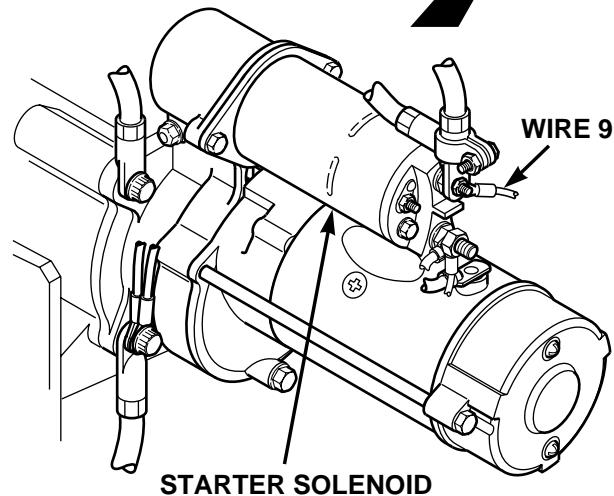
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 14 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

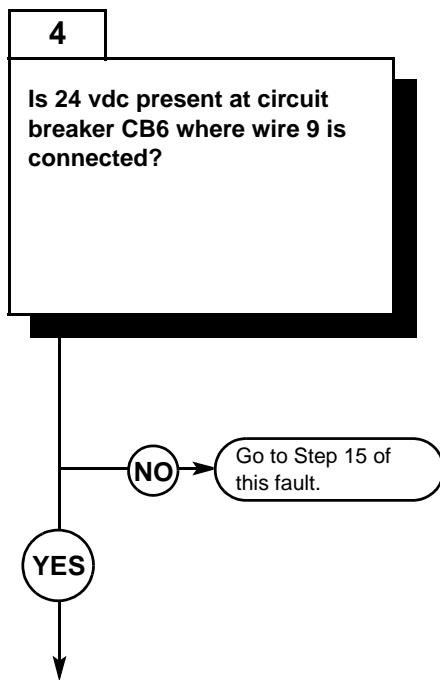


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to the starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, service or replace battery cable (Para 8-42).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



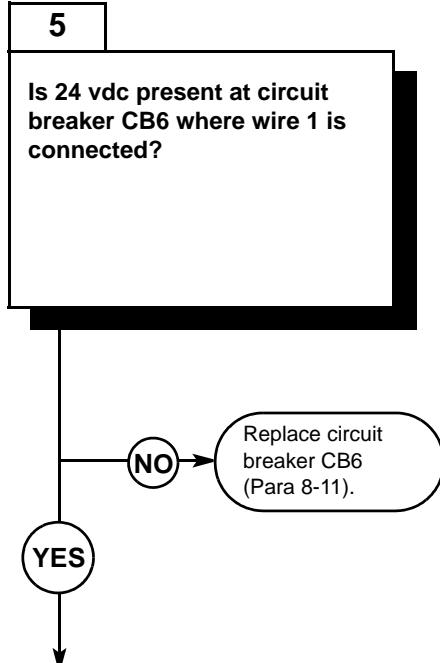
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB5 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



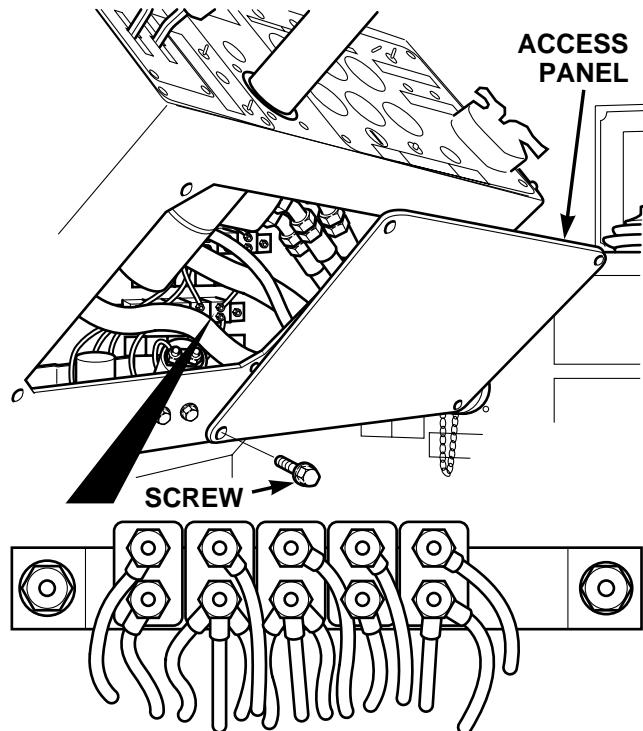
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Circuit breaker CB5 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

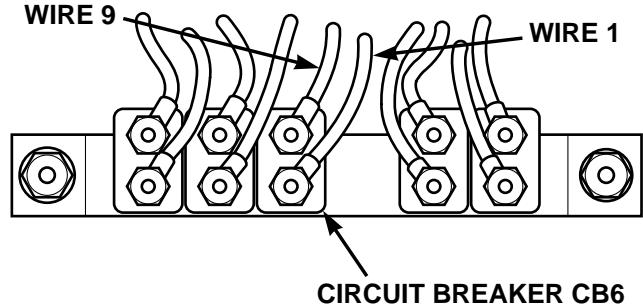


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 faulty.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws and access panel.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 15 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

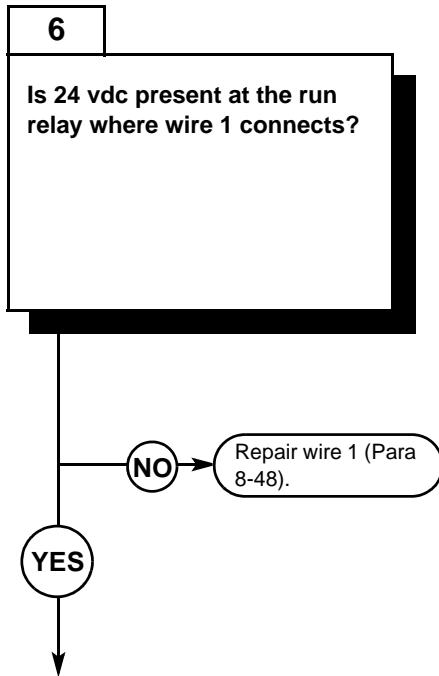


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect the multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).



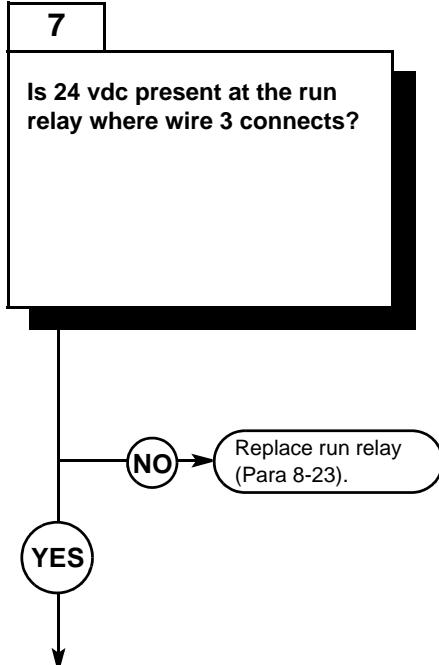
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



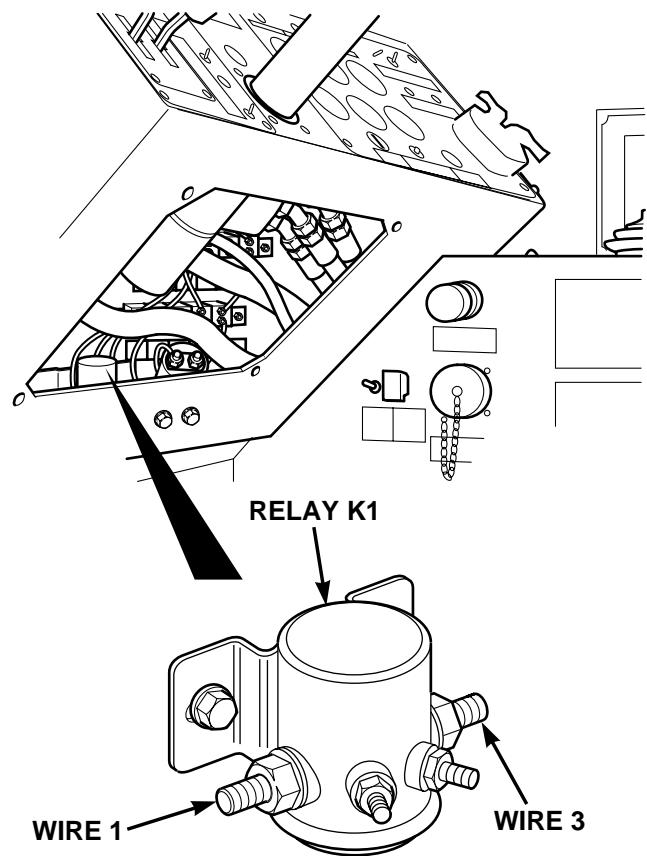
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

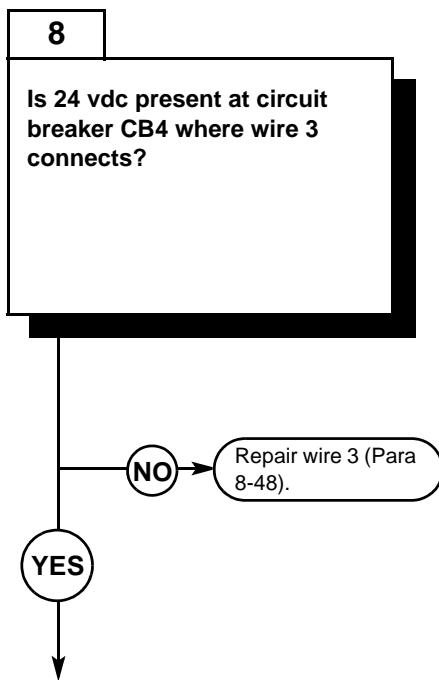
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to the run relay where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



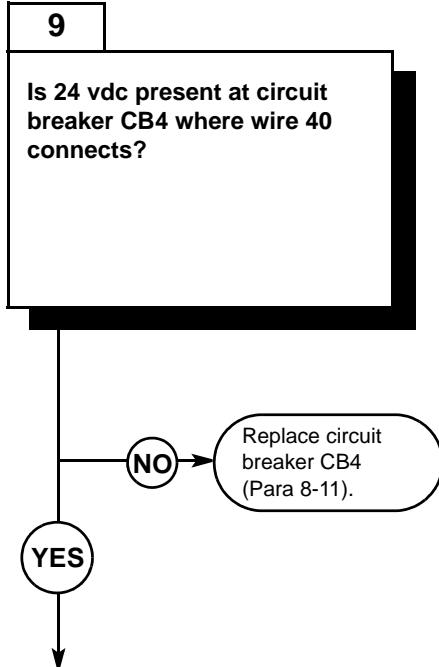
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



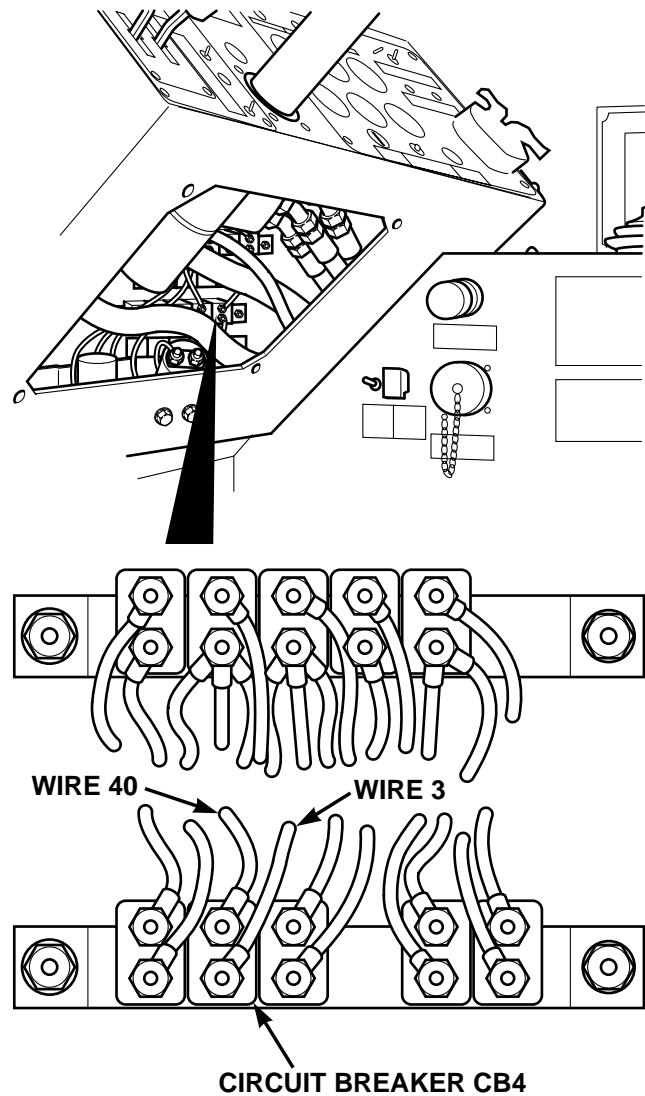
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 47 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



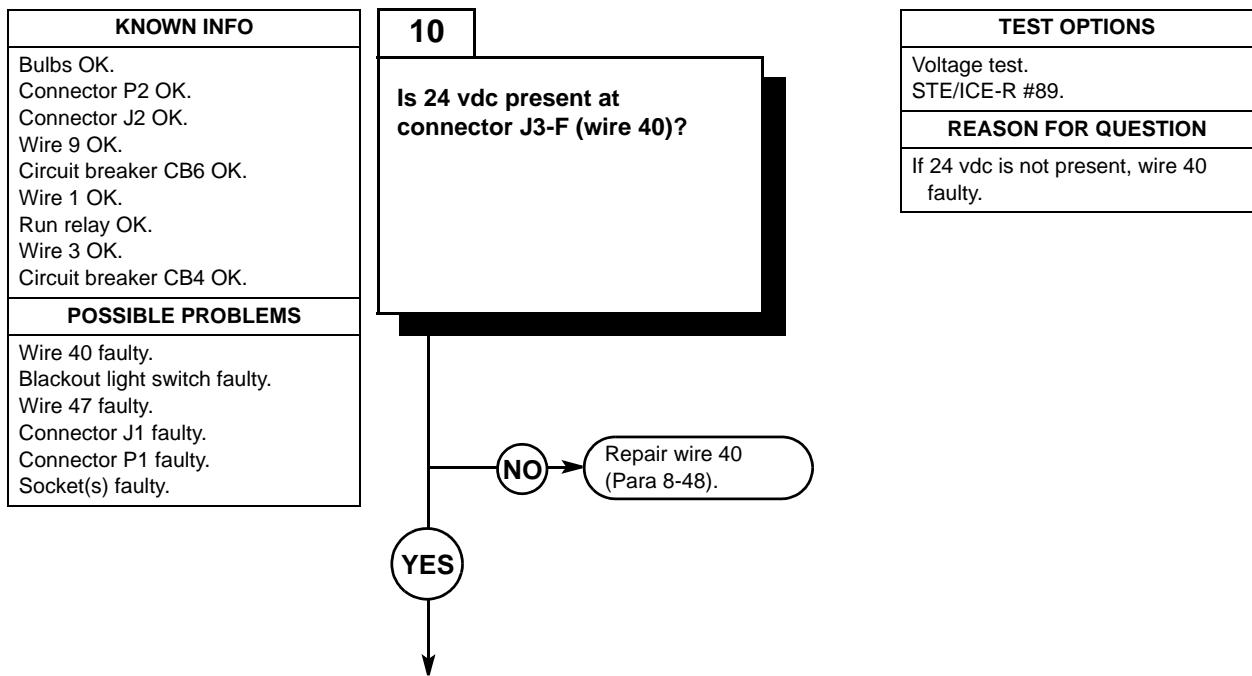
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 faulty.

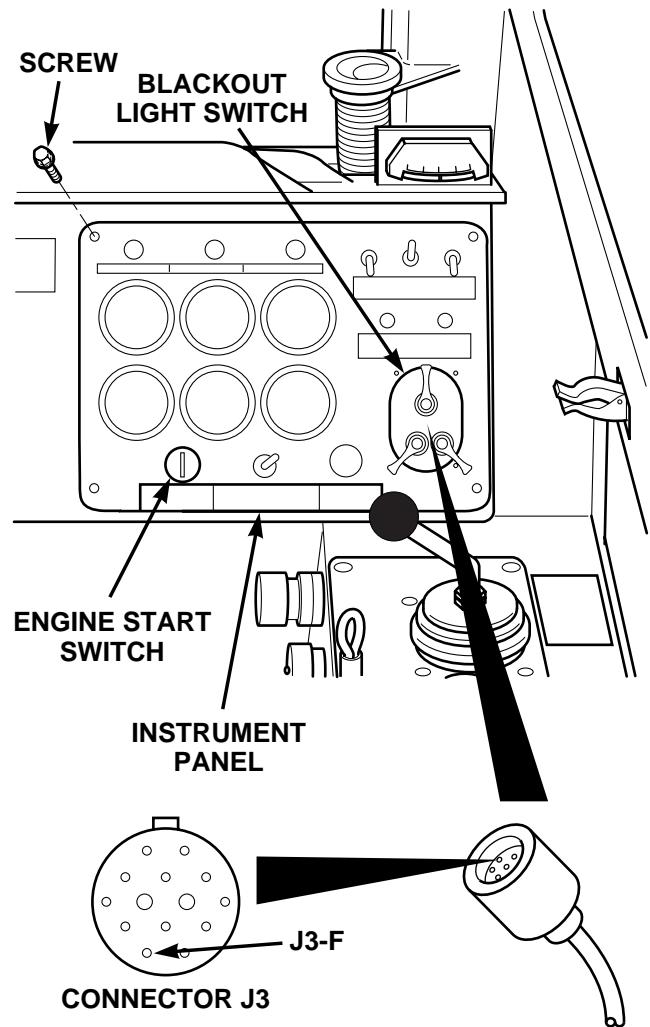
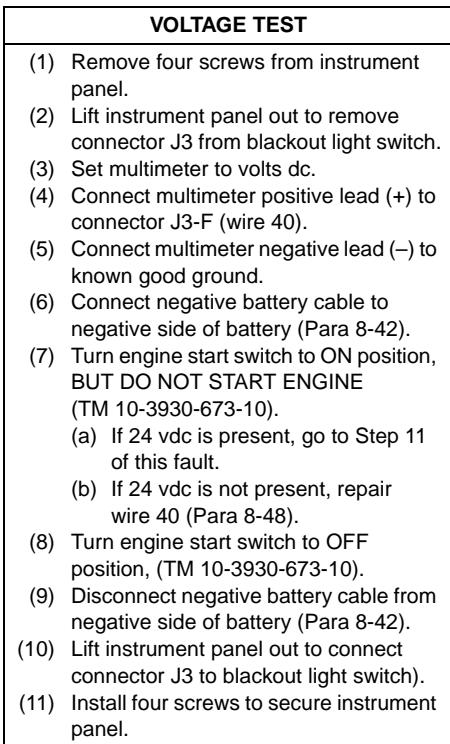
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



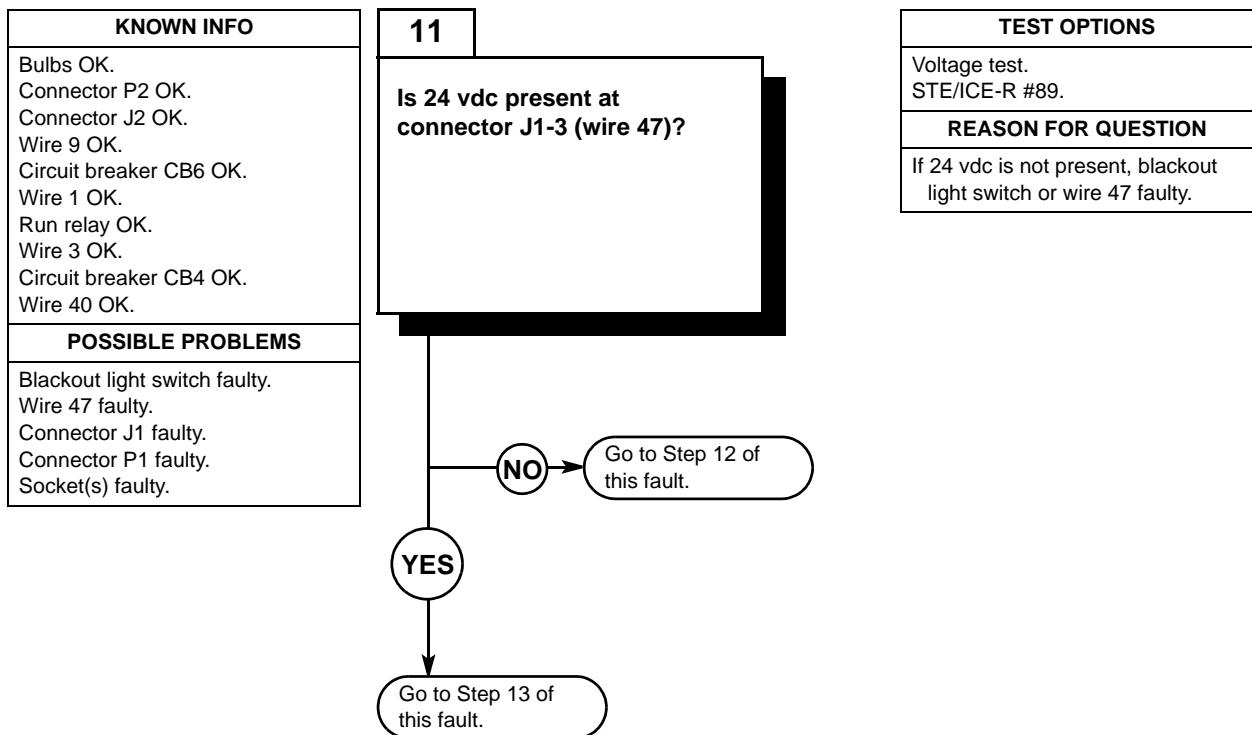
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

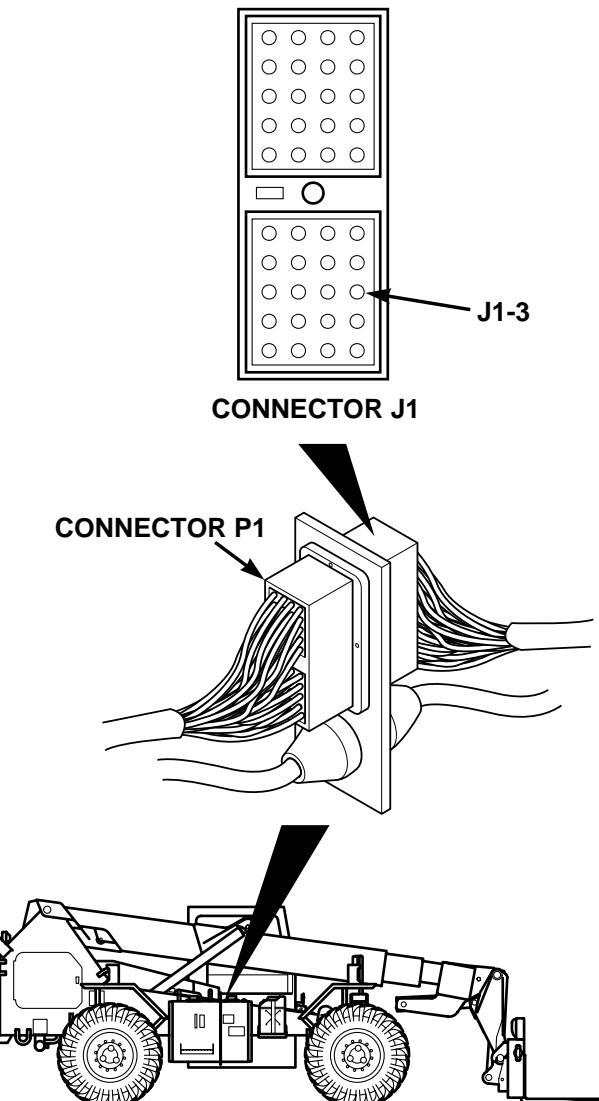




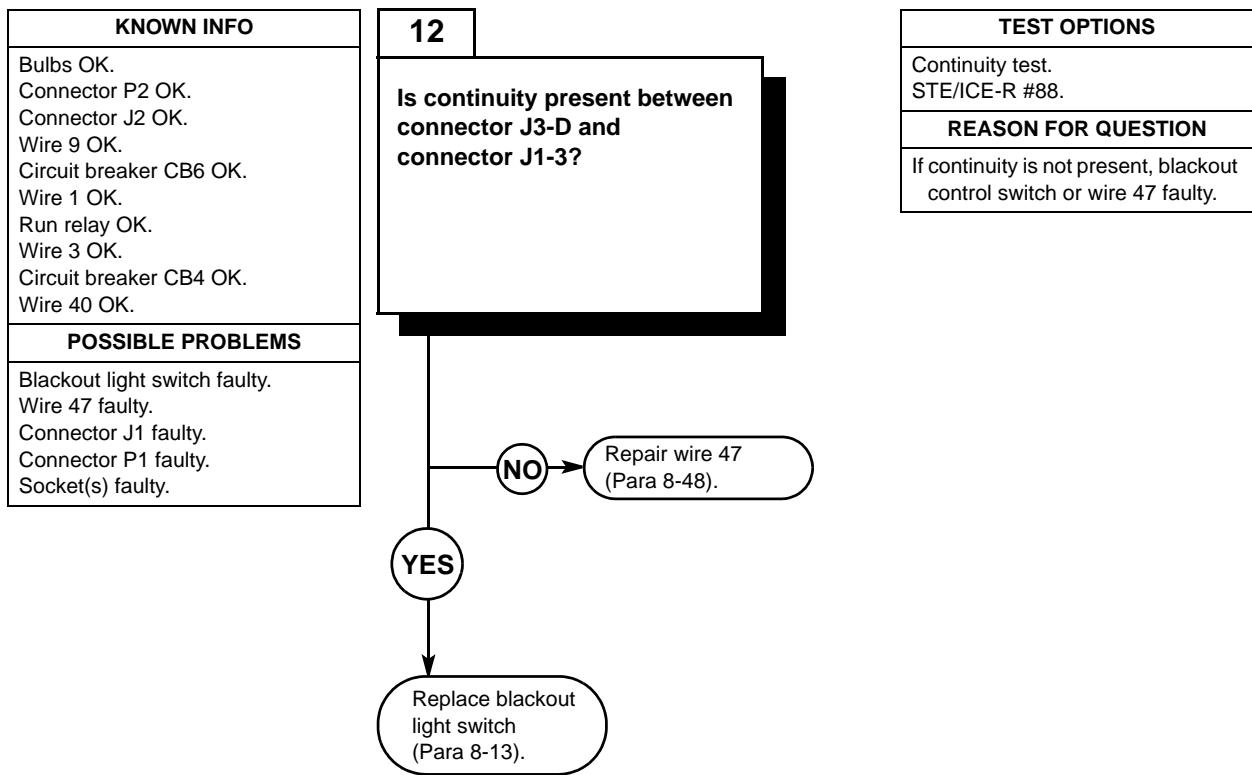
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

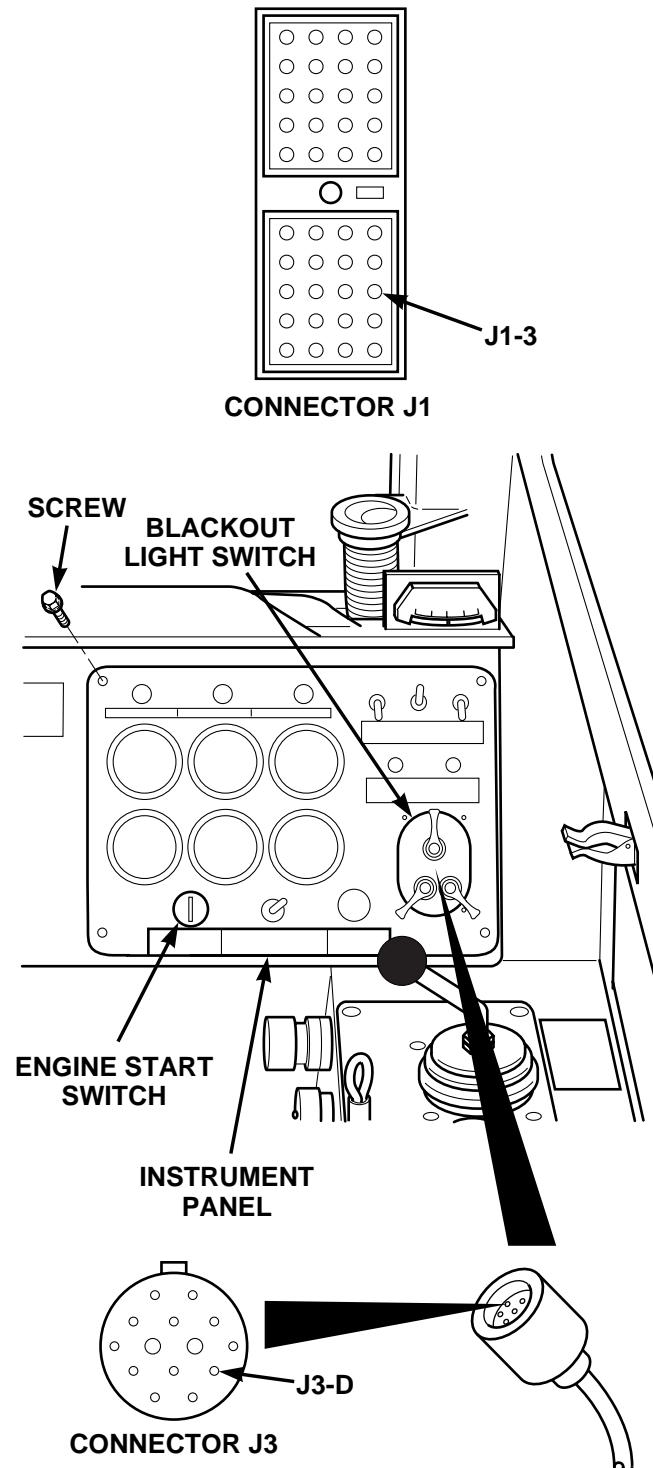
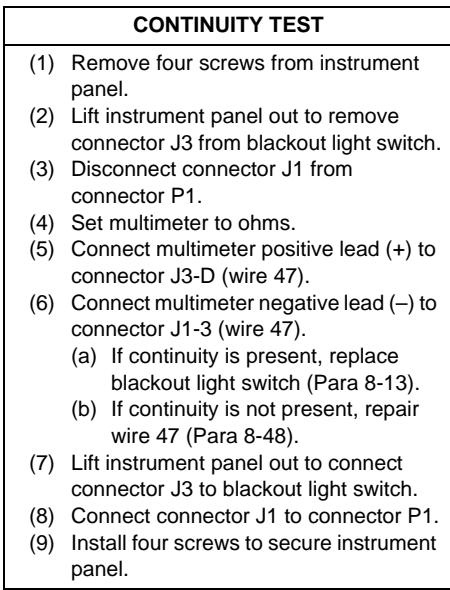


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-3 (wire 47).
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 13 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).

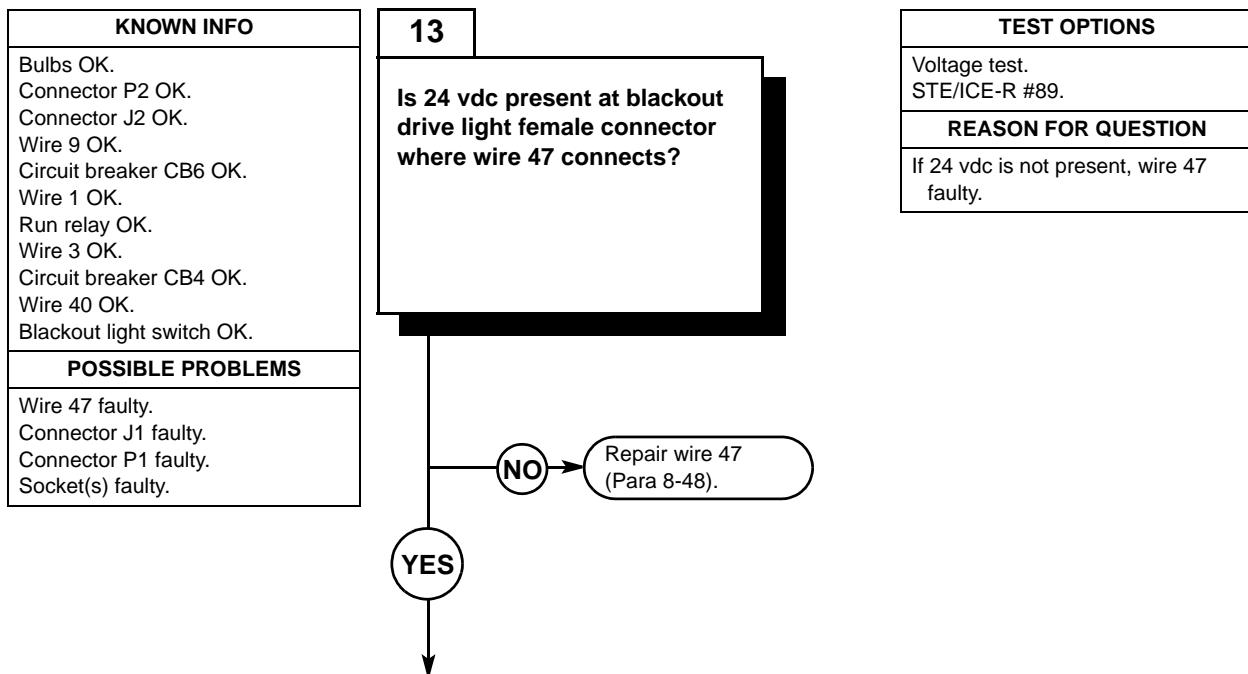


## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

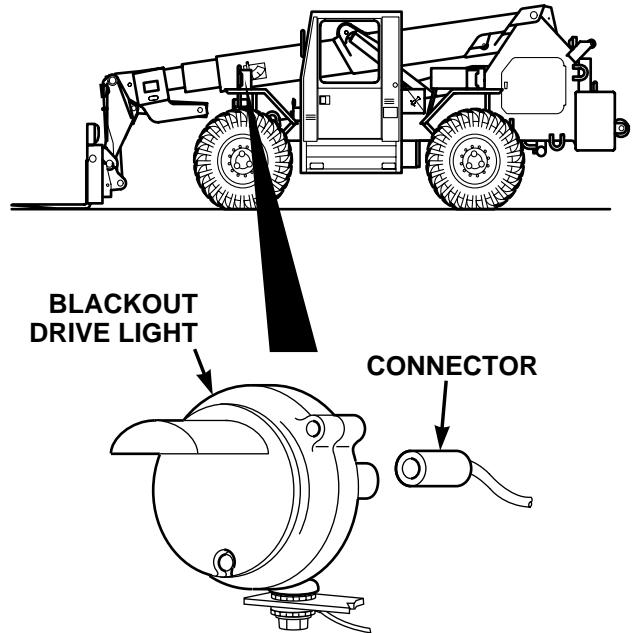




## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

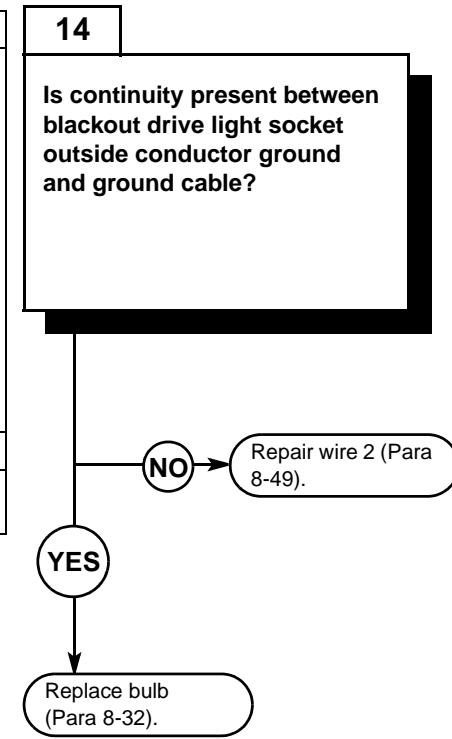


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to blackout drive light female connector where wire 46 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10). (a) If 24 vdc is present, go to Step 14 of this fault. (b) If 24 vdc is not present, repair wire 47 (Para 8-48).
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



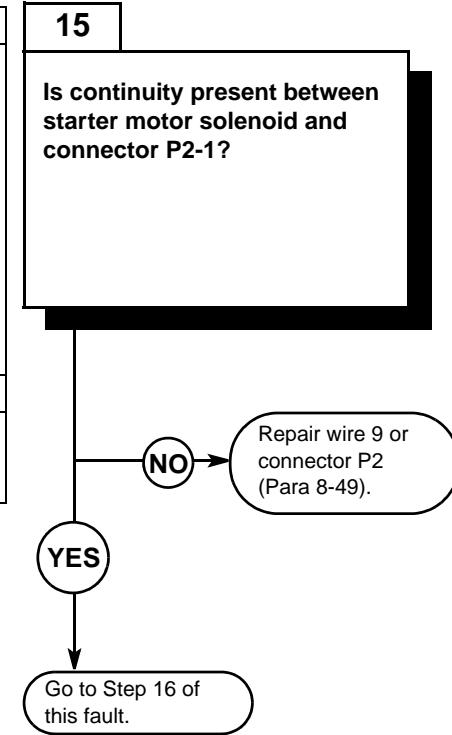
## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 47 OK. Connector J1 OK. Connector P1 OK.



TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 2 ground or brake light socket faulty.

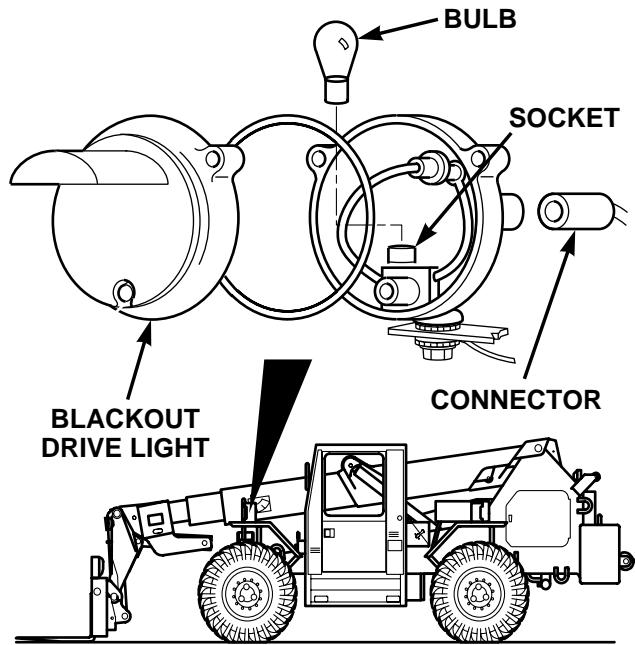
KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Blackout light switch OK. Wire 47 OK. Socket(s) OK.



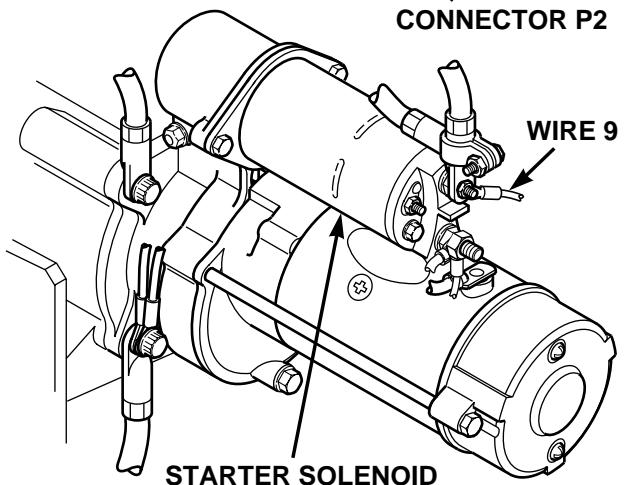
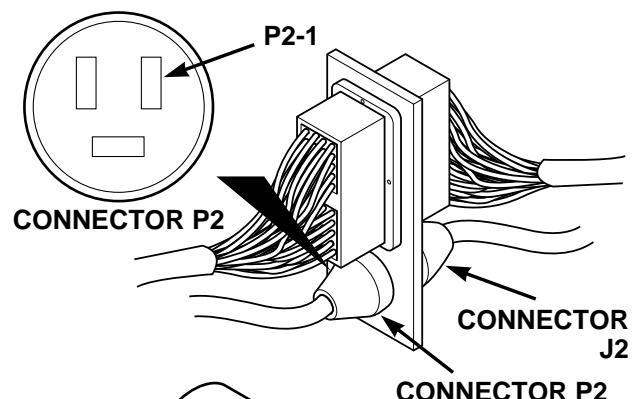
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONTINUITY TEST**

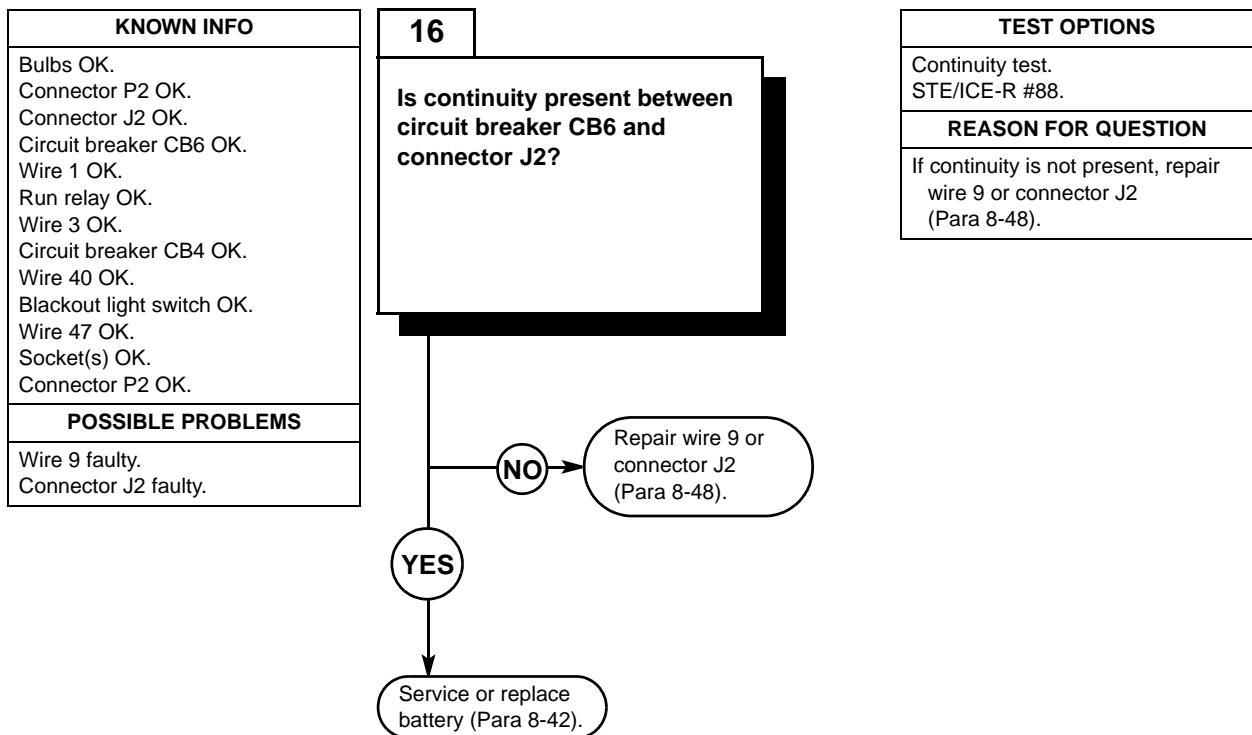
- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at blackout drive light socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-32).
  - (b) If continuity is not present, repair wire 2 (Para 8-49) or replace blackout brake light socket (Para 8-32).

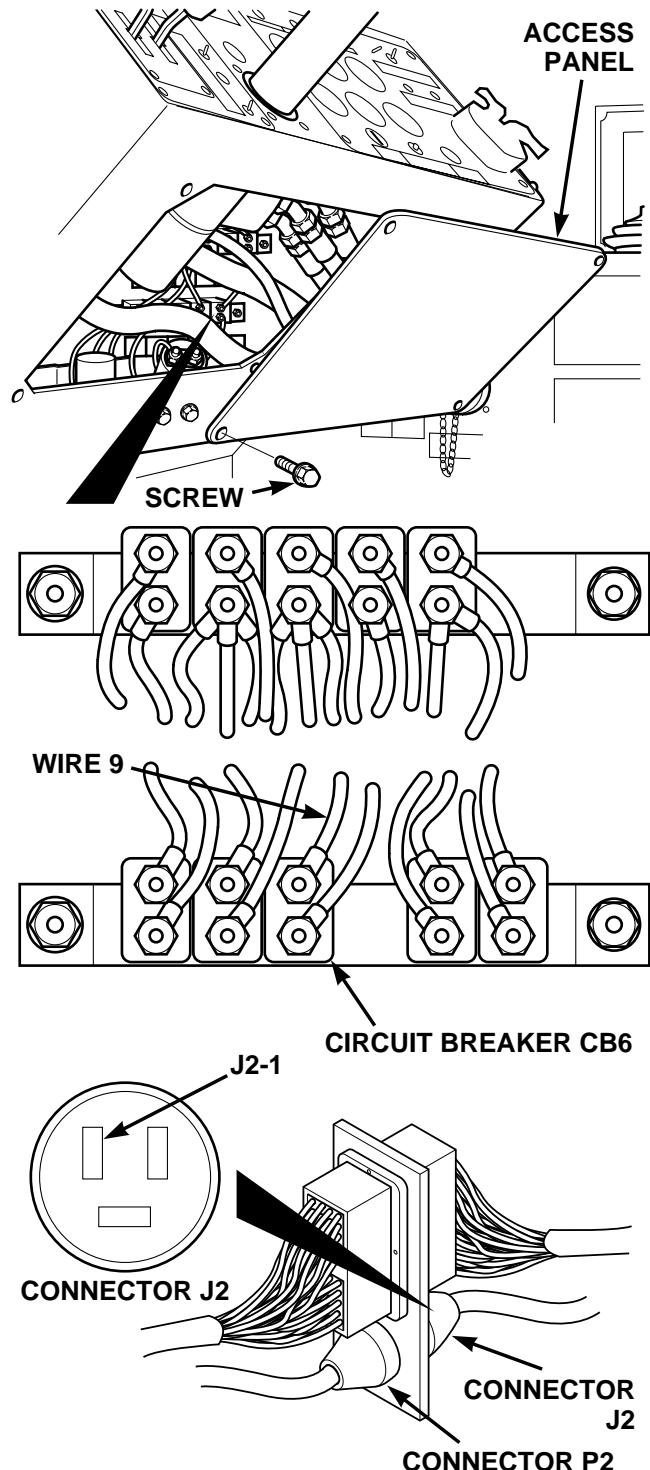
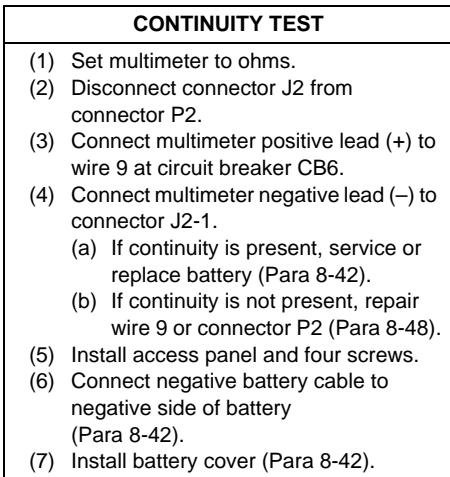
**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 16 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).



## 18. BLACKOUT DRIVE LIGHT(S) DO NOT OPERATE (CONT).





**19. BLACKOUT STOPLIGHTS DO NOT OPERATE.****INITIAL SETUP**

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

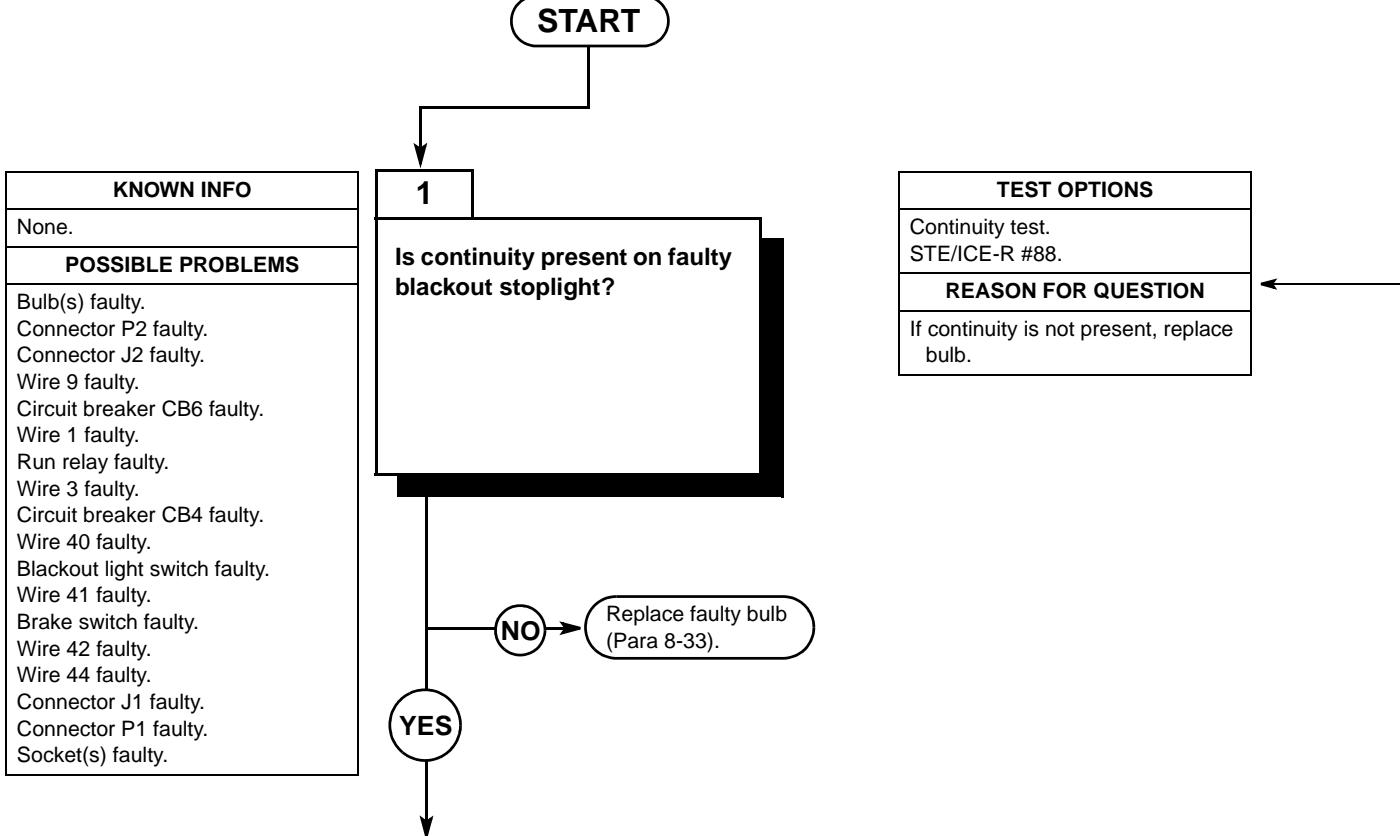
Two

*References*

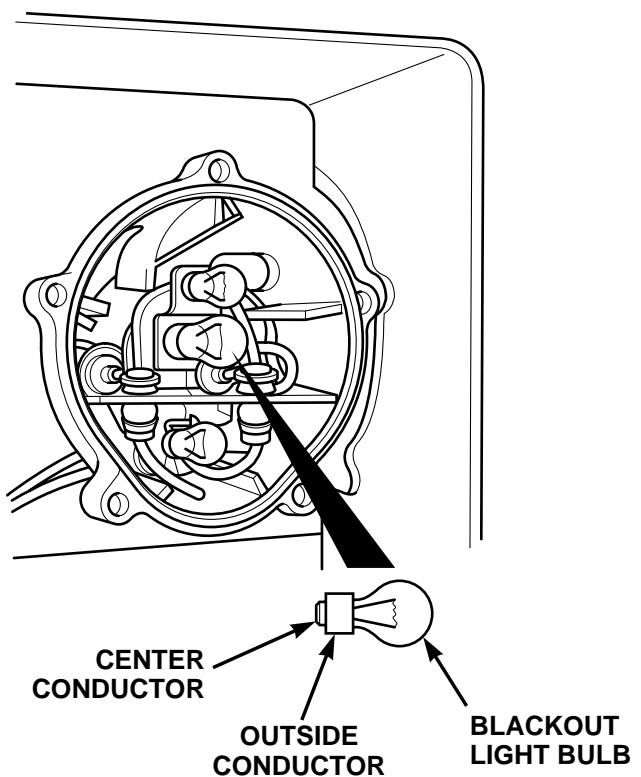
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

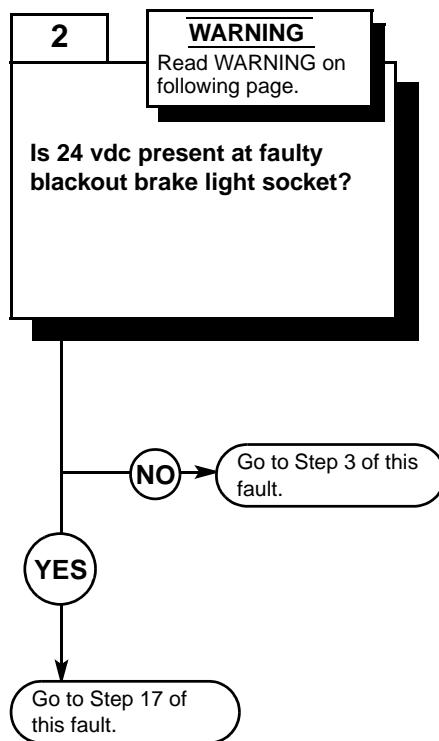


- CONTINUITY TEST**
- (1) Remove bulb from faulty blackout stop light (Para 8-33).
  - (2) Set the multimeter to ohms.
  - (3) Connect multimeter positive lead (+) to the center conductor.
  - (4) Connect multimeter negative lead (-) to the outside conductor.
    - (a) If continuity is present, go to Step 2 of this fault.
    - (b) If continuity is not present, replace faulty bulb (Para 8-33).



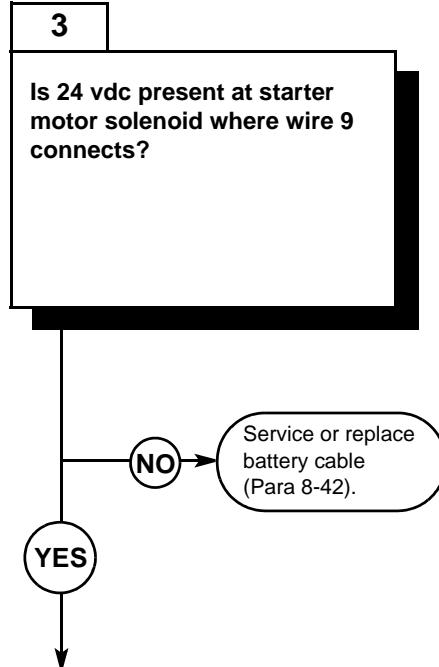
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulb OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

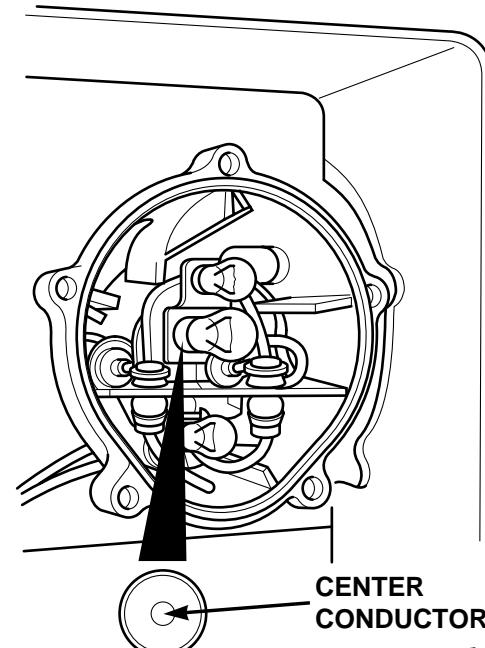


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, service or replace battery cable.

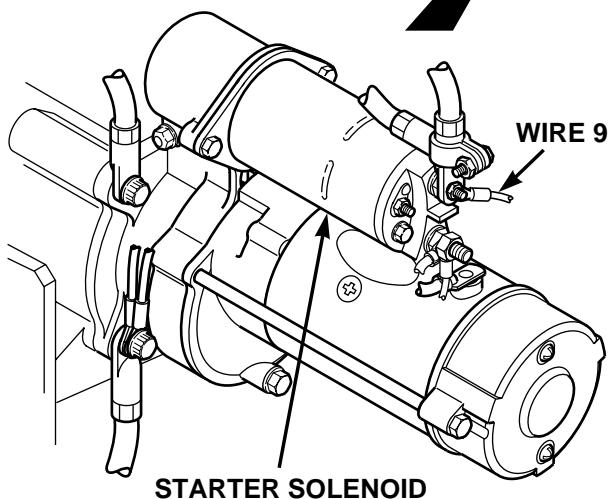
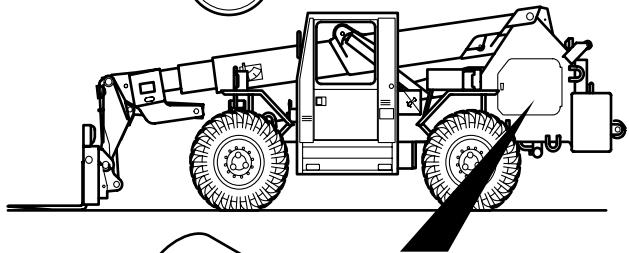
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to center conductor of faulty socket.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress brake pedal (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 17 of this fault.
(b)	If 24 vdc is not present, go to Step 3 of this fault.
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).

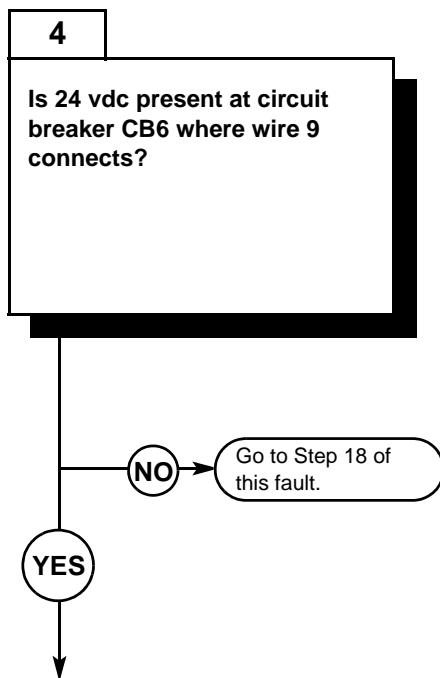


<b>VOLTAGE TEST</b>	
(1)	Remove battery covers (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to starter motor solenoid where wire 9 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, service or replace battery cable (Para 8-42).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



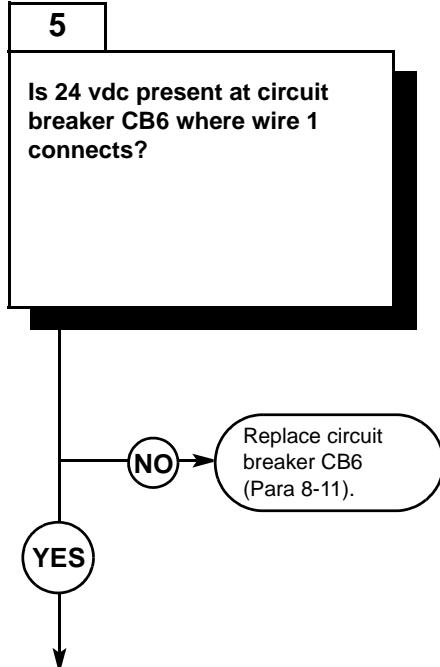
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Connector J2 faulty. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



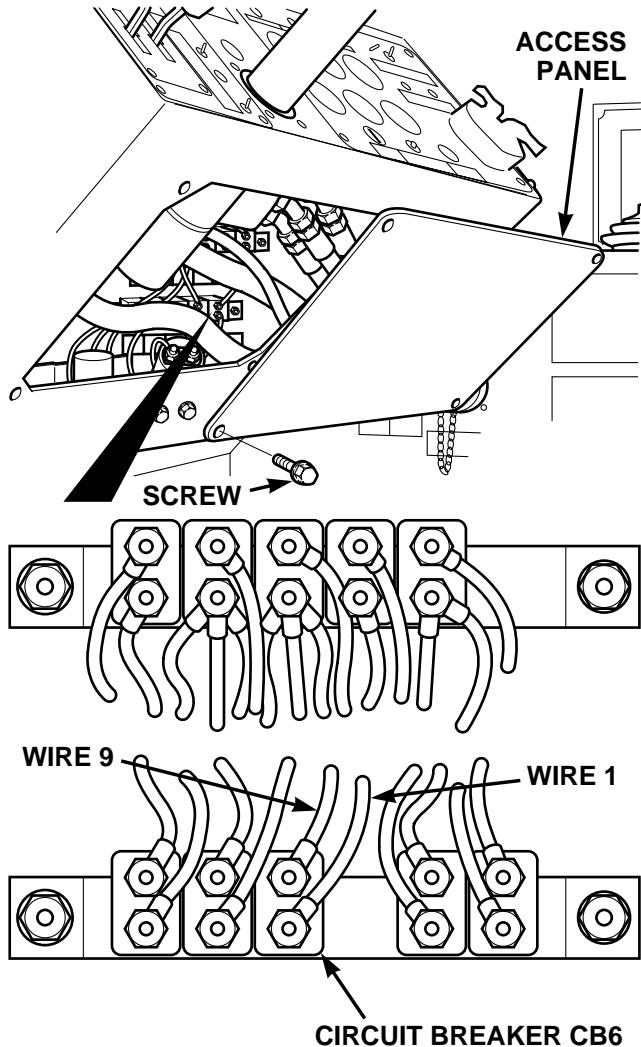
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Bulbs OK.
POSSIBLE PROBLEMS
Connector P2 OK. Connector J2 OK. Wire 9 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB6 faulty.

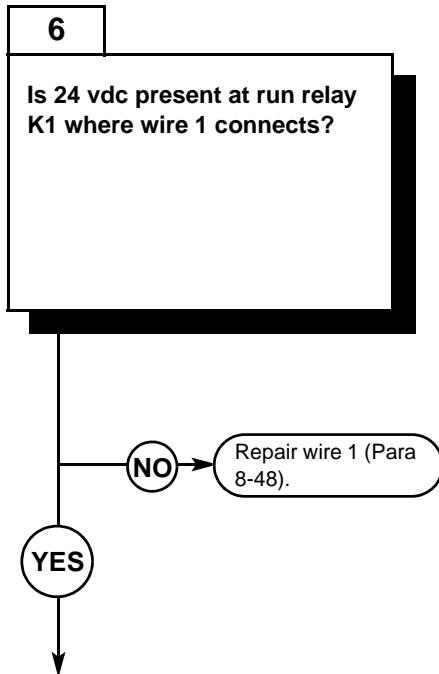
<b>VOLTAGE TEST</b>	
(1)	Remove access panel and four screws.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to circuit breaker CB6 where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 18 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect the multimeter positive lead (+) to circuit breaker CB6 where wire 1 connects.
(3)	Connect multimeter negative lead (-) to a known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).

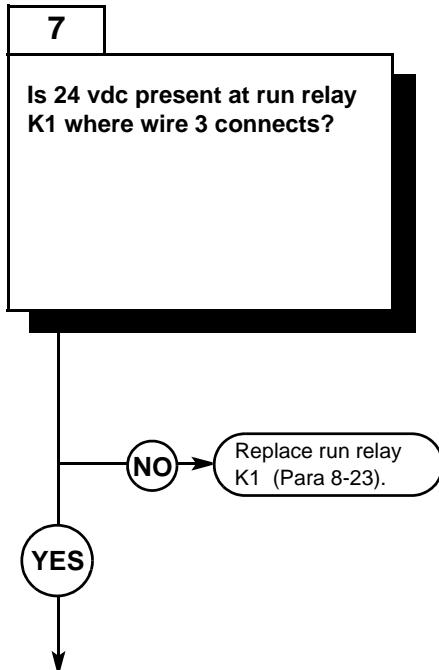
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 1 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



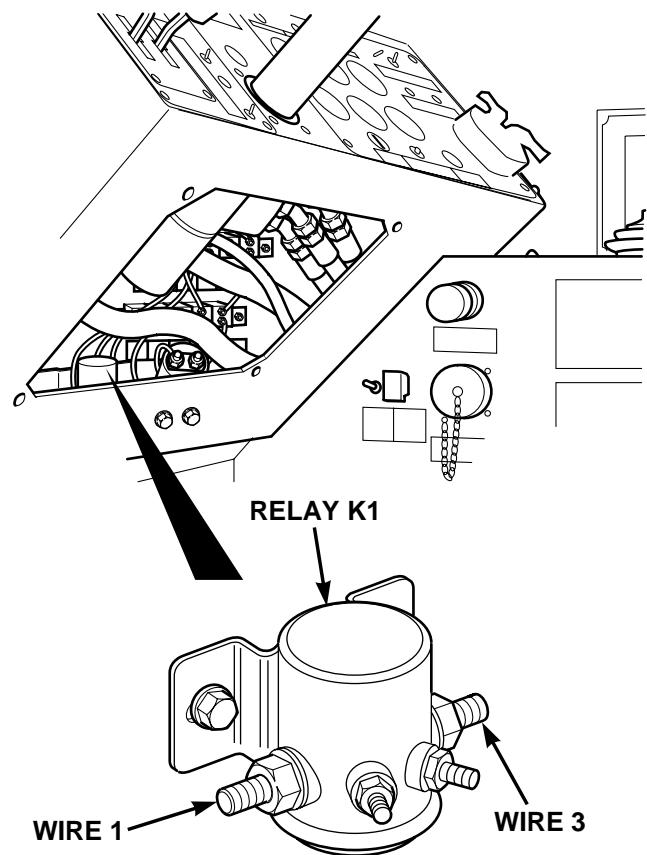
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, run relay K1 faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 1 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1 (Para 8-48).
- (5) Disconnect negative battery cable from negative side of battery (Para 8-42).

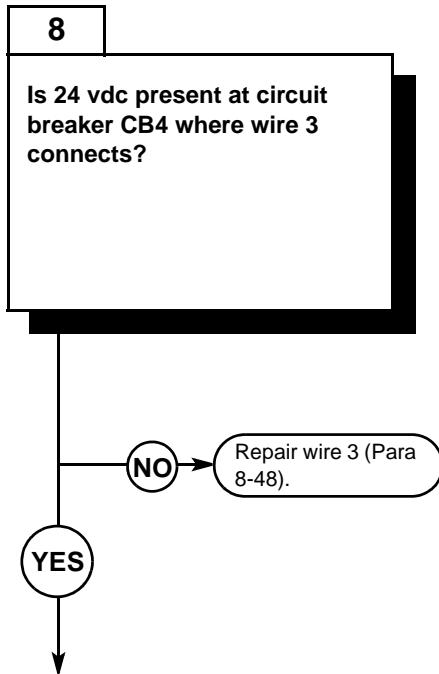
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to run relay K1 where wire 3 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position, (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



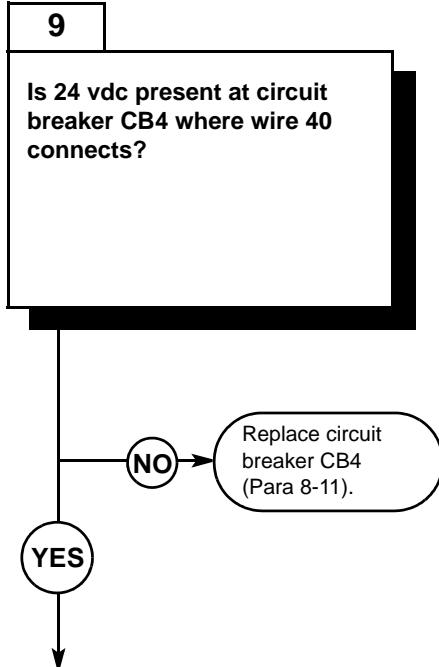
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



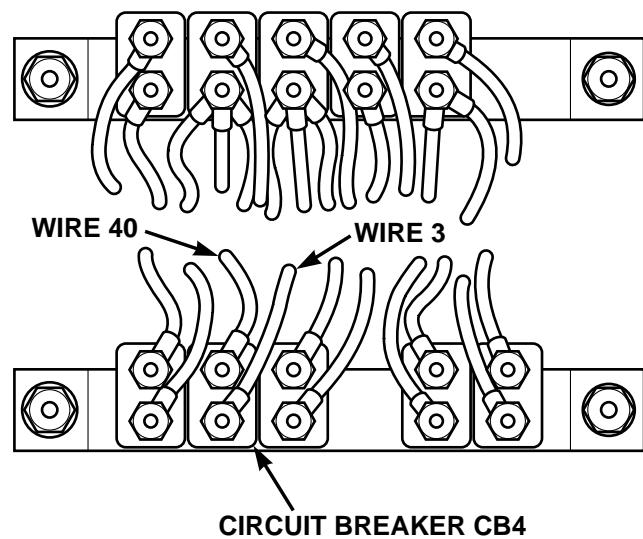
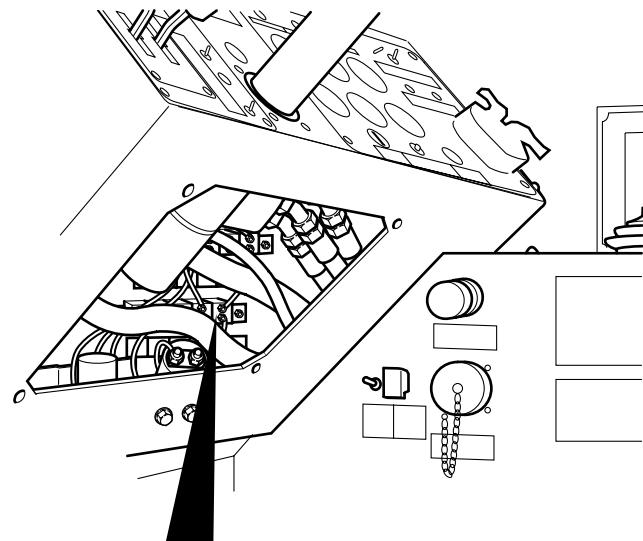
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 3 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB4 faulty. Wire 40 faulty. Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



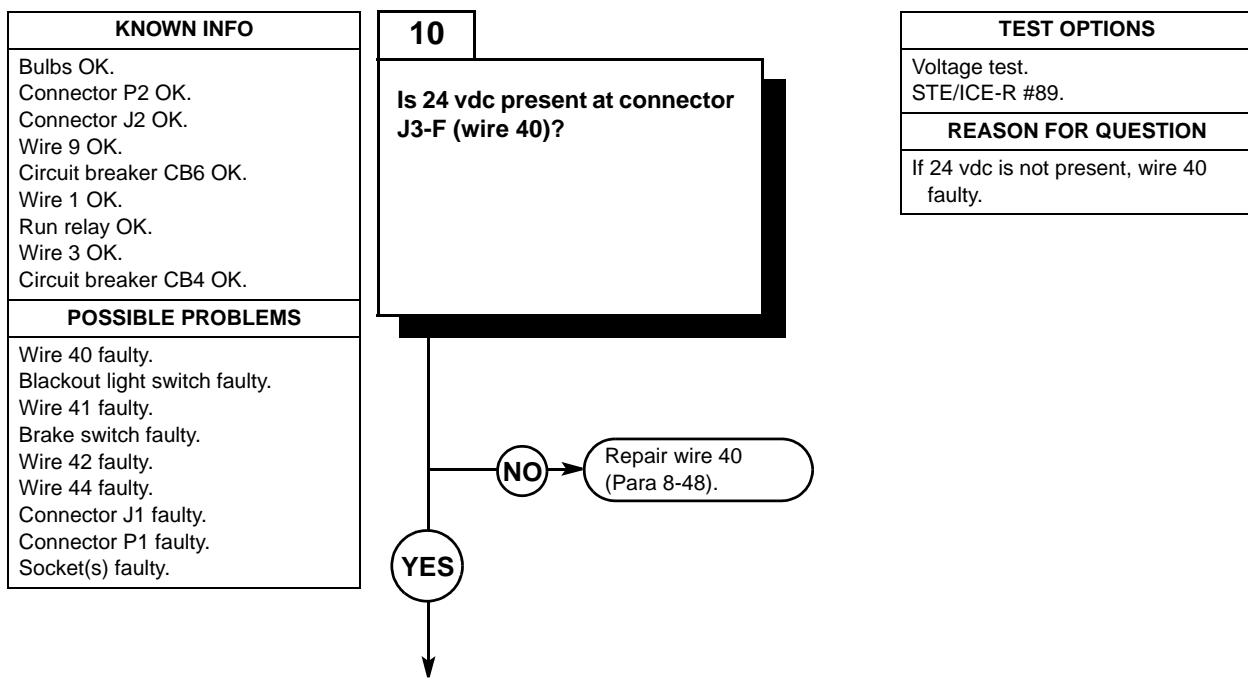
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, circuit breaker CB4 faulty.

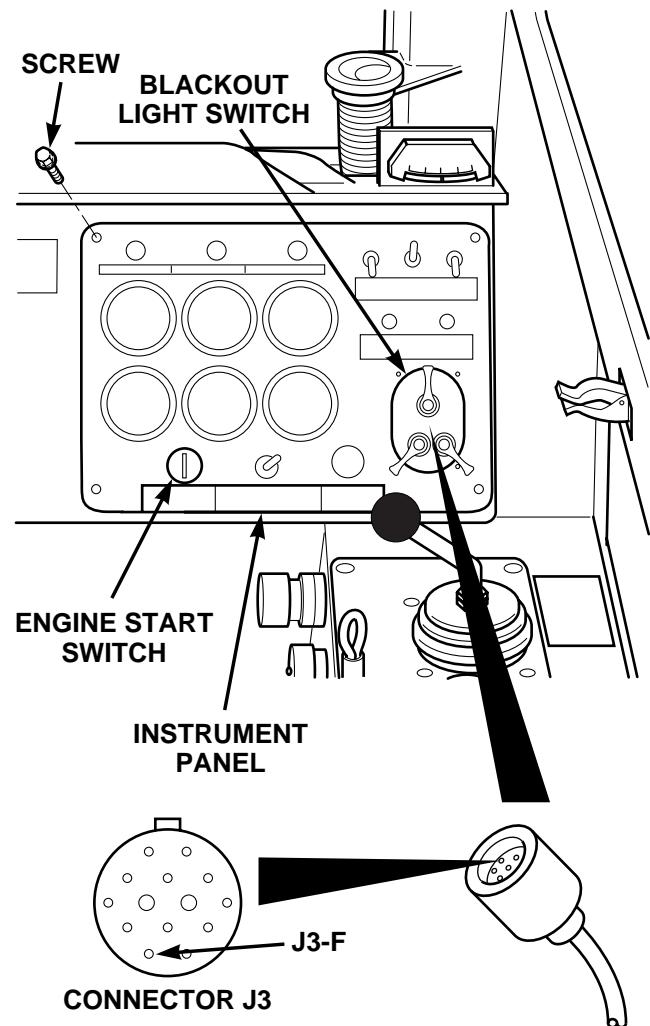
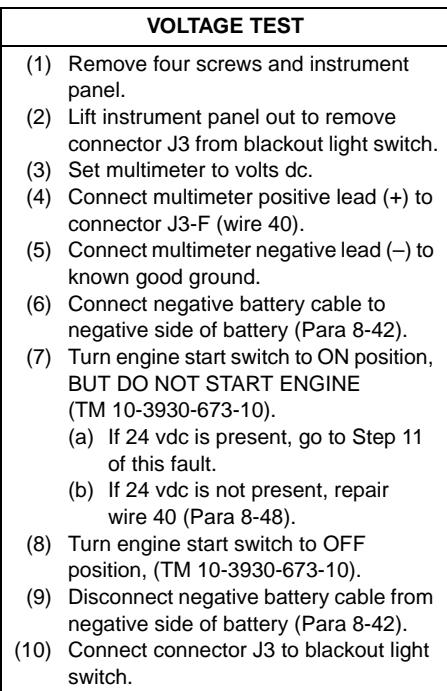
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 3 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB4 where wire 40 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB4 (Para 8-11).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).



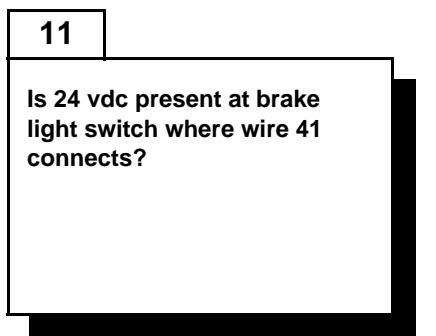


## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.

POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.

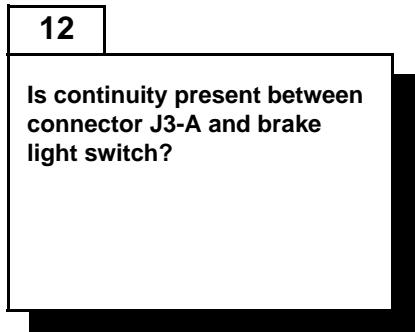


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, blackout light switch or wire 41 faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK.

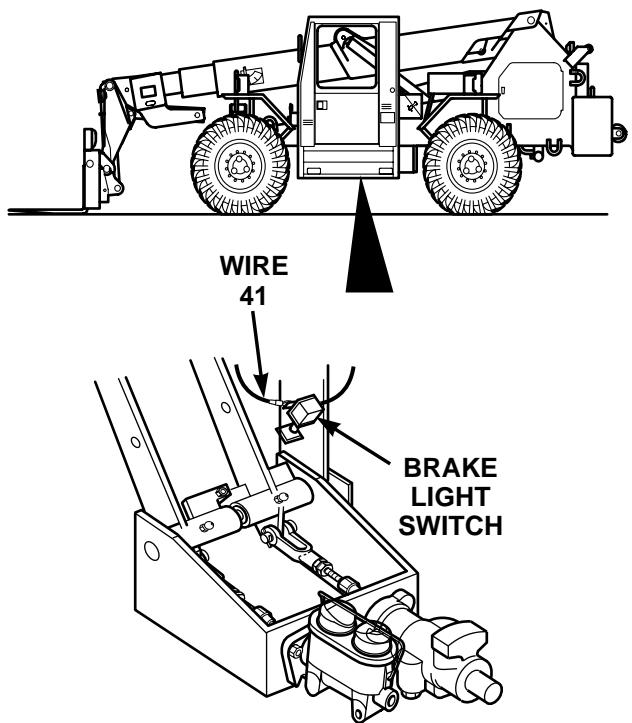
POSSIBLE PROBLEMS
Blackout light switch faulty. Wire 41 faulty. Brake switch faulty. Wire 42 faulty. Wire 44 faulty. Connector J1 faulty. Connector P1 faulty. Socket(s) faulty.



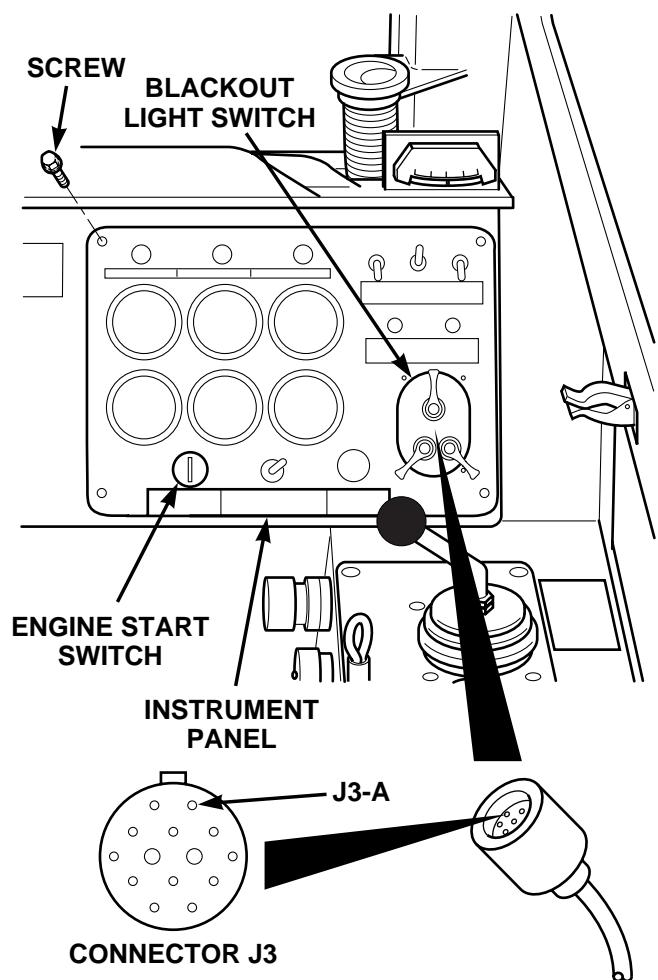
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, blackout light switch or wire 41 faulty.

Replace blackout light switch (Para 8-13).

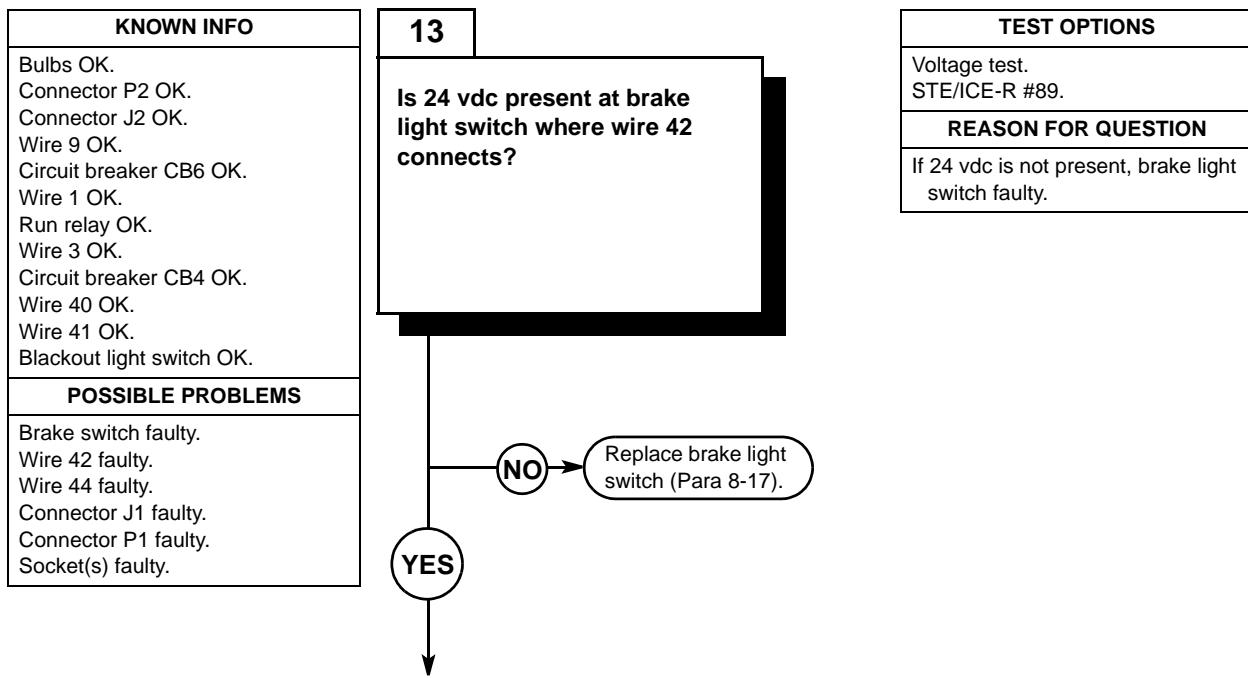
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to brake light switch where wire 41 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10). (a) If 24 vdc is present, go to Step 13 of this fault. (b) If 24 vdc is not present, go to Step 12 of this fault.
(7)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



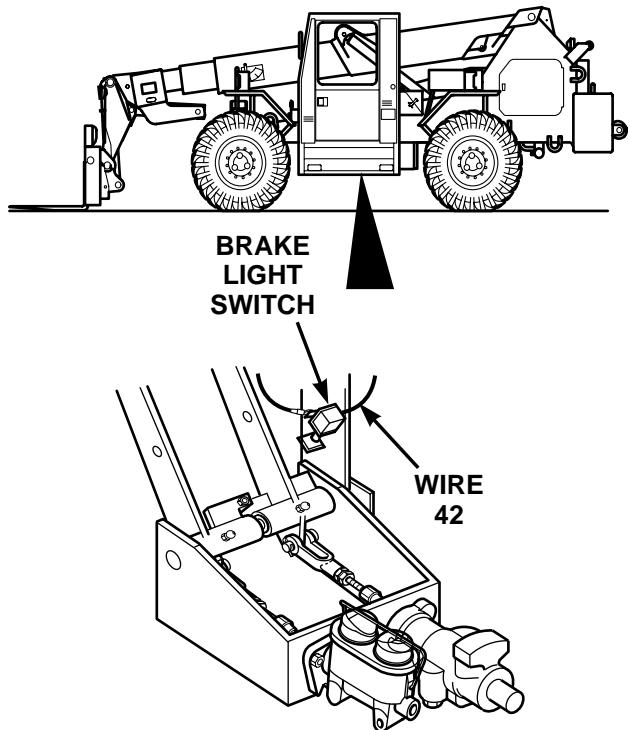
<b>CONTINUITY TEST</b>	
(1)	Lift instrument panel out to remove connector J3 from blackout light switch.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to connector J3-A (wire 41).
(4)	Connect multimeter negative lead (-) to brake switch where wire 41 connects. (a) If continuity is present, replace blackout light switch (Para 8-13). (b) If continuity is not present, repair wire 41 (Para 8-48).
(5)	Connect connector J3 to blackout light switch.



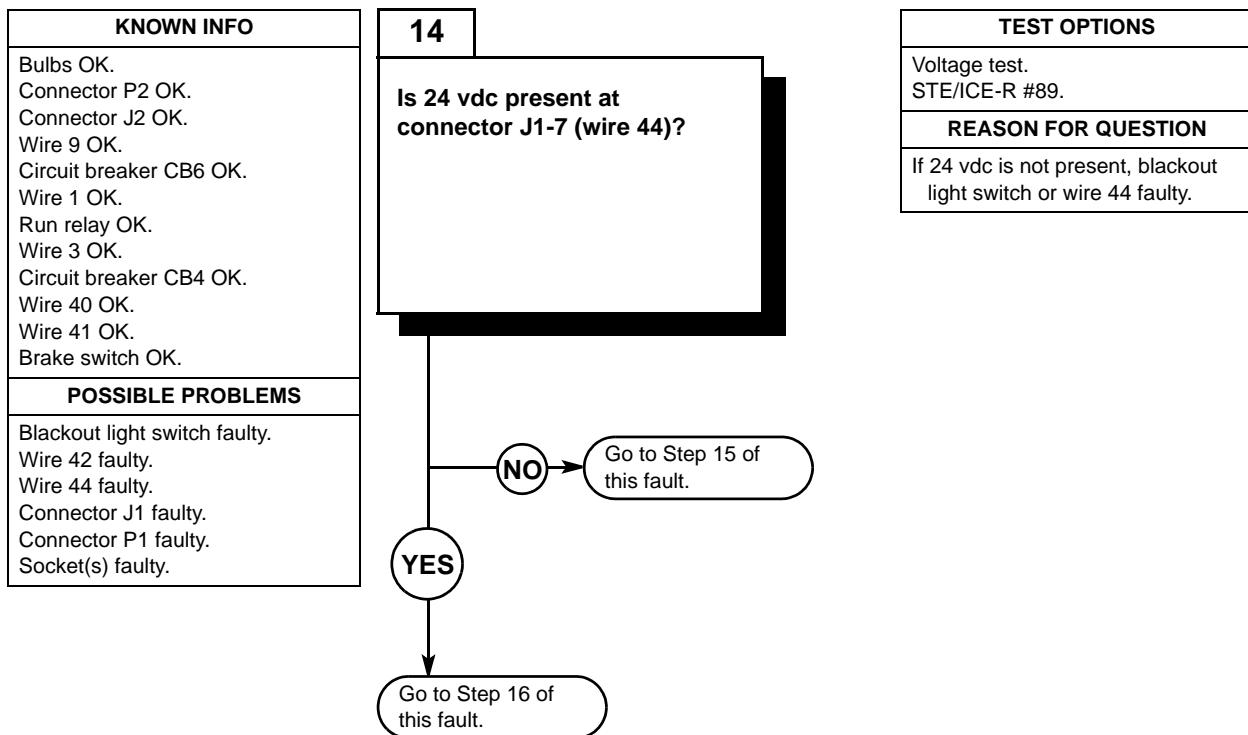
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).



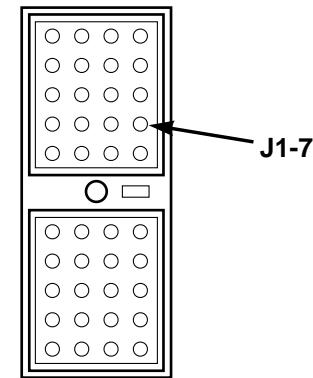
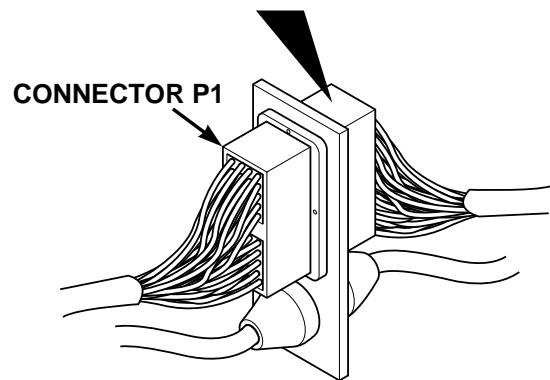
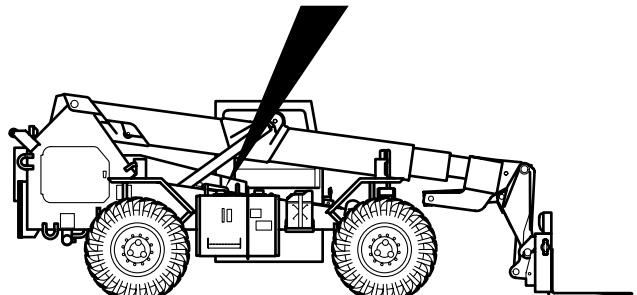
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to brake switch where wire 42 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10).
(7)	Depress brake pedal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 14 of this fault.</li> <li>(b) If 24 vdc is not present, replace brake light switch (Para 8-17).</li> </ul>
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



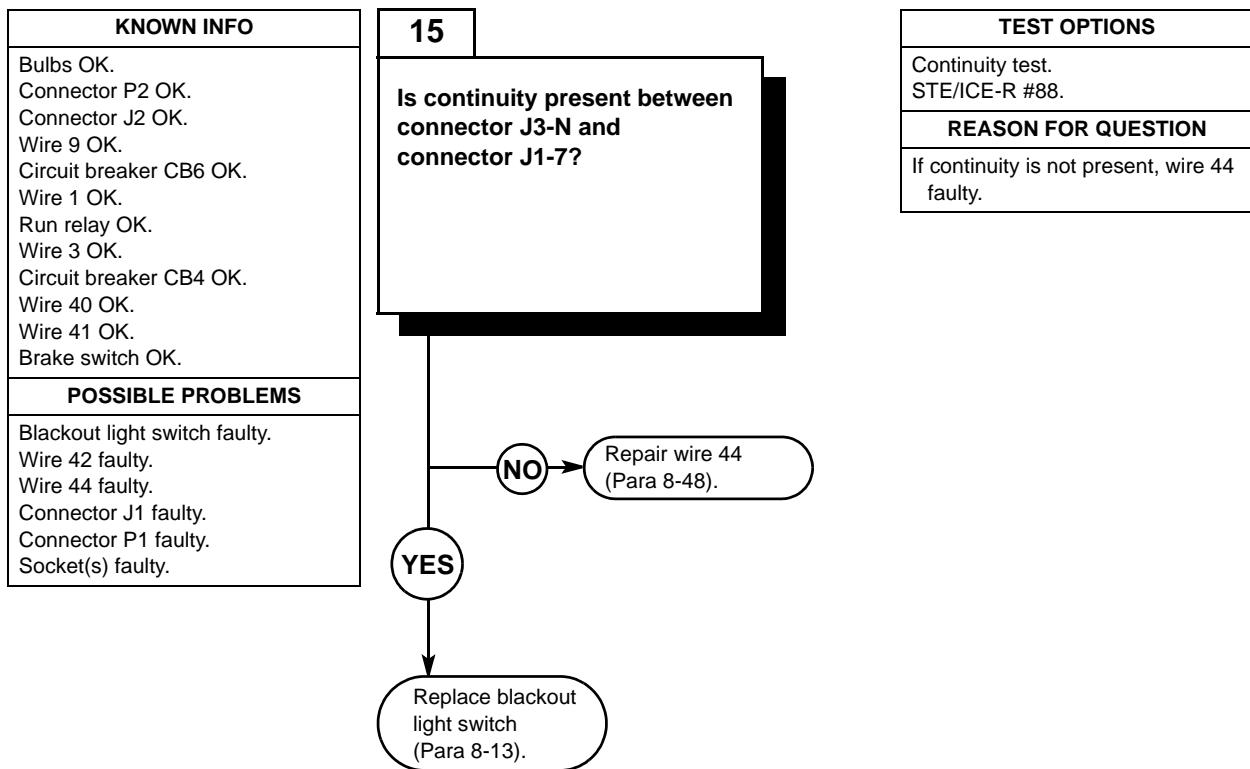
## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

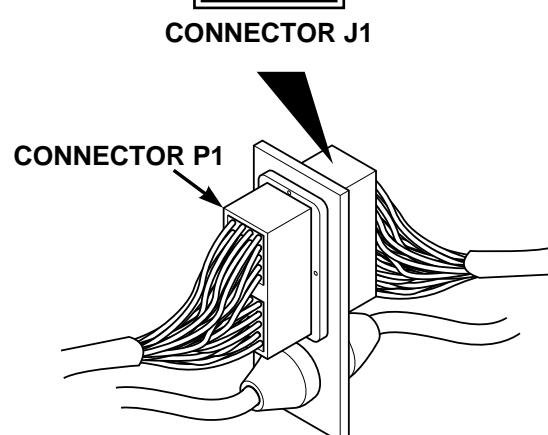
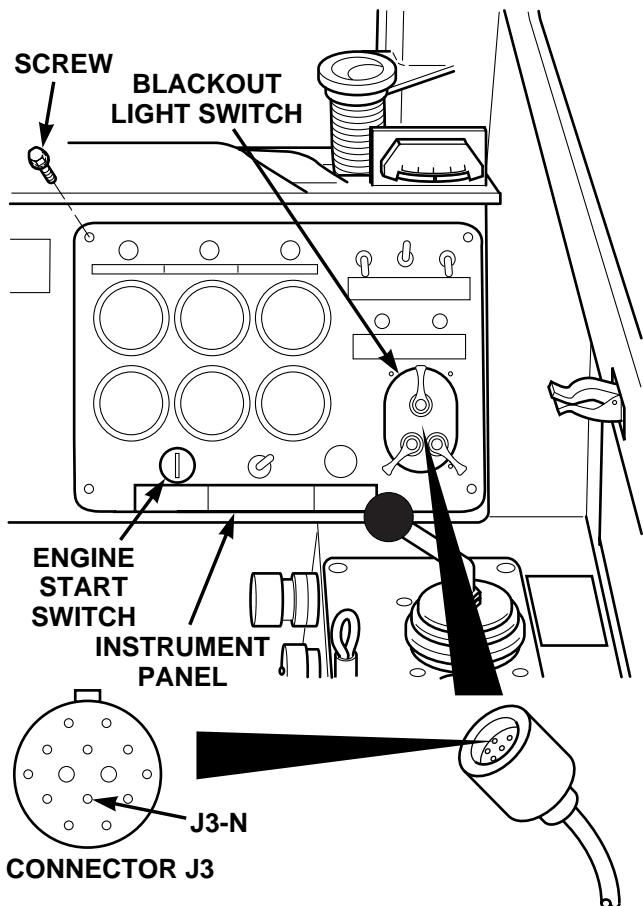
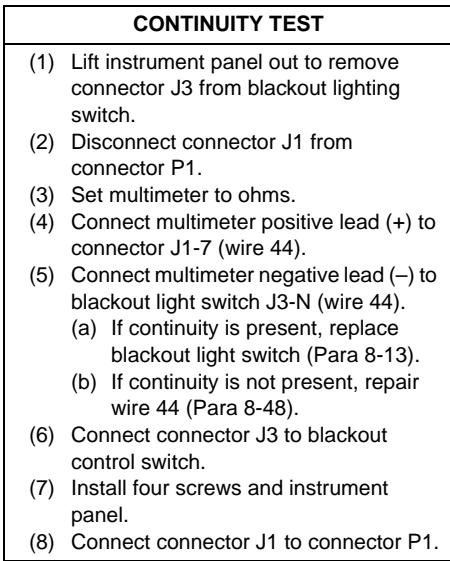


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect connector J1 from connector P1.
(3)	Connect multimeter positive lead (+) to connector J1-7 (wire 44).
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn blackout light switch to B. O. DRIVE position (TM 10-3930-673-10).
(8)	Depress brake pedal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 16 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 15 of this fault.</li> </ul>
(9)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(10)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(12)	Connect connector J1 to connector P1.

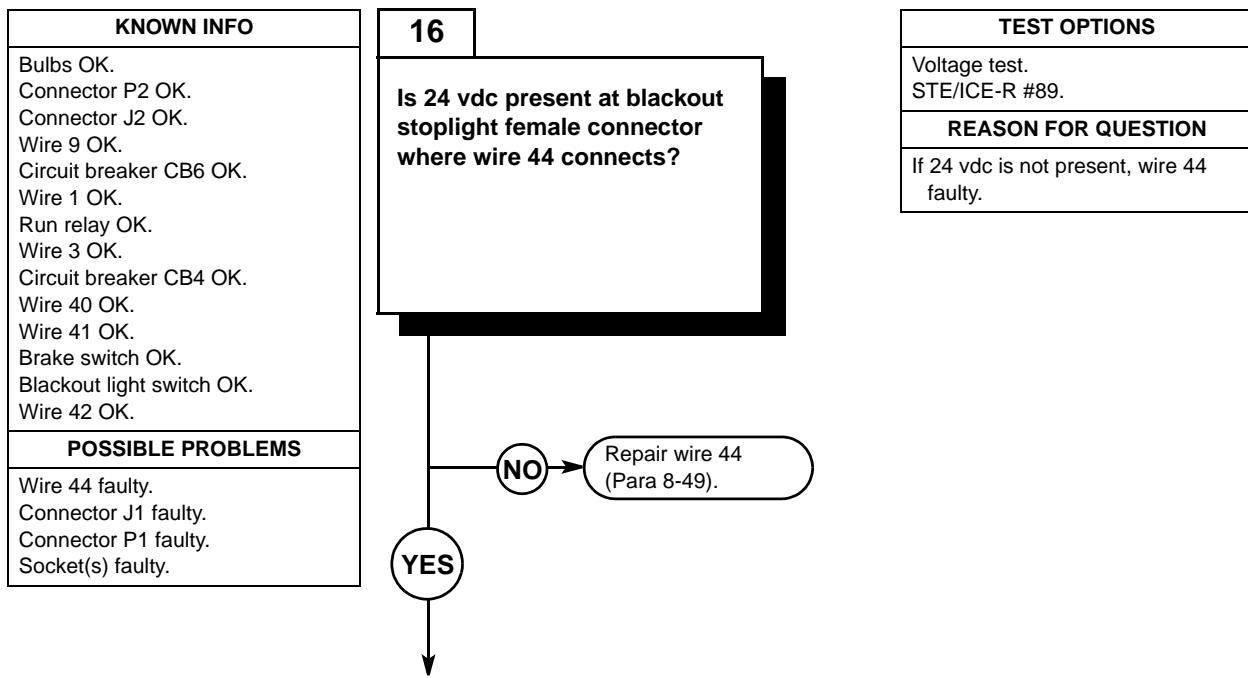
**CONNECTOR J1****CONNECTOR P1**

## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

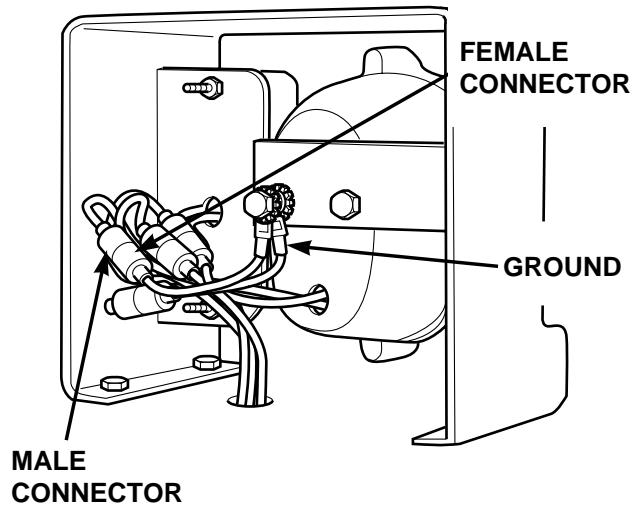
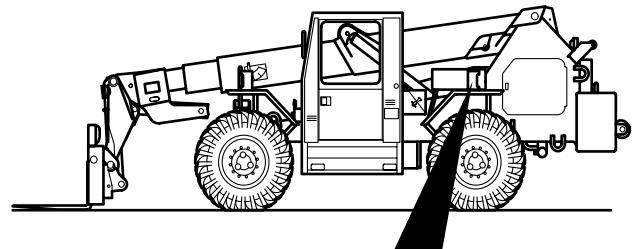




## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to blackout stop light female connector where wire 44 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn blackout light switch to B. O DRIVE position (TM 10-3930-673-10).
(7)	Depress brake pedal (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 17 of this fault.</li> <li>(b) If 24 vdc is not present, repair wire 44 (Para 8-49).</li> </ul>
(8)	Turn blackout light switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).

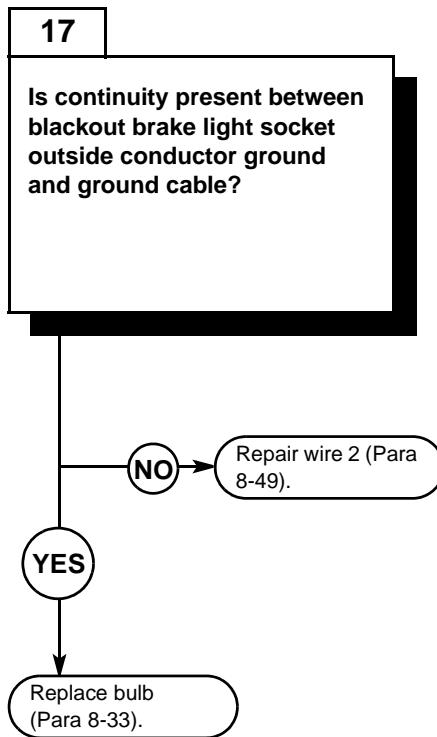


## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Wire 9 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Brake switch OK. Blackout light switch OK. Wire 42 OK. Wire 44 OK. Connector J1 OK. Connector P1 OK.

POSSIBLE PROBLEMS
Socket(s) faulty. Ground faulty.

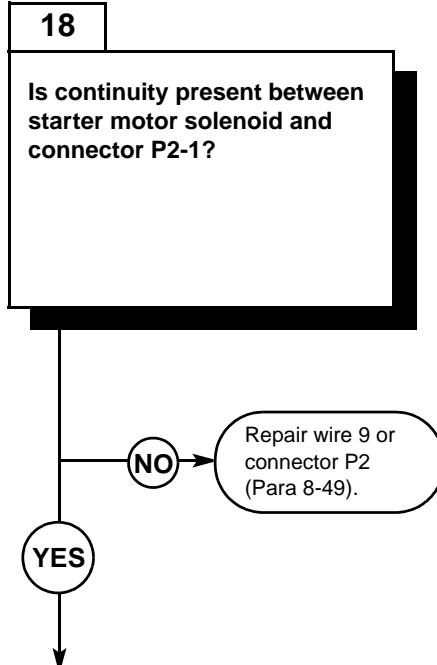


TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, wire 2 ground or brake light socket faulty.

KNOWN INFO
Bulbs OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB4 OK. Wire 40 OK. Wire 41 OK. Brake switch OK. Blackout light switch OK. Wire 42 OK. Wire 44 OK. Connector J1 OK. Connector P1 OK. Socket(s) OK.

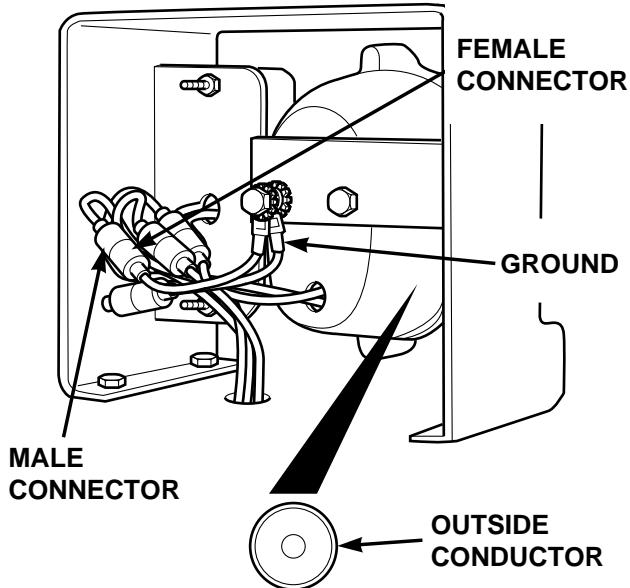
POSSIBLE PROBLEMS
Wire 9 faulty. Connector J2 faulty. Connector P2 faulty.



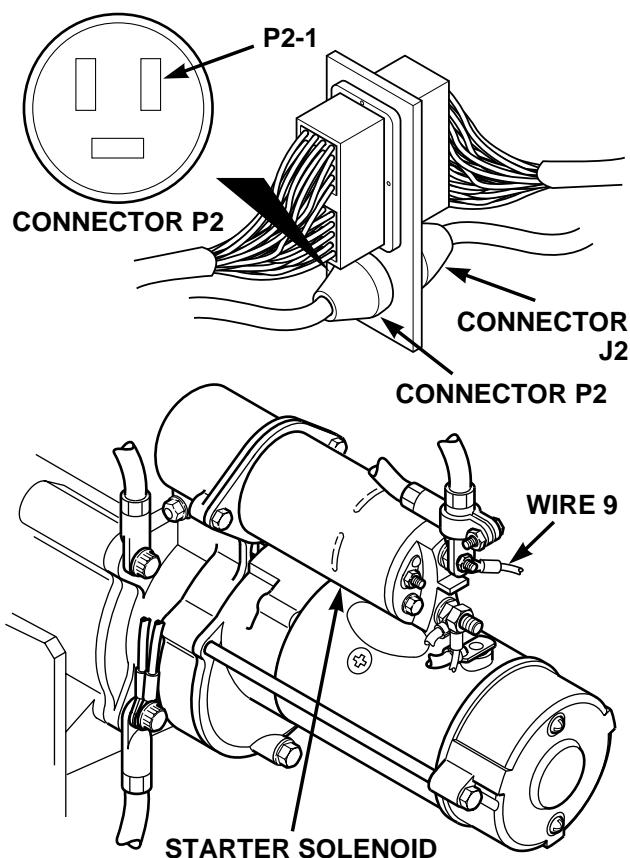
TEST OPTIONS
Continuity test. STE/ICE-R #88.
REASON FOR QUESTION
If continuity is not present, repair wire 9 or connector P2 (Para 8-49).

**CONTINUITY TEST**

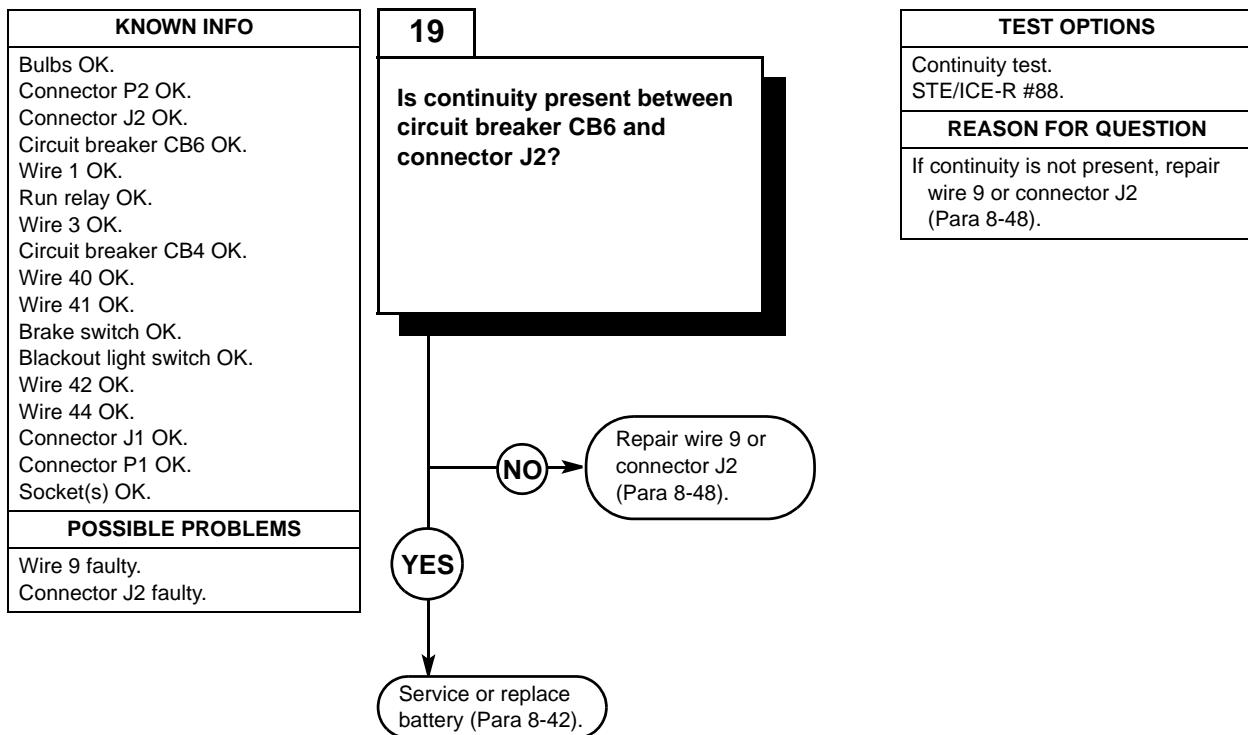
- (1) Disconnect ground female connector from male ground connector.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to ground outside conductor at brake light socket.
- (4) Connect multimeter negative lead (-) to ground cable.
  - (a) If continuity is present, replace bulb (Para 8-33).
  - (b) If continuity is not present, repair wire 2 (Para 8-49) or replace blackout brake light socket (Para 8-33).
- (5) Connect ground female connector to male ground connector.

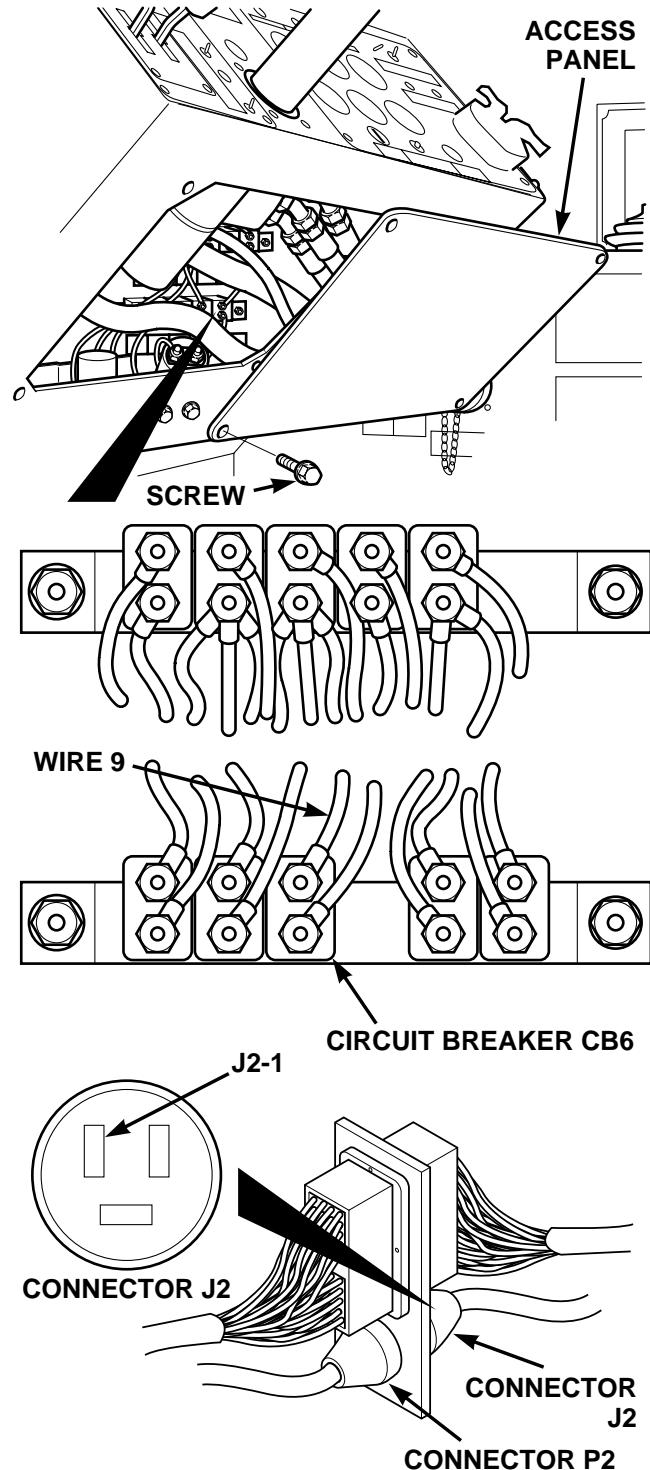
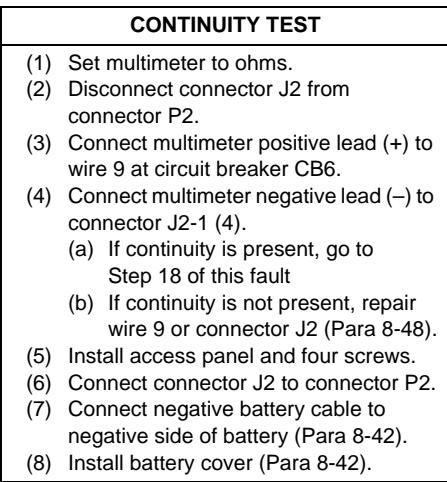
**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead (+) to wire 9 at starter motor solenoid.
- (4) Connect multimeter negative lead (-) to connector P2-1.
  - (a) If continuity is present, go to Step 19 of this fault.
  - (b) If continuity is not present, repair wire 9 or connector P2 (Para 8-49).
- (5) Connect connector J2 to connector P2.



## 19. BLACKOUT STOPLIGHTS DO NOT OPERATE (CONT.).





**20. PARKING BRAKE INDICATOR LIGHT DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

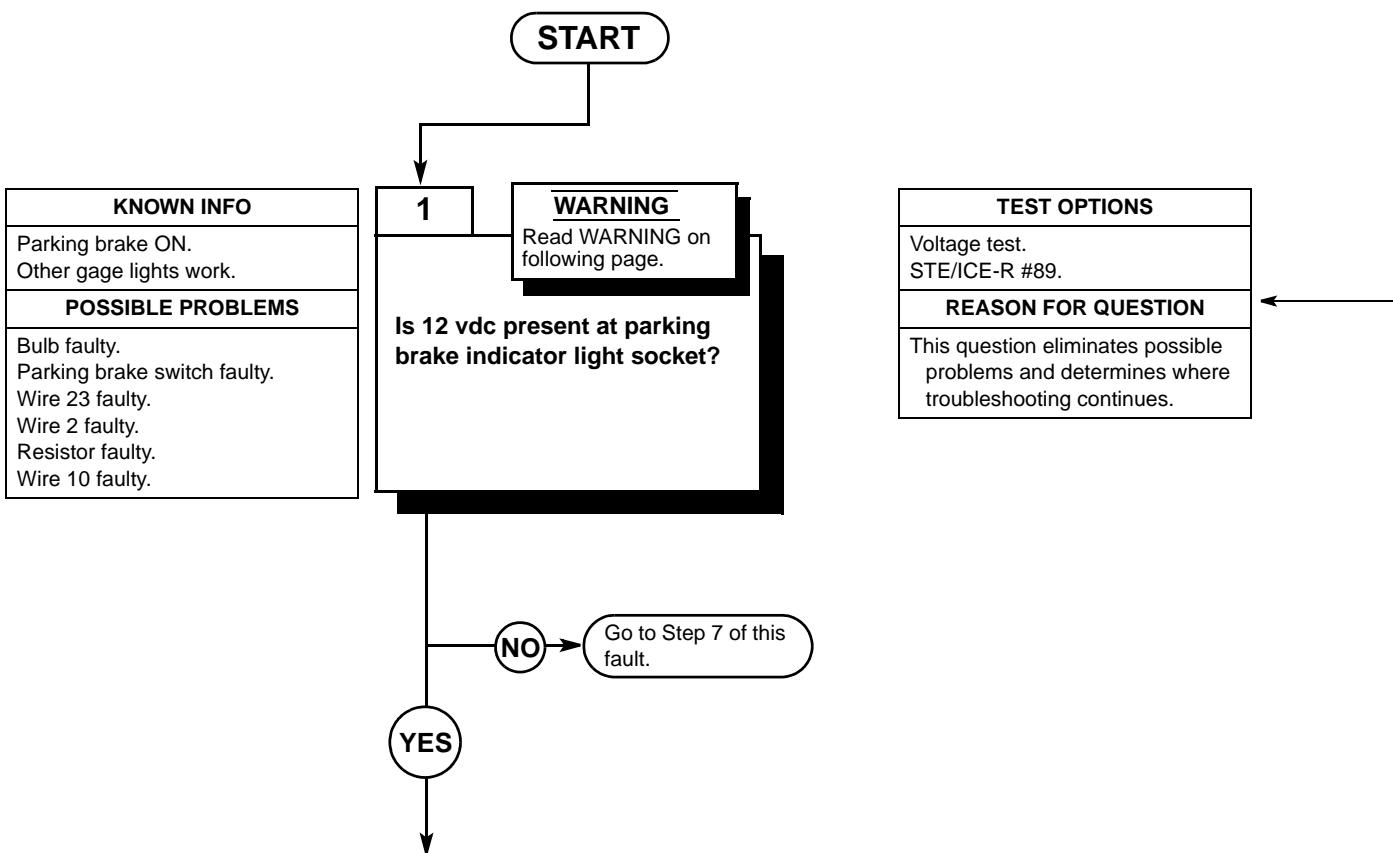
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

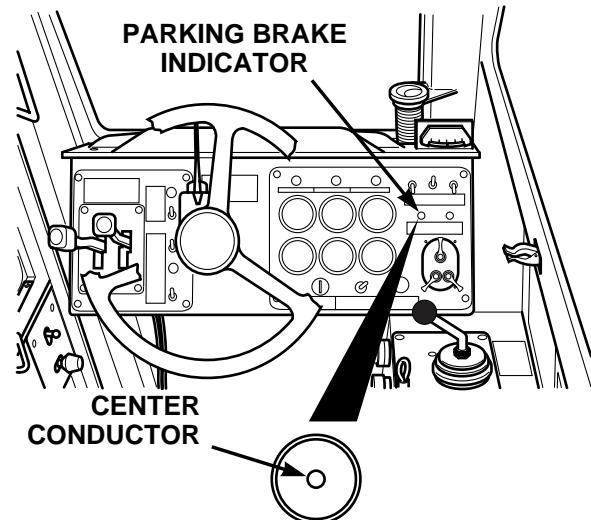
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove lens/bulb from parking brake indicator.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect multimeter positive lead (+) to center conductor of parking brake indicator light socket.
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 12 vdc is present, go to Step 2 of this fault.
(b)	If 12 vdc is not present, go to Step 7 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).



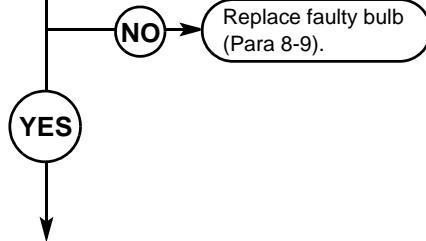
## 20. PARKING BRAKE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Parking brake ON. Other gage lights work.
POSSIBLE PROBLEMS
Bulb faulty. Parking brake switch faulty. Wire 23 faulty. Wire 2 faulty.

**2**

Is continuity present across parking brake lens/bulb?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, replace bulb.

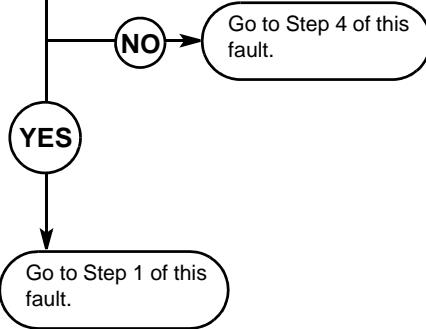


KNOWN INFO
Parking brake ON. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Parking brake switch faulty. Wire 23 faulty. Wire 2 faulty.

**3**

Is continuity present between parking brake indicator outside conductor and known good ground while parking brake switch is on?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
This question determines where troubleshooting continues.

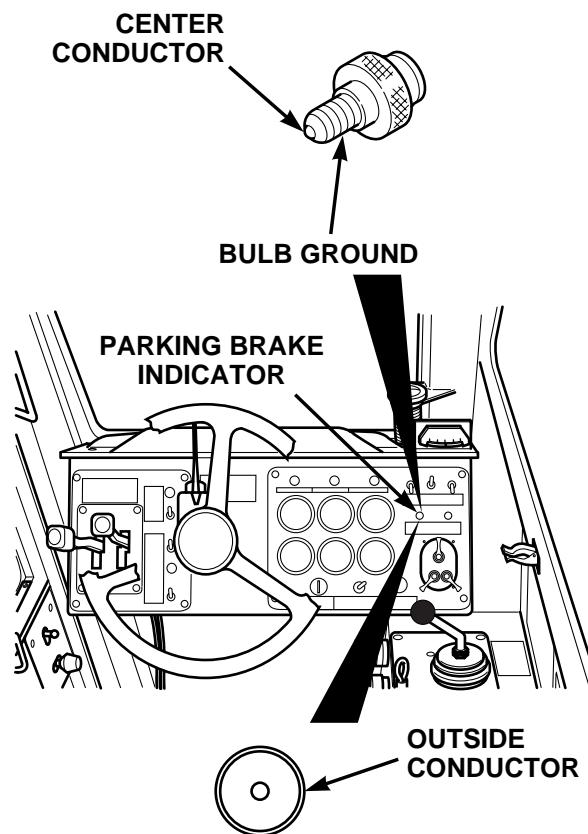


**CONTINUITY CHECK**

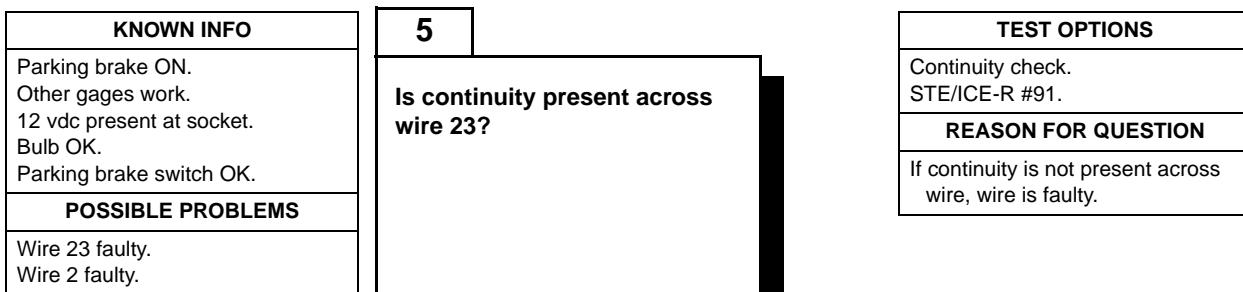
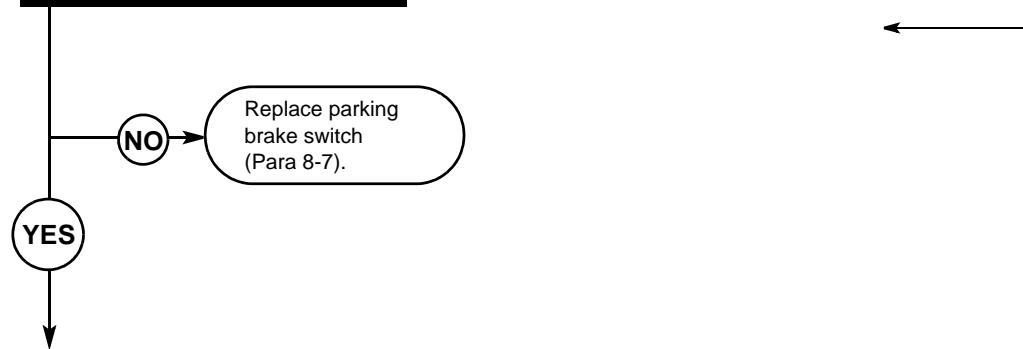
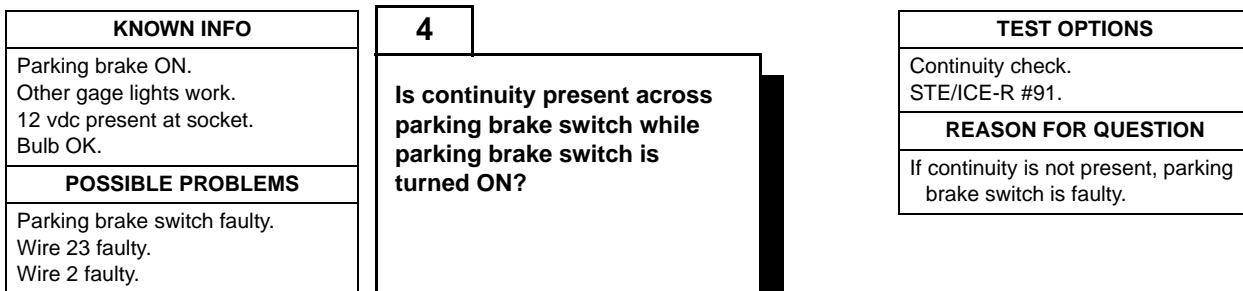
- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to center conductor of bulb.
- (3) Connect multimeter negative lead (-) to bulb ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace lens/bulb (Para 8-9).

**CONTINUITY CHECK**

- (1) Turn parking brake switch ON.
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to outside conductor of parking brake indicator.
- (4) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, replace lens/bulb (Para 8-9).
  - (b) If continuity is not present, go to Step 4 of this fault.



## 20. PARKING BRAKE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

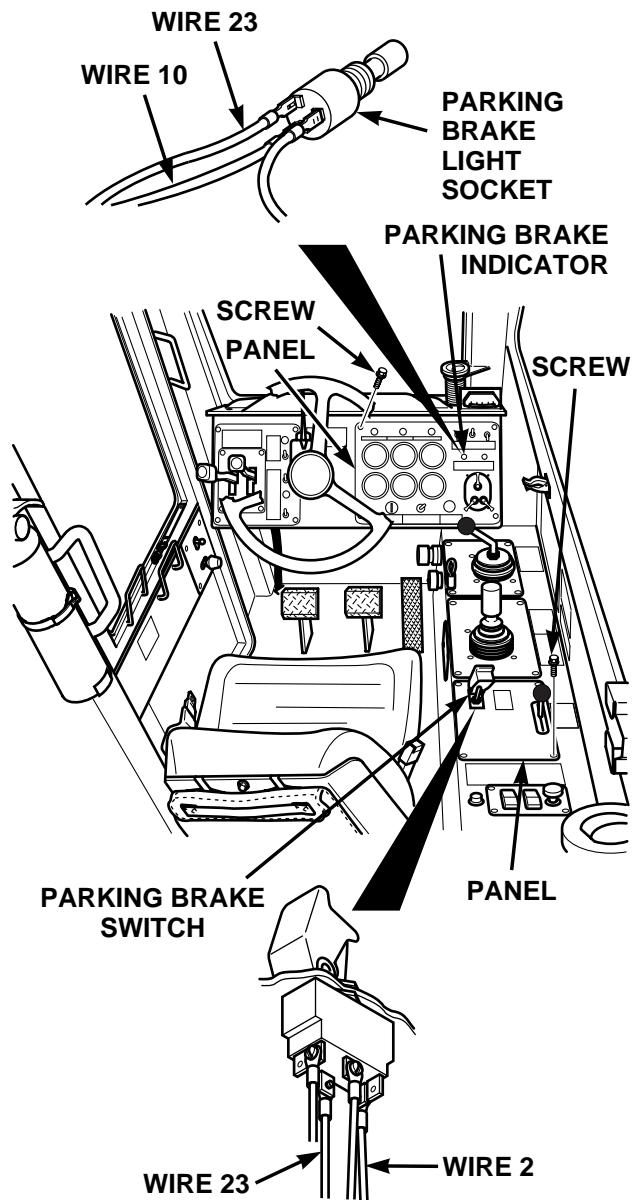


**CONTINUITY CHECK**

- (1) Remove four screws and panel.
- (2) Turn parking brake switch ON.
- (3) Connect multimeter positive lead (+) to wire 23 at parking brake switch terminal.
- (4) Connect multimeter negative (-) lead to wire 2 at parking brake switch terminal.
  - (a) If continuity is not present, replace parking brake switch (Para 8-7).
  - (b) If continuity is present, go to Step 5 of this fault.

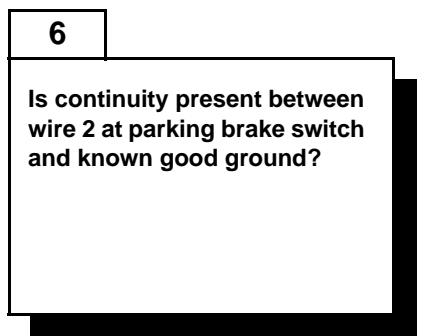
**CONTINUITY CHECK**

- (1) Remove four screws and panel.
- (2) Connect multimeter positive lead (+) to wire 23 at parking brake indicator terminal.
- (3) Connect multimeter negative lead (-) to wire 23 at parking brake light switch terminal.
  - (a) If continuity is not present, replace wire 23 (Para 8-48).
  - (b) If continuity is present, go to Step 6 of this fault.



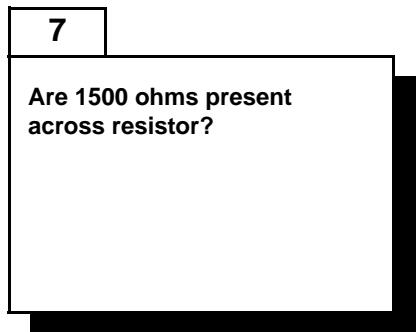
## 20. PARKING BRAKE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Parking brake ON. Other gages work. 12 vdc present at socket. Bulb OK. Parking brake switch OK. Wire 23 OK.
POSSIBLE PROBLEMS
Wire 2 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire is faulty.

KNOWN INFO
Parking brake ON. Other gages work. 12 vdc not measured at socket.
POSSIBLE PROBLEMS
Resistor faulty. Wire 10 faulty.



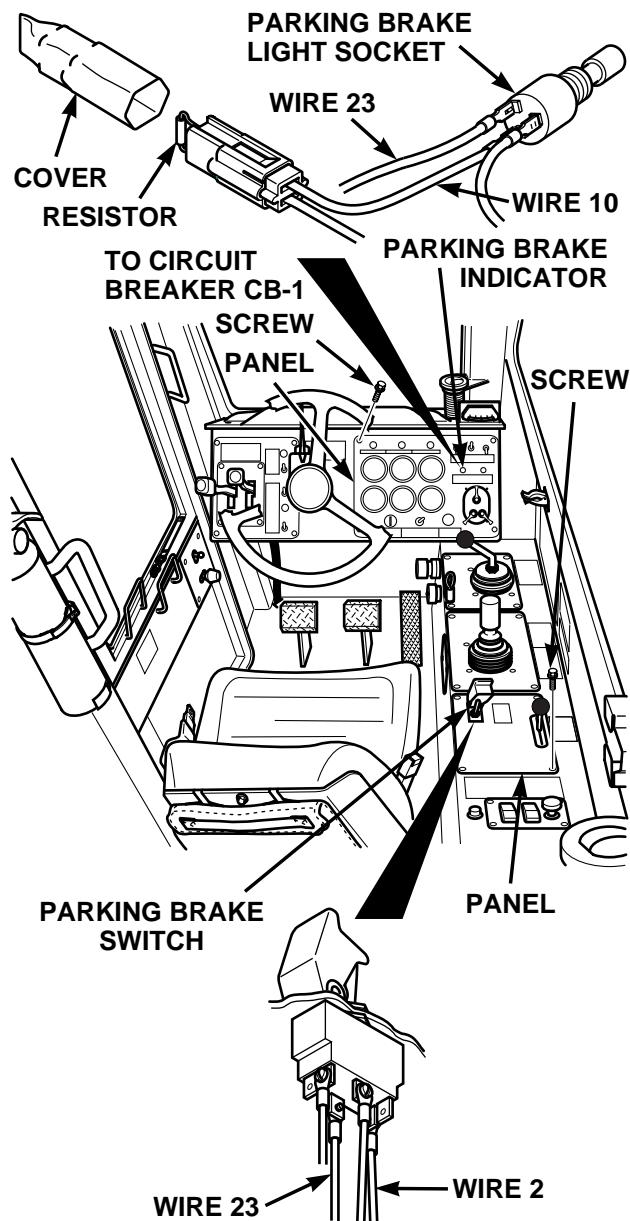
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If 1500 ohms are not measured, resistor is faulty.

**CONTINUITY CHECK**

- (1) Connect multimeter positive lead (+) to wire 2 at parking brake switch terminal.
- (2) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is not present, repair or replace wire 2 (Para 8-48).
  - (b) If continuity is present, repeat Step 3 through Step 6 of this fault.

**RESISTANCE TEST**

- (1) Remove cover and disconnect resistor from connector.
- (2) Attach multimeter positive lead (+) to resistor at circuit breaker side.
- (3) Attach multimeter negative lead (-) to resistor at light side.
  - (a) If 1500 ohms resistance is measured, replace wire 10 (Para 8-48).
  - (b) If 1500 ohms resistance is not measured, replace resistor (Para 8-9).



**21. LOW BRAKE PRESSURE INDICATOR LIGHT DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

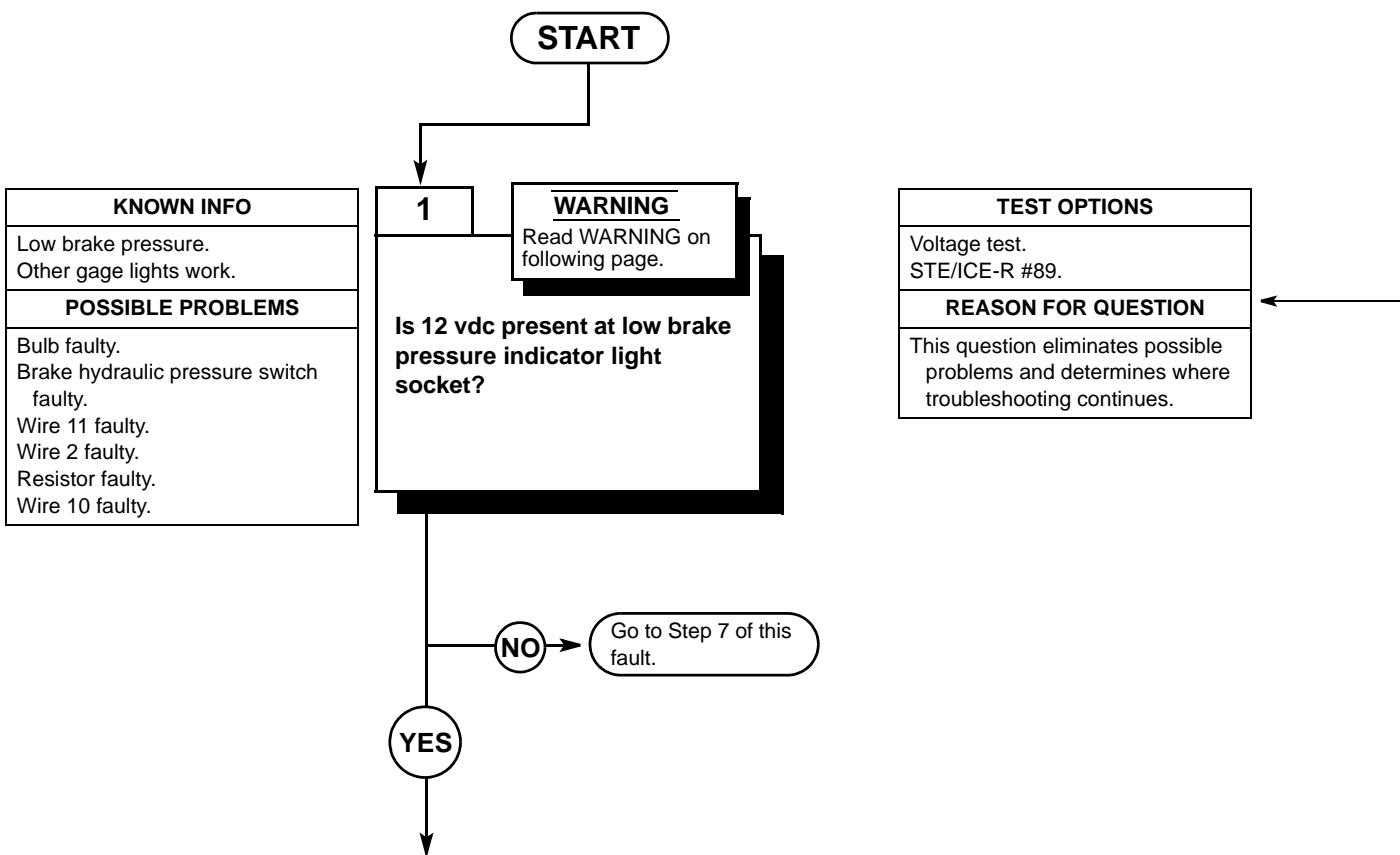
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

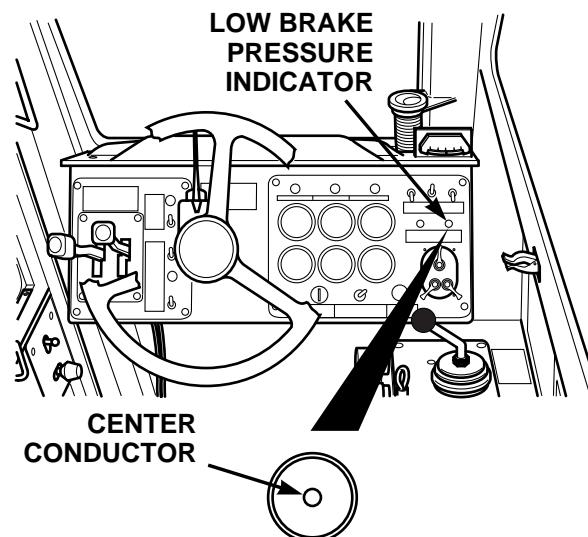
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



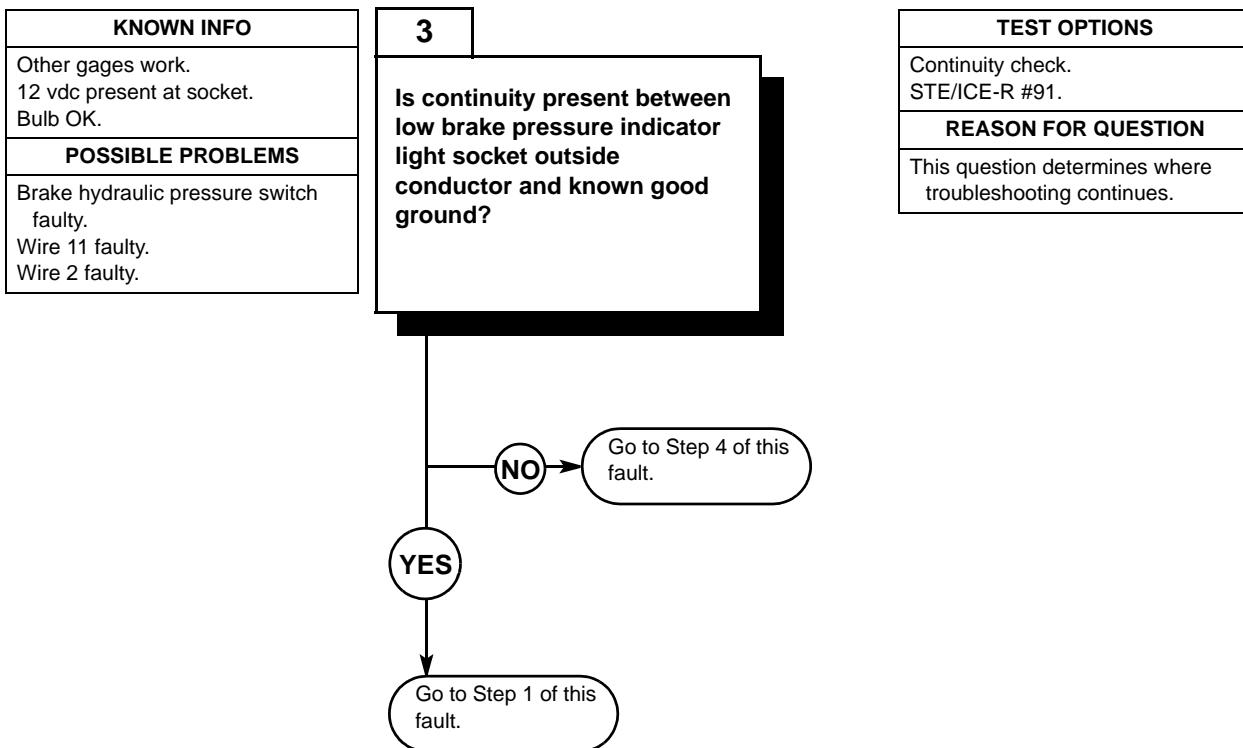
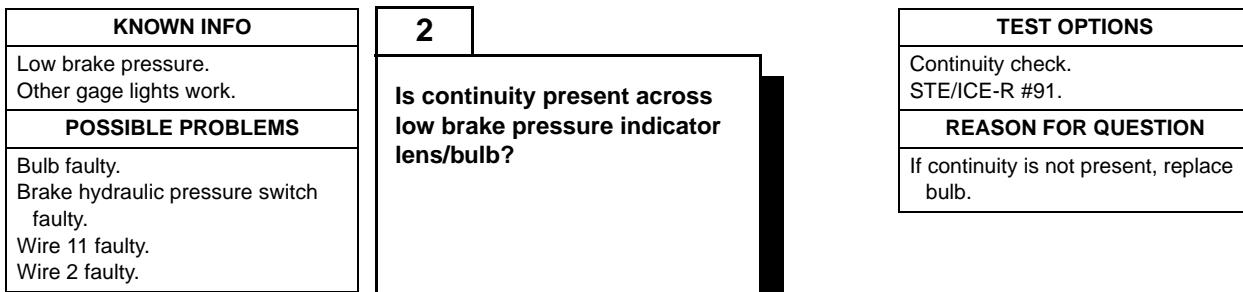
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove lens/bulb from low brake pressure indicator.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter negative lead (−) to known good ground.
(4)	Connect multimeter positive lead (+) to center conductor of low brake pressure indicator light socket.
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 12 vdc is present, go to Step 2 of this fault.
(b)	If 12 vdc is not present, go to Step 7 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).

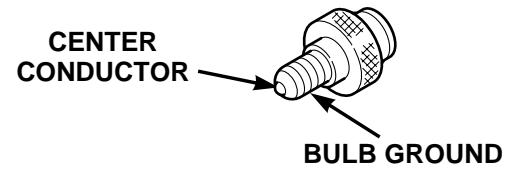


## 21. LOW BRAKE PRESSURE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

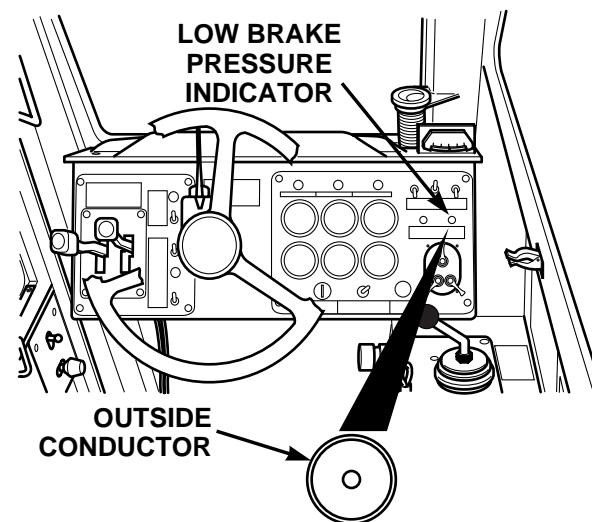


**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to center conductor of bulb.
- (3) Connect multimeter negative lead (-) to bulb ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace bulb (Para 8-9).

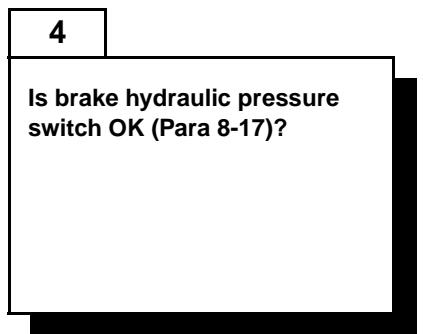
**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to outside conductor of low brake pressure indicator light socket.
- (3) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, replace lens/bulb (Para 8-9).
  - (b) If continuity is not present, go to Step 4 of this fault.

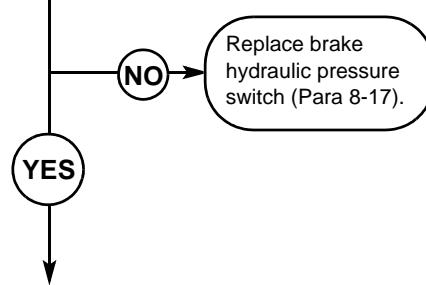


## 21. LOW BRAKE PRESSURE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

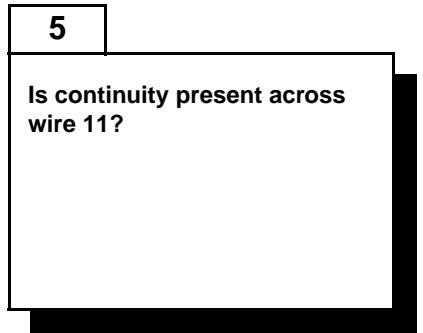
KNOWN INFO
Low brake pressure. Other gage lights work. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Brake hydraulic pressure switch faulty. Wire 11 faulty. Wire 2 faulty.



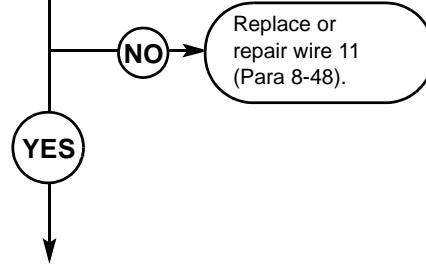
TEST OPTIONS
Brake Hydraulic Pressure Switch Test (Para 8-17)
REASON FOR QUESTION
If continuity is not present, parking brake switch is faulty.



KNOWN INFO
Low brake pressure. Other gages work. 12 vdc present at socket. Bulb OK. Brake hydraulic pressure switch OK.
POSSIBLE PROBLEMS
Wire 11 faulty. Wire 2 faulty.

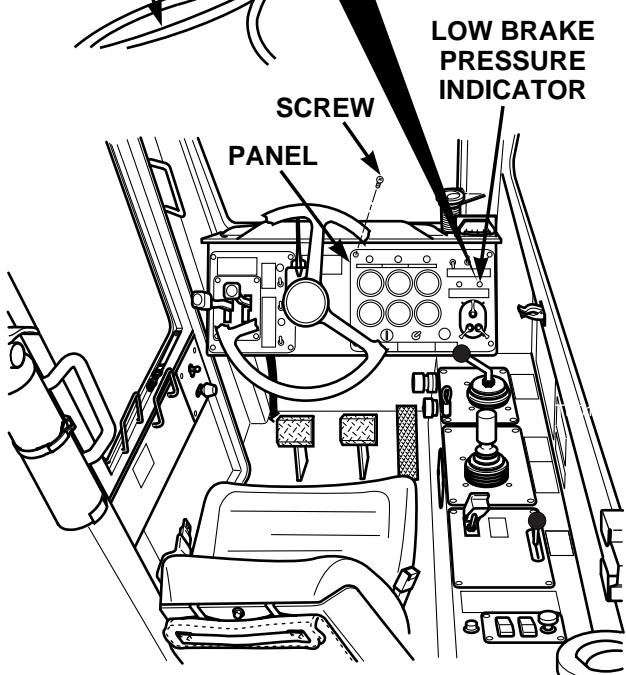
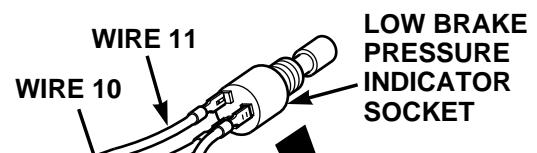
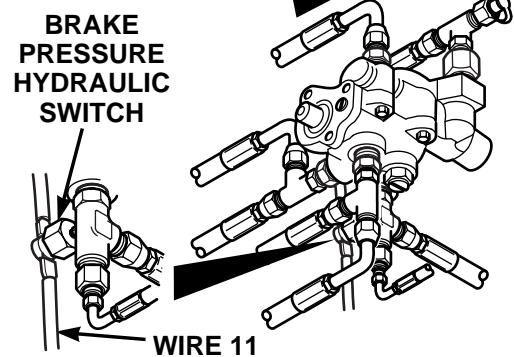
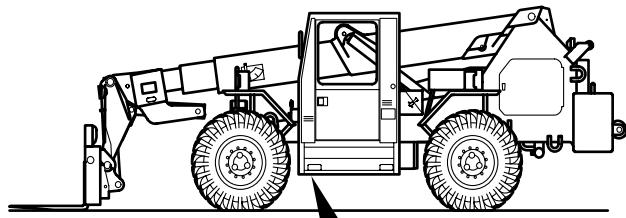


TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present across wire, wire is faulty.



BRAKE HYDRAULIC PRESSURE SWITCH TEST
---

Refer to Paragraph 8-17.

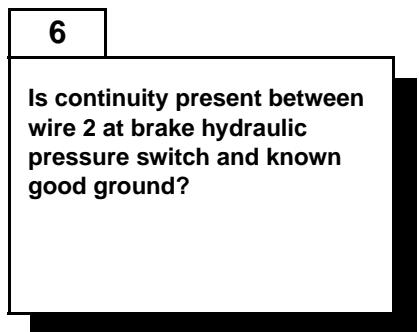


CONTINUITY CHECK
------------------

- (1) Connect multimeter positive lead (+) to wire 11 at brake hydraulic pressure switch.
- (2) Connect multimeter negative lead (-) to wire 11 at low brake pressure indicator light.
  - (a) If continuity is not present, replace wire 11 (Para 8-48).
  - (b) If continuity is present, go to Step 6 of this fault.

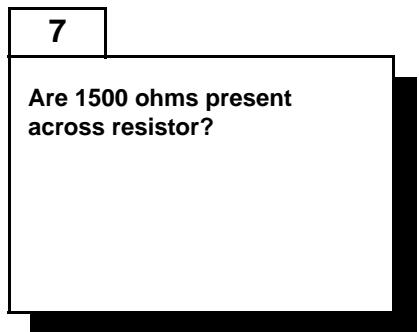
## 21. LOW BRAKE PRESSURE INDICATOR LIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
Low brake pressure. Other gages work. 12 vdc present at socket. Bulb OK. Brake hydraulic pressure switch OK. Wire 11 OK.
POSSIBLE PROBLEMS
Wire 2 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire is faulty.

KNOWN INFO
Low brake pressure. Other gages work. 12 vdc not measured at socket.
POSSIBLE PROBLEMS
Resistor faulty. Wire 10 faulty.



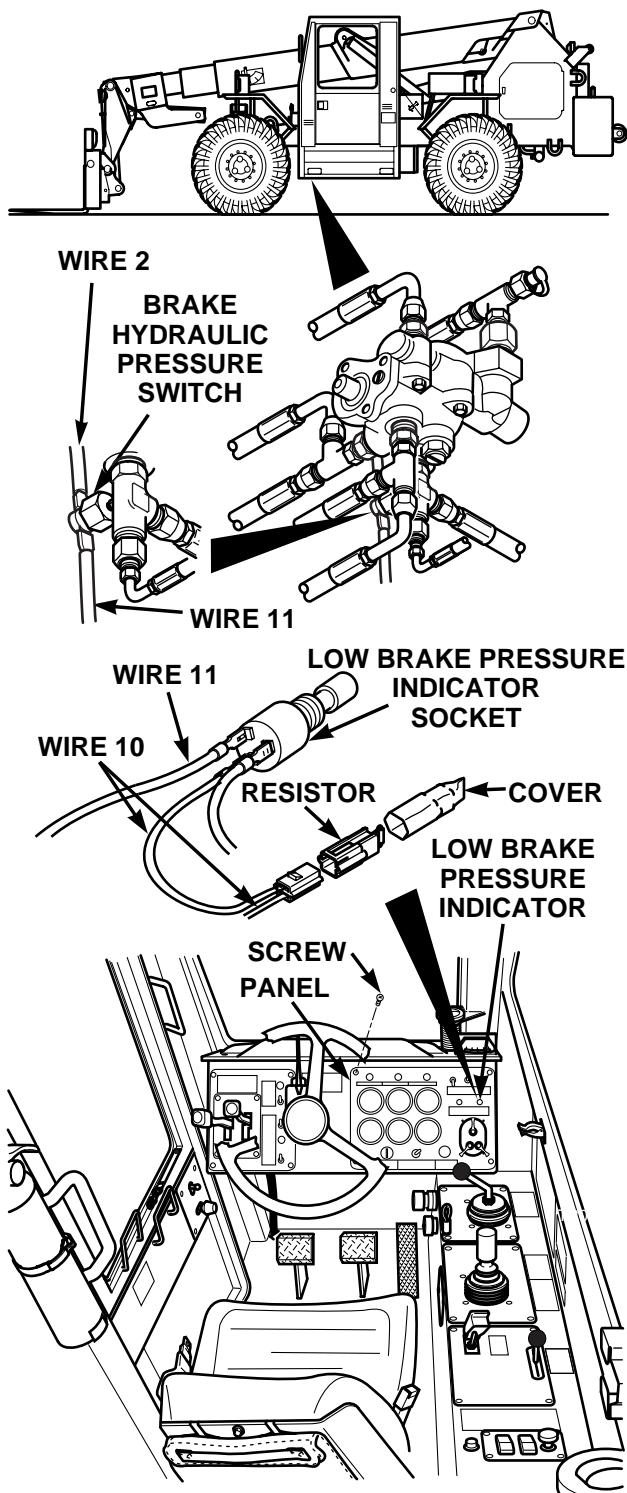
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If 1500 ohms are not measured, resistor is faulty.

**CONTINUITY CHECK**

- (1) Connect multimeter positive lead (+) to wire 2 at brake hydraulic pressure switch terminal.
- (2) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is not present, repair or replace wire 2 (Para 8-48).
  - (b) If continuity is present, repeat Step 3 through Step 6 of this fault.

**RESISTANCE TEST**

- (1) Remove cover and disconnect resistor from connector.
- (2) Attach multimeter positive lead (+) to resistor at circuit breaker side.
- (3) Attach multimeter negative lead (-) to resistor at light side.
  - (a) If 1500 ohms resistance is measured, replace wire 10 (Para 8-48).
  - (b) If 1500 ohms resistance is not measured, replace resistor (Para 8-9).



**22. HIGH WATER TEMP INDICATOR LIGHT DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

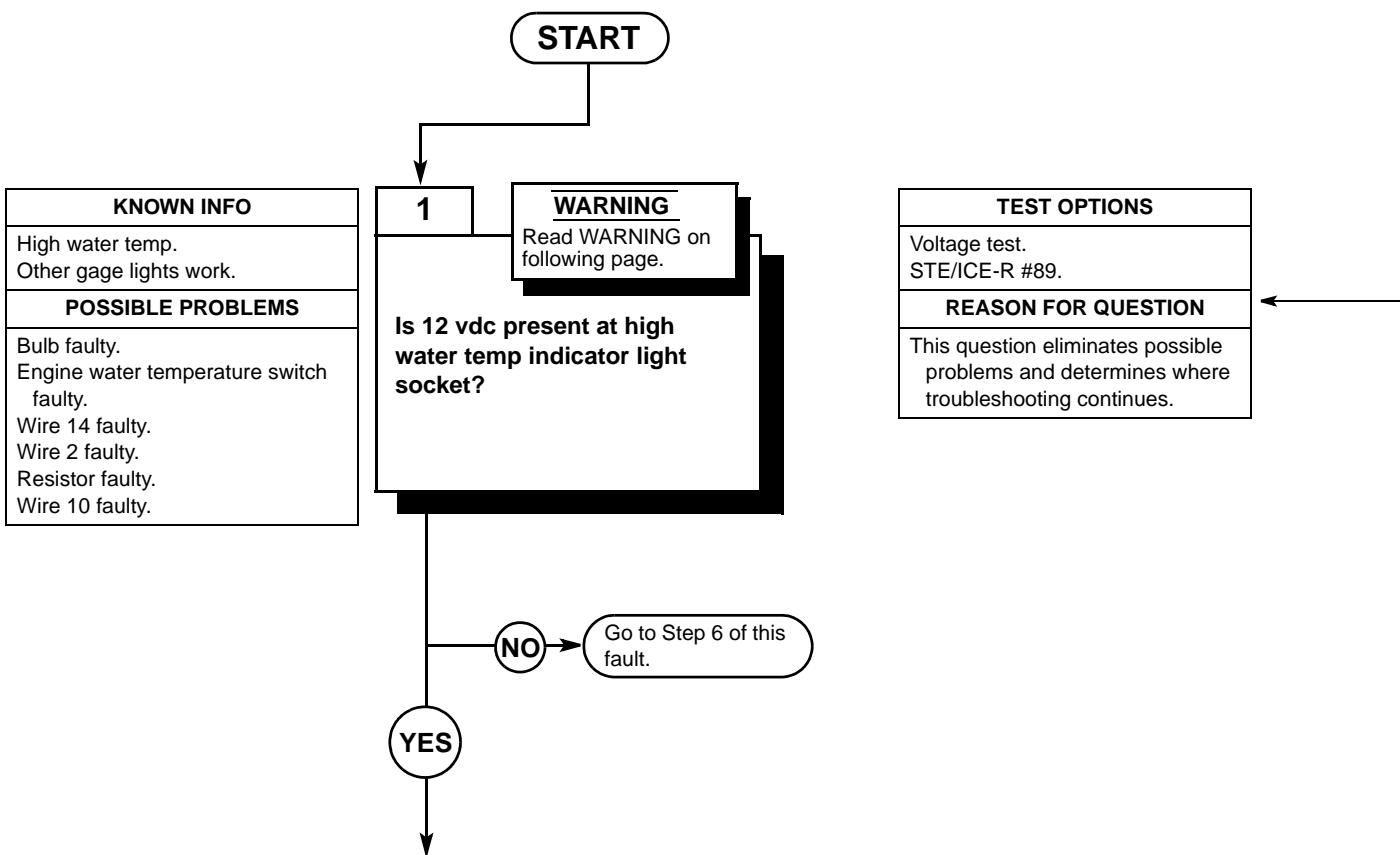
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

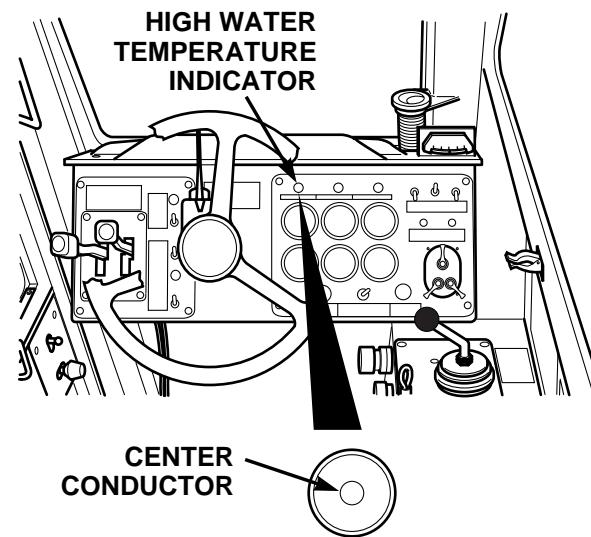
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove lens/bulb from high water temp indicator.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect multimeter positive lead (+) to center conductor of high water temp indicator light socket.
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 12 vdc is present, go to Step 2 of this fault.
(b)	If 12 vdc is not present, go to Step 6 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).



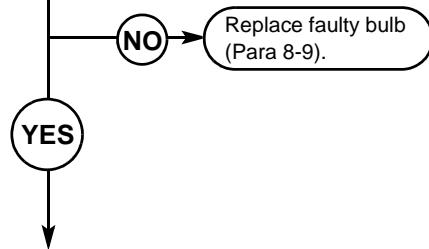
## 22. HIGH WATER TEMP INDICATOR LIGHT DOES NOT OPERATE (CONT.).

KNOWN INFO
High water temp. Other gage lights work.
POSSIBLE PROBLEMS
Bulb faulty. Engine water temperature switch faulty. Wire 14 faulty. Wire 2 faulty.

**2**

Is continuity present across high water temp indicator lens/bulb?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, replace bulb.

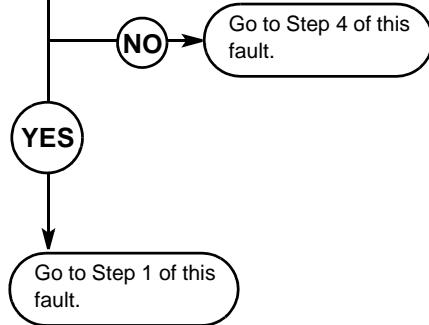


KNOWN INFO
High water temp. Other gages work. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Engine water temperature switch faulty. Wire 14 faulty. Wire 2 faulty.

**3**

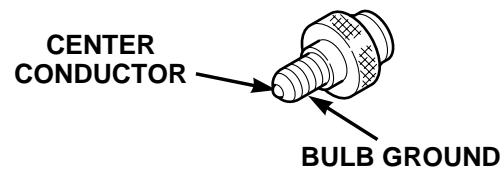
Is continuity present between high water temp indicator light socket outside conductor and known good ground while parking brake switch is on?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
This question determines where troubleshooting continues.

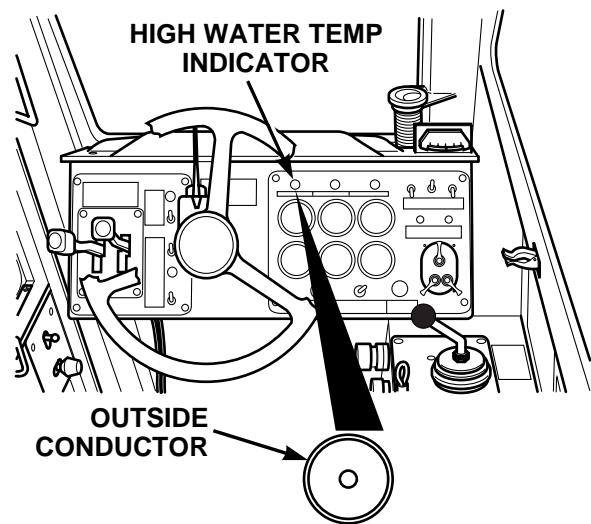


**CONTINUITY CHECK**

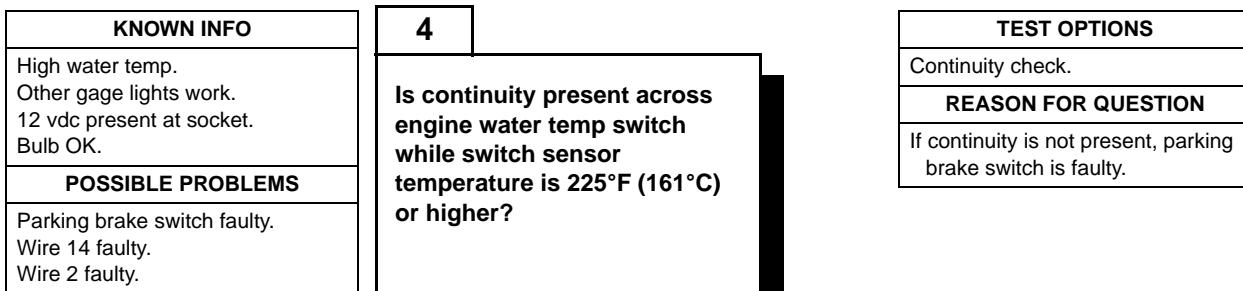
- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to center conductor of bulb.
- (3) Connect multimeter negative lead (-) to bulb ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace lens/bulb (Para 8-9).

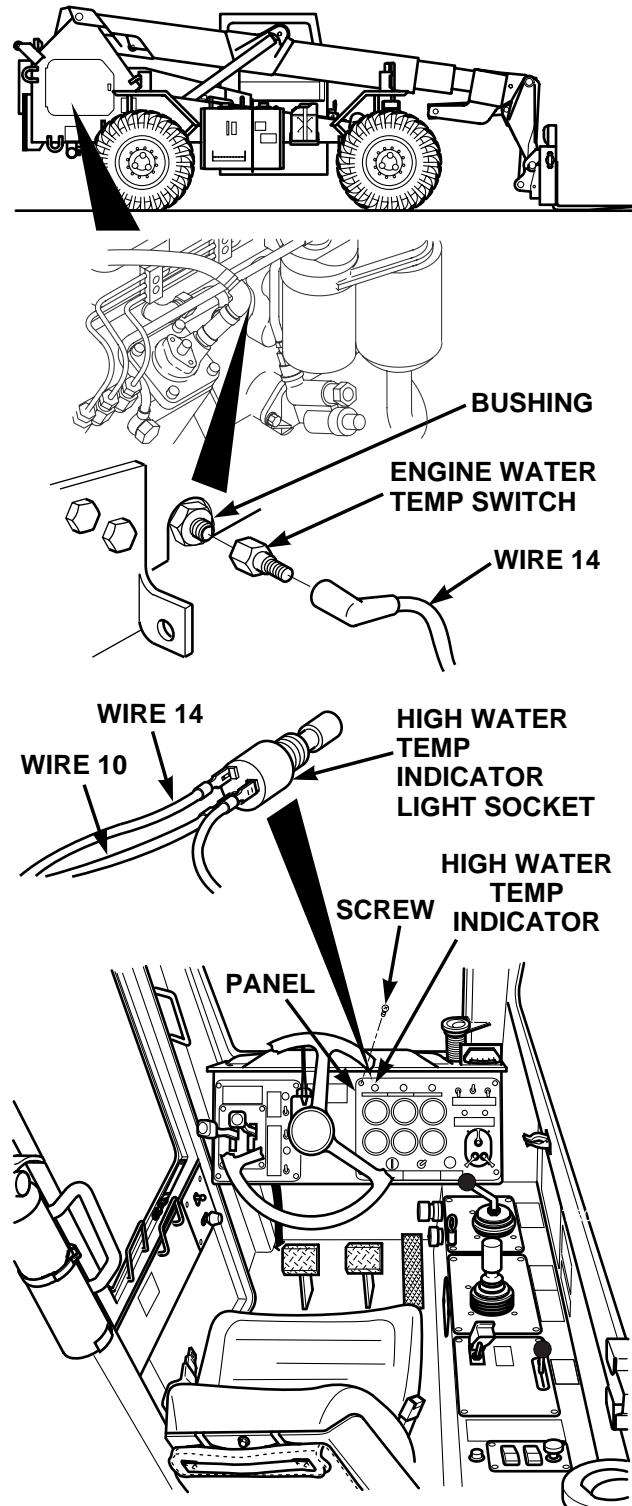
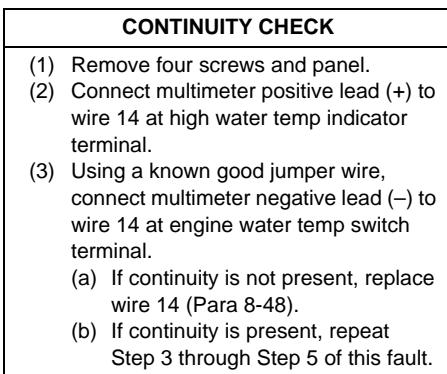
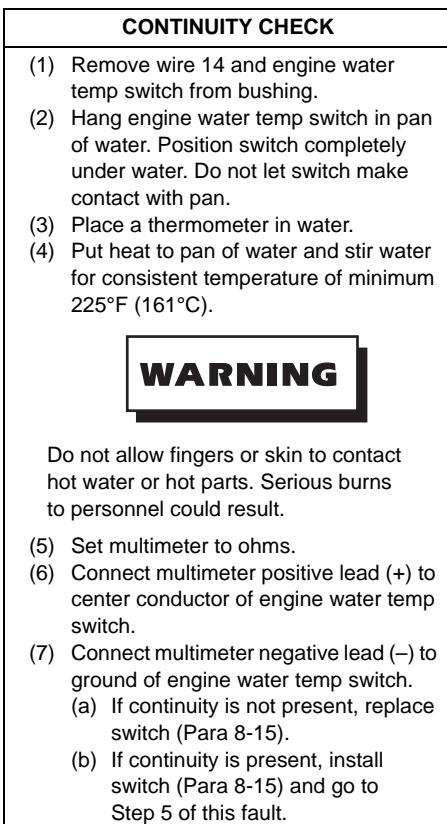
**VOLTAGE TEST**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to outside conductor of high water temp indicator.
- (3) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, replace lens/bulb (Para 8-9).
  - (b) If continuity is not present, go to Step 4 of this fault.

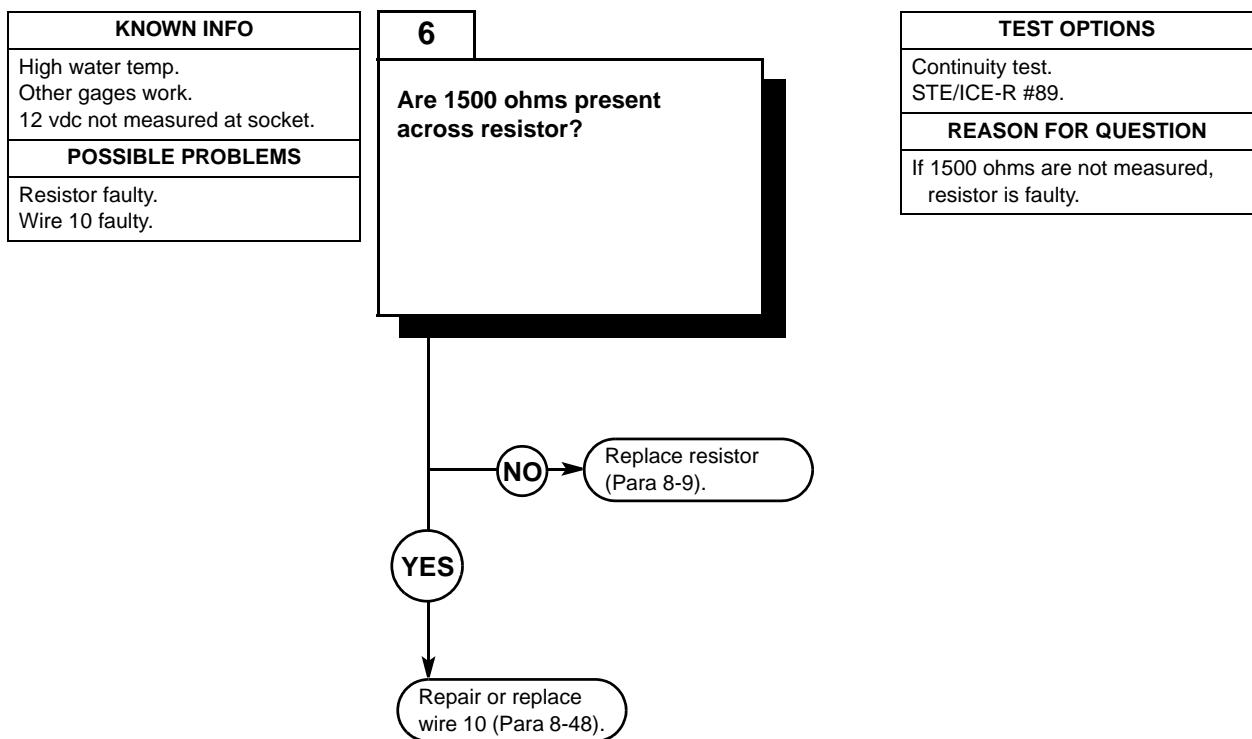


## 22. HIGH WATER TEMP INDICATOR LIGHT DOES NOT OPERATE (CONT.).



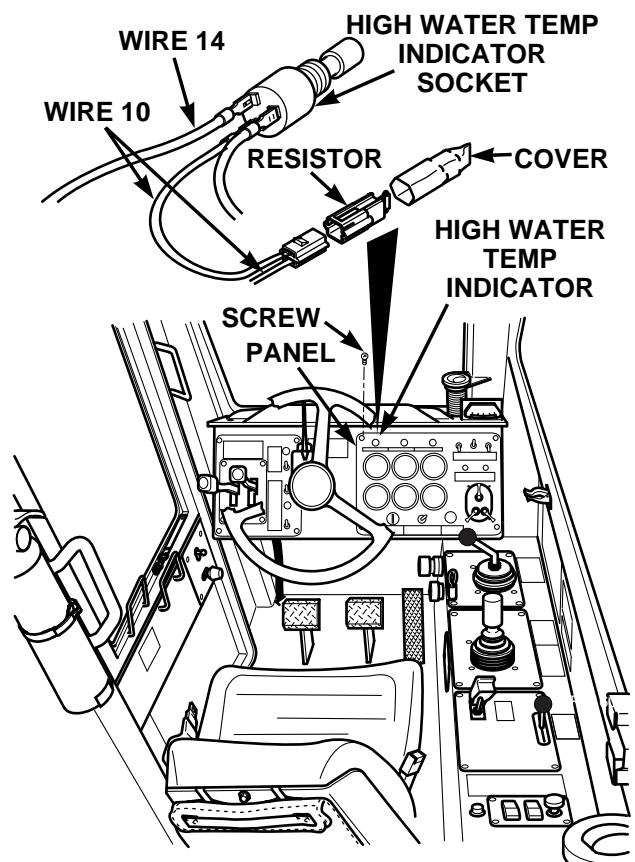


## 22. HIGH WATER TEMP INDICATOR LIGHT DOES NOT OPERATE (CONT).



**RESISTANCE CHECK**

- (1) Remove cover and disconnect resistor from connector.
- (2) Attach multimeter positive lead (+) to resistor at circuit breaker side.
- (3) Attach multimeter negative lead (-) to resistor at light side.
  - (a) If 1500 ohms resistance is measured, replace wire 10 (Para 8-48).
  - (b) If 1500 ohms resistance is not measured, replace resistor (Para 8-9).



**23. LOW OIL PRESSURE INDICATOR DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

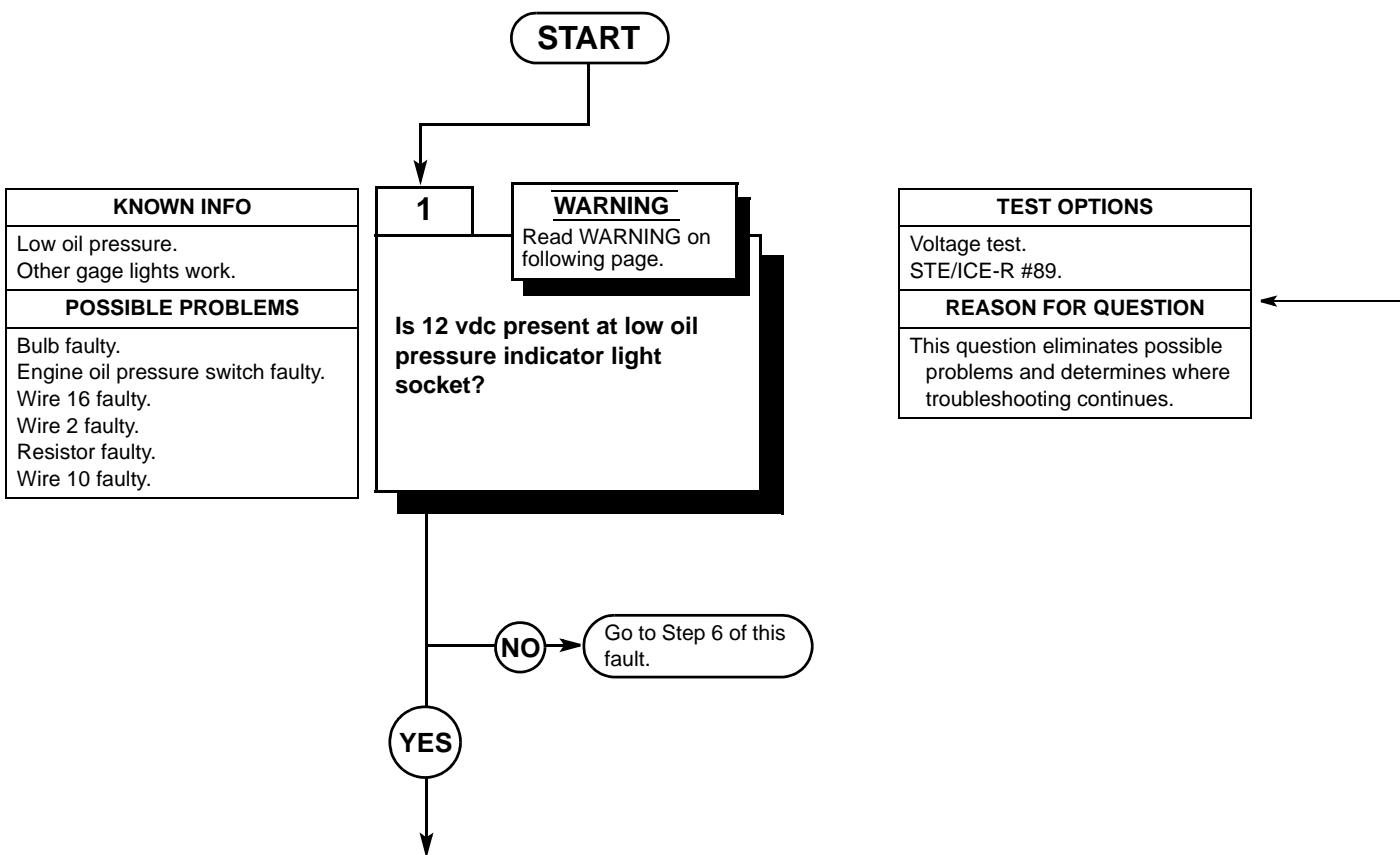
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

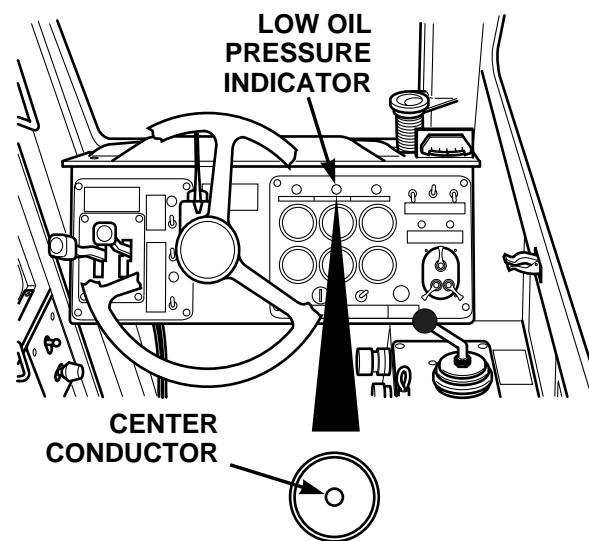
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove lens/bulb from low oil pressure indicator.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter negative lead (–) to known good ground.
(4)	Connect multimeter positive lead (+) to center conductor of low oil pressure indicator light socket.
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 12 vdc is present, go to Step 2 of this fault.
(b)	If 12 vdc is not present, go to Step 6 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).



## 23. LOW OIL PRESSURE INDICATOR DOES NOT OPERATE (CONT.).

KNOWN INFO
Low oil pressure. Other gage lights work.
POSSIBLE PROBLEMS
Bulb faulty. Engine oil pressure switch faulty. Wire 16 faulty. Wire 2 faulty.

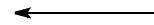
**2**

Is continuity present across low oil pressure lens/bulb?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, replace bulb.

NO → Replace faulty bulb  
(Para 8-9).

YES



KNOWN INFO
Low oil pressure. Other gages work. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Engine oil pressure switch faulty. Wire 16 faulty. Wire 2 faulty.

**3**

Is continuity present between low oil pressure indicator light socket outside conductor and known good ground?

TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
This question determines where troubleshooting continues.

NO → Go to Step 4 of this fault.

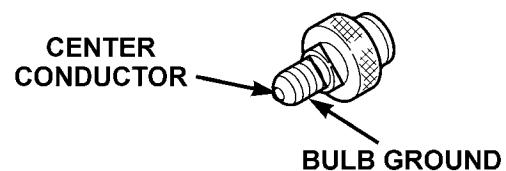
YES



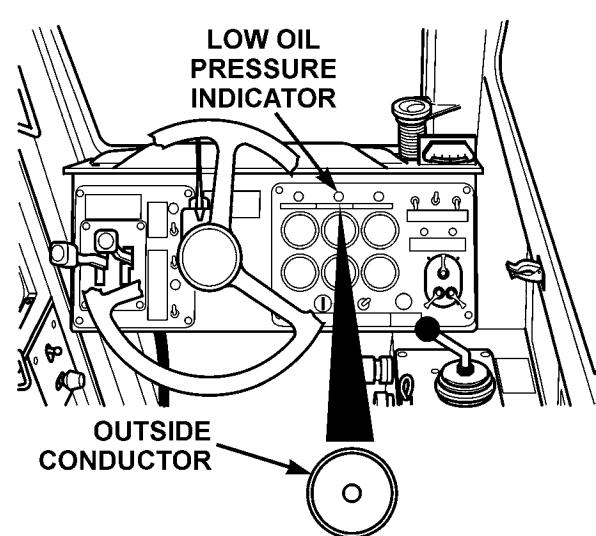
Go to Step 1 of this fault.

**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to center conductor of bulb.
- (3) Connect multimeter negative lead (-) to bulb ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace bulb (Para 8-9).

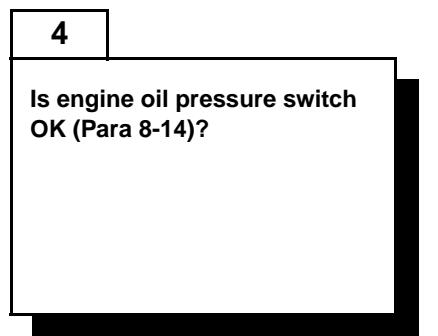
**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to outside conductor of low oil pressure indicator.
- (3) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, replace lens/bulb (Para 8-9).
  - (b) If continuity is not present, go to Step 4 of this fault.



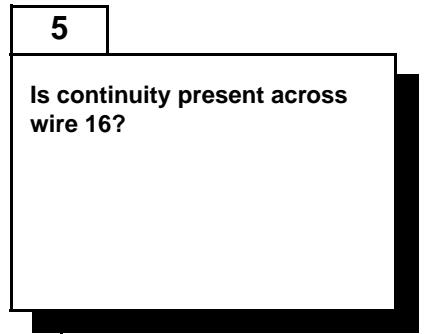
## 23. LOW OIL PRESSURE INDICATOR DOES NOT OPERATE (CONT.).

KNOWN INFO
Low oil pressure. Other gage lights work. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Parking brake switch faulty. Wire 16 faulty. Wire 2 faulty.



TEST OPTIONS
Engine oil pressure switch test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, engine oil pressure switch is faulty.

KNOWN INFO
Low oil pressure. Other gages work. 12 vdc present at socket. Bulb OK. Parking brake switch OK.
POSSIBLE PROBLEMS
Wire 16 faulty. Wire 2 faulty.



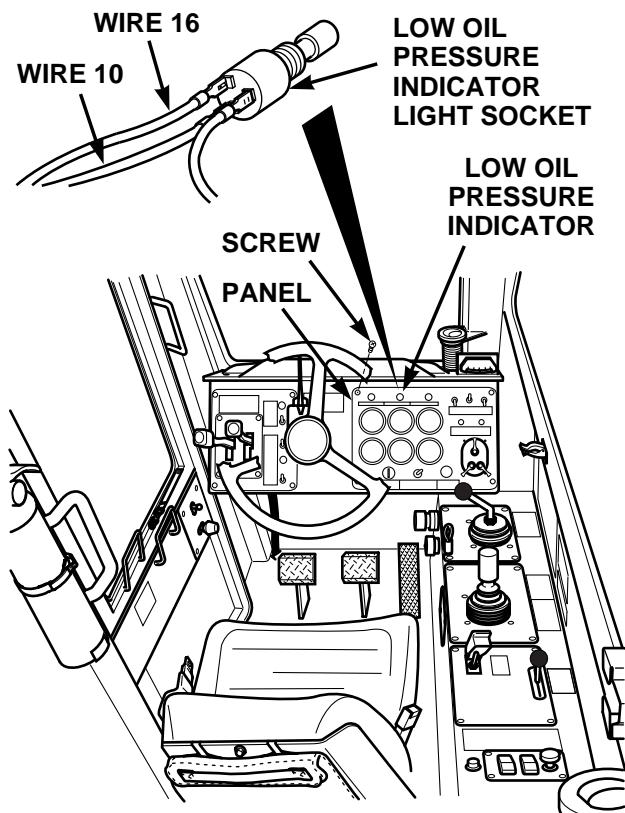
TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present across wire, wire is faulty.

**ENGINE OIL PRESSURE SWITCH TEST**

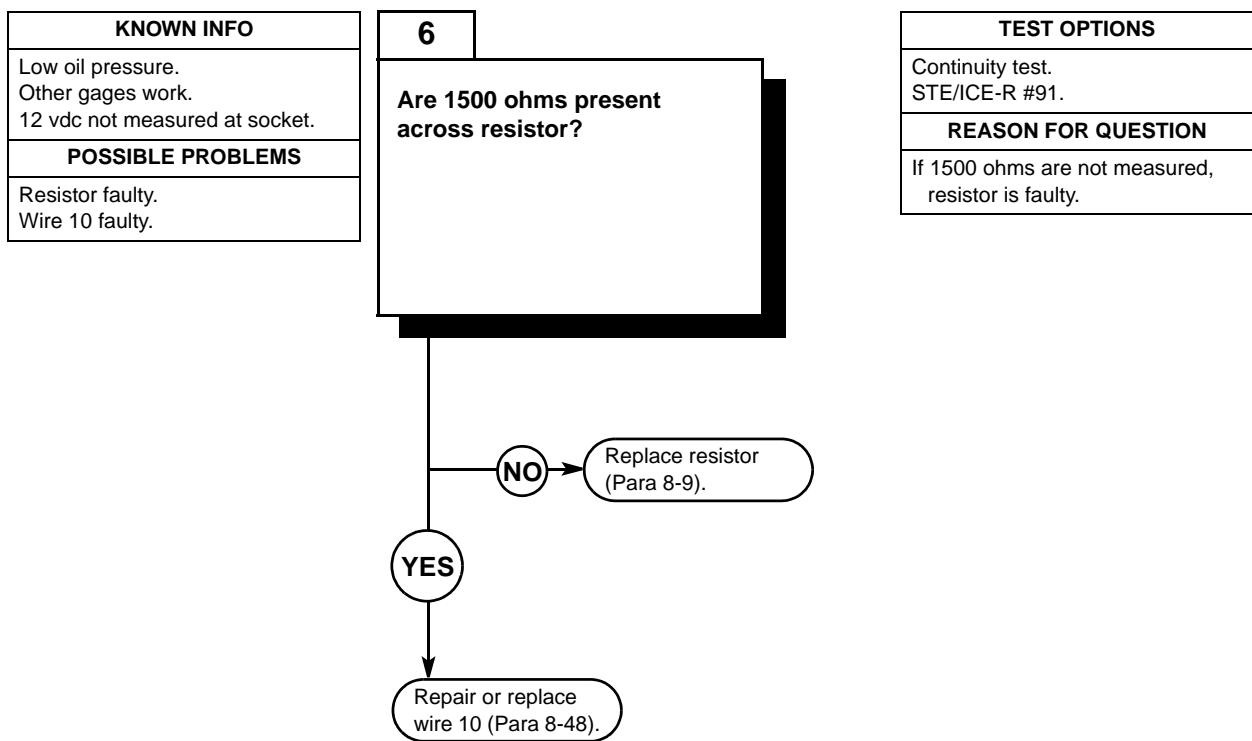
Refer to Paragraph 8-14.

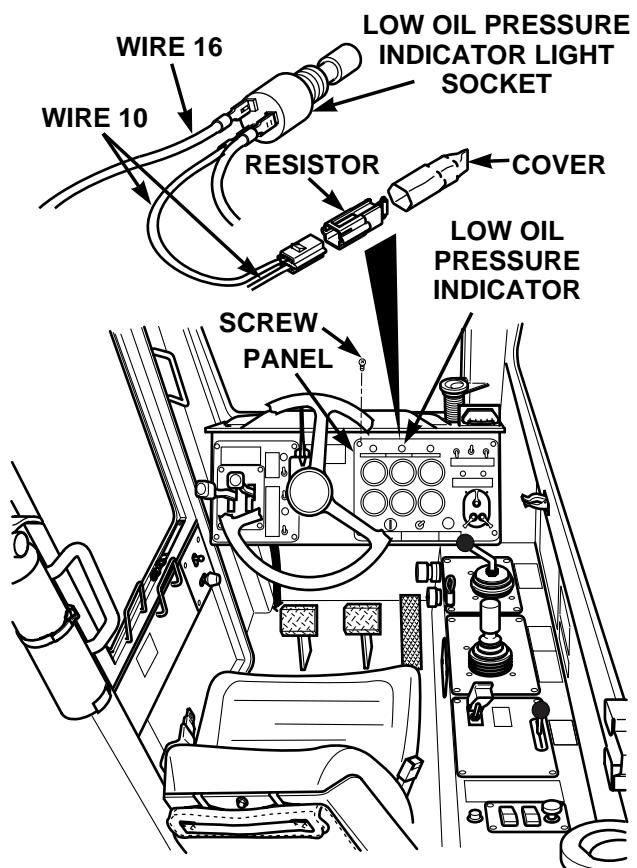
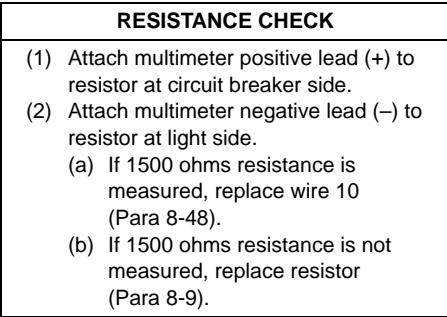
**CONTINUITY CHECK**

- (1) Remove four screws and panel.
- (2) Connect multimeter positive lead (+) to wire 16 at low oil pressure indicator terminal.
- (3) Connect multimeter negative lead (-) to wire 16 at engine oil pressure switch terminal with known good jumper wire.
  - (a) If continuity is not present, replace wire 16 (Para 8-48).
  - (b) If continuity is present, go to Step 6 of this fault.



## 23. LOW OIL PRESSURE INDICATOR DOES NOT OPERATE (CONT).





**24. HIGH TRANSMISSION TEMPERATURE INDICATOR DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

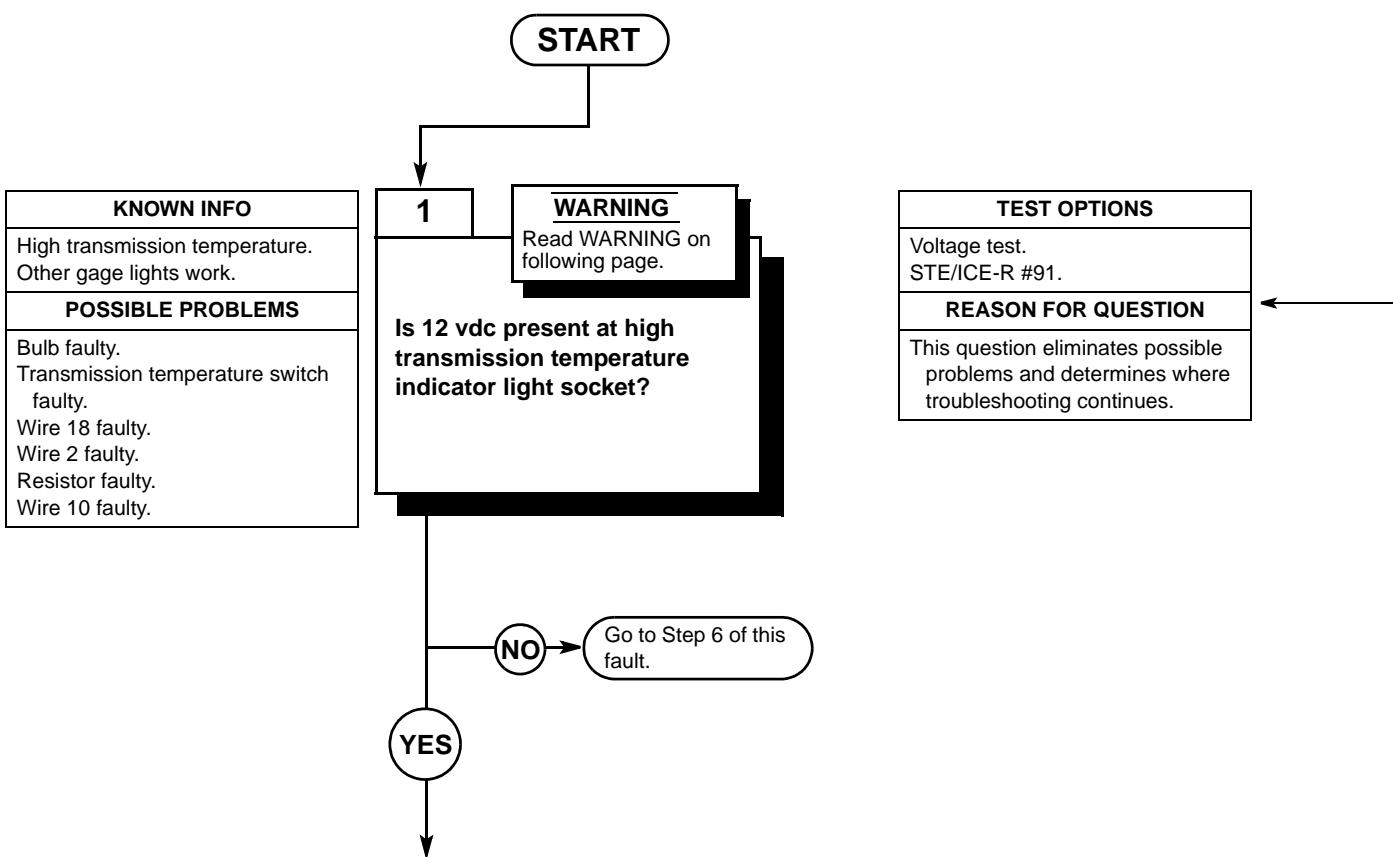
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

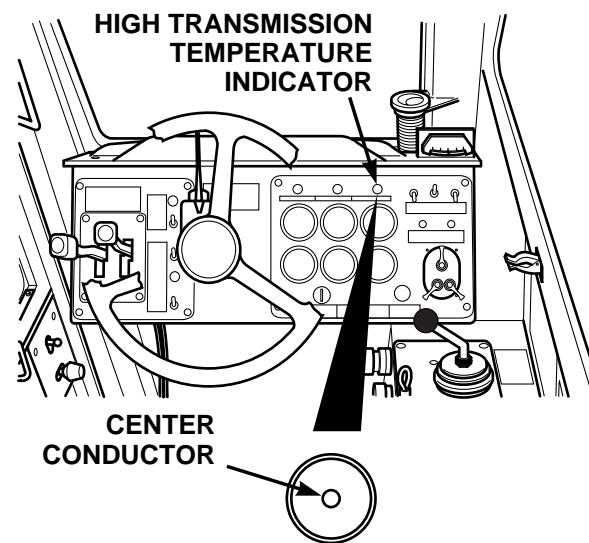
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



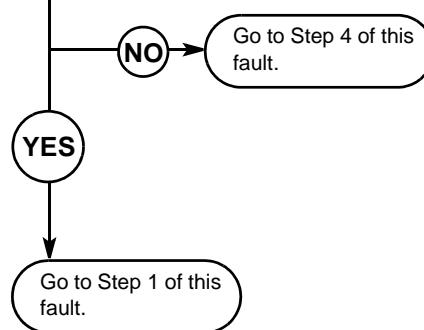
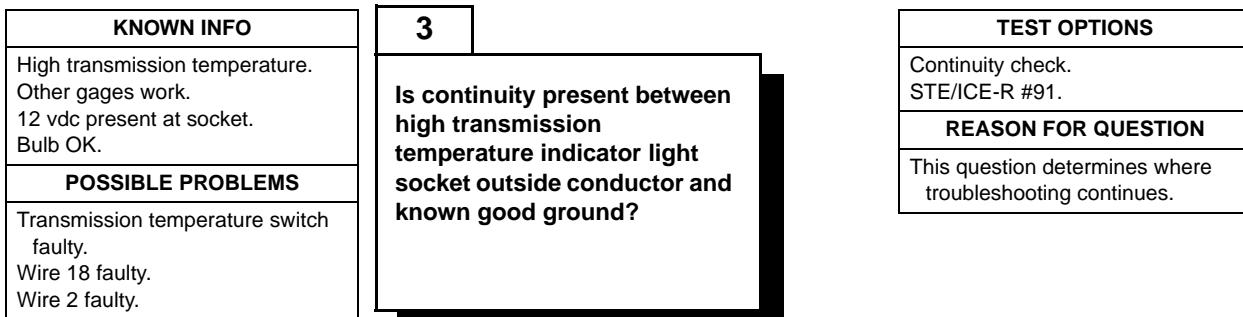
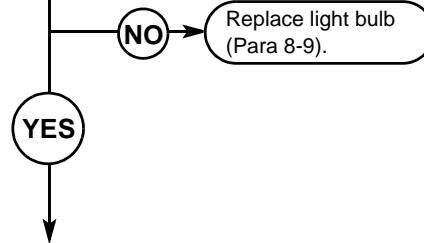
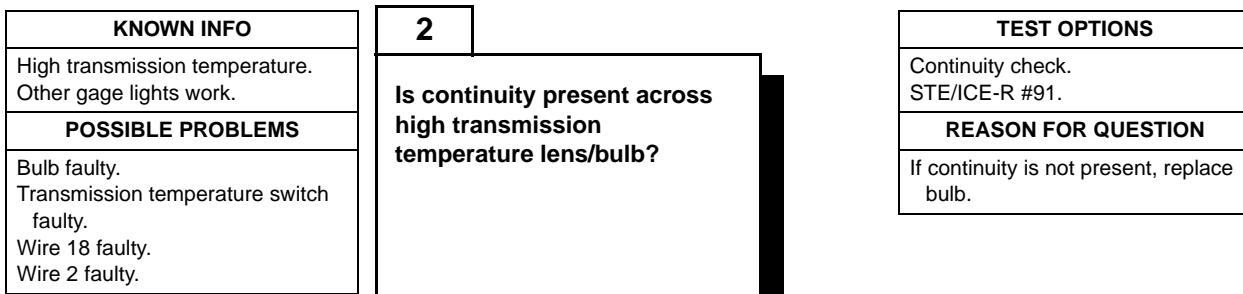
**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove lens/bulb from high transmission temperature indicator.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter negative lead (–) to known good ground.
(4)	Connect multimeter positive lead (+) to center conductor of high transmission temperature indicator light socket.
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 12 vdc is present, go to Step 2 of this fault.
(b)	If 12 vdc is not present, go to Step 6 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).

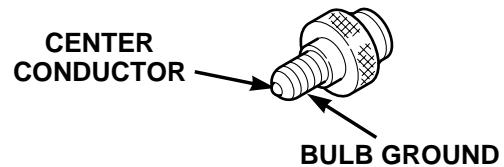


## 24. HIGH TRANSMISSION TEMPERATURE INDICATOR DOES NOT OPERATE (CONT.).

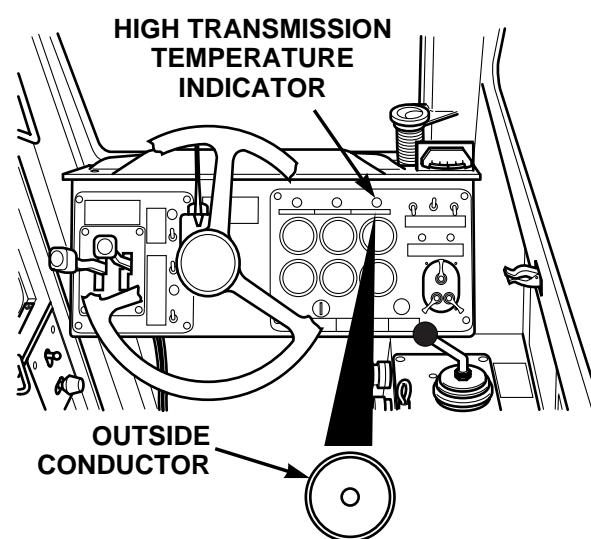


**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to center conductor of bulb.
- (3) Connect multimeter negative lead (-) to bulb ground.
  - (a) If continuity is present, go to Step 3 of this fault.
  - (b) If continuity is not present, replace lens/bulb (Para 8-9).

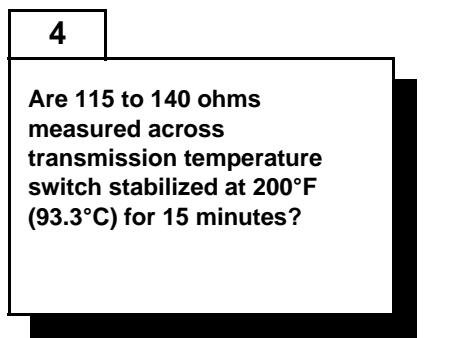
**CONTINUITY CHECK**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead (+) to outside conductor of high transmission temperature indicator.
- (3) Connect multimeter negative lead (-) to known good ground.
  - (a) If continuity is present, replace lens/bulb (Para 8-9).
  - (b) If continuity is not present, go to Step 4 of this fault.



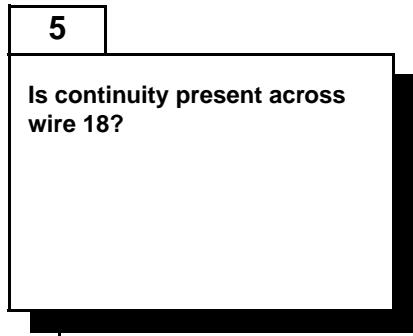
## 24. HIGH TRANSMISSION TEMPERATURE INDICATOR DOES NOT OPERATE (CONT.).

KNOWN INFO
High transmission temperature. Other gage lights work. 12 vdc present at socket. Bulb OK.
POSSIBLE PROBLEMS
Transmission temperature switch faulty. Wire 18 faulty. Wire 2 faulty.



TEST OPTIONS
Resistance check.
REASON FOR QUESTION
If correct resistance is not measured, transmission temperature switch is faulty.

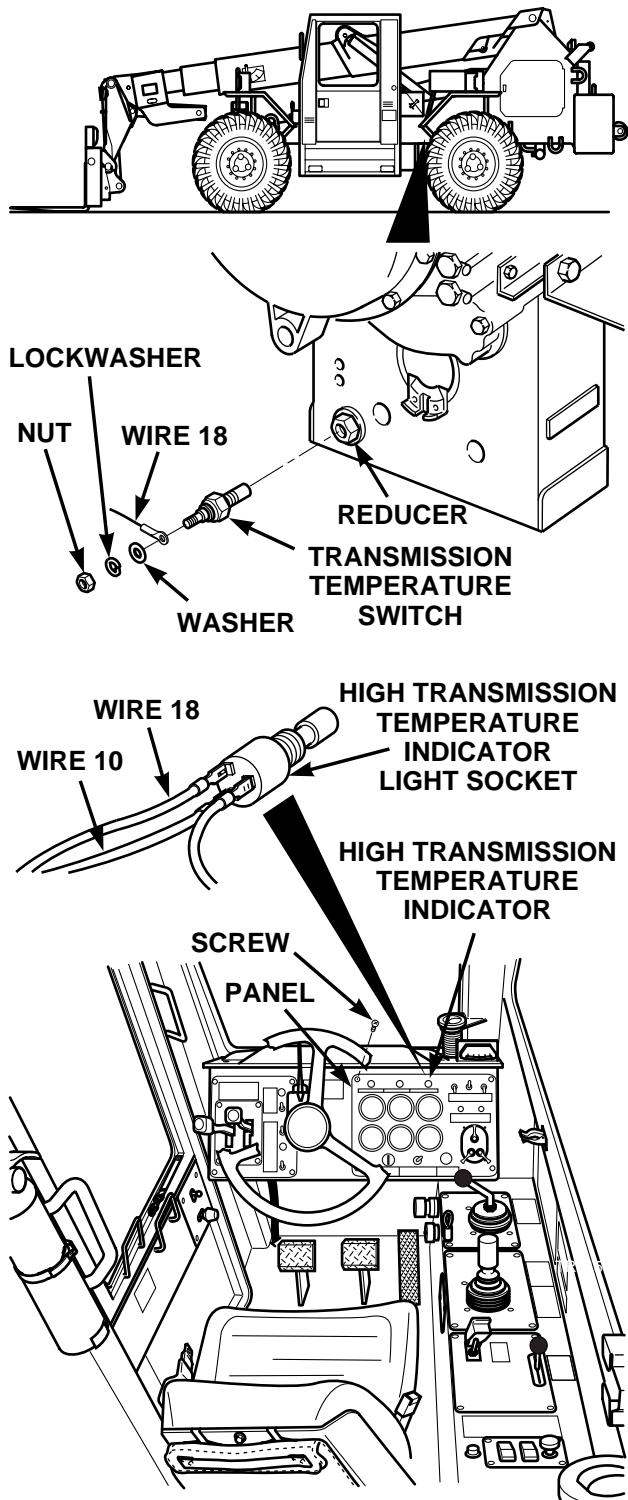
KNOWN INFO
High transmission temperature. Other gages work. 12 vdc present at socket. Bulb OK. Transmission temperature switch OK.
POSSIBLE PROBLEMS
Wire 18 faulty. Wire 2 faulty.



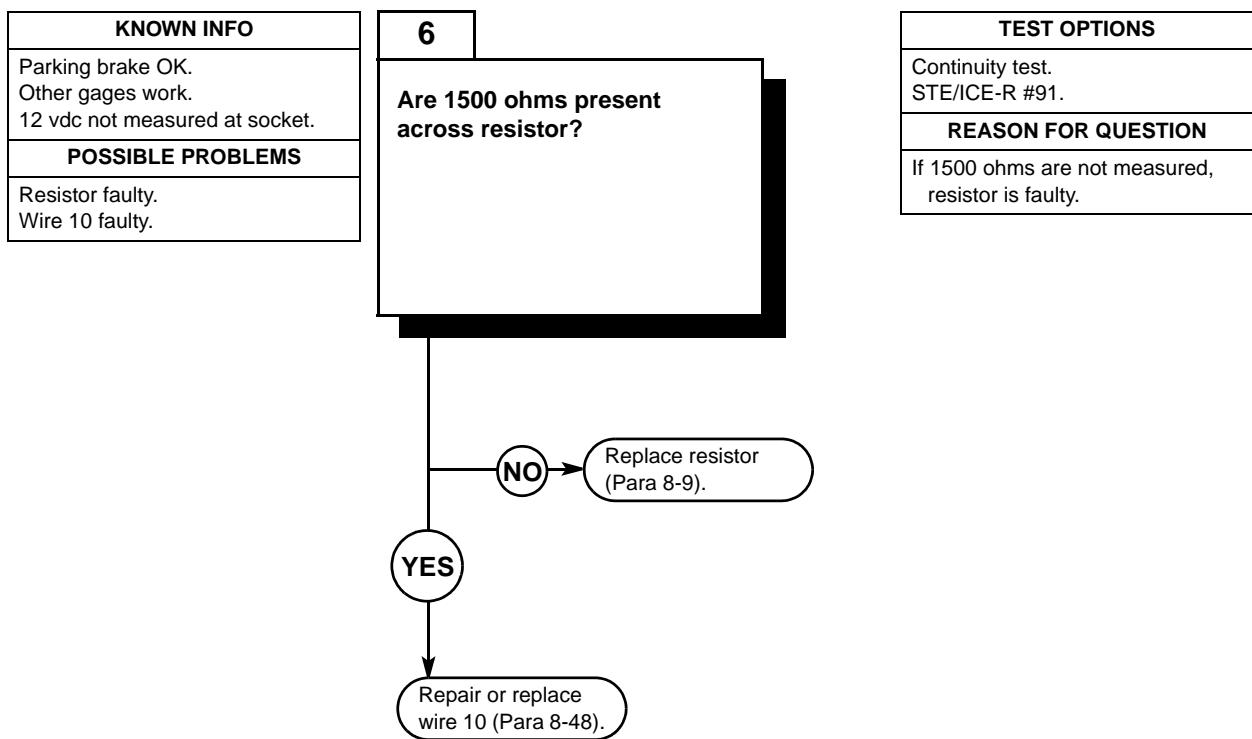
TEST OPTIONS
Continuity check. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present across wire, wire is faulty.

<b>RESISTANCE CHECK</b>	
(1)	Remove nut, lockwasher, washer, and wire 18 from transmission temperature switch.
<b>WARNING</b>	
Do not allow fingers or skin to contact hot water or hot parts. Serious burns to personnel could result.	
(6)	Set multimeter to ohms.
(7)	Connect multimeter positive lead (+) to stud of transmission temperature switch.
(8)	Connect multimeter negative lead (-) to hex or large threads of transmission temperature switch.
(a)	If 115 to 140 ohms are not measured, replace transmission temperature switch (Para 8-16).
(b)	If 115 to 140 ohms are measured, install transmission temperature switch (Para 8-16) and go to Step 5 of this fault.

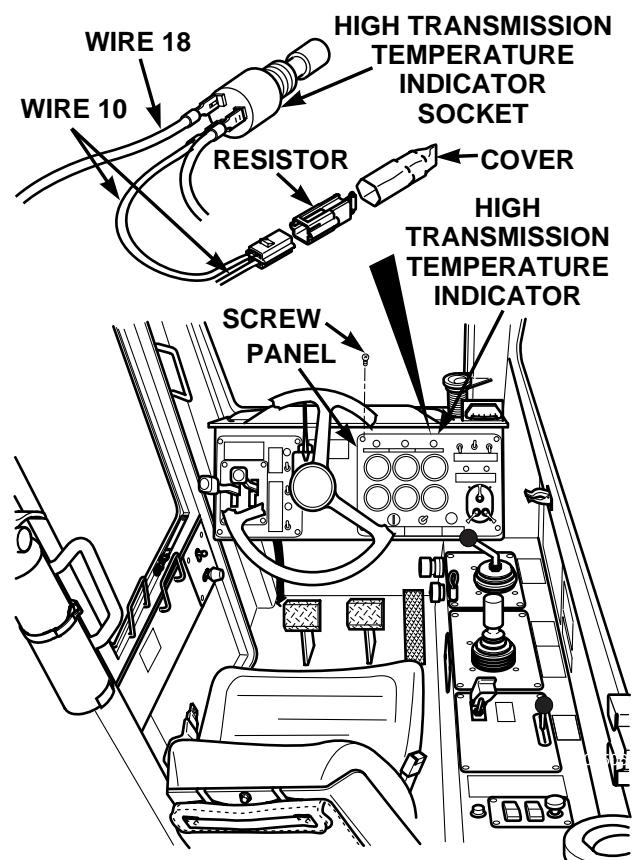
<b>CONTINUITY CHECK</b>	
(1)	Remove four screws and panel.
(2)	Connect multimeter positive lead (+) to wire 18 at high transmission temperature indicator terminal.
(3)	Using a known good jumper wire, connect multimeter negative lead (-) to wire 18 at transmission temperature switch terminal.
(a)	If continuity is not present, replace wire 18 (Para 8-48).
(b)	If continuity is present, go to Step 6 of this fault.



## 24. HIGH TRANSMISSION TEMPERATURE INDICATOR DOES NOT OPERATE (CONT.).



<b>RESISTANCE TEST</b>	
(1)	Remove cover and disconnect resistor from connector.
(2)	Attach multimeter positive lead (+) to resistor at circuit breaker side.
(3)	Attach multimeter negative lead (-) to resistor at light side.
(a)	If 1500 ohms resistance is measured, replace wire 10 (Para 8-48).
(b)	If 1500 ohms resistance is not measured, replace resistor (Para 8-9).



**25. FRONT WINDSHIELD WIPERS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

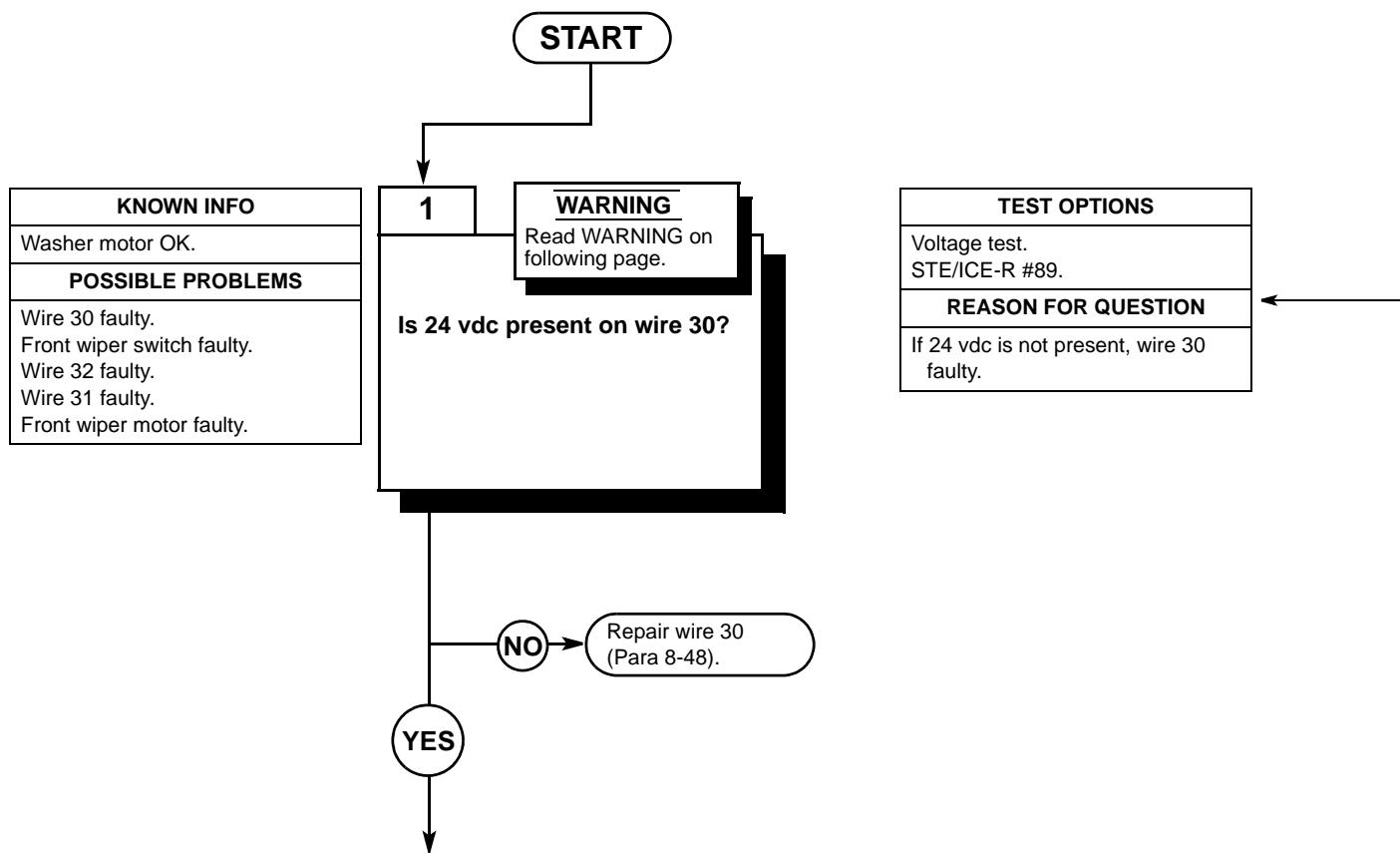
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

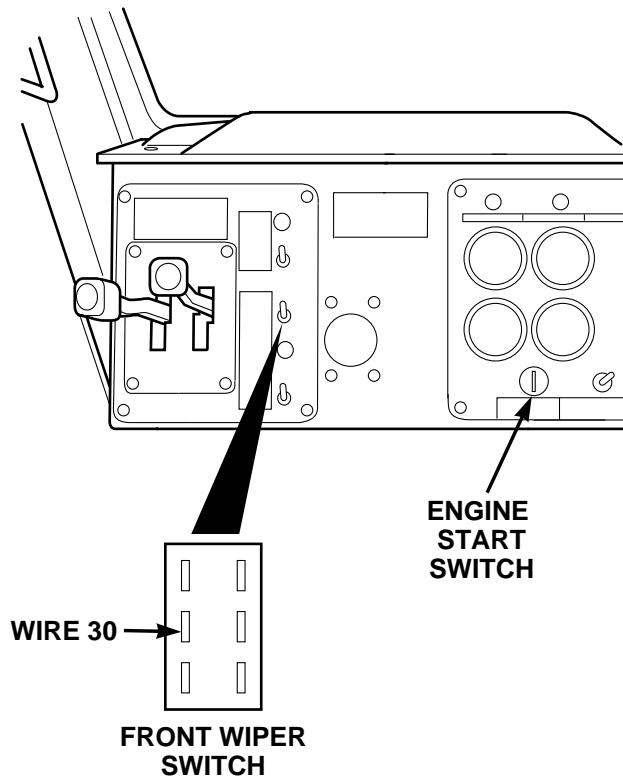
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE CHECK</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable (Para 8-44).
(3)	Remove four screws from left-hand instrument panel.
(4)	Lift panel out to get to back of front wiper switch.
(5)	Set multimeter to volts dc.
(6)	Connect multimeter positive lead (+) to wire 30 where wire 30 connects to front wiper switch.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-44).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, repair wire 30 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable (Para 8-44).



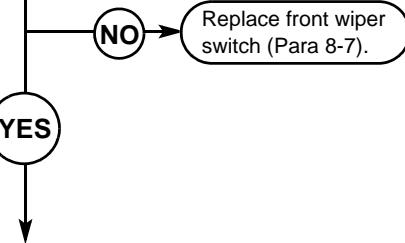
## 25. FRONT WINDSHIELD WIPERS DO NOT OPERATE (CONT).

KNOWN INFO
Washer motor OK. Wire 30 OK.
POSSIBLE PROBLEMS
Front wiper switch faulty. Wire 32 faulty. Wire 31 faulty. Front wiper motor faulty.

**2**

Is 24 vdc present at front wiper switch where wire 31 connects (HIGH)?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, front wiper switch faulty.

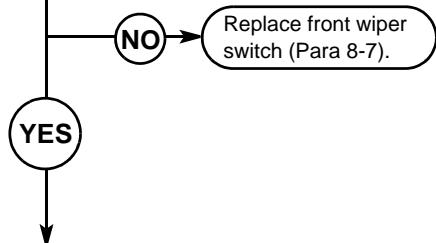


KNOWN INFO
Washer motor OK. Wire 30 OK.
POSSIBLE PROBLEMS
Front wiper switch faulty. Wire 32 faulty. Wire 31 faulty. Front wiper motor faulty.

**3**

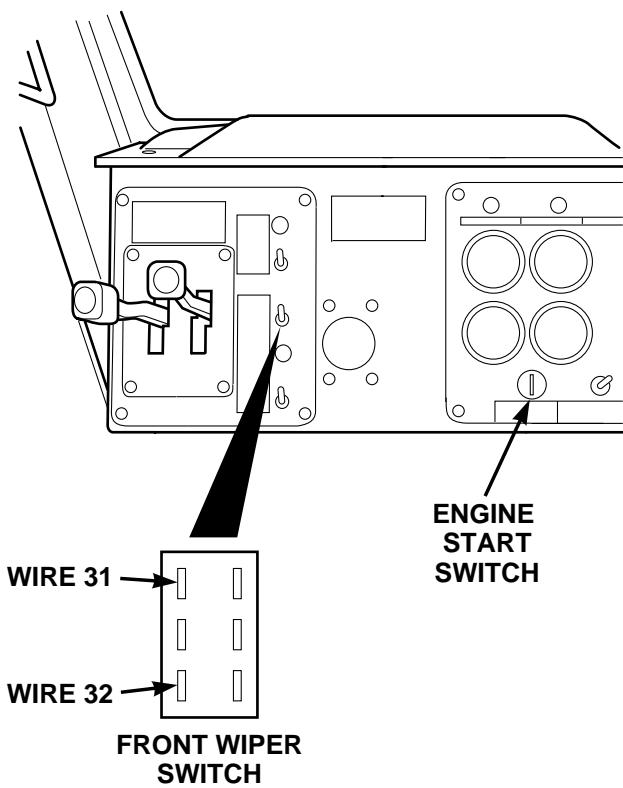
Is 24 vdc present at front wiper switch where wire 32 connects (LOW)?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, front wiper switch faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 31 where wire 31 connects to front wiper switch.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn front wiper switch to HI position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace front wiper switch (Para 8-7).
(7)	Turn front wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Disconnect negative battery cable (Para 8-44).

<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 32 where wire 32 connects to front wiper switch.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn front wiper switch to LO position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, replace front wiper switch (Para 8-7).
(7)	Turn front wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Disconnect negative battery cable (Para 8-44).



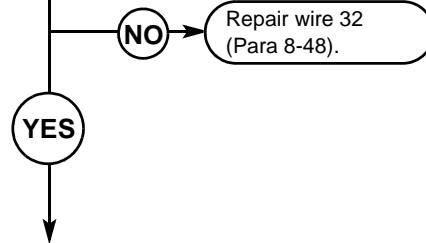
## 25. FRONT WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor OK. Wire 30 OK. Front wiper switch OK.
POSSIBLE PROBLEMS
Wire 32 faulty. Wire 31 faulty. Front wiper motor faulty.

**4**

Is 24 vdc present on wire 32 where wire 32 connects to front wiper motor?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 32 faulty.

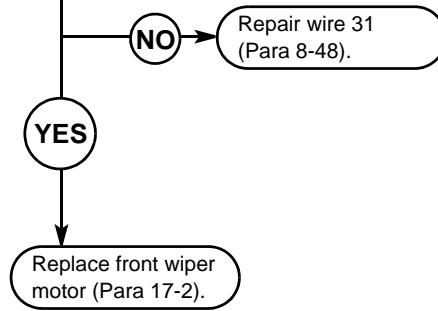


KNOWN INFO
Washer motor OK. Wire 30 OK. Front wiper switch OK. Wire 32 OK.
POSSIBLE PROBLEMS
Wire 31 faulty. Front wiper motor faulty.

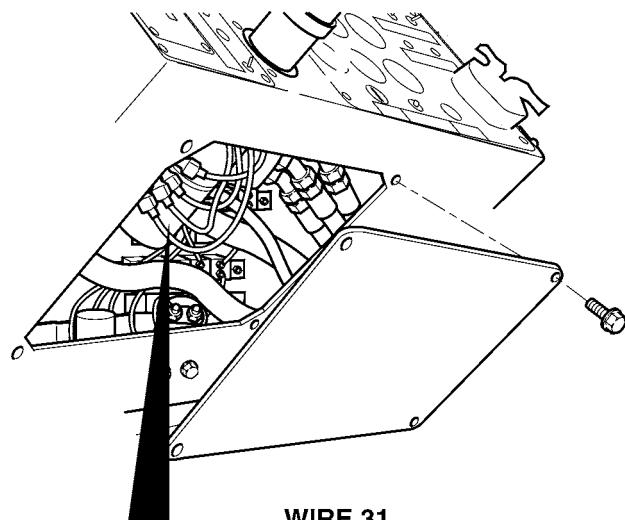
**5**

Is 24 vdc present on wire 31 where wire 31 connects to front wiper motor?

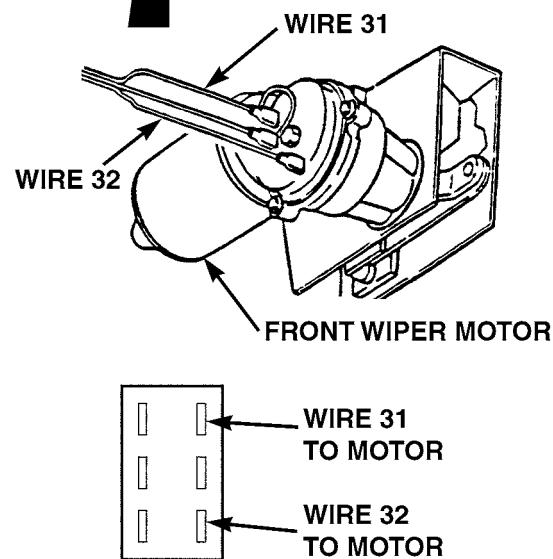
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 31 faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 32 where wire 32 connects to front wiper motor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn front wiper switch to LO position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, repair wire 32 (Para 8-48).
(7)	Turn front wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Disconnect negative battery cable (Para 8-44).



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 31 where wire 31 connects to front wiper motor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn front wiper switch to HI position (TM 10-3930-673-10).
(a)	If 24 vdc is present, replace front wiper motor (Para 17-2).
(b)	If 24 vdc is not present, repair wire 31 (Para 8-48).
(7)	Turn front wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Install battery cover (Para 8-42).
(10)	Install four screws to secure left-hand instrument panel.



**26. REAR WINDSHIELD WIPERS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

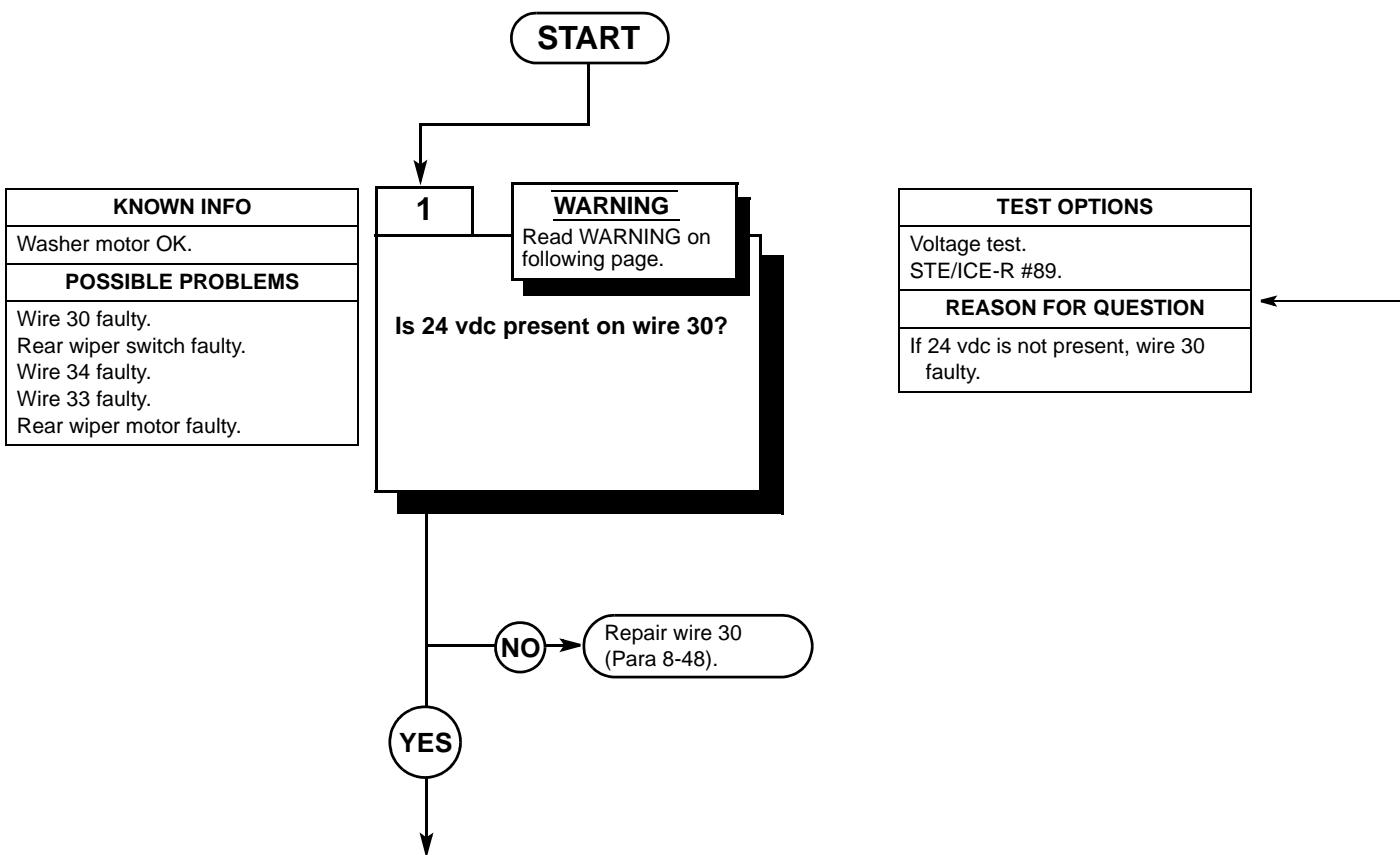
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

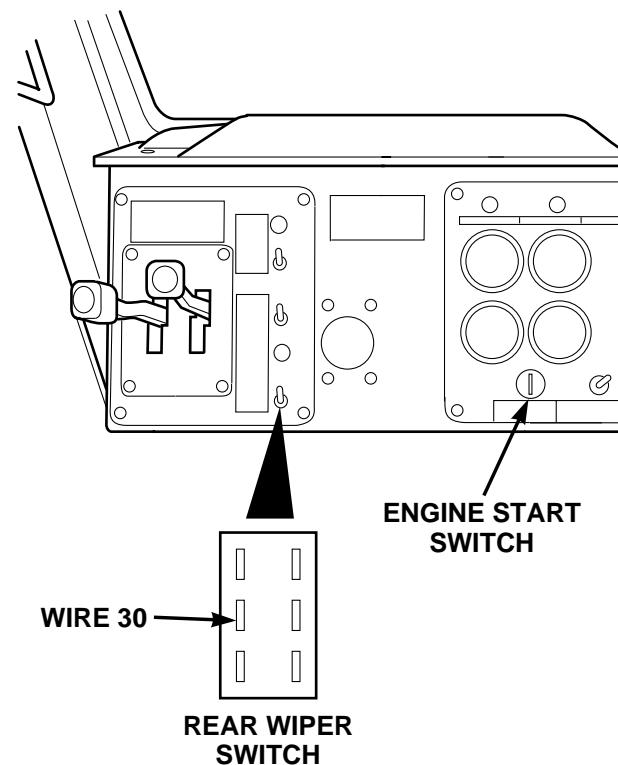
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE CHECK</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable (Para 8-44).
(3)	Remove four screws from left-hand instrument panel.
(4)	Lift panel out to get to back of rear wiper switch.
(5)	Set multimeter to volts dc.
(6)	Connect multimeter positive lead (+) to wire 30 where wire 30 connects to rear wiper switch.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-44).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, repair wire 30 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable (Para 8-44).



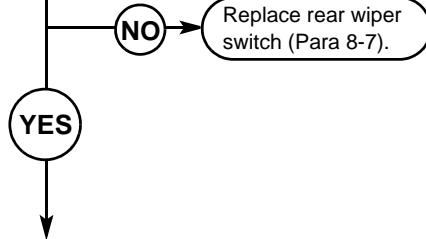
## 26. REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor OK. Wire 30 OK.
POSSIBLE PROBLEMS
Rear wiper switch faulty. Wire 34 faulty. Wire 33 faulty. Rear wiper motor faulty.

**2**

Is 24 vdc present at rear wiper switch where wire 33 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, rear wiper switch faulty.

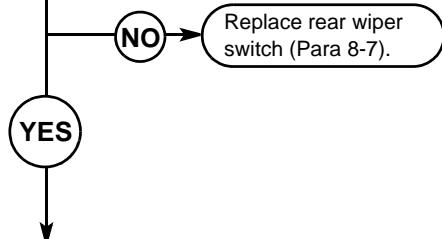


KNOWN INFO
Washer motor OK. Wire 30 OK.
POSSIBLE PROBLEMS
Rear wiper switch faulty. Wire 34 faulty. Wire 33 faulty. Rear wiper motor faulty.

**3**

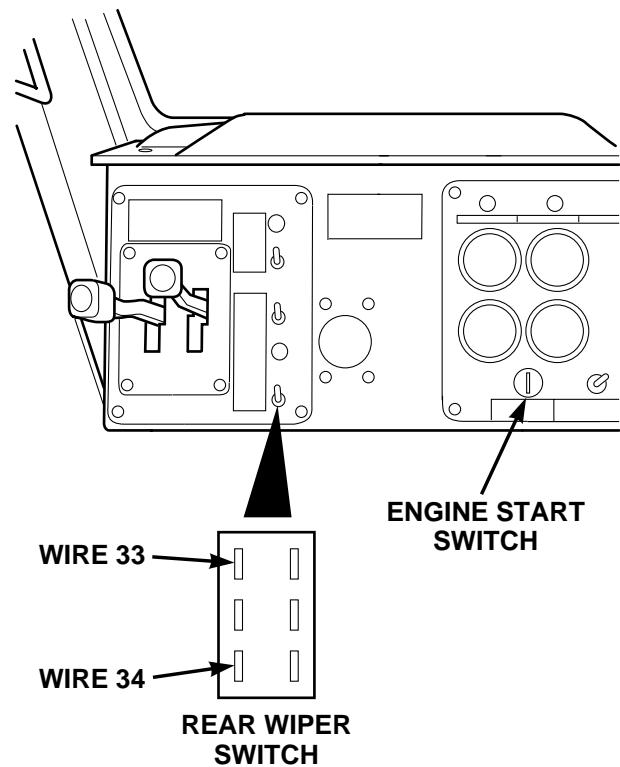
Is 24 vdc present at rear wiper switch where wire 34 connects?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, rear wiper switch faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 33 where wire 33 connects to rear wiper switch.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn rear wiper switch to HI position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace rear wiper switch (Para 8-7).
(7)	Turn rear wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Disconnect negative battery cable (Para 8-44).

<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 34 where wire 34 connects to rear wiper switch.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn rear wiper switch to LO position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, replace rear wiper switch (Para 8-7).
(7)	Turn rear wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch OFF (TM 10-3930-673-10).
(9)	Disconnect negative battery cable (Para 8-44).



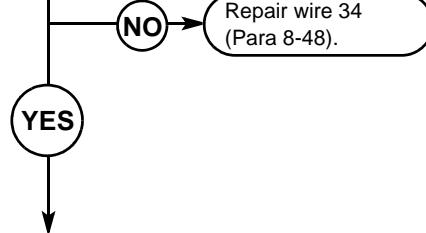
## 26. REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor OK. Wire 30. Rear wiper motor OK.
POSSIBLE PROBLEMS
Wire 34 faulty. Wire 33 faulty. Rear wiper motor faulty.

**4**

Is 24 vdc present at wire 34 where wire 34 connects to rear wiper motor?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 34 faulty.

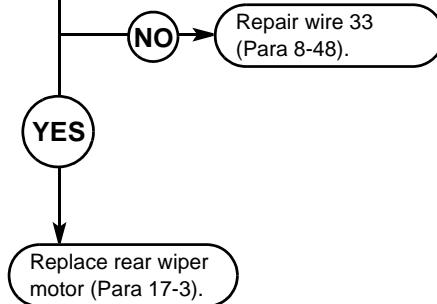


KNOWN INFO
Washer motor OK. Wire 30 OK. Rear wiper switch OK. Wire 34 OK.
POSSIBLE PROBLEMS
Wire 33 faulty. Rear wiper motor faulty.

**5**

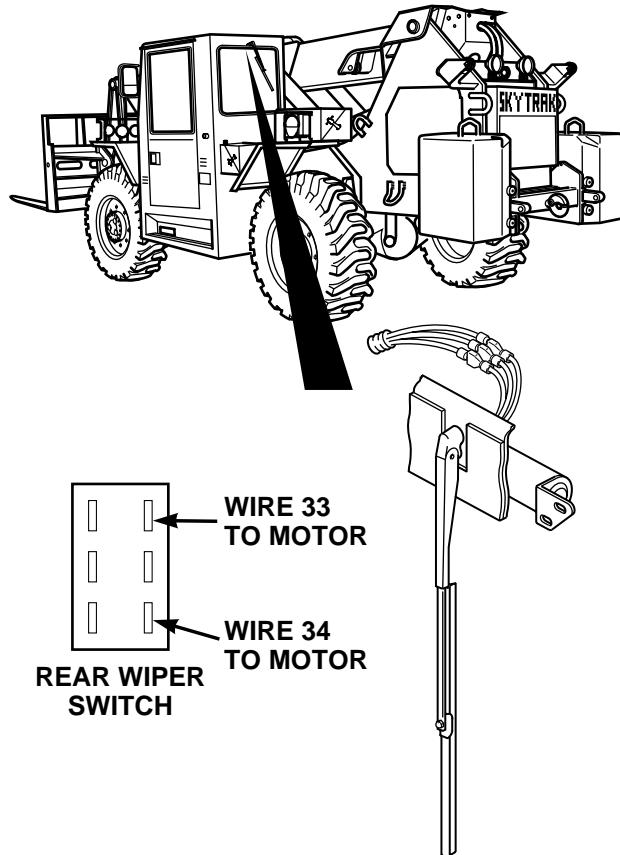
If 24 vdc present at wire 33 where wire 33 connects to rear wiper motor?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If 24 vdc is not present, wire 33 faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Remove rear wiper motor from vehicle (Para 17-3).
(3)	Connect multimeter positive lead (+) to wire 34 where wire 34 connects to rear wiper motor.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn rear wiper switch to LO position (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, repair wire 34 (Para 8-48).
(8)	Turn rear wiper switch to OFF position (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable (Para 8-44).

<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 33 where wire 33 connects to rear wiper motor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Turn rear wiper switch to HI position (TM 10-3930-673-10).
(a)	If 24 vdc is present, replace rear wiper motor (Para 17-3).
(b)	If 24 vdc is not present, repair wire 33 (Para 8-48).
(7)	Turn rear wiper switch to OFF position (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Install rear wiper motor (Para 17-3).
(10)	Install battery cover (Para 8-42).
(11)	Install four screws to secure left-hand instrument panel.



**27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

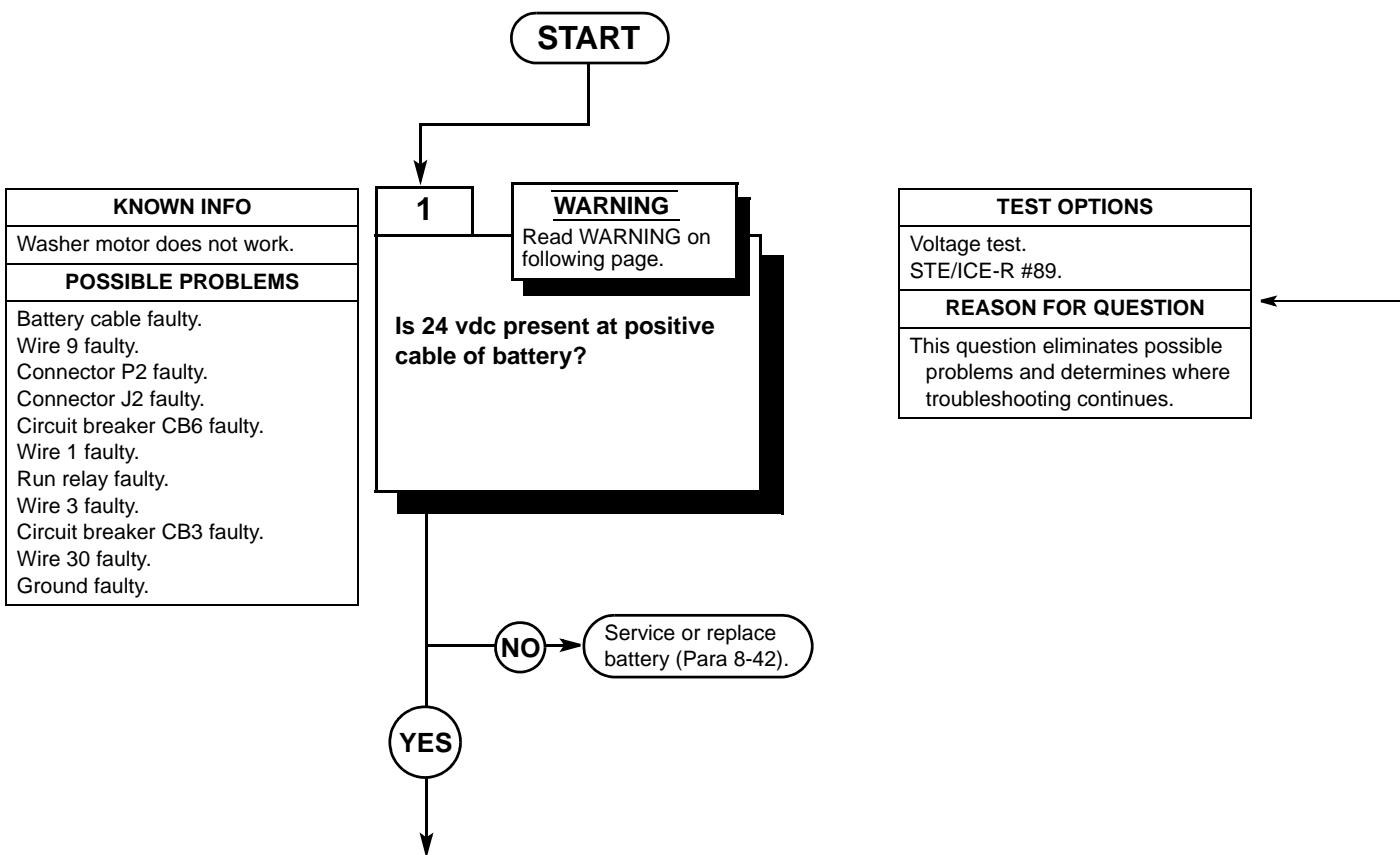
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

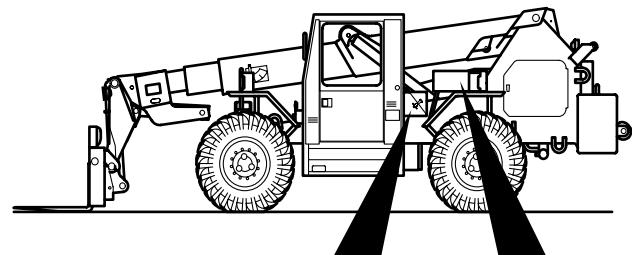
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

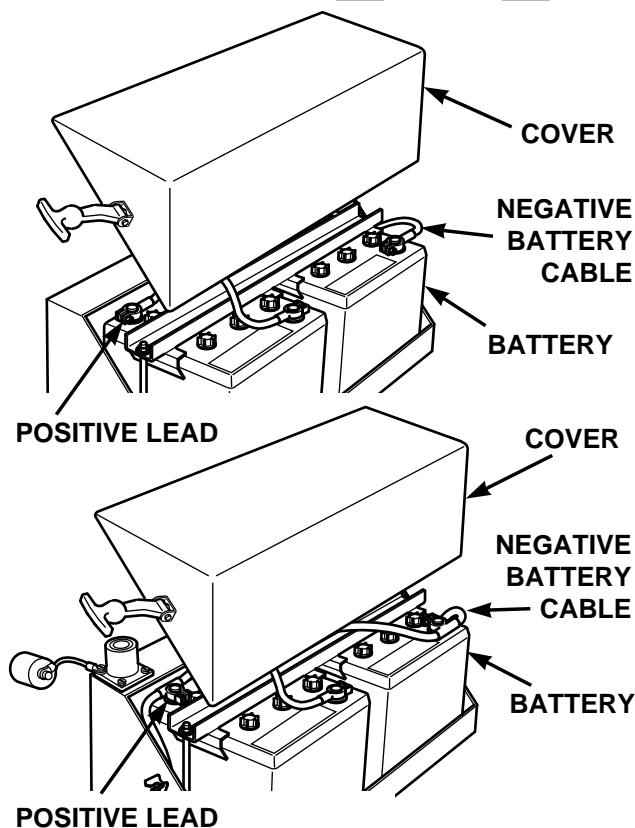


## WARNING

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

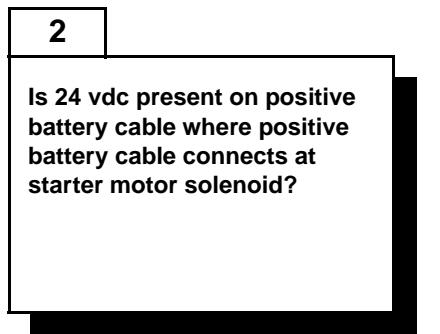


<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter negative lead (–) to known good ground.
(5)	Connect multimeter positive lead (+) to positive lead of battery.
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, service or replace battery (Para 8-42).



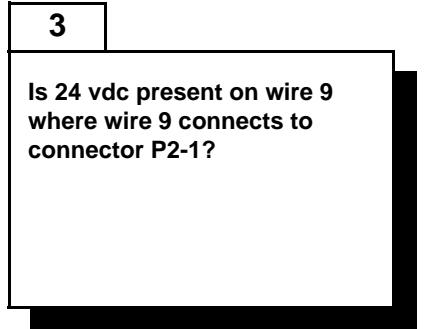
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work.
POSSIBLE PROBLEMS
Battery cable faulty. Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.



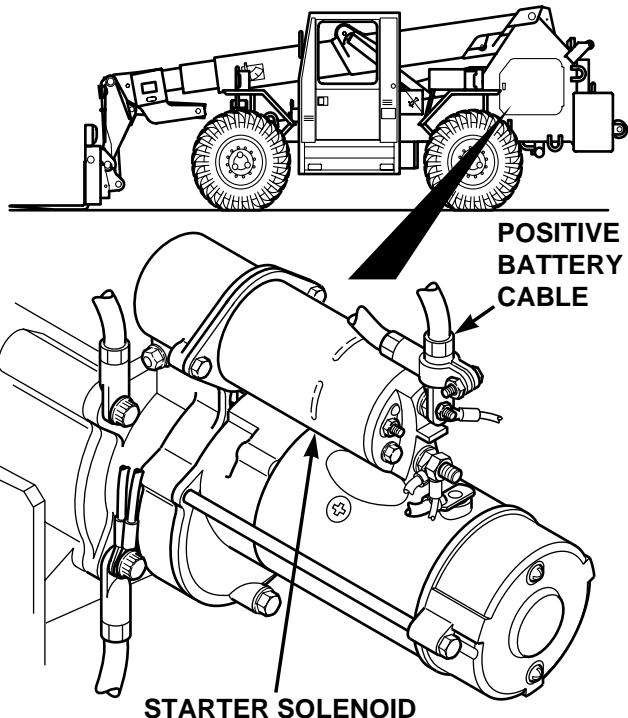
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, battery cable faulty.

KNOWN INFO
Washer motor does not work. Battery cable OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

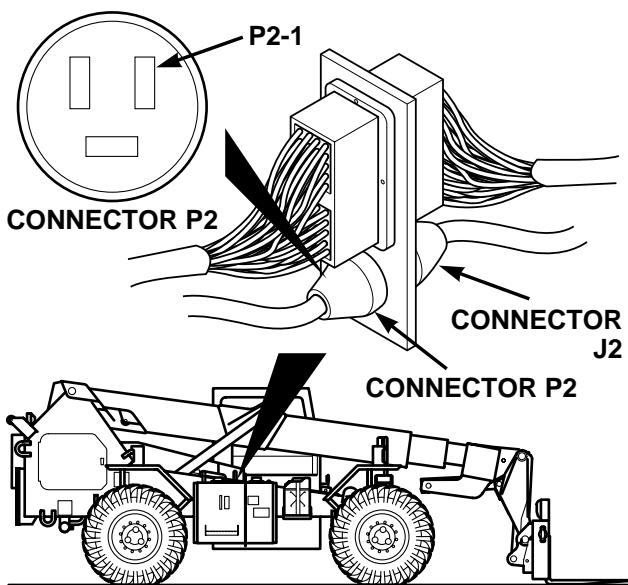


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 or connector P2 faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to starter motor solenoid where positive battery cable connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, repair battery cable (Para 8-42).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-44).

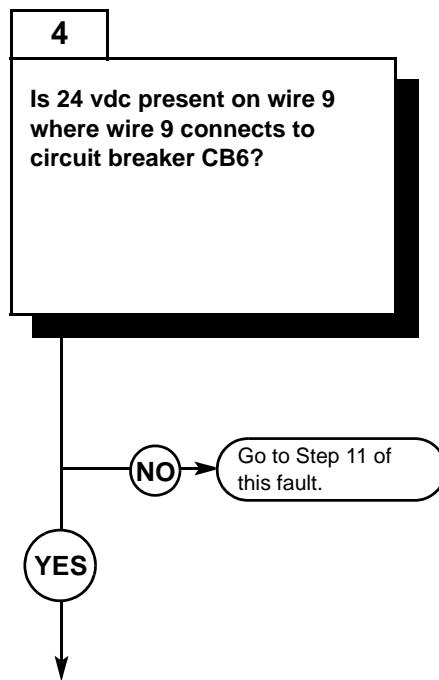


<b>VOLTAGE TEST</b>	
(1)	Disconnect connector J2 from connector P2.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to connector P2-1.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, go to Step 12 of this fault.
(6)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(7)	Connect connector J2 to connector P2.



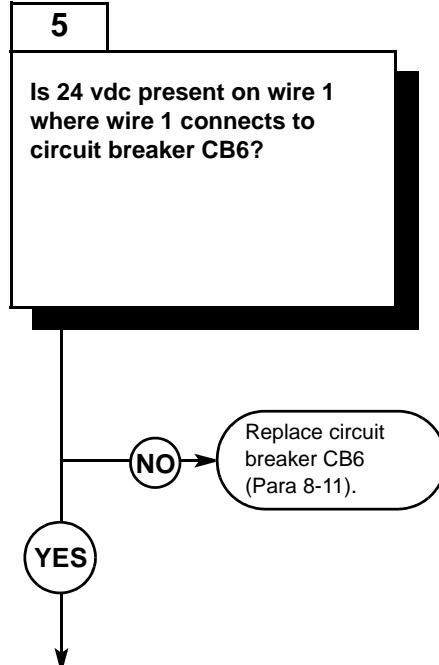
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work. Battery cable OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.



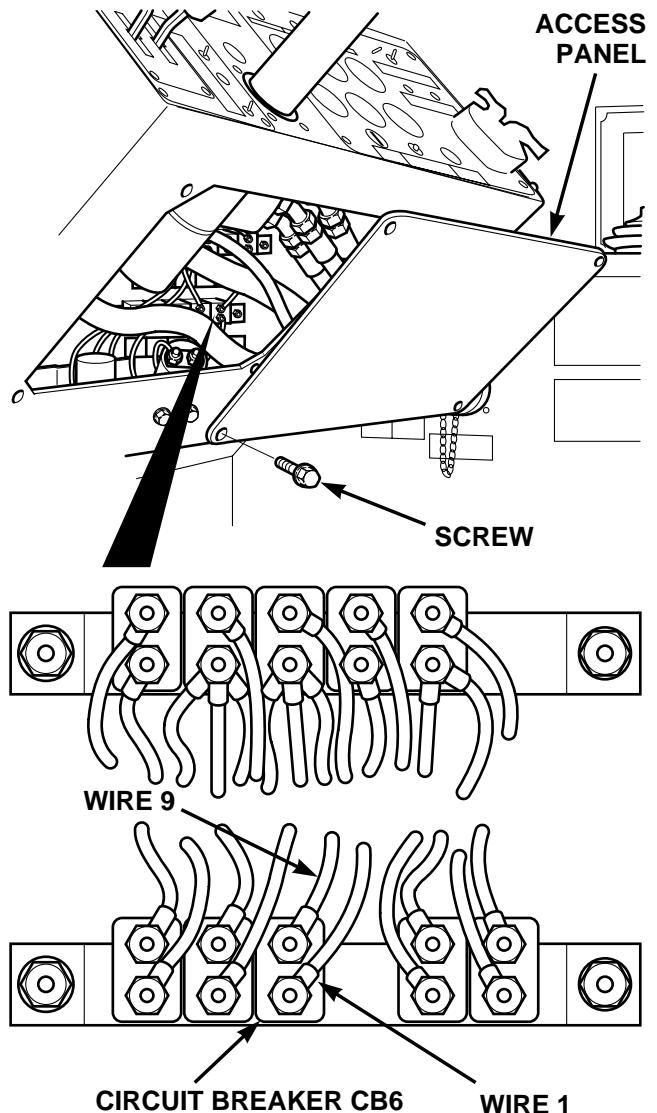
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 9 faulty.

KNOWN INFO
Washer motor does not work. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Remove four screws and access panel.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to circuit breaker CB6.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, go to Step 11 of this fault.
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 1 where wire 1 connects to circuit breaker CB6.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6.
(5)	Disconnect negative battery cable from negative side of battery (Para 8-44).

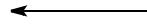
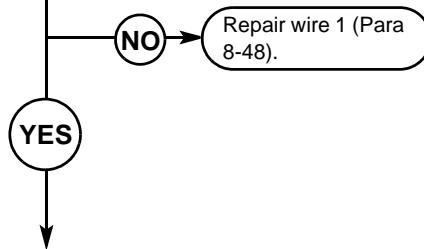
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

**6**

Is 24 vdc present on wire 1 where wire 1 connects to relay K1?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 faulty.

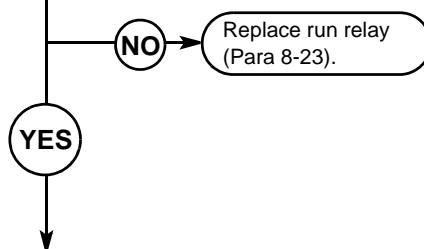
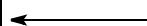


KNOWN INFO
Washer motor does not work. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

**7**

Is 24 vdc present on wire 3 where wire 3 connects to relay K1?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay faulty.

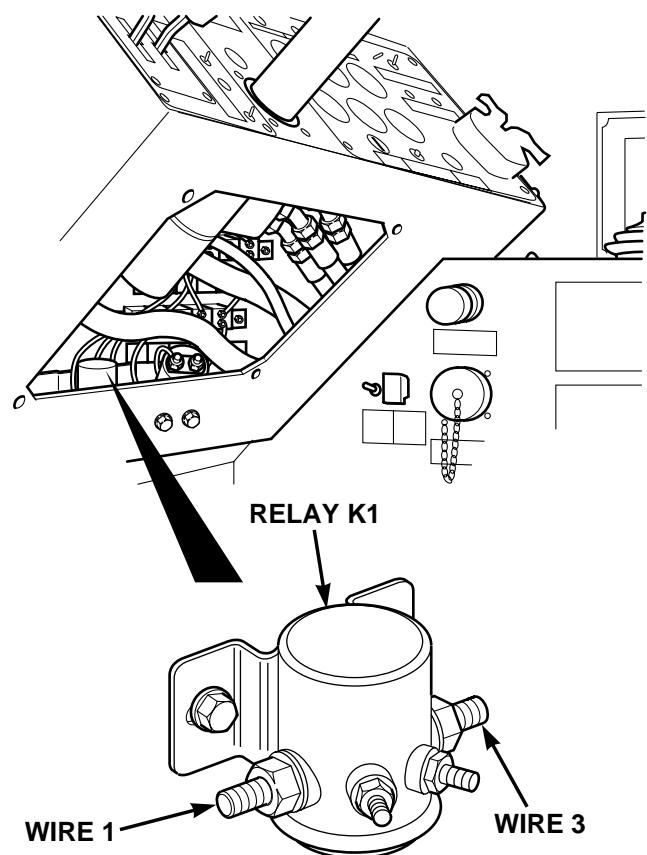


**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-44).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to wire 1 where wire 1 connects to run relay.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-44).
  - (a) If 24 vdc is present, go to Step 7 of this fault.
  - (b) If 24 vdc is not present, repair wire 1.
- (6) Disconnect negative battery cable from negative side of battery (Para 8-44).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to wire 3 where wire 3 connects to run relay.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-44).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If 24 vdc is present, go to Step 8 of this fault.
  - (b) If 24 vdc is not present, replace run relay (Para 8-23).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-44).



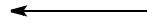
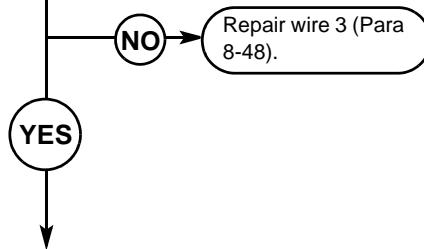
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

**8**

Is 24 vdc present on wire 3 where wire 3 connects to circuit breaker CB3?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 faulty.

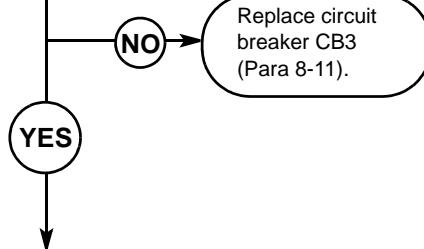


KNOWN INFO
Washer motor does not work. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

**9**

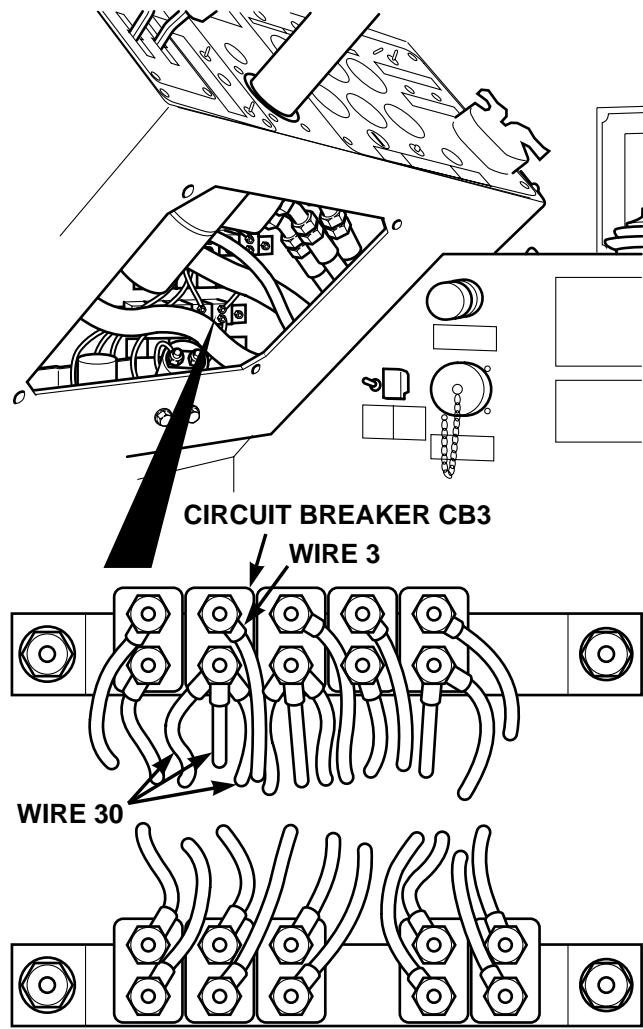
Is 24 vdc present on wire 30 where wire 30 connects to circuit breaker CB3?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB3 faulty.



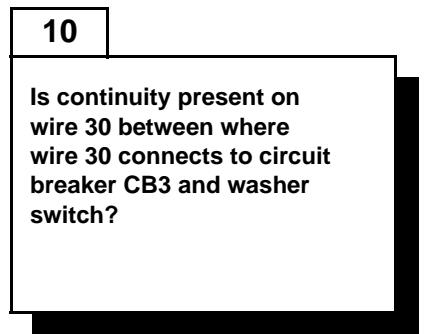
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to wire 3 where wire 3 connects to circuit breaker CB3.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable (1) to negative side of battery (Para 8-44).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 9 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-44).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 30 where wire 30 connects to circuit breaker CB3.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 10 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB3 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-44).



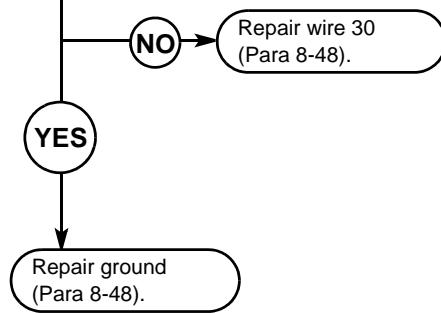
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work.
Battery cable OK.
Wire 9 OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB3 OK.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If voltage is not present, wire 30 faulty.

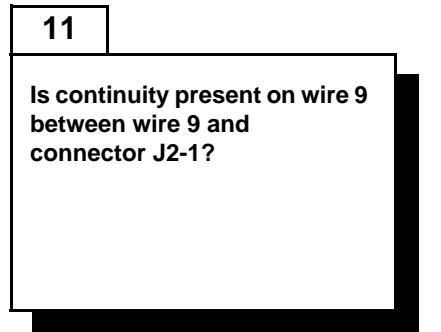
POSSIBLE PROBLEMS
Wire 30 faulty.
Ground faulty.



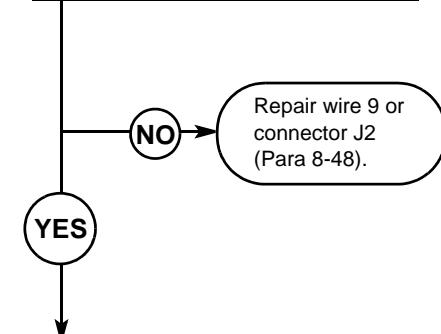
KNOWN INFO
Washer motor does not work.
Wire 9 OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.

POSSIBLE PROBLEMS
Battery cable faulty.
Wire 1 faulty.
Wire 3 faulty.
Circuit breaker CB3 faulty.
Wire 30 faulty.
Ground faulty.

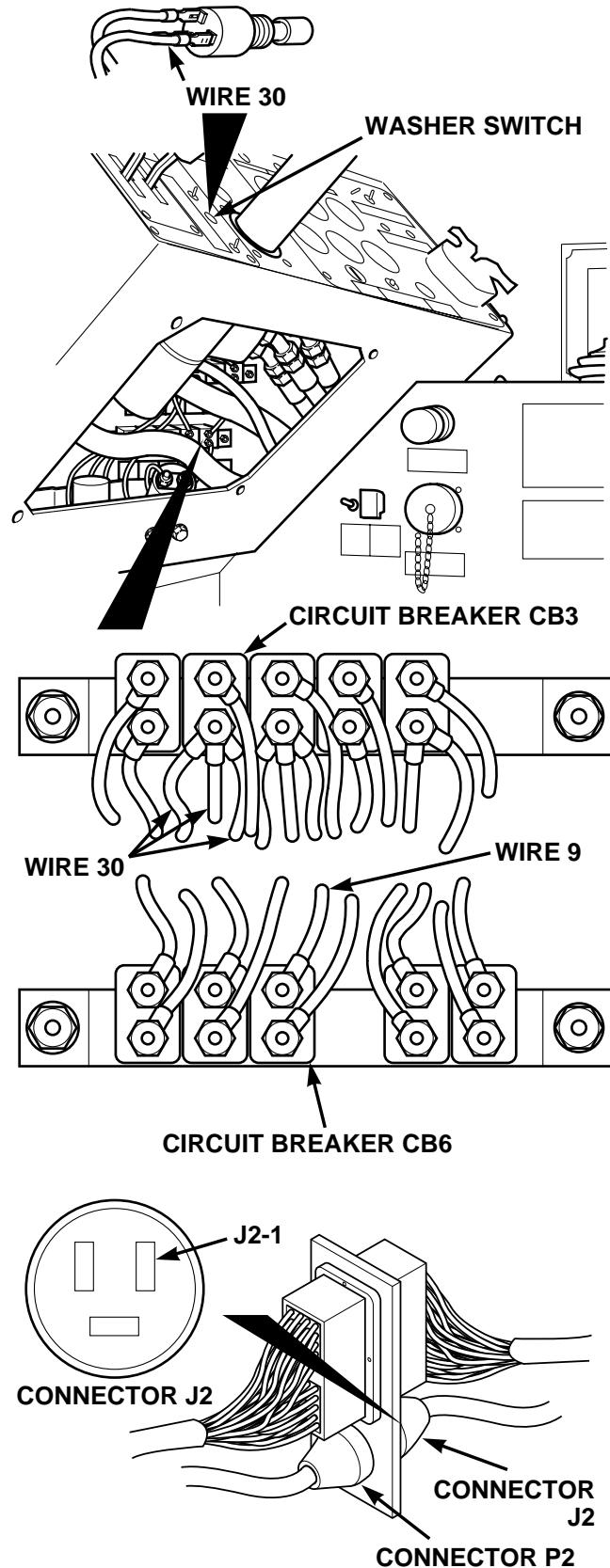


TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, ground faulty.



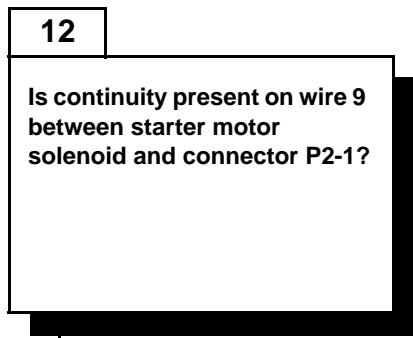
<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 30 where wire 30 connects to circuit breaker CB3.
(4)	Connect multimeter negative lead (-) to wire 30 where wire 30 connects to washer switch.
(a)	If continuity is present, repair ground wire.
(b)	If continuity is not present, repair wire 30.
(5)	Install access panel and four screws.

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Disconnect connector J2 from connector P2.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to circuit breaker CB6.
(5)	Connect multimeter negative lead (-) to connector J2-1.
(a)	If continuity is present, go to Step 5 of this fault.
(b)	If continuity is not present, repair wire 9 or connector J2 (Para 8-48).



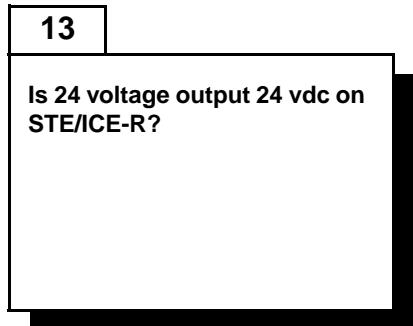
## 27. FRONT AND REAR WINDSHIELD WIPERS DO NOT OPERATE (CONT.).

KNOWN INFO
Washer motor does not work. Wire 9 OK.
POSSIBLE PROBLEMS
Battery cable faulty. Wire 1 faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.



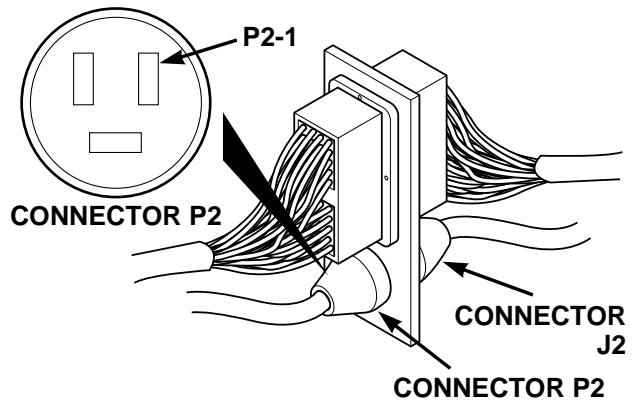
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector P2 faulty.

KNOWN INFO
Washer motor does not work.
POSSIBLE PROBLEMS
Battery cable faulty. Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Wire 3 faulty. Circuit breaker CB3 faulty. Wire 30 faulty. Ground faulty.

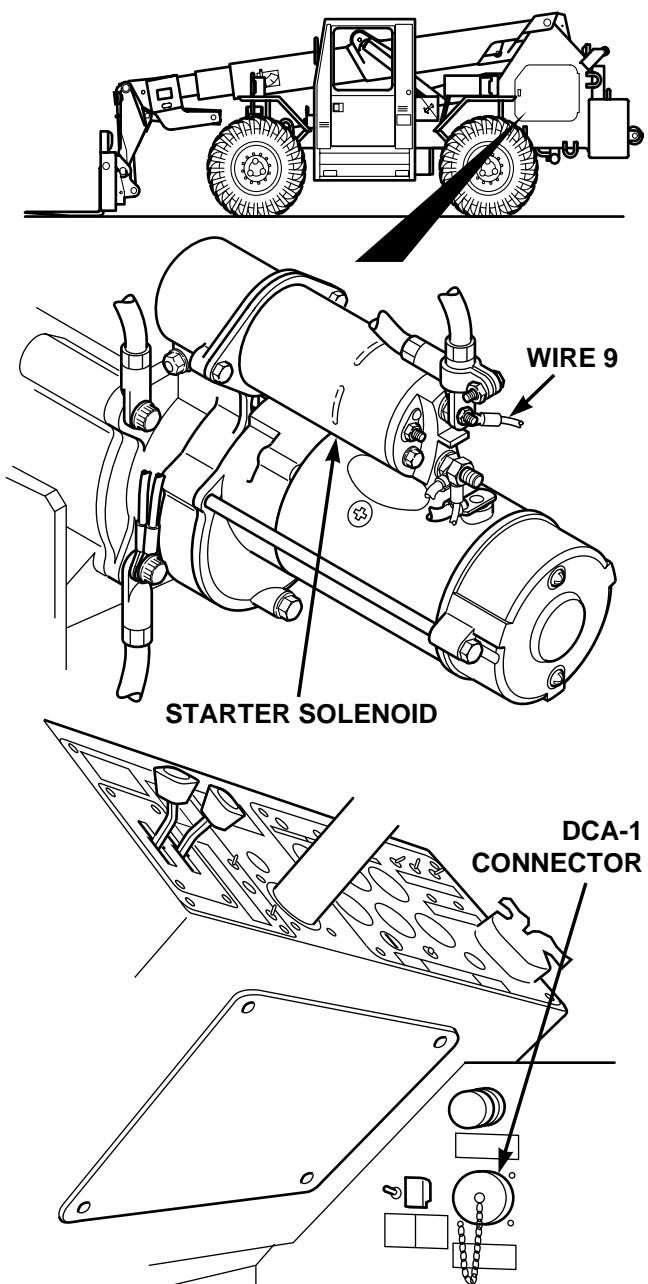


TEST OPTIONS
Voltage test. STE/ICE-R #82.
REASON FOR QUESTION
If voltage is not present, alternator faulty.

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-44).
(2)	Disconnect connector J2 from connector P2.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to starter motor solenoid.
(5)	Connect multimeter negative lead (-) to connector P2-1.
(a)	If continuity is present, go to Step 4 of this fault.
(b)	If continuity is not present, repair wire 9 or connector P2 (Para 8-49).



<b>VOLTAGE TEST</b>	
(1)	Connect negative battery cable to negative side of battery.
(2)	Remove dust cover from DCA-1 connector.
(3)	Connect cable W1 to the Vehicle Test Meter (VTM) and DCA-1 connector.
(4)	Power up STE/ICE-R VTM in the DCA mode (TM 9-4910-571-12&P).
(5)	Turn auxiliary fuel shut-off switch on.
(6)	Start engine (TM 10-3930-763-10).
(7)	Perform STE/ICE test #82.
(8)	Press and release test button.
(9)	Observe VTM display for test results.
(a)	If voltage is present at output of alternator, go to Step 4 of this fault.
(b)	If voltage is not present at output of alternator, replace alternator (Para 8-2).
(10)	Shut off engine (TM 10-3930-673-10).
(11)	Turn auxiliary fuel shut-off switch off.
(12)	Power down STE/ICE-R VTM in the DCA mode (TM 9-4910-571-12&P).
(13)	Disconnect DCA cable from DCA-1(2).
(14)	Install battery cover (Para 8-42).



**28. WINDSHIELD WASHER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

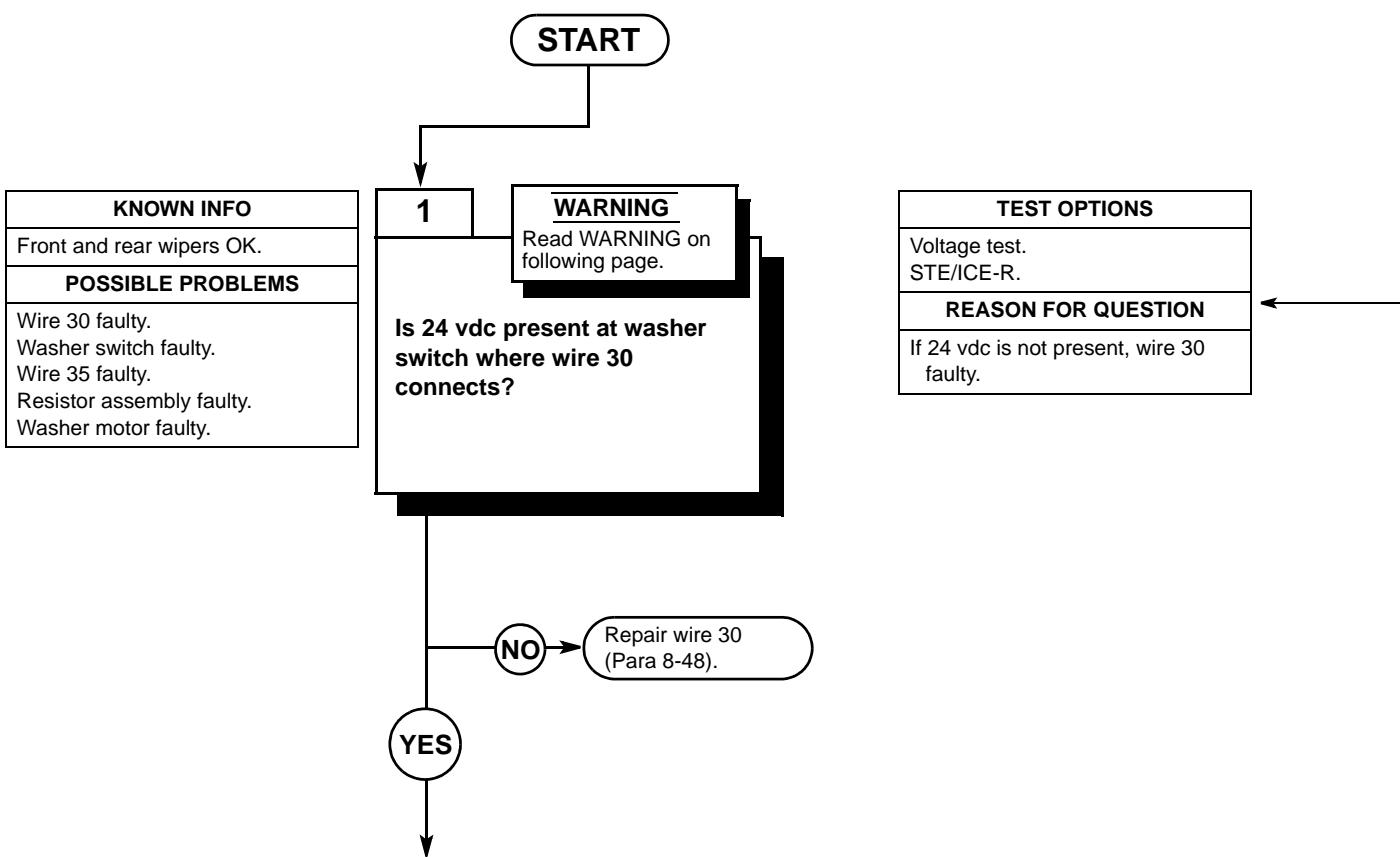
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

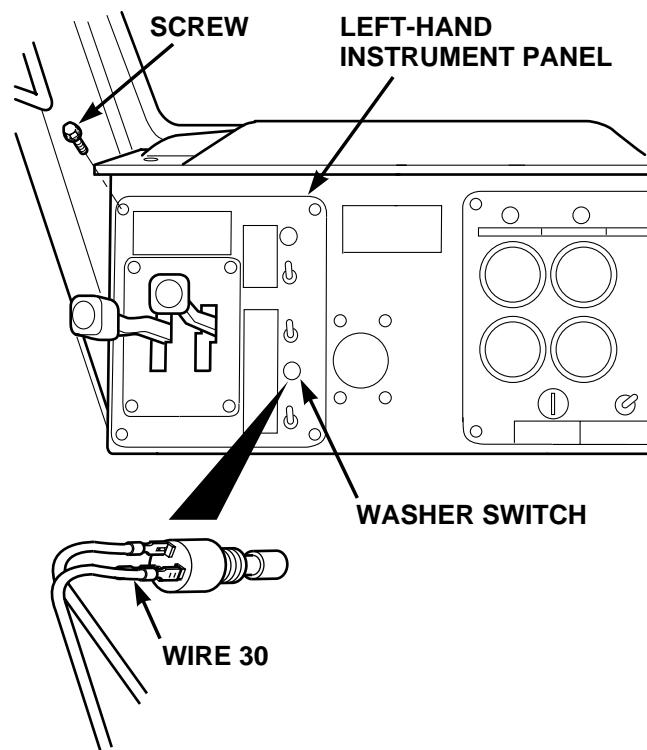
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE CHECK</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable (Para 8-44).
(3)	Remove four screws from left-hand instrument panel.
(4)	Lift left-hand instrument panel out to get to washer switch.
(5)	Set multimeter to volts dc.
(6)	Connect multimeter positive lead (+) to wire 30 where wire 30 connects to washer switch.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-44).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, repair wire 30 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable (Para 8-44).



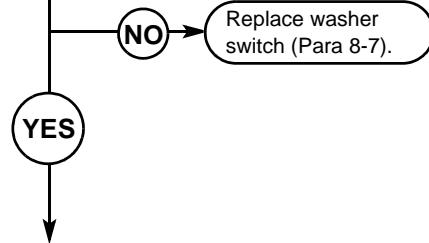
## 28. WINDSHIELD WASHER DOES NOT OPERATE (CONT.).

KNOWN INFO
Washer motor OK. Wire 30 OK.
POSSIBLE PROBLEMS
Washer switch faulty. Wire 35 faulty. Resistor assembly faulty. Washer motor faulty.

**2**

Is 24 vdc present at washer switch where wire 35 connects?

TEST OPTIONS
Voltage test. STE/ICE-R.
REASON FOR QUESTION
If 24 vdc is not present, washer switch faulty.

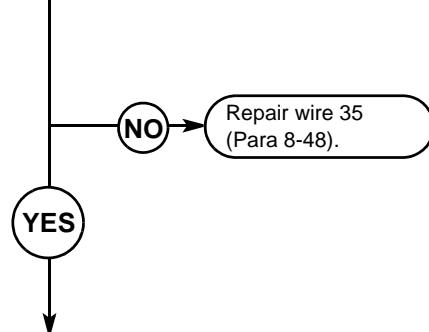


KNOWN INFO
Washer motor OK. Wire 30 OK. Rear wiper switch OK.
POSSIBLE PROBLEMS
Wire 35 faulty. Resistor assembly faulty. Washer motor faulty.

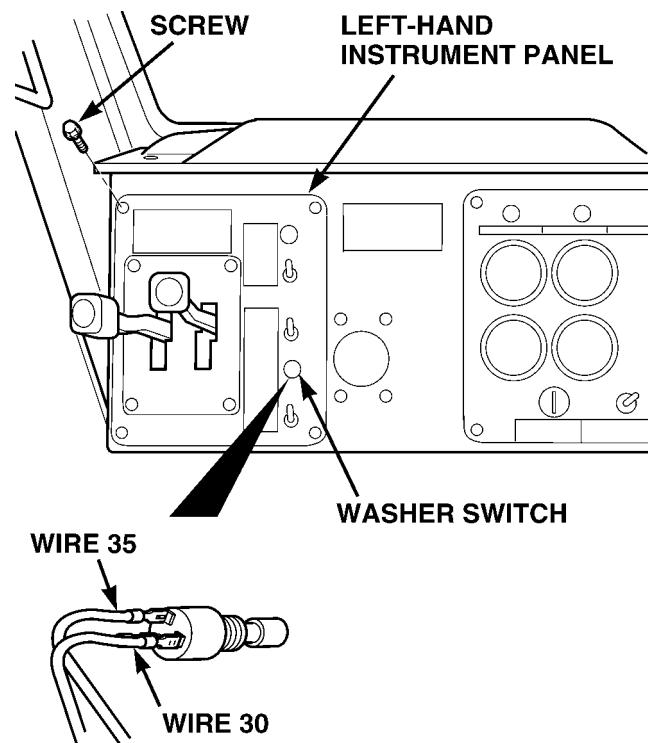
**3**

Is 24 vdc present at resistor assembly where wire 35 connects?

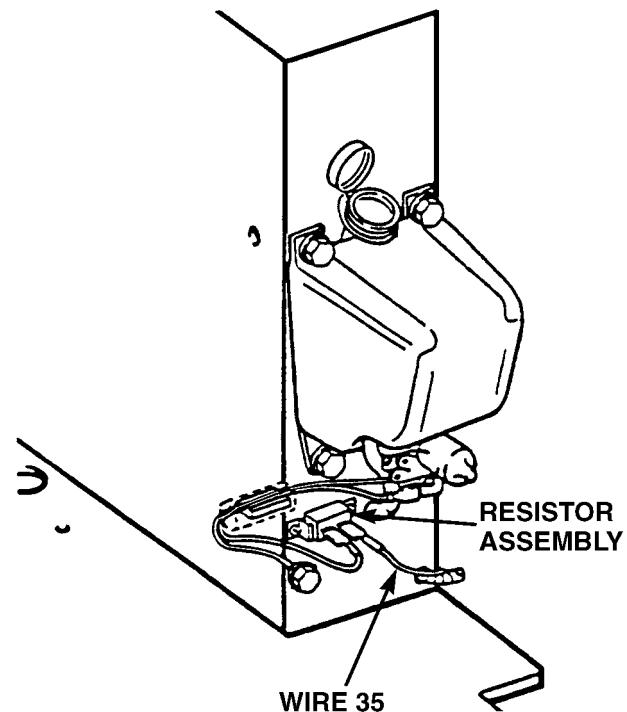
TEST OPTIONS
Voltage test. STE/ICE-R.
REASON FOR QUESTION
If 24 vdc is not present, wire 35 faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 35 where wire 35 connects to washer switch.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress washer switch (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace washer switch (Para 8-7).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable (Para 8-44).



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 35 where wire 35 connects to resistor assembly.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress washer switch (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, repair wire 35.
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable (Para 8-44).



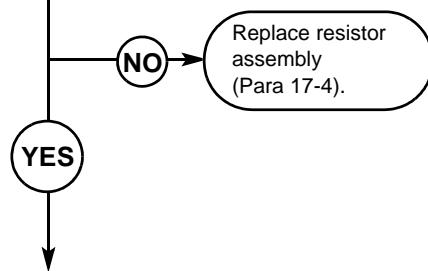
## 28. WINDSHIELD WASHER DOES NOT OPERATE (CONT.).

KNOWN INFO
Washer motor OK. Wire 30 OK. Rear wiper switch OK.
POSSIBLE PROBLEMS
Wire 35 faulty. Washer motor faulty.

**4**

Is 24 vdc present at resistor assembly where wire 35 leads to washer motor?

TEST OPTIONS
Voltage test. STE/ICE-R.
REASON FOR QUESTION
If 24 vdc is not present, wire 35 faulty.

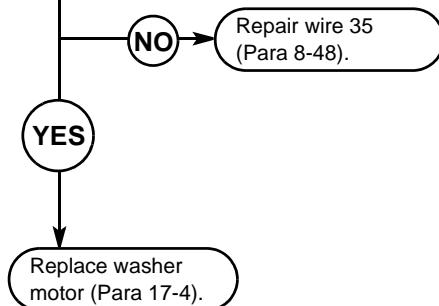


KNOWN INFO
Washer motor OK. Wire 30 OK. Rear wiper switch OK.
POSSIBLE PROBLEMS
Wire 35 faulty. Washer motor faulty.

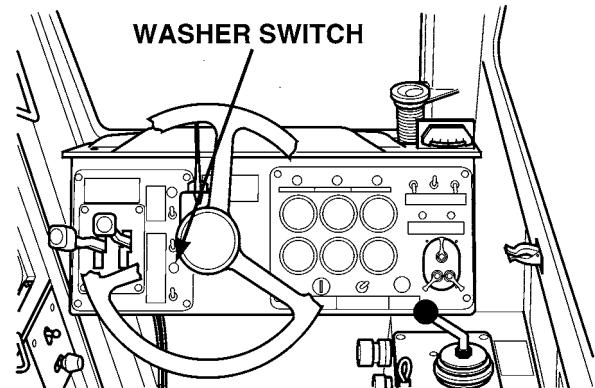
**5**

Is 24 vdc present on wire 35 where wire 35 connects to washer motor?

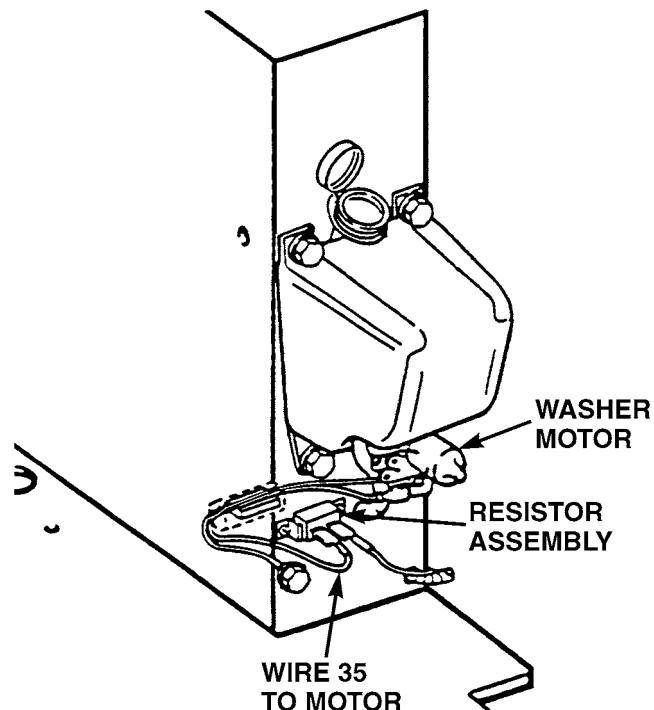
TEST OPTIONS
Voltage test. STE/ICE-R.
REASON FOR QUESTION
If 24 vdc is not present, wire 35 faulty.



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 35 where wire 35 leaves resistor assembly.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress washer switch (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, replace resistor assembly (Para 17-4).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable (Para 8-44).



<b>VOLTAGE CHECK</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 35 where wire 35 connects to motor.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-44).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(6)	Depress washer switch (TM 10-3930-673-10).
(a)	If 24 vdc is present, replace washer motor (Para 17-4).
(b)	If 24 vdc is not present, repair wire 35 (Para 8-48).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Install left-hand instrument panel and four screws.
(9)	Install battery cover (Para 8-42).



**29. HEATER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

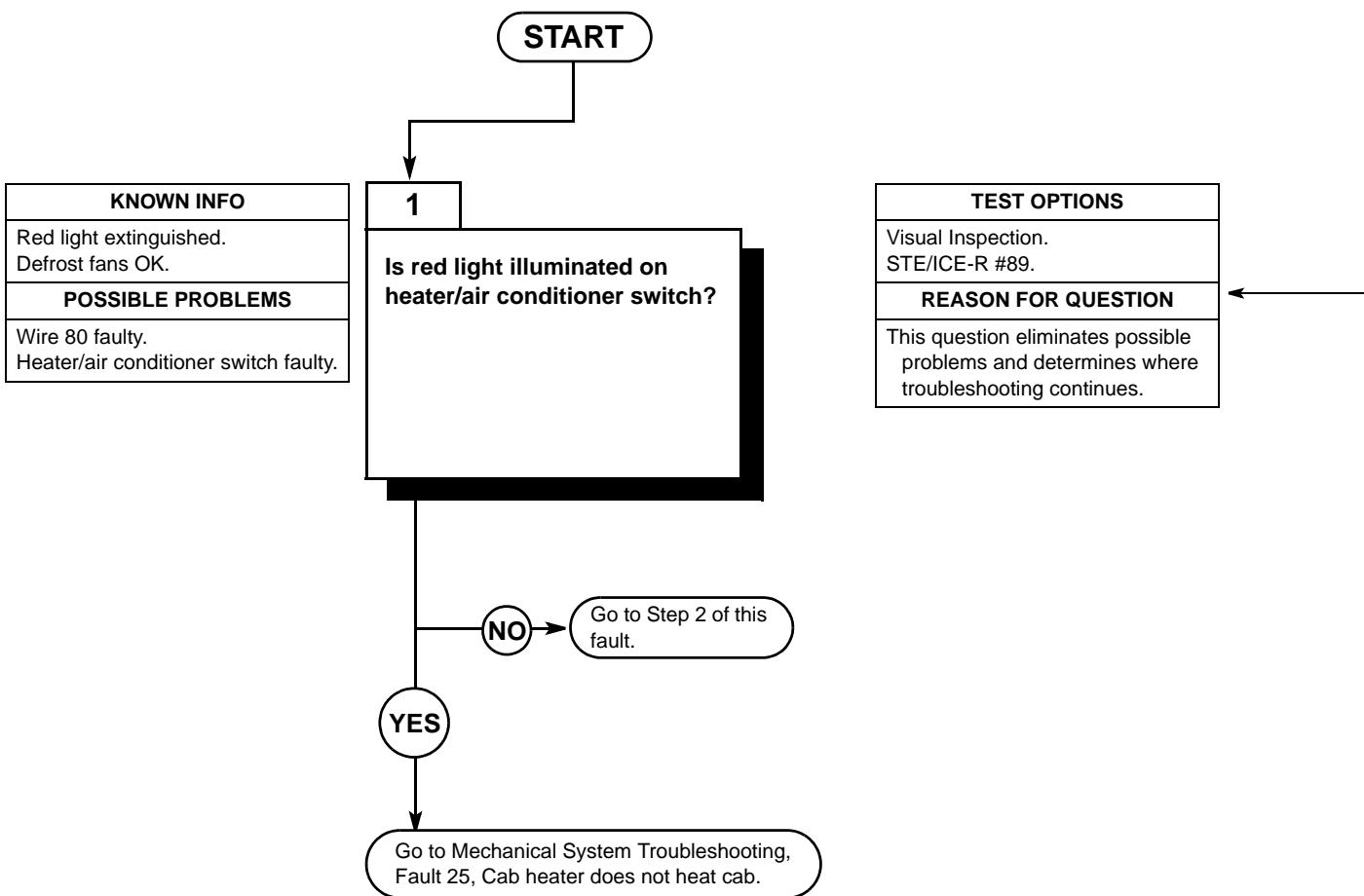
Two

*References*

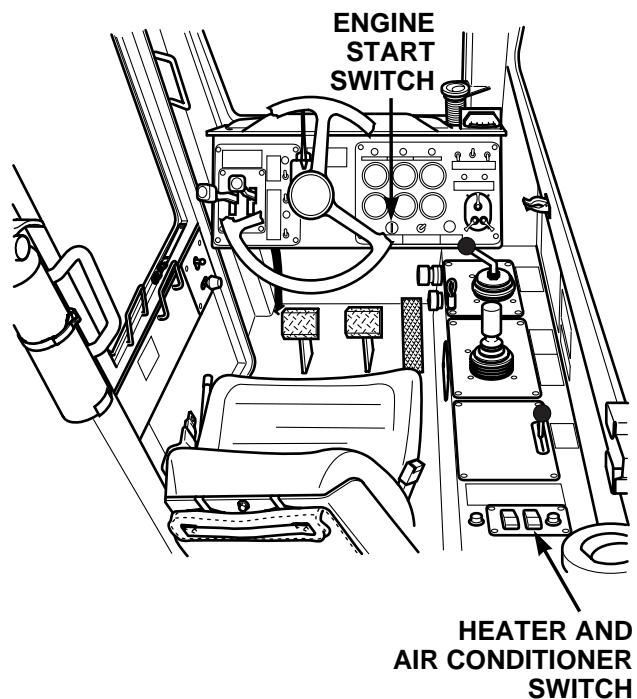
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

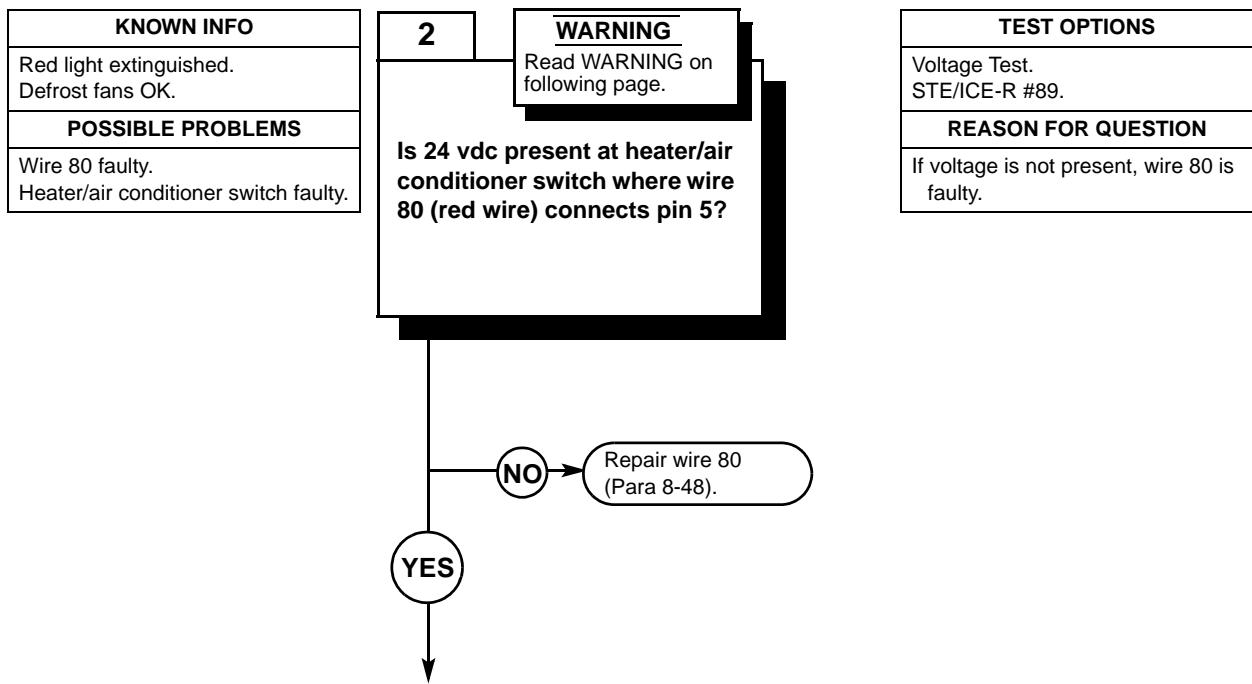
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(2)	Turn heater/air conditioner switch to HEAT (TM 10-3930-673-10). (a) If light is illuminated, go to Mechanical System Troubleshooting Fault 25, Cab heater does not heat cab. (b) If light is not illuminated, go to Step 2 of this fault.
(3)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10).
(4)	Turn engine start switch to OFF position (TM 10-3930-673-10).



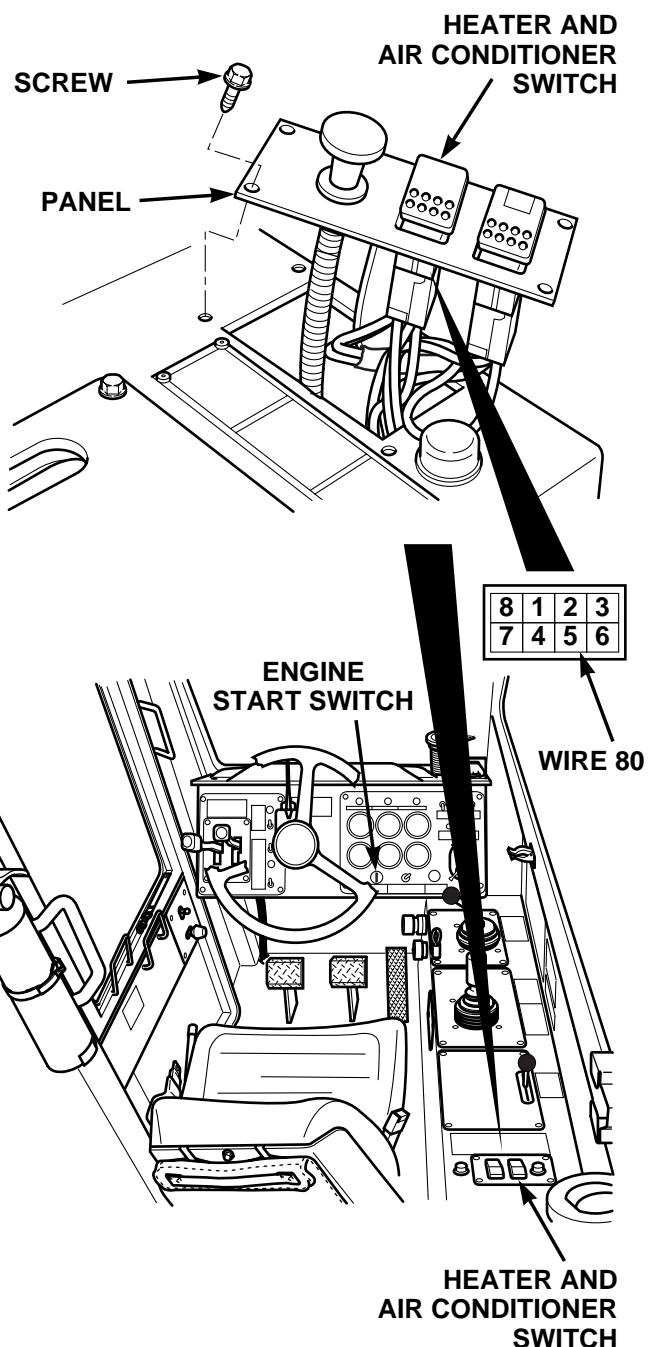
## 29. HEATER DOES NOT OPERATE (CONT.).



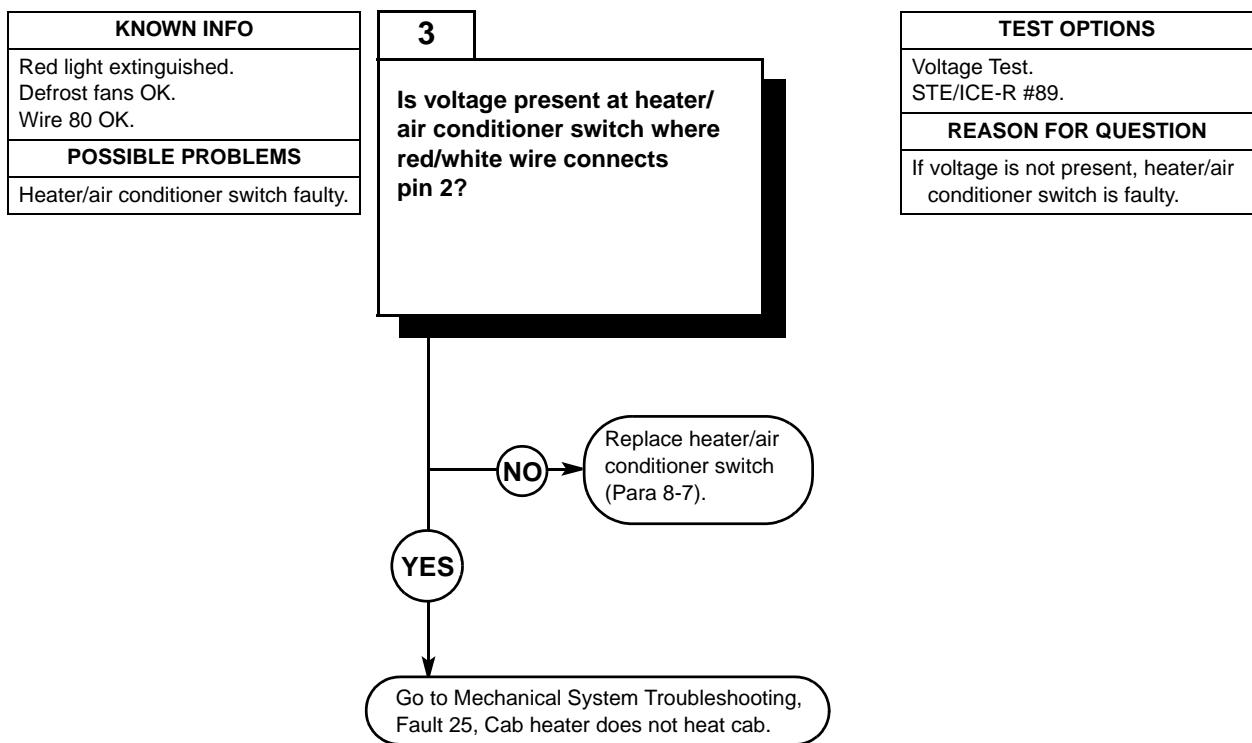
**WARNING**

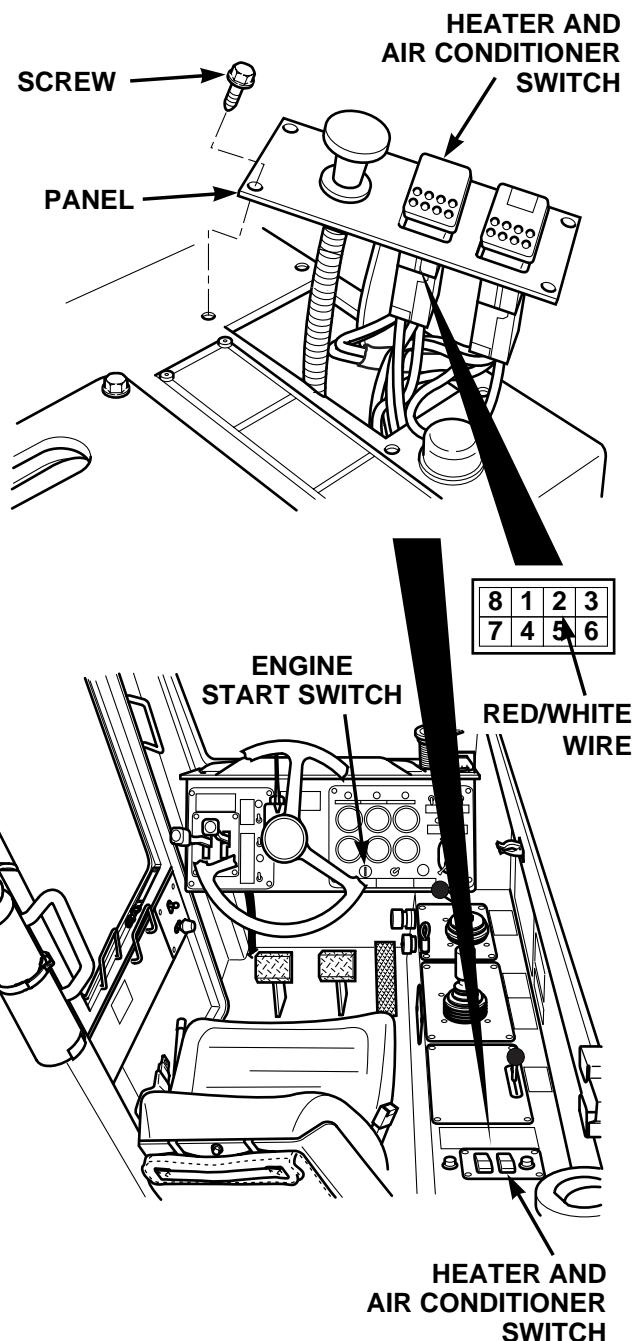
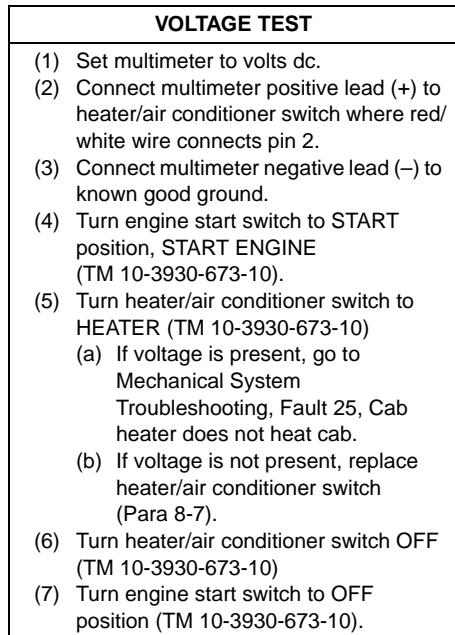
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock. Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from heater and air conditioner temperature control panel.
(4)	Set multimeter to volts dc.
(5)	Raise heater and air conditioner temperature control panel out to reach heater/air conditioner switch.
(6)	Connect multimeter positive lead (+) to heater/air conditioner switch where wire 80 (red wire) connects pin 5.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 80 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).



## 29. HEATER DOES NOT OPERATE (CONT.).





**30. AIR CONDITIONER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

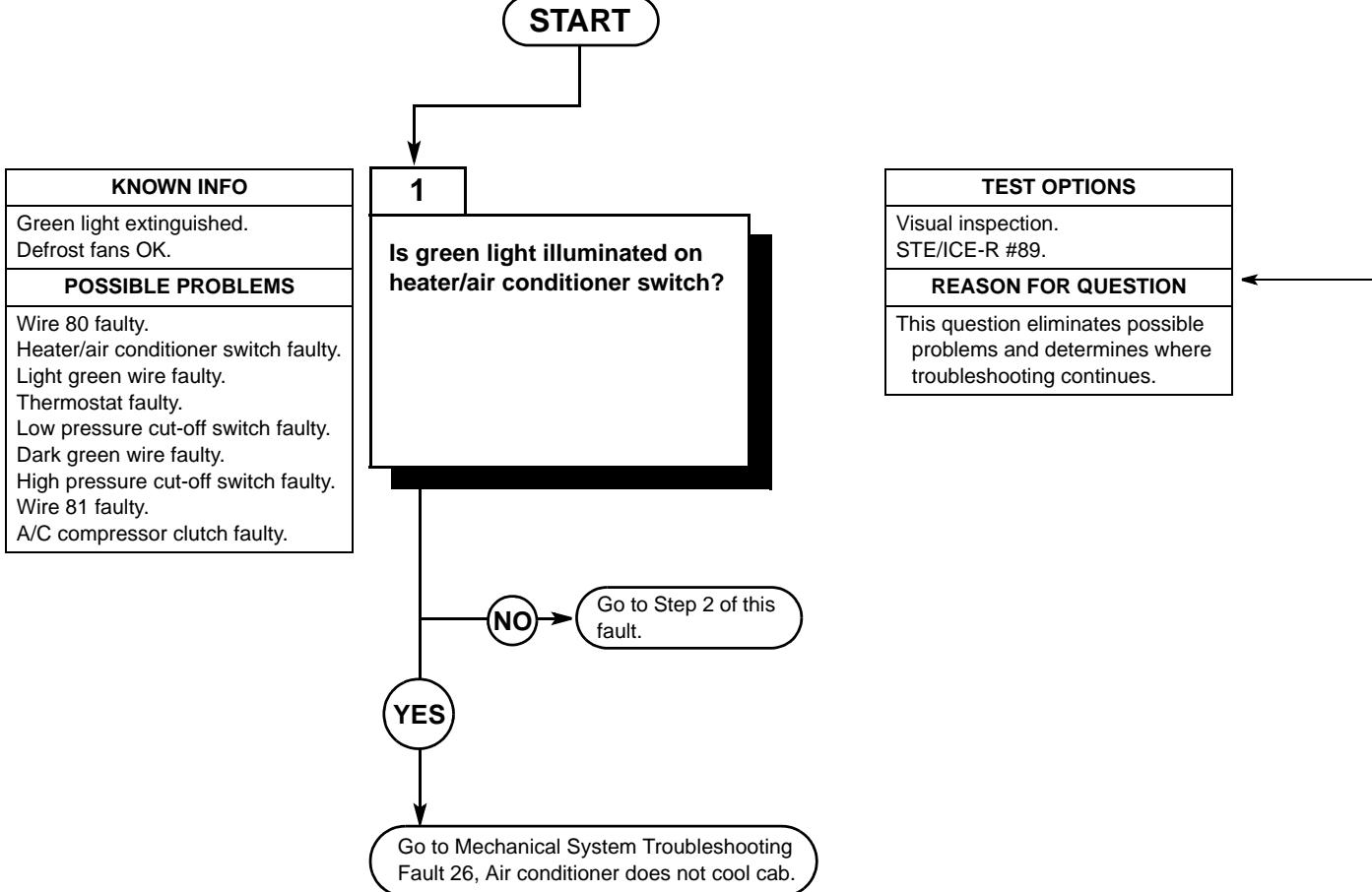
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

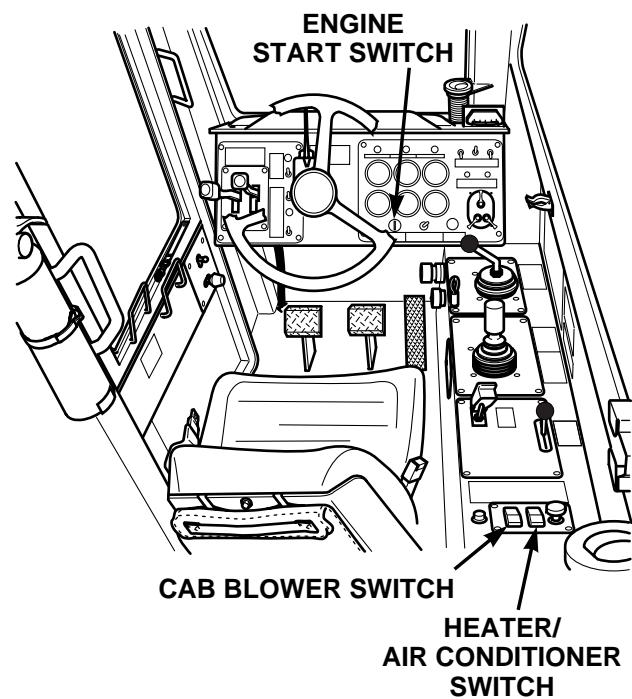
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

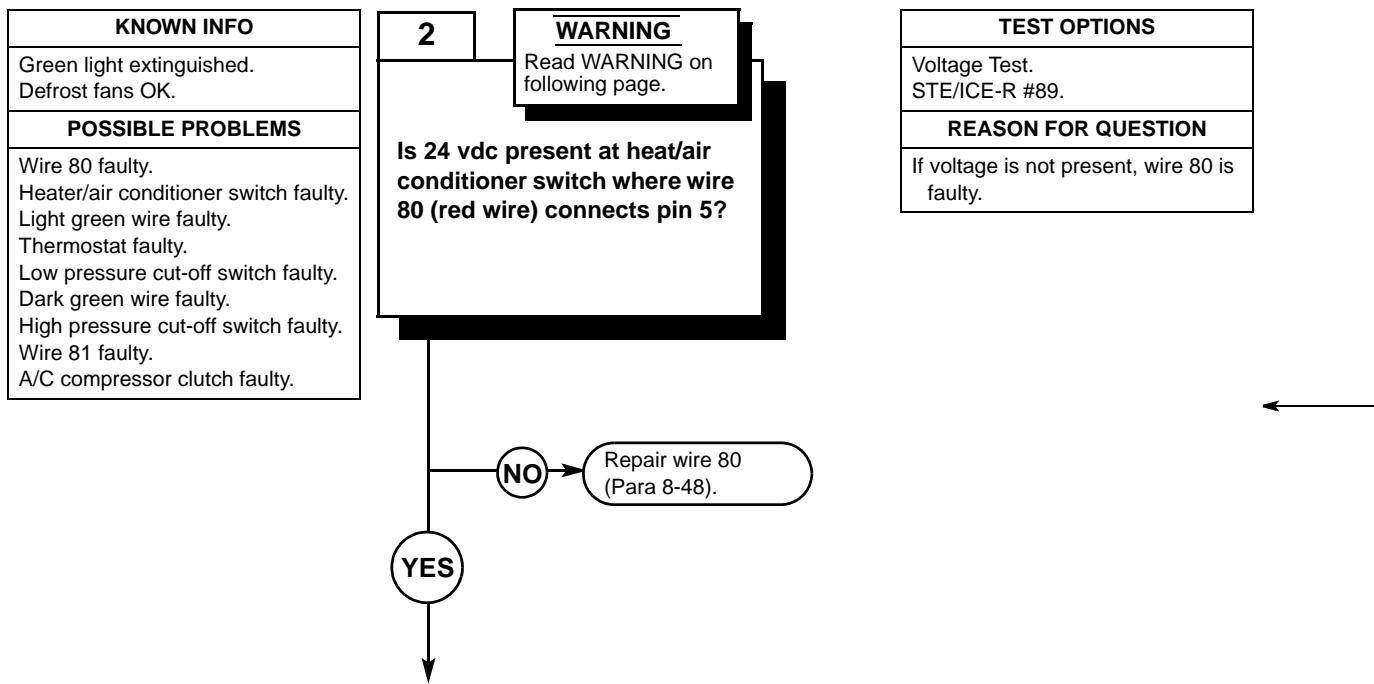


**VISUAL INSPECTION**

- (1) Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
- (2) Turn heater/air conditioner switch to A/C (TM 10-3930-673-10).
  - (a) If light is illuminated, go to Mechanical System Troubleshooting, Fault 26, Air conditioner does not cool cab.
  - (b) If light is not illuminated, go to Step 2 of this fault.
- (3) Turn heater/air conditioner switch OFF (TM 10-3930-673-10).
- (4) Turn engine start switch to OFF position (TM 10-3930-673-10).



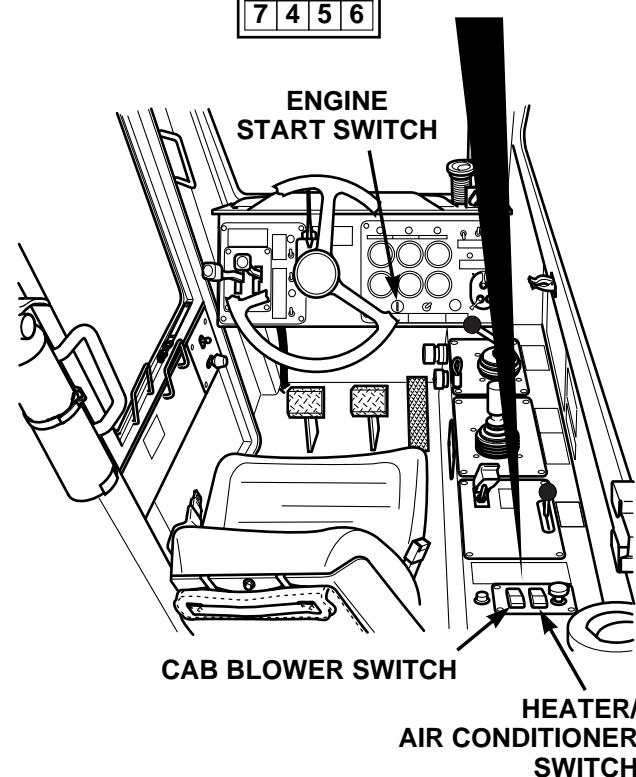
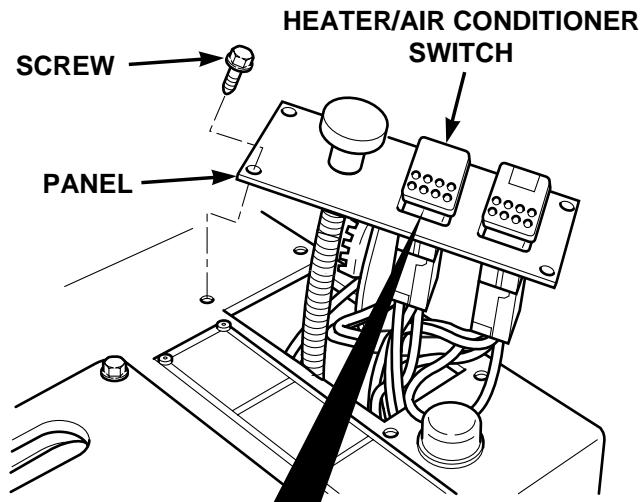
## 30. AIR CONDITIONER DOES NOT OPERATE (CONT.).



**WARNING**

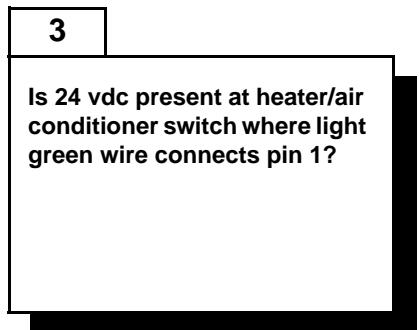
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from heater and air conditioner temperature control panel.
(4)	Set multimeter to volts dc.
(5)	Raise heater and air conditioner temperature control panel out to reach heater/air conditioner switch.
(6)	Connect multimeter positive lead (+) to heater/air conditioner switch where wire 80 (red wire) connects pin 5.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10). <ol style="list-style-type: none"> <li>If 24 vdc is present, go to Step 3 of this fault.</li> <li>If 24 vdc is not present, repair wire 80 (Para 8-48).</li> </ol>
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).

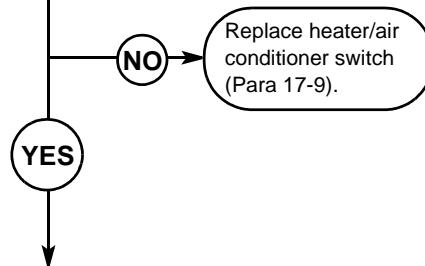


## 30. AIR CONDITIONER DOES NOT OPERATE (CONT.).

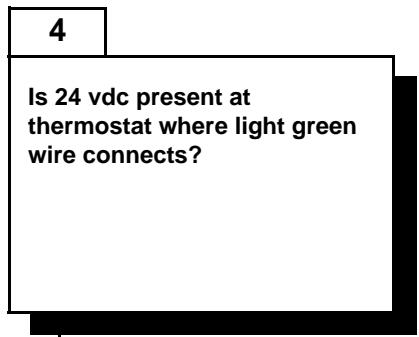
KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK.
POSSIBLE PROBLEMS
Heater/air conditioner switch faulty. Light green wire faulty. Thermostat faulty. Low pressure cut-off switch faulty. Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.



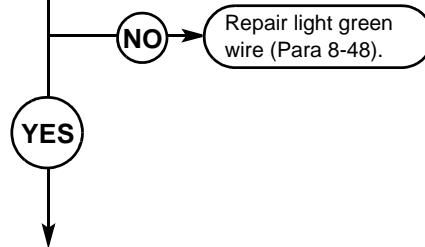
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, heater/air conditioner switch is faulty.



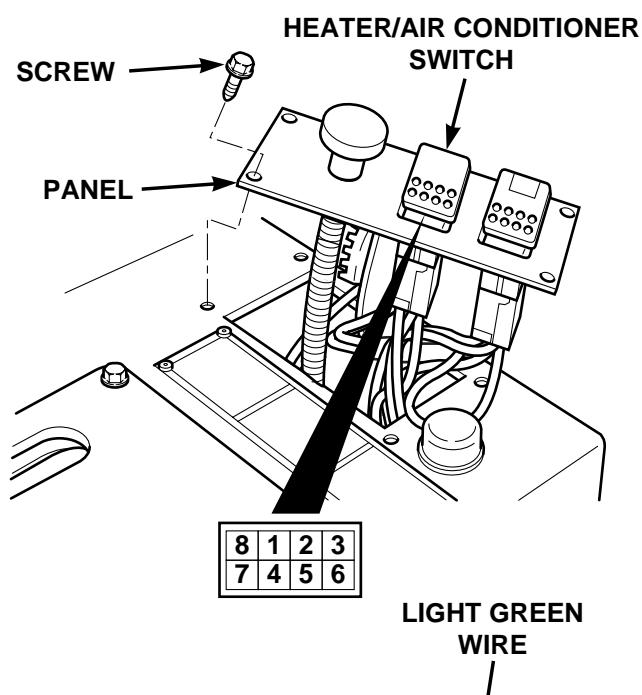
KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK.
POSSIBLE PROBLEMS
Light green wire faulty. Thermostat faulty. Low pressure cut-off switch faulty. Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.



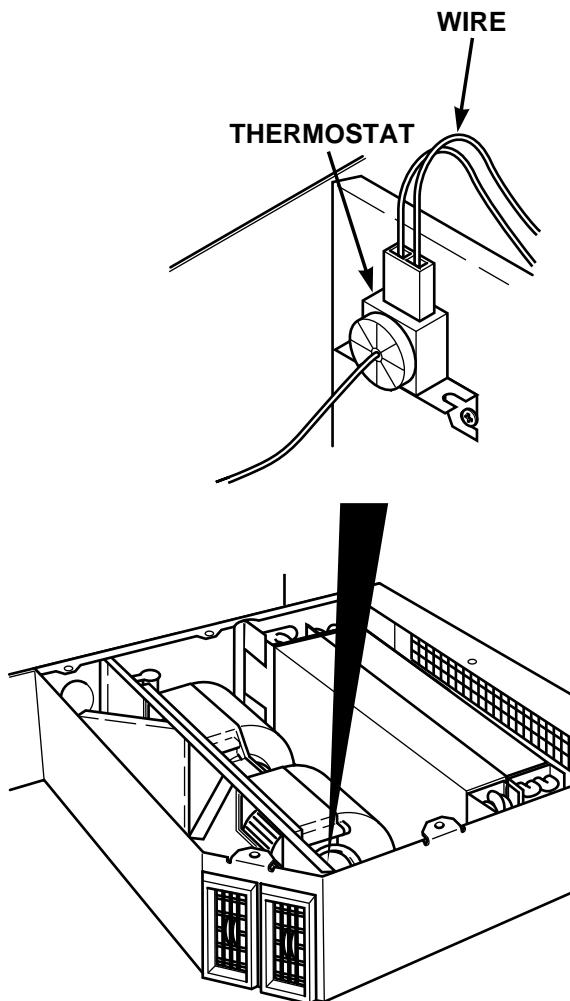
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, light green wire is faulty.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to heater/air conditioner switch where light green wire connects pin 1.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(6)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, replace heater/air conditioner switch (Para 17-9).
(7)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Remove seat (Para 16-12).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to thermostat where light green wire connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If voltage is present, go to Step 5 of this fault.
(b)	If voltage is not present, repair light green wire (Para 8-48).
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



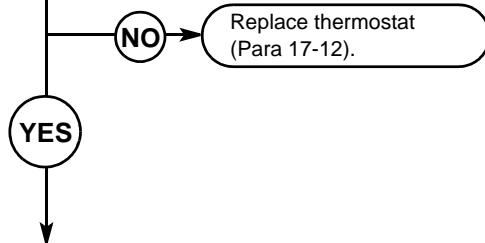
## 30. AIR CONDITIONER DOES NOT OPERATE (CONT.).

KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK.
POSSIBLE PROBLEMS
Thermostat faulty. Low pressure cut-off switch faulty. Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.

**5**

Is voltage present at thermostat where wire 81 connects?

TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, thermostat is faulty.

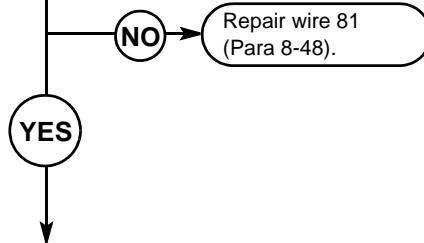


KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK. Thermostat OK.
POSSIBLE PROBLEMS
Low pressure cut-off switch faulty. Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.

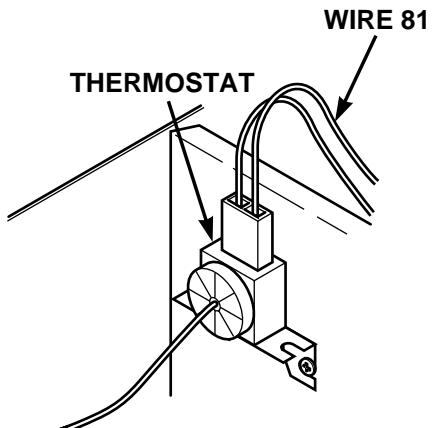
**6**

Is voltage present at low pressure cut-off switch where wire 81 connects?

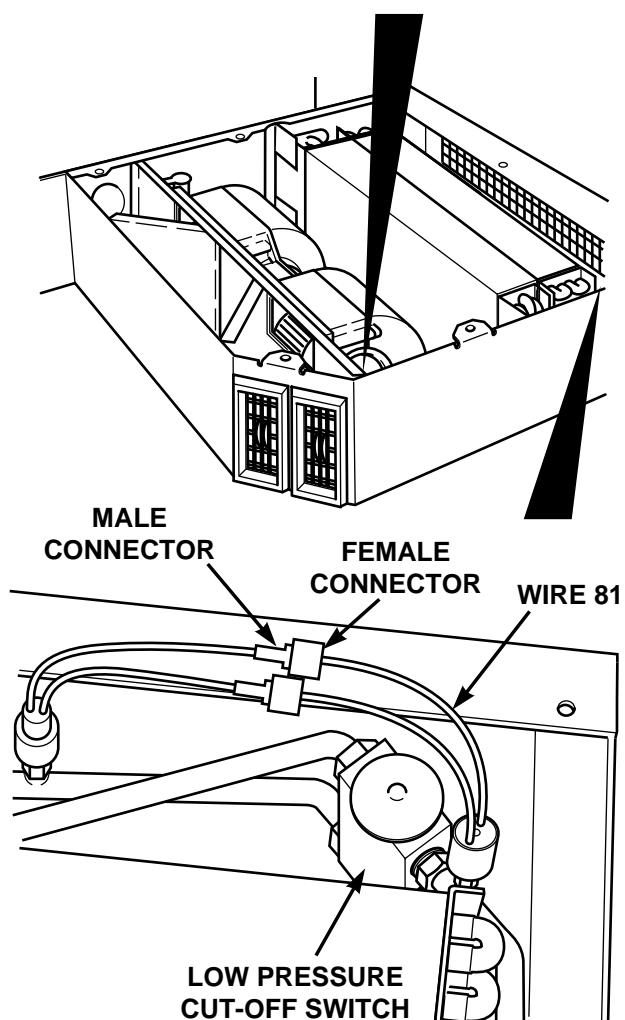
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 81 is faulty.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to thermostat where wire 81 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery to negative side of battery (Para 8-42).
(5)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(6)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10) <ul style="list-style-type: none"> <li>(a) If voltage is present, go to Step 6 of this fault.</li> <li>(b) If voltage is not present, replace thermostat (Para 17-12).</li> </ul>
(7)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect male connector from female connector for wire 81.
(3)	Connect multimeter positive lead (+) to low pressure cut-off switch where wire 81 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10) <ul style="list-style-type: none"> <li>(a) If voltage is present, go to Step 7 of this fault.</li> <li>(b) If voltage is not present, repair wire 81 (Para 8-48).</li> </ul>
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(11)	Connect male connector to female connector for wire 81.



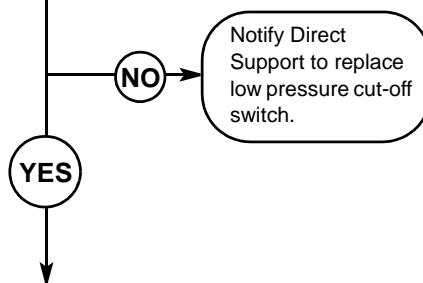
## 30. AIR CONDITIONER DOES NOT OPERATE (CONT.).

KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK. Thermostat OK. Wire 81 OK.
POSSIBLE PROBLEMS
Low pressure cut-off switch faulty. Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.

7

Is voltage present at low pressure cut-off switch where dark green wire connects?

TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, low pressure cut-off switch is faulty.



←

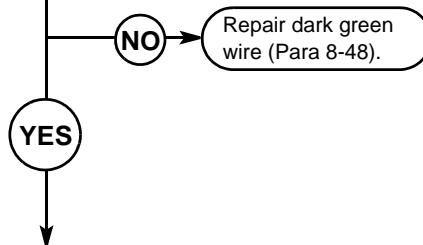
KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK. Thermostat OK. Wire 81 OK. Low pressure cut-off switch OK
POSSIBLE PROBLEMS
Dark green wire faulty. High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.

8

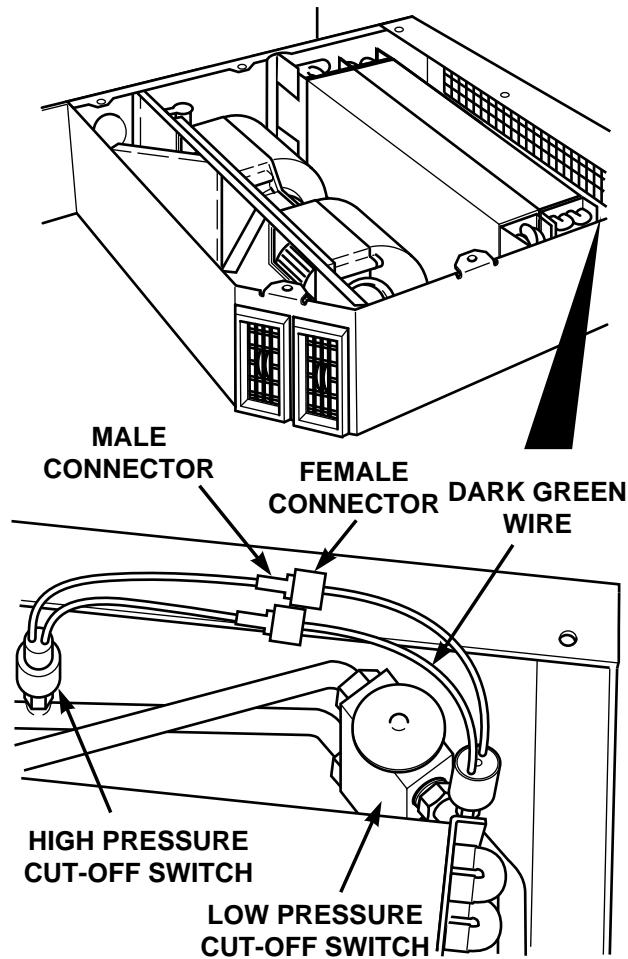
Is voltage present at high pressure cut-off switch where dark green wire connects?

TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, dark green wire is faulty.

←



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect male connector from female connector for dark green wire at low pressure auto-off switch.
(3)	Connect multimeter positive lead (+) to low pressure cut-off switch where dark green wire connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If voltage is present, go to Step 8 of this fault.
(b)	If voltage is not present, notify Direct Suport to replace low pressure cut-off switch.
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(11)	Connect male connector to female connector.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect male connector from female connector.
(3)	Connect multimeter positive lead (+) to high pressure cut-off switch where dark green wire connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If voltage is present, go to Step 9 of this fault.
(b)	If voltage is not present, repair dark green wire (Para 8-48).
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(11)	Connect male connector to female connector for dark green wire at high pressure cut-off switch.

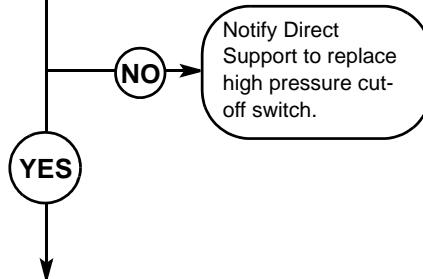
## 30. AIR CONDITIONER DOES NOT OPERATE (CONT.).

KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK. Thermostat OK. Wire 81 OK. Low pressure cut-off switch OK Dark green wire OK.
POSSIBLE PROBLEMS
High pressure cut-off switch faulty. Wire 81 faulty. A/C compressor clutch faulty.

**9**

Is voltage present at high pressure cut-off switch where wire 81 connects?

TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, high pressure cut-off switch is faulty.

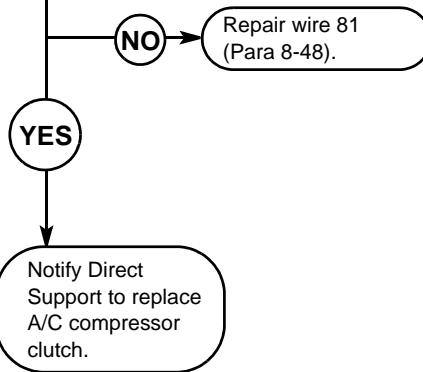


KNOWN INFO
Green light extinguished. Defrost fans OK. Wire 80 OK. Heater/air conditioner switch OK. Light green wire OK. Thermostat OK. Wire 81 OK. Low pressure cut-off switch OK Dark green wire OK. High pressure cut-off switch OK.
POSSIBLE PROBLEMS
Wire 81 faulty. A/C compressor clutch faulty.

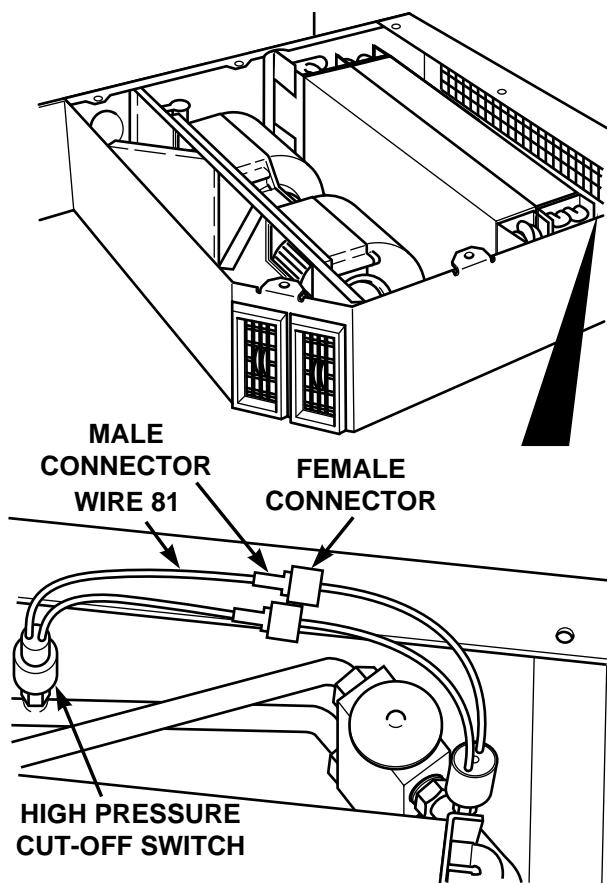
**10**

Is voltage present at A/C compressor clutch where wire 81 connects?

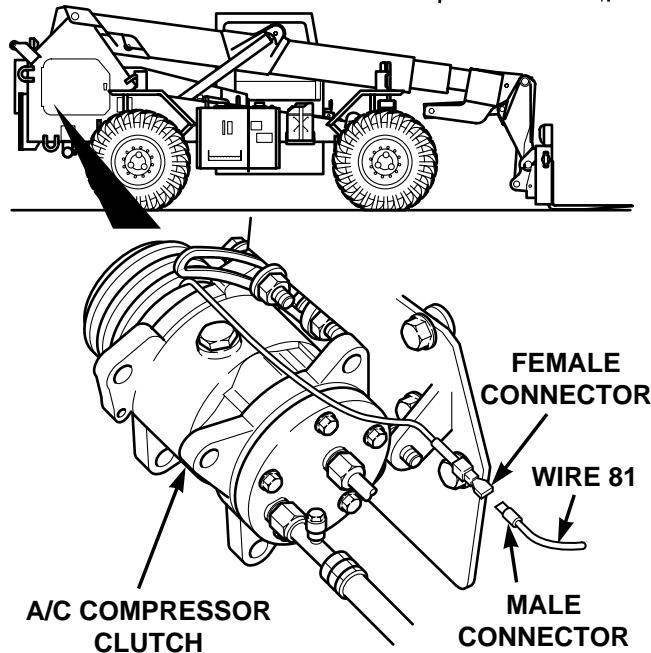
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 81 is faulty.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect male connector from female connector for wire 81 at high pressure cut-off switch.
(3)	Connect multimeter positive lead (+) to high pressure cut-off switch where wire 81 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If voltage is present, go to Step 10 of this fault.
(b)	If voltage is not present, notify Direct Support to replace high pressure cut-off switch.
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(11)	Connect male connector to female connector for wire 81 at high pressure cut-off switch.



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Disconnect male connector from female connector for wire 81.
(3)	Connect multimeter positive lead (+) to A/C compressor clutch where wire 81 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to START position, START ENGINE (TM 10-3930-673-10).
(7)	Turn heater/air conditioner switch to A/C (TM 10-3930-673-10)
(a)	If voltage is present, notify Direct Support to replace A/C compressor clutch.
(b)	If voltage is not present, repair wire 81 (Para 8-48).
(8)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Connect male connector to female connector for wire 81.
(11)	Install battery cover (Para 8-42).



**31. CAB BLOWER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

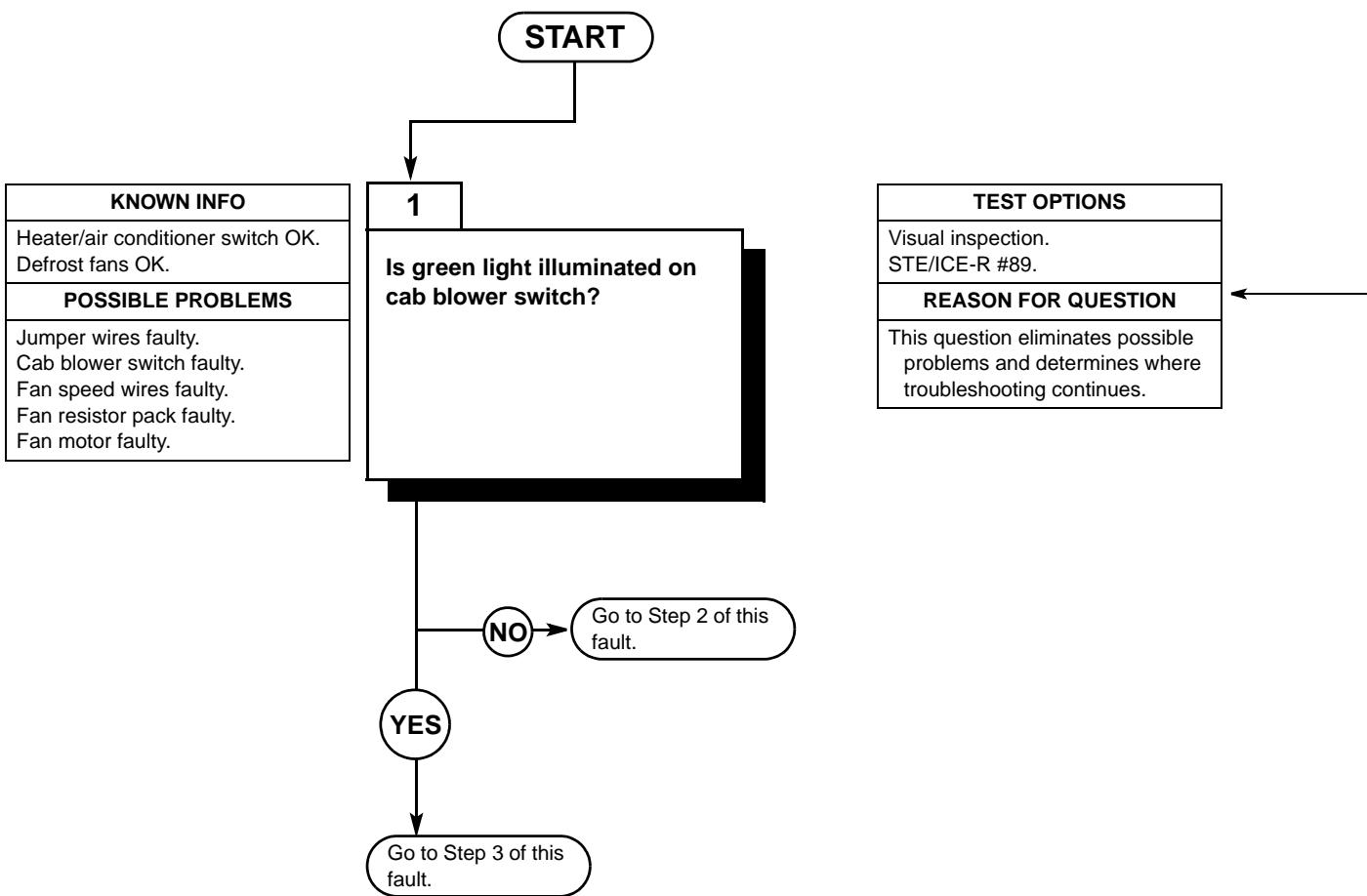
Two

*References*

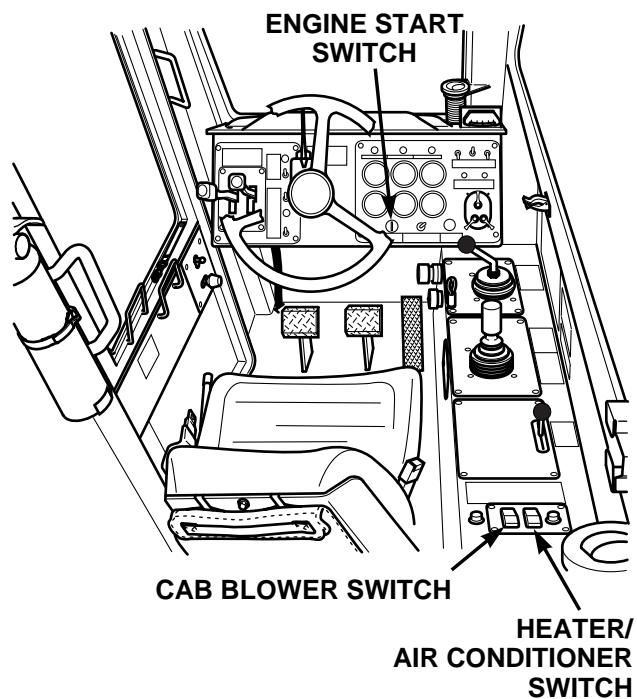
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

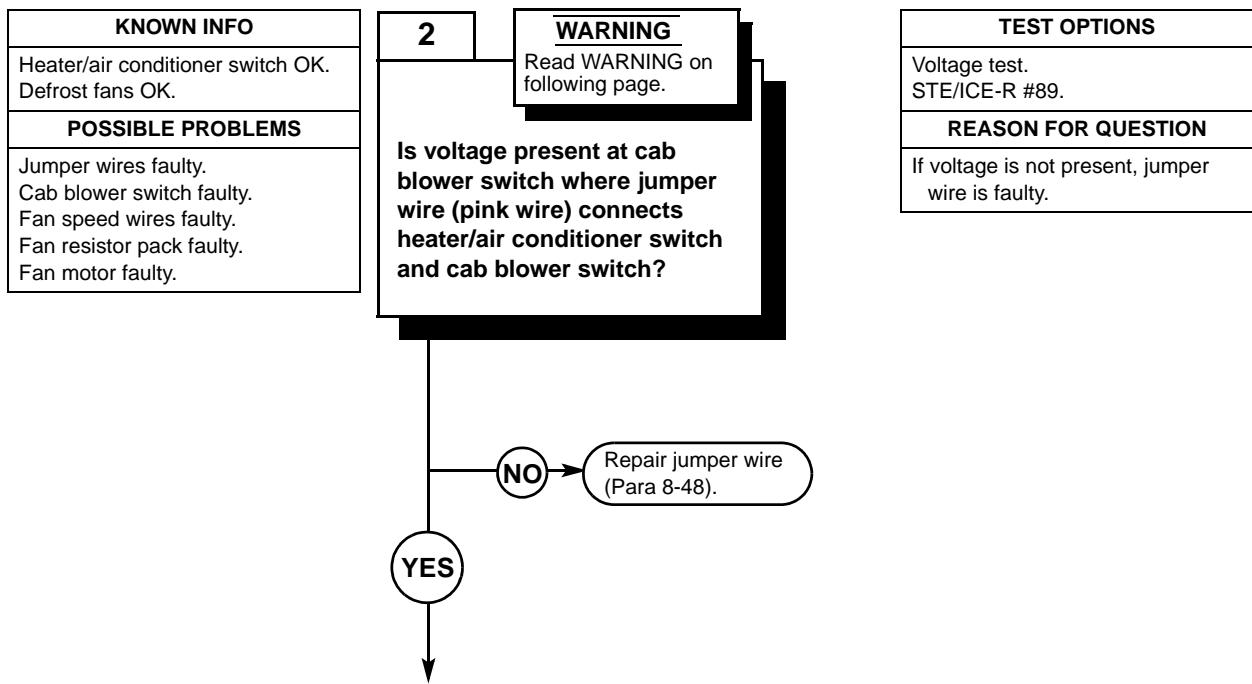
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(2)	Turn heater/air conditioner switch to HEAT (TM 10-3930-673-10).
(3)	Cycle through all fan speeds, High, Medium, Low (TM 10-3930-673-10). (a) If light is illuminated, go to Step 3 of this fault. (b) If light is not illuminated, go to Step 2 of this fault.
(4)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10).
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).



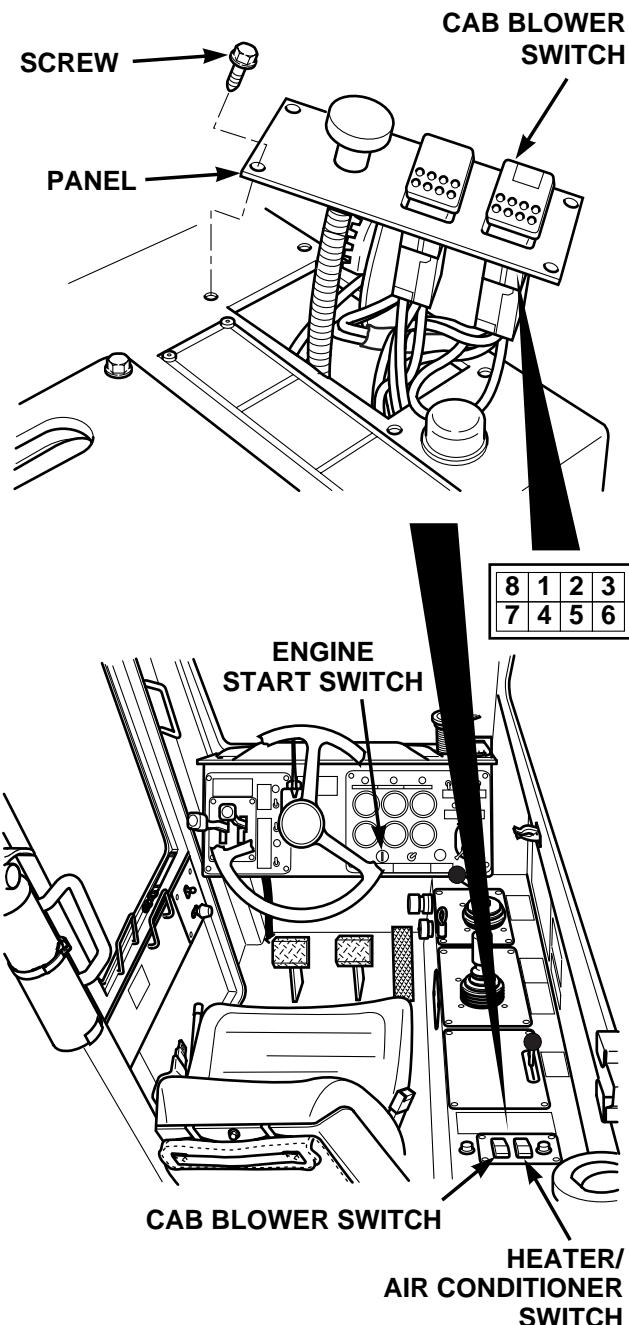
## 31. CAB BLOWER DOES NOT OPERATE (CONT.).



**WARNING**

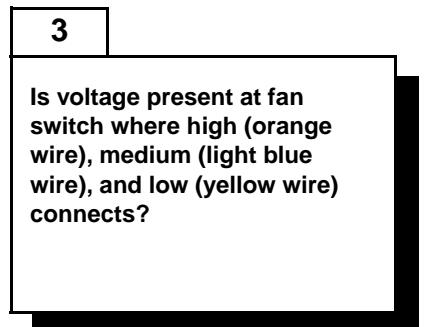
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>
(1) Remove battery cover (Para 8-42).
(2) Disconnect negative battery cable from negative side of battery (Para 8-42).
(3) Remove four screws from heater and air conditioner temperature control panel.
(4) Raise heater and air conditioner temperature control panel out to reach heater/air conditioner switch.
(5) Set multimeter to volts dc.
(6) Connect multimeter positive lead (+) to cab blower switch where jumper wires connect pins 7, 8 and/or 5.
(7) Connect multimeter negative lead (-) to known good ground.
(8) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(9) Turn heater/air conditioner switch to HEAT (TM 10-3930-673-10).
(a) If voltage is present, go to Step 3 of this fault.
(b) If voltage is not present, repair jumper wire (Para 8-48).
(10) Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
(11) Turn engine start switch to OFF position (TM 10-3930-673-10).



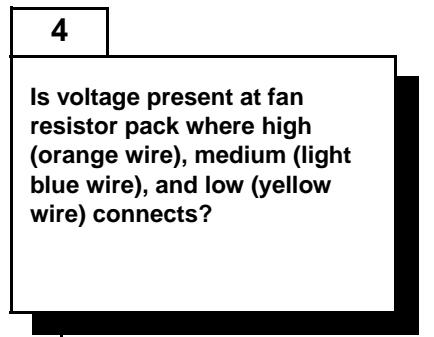
## 31. CAB BLOWER DOES NOT OPERATE (CONT.).

KNOWN INFO
Heater/air conditioner switch OK. Defrost fans OK. Jumper wires OK.
POSSIBLE PROBLEMS
Cab blower switch faulty. Fan speed wires faulty. Fan resistor pack faulty. Fan motor faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, fan switch is faulty.

KNOWN INFO
Heater/air conditioner switch OK. Defrost fans OK. Jumper wires OK. Cab blower switch OK.
POSSIBLE PROBLEMS
Fan speed wires faulty. Fan resistor pack faulty. Fan motor faulty.



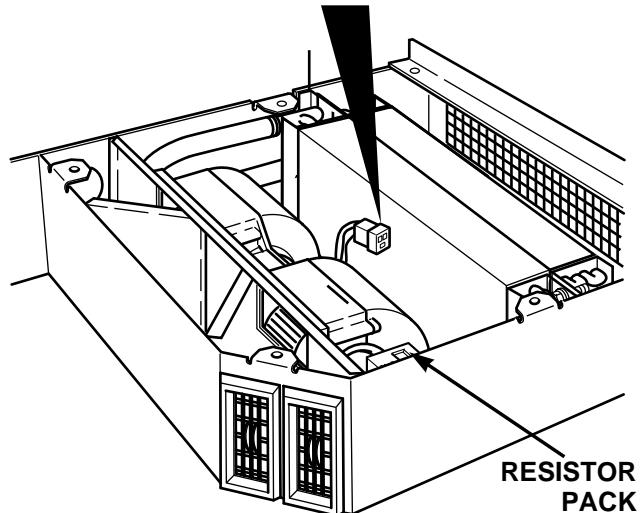
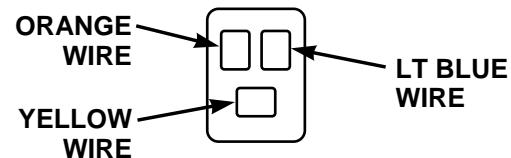
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, fan speed wire is faulty.

**VOLTAGE TEST**

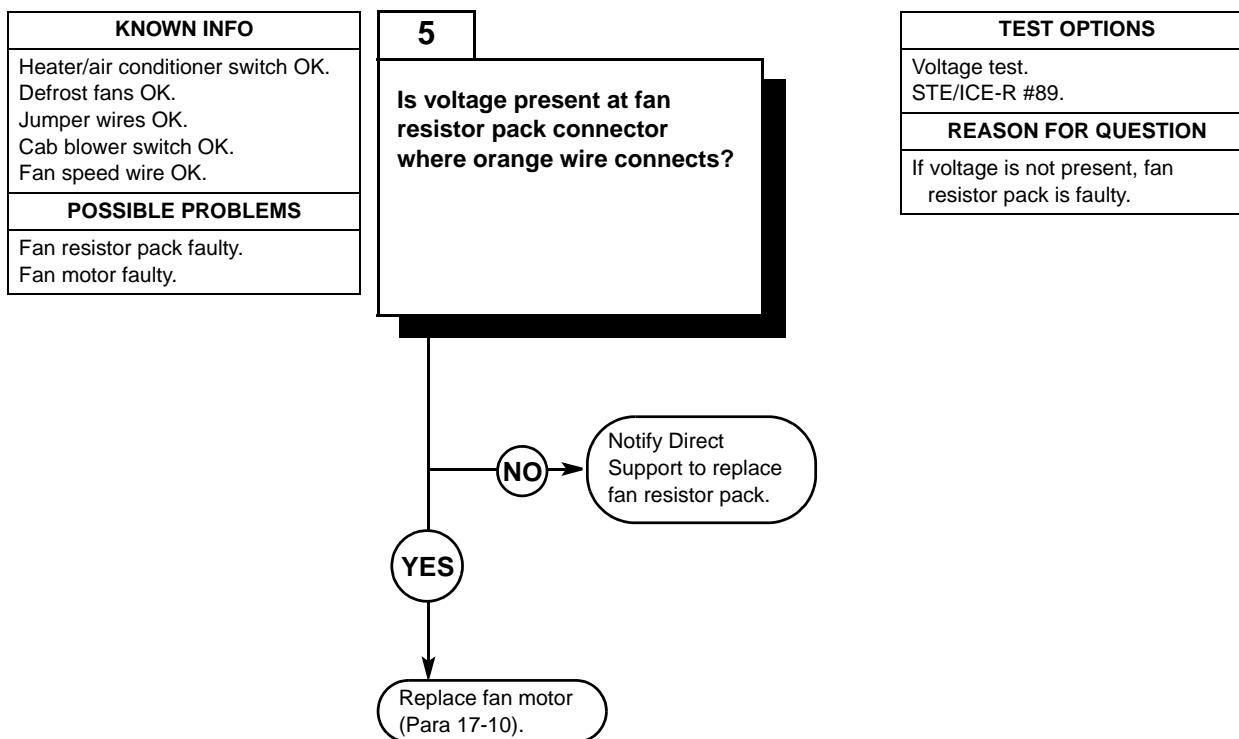
- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to fan switch where high (orange wire), medium (light blue wire), low (yellow wire) connects pins 1, 3, or 6.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (5) Turn heater/air conditioner switch to Heat (TM 10-3930-673-10)
- (6) Cycle through all fan speeds, High, Medium, Low (TM 10-3930-673-10).
  - (a) If voltage is present, go to Step 4 of this fault.
  - (b) If voltage is not present, replace fan switch (Para 17-9).
- (7) Turn heater/air conditioner switch OFF (TM 10-3930-673-10)
- (8) Turn engine start switch to OFF position (TM 10-3930-673-10).

**VOLTAGE TEST**

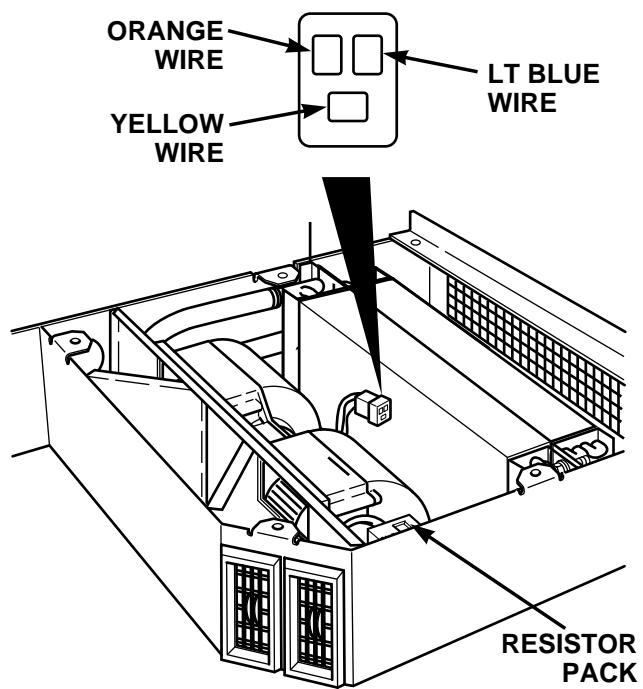
- (1) Remove seat (Para 16-12).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to fan Resistor Pack connector J1 where high (orange wire), medium (light blue wire), low (yellow wire) connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Turn heater/air conditioner switch to Heat (TM 10-3930-673-10)
- (7) Cycle through all the fan speeds, High, Medium, Low (TM 10-3930-673-10).
  - (a) If voltage is present, go to Step 5 of this fault.
  - (b) If voltage is not present, repair faulty wire (Para 8-48).
- (8) Turn heater/air conditioner switch OFF (TM 10-3930-673-10).
- (9) Turn engine start switch to OFF position (TM 10-3930-673-10).



## 31. CAB BLOWER DOES NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to fan blower motor connector J1 where high (orange wire), medium (light blue wire), low (yellow wire) connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(5)	Turn heater/air conditioner switch to Heat (TM 10-3930-673-10).
(6)	Cycle through all the fan speeds, High, Medium, Low (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If voltage is present, replace fan motor (Para 17-10).</li> <li>(b) If voltage is not present, notify Direct Support to replace fan resistor pack.</li> </ul>
(7)	Turn heater/air conditioner switch OFF (TM 10-3930-673-10).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Install seat (Para 16-12).



**32. FORK AUTO-LEVELER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

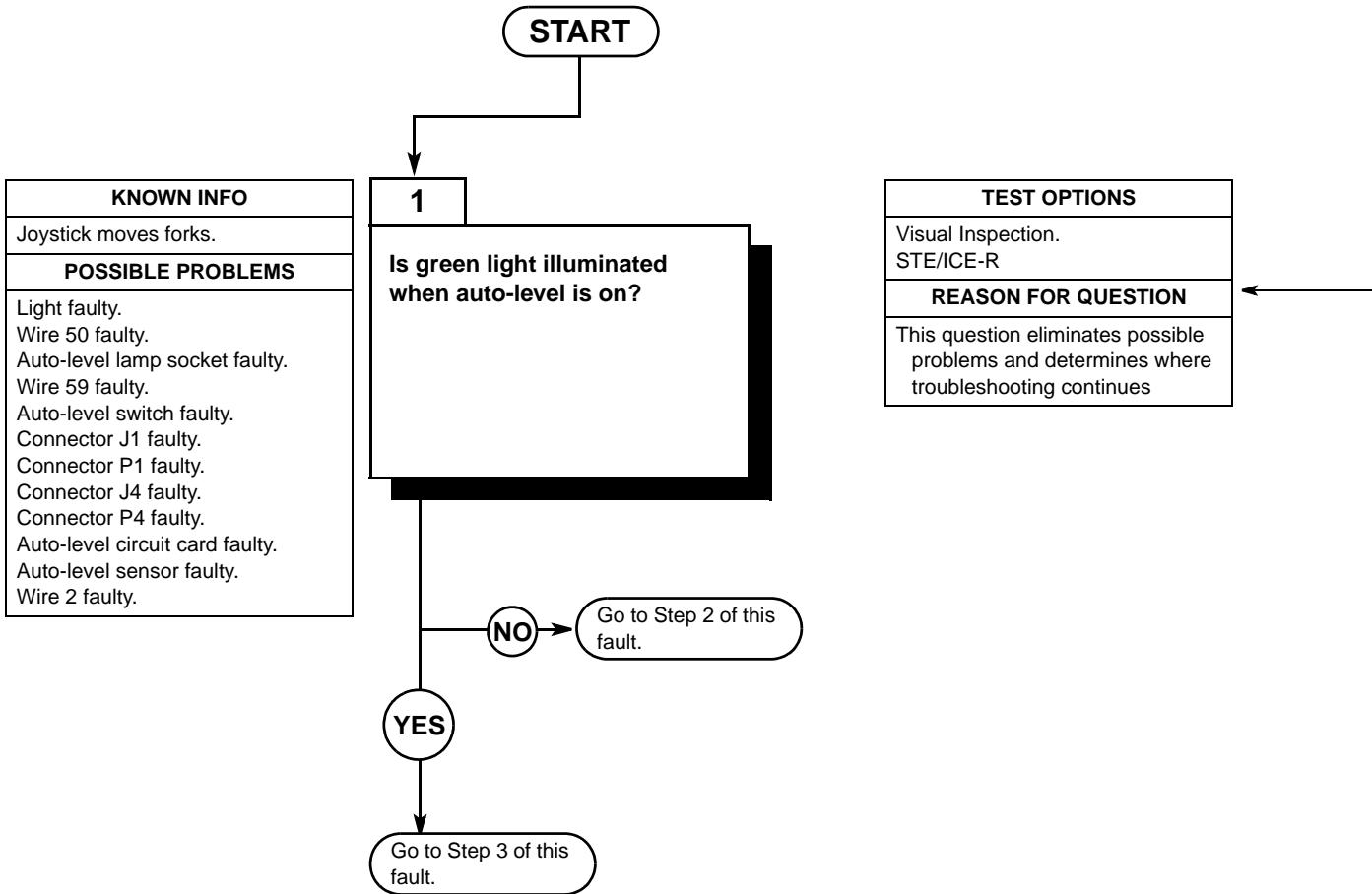
Two

*References*

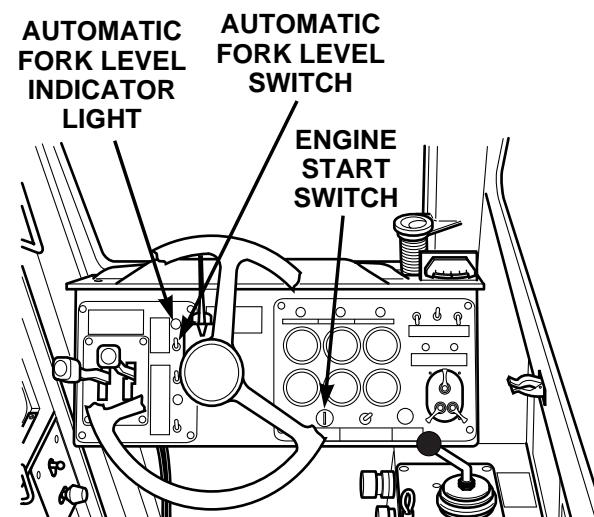
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

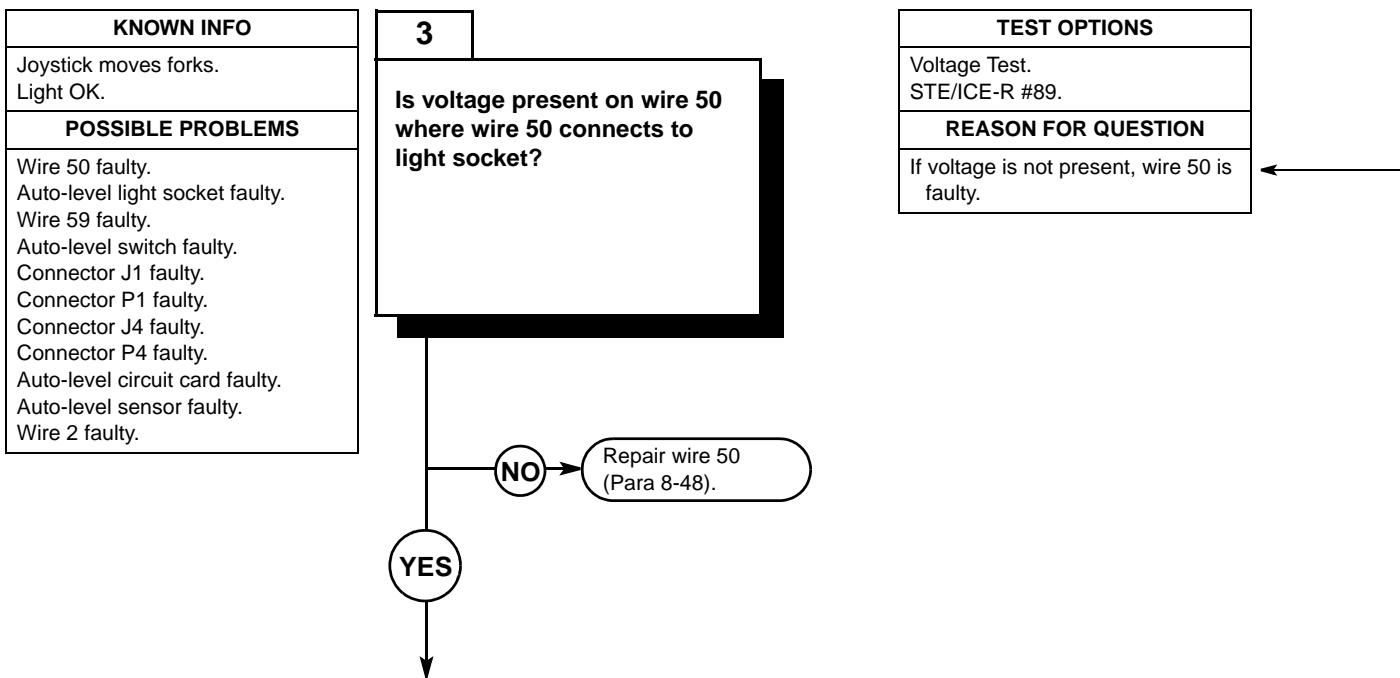
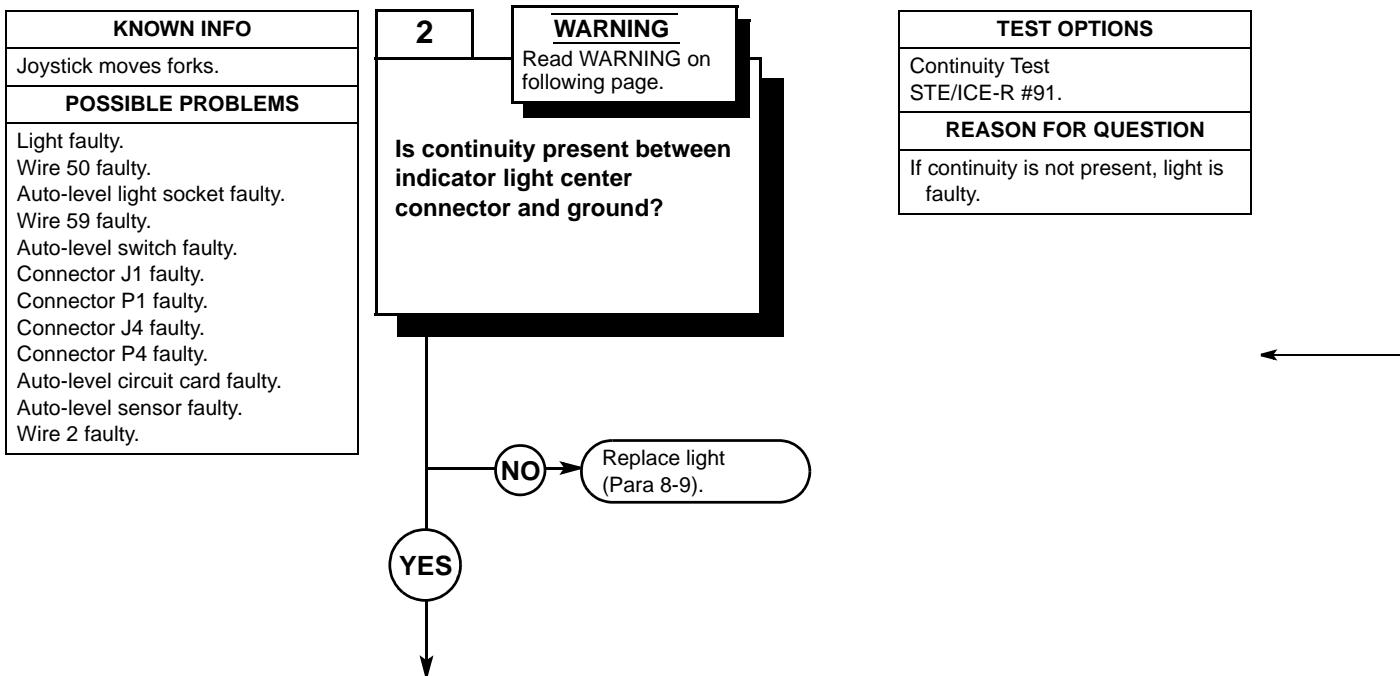
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(2)	Turn auto-level switch to ON (TM 10-3930-673-10). (a) If green light is illuminated, go to Step 3 of this fault. (b) If green light is not illuminated, go to Step 2 of this fault.
(3)	Turn auto-level switch OFF (TM 10-3930-673-10).
(4)	Turn engine start switch to OFF position (TM 10-3930-673-10).



## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

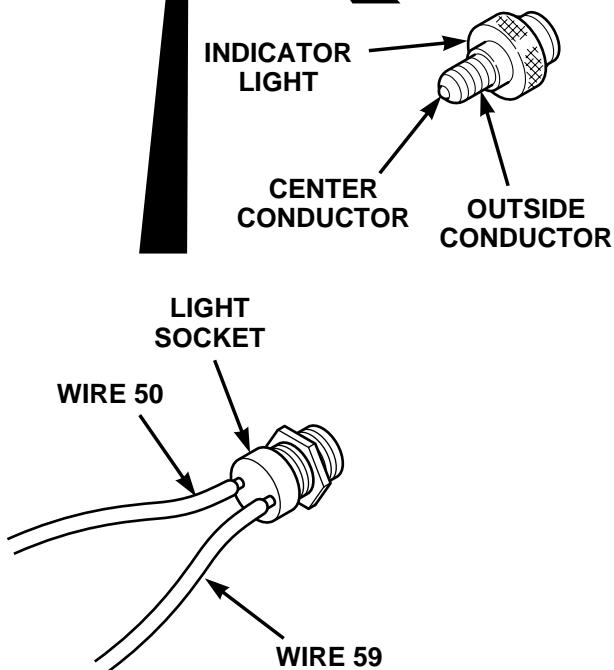
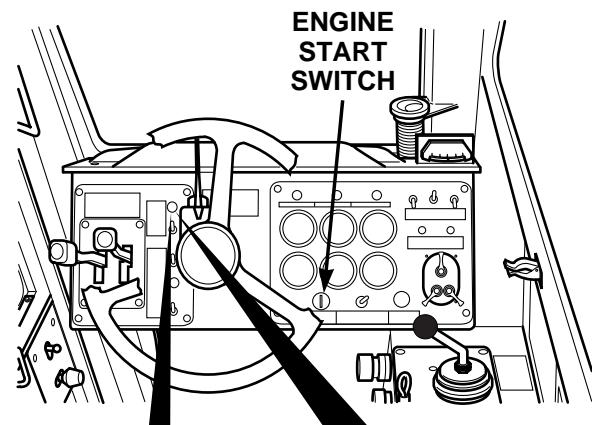


**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

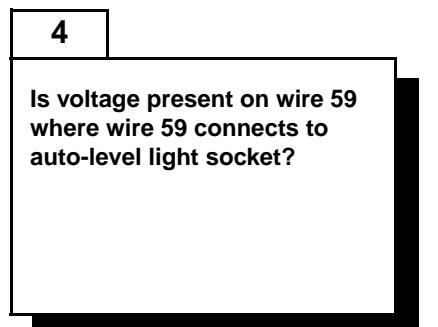
<b>CONTINUITY TEST</b>	
(1)	Remove indicator light from socket.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to center conductor of indicator light.
(4)	Connect multimeter negative lead (-) to outside conductor of indicator light.
(a)	If continuity is present, go to Step 3 of this fault.
(b)	If continuity is not present, replace lamp (Para 8-9).

<b>VOLTAGE TEST</b>	
(1)	Remove four screws from left-hand instrument panel.
(2)	Raise panel out to reach auto-level light socket.
(3)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(4)	Set multimeter to dc.
(5)	Connect multimeter positive lead (+) to wire 50 where wire 50 connects to socket.
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable (1) to negative side of battery (2) (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(9)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 4 of this fault.
(b)	If voltage is not present, repair wire 50 (Para 8-48).
(10)	Turn auto-level switch OFF (TM 10-3930-673-10).
(11)	Turn engine start switch to OFF position (TM 10-3930-673-10).



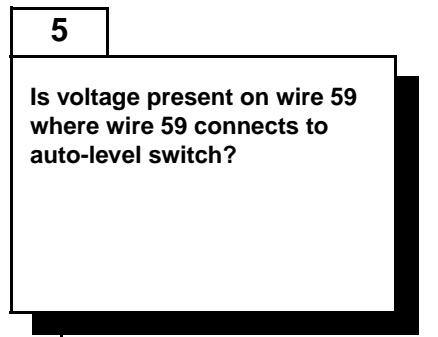
## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK.
POSSIBLE PROBLEMS
Auto-level light socket faulty. Wire 59 faulty. Auto-level switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Auto-level circuit card faulty. Auto-level sensor faulty. Wire 2 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is present, auto-level light socket is faulty.

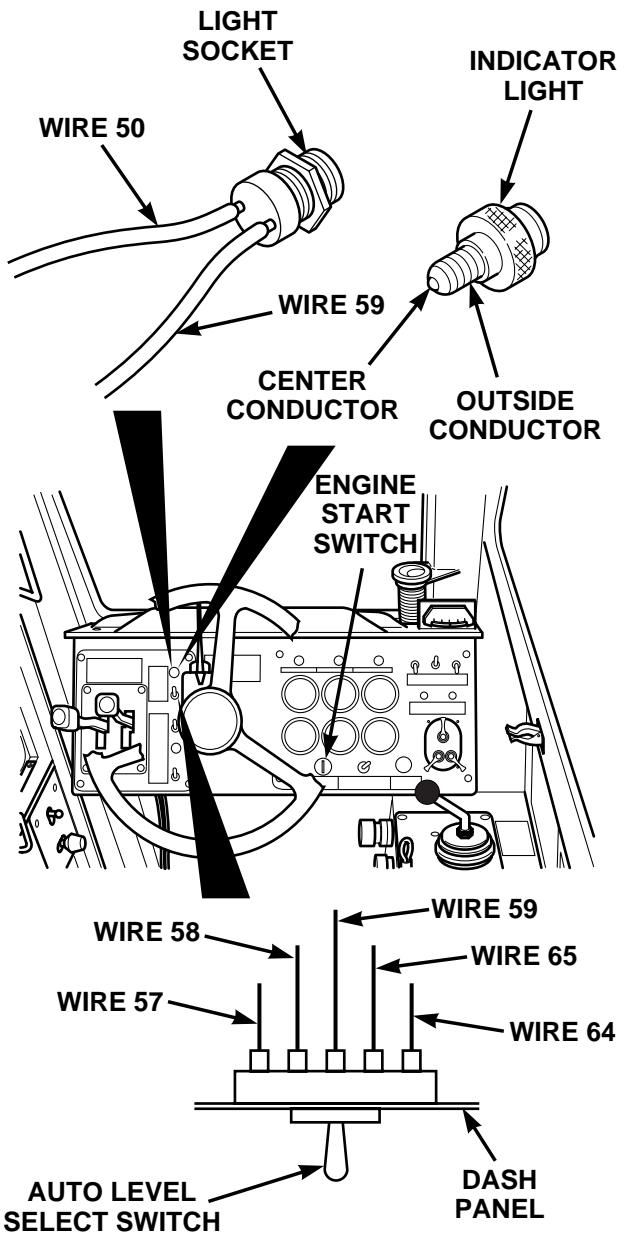
KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK.
POSSIBLE PROBLEMS
Wire 59 faulty. Auto-level switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Auto-level circuit card faulty. Auto-level sensor faulty. Wire 2 faulty.



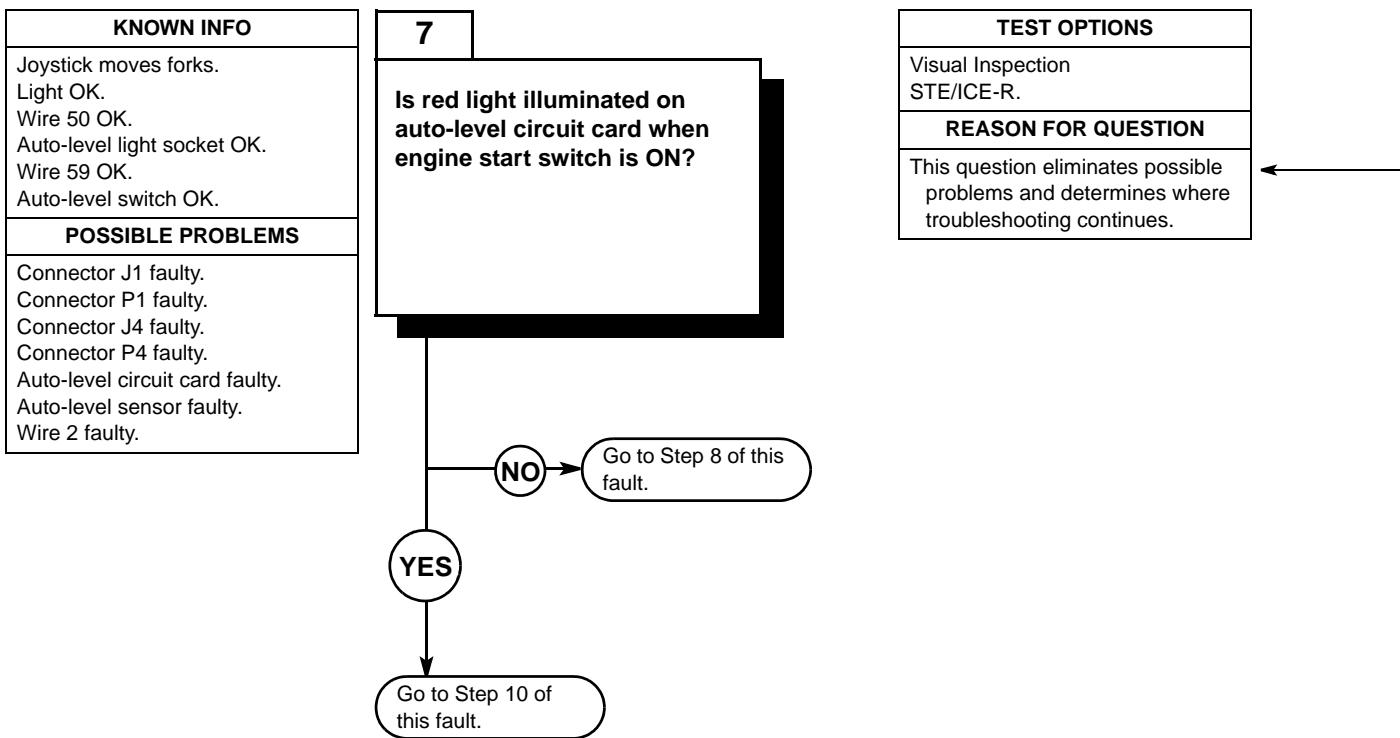
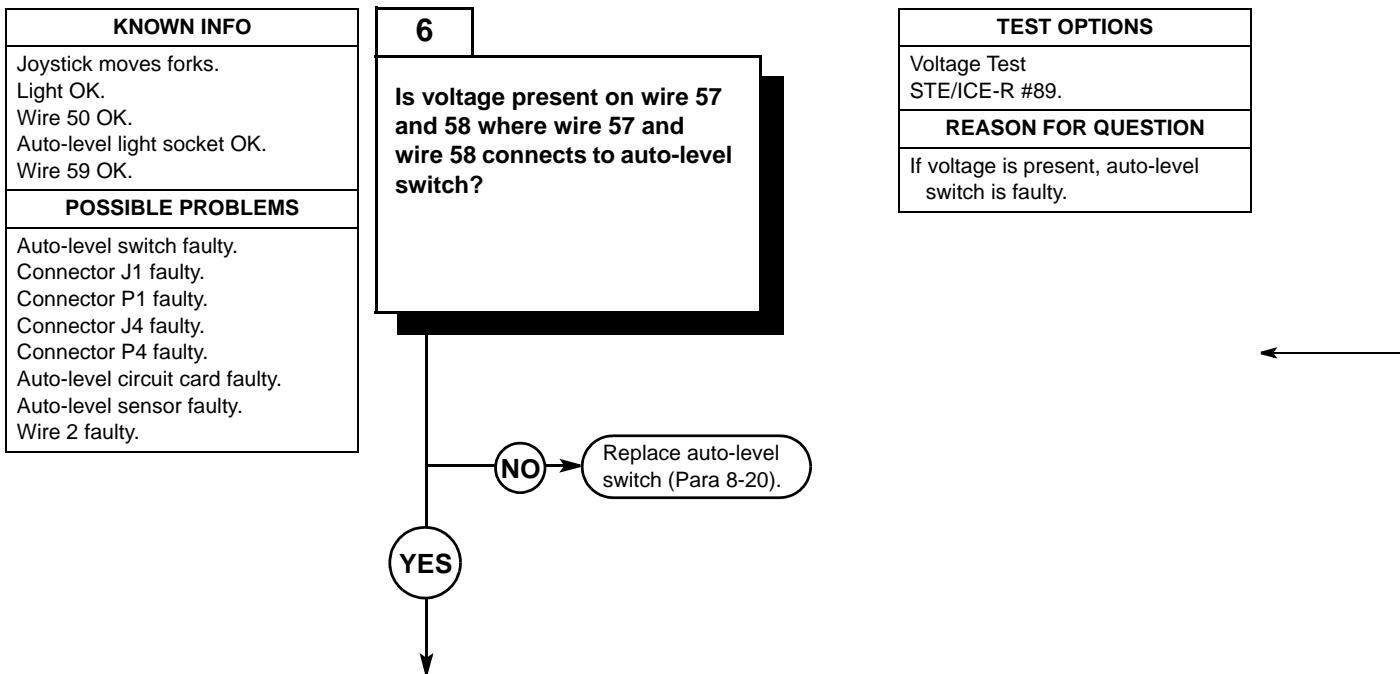
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to dc.
(3)	Connect multimeter positive lead (+) to wire 59 where wire 59 connects to auto-level light socket.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 5 of this fault.
(b)	If voltage is not present, replace auto-level light socket (Para 8-9).
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).

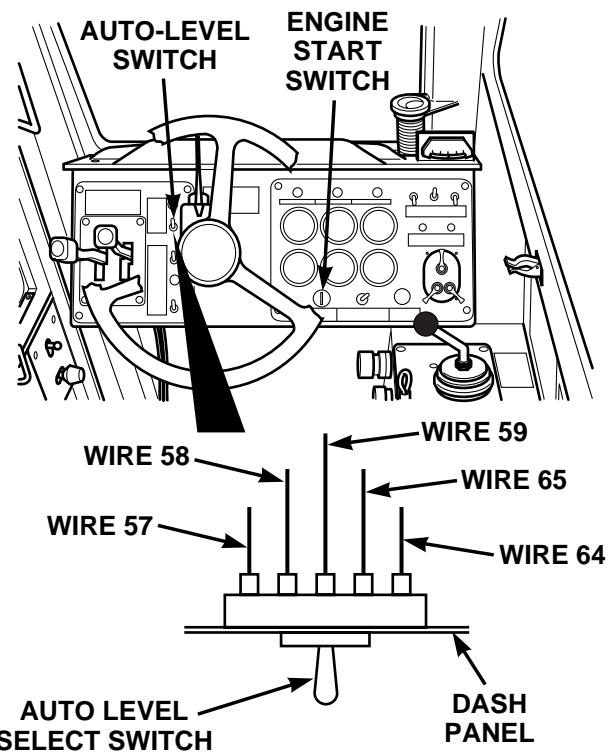
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to dc.
(3)	Connect multimeter positive lead (+) to wire 59 where wire 59 connects to auto-level switch.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 6 of this fault.
(b)	If voltage is not present, go to Step 12 of this fault.
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).



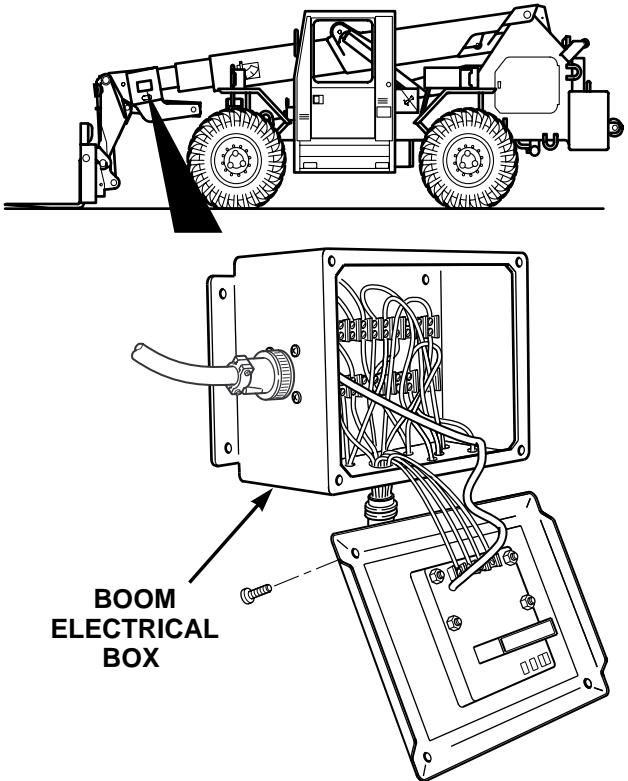
## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).



<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to dc.
(3)	Connect multimeter positive lead (+) to wire 57 and 58 where wire 57 and 58 connects to auto-level switch.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 7 of this fault.
(b)	If voltage is not present, replace auto-level switch (Para 8-20).
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Install four screws to secure left-hand instrument panel.

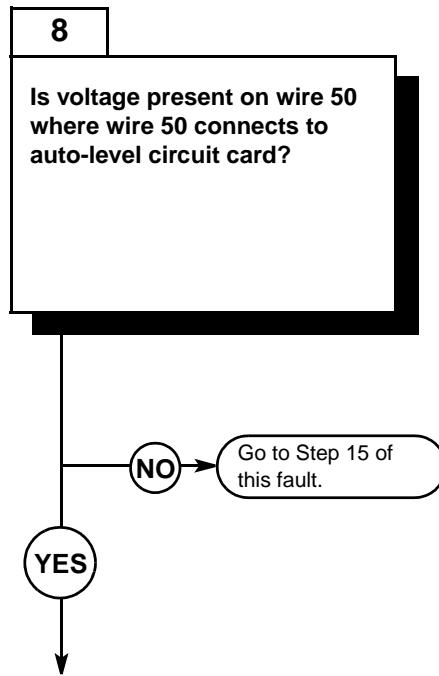


<b>VISUAL INSPECTION</b>	
(1)	Loosen four screws and lower cover from electrical junction box.
(2)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(3)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If red light is illuminated, go to Step 10 of this fault.
(b)	If red light is not illuminated, go to Step 8 of this fault.
(4)	Turn auto-level switch OFF (TM 10-3930-673-10).
(5)	Turn engine start switch OFF (TM 10-3930-673-10).



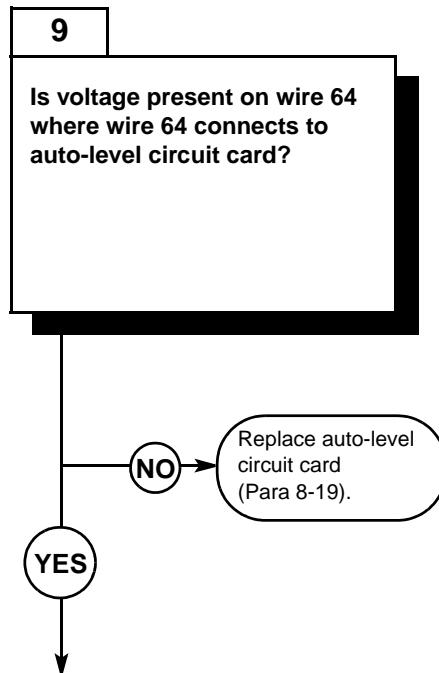
## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Auto-level circuit card faulty. Auto-level sensor faulty. Wire 2 faulty.



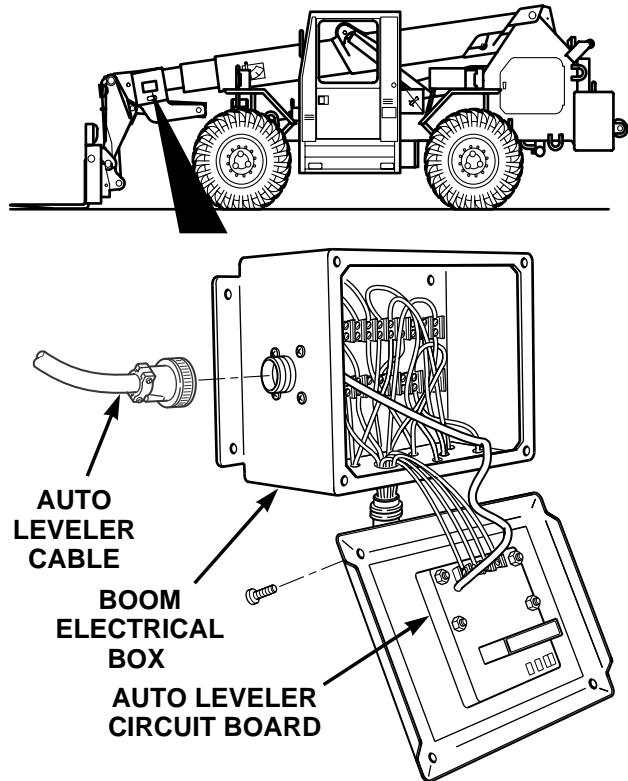
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Connector J1 OK. Connector P1 OK. Connector J4 OK. Connector P4 OK.
POSSIBLE PROBLEMS
Auto-level circuit card faulty. Auto-level sensor faulty. Wire 2 faulty.

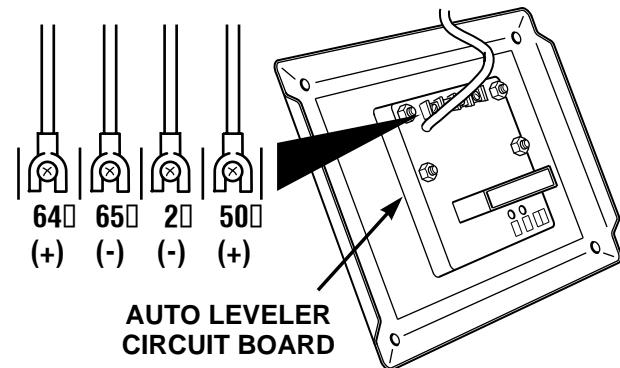


TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, auto-level circuit card faulty.

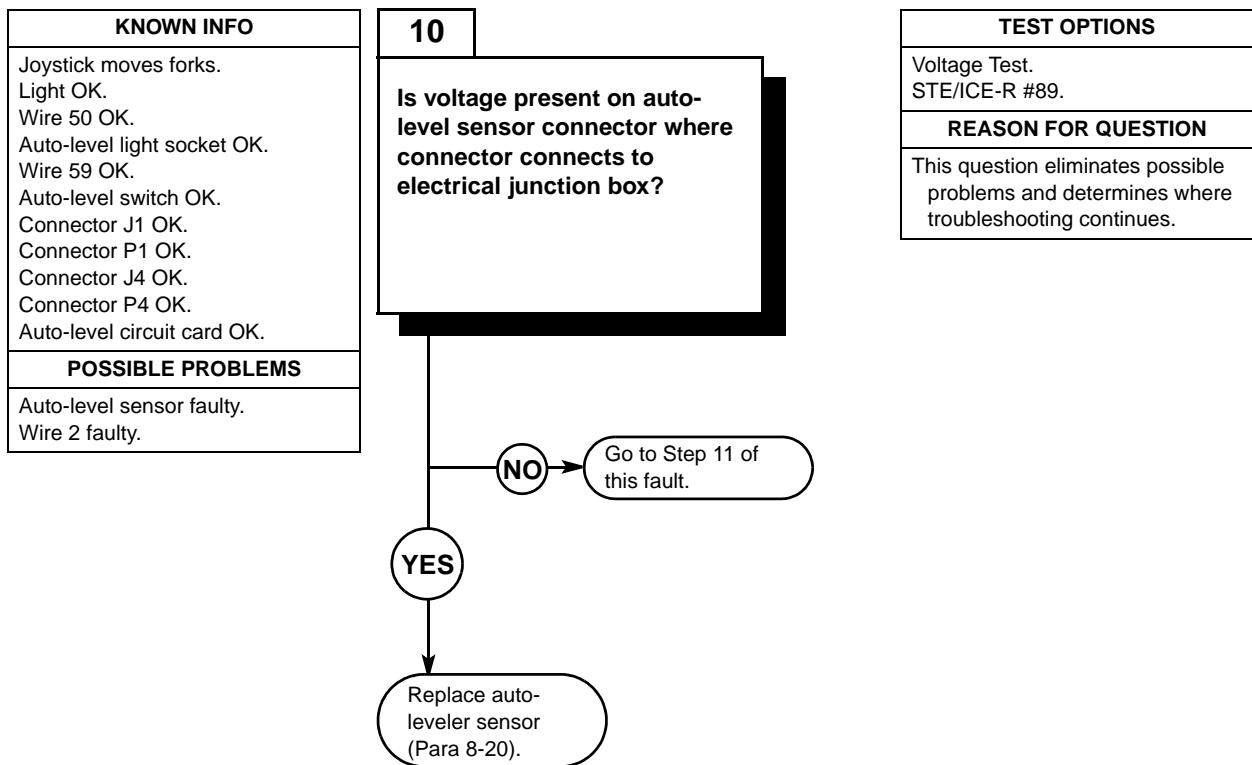
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to dc.
(3)	Connect multimeter positive lead (+) to wire 50 where wire 50 connects to auto-level circuit card.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 9 of this fault.
(b)	If voltage is not present, go to Step 15 of this fault.
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch OFF (TM 10-3930-673-10).

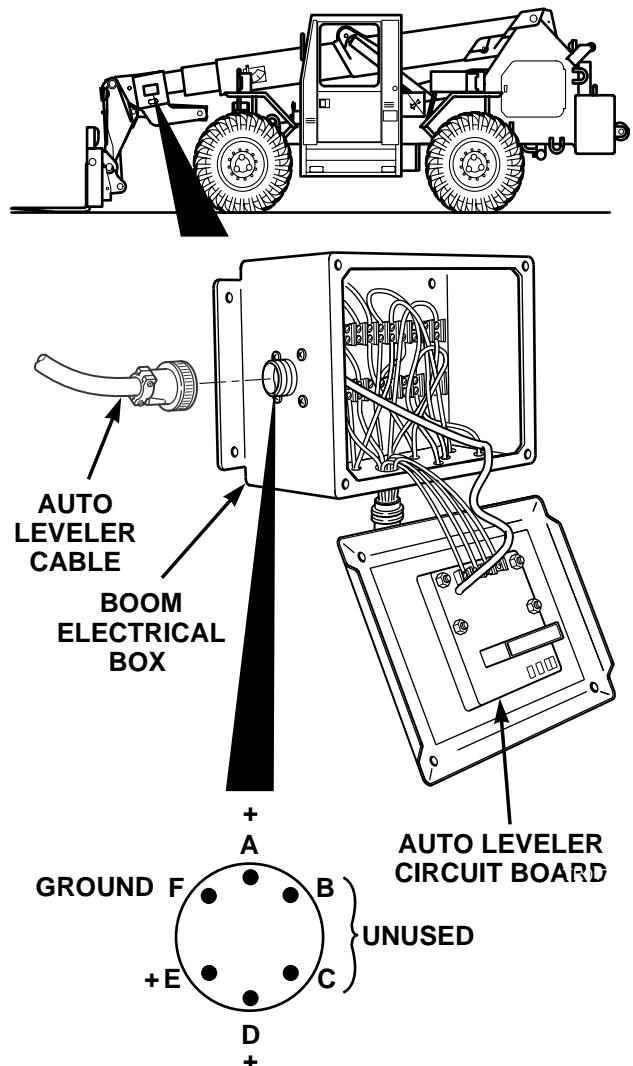
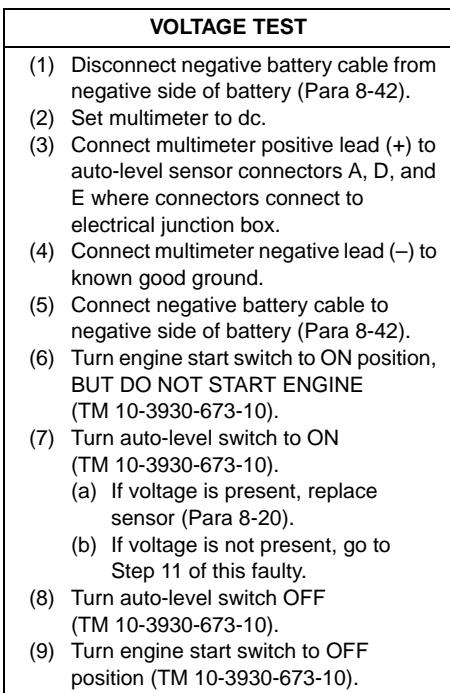


<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to wire 64 where wire 64 connects to auto-level circuit card.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 10 of this fault.
(b)	If voltage is not present, replace auto-level circuit card (Para 8-19).
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch OFF (TM 10-3930-673-10).



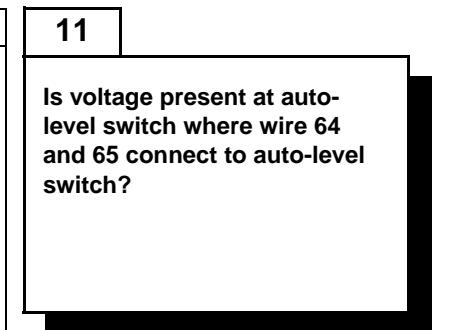
## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).





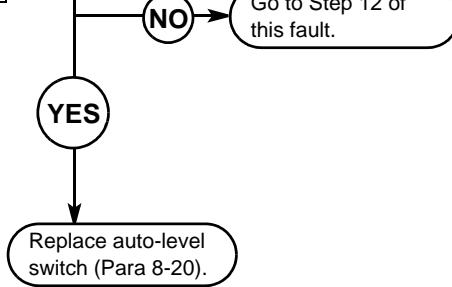
## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Connector J1 OK. Connector P1 OK. Connector J4 OK. Connector P4 OK. Auto-level circuit card OK. Auto-level sensor OK.

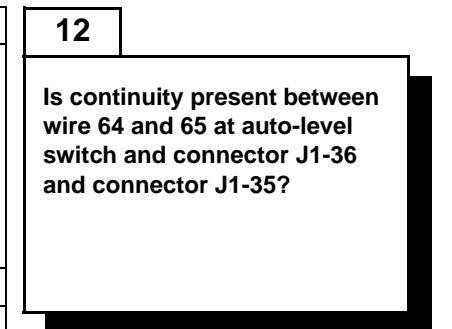


TEST OPTIONS
Voltage Test STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

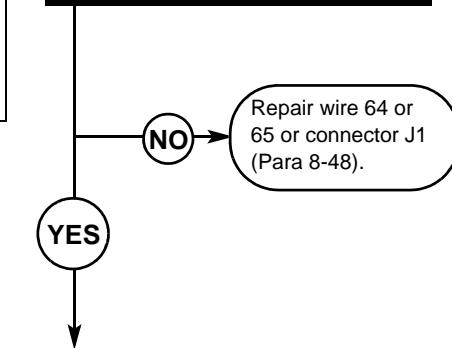
POSSIBLE PROBLEMS
Wire 2 faulty.



KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Auto-level circuit card OK. Auto-level sensor OK.

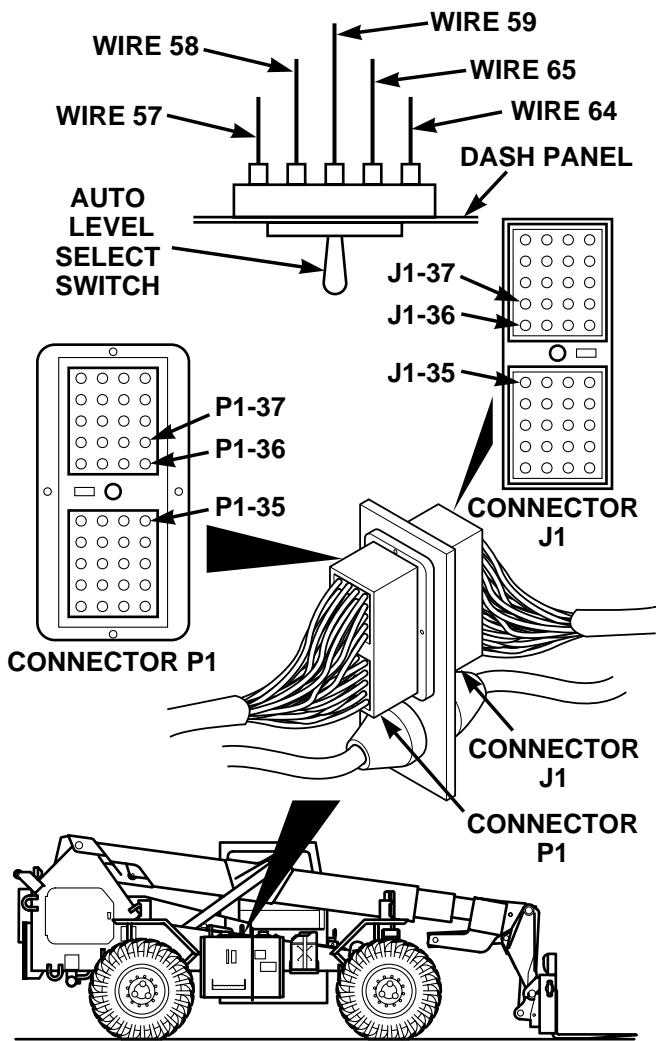


TEST OPTIONS
Continuity Test. STE/ICE-R #89.
REASON FOR QUESTION
If continuity is not present, connector P1, connector J4 and/or wire 64 or 65 are faulty.



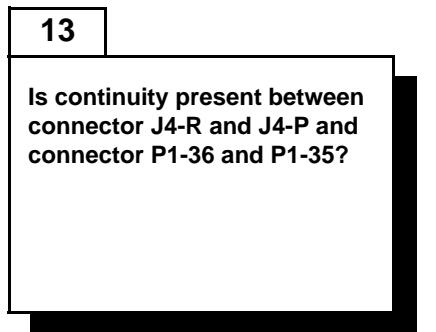
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to dc.
(3)	Connect multimeter positive lead (+) to wire 64 and wire 65 where wire 64 and wire 65 connect to auto-level switch.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Turn auto-level switch to ON (TM 10-3930-673-10).
(a)	If voltage is present, replace auto-level switch (Para 8-20).
(b)	If voltage is not present, go to Step 12 of this fault.
(8)	Turn auto-level switch OFF (TM 10-3930-673-10).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to ohms.
(3)	Disconnect connector J1 from connector P1.
(4)	Connect multimeter positive lead (+) to wire 64 and 65 where wire 64 and 65 connect to auto-level switch.
(5)	Connect multimeter negative lead (-) to connector J1-35 or connector J1-36.
(a)	If continuity is present, go to Step 13 of this fault.
(b)	If continuity is not present, repair wire 64 or 65 and/or connector J1 (Para 8-48).

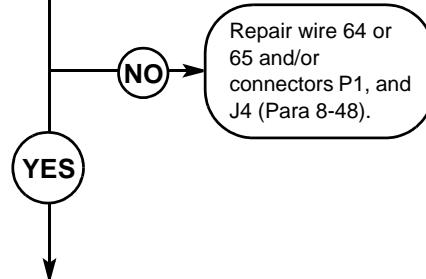


## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

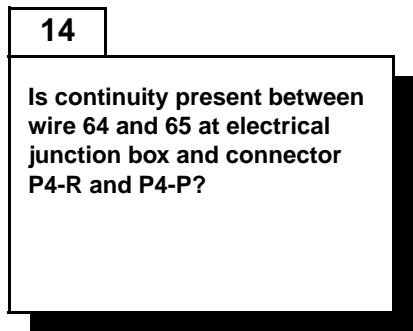
KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Auto-level circuit card OK. Auto-level sensor OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Wire 2 faulty.



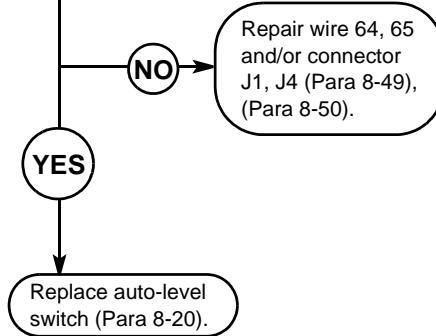
TEST OPTIONS
Continuity Test. STE/ICE-R #89.
REASON FOR QUESTION
If continuity is not present, connector P1, connector J4, and/or wire 64 and 65 are faulty.



KNOWN INFO
Joystick moves forks. Light OK. Wire 50 OK. Auto-level light socket OK. Wire 59 OK. Auto-level circuit card OK. Auto-level sensor OK.
POSSIBLE PROBLEMS
Auto-level switch faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Wire 2 faulty.

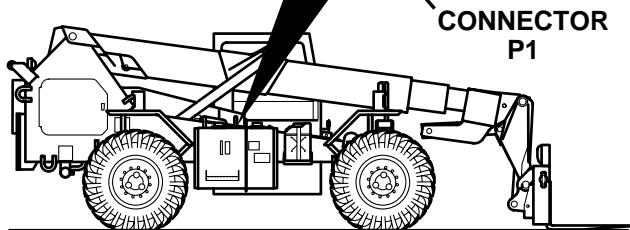
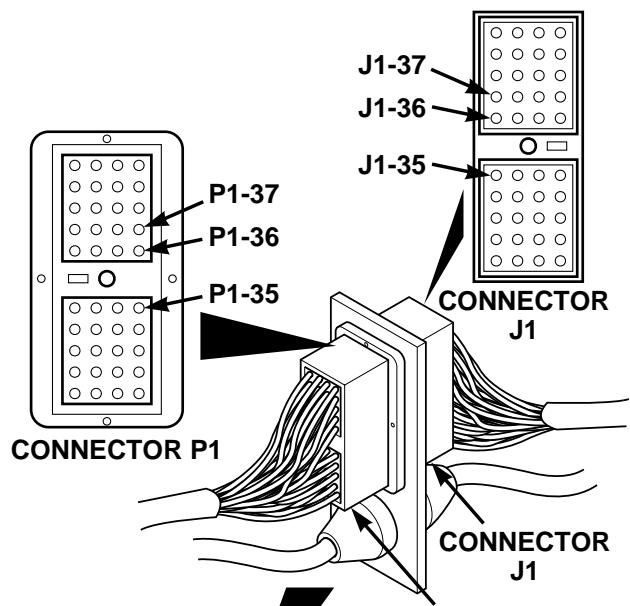


TEST OPTIONS
Continuity Test. STE/ICE-R #89.
REASON FOR QUESTION
If continuity is not present, connector P1, connector J4 and/or wire 64, 65 are faulty.

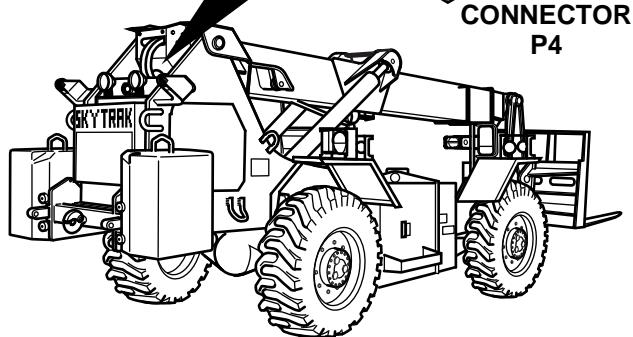
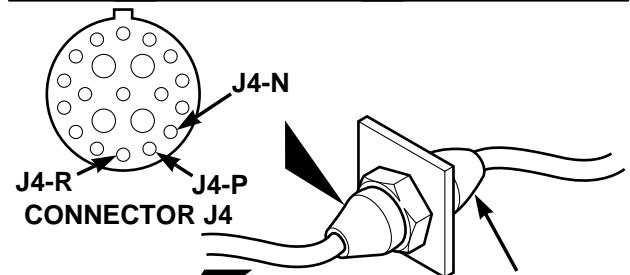


**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Disconnect connector J1 from connector P1.
- (4) Disconnect connector J4 from connector P4.
- (5) Connect multimeter positive lead (+) to connector J4-P and J4-R where wire 64 and 65 connect.
- (6) Connect multimeter negative lead (-) to connector P1-35 and P1-36.
  - (a) If continuity is present, go to Step 14 of this fault.
  - (b) If continuity is not present, repair wire 64 or 65 and/or connector P1, connector J4 (Para 8-49), (Para 8-50).

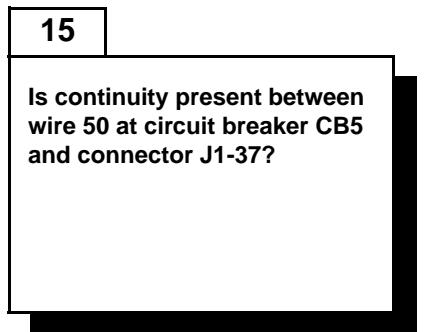
**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Disconnect connector J1 from connector P1.
- (4) Connect multimeter positive lead (+) to wire 64 and 65 where wire 64 and 65 connect to electrical junction box.
- (5) Connect multimeter negative lead (-) to connector P4-R and P4-P.
  - (a) If continuity is present, replace auto-level switch (Para 8-20).
  - (b) If continuity is not present, repair wire 64 or 65 and/or connector J1 (Para 8-49), (Para 8-50).
- (6) Connect connector J1 to connector P1.
- (7) Connect connector J4 to connector P4.

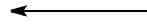
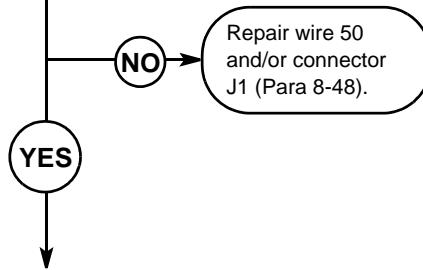


## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).

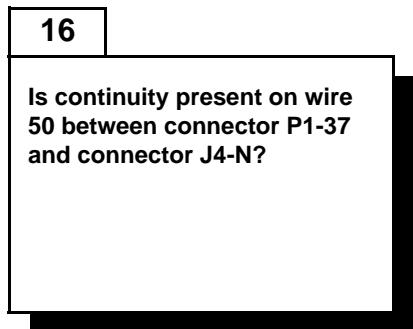
KNOWN INFO
Joystick moves forks. Light OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Auto-level circuit card OK. Auto-level sensor OK.
POSSIBLE PROBLEMS
Wire 50 faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Wire 2 faulty.



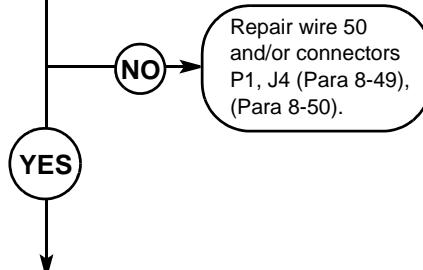
TEST OPTIONS
Continuity Test. STE/ICE-R #89.
REASON FOR QUESTION
If continuity is not present, connector J1 and/or wire 50 is faulty.



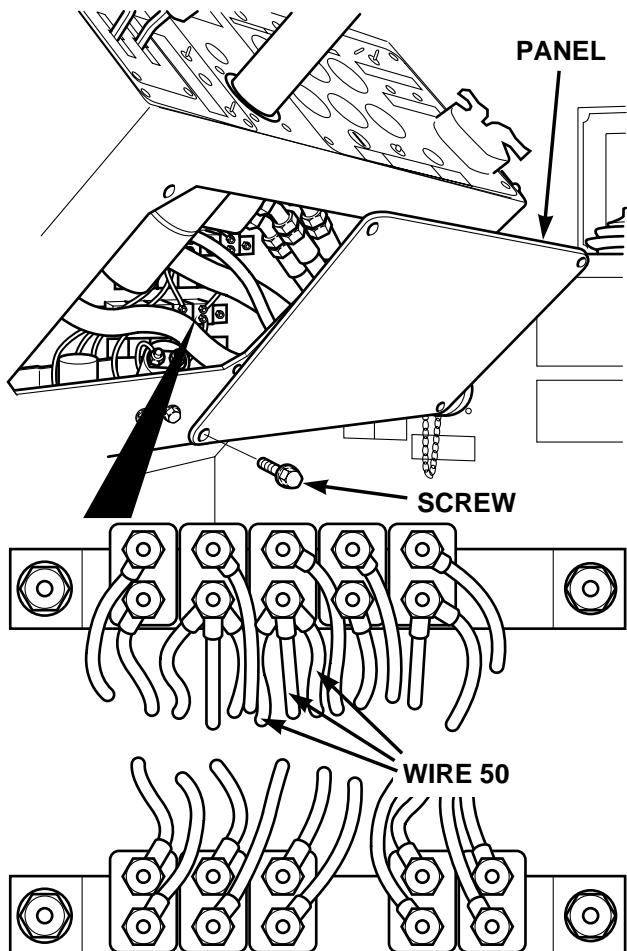
KNOWN INFO
Joystick moves forks. Light OK. Auto-level light socket OK. Wire 59 OK. Auto-level switch OK. Auto-level circuit card OK. Auto-level sensor OK.
POSSIBLE PROBLEMS
Wire 50 faulty. Connector J1 faulty. Connector P1 faulty. Connector J4 faulty. Connector P4 faulty. Wire 2 faulty.



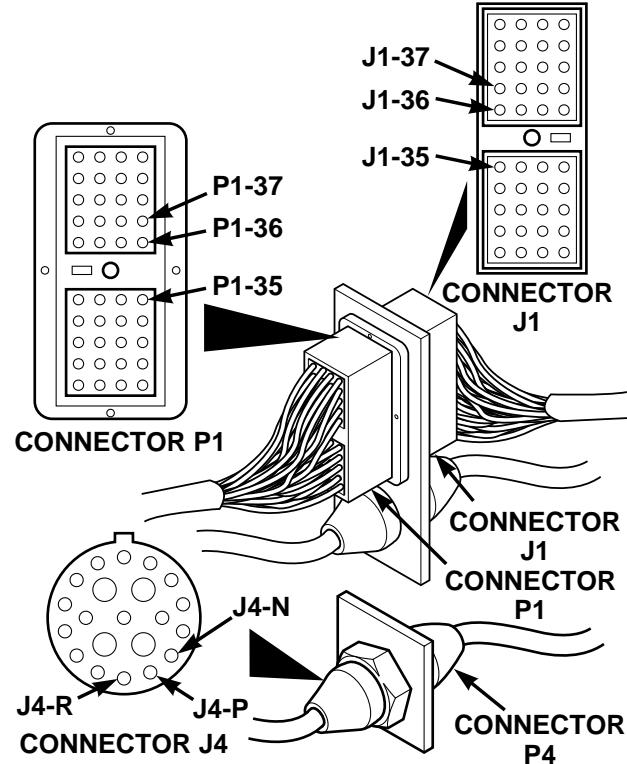
TEST OPTIONS
Continuity Test. STE/ICE-R #89.
REASON FOR QUESTION
If continuity is not present, connector P1, connector J4 and/or wire 50 faulty.



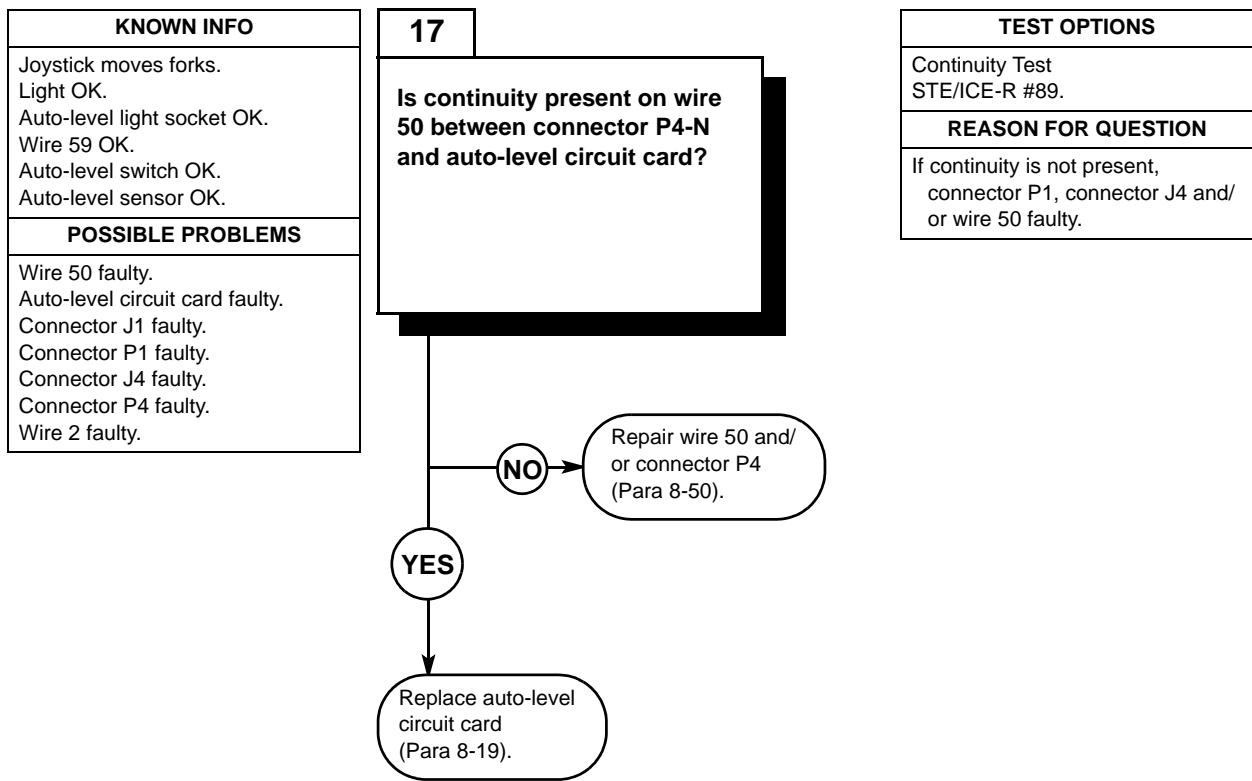
<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to ohms.
(3)	Disconnect connector J1 from connector P1.
(4)	Remove four screws from access panel.
(5)	Connect multimeter positive lead (+) to wire 50 where wire 50 connects to circuit breaker CB6.
(6)	Connect multimeter negative lead (-) to connector J1-37.
(a)	If continuity is present, go to Step 16 of this fault.
(b)	If continuity is not present, repair wire 50 and/or connector J1 (Para 8-48).



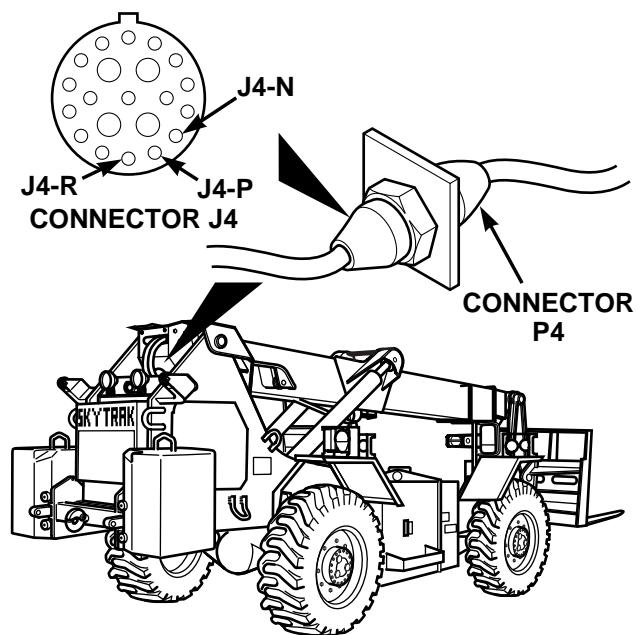
<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Disconnect connector J4 from connector P4.
(3)	Connect multimeter positive lead (+) to connector P1-37 where wire 50 connects.
(4)	Connect multimeter negative lead (-) to connector J4-N.
(a)	If continuity is present, go to Step 17 of this fault.
(b)	If continuity is not present, repair wire 50 and/or connectors P1, J4 (Para 8-49), (Para 8-50).



## 32. FORK AUTO-LEVELER DOES NOT OPERATE (CONT.).



<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive lead (+) to connector P4-N where wire 50 connects.
(3)	Connect multimeter negative lead (-) to auto-level circuit card. (a) If continuity is present, replace auto-level circuit card (Para 8-19). (b) If continuity is not present, repair wire 50 and/or connector P4 (Para 8-50).
(4)	Connect connector J4 to connector P4.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Install battery cover (Para 8-42).
(7)	Install electrical junction box cover and tighten four screws.



**33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

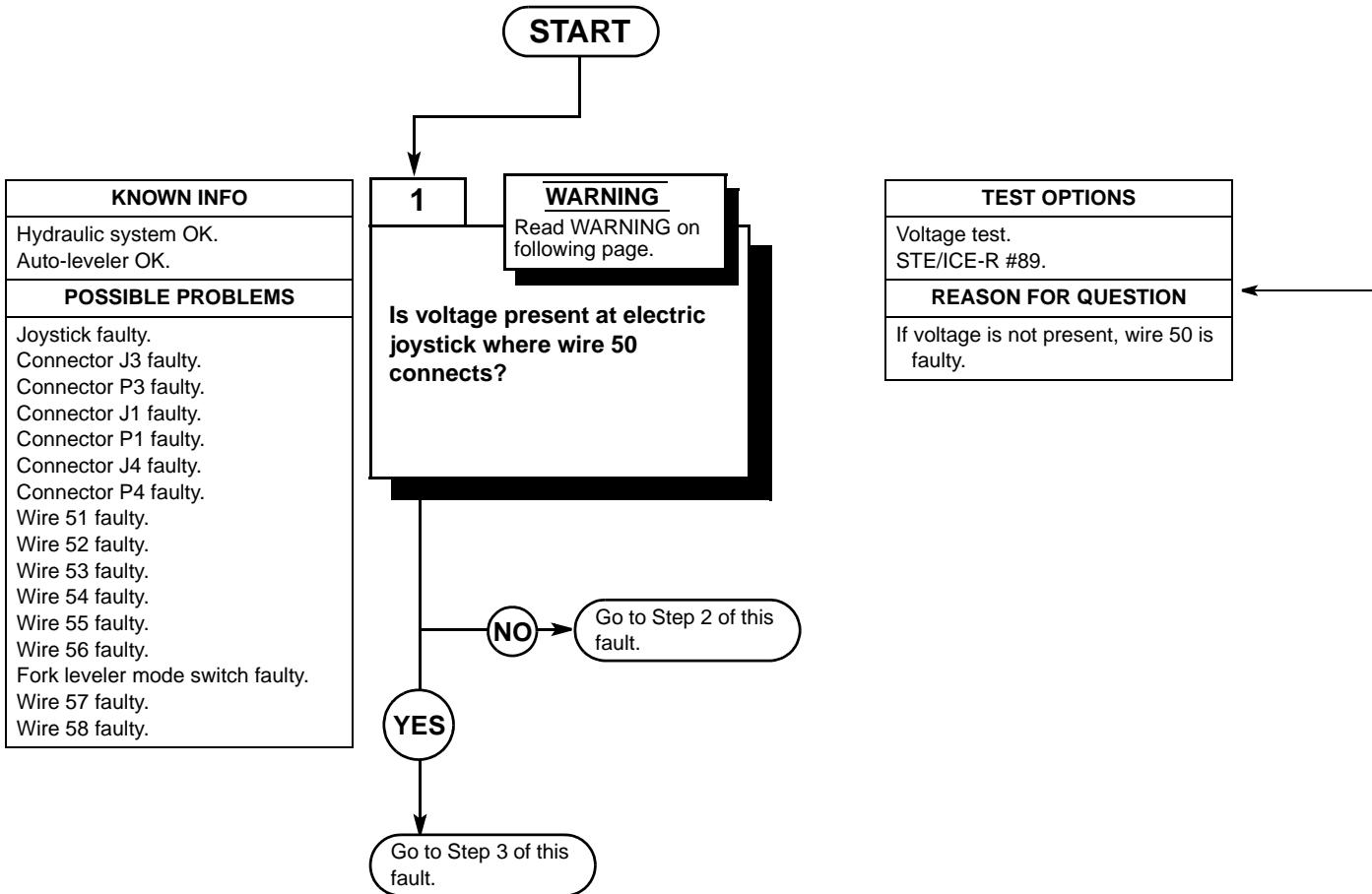
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

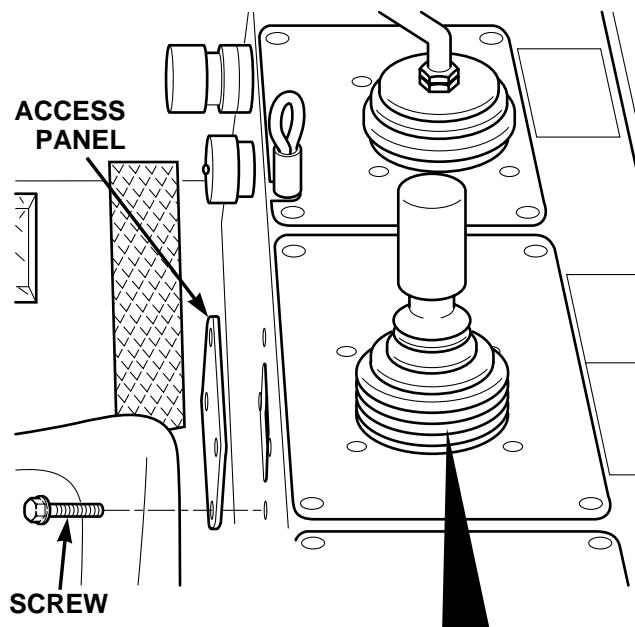
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

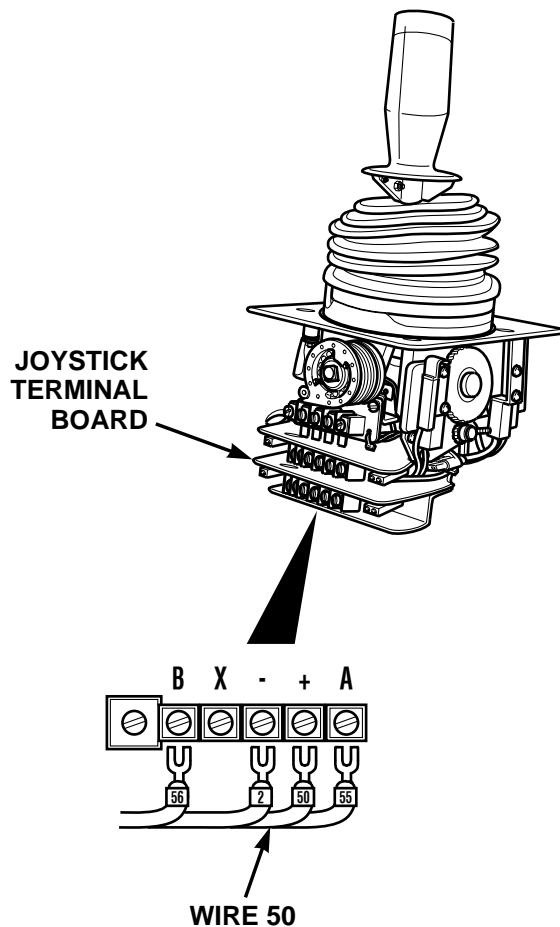


**WARNING**

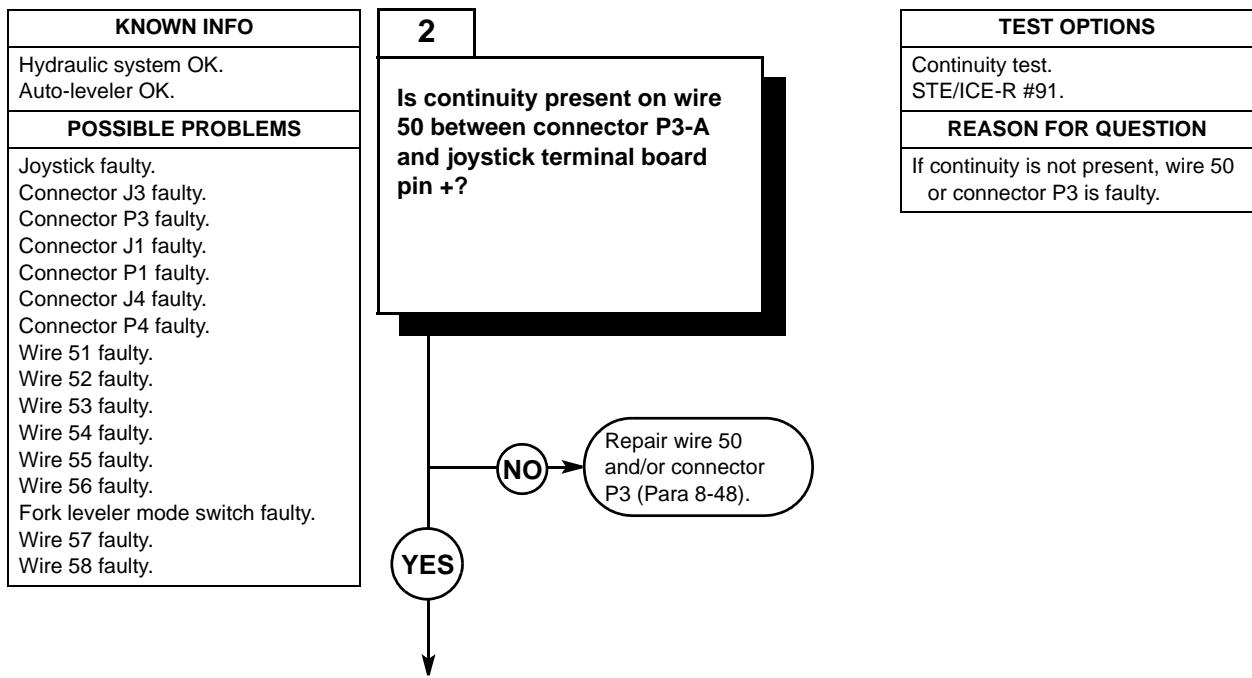
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.



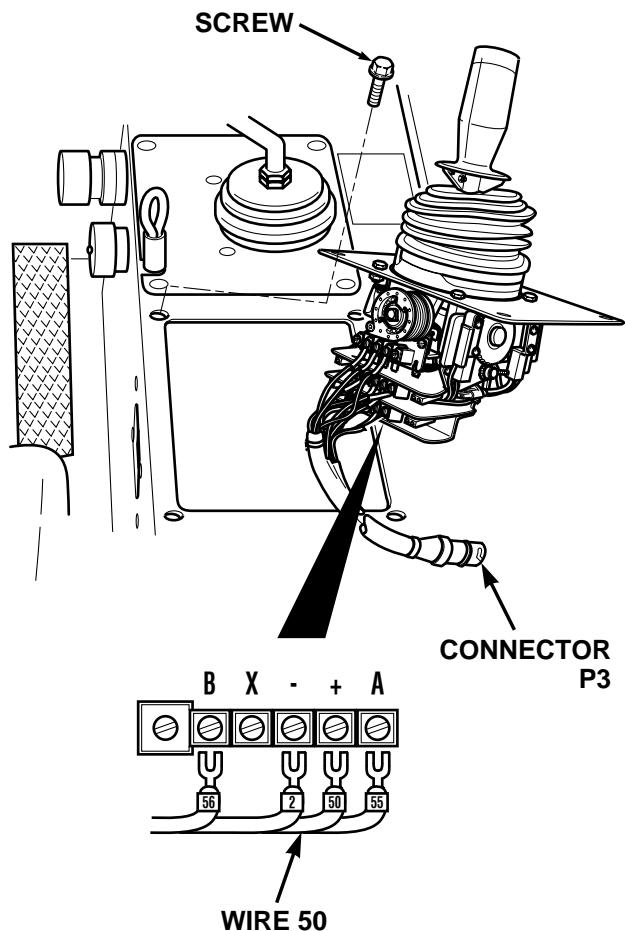
<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws and access panel from side console.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive lead (+) to electric joystick terminal boards 2 and 3 pin + where wire 50 connects (one at a time).
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 3 of this fault.
(b)	If voltage is not present, go to Step 2 of this fault.
(9)	Turn engine start switch OFF (TM 10-3930-673-10).



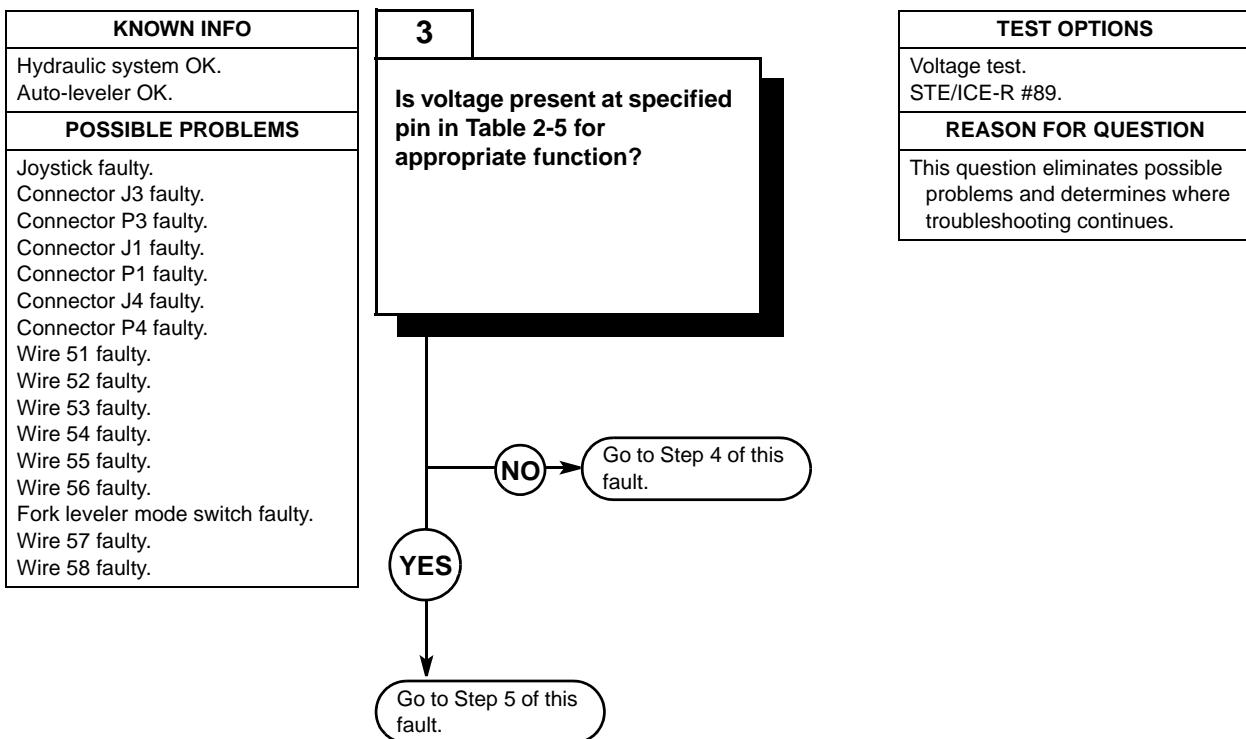
## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).



<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to ohms.
(3)	Remove four screws from joystick cover plate.
(4)	Lift cover plate and joystick out to reach both places where wire 50 connects at pin +.
(5)	Disconnect connector P3 from connector J3. Connect multimeter positive lead (+) to joystick terminal board where wire 50 connects (one at a time).
(6)	Connect multimeter negative lead (-) to connector P3-A.
(a)	If continuity is present, go to Step 3 of this fault.
(b)	If continuity is not present, repair wire 50 and/or connector P3 (Para 8-48).

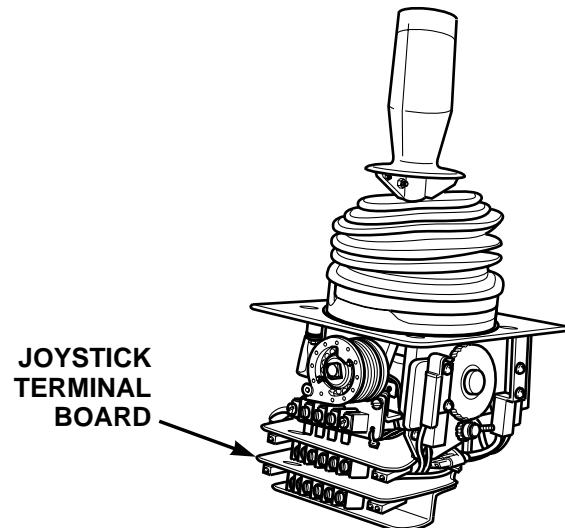
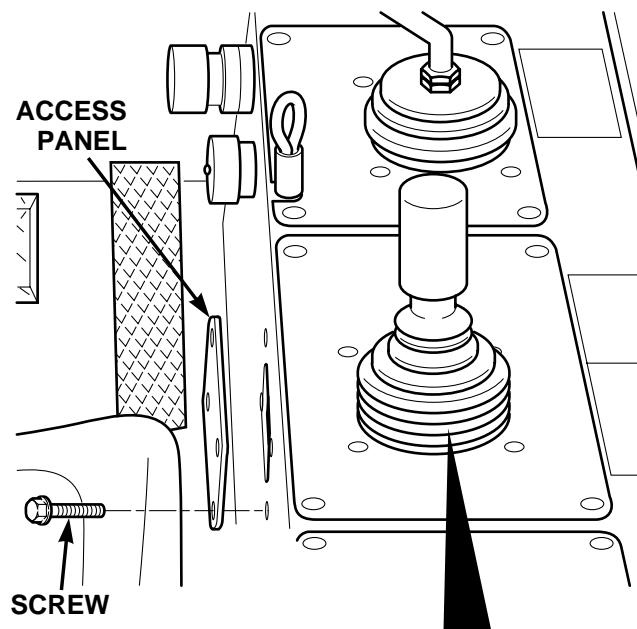


## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).

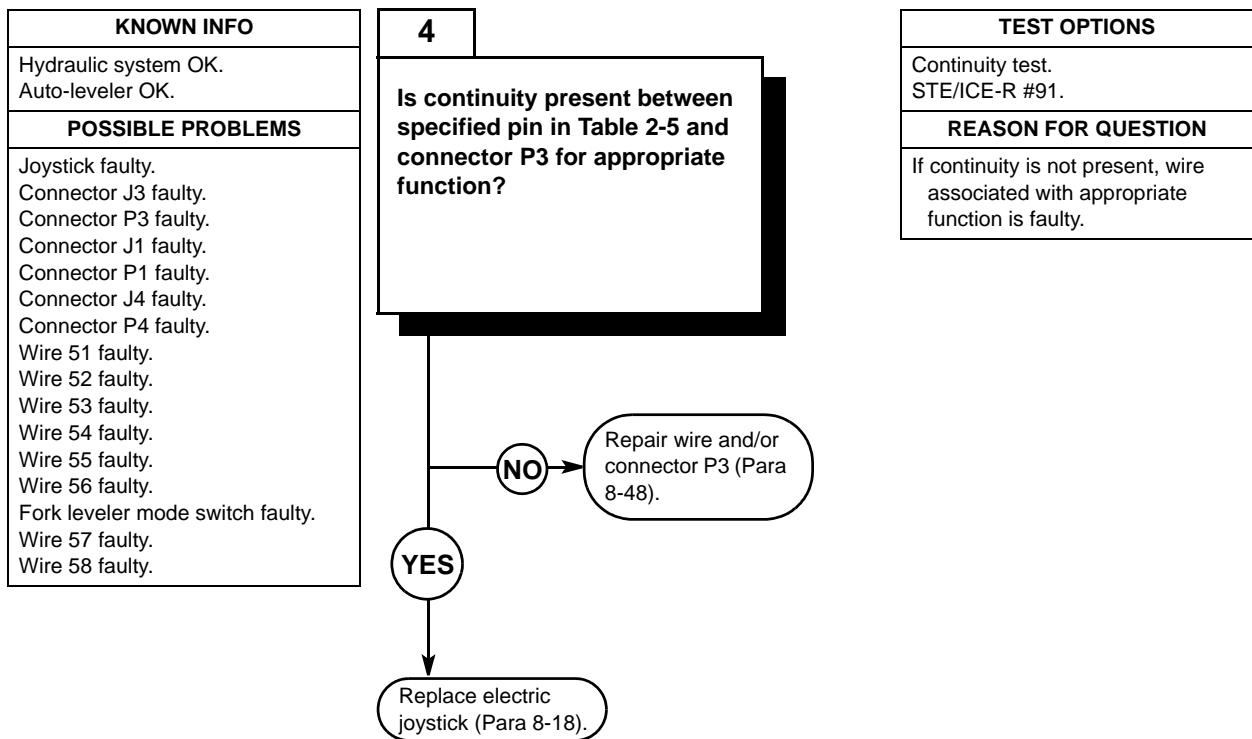
**Table 2-5. Electric Joystick Connections**

Joystick Connector	Wire	Main Connector	Boom Connector	Joystick Terminal Board and Pin	Function		
<b>Button Out</b>							
P3-C	2	J2-2	P2-2	TB1-C, TB2-___, and TB3-___	Ground		
P3-E	51	J1-27	P1-27	J4-K	P4-K	TB1-B	Fork Ground
P3-G	53			Fork Leveler Switch		TB2-A	Fork Tilt Up
P3-D	54			Fork Leveler Switch		TB2-B	Fork Tilt Down
P3-J	55	J1-31	P1-31	J4-X	P4-X	TB3-A	Attachment Raise
P3-F	56	J1-32	P1-32	J4-L	P4-L	TB3-B	Attachment Lower
	57	J1-33	P1-32	J4-M	P4-M		Fork Tilt Up
	58	J1-34	P1-34	J4-S	P4-S		Fork Tilt Down
<b>Button In</b>							
P3-C	2	J2-2	P2-2		TB1-C, TB2-___, and TB3-___	Ground	
P3-H	52	J1-28	P1-28	J4-H	P4-H	TB2-A	Attachment Ground
P3-G	53	J1-29	P1-29	J4-J	P4-J	TB2-A	Left Fork In
P3-D	54	J1-30	P1-30	J4-A	P4-A	TB2-B	Left Fork Out
P3-J	55	J1-31	P1-31	J4-X	P4-X	TB3-A	Right Fork In
P3-F	56	J1-32	P1-32	J4-L	P4-L	TB3-B	Right Fork Out

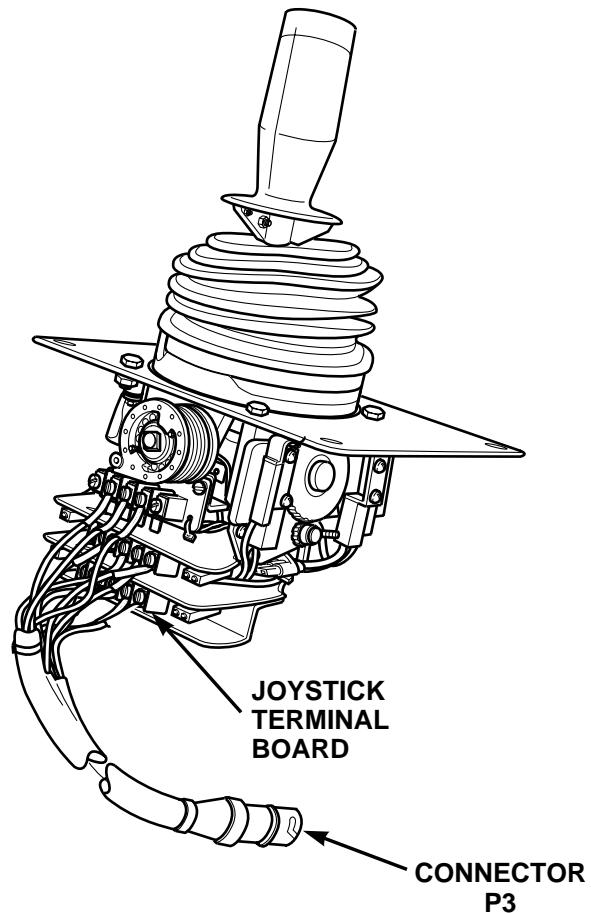
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to joystick terminal board pin for appropriate function.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). (a) If voltage is present, go to Step 5 of this fault. (b) If voltage is not present, go to Step 4 of this fault.
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).



## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT).



<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to ohms.
(3)	Disconnect connector P3 from connector J3.
(4)	Connect multimeter positive lead (+) to joystick terminal board pin for appropriate function.
(5)	Connect multimeter negative lead (-) to connector pin for appropriate function. (a) If continuity is present, replace electric joystick (Para 8-18). (b) If continuity is not present, repair faulty wire and/or connector P3 (Para 8-48).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(7)	Connect connector J3 to connector P3.
(8)	Install four screws to secure access panel to side console.



## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).

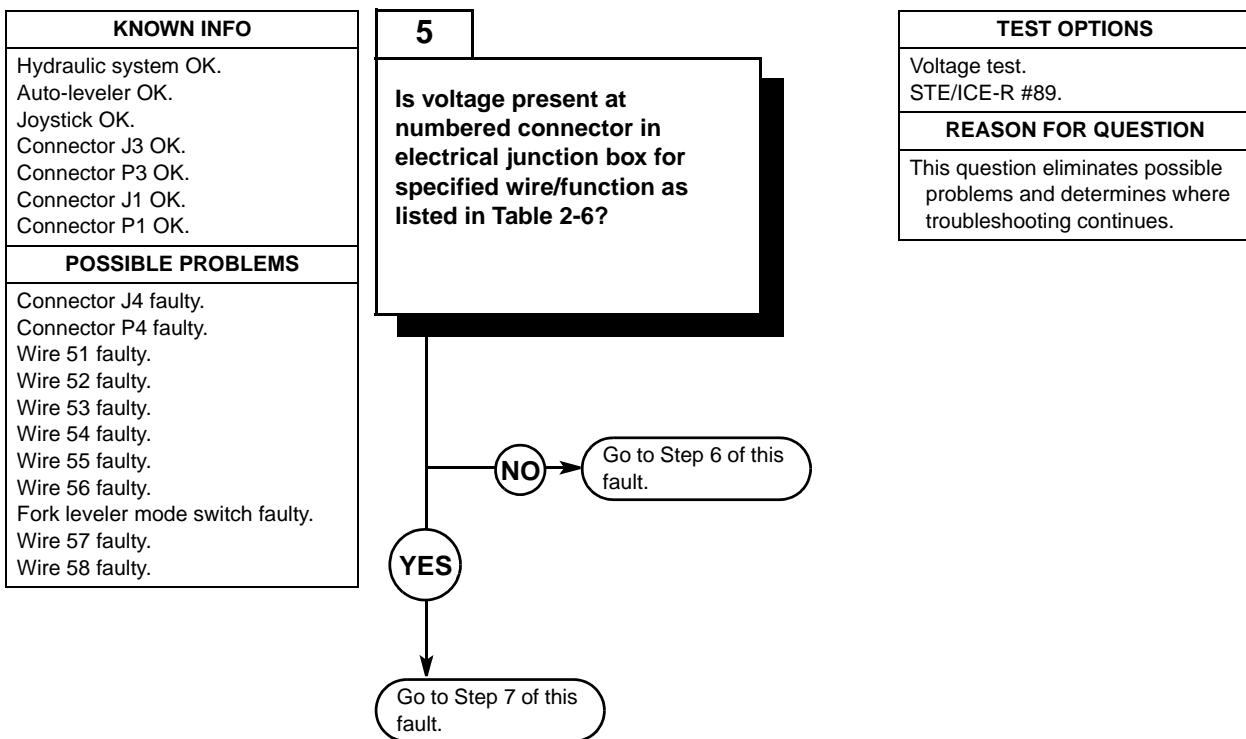
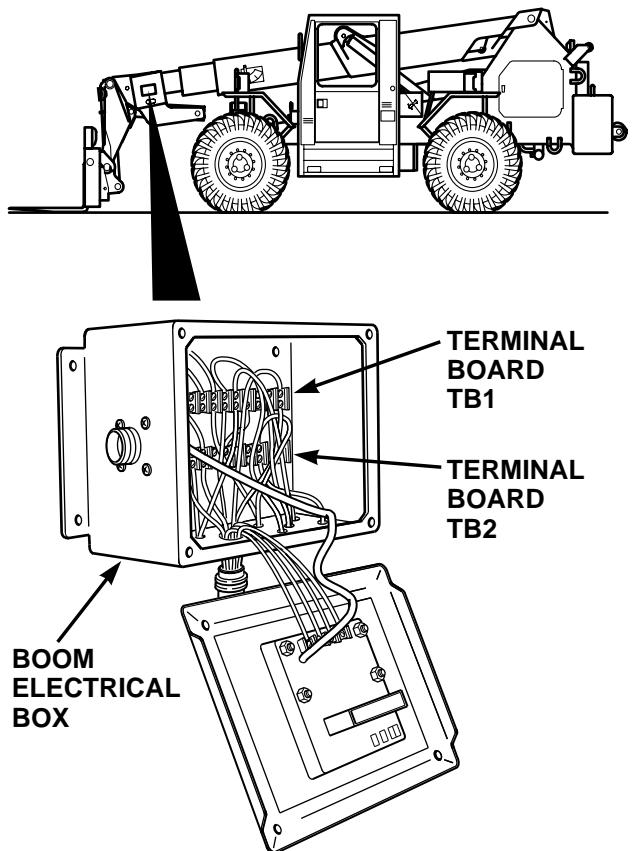


Table 2-6. Electrical Junction Box Connections

Wire	Electrical Junction Box Connector		Boom Connector	Main Connector	Function
	In	Out			
<b>Button Out</b>					
2	TB1-16	TB1-32			Ground
51	TB2-14	TB2-32, 31, 30, and 29	J4-K	P4-K	J1-27 P1-27
53	TB1-4	TB1-20			Fork Leveler Switch
54	TB1-5	TB1-21			Fork Leveler Switch
55	TB1-7	TB1-23	J4-X	P4-X	J1-31 P1-31
56	TB1-9	TB1-25	J4-L	P4-L	J1-32 P1-32
57	TB1-15	TB1-31	J4-M	P4-M	J1-33 P1-33
58	TB1-11	TB1-127	J4-S	P4-S	J1-34 P1-34
<b>Button In</b>					
2	TB1-16	TB1-32			Ground
52	TB2-14	TB2-3, 17, 18, and 19	J4-H	P4-H	J1-28 P1-28
53	TB1-4	TB1-20	J4-J	P4-J	J1-29 P1-29
54	TB1-5	TB1-21	J4-A	P4-A	J1-30 P1-30
55	TB1-7	TB1-23	J4-X	P4-X	J1-31 P1-31
56	TB1-9	TB1-25	J4-L	P4-L	J1-32 P1-32

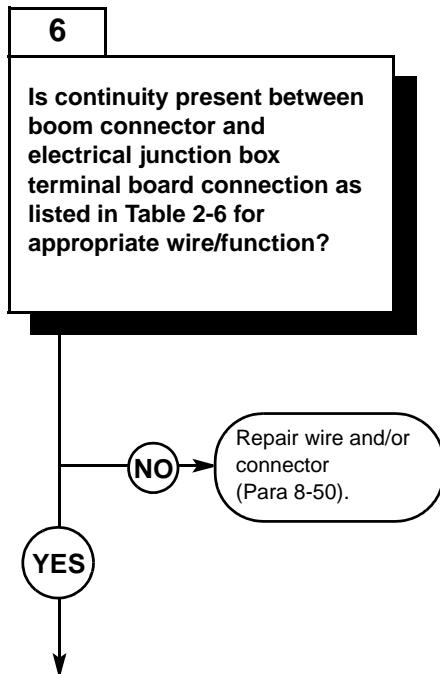
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to electrical junction box terminal board pin for appropriate function.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If voltage is present, go to Step 7 of this fault.
  - (b) If voltage is not present, go to Step 6 of this fault.
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



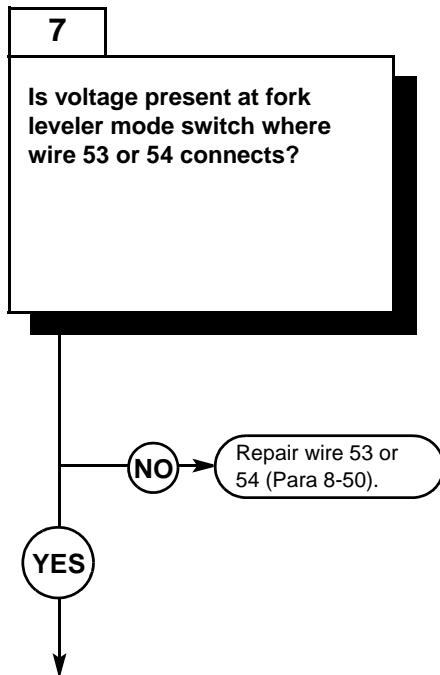
## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic system OK. Auto-leveler OK. Joystick OK. Connector J3 OK. Connector P3 OK. Connector J1 OK. Connector P1 OK.
POSSIBLE PROBLEMS
Connector J4 faulty. Connector P4 faulty. Wire 51 faulty. Wire 52 faulty. Wire 53 faulty. Wire 54 faulty. Wire 55 faulty. Wire 56 faulty. Fork leveler mode switch faulty. Wire 57 faulty. Wire 58 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, repair faulty wire and/or connector for appropriate function.

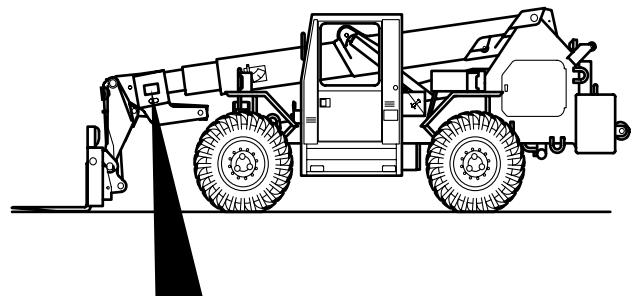
KNOWN INFO
Hydraulic system OK. Auto-leveler OK. Joystick OK. Connector J3 OK. Connector P3 OK. Connector J1 OK. Connector P1 OK. Connector J4 OK. Connector P4 OK. Wire 51 OK. Wire 52 OK. Wire 53 OK. Wire 54 OK. Wire 55 OK. Wire 56 OK.
POSSIBLE PROBLEMS
Fork leveler mode switch faulty. Wire 57 faulty. Wire 58 faulty.



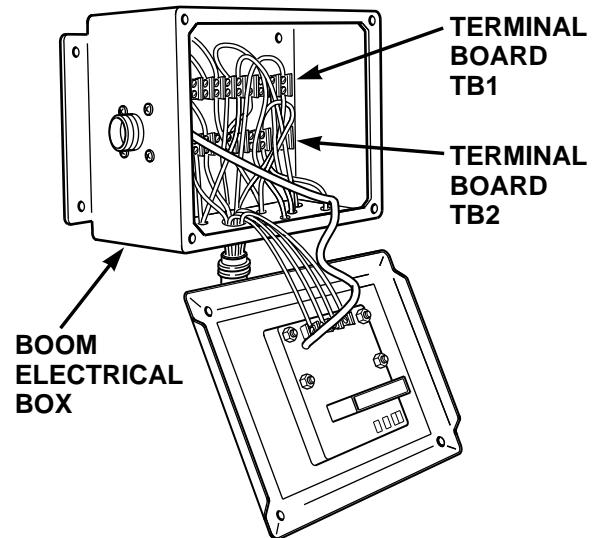
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 53 or 54 is faulty.

**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector P3 from connector J3.
- (3) Connect multimeter positive lead (+) to electrical junction box terminal board pin for appropriate function.
- (4) Connect multimeter negative lead (-) to boom connector pin for appropriate function.
  - (a) If continuity is present, go to Step 7 of this fault.
  - (b) If continuity is not present, repair faulty wire and/or connector (Para 8-50).
- (5) Connect connector J3 to connector P3.

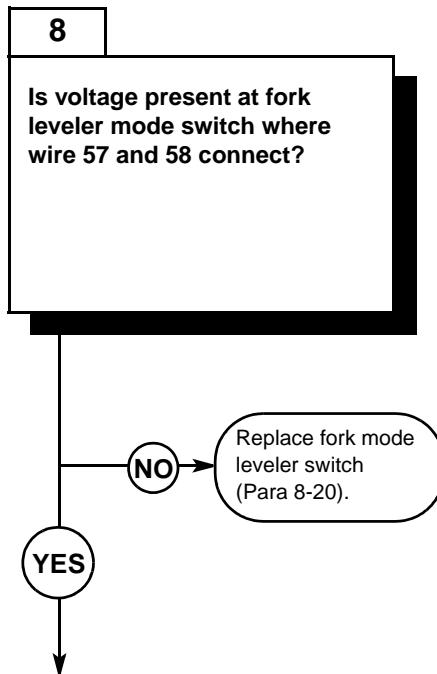
**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to electrical junction box TB1-4 or TB1-5 for appropriate function.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If voltage is present, go to Step 8 of this fault.
  - (b) If voltage is not present, repair wire 53 or 54 (Para 8-50).
- (6) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



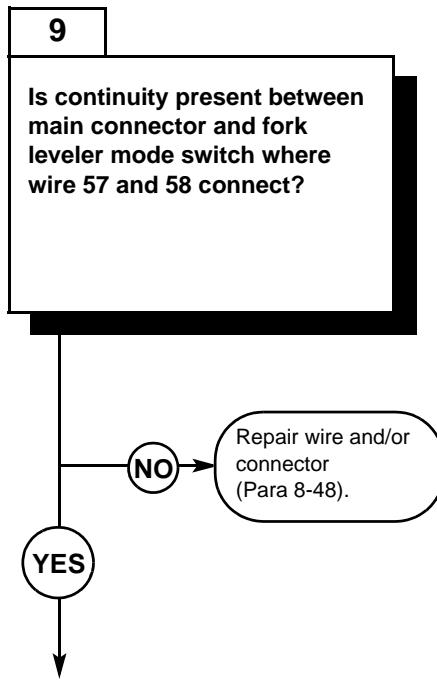
## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic system OK.
Auto-leveler OK.
Joystick OK.
Connector J3 OK.
Connector P3 OK.
Connector J1 OK.
Connector P1 OK.
Connector J4 OK.
Connector P4 OK.
Wire 51 OK.
Wire 52 OK.
Wire 53 OK.
Wire 54 OK.
Wire 55 OK.
Wire 56 OK.
POSSIBLE PROBLEMS
Fork leveler mode switch faulty.
Wire 57 faulty.
Wire 58 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, fork mode leveler switch is faulty.

KNOWN INFO
Hydraulic system OK.
Auto-leveler OK.
Joystick OK.
Connector J3 OK.
Connector P3 OK.
Connector J1 OK.
Connector P1 OK.
Connector J4 OK.
Connector P4 OK.
Wire 51 OK.
Wire 52 OK.
Wire 53 OK.
Wire 54 OK.
Wire 55 OK.
Wire 56 OK.
Fork leveler mode switch OK.
POSSIBLE PROBLEMS
Wire 57 faulty.
Wire 58 faulty.



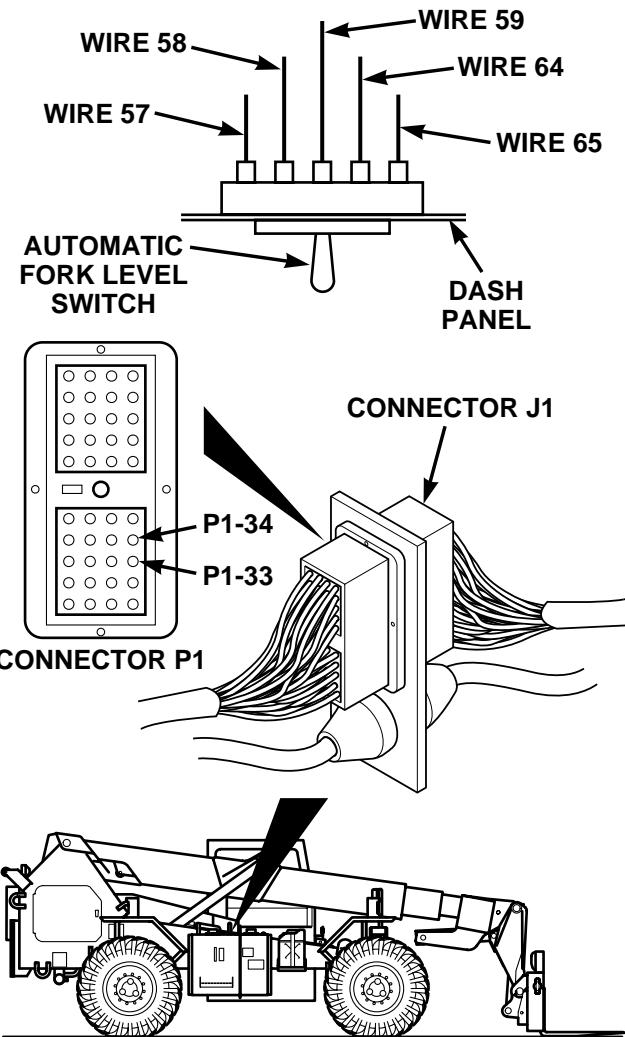
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire and/or connector are faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to fork leveler mode switch where wire 57 and 58 connect.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Turn fork leveler mode switch to MANUAL position (TM 10-3930-673-10).
  - (a) If voltage is present, go to Step 9 of this fault.
  - (b) If voltage is not present, replace fork leveler mode switch (Para 8-20).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable from negative side of battery (Para 8-42).

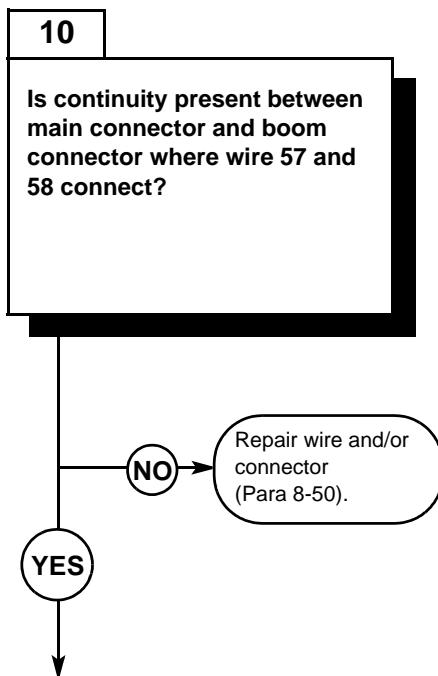
**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J1 from connector P1.
- (3) Connect multimeter positive lead (+) to fork leveler mode switch where wire 57 and 58 connect.
- (4) Connect multimeter negative lead (-) to main connector pin 33 and 34 for appropriate wire.
  - (a) If continuity is present, go to Step 10 of this fault.
  - (b) If continuity is not present, repair faulty wire and/or connector (Para 8-48).



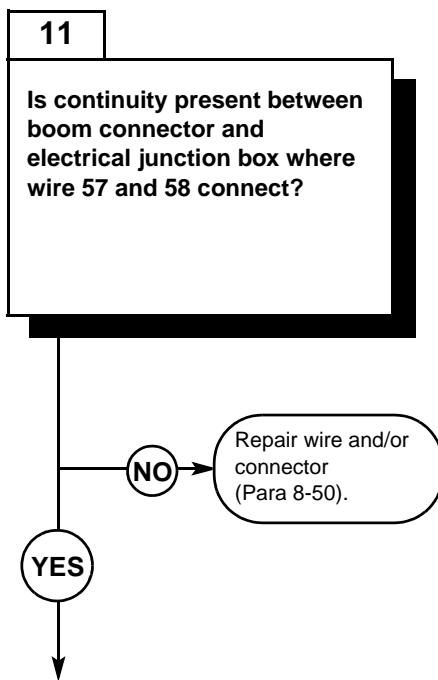
## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic system OK.
Auto-leveler OK.
Joystick OK.
Connector J3 OK.
Connector P3 OK.
Connector J1 OK.
Connector P1 OK.
Connector J4 OK.
Connector P4 OK.
Wire 51 OK.
Wire 52 OK.
Wire 53 OK.
Wire 54 OK.
Wire 55 OK.
Wire 56 OK.
Fork leveler mode switch OK.
POSSIBLE PROBLEMS
Wire 57 faulty.
Wire 58 faulty.



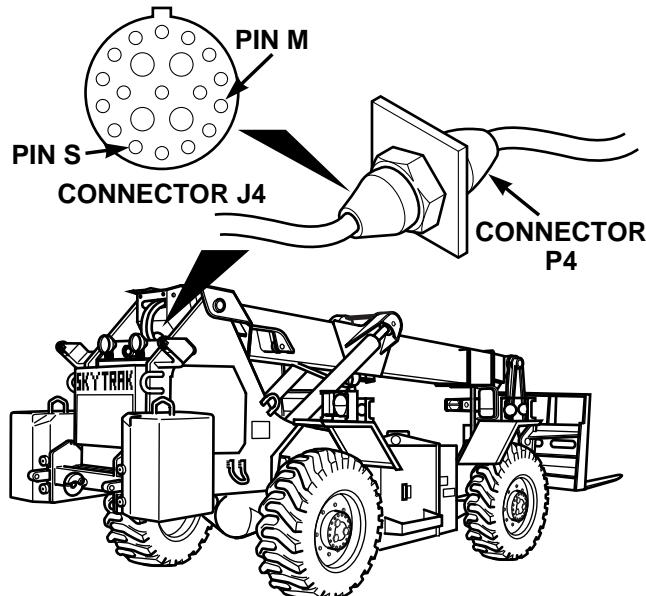
TEST OPTIONS
Continuity test.
STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire and/or connector are faulty.

KNOWN INFO
Hydraulic system OK.
Auto-leveler OK.
Joystick OK.
Connector J3 OK.
Connector P3 OK.
Connector J1 OK.
Connector P1 OK.
Connector J4 OK.
Connector P4 OK.
Wire 51 OK.
Wire 52 OK.
Wire 53 OK.
Wire 54 OK.
Wire 55 OK.
Wire 56 OK.
Fork leveler mode switch OK.
POSSIBLE PROBLEMS
Wire 57 faulty.
Wire 58 faulty.

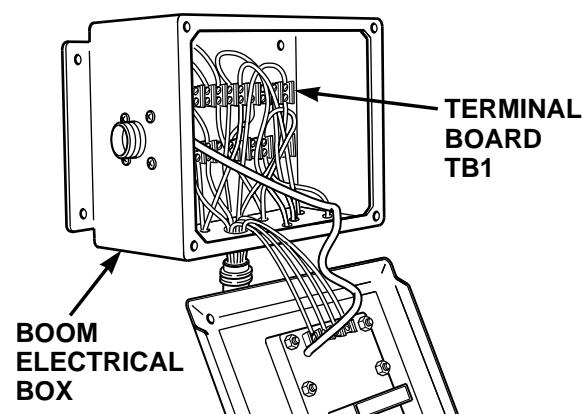
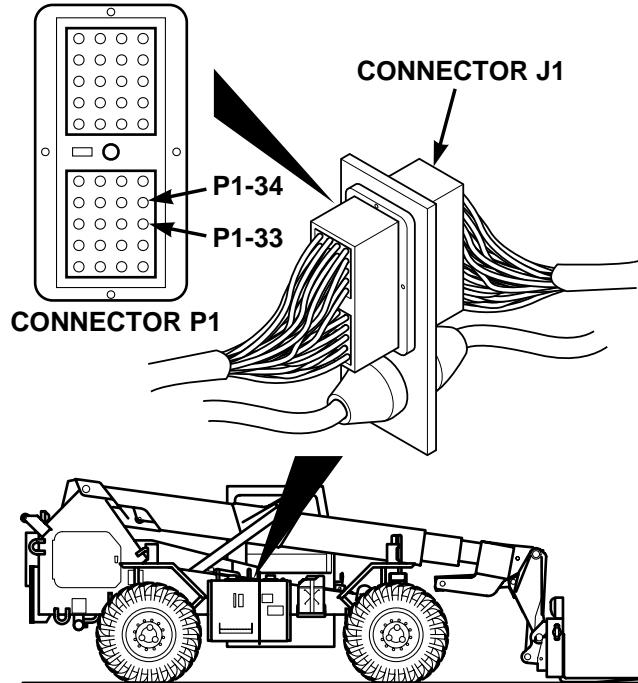


TEST OPTIONS
Continuity test.
STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire and/or connector are faulty.

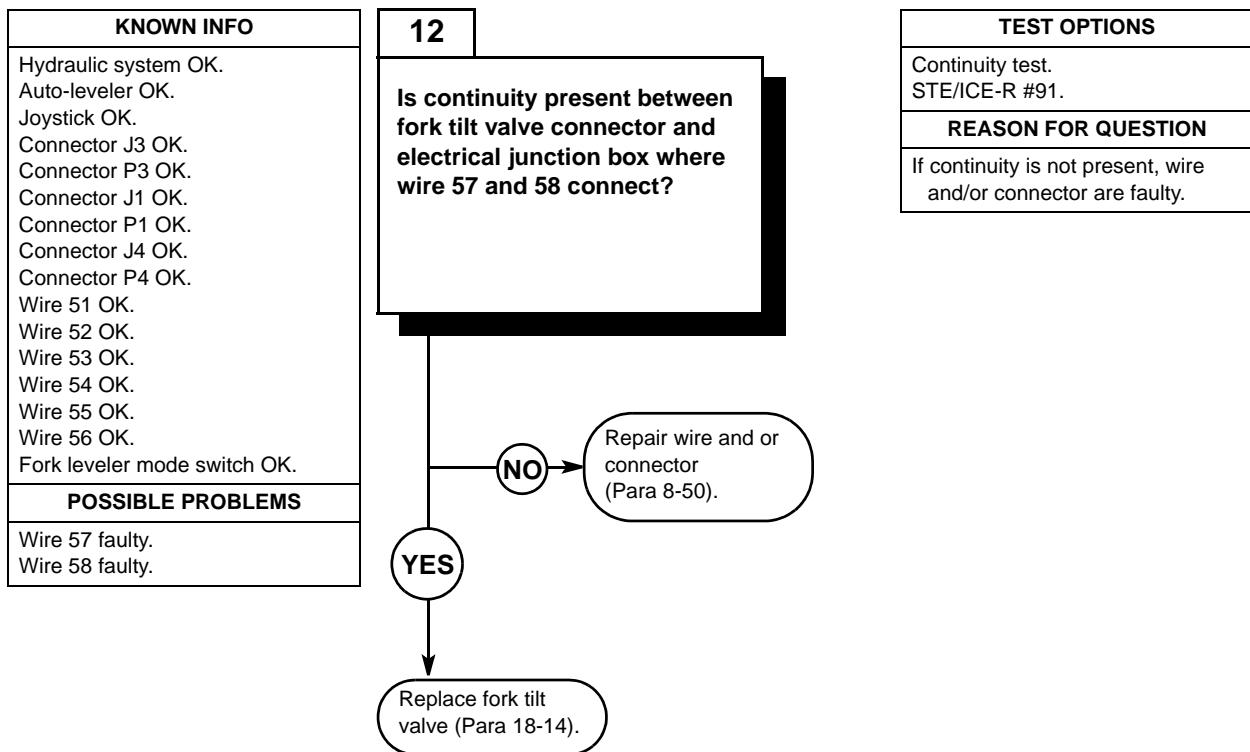
<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Disconnect connector J4 from connector P4.
(3)	Connect multimeter positive lead (+) to boom connector pin M and S for appropriate wire.
(4)	Connect multimeter negative lead (-) to main connector pin 33 and 34 for appropriate wire.
(a)	If continuity is present, go to Step 11 of this fault.
(b)	If continuity is not present, repair faulty wire and/or connector (Para 8-50).

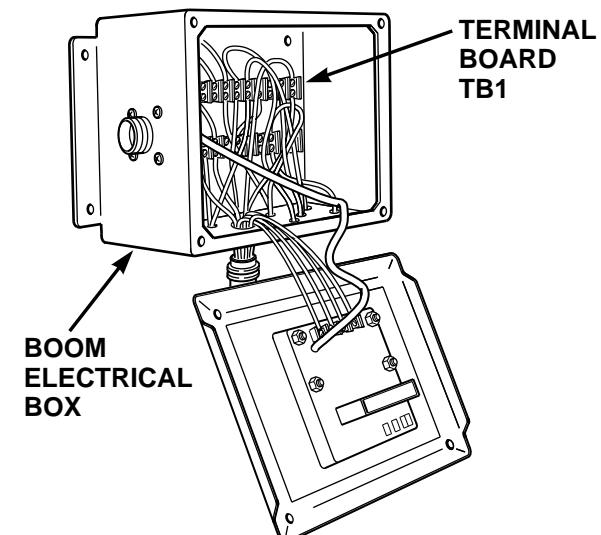
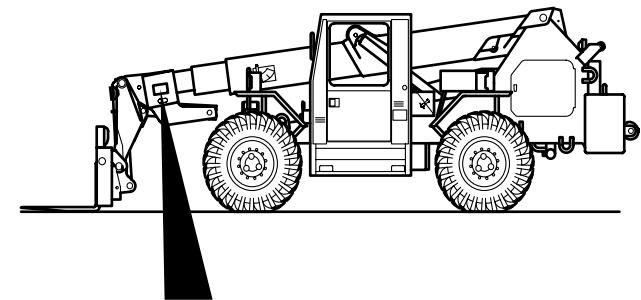
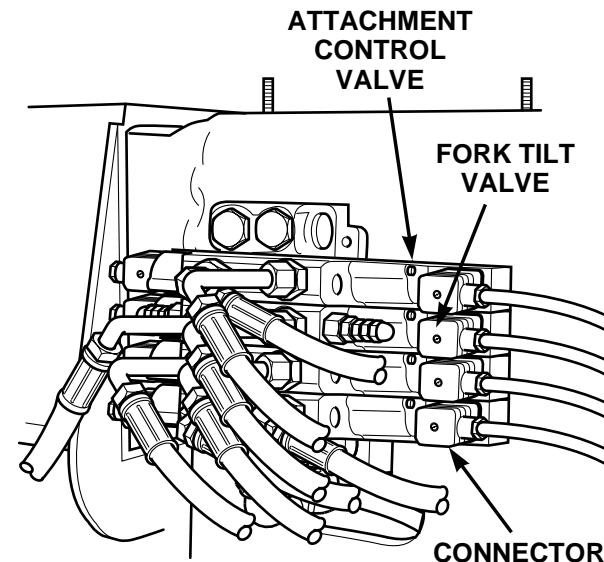
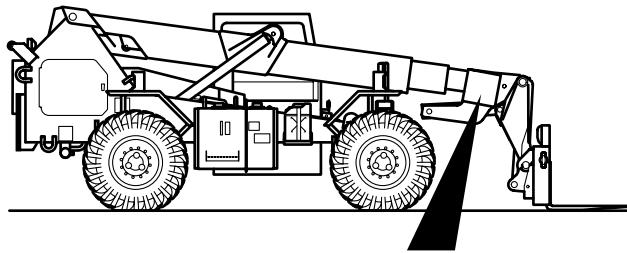
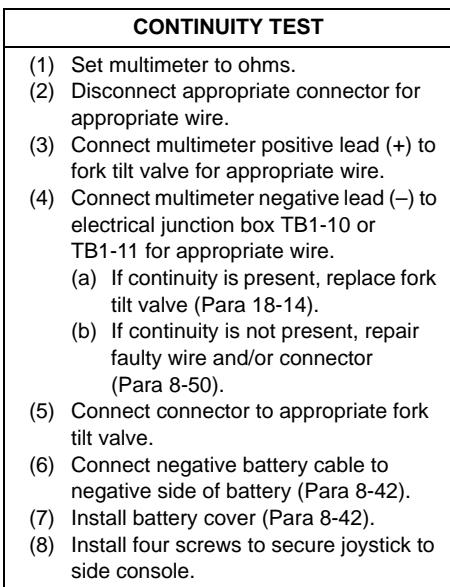


<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive lead (+) to boom connector pin M and S for appropriate wire.
(3)	Connect multimeter negative lead (-) to electrical junction box TB1-10 and TB1-11 for appropriate wire.
(a)	If continuity is present, go to Step 12 of this fault.
(b)	If continuity is not present, repair faulty wire and/or connector (Para 8-50).
(4)	Connect connector J1 to connector P1.
(5)	Connect connector J4 to connector P4.



## 33. ELECTRIC JOYSTICK CONTROL DOES NOT OPERATE (CONT.).





**34. NONE OF THE GAGES OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

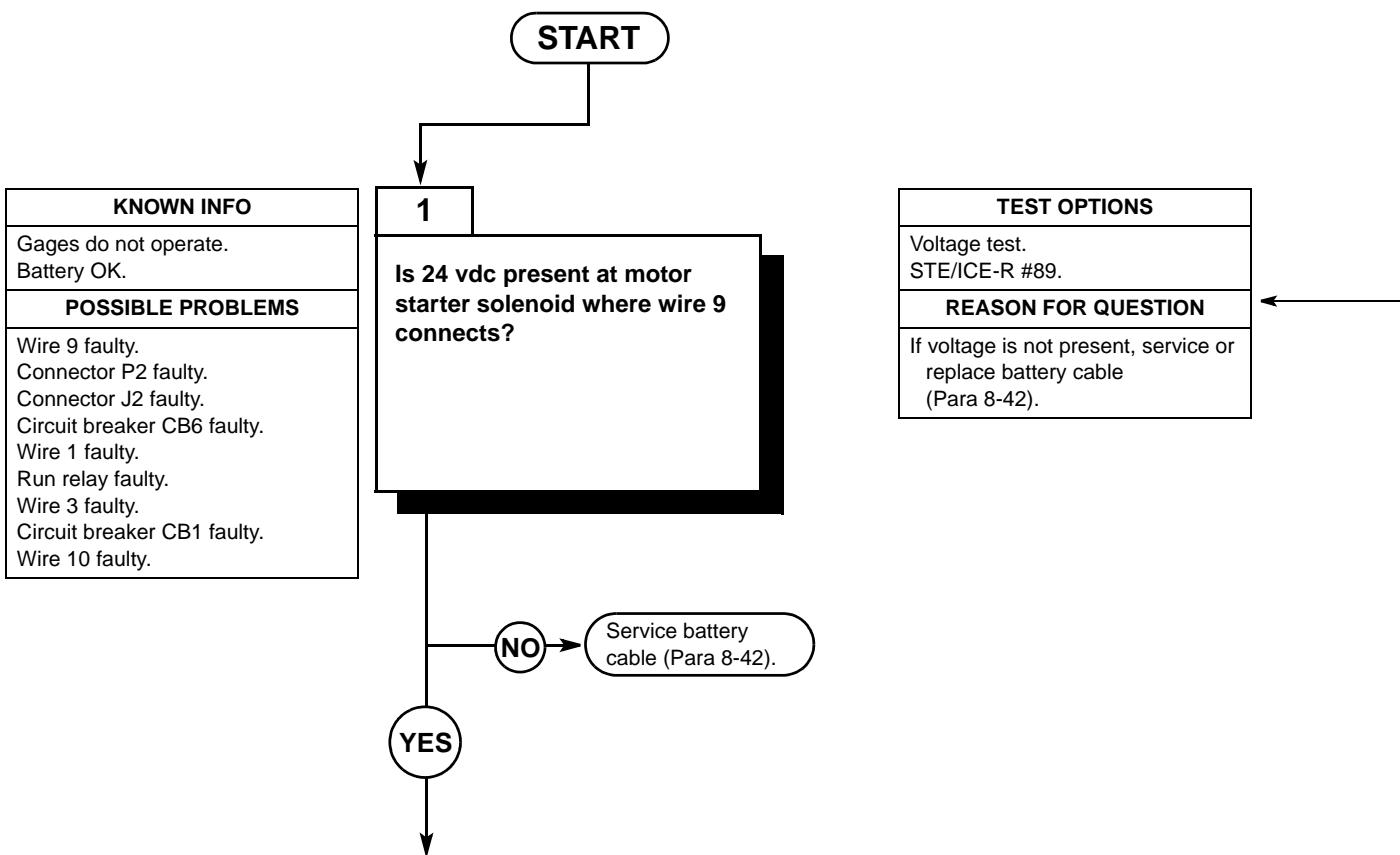
Two

*References*

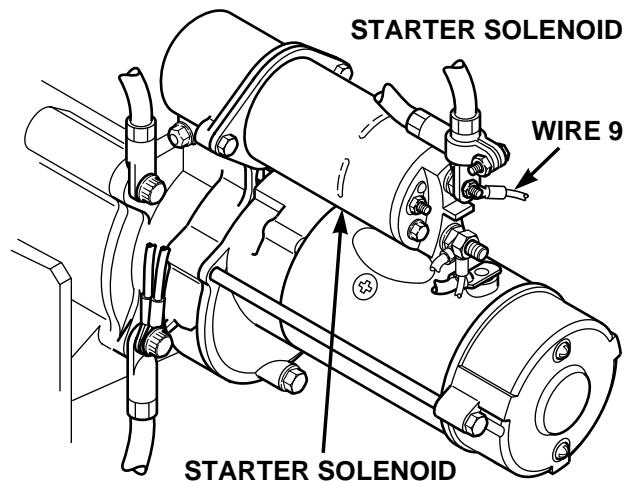
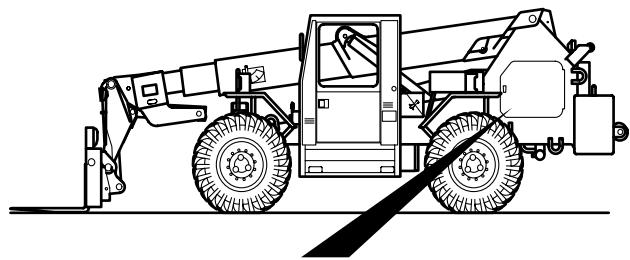
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

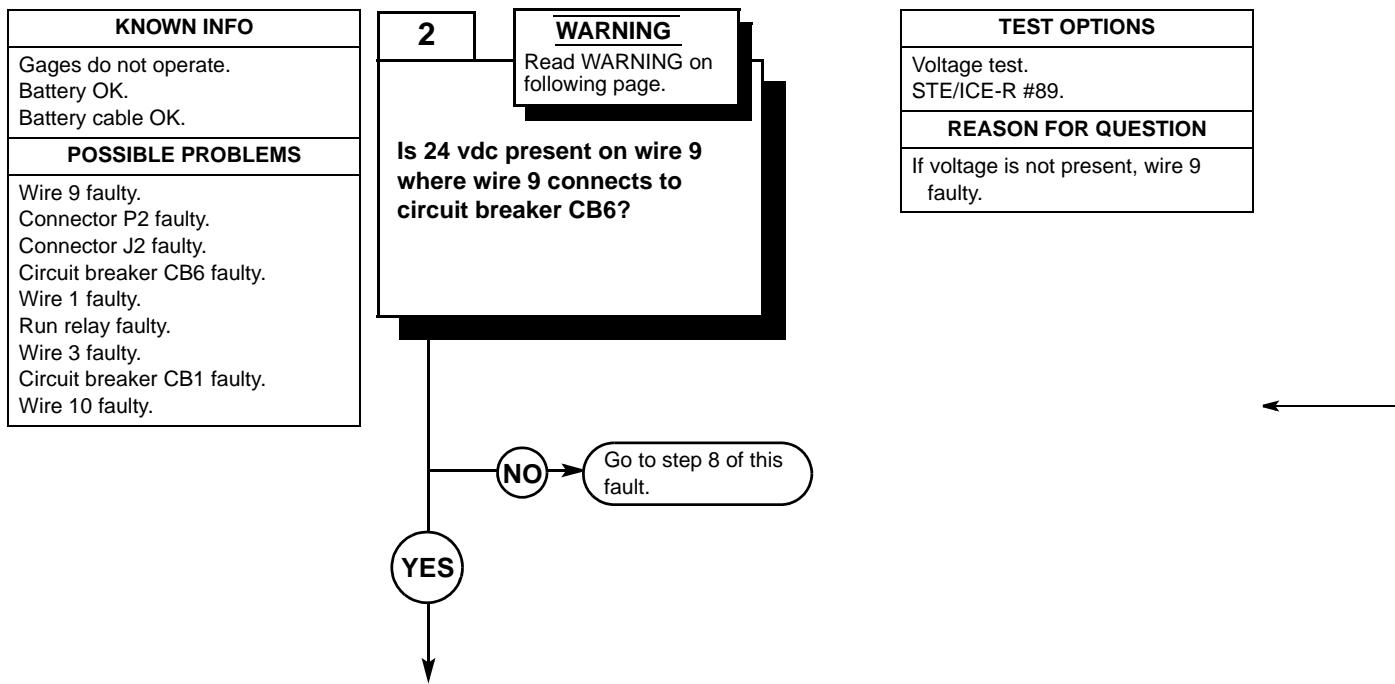
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Set multimeter to volts dc.
(4)	Connect multimeter negative lead (−) to known good ground.
(5)	Connect multimeter positive lead (+) to starter solenoid where wire 9 connects. (a) If 24 vdc is present, go to Step 2 of this fault. (b) If 24 vdc is not present, service battery cable (Para 8-42).



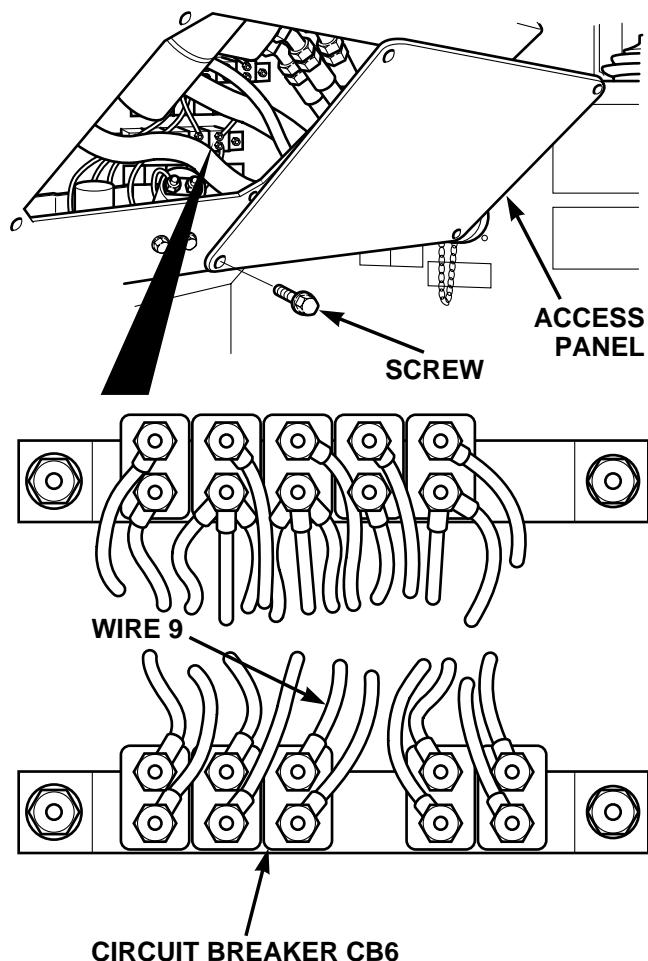
## 34. NONE OF THE GAGES OPERATE (CONT.).



**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Remove four screws and access panel.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to circuit breaker CB6.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42). <ul style="list-style-type: none"> <li>(a) If 24 vdc is present, go to Step 3 of this fault.</li> <li>(b) If 24 vdc is not present, go to Step 8 of this fault.</li> </ul>
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



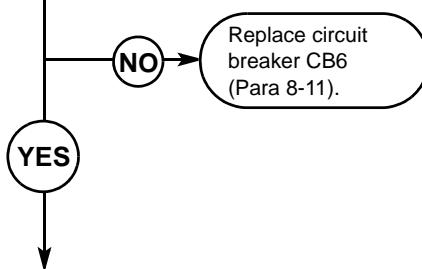
## 34. NONE OF THE GAGES OPERATE (CONT.).

KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK.
POSSIBLE PROBLEMS
Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty.

**3**

Is 24 vdc present on wire 1 where wire 1 connects to circuit breaker CB6?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB6 faulty.

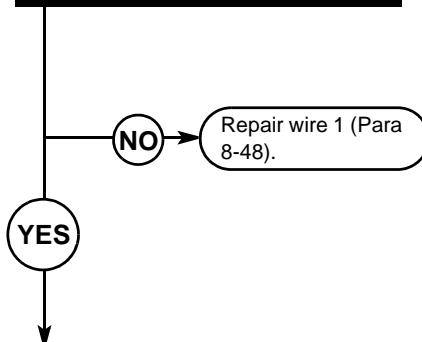


KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK.
POSSIBLE PROBLEMS
Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty. Fuel gage faulty. Wire 12 faulty. Connector J1 faulty. Connector P1 faulty. Fuel level transducer faulty.

**4**

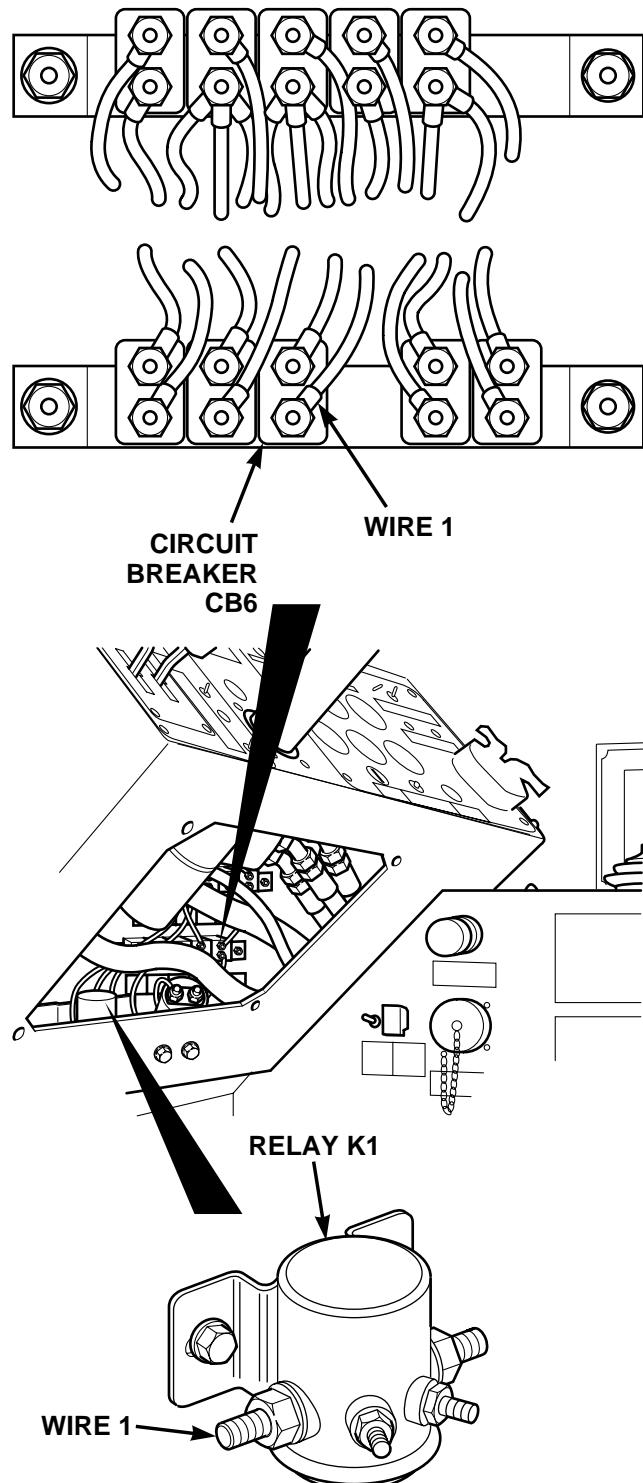
Is 24 vdc present on wire 1 where wire 1 connects to run relay?

TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 1 faulty.



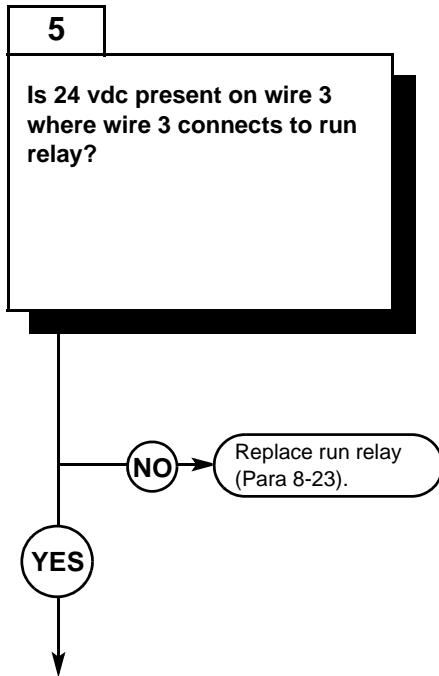
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to wire 1 where wire 1 connects to circuit breaker CB6.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB6 (Para 8-11).
(6)	Disconnect negative battery cable from negative side of battery (Para 8-42).

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 1 where wire 1 connects to run relay.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, repair wire 1 (Para 8-48).
(5)	Disconnect negative battery cable from negative side of battery (Para 8-42).



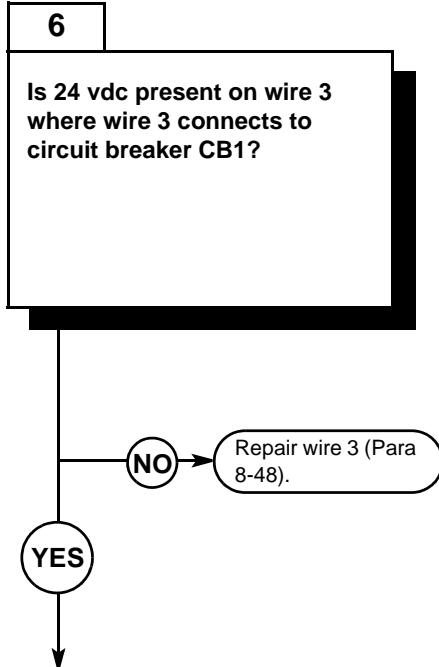
## 34. NONE OF THE GAGES OPERATE (CONT.).

KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK.
POSSIBLE PROBLEMS
Run relay faulty. Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty. Fuel gage faulty. Wire 12 faulty. Connector J1 faulty. Connector P1 faulty. Fuel level transducer faulty.



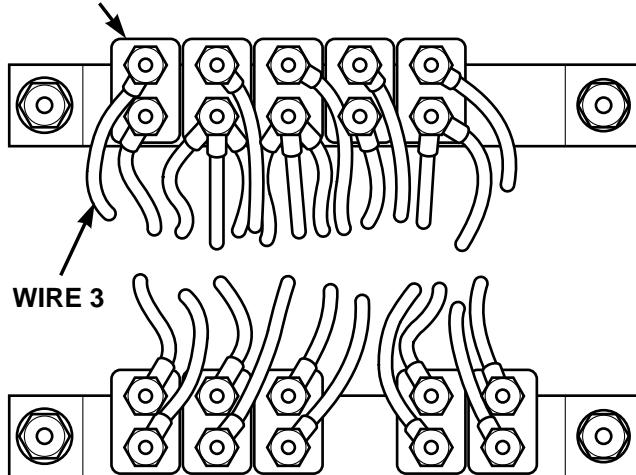
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, run relay faulty.

KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK.
POSSIBLE PROBLEMS
Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty.

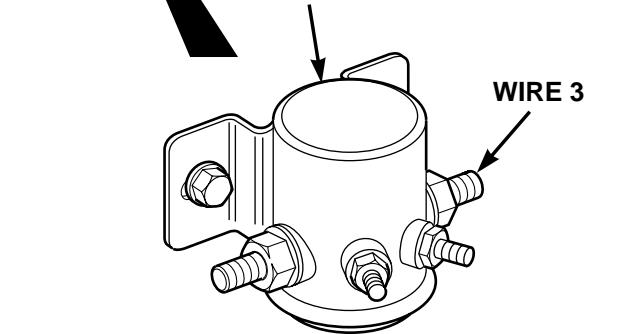


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 3 faulty.

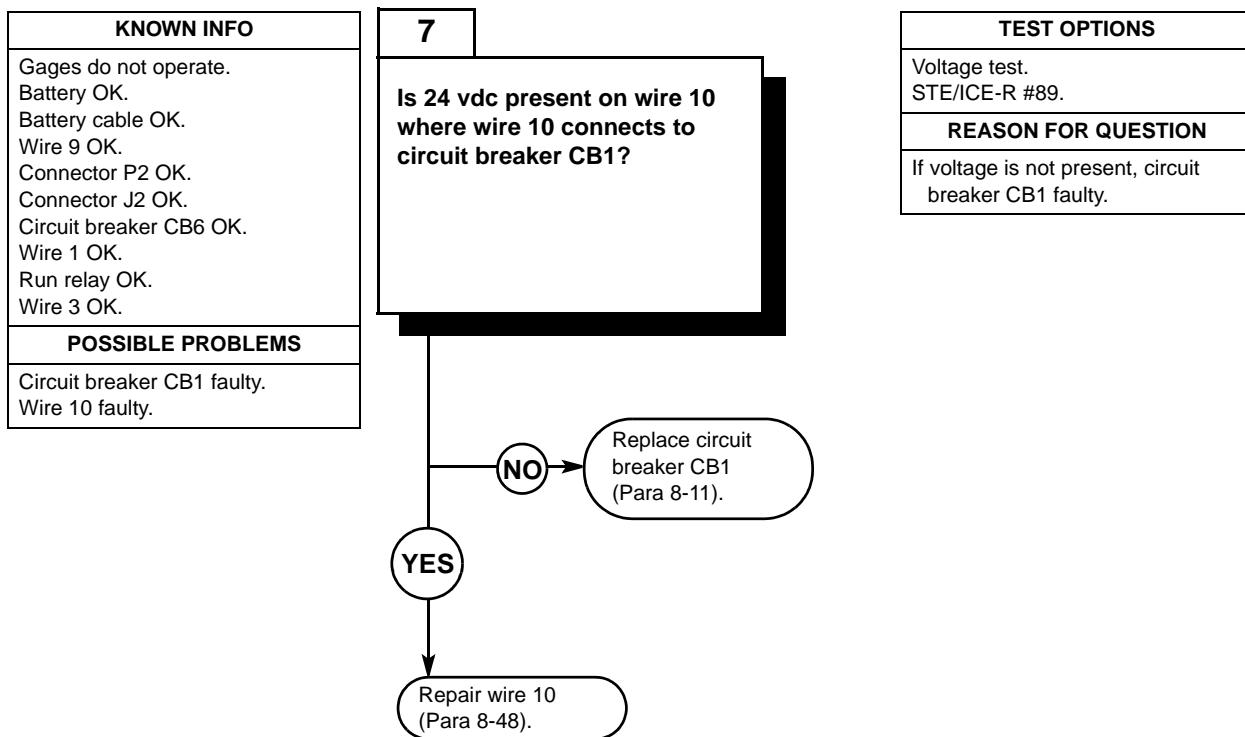
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 3 where wire 3 connects to run relay.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, replace run relay (Para 8-23).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

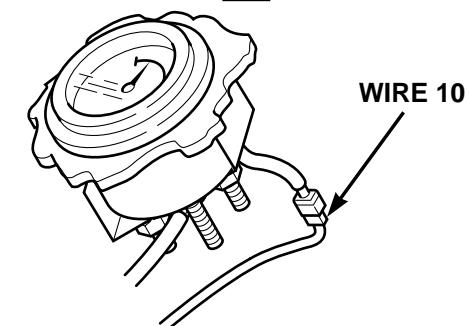
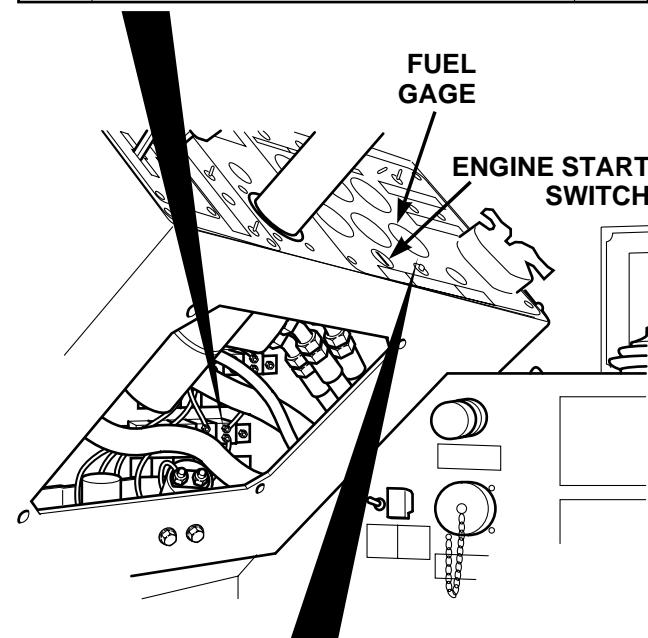
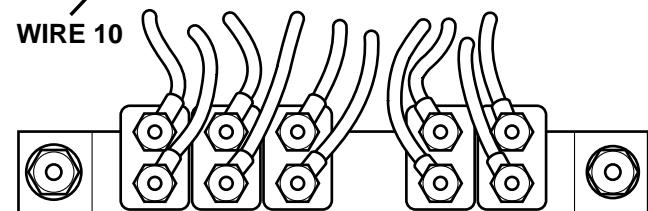
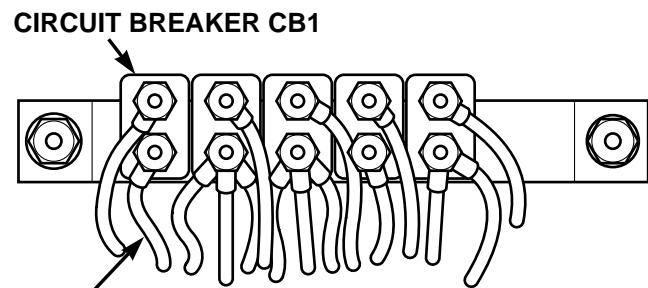
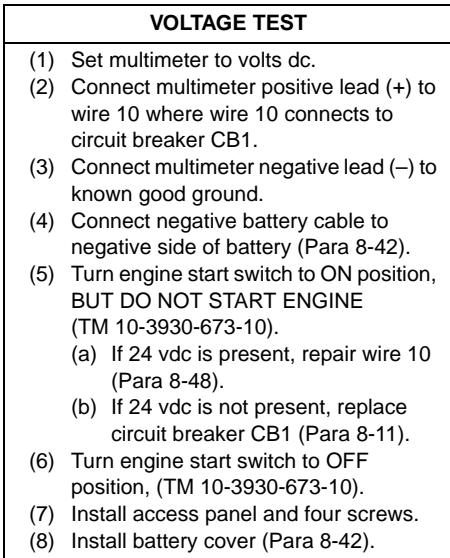
**CIRCUIT BREAKER CB1**

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to wire 3 where wire 3 connects to circuit breaker CB1.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 7 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(6)	Turn engine start switch to OFF position, (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

**RELAY K1**

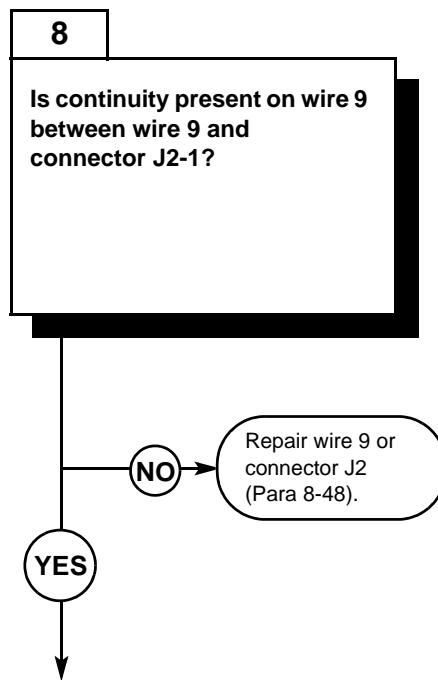
## 34. NONE OF THE GAGES OPERATE (CONT.).





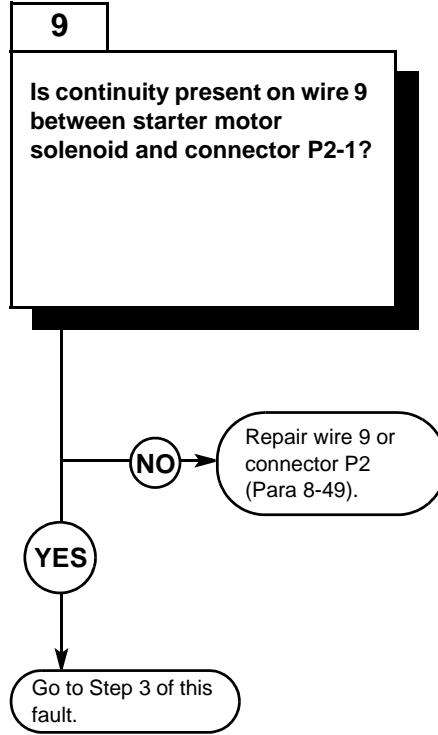
## 34. NONE OF THE GAGES OPERATE (CONT.).

KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK.
POSSIBLE PROBLEMS
Wire 9 faulty. Connector P2 faulty. Connector J2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty.



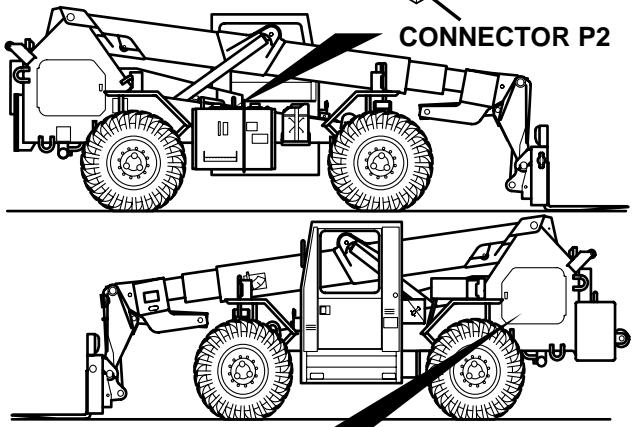
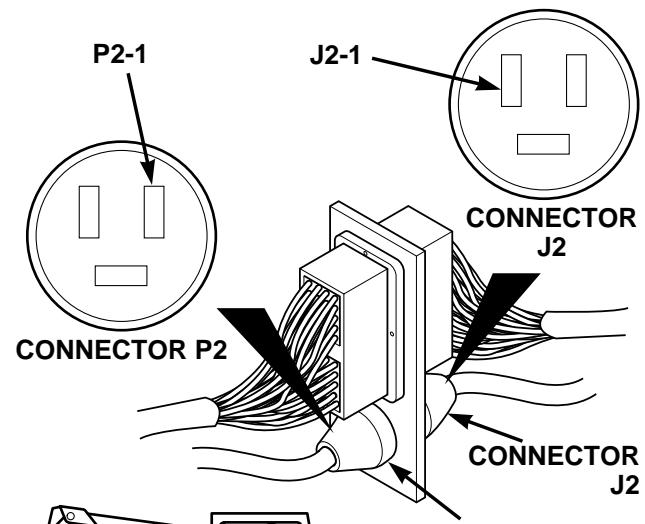
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector J2 faulty.

KNOWN INFO
Gages do not operate. Battery OK. Battery cable OK. Wire 9 OK. Connector J2 OK.
POSSIBLE PROBLEMS
Connector P2 faulty. Circuit breaker CB6 faulty. Wire 1 faulty. Run relay faulty. Wire 3 faulty. Circuit breaker CB1 faulty. Wire 10 faulty. Fuel gage faulty. Wire 12 faulty. Connector J1 faulty. Connector P1 faulty. Fuel level transducer faulty.

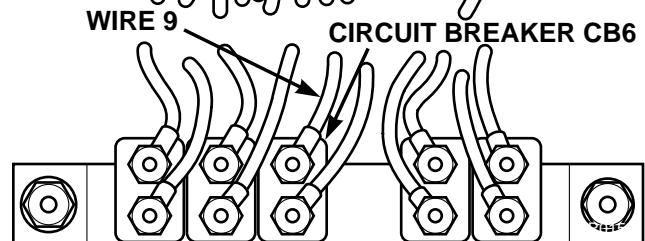
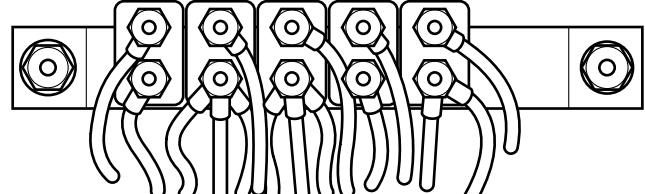
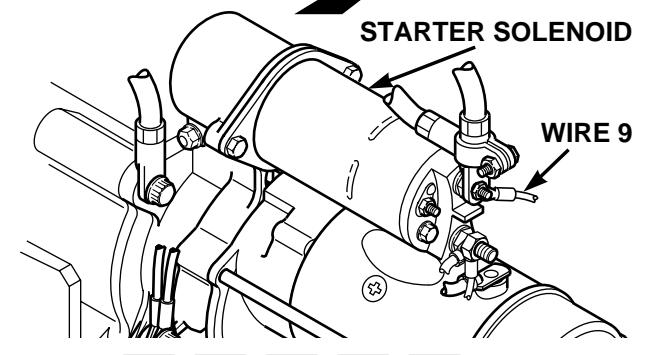


TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 9 or connector P2 faulty.

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Disconnect connector J2 from connector P2.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to circuit breaker CB6.
(5)	Connect multimeter negative lead (-) to connector J2-1.
(a)	If continuity is present, go to Step 9 of this fault.
(b)	If continuity is not present, repair wire 9 or connector J2 (Para 8-48).



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J2 from connector P2.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 9 where wire 9 connects to starter motor solenoid.
(4)	Connect multimeter negative lead (-) to connector P2-1.
(a)	If continuity is present, go to Step 3 of this fault.
(b)	If continuity is not present, repair wire 9 or connector P2 (Para 8-49).



### **35. VOLTMETER DOES NOT OPERATE.**

## INITIAL SETUP

## *Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)  
Multimeter, Digital (Item 9, Appendix F)

### *Personnel Required*

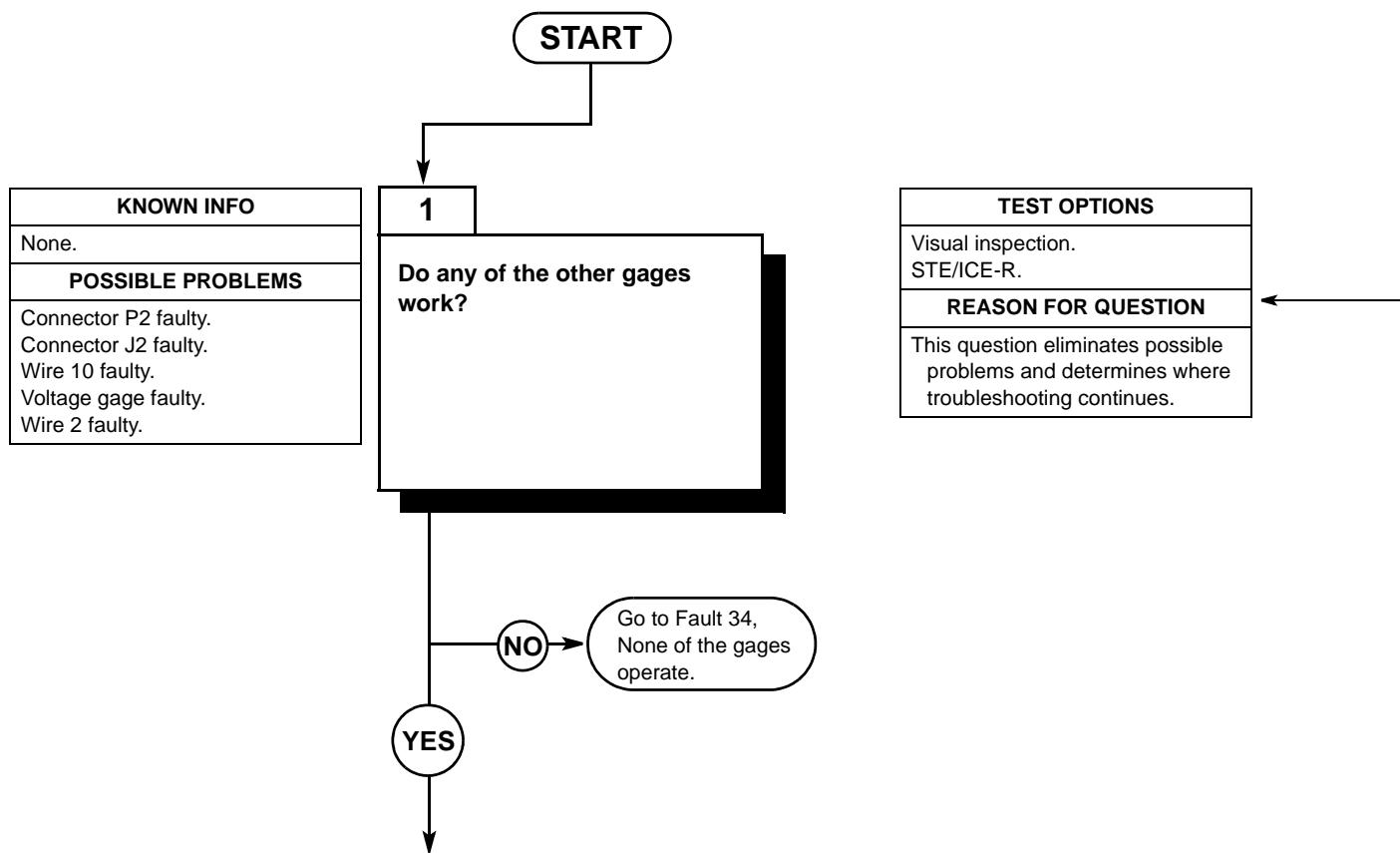
Two

## References

TM 10-3930-673-10  
TM 9-4910-571-12&P

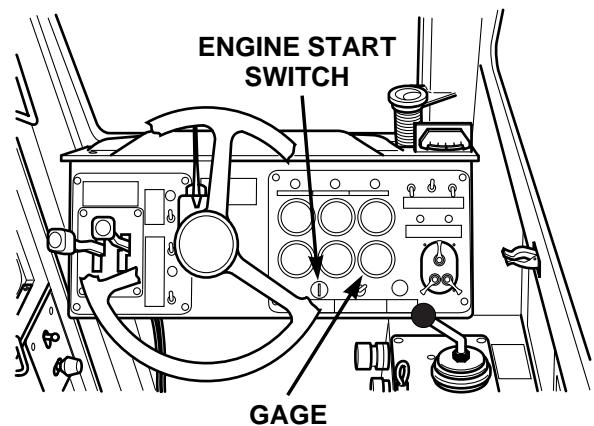
### *Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)

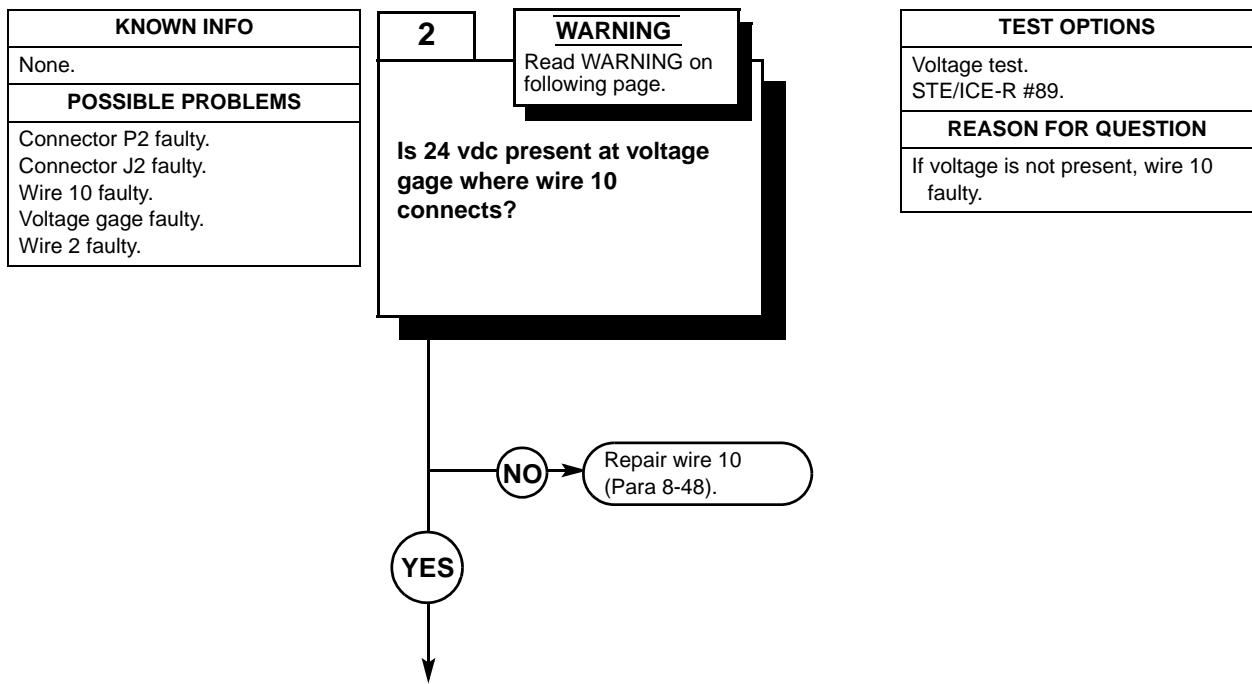


**VISUAL INSPECTION**

- (1) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If the other gages are operating, go to Step 2 of this fault.
  - (b) If all gages are not operating, go to Fault 34, None of the gages operate.
- (2) Turn engine start switch to OFF position (TM 10-3930-673-10).



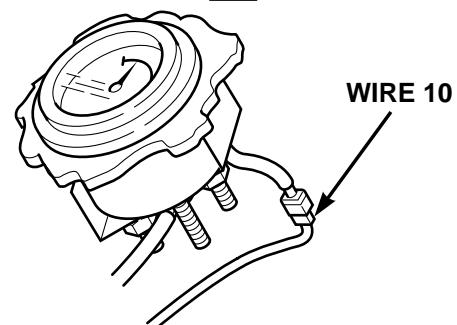
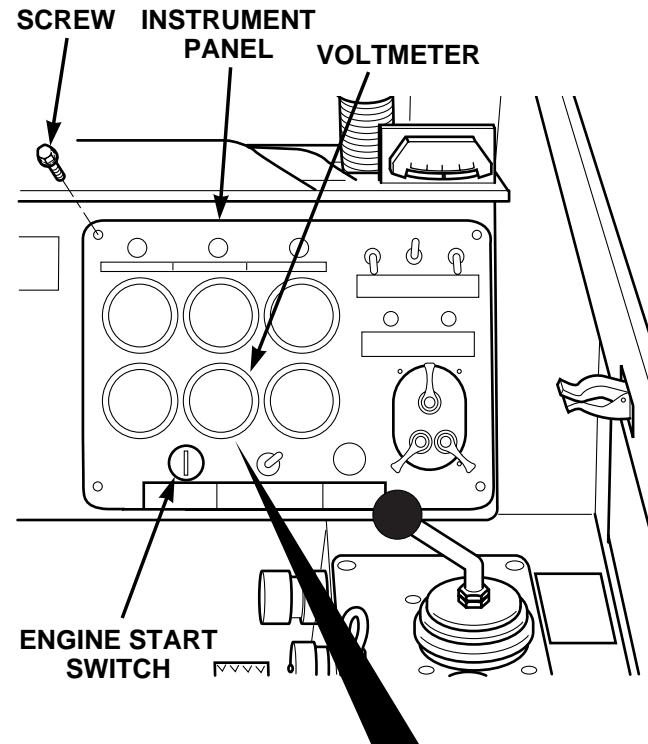
## 35. VOLTMETER DOES NOT OPERATE (CONT).



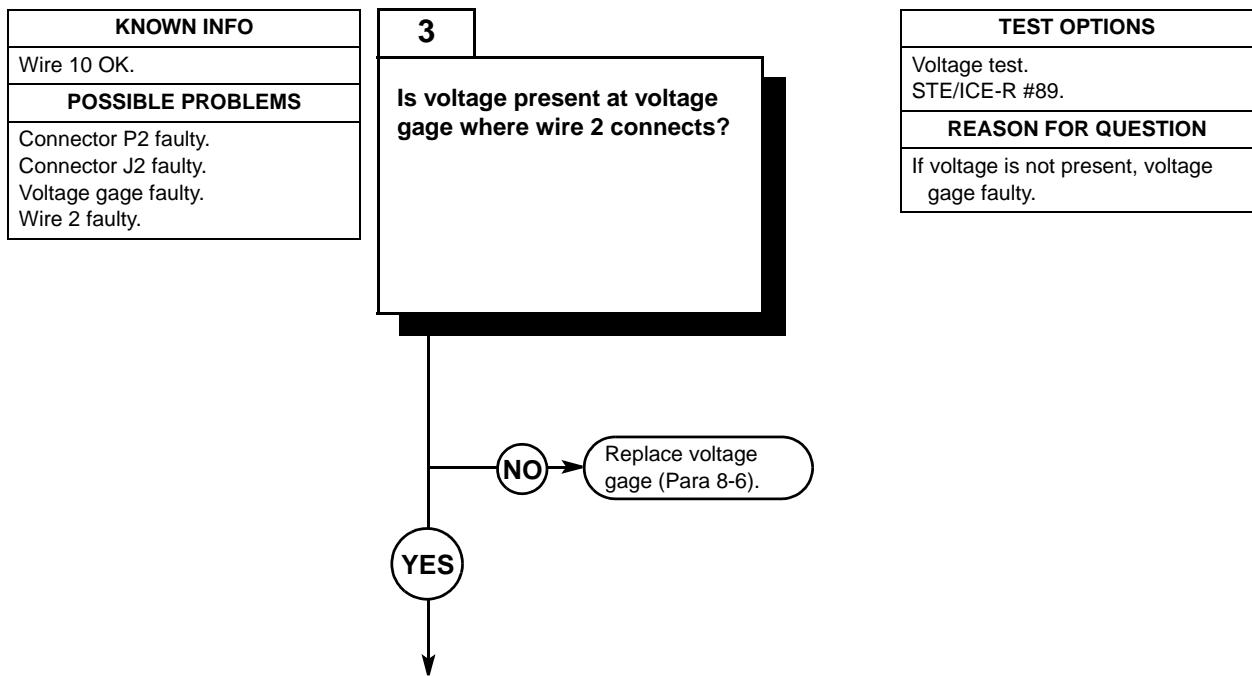
**WARNING**

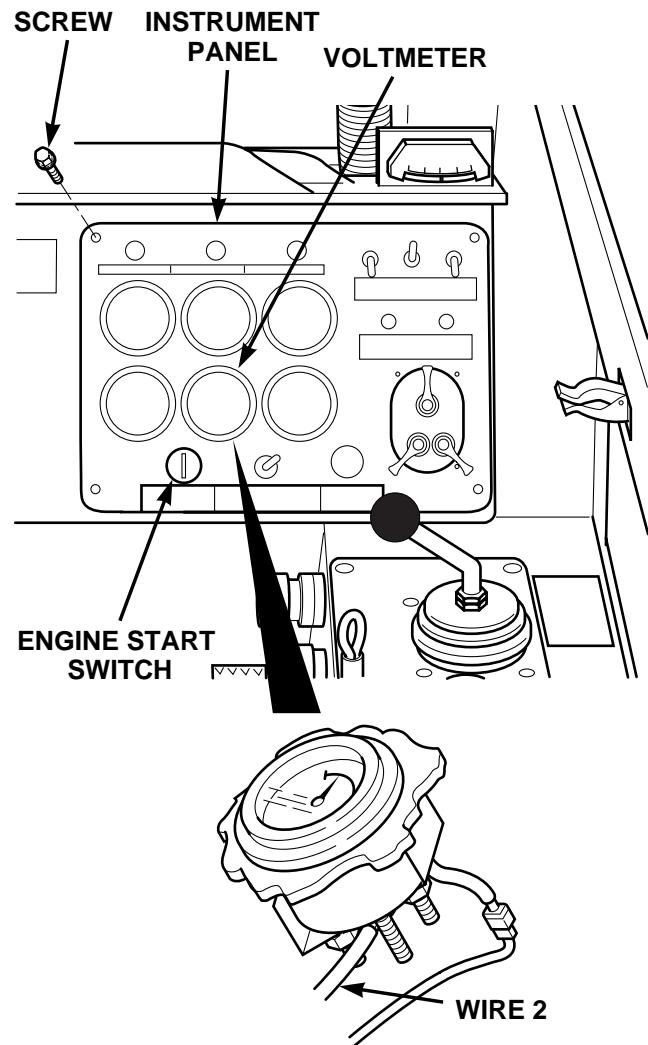
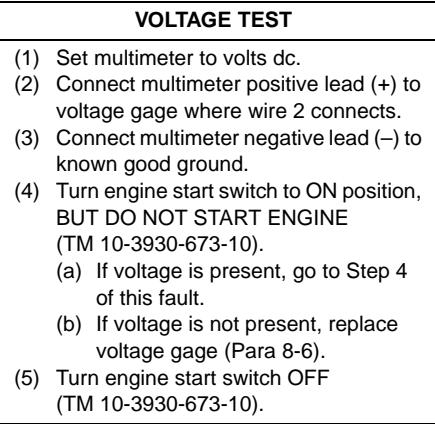
- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from instrument panel.
(4)	Set multimeter to volts dc.
(5)	Lift right-hand instrument panel out to reach voltage gage.
(6)	Connect multimeter positive lead (+) to voltage gage where wire 10 connects.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).

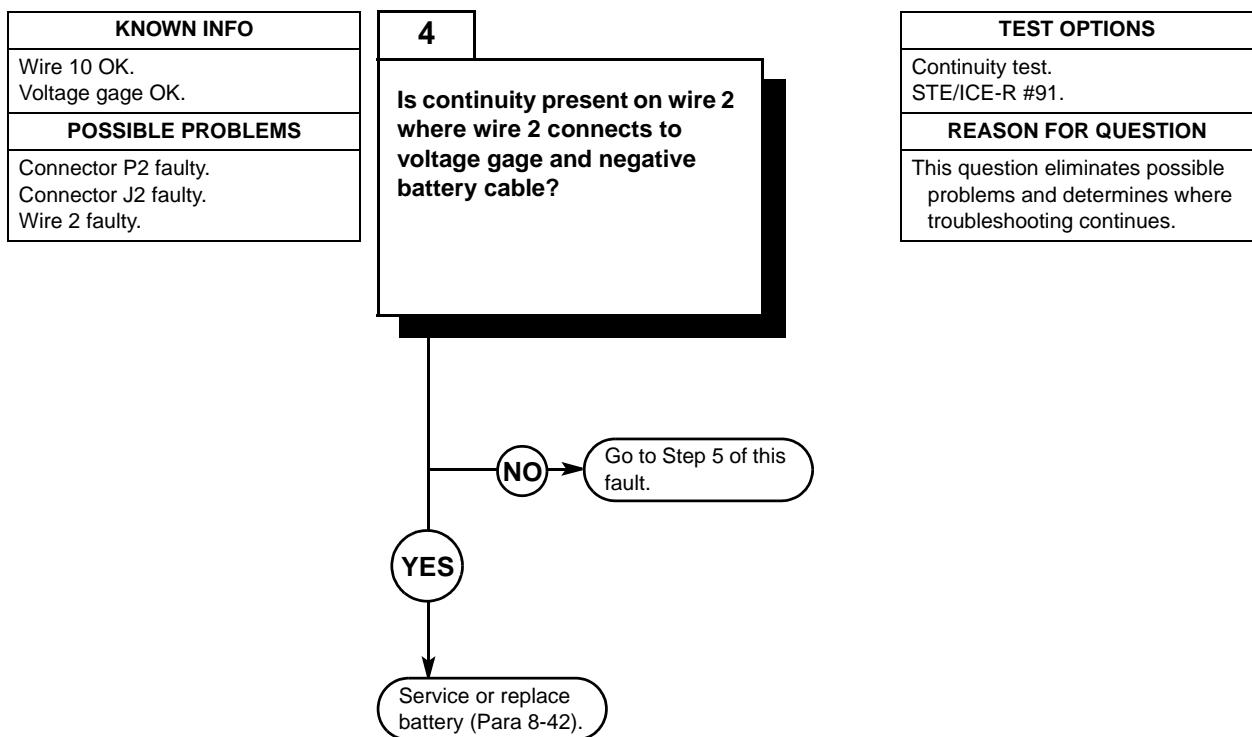


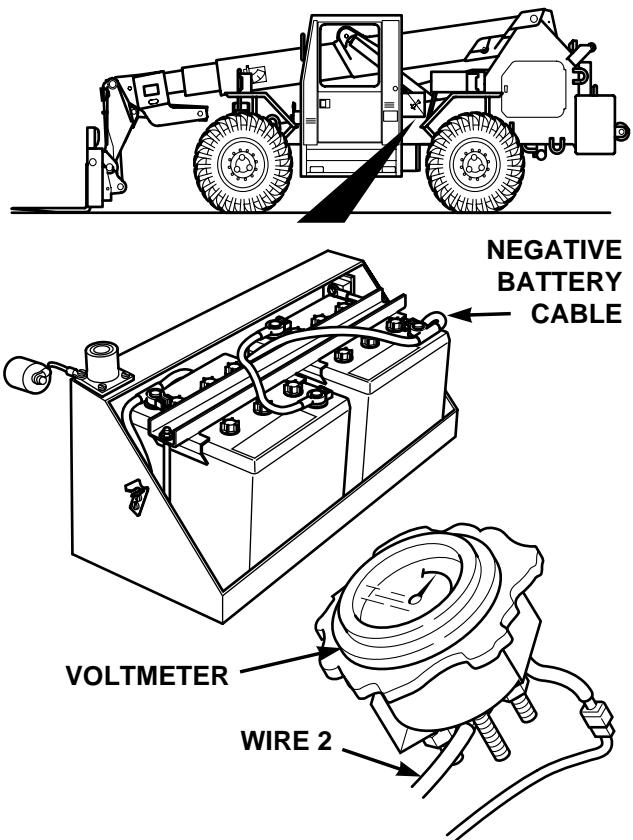
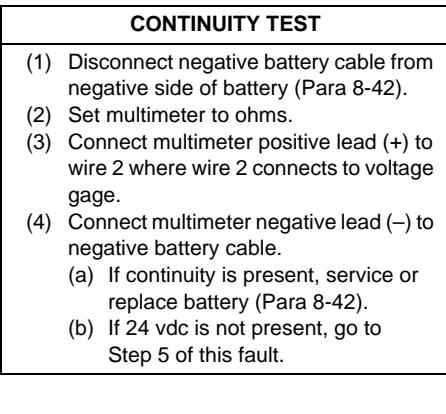
## 35. VOLTMETER DOES NOT OPERATE (CONT).



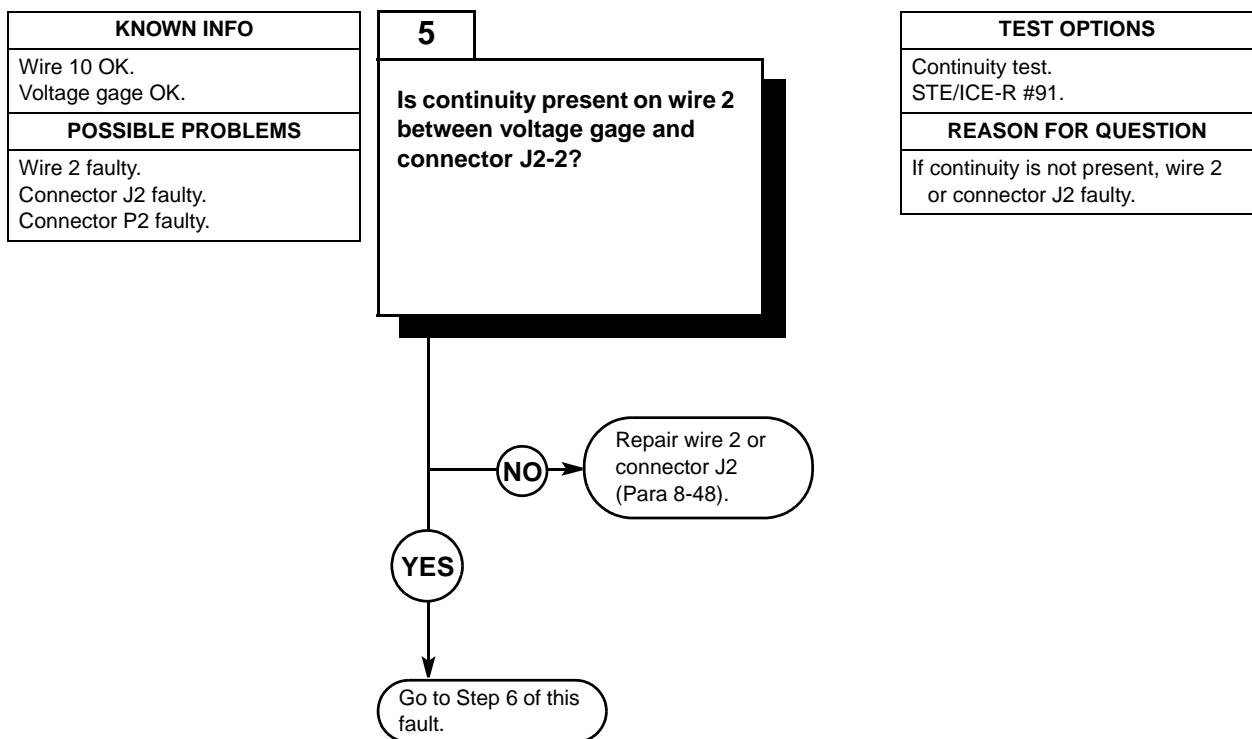


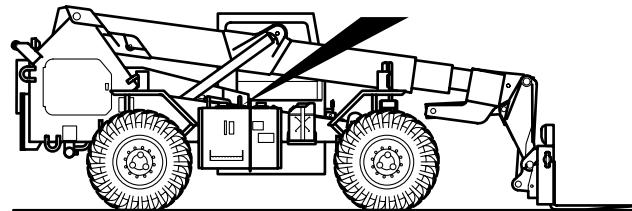
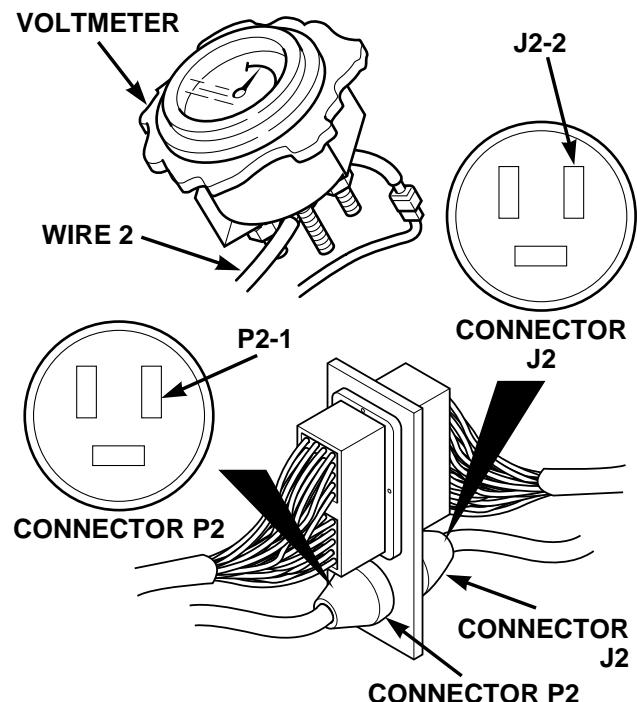
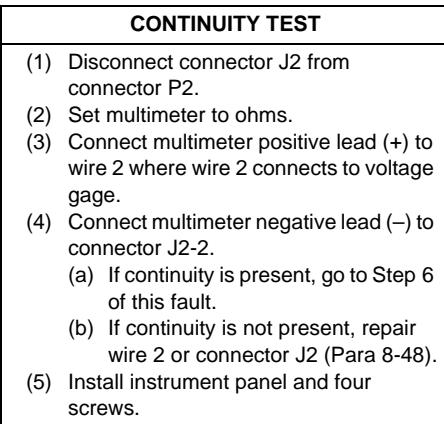
## 35. VOLTMETER DOES NOT OPERATE (CONT.).



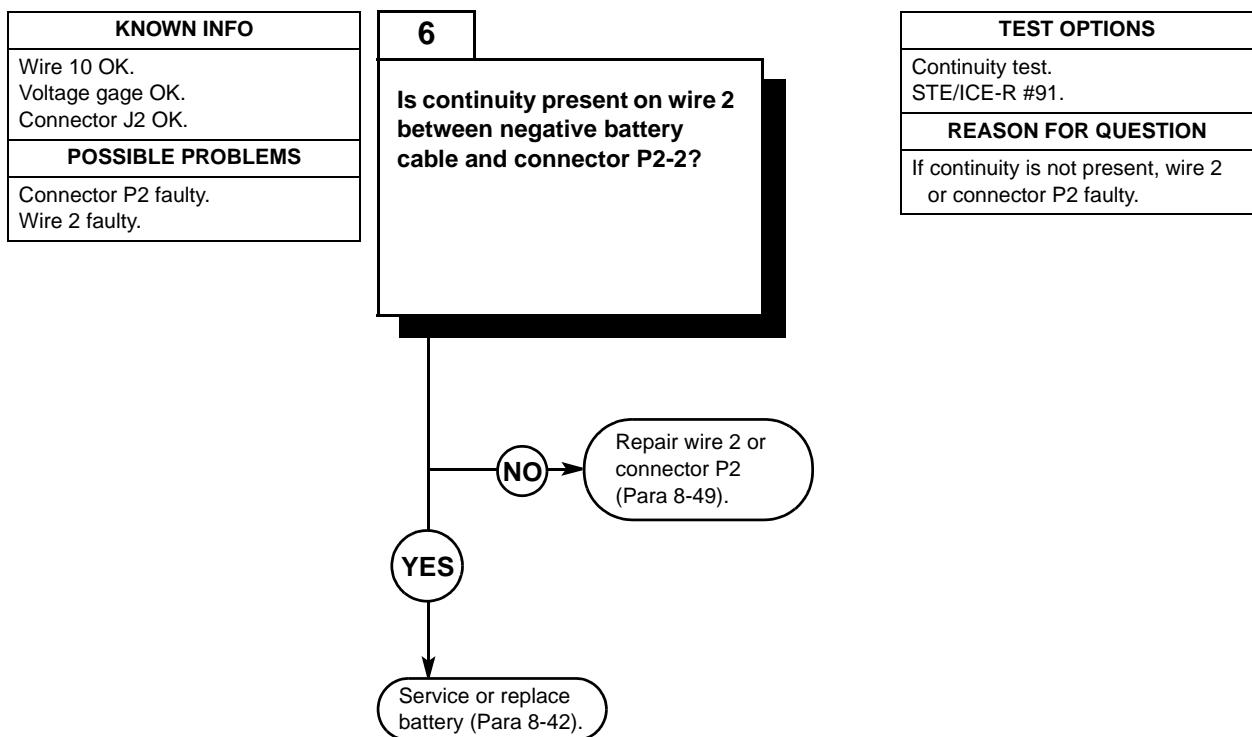


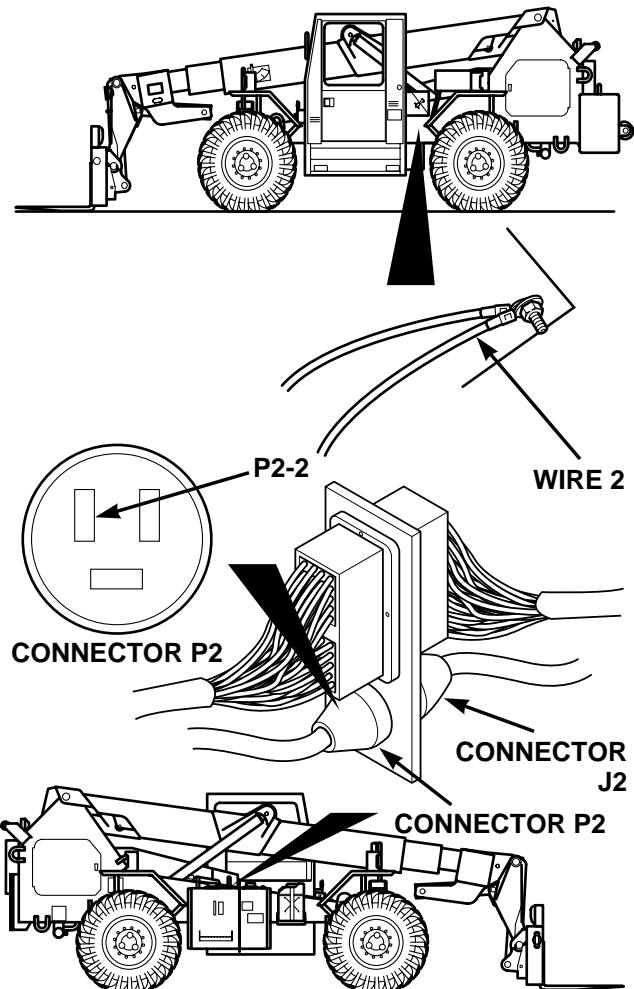
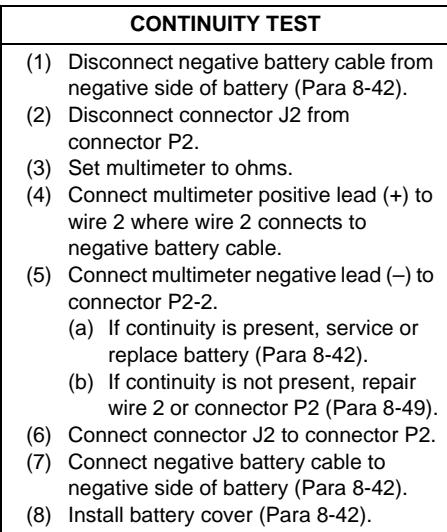
## 35. VOLTMETER DOES NOT OPERATE (CONT.).





## 35. VOLTMETER DOES NOT OPERATE (CONT.).





**36. ENGINE HOUR METER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

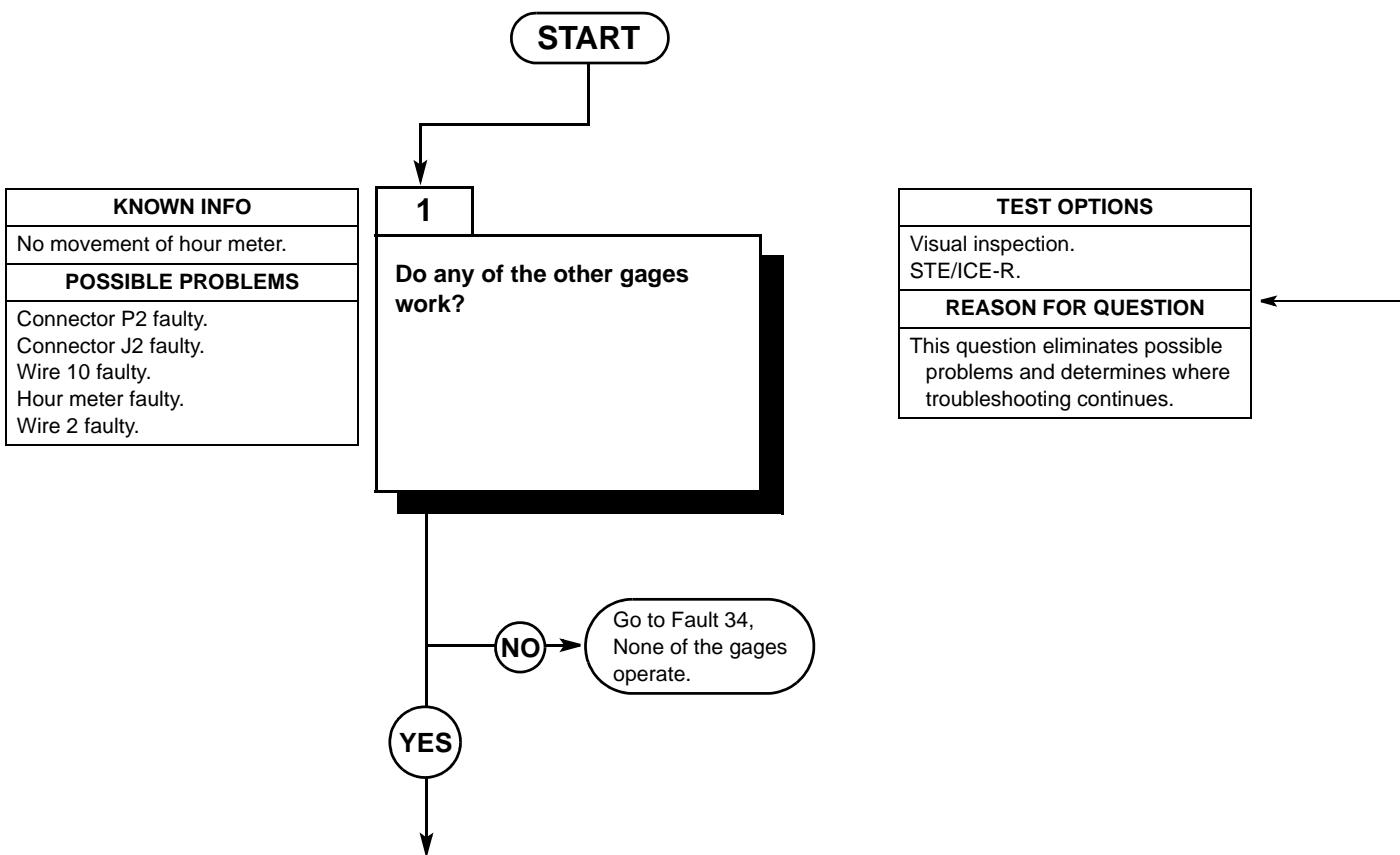
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

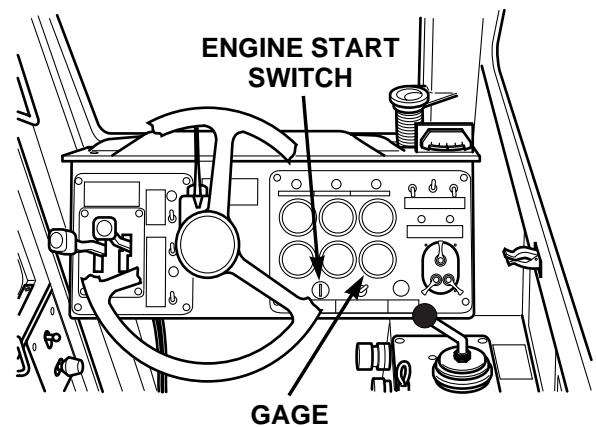
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

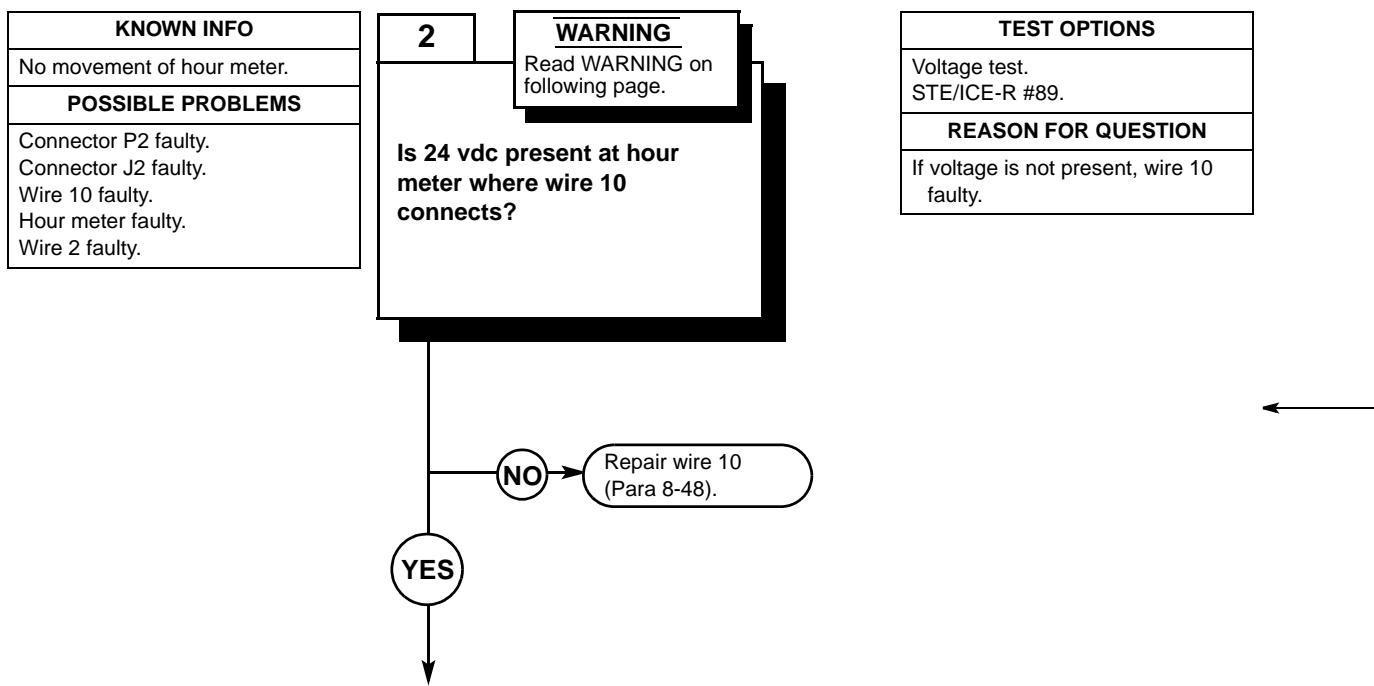


**VISUAL INSPECTION**

- (1) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If the other gages are operating, go to Step 2 of this fault.
  - (b) If all gages are not operating, go to Fault 34, None of the gages operate.
- (2) Turn engine start switch to OFF position (TM 10-3930-673-10).



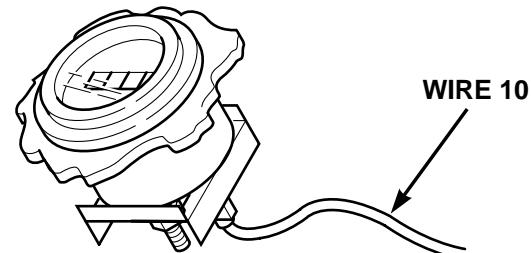
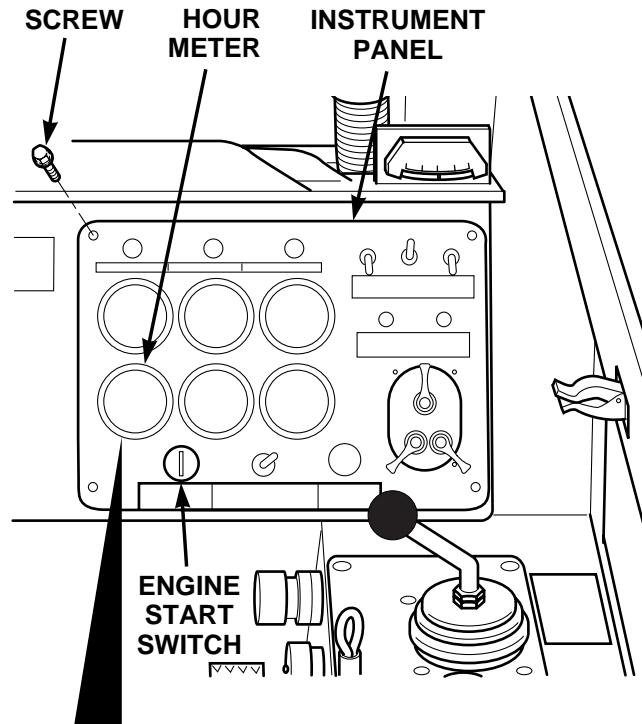
## 36. ENGINE HOUR METER DOES NOT OPERATE (CONT.).



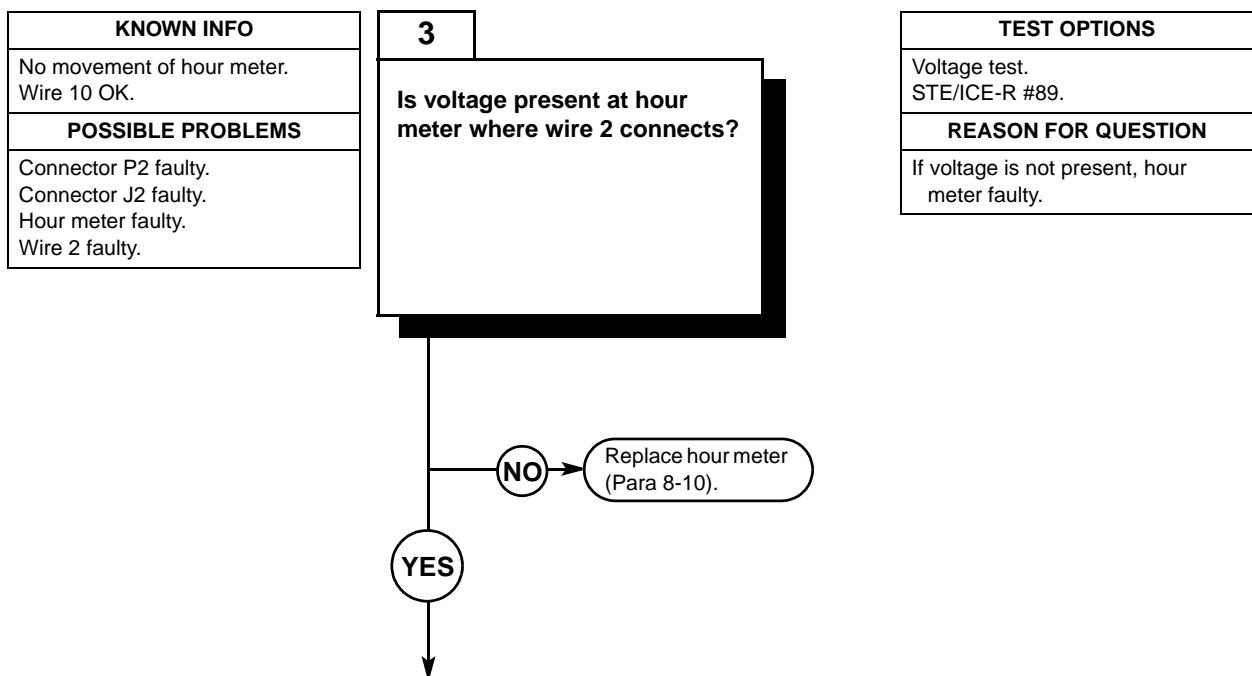
## WARNING

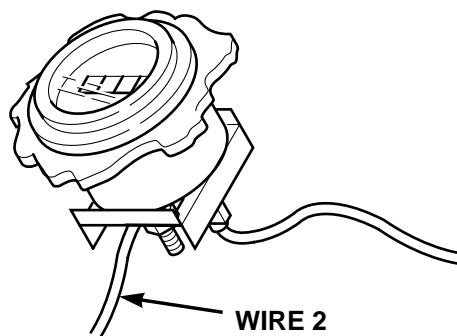
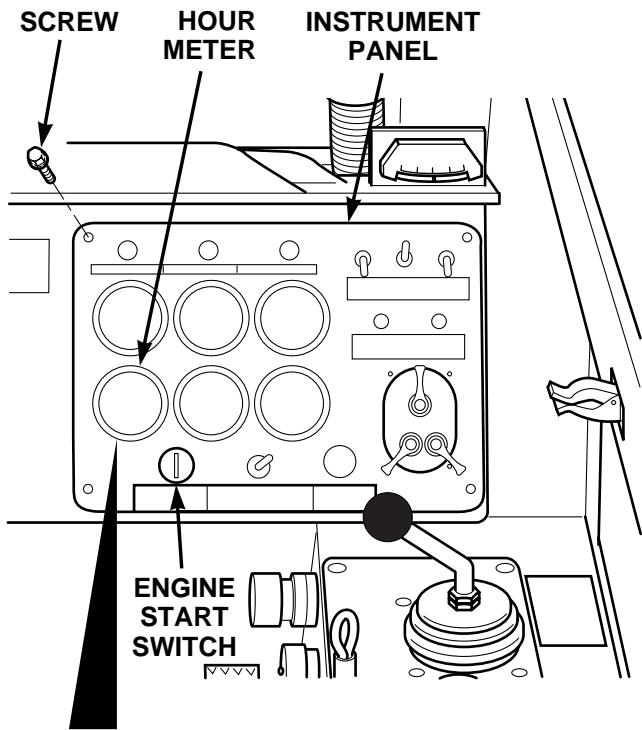
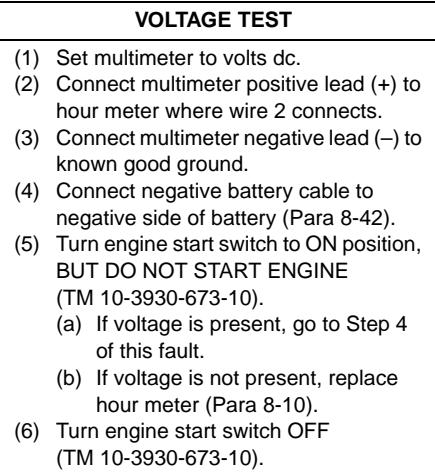
- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from instrument panel.
(4)	Set multimeter to volts dc.
(5)	Left instrument panel out to reach hour meter.
(6)	Connect multimeter positive lead (+) to hour meter where wire 10 connects.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).

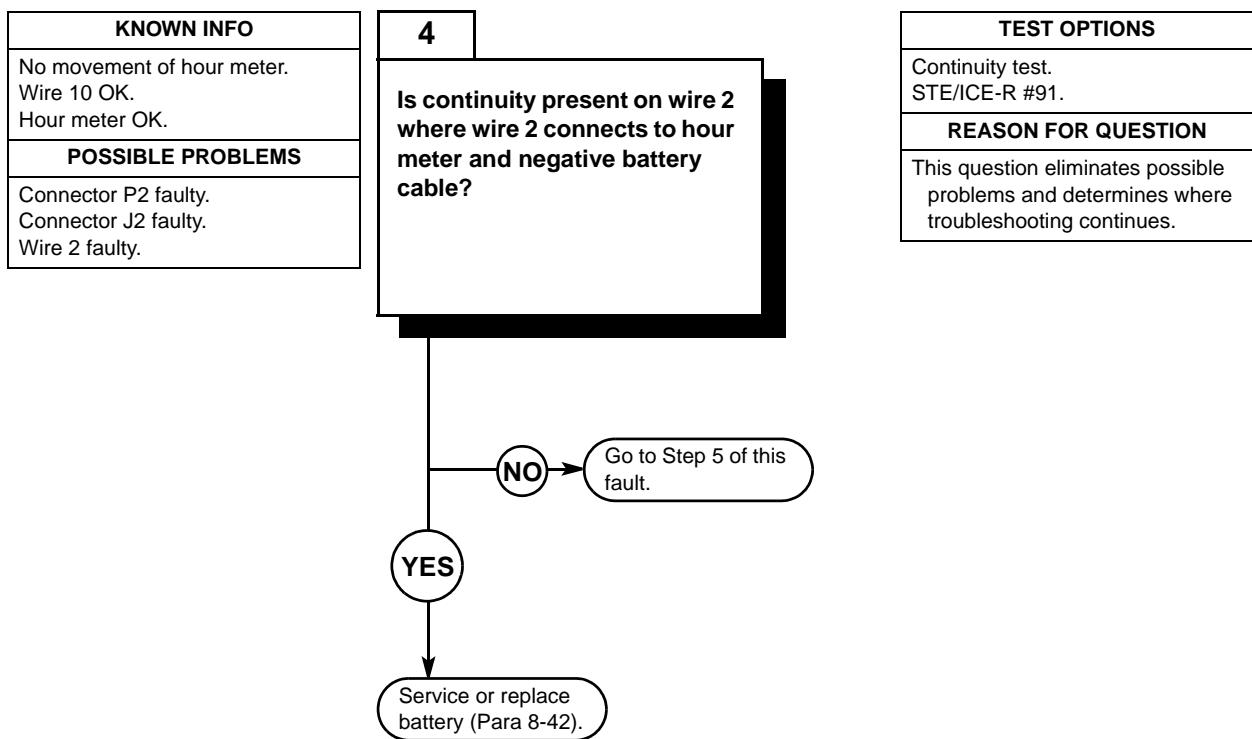


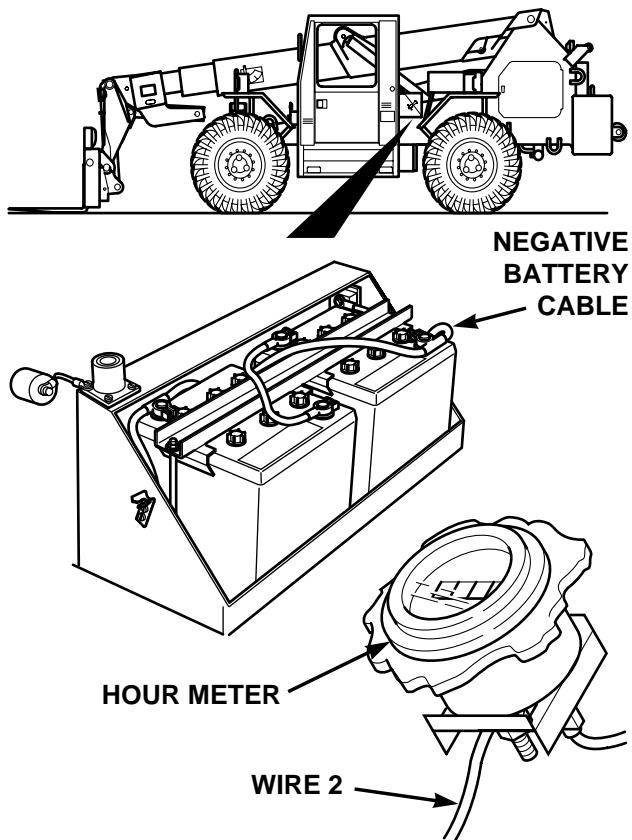
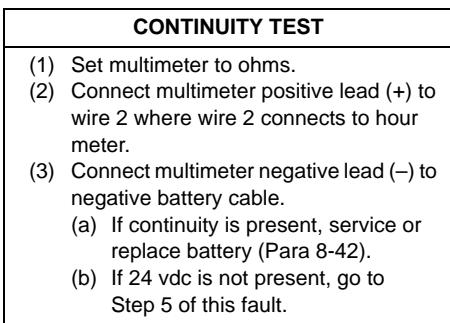
## 36. ENGINE HOUR METER DOES NOT OPERATE (CONT.).



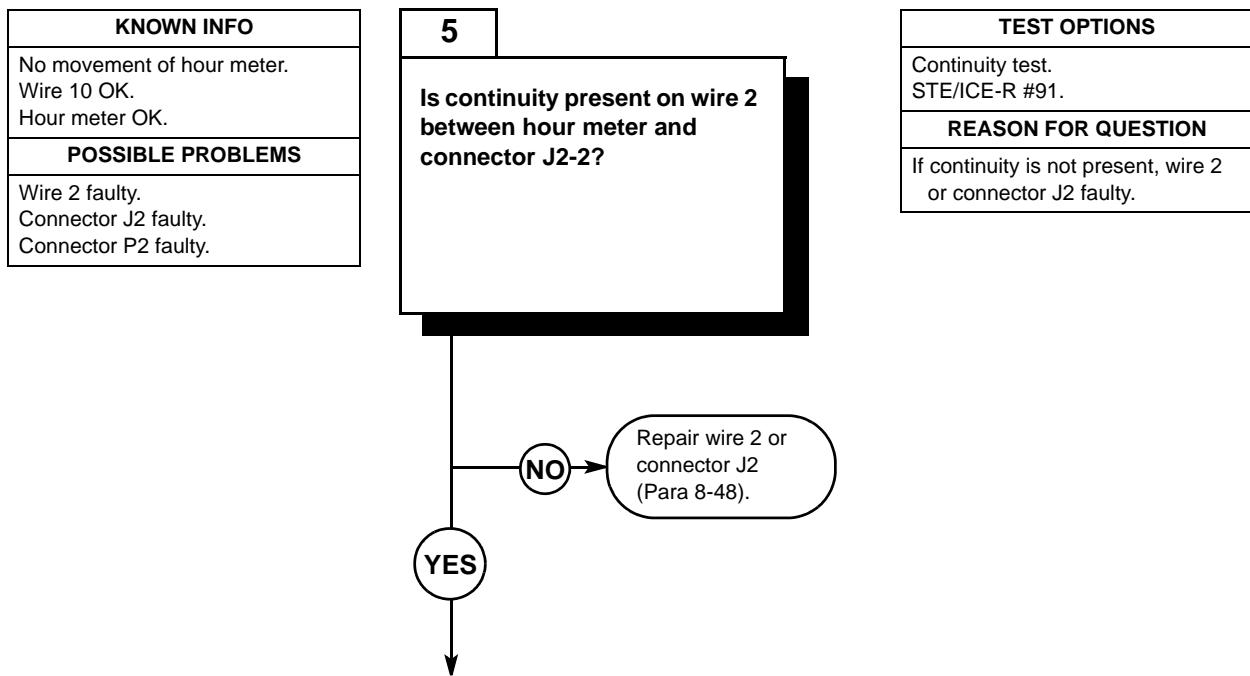


## 36. ENGINE HOUR METER DOES NOT OPERATE (CONT.).

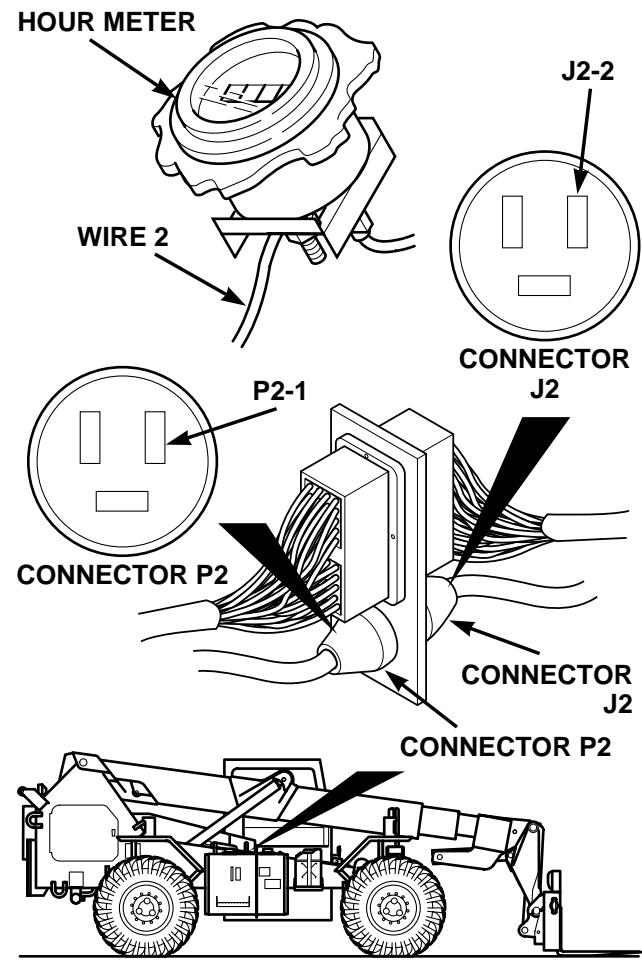




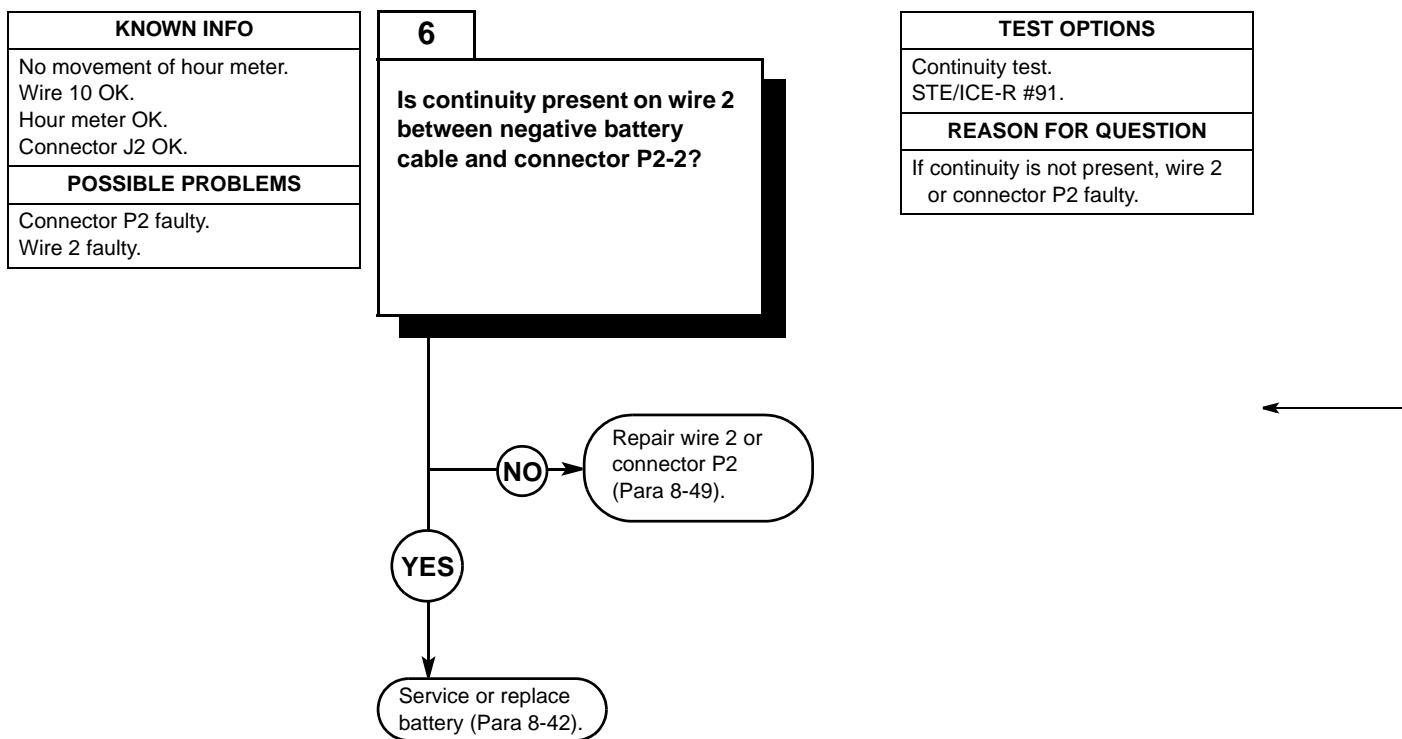
## 36. ENGINE HOUR METER DOES NOT OPERATE (CONT.).

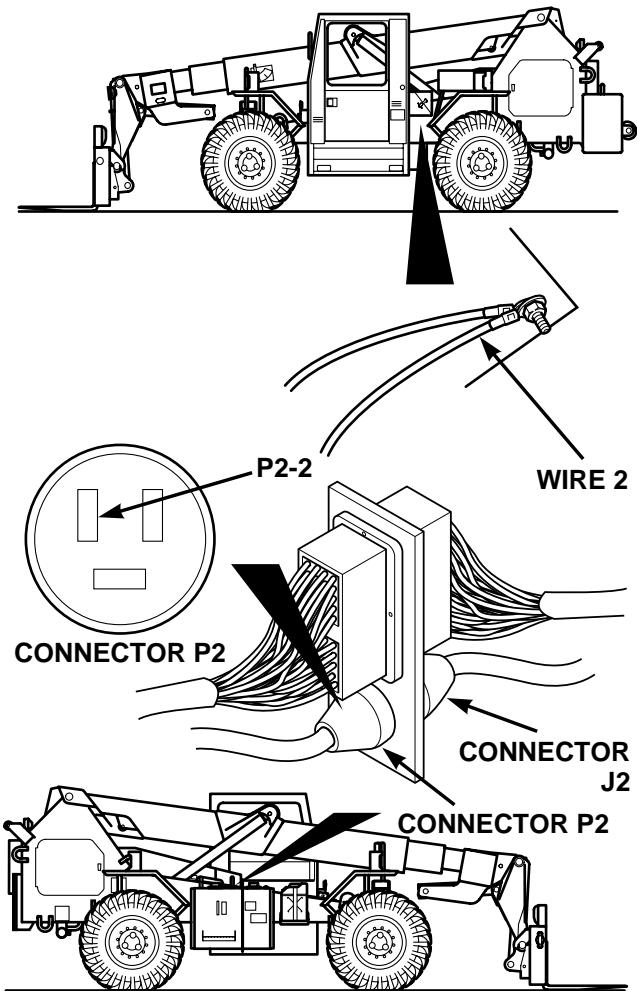
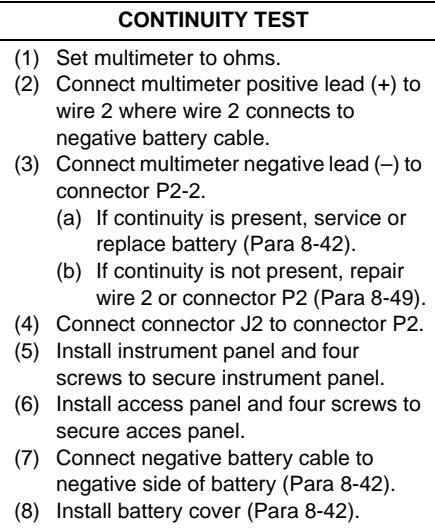


<b>CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Connect multimeter positive lead (+) to wire 2 where wire 2 connects to hour meter.
(3)	Connect multimeter negative lead (-) to connector J2-2.
(a)	If continuity is present, go to Step 6 of this fault.
(b)	If continuity is not present, repair wire 2 or connector J2 (Para 8-48).



**36. ENGINE HOUR METER DOES NOT OPERATE (CONT.).**





**37. FUEL GAGE DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

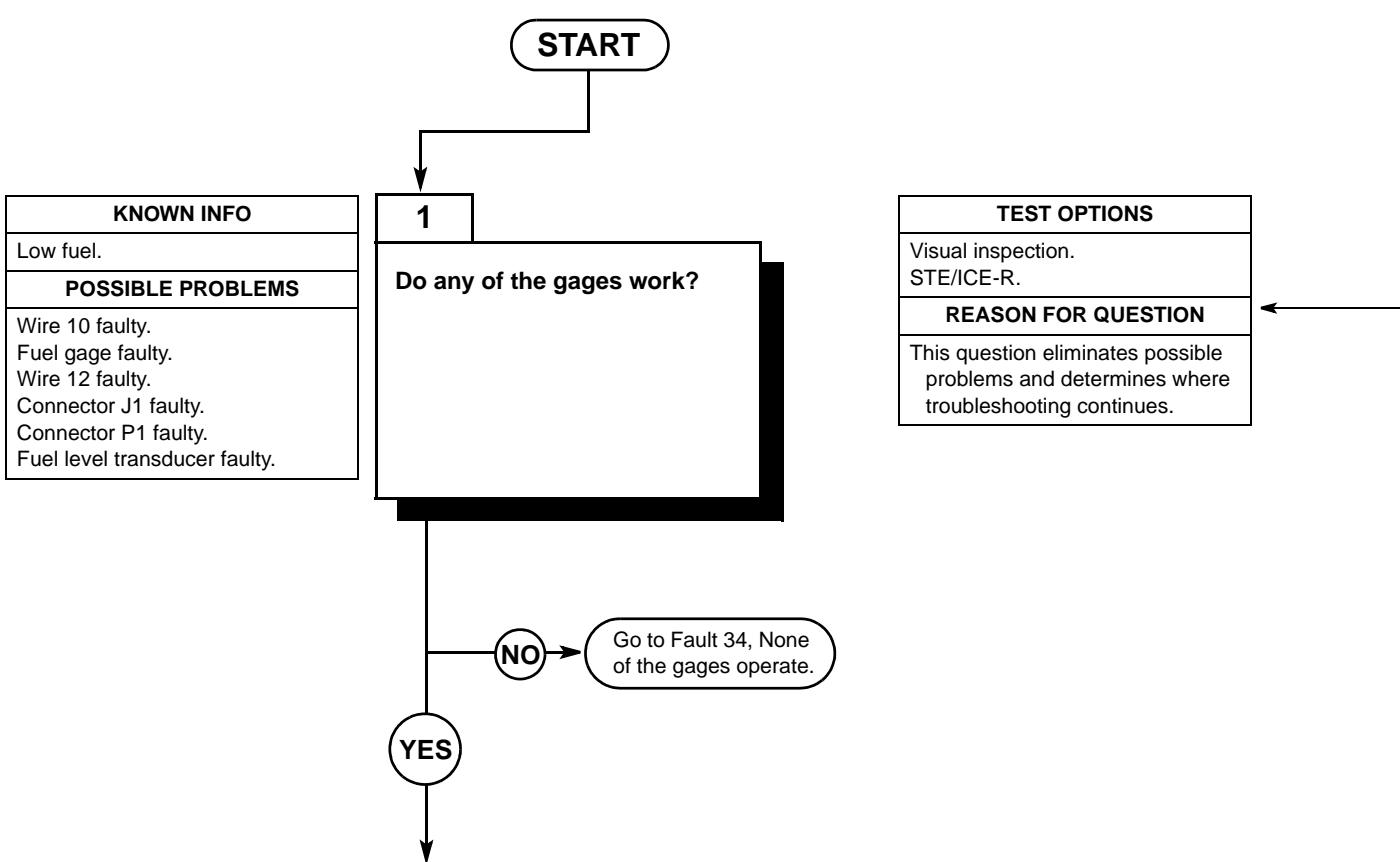
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

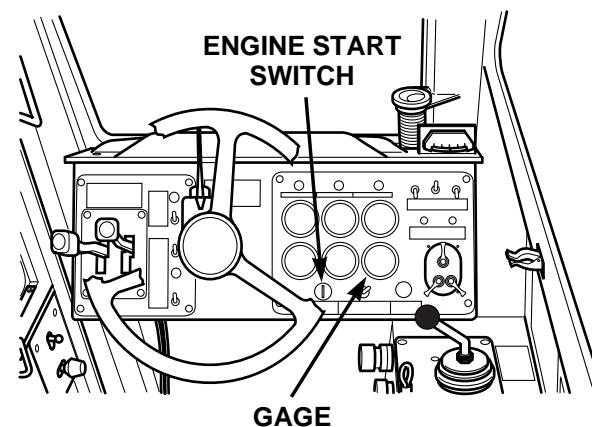
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

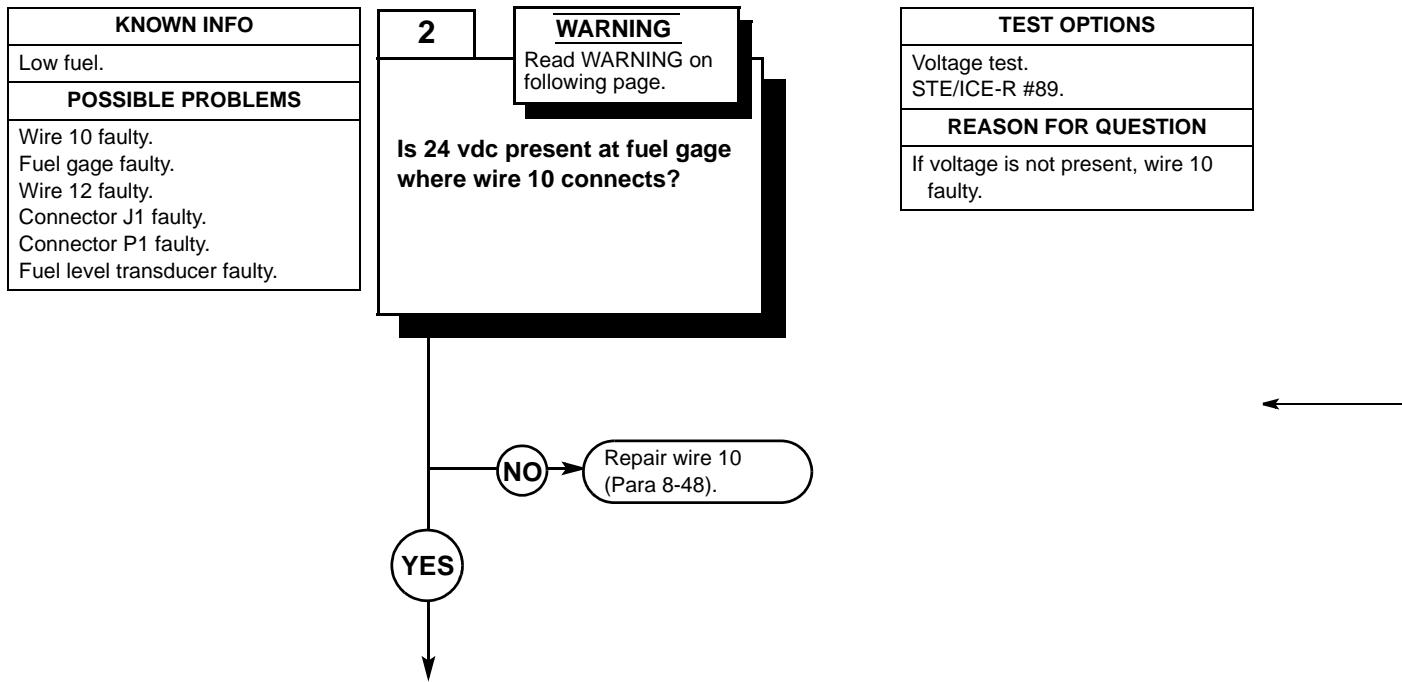


**VISUAL INSPECTION**

- (1) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If the other gages are operating, go to Step 2 of this fault.
  - (b) If all gages are not operating, go to Fault 34, None of the gages operate.
- (2) Turn engine start switch to OFF position (TM 10-3930-673-10).



### **37. FUEL GAGE DOES NOT OPERATE (CONT.).**

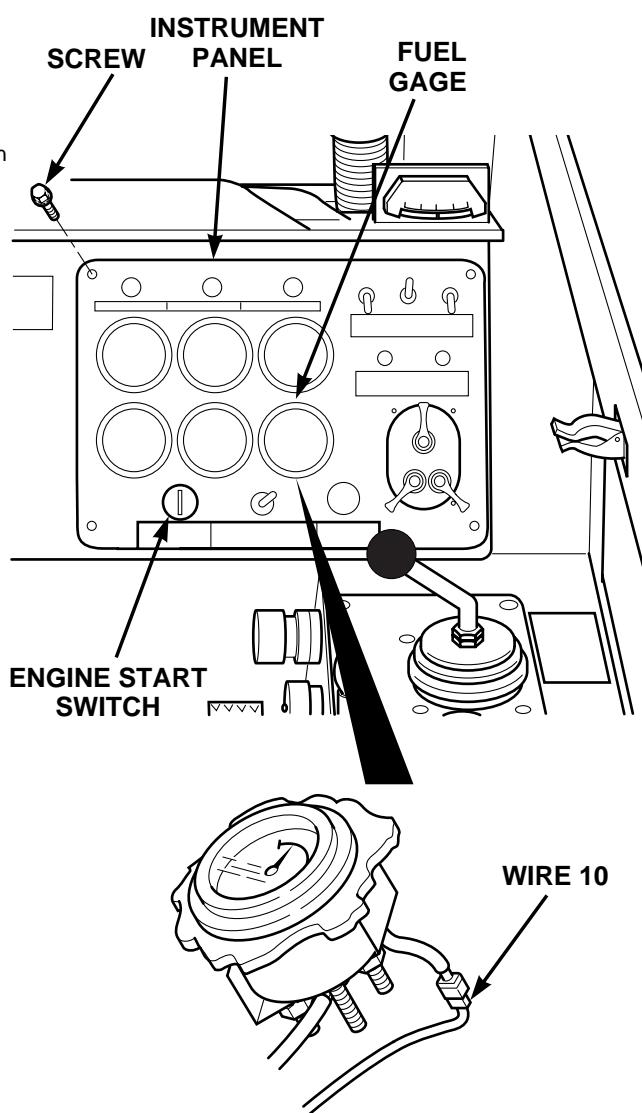


**WARNING**

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

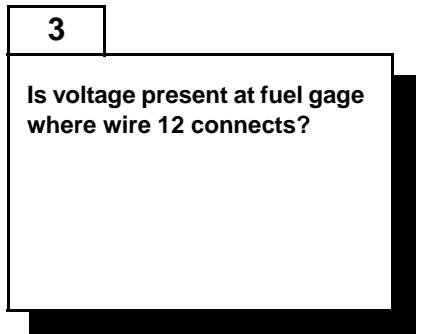
**VOLTAGE TEST**

- Remove battery cover (Para 8-42).
- Disconnect negative battery cable from negative side of battery (Para 8-42).
- Remove four screws from right-hand instrument panel.
- Set multimeter to volts dc.
- Lift right-hand instrument panel out to reach fuel gage.
- Connect multimeter positive lead (+) to fuel gage where wire 10 connects.
- Connect multimeter negative lead (-) to known good ground.
- Connect negative battery cable to negative side of battery (Para 8-42).
- Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - If 24 vdc is present, go to Step 3 of this fault.
  - If 24 vdc is not present, repair wire 10 (Para 8-48).
- Turn engine start switch to OFF position (TM 10-3930-673-10).
- Disconnect negative battery cable from negative side of battery (Para 8-42).



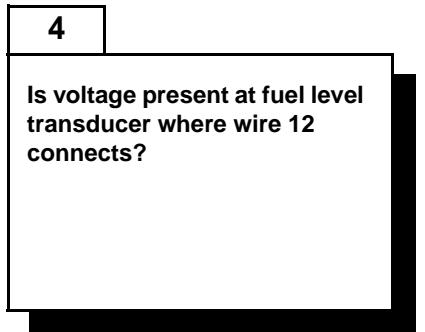
## 37. FUEL GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
Low fuel. Wire 10 OK.
POSSIBLE PROBLEMS
Fuel gage faulty. Wire 12 faulty. Connector J1 faulty. Connector P1 faulty. Fuel level transducer faulty.



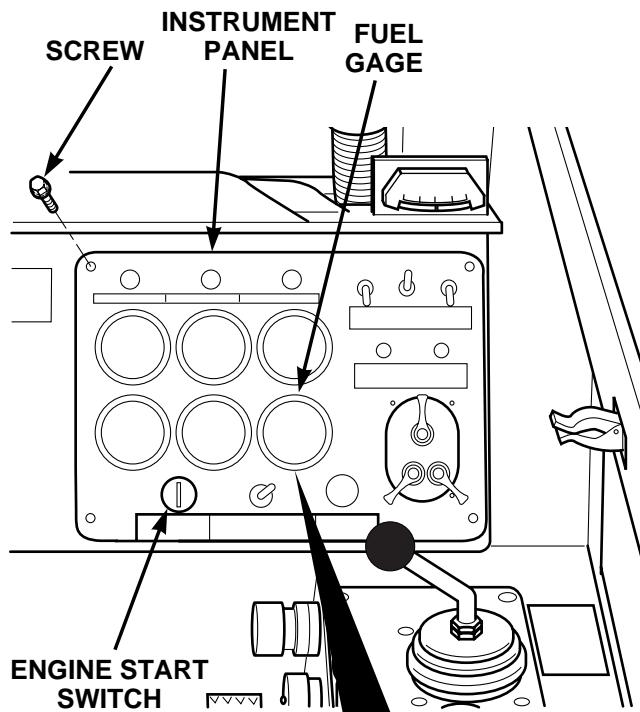
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, fuel gage faulty.

KNOWN INFO
Low fuel. Wire 10 OK. Fuel gage OK.
POSSIBLE PROBLEMS
Wire 12 faulty. Connector J1 faulty. Connector P1 faulty. Fuel level transducer faulty.

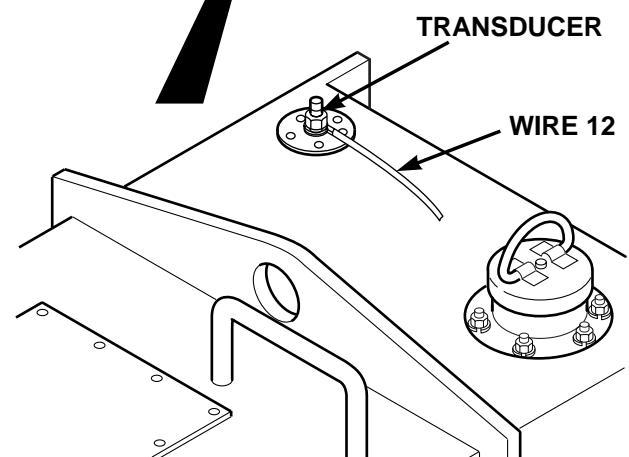
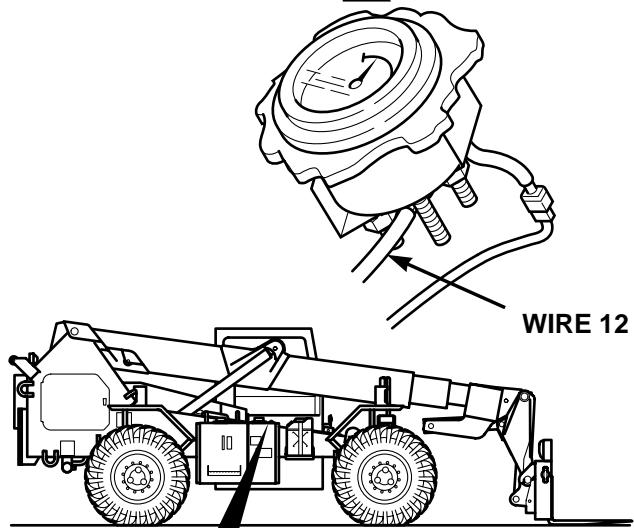


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to fuel gage where wire 12 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 4 of this fault.
(b)	If voltage is not present, replace fuel gage (Para 8-6).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Remove four screws and cap from fuel level transducer.
(3)	Connect multimeter positive lead (+) to fuel level transducer where wire 12 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, replace fuel level transducer (Para 8-38).
(b)	If voltage is not present, go to Step 5 of this fault.
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(9)	Install cap and four screws for fuel level transducer.



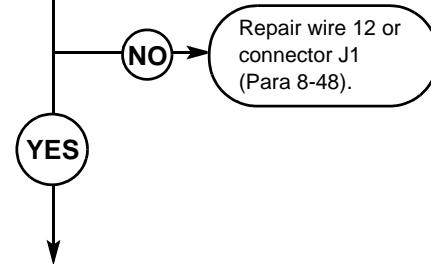
## 37. FUEL GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
Low fuel. Wire 10 OK. Fuel gage OK.
POSSIBLE PROBLEMS
Wire 12 faulty. Connector J1 faulty. Connector P1 faulty.

**5**

Is continuity present on wire 12 between fuel gage and connector J1-16?

TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 12 or connector J1 faulty.

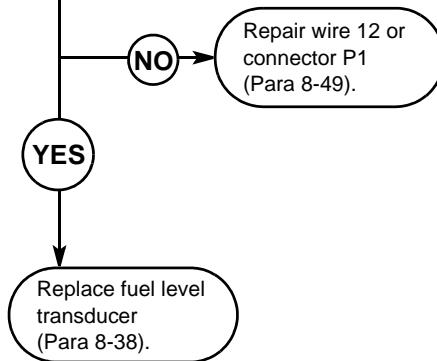


KNOWN INFO
Low fuel. Fuel gage OK. Wire 10 OK. Connector J1 OK.
POSSIBLE PROBLEMS
Connector P1 faulty. Wire 12 faulty.

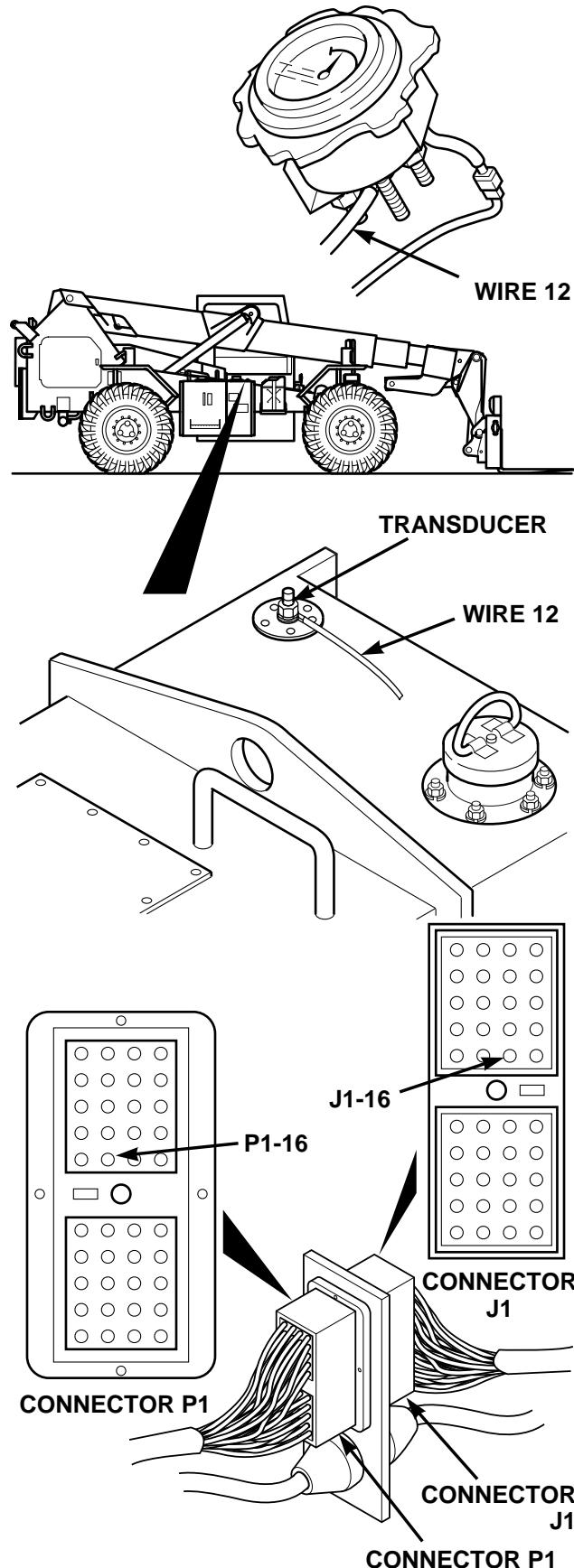
**6**

Is continuity present on wire 12 between fuel level transducer and connector P1-16?

TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 12 or connector P1 faulty.



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J1 from connector P1.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 12 where wire 12 connects to fuel gage.
(4)	Connect multimeter negative lead (-) to connector J1-16.
(a)	If continuity is present, go to Step 6 of this fault.
(b)	If continuity is not present, repair wire 12 or connector J1 (Para 8-48).
(5)	Connect connector J1 to connector P1.



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J1 from connector P1.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 12 where wire 12 connects to fuel level transducer.
(4)	Connect multimeter negative lead (-) to connector P1-16.
(a)	If continuity is present, replace fuel level transducer (Para 8-38).
(b)	If continuity is not present, repair wire 12 or connector P1 (Para 8-49).
(5)	Connect connector J1 to connector P1.
(6)	Install instrument panel and four screws.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Install battery cover (Para 8-42).

**38. TEMPERATURE GAGE DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

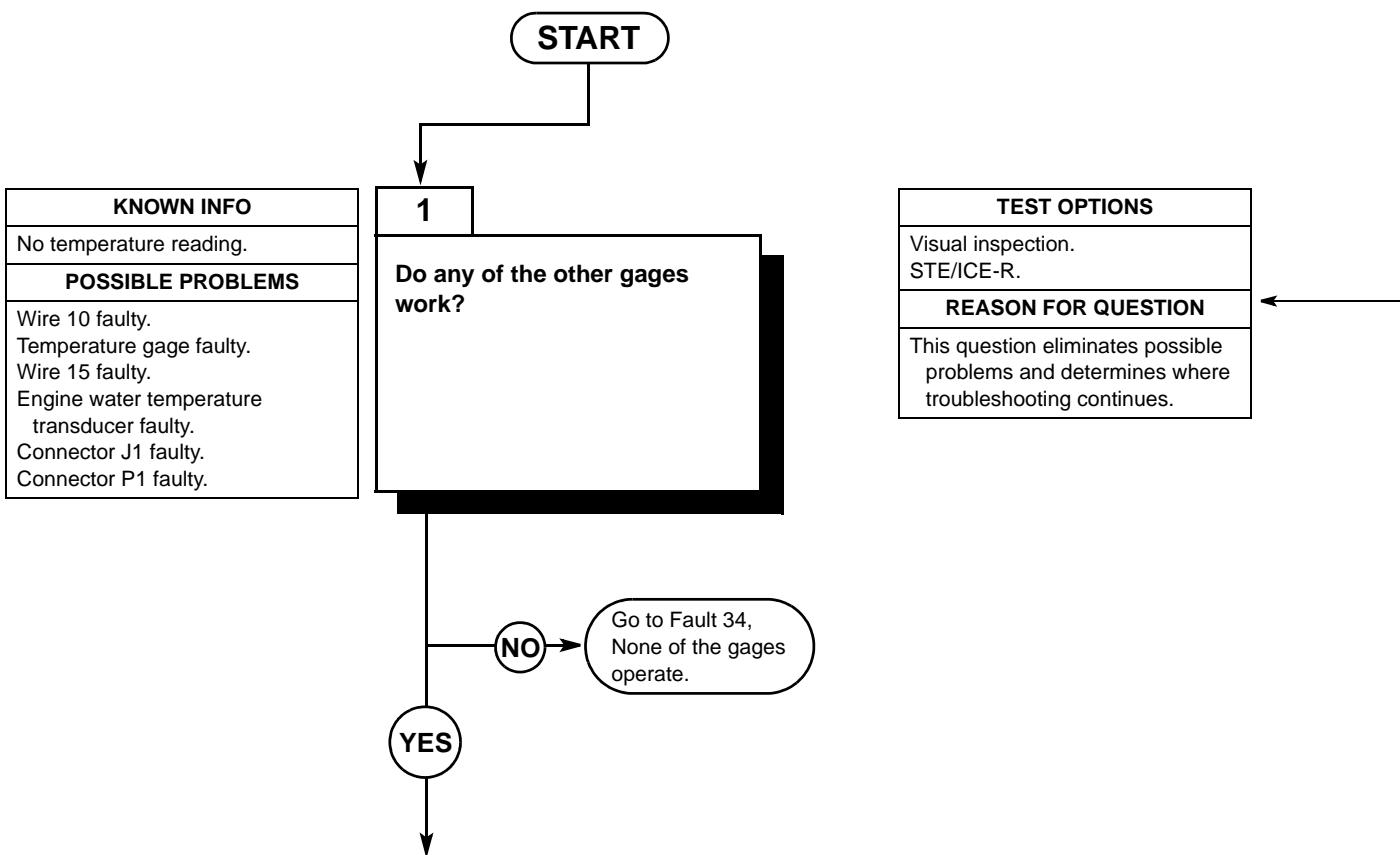
Two

*References*

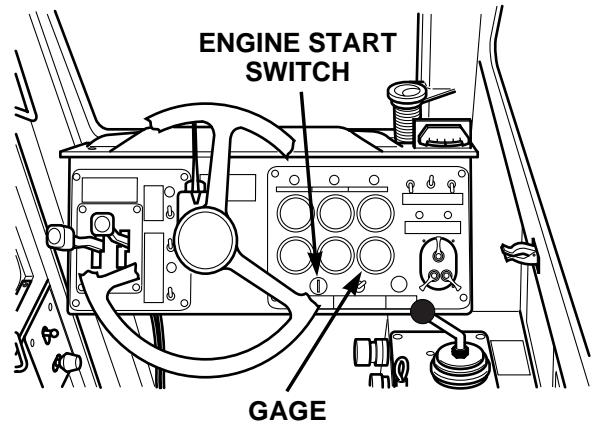
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

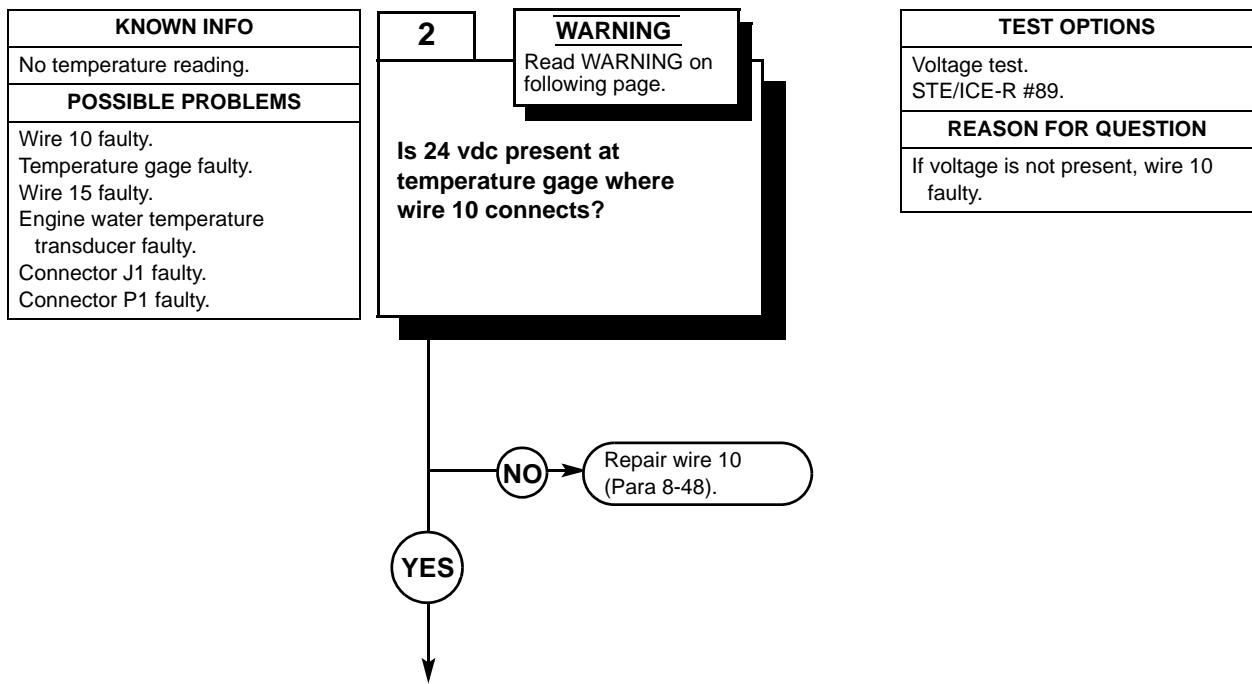
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). (a) If the other gages are operating, go to Step 2 of this fault. (b) If all gages are not operating , go to Fault 34, None of the gages operate.
(2)	Turn engine start switch to OFF position (TM 10-3930-673-10).



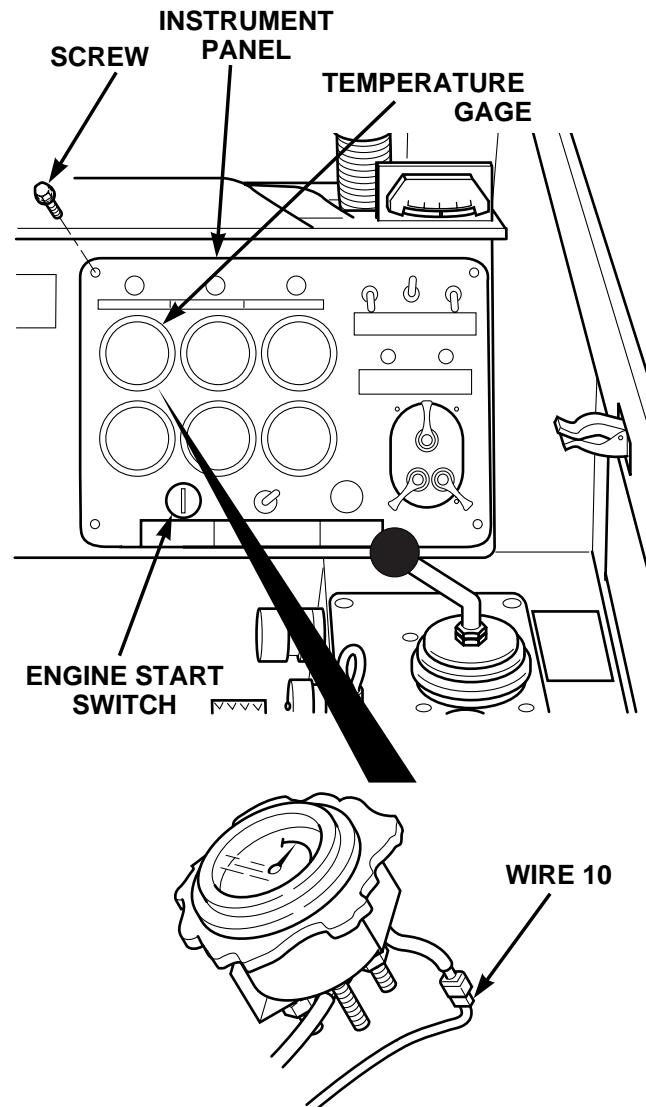
## 38. TEMPERATURE GAGE DOES NOT OPERATE (CONT.).



## WARNING

- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from right-hand instrument panel.
(4)	Set multimeter to volts dc.
(5)	Lift right-hand instrument panel out to reach temperature gage.
(6)	Connect multimeter positive lead (+) to temp gage where wire 10 connects.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).

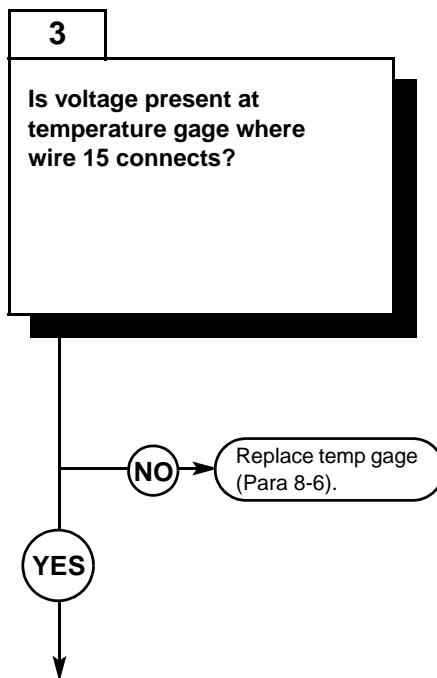


## 38. TEMPERATURE GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
No temperature reading. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB1 OK. Wire 10 OK.

POSSIBLE PROBLEMS
Temperature gage faulty. Wire 15 faulty. Engine water temperature transducer faulty. Connector J1 faulty. Connector P1 faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.

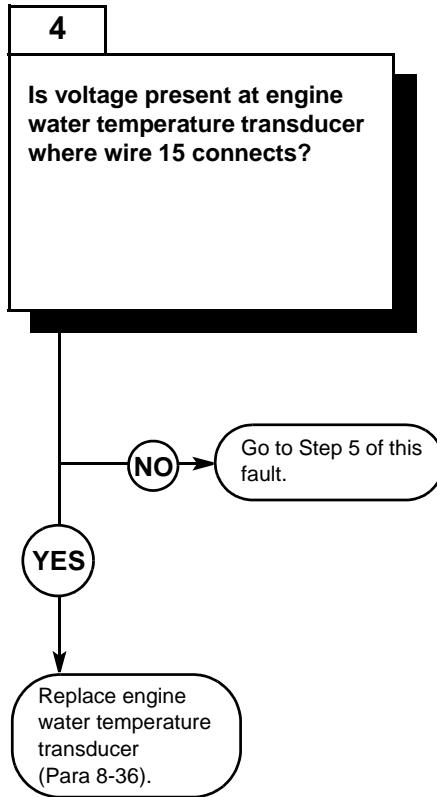
  

REASON FOR QUESTION
If voltage is not present, temperature gage faulty.

KNOWN INFO
No temperature reading. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB1 OK. Wire 10 OK. Temperature gage OK.

POSSIBLE PROBLEMS
Wire 15 faulty. Connector J1 faulty. Connector P1 faulty. Engine water temperature transducer faulty.

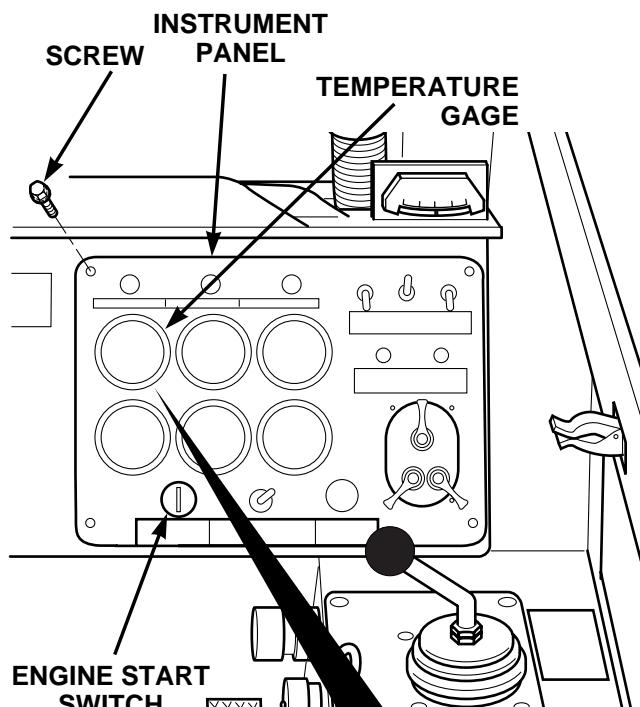


TEST OPTIONS
Voltage test. STE/ICE-R #89.

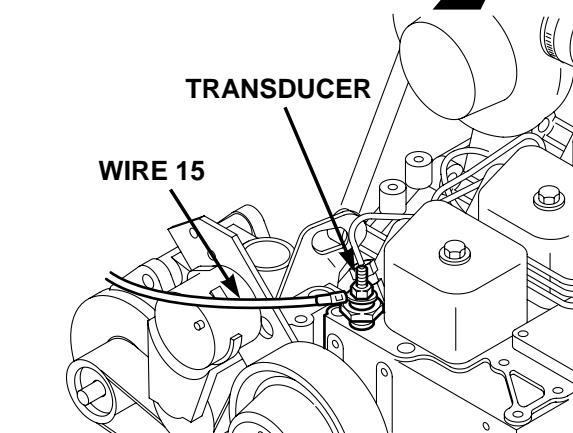
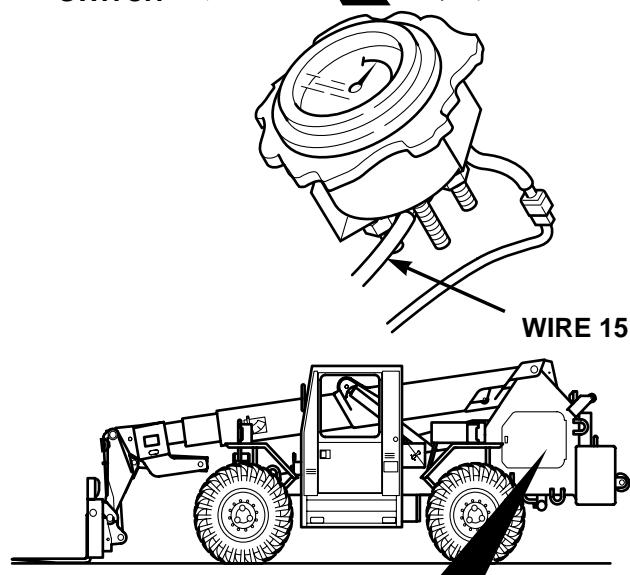
  

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to temp gage where wire 15 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 4 of this fault.
(b)	If voltage is not present, replace temp gage (Para 8-6).
(5)	Turn engine start switch OFF (TM 10-3930-673-10).



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to engine water temperature transducer where wire 15 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, replace temp. transducer (Para 8-36).
(b)	If voltage is not present, go to Step 5 of this fault.
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).

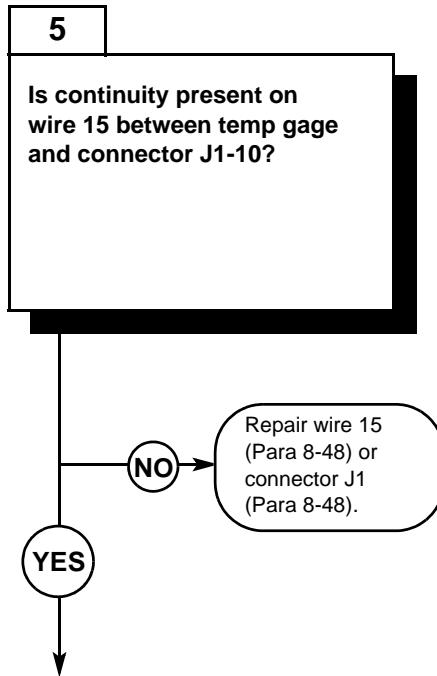


## 38. TEMPERATURE GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
No temperature reading. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB1 OK. Wire 10 OK. Temperature gage OK.

POSSIBLE PROBLEMS
Wire 15 faulty. Connector J1 faulty. Connector P1 faulty.

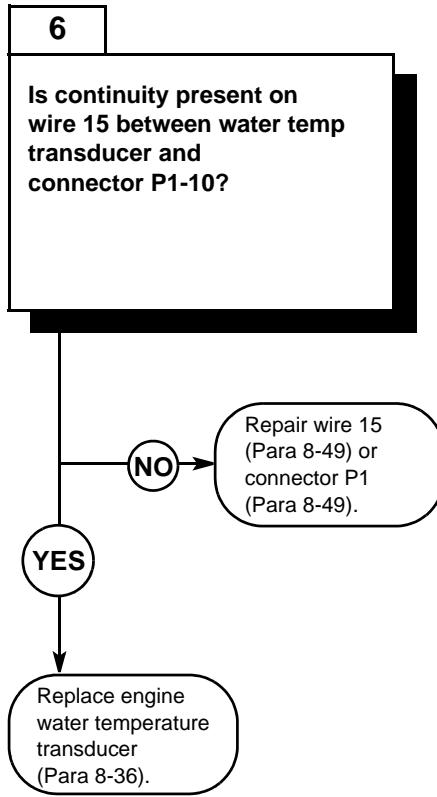


TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 15 or connector J1 faulty.

KNOWN INFO
No temperature reading. Wire 9 OK. Connector P2 OK. Connector J2 OK. Circuit breaker CB6 OK. Wire 1 OK. Run relay OK. Wire 3 OK. Circuit breaker CB1 OK. Wire 10 OK. Connector J1 OK.

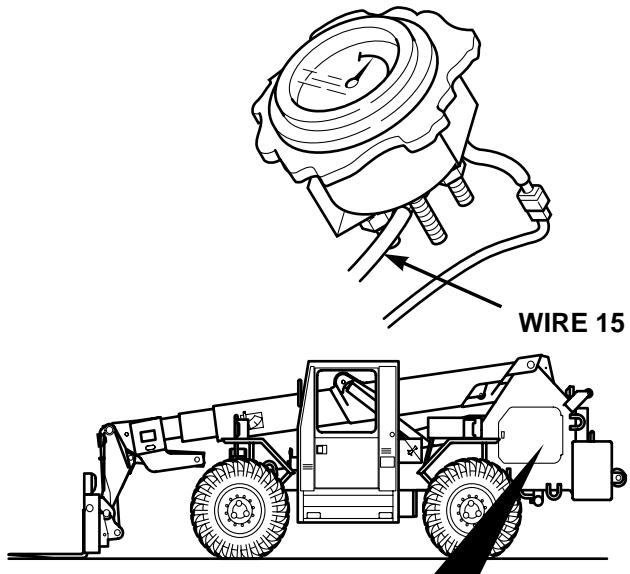
  

POSSIBLE PROBLEMS
Connector P1 faulty. Wire 15 faulty.

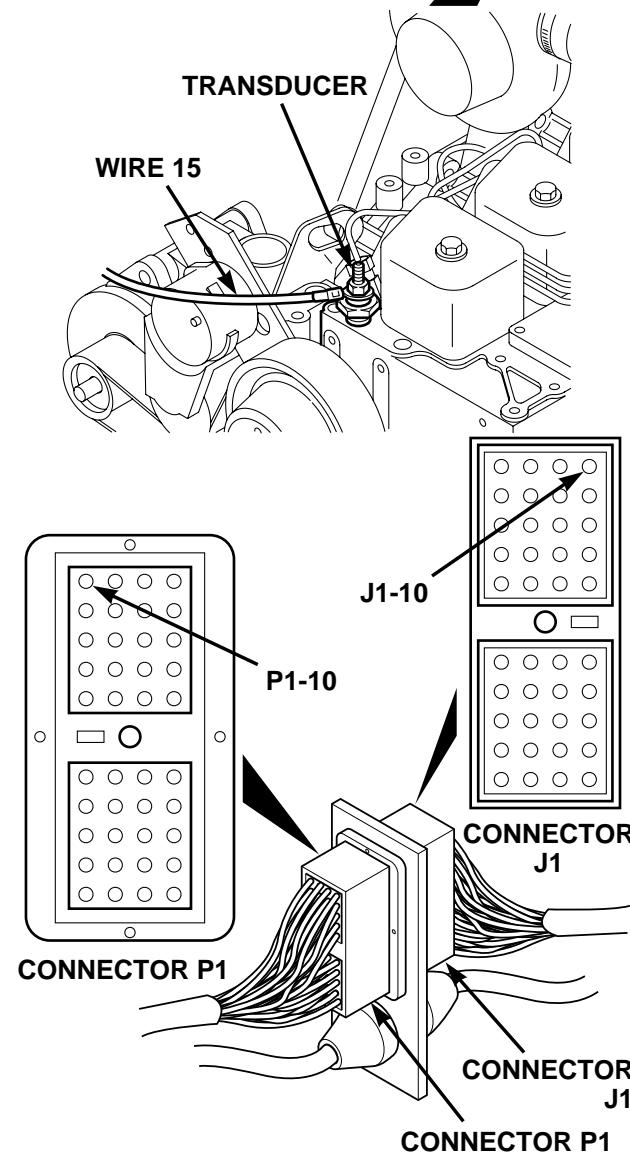


TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 15 or connector P1 faulty.

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Disconnect connector J1 from connector P1.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 15 where wire 15 connects to temp gage.
(5)	Connect multimeter negative lead (-) to connector J1-10.
(a)	If continuity is present, go to Step 6 of this fault.
(b)	If continuity is not present, repair wire 15 or connector J1 (Para 8-48).
(6)	Install instrument panel and four screws.



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J1 from connector P1.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 15 where wire 15 connects to engine water temperature transducer.
(4)	Connect multimeter negative lead (-) to connector P1-16.
(a)	If continuity is present, replace water temp. transducer (Para 8-36).
(b)	If continuity is not present, repair wire 15 or connector P1 (Para 8-49).
(5)	Connect negative battery cable to negative side of battery.
(6)	Install battery cover (Para 8-42).



**39. OIL PRESSURE GAGE DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

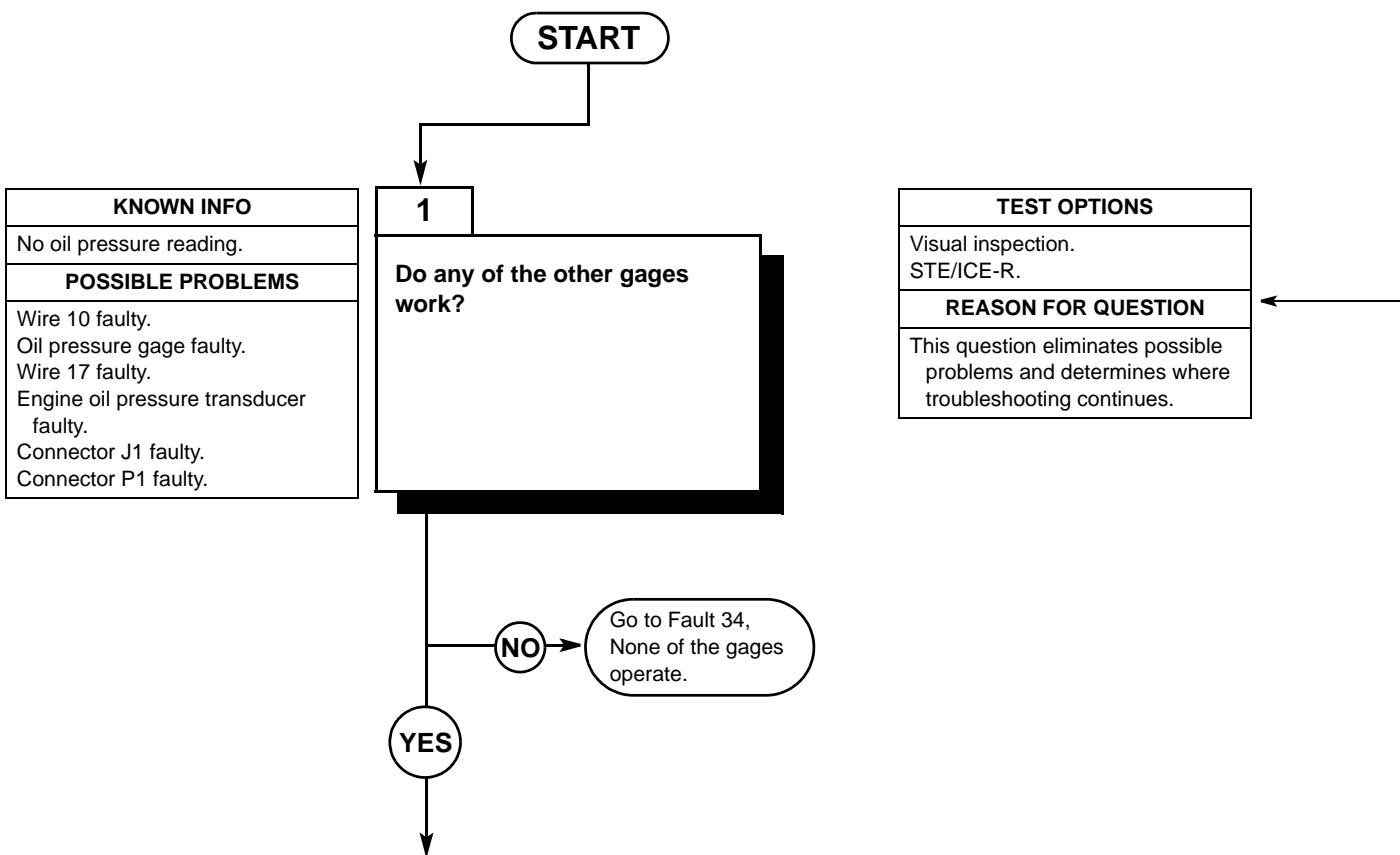
Two

*References*

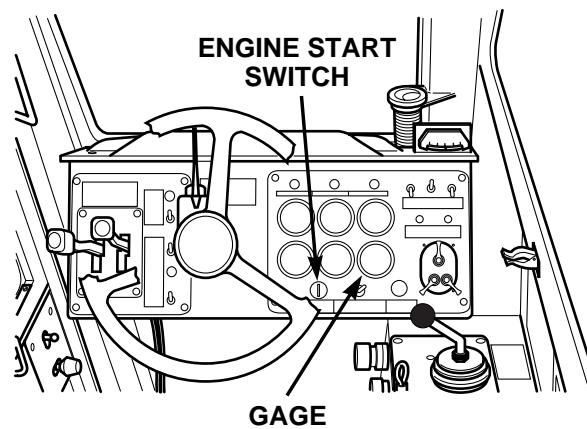
TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

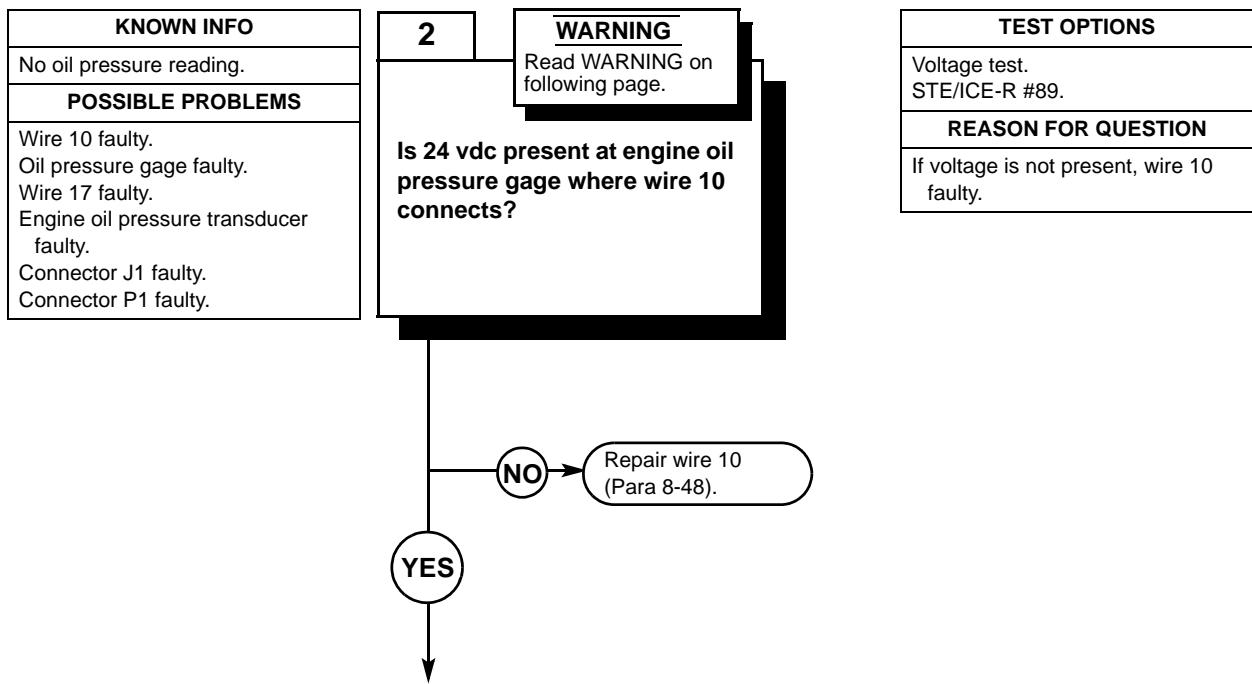
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



<b>VISUAL INSPECTION</b>	
(1)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10). (a) If the other gages are operating, go to Step 2 of this fault. (b) If all gages are not operating, go to Fault 34, None of the gages operate.
(2)	Turn engine start switch to OFF position (TM 10-3930-673-10).



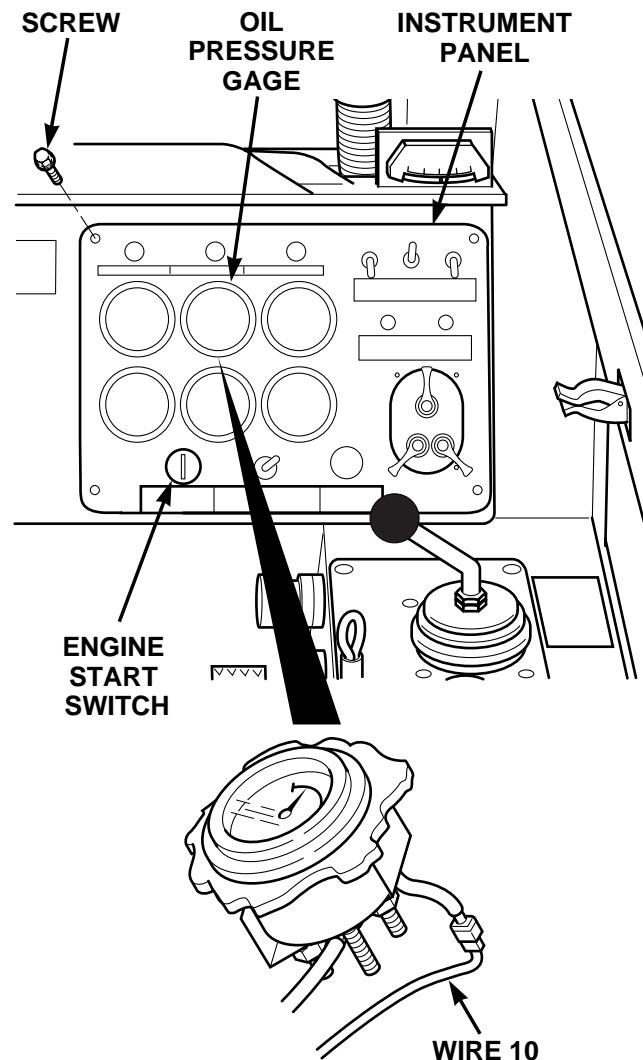
## 39. OIL PRESSURE GAGE DOES NOT OPERATE (CONT.).



## WARNING

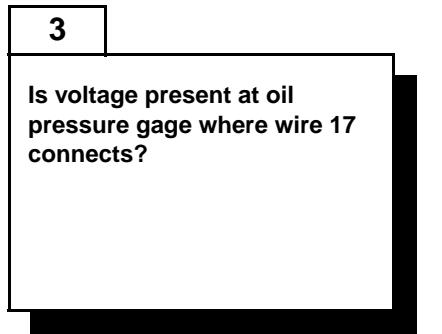
- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from right-hand instrument panel.
(4)	Set multimeter to volts dc.
(5)	Lift right-hand instrument panel out to reach oil pressure gage.
(6)	Connect multimeter positive lead (+) to oil pressure gage where wire 10 connects.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-42).



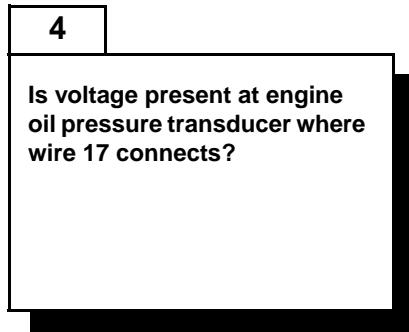
## 39. OIL PRESSURE GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
No oil pressure reading. Wire 10 OK.
POSSIBLE PROBLEMS
Oil pressure gage faulty. Wire 17 faulty. Engine oil pressure transducer faulty. Connector J1 faulty. Connector P1 faulty.



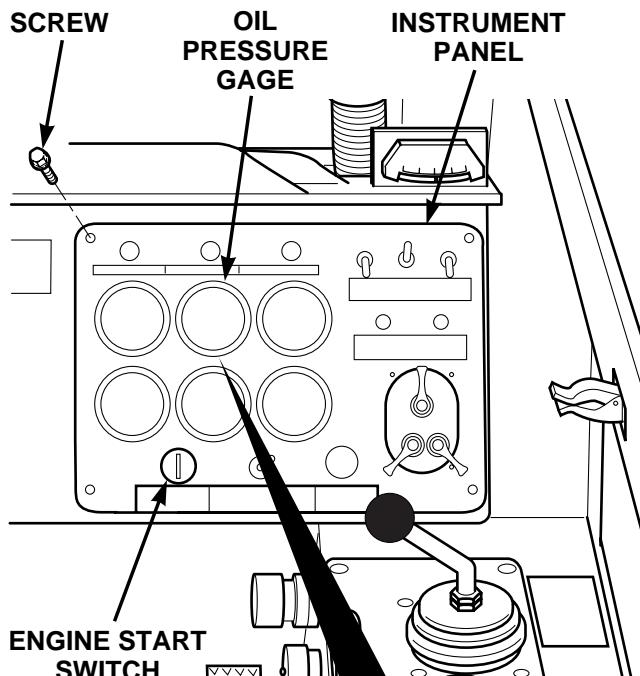
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, temperature gage faulty.

KNOWN INFO
No oil pressure reading. Wire 10 OK.
POSSIBLE PROBLEMS
Wire 17 faulty. Connector J1 faulty. Connector P1 faulty. Engine oil pressure transducer faulty.

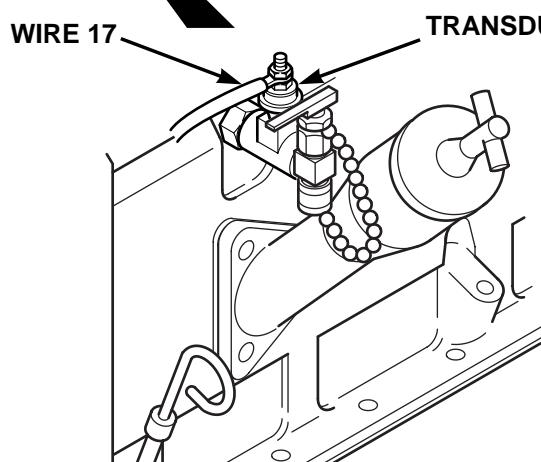
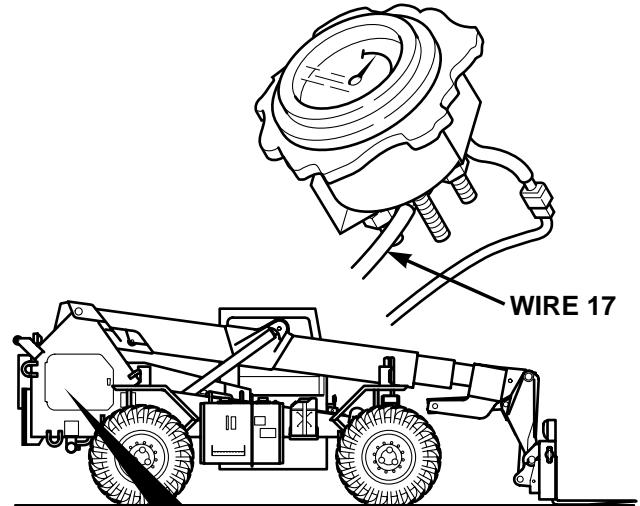


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to oil pressure gage where wire 17 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 4 of this fault.
(b)	If voltage is not present, replace oil pressure gage (Para 8-6).
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).

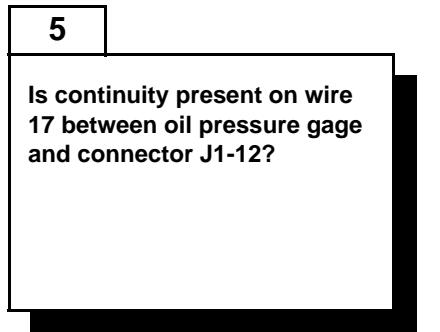


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to engine oil pressure transducer where wire 17 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If voltage is present, replace oil pressure transducer (Para 8-35).
(b)	If voltage is not present, go to Step 5 of this fault.
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).

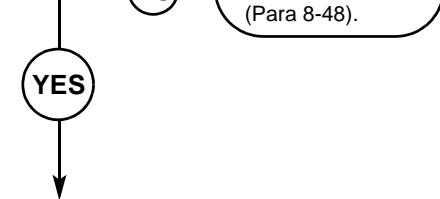


## 39. OIL PRESSURE GAGE DOES NOT OPERATE (CONT.).

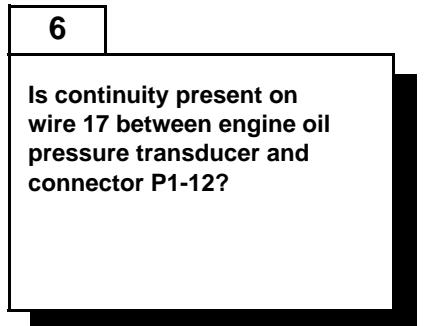
KNOWN INFO
No oil pressure reading.
Wire 9 OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB1 OK.
Wire 10 OK.
Oil pressure gage OK.
POSSIBLE PROBLEMS
Wire 17 faulty.
Connector J1 faulty.
Connector P1 faulty.



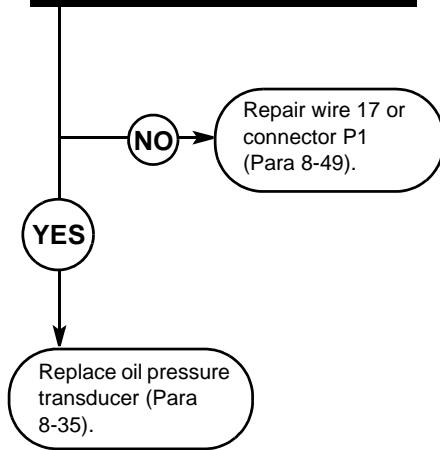
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 17 or connector J1 faulty.



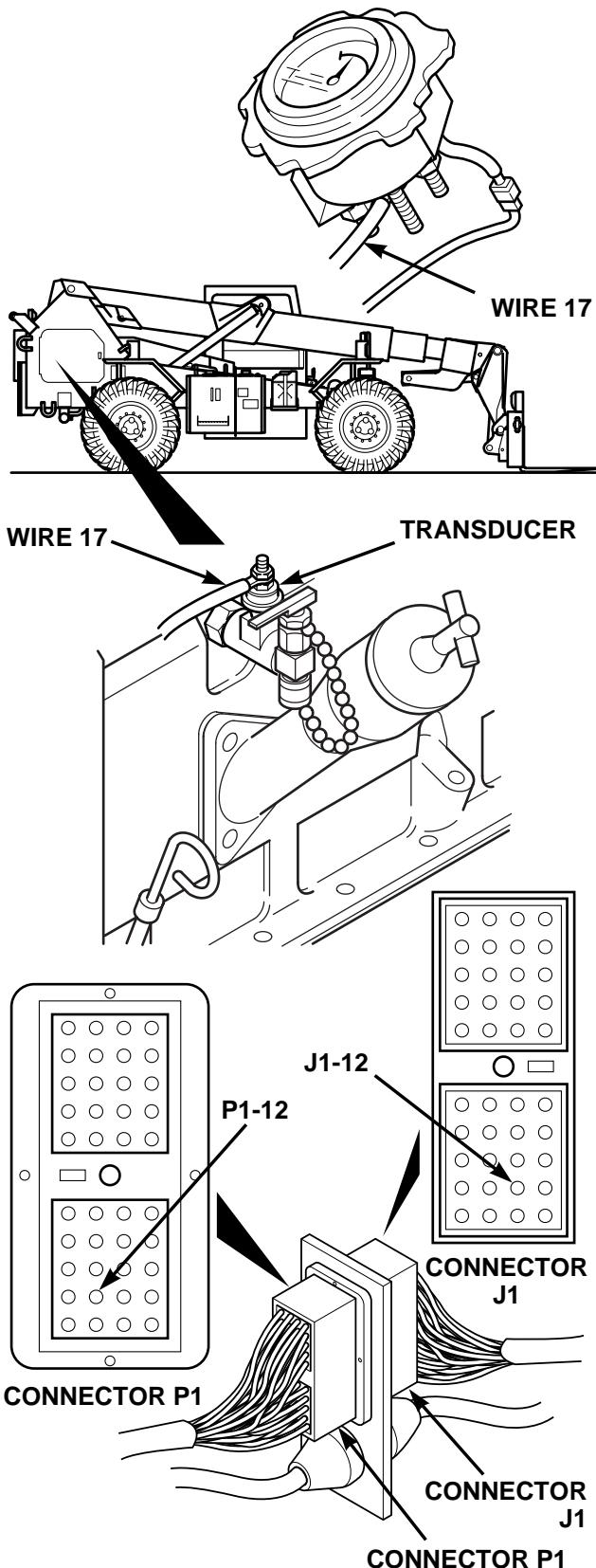
KNOWN INFO
No oil pressure reading.
Wire 9 OK.
Connector P2 OK.
Connector J2 OK.
Circuit breaker CB6 OK.
Wire 1 OK.
Run relay OK.
Wire 3 OK.
Circuit breaker CB1 OK.
Wire 10 OK.
Connector J1 OK.
POSSIBLE PROBLEMS
Connector P1 faulty.
Wire 17 faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 17 or connector P1 faulty.



<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Disconnect connector J1 from connector P1.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 17 where wire 17 connects to oil pressure gage.
(5)	Connect multimeter negative lead (-) to connector J1-12.
(a)	If continuity is present, go to Step 6 of this fault.
(b)	If continuity is not present, repair wire 17 or connector J1 (Para 8-48).
(6)	Install instrument panel and four screws.



<b>CONTINUITY TEST</b>	
(1)	Disconnect connector J1 from connector P1.
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to wire 17 where wire 17 connects to engine oil pressure transducer.
(4)	Connect multimeter negative lead (-) to connector P1-12.
(a)	If continuity is present, replace oil pressure transducer (Para 8-35).
(b)	If continuity is not present, repair wire 17 or connector P1 (Para 8-49).
(5)	Connect negative battery cable to negative side of battery.
(6)	Install battery cover (Para 8-42).

**40. TRANSMISSION FLUID TEMPERATURE GAGE DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

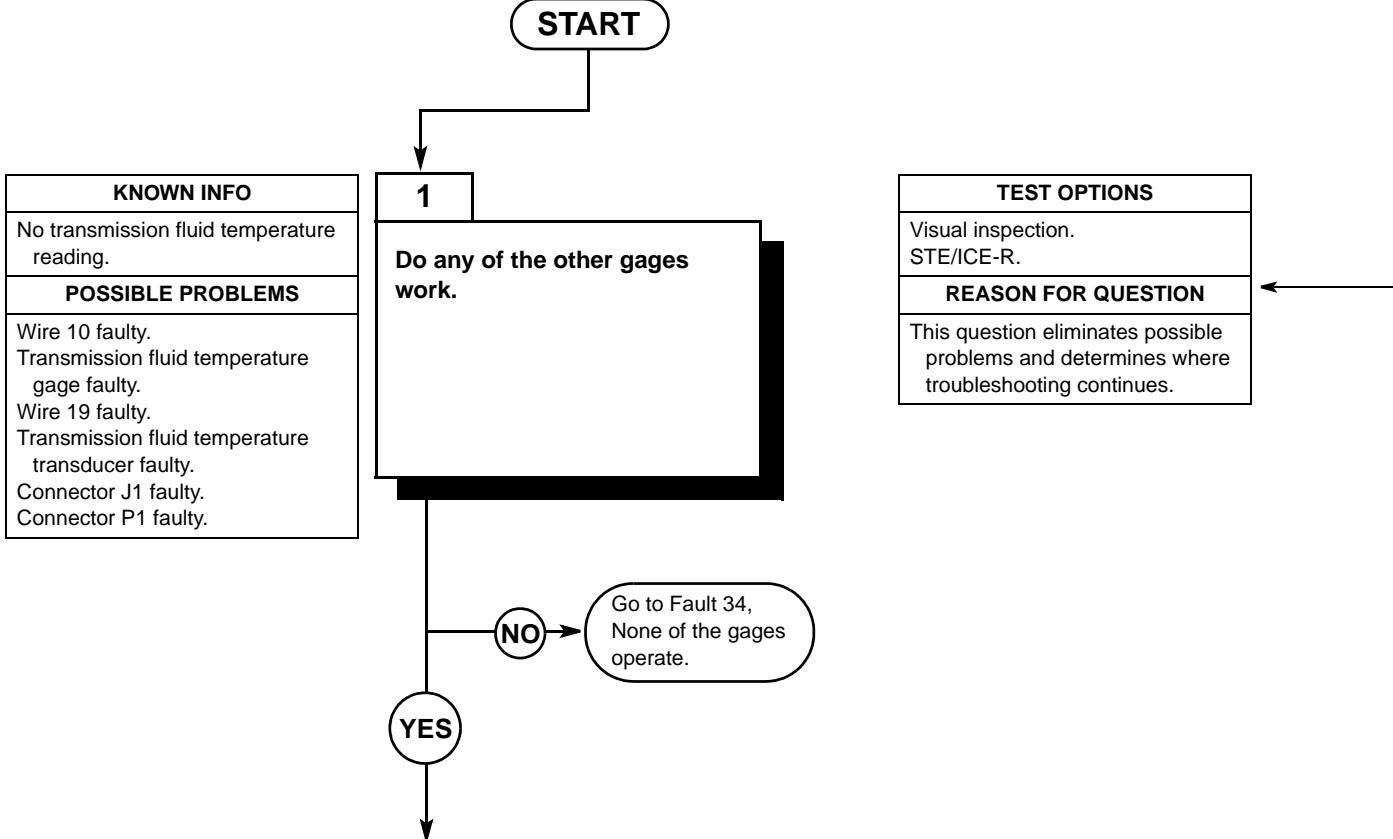
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

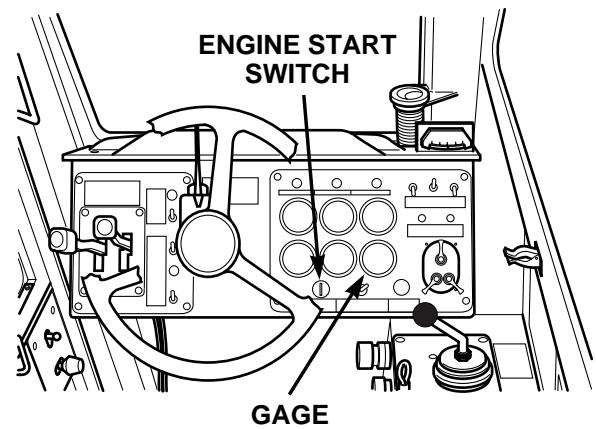
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

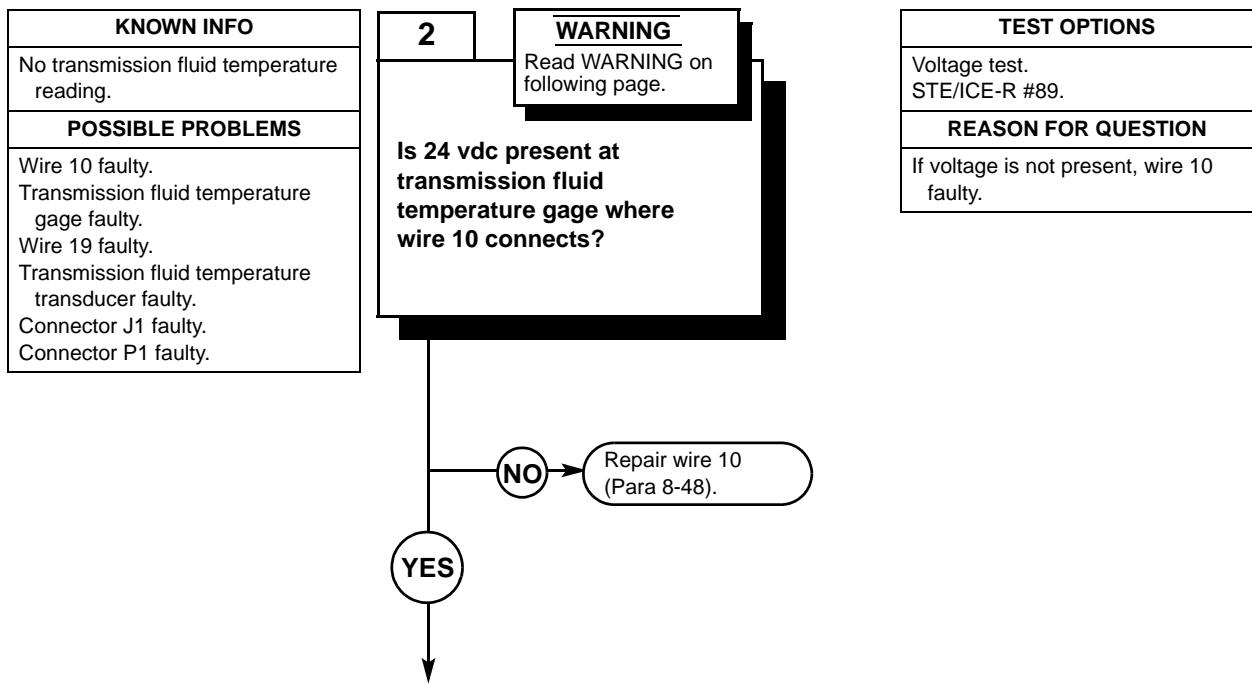


**VISUAL INSPECTION**

- (1) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
  - (a) If the other gages are operating, go to Step 2 of this fault.
  - (b) If all gages are not operating, go to Fault 34, None of the gages operate.
- (2) Turn engine start switch to OFF position (TM 10-3930-673-10).



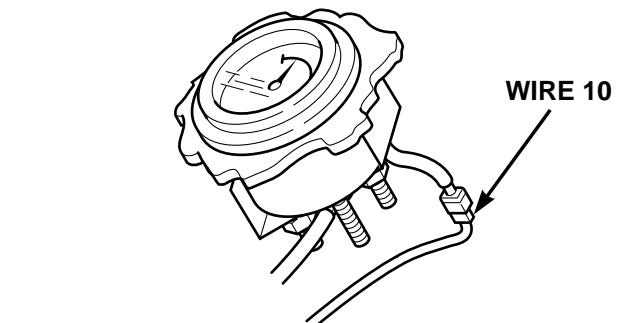
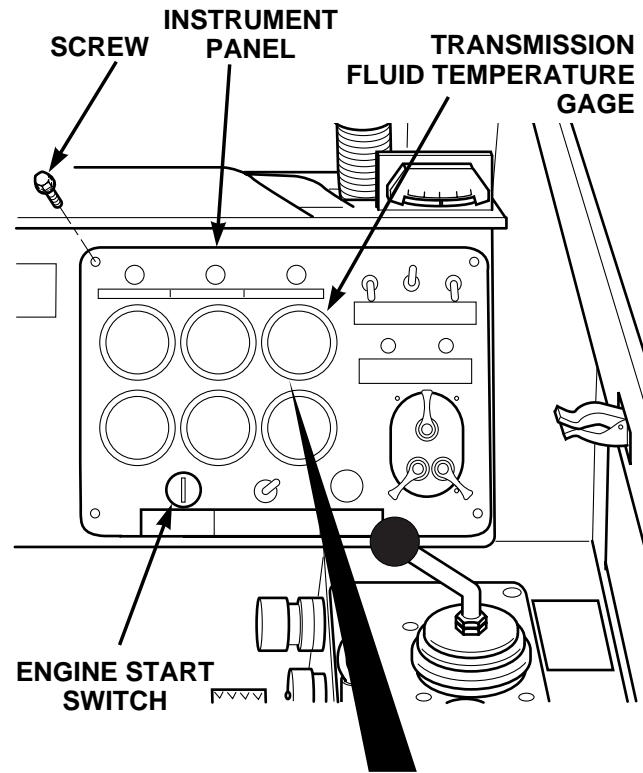
## 40. TRANSMISSION FLUID TEMPERATURE GAGE DOES NOT OPERATE (CONT.).



**WARNING**

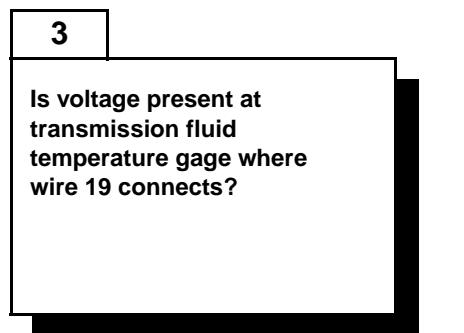
- Remove rings bracelets watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws from right-hand instrument panel.
(4)	Set multimeter to volts dc.
(5)	Lift instrument panel out to reach transmission fluid temperature gage.
(6)	Connect multimeter positive lead (+) to transmission fluid temperature gage where wire 10 connects.
(7)	Connect multimeter negative lead (-) to known good ground.
(8)	Connect negative battery cable to negative side of battery (Para 8-42).
(9)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(10)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(11)	Disconnect negative battery cable from negative side of battery (Para 8-44).



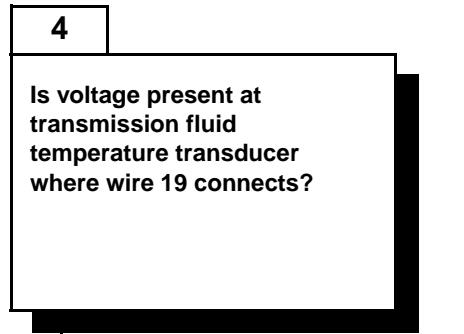
## 40. TRANSMISSION FLUID TEMPERATURE GAGE DOES NOT OPERATE (CONT.).

KNOWN INFO
No transmission fluid temperature reading. Wire 10 OK.
POSSIBLE PROBLEMS
Transmission fluid temperature gage faulty. Wire 19 faulty. Transmission fluid temperature transducer faulty. Connector J1 faulty. Connector P1 faulty.



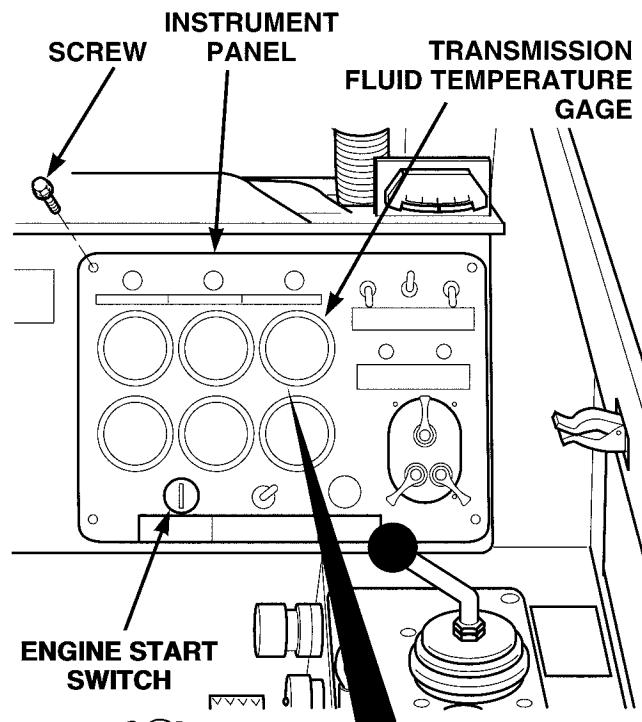
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, transmission fluid temperature gage faulty.

KNOWN INFO
No transmission fluid temperature reading. Wire 10 OK. Transmission fluid temperature gage OK.
POSSIBLE PROBLEMS
Wire 19 faulty. Connector J1 faulty. Connector P1 faulty. Transmission fluid temperature transducer faulty.

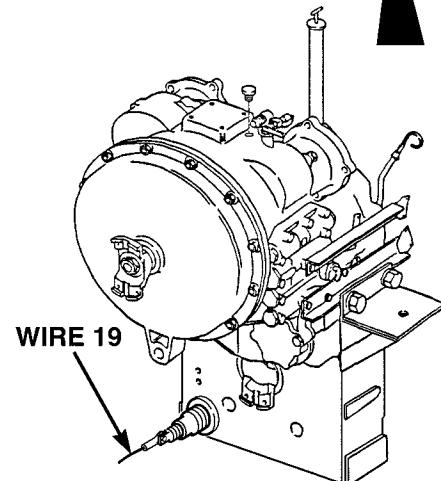
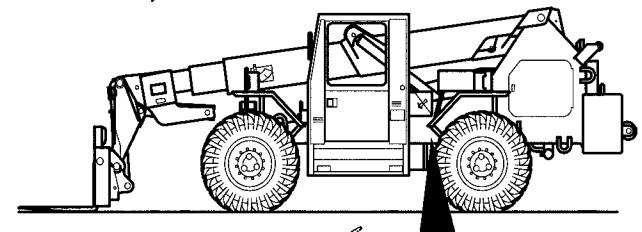


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to transmission fluid temperature gage where wire 19 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If voltage is present, replace transmission fluid temperature gage (Para 8-6).
(b)	If voltage is not present, go to Step 5 of this fault.
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).

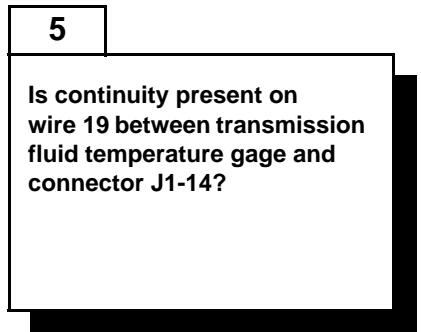


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to trans fluid temp transducer where wire 19 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Turn engine start switch to START position, (TM 10-3930-673-10).
(a)	If voltage is present, replace transmission fluid temperature transducer (Para 8-16).
(b)	If voltage is not present, go to Step 5 of this fault.
(5)	Turn engine start switch to OFF position (TM 10-3930-673-10).

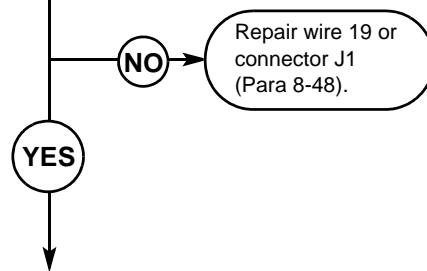


## 40. TRANSMISSION FLUID TEMPERATURE GAGE DOES NOT OPERATE (CONT.).

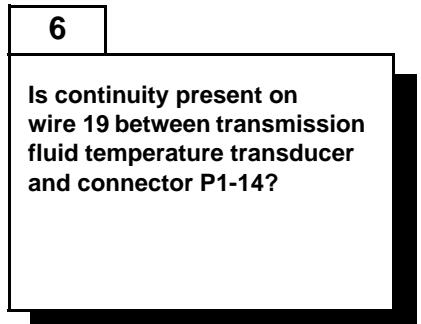
KNOWN INFO
No transmission fluid temperature reading. Wire 10 OK. Transmission fluid temperature gage OK.
POSSIBLE PROBLEMS
Wire 19 faulty. Connector J1 faulty. Connector P1 faulty.



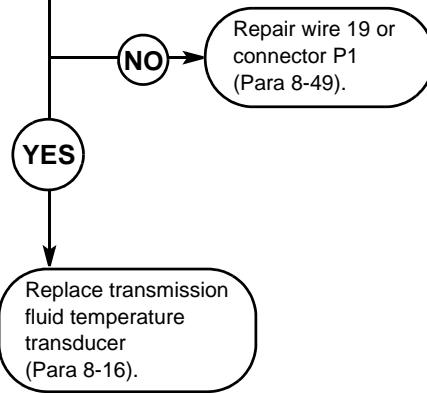
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 19 or connector J1 faulty.



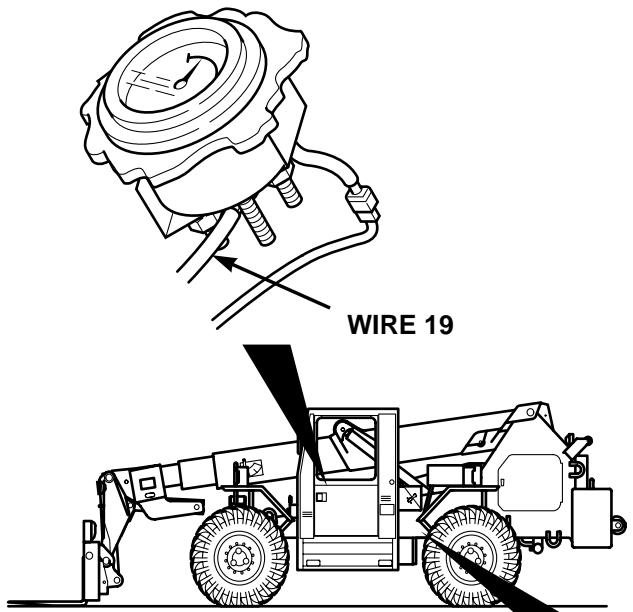
KNOWN INFO
No transmission fluid temperature reading. Wire 10 OK. Connector J1 OK.
POSSIBLE PROBLEMS
Connector P1 faulty. Wire 19 faulty.



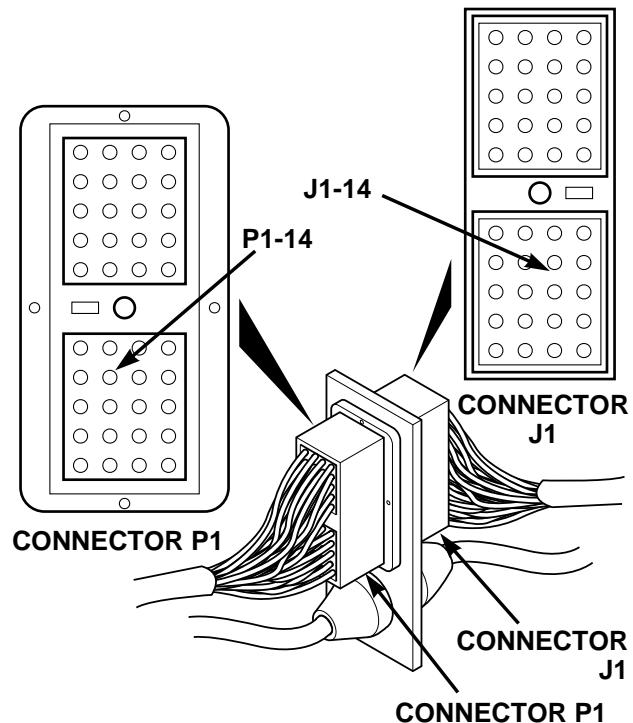
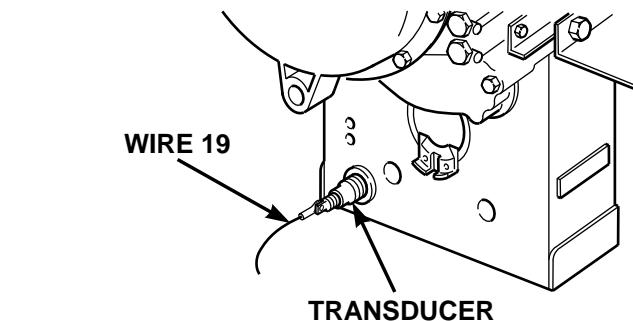
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, wire 19 or connector P1 faulty.



<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Disconnect connector J1 from connector P1.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 19 where wire 19 connects to transmission fluid temperature gage.
(5)	Connect multimeter negative lead (-) to connector J1-14.
(a)	If continuity is present, go to Step 6 of this fault.
(b)	If continuity is not present, repair wire 19 (Para 8-48) or connector J1 (Para 8-48).



<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Disconnect connector J1 from connector P1.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to wire 19 where wire 19 connects to trans fluid temp transducer.
(5)	Connect multimeter negative lead (-) to connector P1-14.
(a)	If continuity is present, replace transmission fluid temperature transducer (Para 8-16).
(b)	If continuity is not present, repair wire 19 or connector P1 (Para 8-49).
(6)	Connect negative battery cable to negative side of battery.
(7)	Install battery cover (Para 8-42).



**41. EMERGENCY STEERING PUMP DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

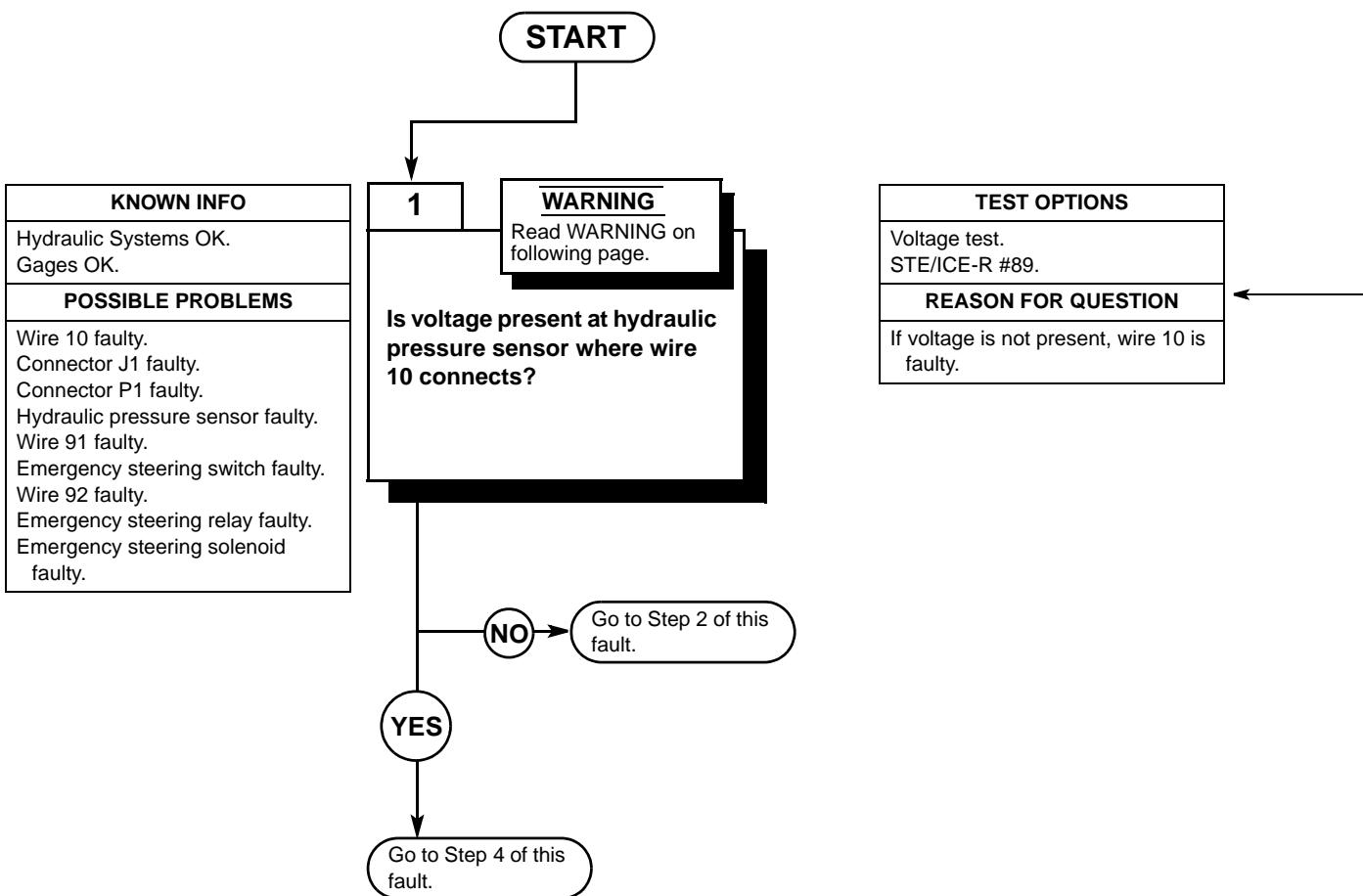
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

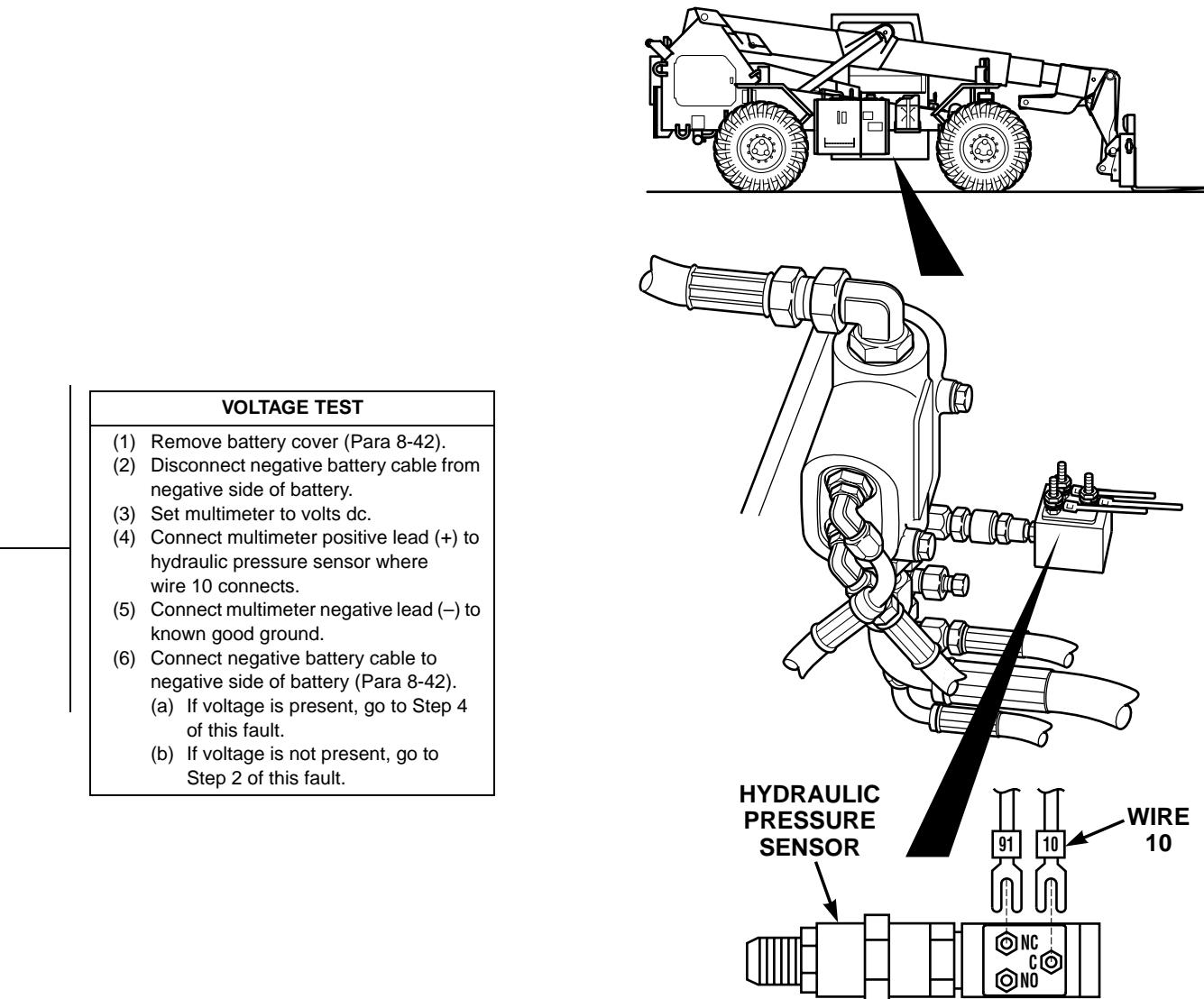
*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



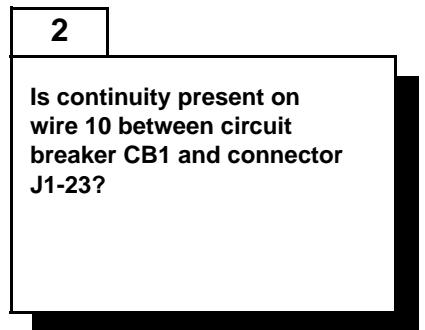
**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.



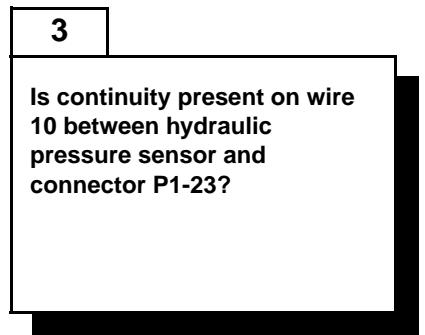
## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



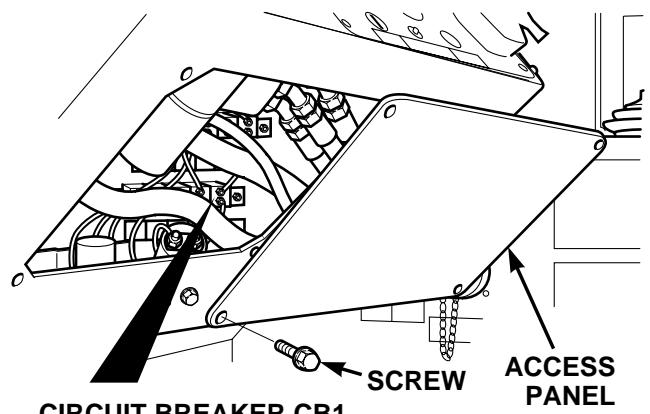
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector J1 or wire 10 is faulty.

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.

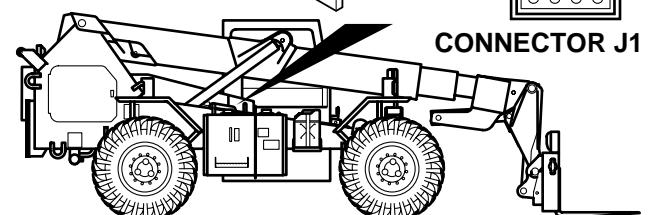
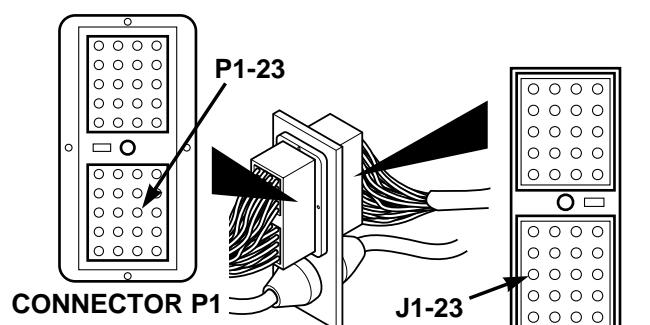
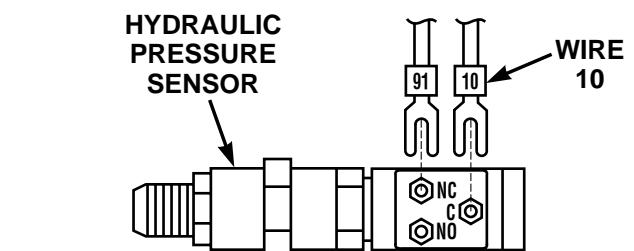


TEST OPTIONS
Continuity test STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector P1 or wire 10 is faulty.

<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Remove four screws and access panel.
(3)	Set multimeter to ohms.
(4)	Connect multimeter positive lead (+) to circuit breaker CB1 where wire 10 connects.
(5)	Connect multimeter negative lead (-) to connector J1-23.
(a)	If continuity is present, go to Step 3 of this fault.
(b)	If continuity is not present, repair wire 10 and/or connector J1 (Para 8-48).
(6)	Install access panel and four screws.

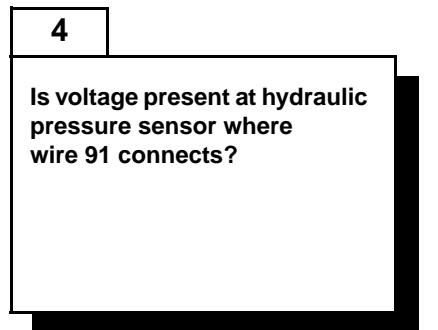


<b>CONTINUITY TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to ohms.
(3)	Connect multimeter positive lead (+) to hydraulic pressure sensor where wire 10 connects.
(4)	Connect multimeter negative lead (-) to connector P1-23.
(a)	If continuity is present, go to Step 4 of this fault.
(b)	If continuity is not present, repair wire 10 and/or connector P1 (Para 8-49).



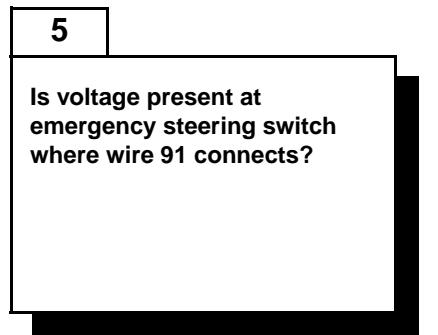
## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, hydraulic pressure sensor is faulty.

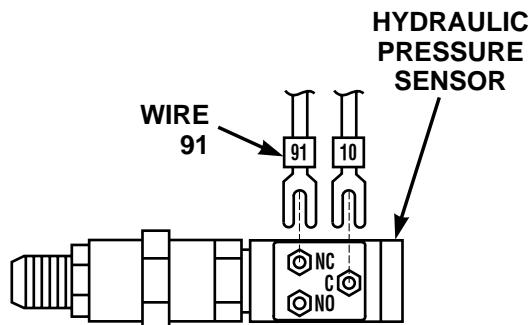
KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



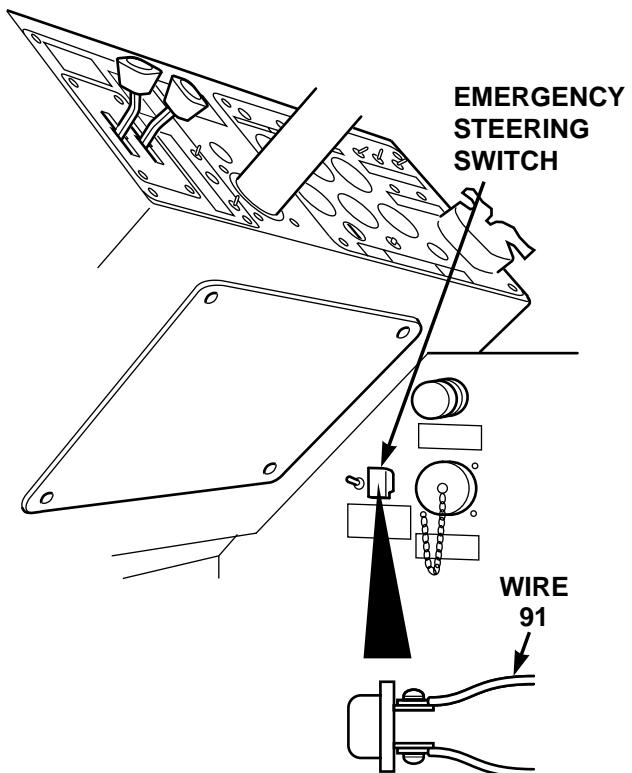
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 91 is faulty.

**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to hydraulic pressure sensor where wire 91 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If voltage is present, go to Step 5 of this fault.
  - (b) If voltage is not present, replace hydraulic pressure sensor (Para 8-53).

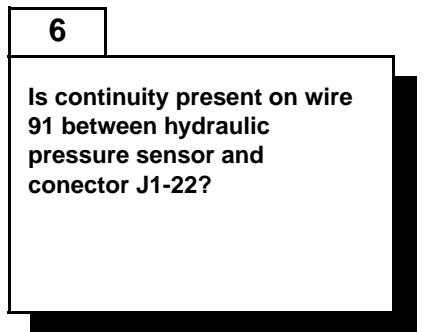
**VOLTAGE TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to volts dc.
- (3) Connect multimeter positive lead (+) to emergency steering switch where wire 91 connects.
- (4) Connect multimeter negative lead (-) to known good ground.
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
  - (a) If voltage is present, go to Step 8 of this fault.
  - (b) If voltage is not present, go to Step 6 of this fault.
- (6) Turn emergency steering switch OFF (TM 10-3930-673-10).
- (7) Disconnect negative battery cable from negative side of battery (Para 8-42).



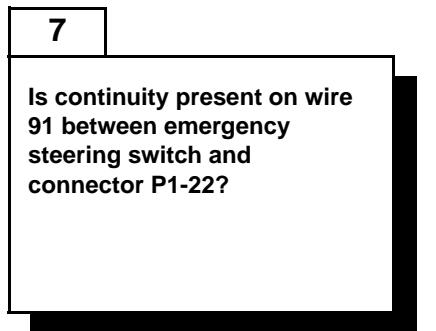
## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector J1 or wire 91 is faulty.

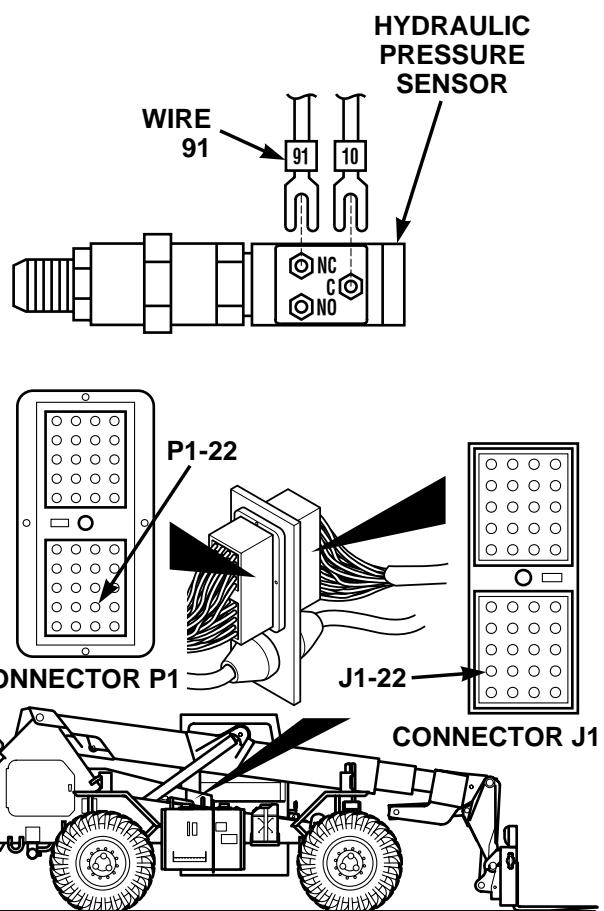
KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Hydraulic pressure sensor faulty. Wire 91 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



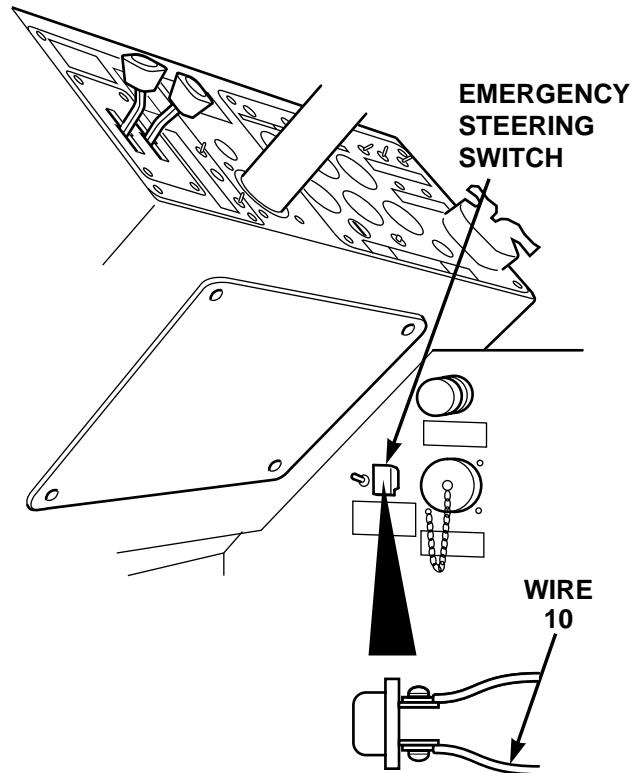
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector P1 or wire 91 faulty.

**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to hydraulic pressure sensor where wire 91 connects.
- (4) Connect multimeter negative lead (-) to connector J1-22.
  - (a) If continuity is present, go to Step 7 of this fault.
  - (b) If continuity is not present, repair wire 91 and/or connector J1 (Para 8-48).

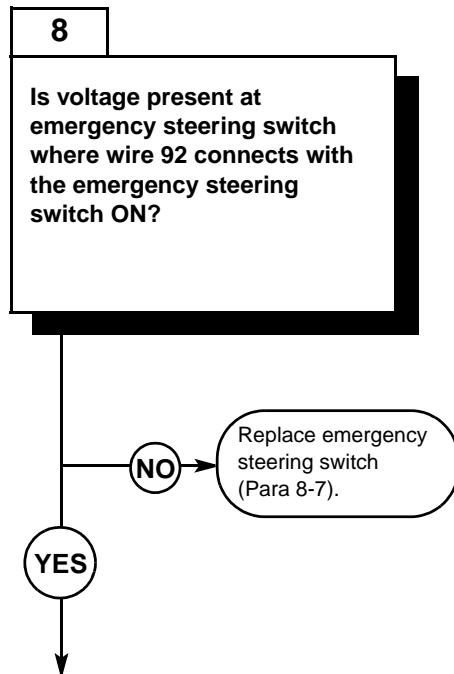
**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to emergency steering switch where wire 91 connects.
- (4) Connect multimeter negative lead (-) to connector P1-22.
  - (a) If continuity is present, go to Step 8 of this fault.
  - (b) If continuity is not present, repair wire 91 and/or connector P1 (Para 8-49).



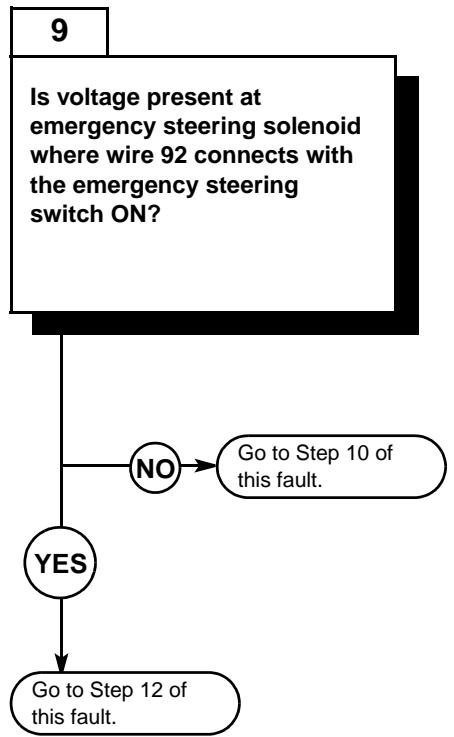
## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK. Hydraulic pressure sensor OK. Wire 91 OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Emergency steering switch faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.



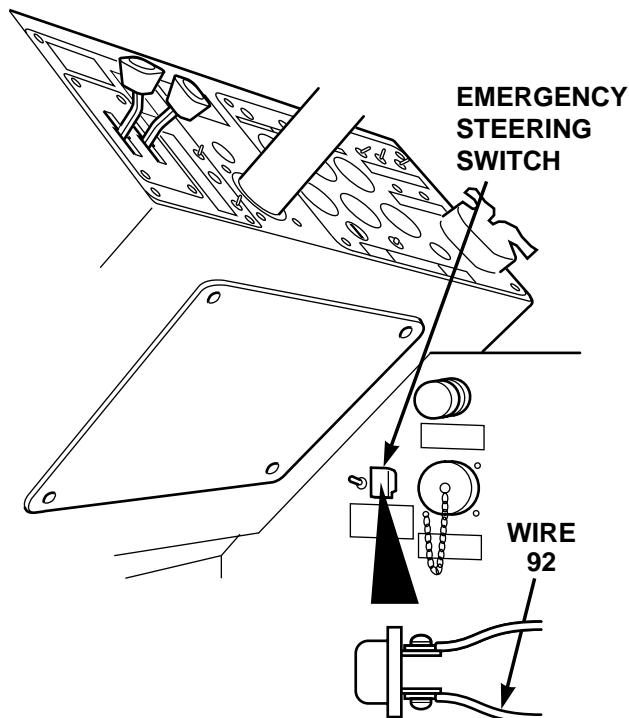
TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, emergency steering switch is faulty.

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK. Hydraulic pressure sensor OK. Wire 91 OK. Emergency steering switch OK.
POSSIBLE PROBLEMS
Connector J1 faulty. Connector P1 faulty. Wire 92 faulty. Emergency steering relay faulty. Emergency steering solenoid faulty.

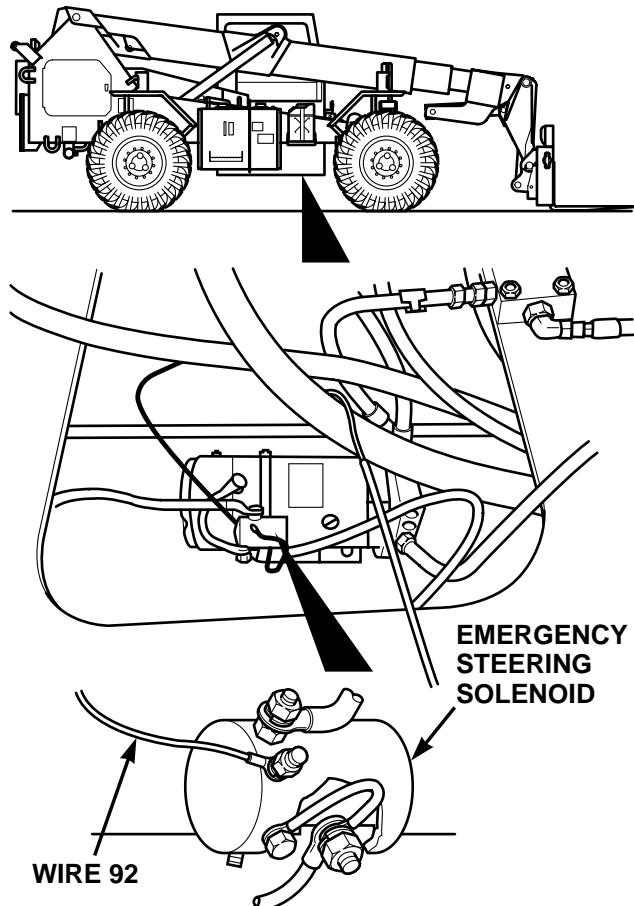


TEST OPTIONS
Voltage test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 92 is faulty.

<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to emergency steering switch where wire 92 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn emergency steering switch ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 9 of this fault.
(b)	If voltage is not present, replace emergency steering switch (Para 8-7).
(7)	Turn emergency steering switch OFF (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).

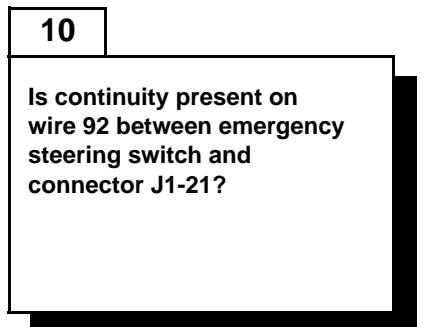


<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to emergency steering switch where wire 92 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn emergency steering switch ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 12 of this fault.
(b)	If voltage is not present, go to Step 10 of this fault.
(6)	Turn emergency steering switch OFF (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).

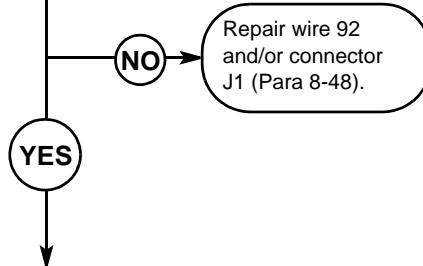


## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT.).

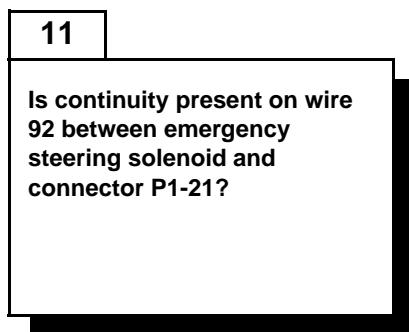
KNOWN INFO
Hydraulic Systems OK.
Gages OK.
Wire 10 OK.
Hydraulic pressure sensor OK.
Wire 91 OK.
Emergency steering switch OK.
POSSIBLE PROBLEMS
Connector J1 faulty.
Connector P1 faulty.
Wire 92 faulty.
Emergency steering relay faulty.
Emergency steering solenoid faulty.



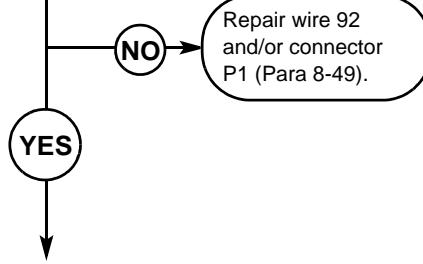
TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector J1 or wire 92 is faulty.



KNOWN INFO
Hydraulic Systems OK.
Gages OK.
Wire 10 OK.
Hydraulic pressure sensor OK.
Wire 91 OK.
Emergency steering switch OK.
POSSIBLE PROBLEMS
Connector J1 faulty.
Connector P1 faulty.
Wire 92 faulty.
Emergency steering relay faulty.
Emergency steering solenoid faulty.

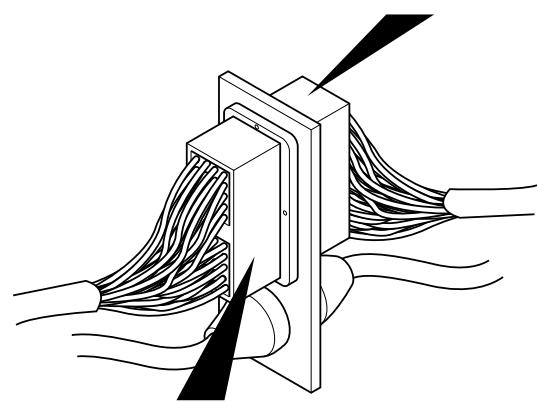
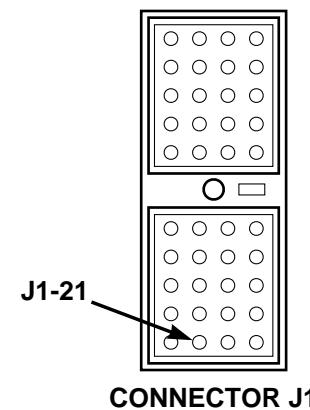


TEST OPTIONS
Continuity test. STE/ICE-R #91.
REASON FOR QUESTION
If continuity is not present, connector P1 or wire 92 is faulty.

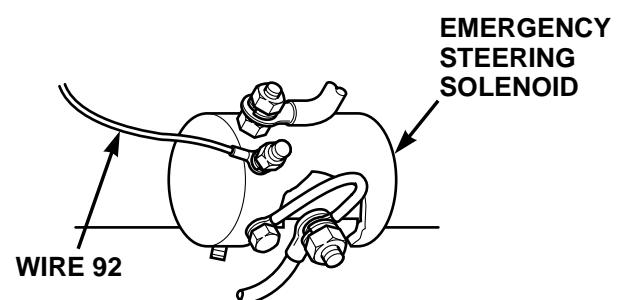
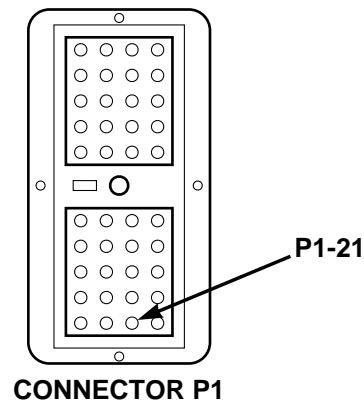


**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to emergency steering switch where wire 92 connects.
- (4) Connect multimeter negative lead (-) to connector J1-21.
  - (a) If continuity is present, go to Step 11 of this fault.
  - (b) If continuity is not present, repair wire 92 and/or connector J1 (Para 8-48).

**CONTINUITY TEST**

- (1) Disconnect negative battery cable from negative side of battery (Para 8-42).
- (2) Set multimeter to ohms.
- (3) Connect multimeter positive lead (+) to emergency steering solenoid where wire 92 connects.
- (4) Connect multimeter negative lead (-) to connector P1-22.
  - (a) If continuity is present, go to Step 12 of this fault.
  - (b) If continuity is not present, repair wire 92 and/or connector J1 (Para 8-49).

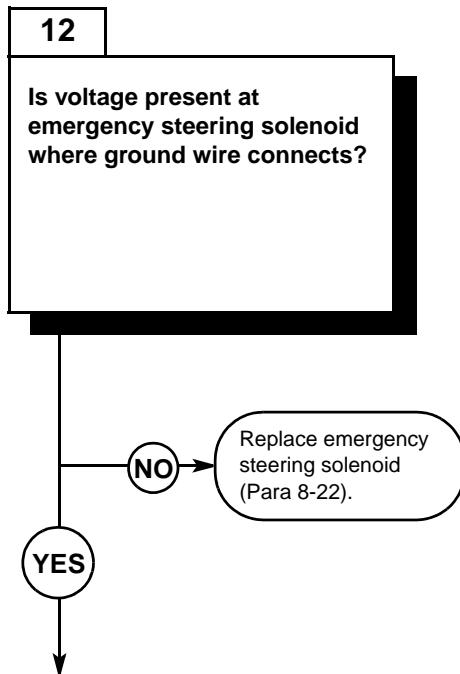


## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK. Hydraulic pressure sensor OK. Wire 91 OK. Emergency steering switch OK. Connector J1 OK. Connector P1 OK. Wire 92 OK. Emergency steering relay OK.

POSSIBLE PROBLEMS
Emergency steering solenoid faulty.



TEST OPTIONS
Voltage test. STE/ICE-R #89.

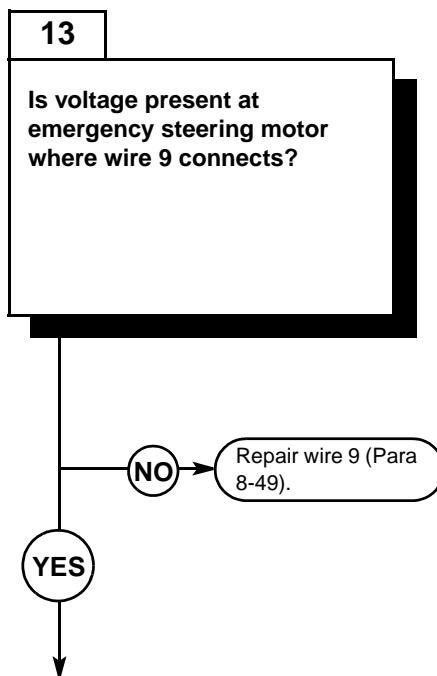
  

REASON FOR QUESTION
If voltage is not present, emergency steering solenoid is faulty.

KNOWN INFO
Hydraulic Systems OK. Gages OK. Wire 10 OK. Hydraulic pressure sensor OK. Wire 91 OK. Emergency steering switch OK. Connector J1 OK. Connector P1 OK. Wire 92 OK. Emergency steering relay OK. Emergency steering solenoid OK.

POSSIBLE PROBLEMS
Wire 9 faulty. Emergency steering motor faulty.

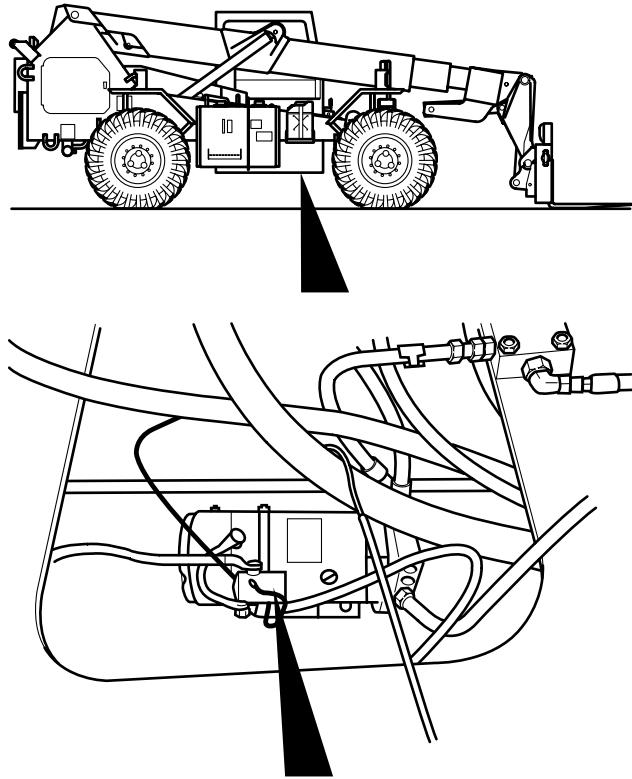


TEST OPTIONS
Voltage test. STE/ICE-R #89.

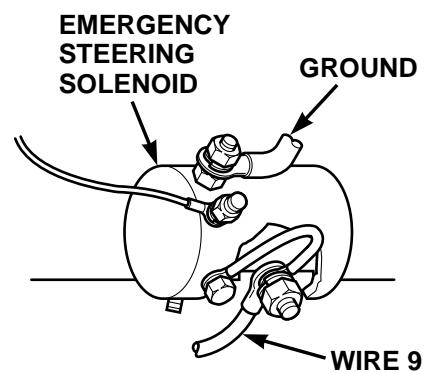
  

REASON FOR QUESTION
If voltage is not present, wire 9 is faulty.

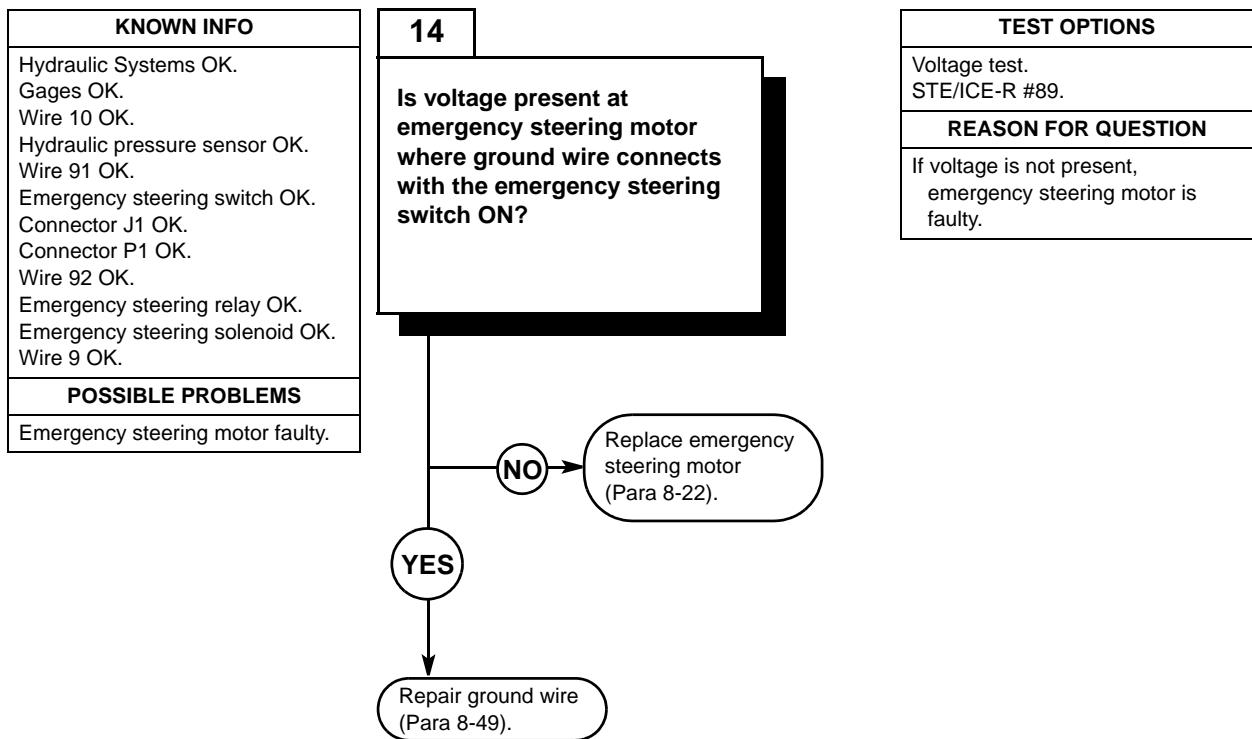
<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to emergency steering solenoid where ground wire connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn emergency steering switch ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 13 of this fault.
(b)	If voltage is not present, replace emergency steering solenoid (Para 8-22).
(7)	Turn emergency steering switch OFF (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).

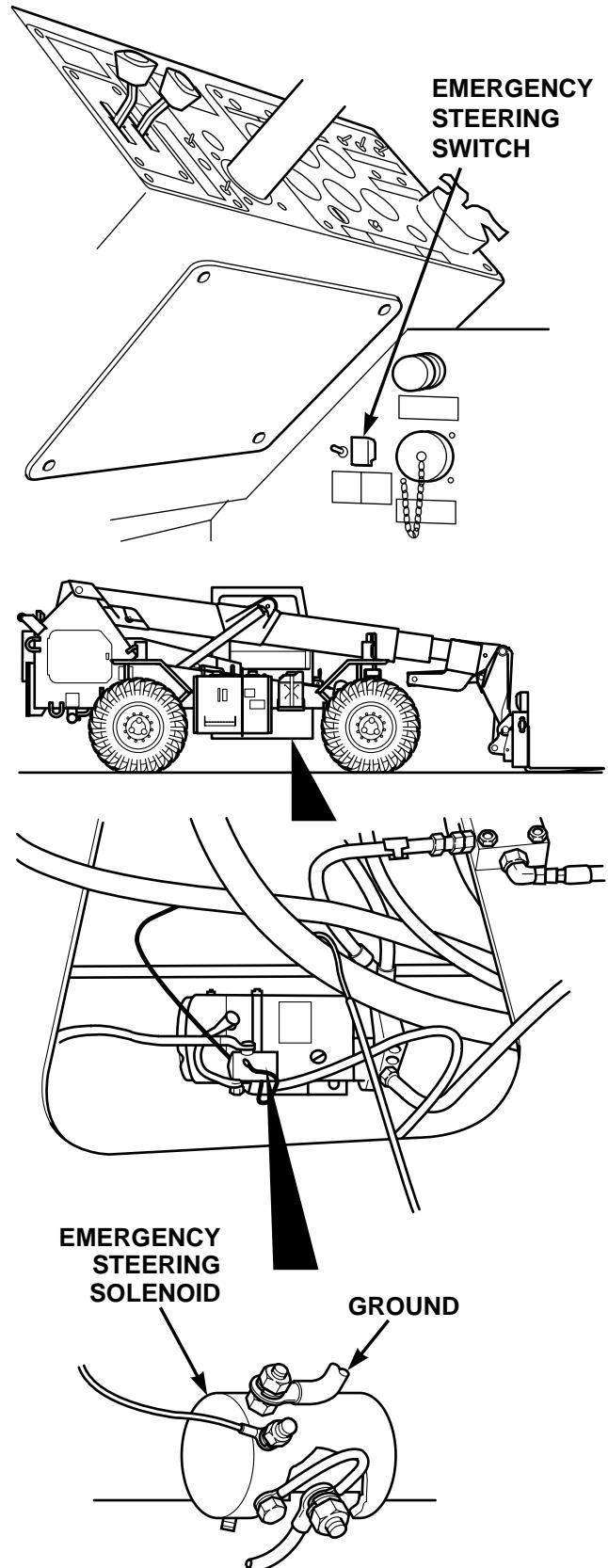
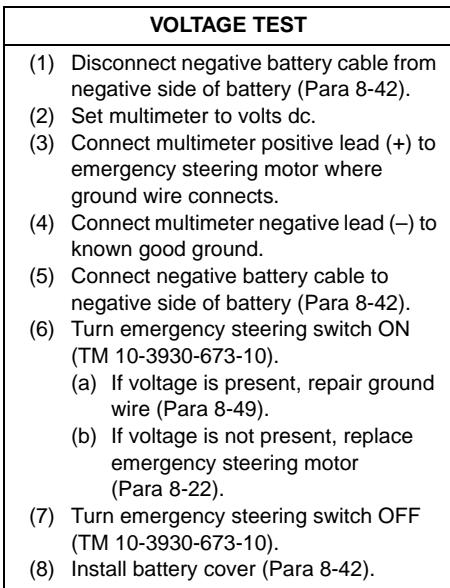


<b>VOLTAGE TEST</b>	
(1)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to emergency steering motor where wire 9 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn emergency steering switch ON (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 14 of this fault.
(b)	If voltage is not present, repair wire 9 (Para 8-49).
(7)	Turn emergency steering switch OFF (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).



## 41. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).





**42. STEERING SELECT SWITCH DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

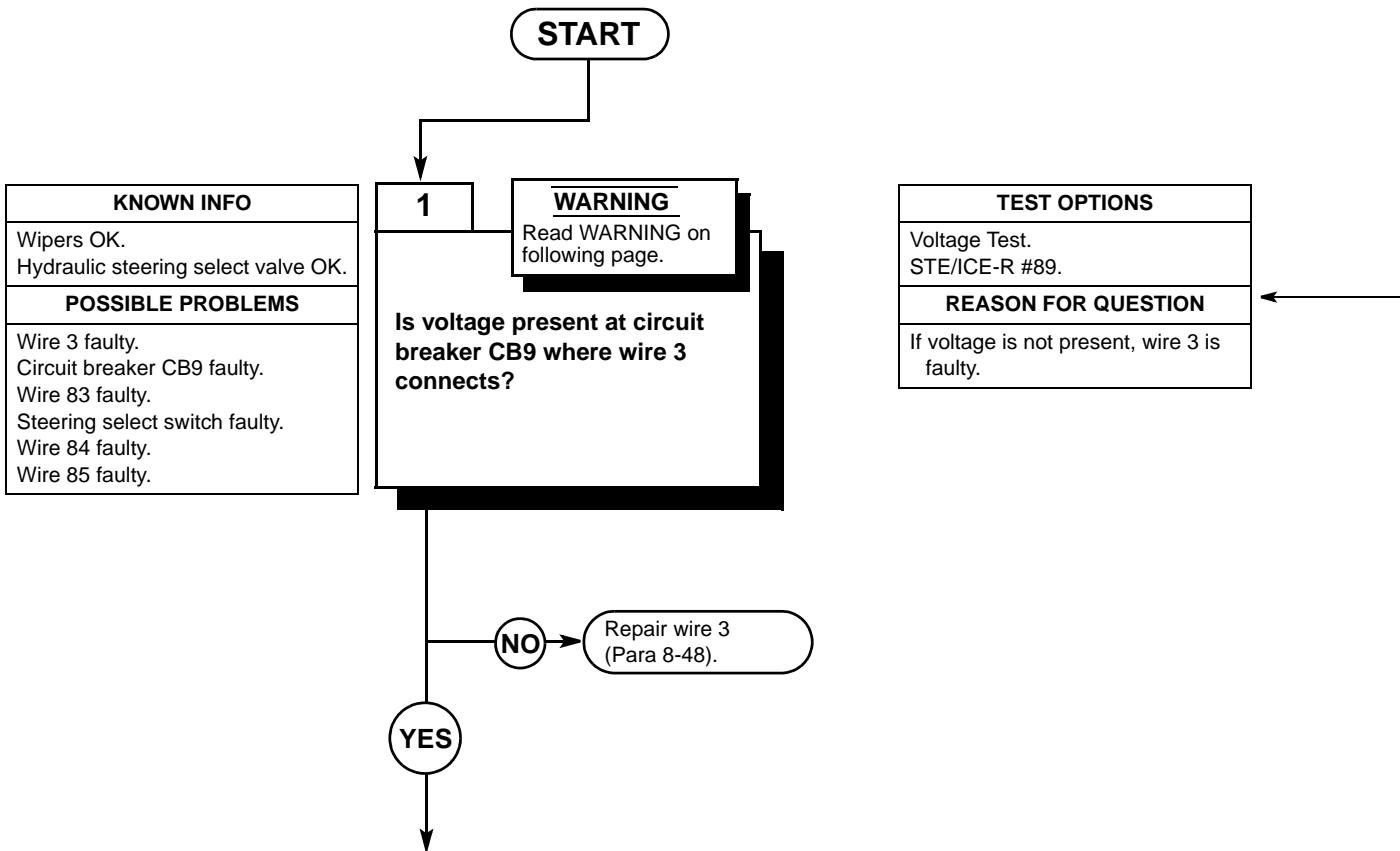
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

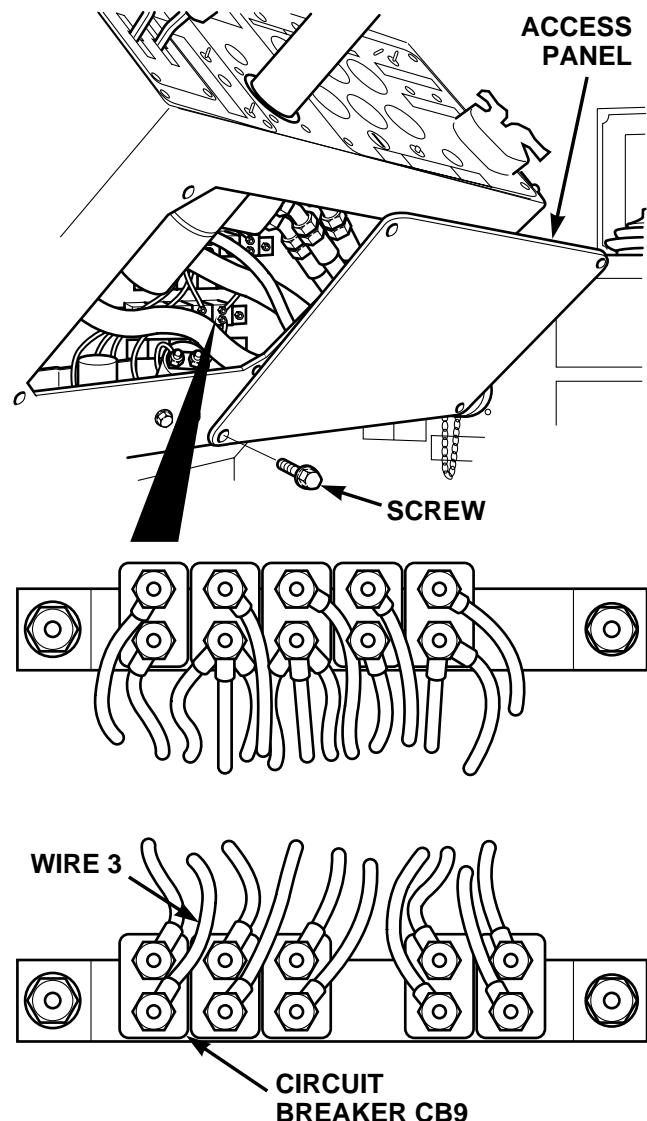
Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

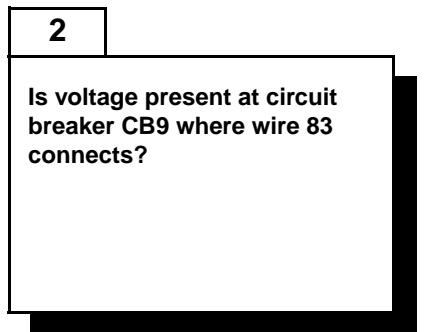
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws and access panel.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive lead (+) to circuit breaker CB9 where wire 3 connects.
(6)	Connect multimeter negative lead (-) to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 2 of this fault.
(b)	If voltage is not present, repair wire 3 (Para 8-48).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).



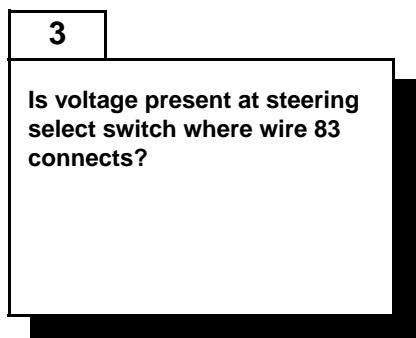
## 42. STEERING SELECT SWITCH DOES NOT OPERATE (CONT).

KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK.
POSSIBLE PROBLEMS
Circuit breaker CB9 faulty. Wire 83 faulty. Steering select switch faulty. Wire 84 faulty. Wire 85 faulty.



TEST OPTIONS
Voltage Test STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, circuit breaker CB9 is faulty.

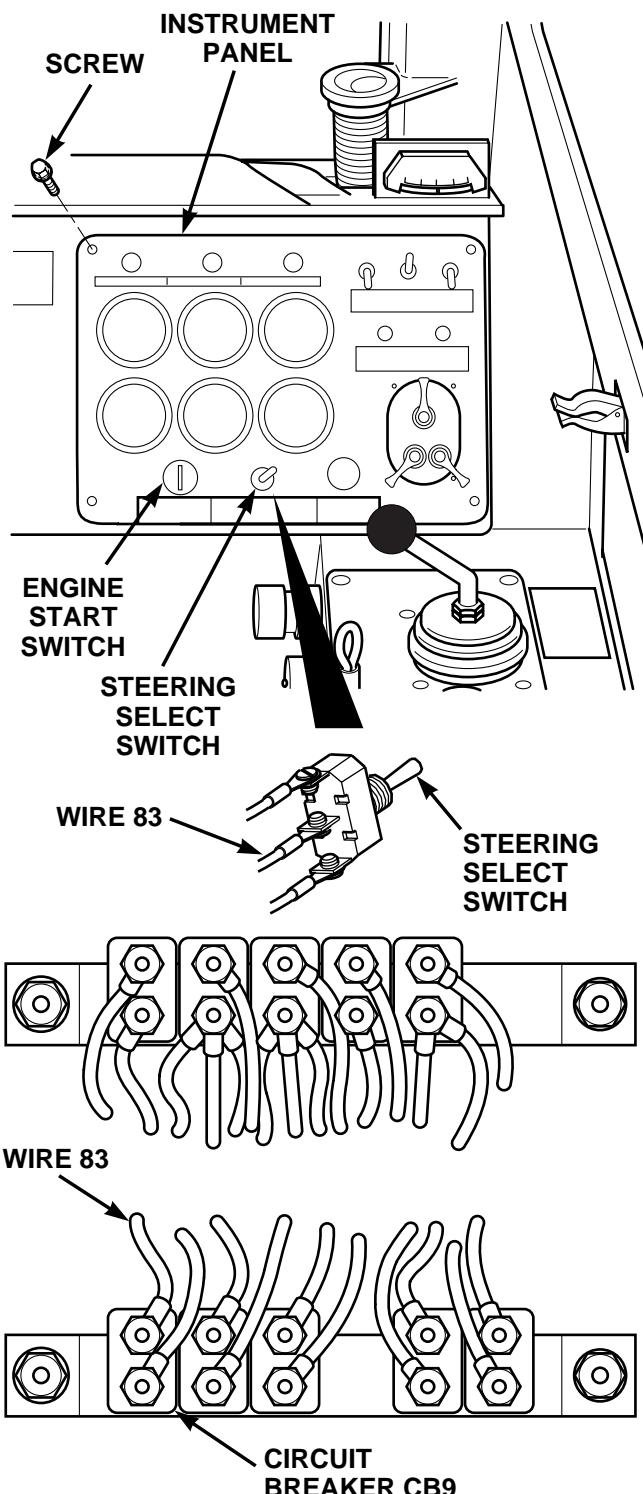
KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK. Circuit breaker CB9 OK.
POSSIBLE PROBLEMS
Wire 83 faulty. Steering select switch faulty. Wire 84 faulty. Wire 85 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 83 is faulty.

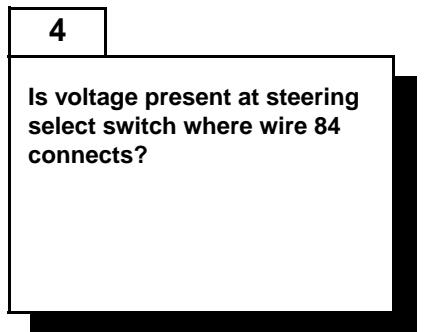
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead (+) to circuit breaker CB9 where wire 83 connects.
(3)	Connect multimeter negative lead (-) to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 3 of this fault.
(b)	If voltage is not present, replace circuit breaker CB9 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(8)	Install access panel and four screws.

<b>VOLTAGE TEST</b>	
(1)	Remove four screws from instrument panel.
(2)	Raise instrument panel out to reach steering select switch.
(3)	Set multimeter to volts dc.
(4)	Connect multimeter positive lead (+) to steering select switch where wire 83 connects.
(5)	Connect multimeter negative lead (-) to known good ground.
(6)	Connect negative battery cable to negative side of battery (Para 8-42).
(7)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If voltage is present, go to Step 4 of this fault.
(b)	If voltage is not present, repair wire 83 (Para 8-48).
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).



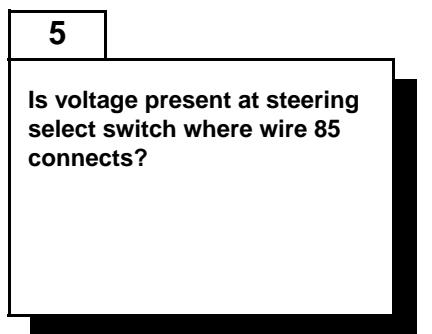
## 42. STEERING SELECT SWITCH DOES NOT OPERATE (CONT.).

KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK. Circuit breaker CB9 OK. Wire 83 OK.
POSSIBLE PROBLEMS
Steering select switch faulty. Wire 84 faulty. Wire 85 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, steering select switch is faulty.

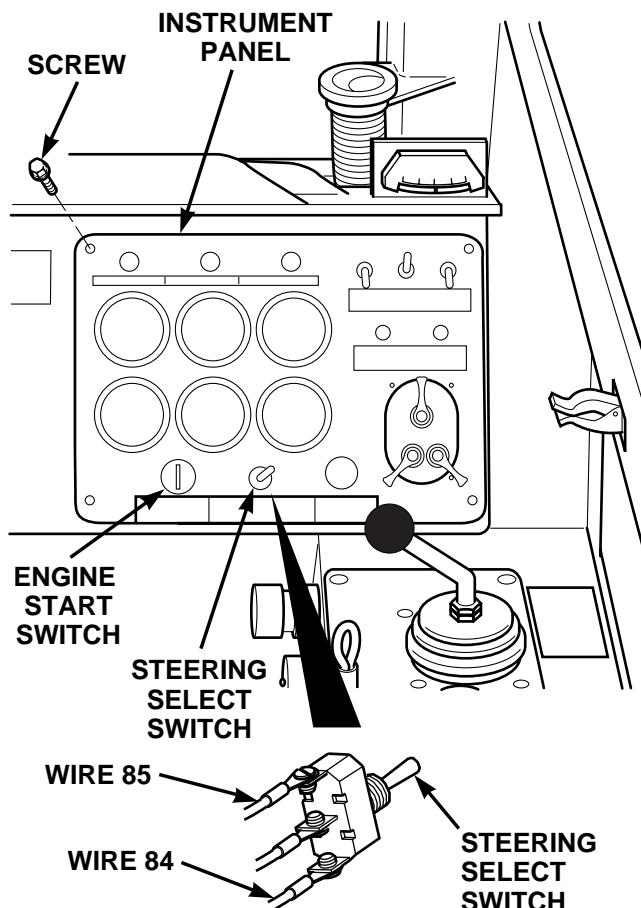
KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK. Circuit breaker CB9 OK. Wire 83 OK.
POSSIBLE PROBLEMS
Steering select switch faulty. Wire 84 faulty. Wire 85 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, steering select switch is faulty.

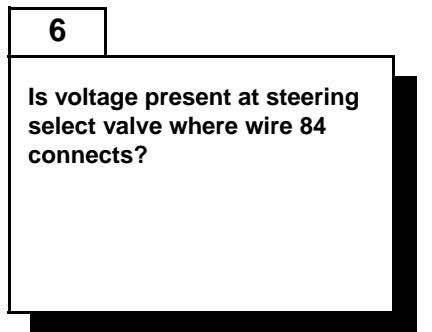
<b>VOLTAGE TEST</b>	
(1)	Raise instrument panel out to reach steering select switch.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to steering select switch where wire 84 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Switch steering select switch to CRAB position (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If voltage present, go to Step 6 of this fault.</li> <li>(b) If voltage is not present, replace steering select switch (Para 8-7).</li> </ul>
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

<b>VOLTAGE TEST</b>	
(1)	Raise instrument panel out to reach steering select switch.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead (+) to steering select switch where wire 85 connects.
(4)	Connect multimeter negative lead (-) to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(7)	Switch steering select switch to 4 WHEEL position (TM 10-3930-673-10). <ul style="list-style-type: none"> <li>(a) If voltage present, go to Step 7 of this fault.</li> <li>(b) If voltage is not present, replace steering select switch (Para 8-7).</li> </ul>
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Install instrument panel and four screws.



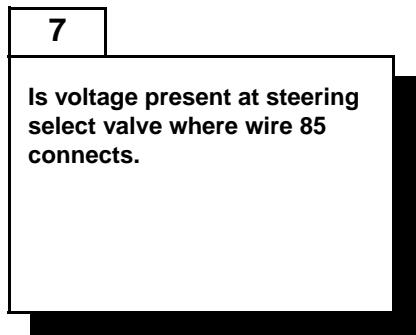
## 42. STEERING SELECT SWITCH DOES NOT OPERATE (CONT).

KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK. Circuit breaker CB9 OK. Wire 83 OK. Steering select switch OK. Wire 85 OK.
POSSIBLE PROBLEMS
Wire 84 faulty.



TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 84 and/or connector is faulty.

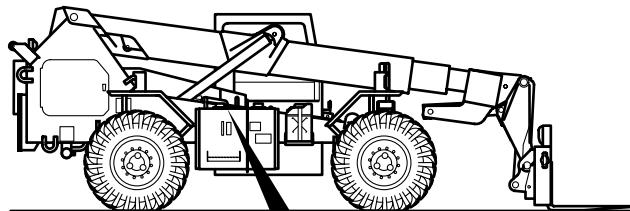
KNOWN INFO
Wipers OK. Steering select valve OK. Wire 3 OK. Circuit breaker CB9 OK. Wire 83 OK. Steering select switch OK. Wire 84 OK.
POSSIBLE PROBLEMS
Wire 85 faulty.



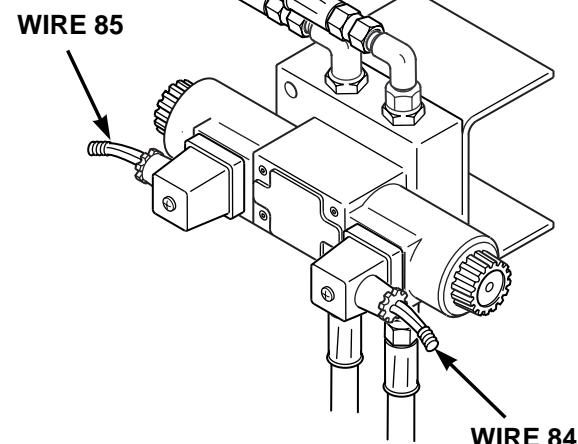
TEST OPTIONS
Voltage Test. STE/ICE-R #89.
REASON FOR QUESTION
If voltage is not present, wire 85 and/or connector is faulty.

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to steering select valve where wire 84 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Switch steering select switch to CRAB position (TM 10-3930-673-10).
  - (a) If voltage present, replace steering select valve (Para 14-10).
  - (b) If voltage is not present, repair wire 84 and/or connector (Para 8-48).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Disconnect negative battery cable from negative side of battery (Para 8-42).

**VOLTAGE TEST**

- (1) Set multimeter to volts dc.
- (2) Connect multimeter positive lead (+) to steering select valve where wire 85 connects.
- (3) Connect multimeter negative lead (-) to known good ground.
- (4) Connect negative battery cable to negative side of battery (Para 8-42).
- (5) Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
- (6) Switch steering select switch to 4 WHEEL position (TM 10-3930-673-10).
  - (a) If voltage present, replace steering select valve (Para 14-10).
  - (b) If voltage is not present, repair wire 85 and/or connector (Para 8-48).
- (7) Turn engine start switch to OFF position (TM 10-3930-673-10).
- (8) Install battery cover (Para 8-42).



**43. PARKING BRAKE SWITCH DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)

*Personnel Required*

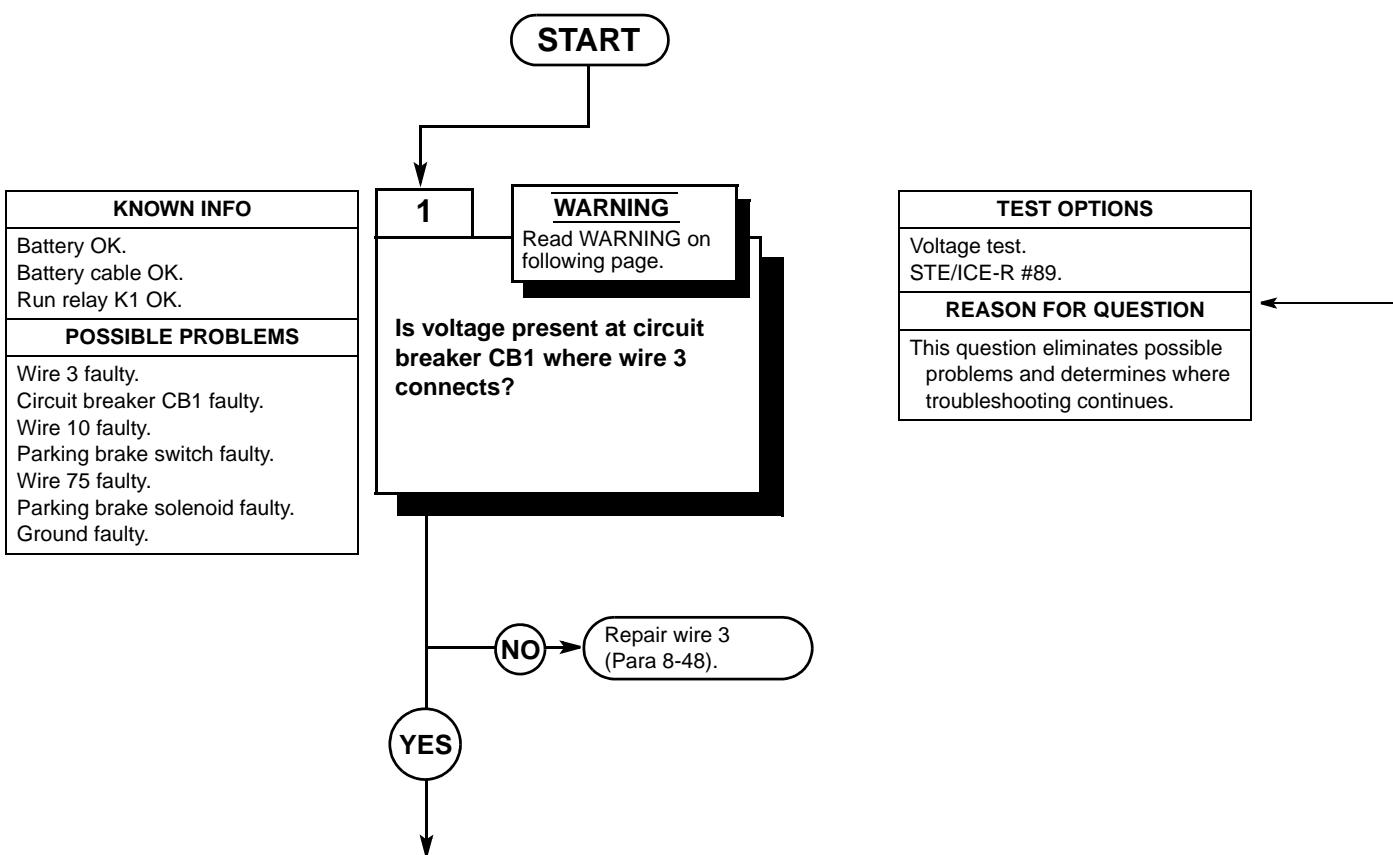
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

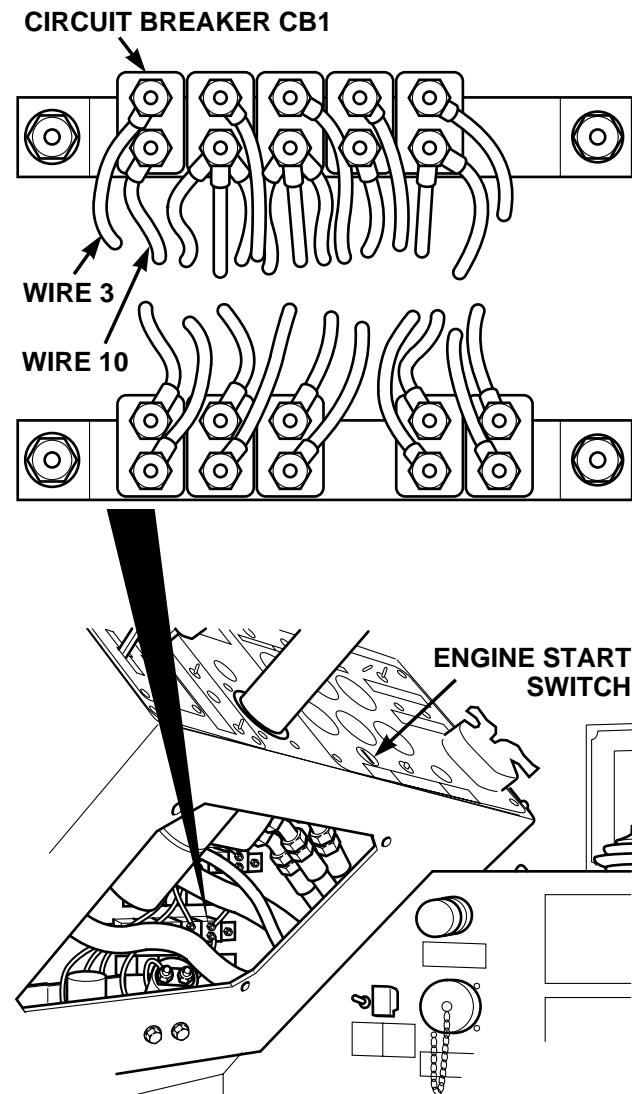
Engine shut down (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

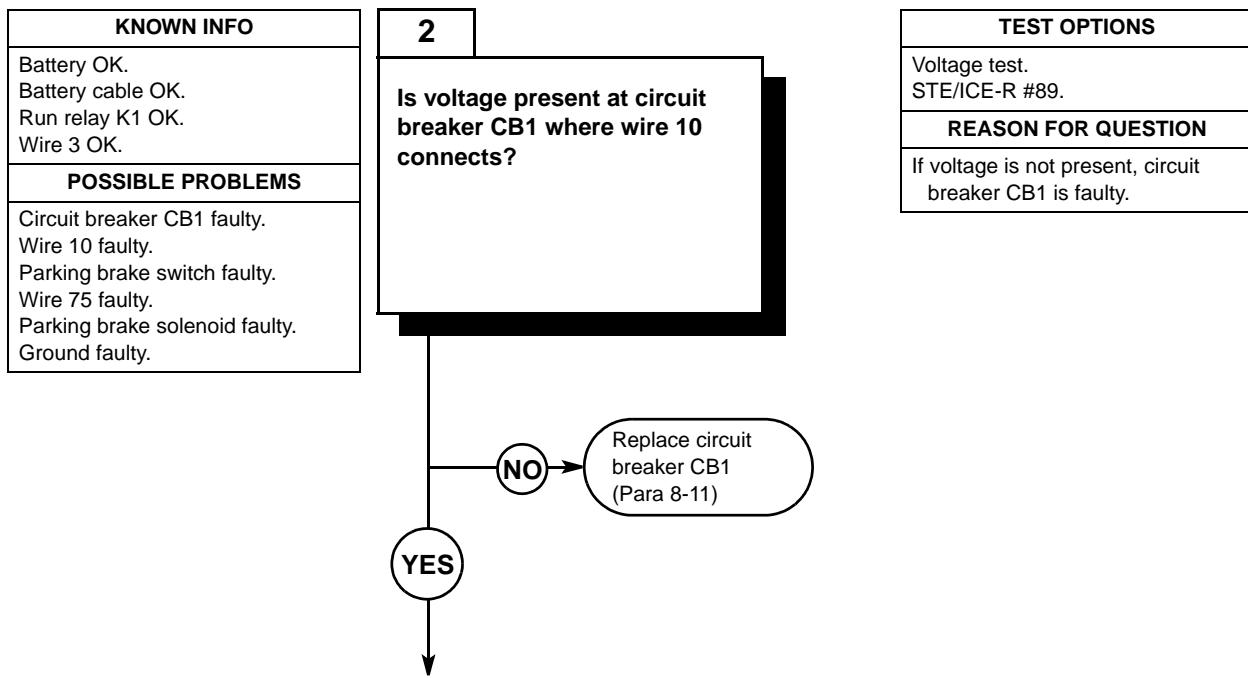


**WARNING**

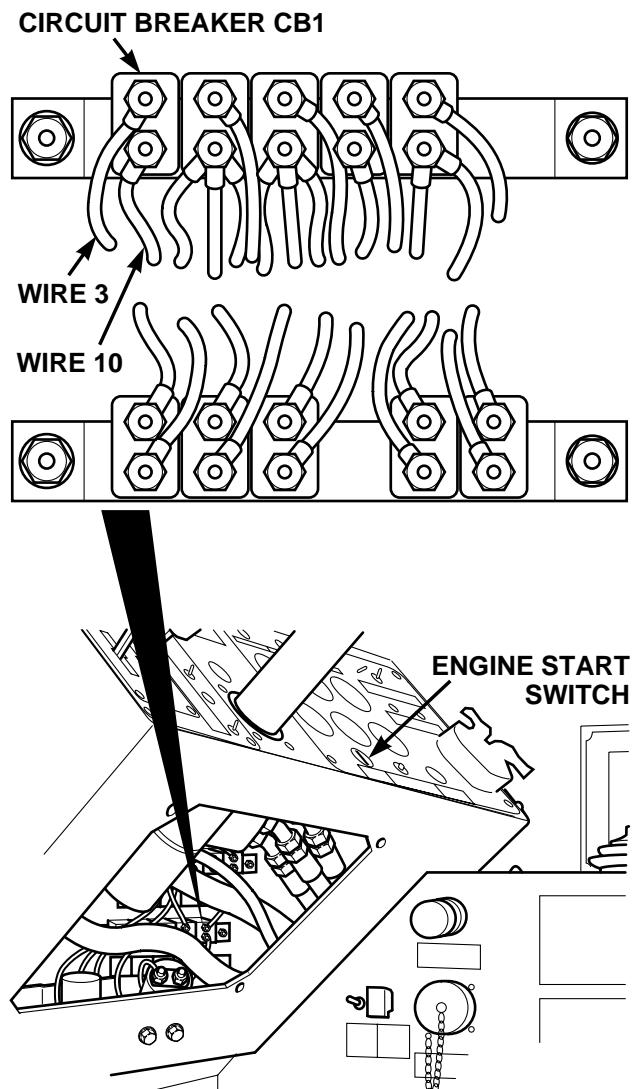
- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

<b>VOLTAGE TEST</b>	
(1)	Remove battery cover (Para 8-42).
(2)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(3)	Remove four screws and access panel.
(4)	Set multimeter to volts dc.
(5)	Connect multimeter positive lead to wire 3 where wire 3 connects to circuit breaker (CB1).
(6)	Connect multimeter negative lead to known good ground.
(7)	Connect negative battery cable to negative side of battery (Para 8-42).
(8)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 2 of this fault.
(b)	If 24 vdc is not present, repair wire 3 (Para 8-48).
(9)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(10)	Disconnect negative battery cable from negative side of battery (Para 8-42).

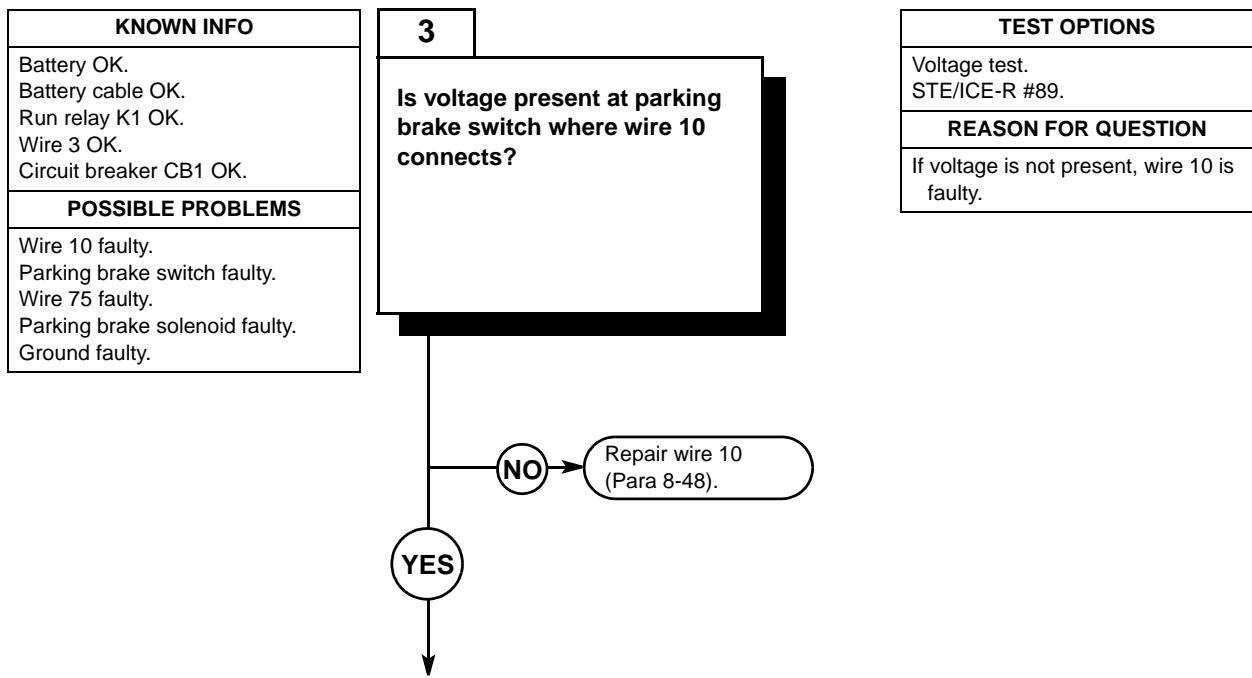


**43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).**

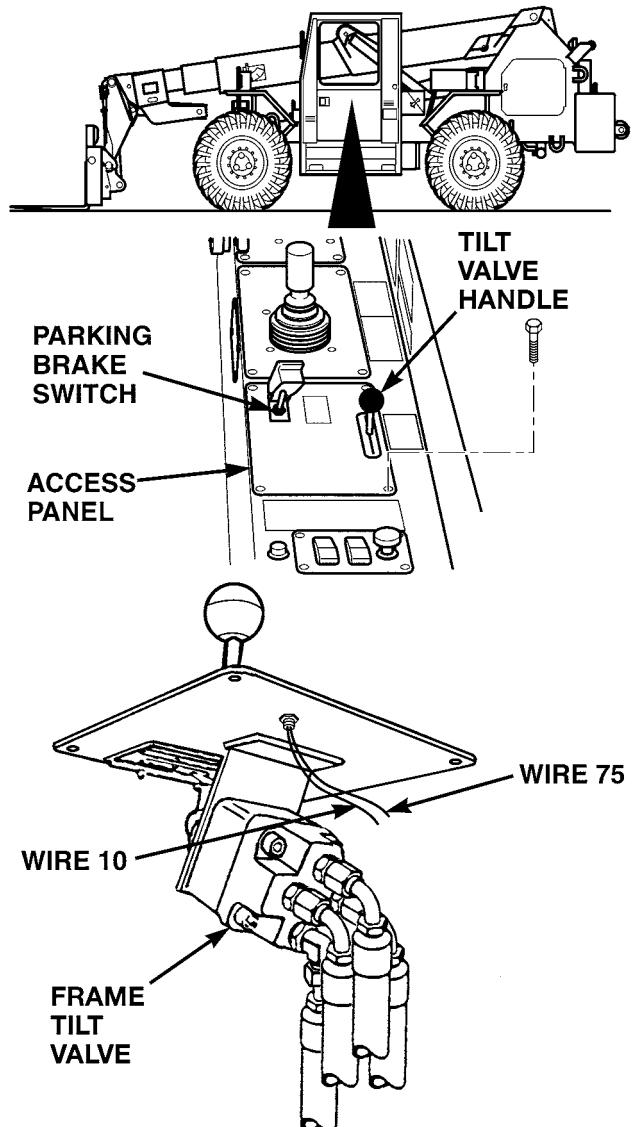
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead to wire 10 where wire 10 connects to circuit breaker CB1.
(3)	Connect multimeter negative lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 3 of this fault.
(b)	If 24 vdc is not present, replace circuit breaker CB1 (Para 8-11).
(6)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(7)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(8)	Install access panel and four screws.

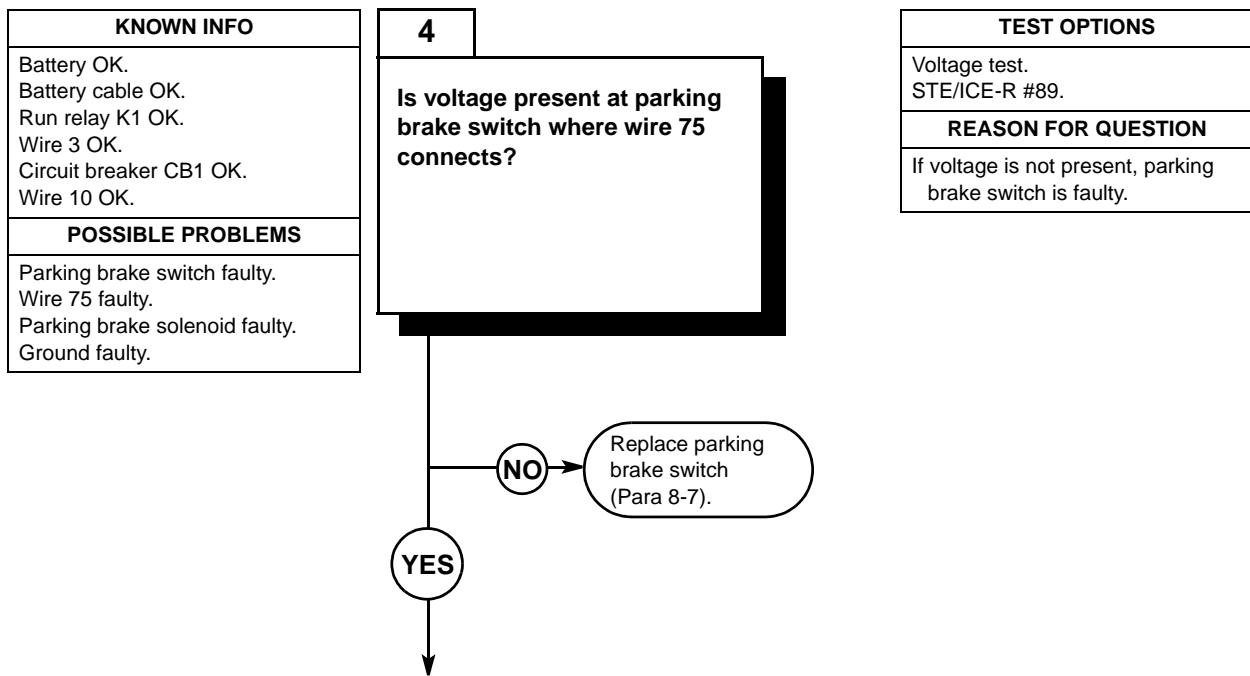


## 43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).

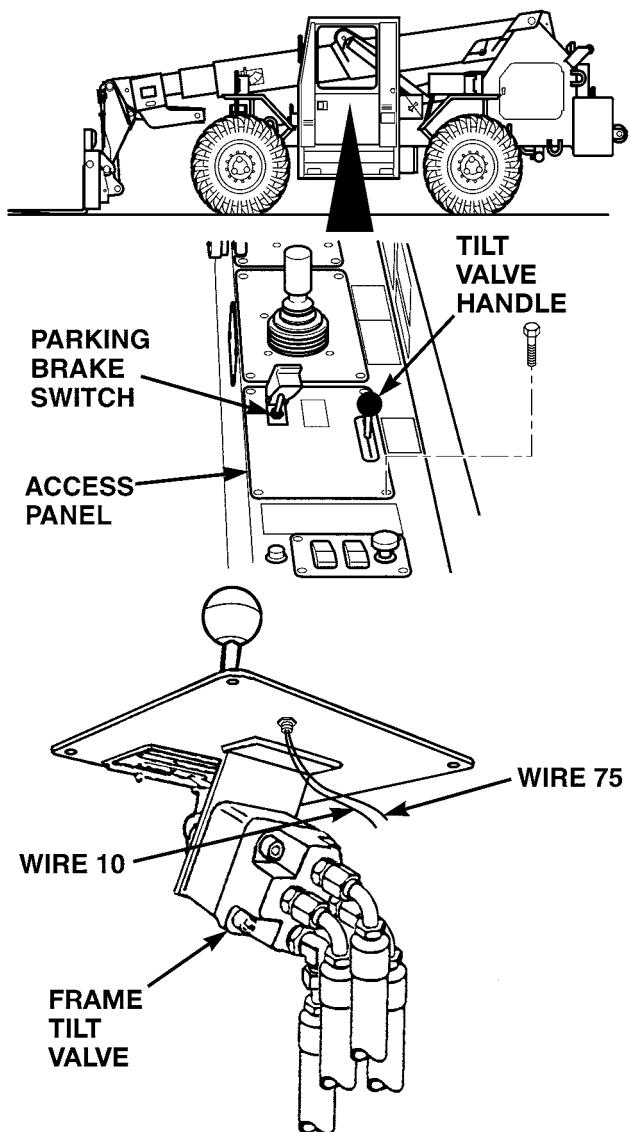


<b>VOLTAGE TEST</b>	
(1)	Remove screws and console access panel to access switch.
(2)	Set multimeter to volts dc.
(3)	Connect multimeter positive lead to wire 10 where wire 10 connects to parking brake switch.
(4)	Connect multimeter negative lead to known good ground.
(5)	Connect negative battery cable to negative side of battery (Para 8-42).
(6)	Turn engine start switch to ON position, BUT DO NOT START ENGINE, (TM 10-3930-673-10).
(a)	If 24 vdc is present, go to Step 4 of this fault.
(b)	If 24 vdc is not present, repair wire 10 (Para 8-48).
(7)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(8)	Disconnect negative battery cable from negative side of battery (Para 8-42).

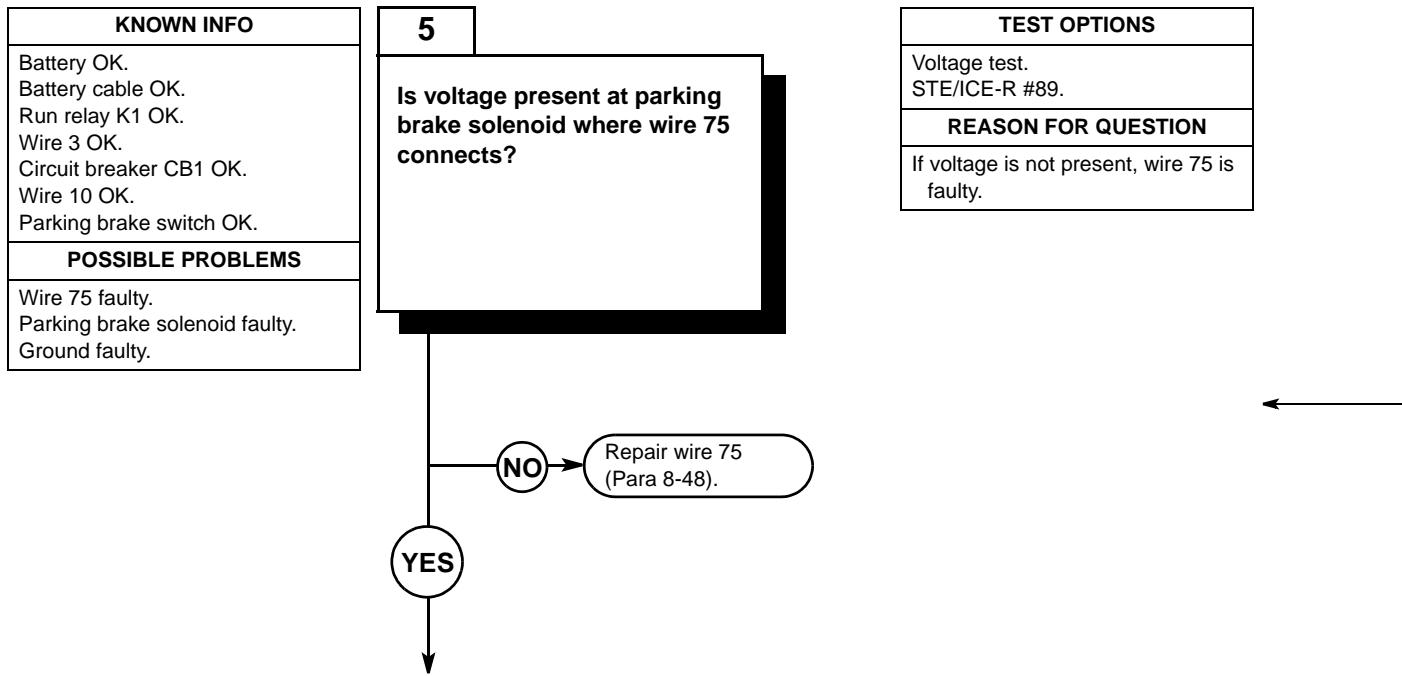


**43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).**

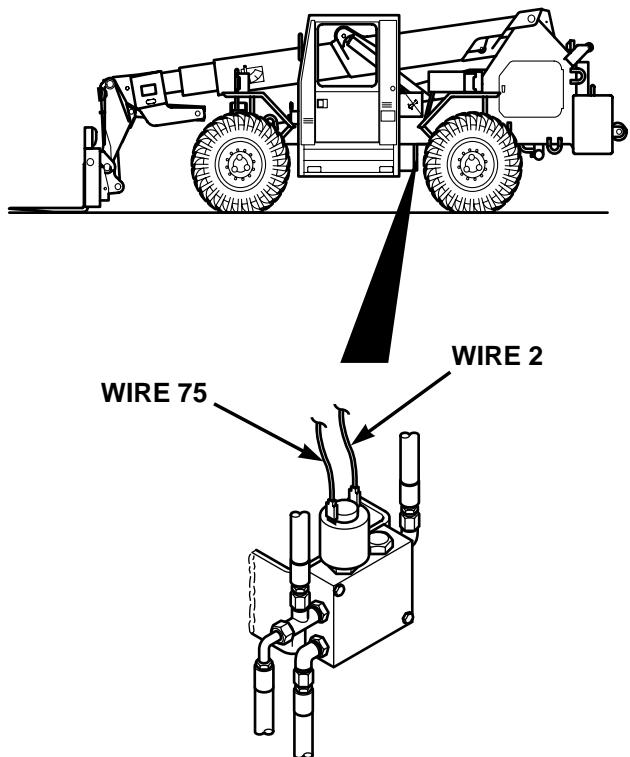
<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead to wire 75 where wire 75 connects to parking brake switch.
(3)	Connect multimeter negative lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE, (TM 10-3930-673-10).
(6)	Turn parking brake switch to ON position.
(a)	If 24 vdc is present, go to Step 5 of this fault.
(b)	If 24 vdc is not present, replace parking brake switch (Para 8-7).
(7)	Turn parking brake switch to OFF position.
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).
(10)	Install console access panel and screws.



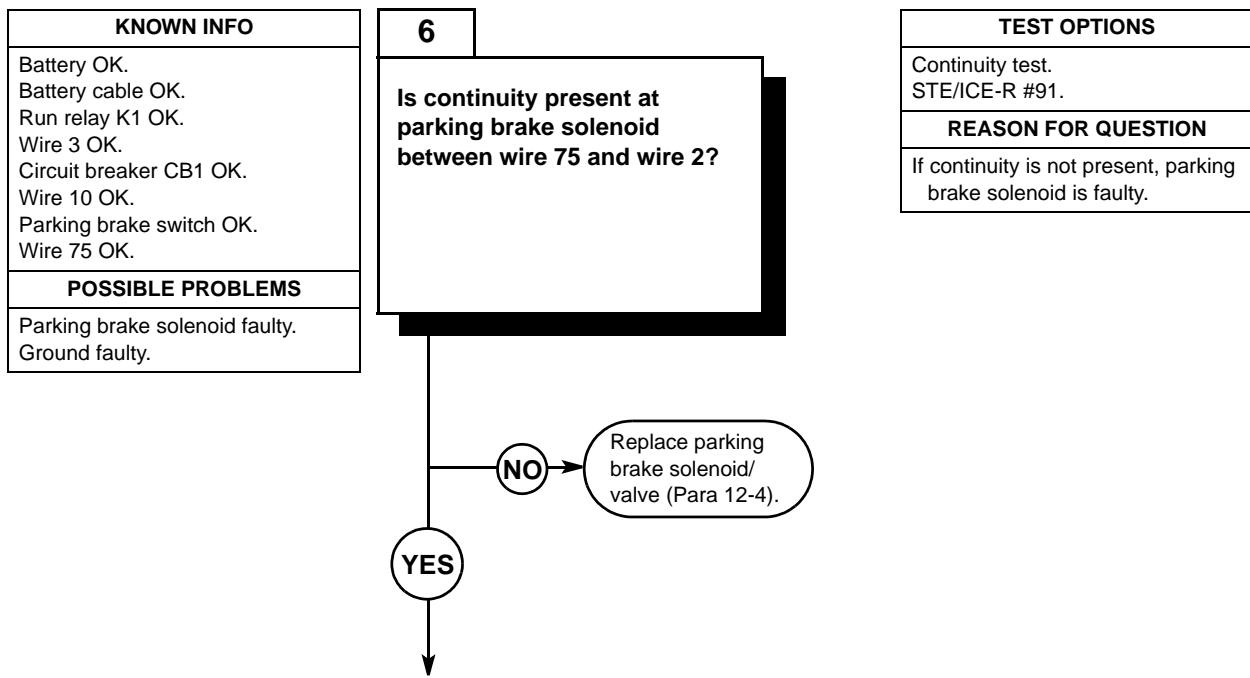
#### **43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).**



<b>VOLTAGE TEST</b>	
(1)	Set multimeter to volts dc.
(2)	Connect multimeter positive lead to wire 75 where wire 75 connects to parking brake solenoid.
(3)	Connect multimeter negative lead to known good ground.
(4)	Connect negative battery cable to negative side of battery (Para 8-42).
(5)	Turn engine start switch to ON position, BUT DO NOT START ENGINE, (TM 10-3930-673-10).
(6)	Turn parking brake switch to ON position.
(a)	If 24 vdc is present, go to Step 6 of this fault.
(b)	If 24 vdc is not present, repair wire 75 (Para 8-48).
(7)	Turn parking brake switch to OFF position.
(8)	Turn engine start switch to OFF position (TM 10-3930-673-10).
(9)	Disconnect negative battery cable from negative side of battery (Para 8-42).

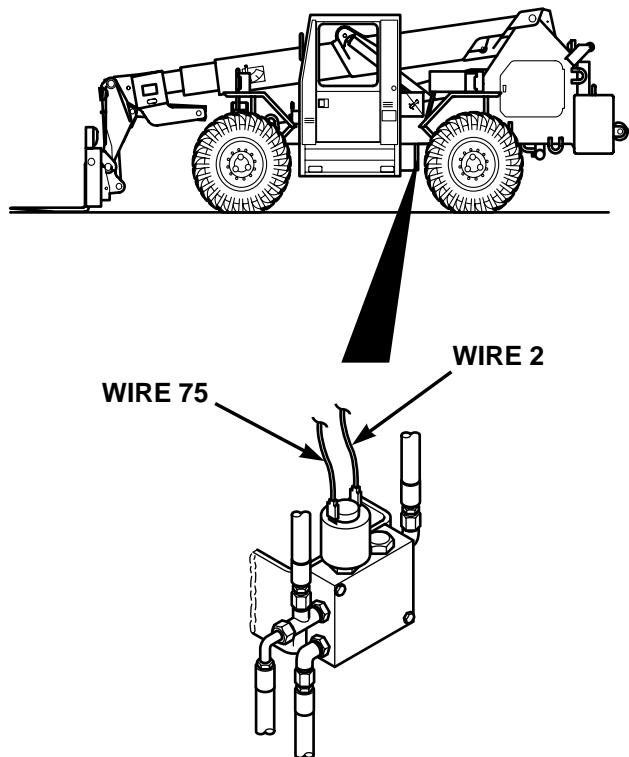


## 43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).

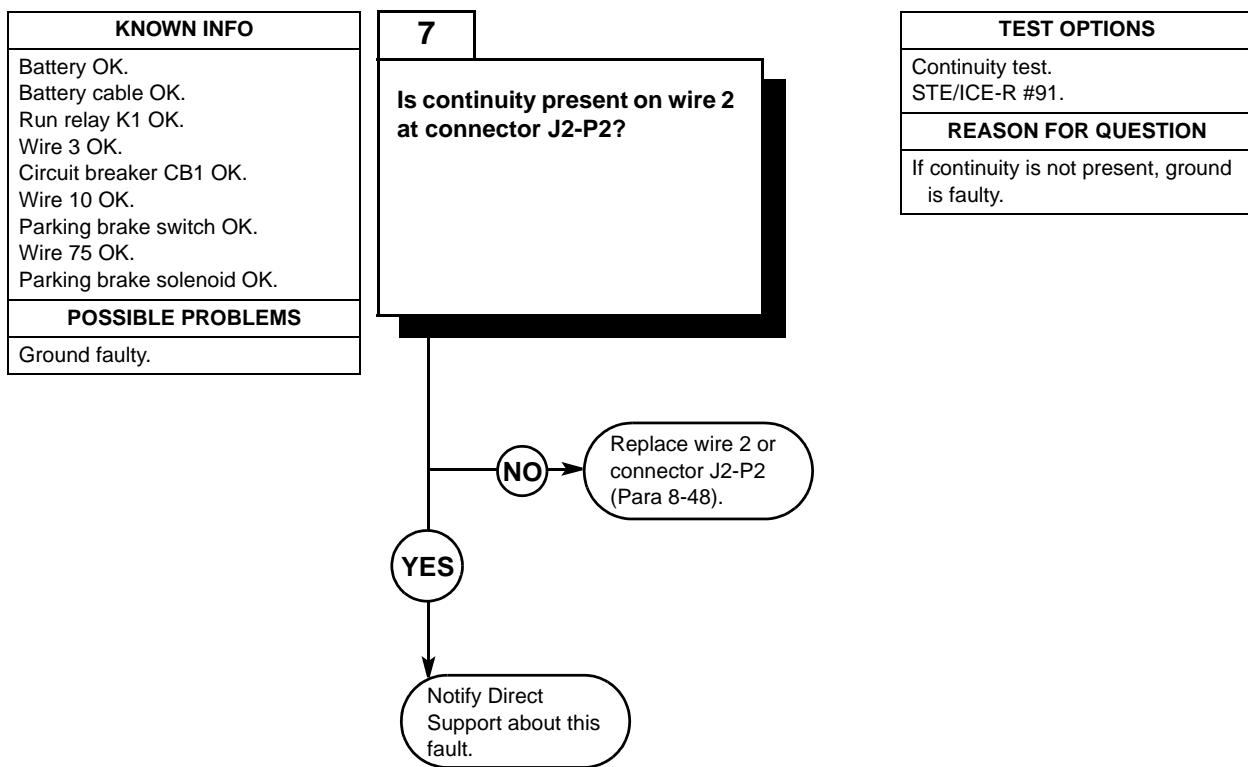


**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Connect multimeter positive lead to wire 75 where wire 75 connects to parking brake solenoid.
- (3) Connect multimeter negative lead to wire 2 where wire 2 connects to parking brake solenoid.
  - (a) If continuity is present, go to Step 7 of this fault.
  - (b) If continuity is not present, replace solenoid valve (Para 12-4).

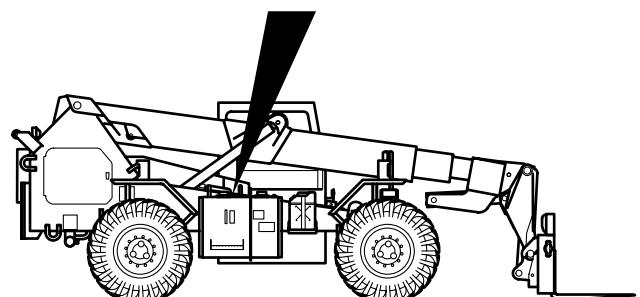
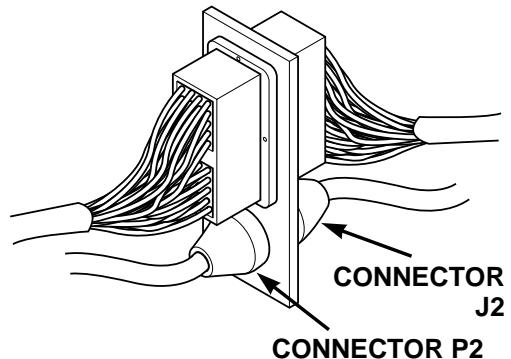


## 43. PARKING BRAKE SWITCH DOES NOT OPERATE (CONT.).



**CONTINUITY TEST**

- (1) Set multimeter to ohms.
- (2) Disconnect connector J2 from connector P2.
- (3) Connect multimeter positive lead to connector J2-2.
- (4) Connect multimeter negative lead to known good ground.
  - (a) If continuity is present, notify Direct Support about this fault.
  - (b) If continuity is not present, repair wire 2 or connector J2-P2 (Para 8-48).
- (5) Connect negative battery cable to negative side of battery (Para 8-42).
- (6) Install battery cover.



This page intentionally left blank.

## 2-16. MECHANICAL SYSTEM TROUBLESHOOTING

This paragraph covers mechanical system troubleshooting. The Mechanical System Fault Index, Table 2-7, lists faults for the mechanical system of the ATLAS. Refer to schematics found at the end of this volume when performing test and corrective actions.

**Table 2-7. Mechanical System Fault Index**

Fault Number	Description	Page No.
1	Starter does not turn engine, turns engine slowly.....	2-618
2	Engine cranks but does not start.....	2-622
3	Engine starts but does not continue to run .....	2-630
4	Engine starts but idles roughly.....	2-638
5	Engine surges, changes speed.....	2-644
6	Engine runs roughly, misfires.....	2-648
7	Engine RPM does not reach rated speed .....	2-652
8	Engine produces excessive white exhaust smoke .....	2-656
9	Engine produces excessive black exhaust smoke.....	2-660
17	Engine produces excessive noise .....	2-708
10	Engine oil pressure below normal .....	2-666
11	Engine oil pressure above normal .....	2-672
12	Engine water temperature below normal .....	2-678
13	Engine water temperature above normal .....	2-682
15	Transmission oil temperature above normal .....	2-692
15	Transmission disconnect slow or malfunctioning .....	2-698
14	Steering pulls to right or left.....	2-692
16	Service brakes chatter, are noisy .....	2-704
18	Brakes drag.....	2-712
19	Service brakes do not stop vehicle.....	2-714
20	Parking brake does not engage/disengage .....	2-720
21	Compression knocks.....	2-734
23	Loss of power.....	2-742
24	Engine does not shut off.....	2-752
25	Cab heater does not heat cab .....	2-756
26	Air conditioner does not cool cab.....	2-762
27	Arctic heater does not operate correctly.....	2-769.0

## 1. STARTER DOES NOT TURN ENGINE, TURNS ENGINE SLOWLY.

### INITIAL SETUP

#### Tools and Special Tools

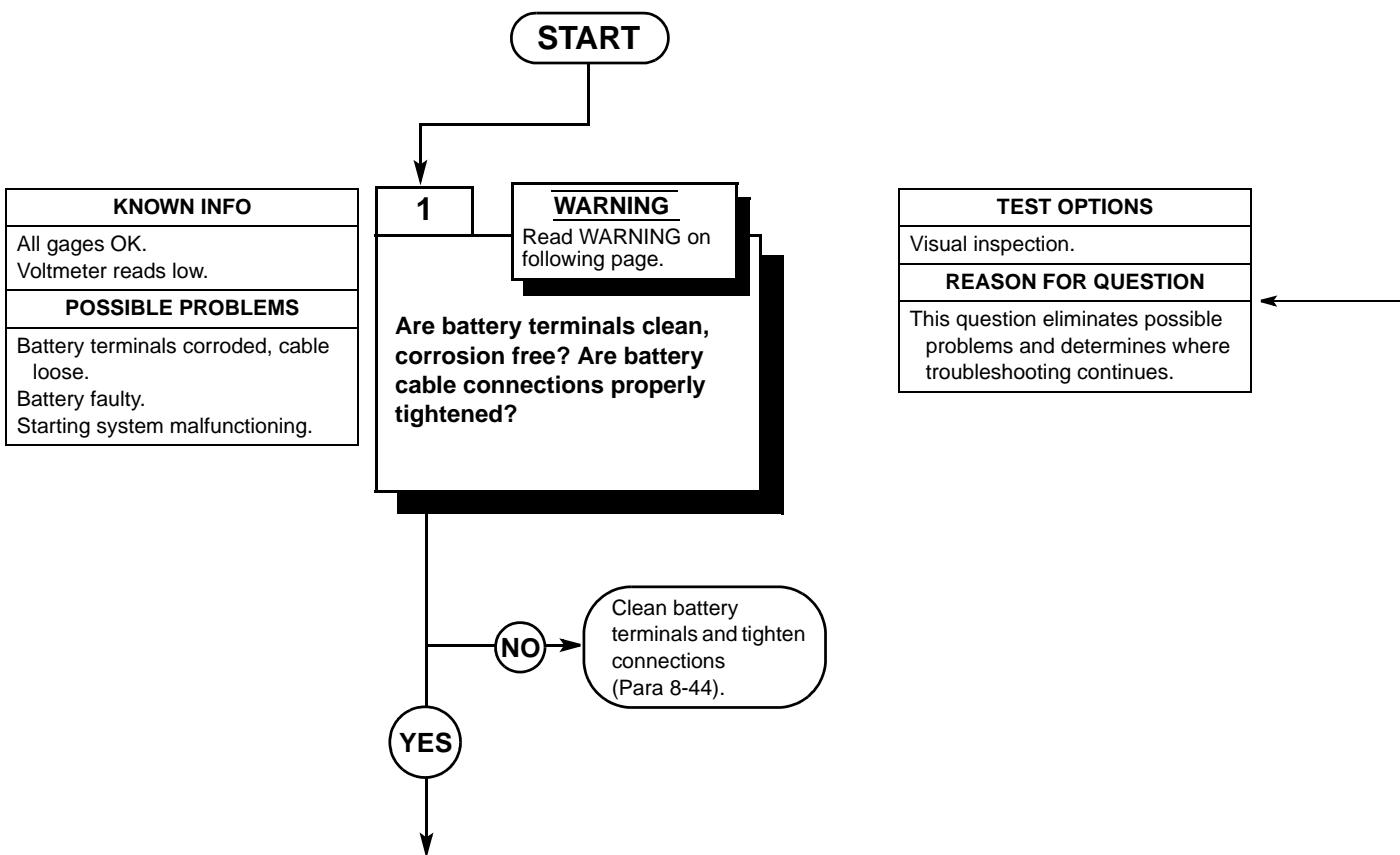
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

#### References

TM 10-3930-673-10  
TM 9-4910-571-12&P

#### Equipment Condition

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

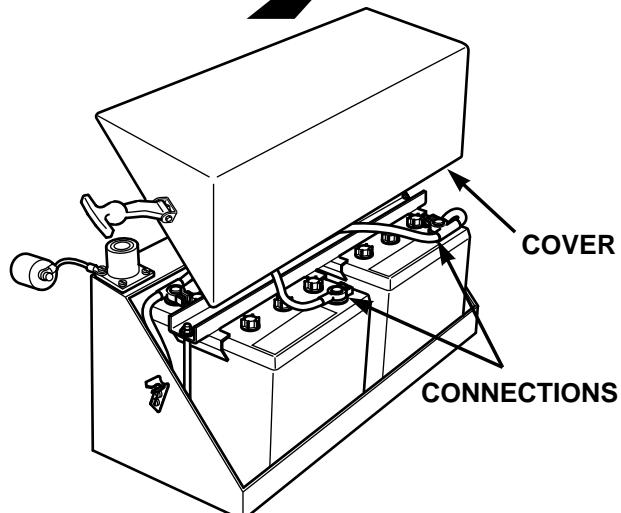
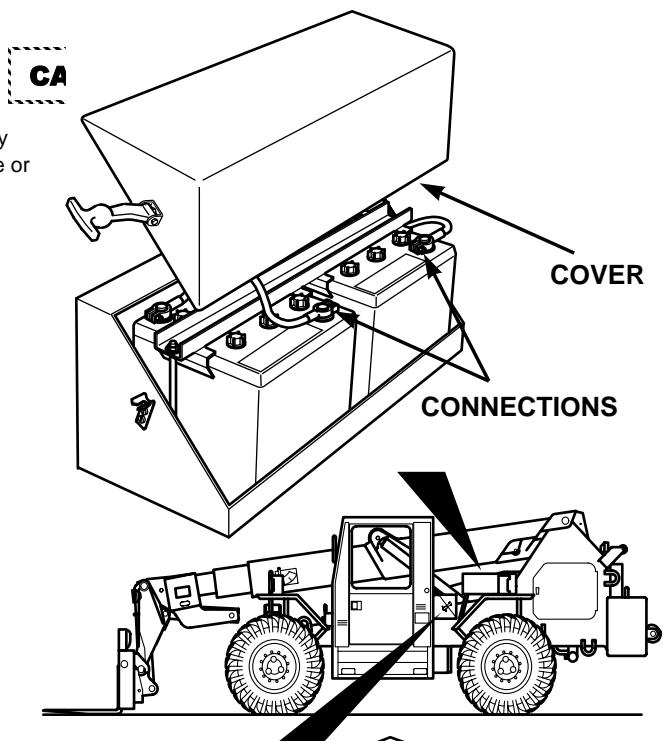
- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**BATTERY TERMINALS AND CABLE CONNECTIONS VISUAL INSPECTION**

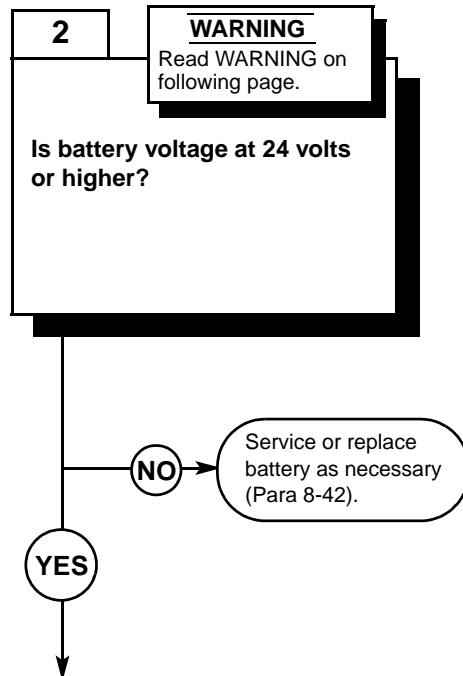
Check battery terminals for corrosion, and check tightness of cable connections.

- If battery terminals are clean, and cable connections properly tightened, go to Step 2 of this fault.
- If terminals are corroded, clean terminals. If cable connections are loose, tighten connections. Restart vehicle.

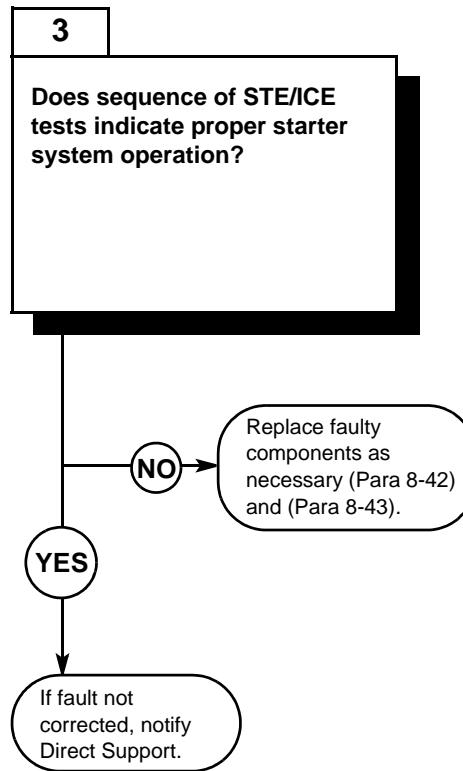


## 1. STARTER DOES NOT TURN ENGINE, TURNS ENGINE SLOWLY (CONT.).

KNOWN INFO	TEST OPTIONS
All gages OK. Voltmeter reads low. Battery terminals, cable connections OK.	STE/ICE test #67.
POSSIBLE PROBLEMS	REASON FOR QUESTION
Battery faulty. Starting system malfunctioning.	If battery voltage below required 24 volts, battery will not turn over engine.



KNOWN INFO	TEST OPTIONS
All gages OK. Voltmeter reads low. Battery terminals, cable connections OK. Battery OK.	STE/ICE Tests #68, 69, 70, 71, 72.
POSSIBLE PROBLEMS	REASON FOR QUESTION
Starting system malfunctioning.	If starting system malfunctioning, engine will not start.



**WARNING**

- Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
- Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.

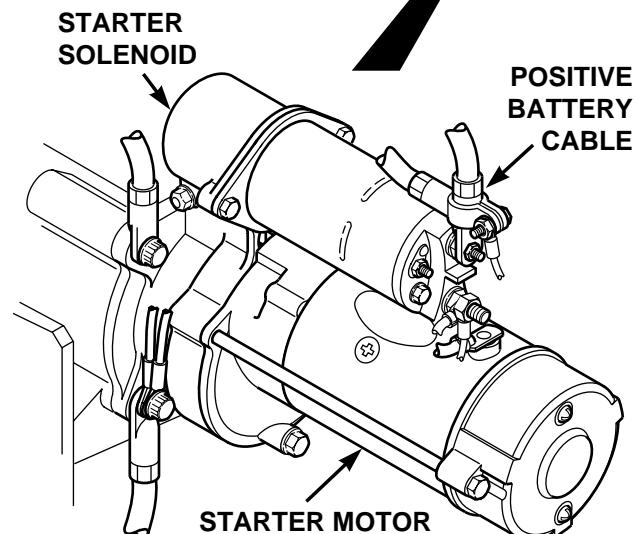
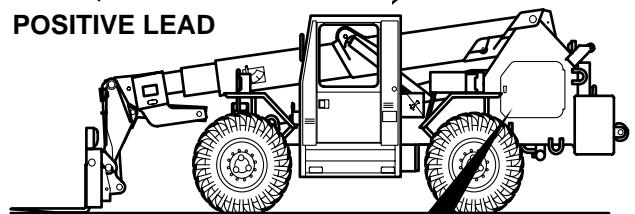
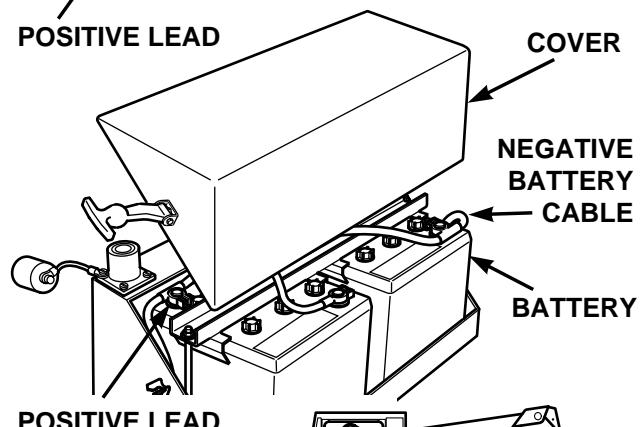
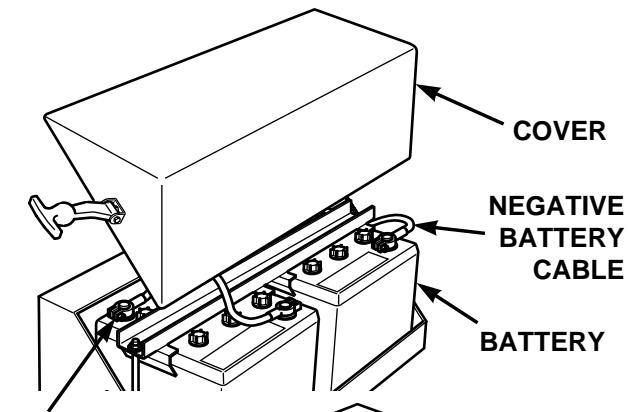
**BATTERY VOLTAGE WITH STE/ICE**

Use STE/ICE Test #67 to test voltage of battery. Or, connect multimeter to positive battery cable and known good ground to test voltage. Battery voltage should be 24 volts or higher.

- If voltage is 24 volts or higher, go to Step 3 of this fault.
- If voltage is below 24 volts, service or replace battery as necessary (Para 8-42). Restart vehicle.

**STE/ICE TESTS ON STARTING SYSTEM**

- Perform STE/ICE Test #68. Starter motor voltage should test between 18 and 27.5 volts. If voltage is not within range, replace positive cable (Para 8-42).
- Perform STE/ICE Test #69. Negative cable voltage drop should test between 0 and 3 volts. If voltage drop is greater, replace negative cable (Para 8-42).
- Perform STE/ICE Test #70. Solenoid voltage should test between 18 and 27.5 volts. If voltage is less, replace solenoid (Para 8-3).
- Perform STE/ICE Test #89. Solenoid voltage drop should test less than 0.3 volts. If voltage drop is greater, replace solenoid (Para 8-3).
- Perform STE/ICE Test #71. Starter current average should test between 0 and 250 amps. If current is greater, replace starter (Para 8-3).
- Perform STE/ICE Test #72. Starter current first peak should test between 300 and 1000 amps. If peak is not within range, service or replace battery (Para 8-42).



**2. ENGINE CRANKS BUT DOES NOT START.****INITIAL SETUP***Tools and Special Tools*

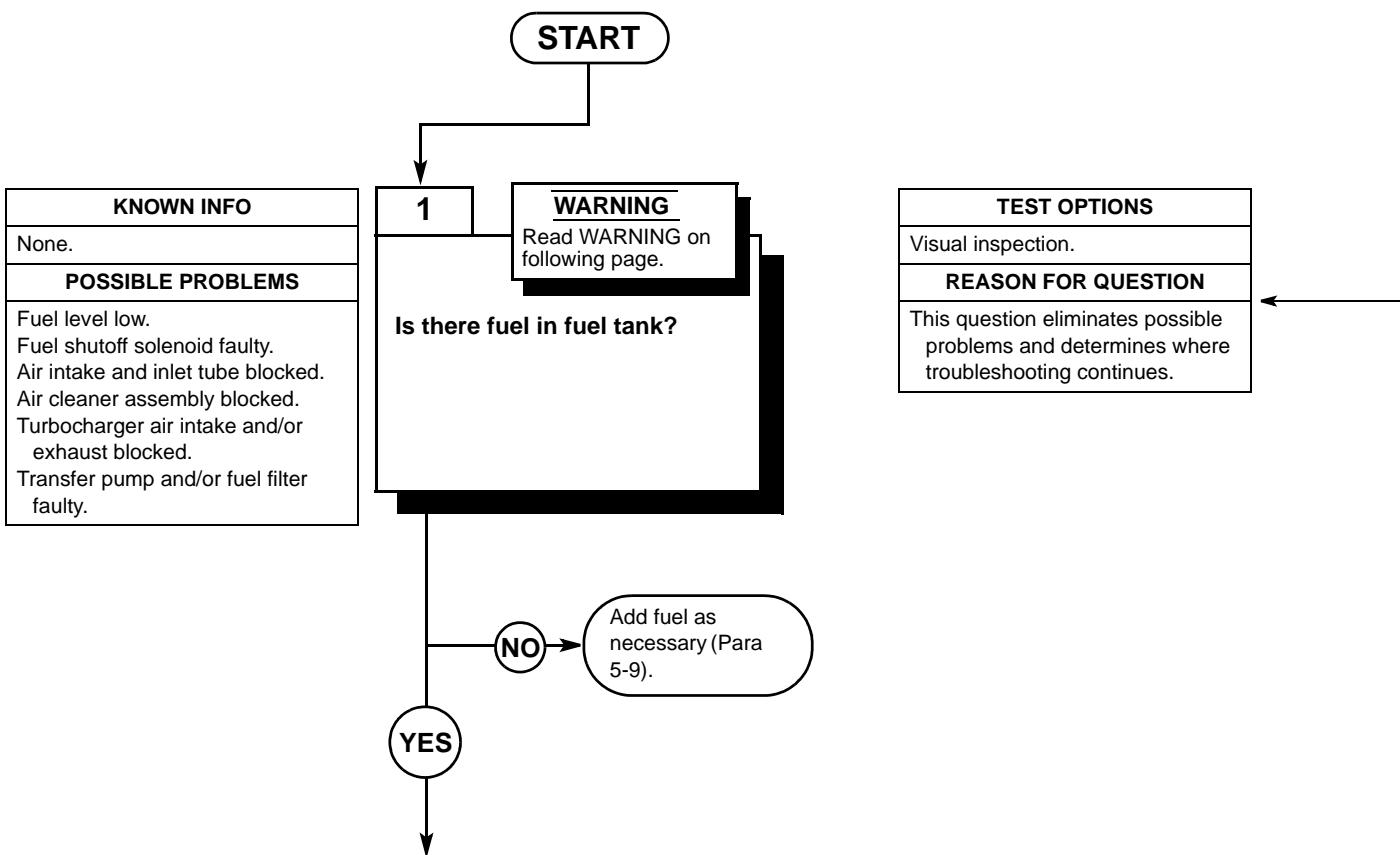
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
Multimeter (Item 9, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

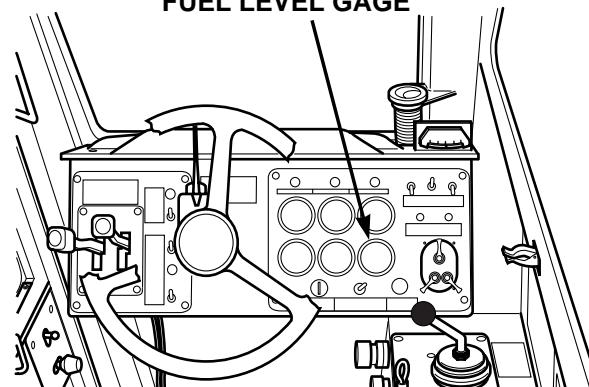
- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

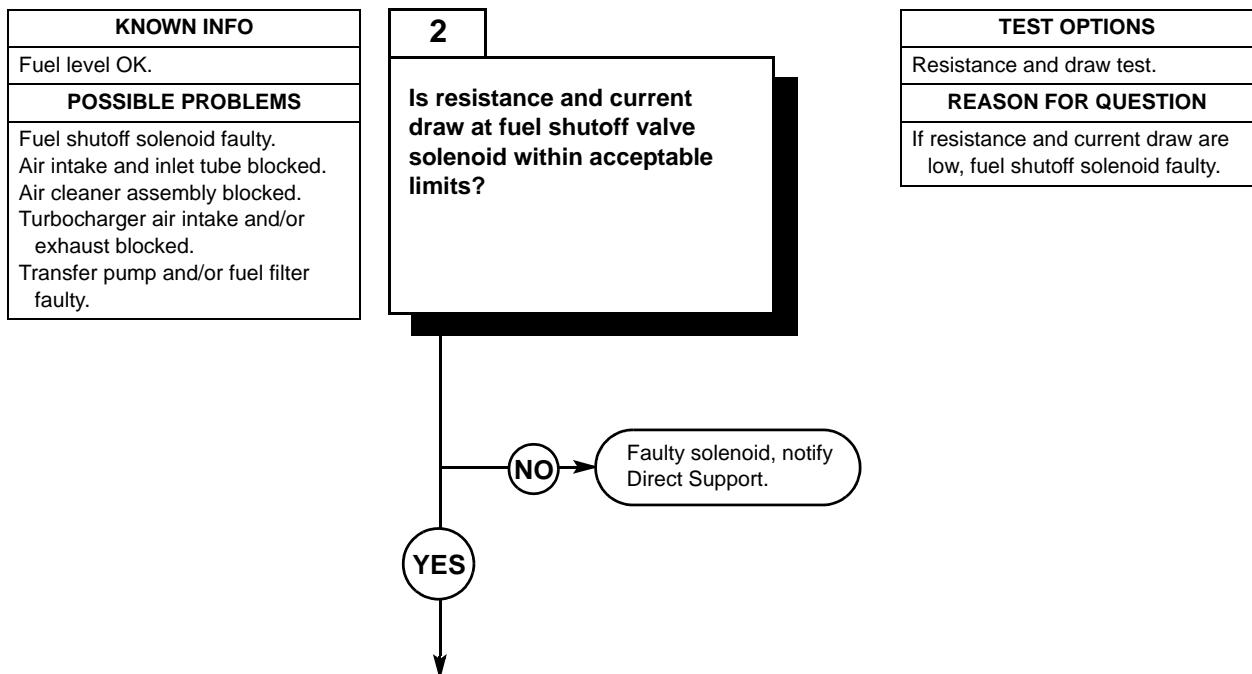
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

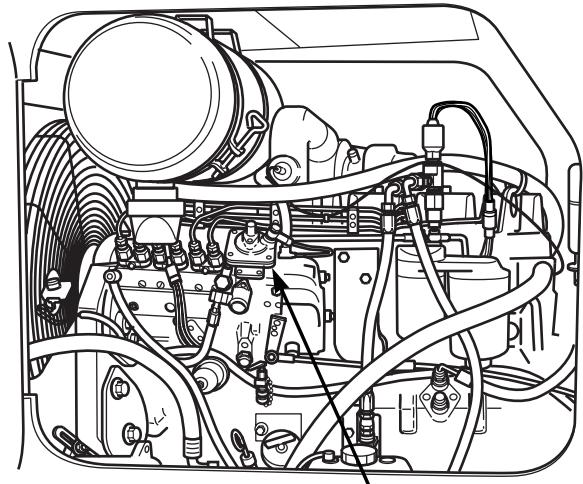
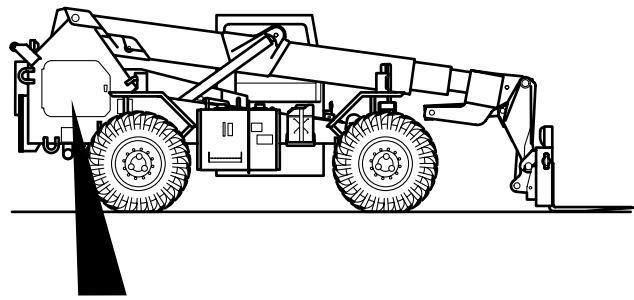
**ENGINE FUEL LEVEL  
VISUAL INSPECTION**

- (1) Check engine fuel level gage to determine if there is fuel in fuel tank.
- (2) Fuel level should be above gage E mark.
  - (a) If fuel level is above the E mark, go to Step 2 of this fault.
  - (b) If fuel level is near or at the E mark, add fuel as necessary (Para 5-9). Go to Step (3) below.
- (3) Start engine (TM 10-3930-673-10). If engine fails to start, go to Step 2 of this fault.

**FUEL LEVEL GAGE**


**2. ENGINE CRANKS BUT DOES NOT START (CONT.).**

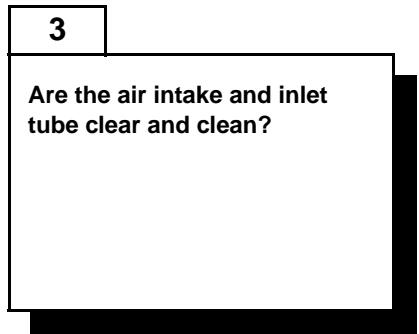
<b>RESISTANCE AND CURRENT DRAW TESTS AT FUEL SHUTOFF VALVE SOLENOID</b>	
(1)	Set multimeter to ohms to test resistance at fuel shutoff solenoid.
(a)	If resistance reads 29.5 ohms $\pm 2.5$ , go to Step (2) below.
(b)	If resistance is not within acceptable limits, notify Direct Support.
(2)	Set multimeter to amps to test current draw at fuel shutoff solenoid.
(a)	If current draw reads approximately 1 ampere, go to Step (3) below.
(b)	If reading is not correct, notify Direct Support.
(3)	Start engine (TM 10-3930-673-10). If engine fails to start, go to Step 3 of this fault.



**FUEL SHUTOFF SOLENOID**

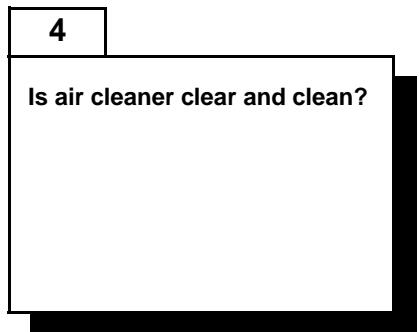
## 2. ENGINE CRANKS BUT DOES NOT START (CONT.).

KNOWN INFO
Fuel level OK. Fuel shutoff solenoid OK.
POSSIBLE PROBLEMS
Air intake and inlet tube blocked. Air cleaner assembly blocked. Turbocharger air intake and/or exhaust blocked. Transfer pump and/or fuel filter faulty.



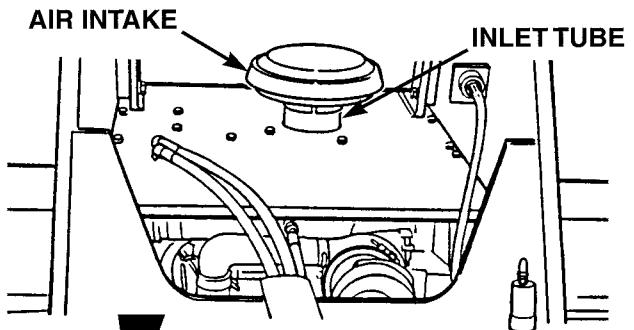
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air intake and inlet tube blocked, engine will not start.

KNOWN INFO
Fuel level OK. Fuel shutoff solenoid OK. Air intake and inlet tube OK.
POSSIBLE PROBLEMS
Air cleaner assembly blocked. Turbocharger air intake and/or exhaust blocked. Transfer pump and/or fuel filter faulty.

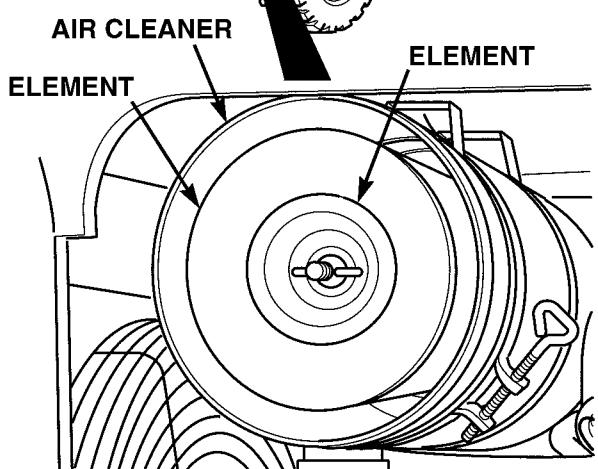


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air cleaner is blocked, engine will not start.

<b>AIR INTAKE AND INLET TUBE VISUAL INSPECTION</b>	
(1)	Visually inspect air intake and inlet tube for obstructions.
(a)	If air intake and inlet tube are clear and clean, go to Step 4 of this fault.
(b)	If air intake and tube are blocked, clean air intake and tube (Para 5-5). Go to Step (2) below.
(2)	Start engine (TM 10-3930-673-10). If engine fails to start, go to Step 4 of this fault.

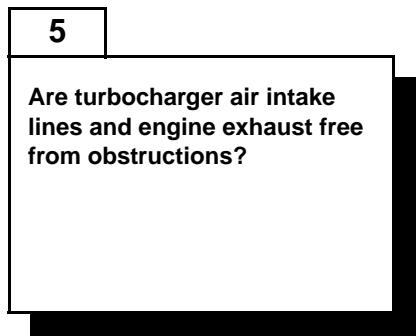


<b>AIR CLEANER ASSEMBLY VISUAL INSPECTION</b>	
(1)	Remove air cleaner and elements (Para 5-4).
(2)	Visually inspect air cleaner elements for obstructions.
(a)	If elements are clear and clean, go to Step 5 of this fault.
(b)	If elements and assembly are dirty and/or blocked, clean and/or replace elements (Para 5-4). Go to Step (3) below.
(3)	Start engine (TM 10-3930-673-10). If engine fails to start, go to Step 5 of this fault.

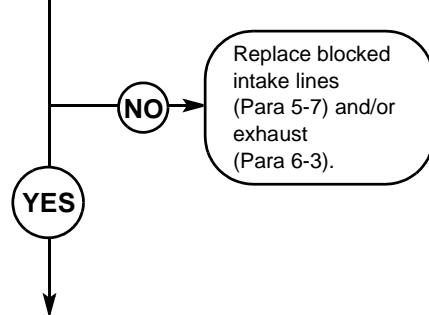


## 2. ENGINE CRANKS BUT DOES NOT START (CONT.).

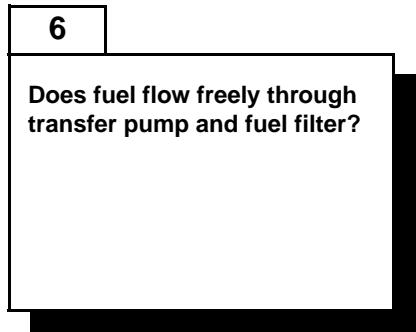
KNOWN INFO
Fuel level OK. Fuel shutoff solenoid OK. Air intake and inlet tube OK. Air cleaner assembly OK.
POSSIBLE PROBLEMS
Turbocharger air intake and/or exhaust blocked. Transfer pump and/or fuel filter faulty.



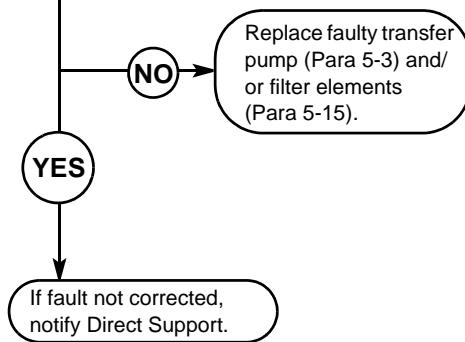
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If turbocharger air intake lines and exhaust are blocked, engine will not run smoothly.



KNOWN INFO
Fuel level OK. Fuel shutoff solenoid OK. Air intake and inlet tube OK. Air cleaner assembly OK. Turbocharger air intake and/or exhaust OK.
POSSIBLE PROBLEMS
Transfer pump and/or fuel filter faulty.

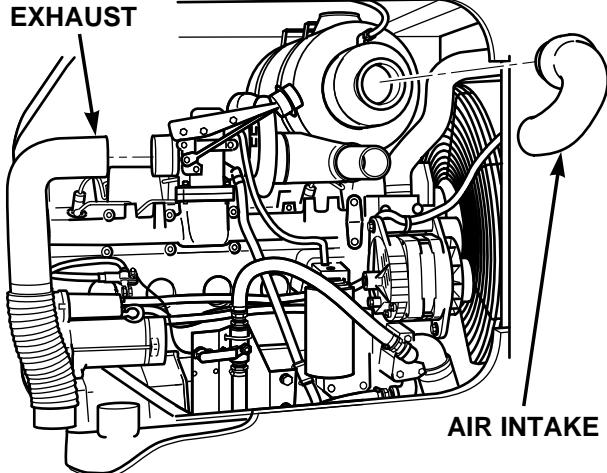
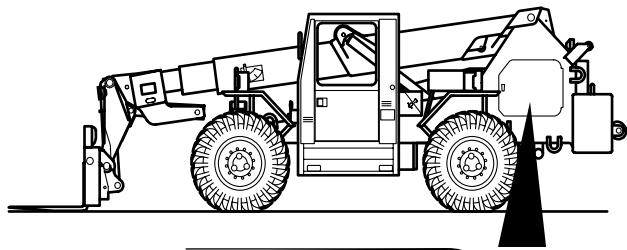


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If transfer pump and/or fuel filter faulty, fuel will not flow freely.



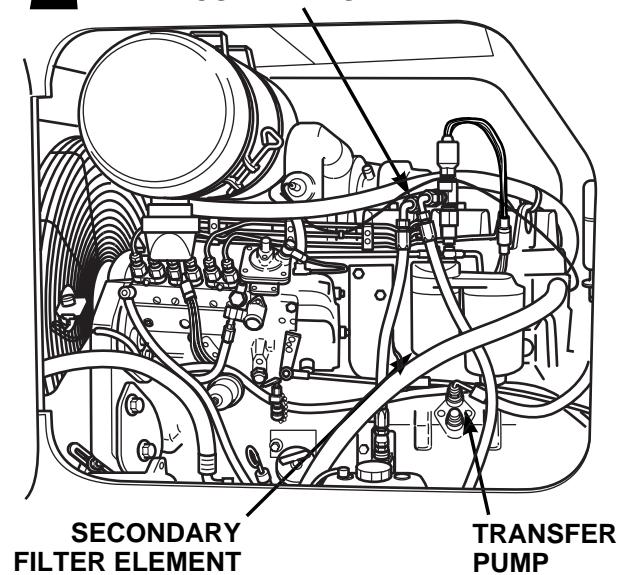
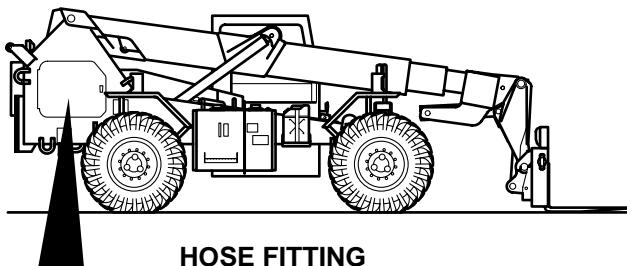
**TURBOCHARGER AIR INTAKE LINES  
AND EXHAUST  
VISUAL INSPECTION**

- (1) Remove turbocharger air intake (Para 5-7) and exhaust (Para 6-3).
- (2) Visually inspect intake and exhaust for obstructions.
  - (a) If intake and exhaust are clear, go to Step 6 of this fault.
  - (b) If intake and/or exhaust are blocked, replace intake (Para 5-7) and/or exhaust (Para 6-3). Go to Step (3) below.
- (3) Start engine (TM 10-3930-673-10). If engine fails to start, go to Step 6 of this fault.



**FUEL FLOW THROUGH FILTER  
VISUAL INSPECTION**

- (1) Loosen hose fitting at top of secondary filter element (Para 5-15).
- (2) Crank engine for thirty seconds.
  - (a) If fuel flows freely from fitting, transfer pump and fuel filter OK.
  - (b) If fuel does not flow freely, replace transfer pump (Para 5-3) and/or filter elements (Para 5-15). Go to Step (3) below.
- (3) Start engine (TM 10-3930-673-10). If engine fails to start, notify Direct Support.



**3. ENGINE STARTS BUT DOES NOT CONTINUE TO RUN.****INITIAL SETUP***Tools and Special Tools*

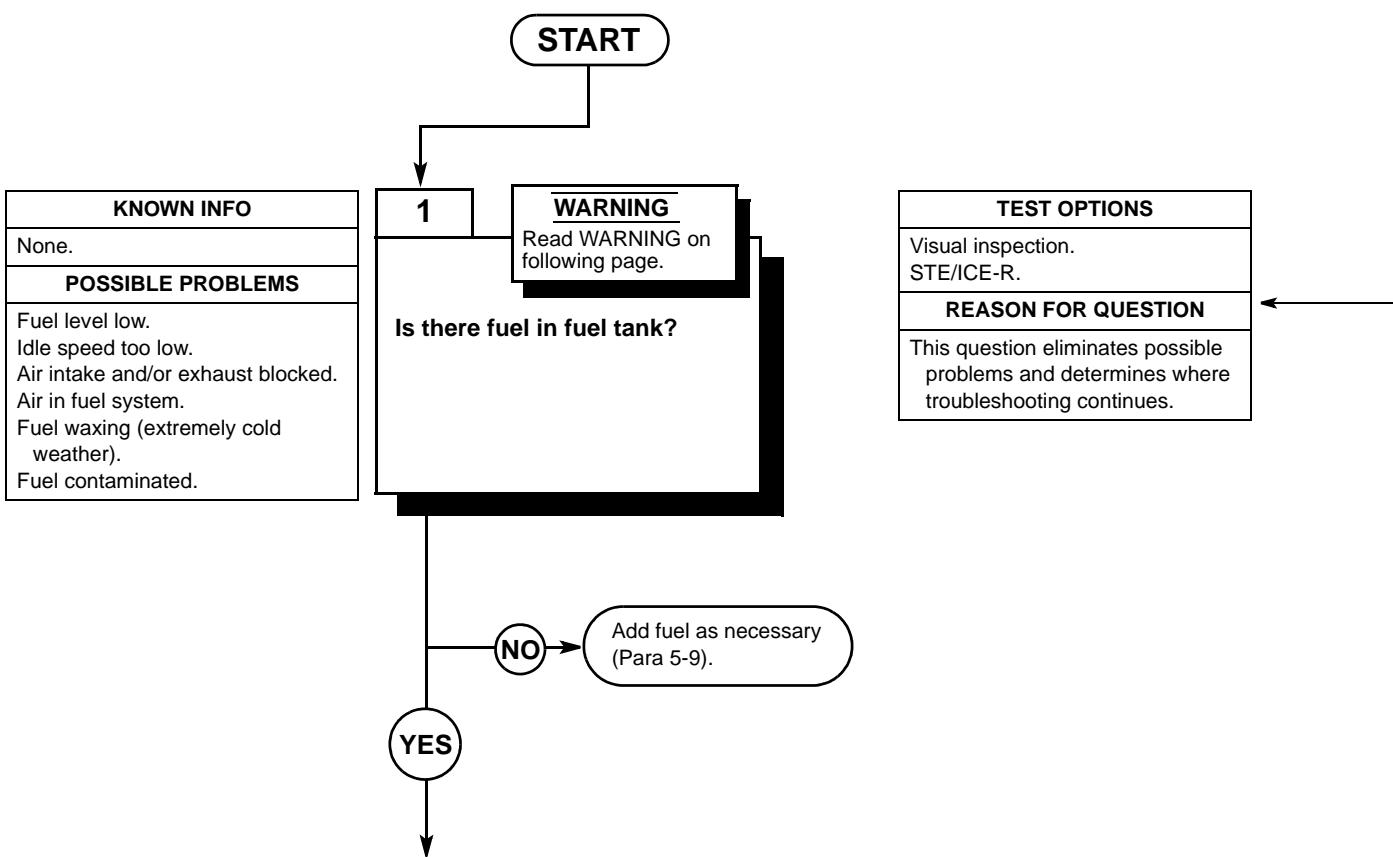
Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

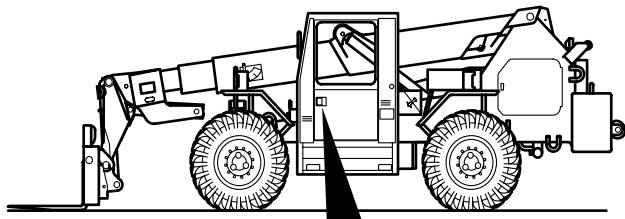
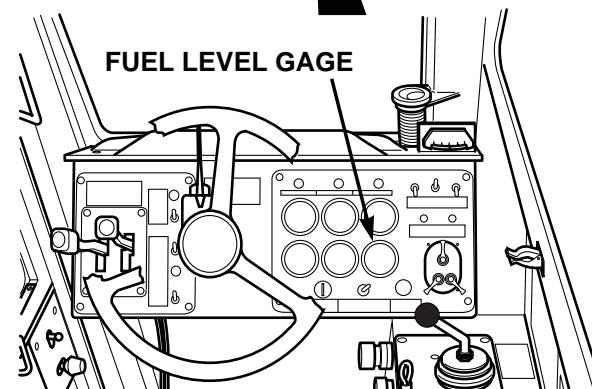
- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

**CAUTION**

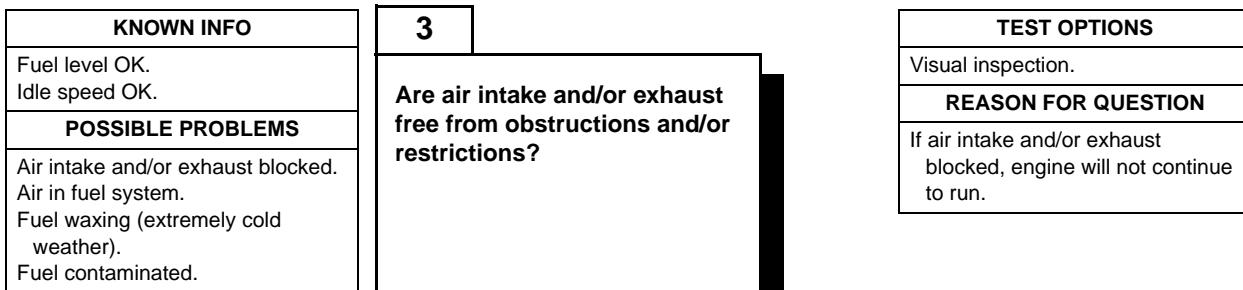
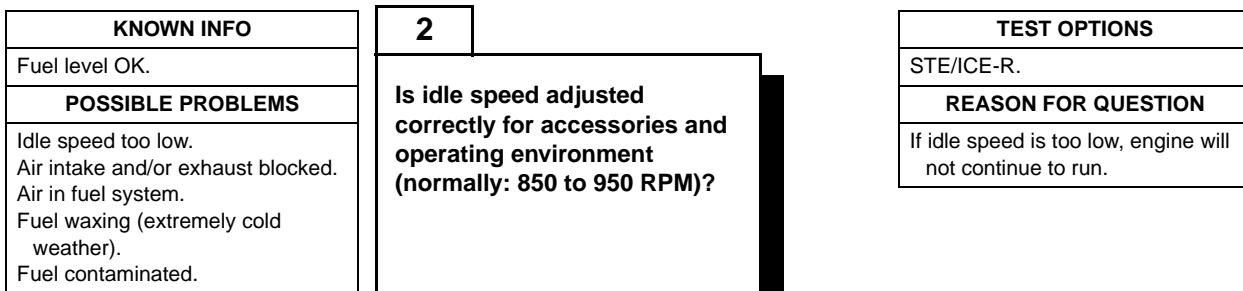
Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**ENGINE FUEL LEVEL  
VISUAL INSPECTION**

- (1) Check engine fuel level gage to determine if there is fuel in fuel tank.
- (2) Fuel level should be above gage E mark.
  - (a) If fuel level is above E mark, go to Step 2 of this fault.
  - (b) If fuel level is near or at E mark, add fuel as necessary (Para 5-9).


**FUEL LEVEL GAGE**


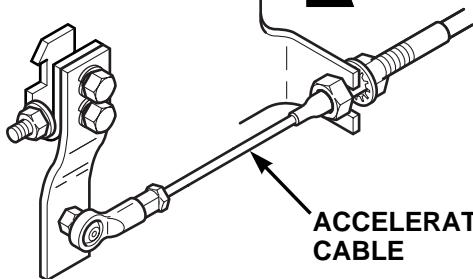
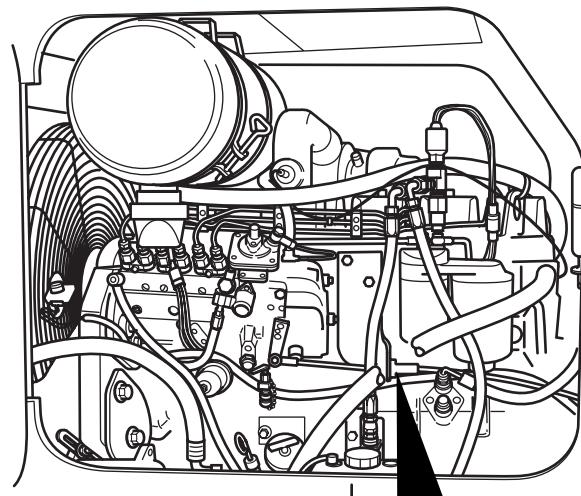
## 3. ENGINE STARTS BUT DOES NOT CONTINUE TO RUN (CONT.).



**IDLE SPEED  
STE/ICE-R RPM CHECK**

Use STE/ICE to check engine RPM at idle (Para 5-20).

- (a) If idle RPM within 850 to 950 range, go to Step 3 of this fault.
- (b) If idle RPM is not within specified range, adjust idle speed by adjusting accelerator cable as necessary (Para 5-20).

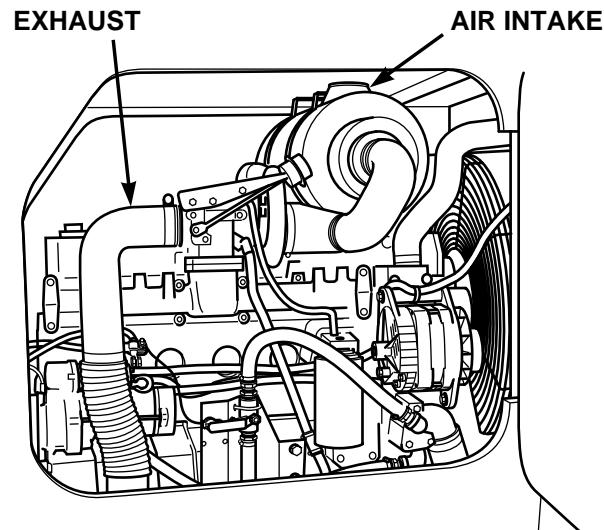


**ACCELERATOR CABLE**

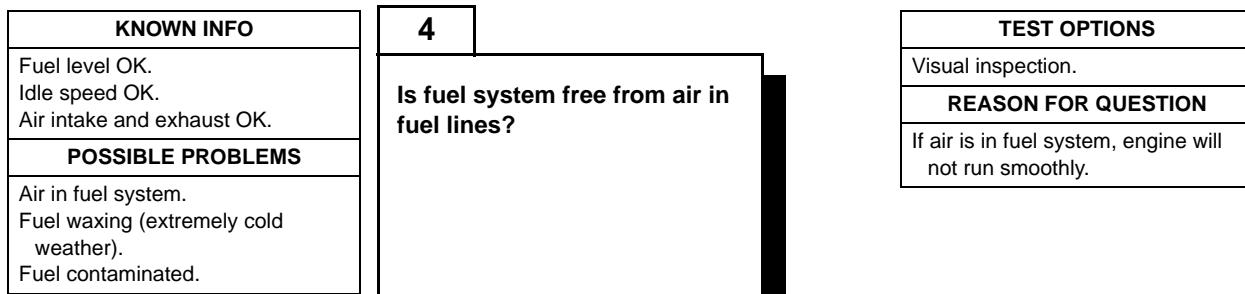
**AIR INTAKE AND EXHAUST  
VISUAL INSPECTION**

Visually inspect air intake and exhaust for obstructions and/or restrictions.

- (a) If air intake and exhaust are clean, go to Step 4 of this fault.
- (b) If air intake and exhaust are blocked, shut down engine (TM 10-3930-673-10) and clean intake cap and exhaust pipe (Para 5-5, Para 5-4, and Para 6-3).

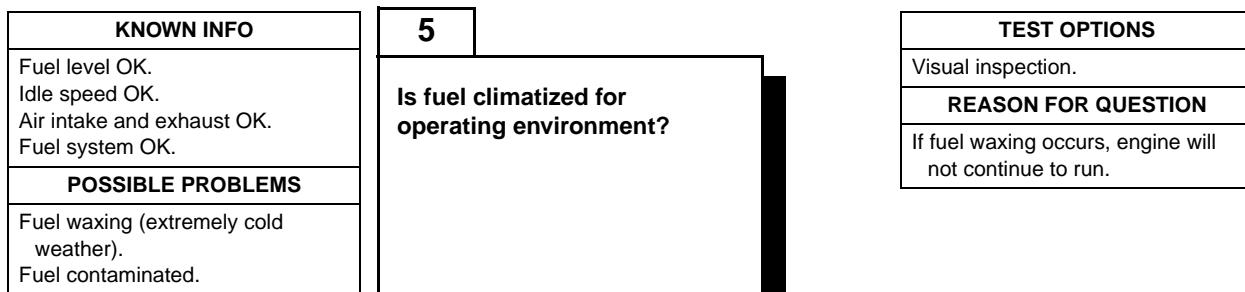


## 3. ENGINE STARTS BUT DOES NOT CONTINUE TO RUN (CONT.).



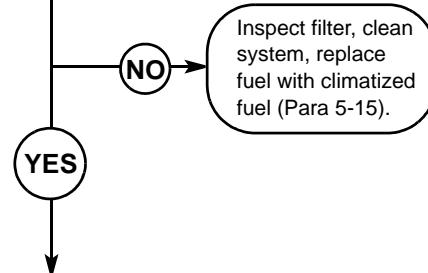
**4**

Is fuel system free from air in fuel lines?



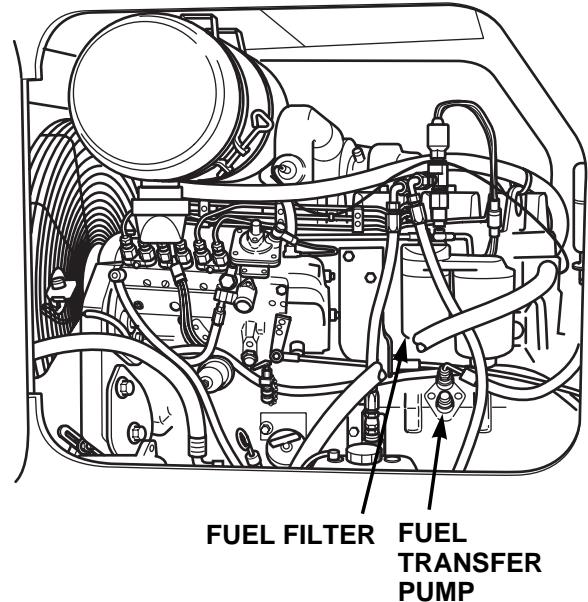
**5**

Is fuel climatized for operating environment?

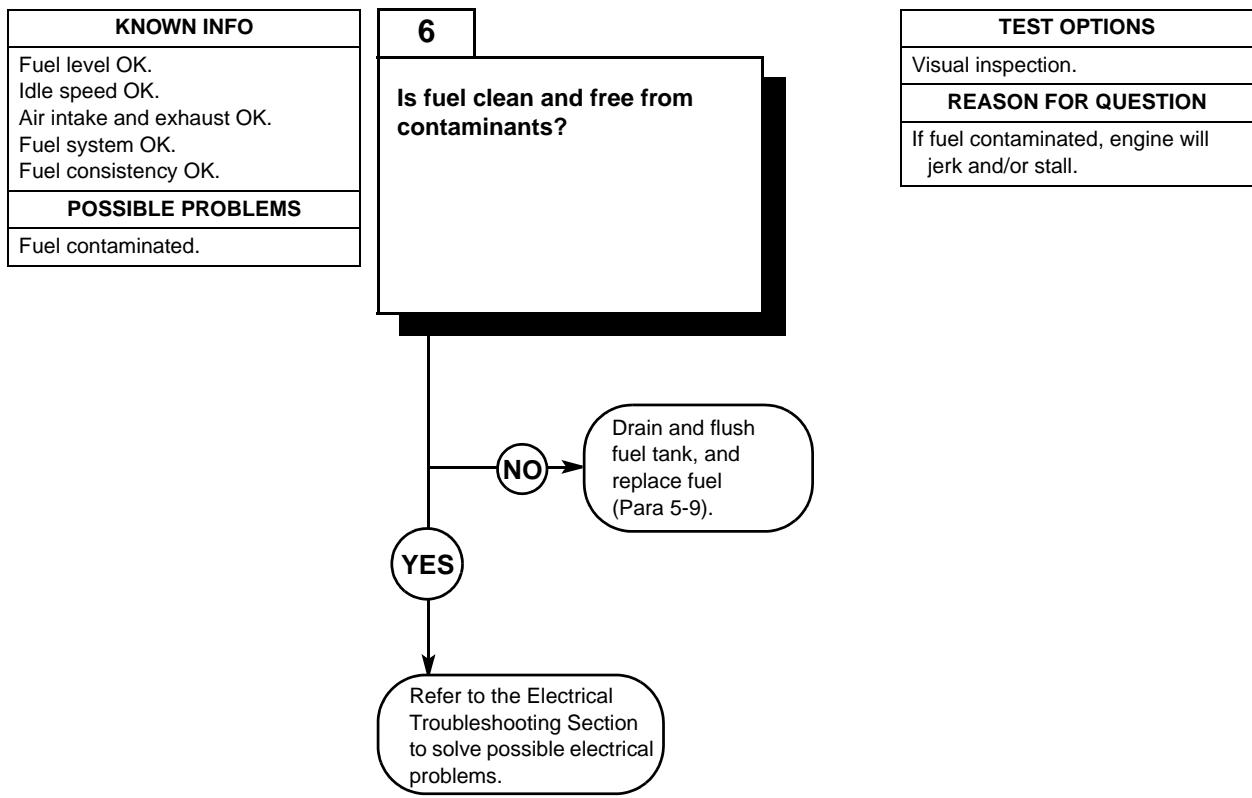


**FUEL FLOW THROUGH FILTER  
VISUAL INSPECTION**

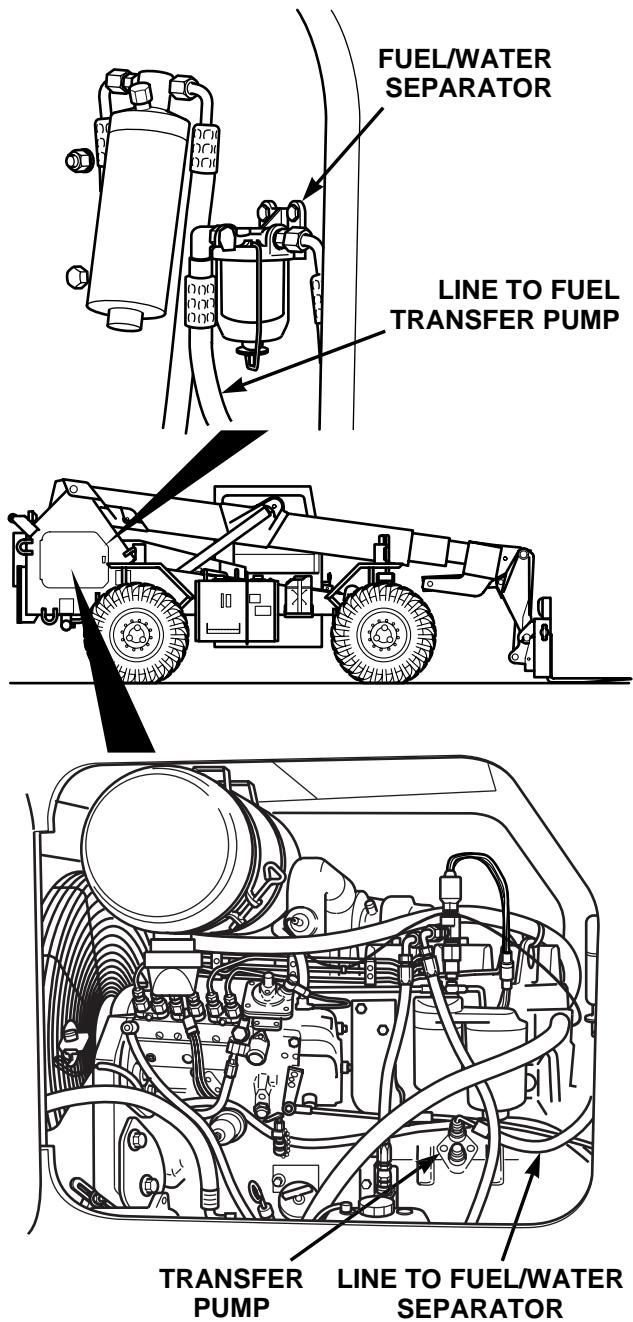
- Check flow of fuel through fuel filter  
(Para 5-11).
- (a) If fuel flows freely without air, go to Step 5 of this fault.
  - (b) If air in fuel lines, check for air leaks, shut down engine (TM 10-3930-673-10), and bleed system (Para 5-11).

**FILTER AND FUEL  
VISUAL INSPECTION**

- Check fuel consistency in fuel filter  
(Para 5-15).
- (a) If fuel is thin and flows freely, go to Step 6 of this fault.
  - (b) If fuel is thick and jelling, shut down engine (TM 10-3930-673-10), clean fuel system (Para 5-15) and replace fuel with climatized fuel (Para 5-9).

**3. ENGINE STARTS BUT DOES NOT CONTINUE TO RUN (CONT.).**

<b>CONTAMINATED FUEL VISUAL INSPECTION</b>	
(1)	Check for contaminated fuel by operating engine with known clean fuel from temporary supply tank.
(a)	Disconnect fuel line at fuel/water separator, where line leads to fuel transfer pump.
(b)	Place disconnected end of fuel line in temp tank of known clean fuel.
(c)	Start engine and run it for approximately 5 minutes to determine if engine performance improves with known clean fuel.
(2)	If fuel in fuel tank proves clean, refer to the Electrical Troubleshooting Section to continue.
(3)	If fuel in fuel tank is contaminated, shut down engine (TM 10-3930-673-10), drain and flush tank, and replace fuel with clean fuel (Para 5-9).



**4. ENGINE STARTS BUT IDLES ROUGHLY.****INITIAL SETUP***Tools and Special Tools*

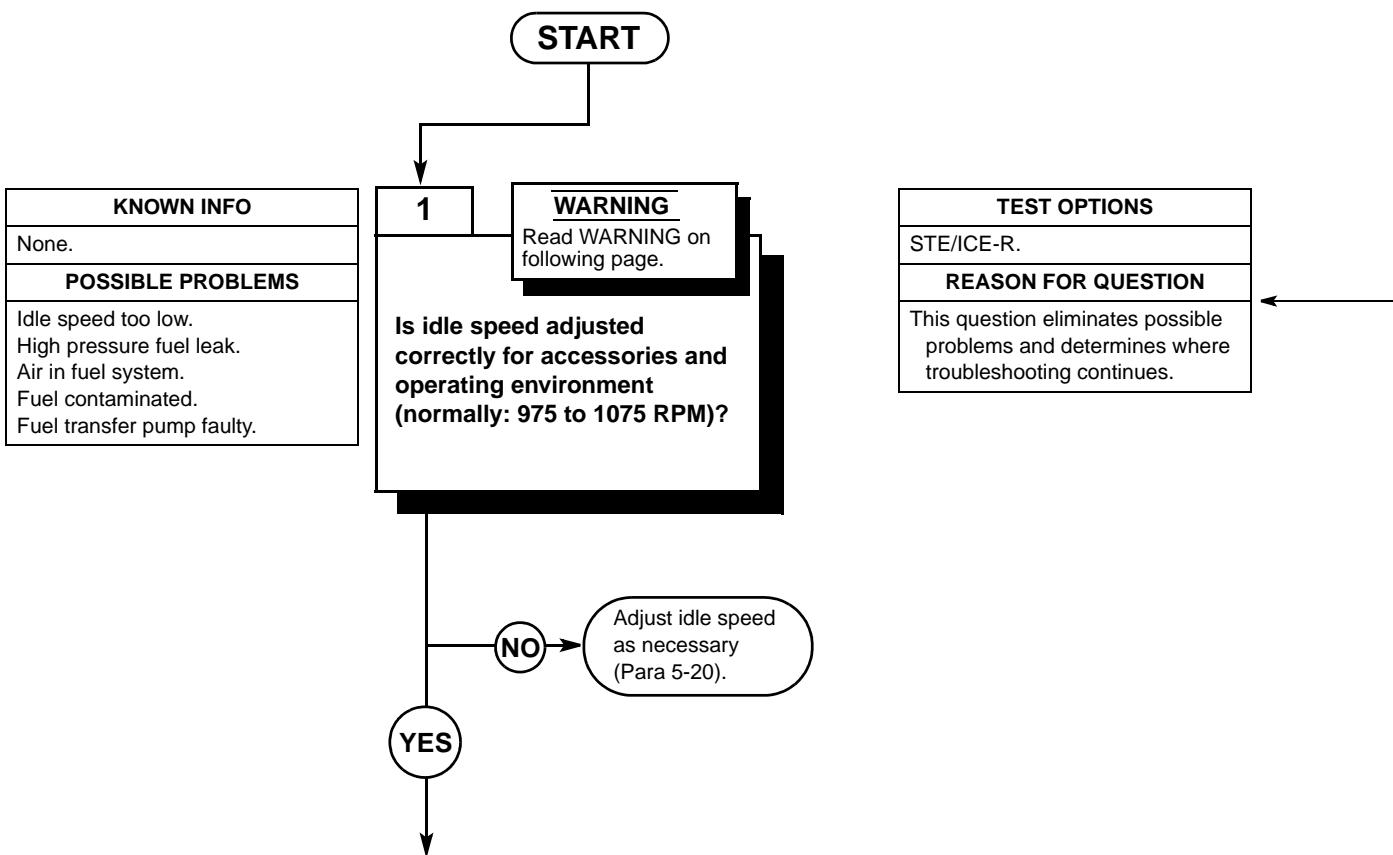
Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

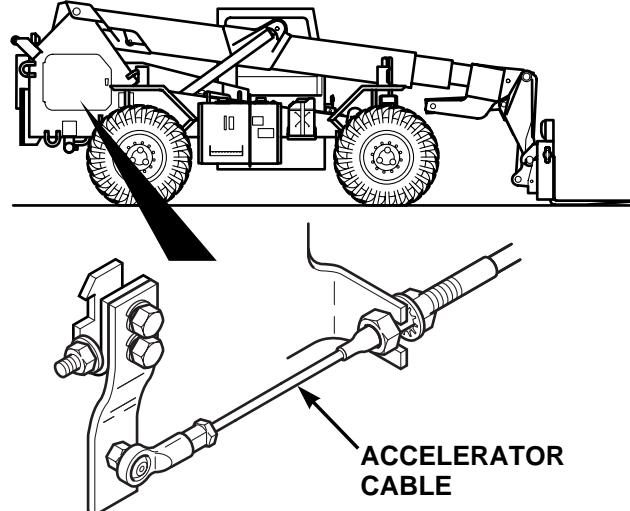
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**IDLE SPEED  
STE/ICE-R RPM CHECK**

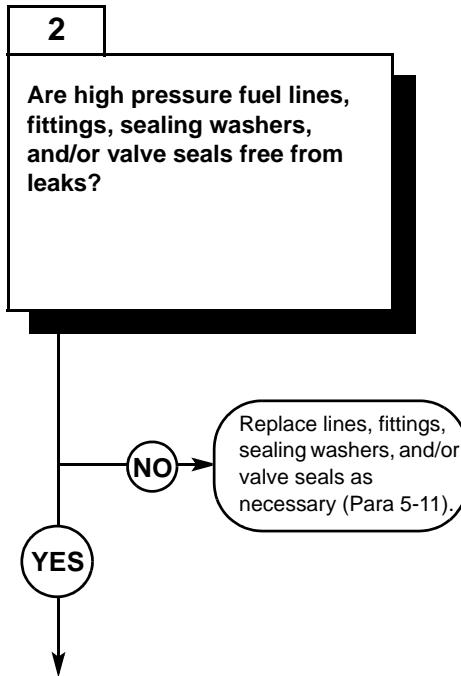
Use STE/ICE to check engine RPM at idle (Para 5-20).

- If idle RPM is within 975 to 1075 range, go to Step 2 of this fault.
- If idle RPM is not within specified range, adjust idle speed by adjusting accelerator cable as necessary (Para 5-20).



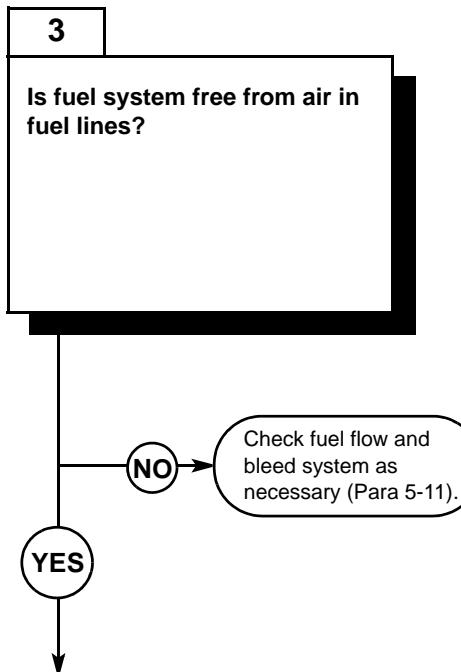
## 4. ENGINE STARTS BUT IDLES ROUGHLY (CONT.).

KNOWN INFO	TEST OPTIONS
Idle speed OK.	Visual inspection.
<b>POSSIBLE PROBLEMS</b>	<b>REASON FOR QUESTION</b>
High pressure fuel leak. Air in fuel system. Fuel contaminated. Fuel transfer pump faulty.	If high pressure fuel leaks, engine will not run smoothly.



TEST OPTIONS
Visual inspection.
<b>REASON FOR QUESTION</b>
If high pressure fuel leaks, engine will not run smoothly.

KNOWN INFO	TEST OPTIONS
Idle speed OK.	Visual inspection.
High pressure fuel lines OK.	
<b>POSSIBLE PROBLEMS</b>	<b>REASON FOR QUESTION</b>
Air in fuel system. Fuel contaminated. Fuel transfer pump faulty.	If air is in fuel system, engine will jerk and/or stall.

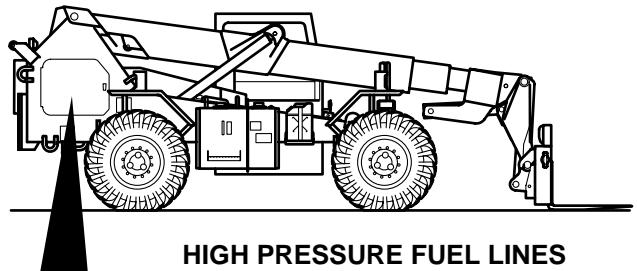


TEST OPTIONS
Visual inspection.
<b>REASON FOR QUESTION</b>
If air is in fuel system, engine will jerk and/or stall.

### HIGH PRESSURE FUEL LINES VISUAL INSPECTION

Visually inspect high pressure fuel lines and fittings for signs of leaks.

- (a) If lines, fittings, and/or seals free from leaks, go to Step 3 of this fault.
- (b) If lines, fittings, and/or seals show signs of leaks, shut down engine (TM 10-3930-673-10) and replace components as necessary (Para 5-11).

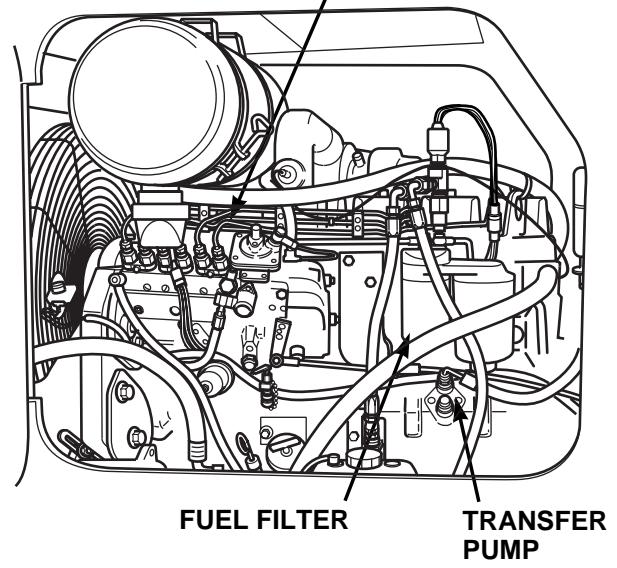


**HIGH PRESSURE FUEL LINES**

### FUEL FLOW THROUGH FILTER VISUAL INSPECTION

Check flow of fuel through fuel filter (Para 5-11).

- (a) If fuel flows freely without air, go to Step 4 of this fault.
- (b) If air in fuel lines, check for air leaks, shut down engine (TM 10-3930-673-10) and bleed system (Para 5-11).

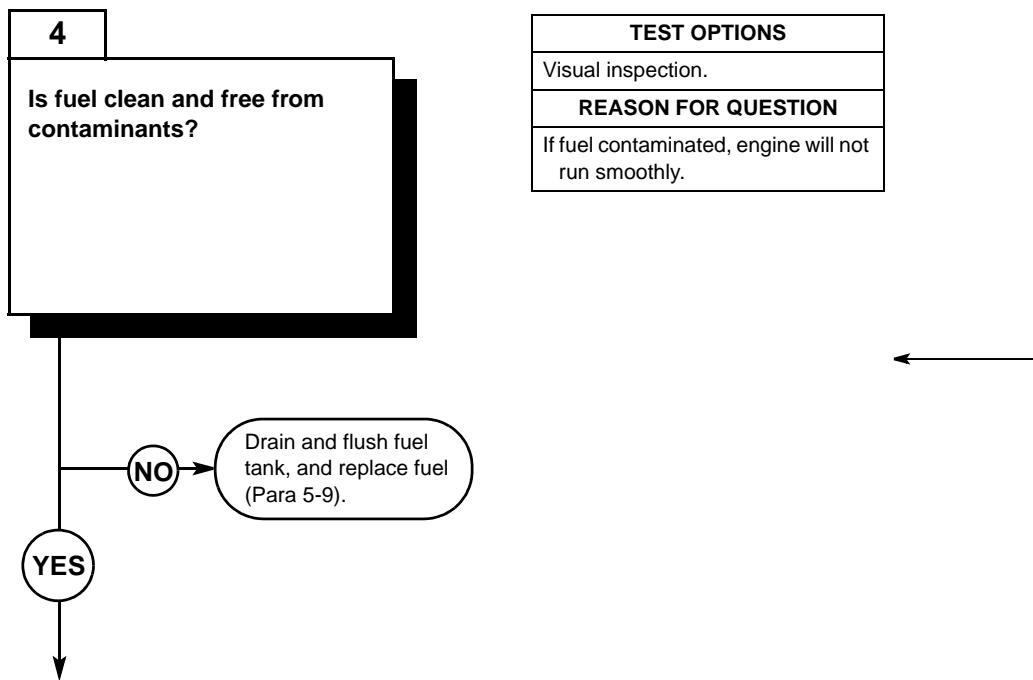


**FUEL FILTER**

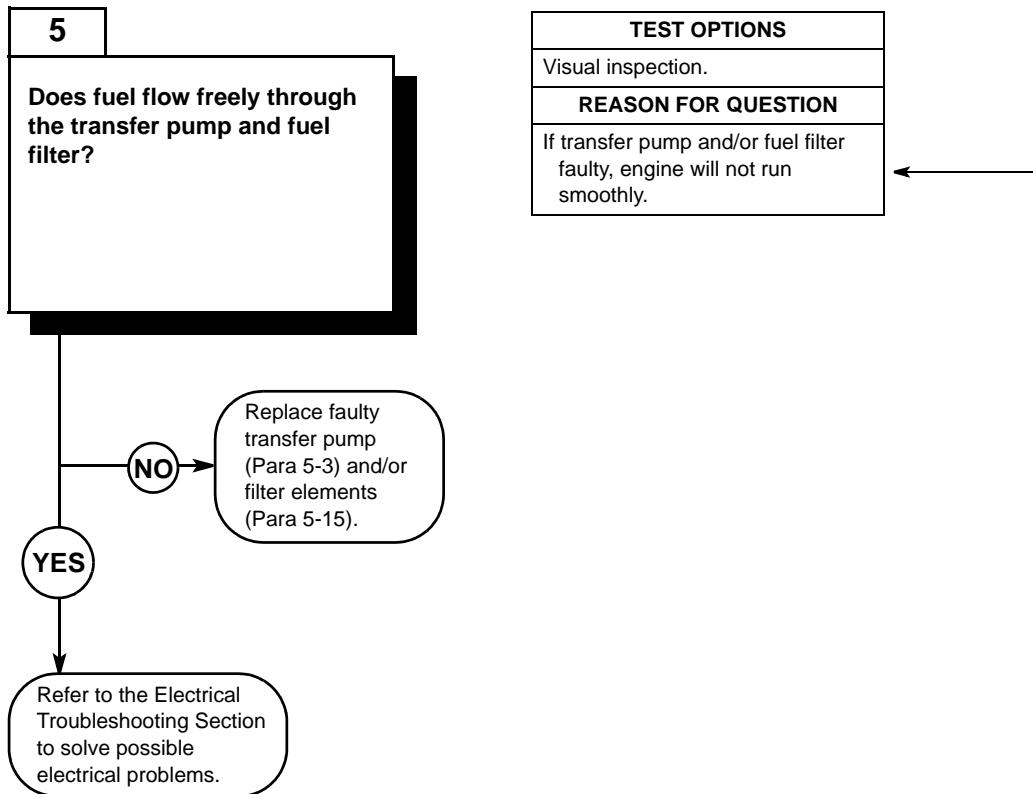
**TRANSFER PUMP**

## 4. ENGINE STARTS BUT IDLES ROUGHLY (CONT.).

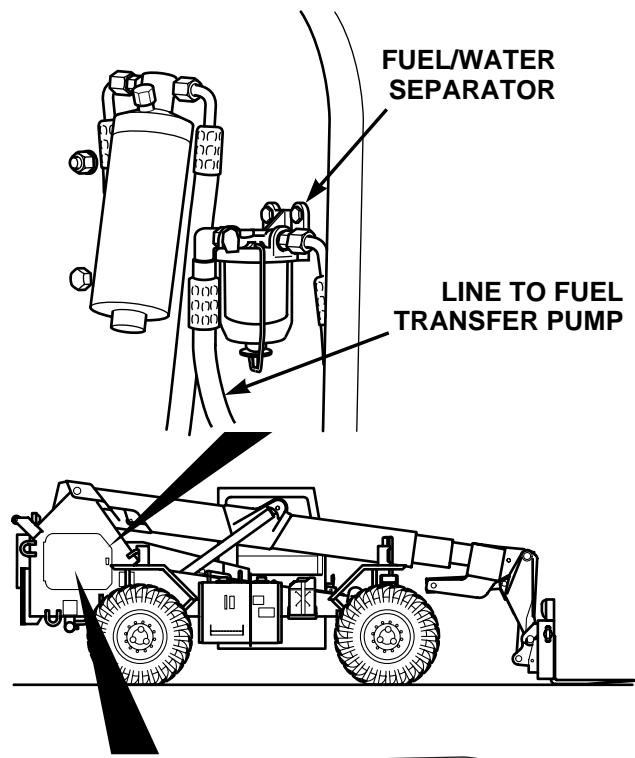
KNOWN INFO	TEST OPTIONS
Idle speed OK. High pressure fuel lines OK. Fuel system OK.	Visual inspection.
POSSIBLE PROBLEMS	REASON FOR QUESTION
Fuel contaminated. Fuel transfer pump faulty.	If fuel contaminated, engine will not run smoothly.



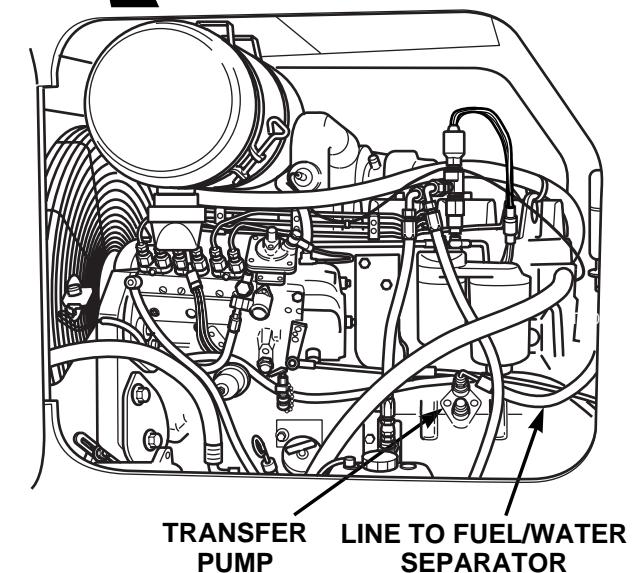
KNOWN INFO	TEST OPTIONS
Idle speed OK. High pressure fuel lines OK. Fuel system OK. Fuel OK.	Visual inspection.
POSSIBLE PROBLEMS	REASON FOR QUESTION
Transfer pump and/or fuel filter faulty.	If transfer pump and/or fuel filter faulty, engine will not run smoothly.



<b>CONTAMINATED FUEL VISUAL INSPECTION</b>	
(1)	Check for contaminated fuel by operating engine with known clean fuel from temporary supply tank.
(a)	Disconnect fuel line at fuel/water separator, where line leads to fuel transfer pump.
(b)	Place disconnected end of fuel line in temp tank of known clean fuel.
(c)	Start engine and run it for approximately 5 minutes to determine if engine performance improves with known clean fuel.
(2)	If fuel in fuel tank proves clean, go to Step 5 of this fault.
(3)	If fuel in fuel tank is contaminated, shut down engine (TM 10-3930-673-10), drain and flush tank, and replace fuel with clean fuel (Para 5-9).



<b>FUEL FLOW THROUGH FILTER VISUAL INSPECTION</b>	
(1)	Loosen hose fitting at top of secondary filter element (Para 5-15).
(2)	Crank engine for thirty seconds.
(a)	If fuel flows freely from fitting, transfer pump and fuel filter OK.
(b)	If fuel does not flow freely, replace transfer pump (Para 5-3) and/or filter elements (Para 5-15).



**5. ENGINE SURGES, CHANGES SPEED.****INITIAL SETUP***Tools and Special Tools*

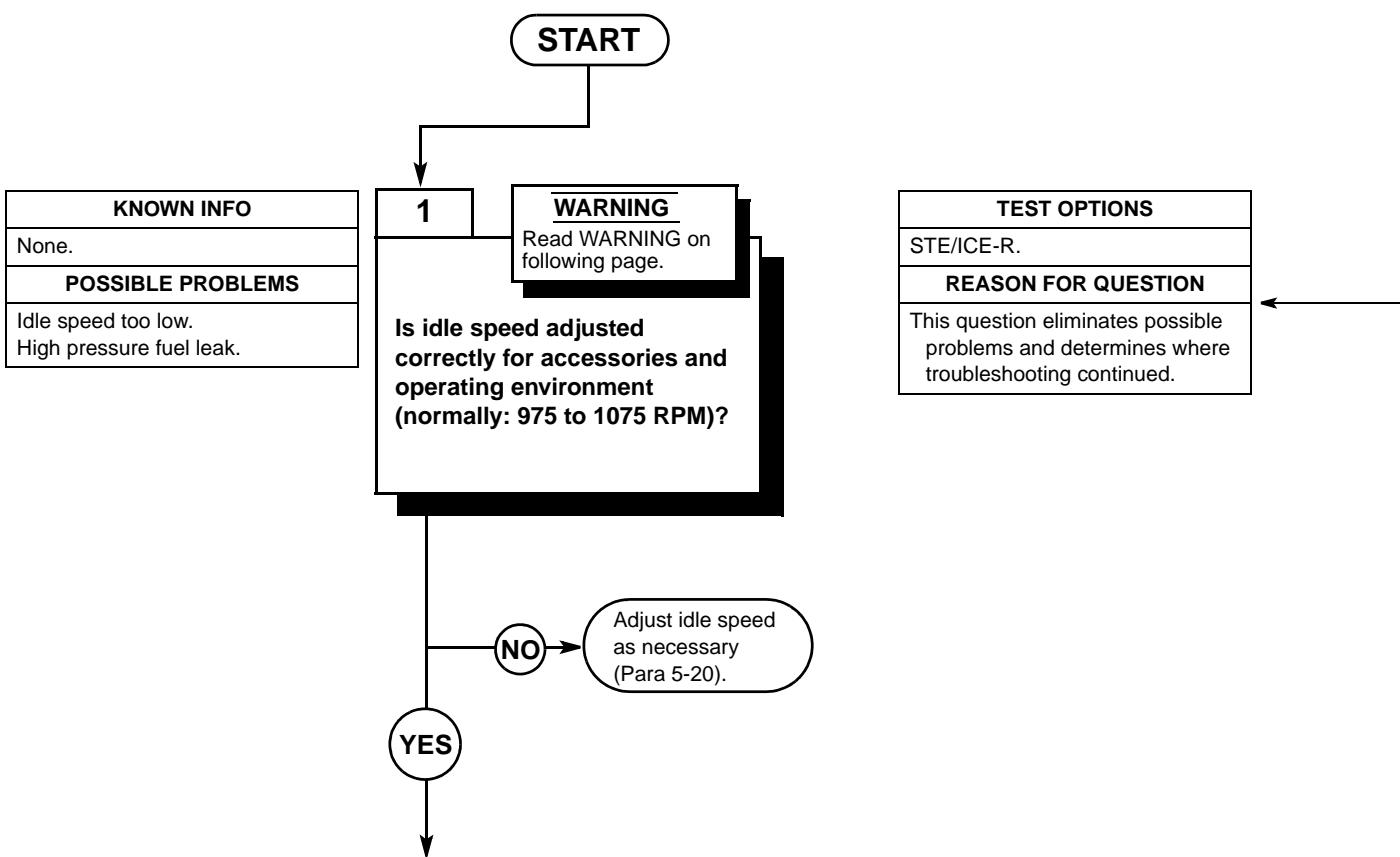
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



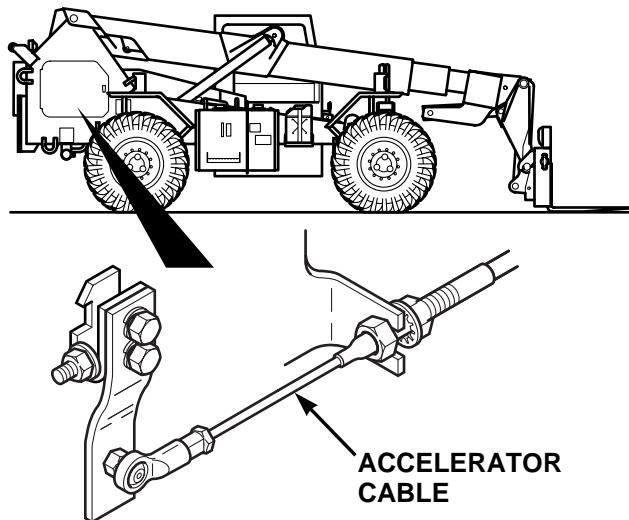
**WARNING**

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

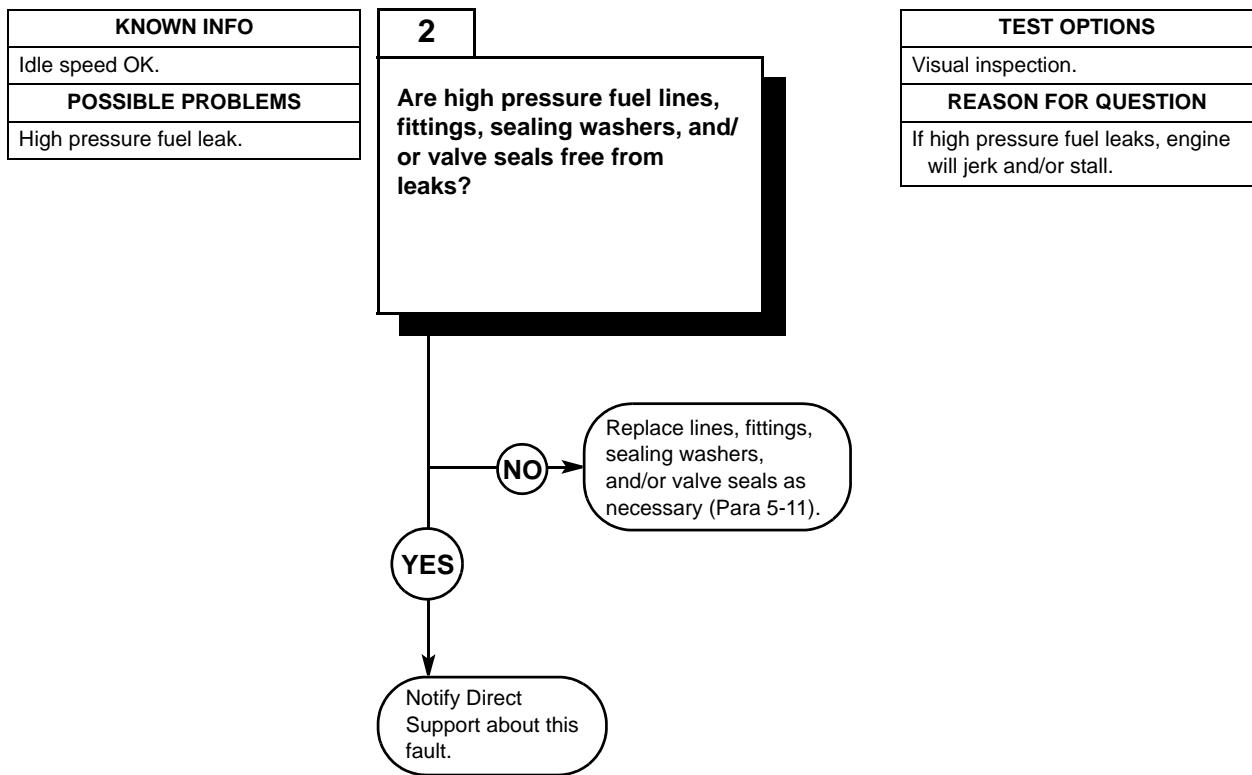
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

<b>IDLE SPEED STE/ICE-R RPM CHECK</b>
Use STE/ICE to check engine RPM at idle (Para 5-20).
(a) If idle RPM within 975 to 1075 range, go to Step 2 of this fault.
(b) If idle RPM is not within specified range, adjust idle speed by adjusting accelerator cable as necessary (Para 5-20).



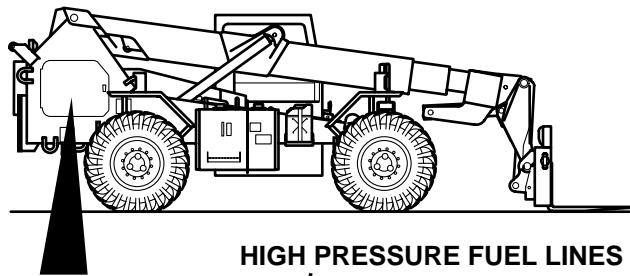
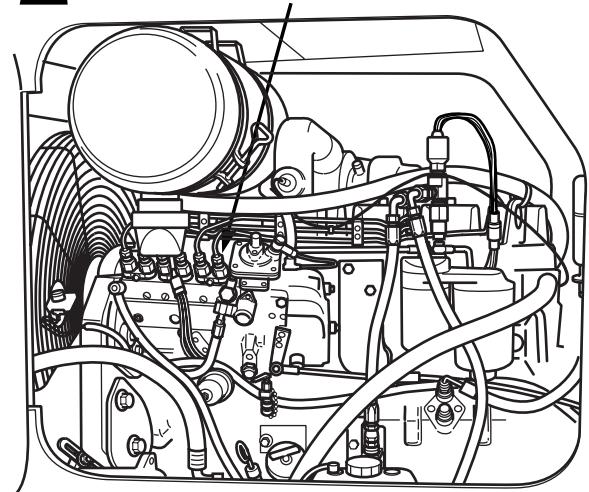
## 5. ENGINE SURGES, CHANGES SPEED (CONT.).



**HIGH PRESSURE FUEL LINES  
VISUAL INSPECTION**

Visually inspect high pressure fuel lines and fittings for signs of leaks.

- (a) If lines, fittings, and/or seals free from leaks, notify Direct Support about this fault.
- (b) If lines, fittings, and/or seals show signs of leaks, shut down engine (TM 10-3930-673-10) and replace components as necessary (Para 5-11).

**HIGH PRESSURE FUEL LINES**

**6. ENGINE RUNS ROUGHLY, MISFIRES.****INITIAL SETUP***Tools and Special Tools*

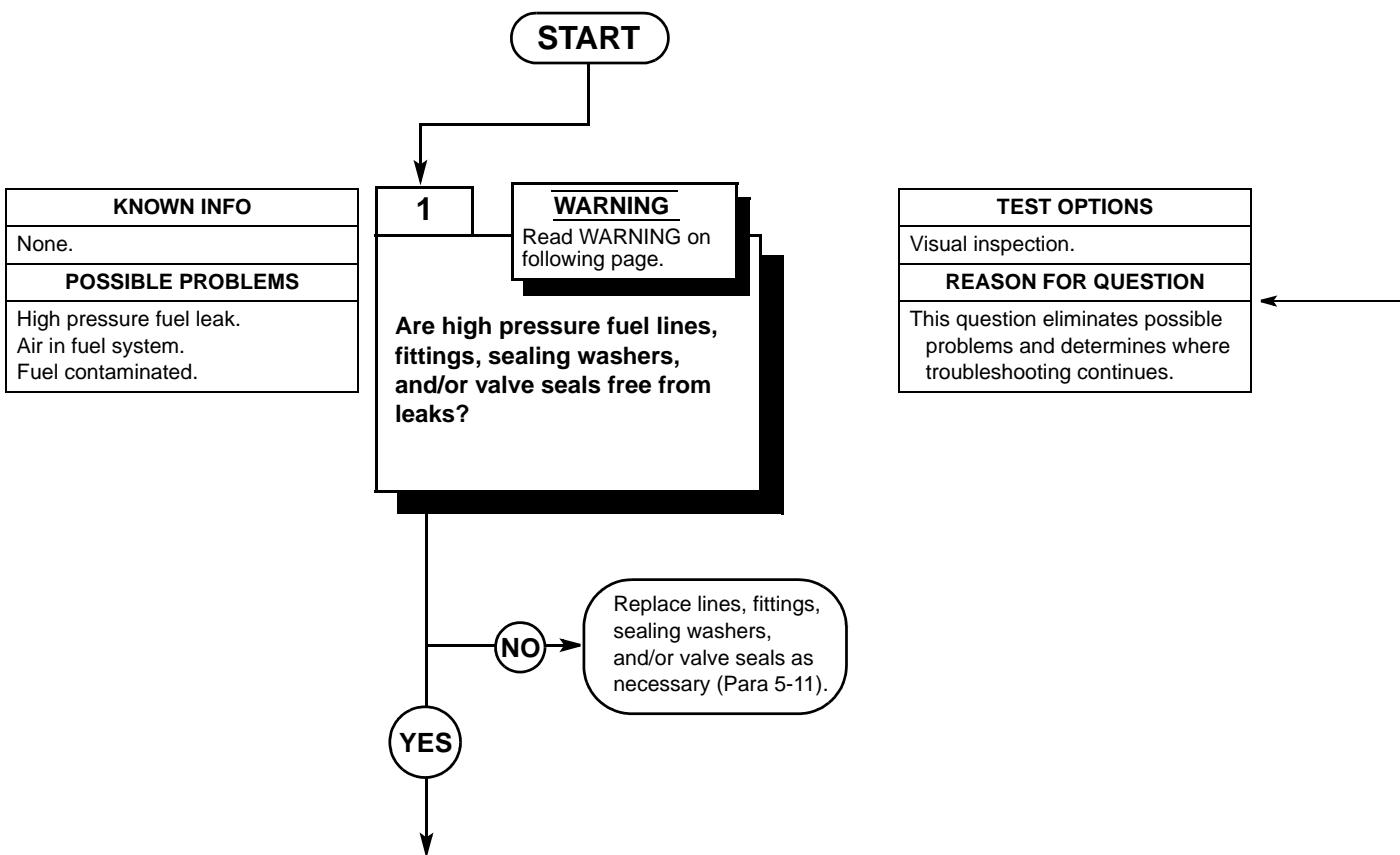
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



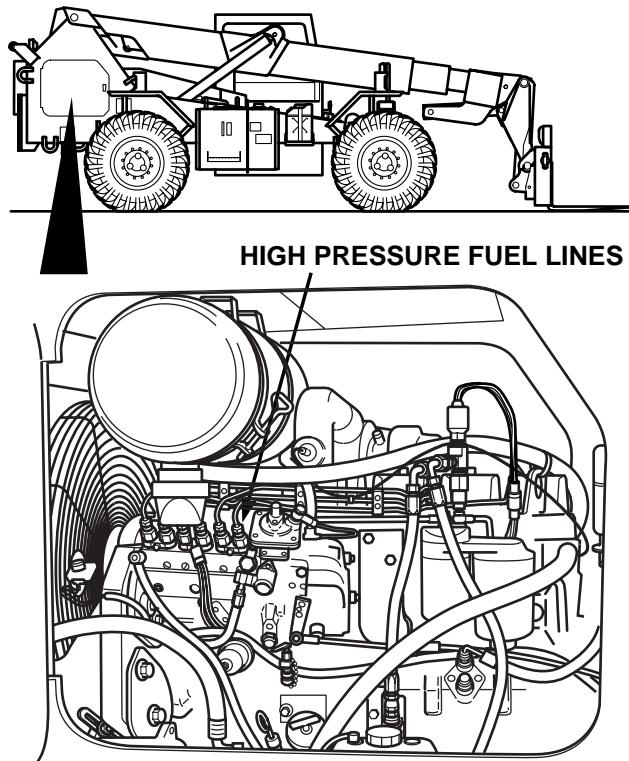
**WARNING**

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

<b>HIGH PRESSURE FUEL LINES VISUAL INSPECTION</b>
Visually inspect high pressure fuel lines and fittings for signs of leaks.
(a) If lines, fittings, and/or seals free from leaks, go to Step 2 of this fault. (b) If lines, fittings, and/or seals show signs of leaks, shut down engine (TM 10-3930-673-10) and replace components as necessary (Para 5-11).



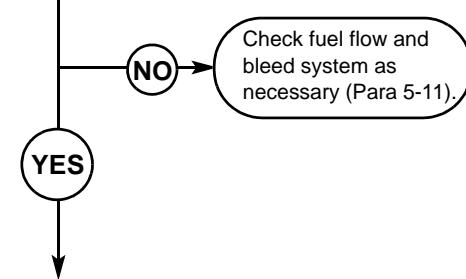
## 6. ENGINE RUNS ROUGHLY, MISFIRES (CONT.).

KNOWN INFO
High pressure fuel lines OK.
POSSIBLE PROBLEMS
Air in fuel system. Fuel contaminated.

**2**

Is fuel system free from air in fuel lines?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air is in fuel system, engine will not run smoothly.

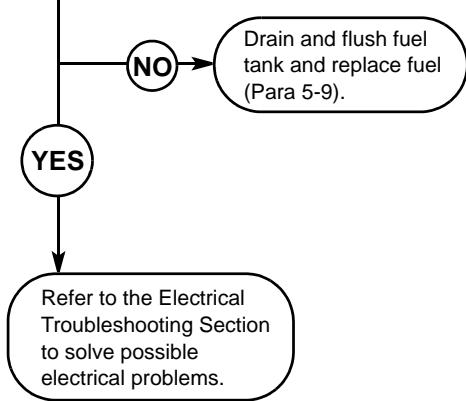


KNOWN INFO
High pressure fuel lines OK.
POSSIBLE PROBLEMS
Fuel system OK.
Fuel contaminated.

**3**

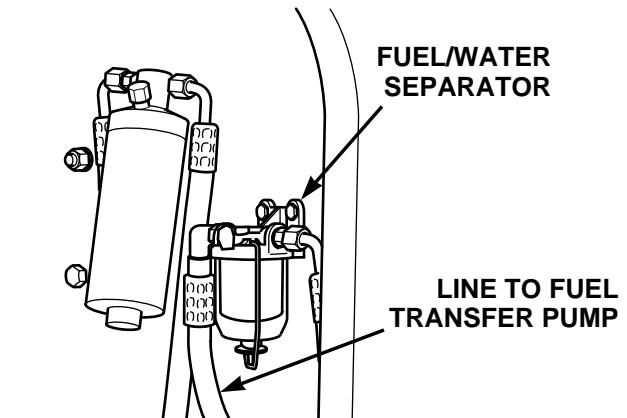
Is fuel clean and free from contaminants?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If fuel contaminated, engine will jerk and/or stall.



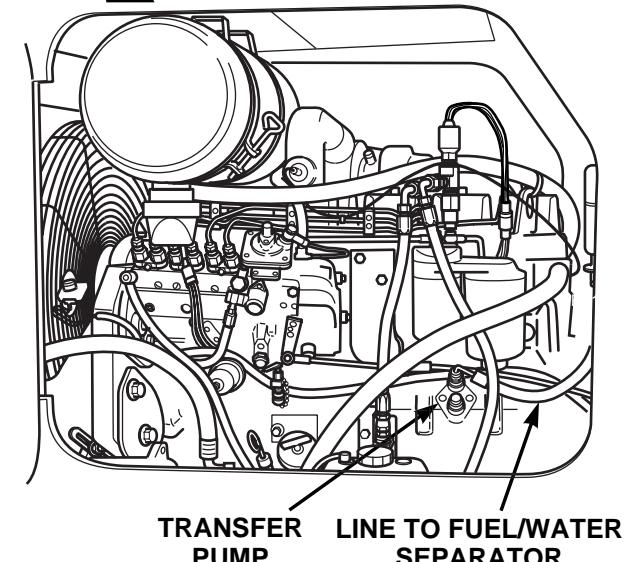
### FUEL FLOW THROUGH FILTER VISUAL INSPECTION

- Check flow of fuel through fuel filter (Para 5-11).
- If fuel flows freely without air, go to Step 3 of this fault.
  - If air in fuel lines, check for air leaks, shut down engine (TM 10-3930-673-10) and bleed system (Para 5-11).



### CONTAMINATED FUEL VISUAL INSPECTION

- Check for contaminated fuel by operating engine with known clean fuel from temporary supply tank.
  - Disconnect fuel line at fuel/water separator, where line leads to fuel transfer pump.
  - Place disconnected end of fuel line in temp tank of known clean fuel.
  - Start engine and run it for approximately 5 minutes to determine if engine performance improves with known clean fuel.
- If fuel in fuel tank proves clean, use as is.
- If fuel in fuel tank is contaminated, shut down engine (TM 10-3930-673-10), drain and flush tank, and replace fuel with clean fuel (Para 5-9).



**7. ENGINE RPM DOES NOT REACH RATED SPEED.****INITIAL SETUP***Tools and Special Tools*

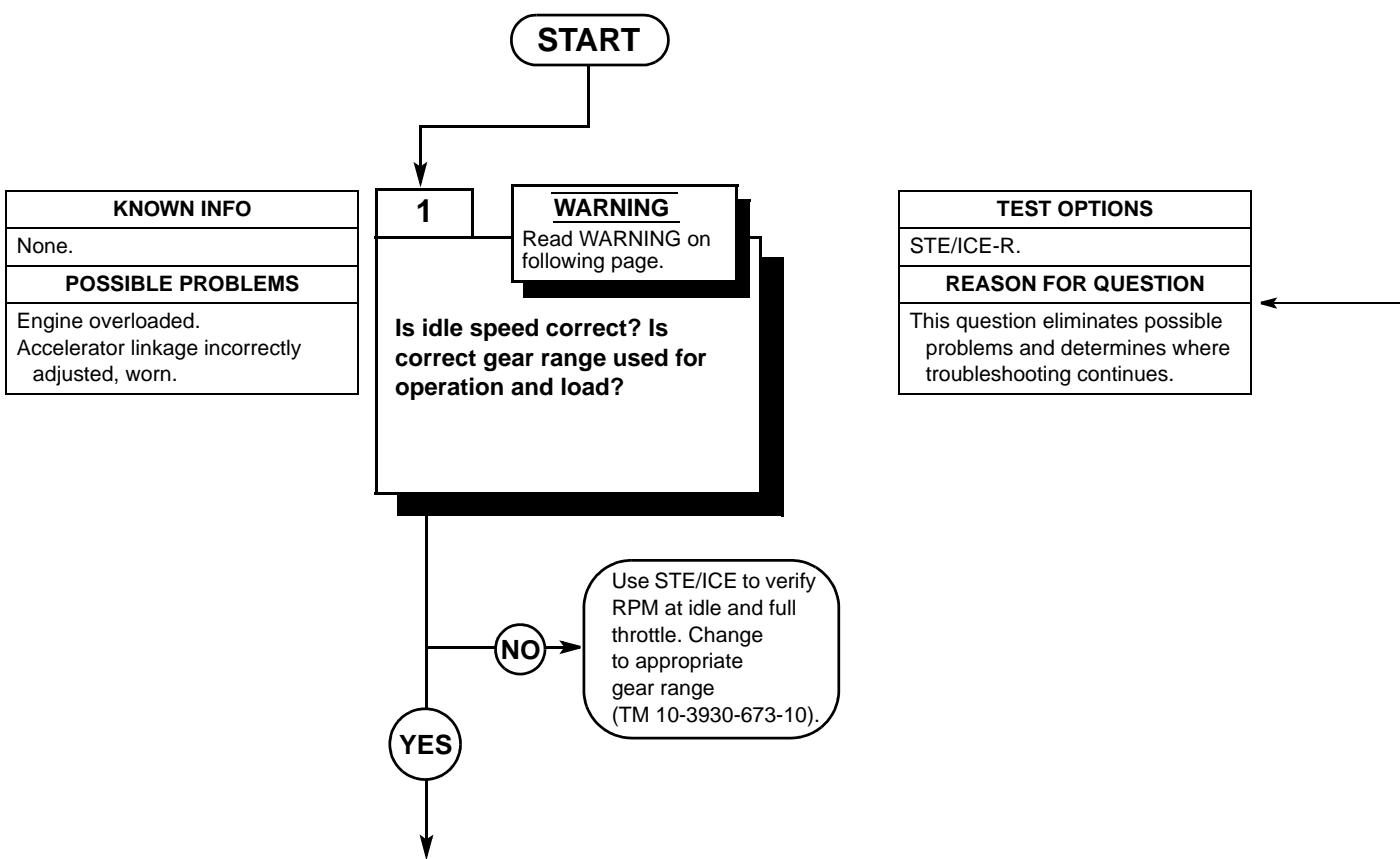
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well ventilated area. Inhalation vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

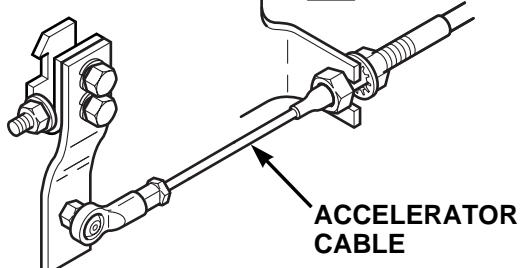
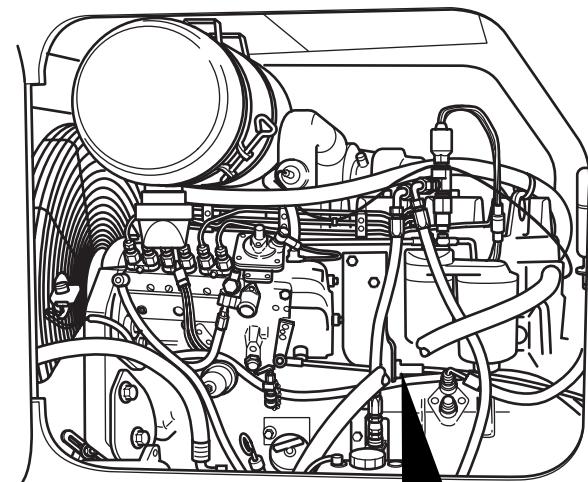
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

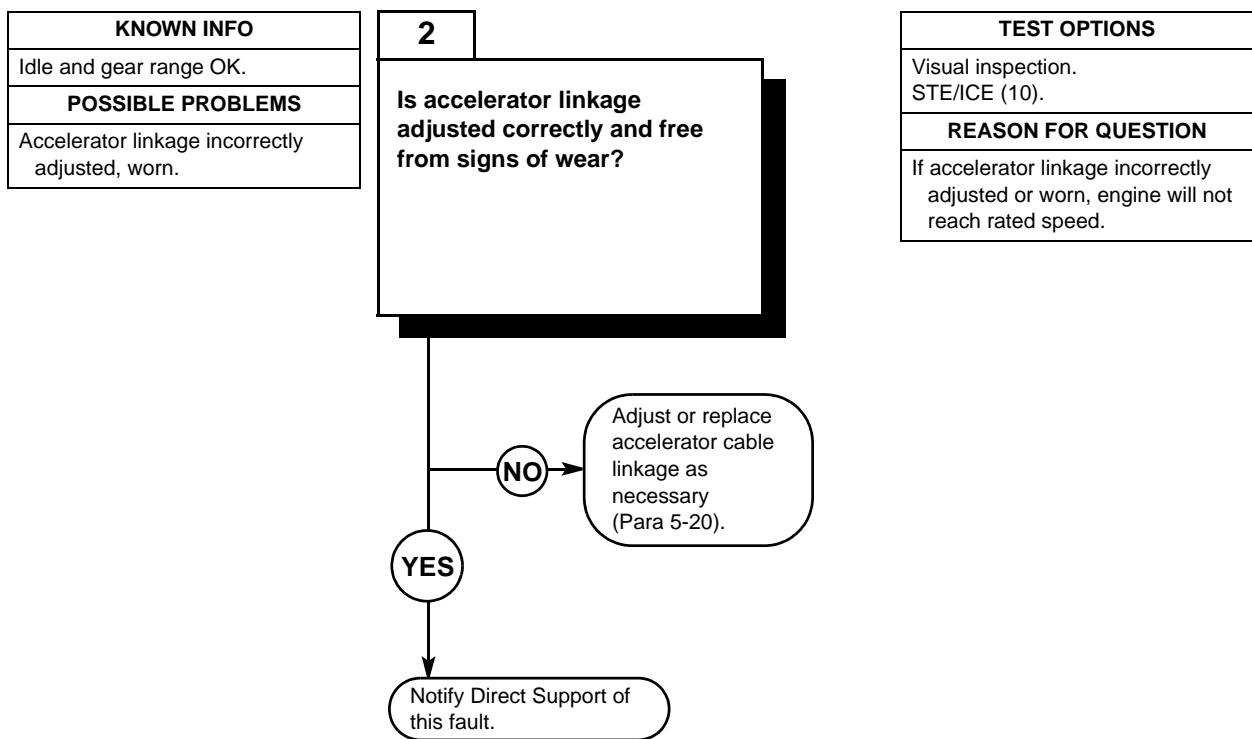
**IDLE AND GEAR RANGE  
STE/ICE-R RPM CHECK**

Use STE/ICE test to verify RPM within 975 to 1075 at idle and 2650 to 2750 at full throttle. Check that gear range is correct for operation and load.

- (a) If RPM is within specified range and gear range is correct, go to Step 2 of this fault.
- (b) If RPM is not within specified range and/or gear range is incorrect, adjust as necessary (Para 5-20).



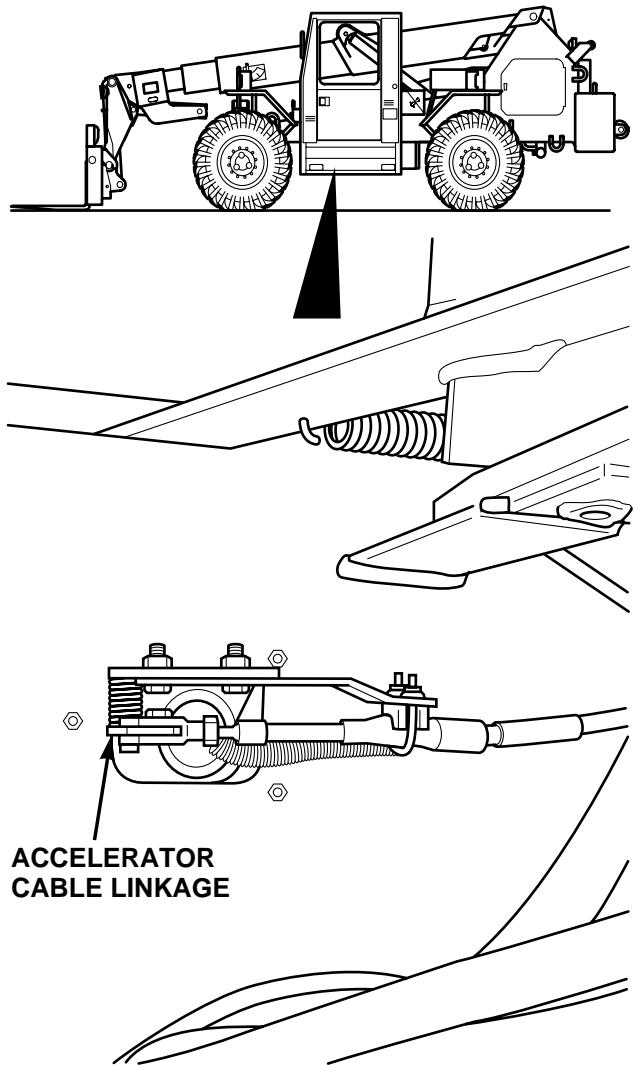
## 7. ENGINE RPM DOES NOT REACH RATED SPEED (CONT).



**ACCELERATOR CABLE LINKAGE  
VISUAL INSPECTION**

Shut down engine and check accelerator cable linkage for adjustment and signs of wear (Para 5-20).

- (a) If linkage is adjusted correctly and is free from signs of wear, notify Direct Support.
- (b) If linkage is not adjusted correctly or worn, adjust or replace linkage as necessary (Para 5-20).



**8. ENGINE PRODUCES EXCESSIVE WHITE EXHAUST SMOKE.****INITIAL SETUP***Tools and Special Tools*

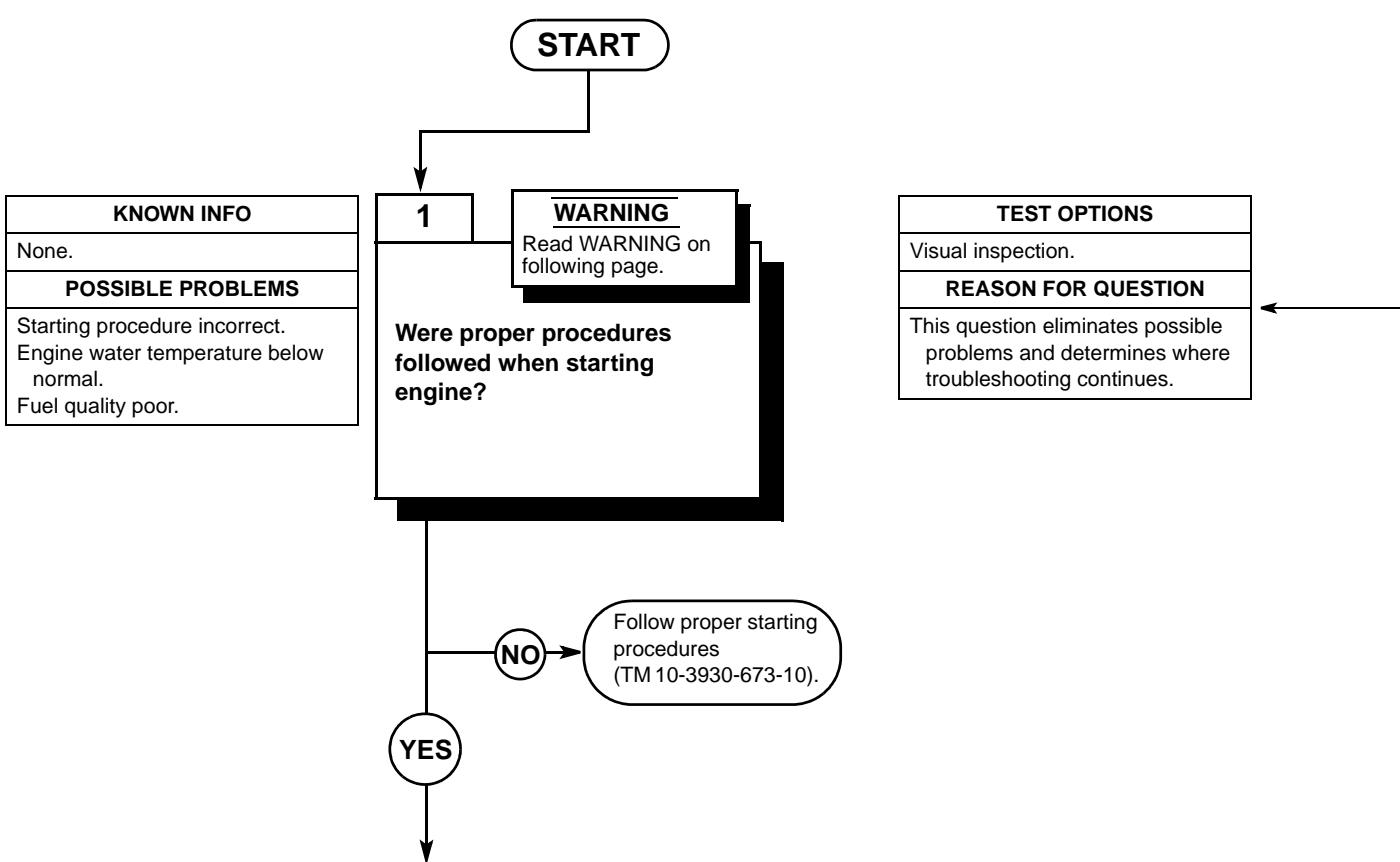
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM 9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**STARTING PROCEDURES  
VISUAL INSPECTION**

Review proper procedures for starting engine.

- (a) If proper starting procedures were followed, go to Step 2 of this fault.
- (b) If proper procedures were not followed, follow proper procedures to restart engine (TM 10-3930-673-10).

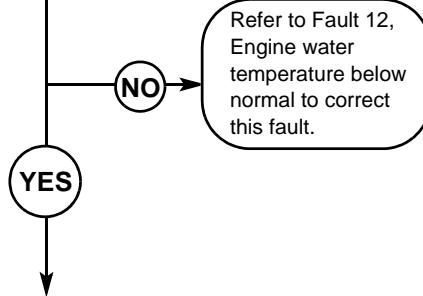
## 8. ENGINE PRODUCES EXCESSIVE WHITE EXHAUST SMOKE (CONT.).

KNOWN INFO
Starting procedure OK.
POSSIBLE PROBLEMS
Engine water temperature below normal. Fuel quality poor.

**2**

Is indicated engine water temperature within normal 180 to 210 degrees F operating range?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If engine water temperature is below normal, engine produces excessive white exhaust smoke.

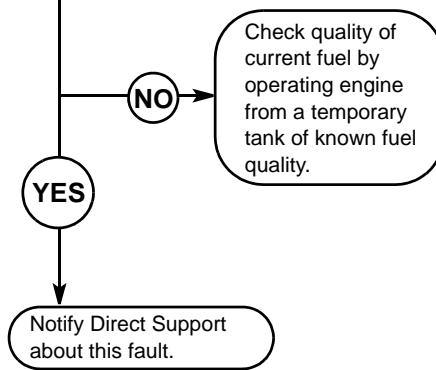


KNOWN INFO
Starting procedures OK.
Engine water temperature OK.
POSSIBLE PROBLEMS
Fuel quality poor.

**3**

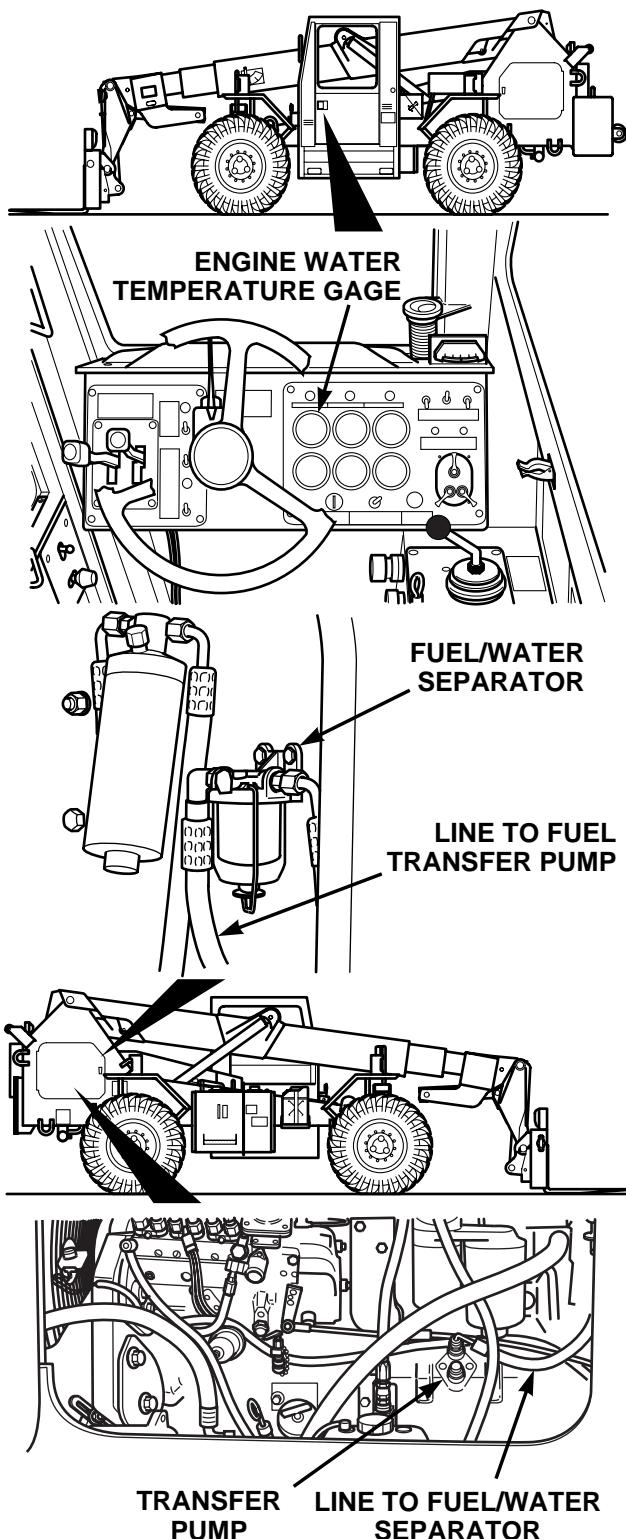
Is fuel in fuel tank known to be of good quality?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If fuel quality is poor, engine produces excessive white exhaust smoke.



**ENGINE WATER TEMPERATURE  
VISUAL INSPECTION**

- (1) Check indicated engine water temperature to determine if it is within normal 180 to 210 degrees F operating range.
  - (a) If engine water temperature is within normal operating range, go to Step 3 of this fault.
  - (b) If engine water temperature is not within normal operating range, refer to the Engine Water Temperature Below Normal Troubleshooting Section to correct this fault.
- (2) Start and run engine (TM 10-3930-673-10). If engine water temperature within normal range, go to Step 3 of this fault.


**CURRENT FUEL QUALITY  
VISUAL INSPECTION**

- (1) Check quality of fuel in fuel tank by operating engine from a temporary tank of known fuel quality.
  - (a) Disconnect fuel line at fuel/water separator, where line leads to fuel transfer pump.
  - (b) Place disconnected end of fuel line in temp tank of known clean fuel.
  - (c) Start engine and run it for approximately 5 minutes to determine if engine performance improves with known clean fuel.
- (2) If fuel is of good quality, notify Direct Support about this fault.
- (3) If fuel is of questionable quality, drain fuel tank and replace fuel (Para 5-9). Go to Step (4) below.
- (4) Start and run engine. If engine exhaust smoke normal, fault is corrected. If not, notify Direct Support about this fault.

**9. ENGINE PRODUCES EXCESSIVE BLACK EXHAUST SMOKE.****INITIAL SETUP***Tools and Special Tools*

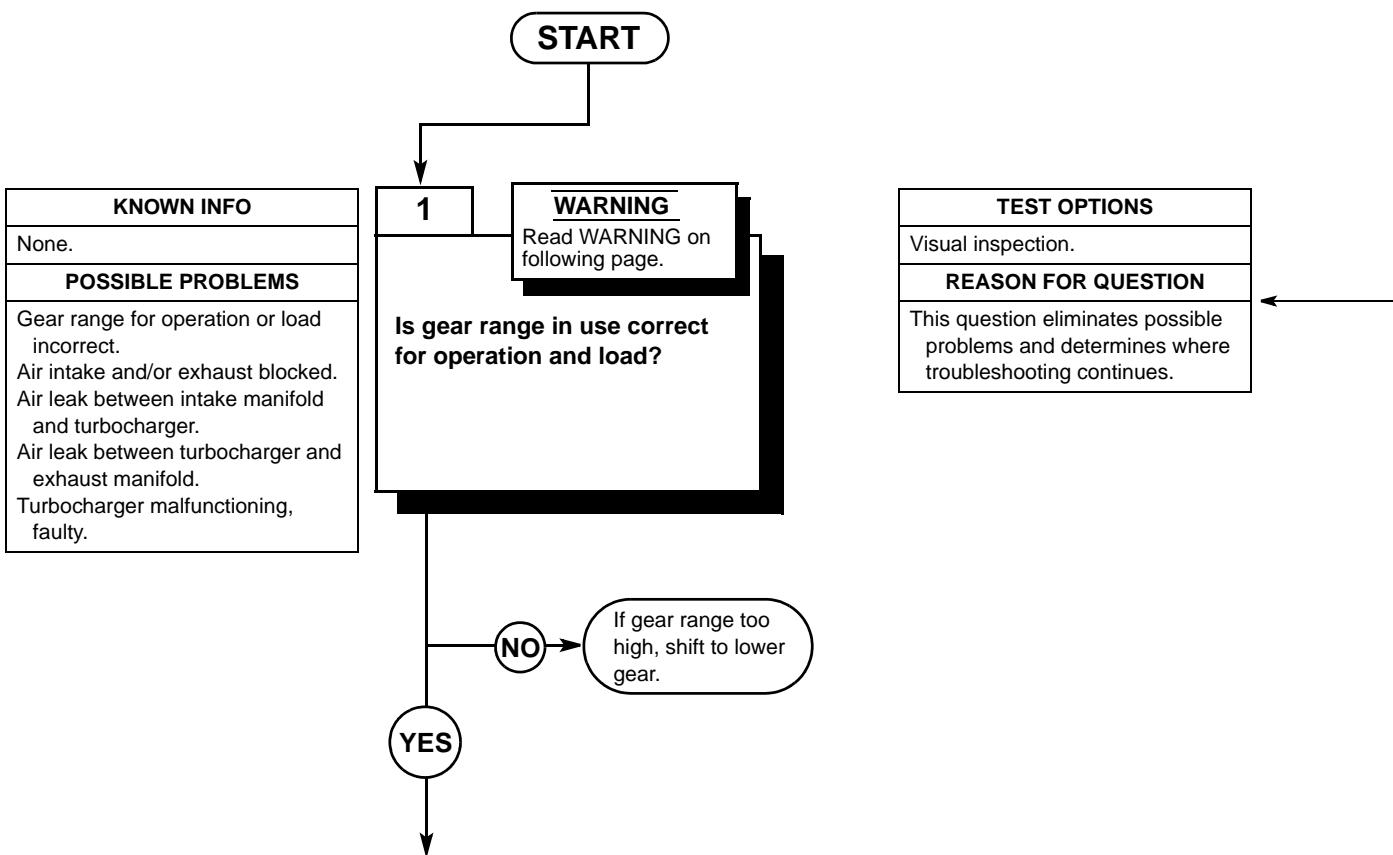
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

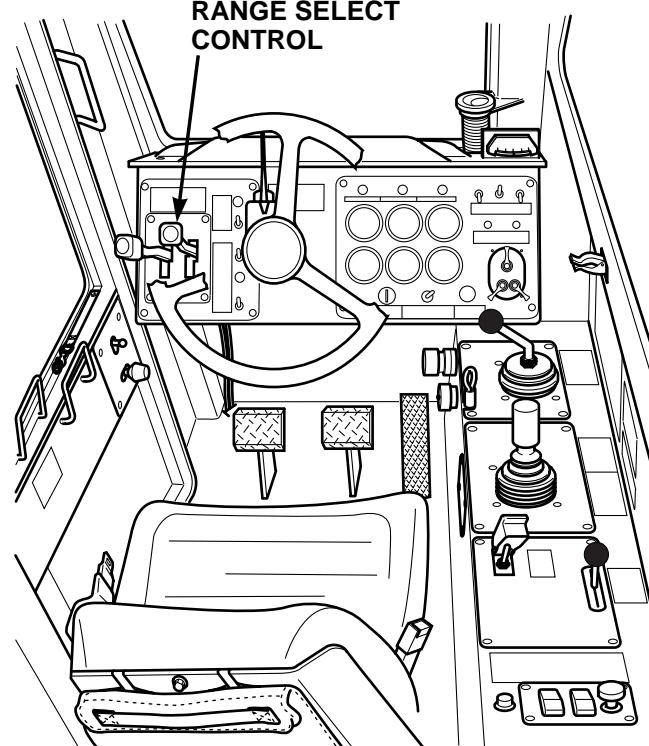
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**GEAR RANGE OPERATION AND LOAD VISUAL INSPECTION**

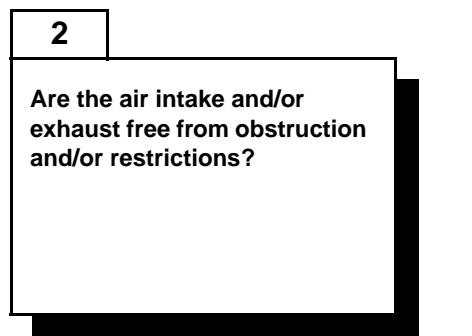
Check that gear range in use is correct for operation and load (TM 10-3930-673-10).

- If gear range is correct, go to Step 2 of this fault.
- If gear range is too high, shift to lower gear (TM 10-3930-673-10).

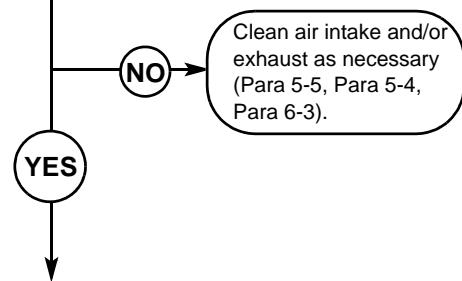
**RANGE SELECT CONTROL**


## 9. ENGINE PRODUCES EXCESSIVE BLACK EXHAUST SMOKE (CONT.).

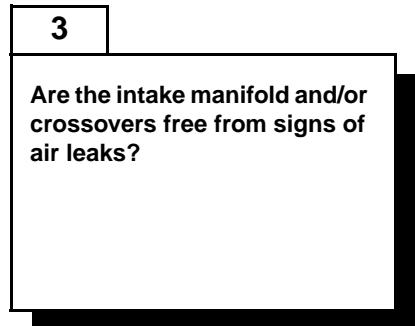
KNOWN INFO
Gear range for operation and load OK.
POSSIBLE PROBLEMS
Air intake and/or exhaust blocked. Air leak between intake manifold and turbocharger. Air leak between turbocharger and exhaust manifold. Turbocharger malfunctioning, faulty.



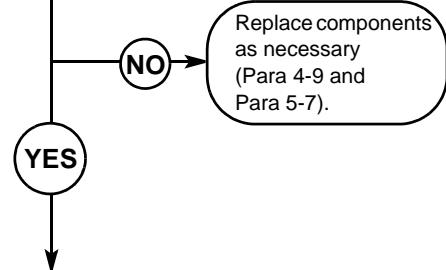
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air intake and/or exhaust blocked, engine will produce excessive black exhaust smoke.



KNOWN INFO
Gear range for operation and load OK.
Air intake and exhaust OK.
POSSIBLE PROBLEMS
Air leak between intake manifold and turbocharger. Air leak between turbocharger and exhaust manifold. Turbocharger malfunctioning, faulty.



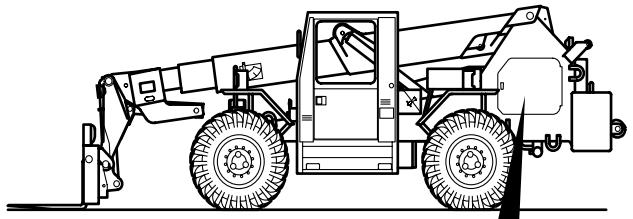
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air leaks in intake manifold and crossovers, engine will run rich, produce excessive black exhaust smoke.



**AIR INTAKE AND EXHAUST  
VISUAL INSPECTION**

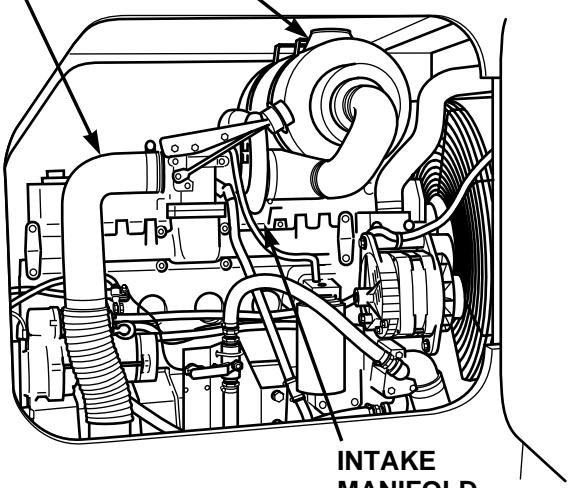
Visually inspect air intake and exhaust for obstructions and/or restrictions.

- (a) If air intake and exhaust are clean, go to Step 3 of this fault.
- (b) If air intake and exhaust are blocked, clean intake cap and exhaust pipe (Para 5-5, Para 5-4, Para 6-3).

**EXHAUST****AIR INTAKE****INTAKE  
MANIFOLD****MANIFOLD AND CROSSOVERS  
VISUAL INSPECTION**

Visually inspect manifold and crossover hoses for obstructions and/or restrictions.

- (a) If manifold and crossover hoses are clean, go to Step 4 of this fault.
- (b) If manifold and crossover hoses are blocked, clean manifold and hoses (Para 4-9 and Para 5-7).



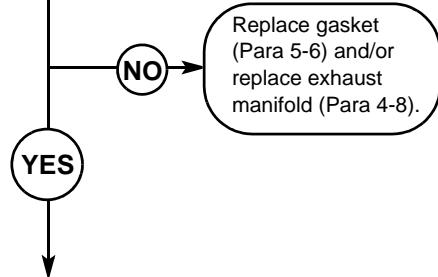
## 9. ENGINE PRODUCES EXCESSIVE BLACK EXHAUST SMOKE (CONT.).

KNOWN INFO
Gear range for operation and load OK. Air intake and exhaust OK. Intake manifold to turbocharger OK.
POSSIBLE PROBLEMS
Air leaks between turbocharger and exhaust manifold. Turbocharger malfunctioning, faulty.

**4**

Is turbocharger gasket free from leaks? Is exhaust manifold free from signs of cracks?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air leaks between turbocharger and exhaust manifold, engine will produce excessive black exhaust smoke.

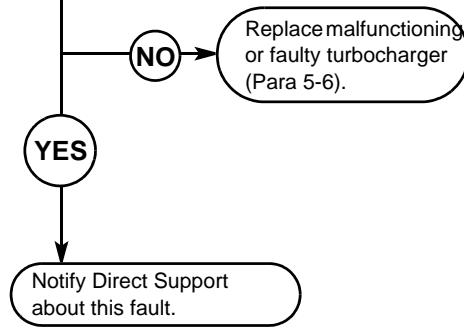


KNOWN INFO
Gear range for operation and load OK. Air intake and exhaust OK. Intake manifold to turbocharger OK. Turbocharger to exhaust manifold OK.
POSSIBLE PROBLEMS
Turbocharger malfunctioning, faulty.

**5**

Is turbocharger functioning correctly?

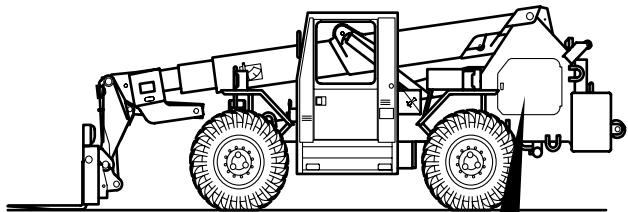
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If turbocharger malfunctioning or faulty, engine will produce excessive black exhaust smoke.



### TURBOCHARGER AND EXHAUST MANIFOLD VISUAL INSPECTION

Visually inspect turbocharger (gasket) and exhaust manifold for signs of cracks and air leaks.

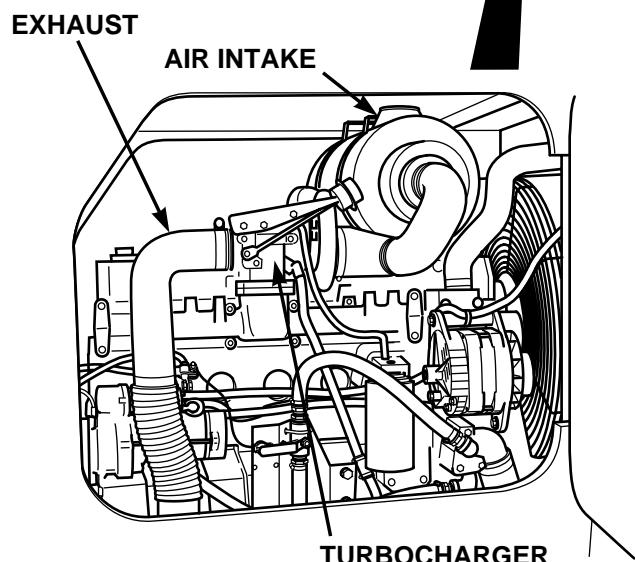
- (a) If there are no signs of cracks and air leaks, go to Step 5 of this fault.
- (b) If there are signs of cracks and/or air leaks, replace turbocharger gasket (Para 5-6), and/or exhaust manifold (Para 4-8) as necessary.



### TURBOCHARGER VISUAL INSPECTION

Check turbocharger intake, air and oil lines for debris. Check wastegate (Para 5-6).

- (a) If turbocharger is functioning correctly, notify Direct Support about this fault.
- (b) If turbocharger shows signs of debris, malfunctioning assemblies, replace turbocharger (Para 5-6).



**10. ENGINE PRODUCES EXCESSIVE NOISE.****INITIAL SETUP***Tools and Special Tools*

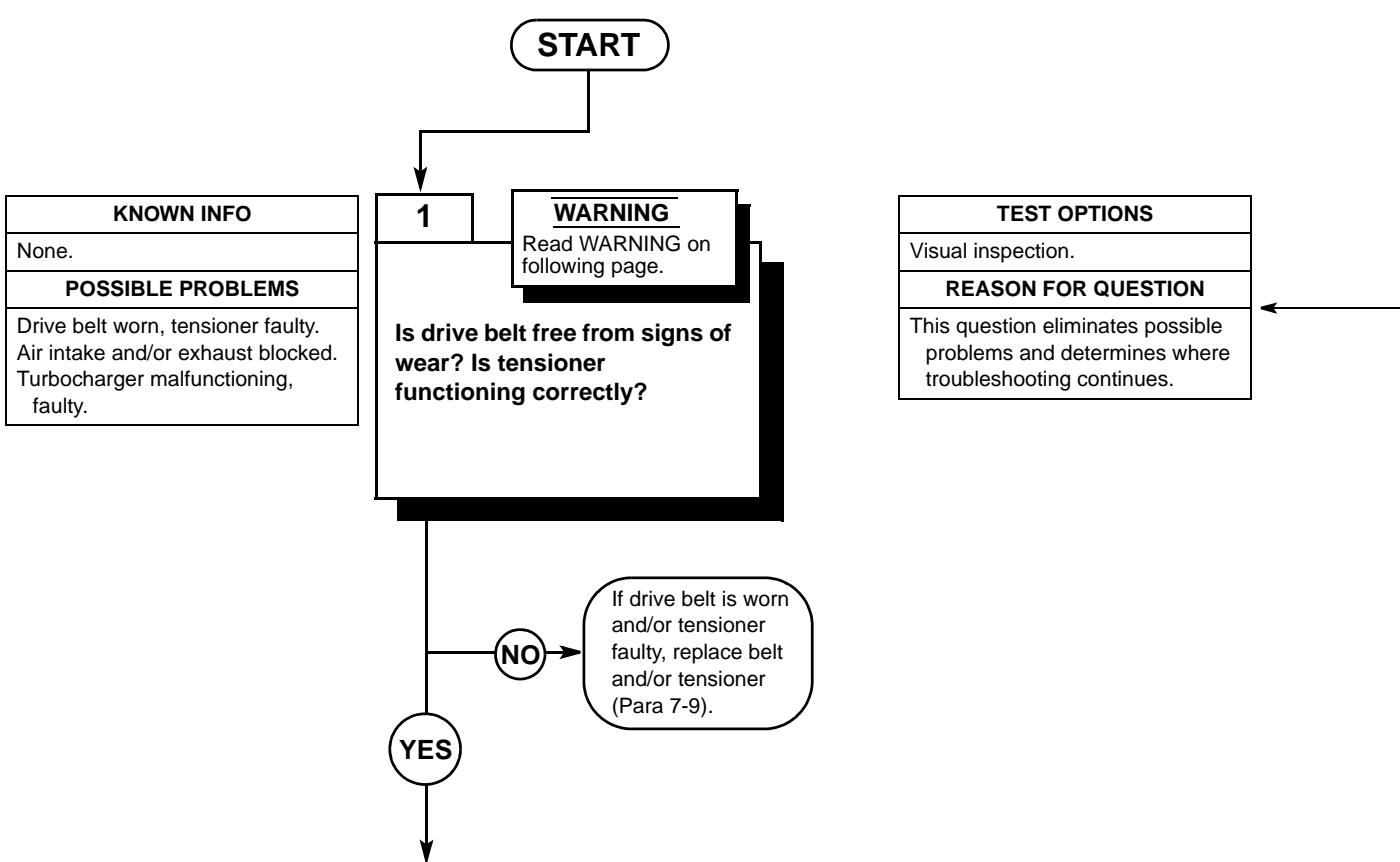
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

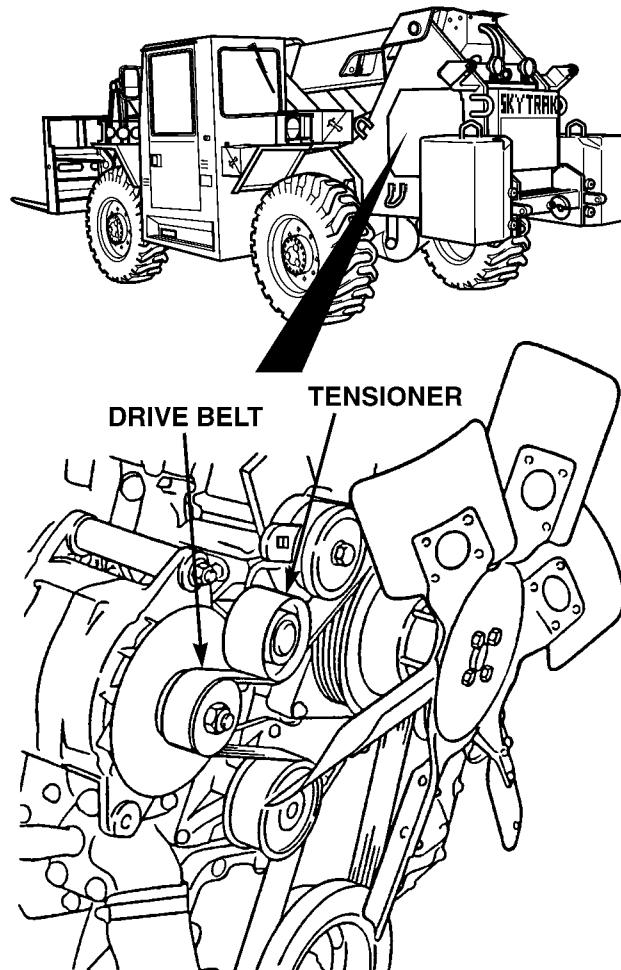
- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**DRIVE BELT AND TENSIONER  
VISUAL INSPECTION**

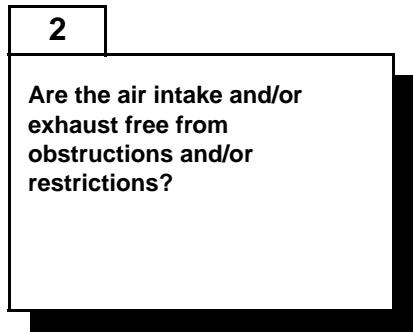
Visually inspect drive belt for wear. Check operation of tensioner. Drive belt deflection should be no greater than 1/2 in.

- If belt is not worn and tensioner is functioning correctly, go to Step 2 of this fault.
- If belt is worn and/or tensioner is not deflecting belt correctly, replace belt and/or tensioner (Para 7-9).

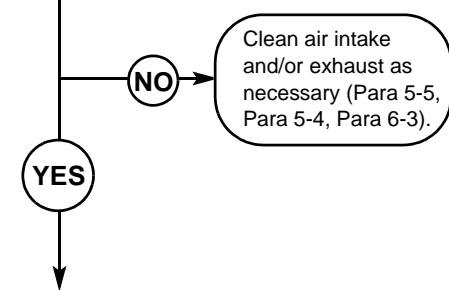


## 10. ENGINE PRODUCES EXCESSIVE NOISE (CONT.).

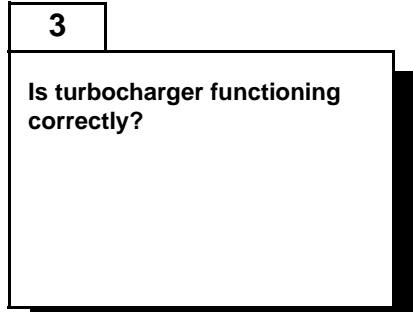
KNOWN INFO
Drive belt and tensioner OK.
POSSIBLE PROBLEMS
Air intake and/or exhaust blocked. Turbocharger malfunctioning, faulty.



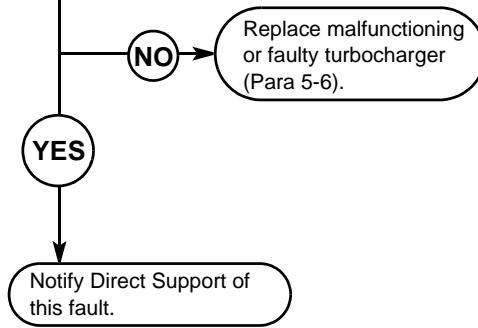
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air intake and/or exhaust blocked, engine will produce excessive noise.



KNOWN INFO
Drive belt and tensioner OK. Air intake and exhaust OK.
POSSIBLE PROBLEMS
Turbocharger malfunctioning, faulty.



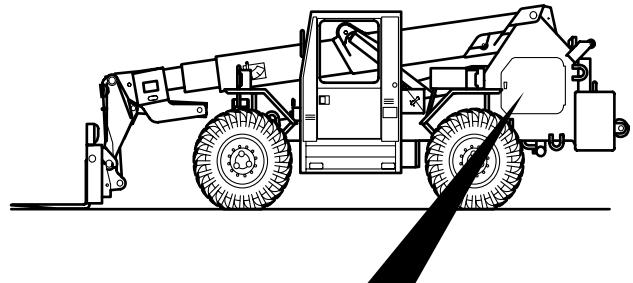
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If turbocharger malfunctioning or faulty, turbocharger will produce additional noise.



#### AIR INTAKE AND EXHAUST VISUAL INSPECTION

Visually inspect air intake and exhaust for obstructions and/or restrictions.

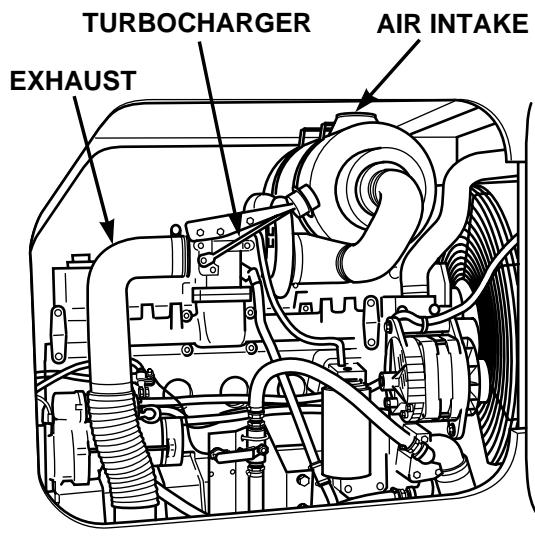
- (a) If air intake and exhaust are clean, go to Step 3 of this fault.
- (b) If air intake and exhaust are blocked, shut down engine and clean intake cap and exhaust pipe (Para 5-5, Para 5-4, Para 6-3).



#### TURBOCHARGER VISUAL INSPECTION

Check turbocharger intake, air and oil lines for obstructions. Check wastegate (Para 5-6).

- (a) If turbocharger is functioning correctly, notify Direct Support about this fault.
- (b) If turbocharger shows signs of obstructions, faulty assemblies, shut down engine (TM 10-3930-673-10) and replace turbocharger (Para 5-6).



**11. ENGINE OIL PRESSURE BELOW NORMAL.****INITIAL SETUP***Tools and Special Tools*

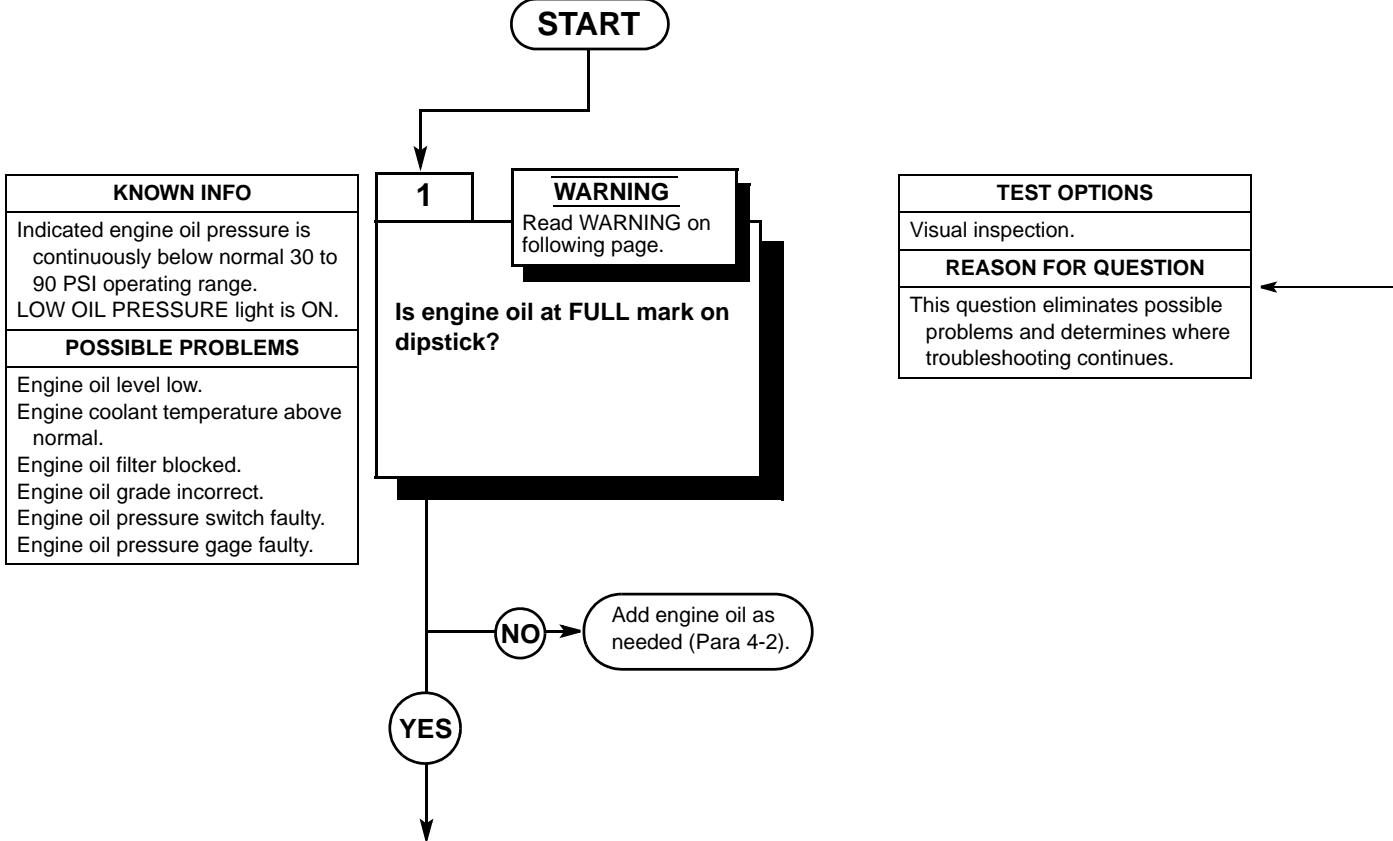
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

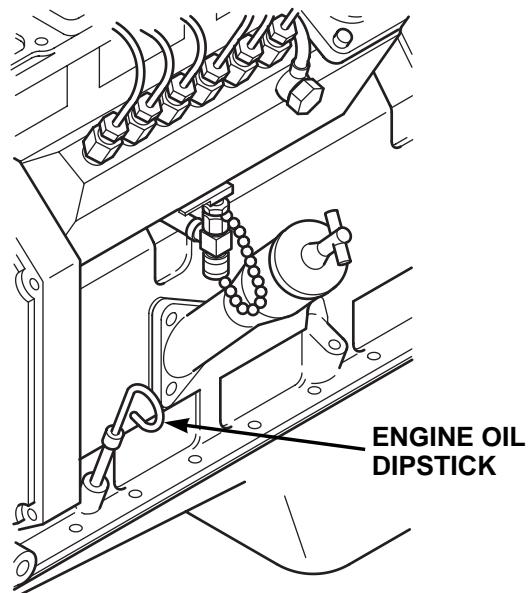
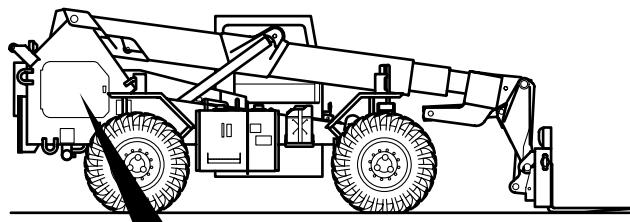
- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

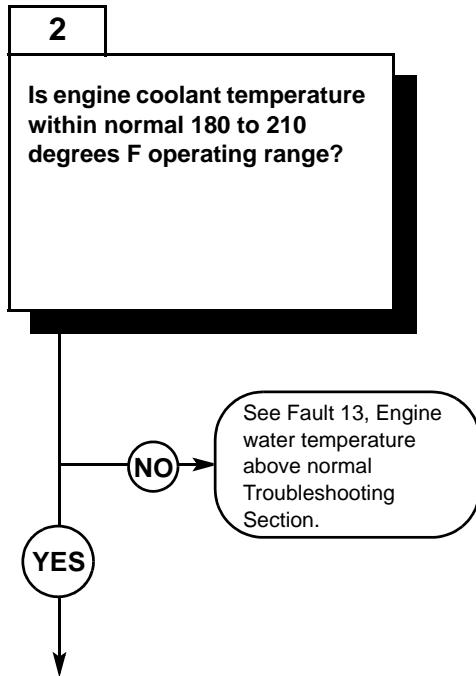
**ENGINE OIL LEVEL  
VISUAL INSPECTION**

- (1) Check engine oil level by means of dipstick to determine if engine oil is at proper level (Para 4-2).
- (2) Engine oil should be near or at FULL mark on dipstick.
  - (a) If engine oil is near or at FULL mark, go to Step 2 of this fault.
  - (b) If engine oil is not at FULL mark, add engine oil as needed (Para 4-2).



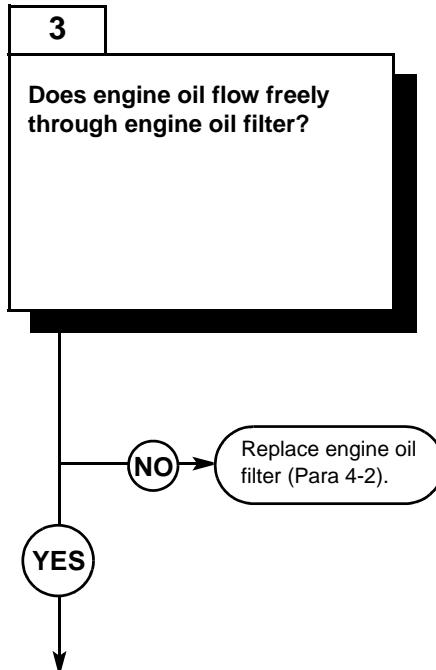
## 11. ENGINE OIL PRESSURE BELOW NORMAL (CONT).

KNOWN INFO
Indicated engine oil pressure is below normal 30 to 90 PSI operating range. LOW OIL PRESSURE light is ON. Engine oil level OK.
POSSIBLE PROBLEMS
Engine coolant temperature is above normal. Engine filter blocked. Engine oil grade incorrect. Oil pressure switch faulty. Oil pressure gage faulty.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If engine coolant temperature is above normal, see Fault 13, Engine water temperature above normal Troubleshooting Section.

KNOWN INFO
Indicated engine oil pressure is below normal 30 to 90 PSI operating range. LOW OIL PRESSURE light is ON. Engine oil level OK. Engine coolant temperature OK.
POSSIBLE PROBLEMS
Engine filter blocked. Engine oil grade incorrect. Oil pressure switch faulty. Oil pressure gage faulty.



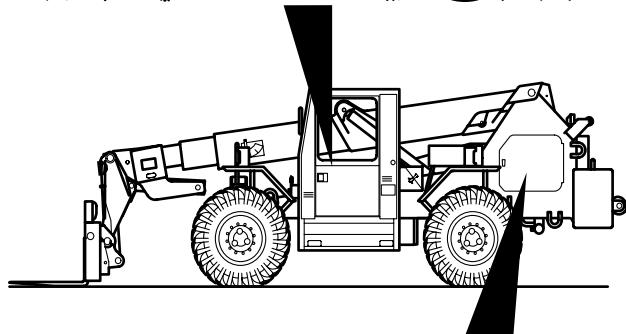
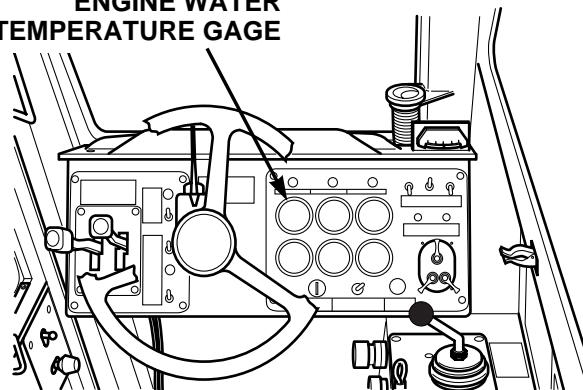
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If engine oil filter is dirty or blocked, engine oil pressure will be low.

#### ENGINE COOLANT TEMPERATURE VISUAL INSPECTION

Check engine coolant temperature gage to determine if coolant temperature is within normal operating range.

- (a) If temperature is within normal operating range (180 to 210 degrees F), go to Step 3 of this fault.
- (b) If temperature is above normal operating range, go to Fault 13, Engine water temperature above normal Troubleshooting Section.

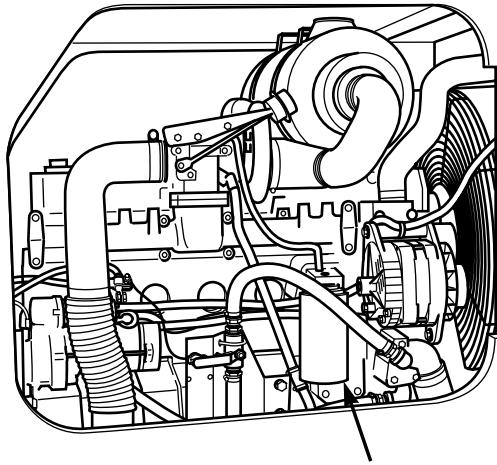
#### ENGINE WATER TEMPERATURE GAGE



#### ENGINE OIL FILTER VISUAL INSPECTION

Check last date of oil filter replacement. Visually inspect oil filter for damage.

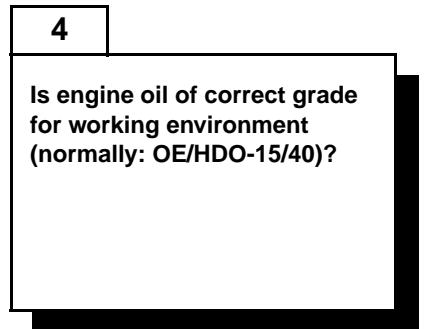
- (a) If recent replacement and no damage, go to Step 4 of this fault.
- (b) If dirty, blocked, or damaged, shut down engine (TM 10-3930-673-10) and replace engine oil filter (Para 4-2).



OIL FILTER

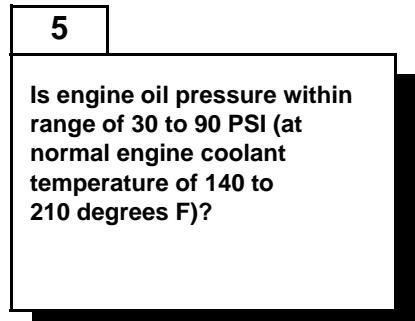
## 11. ENGINE OIL PRESSURE BELOW NORMAL (CONT).

KNOWN INFO
Indicated engine oil pressure is below normal 30 to 90 PSI operating range. LOW OIL PRESSURE light is ON. Engine oil level OK. Engine coolant temperature OK. Engine oil filter OK.
POSSIBLE PROBLEMS
Engine oil grade incorrect. Oil pressure switch faulty. Oil pressure gage faulty.



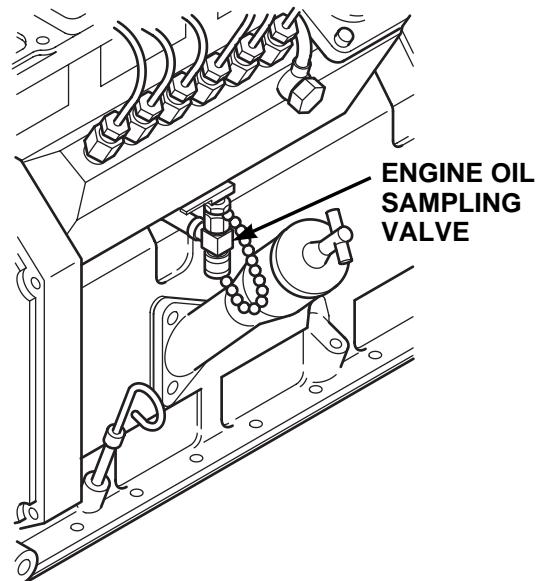
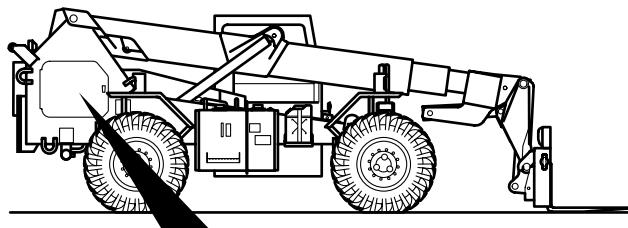
TEST OPTIONS
Sample, analysis.
REASON FOR QUESTION
If engine oil grade is incorrect, engine oil pressure will be low.

KNOWN INFO
Indicated engine oil pressure is below normal 30 to 90 PSI operating range. LOW OIL PRESSURE light is ON. Engine oil OK. Engine coolant temperature OK. Engine oil filter OK. Engine oil grade OK.
POSSIBLE PROBLEMS
Oil pressure switch faulty. Oil pressure gage faulty.

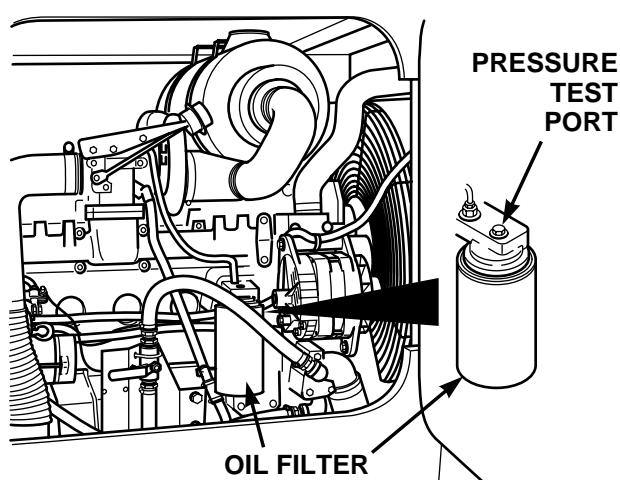
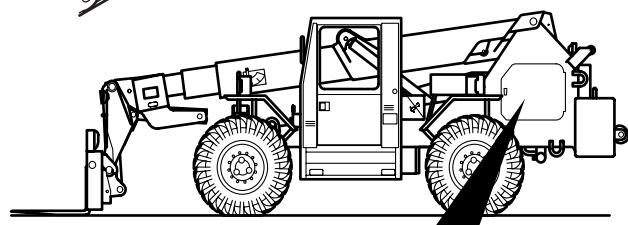


TEST OPTIONS
STE/ICE Test #50.
REASON FOR QUESTION
If engine oil pressure sensor/gage faulty, engine oil pressure will be low.

<b>ENGINE OIL GRADE SAMPLE AND ANALYSIS</b>	
(1)	Take engine oil sample from engine oil sampling valve.
(2)	Have engine oil sample analyzed.
(a)	If engine oil sample is of correct grade, go to Step 5 of this fault.
(b)	If engine oil sample is of incorrect grade, replace the current oil with oil of correct grade (Para 4-2).



<b>PRESSURE AND ENGINE OIL PRESSURE SWITCH STE/ICE TEST</b>	
(1)	Remove plug from oil filter base and install STE/ICE pressure transducer.
(2)	Perform STE/ICE Test #50 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device.
(a)	If engine oil pressure is within 30 to 90 PSI, refer to Electrical System Troubleshooting Fault 39, Oil pressure gage does not operate.
(b)	If engine oil pressure is not within 30 to 90 PSI, shut down engine (TM 10-3930-673-10). Notify Direct Support about this fault.



**12. ENGINE OIL PRESSURE ABOVE NORMAL.****INITIAL SETUP***Tools and Special Tools*

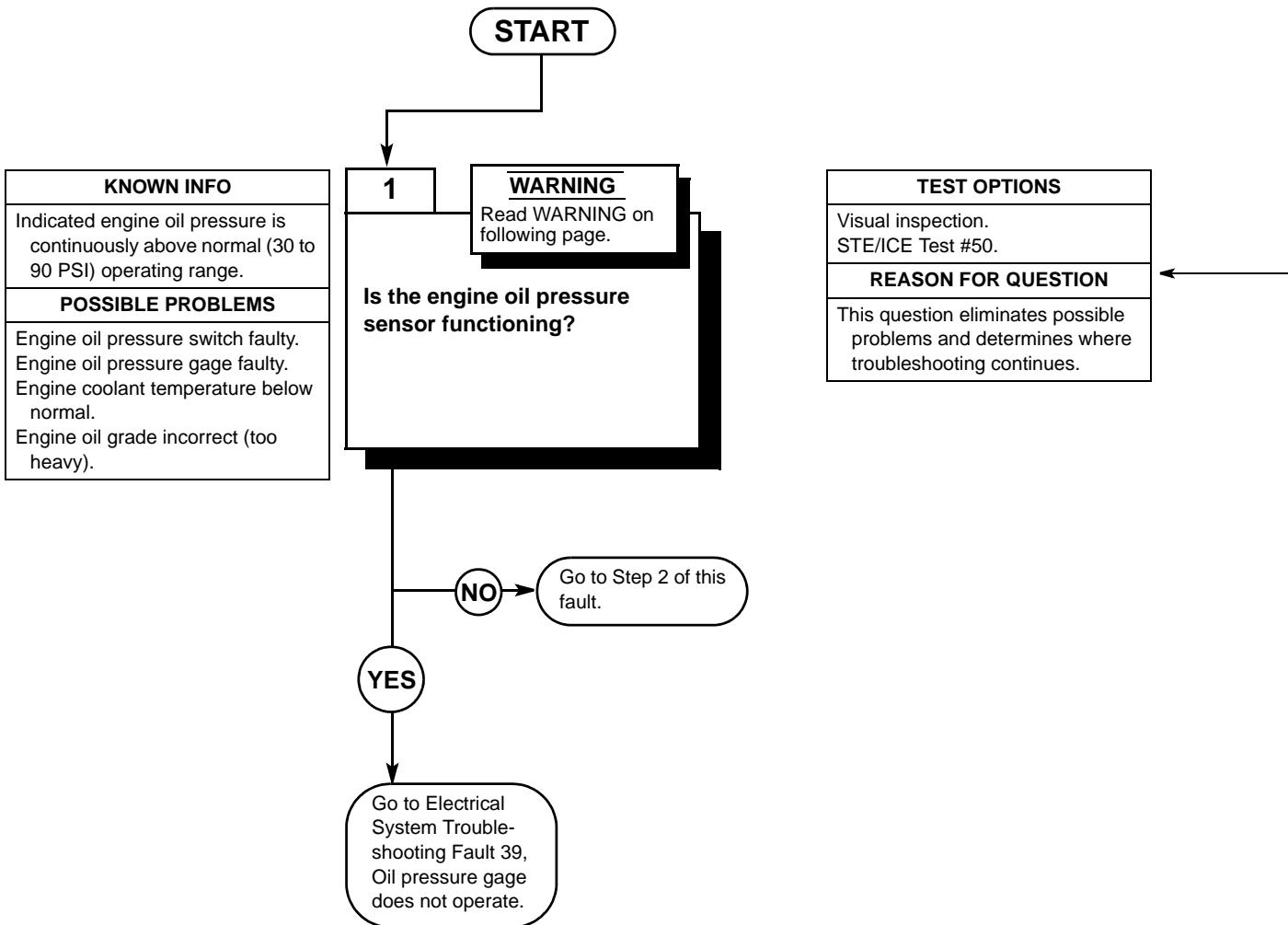
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



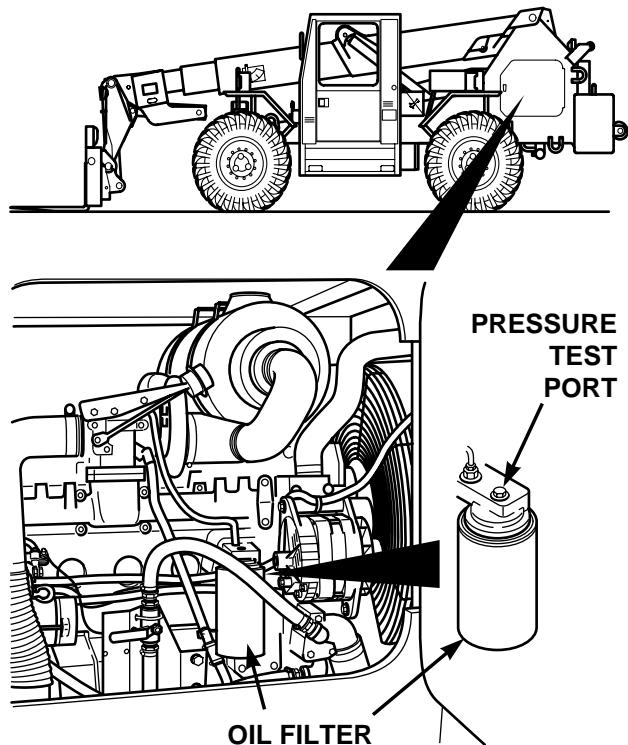
**WARNING**

- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

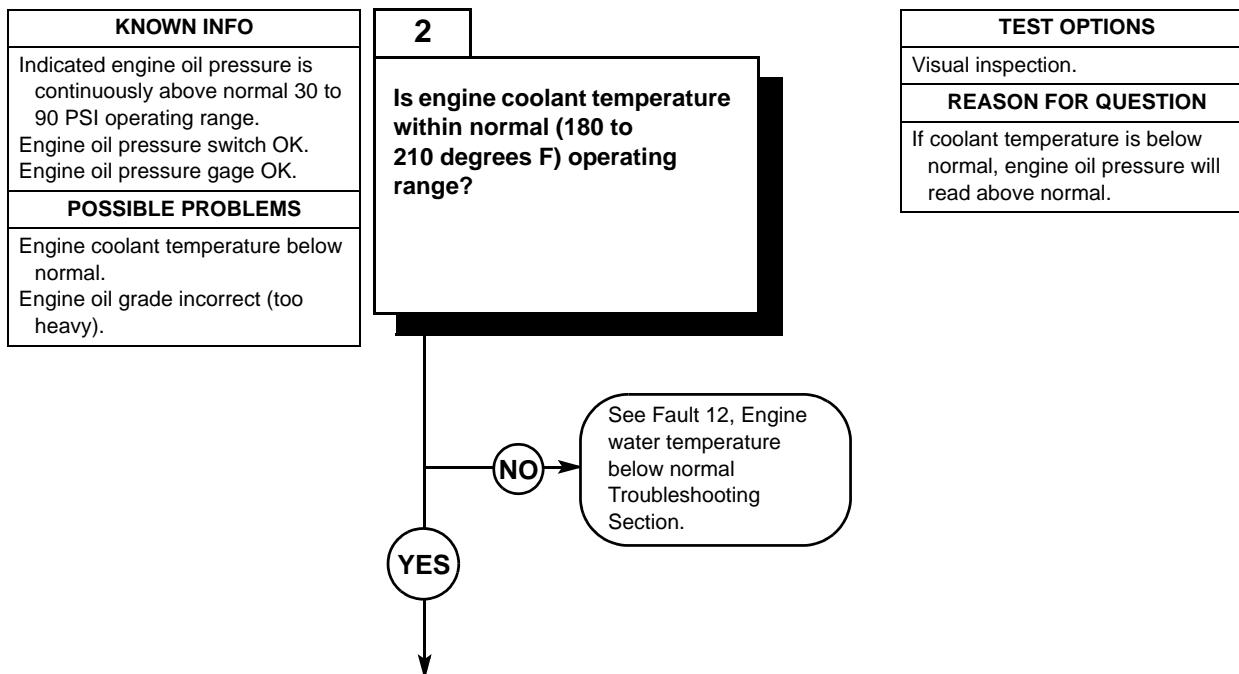
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

<b>PRESSURE AND ENGINE OIL PRESSURE SWITCH VISUAL INSPECTION AND STE/ICE TEST</b>	
(1)	Remove plug from oil filter base and install STE/ICE pressure transducer.
(2)	Perform STE/ICE Test #50 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device. <ol style="list-style-type: none"> <li>If engine oil pressure is within 30 to 90 PSI, go to Electrical System Troubleshooting Fault 39, Oil pressure gage does not operate.</li> <li>If engine oil pressure is not within 30 to 90 PSI, shut down engine (TM 10-3930-673-10). Go to Step 2 of this fault.</li> </ol>



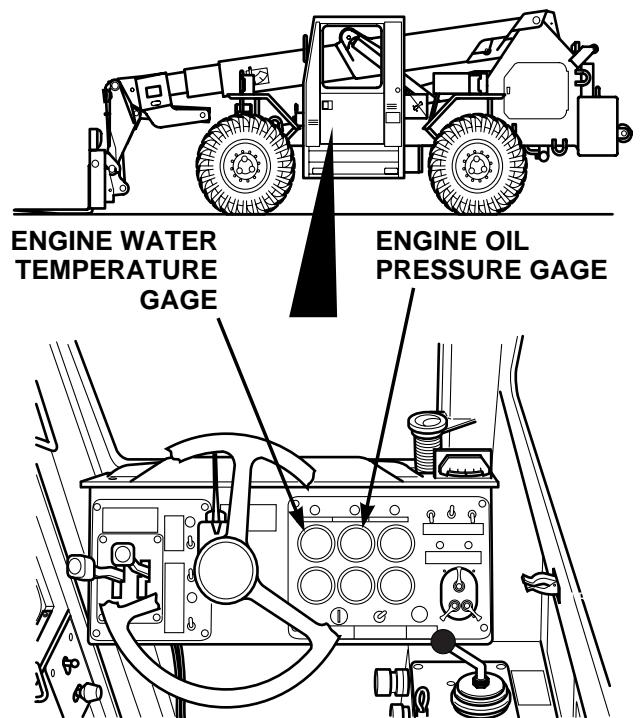
## 12. ENGINE OIL PRESSURE ABOVE NORMAL (CONT.).



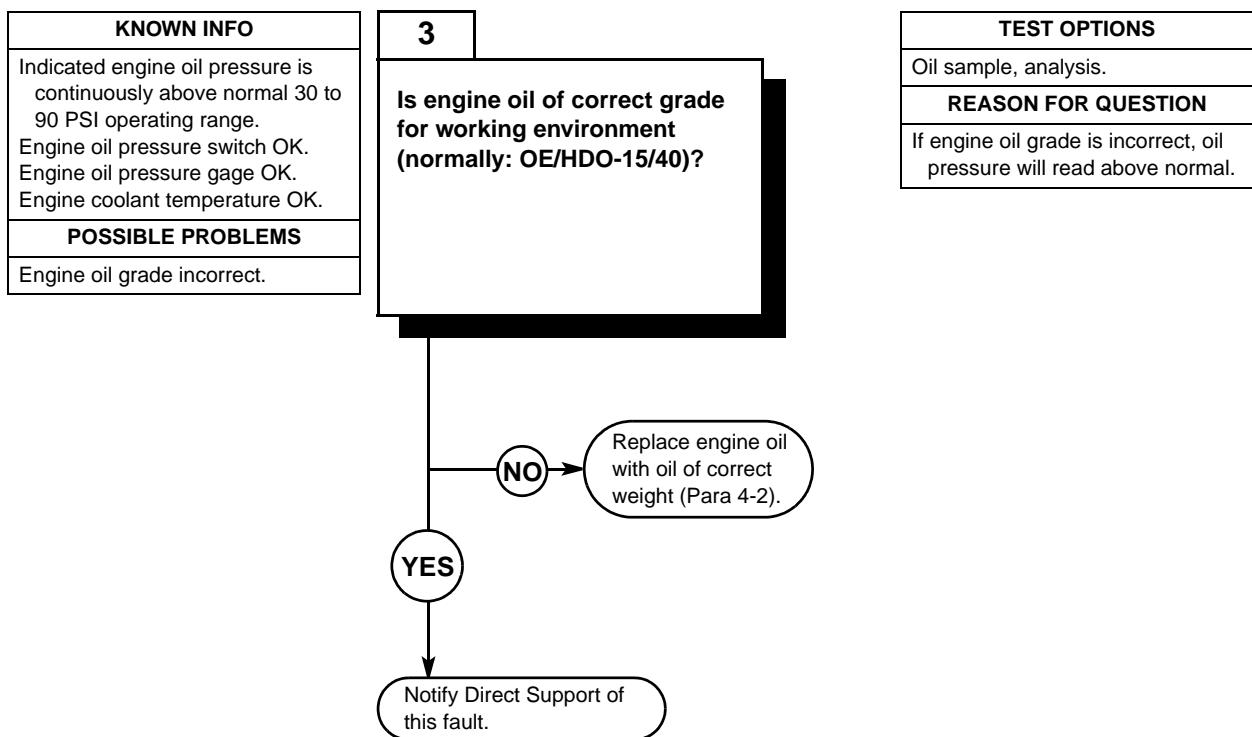
**ENGINE COOLANT TEMPERATURE  
VISUAL INSPECTION**

Check engine coolant temperature gage to determine if coolant temperature is within normal operating range.

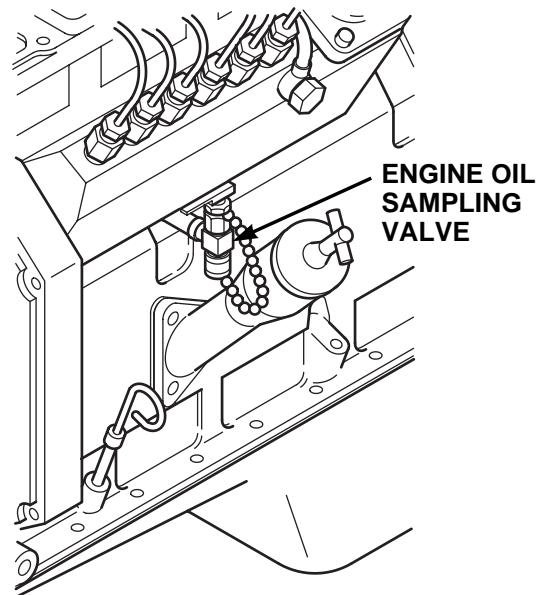
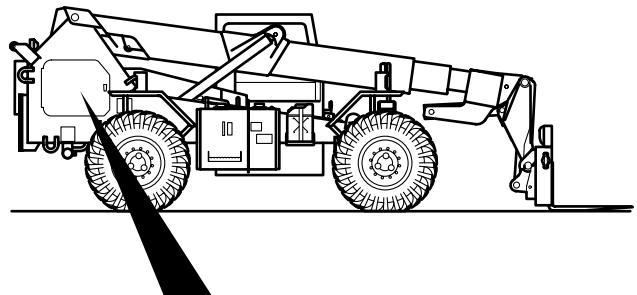
- (a) If temperature is within normal operating range (180 - 210 degrees F), go to Step 3 of this fault.
- (b) If temperature is below normal operating range, go to Fault 12, Engine water temperature below normal Troubleshooting Section.



## 12. ENGINE OIL PRESSURE ABOVE NORMAL (CONT.).



<b>ENGINE OIL GRADE SAMPLE AND ANALYSIS</b>
(1) Take engine oil sample from engine oil sampling valve (TM 10-3930-673-10). (2) Have engine oil sample analyzed. (a) If engine oil sample is of correct grade, notify Direct Support about this fault. (b) If engine oil sample is of incorrect grade, shut down engine (TM 10-3930-673-10) and replace the current oil with oil of correct grade (Para 4-2).



**13. ENGINE WATER TEMPERATURE BELOW NORMAL.****INITIAL SETUP***Tools and Special Tools*

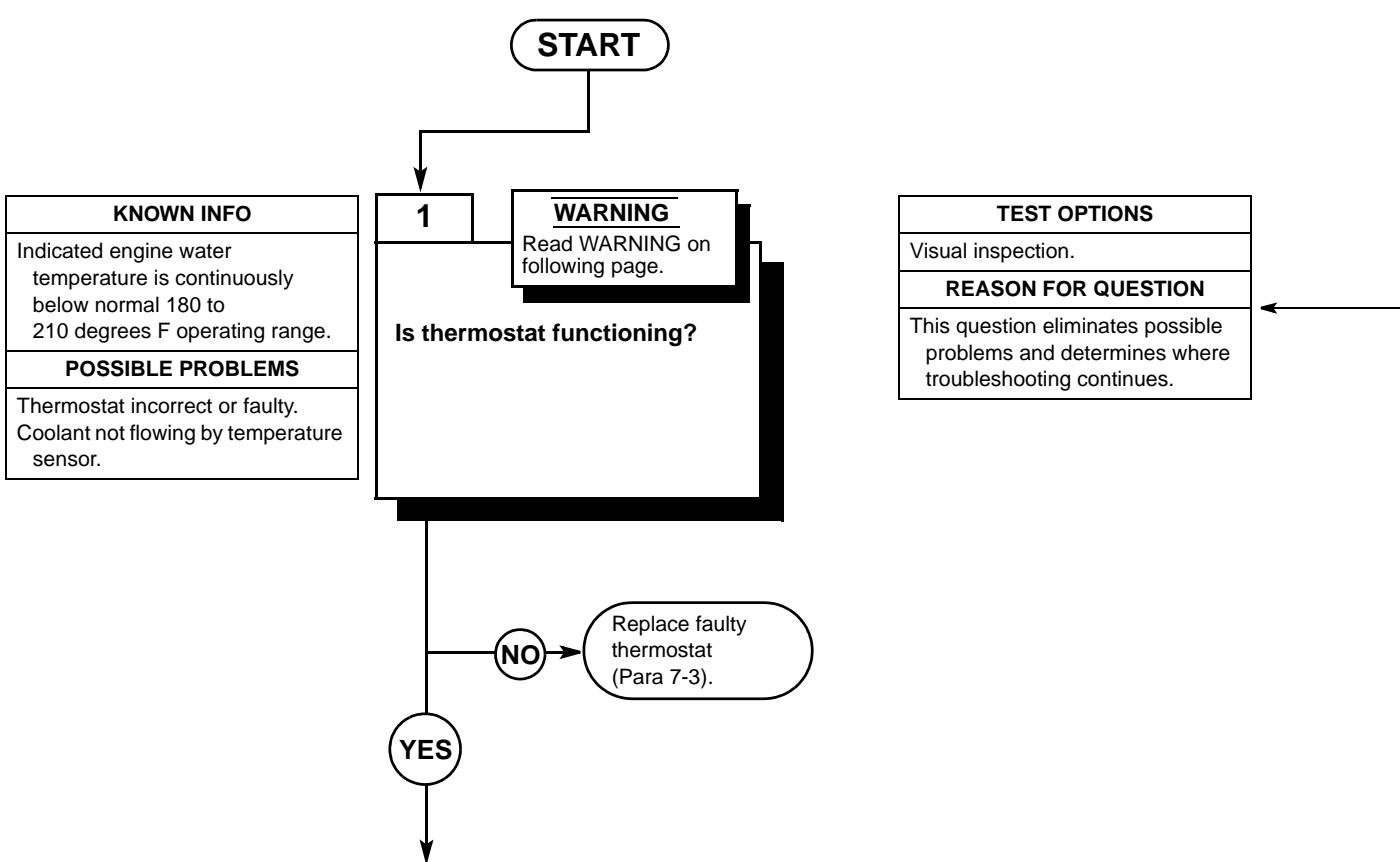
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

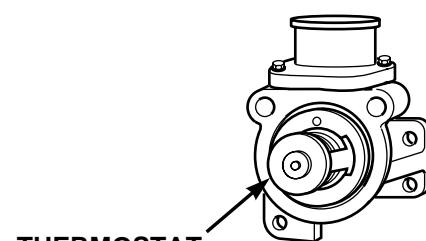
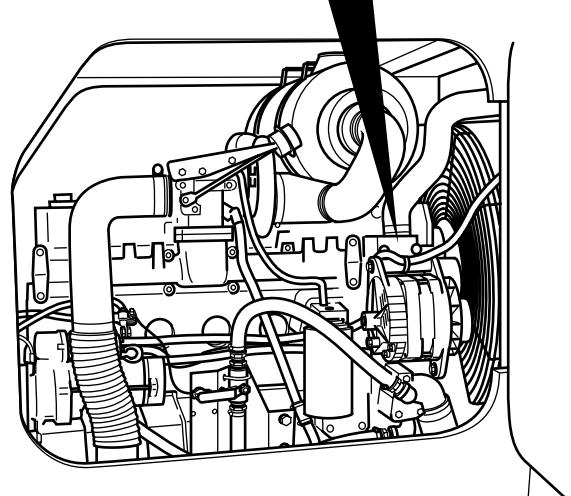
- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

**CAUTION**

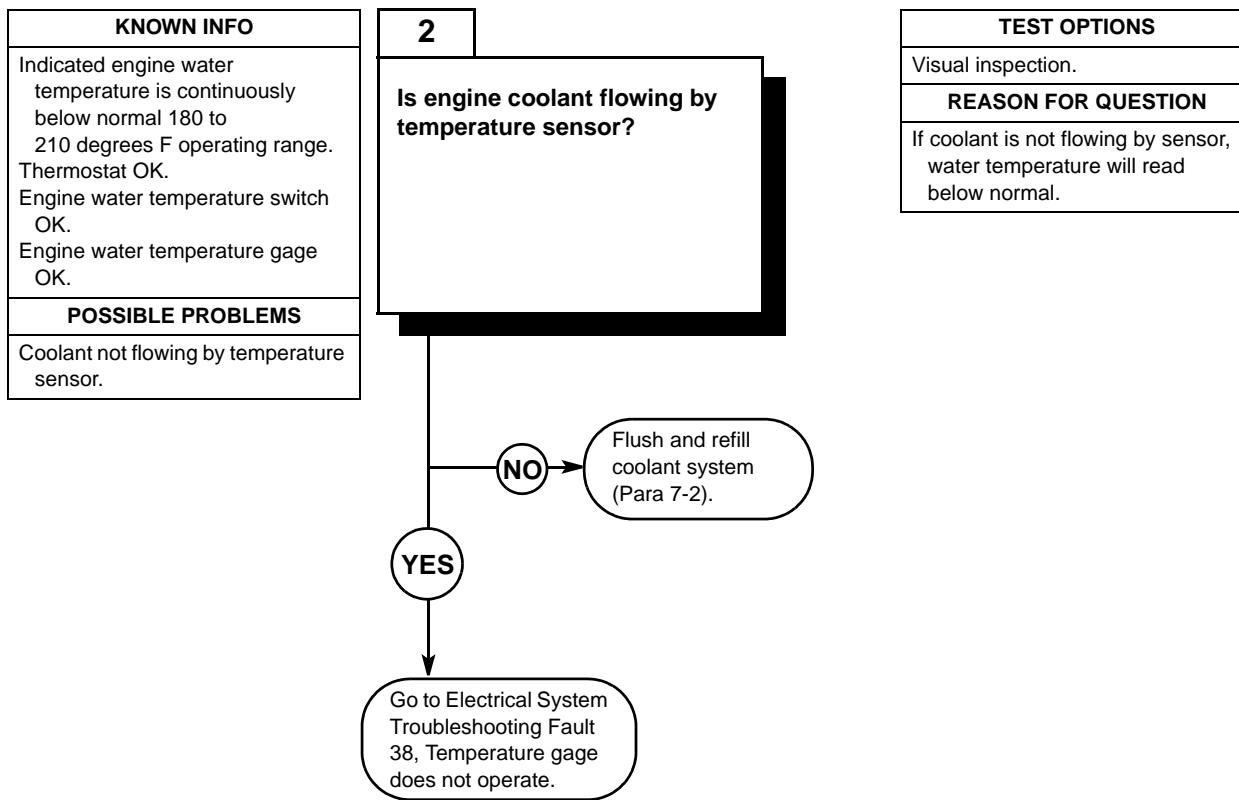
Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

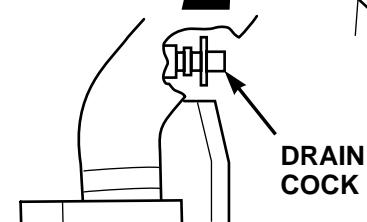
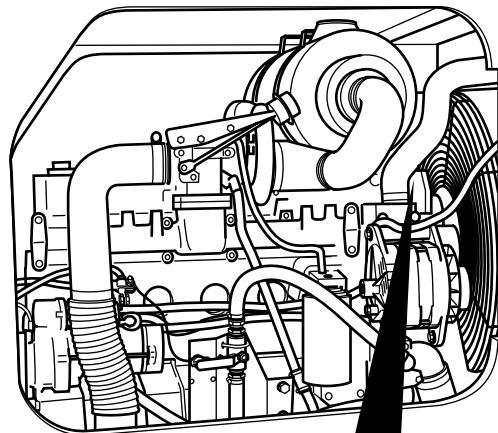
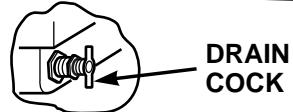
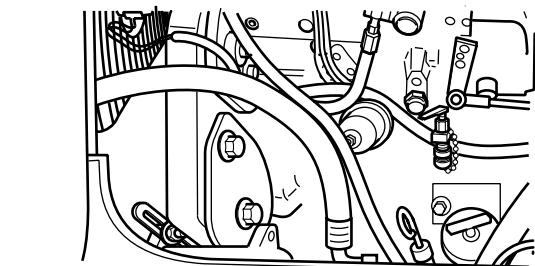
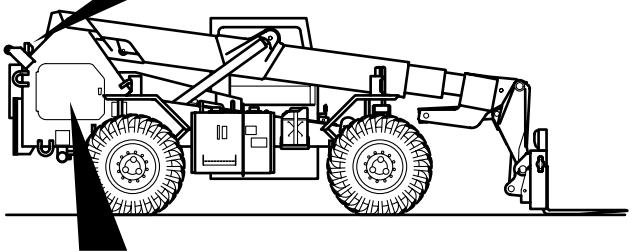
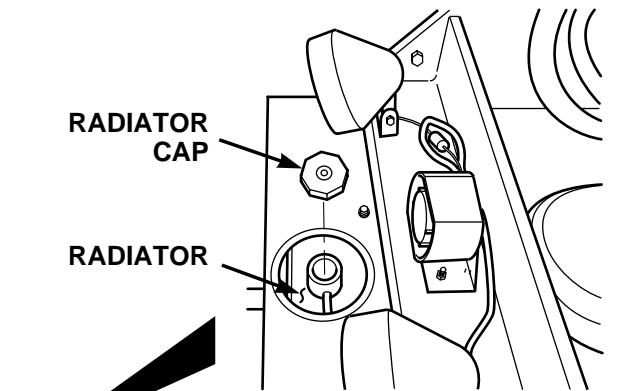
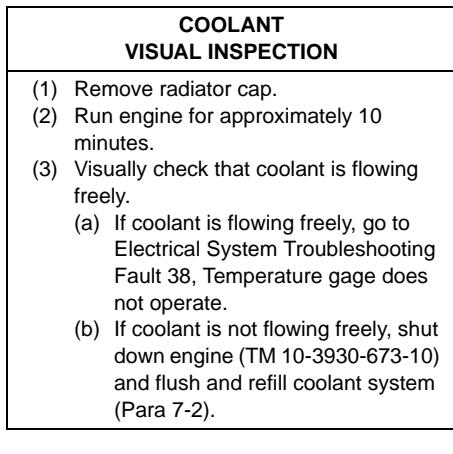
**THERMOSTAT  
VISUAL INSPECTION**

- (1) Shut down engine and let it cool to ambient temperature.
- (2) Relieve pressure on cooling system.
- (3) Remove thermostat. Inspect and test thermostat to determine if it is functioning (Para 7-3).
  - (a) If thermostat is functioning, reinstall thermostat and go to Step 2 of this fault.
  - (b) If thermostat is faulty, replace thermostat (Para 7-3).

**THERMOSTAT**

## 13. ENGINE WATER TEMPERATURE BELOW NORMAL (CONT.).





**14. ENGINE WATER TEMPERATURE ABOVE NORMAL.****INITIAL SETUP***Tools and Special Tools*

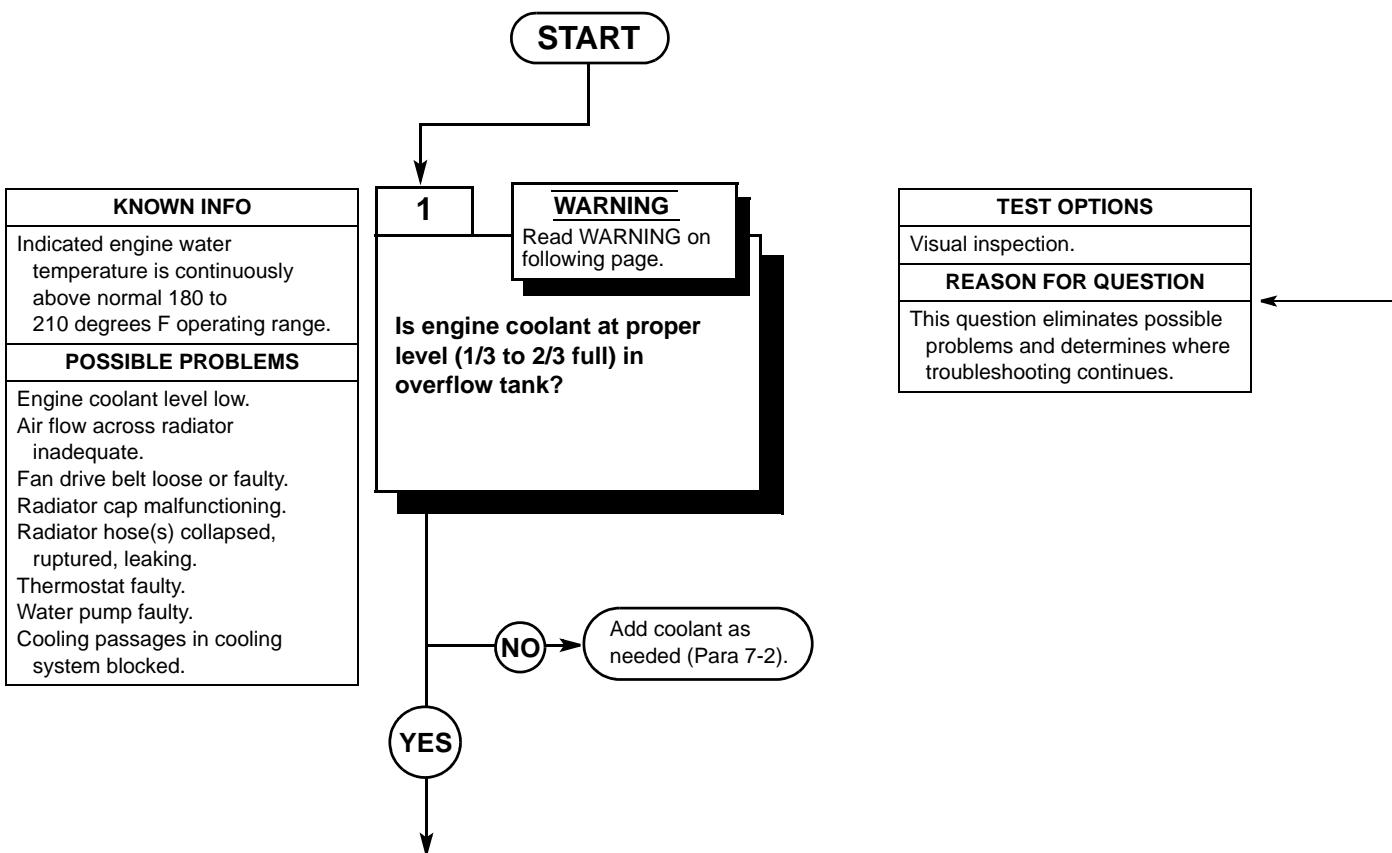
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.
- Cooling system is pressurized. Remove radiator cap slowly and only when engine is cool or painful burns could result.
- The engine and radiator can be extremely hot. Contacting exposed skin to these areas could result in severe burns.

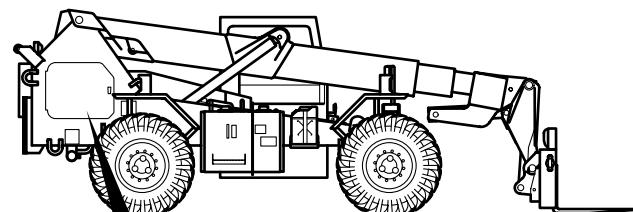
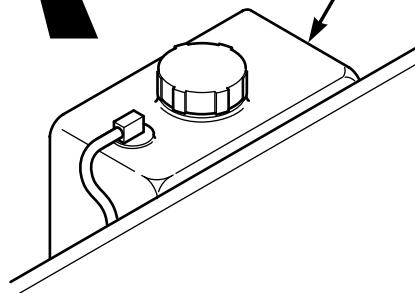
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**ENGINE COOLANT  
VISUAL INSPECTION**

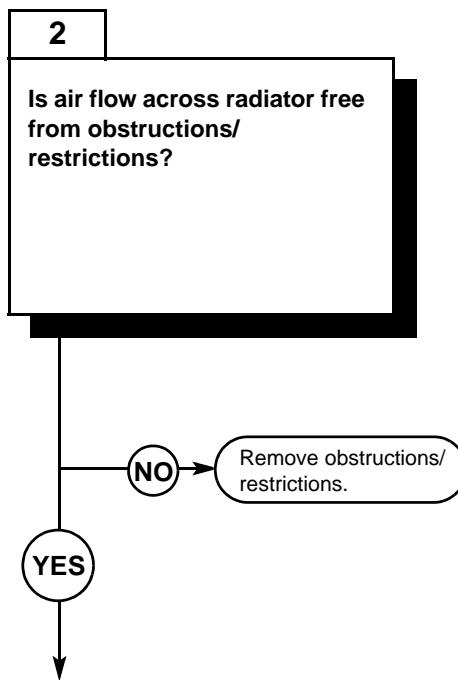
Visually check engine coolant level in overflow tank. Tank should be 1/3 to 2/3 full (Para 7-2).

- If tank is 1/3 to 2/3 full, go to Step 2 of this fault.
- If tank is not filled to proper level, add coolant as needed (Para 7-2).


**OVERFLOW  
TANK**


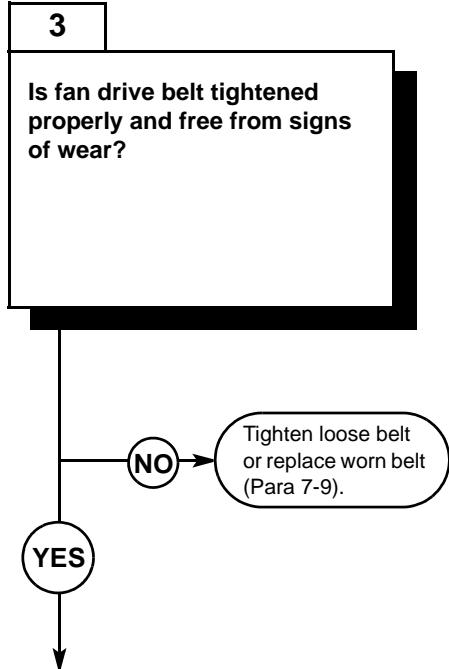
## 14. ENGINE WATER TEMPERATURE ABOVE NORMAL (CONT.).

KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK.
POSSIBLE PROBLEMS
Air flow across radiator inadequate. Fan drive belt loose or faulty. Radiator cap malfunctioning. Radiator hose(s) collapsed, ruptured, leaking. Thermostat faulty. Water pump faulty. Cooling passages in cooling system blocked.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air flow restricted, engine will overheat.

KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK. Air flow across radiator adequate.
POSSIBLE PROBLEMS
Fan drive belt loose or faulty. Radiator cap malfunctioning. Radiator hose(s) collapsed, ruptured, leaking. Thermostat faulty. Water pump faulty. Cooling passages in cooling system blocked.

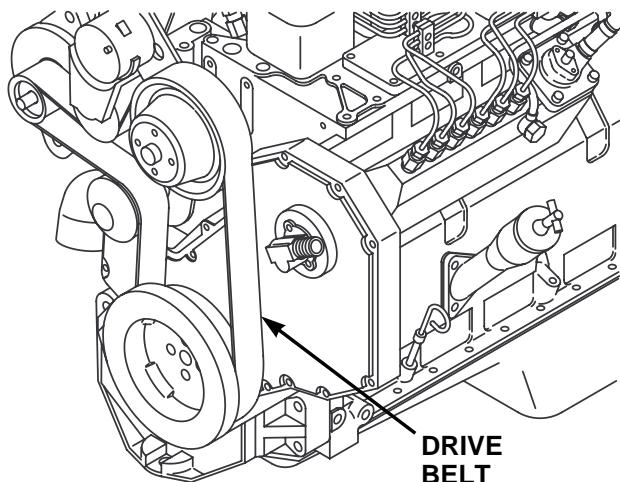


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If fan drive belt is loose or faulty, engine will run hot.

### RADIATOR FINS AND FAN VISUAL INSPECTION

Visually inspect radiator fins and fan for obstructions and/or restrictions that might restrict air flow.

- If there are no obstructions and/or restrictions, go to Step 3 of this fault.
- If there are obstructions and/or restrictions, shut down engine (TM 10-3930-673-10) and remove obstructions and/or restrictions.

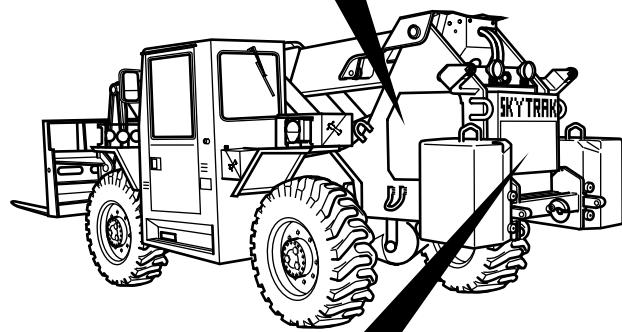


**DRIVE BELT**

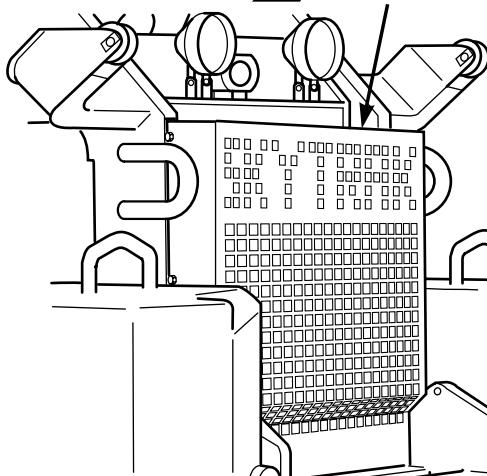
### FAN DRIVE BELT VISUAL INSPECTION

Visually inspect fan drive belt for tension and wear (cracks, frays, worn areas).

- If belt is properly adjusted and not severely worn, go to Step 4 of this fault.
- If belt is loose, shut down engine (TM 10-3930-673-10) and tighten belt. If belt is severely worn, replace belt (Para 7-9).

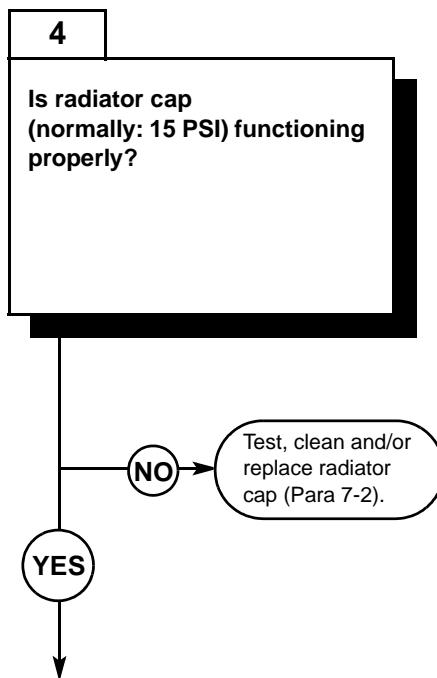


**RADIATOR**



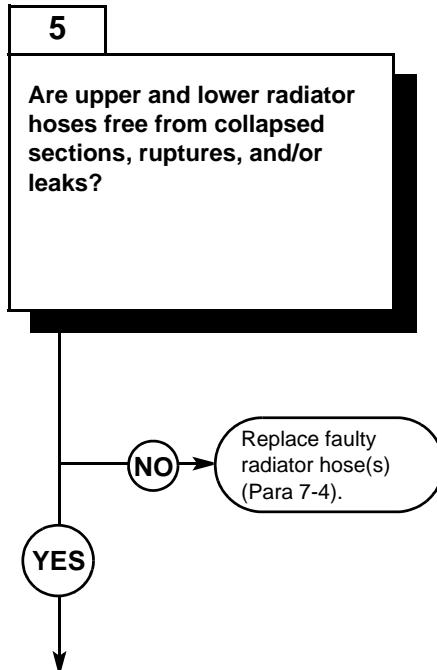
## 14. ENGINE WATER TEMPERATURE ABOVE NORMAL (CONT.).

KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK. Air flow across radiator adequate. Fan drive belt OK.
POSSIBLE PROBLEMS
Radiator cap malfunctioning. Radiator hose(s) collapsed, ruptured, leaking. Thermostat faulty. Water pump faulty. Cooling passages in cooling system blocked.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If radiator cap is malfunctioning, engine will run hot.

KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK. Air flow across radiator adequate. Fan drive belt OK. Radiator cap OK.
POSSIBLE PROBLEMS
Radiator hose(s) collapsed, ruptured, leaking. Thermostat faulty. Water pump faulty. Cooling passages in cooling system blocked.

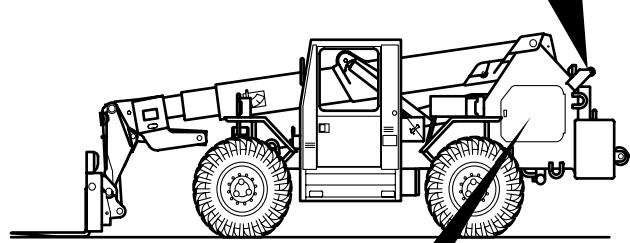
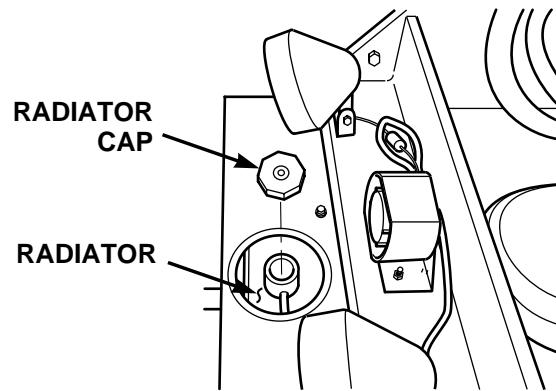


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If radiator hose(s) collapsed, ruptured, leaking, engine will overheat.

### RADIATOR CAP VISUAL INSPECTION

Use a known functioning radiator cap on the radiator.

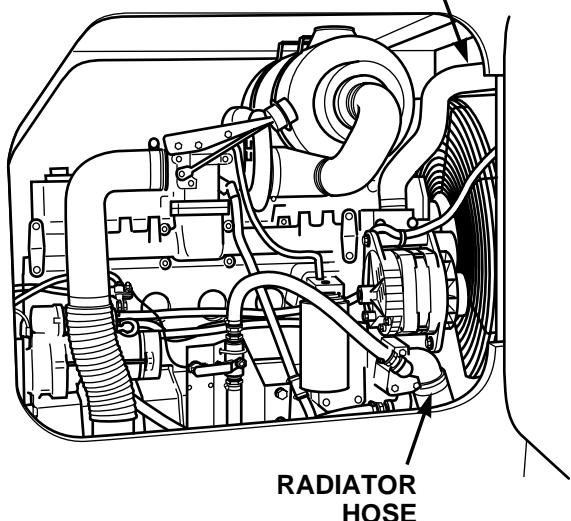
- (a) If engine water temperature continues above normal operating temperature, clean and reinstall original cap. Go to Step 5 of this fault.
- (b) If engine water temperature returns to normal temperature range, original cap faulty. Replace original cap (Para 7-2).



### RADIATOR HOSES VISUAL INSPECTION

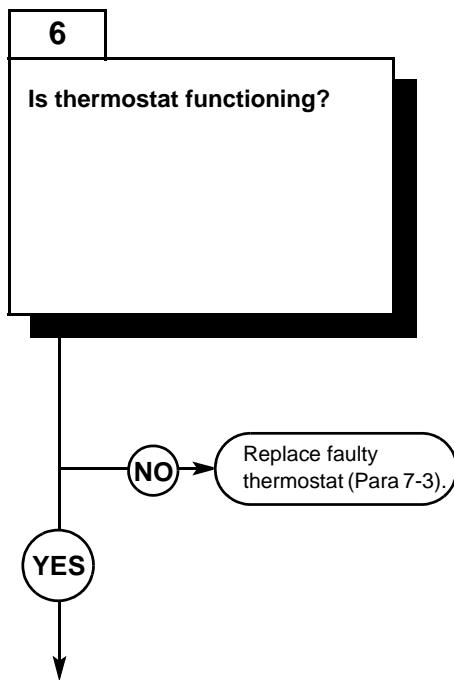
Visually inspect upper and lower radiator hoses for soft or collapsed sections, cracks or ruptures, and leaks.

- (a) If radiator hoses are free from soft or collapsed sections, cracks or ruptures, and leaks, go to Step 6 of this fault.
- (b) If hoses have soft sections, cracks or ruptures, and/or leaks, shut down engine (TM 10-3930-673-10) and replace the hoses (Para 7-4).



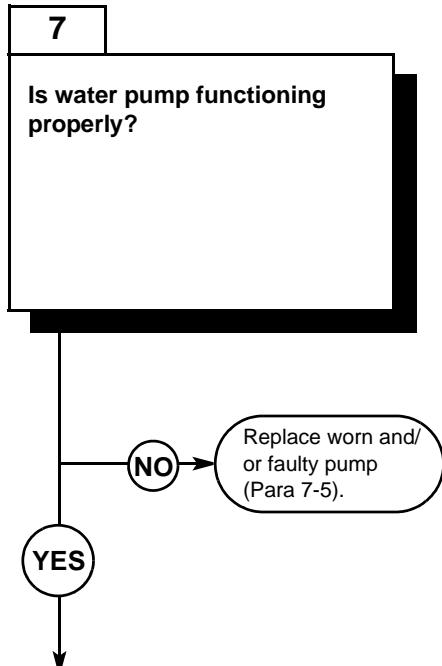
## 14. ENGINE WATER TEMPERATURE ABOVE NORMAL (CONT.).

KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK. Air flow across radiator adequate. Fan drive belt OK. Radiator cap OK. Radiator hose(s) OK.
POSSIBLE PROBLEMS
Thermostat faulty. Water pump faulty. Cooling passages in cooling system blocked.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If thermostat faulty, engine will overheat.

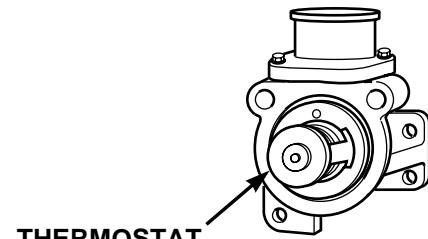
KNOWN INFO
Indicated engine water temperature is continuously above normal 180 to 210 degrees F operating range. Engine coolant level OK. Air flow across radiator adequate. Fan drive belt OK. Radiator cap OK. Radiator hose(s) OK. Thermostat OK.
POSSIBLE PROBLEMS
Water pump faulty. Cooling passages in cooling system blocked.



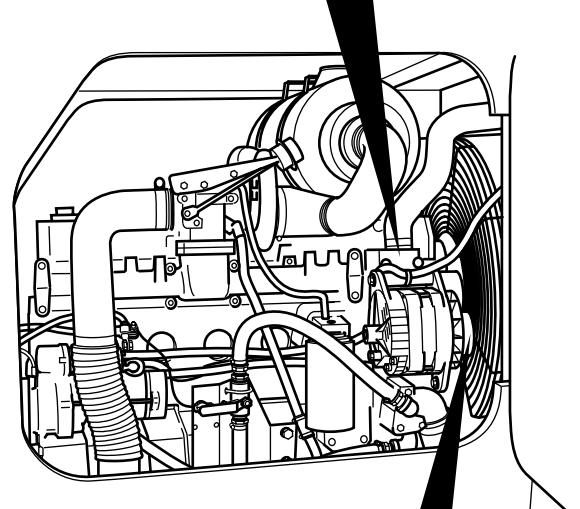
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If water pump faulty, engine will run hot.

**THERMOSTAT  
VISUAL INSPECTION**

- (1) Shut down engine (TM 10-3930-673-10) and let it cool to ambient temperature.
- (2) Relieve pressure on cooling system.
- (3) Remove, inspect, and test thermostat to determine if it is functioning (Para 7-3).
  - (a) If thermostat is functioning, reinstall thermostat and go to Step 7 of this fault.
  - (b) If thermostat is faulty, replace thermostat (Para 7-3).



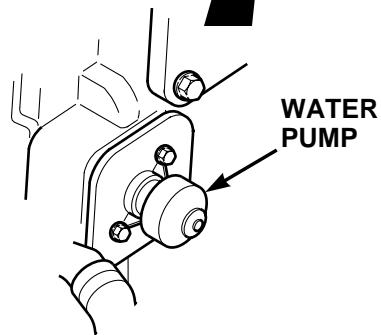
**THERMOSTAT**



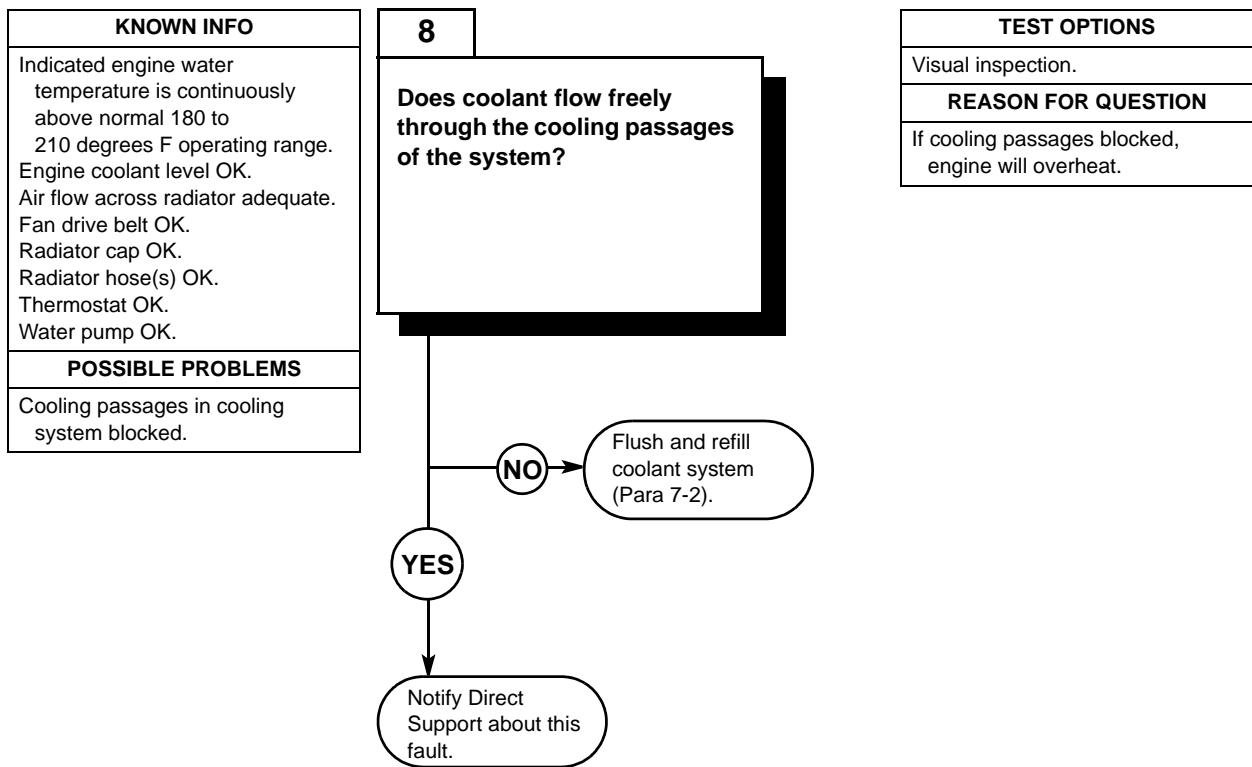
**WATER PUMP  
VISUAL INSPECTION**

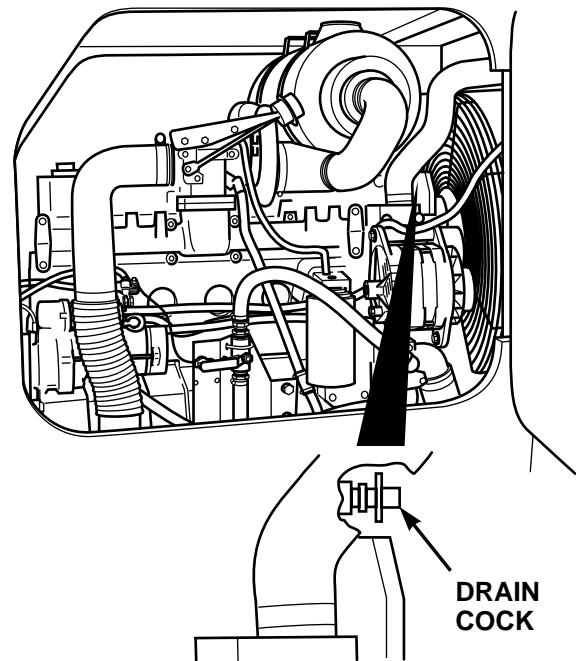
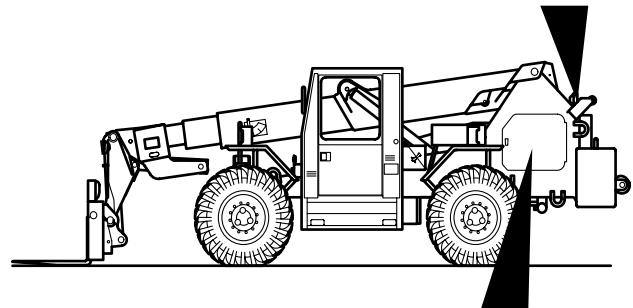
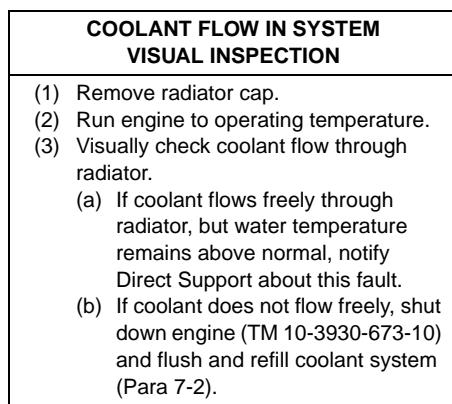
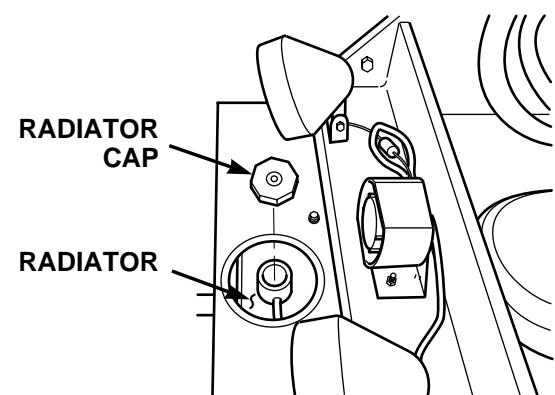
- Listen for rattles and/or squeals from water pump. Visually inspect water pump for leaks.
- (a) If pump is free from unusual noise and leaks, go to Step 8 of this fault.
  - (b) If pump makes unusual noise and/or leaks, pump worn and/or faulty. Shut down engine (TM 10-3930-673-10) and replace pump (Para 7-5).

**WATER PUMP**



## 14. ENGINE WATER TEMPERATURE ABOVE NORMAL (CONT.).





**15. TRANSMISSION OIL TEMPERATURE ABOVE NORMAL.****INITIAL SETUP***Tools and Special Tools*

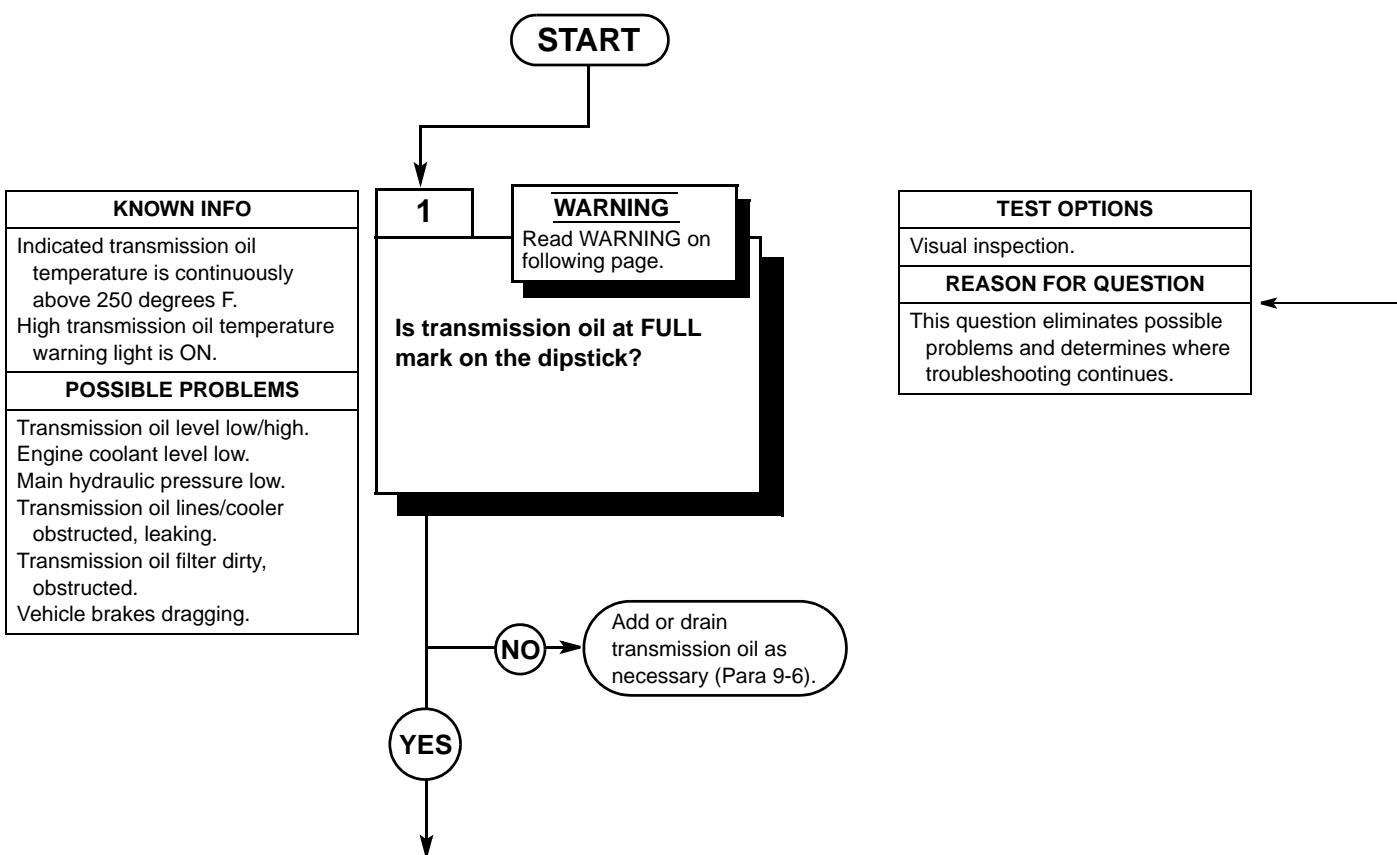
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Drycleaning solvent P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks, or open flame. Flash point of solvent is 138 degrees F (59 degrees C). Use only in a well-ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

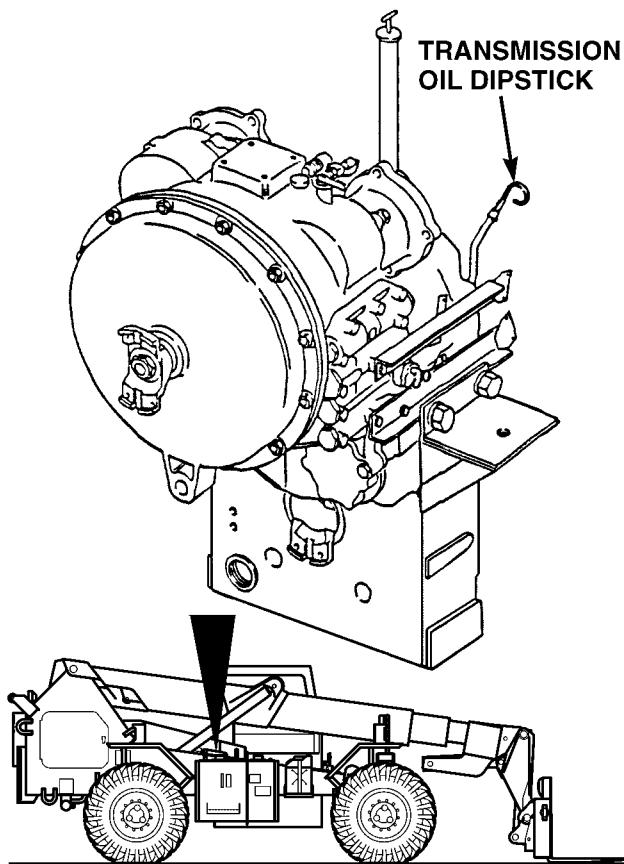
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**TRANSMISSION OIL  
VISUAL INSPECTION**

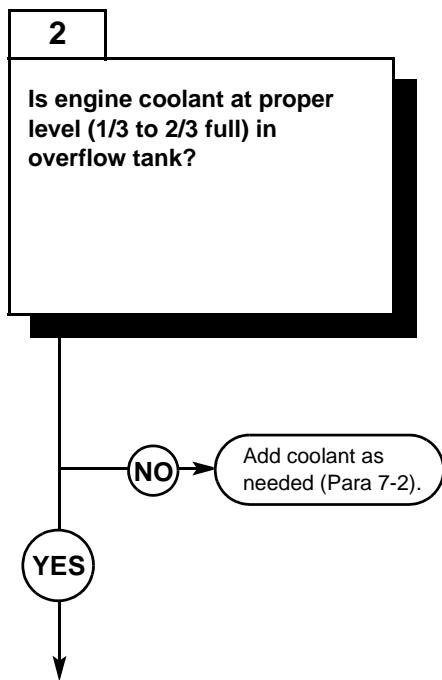
Check transmission oil level with dipstick. Transmission oil should be at or near FULL mark.

- If transmission oil at FULL mark, go to Step 2 of this fault.
- If transmission oil is at or near ADD mark, add transmission oil as necessary (Para 9-6).
- If transmission oil is above FULL mark, drain transmission oil to proper level (Para 9-6).



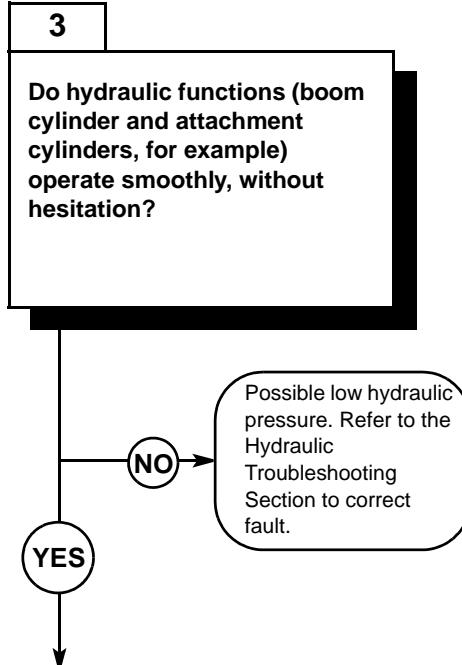
## 15. TRANSMISSION OIL TEMPERATURE ABOVE NORMAL (CONT.).

KNOWN INFO
Indicated transmission oil temperature is continuously above 250 degrees F. High transmission oil temperature warning light is ON. Transmission oil level OK.
POSSIBLE PROBLEMS
Engine coolant level low. Main hydraulic pressure low. Transmission oil lines/cooler obstructed, leaking. Transmission oil filter dirty, obstructed. Vehicle brakes dragging.



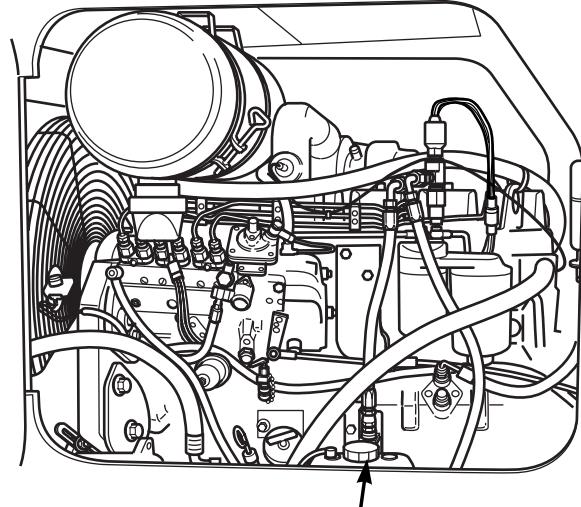
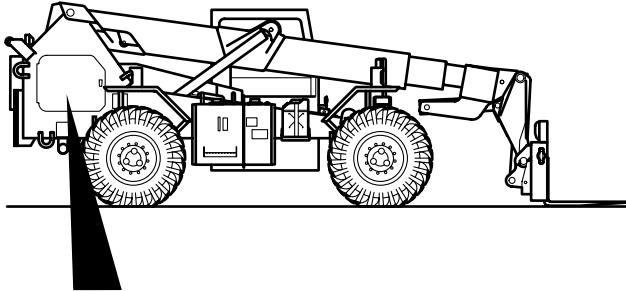
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If engine coolant level low, engine will run hot.

KNOWN INFO
Indicated transmission oil temperature is continuously above 250 degrees F. High transmission oil temperature warning light is ON. Transmission oil level OK. Engine coolant level OK.
POSSIBLE PROBLEMS
Main hydraulic pressure low. Transmission oil lines/cooler obstructed, leaking. Transmission oil filter dirty, obstructed. Vehicle brakes dragging.

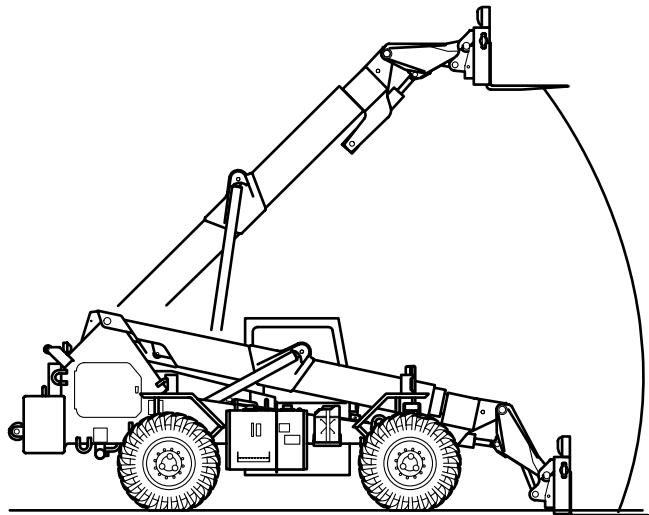


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If hydraulic functions operate slowly and/or jerk, hydraulic pressure is low.

<b>ENGINE COOLANT VISUAL INSPECTION</b>
Visually check engine coolant level in overflow tank. Tank should be 1/3 to 2/3 full (Para 7-2).
(a) If tank is 1/3 to 2/3 full, go to Step 3 of this fault. (b) If tank is not filled to proper level, add coolant as needed (Para 7-2).

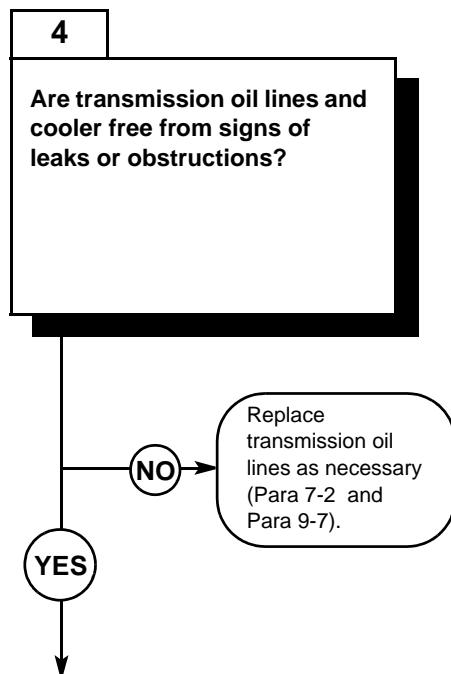
**OVERFLOW TANK**

<b>HYDRAULIC PRESSURE VISUAL INSPECTION</b>
Operate hydraulic functions (boom cylinder, attachment cylinders, for example) to check hydraulic pressure.
(a) If functions operate smoothly, without hesitation, go to Step 4 of this fault. (b) If functions are sluggish, hesitate, or jerk, hydraulic pressure may be low. Refer to the Hydraulic Troubleshooting Section to correct fault.



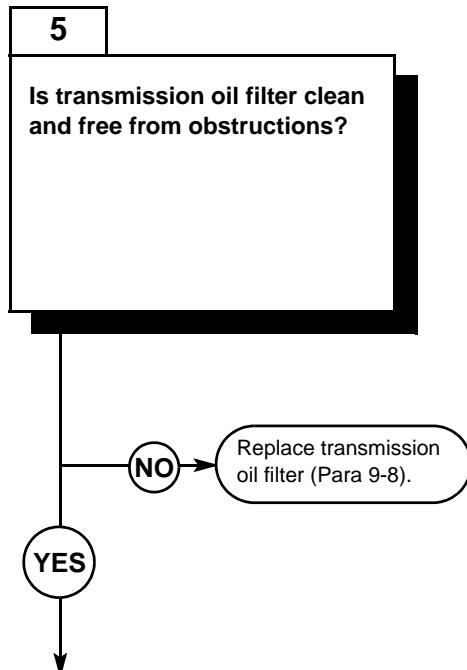
## 15. TRANSMISSION OIL TEMPERATURE ABOVE NORMAL (CONT.).

KNOWN INFO
Indicated transmission oil temperature is continuously above 250 degrees F. High transmission oil temperature warning light is ON. Transmission oil level OK. Engine coolant level OK. Main hydraulic pressure OK.
POSSIBLE PROBLEMS
Transmission oil lines/cooler obstructed, leaking. Transmission oil filter dirty, obstructed. Vehicle brakes dragging.



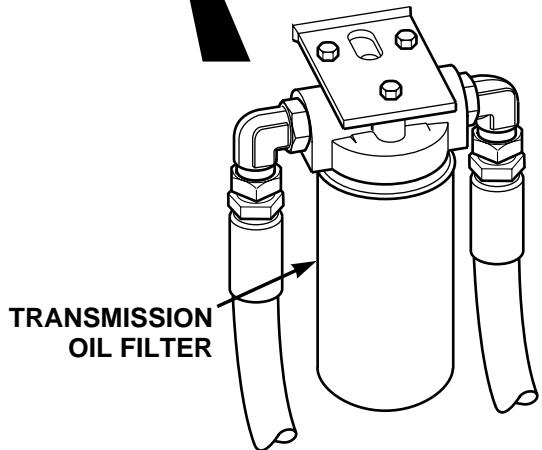
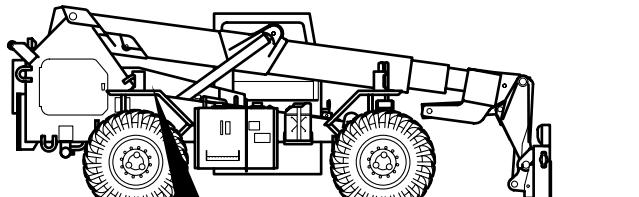
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If transmission oil lines and/or cooler obstructed or leaking, transmission will run hot.

KNOWN INFO
Indicated transmission oil temperature is continuously above 250 degrees F. High transmission oil temperature warning light is ON. Transmission oil level OK. Engine coolant level OK. Main hydraulic pressure OK. Transmission oil lines, cooler OK.
POSSIBLE PROBLEMS
Transmission oil filter dirty, obstructed. Vehicle brakes dragging.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If transmission oil filter is dirty or obstructed, transmission oil will overheat.

<b>TRANSMISSION OIL LINES AND COOLER VISUAL INSPECTION</b>
Visually inspect transmission oil lines and cooler for signs of damage and leaks or obstructions. <ul style="list-style-type: none"><li>(a) If lines and cooler are tight, clean, and undamaged, go to Step 5 of this fault.</li><li>(b) If lines and/or cooler show signs of damage and/or leaks, replace components as necessary (Para 9-7).</li></ul>

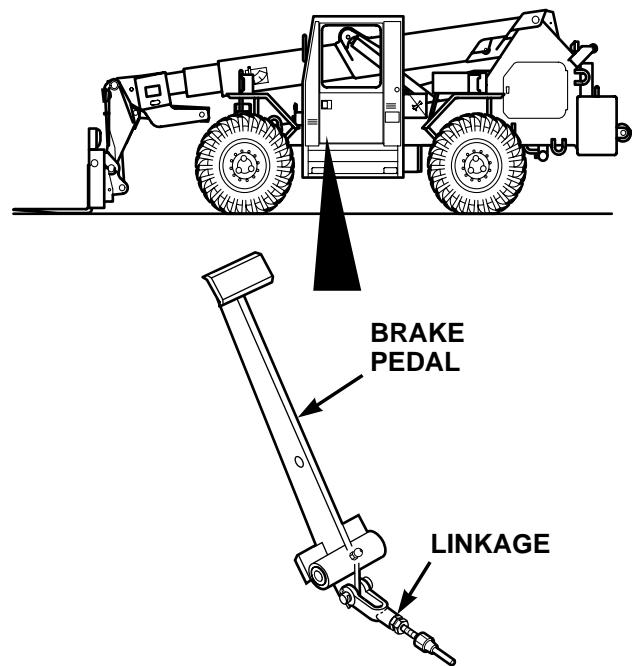


<b>TRANSMISSION OIL FILTER VISUAL INSPECTION</b>
Check transmission oil filter for dirt, damage, and/or obstructions. <ul style="list-style-type: none"><li>(a) If oil flows freely through filter, go to Step 6 of this fault.</li><li>(b) If oil does not flow freely through filter (filter obstructed and/or damaged), replace transmission oil filter (Para 9-8).</li></ul>

#### **15. TRANSMISSION OIL TEMPERATURE ABOVE NORMAL (CONT.).**

KNOWN INFO	6	TEST OPTIONS
<p>Indicated transmission oil temperature is continuously above 250 degrees F.</p> <p>High transmission oil temperature warning light is ON.</p> <p>Transmission oil level OK.</p> <p>Engine coolant level OK.</p> <p>Main hydraulic pressure OK.</p> <p>Transmission oil lines, cooler OK.</p> <p>Transmission oil filter OK.</p>	<p><b>Are vehicle brakes functioning correctly?</b></p>	<p>Visual inspection.</p>
POSSIBLE PROBLEMS		REASON FOR QUESTION
<p>Vehicle brakes dragging.</p>		<p>If vehicle brakes dragging, refer to the Brakes Troubleshooting Sections to correct this fault.</p>
	<pre> graph TD     A[Are vehicle brakes functioning correctly?] -- NO --&gt; B{Refer to the Service and Parking Brakes Troubleshooting Sections to correct this fault.}     A -- YES --&gt; C{Replace transmission oil filter. If fault not corrected, notify Direct Support about this fault.}   </pre>	

<b>VEHICLE BRAKES VISUAL INSPECTION</b>
Check that vehicle brake pedal returns to full up position, and that park brake linkage is adjusted correctly.
(a) If vehicle brakes are functioning correctly, replace transmission oil filter. If fault not corrected, notify Direct Support. (b) If vehicle brakes are not functioning correctly, refer to the Service and Parking Brakes Troubleshooting Sections to correct this fault.



**16. TRANSMISSION DISCONNECT SLOW OR MALFUNCTIONING.****INITIAL SETUP***Tools and Special Tools*

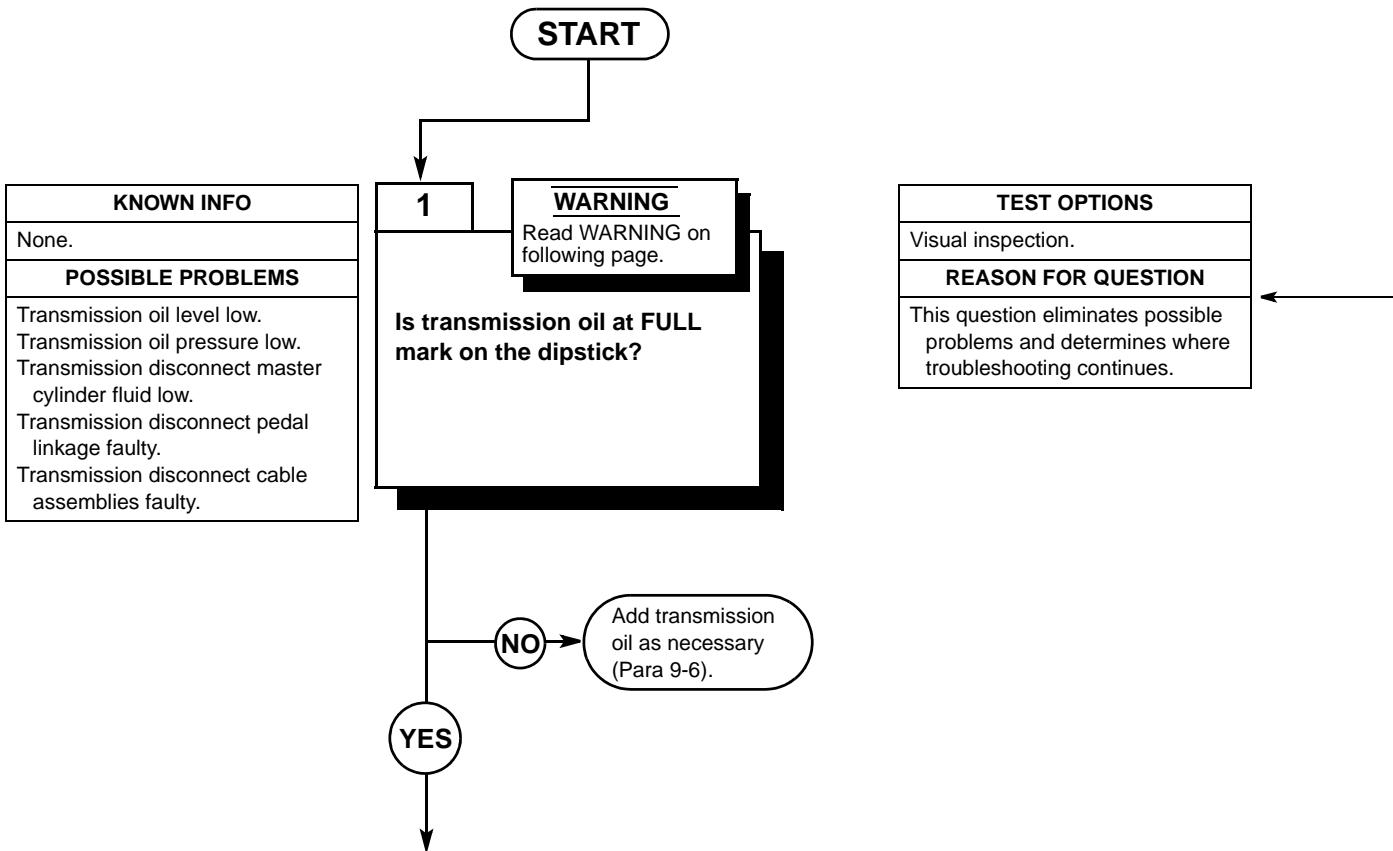
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

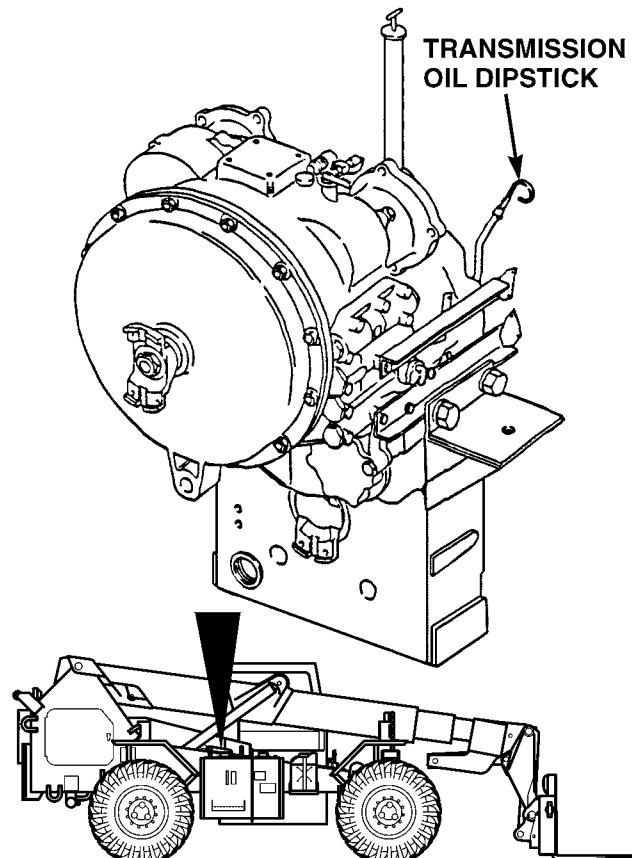
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

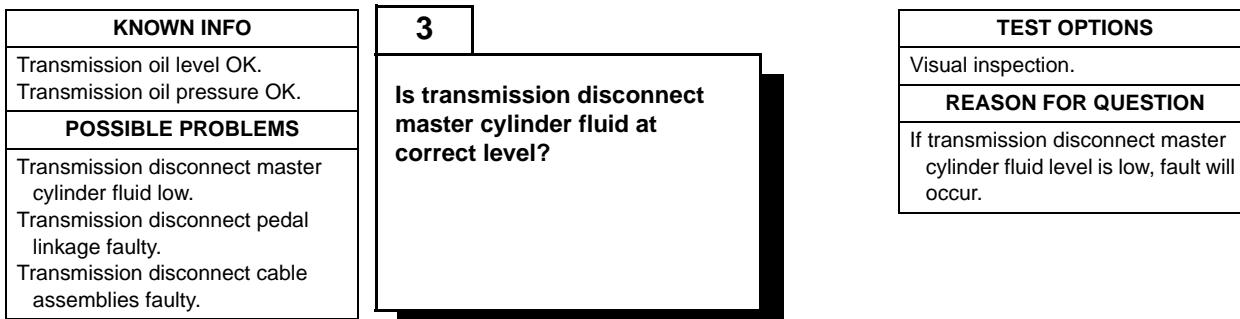
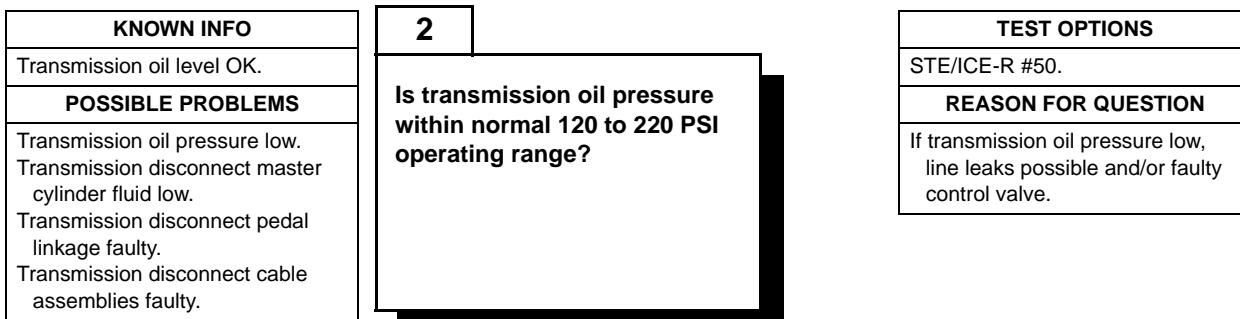
**TRANSMISSION OIL  
VISUAL INSPECTION**

Check transmission oil level with dipstick.  
Transmission oil should be at or near FULL mark.

- If transmission oil at FULL mark, go to Step 2 of this fault.
- If transmission oil is at or near ADD mark, add transmission oil as necessary (Para 9-6).

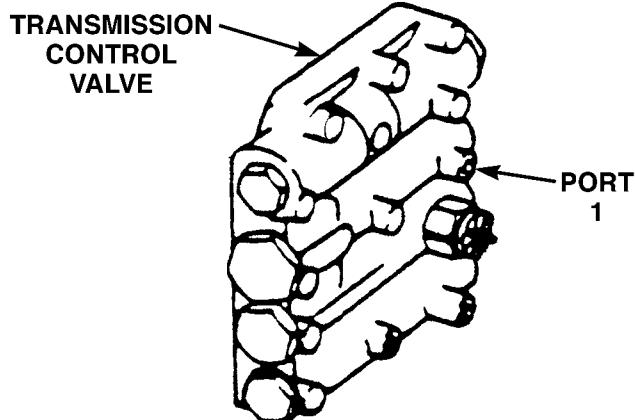
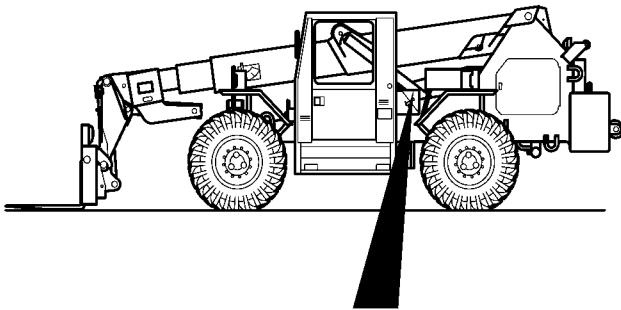


## 16. TRANSMISSION DISCONNECT SLOW OR MALFUNCTIONING (CONT.).



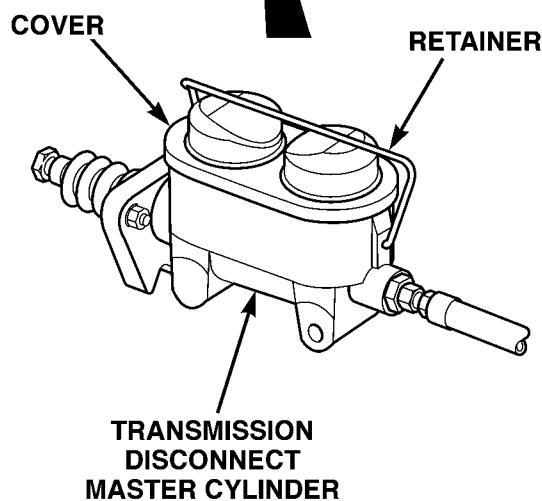
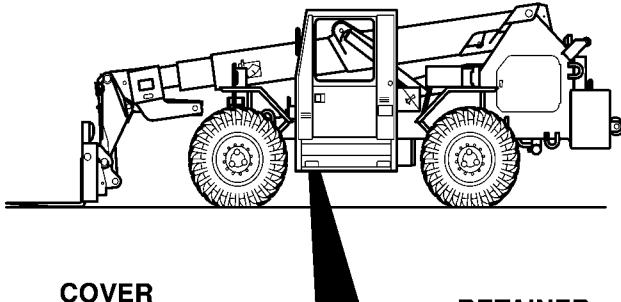
**TRANSMISSION OIL PRESSURE  
STE/ICE PRESSURE TEST**

- (1) Install STE/ICE test device on port number 1 of transmission control valve.
- (2) Perform STE/ICE Test #50 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If pressure is within 120 to 220 PSI at 2000 RPM, go to Step 3 of this fault.
  - (b) If pressure is below specified range, check for leaks along transmission lines, or for faulty control valve. Shut down engine (TM 10-3930-673-10) and replace components as necessary (Para 9-6 and Para 9-10).


**TRANSMISSION DISCONNECT  
MASTER CYLINDER  
VISUAL INSPECTION**

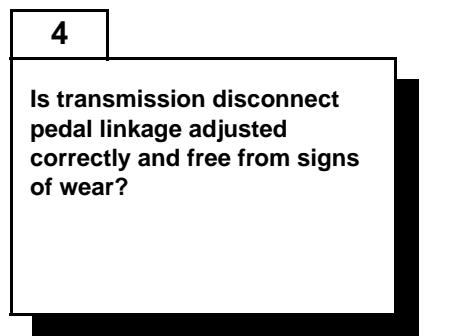
Loosen retainer and remove cover from transmission disconnect master cylinder.

- (a) If fluid level is below 1/4 in. (6.35 mm) of top, service transmission disconnect master cylinder fluid level (LO 10-3930-673-12).
- (b) If fluid level is within 1/4 in. (6.35 mm) of top, install cover with retainer. Go to Step 4 of this fault.



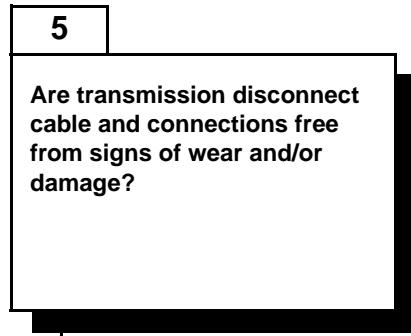
## 16. TRANSMISSION DISCONNECT SLOW OR MALFUNCTIONING (CONT.).

KNOWN INFO
Transmission oil level OK. Transmission oil pressure OK. Transmission disconnect master cylinder fluid level OK.
POSSIBLE PROBLEMS
Transmission disconnect pedal linkage faulty. Transmission disconnect cable assemblies faulty.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If transmission disconnect pedal linkage worn or faulty, transmission disconnect will malfunction.

KNOWN INFO
Transmission oil level OK. Transmission oil pressure OK. Transmission disconnect master cylinder fluid level OK. Transmission disconnect pedal linkage OK.
POSSIBLE PROBLEMS
Transmission disconnect cable assemblies faulty.

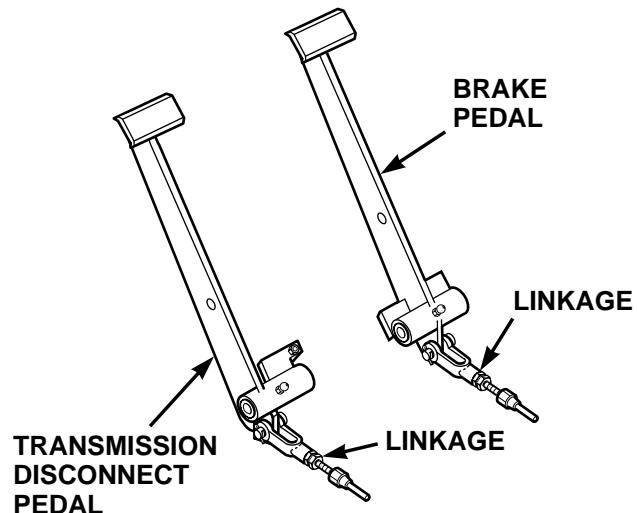
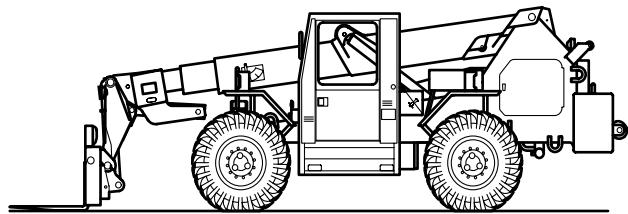


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If transmission disconnect cable and connections worn or damaged, transmission disconnect will malfunction.

**TRANSMISSION DISCONNECT PEDAL  
LINKAGE  
VISUAL INSPECTION**

Visually inspect transmission disconnect pedal linkage for incorrect adjustment and/or signs of wear.

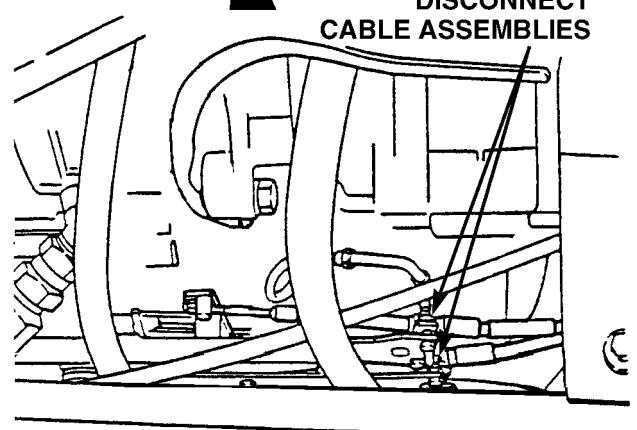
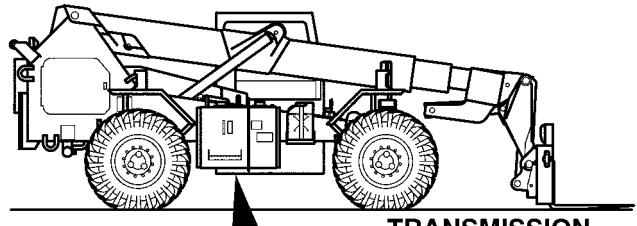
- (a) If linkage is correctly adjusted and free from signs of wear, go to Step 5 of this fault.
- (b) If linkage is incorrectly adjusted, readjust linkage (Para 9-4). If linkage shows signs of wear, replace worn components (Para 9-4).



**TRANSMISSION DISCONNECT CABLE  
AND CONNECTIONS  
VISUAL INSPECTION**

Visually inspect transmission disconnect cable and connections for wear and/or damage.

- (a) If cable and/or connections show no signs of wear or damage, notify Direct Support about this fault.
- (b) If cable and/or connections show signs of wear and/or damage, replace worn or damaged cable and/or connections (Para 9-3).



**17. STEERING PULLS TO RIGHT OR LEFT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 Multimeter, Digital (Item 9, Appendix F)  
 Pressure Gage, 0 to 5000 PSI  
 (Item 6, Appendix F)

*Personnel Required*

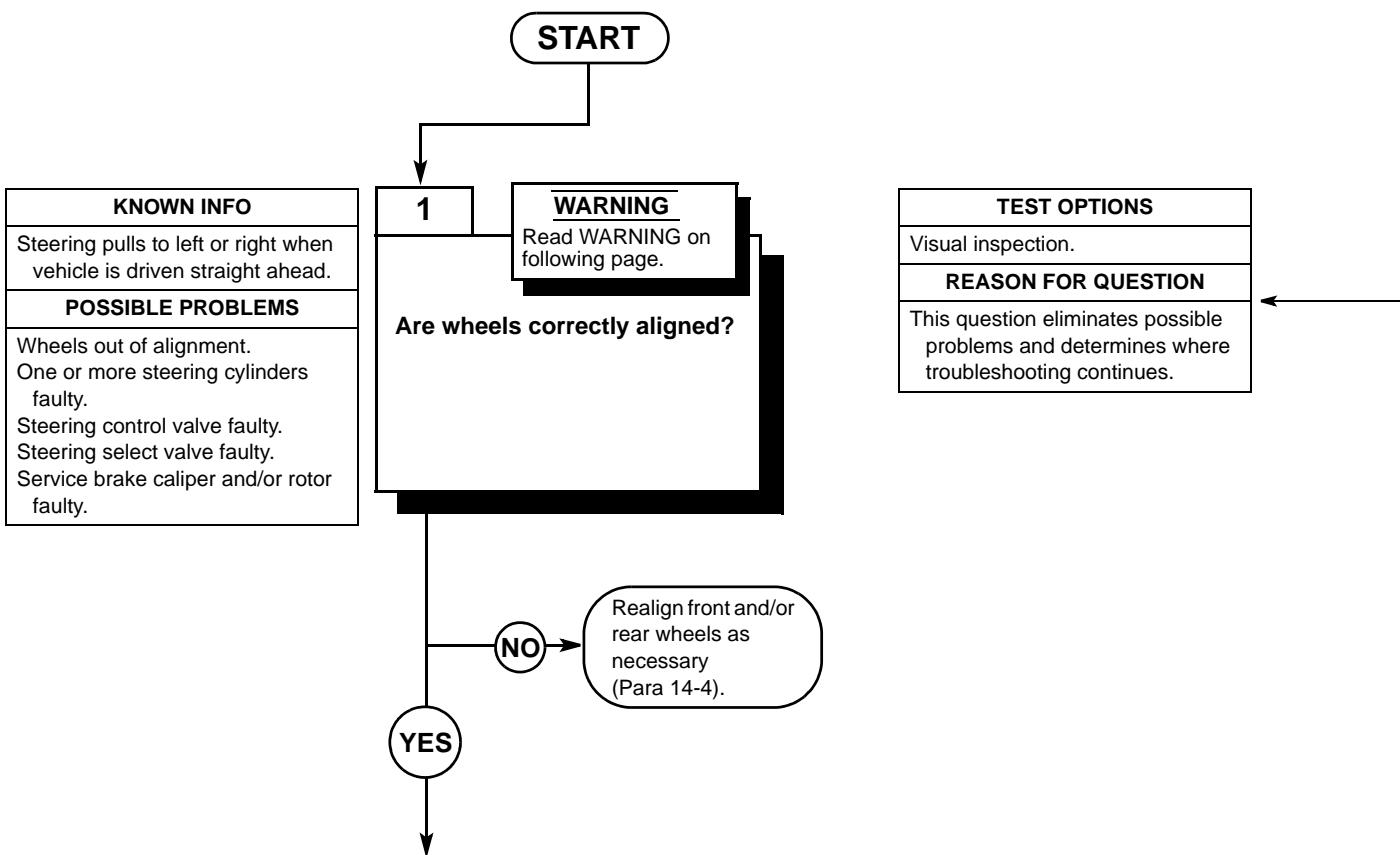
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Hydraulic oil in the system can be under pressure over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

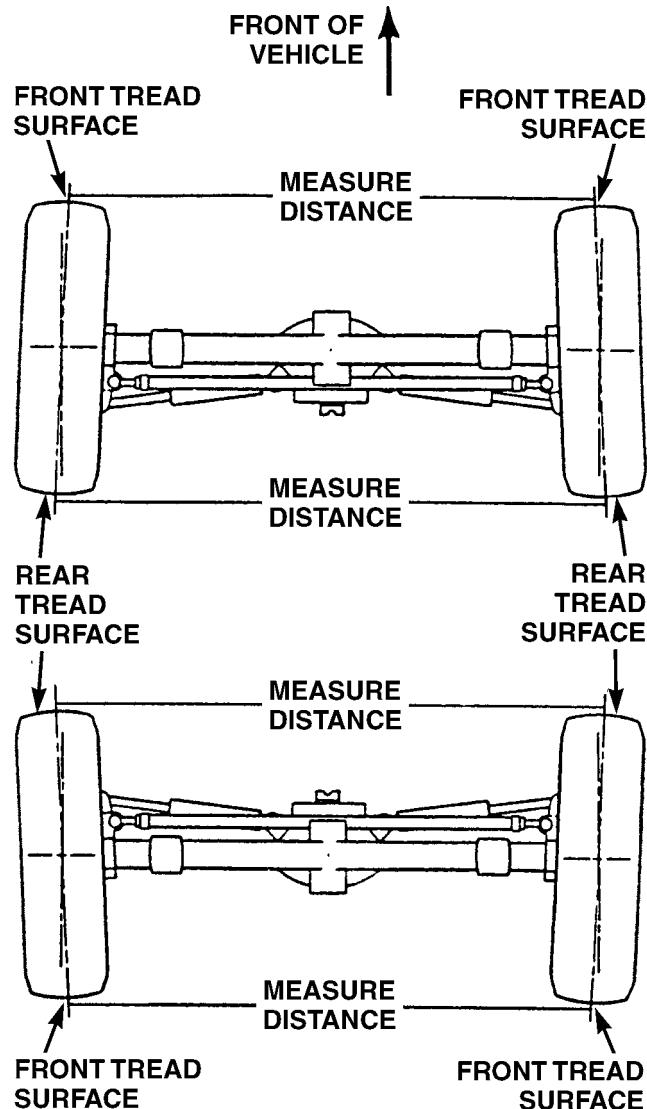
**CAUTION**

- Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines.
- Contamination of the hydraulic system could result in premature failure.

**FRONT AND/OR REAR WHEEL ALIGNMENT VISUAL INSPECTION**

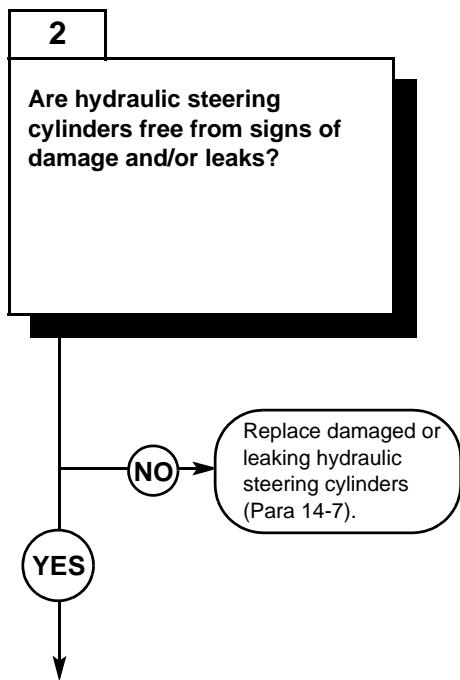
Measure distances between front tread surfaces of front and/or rear wheels, and distances between rear tread surfaces of wheels to determine if front and/or rear wheels are correctly aligned (Para 14-4).

- If distances between the front tread surfaces and rear tread surfaces of wheels are within 1/8 in., go to Step 2 of this fault.
- If distances between the front tread surfaces and rear tread surfaces of wheels are greater than 1/8 in., adjust tie rods to realign wheels (Para 14-4).



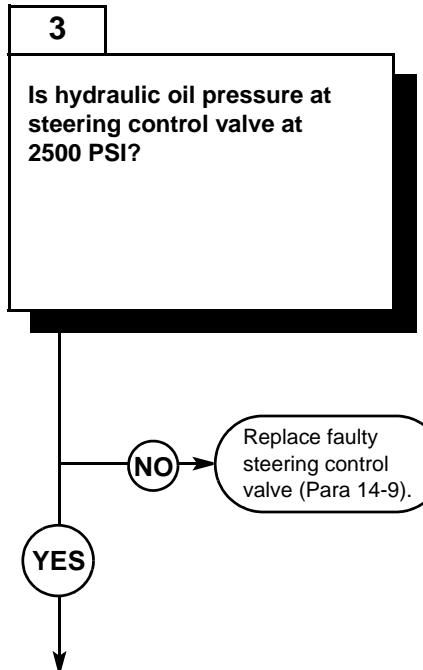
## 17. STEERING PULLS TO RIGHT OR LEFT (CONT.).

KNOWN INFO
Steering pulls to left or right when vehicle is driven straight ahead. Wheel alignment OK.
POSSIBLE PROBLEMS
One or more steering cylinders faulty. Steering control valve faulty. Steering select valve faulty. Service brake caliper and/or rotor faulty.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If one or more steering cylinders faulty, steering will pull to right or left.

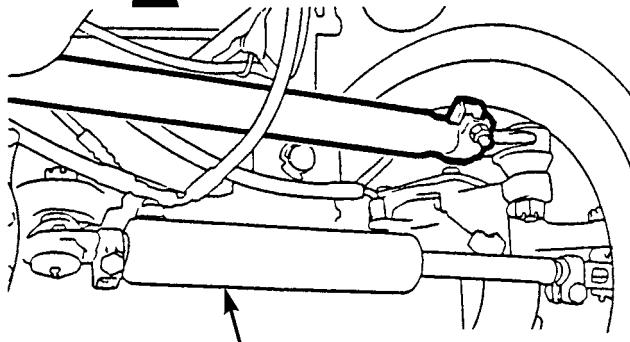
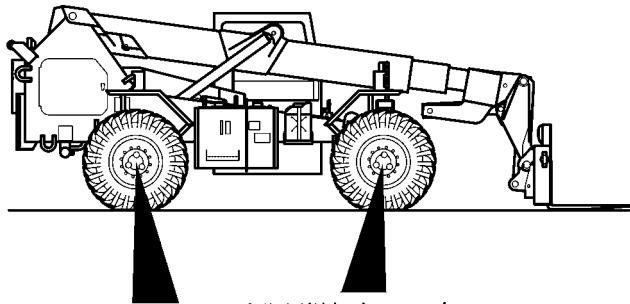
KNOWN INFO
Steering pulls to left or right when vehicle is driven straight ahead. Wheel alignment OK. Hydraulic steering cylinders OK.
POSSIBLE PROBLEMS
Steering control valve faulty. Steering select valve faulty. Service brake caliper and/or rotor faulty.



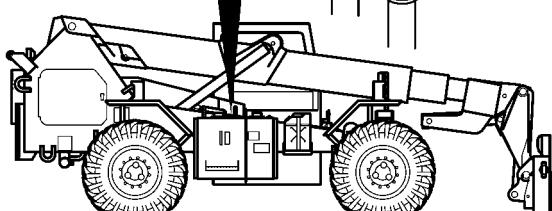
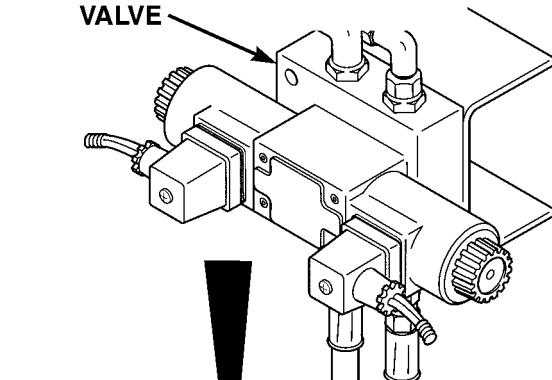
TEST OPTIONS
Visual inspection. Pressure test.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2500 PSI, priority valve is faulty.

### HYDRAULIC STEERING CYLINDERS VISUAL INSPECTION

- Visually inspect hydraulic steering cylinders for signs of damage and/or leaks.
- If there are no signs of damage or leaks, go to Step 3 of this fault.
  - If there are signs of damage and/or leaks replace cylinders as necessary (Para 14-7).

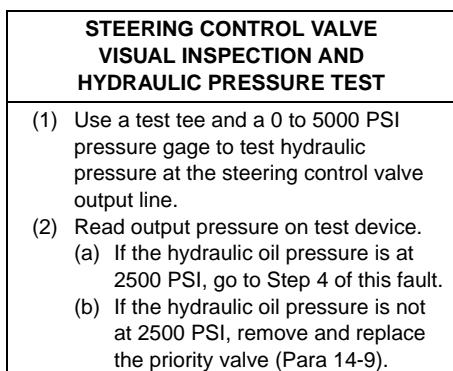


PRIORITY  
VALVE



### STEERING CONTROL VALVE VISUAL INSPECTION AND HYDRAULIC PRESSURE TEST

- Use a test tee and a 0 to 5000 PSI pressure gage to test hydraulic pressure at the steering control valve output line.
- Read output pressure on test device.
  - If the hydraulic oil pressure is at 2500 PSI, go to Step 4 of this fault.
  - If the hydraulic oil pressure is not at 2500 PSI, remove and replace the priority valve (Para 14-9).



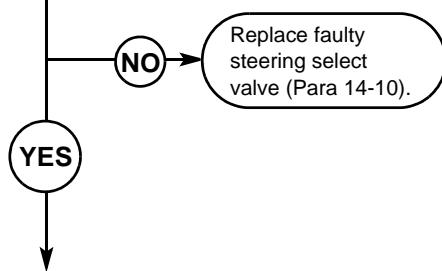
## 17. STEERING PULLS TO RIGHT OR LEFT (CONT.).

KNOWN INFO
Steering pulls to left or right when vehicle is driven straight ahead. Wheel alignment OK. Hydraulic steering cylinders OK. Steering control valve OK.
POSSIBLE PROBLEMS
Steering select valve faulty. Service brake caliper and/or rotor faulty.

**4**

Is continuity indicated at solenoids on the steering select valve?

TEST OPTIONS
Visual inspection. Continuity test.
REASON FOR QUESTION
If continuity is not indicated at solenoids, faulty steering select valve.

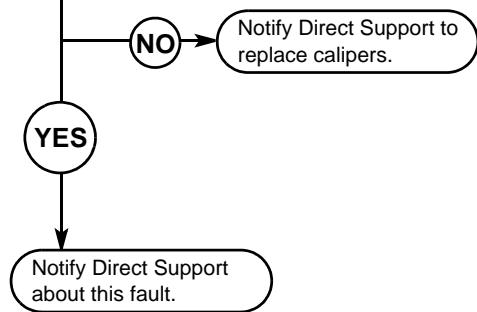


KNOWN INFO
Steering pulls to left or right when vehicle is driven straight ahead. Wheel alignment OK. Hydraulic steering cylinders OK. Steering control valve OK. Steering select valve OK.
POSSIBLE PROBLEMS
Service brake caliper and/or rotor faulty.

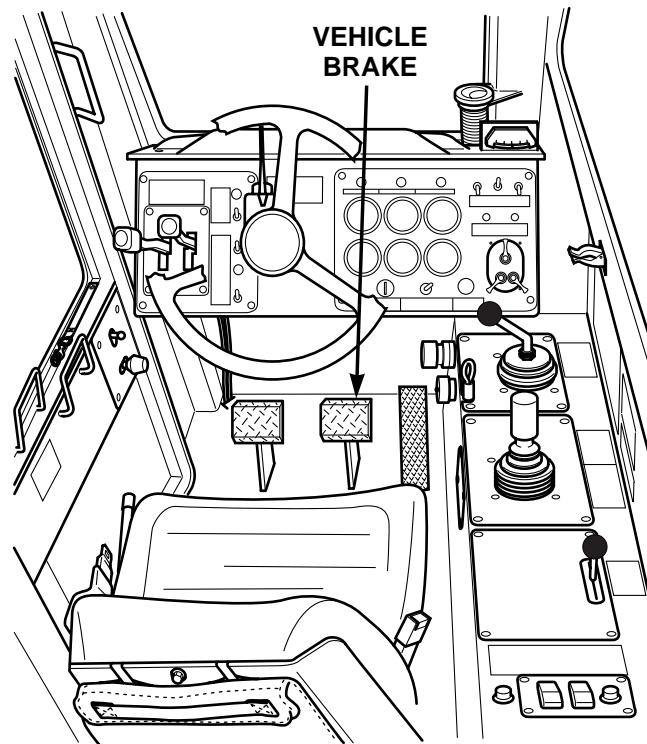
**5**

Are vehicle brakes functioning correctly (not binding or dragging)?

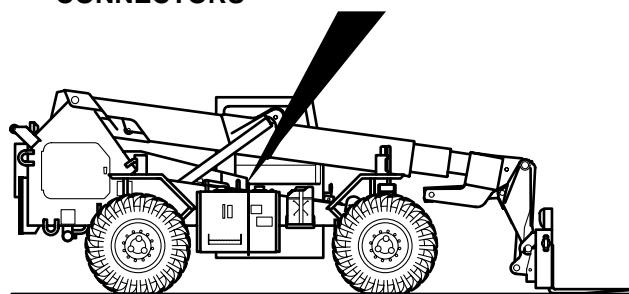
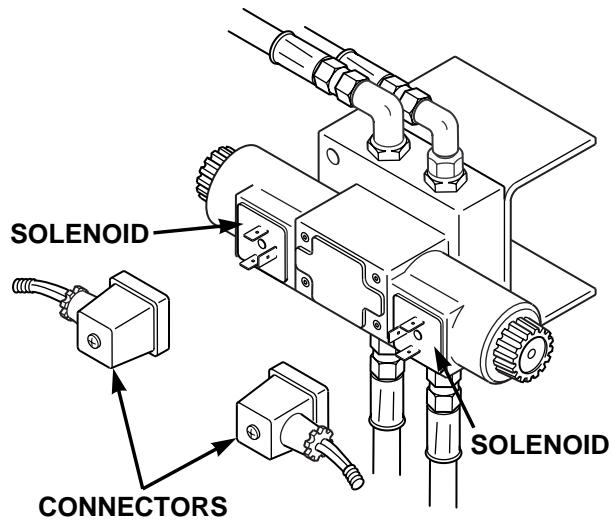
TEST OPTIONS
Visual inspections.
REASON FOR QUESTION
If brake calipers or rotors binding or faulty, notify Direct Support to replace calipers.



<b>SOLENOIDS AT STEERING SELECT VALVE CONTINUITY TEST</b>	
(1)	Set multimeter to ohms.
(2)	Perform a continuity test on solenoids at the steering select valve.
(3)	Read output of multimeter.
(a)	If multimeter indicates continuity, go to Step 5 of this fault.
(b)	If continuity is not indicated, replace steering select valve (Para 14-10).



<b>BRAKES VISUAL INSPECTION</b>	
Operate brakes to test brake calipers, rotors for binding and/or dragging.	
(a)	If brakes functioning correctly, notify Direct Support about this fault.
(b)	If one or more service brakes binding, dragging, notify Direct Support to replace calipers and/or rotors.



**18. SERVICE BRAKES CHATTER, ARE NOISY.****INITIAL SETUP***Tools and Special Tools*

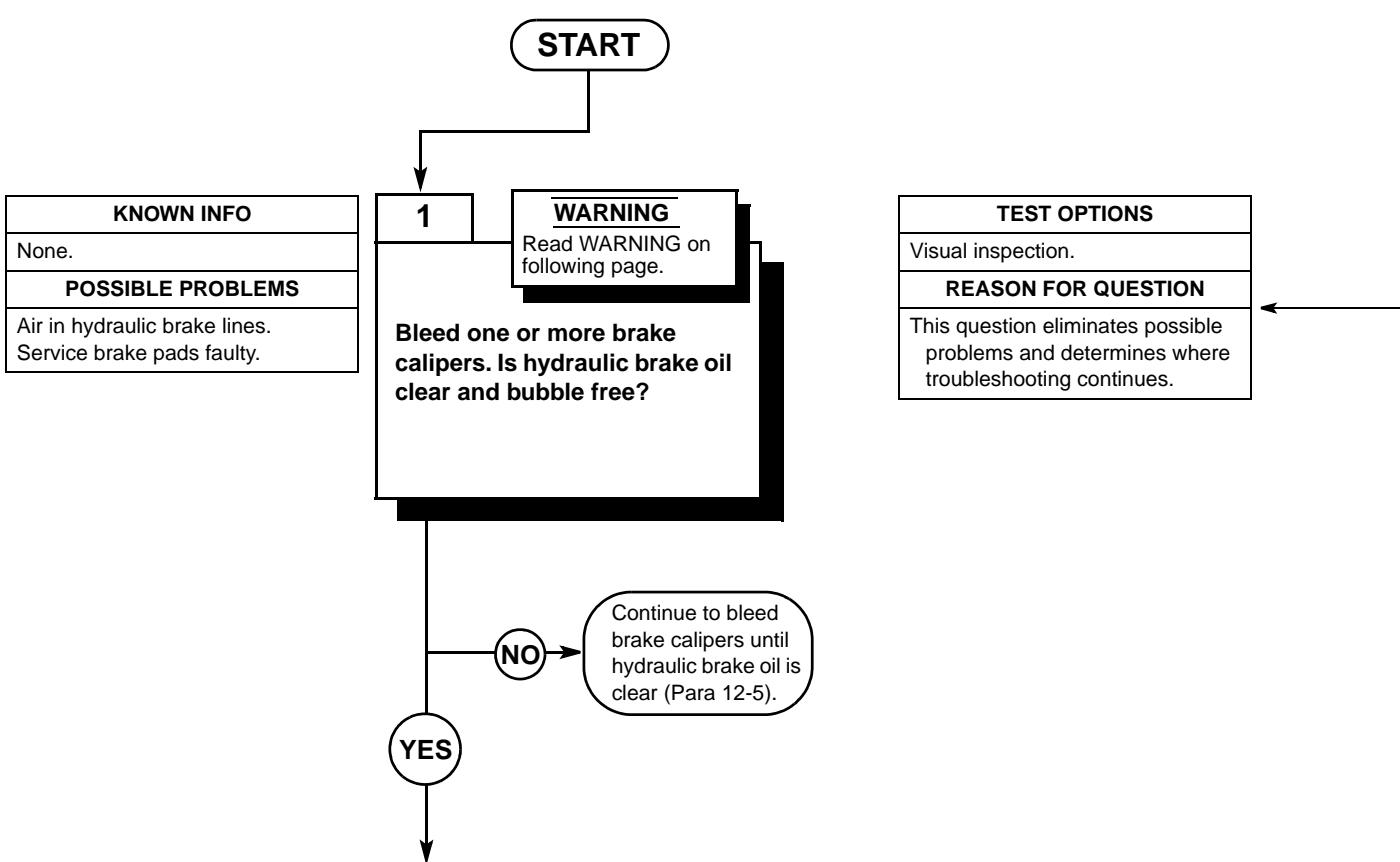
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



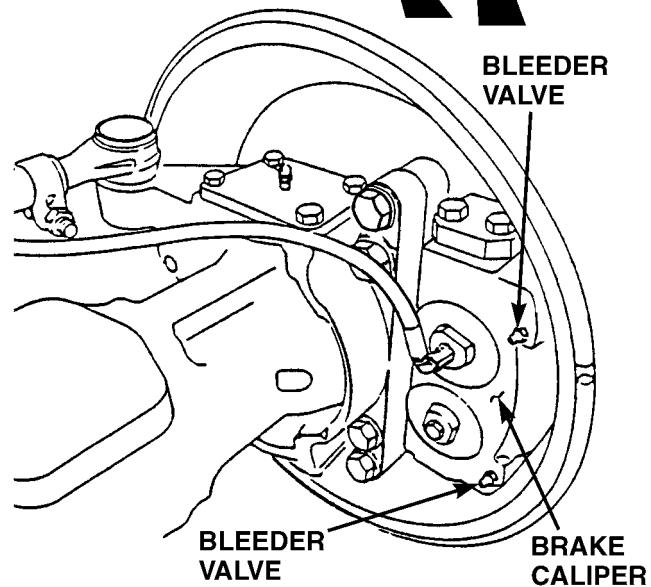
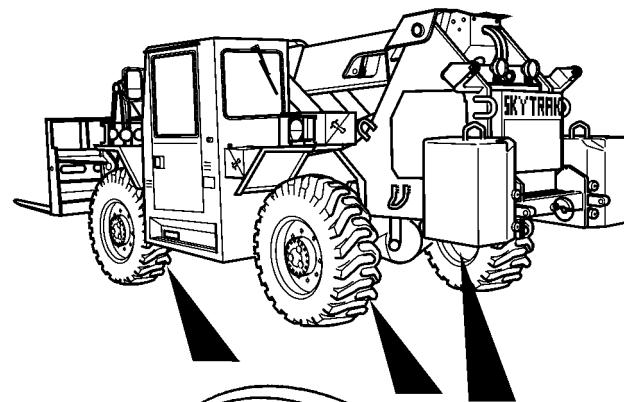
**WARNING**

- Be sure wheels are chocked before removing parking brake assembly.
- Springs are under tension. Always wear protective glasses when working on springs under tension. Use care when removing springs from brake pads. Failure to follow these precautions could result in personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

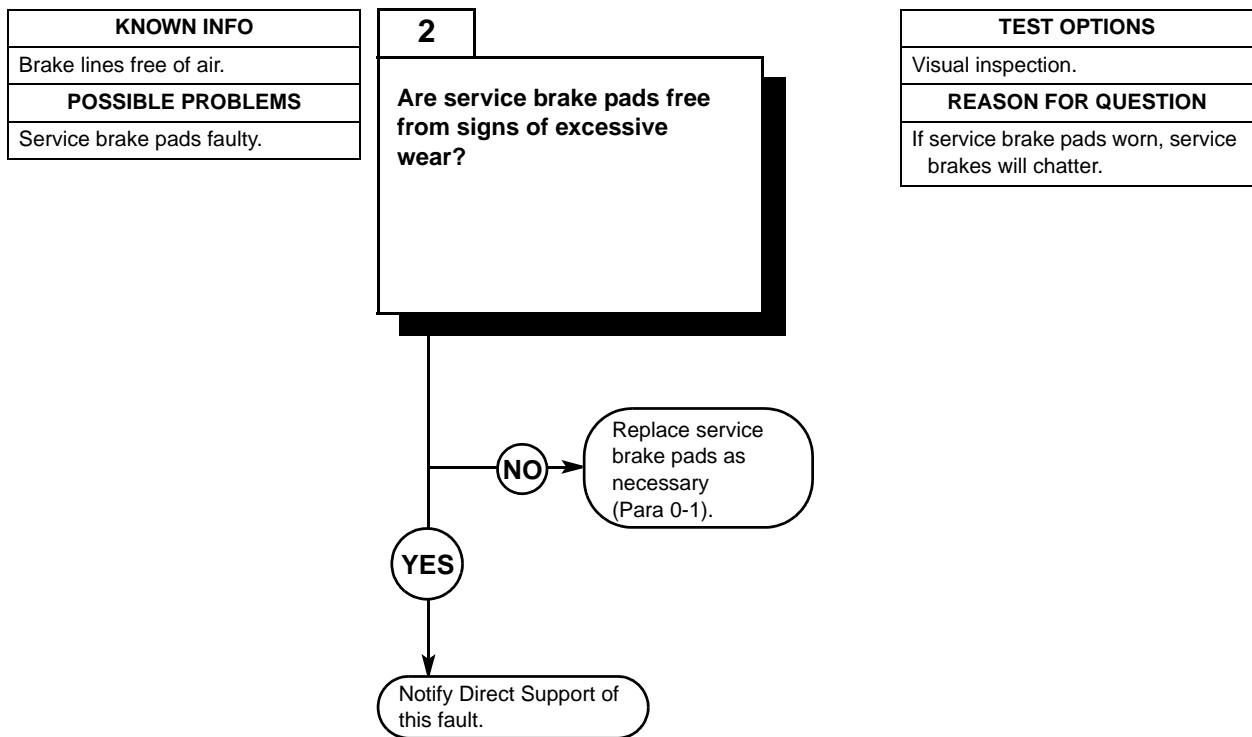
**CAUTION**

- Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines.
- Contamination of the hydraulic system could result in premature failure.
- Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

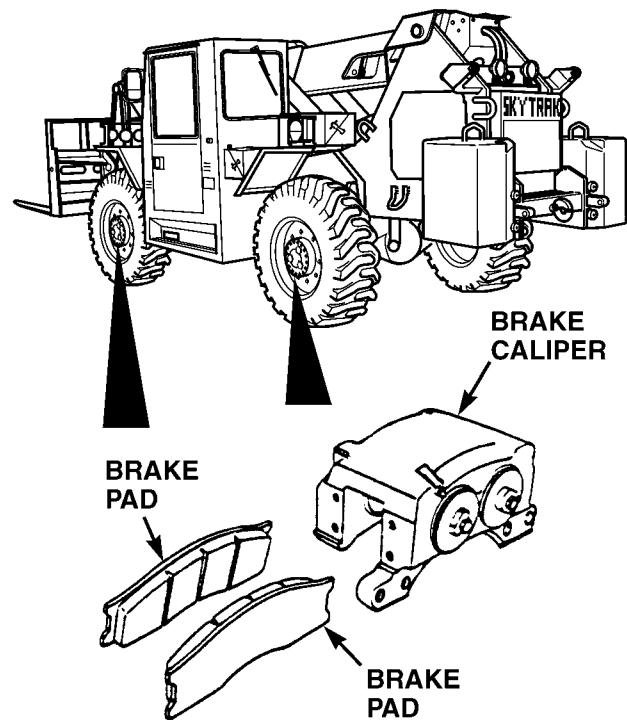
<b>BRAKE CALIPERS VISUAL INSPECTION</b>	
(1)	Bleed one or more brake calipers to determine if there is air in brake lines (Para 12-5).
(a)	If hydraulic brake oil is clear and bubble free, go to Step 2 of this fault.
(b)	If hydraulic brake oil is cloudy or contains bubbles, continue to bleed lines until air is removed from lines (Para 12-5). Go to Step (2) below.
(2)	Test service brakes. If fault is not corrected, go to Step 2 of this fault.



## 18. SERVICE BRAKES CHATTER, ARE NOISY (CONT.).



<b>BRAKE PADS VISUAL INSPECTION</b>	
(1)	Visually inspect service brake pads for uneven and/or excessive wear. (a) If brake pads appear OK, notify Direct Support of this fault. (b) If brake pads show uneven and/or excessive wear, replace pads as necessary (Para 0-1). Go to Step (2) below.
(2)	Test service brakes. If fault is not corrected, notify Direct Support of this fault.



**19. BRAKES DRAG.****INITIAL SETUP***Tools and Special Tools*

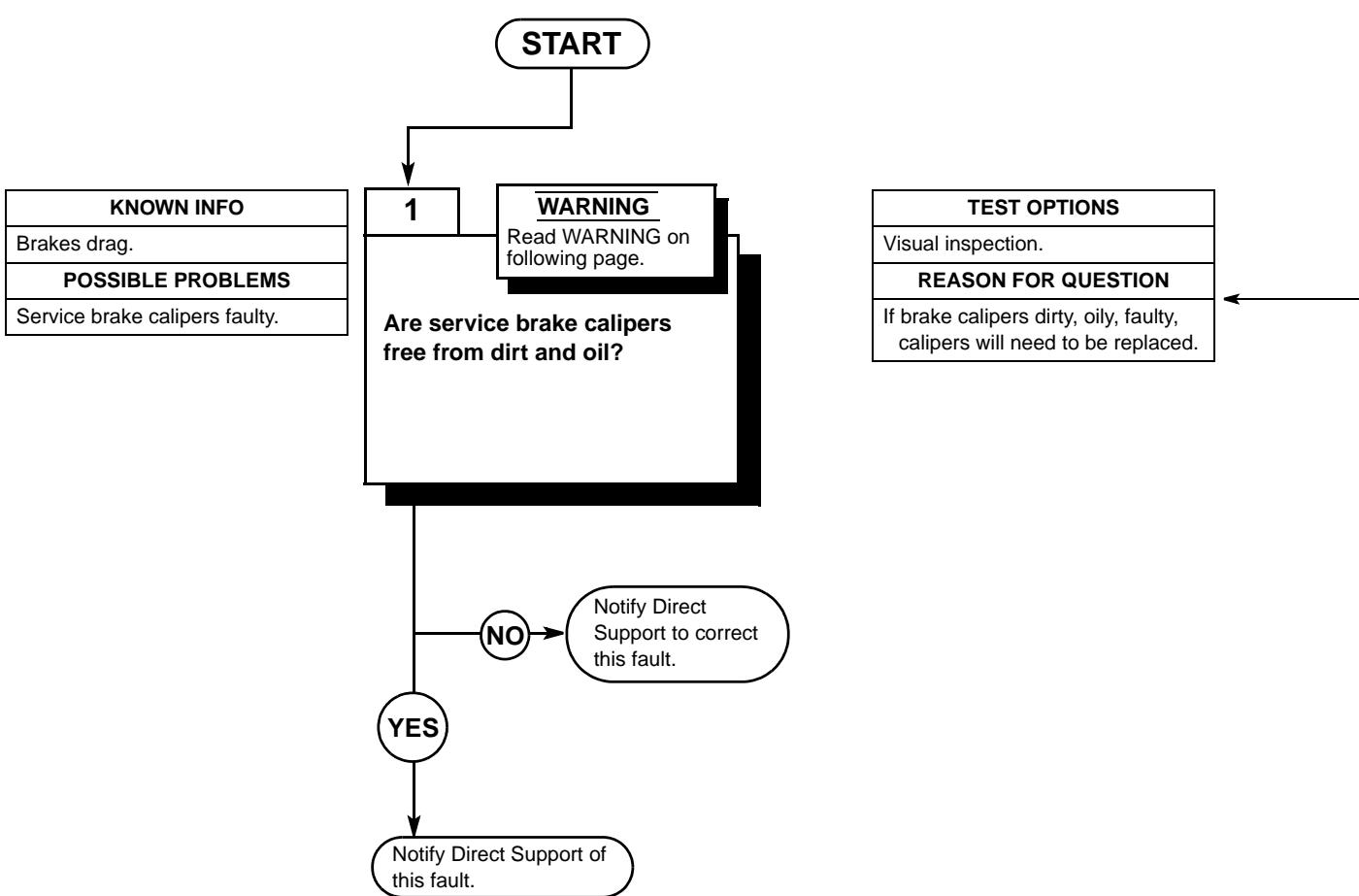
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Be sure wheels are chocked before removing parking brake assembly.
- Springs are under tension. Always wear protective glasses when working on springs under tension. Use care when removing springs from brake pads. Failure to follow these precautions could result in personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

- Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines.
- Contamination of the hydraulic system could result in premature failure.
- Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**BRAKE CALIPERS  
VISUAL INSPECTION**

Inspect service brake calipers for dirt and oil.  
(a) If brake calipers are clean, notify Direct Support of this fault.  
(b) If brake calipers are dirty and show signs of oil, notify Direct Support to replace calipers.

**20. SERVICE BRAKES DO NOT STOP VEHICLE.****INITIAL SETUP***Tools and Special Tools*

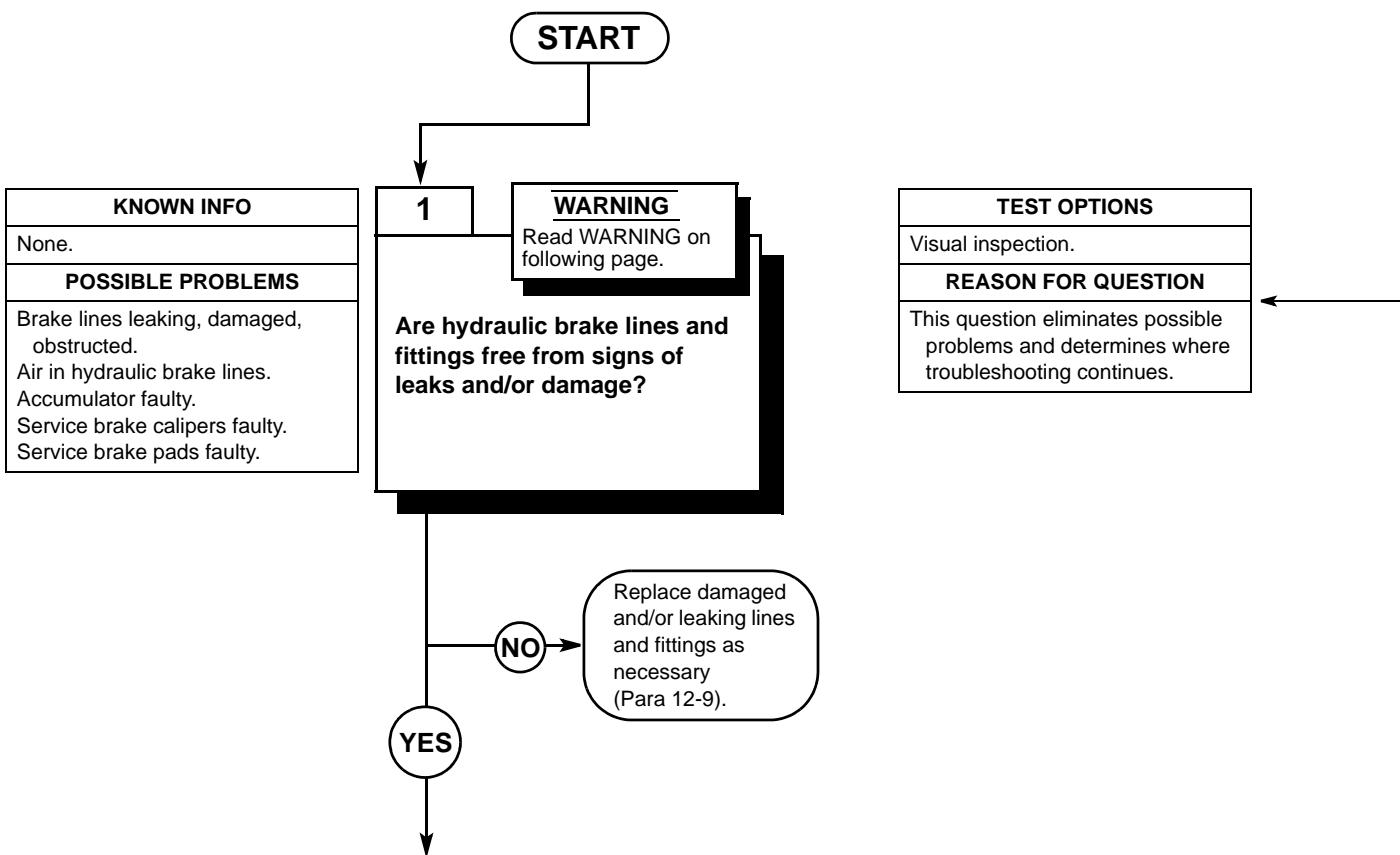
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Be sure wheels are chocked before removing parking brake assembly.
- Springs are under tension. Always wear protective glasses when working on springs under tension. Use care when removing springs from brake pads. Failure to follow these precautions could result in personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

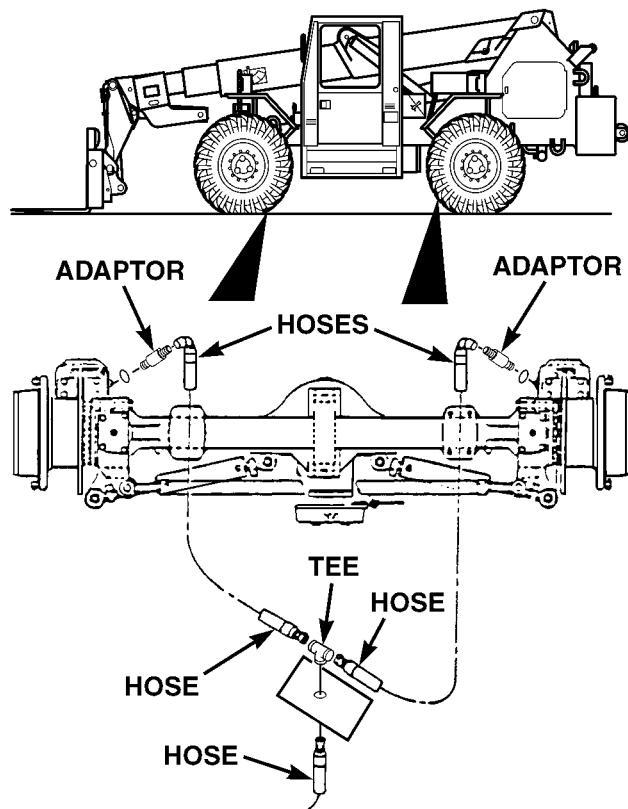
**CAUTION**

- Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines.
- Contamination of the hydraulic system could result in premature failure.
- Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**BRAKE LINES AND FITTINGS  
VISUAL INSPECTION**

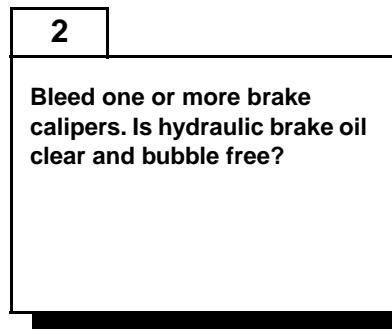
Visually inspect hydraulic brake lines and fittings for breaks and leaks.

- If lines and fittings are free from signs of damage and/or leaks, go to Step 2 of this fault.
- If lines and fittings show signs of damage and/or leaks, replace lines and fittings as necessary (Para 12-9).

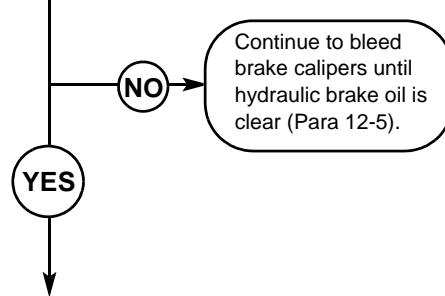


## 20. SERVICE BRAKES DO NOT STOP VEHICLE (CONT.).

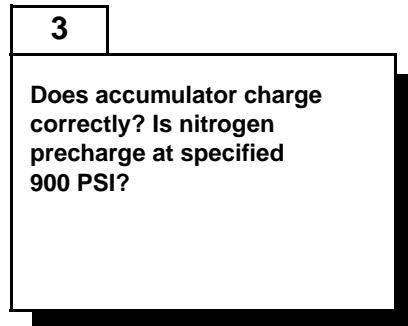
KNOWN INFO
Brake lines and fittings OK.
POSSIBLE PROBLEMS
Air in hydraulic brake lines. Accumulator faulty. Service brake calipers faulty. Service brake pads faulty.



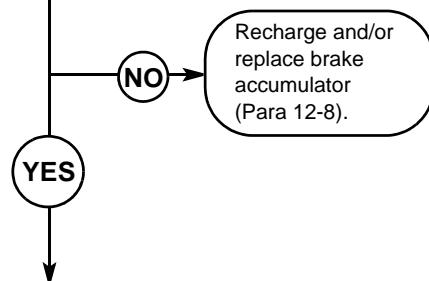
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air is in hydraulic brake lines, lines will need to be bled.



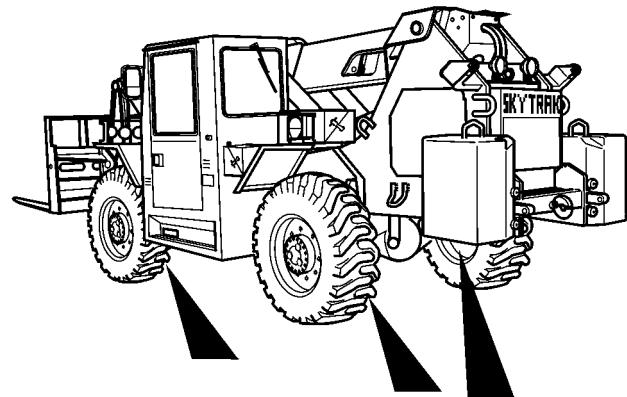
KNOWN INFO
Brake lines and fittings OK.
Brake lines free of air.
POSSIBLE PROBLEMS
Accumulator faulty. Service brake calipers faulty. Service brake pads faulty.



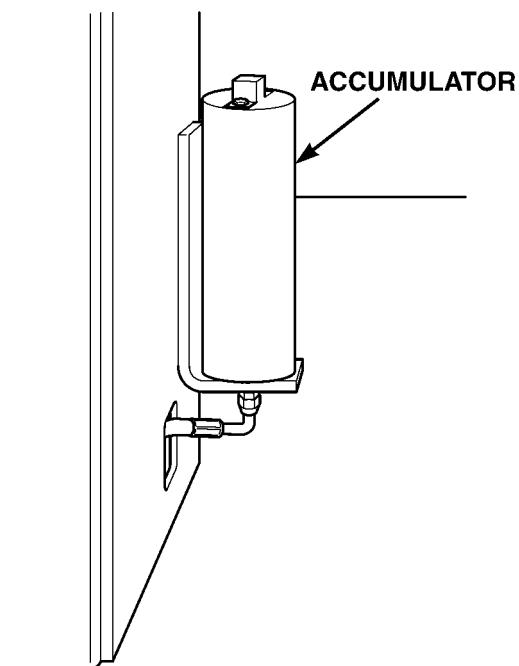
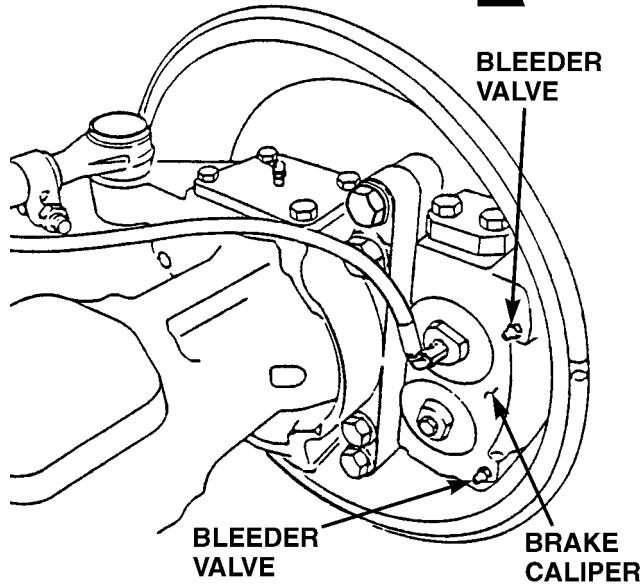
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If accumulator fails to charge, nitrogen precharge is low, accumulator is faulty.



<b>BRAKE CALIPERS VISUAL INSPECTION</b>
Bleed one or more brake calipers to determine if there is air in the brake lines (Para 12-5).
(a) If hydraulic brake oil is clear and bubble free, go to Step 3 of this fault.
(b) If hydraulic brake oil is cloudy or contains bubbles, continue to bleed lines until air is removed from lines (Para 12-5).



<b>ACCUMULATOR VISUAL INSPECTION AND PRECHARGE PRESSURE TEST</b>
Visually inspect brake accumulator for signs of damage. Remove accumulator and test precharge pressure (Para 12-8).
(a) If accumulator shows no signs of damage, and precharge is at specified pressure, go to Step 4 of this fault.
(b) If accumulator is damaged, replace accumulator (Para 12-8).
(c) If precharge is not at 900 PSI, add nitrogen charge (Para 12-8).



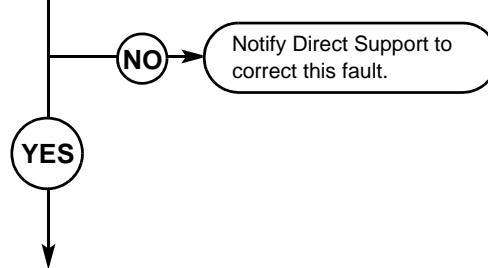
## 20. SERVICE BRAKES DO NOT STOP VEHICLE (CONT.).

KNOWN INFO
Brake lines and fittings OK. Brake lines free of air. Brake accumulator OK.
POSSIBLE PROBLEMS
Service brake calipers faulty. Service brake pads faulty.

**4**

Are service brake calipers free from dirt and oil?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If service brake calipers dirty or show signs of oil, service brakes will not stop vehicle.

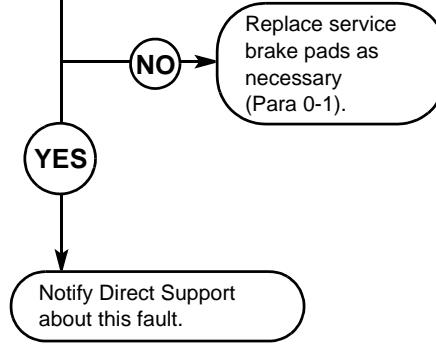


KNOWN INFO
Brake lines and fittings OK. Brake lines free of air. Brake accumulator OK. Service brake calipers OK.
POSSIBLE PROBLEMS
Service brake pads faulty.

**5**

Are service brake pads free from signs of excessive wear?

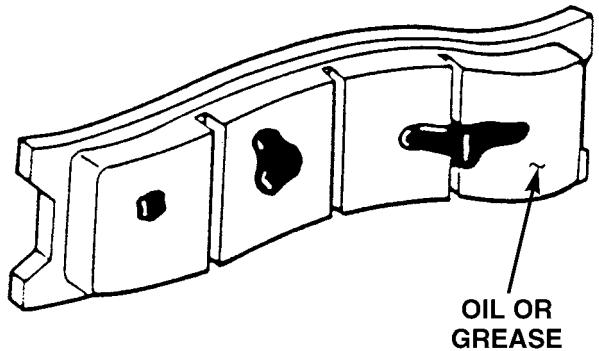
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If service brake pads worn, pads are faulty.



**BRAKE CALIPERS  
VISUAL INSPECTION**

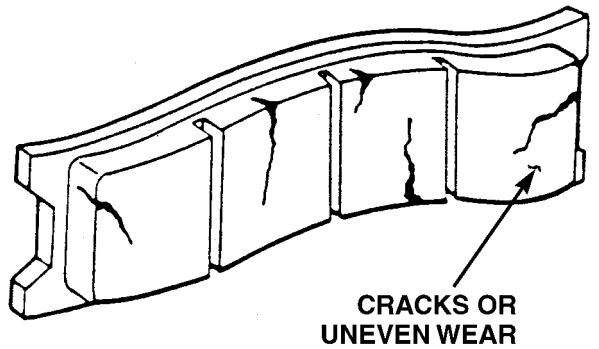
Inspect service brake calipers for dirt and oil.

- (a) If brake calipers are clean, go to Step 5 of this fault.
- (b) If brake calipers are dirty and show signs of oil, notify Direct Support to replace calipers.

**BRAKE PADS  
VISUAL INSPECTION**

Visually inspect service brake pads for uneven and/or excessive wear.

- (a) If brake pads appear OK, notify Direct Support about this fault.
- (b) If brake pads show uneven and/or excessive wear, replace pads as necessary (Para 0-1).



## **21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE.**

## INITIAL SETUP

## *Tools and Special Tools*

## Tool Kit, General Mechanic's: Automotive (Item 18, Appendix F)

### *Equipment Condition*

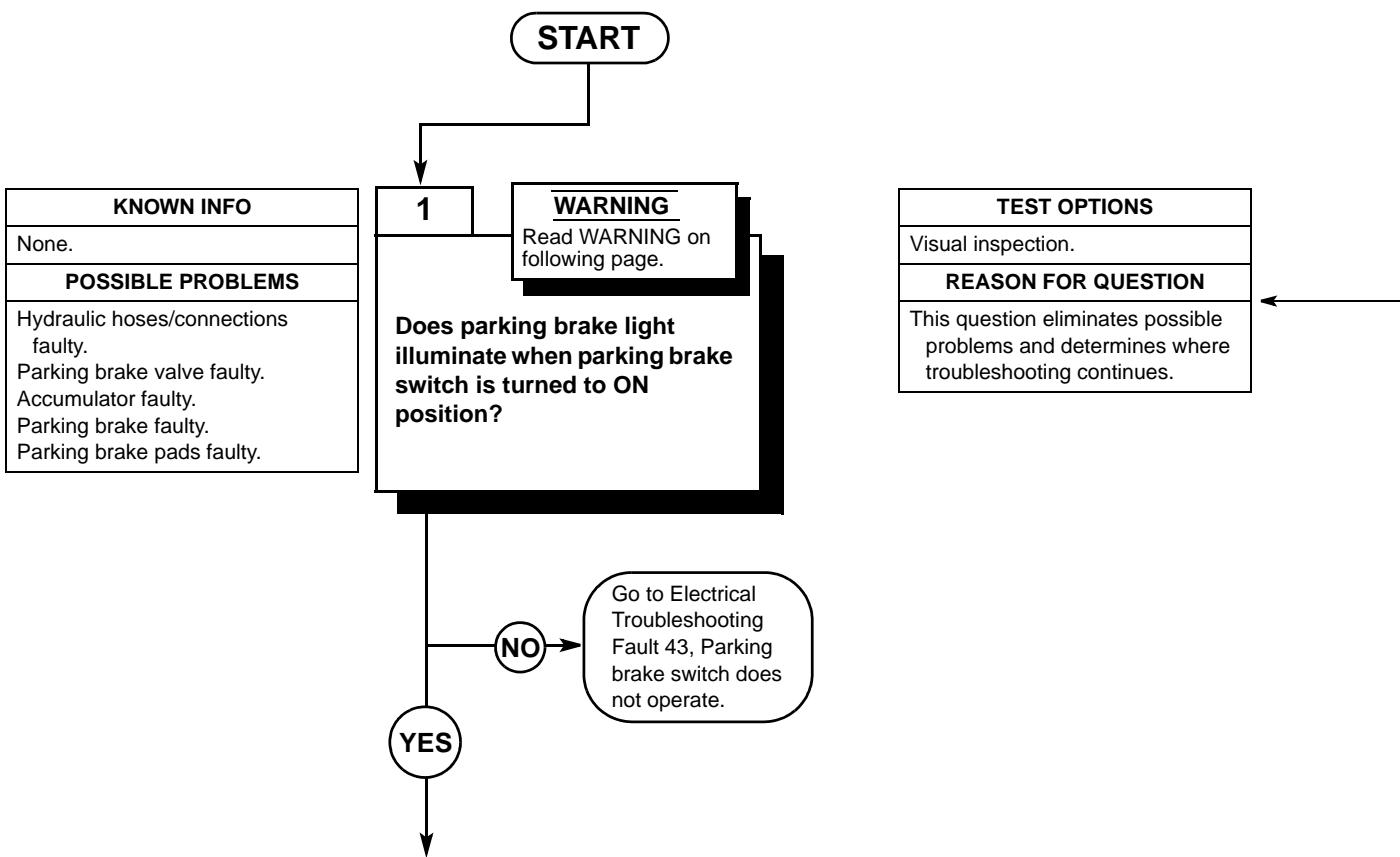
Engine shut down (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)

### *Personnel Required*

Two

## References

TM 10-3930-673-10



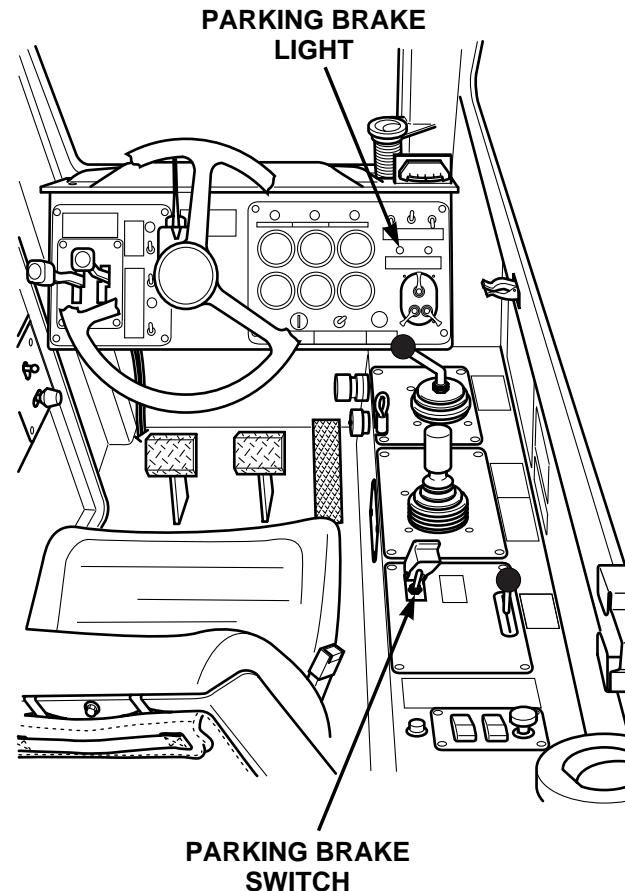
**WARNING**

- Be sure wheels are chocked before removing parking brake.
- Springs are under tension. Always wear protective glasses when working on springs under tension. Use care when removing springs from brake pads. Failure to follow these precautions could result in personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

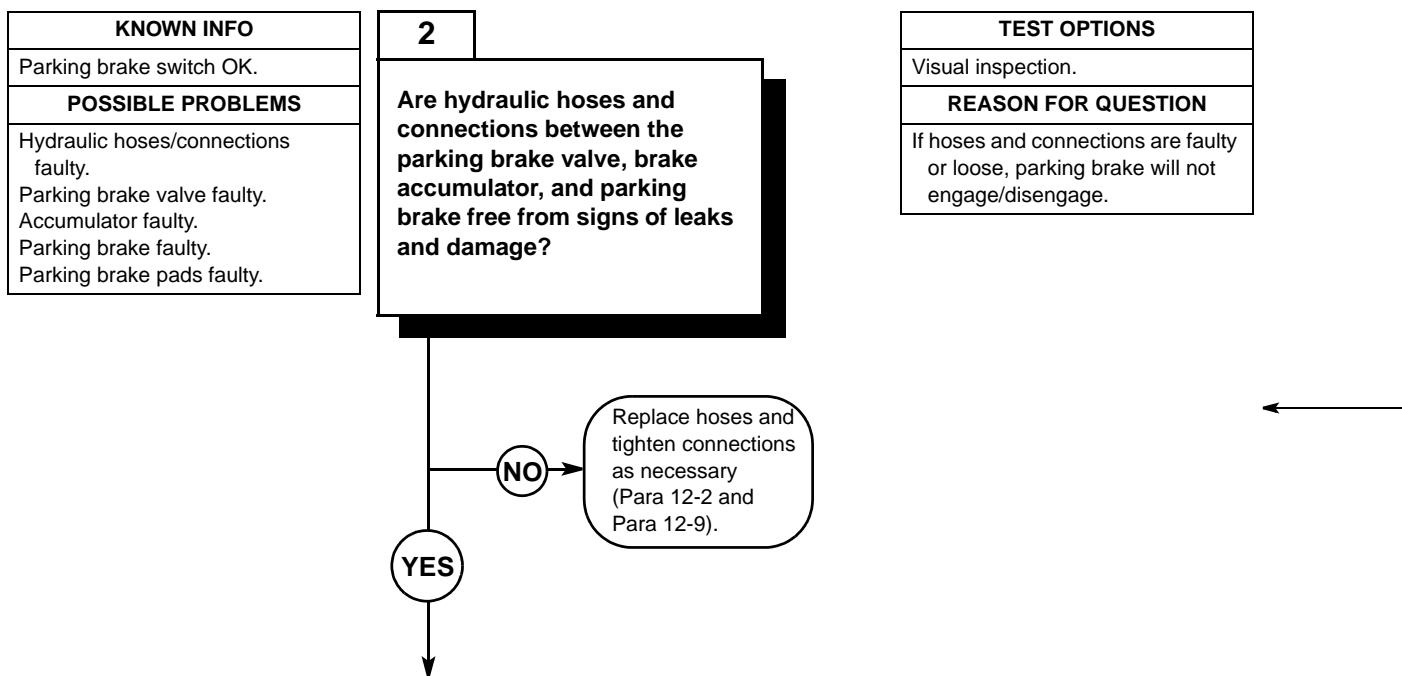
**CAUTION**

- Wipe the area clean around hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines.
- Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

<b>VISUAL INSPECTION</b>
<ol style="list-style-type: none"> <li>(1) Turn engine start switch to ON position (TM 10-3930-673-10).</li> <li>(2) Turn parking brake switch to ON position.</li> <li>(3) Check to determine if parking brake light illuminates.           <ol style="list-style-type: none"> <li>(a) If light illuminates, go to Step 2 of this fault.</li> <li>(b) If light does not illuminate, go to Electrical Troubleshooting Fault 43, Parking brake switch does not operate.</li> </ol> </li> <li>(4) Turn parking brake switch to OFF position.</li> <li>(5) Turn engine start switch to OFF position (TM 10-3930-673-10).</li> </ol>



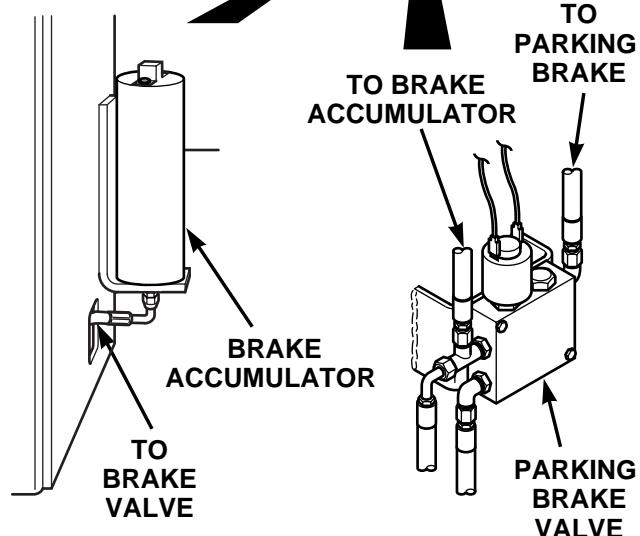
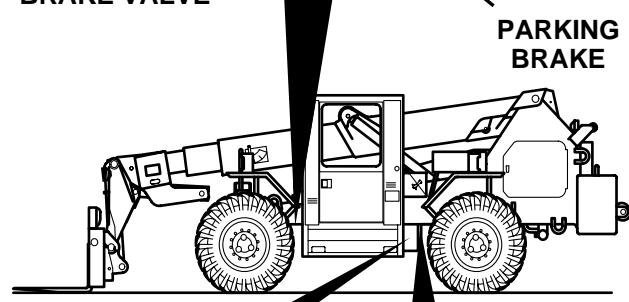
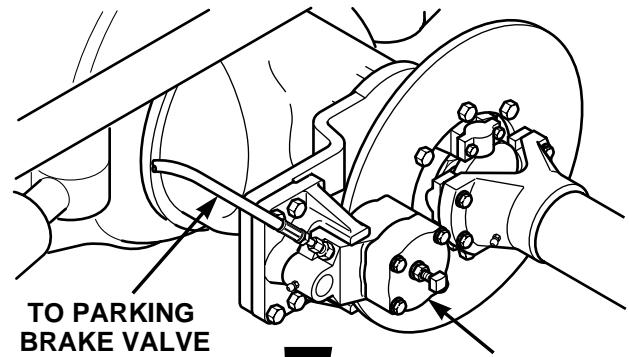
## **21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT.).**



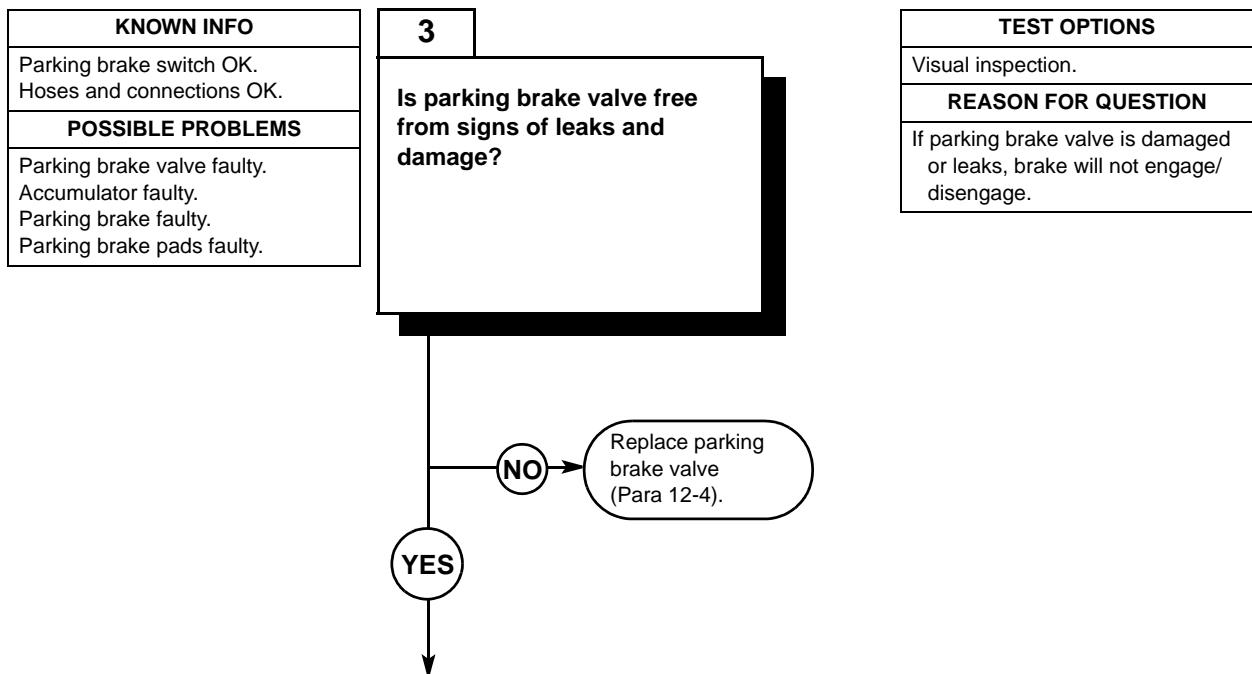
**VISUAL INSPECTION**

Visually inspect the hoses and connections from and to the parking brake valve, brake accumulator, and parking brake.

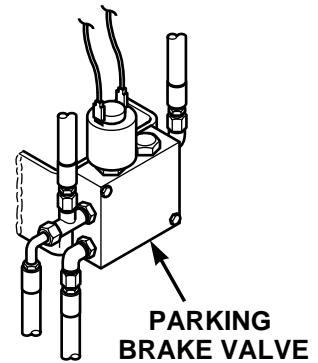
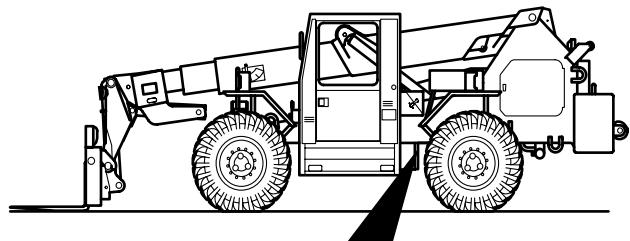
- (a) If hoses and connections are free from signs of leaks and damage, go to Step 3 of this fault.
- (b) If hoses and connections show signs of leaks and damage, replace hoses and tighten connections as necessary (Para 12-2 and Para 12-9).



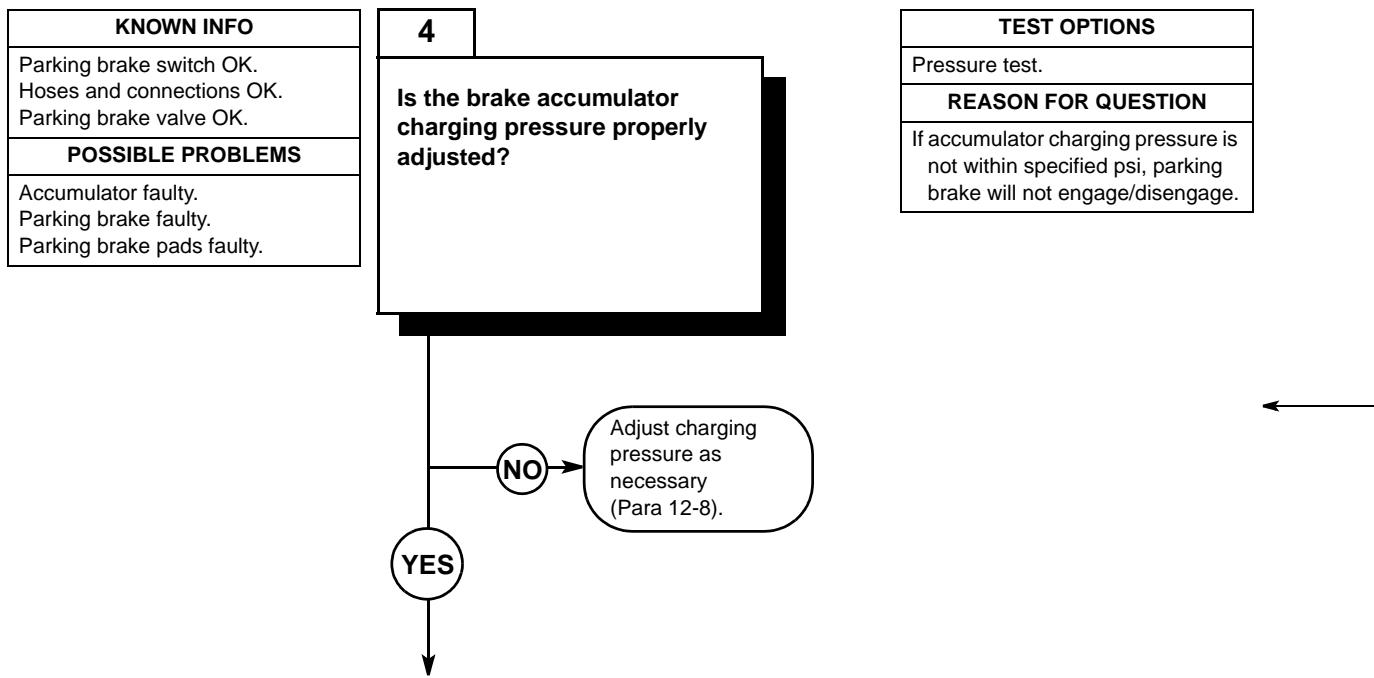
## 21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT).

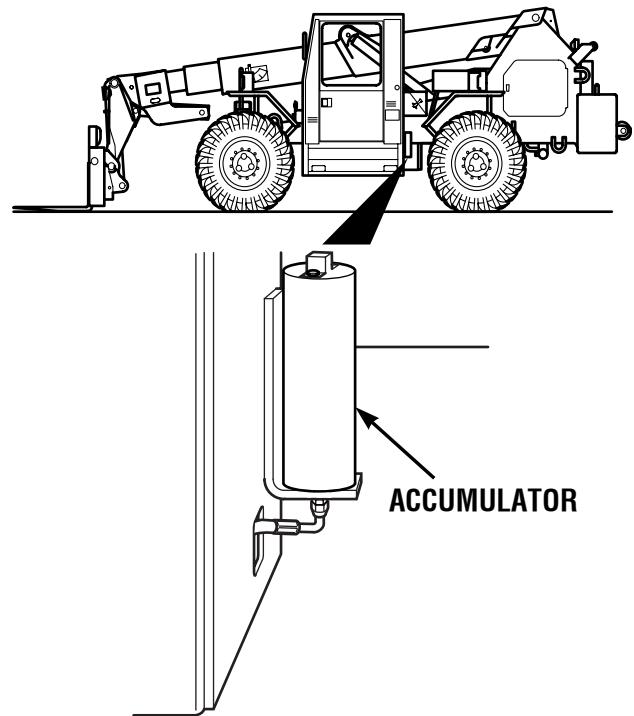
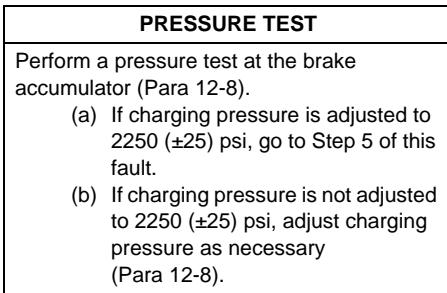


VISUAL INSPECTION
Visually inspect the parking brake valve for leaks and damage.
(a) If valve is free from signs of leaks and damage, go to Step 4 of this fault.
(b) If valve shows signs of leaks and damage, replace parking brake valve (Para 12-4).

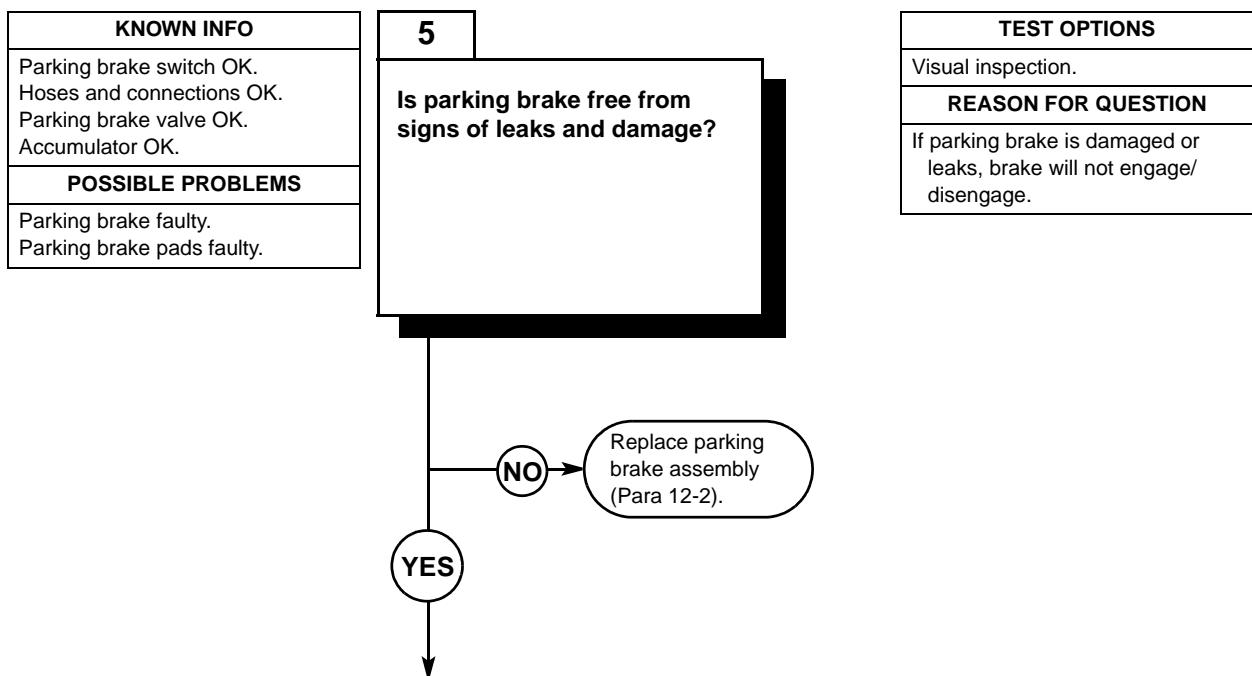


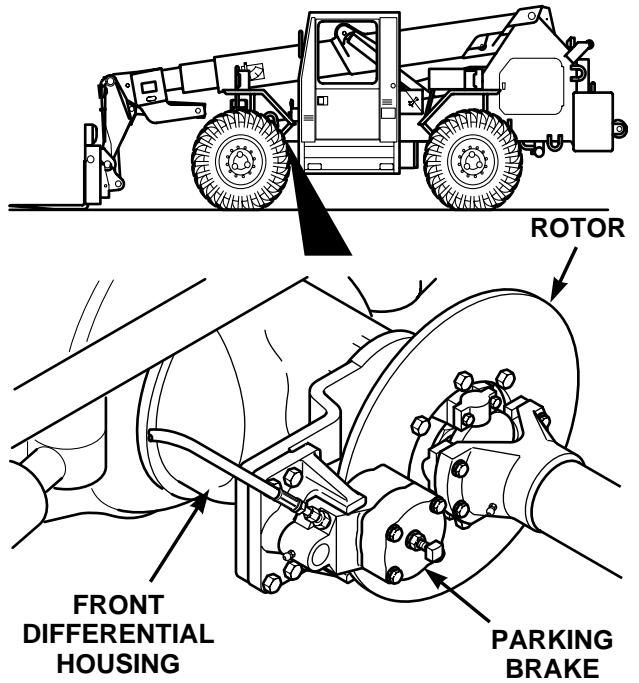
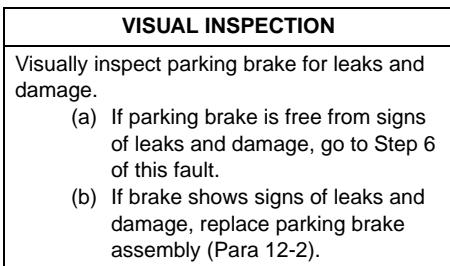
## 21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT).



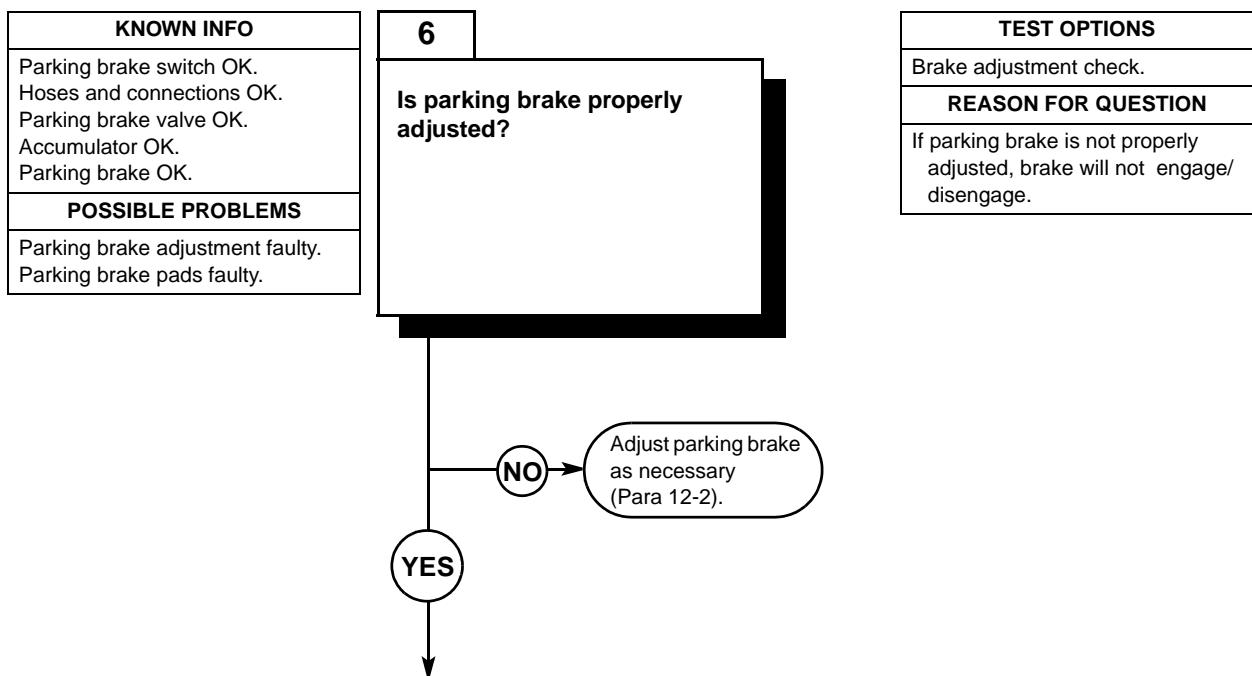


## 21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT).



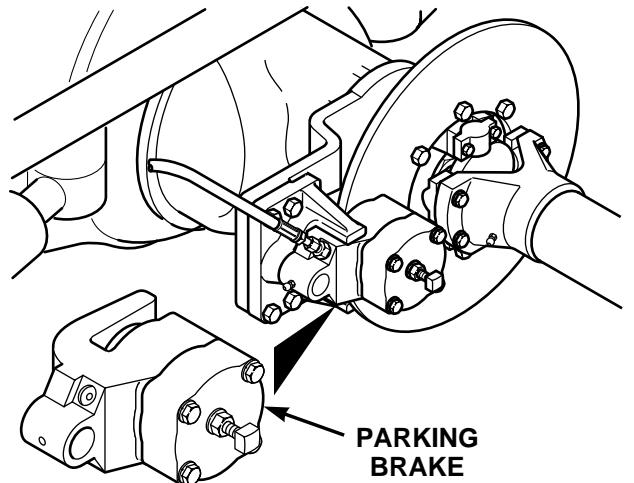
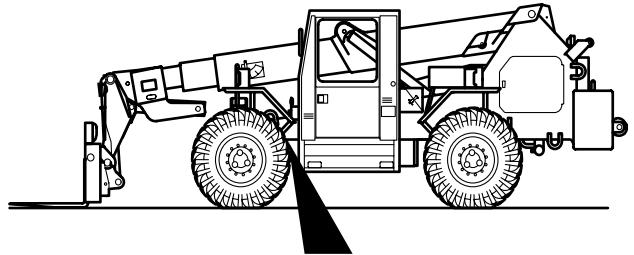


## 21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT).



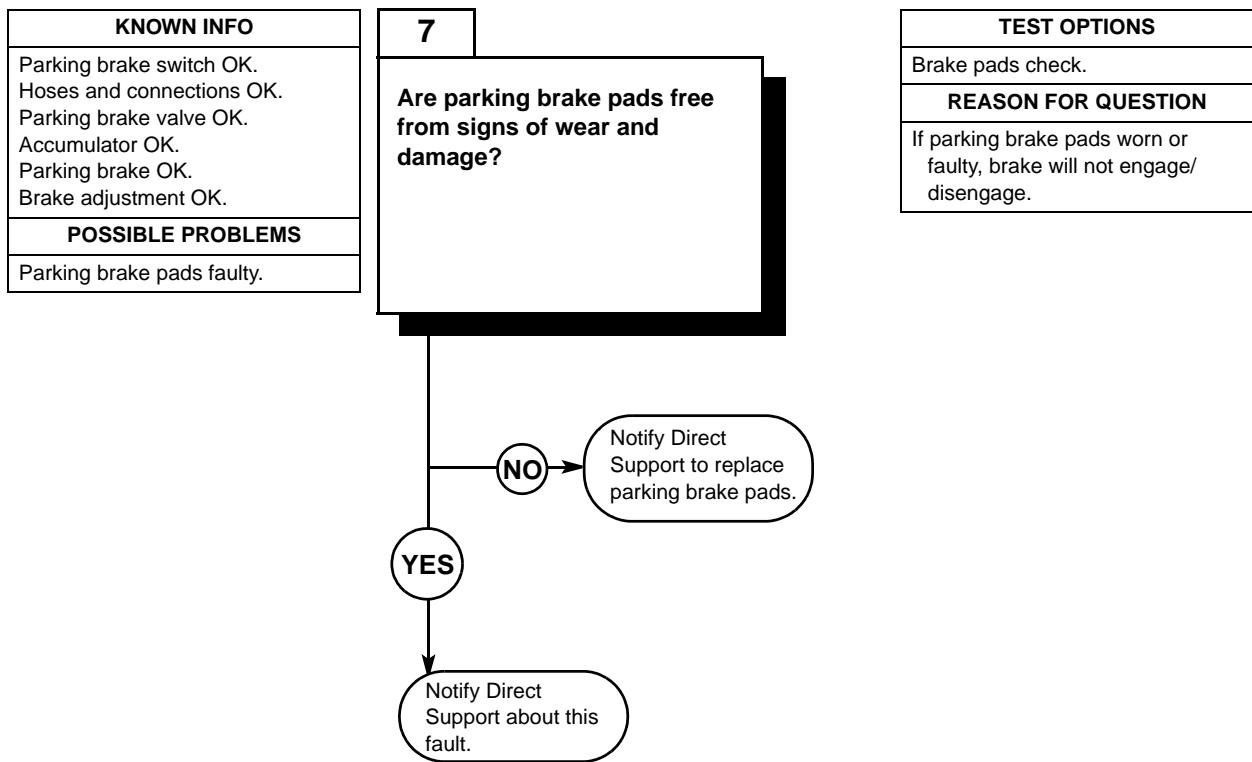
**BRAKE ADJUSTMENT CHECK**

- (1) Remove parking brake assembly from vehicle (Para 12-2).
- (2) Check brake for proper adjustment.
  - (a) If brake is properly adjusted, go to Step 7 of this fault.
  - (b) If brake is not properly adjusted, adjust the parking brake as necessary (Para 12-2).

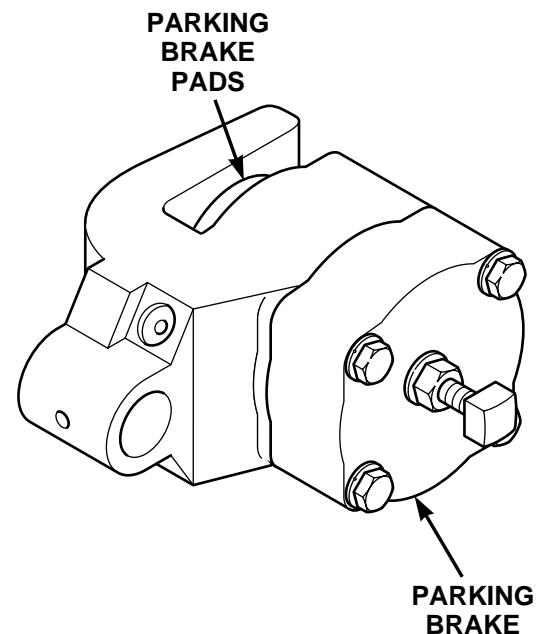


**PARKING  
BRAKE**

## 21. PARKING BRAKE DOES NOT ENGAGE/DISENGAGE (CONT).



<b>BRAKE PADS CHECK</b>	
(1)	With brake removed from vehicle, check parking brake pads (Para 12-2). (a) If brake pads are OK, notify Direct Support about this fault. (b) If brake pads show signs of wear or are faulty, notify Direct Support to replace brake pads.
(2)	Install parking brake assembly on vehicle (Para 12-2).



**22. COMPRESSION KNOCKS.****INITIAL SETUP***Tools and Special Tools*

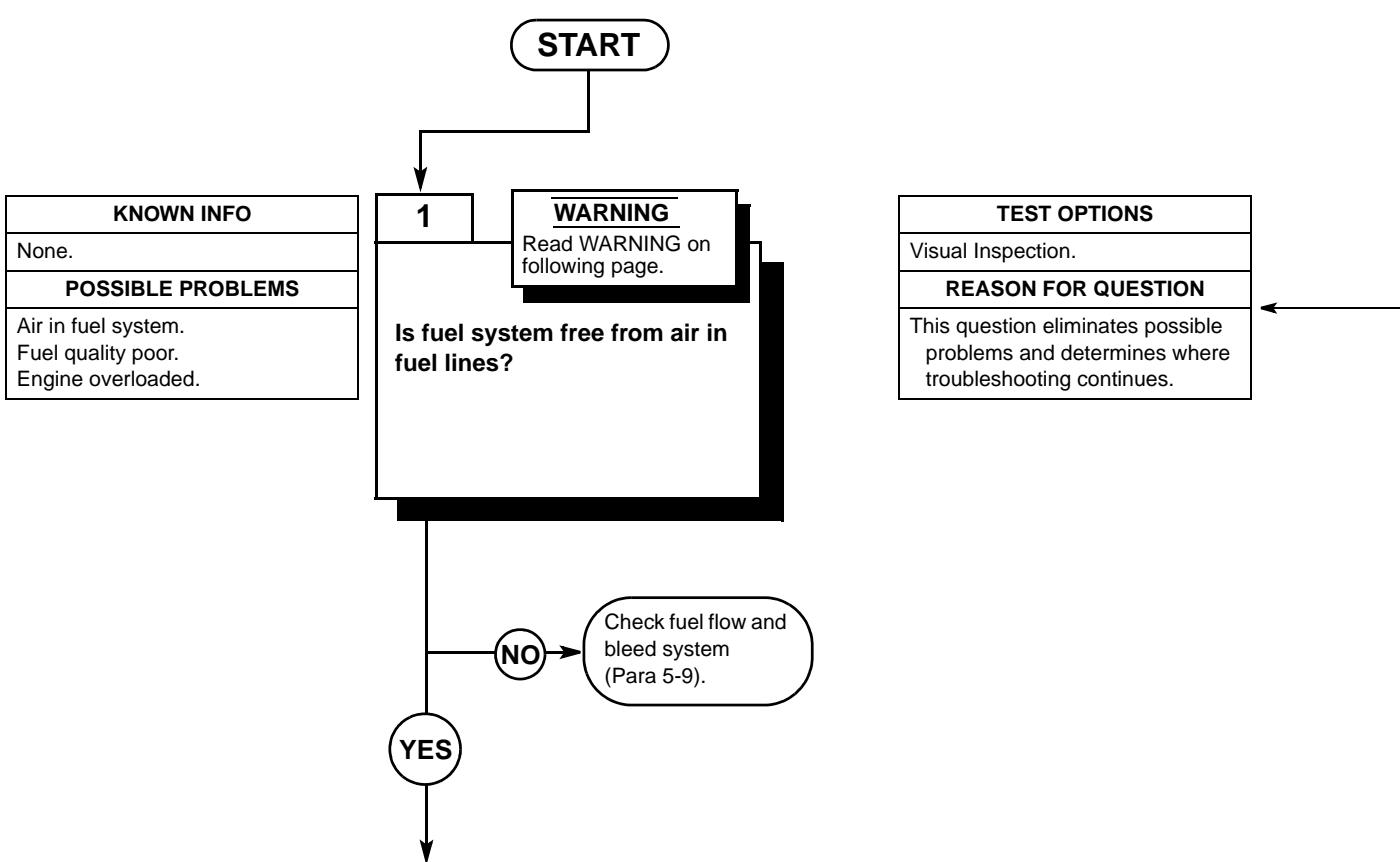
Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET (15 m).
- Pressure test procedure results in fuel under high pressure. Be sure that pressure test device is connected properly and use safety shield during test. Failure to do so may result in injury to personnel.
- Drycleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for type I drycleaning solvent is 100°F (38°C), type II is 138°F (50°C), and type III is 200°F (93.3°C). Failure to do so may result in injury or death to personnel. If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM 9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

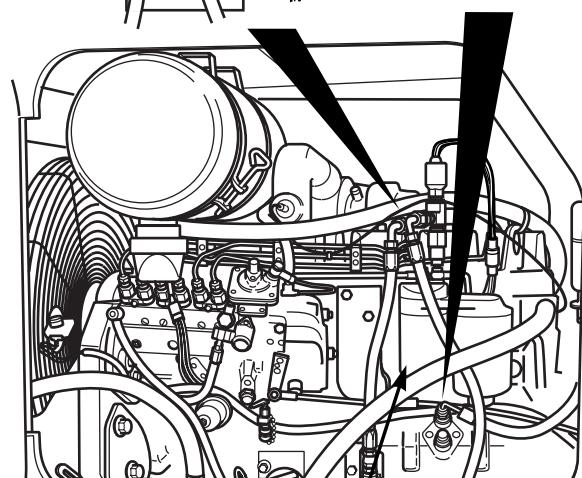
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**FUEL FLOW  
VISUAL INSPECTION**

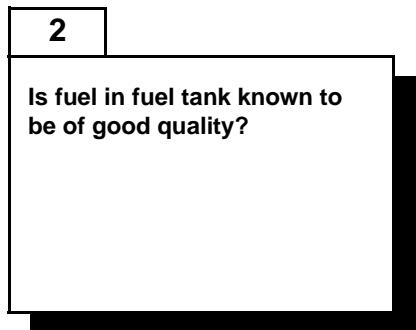
Check flow of fuel through fuel filter (Para 5-9).

- If fuel flows freely without air bubbles, go to Step 2 of this fault.
- If air is in fuel lines, check for air leaks then bleed system (Para 5-9).

**FUEL  
HOSE****FUEL TRANSFER  
PUMP****FUEL FILTER**

## 22. COMPRESSION KNOCKS (CONT.).

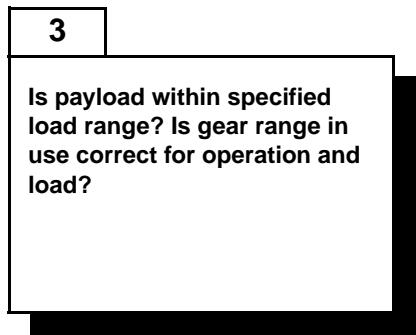
KNOWN INFO
Fuel system fuel OK.
POSSIBLE PROBLEMS
Fuel quality poor. Engine overloaded.



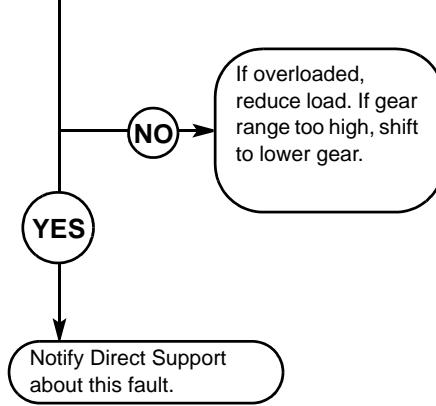
TEST OPTIONS
Visual Inspection.
REASON FOR QUESTION
If fuel quality is poor, engine will produce audible compression knocks.



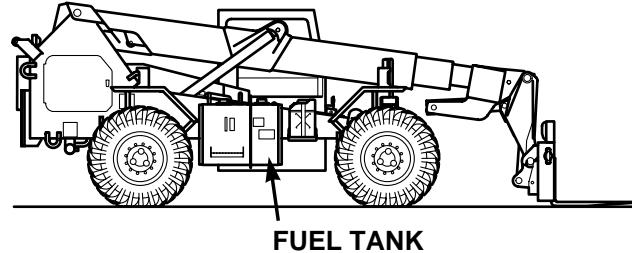
KNOWN INFO
Fuel system fuel OK.
Fuel quality OK.
POSSIBLE PROBLEMS
Engine overloaded.



TEST OPTIONS
Visual Inspection.
REASON FOR QUESTION
If machine is overloaded, or gear range incorrect, engine will produce audible compression knocks.

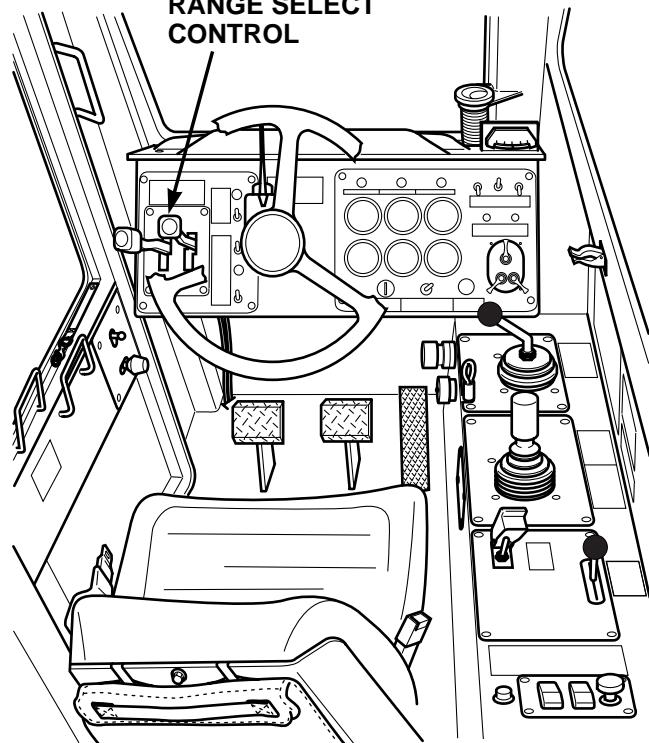


<b>FUEL QUALITY VISUAL INSPECTION</b>	
(1)	Check quality of fuel in fuel tank by operating engine from a temporary tank of known fuel quality.
(a)	Disconnect fuel line at fuel/water separator, where line leads to fuel transfer pump.
(b)	Place disconnected end of fuel line in temp tank of known clean fuel.
(c)	Start engine and run it for approximately 5 minutes to determine if engine performance improves with known clean fuel.
(2)	If fuel is of good quality, go to Step 3 of this fault.
(3)	If fuel is of questionable quality, drain fuel tank and replace fuel (Para 5-9).



FUEL TANK

<b>LOAD AND GEAR RANGE VISUAL INSPECTION</b>	
Check that payload is within specified load range for machine. Check that gear range in use is correct for operation and load (TM 10-3930-673-10).	
(a)	If load is within specified range and gear range is correct, notify Direct Support about this fault.
(b)	If load is above specified range, reduce load. If gear range too high, shift to lower gear (TM 10-3930-673-10).



RANGE SELECT CONTROL

**23. LOSS OF POWER.****INITIAL SETUP***Tools and Special Tools*

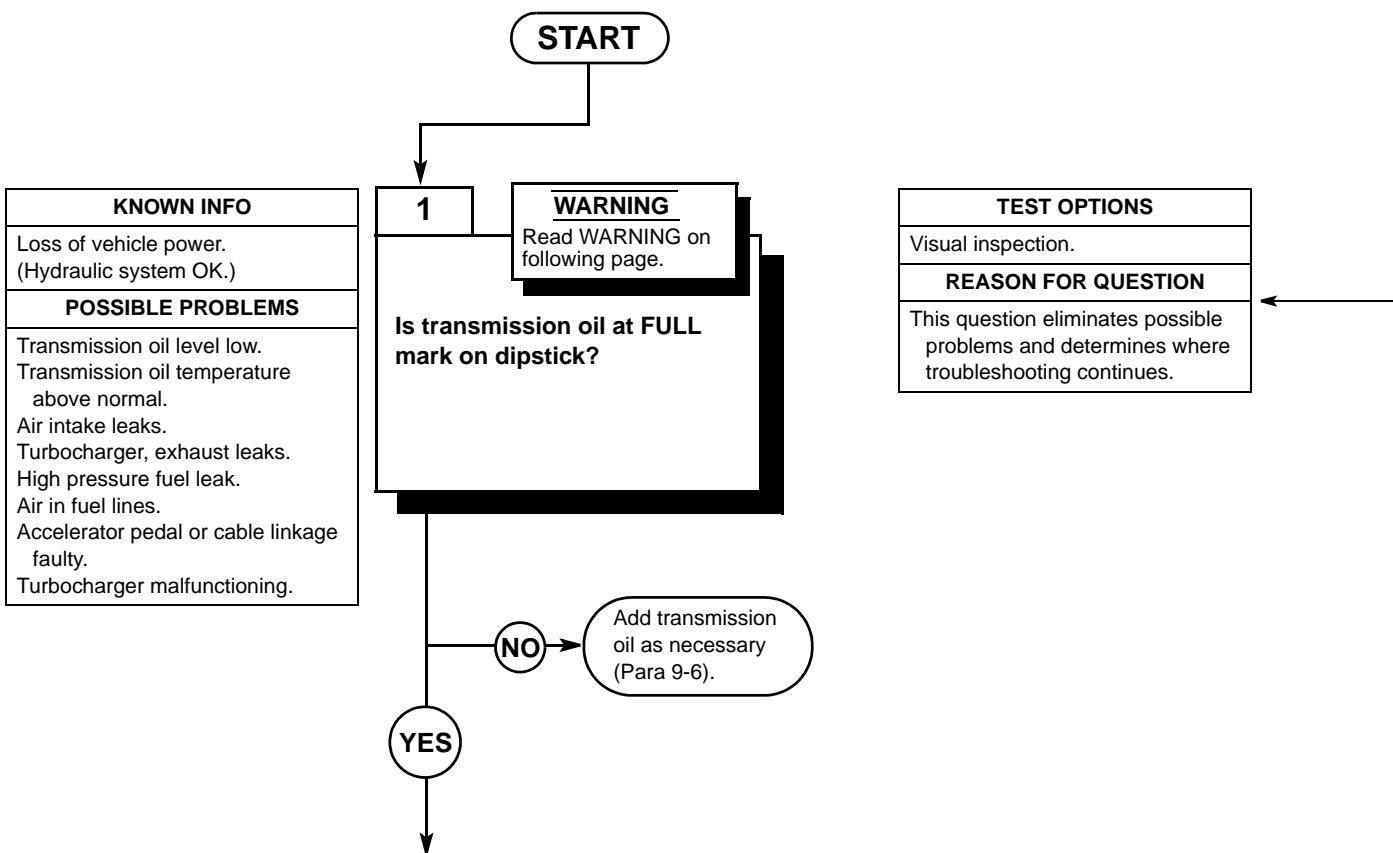
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

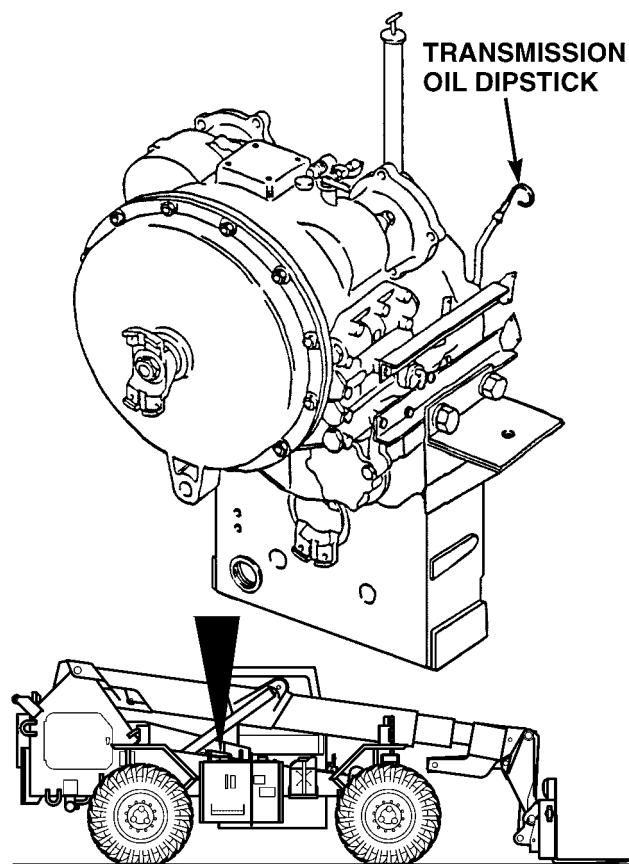
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**TRANSMISSION OIL  
VISUAL INSPECTION**

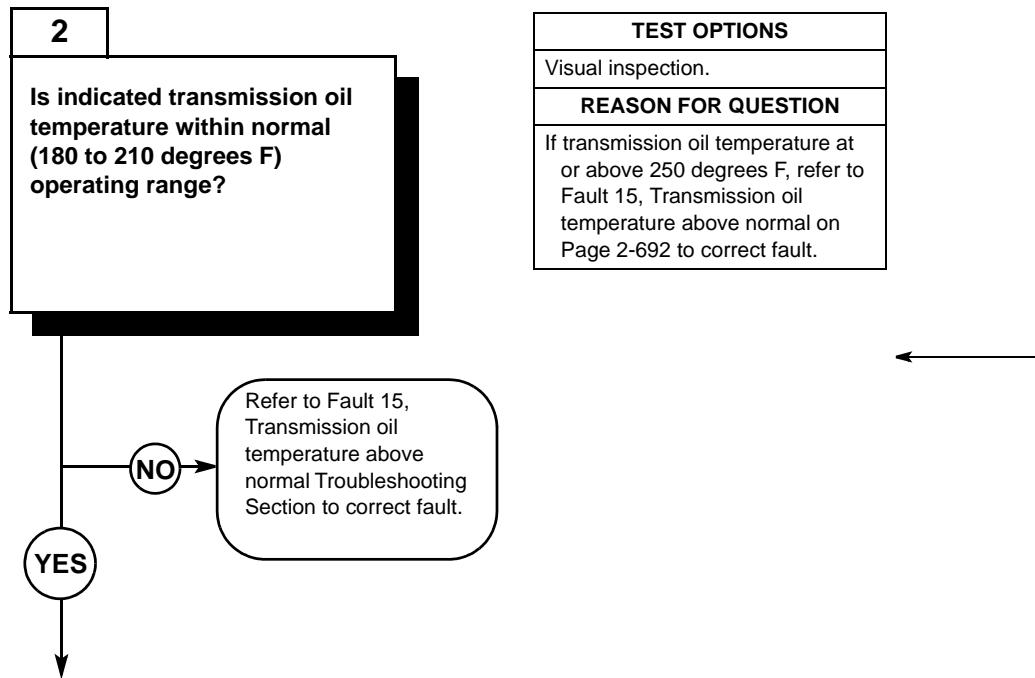
Check transmission oil level with dipstick. Transmission oil should be at or near FULL mark.

- If transmission oil is at FULL mark, go to Step 2 of this fault.
- If transmission oil is at or near ADD mark, add transmission oil as necessary (Para 9-6).

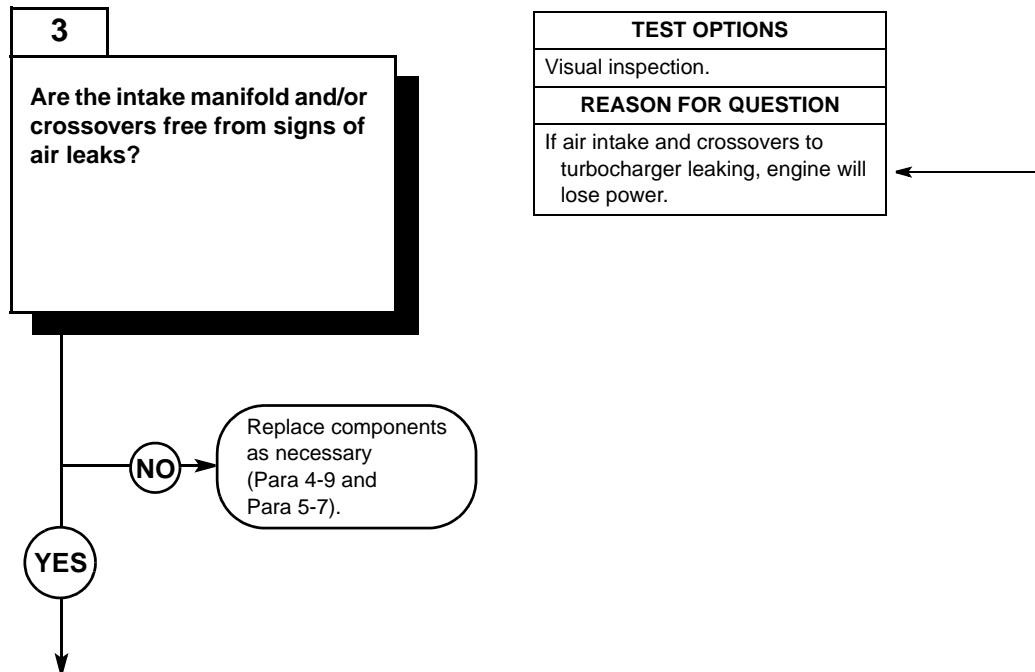


## 23. LOSS OF POWER (CONT.).

KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK.
POSSIBLE PROBLEMS
Transmission oil temperature above normal. Air intake leaks. Turbocharger, exhaust leaks. High pressure fuel leak. Air in fuel lines. Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.



KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK. Transmission oil temperature OK.
POSSIBLE PROBLEMS
Air intake leaks. Turbocharger, exhaust leaks. High pressure fuel leak. Air in fuel lines. Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.

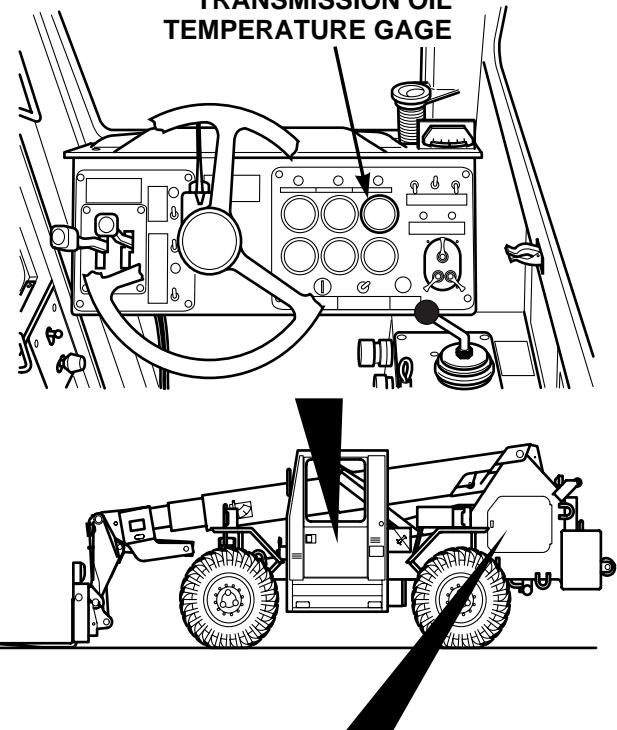


### TRANSMISSION OIL TEMPERATURE VISUAL INSPECTION

Check transmission oil temperature gage to determine oil temperature.

- (a) If transmission oil temperature is within normal 180 to 210 degrees F operating range, go to Step 3 of this fault.
- (b) If indicated temperature is at or near 250 degrees F, refer to Fault 15, Transmission oil temperature above normal to correct fault.

### TRANSMISSION OIL TEMPERATURE GAGE

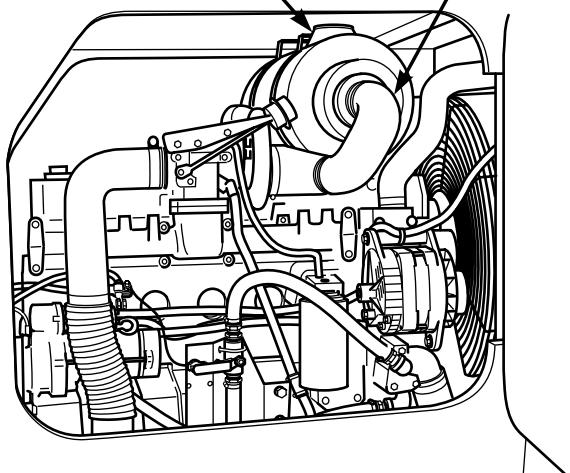


### INTAKE MANIFOLD AND CROSSOVERS AIR LEAK VISUAL INSPECTION

Visually inspect air intake and air crossovers to turbocharger for air leaks.

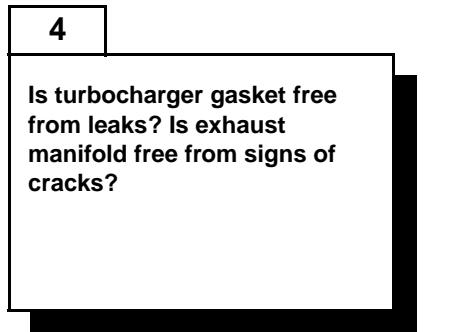
- (a) If there are no signs of air leaks, go to Step 4 of this fault.
- (b) If there are signs of air leaks, replace components as necessary (Para 4-9 and Para 5-7).

### AIR INTAKE      TURBOCHARGER

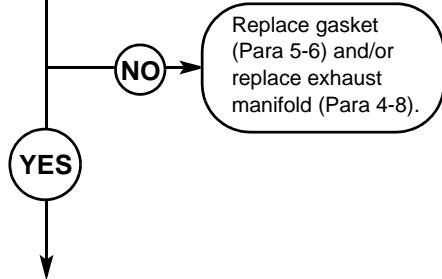


## 23. LOSS OF POWER (CONT.).

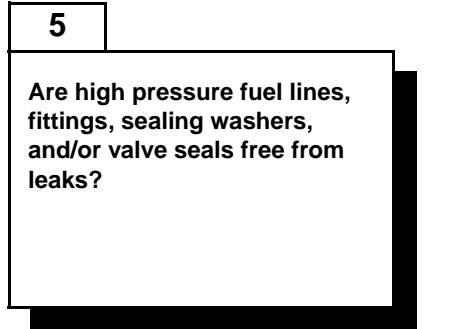
KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK. Transmission oil temperature OK. Air intake manifold OK.
POSSIBLE PROBLEMS
Turbocharger, exhaust leaks. High pressure fuel leak. Air in fuel lines. Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.



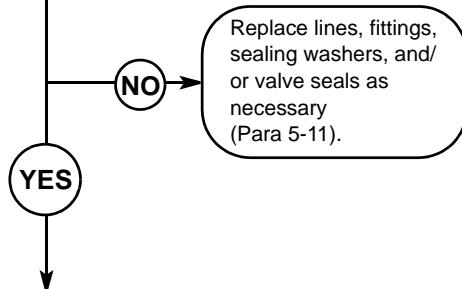
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air leaks in turbocharger gasket and/or exhaust manifold, engine will lose power.



KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK. Transmission oil temperature OK. Air intake manifold OK. Turbocharger, exhaust manifold OK.
POSSIBLE PROBLEMS
High pressure fuel leak. Air in fuel lines. Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If leak in high pressure fuel lines and/or fittings, lines, engine will lose power.



**TURBOCHARGER AND EXHAUST  
MANIFOLD AIR LEAK  
VISUAL INSPECTION**

Visually inspect turbocharger gasket and exhaust manifold for signs of cracks and air leaks.

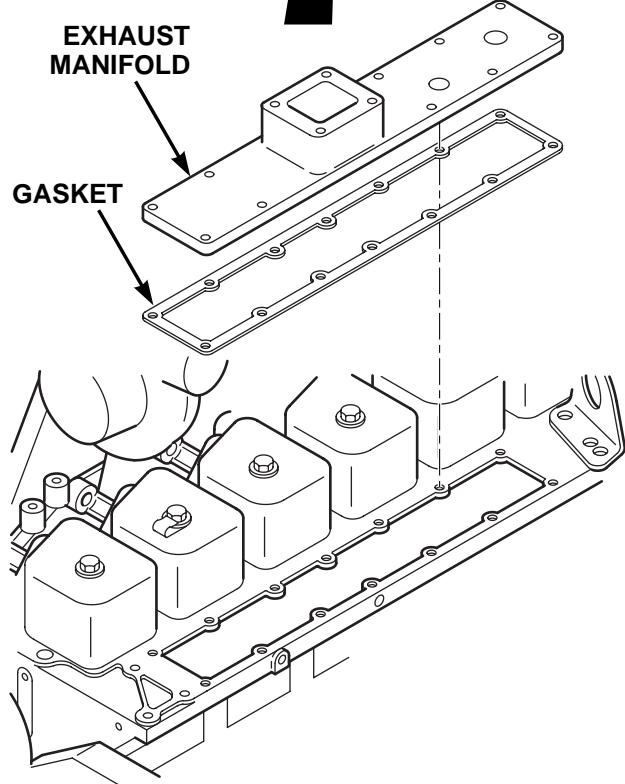
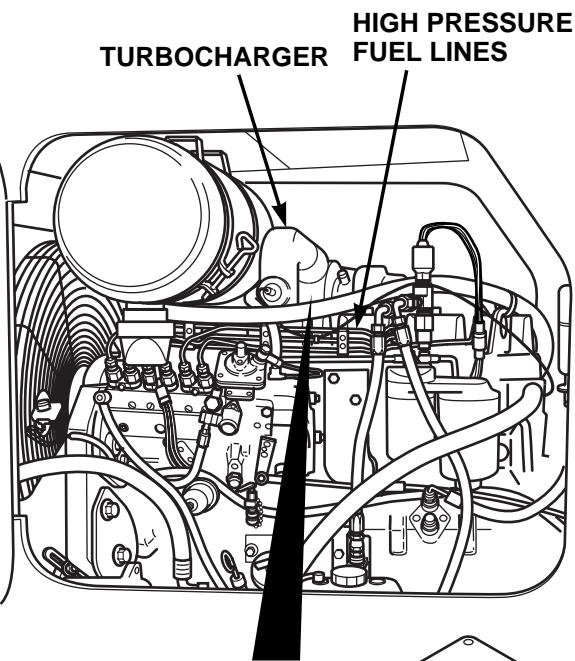
- (a) If there are no signs of cracks and air leaks, go to Step 5 of this fault.
- (b) If there are signs of cracks and/or air leaks, replace turbocharger gasket (Para 5-6), and/or exhaust manifold (Para 4-8) as necessary.

**HIGH PRESSURE FUEL LINES  
VISUAL INSPECTION**

**HIGH PRESSURE FUEL LINES  
VISUAL INSPECTION**

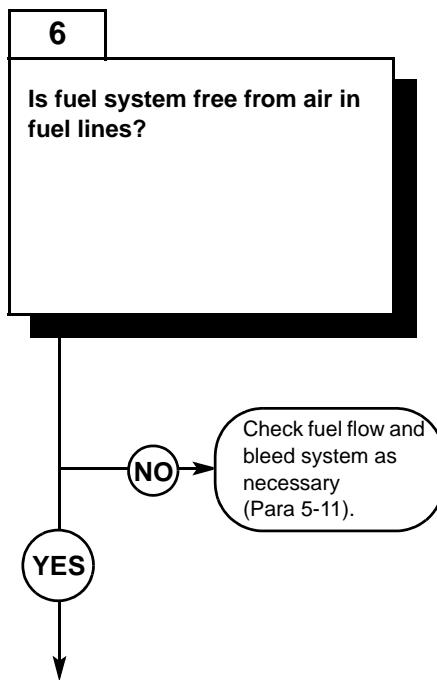
Visually inspect high pressure fuel lines and fittings for signs of leaks.

- (a) If lines, fittings, and/or seals free from signs of leaks, go to Step 6 of this fault.
- (b) If lines, fittings, and/or seals show signs of leaks, replace components as necessary (Para 5-11).



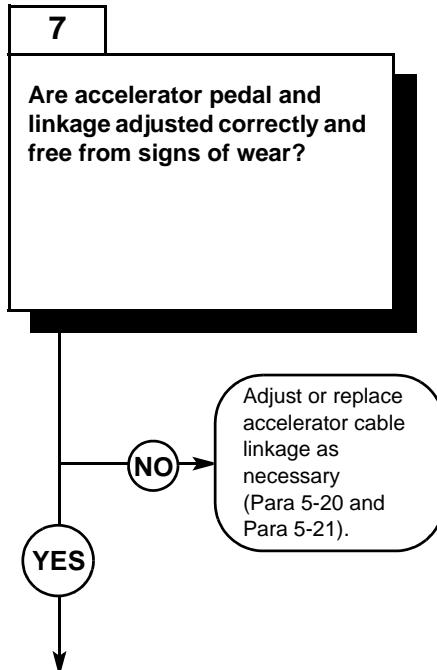
## 23. LOSS OF POWER (CONT.).

KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK. Transmission oil temperature OK. Air intake manifold OK. Turbocharger, exhaust manifold OK. High pressure fuel lines OK.
POSSIBLE PROBLEMS
Air in fuel lines. Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.



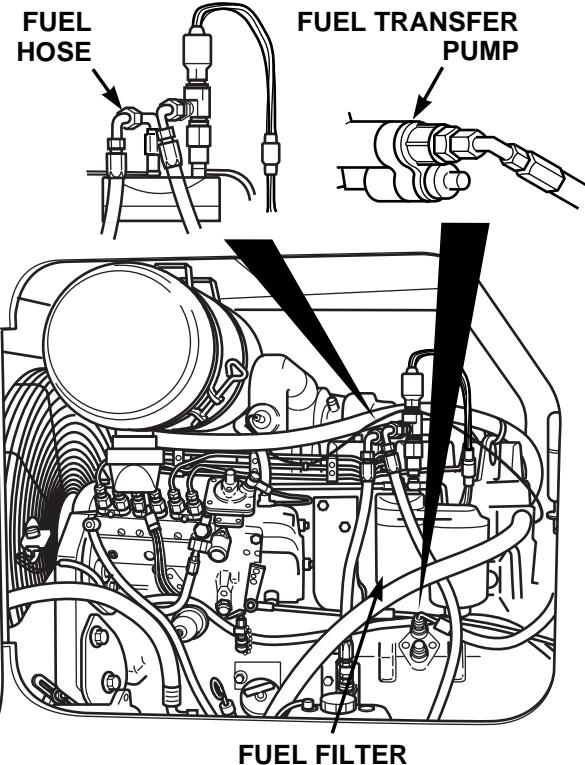
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air in fuel lines, engine will not run smoothly.

KNOWN INFO
Loss of vehicle power. (Hydraulic system OK.) Transmission oil level OK. Transmission oil temperature OK. Air intake manifold OK. Turbocharger, exhaust manifold OK. High pressure fuel lines OK. Fuel lines OK.
POSSIBLE PROBLEMS
Accelerator pedal or cable linkage faulty. Turbocharger malfunctioning.

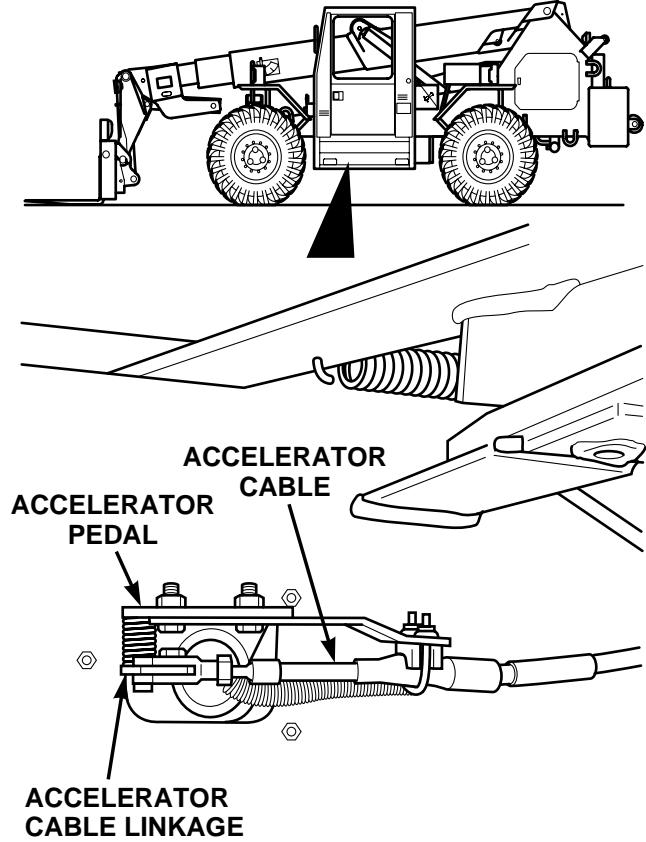


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If accelerator pedal and/or linkage incorrectly adjusted or worn, engine will not run smoothly.

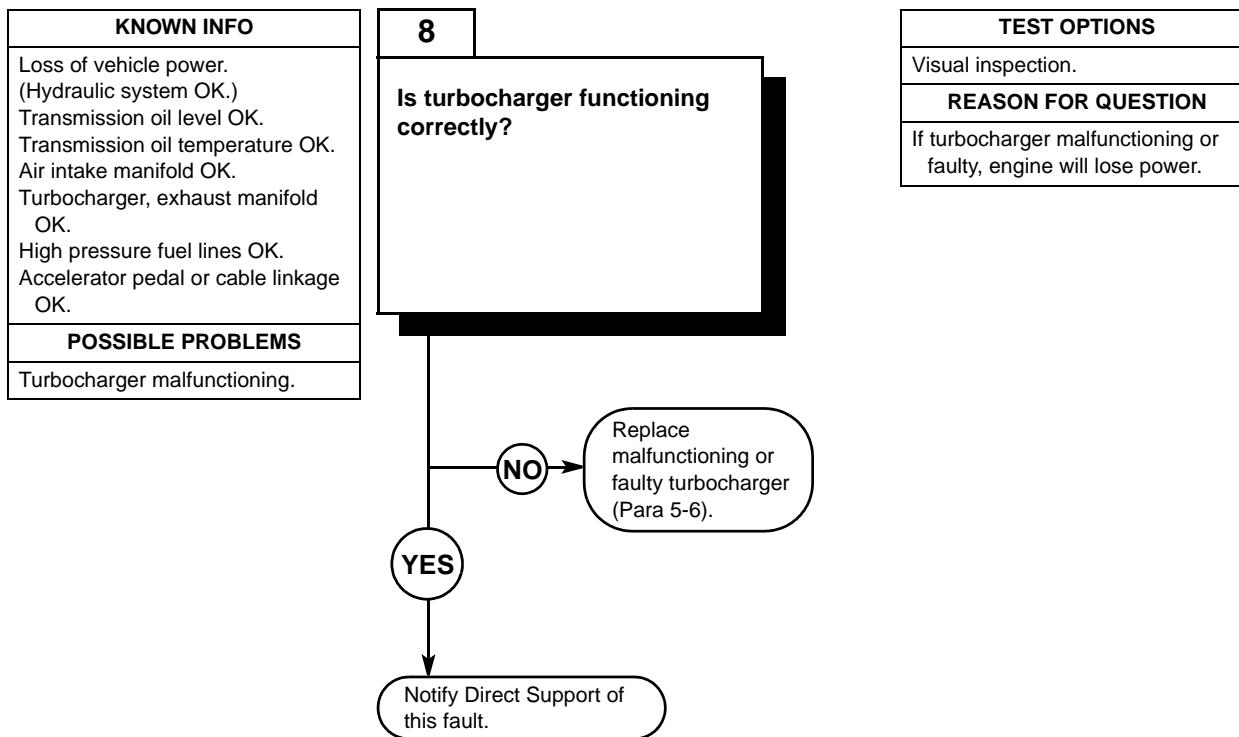
FUEL FLOW THROUGH FILTER VISUAL INSPECTION
Check flow of fuel through fuel filter (Para 5-11).
(a) If fuel flows freely without air, go to Step 7 of this fault. (b) If air in fuel lines, check for air leaks, then bleed system (Para 5-11).

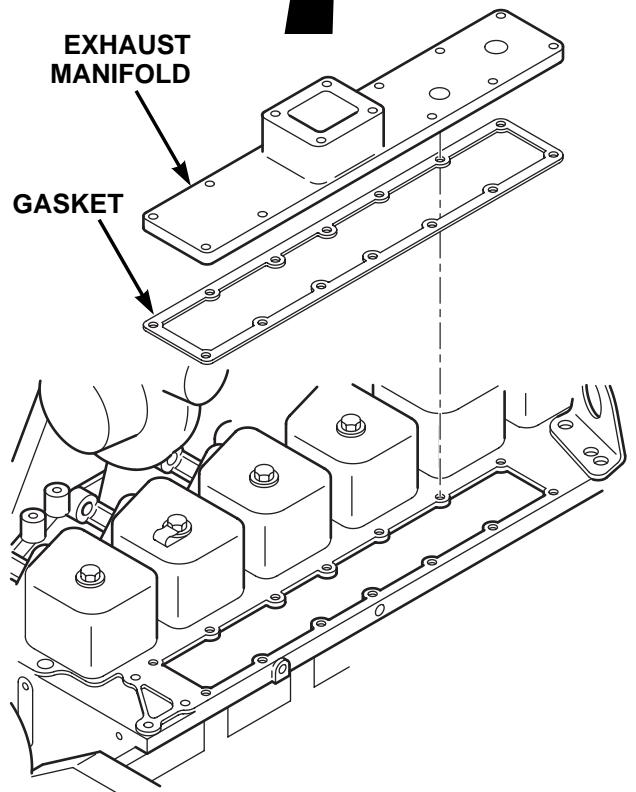
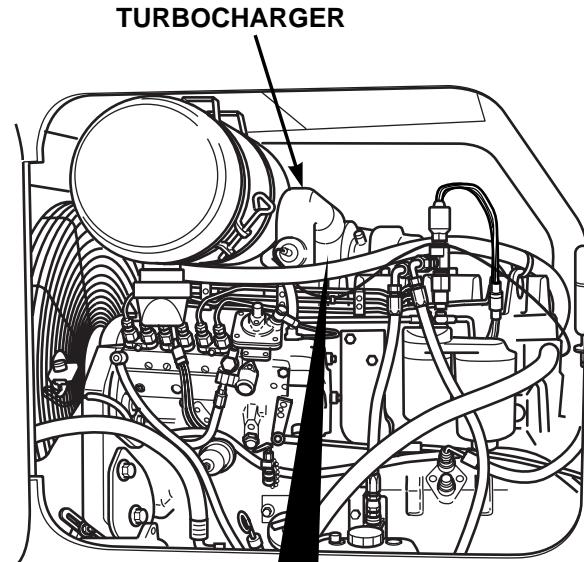
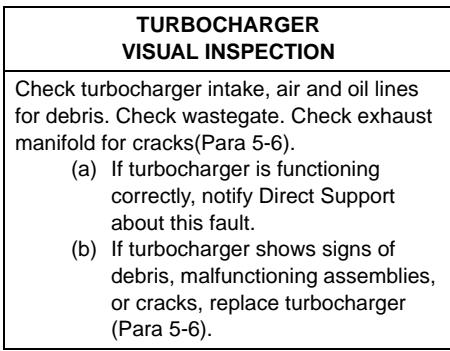


ACCELERATOR PEDAL AND/OR LINKAGE VISUAL INSPECTION
Check accelerator pedal and cable linkage for adjustment and signs of wear (Para 5-20 and Para 5-21).
(a) If pedal and linkage are adjusted correctly and are free from signs of wear, go to Step 8 of this fault. (b) If pedal and linkage are not adjusted correctly or are worn, adjust or replace pedal and/or linkage as necessary (Para 5-20 and Para 5-21).



## 23. LOSS OF POWER (CONT.).





**24. ENGINE DOES NOT SHUT OFF.****INITIAL SETUP***Tools and Special Tools*

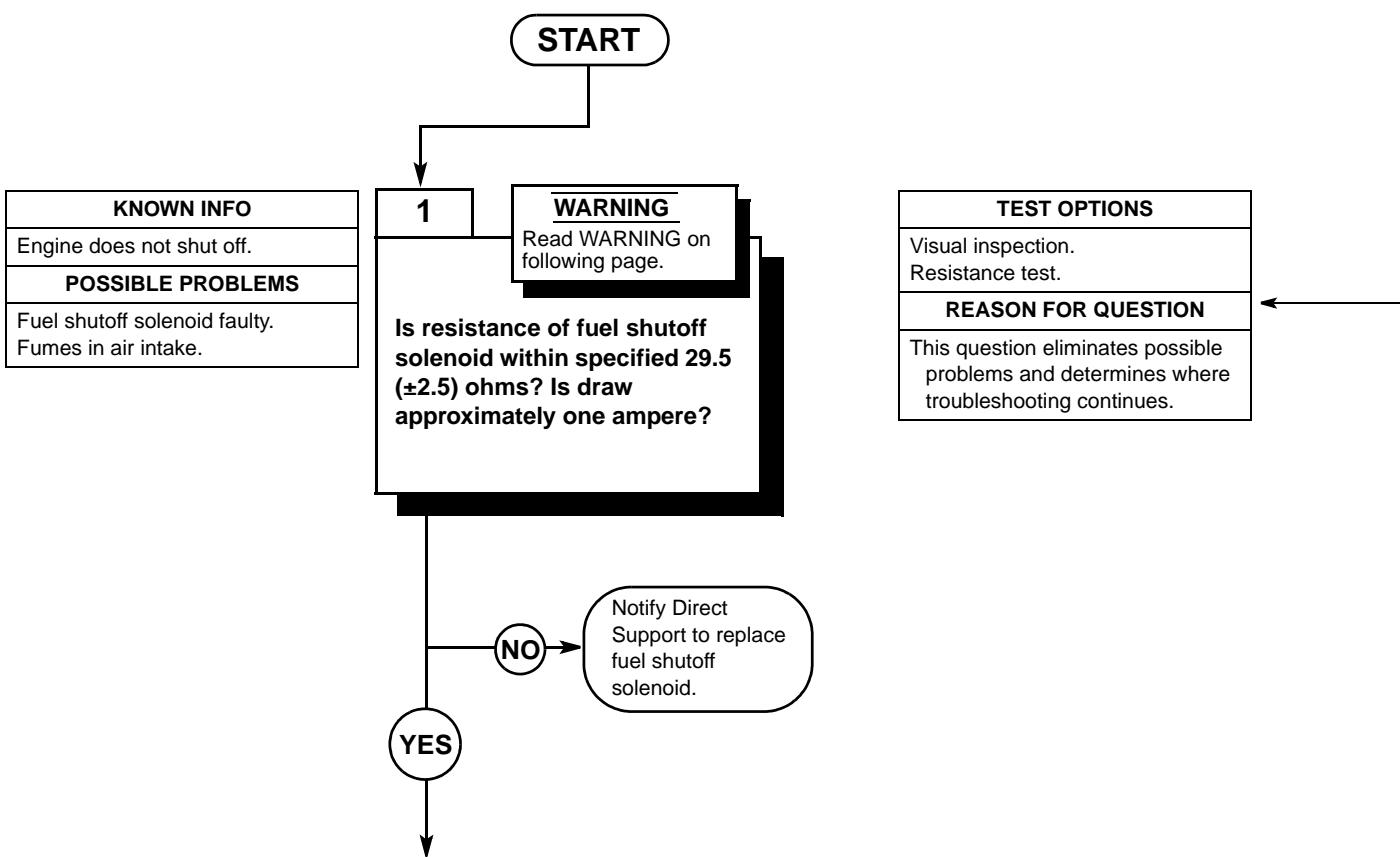
Tool Kit, General Mechanic's: Automotive  
 (Item 18, Appendix F)  
 Multimeter (Item 9, Appendix F)

*References*

TM 10-3930-673-10

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Diesel fuel is highly flammable and can cause injury or death if accidentally ignited.
- Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.
- Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.
- Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

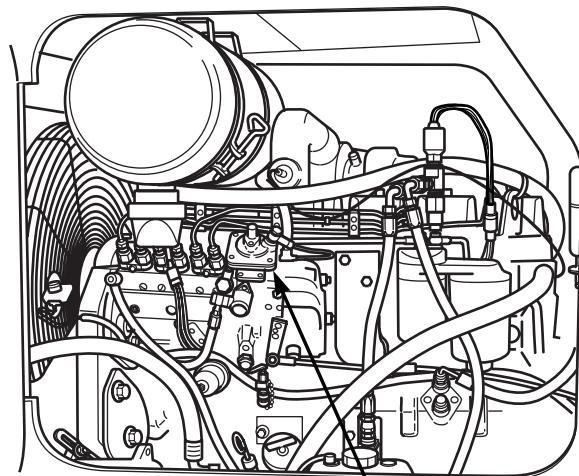
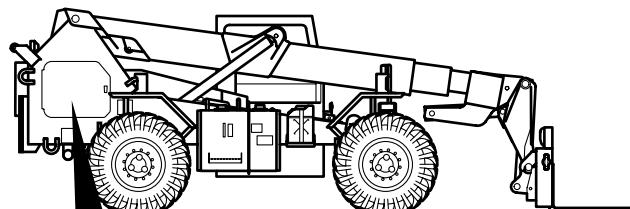
**CAUTION**

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**RESISTANCE TEST AND  
DRAW OF SOLENOID**

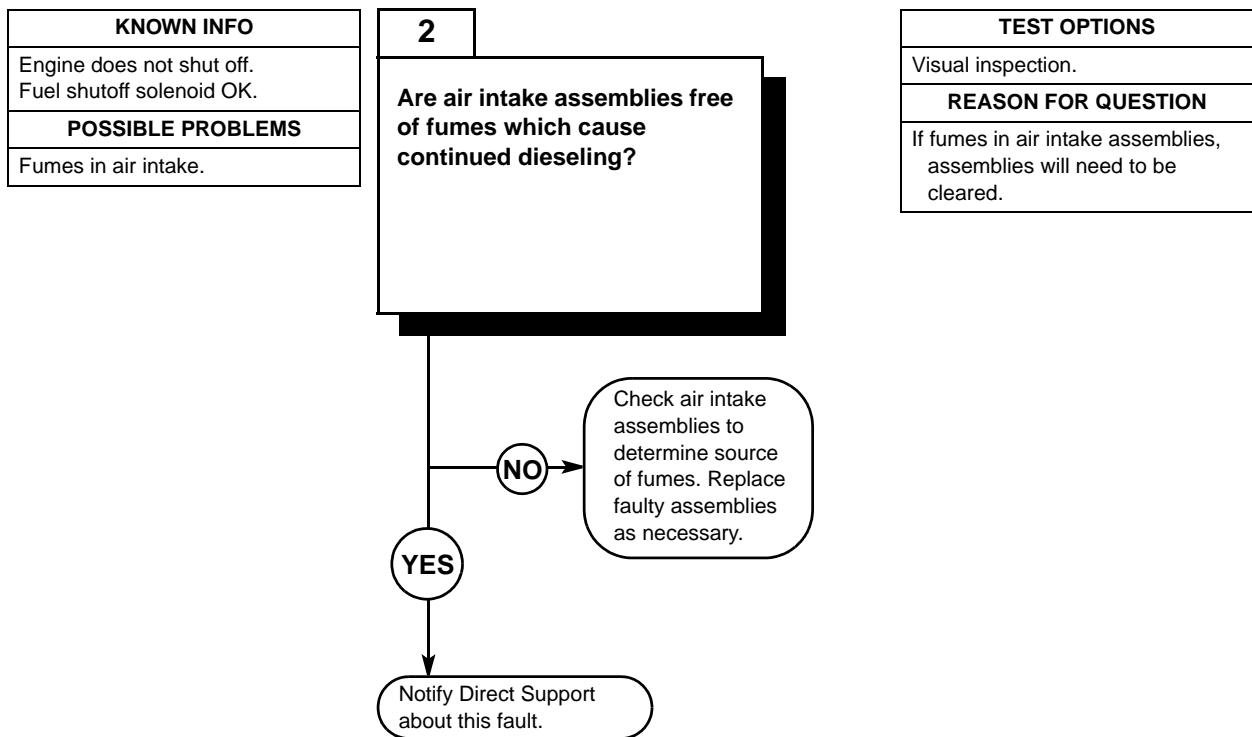
Set multimeter to ohms to test resistance of fuel shutoff solenoid. Set multimeter to amps to test draw of solenoid (Para 5-2).

- If resistance and draw are within specified ohms and amperes, go to Step 2 of this fault.
- If resistance and/or draw are not within specified ohms and amperes, notify Direct Support to replace solenoid.

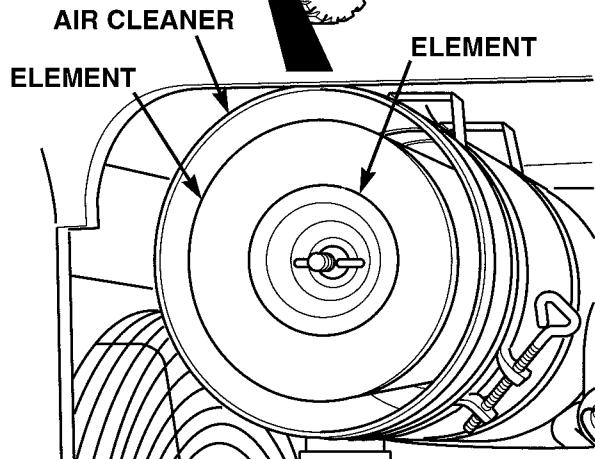
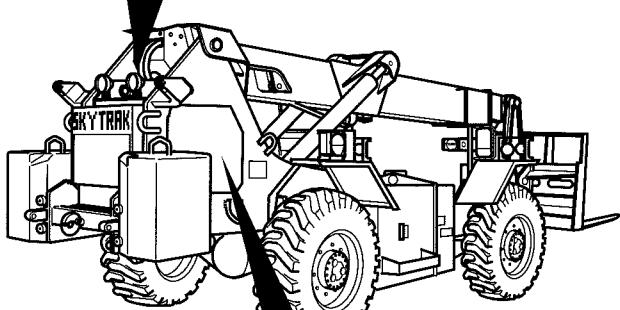
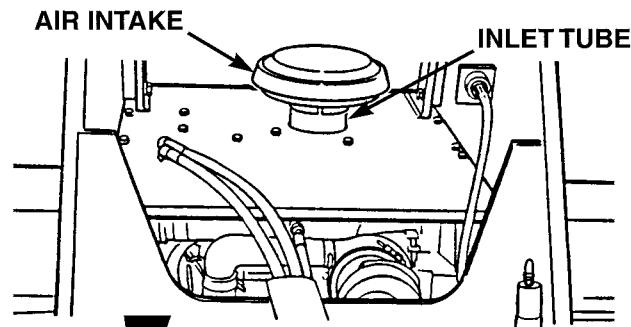


**FUEL SHUTOFF SOLENOID**

## 24. ENGINE DOES NOT SHUT OFF (CONT.).



<b>AIR INTAKE ASSEMBLIES VISUAL INSPECTION</b>	
(1)	Check air intake assemblies to determine source of fumes which cause continued dieseling.
(a)	If air intake assemblies are clear and functioning correctly, notify Direct Support of this fault.
(b)	If source of fumes is determined, replace air intake assemblies as necessary.
(2)	Start engine, then shut off engine. If engine shuts off, fault corrected. If not, notify Direct Support of this fault.



**25. CAB HEATER DOES NOT HEAT CAB.****INITIAL SETUP***Tools and Special Tools*

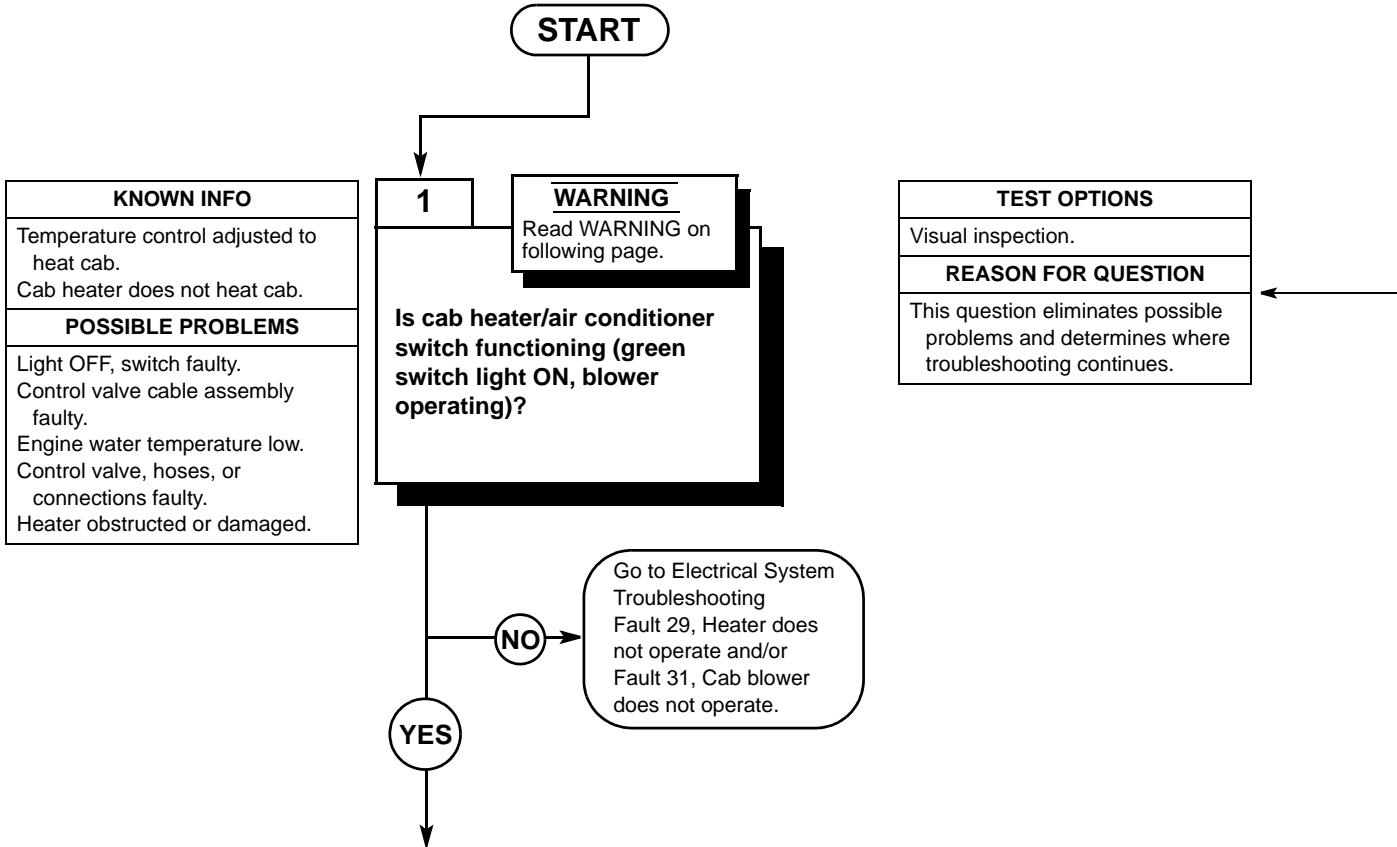
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



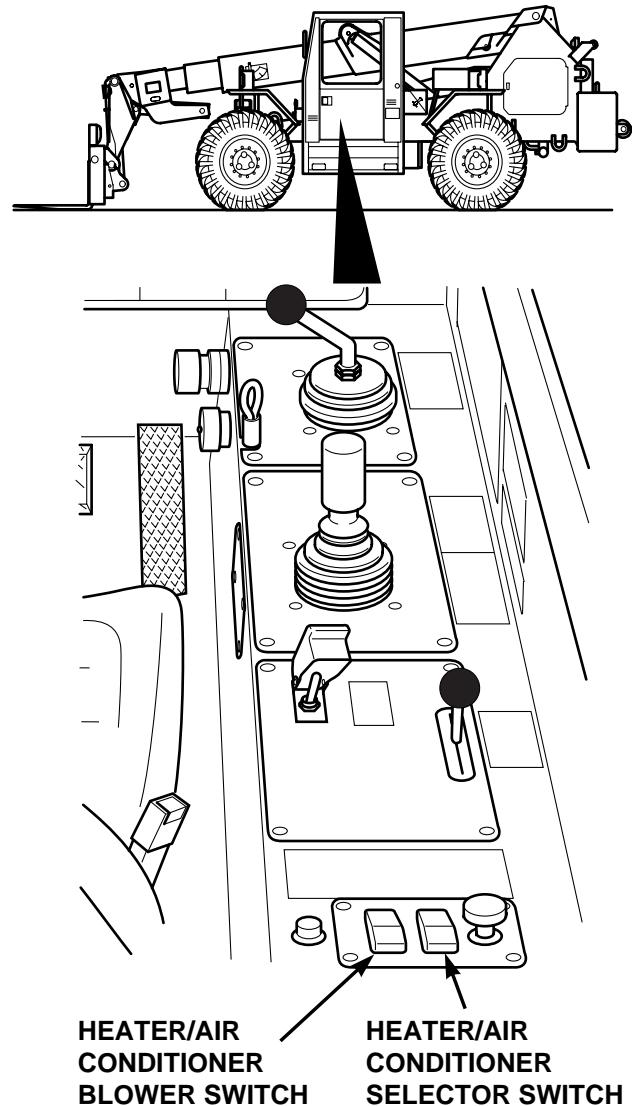
**WARNING**

Always wear eye and hand protection when working on an air conditioning system or compressor. Liquid refrigerant can cause frostbite and/or blindness.

**CAUTION**

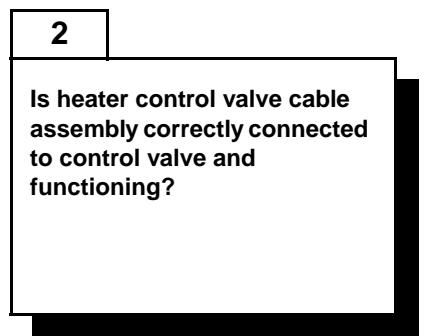
Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

HEATER/AIR CONDITIONER SWITCH VISUAL INSPECTION	
Press cab heater/air conditioner switch to ON position.	
<ul style="list-style-type: none"> <li>(a) If green switch light is ON and blower functions, go to Step 2 of this fault.</li> <li>(b) If green switch light is not ON and blower does not function, go to Electrical System Trouble-shooting Fault 29, Heater does not operate and/or Fault 31, Cab blower does not operate.</li> </ul>	



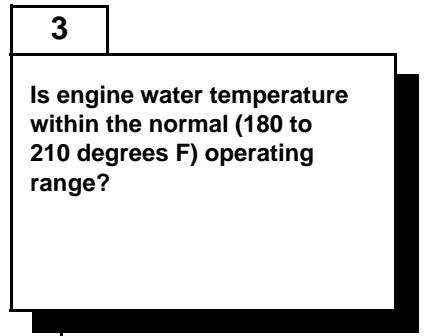
## 25. CAB HEATER DOES NOT HEAT CAB (CONT.).

KNOWN INFO
Temperature control adjusted to heat cab. Cab heater does not heat cab. Light ON, switch OK.
POSSIBLE PROBLEMS
Control valve cable assembly faulty. Engine water temperature low. Control valve, hoses, or connections faulty. Heater obstructed or damaged.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If control valve cable assembly faulty, valve will not operate properly.

KNOWN INFO
Temperature control adjusted to heat cab. Cab heater does not heat cab. Light ON, switch OK. Control valve cable assembly OK.
POSSIBLE PROBLEMS
Engine water temperature low. Control valve, hoses, or connections faulty. Heater obstructed or damaged.

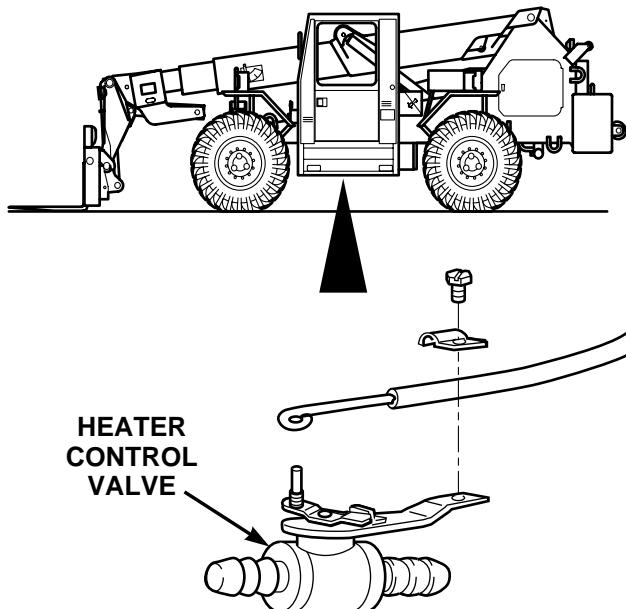


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If engine water temperature low, refer to Fault 12, Engine water temperature below normal on Page 2-678.

**CONTROL VALVE CABLE ASSEMBLY  
AND CONNECTION TO CONTROL VALVE  
VISUAL INSPECTION**

Inspect heater control valve cable assembly and its connection to heater control valve (Para 17-8).

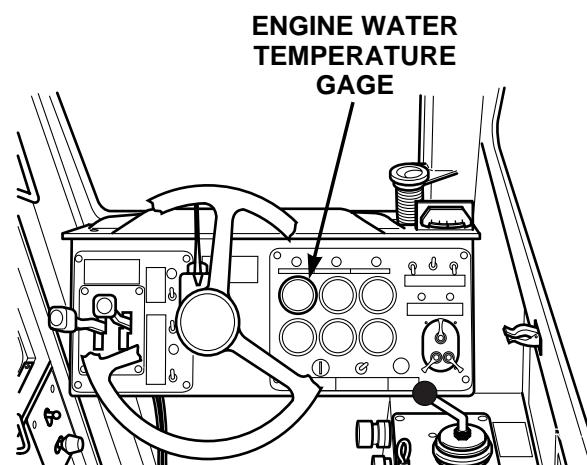
- (a) If control valve cable assembly is correctly connected to control valve and functioning, go to Step 3 of this fault.
- (b) If cable assembly is disconnected from control valve, connect assembly to valve (Para 17-8).
- (c) If cable assembly is damaged, replace assembly (Para 17-8).



**ENGINE WATER TEMPERATURE  
VISUAL INSPECTION**

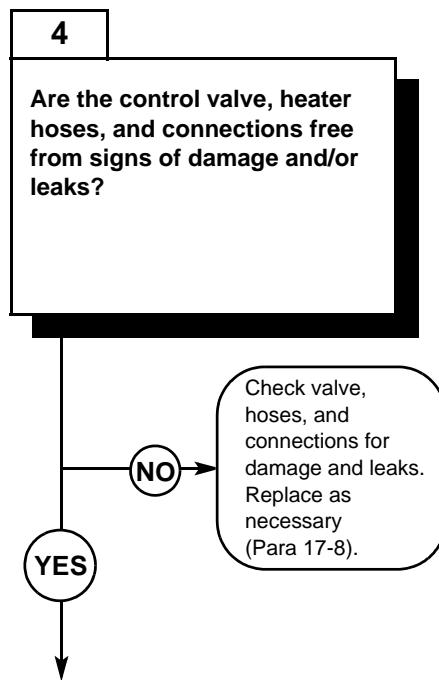
Check engine water temperature gage to determine if water temperature is within the normal (180 to 210 degrees F) operating range.

- (a) If engine water temperature is within normal operating range, go to Step 4 of this fault.
- (b) If engine water temperature below normal, refer to Fault 12, Engine water temperature below normal on Page 2-678 to correct fault.



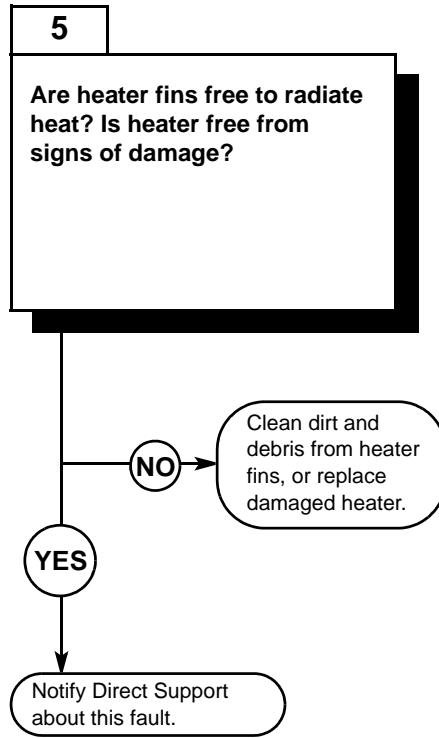
## 25. CAB HEATER DOES NOT HEAT CAB (CONT.).

KNOWN INFO
Temperature control adjusted to heat cab. Cab heater does not heat cab. Light ON, switch OK. Control valve cable assembly OK. Engine water temperature OK.
POSSIBLE PROBLEMS
Control valve, hoses, or connections faulty. Heater obstructed or damaged.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
Damaged or leaking valve, hoses, or connections will affect heater operation.

KNOWN INFO
Temperature control adjusted to heat cab. Cab heater does not heat cab. Light ON, switch OK. Control valve cable assembly OK. Engine water temperature OK. Control valve, hoses, connections OK.
POSSIBLE PROBLEMS
Heater obstructed or damaged.



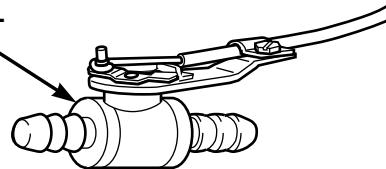
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If heater obstructed or damaged, heater will not operate properly.

<b>VALVE, HOSES, CONNECTIONS VISUAL INSPECTION</b>
--

Visually inspect heater control valve, heater hoses, and connections for damage and leaks.

- If valve, hoses, and connections are clean, tight, and free from damage and leaks, go to Step 5 of this fault.
- If valve, hoses, and/or connections show signs of damage or leaks, replace as necessary (Para 17-7).

**HEATER  
CONTROL  
VALVE**



<b>HEATER VISUAL INSPECTION</b>
-------------------------------------

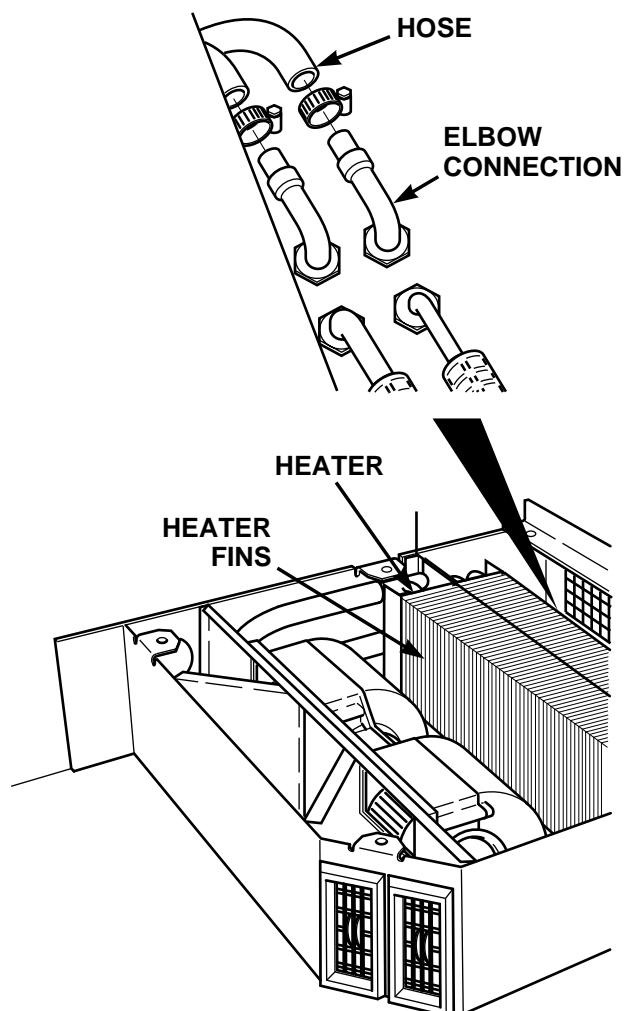
Visually inspect heater fins for dirt and debris or signs of damage.

- If heater fins are free to radiate heat and heater is free from signs of damage, notify Direct Support about this fault.
- If heater fins are blocked by dirt and debris, clean heater fins.
- If heater shows signs of damage, repair or replace heater (Para 17-7).

**HOSE**

**ELBOW  
CONNECTION**

**HEATER**  
**HEATER  
FINS**



**26. AIR CONDITIONER DOES NOT COOL CAB.****INITIAL SETUP***Tools and Special Tools*

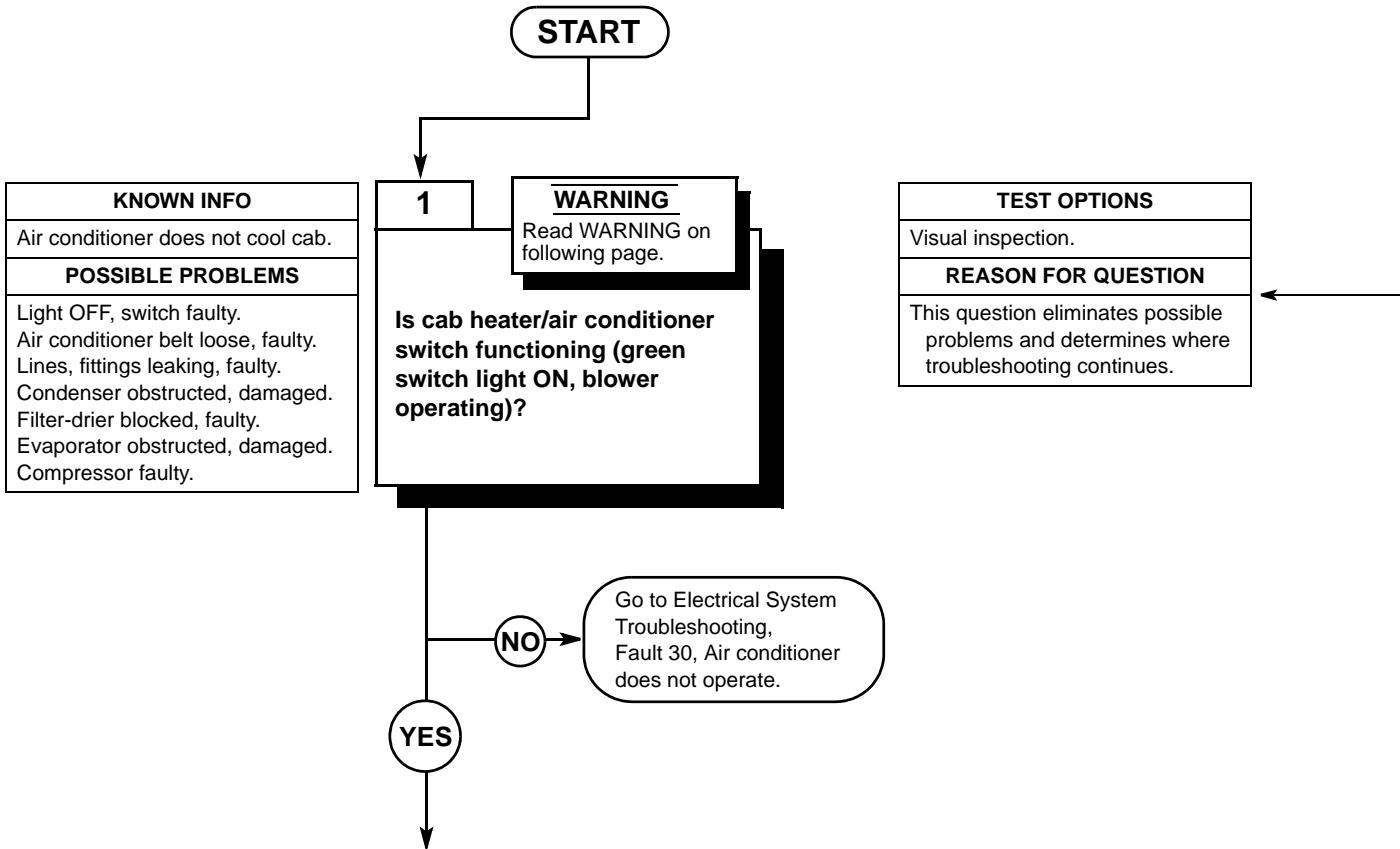
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
Refrigerant Leak Detector (Item 13, Appendix F)

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

Always wear eye and hand protection when working on an air conditioning system or compressor. Liquid refrigerant can cause frostbite and/or blindness.

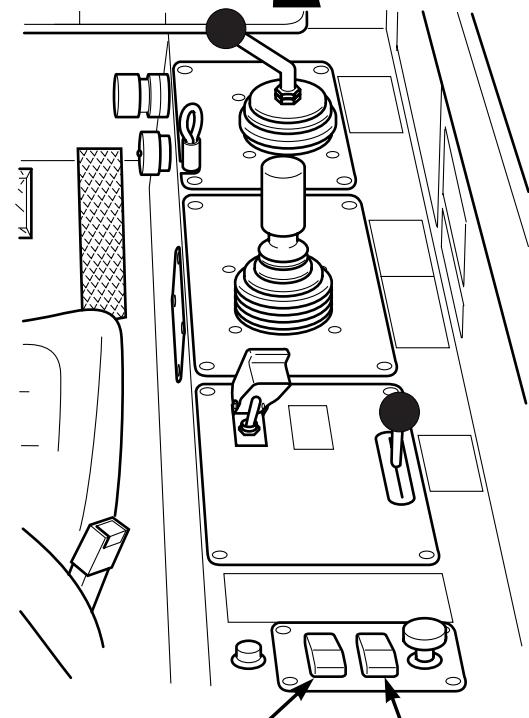
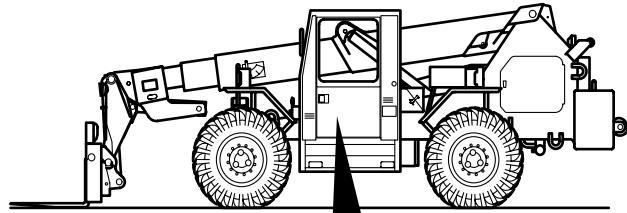
**CAUTION**

- Before disconnecting lines, make sure refrigerant has been removed from air conditioning system by recovering it with appropriate recovery equipment. Do not mix refrigerant in same recovery equipment.
- When working on compressors, always relieve internal pressure first. Internal compressor pressure can be relieved by removing oil plug, or by removing shipping caps/pads from ports.
- Keep refrigerants and oils away from open flames. Refrigerants can produce poisonous gases in open flames. Work in well-ventilated area.
- Do not introduce compressed air into an air conditioning system due to danger of contamination.
- Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy materials.

**HEATER/AIR CONDITIONER SWITCH VISUAL INSPECTION**

Press cab heater/air conditioner switch to ON position.

- (a) If green switch light is ON and blower functions, go to Step 2 of this fault.
- (b) If green switch light is not ON and blower does not function, go to Electrical System Trouble-shooting Fault 30, Air conditioner does not operate.

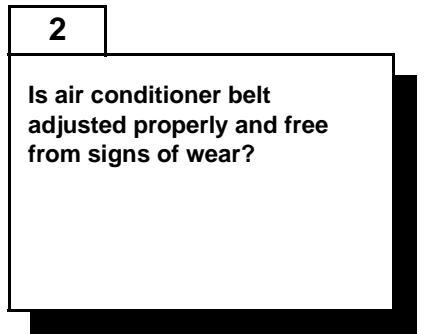


HEATER/AIR CONDITIONER BLOWER SWITCH

HEATER/AIR CONDITIONER SELECTOR SWITCH

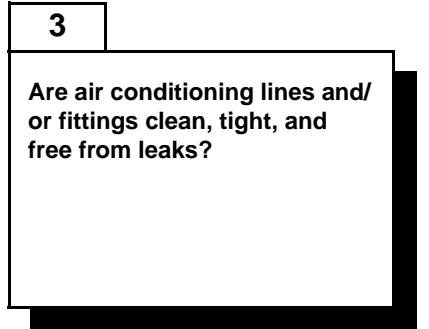
## 26. AIR CONDITIONER DOES NOT COOL CAB (CONT.).

KNOWN INFO
Air conditioner does not cool cab. Light ON, switch OK.
POSSIBLE PROBLEMS
Air conditioner belt loose, faulty. Lines, fittings leaking, faulty. Condenser obstructed, damaged. Filter-drier blocked, faulty. Evaporator obstructed, damaged. Compressor faulty.



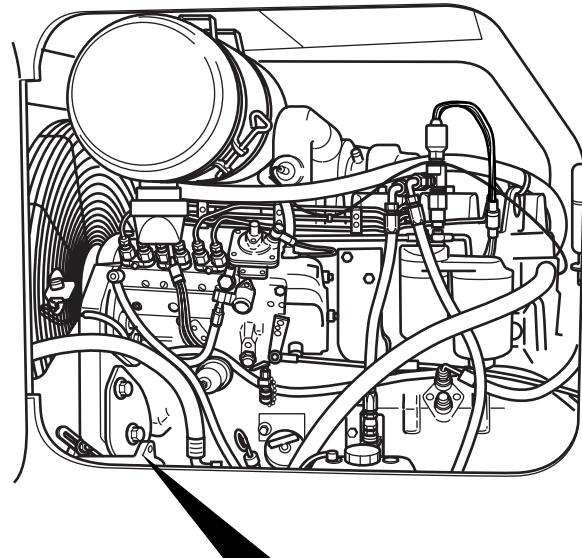
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If air conditioner belt loose or faulty, air conditioner will not operate properly.

KNOWN INFO
Air conditioner does not cool cab. Light ON, switch OK. Air conditioner belt OK.
POSSIBLE PROBLEMS
Lines, fittings leaking, faulty. Condenser obstructed, damaged. Filter-drier blocked, faulty. Evaporator obstructed, damaged. Compressor faulty.

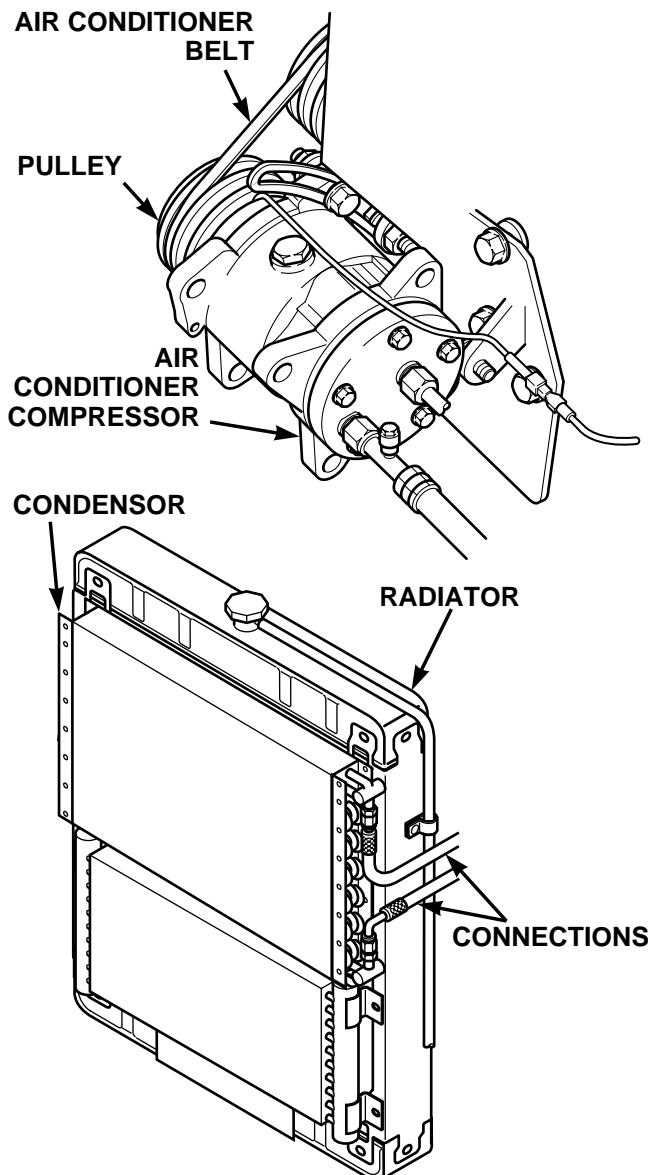


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If lines and/or fittings are leaking, air conditioner will not operate properly.

<b>AIR CONDITIONER BELT VISUAL INSPECTION</b>
Inspect air conditioner belt for proper tension and/or signs of wear.
(a) If tension correct and belt free from signs of wear, go to Step 3 of this fault.
(b) If tension is incorrect, tighten or loosen the belt as necessary (Para 7-8).
(c) If belt shows signs of wear (cracks, deteriorated sections), replace belt (Para 7-8).

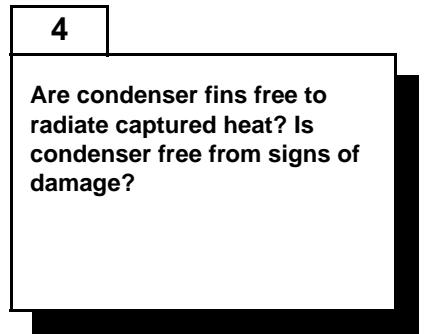


<b>LINES AND FITTINGS VISUAL INSPECTION</b>
Use a leak detector (which is sensitive to refrigerant in use) to check air conditioning lines and fittings for leaks.
(a) If lines and fittings are clean, tight, and free from leaks, go to Step 4 of this fault.
(b) If leaks are detected, evacuate system, replace faulty lines and/or fittings, and recharge system.



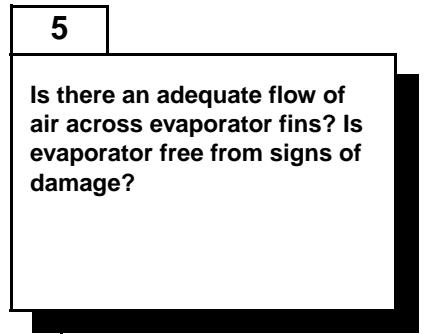
## 26. AIR CONDITIONER DOES NOT COOL CAB (CONT.).

KNOWN INFO
Air conditioner does not cool cab. Light ON, switch OK. Air conditioner belt OK. Lines and fittings OK.
POSSIBLE PROBLEMS
Condenser obstructed, damaged. Filter-drier blocked, faulty. Evaporator obstructed, damaged. Compressor faulty.



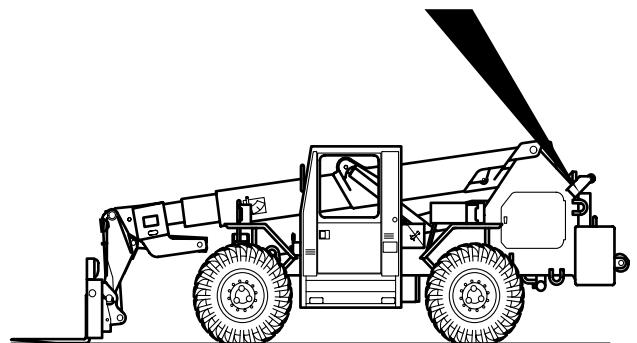
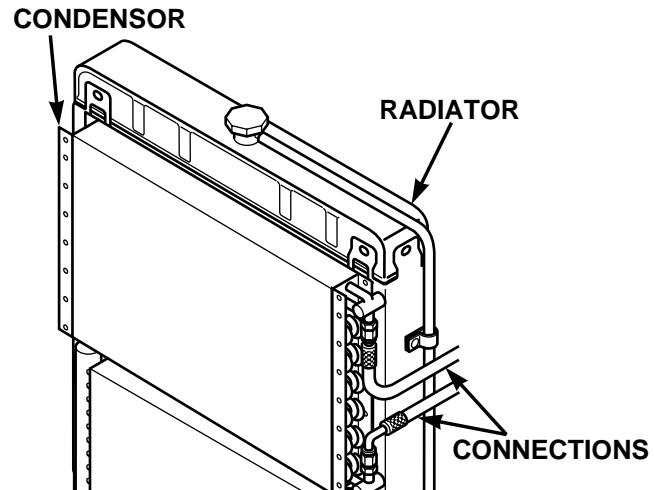
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If condenser is obstructed or damaged, condenser will not function.

KNOWN INFO
Air conditioner does not cool cab. Light ON, switch OK. Air conditioner belt OK. Lines and fittings OK. Condenser OK. Filter-drier OK.
POSSIBLE PROBLEMS
Evaporator obstructed, damaged. Compressor faulty.

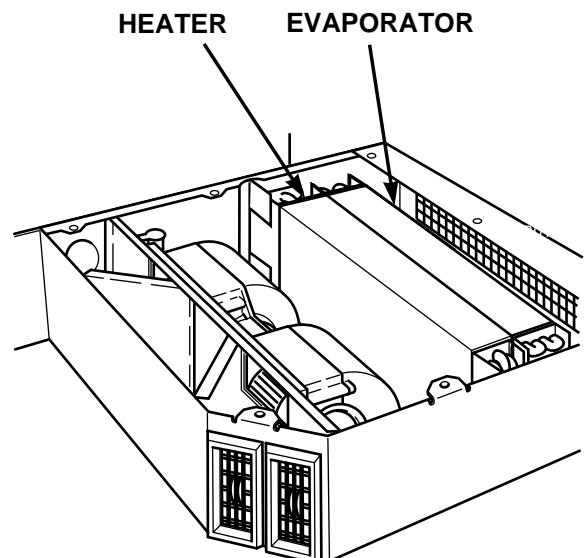


TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If evaporator in cab is obstructed or damaged, evaporator will not function properly.

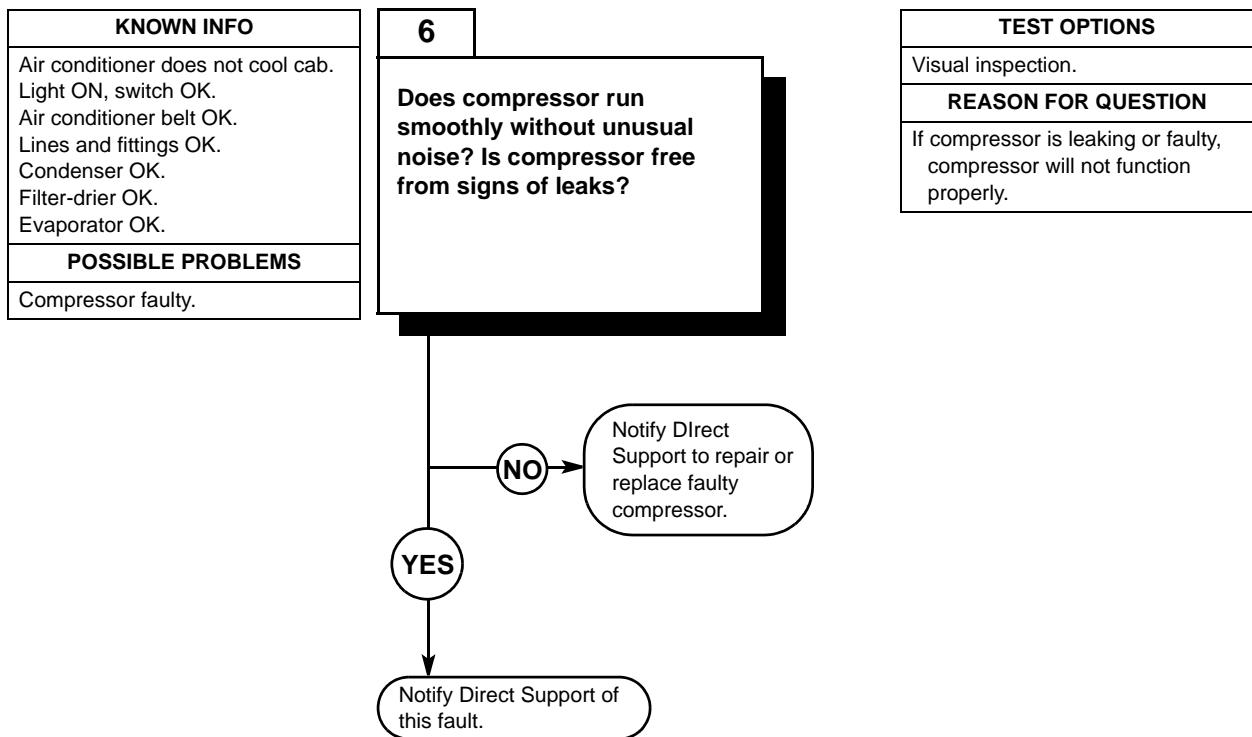
<b>CONDENSER VISUAL INSPECTION</b>
Visually inspect condenser fins for dirt and debris or signs of damage.
(a) If condenser fins are free to radiate heat and condenser is free from signs of damage, go to Step 5 of this fault.
(b) If condenser fins are blocked by dirt and debris, clean condenser with water or air (under pressure).
(c) If condenser shows signs of damage, notify Direct Support Maintenance.



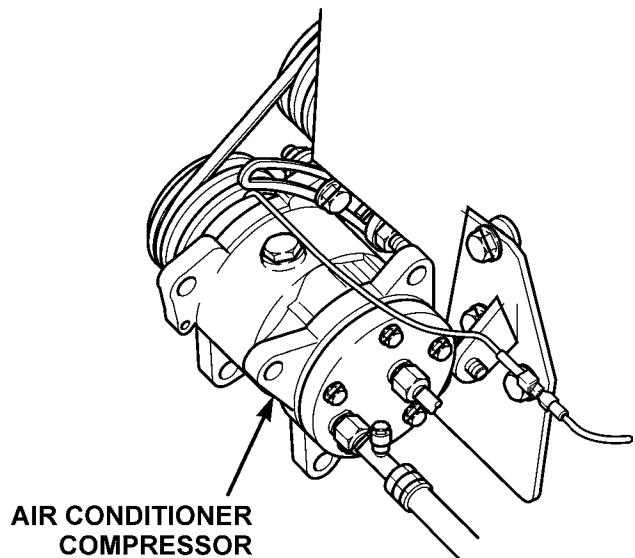
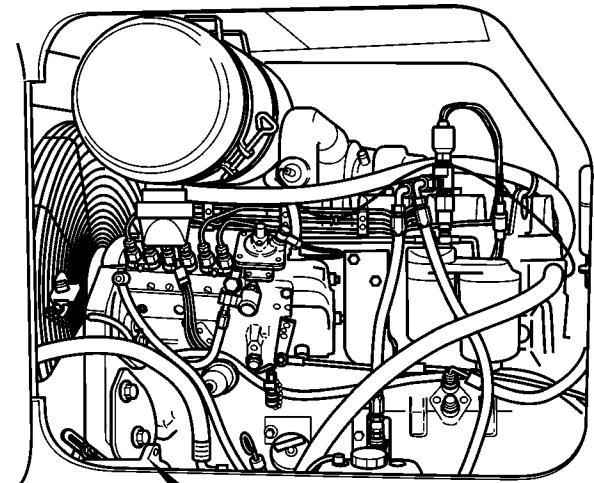
<b>EVAPORATOR VISUAL INSPECTION</b>
Visually inspect evaporator fins for dirt and debris, and for signs of damage.
(a) If evaporator fins are clean and free from damage, go to Step 6 of this fault.
(b) If evaporator fins obstructed with dirt and debris, clean fins.
(c) If evaporator shows signs of damage, repair or replace evaporator.



## 26. AIR CONDITIONER DOES NOT COOL CAB (CONT.).



<b>COMPRESSOR VISUAL INSPECTION</b>
Check compressor (clutch, shaft, and mounting components, for example) for unusual noise. Leak check compressor.
(a) If compressor runs smoothly and is free from signs of leaks, notify Direct Support about this fault. (b) If compressor runs with unusual noise and/or shows signs of leaks, notify Direct Support to repair faulty components or replace compressor.



**AIR CONDITIONER  
COMPRESSOR**

**27. ARCTIC HEATER DOES NOT OPERATE CORRECTLY****INITIAL SETUP***Tools and Special Tools*

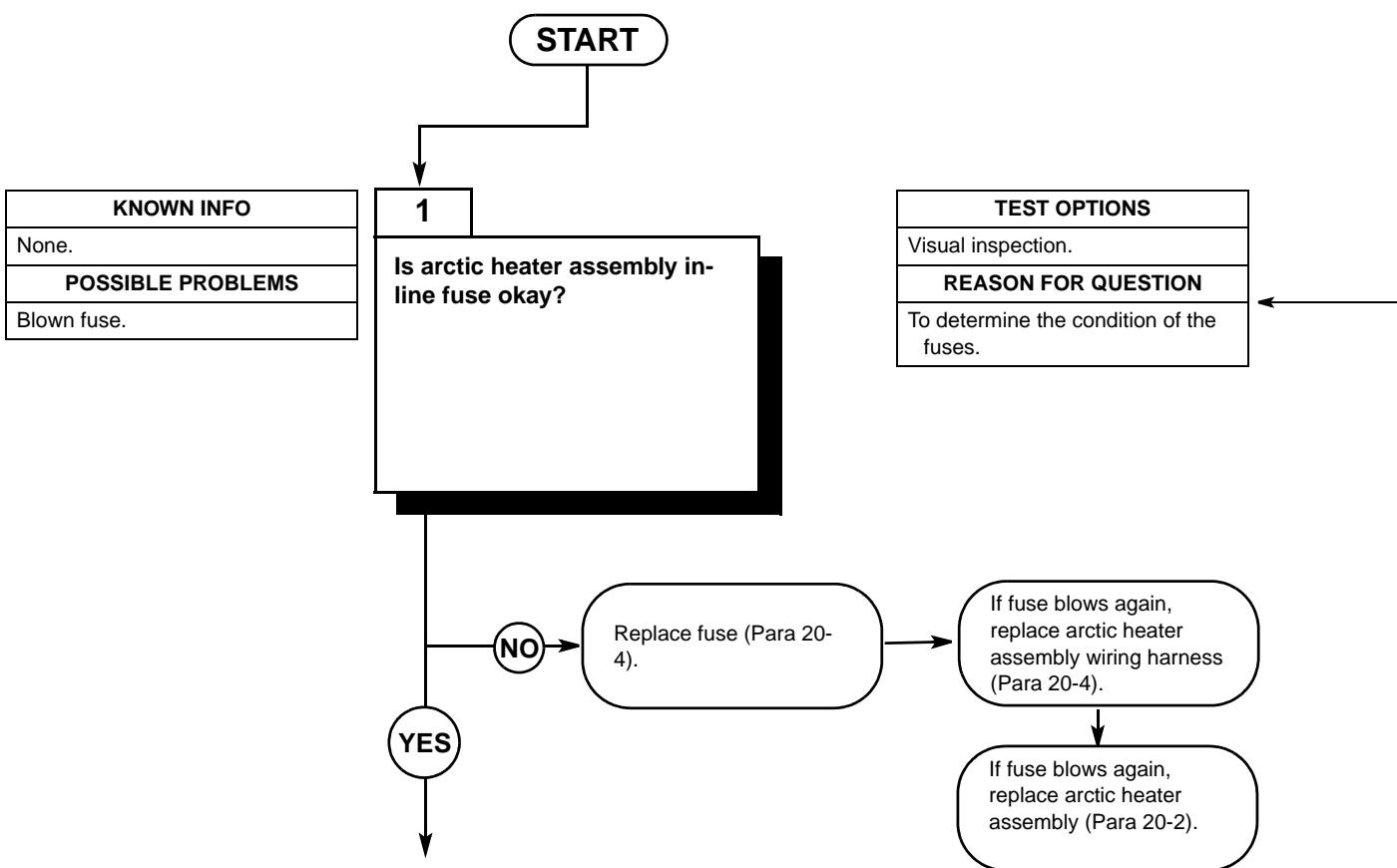
Tool Kit, General Mechanic's: Automotive  
(Item 18, Appendix F)  
Refrigerant Leak Detector (Item 13, Appendix F)

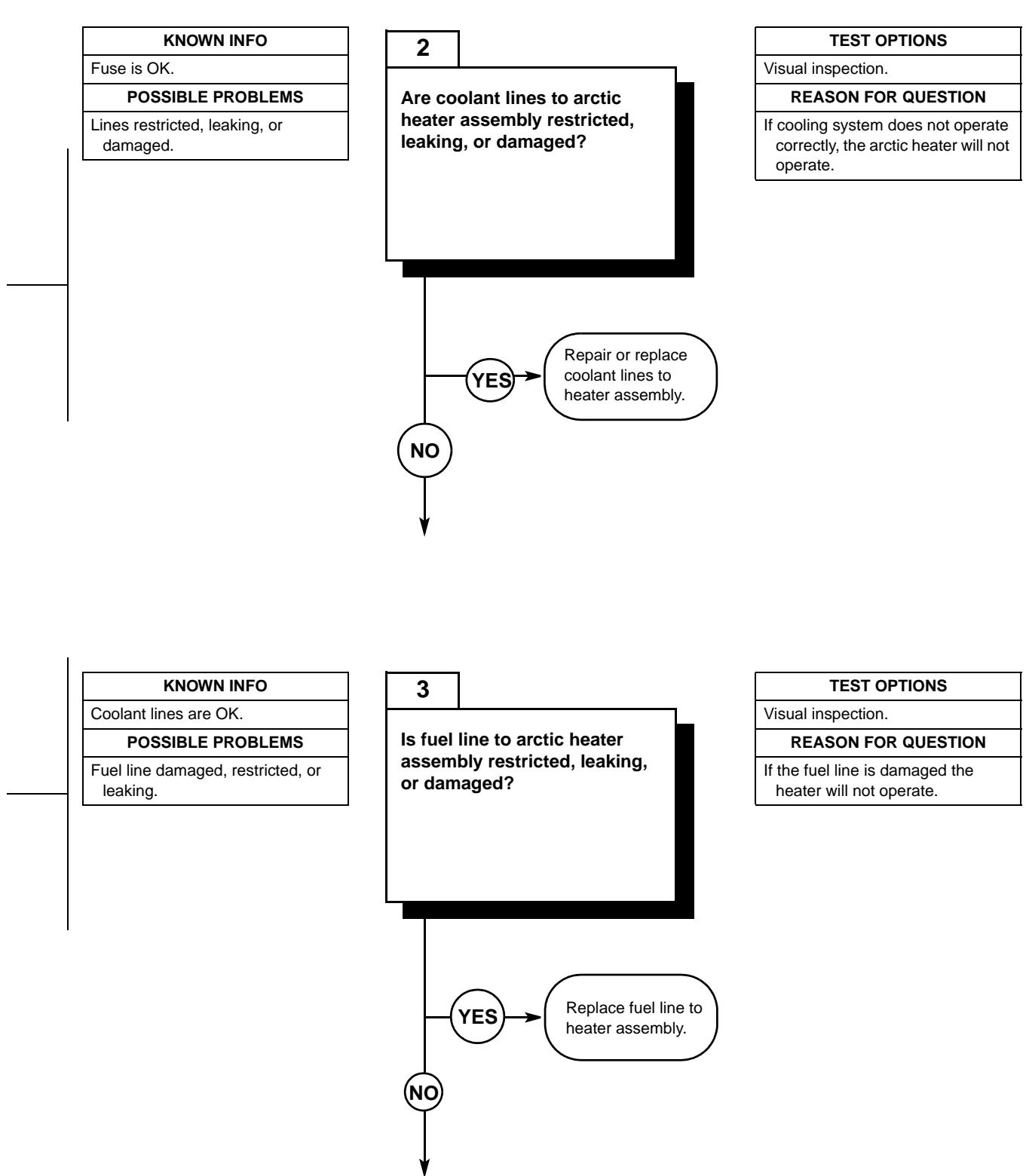
*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

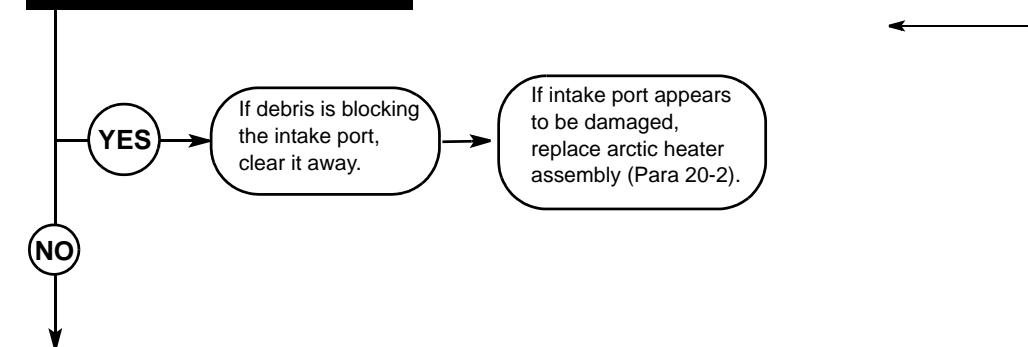
Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



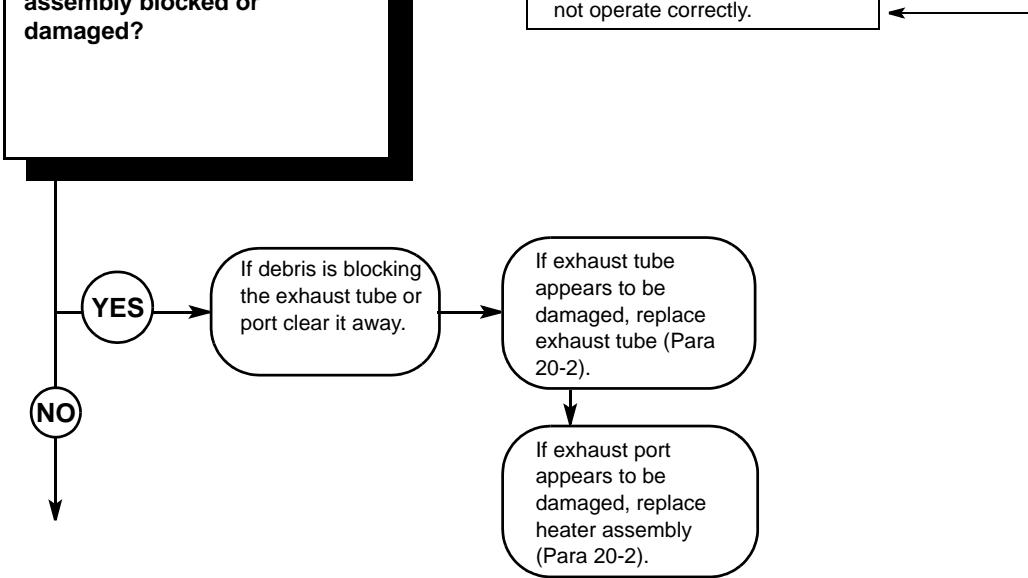


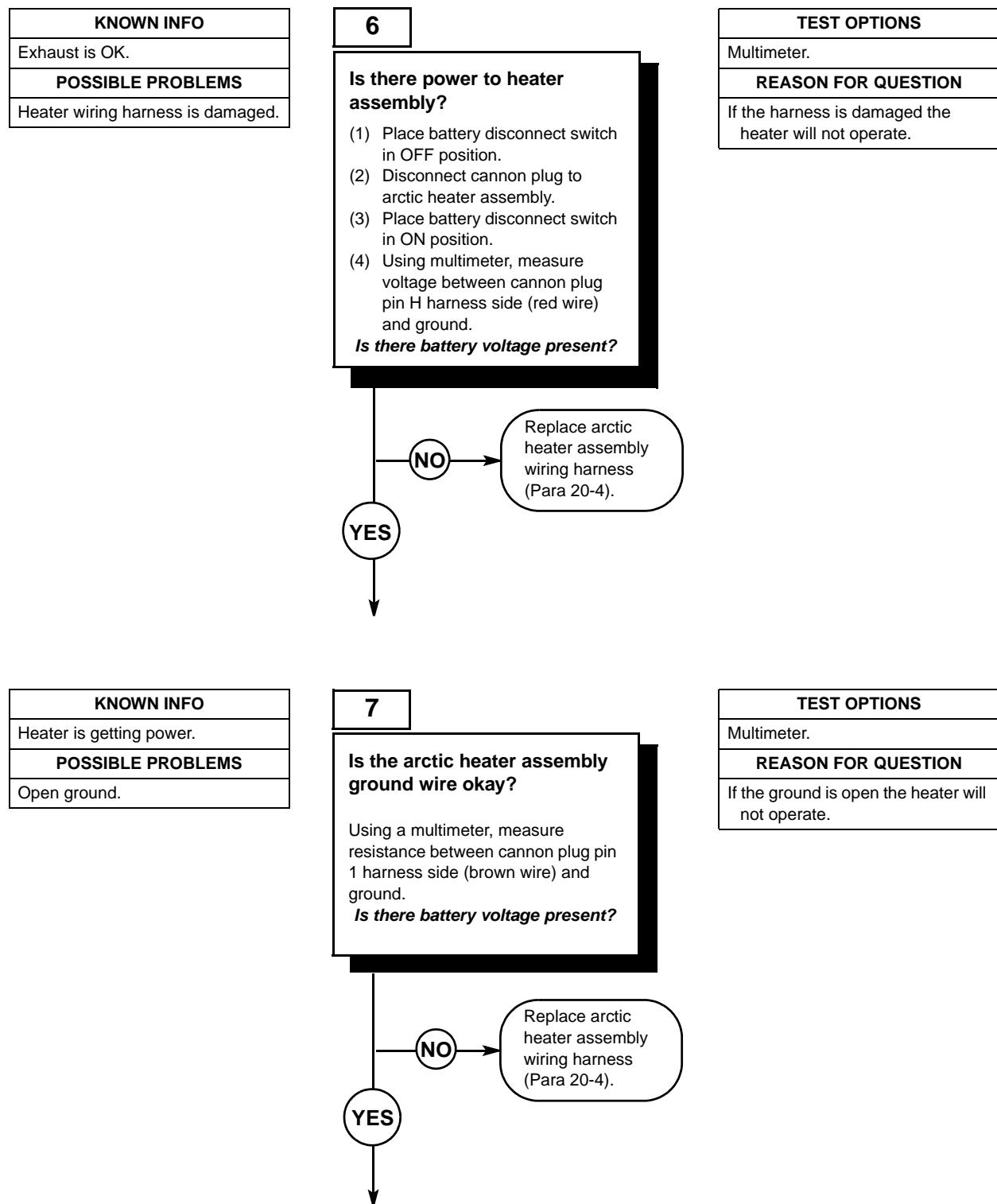
## 27. ARCTIC HEATER DOES NOT OPERATE CORRECTLY (CONT).

KNOWN INFO	4	TEST OPTIONS
Fuel line is OK.	Is intake port on bottom of arctic heater assembly blocked or damaged?	
POSSIBLE PROBLEMS	Debris blocking the intake.	



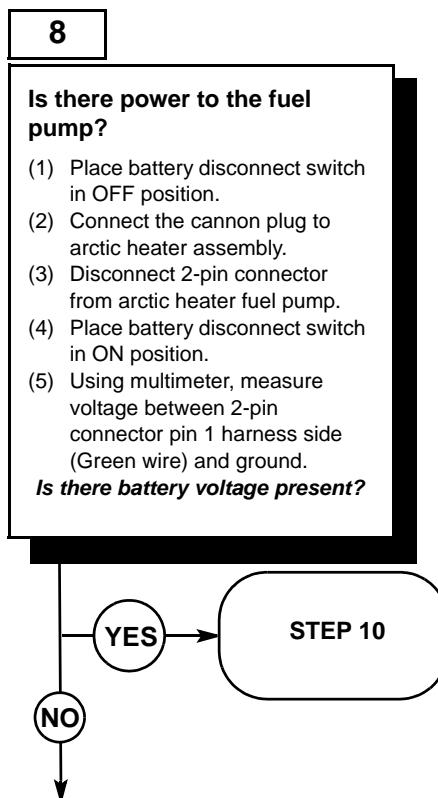
KNOWN INFO	5	TEST OPTIONS
Intake is OK.	Is exhaust port and tube on bottom of arctic heater assembly blocked or damaged?	
POSSIBLE PROBLEMS	Exhaust is plugged.	





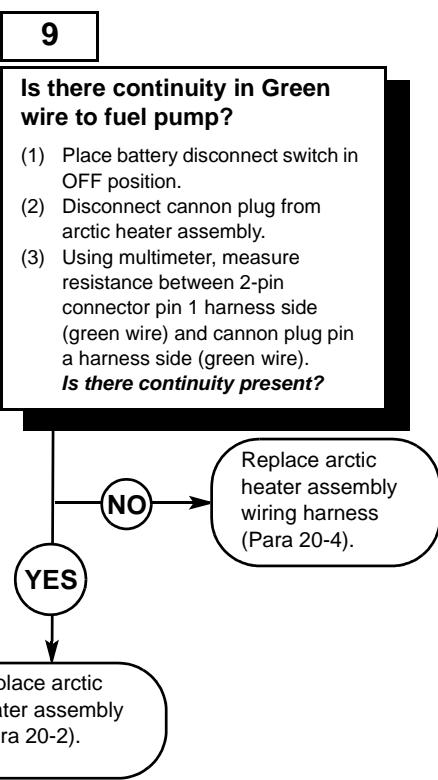
## 27. ARCTIC HEATER DOES NOT OPERATE CORRECTLY (CONT).

KNOWN INFO
Ground is OK.
POSSIBLE PROBLEMS
Damaged heater harness.

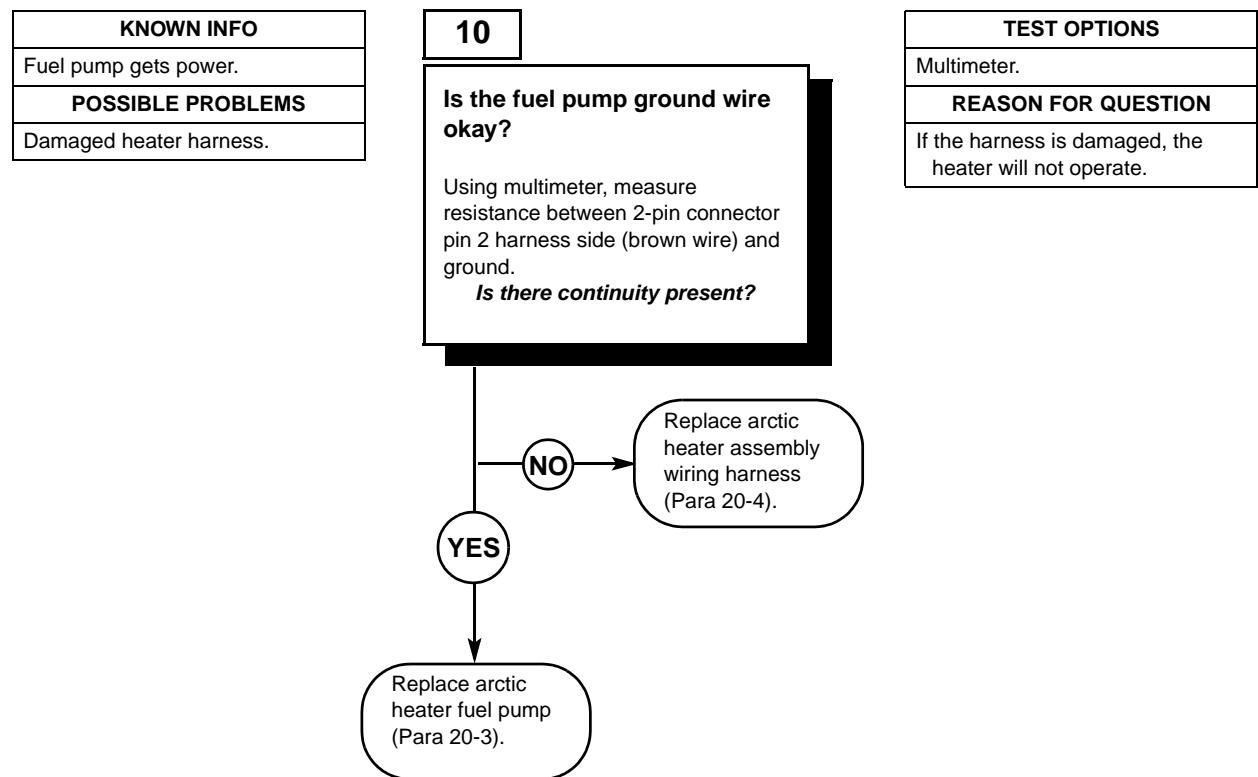


TEST OPTIONS
Multimeter.
REASON FOR QUESTION
If the harness is damaged, the heater will not operate.

KNOWN INFO
No power to fuel pump.
POSSIBLE PROBLEMS
Damaged harness or heater assembly.



TEST OPTIONS
Multimeter.
REASON FOR QUESTION
If the harness is damaged, the heater will not operate.





## 2-17. HYDRAULIC SYSTEM TROUBLESHOOTING

This paragraph covers hydraulic system troubleshooting. The Hydraulic System Fault Index, Table 2-8, lists faults for the hydraulic system of the ATLAS. Refer to schematics found at the end of this volume when performing test and corrective actions.

***Table 2-8. Hydraulic System Fault Index***

Fault Number	Description	Page No.
1	Left hand fork sideshift cylinder does not operate.....	2-772
2	Right hand fork sideshift cylinder does not operate.....	2-780
3	Fork tilt cylinder does not operate .....	2-788
4	Attachment cylinder does not operate .....	2-796
5	Left and/or right hoist cylinders do not extend or retract.....	2-804
6	Boom extend cylinder slow or does not extend or retract .....	2-814
7	Left and right rear steering cylinders do not extend or retract.....	2-822
8	Left and right front steering cylinders do not extend or retract .....	2-832
9	Frame tilt cylinder does not extend or retract.....	2-842
10	Brake actuators (left and/or right rear and left and/or right front) do not operate correctly .....	2-850
11	Emergency steering pump does not operate.....	2-858

**1. LEFT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Gage 0-5000 psi

*Personnel Required*

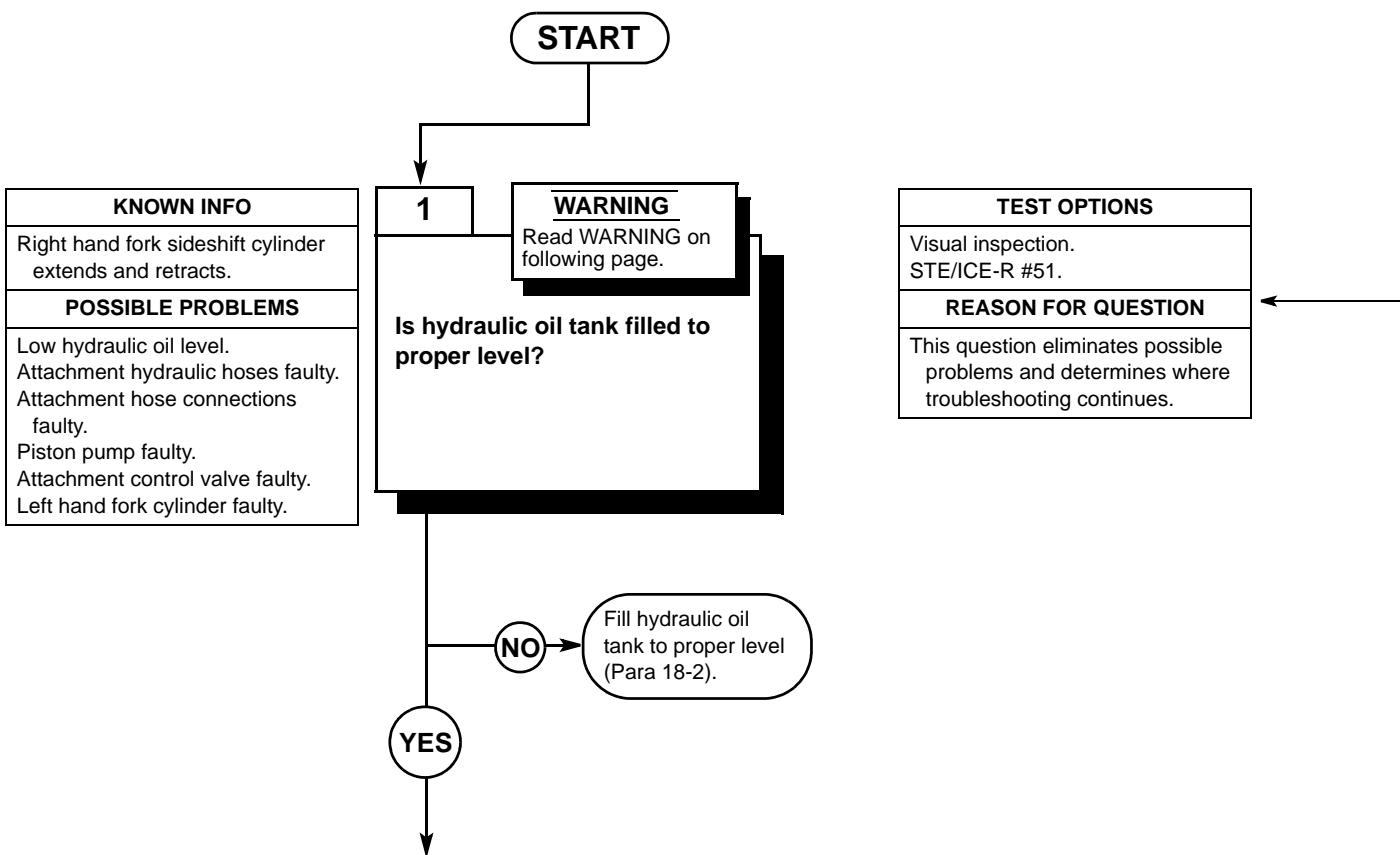
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



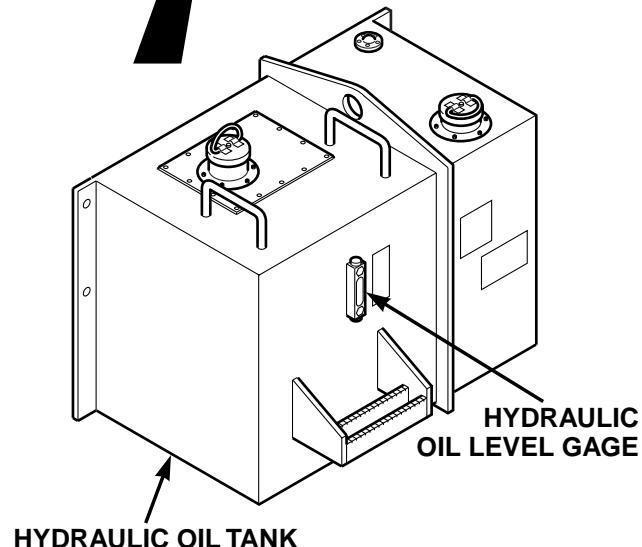
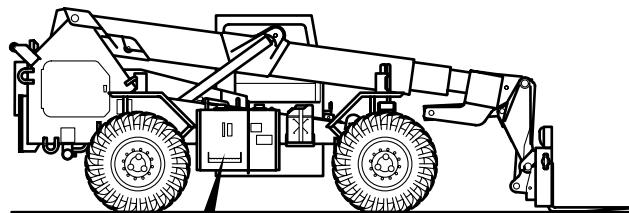
**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1) Visually inspect hydraulic oil level gage to determine if tank is filled to proper level. (2) Hydraulic oil should be visible between ADD and FULL marks. (a) If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault. (b) If hydraulic oil is not visible, inspect tank for leaks. Fill tank to FULL mark with hydraulic oil, (TM 10-3930-673-20). Go to Step 2 of this fault.	



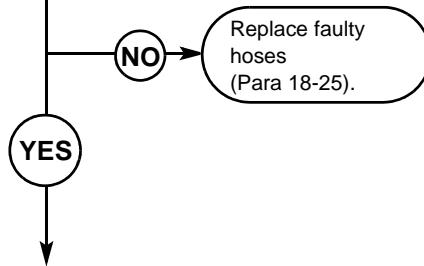
## 1. LEFT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Right hand fork cylinder extends and retracts. Hydraulic oil OK.
POSSIBLE PROBLEMS
Attachment hydraulic hoses faulty. Attachment hose connections faulty. Piston pump faulty. Attachment control valve faulty. Left hand fork cylinder faulty.

**2**

Are hydraulic hoses leading to left hand fork sideshift cylinder free of cracked, kinked, or pinched sections?

TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, fork cylinder will not operate.

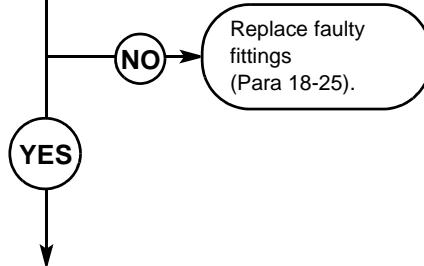


KNOWN INFO
Right hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK.
POSSIBLE PROBLEMS
Attachment hose connections faulty. Piston pump faulty. Attachment control valve faulty. Left hand fork cylinder faulty.

**3**

Are hydraulic hose connections leading to left hand fork sideshift cylinder tight and free of leaks?

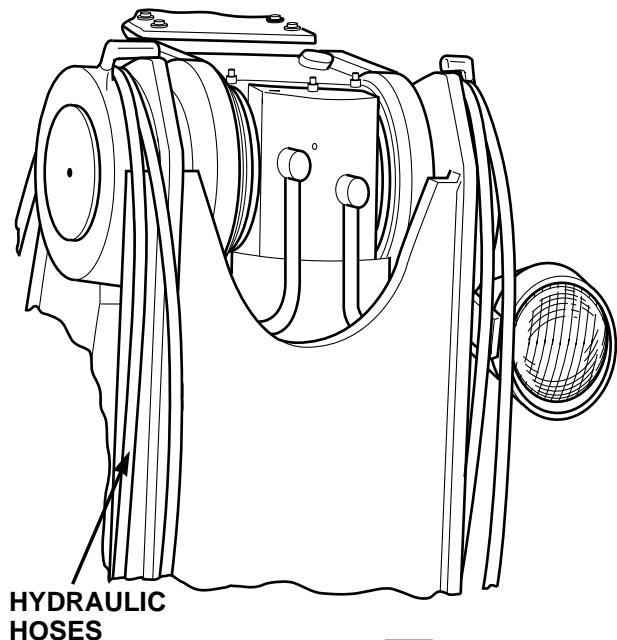
TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hydraulic hose connections are leaking, fork cylinder will not operate.



### HYDRAULIC HOSES VISUAL INSPECTION

Visually inspect hydraulic hoses leading to left-hand fork sideshift cylinder for cracks, kinks, or pinches.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).

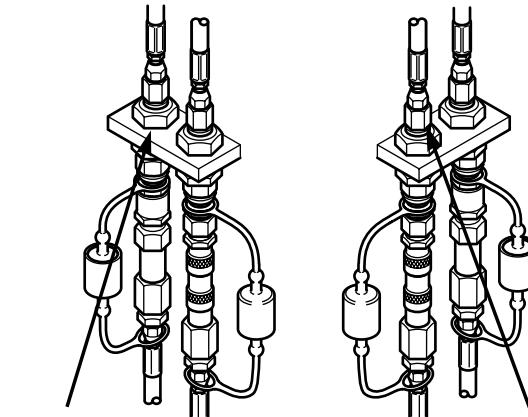
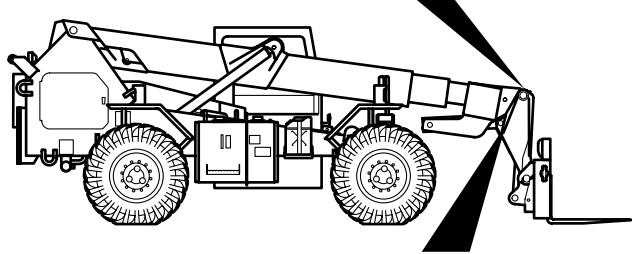


**HYDRAULIC  
HOSES**

### HYDRAULIC HOSE CONNECTION VISUAL INSPECTION

Visually inspect hydraulic hose connections leading to left hand fork sideshift cylinder for leaks.

- (a) If there are no leaks at hydraulic hose connections, go to Step 4.
- (b) If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25).

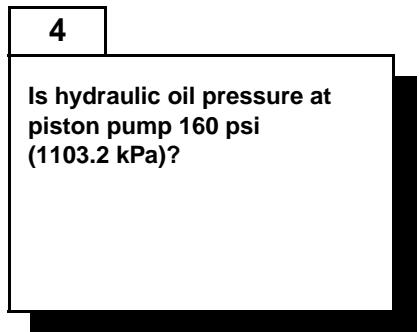


**HYDRAULIC  
FITTINGS**

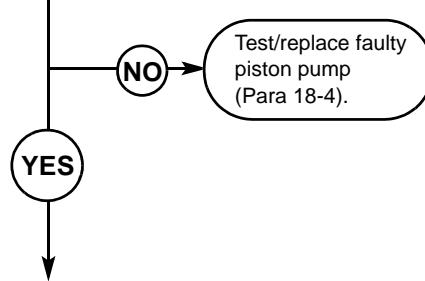
**HYDRAULIC  
CONNECTIONS**

## 1. LEFT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).

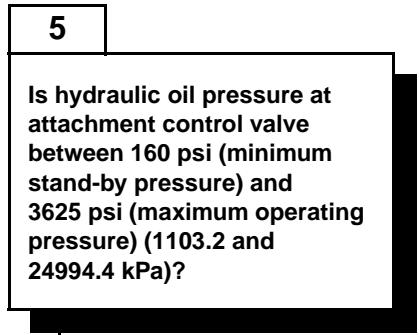
KNOWN INFO
Right hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK. Hose connections OK.
POSSIBLE PROBLEMS
Piston pump faulty. Attachment control valve faulty. Left hand fork cylinder faulty.



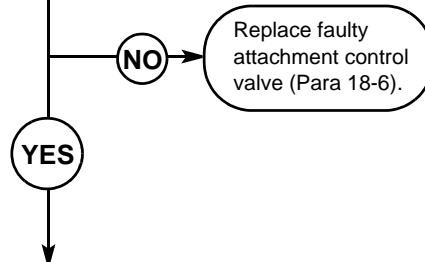
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not 160 psi, piston pump faulty.



KNOWN INFO
Right hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK. Hose connections OK. Piston pump OK.
POSSIBLE PROBLEMS
Attachment control valve faulty. Left hand fork cylinder faulty.



TEST OPTIONS
Pressure Test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not between 160 and 3625 psi, attachment control valve faulty.

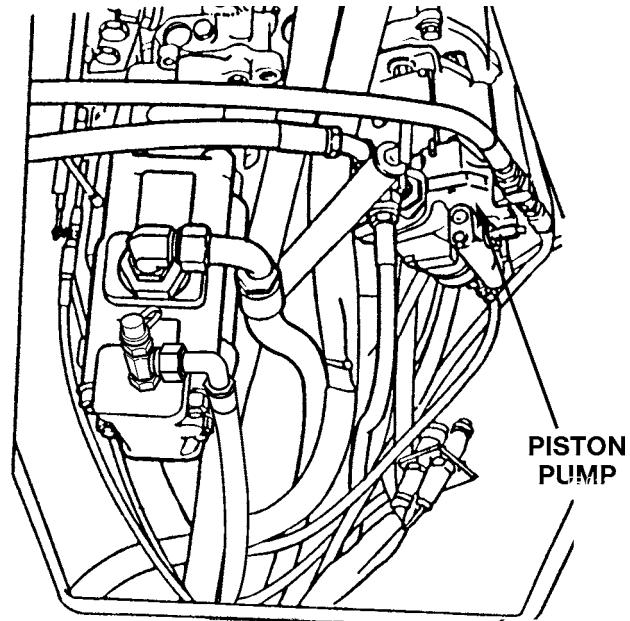


**NOTE**

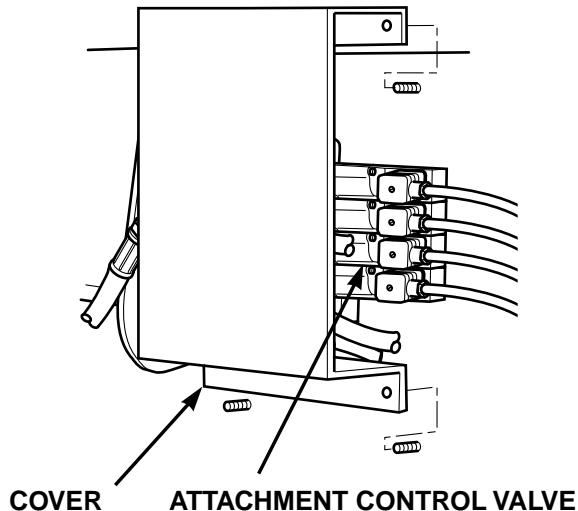
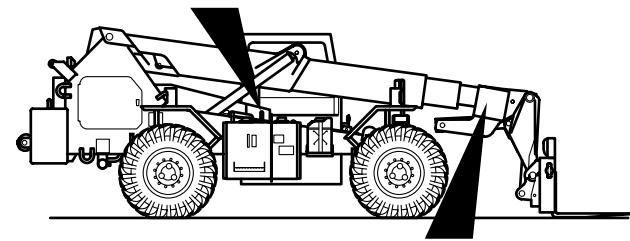
Hydraulic oil pressure should be checked only while engine is idling with no controls operated. If a function is operated, the pressure will rise up to 3625 psi.

**PISTON PUMP  
PRESSURE TEST**

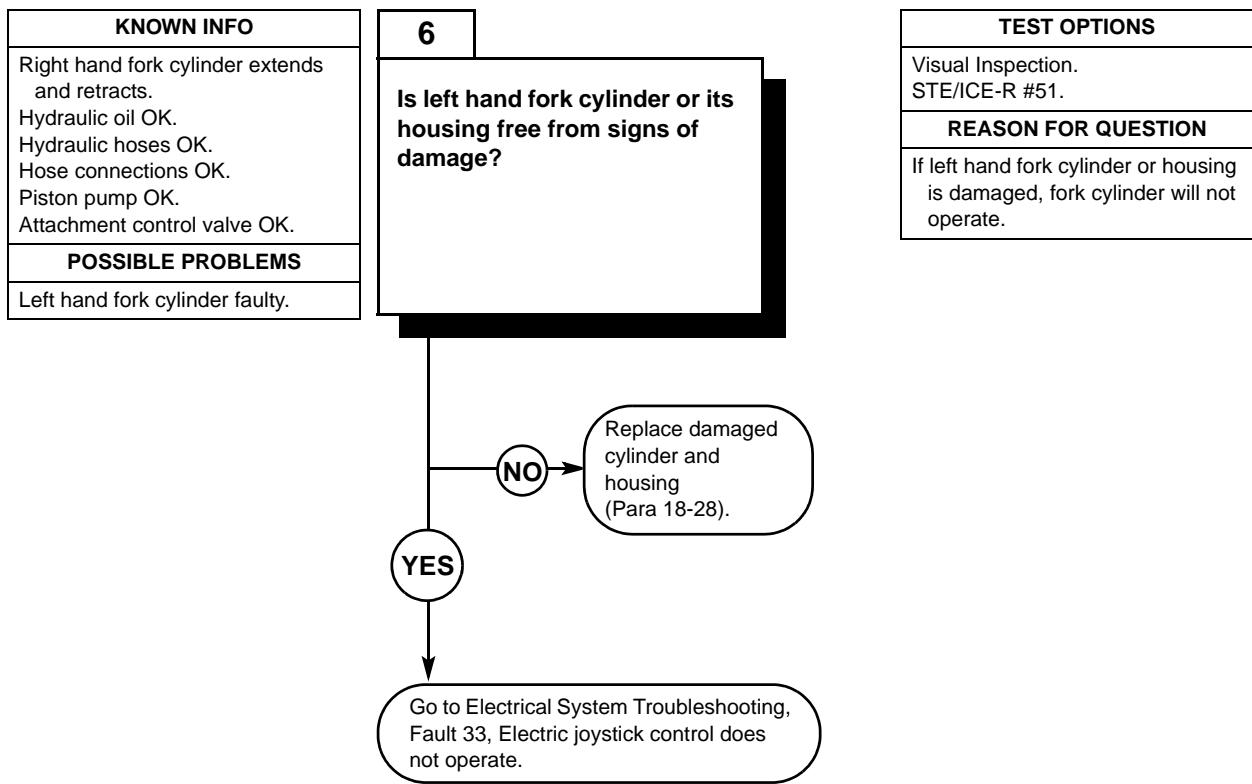
- (1) Remove cover from diagnostic coupler on piston pump.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is 160 psi (1103.2 kPa), go to Step 5 of this fault.
  - (b) If hydraulic oil pressure is not 160 psi (1103.2 kPa), shut down engine (TM 10-3930-673-10) and test and replace piston pump (Para 18-4).


**ATTACHMENT CONTROL VALVE  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler on attachment control valve.
- (2) Perform STE/ICE Test #51 (see TM 9-4910-571-12&P)
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is between 160 and 3625 psi (1003.2 and 24994.4 kPa), go to Step 6 of this fault.
  - (b) If hydraulic oil pressure is not between 160 and 3625 psi (1003.2 and 24994.4 kPa), shut down engine (TM 10-3930-673-10) and replace attachment control valve (Para 18-6).



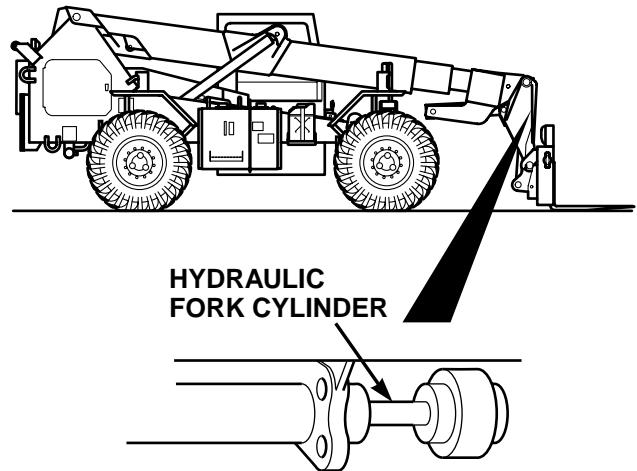
## 1. LEFT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).



**LEFT HAND FORK CYLINDER  
VISUAL INSPECTION**

Visually inspect left hand fork sideshift cylinder and its housing for signs of damage.

- (a) If left hand fork cylinder and/or its housing are not damaged, see Electrical System Troubleshooting, Fault 33, Electric joystick control does not operate.
- (b) If left hand fork cylinder and/or its housing are damaged, shut down engine (TM 10-3930-673-10) and replace cylinder and its housing (Para 18-28).



**2. RIGHT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

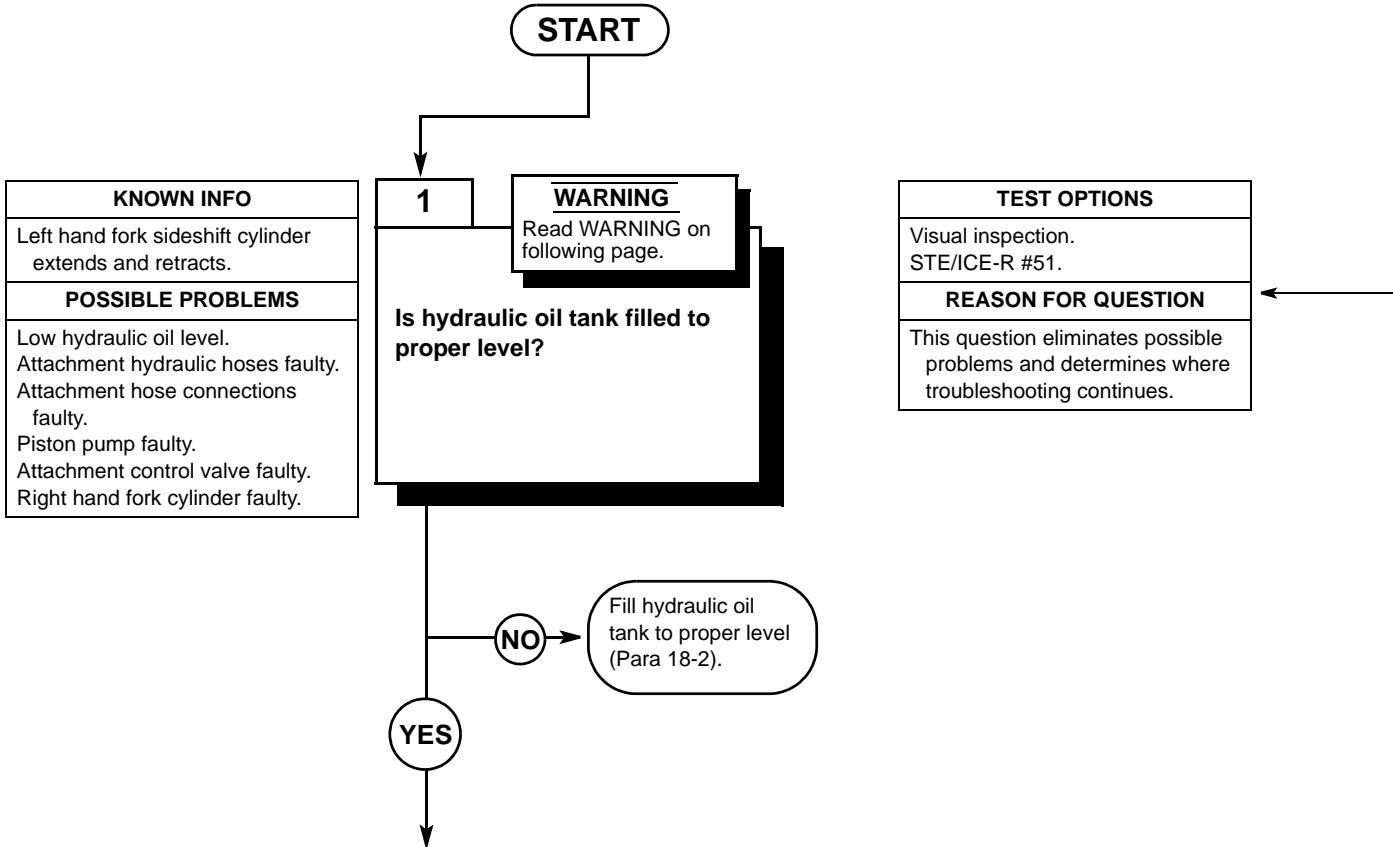
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



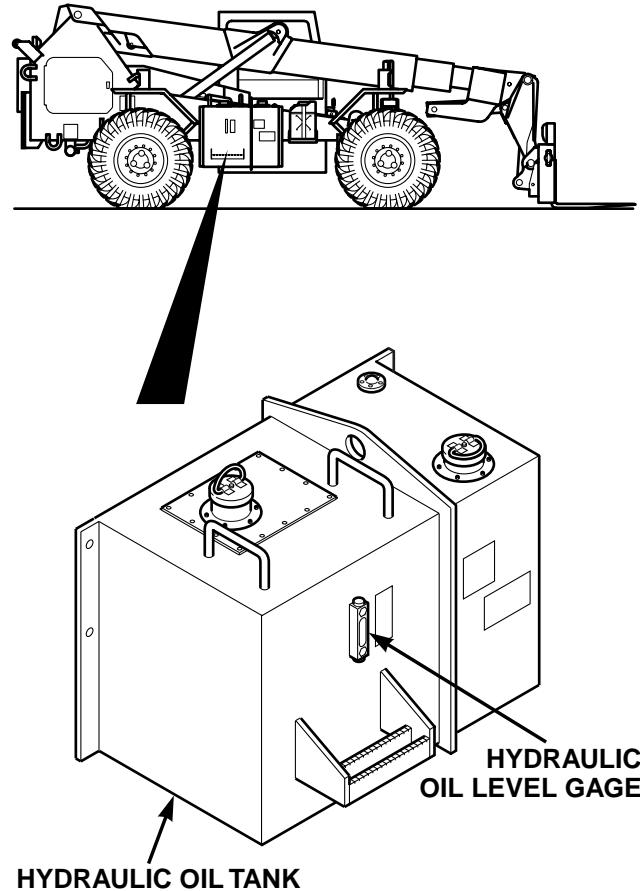
**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

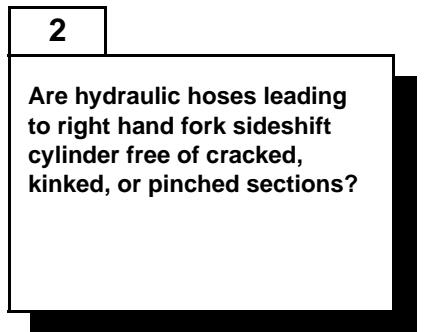
Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gauge to determine if tank is filled to proper level.
(2)	Hydraulic oil should be visible between ADD and FULL marks.
	(a) If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.
	(b) If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil, (TM 10-3930-673-20). Go to Step 2 of this fault.



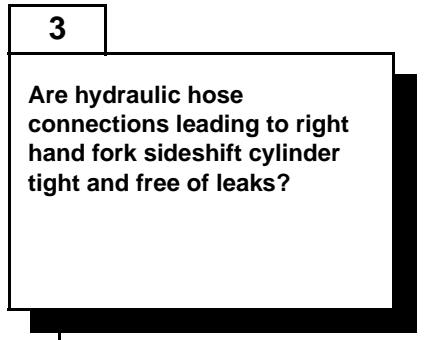
## 2. RIGHT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Left hand fork cylinder extends and retracts. Hydraulic oil OK.
POSSIBLE PROBLEMS
Attachment hydraulic hoses faulty. Attachment hose connections faulty. Piston pump faulty. Attachment control valve faulty. Right hand fork cylinder faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, fork cylinder will not operate.

KNOWN INFO
Left hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK.
POSSIBLE PROBLEMS
Attachment hose connections faulty. Piston pump faulty. Attachment control valve faulty. Right hand fork cylinder faulty.

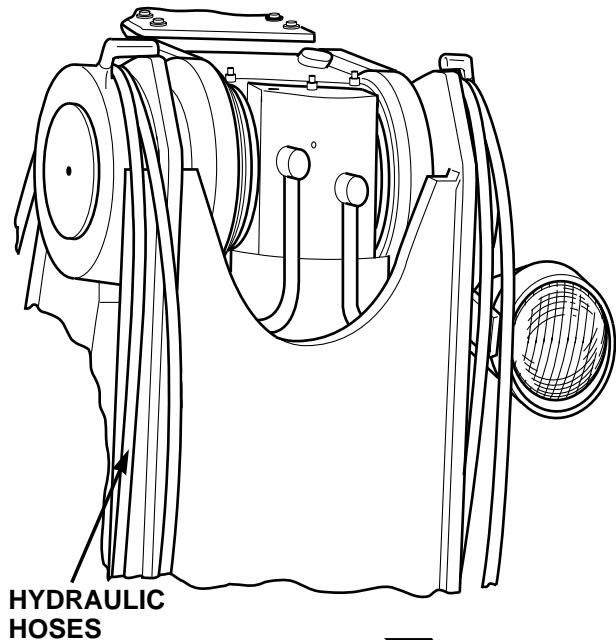


TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hydraulic hose connections are leaking, fork cylinder will not operate.

### HYDRAULIC HOSES VISUAL INSPECTION

Visually inspect hydraulic hoses leading to right hand fork sideshift cylinder for cracks, kinks, or pinches.

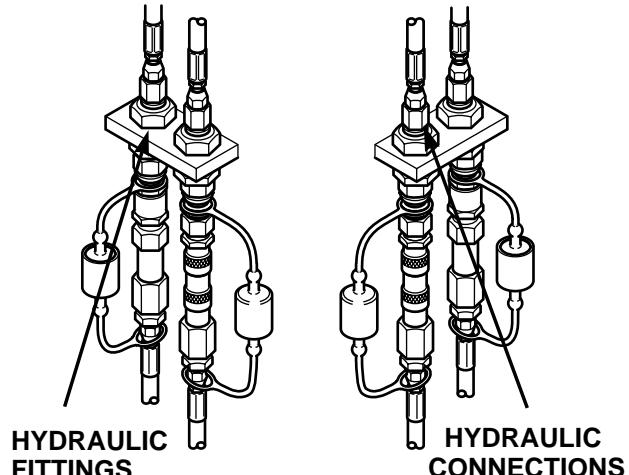
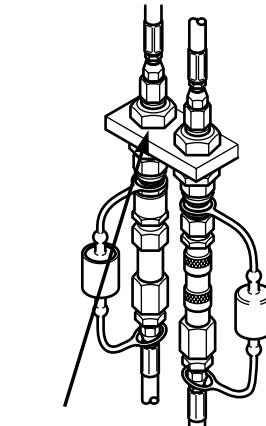
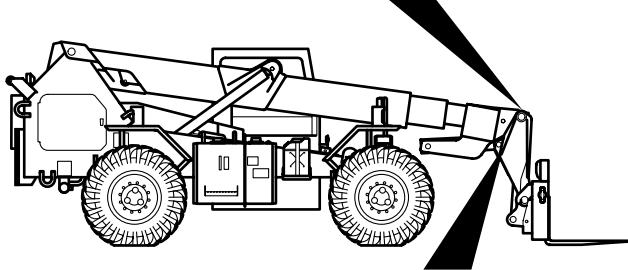
- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).



### HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION

Visually inspect hydraulic hose connections leading to right hand fork sideshift cylinder for leaks.

- (a) If there are no leaks at hydraulic hose connections, go to Step 4 of this fault.
- (b) If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25).



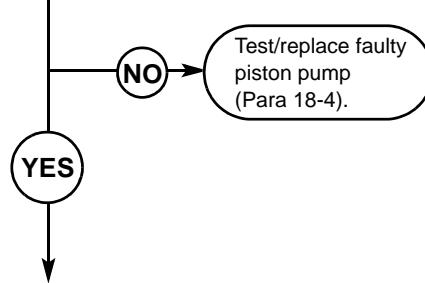
## 2. RIGHT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Left hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK. Hose connections OK.
POSSIBLE PROBLEMS
Piston pump faulty. Attachment control valve faulty. Right hand fork cylinder faulty.

**4**

Is hydraulic oil pressure at piston pump 160 psi (1103.2 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not 160 psi, piston pump is faulty.

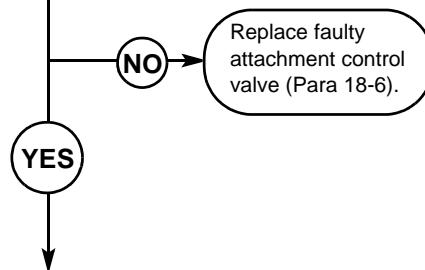


KNOWN INFO
Left hand fork cylinder extends and retracts. Hydraulic oil OK. Hydraulic hoses OK. Hose connections OK. Piston pump OK.
POSSIBLE PROBLEMS
Attachment control valve faulty. Right hand fork cylinder faulty.

**5**

Is hydraulic oil pressure at attachment control valve between 160 psi (minimum stand-by pressure) and 3625 psi (maximum operating pressure) (1103.2 and 24994.4 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not between 160 and 3625 psi, attachment control valve is faulty.

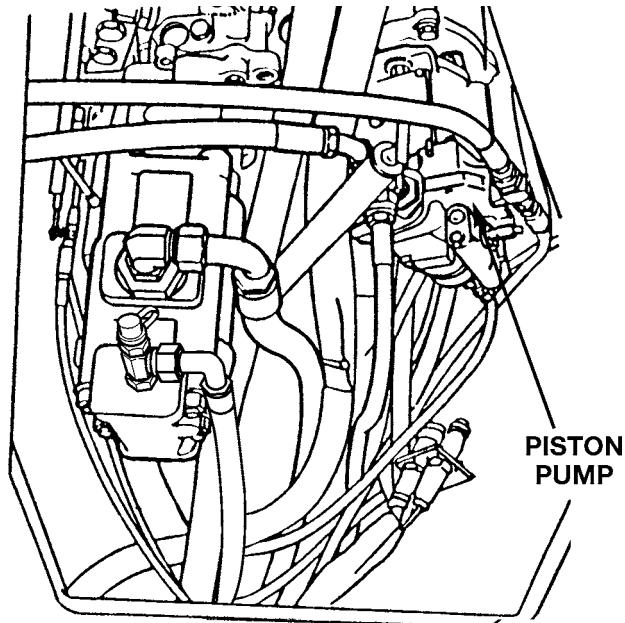


**NOTE**

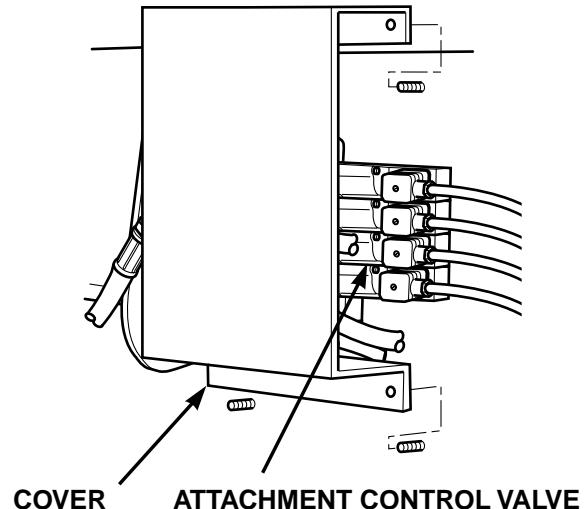
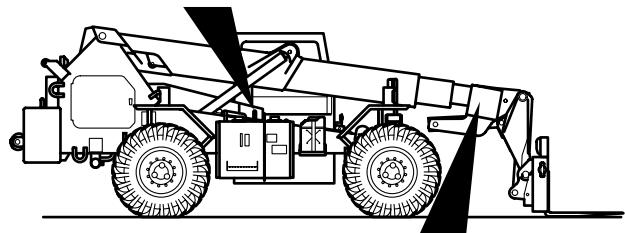
Hydraulic oil pressure should be checked only while engine is idling with no controls operated. If a function is operated, the pressure will rise up to 3625 psi.

**PISTON PUMP  
PRESSURE TEST**

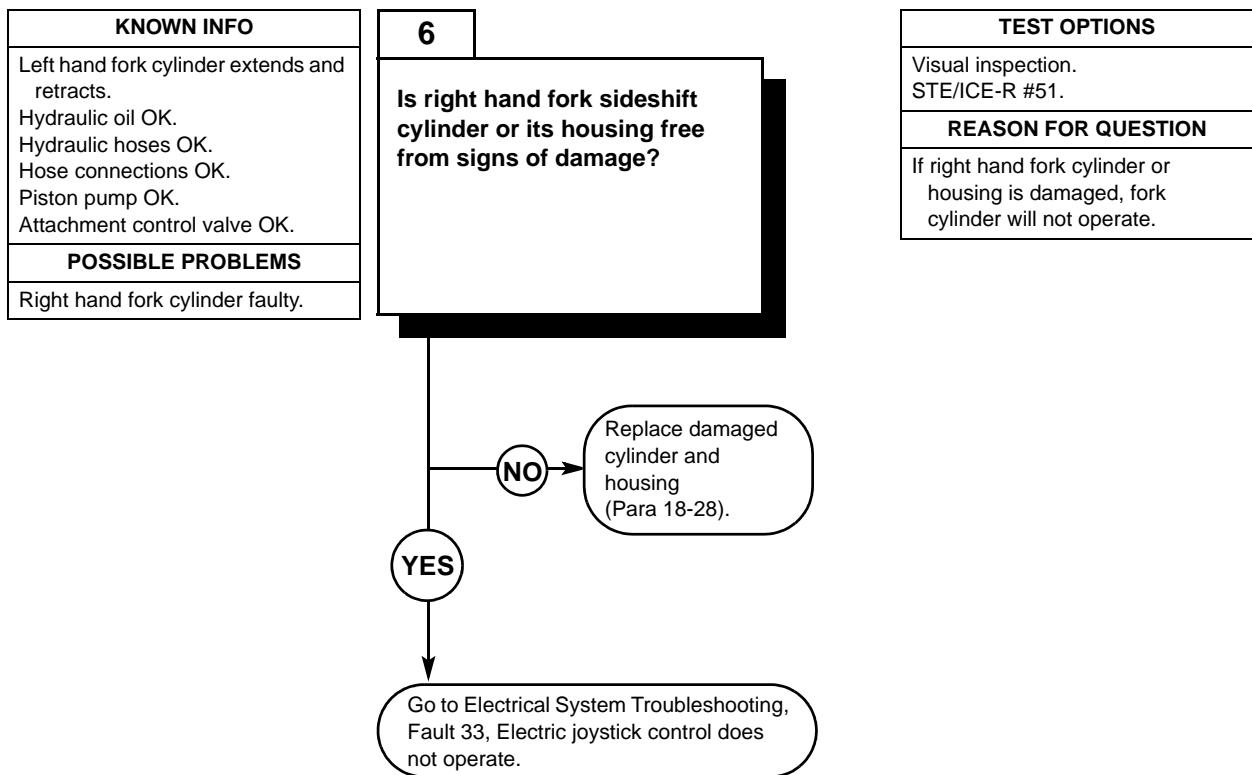
- (1) Remove cover from diagnostic coupler on piston pump.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is 160 psi (1103.2 kPa), go to Step 5 of this fault.
  - (b) If hydraulic oil pressure is not 160 psi (1103.2 kPa), shut down engine (TM 10-3930-673-10) and test and replace piston pump (Para 18-4).


**ATTACHMENT CONTROL VALVE  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler on attachment control valve.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is between 160 and 3625 psi (1103.2 and 24994.4 kPa), go to Step 6 of this fault.
  - (b) If hydraulic oil pressure is not between 160 and 3625 psi (1103.2 and 24994.4 kPa), shut down engine (TM 10-3930-673-10) and replace attachment control valve (Para 18-6).



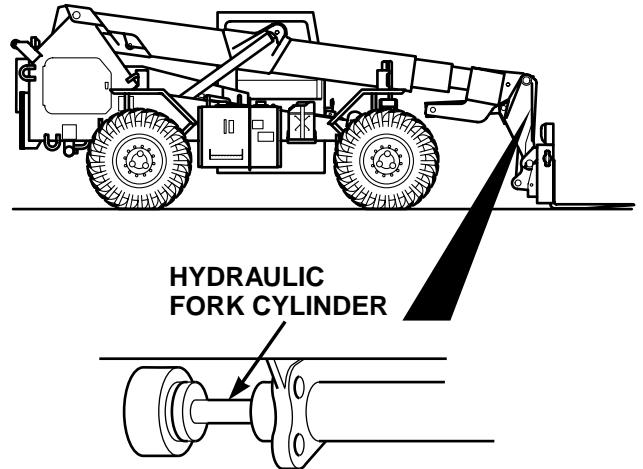
## 2. RIGHT HAND FORK SIDESHIFT CYLINDER DOES NOT OPERATE (CONT.).



**HAND FORK CYLINDER  
VISUAL INSPECTION**

Visually inspect right hand fork sideshift cylinder and its housing for signs of damage.

- (a) If right hand fork cylinder and/or its housing are not damaged, see Electrical System Troubleshooting, Fault 33, Electric joystick control does not operate.
- (b) If right hand fork cylinder and/or its housing are damaged, shut down engine (TM 10-3930-673-10) and replace cylinder and its housing (Para 18-28).



**3. FORK TILT CYLINDER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)  
 Gage, 0-5000 psi

*Personnel Required*

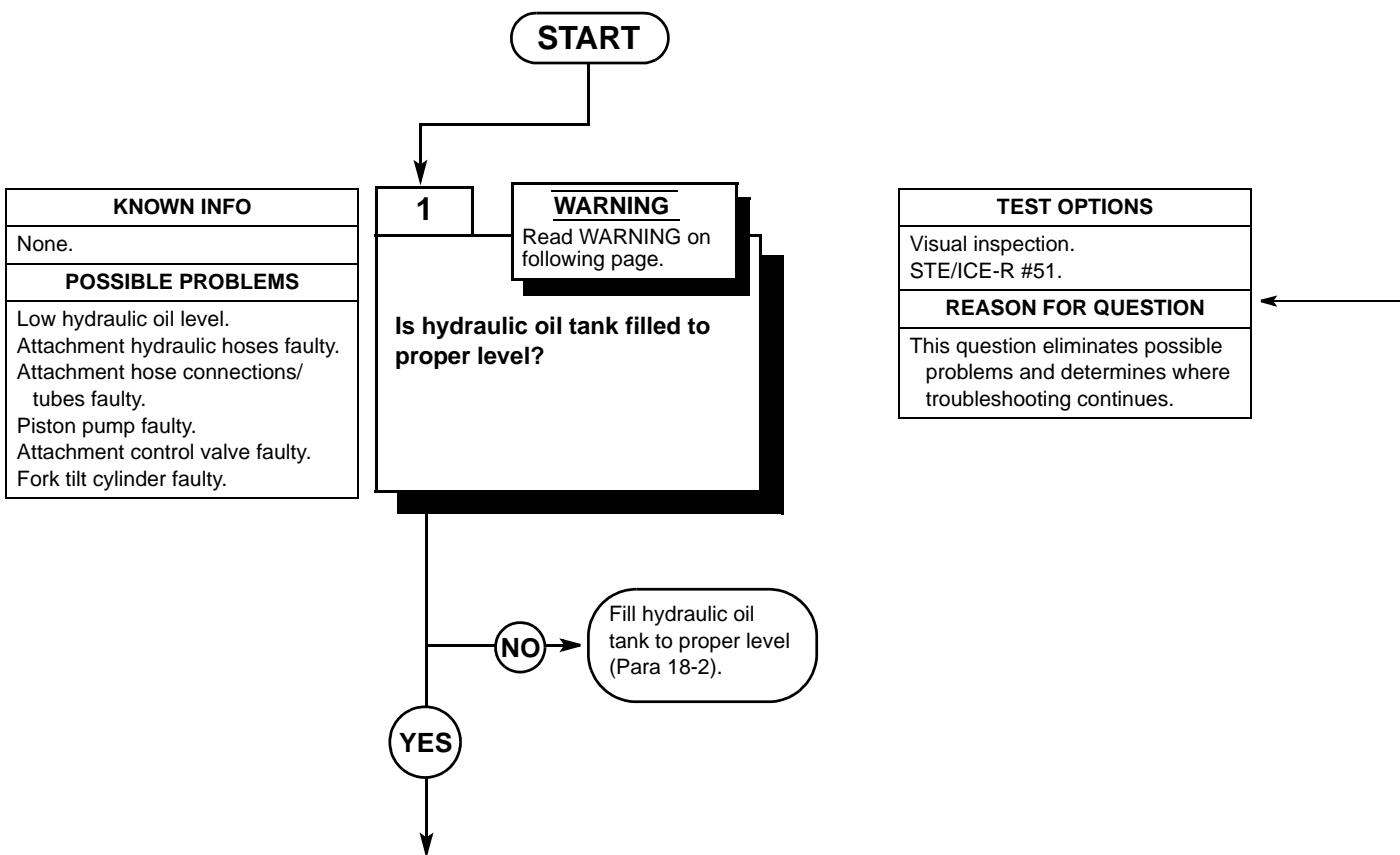
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)

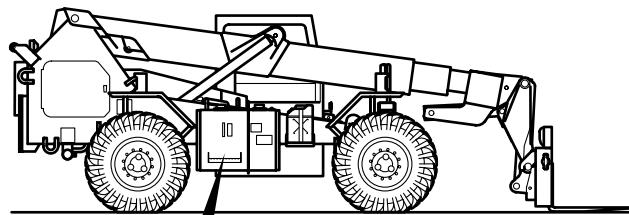


**WARNING**

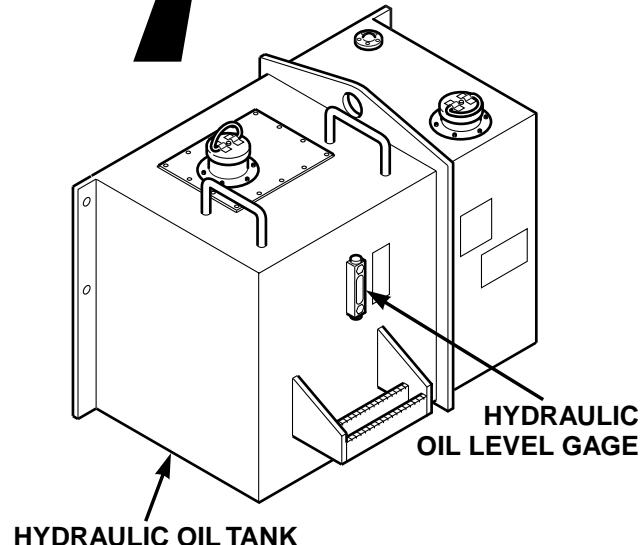
- Hydraulic oil in system can be under pressures over 3000 psi With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

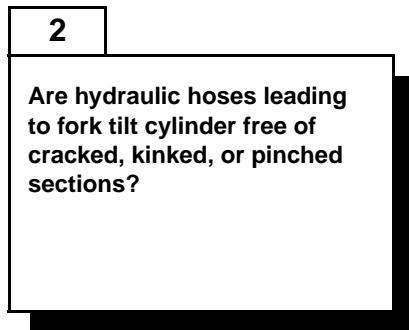


<b>HYDRAULIC OIL LEVEL VISUAL INSPECTION</b>	
(1)	Visually inspect hydraulic oil level gauge to determine if tank is filled to proper level.
(2)	Hydraulic oil should be visible between ADD and FULL marks.
(a)	If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.
(b)	If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (TM 10-3930-673-20) and go to Step 2 of this fault.

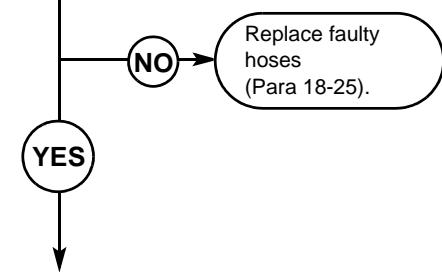


## 3. FORK TILT CYLINDER DOES NOT OPERATE (CONT.).

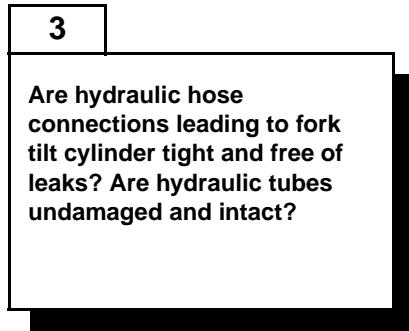
KNOWN INFO
Hydraulic oil OK.
POSSIBLE PROBLEMS
Attachment hydraulic hoses faulty. Attachment hose connections/tubes faulty. Piston pump faulty. Attachment control valve faulty. Fork tilt cylinder faulty.



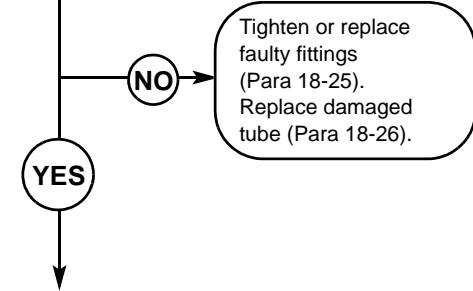
TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, tilt cylinder will not operate.



KNOWN INFO
Hydraulic oil OK.
Hydraulic hoses OK.
POSSIBLE PROBLEMS
Attachment hose connections/tubes faulty. Piston pump faulty. Attachment control valve faulty. Fork tilt cylinder faulty.



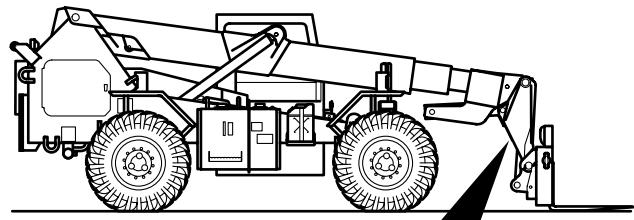
TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hydraulic hose connections are leaking, tilt cylinder will not operate.



### **HYDRAULIC HOSES VISUAL INSPECTION**

Visually inspect hydraulic hoses leading to fork tilt cylinder for cracks, kinks, or pinches.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).

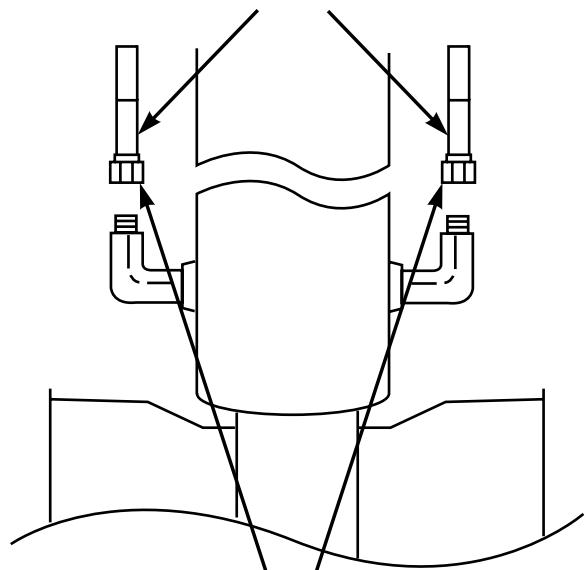


**HYDRAULIC  
HOSES**

### **HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION**

Visually inspect hydraulic hose connections leading to fork tilt cylinder for leaks. Visually inspect hydraulic tubes on cylinder housing.

- (a) If there are no leaks at hydraulic hose connections and tubes are not damaged, go to Step 4 of this fault.
- (b) If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25). If tube(s) are damaged, replace tube(s) (Para 18-26).



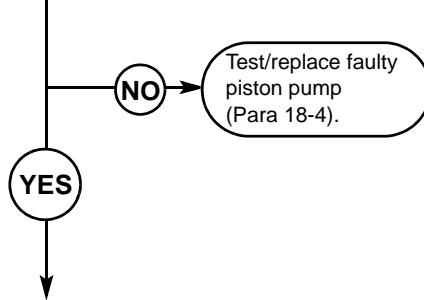
## 3. FORK TILT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic oil OK. Hydraulic hoses OK. hose/tube connections OK.
POSSIBLE PROBLEMS
Piston pump faulty. Attachment control valve faulty. Fork tilt cylinder faulty.

**4**

Is hydraulic oil pressure at piston pump 160 psi (1103.2 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not 160 psi, piston pump is faulty.

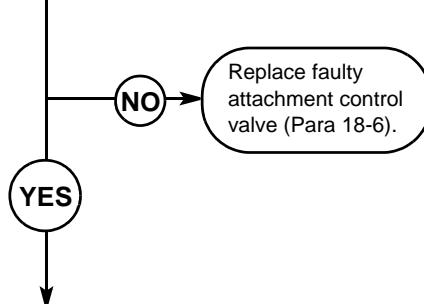


KNOWN INFO
Hydraulic oil OK. Hydraulic hoses OK. Hose/tube connections OK. Piston pump OK.
POSSIBLE PROBLEMS
Attachment control valve faulty. Fork tilt cylinder faulty.

**5**

Is hydraulic oil pressure at attachment control valve between 160 psi (minimum stand-by pressure) and 3625 psi (maximum operating pressure) (1103.2 and 24994.4 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not between 160 and 3625 psi, attachment control valve is faulty.

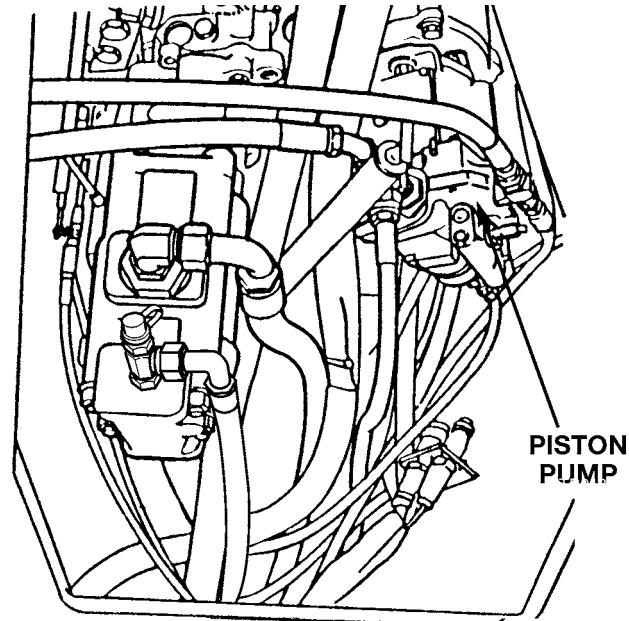


**NOTE**

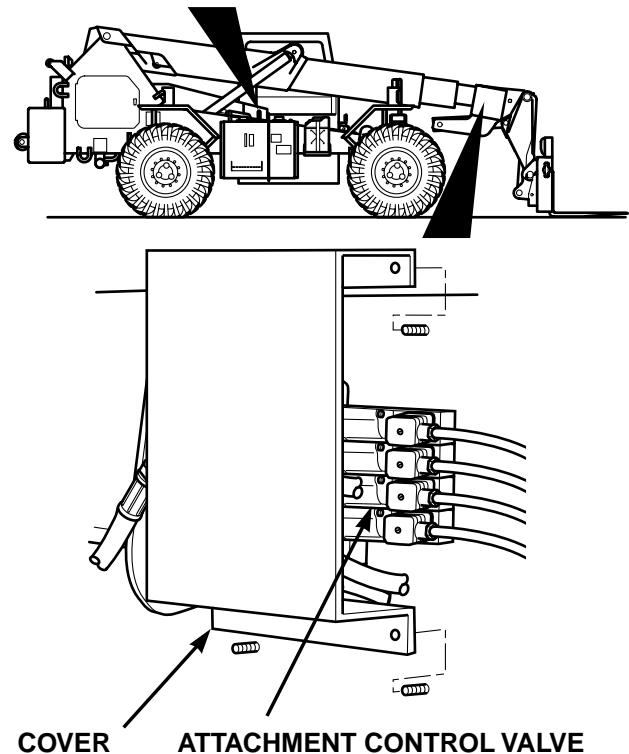
Hydraulic oil pressure should be checked only while engine is idling with no controls operated. If a function is operated, the pressure will rise up to 3625 psi.

**PISTON PUMP  
PRESSURE TEST**

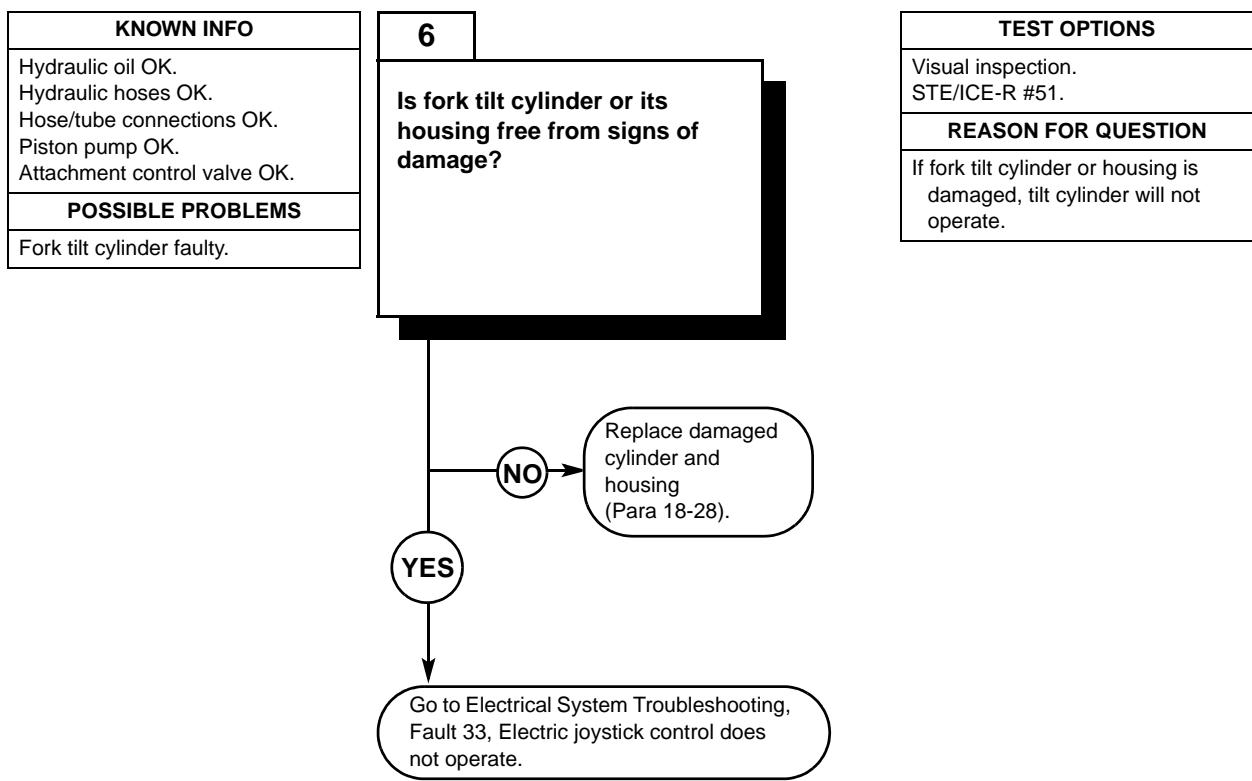
- (1) Remove cover from diagnostic coupler on piston pump.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is 160 psi (1103.2 kPa), go to Step 5 of this fault.
  - (b) If hydraulic oil pressure is not 160 psi (1103.2 kPa), shut down engine (TM 10-3930-673-10) and test and replace piston pump (Para 18-4).

**ATTACHMENT CONTROL VALVE  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler on attachment control valve.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P)
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is between 160 and 3625 psi (1103.2 and 24994.4 kPa), go to Step 6 of this fault.
  - (b) If hydraulic oil pressure is not between 160 and 3625 psi (1103.2 and 24994.4 kPa), shut down engine (TM 10-3930-673-10) and replace attachment control valve (Para 18-6).



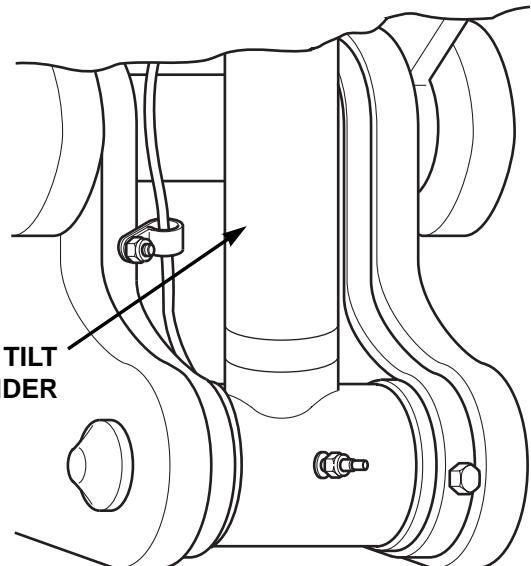
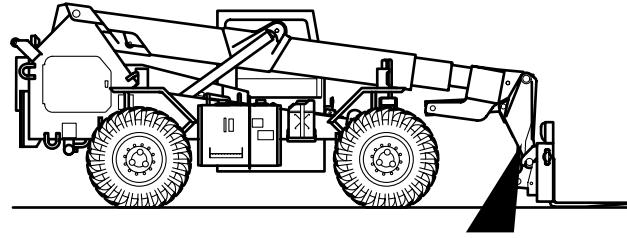
## 3. FORK TILT CYLINDER DOES NOT OPERATE (CONT.).



**TILT CYLINDER  
VISUAL INSPECTION**

Visually inspect fork tilt cylinder and its housing for signs of damage.

- (a) If fork tilt cylinder and/or its housing are not damaged, see Electrical System Troubleshooting, Fault 33, Electric joystick control does not operate.
- (b) If fork tilt cylinder and/or its housing are damaged, shut down engine (TM 10-3930-673-10) and replace cylinder and its housing (Para 18-28).



**4. ATTACHMENT CYLINDER DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

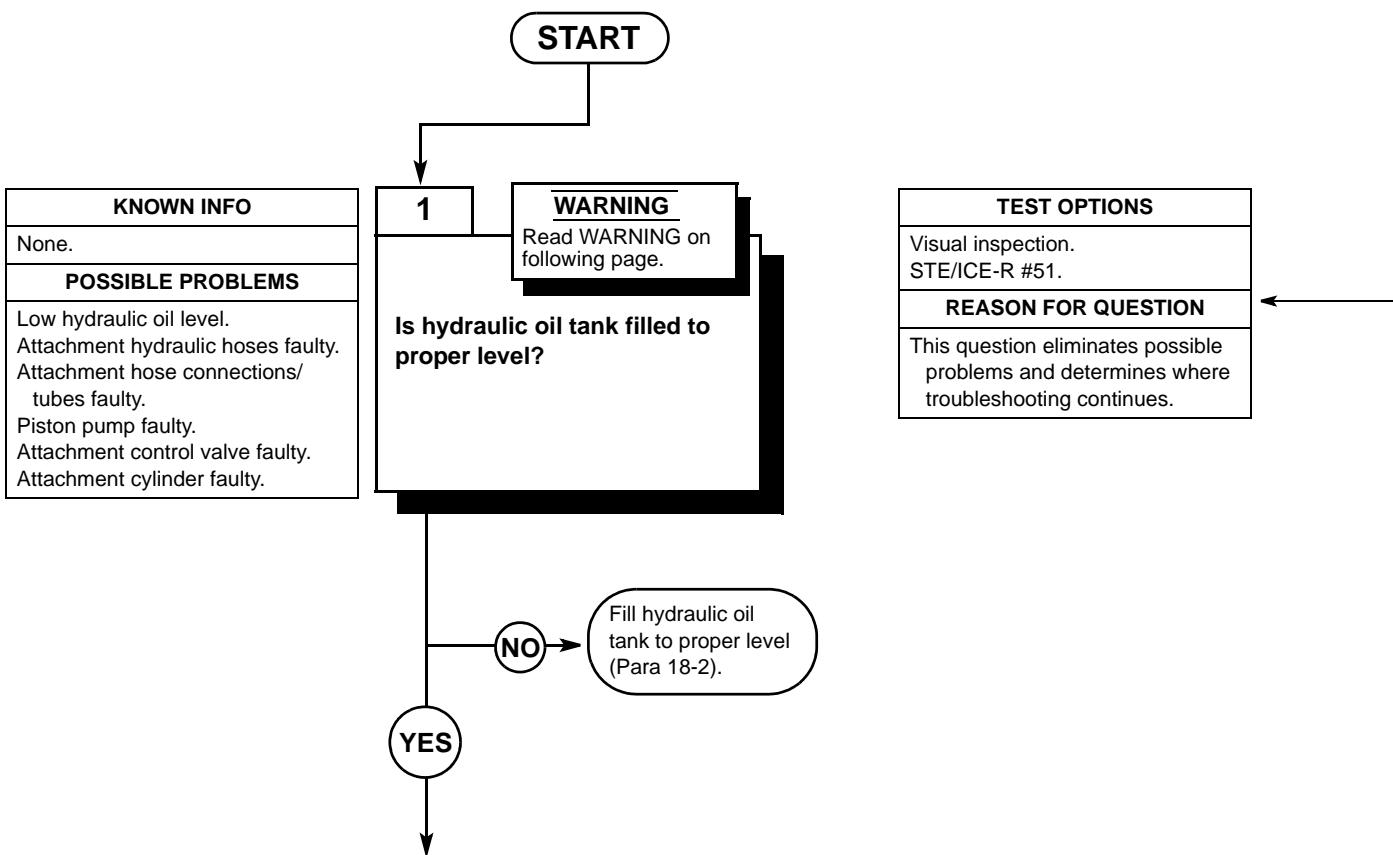
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)

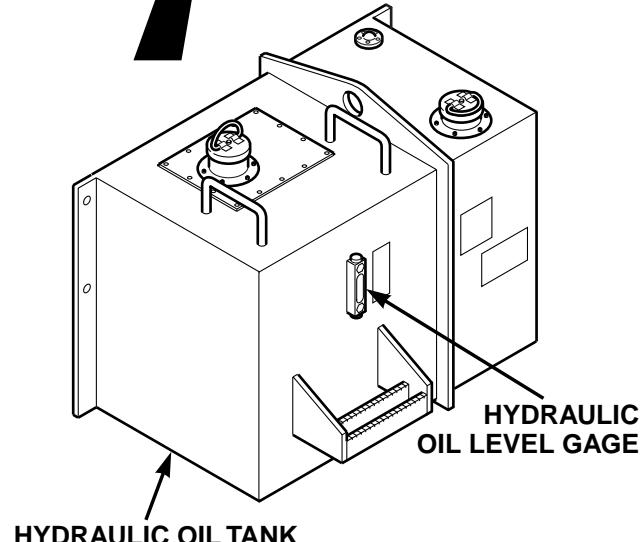
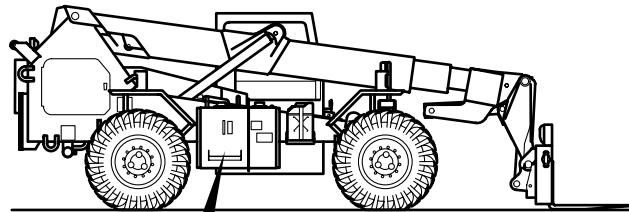
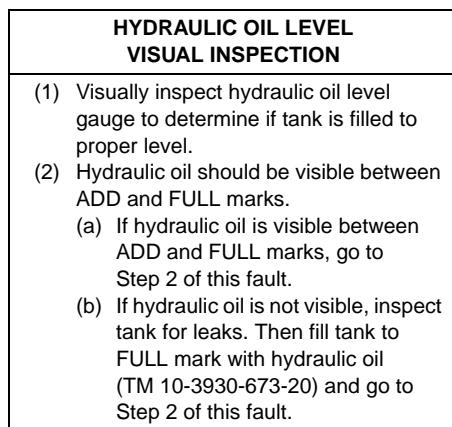


**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

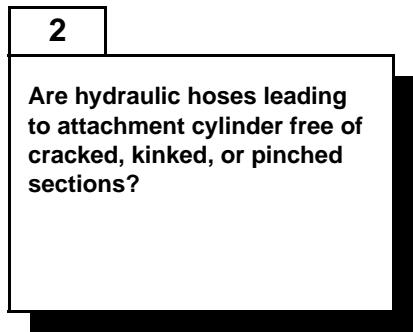
**CAUTION**

Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.



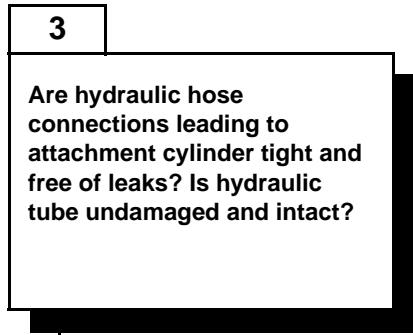
## 4. ATTACHMENT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic oil OK.
POSSIBLE PROBLEMS
Attachment hydraulic hoses faulty. Attachment hose connections/tubes faulty. Piston pump faulty. Attachment control valve faulty. Attachment cylinder faulty.



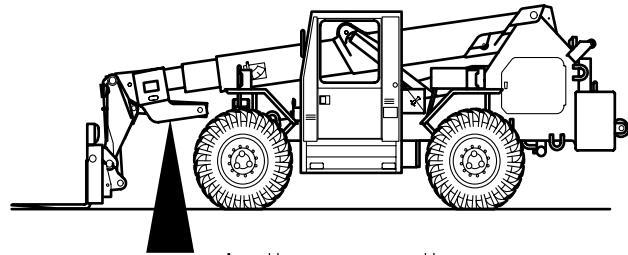
TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, attachment cylinder will not operate.

KNOWN INFO
Hydraulic oil OK.
Hydraulic hoses OK.
POSSIBLE PROBLEMS
Attachment hose connections/tubes faulty. Piston pump faulty. Attachment control valve faulty. Attachment cylinder faulty.

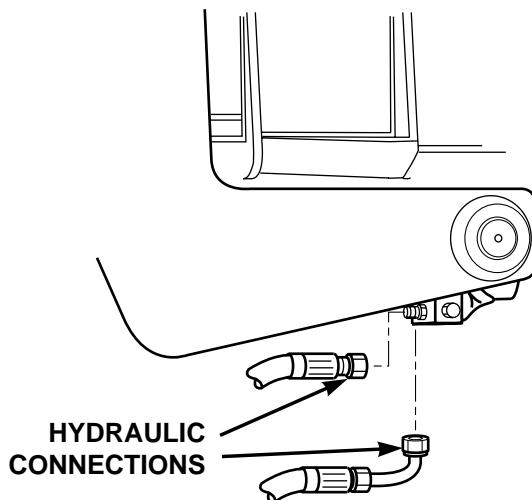
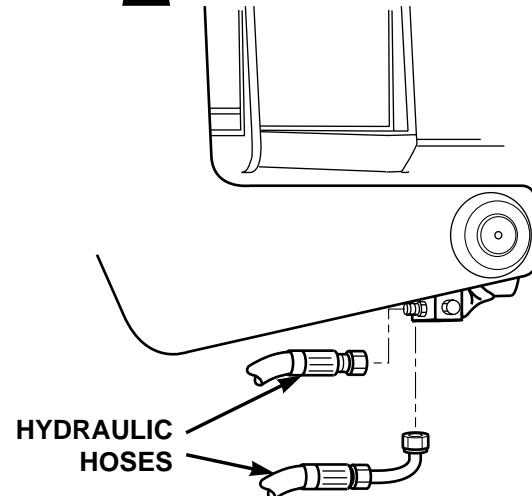


TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hydraulic hose connections and tubes are leaking, attachment cylinder will not operate.

<b>HYDRAULIC HOSES VISUAL INSPECTION</b>
Visually inspect hydraulic hoses leading to attachment cylinder for cracks, kinks, or pinches.
<ul style="list-style-type: none"> <li>(a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.</li> <li>(b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-24).</li> </ul>



<b>HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION</b>
Visually inspect hydraulic hose connections leading to attachment cylinder for leaks. Visually inspect hydraulic tube on cylinder housing.
<ul style="list-style-type: none"> <li>(a) If there are no leaks at hydraulic hose connections and tube is not damaged, go to Step 4 of this fault.</li> <li>(b) If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25). If tube is damaged, replace tube (Para 18-26).</li> </ul>



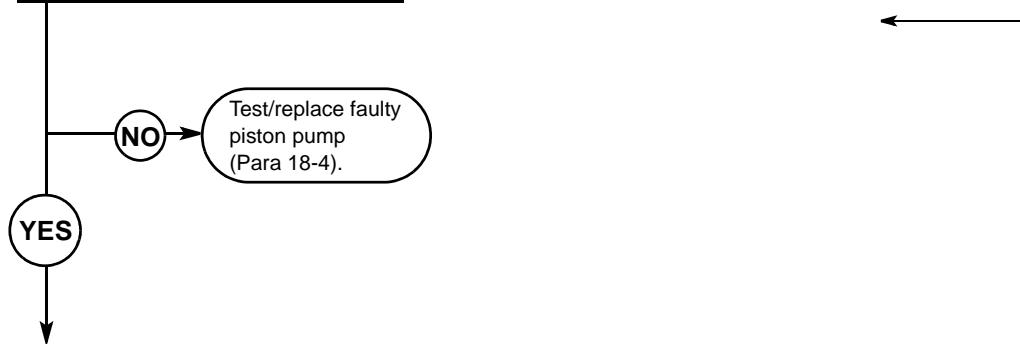
## 4. ATTACHMENT CYLINDER DOES NOT OPERATE (CONT.).

KNOWN INFO
Hydraulic oil OK. Hydraulic hoses OK. Hose/tube connections OK.
POSSIBLE PROBLEMS
Piston pump faulty. Attachment control valve faulty. Attachment cylinder faulty.

**4**

Is hydraulic oil pressure at piston pump 160 psi (1103.2 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not 160 psi, piston pump is faulty.

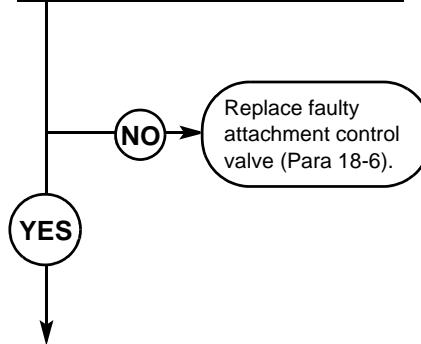


KNOWN INFO
Hydraulic oil OK. Hydraulic hoses OK. Hose/tube connections OK. Piston pump OK.
POSSIBLE PROBLEMS
Attachment control valve faulty. Attachment cylinder faulty.

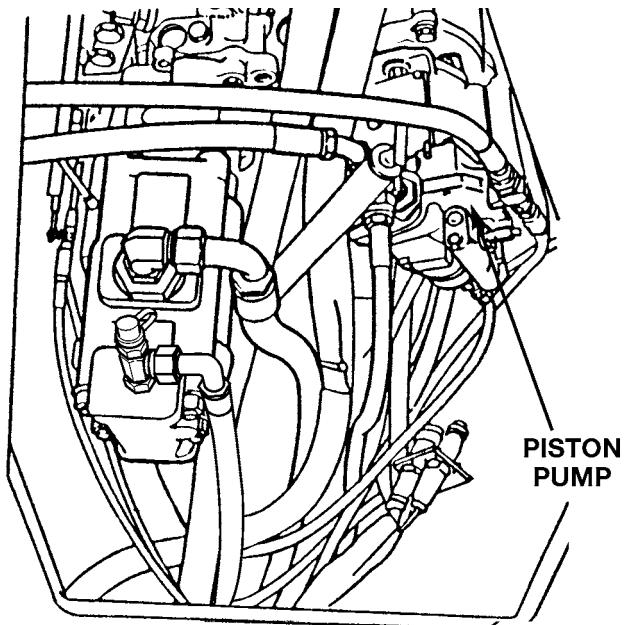
**5**

Is hydraulic oil pressure at attachment control valve between 160 psi (minimum stand-by pressure) and 3625 psi (maximum operating pressure) (1103.2 and 24994.4 kPa)?

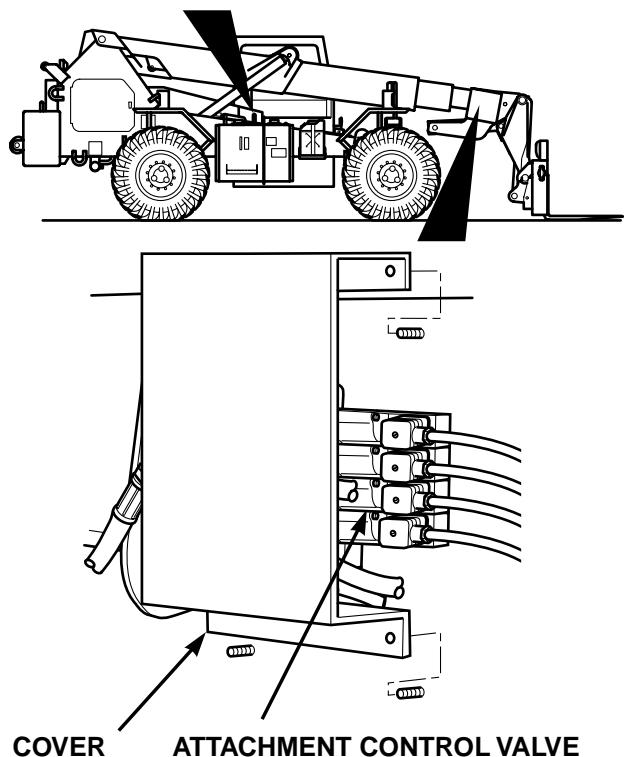
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not between 160 and 3625 psi, attachment control valve is faulty.



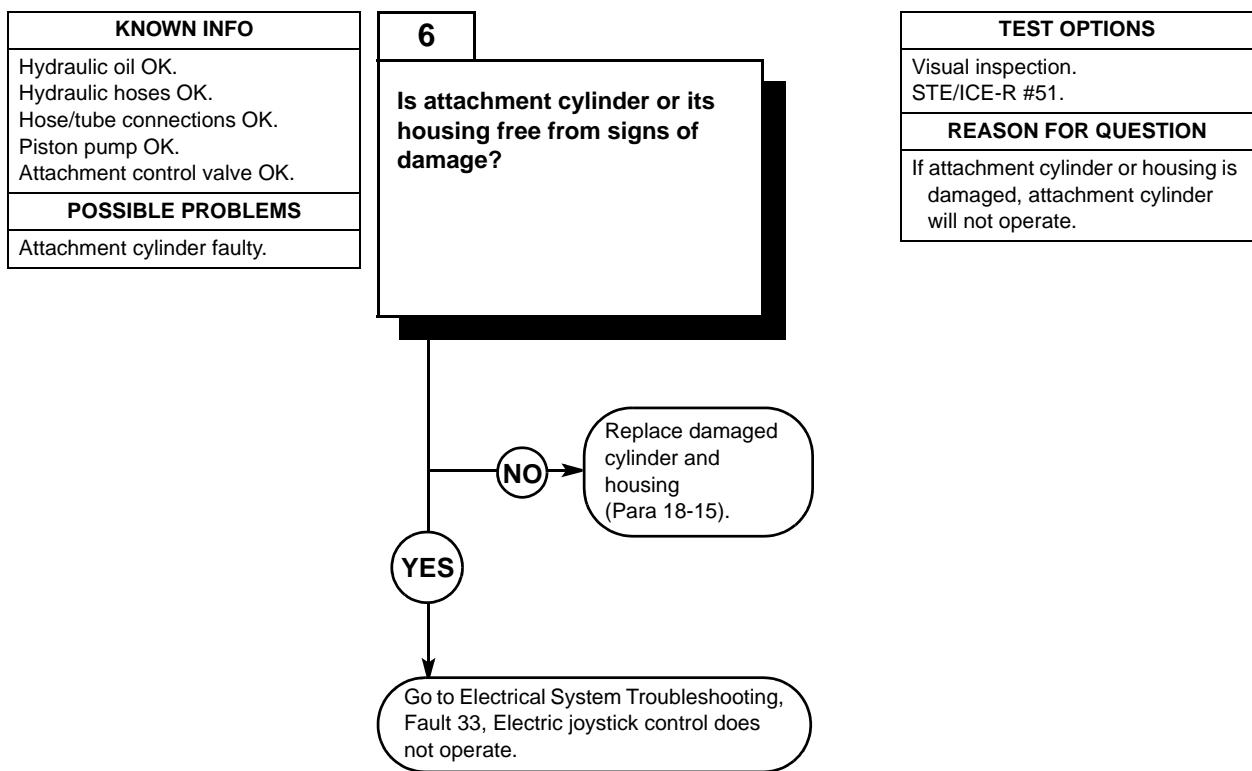
<b>PISTON PUMP PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on piston pump.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is 160 psi (1103.2 kPa), go to Step 5 of this fault.
(b)	If hydraulic oil pressure is not 160 psi (1103.2 kPa), shut down engine (TM 10-3930-673-10) and test and replace piston pump (Para 18-4).

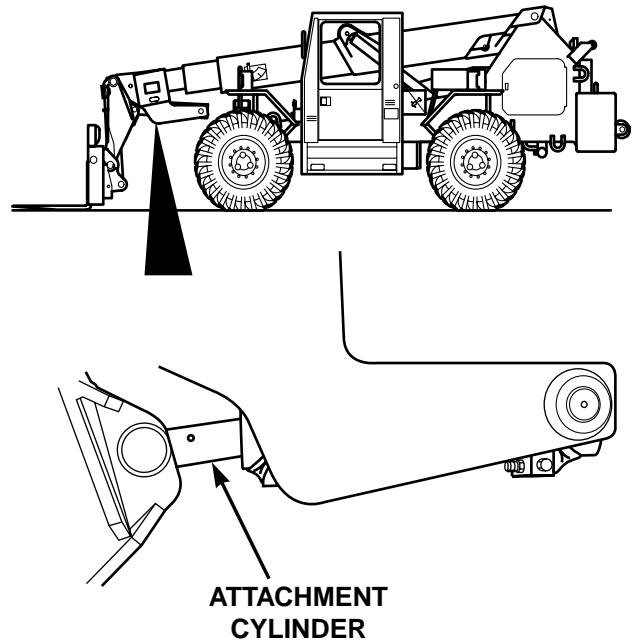
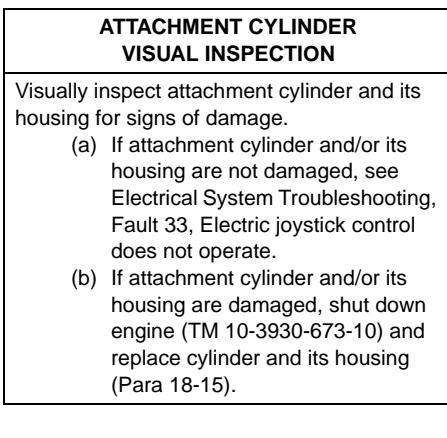


<b>ATTACHMENT CONTROL VALVE PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on attachment control valve.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P)
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is between 160 and 3625 psi (1103.2 and 24994.4 kPa), go to Step 6 of this fault.
(b)	If hydraulic oil pressure is not between 160 and 3625 psi (1103.2 and 24994.4 kPa), shut down engine (TM 10-3930-673-10) and replace attachment control valve (Para 18-6).



## 4. ATTACHMENT CYLINDER DOES NOT OPERATE (CONT).





**5. LEFT AND/OR RIGHT HOIST CYLINDERS DO NOT EXTEND OR RETRACT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

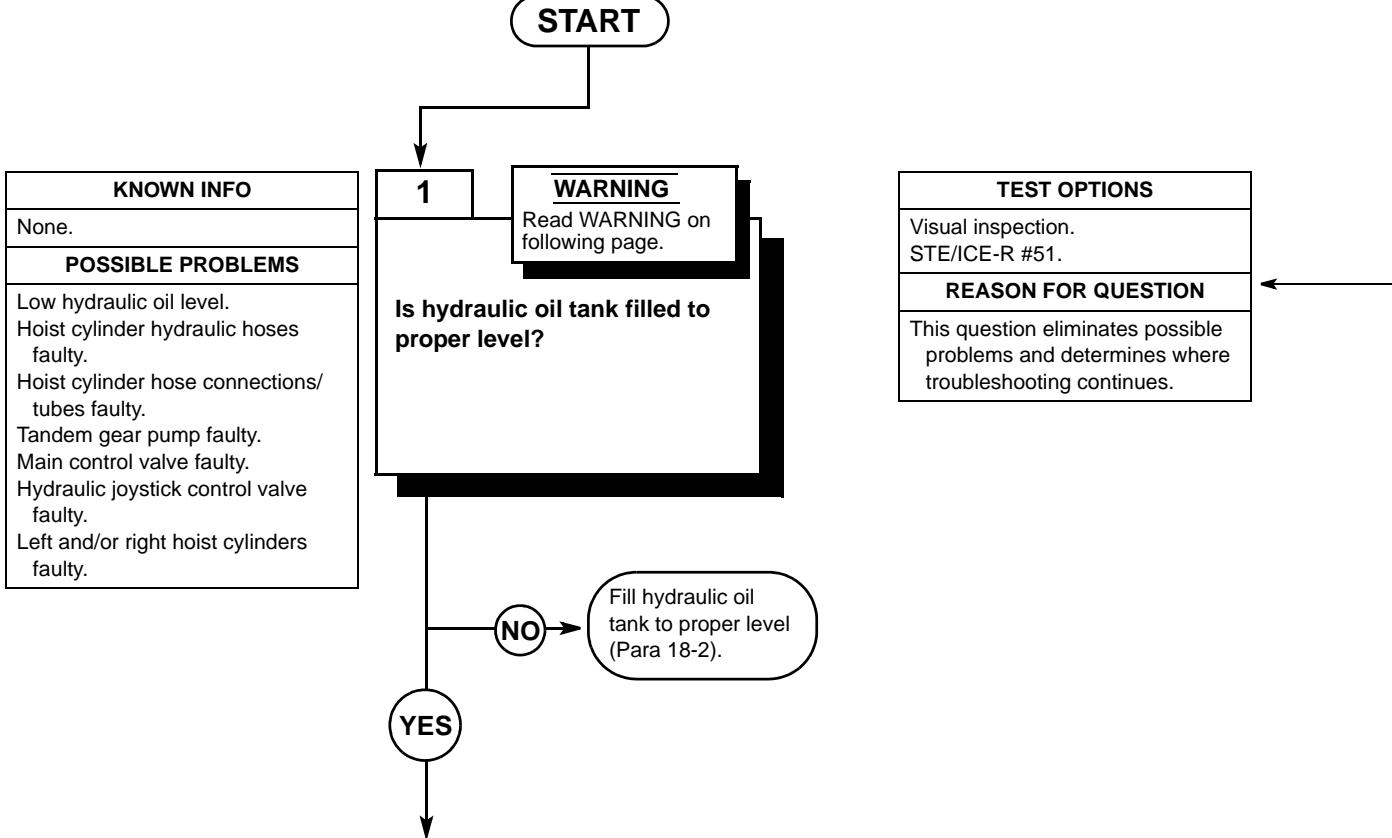
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



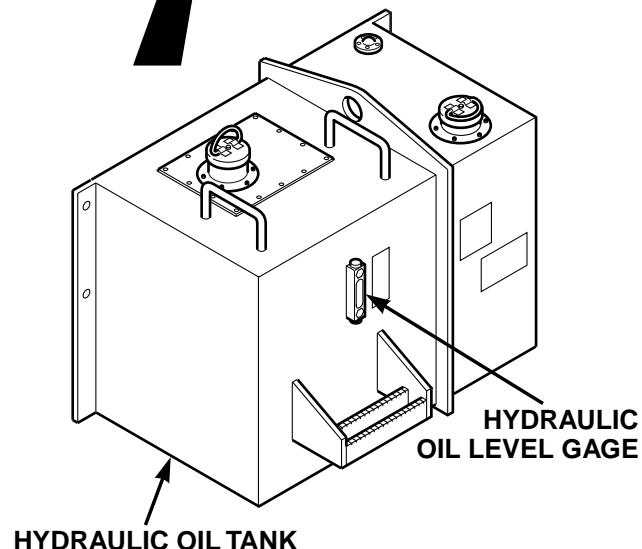
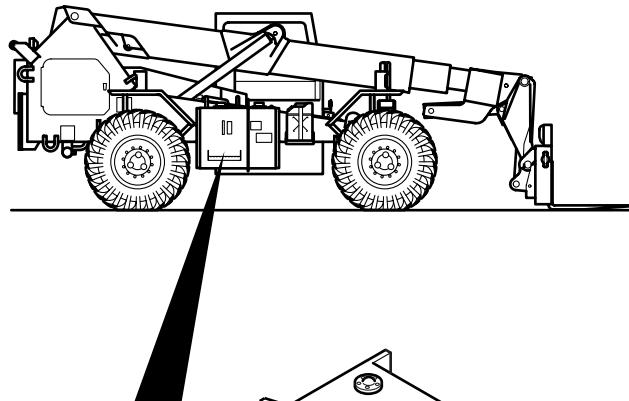
**WARNING**

- Hydraulic oil in the system can be under pressures over 3000 psi. With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

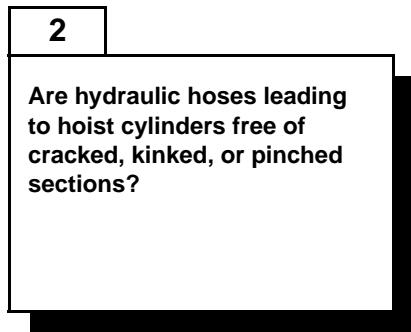
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gauge to determine if tank is filled to proper level (Para 18-2).
(2)	Hydraulic oil should be visible between ADD and FULL marks.
(a)	If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.
(b)	If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2). Go to Step 2 of this fault.



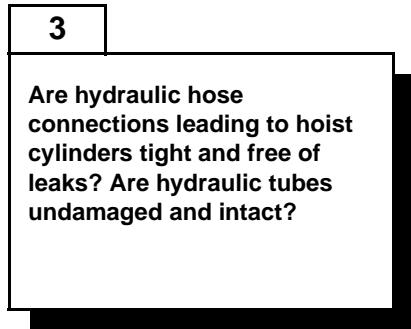
## 5. LEFT AND/OR RIGHT HOIST CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Hydraulic oil OK.
POSSIBLE PROBLEMS
Hoist cylinder hydraulic hoses faulty. Hoist cylinder hose connections/tubes faulty. Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Left and/or right hoist cylinders faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, hoist cylinders will not operate.

KNOWN INFO
Hydraulic oil OK. Hoist cylinder hydraulic hoses OK.
POSSIBLE PROBLEMS
Hoist cylinder hose connections/tubes faulty. Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Left and/or right hoist cylinders faulty.

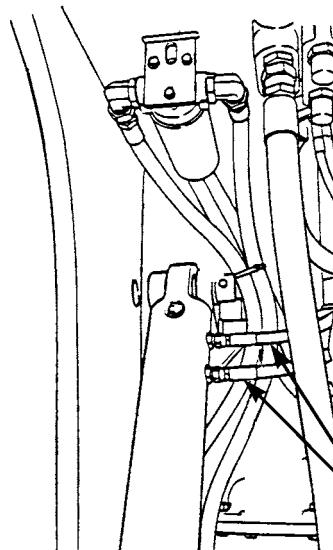


TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hydraulic hose connections/tubes are leaking, hoist cylinders will not operate.

### **HYDRAULIC HOSES VISUAL INSPECTION**

Visually inspect hydraulic hoses leading to left and/or right hoist cylinders for cracks, kinks, or pinches.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).

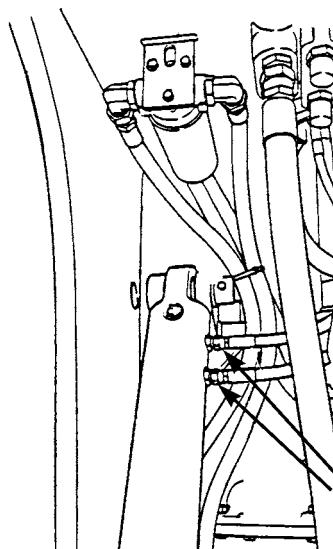


**HYDRAULIC  
HOSES**

### **HYDRAULIC HOSE CONNECTIONS/ TUBES VISUAL INSPECTION**

Visually inspect hydraulic hose connections leading to hoist cylinders for leaks. Visually inspect hydraulic tubes on cylinder housings.

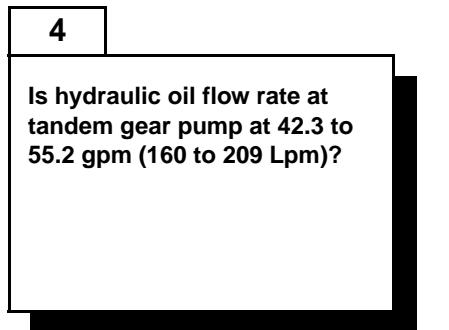
- (a) If there are no leaks at hydraulic hose connections and tubes are not damaged, go to Step 4 of this fault.
- (b) If there are leaks at one or more connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25). If tubes are damaged, replace tubes (Para 18-26).



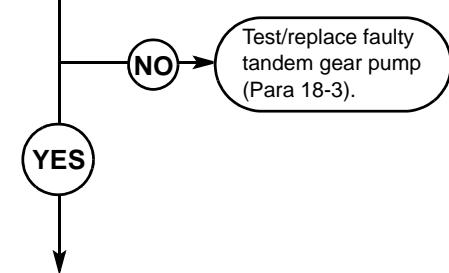
**HYDRAULIC  
CONNECTIONS**

## 5. LEFT AND/OR RIGHT HOIST CYLINDERS DO NOT EXTEND OR RETRACT (CONT).

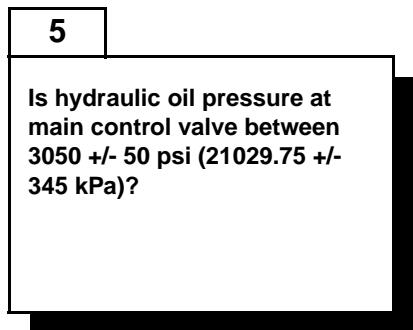
KNOWN INFO
Hydraulic oil OK. Hoist cylinder hydraulic hoses OK. Hoist cylinder hose connections/tubes OK.
POSSIBLE PROBLEMS
Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Left and/or right hoist cylinders faulty.



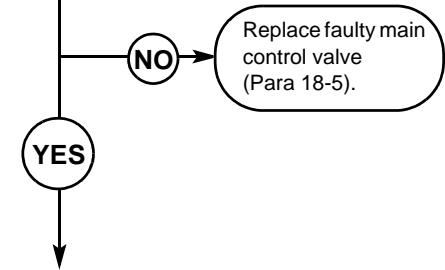
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil flow rate is not at 42.3 to 55.2 gpm (160 to 209 Lpm), tandem gear pump faulty.



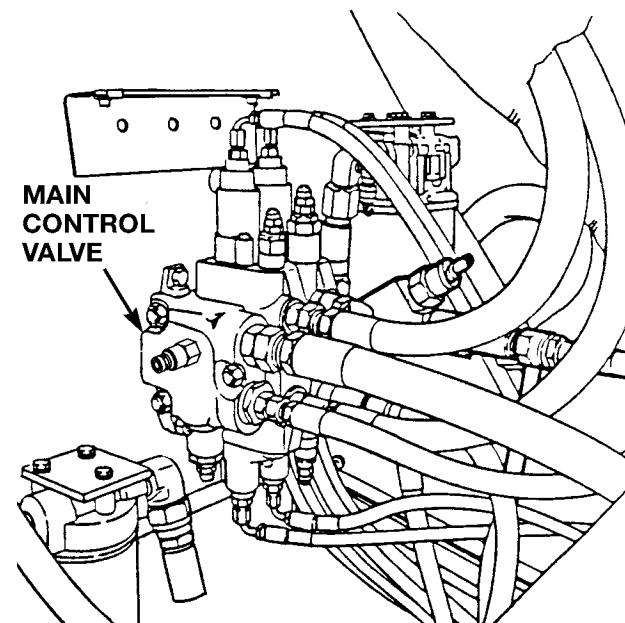
KNOWN INFO
Hydraulic oil OK. Hoist cylinder hydraulic hoses OK. Hoist cylinder hose connections/tubes OK. Tandem gear pump OK.
POSSIBLE PROBLEMS
Main control valve faulty. Hydraulic joystick control valve faulty. Left and/or right hoist cylinders faulty.



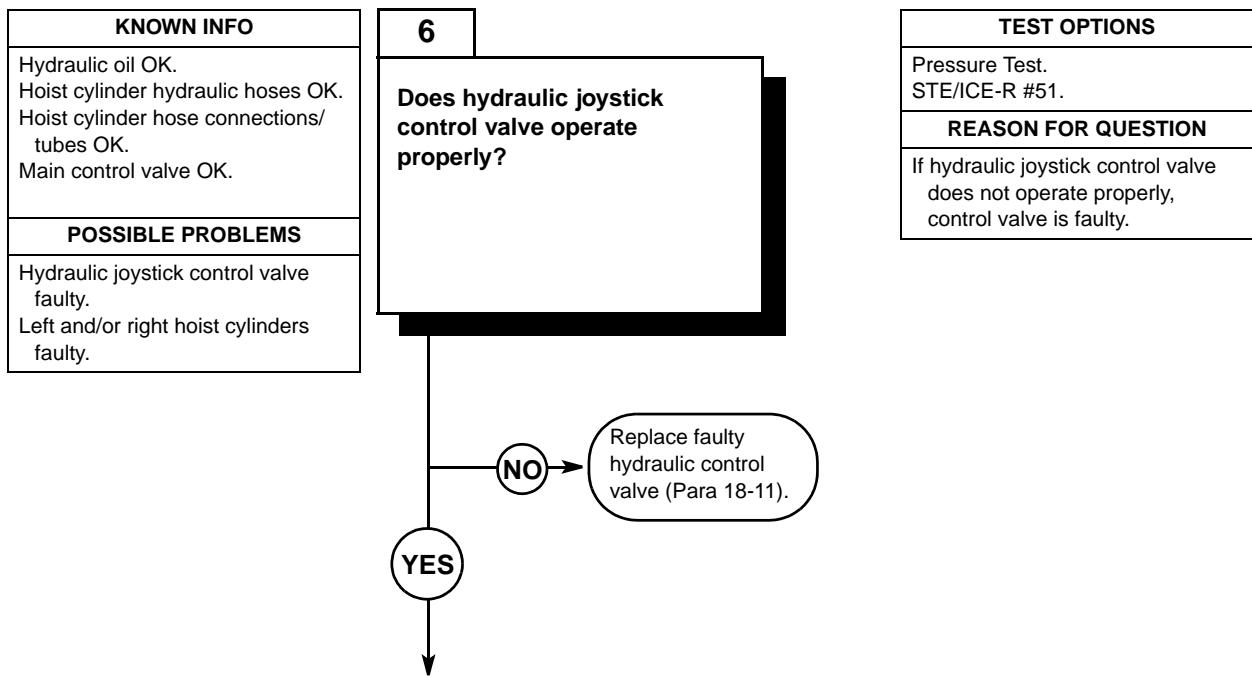
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 3050 +/- 50 psi (21029.75 +/- 345 kPa), main control valve faulty.



<b>MAIN CONTROL VALVE PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on main control valve.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device. (a) If hydraulic oil pressure is at 3050 +/- 50 psi (21029.75 +/- 345 kPa), go to Step 6 of this fault. (b) If hydraulic oil pressure is not at 3050 +/- 50 psi (21029.75 +/- 345 kPa), shut down engine (TM 10-3930-673-10) and replace main control valve (Para 18-5).



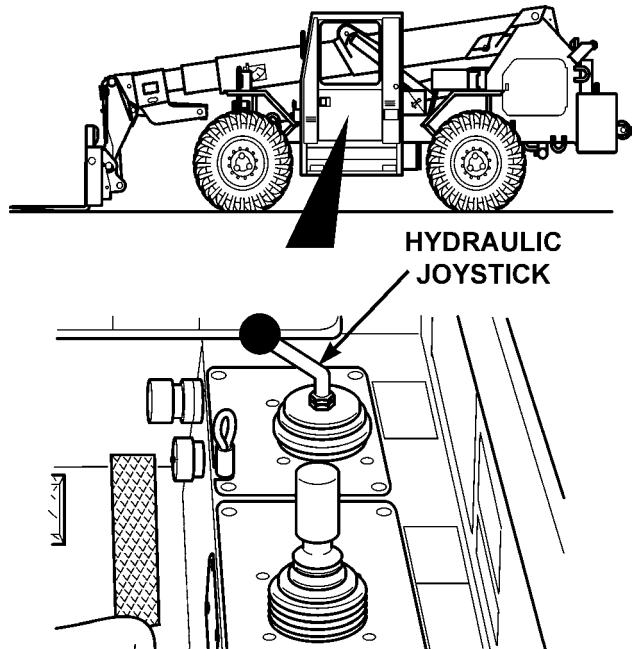
## 5. LEFT AND/OR RIGHT HOIST CYLINDERS DO NOT EXTEND OR RETRACT (CONT).



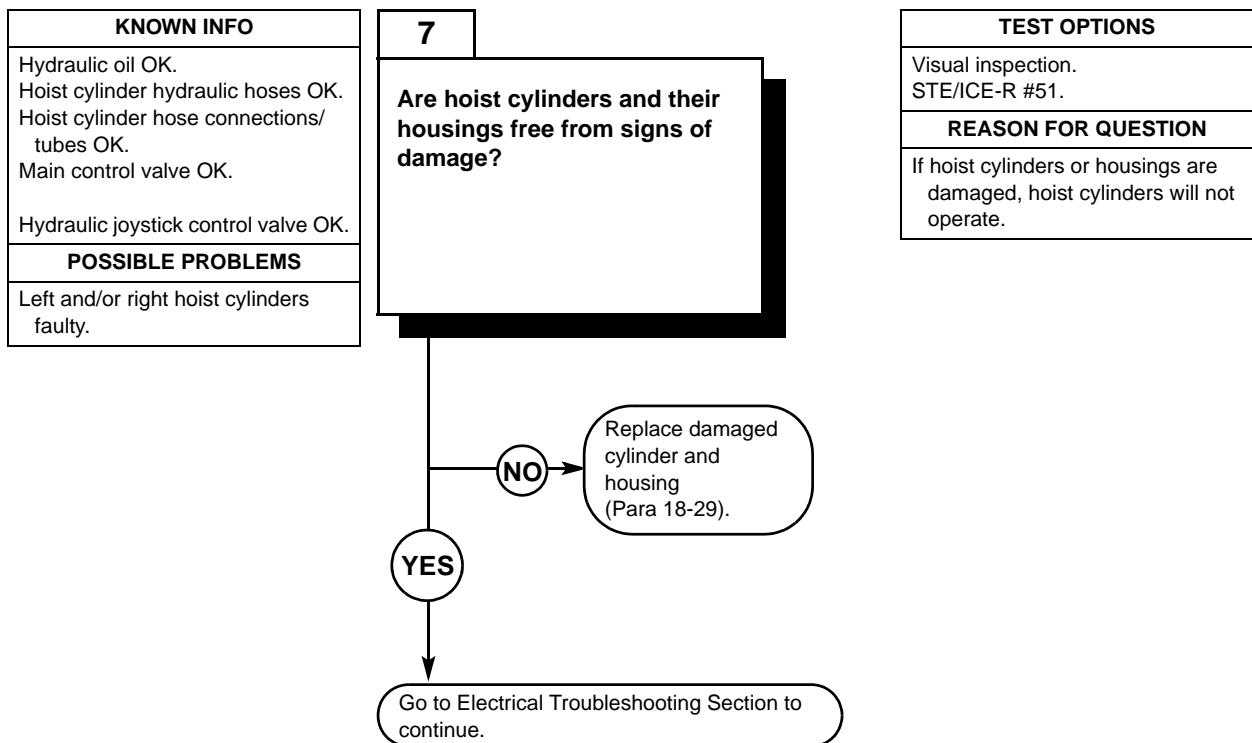
**NOTE**

Relieve accumulator pressure before removing pressure hose on hydraulic joystick.

HYDRAULIC JOYSTICK CONTROL VALVE PRESSURE TEST	
(1)	Place hydraulic joystick in neutral position. Attach 3-way gage and check pressure at "P" port on joystick.
(a)	If hydraulic oil pressure is null go to Step (2) of this fault.
(b)	If not, replace joystick control valve (Para 18-11).
(2)	Place hydraulic joystick in raise position and then in lower position. Check pressure at input lines to main control valve.
(a)	If hydraulic oil pressure is at 1700 to 1800 psi (11721 to 12411 kPa), go to Step 7 of this fault.
(b)	If hydraulic oil pressure is not at 1700 to 1800 psi (11721 to 12411 kPa), shut down engine (TM 10-3930-673-10) and replace the joystick control valve.



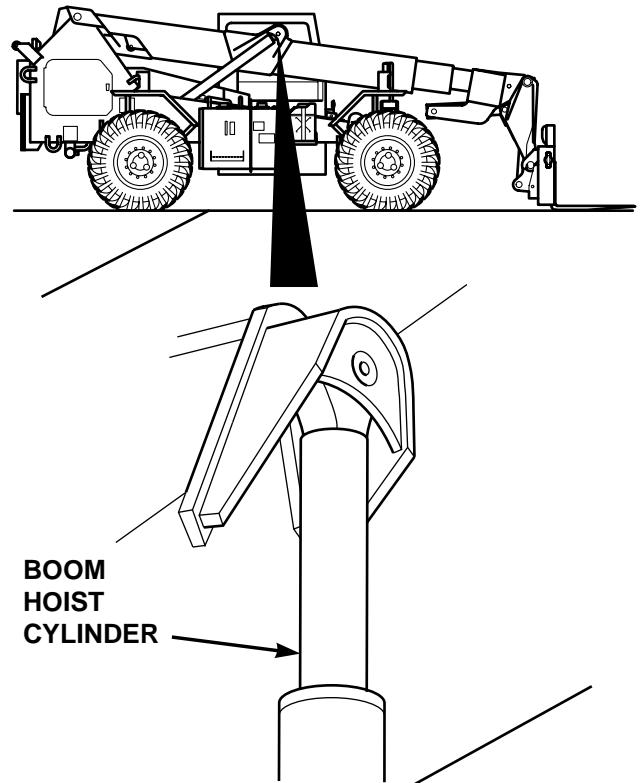
## 5. LEFT AND/OR RIGHT HOIST CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).



**VISUAL INSPECTION**

Visually inspect hoist cylinders and their housings for signs of damage.

- (a) If hoist cylinders and/or their housings are not damaged, go to Electrical Troubleshooting Section to continue.
- (b) If hoist cylinders and/or their housings are damaged, shut down engine (TM 10-3930-673-10) and replace cylinders and their housings (Para 18-29).



**6. BOOM EXTEND CYLINDER SLOW OR DOES NOT EXTEND OR RETRACT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

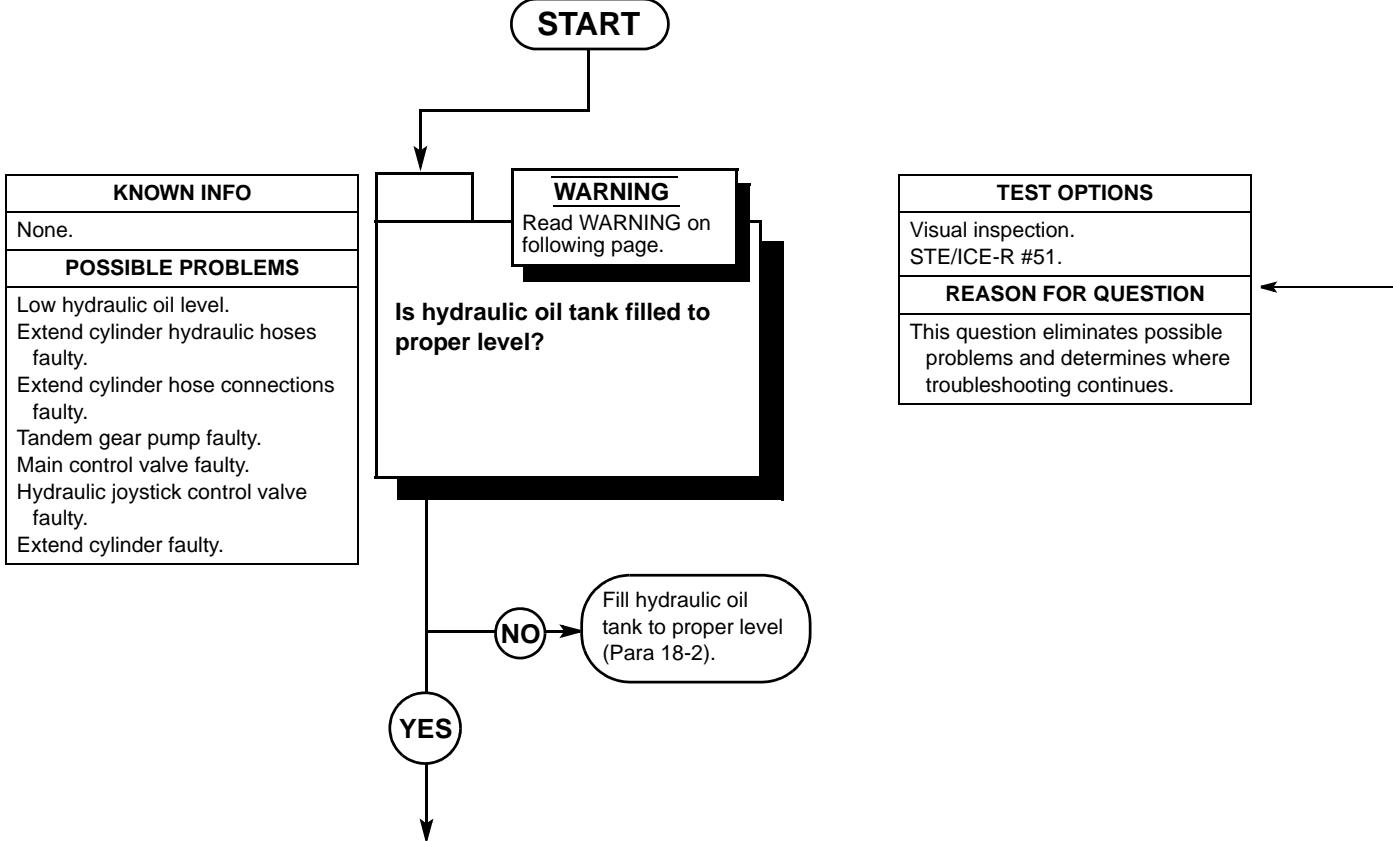
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



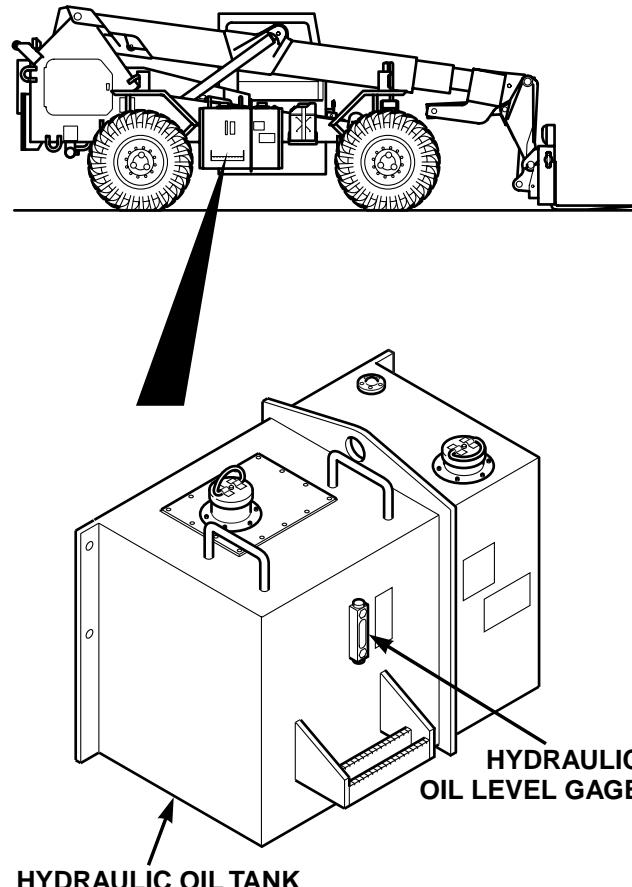
**WARNING**

- Hydraulic oil in the system can be under pressures over 3000 psi. With engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

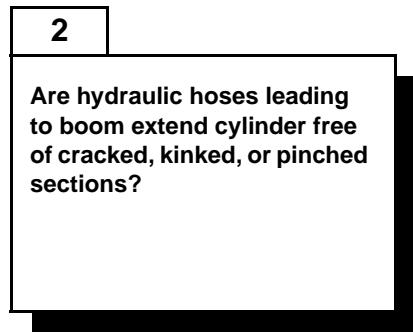
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gage to determine if tank is filled to proper level (Para 18-2).
(2)	Hydraulic oil should be visible between ADD and FULL marks.
(a)	If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.
(b)	If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).



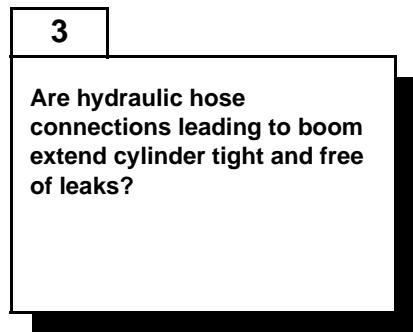
## 6. BOOM EXTEND CYLINDER SLOW OR DOES NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Hydraulic oil OK.
POSSIBLE PROBLEMS
Extend cylinder hydraulic hoses faulty. Extend cylinder hose connections faulty. Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Extend cylinder faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If any hoses are cracked, kinked, or pinched, extend cylinder will not function.

KNOWN INFO
Hydraulic oil OK.
Extend cylinder hydraulic hoses OK.
POSSIBLE PROBLEMS
Extend cylinder hose connections faulty. Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Extend cylinder faulty.

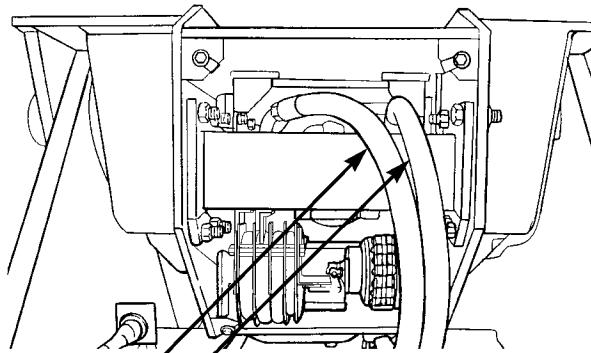


TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic hose connections show signs of leaks, hydraulic system will lose pressure.

### **HYDRAULIC HOSES VISUAL INSPECTION**

Visually inspect hydraulic hoses leading to extend cylinder for cracks, kinks, or pinches. Note especially points of possible wear: at boom hoist pulley, for example, and at tensioner.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).

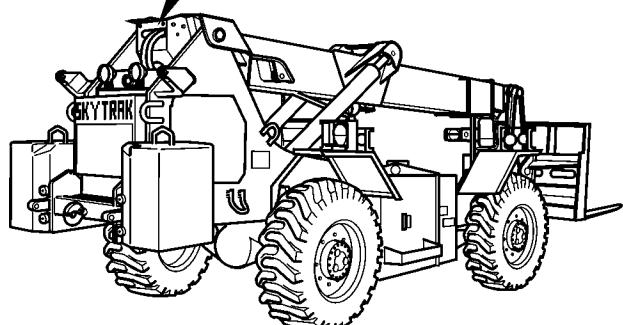


**BOOM  
EXTEND  
HOSES**

### **HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION**

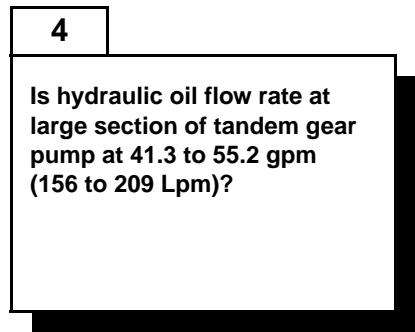
Visually inspect hydraulic hose connections leading to extend cylinder for leaks.

- (a) If there are no leaks at hydraulic hose connections, go to Step 4 of this fault.
- (b) If there are leaks at one or more connections, shut down engine (TM 10-3930-673-10) and tighten or replace the connection(s) (Para 18-25).



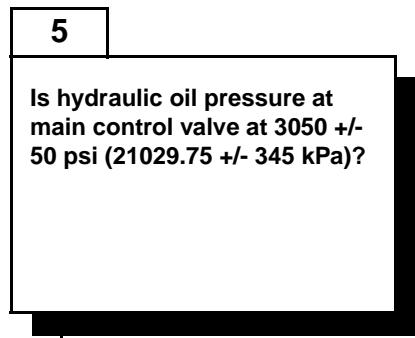
## 6. BOOM EXTEND CYLINDER SLOW OR DOES NOT EXTEND OR RETRACT (CONT).

KNOWN INFO
Hydraulic oil OK. Extend cylinder hydraulic hoses OK. Extend cylinder hose connections OK.
POSSIBLE PROBLEMS
Tandem gear pump faulty. Main control valve faulty. Hydraulic joystick control valve faulty. Extend cylinder faulty.

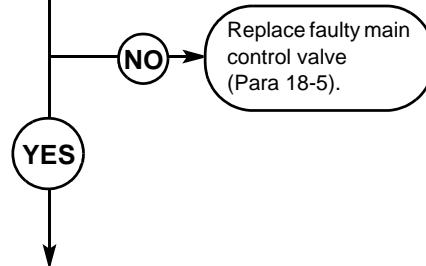


TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil flow rate is not at 41.3 to 55.2 gpm (156 to 209 Lpm), tandem gear pump faulty.

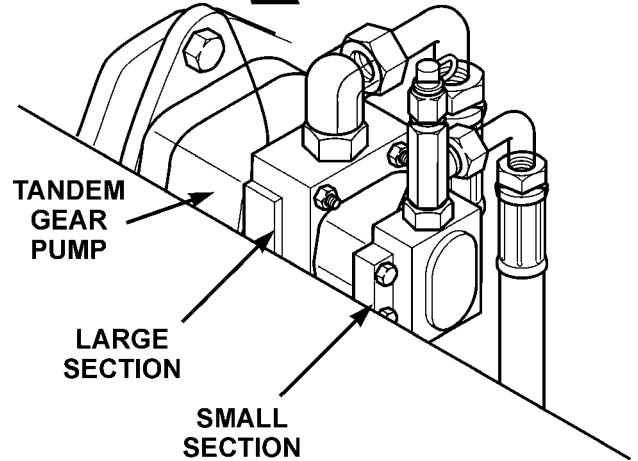
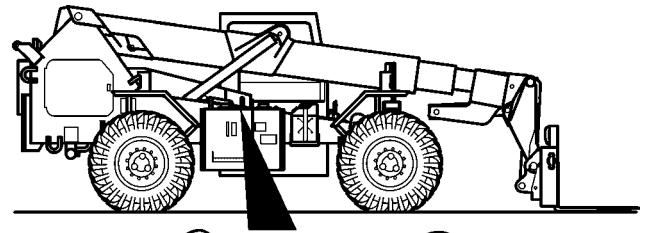
KNOWN INFO
Hydraulic oil OK. Extend cylinder hydraulic hoses OK. Extend cylinder hose connections OK. Tandem gear pump OK.
POSSIBLE PROBLEMS
Main control valve faulty. Hydraulic joystick control valve faulty. Extend cylinder faulty.



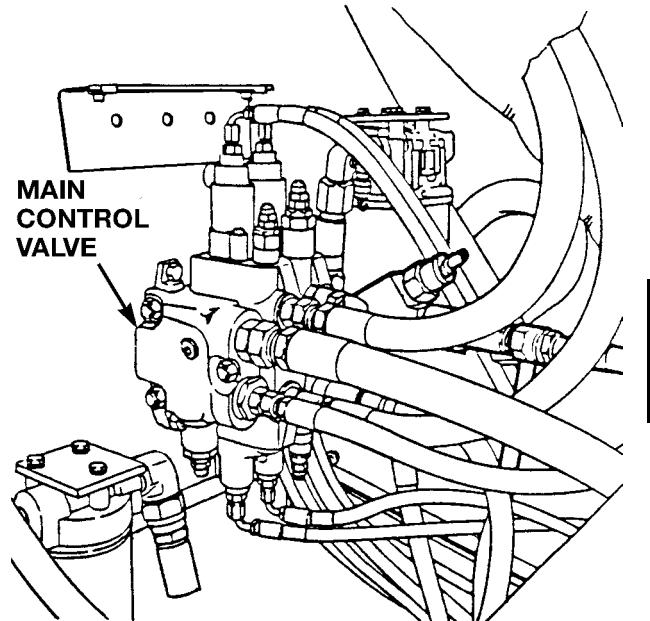
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 3050 +/- 50 psi (21029.75 +/- 345 kPa), main control valve faulty.



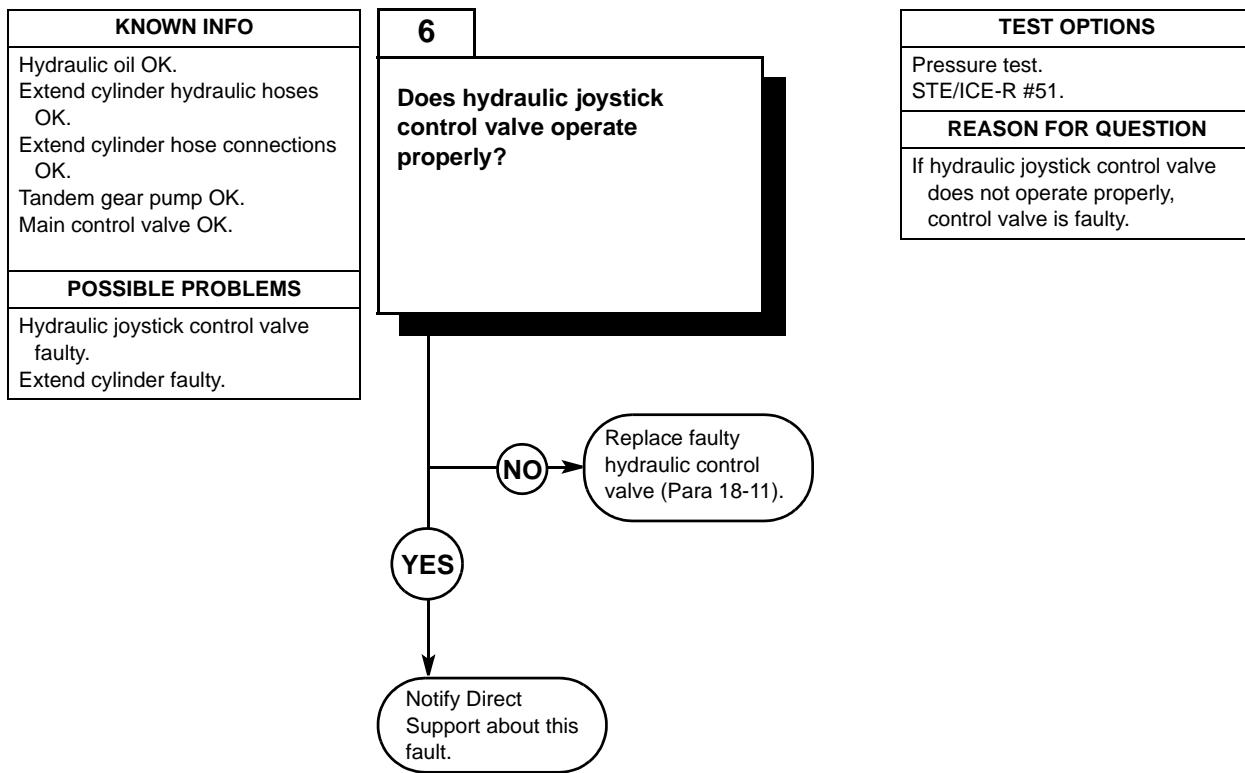
<b>TANDEM GEAR PUMP PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on large section tandem gear pump.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is at 3050+/- 50 psi (21029.75 +/- 345 kPa), go to Step 5 of this fault.
(b)	If hydraulic oil pressure is not at 3050+/- 50 psi (21029.75 +/- 345 kPa), shut down engine (TM 10-3930-673-10) and test and replace tandem gear pump (Para 18-3).



<b>MAIN CONTROL VALVE PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on main control valve.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read the output pressure on test device.
(a)	If hydraulic oil pressure is at 3050 +/- 50 psi (21029.75 +/- 345 kPa), go to Step 6 of this fault.
(b)	If the hydraulic oil pressure is not at 3050 +/- 50 psi (21029.75 +/- 345 kPa), shut down engine (TM 10-3930-673-10) and replace main control valve (Para 18-5).



## 6. BOOM EXTEND CYLINDER SLOW OR DOES NOT EXTEND OR RETRACT (CONT).

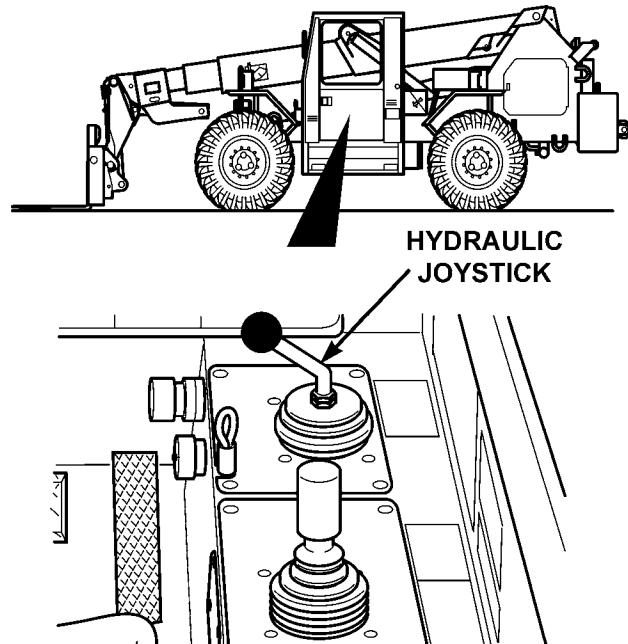


**WARNING**

- Hydraulic oil in the system can be under pressures over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**HYDRAULIC JOYSTICK CONTROL VALVE  
PRESSURE TEST**

- (1) Place hydraulic joystick in neutral position and check the pressure at the hydraulic joystick control valve "p" port.
  - (a) If hydraulic oil pressure is null go to Step (2) below.
  - (b) If not, replace joystick control valve (Para 18-11).
- (2) Place hydraulic joystick in raise position and then in lower position. Check pressure at input lines to hydraulic joystick control valve.
  - (a) If hydraulic oil pressure is at 1700 to 1800 psi (11721 to 12411 kPa), notify Direct Support of faulty extend cylinder.
  - (b) If hydraulic oil pressure is not at 1700 to 1800 psi (11721 to 12411 kPa), shut down engine (TM 10-3930-673-10) and replace hydraulic joystick control valve.



**7. LEFT AND RIGHT REAR STEERING CYLINDERS DO NOT EXTEND OR RETRACT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

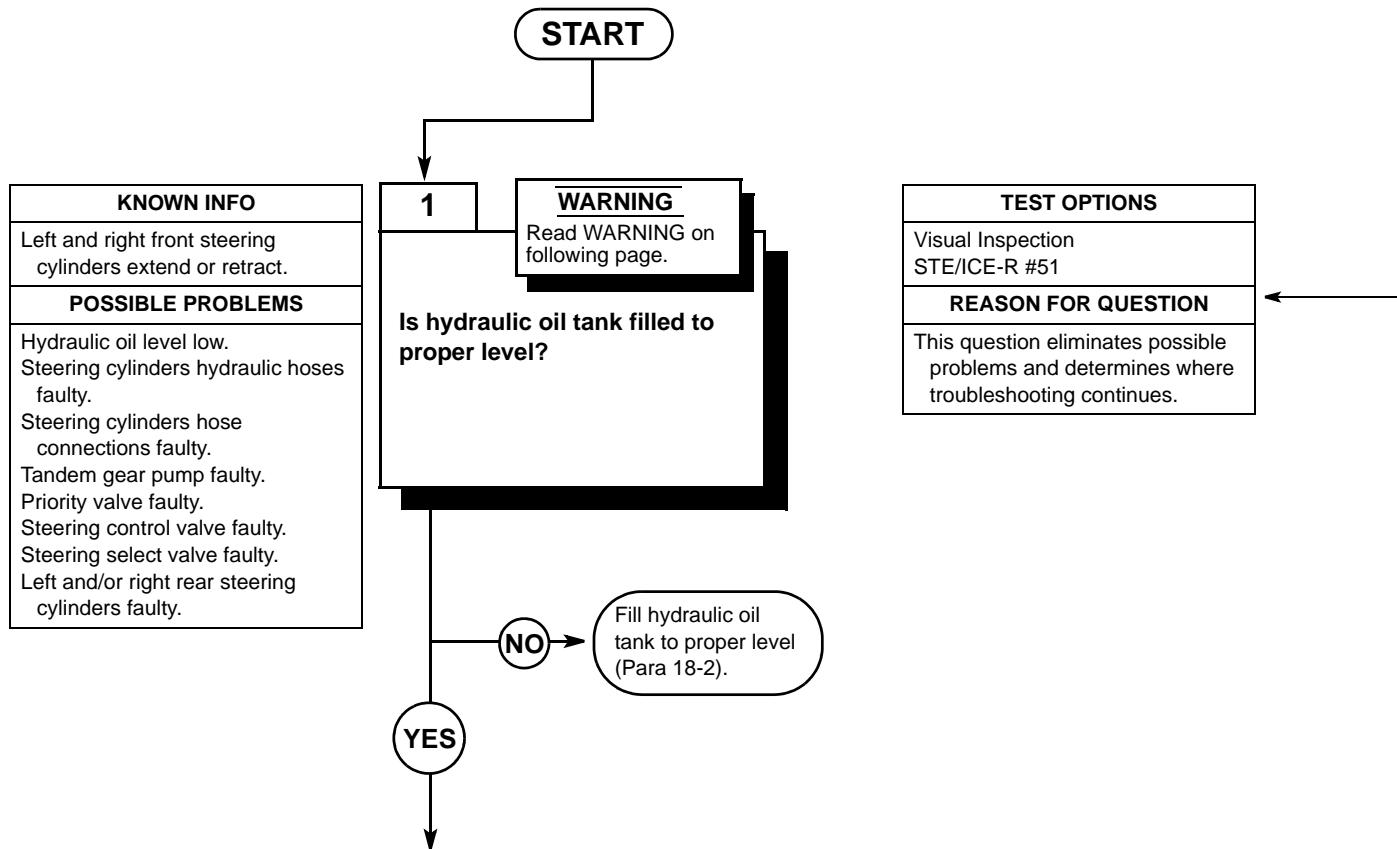
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



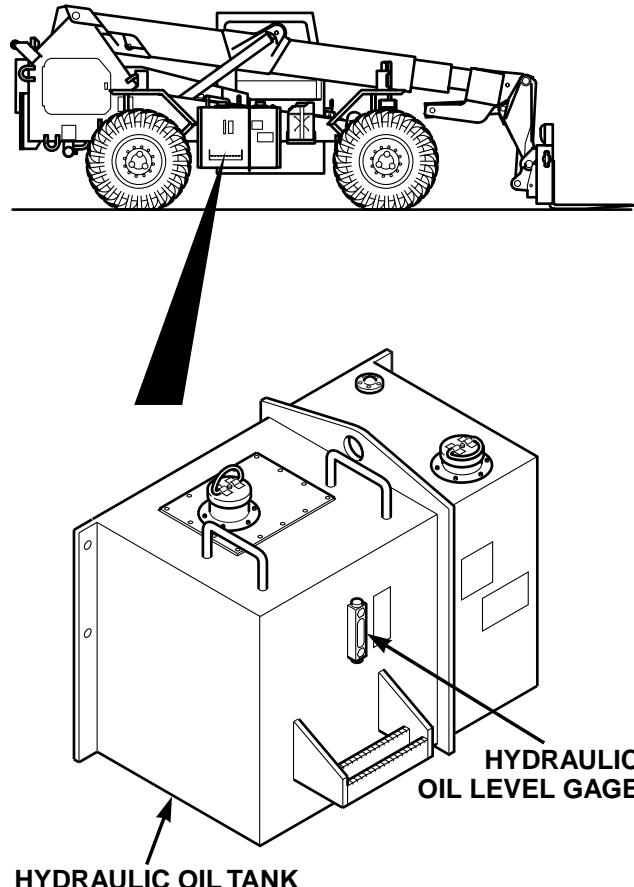
**WARNING**

- Hydraulic oil in the system can be under pressures over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

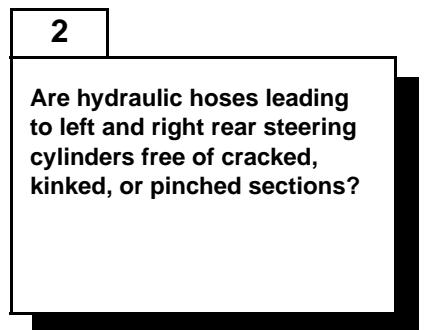
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gage to determine if tank is filled to proper level.
(2)	Hydraulic oil should be visible between ADD and FULL marks. <ol style="list-style-type: none"> <li>If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.</li> <li>If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).</li> </ol>



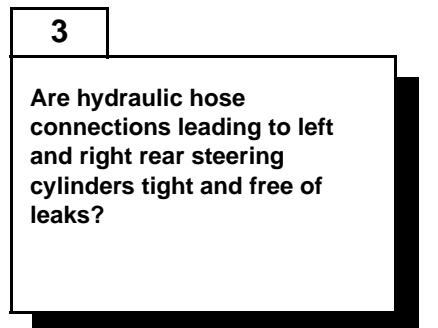
## 7. LEFT AND RIGHT REAR STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK.
POSSIBLE PROBLEMS
Steering cylinders hydraulic hoses faulty. Steering cylinders hose connections faulty. Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right rear steering cylinders faulty.



TEST OPTIONS
Visual Inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hoses are cracked, kinked, or pinched, hoses are faulty and will need replaced.

KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK.
POSSIBLE PROBLEMS
Steering cylinders hose connections faulty. Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right rear steering cylinders faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hose connections are loose or show signs of leaks, hose connections will need to be tightened or replaced.

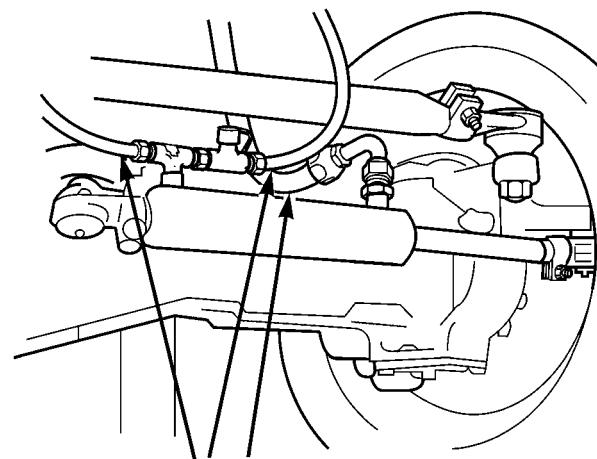
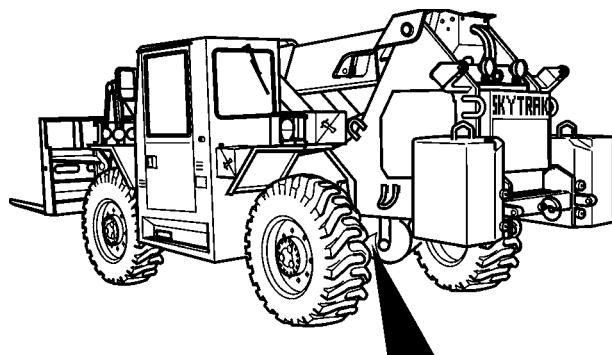
#### HYDRAULIC HOSES VISUAL INSPECTION

Visually inspect hydraulic hoses leading to rear steering cylinders for cracks, kinks, or pinches.

- If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 14-6).

#### NOTE

Hydraulic hoses must be mounted (indexed) in such a way to allow movement of hoses during steering without rubbing, crimping, or exceeding minimum bend radius.

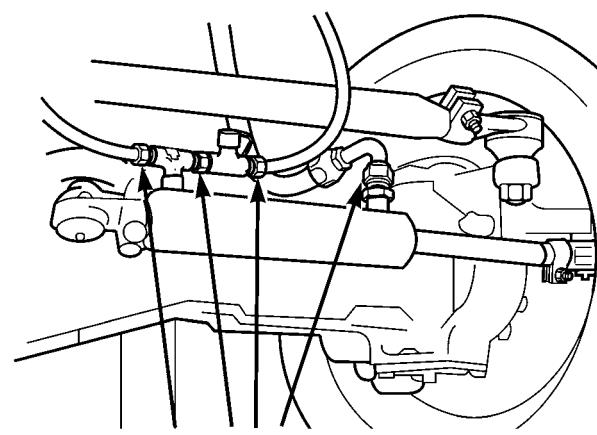


**HYDRAULIC HOSES**

#### HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION

Visually inspect hydraulic hose connections leading to left and right rear steering cylinders for leaks.

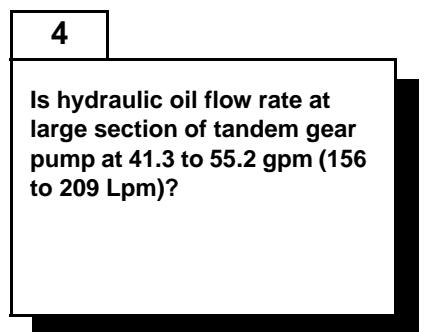
- If there are no leaks at hydraulic hose connections, go to Step 4 of this fault.
- If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 14-6).



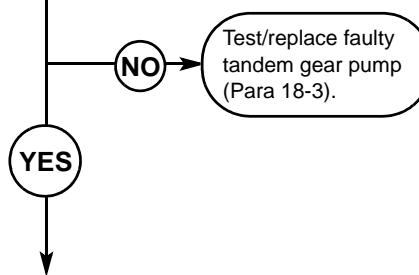
**HYDRAULIC CONNECTIONS**

## 7. LEFT AND RIGHT REAR STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

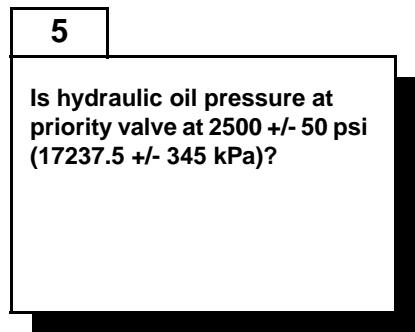
KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK.
POSSIBLE PROBLEMS
Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right rear steering cylinders faulty.



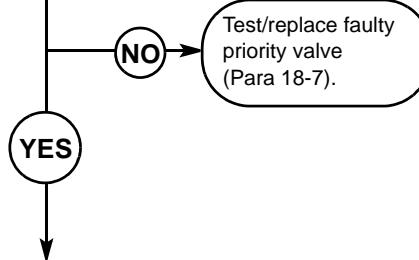
TEST OPTIONS
Pressure Test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil flow rate is not at 41.3 to 55.2 gpm (156 to 55.2 Lpm), tandem gear pump is faulty.

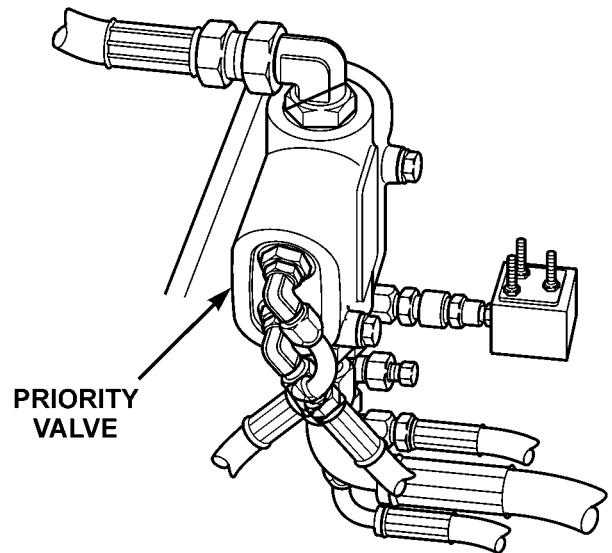
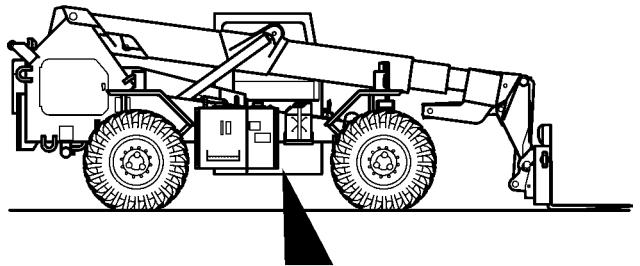


KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK. Tandem gear pump OK.
POSSIBLE PROBLEMS
Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right rear steering cylinders faulty.



TEST OPTIONS
Pressure Test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2500 +/- 50 psi (17237.5 +/- 345 kPa), priority valve is faulty.

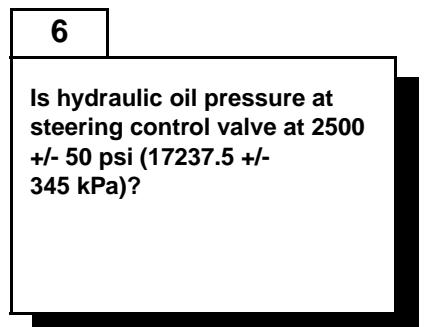




<b>PRIORITY VALVE PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler at priority valve.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device. (a) If hydraulic oil pressure is at 2500 +/- 50 psi (17237.5 +/- 345 kPa), go to Step 6 of this fault. (b) If hydraulic oil pressure is not at 2500 +/- 50 psi (17237.5 +/- 345 kPa), shut down engine (TM 10-3930-673-10) and replace priority valve (Para 18-7).

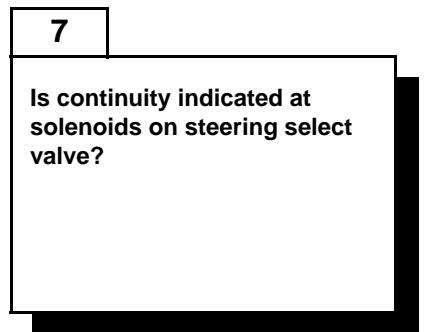
## 7. LEFT AND RIGHT REAR STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK.
Steering cylinders hydraulic hoses OK.
Steering cylinders hose connections OK.
Tandem gear pump OK.
Priority valve OK.
POSSIBLE PROBLEMS
Steering control valve faulty. Steering select valve faulty. Left and/or right rear steering cylinders faulty.



TEST OPTIONS
Pressure Test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2500 +/- 50 psi (17237.5 +/- 345 kPa), steering control valve is faulty.

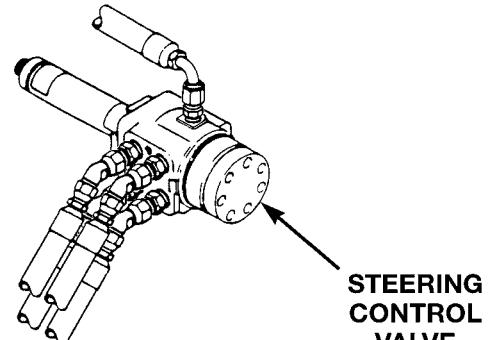
KNOWN INFO
Left and right front steering cylinders extend or retract. Hydraulic oil level OK.
Steering cylinders hydraulic hoses OK.
Steering cylinders hose connections OK.
Tandem gear pump OK.
Priority valve OK.
Steering control valve OK.
POSSIBLE PROBLEMS
Steering select valve faulty. Left and/or right rear steering cylinders faulty.



TEST OPTIONS
Continuity Test. STE/ICE-R #51.
REASON FOR QUESTION
If continuity is not indicated at solenoids, steering select valve is faulty.

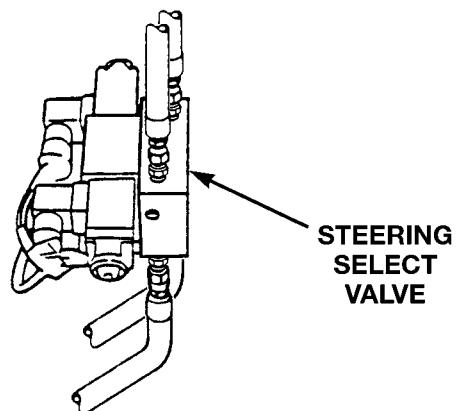
<b>STEERING CONTROL VALVE PRESSURE TEST</b>
---

- (1) Use test tee and 0 to 5000 psi (0 to 34475 kPa) pressure gage to test hydraulic pressure at steering control valve output line.
- (2) Read output pressure on test device.
  - (a) If hydraulic oil pressure is at 2500 +/- 50 psi (17237.5 +/- 345 kPa), go to Step 7 of this fault.
  - (b) If hydraulic oil pressure is not at 2500 +/- 50 psi (17237.5 +/- 345 kPa), shut down engine (TM 10-3930-673-10) and replace steering control valve (Para 14-9).

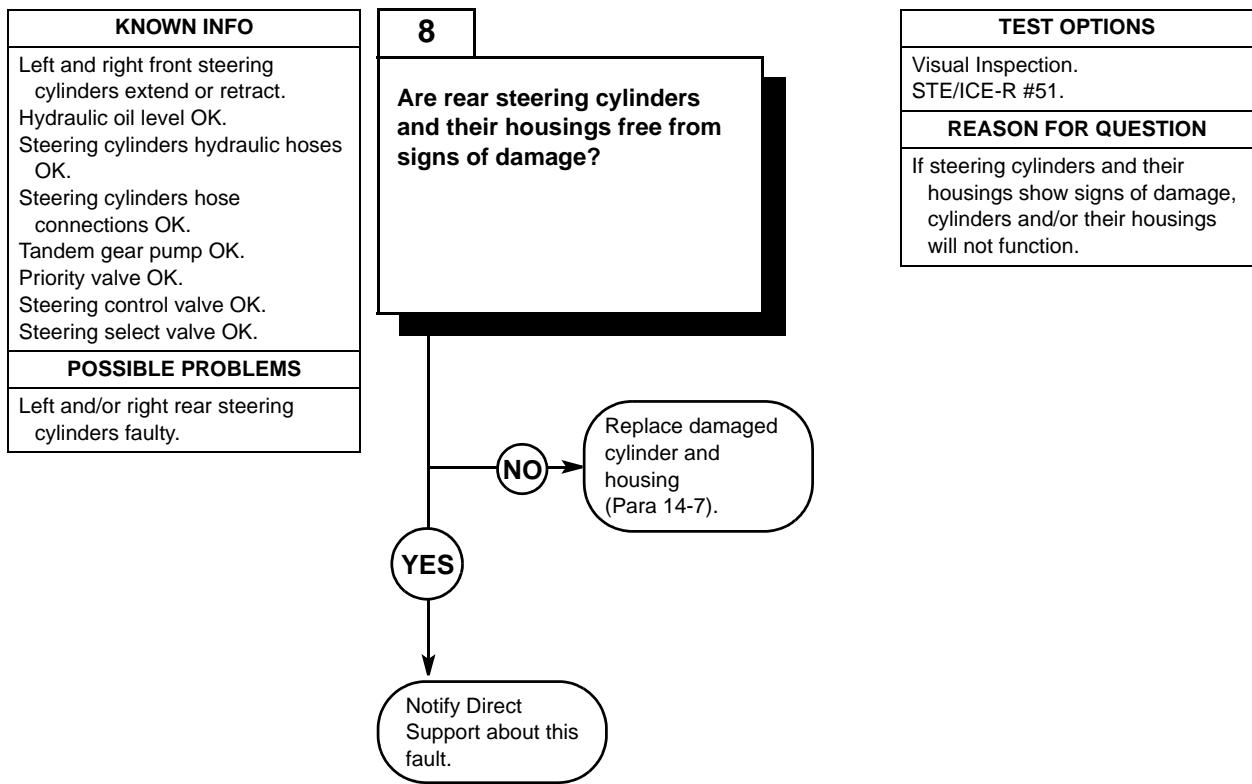


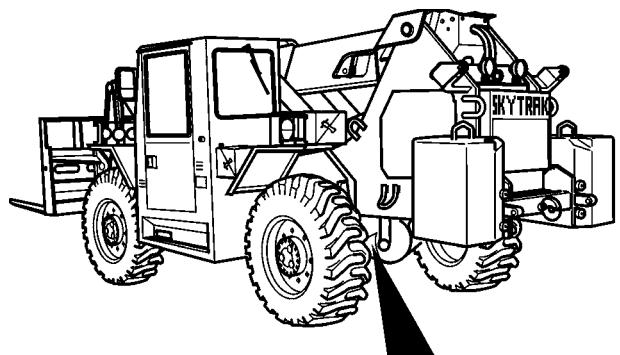
<b>STEERING SELECT VALVE SOLENOID CONTINUITY TEST</b>
---

- (1) Perform continuity test on solenoids at steering select valve.
- (2) Read output of ohmmeter.
  - (a) If ohmmeter indicates continuity, go to Step 8 of this fault.
  - (b) If continuity is not indicated, shut down engine (TM 10-3930-673-10) and replace steering select valve (Para 14-10).



## 7. LEFT AND RIGHT REAR STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

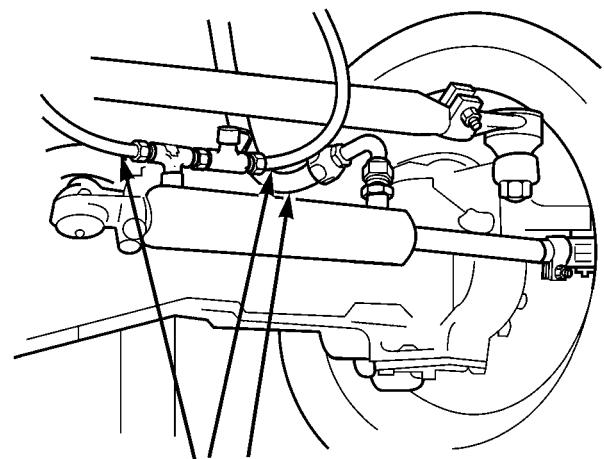




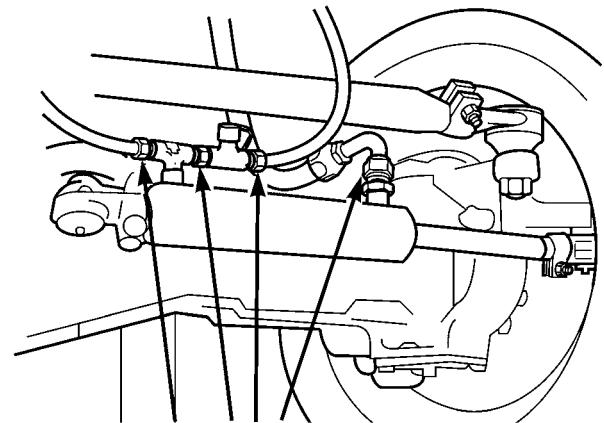
#### REAR STEERING CYLINDER VISUAL INSPECTION

Visually inspect rear steering cylinders and their housings for signs of damage.

- (a) If steering cylinders and/or their housings are not damaged, notify Direct Support about this fault.
- (b) If rear steering cylinders and/or their housings are damaged, shut down engine (TM 10-3930-6573-10) and replace cylinders and their housings (Para 14-7).



HYDRAULIC HOSES



HYDRAULIC CONNECTIONS

**8. LEFT AND RIGHT FRONT STEERING CYLINDERS DO NOT EXTEND OR RETRACT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

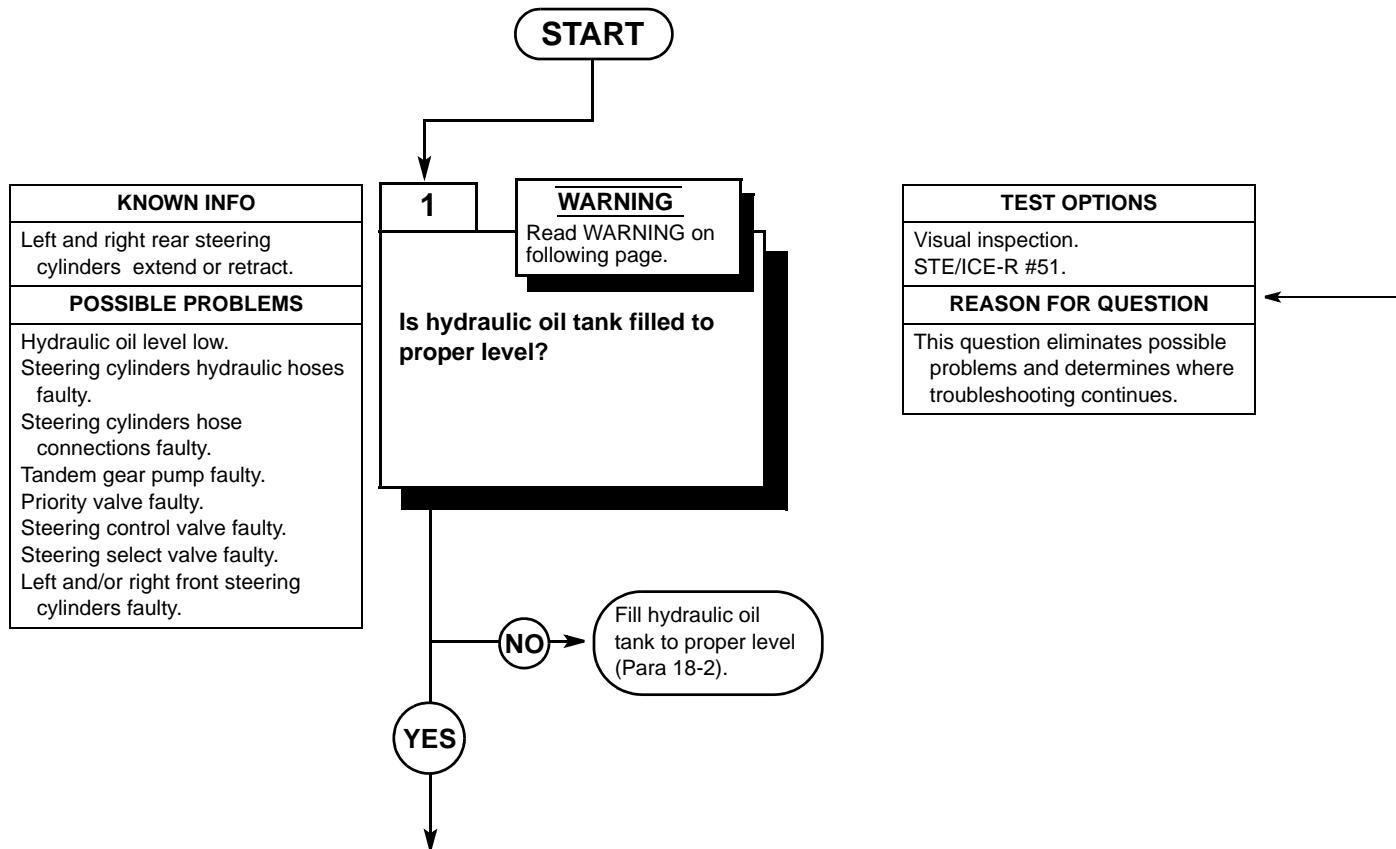
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



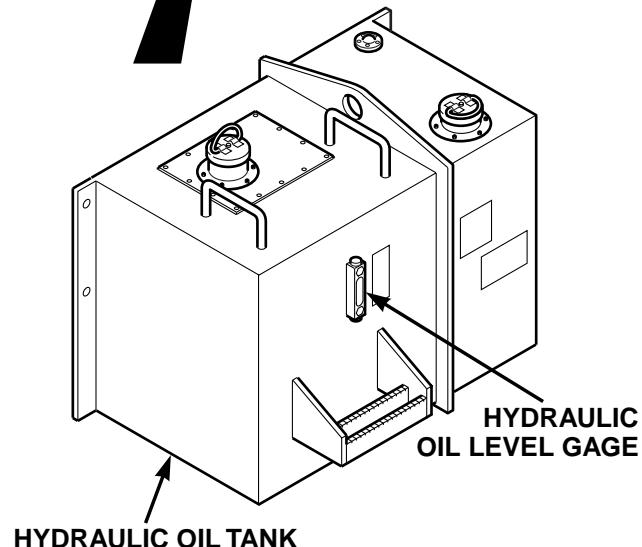
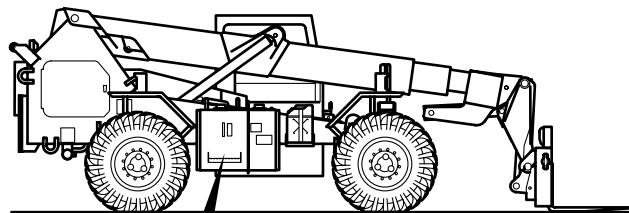
**WARNING**

- Hydraulic oil in the system can be under pressures over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on the ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

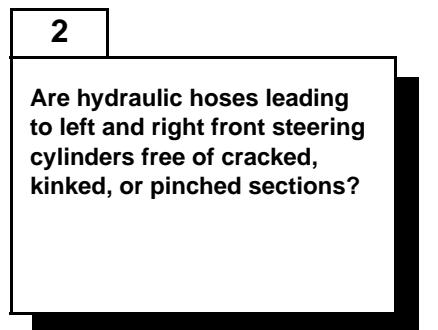
Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1) Visually inspect hydraulic oil level gage to determine if tank is filled to proper level. (2) Hydraulic oil should be visible between ADD and FULL marks. (a) If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault. (b) If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).	

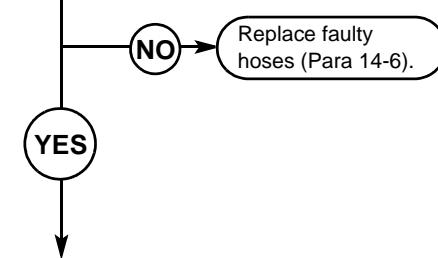


## 8. LEFT AND RIGHT FRONT STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

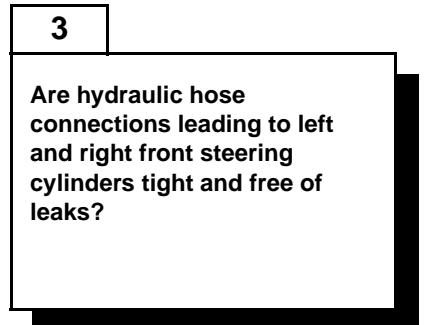
KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK.
POSSIBLE PROBLEMS
Steering cylinders hydraulic hoses faulty. Steering cylinders hose connections faulty. Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right front steering cylinders faulty.



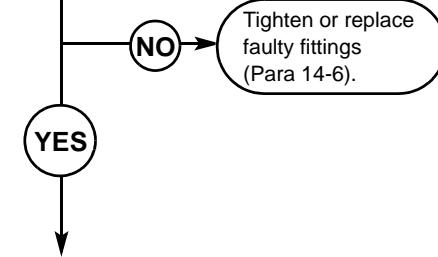
TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hoses are cracked, kinked, or pinched, cylinders will not function.



KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK.
POSSIBLE PROBLEMS
Steering cylinders hose connections faulty. Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right front steering cylinders faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hose connections are loose or show signs of leaks, cylinders will not function.



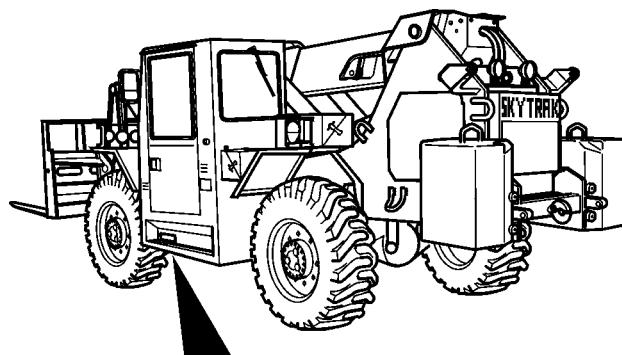
#### HYDRAULIC HOSES VISUAL INSPECTION

Visually inspect hydraulic hoses leading to front steering cylinders for cracks, kinks, or pinches.

- If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 14-6).

#### NOTE

Hydraulic hoses must be mounted (indexed) in such a way to allow movement of hoses during steering without rubbing, crimping, or exceeding minimum bend radius.

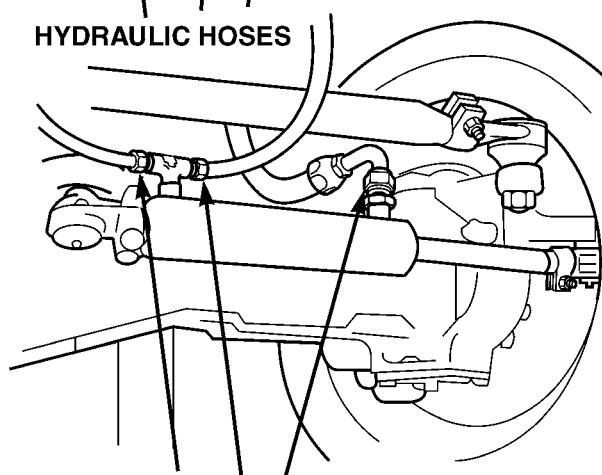


#### HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION

Visually inspect hydraulic hose connections leading to left and right front steering cylinders for leaks.

- If there are no leaks at hydraulic hose connections, go to Step 4 of this fault.
- If there are leaks at one or more of connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 14-6).

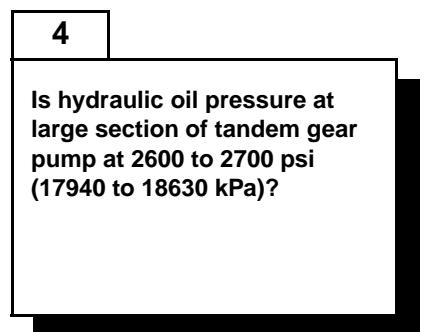
**HYDRAULIC HOSES**



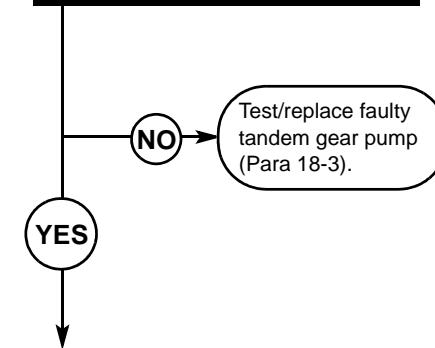
**HYDRAULIC CONNECTONS**

## 8. LEFT AND RIGHT FRONT STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

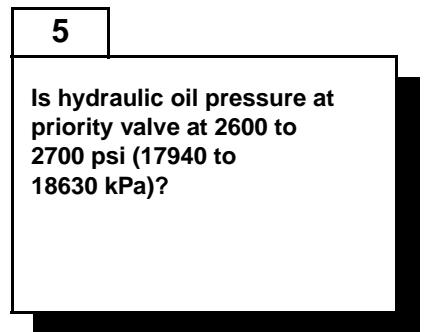
KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK.
POSSIBLE PROBLEMS
Tandem gear pump faulty. Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right front steering cylinders faulty.



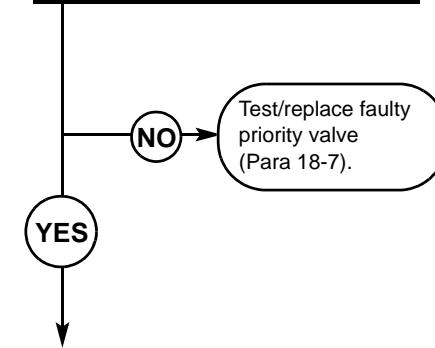
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), tandem gear pump is faulty.



KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK. Tandem gear pump OK.
POSSIBLE PROBLEMS
Priority valve faulty. Steering control valve faulty. Steering select valve faulty. Left and/or right front steering cylinders faulty.

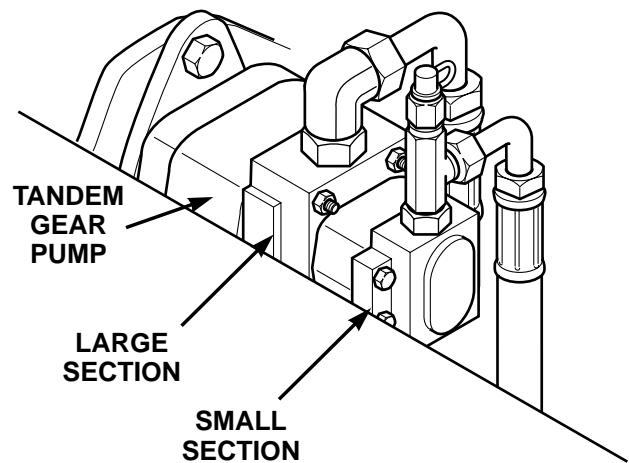


TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), priority valve is faulty.



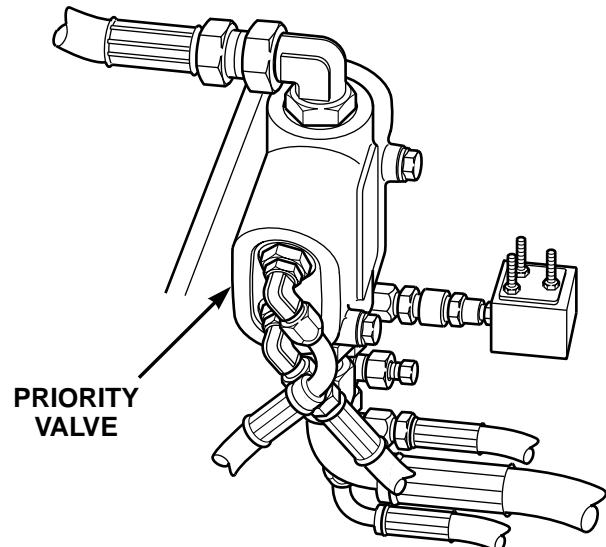
**TANDEM GEAR PUMP  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler on large section of tandem gear pump.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 5 of this fault.
  - (b) If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), shut down engine (TM 10-3930-673-10) and test and replace tandem gear pump (Para 18-3).



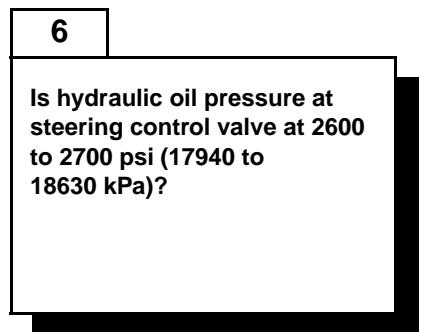
**PRIORITY VALVE  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler at priority valve.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 6 of this fault.
  - (b) If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), shut down engine (TM 10-3930-673-10) and replace priority valve (Para 18-7).



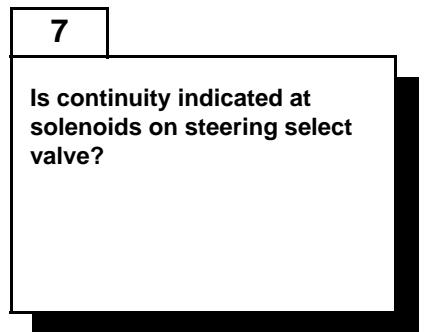
## 8. LEFT AND RIGHT FRONT STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK. Tandem gear pump OK. Priority valve OK.
POSSIBLE PROBLEMS
Steering control valve faulty. Steering select valve faulty. Left and/or right front steering cylinders faulty.



TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), steering control valve is faulty.

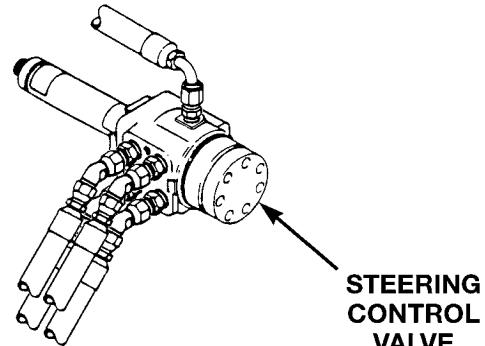
KNOWN INFO
Left and right rear steering cylinders extend or retract. Hydraulic oil level OK. Steering cylinders hydraulic hoses OK. Steering cylinders hose connections OK. Tandem gear pump OK. Priority valve OK. Steering control valve OK.
POSSIBLE PROBLEMS
Steering select valve faulty. Left and/or right front steering cylinders faulty.



TEST OPTIONS
Continuity test. STE/ICE-R #51.
REASON FOR QUESTION
If continuity is not indicated at solenoids, steering select valve is faulty.

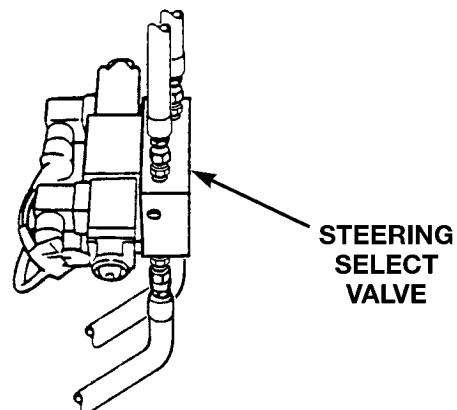
<b>STEERING CONTROL VALVE PRESSURE TEST</b>
---

- (1) Use test tee and 0 to 5000 psi (0 to 34475 kPa) pressure gage to test hydraulic pressure at steering control valve output line.
- (2) Read output pressure on test device.
  - (a) If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 7 of this fault.
  - (b) If hydraulic oil pressure is not at 2500 psi (17237.5 kPa), shut down engine (TM 10-3930-673-10) and replace steering control valve (Para 14-9).

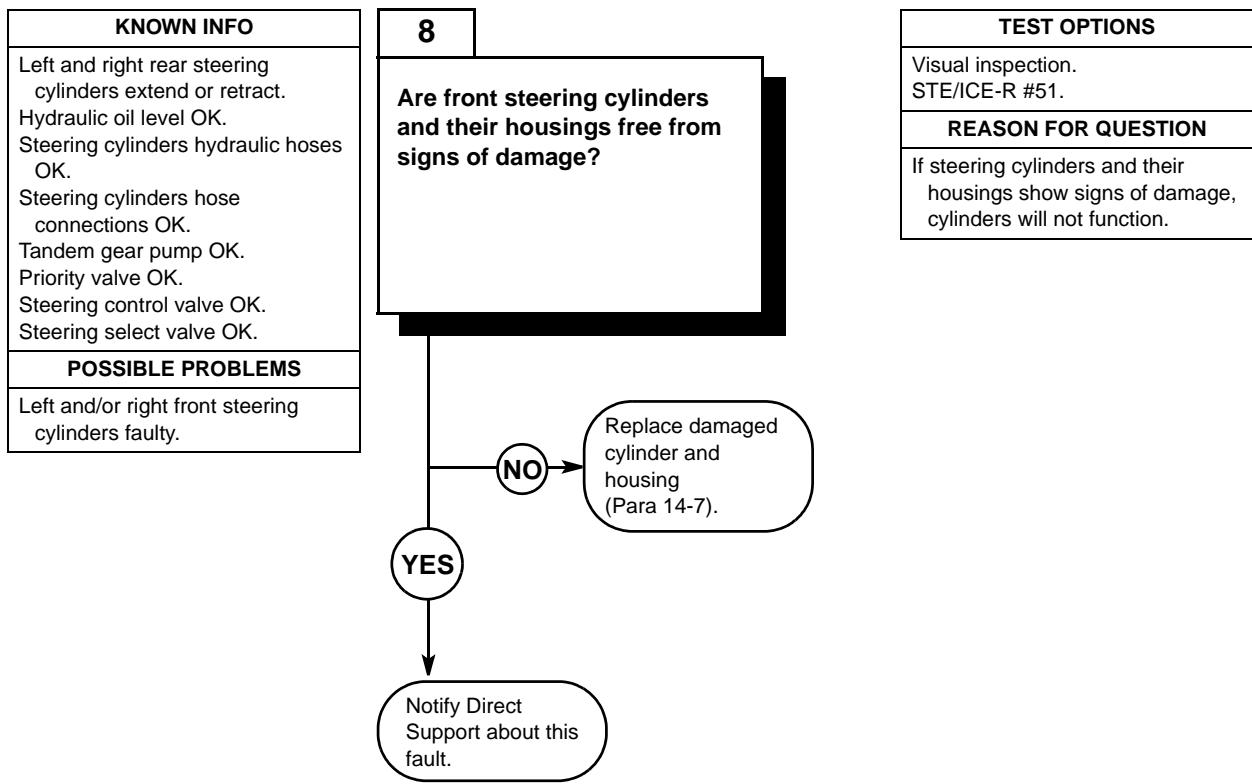


<b>STEERING SELECT VALVE SOLENOID CONTINUITY TEST</b>
---

- (1) Perform continuity test on solenoids at steering select valve.
- (2) Read output of ohmmeter.
  - (a) If ohmmeter indicates continuity, go to Step 8 of this fault.
  - (b) If continuity is not indicated, shut down engine (TM 10-3930-673-10) and replace steering select valve (Para 14-10).



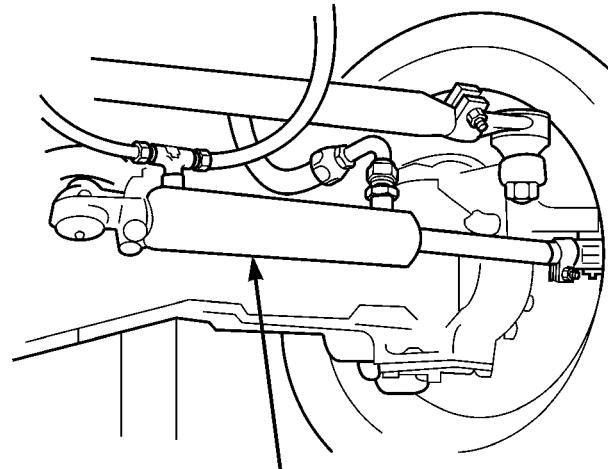
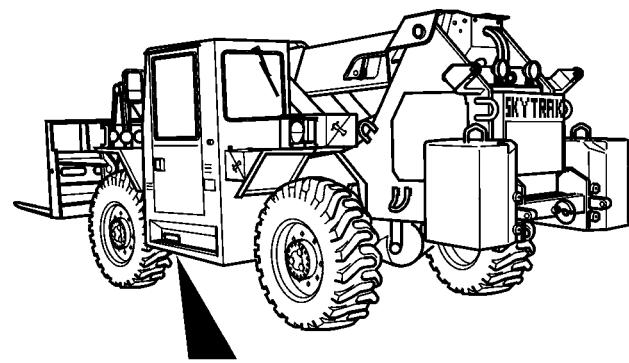
## 8. LEFT AND RIGHT FRONT STEERING CYLINDERS DO NOT EXTEND OR RETRACT (CONT.).



**FRONT STEERING CYLINDER  
VISUAL INSPECTION**

Visually inspect front steering cylinders and their housings for signs of damage.

- (a) If steering cylinders and/or their housings are not damaged, notify Direct Support about this fault.
- (b) If steering cylinders and/or their housings are damaged, shut down engine (TM 10-3930-673-10) and replace cylinders and their housings (Para 14-7).



**HYDRAULIC  
STEERING  
CYLINDER**

**9. FRAME TILT CYLINDER DOES NOT EXTEND OR RETRACT.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
 (Item 18, Appendix F)  
 STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

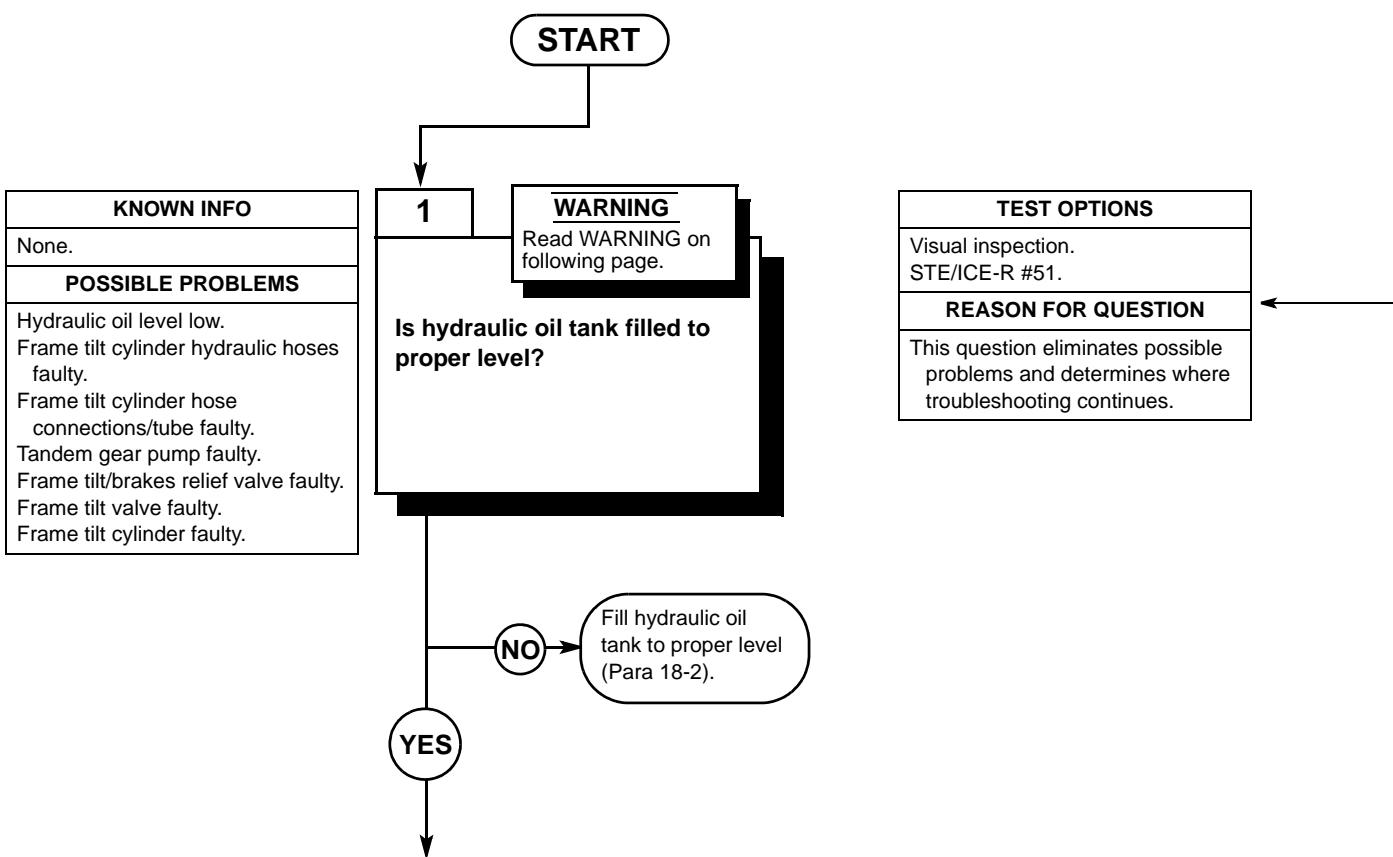
Two

*References*

TM 10-3930-673-10  
 TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
 Parking brake on (TM 10-3930-673-10)  
 Wheels chocked (TM 10-3930-673-10)



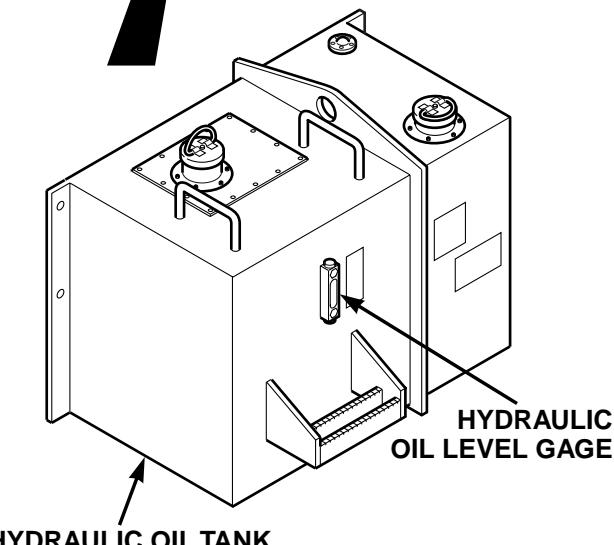
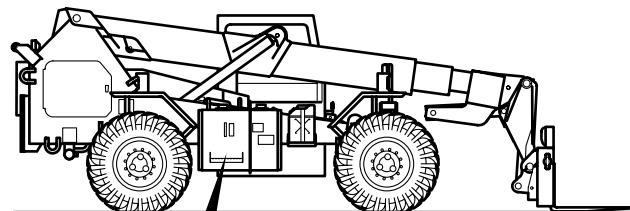
**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

**CAUTION**

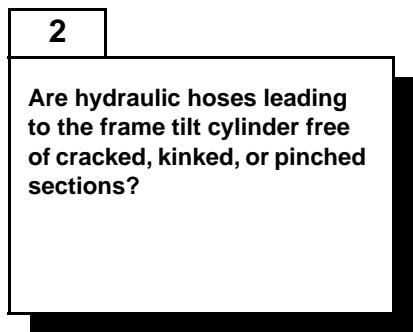
Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gage to determine if tank is filled to proper level.
(2)	Hydraulic oil should be visible between ADD and FULL marks.
(a)	If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of this fault.
(b)	If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).



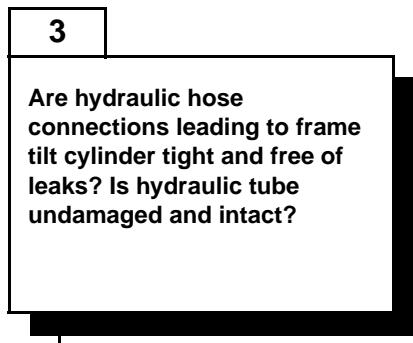
## 9. FRAME TILT CYLINDER DOES NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Hydraulic oil level OK.
POSSIBLE PROBLEMS
Frame tilt cylinder hydraulic hoses faulty. Frame tilt cylinder hose connections/tube faulty. Tandem gear pump faulty. Frame tilt/brakes relief valve faulty. Frame tilt valve faulty. Frame tilt cylinder faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic hoses are cracked, kinked, or pinched, hydraulic system will lose pressure.

KNOWN INFO
Hydraulic oil level OK.
POSSIBLE PROBLEMS
Frame tilt cylinder hydraulic hoses OK. Frame tilt cylinder hose connections/tube faulty. Tandem gear pump faulty. Frame tilt/brakes relief valve faulty. Frame tilt valve faulty. Frame tilt cylinder faulty.



TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic hose connections and tube are damaged or leaking, hydraulic system will lose pressure.

#### **HYDRAULIC HOSES VISUAL INSPECTION**

Visually inspect hydraulic hoses leading to frame tilt cylinder for cracks, kinks, or pinches.

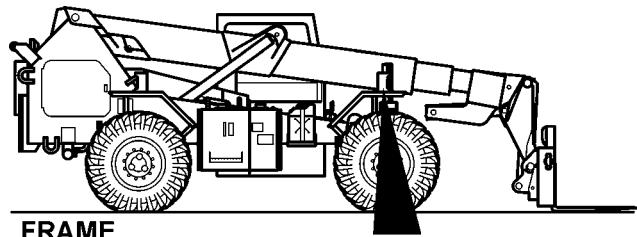
- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 18-25).

#### **HYDRAULIC HOSE CONNECTIONS/TUBE VISUAL INSPECTION**

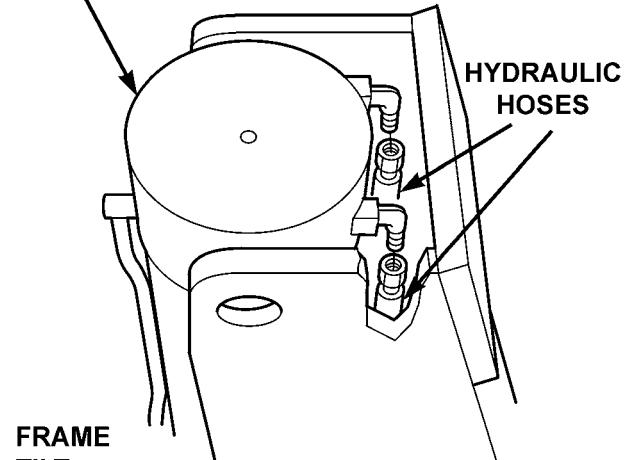
Visually inspect hydraulic hose connections leading to frame tilt cylinder for leaks.

Visually inspect hydraulic tube on cylinder housing.

- (a) If there are no leaks at hydraulic hose connections, and tube is not damaged, go to Step 4 of this fault.
- (b) If there are leaks at one or more connections, shut down engine (TM 10-3930-673-10) and tighten or replace connection(s) (Para 18-25). If tube is damaged, replace tube (Para 18-26).

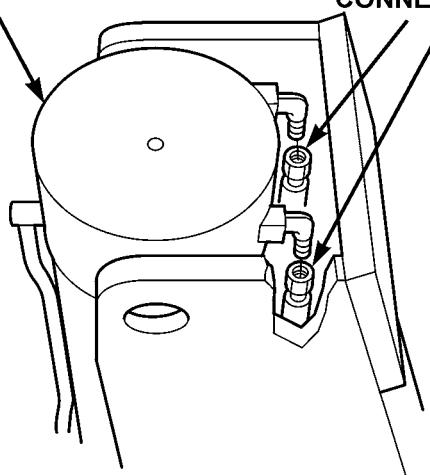


**FRAME  
TILT  
CYLINDER**



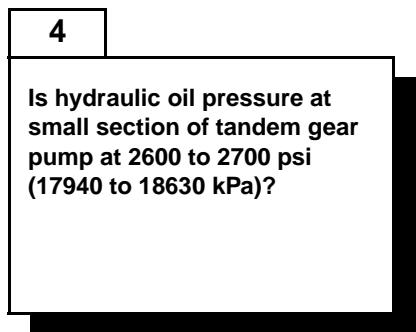
**FRAME  
TILT  
CYLINDER**

**HYDRAULIC  
CONNECTIONS**



## 9. FRAME TILT CYLINDER DOES NOT EXTEND OR RETRACT (CONT.).

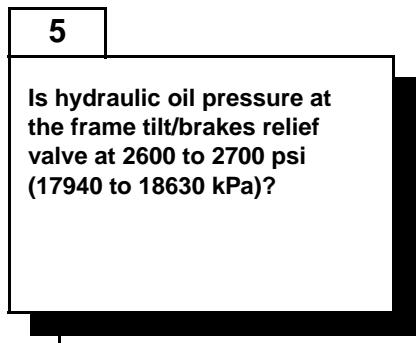
KNOWN INFO
Hydraulic oil level OK. Frame tilt cylinder hydraulic hoses OK. Frame tilt cylinder hose connections/tube OK.
POSSIBLE PROBLEMS
Tandem gear pump faulty. Frame tilt brakes relief valve faulty. Frame tilt valve faulty. Frame tilt cylinder faulty.



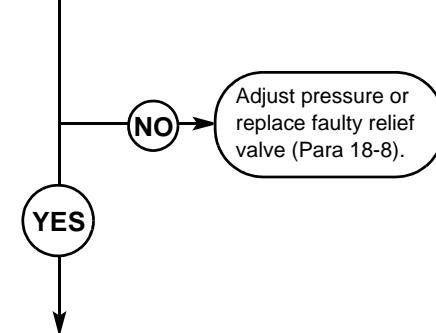
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), tandem gear pump is faulty.



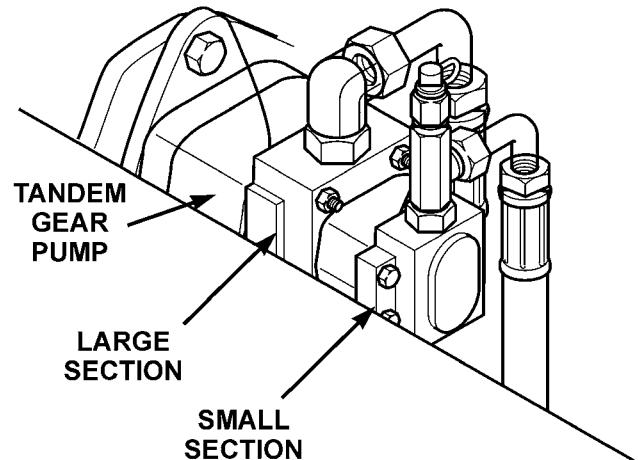
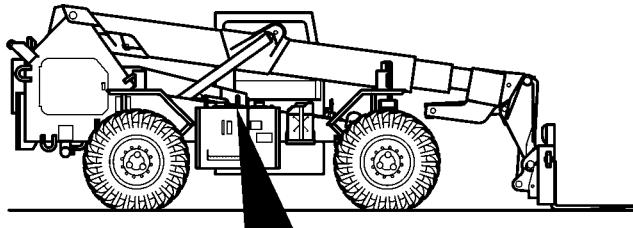
KNOWN INFO
Hydraulic oil level OK. Frame tilt cylinder hydraulic hoses OK. Frame tilt cylinder hose connections/tube OK. Tandem gear pump OK.
POSSIBLE PROBLEMS
Frame tilt brakes relief valve faulty. Frame tilt valve faulty. Frame tilt cylinder faulty.



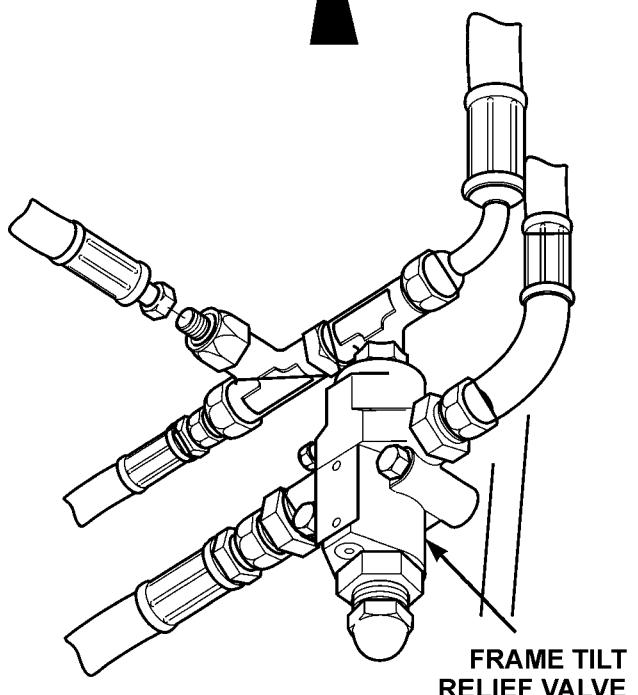
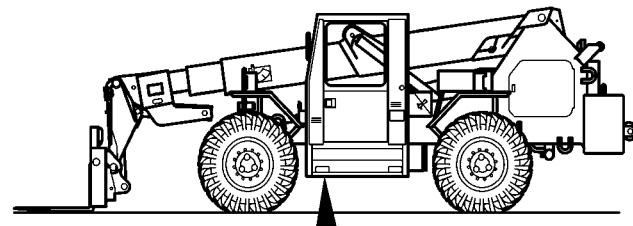
TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), relief valve is faulty.



<b>TANDEM GEAR PUMP PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on small section of tandem gear pump.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is at 2600 to 2700 psi (17927 to 18616 kPa), go to Step 5 of this fault.
(b)	If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), shut down engine (TM 10-3930-673-10) and test and replace tandem gear pump (Para 18-3).



<b>FRAME TILT/BRAKES RELIEF VALVE PRESSURE TEST</b>	
(1)	Install test tee on inlet line to frame tilt/brakes relief valve.
(2)	Connect 0 to 5000 psi (0 to 34475 kPa) pressure gage to test tee.
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 6 of this fault.
(b)	If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), go to Step (4) below.
(4)	If valve is not damaged, adjust relief pressure to specified psi and remove pressure gage and test tee.
(a)	If hydraulic oil pressure is adjusted to specified psi, go to Step 6 of this fault.
(b)	If hydraulic oil pressure cannot be adjusted, replace relief valve (Para 18-8).



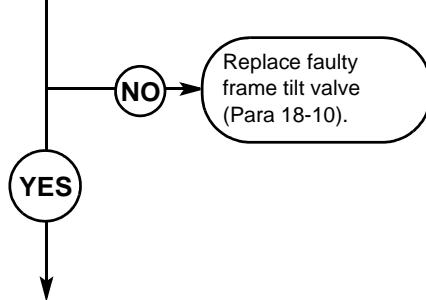
## 9. FRAME TILT CYLINDER DOES NOT EXTEND OR RETRACT (CONT.).

KNOWN INFO
Hydraulic oil level OK. Frame tilt cylinder hydraulic hoses OK. Frame tilt cylinder hose connections/tube OK. Tandem gear pump OK. Frame tilt brakes relief valve OK.
POSSIBLE PROBLEMS
Frame tilt valve faulty. Frame tilt cylinder faulty.

**6**

Is hydraulic oil at 2600 to 2700 psi (17940 to 18630 kPa)?

TEST OPTIONS
Pressure test. STE/ICE-R #51.
REASON FOR QUESTION
If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), frame tilt valve is faulty.

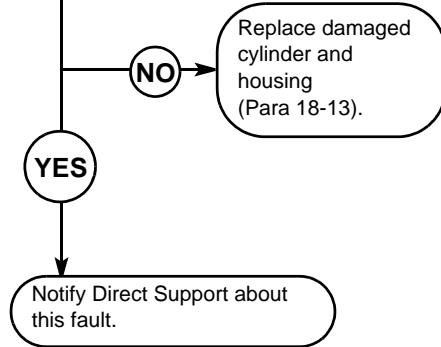


KNOWN INFO
Hydraulic oil level OK. Frame tilt cylinder hydraulic hoses OK. Frame tilt cylinder hose connections/tube OK. Tandem gear pump OK. Frame tilt brakes relief valve OK. Frame tilt valve OK.
POSSIBLE PROBLEMS
Frame tilt cylinder faulty.

**7**

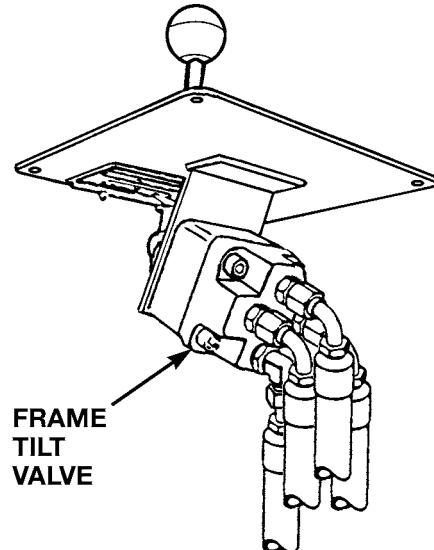
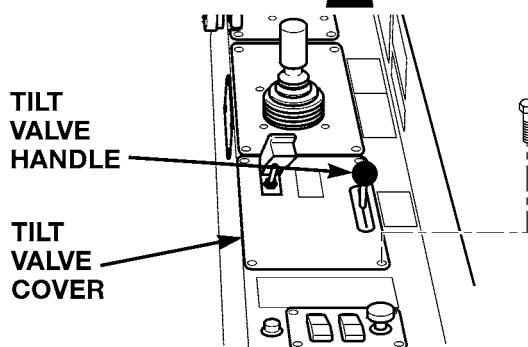
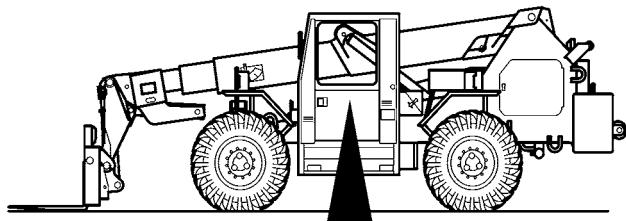
Is frame tilt cylinder and its housing free from signs of damage?

TEST OPTIONS
Visual inspection. STE/ICE-R #51.
REASON FOR QUESTION
If frame tilt cylinder and its housing is damaged, cylinder will not function.

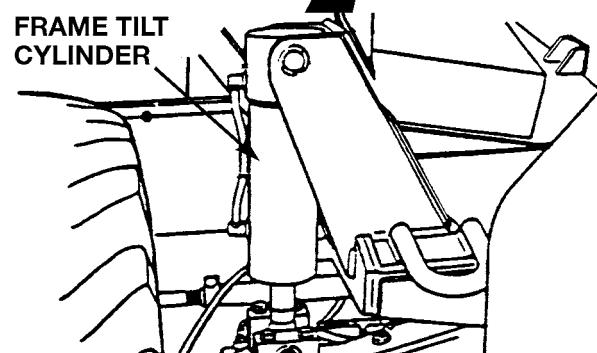
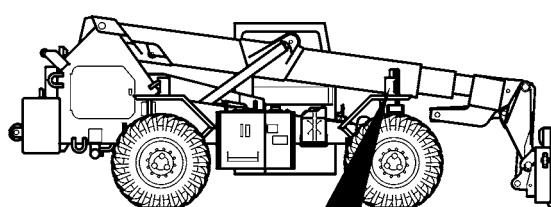


**FRAME TILT VALVE  
PRESSURE TEST**

- (1) Remove cover from diagnostic coupler.
- (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
- (3) Read output pressure on test device.
  - (a) If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 7 of this fault.
  - (b) If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), shut down engine (TM 10-3930-673-10) and replace frame tilt valve.


**FRAME TILT CYLINDER  
VISUAL INSPECTION**

- Visually inspect frame tilt cylinder and its housing for signs of damage.
- (a) If frame tilt cylinder and/or its housing are not damaged, notify Direct Support about this fault.
  - (b) If frame tilt cylinder and/or its housing are damaged, shut down engine (TM 10-3930-673-10) and replace cylinder and/or its housing (Para 18-13).



**10. BRAKE ACTUATORS (LEFT AND/OR RIGHT REAR AND LEFT AND/OR RIGHT FRONT) DO NOT OPERATE CORRECTLY.**

**INITIAL SETUP**

*Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)  
STE/ICE-R (Item 17, Appendix F)

*Personnel Required*

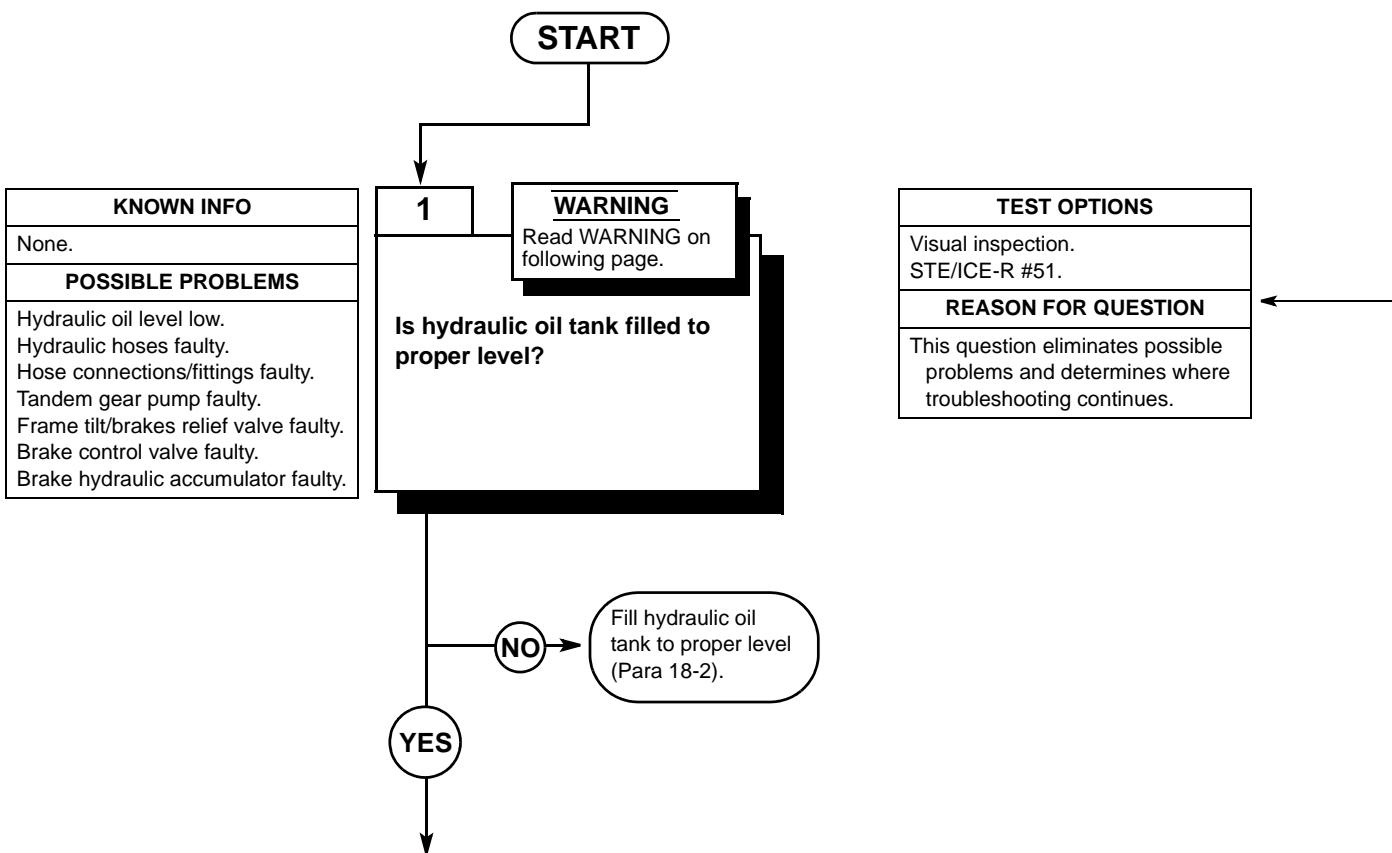
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine running (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



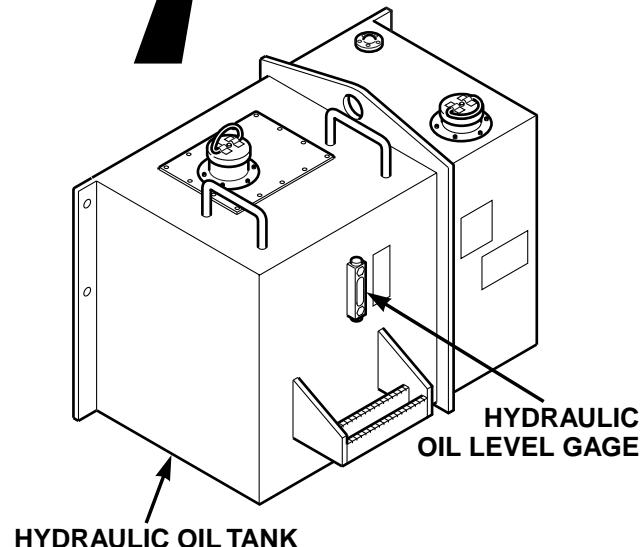
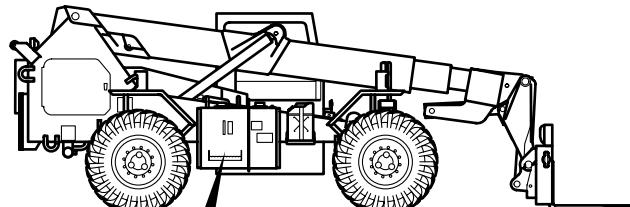
**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

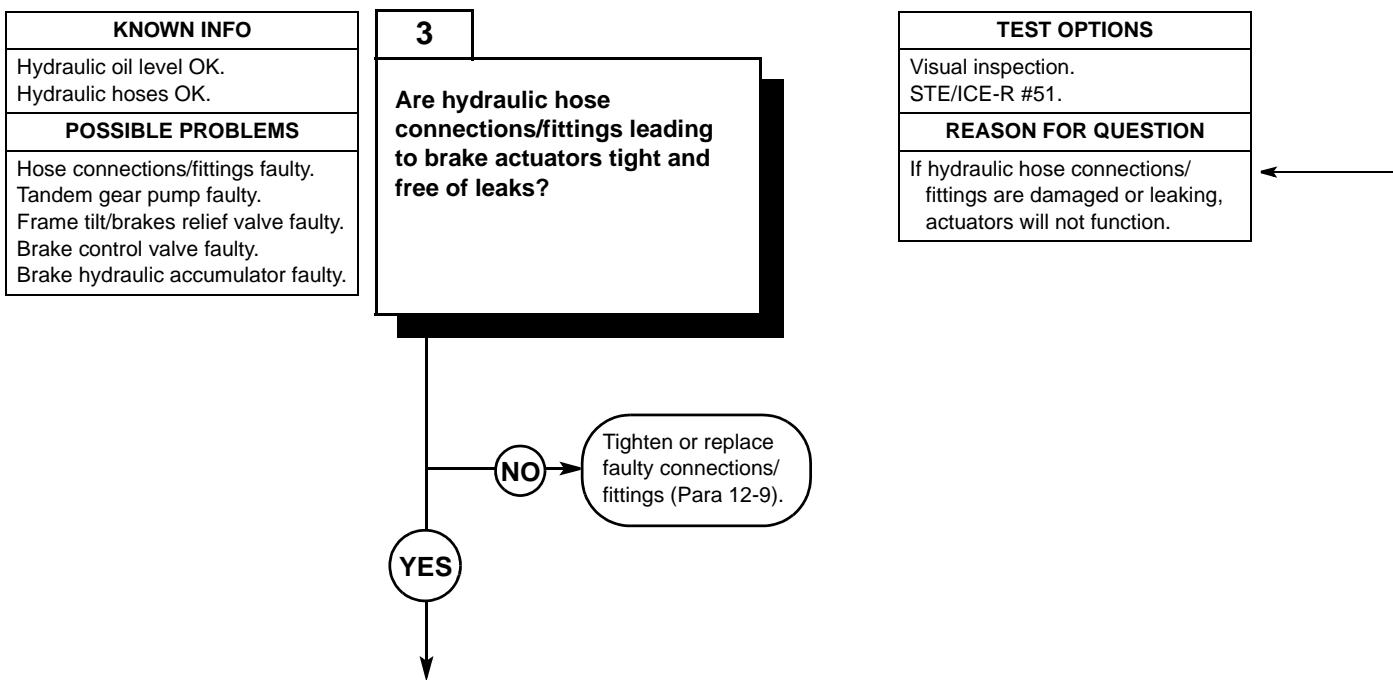
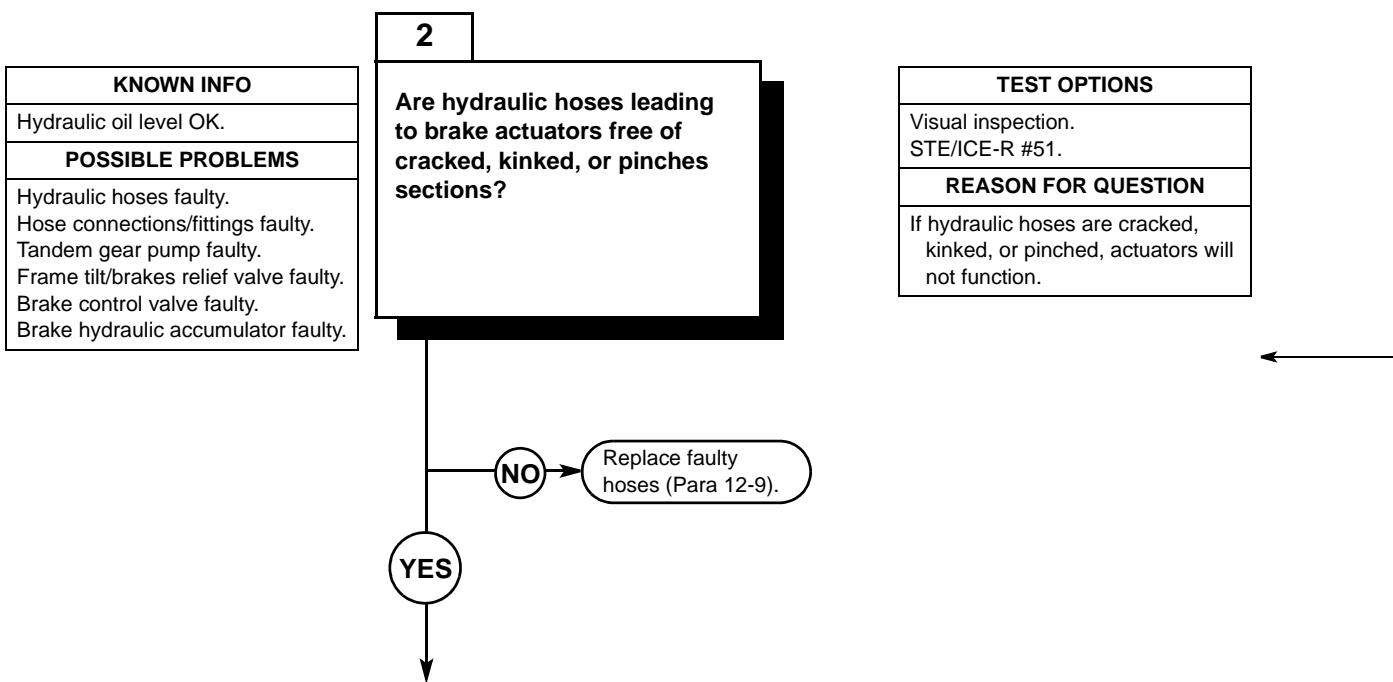
**CAUTION**

Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

HYDRAULIC OIL LEVEL VISUAL INSPECTION	
(1)	Visually inspect hydraulic oil level gage to determine if tank is filled to proper level.
(2)	Hydraulic oil should be visible between ADD and FULL marks.
(a)	If hydraulic oil is visible between ADD and FULL marks, go to Step 2.
(b)	If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).



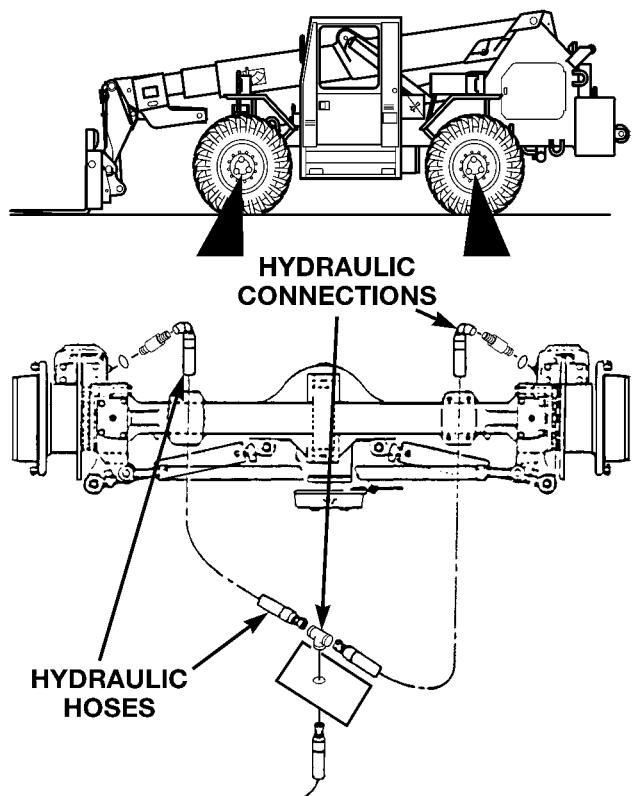
**10. BRAKE ACTUATORS (LEFT AND/OR RIGHT REAR AND LEFT AND/OR RIGHT FRONT) DO NOT OPERATE CORRECTLY (CONT).**



### **HYDRAULIC HOSES VISUAL INSPECTION**

Visually inspect hydraulic hoses leading to brake actuators for cracks, kinks, or pinches.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, shut down engine (TM 10-3930-673-10) and replace hose(s) (Para 12-9).

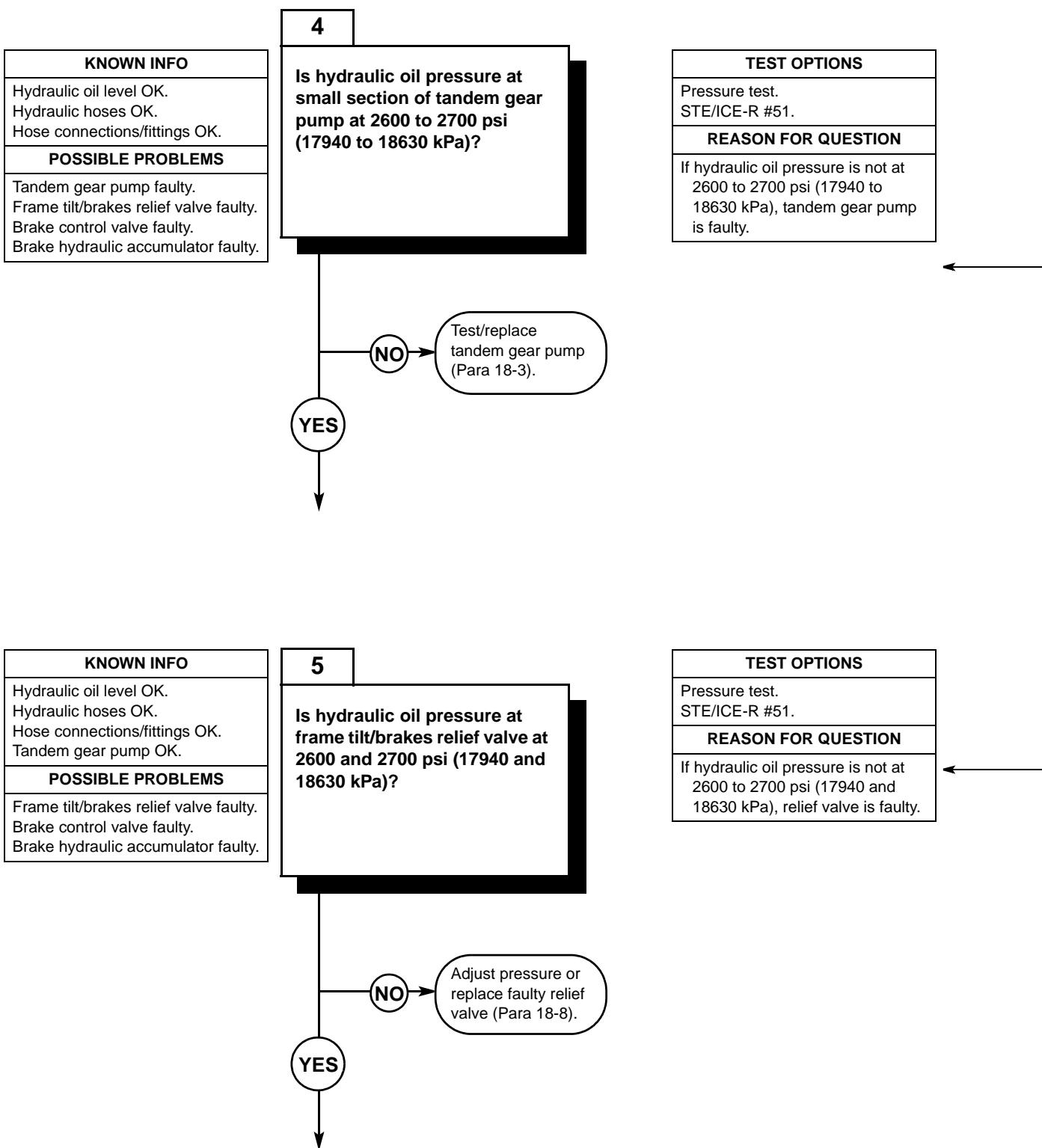


### **HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION**

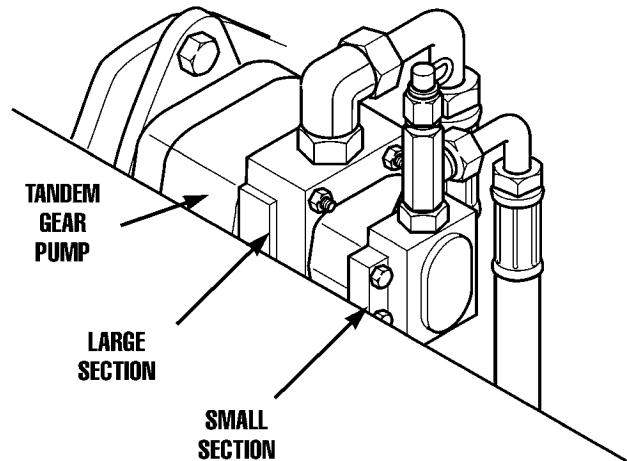
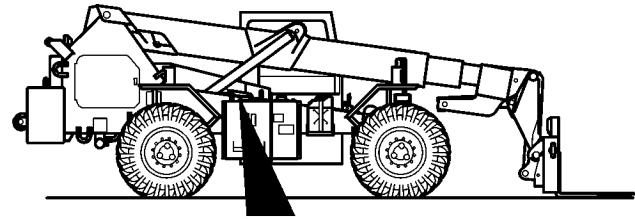
Visually inspect hydraulic hose connections/ fittings leading to brake actuators for leaks.

- (a) If there are no leaks at hydraulic hose connections/fittings, go to Step 4 of this fault.
- (b) If there are leaks at one or more of connections/fittings, shut down engine (TM 10-3930-673-10) and tighten or replace connections/ fittings (Para 12-9).

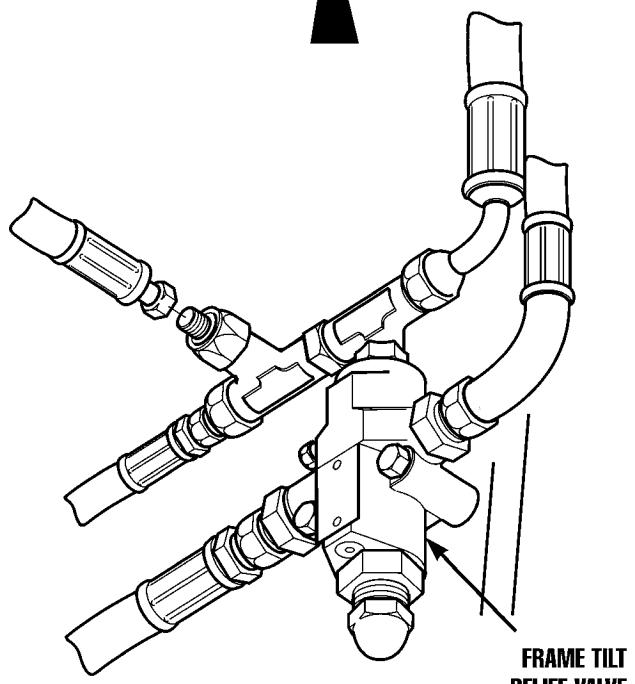
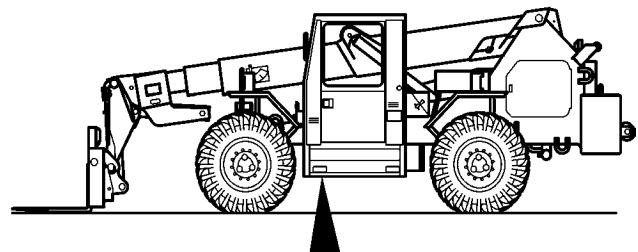
**10. BRAKE ACTUATORS (LEFT AND/OR RIGHT REAR AND LEFT AND/OR RIGHT FRONT) DO NOT OPERATE CORRECTLY (CONT).**



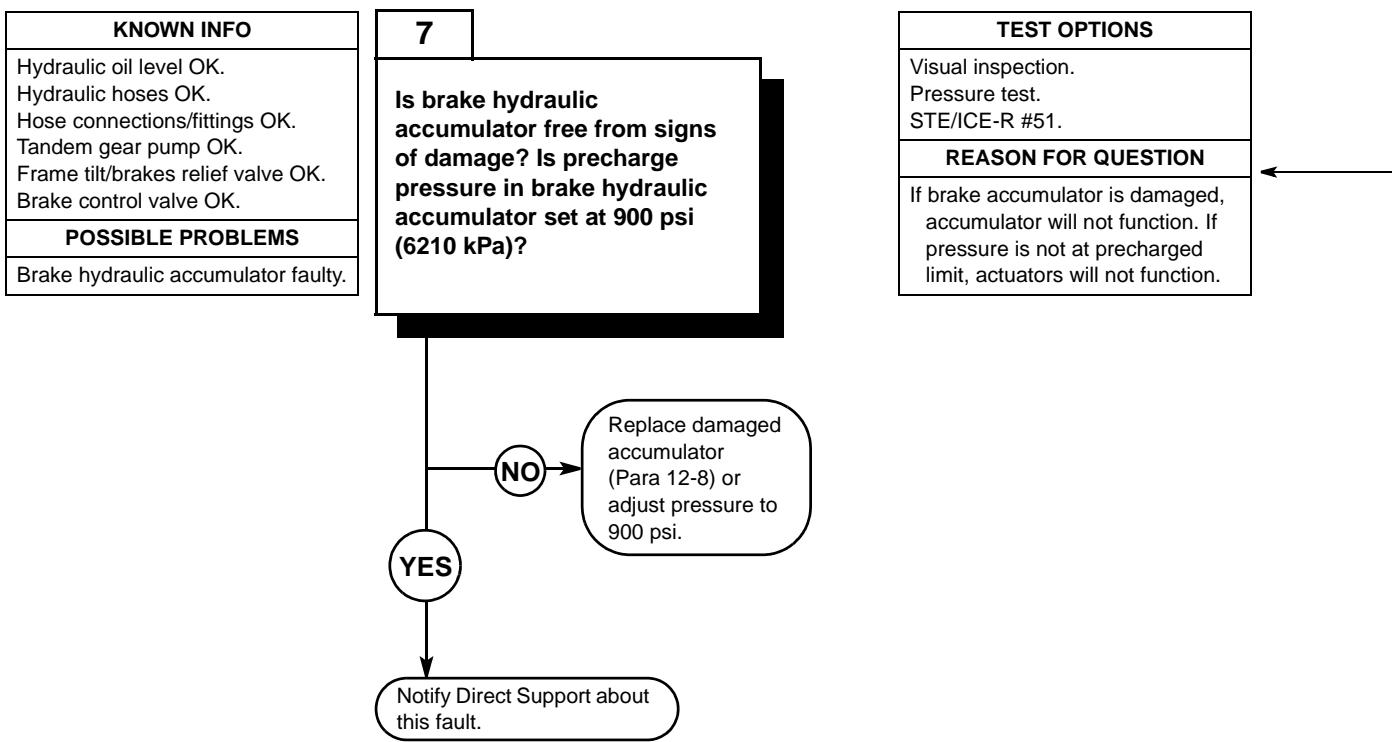
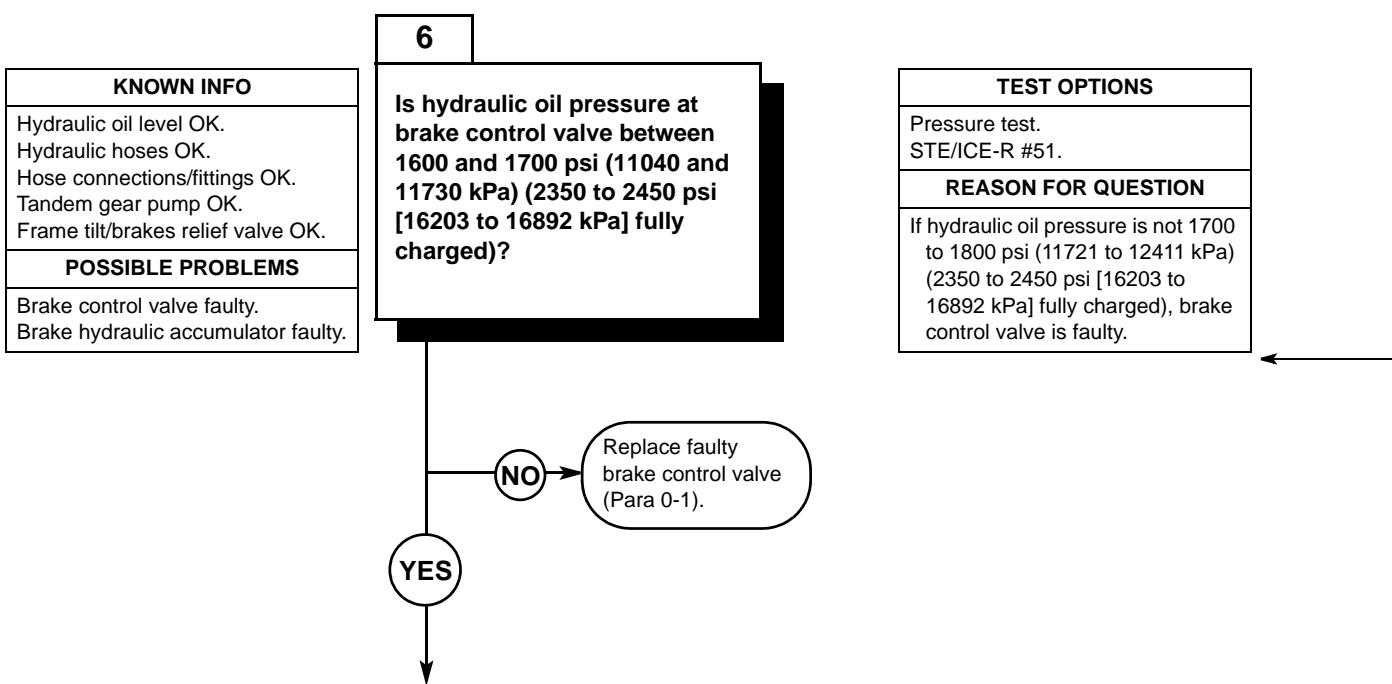
<b>TANDEM GEAR PUMP PRESSURE TEST</b>	
(1)	Remove cover from diagnostic coupler on small section of tandem gear pump.
(2)	Perform STE/ICE Test #51 (TM 9-4910-571-12&P).
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is at 2600 to 2700 psi (17940 to 18630 kPa), go to Step 5 of this fault.
(b)	If hydraulic oil pressure is not at 2600 to 2700 psi (17940 to 18630 kPa), shut down engine (TM 10-3930-673-10) and test (small section) and replace tandem gear pump (Para 18-3).



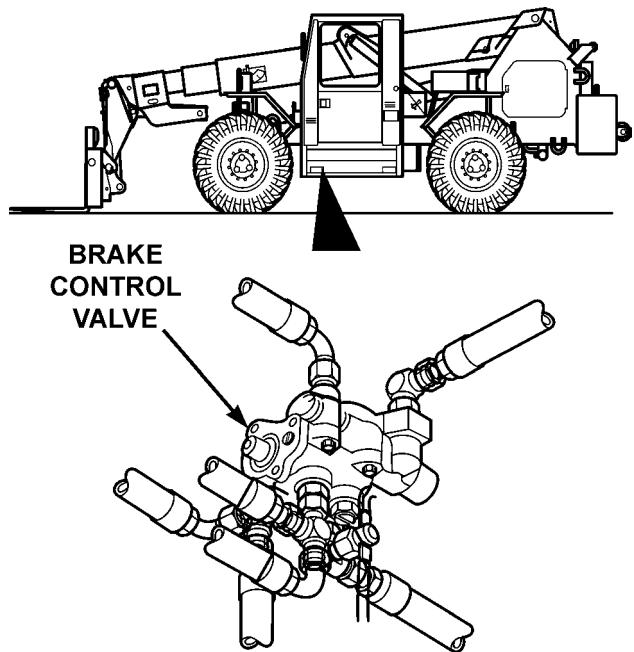
<b>FRAME TILT/BRAKES RELIEF VALVE PRESSURE TEST</b>	
(1)	Install a test tee on inlet line to frame tilt brakes relief valve.
(2)	Connect a 0 to 5000 psi (0 to 34475 kPa) pressure gage to test tee.
(3)	Read output pressure on test device.
(a)	If hydraulic oil pressure is between 2350 to 2450 psi (16215 to 16905 kPa), go to Step 6 of this fault.
(b)	If hydraulic oil pressure is not between 2350 to 2450 psi (16215 to 16905 kPa), go to Step (4) below.
(4)	If valve is not damaged, adjust relief pressure to specified psi and remove pressure gage and test tee.
(a)	If hydraulic oil pressure is adjusted to specified psi, go to Step 6 of this fault.
(b)	If hydraulic oil pressure cannot be adjusted, replace relief valve (Para 18-8).



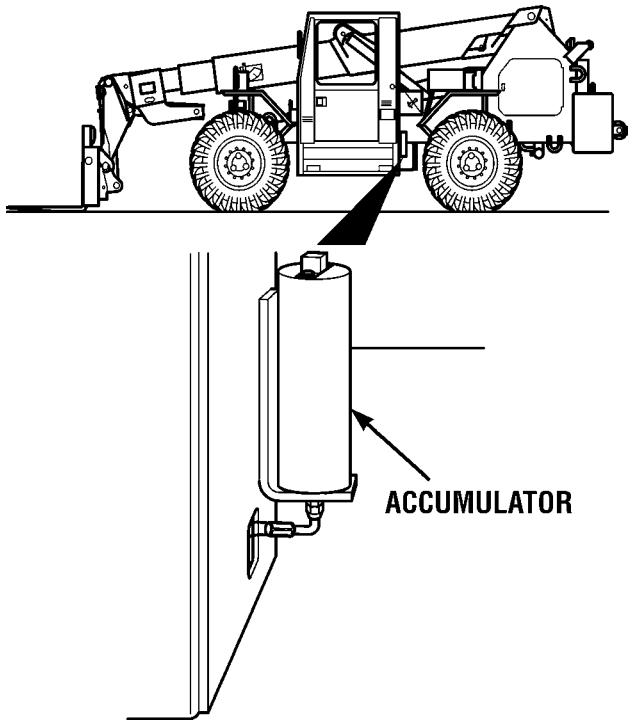
**10. BRAKE ACTUATORS (LEFT AND/OR RIGHT REAR AND LEFT AND/OR RIGHT FRONT) DO NOT OPERATE CORRECTLY (CONT).**



<b>FRAME TILT VALVE PRESSURE TEST</b>	
(1) Remove cover from diagnostic coupler on brake control valve. (2) Perform STE/ICE Test #51 (TM 9-4910-571-12&P). (3) Read output pressure on test device. (a) If hydraulic oil pressure is at 1600 and 1700 psi (11040 and 11730 kPa) (2350 to 2450 psi [16203 to 16892 kPa] fully charged), go to Step 7 of this fault. (b) If hydraulic oil pressure is not at 1600 and 1700 psi (11040 and 11730 kPa) (2350 to 2450 psi [16203 to 16892 kPa] fully charged), shut down engine (TM 10-3930-673-10) and replace brake control valve (Para 0-1).	<b>NOTE</b> Adjust accumulator charging pressure at brake control valve to 1650 ±25 psi.



<b>HYDRAULIC ACCUMULATOR VISUAL INSPECTION/PRESSURE TEST</b>	
(1) Visually inspect brake hydraulic accumulator for signs of damage. (a) If brake hydraulic accumulator is not damaged, go to Step (2) below. (b) If brake hydraulic accumulator is damaged, replace accumulator (Para 12-8). (2) Shut down engine (TM 10-3930-673-10) and remove brake hydraulic accumulator (Para 12-8) and test precharge pressure in accumulator. (a) If precharge pressure in accumulator is at 900 psi (6210 kPa), reinstall accumulator (Para 12-8). (b) If precharge pressure in accumulator is less than 900 psi (6210 kPa), add nitrogen; if pressure is greater than 900 psi (6210 kPa), bleed nitrogen from accumulator. Reinstall accumulator (Para 12-8).	



**11. EMERGENCY STEERING PUMP DOES NOT OPERATE.****INITIAL SETUP***Tools and Special Tools*

Tool Kit, General Mechanics: Automotive  
(Item 18, Appendix F)

*Personnel Required*

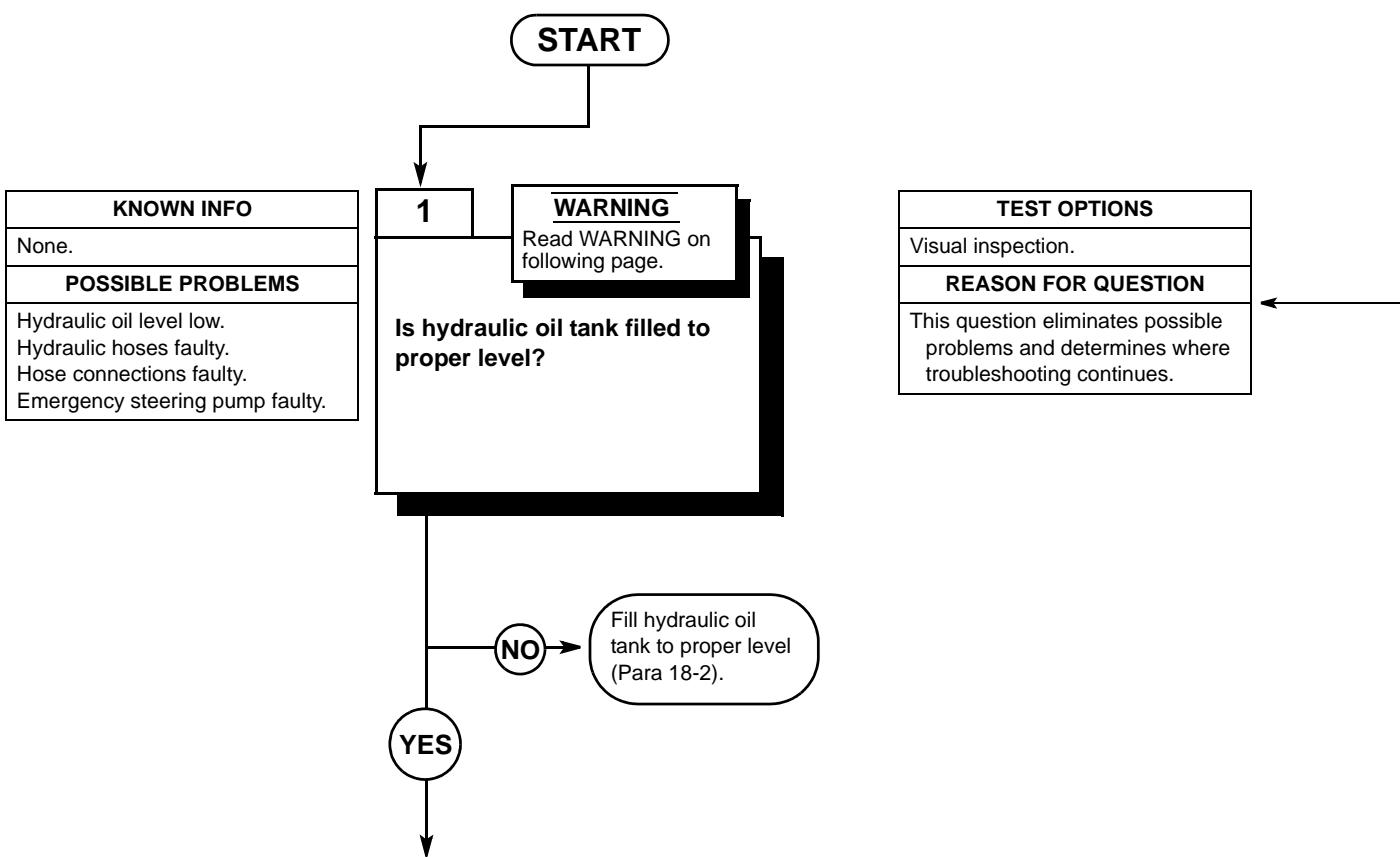
Two

*References*

TM 10-3930-673-10  
TM 9-4910-571-12&P

*Equipment Condition*

Engine shut down (TM 10-3930-673-10)  
Parking brake on (TM 10-3930-673-10)  
Wheels chocked (TM 10-3930-673-10)



**WARNING**

- Hydraulic oil in system can be under pressures over 3000 psi (20685 kPa) with engine OFF. Always relieve pressure in hydraulic lines before attempting to remove any component in hydraulic system. With engine OFF, starter switch in RUN position, and MLRS attachment on ground, move control levers through all operating positions several times to relieve live pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.
- At operating temperatures, hydraulic oil is hot and under pressure. Hot oil is hot and under pressure. Hot oil can cause injuries. Allow hydraulic oil to cool before disconnecting any hydraulic lines.

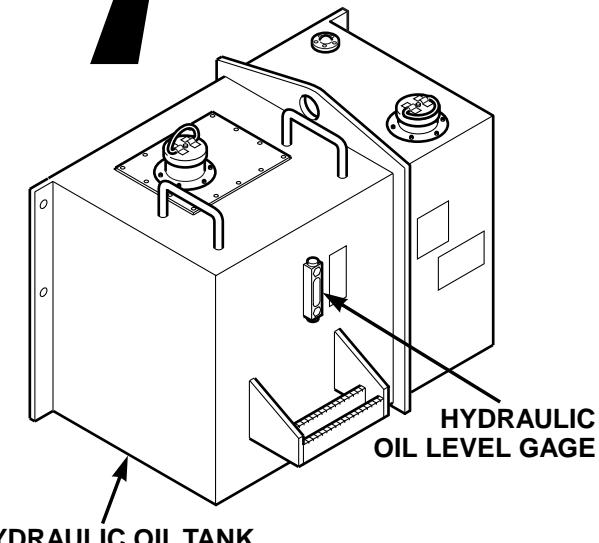
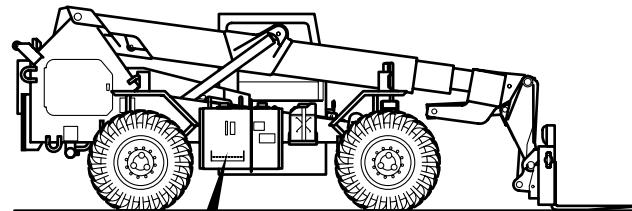
**CAUTION**

Wipe area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of hydraulic system could result in premature failure.

<b>HYDRAULIC OIL LEVEL VISUAL INSPECTION</b>	
(1) Visually inspect hydraulic oil level gage to determine if tank is filled to proper level.	

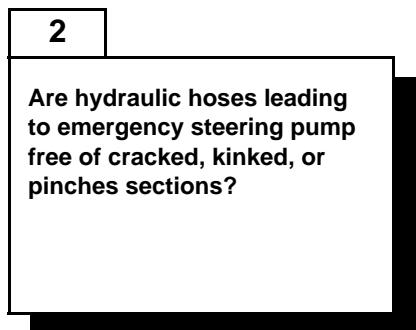
(2) Hydraulic oil should be visible between ADD and FULL marks.

- If hydraulic oil is visible between ADD and FULL marks, go to Step 2 of the fault.
- If hydraulic oil is not visible, inspect tank for leaks. Then fill tank to FULL mark with hydraulic oil (Para 18-2).



## 11. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).

KNOWN INFO
Hydraulic oil level OK.
POSSIBLE PROBLEMS
Hydraulic hoses faulty. Hose connections faulty. Emergency steering pump faulty.



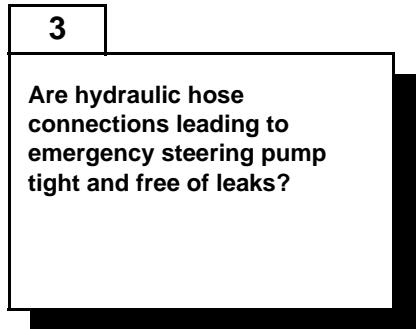
TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If hydraulic hoses are cracked, kinked, or pinched, emergency steering pump will not function.



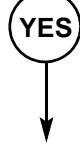
Replace faulty hoses (Para 14-6)..



KNOWN INFO
Hydraulic oil level OK.
Hydraulic hoses OK.
POSSIBLE PROBLEMS
Hose connections faulty. Emergency steering pump faulty.



TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
If hydraulic hose connections are damaged or leaking, hydraulic system will lose pressure.

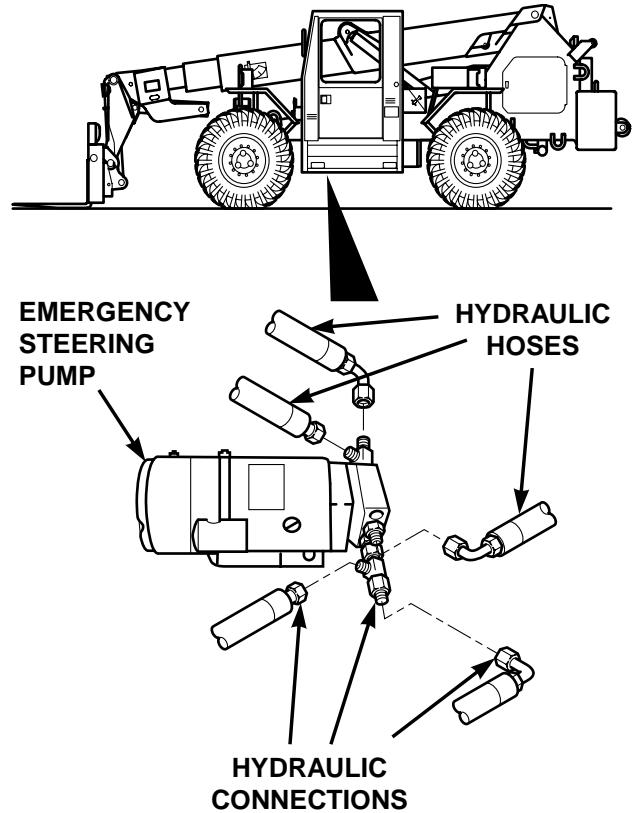


Tighten or replace faulty connections/ fittings (Para 14-6).

#### HYDRAULIC HOSES VISUAL INSPECTION

Visually inspect hydraulic hoses leading to emergency steering pump for cracks, kinks, or pinches.

- (a) If there are no cracks, kinks, or pinches in hydraulic hoses, go to Step 3 of this fault.
- (b) If there are cracks, kinks, or pinches in one or more of hydraulic hoses, replace hose(s) (Para 14-6).

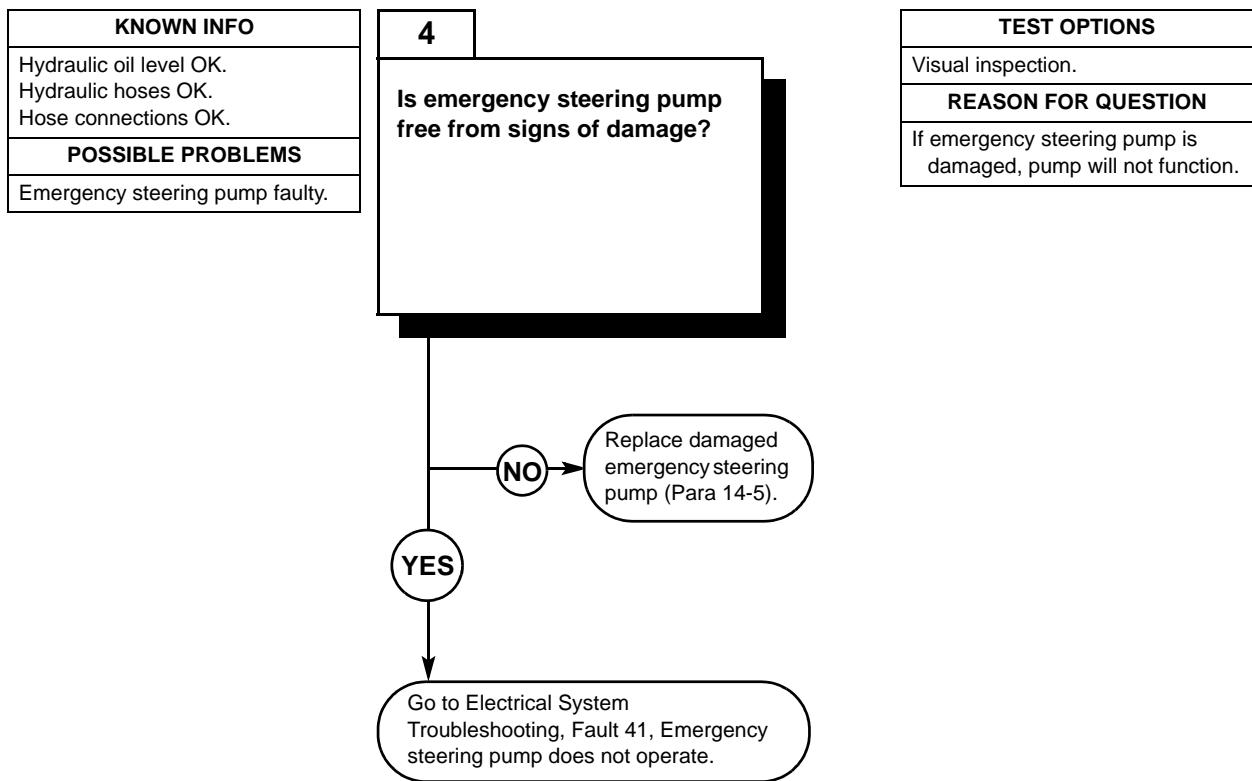


#### HYDRAULIC HOSE CONNECTIONS VISUAL INSPECTION

Visually inspect hydraulic hose connections leading to emergency steering pump for leaks.

- (a) If there are no leaks at hydraulic hose connections, go to Step 4 of this fault.
- (b) If there are leaks at one or more of connections/fittings, tighten or replace connections/fittings (Para 14-6).

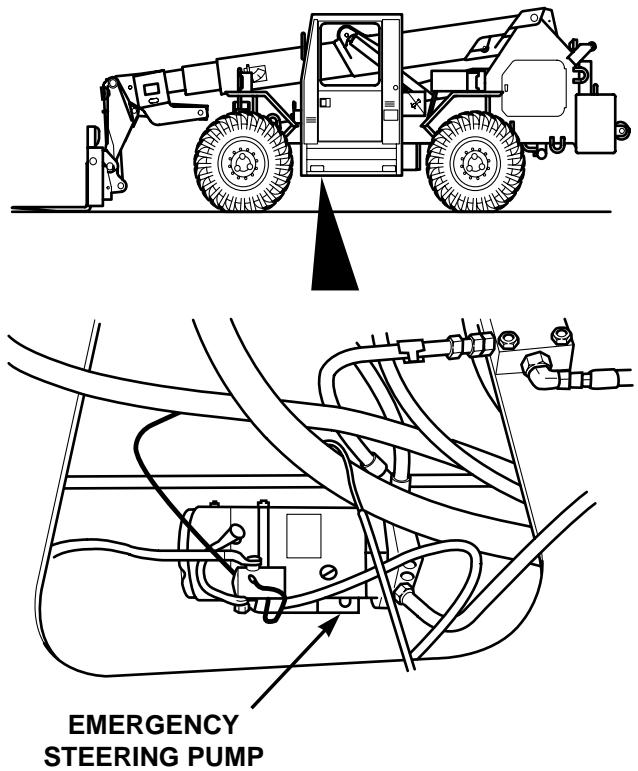
## 11. EMERGENCY STEERING PUMP DOES NOT OPERATE (CONT).



**EMERGENCY STEERING PUMP  
VISUAL INSPECTION**

Visually inspect emergency steering pump for signs of damage.

- (a) If emergency steering pump is not damaged, go to Fault 41.  
Emergency steering pump does not operate.
- (b) If emergency steering pump is damaged, replace pump  
(Para 14-5).





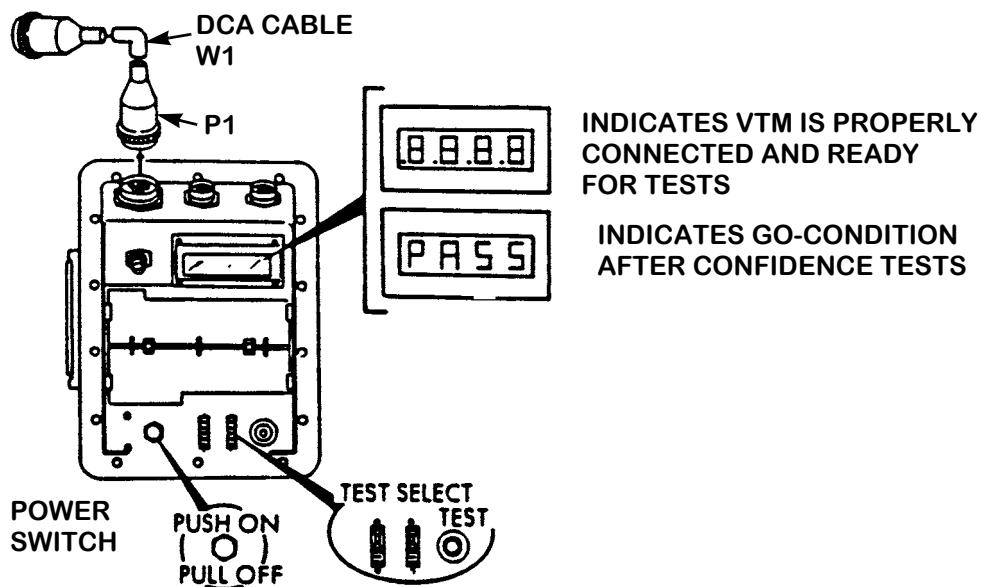
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK

STE-ICE-R GO-Chain Testing Sequence

The following GO-Chain tests are made using vehicle DCA connector. All tests must be performed sequentially. The following is a summary of each test.

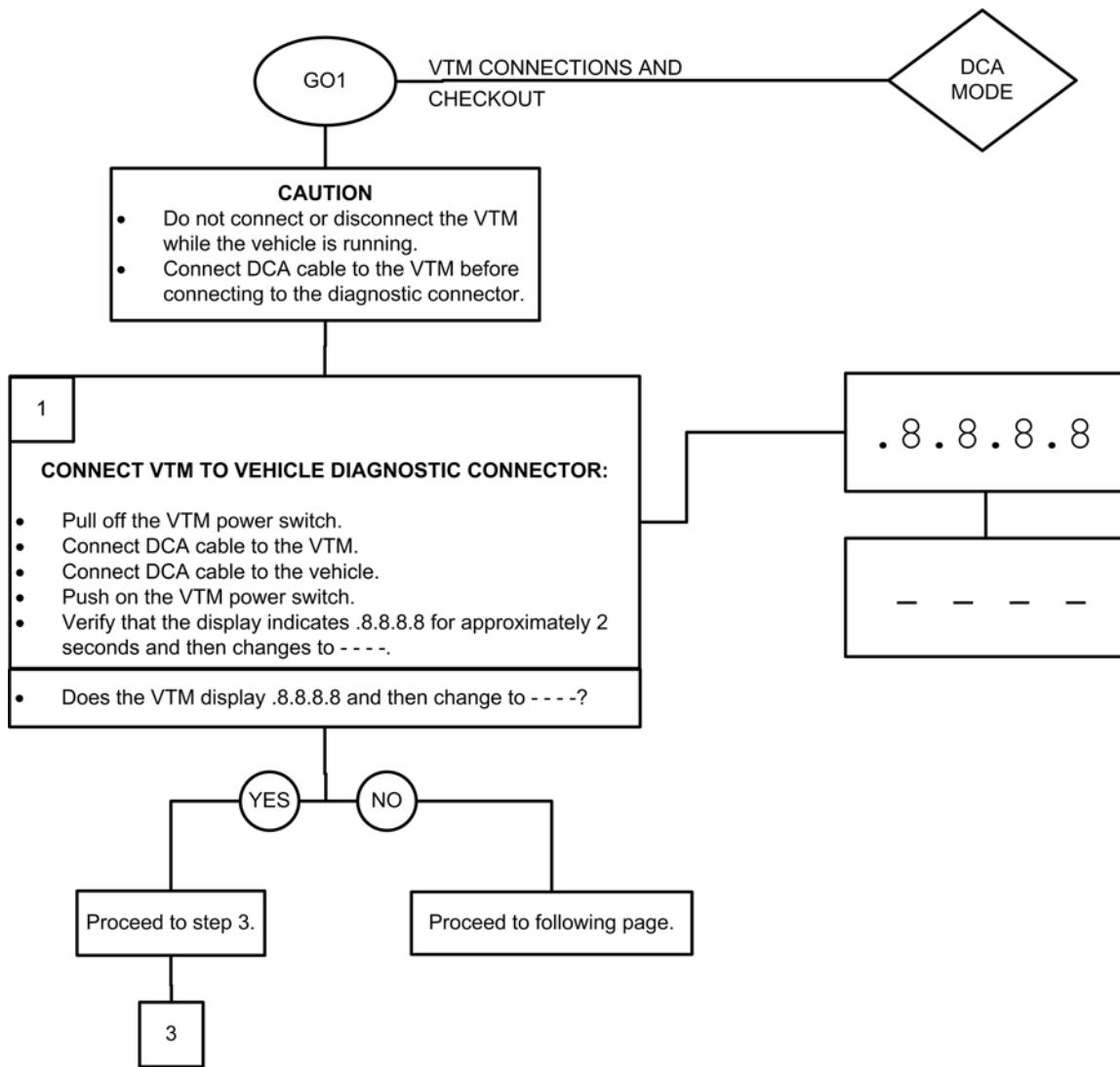
For normal readings, see vehicle test card, page 2-912.

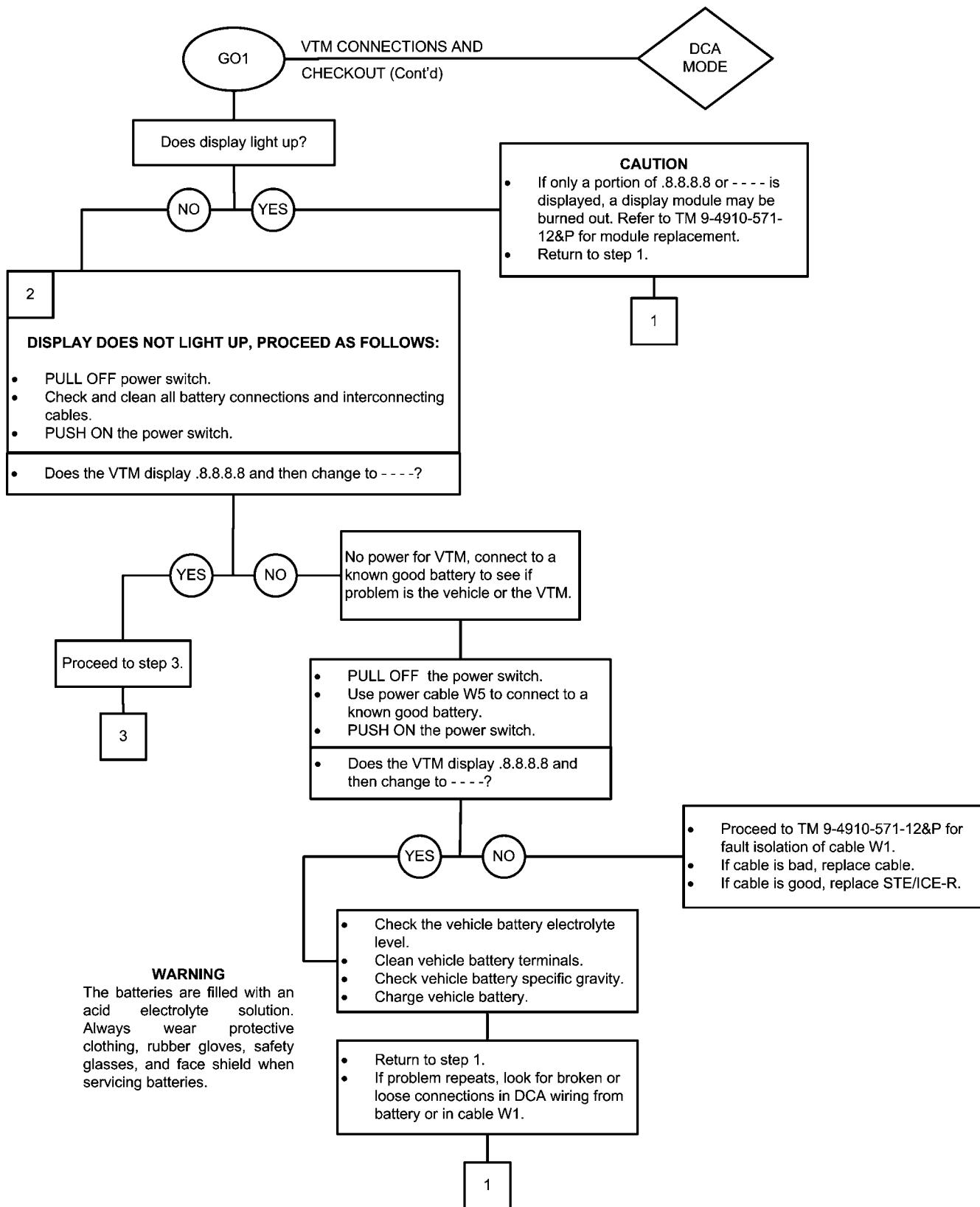
GO TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
GO1	DCA	VTM Connection and Checkout	2-866
GO2	DCA	First Peak Test-Starter Current	2-870
GO3	DCA	Vehicle Gauges Check	2-872
GO4	DCA	Vehicle Voltmeter	2-875
GO5	DCA	Engine Temperature and Pressure Checks	2-876
GO6	DCA	Engine Idle Speed Check	2-878
GO7	DCA	Battery Voltage Check	2-879
GO8	DCA-TK	Engine Oil Pressure Test	2-880
GO9	DCA	Engine Power Test	2-882
G10	DCA-TK	Transmission Oil Pressure Test	2-883
G11	DCA-TK	Transmission Clutch Pressure Test	2-885
G12	DCA-TK	Transmission Converter Charge Pressure Test	2-887
G13	DCA-TK	Transmission Brake Cutoff Valve Pressure Test	2-889
G14	DCA-TK	Fuel Return Line Pressure Test	2-891



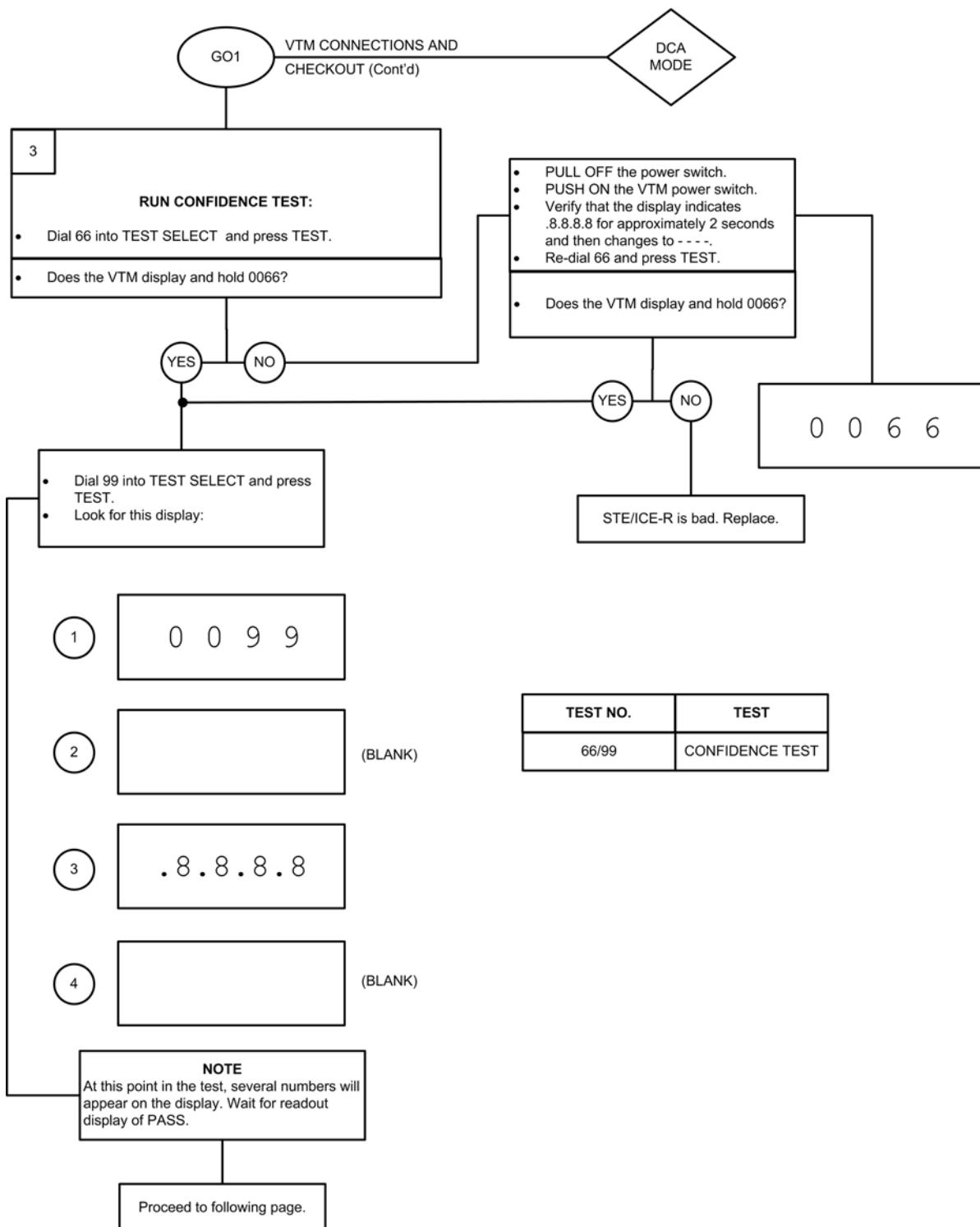
**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)****NOTE**

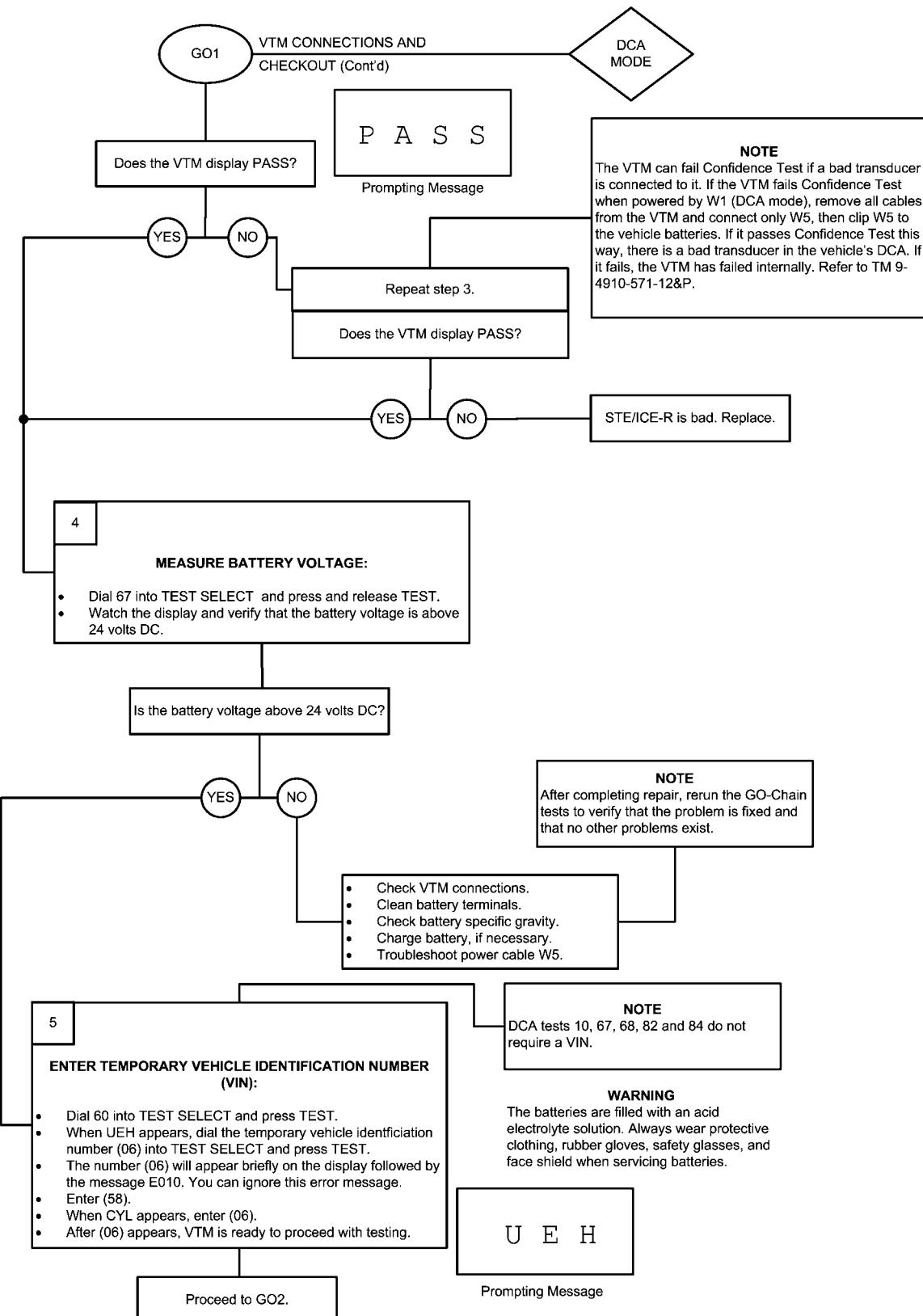
Perform all GO steps until a NO-GO condition exists, then perform the NO-GO step indicated.



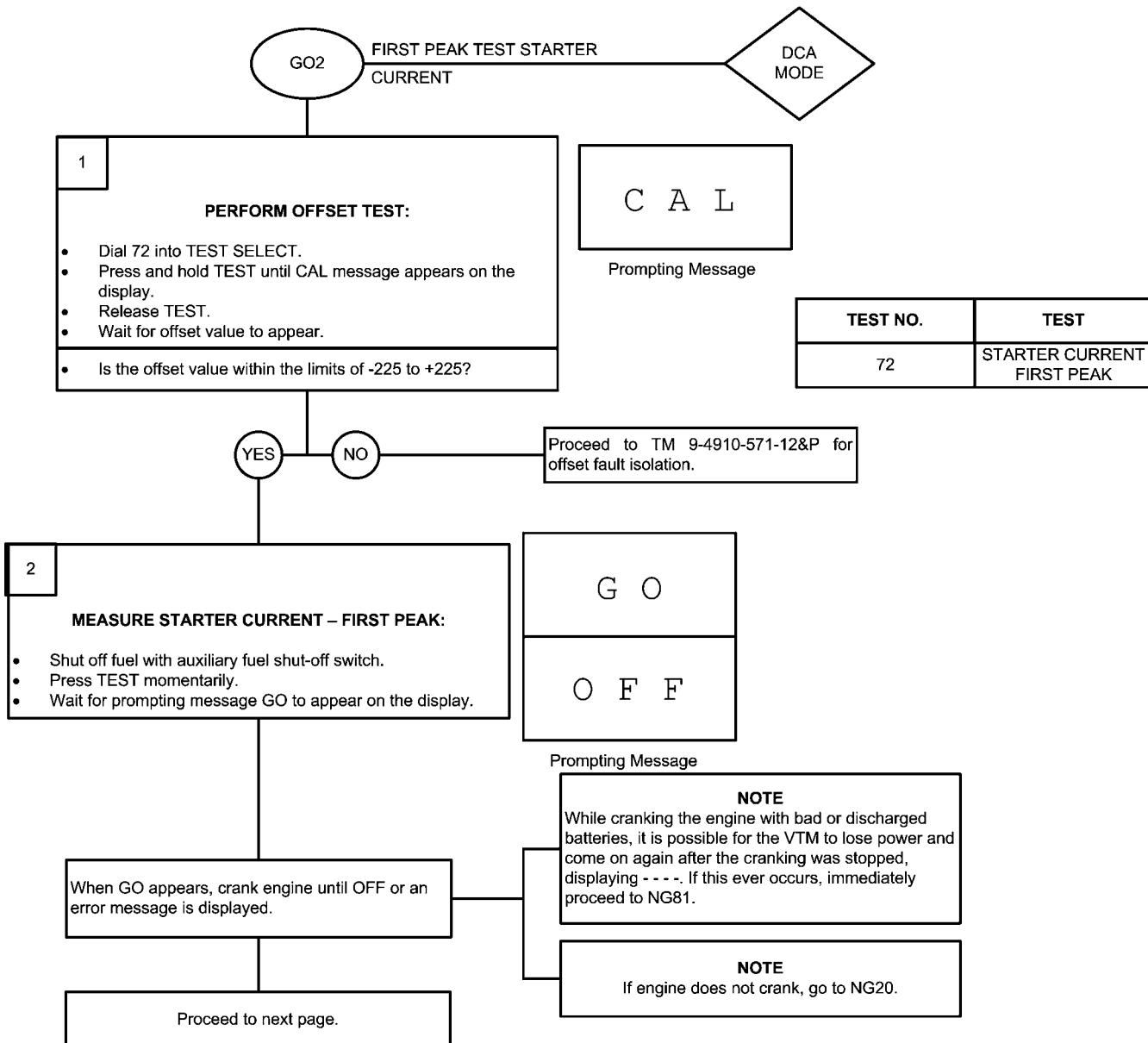


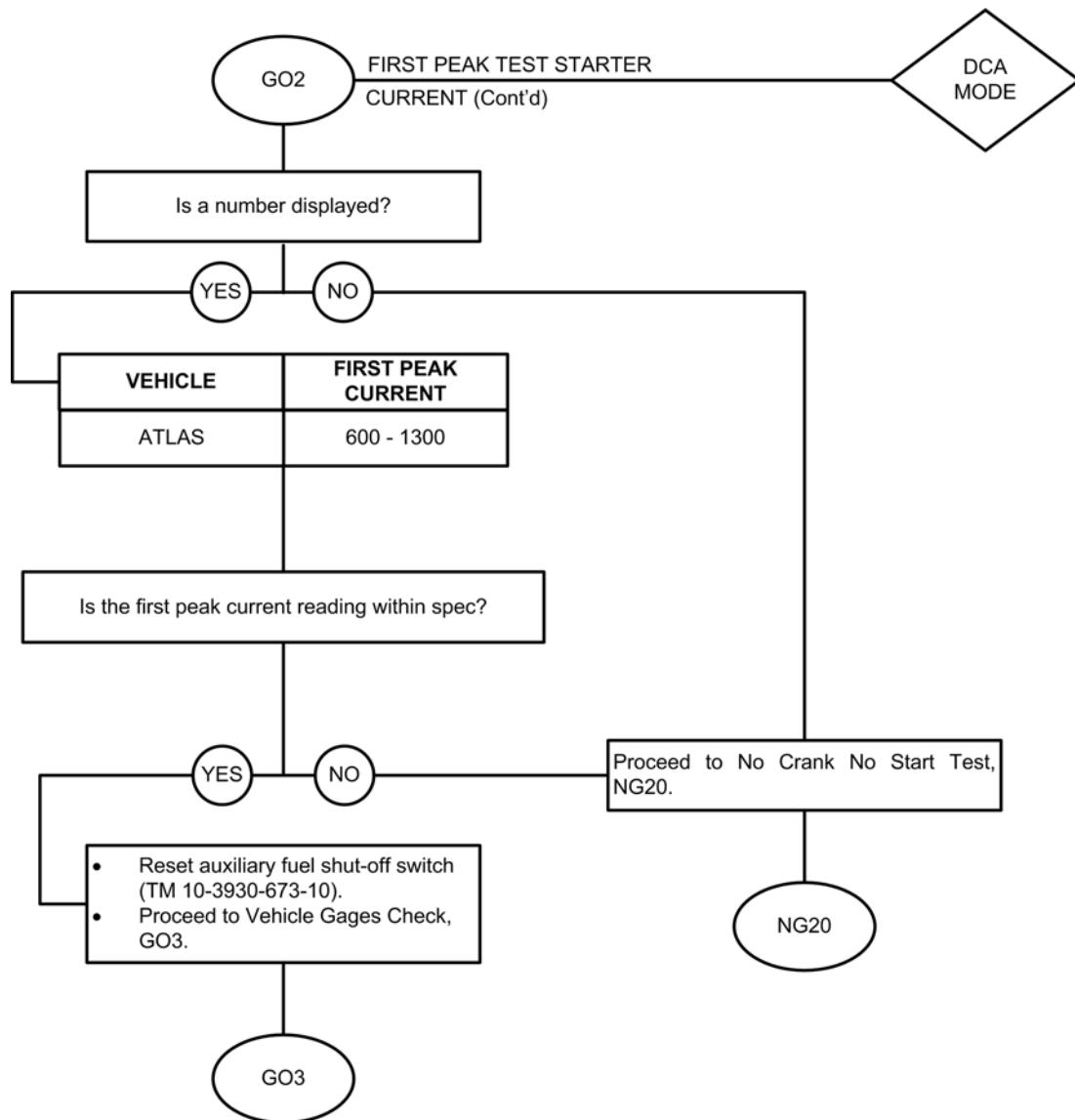
## **2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**



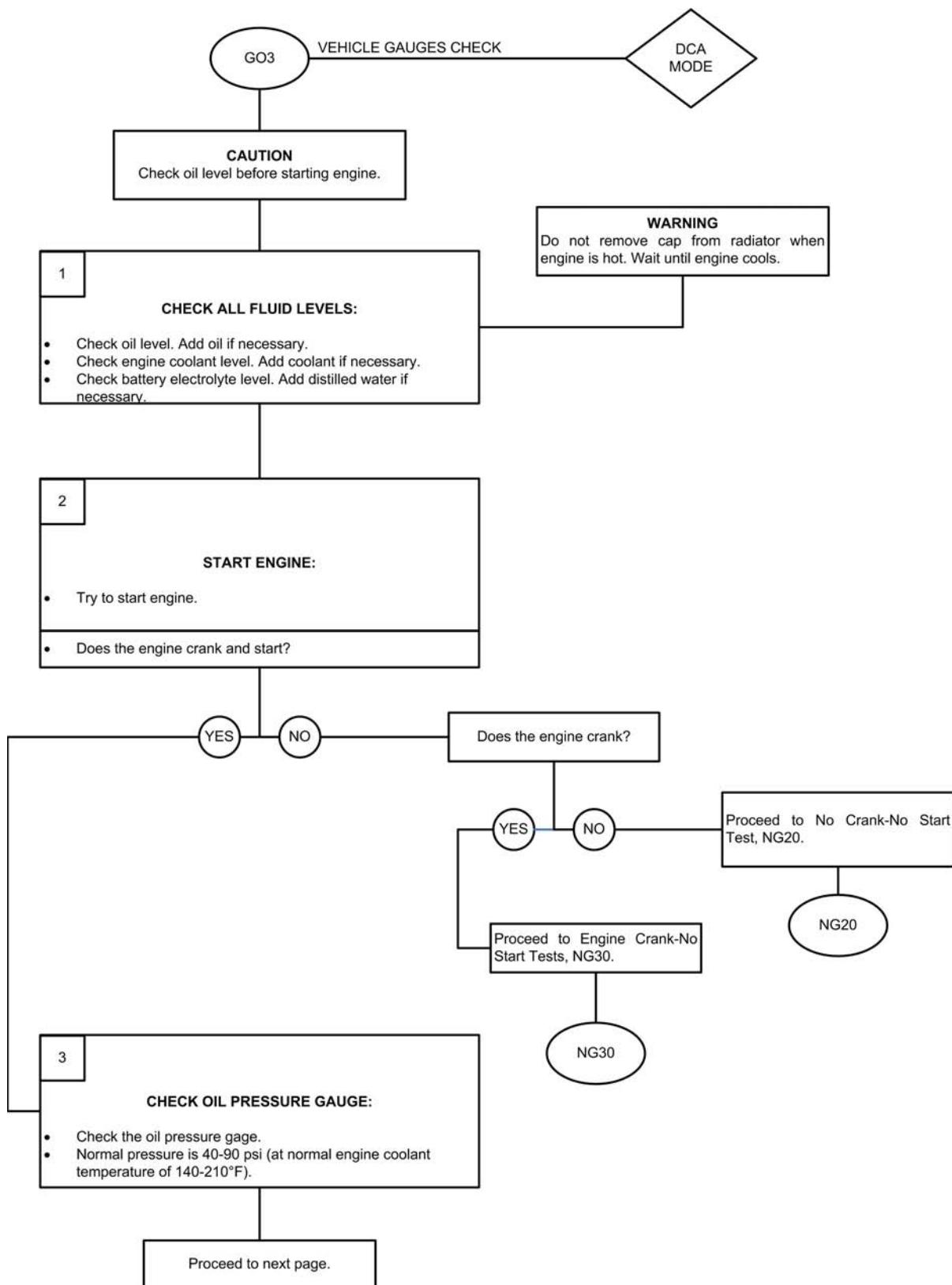


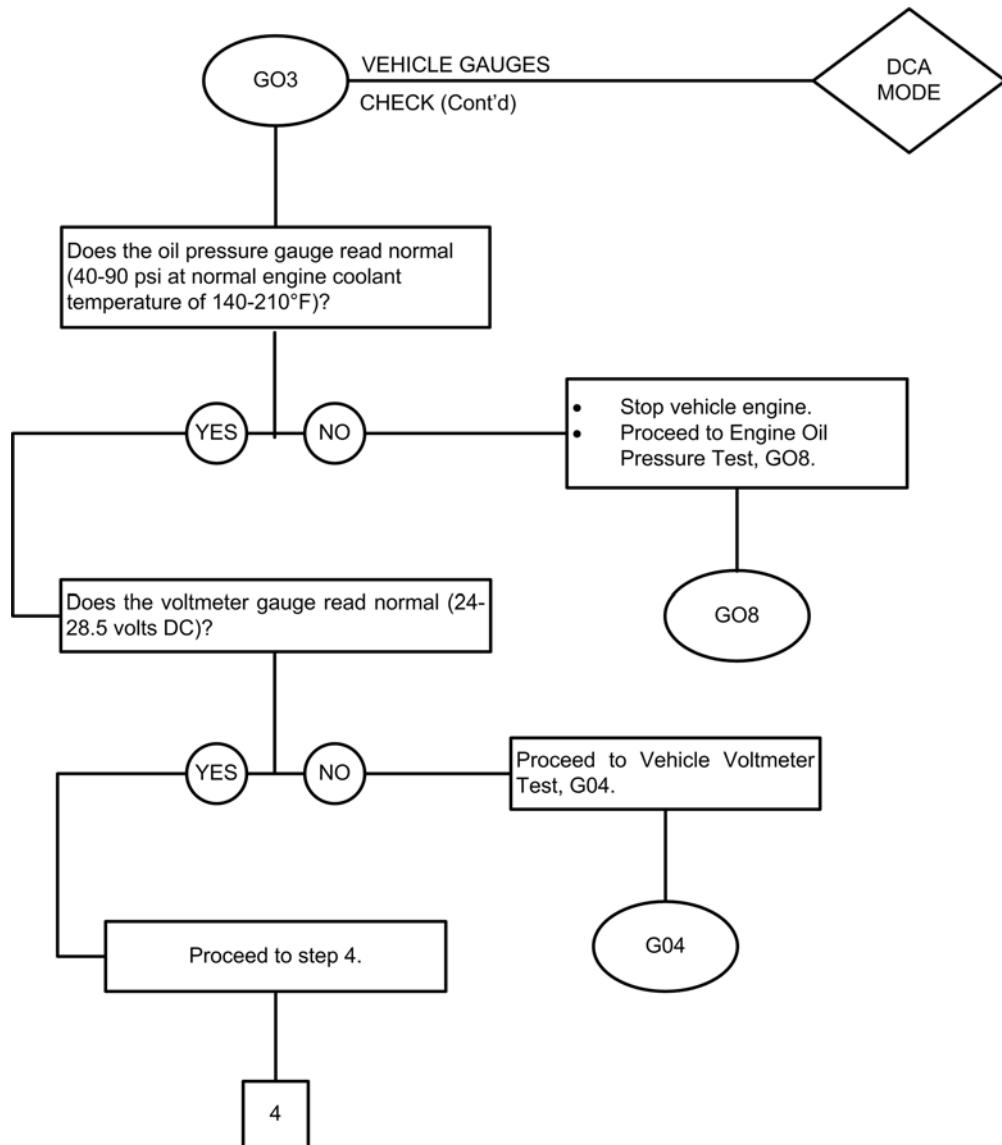
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

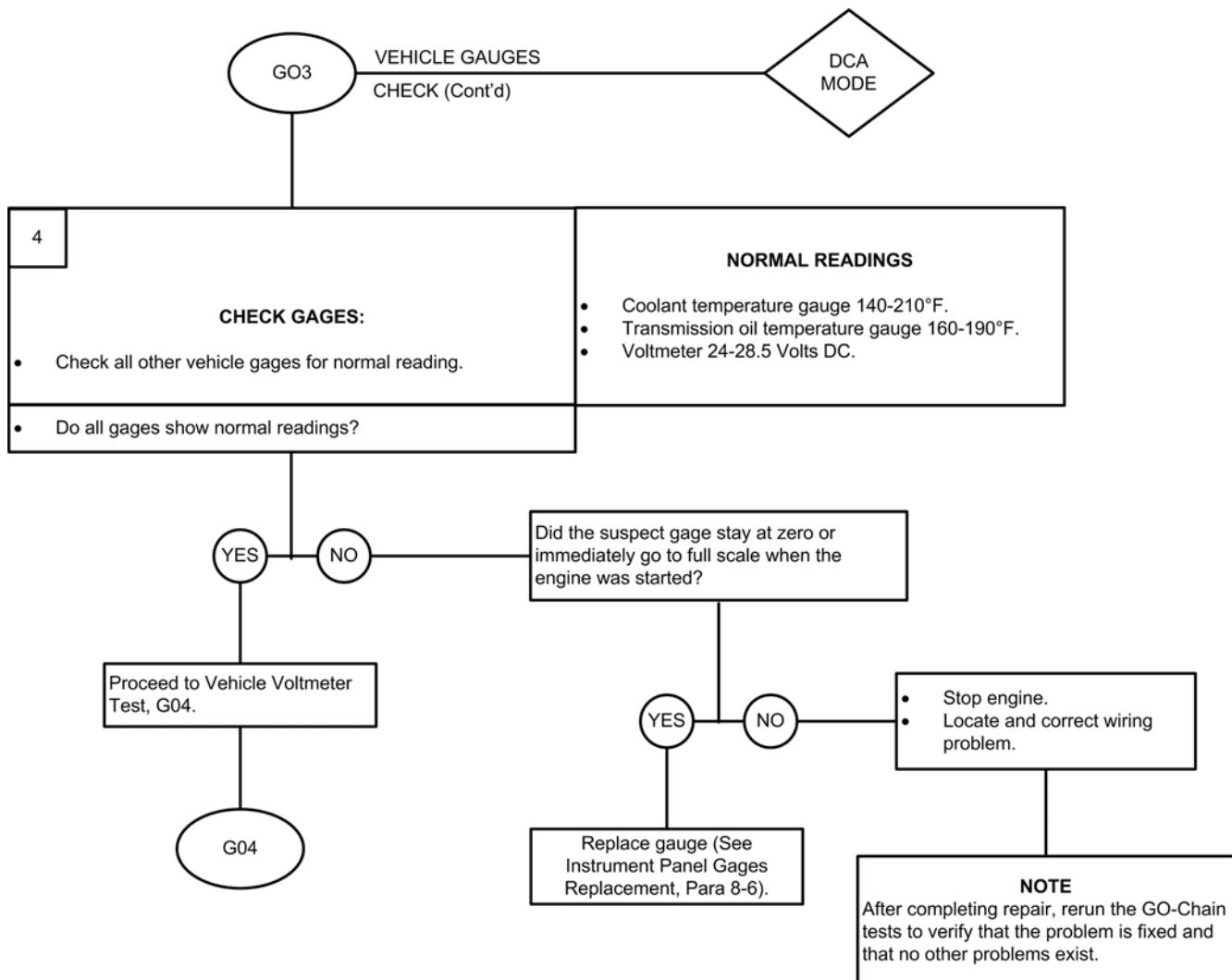


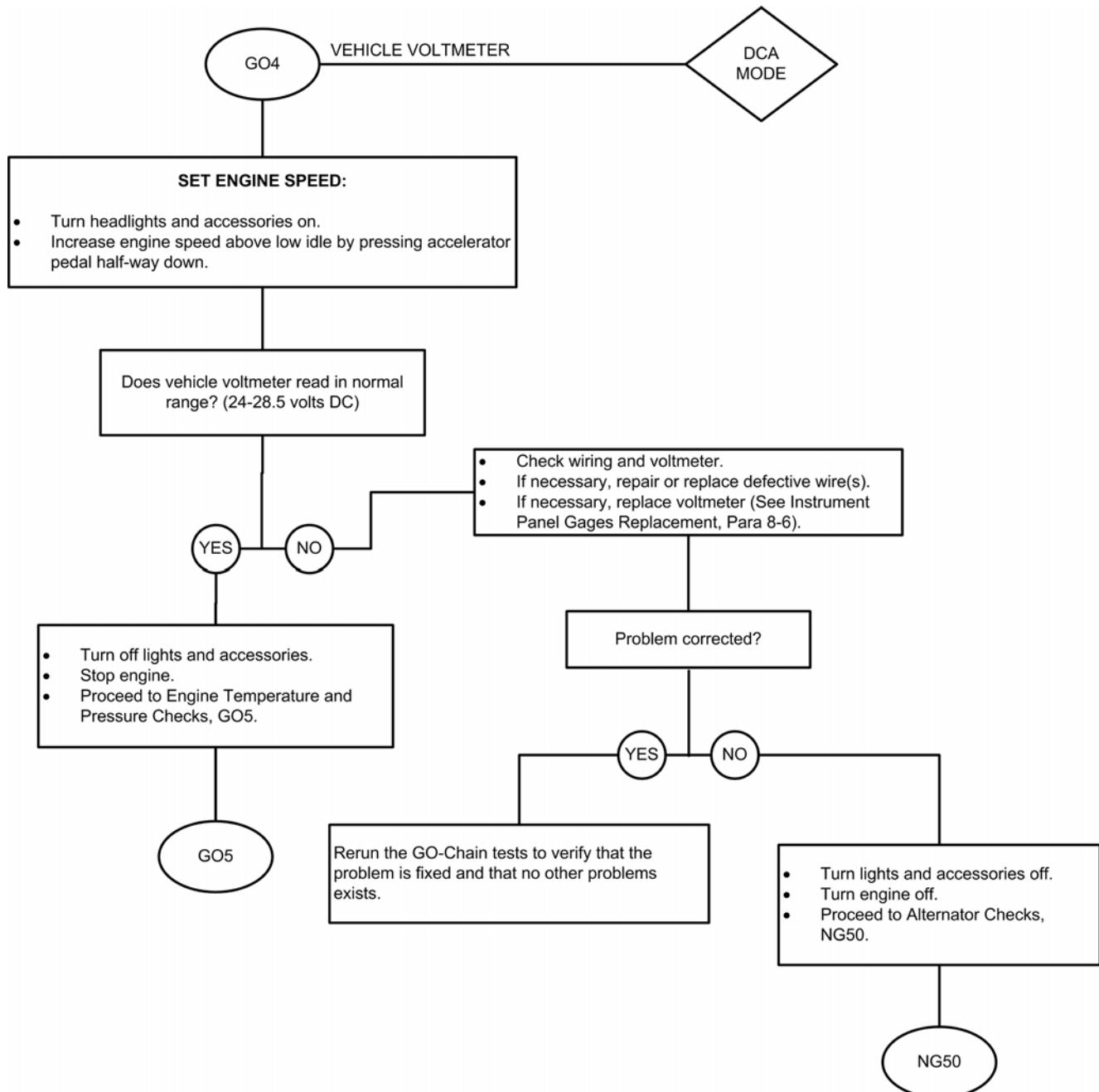


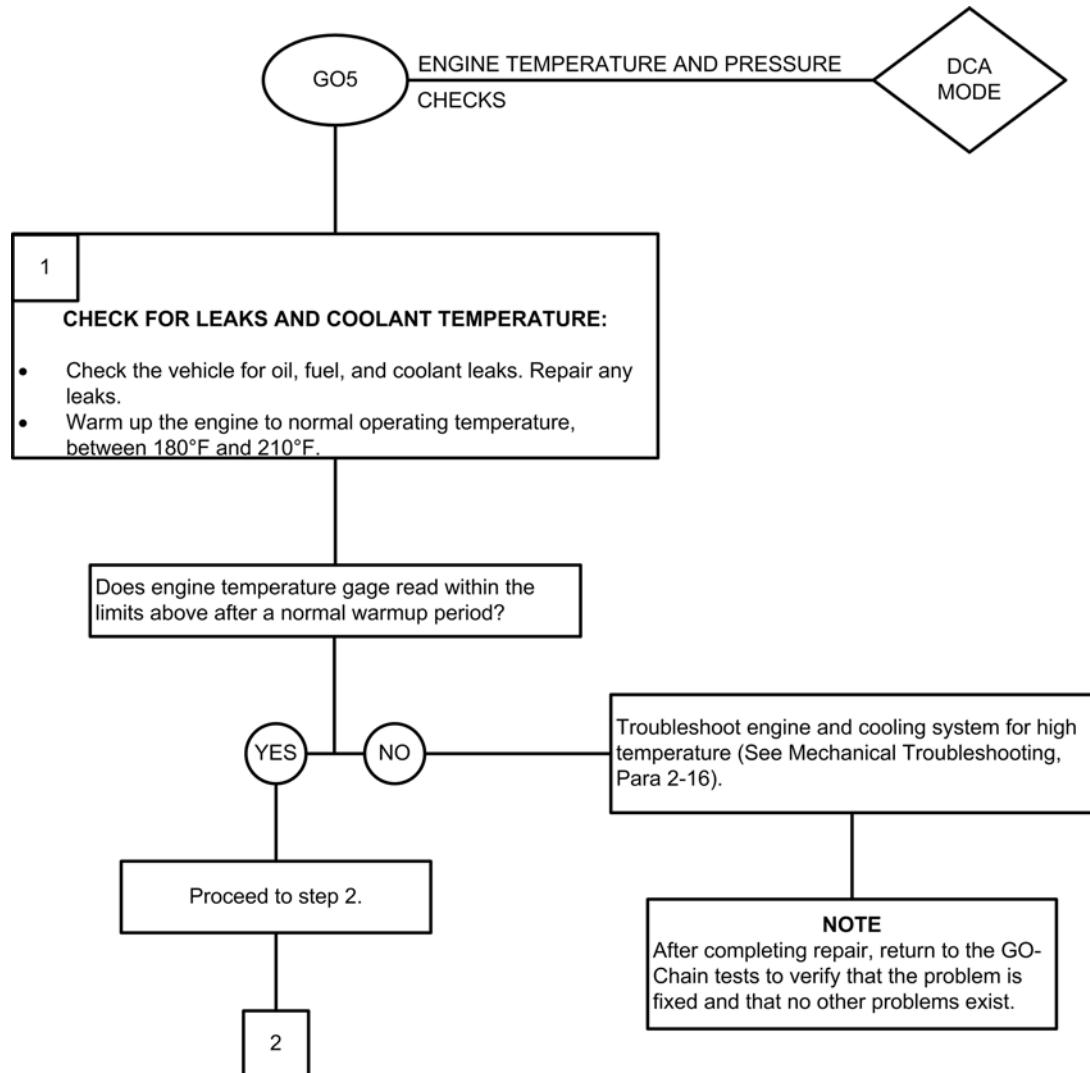
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

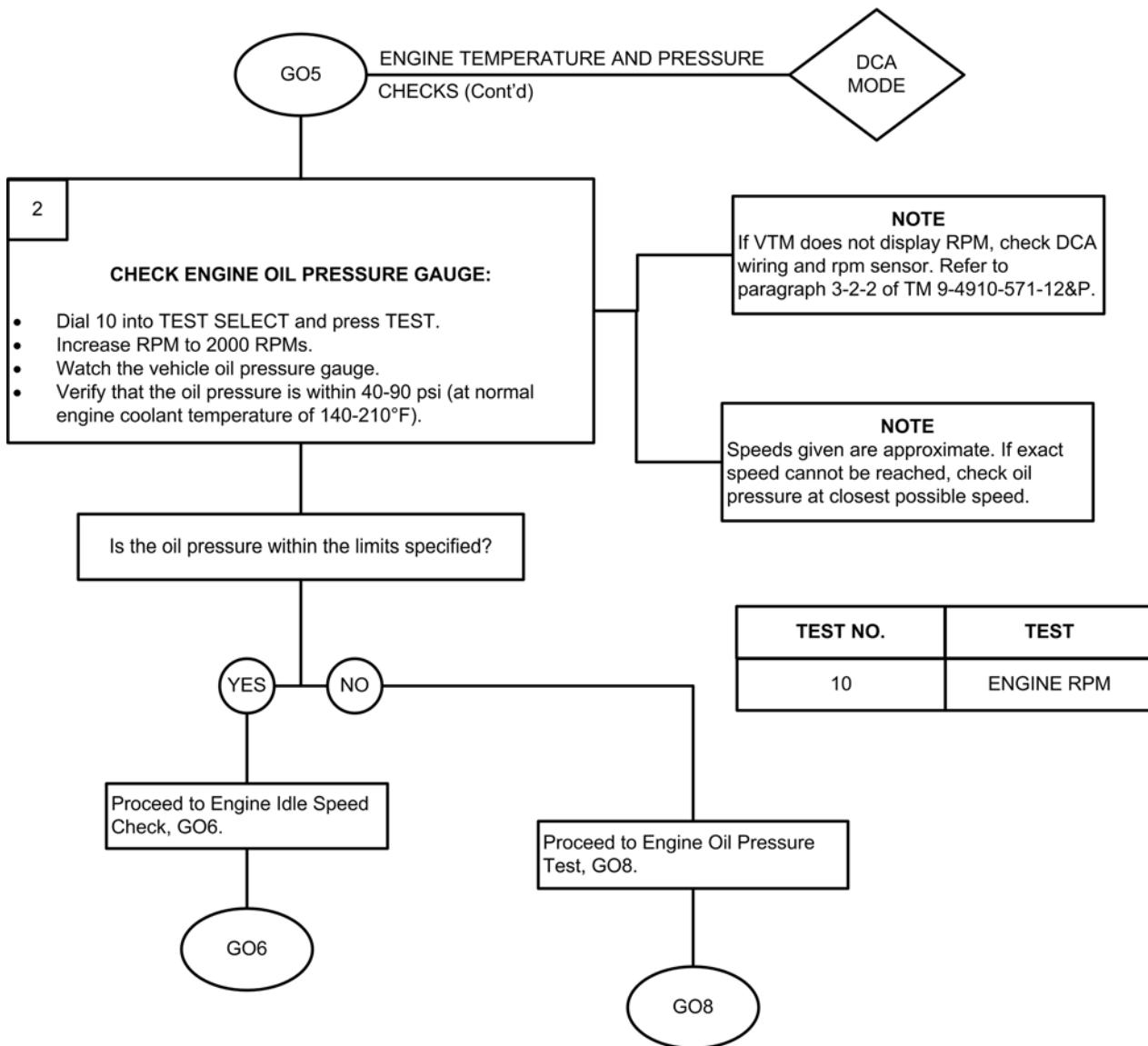


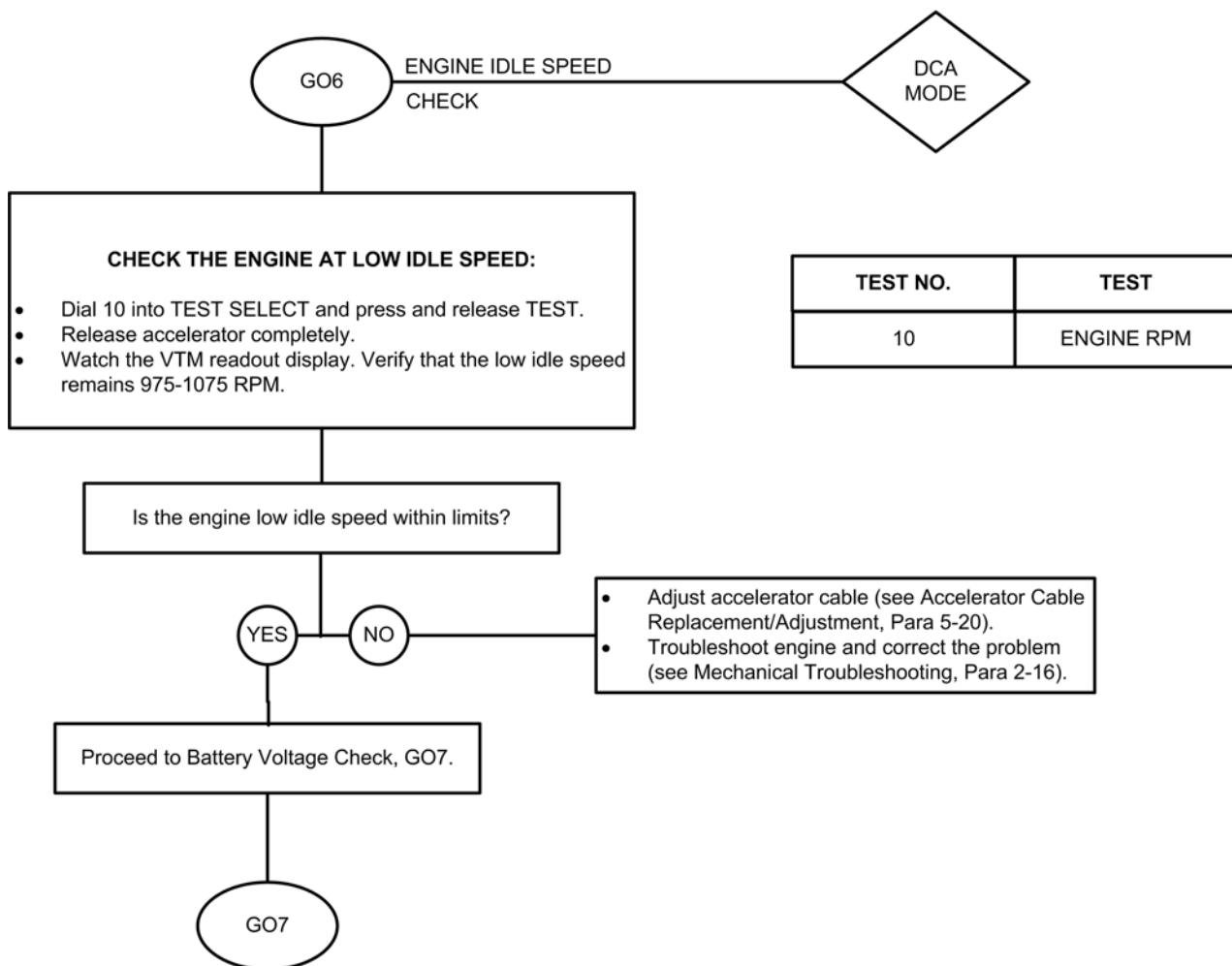


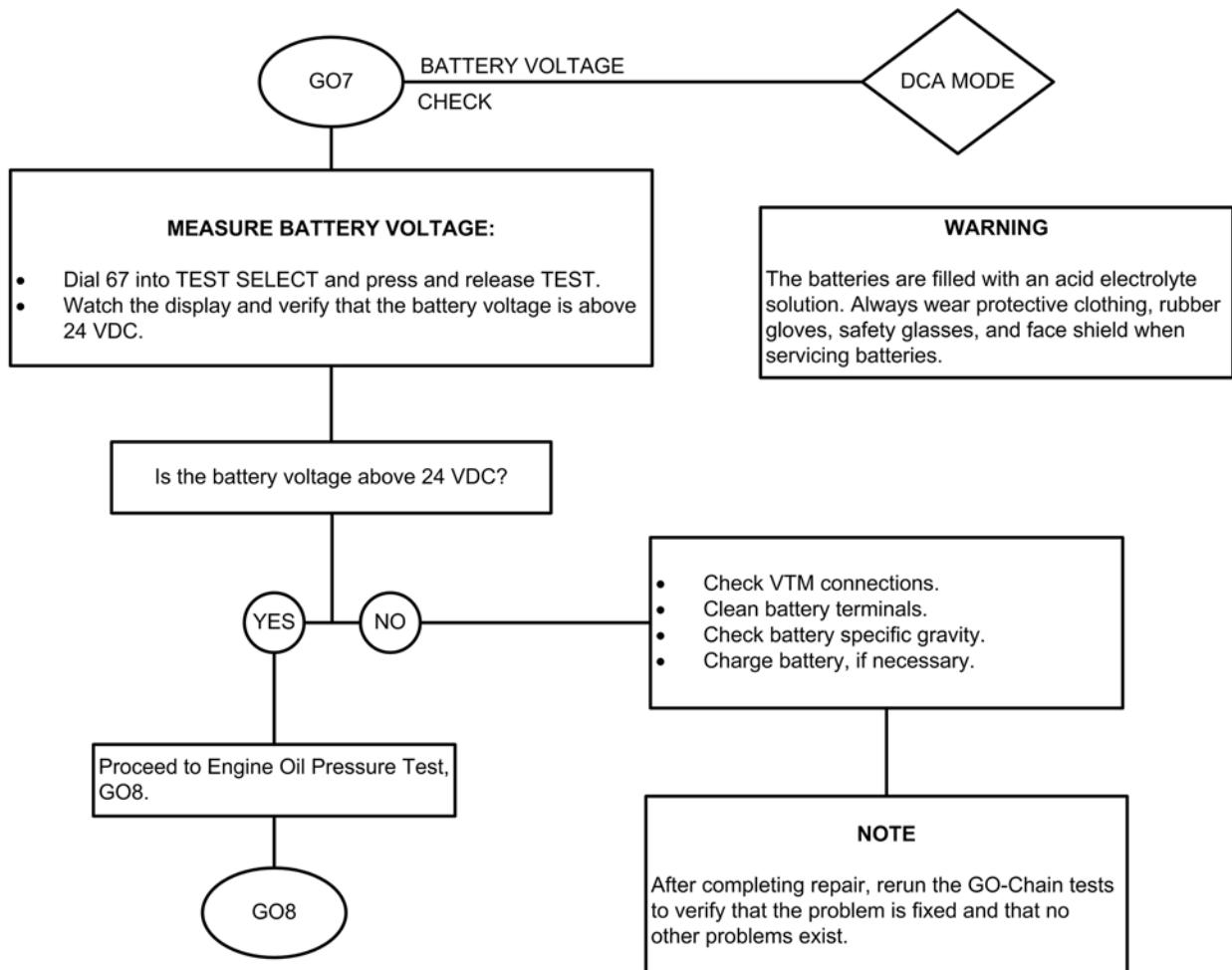
**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**



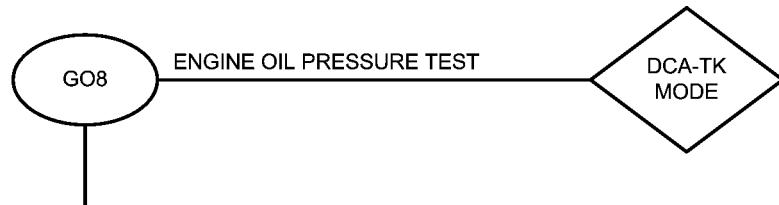
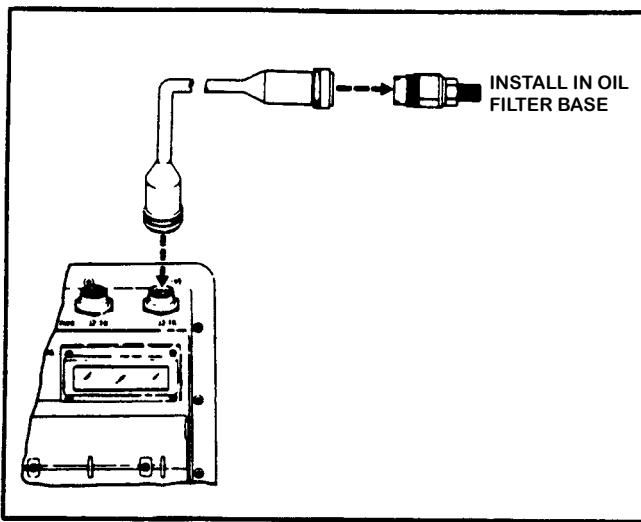
**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**



**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**



## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



**1**

**INSTALL TRANSDUCER – DO OFFSET:**

- Stop vehicle engine.
- Remove plug in oil filter head.
- Install pressure transducer TK item 17 (blue strip).
- Connect P1 of the transducer cable W4 to J1 or J2 on the VTM.
- Connect P2 of the transducer cable to the connector on the pressure transducer (TK17).

- Dial 50 into TEST SELECT.
- Press and hold TEST until CAL message appears on display.
- Release TEST.
- Wait for offset value to appear on the display.

• Is the offset value within the limits -150 to +150?

TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

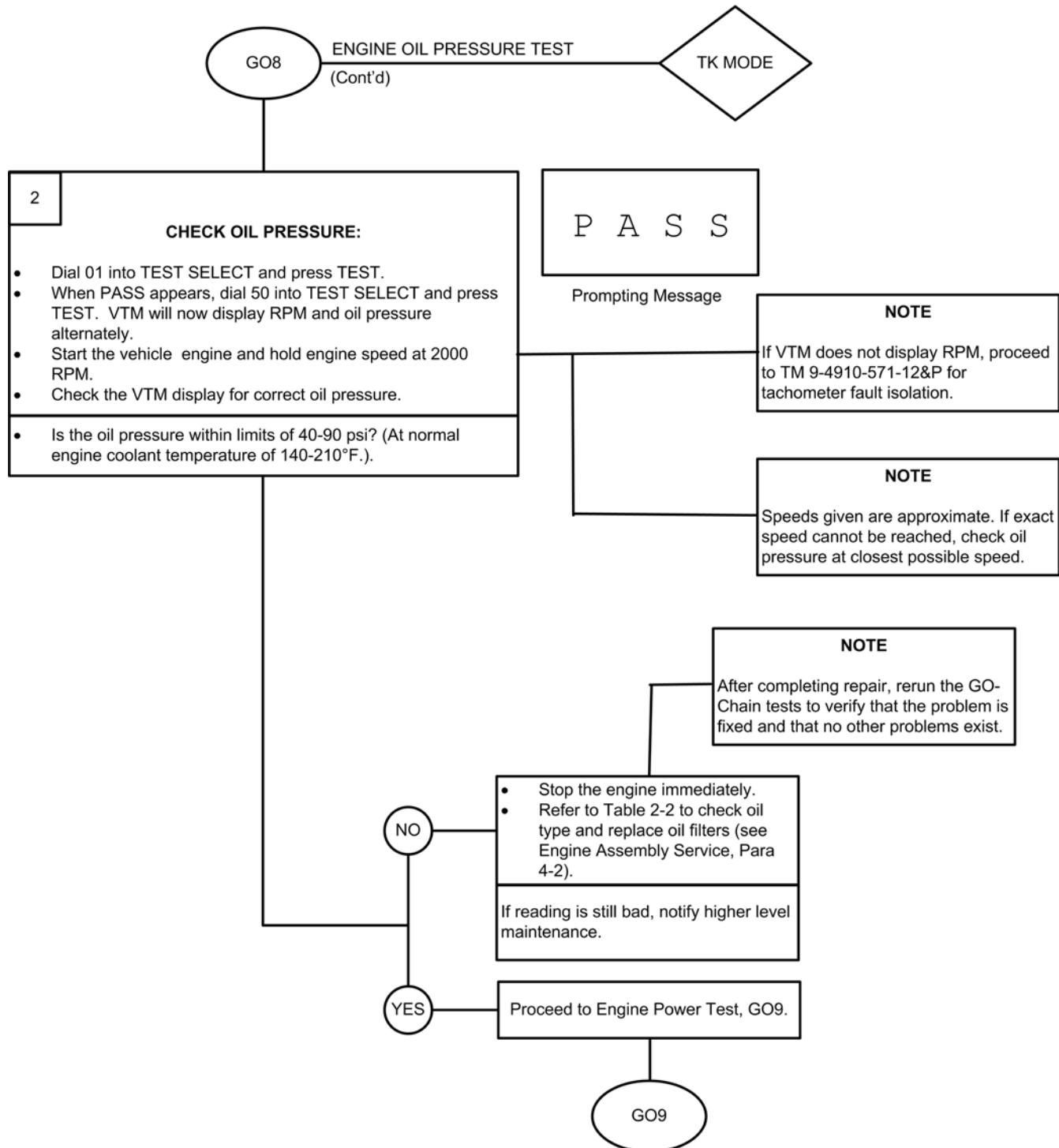
C A L

Prompting Message

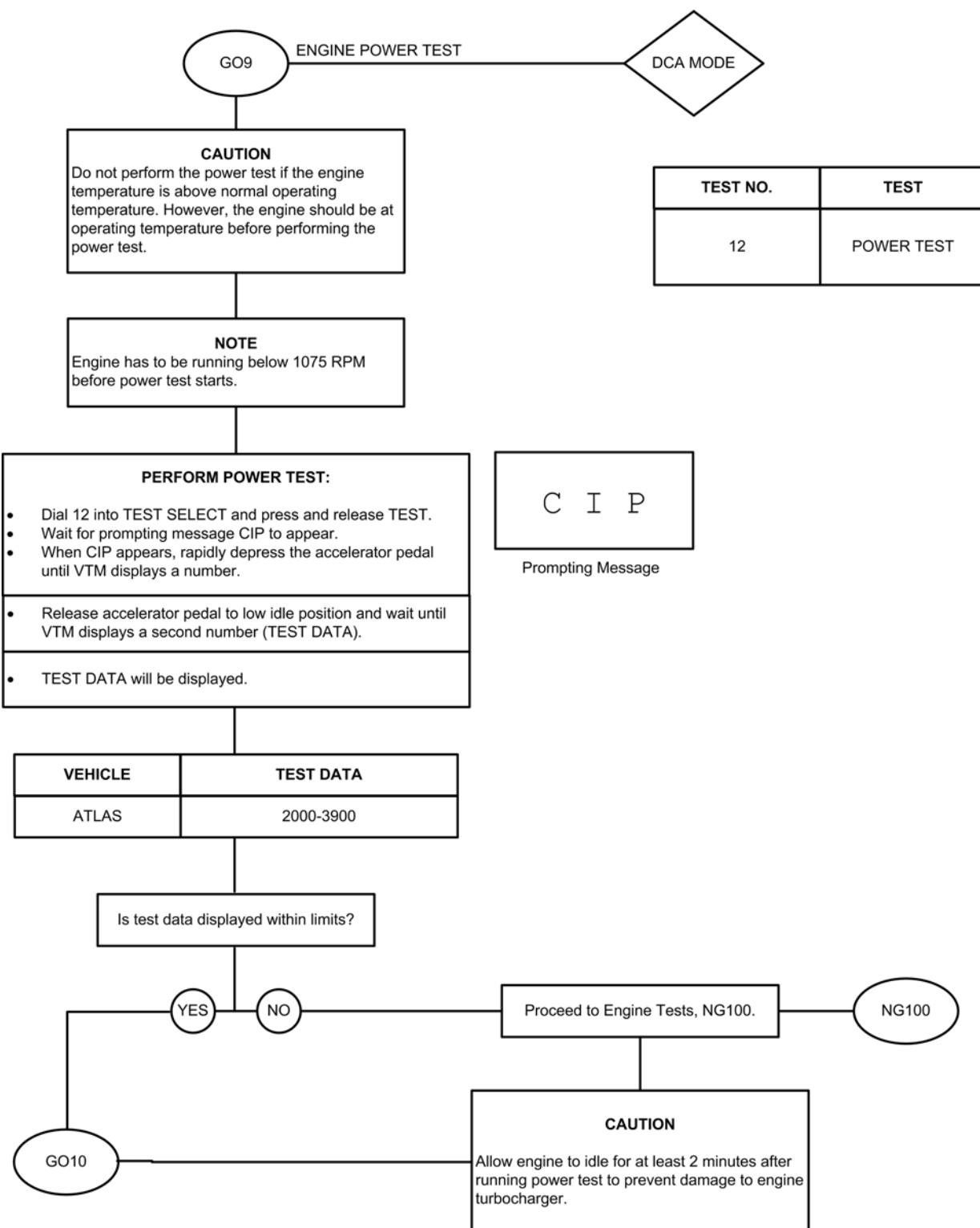
Proceed to TM 9-4910-571-12&P for offset fault isolation.

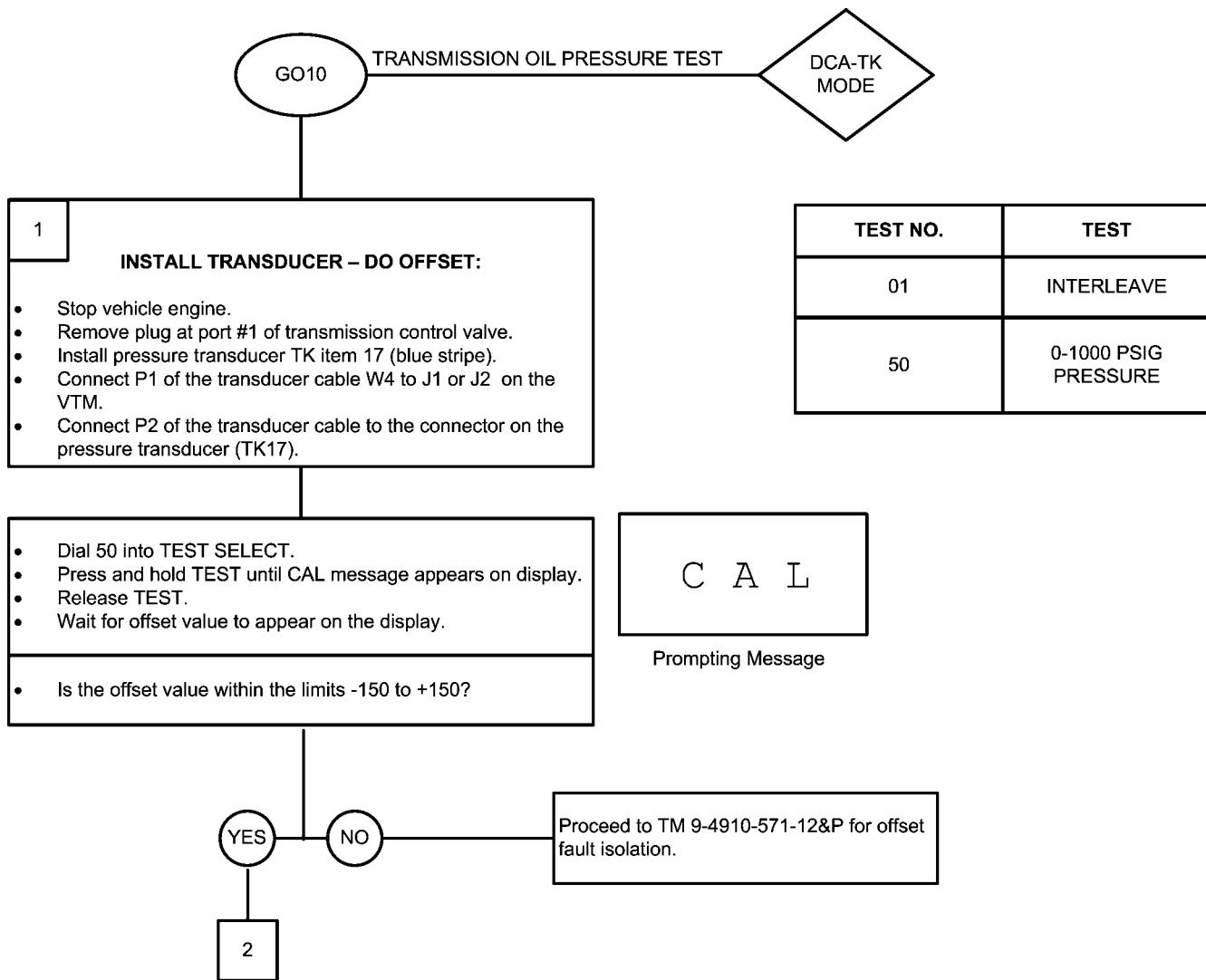
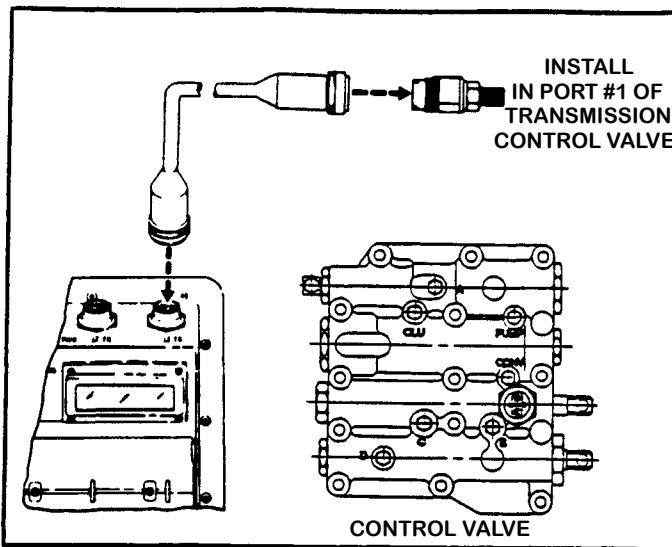
YES — NO

2

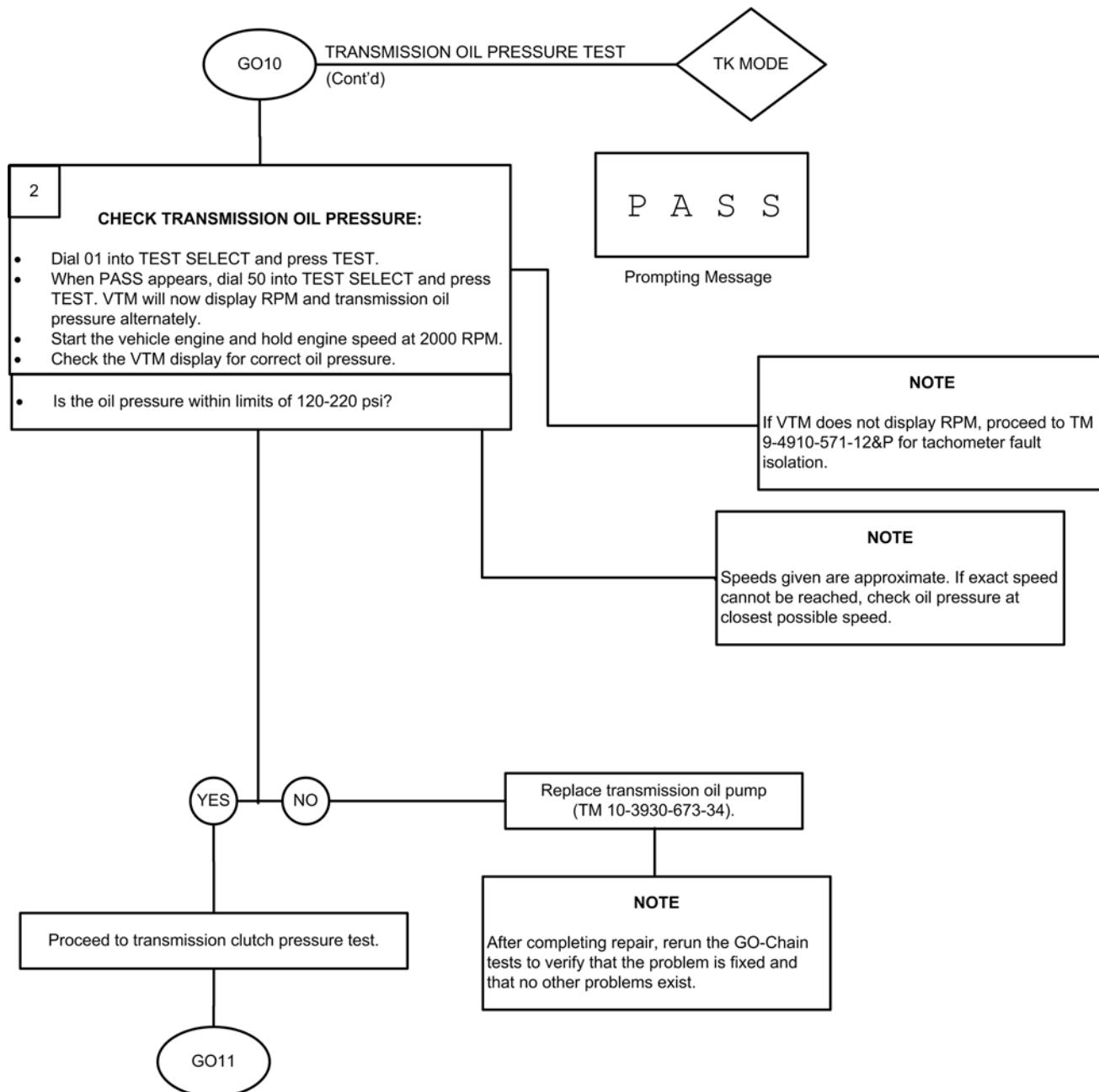


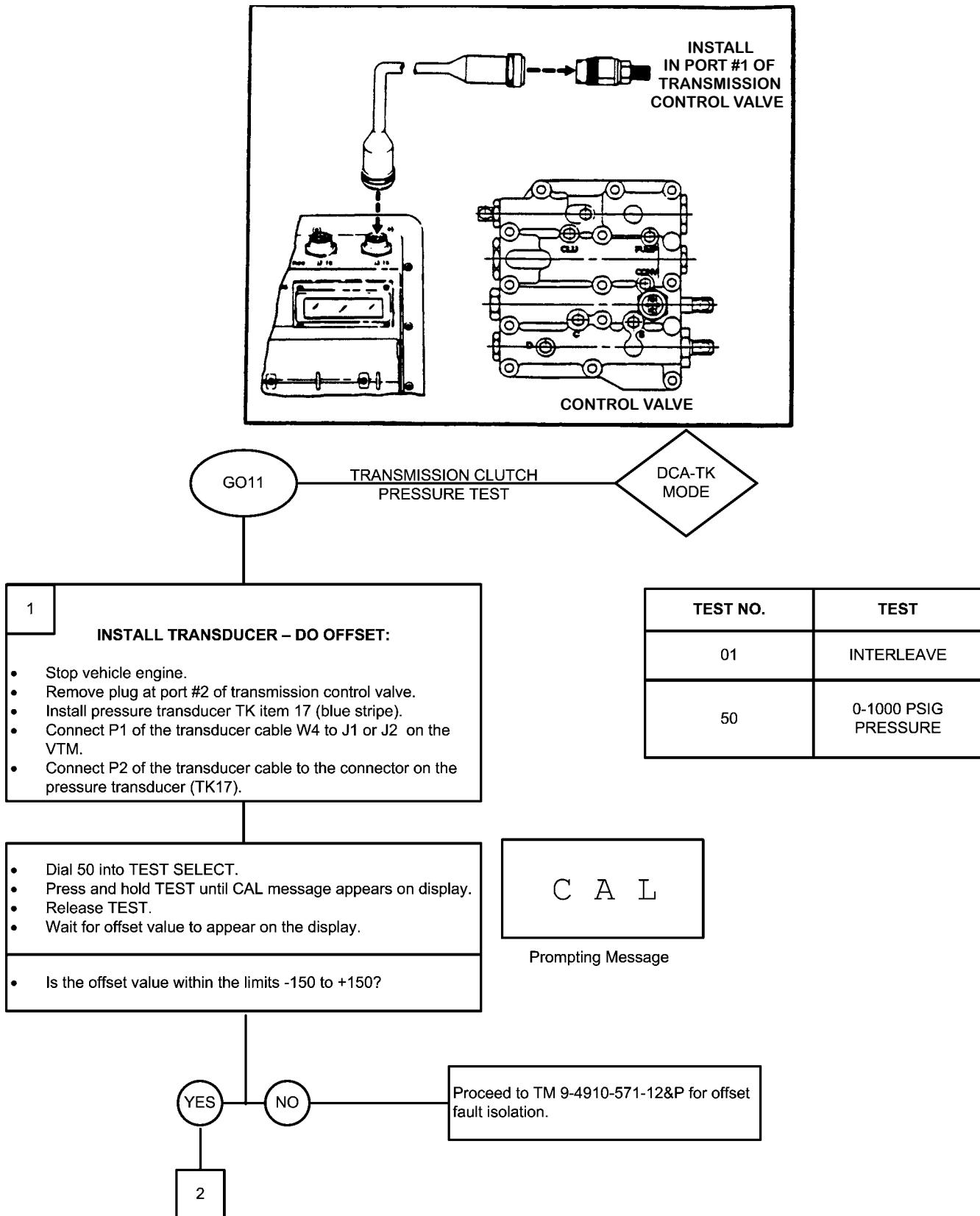
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



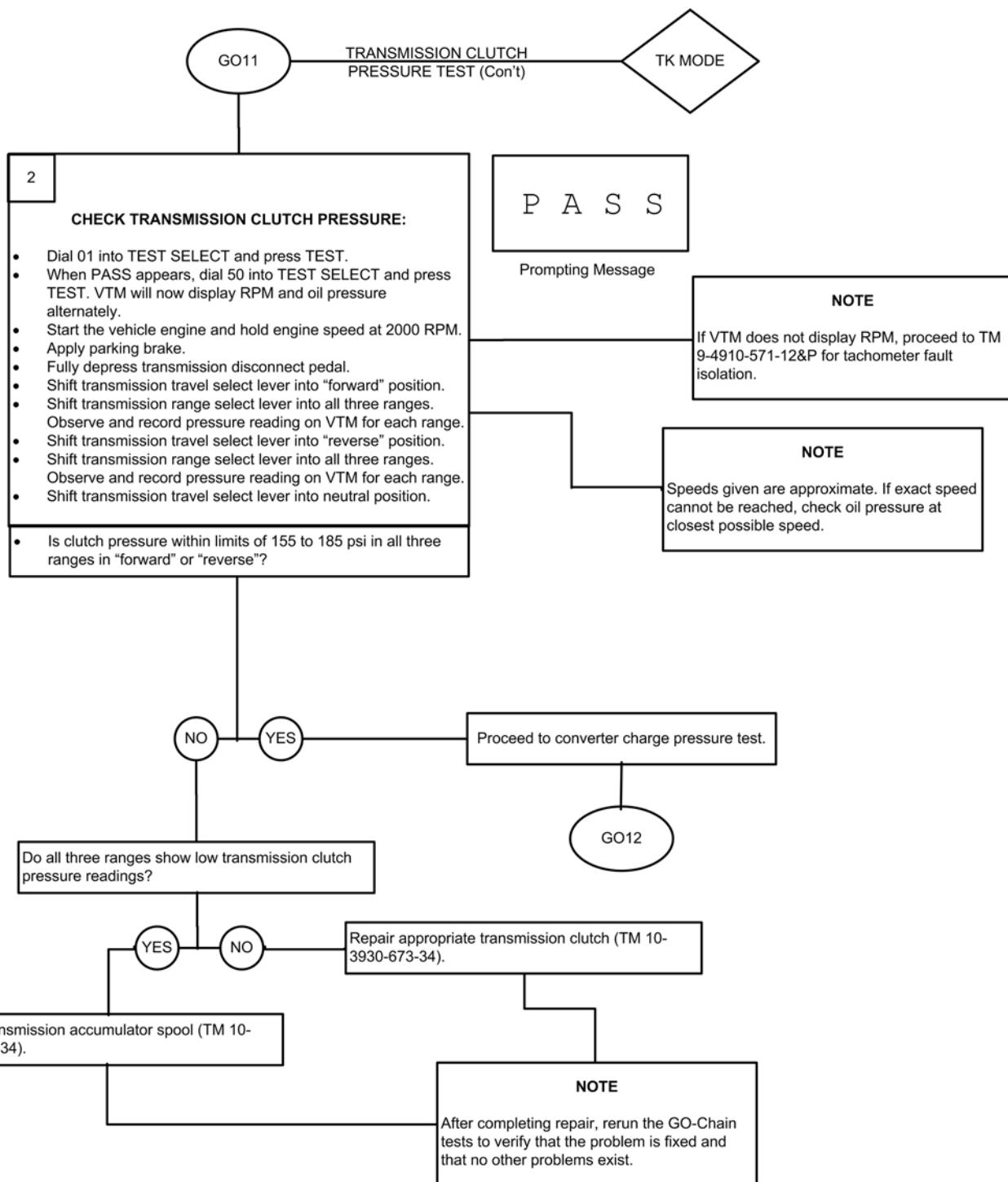


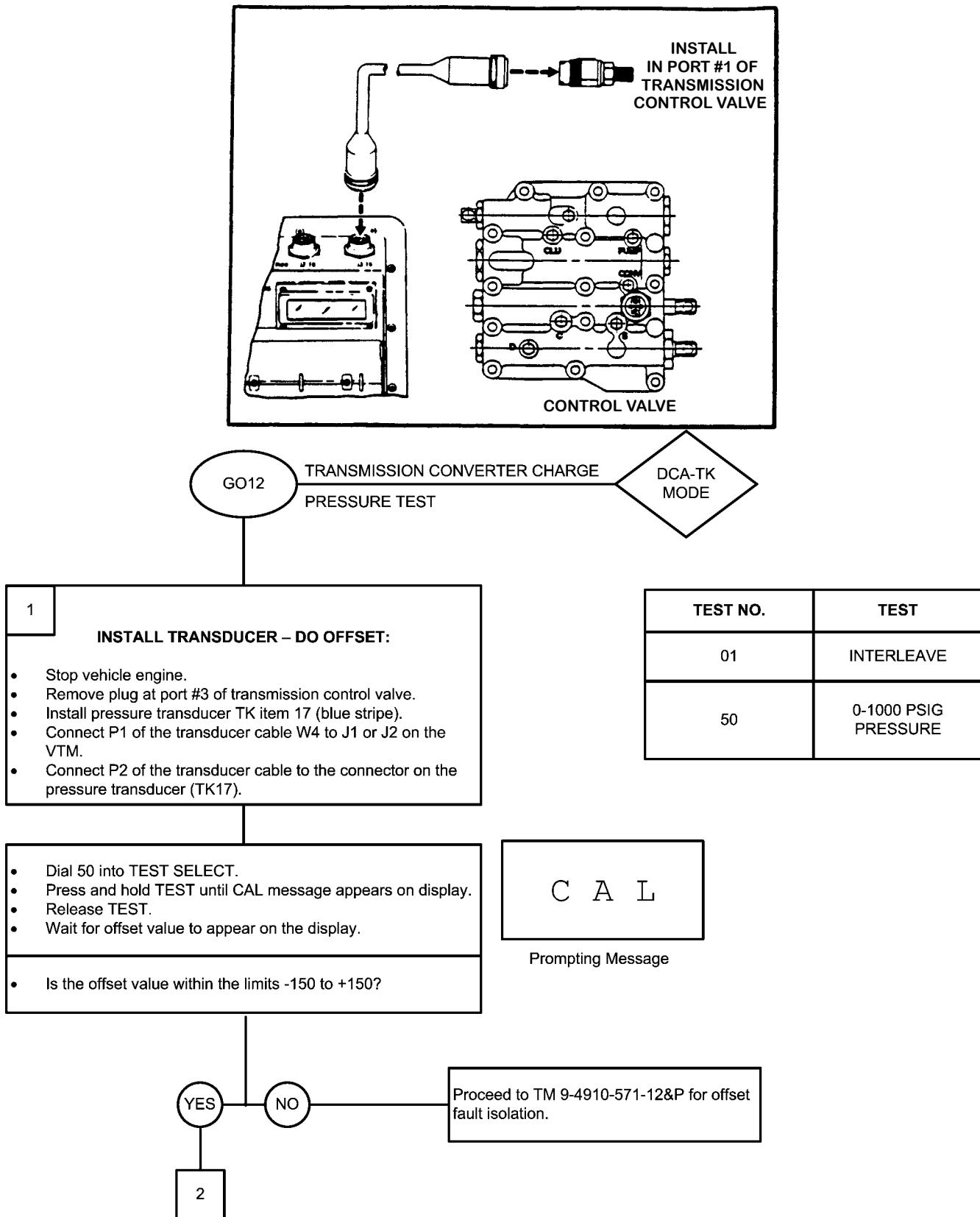
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



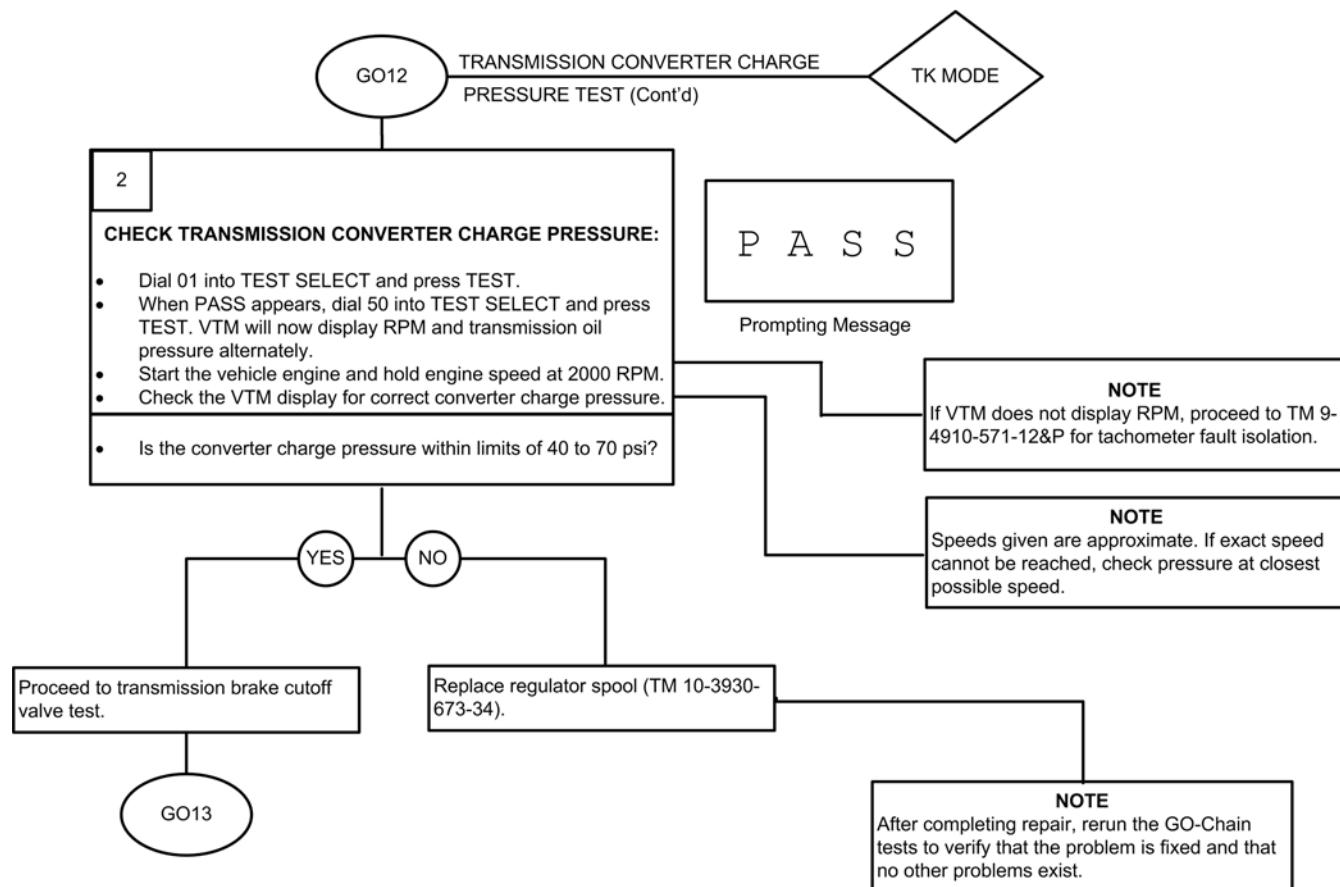


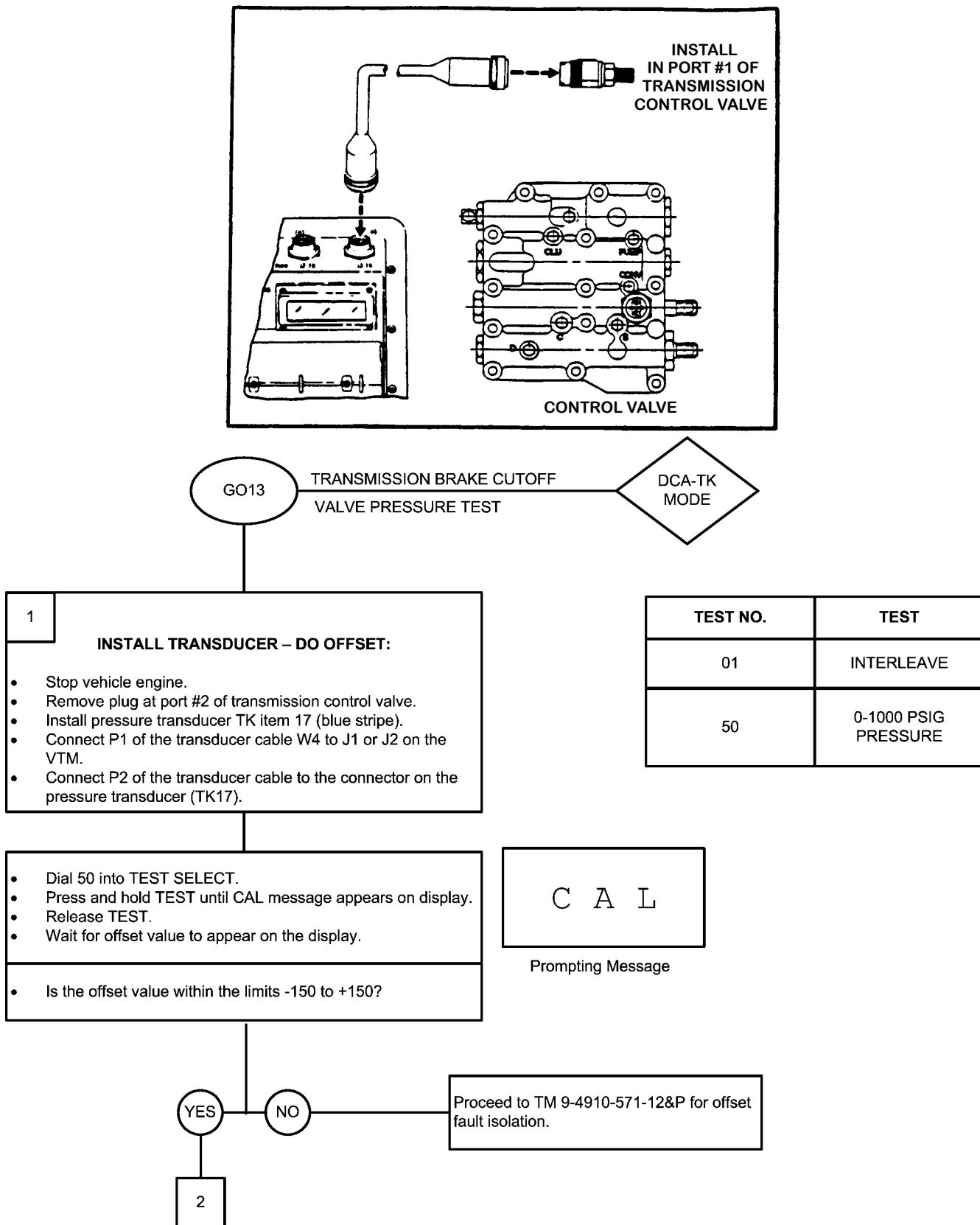
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



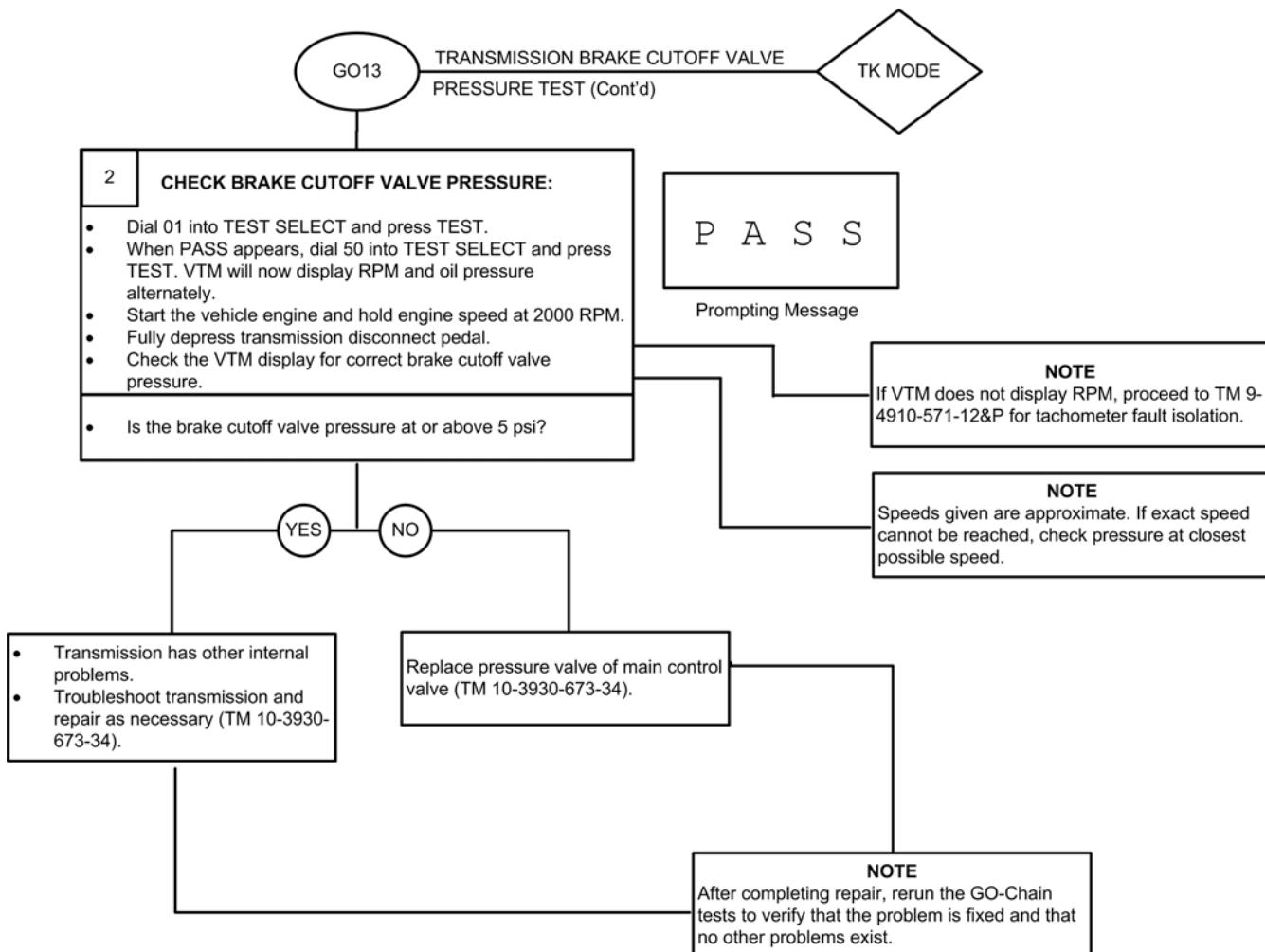


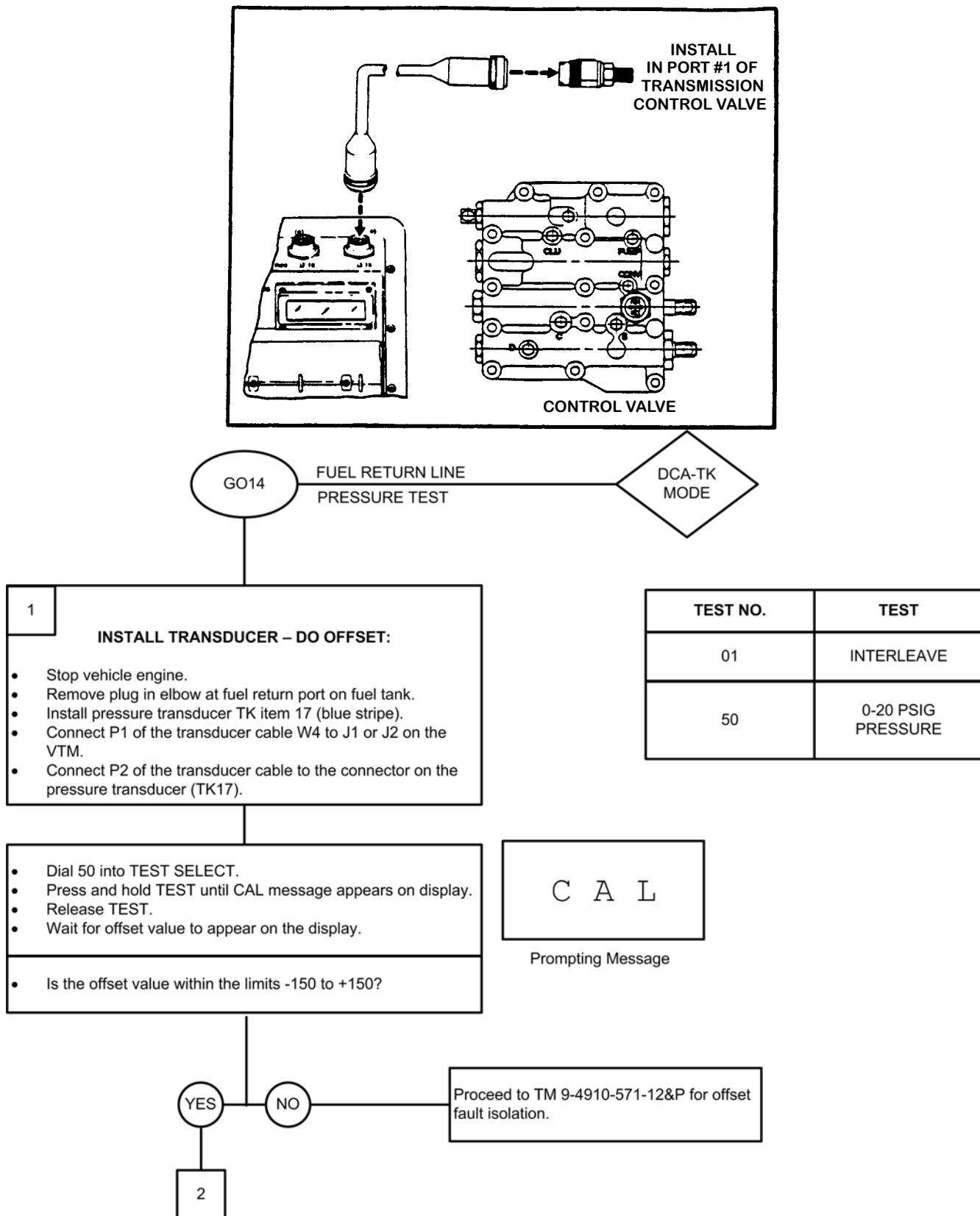
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



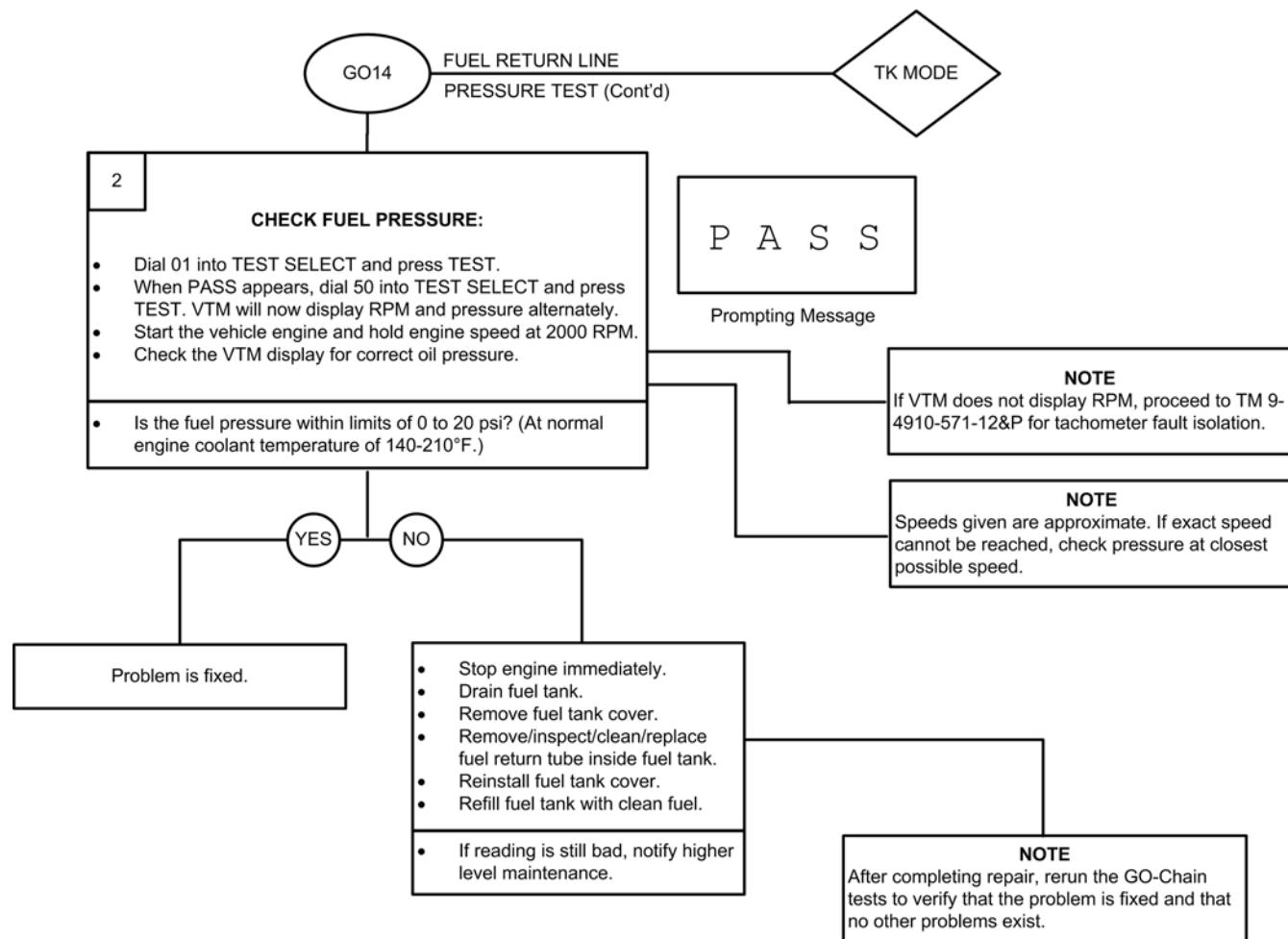


## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)





## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

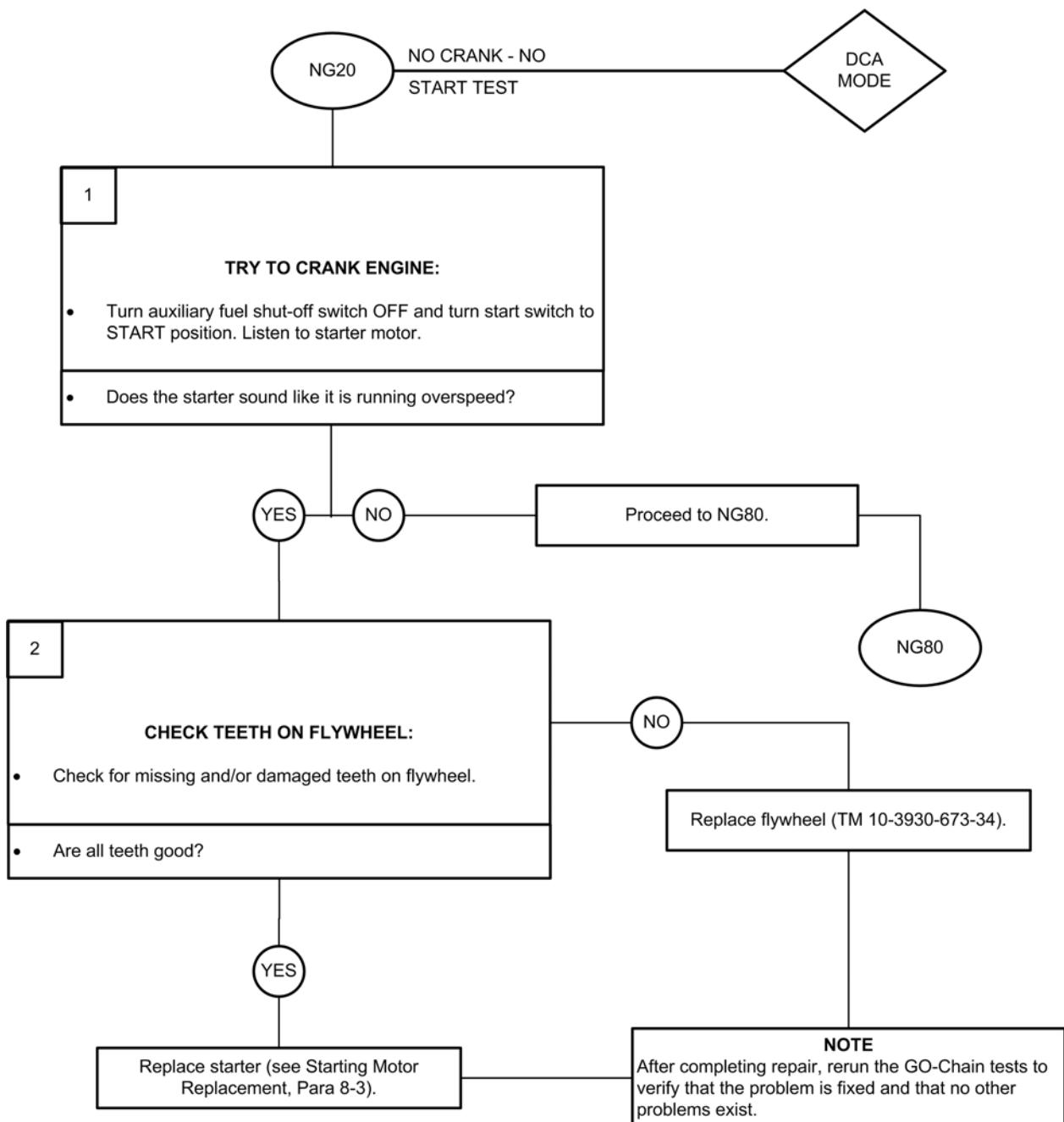


### STE/ICE-R NO-GO-Chain Testing Sequence

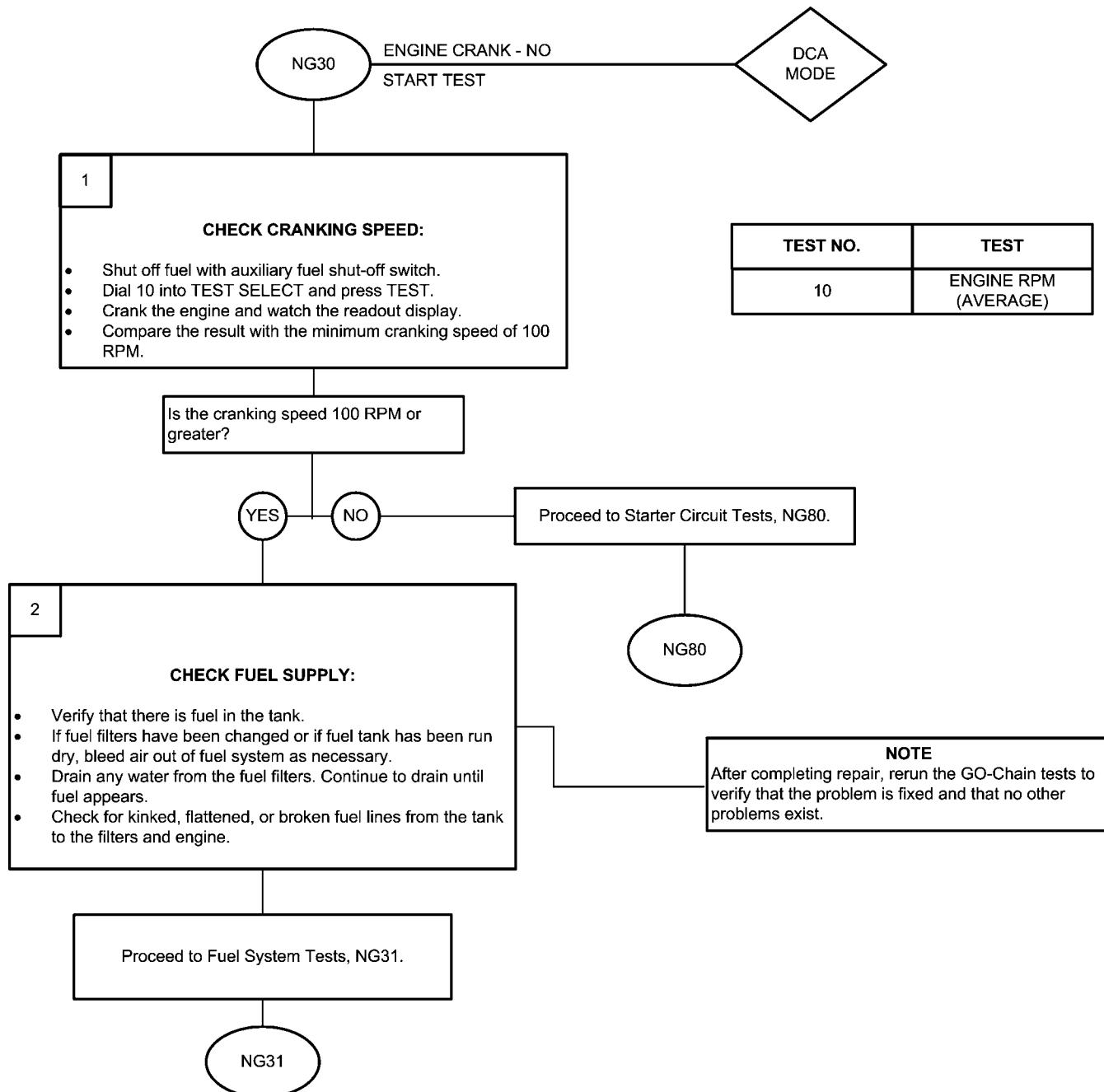
The following NO-GO-Chain tests are made using the vehicle DCA connector. Each test is referenced from the GO-Chain testing sequence. Do not perform any of these test unless you are instructed to by the GO-Chain testing. All testing is referenced by the NG (NO-GO) number. Refer to the following table for the NO-GO test index.

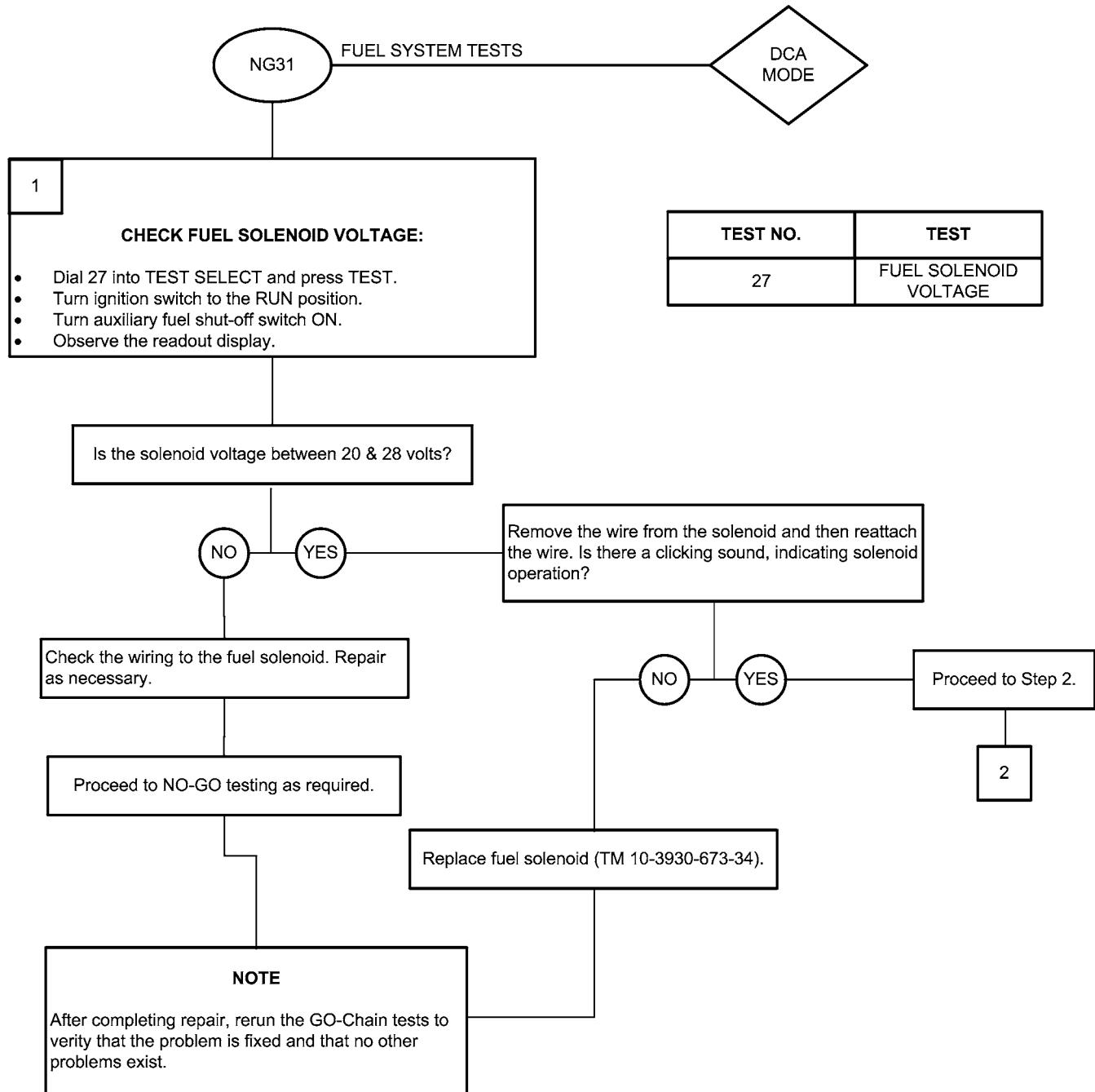
For normal readings, see vehicle test card, page 2-912.

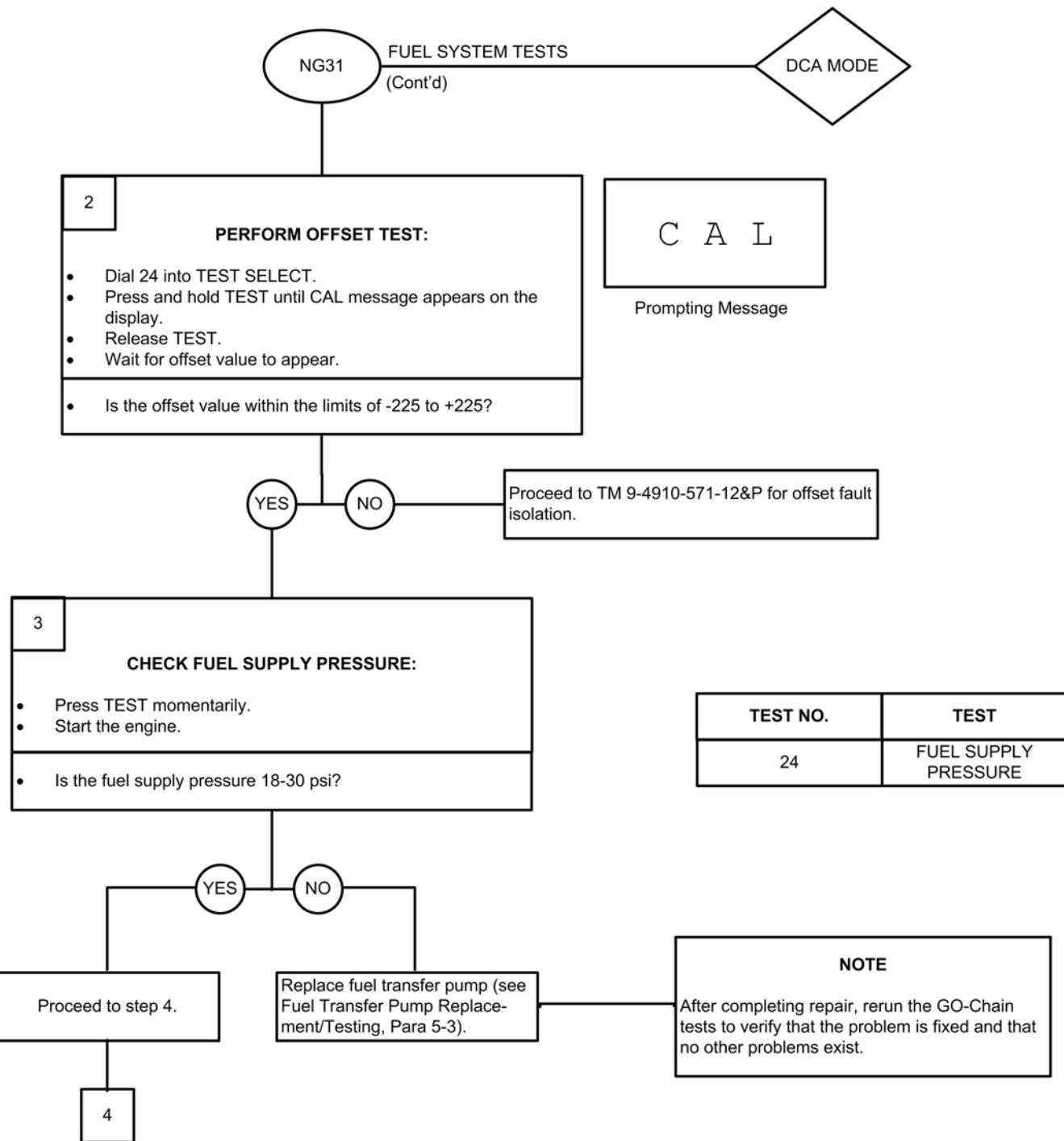
GO TEST NUMBER	MODE	TEST TITLE	PAGE NUMBER
NG20	DCA	No Crank-No Start Test	2-893
NG30	DCA	Engine Crank-No Start Test	2-894
NG31	DCA	Fuel System Tests	2-895
NG50	DCA	Alternator Tests	2-898
NG80	DCA	Starter Circuit Tests	2-900
NG81	DCA	Battery Tests	2-904
NG90	DCA	Starter Tests	2-907
NG100	DCA	Engine Tests	2-909
NG110	DCA	Starter Current Test	2-911

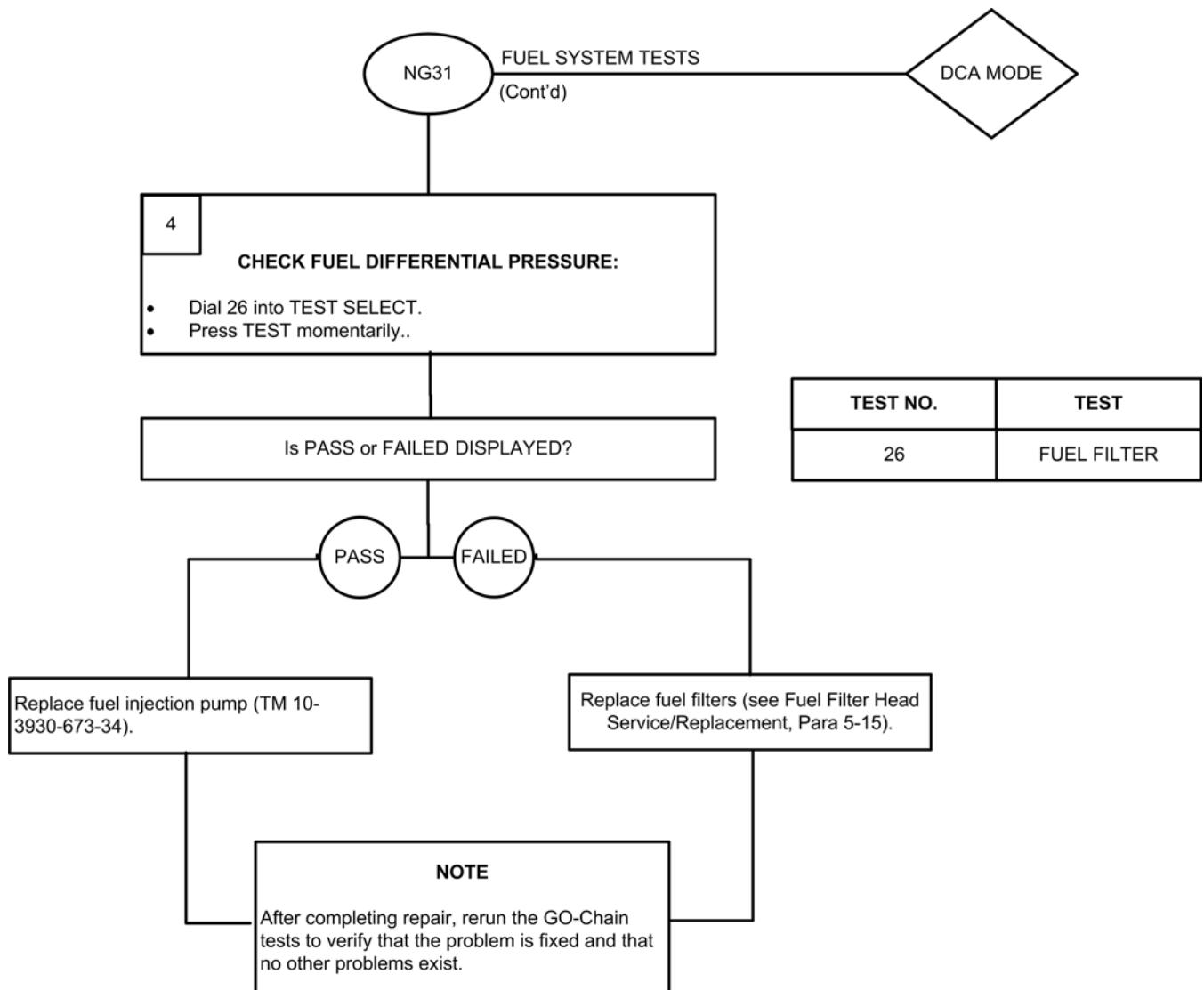


## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

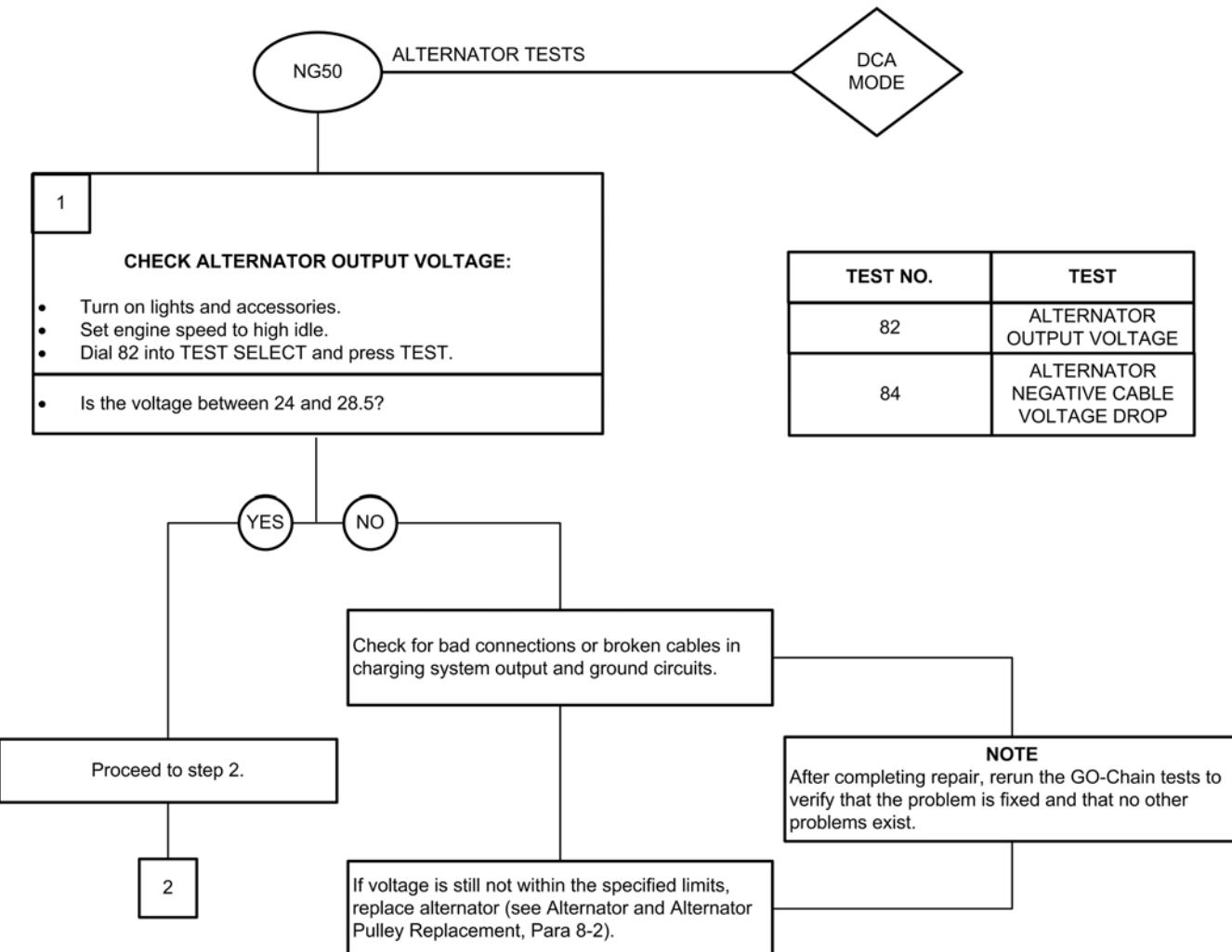


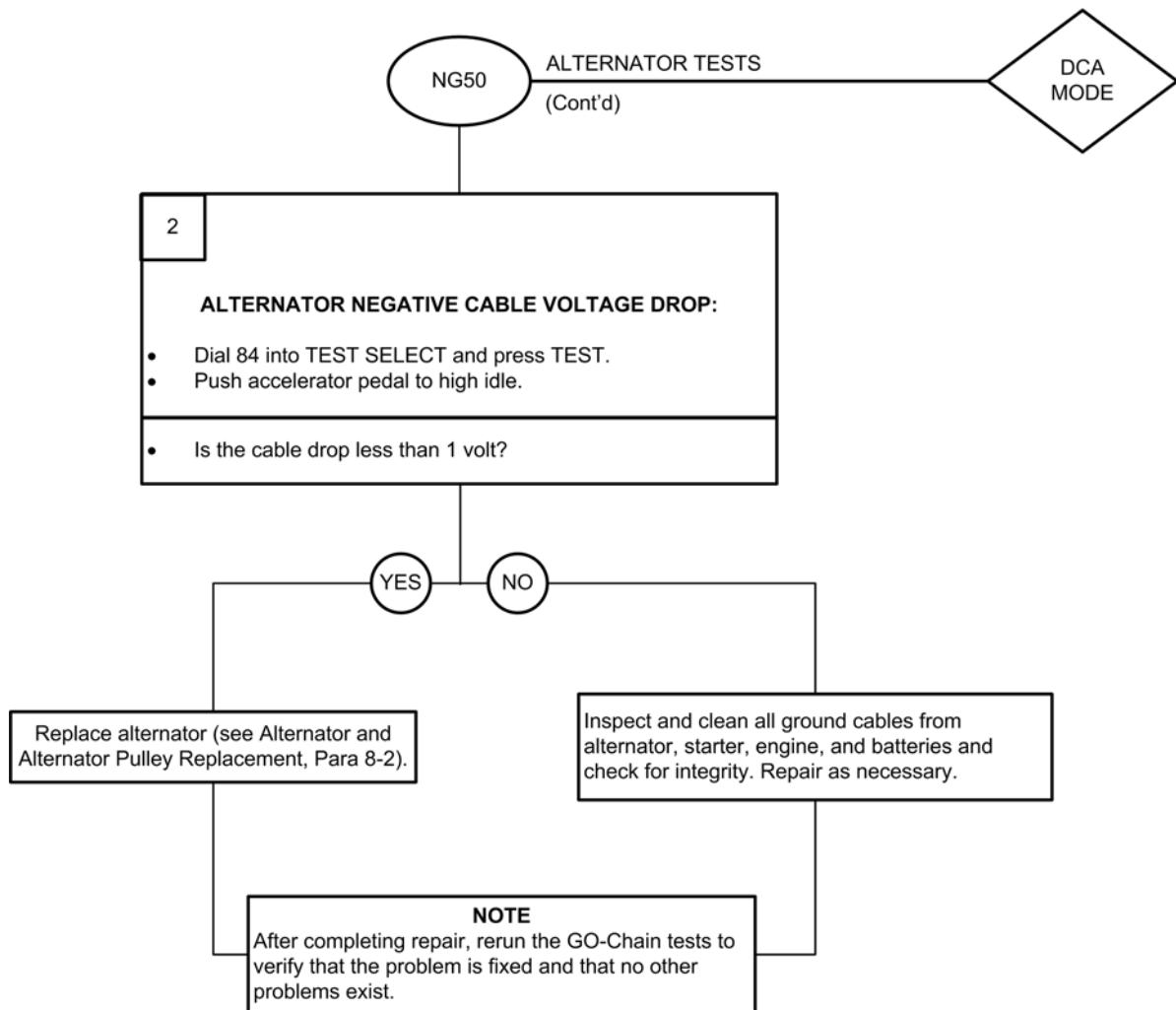


**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**

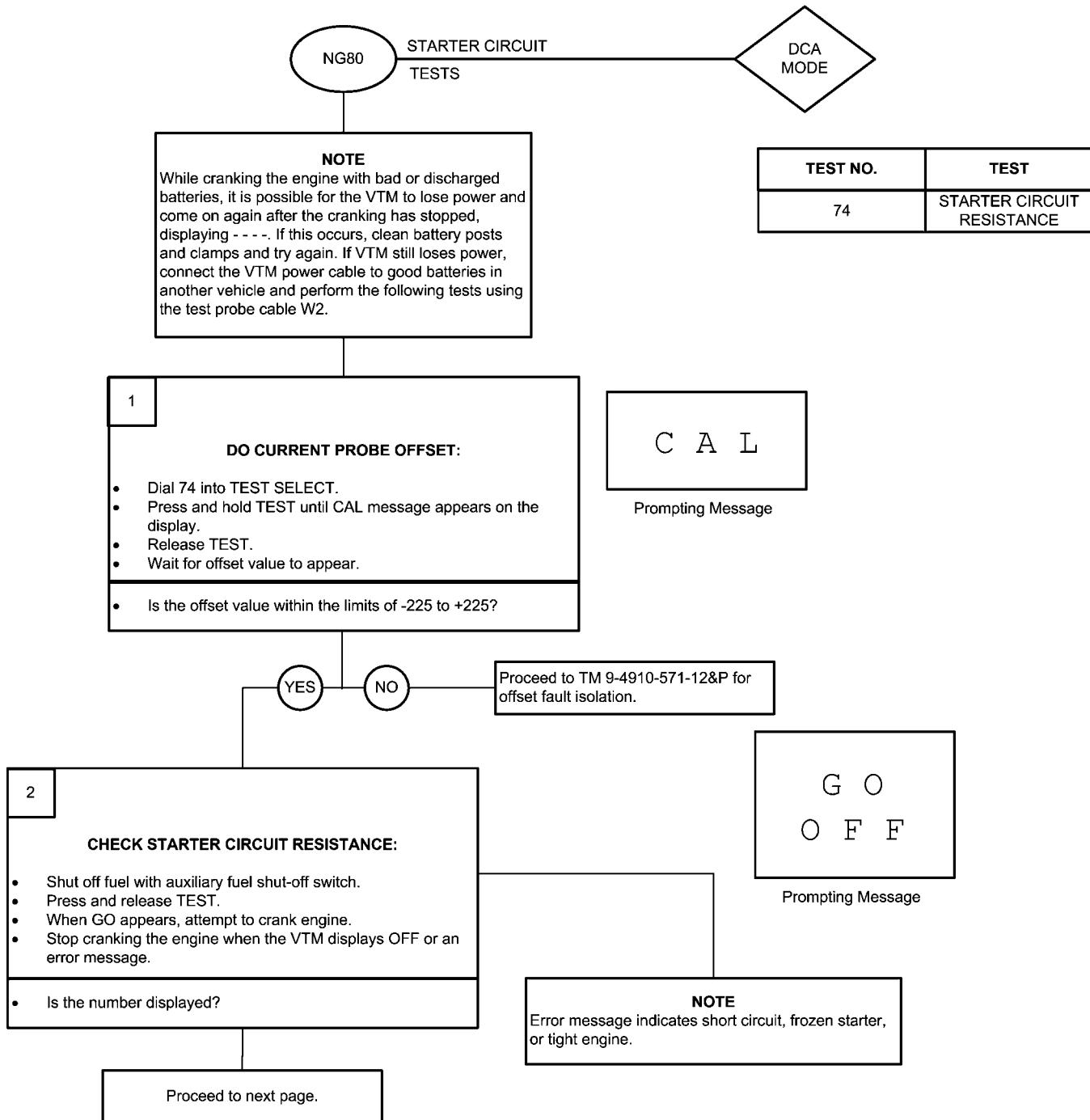


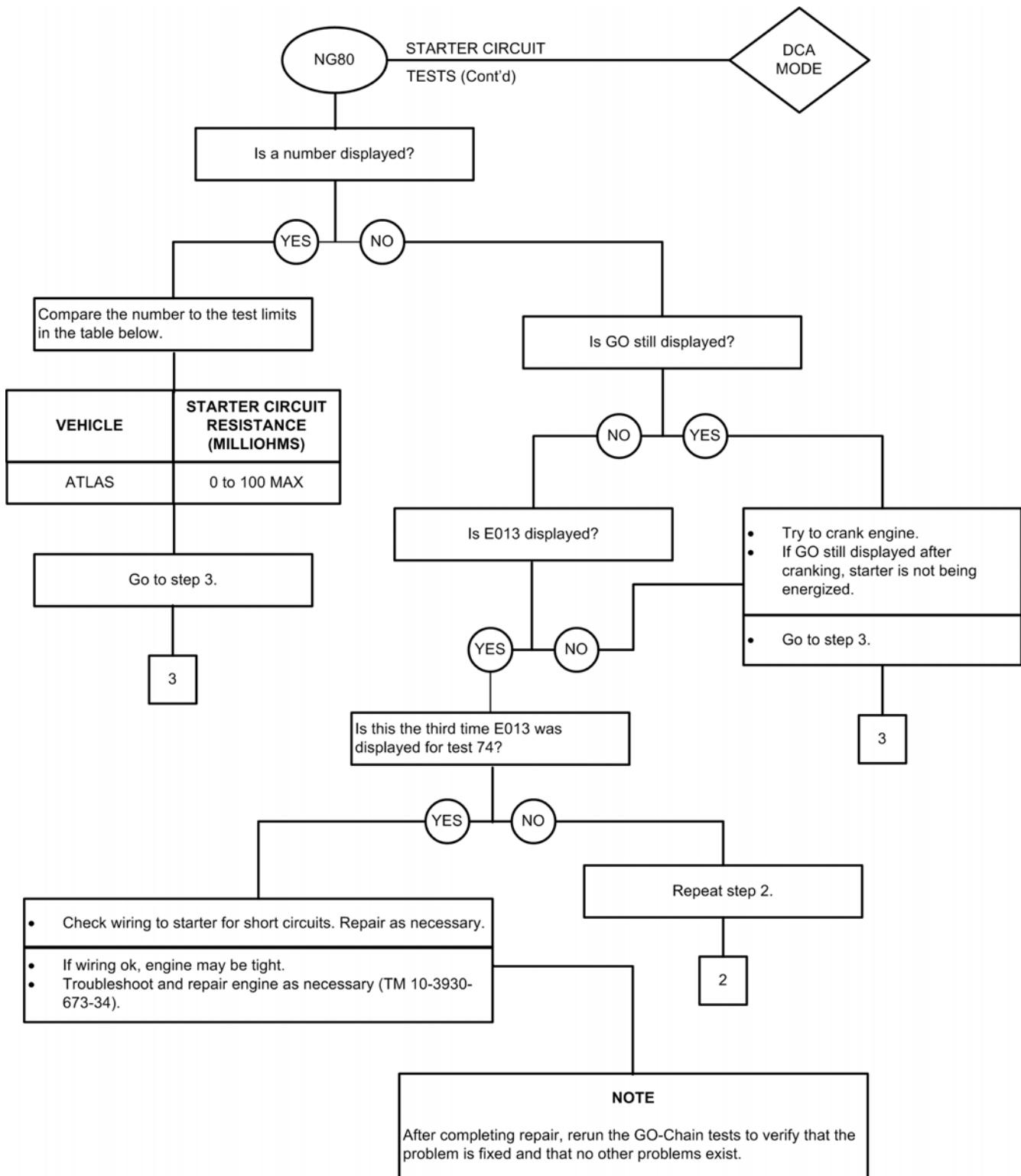
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



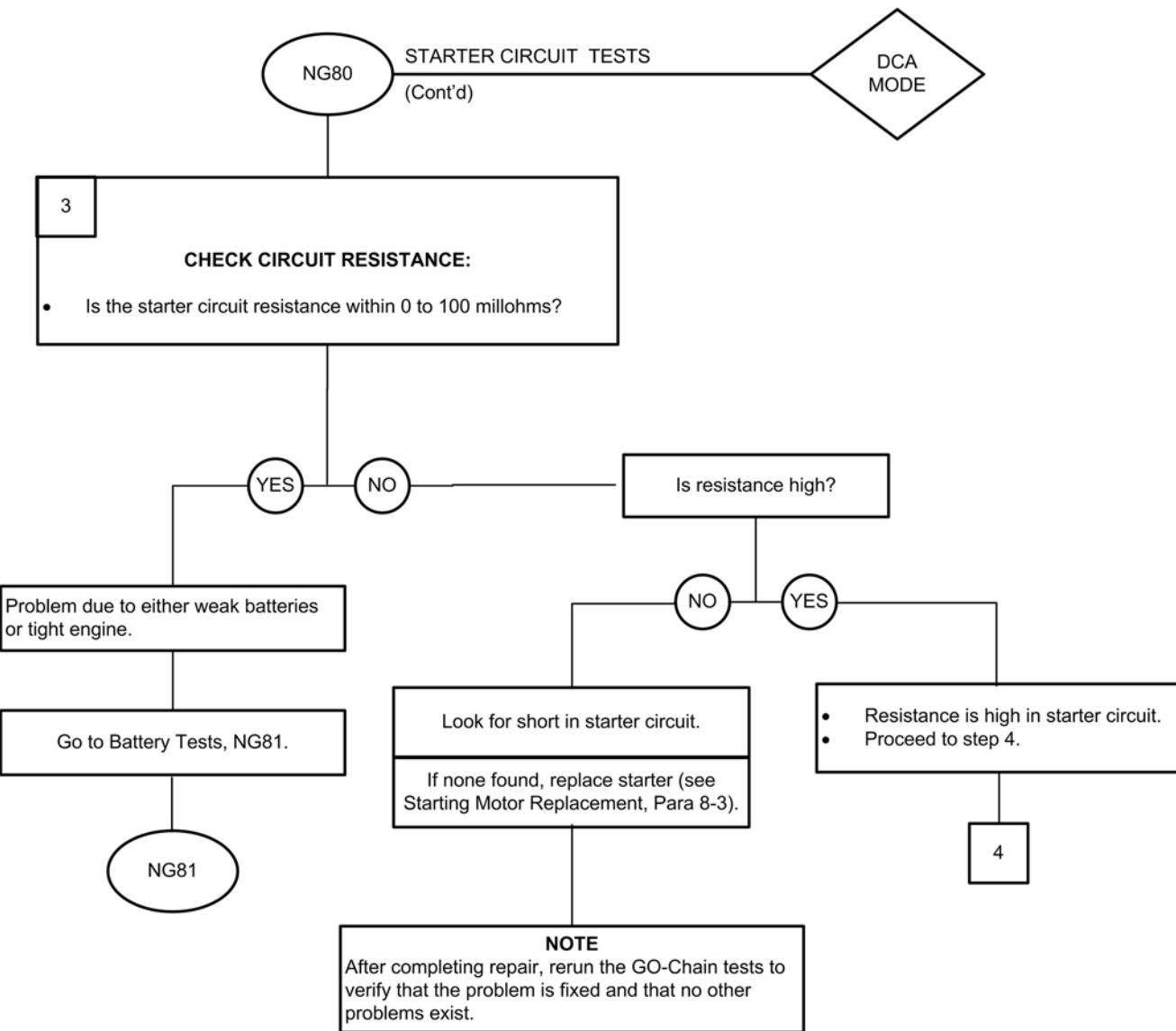


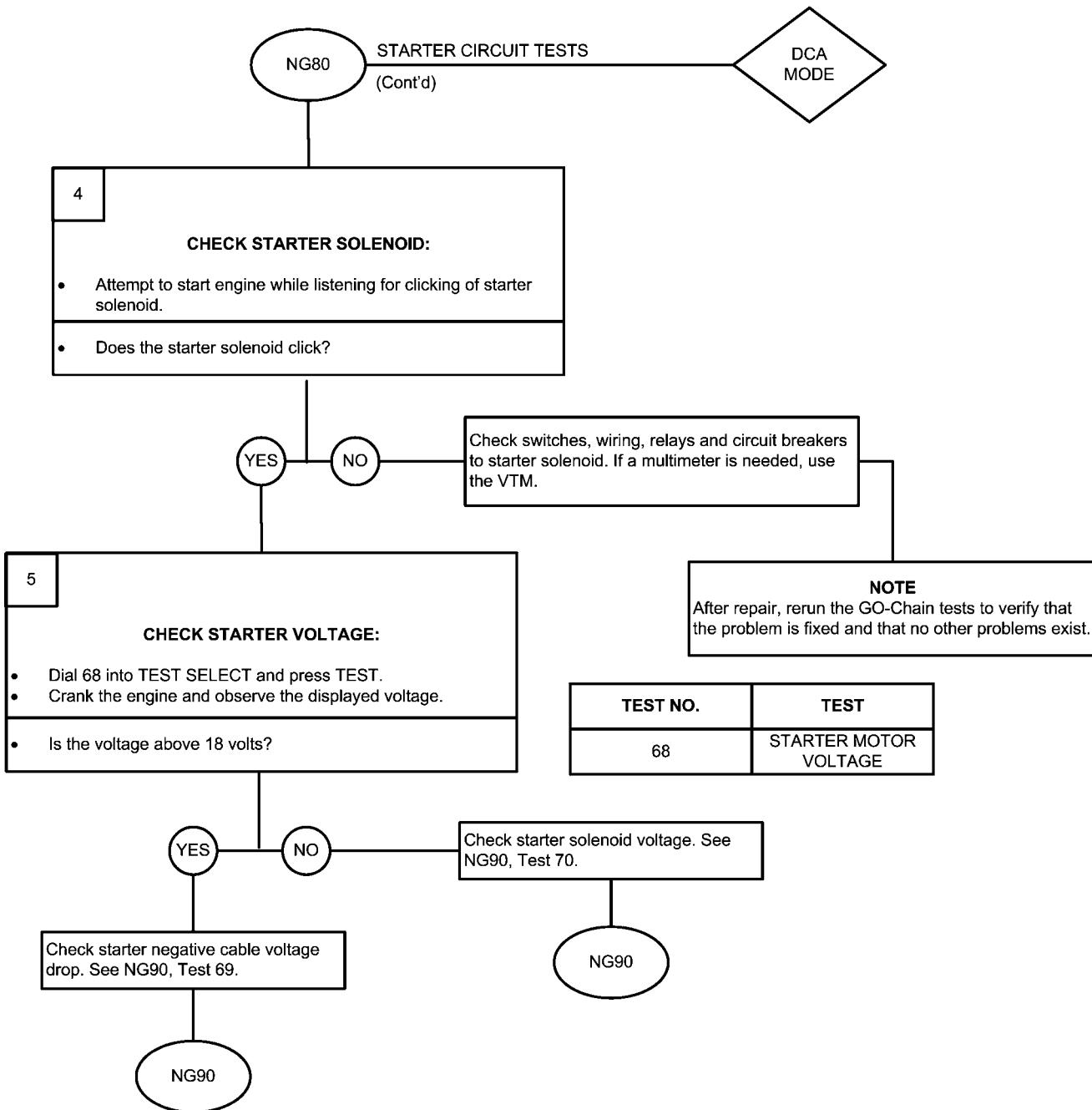
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)



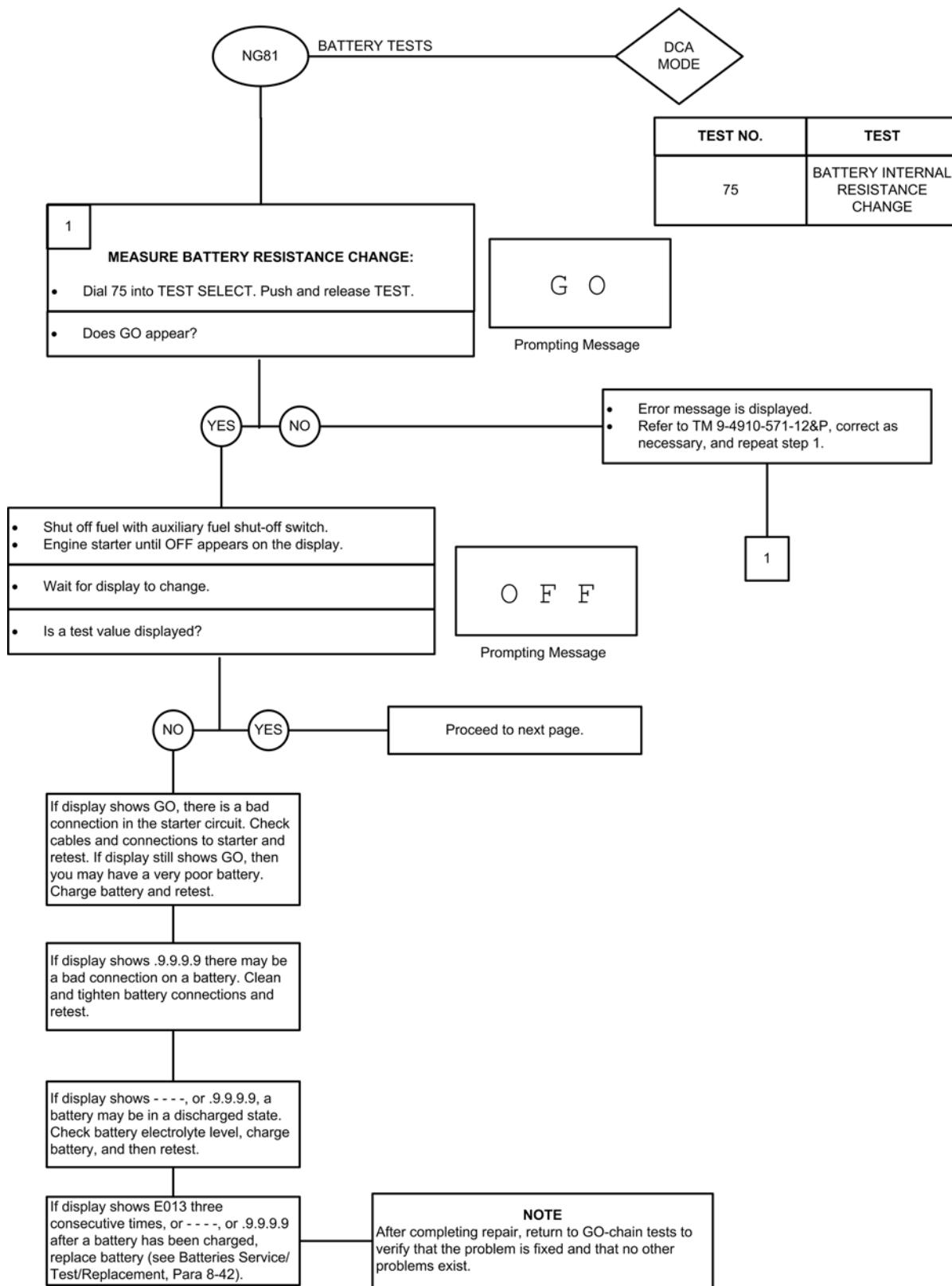


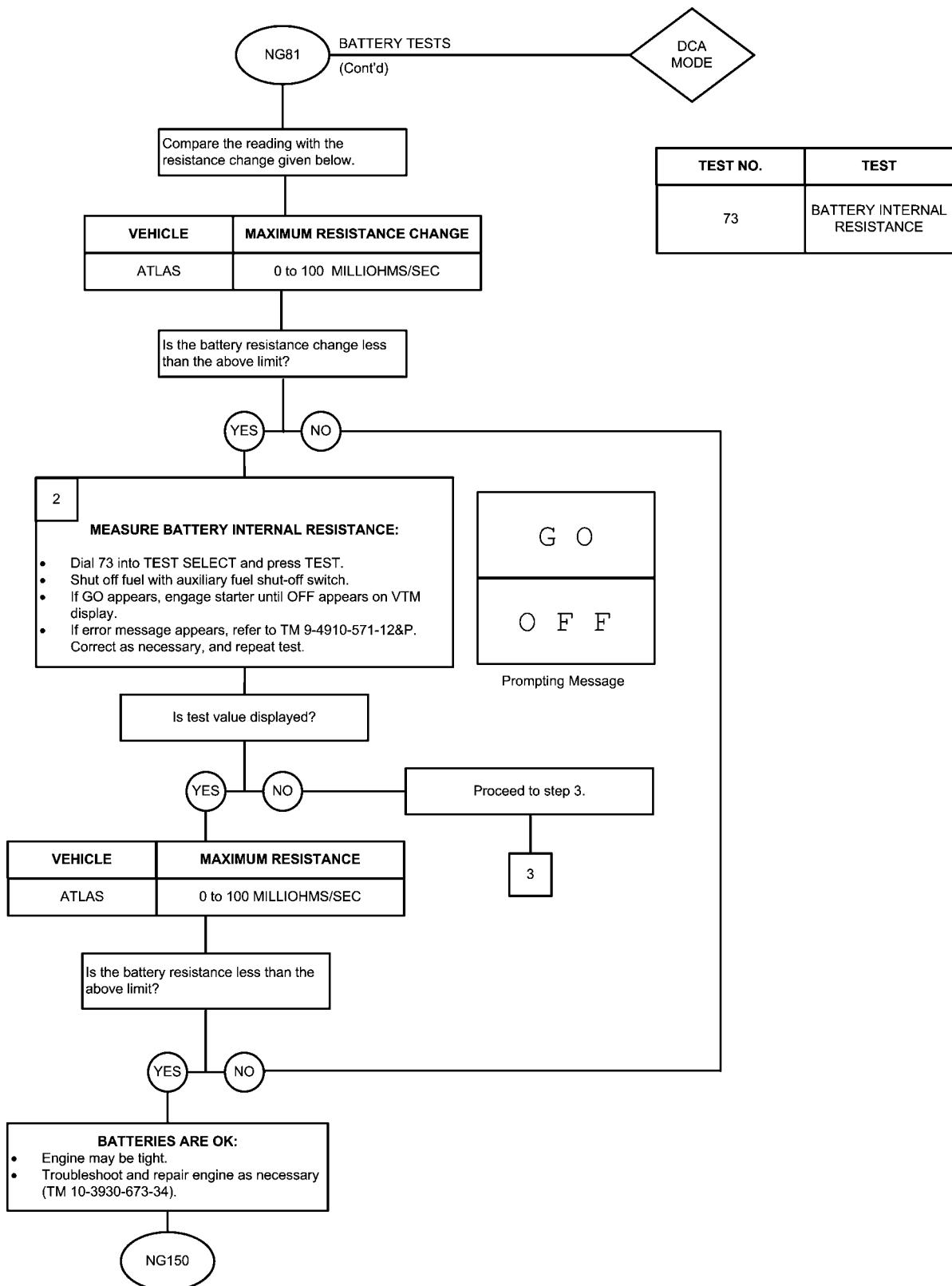
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

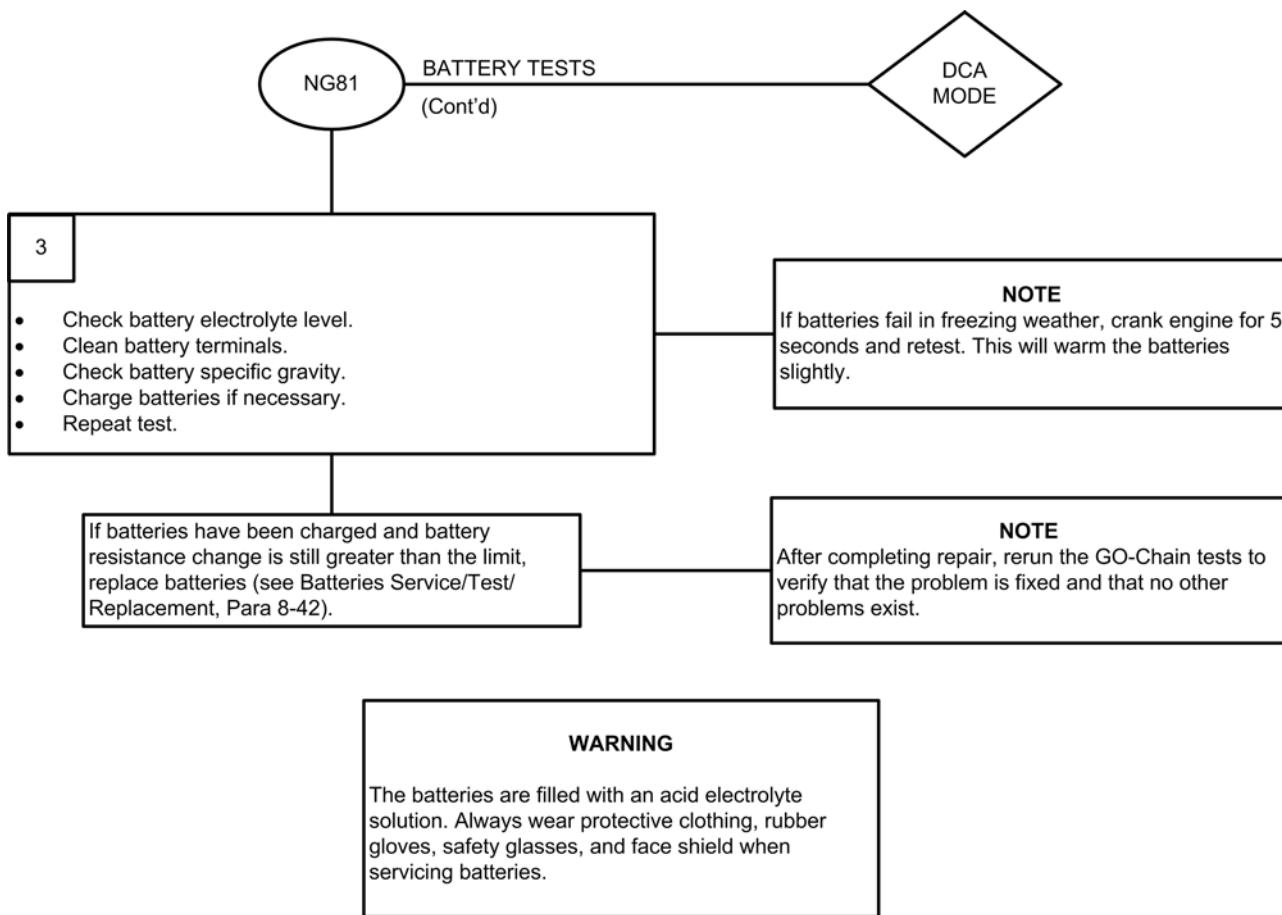


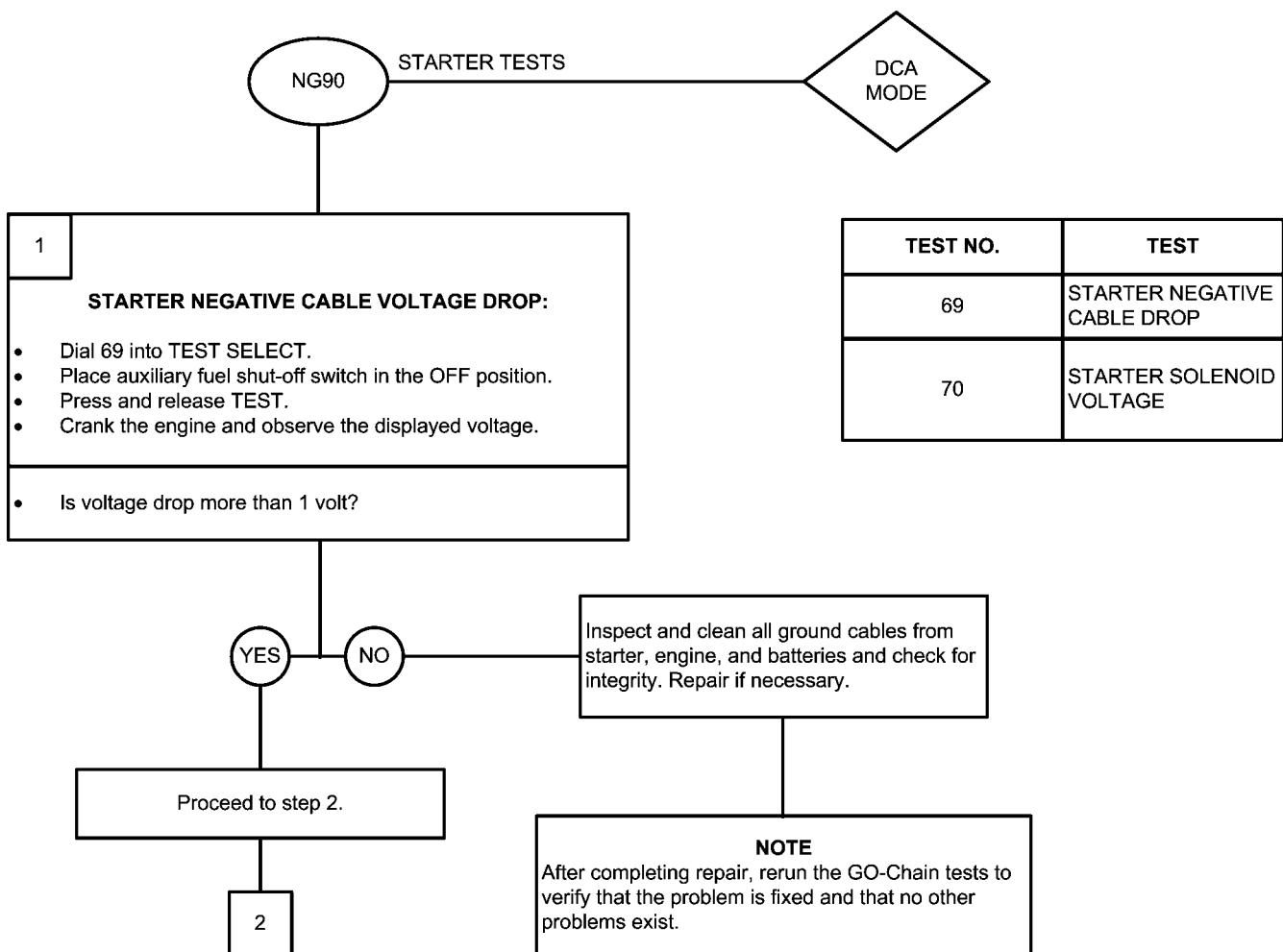


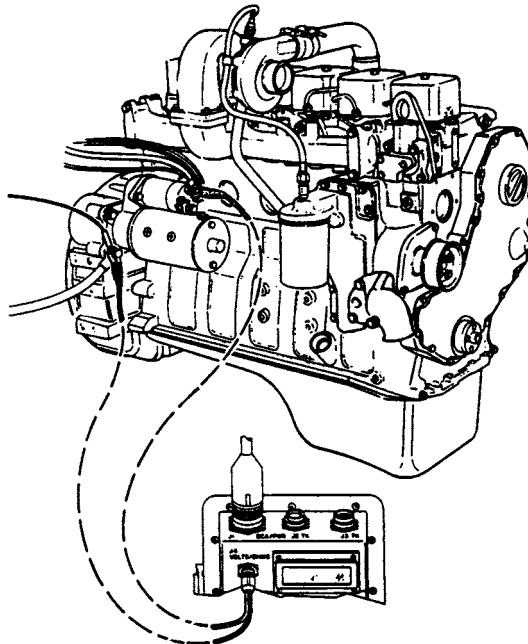
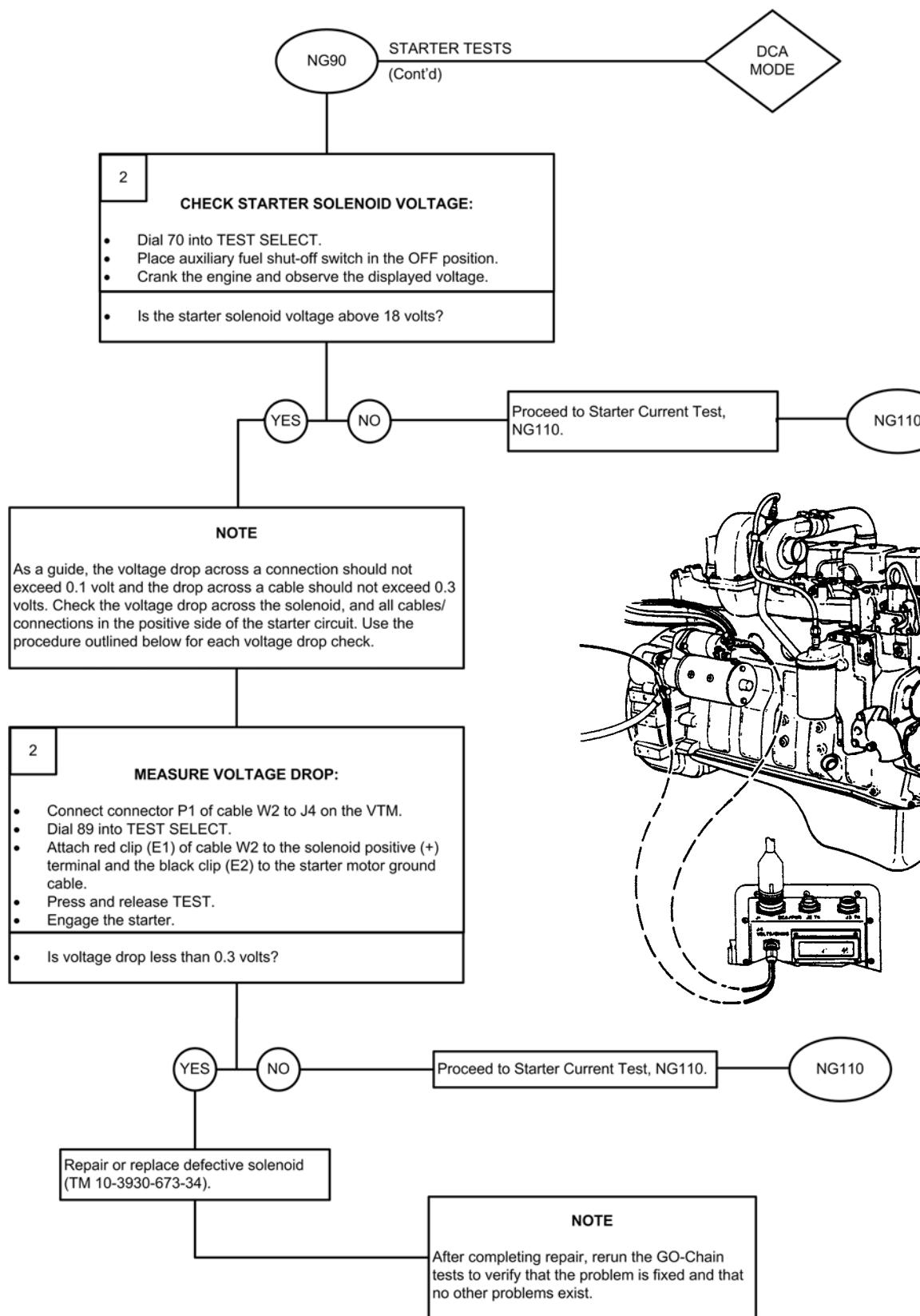
## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)

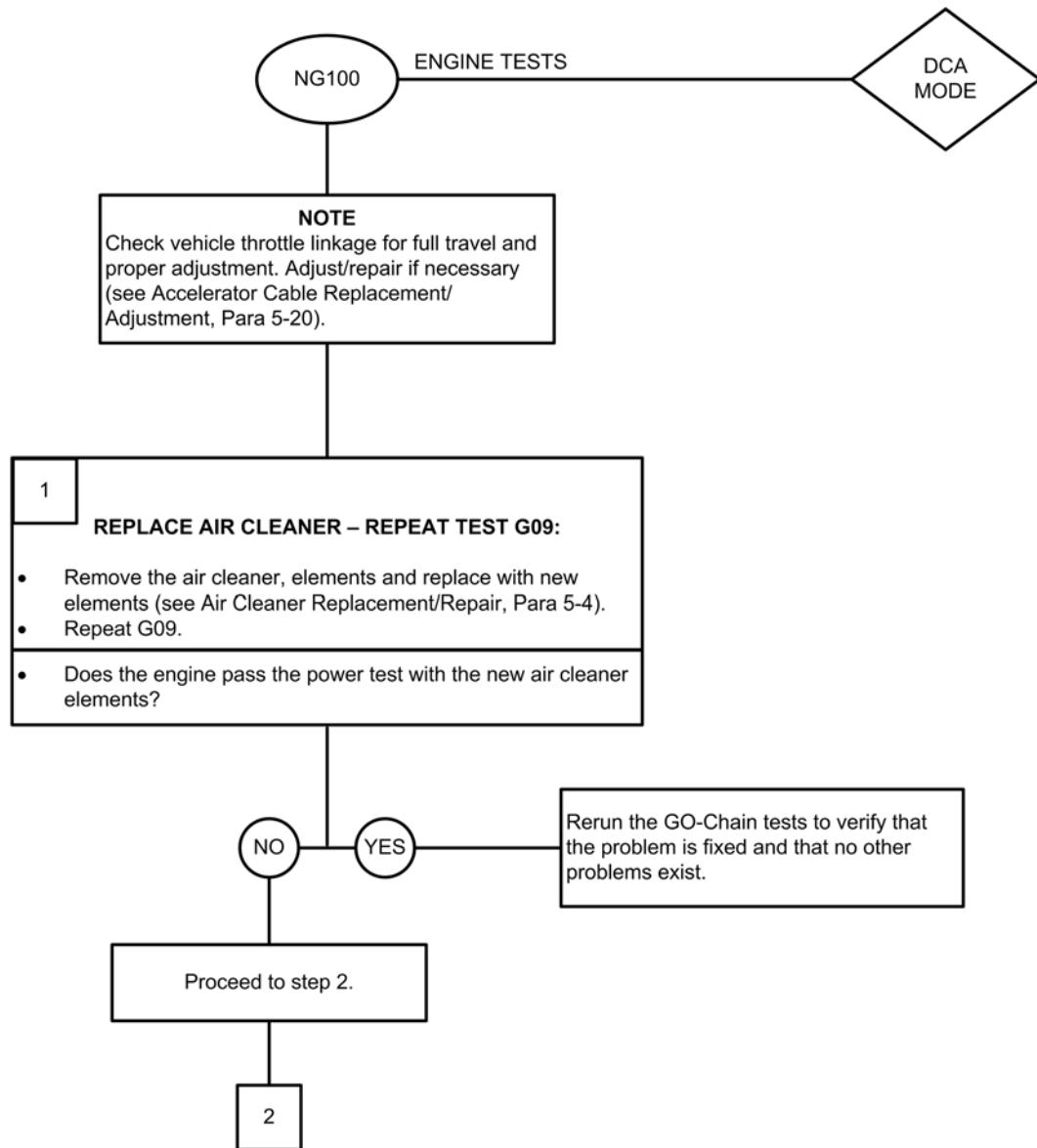




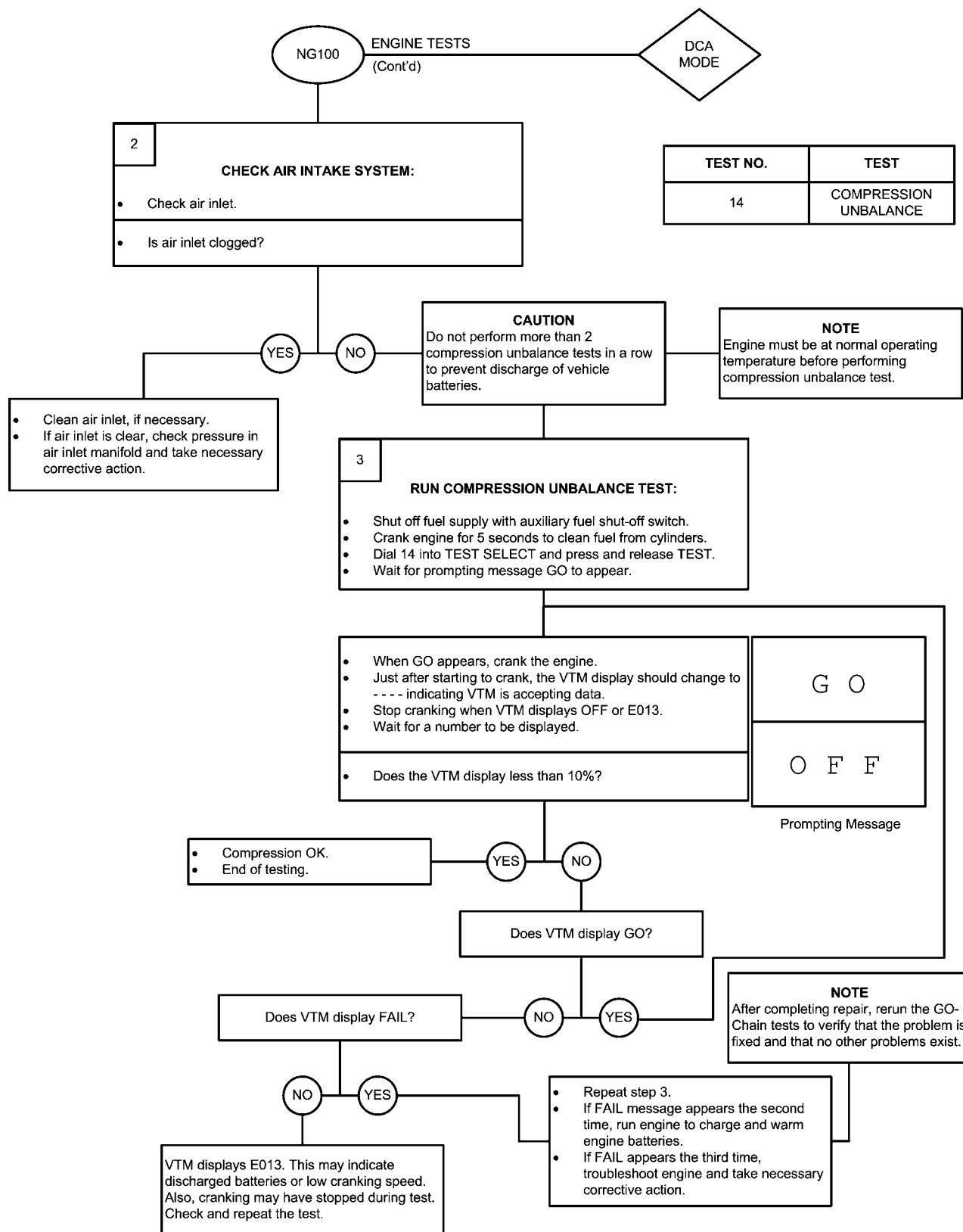
**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**

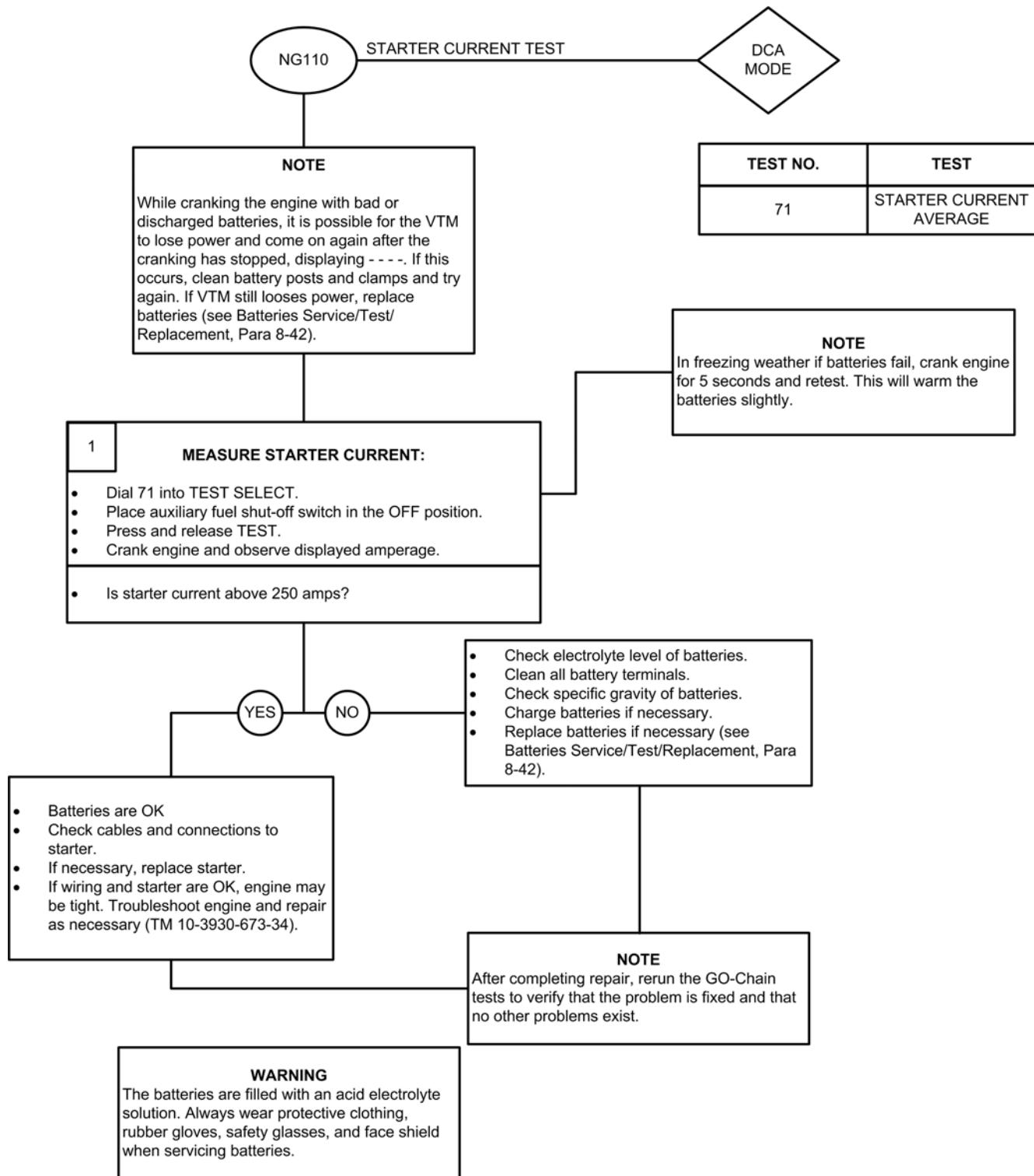


**2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)**



## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)





## ATLAS VEHICLE TEST CARD

## PRE-TEST INSPECTION

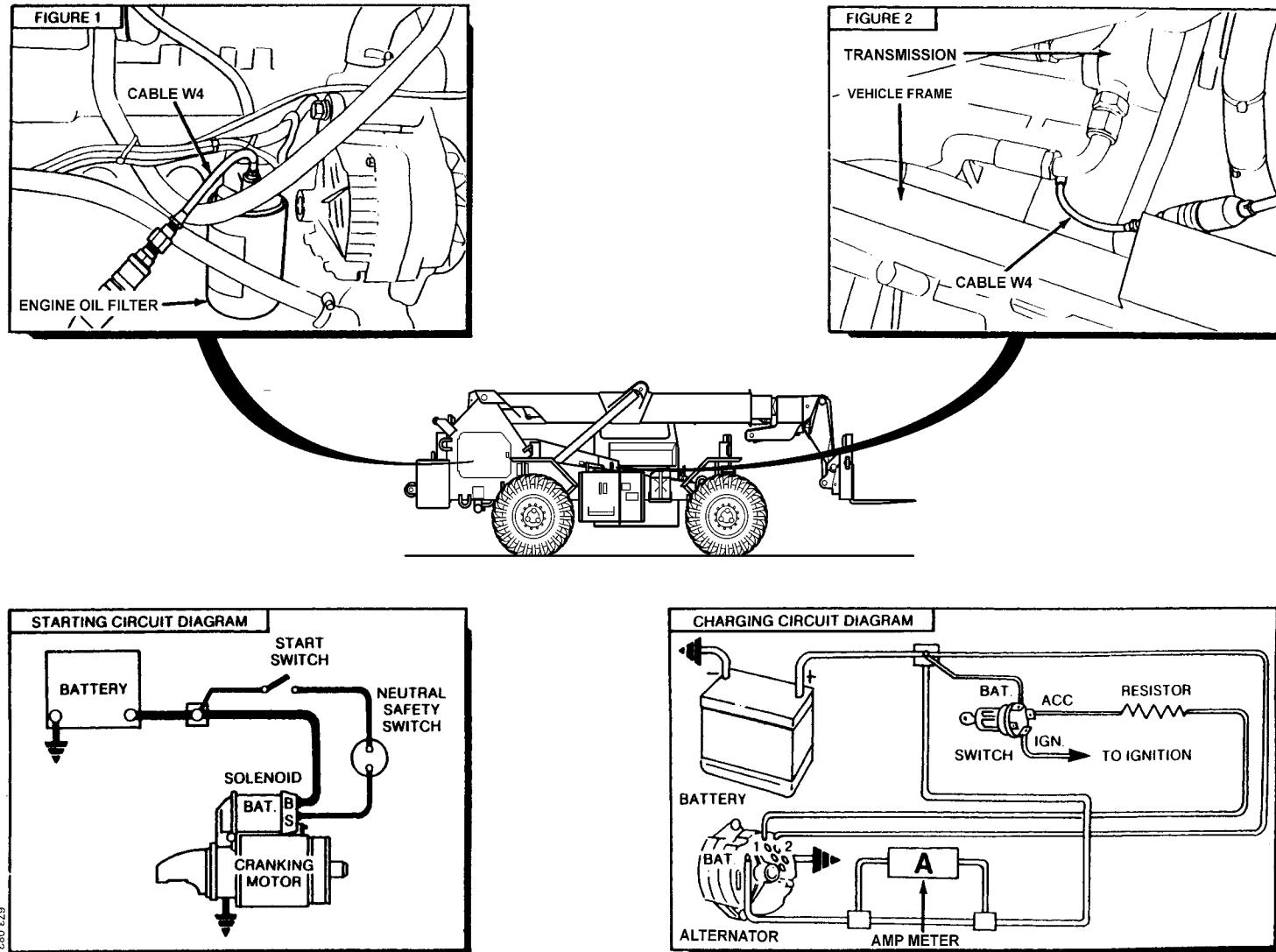
1. Fan Belts	4. Fuel Level
2. Oil Level	5. Batteries
3. Coolant Level	

## POWERING UP VTM

1. Connect VTM to W1 cable. W1 cable attaches to batteries.
2. Enter VID into VTM using test 60.
3. Perform confidence test, test 66. (second entry 99)

MEASUREMENT NAME	VTM TEST NO.	VTM OFFSET LIMITS	OPERATING CONDITION	SPECIAL CONNECTIONS REQUIRED	MIN	LIMITS NORM	MAX	UNITS
Engine RPM (Average)	10	—	Idle	DCA-CABLE W1	975	±50	1075	RPM Average
Power Test	12	—	Engine Warm	DCA-CABLE W1	2000	2000-3900	3900	— — —
Compression Unbalance	14	—	Warm Engine, Crank on GO	DCA-CABLE W1	0	0-10	10	%
Fuel Supply Pressure	24	—	Idle	DCA-CABLE W1	20	18-30	50	PSI
Fuel Filter Pressure Drop (PASS/FAIL)	26	—	Idle	DCA-CABLE W1				PASS/FAIL
Fuel Solenoid Voltage	27	—	Idle	DCA-CABLE W1	20	20-28	28	VOLTS DC
Engine Oil Pressure	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	40	40-90	90	PSI
Transmission Oil Pressure	50	±150	Engine Warm, Neutral	CABLES W1, W4 (FIG 2)	120	120-220	220	PSI
Transmission Clutch Pressure	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	155	155-185	185	PSI
Transmission Converter Charge	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	40	40-70	70	PSI
Transmission Brake Cutoff Valve	50	±150	Engine Warm	CABLES W1, W4 (FIG 1)	5	—	—	PSI
Battery Voltage	67	—	Engine Off	DCA-CABLE W1	24	24-27	27	VOLTS DC
Starter Motor Voltage	68	—	Cranking	DCA-CABLE W1	18	18-27.5	27.5	VOLTS DC
Starter Negative Cable Voltage Drop	69	—	Cranking	DCA-CABLE W1	0	0-3	1	VOLTS DC
Starter Solenoid Volts	70	—	Cranking	DCA-CABLE W1	18	18-27.5	27.5	VOLTS DC
Starter Current Average	71	—	Crank on the GO	DCA-CABLE W1	0	0-250	250	AMPS
Starter Current First Peak	72	±225	Crank on the GO	DCA-CABLE W1	600	600-1300	1300	AMPS (PEAK)
Battery Internal Resistance	73	±225	Crank on the GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS
Starter Circuit Resistance	74	±225	Crank on the GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS
Battery Resistance Change	75	±225	Crank on the GO	DCA-CABLE W1	0	0-100	100	MILLIOHMS/ SECOND
Alternator Output Voltage	82	—	2,000 RPM	DCA-CABLE W1	24	24-28.5	28.5	VOLTS DC
Alternator Negative Cable Voltage Drop	84	—	Idle	DCA-CABLE W1	0	0-1	1	VOLTS DC
Fuel Return Pressure	50	±150	2,000 RPM	DCA-CABLE W1, W4	0	0-20	20	PSI

## 2-18. STE/ICE-R VEHICLE SYSTEM DIAGNOSTIC CHECK (CONT)





## APPENDIX A

### REFERENCES

#### **A-1. SCOPE**

This appendix lists forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to unit maintenance of the ATLAS Clean Burn Diesel, Model Skytrak 10000M.

#### **A-2. DEPARTMENT OF THE ARMY PAMPHLETS**

Consolidated Index of Army Publications and Blank Forms .....	DA Pam 25-30
The Army Maintenance Management System (TAMMS).....	DA Pam 738-750

#### **A-3. FORMS**

Recommended Changes to Equipment Technical Publications.....	DA Form 2028-2
Organizational Control Record for Equipment .....	DA Form 2401
Equipment Inspection and Maintenance Worksheet (Electronic) .....	DA Form 5988-E
Maintenance Request .....	DA Form 2407
Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines.....	DD Form 1397
Product Quality Deficiency Report (NSN 7540-00-105-0078).....	SF 368

#### **A-4. FIELD MANUALS**

Camouflage, Concealment, and Decoys .....	FM 20-3
First Aid .....	FM 4-25.11
Basic Cold Weather Manual.....	FM 31-70
Northern Operations.....	FM 31-71
Mountain Operations (How To Fight) .....	FM 3-97.6
Desert Operations.....	FM 90-3

#### **A-5. TECHNICAL BULLETINS**

Hearing Conservation Program .....	DA Pam 40-501
Equipment Improvement Report and Maintenance Digest (US Army Tank-Automotive Command) Tank-Automotive Equipment .....	TB 430001-39 series
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling System .....	TB 750-651

**A-6. TECHNICAL MANUALS**

Operator's Manual for All Terrain Lifter Army System (ATLAS) Clean Burn Diesel, 10,000 lb Capacity, Model Skytrak 10000M. ....	TM10-3930-673-10
Unit Maintenance, Intermediate Direct Support, and Intermediate General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List) for All TerrainLifter Army System (ATLAS) Clean Burn Diesel, 10,000 lb Capacity, Model Skytrak 10000M. ....	TM10-3930-673-24P
Operator and Organizational Maintenance Manual Including Repair Parts and Special Tools List Simplified Test Equipment for Internal Combustion Engines (STE-ICE) (4910-00-124-2554) ....	TM9-4910-571-12&P
Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries; 4HN, 24V, (NSN 6140-00-069- 3528) MS75047-1; 2HN, 12V (6140-00-057-2553) MS 35000-1; 6TN, 12V (6140-00-057-2554) Ms35000-3 ....	TM9-6140-200-14
Organizational, Direct Support, and General Support Care, Maintenance and Repair: Pneumatic Tires and Inner Tubes ....	TM 9-2610-200-24
Inspection, Care, and Maintenance of Antifriction Bearings ....	TM 9-214
Painting Instructions for Field Use....	TM43-0139
Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) ....	TM 750-244-3
Tool Outfit, Hydraulic Systems Test and Repair (HSTRU) (4940-01-036-5784). ....	TM9-4940-468-13
■ Transportability Guidance for Application of Blocking, Bracing and Tiedown Materiels for Rail Transport ....	TM 55-2200-001-12

**A-7. SPECIFICATIONS AND STANDARDS**

Drycleaning Solvent.....	Fed Spec P-D-680
Methyl Ethyl Ketone, Technica1 .....	TT-M-261

**A-8. OTHER PUBLICATIONS**

Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) .....	CTA-50-970
Army Medical Department Expendable/Durable Items.....	CTA 8-100

## APPENDIX B

### MAINTENANCE ALLOCATION CHART (MAC)

#### Section I. INTRODUCTION

##### **B-1. THE ARMY MAINTENANCE SYSTEM MAC**

- a.** This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.
- b.** The MAC immediately following this introduction designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown in the MAC in column (4) as:

Field - includes subcolumns:

C - Operator/Crew  
O - Unit  
D - Direct Support

Sustainment - includes subcolumns:

H - General Support  
D - Depot

- c.** Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.
- d.** Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

##### **B-2. MAINTENANCE FUNCTIONS**

Maintenance functions are limited to and defined as follows:

- a. Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).
- b. Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
- d. Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
- e. Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.

## B-2. MAINTENANCE FUNCTIONS (CONT)

**f. Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

**g. Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

**h. Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and the assigned maintenance level is shown as the third position code of the SMR code.

**i. Repair.** The application of maintenance services<sup>1</sup> including fault location/troubleshooting<sup>2</sup>, removal/installation and disassembly/assembly<sup>3</sup> procedures, and maintenance actions<sup>4</sup> to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

**j. Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e. DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

**k. Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g. hours/miles) considered in classifying Army equipment/components.

## B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

**a. Column (1), Group Number.** Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

**b. Column (2), Component/Assembly.** Column 2 contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

**c. Column (3), Maintenance Function.** Column 3 lists functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

**d. Column (4) - Maintenance Level.** Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average

- 
1. Services - Inspect, test, service, adjust, align, calibrate, and/or replace.
  2. Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).
  3. Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e. identified as maintenance significant).
  4. Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

- C - Operator/Crew Maintenance
- O - Unit Maintenance
- D - Direct Support Maintenance

Sustainment:

- H - General Support Maintenance
- D - Depot Maintenance

\*Asterisk indicates level of maintenance authorized to complete this function. No time is established.

**e. Column (5), Tools and Equipment Ref Code.** Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to tools and test equipment in Section III.

**f. Column (6), Remarks Code.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section IV.

#### **B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III**

**a. Column (1), Tool or Test Equipment Code.** The tool and test equipment reference code correlates with a code used in the MAC, Section II, column 5.

**b. Column (2), Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.

**c. Column (3), Nomenclature.** Name or identification of the tool or test equipment.

**d. Column (4), National Stock Number.** The National Stock Number of the tool or test equipment.

**e. Column (5), Tool Number.** The manufacturer's part number, model number, or type number.

#### **B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV**

**a. Column (1), Remarks Code.** The code recorded in column 6, Section II.

**b. Column (2), Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
ALL TERRAIN LIFTER, ARMY SYSTEM (ATLAS)**

**Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS)**

(1) <b>Group Number</b>	(2) <b>Component/Assembly</b>	(3) <b>Maintenance Function</b>	(4) <b>Maintenance Level</b>					(5) <b>Tools and Equipment</b>	(6) <b>Remarks</b>		
			<b>FIELD</b>		<b>SUSTAINMENT</b>						
			<b>Unit</b>	<b>DS</b>	<b>GS</b>	<b>Depot</b>					
			<b>C</b>	<b>O</b>	<b>F</b>	<b>H</b>	<b>D</b>				
01	ENGINE								A		
0100	Engine Assembly:	Inspect	0.1								
		Service	0.1	1.5				2,3	C,I		
		Test		1.0				4,11	B		
		Replace			7.0			5			
		Repair			10.0			5,6			
		Rebuild				40.0		5,6			
	Engine Mounts	Inspect	0.1								
		Replace			2.0			2,5			
	Lifting Bracket	Replace			1.0			2,5			
0101	Crankcase, Cylinder Block, Cylinder Head:	Replace				30.0		5			
	Cylinder Block	Replace				8.0		5,6			
	Cylinder Head	Adjust			2.0			5	D		
	Assembly with Valves	Replace			2.0			5			
		Repair				8.0		5,6			
0102	Crankshaft:	Replace									
	Crankshaft	Replace				8.0		5			
		Repair				8.0		5,6			
	Crankshaft Main Bearings	Replace				6.0		5	E		
	Oil Seals	Replace				4.0		5			
	Vibration Damper	Replace				4.0		5			
0103	Flywheel Assembly:	Replace									
	Flywheel	Replace			4.0			5,15			
	Flywheel Housing and Cover	Replace			4.0			5			

**Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment	(6) Remarks			
			FIELD		SUSTAINMENT						
			Unit		DS	GS					
			C	O	F	H	D				
0104	Pistons, Connecting Rods:	Replace				10.0		6			
	Pistons, Piston Pins, and Rings					10.0					
0105	Connecting Rods and Bearings	Replace						6			
	Valves, Camshaft and Timing System:										
	Rocker Lever Covers	Replace	1.0					2			
	Rocker Lever Assembly	Replace		4.0							
	Repair	Repair				2					
	Tappet, Valve	Replace				4.0		5			
	Camshaft and Timing Gears	Replace				24.0		5			
	Front Housing	Replace				3.0		2,5			
	Front Cover	Replace	1.0	3.0				2			
0106	Push Rod Cover	Replace									
	Engine Lubrication System:										
	Oil Pan	Inspect	0.1					5	F		
	Replace	Replace									
	Oil Pump Inlet Tube	Replace			4.0						
	Engine Oil Pump	Replace			1.0			2			
	Oil Filter	Replace			1.0			2			
	Oil Filter Base	Replace			0.2			14			
	Oil Dipstick and Dipstick Tube	Replace			0.5			2			
	Oil Filler Neck	Replace			0.1			2			
0108	Oil Hoses, Tubes, and Fittings	Inspect	0.1					2	F		
	Replace	Replace									
	Oil Sampling Valve	Service	0.1	0.1				4			
	Replace	Replace									
	Oil Cooler	Replace				1.0		2			
	Manifolds:										
0108	Exhaust Manifold	Replace	1.0					2			
	Intake Manifold Cover	Replace									

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
03	FUEL SYSTEM										
0301	Fuel Injector: Injector	Test			0.5			6,18			
		Replace			1.0			5			
0302	Fuel Pumps: Fuel Injection Pump	Test		0.5				2			
		Adjust			2.0			2			
		Replace			4.0			4,5,6			
	Fuel Shutoff Valve	Test		0.1				3			
	Fuel Shutoff Solenoid	Replace			0.5			2			
	Fuel Transfer Pump	Test		0.5				3			
		Replace		1.0				2			
0304	Air Cleaner: Air Cleaner Assembly	Replace		0.7				2			
		Repair		1.0				2			
	Air Cleaner Elements	Service	0.2	0.2					H		
		Replace		0.2				2			
	Air Inlet Cap	Replace		0.2				2			
	Air Inlet Hoses and Tubing	Replace		0.5				2			
0305	Turbocharger: Turbocharger Assembly	Replace		2.0				2			
		Repair				4.0		3			
	Turbocharger Air Hoses	Replace		1.0				2			
	Turbocharger Oil Hoses and Tubes	Replace		0.2				2			
0306	Tanks, Hoses, Tubes, and Fittings										
	Fuel/Hydraulic Tank	Inspect	0.1						I		
		Service	0.2	1.5					J		
		Replace			2.0			2			
		Repair			2.0			7,8			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0309	Fuel Filter	Inspect	0.1					F			
		Service		0.5					2		
		Replace		0.5					2		
	Fuel Hoses, Tubes, and Fittings	Inspect	0.1						2		
		Replace		1.0					2		
		Service	0.1						2		
0311	Fuel Filter Assemblies	Replace		0.5				14			
		Replace		0.5							
0312	Engine Starting Aids:	Replace		0.7				K			
		Repair		1.0					2		
		Replace		0.2					2		
	Ether Start Cartridge	Test		1.0					3		
		Replace		1.0					2		
		Replace		0.3					2		
04	Accelerator Controls:	Adjust		0.5				K			
		Replace		2.0					2		
		Inspect	0.1								
	Accelerator Pedal and Linkage	Replace		2.0					2		
		Repair		1.0					2		
		Replace		0.7					2		
05	EXHAUST SYSTEM										
	Muffler	Replace		0.5					2		
	Tail Pipe	Replace		0.3					2		
0501	COOLING SYSTEM	Replace		0.3					2		
		Replace		0.5					1		
		Replace		0.5					3		
	Radiator:	Replace		2.0					2		
		Repair							2.5		
		Inspect	0.1								
		Test		0.5							

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0502	Radiator Overflow Tank	Replace		0.5							
	Cover	Replace		2.0				2			
0503	Water Manifold, Headers, Thermostats, Housing Gasket:										
	Thermostat	Test		1.0				3			
		Replace		0.5				2			
	Housing	Replace		1.0				2			
	Radiator Hoses	Inspect	0.1								
		Replace		0.5				2			
0504	Water Pump	Replace		2.0				2			
0505	Fan Assembly:										
	Fan Blade and Spacer	Inspect	0.1					2			
		Replace		1.5				2			
	Fan Guard	Inspect	0.1					2			
		Replace		1.0				2			
	Drive Belt and Tensioner	Inspect	0.1					2			
		Replace		1.5				2			
06	ELECTRICAL SYSTEM										
0601	Alternator:										
	Alternator and Alternator Connections	Replace		0.4				2			
		Repair				4.0		5			
	Pulley	Replace		1.0				2			
0603	Starter:										
	Starting Motor	Replace		0.4				2			
		Repair				4.0		5			
	Neutral Safety Switch	Inspect		0.2				2			
		Replace		0.5							
0607	Instrument Panel:										
	Instrument Panel	Replace		4.0				2,3			
	Gages, Switches, Lights	Inspect	0.1								
		Replace		0.5				3			
	Circuit Breakers	Replace		0.2				3			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0608	Miscellaneous Electrical Components: Blackout/Service Light Switch Temperature and Pressure Switches Electric Joystick Assembly Fork Autoleveler Switch Relays Boom Electrical Junction Box Assembly STE/ICE-R Electrical Components	Inspect Replace Test Replace Inspect Replace Inspect Adjust Test Replace Test Replace Inspect Replace Repair Test Replace	0.1	0.5				2			
				0.5				3			
				0.2				3			
			0.1	1.0				3			
			0.1	1.0				2,11			
				1.0				3			
				1.0				3			
				0.5				3			
				0.2				3			
			0.1	2.0				3			
0609	Lights: Headlights/Floodlights Blackout Headlights Stop and Blackout Tailights Blackout Marker Lights	Inspect Replace Repair Inspect Replace Repair Inspect Replace Repair Inspect Replace Repair Inspect Replace Repair Inspect Replace 	0.1	2.0				3			
				2.0				3			
				2.0				3			
				0.5				3,10	B		
				0.2				3			
			0.1	1.0				2			
				1.0				2			
			0.1	0.5				2			
				0.5				2			
			0.1	1.0				2			
				1.0				2			
			0.1	0.5				2			
				0.5				2			
			0.1	0.5				2			
				0.5				2			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0610	Turn Signal Lights	Inspect	0.1					2			
		Replace		0.5							
		Repair		0.5				2			
	Turn Signal Switch	Replace		0.5				3			
		Replace		0.5							
	Turn Signal Flasher	Replace		0.5				3			
		Replace		0.5							
	Sending Units and Warning Switches:	Test		0.5				3			
		Replace		0.1							
	Oil Pressure Sender	Test		0.5				3			
		Replace		0.1							
0611	Water Temperature Sender	Test		0.5				3			
		Replace		0.1							
	Transmission Temperature Sender	Test		0.5				3			
		Replace		0.1							
	Fuel Level Sender	Test		0.5				3			
		Replace		0.7							
	Horn, Siren:	Inspect	0.1					3			
		Replace		0.1							
0612	Back-up Alarm	Test	0.1					3			
		Adjust		0.5							
	Back-up Switch	Replace		1.0				3			
		Test		0.1							
	Horn	Inspect	0.1					3			
		Replace		0.1							
	Batteries:	Inspect	0.1					3			
		Test		0.5							
		Service		0.5							
	Battery Cables	Replace		0.5				2			
		Service		0.1				3			
		Inspect	0.1								
	Battery Boxes	Replace		0.2				2			
		Replace		0.5							

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0613	Wiring Harnesses: Cab Wiring Harness  Main Wiring Harness  Boom Electrical Cable  STE/ICE-R Harness  Electric Joystick Harness  Slave Receptacle	Test  Replace  Repair  Inspect  Test  Replace  Repair  Test  Replace  Repair  Test  Replace  Repair  Test  Replace  Repair  Replace	0.5  8.0  2.5  0.1  0.5  8.0  2.0  0.5  4.0  0.5  0.5  4.0  0.5  0.5  0.5  0.3	3  2  5  3  2  5  3  2  3  3  2  3  2							
07	TRANSMISSION										
0705	Transmission Shifting Components:  Transmission Shifter  Transmission Cables  Transmission Disconnect Pedal  Transmission Disconnect Master Cylinder	Adjust  Replace  Replace  Replace  Replace	1.0  2.5  2.0  1.0  2.0  2.0  0.3					1  2  2  2  2		P	
0708	Torque Converter	Test  Replace  Repair		0.2  8.0  14.0				5  2,5  2,5			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
0710	Transmission: Transmission Assembly	Inspect	0.1								
		Service	0.1	0.5				2,3	F		
		Test		0.5				17	C,J		
		Replace			8.0			5			
		Repair			8.0			5			
		Rebuild				40.0		5,6,12			
		Mounting Brackets	Replace		2.0			5			
		Front Cover Assembly	Replace		2.0			5			
			Repair			1.0		5			
		Clutch Packs	Replace			4.0		5,12			
			Repair			3.0		5,6			
0714	Servo Unit: Control Valve	Replace			4.0			5			
			Repair			3.0		5,6			
		Case and Covers	Replace			2.0		5			
			Repair			2.0		5			
		Input Shaft	Replace			4.0		5			
			Repair			1.0		5,6			
		Transmission Oil Pump	Replace			8.0		5			
			Repair			4.0		5			
		Breather	Replace		0.5			2			
		Oil Filter	Replace		0.2			5,6			
		Valve, Oil Sampling	Service	0.1				2			
			Replace		0.1			14			
0721	Coolers, Pumps, Motors: Transmission Cooler	Inspect	0.1					4			
		Replace			2.0			2			
			Repair			4.0		2			
		Transmission Cooler	Replace		0.1			5			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
09	PROPELLER AND PROPELLER SHAFTS										
0900	Front and Rear Propeller Shafts	Service	0.1					3			
		Replace	0.3					3			
		Repair	0.3					3			
	Transmission Propeller Shaft	Service	0.1					3			
		Replace	1.0					3			
		Repair	1.0					3			
10	FRONT AXLE										
1000	Front Axle Assembly	Inspect	0.1								
		Service	0.1					3			
		Replace		2.0				5			
		Repair			22.0			5			
	Pin, Axle Carrier	Service	0.1					3			
		Replace		0.7				5			
1002	Front Differential Carrier Assembly	Service	0.3					3			
		Replace			4.0			5	M		
		Repair			2.0			5			
1003	Front Planetary Wheel Ends	Service	0.3					3			
		Replace		1.0				5			
		Repair			4.0			5	M		
11	REAR AXLE										
1100	Rear Axle Assembly	Inspect	0.1								
		Service	0.1					3			
		Replace		2.0				5			
		Repair			22.0			5			
	Pin, Axle Carrier	Service	0.1					3			
		Replace		0.7				5			
1102	Rear Differential Carrier Assembly	Service	0.3					3			
		Replace			4.0			5			
		Repair			2.0			5	M		
1103	Rear Planetary Wheel Ends	Service	0.3					3			
		Replace		1.0				5	M		

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
12	BRAKES	Inspect			1.0			5,6			
		Repair			4.0						
		Parking Brake:									
		Parking Brake Assembly	Inspect	0.1							
			Adjust		1.0						
			Replace		1.0						
			Repair			2.0					
		Brake Pads	Inspect		0.5						
			Replace		1.0						
		Brake Valve	Inspect		0.2						
			Replace		1.0						
1202	Service Brakes:							2			
		Disc Brake Assembly	Replace		1.0						
			Repair			1.5					
		Brake Pads	Inspect		0.5						
1204	Hydraulic Brake System:							3			
		Brake Control Valve	Replace		1.0						
		Accumulator	Test		0.2						
			Replace		0.5						
		Hoses, Tubes, and Fittings	Inspect	0.1							
13	WHEELS AND TRACKS		Replace		1.0			5			
		Wheel Assembly	Inspect	0.1							
			Replace		1.0						
			Repair		1.0						
1311	Tire		Inspect	0.1				2			
			Service	0.1							
			Replace		1.0						
			Repair			1.0					

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT					
			Unit		DS	GS				
			C	O	F	H	D			
14	STEERING									
1401	Steering Gear Assembly:									
	Steering Wheel	Replace	0.5				3			
	Steering Column	Replace	1.0				3			
	Drive Wheel Spindle	Service	0.2				3			
		Adjust		1.0			2			
		Replace		2.0			5			
	Tie Rod	Service	0.2				3			
		Adjust	0.5				1			
		Replace	1.5				3			
	Universal (Cardan) Steering Joints	Replace	1.5				3			
1410	Hydraulic Pump:									
	Emergency Steering Pump	Test	0.1	0.2			17			
		Replace		1.0			2			
		Repair			2.0		5			
1411	Hoses, Tubes, Fittings	Inspect	0.1							
		Replace		0.5			2			
		Repair		0.5			3,9			
1412	Hydraulic Cylinders:									
	Steering Cylinders	Inspect								
		Service								
		Replace	0.2							
1414	Steering System Valves:									
	Steering Valve, Control	Replace		1.0			3			
		Repair					5			
	Valve, Steering Select, Solenoid	Test		0.5			16			
		Replace		1.0			2			
15	FRAME, TOWING ATTACHMENTS, AND DRAWBARS									
1501	Frame Assembly	Repair				2.0	7,8			
1502	Counterweight	Replace	0.3				3			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
1503	Pintle Hook	Inspect	0.1								
		Service		0.1				3			
		Replace		0.3				2			
		Repair		0.5				2			
18	BODY, CAB, HOOD AND HULL										
1801	Body, Cab, Hood and Hull Assemblies:										
	Engine Covers	Replace		0.3				2			
	Radiator Cover	Replace		0.5				2			
	Engine Door Panel	Replace		0.1				2			
	Transmission Cover	Replace		0.1				2			
	Cab Assembly with ROPS/ FOPS	Inspect	0.2								
		Replace			8.0			5	N		
		Repair			1.5			5,7,8	L		
	Sound Suppression Panels	Replace			1.0			2			
	Doors	Service		0.1				3			
		Replace		0.2				2			
		Repair			1.0			5,7,8	L		
1802	Fenders, Running Boards, Windshield Glass:										
	Fenders	Replace		0.2				2			
	Fender Braces	Replace		0.6				2			
	Cab Windows	Replace		2.0				3			
1806	Seat:										
	Seat Assembly	Inspect	0.1								
		Replace		1.0				2			
		Repair		1.0				3			
	Seat Suspension Assembly	Replace			1.0			2,5			
	Seat Belts	Inspect	0.1								
		Replace		0.2				2			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
22	BODY, CHASSIS AND HULL ACCESSORY ITEMS										
2202	Accessory Items:										
	Front and Rear Wiper Assemblies	Inspect Replace Repair	0.1	1.0 0.5				2 2			
	Front and Rear Windshield Washer Assembly	Inspect Service Replace Repair	0.1	0.3 0.6 0.6				2 2			
	Left and Right Hand Mirrors	Inspect Replace	0.1	0.5				2			
	Fans, Ventilation	Inspect Replace	0.1	0.5				2			
2207	Winterization Equipment:										
	24V Heater/Air Conditioner Assembly	Inspect Replace Repair	0.1	3.0 2.0				2 2			
	Compressor Belt	Replace		0.5				2			
	Compressor, Air Conditioner	Remove Repair		1.0 4.0				19,20 2,5			
	Temperature Control Valve	Inspect Replace	0.1	1.0				2			
	AC Thermostat	Replace		0.5				2			
	Heater/AC Fan Switches	Replace		1.0							
	Heater Hose, Lines and Fittings	Inspect Replace	0.1	1.0				2			
	Cab Blower	Replace		1.0							
	Heater Plenum and Hoses	Replace		1.0							
2210	Data Plates	Replace		0.2				3			
24	HYDRAULIC AND FLUID SYSTEMS										
2401	Drive Pump Assemblies:										

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT					
			Unit	DS	GS	Depot				
			C	O	F	H	D			
2402	Tandem Gear Pump	Test	0.5				16			
		Replace	1.5				2			
		Repair			2.0		5,16			
	Piston Pump	Test	0.5				17			
		Replace	1.0				2			
	Control Valves									
	Main Control Valve Assembly	Adjust	0.5				2			
		Replace	2.0				2			
		Repair			2.0		5			
	Attachment Control Valve Assembly	Replace	1.0				2			
2404		Repair			2.0		5			
	Priority Valve	Replace	0.5				2			
	Relief Valve, Frame Tilt/Brakes	Test	0.5				16			
		Replace	0.5				2			
	Shuttle Valve	Replace	0.5				2			
	Frame Tilt Valve	Replace	0.5				2			
	Boom Cylinder Flow Control Valve	Replace	0.4				2			
	Tilt Cylinder:									
	Frame Tilt Cylinder	Service	0.3				3			
		Replace	0.7				2			
2405		Repair			1.0	1.0	5,13			
	Carriage Tilt Cylinder	Service	0.3				3			
		Replace	2.0				2			
		Repair			1.0	1.0	5,13			
	Attachment:									
	Carriage Assembly	Inspect	0.1				3			
		Service		0.3			2			
		Replace		0.1			5			
		Repair			2.0					
	Forks	Inspect	0.1				2			
		Replace		1.0						
		Repair		1.0						
	Fork Bushings	Inspect	0.1				3			
		Replace		0.5						

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
2406	Attachment	Inspect	0.1	0.3				3			
		Service		4.0				2			
		Replace			2.0			7,8			
	Boom Assembly	Inspect		0.5							
		Service		0.2				3			
		Replace			5.0			3			
	Boom Pivot Pins	Repair			8.0			3			
		Inspect	0.1	0.1							
		Service			1.0			3			
	Wear Pads, Boom	Replace						5			
		Inspect		0.5							
		Replace			8.0			5,8	O		
	Pulley	Replace		1.0				3			
	Sheave	Replace		1.0				3			
	Extend and Retract Chains	Inspect		0.1							
		Adjust		0.5				2			
		Replace			4.0			2			
2407	Strainers, Filters, Hoses, Tubes and Fittings:										
		Inspect	0.1								
	Hoses, Lines and Fittings	Replace		1.0				2			
		Repair		0.5				6,9			
		Inspect	0.1								
	Tubing	Replace		0.5				3			
		Inspect									
		Replace									
	Oil Sampling Valve	Service	0.1					4			
		Replace		0.1				2			
		Service									
	Strainer	Replace		0.2				2			
		Service									
		Replace		0.5				2			
	Oil Filter	Replace		0.2					14		
	Hydraulic Cylinders:										
		Inspect	0.2								
	Boom Extend Cylinder	Replace			3.0			5			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
2408	Fork Sideshift Cylinders	Repair			1.5			5,13			
		Inspect	0.2					3			
		Replace		1.0				13,14			
		Repair			1.0						
	Boom Hoist Cylinders	Inspect	0.2					4			
		Service		0.1				3			
		Replace		2.0				5,13			
		Repair			1.5						
	Attachment Cylinder	Inspect	0.2					4			
		Service		0.1				3			
		Replace		1.5				5,13			
		Repair			1.5						
31	Tanks and Reservoirs:										
	Hydraulic Oil Cooler		Inspect	0.1							
3100	BASIC ISSUE ITEMS, MANUFACTURER INSTALLED		Replace								
	Basic Issue Items:										
33	Emergency Boom Lift Kit		Replace		0.2			2			
	SPECIAL PURPOSE KITS										
3303	Engine Arctic Kit		Inspect	0.1							
	Install					4.0		2,5			
	Repair			1.5							
47	GAGES (NON-ELECTRICAL)										
	Gages, Mountings, Lines and Fittings:										
4702	Sight Gages		Inspect	0.1							
	Replace			0.5				2			
	Air Cleaner Restriction Indicator		Inspect	0.1							
	Replace			0.5				2			

## Maintenance Allocation Chart for All Terrain Lifter, Army System (ATLAS) (Continued)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks		
			FIELD		SUSTAINMENT						
			Unit		DS	GS	Depot				
			C	O	F	H	D				
91	CHEMICAL, BIOLOGI-CAL, AND RADIOLOGI-CAL (CBR) EQUIPMENT	Inspect Replace	0.2	0.5				2,3			
9131											

**Section III. TOOLS AND TEST EQUIPMENT  
FOR  
ALL TERRAIN LIFTER, ARMY SYSTEM (ATLAS)**

**Tools and Test Equipment for All Terrain Lifter, Army System (ATLAS)**

<b>Tool or Test Equipment Reference Code</b>	<b>Maintenance Level</b>	<b>Nomenclature</b>	<b>National Stock Number</b>	<b>Tool Number</b>
1	O	Tool Kit, Auto Mechanics SC5180-90-N26	5180-00-177-7033	W33004
2	O,F	Tool Kit, General Mechanics SC5180-90-CL-N05	5180-00-699-5273	W45060
3	O	Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power SC4910-95-CL-A74	4910-00-754-0654	W32593
4	O	Shop Equipment, Automotive Maintenance, Common #2 Less Power SC4910-95-CL-A72	4910-00-754-0650	W32730
5	F	Shop Equipment, Automotive Maintenance and Repair; Field Maintenance, Basic, Less Power SC4910-95-CL-A31	4910-00-754-0705	T24660
6	F	Tool Kit, Machinists: Post, Camp and Station SC5280-95-CL-A02	5280-00-511-1950	W44512
7	F	Shop Equipment, Machine Shop: Field Maintenance Basic, Less Power SC3470-95-CL-A02	3470-00-754-0708	T15644
8	F	Tool Kit, Body and Fender Repair SC5180-90-CL-N34	5180-00-754-0643	W33689
9	F	Tool Outfit, Hydraulic System Test and Repair (HSTRU) SC4940-95-CL-B07	4940-01-036-5784	13221E6850
10	O	Simplified Test Equip. for Internal Combustion Engines (STE-ICE-R) TM9-4910-571-34&P	4910-01-222-6589	2389409
11	O	Level, Pocket	5210-00-223-9604	GGG-L-211
12	H	Tool Kit, Transmission Consisting of the following:  Clutch Pack, Lift  Bearing Driver	5180-01-307-9395  5120-01-311-9161  5120-01-311-7242	8801801  DR04-708-1  DR04-708-2

**Tools and Test Equipment for All Terrain Lifter, Army System (ATLAS) (Continued)**

<b>Tool or Test Equipment Reference Code</b>	<b>Maintenance Level</b>	<b>Nomenclature</b>	<b>National Stock Number</b>	<b>Tool Number</b>
		Bearing Driver	5120-01-311-7243	DR04-708-3
		Spring Compressor Tool	5120-01-311-7244	DR04-708-5
13	F	Wrench Set, Spanner, Consisting of the following:	5120-01-454-1235	6621222
		Spanner Wrench, Boom Lift Cylinder and Boom Extend Cylinder	5120-01-510-2556	8801816
		Spanner Wrench, Adjustable	5120-01-510-2561	6623737
14	O	Wrench, Strap, 1-6" Capacity		W18-36
15	F	Tool, Engine Barring	5120-01-285-5193	3377371
16	O,F	Gage, Hydraulic Pressure	4940-01-086-8756	13221E6828
17	O,F	Kit, Accumulator Charging	4930-01-046-7109	1225217
18	F	Test Set, Diesel Injector	4910-00-317-8265	5910359
19	F	Kit, Compressor Tool		J-529642-B
20	F	Gauge Set, Manifold	4130-01-032-2912	

**Section IV. REMARKS  
FOR  
ALL TERRAIN LIFTER, ARMY SYSTEM (ATLAS)**

(1) Remarks Code	(2) Remarks
A	Engine assembly is manufactured to metric measure.
B	STE/ICE tests.
C	Service by changing oil and filter.
D	Consists of valve clearance adjustment.
E	Oversize/undersize replacement bearings are available.
F	Inspect for leakage.
G	Includes timing the injection pump using a timing pin method.
H	Consists of cleaning element with compressed air, if appropriate. Crew can remove and clean inner element.
I	Fuel and hydraulic tanks are incorporated in one assembly.
J	Crew adds oil or fuel; Unit Maintenance drains, cleans and refills the tank/reservoir.
K	Fuel control lever travel adjustment.
L	No repair on ROPS or FOPS.
M	Front and rear differential carriers and planetaries are identical, except No-Spin differential is used on front axle.
N	Includes replacement of instrument panels, seat, etc.
O	Only inspect wear pads that are visible at boom ends.
P	Repair by replacing boot and adapter.
Q	End play adjustment.
R	Crew can remove and install only.

## APPENDIX C

### EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

#### Section IV. INTRODUCTION

##### **C-1. SCOPE**

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the ATLAS. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

##### **C-2. EXPLANATION OF COLUMNS**

**a. Column (1) -- Item Number.** This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, Appendix C").

**b. Column (2) -- Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Organizational Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

**c. Column (3) - National Stock Number.** This is the National Stock Number assigned to the item; use it to request or requisition the item.

**d. Column (4) - Description.** Indicates the Federal item name, and, if required, a description to identify the item. The last line for each item indicates the part number followed by Commercial And Government Entity (CAGE) Code in parentheses.

**e. Column (5) - Unit of Measure (U/M).** Indicates the measure used in performing the actual maintenance function. This measure is expressed by two-character alphabetical abbreviations (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

## Section V. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O	8040-01-202-1138	Adhesive, P12 (08125)	oz
2	O	6810-00-527-2476	Ammonia	qt
			Antifreeze, Permanent, Type: Arctic Grade (58536) A-A-52624	
3	O	6850-01-441-3248	55 Gallon Drum	gal
4	O		Antifreeze, Permanent, Ethylene Glycol, Inhibited MIL-A-46153 (81349)  6850-00-464-9137 6850-01-464-9152  5 Gallon Can 55 Gallon Drum	gal gal
5	O	5120-00-926-5175	Brush, Wire	ea
6	O	8040-00-938-1535	Caulk, Silicone, Clear	tu
7	O	8030-00-087-8630	Compound, Anti-seize, MIL-T-83483 (81349) 1 Can	lb
8	O	8030-01-054-0740	Compound, Sealing: Pipe Thread (61603), Type A	ea
9	O	6810-00-543-7415	Denatured Alcohol	qt
10	O	6850-00-926-2276	Fluid, Windshield Washer	qt
10.1	O	9130-01-031-5816	Fuel, Turbine, Aviation (81349) MILT83133 GR JP8	gal
11	O	9320-01-237-1157	Gloves, Rubber	pr
12	O	9150-01-197-7688 9150-01-197-7693 9150-01-197-7690 9150-01-197-7692	Grease, Automotive and Artillery, GAA, MIL-G-10924 (81349) 2-1/4 oz Tube 14 oz Cartridge 1-3/4 Pound Can 35 Pound Can	oz oz lb lb
13	O	9150-00-735-1800	Grease, Graphite	tu
14	O	9150-00-250-0933	Jelly, Petroleum	lb
15	O	2640-00-256-5526	Lubricant, Ru-Glide Rubber	lb
15.1	O	3930-01-512-2281	Lubricant, Teflon Dry, 8526415 (1YHH8) 1 Spray Can	oz

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
17	O	9140-00-286-5295 9140-00-286-5296 9140-00-286-5294	Oil, Fuel, Diesel, DF-2 Regular VVF800 (81349) 5 Gallon Can 55 Gallon Drum Bulk	gal gal gal
18	O	9140-00-286-5287 9140-00-286-5288 9140-00-286-5286	Oil, Fuel, Diesel, DF-1 Winter VVF800 (81349) 5 Gallon Can 55 Gallon Drum Bulk	gal gal gal
19	O	9140-00-286-5282 9140-00-286-5284 9140-00-286-5283	Oil, Fuel, Diesel, DF-A Arctic WF800 (81349) 5 Gallon Can 55 Gallon Drum Bulk	gal gal gal
20	O	9150-01-152-4117 9150-01-152-4118 9150-01-152-4119	Oil, Lubricating, Engine OE/HDO-15/40, MIL-L-2104 (81349) 1 Quart Can 5 Gallon Can 55 Gallon Drum	qt gal gal
21	O	9150-00-402-2372	Oil, Lubricating, Engine Arctic OEA, MIL-L-46167 (81349) 1 Quart Can	qt
22	O	9150-01-035-5392 9150-01-035-5393 9150-01-035-5394	Oil, Lubricating, Gear Multipurpose GO 80/90 MIL-L-2105 (81349) 1 Quart Can 5 Gallon Can 55 Gallon Drum	qt gal gal
23	O	9150-00-189-6727 9150-00-191-2772	Oil, Lubricating, Transmission/Hydraulic OE/HDO-10 MIL-L-2104 (81349) 1 Quart Can 55 Gallon Drum	qt gal
24	O	5350-00-619-9167	Paper, Emery, Grit #80	pcs
25	O	8010-00-159-4518	Primer, Metal (83421)	qt
26	O	7920-00-205-1711	Rags, Wiping (64067)	lb
27	O		Rubber, Window Locking (P/N 8582421-1080)	ea
28	O	8030-01-014-5869	Sealant, Loctite 242 MIL-S-46163 Type II Grade N (80244)	oz
29	O	8030-01-158-6070	Sealant, Loctite 271 MIL-S-46163 Type I Grade L (80244)	oz
30	O	8030-01-063-7510	Sealant, Loctite 277 MIL-S-46163 Type I Grade L (80244)	oz
31	O		Sealant, Loctite 545	oz
32	O	8030-00-204-9149	Sealant, Loctite 59241	oz

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
33	O	8030-00-180-6150	Sealant, Loctite 609 MIL-R-46082BB Type I (05962)	oz
33.1	O	3930-01-504-6944	Sealant, Urethane (1YHH8) 8035523	oz
34	O	5680-01-067-9998	Sealer, Ribbon, Black Tape	ft
35	O	6810-00-252-1345	Soap, Liquid	bt
36	O	6810-00-264-6618	Soda, Baking	oz
37	O		Solvent, Chlorinated	qt
38	O	6850-01-337-1808 6850-01-337-3349 6850-01-331-3350	Solvent, Dry Cleaning P-D-680 Type III (81348) 1 Quart Container 1 Gallon Container 1 Drum	qt gal dr
39	O	8135-00-178-9200	Tags 1 Carton	ctn
40	O	5970-00-547-0966	Tape, Electrical 1 Dispenser	ea
41	O	5975-00-984-6582	Tie Wraps 1 Carton	hd
42	O	8010-00-180-6343	Varnish, Anti-fungus	qt
43	O	6810-00-356-4936	Water, Distilled	gal

**APPENDIX D**  
**ILLUSTRATED LIST OF MANUFACTURED ITEMS**

None



## APPENDIX E

### TORQUE LIMITS

#### **E-1. SCOPE**

This appendix provides general torque limits for the different fasteners used on the ATLAS. Special torque limits are listed in the maintenance procedures for applicable components. The general torque limits given in this appendix shall be used when specific torque limits are not indicated in the maintenance procedure. These general torque limits cannot be applied to screws that retain rubber components. The rubber components will be damaged before the torque limit is reached. If a special torque limit is not given in the maintenance instructions, tighten the screw or nut until it touches the metal bracket then tighten it one more turn.

#### **E-2. TORQUE LIMITS**

Refer to the following tables for specific torque limits:

Wet Flange Nuts*	.....	Table E-1
Wet Socket Head Capscrews*	.....	Table E-2
Dry Capscrews**	.....	Table E-3
Wet Capscrews*	.....	Table E-4

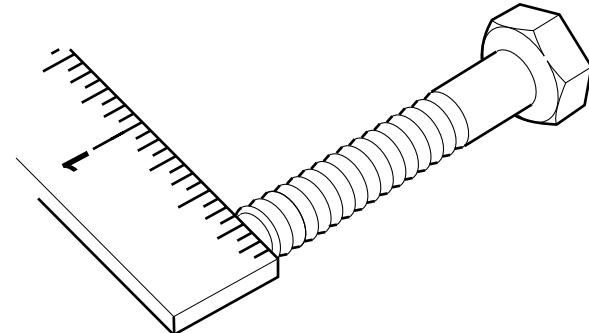
\* Wet torque limits are used on screws that have high pressure lubricants applied to the threads.

\*\* Dry torque limits are used on screws that do not have high pressure lubricants applied to the threads.

#### **E-3. HOW TO USE THE TORQUE TABLE**

**a.** Measure the diameter of the screw you are installing with a ruler.

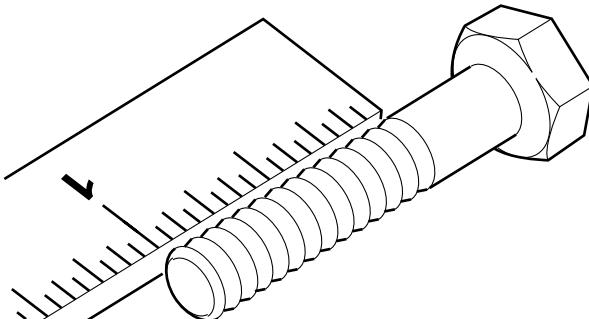
**b.** Measure out one inch with a ruler and count the number of threads per inch.



**c.** Under the heading SIZE, look down the left-hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).

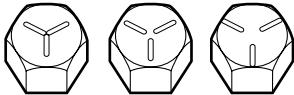
**d.** In the second column under SIZE, find the number of threads per inch that matches the number of threads per inch you counted in Step b. (Not required for metric screws.)

**e.** To find the grade screw you are installing, match the markings on the head to the correct picture of CAPSCREW HEAD MARKINGS on the torque table.

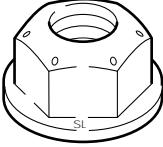


**f.** Look down the column under the picture you found in Step e. until you find the torque limit (lb-ft or N•m) for the diameter and threads per inch of the screw you are installing.

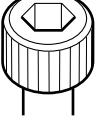
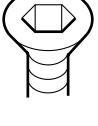
**g.** Use wet torque values.

Capscrew Head Markings					
Standard			Metric		
					
Manufacturer's marks may vary. These are all SAE Grade 5 (3-line).			Metric screws are of three grades: 8.8, 10.9, and 12.9. Grades and manufacturer's marks appear on the screw head.		

**Table E-1. Torque Limits for Wet Flange Nuts**

Spiralock Flange Nut Markings Grade 8	Diameter		Threads per inch	Torque	
	In.	mm		lb-ft	N•m
	1/4	6.35	20	15	20
	5/16	7.94	18	25	34
	3/8	9.65	16	45	61
	1/2	12.70	13	110	149
	5/8	15.87	11	210	285
	3/4	19.05	10	375	508

**Table E-2. Torque Limits for Wet Socket Head Capscrews**

Torque in Ft Lbs (Capscrews) Lubed			
	Size	Socket Head or 12 Pt	Socket Flat Head
	0.10-24	5	2.5
	0.25-20	12	6
	0.31-18	25	12
	0.38-16	44	22
	0.50-13	70	36
	0.56-12	106	53
	0.62-11	212	106
	0.75-10	375	187
	1.00-8	781	

**Table E-3. Torque Limits for Dry Fasteners**

CAPSCREW HEAD MARKINGS			Torque							
Size			SAE Grade No. 2		SAE Grade No. 5		SAE Grade No. 6 or 7		SAE Grade No. 8	
Dia. Inches	Threads per Inch	mm	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m
1/4	20	6.35	5	7	8	11	10	14	12	16
	28	6.35	6	9	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
	24	7.94	12	16	19	26	24	33	25	34
3/8	16	9.53	20	27	30	41	40	54	45	61
	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
	20		35	47	55	75	70	95	80	108
1/2	13	12.70	50	68	75	102	95	129	110	149
	20		55	75	90	122	100	136	120	163
9/16	12	14.29	65	88	110	149	135	183	150	203
	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
	18		100	136	180	244	210	285	240	325
3/4	10	19.05	160	217	260	353	320	434	380	515
	16		180	244	300	407	360	488	420	570
7/8	9	22.23	140	190	400	542	520	705	600	814
	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
	12		240	325	640	868	860	1166	1000	1356
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1736
	12		340	461	880	1193	1260	1709	1440	1953
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
	12		460	624	1240	1681	1760	2387	2000	2712
1-3/8	6	34.93	560	759	1460	1980	2080	2820	2380	3227
	12		640	868	1680	2278	2380	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2631	2780	3770	3160	4285
	12		840	1139	2200	2983	3100	4204	3560	4827

**Table E-4. Torque Limits for Wet Fasteners**

CAPSCREW HEAD MARKINGS			Torque							
Size			SAE Grade No. 2		SAE Grade No. 5		SAE Grade No. 6 or 7		SAE Grade No. 8	
Dia. Inches	Threads per Inch	mm	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m
1/4	20	6.35	4	6	6	8	8	11	9	12
	28	6.35	5	7	7	9	9	12	10	14
5/16	18	7.94	8	11	13	18	16	22	18	24
	24	7.94	9	12	14	19	18	24	20	27
3/8	16	9.53	15	20	23	31	30	41	35	47
	24	9.53	17	23	25	34	30	41	35	47
7/16	14	11.11	24	33	35	47	45	61	55	75
	20		25	34	40	54	50	68	60	81
1/2	13	12.70	35	47	55	75	70	95	80	108
	20		40	54	65	88	80	108	90	122
9/16	12	14.29	50	68	80	108	100	136	110	149
	18		55	75	90	122	110	149	130	176
5/8	11	15.88	70	95	110	149	140	190	170	231
	18		80	108	130	176	160	217	180	244
3/4	10	19.05	120	163	200	271	240	325	280	380
	16		140	190	220	298	280	380	320	434
7/8	9	22.23	110	149	300	407	400	542	460	624
	14		120	163	320	434	440	597	500	678
1	8	25.40	160	217	440	597	600	814	680	922
	12		170	231	480	651	660	895	740	1003
1-1/8	7	25.58	220	298	600	814	840	1139	960	1320
	12		260	353	660	895	940	1275	1080	1464
1-1/4	7	31.75	320	434	840	1139	1100	1492	1360	1844
	12		360	488	920	1248	1320	1790	1500	2034
1-3/8	6	34.93	420	570	1100	1492	1560	2115	1780	2414
	12		460	624	1260	1709	1780	2414	2040	2776
1-1/2	6	38.10	560	760	1460	1980	2080	2820	2360	3200
	12		620	841	1640	2224	2320	3146	2660	3607

## APPENDIX F

### TOOL IDENTIFICATION LIST

#### Section I. INTRODUCTION

##### **F-1. SCOPE**

This appendix lists the tools you will need to operate and maintain the ATLAS.

##### **F-2. EXPLANATION OF COLUMNS**

**a. Column (1) -- Item Number.** This number is assigned to the entry in the listing and is referenced in the narrative task box to identify the tool (e.g., "Tool Kit, General Mechanic's: Automotive (Item 18, Appendix F)").

**b. Column (2) -- Item Name.** This column identifies the tool.

**c. Column (3) - National Stock Number.** This is the National Stock Number assigned to the item; use it to request or requisition the item.

**d. Column (4) - Part Number.** This is the manufacturer's part number assigned to the item.

**e. Column (5) - Reference.** This column references the Supply Catalog Number and tools which are part of/ components of shop set authorized to section/teams; tools authorized by RPSTL and CTA 50-970; special and fabricated tools; and items of TMDE.

## Section II. TOOL IDENTIFICATION LIST

(1) Item Number	(2) Item Name	(3) National Stock Number	(4) Part Number	(5) Reference
1	Bits, Torx Head Set	5120-01-170-4454	38699-1	SC 4910-95-CL-A72
2	Cable/Chain Hoist, 6000 lb capacity	3950-00-965-0097		
3	Cap and Plug Set	5340-00-450-5718	10935405	
4	Floor Jack, 10-ton capacity	4910-00-289-7233		SC 4910-95-A31
5	Flowmeter, Hydraulic	4940-01-079-5263	13221E6829	
6	Gage, Hydraulic Pressure	4940-01-086-8756	13221E6828	
7	Jackstand, 10-ton capacity	4910-01-265-0401	93525	SC 4910-95-A31
8	Level, Template	4910-01-075-0020	3375855	
9	Multimeter, Digital	6625-01-139-2512	T00377	SC 4910-95-A72
10	Press, Arbor, 10-ton	3444-00-163-4338		
11	Protractor, Circular	5210-00-273-3422	GGG-P-676	
12	Puller, Steering Wheel	5120-00-620-0020		
13	Refrigerant Leak Detector	4330-01-411-6560		
14	Shop Equipment, Automotive Maintenance and Repair, Common No. 1 Less Power	4910-00-754-0654	W32593	SC 4910-95-CL-A74
15	Shop Equipment, Automotive Maintenance, Common No. 2 Less Power	4910-00-754-0650	W32730	SC 4910-95-CL-A72
16	Soldering Kit	3439-00-460-7198		
17	STE/ICE-R (Include transducer from AAL)	4910-00-124-2554 (6685-01-193-1733)	12258760 (1225B956)	TM 9-4910-571-12&P
18	Tool Kit, General Mechanic's: Automotive	5180-00-177-7033	W33004	SC 5180-90-N26
19	Tool Kit, Machinists: Post, Camp and Station	5280-00-511-1950	W44512	SC 5280-95-CL-A02
20	Tool Outfit, Hydraulic System Test and Repair (HSTRU)	4940-01-036-5784	13221E6850	SC 4940-95-CL-B07
21	Wrench, Adjustable	5120-00-264-3793		

(1) Item Number	(2) Item Name	(3) National Stock Number	(4) Part Number	(5) Reference
22	Wrench, Strap, 1 - 6 in. Capacity	5120-00-776-1840	W18-36	
23	Wrench, Torque, 3/8 inch drive, 0-200 lb-in (0-1700 N•m)	5120-00-853-4538	F200-1	SC 4910-95-A72
24	Wrench, Torque, 1/2 inch drive, 0-175 lb-ft (0-237 N•m)	5100-00-640-6364	A-A-2411	SC 4910-95-A72
25	Wrench, Torque, 0-600 lb-ft (0-814 N•m)	5120-00-221-7983	SW130-301	SC 4910-95-A74



## ALPHABETICAL INDEX

**Subject, Page**
**A**

- Accelerator Cable
  - Adjustment, 5-61
  - Replacement, 5-61
- Accelerator Pedal Assembly
  - Repair, 5-65
  - Replacement, 5-65
- Air Cleaner Assembly
  - Repair, 5-7
  - Replacement, 5-7
- Air Cleaner Intake Cap Replacement, 5-15
- Air Cleaner Restriction Indicator Replacement, 19-3
- Air Conditioner Compressor Belt Replacement, 7-37
- Air Conditioner Thermostat Replacement, 17-39
- Alternator and Alternator Pulley Replacement, 8-3
- Arctic Heater
  - Fuel Pump Replacement, 20-8
  - Fuse Replacement, 20-11
  - Mounting Bracket Replacement, 20-12
  - Replacement, 20-2
  - Wiring Harness Replacement, 20-13
- Attachment Control Valve Replacement, 18-34
- Attachment Cylinder Replacement, 18-86
- Attachment Replacement, 18-96
- Auxiliary Batteries
  - Replacement, 8-117
  - Service, 8-117
  - Test, 8-117
- Auxiliary Battery Box and Cover Replacement, 8-143
- Auxiliary Battery Cables and Terminals
  - Replacement, 8-135
  - Service, 8-135

**B**

- Backup Alarm
  - Repair, 8-105
  - Replacement, 8-105
- Backup Alarm Switch
  - Adjustment, 8-106
  - Replacement, 8-106
- Batteries
  - Replacement, 8-111
  - Service, 8-111
  - Test, 8-111

**Subject, Page**
**B (Cont)**

- Battery Box and Cover Replacement, 8-141
- Battery Cables and Terminals
  - Replacement, 8-123
  - Service, 8-123
- Blackout Headlight
  - Repair, 8-92
  - Replacement, 8-92
- Blackout/Service Light Switch Replacement, 8-36
- Body and Cab
  - Cab Doors Replacement, 16-10
  - Cab Rear Window Replacement, 16-24
  - Cab Skylight Guard and Window Replacement, 16-22
  - Cab Windows Replacement, 16-20
  - Engine Covers Replacement, 16-2
  - Engine Door Panels Replacement, 16-5
  - Fender Braces Replacement, 16-18
  - Fender Replacement, 16-15
  - Fire Extinguisher Bracket Replacement, 16-34
  - Front Windshield Replacement, 16-20
  - Radiator Cover Replacement, 16-4
  - Right-hand Window Replacement, 16-20
  - Seat
    - Repair, 16-31
    - Replacement, 16-26
  - Seat Belts Replacement, 16-33
  - Tool Box Door Latch Replacement, 16-35
  - Transmission Cover Replacement, 16-8
  - Upper Door Window Replacement, 16-20
- Body and Chassis Accessories
  - Air Conditioner Thermostat Replacement, 17-39
  - Cab Blower Replacement, 17-37
  - Cab Defroster Fans Replacement, 17-24
  - Cab Floor Mat Replacement, 17-43
  - Cab Heater and Hoses Replacement, 17-26
  - Cab Heater Temperature Control Replacement, 17-34
  - Cab Heater/AC Plenum and Hoses Replacement, 17-38
  - Cab Heater/Air Conditioner Fan Switches
    - Replacement, 17-36
  - Data Plates Replacement, 17-40
  - Front and Rear Windshield Washer
    - Replacement, 17-12
    - Service, 17-12

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**B (Cont)**

- Body and Chassis Accessories (Cont)
  - Front Windshield Wiper Assembly
    - Repair, 17-2
    - Replacement, 17-2
  - Leveling Indicator Replacement, 17-46
  - Rear Windshield Wiper Assembly Replacement, 17-10
  - Right and Left Hand Mirror Replacement, 17-17
  - Steering Wheel Locking Cable Replacement, 17-44
- Boom Chain Pulleys Replacement, 18-113
- Boom Cylinder Flow Control Valve Replacement, 18-73
- Boom Electrical Cable
  - Repair, 8-157
  - Replace, 8-157
  - Test, 8-157
- Boom Electrical Junction Box Assembly Replacement, 8-75
- Boom Extend and Retract Chains Inspection/Adjustment, 18-117
- Boom Hoist Cylinders Replacement, 18-158
- Boom Hose Pulley Replacement, 18-106
- Boom Hydraulic Hose and Electrical Cable Tension Adjustment, 18-119
- Boom Pivot Pins Service, 18-101
- Boom Wear Pads Inspection, 18-103
- Brake
  - Parking
    - Adjustment, 12-2
    - Replacement, 12-2
    - Valve Replacement, 12-7
- Brake Hydraulic Pressure Switch
  - Replacement, 8-43
  - Test, 8-43

**C**

- Cab Blower Replacement, 17-37
- Cab Defroster Fans Replacement, 17-24
- Cab Doors Replacement, 16-10
- Cab Floor Mat Replacement, 17-43
- Cab Heater and Hoses Replacement, 17-26
- Cab Heater Temperature Control Replacement, 17-34

**Subject, Page**
**C (Cont)**

- Cab Heater/AC Plenum and Hoses Replacement, 17-38
- Cab Heater/Air Conditioner Fan Switches Replacement, 17-36
- Cab Rear Window Replacement, 16-24
- Cab Skylight Guard and Window Replacement, 16-22
- Cab Windows Replacement, 16-20
- Cab Wiring Harness
  - Repair, 8-146
  - Replacement, 8-146
  - Test, 8-146
- Capabilities, 1-3
- Carriage Tilt Cylinder Replacement, 18-81
- Characteristics, 1-3
- Circuit Breakers Replacement, 8-30
- Cleaning Instructions, 3-2
- Common Tools and Equipment, 2-1
- Console Mounted Relays
  - Replacement, 8-69
  - Test, 8-69
- Cooling System
  - Air Conditioner Compressor Belt Replacement, 7-37
  - Drive Belt and Tensioner Replacement, 7-39
  - Engine Cooling Fan Guards Replacement, 7-35
  - Engine Cooling Fan Replacement, 7-32
  - Overflow Tank Replacement, 7-41
  - Radiator
    - Replacement, 7-2
    - Service, 7-2
    - Test, 7-2
  - Radiator Hoses
    - Inspection, 7-29
    - Replacement, 7-29
  - Thermostat and Water Outlet Replacement, 7-26
  - Water Inlet Replacement, 7-43
  - Water Pump Replacement, 7-31
- Corrosion Prevention and Control (CPC), 1-2
- Counterweight Replacement, 15-2

**D**

- Data Plates Replacement, 17-40
- Description of Major Components, 1-4

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**D (Cont)**

Destruction of Army Materiel to Prevent Enemy Use, 1-2  
 Disassembly and Assembly Instructions, 3-5  
 Drive Belt and Tensioner Replacement, 7-39

**E**

Electrical System, 1-13  
 Alternator and Alternator Pulley Replacement, 8-3  
 Auxiliary Batteries  
     Replacement, 8-117  
     Service, 8-117  
     Test, 8-117  
 Auxiliary Battery Box and Cover Replacement, 8-143  
 Auxiliary Battery Cables and Terminals  
     Replacement, 8-135  
     Service, 8-135  
 Backup Alarm  
     Repair, 8-105  
     Replacement, 8-105  
 Backup Alarm Switch  
     Adjustment, 8-106  
     Replacement, 8-106  
 Batteries  
     Replacement, 8-111  
     Service, 8-111  
     Test, 8-111  
 Battery Box and Cover Replacement, 8-141  
 Battery Cables and Terminals  
     Replacement, 8-123  
     Service, 8-123  
 Blackout Headlight  
     Repair, 8-92  
     Replacement, 8-92  
 Blackout/Service Light Switch Replacement, 8-36  
 Boom Electrical Cable  
     Repair, 8-157  
     Replace, 8-157  
     Test, 8-157

**Subject, Page**
**E (Cont)**

Boom Electrical Junction Box Assembly Replacement, 8-75  
 Brake Hydraulic Pressure Switch  
     Replacement, 8-43  
     Test, 8-43  
 Cab Wiring Harness  
     Repair, 8-146  
     Replacement, 8-146  
     Test, 8-146  
 Electrical System (Cont)  
     Circuit Breakers Replacement, 8-30  
     Console Mounted Relays  
         Replacement, 8-69  
         Test, 8-69  
     Emergency Steer Pump Relay  
         Replacement, 8-66  
         Test, 8-66  
     Engine Oil Pressure Sender  
         Replacement, 8-99  
         Test, 8-99  
     Engine Oil Pressure Switch  
         Replacement, 8-38  
         Test, 8-38  
     Engine Start Switch Replacement, 8-23  
     Engine Water Temperature Switch Replacement, 8-40  
 Floodlights  
     Repair, 8-87  
     Replacement, 8-87  
 Fork Autoleveler  
     Circuit Board  
         Replacement, 8-53  
         Test, 8-53  
     Switch  
         Adjustment, 8-58  
         Replacement, 8-58  
 Front Composite Blackout/Turn Signal/Parking Light  
     Repair, 8-94  
     Replacement, 8-94  
 Fuel Level Sender  
     Replacement, 8-103  
     Test, 8-103  
 Horn Replacement, 8-110

## ALPHABETICAL INDEX (CONT)

<b>Subject, Page</b>	<b>E (Cont)</b>	<b>Subject, Page</b>	<b>E (Cont)</b>
Electrical System (Cont)		Electrical System (Cont)	
Hour Meter Replacement, 8-28		Toggle Switches Replacement, 8-20	
Hydraulic Bypass Switch		Transmission Temperature Sender Replacement, 8-	
Replacement, 8-170		102	
Test, 8-170		Transmission Temperature Switch Replacement, 8-41	
Instrument Panel Gages Replacement, 8-17		Troubleshooting, 2-34	
Joystick and Harness Assembly		Turn Signal Flasher Replacement, 8-74	
Replacement, 8-46		Turn Signal Switch Replacement, 8-33	
Test, 8-46		Warning Lights and Resistors Replacement,	
Left and Right Hand Instrument Panels Replacement,		8-26	
8-13		Water Temperature Sender Replacement, 8-101	
Main Wiring Harness		Emergency Steer Pump Relay	
Repair, 8-152		Replacement, 8-66	
Replace, 8-152		Test, 8-66	
Test, 8-152		Emergency Steering Pump Replacement, 14-7	
Neutral Safety Switch		Engine	
Inspection, 8-11		Engine Assembly - Service, 4-2	
Replacement, 8-11		Engine Oil Dipstick and Dipstick Tube Replacement,	
Pushbutton Switches Replacement, 8-20		4-9	
Rear Composite Blackout/Tail/Stop Light		Engine Oil Filler Neck Replacement, 4-10	
Repair, 8-94		Engine Oil Sampling Valve Replacement, 4-11	
Replacement, 8-94		Exhaust Manifold Replacement, 4-12	
Rear Turn Signal Lights		Intake and Exhaust Valve Adjustment, 4-4	
Repair, 8-96		Intake Manifold Cover Replacement, 4-13	
Replacement, 8-96		Rocker Lever Covers Replacement, 4-7	
Slave Receptacle Replacement, 8-168		Engine Assembly - Service, 4-2	
Spotlights		Engine Cooling Fan Guards Replacement, 7-35	
Repair, 8-87		Engine Cooling Fan Replacement, 7-32	
Replacement, 8-87		Engine Cooling System, 1-10	
Starter Relay		Engine Covers Replacement, 16-2	
Replacement, 8-62		Engine Door Panels Replacement, 16-5	
Test, 8-62		Engine Fuel System, 1-8	
Starting Motor Replacement, 8-7		Engine Lubrication System, 1-9	
STE/ICE-R		Engine Oil Dipstick and Dipstick Tube Replacement, 4-9	
Fuel Filter Differential Pressure Switch		Engine Oil Filler Neck Replacement, 4-10	
Replacement, 8-79		Engine Oil Pressure Sender	
Fuel Pressure Sender Replacement, 8-78		Replacement, 8-99	
Pulse Tachometer and Drive Assembly		Test, 8-99	
Replacement, 8-81		Engine Oil Pressure Switch	
Resistor Assembly Replacement, 8-77		Replacement, 8-38	
Shunt Replacement, 8-84		Test, 8-38	
Wiring Harness		Engine Oil Sampling Valve Replacement, 4-11	
Repair, 8-164		Engine Water Temperature Switch Replacement,	
Replacement, 8-164		8-40	
Test, 8-164		Equipment Configuration, 1-7	
Vehicle System Diagnostic Check, 2-865			

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**E (Cont)**

- Equipment Data, 1-6
- Equipment Description
  - Equipment Characteristics, Capabilities, and Features, 1-3
  - Equipment Configuration, 1-7
  - Equipment Data, 1-6
  - Location and Description of Major Components, 1-4
  - Safety, Care, and Handling, 1-7
- Equipment Improvement Report and Maintenance Digest (EIR MD), 1-3
- Ether Start
  - Cartridge Mounting Bracket Replacement, 5-59
  - Cartridge Replacement, 5-56
  - Hose and Atomizer Replacement, 5-53
  - Thermostat Replacement, 5-57
- Exhaust Manifold Replacement, 4-12
- Exhaust Pipe Replacement, 6-5
- Exhaust System
  - Exhaust Pipe Replacement, 6-5
  - Muffler and Tail Pipe Replacement, 6-2
- Expendable/Durable Supplies and Materials List, C-1

**F**

- Features, 1-3
- Fender Braces Replacement, 16-18
- Fender Replacement, 16-15
- Fire Extinguisher Bracket Replacement, 16-34
- Floodlights
  - Repair, 8-87
  - Replacement, 8-87
- Fork Autoleveler
  - Circuit Board
    - Replacement, 8-53
    - Test, 8-53
  - Switch
    - Adjustment, 8-58
    - Replacement, 8-58
- Fork Bushings Replacement, 18-93
- Fork Sideshift Cylinders Replacement, 18-155
- Forks and Wear Pad Replacement, 18-90
- Frame and Towing Attachment
  - Counterweight Replacement, 15-2

**Subject, Page**
**F (Cont)**

- Frame and Towing Attachment (Cont)
  - Pintle Hook
    - Repair, 15-6
    - Replacement, 15-6
- Frame Tilt Cylinder Replacement, 18-76
- Frame Tilt Valve Replacement, 18-59
- Front and Rear Differential Propeller Shafts
  - Repair, 10-2
  - Replacement, 10-2
- Front and Rear Windshield Washer
  - Replacement, 17-12
  - Service, 17-12
- Front Composite Blackout/Turn Signal/Parking Light
  - Replacement, 8-94
  - Repair, 8-94
- Front Windshield Replacement, 16-20
- Front Windshield Wiper Assembly
  - Repair, 17-2
  - Replacement, 17-2
- Fuel Drain Lines and Manifold Replacement, 5-32
- Fuel Filter Head
  - Service, 5-50
- Fuel Filter Head Replacement, 5-50
- Fuel Level Sender
  - Replacement, 8-103
  - Test, 8-103
- Fuel Shut-off Solenoid Testing, 5-2
- Fuel Strainer Assembly
  - Replacement, 5-26
  - Service, 5-26
- Fuel Supply Lines Replacement, 5-37
- Fuel System
  - Accelerator Cable
    - Adjustment, 5-61
    - Replacement, 5-61
  - Accelerator Pedal Assembly
    - Repair, 5-65
    - Replacement, 5-65
  - Air Cleaner Assembly
    - Repair, 5-7
    - Replacement, 5-7
  - Air Cleaner Intake Cap Replacement, 5-15
  - Ether Start
    - Cartridge Mounting Bracket Replacement, 5-59
    - Cartridge Replacement, 5-56

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**F (Cont)**

- Fuel System (Cont)
  - Ether Start (Cont)
    - Hose and Atomizer Replacement, 5-53
    - Thermostat Replacement, 5-57
  - Fuel Drain Lines and Manifold Replacement, 5-32
  - Fuel Filter Head
    - Replacement, 5-50
    - Service, 5-50
  - Fuel Shut-off Solenoid Testing, 5-2
  - Fuel Strainer Assembly
    - Replacement, 5-26
    - Service, 5-26
  - Fuel Supply Lines Replacement, 5-37
  - Fuel Transfer Pump
    - Replacement, 5-4
    - Testing, 5-4
  - Fuel/Hydraulic Tank Service, 5-24
  - Fuel/Water Separator Replacement, 5-47
  - High Pressure Fuel Lines Replacement, 5-28
  - Turbocharger
    - Air Hoses and Tubes Replacement, 5-18
    - Assembly Replacement, 5-16
    - Oil Hoses and Tubes Replacement, 5-22
  - Fuel Transfer Pump
    - Replacement, 5-4
    - Testing, 5-4
  - Fuel/Hydraulic Tank Service, 5-24
  - Fuel/Water Separator Replacement, 5-47

**G**

- Gages (Non-electrical)
  - Air Cleaner Restriction Indicator Replacement, 19-3
  - Hydraulic Oil Sight Gages Replacement, 19-2
- General Information
  - Corrosion Prevention and Control (CPC), 1-2
  - Destruction of Army Materiel to Prevent Enemy Use, 1-2
  - Equipment Improvement Report and Maintenance Digest (EIR MD), 1-3
  - Maintenance Forms and Records, 1-2
  - Official Nomenclature, Names, and Designations, 1-2
  - Preparation for Storage or Shipment, 1-2

**Subject, Page**
**G (Cont)**

- General Information (Cont)
  - Quality Assurance/Quality Control, 1-2
  - Reporting Equipment Improvement Recommendations (EIR'S), 1-2
  - Scope, 1-1
- General Maintenance Practices
  - Cleaning Instructions, 3-2
  - Disassembly and Assembly Instructions, 3-5
  - General Information, 3-1
  - Inspection Instructions, 3-5
  - Painting Instructions, 3-8
  - Repair Instructions, 3-7
  - Scope, 3-1
  - Work Safety, 3-1

**H**

- High Pressure Fuel Lines Replacement, 5-28
- Horn Replacement, 8-110
- Hour Meter Replacement, 8-28
- How to Use This Manual, iv
- Hydraulic Bypass Switch
  - Replacement, 8-170
  - Test, 8-170
- Hydraulic Hoses, Tubes, and Fittings
  - Repair, 18-123
  - Replacement, 18-123
- Hydraulic Joystick Control Valve Replacement, 18-64
- Hydraulic Oil Cooler Replacement, 18-162
- Hydraulic Oil Filter Replacement, 18-151
- Hydraulic Oil Sampling Valve Replacement, 18-149
- Hydraulic Oil Sight Gages Replacement, 19-2
- Hydraulic System, 1-14
  - Attachment Control Valve Replacement, 18-34
  - Attachment Cylinder Replacement, 18-86
  - Attachment Replacement, 18-96
  - Boom Chain Pulleys Replacement, 18-113
  - Boom Cylinder Flow Control Valve Replacement, 18-73
  - Boom Extend and Retract Chains Inspection/Adjustments, 18-117
  - Boom Hoist Cylinders Replacement, 18-158
  - Boom Hose Pulley Replacement, 18-106
  - Boom Hydraulic Hose and Electrical Cable Tension Adjustment, 18-119

## ALPHABETICAL INDEX (CONT)

### **Subject, Page**

#### **H (Cont)**

- Hydraulic System (Cont)
  - Boom Pivot Pins Service, 18-101
  - Boom Wear Pads Inspection, 18-103
  - Carriage Tilt Cylinder Replacement, 18-81
  - Fork Bushings Replacement, 18-93
  - Fork Sideshift Cylinders Replacement, 18-155
  - Forks and Wear Pad Replacement, 18-90
  - Frame Tilt Cylinder Replacement, 18-76
  - Frame Tilt Valve Replacement, 18-59
  - Hoses, Tubes, and Fittings Replacement/Repair, 18-123
  - Hydraulic Oil Cooler Replacement, 18-162
  - Hydraulic Tubing Replacement, 18-147
  - Joystick Control Valve Replacement, 18-64
  - Main Control Valve Adjustment/Replacement, 18-20
  - Oil Filter Replacement, 18-151
  - Oil Sampling Valve Replacement, 18-149
  - Piston Pump Test/Replacement, 18-12
  - Priority Valve Replacement, 18-43
  - Relief Valve, Frame Tilt/Brakes Test Replacement, 18-50
  - Service, 18-2
  - Shuttle Valve Replacement, 18-56
  - Tandem Gear Pump Test/Replacement, 18-6
  - Transmission Cooler Replacement, 18-164
  - Troubleshooting, 2-771
  - Hydraulic Tubing Replacement, 18-147

#### **I**

- Illustrated List of Manufactured Items, D-1
- Inspection Instructions, 3-5
- Instrument Panel Gages Replacement, 8-17
- Intake and Exhaust Valve Adjustment, 4-4
- Intake Manifold Cover Replacement, 4-13

#### **J**

- Joystick and Harness Assembly
  - Replacement, 8-46
  - Test, 8-46

#### **L**

- Left and Right Hand Instrument Panels Replacement, 8-13

### **Subject, Page**

#### **L (Cont)**

- Leveling Indicator Replacement, 17-46
- Location of Major Components, 1-4
- Lubrication Instructions, 2-5

#### **M**

- Main Control Valve Adjustment/Replacement, 18-20
- Main Wiring Harness
  - Repair, 8-152
  - Replace, 8-152
  - Test, 8-152
- Maintenance Allocation Chart (MAC), B-1
- Maintenance Forms and Records, 1-2
- Mechanical System Troubleshooting, 2-613
- Mirror Replacement, 17-17
- Muffler and Tail Pipe Replacement, 6-2

#### **N**

- Neutral Safety Switch
  - Inspection, 8-11
  - Replacement, 8-11

#### **O**

- Official Nomenclature, Names, and Designations, 1-2
- Overflow Tank Replacement, 7-41

#### **P**

- Painting Instructions, 3-8
- Parking Brake
  - Valve Replacement, 12-7
- Parking Brake Assembly
  - Adjustment, 12-2
  - Replacement, 12-2
- Parking Brake Pads Replacement, 12-6
- Pintle Hook
  - Repair, 15-6
  - Replacement, 15-6
- Piston Pump Test/Replacement, 18-12
- Preliminary Servicing and Adjustment of Equipment, 2-2

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**P (Cont)**

Preparation for Return to Service from Long-term Storage, 21-3  
 Preparation for Return to Service from Short-term Storage, 21-4  
 Preparation for Shipment, 21-4  
 Preparation for Storage  
     Long-term, 21-2  
     Short-term, 21-1  
 Preparation for Storage or Shipment, 1-2  
 Preventive Maintenance Checks and Services (PMCS), 2-3  
 Principles of Operation  
     Electrical System, 1-13  
     Engine Cooling System, 1-10  
     Engine Fuel System, 1-8  
     Engine Lubrication System, 1-9  
     General, 1-7  
     Hydraulic System, 1-14  
     Steering and Brake System, 1-12  
     Transmission Lubrication and Cooling Systems, 1-11  
 Priority Valve Replacement, 18-43  
 Propeller and Drive Shaft  
     Propeller Shafts Front and Rear Differential  
         Repair, 10-2  
         Replacement, 10-2  
     Transmission Drive Shaft  
         Repair, 10-6  
         Replacement, 10-6  
 Pushbutton Switches Replacement, 8-20

**Q**

Quality Assurance/Quality Control, 1-2

**R**

Radiator  
     Replacement, 7-2  
     Service, 7-2  
     Test, 7-2  
 Radiator Cover Replacement, 16-4  
 Radiator Hoses  
     Inspection, 7-29  
     Replacement, 7-29

**Subject, Page**
**R (Cont)**

Rear Composite Blackout/Tail/Stop Light Repair, 8-94  
     Replacement, 8-94  
 Rear Turn Signal Lights  
     Repair, 8-96  
     Replacement, 8-96  
 Rear Windshield Wiper Assembly Replacement, 17-10  
 References, A-1  
 Relief Valve, Frame Tilt/Brakes Test/Replacement, 18-50  
 Repair Instructions, 3-7  
 Repair Parts, 2-1  
 Repair Parts, Special Tools, TMDE and Support Equipment, 2-1  
 Reporting Equipment Improvement Recommendations (EIR'S), 1-2  
 Right and Left Hand Mirror Replacement, 17-17  
 Right-hand Window Replacement, 16-20  
 Rocker Lever Covers Replacement, 4-7

**S**

Safety, Care, and Handling, 1-7  
 Schematics, 1  
 Seat  
     Repair, 16-31  
     Replacement, 16-26  
 Seat Belts Replacement, 16-33  
 Service and Parking Brake  
     Parking Brake Pads Replacement, 12-6  
     Service Brake Control Valve  
         Adjustment, 12-17  
         Replacement, 12-17  
     Service Brake Hydraulic Accumulator  
         Repair, 12-24  
         Replacement, 12-24  
         Test, 12-24  
     Service Brake Shoes  
         Inspection, 12-13  
         Replacement, 12-13  
     Service Brake System Bleeding, 12-11  
     Service Brake System Hoses, Lines, and Fittings  
         Repair, 12-28  
         Replacement, 12-28

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**S (Cont)**

- Service Brake Control Valve
  - Adjustment, 12-17
  - Replacement, 12-17
- Service Brake Hydraulic Accumulator
  - Repair, 12-24
  - Replacement, 12-24
  - Test, 12-24
- Service Brake Shoes
  - Inspection, 12-13
  - Replacement, 12-13
- Service Brake System Bleeding, 12-11
- Service Brake System Hoses, Lines, and Fittings
  - Repair, 12-28
  - Replacement, 12-28
- Service Upon Receipt, 2-2
- Shuttle Valve Replacement, 18-56
- Slave Receptacle Replacement, 8-168
- Special Kits Maintenance
  - Arctic Heater
    - Fuel Pump Replacement, 20-8
    - Fuse Replacement, 20-11
    - Mounting Bracket Replacement, 20-12
    - Replacement, 20-2
    - Wiring Harness Replacement, 20-13
- Spotlights
  - Repair, 8-87
  - Replacement, 8-87
- Start Switch Replacement, 8-23
- Starter Relay
  - Replacement, 8-62
  - Test, 8-62
- Starting Motor Replacement, 8-7
- STE/ICE-R
  - Fuel Filter Differential Pressure Switch Replacement, 8-79
  - Fuel Pressure Sender Replacement, 8-78
  - Pulse Tachometer and Drive Assembly Replacement, 8-81
  - Resistor Assembly Replacement, 8-77
  - Shunt Replacement, 8-84
  - Wiring Harness
    - Repair, 8-164
    - Replacement, 8-164
    - Test, 8-164
  - Vehicle System Diagnostic Check, 2-865
- Steering and Brake System, 1-12
- Steering Column Replacement, 14-3

**Subject, Page**
**S (Cont)**

- Steering Control Valve Replacement, 14-21
- Steering Cylinder Ball Joint End Cap Assemblies
  - Replacement, 14-20
- Steering Cylinders Replacement, 14-16
- Steering Hoses and Fittings Replacement, 14-12
- Steering Select Valve
  - Repair, 14-24
  - Replacement, 14-24
- Steering System
  - Emergency Steering Pump Replacement, 14-7
  - Steering Column Replacement, 14-3
  - Steering Control Valve Replacement, 14-21
  - Steering Cylinder Ball Joint End Cap Assemblies
    - Replacement, 14-20
  - Steering Cylinders Replacement, 14-16
  - Steering Hoses and Fittings Replacement, 14-12
- Steering Select Valve
  - Repair, 14-24
  - Replacement, 14-24
- Steering Wheel Replacement, 14-2
  - Tie Rod Adjustment, 14-5
- Steering Wheel Locking Cable Replacement, 17-44
- Steering Wheel Replacement, 14-2

**T**

- Tandem Gear Pump Test/Replacement, 18-6
- Thermostat and Water Outlet Replacement, 7-26
- Tie Rod Adjustment, 14-5
- Tire Replacement, 13-6
- Toggle Switches Replacement, 8-20
- Tool Box Door Latch Replacement, 16-35
- Tool Identification List, F-1
- Tools and Test Equipment, B-22
- Torque Limits, E-1
- Transmission
  - Assembly
    - Service, 9-19
    - Test, 9-19
- Brake Pedal
  - Adjustment, 9-9
  - Replacement, 9-9
- Breather Replacement, 9-21
- Cable Assemblies Replacement, 9-7
- Control Valve Linkage Replacement, 9-25

## ALPHABETICAL INDEX (CONT)

**Subject, Page**
**T (Cont)**

- Transmission (Cont)
  - Disconnect Master Cylinder Assembly Replacement, 9-15
  - Disconnect Pedal
    - Adjustment, 9-9
    - Replacement, 9-9
  - Oil Filter Head Assembly Replacement, 9-22
  - Oil Sampling Valve Replacement, 9-24
  - Shifter
    - Adjustment, 9-2
    - Replacement, 9-2
  - Transmission Cooler Replacement, 18-164
  - Transmission Cover Replacement, 16-8
  - Transmission Drive Shaft
    - Repair, 10-6
    - Replacement, 10-6
  - Transmission Lubrication and Cooling Systems, 1-11
  - Transmission Temperature Sender Replacement, 8-102
  - Transmission Temperature Switch Replacement, 8-41
  - Troubleshooting
    - Electrical, 2-34
    - Hydraulic System, 2-771
    - Mechanical, 2-613
  - Turbocharger
    - Air Hoses and Tubes Replacement, 5-18

**Subject, Page**
**T (Cont)**

- Turbocharger (Cont)
  - Assembly Replacement, 5-16
  - Oil Hoses and Tubes Replacement, 5-22
- Turn Signal Flasher Replacement, 8-74
- Turn Signal Switch Replacement, 8-33

**U**

- Upper Door Window Replacement, 16-20

**W**

- Warning Lights and Resistors Replacement, 8-26
- Water Inlet Replacement, 7-43
- Water Pump Replacement, 7-31
- Water Temperature Sender Replacement, 8-101
- Wheel and Tire
  - Tire Replacement, 13-6
  - Wheel Assembly
    - Repair, 13-2
    - Replacement, 13-2
- Wheel Assembly
  - Repair, 13-2
  - Replacement, 13-2
- Work Safety, 3-1

By Order of the Secretary of the Army:

Official:

DENNIS J. REIMER  
General, United States Army  
Chief of Staff

JOEL B. HUDSON  
Administrative Assistant to the  
Secretary of the Army  
04737

DISTRIBUTION:

To be distributed in accordance with the initial distribution number (IDN) 256416,  
requirements for TM 10-3939-673-20-1.

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE  Date you filled out this form.
TO: <i>(Forward to proponent of publication or form) (Include ZIP Code)</i> AMSTALC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630						FROM: <i>(Activity and location) (Include ZIP Code)</i>  Your mailing address	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 10-3930-673-20-1					DATE 4 May 1998	TITLE 10,000 LB Capacity ATLAS	
ITEM NO.	PAGE NO.	PARA-GRAF	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
	0004 00-1	4-1.				Wrong POC is listed. 	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE  Your Name			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE  Your Signature	

<b>TO:</b> (Forward direct to addressee listed in publication) AMSTALC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630				<b>FROM:</b> (Activity and location) (Include ZIP Code) Your address				<b>DATE</b> Date you filled out this form
<b>PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION NUMBER TM 10-3930-673-20-1				DATE 4 May 1998			TITLE 10,000 LB Capacity ATLAS	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III - REMARKS</b> (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)								
TYPED NAME, GRADE OR TITLE  Your Name			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE  Your Signature		

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) AMSTA-LC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630						<b>FROM:</b> (Activity and location) (Include ZIP Code)	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 10-3930-673-20-1					DATE 4 May 1998	TITLE 10,000 LB Capacity ATLAS	
ITEM NO.	PAGE NO.	PARA- GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

<b>TO:</b> (Forward direct to addressee listed in publication) AMSTALC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630				<b>FROM:</b> (Activity and location) (Include ZIP Code)				<b>DATE</b>
<b>PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION NUMBER TM 10-3930-673-20-1				DATE 4 May 1998			TITLE 10,000 LB Capacity ATLAS	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III - REMARKS</b> (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)								
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION				SIGNATURE	

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) AMSTA-LC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630						<b>FROM:</b> (Activity and location) (Include ZIP Code)	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 10-3930-673-20-1					DATE 4 May 1998	TITLE 10,000 LB Capacity ATLAS	
ITEM NO.	PAGE NO.	PARA-GRAF	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

<b>TO:</b> (Forward direct to addressee listed in publication) AMSTALC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630				<b>FROM:</b> (Activity and location) (Include ZIP Code)				<b>DATE</b>
<b>PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION NUMBER TM 10-3930-673-20-1				DATE 4 May 1998			TITLE 10,000 LB Capacity ATLAS	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III - REMARKS</b> (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)								
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION				SIGNATURE	

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) AMSTA-LC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630						<b>FROM:</b> (Activity and location) (Include ZIP Code)	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 10-3930-673-20-1					DATE 4 May 1998	TITLE 10,000 LB Capacity ATLAS	
ITEM NO.	PAGE NO.	PARA-GRAF	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

<b>TO:</b> (Forward direct to addressee listed in publication) AMSTALC-LMIT / TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630				<b>FROM:</b> (Activity and location) (Include ZIP Code)				<b>DATE</b>
<b>PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION NUMBER TM 10-3930-673-20-1				DATE 4 May 1998			TITLE 10,000 LB Capacity ATLAS	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III - REMARKS</b> (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)								
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION				SIGNATURE	

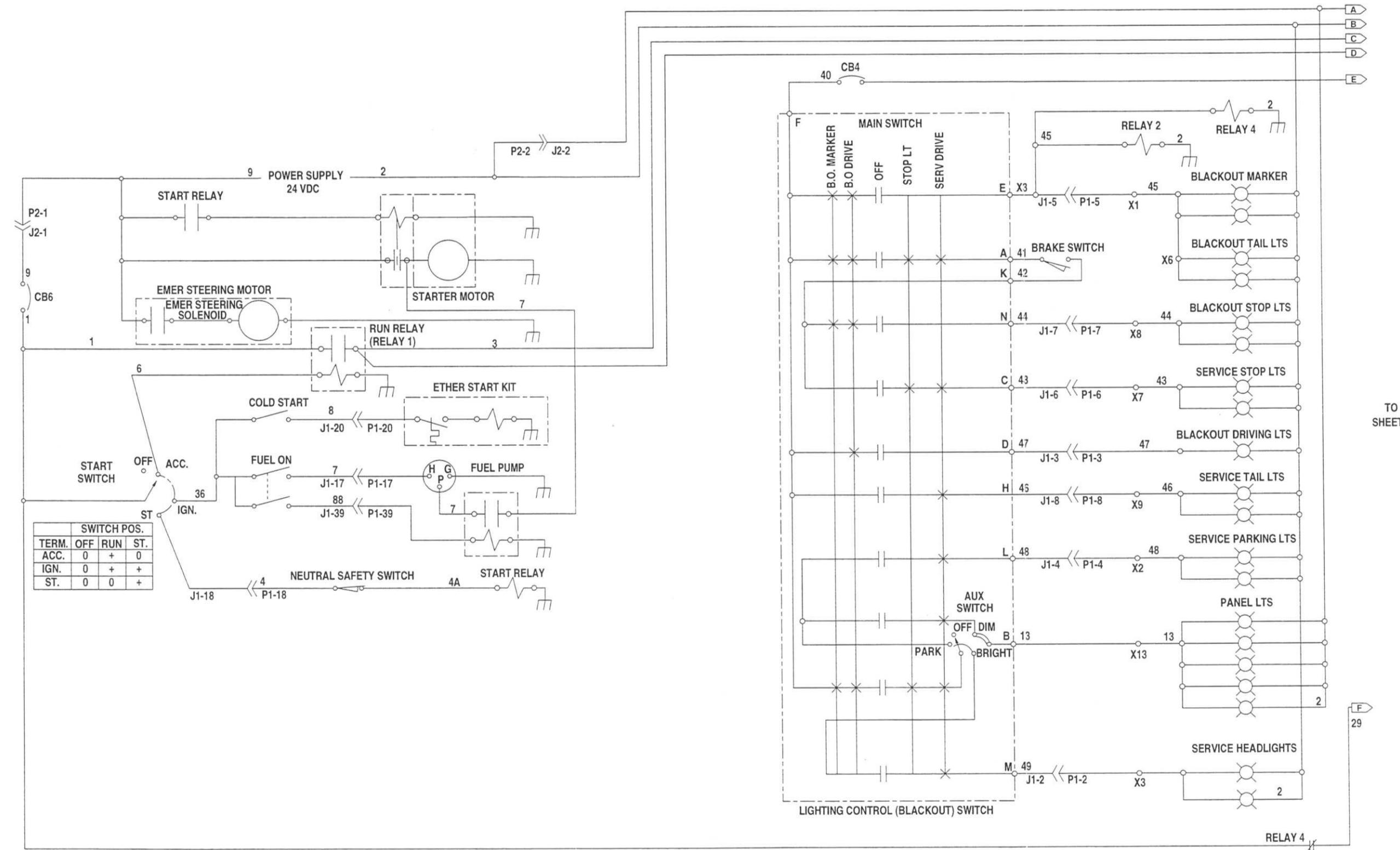


Figure FO-1. Electrical System (Sheet 1 of 3)



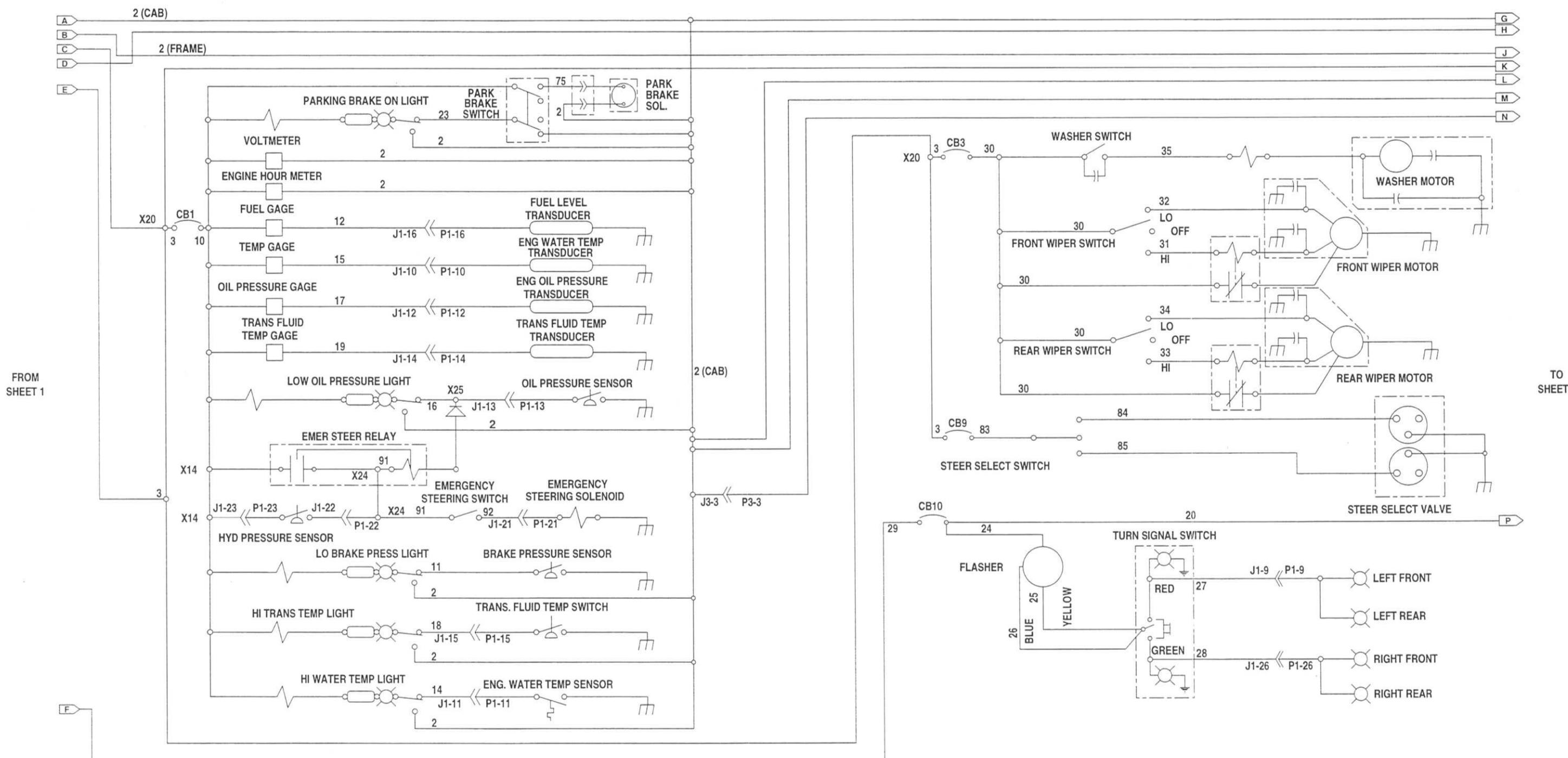


Figure FO-1. Electrical System (Sheet 2 of 3)



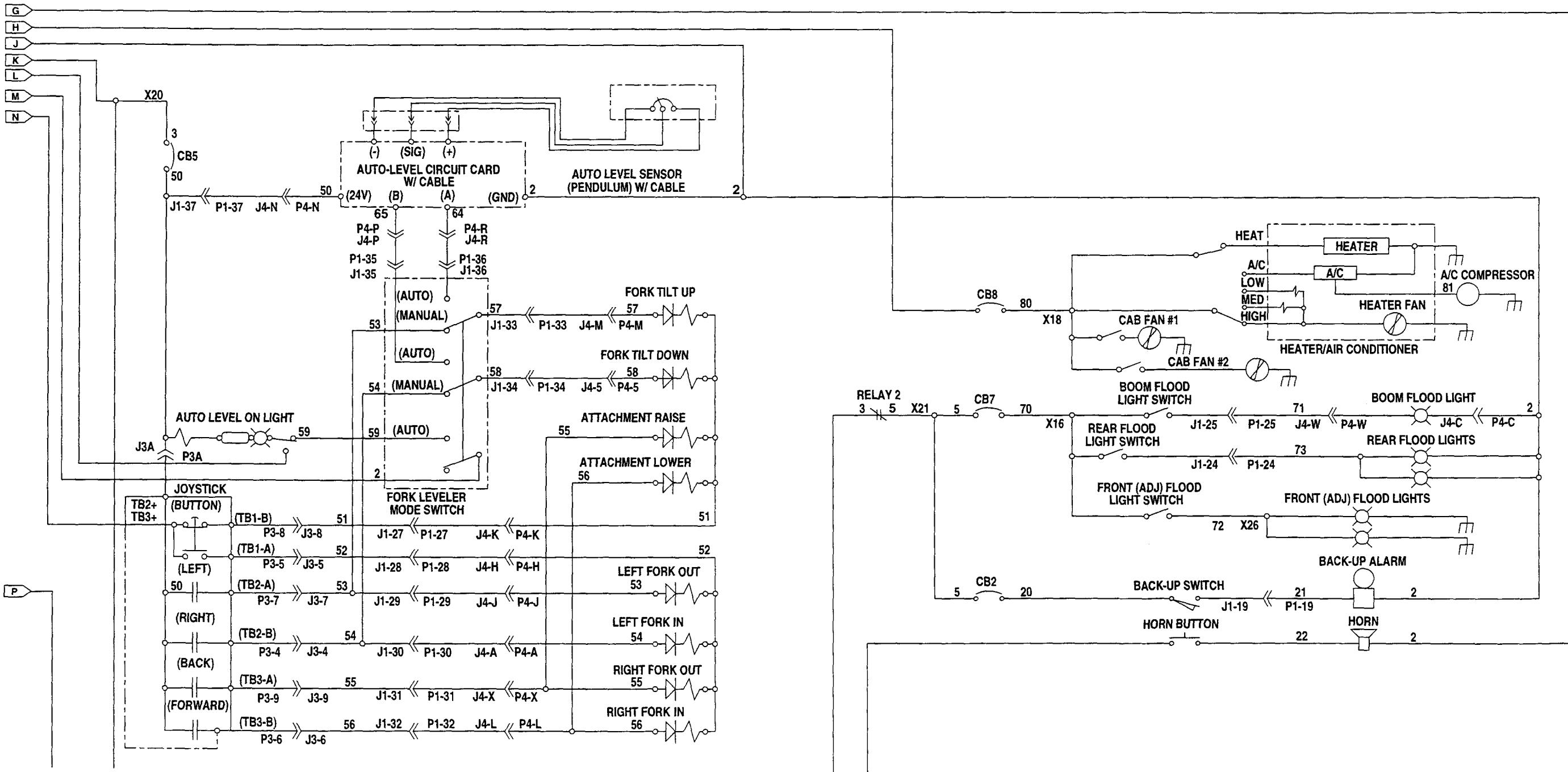


Figure FO-1. Electrical System (Sheet 3 of 3)  
Change 1 FP-5/(FP-6 blank)



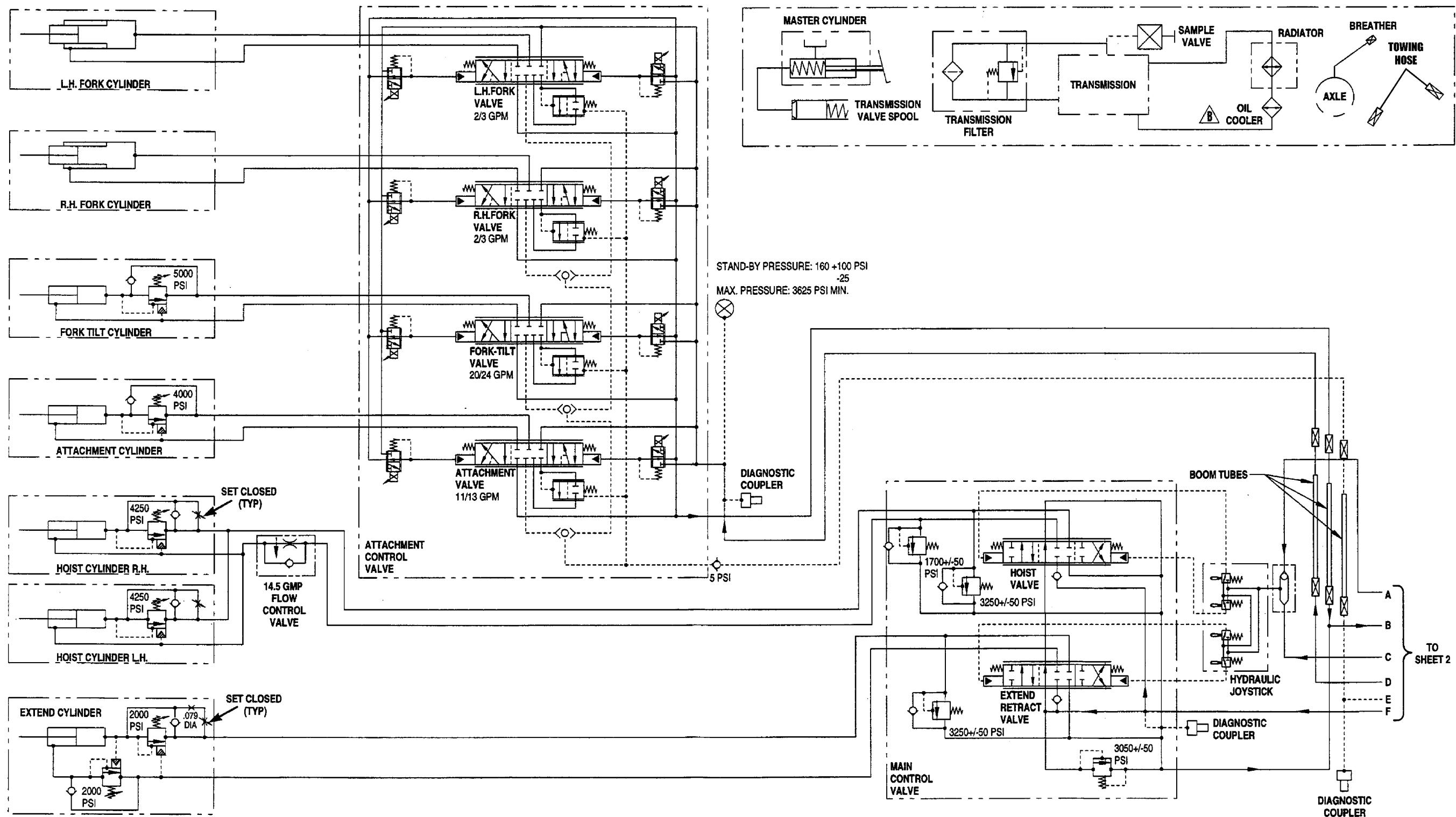


Figure FO-2. Hydraulic System (Sheet 1 of 2)  
Change 1 FP-7/(FP-8 blank)



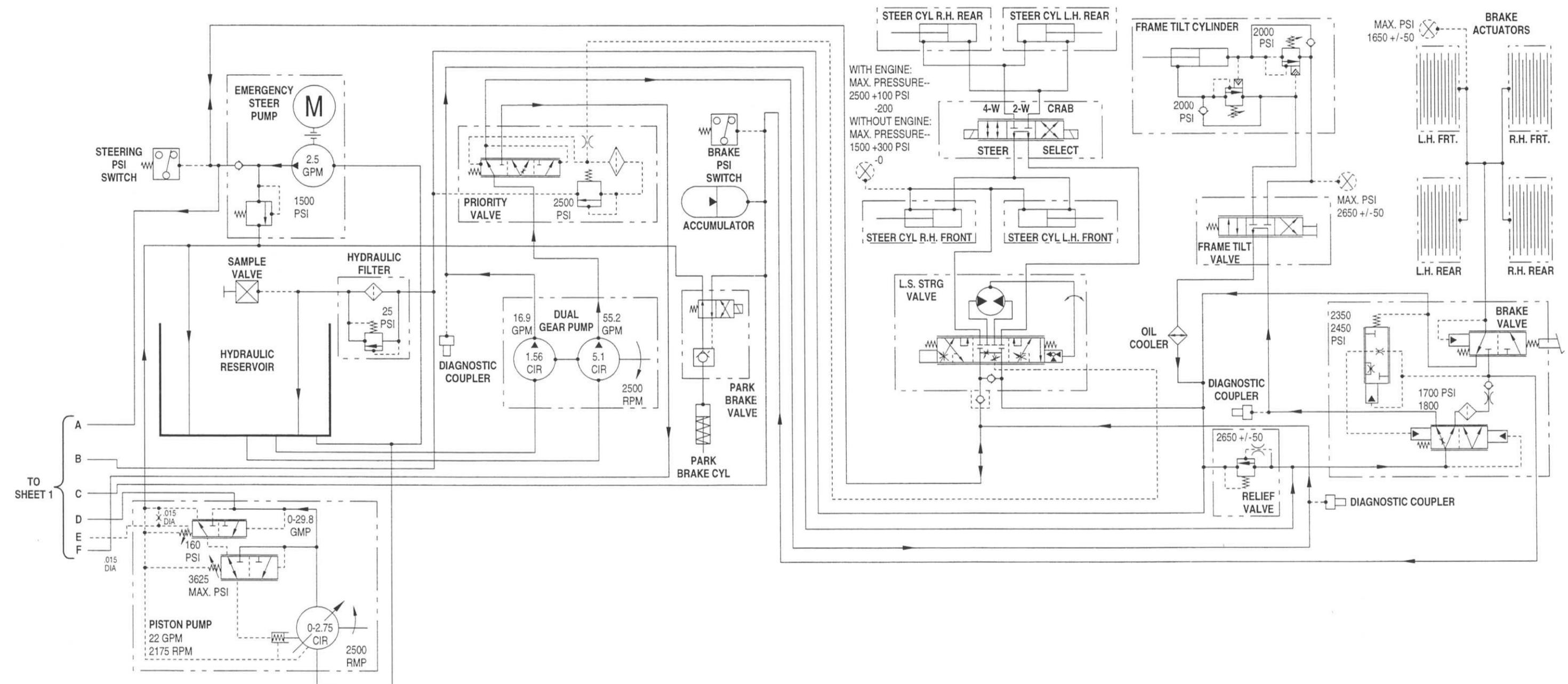


Figure FO-2. Hydraulic System (Sheet 2 of 2)



## THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

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

### WEIGHTS

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

### LIQUID MEASURE

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

### SQUARE MEASURE

1 Sq Centimeter=100 Sq Millimeters=0.155 Sq Inches  
 1 Sq Meter=10,000 Sq Centimeters=10.76 Sq Feet  
 1 Sq Kilometer=1,000,000 Sq Meters=0.386 Sq Miles

### CUBIC MEASURE

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

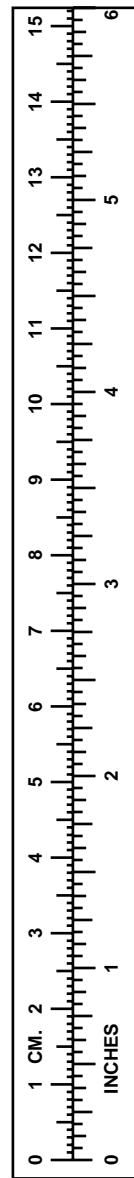
### TEMPERATURE

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

### APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches .....	Centimeters.....	2.540
Feet .....	Meters.....	0.305
Yards .....	Meters.....	0.914
Miles .....	Kilometers.....	1.609
Squares 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/Sq Inch .....	Kilopascals.....	6.895
Miles per Gallon.....	Kilometers per Liter.....	0.425
Miles per Hour .....	Kilometers per Hour.....	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters.....	Inches .....	0.394
Meters .....	Feet .....	3.280
Meters .....	Yards .....	1.094
Kilometers .....	Miles .....	0.621
Sq Centimeters .....	Square Inches .....	0.155
Square Meters .....	Square Feet .....	10.764
Square Meters .....	Square Yards .....	1.196
Square Kilometers .....	Square Miles .....	0.386
Sq 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 Sq Inch .....	0.145
Km per Liter .....	Miles per Gallon .....	2.354
Km per Hour .....	Miles per Hour .....	0.621





This fine document...

Was brought to you by me:



## Liberated Manuals -- free army and government manuals

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

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

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

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

- Sincerely  
Igor Chudov  
<http://igor.chudov.com/>
- [Chicago Machinery Movers](http://chicagomachinerymovers.com)