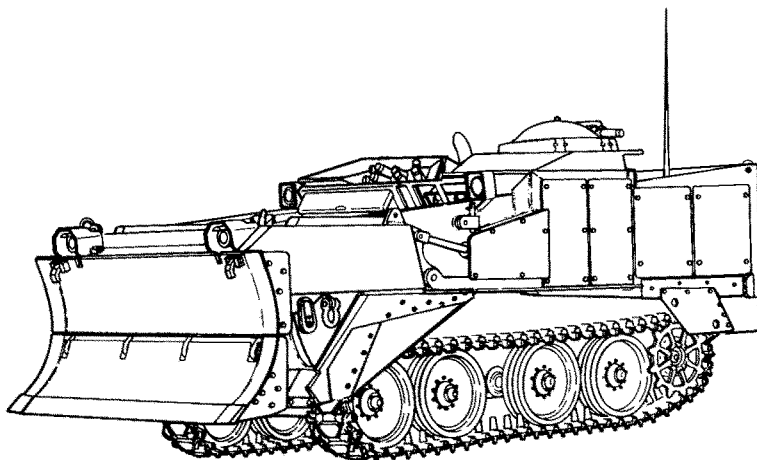


TM 5-2350-262-20-3

TECHNICAL MANUAL UNIT MAINTENANCE MANUAL

VOLUME 3 OF 3

HYDRAULIC TROUBLESHOOTING
TEST PROCEDURES



ARMORED COMBAT EARTHMOVER
(ACE), M9
(NSN 2350-00-808-7100)

TABLE OF CONTENTS i

HOW TO USE THIS
MANUAL ii

EQUIPMENT DESCRIPTION 1-2

HYDRAULIC SYSTEM 2-1

TROUBLESHOOTING
PROCEDURES 3-1

INDEX INDEX 1

DISTRIBUTION STATEMENT A. Approved for public release; distribution is limited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1998

Change 2

CHANGE**NO. 2**

**HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 March 2000**

**UNIT MAINTENANCE MANUAL
ARMORED COMBAT EARTHMOVER
(ACE), M9
(NSN 2350-00-808-7100)**

TM 5-2350-262-20-3, 16 NOV 1998 is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin.
3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration.

Remove Pages

Cover
Change 1 List of Effective Pages
1-3 and 1-4
2-3 through 2-6
3-7 and 3-8
3-27 and 3-28
3-67 and 3-68
3-215 through 3-230
A-1 through A-4 (Blank)
E-1 and E-2
INDEX 1 through INDEX 10

Rear Cover

Insert Pages


Cover
Change 2 List of Effective Pages
1-3 and 1-4
2-3 through 2-6
3-7 and 3-8
3-27 and 3-28
3-67 and 3-68
3-215 through 3-230
A-1 through A-4 (Blank)
E-1 and E-2 (Blank)
INDEX 1 through INDEX 10
FP-1 and FP-2 (Blank)
Rear Cover

Approved for public release; distribution is unlimited.

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

By Order of the Secretary of the Army:

Official:


JOEL B. HUDSON
*Administrative Assistant to the
Secretary of the Army*
0001306

ERIC K. SHINSEKI
*General, United States Army
Chief of Staff*

DISTRIBUTION: To be distributed in accordance with the Initial Distribution Number (IDN) 372497, requirements for TM5-2350-262-20-3.

CHANGE

NO. 1

**HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 June 1999**

**UNIT MAINTENANCE MANUAL
ARMORED COMBAT EARTHMOVER
(ACE), M9
(NSN 2350-00-808-7100)**

TM 5-2350-262-20-3, 16 NOV 1998 is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin.
3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration.

Remove Pages

i through vi
3-15 and 3-16
3-231 and 3-232 (Blank)
INDEX 1 and INDEX 2 (Blank)

Insert Pages

List of Effective Pages
i through vi
3-15 and 3-16
3-231 through 3-250 (Blank)
INDEX 1 through INDEX 10

Approved for public release; distribution is unlimited.

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

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9914005

DISTRIBUTION: To be distributed in accordance with Initial Distribution Number (IDN) 372497, requirements for TM 5-2350-262-20-3.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of text or illustration effected by the updates is indicated by a vertical line in the outer margin of the page. Updates to wiring diagrams are indicated by shaded areas.

Dates of issue for original and updated pages/work packages are:

Original 0 16..NOV 98
 Change 1 30..JUN 99
 Change 2 27..MAR 00

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 41 AND
 TOTAL NUMBER OF PAGES IS 281 CONSISTING OF THE FOLLOWING:**

Page/WP No.	Change No.	Page/WP No.	Change No.
Cover	2	3-228.....	0
a-c	0	3-229.....	2
List of Effective Pages	2	3-230.....	0
i	1	3-231 through 3-250 (Blank)	1
ii-iii	0	A-1 through A-3	2
iv.....	1	A-4(Blank)	0
v	0	B-1 through B-4	0
vi.....	1	C-1 and C-2	0
1-1 thru 1-2.....	0	D-1 and D-2 (Blank)	0
1-3 and 1-4	2	E-1 and E-2	2
1-5 and 1-6 (Blank)	0	INDEX 1 through INDEX 10 .	2
2-1 through 2-3.....	0	FP-1 and FP-2 (Blank)	2
2-4 and 2-5	2	Rear Cover	2
2-6 through 2-12 (Blank)	0		
3-1 through 3-6.....	0		
3-7	2		
3-8 through 3-14	0		
3-15.....	1		
3-16 through 3-27	0		
3-28	2		
3-29 through 3-66	0		
3-67	2		
3-68 through 3-215	0		
3-216.....	2		
3-217.....	0		
3-218 through 3-225	2		
3-226.....	0		
3-227	2		

WARNING

CARBON MONOXIDE POISONING CAN BE DEADLY

CARBON MONOXIDE IS A COLORLESS, ODORLESS, DEADLY POISONOUS GAS WHICH, WHEN BREATHED, DEPRIVES THE BODY OF OXYGEN AND CAUSES SUFFOCATION. EXPOSURE TO AIR CONTAMINATED WITH CARBON MONOXIDE PRODUCES SYMPTOMS OF HEADACHE, DIZZINESS, LOSS OF MUSCULAR CONTROL, APPARENT DROWSINESS, AND COMA. PERMANENT BRAIN DAMAGE OR DEATH CAN RESULT FROM SEVERE EXPOSURE.

CARBON MONOXIDE OCCURS IN THE EXHAUST FUMES OF FUEL-BURNING HEATERS AND INTERNAL COMBUSTION ENGINES AND BECOMES DANGEROUSLY CONCENTRATED UNDER CONDITIONS OF INADEQUATE VENTILATION. THE FOLLOWING PRECAUTIONS MUST BE OBSERVED TO ENSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE.

1. DO NOT operate heater or engine of vehicle in an enclosed area unless it is ADEQUATELY VENTILATED.
2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in personnel compartments.
3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air, keep warm, DO NOT PERMIT PHYSICAL EXERCISE. If necessary, administer artificial respiration.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

WARNING

- Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.
- Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travel. Failure to comply may result in severe injury to personnel.
- Do not work under vehicle unless hull is blocked and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.
- Do not work under vehicle unless hull is blocked. Failure to comply may result in severe injury or death to personnel.
- Do not stand or work under raised apron and dozer assembly unless apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

WARNING - CONTINUED

- Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death to personnel.
solvent is flammable and must not be used near an open flame. A fire extinguisher will be kept nearby when the solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.
- Always wear leather gloves when handling wire rope. Never allow wire rope to run through hands. Failure to comply may result in severe injury to personnel.
- Stand clear of wire rope. Should wire rope break or snap loose, severe injury or death to personnel may result.
- Compressed air can injury you and others. Do not aim compressed air hoses at anyone. Do not use more than 30 psi (207 kPa). Always wear goggles. Failure to comply may result in serious injury to personnel.
- Dozer blade weighs 585 lb (266 kg). Keep feet and hands from under ejector assembly while lifting or moving. Failure to comply may result in severe injury or death to personnel.
- Ejector cylinder weighs 325 lb (148 kg). Support ejector cylinder before disconnecting or removing. Failure to comply may result in severe injury to personnel.
- Support apron cylinder while removing or installing. Apron cylinder weighs 85 lb (39 kg) and can cause serious injury if dropped on hands or feet.
- Personnel must stand clear during lifting operations. A swinging or shifting load may result in injury to personnel.
- Do not lift apron and dozer assembly with dozer blade attached unless dozer lockpins are installed. Failure to comply may result in severe injury or death to personnel.
- Do not stand between ejector and ejector cylinder while performing ejector leak checks. Failure to comply may result in severe injury to personnel.
- Do not stand directly behind vehicle or directly in front of vehicle when positioning jack stands. Failure to comply may result in severe injury or death to personnel.
- Before performing any hydraulic troubleshooting in bowl, move the ejector forward and disable it by disconnecting the ejector cylinder or by engaging the ejector lock. Failure to comply may result in severe injury to personnel.
- Hot engine and engine components can cause severe burns. Do not work on engine or engine components unless engine is cool. Failure to comply may result in injury to personnel.
- Spilled hydraulic oil is very slippery. Use caution when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.
- Do not work under vehicle or on track retainers unless hull is blocked or vehicle has settled on bump stops. Failure to comply may result in severe injury or death to personnel.

WARNING - CONTINUED

- Ensure hydraulic pressure is relieved after ejector cylinder is pushed forward. Pressure may build up and cause the ejector to retract. Failure to comply may result in severe injury to personnel.
- Hot exhaust systems can cause serious burns. Do not work on or near hot exhaust system components unless exhaust system is cool. Failure to comply may result in injury to personnel.
- Ensure stop is in locked position to prevent any movement of ejector control valve plunger, or ejector can move. Failure to comply may result in severe injury to personnel.
- Do not breathe nitrogen gas. Failure to comply may result in death to personnel.
- Hot hydraulic oil can cause serious burns. Pump and fittings must be cool to touch before working on hydraulic system. Failure to comply may result in severe injury to personnel.
- Wear face shield or goggles for eye protection when using wire brush. Failure to comply may result in injury to personnel.
- Ensure personnel are clear of bilge pump area before starting engine. Failure to comply may result in injury to personnel.
- High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions, and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury to personnel.
- Protective plates and hull access covers may be heavier than they appear due to accumulation of fluid and dirt. Take extra precautions when removing access covers. Failure to comply may result in severe injury or death to personnel.
- Wear face shield or goggles for eye and face protection when removing and installing hoses from bottom of hydraulic tank. Failure to comply may result in injury to personnel.

HYDRAULIC TROUBLESHOOTING TEST PROCEDURES

**ARMORED COMBAT EARTHMOVER (ACE), M9
(NSN 2350-00-808-7100)**

VOLUME 3 OF 3

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this publication. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the Internet on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using the form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2020, or DA Form 2028-2 direct to: Comander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, IL 61299-7630. The email address is amsta-ac-nml@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

TABLE OF CONTENTS

	Page
CHAPTER 1 INTRODUCTION	
Section I General Information	1-1
Section II Equipment Description	1-2
CHAPTER 2 HYDRAULIC SYSTEM	
Section I Principles of Operation	2-1
Section II General Hydraulic System Repair Methods	2-6
CHAPTER 3 TROUBLESHOOTING	
Section I General Hydraulic System Troubleshooting Procedures	3-1
Section II Troubleshooting Procedures	3-14
APPENDIX A REFERENCES	A-1
APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT	B-1
APPENDIX C SPECIAL TOOLS, HYDRAULIC TROUBLESHOOTING PARTS KIT, 5705562	C-1
APPENDIX D TORQUE VALUE GUIDE FOR HYDRAULIC FITTINGS	D-1
APPENDIX E SCHEMATIC DIAGRAM	E-1
INDEX	Index 1

HOW TO USE THIS MANUAL

This manual describes hydraulic troubleshooting test procedures for the M9, Armored Combat Earthmover (ACE). Before performing any work on the M9, you should become thoroughly familiar with this manual, its content, organization, and features.

ABOUT YOUR MANUAL

- a. Spend some time looking through this manual. You'll find that it has a new look, different than most of the TMs you've been using. New features added to improve the convenience of this manual and increase your efficiency are:
 1. **Accessing Information** - Extensive troubleshooting guides for specific systems lead directly to step by step directions for problem solving and troubleshooting tasks.
 2. **Illustrations** - A variety of methods are used to make locating and fixing components much easier. Locator illustrations with keyed text, exploded views, and cutaway diagrams make the information in this manual easier to understand.
 3. **Keying Text With Illustrations** - Instructions are located together with figures that illustrate the specific task you are working on. In most cases, the task steps are located after the figures making part identification and procedure sequence easier to follow.

The TM is the fundamental means by which the Army communicates to soldiers the requirements and procedures necessary to perform hydraulic troubleshooting.

- b. **General Features.** Your TM is the best source available for providing information and data critical to vehicle hydraulic troubleshooting:
 - Safety summary (warning page a through c)
 - General information and equipment descriptions (chapter 1)
 - Principles of operation (chapter 2, section I)
 - Troubleshooting (chapter 3, section II)
 - Special Tools, TMDE, and Support Equipment (appendix B)
 - Special Tools, Hydraulic Troubleshooting Parts Kit, 5705562 (appendix C)
 - Torque Value Guide for Hydraulic Fittings (appendix D)
 - Schematic Diagram (appendix E)

A typical example of how to use this manual is provided on the following pages.

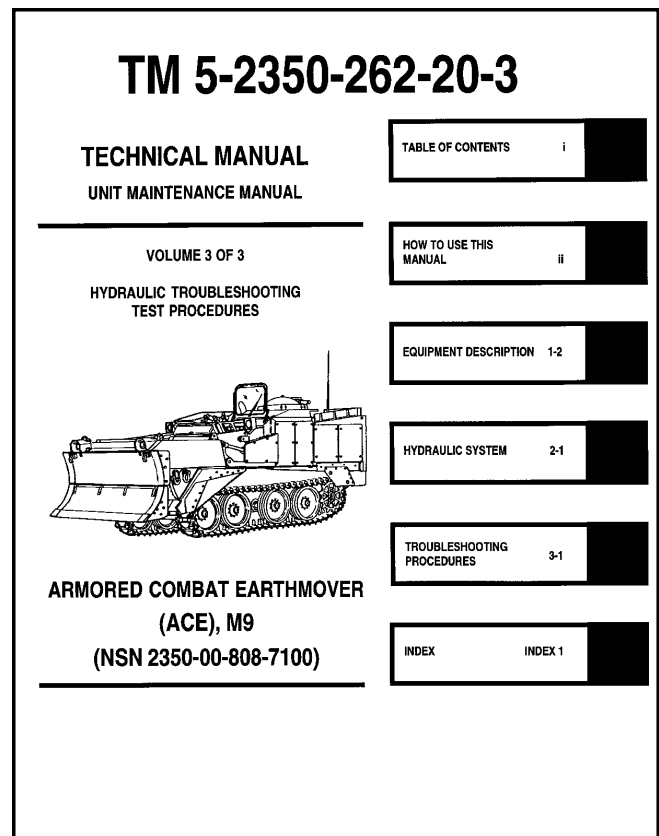
USING YOUR MANUAL: AN EXAMPLE

- a. **TASK:** The operator of an M9 ACE vehicle has complained that the apron will not raise. The vehicle has been assigned to you for repair.

b. **TROUBLESHOOTING STEPS:**

1. Look at the cover of this manual. You'll see chapter titles listed from top to bottom on the right hand side.

2. Look at the right edge of the manual. On some of the pages you'll see black bars (bleed-to-edge indicators) that are aligned with the chapter bars on the cover. These are the locations of the chapters in the text.



3. Look for "TROUBLESHOOTING PROCEDURES" on the cover. This is where the troubleshooting information is located.
4. Turn to those pages with the edge indicator matching the black bar for troubleshooting procedures. Page numbers are also listed next to chapter titles.
5. Chapter 3 is divided into two sections:
- Section I - General Hydraulic System Troubleshooting Procedures
 - Section II - Troubleshooting Procedures

TM 5-2350-262-20-3

Section II. TROUBLESHOOTING PROCEDURES

SCOPE

This section contains information on locating faults and causes of hydraulic malfunctions that may develop in the M9 ACE. An alphabetical symptom index is provided.

GENERAL

Before you begin troubleshooting, ensure the defect is real. If possible, talk to the operator or mechanic that reported the problem. Look for any other problems that could cause the system or component to malfunction, such as a switch or lever in the wrong position. Refer to TM 5-2350-262-10 for correct operating procedures. Check fluid levels as shown in TM 5-2350-262-10.

Many faults can be located by a good visual inspection. Look for leaks, loose or corroded connections, damaged controls, and loose or damaged linkages.

When working on the hydraulic system, follow the general hydraulic system repair methods and refer to the general hydraulic system troubleshooting procedures.

If you use the optional STE/ICE-R tests, use the STE/ICE-R Operator's Manual (TM 9-4910-571-12&P) for reference before and during testing.

When trying to isolate a fault, review the past maintenance record on the affected vehicle. Although it doesn't happen often, an incomplete or poorly performed maintenance task may lead to another problem.

USING THE TROUBLESHOOTING PROCEDURES

Find the symptom in the symptom index. Go to the page referenced for that symptom. All possible malfunctions cannot be listed. If the specific malfunction is not listed in this section, refer to vehicle hydraulic schematic diagram for additional information or reference data.

6. Turn to section II, "TROUBLESHOOTING PROCEDURES" (page 3-14).

TM 5-2350-262-20-3

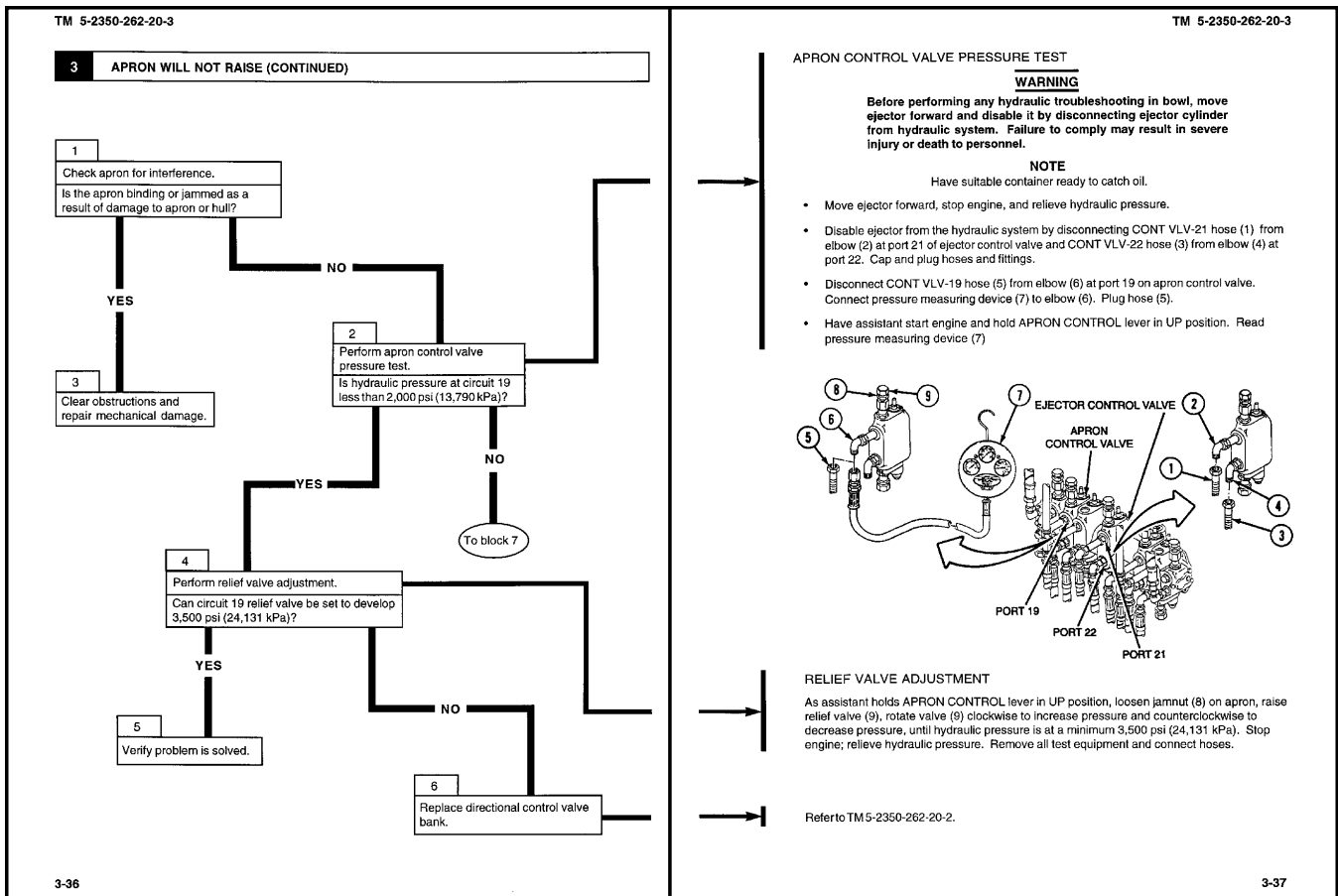
SYMPTOM INDEX

Number	Symptom Title	
1	All Hydraulic Functions Inoperative	3-12
2	Apron, Bilge Pump, and Left-Hand Wheel Control Inoperative	3-28
3	Apron Will Not Raise	3-34
4	Bump Stops Inoperative	3-42
5	Ejector Creeps	3-52
6	Ejector Does Not Extend or Retract	3-62
7	Front Corner (Left or Right) Raises in SPRUNG, But Not UNSPRUNG Mode	3-84
8	Front Corner (Left or Right) Raises in UNSPRUNG, But Not SPRUNG Mode	3-110
9	Front Corner (Left or Right) Does Not Raise in SPRUNG or UNSPRUNG Mode	3-124
10	Hydraulic Oil Overheats	3-132
11	Left Rear Corner Does not Raise in SPRUNG or UNSPRUNG Mode	3-172
12	Rear of Vehicle Raises in SPRUNG, But Not UNSPRUNG Mode	3-178
13	Right Rear Corner Raises in SPRUNG, But Not UNSPRUNG Mode	3-190
14	Right Rear Corner Raises in UNSPRUNG, But Not SPRUNG Mode	3-194
15	Vehicle Does Not Respond to Driver Controls	3-200
16	Winch and Right-Hand Wheel Control Inoperative	3-210
17	Winch Will Not Pull Rated Load	3-216
18	Track (Left or Right) Will Not Tighten or Loosen, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-232
19	Front Corner (Left or Right) Does Not Raise or Lower in UNSPRUNG Mode, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-238
20	Left or Right Track Adjuster Will Not Extend After Suspension Control Levers are Returned to Neutral (NEW PRODUCTION)	3-244

7. The second page of this section is the "SYMPTOM INDEX" (turn to page 3-15).

8. Look down the list of symptoms until you find "APRON WILL NOT RAISE."

9. Turn to the test indicated.



10. On page 3-36, steps relating to resolving the problem of apron not raising are listed in the form of a flow chart.

11. Just answer the questions on the left hand page and follow the YES or NO path. Helpful information about the question is also on the right hand page.

12. The procedures presume a basic working knowledge of the equipment to be used, but references are included for less experienced personnel.

13. At this point the diagnostic flow chart will direct you to a specific detailed procedure to solve the problem.

NOTE: Before attempting to repair or replace any hydraulic component you must:

- (a) Determine the maintenance responsibility for repair or replacement of the component.
- (b) If the task is at your echelon of maintenance responsibility, you must identify the tools needed and the replacement parts required.

Refer to the Maintenance Allocation Chart - MAC to determine not only the maintenance responsibility of the item, but also to obtain an estimate of the time required to perform the task, tools needed, and any special notes/requirements necessary.

Refer to TM 5-2350-262-24P, Unit Direct Support and General Support Maintenance Repair Parts and Special Tools List for requisition data concerning replacement parts for this task.

LIST OF PROCEDURES

Hydraulic troubleshooting procedures included in this manual are listed below and on the following pages. Use the table of contents for page reference by chapter and section, and use the alphabetical index for page cross reference to procedures by component/part name.

	Page
General Hydraulic System Repair	2-6
Installation of Adjustable Fittings	2-11
Preliminary Troubleshooting Procedures	3-3
Suspending the M9 for Suspension System Checks	3-6
Relieving Hydraulic System Pressure	3-7
Accumulator Dump Valve Installation	3-8
General Suspension Troubleshooting Information	3-10
Actuator Port Identification and Description	3-11
Locking and Disabling Ejector	3-13
All Hydraulic Functions Inoperative	3-16
Apron, Bilge Pump, and Left-Hand Wheel Control Inoperative	3-28
Apron Will Not Raise	3-34
Bump Stops Inoperative	3-42
Ejector Creeps	3-52
Ejector Does Not Extend or Retract	3-62
Front Corner (left or Right) Raises in SPRUNG, But Not UNSPRUNG Mode	3-84
Front Corner (Left or Right) Raises in UNSPRUNG, But Not SPRUNG Mode	3-110
Front Corner (Left or Right) Does Not Raise in SPRUNG or UNSPRUNG Mode	3-124
Hydraulic Oil Overheats	3-132
Left Rear Corner Does Not Raise in SPRUNG or UNSPRUNG Mode	3-172
Rear of Vehicle Raises in SPRUNG, But Not UNSPRUNG Mode	3-178
Right Rear Corner Raises in SPRUNG, But Not UNSPRUNG Mode	3-190
Right Rear Corner Raises in UNSPRUNG, But Not SPRUNG Mode	3-194
Vehicle Does Not Respond to Driver Controls	3-200
Winch and Right-Hand Wheel Control Inoperative	3-210
Winch Will Not Pull Rated Load	3-216
Track (Left or Right) Will Not Tighten or Loosen, Semi Automatic Track Adjuster (NEW PRODUCTION)	3-232
Front Corner (Left or Right) Does Not Raise or Lower in UNSPRUNG Mode, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-238
Left or Right Track Adjuster Will Not Extend After Suspension Control Levers Are Returned to Neutral, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-244

CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

SCOPE

Type of Manual: Hydraulic Troubleshooting

Model Number and Equipment Name: M9, Armored Combat Earthmover (ACE)

Purpose of Equipment: A combat engineer vehicle used for dozing, grading, hauling and defilade preparation.

MAINTENANCE FORMS, RECORDS, AND REPORTS

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

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your M9 ACE needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to:

Commander
U.S. Army Tank-automotive and Armaments Command
Attn: AMSTA-AC-NML
Rock Island, IL 61299-7630

SCOPE

This section contains information that is useful when performing unit level hydraulic troubleshooting tasks on the M9. The following information is provided in this section:

- Equipment Characteristics, Capabilities, and Features
- Location and Description of Major Components
- Safety, Care, and Handling

SECTION II. EQUIPMENT DESCRIPTION

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The M9 ACE is an armored, amphibious (wades) combat earthmover, used for:

- Dozing.
- Rough grading.
- Excavating.
- Hauling.
- Scraping.

It is a multi-purpose vehicle, and can be used as:

- An earth hauler.
- A cargo carrier.
- A prime mover.

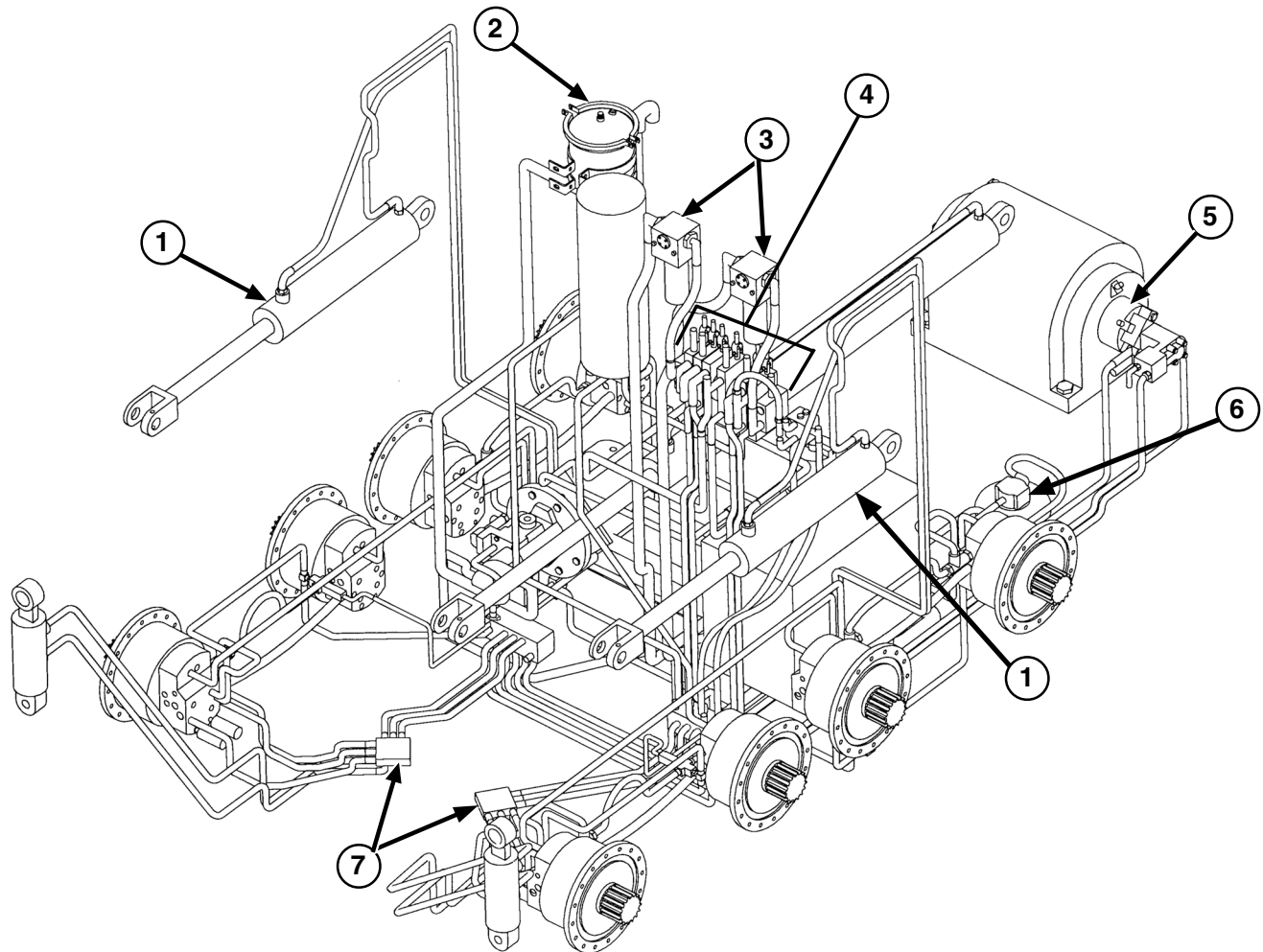
Some of the M9 capabilities are:

- Travels on land up to 30 mph (48 km/h).
- Climbs up to 60 percent grades.
- Drawbar pull of up to 30,000 lb (13,620 kg) at 1.5 mph (2.4 km/h).
- Winch (Invar) pull of up to 25,000 lb (11,350 kg).
- Winch (Lakeshore) pull of up to 35,000 lb (15,891 kg).

The features of the M9 are:

- Full-tracked.
- Air-transportable.
- Highly mobile.
- Armored.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



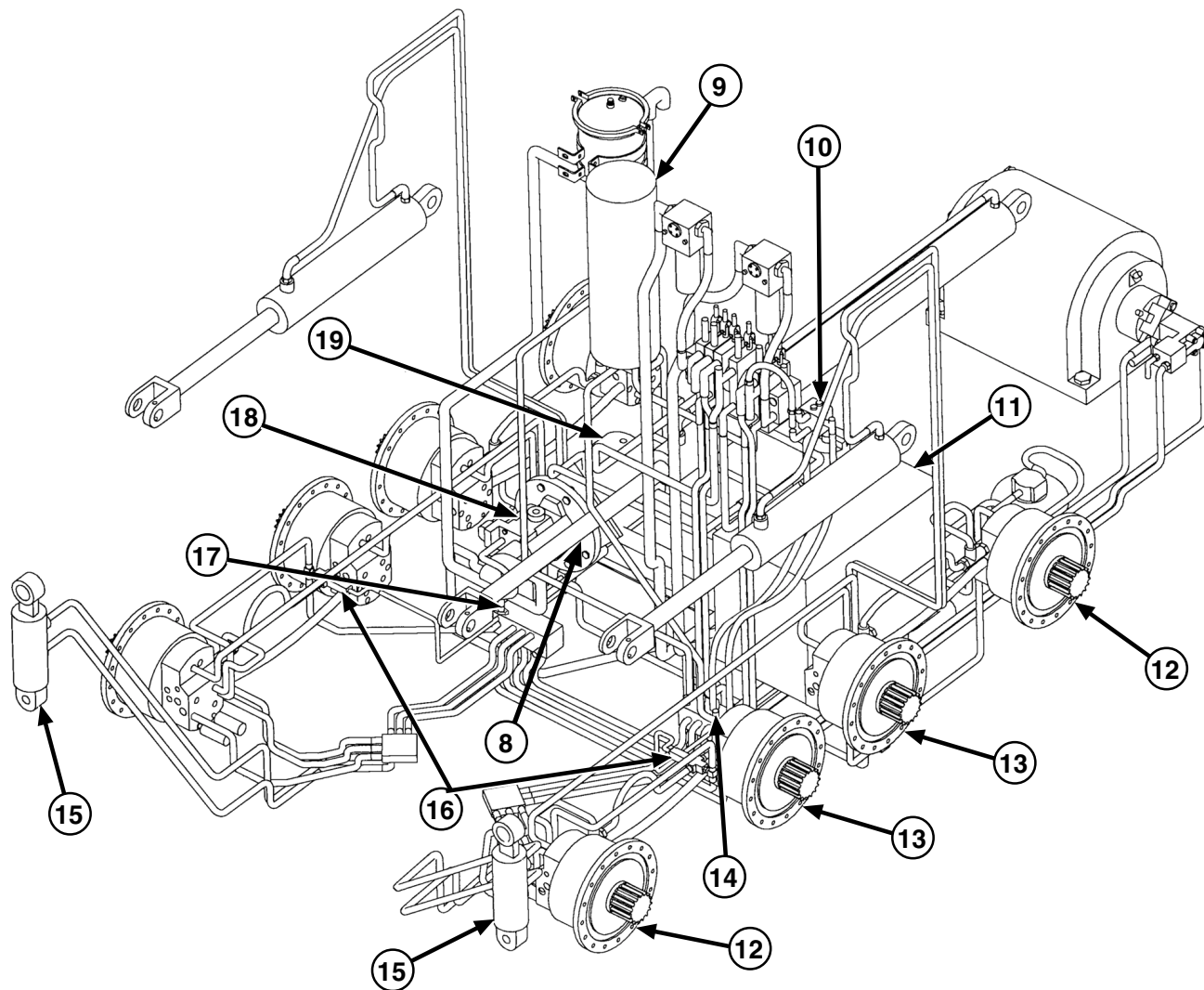
- (1) APRON CYLINDER. Raises and lowers apron and dozer assembly (one each side).
- (2) RETURN LINE FILTER. Filters out contaminants from hydraulic oil that is returning to reservoir.
- (3) HIGH PRESSURE FILTERS. Two high-pressure filters located directly in front of driver's compartment filter hydraulic fluid from the main hydraulic pump while it is enroute to the directional control valve bank.
- (4) DIRECTIONAL CONTROL VALVE. Activated by mechanical linkages from the operator's controls to activate hydraulic functions in the vehicle. Controls direction of fluid flow and pressure.
- (5) WINCH MOTOR. Operates the winch which is used in recovery operations.

NOTE

Although the Bilge Pump is considered Not Mission Essential and will no longer be supported with spare and repair parts, this manual contains troubleshooting procedures For Your Information Only. See TB 43 0001-62-7 (dated Oct 98) for Instructions to Isolate and Disconnect a Non-functional Bilge Pump.

- (6) BILGE PUMP MOTOR. Starts bilge pump operation through hydraulic pressure when bilge pump control lever is activated.
- (7) FORWARD MANIFOLD. Routes the flow of hydraulic fluid to components.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



- (8) EJECTOR CYLINDER. Moves ejector forward and back with hydraulic pressure.
- (9) MAIN ACCUMULATOR. Helps keep pressure constant in hydropneumatic suspension system.
- (10) SPRUNG/UNSPRUNG VALVE. Regulates pressurized fluid flow for whichever mode is selected.
- (11) HYDRAULIC RESERVOIR. Supplies hydraulic oil through main pump, high-pressure filters, and directional control valve to activate hydraulic functions of vehicle.
- (12) NO. 1 AND 4 ACTUATORS. Front: provides vehicle suspension in SPRUNG mode and allows vehicle to raise and lower in UNSPRUNG mode. Rear: No. 4 is same as front, except they cannot be raised or lowered.
- (13) NO. 2 AND 3 ACTUATORS. Operate off No. 1 and 4 actuators. Interwheel control valves allow them to follow, rather than lead No. 1 and 4 actuators when vehicle is lowered.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

- (14) SUSPENSION RELIEF VALVE. Relieves pressure surges or gradual increases in pressure to suspension.
- (15) BUMP STOP CYLINDERS. Limit upward travel of roadwheel arms when in SPRUNG position (one on each side).
- (16) INTERMEDIATE WHEEL VALVE. Prevents No. 2 and 3 actuators from raising when lowering front of vehicle.
- (17) CHECK VALVE. A device to control the direction of fluid flow.
- (18) COMPENSATING PUMP. Provides pressure to vehicle for SPRUNG/UNSPRUNG hydraulic operation.
- (19) MAIN HYDRAULIC PUMP. Fixed displacement pump that pulls hydraulic oil from the reservoir to perform whatever function is necessary.

SAFETY, CARE, AND HANDLING

Warnings are listed in the warning summary front of the manual and before specific steps where they apply in the troubleshooting tests. In addition to these warnings, always keep in mind the following when working on the M9:

- The hydraulic system operates at pressures up to 4,500 psi (31,028 kPa).
- Ensure the upper apron lockpins are installed anytime personnel are working on the apron or dozer blade and anytime the apron is raised.
- Never operate the ejector when personnel are in the bowl.
- Always place support stands under the hull before crawling under the vehicle. The vehicle suspension will settle down after engine has been shut off.

CHAPTER 2 HYDRAULIC SYSTEM

Section I. PRINCIPLES OF OPERATION

SCOPE

This section contains information relative to the principles of hydraulic system operation for the M9, Armored Combat Earthmover (ACE). The general functional description of the vehicle and separate systems are contained in TM 5-2350-262-20-1. Unit maintenance personnel should be familiar with the principles of operation of these systems before working on or troubleshooting hydraulic systems. A more thorough understanding of the hydraulic system and electrical system can be obtained by referring to the vehicle wiring diagram in TM 5-2350-262-20-1 and the vehicle hydraulic schematic in appendix E of this manual.

HYDRAULIC SYSTEM

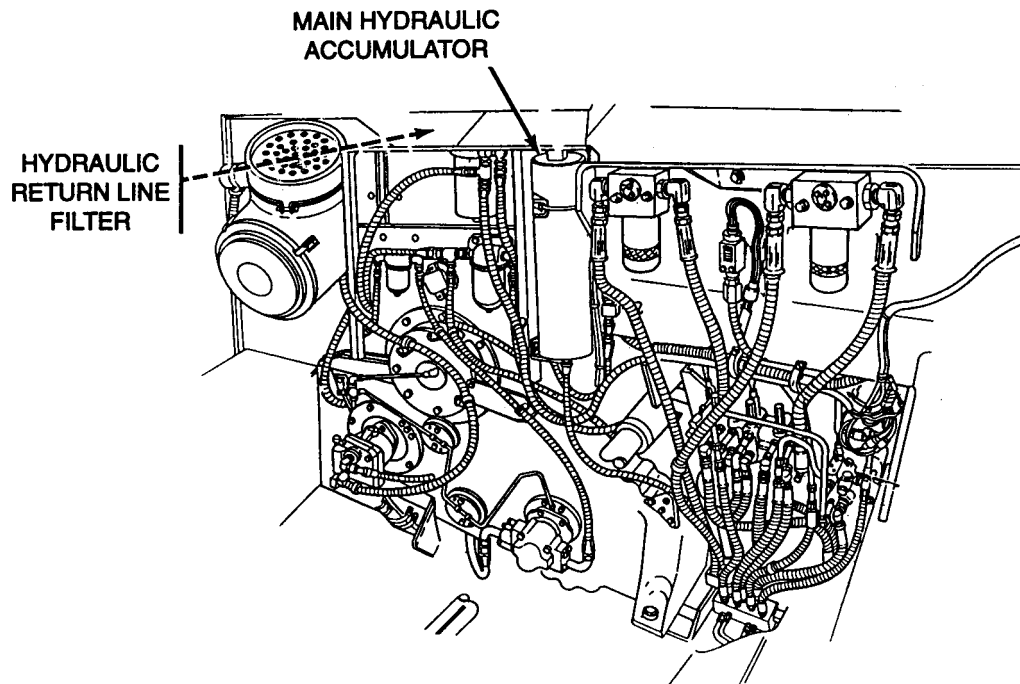
NOTE

Refer to the vehicle hydraulic schematic, appendix E.

The hydraulic system provides hydraulic pressure to energize the suspension system, operate the winch, ejector and apron cylinders, and bilge pump. Some hydraulic components are briefly described below.

HYDRAULIC RETURN LINE FILTER This filter, located on top of the engine, filters out contaminants from the hydraulic oil returning to the hydraulic reservoir.

MAIN HYDRAULIC ACCUMULATOR The main hydraulic accumulator is located on the left side of the filter support. It is charged with nitrogen to 1,750-1,850 psi (12,066-12,756 kPa) at 70 F (21 C) and provides immediate response to temporary needs of the SPRUNG mode that the compensating pump cannot meet. A charge and gauge assembly is mounted on the accumulator and is used to check accumulator charge status and to charge the accumulator.



HYDRAULIC HIGH-PRESSURE FILTERS Two high-pressure filters located directly in front of the driver's compartment filter hydraulic fluid from the main hydraulic pump while it is enroute to the directional control valve bank.

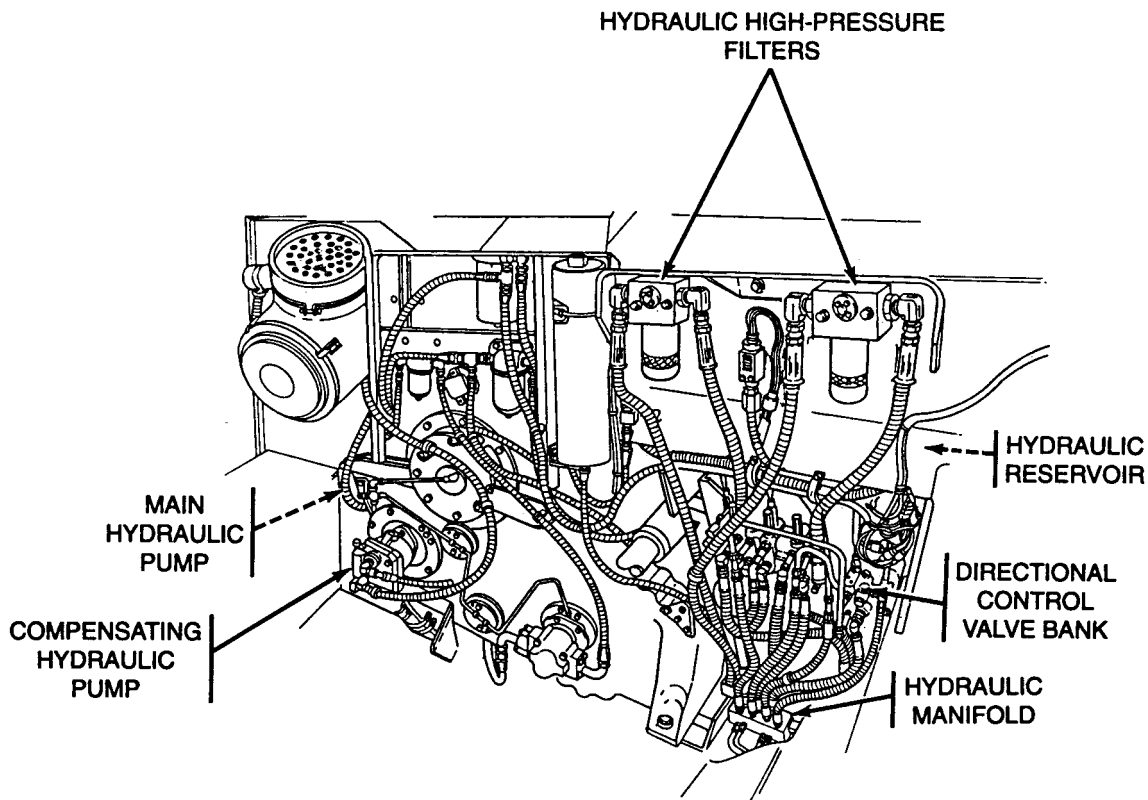
HYDRAULIC RESERVOIR The hydraulic reservoir is located beneath the driver's compartment and its check and fill point is located in the driver's compartment. It has a capacity of 32 gal. (121 L) of OE/HDO-10.

DIRECTIONAL CONTROL VALVE BANK The control valve bank is located beneath the hydraulic high-pressure filters. The control valves in the valve bank are activated by mechanical linkages from the operator's compartment and they, in turn, activate the hydraulic functions of the vehicle.

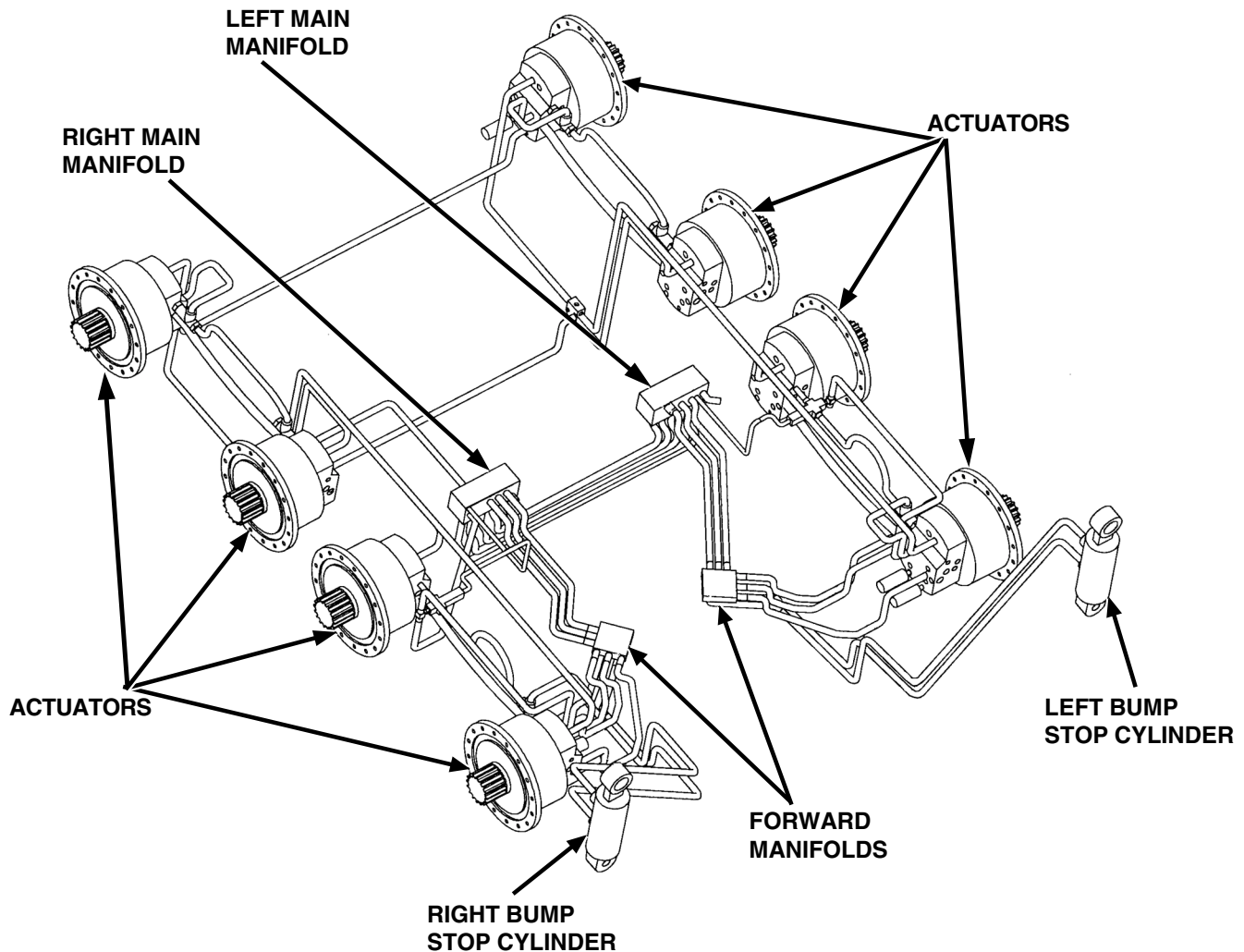
HYDRAULIC MANIFOLDS Located in the hull, the manifolds route the flow of hydraulic fluid to the vehicle components.

COMPENSATING HYDRAULIC PUMP Located on the front of the transfer case, the pump provides pressure at a constant 2,800-2,900 psi (19,306-19,996 kPa) to the SPRUNG/UNSPRUNG hydraulic operation. Capacity of this variable displacement pump is 10 gpm (38 Lpm).

MAIN HYDRAULIC PUMP A fixed displacement pump is mounted on the rear of the transfer case. The pump pulls fluid from the hydraulic reservoir and circulates it through the hydraulic filters at 13 gpm (49 Lpm), then splits the pressure at the directional control valves to provide pressure to both left and right suspension controls.



HYDRAULIC SYSTEM-CONTINUED



HYDRAULIC SUSPENSION OPERATION

SPRUNG/UNSPRUNG Circuit The key to the operation of the M9 ACE is its hydropneumatic suspension system that allows the vehicle to operate in both SPRUNG and UNSPRUNG modes.

SPRUNG Mode Pressure is delivered through line 9 to bump stops and front actuator fill valves, causing the bump stops to extend and limit movement of the front roadwheel arms. The actuators become a fixed suspension with the accumulators acting like shock absorbers for the system, providing a smooth ride up to 30 MPH (48 Km/H). SPRUNG mode is used for road marches and parking.

UNSPRUNG Mode Pressure is routed through the SPRUNG/UNSPRUNG valve to line 11 and to the actuator wheel valves, causing bump stops to retract and the suspension system to become variable. The front of the vehicle can be raised or lowered, and the operator has independent control of the left and right suspension components. UNSPRUNG mode is used for earthmoving operations.

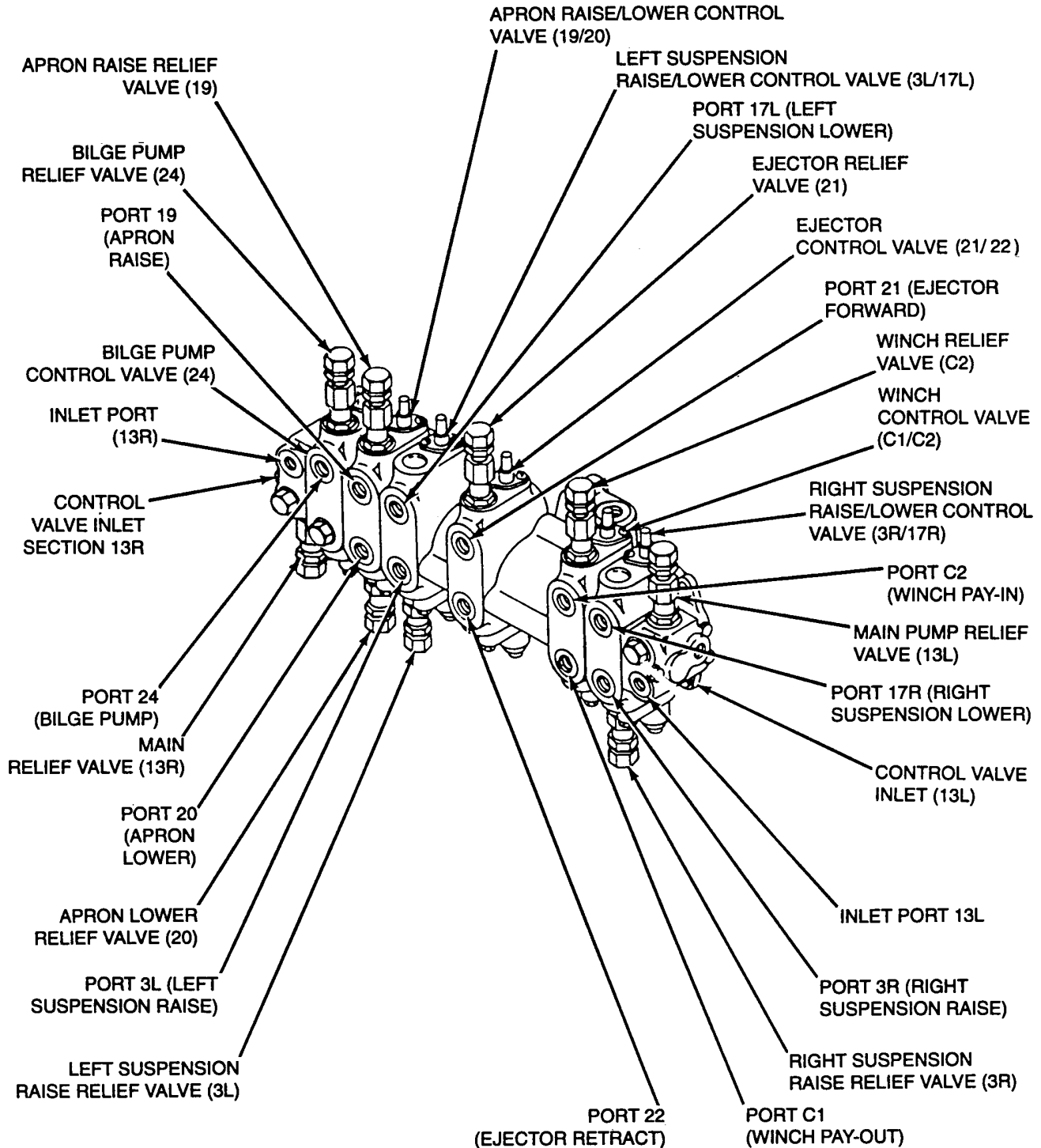
SPRUNG/UNSPRUNG CONTROL VALVE Located to the right of the main valve bank, facing rearward, this valve regulates fluid flow for whichever mode is selected.

HYDRAULIC CONTROL VALVE OPERATION The hydraulic control valves on the directional control valve bank are activated by mechanical linkages from the operator's compartment and they, in turn, activate the hydraulic functions of the vehicle.

NOTE

Although the Bilge Pump is considered Not Mission Essential and will no longer be supported with spare and repair parts, this manual contains troubleshooting procedures For Your Information Only. See TB 43 0001-62-7 (dated Oct 98) for Instructions to Isolate and Disconnect a Non-functional Bilge Pump.

This page and page 2-5 describe the functions of valves and circuits they activate. Refer to this page when following the bilge pump, apron raise/lower, winch, and ejector valve circuits.



BILGE PUMP CONTROL VALVE (24) When activated, pressurizes bilge pump circuit at 1,450-1,550 psi (9,998-10,687 kPa) and starts bilge pump action.

RIGHT PUMP CONTROL VALVE (13R) Receives oil flow from the main hydraulic pump and maintains pressure at 3,950-4,050 psi (27,235-27,925 kPa) for right-side hydraulic functions.

LEFT PUMP CONTROL VALVE (13L) Receives oil flow from main hydraulic pump and maintains pressure at 3,950-4,050 psi (27,235-27,925 kPa).

RIGHT SUSPENSION CONTROL VALVE (3R/17R) Port 3R, front bottom of valve, raises the right front-side of vehicle. Port 17R, above port 3R, lowers right front-side of vehicle. Relief valve is set at 3,450-3,550 psi (23,788-24,477 kPa).

LEFT SUSPENSION CONTROL VALVE (3L/17L) Port 3L, front bottom of valve, raises the left front-side of vehicle. Port 17L, above port 3L, lowers the left front-side of vehicle. Relief valve is set at 3,450-3,550 psi (23,788 - 24,477 kPa).

APRON RAISE/LOWER CONTROL VALVE (19/20) Port 19, front top of valve, actuates circuit and raises apron. Port 20, below port 19, actuates circuit and lowers apron. Relief valve No. 19 is set at 4,450-4,550 psi (30,683-31,372 kPa) and relief valve No. 20 is set at 1,950-2,050 psi (13,445-14,135 kPa).

WINCH CONTROL VALVE (C1/C2) Port C1, front bottom of valve, actuates circuit and moves cable out of winch, Port C2, above port C1, brings cable into winch. Relief valve is set at 1,950-2,050 psi (13,445-14,135 kPa) on the winch.

EJECTOR CONTROL VALVE (21/22) Port 21, front top of valve, actuates circuit and moves ejector forward. Port 22, below port 21, actuates and moves the ejector back. Relief valve is set at 1,950-2,050 psi (13,445-14,135 kPa).

Section II. GENERAL HYDRAULIC SYSTEM REPAIR METHODS

SCOPE

This section contains repair methods for the hydraulic system. If special repair methods or procedures are required for the hydraulic system components or parts, specific repair instructions are included in the individual maintenance tasks in TM 5-2350-262-20-1.

GENERAL HYDRAULIC SYSTEM REPAIR

WARNING

- **High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions, and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury to personnel.**
- **Main hydraulic pump weighs approximately 130 lb (59 kg). Severe injury to personnel could result if pump is not handled with caution.**
- **Before performing any hydraulic troubleshooting in the bowl, move the ejector forward and disable it by disconnecting the ejector cylinder or by engaging the ejector lock. Failure to comply may result in severe injury to personnel.**
- **Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.**
- **Ensure personnel are clear of bilge pump area before starting engine. Failure to comply may result in injury to personnel.**

GENERAL HYDRAULIC SYSTEM REPAIR - CONTINUED**CAUTION**

- **Always clean around fittings before disconnecting or connecting hoses or fittings. Ensure area is clean before installing hydraulic components. Failure to comply may result in damage to equipment.**
- **Cover, cap, or plug all openings, ports, and tube or hose ends when they are disconnected. Failure to comply may result in damage to equipment.**
- **Ensure you mate only fittings designed to be mated with each other. Never depend on trial and error. Just because two fittings will screw together is no guarantee that the connection will not leak. See illustrations of fitting types in this chapter. Failure to comply may result in damage to equipment.**
- **Fittings must be installed and hand-tightened. If a fitting cannot be hand-tightened, it may be cross-threaded or have damaged threads. Use wrench only for final tightening. Failure to comply may result in damage to equipment.**
- **Do not use Teflon tape as a sealer on any fittings. It can separate from the fittings and cause control valves, relief valves, and actuators to become contaminated and fail.**
- **It is possible to screw a male National Pipe Thread (NPT) into a female straight thread, but the fitting will leak. Learn to recognize the very slight taper which an NPT has. Do not attempt to connect NPT and female straight threads.**
- **Do not apply sealant to the first threads of NPT fittings. If sealant enters the hydraulic system, it may cause components to fail.**
- **When connecting NPTs, care must be exercised. If overtightened, the female pipe thread will split. Replace it. If a connection leaks, disconnect and apply thread sealant. Reconnect the threads and snug up with an open-end wrench. Failure to comply may result in damage to equipment.**
- **Be careful when installing preformed packings. Sharp threads can nick the packing, causing it to leak. If fitting leaks, check packing for nicks or cuts and replace if necessary.**
- **Do not overtighten a flareless connection. Observe torque values in appendix for hydraulic fittings. Overtightening can cause leakage, requiring replacement of entire tube assembly.**
- **When connecting a hose to a fitting, always use two wrenches. Use one wrench to turn the swivel nut onto the fitting, and use another wrench to keep the hose from rotating. If the hose rotates, it can loosen the other end of the hose, or loosen the fitting at the other end.**

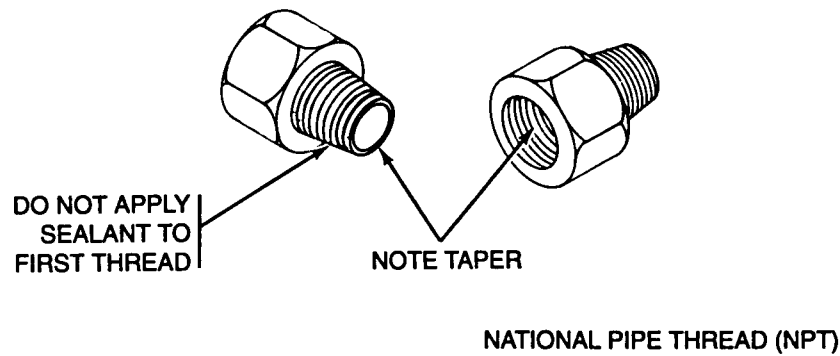
GENERAL HYDRAULIC SYSTEM REPAIR-CONTINUED

The following information is provided to familiarize personnel with the various types of hydraulic fittings. Refer to this section and the warning and cautions on the previous pages when working on hydraulic systems.

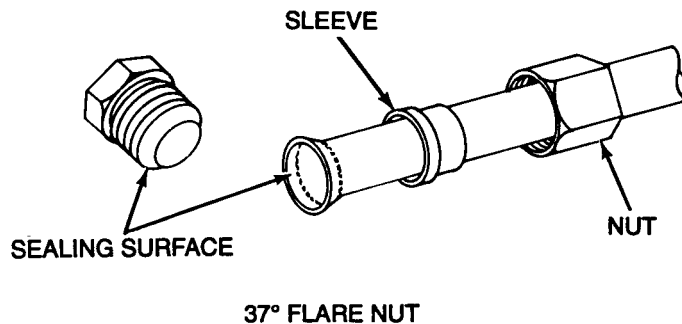
- A** National Pipe Thread (NPT) is commonly found in hydraulic systems. It differs from other fittings because it is tapered. In order to obtain a proper seal with this thread, you must use a sealant. The sealant should be applied to the male fitting. Torque valve guide, in appendix, is NOT to be used.

CAUTION

Do not apply sealant to the leading edge or the first thread of hydraulic fitting, or sealant may get into the hydraulic system and contaminate it. Failure to comply may result in damage to equipment.



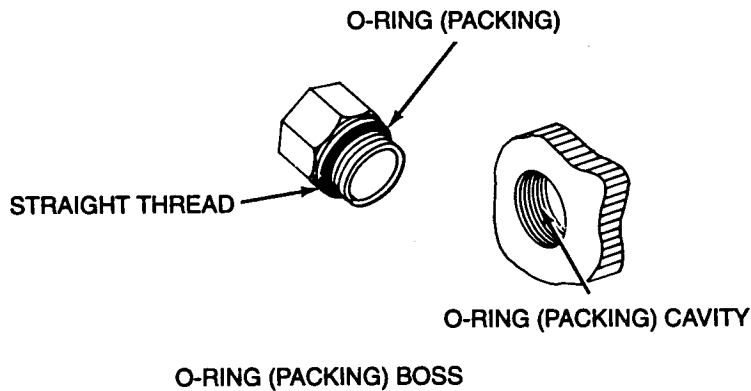
- B** The 37° flare termination has a male straight thread that mates with a female straight thread. The sealing surface for this termination is the angled nose at the end of the male fitting. This nose mates with a similar surface in the female 37° flare fitting. These sealing surfaces must be free of nicks and scratches in order to seal properly. If nicked or scratched, item must be replaced. For torque requirements, see guide in appendix.



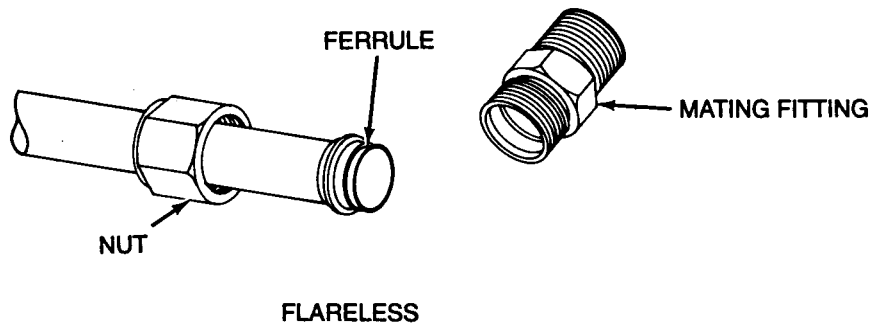
- C An O-ring (preformed packing) boss has a straight thread. The seal for this termination is a preformed packing that fits at the top of the threads on the male fitting. This packing is squeezed into the extra space at the top of the threads of the female fitting and seals the connection. The installed packing must be free of nicks and cuts to seal properly. If packing is nicked or cut, it must be replaced.

CAUTION

Packing must be located fully into groove and not on threads. Failure to comply may result in damage to equipment.



- D. A flareless fitting uses a straight thread. The female fitting contains a ferrule that mates with a cavity in the male fitting. Use recommended torque values in appendix D to tighten nut. If this fitting is overtightened, the ferrule will be deformed and the fitting will leak.

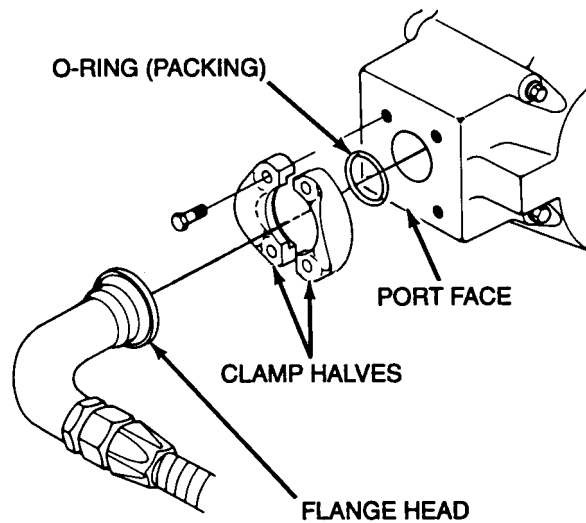


GENERAL HYDRAULIC SYSTEM REPAIR-CONTINUED

- E A four-bolt split flange has a flange head that is clamped to a smooth face. The flange head uses a preformed packing that is squeezed between the head and the face. The face and the end of flange head must be free of nicks and scratches to seal properly. The packing must also be free of nicks and cuts, or the connection will leak.

CAUTION

Replace or repair parts with nicks, cuts, or scratches. Failure to comply may result in damage to equipment.



4-BOLT SPLIT FLANGE

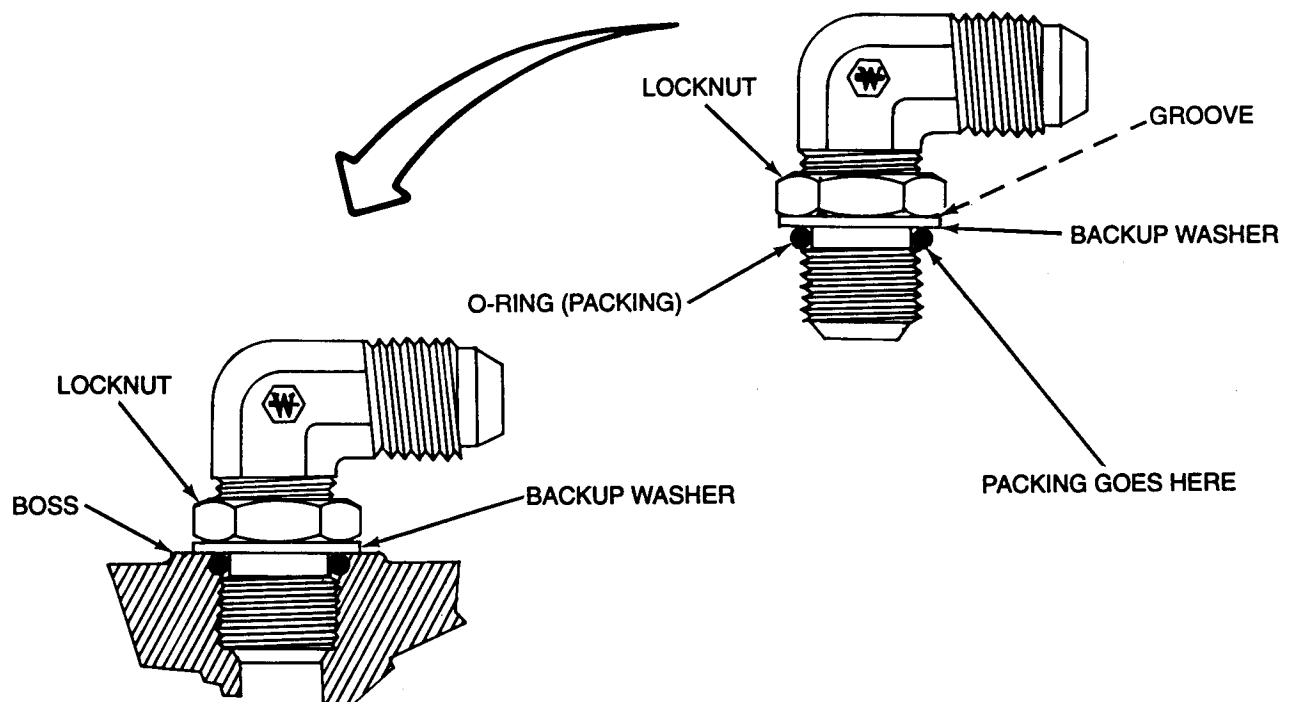
INSTALLATION OF ADJUSTABLE FITTINGS

- A** Apply light weight oil (OE/HDO-10) to O-ring (preformed packing).

CAUTION

Packing must be positioned fully into groove and not on threads. Failure to comply may result in damage to equipment.

- B** Gently push backup washer and O-ring all the way into groove.
- C** Turn locknut down until locknut contacts backup washer.
- D** Install fitting on boss until backup washer contacts face of boss.
- E** Position fitting to desired position by backing out fitting up to one full turn. Hold fitting in desired position, and tighten locknut.
- F** Connect tube to fitting after fitting is properly positioned and tightened.



CHAPTER 3 TROUBLESHOOTING

SCOPE

This chapter contains information necessary to hydraulically troubleshoot the M9. It includes information on use of test equipment, hydraulic valves, hoses, and tubes identification; symptom index, and troubleshooting procedures.

		Page
Section I	General Hydraulic System Troubleshooting Procedures	3-1
Section II	Troubleshooting Procedures	3-14

Section I. GENERAL HYDRAULIC SYSTEM TROUBLESHOOTING PROCEDURES

SCOPE

This section describes the general procedures for troubleshooting the M9 hydraulic system at the unit maintenance level. These procedures should be referred to before you start troubleshooting, and during troubleshooting when these procedures are referenced in the troubleshooting procedures of section II. Procedures contained in this section are listed below.

	Page
General	3-2
General Notes	3-2
Preliminary Troubleshooting Procedures	3-3
Suspending the M9 for Suspension System Checks	3-6
Relieving Hydraulic System Pressure	3-7
Accumulator Dump Valve Installation	3-8
General Suspension Troubleshooting Information	3-10
Actuator Port Identification and Description	3-11
Typical No. 1 and 4 Actuator Schematic Diagram	3-12
Locking and Disabling Ejector	3-13

GENERAL

The causes of many hydraulic system malfunctions cannot be isolated by visual inspection and require special procedures to locate. When a thorough visual inspection does not indicate the cause of a hydraulic malfunction, troubleshoot the hydraulic system to locate the faulty component. The troubleshooting procedures in this section and in the troubleshooting procedures cannot cover all the possible malfunctions and deficiencies that may occur on the M9. Carefully listen and observe all hydraulic actions to assist in the location of troubles. The more symptoms that can be evaluated, the easier it will be to isolate the defect.

Refer to the information in this section for preliminary troubleshooting procedures and connections of test equipment and adapters necessary for fault isolation. While troubleshooting the hydraulic system, refer to the vehicle hydraulic schematic diagram Appendix E to determine flow paths, pressures, routing of lines, and position of control valves.

GENERAL NOTES**WARNING**

- **High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Before performing any hydraulic troubleshooting in the bowl, move the ejector forward and disable it by disconnecting the ejector cylinder or by engaging the ejector lock. Failure to comply may result in severe injury or death to personnel.**

Hydraulic troubleshooting can often be reduced by taking the following steps:

- Before removing the hull access plates from the bottom of the hull, thoroughly and carefully inspect all readily and easily accessible hydraulic lines and components for leaks or damage.
- If hull access plates must be removed from the bottom of the hull, remove the front access plates first. More suspension malfunctions occur in the front of the vehicle than at the rear.
- Always observe the general hydraulic system repair methods described in this chapter.
- Instead of replacing a relief valve for troubleshooting purposes, temporarily switch it with another relief valve on the directional control valve bank.
- When proceeding from one troubleshooting task to another, read the next task to determine what test equipment or configuration is required. Time can be saved by not repeating gauge, fitting, and hose connections.

When troubleshooting is complete, make sure all test equipment and test fittings are removed, and all hydraulic components are returned to the original configuration, before operating the vehicle.

NOTE

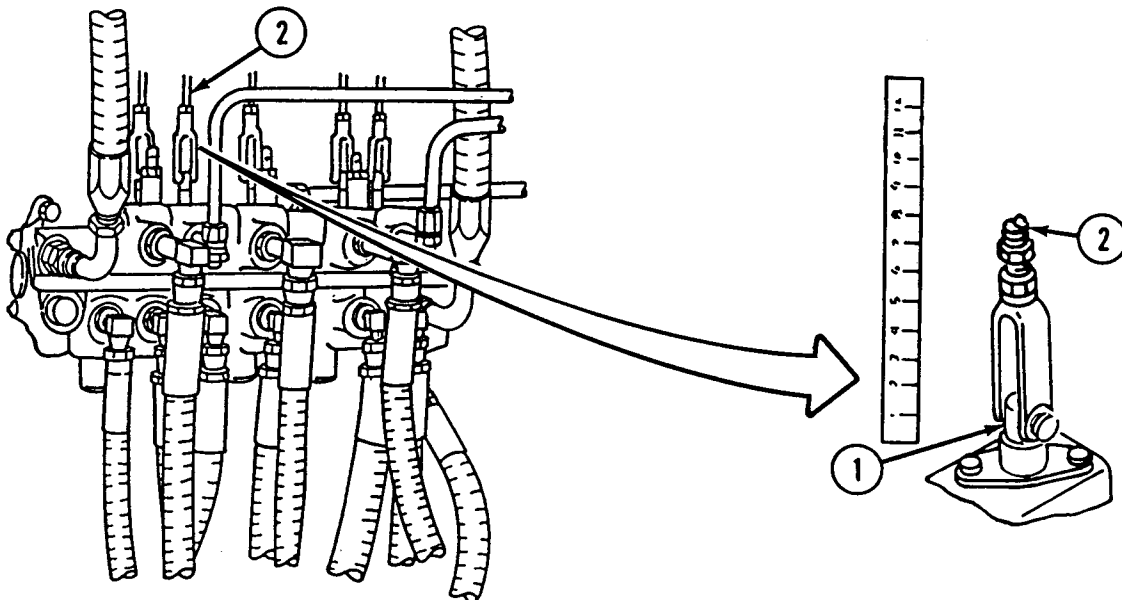
Fluid leaks are classified as either Class I, Class II, or Class III.

- 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 or observed.
- Class III Leakage of fluid great enough to form drops that fall from the item being checked or observed.

PRELIMINARY TROUBLESHOOTING PROCEDURES

Before starting any specific troubleshooting procedures, perform the following procedures:

- Visually check for ruptured oil hoses or tubes, and for Class II or Class III leaks. Replace any damaged components.
- Visually check both high-pressure filters and return line filter for cracks, loose fittings, damaged hoses, and broken brackets. Replace or repair any damaged components.
- Check for mechanical jamming or binding caused by rocks or other foreign matter.
- Check oil level in hydraulic tank and service as necessary.
- Check temperature of hydraulic oil at hydraulic oil temperature gauge in driver's compartment. Temperature should not be more than 180°F (82°C).
- Check operation and adjustment of each hydraulic control and valve plunger (1). Plungers should move 9/32 in (7 mm) above or below neutral position when control rod (2) is operated. (Bilge pump and SPRUNG/UNSPRUNG plungers only move up).



Ensure all equipment and tools are available before performing hydraulic system troubleshooting. The following items are required for hydraulic system troubleshooting:

Pressure Measuring Devices:

Pressure Measuring Device-4940-00-595-5720-GS5

STE/ICE-R-4910-01-222-6589-12258880 (optional)

Wiping rags

Hand tools from Common No.1 Kit

Bushing - 4730-00-580-7417-2081-8-4S

Adapter - N/A - 2027-12-12S

Tee - 4730-00-738-7558-203102-12-12S

Reducer - 4700-00-675-9216-221501-12-8S

Liquid measures from Common No.1 Kit:

2 qt (1.9 L) capacity - NSN 7240-00-255-8113

8 qt (7.6 L) capacity - NSN 7240-00-255-5996

Packing (O-rings) - Quantity determined by tasks. Refer to TM 5-2350-262-24P.

Hydraulic Troubleshooting Kit (NSN 2590-01-216-8646) Part No. 5705562 is comprised of the following components:

Item	NSN	Part No.	Quantity
Adapter	4730-00-441-8700	MS51500A8-4	4
Adapter	4730-00-800-7570	MS51503A4	2
Adapter	4730-01-305-5796	4-4F6BX-S	1
Adapter	4730-01-183-7167	2242-8-8S	2
Bushing	4730-00-729-4930	2081-8-2S	2
Cap	4730-00-542-5911	MS51532B10	2
Cap	4730-00-647-3311	MS51532B12	4
Cap	4730-01-044-0878	MS51532B4	4
Cap	4730-00-540-1525	MS51532B6	8
Cap	4730-00-625-2212	MS51532B8	8
Hose Assembly	4720-01-246-0992	12355351	2
Hose Assembly	4720-01-252-8425	12355352	2
Nipple	4730-00-855-4799	MS51519A10S	2
Nipple	4730-01-079-1986	MS51519A4	2
Nipple	4730-01-329-4994	MS51519A8	4
Nut	4730-00-203-3831	C5105X6	2
Plug	5365-01-249-9707	MS51518B10	2
Plug	4730-01-203-6941	MS51518B12	4
Plug	4730-01-021-3850	MS51518B4	8
Plug	4730-01-070-9214	MS51518B8	8
Plug	5365-01-251-2034	MS51518B6	4
Reducer	4730-00-805-5094	MS24399-19	4
Reducer	4730-01-214-1741	10-8-070123C	2
Reducer	4730-00-706-8711	MS51534A6-4	2
Reducer	4730-00-676-3075	MS51534A8-4	2
Tee	4730-00-074-0713	MS51523A8	4
Coupling Assembly	4730-01-270-7650	12355353	2
Check Valve	4820-00-045-7415	MS24593-8	2
Globe Valve	4820-00-513-5471	10F0-1-3T	2
Box Hydraulic Assembly Troubleshooting Kit	2540-01-298-3975	12367609	1

PRELIMINARY TROUBLESHOOTING PROCEDURES - CONTINUED

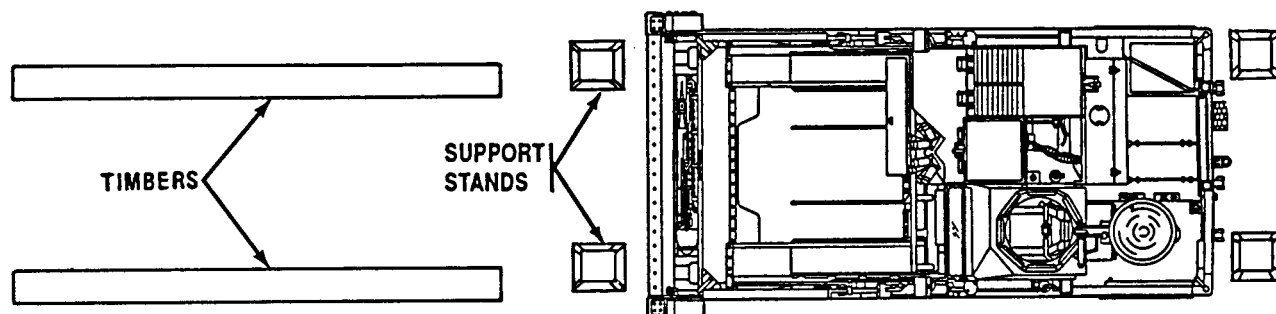
Wrench Set (NSN 5120-01-302-4387) Part No.5705566 is comprised of one each of the following components:

Item	NSN
Wrench, crowfoot, 9/16 in.	5120-00-184-8397
Wrench, crowfoot, 5/8 in.	5120-00-184-8398
Wrench, crowfoot, 11/16 in.	5120-00-236-2261
Wrench, crowfoot, 3/4 in.	5120-00-184-8400
Wrench, crowfoot, 13/16 in.	5120-00-184-8401
Wrench, crowfoot, 7/8 in.	5120-00-541-4071
Wrench, crowfoot, 15/16 in.	5120-00-184-8403
Wrench, crowfoot, 1 in.	5120-00-595-8213
Wrench, crowfoot, 1-1/16 in.	5120-00-184-8405
Wrench, crowfoot, 1-1/8 in.	5120-00-517-7021
Wrench, crowfoot, 1-3/16 in.	5120-00-184-8407
Wrench, crowfoot, 1-1/4 in.	5120-00-293-2567
Wrench, crowfoot, 1-5/16 in.	5120-00-184-8409
Wrench, crowfoot, 1-3/8 in.	5120-00-184-8410
Wrench, crowfoot, 1-1/2 in.	5120-00-184-8412
Wrench, crowfoot, 1-5/8 in.	5120-00-184-8414
Wrench, crowfoot, 1-11/16 in.	5120-00-184-8415
Wrench, crowfoot, 1-3/4 in.	5120-00-184-8416
Wrench, crowfoot, 1-7/8 in.	5120-00-184-8418
Wrench, crowfoot, 2 in.	5120-00-184-8420
Wrench, crowfoot, 2-1/8 in.	5120-00-184-8422
Wrench, crowfoot, 2-1/4 in.	5120-00-184-8424
Wrench, crowfoot, 2-1/2 in.	5120-00-184-8428
Box, tool	5140-01-298-3983

SUSPENDING THE M9 FOR SUSPENSION SYSTEM CHECKS

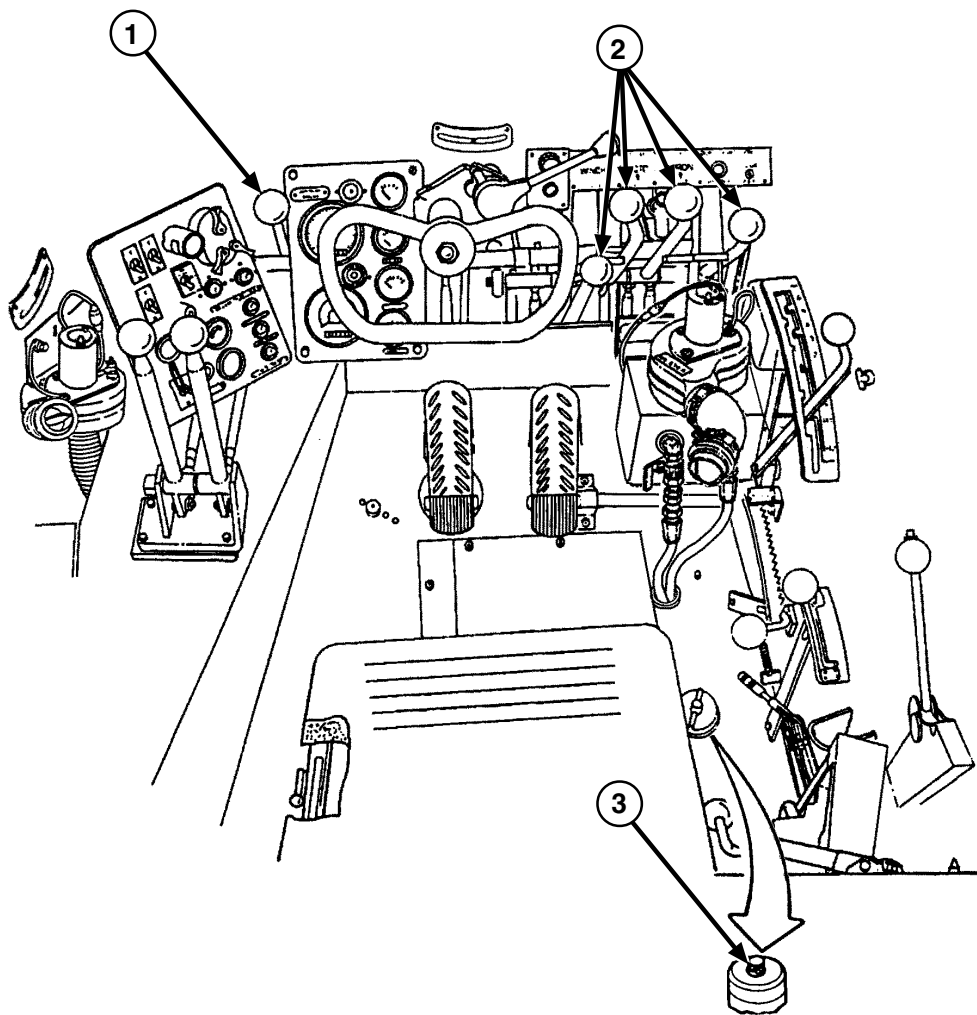
While troubleshooting the hydraulic components of the suspension system, the pressure tests are more reliable if the vehicle is supported by the suspension. If conditions do not permit this, pressure tests should be rechecked to insure accurate readings. If the suspension must be supported, perform the following procedure:

Place the vehicle on support stands to allow a safe working area under the vehicle while performing procedures that require working through hull access plate openings. If vehicle support stands are not available, use two long, parallel timbers, or similar supports, between 12 and 18 in. (30 and 46 cm) high.



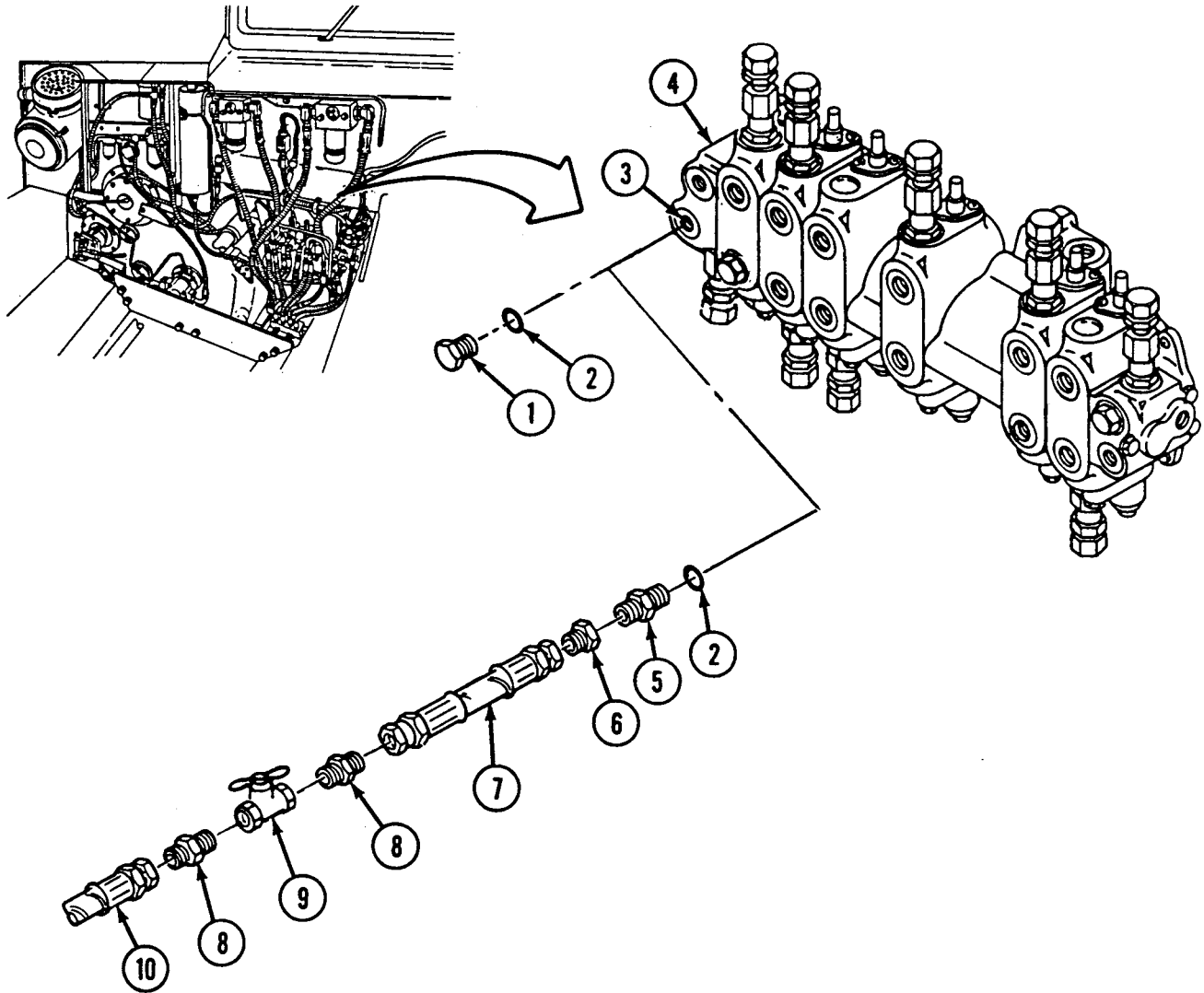
RELIEVING HYDRAULIC SYSTEM PRESSURE

- A** If necessary, stop vehicle engine. Place SPRUNG/UNSPRUNG control lever (1) in SPRUNG position.
- B** Relieve pressure from main accumulator by slowly moving SPRUNG/UNSPRUNG control lever (1) toward UNSPRUNG position until a hissing can be heard. Hold in that intermediate position until hissing ceases, then place SPRUNG/UNSPRUNG control lever (1) in SPRUNG position.
- C** Operate each of the four control levers (2) several times, through all positions, to relieve any residual pressure in hydraulic subsystems.
- D** Slowly loosen hydraulic tank dipstick (3) to allow air pressure to escape. Tighten dipstick (3).



ACCUMULATOR DUMP VALVE INSTALLATION

Some procedures in the troubleshooting charts require starting and stopping the engine several times. To rapidly and safely relieve pressure from the main hydraulic accumulator, a dump valve may be installed in the system. If installing a dump valve, use the procedure described below.



- A** Stop vehicle engine and relieve hydraulic pressure
- B** Remove plug (1) and packing (2) from port 7 (3) of valve 13R (4). Discard packing (2).
- C** Install new packing (2) and nipple (5) in port 7 (3).
- D** Install reducer (6) to nipple (5).

- E** Connect tube assembly (7) to reducer (6).
- F** Install two adapters (8) on globe valve (9), and connect this assembly to tube (7), with arrow of globe valve (9) pointed toward port 7 (3).

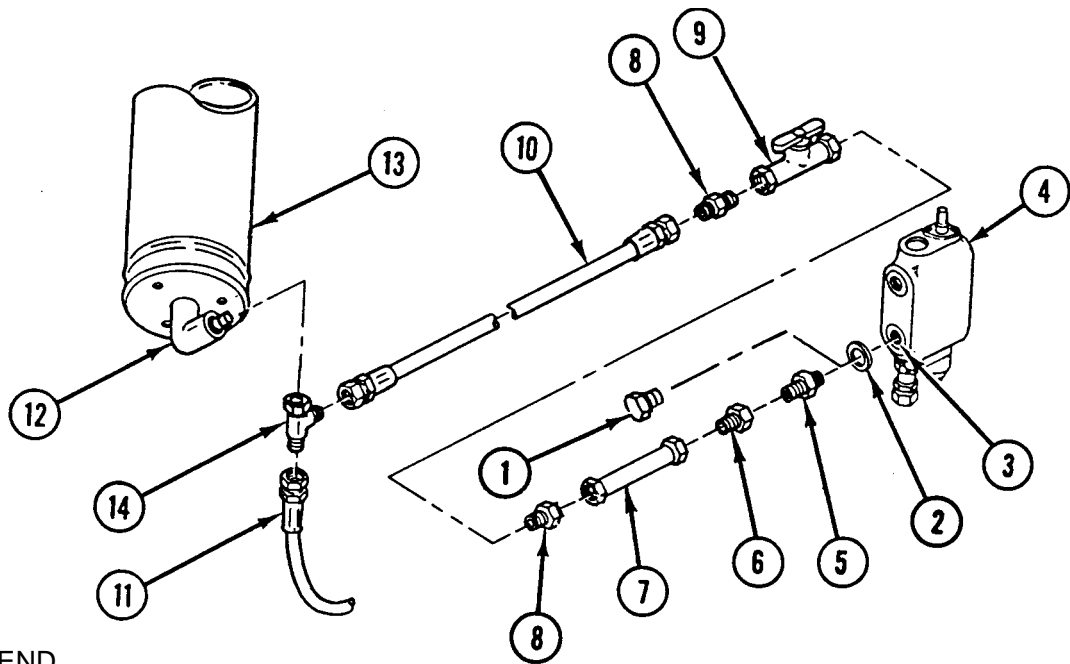
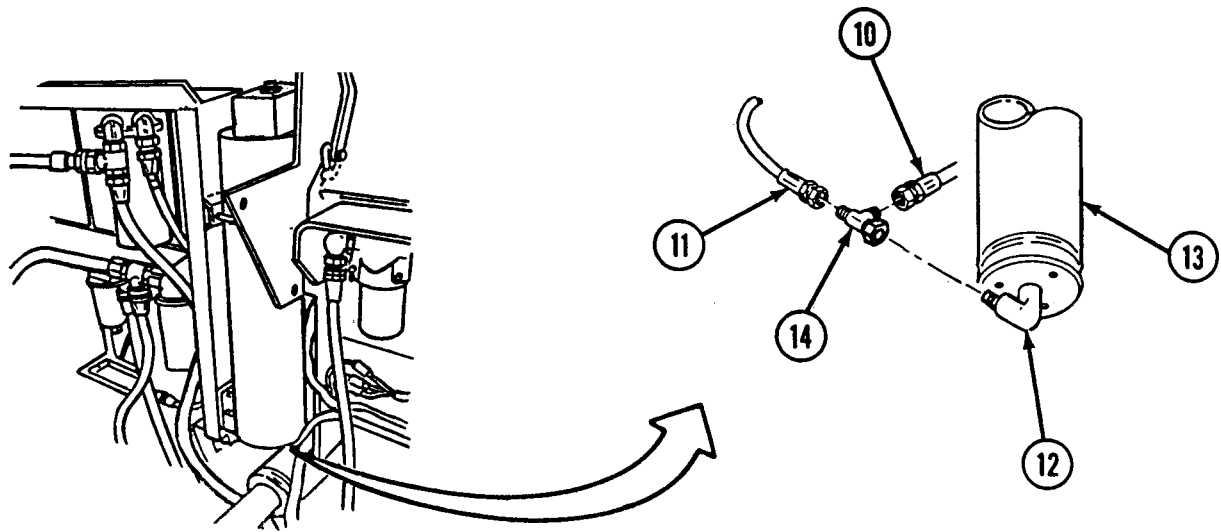
CAUTION

Make sure globe valve is closed when dump valve is not in use or when engine is running. Damage to equipment may result.

- G** Connect hose assembly (10) to adapter (8) at end of globe valve (9).

ACCUMULATOR DUMP VALVE INSTALLATION - CONTINUED

- H Disconnect ACCUMULATOR-9 hose (11) from elbow (12) at bottom of main hydraulic accumulator (13).
- I Install tee (14) on elbow (12), and connect hose (11) and hose assembly (10) to tee (14).



LEGEND

- | | |
|-----------------|----------------------|
| 1 Plug | 8 Adapter |
| 2 Packing | 9 Globe Valve |
| 3 Port 7 | 10 Hose Assembly |
| 4 Valve 13R | 11 Accumulator Hose |
| 5 Nipple | 12 Accumulator Elbow |
| 6 Reducer | 13 Accumulator |
| 7 Tube Assembly | 14 Tee |

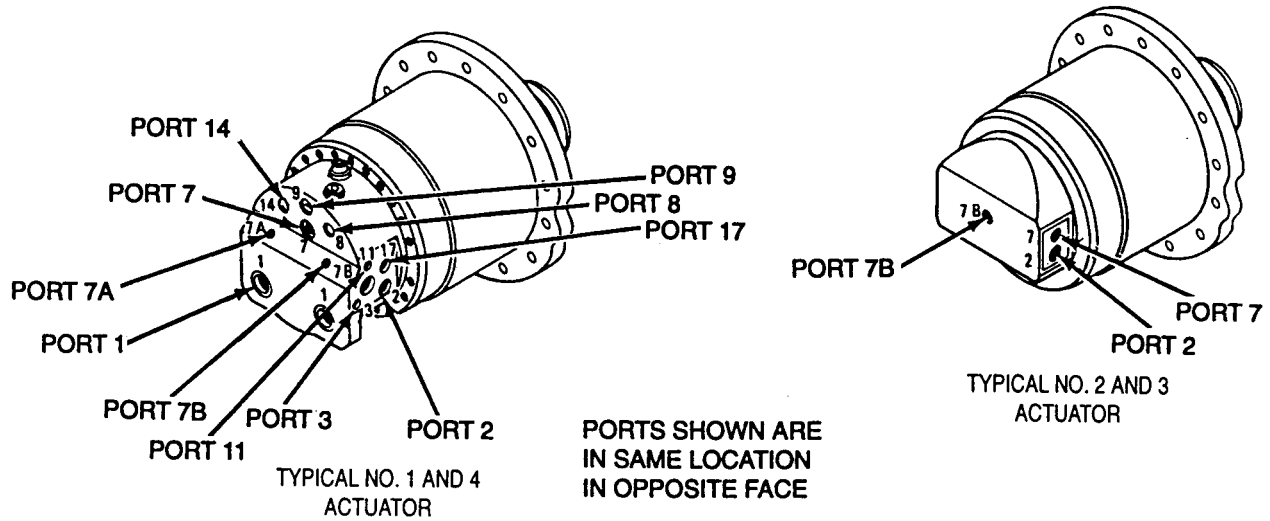
GENERAL SUSPENSION TROUBLESHOOTING INFORMATION

- A PRESSURE CHECKS:** The 2,800-2,900 psi (19,306 - 19,996 kPa) maximum suspension system pressure is controlled by an adjustment on the compensating pump. This adjustment should always be checked prior to performing suspension system pressure checks. The suspension system pressure checks can then be performed as specified in the troubleshooting procedures.
- B SUSPENSION SYSTEM RELIEF VALVE:** The sole function of this valve is to protect the suspension hydraulic circuit in the event the pressure control device on the pump should fail. This valve is set to open at 3,700-3,800 psi (25,512-26,201 kPa).
- C DESCRIPTION OF THE SPRUNG SUSPENSION CIRCUIT:** When the SPRUNG/UNSPRUNG control lever is in the SPRUNG position, the operator has no control over the suspension. The height of the vehicle is automatically controlled by leveling valves in the No.1 and 4 actuators. Each No.1 and 4 actuator and its paired No. 2 or 3 actuator is independent of the other three corners (fully independent suspension). Therefore, the SPRUNG suspension system can be considered as consisting of five major areas as follows:
1. The right rear pair of actuators.
 2. The left rear pair of actuators.
 3. The right front pair of actuators, with the right front bump stop cylinder.
 4. The left front pair of actuators, with the left front bump stop cylinder.
 5. The power system: pump, suspension relief valve, SPRUNG/UNSPRUNG valve, and the main accumulator.

When the suspension will not raise, the most probable cause is excessive internal leakage in one or more components. The troubleshooting procedures eliminate these major areas from the circuit one by one to locate the fault.

- D DESCRIPTION OF THE UNSPRUNG SUSPENSION CIRCUIT:** When the SPRUNG/UNSPRUNG control lever is placed in the UNSPRUNG position, the operator assumes control of the four front actuators. However, the four rear actuators remain in an automatic mode. Hydraulic valves in the No.1 and 4 actuators shift position to cause all four rear actuators to share a common pressure line (the two rear No. 4's are no longer independent). This is necessary so the front of the vehicle can be tilted (one front side of the vehicle lowered more than the other side). Therefore, problems can develop in either the front or rear areas of the suspension hydraulic system that could affect performance in the SPRUNG mode only, the UNSPRUNG mode only, or both modes.
- E OPERATIONAL VEHICLE:** The vehicle should be considered operational if it will rise within 2 minutes of engine start and will stay up long enough to perform its mission.

ACTUATOR PORT IDENTIFICATION AND DESCRIPTION



Port	Description
1	Actuator accumulator to wheel valve and leveling dump valve.
2	External port and passage to wheel valve and actuator shaft vanes (pressurized to raise vehicle).
3	External port and passage to wheel valve (pressurized to raise vehicle when in UNSPRUNG mode).
4	Internal passage from leveling dump valve to wheel valve (see next page).
7	External port for relief valve outlet flow.
7A	External port and passage from wheel valve (carries leveling dump valve flow when vehicle is in SPRUNG mode).
7B	External port and passage from drain chamber.
8	External port and auxiliary passage to actuator accumulator from port 9.
9	External port and passage through leveling fill valve to actuator accumulator (pressurized to charge accumulator when leveling fill valve is held open by cam).
11	External port and passage to wheel valve (pressurized to shift wheel valve into UNSPRUNG mode).
14	External port and axillary passage to actuator accumulator.
17	External port and passages to actuator shaft vanes (pressurized to lower vehicle when in UNSPRUNG mode, and is return line passage when raising vehicle in both SPRUNG and UNSPRUNG modes).

TYPICAL NO. 1 AND 4 ACTUATOR SCHEMATIC DIAGRAM

Shock load and replenishing check valve:
Permits replenishing of accumulator via port 9, but prevents accumulator pressure surges from entering circuit No. 9

Relief valve:
Protects unit from high- pressure surges

Leveling fill valve:
Opened by cam to replenish accumulators and raise vehicle when vehicle is too low

Ports 11, 17, 2 and 3 are plugged on LH or RH side of unit, depending on desired direction of shaft rotation. When plugs are installed as shown, pressure to port 2 will cause clockwise shaft rotation

Cam:
Bolted to actuator shaft, opens and closes leveling valves at appropriate points of shaft rotation (at appropriate vehicle height)

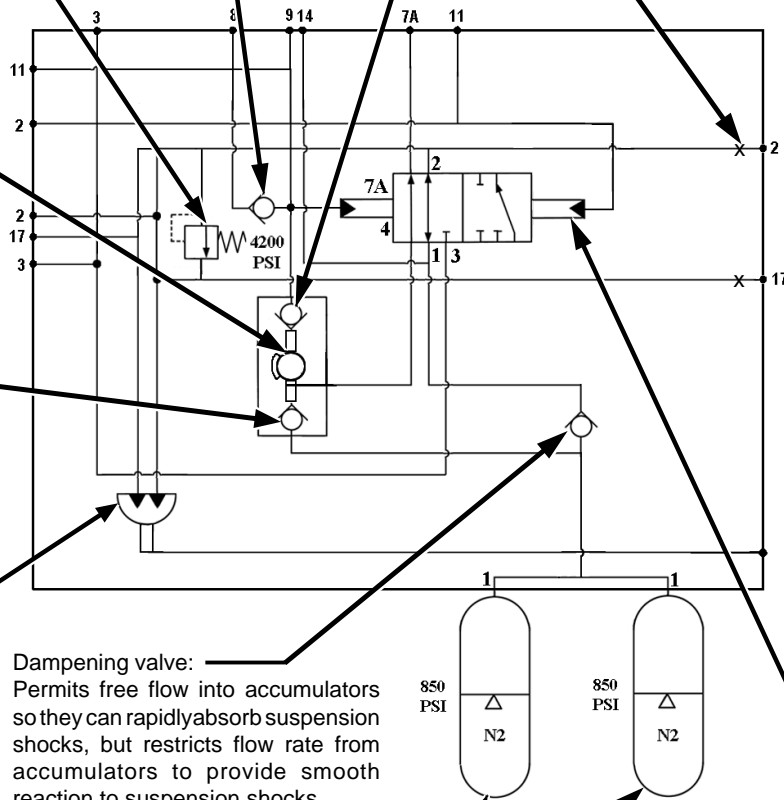
Leveling dump valve:
Opened by cam to drain accumulators and lower vehicle when vehicle is too high

Rotary actuator shaft:
(mounts roadwheel arm)

Dampening valve:
Permits free flow into accumulators so they can rapidly absorb suspension shocks, but restricts flow rate from accumulators to provide smooth reaction to suspension shocks

Wheel accumulators:
Attach to port 1 of rotary actuator, function as suspension springs when vehicle is in SPRUNG mode

Wheel valve:
A. In SPRUNG mode (shown), actuator shaft is hydraulically connected to accumulators (suspension has springs), and flow from leveling dump valve can return to reservoir through port 7A
B. In UNSPRUNG mode (port 11 pressurized), actuator shaft is isolated from accumulator (suspension has no springs), flow from leveling dump valve is blocked to prevent loss of accumulator pressure during dozing, and actuator shaft is hydraulically connected to main control valve via port 3

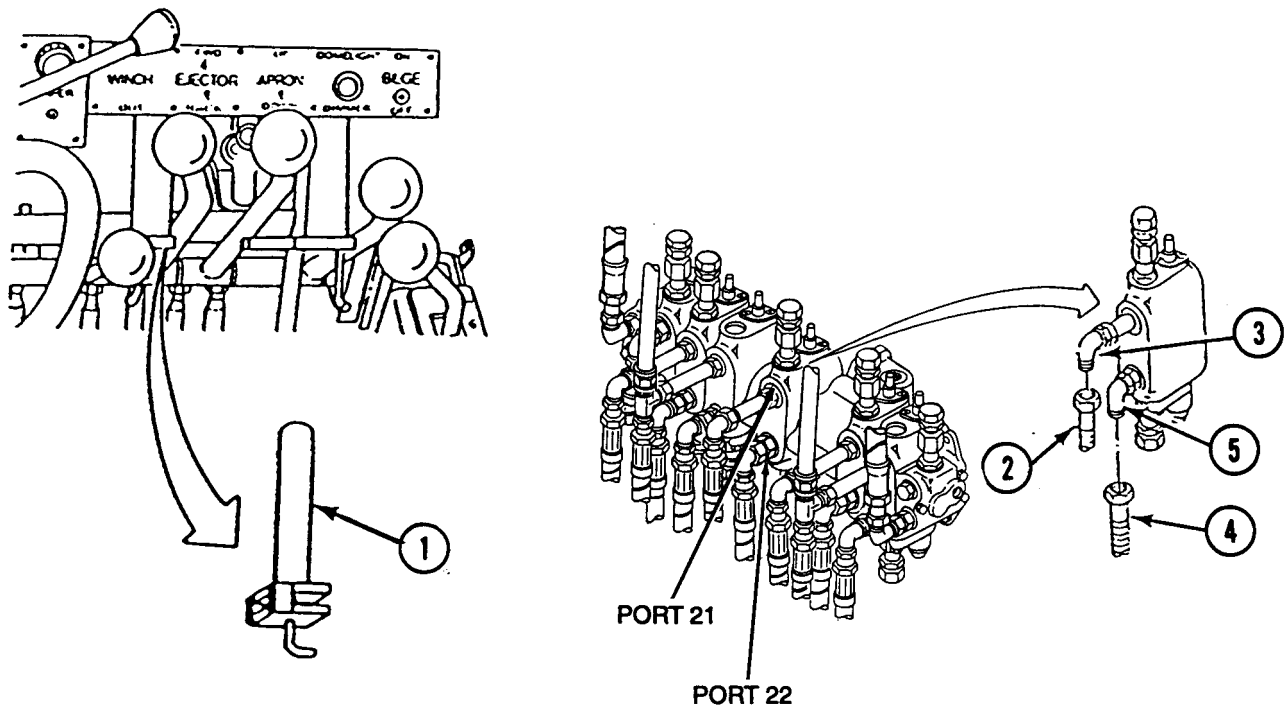


LOCKING AND DISABLING EJECTOR

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

- A** When working in the bowl, always engage the ejector lock (1) to prevent the ejector from being extended (FWD) or retracted (BACK).
- B** The ejector can also be disabled by disconnecting the ejector cylinder.
- C** Disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (2) from elbow (3) at port 21 and CONT VLV-22 hose (4) from elbow (5) at port 22 on ejector control valve. Cap and plug hoses and fittings.



Section II. TROUBLESHOOTING PROCEDURES

SCOPE

This section contains information on locating faults and causes of hydraulic malfunctions that may develop in the M9 ACE. An alphabetical symptom index is provided.

GENERAL

Before you begin troubleshooting, ensure the defect is real. If possible, talk to the operator or mechanic that reported the problem. Look for any other problems that could cause the system or component to malfunction, such as a switch or lever in the wrong position. Refer to TM 5-2350-262-10 for correct operating procedures. Check fluid levels as shown in TM 5-2350-262-10.

Many faults can be located by a good visual inspection. Look for leaks, loose or corroded connections, damaged controls, and loose or damaged linkages.

When working on the hydraulic system, follow the general hydraulic system repair methods and refer to the general hydraulic system troubleshooting procedures.

If you use the optional STE/ICE-R tests, use the STE/ICE-R Operator's Manual (TM 9-4910-571-12&P) for reference before and during testing.

When trying to isolate a fault, review the past maintenance record on the affected vehicle. Although it doesn't happen often, an incomplete or poorly performed maintenance task may lead to another problem.

USING THE TROUBLESHOOTING PROCEDURES

Find the symptom in the symptom index. Go to the page referenced for that symptom. All possible malfunctions cannot be listed. If the specific malfunction is not listed in this section, refer to vehicle hydraulic schematic diagram for additional information or reference data.

SYMPTOM INDEX

Symptom Number	Symptom Title	Page Number
1	All Hydraulic Functions Inoperative	3-16
2	Apron, Bilge Pump, and Left-Hand Wheel Control Inoperative	3-28
3	Apron Will Not Raise	3-34
4	Bump Stops Inoperative	3-42
5	Ejector Creeps	3-52
6	Ejector Does Not Extend or Retract	3-62
7	Front Corner (Left or Right) Raises in SPRUNG, But Not UNSPRUNG Mode	3-84
8	Front Corner (Left or Right) Raises in UNSPRUNG, But Not SPRUNG Mode	3-110
9	Front Corner (Left or Right) Does Not Raise in SPRUNG or UNSPRUNG Mode	3-124
10	Hydraulic Oil Overheats	3-132
11	Left Rear Corner Does not Raise in SPRUNG or UNSPRUNG Mode	3-172
12	Rear of Vehicle Raises in SPRUNG, But Not UNSPRUNG Mode	3-178
13	Right Rear Corner Raises in SPRUNG, But Not UNSPRUNG Mode	3-190
14	Right Rear Corner Raises in UNSPRUNG, But Not SPRUNG Mode	3-194
15	Vehicle Does Not Respond to Driver Controls	3-200
16	Winch and Right-Hand Wheel Control Inoperative	3-210
17	Winch Will Not Pull Rated Load	3-216
18	Track (Left or Right) Will Not Tighten or Loosen, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-232
19	Front Corner (Left or Right) Does Not Raise or Lower in UNSPRUNG Mode, Semi-Automatic Track Adjuster (NEW PRODUCTION)	3-238
20	Left or Right Track Adjuster Will Not Extend After Suspension Control Levers are Returned to Neutral (NEW PRODUCTION)	3-244

1

ALL HYDRAULIC FUNCTIONS INOPERATIVE

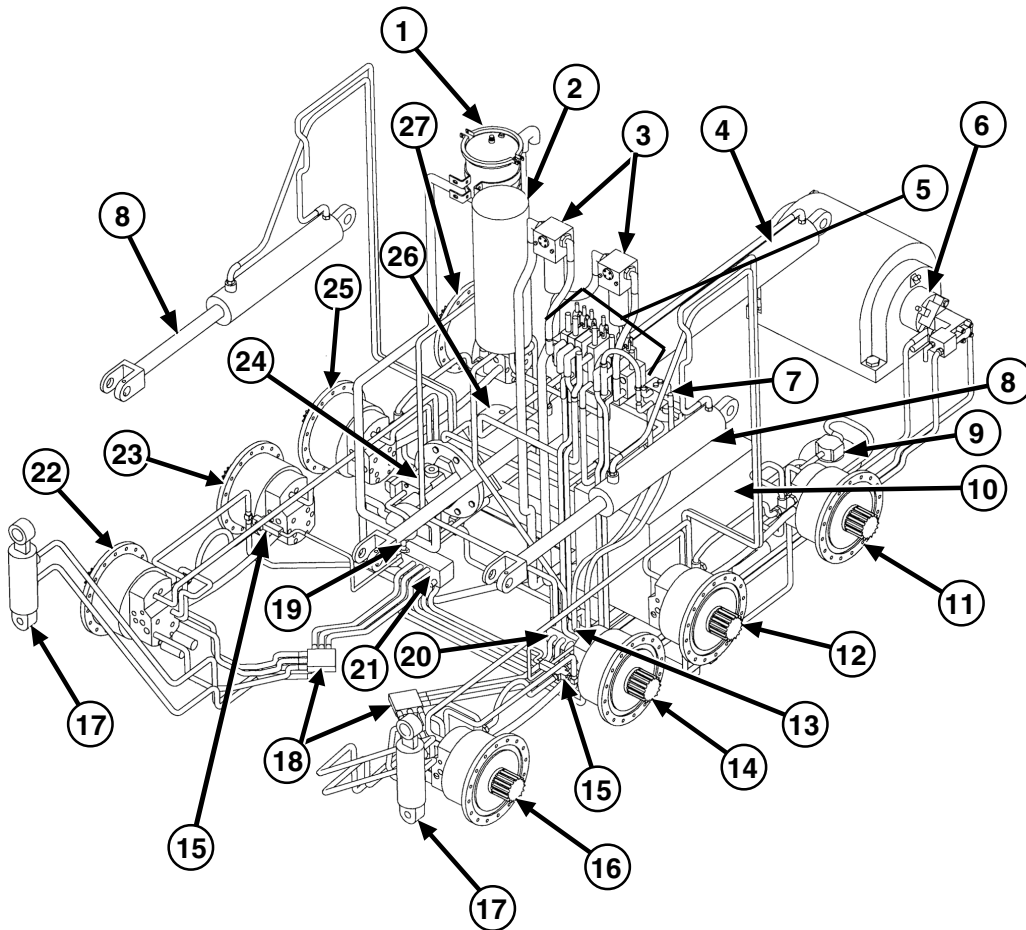
The hydraulic control valves on the directional control valve bank are activated by mechanical linkages from the operator's compartment which then activate hydraulic functions of the vehicle.

WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Perform this procedure only when all hydraulic functions are inoperative. Refer to hydraulic schematic in appendix E.






COMPONENTS:

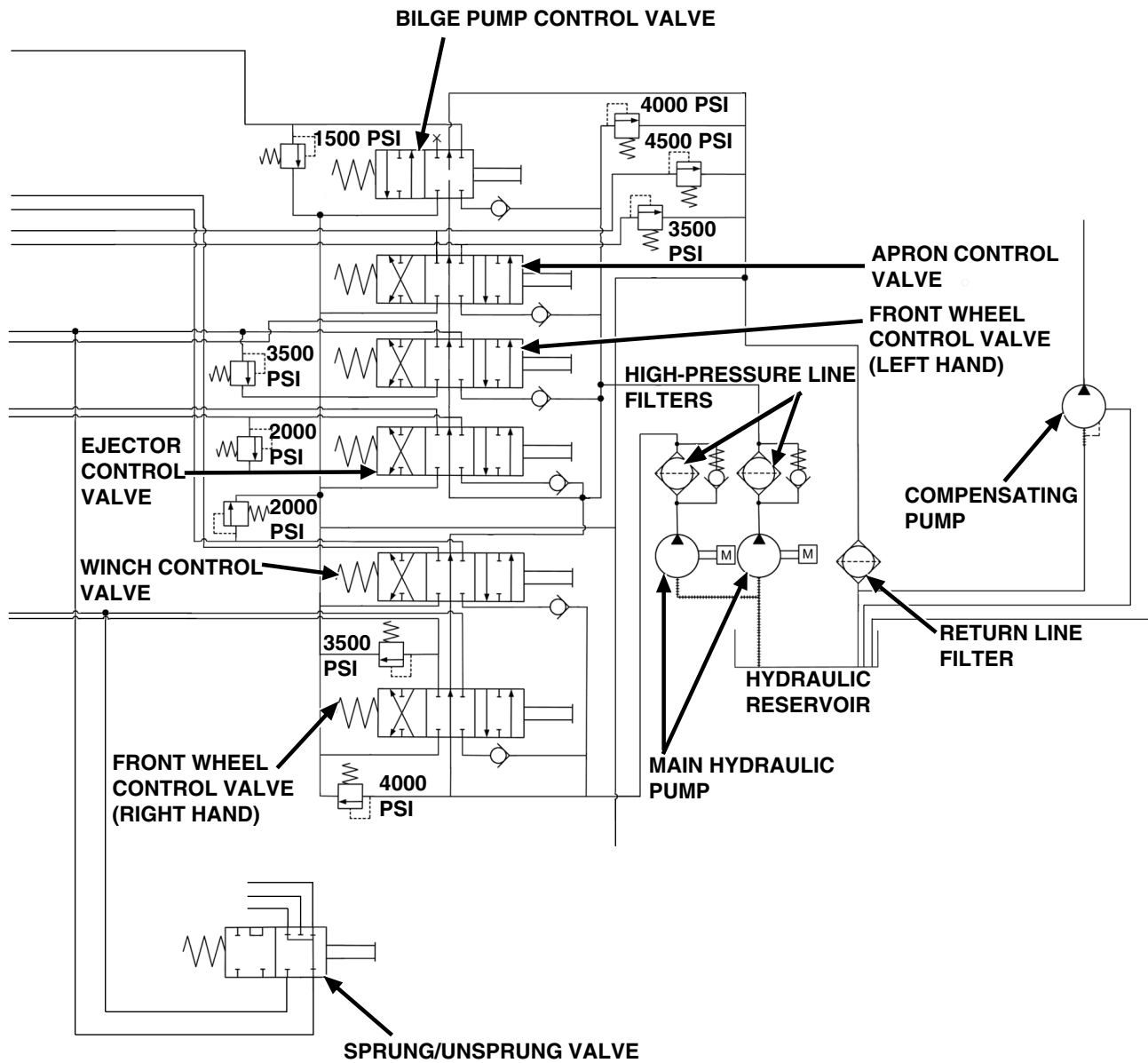
1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. EJECTOR CYLINDER
5. DIRECTIONAL CONTROL VALVE BANK
6. WINCH MOTOR
7. SPRUNG/UNSPRUNG VALVE
8. APRON CYLINDER
9. BILGE PUMP MOTOR
10. HYDRAULIC RESERVOIR
11. NO. 4 ACTUATOR, LEFT HAND
12. NO. 3 ACTUATOR, LEFT HAND
13. SUSPENSION RELIEF VALVE (BEHIND)
14. NO. 2 ACTUATOR, LEFT HAND
15. INTERMEDIATE WHEEL VALVE

HYDRAULIC CIRCUIT

COMPONENTS (continued):

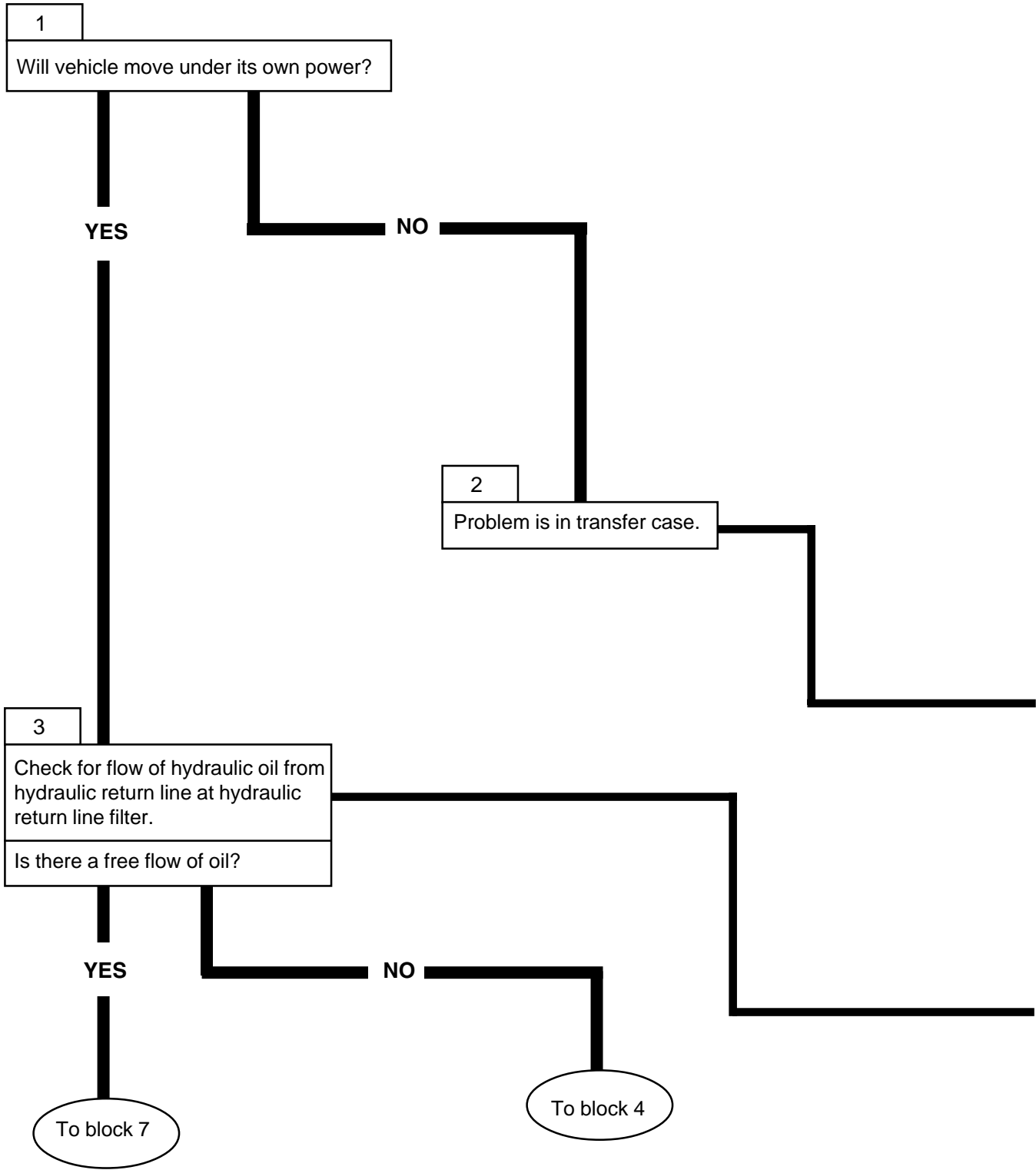
- | | |
|--------------------------------|--------------------------------|
| 16. NO. 1 ACTUATOR, LEFT HAND | 23. NO. 2 ACTUATOR, RIGHT HAND |
| 17. BUMP STOP CYLINDERS | 24. COMPENSATING PUMP |
| 18. FORWARD MANIFOLDS | 25. NO. 3 ACTUATOR, RIGHT HAND |
| 19. CHECK VALVE (ON TOP) | 26. MAIN HYDRAULIC PUMP |
| 20. MAIN MANIFOLD, LEFT HAND | 27. NO. 4 ACTUATOR, RIGHT HAND |
| 21. MAIN MANIFOLD, RIGHT HAND | |
| 22. NO. 1 ACTUATOR, RIGHT HAND | |

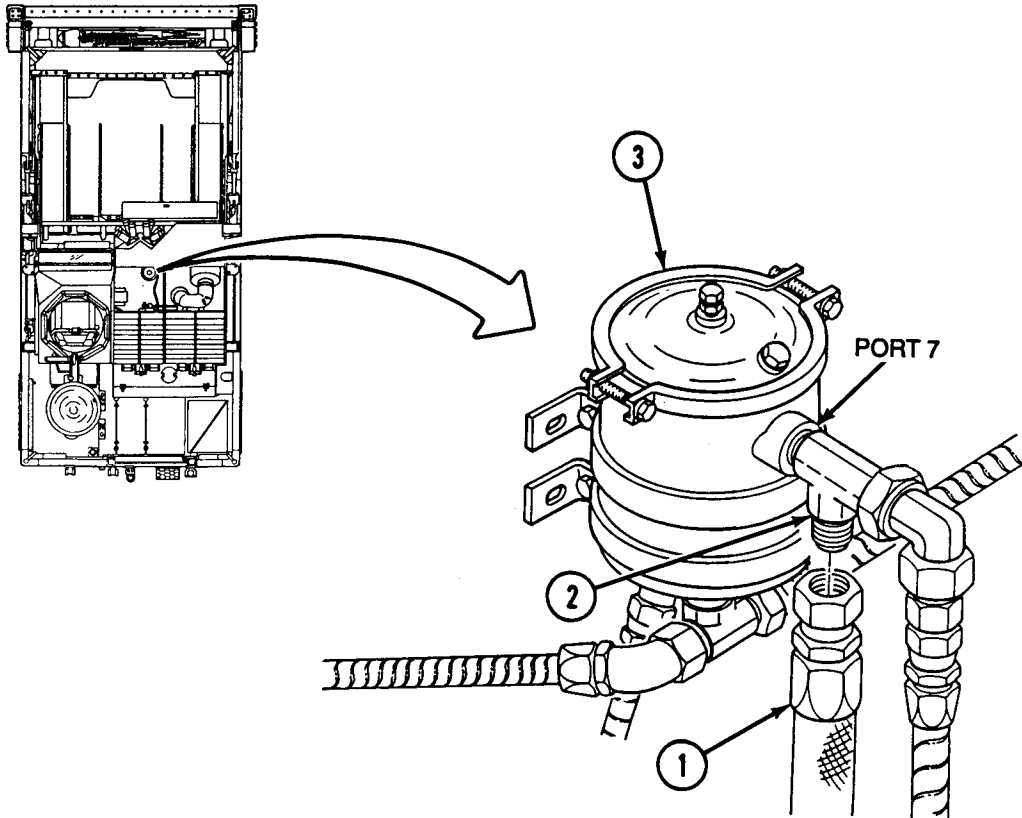
HIGH-PRESSURE 
CIRCUIT 
SUPPLY 



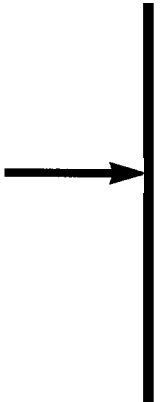
HYDRAULIC CONTROLS SCHEMATIC

1 ALL HYDRAULIC FUNCTIONS INOPERATIVE (CONTINUED)





Notify Direct Support Maintenance.



OIL FLOW TEST

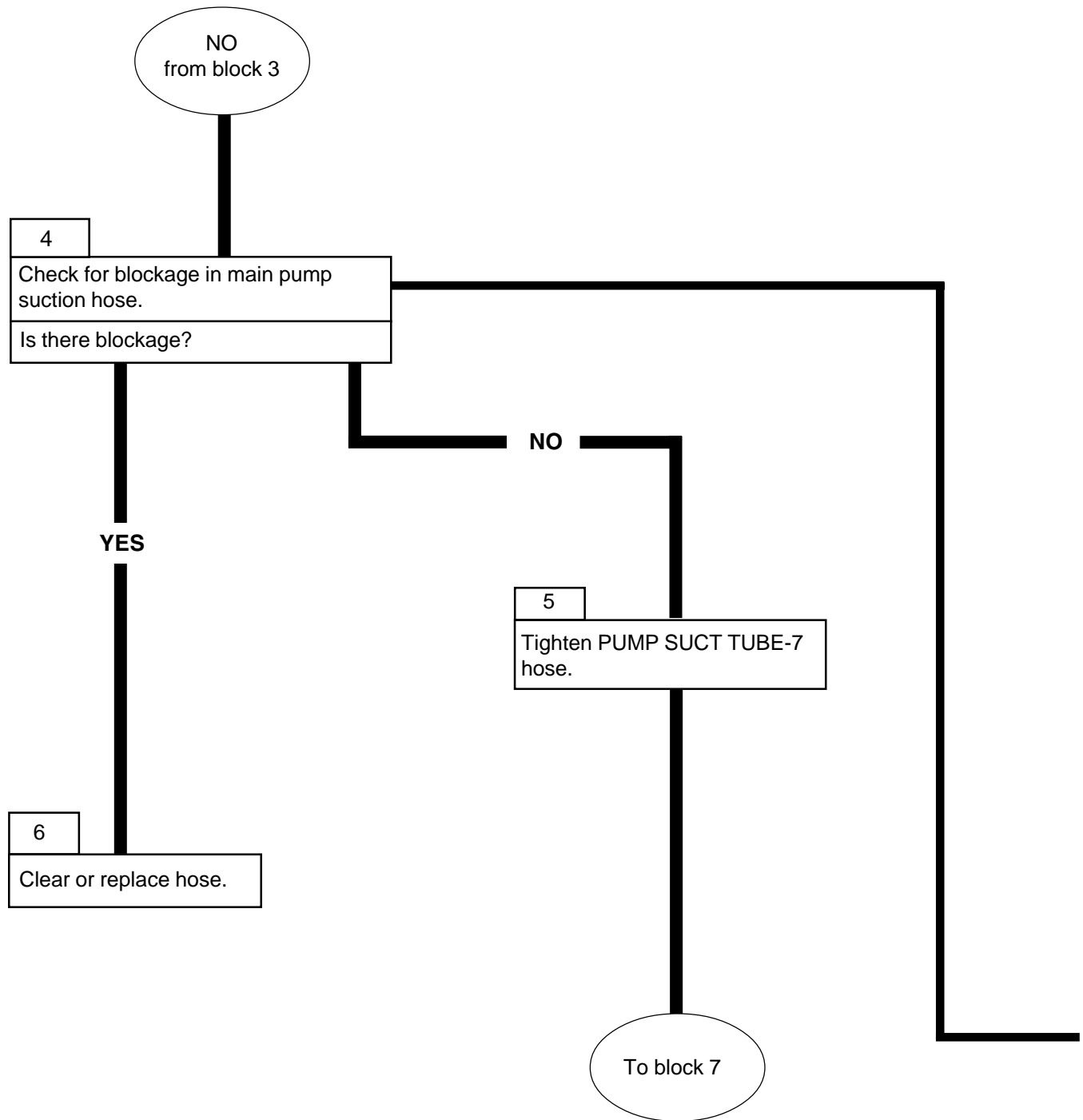
NOTE

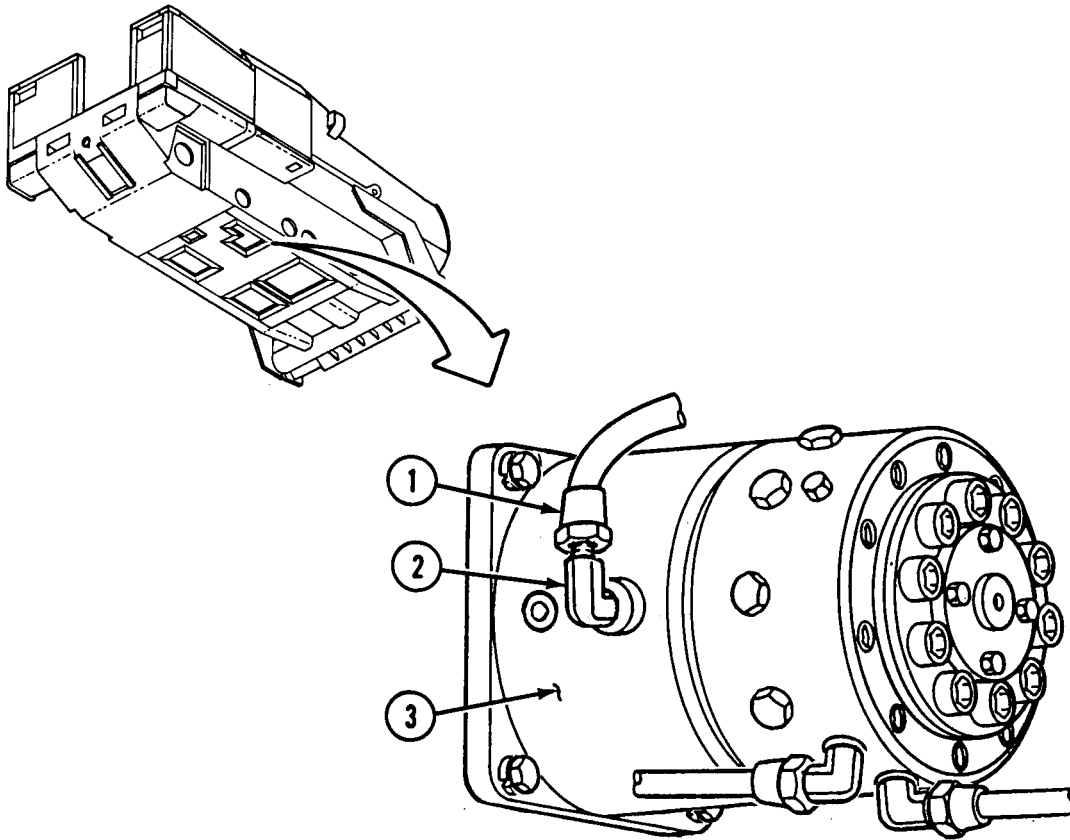
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect HYDR FLTR-IN-7 hose (1) from tee (2) at port 7 on hydraulic return line filter (3). Cap tee (2).
- While holding open end of hose (1) in container, have assistant start engine. Check for free flow of hydraulic oil from hose (1).
- Stop engine; relieve hydraulic pressure. Connect hose (1) to tee (2).

1

ALL HYDRAULIC FUNCTIONS INOPERATIVE (CONTINUED)





MAIN PUMP SUCTION HOSE CHECK

WARNING

Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

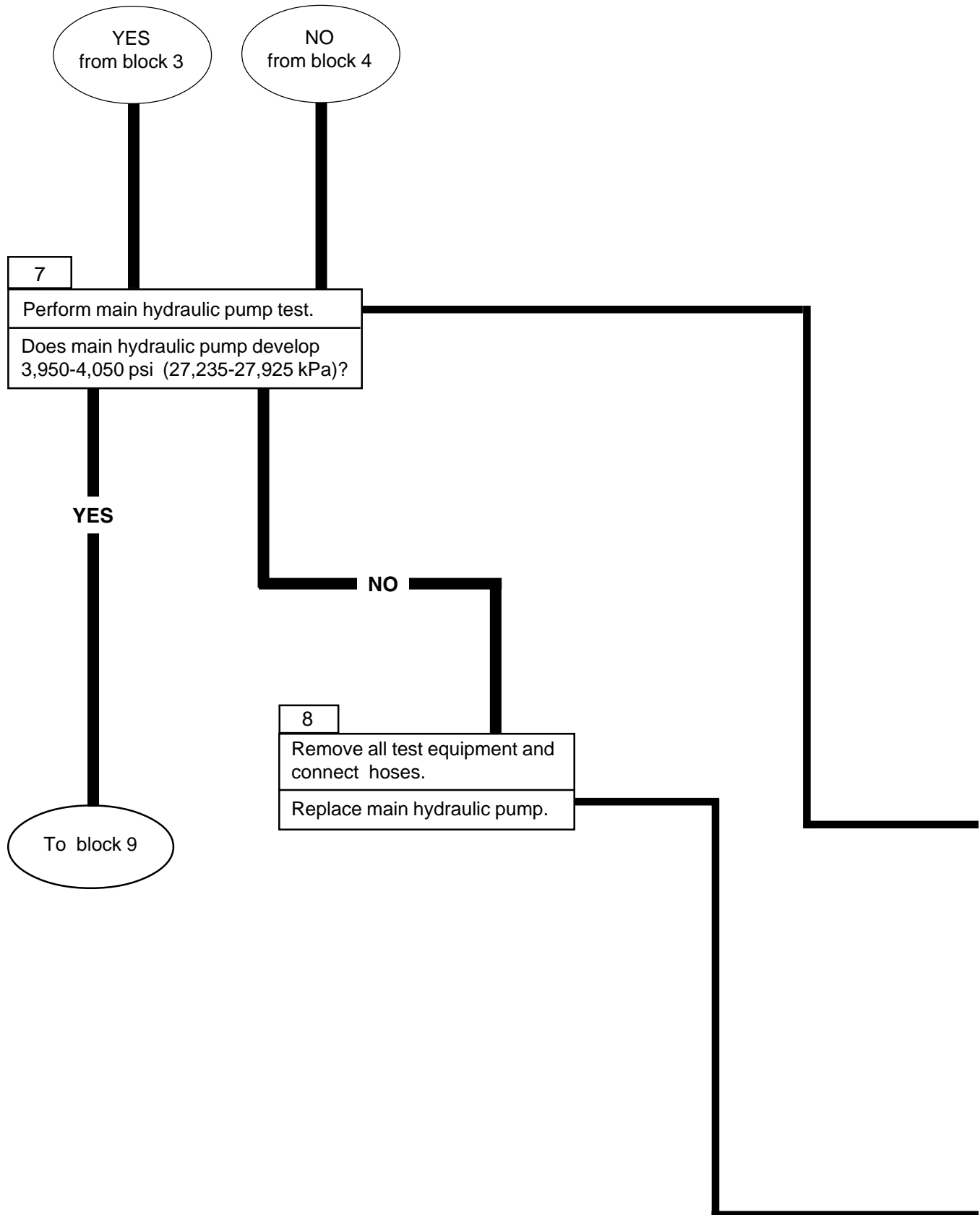
NOTE

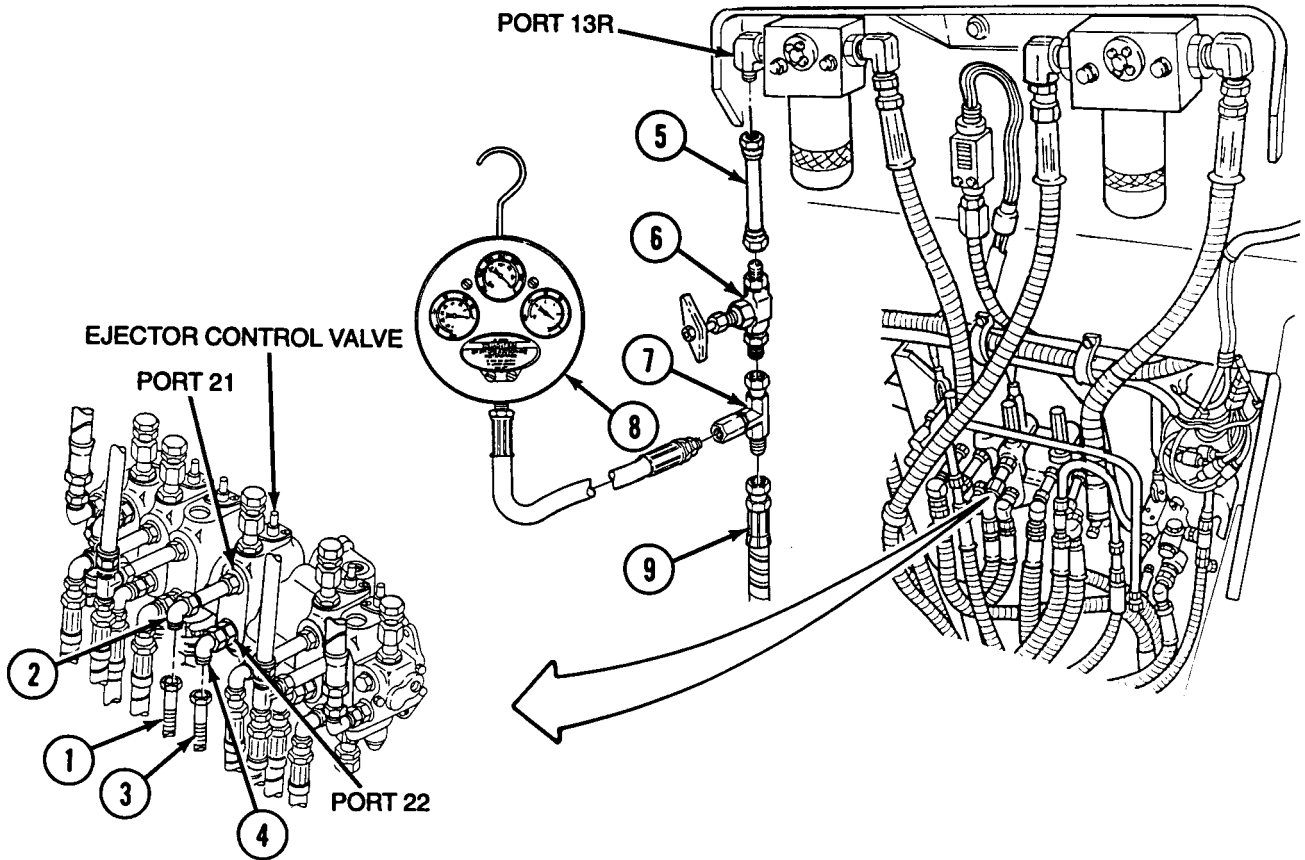
Have suitable container ready to catch oil.

Loosen, but do not disconnect, PUMP SUCT TUBE-7 (1) from elbow (2) on main hydraulic pump (3). Hydraulic oil should flow freely from the loosened fitting.

1

ALL HYDRAULIC FUNCTIONS INOPERATIVE (CONTINUED)





MAIN HYDRAULIC PUMP TEST

WARNING

- Before performing any troubleshooting in bowl, move the ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.
- Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in injury or death to personnel and damage to equipment.

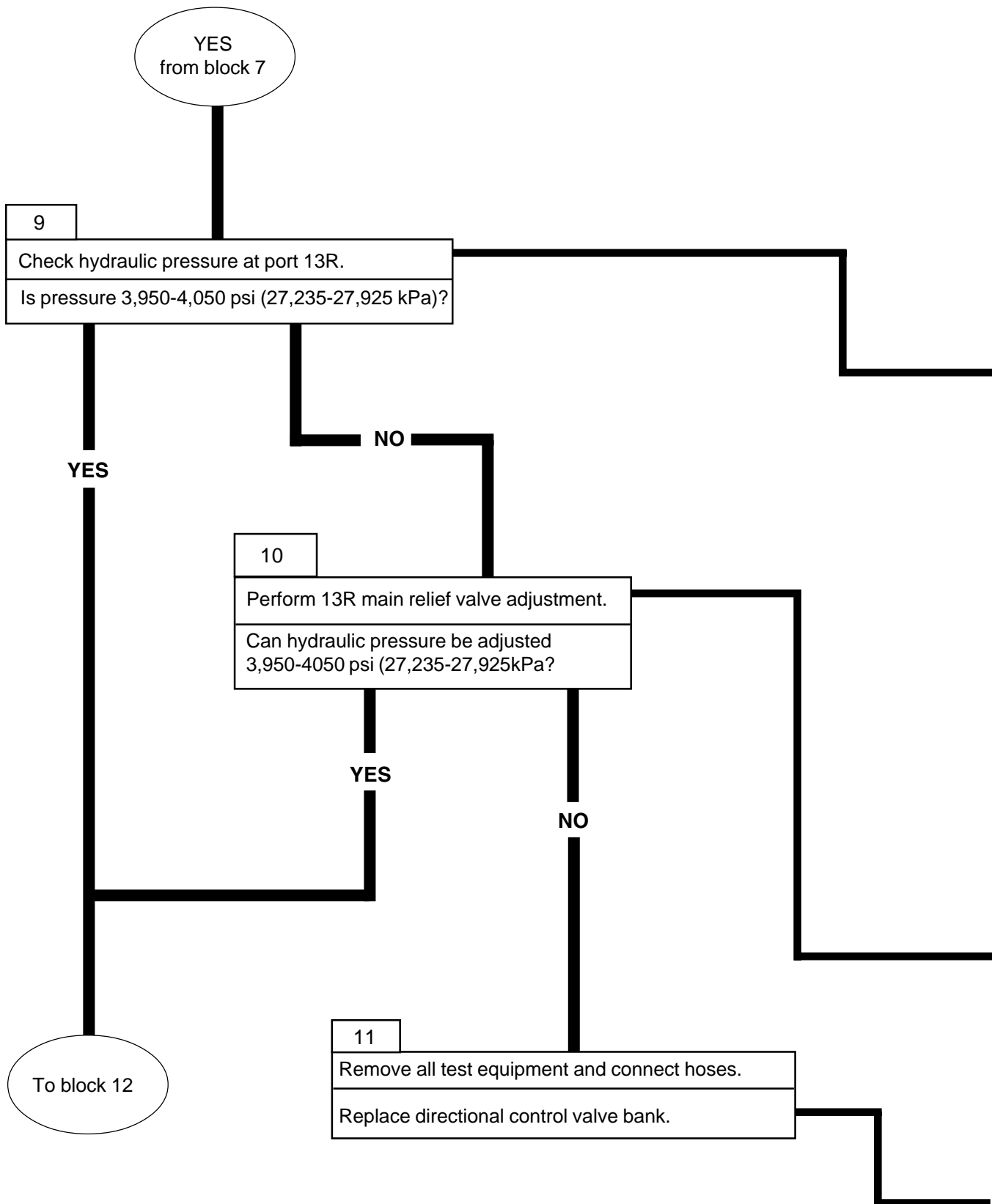
NOTE

Have a suitable container ready to catch oil.

- Disable ejector from hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap plug hoses and fittings.
- Install coupling tube (5), globe valve (6), tee (7), and pressure measuring device (8) between HYDR FLTR-IN-13R hose (9) and high-pressure filter inlet port 13R.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (6) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (6). Stop engine; relieve hydraulic pressure.

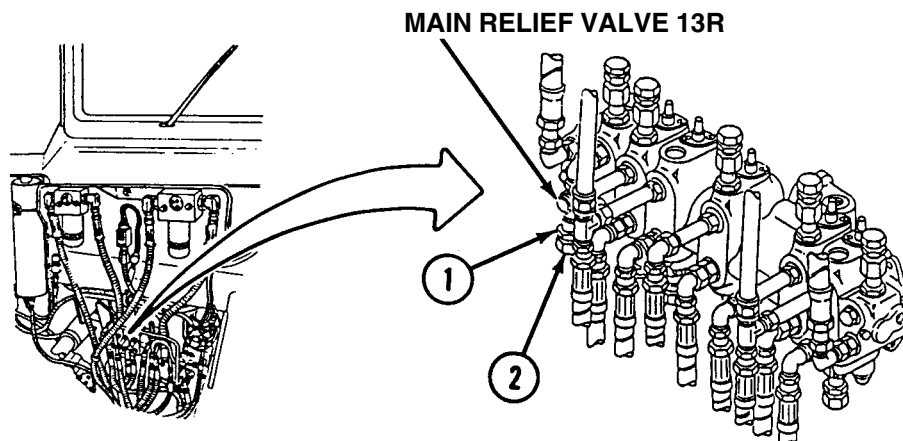
Notify Direct Support maintenance.

1 ALL HYDRAULIC FUNCTIONS INOPERATIVE (CONTINUED)



HYDRAULIC PRESSURE AT PORT 13R CHECK

- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG, and hold EJECTOR CONTROL lever in BACK. Read pressure measuring device. If hydraulic pressure is not within limits, continue with following step.
- While assistant is still holding EJECTOR CONTROL lever in BACK, have assistant move right-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device. If pressure is not within limits, main relief valve 13R requires adjustment.
- Release EJECTOR CONTROL and right-hand SUSPENSION CONTROL levers.

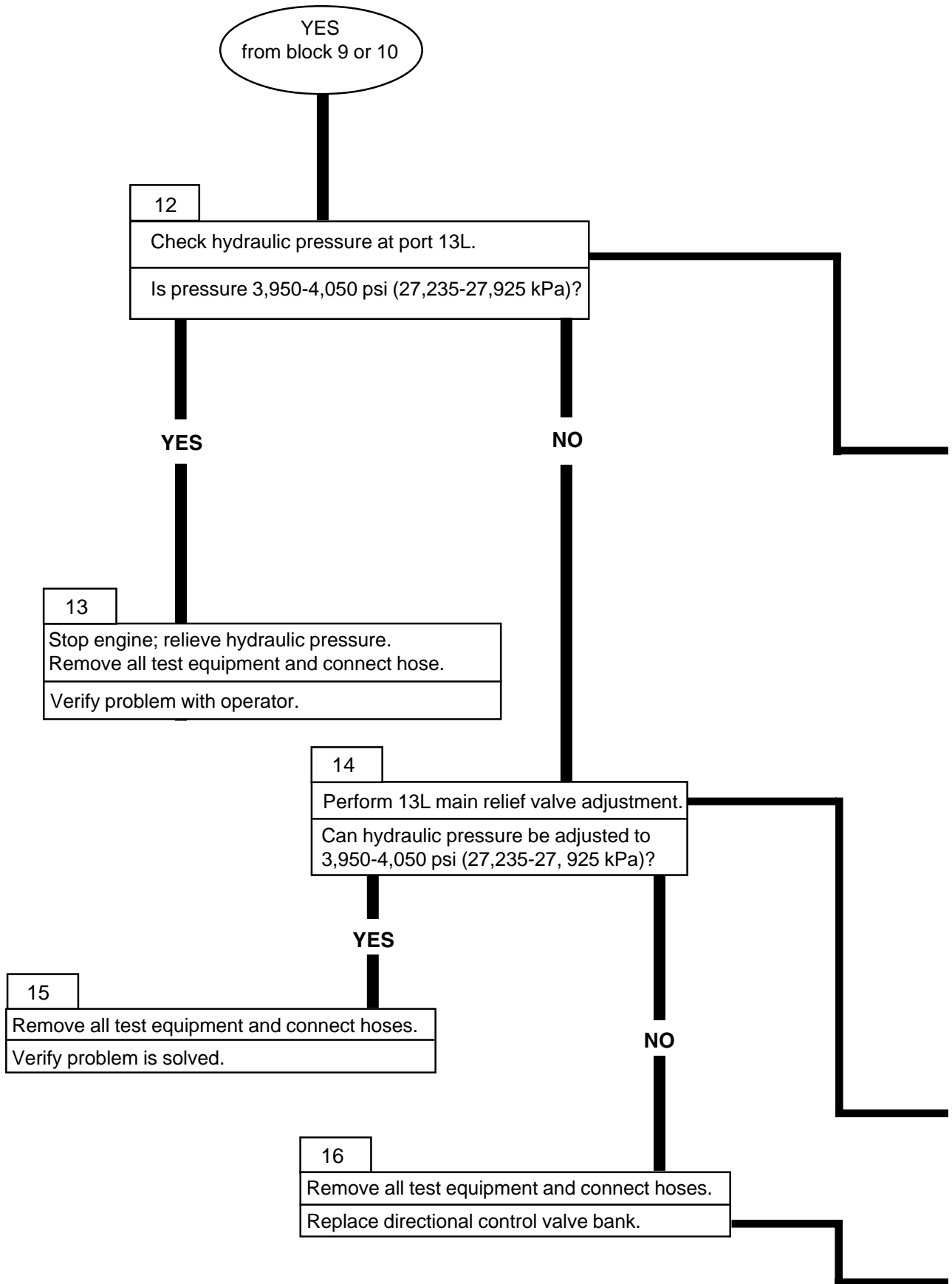


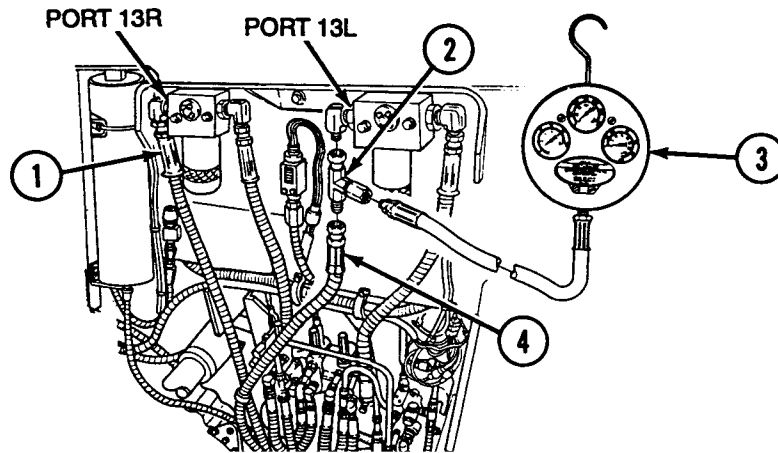
13R MAIN RELIEF VALVE ADJUSTMENT

- Loosen jamnut (1). Read pressure measuring device as assistant moves right-hand SUSPENSION CONTROL to RAISE and EJECTOR CONTROL to BACK. Rotate valve (2) clockwise to increase pressure; counterclockwise to decrease pressure.
- When pressure is 3,950-4,050 psi (27,235-27,925 kPa), tighten jamnut (1).
- Verify pressure is now within limits by having assistant move right SUSPENSION CONTROL lever to RAISE and hold EJECTOR CONTROL lever in BACK. Read pressure measuring device.
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

1 ALL HYDRAULIC FUNCTIONS INOPERATIVE (CONTINUED)



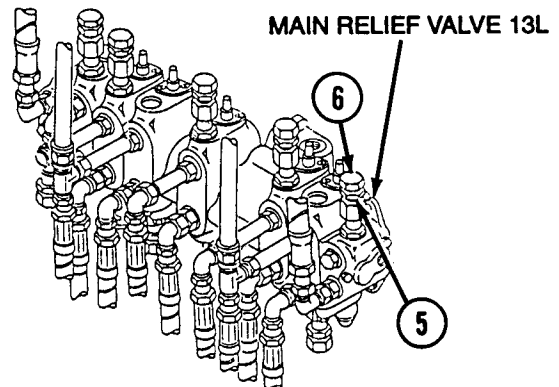
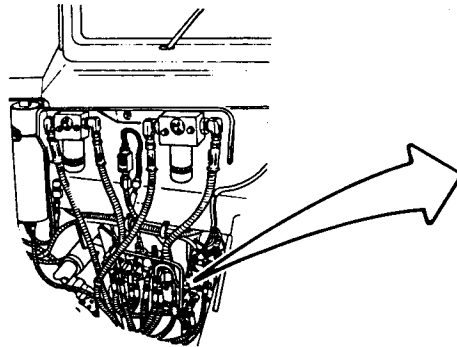


HYDRAULIC PRESSURE AT PORT 13L CHECK

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect HYDR FLTR-IN-13R hose (1) to high-pressure filter inlet port 13R..
- Connect tee (2) and pressure measuring device (3) between high-pressure inlet port 13L and HYDR FLTR-IN-13L hose (4).
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG, and hold EJECTOR CONTROL lever in BACK. Read pressure measuring device (3). If hydraulic pressure is not within limits, continue with the following step.
- While still holding EJECTOR CONTROL lever in BACK, have assistant move left-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (3). If pressure is not within limits, main relief valve 13L requires adjustment.
- Release EJECTOR and SUSPENSION CONTROL levers.



MAIN RELIEF VALVE 13L ADJUSTMENT

- Loosen jamnut (5). Read pressure measuring device as assistant moves left-hand SUSPENSION CONTROL lever to RAISE and EJECTOR CONTROL lever to BACK. Rotate valve (6) clockwise to increase pressure; counterclockwise to decrease pressure.
- When pressure is 3,950-4,050 psi (27,235-27,925 kPa), tighten jamnut (5).
- Verify pressure is now within limits by having assistant move left-hand SUSPENSION CONTROL lever to RAISE and hold EJECTOR CONTROL lever in BACK. Read pressure measuring device (3).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

2

APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL INOPERATIVE

The inboard valve bank hydraulic system 13R circuit is supplied by hydraulic pump port 13R and pressure is controlled by the relief valve at inlet port 13R.

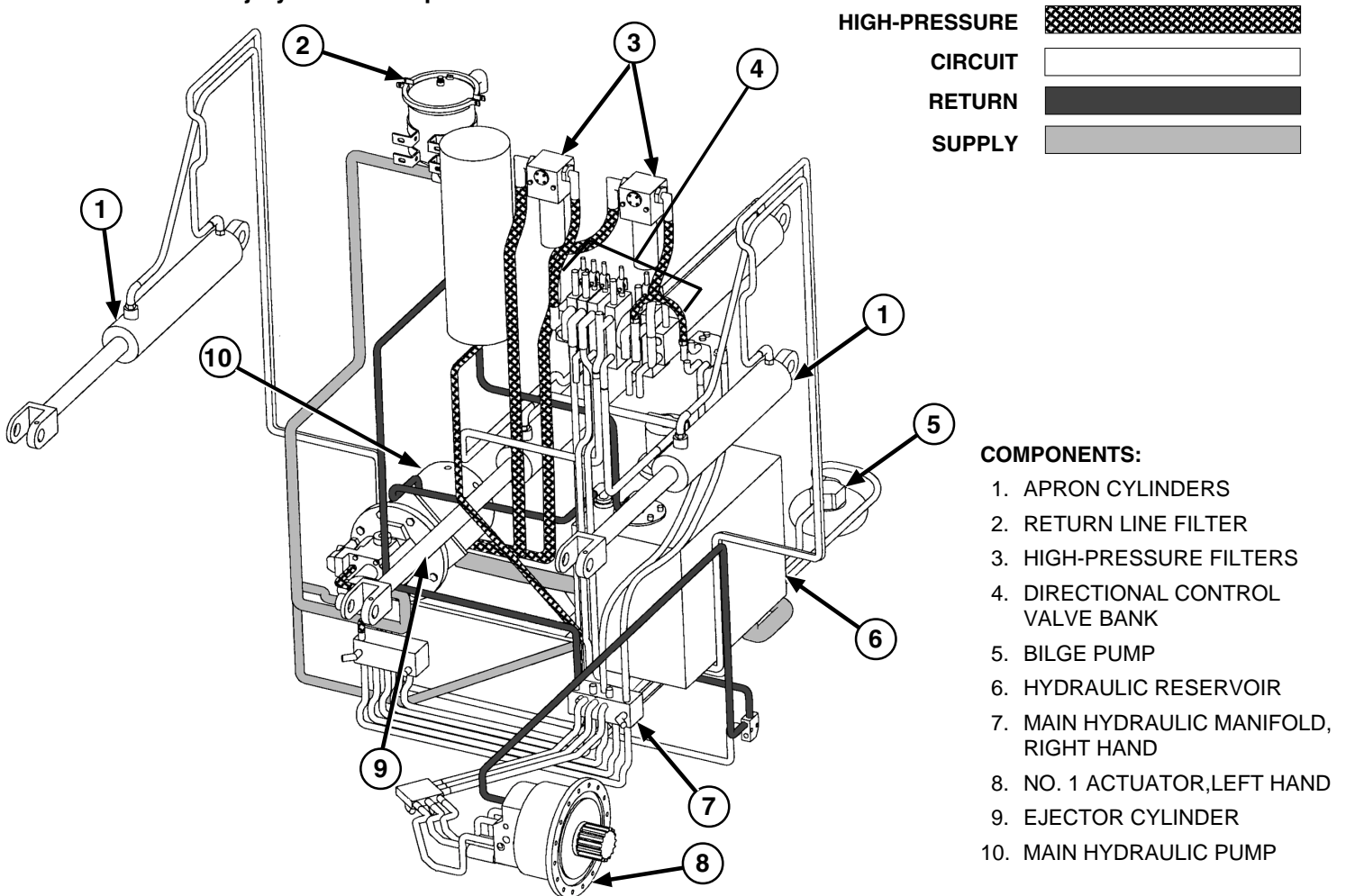
NOTE

Perform this procedure only when the bilge pump, apron, left-hand suspension controls, and ejector are all inoperative.

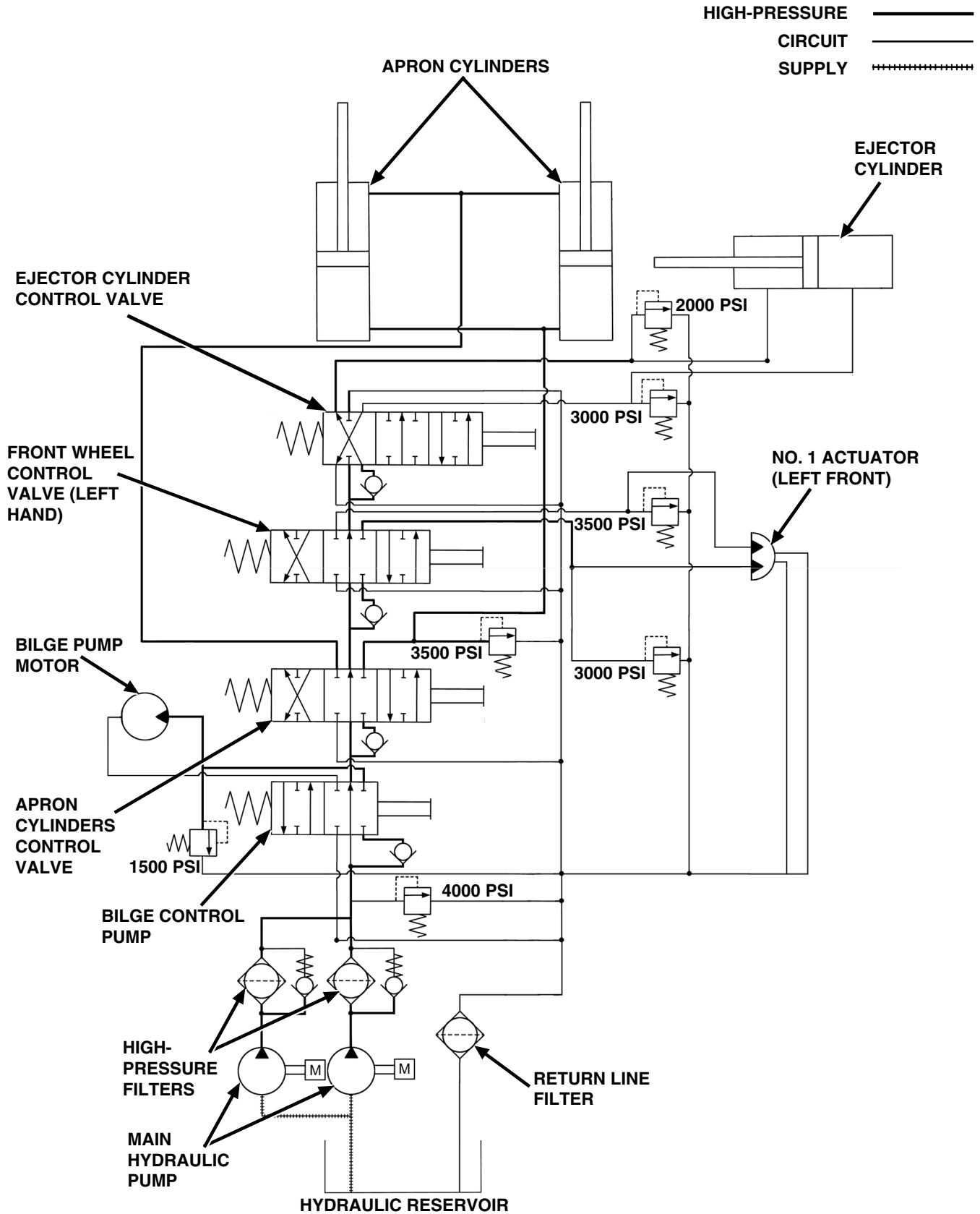
Although the Bilge Pump is considered Not Mission Essential and will no longer be supported with spare and repair parts, this task contains troubleshooting procedures For Your Information Only. See TB 43 0001-62-7 (dated Oct 98) for Instructions to Isolate and Disconnect a Non-functional Bilge Pump.

WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

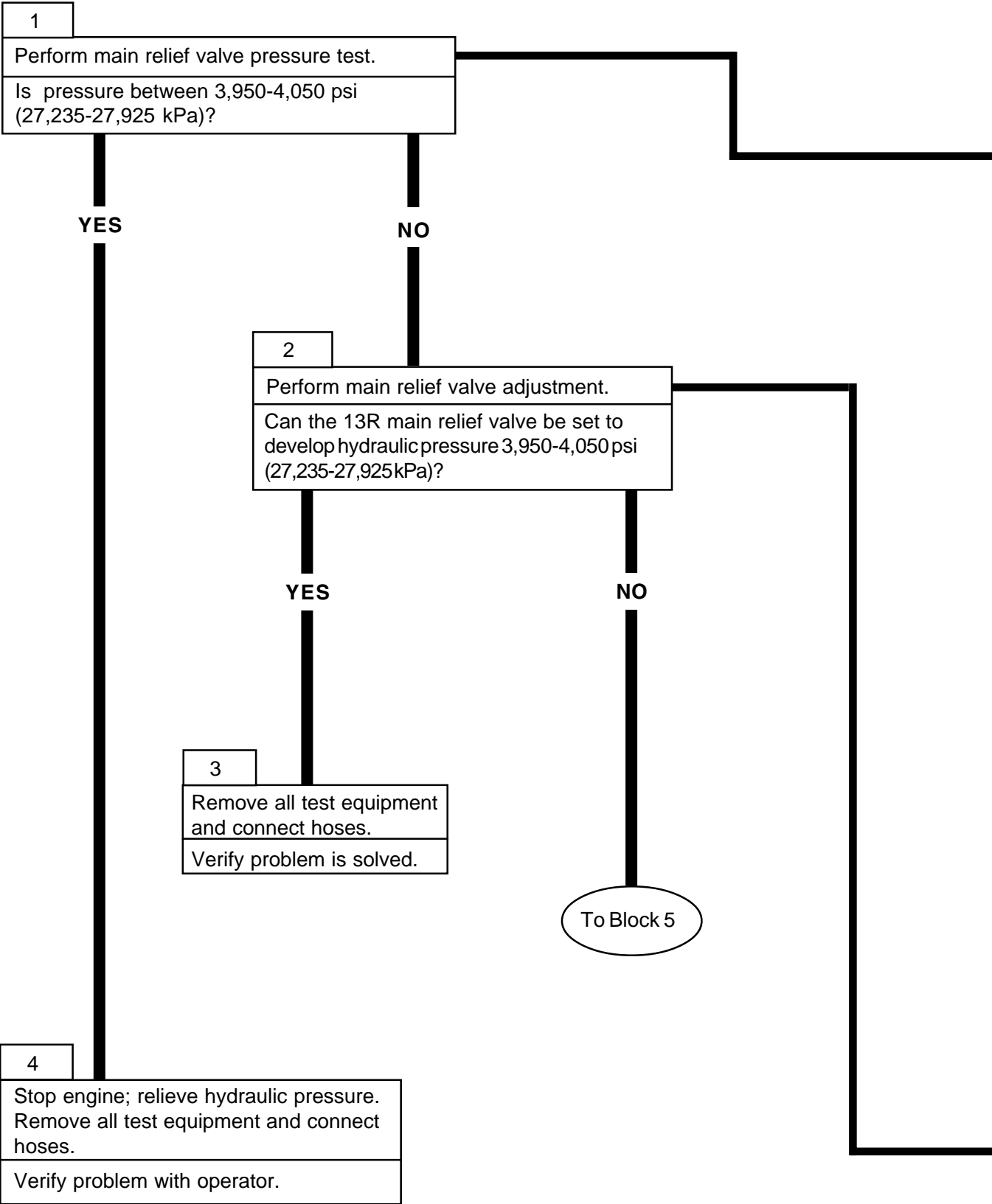


APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL CIRCUIT



APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL CIRCUIT

2 APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL INOPERATIVE (CONTINUED)



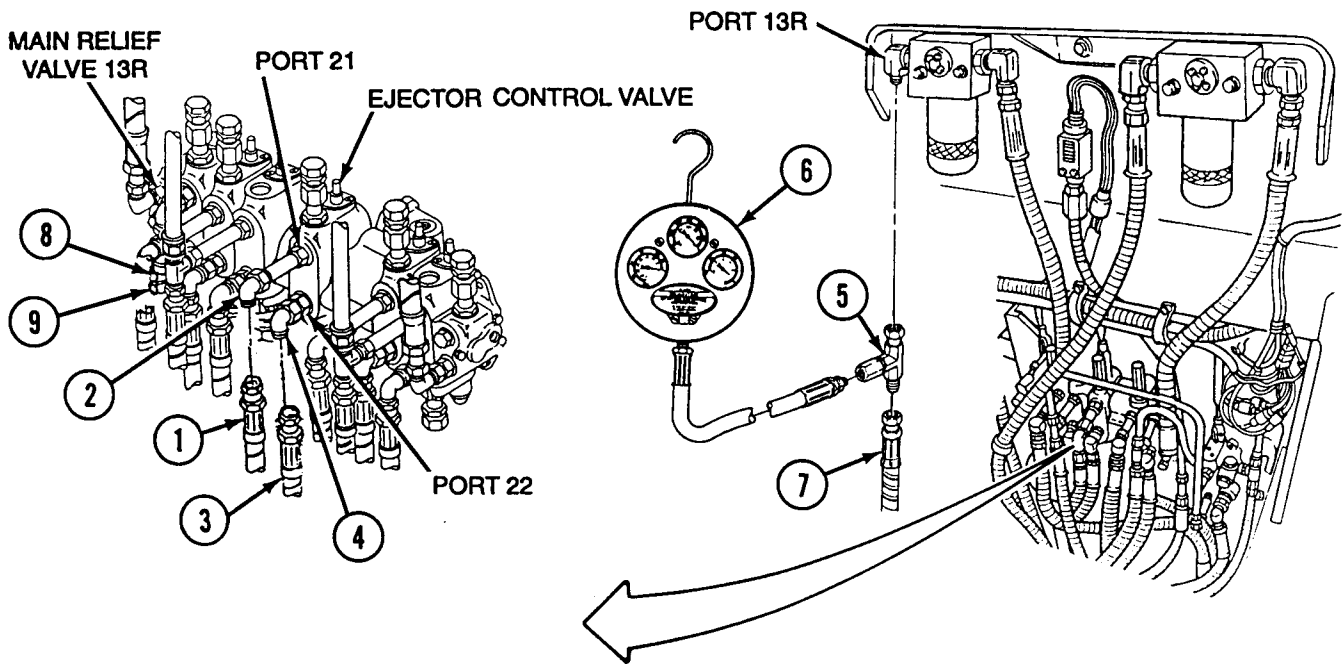
WARNING

Before performing any hydraulic troubleshooting in the bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

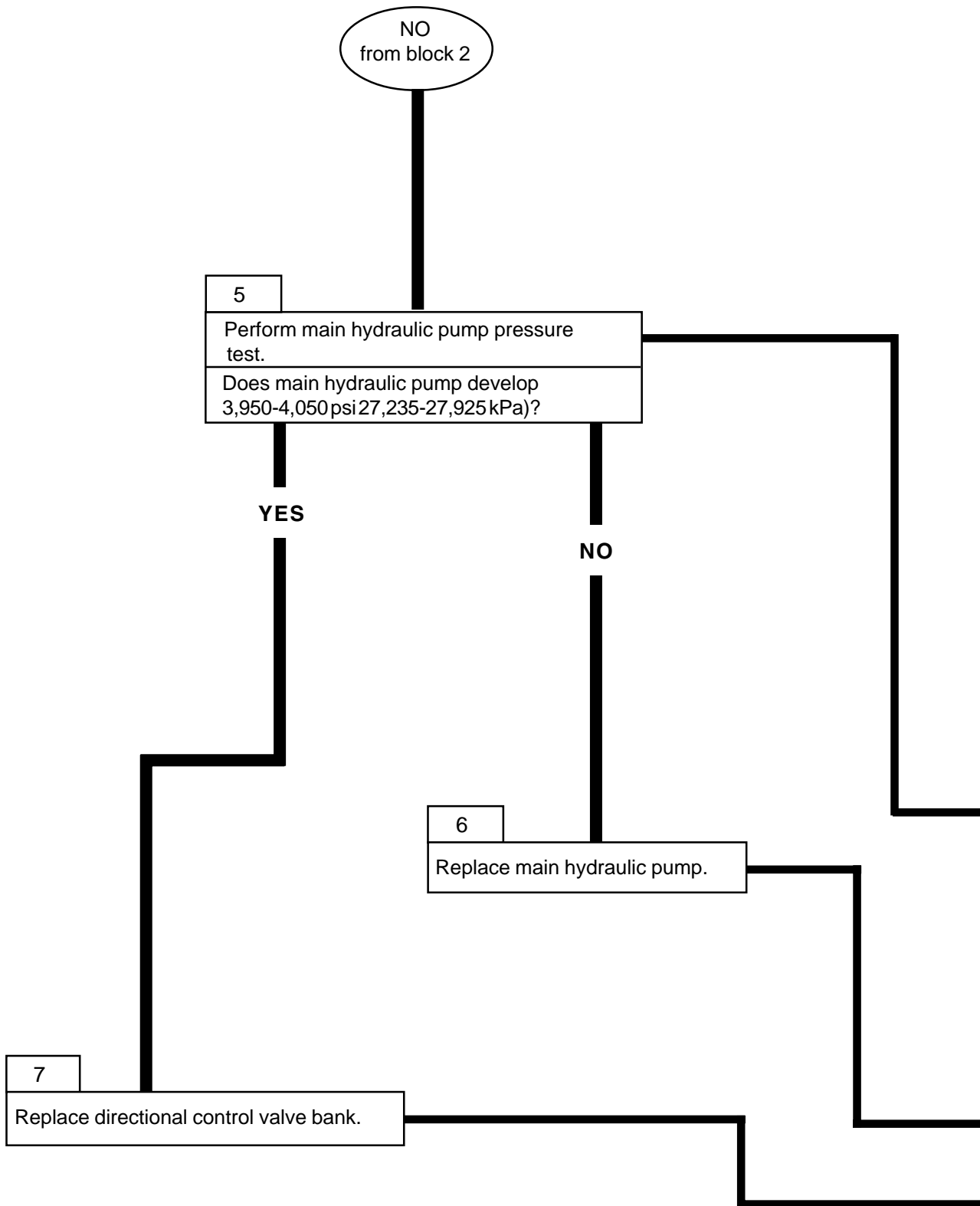
- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings.
- Connect tee (5) and pressure measuring device (6) between HYDR FLTR-IN-13R hose (7) and high-pressure inlet port 13R.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG and move the EJECTOR CONTROL lever to BACK. Read pressure measuring device (6).
- While simultaneously holding the EJECTOR CONTROL lever in BACK, have assistant move the right-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (6).

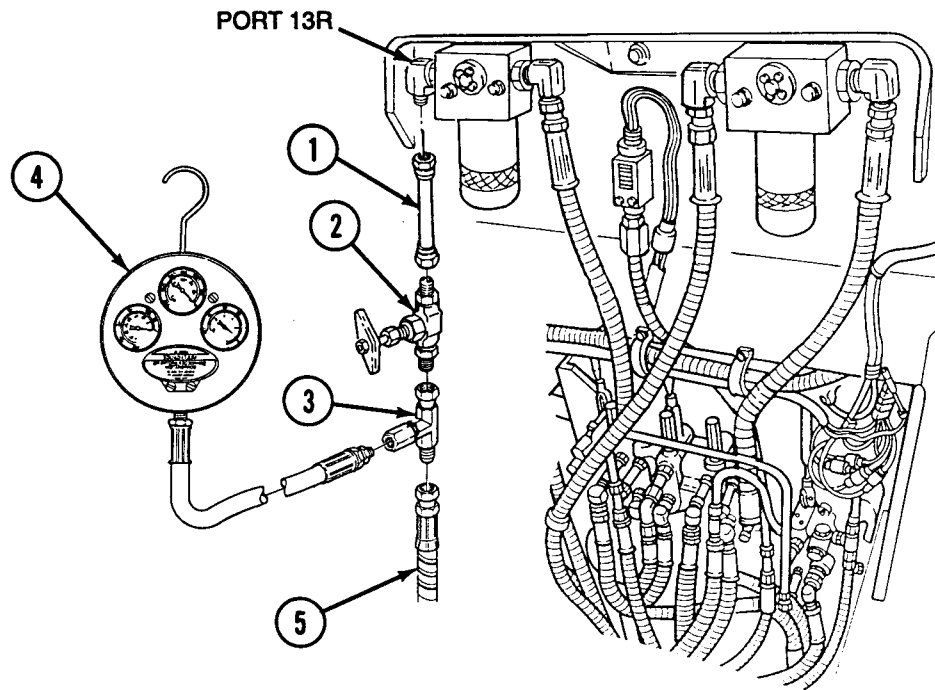


13R MAIN RELIEF VALVE ADJUSTMENT

- Loosen jamnut (8) on main relief valve 13R.
- Have assistant simultaneously hold EJECTOR CONTROL lever in BACK while holding the right-hand SUSPENSION CONTROL lever in RAISE.
- Rotate adjusting screw (9) clockwise to increase pressure; counterclockwise to decrease pressure. Tighten jamnut (8).
- Stop engine; relieve hydraulic pressure.

2 APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL INOPERATIVE (CONTINUED)





MAIN HYDRAULIC PUMP PRESSURE TEST

WARNING

Before performing any troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

Ensure globe valve is fully opened prior to starting vehicle engine. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in damage to equipment or injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Install coupling tube (1), globe valve (2), tee (3), and pressure measuring device (4) between HYDR FLTR-IN 13R hose (5) and high-pressure filter inlet port 13R.
- Turn globe valve (2) counterclockwise until fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (2) until pressure reaches 3,950-4,050 psi (27,235-27, 925 kPa).
- Open globe valve (2). Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

Notify Direct Support maintenance.

Refer to TM 5-2350-262-20-2.

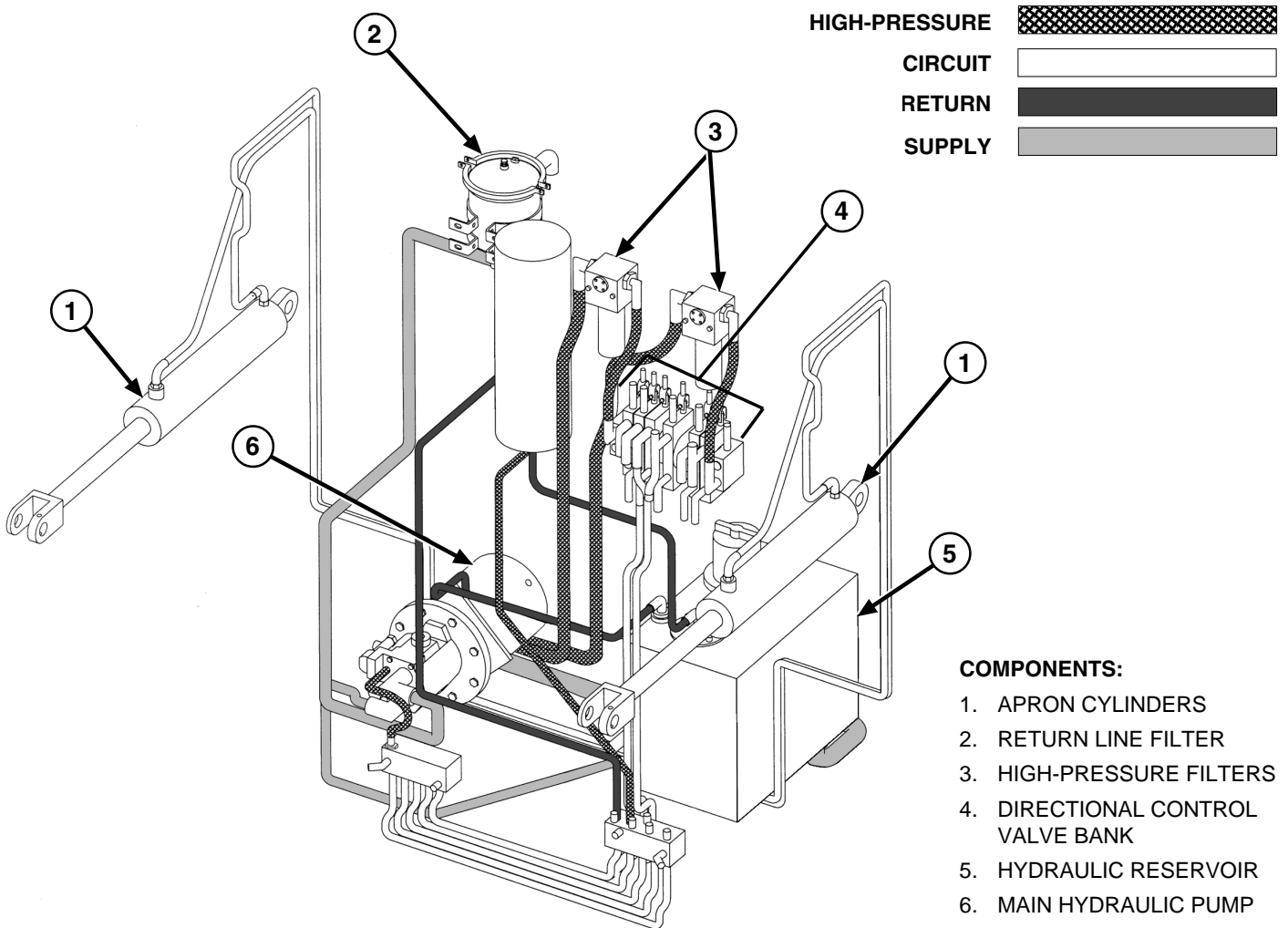
3

APRON WILL NOT RAISE

The apron cylinders receive oil flow from main control valve circuits 19 and 20. Relief valves at ports 19 and 20 of main control valve limit pressure to apron cylinders to 3,500 psi (24,131 kPa).

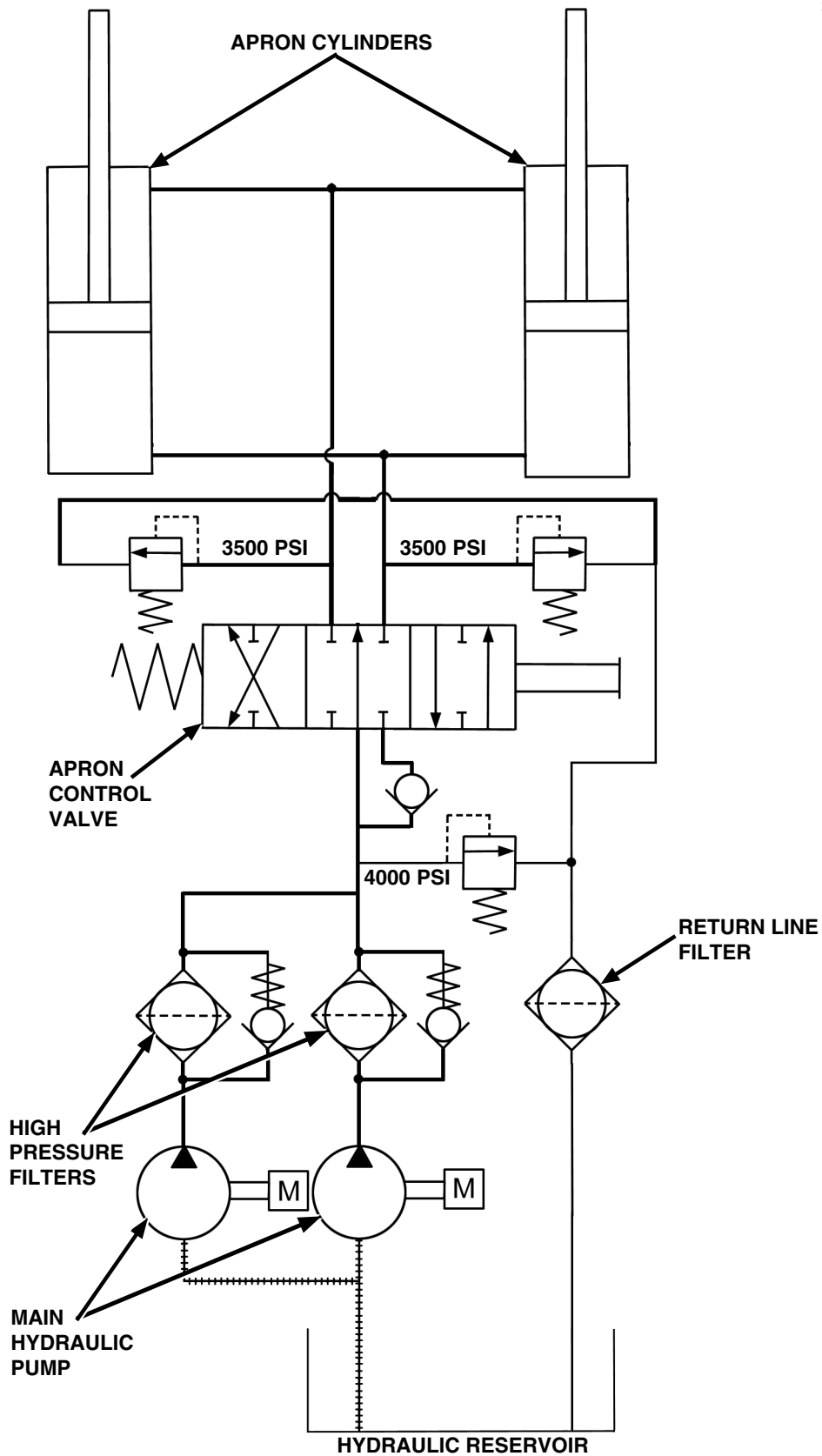
WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.



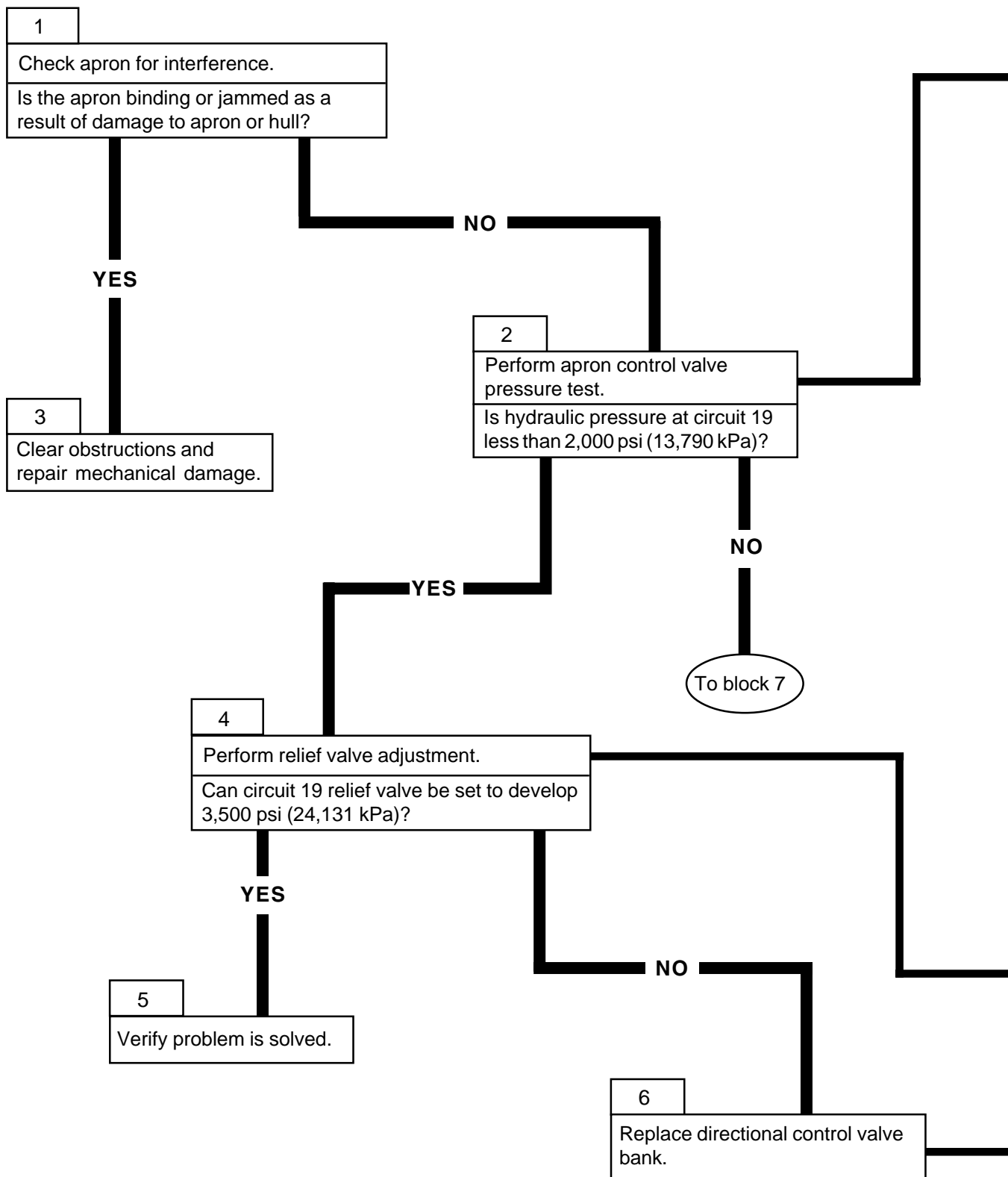
APRON HYDRAULIC CIRCUIT

HIGH-PRESSURE **—————**
 CIRCUIT **—————**
 SUPPLY **+++++**



APRON HYDRAULIC SCHEMATIC

3 APRON WILL NOT RAISE (CONTINUED)



APRON CONTROL VALVE PRESSURE TEST

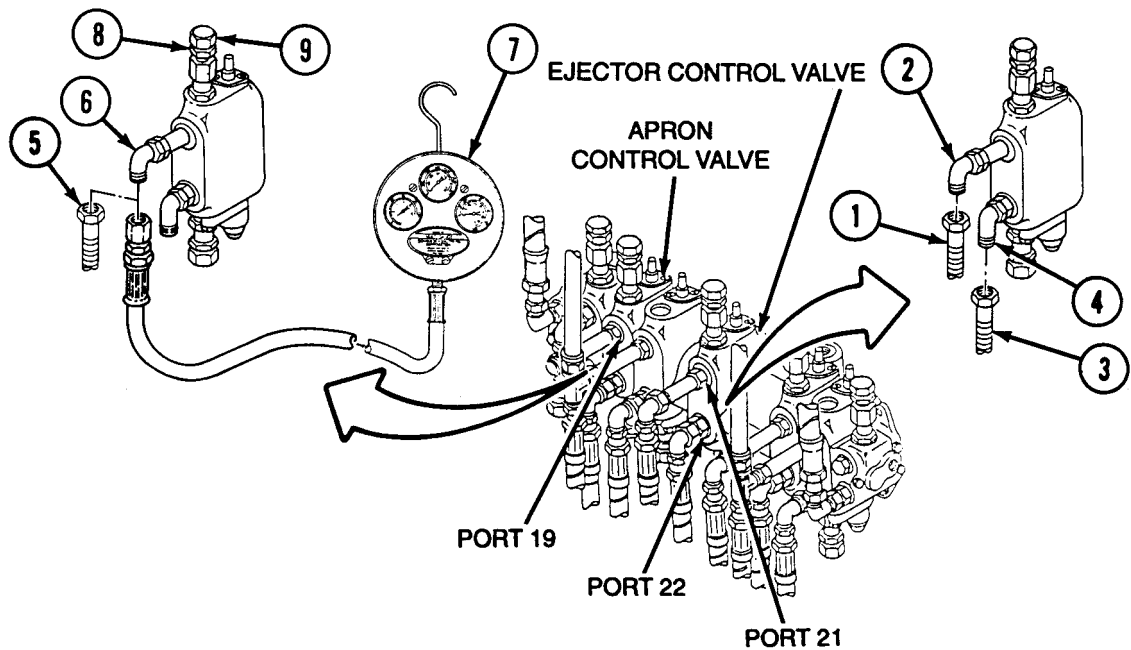
WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector from the hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 of ejector control valve and CONT VLV-22 hose (3) from elbow (4) at port 22. Cap and plug hoses and fittings.
- Disconnect CONT VLV-19 hose (5) from elbow (6) at port 19 on apron control valve. Connect pressure measuring device (7) to elbow (6). Plug hose (5).
- Have assistant start engine and hold APRON CONTROL lever in UP position. Read pressure measuring device (7)

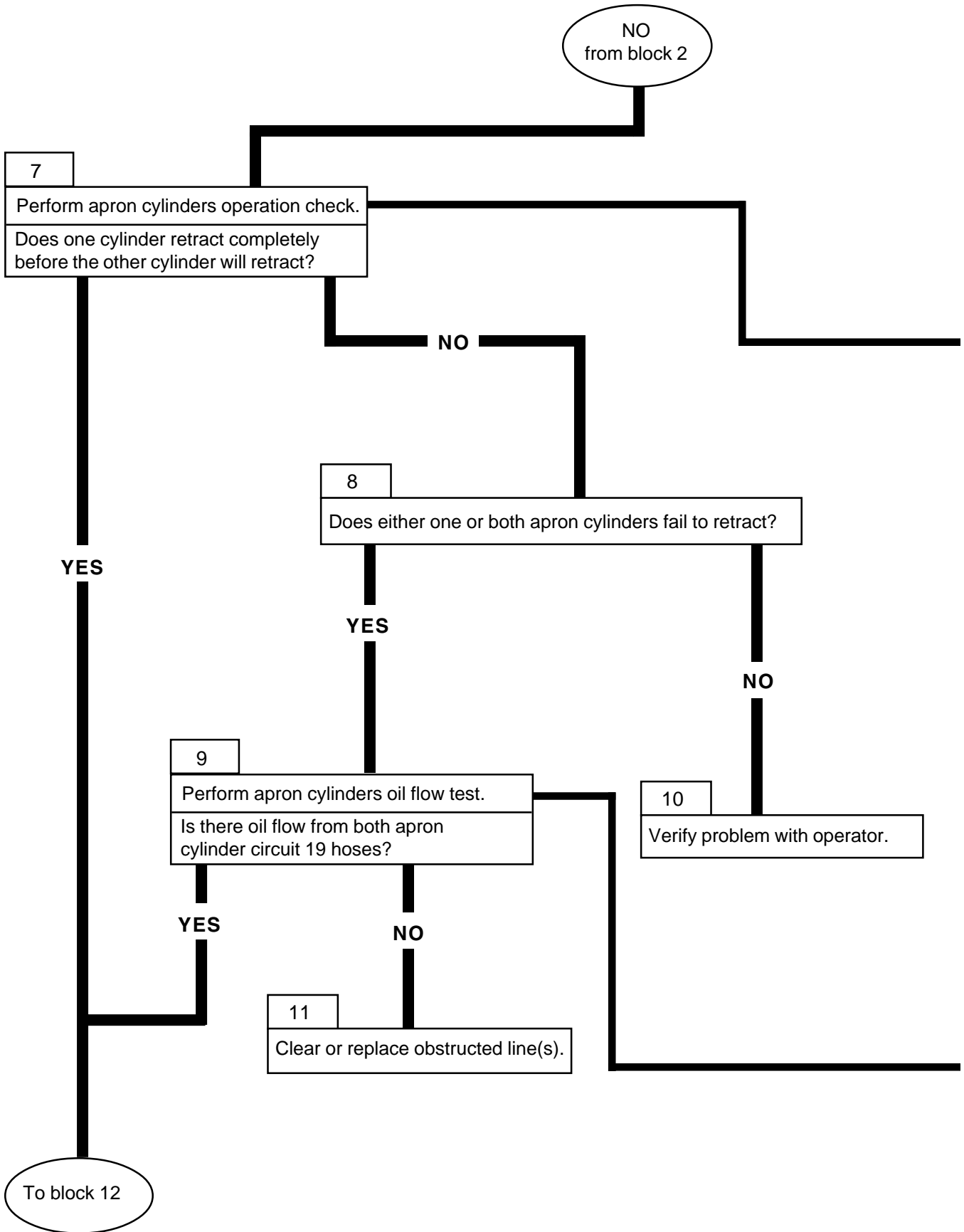


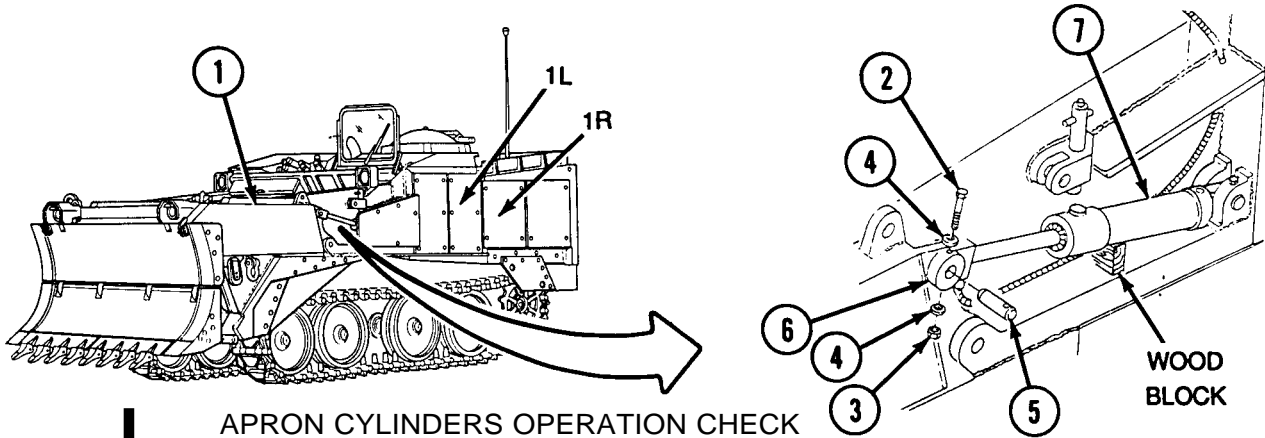
RELIEF VALVE ADJUSTMENT

As assistant holds APRON CONTROL lever in UP position, loosen jamnut (8) on apron, raise relief valve (9), rotate valve (9) clockwise to increase pressure and counterclockwise to decrease pressure, until hydraulic pressure is at a minimum 3,500 psi (24,131 kPa). Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

Refer to TM5-2350-262-20-2.

3 APRON WILL NOT RAISE (CONTINUED)



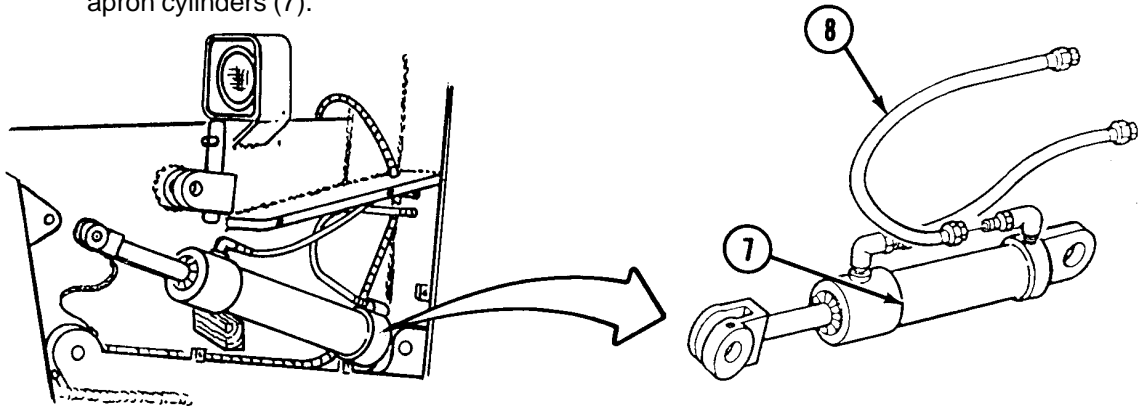


APRON CYLINDERS OPERATION CHECK

CAUTION

Ensure apron cylinders are blocked prior to retracting disconnected cylinder rod ends. Cylinders will drop and damage hydraulic hoses.

- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.
- With apron (1) lowered, remove exterior armor plates 1L and 1R. Remove bolt (2), nut (3), two washers (4), and clevis pin (5) from rod end (6) of both apron cylinders (7). Block apron cylinders (7).
- Start engine and hold APRON CONTROL lever in UP position. Observe movement of apron cylinders (7).



APRON CYLINDERS OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Extend apron cylinders (7) fully. Stop engine. Relieve hydraulic pressure by moving APRON CONTROL lever UP and DOWN several times, and disconnect left and right APRON CYL-19 hoses (8) from apron cylinders (7). Hold open end of each hose (8) in a bucket.

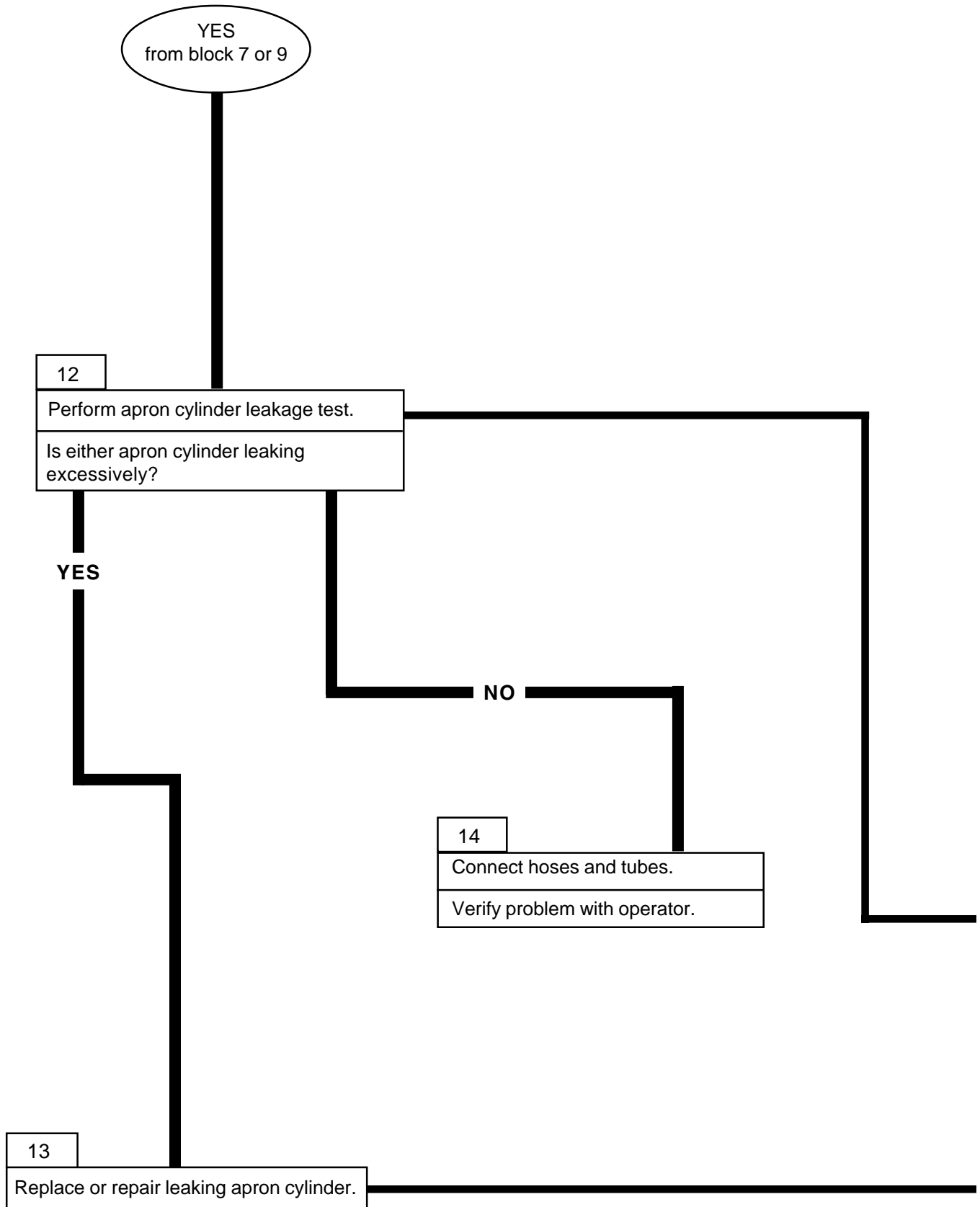
NOTE

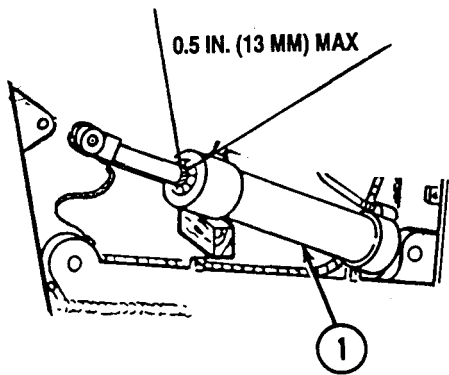
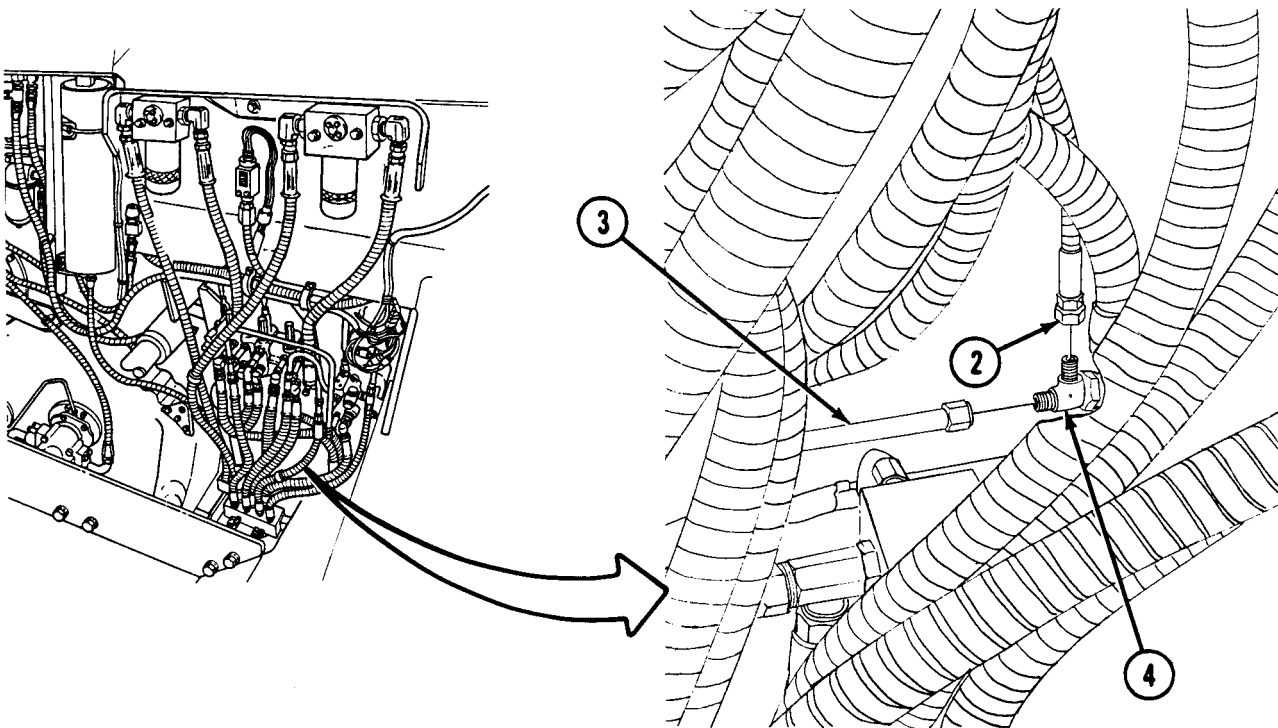
If there is no flow from one of the APRON CYL-19 hoses, the blockage is between the cylinder end of that hose and circuit 19 tee on the hull floor. If no flow from either hose is observed, the blockage is in CONT VLV-19 hose between circuit 19 control valve and tee on hull floor.

- Have assistant start engine and slowly move APRON CONTROL lever to UP position. Observe oil flow from both APRON CYL-19 hoses. Stop engine; relieve hydraulic pressure. Reconnect left and right APRON CYL-19 hoses (8) to cylinders (7).

3

APRON WILL NOT RAISE (CONTINUED)





APRON CYLINDER LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Have assistant start engine, and retract cylinders (1) approximately halfway. Stop engine; relieve hydraulic pressure.
- Disconnect CKT-20 (REAR) TEE hose (2) and CKT-20 (REAR) TEE tube (3) from tee (4) on hull floor. Plug hose (2) and tube (3), and cap tee (4).
- Start engine and have assistant hold APRON CONTROL lever in UP position. Measure cylinder rod extension of both apron cylinders (1). Continue to hold APRON CONTROL lever UP for one minute. Have assistant return APRON CONTROL lever to NEUTRAL position. Measure the cylinder rod extension of both apron cylinders (1) again. If extension rate is greater than 0.5 in. (13 mm) per minute, cylinder is leaking excessively.
- Stop engine; relieve hydraulic pressure.

Refer to TM5-2320-262-20-1.

4

BUMP STOPS INOPERATIVE

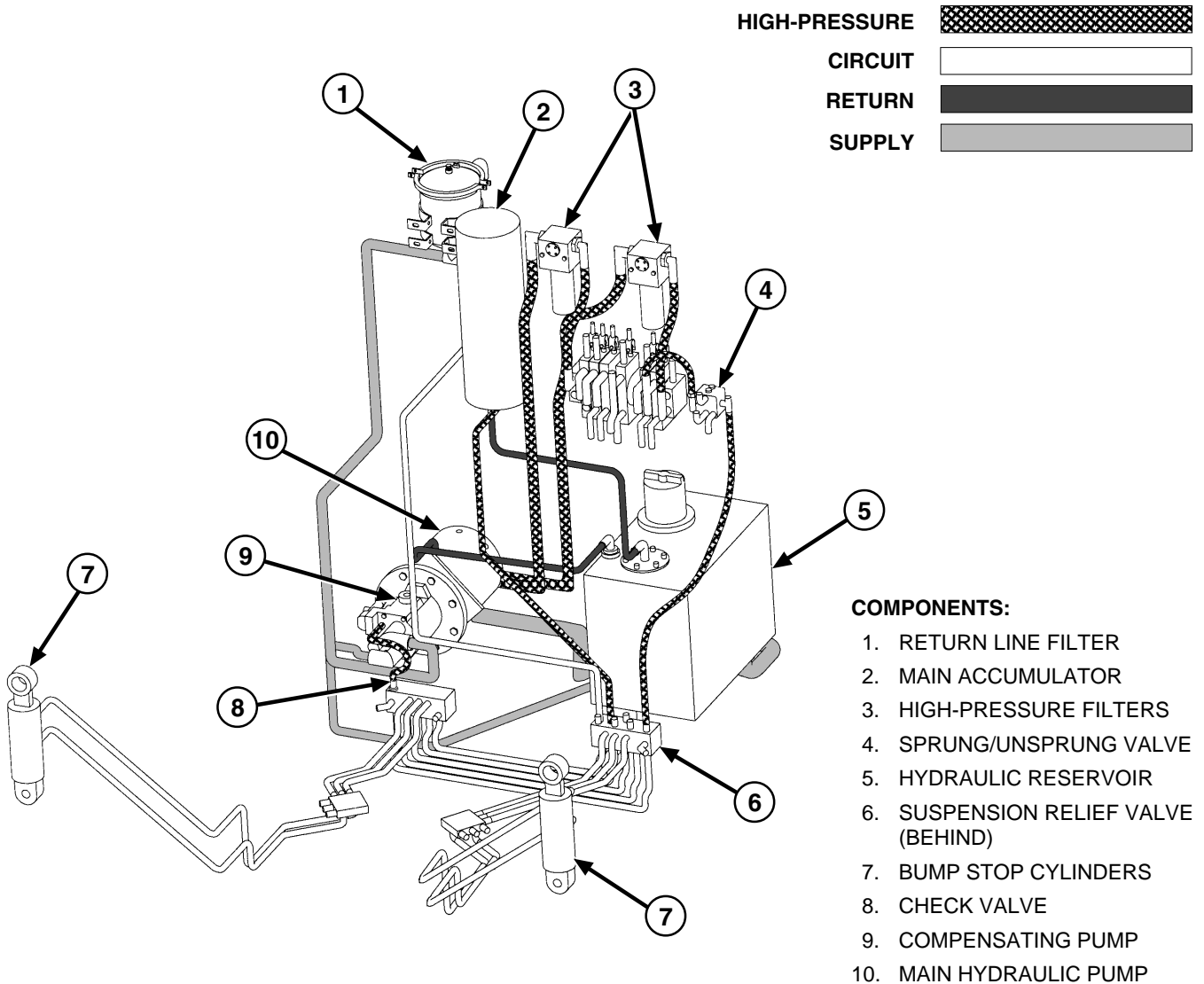
The bump stops limit travel of the vehicle's No. 1 left and right suspension unit in SPRUNG mode. Hydraulic pressure is supplied to bump stops by compensating pump through SPRUNG/UNSPRUNG valve.

NOTE

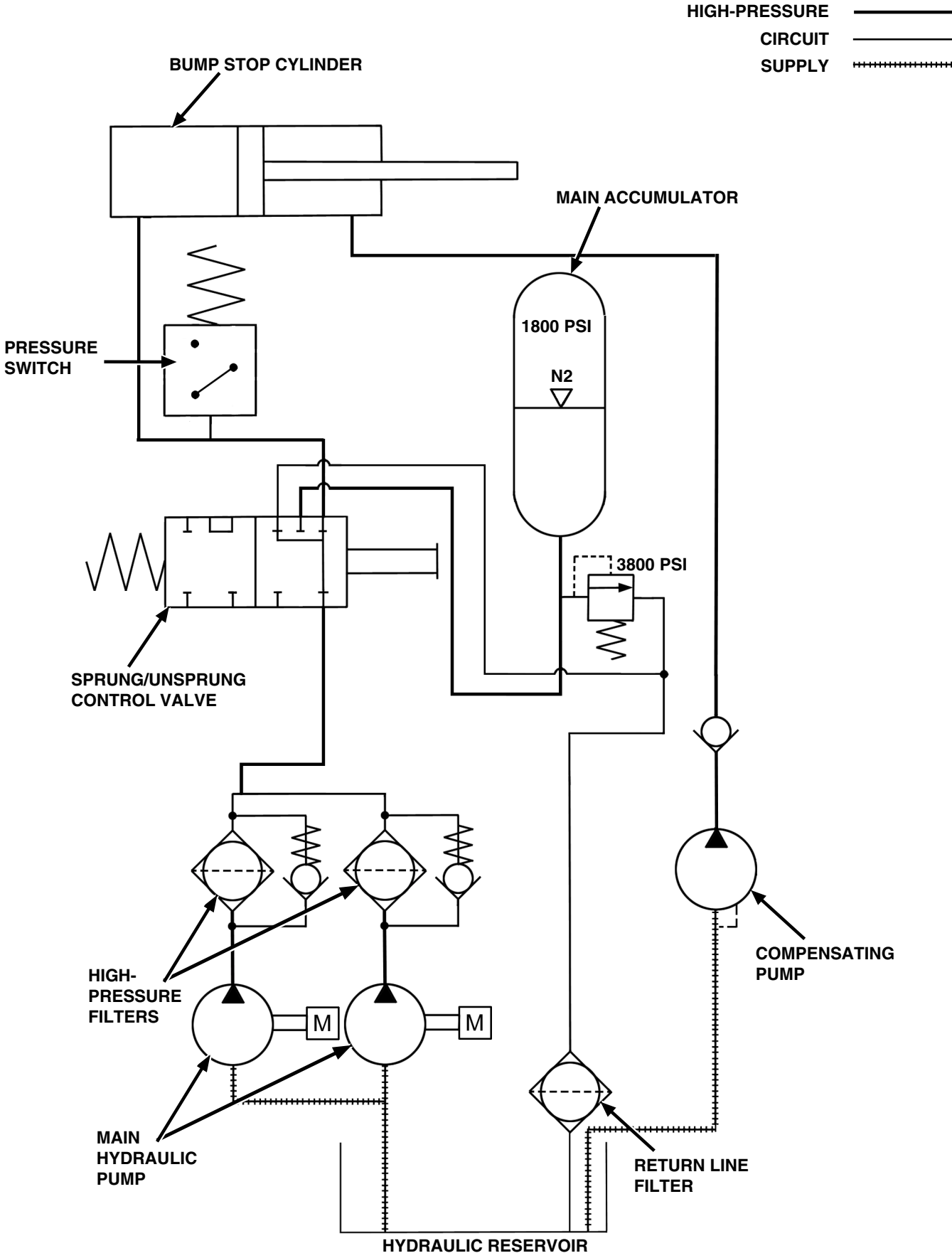
Perform these procedures for left or right bump stop.

WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

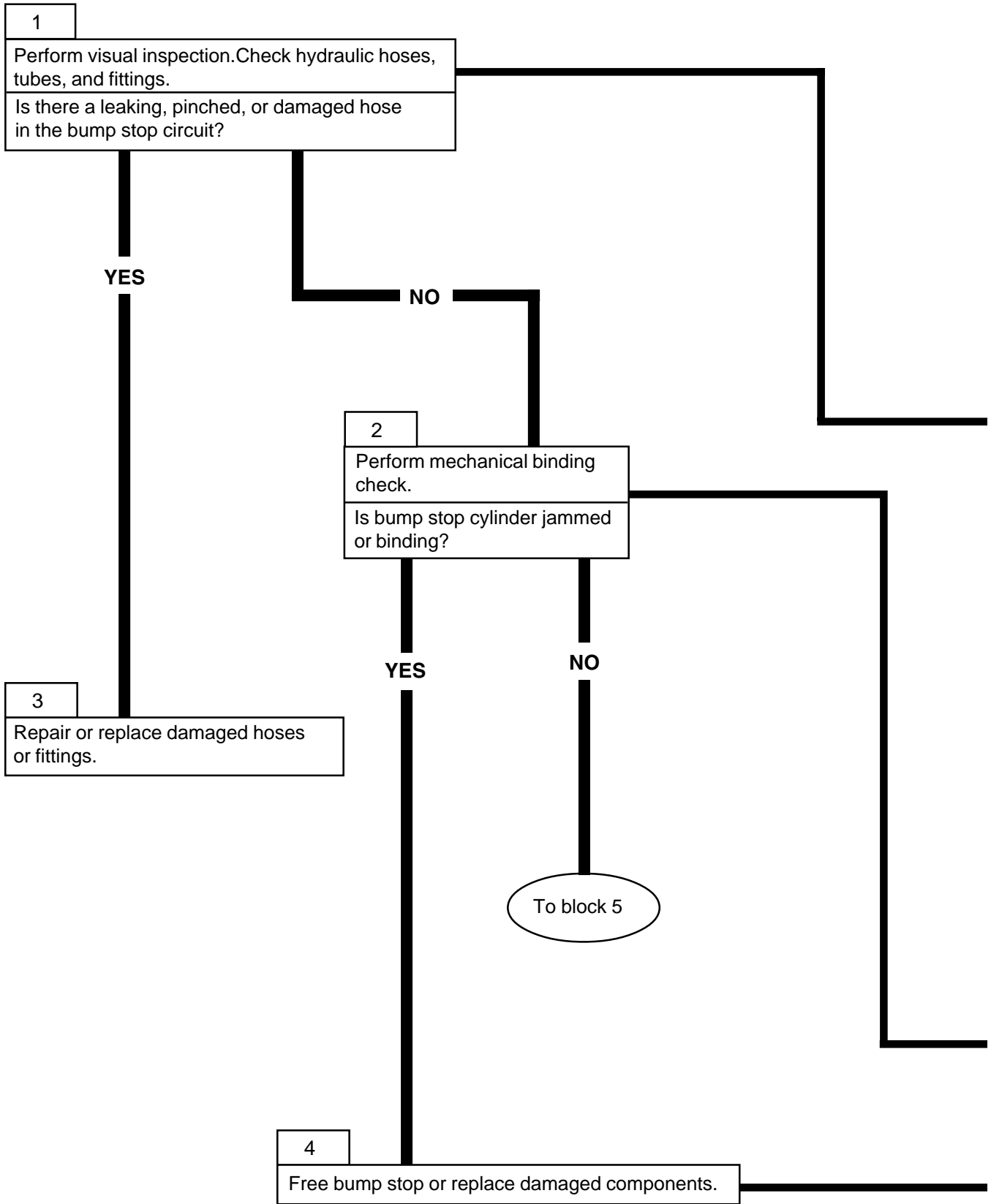


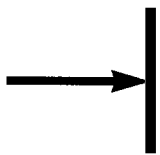
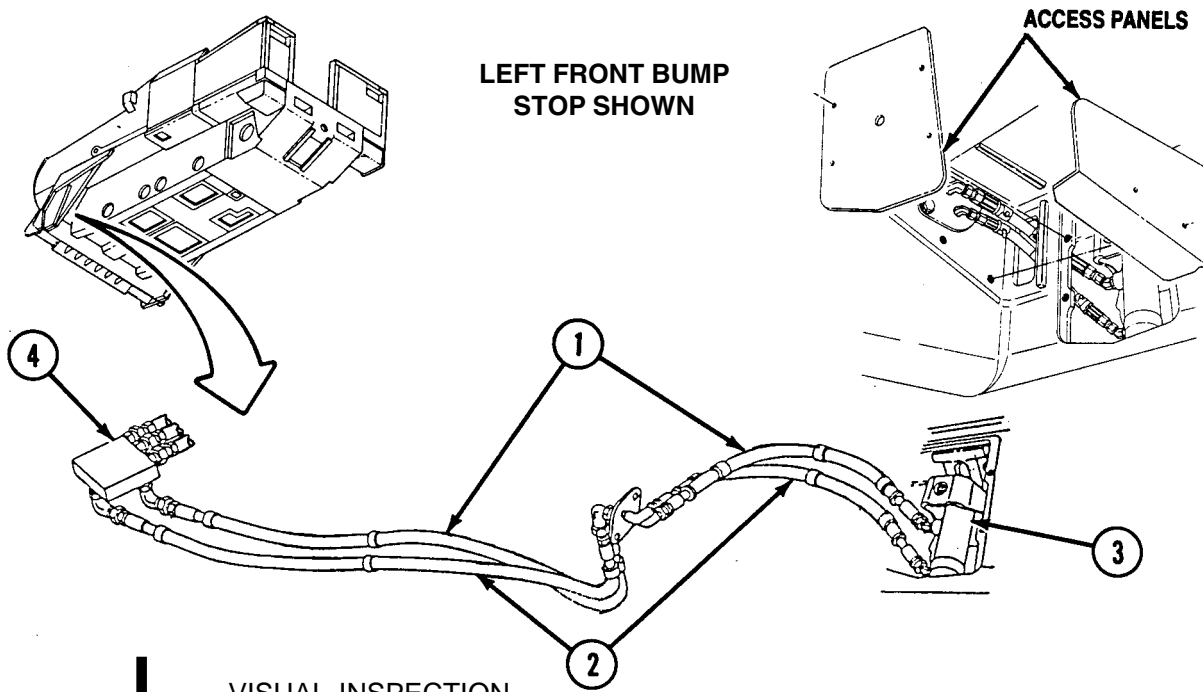
BUMP STOP CIRCUIT



BUMP STOP SCHEMATIC

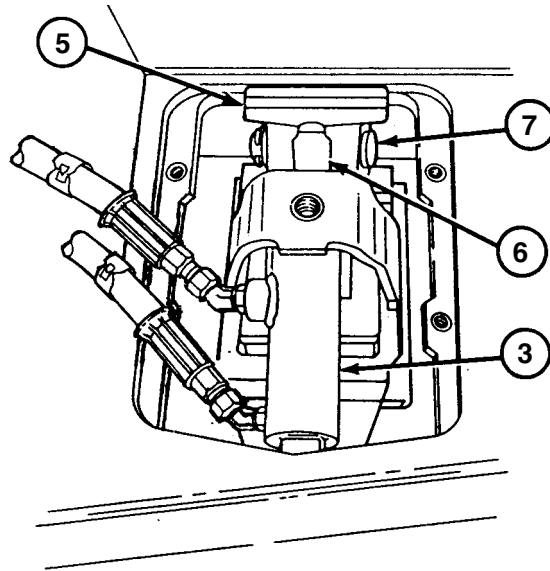
4 BUMP STOPS INOPERATIVE (CONTINUED)



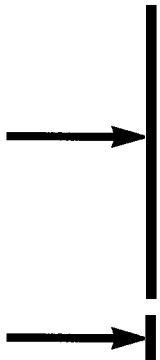


VISUAL INSPECTION

Remove bump stop access panels from hull on inoperative side of vehicle, and check hydraulic lines at circuits 9 (1) and 11 (2) between bump stop cylinder (3) and forward manifold (4).



LEFT FRONT BUMP STOP SHOWN

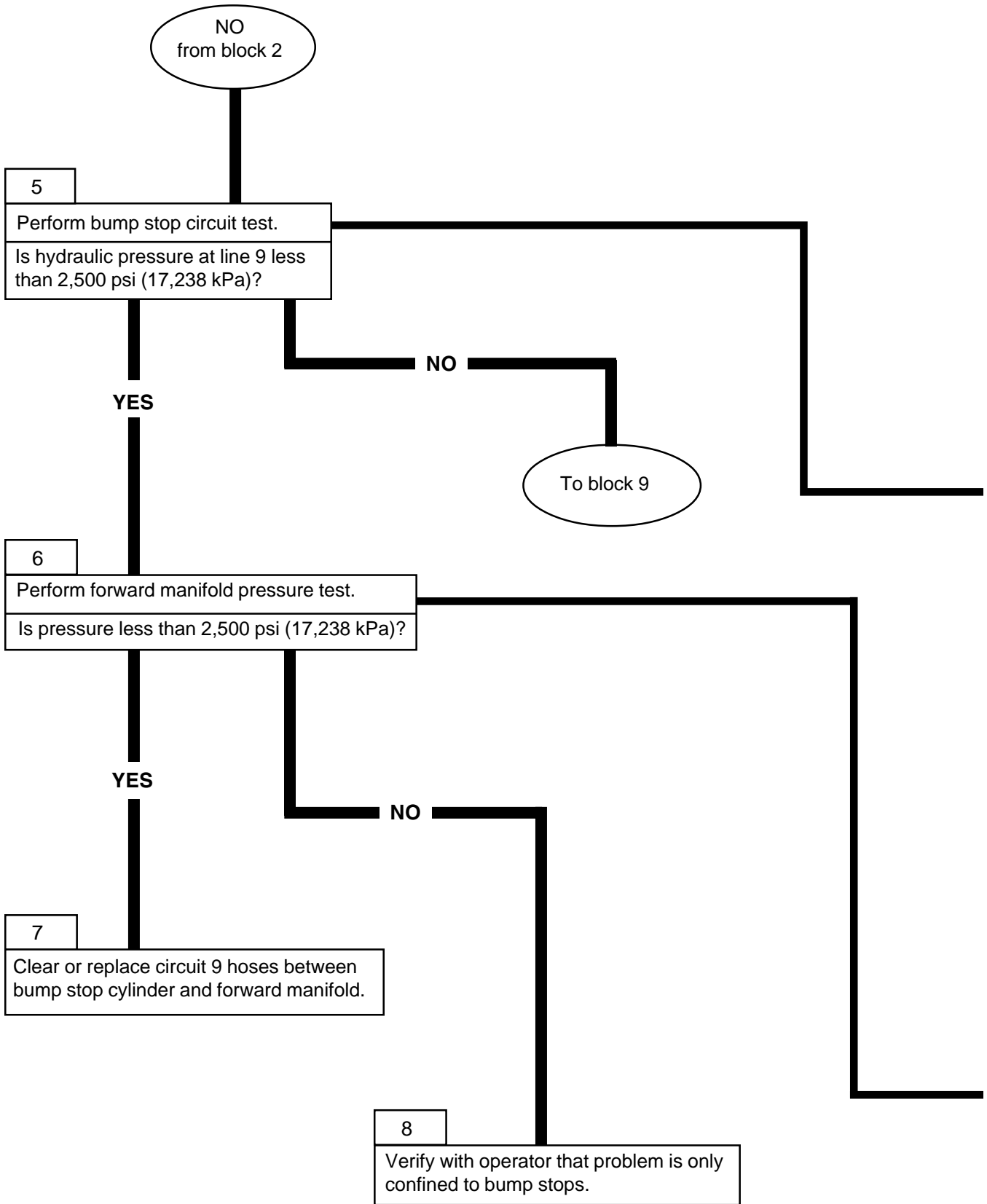


MECHANICAL BINDING CHECK

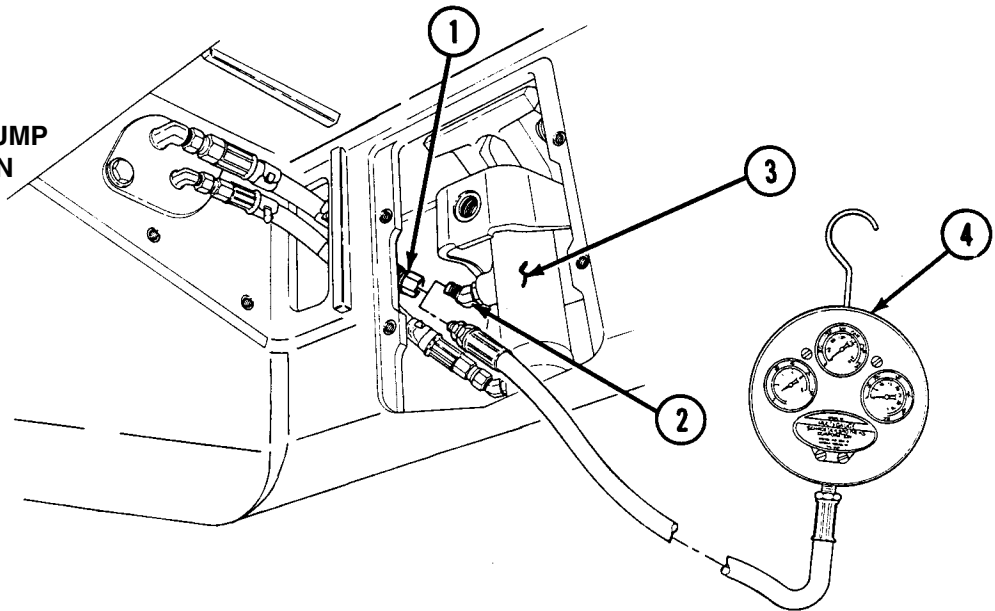
- Clear debris from area of bump stop (5).
- Start engine and allow to run for at least two minutes to build up hydraulic pressure.
- Have assistant shift SPRUNG/UNSPRUNG lever to SPRUNG, then to UNSPRUNG. Repeat several times. Check for free movement of bump stop cylinder (3). Check for missing or damaged components including cylinder rod (6), cylinder rod connecting pin (7), and bump stop (5).

Refer to TM 5-2350-262-20-2

4 BUMP STOPS INOPERATIVE (CONTINUED)



LEFT FRONT BUMP STOP SHOWN

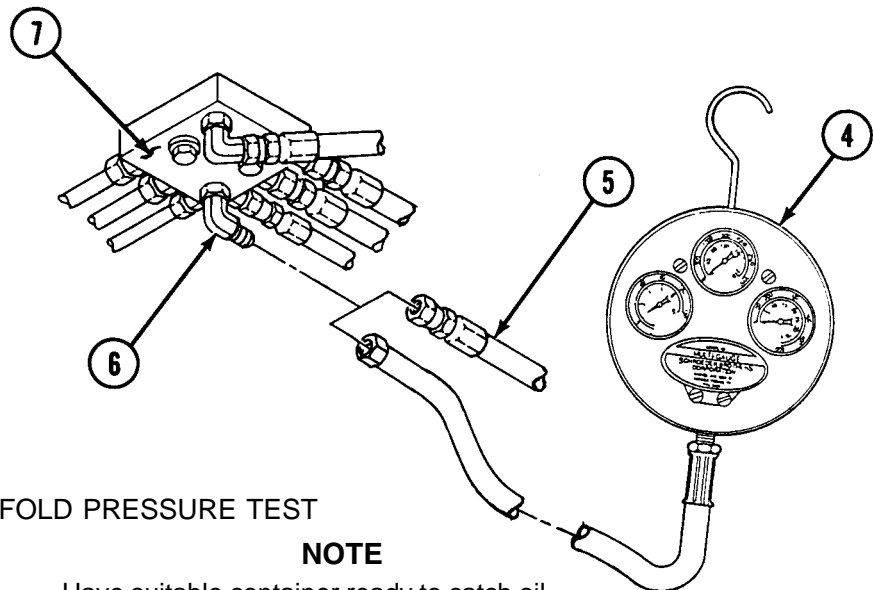
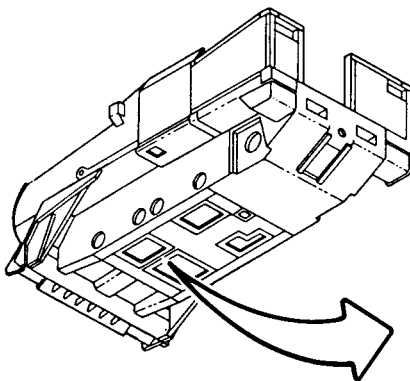


BUMP STOP CIRCUIT TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect BUMP STOP CYL-9 hose (1) from elbow (2) on bump stop cylinder (3), and cap elbow (2). Connect pressure measuring device (4) to BUMP STOP CYL-9 hose (1).
- Start engine, place vehicle in SPRUNG mode, and read pressure measuring device (4).



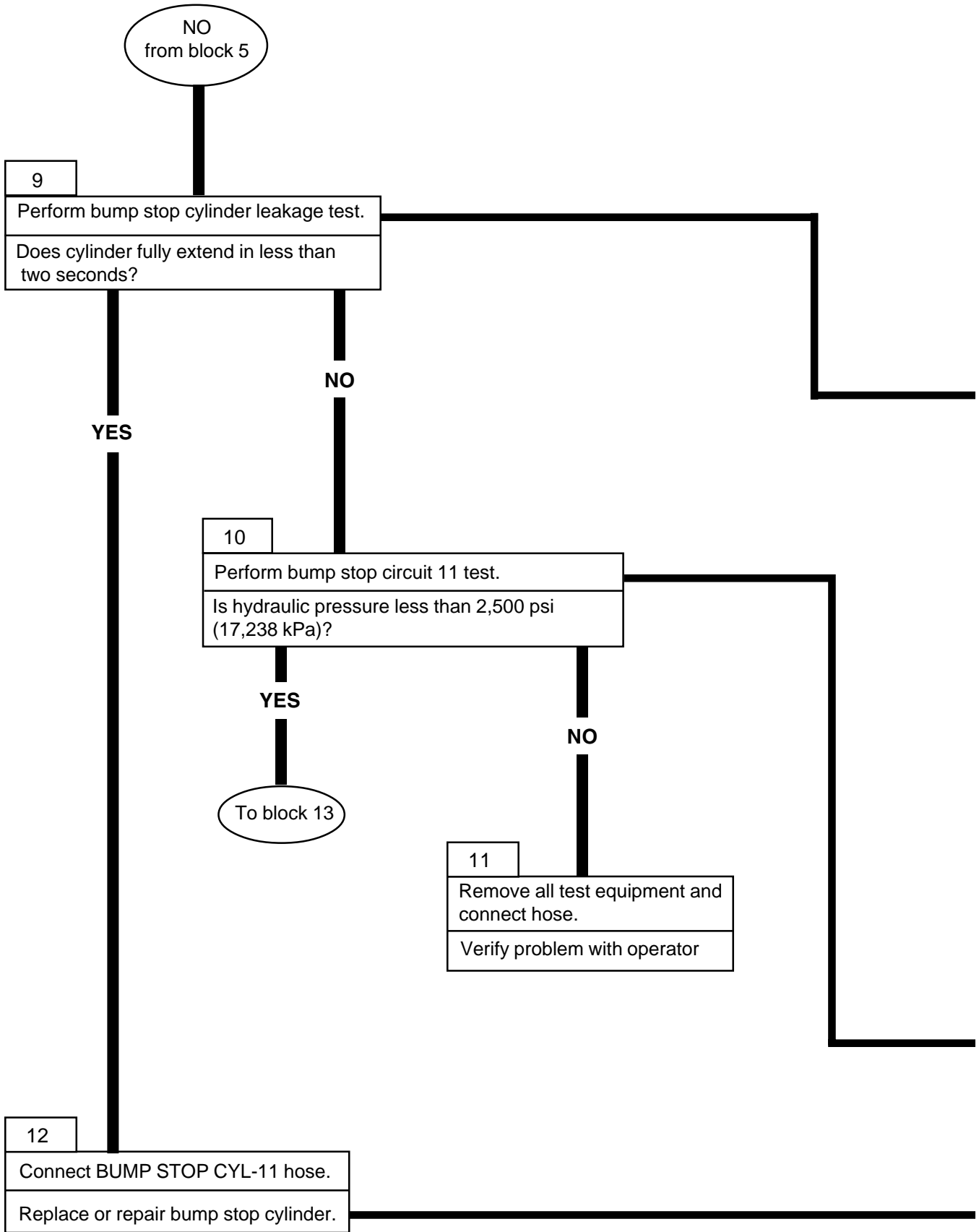
FORWARD MANIFOLD PRESSURE TEST

NOTE

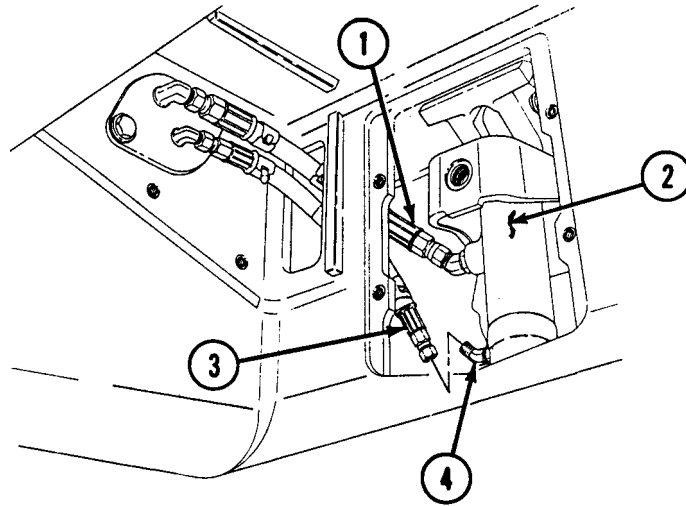
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Remove measuring device (4) and connect hose (1).
- Disconnect FWD MANF-9 ELB hose (5) from elbow (6) on forward manifold (7), and plug hose (5). Connect pressure measuring device (4) to elbow (6).
- Start engine and read pressure measuring device (4).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

4 BUMP STOPS INOPERATIVE (CONTINUED)



LEFT FRONT BUMP
STOP SHOWN



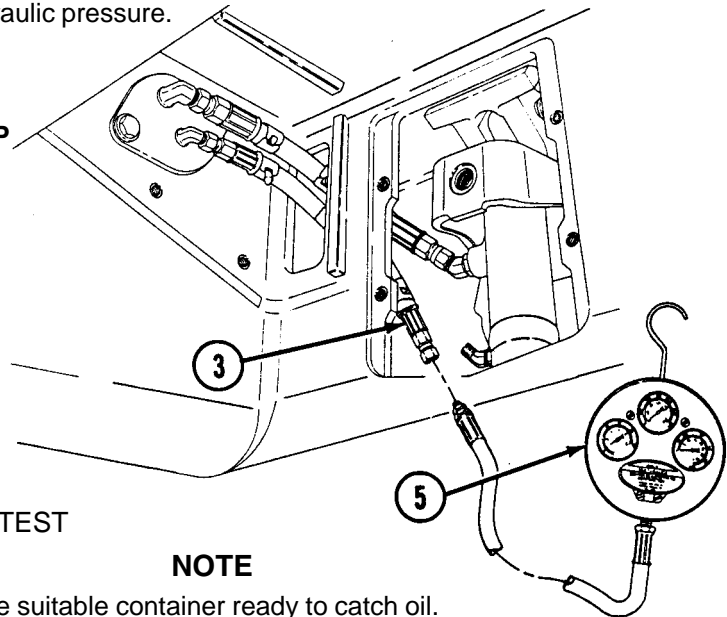
BUMP STOP CYLINDER LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure and remove all test equipment. Connect BUMP STOP CYL-9 hose (1) to bump stop cylinder (2).
- Disconnect BUMP STOP CYL-11 hose (3) from elbow (4) on bump stop cylinder (2). Cap elbow (4) and plug hose (3).
- Start engine and move SPRUNG/UNSPRUNG lever to SPRUNG. Note the time it takes for the bump stops to extend fully.
- Stop engine; relieve hydraulic pressure.

LEFT FRONT BUMP
STOP SHOWN



BUMP STOP CIRCUIT 11 TEST

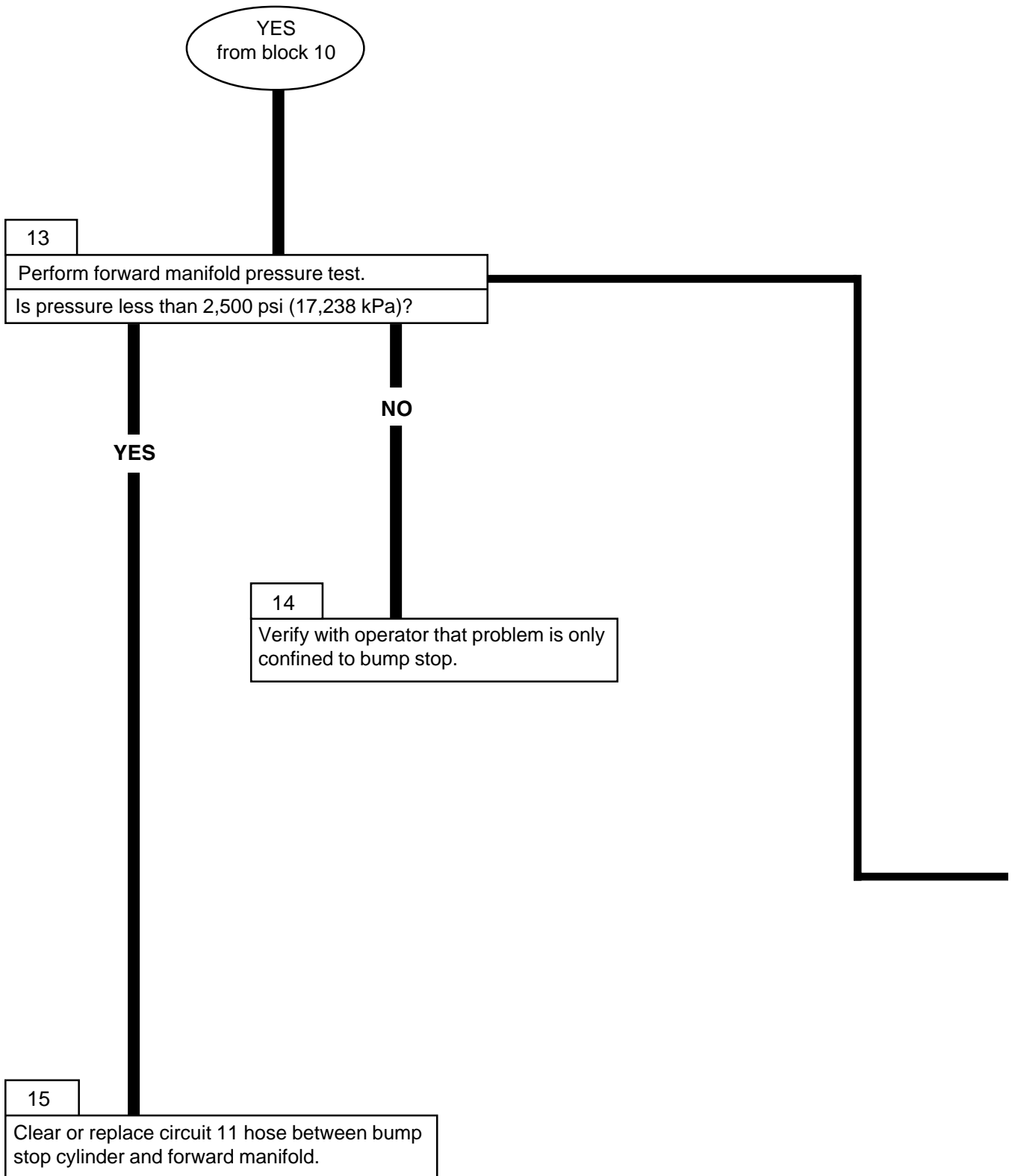
NOTE

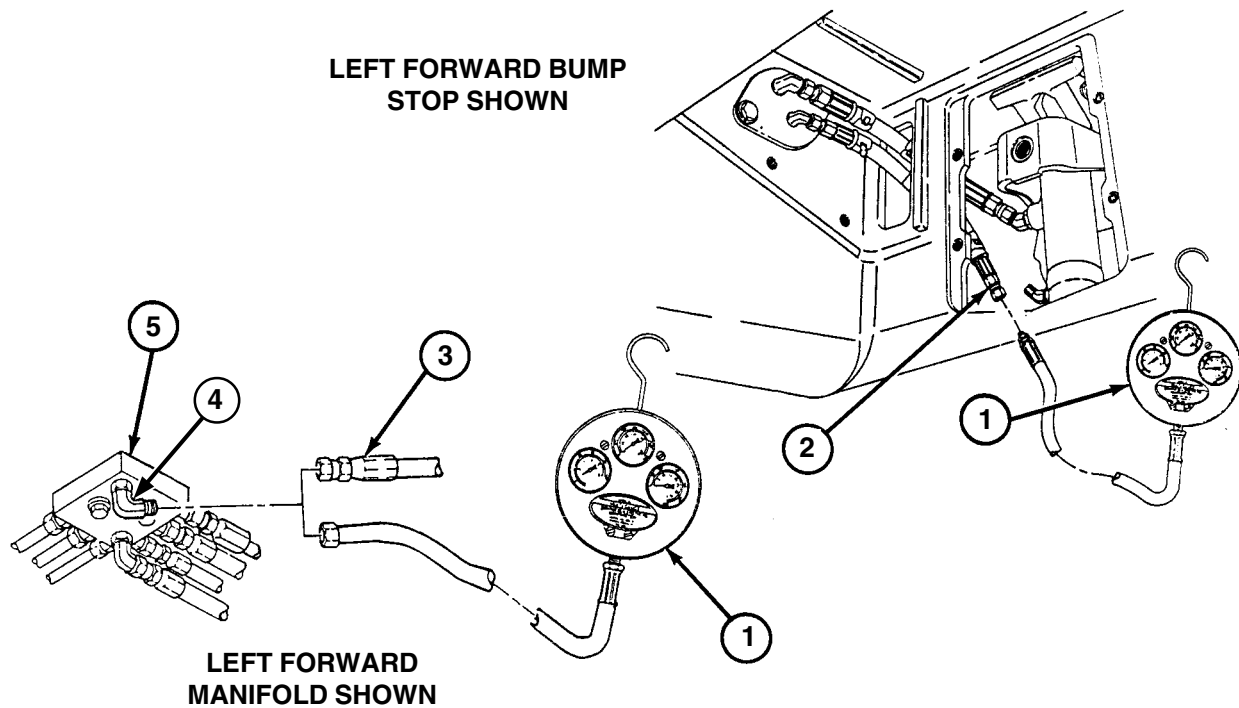
Have suitable container ready to catch oil.

- Connect pressure measuring device (5) to end of BUMP STOP CYL-11 hose (3).
- Start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Read pressure measuring device (5).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

4 BUMP STOPS INOPERATIVE (CONTINUED)





FORWARD MANIFOLD PRESSURE TEST

NOTE

Have suitable container ready to catch oil.

- Remove pressure measuring device (1) and connect BUMP STOP CYL-9 hose (2).
- Disconnect FWD MANF-11-ELB hose (3) from elbow (4) on forward manifold (5). Cap hose (3) and install pressure measuring device (1) on elbow (4).
- Start engine. With SPRUNG/UNSPRUNG lever in UNSPRUNG, read pressure measuring device (1).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

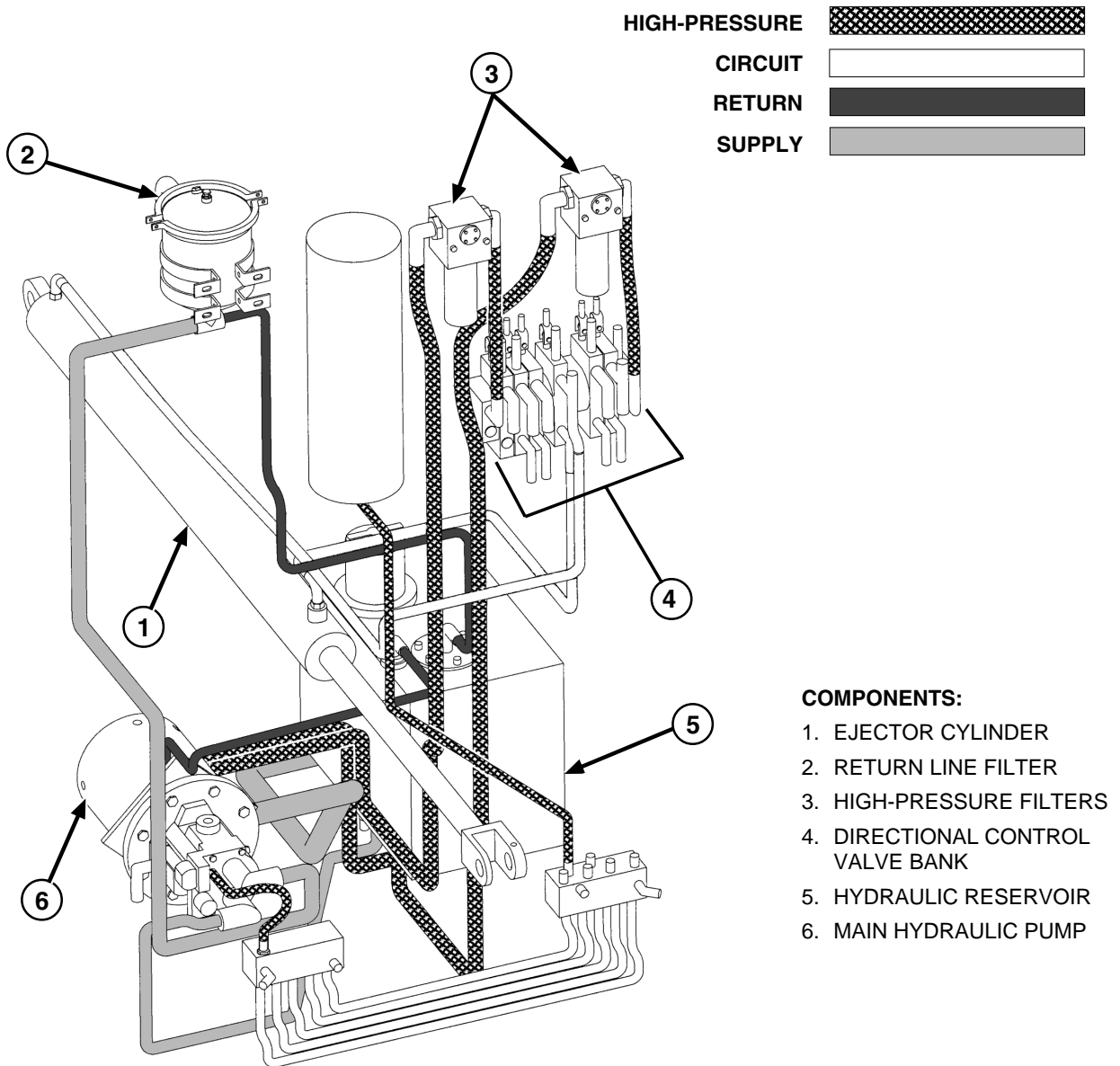
5

EJECTOR CREEPS

Hydraulic oil is supplied to the ejector cylinder through circuits 21 and 22. When actuated, the ejector control valve distributes hydraulic pressure to extend the ejector cylinder through port 21 and retract the ejector cylinder through port 22. Hydraulic pressure is controlled by the ejector relief valve 21.

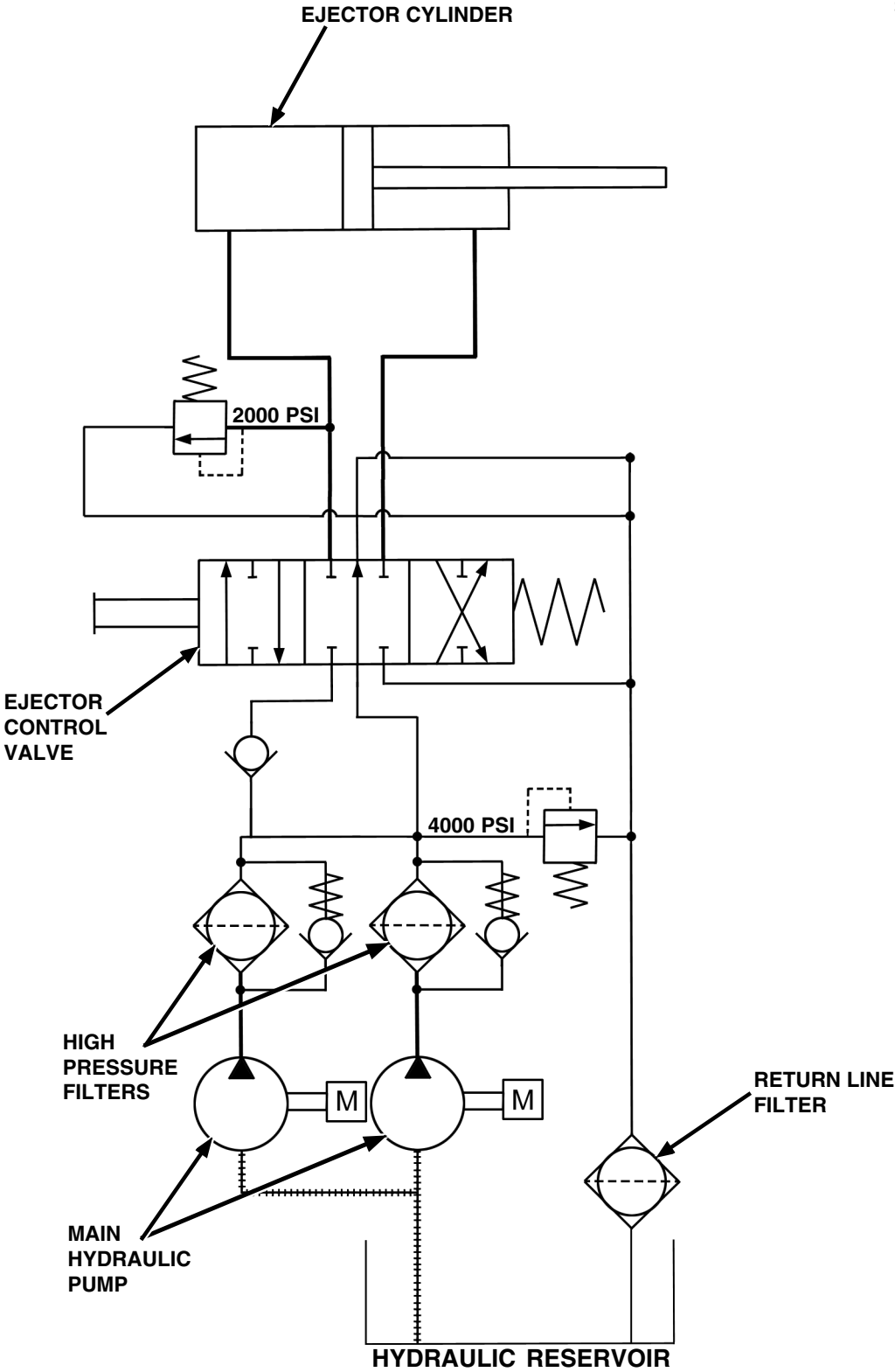
WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.



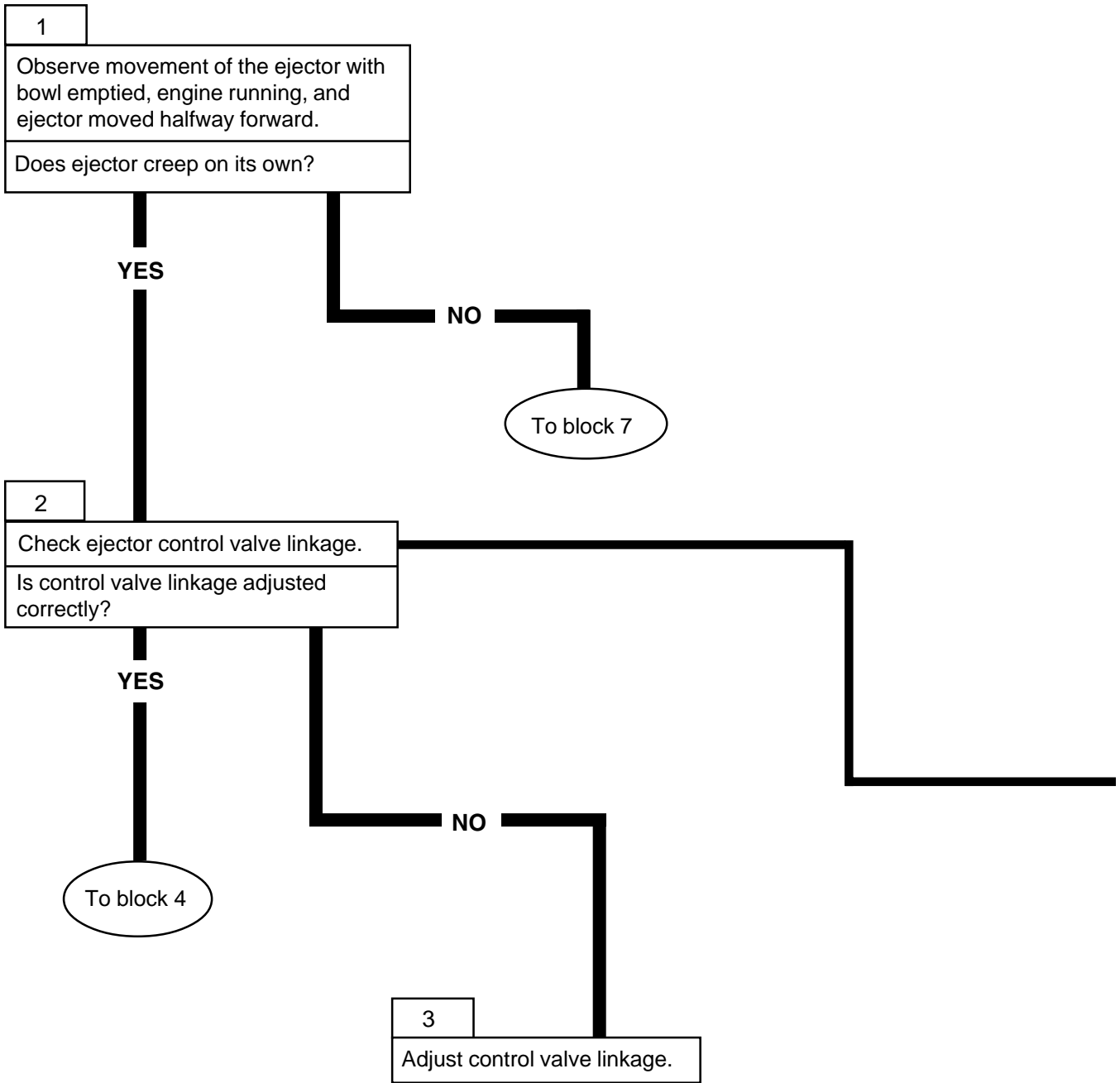
EJECTOR HYDRAULIC CIRCUIT

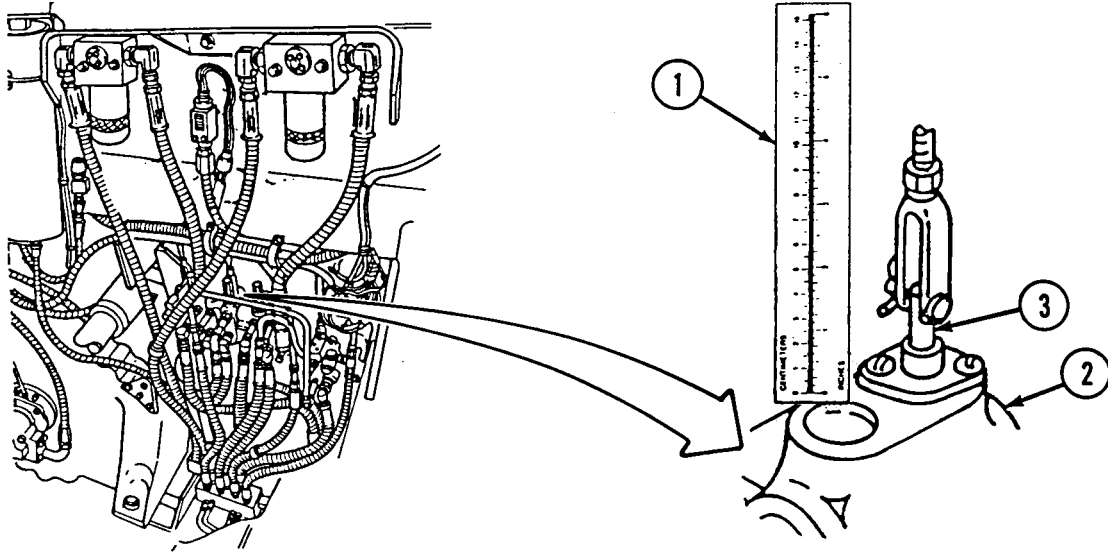
HIGH-PRESSURE —————
CIRCUIT —————
SUPPLY +-----+



EJECTOR HYDRAULIC SCHEMATIC

5 **EJECTOR CREEPS (CONTINUED)**

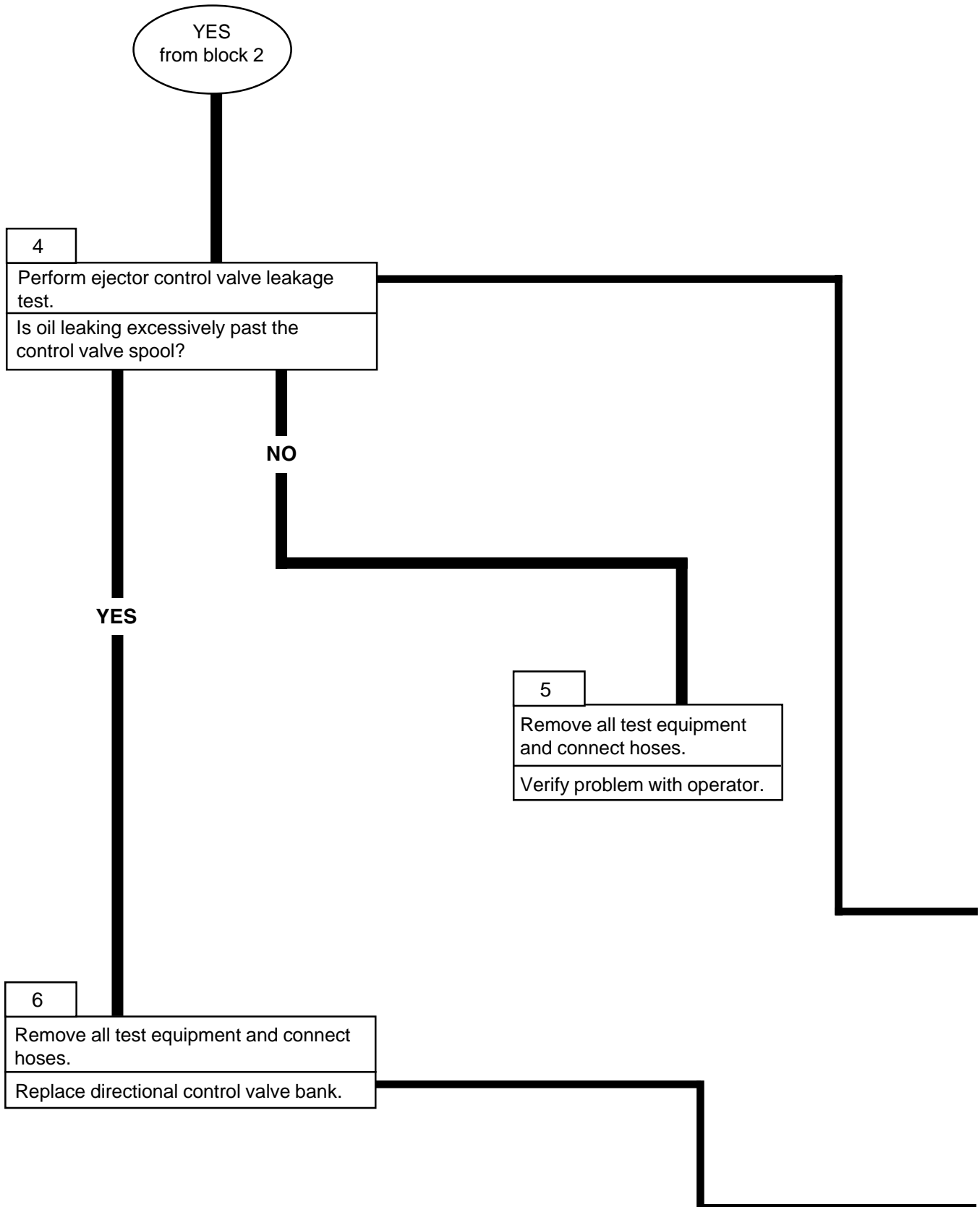


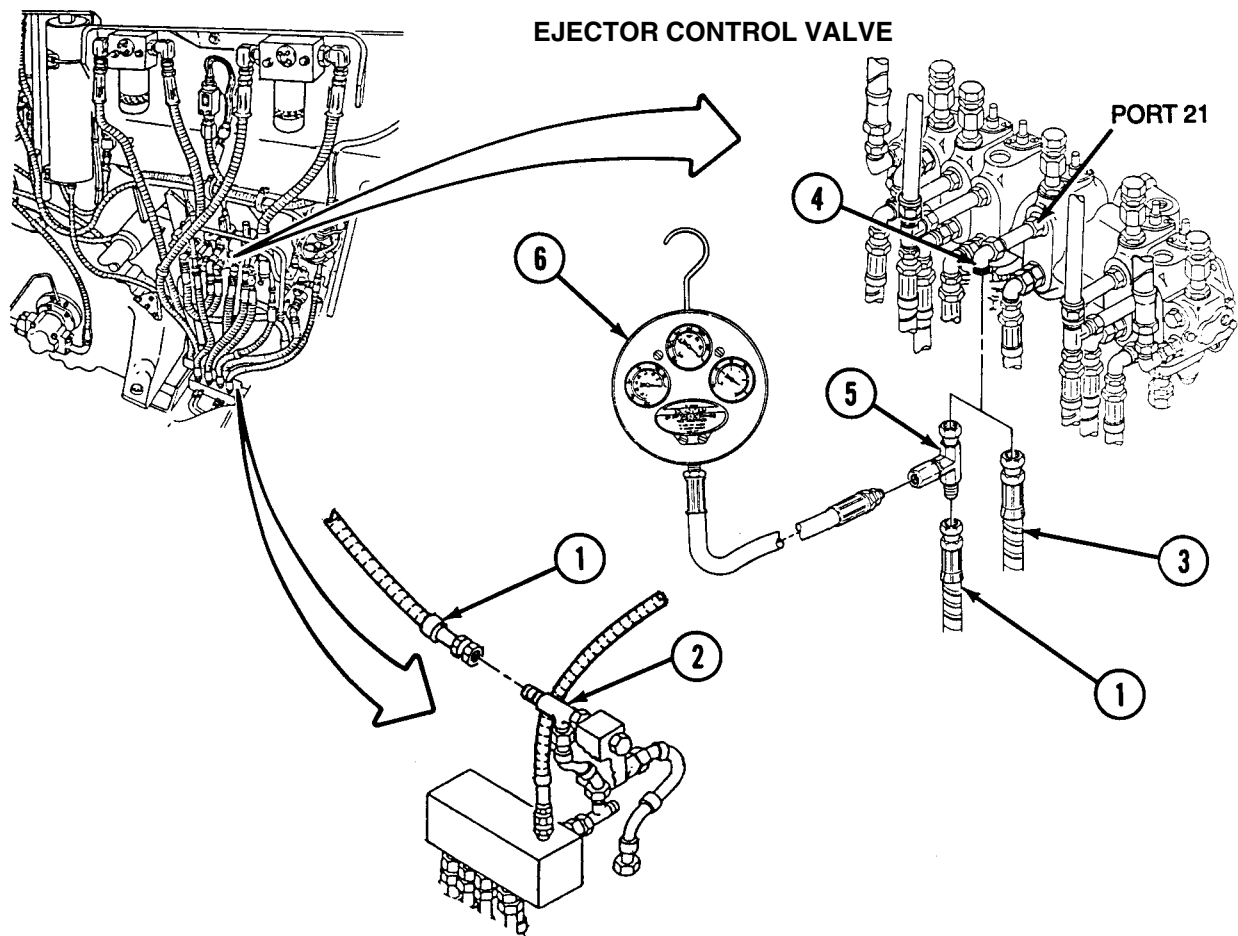


EJECTOR CONTROL VALVE LINKAGE CHECK

- Stop engine; relieve hydraulic pressure.
- Hold a measuring device (1) on the face of ejector control valve (2). Have assistant move EJECTOR CONTROL lever between FORWARD and BACK. Measure distance plunger (3) travels as lever is moved. The distance of travel should be 9/32 in. (7 mm).

5 EJECTOR CREEPS (CONTINUED)





EJECTOR CONTROL VALVE LEAKAGE TEST

NOTE

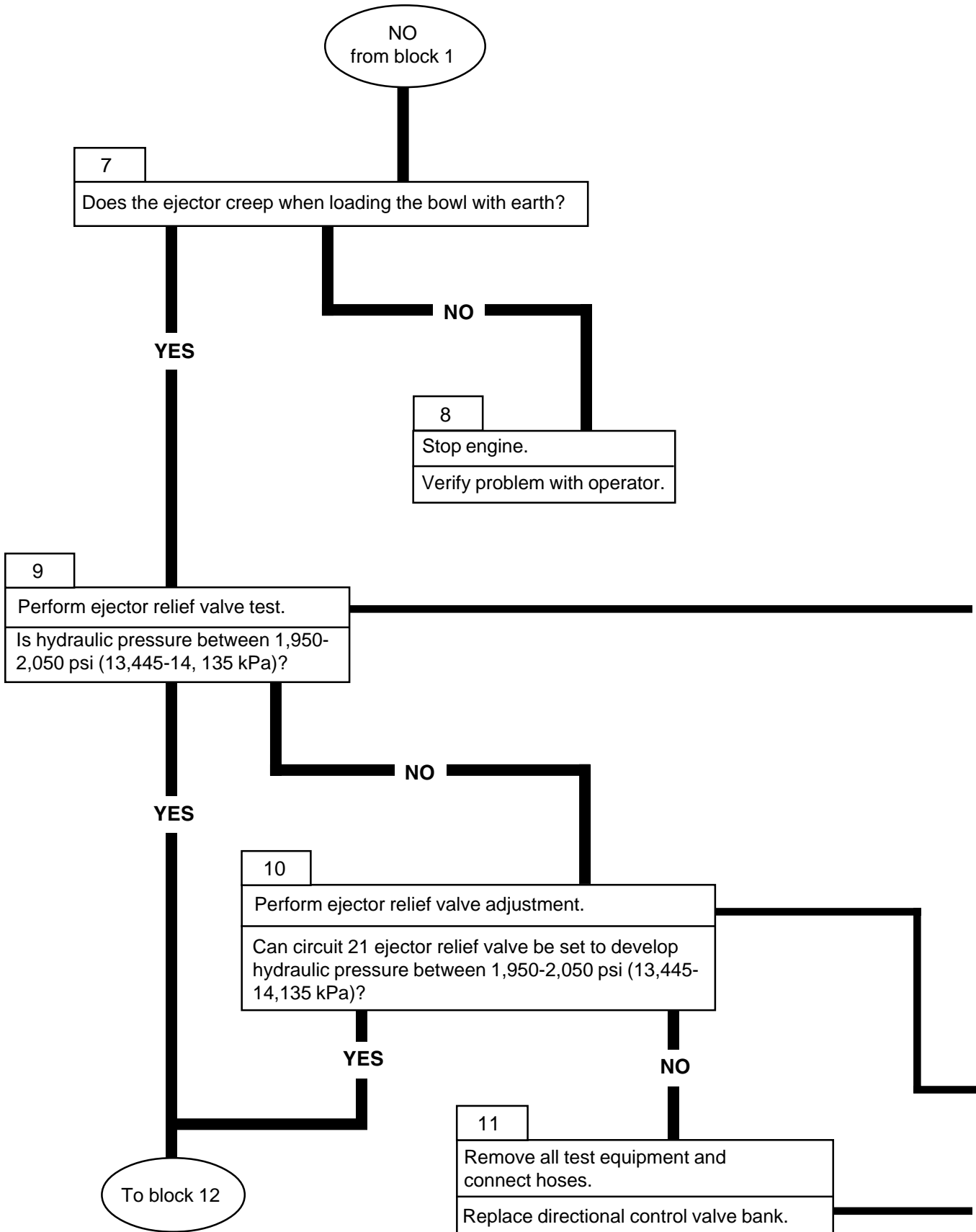
Have suitable container ready to catch oil

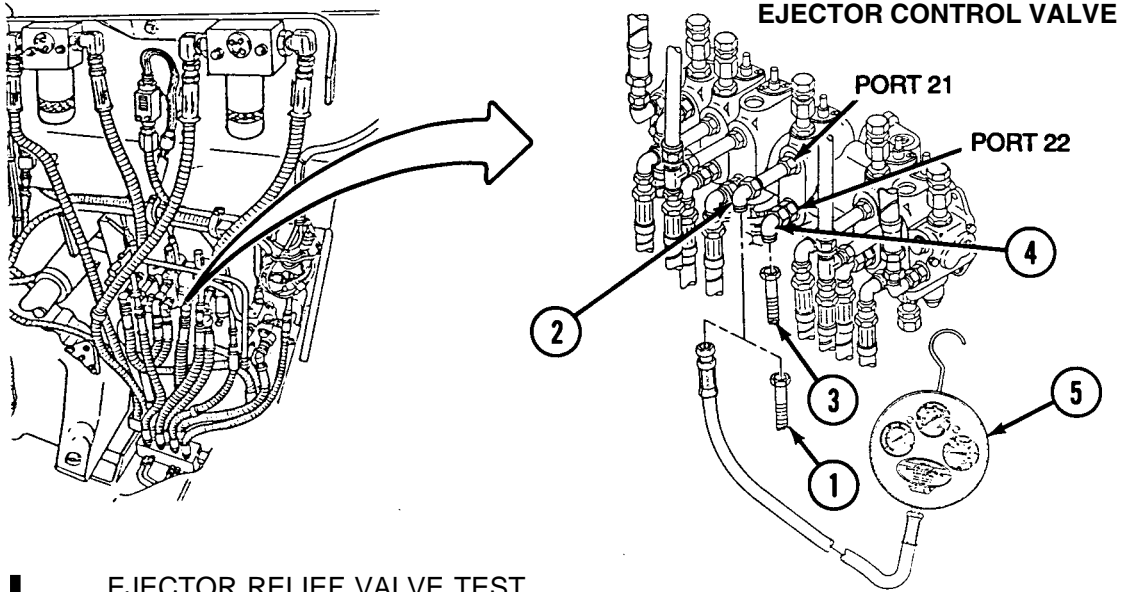
Connecting into the main accumulator is designed to maintain a steady supply of oil to the ejector cylinder while performing the leakage test.

- Disconnect accumulator RELIEF VLV-9 TEE hose (1) from suspension relief valve tee (2), and cap tee (2).
- Disconnect CONT VLV-21 hose (3) from elbow (4) on port 21 of ejector control valve, and plug hose (3). Connect RELIEF VLV-9 TEE hose (1), tee (5), and pressure measuring device (6) to elbow (4).
- Start engine and hold EJECTOR CONTROL lever in the FORWARD position until pressure measuring device (6) indicates 1,950-2,050 psi (13,445-14,135 kPa). Release EJECTOR CONTROL lever to the NEUTRAL position, allow hydraulic pressure to stabilize for thirty seconds, then time-pressure loss for one minute. If pressure loss is greater than 100 psi (690 kPa) per minute, oil is leaking excessively past the control valve spool. Stop engine and relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

5 EJECTOR CREEPS (CONTINUED)





EJECTOR RELIEF VALVE TEST

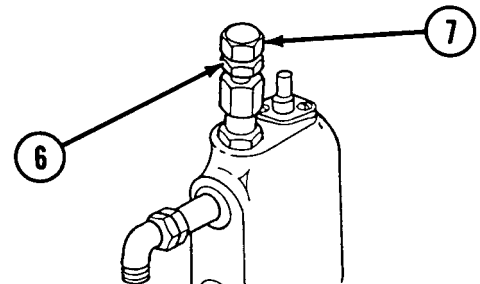
WARNING

Before performing any hydraulic troubleshooting in bowl, move the ejector forward and disable it by disconnecting the ejector cylinder from the hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Move ejector halfway forward, stop engine, and relieve hydraulic pressure.
- Disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) on port 21 of ejector control valve and CONT VLV-22 hose (3) from elbow (4) on port 22. Cap and plug hoses and fittings.
- Connect pressure measuring device (5) to elbow (2) on port 21 of ejector control valve.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read pressure measuring device (5).
- Stop engine; relieve hydraulic pressure.

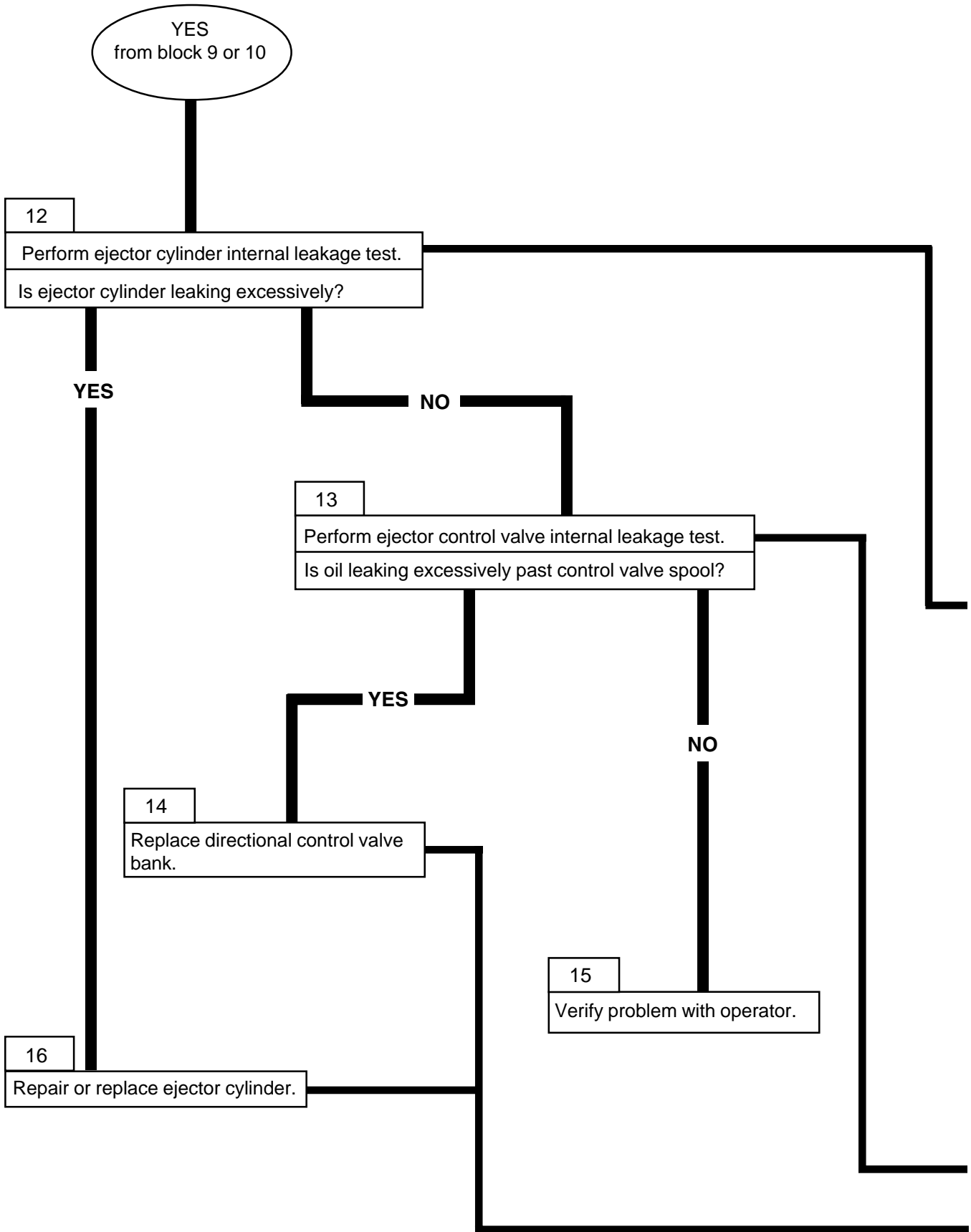


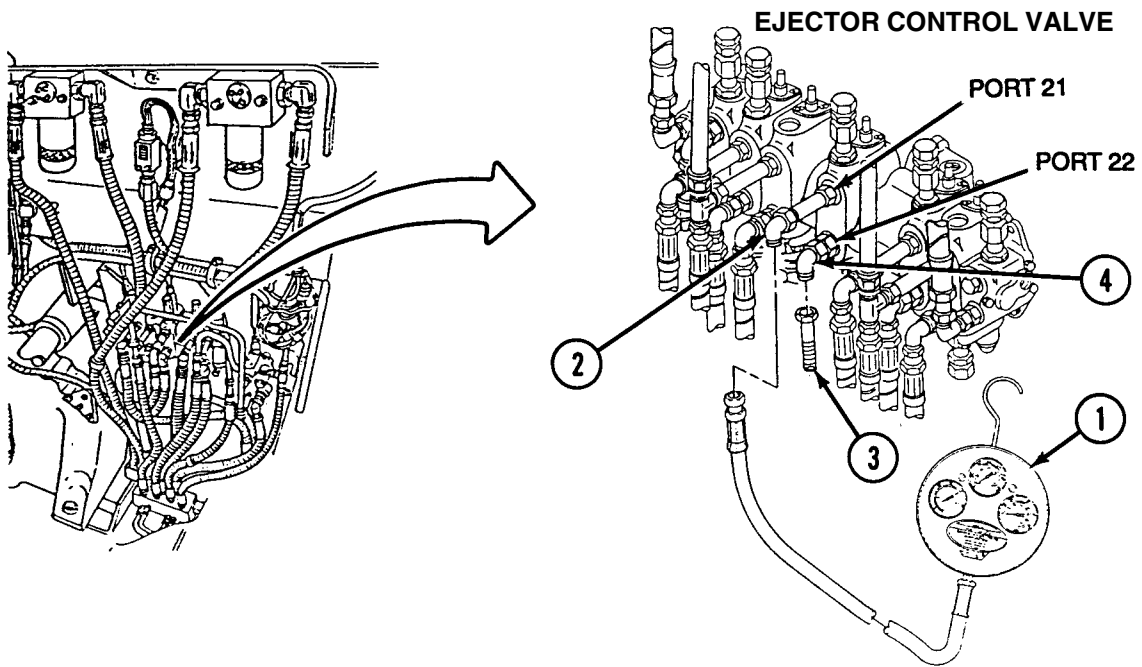
EJECTOR RELIEF VALVE ADJUSTMENT

- Start engine.
- Loosen jamnut (6) on ejector relief valve and turn adjusting screw (7) clockwise or counterclockwise until pressure is within limits. Tighten jamnut (6).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

5 **EJECTOR CREEPS (CONTINUED)**





EJECTOR CYLINDER INTERNAL LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Remove pressure measuring device (1) from elbow (2) on port 21 ejector control valve. Cap port 21 and connect CONT-VLV-22 hose (3) to elbow (4) on port 22.
- Start engine and have assistant hold EJECTOR CONTROL lever in the BACK position for one minute. Mark position of ejector at side of hull and continue to hold lever in the BACK position for one more minute. Check position of ejector while still holding lever in the BACK position. If ejector has moved more than 0.5 in. (13 mm), the ejector cylinder is leaking excessively.
- Stop engine and relieve hydraulic pressure. Remove all test equipment and connect hose.



Follow ejector control valve leakage test from block 4.



Refer to TM 5-2320-262-20-2.

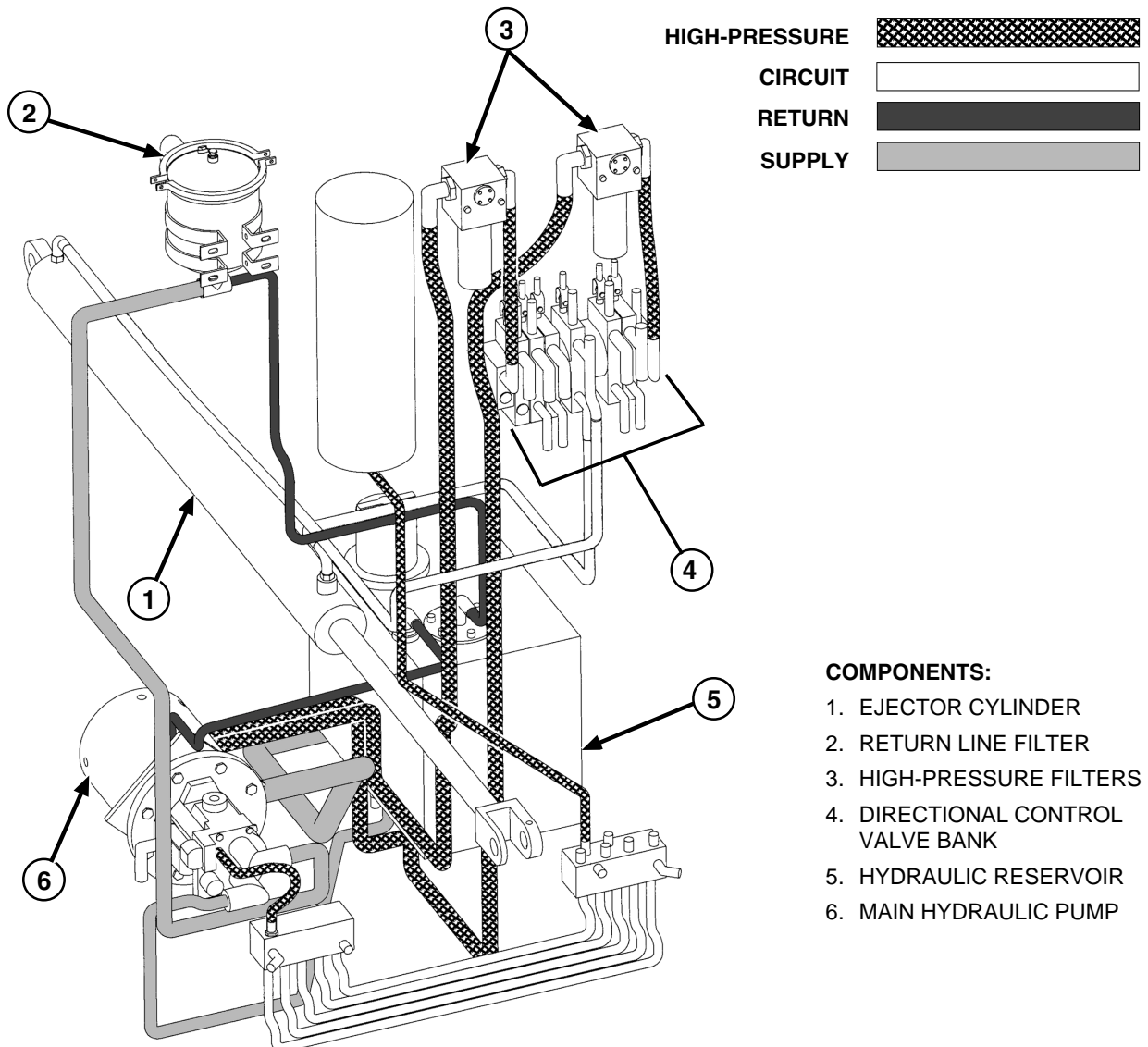
6

EJECTOR DOES NOT EXTEND OR RETRACT

Ejector circuit oil is supplied by main pump outputs 13L and 13R. Oil enters main control valve through inlet ports 13L and 13R and combines at the ejector control valve section. When ejector control valve is shifted to the BACK position, oil is supplied from port 22 and fed to rod end of ejector cylinder, which causes cylinder rod to retract, pulling ejector back in bowl. When ejector control valve is shifted to FORWARD positioning, oil is supplied from port 21 and fed to the ejector head end, causing cylinder rod to extend, pushing ejector forward in bowl. Pressure in ejector circuit is limited by main relief valves 13L and 13R to 3,950-4,050 psi (27,235-27,925 kPa) and circuit relieve valve 21, which limits pressure to extend the ejector cylinder.

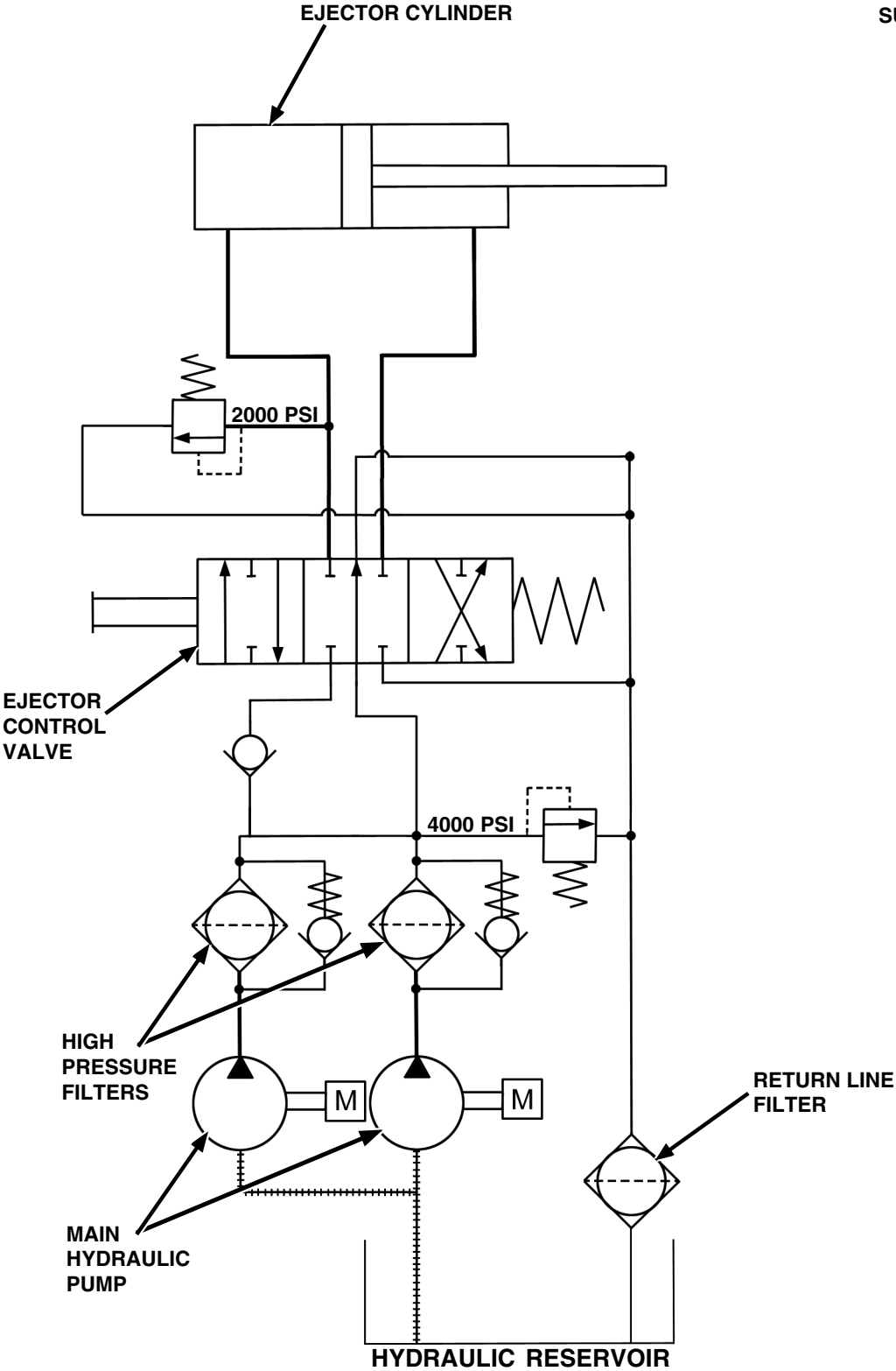
WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury to personnel.



EJECTOR HYDRAULIC CIRCUIT

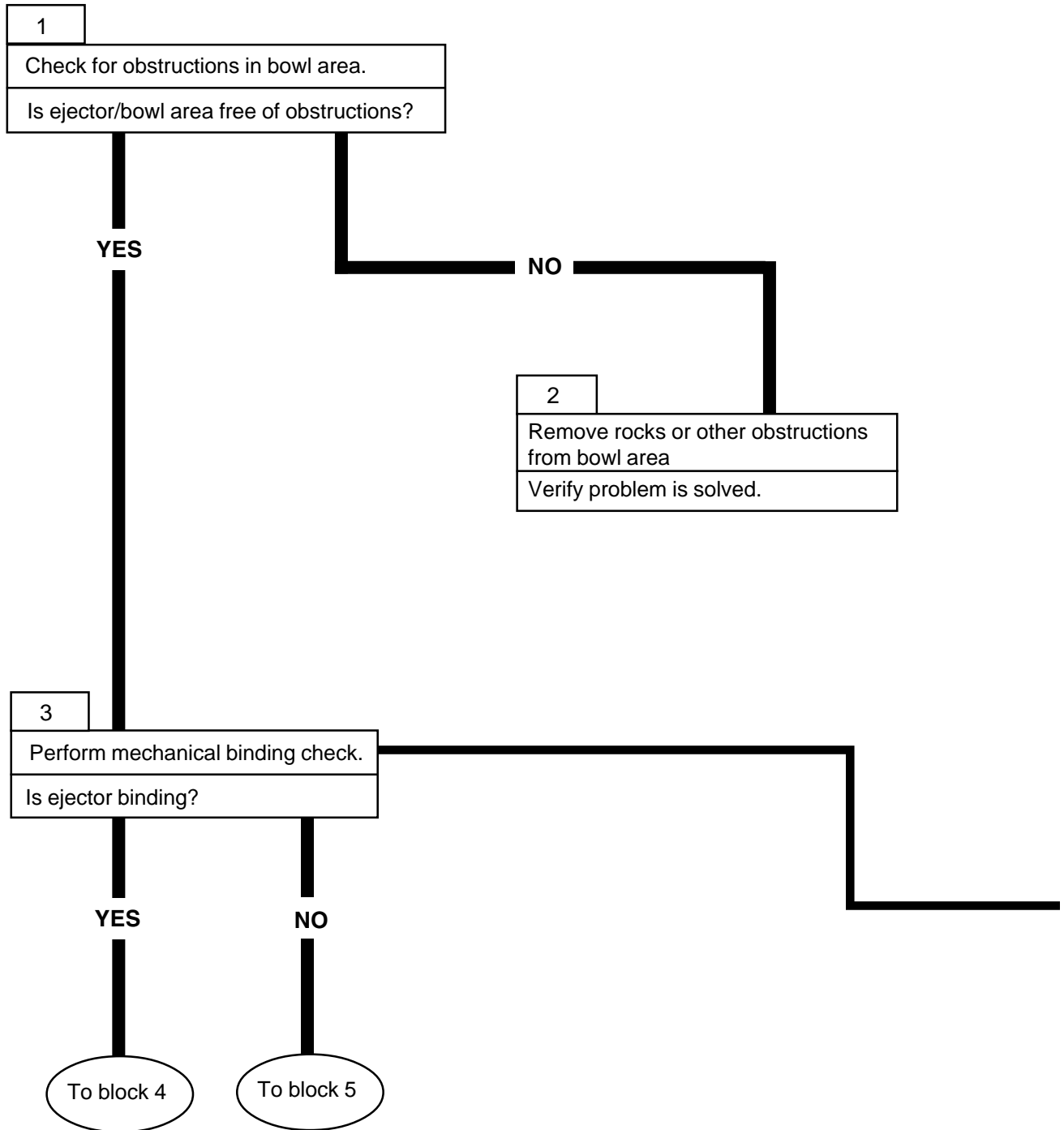
HIGH-PRESSURE —————
CIRCUIT —————
SUPPLY +-----+

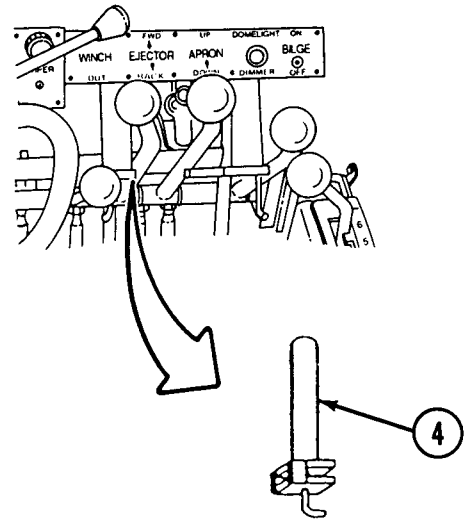
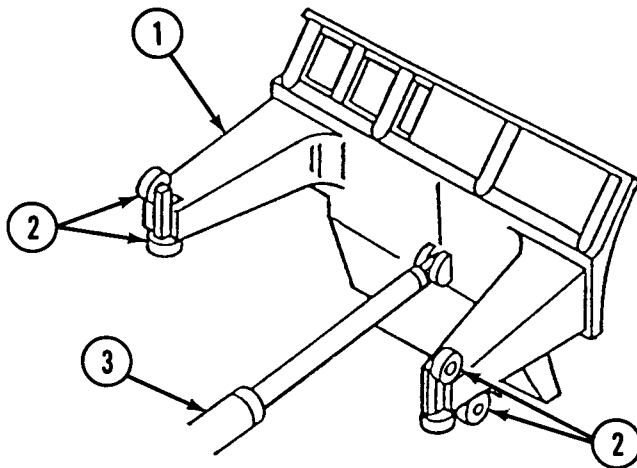


EJECTOR HYDRAULIC SCHEMATIC

6

EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





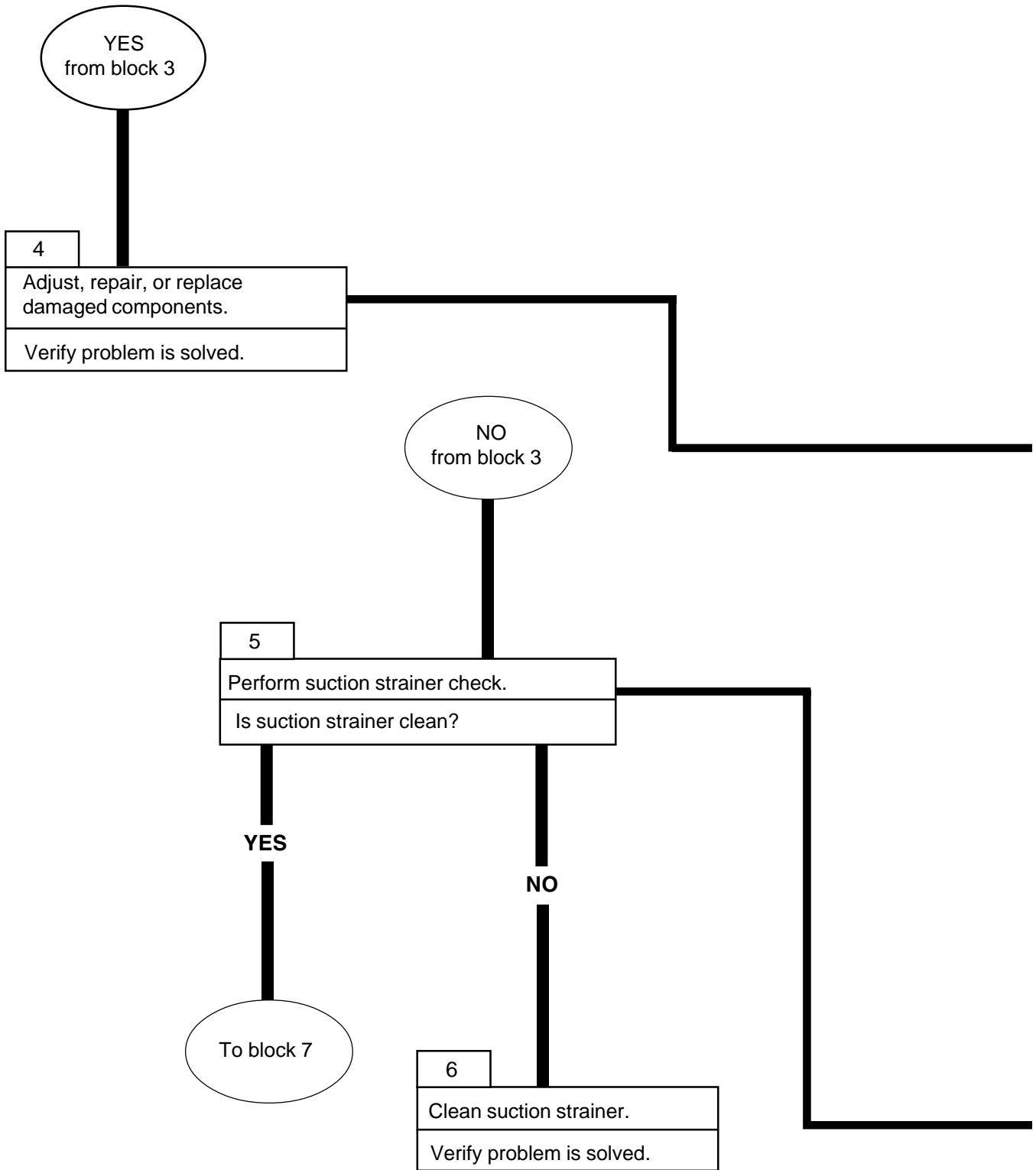
WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

MECHANICAL BINDING CHECK

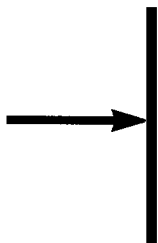
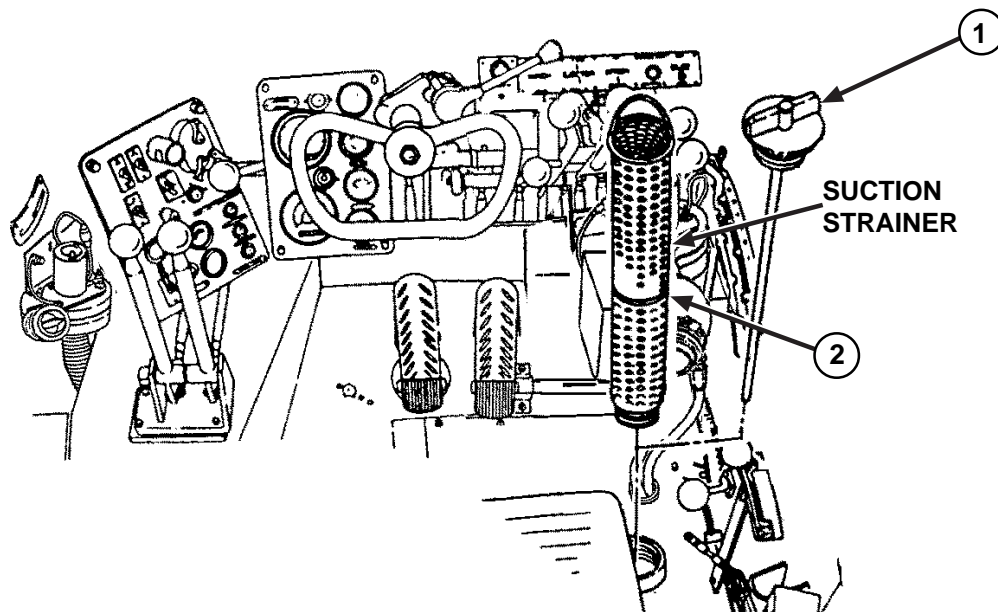
- Start engine, operate ejector (1), and check for mechanical binding. Check ejector (1), rollers (2), and ejector hydraulic cylinder (3) for damage or jamming. Check that ejector lock (4) is not restricting movement of control lever.
- Stop engine; relieve hydraulic pressure.

6 **EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)**





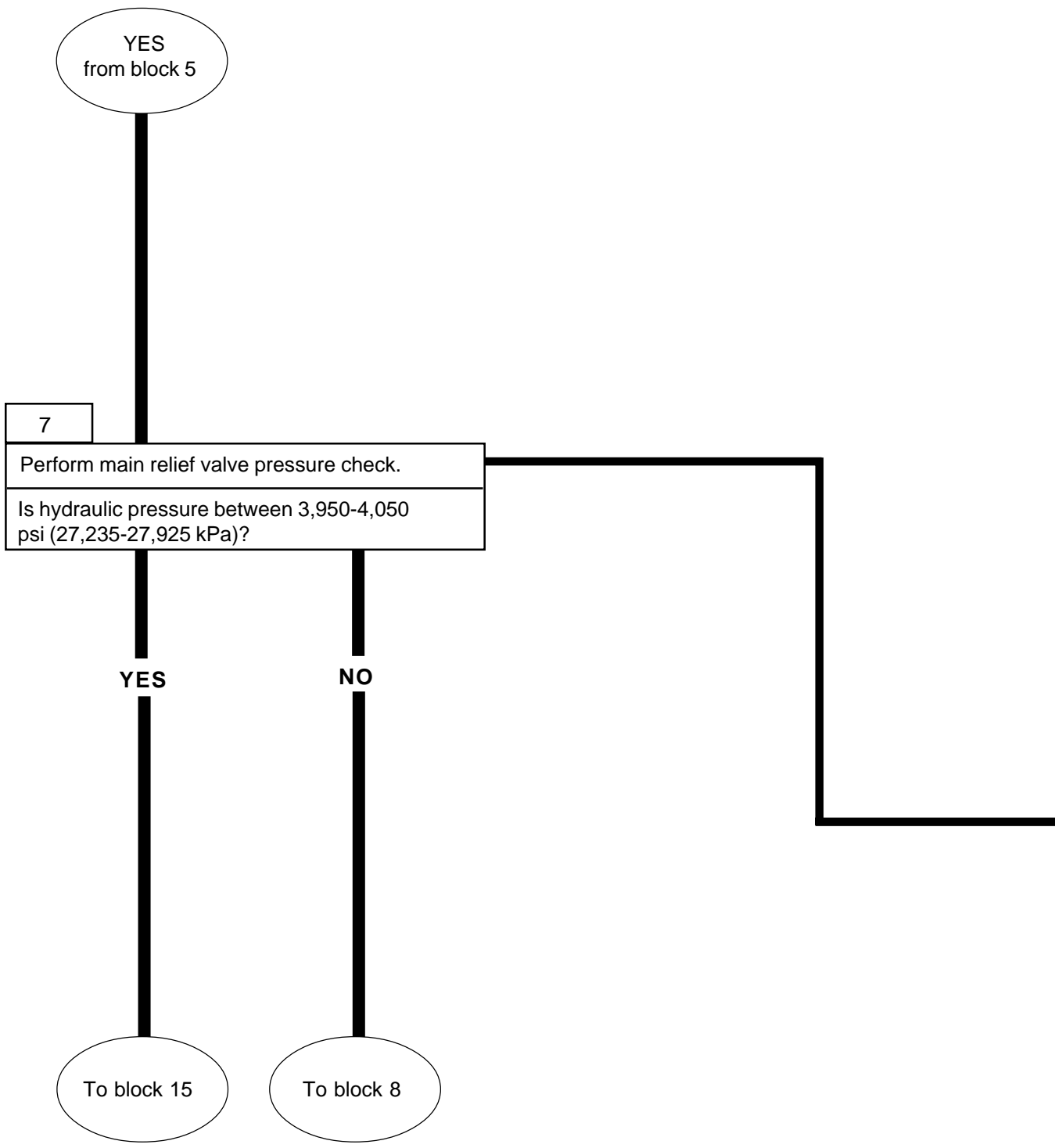
Refer to TM 5-2350-262-20-1

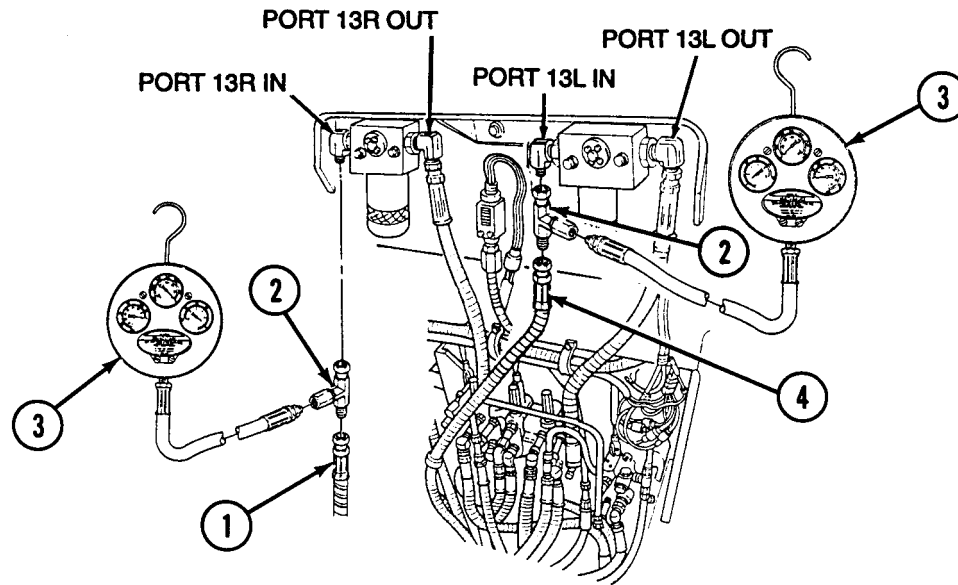


SUCTION STRAINER CHECK

- Slowly loosen hydraulic tank dipstick (1) to release pressure and remove dipstick.
- Remove suction strainer (2) and inspect for clogged ports or obstructions.
- If dirt, obstructions, or debris is found, clear and clean suction strainer (2).
- Replace suction strainer (2) and dipstick (1).

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





MAIN RELIEF VALVE PRESSURE CHECK

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

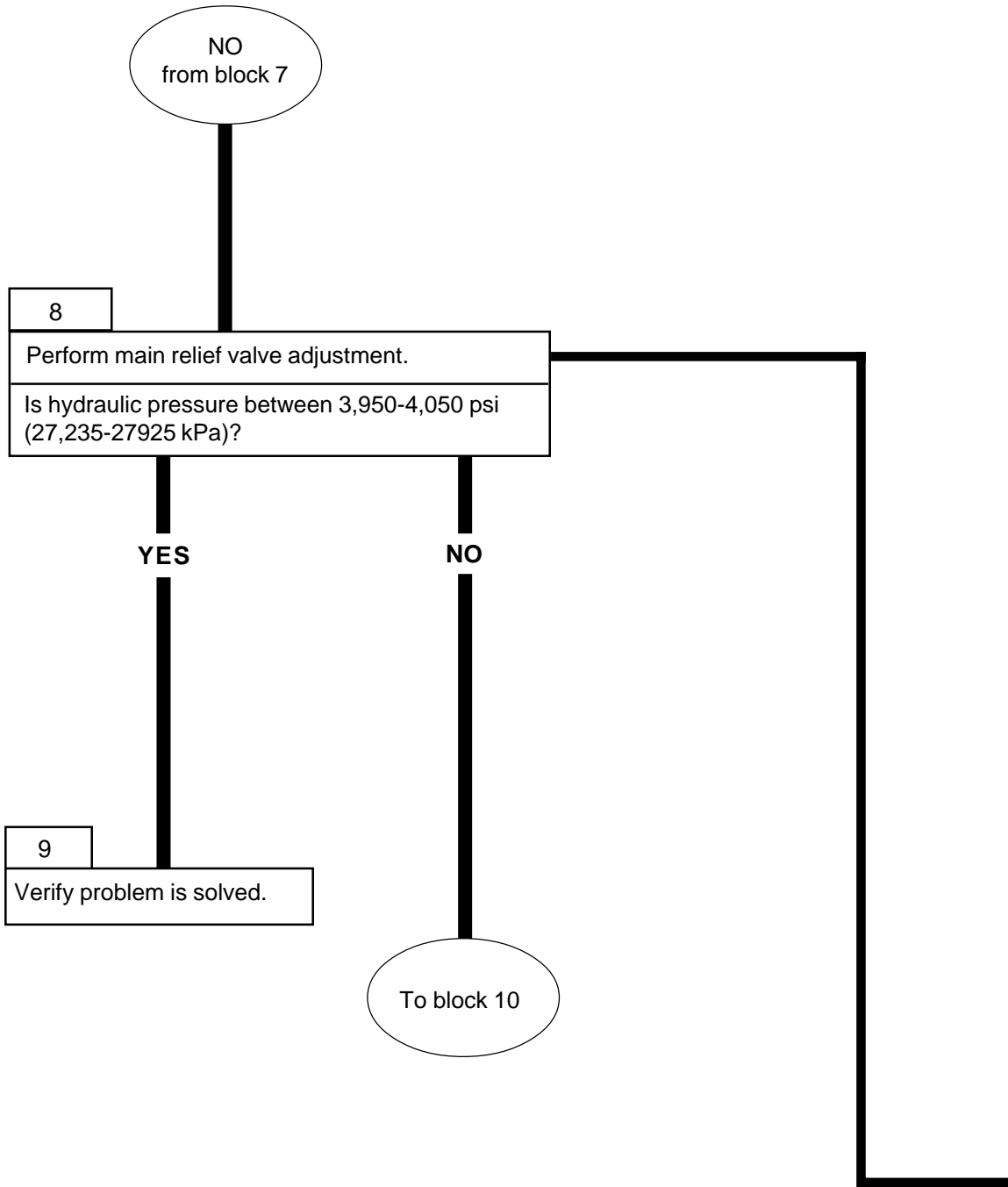
STEP 1

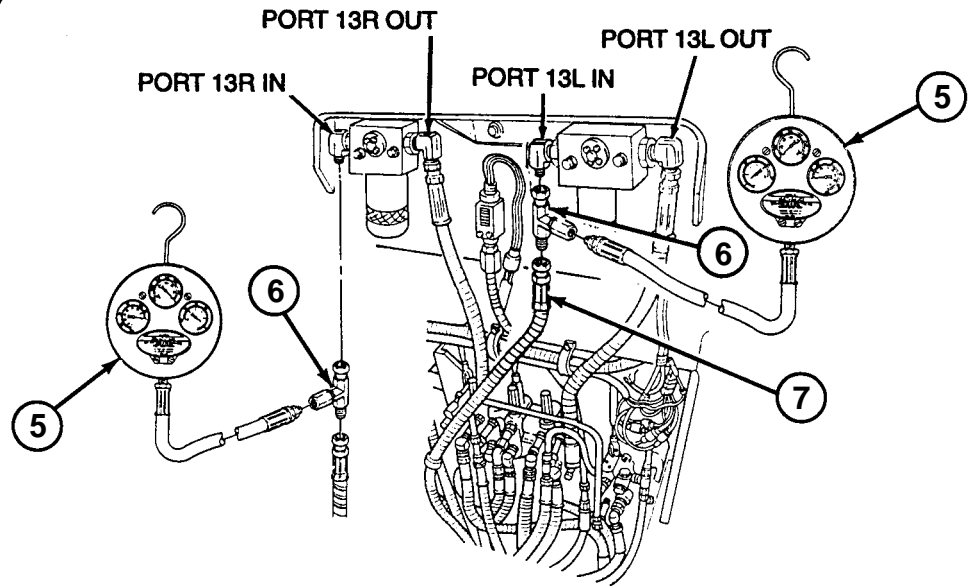
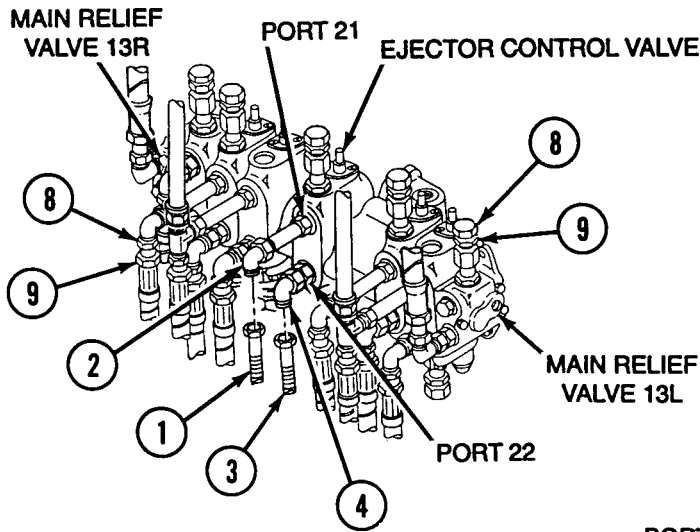
- To test 13R circuit, disconnect HYDR FLTR-IN-13R hose (1) from 13R high-pressure filter inlet port.
- Connect tee (2) between 13R high-pressure filter inlet port and HYDR FLTR-IN-13R hose (1). Connect pressure measuring device (3) to tee (2).
- Start vehicle engine and read pressure measuring device (3).
- With SPRUNG/UNSPRUNG control valve in SPRUNG mode, actuate left suspension control valve to RAISE position. Read pressure measuring device (3).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

STEP 2

- To test 13L circuit, disconnect HYDR FLTR-IN-13L hose (4) from 13L high-pressure filter inlet port. Connect tee (2) and pressure measuring device (3) between 13L hose (4) and HYDR FLTR-IN-13L high-pressure filter inlet port.
- Using right suspension control valve, repeat the above test.
- Stop engine; relieve hydraulic pressure.

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





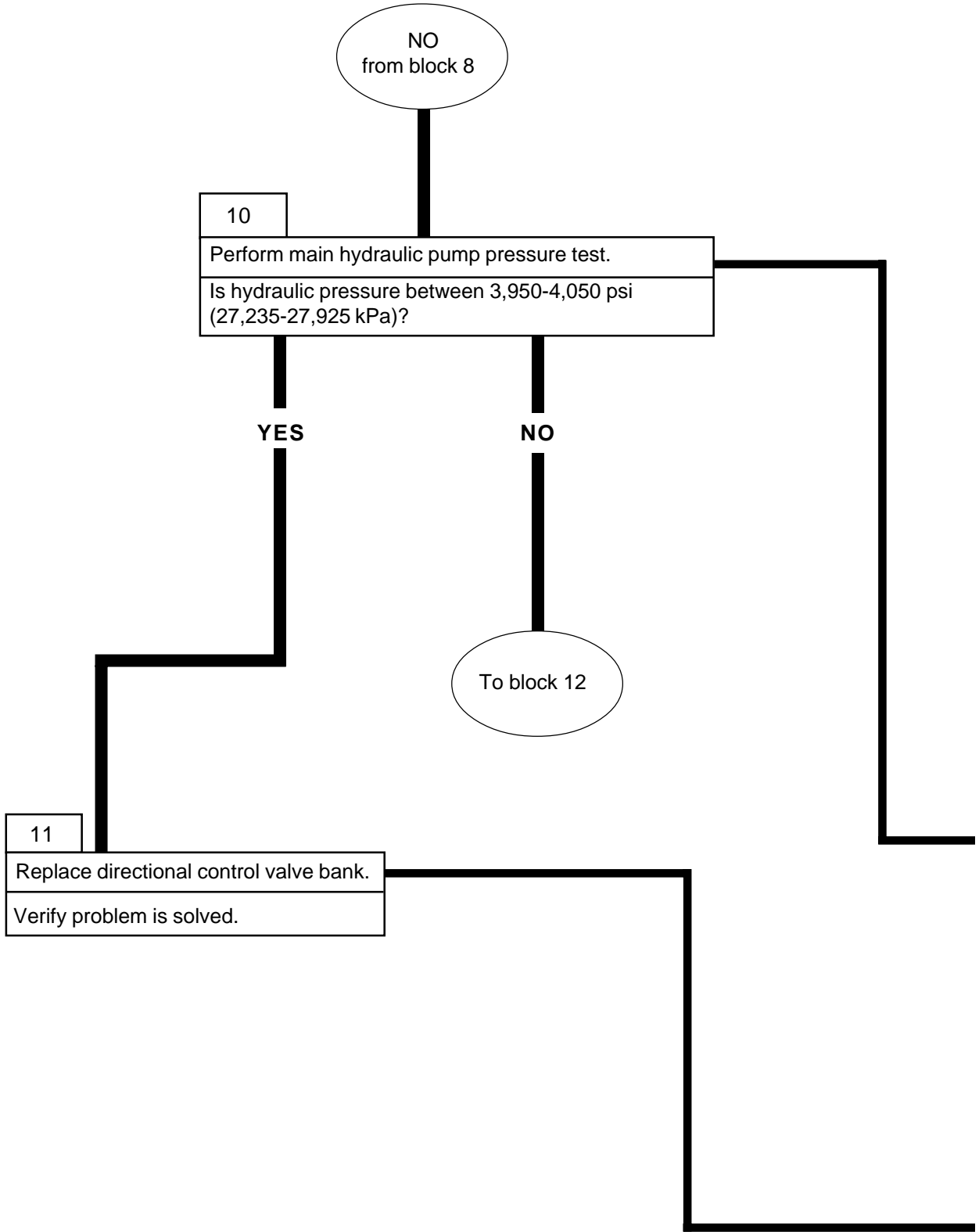
MAIN RELIEF VALVE ADJUSTMENT

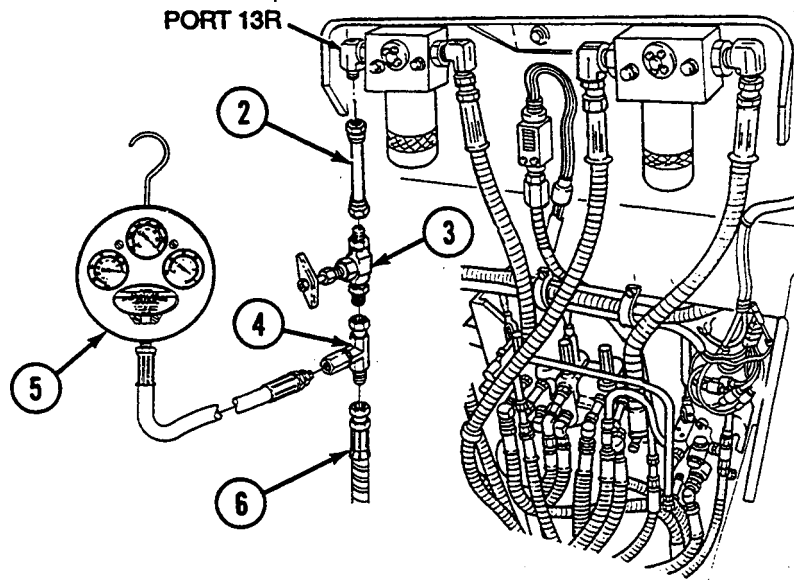
NOTE

Have suitable container ready to catch oil.

- Disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings.
- With pressure measuring device (5) and tee (6) still connected to HYDR-FLTR-IN 13L hose (7) and high-pressure filter inlet port 13L and SPRUNG/UNSPRUNG lever in SPRUNG, have assistant start engine and move left-hand SUSPENSION CONTROL lever to RAISE, while at the same time, holding EJECTOR CONTROL lever in BACK. Read pressure measuring device (5). Adjust the main relief valve 13L by loosening jamnut (8) and rotating adjustment screw (9) clockwise to increase pressure; counterclockwise to decrease pressure. When hydraulic pressure is within limits, tighten jamnut (8).
- Stop engine; relieve hydraulic pressure.
- Move test equipment to high-pressure filter inlet port 13R and repeat the previous steps using the right-hand suspension control lever.
- Stop engine; relieve hydraulic pressure.

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





MAIN HYDRAULIC PUMP PRESSURE TEST

WARNING

Before performing any troubleshooting in bowl, move ejector forward and disable it from hydraulic system. Failure to comply may result in severe injury or death to personnel.

Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in damage to equipment and injury to personnel.

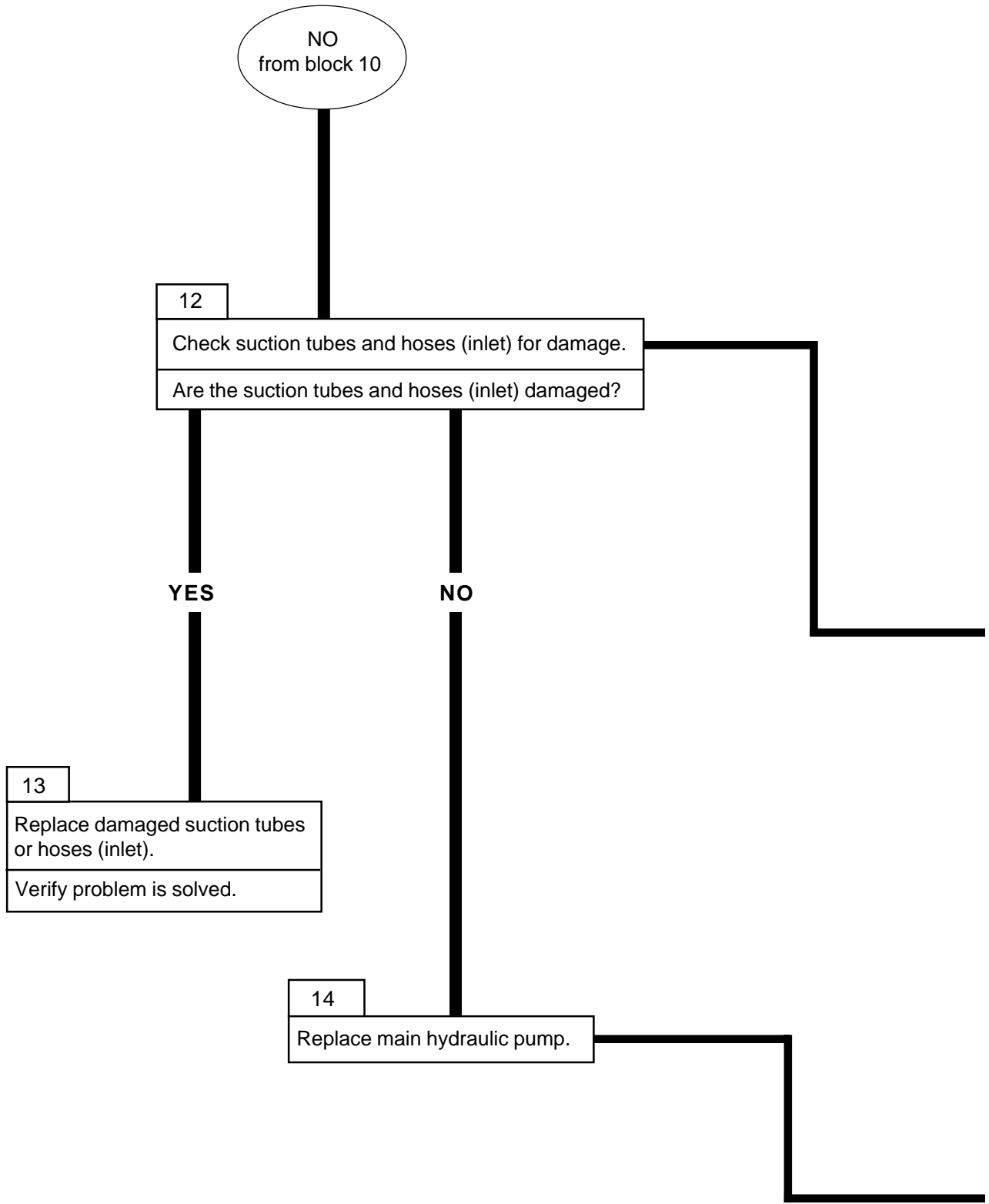
NOTE

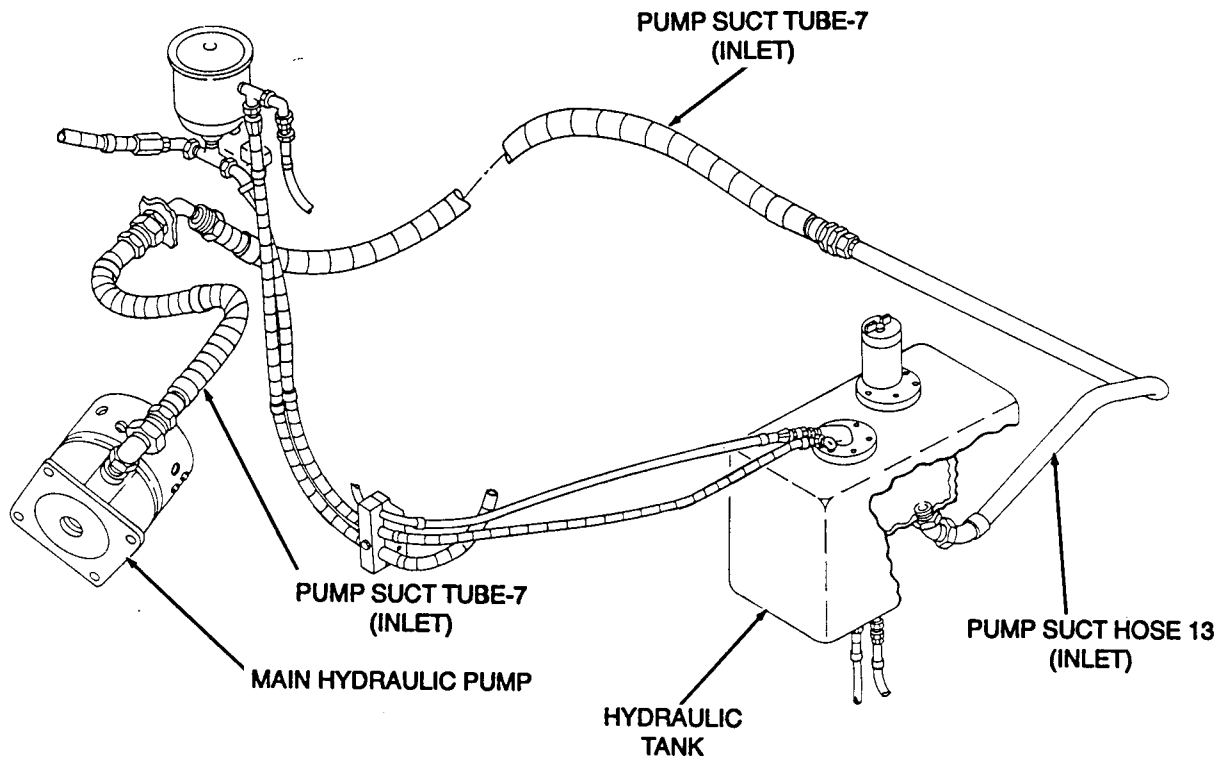
Have suitable container ready to catch oil.

- Disconnect tee (4) from 13R high pressure filter inlet port, install coupling tube (2), globe valve (3), tee (4), and pressure measuring device (5) between HYDR FLTR-IN-13R hose (6) and high-pressure filter inlet port 13R.
- Have assistant start engine and allow to idle. Slowly close globe valve (3) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (3). Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

Refer to TM5-2350-262-20-2

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)

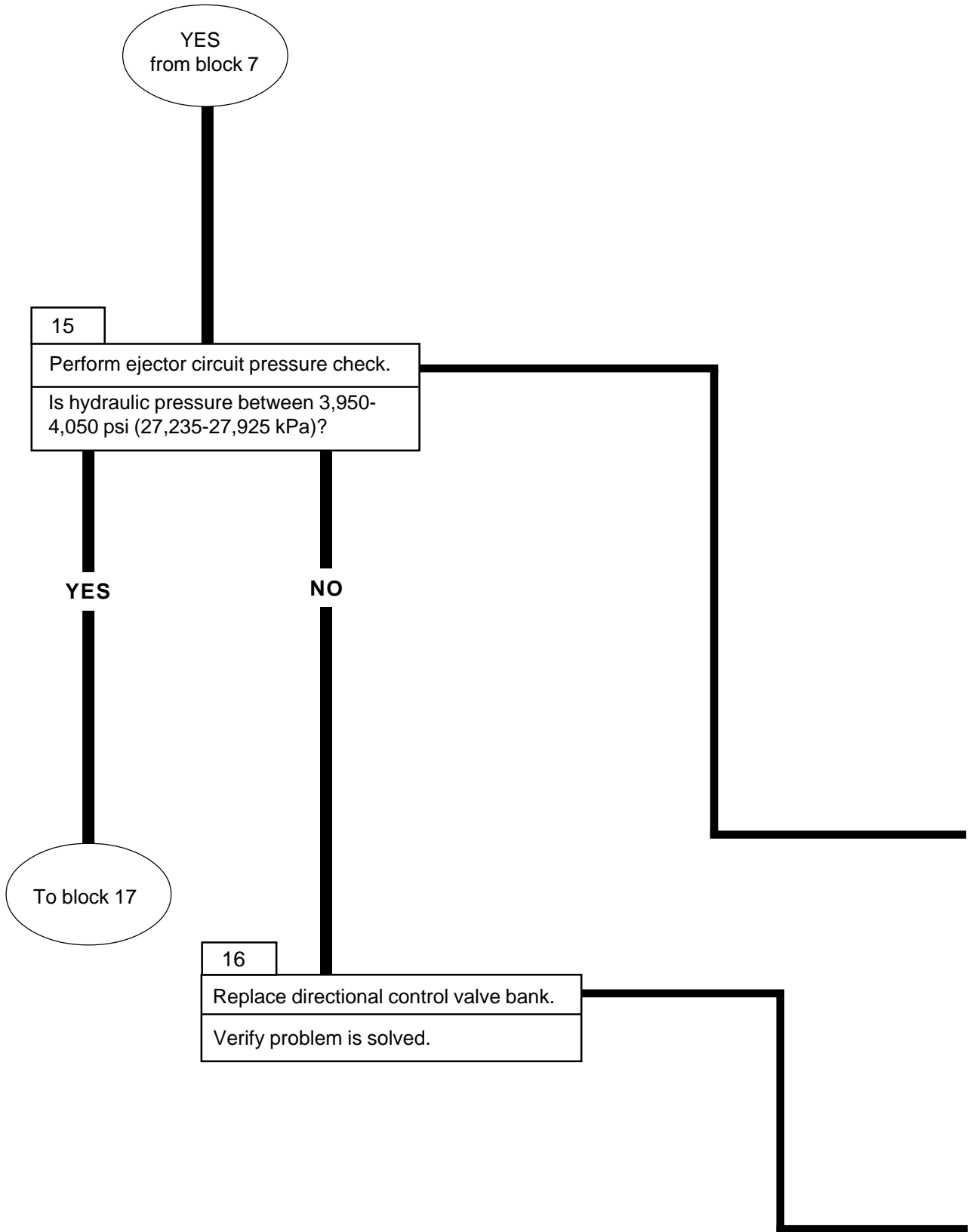


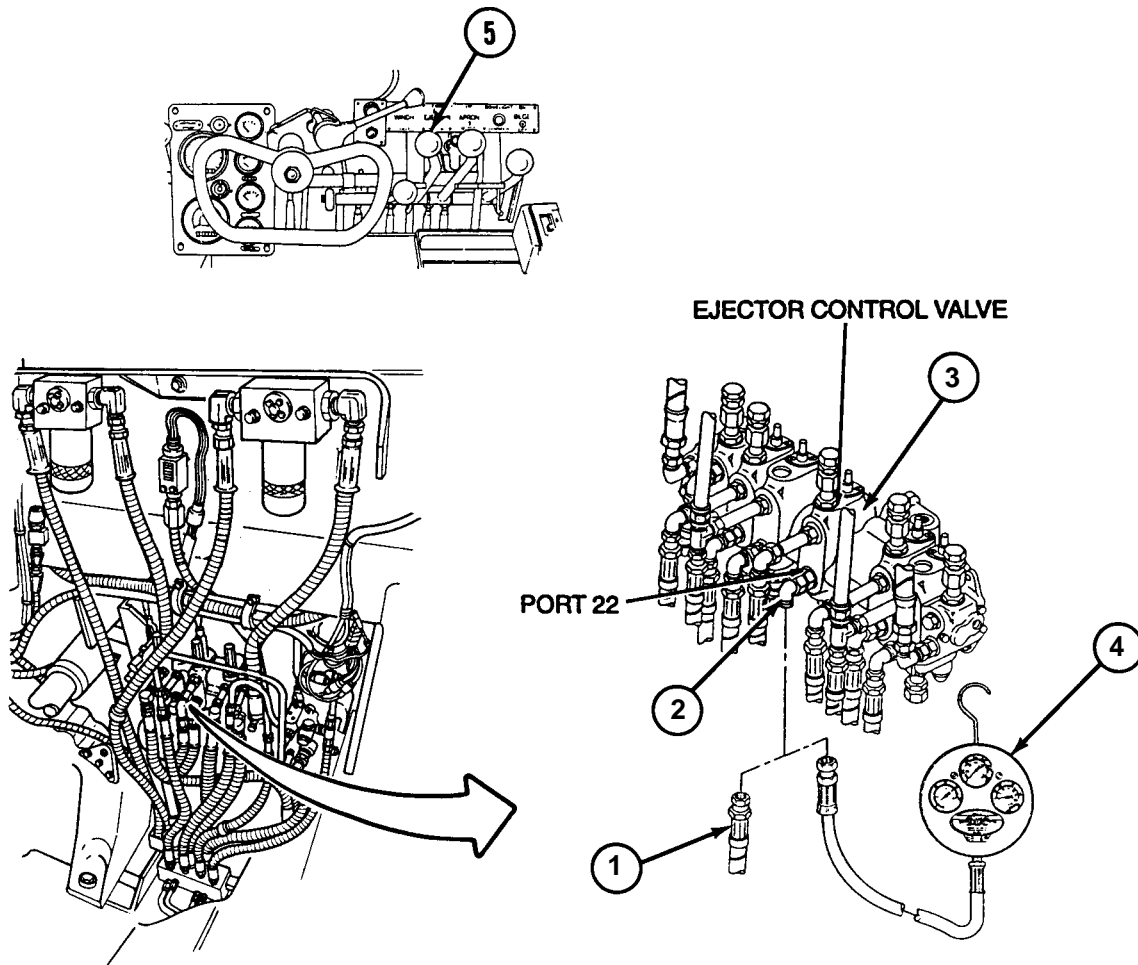


➔ Inspect suction tubes and hoses (inlet).

➔ Notify Direct Support maintenance.

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





EJECTOR CIRCUIT PRESSURE CHECK

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.

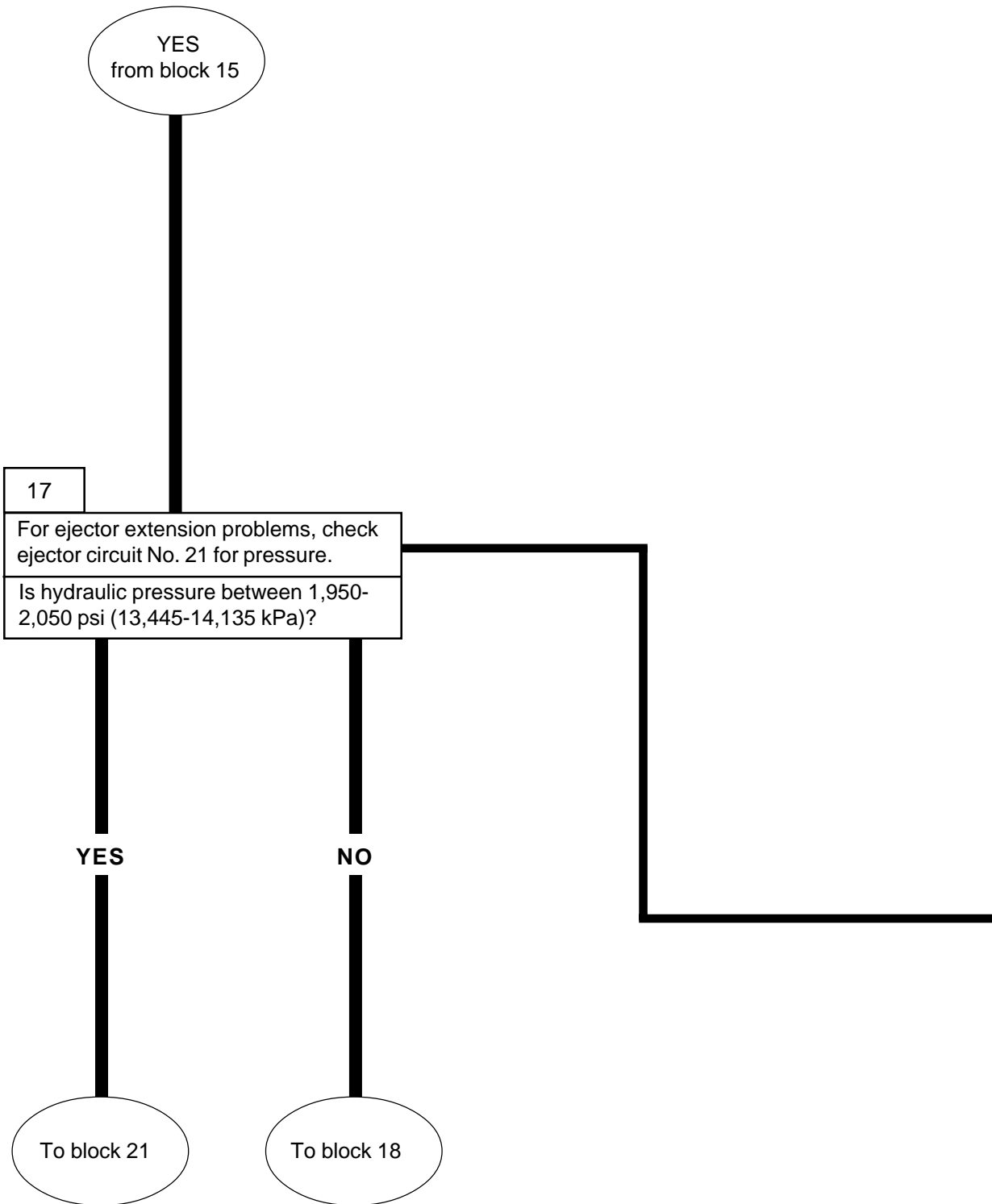
NOTE

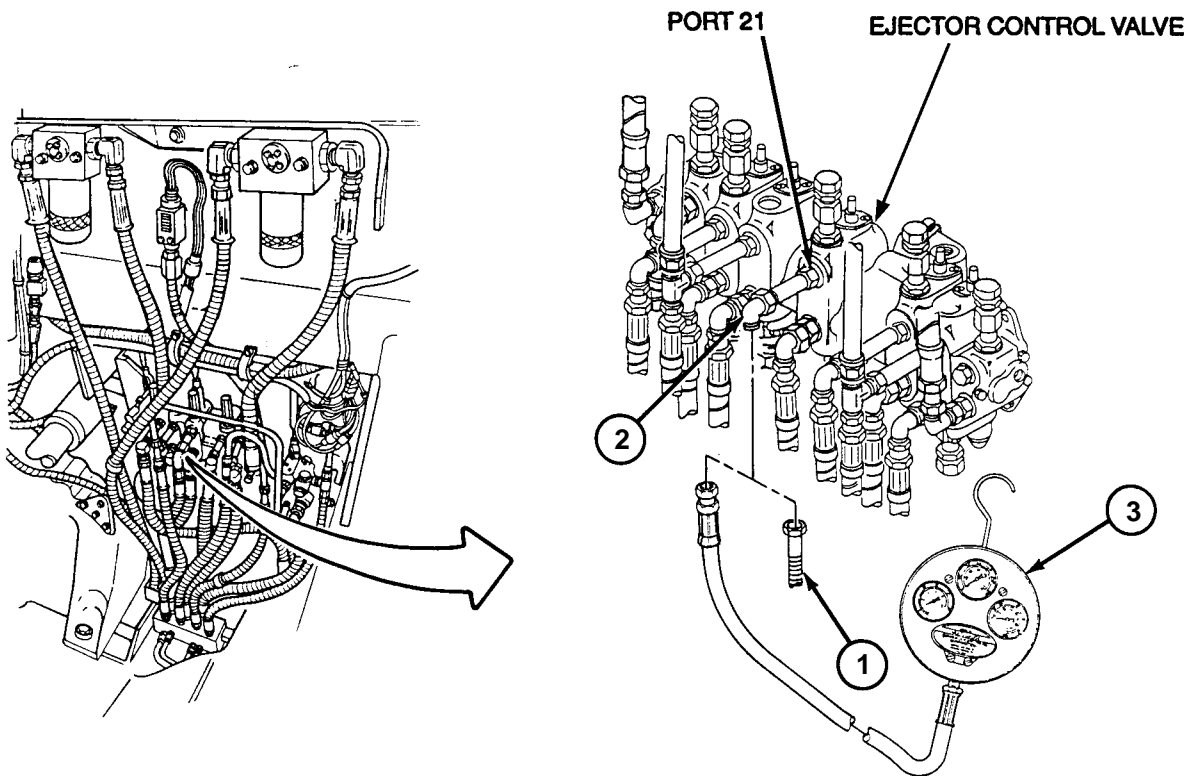
Have suitable container ready to catch oil.

- Remove all test equipment and connect lines.
- Disconnect hose (1) from ejector control valve port 22 elbow (2) on the ejector control valve (3). Plug hose (1).
- Install pressure measuring device (4) on elbow (2) in port 22.
- Start engine and actuate EJECTOR CONTROL lever (5) to BACK position. Read pressure measuring device (4). Pressure should be 3,950-4,050 psi (27,235-27,925kPa).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

Refer to TM5-2350-262-20-2.

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





EJECTOR CIRCUIT PRESSURE CHECK

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

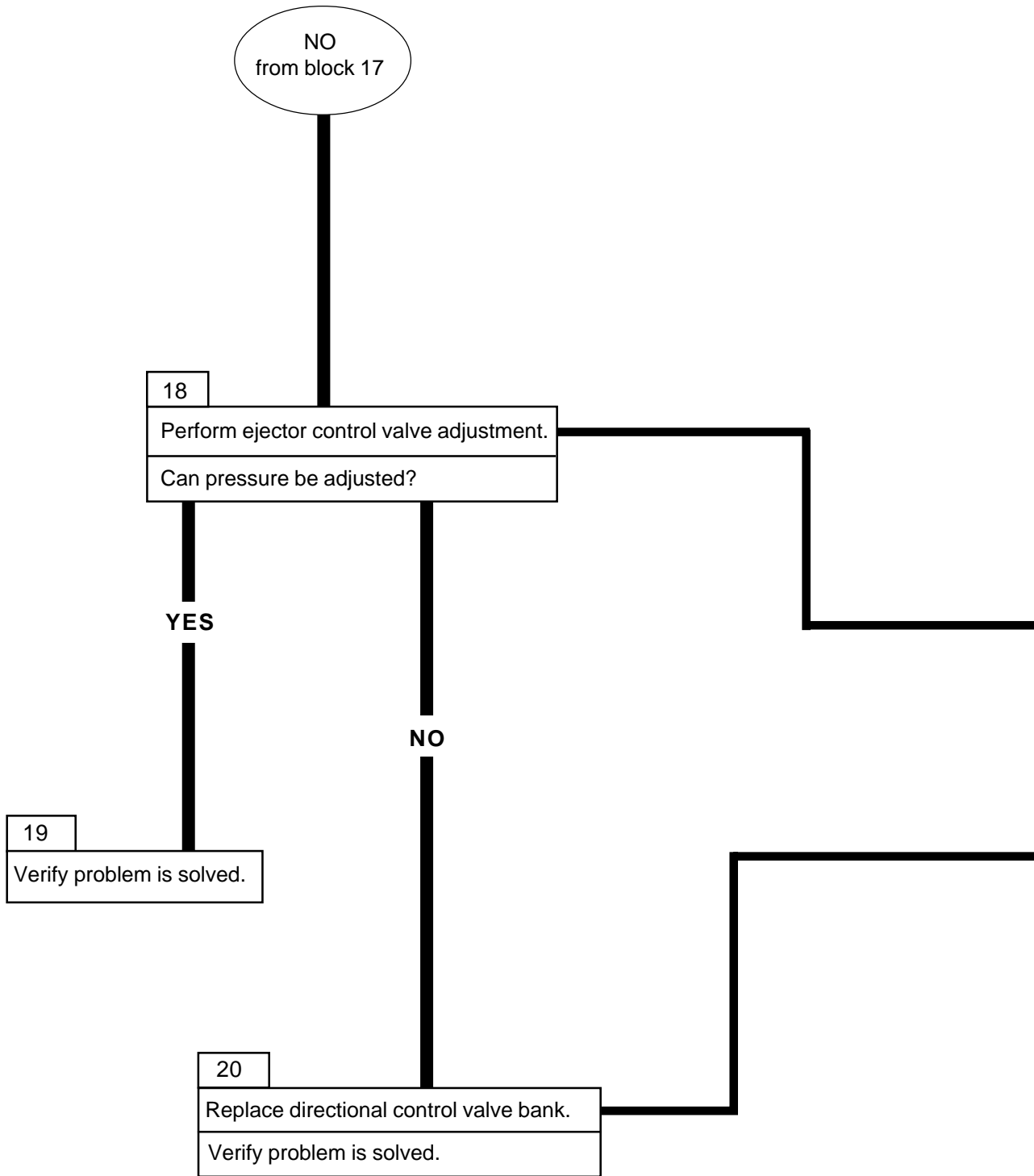
Start engine, move ejector halfway forward, stop engine, and relieve hydraulic pressure.

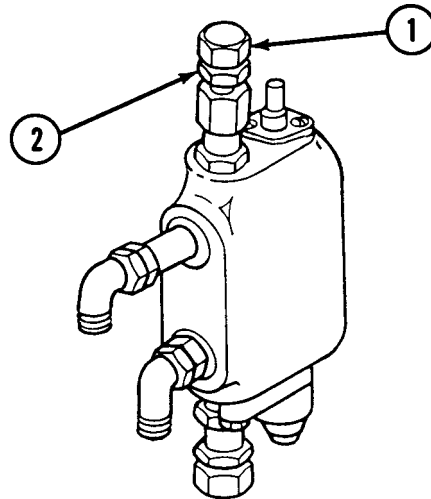
NOTE

Have suitable container ready to catch oil.

- Disconnect line (1) from elbow (2) and cap line.
- Connect pressure measuring device (3) to elbow (2) on port 21 of ejector control valve.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read pressure measuring device (3).

6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)

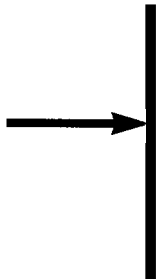




EJECTOR CONTROL VALVE

EJECTOR CONTROL VALVE ADJUSTMENT

- With engine still at idle speed and EJECTOR CONTROL lever in FORWARD position, loosen jamnut (1) on ejector control valve and turn adjusting screw (2) clockwise to increase pressure; counterclockwise to decrease pressure. Pressure should be 1,950-2,050 psi (13,445-14,135 kPa).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

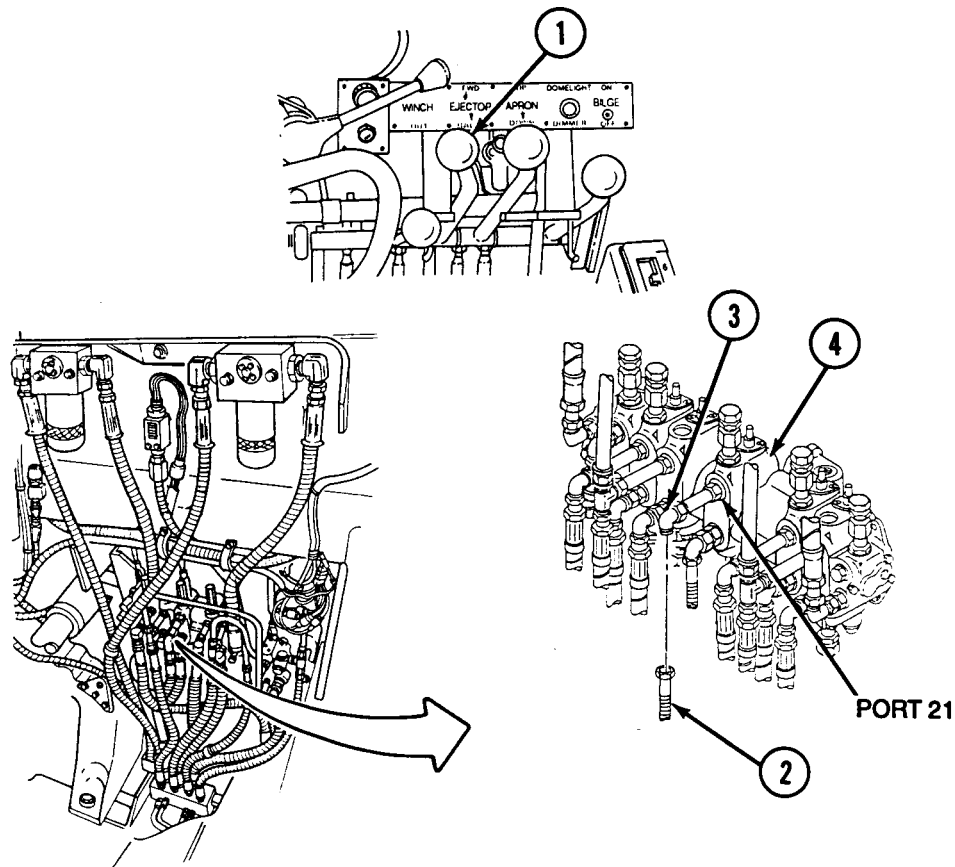


Refer to TM 5-2350-262-20-2.



6 EJECTOR DOES NOT EXTEND OR RETRACT (CONTINUED)





EJECTOR CYLINDER LEAKAGE TEST

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

Do not stand or work in bowl unless ejector lock is engaged. Do not stand in bowl to observe roller guide travel. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil

- Have assistant actuate ejector control handle (1) to move ejector forward 3/4 of full travel.
- Stop engine and relieve hydraulic pressure.
- Remove pressure measuring device. Plug hose (2) and cap elbow (3).
- Start engine and have assistant hold ejector control lever in BACK position for one minute. Mark position of ejector at side of hull and continue to hold valve lever in BACK position for one more minute. Check position of ejector while still holding valve lever in BACK position. If ejector has moved more than 0.5 in. (13mm), the ejector cylinder is leaking excessively.
- Stop engine; relieve hydraulic pressure and connect line.

Refer to TM 5-2350-262-20-1

7

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE

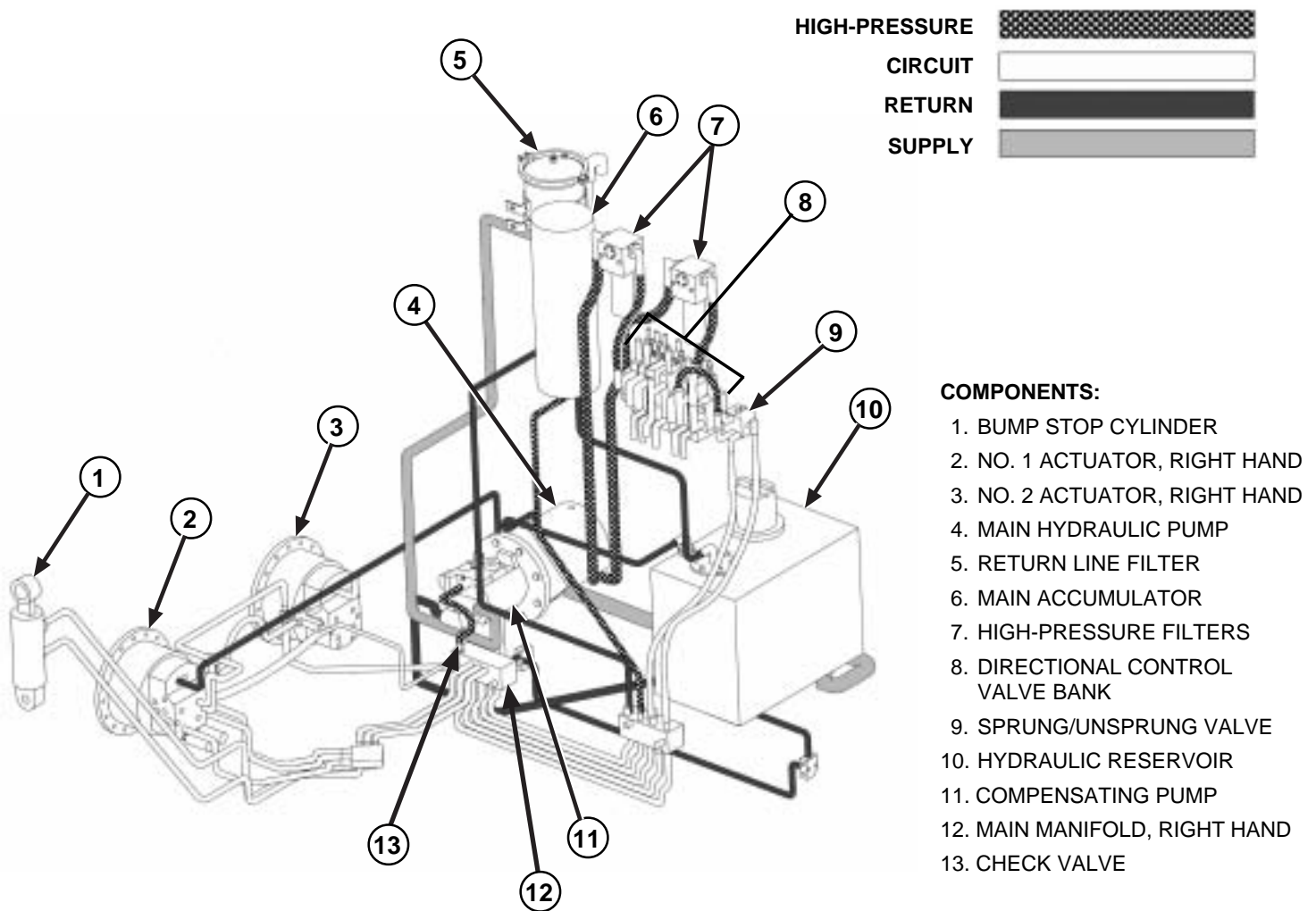
SPRUNG mode provides for a smooth ride up to 30 mph (48km/h) and is used for over the road marches and parking of the vehicle. Hydraulic pressure is supplied to the front actuators through line 9.

WARNING

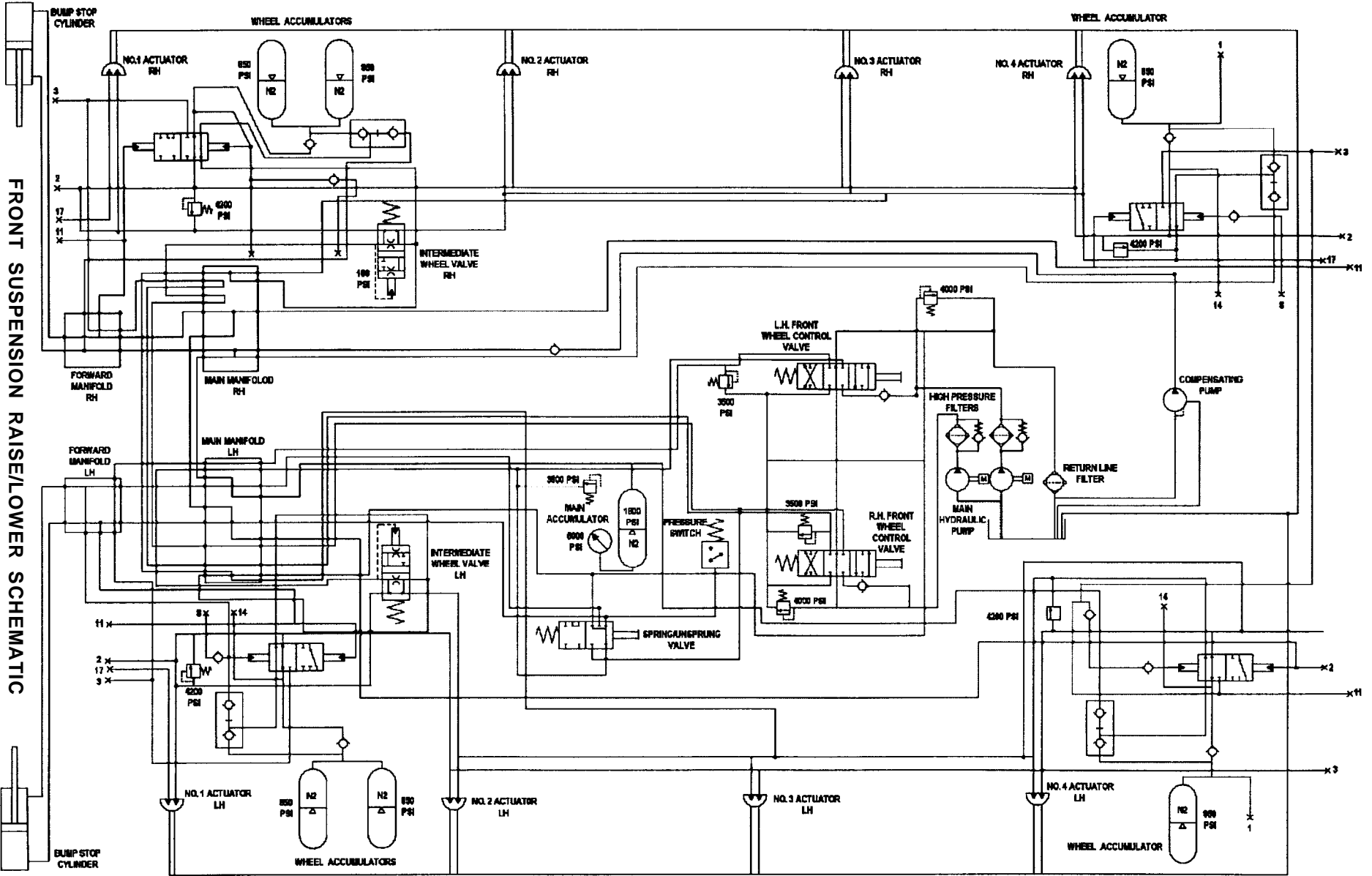
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right front of vehicle.

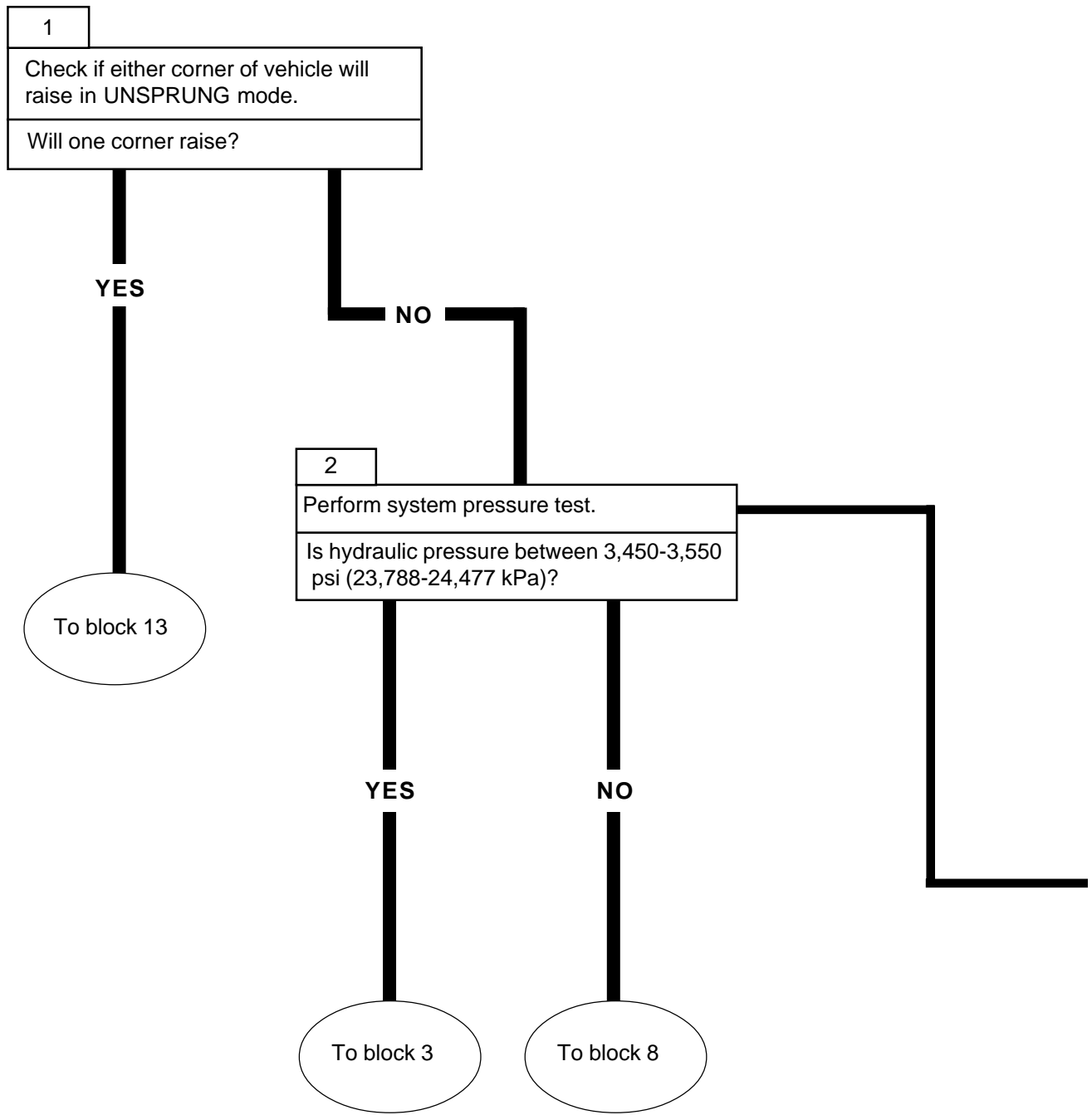


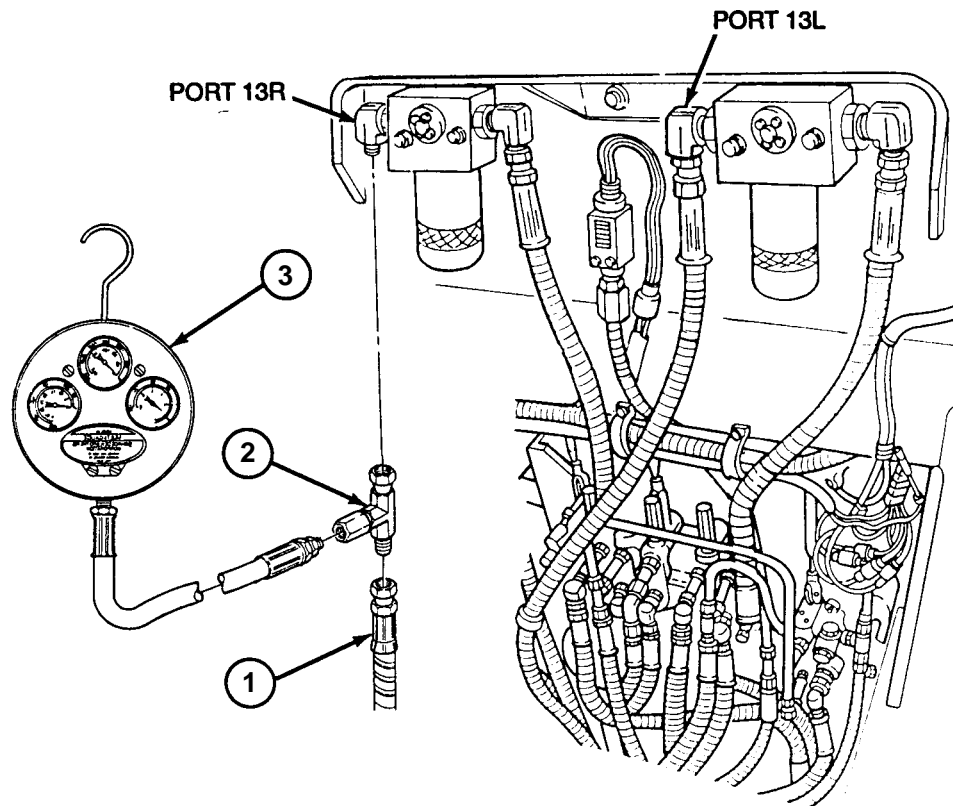
FRONT SUSPENSION RAISE/LOWER CIRCUIT



7

**FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)**





SYSTEM PRESSURE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage ejector lock. Failure to comply may result in severe injury or death to personnel.

NOTE

If right corner will not raise in UNSPRUNG mode, check 13L circuit using the right wheel control.

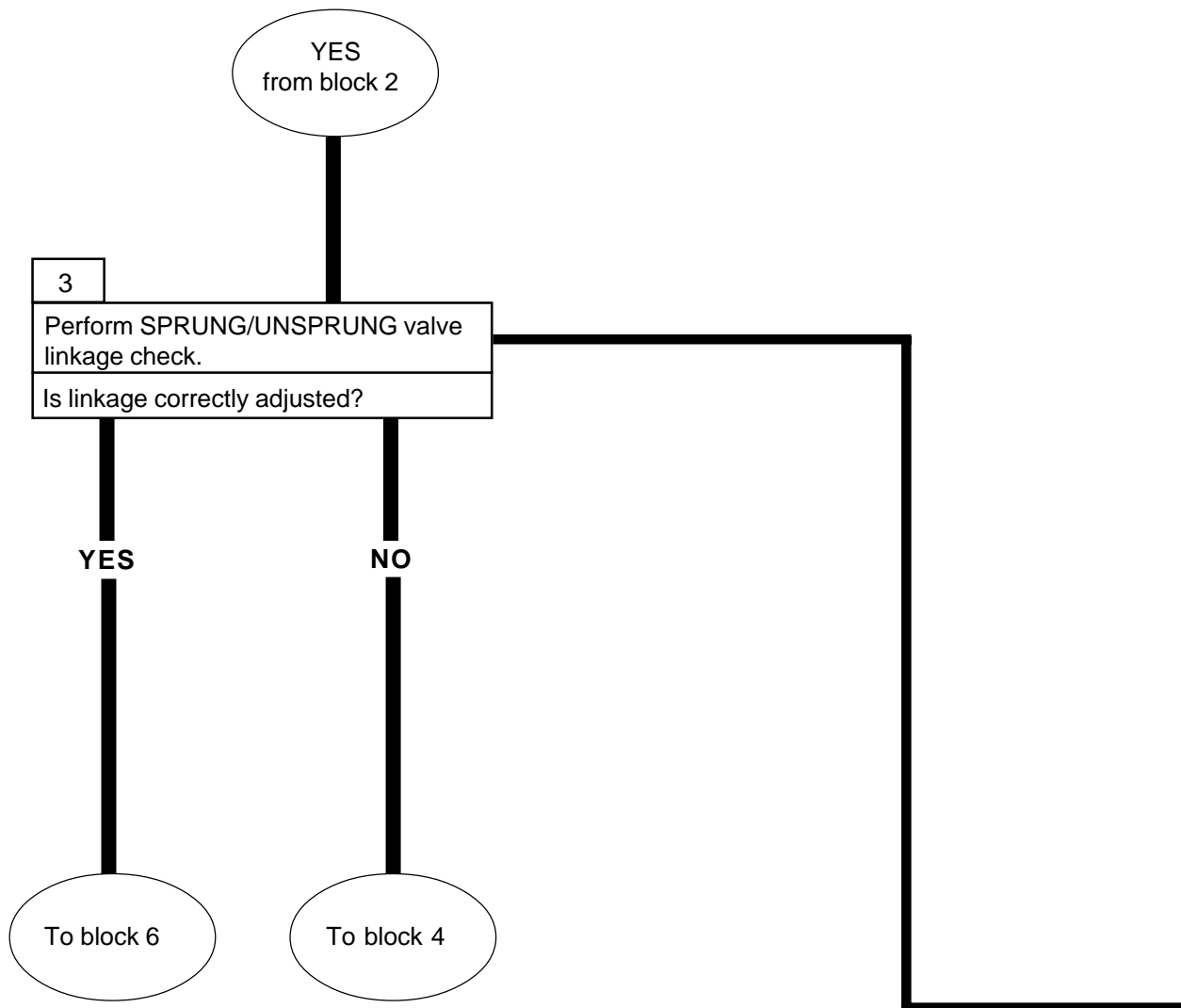
If left corner will not raise in UNSPRUNG mode, check 13R circuit using the left wheel control.

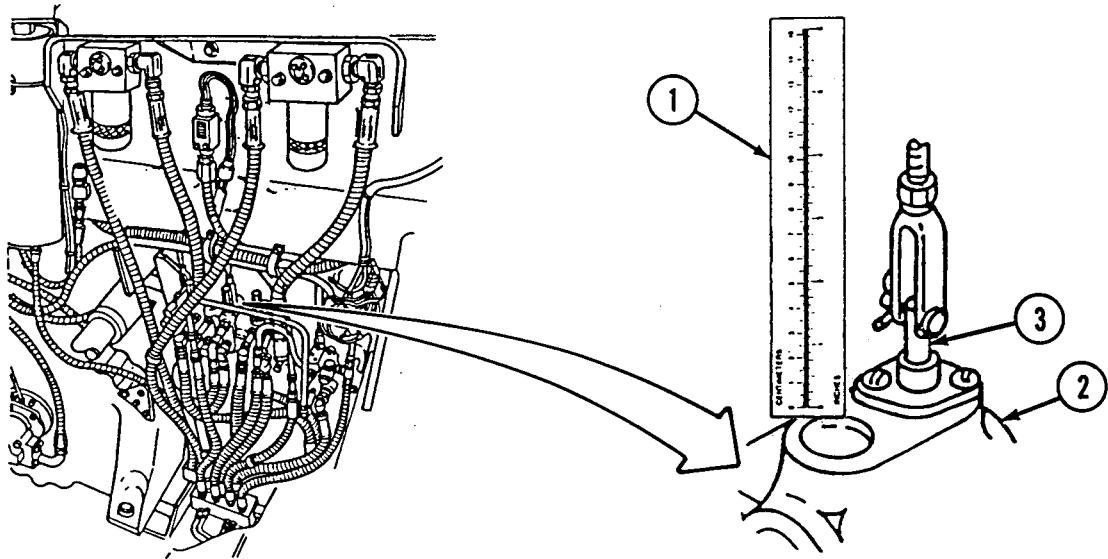
Have suitable container ready to catch oil.

- Start engine, move ejector forward, engage ejector lock, stop engine, and relieve hydraulic pressure.
- Disconnect inlet hose (1) from appropriate high-pressure filter inlet port.
- Connect tee (2) and pressure measuring device (3) between inlet hose (1) and high-pressure filter inlet port 13R or 13L.
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to RAISE.
- Read pressure measuring device (3).
- Move SUSPENSION CONTROL lever to NEUTRAL.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

7

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





CONTROL SPRUNG/UNSPRUNG VALVE LINKAGE CHECK

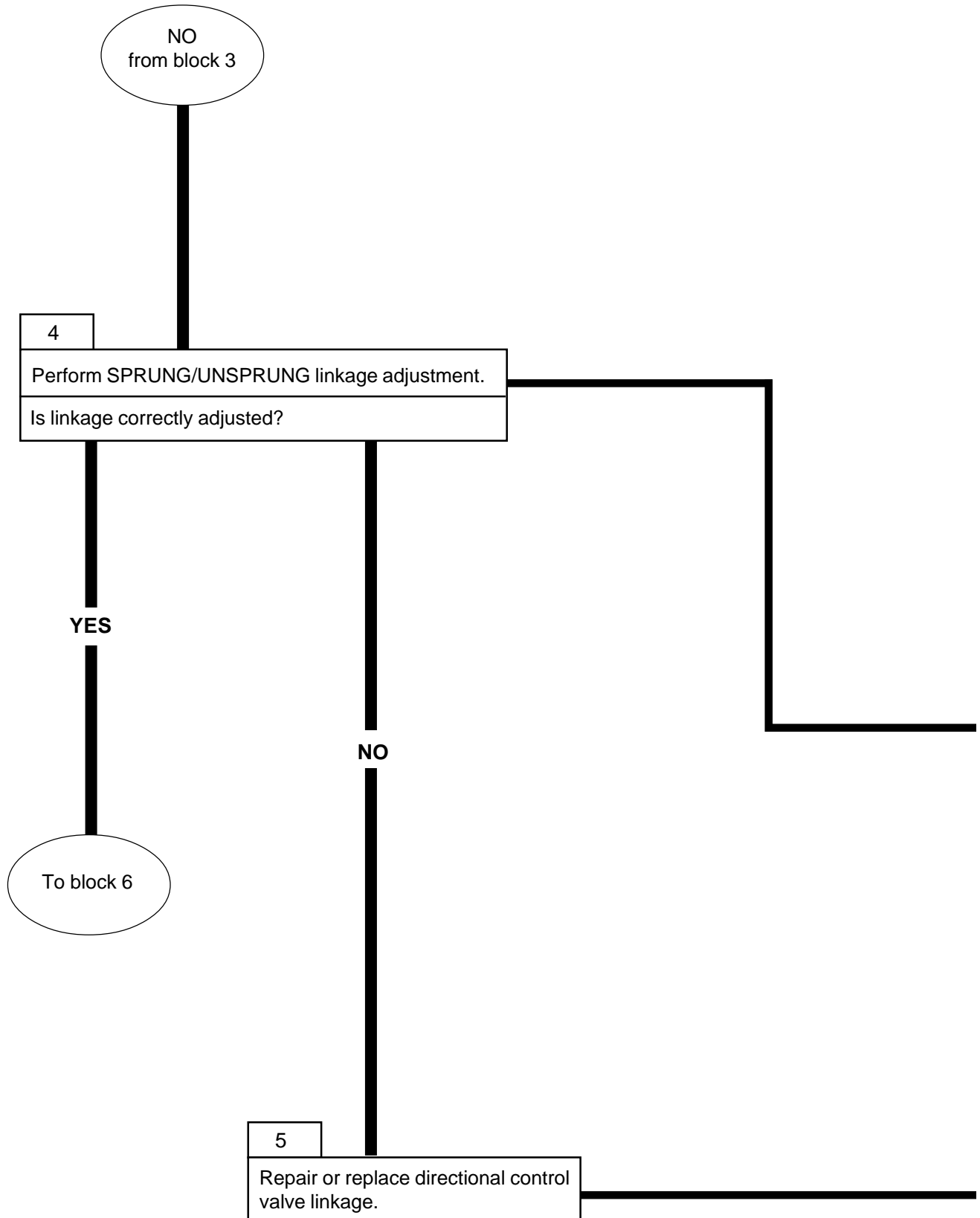
WARNING

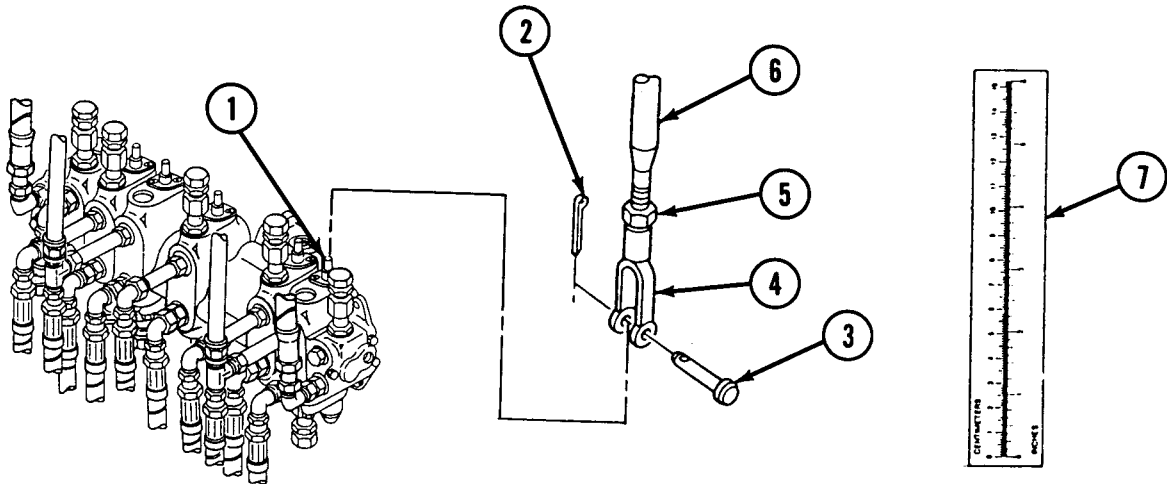
Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.

- Hold measuring device (1) on face of SPRUNG/UNSPRUNG control valve (2). Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance plunger (3) travels as lever is moved. Distance of travel should be 9/32 in. (7mm).

7

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)





SPRUNG/UNSPRUNG LINKAGE ADJUSTMENT

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

NOTE

All control rods are adjusted the same way. This procedure covers SPRUNG/UNSPRUNG control rod.

- Note position of control valve plunger (1) when SPRUNG/UNSPRUNG control lever is in NEUTRAL (off) position.

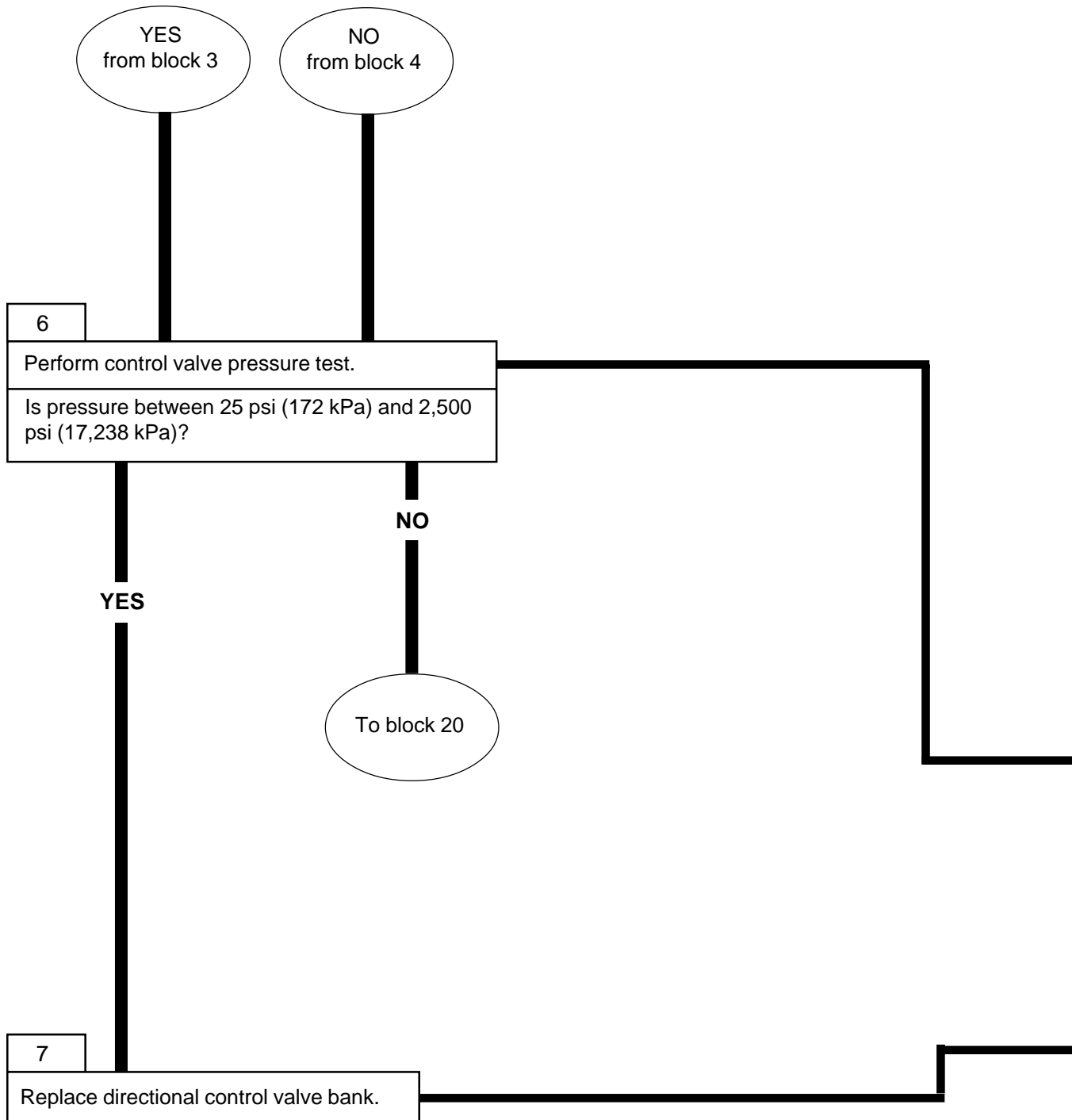
NOTE

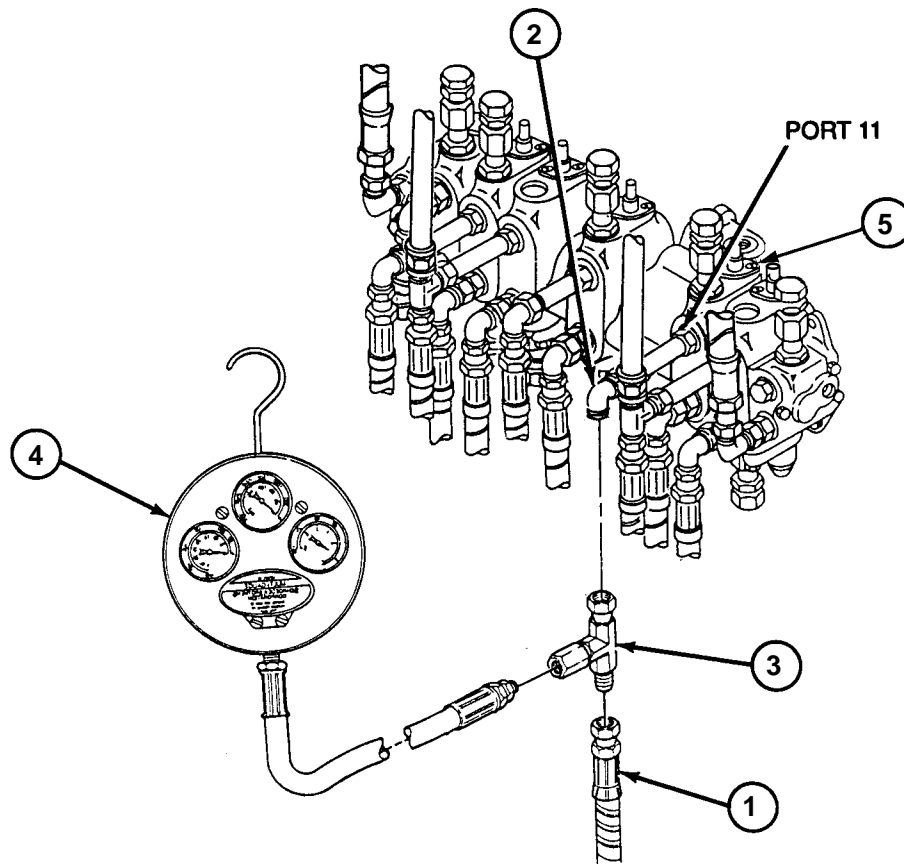
Normal control valve plunger travel is 9/32 in. (7 mm).

- Remove cotter pin (2), straight pin (3), and clevis (4) from control valve plunger (1). Discard cotter pin (2).
- Loosen jamnut (5). Turn clevis (4) clockwise to shorten rod (6); counterclockwise to lengthen rod (6).
- Hold measuring device (7) on face of SPRUNG/UNSPRUNG control valve. Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance of plunger travel.
- Coat threads of rod (6) with sealing compound primer and sealing compound. Tighten jamnut (5) against clevis (4).
- Connect clevis (4) to control valve plunger (1) with straight pin (3) and new cotter pin (2).

Refer to TM 5-2320-262-20-1

7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





CONTROL VALVE PRESSURE TEST

NOTE

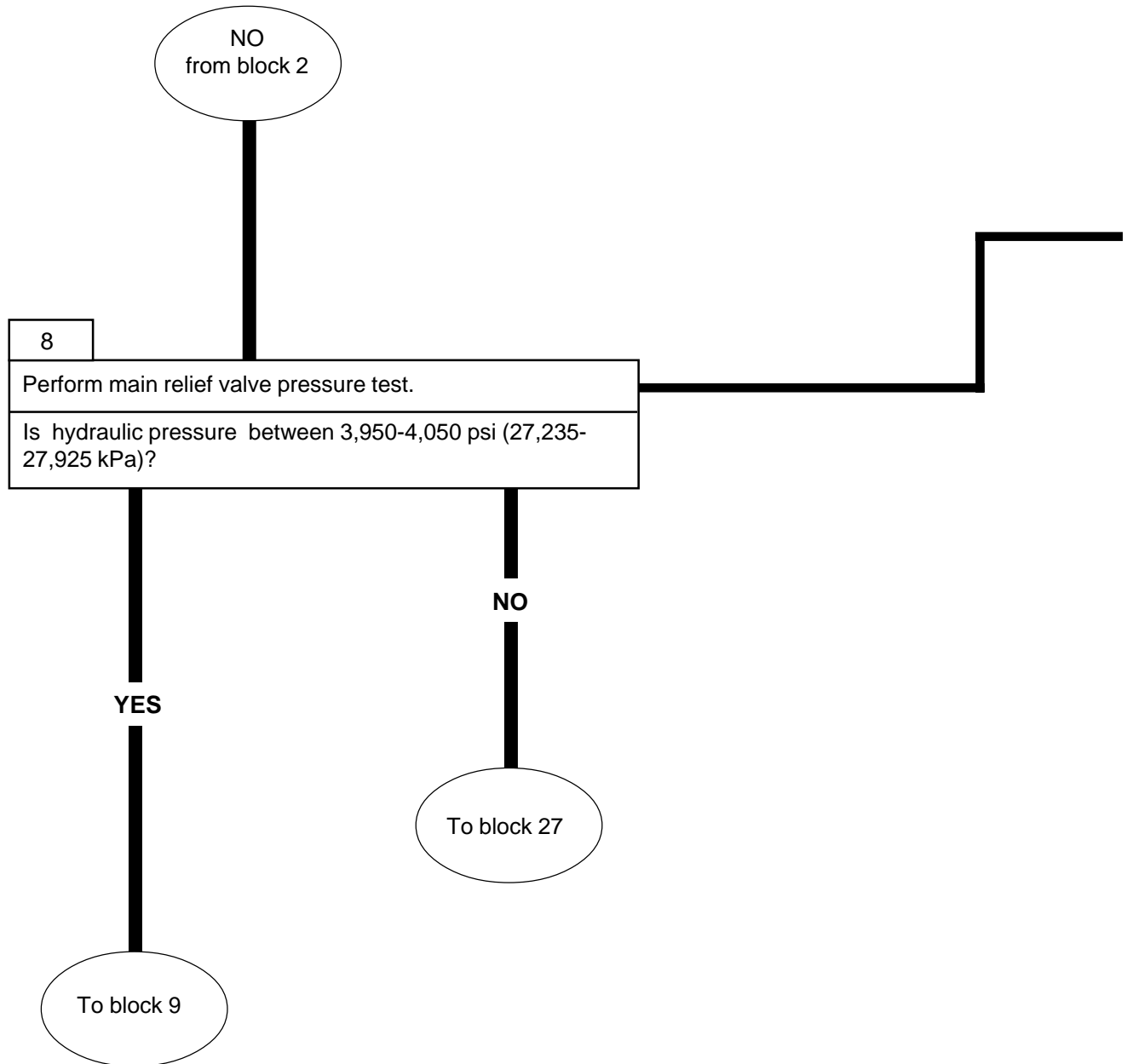
Have suitable container ready to catch oil.

- Disconnect UNSPR VLV-11 hose (1) from elbow (2).
- Install tee (3) and pressure measuring device (4) between UNSPR VLV-11 hose (1) and elbow (2) on port 11 of SPRUNG/UNSPRUNG control valve (5).
- Start engine and have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG several times. Hydraulic pressure should be less than 25 psi (172 kPa) in SPRUNG mode and greater than 2,500 psi (17,238 kPa) in UNSPRUNG mode.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

Refer to TM 5-2350-262-20-2.

7

**FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)**



MAIN RELIEF VALVE PRESSURE TEST

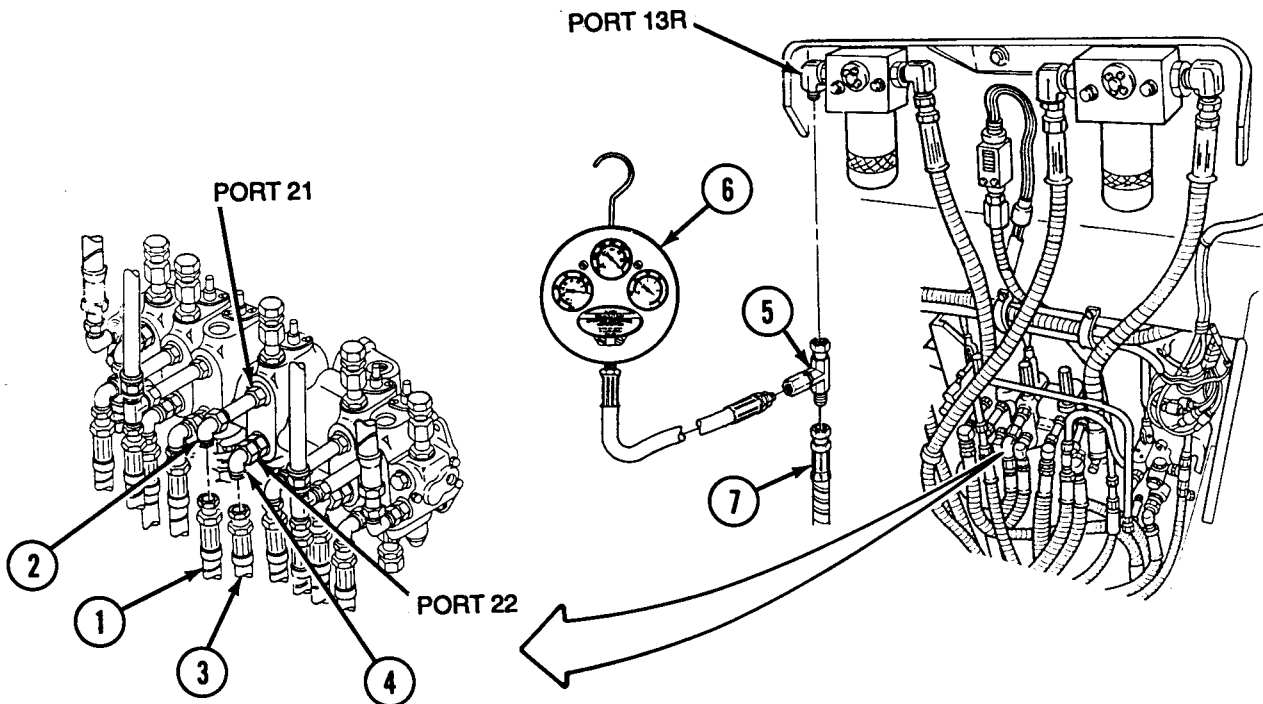
WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

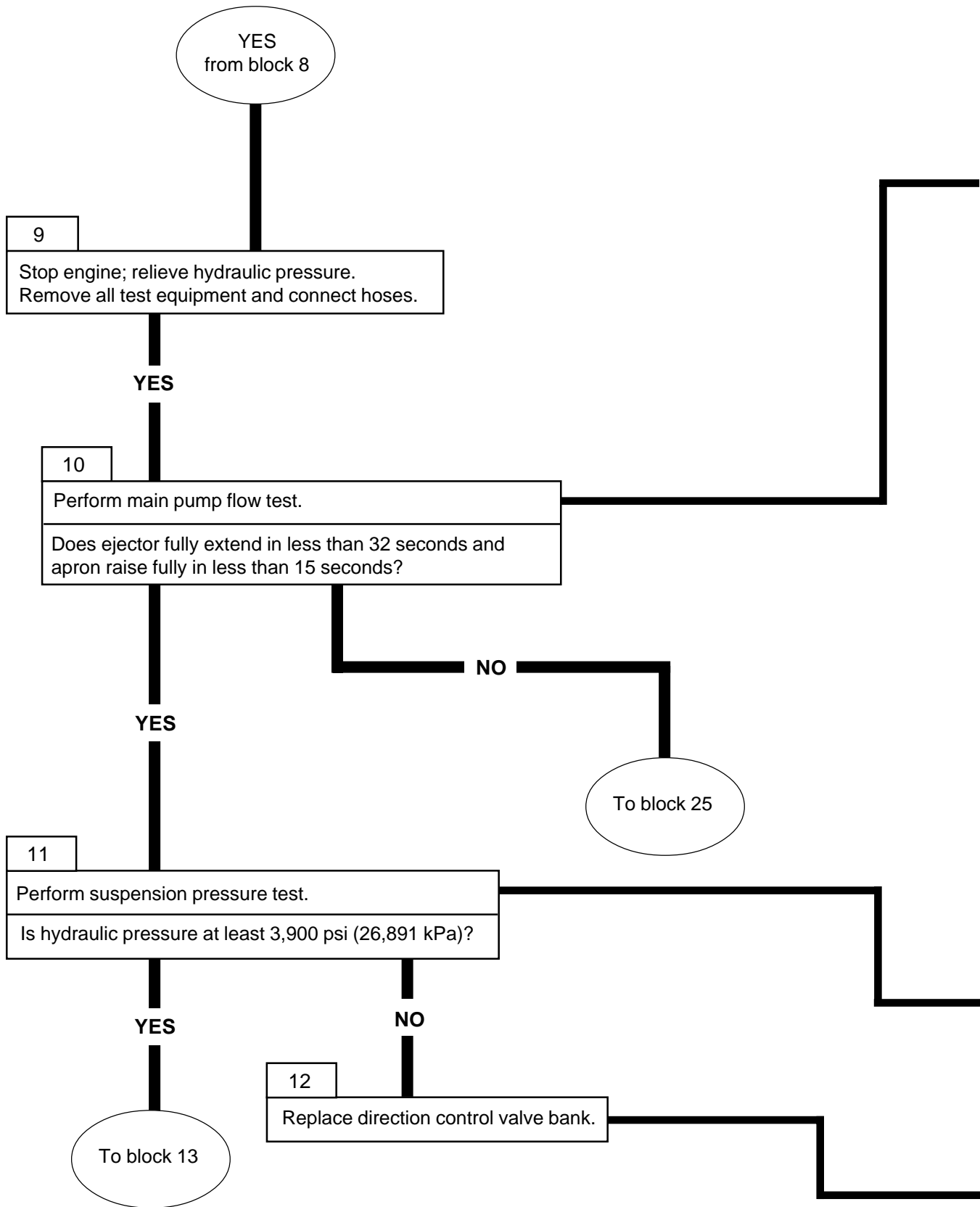
NOTE

Have suitable container ready to catch oil.

- Have assistant start engine and move ejector forward, stop engine and relieve hydraulic pressure.
- Disable ejector by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings.
- Connect tee (5) and pressure measuring device (6) between HYDR FLTR-IN-13R hose (7) and high pressure inlet port 13R.
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG and move EJECTOR CONTROL lever to BACK. Read pressure measuring device (6).
- While simultaneously holding EJECTOR CONTROL lever in BACK, have assistant move right-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (6).



7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)



MAIN PUMP FLOW TEST

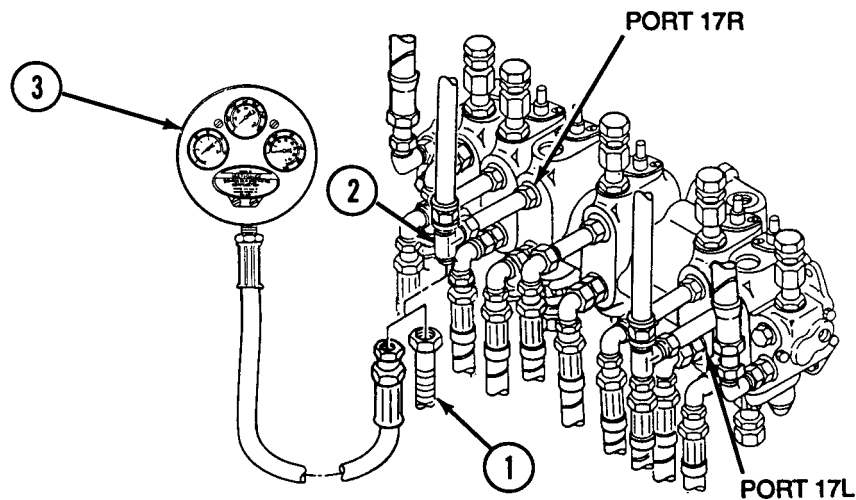
WARNING

Remove all tools and exit bowl before performing this test. Failure to comply may result in severe injury to personnel or damage to equipment.

NOTE

An insufficient flow of hydraulic oil is indicated if ejector requires more than 32 seconds to fully extend or if apron requires more than 15 seconds to fully raise.

- Start engine and allow engine to idle (750-850 rpm).
- With ejector fully retracted, hold EJECTOR CONTROL lever in FORWARD, and note length of time required for ejector to fully extend.
- With apron in full down position, move APRON CONTROL lever to UP, and note length of time required for apron to fully raise. Lower apron.
- Stop engine; relieve hydraulic pressure.



SUSPENSION PORT 17 PRESSURE TEST

NOTE

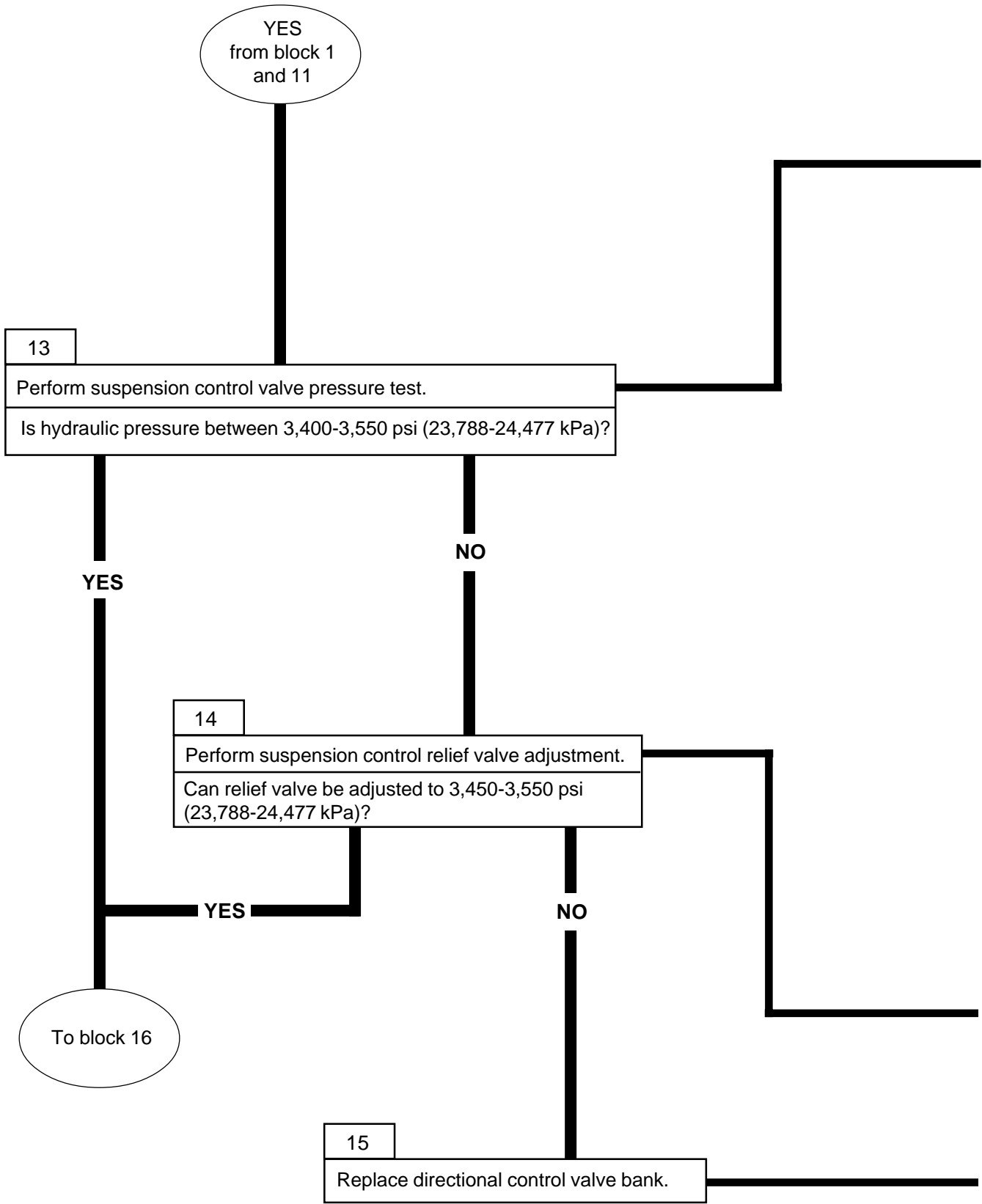
Perform this test at ports 17R and 17L on the directional control valve bank. Use the right-hand suspension control lever for port 17R and the left-hand suspension control lever for port 17L.

Have suitable container ready to catch oil.

- Disconnect hose (1) from tee (2) on port 17 of suspension control valve. Plug hose (1).
- Connect pressure measuring device (3) to tee (2).
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG, and SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (3).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

Refer to TM 5-2350-262-20-2.

7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)



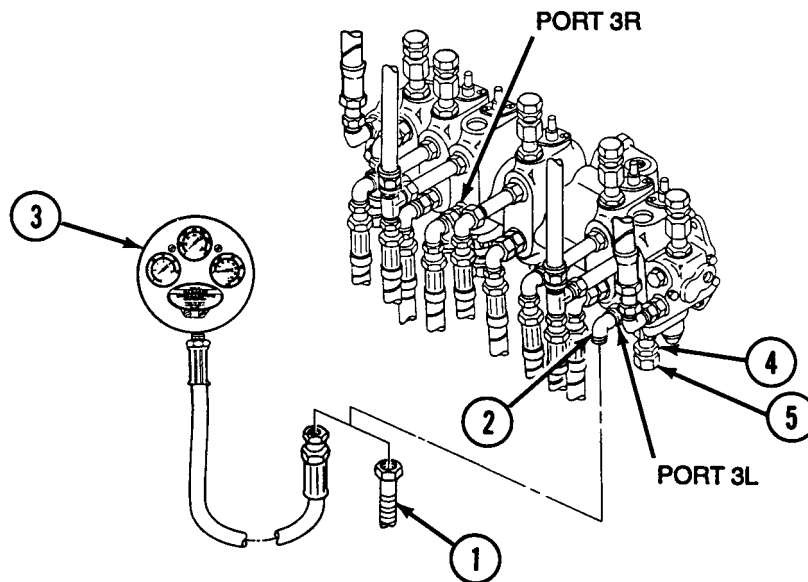
SUSPENSION CONTROL VALVE PRESSURE TEST

NOTE

If left corner of vehicle will not raise, perform test at port 3L and actuate left-hand suspension control lever. If right corner of vehicle will not raise, perform test at port 3R and actuate right-hand suspension control lever.

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Disconnect hose (1) from elbow (2) at port 3 of suspension control valve 3L or 3R. Plug hose (1).
- Connect pressure measuring device (3) to elbow (2).
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to UNSPRUNG, and SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (3).



SUSPENSION CONTROL RELIEF VALVE ADJUSTMENT

NOTE

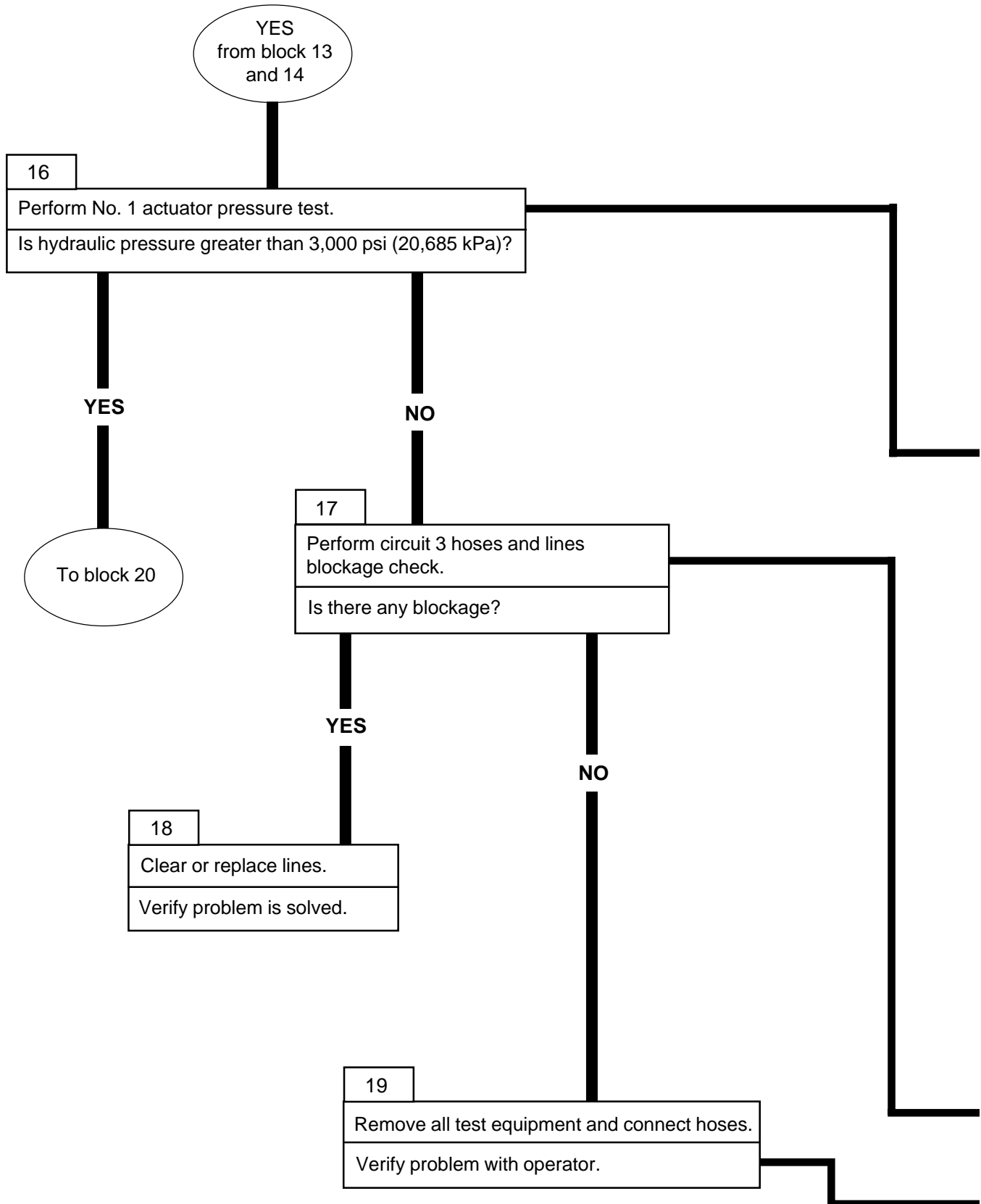
Perform this adjustment at relief valve 3L if left corner of vehicle will not raise, or at relief valve 3R if right corner of vehicle will not raise.

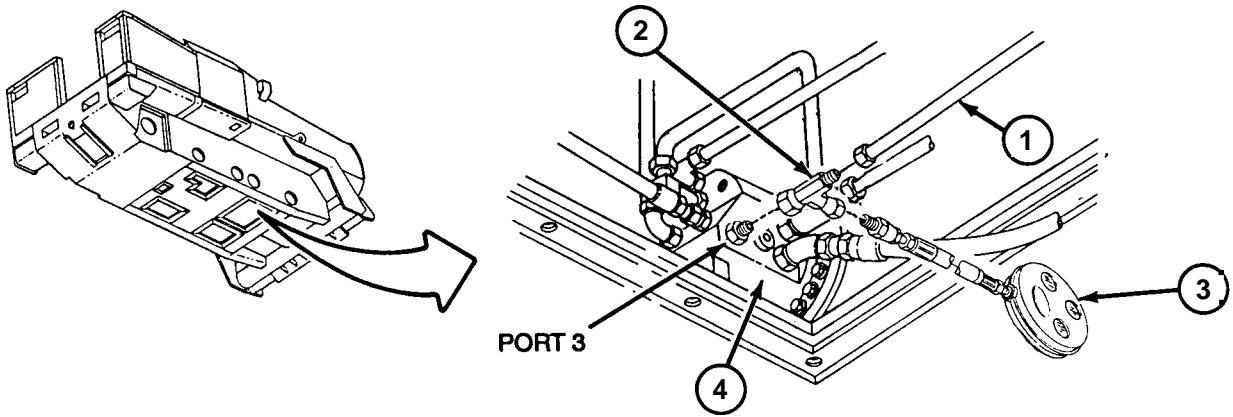
- Loosen jamnut (4) and turn adjusting screw (5) clockwise to increase pressure; counterclockwise to decrease pressure. Adjust pressure within limits, and tighten jamnut (4).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

Refer to TM 5-2350-262-20-2.

7

**FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)**





NO. 1 ACTUATOR PRESSURE TEST

WARNING

Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

NOTE

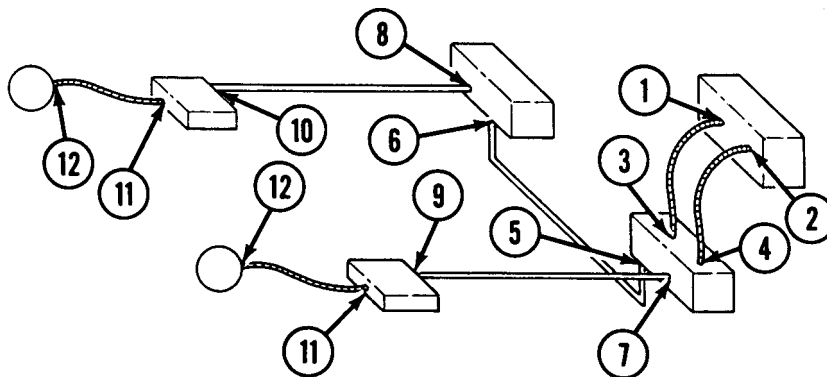
This test is performed at No. 1 actuator of front corner which will not raise.

Have suitable container ready to catch oil.

- Stop engine, relieve hydraulic pressure, remove all test equipment and connect lines.
- Disconnect NO. 1 SPNSN UNIT-3 hose (1).
- Connect tee (2) and pressure measuring device (3) between NO 1 SPNSN UNIT-3 hose (1) and port 3 on No. 1 actuator (4).
- Start engine. Read pressure measuring device (3).
- Stop engine; relieve hydraulic pressure.
- Remove all test equipment and connect lines.

LINE IDENTIFIERS:

1. CONT VLV-3L
2. CONT VLV-3R
3. LH MAIN MANF TOP-3L
4. RH MAIN MANF TOP-3R
5. LH MAIN MANF BOT-3L
6. RH MAIN MANF BOT-3R
7. LH MAIN MANF FRONT-3L
8. RH MAIN MANF FRONT-3R
9. LH FWD MANF-3L
10. RH FWD MANF-3R
11. FWD NAMF ADPTR-3
12. NO 1 SPNSN UNIT-3

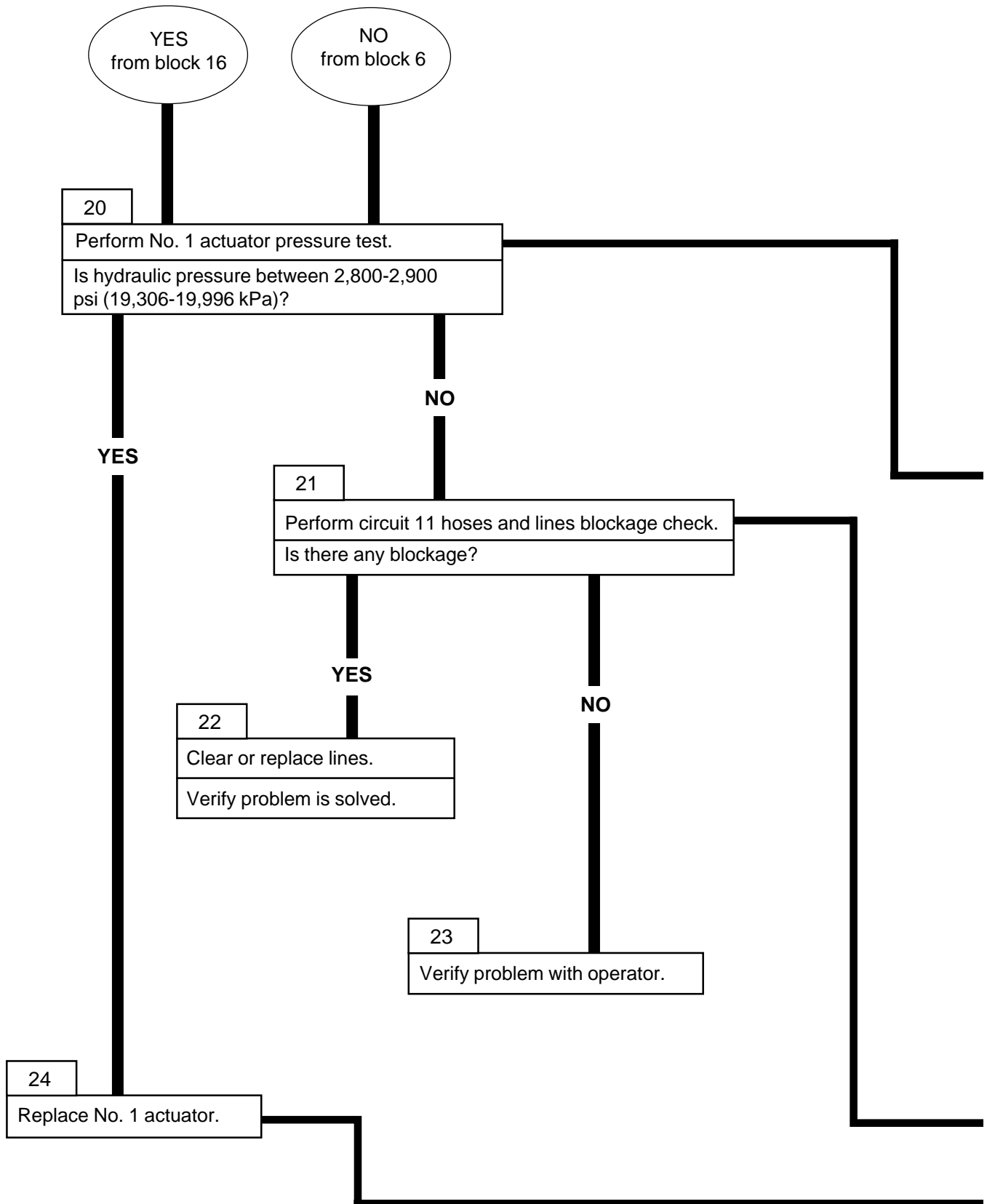


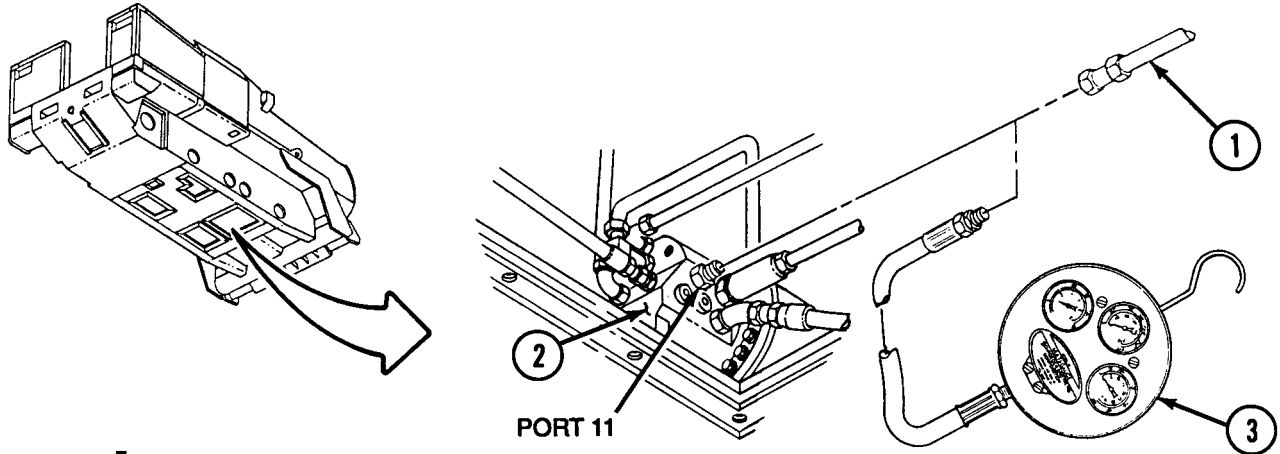
CIRCUIT 3 HOSES AND LINES BLOCKAGE CHECK

- Check for blockage in all hoses and lines applicable to corner of vehicle which will not raise.

A previous task was incorrectly performed or results misinterpreted. Verify results of all previous tests, beginning at block 1.

7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





NO. 1 ACTUATOR PRESSURE TEST

WARNING

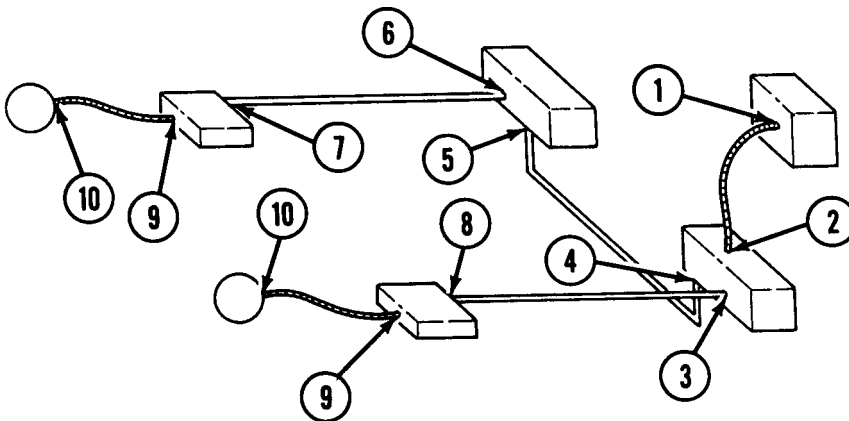
Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

NOTE

This test is performed at No. 1 front actuator which will not raise.

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect NO 1 SPNSN UNIT-11 hose (1) from port 11 on No. 1 actuator (2). Cap port 11.
- Connect pressure measuring device (3) to NO 1 SPNSN UNIT-11 hose (1).
- Start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Read pressure measuring device (3).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.



LINE IDENTIFIERS:

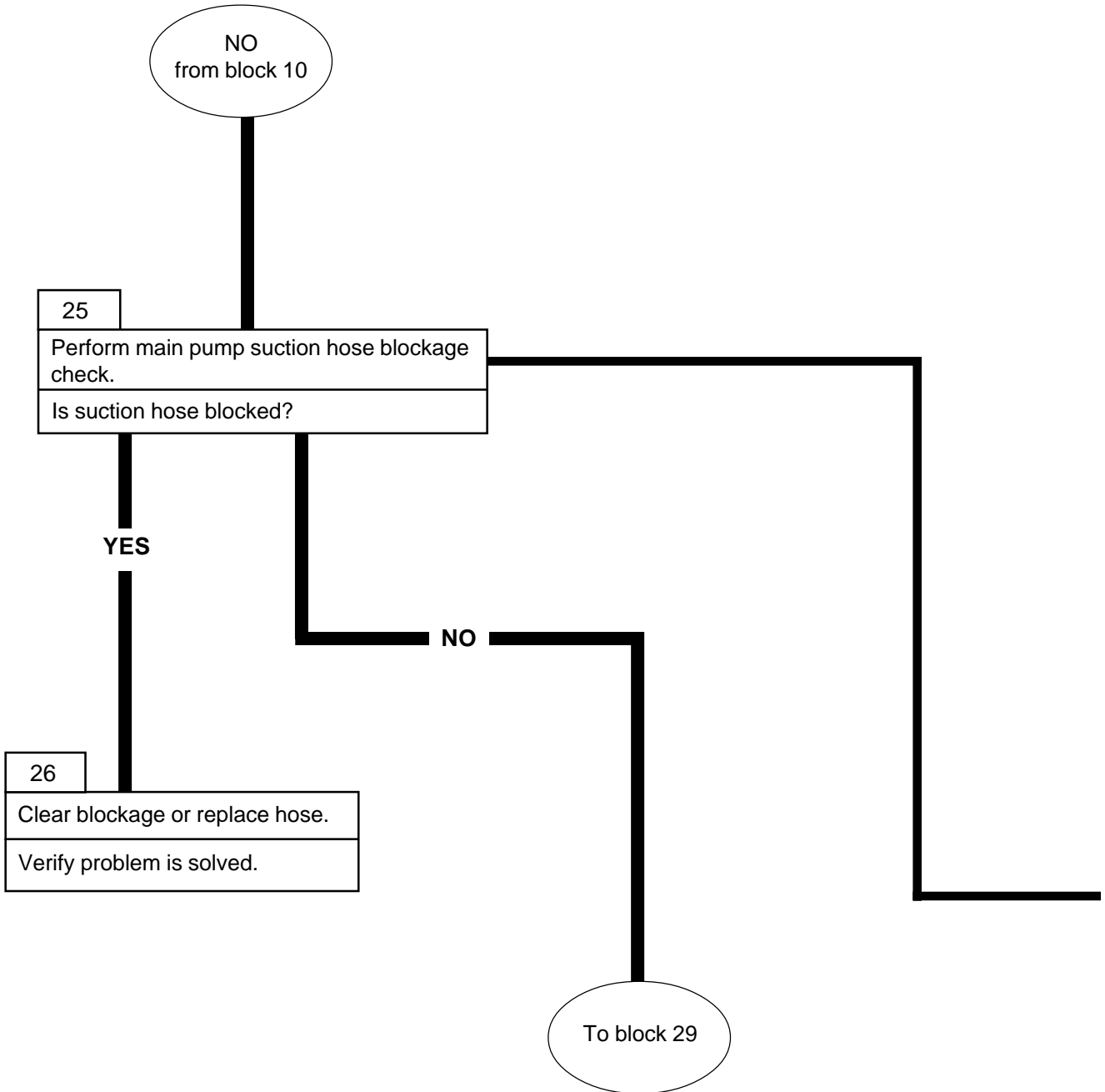
1. SPR-UNSPR VLV-11
2. LH MAIN MANTOP-11
3. LH MAIN MANF FRONT-11
4. LH MAIN MANF BOT-11
5. RH MAIN MANF BOT-11
6. RH MAIN MANF FRONT-11
7. RH FWD MANF-11
8. LH FWD MANF-11
9. FWD MANF-11ELB
10. NO. 1 SPNSN UNIT-11

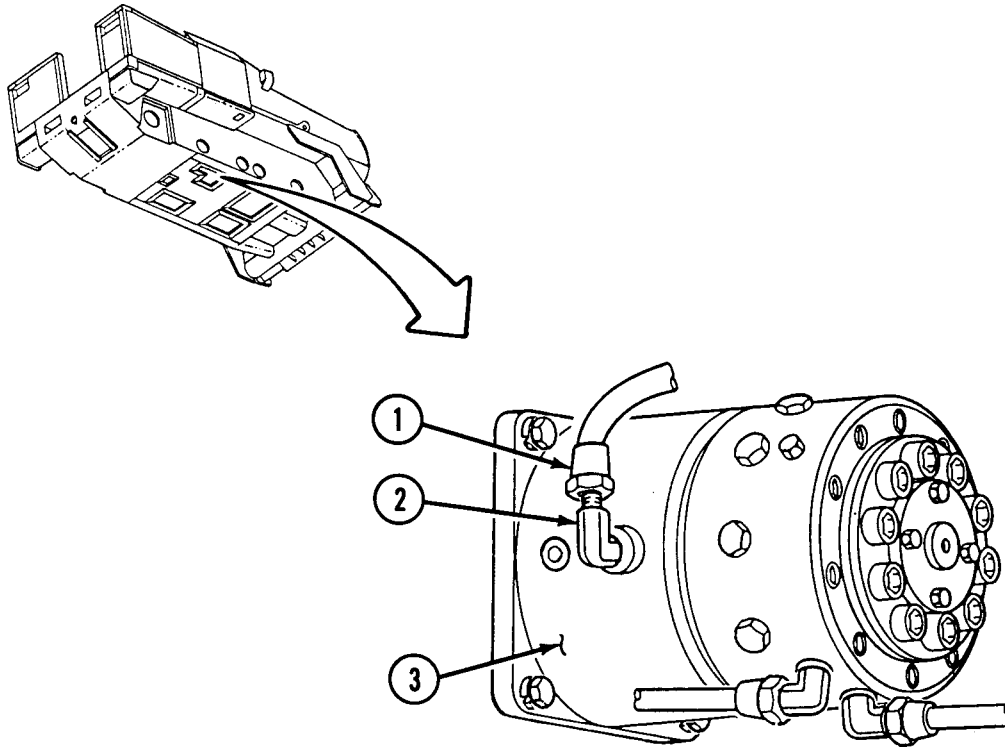
CIRCUIT 11 HOSES AND LINES BLOCKAGE CHECK

Check for blockage in all hoses and lines applicable to corner of vehicle which will not raise.

Notify Direct Support maintenance.

7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





MAIN PUMP SUCTION HOSE BLOCKAGE CHECK

WARNING

Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

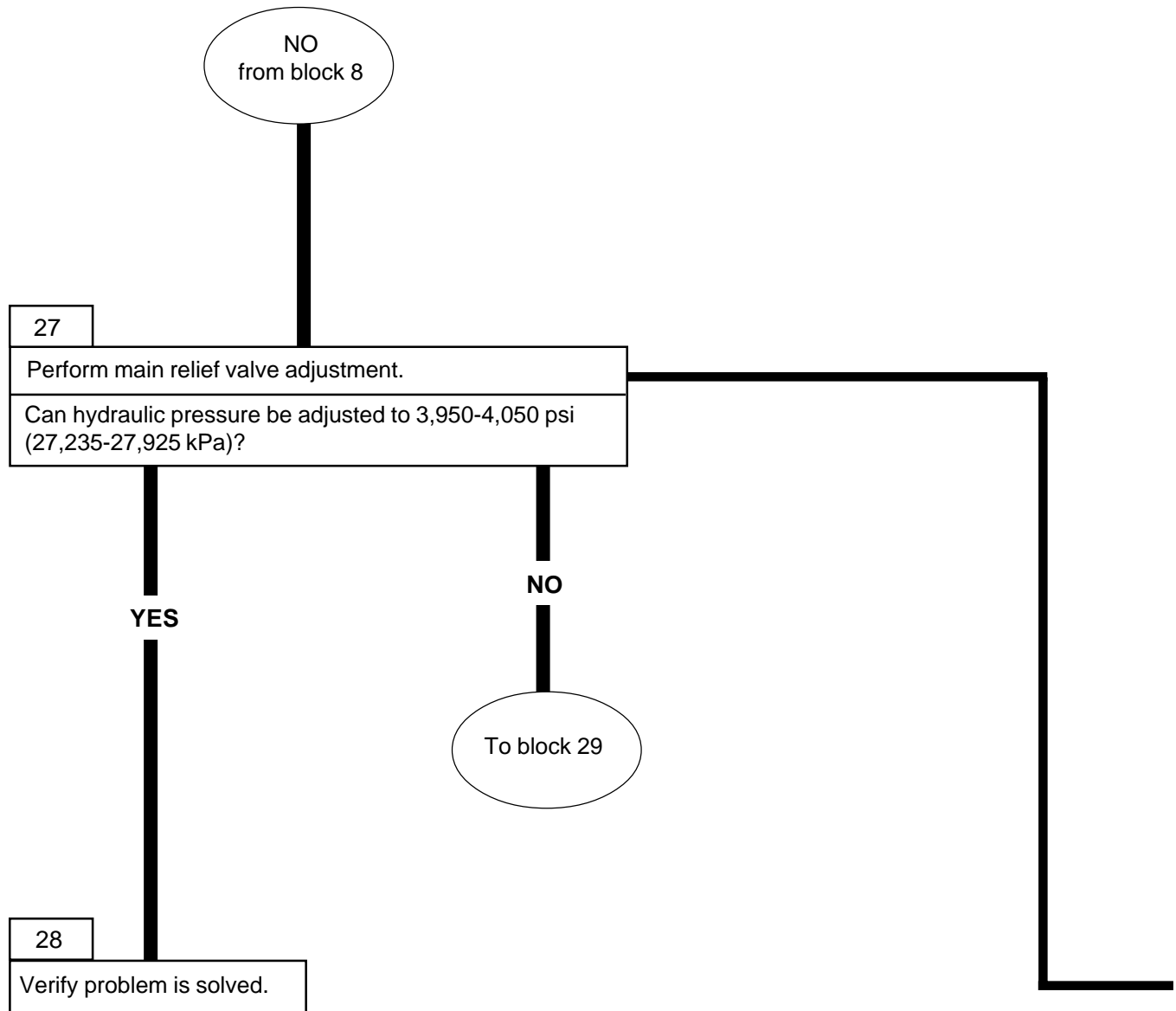
NOTE

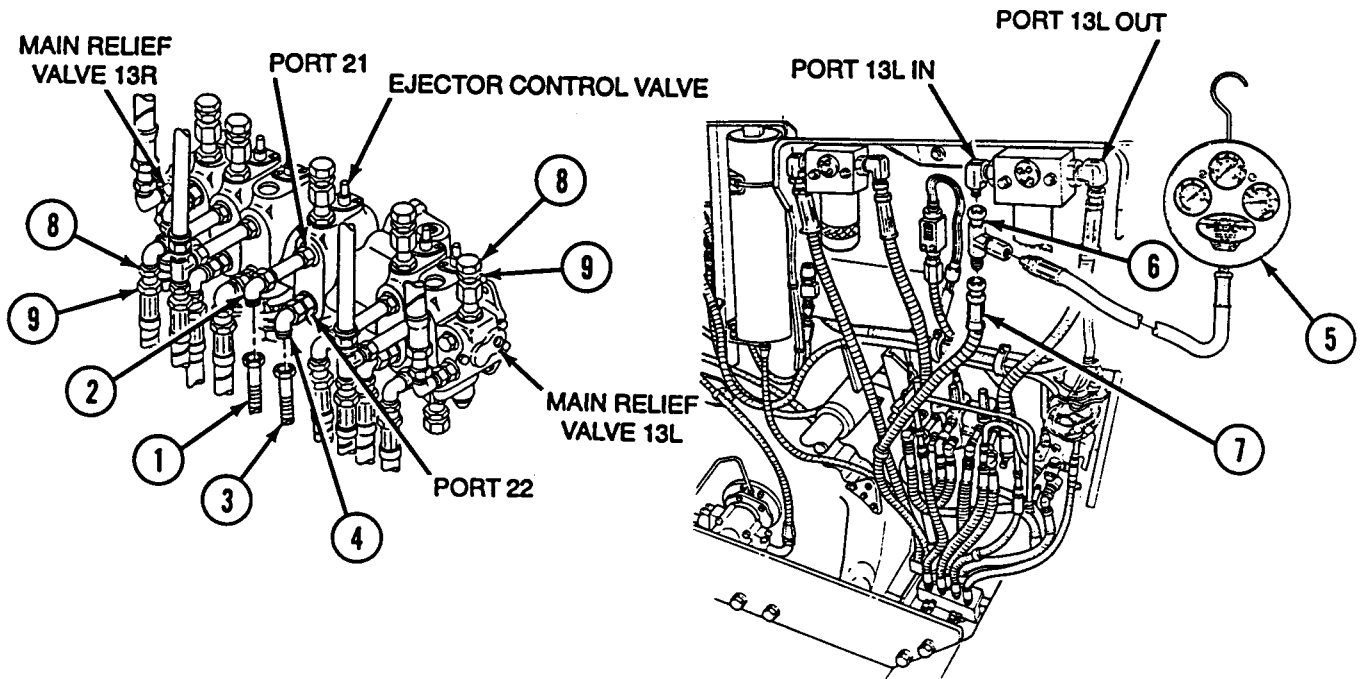
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Loosen, but do not disconnect, PUMP SUCT TUBE-7 (1) from elbow (2) on main hydraulic pump (3). Hydraulic oil should flow freely from the loosened fitting. Reconnect line.

7

**FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)**





MAIN RELIEF VALVE ADJUSTMENT

WARNING

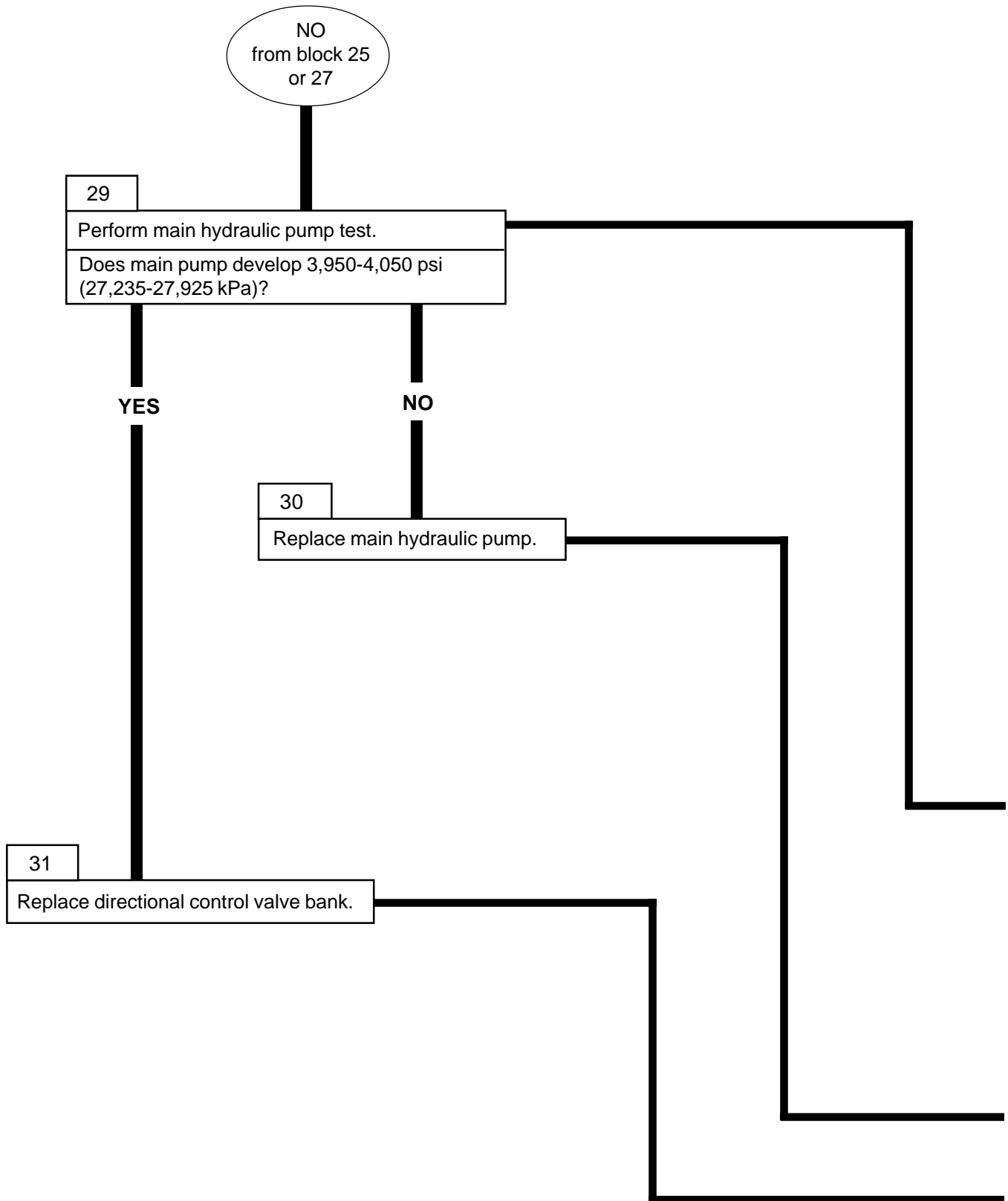
Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

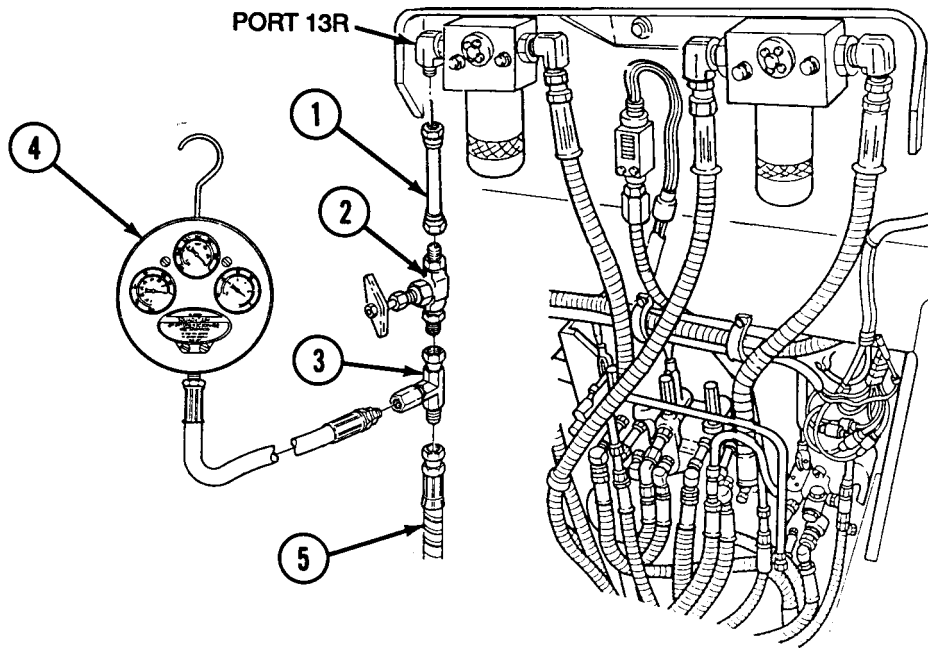
NOTE

Have suitable container ready to catch oil.

- Disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings.
- With pressure measuring device (5) and tee (6) still connected to HYDR-FLTR-IN 13L hose (7) and high-pressure filter inlet port 13L and SPRUNG/UNSPRUNG lever in SPRUNG, have assistant move left hand SUSPENSION CONTROL lever to RAISE, while at the same time, holding EJECTOR CONTROL lever in BACK. Read pressure measuring device (5). If the pressure is not within limits, adjust the main relief valve 13L by loosening jamnut (8) and rotating adjustment screw (9) clockwise to increase pressure; counterclockwise to decrease pressure. When hydraulic pressure is within limits, tighten jamnut (8).
- Stop engine; relieve hydraulic pressure.
- Move test equipment to high-pressure filter inlet port 13R and repeat the previous steps using the right-hand suspension control lever.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

7 FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





MAIN HYDRAULIC PUMP TEST

WARNING

- Before performing any troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.
- Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in damage to equipment and injury to personnel.

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Install coupling tube (1), globe valve (2), tee (3), and pressure measuring device (4) between HYDR FLTR-IN-13R hose (5) and high pressure filter inlet port 13R.
- Turn globe valve (2) counterclockwise until fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (2) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (2). Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.

Notify Direct Support maintenance.

Refer to TM 5-2350-262-20-2.

8

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE

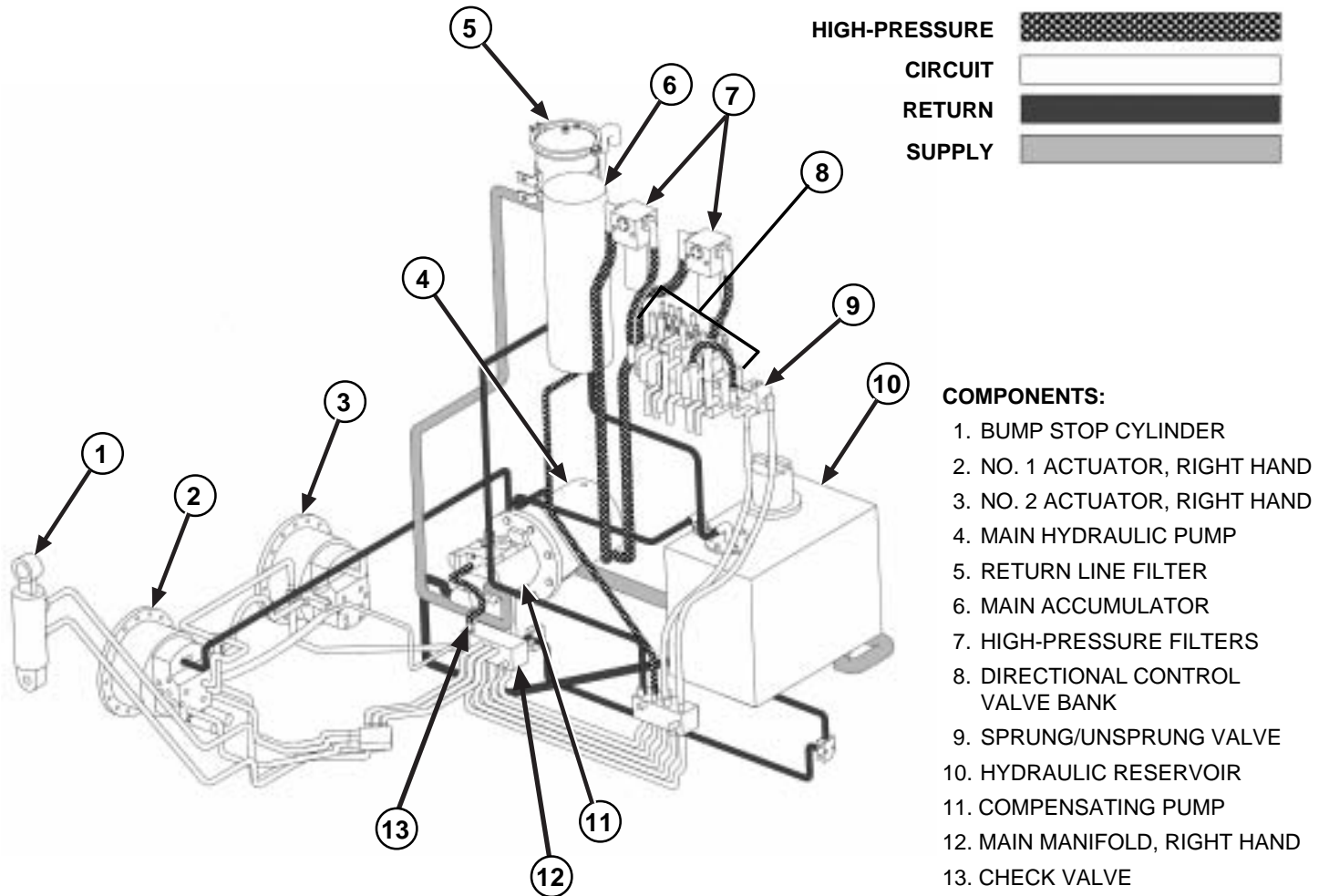
SPRUNG mode provides for a smooth ride up to 30 mph (48 km/h) and is used for over the road marches and parking of the vehicle. Hydraulic pressure is supplied to front actuators through line 9.

WARNING

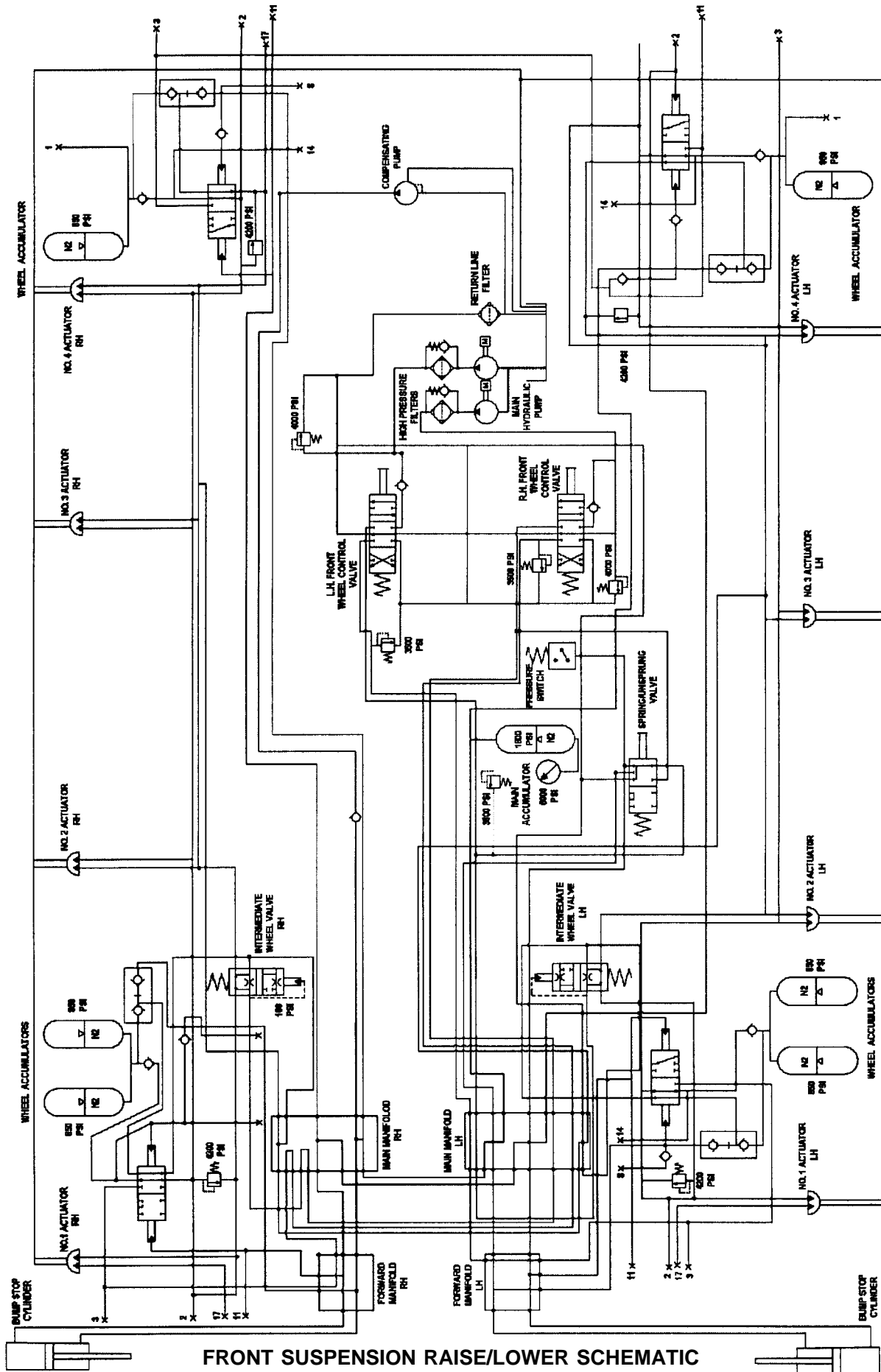
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right front of vehicle.

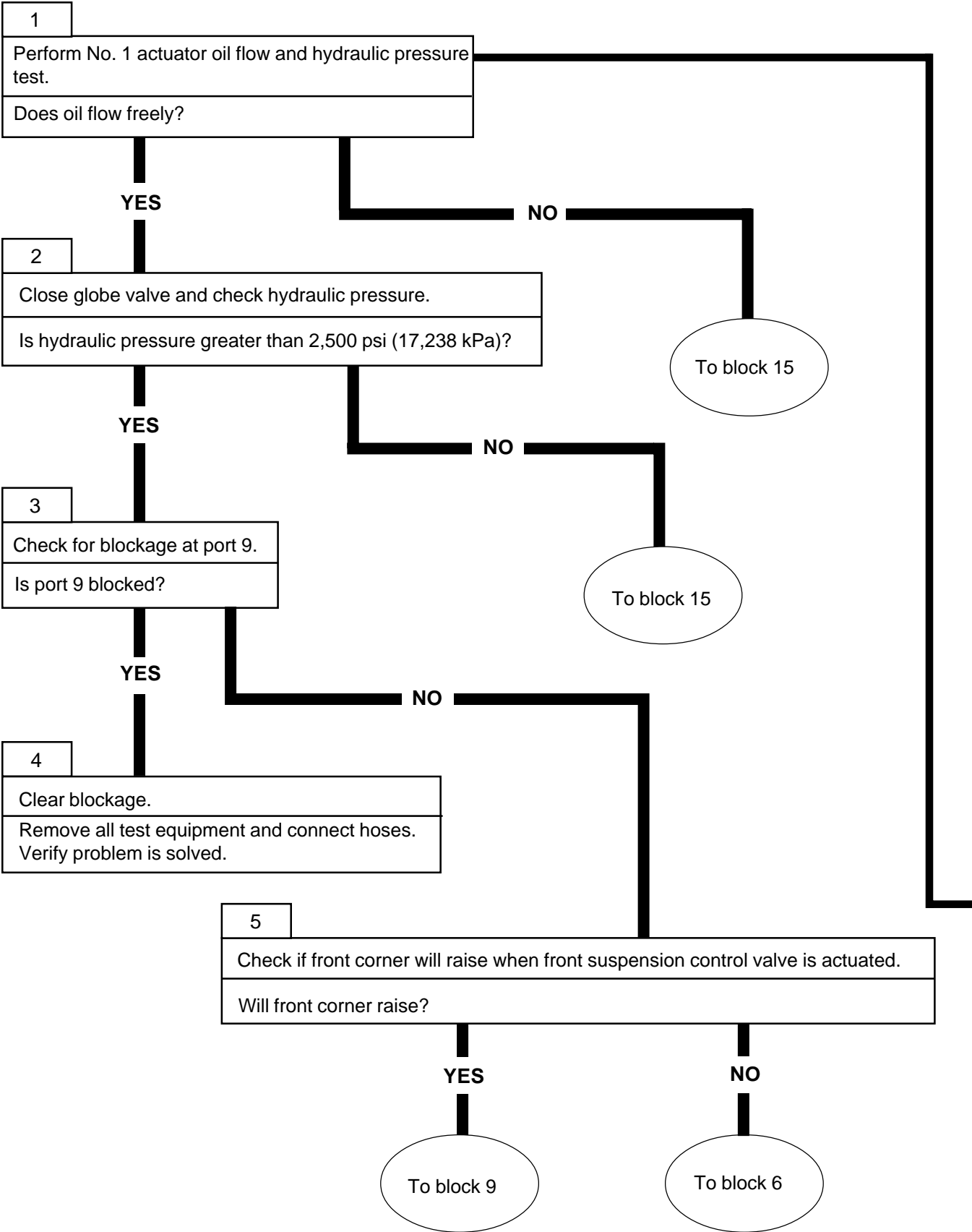


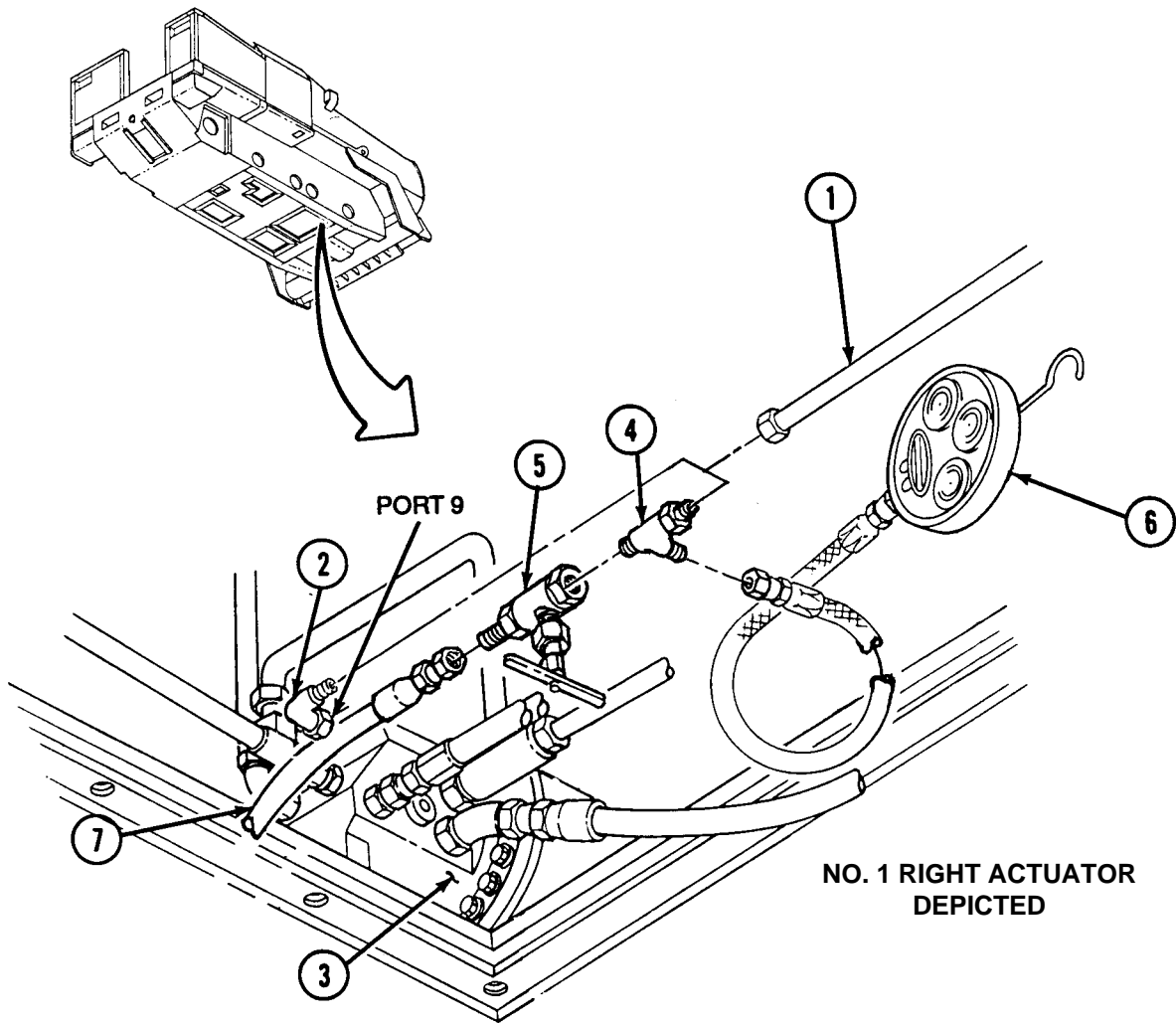
FRONT SUSPENSION RAISE/LOWER CIRCUIT



FRONT SUSPENSION RAISE/LOWER SCHEMATIC

8 FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE (CONTINUED)





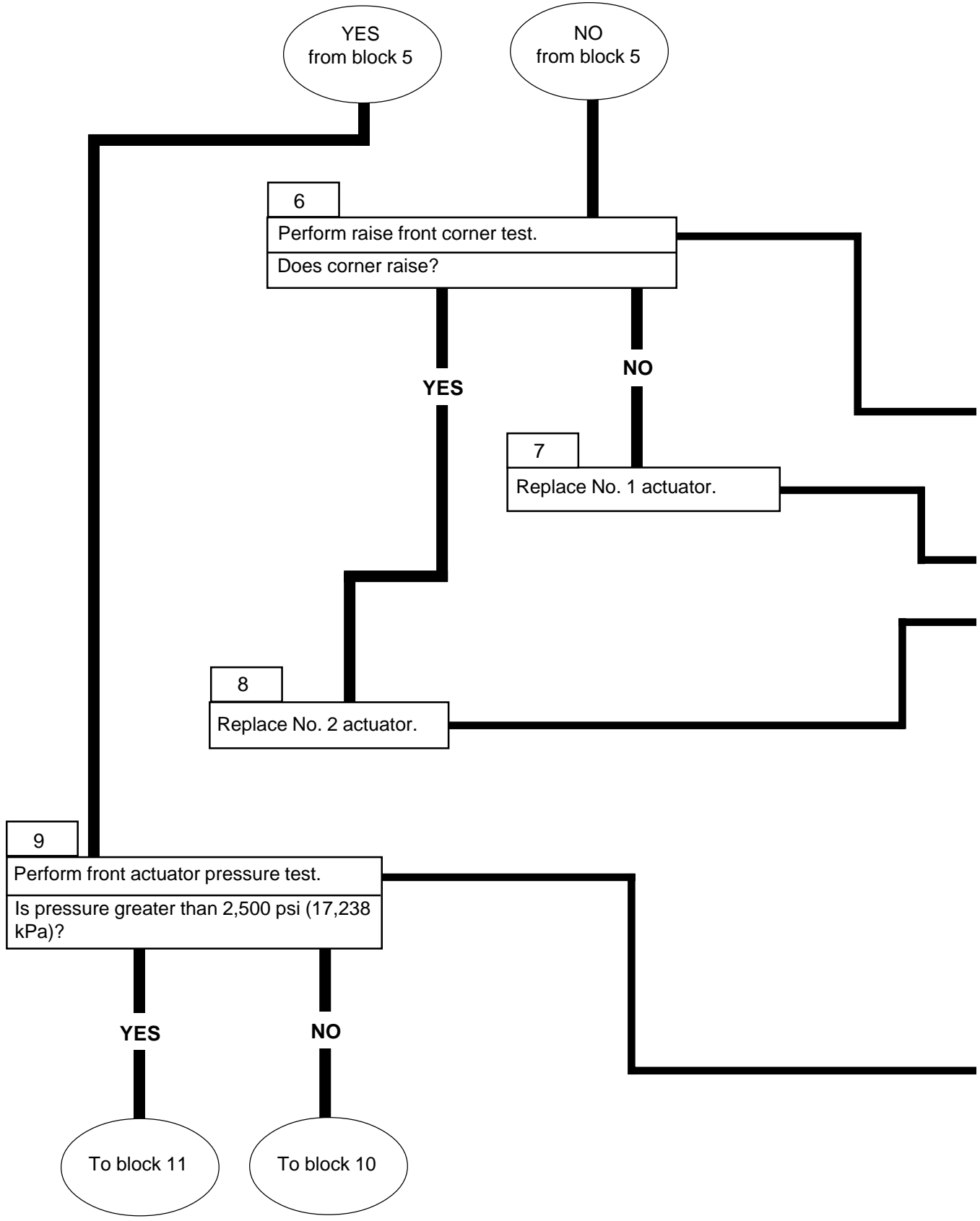
NO. 1 ACTUATOR OIL FLOW AND HYDRAULIC PRESSURE TEST

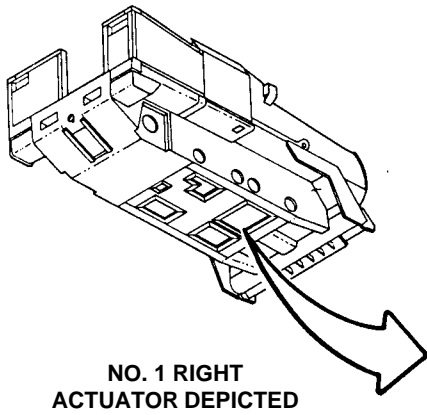
NOTE

Have suitable container ready to catch oil.

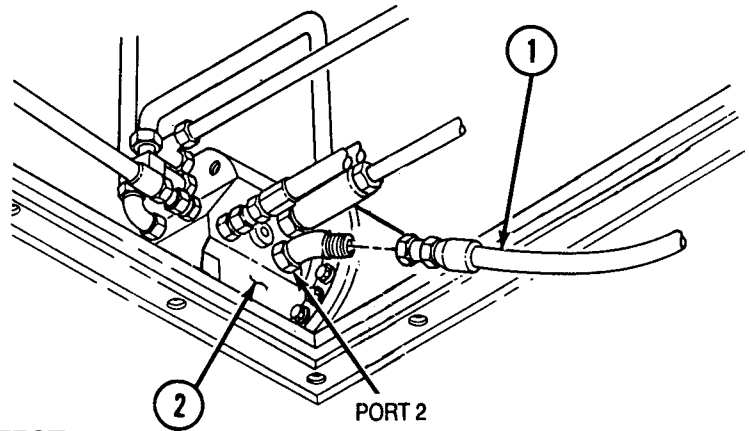
- Stop engine; relieve hydraulic pressure. Disconnect NO 1 SPNSN UNIT-9 hose (1) at elbow (2) on port 9 of No. 1 actuator (3). Cap elbow (2).
- Connect tee (4), globe valve (5), and pressure measuring device (6) to end of NO 1 SPNSN UNIT-9 hose (1). Connect a drain hose (7) to open end of globe valve (5).
- Place end of hose (7) in container. Start engine. Open globe valve (5). Observe for flow of oil.

8 FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE (CONTINUED)





NO. 1 RIGHT ACTUATOR DEPICTED



RAISE FRONT CORNER TEST

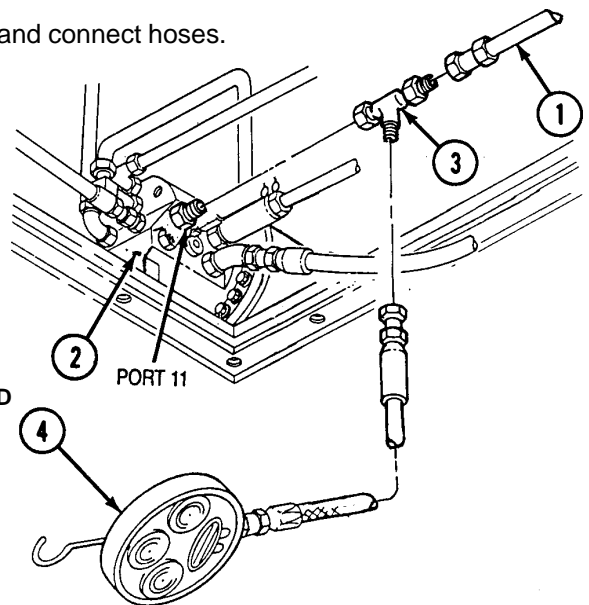
NOTE

Have suitable container ready to catch oil.

- Disconnect SPNSN UNIT-2 hose (1) from port 2 on No. 1 actuator (2). Cap and plug port 2 and SPNSN UNIT-2 hose (1).
- Start engine. Move SPRUNG/UNSPRUNG lever to SPRUNG mode.
- Stop engine; relieve hydraulic pressure and connect hoses.

Notify Direct Support maintenance.

Notify Direct Support maintenance.



NO. 1 RIGHT ACTUATOR DEPICTED

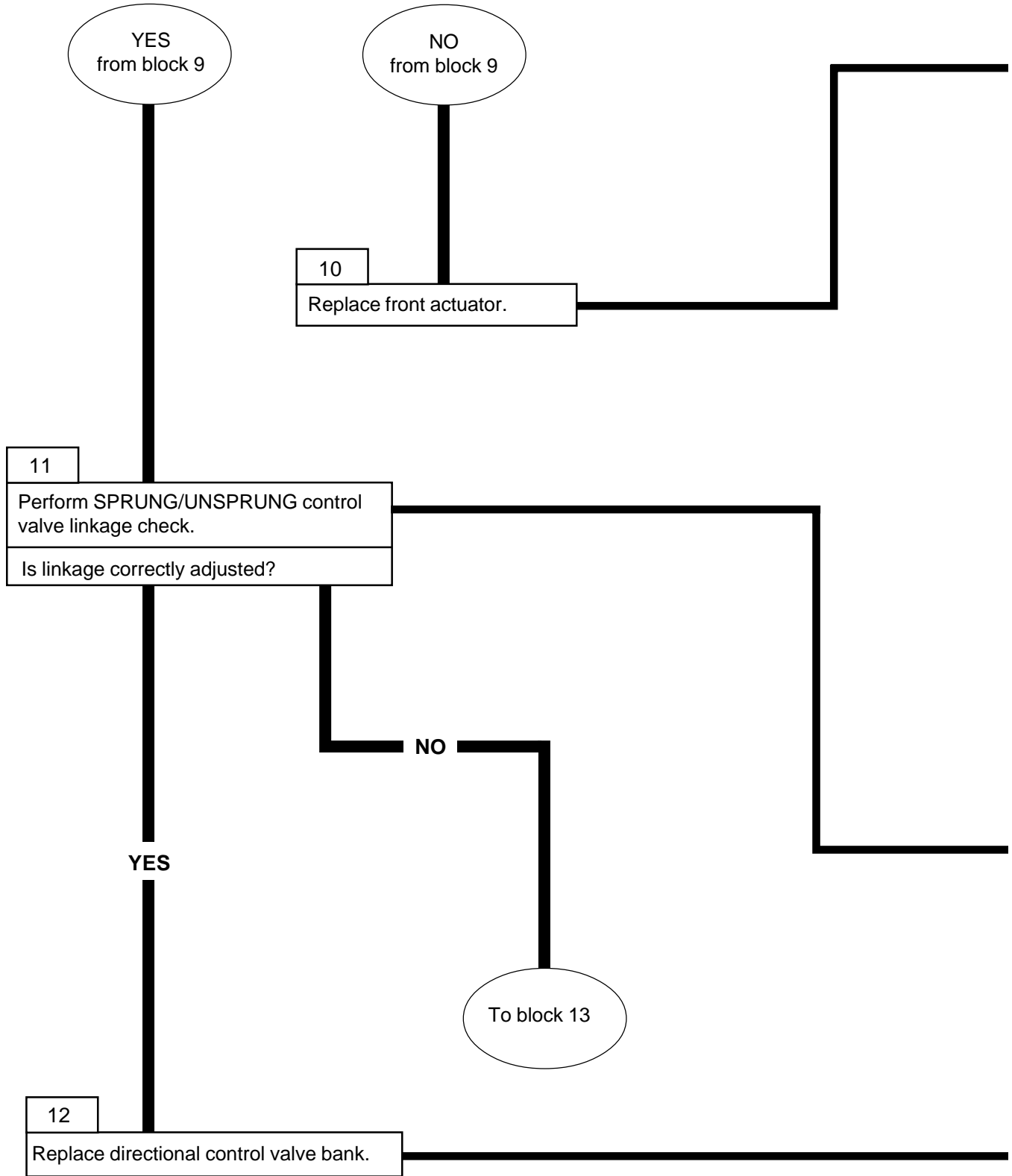
FRONT ACTUATOR PRESSURE TEST

NOTE

Have suitable container ready to catch oil.

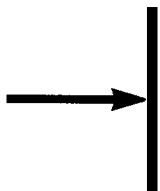
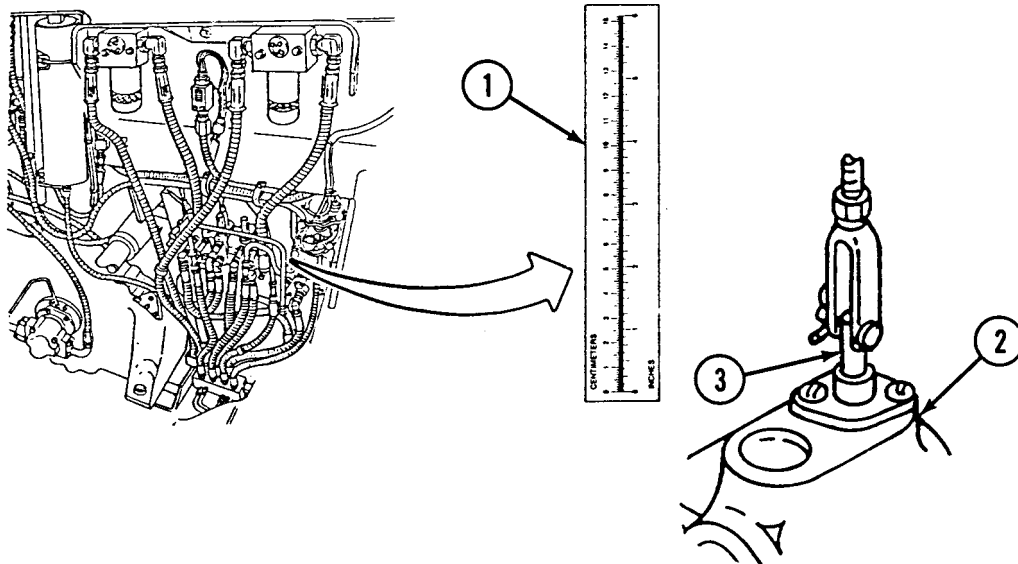
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect lines. Disconnect NO 1 SPNSN UNIT-11 hose (1) from port 11 on No. 1 actuator (2). Cap port 11.
- Connect tee (3) and pressure measuring device (4) to NO 1 SPNSN UNIT-11 hose (1). Cap tee (3).
- Start engine Move SPRUNG/UNSPRUNG lever to UNSPRUNG mode. Read pressure measuring device (4).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

8 FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE (CONTINUED)





Notify Direct Support maintenance.



SPRUNG/UNSPRUNG CONTROL VALVE LINKAGE CHECK

Hold measuring device (1) on face of SPRUNG/UNSPRUNG control valve (2). Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance plunger (3) travels as lever is moved. Distance of travel should be 9/32 in. (7 mm).



Refer to TM 5-2320-262-20-2.

8

**FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE
(CONTINUED)**

NO
from block 11

13

Perform SPRUNG/UNSPRUNG
valve linkage adjustment.

Is linkage correct adjusted?

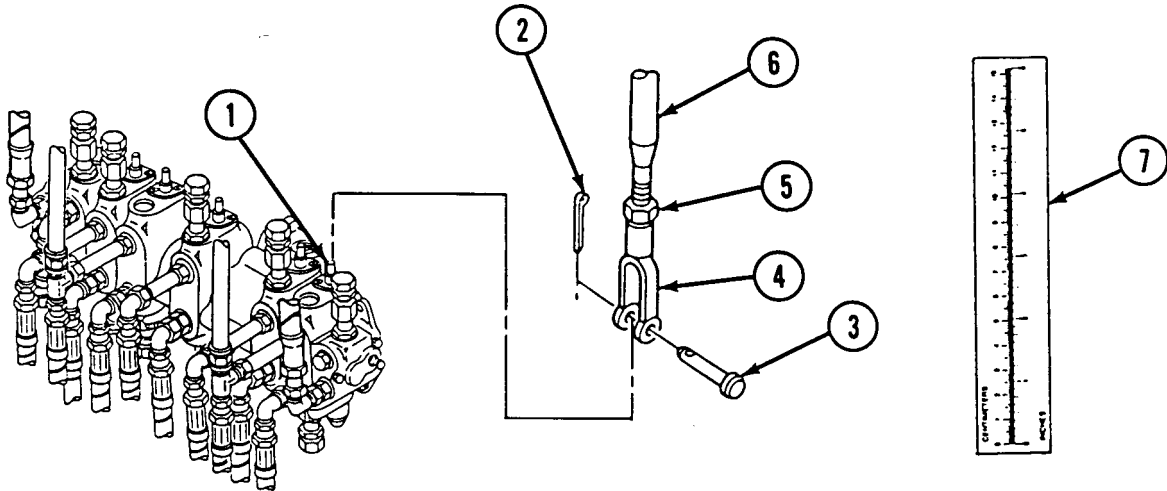
YES

NO

Repair or replace directional valve
linkage.

14

Replace directional control valve bank.



SPRUNG/UNSPRUNG LINKAGE ADJUSTMENT

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

NOTE

All control rods are adjusted basically the same way. This procedure covers SPRUNG/UNSPRUNG control rod.

- Note position of control valve plunger (1) when SPRUNG/UNSPRUNG control lever is in neutral (off) position.

NOTE

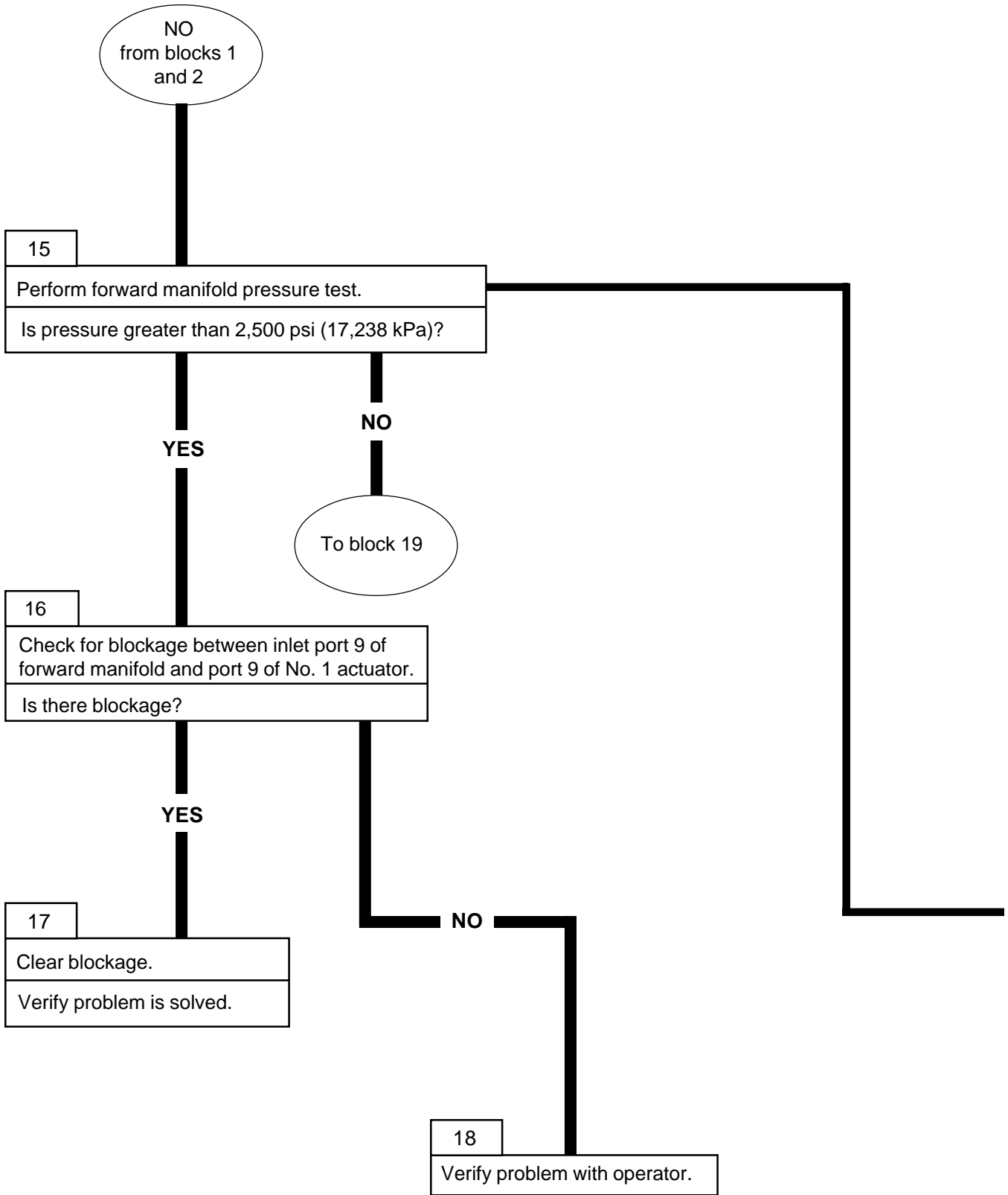
Normal control valve plunger travel is 9/32 in. (7 mm).

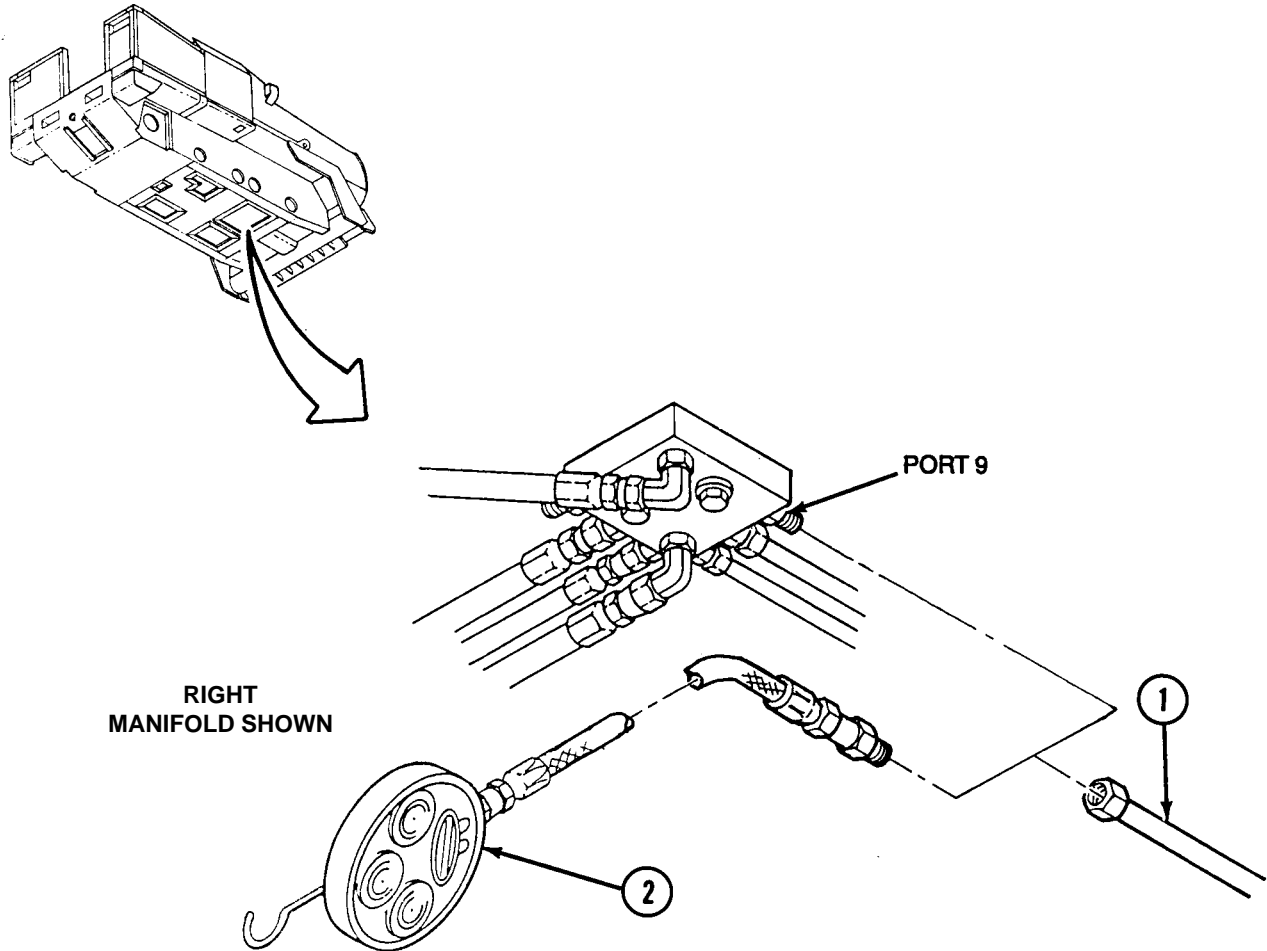
- Remove cotter pin (2), straight pin (3), and clevis (4) from control valve plunger (1). Discard cotter pin (2).
- Loosen jamnut (5). Turn clevis (4) clockwise to shorten rod (6); counterclockwise to lengthen rod (6).
- Hold measuring device (7) on face of SPRUNG/UNSPRUNG control valve. Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance of plunger travel.
- Coat threads of rod (6) with sealing compound primer and sealing compound. Tighten jamnut (5) against clevis (4).
- Connect clevis (4) to control valve plunger (1) with straight pin (3) and new cotter pin (2).

Refer to TM 5-5320-262-20-2.

8

**FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE
(CONTINUED)**





FORWARD MANIFOLD PRESSURE TEST

WARNING

Do not work under vehicle unless hull is blocked. Failure to comply may result in severe injury or death to personnel.

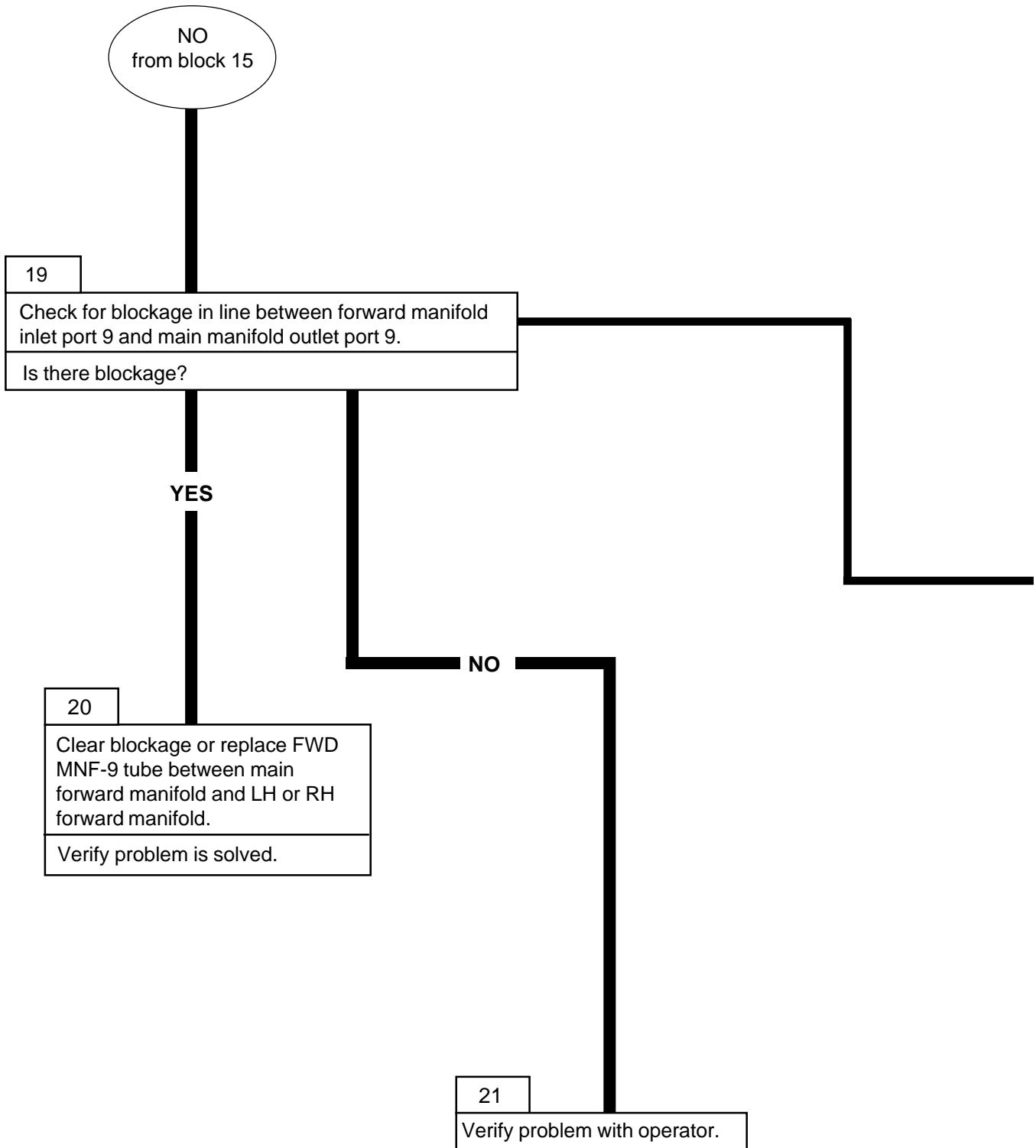
NOTE

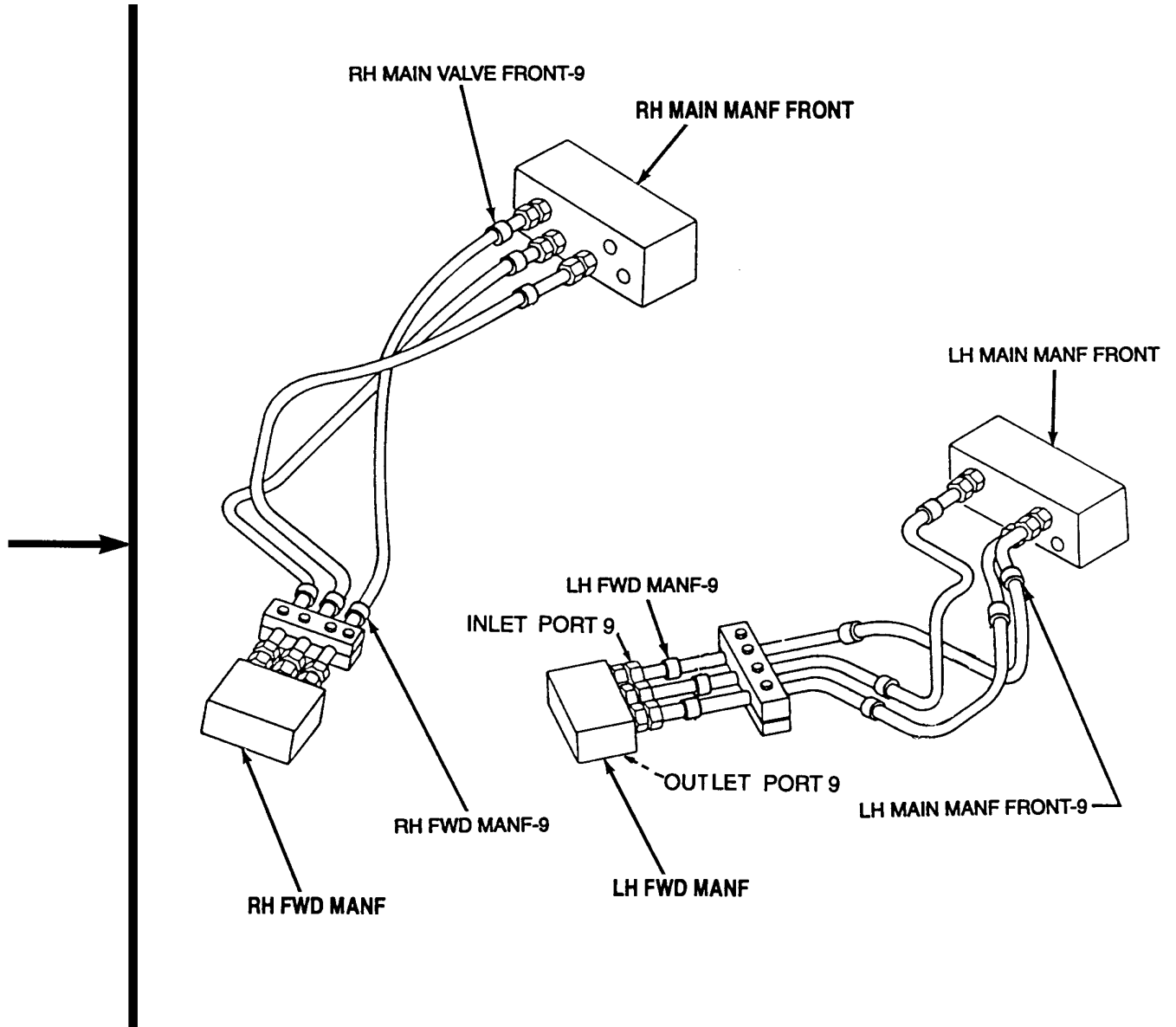
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect lines. Disconnect FWD MNF-9 tube (1) at forward manifold inlet port 9. Install pressure measuring device (2) at end of FWD MANF-9 tube (1). Cap port 9.
- Have assistant start engine and move SPRUNG/UNSPRUNG control valve lever to SPRUNG mode. Read pressure measuring device.
- Stop engine; relieve hydraulic pressure. Remove test equipment and connect hose.

8

**FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE
(CONTINUED)**





9

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE

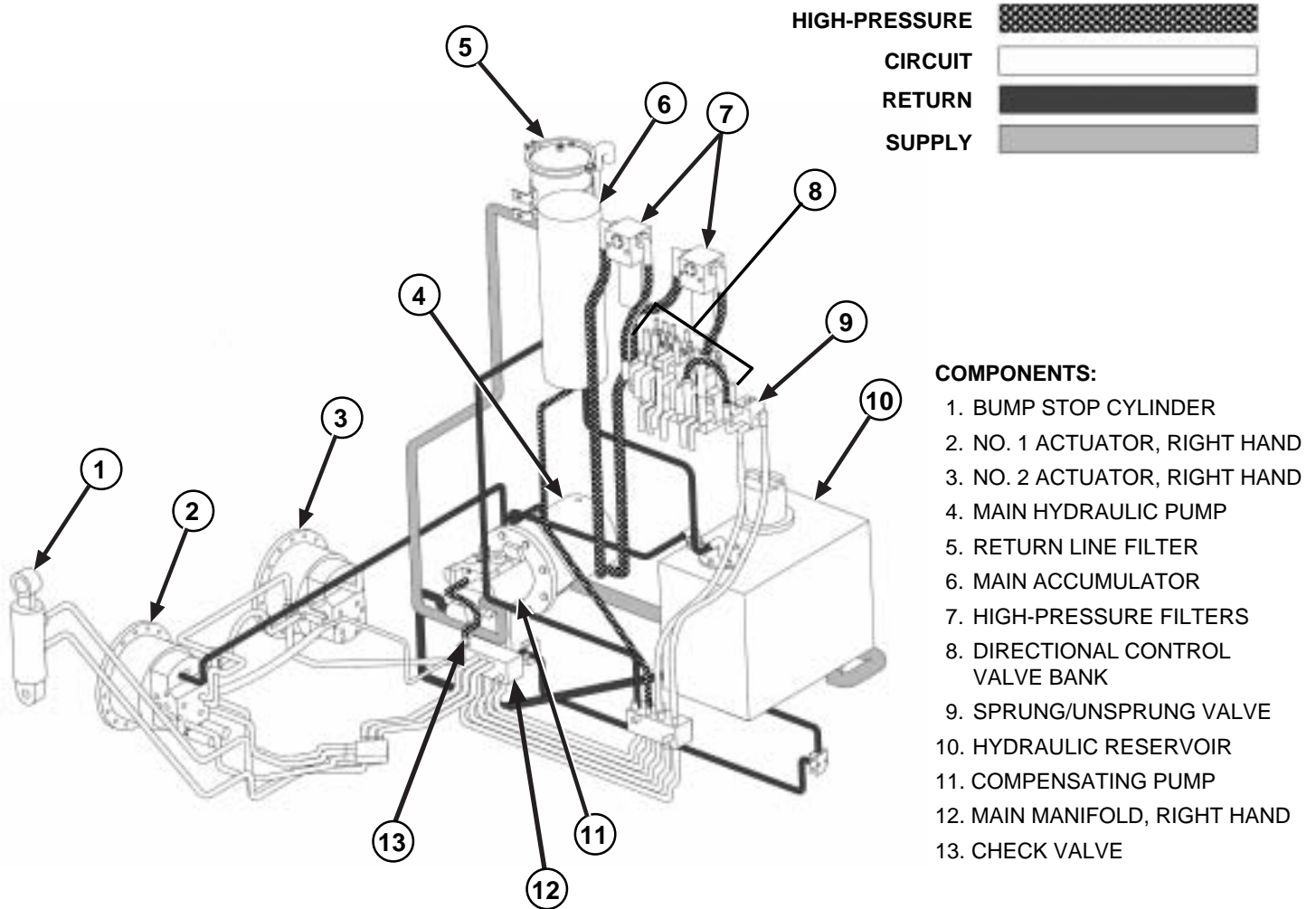
In SPRUNG mode, hydraulic pressure is delivered to front actuator through line 9. In UNSPRUNG mode, hydraulic pressure to raise front corner of vehicle is delivered through line 3.

WARNING

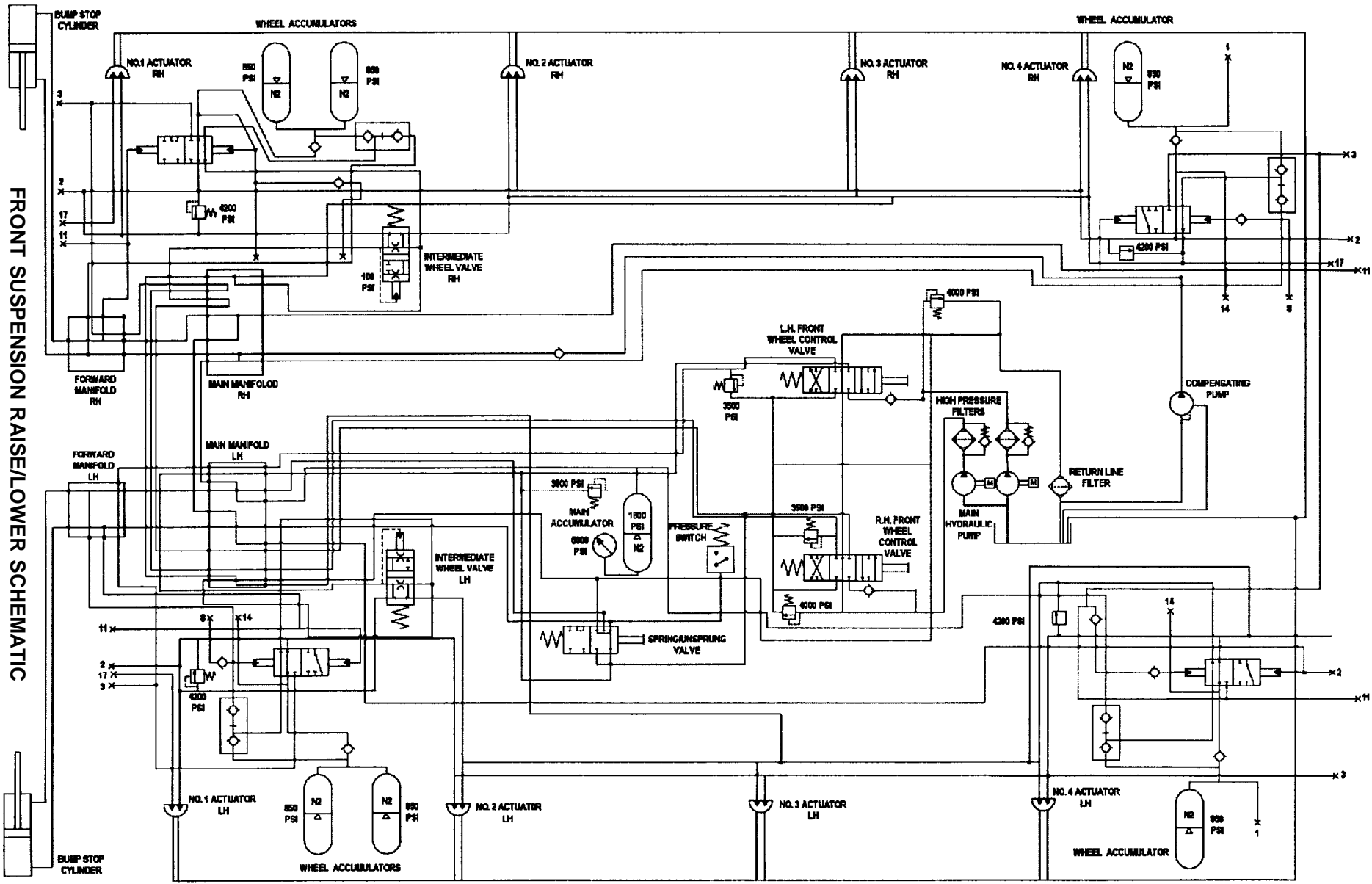
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right front of vehicle.



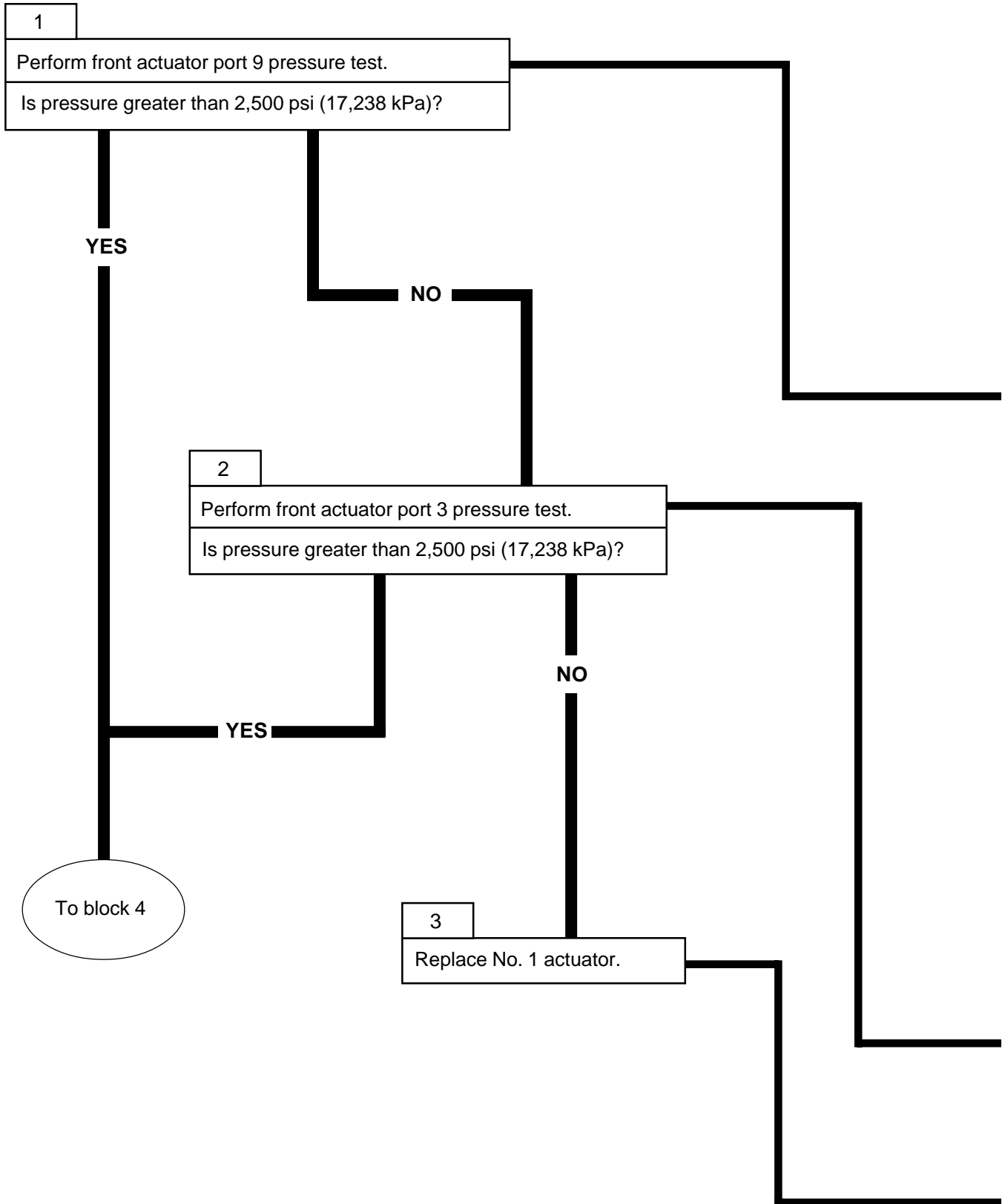
FRONT SUSPENSION RAISE/LOWER CIRCUIT

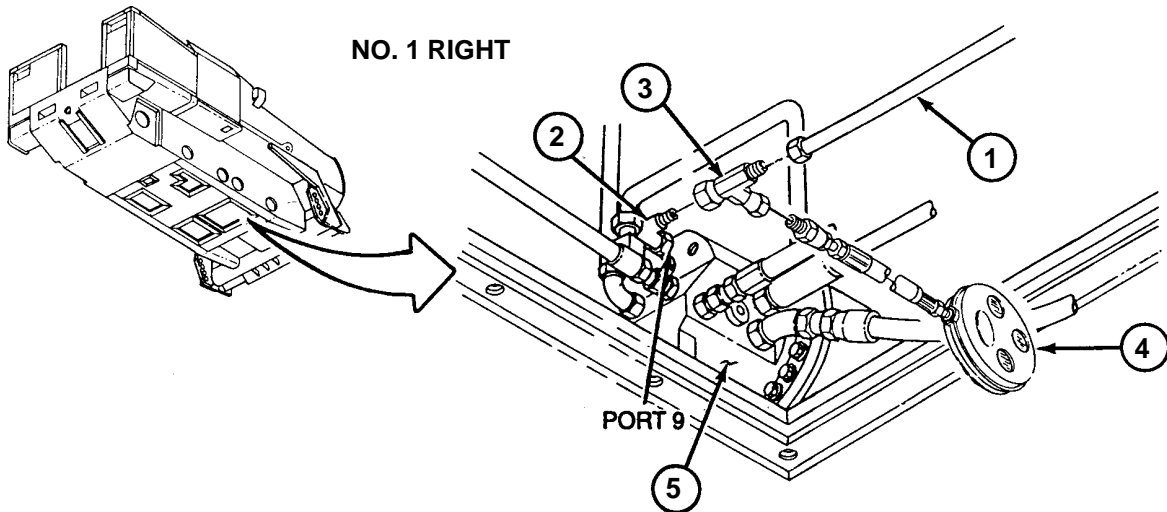


FRONT SUSPENSION RAISE/LOWER SCHEMATIC

9

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE (CONTINUED)





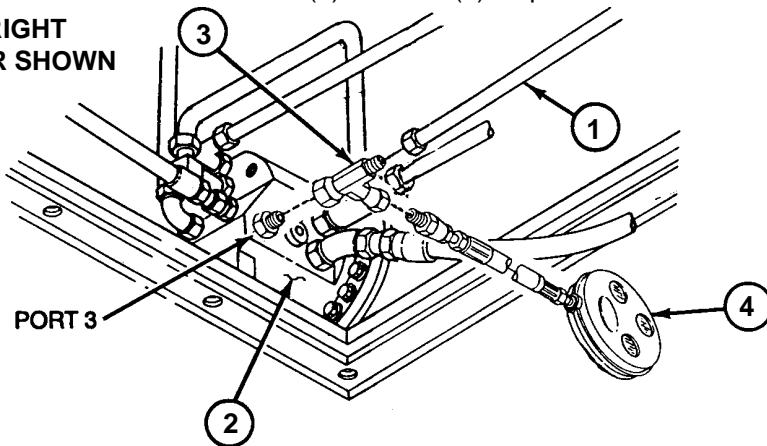
FRONT ACTUATOR PORT 9 PRESSURE TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Disconnect NO 1 SPNSN UNIT-9 hose (1) from elbow (2).
- Connect tee (3) and pressure measuring device (4) between NO 1 SPNSN UNIT-9 hose (1) and elbow (2) at port 9 on No. 1 actuator (5).
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to SPRUNG mode. Read pressure measuring device (4).
- Stop engine; relieve hydraulic pressure. Remove tee (3) and pressure measuring device (4) and connect NO 1 SPNSN UNIT-9 hose (1) to elbow (2) on port 9.

NO. 1 RIGHT ACTUATOR SHOWN



FRONT ACTUATOR PORT 3 PRESSURE TEST

NOTE

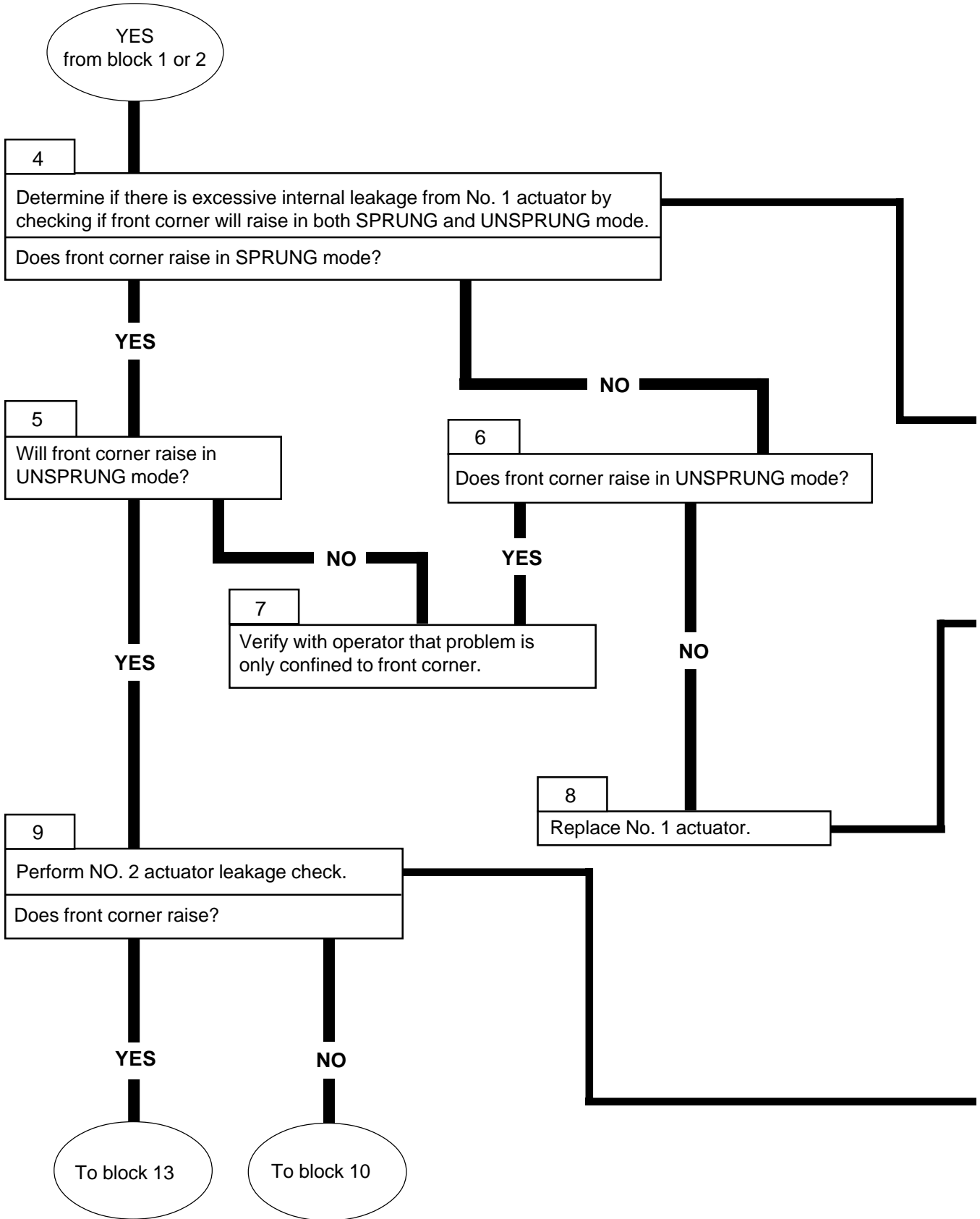
Have suitable container ready to catch oil.

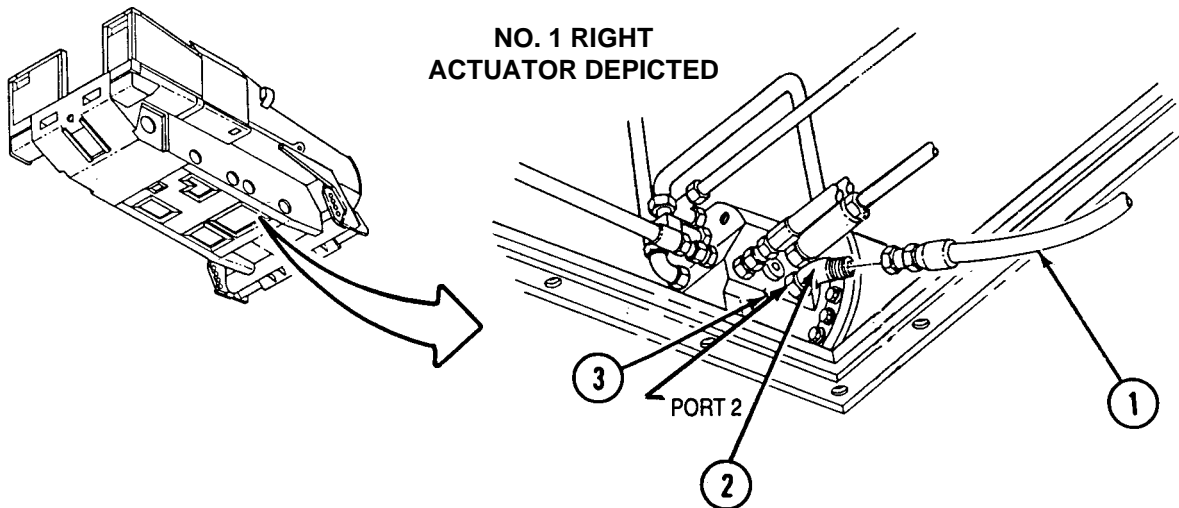
- Disconnect NO 1. SPNSN UNIT-3 hose (1) from port 3 on NO. 1 actuator (2).
- Connect tee (3) and pressure measuring device (4) between NO 1 SPNSN UNIT-3 hose (1) and port 3 on No. 1 actuator (2).
- Start engine. Have assistant move SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (4).
- Stop engine; relieve hydraulic pressure. Remove test equipment and connect lines.

Notify Direct Support maintenance.

9

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE (CONTINUED)





NO. 1 ACTUATOR LEAKAGE CHECK

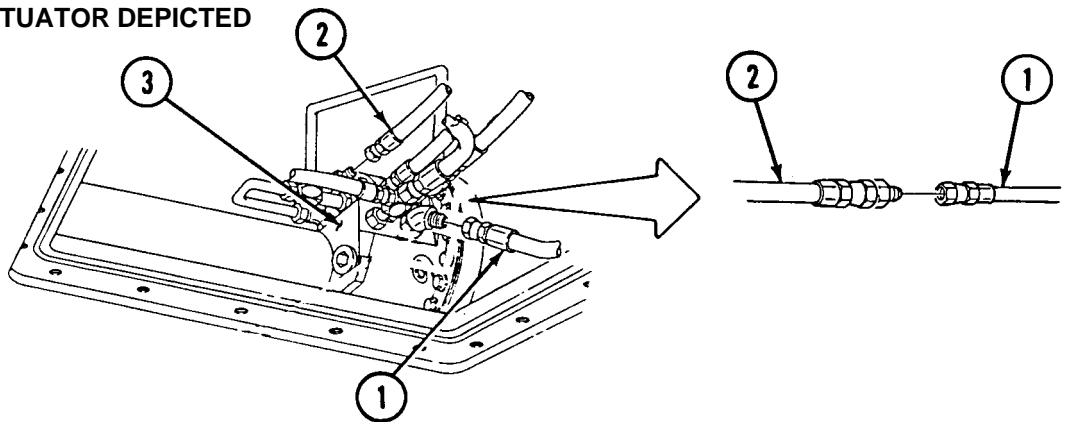
NOTE

Have suitable container ready to catch oil.

- Disconnect NO 1 SPNSN UNIT-2 hose (1) from elbow (2) at port 2 on No. 1 actuator (3). Cap elbow (2) and plug hose (1).
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to SPRUNG. Observe that corner of vehicle does raise.
- Have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to RAISE. Observe that corner of vehicle does raise.
- Stop engine; relieve hydraulic pressure and connect lines.

Notify Direct Support maintenance.

NO. 1 RIGHT ACTUATOR DEPICTED

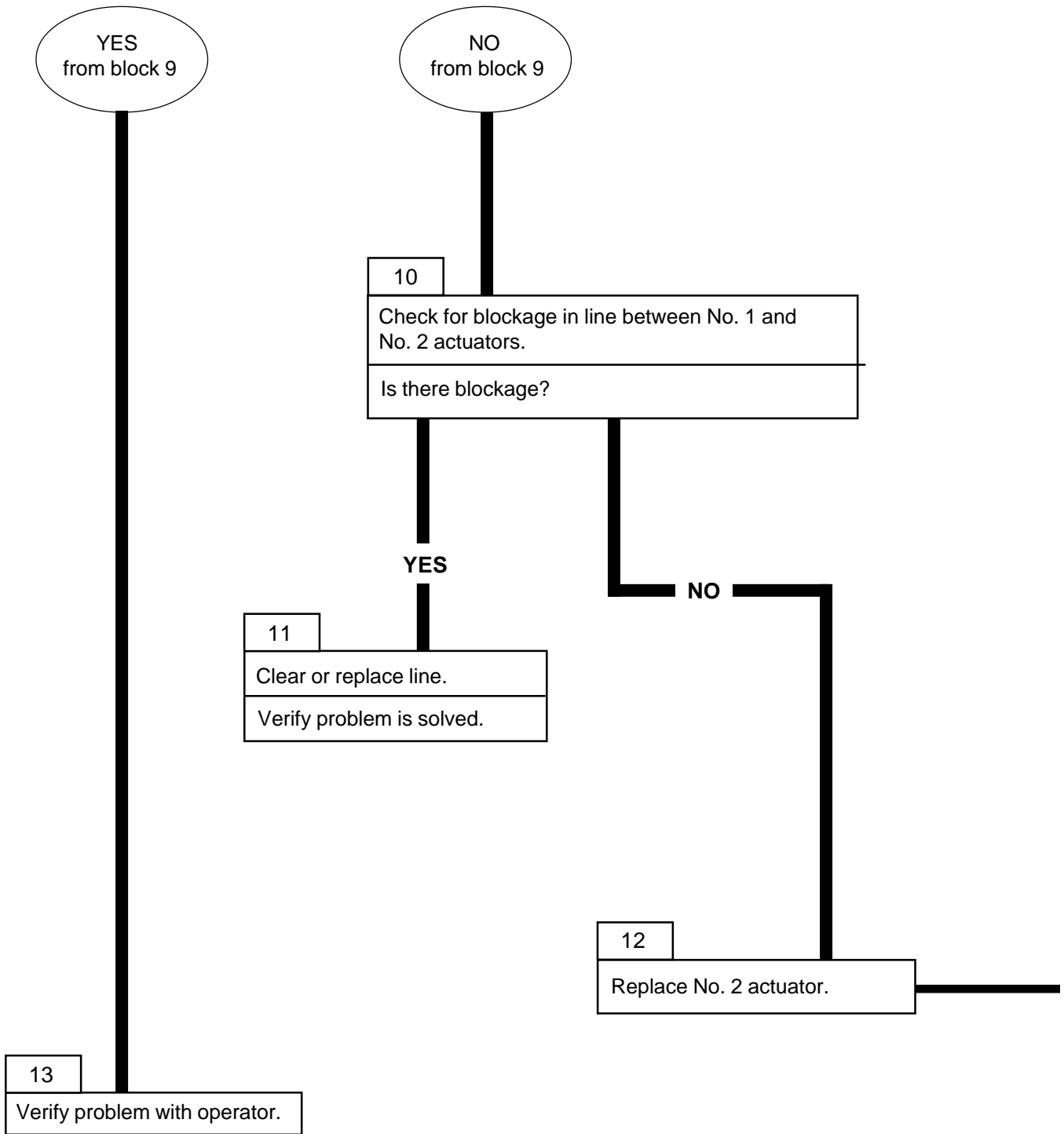


NO. 2 ACTUATOR LEAKAGE CHECK

- Connect NO 1 SPNSN UNIT-2 hose (1) to NO 1 SPNSN UNIT-3 hose (2).
- Start engine and move SUSPENSION CONTROL lever to RAISE. Excessive leakage is indicated if corner of vehicle fails to raise. If front corner does raise, problem is most likely in No. 1 actuator (3).
- Stop engine; relieve hydraulic pressure and connect lines.

9

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE (CONTINUED)





Notify Direct Support maintenance.

10

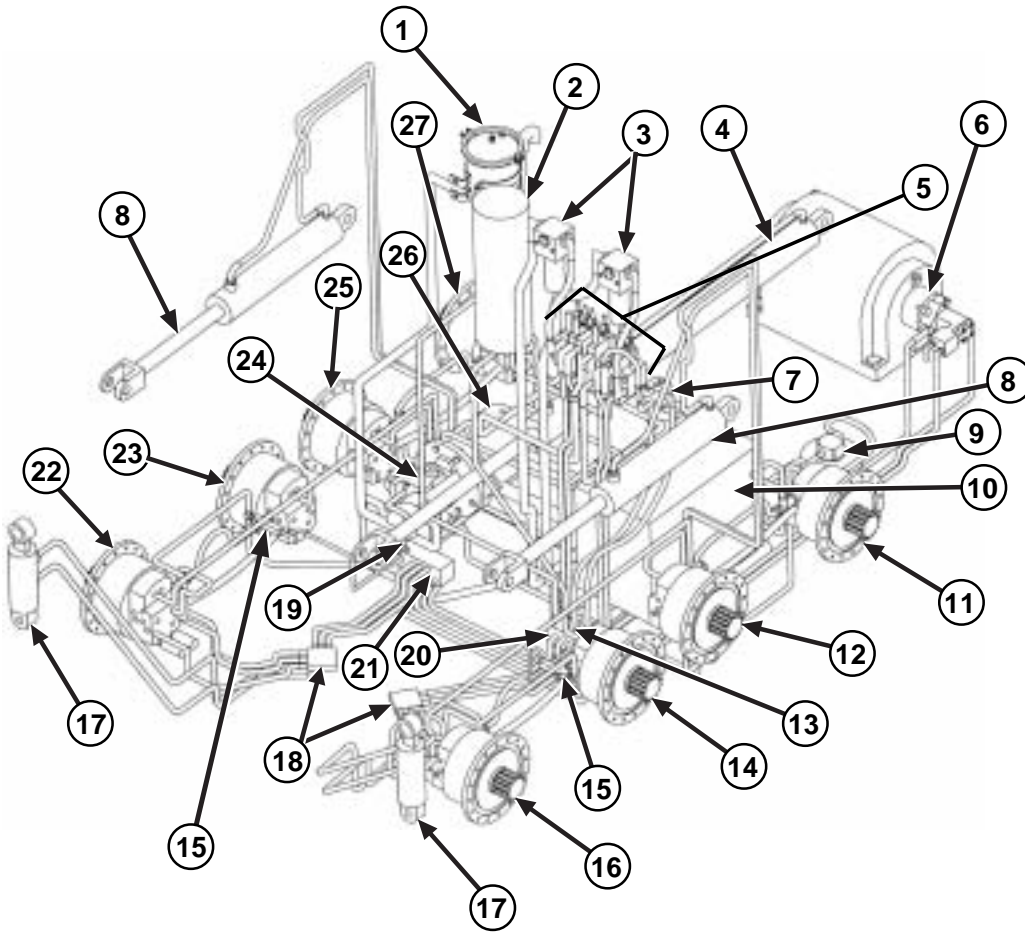
HYDRAULIC OIL OVERHEATS

WARNING

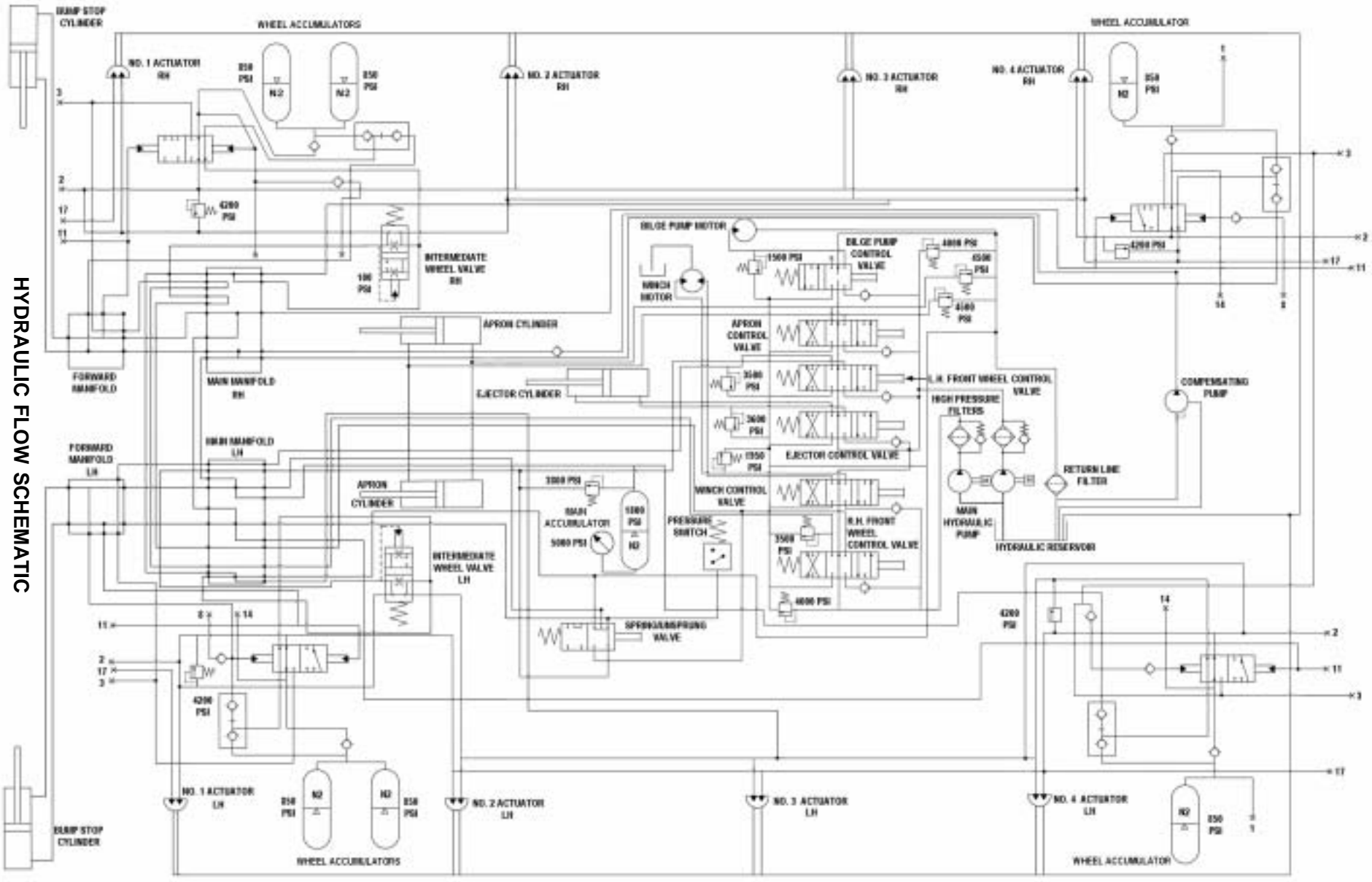
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

COMPONENTS:

1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. EJECTOR CYLINDER
5. DIRECTION CONTROL VALVE BANK
6. WINCH MOTOR
7. SPRUNG/UNSPRUNG VALVE
8. APRON CYLINDER
9. BILGE PUMP MOTOR
10. HYDRAULIC RESERVOIR
11. NO. 4 ACTUATOR, LEFT HAND
12. NO. 3 ACTUATOR, LEFT HAND
13. SUSPENSION RELIEF VALVE (BEHIND)
14. NO. 2 ACTUATOR, LEFT HAND
15. INTERMEDIATE WHEEL VALVE
16. NO. 1 ACTUATOR, LEFT HAND
17. BUMP STOP CYLINDERS
18. FORWARD MANIFOLDS
19. CHECK VALVE
20. MAIN MANIFOLD, LEFT HAND
21. FORWARD MANIFOLDS, RIGHT HAND
22. NO. 1 ACTUATOR, RIGHT HAND
23. NO. 2 ACTUATOR, RIGHT HAND
24. COMPENSATING PUMP
25. NO. 3 ACTUATOR, RIGHT HAND
26. MAIN HYDRAULIC PUMP
27. NO. 4 ACTUATOR, RIGHT HAND

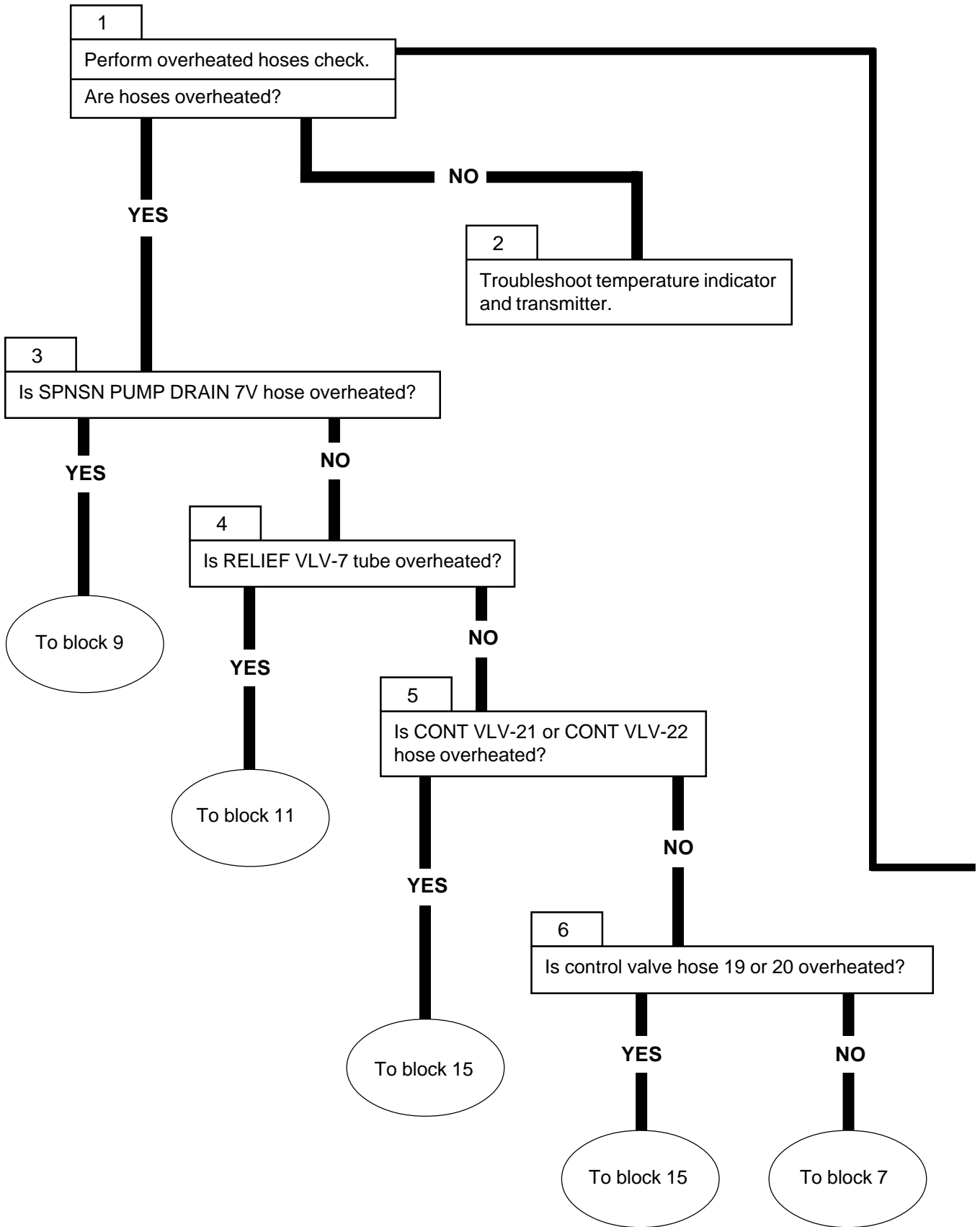


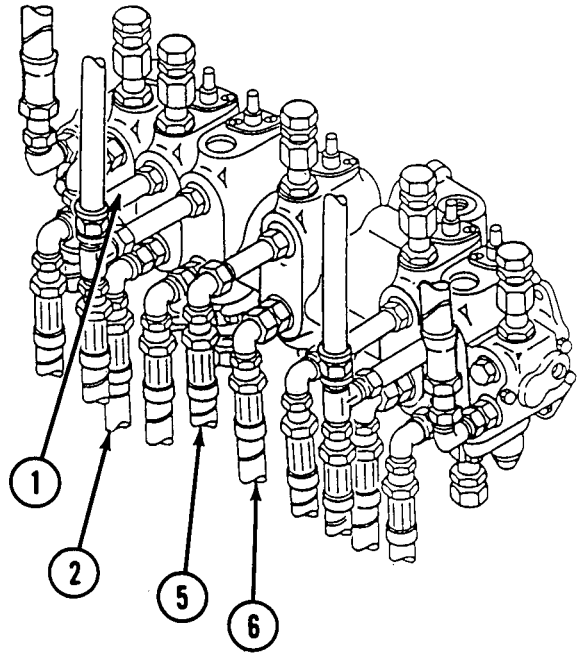
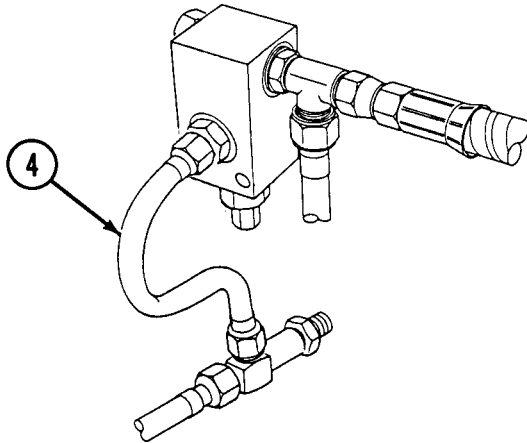
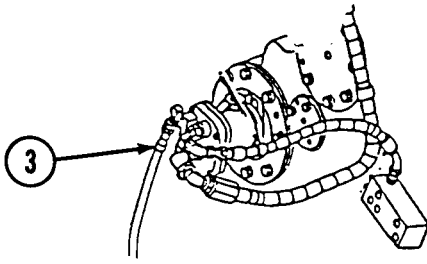
HYDRAULIC CIRCUIT



HYDRAULIC FLOW SCHEMATIC

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





WARNING

Before performing any troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

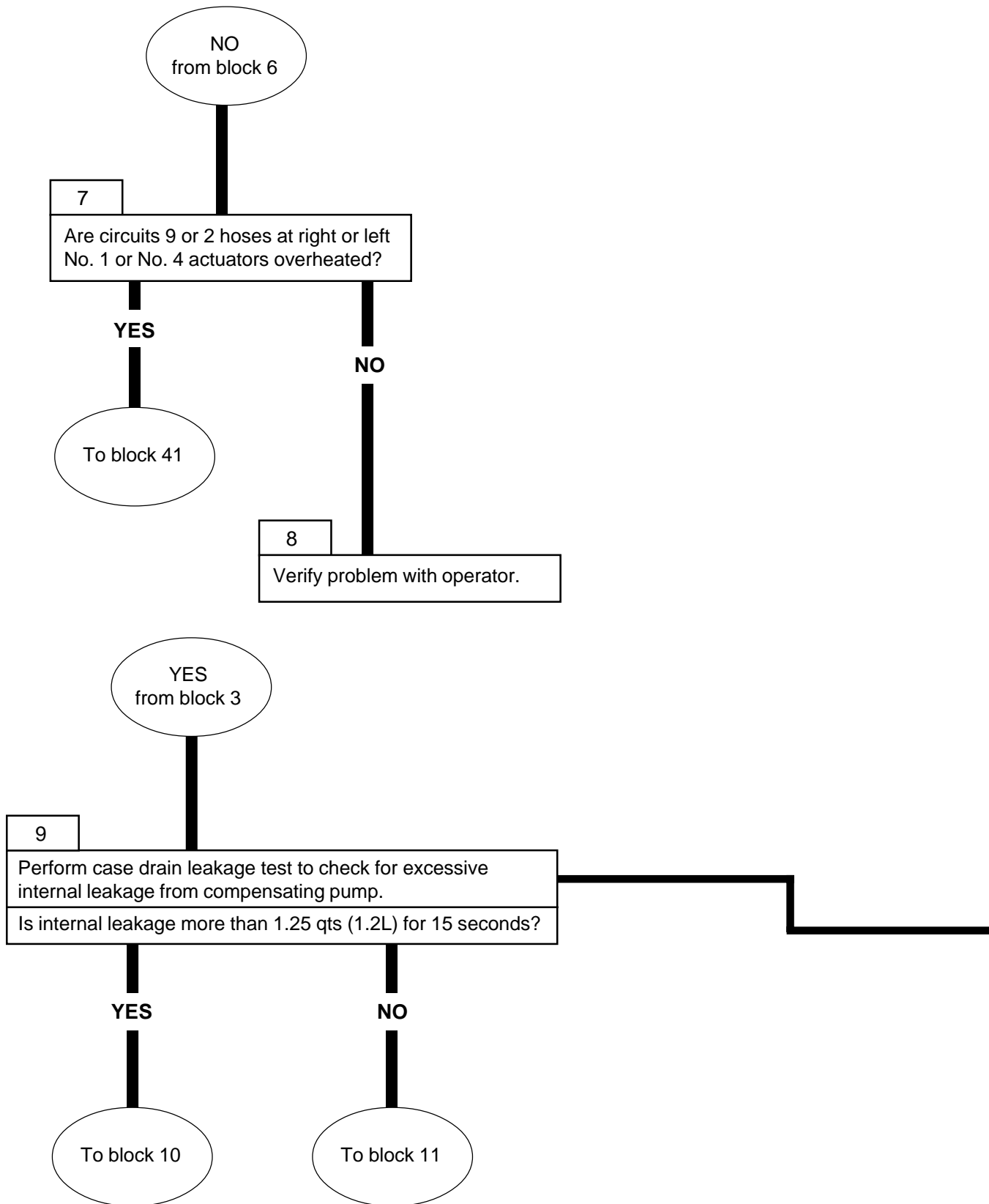
OVERHEATED HOSES CHECK

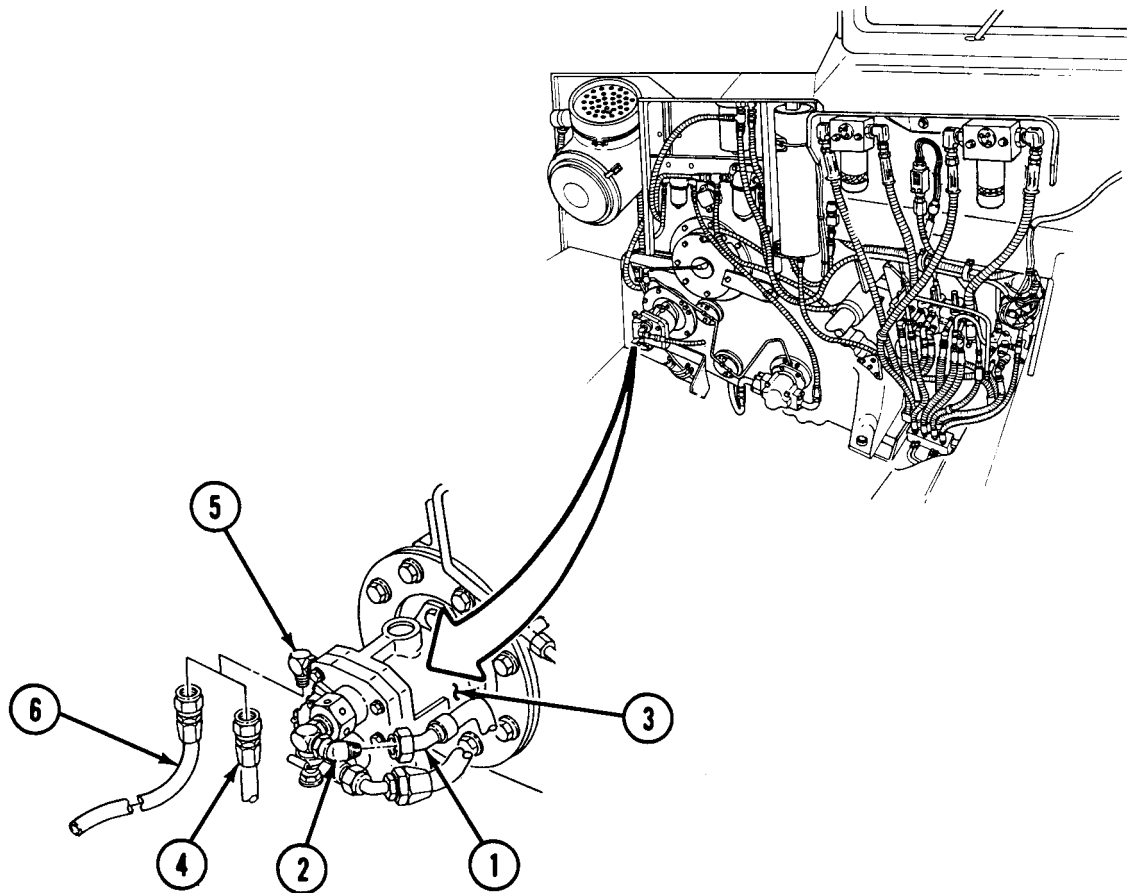
NOTE

Begin this procedure with the engine cold.

- Start engine and allow to run for about five minutes.
- As engine warms, carefully feel CONT VLV-19 (1), CONT VLV-20 (2), SPNSN PUMP DRAIN-7V hose (3), relief VLV-7 tube (4), CONT VLV-21 hose (5), and CON VLV-22 hose (6) with an ungloved hand. Hoses should feel warm but not hot.
- Cycle apron and ejector control levers for total oil flow through the systems.
- Operate vehicle for 1/2 hour. Stop and repeat steps 2 and 3 every 10 minutes to check if an overheated hose or tube can be detected.
- Stop engine; relieve hydraulic pressure.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





CASE DRAIN LEAKAGE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

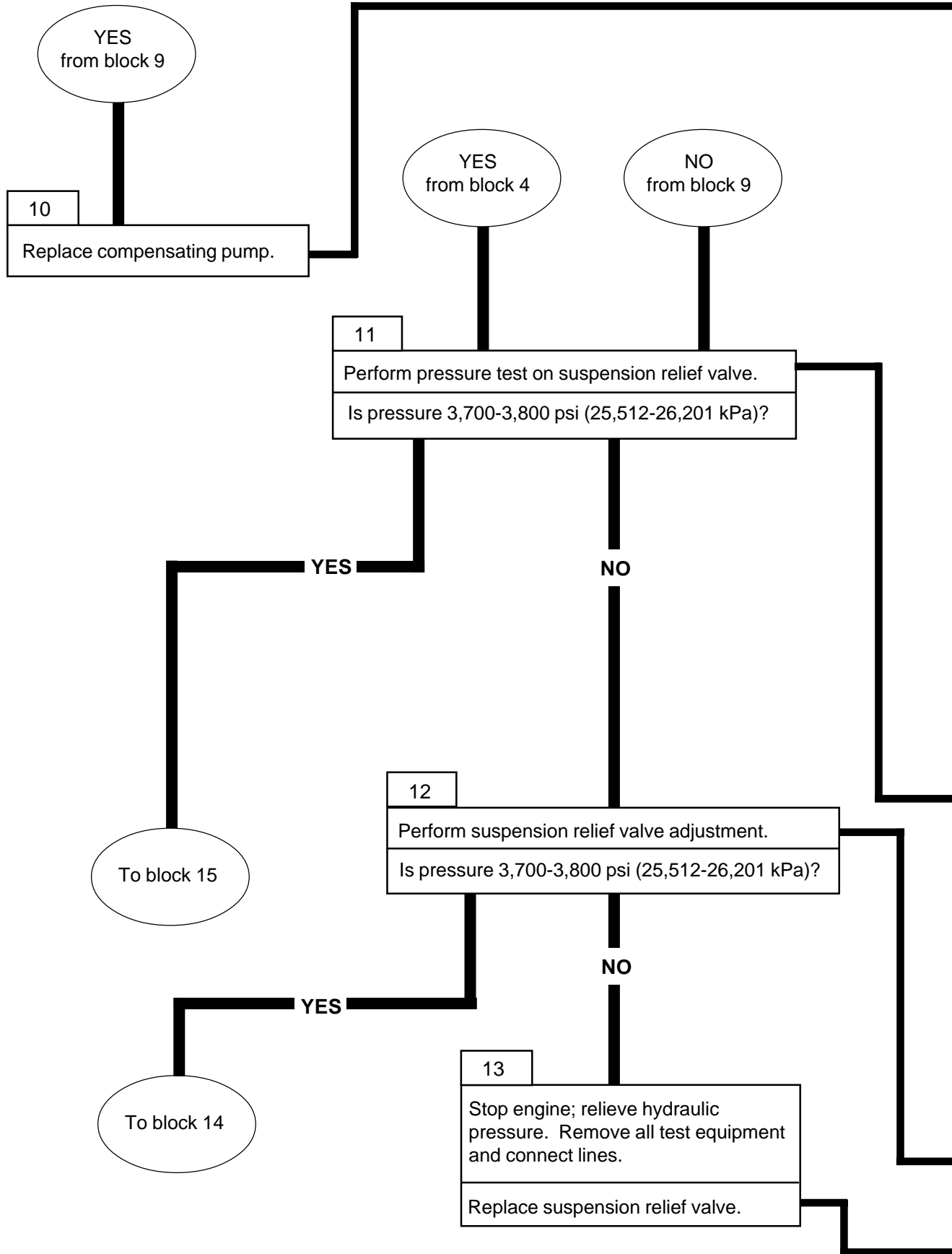
NOTE

Have a graduated container of at least two quart (1.9 liter) capacity available to catch hydraulic oil while test is being performed.

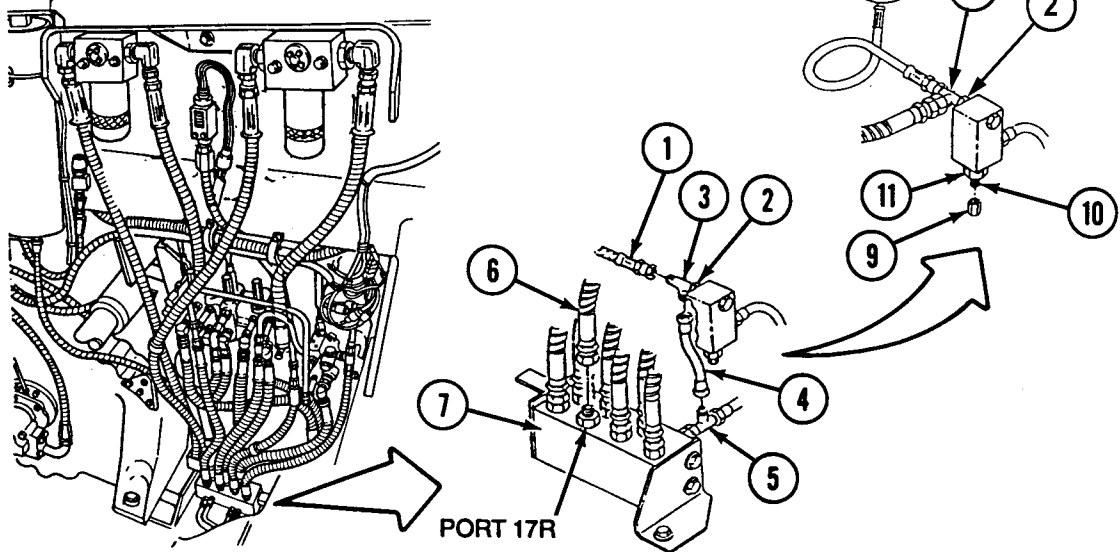
Have suitable container ready to catch oil.

- Start engine, move ejector forward, stop engine, engage ejector lock, and relieve hydraulic pressure.
- Disconnect SPNSN PUMP-9 hose (1) from elbow (2) on compensating pump (3). Cap elbow (2) and plug hose (1).
- Disconnect SPNSN PUMP DRAIN-7V hose (4) from elbow (5). Plug hose (4). Connect drain hose (6) to elbow (5).
- Hold end of drain hose (6) in graduated container.
- Have assistant start engine and run at 1,800 rpm for 15 seconds. Observe the quantity of hydraulic oil in container. More than 1.25 qts (1.2L) indicates excessive leakage.
- Stop engine; relieve hydraulic pressure, remove all test equipment, and connect hoses.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)



Refer to TM 5-2350-262-20-2



SUSPENSION RELIEF VALVE PRESSURE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

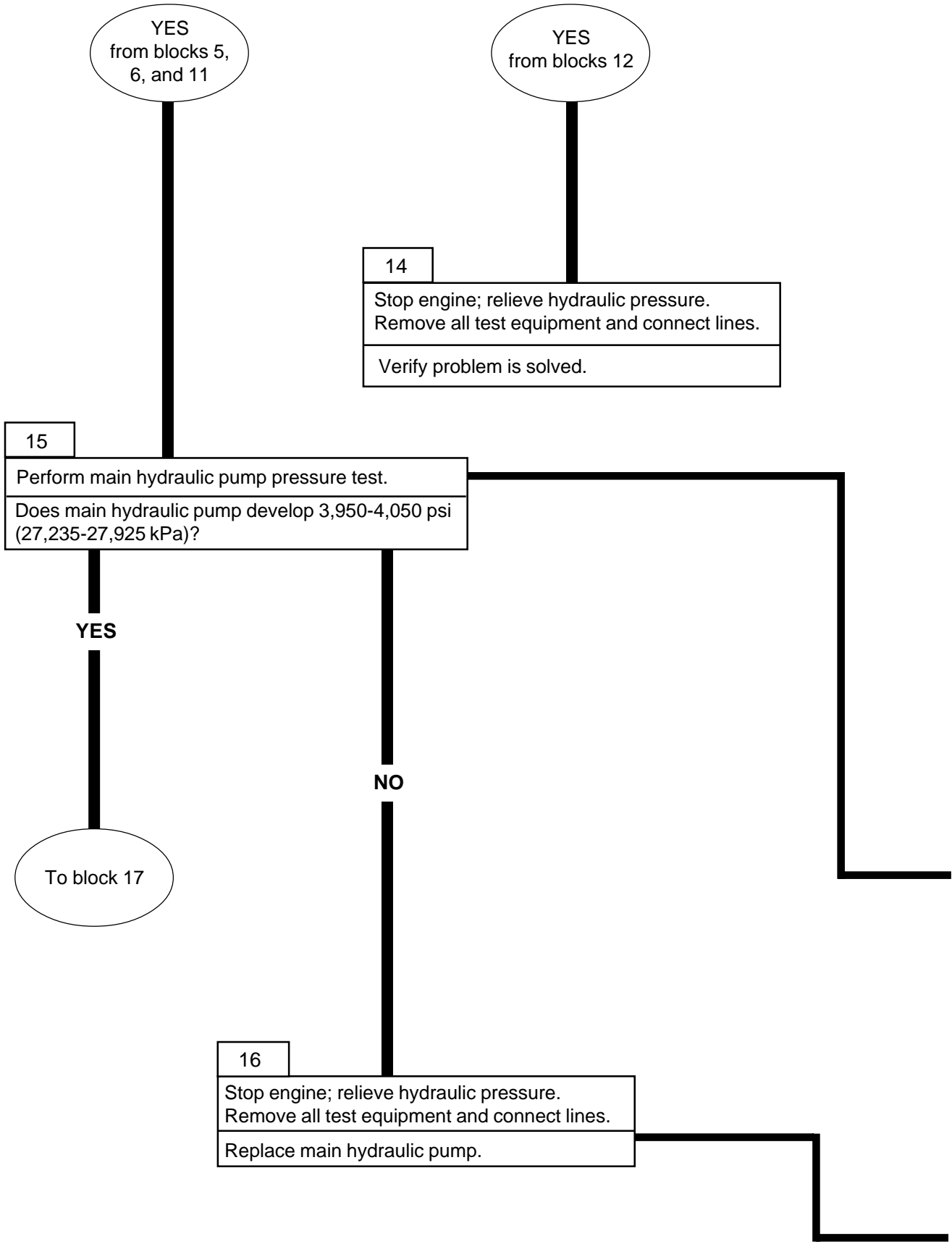
- Start engine, move ejector forward, engage ejector lock, stop engine, and relieve hydraulic pressure.
- Disconnect RELIEF VLV-9 hose (1) and loosen jamnut (2) on suspension relief valve tee (3). Plug hose (1).
- Disconnect RELIEF VLV-9 tube (4) from suspension relief valve tee (3) and rear left-hand main manifold tee (5). Cap tee (5).
- Rotate suspension relief valve tee (3) 90° toward front of vehicle. Tighten jamnut (2).
- Disconnect LH MAIN MANF TOP-17R hose (6) from port 17R on left-hand main manifold (7) and connect it to suspension relief valve tee (3). Cap port 17R.
- Connect pressure measuring device (8) to suspension relief valve tee (3).
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG and SUSPENSION CONTROL lever to LOWER. Read pressure measuring device (8).

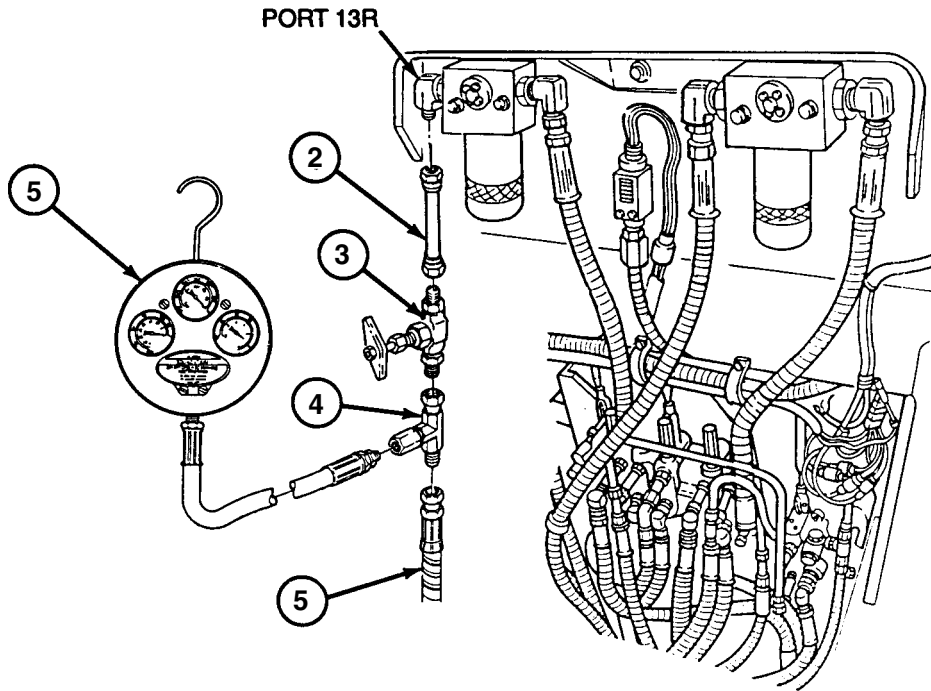
SUSPENSION RELIEF VALVE ADJUSTMENT

- Adjust the pressure as follows: remove cap (9) from suspension relief valve adjusting shaft (10) and loosen jamnut (11).
- Turn adjusting shaft (1) clockwise to increase pressure; counterclockwise to decrease pressure. Read pressure measuring device (8). Tighten jamnut (11) and replace cap (9).

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





MAIN HYDRAULIC PUMP PRESSURE TEST

WARNING

Before performing any troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in injury or death to personnel and damage to equipment.

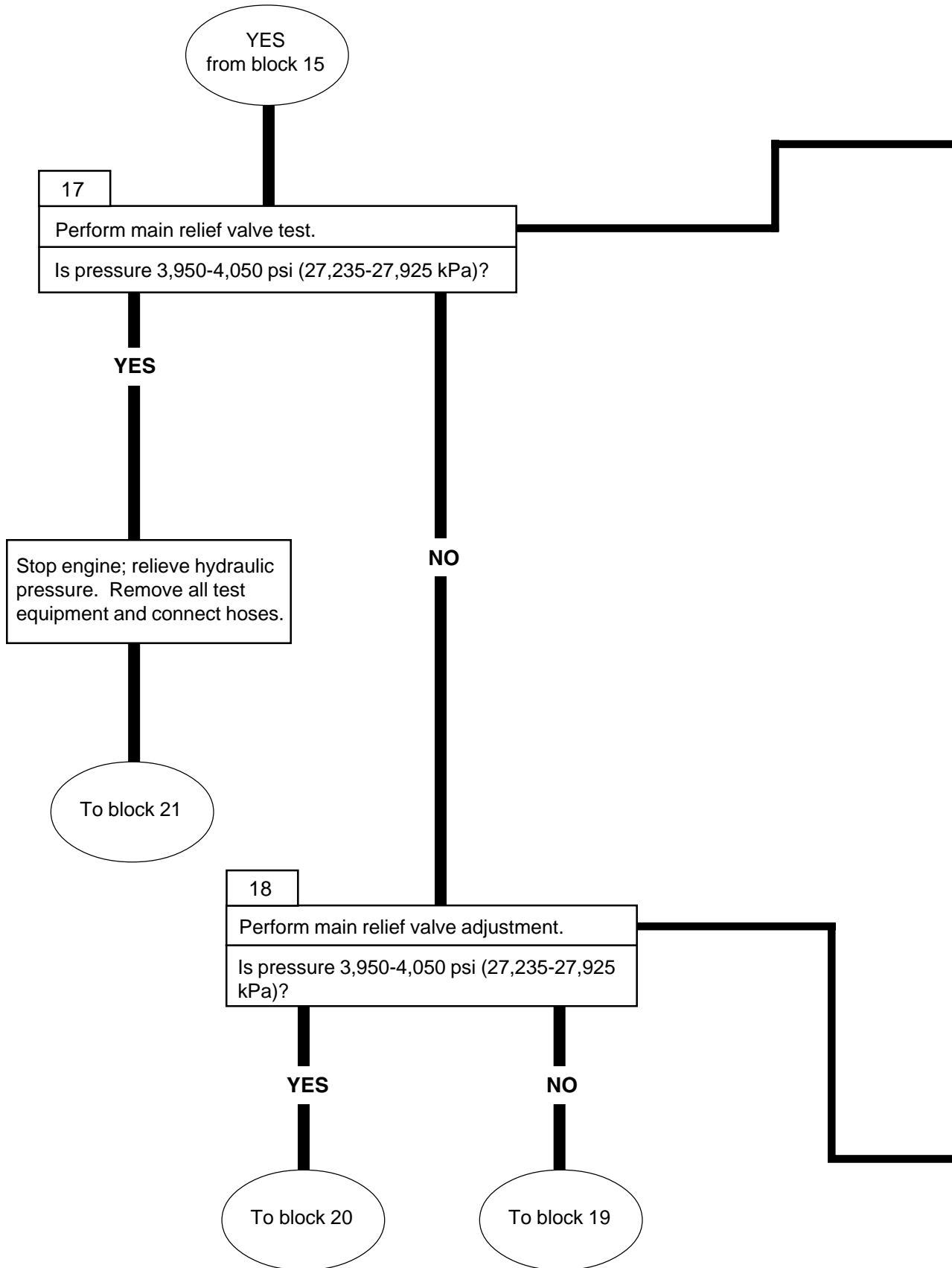
NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.
- Disconnect HYDR FLTR-IN-13R hose (1) from high-pressure filter inlet port 13R.
- Install coupling tube (2), globe valve (3), tee (4), and pressure measuring device (5) between HYDR FLTR-IN-13R hose (5) and high-pressure filter inlet port 13R.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (3) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (3).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)



MAIN RELIEF VALVE TEST

WARNING

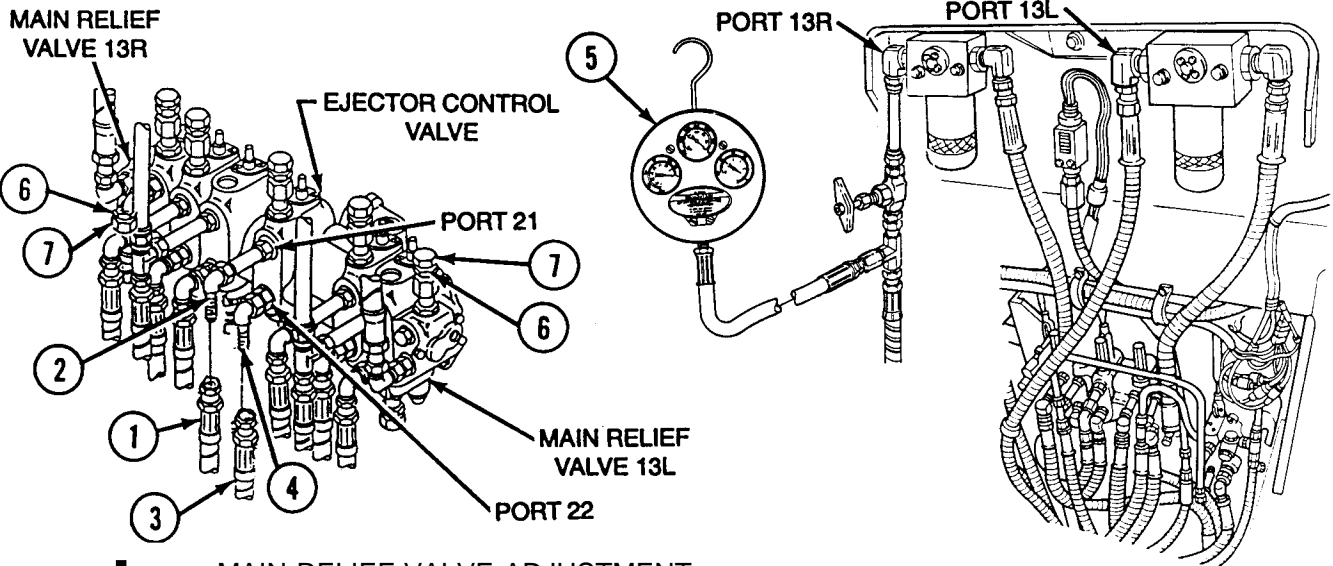
Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

When moving test equipment to high-pressure filter inlet port 13L, the coupling tube and globe valve installed during the main hydraulic pump test will not be required.

Have suitable container ready to catch oil.

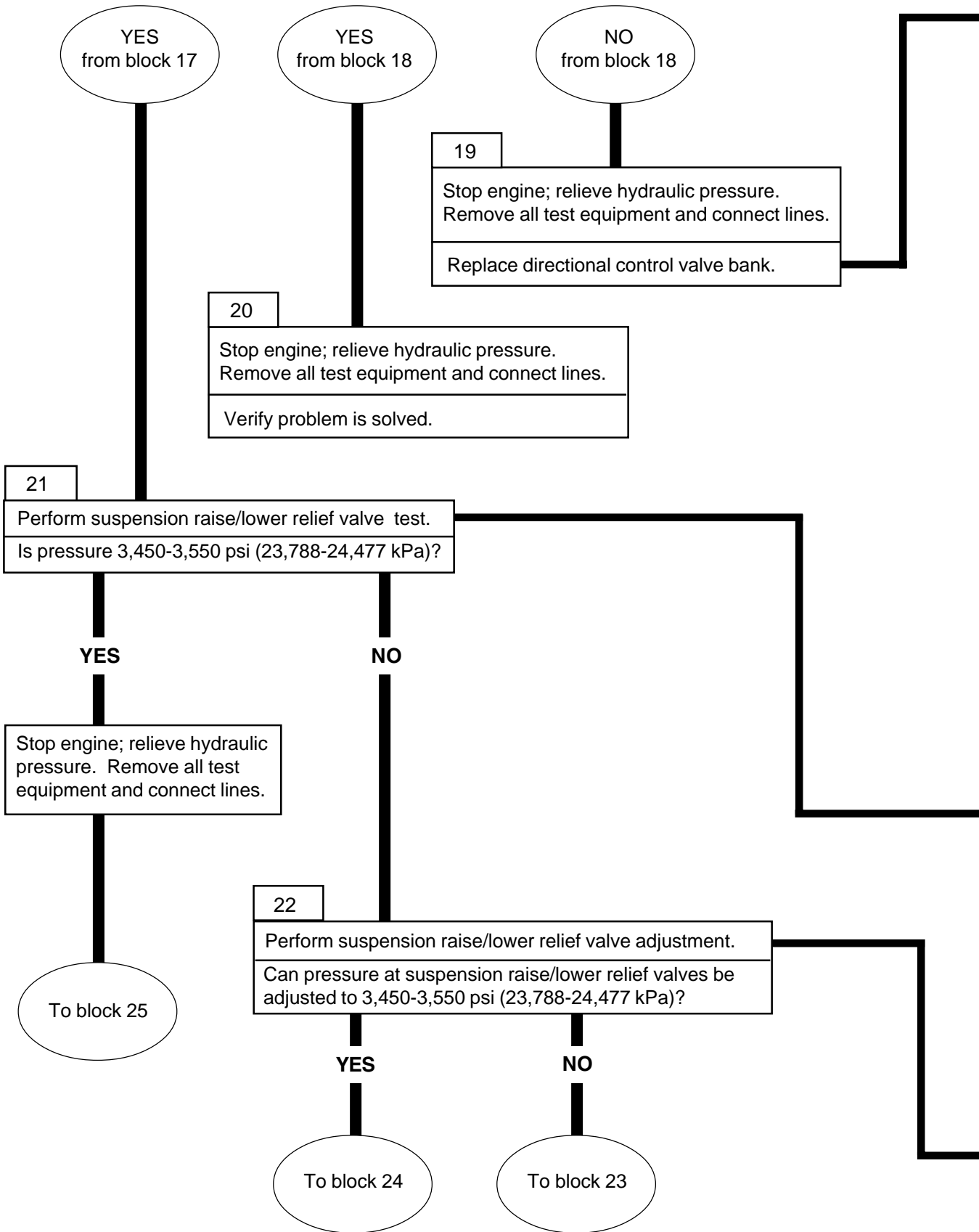
- Start engine, move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector by disconnecting CONT VLV-21 at port 22 on ejector control valve. Plug hoses; cap elbows.
- Start engine; have assistant hold EJECTOR CONTROL lever in BACK position. Read pressure measuring device (5). Check main relief valves 13R and 13L individually as follows:
- With SPRUNG/UNSPRUNG lever in SPRUNG position, have assistant move right-hand SUSPENSION CONTROL lever to RAISE while, at the same time, holding the EJECTOR CONTROL lever in BACK. Read pressure measuring device (5). If the pressure is not within limits adjust the main relief valve 13R.

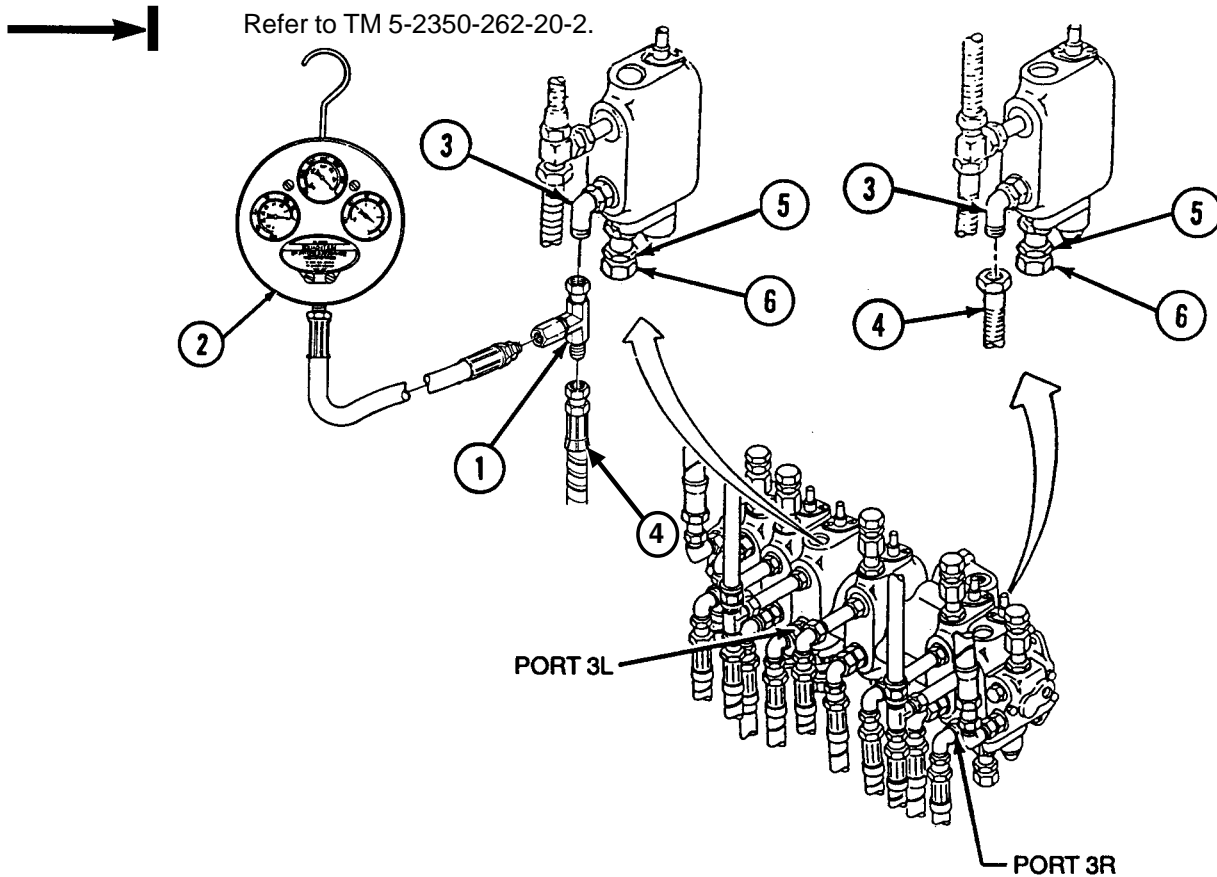


MAIN RELIEF VALVE ADJUSTMENT

- Loosen jamnut (6) on main relief valve 13R.
- Have assistant simultaneously hold EJECTOR CONTROL lever in BACK while holding the right-hand SUSPENSION CONTROL lever in RAISE.
- Rotate adjusting screw (7) on main relief valve 13R clockwise to increase pressure and counterclockwise to decrease pressure. Once hydraulic pressure is within limits, tighten jamnut (6).
- Stop engine; relieve hydraulic pressure.
- Move test equipment to high-pressure filter inlet port 13L and repeat the previous steps using the left-hand SUSPENSION CONTROL lever.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





SUSPENSION RAISE/LOWER RELIEF VALVE TEST

NOTE

This test is done at both right-hand and left-hand suspension raise/lower relief valves. For the right-hand valve, install test equipment at port 3R and actuate the right-hand SUSPENSION CONTROL lever. For the left-hand valve, install test equipment at port 3L and actuate the left-hand SUSPENSION CONTROL lever.

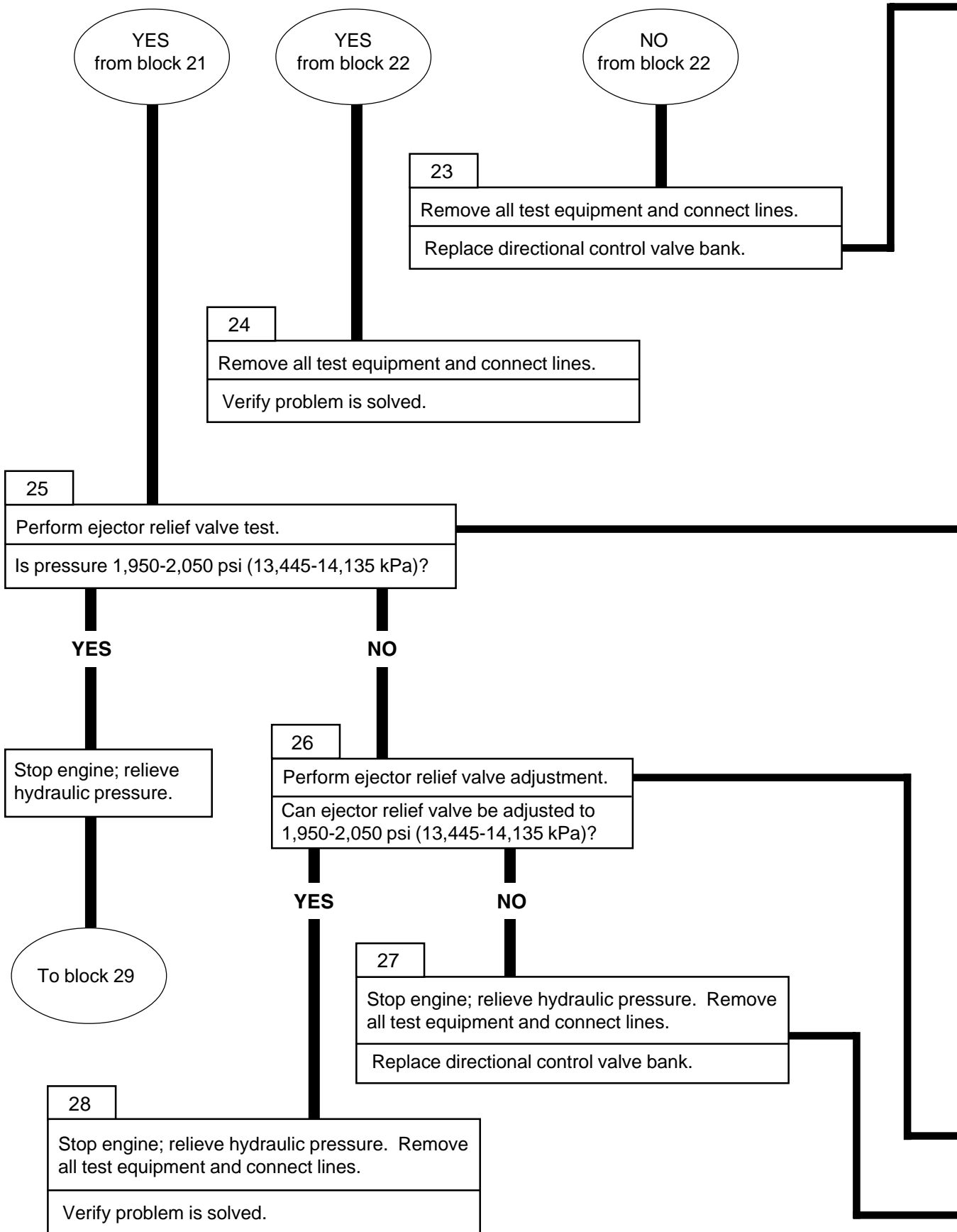
Have suitable container ready to catch oil.

- Install tee (1) and pressure measuring device (2) between elbow (3) on port 3R or port 3L and port 3 hose (4).
- Have assistant start engine and move SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (2). Adjust pressure.

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT

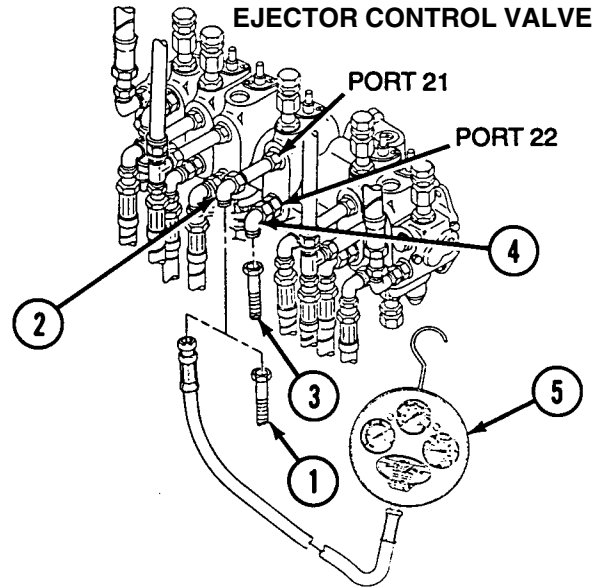
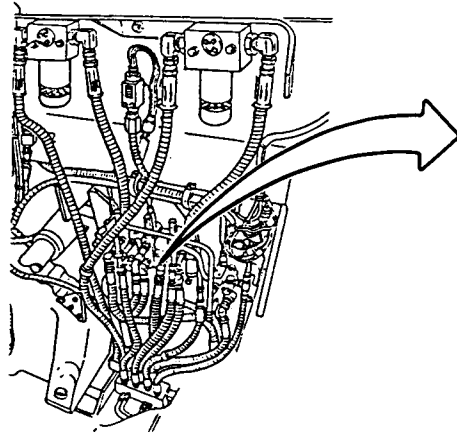
- Loosen jamnut (5) on port 3R or port 3L of suspension raise/lower relief valve.
- With SUSPENSION CONTROL lever still in RAISE, turn adjusting screw (6) clockwise to increase pressure; counterclockwise to decrease pressure.
- Tighten jamnut (5).
- Stop engine; relieve hydraulic pressure.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





Refer to TM 5-2350-262-20-1



EJECTOR RELIEF VALVE TEST

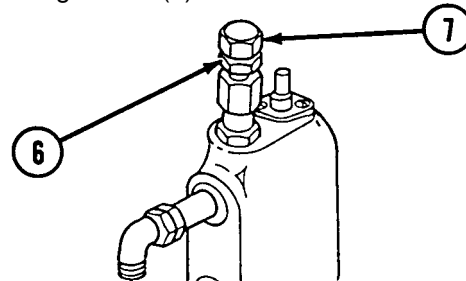
WARNING

Before performing any hydraulic troubleshooting in bowl, move the ejector forward and disable it by disconnecting the ejector cylinder from the hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Move ejector halfway forward, stop engine, and relieve hydraulic pressure.
- Disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (1) from elbow (2) on port 21 of ejector control valve and CONT VLV-22 hose (3) from elbow (4) on port 22. Cap elbow (4) on port 22 and plug hoses (1 and 3)
- Connect pressure measuring device (5) to elbow (2) on port 21 of ejector control valve.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read pressure measuring device (5).



EJECTOR CONTROL VALVE

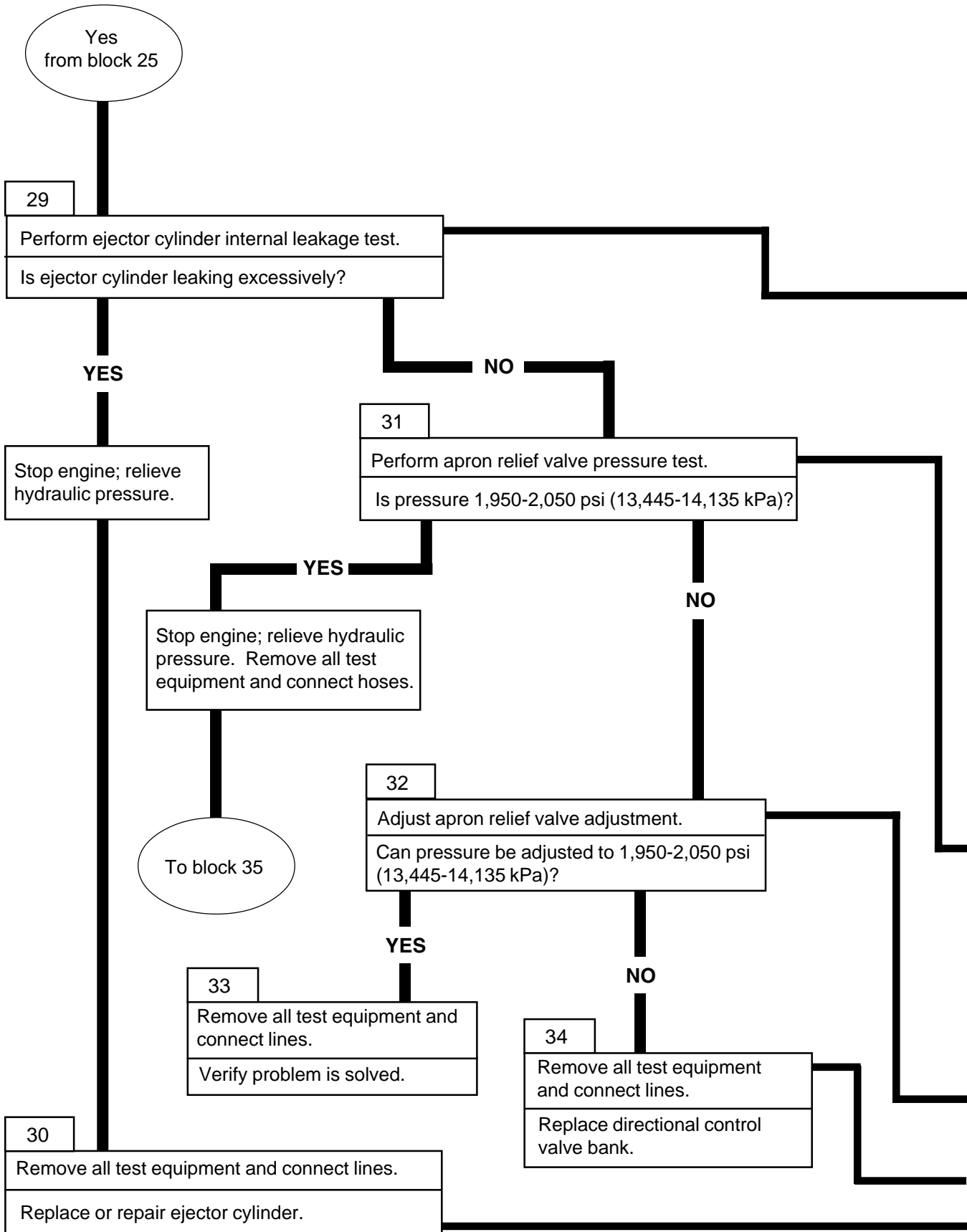
EJECTOR RELIEF VALVE ADJUSTMENT

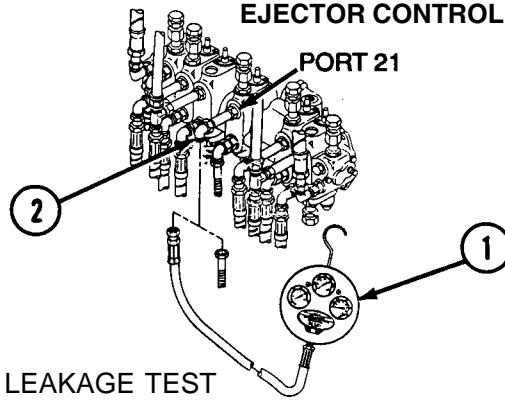
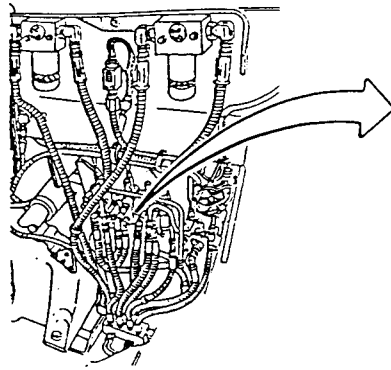
Loosen jamnut (6) on ejector relief valve and turn valve (7) clockwise or counterclockwise until pressure is within limits. Tighten jamnut (6).



Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)



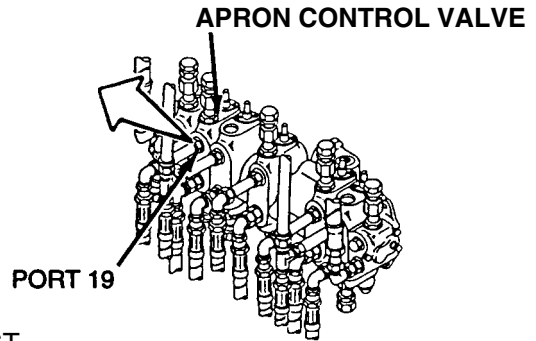
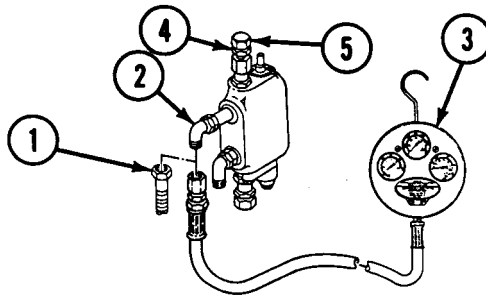


EJECTOR CYLINDER INTERNAL LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Remove pressure measuring device (1) from elbow (2) on port 21 of ejector control valve. Cap port 21.
- Start engine and have assistant hold EJECTOR CONTROL lever in the BACK position for one minute. Mark position of ejector at side of hull and continue to hold valve lever in the BACK position for one more minute. Check position of ejector while still holding valve lever in the BACK position. If ejector has moved more than 1/2 in (12 mm), the ejector cylinder is leaking excessively.



APRON RELIEF VALVE PRESSURE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Move ejector forward, engage ejector lock, stop engine, and relieve hydraulic pressure.
- Disconnect CONT VLV-19 hose (1) from elbow (2) at port 19 of apron control valve. Connect pressure measuring device (3) to elbow (2). Plug hose (1).
- Have assistant start engine and hold APRON CONTROL lever in UP position. Read pressure measuring device (3). If pressure is low, adjust apron raise relief valve.

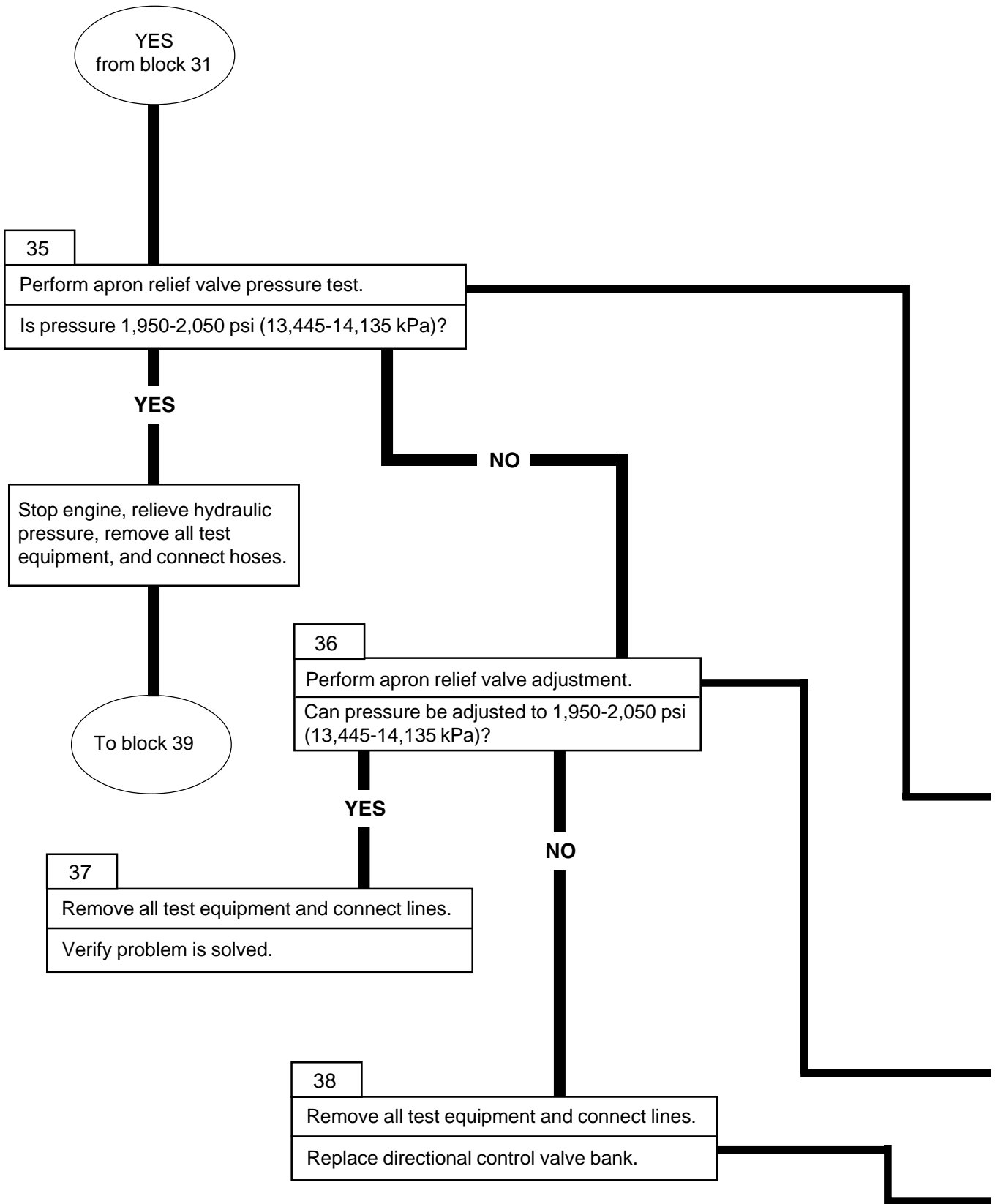
APRON RELIEF VALVE ADJUSTMENT

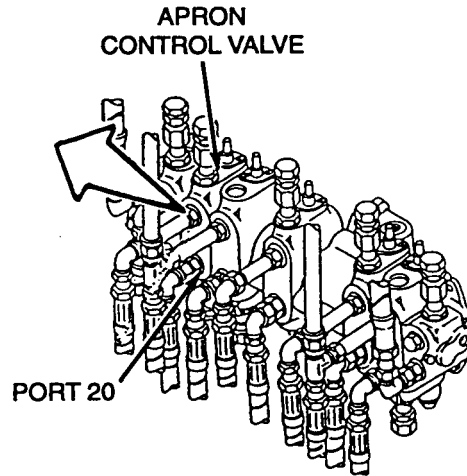
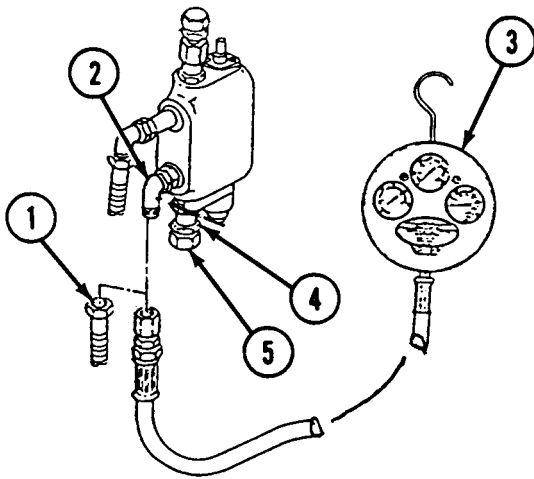
- As assistant holds APRON CONTROL lever in UP position, loosen jamnut (4), and rotate adjusting screw (5) clockwise to increase pressure; counterclockwise to decrease pressure.
- Tighten jamnut (4). Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





APRON RELIEF VALVE PRESSURE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

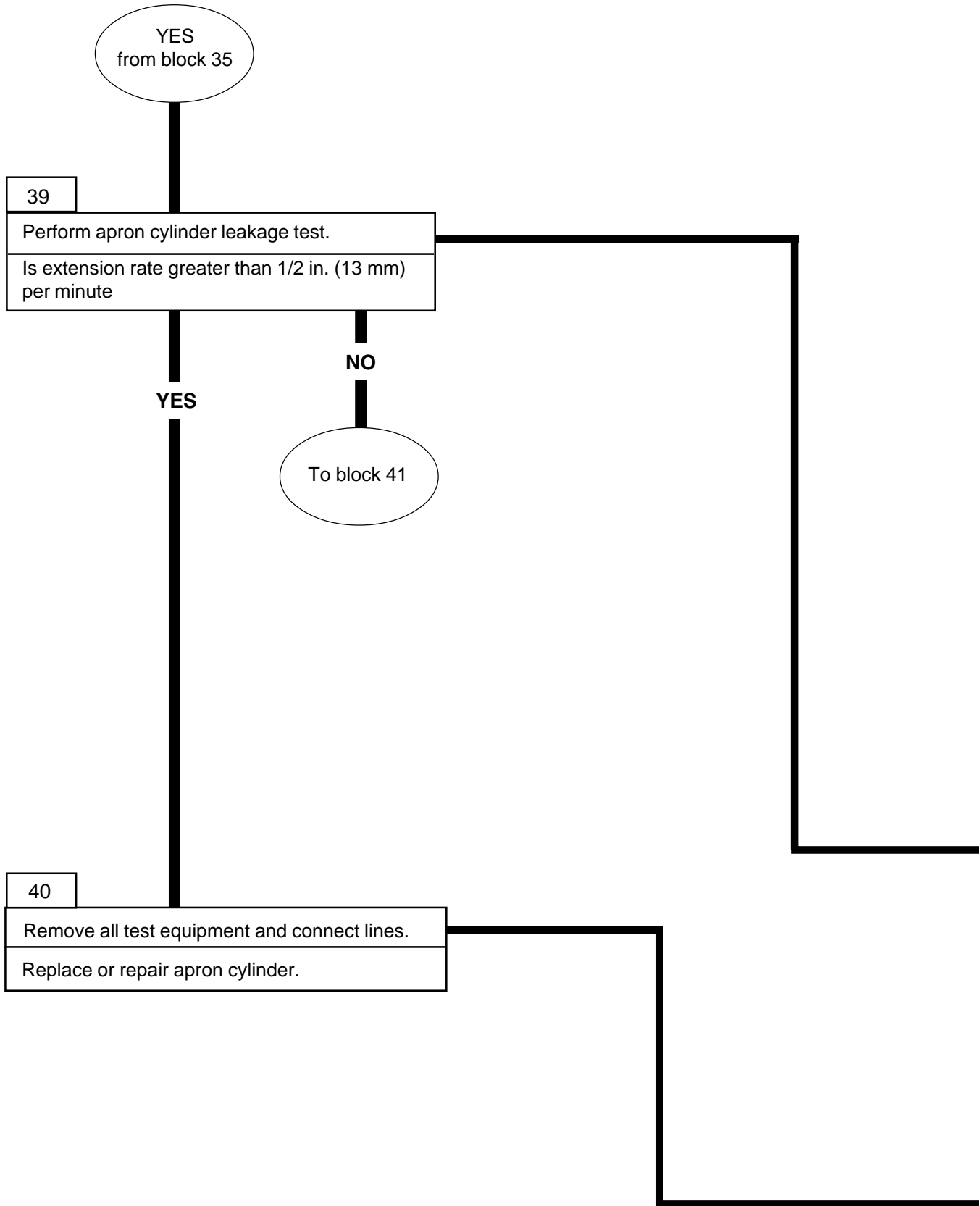
- Start engine, move ejector forward, engage ejector lock, stop engine, and relieve hydraulic pressure.
- Disconnect CONT VLV-20 hose (1) from elbow (2) at port 20 of apron control valve. Connect pressure measuring device (3) to elbow (2). Plug hose (1).
- Have assistant start engine and hold APRON CONTROL lever in DOWN position. Read pressure measuring device (3).

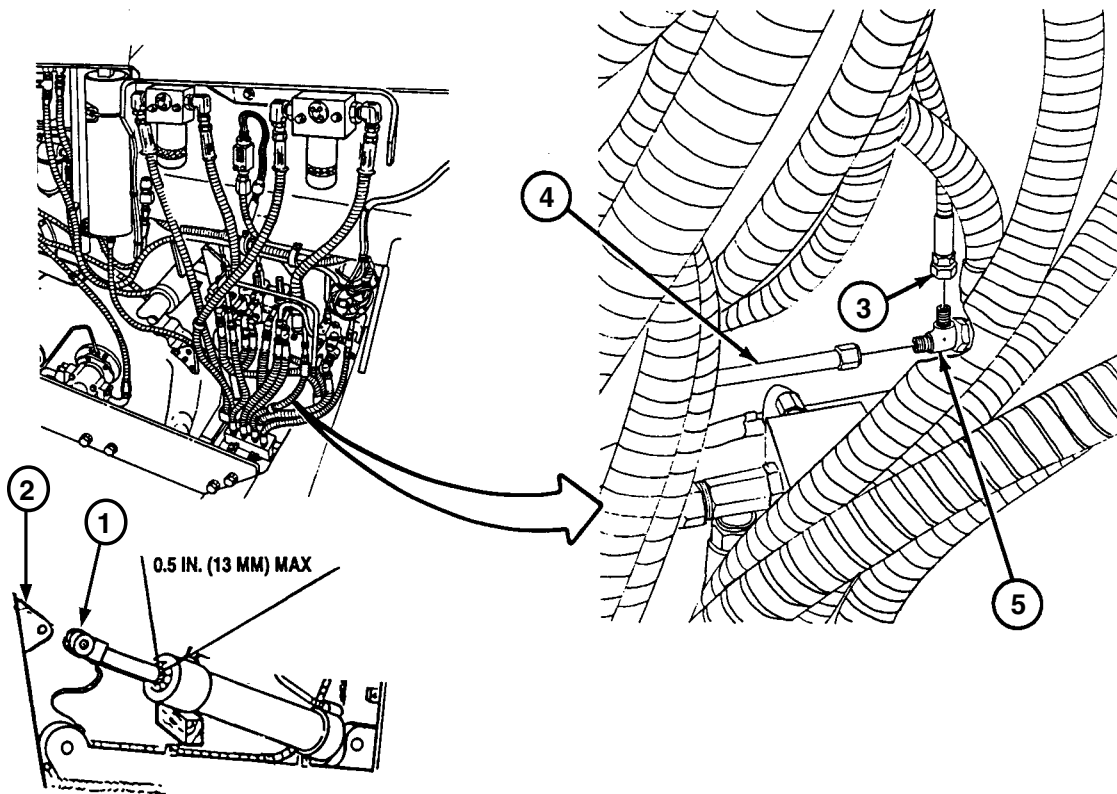
APRON RELIEF VALVE ADJUSTMENT

- As assistant holds APRON CONTROL lever DOWN, loosen jamnut (4) and rotate adjusting screw (5) clockwise to increase pressure; counterclockwise to decrease pressure. When adjustment is completed, tighten jamnut (4).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





APRON CYLINDER LEAKAGE TEST

CAUTION

Ensure apron cylinders are blocked prior to retracting disconnected cylinder rod ends. Cylinders will drop and damage hoses.

NOTE

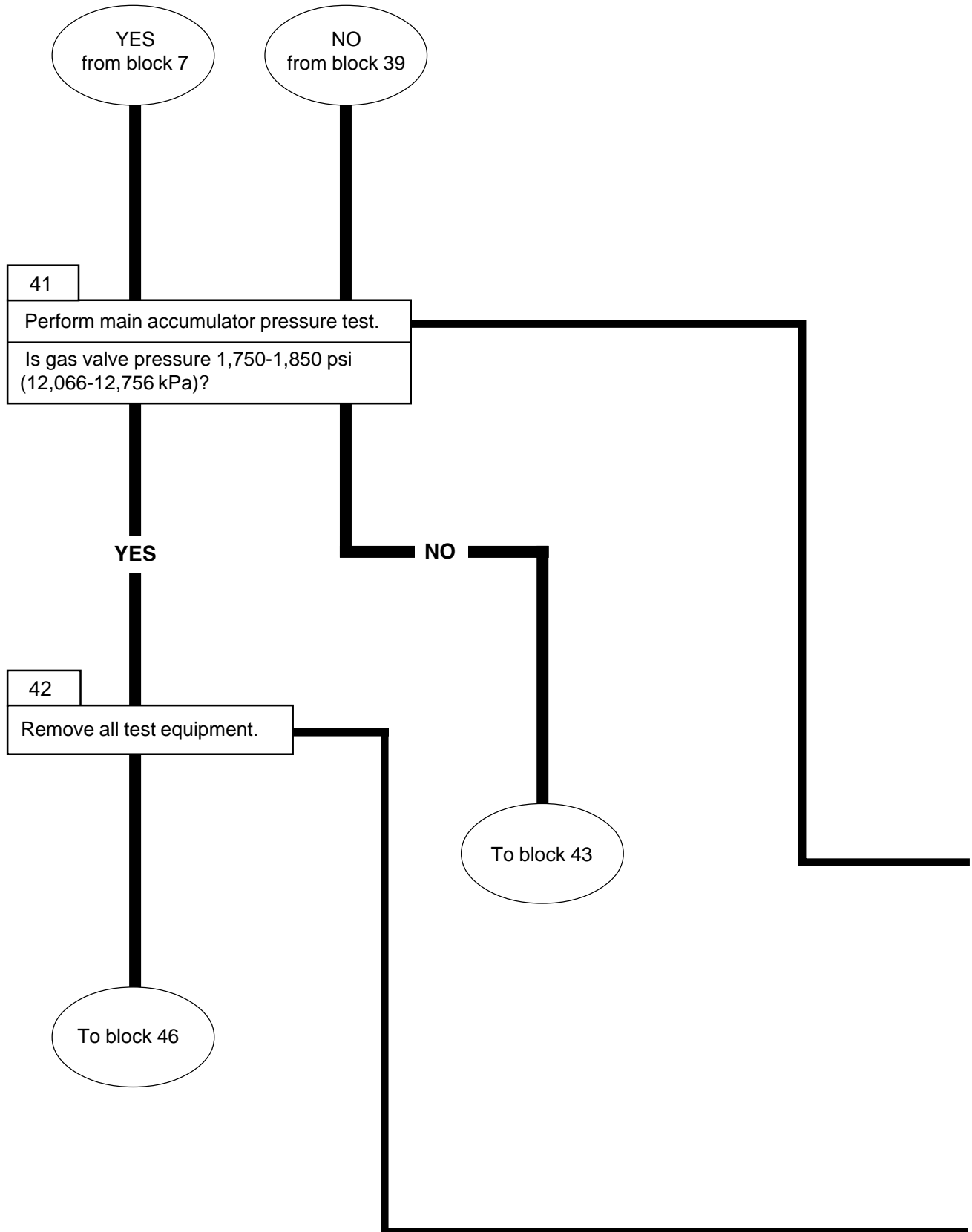
Armor plates 1L and 1R must be removed to expose apron cylinder.

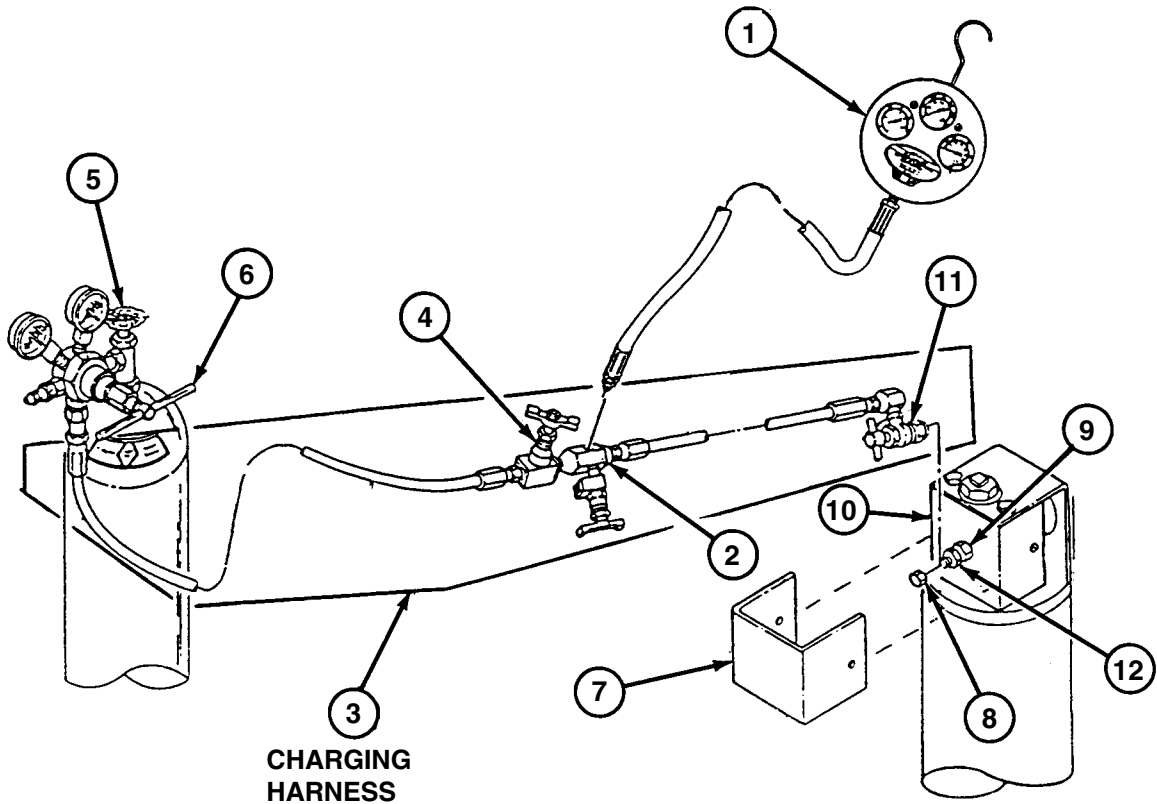
Have suitable container ready to catch oil.

- Start engine, lower apron completely, and disconnect right-hand and left-hand end of cylinder rods (1) from apron (2).
- Retract cylinder rods (1) approximately halfway, stop engine, and relieve hydraulic pressure.
- Disconnect CKT-20 (REAR) TEE hose (3) and CKT-20 (REAR) TEE tube (4) from tee (5) on hull floor. Cap and plug hose, tube, and fittings.
- Start engine, have assistant hold APRON CONTROL lever in UP position. Measure the extension of both cylinder rods (1). Continue to hold APRON CONTROL lever in UP position for one minute. Measure the extension of both cylinder rods (1) again. Have assistant return APRON CONTROL lever to NEUTRAL position. If extension rate is greater than 1/2 in. (13 mm) per minute, the cylinder is leaking excessively.
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-1.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





MAIN HYDRAULIC ACCUMULATOR PRESSURE TEST

WARNING

High-pressure nitrogen gas is used in this equipment. Keep hands and face away from valves and hose ends. Failure to comply may result in severe injury or death to personnel.

Do not breathe nitrogen gas. Failure to comply may result in severe injury or death to personnel.

- Connect pressure measuring device (1) to bleed valve (2) on charging harness (3). Close shutoff valve (4).
- Open nitrogen tank valve (5) and adjust regulator valve (6) to 50 psi (353 kPa).
- Open shutoff valve (4) for about 10 seconds to clear charging hoses . Close valve (4).
- Remove valve guard (7). Remove charge valve cap (8) from charge valve assembly (9) on accumulator (10).
- Loosely connect adapter valve (11) to charge valve (9) and again open shutoff valve (4) for about 10 seconds. Close shutoff valve (4). Fully tighten adapter valve (11).

NOTE

Accumulator gas valve is fully open after about 2-1/2 turns.

- Open charge valve (9) by loosening nut (12). Read pressure measuring device (1).

Tighten nut (12) on charge valve (9). Close nitrogen tank valve (5). Back off regulator valve (6), open bleed valve (2), and bleed hose pressure to 0 psi. Remove adapter valve (11) from charge valve (9). Remove pressure measuring device (1) from bleed valve (2) on charging harness (3). Install charge valve cap (8) on charge valve (9). Install valve guard (7).

10 HYDRAULIC OIL OVERHEATS (CONTINUED)

NO
from block 41

43

Charge main accumulator.
Can main accumulator be charged to
1,750-1,850 psi (12,066-12,756 kPa)?

YES

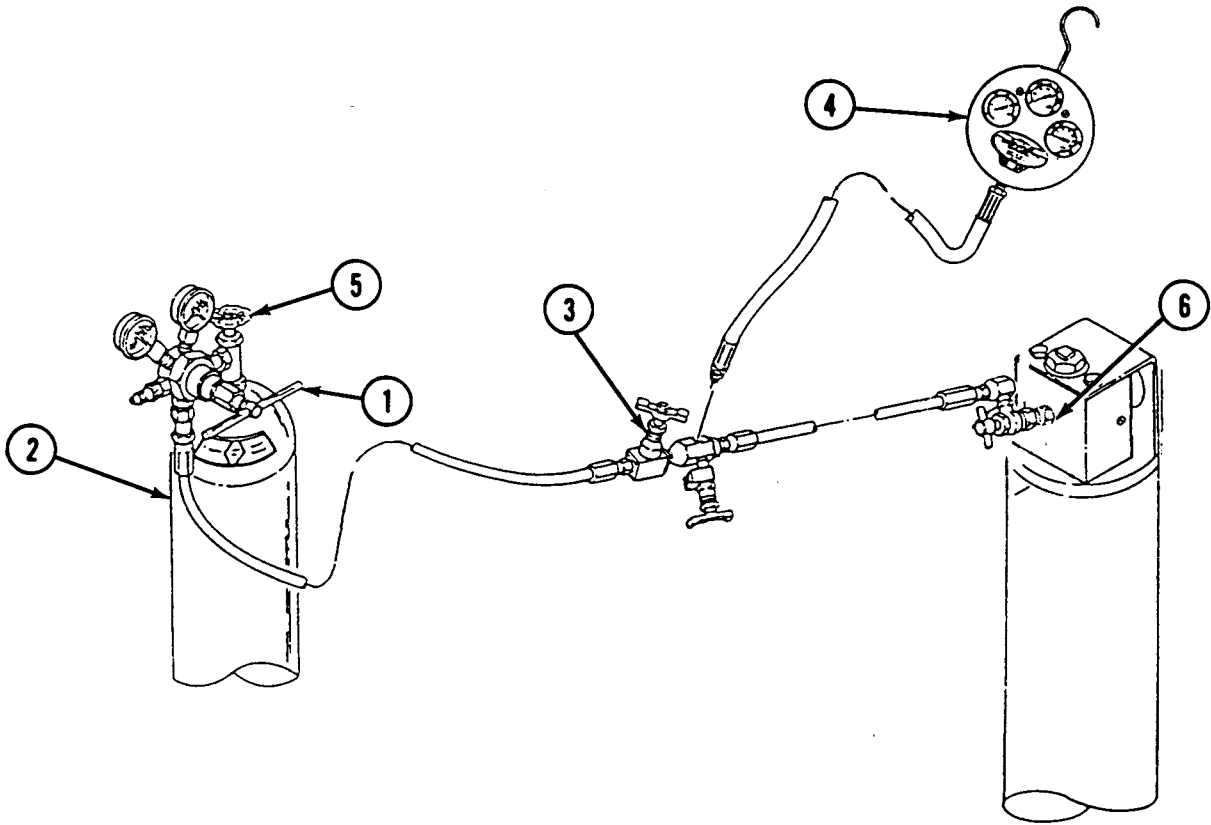
NO

44

Remove all test equipment and connect hoses.
Replace main accumulator.

45

Remove all test equipment and connect hoses.
Verify problem is solved.



MAIN ACCUMULATOR CHARGING

CAUTION

Ensure regulator valve is fully backed off to relieve tension on diaphragm. Failure to comply may result in damage to equipment.

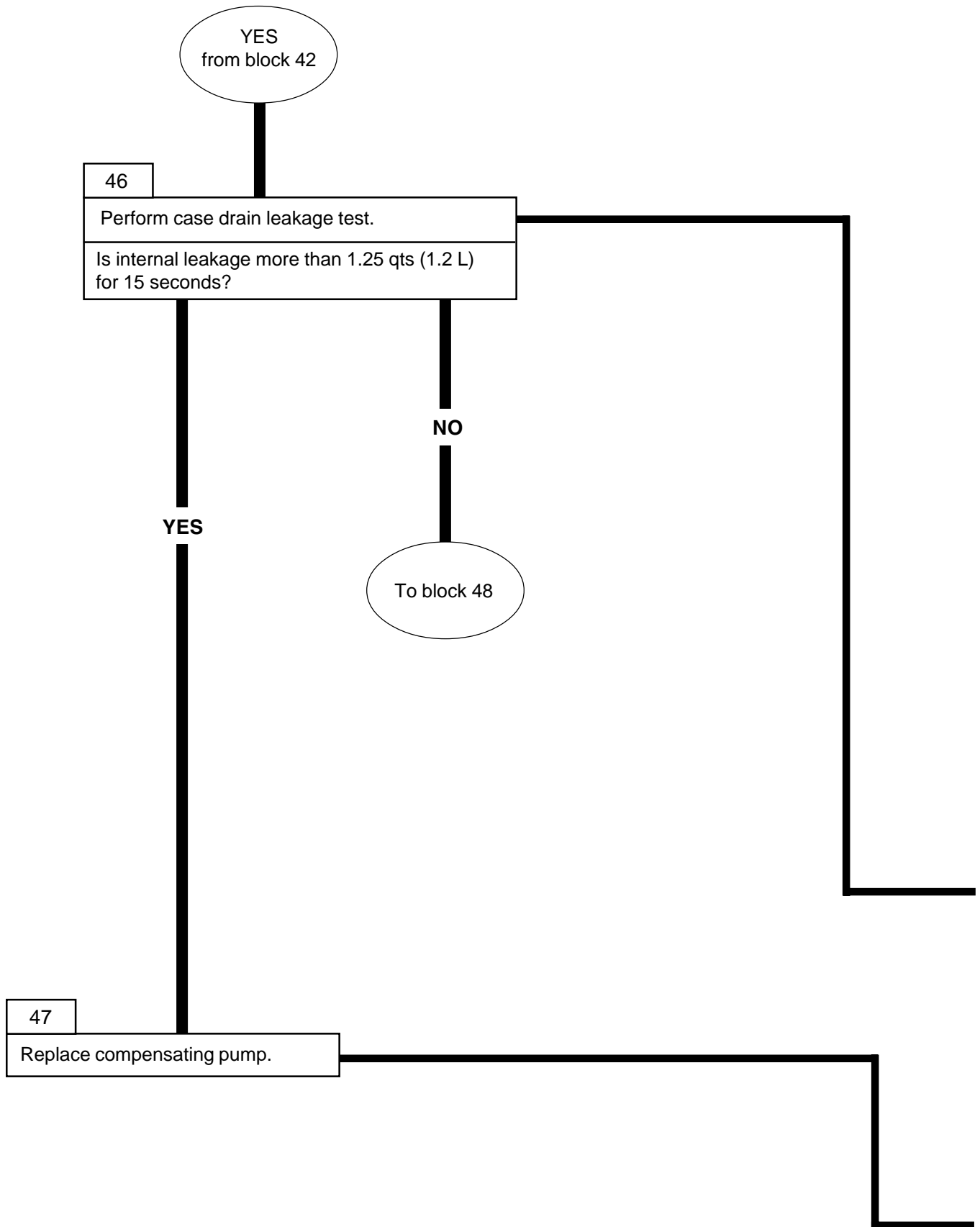
NOTE

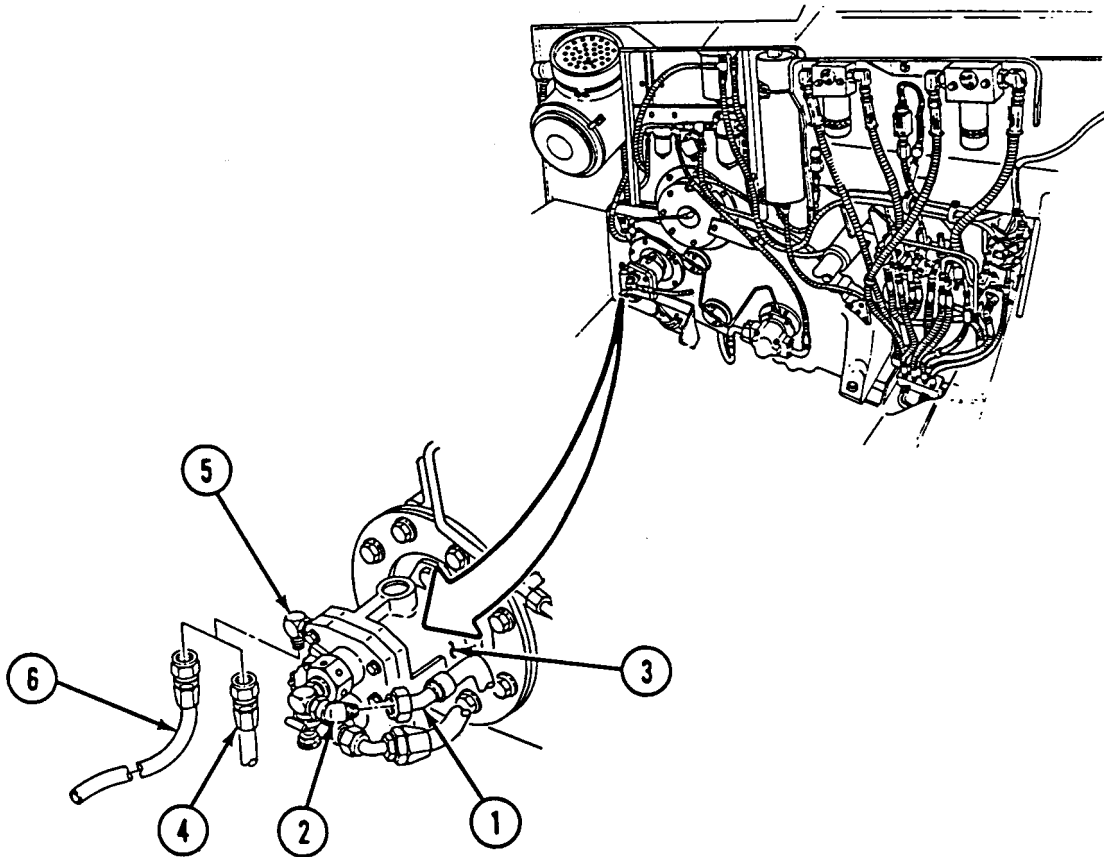
Rapid pressurization will cause an inaccurate pressure reading due to heating of nitrogen gas. Always pressurize slowly.

- Adjust regulator valve (1) on nitrogen tank (2) to 1,750-1,850 psi (12,066-12,756 kPa).
- Open shutoff valve (3). Read pressure measuring device (4). When pressure reaches 1,750-1,850 psi (12,066-12,756 kPa), close shutoff valve (3), nitrogen tank valve (5), and accumulator charge valve (6).
- Wait 15 minutes and open charge valve (6). Read pressure measuring device (4).

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





CASE DRAIN LEAKAGE TEST

WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

NOTE

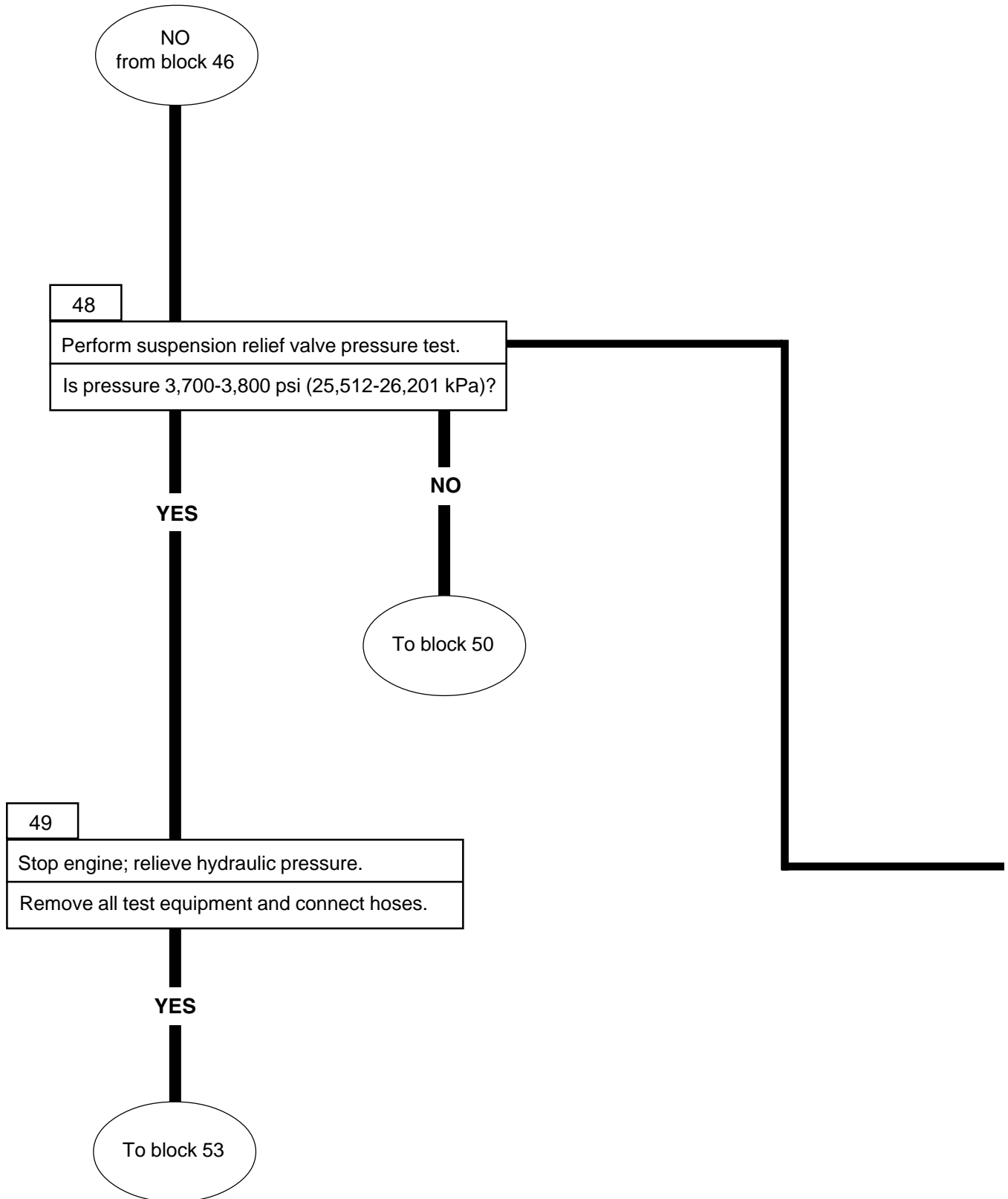
Have a graduated container of at least 2 qts (1.9 L) capacity available to catch hydraulic oil while test is being performed.

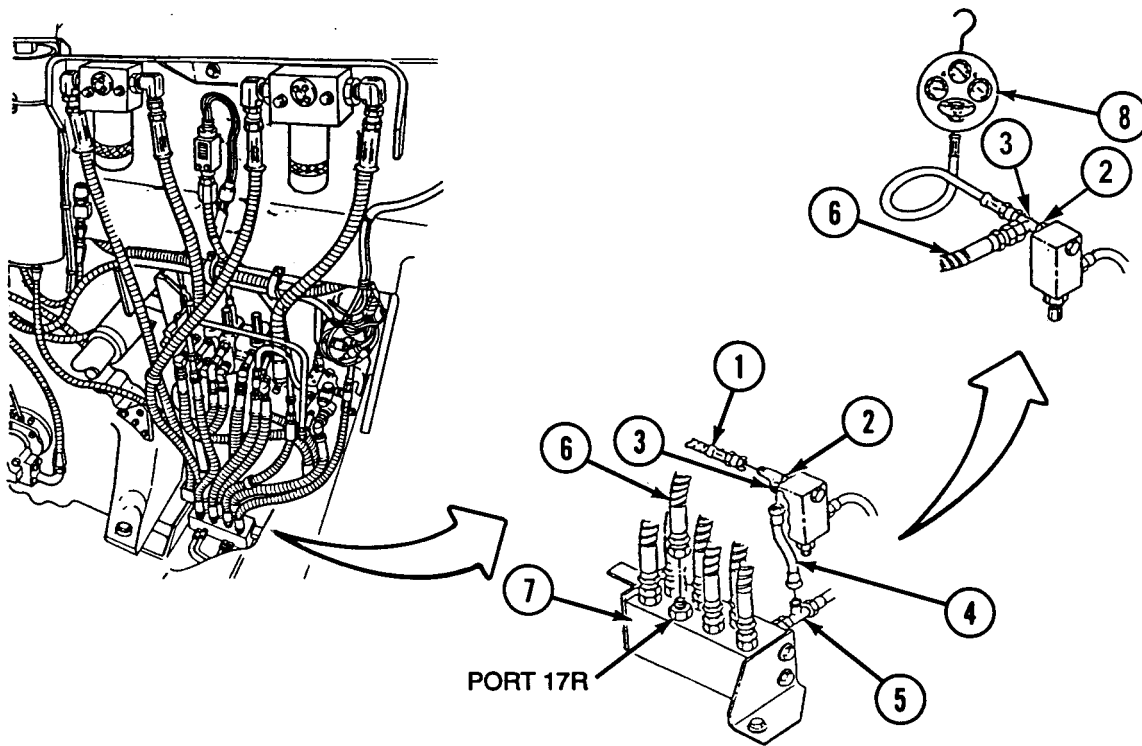
Have suitable container ready to catch oil.

- Start engine, move ejector forward, stop engine, engage ejector lock, and relieve hydraulic pressure.
- Disconnect SPNSN PUMP-9 hose (1) from elbow (2) on compensating pump (3). Cap elbow (2) and plug hose (1).
- Disconnect SPNSN PUMP DRAIN-7V hose (4) from elbow (5). Plug hose (4). Connect drain hose (6) to elbow (5).
- Hold end of drain hose (6) in graduated container.
- Have assistant start engine and run at 1,800 rpm for 15 seconds. Observe the quantity of hydraulic oil in container.
- Stop engine, relieve hydraulic pressure and connect hoses.

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





SUSPENSION RELIEF VALVE PRESSURE TEST

WARNING

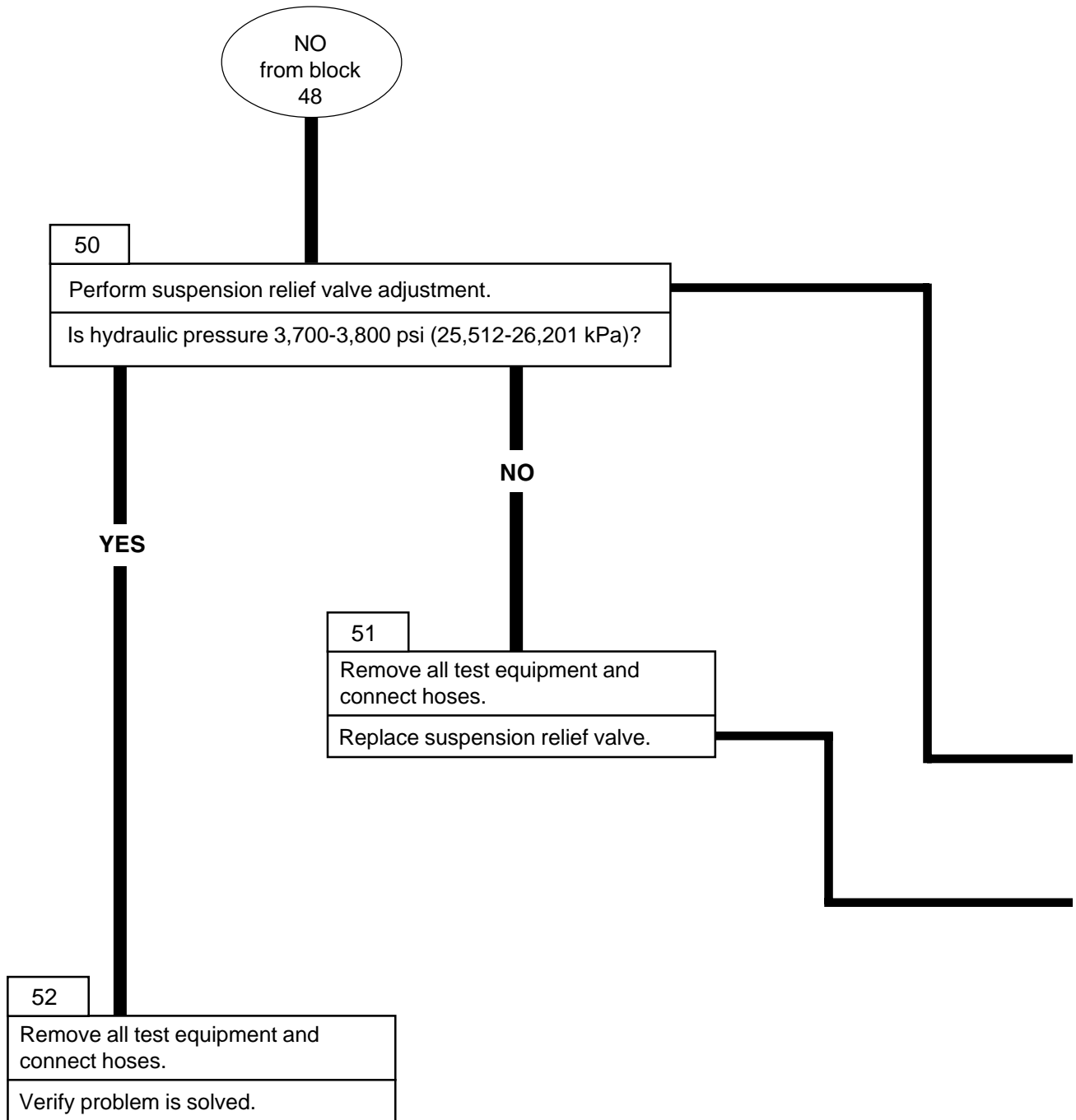
Before performing any hydraulic troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

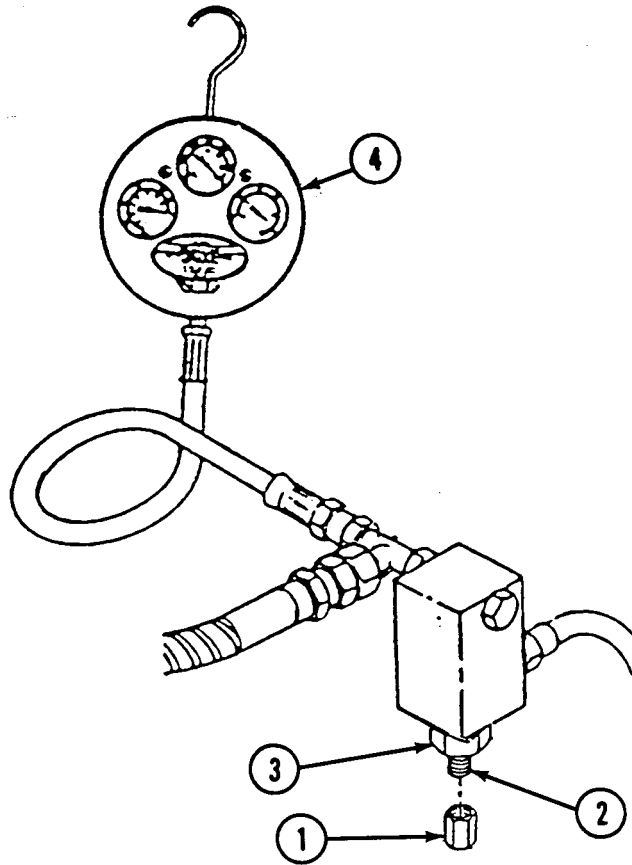
NOTE

Have suitable container ready to catch oil.

- Start engine, move ejector forward, engage ejector lock, stop engine, and relieve hydraulic pressure.
- Disconnect RELIEF VLV-9 tube (4) from suspension relief valve tee (3) and rear left-hand main manifold tee (5). Cap tee (5).
- Rotate suspension relief valve tee (3) 90 upward toward front of vehicle. Tighten jamnut (2).
- Disconnect LH MAIN MANF TOP-17R hose (6) from port 17R on left-hand main manifold (7) and connect it to suspension relief valve tee (3). Cap port 17R
- Connect pressure measuring device (8) to suspension relief valve tee (3).
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to SPRUNG and right-hand SUSPENSION CONTROL lever to LOWER. Read pressure measuring device (8).

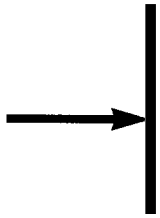
10 HYDRAULIC OIL OVERHEATS (CONTINUED)





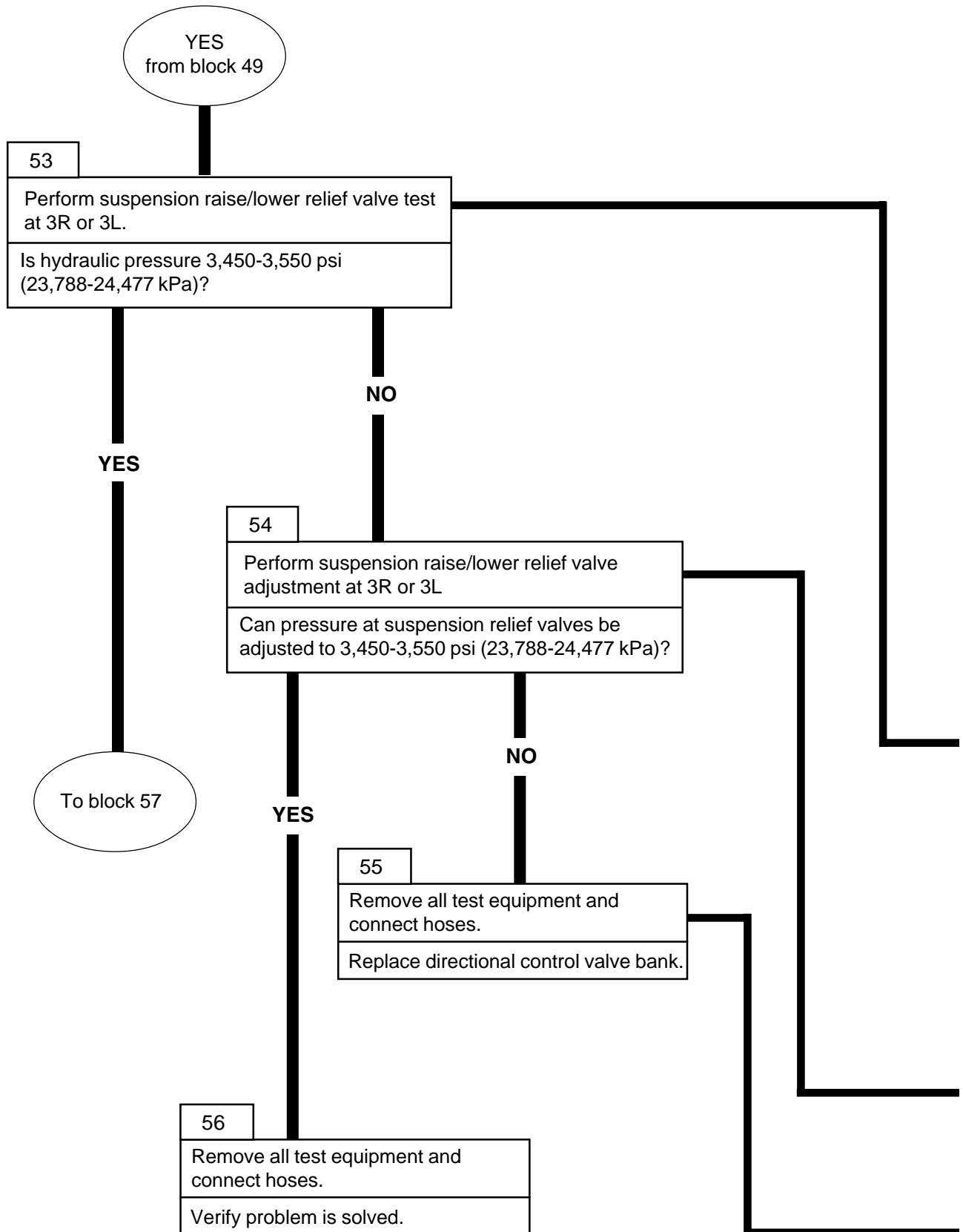
SUSPENSION RELIEF VALVE ADJUSTMENT

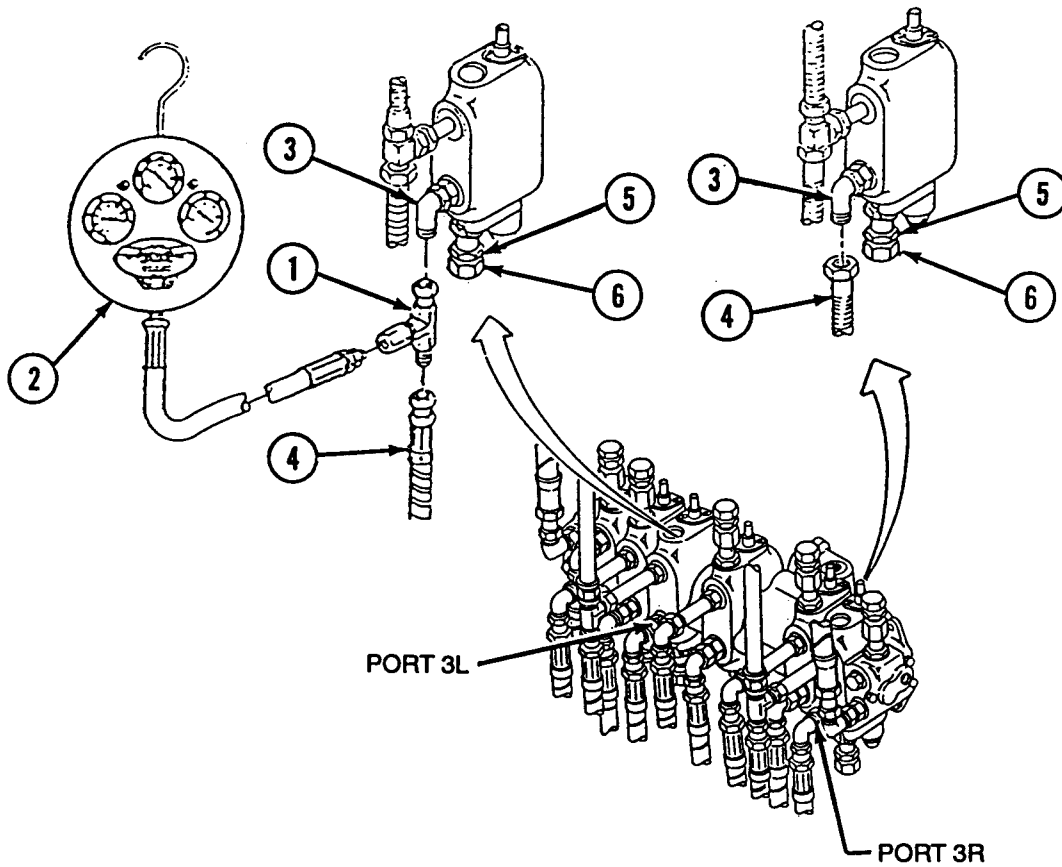
- Remove cap (1) from suspension relief valve adjusting shaft (2), and loosen jamnut (3). Turn adjusting shaft (2) clockwise to increase pressure; counterclockwise to decrease pressure. Read pressure measuring device (4). Tighten jamnut (3); replace cap (1).
- Stop engine; relieve hydraulic pressure.



Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





SUSPENSION RAISE/LOWER RELIEF VALVE TEST

NOTE

This test is done at both the right-hand and left-hand suspension raise/lower relief valves. For the right-hand valve, install test equipment at port 3R and actuate the right-hand SUSPENSION CONTROL lever. For the left-hand valve, install test equipment at port 3L and actuate the left-hand SUSPENSION CONTROL lever.

Have suitable container ready to catch oil.

- Install tee (1) and pressure measuring device (2) between elbow (3) on port 3R or 3L and port 3 hose (4).
- Have assistant start engine and move SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (2).

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT

- Loosen jamnut (5) on port 3R or 3L of suspension raise/lower relief valve.
- With SUSPENSION CONTROL lever still in RAISE, turn adjusting screw (6) clockwise to increase pressure; counterclockwise to decrease pressure.
- Tighten jamnut (5). Stop engine; relieve hydraulic pressure.

Refer to TM 5-2350-262-20-2.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)

YES
from block 53

57

Perform actuator internal leakage test on No. 1 or No. 4 actuators where excessive heat in circuit 9 or 2 hoses was detected.
Is leakage rate greater than 1/2 gpm (1.89 Lpm)?

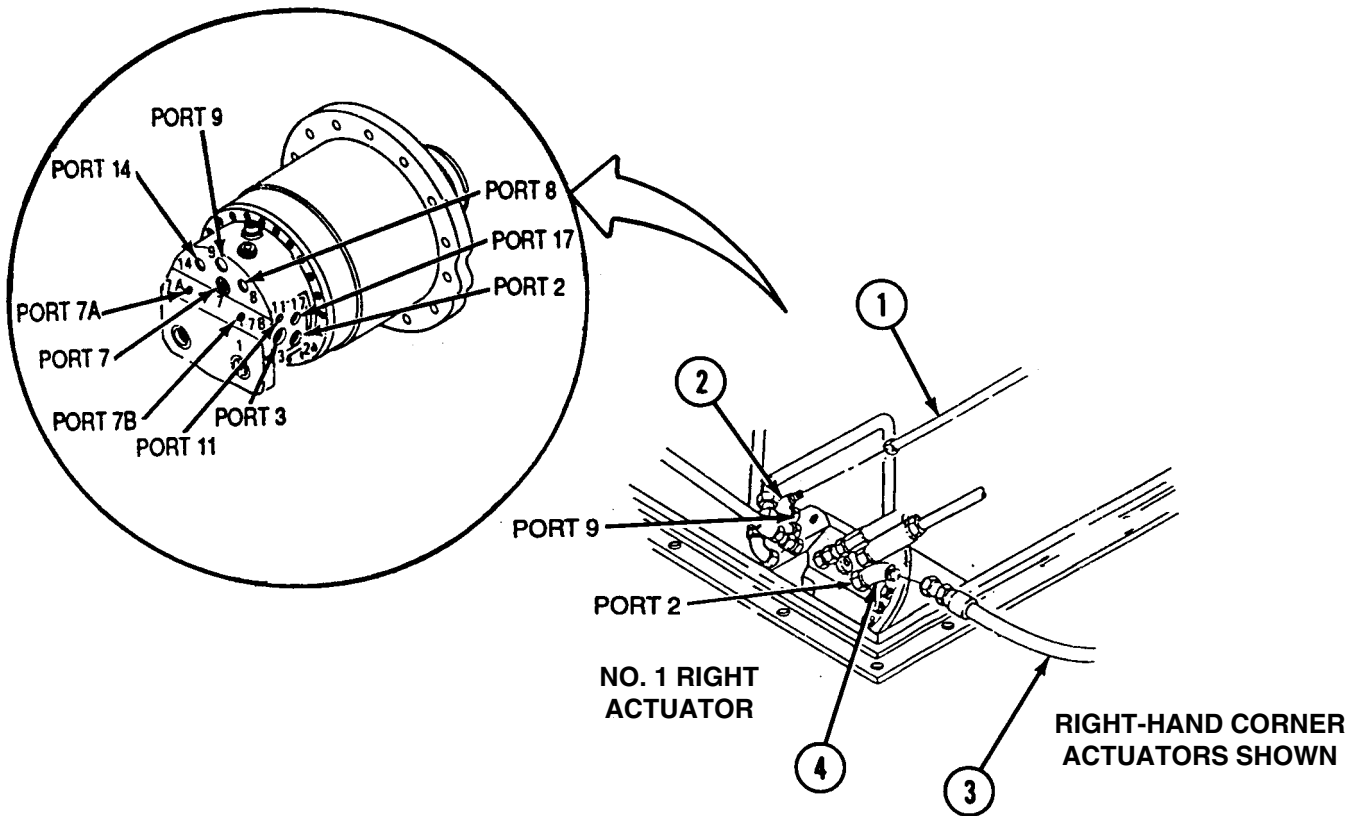
YES

NO

To block 59

58

Remove all test equipment and connect hoses.
Replace leaking actuator.



ACTUATOR INTERNAL LEAKAGE TEST

WARNING

Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

NOTE

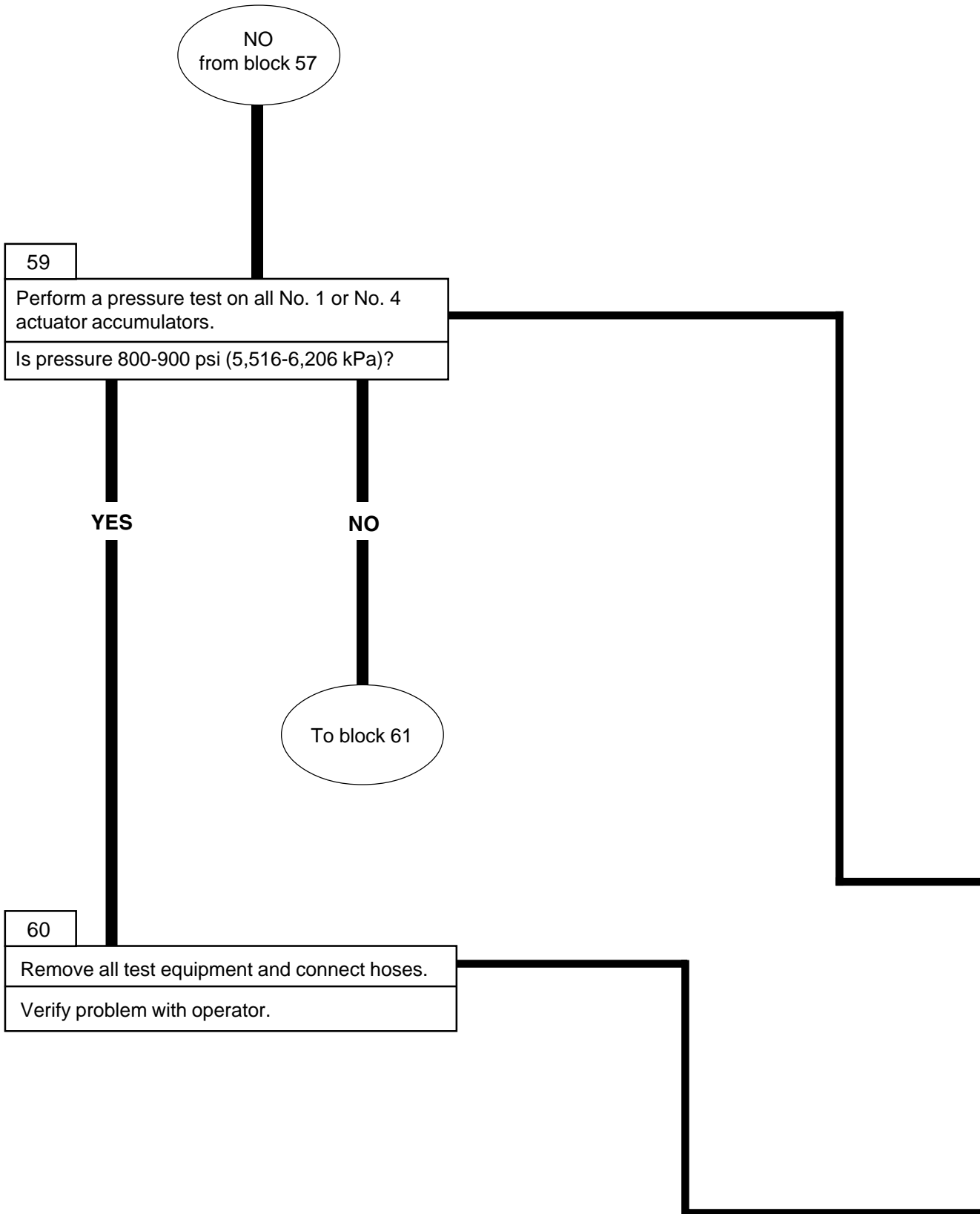
Procedure below is for internal leakage test on No.1 right actuator. Procedures for No. 4 right, No. 1 left, and No. 4 left actuators are the same. Ports are in same location on opposite face. Circuits 2 and 9 are the same.

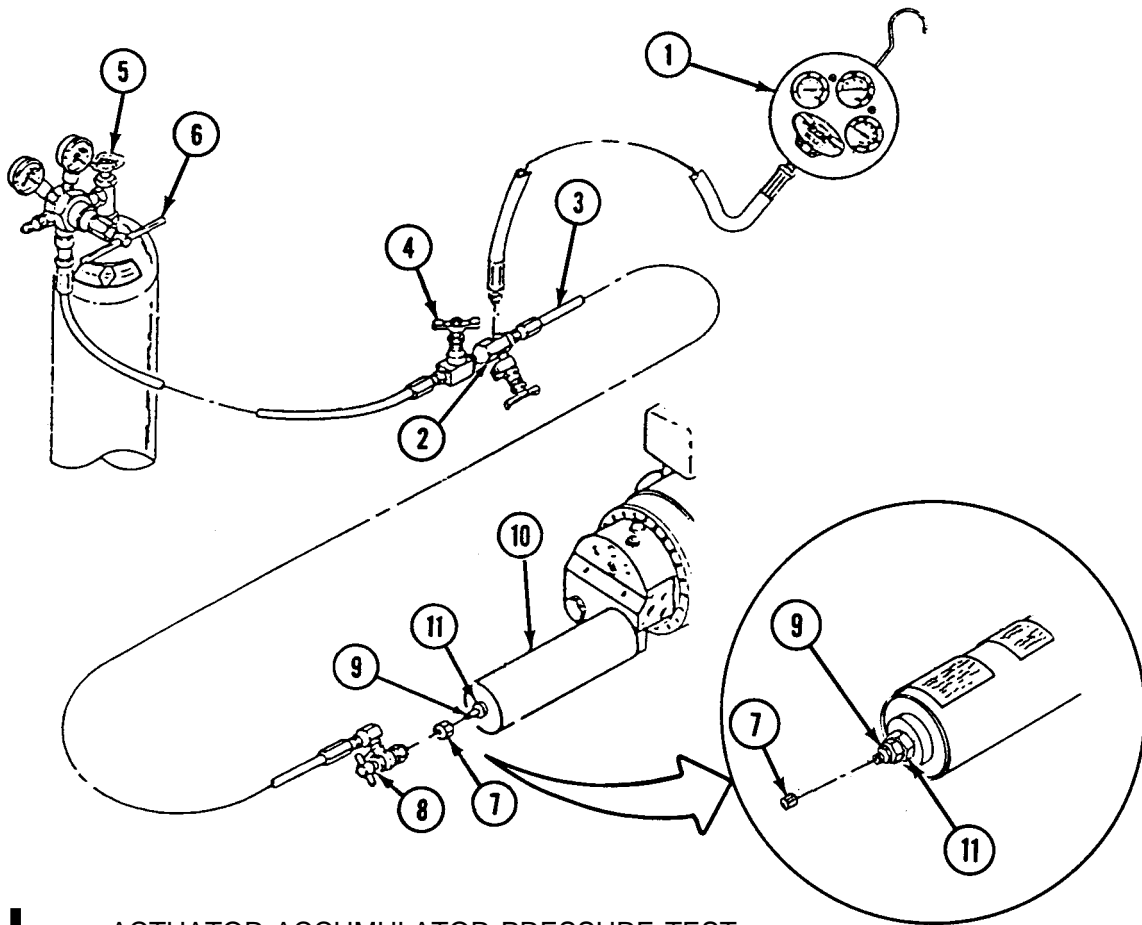
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Disconnect SPNSN UNIT-9 hose (1) from elbow (2) on port 9 of No. 1 right actuator. Cap elbow (2).
- Disconnect CORNER SPNSN UNIT-2 hose (3) from elbow (4) on port 2 of No. 1 right actuator. Plug hose (3). Connect hose (1) to elbow (4) on port 2.
- Catch oil in a graduated 2 gal. (7.6L) container.
- With suspension in SPRUNG mode, start engine and check leakage from ports 7, 7B, and 17.
- Stop engine; relieve hydraulic pressure.

Notify Direct Support maintenance.

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





ACTUATOR ACCUMULATOR PRESSURE TEST

WARNING

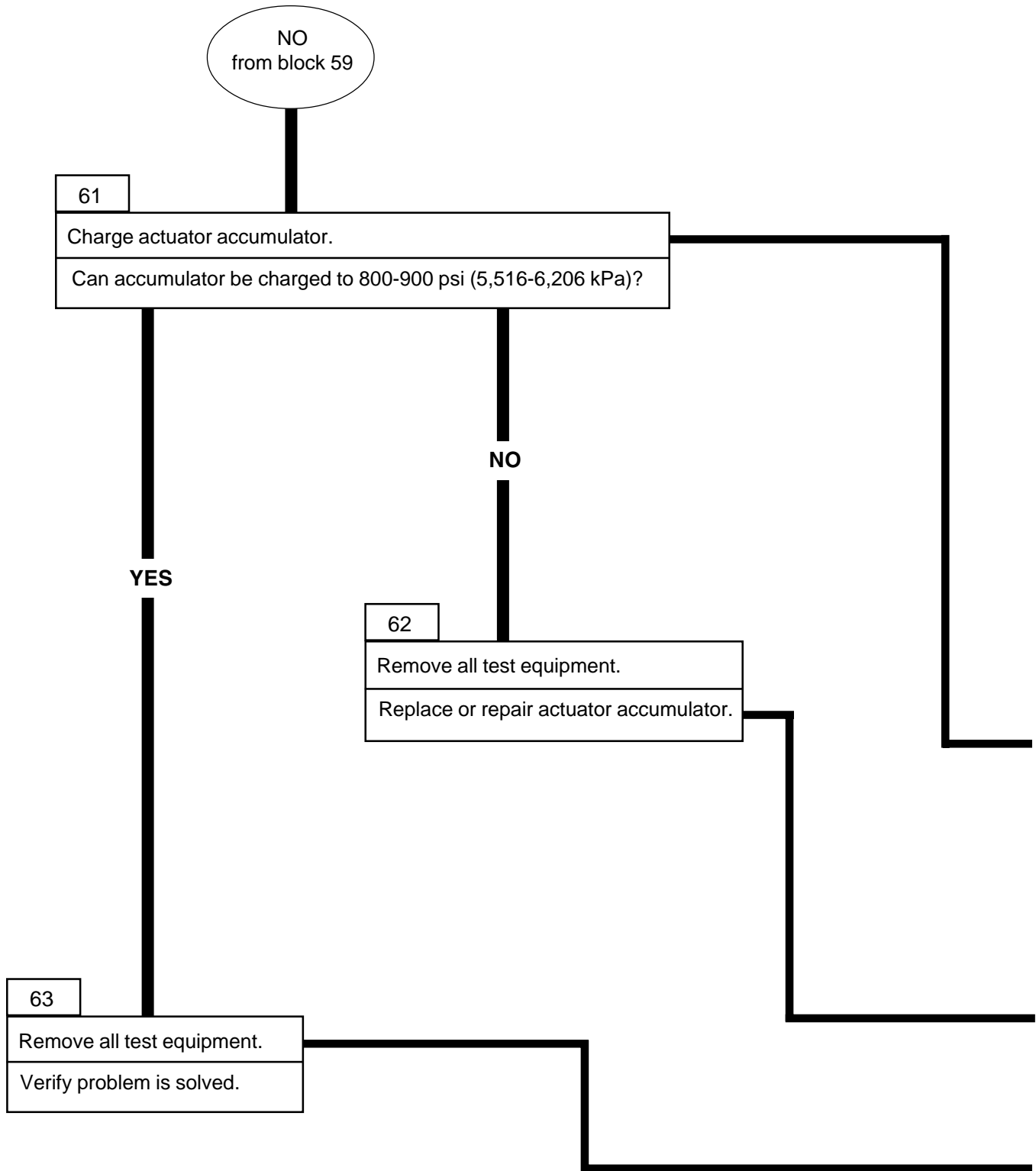
High pressure nitrogen gas is used in this equipment. Keep face and hands away from valves and hose ends. Failure to comply may result in serious injury or death to personnel.

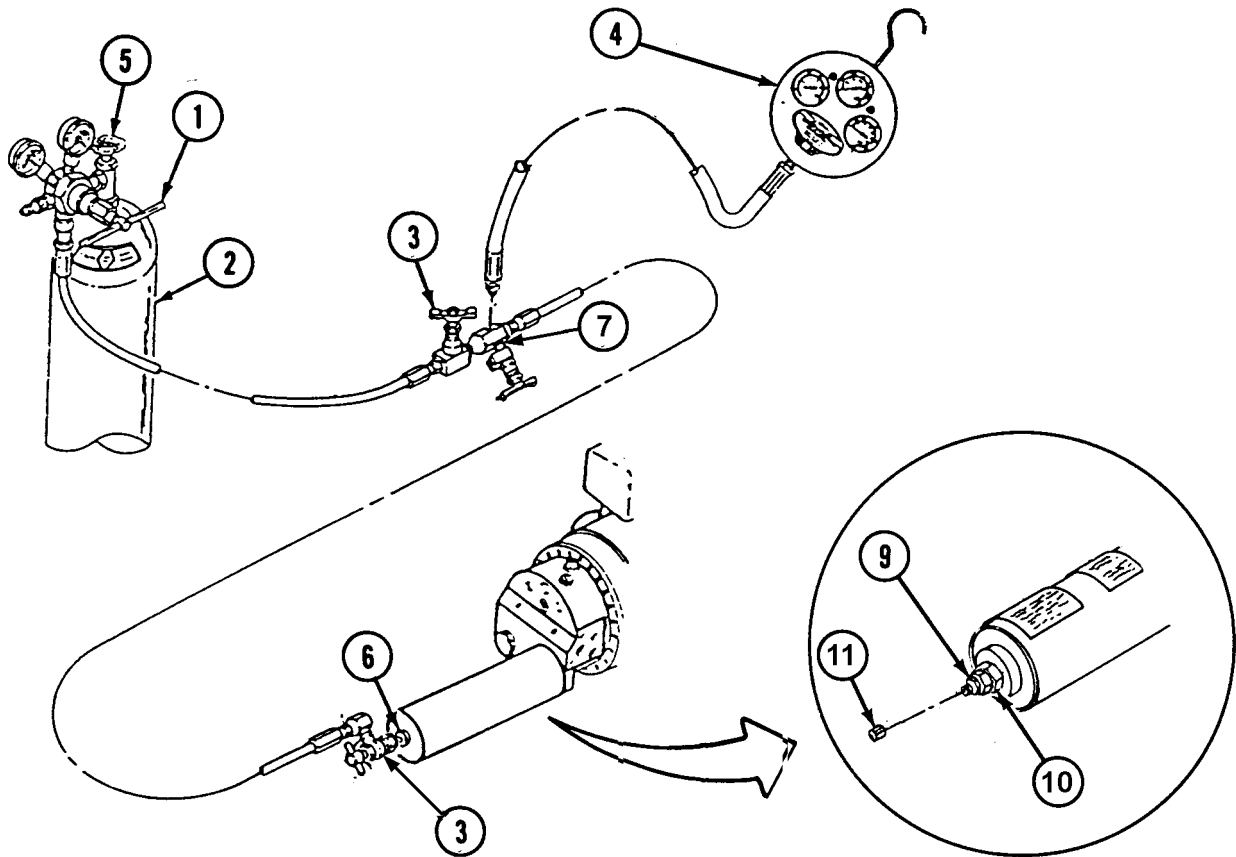
Do not breathe nitrogen gas. Failure to comply may result in serious injury or death to personnel.

- Connect pressure measuring device (1) to bleed valve (2) on charging harness (3). Close shutoff valve (4).
- Open nitrogen tank valve (5) and adjust regulator valve (6) to 50 psi (353 kPa).
- Open shutoff valve (4) for about 10 seconds to clear charging hoses. Close valve (4).
- Remove charge valve cap (7).
- Loosely connect adapter valve (8) to charge valve (9) on actuator accumulator (10).
- Open shutoff valve (4) for about 10 seconds. Close shutoff valve (4). Tighten adapter valve (8).
- Open charge valve (9) by loosening nut (11). Read pressure measuring device (1).

Tighten nut (11) on actuator accumulator (10). Close nitrogen tank valve (5) to ease pressure. Open bleed valve (2), bleed line pressure to 0 psi. Remove adapter valve (8) from actuator accumulator (10). Remove pressure measuring device (1) from bleed valve (2) on charging harness (3). Install valve cap (7) on actuator accumulator (10).

10 HYDRAULIC OIL OVERHEATS (CONTINUED)





ACTUATOR ACCUMULATOR CHARGING

CAUTION

Ensure regulator valve is fully backed off to relieve tension in diaphragm. Failure to comply may result in damage to equipment.

NOTE

Have suitable container ready to catch oil.

- Adjust regulator valve (1) on nitrogen tank (2) to 800-900 psi (5,516-6,206 kPa).
- Open shutoff valve (3). Read pressure measuring device (4).
- When pressure reaches 800-900 psi (5,516-6,206 kPa), close shutoff valve (3), nitrogen tank valve (5), and accumulator charge valve (6).
- Wait 15 minutes and open accumulator charge valve (6). Read pressure measuring device (4).

Notify Direct Support maintenance.

Tighten nut (9) on charge valve (6). Close nitrogen tank valve (5). Back off regulator valve (1), open bleed valve (7), and bleed hose pressure to 0 psi. Remove adapter valve (8) from charge valve (6). Remove pressure measuring device (4) from bleed valve (7) on charging harness. Install charge cap (11) on actuator accumulator (10).

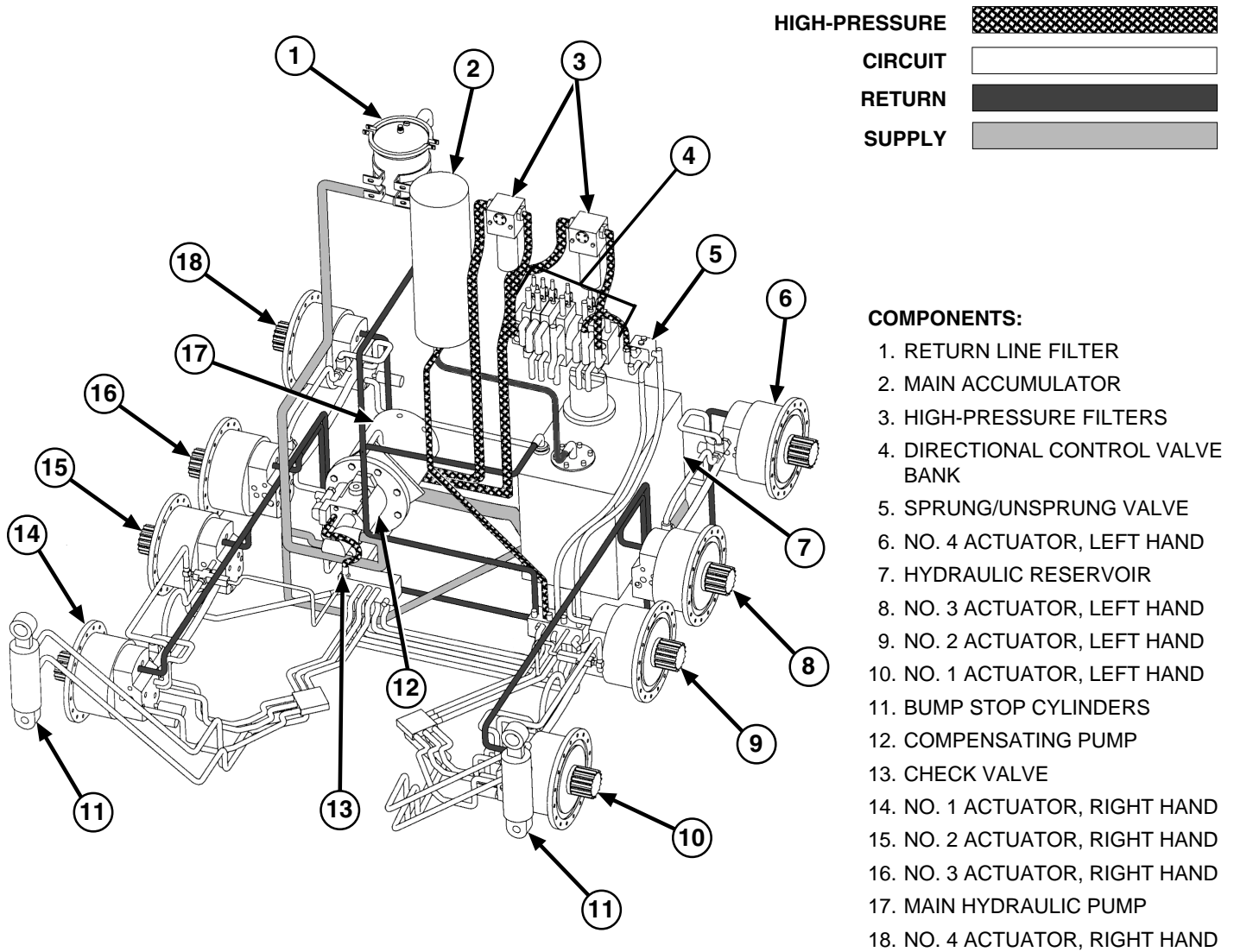
11

LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE

No. 4 left and right actuators provide vehicle suspension in SPRUNG mode and allow vehicle to raise and lower in UNSPRUNG mode. The compensating pump provides fluid through line 9 for SPRUNG mode and line 11 for UNSPRUNG mode.

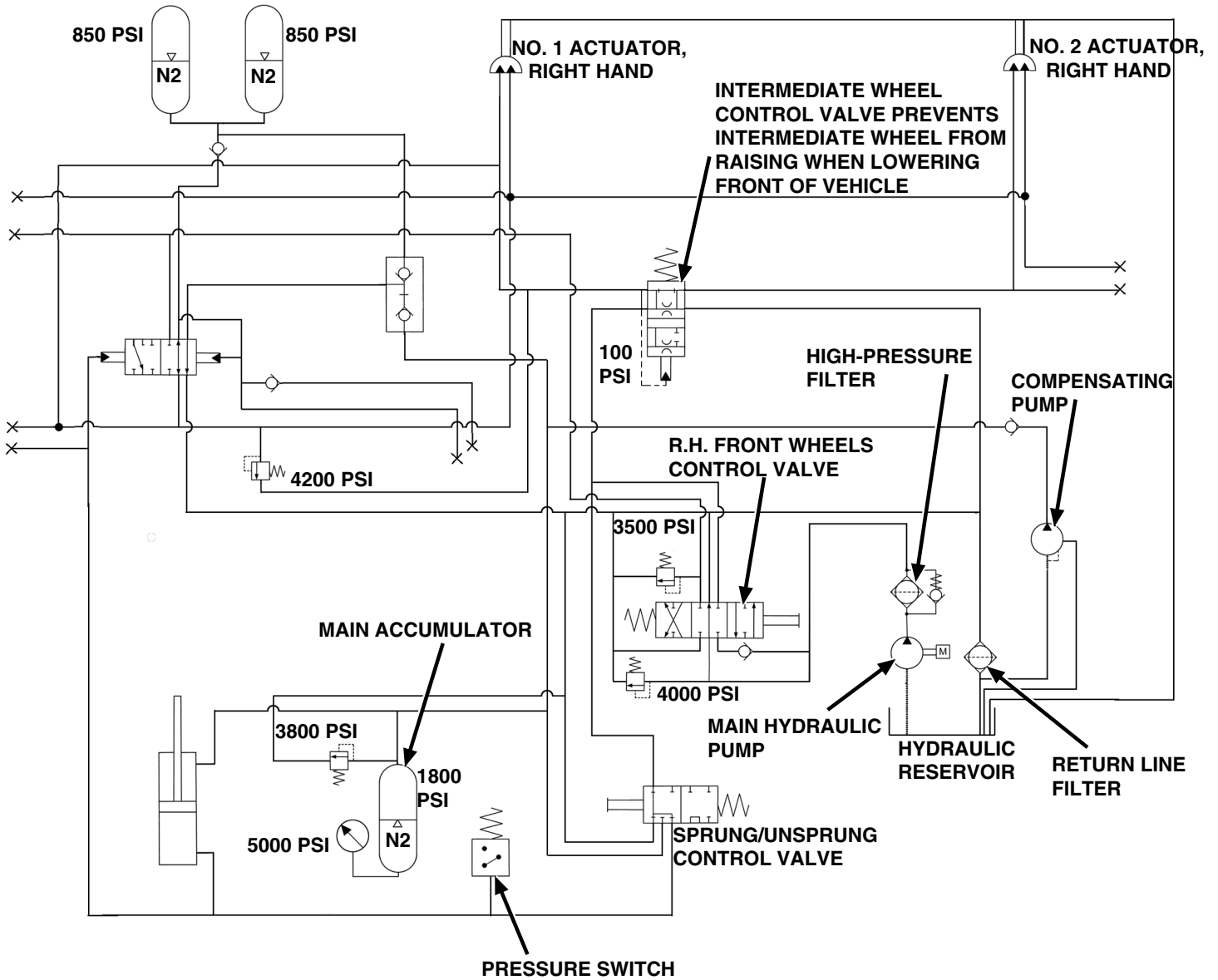
WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.



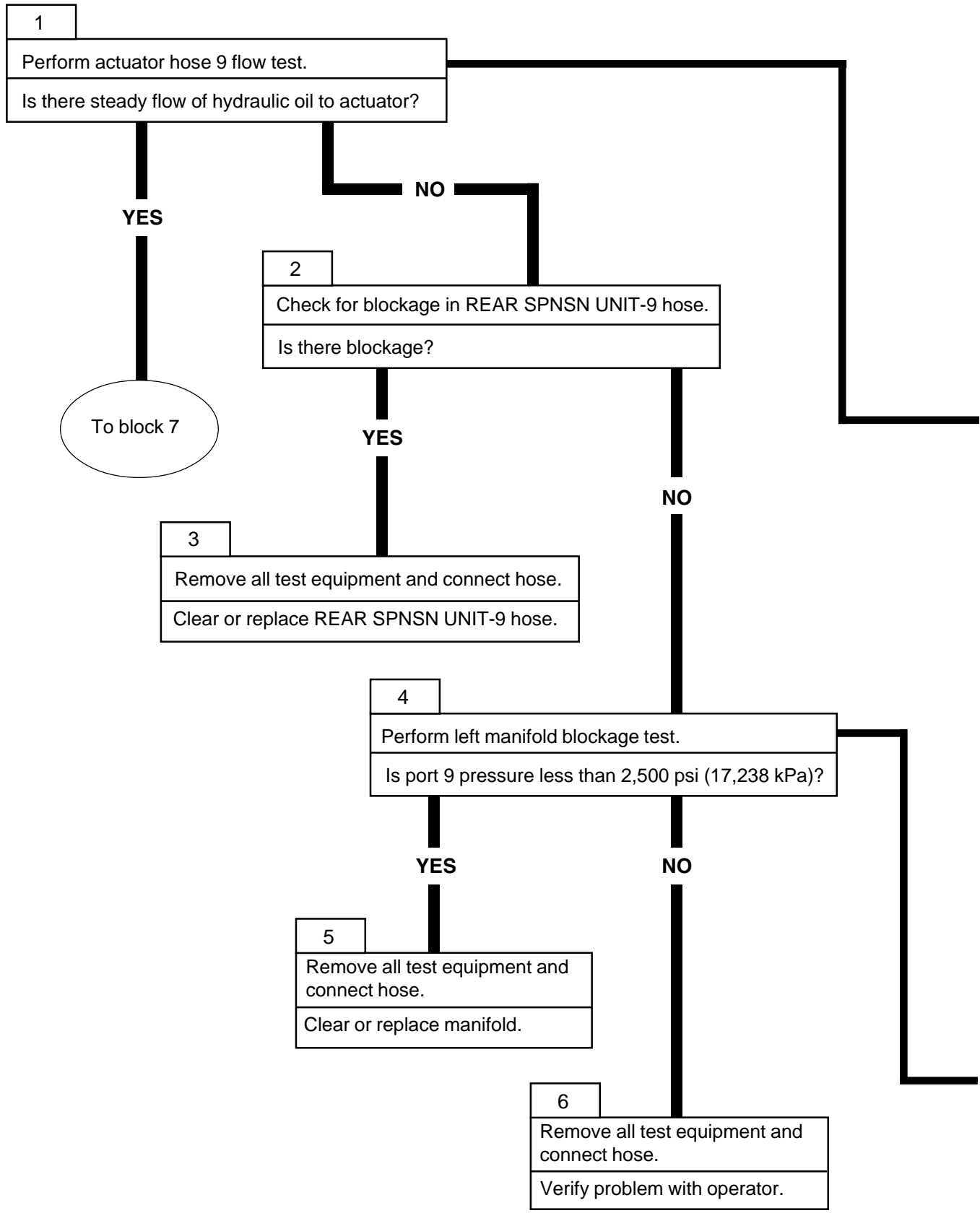
SUSPENSION CIRCUIT

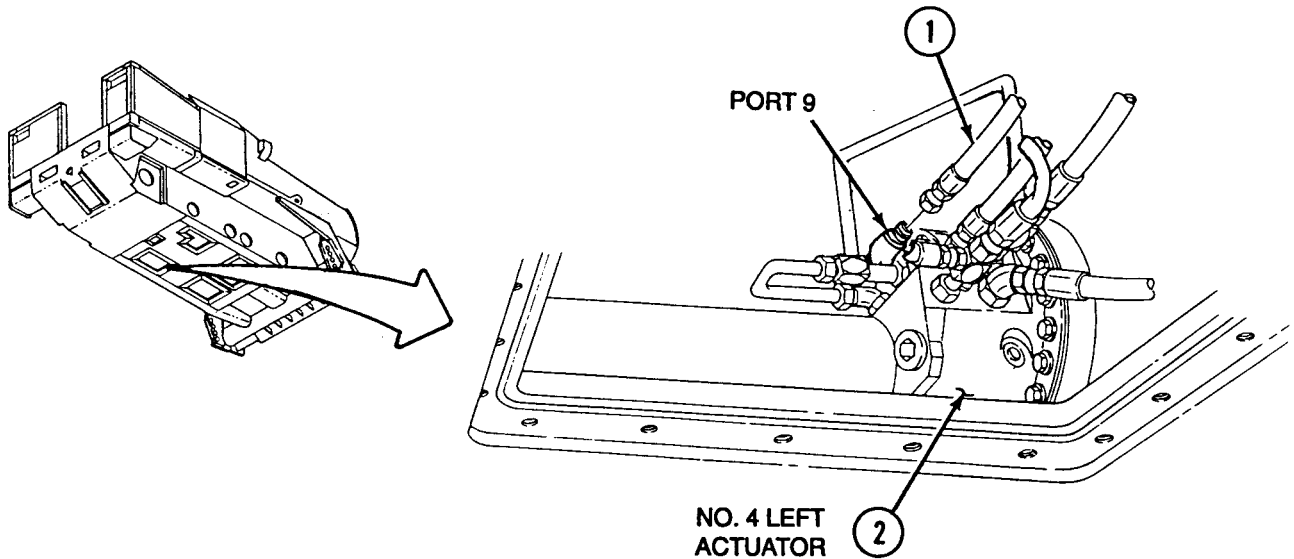
HIGH-PRESSURE **—————**
 CIRCUIT **—————**
 SUPPLY **+++++**



SUSPENSION SCHEMATIC

11 LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE (CONTINUED)



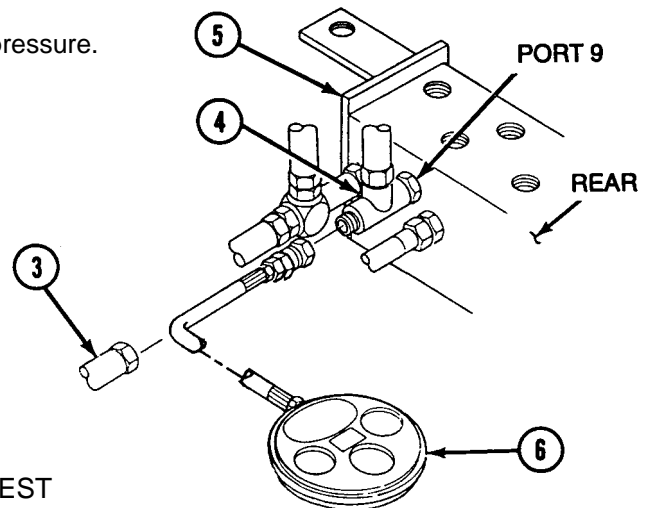


HOSE 9 FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect REAR SPNSN UNIT-9 hose (1) from port 9 on No. 4 left actuator (2). Cap port 9.
- Connect drain hose to open end of REAR SPNSN UNIT-9 hose (1).
- Place end of drain hose in container and have assistant start engine. Observe a free flow of oil from drain hose.
- Stop engine; relieve hydraulic pressure.



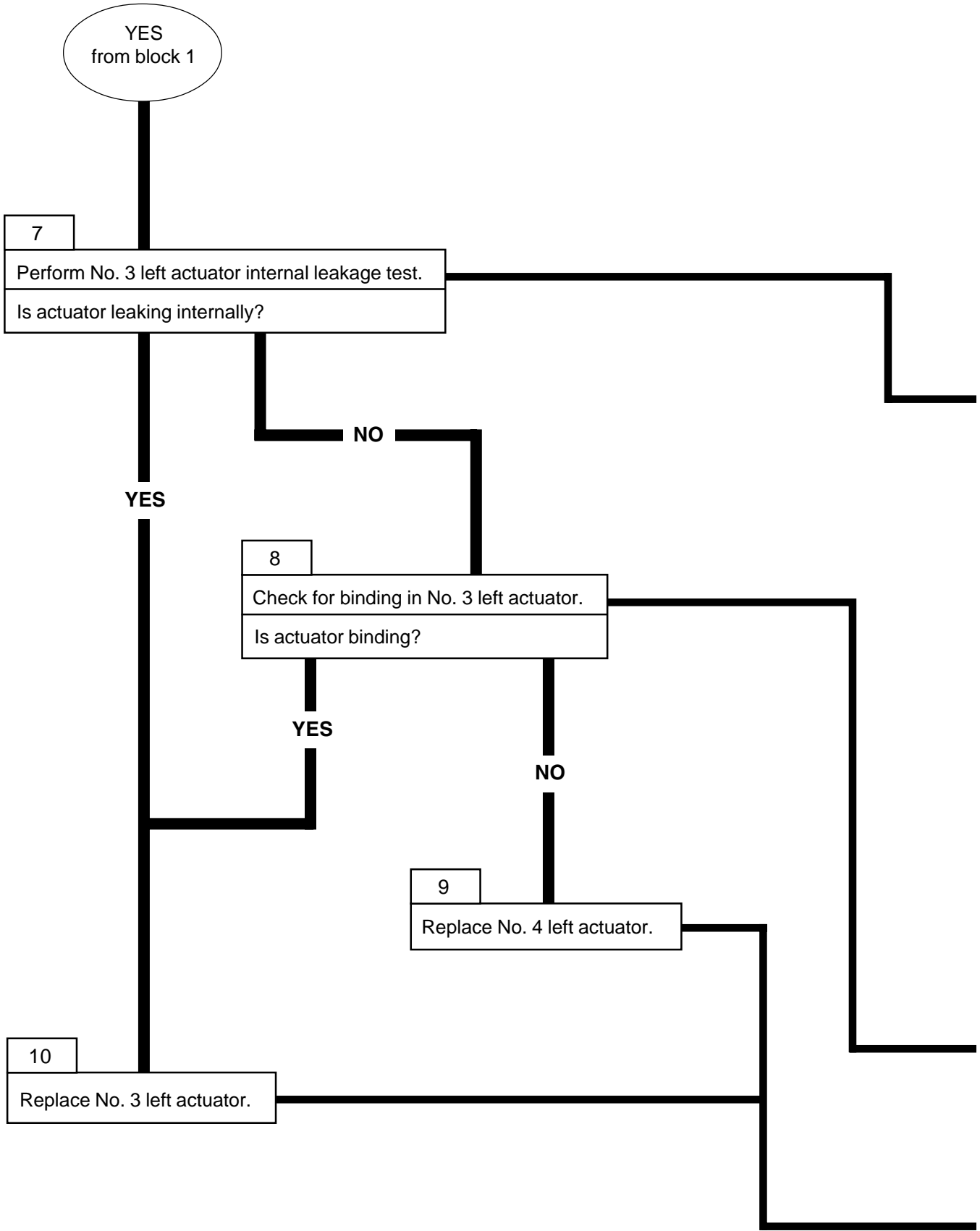
LEFT MANIFOLD BLOCKAGE TEST

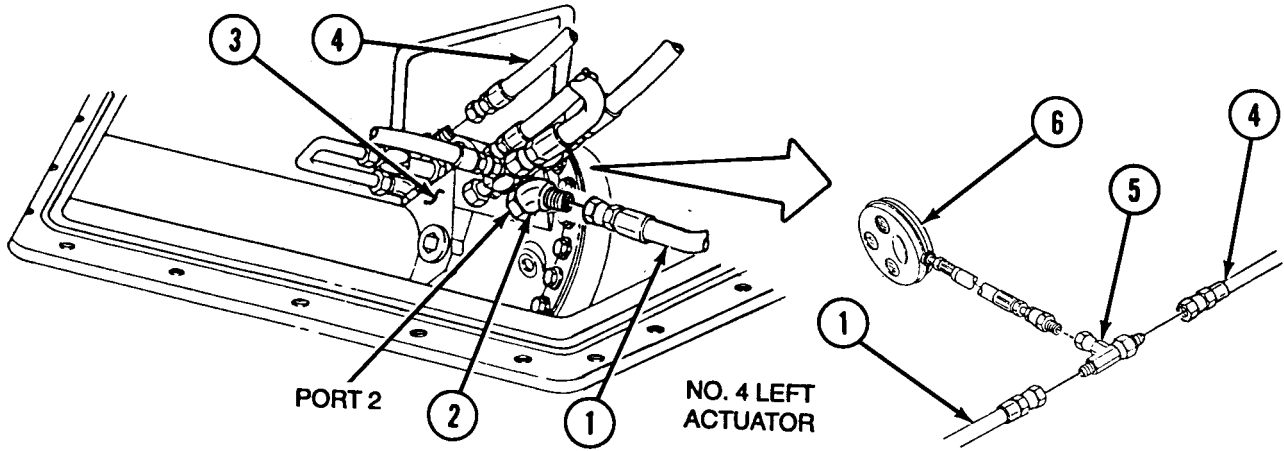
NOTE

Have suitable container ready to catch oil.

- Connect REAR SPNSN UNIT-9 hose (1) to port 9 on No. 4 left actuator (2).
- Disconnect MAIN MANF REAR-9 hose (3) from tee (4) on port 9 of left manifold (5). Plug MAIN MANF REAR-9 hose (3).
- Install pressure measuring device (6) on tee (4) at port 9.
- Start engine; read pressure measuring device.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

11 LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE (CONTINUED)



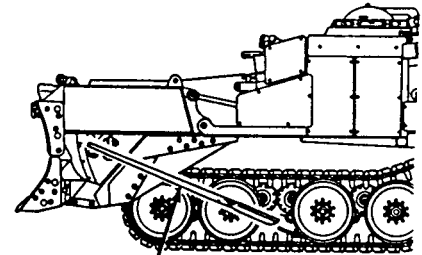
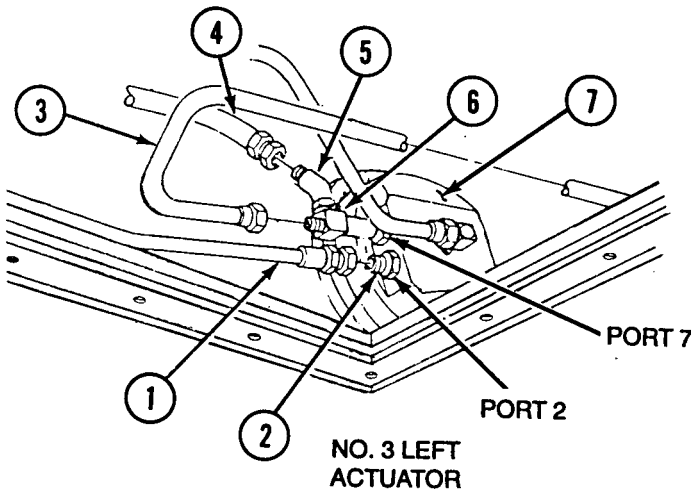


NO. 3 LEFT ACTUATOR INTERNAL LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect CORNER SPNSN UNIT-2 hose (1) from elbow (2) at port 2 on NO. 4 left actuator (3). Cap elbow (2).
- Remove drain hose from REAR SPNSN UNIT-9 hose (4) and connect tee (5) and pressure measuring device (6) between REAR SPNSN UNIT-9 hose (4) and CORNER SPNSN UNIT-2 hose (1).
- Start engine and observe that hydraulic pressure is greater than 2,500 psi (17,238 kPa). Less than 2,500 psi (17,238 kPa) indicates leakage from No. 3 left actuator. Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hoses.



PRYBAR

NO. 3 LEFT ACTUATOR BINDING CHECK

NOTE

Have suitable container ready to catch oil.

- Disconnect INTMD SPNSN UNIT-2 hose (1) from adapter (2) at port 2, and disconnect LH 3 SPNSN UNIT-7 TEE tube (3) and NO 3 SPNSN UNIT-7 TEE hose (4) from elbow (5) and tee (6) at port 7 on No. 3 left actuator (7). Plug all lines.
- Check for binding in No. 3 left actuator (7) by using a prybar to determine if No. 3 lift road-wheel arm can be moved up or down. Reconnect lines.

Notify Direct Support maintenance.

12

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE

The rear of vehicle is raised by left and right actuators, interconnected by hydraulic circuit 8. The SPRUNG and UNSPRUNG circuits operate left and right rear actuators through valves and mechanical controls. Circuit 9 operates SPRUNG mode and circuit 11 operates UNSPRUNG mode.

WARNING

High pressure is present in the M9 hydraulic system, Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

HIGH-PRESSURE



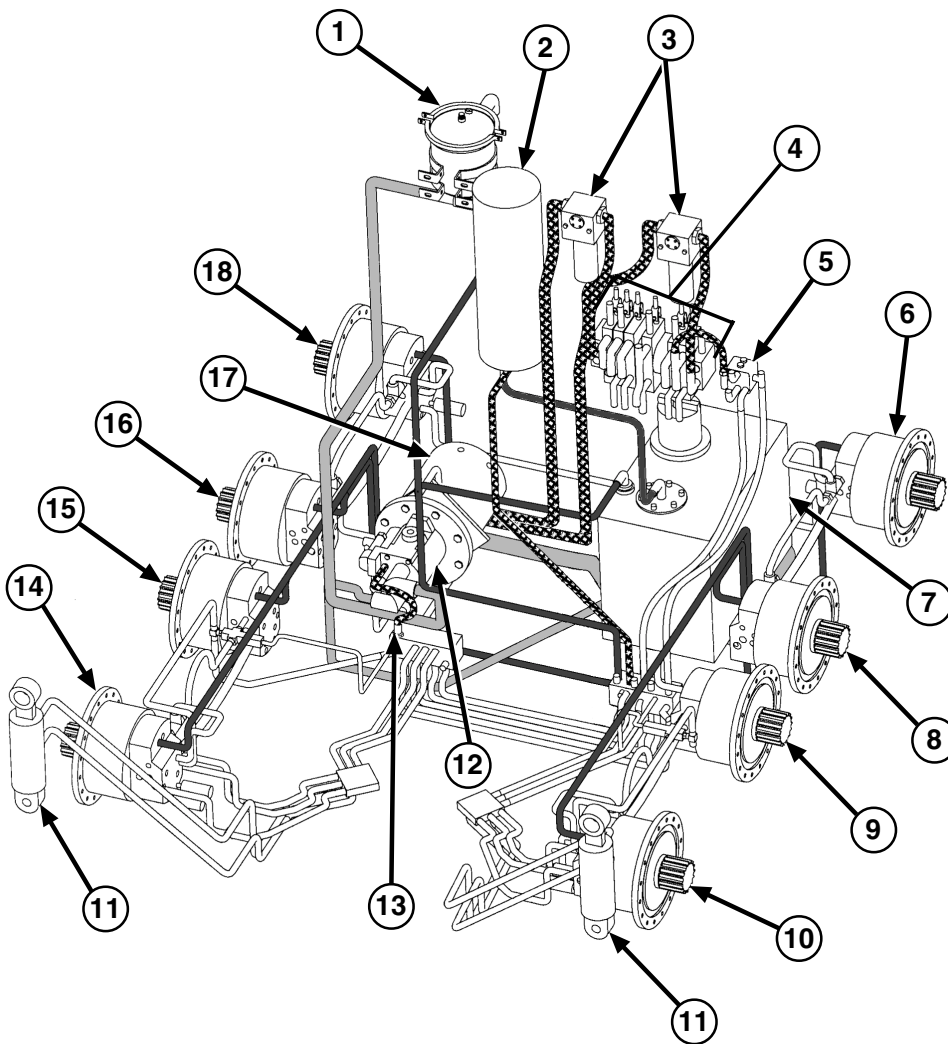
CIRCUIT



RETURN






SUPPLY

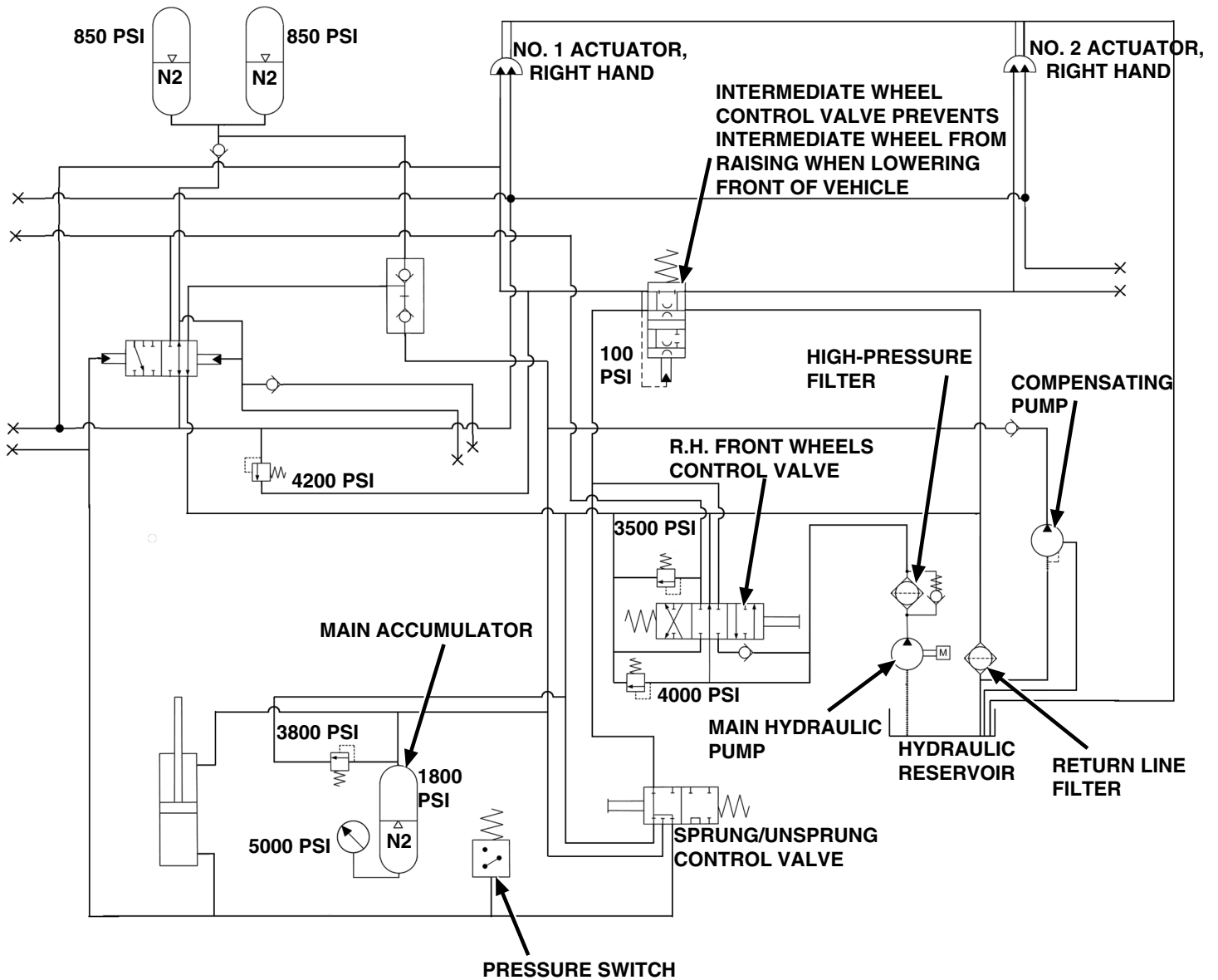


COMPONENTS:

1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. DIRECTIONAL CONTROL VALVE BANK
5. SPRUNG/UNSPRUNG VALVE
6. NO. 4 ACTUATOR, LEFT HAND
7. HYDRAULIC RESERVOIR
8. NO. 3 ACTUATOR, LEFT HAND
9. NO. 2 ACTUATOR, LEFT HAND
10. NO. 1 ACTUATOR, LEFT HAND
11. BUMP STOP CYLINDERS
12. COMPENSATING PUMP
13. CHECK VALVE
14. NO. 1 ACTUATOR, RIGHT HAND
15. NO. 2 ACTUATOR, RIGHT HAND
16. NO. 3 ACTUATOR, RIGHT HAND
17. MAIN HYDRAULIC PUMP
18. NO. 4 ACTUATOR, RIGHT HAND

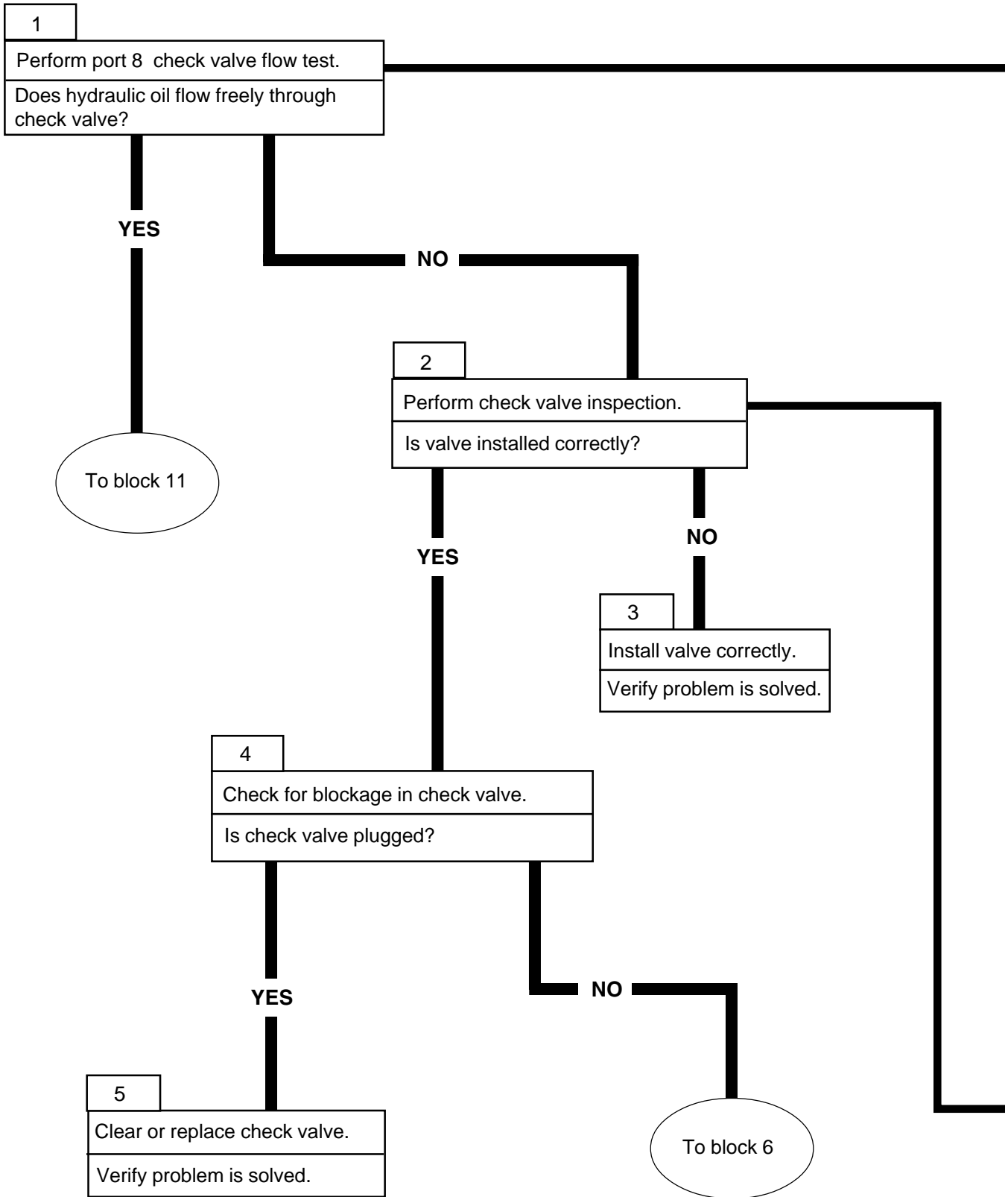
SUSPENSION CIRCUIT

HIGH-PRESSURE 
CIRCUIT 
SUPPLY 



SUSPENSION SCHEMATIC

12 REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)

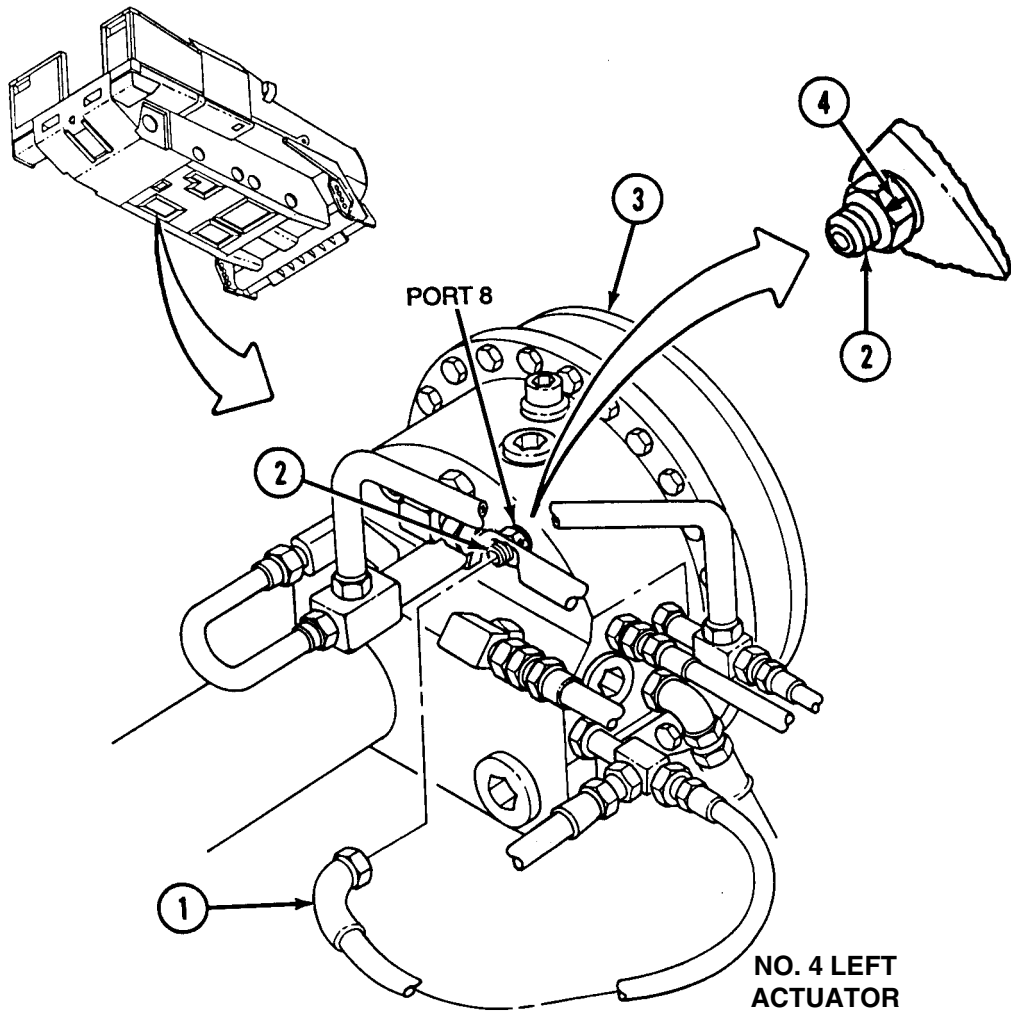


PORT 8 CHECK VALVE FLOW TEST

NOTE

Have suitable container ready to catch oil.

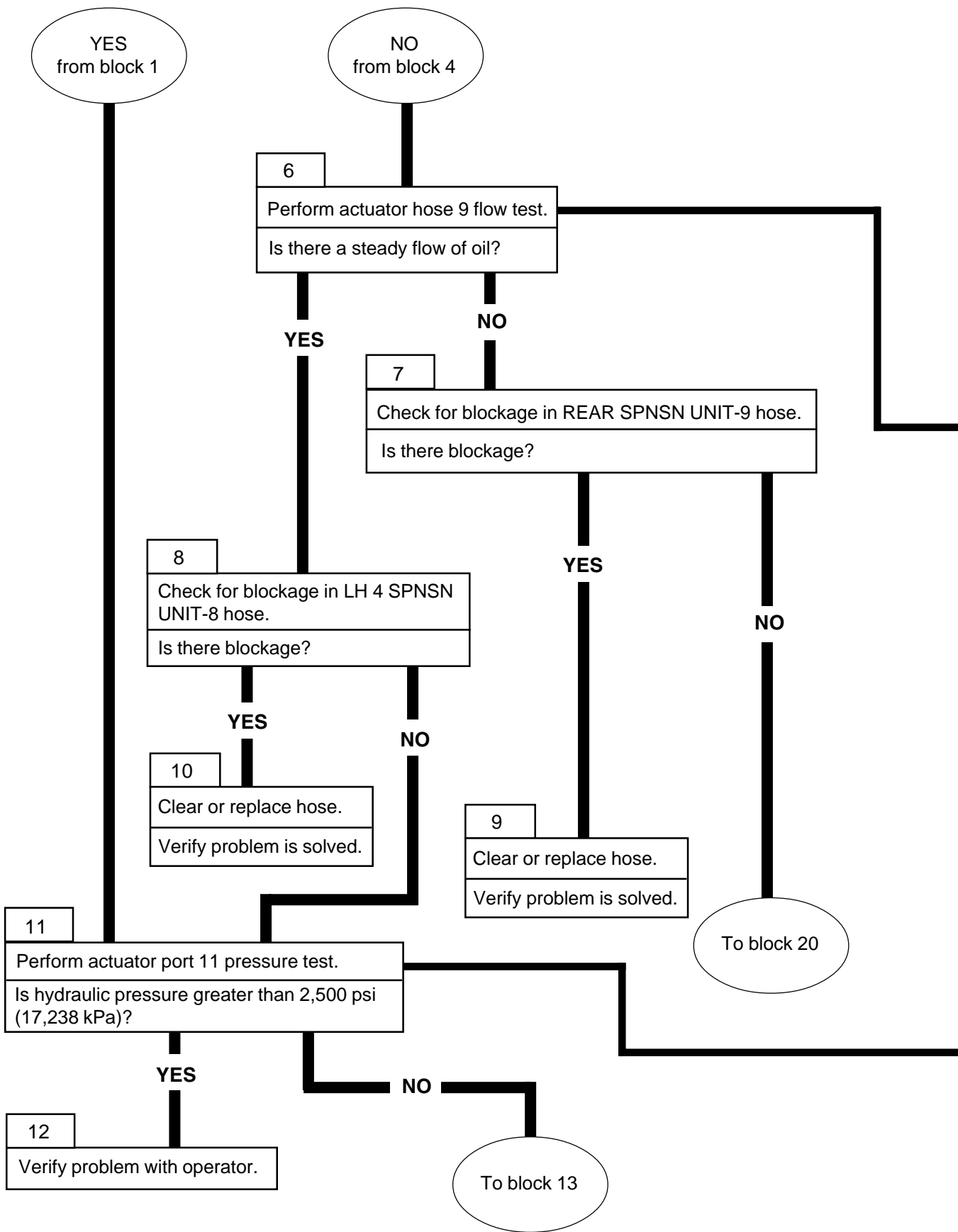
- Stop engine; relieve hydraulic pressure. Disconnect LH 4 SPNSN UNIT-8 hose (1) from check valve (2) at port 8 on No. 4 left actuator (3). Plug end of LH 4 SPNSN UNIT-8 hose (1).
- Connect drain hose to check valve (2).
- While holding end of drain hose in container, have assistant start engine and move SPRUNG/UNSPRUNG lever to SPRUNG mode. Observe for steady flow of oil from drain hose. Vehicle should raise.
- Stop engine; relieve hydraulic pressure and connect line.

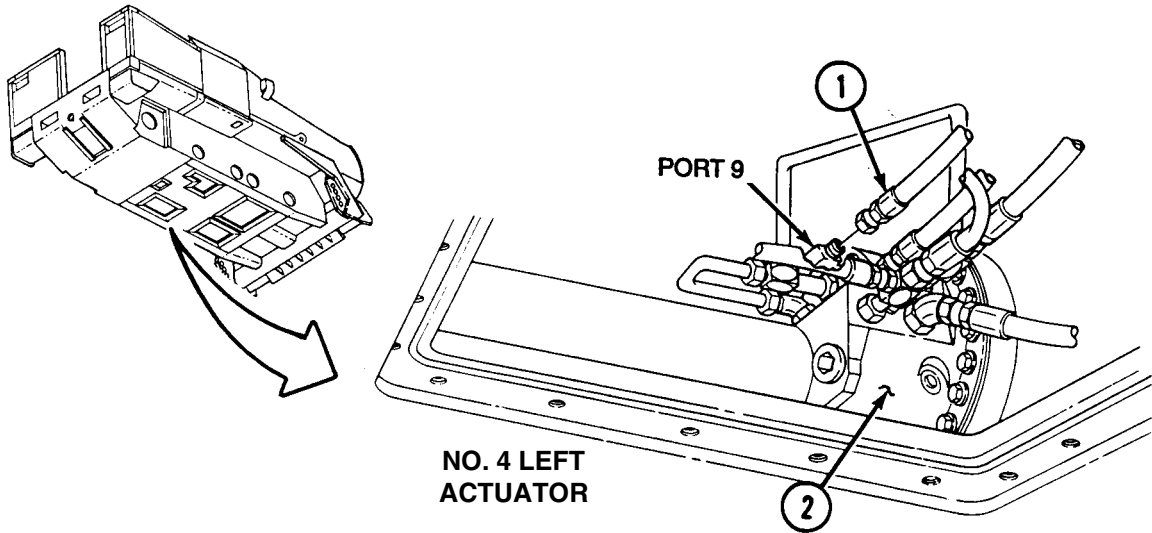


CHECK VALVE INSPECTION

- Inspect check valve (2). Ensure arrow (4) points away from actuator (3).
- Connect LH 4 SPNSN UNIT-8 hose (1) to check valve (2) at port 8.

12 REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)



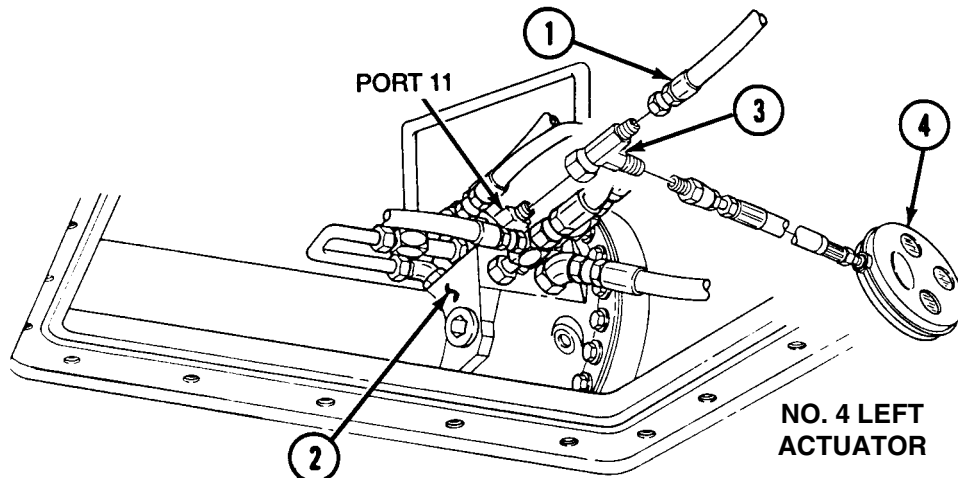


ACTUATOR HOSE 9 FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect REAR SPNSN UNIT-9 hose (1) at port 9 on No. 4 left actuator (2). Cap port 9.
- Connect a drain hose to open end of REAR SPNSN UNIT-9 hose (1).
- Hold free end of drain hose in clean container. Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Observe for a steady flow of oil from drain hose.
- Stop engine; relieve hydraulic pressure and connect hose.



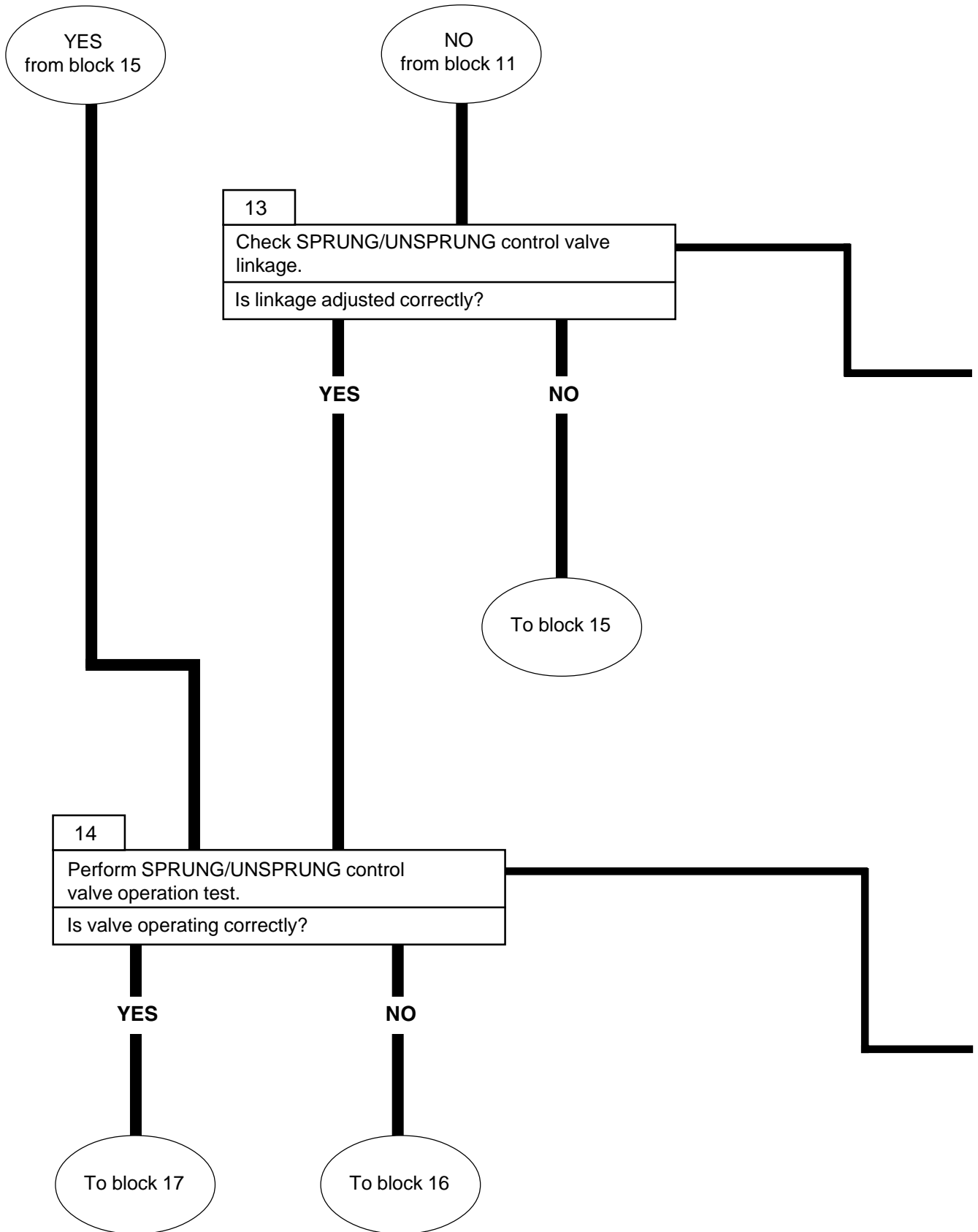
ACTUATOR PORT 11 PRESSURE TEST

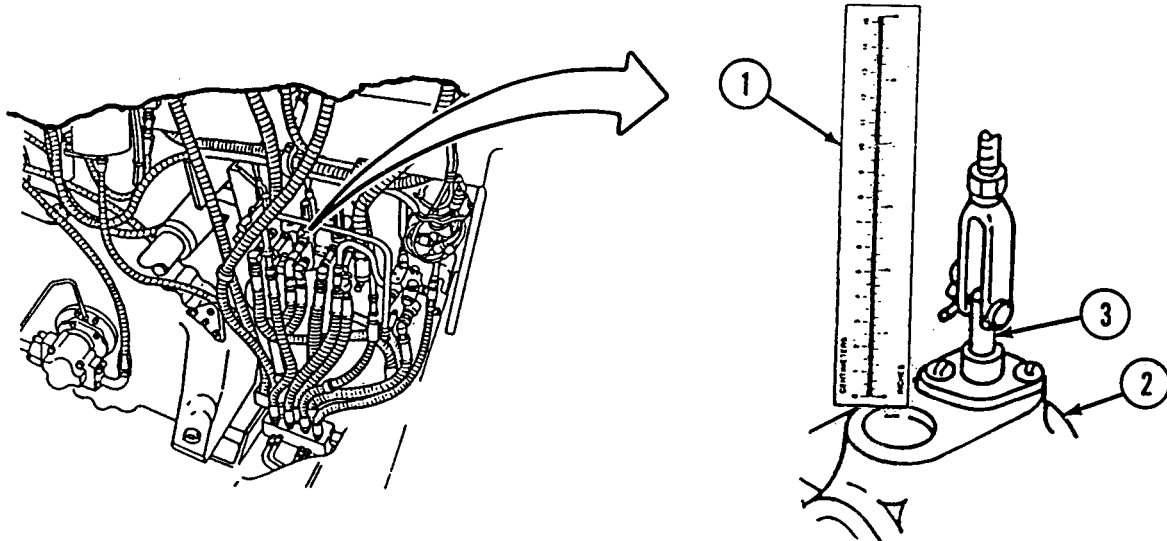
NOTE

Have suitable container ready to catch oil.

- Disconnect REAR SPNSN UNIT-11 hose (1) at port 11 on No. 4 left actuator (2). Cap port 11.
- Install tee (3) and pressure measuring device (4) on end of REAR SPNSN UNIT-11 hose (1). Cap open end of tee (3).
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Observe hydraulic pressure.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

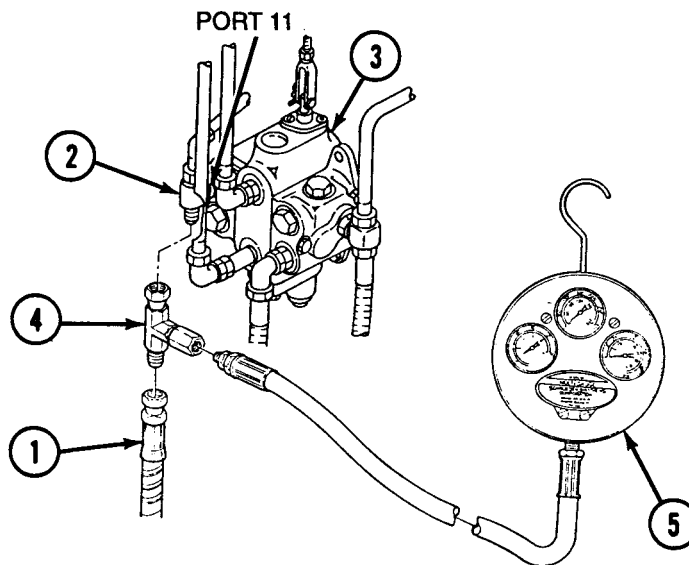
12 REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





SPRUNG/UNSPRUNG CONTROL VALVE LINKAGE CHECK

Hold measuring device (1) on face of SPRUNG/UNSPRUNG control valve (2). Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG modes. Measure distance plunger (3) travels as lever is moved. Distance of travel should be 9/32 in. (7 mm).



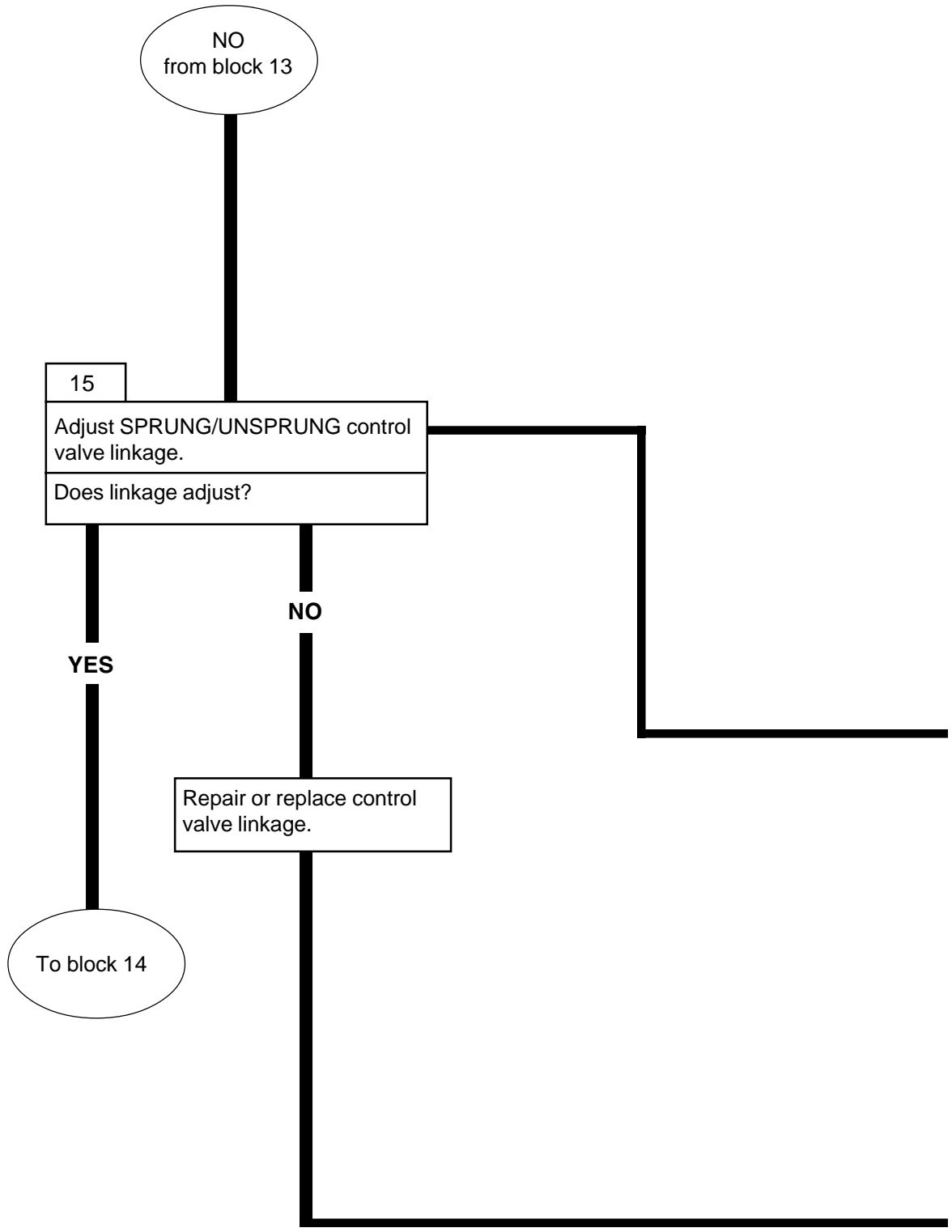
SPRUNG/UNSPRUNG CONTROL VALVE OPERATION TEST

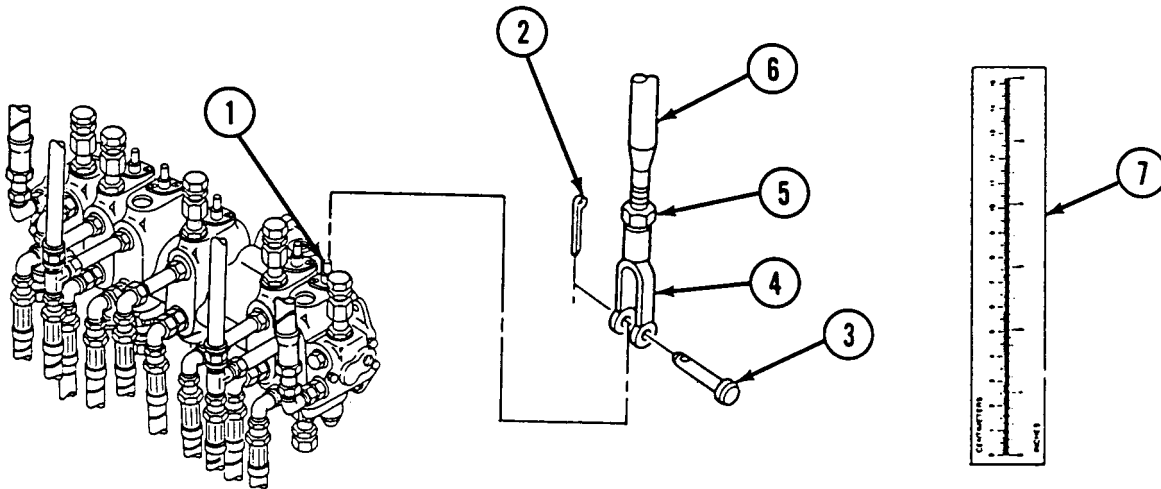
NOTE

Have suitable container ready to catch oil.

- Disconnect UNSPR VLV-11 TEE hose (1) from tee (2) at port 11 of SPRUNG/ UNSPRUNG control valve (3).
- Install tee (4) and pressure measuring device (5) between UNSPR VLV-11 TEE hose (1) and tee (2) at port 11.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG several times. Hydraulic pressure should be less than 25 psi (172 kPa) in SPRUNG mode and greater than 2,500 psi (17,238 kPa) in UNSPRUNG mode.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

12 REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





SPRUNG/UNSPRUNG LINKAGE ADJUSTMENT

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

NOTE

All control rods are adjusted the same way. This procedure covers SPRUNG/UNSPRUNG control rod.

- Note position of control valve plunger (1) when SPRUNG/UNSPRUNG control lever is in neutral (off) position.

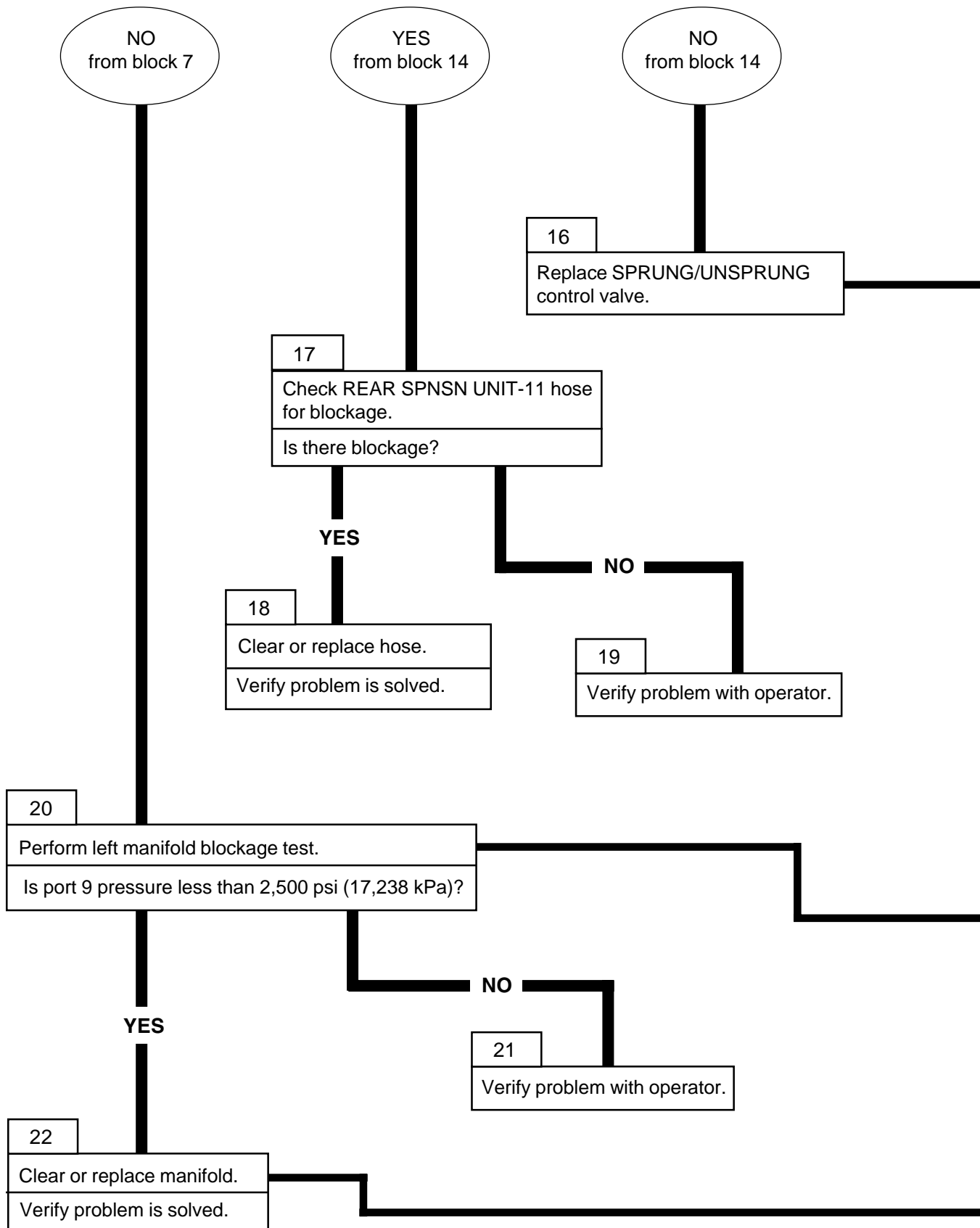
NOTE

Normal control valve plunger travel is 9/32 in. (7 mm).

- Remove cotter pin (2), straight pin (3), and clevis (4) from control valve plunger (1). Discard cotter pin. (2).
- Loosen jamnut (5). Turn clevis (4) clockwise to shorten rod (6); counterclockwise to lengthen rod (6).
- Hold measuring device (7) on face of SPRUNG/UNSPRUNG control valve. Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance of plunger travel.
- Coat threads of rod (6) with sealing compound primer and sealing compound. Tighten jamnut (5) against clevis (4).
- Connect clevis (4) to control valve plunger (1) with straight pin (3) and new cotter pin (2).

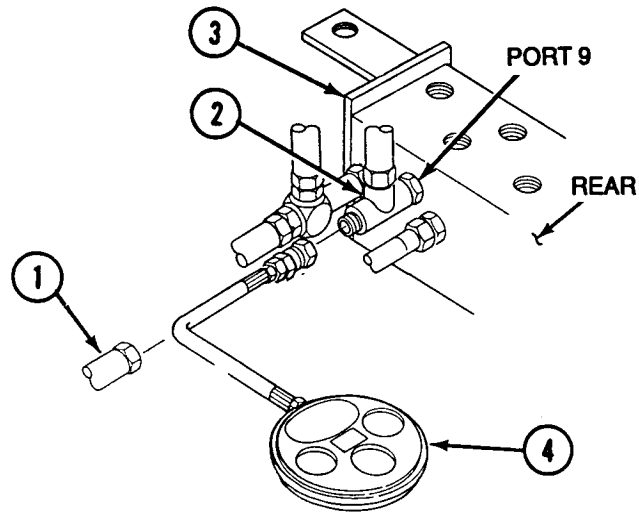
Refer to TM 5-2350-262-20-2.

12 REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE (CONTINUED)





Refer to TM 5-2350-262-20-2.



LEFT MANIFOLD BLOCKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Disconnect MAIN MANF REAR-9 hose (1) from tee (2) on port 9 of LH manifold (3). Plug MAIN MANF REAR-9 hose (1).
- Install pressure measuring device (4) on tee (2) at port 9.
- Start engine; read pressure measuring device (4).
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.



Refer to TM 5-2350-262-20-2.

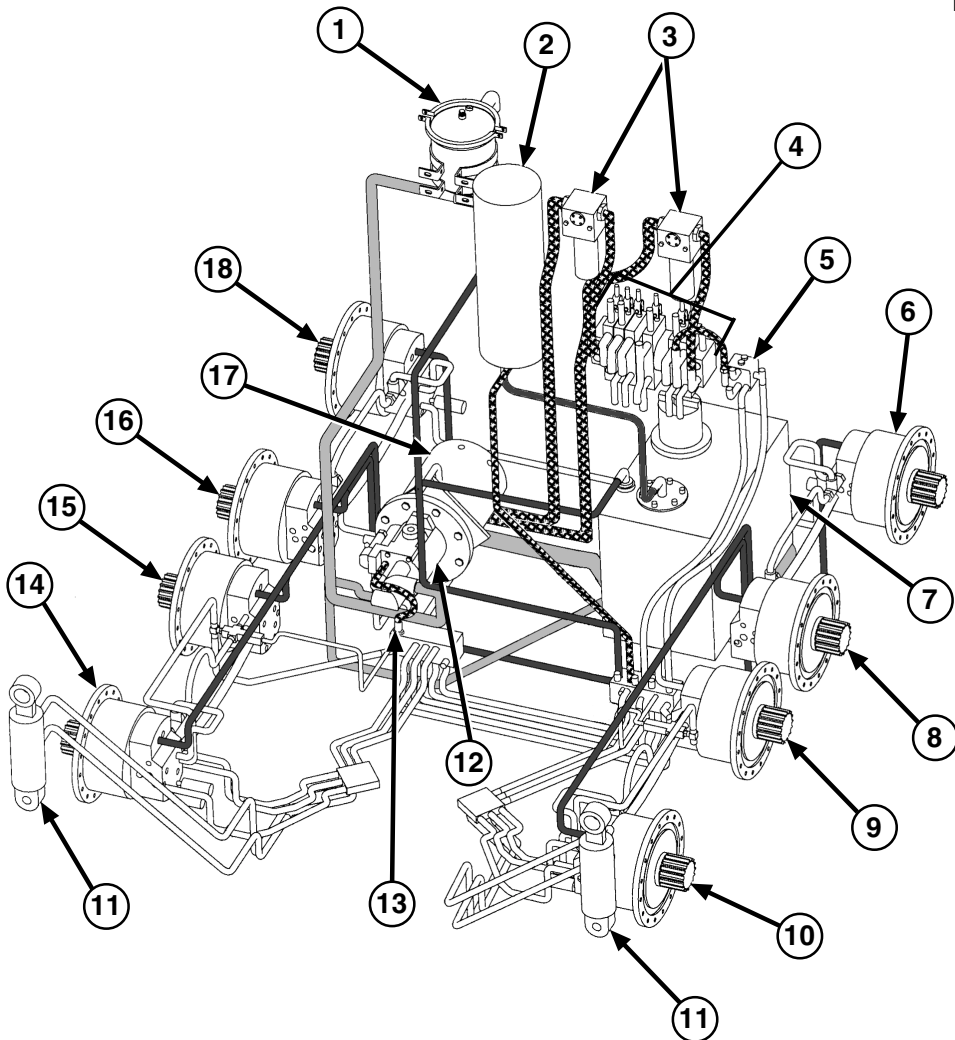
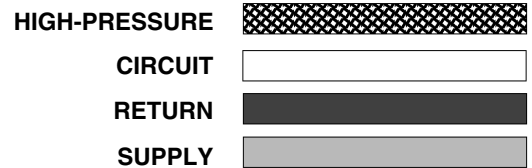
13

RIGHT REAR CORNER RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE

The No. 4 right and No. 4 left actuators are interconnected through circuit 3 which balances the pressure between the two actuators. Hydraulic pressure is supplied to the No. 4 right actuator at port 3.

WARNING

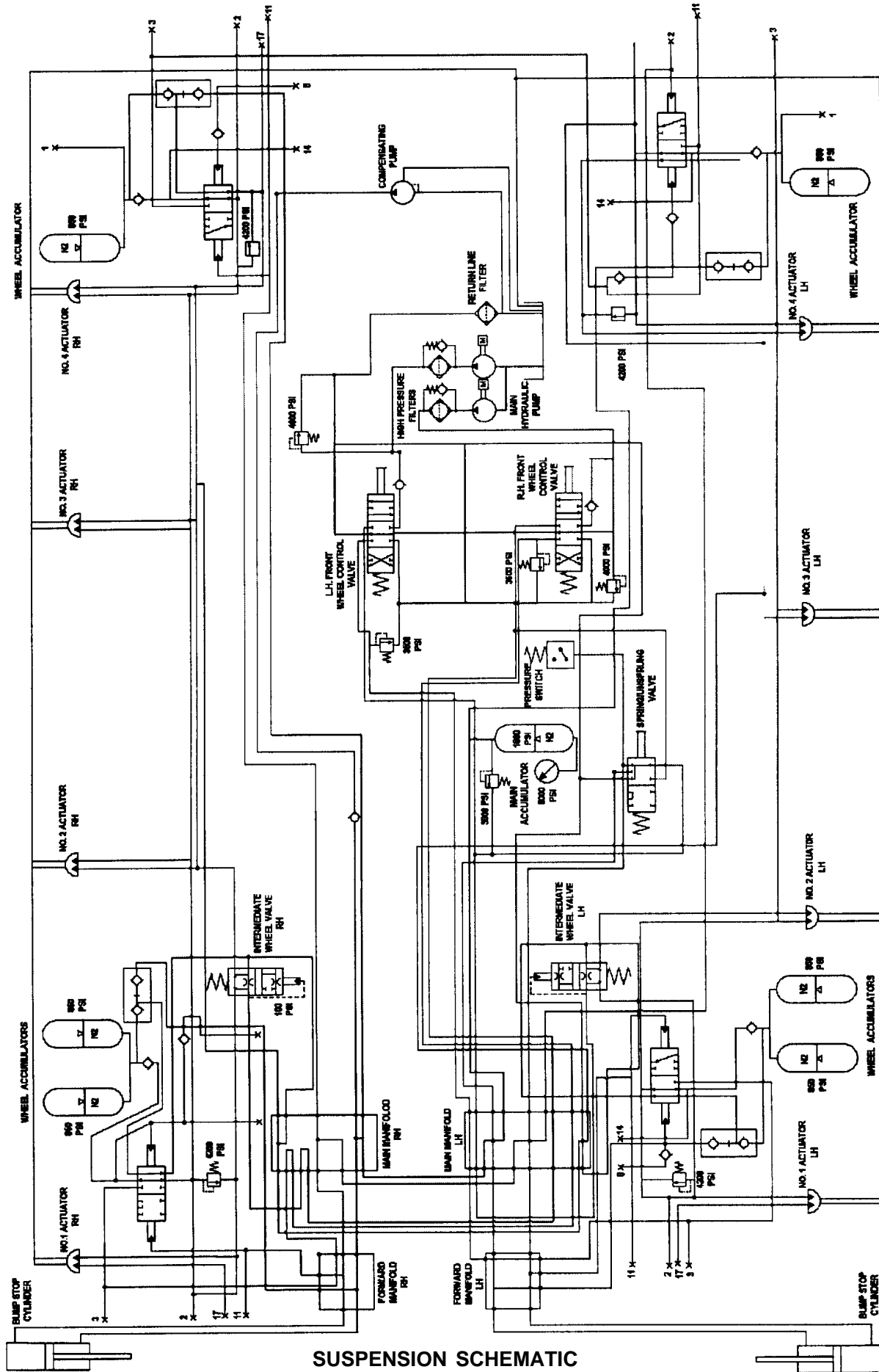
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.



COMPONENTS:

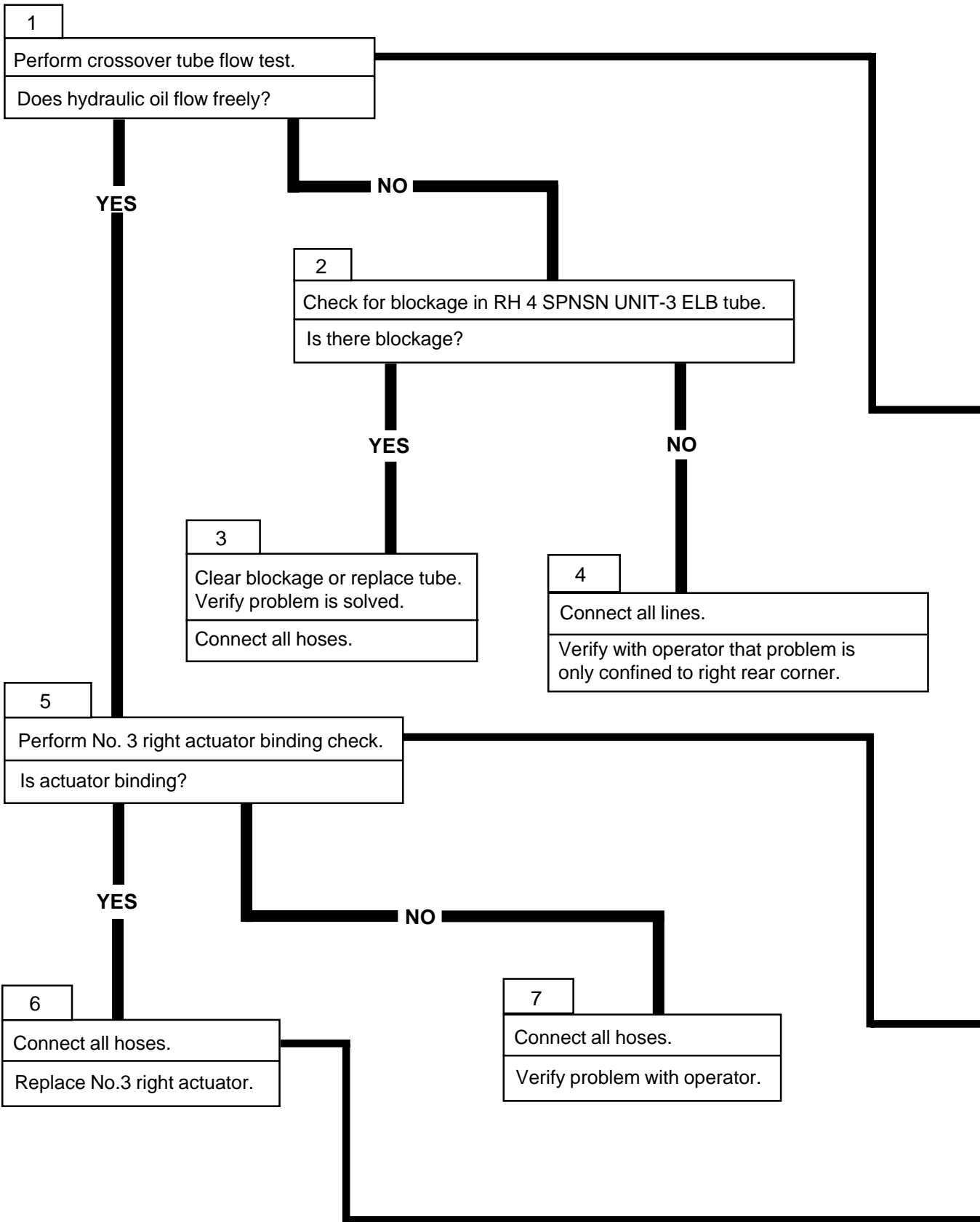
1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. DIRECTIONAL CONTROL VALVE BANK
5. SPRUNG/UNSPRUNG VALVE
6. NO. 4 ACTUATOR, LEFT HAND
7. HYDRAULIC RESERVOIR
8. NO. 3 ACTUATOR, LEFT HAND
9. NO. 2 ACTUATOR, LEFT HAND
10. NO. 1 ACTUATOR, LEFT HAND
11. BUMP STOP CYLINDERS
12. COMPENSATING PUMP
13. CHECK VALVE
14. NO. 1 ACTUATOR, RIGHT HAND
15. NO. 2 ACTUATOR, RIGHT HAND
16. NO. 3 ACTUATOR, RIGHT HAND
17. MAIN HYDRAULIC PUMP
18. NO. 4 ACTUATOR, RIGHT HAND

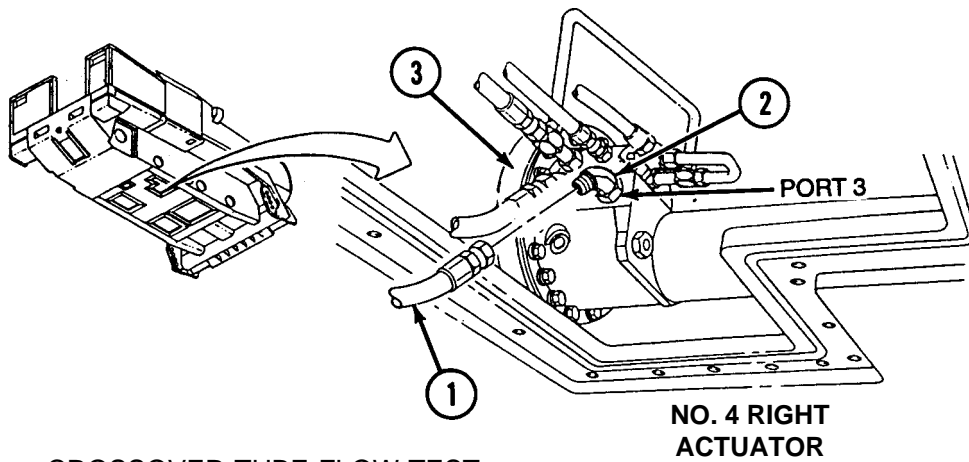
SUSPENSION CIRCUIT



SUSPENSION SCHEMATIC

13 RIGHT REAR CORNER RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE
(CONTINUED)



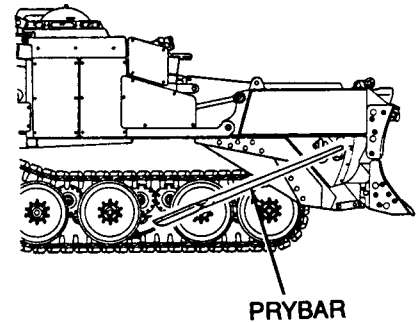
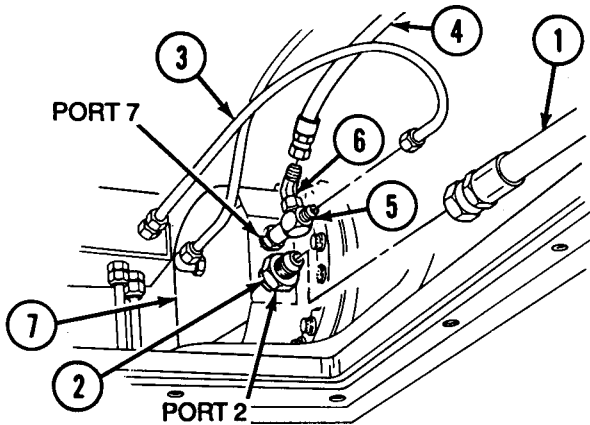


CROSSOVER TUBE FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect RH 4 SPNSN UNIT-3 ELB hull crossover hose (1) from elbow (2) at port 3 on No. 4 right actuator (3). Cap elbow (2).
- Connect drain hose to open end of RH 4 SPNSN UNIT-3 ELB hull crossover hose (1). Place end of hose in container.
- Have assistant start engine and move SPRUNG/UNSPRUNG control lever to UNSPRUNG. Observe a free flow of hydraulic oil.
- Stop engine; relieve hydraulic pressure. Remove drain hose and connect RH 4 SPNSN UNIT-3 ELB hose (1).



NO. 3 RIGHT ACTUATOR BINDING CHECK

NOTE

Have suitable container ready to catch oil.

- Disconnect INTMD SPNSN UNIT-2 hose (1) from adapter (2) at port 2. Disconnect R/H 3 SPNSN UNIT-7 tee tube (3) and NO 3 SPNSN UNIT-7 tee hose (4) from tee (5) and elbow (6) at port 7 on No. 3 right actuator (7). Plug all lines.
- Check for binding in No. 3 right actuator (6) by using a prybar to determine if No.3 right roadwheel can be moved up and down.

Notify Direct Support maintenance.

14

RIGHT REAR CORNER RAISES UNSPRUNG, BUT NOT SPRUNG MODE

Hydraulic pressure to No. 4 right actuator is provided by compensating pump through right-hand manifold by way of circuit 9.

WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

HIGH-PRESSURE



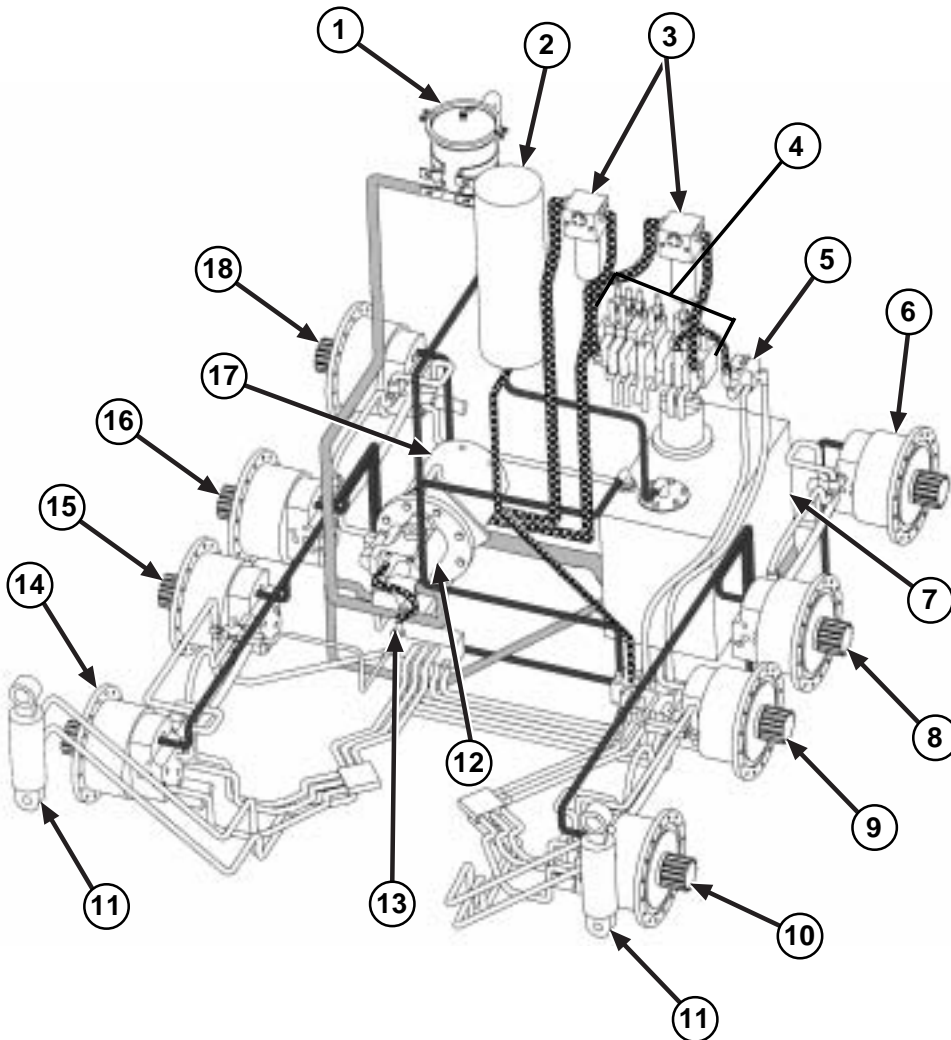
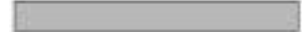
CIRCUIT



RETURN



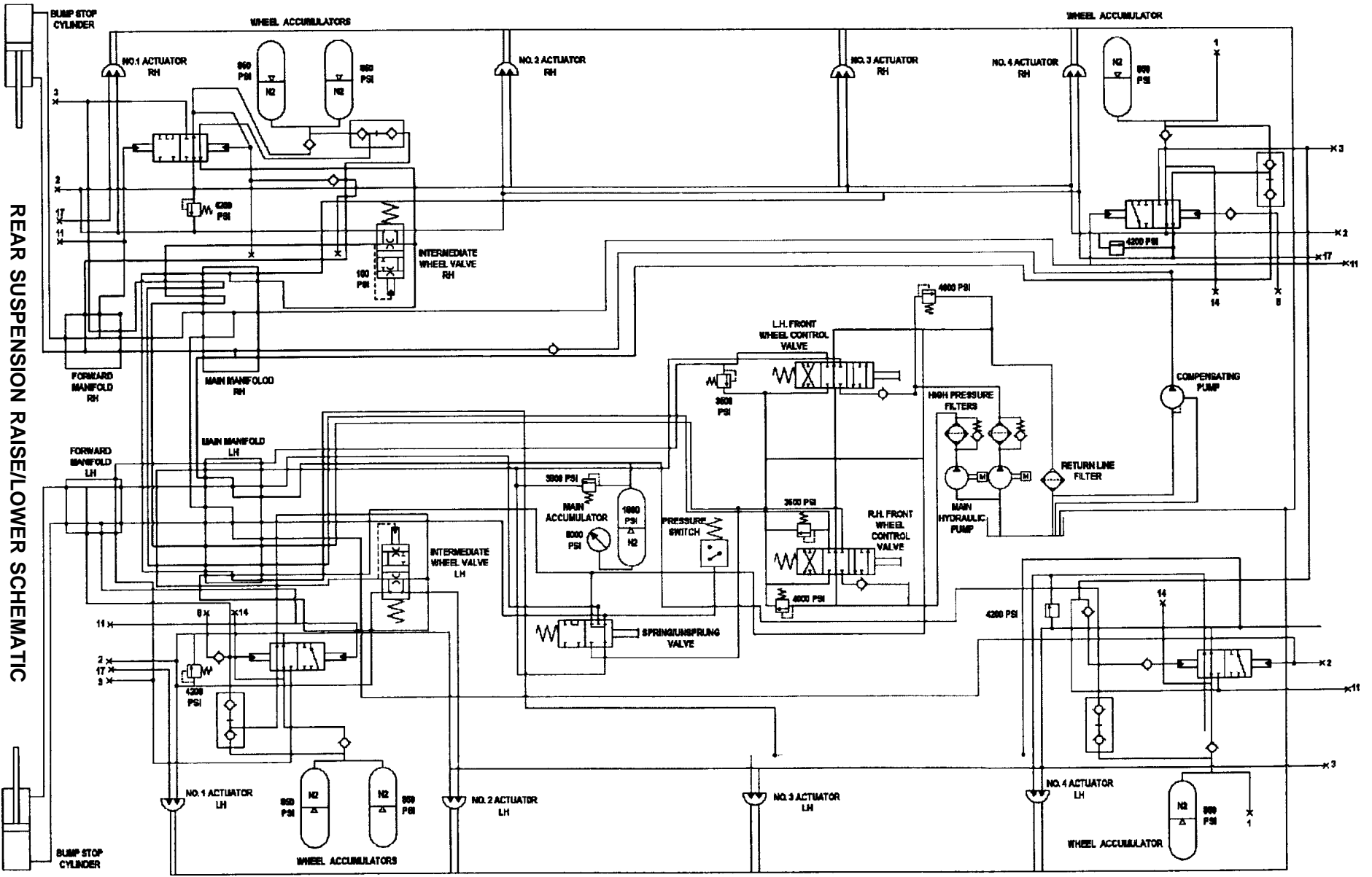
SUPPLY



COMPONENTS:

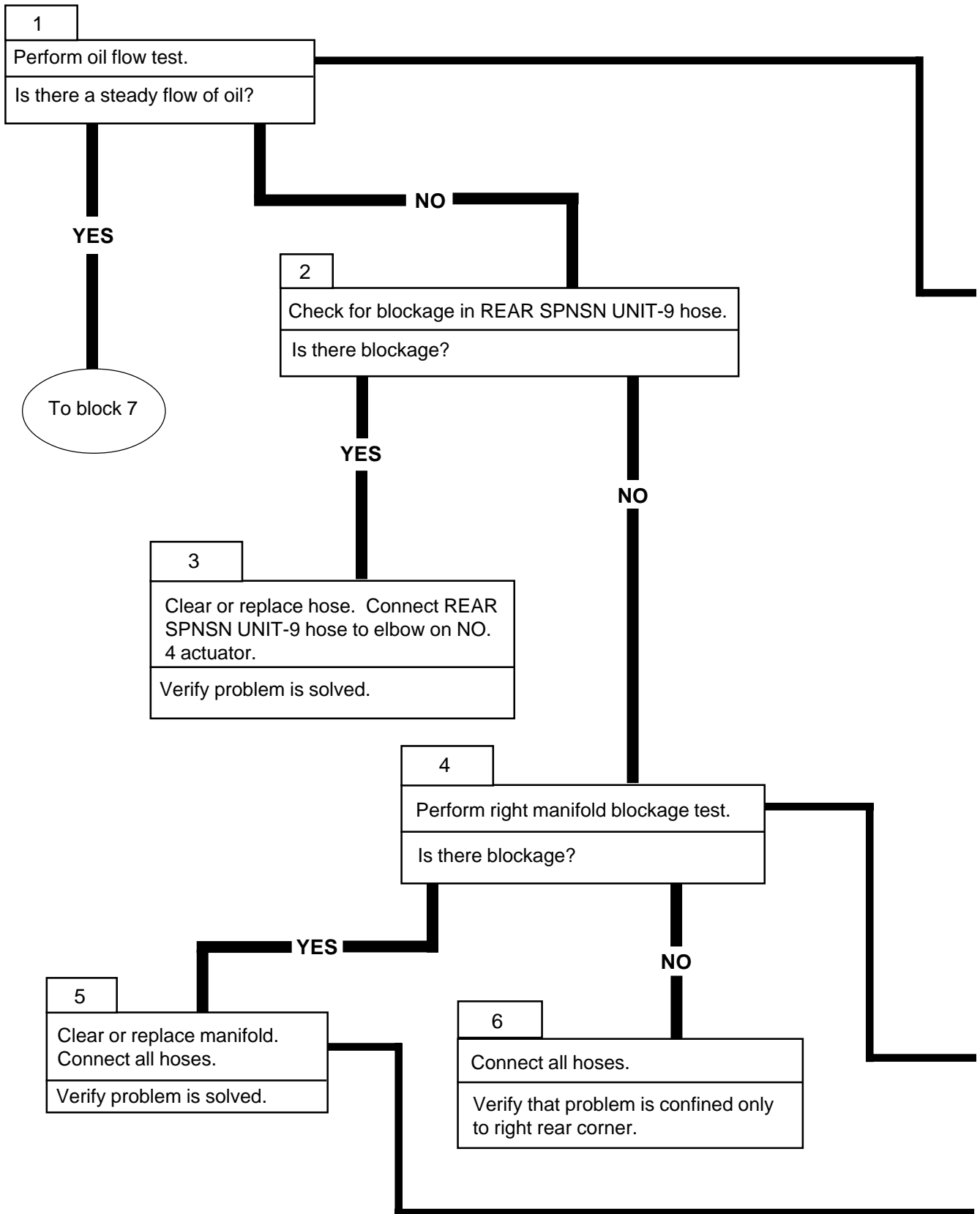
1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. DIRECTIONAL CONTROL VALVE BANK
5. SPRUNG/UNSPRUNG VALVE
6. NO. 4 ACTUATOR, LEFT HAND
7. HYDRAULIC RESERVOIR
8. NO. 3 ACTUATOR, LEFT HAND
9. NO. 2 ACTUATOR, LEFT HAND
10. NO. 1 ACTUATOR, LEFT HAND
11. BUMP STOP CYLINDERS
12. COMPENSATING PUMP
13. CHECK VALVE
14. NO. 1 ACTUATOR, RIGHT HAND
15. NO. 2 ACTUATOR, RIGHT HAND
16. NO. 3 ACTUATOR, RIGHT HAND
17. MAIN HYDRAULIC PUMP
18. NO. 4 ACTUATOR, RIGHT HAND

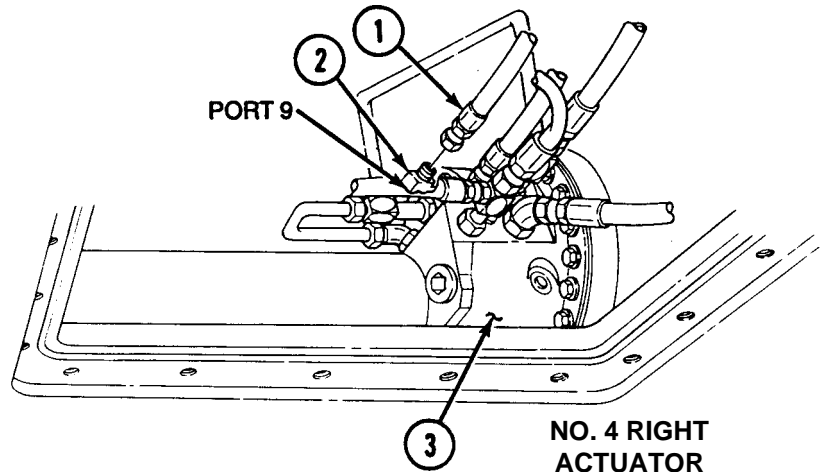
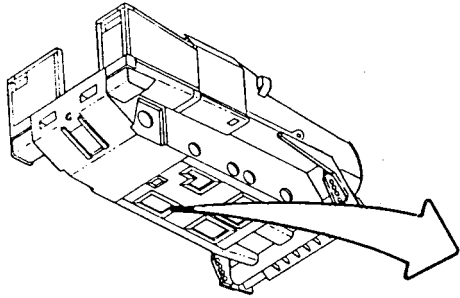
REAR SUSPENSION RAISE/LOWER CIRCUIT



REAR SUSPENSION RAISE/LOWER SCHEMATIC

14 RIGHT REAR CORNER RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE (CONTINUED)



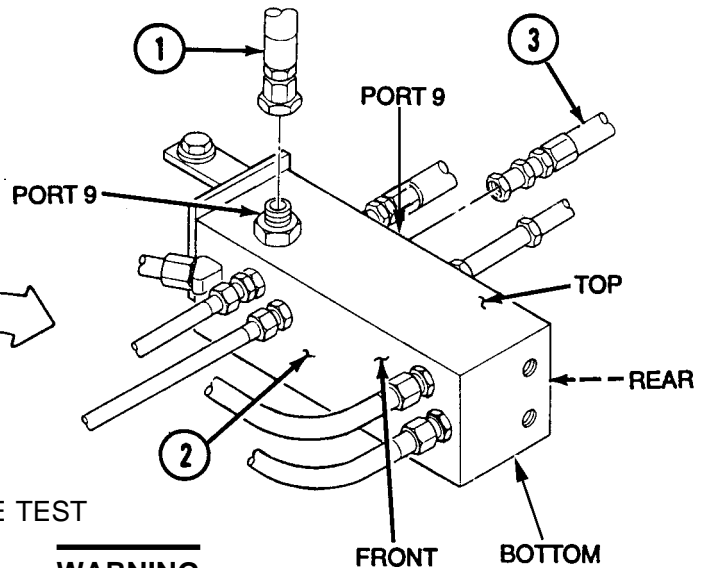
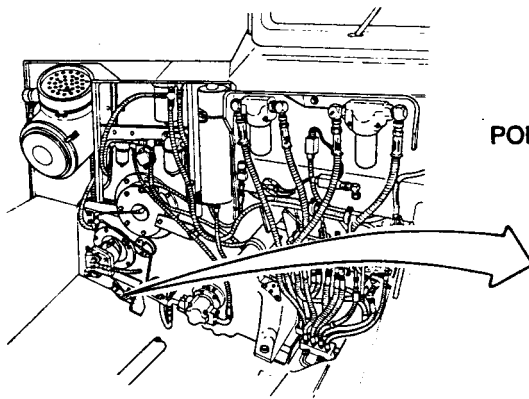


OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect REAR SPNSN UNIT-9 hose (1) from elbow (2) at port 9 on No. 4 right actuator (3). Cap elbow (2).
- While holding end of hose (1) in container, have assistant start engine and move SPRUNG/UNSPRUNG lever to SPRUNG. Observe for free flow of hydraulic oil from hose (1).
- Stop engine; relieve hydraulic pressure.



RIGHT MANIFOLD BLOCKAGE TEST

WARNING

Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more than 30 psi (207kPa). Always wear goggles.

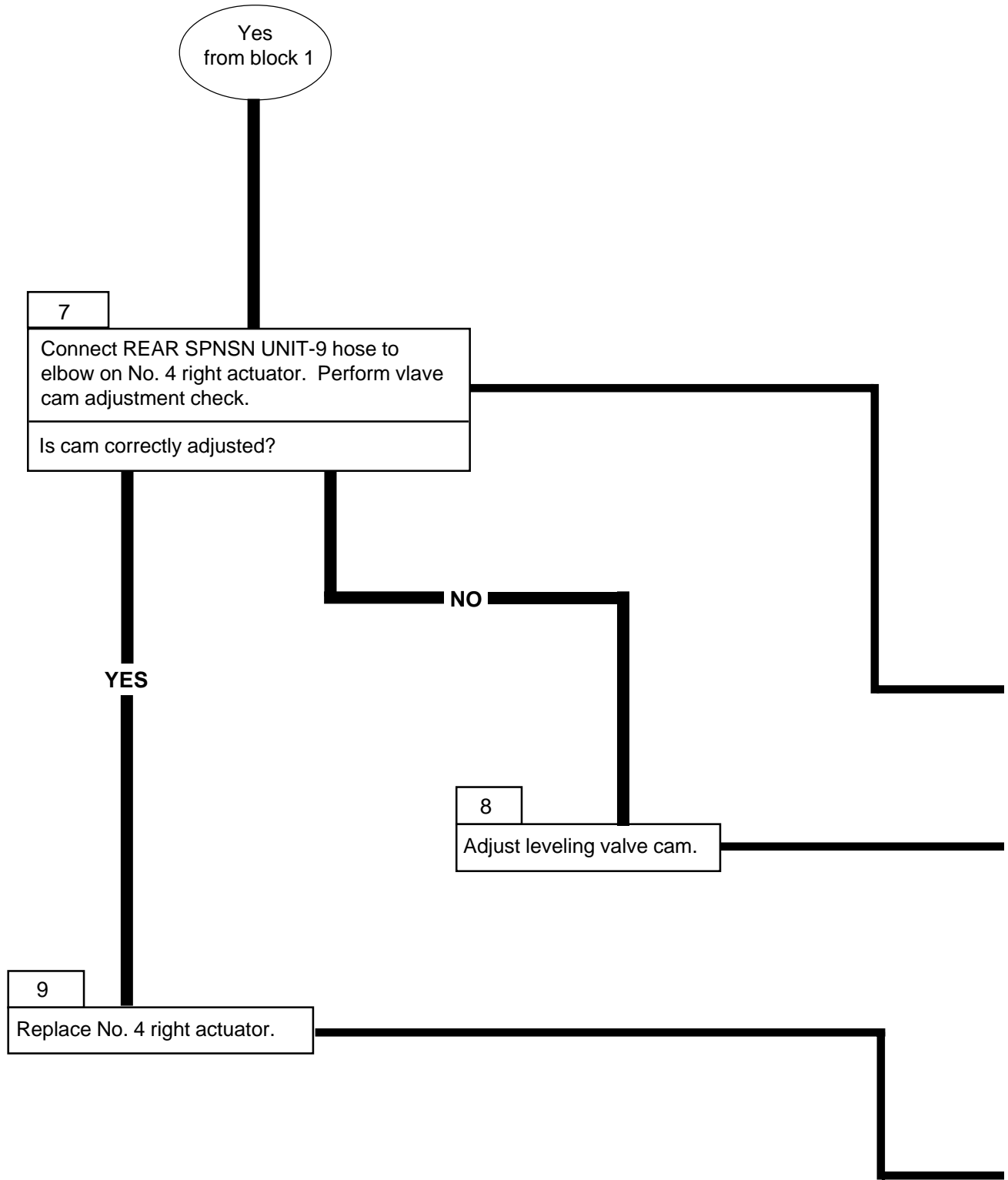
NOTE

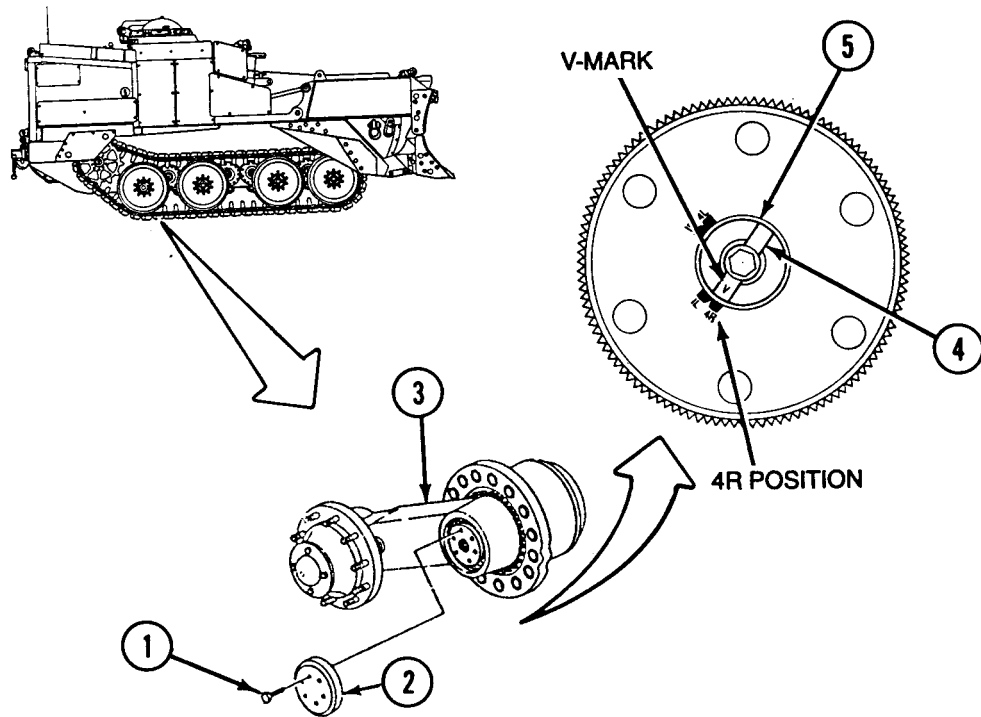
Have suitable container ready to catch oil.

- Disconnect MAIN MANF TOP-9 hose (1) from port 9 at top of right manifold (2).
- Disconnect MAIN MANF REAR-9 hose (3) from port 9 at rear of right manifold (2).
- Apply air pressure through top port 9. Observe for air flow through rear port 9.

Refer to TM 5-2350-262-20-2.

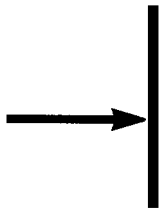
14 RIGHT REAR CORNER RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE (CONTINUED)





CHECK LEVELING VALVE CAM ADJUSTMENT

- Remove six self-locking screws (1) and retainer (2) from roadwheel arm (3) on No. 4 right roadwheel. Verify that V-mark on index key (4) is set to 4R position on camshaft (5).
- Install retainer (2) with six self-locking screws (1).



Notify Direct Support maintenance.



Notify Direct Support maintenance.



15

VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS

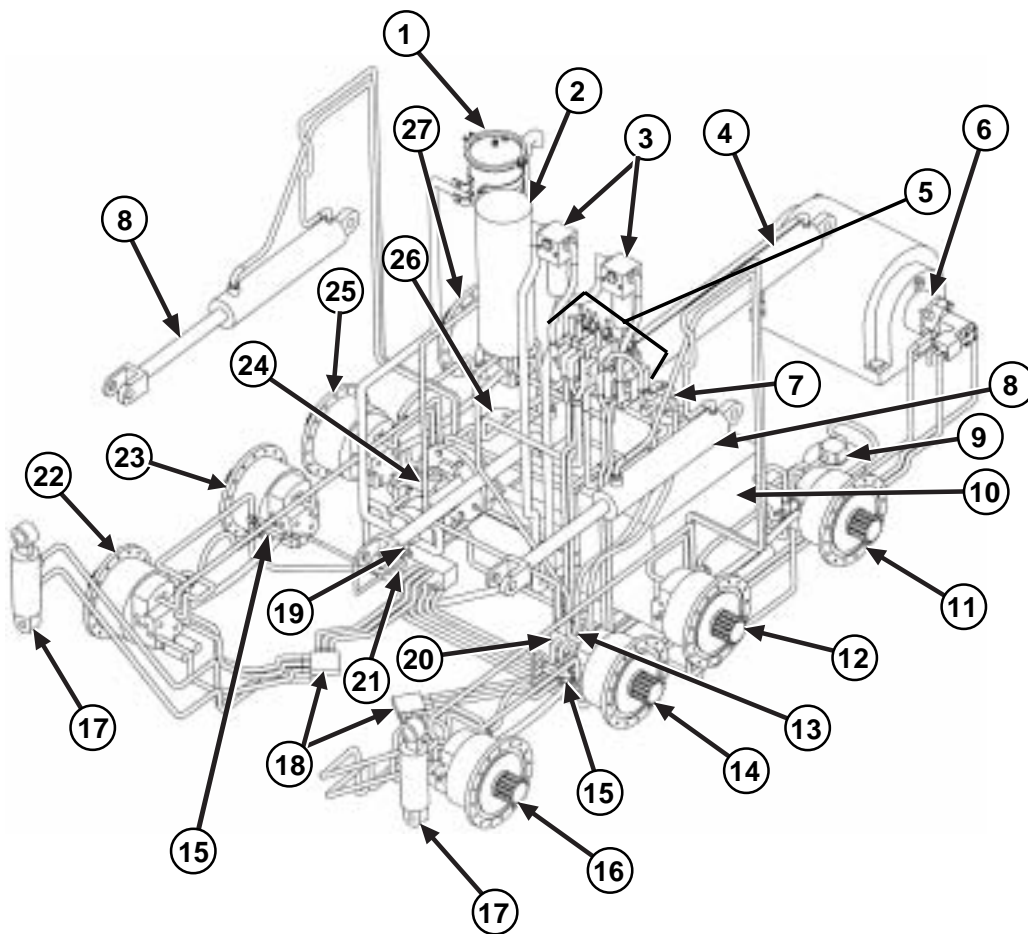
Valve bank hydraulic system is supplied by hydraulic ports 13L and 13R. Pressure is controlled by relief valves 13L and 13R.

WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Perform this procedure when all driver controls are inoperative. Refer to hydraulic schematic in appendix E.



COMPONENTS:

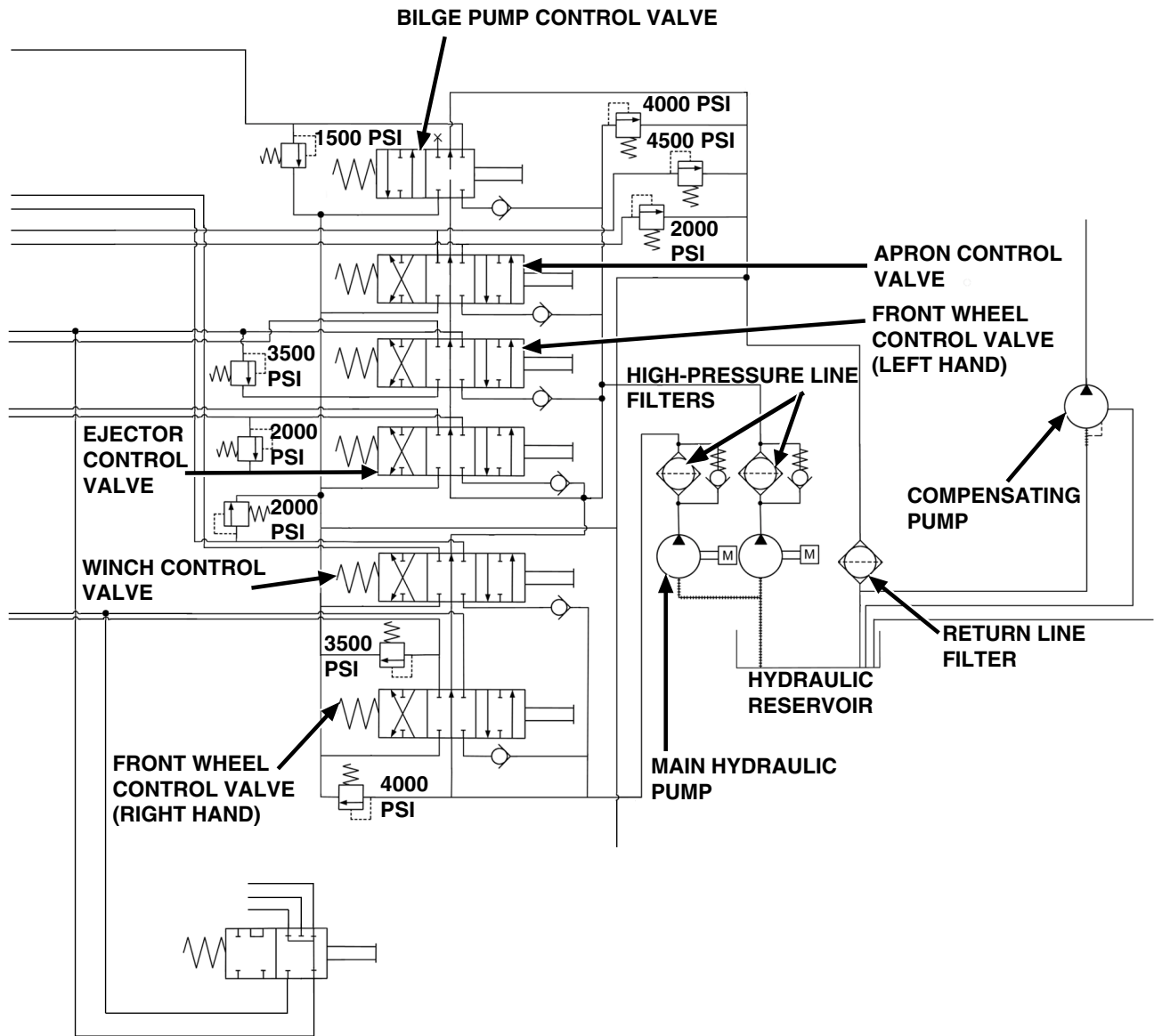
1. RETURN LINE FILTER
2. MAIN ACCUMULATOR
3. HIGH-PRESSURE FILTERS
4. EJECTOR CYLINDER
5. DIRECTIONAL CONTROL VALVE BANK
6. WINCH MOTOR
7. SPRUNG/UNSPRUNG VALVE
8. APRON CYLINDER
9. BILGE PUMP MOTOR
10. HYDRAULIC RESERVOIR
11. NO. 4 ACTUATOR, LEFT HAND
12. NO. 3 ACTUATOR, LEFT HAND
13. SUSPENSION RELIEF VALVE (BEHIND)
14. NO. 2 ACTUATOR, LEFT HAND
15. INTERMEDIATE WHEEL VALVE

DRIVER CONTROL CIRCUIT

COMPONENTS (continued):

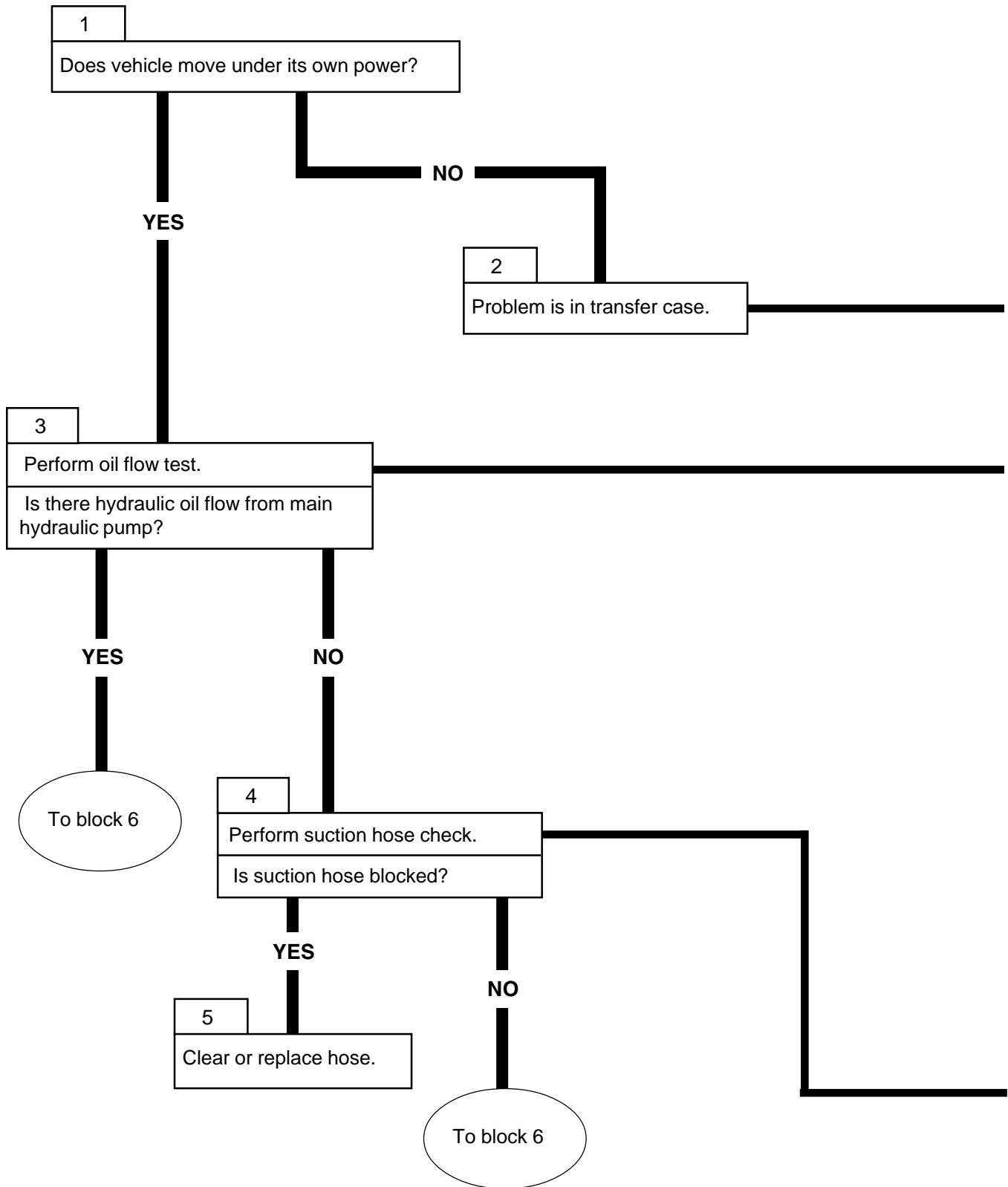
- | | |
|--------------------------------|--------------------------------|
| 16. NO. 1 ACTUATOR, LEFT HAND | 23. NO. 2 ACTUATOR, RIGHT HAND |
| 17. BUMP STOP CYLINDERS | 24. COMPENSATING PUMP |
| 18. FORWARD MANIFOLDS | 25. NO. 3 ACTUATOR, RIGHT HAND |
| 19. CHECK VALVE | 26. MAIN HYDRAULIC PUMP |
| 20. MAIN MANIFOLD, LEFT HAND | 27. NO. 4 ACTUATOR, RIGHT HAND |
| 21. MAIN MANIFOLD, RIGHT HAND | |
| 22. NO. 1 ACTUATOR, RIGHT HAND | |

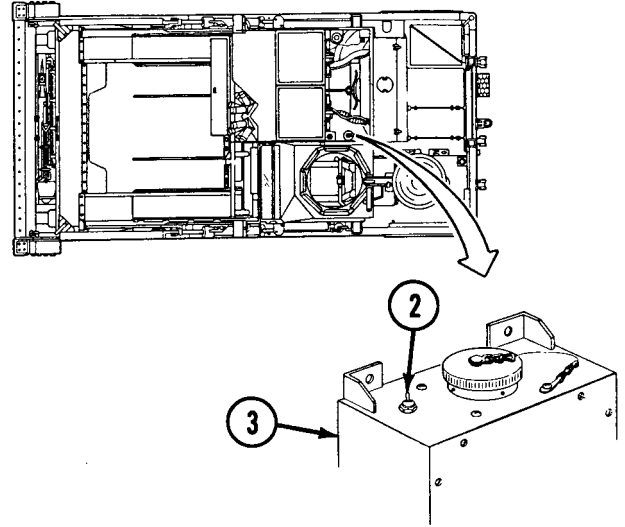
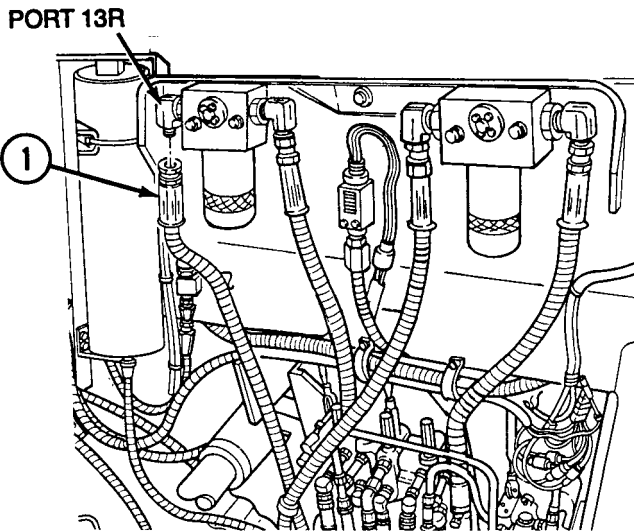
HIGH-PRESSURE **—————**
 CIRCUIT **—————**
 SUPPLY **+++++**



DRIVER CONTROL SCHEMATIC

15 VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS (CONTINUED)





Notify Direct Support Maintenance.

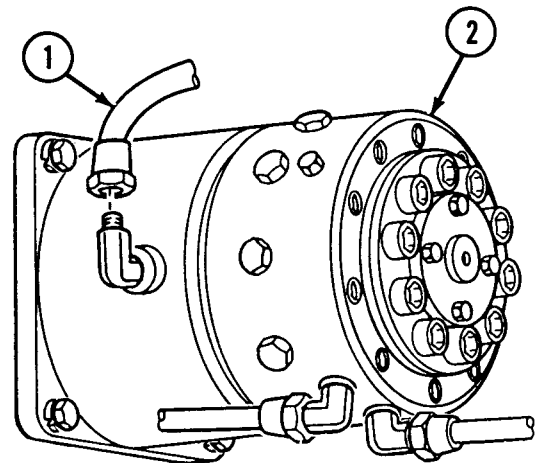
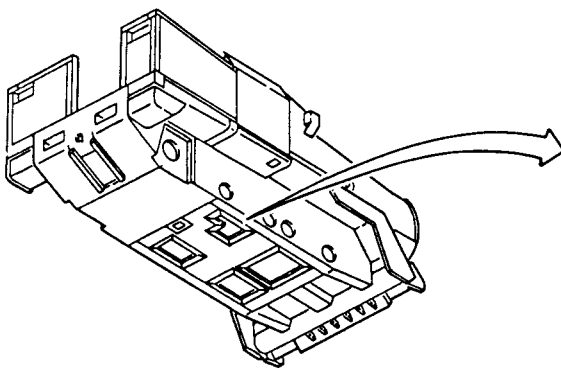


OIL FLOW TEST

NOTE

Three personnel are required to perform this test.
Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect HYDR FLTR-IN-13R hose (1) from high-pressure filter inlet port 13R.
- While assistant one is holding disconnected end of hose over container, assistant two will hold fuel solenoid shutoff toggle switch (2) on STE/ICE-R interface box (3) in shutoff position. Crank engine for approximately 15 seconds. Hydraulic oil should flow freely.



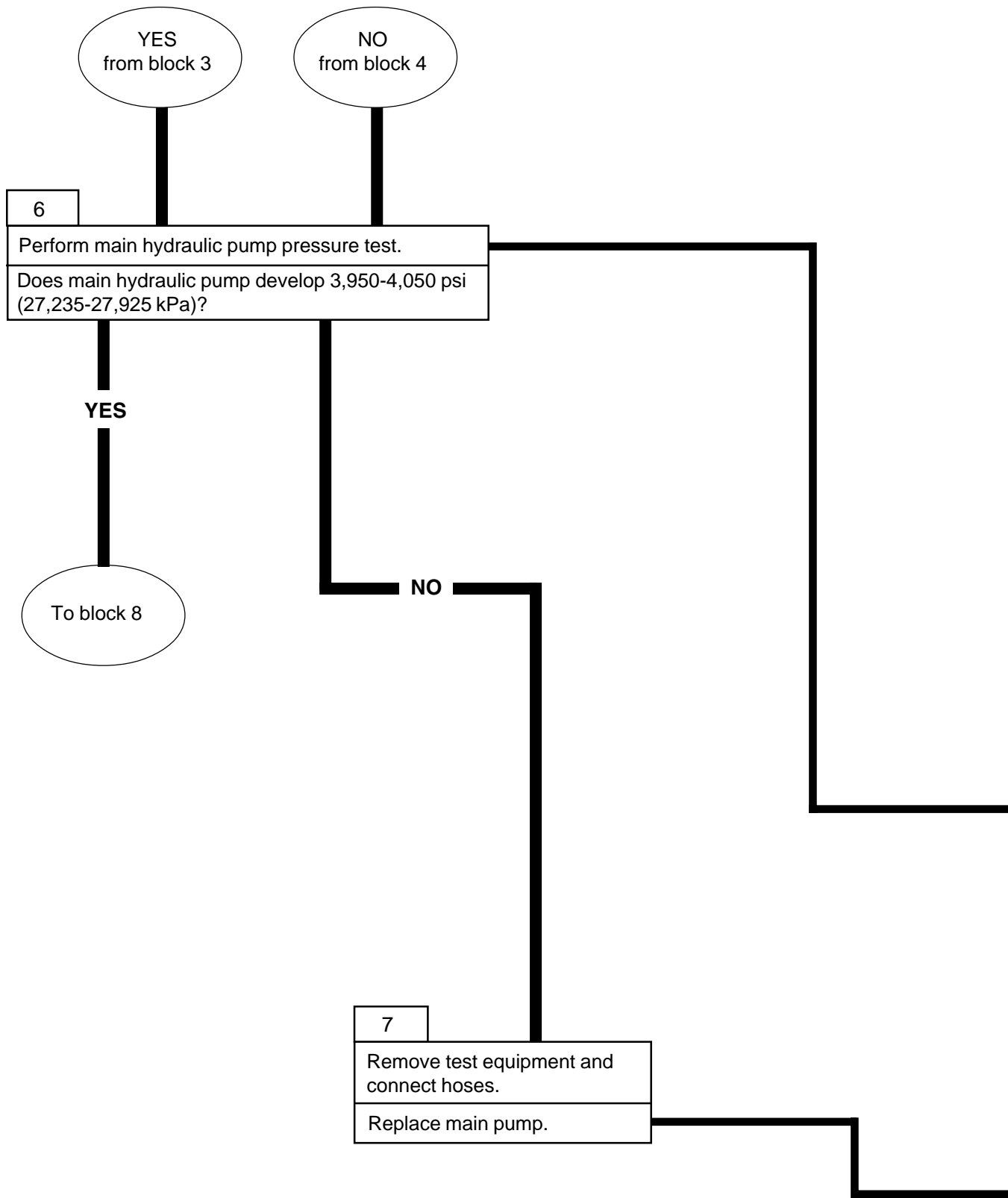
SUCTION HOSE CHECK

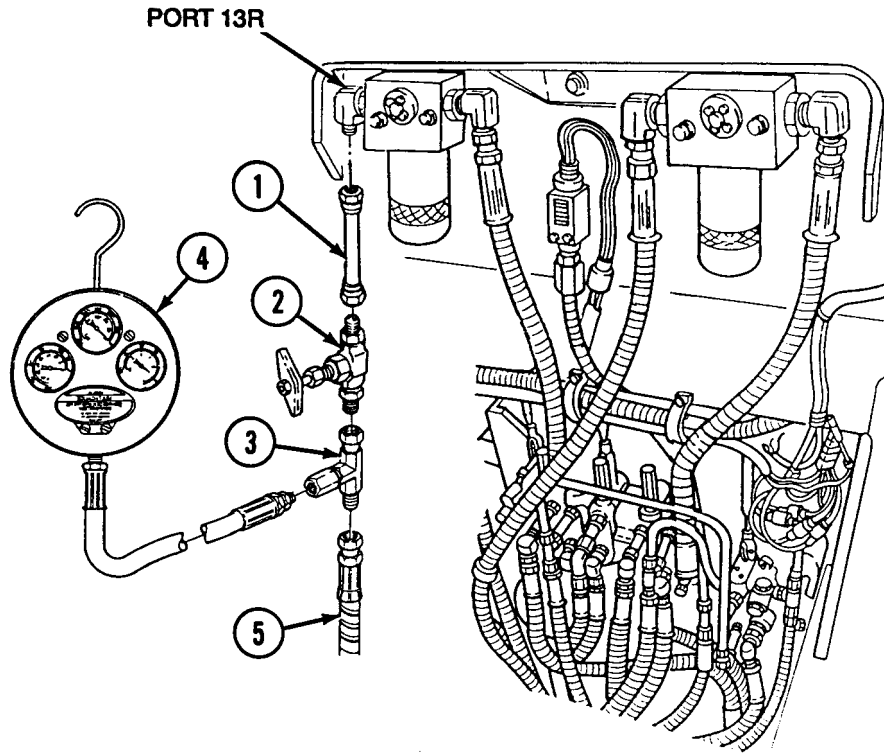
NOTE

Have suitable container ready to catch oil.

- Loosen PUMP SUCT TUBE-7 hose (1) approximately three-quarters of the way at main hydraulic pump (2). Hydraulic oil should flow freely.

15 VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS (CONTINUED)





MAIN HYDRAULIC PUMP PRESSURE TEST

WARNING

Before performing any troubleshooting in bowl, move ejector forward and engage the ejector lock. Failure to comply may result in severe injury or death to personnel.

Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in damage to equipment and injury or death to personnel.

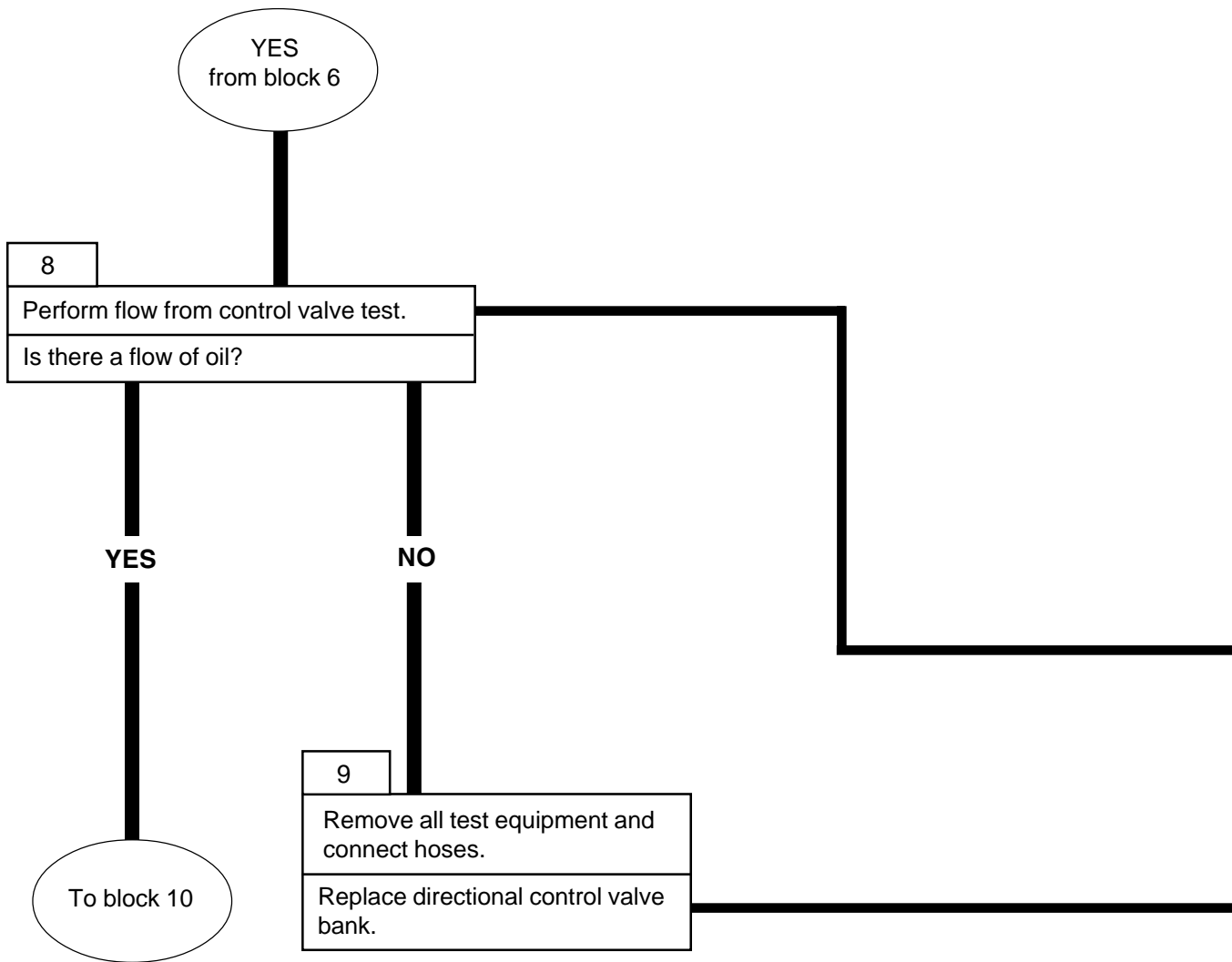
NOTE

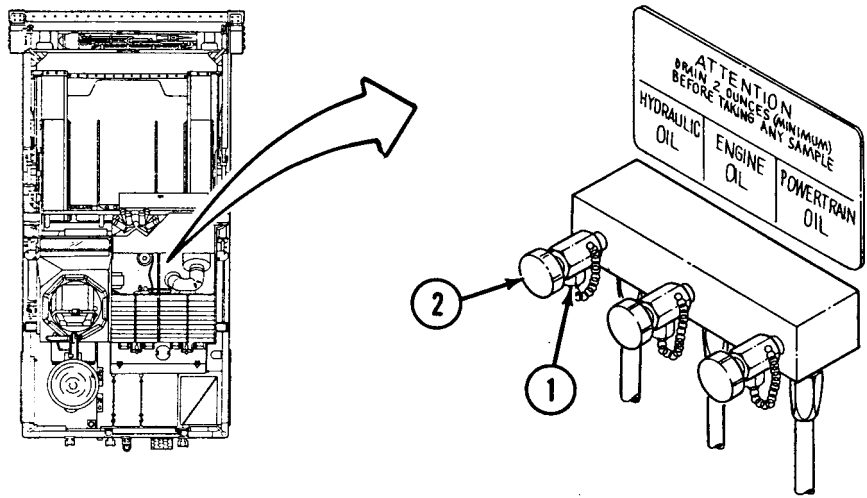
Have suitable container ready to catch oil.

- Install coupling tube (1), globe valve (2), tee (3), and pressure measuring device (4) between HYDR FLTR-IN-13R hose (5) and high-pressure filter inlet port 13R.
- Turn globe valve (2) counterclockwise until fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (2) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (2). Stop engine; relieve hydraulic pressure.

Notify Direct Support maintenance.

15 VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS (CONTINUED)



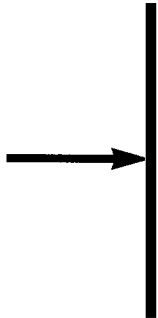


FLOW FROM CONTROL VALVE TEST

NOTE

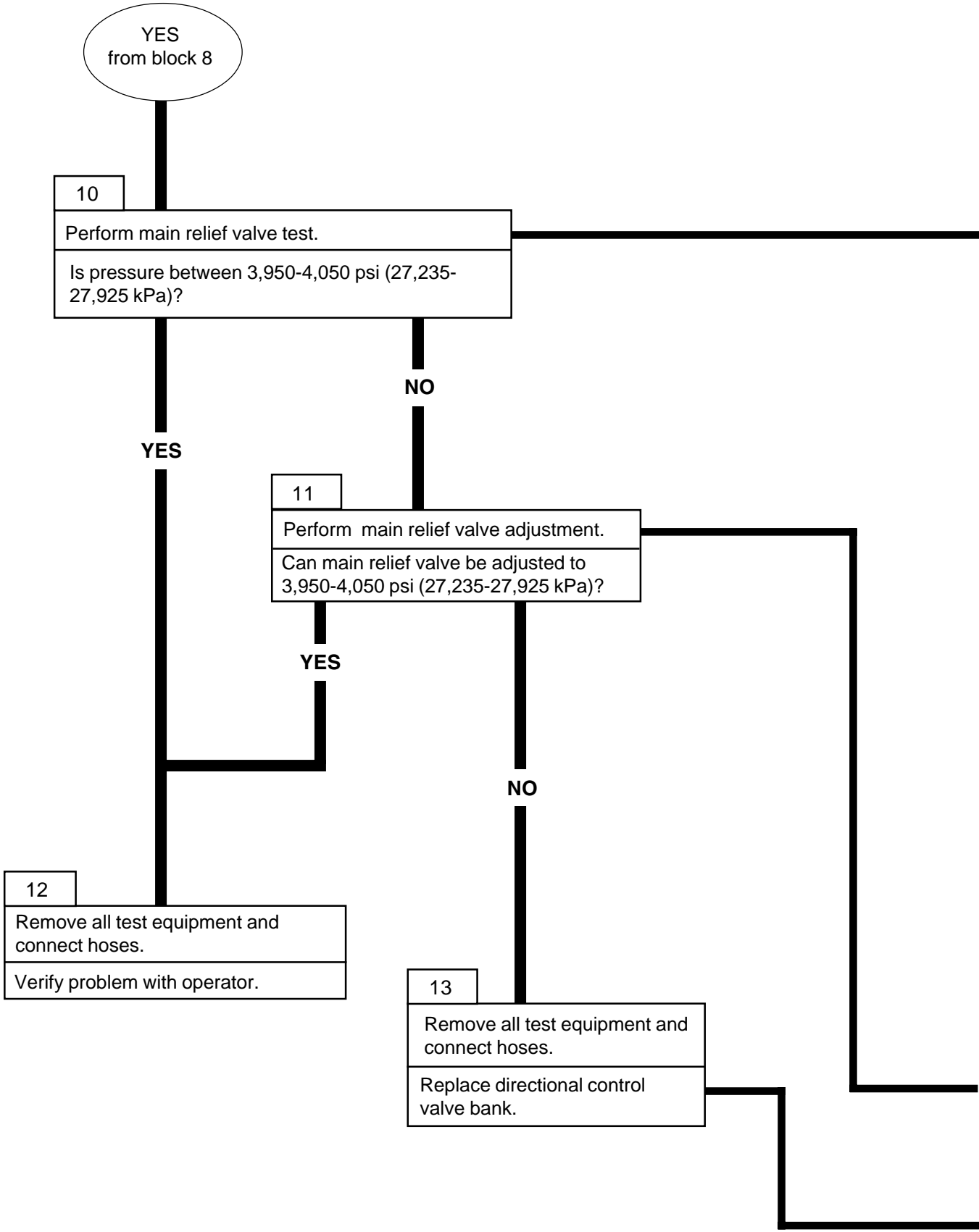
Have suitable container ready to catch oil.

- Start engine. Remove cap (1) from hydraulic system sample valve (2).
- Open valve (2) by turning it clockwise. Hold valve (2) open for several seconds. Oil should flow freely from sample valve (2).
- Close valve (2) and replace cap (1). Stop engine; relieve hydraulic pressure.



Refer to TM 5-2320-262-20-2.

15 VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS (CONTINUED)



MAIN RELIEF VALVE TEST

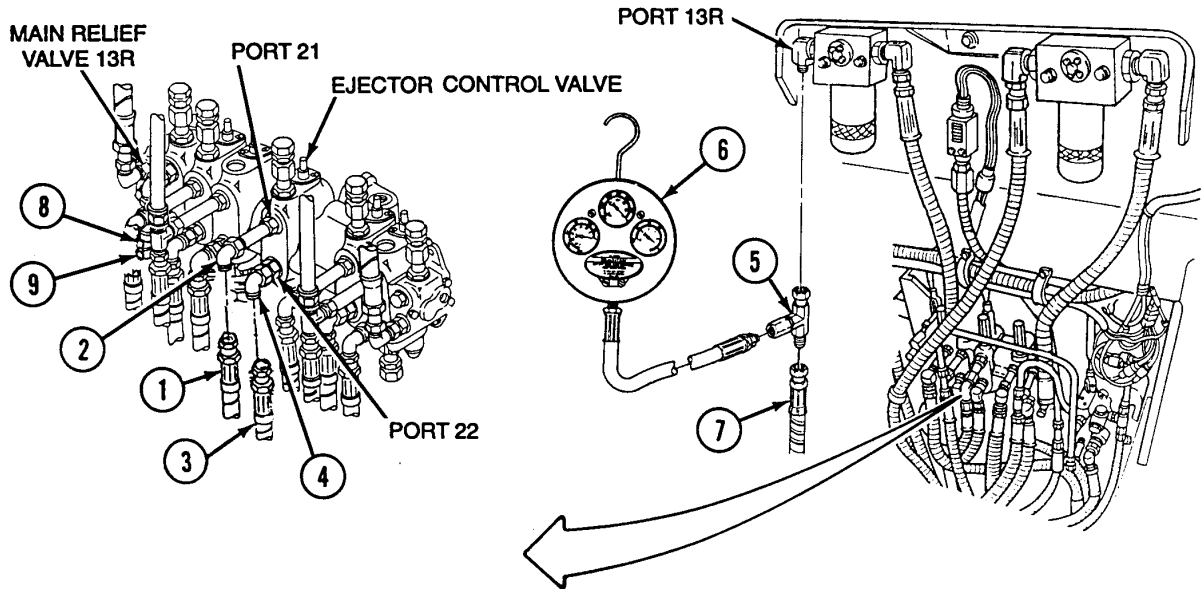
WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Have assistant start engine and move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings.
- Remove globe valve and coupling tube between tee (5) and port 13R. Connect tee (5) and pressure measuring device (6) between HYDR FLTR-IN-13R hose (7) and high-pressure inlet port 13R.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG and move the EJECTOR CONTROL lever to BACK. Read pressure measuring device (6).
- While simultaneously holding the EJECTOR CONTROL lever in BACK, have assistant move the right-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (6).
- Stop engine; relieve hydraulic pressure.



MAIN RELIEF VALVE ADJUSTMENT

- Loosen jamnut (8) on main relief valve 13R.
- Have assistant start engine and simultaneously hold EJECTOR CONTROL lever in BACK while holding the right-hand SUSPENSION CONTROL lever in RAISE.
- Rotate adjusting screw (9) clockwise to increase pressure; counterclockwise to decrease pressure. Tighten jamnut (8).
- Stop engine; relieve hydraulic pressure.

Refer to TM 5-2320-262-20-2.

16

WINCH AND RIGHT-HAND WHEEL CONTROL INOPERATIVE

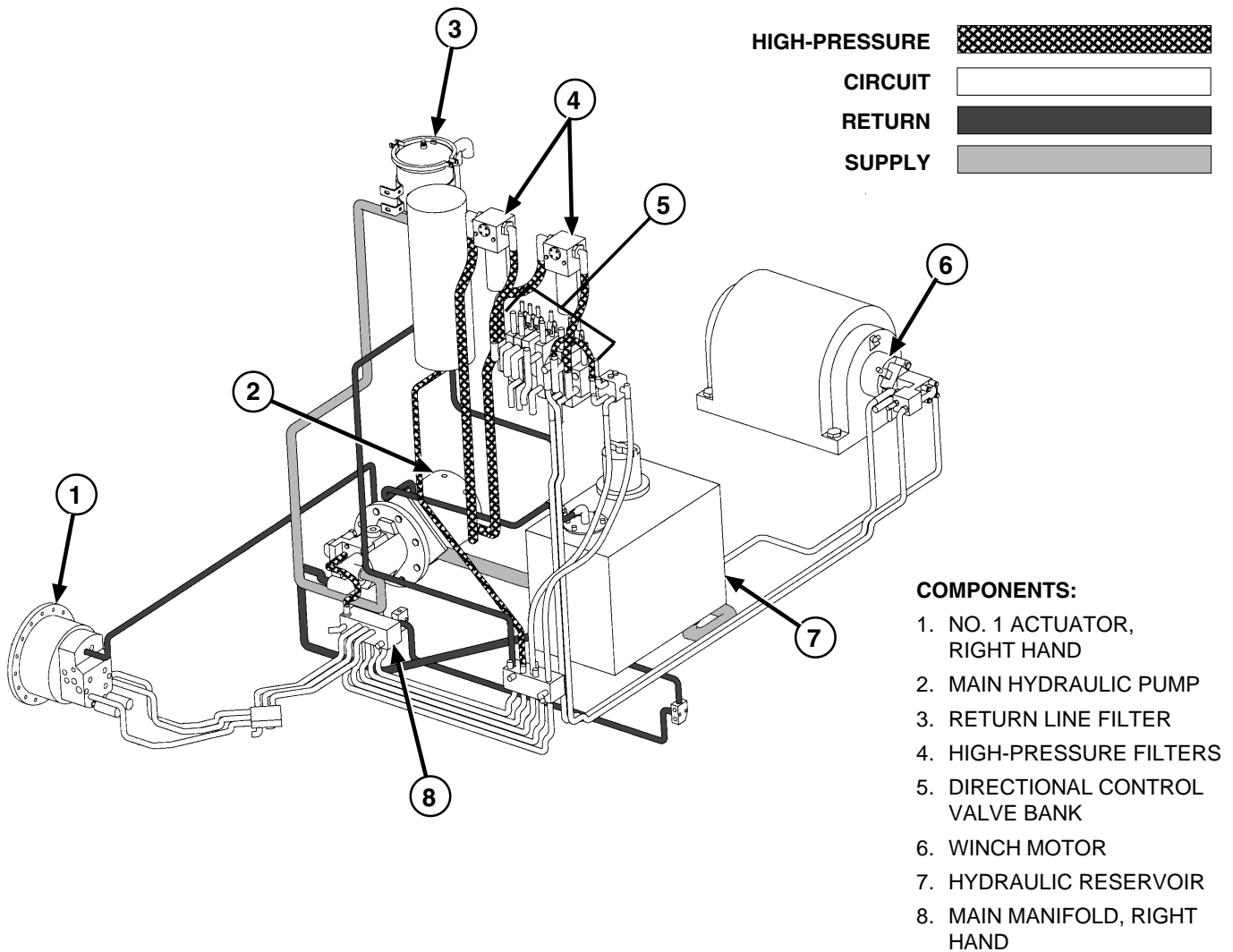
The outboard valve bank hydraulic system 13L circuit is supplied by hydraulic pump port 13L and pressure is controlled by the relief valve at inlet port 13L.

NOTE



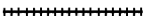
Perform this procedure only when the winch and right-hand suspension controls are inoperative.

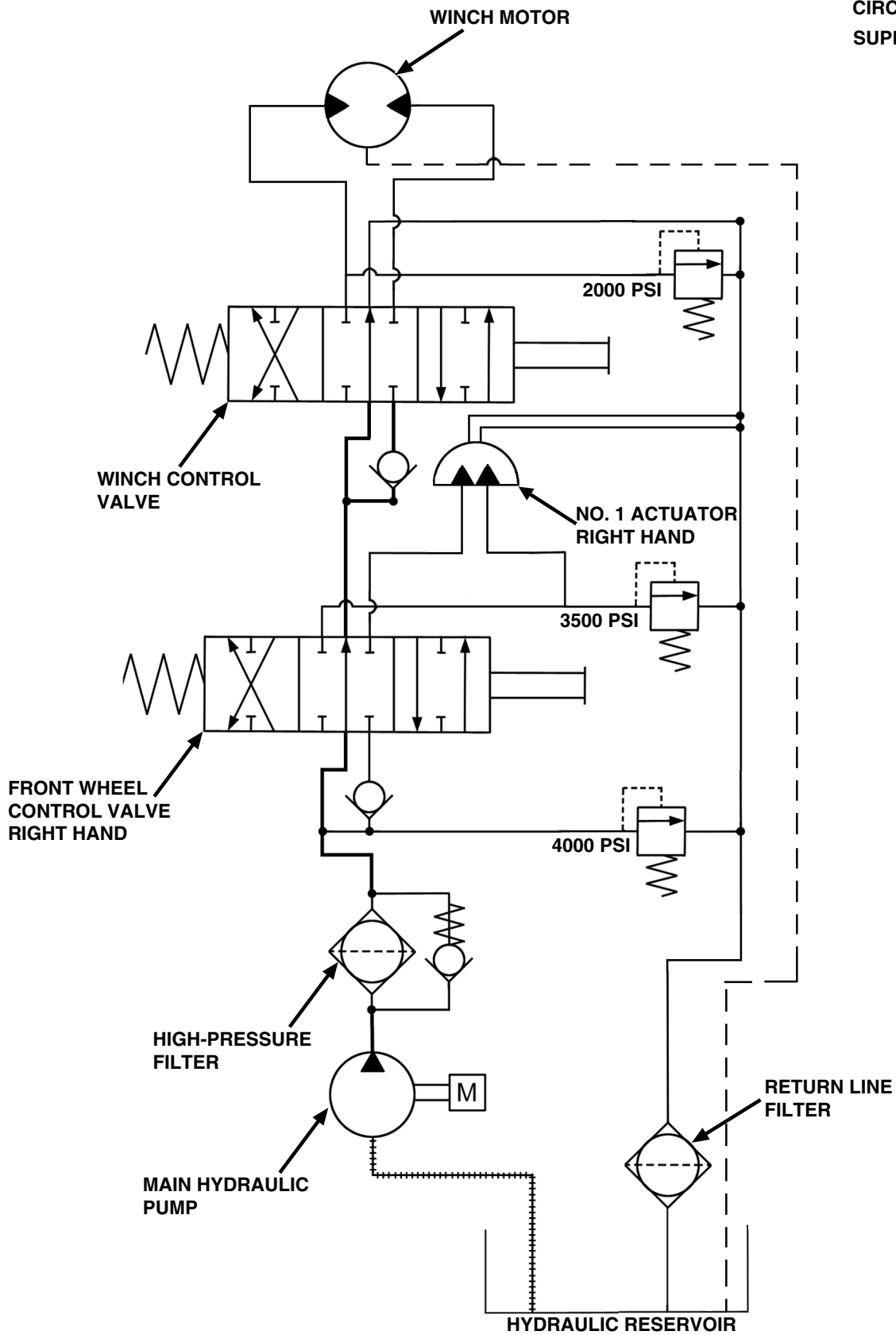
WARNING

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.



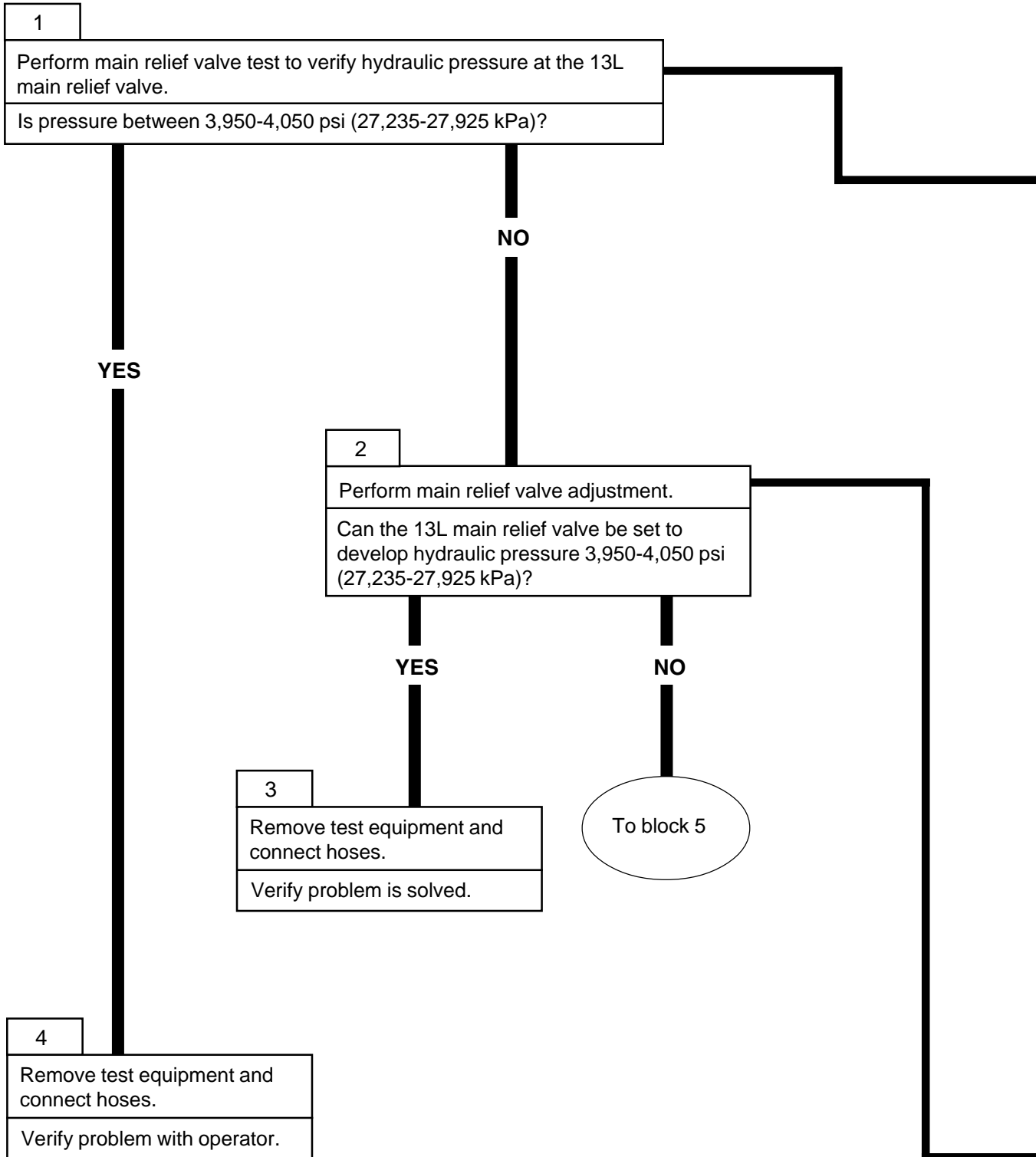
OUTBOARD HYDRAULIC VALVE BANK CIRCUIT

HIGH-PRESSURE 
 CIRCUIT 
 SUPPLY 



OUTBOARD HYDRAULIC VALVE BANK SCHEMATIC

16 WINCH AND RIGHT-HAND WHEEL CONTROL INOPERATIVE (CONTINUED)



MAIN RELIEF VALVE TEST

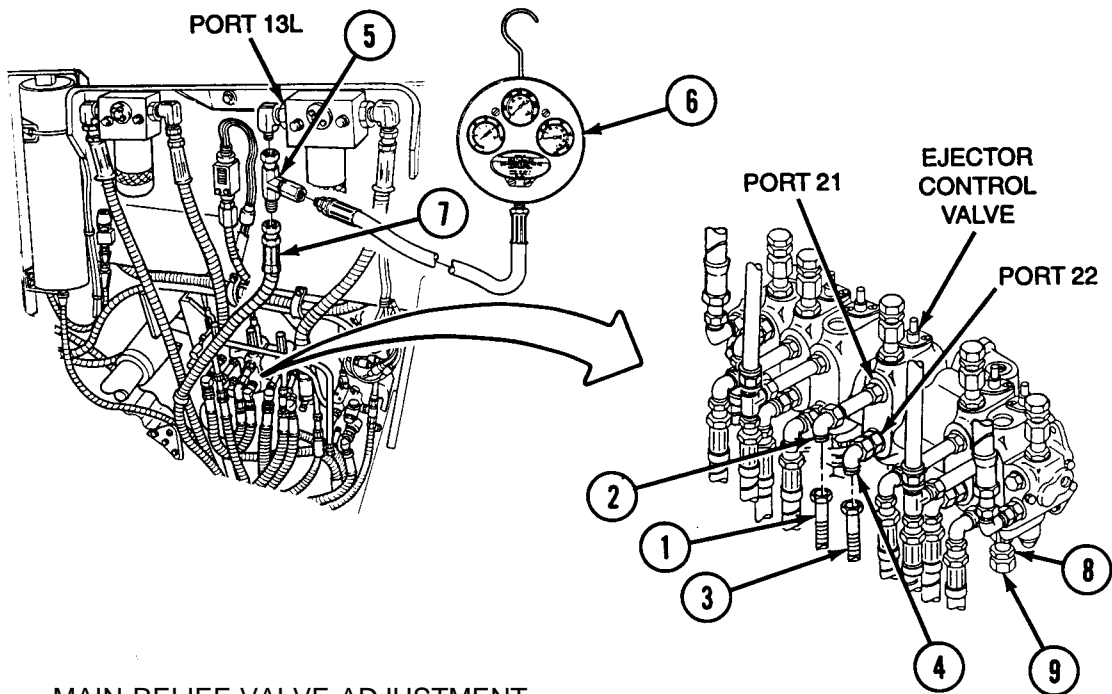
WARNING

Before performing any hydraulic troubleshooting in bowl, move ejector forward and disable it by disconnecting ejector cylinder from hydraulic system. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

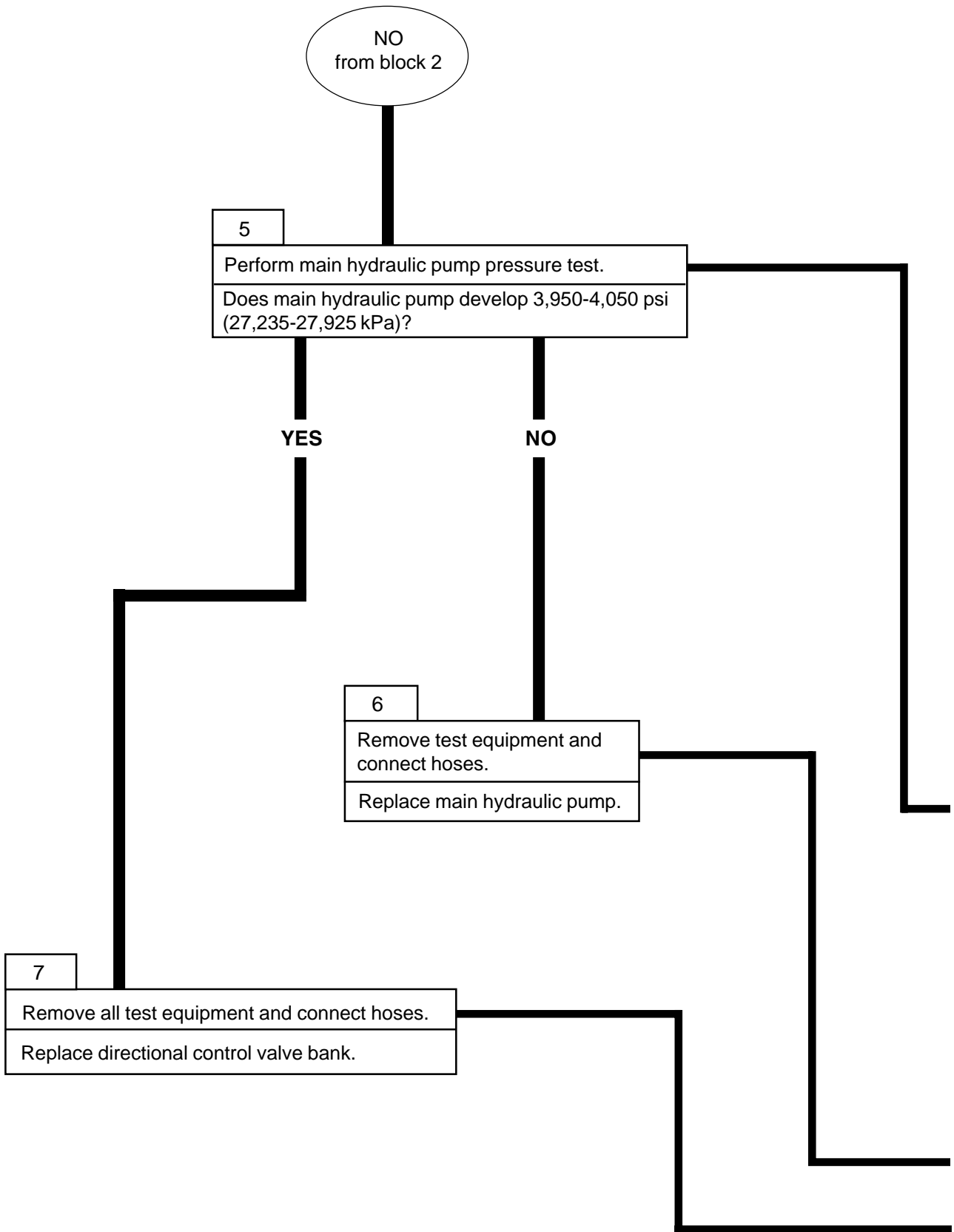
- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector by disconnecting CONT VLV-21 hose (1) from elbow (2) at port 21 and CONT VLV-22 hose (3) from elbow (4) at port 22 on ejector control valve. Cap and plug hoses and fittings
- Connect tee (5) and pressure measuring device (6) between HYDR FLTR-IN-13L hose (7) and high-pressure inlet port 13L.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG, and move EJECTOR CONTROL lever to BACK. Read pressure measuring device (6).
- While simultaneously holding the EJECTOR CONTROL lever in BACK, have assistant move left-hand SUSPENSION CONTROL lever to RAISE. Read pressure measuring device (6).
- Stop engine; relieve hydraulic pressure.

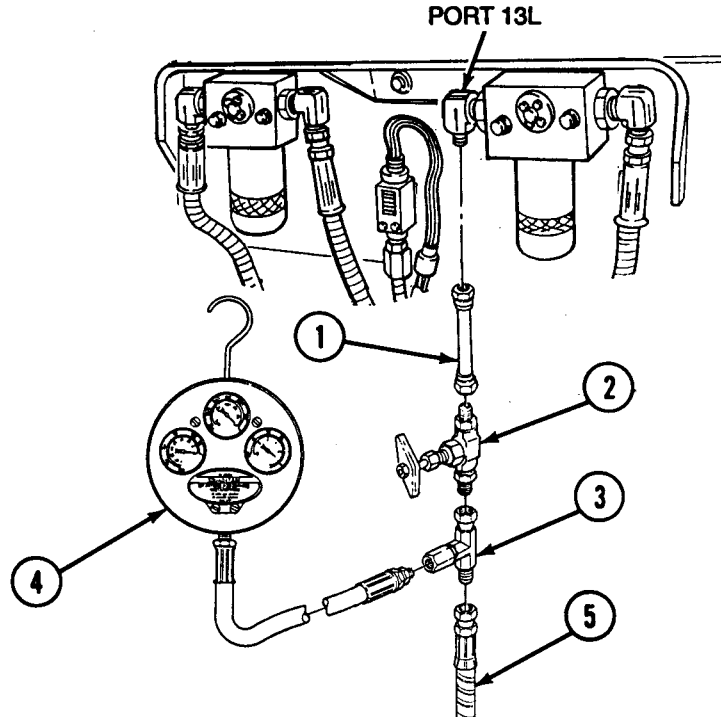


MAIN RELIEF VALVE ADJUSTMENT

- Loosen jamnut (8) on main relief valve 13L (9).
- Have assistant start engine and simultaneously hold EJECTOR CONTROL lever in BACK while holding left-hand SUSPENSION CONTROL lever in RAISE.
- Rotate adjusting screw clockwise to increase pressure; counterclockwise to decrease pressure. Tighten jamnut (8).
- Stop engine; relieve hydraulic pressure.

16 WINCH AND RIGHT-HAND WHEEL CONTROL INOPERATIVE (CONTINUED)





MAIN HYDRAULIC PUMP PRESSURE TEST

WARNING

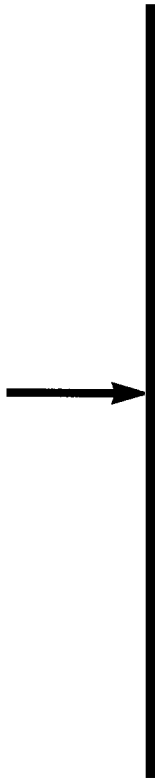
Before performing any troubleshooting in bowl, move ejector forward and engage ejector lock. Failure to comply may result in severe injury or death to personnel.

Ensure globe valve is fully opened prior to starting vehicle. A fully or partially closed valve will cause immediate high pressure. Failure to comply may result in damage to equipment and injury to personnel.

NOTE

Have suitable container ready to catch oil.

- Install coupling tube (1), globe valve (2), tee (3), and pressure measuring device (4) between HYDR FLTR-IN 13L hose (5) and high-pressure filter inlet port 13L.
- Turn globe valve (2) counterclockwise until fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close globe valve (2) until pressure reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open globe valve (2). Stop engine; relieve hydraulic pressure.



Notify Direct Support maintenance.



Refer to TM 5-2350-262-20-2.

17

WINCH WILL NOT PULL RATED LOAD

The winch hydraulic motor receives oil flow from control valve through circuit VA to PAY OUT cable and through circuit VB to PAY IN cable. Hydraulic pressure is controlled by winch relief valve C2. The winch motor case drain line is 7W.

WARNING

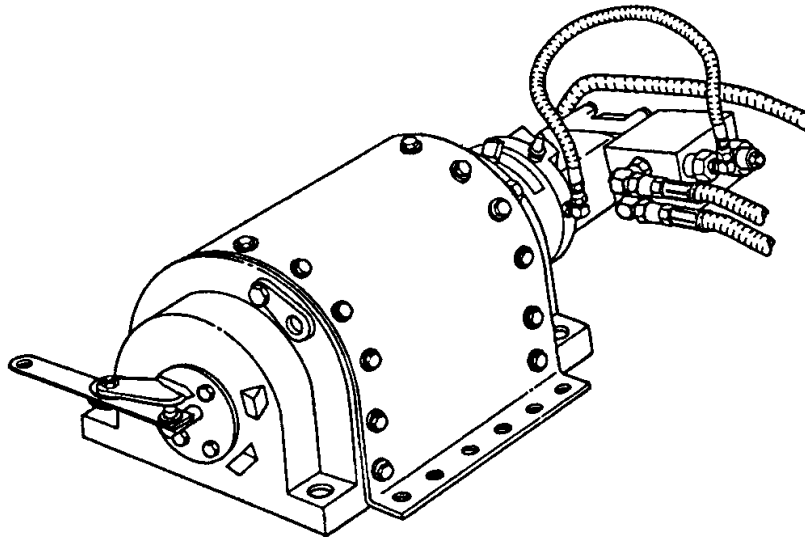
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

CAUTION

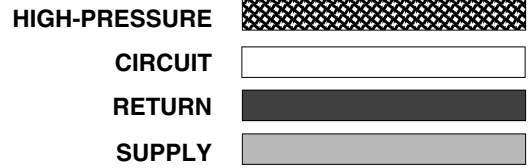
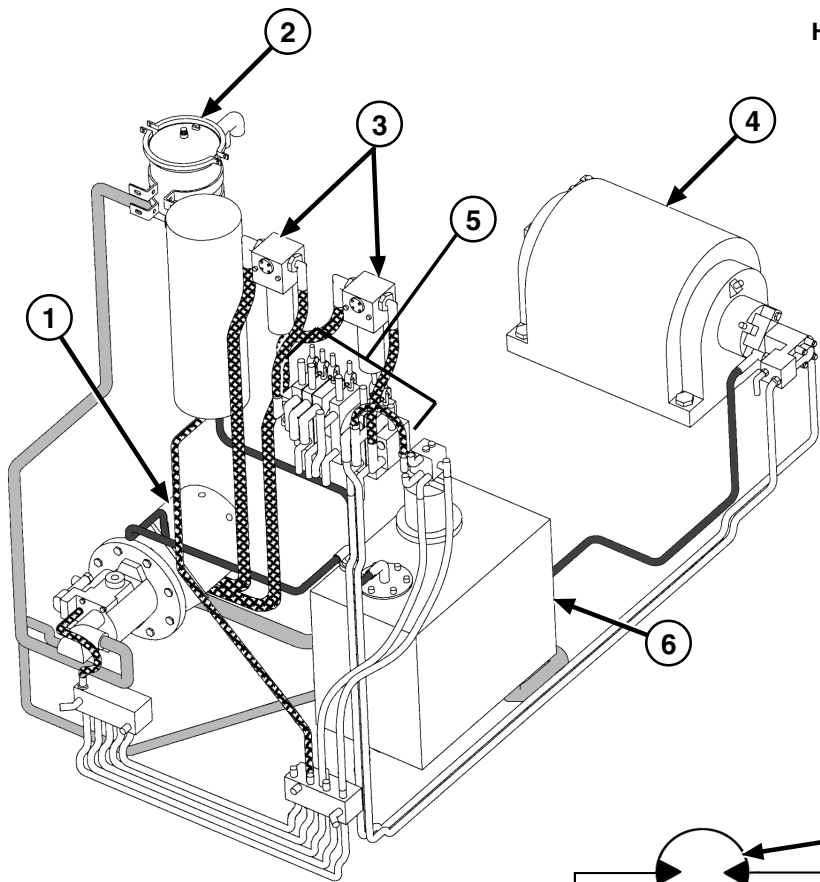
Do not reuse drained captured hydraulic oil unless it has been filtered and is clean. Failure to comply may result in damage to equipment.

NOTE

DELETED



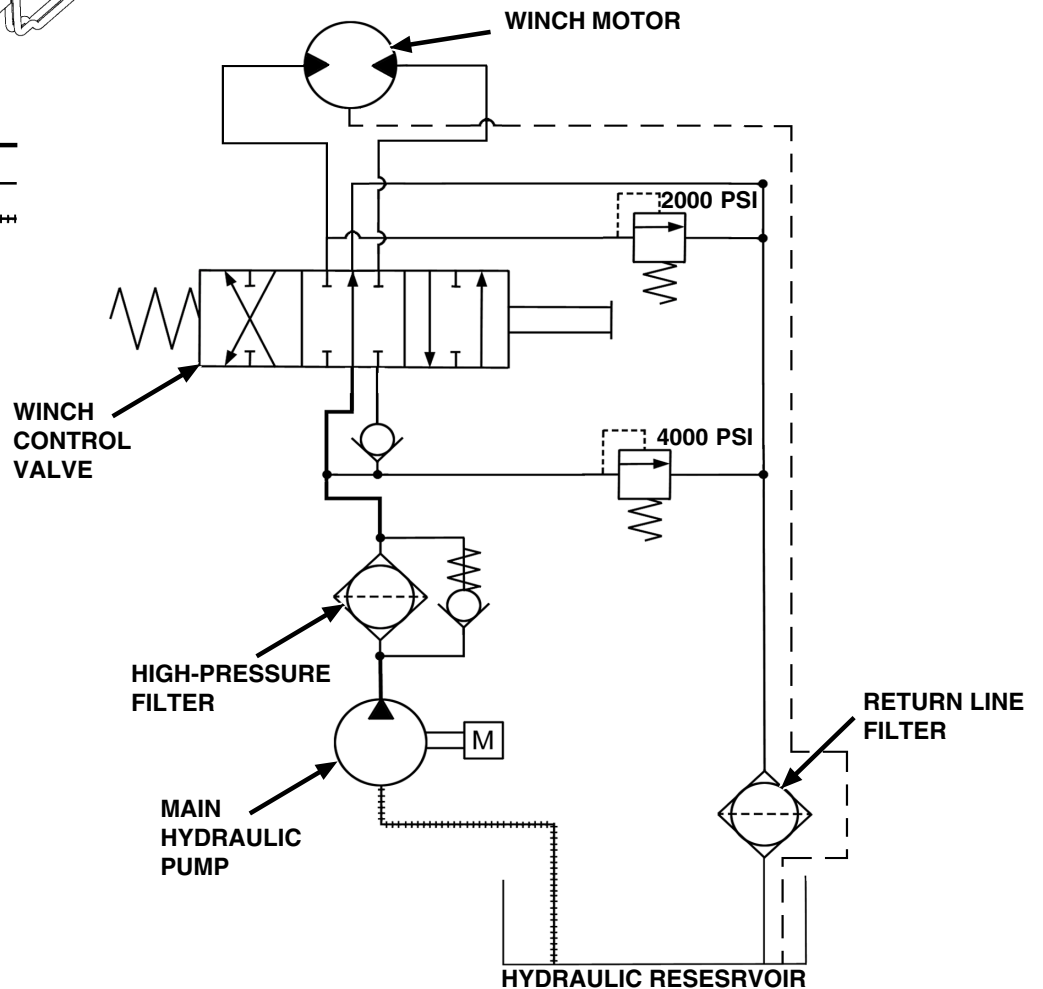
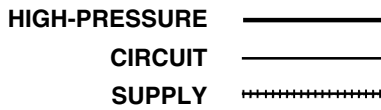
35,000 LB (15,890 KG) WINCH



WINCH HYDRAULIC CIRCUIT

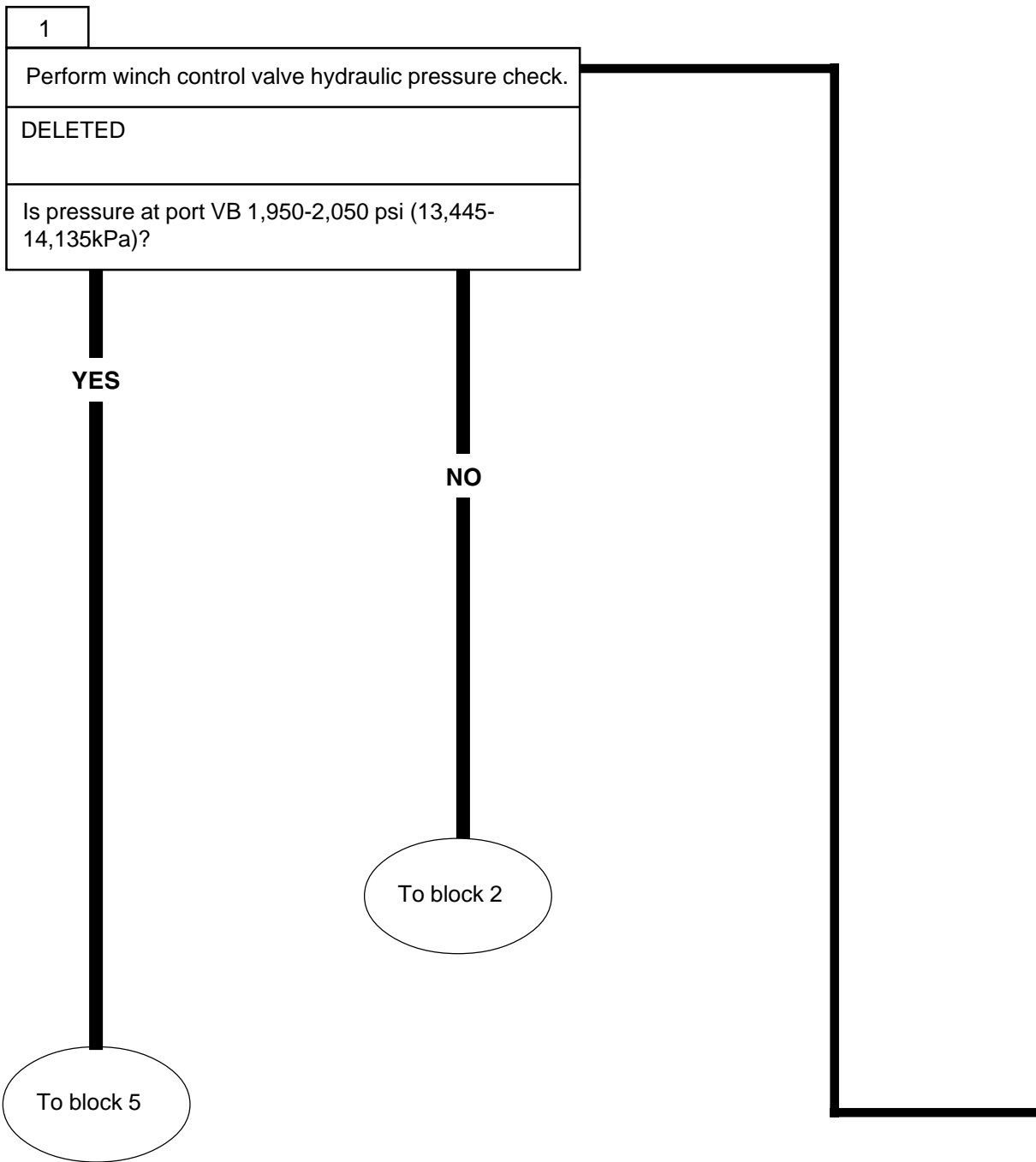
COMPONENTS:

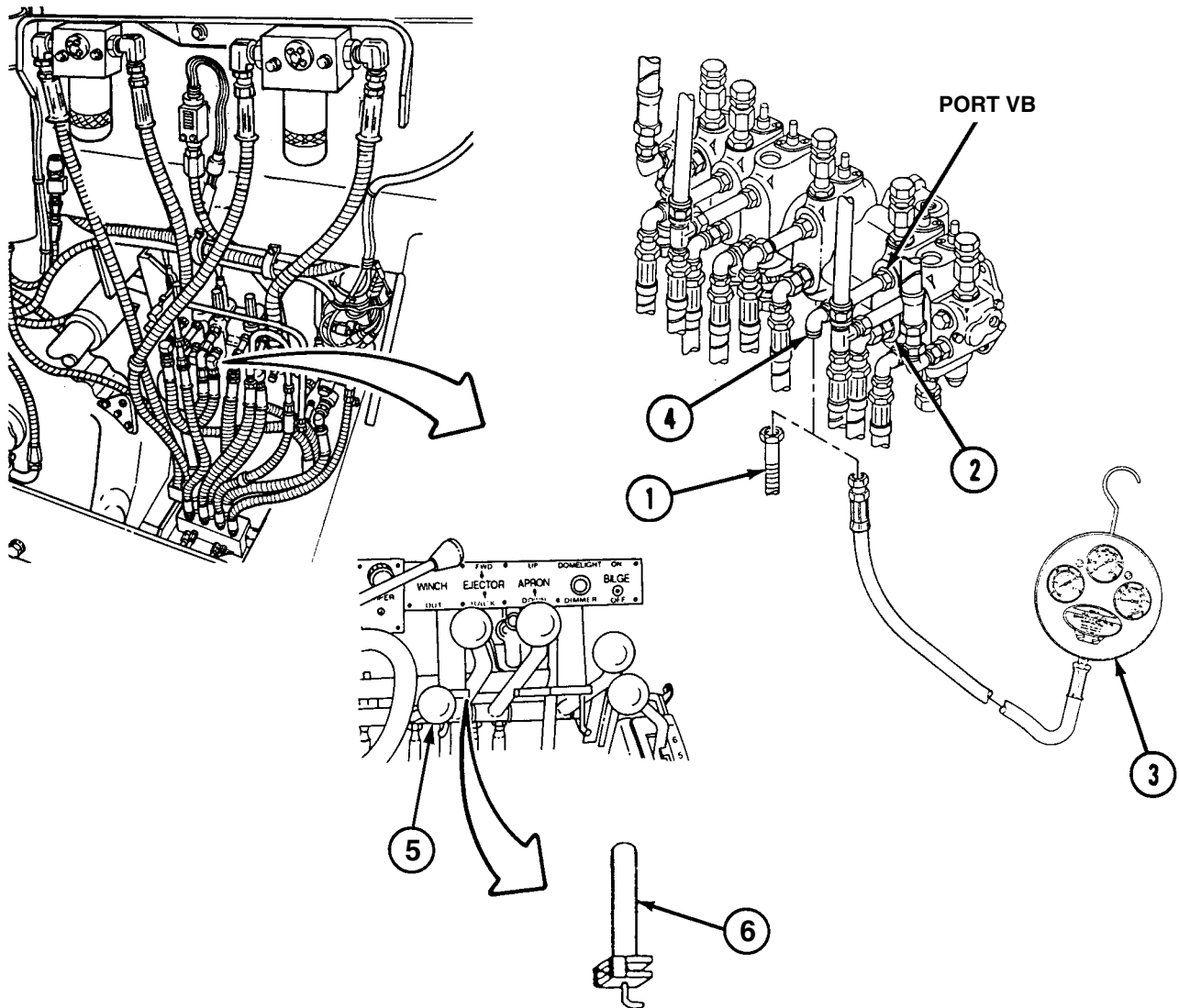
1. MAIN HYDRAULIC PUMP
2. RETURN LINE FILTER
3. HIGH PRESSURE FILTERS
4. WINCH ASSEMBLY
5. DIRECTIONAL CONTROL VALVE BANK
6. HYDRAULIC RESERVOIR



WINCH HYDRAULIC SCHEMATIC

17 WINCH WILL NOT PULL RATED LOAD (CONTINUED)





WINCH CONTROL VALVE HYDRAULIC PRESSURE CHECK

WARNING

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury or death to personnel.

- Start vehicle engine and move ejector forward. Stop engine and relieve hydraulic pressure.
- Engage ejector lock (6).

NOTE

Have suitable container ready to catch oil.

- Disconnect CONT VLV-VB hose (1) from winch control valve (2). Plug CONT VLV-VB hose (1). Connect pressure measuring device (3) to elbow (4) on port VB of winch control valve.
- Have assistant start vehicle engine and hold WINCH CONTROL lever (5) in PAY IN position. Read pressure measuring device (3).
- Return winch control lever (5) to NEUTRAL position.

17 WINCH WILL NOT PULL RATED LOAD (CONTINUED)

NO
from block 1

2

Perform winch relief valve VB adjustment.
Can relief valve be set to develop the correct hydraulic pressure;
1,950-2,050 psi (13,445-14,135 kPa)?

YES

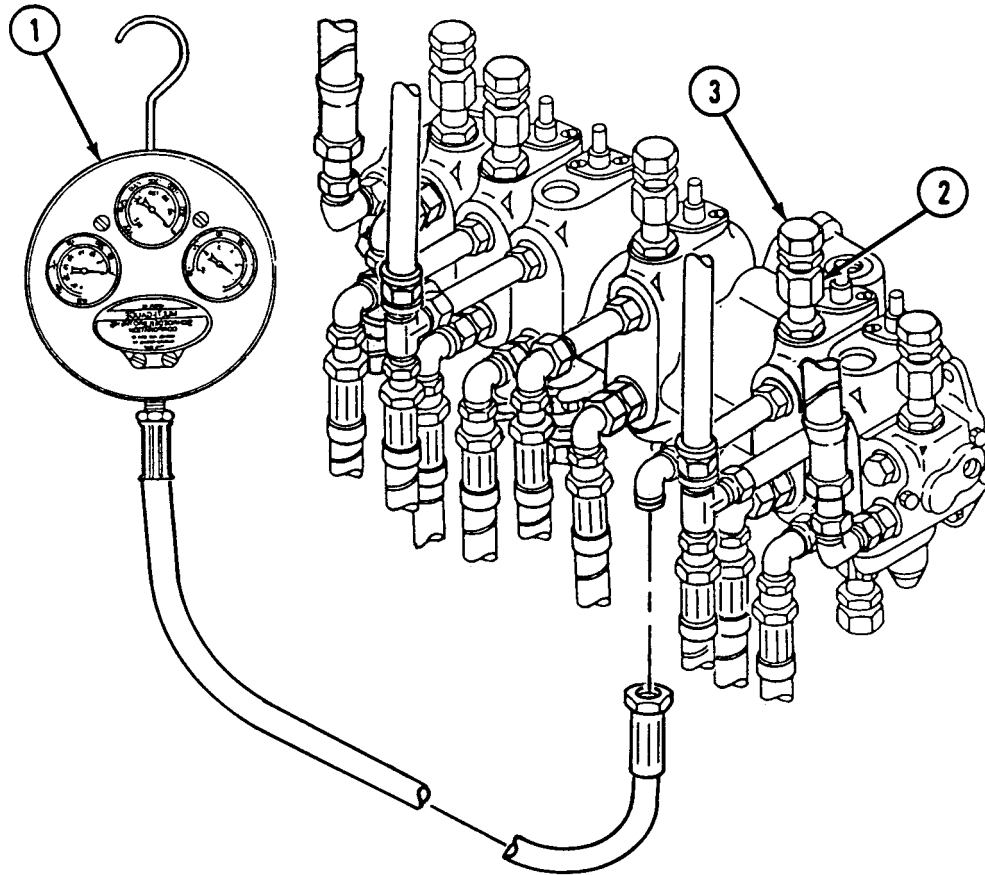
NO

3

Verify problem is solved.

4

Replace directional control valve
bank assembly.



WINCH RELIEF VALVE VB ADJUSTMENT

- Have assistant hold WINCH CONTROL lever in PAY IN position.
- Read pressure measuring device (1), loosen jamnut (2), and turn relief valve adjusting screw (3). Tighten jamnut (2).
- Stop engine; relieve pressure. Remove all test equipment and connect all hoses.

Refer to TM 5-2350-262-20-2.

17 WINCH WILL NOT PULL RATED LOAD (CONTINUED)

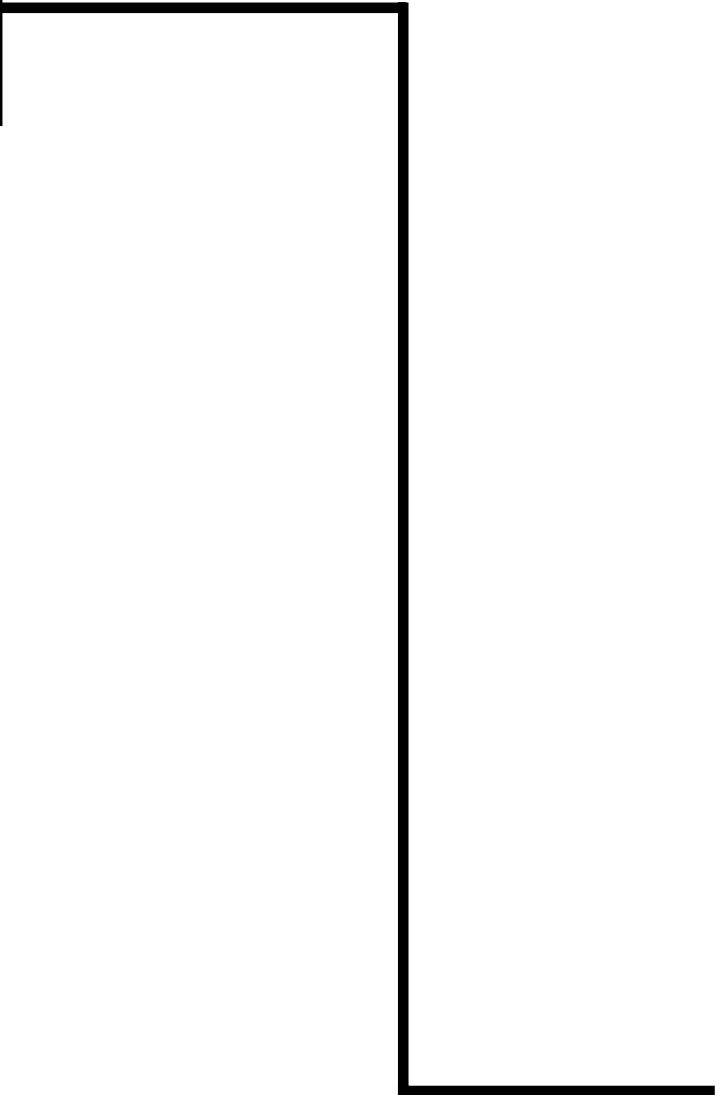
5
Perform winch motor internal leakage test.
Is winch leakage rate greater than 1.25 gpm (4.73 Lpm)?

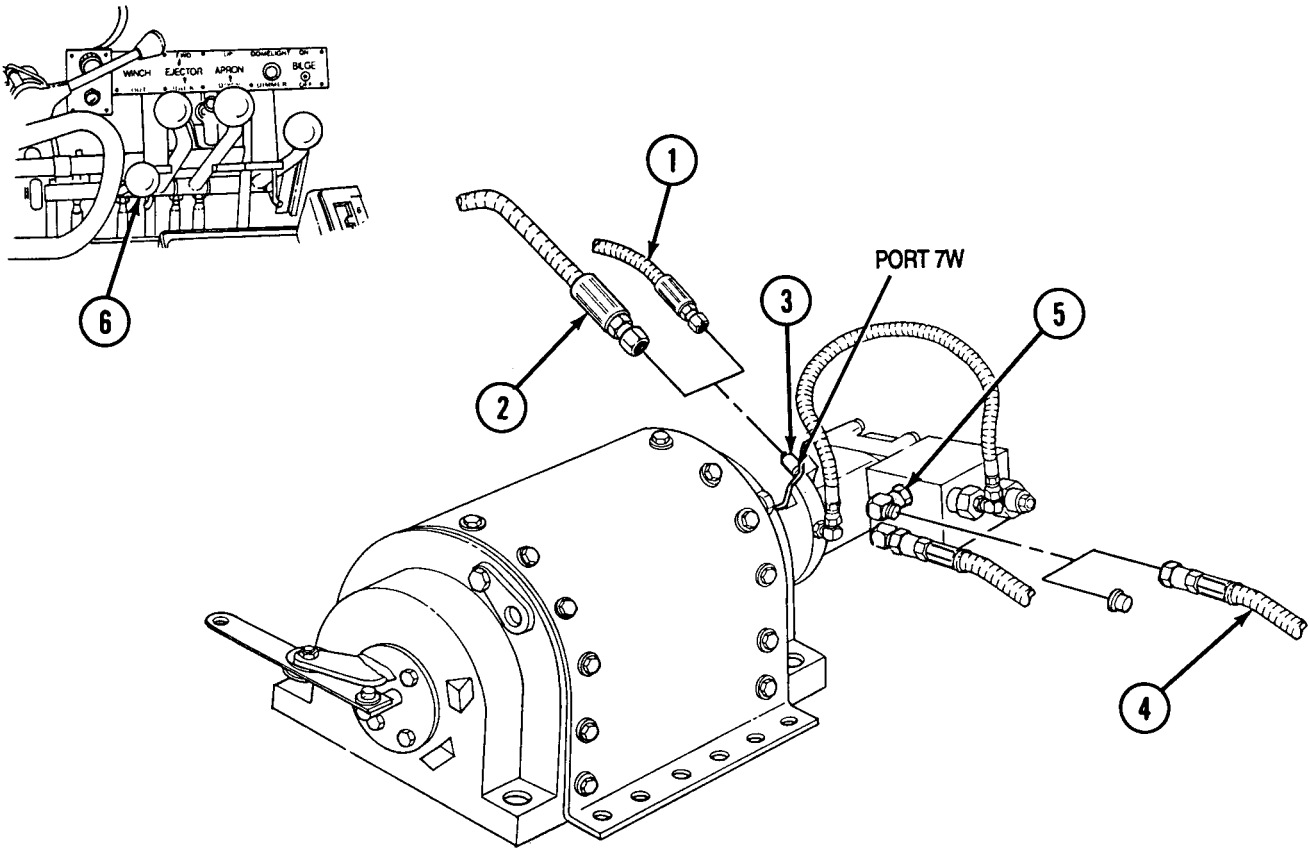
YES

NO

To block 9

To block 6





WINCH MOTOR INTERNAL LEAKAGE TEST (CONTINUED)

NOTE

Have suitable container ready to catch oil.

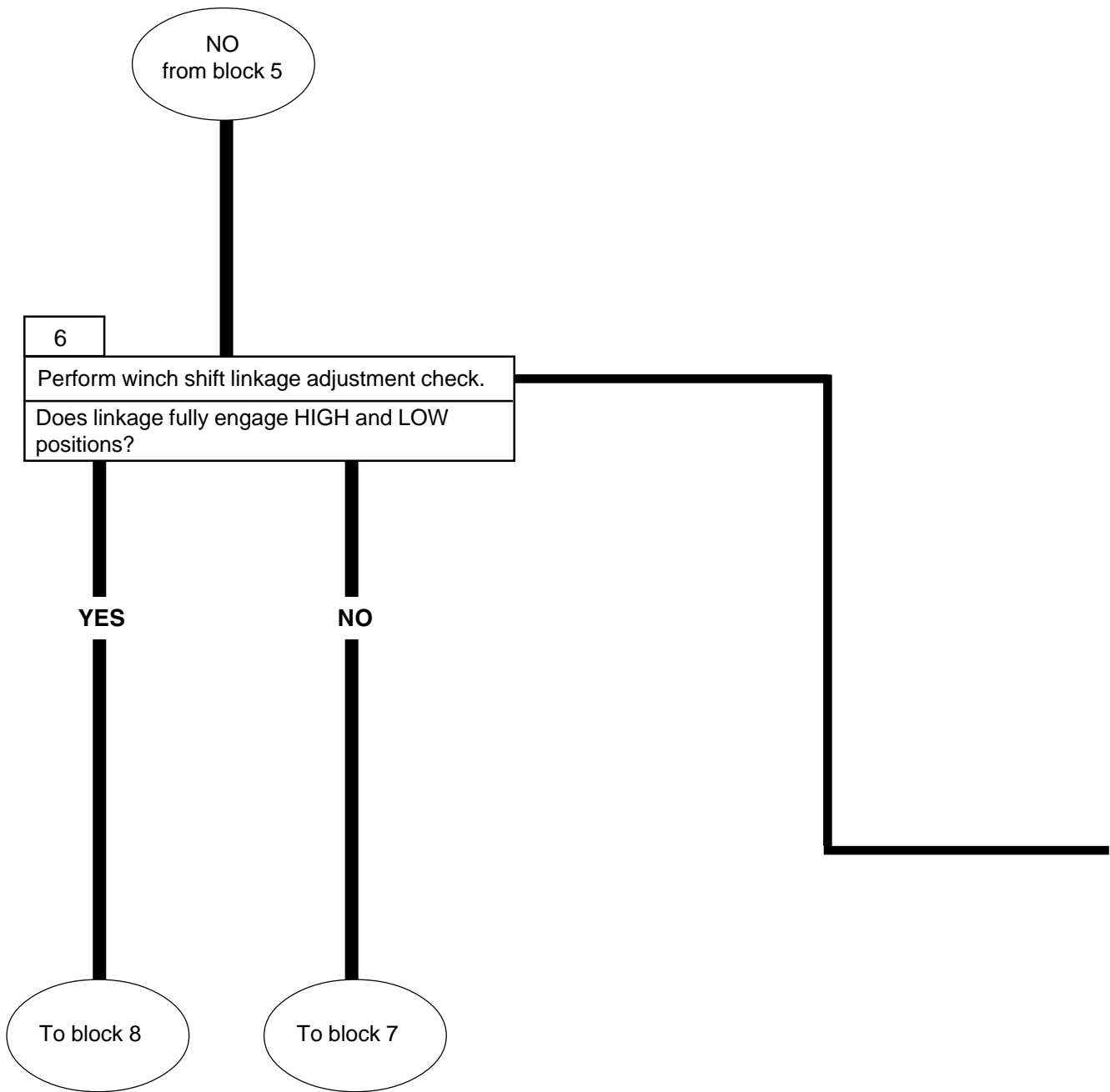
- Disconnect WINCH DRAIN-7W hose (1) from winch motor port 7W and plug hose (1). Connect drain hose (2) to elbow (3) on port 7W and place end of hose (2) in container.
- Disconnect CONT-VLV-VA (FWD) hose (4) from winch. Plug hose (4) and cap elbow (5).

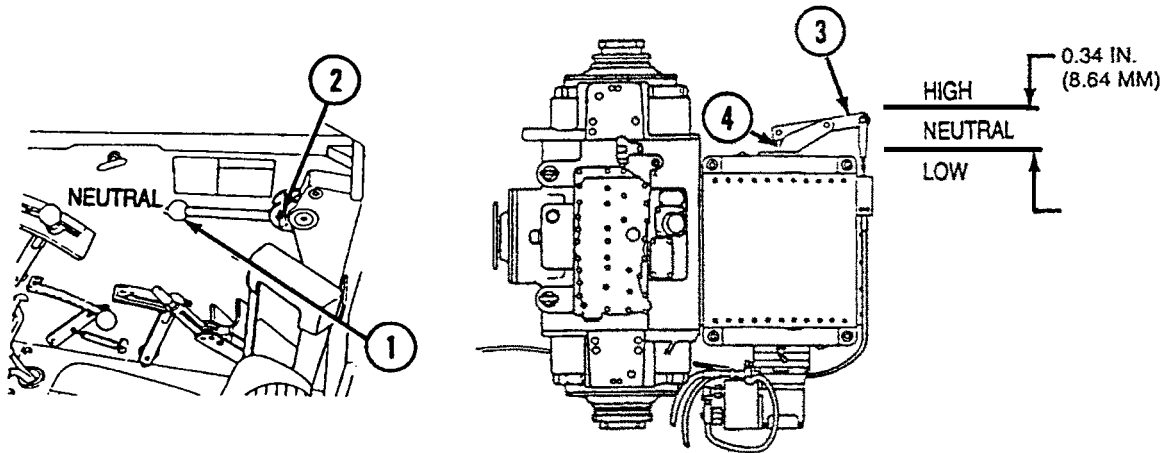
NOTE

Two containers are necessary for a true metered 15-second reading during winch motor internal leakage test.

- Have assistant start vehicle engine and hold WINCH CONTROL lever (6) in PAY IN position. With lever held in PAY IN position and oil flowing, move drain hose 7W (2) to a graduated container for exactly 15 seconds. Return lever (6) to NEUTRAL position.
- Measure oil in graduated container. Allowable internal leakage flow from drain hose (2) is 1.25 qts (1.18 L) in 15 seconds or 1.25 gpm (4.73 Lpm).
- Stop engine; relieve hydraulic pressure and connect all hoses.

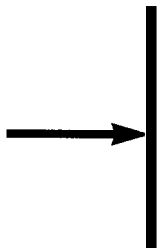
17 WINCH WILL NOT PULL RATED LOAD (CONTINUED)



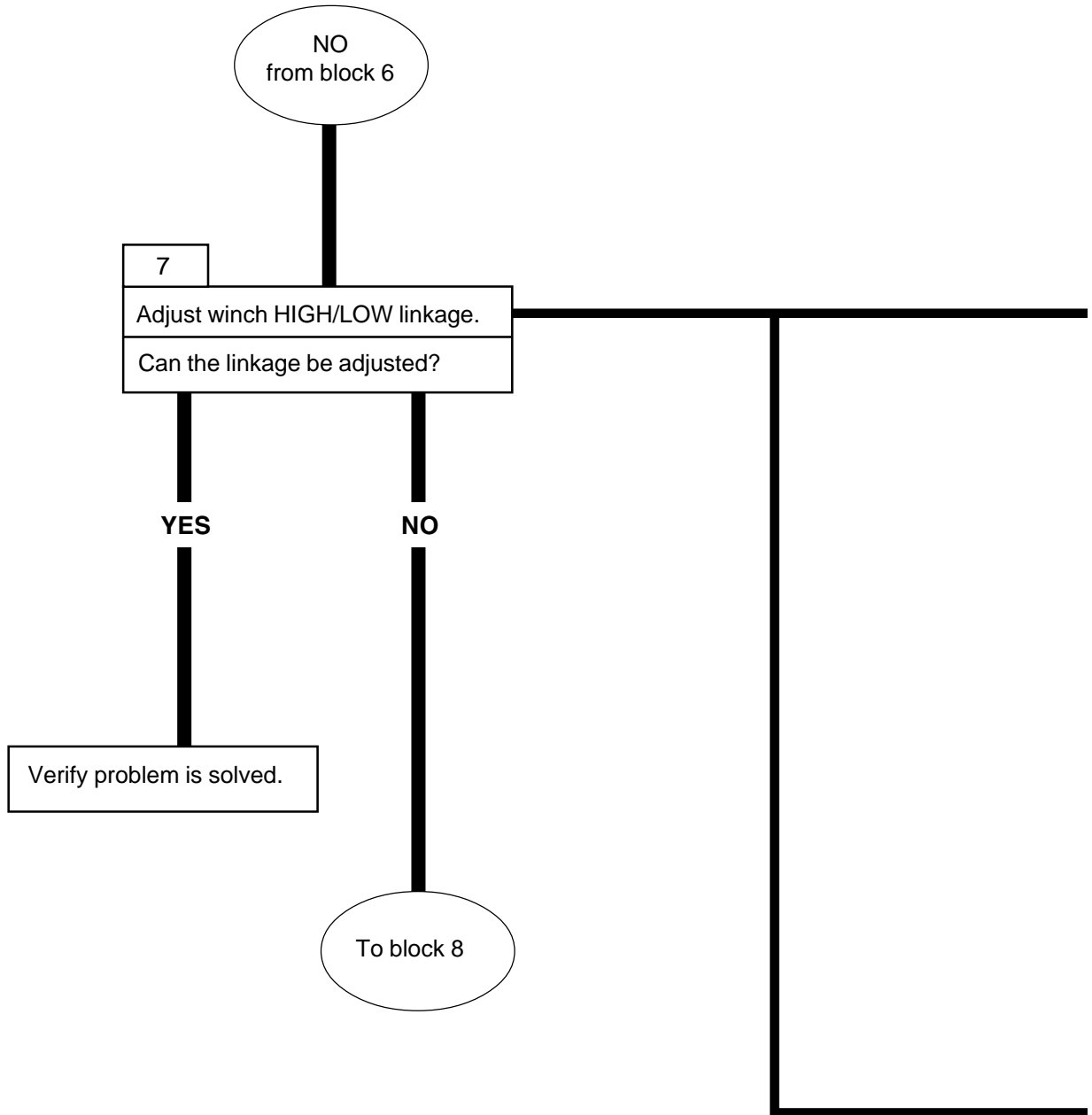


SHIFT LINKAGE ADJUSTMENT CHECK

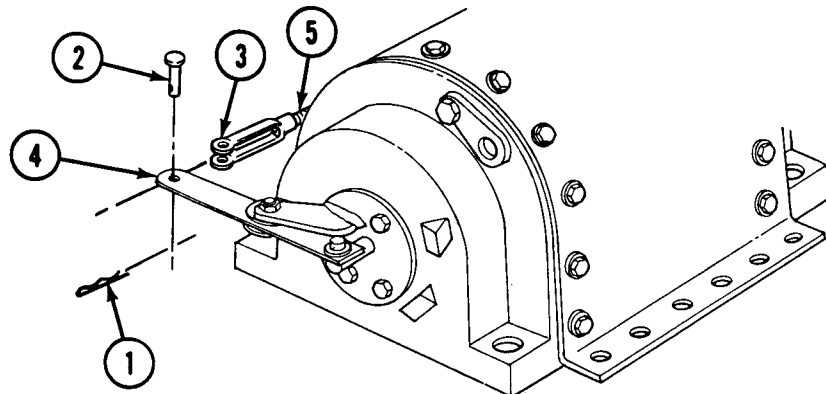
- Set control lever (1) in NEUTRAL detent (2).
- Move lever (3) from side to side and measure for proper shift rod (4) NEUTRAL position. Shift rod (4) must move at least 0.10 in. (2.54 mm) in either direction without engaging LOW or HIGH gear. Total NEUTRAL zone travel is 0.34 in. (8.64 mm). Go to block 7 if shift rod (4) NEUTRAL travel is not within limits.



17 WINCH WILL NOT PULL RATED LOAD (CONTINUED)



DELETED



HIGH/LOW LINKAGE WINCH ADJUSTMENT

NOTE

Ensure control lever is in NEUTRAL detent.

Control lever must move 0.10 in. (2.54 mm) in either direction without engaging winch. Total NEUTRAL travel zone is 0.34 in. (8.64mm).

- Remove cotter pin (1) and clevis pin (2) from clevis (3) and control lever (4). Discard cotter pin (1).
- Pull shift rod (5) out as far as possible. This is the end of travel in high-gear position.
- Push shift rod (5) back in 1.220 in. (30.99 mm) to locate center of NEUTRAL position.
- Adjustment can be made by turning clevis (3) clockwise for NEUTRAL position out; counterclockwise for NEUTRAL position in.
- Install clevis (3) on control lever (4) with clevis pin (2) and new cotter pin (1). Verify shift rod (5) is within NEUTRAL travel limits.
- Operate winch and check for proper operation. If winch does not function properly, notify Direct Support maintenance.



Refer to TM 5-2350-262-20-2.



Refer to TM 5-2350-262-20-2.



18

TRACK (LEFT OR RIGHT) WILL NOT TIGHTEN OR LOOSEN, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION)

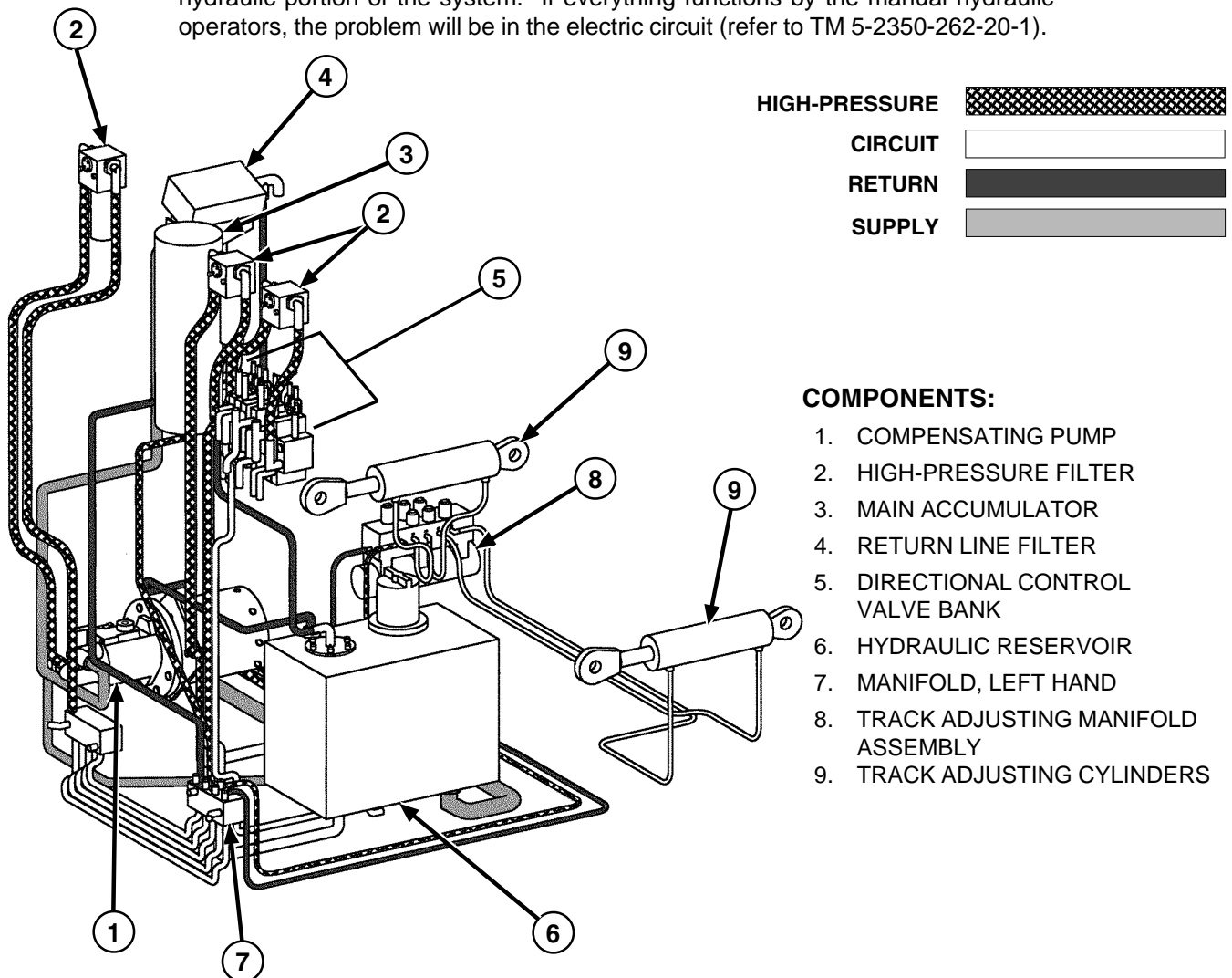
Track adjustment is provided by hydraulic pressure from the compensating pump and controlled by electric current tapped at the UNSPRUNG switch. In the SPRUNG or UNSPRUNG mode, hydraulic pressure is delivered to the track adjuster manifold from line nine (9) and returned through line seven (7) at the left manifold.

WARNING

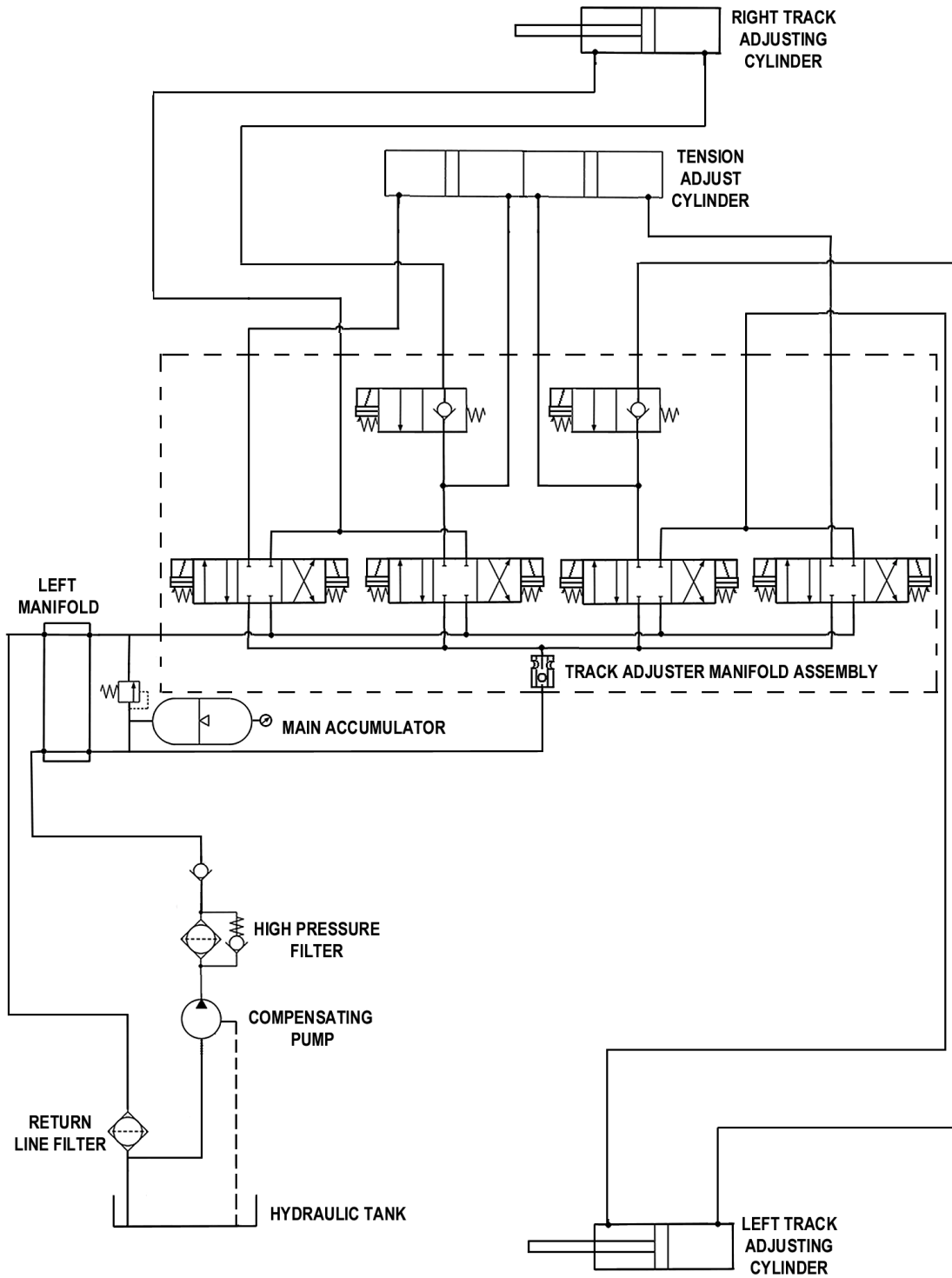
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right track adjuster cylinder. The hydraulic valves are equipped with manual operators which can be used to check the hydraulic portion of the system. If everything functions by the manual hydraulic operators, the problem will be in the electric circuit (refer to TM 5-2350-262-20-1).



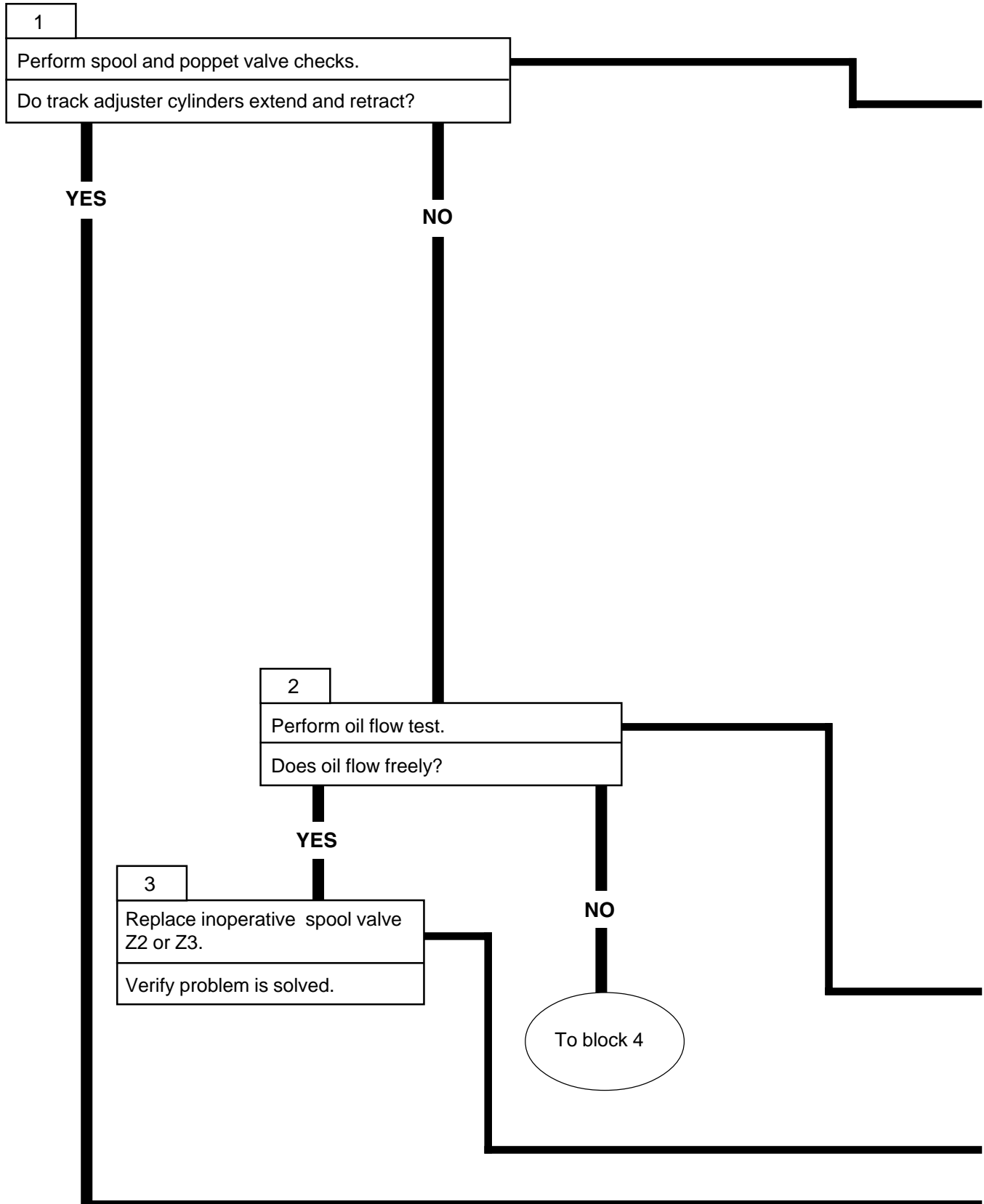
HIGH-PRESSURE —————
CIRCUIT —————
SUPPLY - - - - -



TRACK ADJUSTER HYDRAULIC SCHEMATIC

18

TRACK (LEFT OR RIGHT) WILL NOT TIGHTEN OR LOOSEN, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION) (CONTINUED)

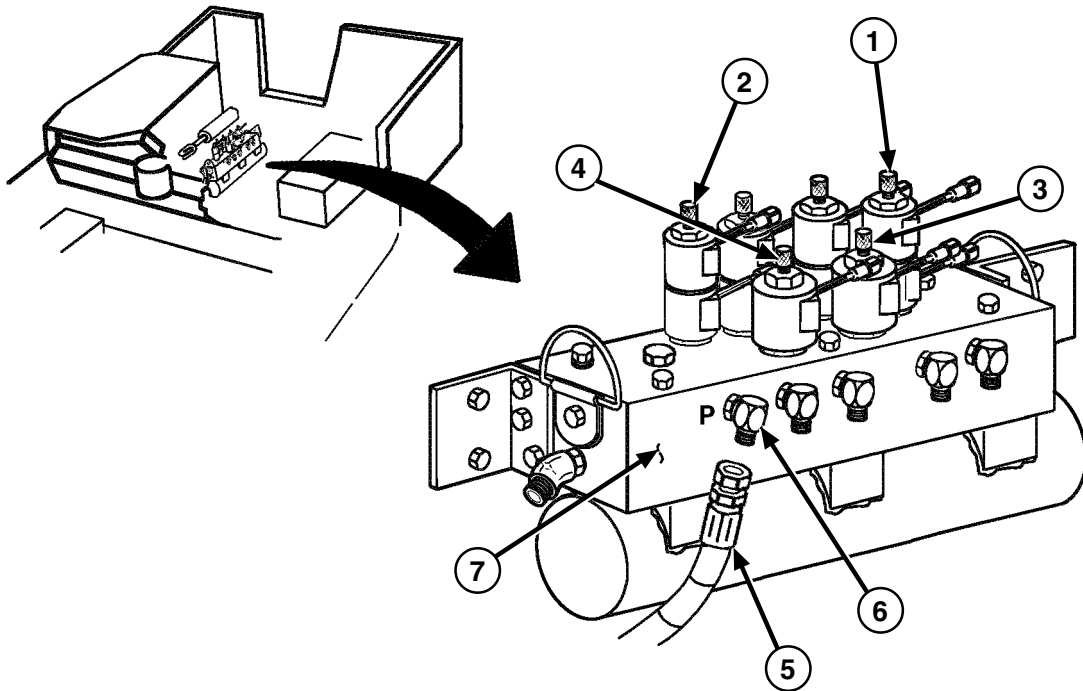


SPOOL AND POPPET VALVE CHECKS

NOTE

To test spool valve, extend and retract track adjuster cylinders. To retract track adjuster cylinders, the poppet valves must be overridden. To override the poppet valves (X1 or X2), depress manual override, rotate 180° counter clockwise and release (it will be up).

- Have assistant start engine
- To extend left cylinder, depress manual override spool valve Z3 (1).
- To extend right cylinder, depress manual override spool valve Z2 (2).
- To retract left cylinder, override poppet valve X2 (3) and lift manual override spool valve Z3 (1).
- To retract right cylinder, override poppet valve X1 (4) and lift manual override spool valve Z2 (2).
- Stop engine; relieve hydraulic pressure.



OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

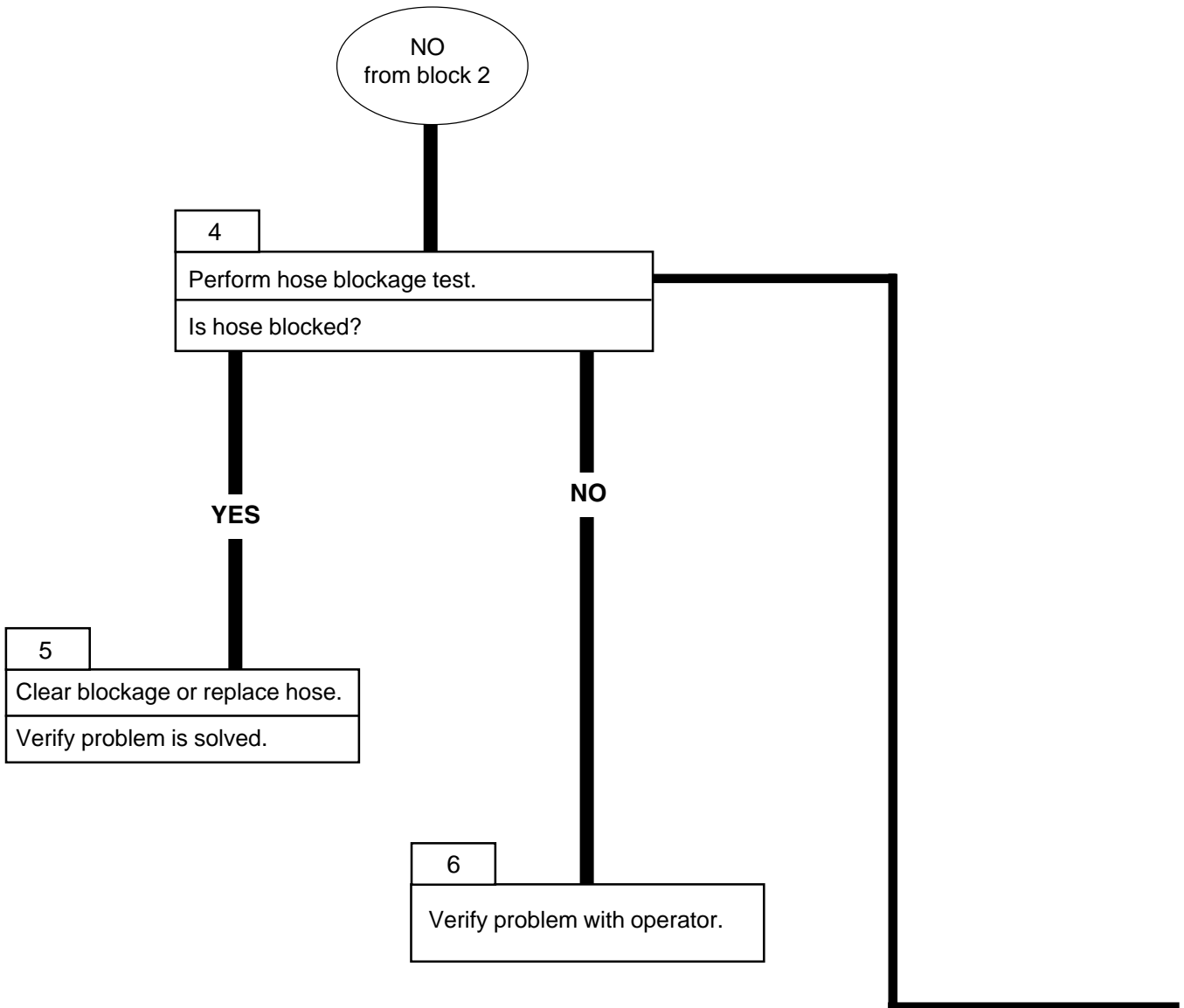
- Disconnect HYDR-MAN-IN-9 hose (5) from elbow (6) at port P on track adjuster manifold (7). Cap elbow (6).
- While holding open end of hose (5) in suitable container, have assistant start engine. Check for free flow of hydraulic oil from hose (5).
- Stop engine; relieve hydraulic pressure. Connect hose (5) to elbow (6).

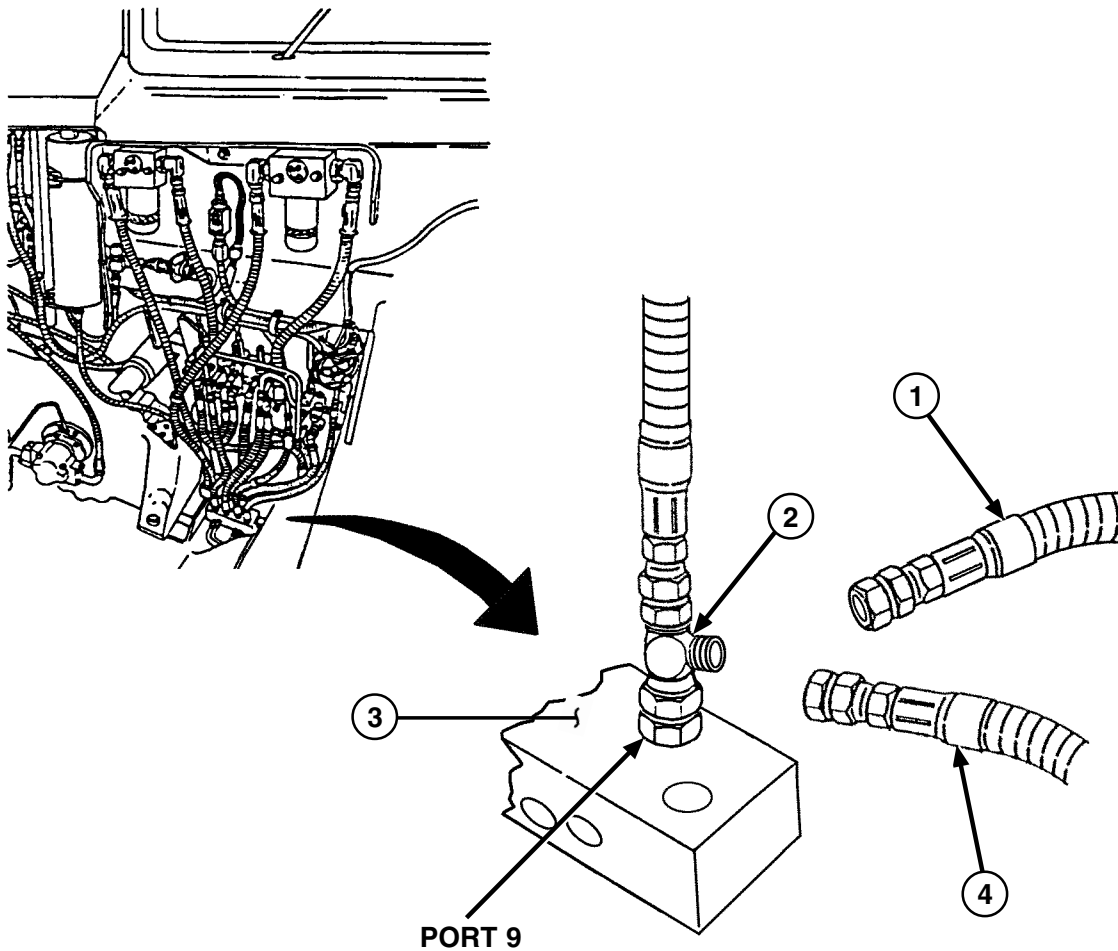
Refer to TM 5-2350-262-20-2.

Perform Semi-automatic track adjuster electrical troubleshooting, refer to TM 5-2350-262-20-1.

18

TRACK (LEFT OR RIGHT) WILL NOT TIGHTEN OR LOOSEN, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION) (CONTINUED)





HOSE BLOCKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect HYDR-MAN-IN-9 hose (1) from tee (2) at port 9 on LH MAN (3). Plug pressure hose (1). Add short hose (4) to tee (2).
- While holding open end of hose (4) in container, have assistant start engine. Check for free flow of hydraulic oil from hose (4).
- Stop engine; relieve hydraulic pressure. Disconnect hose (4) from tee (2) and connect HYDR-MAN-IN-9 hose (1) to tee (2).

19

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE OR LOWER IN UNSPRUNG MODE, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION)

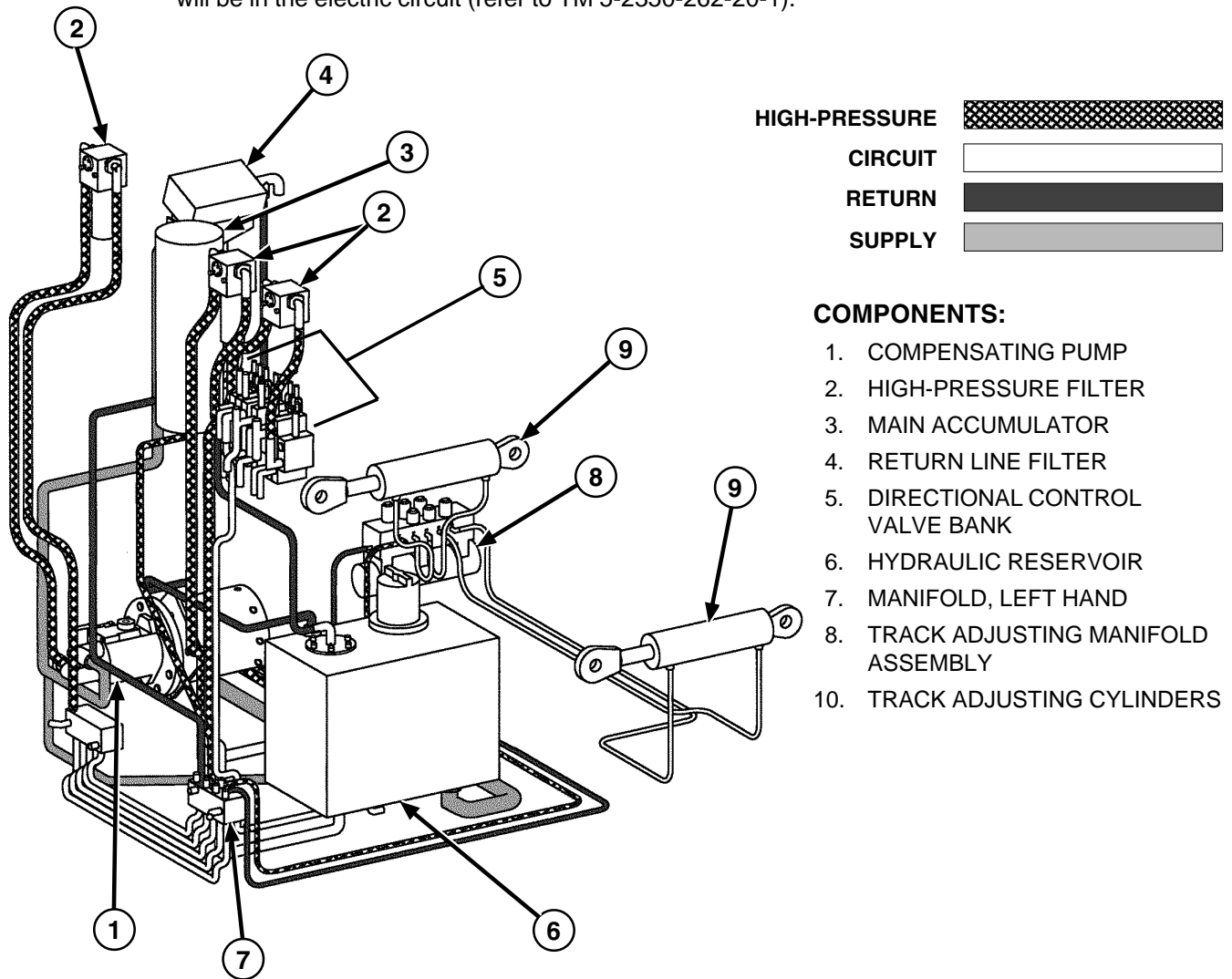
Track adjustment is provided by hydraulic pressure from the compensating pump and controlled by electric current tapped at the SPRUNG/UNSPRUNG pressure switch. In the UNSPRUNG mode, hydraulic pressure is delivered to the track adjuster manifold from line nine (9) and returned through line seven (7) at the left manifold.

WARNING

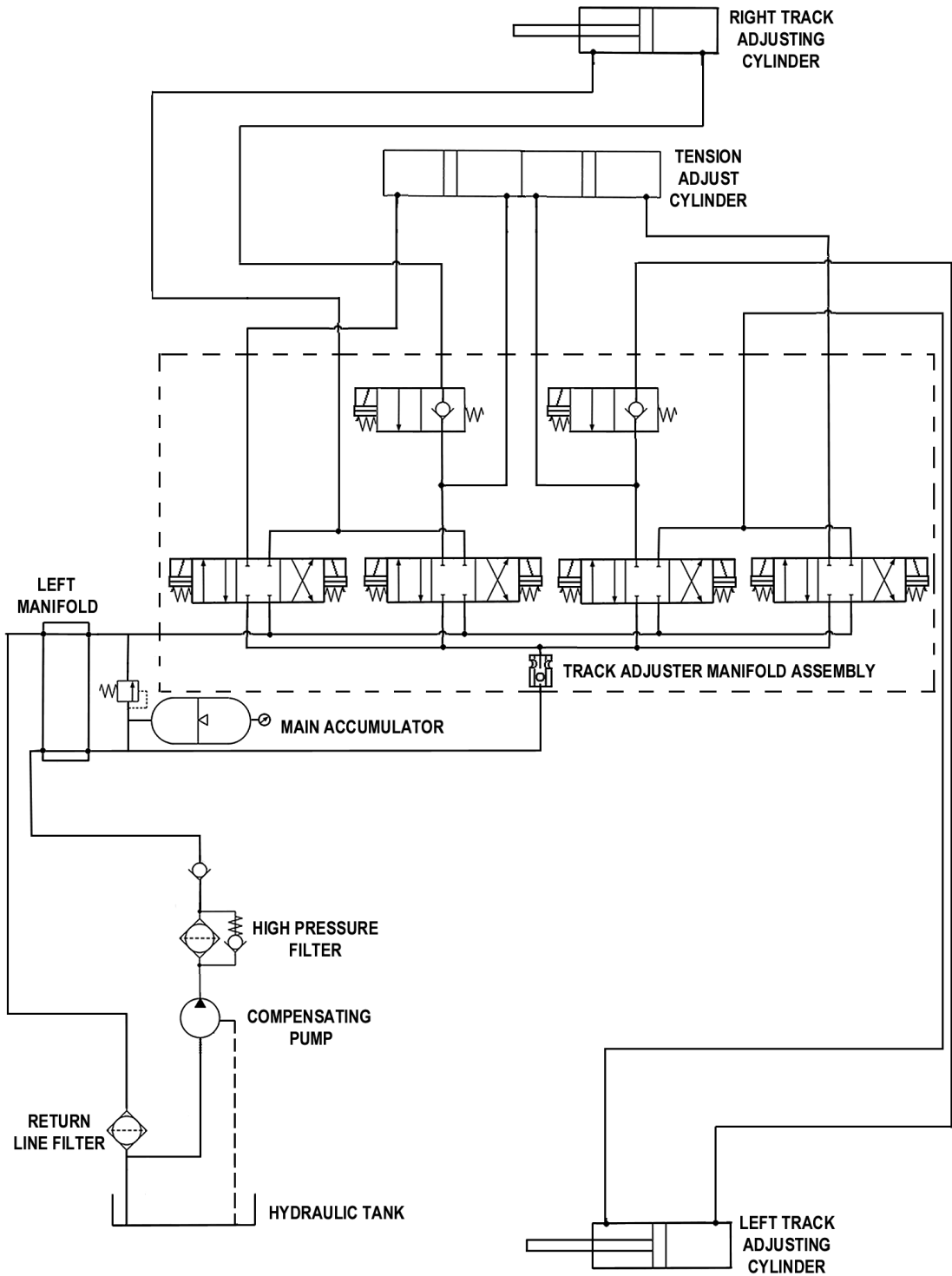
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right front corner. Front corners will not lower if the track adjuster cylinders are not retracted. The hydraulic valves are equipped with manual operators which can be used to check the hydraulic portion of the system. If everything functions by the manual hydraulic operators, the problem will be in the electric circuit (refer to TM 5-2350-262-20-1).

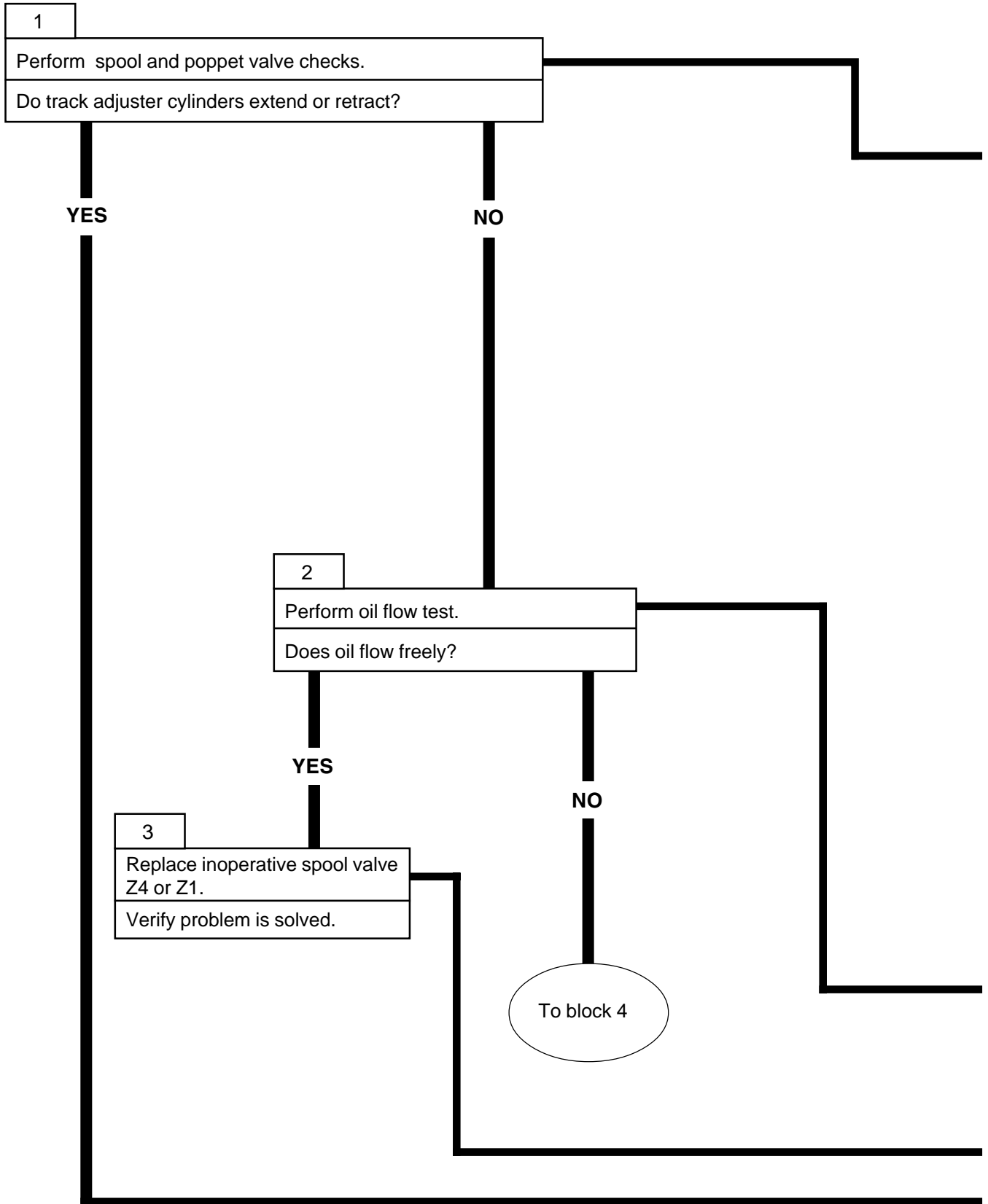


HIGH-PRESSURE —————
CIRCUIT —————
SUPPLY - - - - -



TRACK ADJUSTER HYDRAULIC SCHEMATIC

19 FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE OR LOWER IN UNSPRUNG MODE, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION) (CONTINUED)

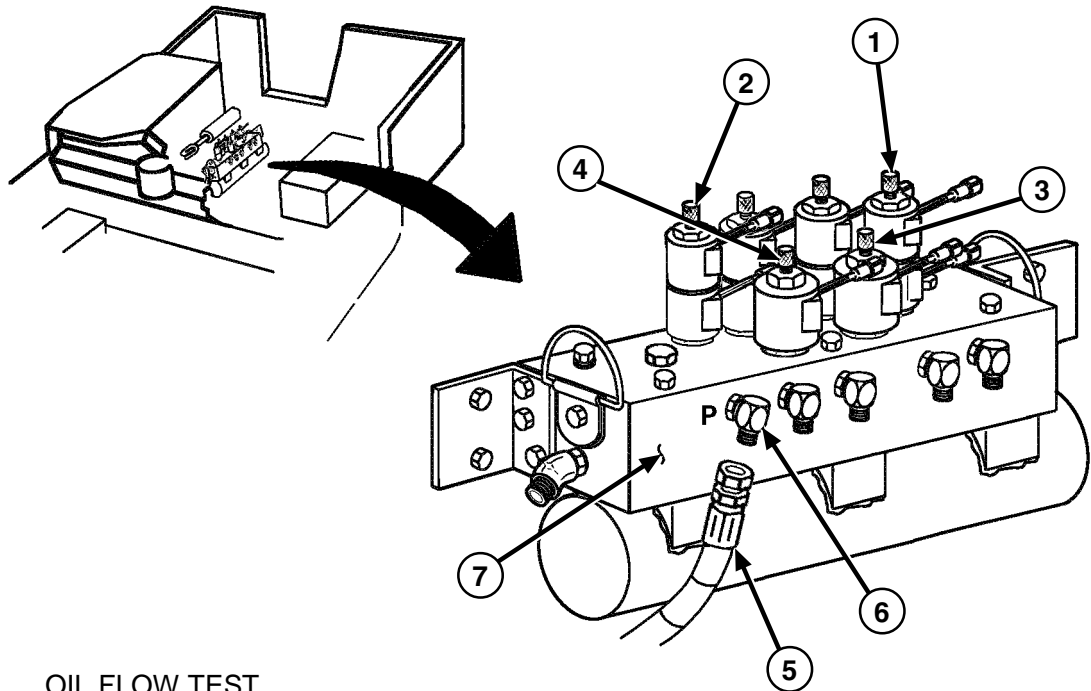


SPOOL AND POPPET VALVE CHECKS

NOTE

The track adjuster cylinders must be retracted to raise or lower front corner(s). To test spool valve, extend and retract track adjuster cylinders. To retract track adjuster cylinders, the poppet valves must be overridden. To override poppet valves (X1 or X2), depress manual override, rotate 180° counter clockwise and release (it will be up).

- Have assistant start engine.
- To extend left cylinder, depress manual override spool valve Z4 (1).
- To extend right cylinder, depress manual override spool valve Z1 (2).
- To retract left cylinder, override poppet valve X2 (3) and lift manual override spool valve Z4(1).
- To retract right cylinder, override poppet valve X1 (4) and lift manual override spool valve Z1 (2).
- Stop engine; relieve hydraulic pressure.



OIL FLOW TEST

NOTE

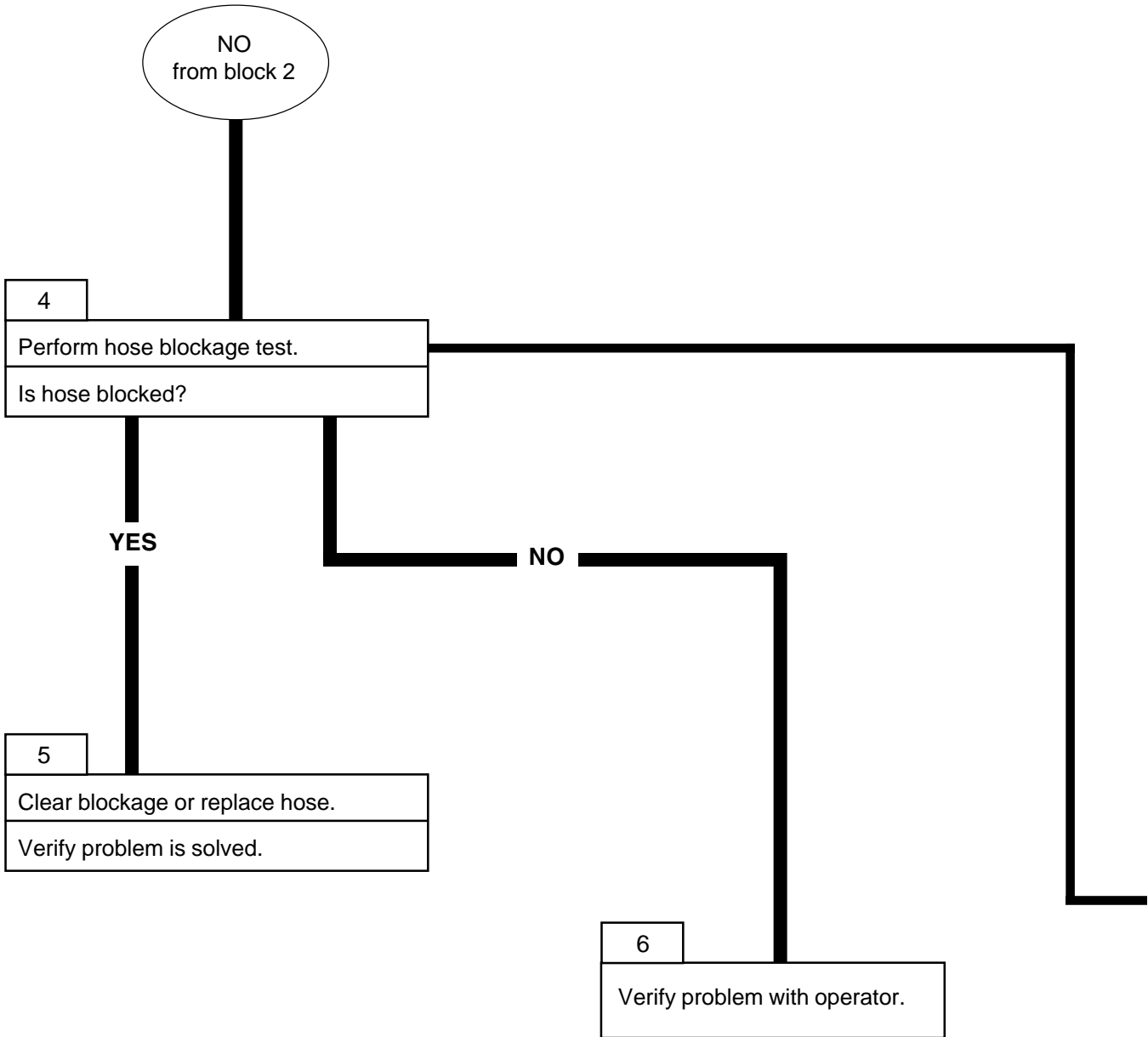
Have suitable container ready to catch oil.

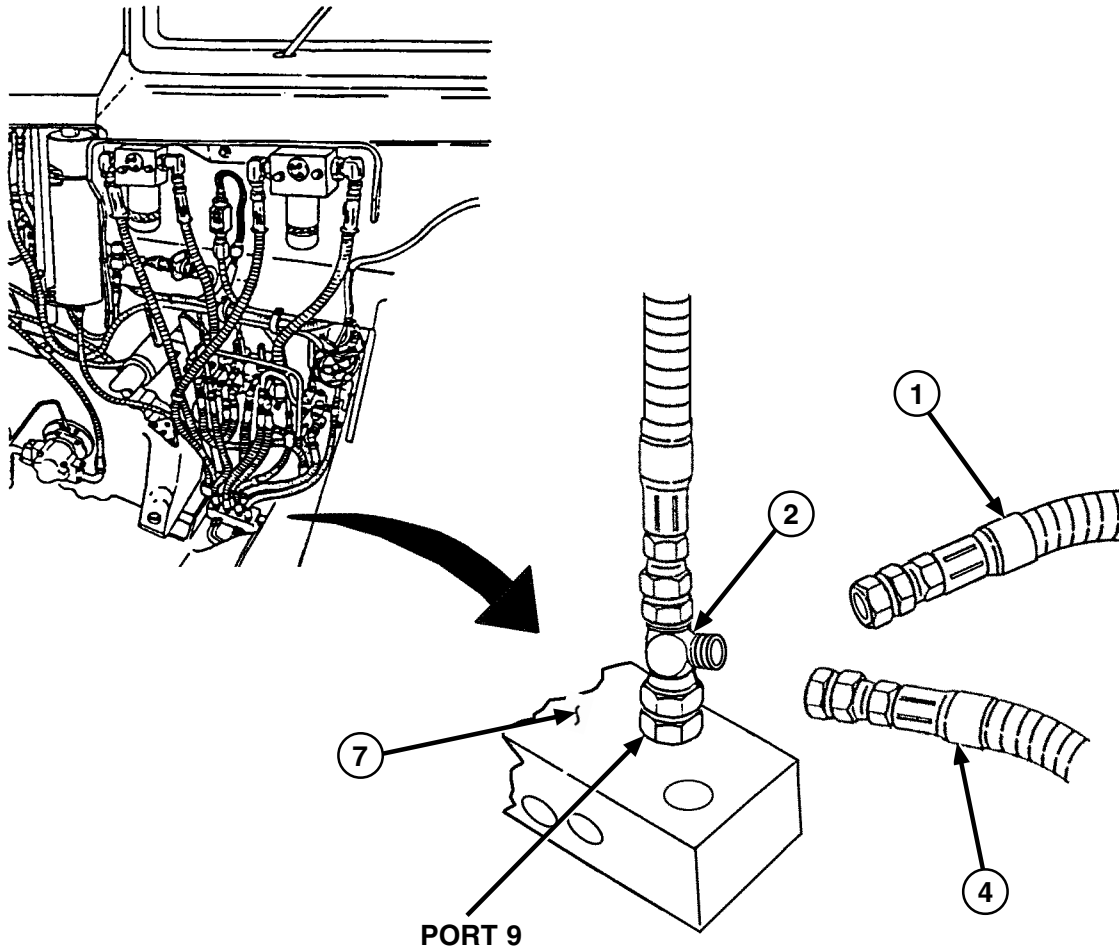
- Disconnect HYDR-MAN-IN-9 hose (5) from elbow (6) at port P on track adjuster manifold (7). Cap elbow (6).
- While holding open end of hose (5) in container, have assistant start engine. Check for free flow of hydraulic oil from hose (5).
- Stop engine; relieve hydraulic pressure. Connect hose (5) to elbow (6).

Refer to TM 5-2350-262-20-2.

Perform Semi-automatic track adjuster electrical troubleshooting, refer to TM 5-2350-262-20-1.

19 FRONT CORNER (LEFT OR RIGHT) DOES NOT EXTEND OR LOWER IN UNSPRUNG MODE, SEMI-AUTOMATIC TRACK ADJUSTER (NEW PRODUCTION) (CONTINUED)





HOSE BLOCKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect HYDR-MAN-IN-9 hose (1) from tee (2) at port 9 on LH MAN (3). Plug pressure hose (1), and add short hose (4) to tee (2).
- While holding open end of hose (4) in suitable container, have assistant start engine. Check for free flow of hydraulic oil from hose (4).
- Stop engine; relieve hydraulic pressure. Disconnect hose (4) from tee (2) and connect HYDR-MAN-IN-9 hose (1) to tee (2).

20

LEFT OR RIGHT TRACK ADJUSTER WILL NOT EXTEND AFTER THE SUSPENSION CONTROL LEVERS ARE RETURNED TO NEUTRAL (NEW PRODUCTION)

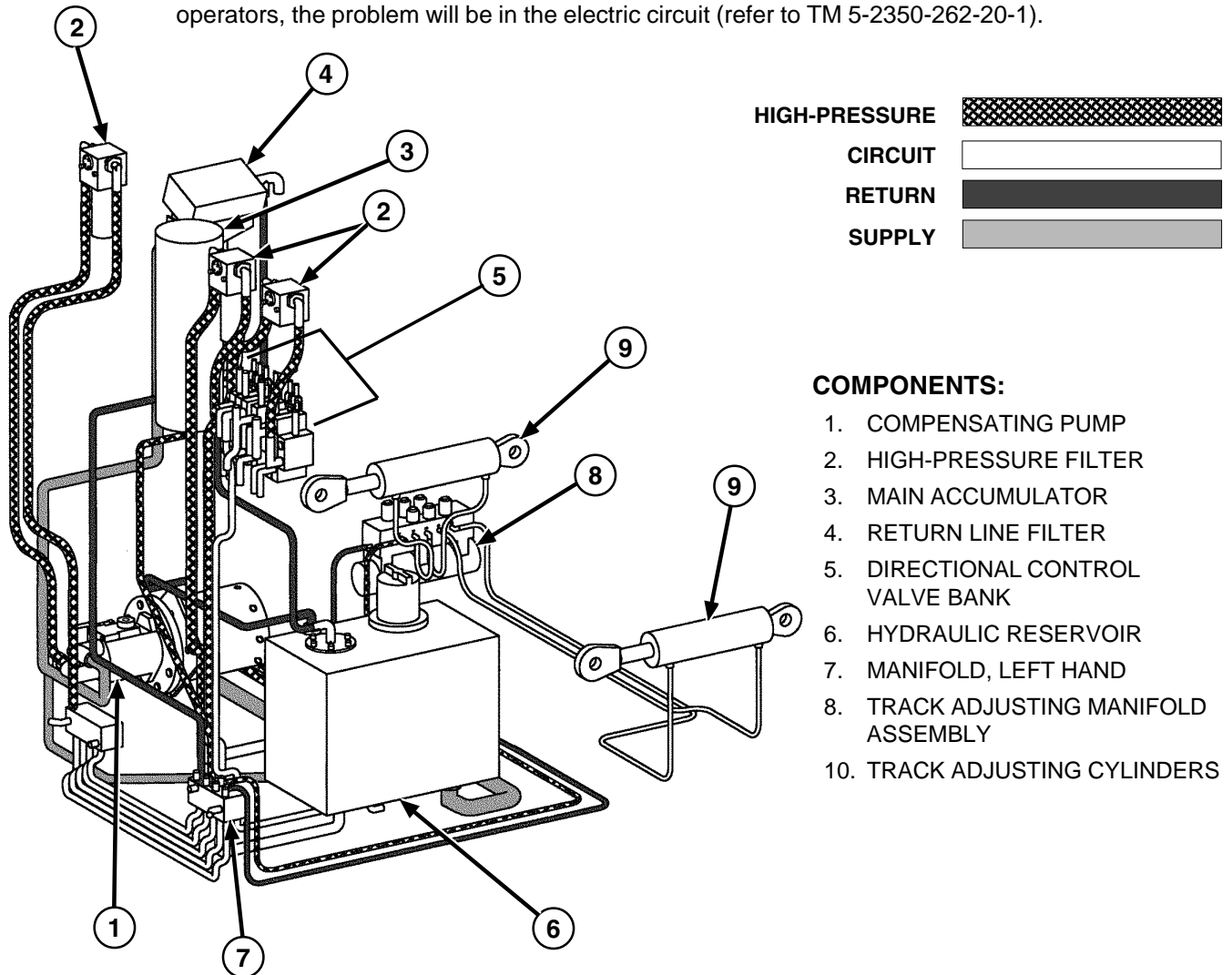
Track adjustment is powered by hydraulic pressure from the compensating pump and controlled by electric current tapped at the SPRUNG/UNSPRUNG pressure switch. In the UNSPRUNG mode, hydraulic pressure is delivered to the track adjuster manifold from line nine and returned through line seven at the left manifold.




WARNING

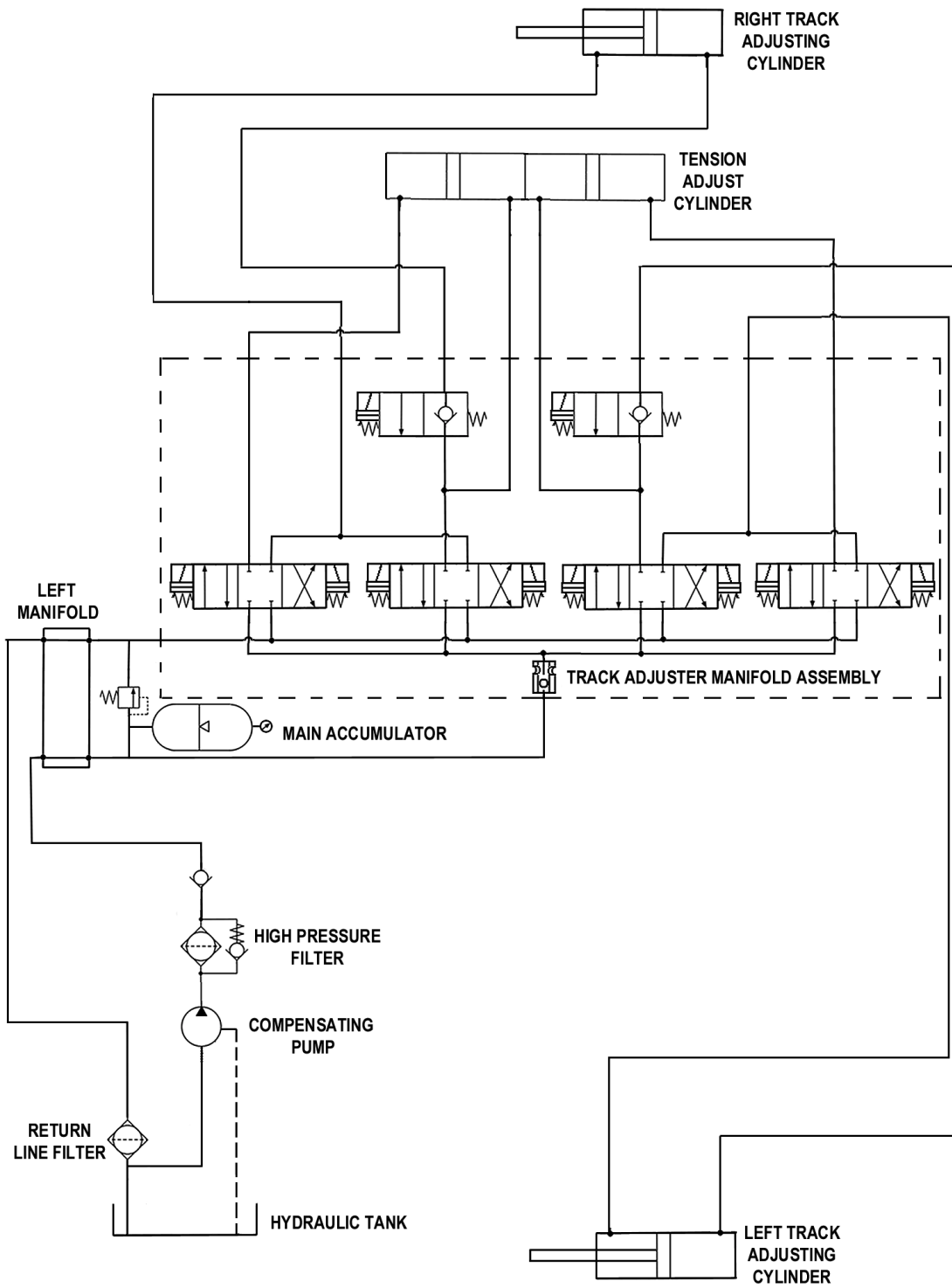
High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each hydraulic control lever is moved several times through all positions and hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

NOTE

Use these procedures to troubleshoot either left or right track adjusting cylinder. After reaching required dozer blade height, tracks are tightened for retention. The hydraulic valves are equipped with manual operators which can be used to check the hydraulic portion of the system. If everything functions by the manual hydraulic operators, the problem will be in the electric circuit (refer to TM 5-2350-262-20-1).



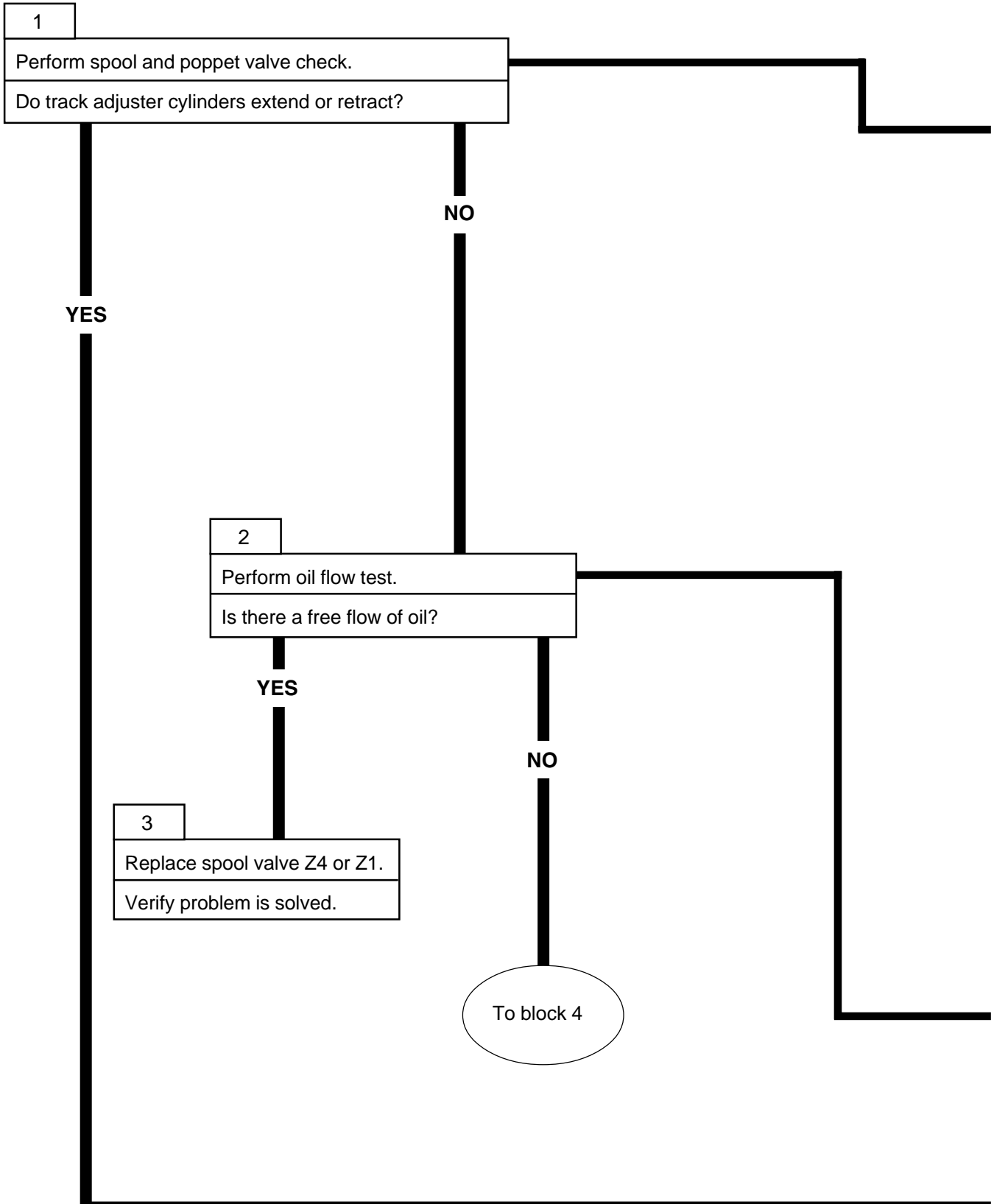
HIGH-PRESSURE 
CIRCUIT 
SUPPLY 



TRACK ADJUSTER HYDRAULIC SCHEMATIC

20

LEFT OR RIGHT TRACK ADJUSTER WILL NOT EXTEND AFTER THE SUSPENSION CONTROL LEVERS ARE RETURNED TO NEUTRAL (NEW PRODUCTION) (CONTINUED)

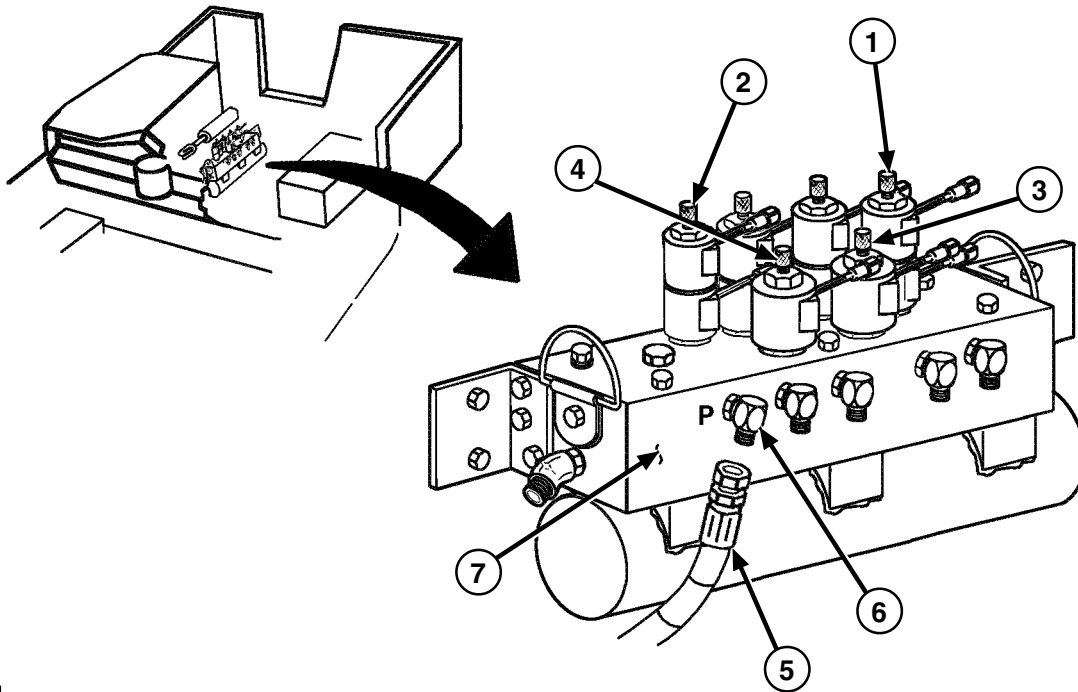


SPOOL AND POPPET VALVE CHECKS

NOTE

The track adjuster cylinders must be extended (after reaching desired height) to tighten the track. To retract track adjuster cylinders, the poppet valves must be overridden. To override poppet valve (X1 Or X2), depress manual override, rotate 180° counter clockwise and release (it will be up).

- To test spool valve, retract and extend track adjuster cylinders.
- Have assistant start engine.
- To retract left cylinder, override poppet valve X2 (3) and lift manual override spool valve Z4 (1).
- To retract right cylinder, override poppet valve X1 (4) and lift manual override spool valve Z1 (2).
- To extend left cylinder, depress manual override spool valve Z4 (1).
- To extend right cylinder, depress manual override spool valve Z1 (2).
- Stop engine; relieve hydraulic pressure.



OIL FLOW TEST

NOTE

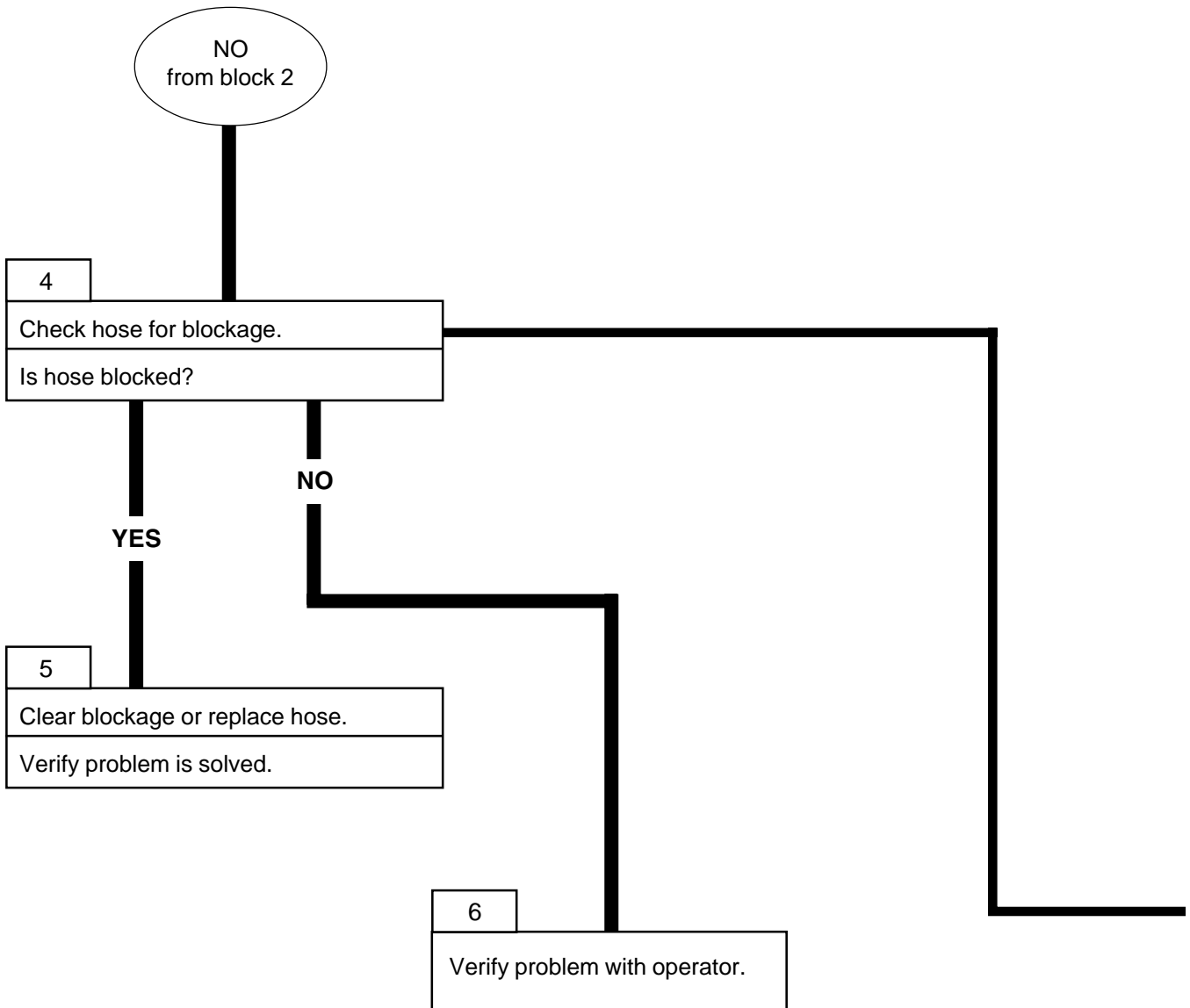
Have suitable container ready to catch oil.

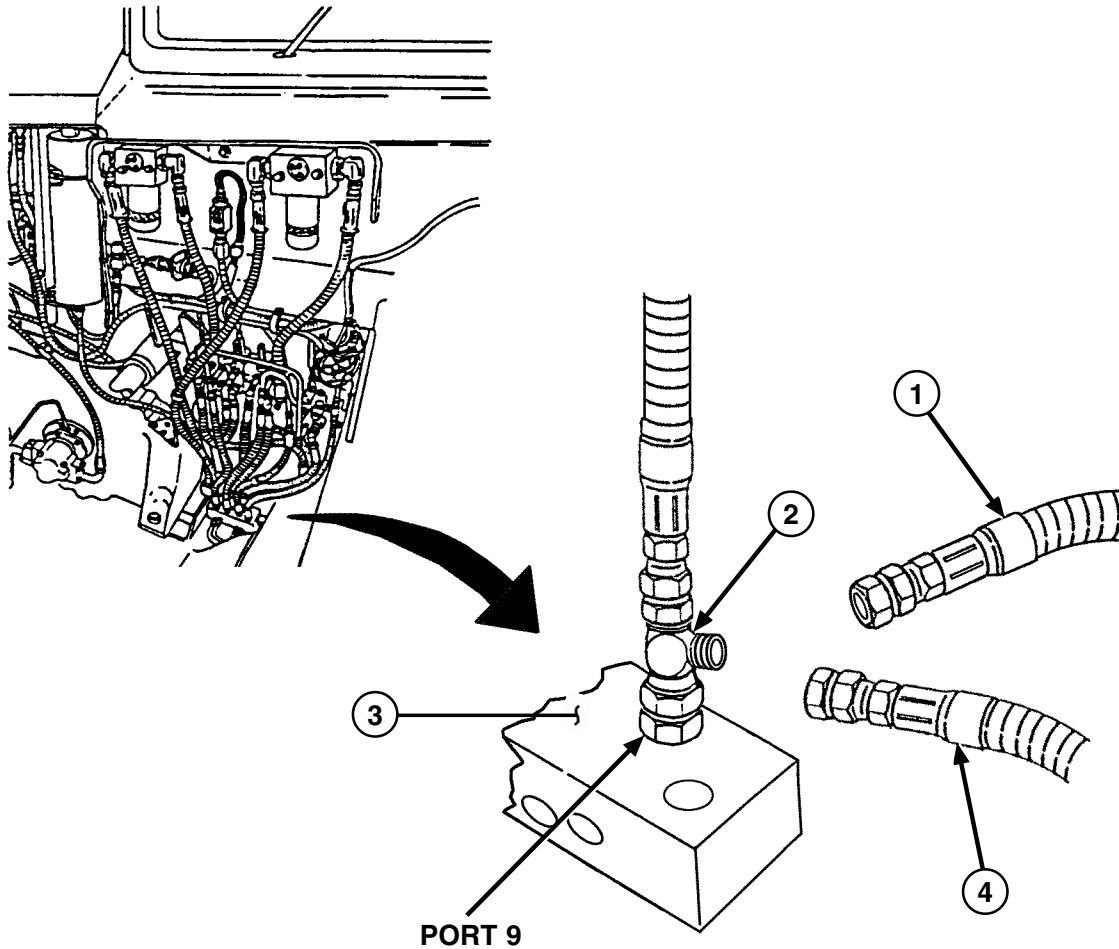
- Disconnect HYDR-MAN-IN-9 hose (5) from elbow (6) at port P on track adjuster manifold (7). Cap elbow (6).
- While holding open end of hose (5) in suitable container, have assistant start engine. Check for free flow of hydraulic oil from hose (5).
- Stop engine; relieve hydraulic pressure. Connect hose (5) to elbow (6).

Perform semi-automatic track adjuster electrical troubleshooting. Refer to TM 5-2350-262-20-1.

20

LEFT OR RIGHT TRACK ADJUSTER WILL NOT EXTEND AFTER THE SUSPENSION CONTROL LEVERS ARE RETURNED TO NEUTRAL (NEW PRODUCTION) (CONTINUED)





OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect HYDR-MAN-IN-9 hose (1) from tee (2) at port 9 on LH MAN (3). Plug pressure hose (1). Add short hose (4) to tee (2).
- While holding open end of hose (4) in suitable container, have assistant start engine. Check for free flow of hydraulic oil from hose (4).
- Stop engine; relieve hydraulic pressure. Disconnect hose (4) from tee (2) and connect HYDR-MAN-IN-9 hose (1) to tee (2).

APPENDIX A REFERENCES

A-1. SCOPE

This appendix lists Army regulations, forms, field manuals, technical manuals, and other publications referenced in the three volumes of this manual and which apply to unit maintenance of the M9 (ACE).

A-2. ARMY REGULATIONS

Reporting of Transportation Discrepancies in Shipments AR 55-38
Department of the Army Information Security Program Regulation AR 380-5

A-3. DEPARTMENT OF THE ARMY PAMPHLETS

Consolidated Index of Army Publications and Forms DA Pam 25-30
The Army Maintenance Management System (TAMMS) DA Pam 738-750
U.S. Army Equipment Index of Modification Work Orders DA Pam 750-10

A-4. FORMS

Army Accident Investigation Report DA Form 285
Equipment Operator's Qualifications Record (Except Aircraft) DA Form 348
Recommended Changes to Publications and Blank Forms DA Form 2028
Recommended Changes to Equipment Technical Manuals DA Form 2028-2
Organizational Control-Record for Equipment DA Form 2401
Equipment Inspection and Maintenance Worksheet DA Form 2404
Maintenance Request DA Form 2407
Preventive Maintenance Schedule and Record DD Form 314
Processing and Deprocessing Record for Shipment, Storage, and
Issue of Vehicles and Spare Engines DD Form 1397
DOD-Fire Incident Report DD Form 2324
U.S. Government Motor Vehicle Operator's Identification Card OF Form 346
Operator's Report on Motor Vehicle Accident SF Form 91
Transportation Discrepancy Report SF Form 361
Report of Discrepancy (ROD) SF Form 364
Product Quality Deficiency Report (7540-00-113-5541) SF Form 368

A-5. FIELD MANUALS

NBC-Contamination Avoidance FM 3-3
NBC Protection FM 3-4
NBC-Decontamination FM 3-5
Field Behavior of NBC Agents (Including Smoke and Incendiaries) FM 3-6
Camouflage FM 5-20
Vehicle Recovery Operations FM 20-22
First Aid for Soldiers FM 21-11
Visual Signals FM 21-60
Basic Cold Weather Manual FM 31-70
Northern Operations FM 31-71
Desert Operations FM 90-3
Mountain Operations (How to Fight) FM 90-6
Rigging FM 5-125

A-6. TECHNICAL BULLETINS

Occupational and Environmental Health: Hearing Conservation TB MED 501
 Solder and Soldering TB SIG 222
 Installation Instructions of Rotating Amber Warning Light Kit TB 9-2590-510-23
 Color, Marking, and Camouflage Painting of Military Vehicles,
 Construction Equipment, and Materiels Handling Equipment TB 43-0209
 Maintenance in the Desert TB 43-0239
 Warranty Technical Bulletin for M9 ACE TB 5-2350-262-15
 Use of antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems TB 750-651

A-7. TECHNICAL MANUALS

Operator’s and Unit Maintenance Manual (including
 Repair Parts and Special Tools List) for Decontaminating Apparatus,
 Portable DS2, 1-1/2 Quart, ABC M11 (4230-00-720-1618) TM 3-4230-204-12&P
 Operator’s Manual for Mask, Chemical-Biological, Aircraft ABC-M24 and
 Accessories for Mask, Chemical-Biological; Tank M25A1 and Accessories TM 3-4240-280-10
 Operator’s Manual: Training Set, Chemical Agent Identification:
 Simulants, M72A2 (6910-01-043-2090) TM 3-6910-227-10
 Operator’s Manual for Armored Combat Earthmover (ACE), M9
 (2350-00-808-7100) TM 5-2350-262-10
 Hand Receipt Manual Covering End Item/Components of End Item (COEI),
 Basic Issue Items (BII), and Additional Authorization List (AAL) for Armored
 Combat Earthmover (ACE), M9 (2350-00-808-7100) TM 5-2350-262-10-HR
 Unit Maintenance Repair Parts and Special Tools Lists for Armored
 Combat Earthmover (ACE), M9 (2350-00-808-7100) TM 5-2350-262-24P
 Operator’s, Unit and Direct Support Maintenance Manual Including
 Repair Parts and Special Tools List for Recovery/Recharger Unit Fire Extinguisher,
 Monobromotrifluoromethane, Skid Mounted, Electric Motor Driven
 Model RHA-101-M, Part No. 350501-001, S/N 3505-1 to 3505-368
 (4210-01-176-3517) TM 5-4210-218-13&P
 Organizational Maintenance Manual Including Repair Parts and Special Tools
 List for Launcher, Grenade, Smoke: Screening, RP, I M243 (1040-01-059-0560),
 M257 (1040-01-070-1213), and M259 (1040-01-107-7051) TM 9-1040-267-20&P
 Inspection, Care, and Maintenance of Antifriction Bearings TM 9-214
 Operator’s Manual for Welding Theory and Application TM 9-237
 Organizational, Direct Support, and General Support Maintenance Manual:
 Standards for Inspection and Classification of Tracks, Track Components,
 and Solid Rubber Tires (FSC 2530) TM 9-2530-200-24
 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) TM 9-4910-571-12&P
 Operator’s, Organizational, Direct Support, and General Support Maintenance
 Manual for Lead-Acid Storage Batteries; 4HN, 24V, (6140-00-069-3528)
 MS75047-1; 2HN, 12V (6140-00-057-2553) MS35000-1; 6TN, 12V
 (6140-00-057-2554) MS35000-3 TM 9-6140-200-14

A-7. TECHNICAL MANUALS - CONTINUED

Operator's Manual for Radio Sets AN/VRC-12 (5820-00-223-7412), AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433, AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), and AN/VRC-49 (5820-00-223-7437); (Used Without Intercom Systems) [EE150-JA-OP1-101-E154; to 31R2-2VRC-191]..... TM 11-5820-401-10-1

Operator's and Organizational Maintenance Manual: Radio Sets, AN/VRC-53 (5820-00-223-7467), AN/VRC-64 (5820-00-223-7475), AN/GRC-125 (5820-00-223-7411), and AN/GRC-160 (5820-00-223-7473) and Amplifier-Power Supply Groups, OA-3633/GRC and OA-3633A/GRC (5820-00-973-3383) TM 11-5820-498-12

Organizational Maintenance Repair Parts and Special Tools List for Radio Sets, AN/VRC-53 (5820-00-223-7467, AN/VRC-64 (5820-00-223-7475), AN/VRC-125 (5820-00-223-7411), AN/GRC-160 (5820-00-223-7473) and Amplifier, Power Supply Groups, OA-3633/GRC and OA-3633A/GRC (Parts List for OA-3633/GRC and OA-3633A/GRC (5820-00-973-3383) Only) TM 11-5820-498-20P

Operator's Manual for Radio Set AN/VRC-87, SINGARS, TM 11-5820-890-10-3

Hand Receipt Manual Covering End Items/Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) for SINGARS Radio AN/VRC-87 TM 11-5820-890-10-HR

Organizational Maintenance Manual: Night Vision Goggles AN/PVS-5 and AN/PVS-5A (5855-00-150-1820) TM 11-5855-238-20

Organizational, Direct Support, and General Support Maintenance Manual, Including Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools), Night Vision Goggles AN/PVS-5 and AN/PVS-5A (5855-00-150-1820) TM 11-5855-238-24&P

Operator's, Organizational, Direct Support, and General Support Maintenance Manual, Multimeter, Digital AN/PSM-45 (6625-01-139-2512) TM 11-6625-3052-14

Army Equipment Data Sheets: Chemical Defense Equipment (Reprinted with Basic INCL-1) TM 43-0001-26-1

Painting Instructions for Field Use TM 43-0139

Transportability Guidance, Armored Combat Earthmover (ACE), M9 (2350-00-808-7100) TM 55-2350-262-14

Cooling Systems: Tactical Vehicles TM 750-254

Procedures for Destruction of Tank-automotive Equipment to Prevent Enemy Use TM 750-244-6

A-8. OTHER PUBLICATIONS

Army Medical Department Expendable/Durable Items CTA 8-100

Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) CTA 50-970

Catalog of Audiovisual Productions, Army Productions, Volume 1 (PA) DOD5040.2-C-1

Vehicular Radio Sets and Authorized Instructions SB 11-131-2

APPENDIX B SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

SCOPE

Repair parts, special tools, and support equipment are issued for maintaining the vehicle. Tools and equipment should not be used for purposes other than those prescribed. When not in use, they should be properly stowed.

COMMON TOOLS AND EQUIPMENT

Standard and commonly used tools and equipment that have general application to this material are authorized for issue by tables of allowances and modified tables of organization and equipment. Refer to the tables applicable to your unit for common tools and equipment.

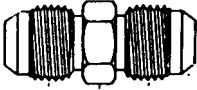
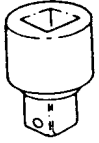

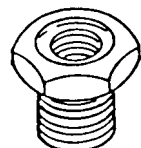
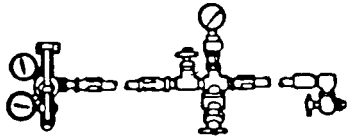
SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools and equipment necessary to perform the maintenance described in this manual are listed for your information. Special tools and support equipment are listed in TM 5-2350-262-24P, which is the authority for requisitioning replacement parts.

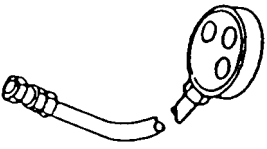
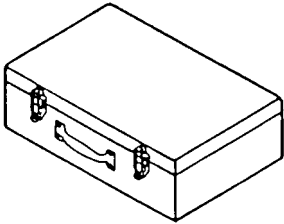
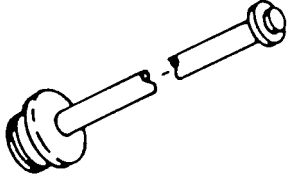
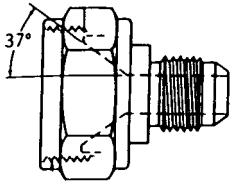
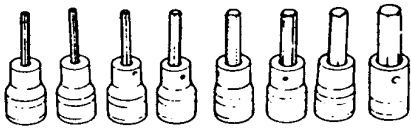
REPAIR PARTS

Repair parts are issued for the replacement of parts that have become worn, broken, or otherwise unserviceable. Repair parts are listed in TM 5-2350-262-24P, which is the authority for requisitioning replacements.

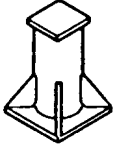
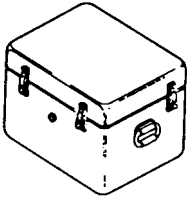
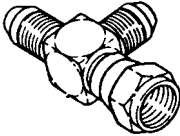
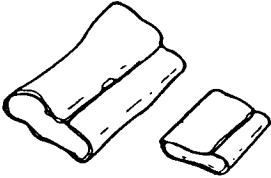

**APPENDIX B
SPECIAL TOOLS, TMDE, AND SUPPORT
EQUIPMENT - CONTINUED**

ITEM	NUMBER	USE
 ADAPTER	2027-12-12S	For hydraulic troubleshooting
 ADAPTER, SOCKET WRENCH	5120-00-240-8702 (GAX-1)	For use with crowfoot wrenches
 BUSHING	4730-00-580-7417 (2081-8-4S)	For hydraulic troubleshooting
 BUSHING, PIPE	4730-00-873-0110 (C3109X6X2)	To adapt gauge, 4940-00-595-5720 to charging device, 4933-01-046-7109
 CHARGING DEVICE	4940-01-046-7109 (12252157)	For charging accumulators

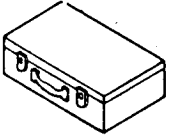
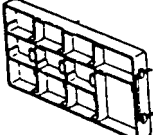
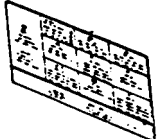










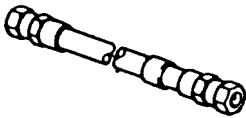


**APPENDIX B
SPECIAL TOOLS, TMDE, AND SUPPORT
EQUIPMENT - CONTINUED**

ITEM	NUMBER	USE
 HYDRAULIC TESTER (GAUGE)	4940-00-595-5720 (GS-5)	For checking pressures
 PARTS KIT	2590-01-216-8646 (5705562)	For troubleshooting hydraulic system
 PLUG, HYDRAULIC TANK	5120-01-222-7934 (12355501)	To plug hydraulic tank outlet to prevent drainage when hydraulic lines are disconnected
 REDUCER	4700-00-675-9216 (221501-12-8S)	For hydraulic troubleshooting
 SOCKET SET, SOCKET WRENCH	5120-01-195-0640 (208fa)	To tighten screws on track wear plate and compensating pump compensator screws













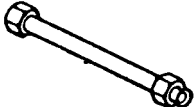



**APPENDIX B
SPECIAL TOOLS, TMDE, AND SUPPORT
EQUIPMENT - CONTINUED**

ITEM	NUMBER	USE
 STAND, VEHICLE	2590-01-228-5802 (12355345)	To support hull during maintenance
 STE/ICE-R	4910-001-222-6589 (2389409)	For hydraulic electrical and engine troubleshooting
 TEE	4730-00-738-7558 (203102-12-12S)	For hydraulic troubleshooting
 WRENCH SET, OPEN END	5120-01-301-5783 (5705565)	To disconnect and connect various oil lines
 WRENCH SET, CROWFOOT	5120-01-302-4387 (5705566)	To disconnect and connect miscellaneous hydraulic lines

APPENDIX C SPECIAL TOOLS, HYDRAULIC TROUBLESHOOTING PARTS KIT 5705562

ITEM	NUMBER	ITEM	NUMBER
 STORAGE BOX	2540-01-298-3975 (12367609)	 ACCESSORIES DRAWER	25400-01-326-8178 (1236707)
 KIT DECAL	7690-01-413-3020 (12367608)	 ADAPTER	4730-00-441-8700 (MS51500A8-4)
 ADAPTER	4730-00-800-7570 (MS51503A4)	 ADAPTER	4730-01-183-7167 (2242-8-8S)
 PIPE BUSHING	4730-00-729-4930 (2081-8-2S)	 TUBE CAP 5/8 OD	4730-00-542-5911 (MS51532B10)
 TUBE CAP 3/4 OD	4730-00-647-3311 (MS51532B12)	 TUBE CAP 1/4 OD	4730-01-044-0878 (MS51532B4)
 TUBE CAP 3/8 OD	4730-00-540-1525 (MS51532B6)	 TUBE CAP 1/2 OD	4730-00-625-2212 (MS51532B8)
 HOSE ASSEMBLY 1/4 ID	4720-01-246-0992 (12355351)	 HOSE ASSEMBLY 1/2 ID	4720-01-252-8425 (12355352)
 NIPPLE 5/8 OD	4730-00-855-4799 (MS51519B10S)	 NIPPLE 1/4 OD	4730-01-079-1986 (MS51519A4)

**APPENDIX C
SPECIAL TOOLS, HYDRAULIC
TROUBLESHOOTING PARTS KIT 5705562 - CONTINUED**

ITEM	NUMBER	ITEM	NUMBER
 NIPPLE 1/2 OD	4730-01-329-4994 (MS51519A8)	 TUBE NUT 3/8 OD	4730-00-203-3831 (C5105X6)
 PLUG 5/8 OD	5365-01-249-9707 (MS51518B10)	 PLUG 3/4 OD	4730-01-203-6941 (MS51518B12)
 PLUG 1/4 OD	4730-01-021-3850 (MS51518B4)	 PLUG 3/8 OD	5365-01-251-2034 (MS51518B6)
 PLUG 1/2 OD	4730-01-070-9214 (MS51518B8)	 REDUCER 3/4 X 3/8	4730-00-805-5094 (MS51534A6-4)
 REDUCER 5/8 X 1/2	4730-00-676-3075 (MS51534A8-4)	 REDUCER 3/8 X 1/4	4730-00-706-8711 (MS51523A8)
 REDUCER 1/2 X 1/4	4730-00-676-3075 (MS51534A8-4)	 TUBE TEE	4730-00-074-0713 (MS551532B8)
 COUPLING 1/2 OD	4730-01-270-47650 (12355351)	 CHECK VALVE	4820-00-045-7415 (MS24593-8)
 GLOBE VALVE	4820-00-513-5471 (12355353)	 ADAPTER	4730-01-305-5796 (4-4F6BX-S)

APPENDIX D TORQUE VALUE GUIDE FOR HYDRAULIC FITTINGS

WARNING

Do not use table for assembly of NPT fittings. Failure to comply may result in damage to equipment.

Size	Torque in Pound-Inches	Torque in Pound-Feet
-2 (5/16-24 Thread)	40-50	3-4
-3 (3/8-24 Thread)	90-100	7-8
-4 (7/16-20 Thread)	135-150	11-12
-5 (1/2-20 Thread)	180-200	15-16
-6 (9/16-18 Thread)	270-300	22-25
-8 (3/4-16 Thread)	450-500	37-41
-10 (7/8-14 Thread)	650-700	54-58
-12 (1 1/6-12 Thread)	900-1000	75-83
-14 (1 3/16-12 Thread)	1050-1200	87-100
-16 (1 5/16-12 Thread)	1200-1400	100-116
-20 (1 5/8-12 Thread)	1900-2100	158-175
-24 (1 7/8-12 Thread)	2700-3000	225-250
-32 (2 1/2-12 Thread)	4000-4500	333-375
<p>Note 1. Torquing requirements are extracted from MIL-F-18866D, Table III.</p> <p>Note 2. Torque to be used on hose fittings, tube fittings, straight thread fittings, and SAE/AN ports.</p>		

APPENDIX E SCHEMATIC DIAGRAMS

SCOPE

This appendix identifies the following schematic for the M9 ACE:

Hydraulic Schematic FP-1

INDEX

This alphabetical index covers tasks in TM 5-2350-262-20-1, TM 5-2350-262-20-2, and TM 5-2350-262-20-3.

A	Page	A - Continued	Page
Accelerator and throttle linkage:		Arm, wiper	4-61
Adjustment	4-3	Arming-firing unit, smoke grenade	4-162
Replacement and repair	4-6	Arming-firing unit, wiring harness	4-166
Access cover seals, hull		Armor, fuel tank	4-323
(OLD PRODUCTION)	4-382	Armor plate, exterior	4-40
Access covers, engine intake and		Assembly, apron and dozer	4-249
exhaust grilles	4-339	Assembly, bilge pump	4-390
Access covers, hull, and plug	4-375	Assembly, driver's hatch	4-300
Accumulator, actuator	4-846	Assembly, NBC frame	4-800
Accumulator dump valve installation	Vol. 3, 3-8	Assembly, front bump stop	4-870
Accumulator, main hydraulic:		Assembly, fuel/water separator	4-228
Charging	4-466	Assembly, heater	4-241
Replacement	4-470	Assembly, seat	4-822
Accumulator, transmission shift:		Deleted	
Charging	4-678	Assembly, winch	4-894.2
Replacement	4-683	Assembly, winch shift control	4-894.13
Actuator access plates replacement	4-382.2	Deleted	
Actuator accumulator	4-846	Assembly, wire rope	4-894.17
Actuator port identification and		Atomizer, start-aid	4-618
description	Vol. 3, 3-11		
Actuator schematic diagram	Vol. 3, 3-12	B	
Adjusting cable, fan belt	4-638	Battery	4-77
Air cleaner	4-604	Battery box	4-80
Air compressor governor:		Battery box insulation replacement	2-48
Adjustment	4-27	Battery cables	4-83
Replacement	4-30	Battery service	2-49
Air hose, MCS unit	4-932	Beam selecting switch, headlight	4-88
Air lines and fittings	4-14	Belt, alternator	4-596
Air purifier	4-802	Belt, fan tensioner:	
Air purifier electrical components	4-806	Adjustment	4-630
Air purifier hoses	4-804	Replacement	4-632
Air reservoir	4-24	Belt, seat	4-820
All hydraulic functions inoperative	Vol. 3, 3-16	Belt, water pump	4-596
Deleted		Bilge pump assembly	4-390
Alternator replacement	4-535	Bilge pump "ON" lamp receptacle	4-124
Alternator/water pump belt replacement	4-596	Bilge pump "ON" switch	4-126
Apron and dozer assembly	4-249	Bilge pump relief valve	4-502
Apron and dozer extensions	4-260	Blade, dozer	4-266
Apron, bilge pump, and left hand wheel		Blade, ripper	4-957
control inoperative	Vol. 3, 3-16	Blade, wiper	4-61
Apron cylinder to inner bowl hydraulic tubes ...	4-428	Blocking roadwheels	2-28
Apron hydraulic cylinder	4-286	Blocking the hull	2-27
Apron lower relief valve	4-526	Blocking track	2-28
Apron raise relief valve	4-523	Blower, Heater Motor Housing	4-244
Apron strip replacement	4-264	Box, battery	4-80
Apron wear plates replacement	4-262	Box, ejector stowage	4-275
Apron will not raise	Vol. 3, 3-34	Box, radio equipment	4-815
Arm, roadwheel	4-853		

INDEX - Continued

	Page
B - Continued	
Boxes, smoke grenade stowage	4-842
Bracket, brake chamber	4-21
Bracket, ejector cylinder	4-296
Deleted	
Bracket, portable fire extinguisher, Dry Powder	4-213
Brackets, liquid container	4-43
Bracket, main accumulator	4-470
Brackets, shackles and	4-369
Brackets, tiedown	4-351
Brake chamber	4-21
Brake lever boot, steer unit	4-738
Brake linkage and bracket	4-54
Breathers, final drive	4-746
Breathers, steer unit and winch	4-725
Breather, transfer case	4-656
Bump stop assembly, front	4-870
Bump stop cylinder, front	4-870
Bump stop, rear	4-384
Bump stops inoperative	Vol. 3, 3-42
Buzzer, warning	4-136

C

Cable, fan belt adjusting	4-638
Cable, parking brake:	
Adjustment	4-46
Replacement	4-49
■ Cable repair, electrical	3-1
Cable, winch shift control	4-894.13
Cables, battery	4-83
Calibration	1-1
Cartridge, start-aid	4-618
CB/GS steer selector lever and linkage	4-716
Charge and gauge assembly, main hydraulic accumulator	4-472
Charging limits	H-1
Circuit breakers	4-122
Clamps, cooling system	4-581
Clamps, fixed fire extinguisher canister and	4-211
Cleaner, air	4-604
Cleaning methods, general	2-25
Common tools and equipment	2-1
Compensating hydraulic pump:	
Adjustment	4-486
Replacement	4-490
Testing	4-486

	Page
C - Continued	
Compressor motor, MCS unit	4-939
Condenser fan, MCS unit	4-903
Control box, MCS unit	4-934
Control valve and cable, fixed fire extinguisher	4-206
Control valve, hydraulic shift	4-685
Conversion table, metric	Back Cover
Convoy warning light kit	4-961
Cooler, transmission oil	4-586
Cooling system fan assembly and shroud	4-634
Cooling system service	4-646
Cooling system tubes, hoses, clamps, and fittings	4-581
Coupling, trailer brake	4-32
Cover, kit, winch	4-962
Cover, rocker arm	4-602
Covers and plug, hull access	4-375
Covers, engine access	4-339
Cowling	4-334
Crankshaft, engine, drain and fill	4-570.1
Cylinder, apron hydraulic	4-286
Cylinder, ejector hydraulic	4-290
Cylinder, front bump stop	4-870
Clinder, track adjusting	4-865

D

Data plates	4-393
Debris shield replacement	4-298
Delta pressure switch, MCS unit	4-948
Description of data, equipment	1-8
Destruction of Army materiel to prevent enemy use	1-1
Dimmer control switch, domelight	4-90
Dipstick, hydraulic tank	4-484
Directional control valve bank	4-497
Discharger wiring harness	4-164
Dischargers, smoke grenade	4-160
Domelight	4-190
Domelight dimmer control switch	4-90
Dozer assembly	4-249
Dozer blade	4-266
Dozer blade cutting edge and dozer extension end bits	4-257
Drain hose transmission	4-577
Drain hoses, fuel tank-to-filter and	4-225
Drain valve, hull	4-388

INDEX - Continued

Page	Page
D - Continued	
Drain valves, manifold	4-461
Draining, fuel tank	4-216
Driver's compartment floor plate	4-358
Driver's compartment mounting bracket	4-809
Driver's compartment step	4-353
Driver's hatch assembly	4-300
Driver's instrument panel	4-105
Deleted	
Driver's ventilation fan filter and lower duct	4-246
Driver's ventilation fan	4-244.2
Driver's ventilation fan motor blower	4-244.4
Driveshaft	4-742
Deleted	
Drive sprocket and hub	4-758.1
E	
Ejector	4-271
Ejector creeps	Vol. 3, 3-52
Ejector cylinder bracket	4-296
Ejector does not extend or retract	Vol. 3, 3-62
Ejector hydraulic cylinder	4-290
Ejector relief valve	4-505
Ejector rollers	4-277
Ejector stowage box	4-275
Ejector wear plates	4-280
Electrical components, air purifier	4-806
Electrical housing, MCS unit	4-919
Electrical test equipment	3-1
Element, filter, hydraulic high pressure	4-475
Element, filter, transmission oil	4-695
Element, fuel/water separator	4-228
Element, hydraulic return line filter	4-478
Element, scavenger pump filter	4-659
EMI filter box, MCS unit	4-922
EMI filter box wiring harness and circuit breaker, MCS unit	4-926
Engine compartment armor shroud, radiator and	4-326
Engine crankcase drain and fill	4-570.1
Engine intake and exhaust grilles and access covers	4-339
Engine oil cooler bypass tube	4-571
Engine oil filter	4-626
Engine oil filter element	4-624
Engine oil level indicator	4-579
Engine oil pressure switch and transmitter	4-150
E - Continued	
Engine water temperature transmitter	4-152
Equipment box, radio	4-815
Equipment characteristics capabilities, and features	1-2
Equipment data	1-8
Equipment description and data	1-2
Evaporator fan, MCS unit	4-955
Exhaust grilles, engine	4-339
Exhaust pipes	4-611
Expendable supplies and materials list	D-1
Extensions, apron and dozer	4-260
Exterior armor plates	4-40
External oil lines, power package	4-560
F	
Fan assembly, cooling system	4-634
Fan belt adjusting cable and tensioner	4-638
Fan belt tensioner:	
Adjustment	4-630
Replacement	4-632
Fan belt tensioner assembly	4-644
Fan belt tensioner pulley assembly	4-640
Deleted	
Fan, driver's ventilation	4-244.2
Fan, driver's ventilation motor blower	4-244.4
Fan filter and lower duct, driver's ventilation ...	4-246
Fan, MCS evaporator	4-955
Filler neck, fuel	4-232
Filter element, scavenger pump	4-659
Filter housing, MCS NBC	4-899
Filter, hydraulic high-pressure	4-475
Filter, hydraulic return line	4-478
Filter, MCS main air inlet and plenum	4-909
Filter, scavenger pump	4-661
Final drive lines, fittings, and breathers	4-746
Final drives disconnect and connect	4-749
Final drives drain and fill	4-744.2
Fittings, air	4-14
Fittings, power package external oil lines and	4-560
Fittings, final drives	4-746
Fittings, fixed fire extinguisher	4-201
Fittings, heater assembly	4-242.2
Fittings, start-aid	4-620
Fittings, steer unit	4-725
Fittings, transfer case	4-656
Fittings, transmission shift control	4-672

INDEX - Continued

	Page		Page
F - Continued		G	
Fixed dry powder fire extinguisher control valve and cable replacement (NEW PRODUCTION)	4-210.1	Gauge and panel assembly	4-114
Fixed dry powder fire extinguisher cylinders and clamps replacement (NEW PRODUCTION)	4-212.1	Gauge, main hydraulic accumulator	4-472
Fixed dry powder fire extinguisher hoses and fittings replacement (NEW PRODUCTION)	4-205.1	Gauges, electrical system	4-114
Fixed halon fire extinguisher canister and clamps (OLD PRODUCTION)	4-211	Gasket, rocker arm cover	4-602
Fixed halon fire extinguisher control valve and cable (OLD PRODUCTION)	4-206	Gear, belt, MCS unit	4-905
Fixed halon fire extinguisher tubes, hose, and fittings (OLD PRODUCTION)	4-201	Gear, transfer case input	4-664
Flange, transmission output shaft	4-701	General hull repair procedures	2-36
Flasher, UNSPRUNG/REVERSE warning light	4-129	General hydraulic system repair methods	2-29
Floodlight	4-173	General hydraulic system troubleshooting	3-77
Floor plate, driver's compartment	4-358	General information	1-1
Floor plates, rear	4-360	General quick-disconnect repair methods	2-34
Floor plates supports, rear	4-355	General repair and cleaning methods	2-25
Foam insulation, battery box	2-48	Goggle case stowage straps	4-840
Frame assembly, NBC	4-800	Governor, air compressor:	
Front bump stop assembly and cylinder	4-870	Adjustment	4-27
Front corner (left or right) does not raise in SPRUNG or UNSPRUNG mode	Vol. 3, 3-124	Replacement	4-30
Front corner (left or right) does not raise or lower in UNSPRUNG mode, semi-automatic track adjuster (NEW PRODUCTION)	Vol. 3, 3-238	Grab rails, rear	4-347
Front corner (left or right) raises in SPRUNG, but not UNSPRUNG mode	Vol. 3, 3-84	Grilles, engine intake and exhaust	4-339
Front corner (left or right) raises in UNSPRUNG, but not SPRUNG mode	Vol.3, 3-110		
Fuel drain hose	4-225	H	
Fuel filler neck and strainer	4-232	Hatch assembly, driver's	4-300
Fuel inlet hose	4-221	Hatch cover holddown latch	4-317
Fuel level transmitter	4-97	Hatch release, interior driver's	4-315
Fuel pressure transducer	4-156	Headlight beam selecting switch	4-88
Fuel return hose	4-218	Headlight incandescent lamp	4-168
Fuel shutdown valve	4-558	Headlight sealed beam	4-168
Fuel tank:		Heater, NBC air	4-798
Draining	4-216	Deleted	
Replacement	4-234	Heater assembly, hoses and fittings	4-242.2
Fuel tank armor	4-323	Heater assembly, MCS unit	4-951
Fuel tank-to-filter and drain hoses	4-225	Deleted	
Fuel/water separator assembly and element	4-228	Heater blower motor housing, resistor, and fittings replacement	4-244
		Deleted	
		Heater, motor blower assembly	4-242.4
		Deleted	
		Holddown latch, hatch cover	4-317
		Hook, pintle	4-371
		Hose, fixed fire extinguisher	4-201
		Hose, hydraulic	4-413
		Hose, hydraulic return	4-420
		Hose, transmission drain	4-577
		Hoses, air purifier	4-804

INDEX - Continued

Page	Page
H - Continued	
Hoses, cooling system	4-581
■ Hoses, heater	4-242.2
Hoses, suspension, hydraulic	4-416
Hoses, transmission shift control valve	4-672
Housing, MCS NBC filter	4-899
■ Hub, and drive sprocket	4-758.1
Hub, roadwheel	4-773
■ Hull access cover seal (OLD PRODUCTION) .	4-382
Hull access covers and plug	4-375
Hull blocking	2-27
Hull drain valve	4-388
Hull repair procedures, general	2-36
Hydraulic control levers and linkage:	
Adjustment	4-398
Replacement and repair (NEW PRODUCTION)	4-411.1
Replacement and repair (OLD PRODUCTION)	4-400
Hydraulic cylinder tubes, inner bowl	4-428
Hydraulic front manifolds and fittings	4-451
Hydraulic high-pressure filter and element	4-475
Hydraulic hose assembly	4-413
Hydraulic intermediate manifolds and fittings	4-453
Hydraulic oil overheats	Vol. 3, 3-132
Hydraulic oil temperature transmitter	4-142
Hydraulic pump, compensating:	
Adjustment	4-486
Replacement	4-490
Hydraulic pump, main:	
Efficiency test	3-87
Output flow rate test	3-86
Hydraulic return hoses	4-420
Hydraulic return line filter replacement:	
(NEW PRODUCTION)	4-483.1
(OLD PRODUCTION)	4-481
Hydraulic return line filter element replacement:	
(NEW PRODUCTION)	4-480.1
(OLD PRODUCTION)	4-478
Hydraulic shift control valve	4-685
Hydraulic suspension hoses	4-416
Hydraulic suspension tubes, fittings, and pressure relief valve	4-441
Hydraulic system repair methods, general	2-29
Hydraulic tank dipstick and strainer filter	4-484
Hydraulic tank drain and fill	4-412
Hydraulic tube assembly	4-425
Hydraulic tube assembly, main supply	4-436
Hydraulic tubes, apron cylinder inner bowl	4-432
I	
Illustrated list of manufactured items	E-1
Inclinometers	4-313
Indicator, engine oil level	4-579
Information, general	1-1
Inner bowl apron hydraulic cylinder tubes	4-432
Input gear, transfer case	4-664
Insulation, battery box foam	2-48
Intake assembly, MCS unit	4-907
Intake grilles, engine	4-339
Interface plate, MCS unit	4-917
Interior driver's hatch release adjustment	4-315
Intermediate manifold, hydraulic	4-453
Introduction	1-1
L	
Lamp, stoplight/taillight	4-171
Latch adjustment	4-345
Latch, hatch cover holddown	4-317
Left or right track adjuster will not extend after suspension control levers are returned to neutral (NEW PRODUCTION)	Vol. 3, 3-244
Left pump line relief valve	4-520
Left rear corner does not raise in SPRUNG or UNSPRUNG mode	Vol. 3, 3-172
Left suspension raise relief valve	4-514
Lever, CB/GS steer selector	4-716
Lever, parking brake:	
Adjustment	4-46
Replacement	4-49
Lever, shift and linkage, t ransmission shift	4-689
Lever, transmission shift	4-689
Lever, winch shift control	4-894.13
Levers, hydraulic control:	
Adjustment	4-398
Replacement and repair	4-400
Lift eye shackle, rear	4-367
Light, convoy warning	4-942
Lines, air	4-14
Lines, final drive	4-746
Lines, steer unit	4-725

INDEX - Continued

	Page
L - Continued	
Lines, transfer case	4-656
Link, torque, steer unit	4-732
Linkage, accelerator and throttle:	
Adjustment	4-3
Replacement and repair	4-6
Linkage, brake	4-54
Linkage, hydraulic control:	
Adjustment	4-398
Replacement and repair	4-400
Linkage, shift lever, transmission	4-689
Linkage, steering wheel:	
Adjustment	4-703
Replacement	4-706
Linkage, transmission shift	4-689
Liquid container brackets	4-43
Location and description of major components	1-3
Locking and disabling ejector	Vol. 3, 3-13
Low air pressure warning switch	4-144
Low transmission oil pressure warning transmitter	4-148
Deleted	

M

Main hydraulic accumulator charging	4-466
Main hydraulic accumulator and bracket replacement	4-470
Main hydraulic accumulator charge and gauge assembly	4-472
Main supply hydraulic tube assembly	4-436
Maintenance allocation chart	B-1
Maintenance forms, records, and reports	1-1
Manifold drain valves	4-461
Manifold, oil analysis sampling	4-575
Manifolds, hydraulic front	4-451
Manifolds, hydraulic intermediate	4-453
Master relay	4-73
MCS air hoses replacement	4-932
MCS armor enclosure and harness shield	4-912
MCS compressor motor replacement	4-939
MCS condenser fan replacement	4-903
MCS control box replacement and repair	4-934
MCS delta pressure switch	4-948
MCS dump valve	4-953
MCS electrical housing replacement	4-919
MCS EMI filter box replacement and repair	4-922

	Page
M - Continued	
MCS EMI filter box wiring harness and circuit breaker replacement	4-926
MCS evaporator fan	4-955
MCS gear belt replacement	4-905
MCS heater assembly	4-951
MCS intake assembly replacement	4-907
MCS interface plate replacement	4-917
MCS main air inlet and plenum	4-909
MCS main wiring harness	4-941
MCS NBC filter housing	4-899
MCS NBC filter replacement	4-897
MCS NBC filter switch replacement	4-930
MCS protective shield	4-918.1
MCS refrigerant line shield replacement	4-901
MCS secondary wiring harness	4-946
MCS unit replacement	4-915
Metric conversion table	Back Cover
Motor, MCS compressor	4-939
Motor, starter	4-549
Deleted	
Motor, winch	4-894.15
Muffler	4-608
Muffler shields	4-606

N

NBC air heater	4-798
NBC filter housing, MCS unit	4-899
NBC filter, MCS unit	4-897
NBC filter switch, MCS unit	4-930
Neutral start switch	4-693
No. 1 outer roadwheel	4-766
No. 1 roadwheel	4-759
No. 2, 3, and 4 roadwheels	4-770
Nozzle, start aid	4-618

O

Oil analysis sampling manifold	4-575
Oil cooler bypass tube, engine	4-571
Oil cooler, transmission	4-586
Oil filler neck, steer unit	4-736
Oil filter, engine	4-626
Oil filter element, engine	4-624
Oil filter element, transmission	4-695
Oil filter, transmission	4-697
Oil level gauge rod and oil filler neck,	

INDEX - Continued

Page	Page
O - Continued	
steer unit	4-736
Oil level indicator, engine	4-579
Oil lines, external, power package	4-560
Oil lines, transmission	4-565
Oil temperature transmitter, transmission	4-146
Operation, principles of	1-11
Outer roadwheel, No. 1	4-766
Output shaft flange, transmission	4-701
P	
Pad, track	4-788
Painting and restenciling markings	2-22
Panel assembly, gauge and	4-114
Panel, driver's instrument	4-105
Parking brake lever and cable:	
Adjustment	4-46
Replacement	4-49
Parking brake relay	4-131
Parking brake warning switch	4-133
Pintle hook	4-371
Pipes, exhaust	4-611
Plates, data	4-393
Plates, ejector wear	4-280
Plates, protective	4-379
Plates, rear floor	4-360
Portable fire extinguisher bracket	
Dry Powder	4-312
Power harness, radio	4-812
Power package external oil lines	4-560
Preparation for storage or shipment	1-1
Preparation for transport	4-964
Pressure relief valve, hydraulic suspension	
tubes and fittings	4-441
Pressure switch, reverse alarm	4-140
Pressure switch, UNSPRUNG	4-138
Preventive maintenance checks	
and services (PMCS)	2-3
Principles of operation	1-11
Protective plates	4-379
Pulley assembly, fan belt tensioner	4-640
Pump assembly, bilge	4-390
Pump, hydraulic compensating:	
Adjustment	4-486
Replacement	4-490
P - Continued	
Testing	4-486
Pump, main hydraulic, efficiency test	3-87
Pump, scavenger	4-668
Purifier, air	4-802
Purifier, air electrical components	4-806
R	
Radiator	4-649
Radiator and engine compartment	
armor shroud	4-326
Radiator side seals	4-654
Radio equipment box	4-815
Radio power harness	4-812
Rear bump stop	4-384
Rear floor plates	4-360
Rear floor plates supports	4-355
Rear grab rails	4-347
Rear lift eye shackle	4-367
Rear of vehicle raises in SPRUNG, but	
not UNSPRUNG mode	Vol. 3, 3-178
Rear step	4-349
Receptacle, bilge pump "ON" lamp	4-124
Receptacle, slave	4-75
Receptacle, trailer	4-92
References	A-1
Refrigerant line shield, MCS unit	4-901
Regulator replacement	4-535
Relay, master	4-73
Relay, parking brake	4-131
Relay, starter	4-158
Relieving air pressure	2-27
Relieving hydraulic pressure	3-82
Relieving hydraulic system pressure	Vol. 3, 3-7
Repair and cleaning methods, general	2-25
Repair parts, special tools, TMDE, and	
support equipment	2-1
Repair procedures, general hull	2-36
Reporting equipment improvement	
recomendations	1-1
Reservoir, air	4-24
Resistor box, STE/ICE-R interface	4-69
Resistor, heater blower motor	4-244
Restenciling markings	2-22
Retainer, track	4-362

INDEX - Continued

	Page
R- Continued	
Reverse alarm pressure switch	4-140
Right pump line relief valve	4-517
Right rear corner raises in SPRUNG, but not UNSPRUNG mode..... Vol. 3, 3-190	
Right rear corner raises in SUNSPRUNG, but not SPRUNG mode..... Vol. 3, 3-194	
Right suspension raise relief valve	4-511
Ripper blade	4-957
Roadwheel, blocking	2-28
Roadwheel hub.....	4-773
Roadwheel, No. 1	4-759
Roadwheel, No. 1 outer	4-766
Roadwheel seal	4-853
Roadwheels, No. 2, 3, and 4.....	4-770
Rocker arm cover	4-602
Rocker arm gasket	4-602
Rods, support	4-554
Rollers, ejector.....	4-277

S

Safety, care, and handling	1-10
Scavenger pump.....	4-668
Scavenger pump filter assembly	4-661
Scavenger pump filter element.....	4-659
Schematic diagrams	Vol. 3, E-1
Schematic diagrams	G-1
Scraper cutting edges.....	4-283
Seal, hull access cover (OLD PRODUCTION)	4-382
Seal, roadwheel.....	4-853
Seat assembly	4-822
Seatbelts	4-820
Secondary wiring harness, MCS unit.....	4-946
Semi-automatic track adjuster control wiring harness replacement (NEW PRODUCTION)	4-199.6
Semi-automatic track adjuster hydraulic control switches adjustment (NEW PRODUCTION)	4-399.1
Semi-automatic track adjuster main wiring harness replacement (NEW PRODUCTION)	4-199.3
Semi-automatic track adjuster SPRUNG/ UNSPRUNG tap wiring harness Replacement (NEW PRODUCTION)	4-199.9
Semi-automatic track adjuster suspension control electrical box replacement	

	Page
S - Continued	
(NEW PRODUCTION)	4-199.1
Sender and adapter, speedometer.....	4-154
Sender and adapter, tachometer.....	4-95
Service brake valve	4-34
Service upon receipt.....	2-2
Services and scheduled maintenance	2-1
Shackles and brackets	4-369
Shield, debris	4-298
Shield, MCS, protective	4-918.1
Shields, Muffler	4-606
Deleted	
Shift control lever, winch	4-894.13
Shift lever, transmission	4-689
Shoe, track.....	4-788
Shroud, fan assembly	4-634
Shunt, STE/ICE-R.....	4-71
Shutdown valve, fuel	4-558
Side seals, radiator.....	4-654
Slave receptacle	4-75
Smoke grenade arming-firing unit	4-162
Smoke grenade dischargers	4-160
Smoke grenade stowage boxes	4-842
Special tools and equipment	C-1
Special tools, hydraulic troubleshooting parts kit..... Vol. 3, C-1	
Special tools, TMDE, and support equipment	Vol. 3, B-1
Special tools, TMDE, and support equipment	2-1
Speedometer sender and adapter.....	4-154
Deleted	
Sprocket, drive, and hub	4-758.1
SPRUNG/UNSPRUNG valve	4-529
Start-aid cartridge	4-618
Start-aid control switch	4-120
Start-aid nozzle and atomizer	4-618
Start-aid thermostat.....	4-622
Start-aid tubes and fittings	4-620
Start-aid valve.....	4-616
Start switch, neutral	4-693
Starter cable	4-67
Starter motor	4-549
Starter relay	4-158
STE/ICE-R interrace resistor box.....	4-69
STE/ICE-R shunt	4-71
STE/ICE-R troubleshooting	3-6

INDEX - Continued

Page	Page
S - Continued	
Steer selector lever and linkage CB/GS	4-716
Steer unit and winch lines, fittings, and breathers	4-725
Steer unit brake lever	4-738
Steer unit brake lever boot	4-740
Steer unit oil level gauge rod and oil filter neck	4-736
Steer unit torque link	4-732
Steering wheel and linkage:	
Adjustment	4-703
Replacement	4-706
Step, driver's compartment	4-353
Step, rear	4-349
Stoplight switch	4-99
Stoplight/taillight assembly	4-188
Stoplight/taillight lamp	4-171
Stowage box, ejector	4-275
Stowage straps, goggles case	4-840
Strainer filter, hydraulic tank	4-484
Strainer, fuel	4-232
■ Strip, apron	4-264
Support rods	4-554
Supports, rear floor plates	4-355
Suspension hose assembly, hydraulic	4-416
Suspension relief valve:	
Adjustment	4-445
Replacement	4-449
Switch, bilge pump "ON"	4-126
Switch, engine oil pressure	4-150
Switch, headlight beam selecting	4-88
Switch, low air pressure warning	4-144
Switch, MCS delta pressure	4-948
Switch, parking brake warning	4-133
Switch, reverse alarm pressure	4-140
Switch, start-aid control	4-120
Switch, stoplight	4-99
Switch, UNSPRUNG pressure	4-138
Symptom index, alphabetical	3-124
Symptom index, by system	3-126
T	
Tachometer sender and adapter	4-95
Tank dipstick and strainer filter element, hydraulic	4-484
Tank, fuel	4-234
T - Continued	
Tank, hydraulic, drain and fill	4-412.1
Tensioner, fan belt:	
Repair	4-644
Replacement	4-638
Tensioner replacement, alternator/water pump	4-596
Test equipment, using electrical	3-1
Thermostat, start aid	4-622
Tiedown brackets	4-351
Torque limits	F-1
Torque link, steer unit	4-732
Torque value guide for hydraulic fittings . Vol. 3, D-1	
Track	4-782
Track adjusting cylinder replacement (NEW PRODUCTION)	4-869.1
(OLD PRODUCTION)	4-865
Track blocking	2-28
Track (left or right) will not tighten or loosen, semi-automatic track adjuster (NEW PRODUCTION)	Vol. 3, 3-232
Track retainer	4-362
Track shoe and pad	4-788
Track wear plates	4-364
Track wear shields	4-364
Trailer brake coupling and valve	4-32
Trailer brake valve	4-37
Trailer receptacle	4-92
Transducer, fuel pressure switch	4-156
Transfer case input gear	4-664
Transfer case lines, fittings, and breather	4-656
Transmission drain hose	4-577
Transmission oil cooler	4-586
Transmission oil filter	4-697
Transmission oil filter element	4-695
Transmission oil lines	4-565
Transmission oil temperature transmitter	4-146
Transmission output shaft flange	4-701
Transmission shift accumulator:	
Charging	4-678
Replacement	4-683
Transmission shift control valve hoses and fittings	4-672
Transmission shift lever and linkage	4-689
Transmitter, engine oil pressure	4-150
Transmitter, engine water temperature	4-152
Transmitter, fuel level	4-97
Transmitter, hydraulic oil temperature	4-142

INDEX - Continued

Page

Page

T - Continued

Transport, preparation for	4-964
Troubleshooting	3-1
Troubleshooting charts	3-123
Troubleshooting, general	3-123
Troubleshooting with STE/ICE-R	3-6
Tube assembly, hydraulic	4-425
Tube, engine oil cooler bypass	4-571
Tubes, fixed fire extinguisher	4-201
Tubes, hydraulic suspension	4-441

U

UNSPRUNG pressure switch (NEW PRODUCTION)	4-139.1
UNSPRUNG pressure switch (OLD PRODUCTION)	4-138
UNSPRUNG/REVERSE warning light flasher	4-129

V

Valve, apron lower relief	4-526
Valve, apron raise relief	4-523
Valve bank, directional control	4-497
Valve, bilge pump relief	4-502
Valve, ejector relief	4-505
Valve, fuel shutdown	4-558
Valve, left pump relief	4-520
Valve, left suspension raise relief	4-514
Valve, MCS dump	4-953
Valve, right pump line relief	4-517
Valve, right suspension raise relief	4-511
Valve, service brake	4-34
Valve, SPRUNG/UNSPRUNG	4-529
Valve, start-aid	4-616
Valve, suspension relief:	
Adjustment	4-445
Replacement	4-449
Valve, trailer brake	4-37
Valve, trailer brake coupling and	4-32
Valve, transmission shift control	4-685
Valve, winch relief	4-508
Vehicle does not respond to driver controls	Vol. 3, 3-200

V - Continued


Ventilation fan, driver's	4-244.2
Ventilation fan, driver's motor blower	4-244.4
Deleted	
Ventilation fan, wiring harness	4-101

W

Warning buzzer	4-136
Warning light kit, convoy	4-961
Warning switch, low air pressure	4-144
Warning switch, parking brake	4-133
Water pump/alternator belt replacement	4-596
Water pump replacement	4-598
Wear plates, apron	4-262
Wear plates, ejector	4-280
Winch and right-hand wheel control inoperative	Vol. 3, 3-210
Deleted	
Winch assembly replacement	4-894.2
Winch cover kit	4-962
Deleted	
Winch motor replacement	4-894.15
Winch relief valve	4-508
Deleted	
Winch shift control assembly Replacement and repair	4-894.13
Deleted	
Winch shift control cable replacement	4-894.10
Deleted	
Winch shift control lever adjustment	4-894.8
Winch will not pull rated load	Vol. 3, 3-216
Deleted	
Wire rope assembly Replacement and repair	4-894.17
Wiring harness and cable repair	3-1
Wiring harness, arming-firing unit	4-166
Wiring harness, discharger	4-164
Wiring harness, high ventilation fan	4-103
Wiring harness, low ventilation fan	4-101
Wiring harness, MCS main	4-941
Wiring harness, MCS secondary	4-946

By Order of the Secretary of the Army:

Official:


JOEL B. HUDSON
*Administrative Assistant to the
Secretary of the Army*
03033

DENNIS J. REIMER
*General, United States Army
Chief of Staff*

DISTRIBUTION:

To be distributed in accordance with the initial distribution number (IDN) 371272, requirements for TM 5-2350-262-20-3.



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

SOMETHING WRONG

WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

Your Mailing Address

DATE SENT

Date you filled out this form

PUBLICATION NUMBER

TM 5-2350-262-20-3.

PUBLICATION DATE

Date of TM

PUBLICATION TITLE

M9 Unit Maintenance Manual

BE EXACT. . . PIN-POINT WHERE IT IS

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

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
----------	------------	------------	-----------

3-193

2

3-227

Step No. 1 says to connect LH 4 SPNSN Unit-8 hose from where to what? It is also not identified.

Procedure is continued from another page, but cap is not removed - add step to procedure.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBERS

Doe, John, CPL

755-1313

SIGN HERE:

CPL John Doe

SAMPLE

FILL IN YOUR
UNIT'S ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY

CPL John Doe

APO NY

PLACE
POSTAGE
HERE

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-AC-NML
Rock Island, IL 61299-7630



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

SOMETHING WRONG

WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER TM 5-2350-262-20-3.	PUBLICATION DATE 3 JAN 97	PUBLICATION TITLE M9 Unit Maintenance Manual
---	------------------------------	---

BE EXACT. . . PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBERS	SIGN HERE:
---	------------

FILL IN YOUR
UNIT'S ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY

PLACE
POSTAGE
HERE

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-AC-NML
Rock Island, IL 61299-7630



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

SOMETHING WRONG

WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER

TM 5-2350-262-20-3.

PUBLICATION DATE

3 JAN 97

PUBLICATION TITLE

M9 Unit Maintenance Manual

BE EXACT. . . PIN-POINT WHERE IT IS

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

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBERS

SIGN HERE:

FILL IN YOUR
UNIT'S ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY

PLACE
POSTAGE
HERE

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-AC-NML
Rock Island, IL 61299-7630



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

SOMETHING WRONG

WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER TM 5-2350-262-20-3.	PUBLICATION DATE 3 JAN 97	PUBLICATION TITLE M9 Unit Maintenance Manual
--	-------------------------------------	--

BE EXACT. . . PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBERS	SIGN HERE:
---	------------

FILL IN YOUR
UNIT'S ADDRESS



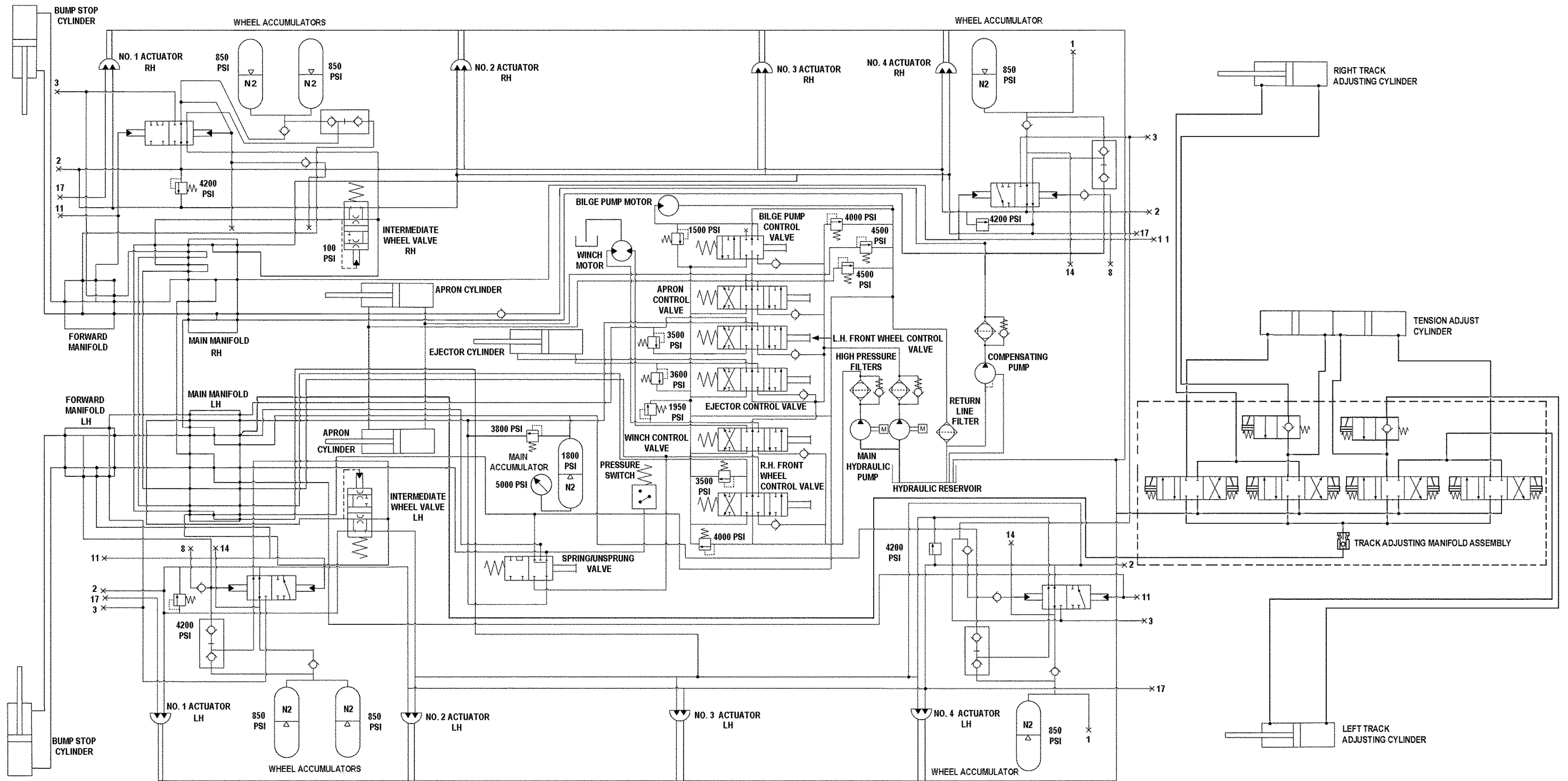
FOLD BACK

DEPARTMENT OF THE ARMY

PLACE
POSTAGE
HERE

TEAR ALONG PERFORATED LINE

Commander
U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-AC-NML
Rock Island, IL 61299-7630



HYDRAULIC SCHEMATIC

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
 1 Kilometer = 1,000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
 1 Kilogram = 1,000 Grams = 2.2 Lb
 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1,000 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 = 1,000 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° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 ^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton•Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609
TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton•Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621

