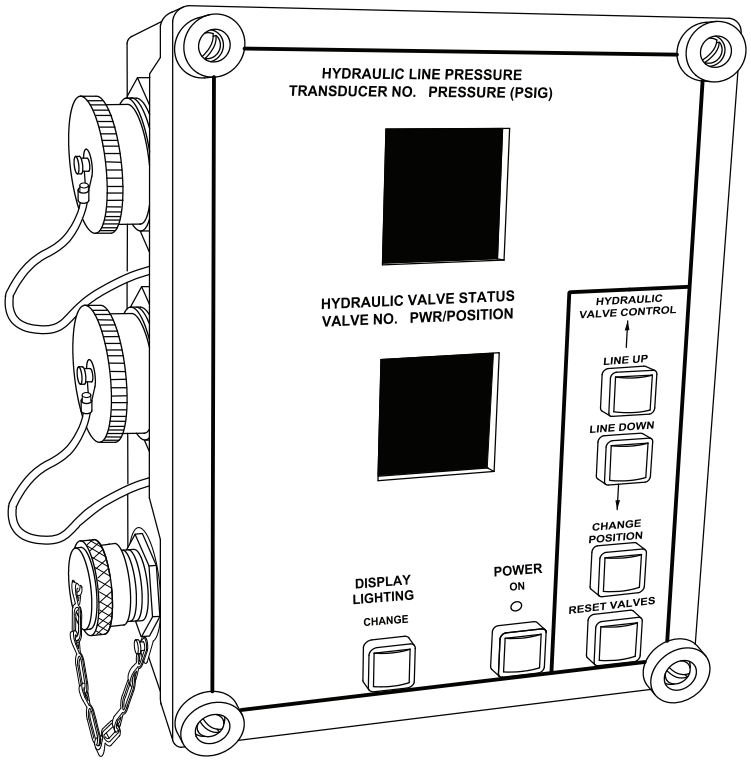
TM 5-2350-378-24&P

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

FOR



HYDRAULIC DIAGNOSTIC CENTER (HDC) SUPPORTING ARMORED COMBAT EARTHMOVER (ACE), M9 (2350-00-808-7100)

HEADQUARTERS DEPARTMENT OF THE ARMY

DECEMBER 2008

WARNING SUMMARY

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.

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. If injured, seek medical attention immediately.

WARNING SUMMARY (cont)

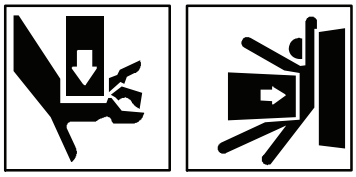
High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

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

When folding dozer blade, work on blade latches from side of vehicle only. Do not stand in front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. 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 to personnel.

WARNING SUMMARY (cont)

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.

Ensure right main hydraulic pressure inhibit valve V22 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.

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

WARNING SUMMARY (cont)

CAUTION

Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.

CAUTION

When securing aft manifold in vice, exercise extreme care not to mar any surfaces or damage components

CAUTION

Do not over torque.

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

Note: Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is: 26 December 2008

Original

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 26 AND TOTAL NUMBER OF WORK PACKAGES IS 68, CONSISTING OF THE FOLLOWING:

Page/WP No.	Change No.	Page/WP No.	Change No.
Title	0	WP00030 00 (6 pages)	0
Warning	0	WP00031 00 (6 pages)	0
i–vi	0	WP00032 00 (6 pages)	0
Chp 1 title page	0	WP00033 00 (6 pages)	0
WP0001 00 (2 pages)	0	WP00034 00 (8 pages)	0
WP0002 00 (2 pages)	0	WP00035 00 (6 pages)	0
WP0003 00 (2 pages)	0	WP00036 00 (6 pages)	0
Chp 2 title page	0	WP00037 00 (2 pages)	0
WP0004 00 (34 pages)	0	WP00038 00 (4 pages)	0
WP0005 00 (12 pages)	0	WP00039 00 (4 pages)	0
WP0006 00 (2 pages)	0	Chp 4 title page	0
WP0007 00 (28 pages)	0	WP00040 00 (10 pages)	0
WP0008 00 (12 pages)	0	WP00041 00 (4 pages)	0
WP0009 00 (20 pages)	0	WP00042 00 (4 pages)	0
WP00010 00 (18 pages)	0	WP00043 00 (4 pages)	0
WP00011 00 (16 pages)	0	WP00044 00 (4 pages)	0
WP00012 00 (38 pages)	0	WP00045 00 (4 pages)	0
WP00013 00 (46 pages)	0	WP00046 00 (4 pages)	0
WP00014 00 (22 pages)	0	WP00047 00 (4 pages)	0
WP00015 00 (10 pages)	0	WP00048 00 (4 pages)	0
WP00016 00 (98 pages)	0	WP00049 00 (4 pages)	0
WP00017 00 (12 pages)	0	WP00050 00 (4 pages)	0
WP00018 00 (20 pages)	0	WP00051 00 (4 pages)	0
WP00019 00 (14 pages)	0	WP00052 00 (4 pages)	0
WP00020 00 (12 pages)	0	WP00053 00 (4 pages)	0
WP00021 00 (22 pages)	0	WP00054 00 (4 pages)	0
WP00022 00 (46 pages)	0	WP00055 00 (4 pages)	0
Chp 3 title page	0	WP00056 00 (4 pages)	0
WP00023 00 (2 pages)	0	WP00057 00 (4 pages)	0
WP00024 00 (4 pages)	0	WP00058 00 (4 pages)	0
WP00025 00 (2 pages)	0	WP00059 00 (4 pages)	0
WP00026 00 (4 pages)	0	WP00060 00 (4 pages)	0
WP00027 00 (6 pages)	0	WP00061 00 (4 pages)	0
WP00028 00 (4 pages)	0	WP00062 00 (4 pages)	0
WP00029 00 (6 pages)	0	WP00063 00 (4 pages)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP00064 00 (4 pages)	0	WP00069 00 (2 pages)	0
WP00065 00 (4 pages)	0	WP00070 00 (2 pages)	0
WP00066 00 (4 pages)	0	WP00071 00 (2 pages)	0
Chp 5 title page	0	WP00072 00 (2 pages)	0
WP00067 00 (2 pages)	0	INDEX-1 - INDEX-2	0
WP00068 00 (4 pages)	0	Foldout Pages (26 pages)	0

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 26 December 2008

TECHNICAL MANUAL
UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR
HYDRAULIC DIAGNOSTIC CENTER (HDC)
SUPPORTING
ARMORED COMBAT EARTHMOVER (ACE), M9

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is https://aeps.ria.army.mil. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this 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, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LMPP/TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

TABLE OF CONTENTS

TABLE OF CONTENTS - CONTINUED

TABLE OF CONTENTS - CONTINUED

HOW TO USE THIS MANUAL

This manual describes hydraulic troubleshooting test procedures and tells you how to perform unit maintenance for the M9, Armored Combat Earthmover (ACE) HDC System.

Before starting a task or procedure, make sure you have read this HOW TO USE section and the General Maintenance Procedures Work Package.

WHAT'S IN THE MANUAL

This TM is divided into chapters and front and rear matter. The chapters are further divided into Work Packages (WPs) for ease of use.

The WARNING SUMMARY section provides safety and first aid information. This section includes general warnings not found in the TM text and a list of the most important detail warning extracted from the WPs. All of these warnings cover hazards that could kill or injure personnel.

The TABLE OF CONTENTS lists the WPs in each chapter.

CHAPTER 1 covers General Information, Equipment Description and Data, and Theory of Operation. The Equipment Description WP gives a brief description of major parts and features of the HDC system. The Theory of Operation WP provides information that will help you understand how the components work.

CHAPTER 2 contains WPs on an introduction on how to use HDC system troubleshooting, troubleshooting with the HDC system installed, and WPs on locating faults and causes e of Hydraulic malfunctions.

CHAPTER 3 includes an introduction to Preventative Maintenance Checks and Services (PMCS), PMCS instructions and other maintenance WPs. These WPs contain the maintenance procedures authorized at the unit level.

CHAPTER 4 provides a Parts Information introduction, Repair Parts List, NSN Index and P/N Index WPs.

CHAPTER 5 covers supporting information for the TM. It includes the following WPs:

The References WP list references to be used by personnel in maintaining the HDC system. These references include technical manuals and other publications.

The MAINTENANCE ALLOCATION CHART (MAC) WP contains a listing for M9 ACE HDC system.

The EXPENDABLE AND DURABLE ITEMS WP lists expendable and durable supplies and materials used to maintain the M9 ACE HDC system.

The TOOL IDENTIFICATION LIST WP includes those tools used to maintain or repair the M9 ACE HDC system.

The MANDATORY REPLACEMENT PARTS WP is a listing of all items that must be replaced during repair or replacement of the M9 ACE HDC system.

REAR MATTER includes DA FORM 2028 used to report errors and to recommend improvements for procedures in this manual, the Authentication Page and Foldout pages.

USING YOUR MANUAL ON THE JOB

The best way to learn about this manual is to practice using it. Knowing how to use this manual will save both time and energy.

HOW TO USE THE WORK PACKAGES

How to read the WP

Pay attention to all WARNINGS, CAUTIONS, and NOTES. These can appear in all types of procedures. They help you avoid harm to yourself, other personnel, and equipment. They also tell you things you should know about the procedure.

Before you start a procedure, get all the tools, supplies, and personnel you need to do the procedure. These items will be listed in the INITIAL SETUP of the WP.

Start with Step 1 and do each step in the order given.

Look at the illustrations. Locators show you where the equipment and parts are located on the vehicle. Close-up illustrations show the details you need to do the procedure.

Maintenance Procedures WPs

Maintenance Procedures WPs keep the HDC system and related components in shape to operate. Each maintenance procedure details steps which you need to perform. If the HDC system and components need maintenance that is not included in any procedure in the manual, notify you supervisor.

The first sample below shows the THIS WORK PACKAGE COVERS and INITIAL SETUP sections on the first page of a WP. The legend defines each item of information.

	LEGEND
TITLE	The name of the procedure
TOOLS AND SPECIAL TOOLS	The tools and equipment needed to do the procedures in the WP.
MATERIALS/PARTS	The supplies and parts needed to do the procedures in the WP.
PERSONNEL REQUIRED	The personnel needed to do the procedures in the WP.
REFERENCES	Other WPs, TMs, and publications you will need to do the procedures in the WP.
EQUIPMENT CONDITION	Any special equipment conditions required before the procedure can be started.

Some WPs will include all of the above items. Other WPs will only include some of the above items.

Read the INITIAL SETUP section carefully before you start any procedure. Get the tools and supplies listed and the personnel needed. Be sure the equipment is in the condition required.

The second sample below shows you things to watch for when performing the procedures in the WP. Read all steps, warnings, cautions, and notes before starting the WP procedure. The legend defines each item of information.

	LEGEND
STEP	This tells you WHAT to do.
WARNING	This describes some danger to yourself and other personnel.
CAUTION	This describes possible damage to equipment.
NOTE	This gives you additional information which may not be obvious the first time you do the procedure.
LOCATOR	An illustration that locates the equipment on the vehicle.
CLOSEUP	A detailed illustration of the component.

Some WPs will include all of the above items. Some will not.

Read all of the WP before starting. Follow the steps in the order given.

FOLLOW-THROUGH STEPS tell you what to do after the maintenance task is done. The words END OF TASK will tell you when you have finished the procedure.

Troubleshooting WPs

Troubleshooting WPs help you located faulty equipment/parts. They direct you to the maintenance procedure to correct these faults. Chapter 2, Troubleshooting, contains detailed information on how to perform troubleshooting procedures. Read INTRODUCTION HOW TO USE HDC SYSTEM TROUBLESHOOTING WP (WP 0004 00) before performing the troubleshooting procedures in the chapter.

Preventative Maintenance Checks and Services (PMCS) WP

Preventative maintenance is required to keep the HDC system in good condition. The PMCS procedures for unit maintenance are performed on a periodic basis.

If anything seems wrong with the HDC system and you cannot fix it, notify unit maintenance. Common things to watch for are loose bolts, loose clamps and loose connectors.

DEFINITION OF WP TERMS

Warning, Cautions, and Notes

Pay attention to all warnings and cautions within the WP. Ignoring a warning could cause death or injury to yourself or other personnel. Ignoring a caution could cause damage to equipment. Notes contain facts to make the procedure easier. Warnings, cautions, and notes always appear just above the step to which they apply.

WARNINGs	Call attention to things that could kill or injure personnel. Warnings are also listed in the Warning Summary section.
CAUTIONs	Call attention to actions or materials that could damage equipment.
NOTEs	Contain important facts to make the procedure easier.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION

WORK PACKAGE INDEX

GENERAL INFORMATION 0001 00

SCOPE

Type of Manual: Direct Support and General Support
Model Number and Equipment Name:
M9 ACE HDC - Armored Combat Earthmover, Hydraulic Diagnostic Center.
Purpose of Equipment: Reduce maintenance time when vehicle's hydraulic system fails.

MAINTENANCE FORMS, RECORDS, AND REPORTS

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

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Hydraulic Diagnostic Center (HDC) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/MPA/267, Warren, MI 48397-5000. We'll send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS).

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

When the tactical situation requires that Army materiel be abandoned, refer to TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use.

PREPARATION FOR STORAGE OR SHIPMENT

When not in use, stow HDC control box in stowage fixture with front of control box facing towards the rear wall and electrical connectors at top. To secure HDC control box in stowed position, hand-tightened wing nuts against retainer bar on threaded rods.

LIST OF ABBREVIATIONS / ACRONYMS

The following abbreviations / acronyms are used in this manual.

Term	Definition
ACE	Armored Combat Earthmover
Aka	Also known as
HDC	Hydraulic Diagnostic Center
LCD	Liquid Crystal Display
BIT	Binary Digit
Psi	pounds per Square Inch
kPA	Kilo Pascal
CBT	Common Bridge Transporter
Rpm	Revolutions Per Minute
DCV	Directional Control Valve
Mph	miles per hour
km/h	Kilometers Per Hour
psi	Pounds per Square Inch
qts	quarts
L	liter
Lpm	liters per minute
FO	foldout
TM	Technical Manual
In	inch
Mm	Millimeter
SRA	Specialized Repair Activity
MAC	Maintenance allocation chart
SMR	Source, Maintenance, & Recoverability
CAGEC	Commercial and Government Entity Code
NSN	National Stock Number
RPSTL	Repair Parts & Special Tools List

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this technical manual. If quality of material requirements is not stated in the technical manual, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA 0002 00

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The HDC is used to aid in troubleshooting the M9 ACE's hydraulic system and components. The HDC consists of a control box with a display screen, twenty electrically controlled solenoid valves, three manually controlled valves, and thirteen transducers. Four wiring harnesses connect the HDC to the vehicle's hydraulic system's test points (installed prior to use of the HDC, and left in place on the vehicle) and the LED screen. Each of the twenty electronically-controlled valves (V1 through V20) return to their normal operating positions when the HDC control box is shut off or power is disconnected for any other reason. Valves V1 through V20 can be opened and closed by using the LINE UP and LINE DOWN buttons on the display screen to select a valve, then pressing the CHANGE POSITION button to open or close the valve. The control box software allows up to four of the solenoid valves to be powered ON at one time. Pressing the RESET VALVES button returns all valves to their normal vehicle operating position (power OFF).

VALVE NO.	PWR	/	POSITION
V1	OFF	/	OPEN
V2	OFF	/	OPEN
V3	OFF	/	OPEN
V4	OFF	/	OPEN
V5	OFF	/	OPEN
V6	OFF	/	OPEN
V7	OFF	/	OPEN
V8	OFF	/	OPEN
V9	OFF	/	OPEN
V10	OFF	/	OPEN
V11	OFF	/	OPEN
V12	OFF	/	OPEN
V13	OFF	/	OPEN
V14	OFF	/	OPEN
V15	OFF	/	OPEN
V16	OFF	/	OPEN
V17	OFF	/	OPEN
V18	OFF	/	CLOSED
V19	OFF	/	CLOSED
V20	OFF	/	CLOSED

Valves V21 and V22, located in the bowl area near the high pressure filters, are manually operated and can be operated from outside the bowl, while standing on top of the vehicle.

Valve V23, also manually operated, is located on the front of the directional control valve bank in the bowl area, and must be operated while standing in the bowl. This valve is used to interrupt the flow to the ejector. It is recommended for safety purposes that the engine be shut down when operating valve V23.

The diagnostic unit is stowed in the driver's compartment. It is removed and becomes mobile for use, and, upon completion of troubleshooting, is stored in the driver's compartment. Harness W4 is also stowed in the driver's compartment.

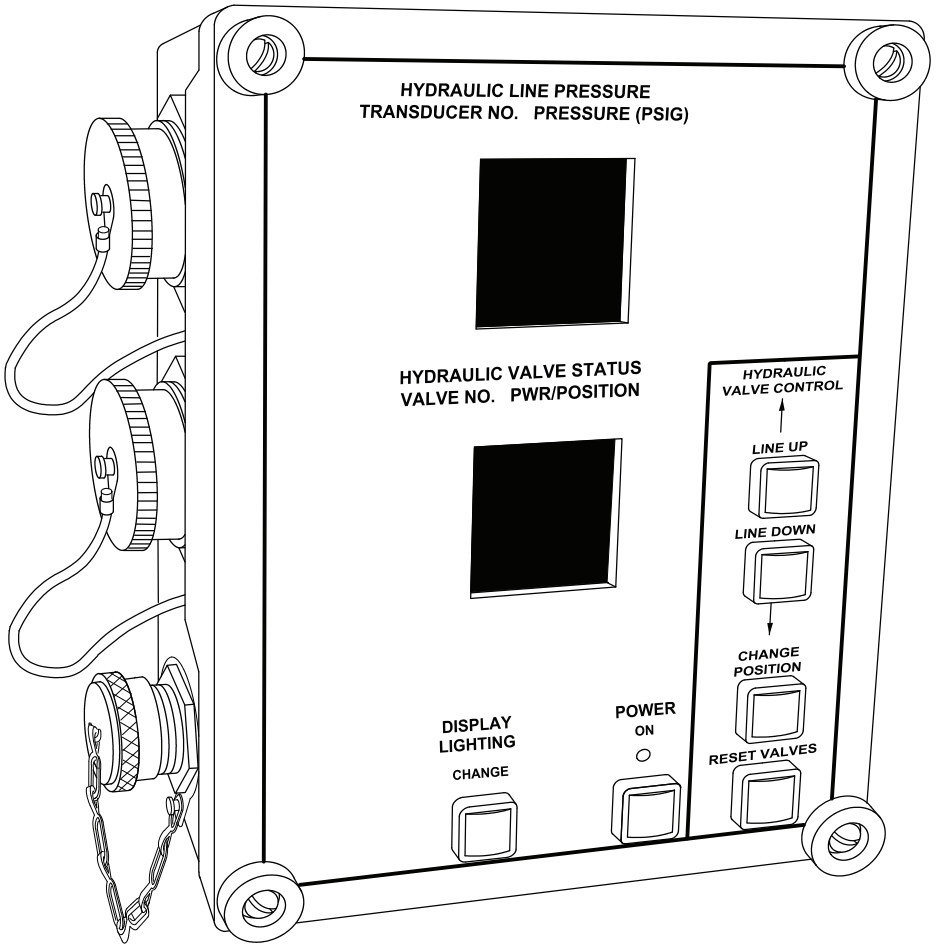


Figure 1. HDC Control Box

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

The major component of the HDC is a centrally located, permanently installed Control Box, connected to distributed sensors and hydraulic controls mounted throughout the vehicle that is used to diagnose the hydraulic system for malfunctions, routine and breakdown maintenance.

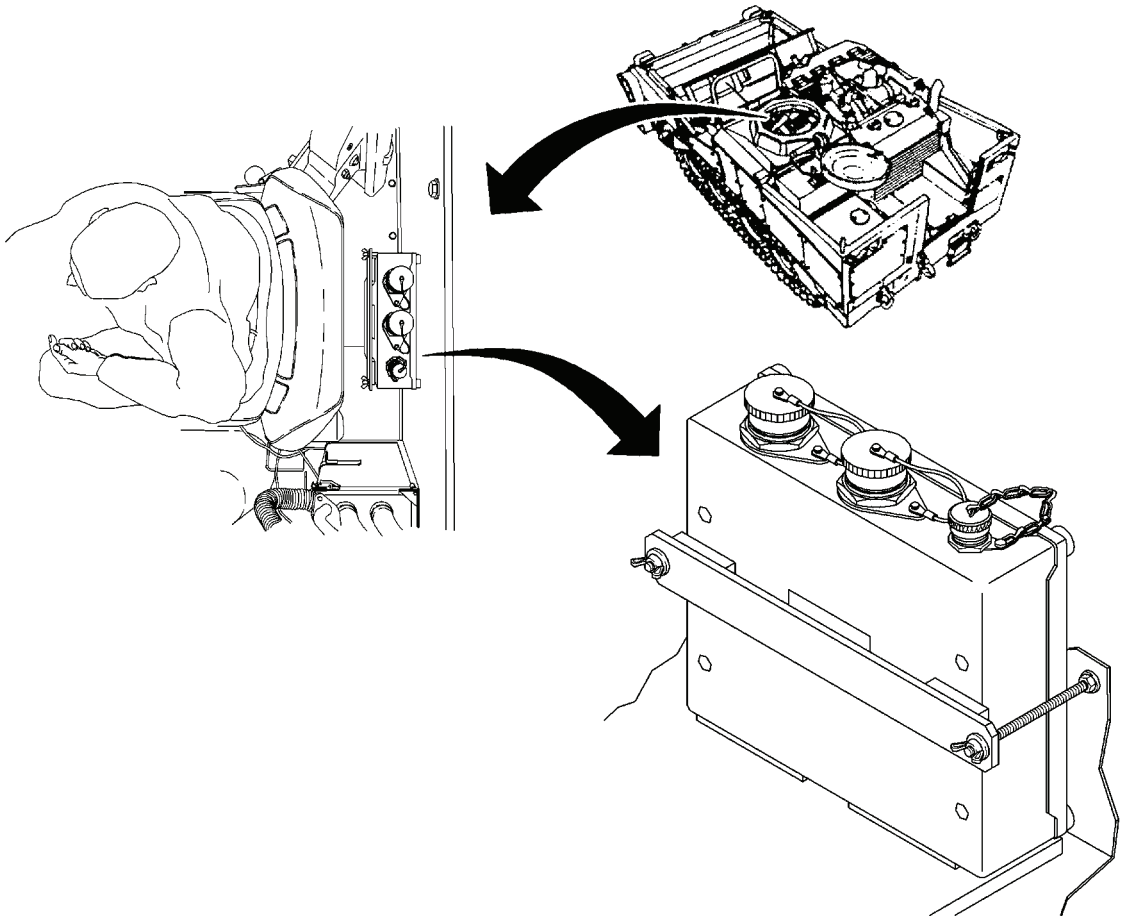


Figure 2. HDC Control Box Locator

EQUIPMENT DATA

Hydraulic Diagnostic Center

Size

Length - 11”

Width - 10”

Depth - 2.75”

Weight

15 pounds

SCOPE

This section contains information that is useful when performing Hydraulic Diagnostic Center (HDC) troubleshooting tasks on the M9 ACE. The following information is provided in this section:

Equipment Characteristics, Capabilities, and Features
Safety, Care, and Handling

PURPOSE

The Hydraulic Diagnostic Center (HDC) is used for troubleshooting the hydraulic system and components.

CAPABILITIES AND FEATURES

- Highly mobile
- Efficient and accurate
- User Friendly
- Time saving

PURPOSE

The Hydraulic Diagnostic Center (HDC) is a diagnostic tool used to troubleshoot the hydraulic system of the M9 ACE vehicle.

SAFETY, CARE, AND HANDLING

Warnings are listed in the warning summary in front of the manual, at the beginning of each task in the initial setup, and before specific steps where they apply in the maintenance tasks. In addition to these warnings, always keep in mind the following when working on the M9 ACE and HDC:

The hydraulic system operates at pressures up to 4,500 psi (31,028 kPa).

Ensure the upper apron lockpins are installed any time personnel are working on the apron or dozer blade and any time 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 the engine has been shut off.

Always remove all jewelry such as rings, dog tags, bracelets, watches, etc., and ensure batteries are disconnected at the negative terminals before working on the electrical system.

END OF WORK PACKAGE

THEORY OF OPERATION 0003 00

SCOPE

This section contains information relative to the principles of operation for the Hydraulic Diagnostic Center (HDC). The general functional description of the HDC is contained in this section. Unit maintenance personnel should be familiar with the principals of operation of this system before working on or troubleshooting the hydraulic system. A more thorough understanding of the hydraulic system and electrical system/HDC integration may be obtained by referring to the interconnecting wiring diagram (FP-17) and the HDC hydraulic schematic (FP-6).

Components:

HYDRAULIC DIAGNOSTIC CENTER

This component analyzes and diagnoses problems within the ACE vehicle's hydraulic system. Connected to valves and transducers on manifolds and at components by wiring harness W4, it sends messages to the LED screen concerning problems it encounters within the hydraulic system. The HDC is stowed in the driver's compartment.

LCD SCREEN

This screen is used to input commands to the unit itself, and displays alerts and diagnoses as they become available.

SOLENOID VALVES

The HDC uses twenty electronically-controlled solenoids, as well as three manual valves.

TRANSDUCERS

Thirteen transducers are installed into the hydraulic lines at critical points and remain there. Connected to the HDC system, they aid in diagnosing any problems the M9 ACE may be having with the hydraulic system.

WIRING HARNESSES

Four wiring harnesses connect the components of the HDS system to the vehicle's hydraulic system. When not in use, harness W4 is stowed in the driver's compartment.

END OF WORK PACKAGE

CHAPTER 2

TROUBLESHOOTING

WORK PACKAGE INDEX

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM

0004 00

SCOPE

This work package contains introductory, but essential, information necessary to troubleshoot and repair the M9 ACE vehicle hydraulic system that incorporates the Hydraulic Diagnostic Center (HDC) System modification. It includes locating and describing major components of the hydraulic system, a description of the M9 hydraulic system principles of operation, general hydraulic system repair methods, and general hydraulic system troubleshooting procedures.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

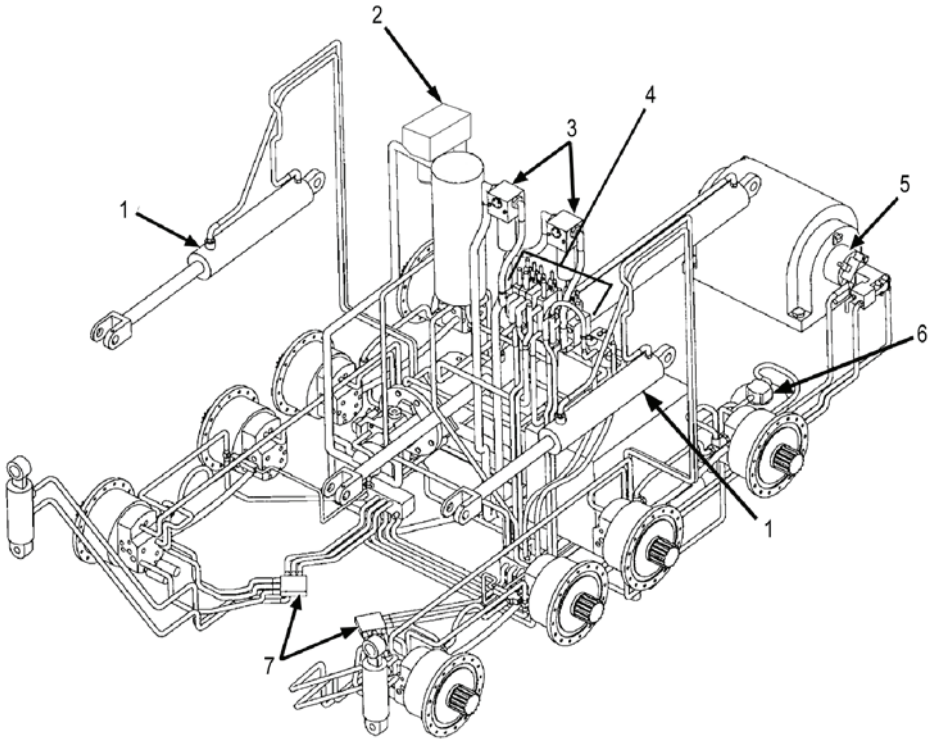


Figure 3. M9 ACE Hydraulic System Major Components

(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 (DCV) BANK. 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.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

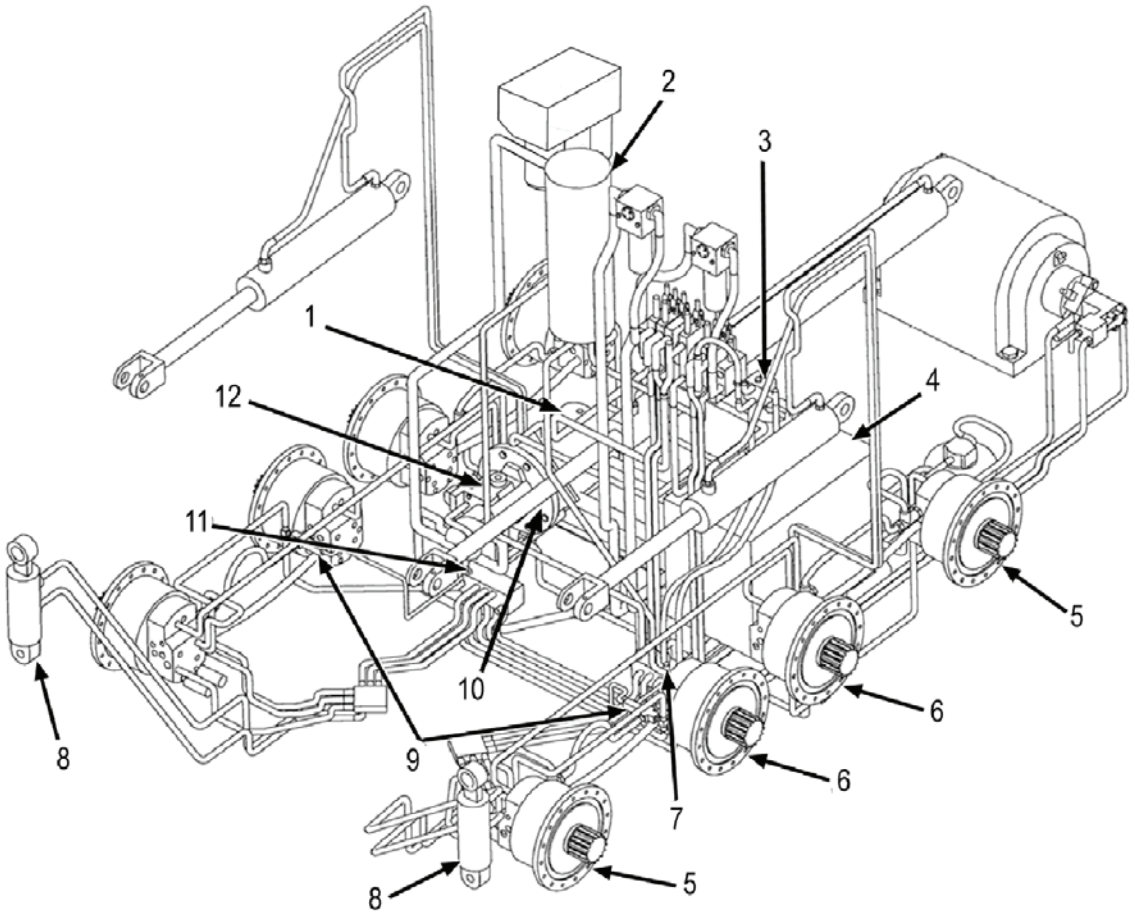


Figure 4. M9 ACE Hydraulic System Major Components

(1) MAIN HYDRAULIC PUMP. Fixed displacement pump that pulls hydraulic oil from the reservoir to perform whatever function is necessary

(2) MAIN ACCUMULATOR. Helps keep pressure constant in hydropneumatic suspension system.

(3) SPRUNG/UNSPRUNG VALVE. Regulates pressurized fluid flow for whichever mode is selected.

(4) HYDRAULIC RESERVOIR. Supplies hydraulic oil through main pump, high-pressure filters, and directional control valve to activate hydraulic functions of vehicle.

(5) 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.

(6) 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.

(7) SUSPENSION RELIEF VALVE. Relieves pressure surges or gradual increases in pressure to suspension.

(8) BUMP STOP CYLINDERS. Limit upward travel of roadwheel arms when in SPRUNG position (one on each side).

(9) INTERMEDIATE WHEEL VALVE. Prevents No. 2 and 3 actuators from raising when lowering front of vehicle.

(10) EJECTOR CYLINDER. Moves ejector forward and back with hydraulic pressure.

(11) CHECK VALVE. A device to control the direction of fluid flow.

(12) COMPENSATING PUMP. Provides pressure to vehicle for SPRUNG/UNSPRUNG hydraulic operation.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

SAFETY, CARE, AND HANDLING

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

- 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.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

HYDRAULIC SYSTEM PRINCIPLES OF OPERATION

This portion of the work package contains information relative to the principles of hydraulic system operation for the M9, 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 this manual.

HYDRAULIC SYSTEM

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 behind the bowl area, 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.

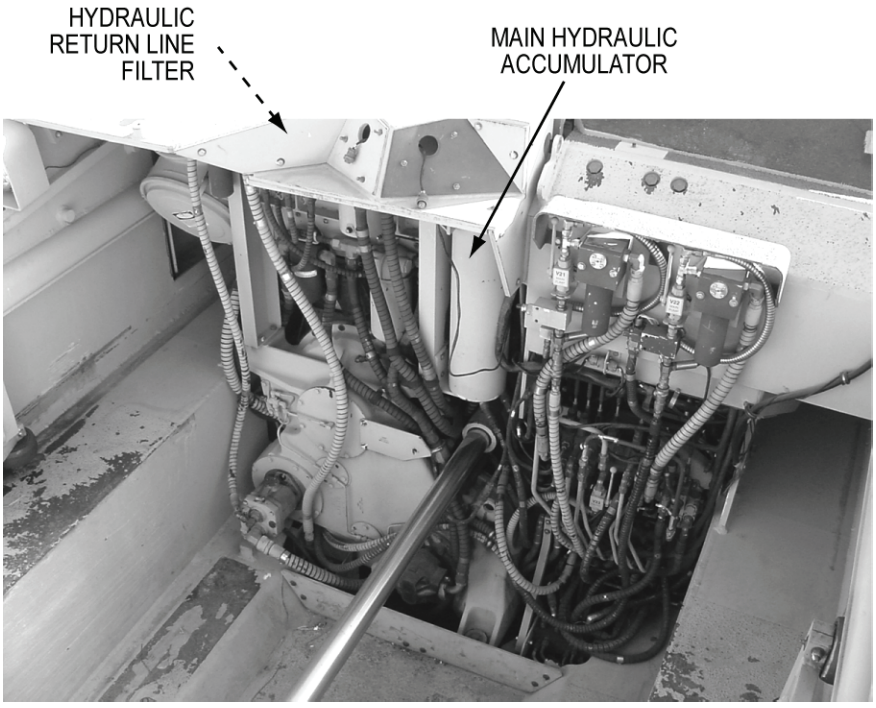


Figure 5. Main Hydraulic Accumulator

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

HYDRAULIC SYSTEM - CONTINUED

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.

Direction Control Valve (DCV) 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.

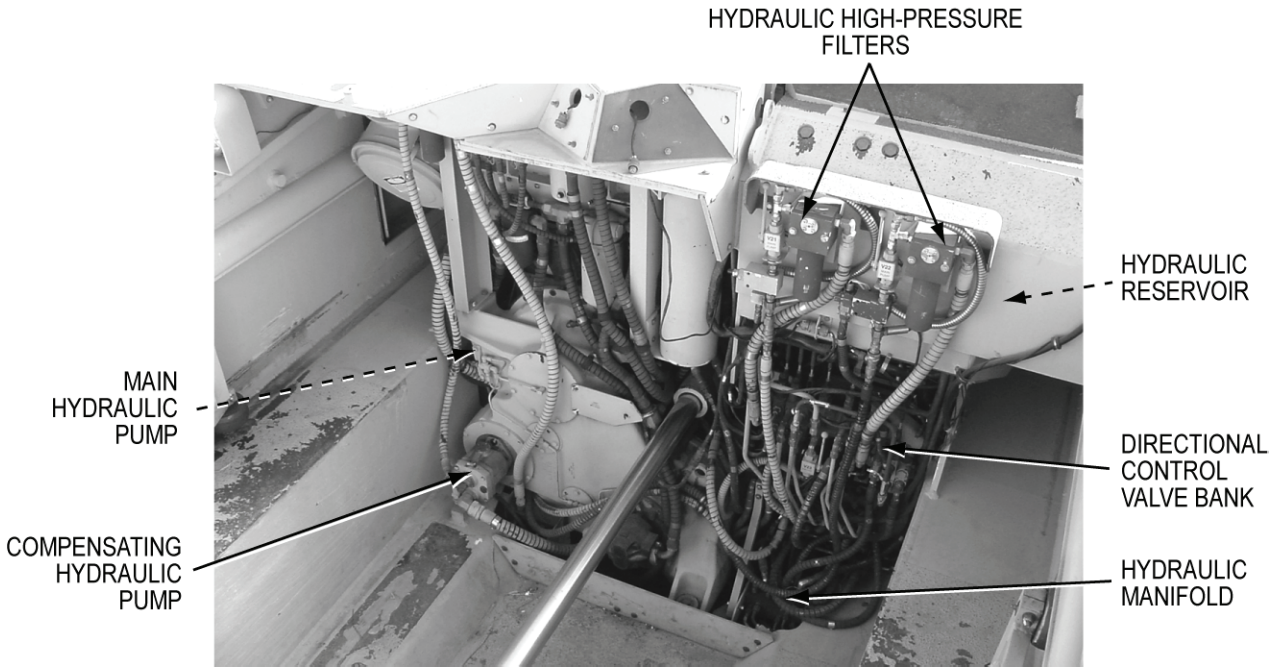


Figure 6. Bowl Area Major Components

HYDRAULIC SYSTEM - CONTINUED

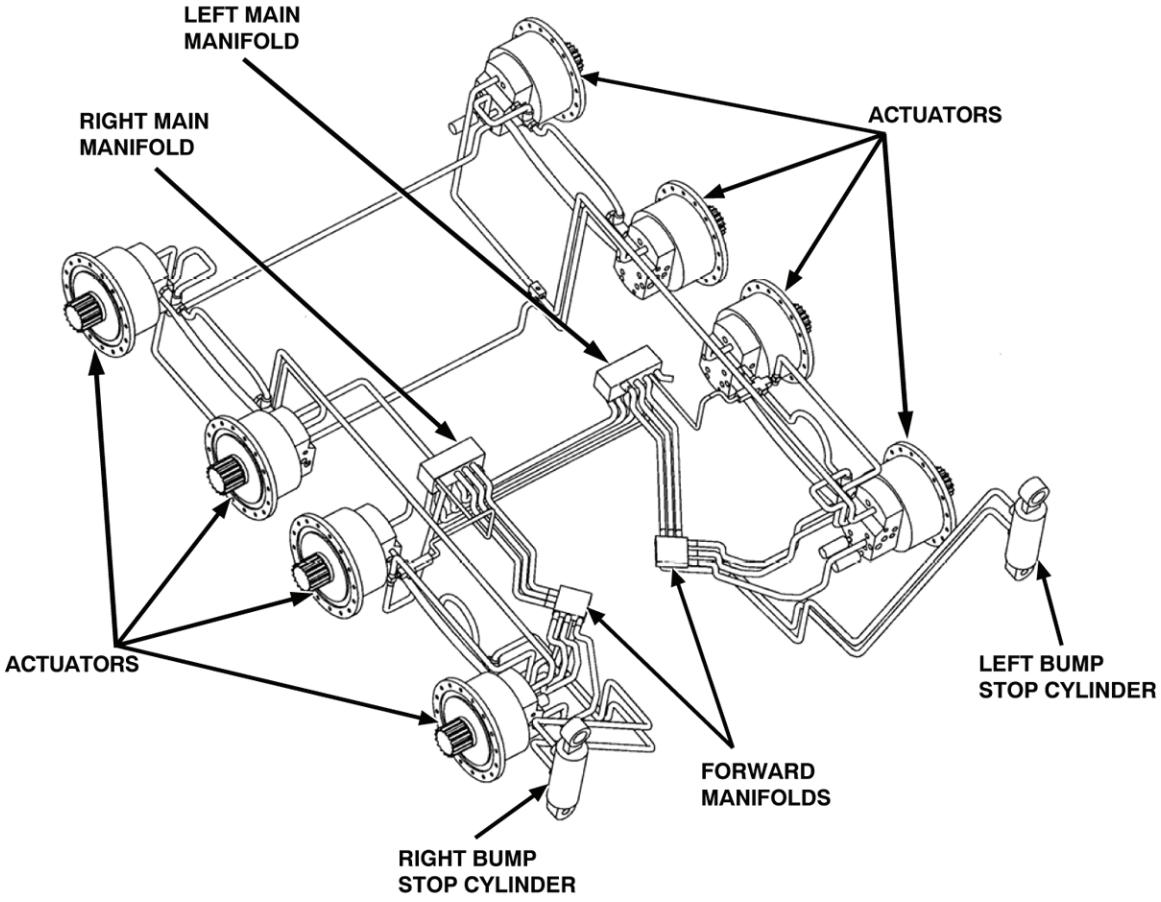


Figure 7. Hydraulic Suspension Components

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 directional control valve (DCV) bank, facing rearward, this valve regulates fluid flow for whichever mode is selected.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

HYDRAULIC SYSTEM - CONTINUED

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 describes 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.

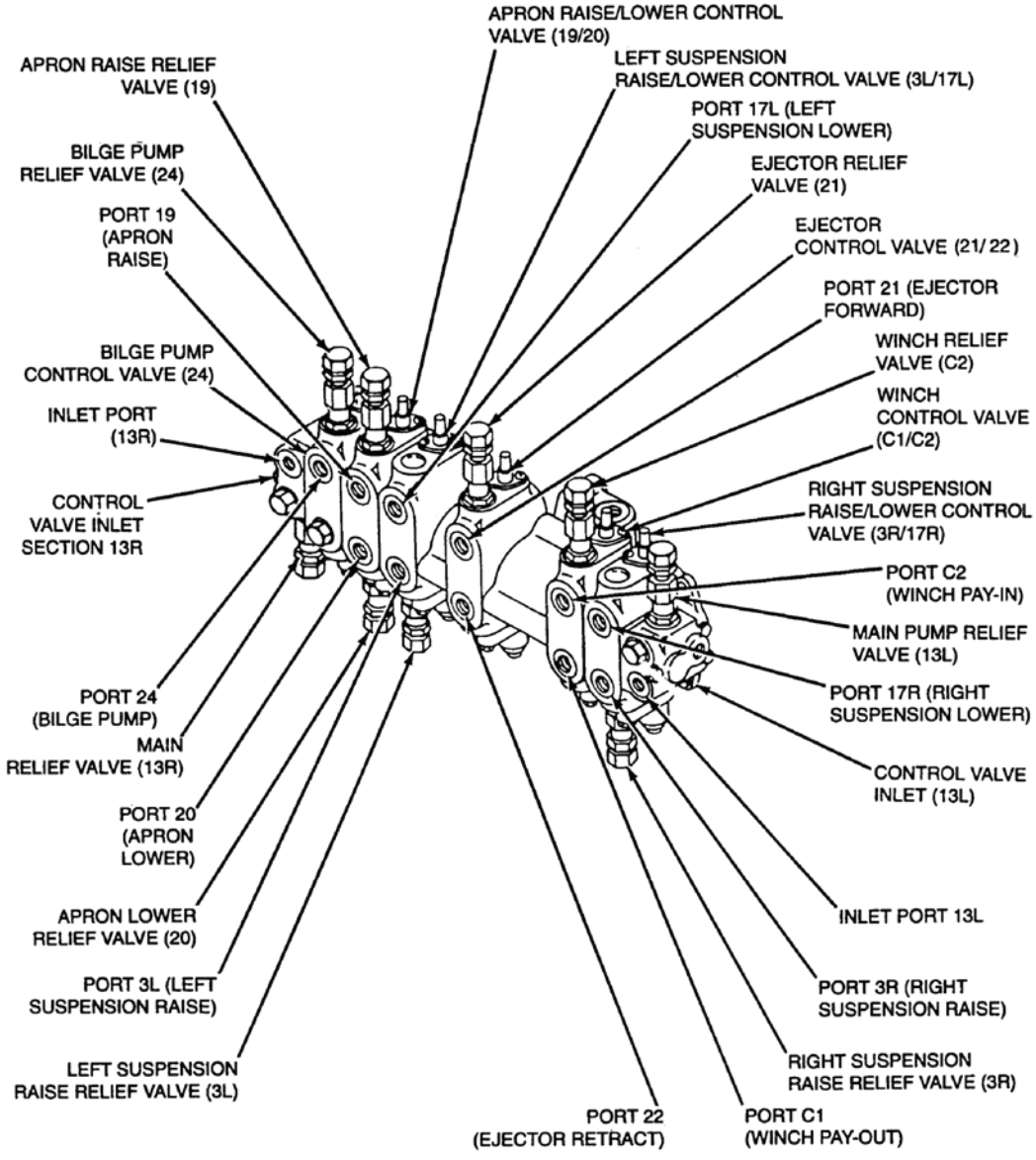


Figure 8. Directional Control Valve (DCV) Bank

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

HYDRAULIC SYSTEM - CONTINUED

Bilge Pump Control Valve (24)

When activated, pressurized 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 the 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 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).

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

GENERAL HYDRAULIC SYSTEM REPAIR METHODS

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 or death 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 or death to personnel.**
- **Spilled hydraulic oil is very slippery. Be careful when entering or working in bowl area. Wip 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.**

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 spilt. 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.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

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

1. 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 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.

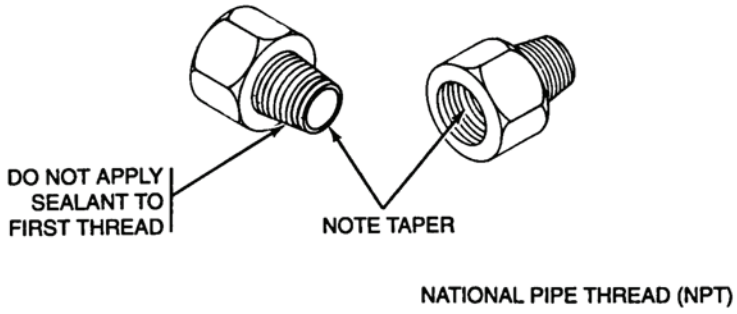


Figure 9. National Pipe Thread (NPT) Fittings

2. 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.

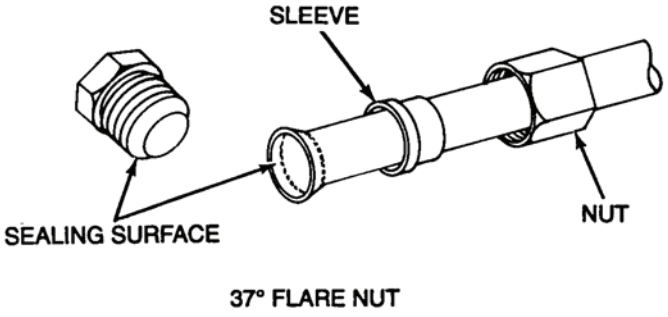


Figure 10. 37° Flare Termination Fitting

3. 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.

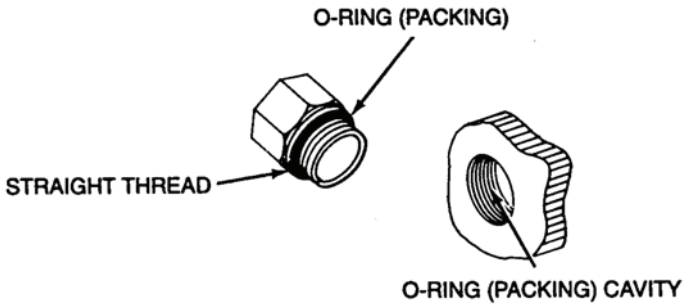


Figure 11. O-Ring (Packing) Boss

4. 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 to tighten nut (TM 5-2350-262-20-2). If this fitting is overtorqued, the ferrule will be deformed and the fitting will leak.

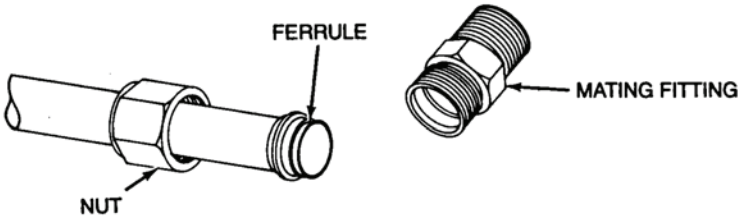


Figure 12. Flareless Fitting

5. 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.

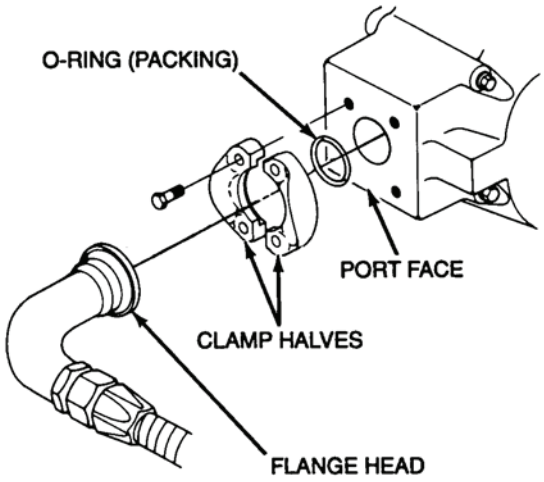


Figure 13. Four-Bolt Split Flange

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

INSTALLATION OF ADJUSTABLE FITTINGS

1. 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.

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

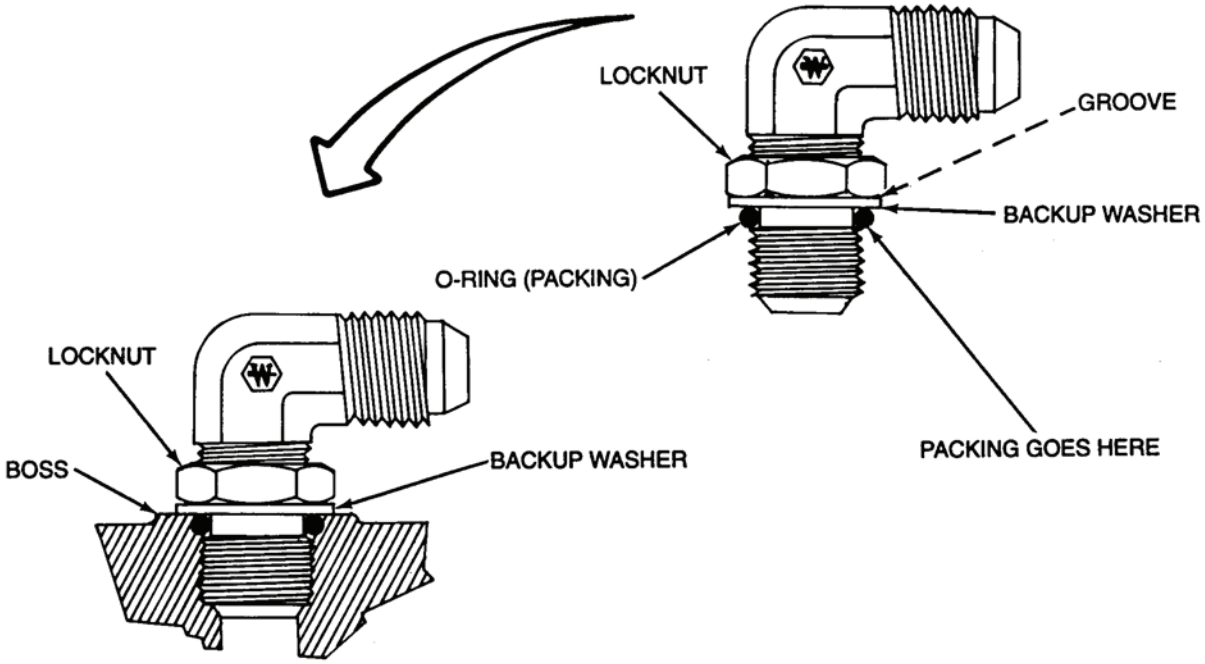


Figure 14. Adjustable Fittings

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

GENERAL HYDRAULIC SYSTEM TROUBLESHOOTING PROCEDURES

This portion of the work package 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 individual troubleshooting procedures work packages. Procedures contained in this work package are listed below.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

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 work package and in individual troubleshooting work packages (WP 0005 00 through WP 0022 00) 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 work package 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 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 work package.
- Instead of replacing a relief valve for troubleshooting purposes, temporarily switch it with another relief valve on the directional control valve bank.
- Instead of replacing an HDC System solenoid valve or pressure transducer, temporary switch it with a spare item, or with another identical solenoid valve or pressure transducer.
- 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, where applicable.

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

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.

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 (Figure 15, item 2). Plungers should move 9/32 in (7 mm) above or below neutral position when control rod (Figure 15, item 1) is operated. (Bilge pump and SPRUNG/UNSPRUNG plungers only move up).

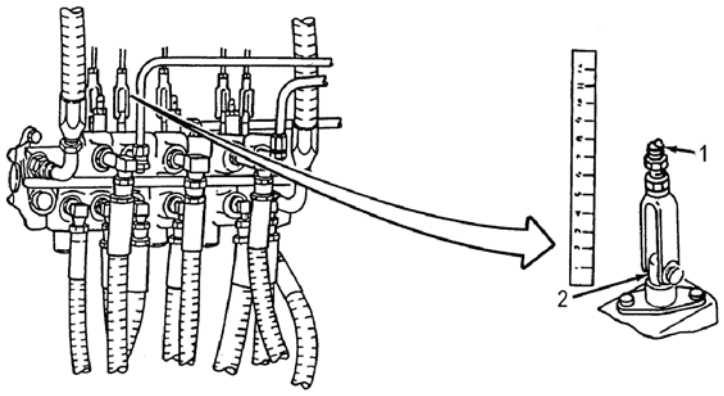


Figure 15. Adjustment of Hydraulic Control and Valve Plunger

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

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 and the RPSTL work package in this TM. 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

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

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.

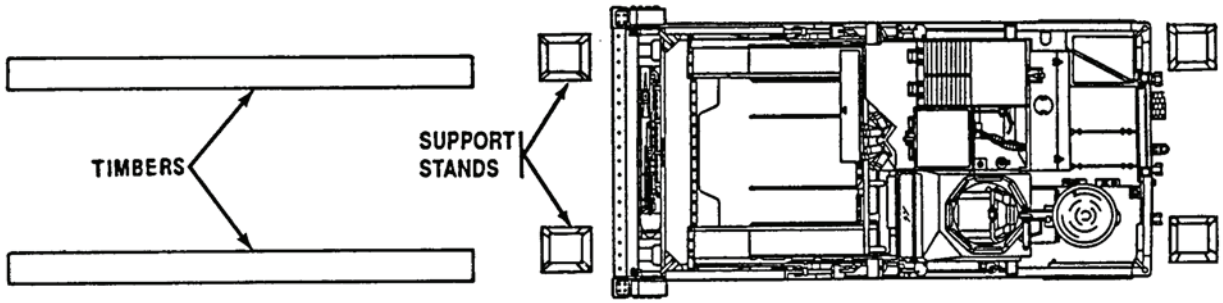


Figure 16. Suspending the M9 for Suspension System Checks

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

RELIEVING HYDRAULIC SYSTEM PRESSURE

1. If necessary, stop vehicle engine. Place SPRUNG/UNSPRUNG control lever (Figure 17, item 1) in SPRUNG position.
2. Relieve pressure from main accumulator by slowly moving SPRUNG/UNSPRUNG control lever (Figure 17, item 1) toward UNSPRUNG position until a hissing can be heard. Hold in that intermediate position until hissing ceases, then place SPRUNG/UNSPRUNG control lever (Figure 17, item 1) in SPRUNG position.
3. Operate each of the four control levers (Figure 17, item 2) several times, through all positions, to relieve any residual pressure in hydraulic subsystems.
4. Slowly loosen hydraulic tank dipstick (Figure 17, item 3) to allow air pressure to escape. Tighten dipstick (Figure 17, item 3).

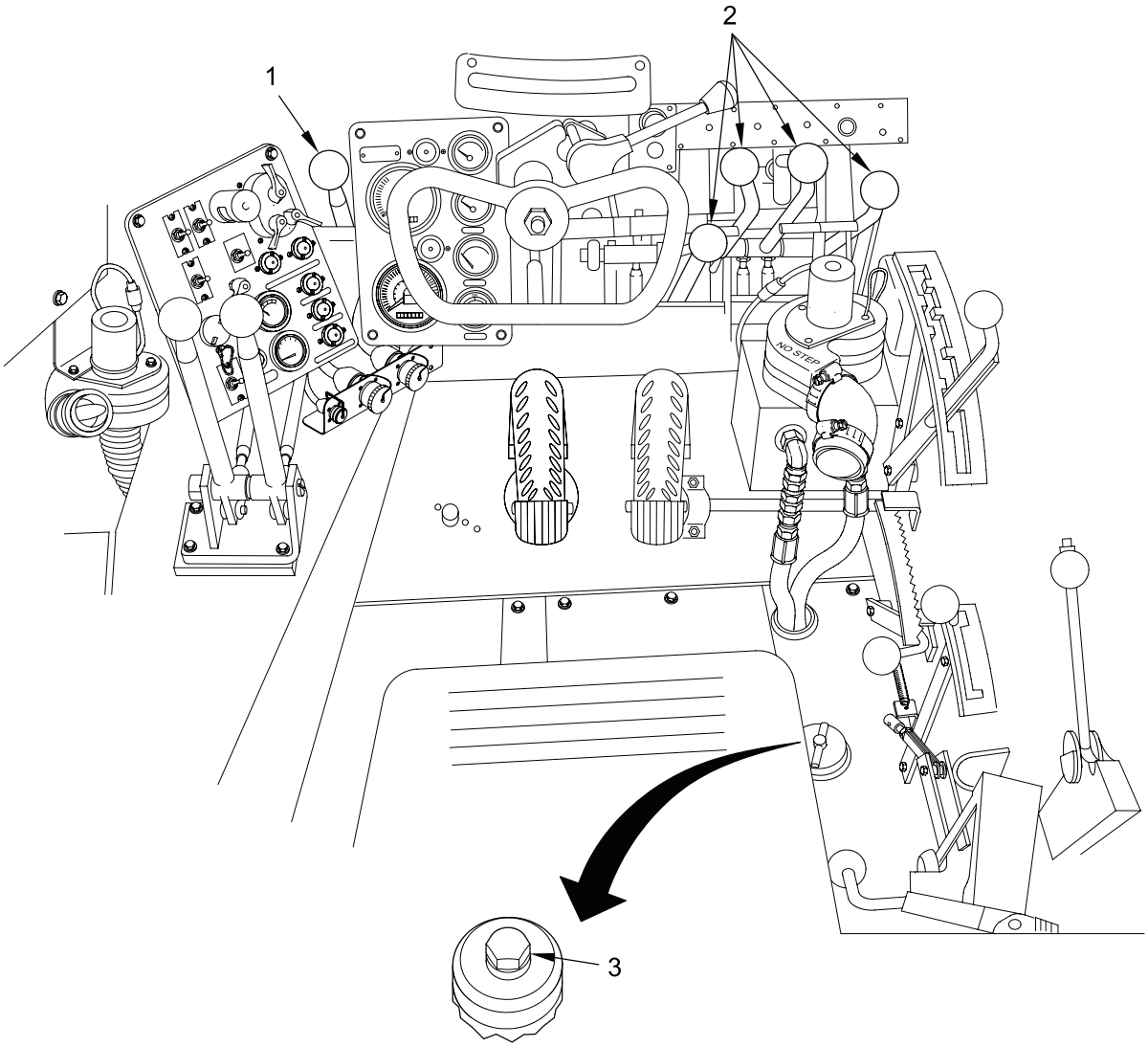


Figure 17. Relieving Hydraulic System Pressure

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

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.

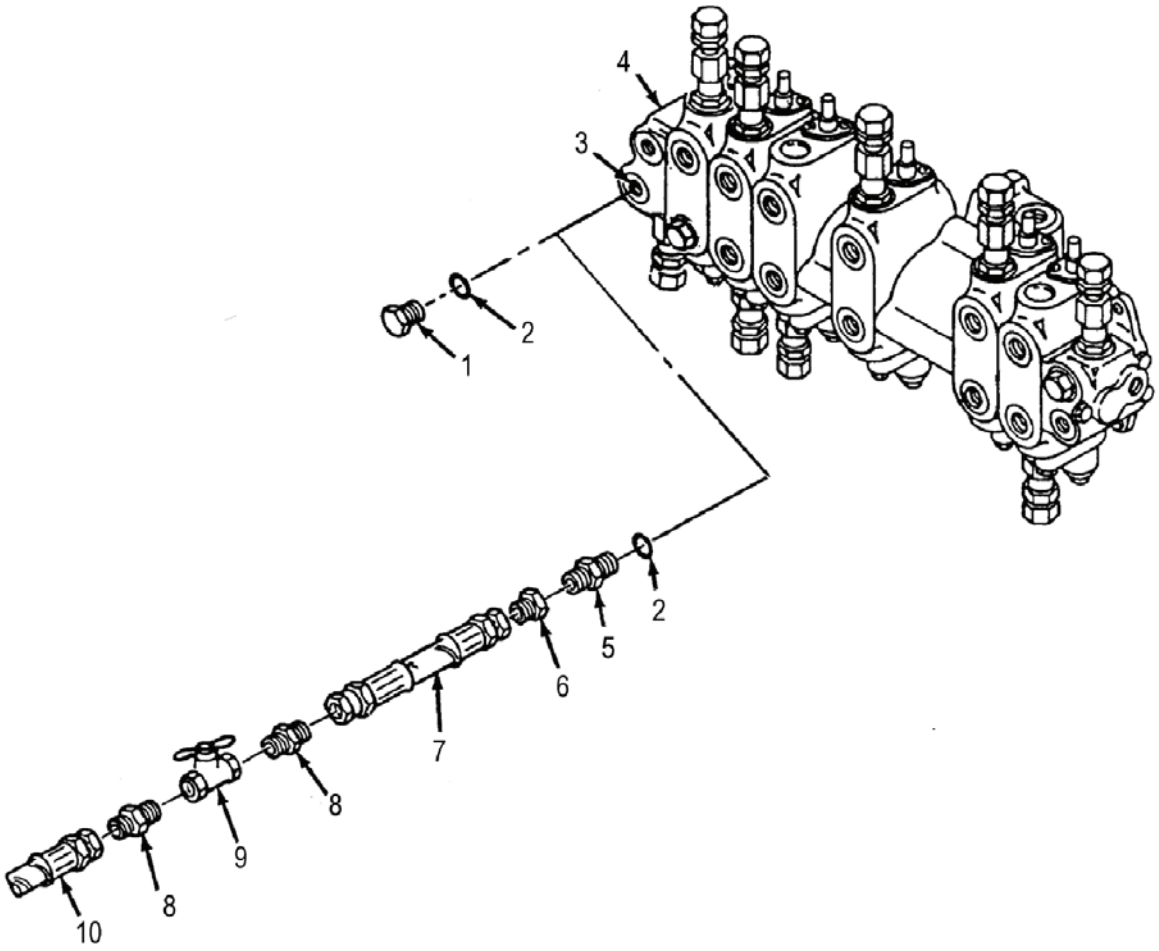


Figure 18. Accumlator Dump Valve Installation

1. Stop vehicle engine and relieve hydraulic pressure
2. Remove plug (Figure 18, item 1) and packing (Figure 18, item 2) from port 7 (Figure 18, item 3) of valve 13R (Figure 18, item 4). Discard packing (Figure 18, item 2).
3. Install new packing (Figure 18, item 2) and nipple (Figure 18, item 5) in port 7 (Figure 18, item 3).
4. Install reducer (Figure 18, item 6) to nipple (Figure 18, item 5).
5. Connect tube assembly (Figure 18, item 7) to reducer (Figure 18, item 6).
6. Install two adapters (Figure 18, item 8) on globe valve (Figure 18, item 9), and connect this assembly to tube (Figure 18, item 7), with arrow of globe valve (Figure 18, item 9) pointed toward port 7 (Figure 18, item 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.

7. Connect hose assembly (Figure 18, item 10) to adapter (Figure 18, item 8) at end of globe valve (Figure 18, item 9).

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

ACCUMULATOR DUMP VALVE INSTALLATION - CONTINUED

8. Disconnect ACCUMULATOR-9 hose (Figure 19, item 5) from elbow (Figure 19, item 3) at bottom of main hydraulic accumulator (Figure 19, item 2).
9. Install tee (Figure 19, item 4) on elbow (Figure 19, item 3), and connect hose (Figure 19, item 5) and hose assembly (Figure 19, item 1) to tee (Figure 19, item 4).

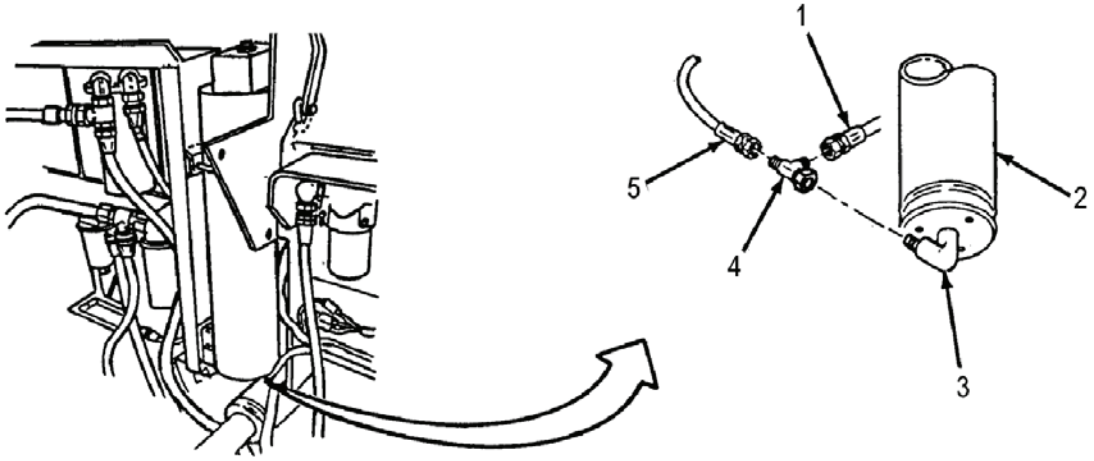
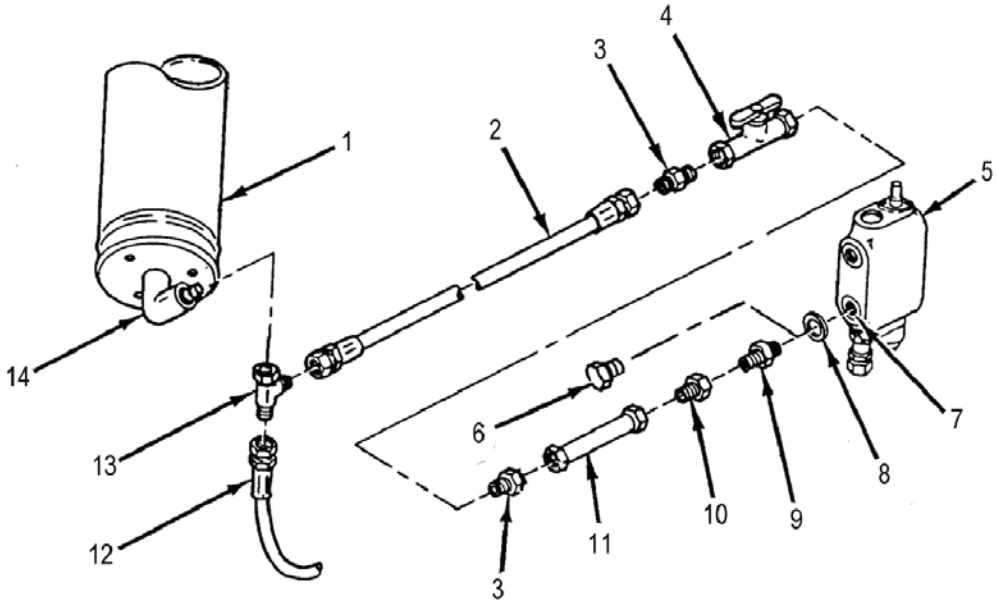


Figure 19. Accumualtor Dump Valve Installation



LEGEND

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

Figure 20. Accumulator Dump Valve Installation

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

GENERAL SUSPENSION TROUBLESHOOTING INFORMATION

1. 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.

2. 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).

3. 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:

   a. The right rear pair of actuators.

   b. The left rear pair of actuators.

   c. The right front pair of actuators, with the right front bump stop cylinder.

   d. The left front pair of actuators, with the left front bump stop cylinder.

   e. 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.

4. 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.

5. 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.

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

ACTUATOR PORT IDENTIFICATION AND DESCRIPTION

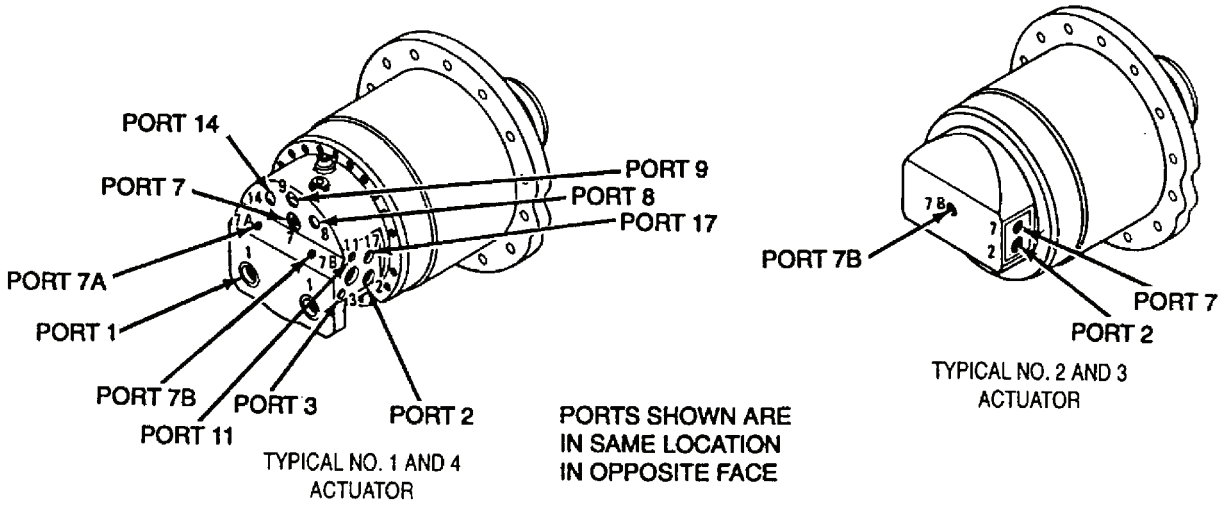


Figure 21. Actuator Port Identification

Table 1. Actuator Port 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).

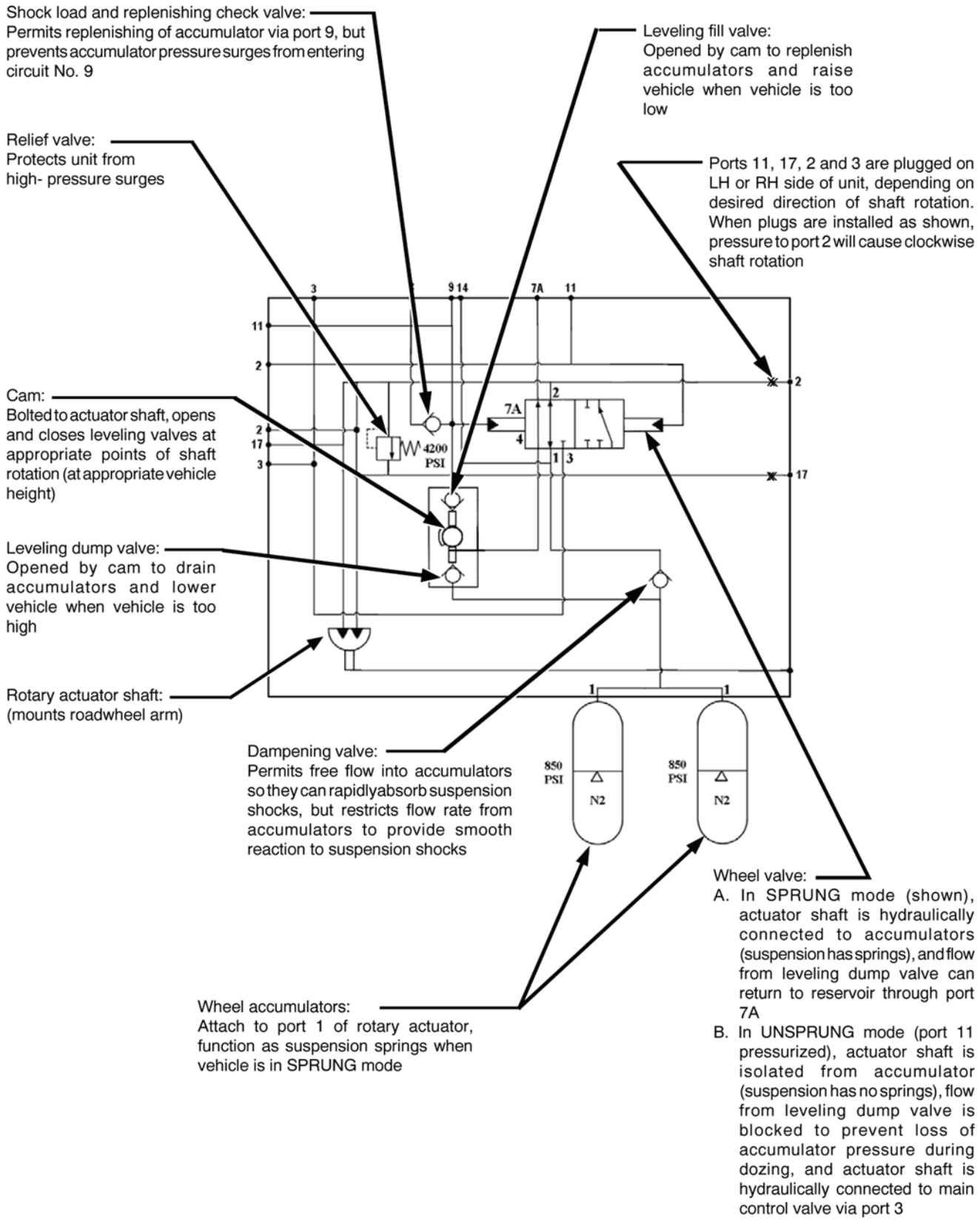


Figure 22. Typical No. 1 and 4 Actuator Schematic Diagram

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.

1. When working in the bowl, always engage the ejector lock (Figure 23, item 1) to prevent the ejector from being extended (FWD) or retracted (BACK).
2. The ejector can also be disabled by disconnecting the ejector cylinder or manually closing HDC system ejector disable valve V23 (Figure 24, item 1) on the DCV bank.
3. If necessary, disable the ejector from the hydraulic system by disconnecting CONT VLV-21 hose (Figure 23, item 2) from elbow (Figure 23, item 3) at port 21 and CONT VLV-22 hose (Figure 23, item 5) from elbow (Figure 23, item 4) at port 22 on ejector control valve. Cap and plug hoses and fittings.

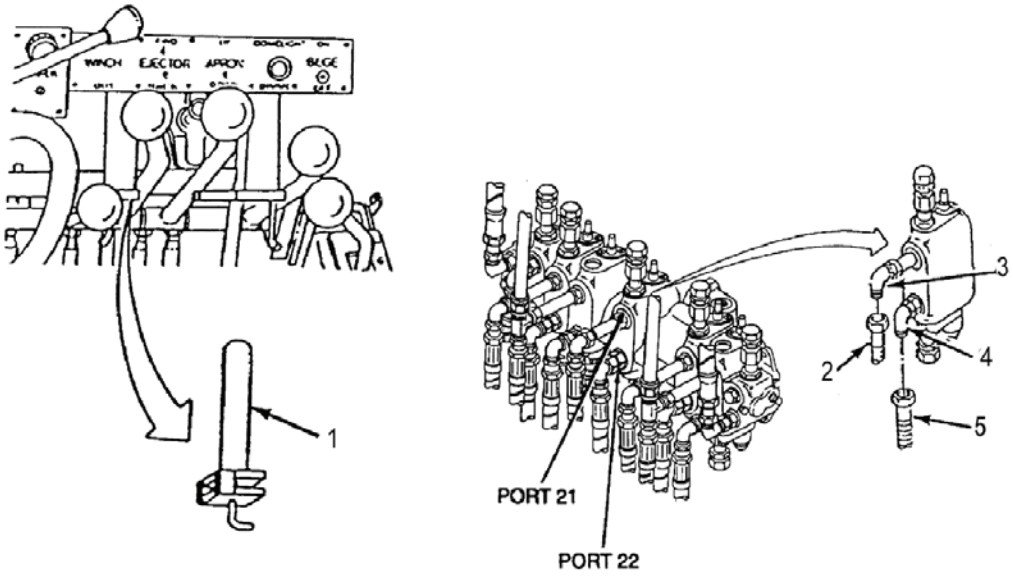


Figure 23. Locking and Disabling Ejector

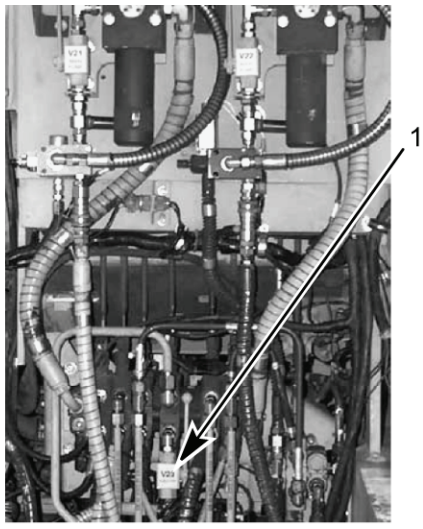


Figure 24. HDC System Ejector Disable Valve V23

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

INSTALLATION

1. Loosen two thumb screws (Figure 25, item 3) on two threaded rods (Figure 25, item 2) until control box (Figure 25, item 1) can be removed from stowage bracket (Figure 25, item 4).

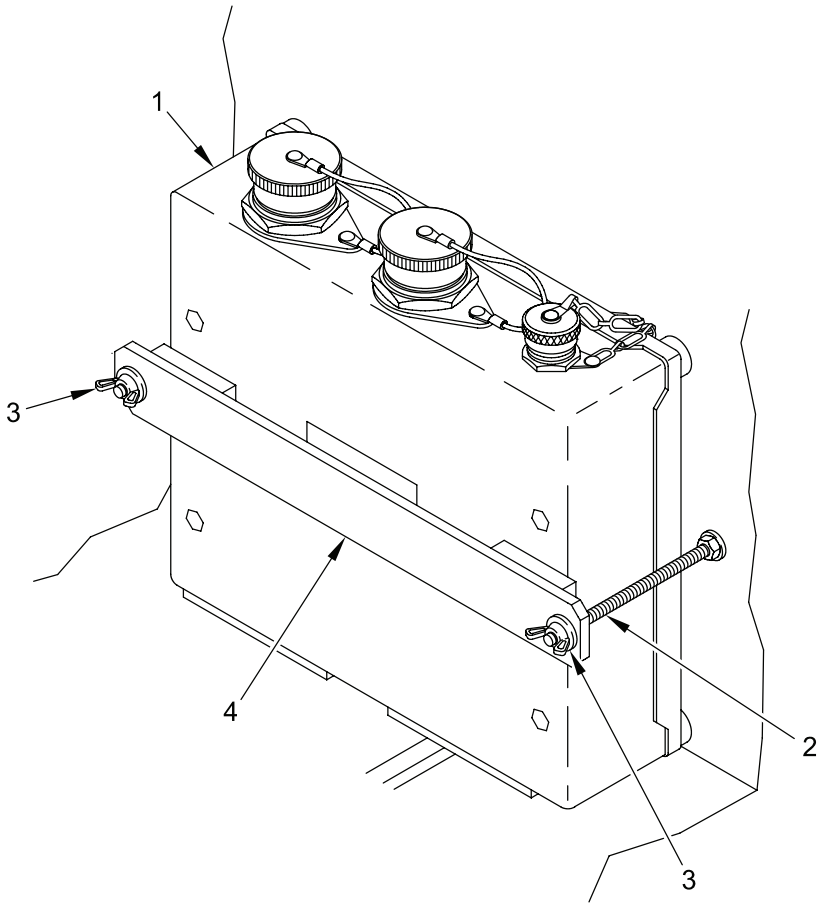


Figure 25. Installation and Removal of HDC Control Box

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

INSTALLATION - Continued

2. Connect umbilical cable connector W4P4 (Figure 26, item 6) to disconnect bracket harness W1 connector J1 (Figure 26, item 1).
3. Connect umbilical cable connector W4P5 (Figure 26, item 5) to disconnect bracket harness W2 connector J1 (Figure 26, item 2).
4. Connect umbilical cable connector W4P6 (Figure 26, item 4) to disconnect bracket harness W3 connector J1 (Figure 26, item 3).

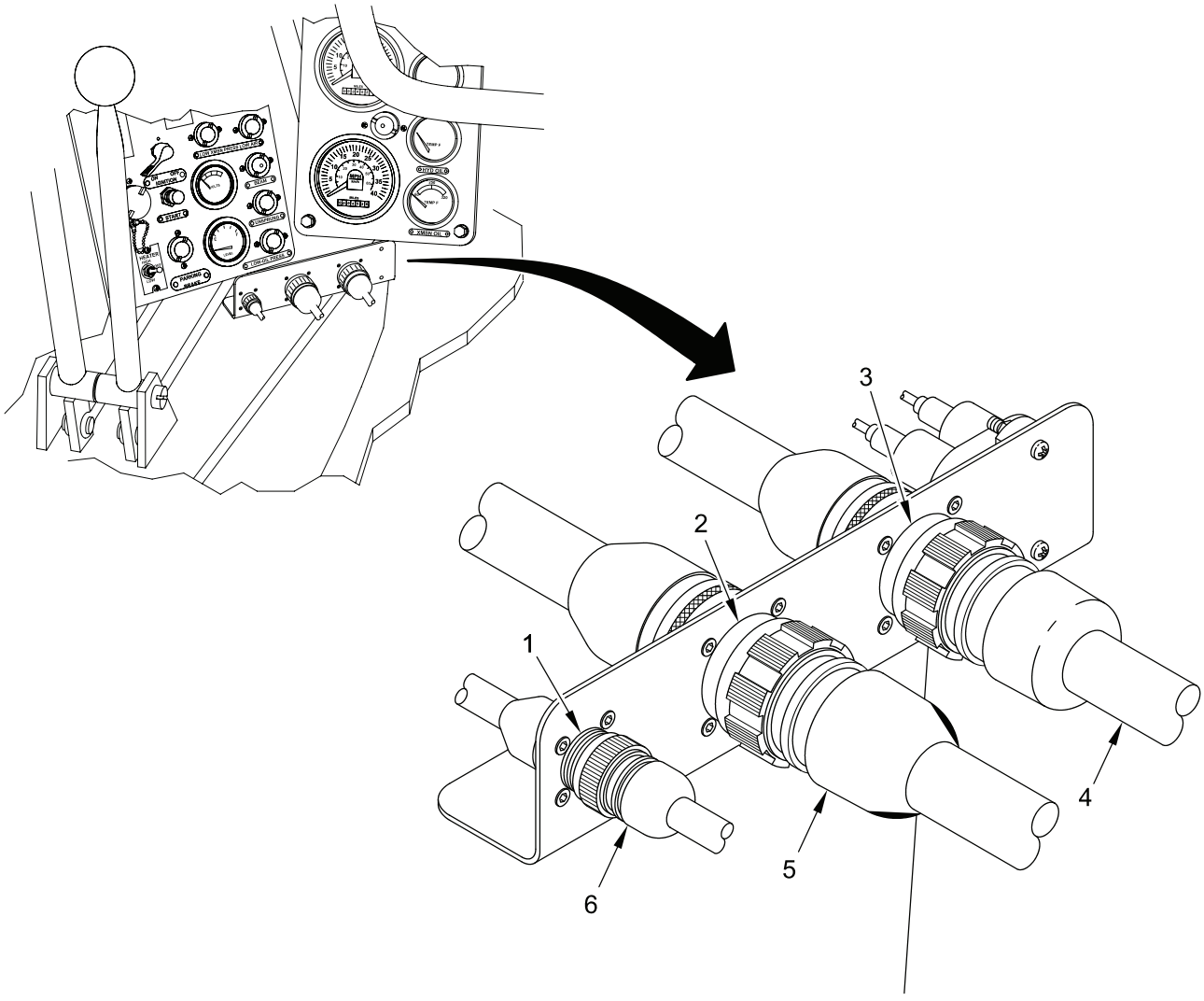


Figure 26. Installation and Removal of Wiring Harness W4 (Umbilical Cable W4).

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

INSTALLATION - Continued

5. Connect umbilical cable connector W4P1 (Figure 27, item 5) to control box connector J1 (Figure 27, item 6).
6. Connect umbilical cable connector W4P2 (Figure 27, item 3) to control box connector J2 (Figure 27, item 4).
7. Connect umbilical cable connector W4P3 (Figure 27, item 1) to control box connector J3 (Figure 27, item 2).

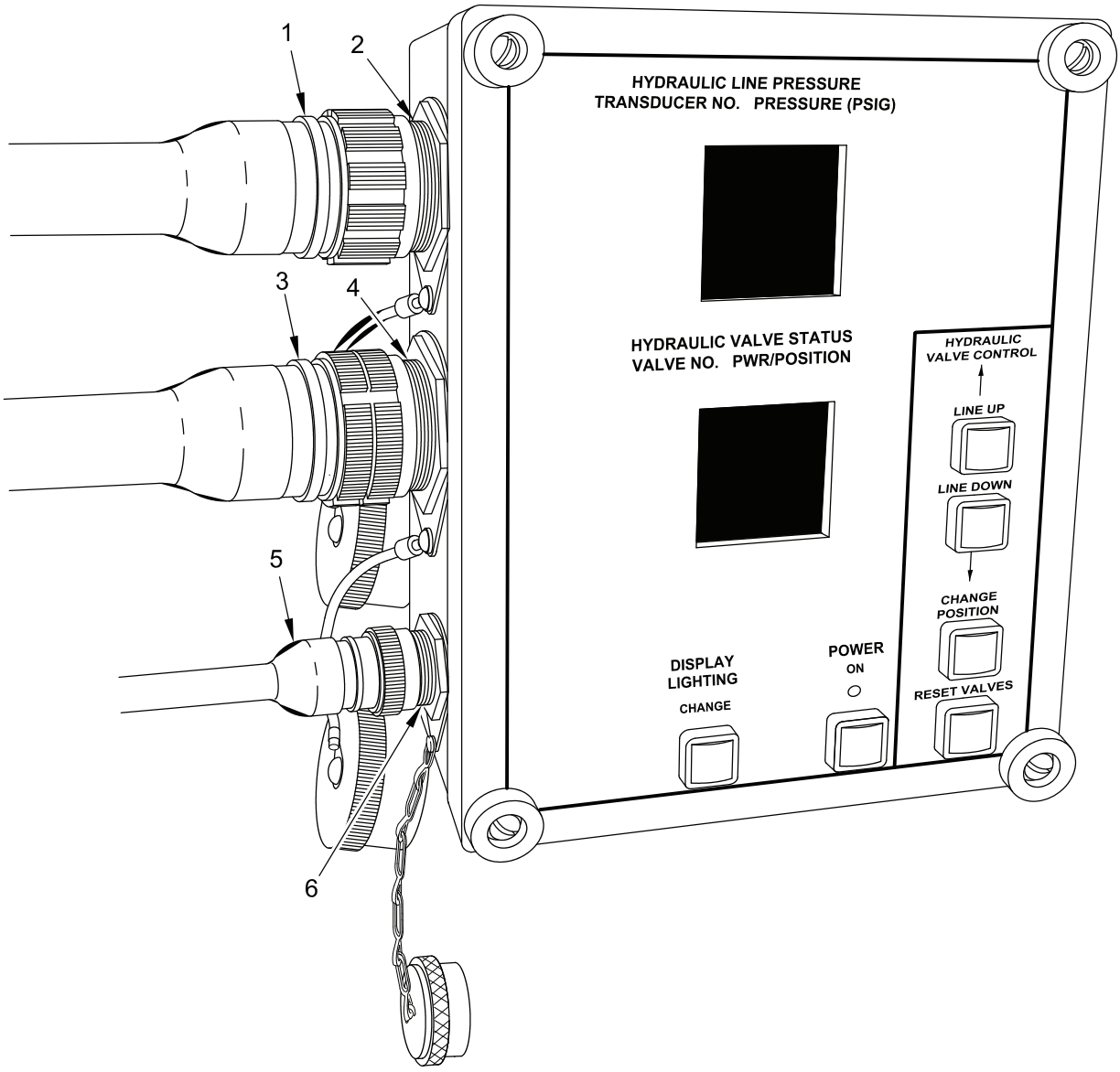


Figure 27. Installation and Removal of Wiring Harness W4 (Umbilical Cable W4).

END OF TASK

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

REMOVAL

1. Remove umbilical cable connector W4P3 (Figure 28, item 1) from control box connector J3 (Figure 28, item 2).
2. Remove umbilical cable connector W4P2 (Figure 28, item 3) from control box connector J2 (Figure 28, item 4).
3. Remove umbilical cable connector W4P1 (Figure 28, item 5) from control box connector J1 (Figure 28, item 6).

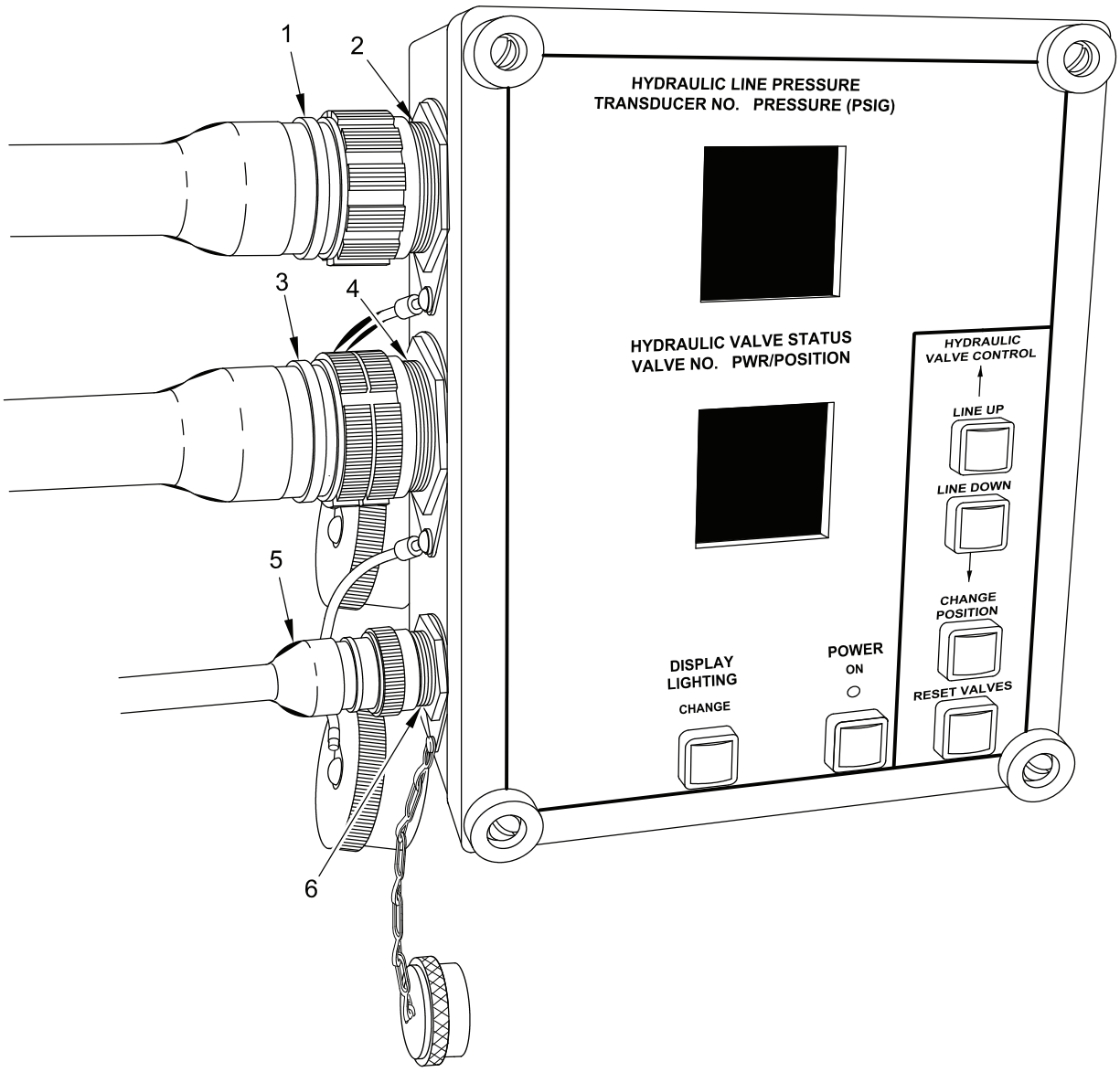


Figure 28. Installation and Removal of Wiring Harness W4 (Umbilical Cable W4).

INTRODUCTION TO TROUBLESHOOTING AND REPAIR OF THE M9 ACE HYDRAULIC SYSTEM - Continued **0004 00**

4. Remove umbilical cable connector W4P6 (Figure 29, item 4) from disconnect bracket harness W3 connector J1 (Figure 29, item 3).
5. Remove umbilical cable connector W4P5 (Figure 29, item 5) from disconnect bracket harness W2 connector J1 (Figure 29, item 2).
6. Remove umbilical cable connector W4P4 (Figure 29, item 6) from disconnect bracket harness W1 connector J1 (Figure 29, item 1).

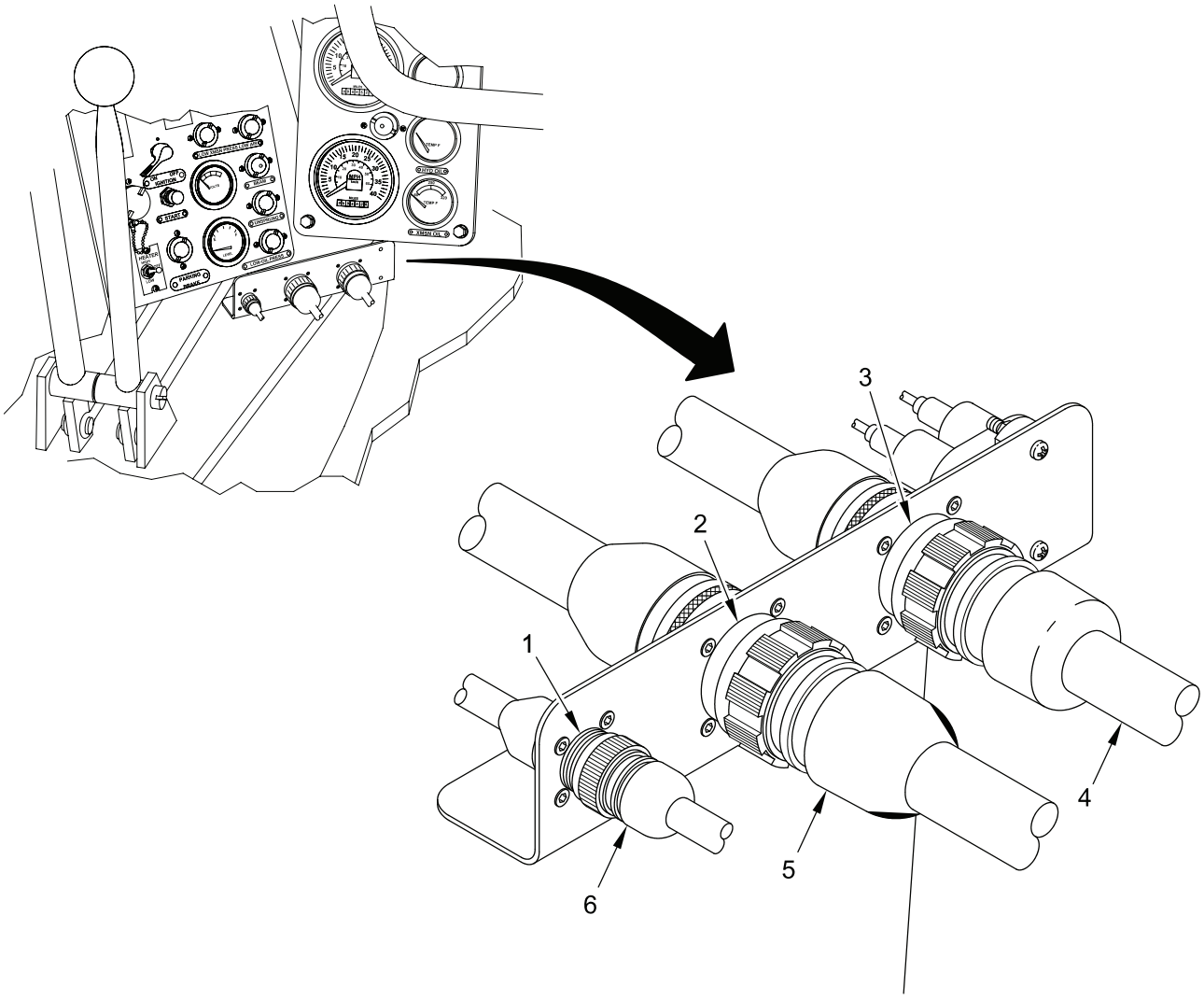


Figure 29. Removal of Wiring Harness W4 (Umbilical Cable W4).

7. Place control box (Figure 30, item 1) in stowage bracket (Figure 30, item 4) and secure by tightening two wing nuts (Figure 30, item 3) on two threaded rods (Figure 30, item 2).

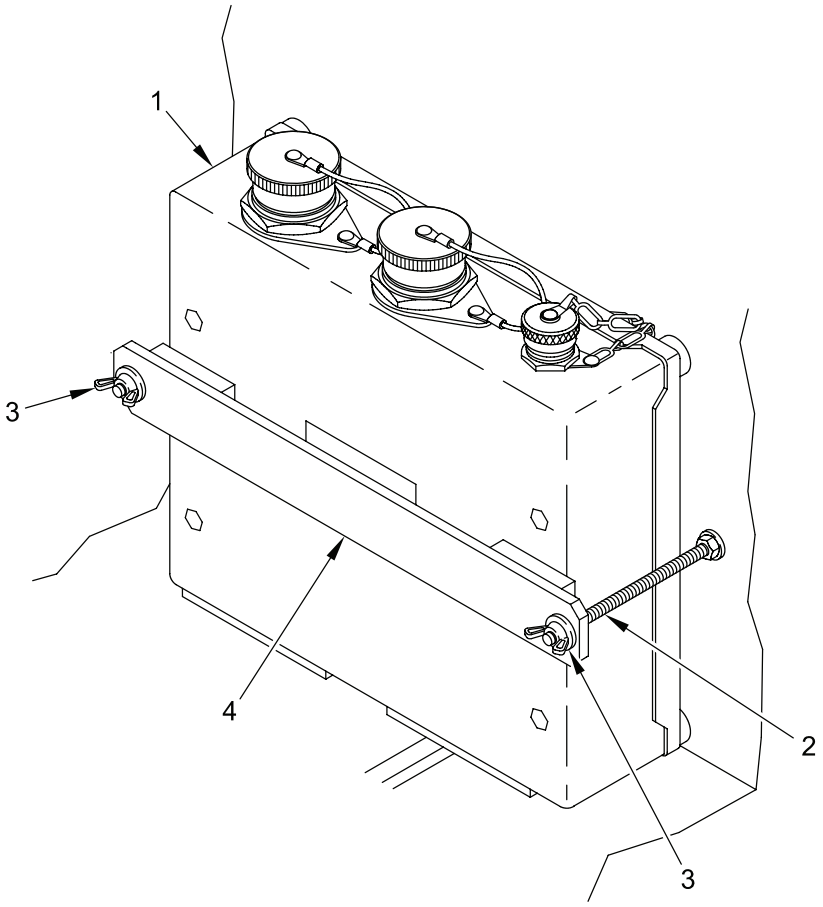


Figure 30. Stowage of HDC Control Box.

END OF TASK

END OF WORK PACKAGE

USING THE HYDRAULIC DIAGNOSTIC CENTER (HDC) SYSTEM TO TROUBLESHOOT THE M9 HYDRAULIC SYSTEM

0005 00

INTRODUCTION

This Work Package contains information needed when troubleshooting the M9 ACE Hydraulic System using the Hydraulic Diagnostic Center (HDC) System. It includes information for preparing the HDC System for use and procedures for performing a Functional Check-Out of the HDC System, both as a weekly PMCS check of the HDC System integrity, and as the initial step in using the HDC System to aid in troubleshooting the M9 ACE hydraulic system.

This work package describes the differences between troubleshooting the ACE hydraulic system with, and without, the HDC System, and explains the additional items that need to be considered when using the HDC System to aid in troubleshooting the vehicle hydraulic system. Information as to how to use the HDC System to aid in troubleshooting the M9 ACE Hydraulic System is included as well as information to aid in troubleshooting the specific HDC System hydraulic and electrical circuits. When used with the HDC system troubleshooting work package (WP 0022 00).

The HDC System is an aid, used to assist in the troubleshooting of the M9 ACE hydraulic system. The HDC is not an independent diagnostic tool; it does not provide an automated or semi-automated means of localizing hydraulic faults. The use of the HDC System allows the amount of time required to isolate faults and malfunctions in the vehicle hydraulic system to be dramatically reduced, when compared to the time required to troubleshoot the vehicle hydraulic system without the HDC System.

TROUBLESHOOTING THE HDC SYSTEM

Using the HDC System does introduce some additional factors that should be considered when troubleshooting the vehicle hydraulic system. Components of the HDC System are located throughout the ACE vehicle and, although they simplify the actual troubleshooting process, they also introduce additional components that interface with the previously existing vehicle hydraulic system, that also can fail or malfunction like any other component.

To aid in the troubleshooting of the ACE hydraulic system, the HDC System must be operating properly, and there must be some way to assess the operational status of the HDC System. The M9 ACE HDC System Functional Check-Out on the following pages provides the means for the maintainer to easily check portions of the HDC System to determine if the HDC System is functionally operational.

When the HDC System is to be used (for troubleshooting the vehicle hydraulic system or when just being functionally checked as part of a PMCS requirement), the M9 ACE HDC System Functional Check-Out should first be performed. If the HDC System does not pass all portions of the Functional Check-Out, refer to (WP 0022 00) and proceed to troubleshoot the HDC System as indicated.

Aside from the HDC Control Box and three electrical cables integrated into the vehicle, two main types of components comprise the HDC System; solenoid valves and hydraulic pressure transducers. Although both of these types of components are very reliable (as are the electrical cables), they can possibly fail like other electrical and hydraulic components. The solenoid valves are spring-loaded and can possibly fail in two ways. They can fail to energize, and they can fail to return to the original de-energized state (valve spool does not return to the de-energized state), when the energizing (supply) voltage is removed. The probability of a solenoid valve being stuck (the valve spool does not return to the de-energized position) is very low and would only occur after a hydraulic maintenance test was performed in which the valve had been energized. The actual movement (or non-movement) of the valve spool cannot be detected by the HDC Control Box as part of the System BIT. The solenoid valves are normally not energized. They are only energized upon command, and are supplied 24 VDC only when energized. Normally all solenoid valves are de-energized (reset) and are not supplied any voltage.

When the HDC System is operating, a reference voltage is always supplied to the hydraulic pressure transducers from the HDC Control Box and the respective hydraulic pressure measured by the individual pressure transducers is displayed on the HDC Control Box upper LCD. The pressure transducer is supplied a 15 V DC reference voltage and returns a DC analog voltage between 0.5 V DC and 9.5 V DC to the HDC Control Box representing the hydraulic pressure measured by the transducer in the circuit.

USING THE HYDRAULIC DIAGNOSTIC CENTER (HDC) SYSTEM TO TROUBLESHOOT THE M9 HYDRAULIC SYSTEM - Continued **0005 00**

The hydraulic pressure transducers can also fail in two ways; failure to measure any hydraulic pressure (complete failure) or failure to accurately measure the hydraulic pressure (producing erroneous measurement indications) and provide an analog voltage back to the HDC Control Box that is outside of the range of acceptable voltages (outside the 0.5 - 9.5 V DC range). If "measured" the DC voltage returned to the HDC Control Box from the pressure transducer is within the acceptable range of 0.5 to 9.5 V DC, regardless of how inaccurate the measurement may be, the inaccuracy/malfunction cannot be detected by the HDC Control Box as part of the System BIT.

The HDC System Functional Check-Out addresses many of the HDC System components and fault isolates most problems/malfunctions associated with those components. For those HDC System solenoid valves and pressure transducers specified, and those not specifically addressed in the Functional Check-Out, refer to Table 5 to aid in determining if an HDC System solenoid valve or hydraulic pressure transducer may have failed or malfunctioned, based on possible consequences and symptoms of a malfunctioning or failed HDC system component.

USE OF THE HDC SYSTEM

The HDC is only used when a problem has been detected (or suspected) in the M9 ACE hydraulic system and formal troubleshooting of the system is necessary. Before the HDC System is actually used to aid in troubleshooting the vehicle hydraulic system, the M9 ACE HDC System Functional Check-Out should be performed to establish the operational readiness of the HDC System. The HDC system is only used when the vehicle is not moving, the vehicle is in "neutral" and the parking brake is fully engaged.

M9 ACE HDC SYSTEM FUNCTIONAL CHECK-OUT

Purpose:

The purpose of the Functional Check-Out is to ensure that the vehicle and the HDC System are functioning properly.

Assumptions:

1. Vehicle relief valve settings have previously been adjusted using a GS-5 pressure gauge, with a tolerance of +/- 100 psi (689.4757 kPa).
2. The accuracy of the HDC system is +/- 100 psi (689.4757 kPa).
3. Pressure values within +/- 200 psi (1378.951 kPa) are considered within specification.
4. Other vehicle operational characteristics meet the specifications.

Procedure:

The individual tests should be conducted in accordance with this procedure. The HDC System is considered fully operational when it has passed all of the tests.

WARNING

Before performing any troubleshooting in bowl, move the ejector forward and disconnect the ejector cylinder from the hydraulic system by pulling the handle down on ball valve V23, located in the rear of the bowl area, just below the main directional control valve (DCV) bank. Failure to comply may result in severe injury or death to personnel.

NOTE

Problems existing in the vehicle hydraulic system when the HDC System Functional Check-Out is performed could result in the HDC System not passing all portions of the Functional Check-Out. Because of this, it is important that all applicable vehicle PMCS checks have been performed and that vehicle hydraulic functions be exercised prior to performing the HDC System Functional Check-Out to determine exactly which vehicle hydraulic functions are impaired and to use this information with the results of the Functional Check-Out to help isolate the problem area.

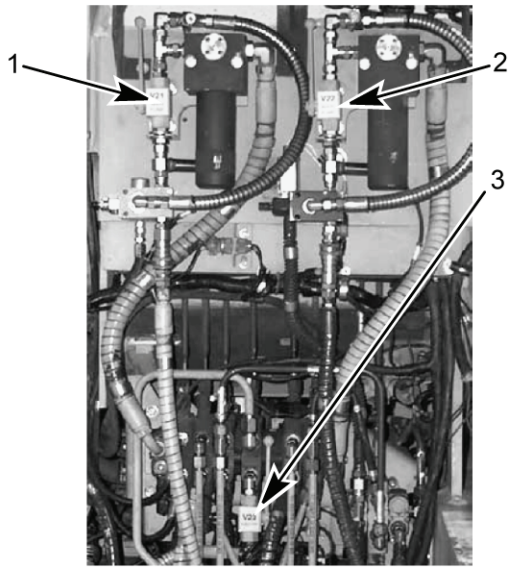


Figure 1. DCV Bank

1. Exercise vehicle functions:
   a. Confirm that the three HDC System manual valves V21 (Figure 1, item 1), V22 (Figure 1, item 2), and V23 (Figure 1, item 3) are in the fully OPEN position. Handles must be vertical.
   b. Start engine.
   c. Confirm that vehicle rises up and levels out normally when the engine is started within two minutes.
   d. Confirm that ejector extends and retracts.
   e. Confirm that apron moves up and down.
   f. Confirm that left suspension moves up and down.
   g. Confirm that right suspension moves up and down.
   h. Confirm that the left and right bump stops extend when the vehicle is placed in SPRUNG mode, and retract when the vehicle is placed in UNSPRUNG mode.
   i. Confirm that winch pays out and pays in.
2. Valve V23 check:
   a. Stop engine.
   b. Manually place valve V23 in the closed position. Handle horizontal (down).
   c. Start engine.

d. Confirm that the ejector does not extend or retract. (This indicates that valve V23 is working properly.)

e. Stop engine and ensure that engine is off before connecting HDC control box.

3. HDC Control Box power-up and operation.

WARNING

Do not activate the vehicle's hydraulic control levers or depress any buttons on the HDC control box unless directed by this procedure. Failure to comply could result in serious injury or death to personnel.

a. Ensure vehicle power is off.

b. Remove HDC Control Box and umbilical cable W4 from stowage location behind driver's seat.

c. Place HDC Control Box in operating location.

d. Connect HDC Control Box and umbilical cable W4 to vehicle as per (WP 0004 00).

e. Place vehicle power on.

f. Ensure parking brake is on and transmission is in neutral, then start vehicle engine. HDC System will not receive operating power from vehicle unless parking brake is on and transmission is in neutral.

g. With the vehicle engine running and the transmission in neutral, turn the HDC Control Box on by pressing the POWER button. (Depressing the POWER button again will turn the HDC Control Box off.) Note that:

(1) Power to the HDC System is disconnected if the vehicle is taken out of neutral.

(2) The solenoid valves will return to their normal vehicle operating positions (de-energized/not powered) when the HDC Control Box is turned off (or power is disconnected).

NOTE

The HDC System automatically initiates a start-up Built-In-Test (BIT) when power is applied to the system.

h. After power is applied to the HDC System, and a start-up BIT is performed, if a BIT fault message is displayed on the Liquid Crystal Display (LCD), do not use the HDC Control Box for testing.

i. When system powers up, displays will be dark for 3 seconds. If significant sections of the displays are missing, displays will be unreadable; do not use if displays are unreadable.

j. If the temperature is below -4° F (-20° C), the displays will not come on until warmed up. The power light will blink until the displays have warmed up.

k. If the start-up BIT passed, and the HDC System is operating properly, the initial default display for the status of the HDC System solenoid valves will appear as shown Table 1. This is the normal de-energized (unpowered) state of the HDC System solenoid valves.

USING THE HYDRAULIC DIAGNOSTIC CENTER (HDC) SYSTEM TO TROUBLESHOOT THE M9 HYDRAULIC SYSTEM - Continued **0005 00**

l. Confirm that the HDC Control Box displays the pressure transducer number, hydraulic line pressure, solenoid valve number, valve power status (on/off) (PWR), and valve position (open/closed) status similar to Table 1 (for the solenoid valves). (Note: a CIRCUIT FAULT message indicates a disconnected or malfunctioning wire harness, electrical cable, or defective component. Check all connections in the event of a CIRCUIT FAULT message as shown in the test display example on Figure 2).

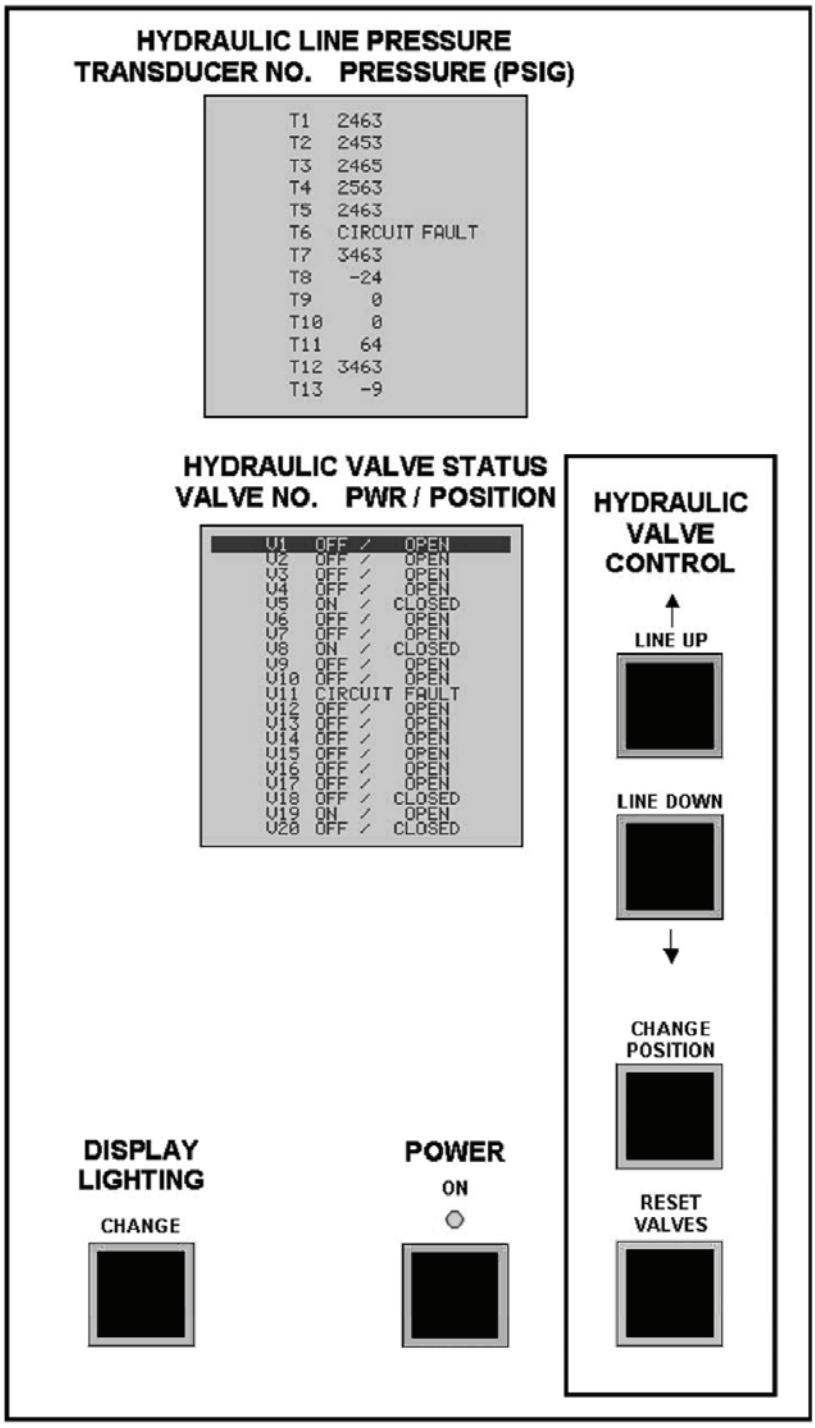


Figure 2. Typical HDC Control Box Test Display (Not The Start-up Display)

m. If the solenoid valves portion of the HDC Control Box start-up LCD display does not appear as shown in Table 1, refer to Troubleshooting (WP 0022 00), for troubleshooting procedures to aid in isolating a fault or problem in the HDC System.

The HDC Control Box default solenoid valve display (all solenoid valves in the OFF position) should be as shown in Table 1.

Table 1. Default Solenoid Valve LCD Display

VALVE NO.	PWR	/	POSITION
V1	OFF	/	OPEN
V2	OFF	/	OPEN
V3	OFF	/	OPEN
V4	OFF	/	OPEN
V5	OFF	/	OPEN
V6	OFF	/	OPEN
V7	OFF	/	OPEN
V8	OFF	/	OPEN
V9	OFF	/	OPEN
V10	OFF	/	OPEN
V11	OFF	/	OPEN
V12	OFF	/	OPEN
V13	OFF	/	OPEN
V14	OFF	/	OPEN
V15	OFF	/	OPEN
V16	OFF	/	OPEN
V17	OFF	/	OPEN
V18	OFF	/	CLOSED
V19	OFF	/	CLOSED
V20	OFF	/	CLOSED

NOTE

- **Electrical solenoid valves V1 through V20 can be opened and closed by using the LINE UP and LINE DOWN buttons on the HDC Control Box to select a valve, and then pressing the CHANGE POSITION button to open or close the valve. The HDC Control Box software allows up to four of the solenoid valves (V1-V20) to be powered ON at one time. Pressing the RESET VALVES button returns all solenoid valves to their normal (default) operating position (power to the valves is OFF).**
- **Valves V21 and V22 are manually operated, and are located in the bowl area, near the high pressure filters.**
- **Valve V23 is also manually operated, and is located in the bowl area, on the front of the directional control valve (DCV) bank. It is operated while standing in the bowl. This valve is used to interrupt hydraulic fluid flow to the ejector. It is recommended that the engine be shut down when operating valve V23, for safety purposes.**

n. Use LINE UP or LINE DOWN buttons to scroll to desired solenoid valve number and select CHANGE POSITION to energize (open or close) valve. Note: A maximum of four valves can be powered on at one time. If a solenoid valve circuit has failed, CIRCUIT FAULT will be displayed next to the solenoid valve number on the HDC Control Box LCD display and that valve cannot be selected/powered.

o. After solenoid valves are selected, read applicable hydraulic line pressures on the other LCD. If a hydraulic pressure transducer circuit has failed, a CIRCUIT FAULT message will be displayed next to the transducer number and the pressure will not be displayed.

p. Use “RESET VALVES” to place all solenoid valves in their normal de-energized (un-powered) position.

q. Select “CHANGE” to adjust display lighting.

4. Transducer T7, T8, T9, T10, T11, T12, and T13 check:

   a. Have the vehicle operator move the SPRUNG/UNSPRUNG lever to the UNSPRUNG position.

   b. With the vehicle running, confirm that T7, T8, T9, T10, T11, T12, and T13 read greater than 2500 psi (17236.89 kPa). (This is the pressure provided by the compensating pump, and it indicates that transducers T7 through T13 are working properly).

5. Transducer T5 check:

   a. Push the RESET VALVES button on the HDC Control Box, and verify that all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

   b. Verify that the SPRUNG/UNSPRUNG lever is in the UNSPRUNG position.

   c. Have the vehicle operator move the right SUSPENSION CONTROL lever to the RAISE position, and hold it there until the vehicle reaches the maximum height.

   d. Verify that the pressure reading for T5 is at least 2,800 psi (19305.32 kPa). (T5 is now indicating the pressure setting of the right suspension relief valve, and indicates that transducer T5 is working properly.)

   e. Have the vehicle operator release the right SUSPENSION CONTROL lever.

6. Transducer T6 check:

   a. Push the RESET VALVES button and verify all the valves are set to the power OFF setting and are in the default position, as shown in Table 1.

   b. Verify that the SPRUNG/UNSPRUNG lever is in the UNSPRUNG position.

   c. Have the vehicle operator move the left SUSPENSION CONTROL lever to the RAISE position, and hold it there until the vehicle reaches the maximum height.

d. Verify that the pressure reading for T6 is at least 2,800 psi (19305.32 kPa). (T6 is now indicating the pressure setting of the left suspension relief valve, and indicates that transducer T6 is working properly.)

e. Have the vehicle operator release the left SUSPENSION CONTROL lever.

7. Valve V21 and transducer T3 check:

a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

b. Slowly close ball valve V21 until the pressure reading on T3 display exceeds 3,000 psi (20684.27 kPa). (This indicates that V21 and T3 are both working properly.)

c. Open ball valve V21 completely.

8. Valve V22 and transducer T4 check:

a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

b. Slowly close ball valve V22 until the pressure reading on T4 display exceeds 3,000 psi (20684.27 kPa). (This indicates that V22 and T4 are both working properly).

c. Open ball valve V22 completely.

9. Valve V5 and transducer T1 check:

a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

b. Have the vehicle operator place the vehicle in UNSPRUNG mode.

c. Use the LINE UP and LINE DOWN buttons to select valve V5. Press CHANGE POSITION to close valve V5.

d. Have the vehicle operator move the right SUSPENSION CONTROL lever to LOWER. Verify that the right suspension does NOT lower, and that transducer T1 reads greater than 3500 psi (24131.65 kPa). (This indicates that valve V5 has redirected flow from the suspension to transducer T1, which will now read the value of the system relief valves.)

10. Valve V9 and V10 check:

a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

b. Have the vehicle operator place the vehicle in SPRUNG mode.

c. Verify that the bump stops are extended.

d. Use the LINE UP and LINE DOWN buttons to select valve V9. Press CHANGE POSITION to close valve V9.

e. Use the LINE UP and LINE DOWN buttons to select valve V10. Press CHANGE POSITION to close valve V10.

f. Have the vehicle operator place the vehicle in UNSPRUNG mode.

g. Verify that the bump stops are still extended. (This indicates that V9 and V10 are closed, preventing operation of the bump stops.)

h. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.

i. Verify that the bump stops are now retracted. (This verifies that V9 and V10 have opened.)

USING THE HYDRAULIC DIAGNOSTIC CENTER (HDC) SYSTEM TO TROUBLESHOOT THE M9 HYDRAULIC SYSTEM - Continued **0005 00**

11. Valve V11 check:
    a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
    b. Have the vehicle operator place the vehicle in SPRUNG mode.
    c. Use the LINE UP and LINE DOWN buttons to select valve V11. Press CHANGE POSITION to close valve V11.
    d. Verify that transducer T1 reads less than 500 psi (3447.379 kPa).
    e. Have the vehicle operator place the vehicle in UNSPRUNG mode.
    f. Have the vehicle operator move the left SUSPENSION CONTROL lever to LOWER.
    g. Verify that transducer T1 reads greater than 3000 psi (20684.27 kPa). (This indicates that V11 has directed flow from the suspension to transducer T1, which now reads the system relief valve pressure setting.)
12. Valve V14 check:
    a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
    b. Use the LINE UP and LINE DOWN buttons to select valve V14. Press CHANGE POSITION to close valve V14.
    c. Have the vehicle operator move the winch control lever to PAY OUT until transducer T1 reads less than 500 psi (3447.379 kPa).
    d. Have the vehicle operator move the winch control lever to PAY IN until transducer T1 reads greater than 1500 psi (10342.14 kPa). (This indicates that V14 has directed flow from the winch circuit to transducer T1.)
13. Valve V15 check:
    a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
    b. Use the LINE UP and LINE DOWN buttons to select valve V15. Press CHANGE POSITION to close valve V15.
    c. Have the vehicle operator move the right SUSPENSION CONTROL lever to LOWER until transducer T1 reads less than 500 psi (3447.379 kPa).
    d. Have the vehicle operator move the right SUSPENSION CONTROL lever to RAISE until transducer T1 reads greater than 3000 psi (20684.27 kPa). (This indicates that V15 has directed flow from the suspension circuit to transducer T1.)
14. Valve V16 check:
    a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
    b. Use the LINE UP and LINE DOWN buttons to select valve V16. Press CHANGE POSITION to close valve V16.
    c. Have the vehicle operator move the left SUSPENSION CONTROL lever to LOWER until transducer T1 reads less than 500 psi (3447.379 kPa).
    d. Have the vehicle operator move the left SUSPENSION CONTROL lever to RAISE until transducer T1 reads greater than 3000 psi (20684.27 kPa). (This indicates that V16 has directed flow from the suspension circuit to transducer T1.)

USING THE HYDRAULIC DIAGNOSTIC CENTER (HDC) SYSTEM TO TROUBLESHOOT THE M9 HYDRAULIC SYSTEM - Continued **0005 00**

15. Valve V17 check:
    a. Push the RESET VALVES button on the HDC Control Box, and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
    b. Use the LINE UP and LINE DOWN buttons to select valve V17. Press CHANGE POSITION to close valve V17.
    c. Have the vehicle operator move the APRON control lever to LOWER until transducer T1 reads less than 500 psi (3447.379 kPa).
    d. Have the vehicle operator move the APRON control lever to RAISE until transducer T1 reads greater than 3000 psi (20684.27 kPa). (This indicates that V17 has directed flow from the apron circuit to transducer T1.)
16. Valve V1 check:
    a. Turn off the HDC Control Box by depressing the POWER button.
    b. Have the vehicle operator stop the engine.
    c. Manually open valve V23 by moving the handle to a fully vertical position.
    d. Have the vehicle operator start the engine.
    e. Power up the HDC Control Box by pressing the POWER button.
    f. Use the LINE UP and LINE DOWN buttons to select valve V1. Press CHANGE POSITION button to close valve V1.
    g. Have vehicle operator move the EJECTOR CONTROL lever forward and backward. Ensure that the ejector does not move. (This indicates that valve V1 has closed.)
    h. Push the RESET VALVES button on the HDC Control Box and verify all the valves are set to the power OFF setting and are in the default position as shown in Table 1.
17. When the Functional Check-Out is complete, proceed to use the HDC system as an aid to troubleshoot a problem with the vehicle hydraulic system or shut down the vehicle per TM 5-2350-262-10 and stow the HDC Control Box and umbilical cable W4.

Table 2. HDC SYSTEM SOLENOID VALVE DEFINITION

VALVE NO.	ELECTRICAL MATING CONNECTOR	PHYSICAL LOCATION	DEFINITION	CIRCUIT/ PORT	NOTES
V1	W2P1	Primary Manifold	Ejector Control Extend	21	Shutoff Valve (Normally Open)
V2	W3P2	Forward Right Manifold	No. 1 Actuator, Right Suspension Port 11	11/11A	Shutoff Valve (Normally Open)
V3	W3P3	Forward Left Manifold	No. 1 Actuator, Left Suspension Port 11	11/11A	Shutoff Valve (Normally Open)
V4	W3P4	Aft Manifold	No. 4 Actuator, Left Suspension Port 9	9	Shutoff Valve (Normally Open)
V5	W2P5	Primary Manifold	Right Hand Suspension Lower	17R	Three-Way Valve
V6	W3P6	Aft Manifold	No. 4 Actuator, Left Suspension Port 2	2	Shutoff Valve (Normally Open)
V7	W3P7	Aft Manifold	No. 3 Actuator, Left Suspension Port 2	2A/2	Shutoff Valve (Normally Open)
V8	W3P8	Aft Manifold	No. 4 Actuator, Left Suspension Port 11	11	Shutoff Valve (Normally Open)
V9	W3P9	Forward Left Manifold	Left Bump Stop Cylinder Extend	11/11B	Shutoff Valve (Normally Open)
V10	W3P10	Forward Right Manifold	Right Bump Stop Cylinder Extend	11/11B	Shutoff Valve (Normally Open)
V11	W2P11	Primary Manifold	Left Hand Suspension Lower	17L/7	Three-Way Valve
V12	W2P12	Primary Manifold	Suspension Relief Valve Port 9	9	Shutoff Valve (Normally Open)
V13	W2P13	Primary Manifold	Suspension Relief Valve, Main Accumulator	9A	Shutoff Valve (Normally Open)
V14	W2P14	Primary Manifold	Winch Control Shutoff	C2	Three-Way Valve
V15	W2P15	Primary Manifold	Right Hand Suspension Raise	3R	Three-Way Valve
V16	W2P16	Primary Manifold	Left Hand Suspension Raise	3L	Three-Way Valve
V17	W2P17	Primary Manifold	Apron Cylinder Retract (Raise)	19	Three-Way Valve
V18	W3P18	Aft Manifold	No. 4 Actuator, Left Suspension Port 9 to Port 2		Shutoff Valve (Normally Open)

Table 2 HDC SYSTEM SOLENOID VALVE DEFINITION - Continued

V19	W2P19	Primary Manifold	Suspension Relief Valve Port 17R	17R	Shutoff Valve (Normally Closed)
V20	W2P20	Primary Manifold	Ejector Cylinder Extend to Main Accumulator	9A	Shutoff Valve (Normally Closed)

Table 3. HDC SYSTEM PRESSURE TRANSDUCERS

TRANSDUCER NO.	ELECTRICAL MATING CONNECTOR	PHYSICAL LOCATION	DEFINITION
T1	W2P31	Primary Manifold	Shared
T2	W2P2	Primary Manifold	Ejector Control Valve Extend Pressure
T3	W2P3	Near Left Main Pump Filter	Right Main Hydraulic Pressure
T4	W2P4	Near Right Main Pump Filter	Left Main Hydraulic Pressure
T5	W3P5	Forward Right Actuator #1	#1 Actuator, Right Suspension Port 3 Pressure
T6	W3P31	Forward Left Actuator #1	#1 Actuator, Left Suspension Port 3 Pressure
T7	W2P7	Left Main Manifold	Left Manifold Port 9 Pressure
T8	W3P33	Right Side Underneath Sprung Stop Cylinder	Right Bump Stop Cylinder Retract Pressure
T9	W3P32	Left Side Underneath Sprung Stop Cylinder	Left Bump Stop Cylinder Retract Pressure
T10	W3P30	Forward Left Manifold	Left Bump Stop Cylinder Extend Pressure
T11	W3P11	Forward Right Manifold	Right Bump Stop Cylinder Extend Pressure
T12	W2P30	Near Suspension (Sprung/Unsprung) Valve	Sprung/Unsprung Control Valve Port 11 Pressure
T13	W2P32	Primary Manifold	Suspension Relief Valve Pressure

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification

Connector J1: Mates with Umbilical Cable Connector W4P1								
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description	Comments
A	16	HDC Control Box Power		Vehicle 15A Circuit Breaker	HDC Control Box	1070	18 – 32VDC per MIL-STD-1275, 10A Maximum	The maximum current rating includes the 4 spare transducers and 4 valves turned 'ON' simultaneously
B	16	HDC Control Box Power Return		Vehicle Ground Connection	HDC Control Box	1069	24VDC Ground	
C	16	Spare						

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
A	20	Spare Shutoff Valve Power 1		HDC Control Box			18 – 32VDC per MIL-STD-1275
B	20	Spare Shutoff Valve Power Return 1		HDC Control Box			18 – 32VDC per MIL-STD-1275 Power Return
C	20	Spare Shutoff Valve Power 2		HDC Control Box			18 – 32VDC per MIL-STD-1275
D	20	Spare Shutoff Valve Power Return 2		HDC Control Box			18 – 32VDC per MIL-STD-1275 Power Return
E	20	Spare Shutoff Valve Power 3		HDC Control Box			18 – 32VDC per MIL-STD-1275
F	20	Spare Shutoff Valve Power Return 3		HDC Control Box			18 – 32VDC per MIL-STD-1275 Power Return

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
G	20	Spare Shutoff Valve Power 4		HDC Control Box			18 – 32VDC per MIL-STD-1275
H	20	Spare Shutoff Valve Power Return 4		HDC Control Box			18 – 32VDC per MIL-STD-1275 Power Return
J	20	Spare					
K	20	Spare					
L	20	Spare					
M	20	Spare					
N	20	Spare					
P	20	Ejector Control Extend Shutoff Valve Power	V1	HDC Control Box	Ejector Control Extend Shutoff Valve	1029	18 – 32VDC per MIL-STD-1275
R	20	Ejector Control Extend Shutoff Valve Power Return	V1	HDC Control Box	Ejector Control Extend Shutoff Valve	1030	18 – 32VDC per MIL-STD-1275 Power Return
S	20	Right Suspension Port 11 Shutoff Valve No. 1 Actuator Power	V2	HDC Control Box	Right Suspension Port 11 Shutoff Valve No. 1 Actuator	1031	18 – 32VDC per MIL-STD-1275
T	20	Right Suspension Port 11 Shutoff Valve No. 1 Actuator Power Return	V2	HDC Control Box	Right Suspension Port 11 Shutoff Valve No. 1 Actuator	1032	18 – 32VDC per MIL-STD-1275 Power Return
U	20	Left Suspension Port 11 Shutoff Valve No.1 Actuator Power	V3	HDC Control Box	Left Suspension Port 11 Shutoff Valve No.1 Actuator	1033	18 – 32VDC per MIL-STD-1275

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
V	20	Left Suspension Port 11 Shutoff Valve No.1 Actuator Power Return	V3	HDC Control Box	Left Suspension Port 11 Shutoff Valve No.1 Actuator	1034	18 – 32VDC per MIL-STD-1275 Power Return
W	20	Left Suspension Port 9 Shutoff Valve No. 4 Actuator Power	V4	HDC Control Box	Left Suspension Port 9 Shutoff Valve No. 4 Actuator	1035	18 – 32VDC per MIL-STD-1275
X	20	Left Suspension Port 9 Shutoff Valve No. 4 Actuator Power Return	V4	HDC Control Box	Left Suspension Port 9 Shutoff Valve No. 4 Actuator	1036	18 – 32VDC per MIL-STD-1275 Power Return
Y	20	Right Hand Suspension Lower Shutoff Valve Power	V5	HDC Control Box	Right Hand Suspension Lower Shutoff	1037	18 – 32VDC per MIL-STD-1275
Z	20	Right Hand Suspension Lower Shutoff Valve Power Return	V5	HDC Control Box	Right Hand Suspension Lower Shutoff	1038	18 – 32VDC per MIL-STD-1275 Power Return
a	20	Left Suspension Port 2 Shutoff Valve No. 4 Actuator Power	V6	HDC Control Box	Left Suspension Port 2 Shutoff Valve No. 4 Actuator	1039	18 – 32VDC per MIL-STD-1275
b	20	Left Suspension Port 2 Shutoff Valve No. 4 Actuator Power Return	V6	HDC Control Box	Left Suspension Port 2 Shutoff Valve No. 4 Actuator	1040	18 – 32VDC per MIL-STD-1275 Power Return
c	20	Left Suspension Port 2 Shutoff Valve No. 3 Actuator Power	V7	HDC Control Box	Left Suspension Port 2 Shutoff Valve No. 3 Actuator	1041	18 – 32VDC per MIL-STD-1275

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
d	20	Left Suspension Port 2 Shutoff Valve No. 3 Actuator Power Return	V7	HDC Control Box	Left Suspension Port 2 Shutoff Valve No. 3 Actuator	1042	18 – 32VDC per MIL-STD-1275 Power Return
e	20	Left Suspension Port 11 Shutoff Valve No. 4 Actuator Power	V8	HDC Control Box	Left Suspension Port 11 Shutoff Valve No. 4 Actuator	1043	18 – 32VDC per MIL-STD-1275
f	20	Left Suspension Port 11 Shutoff Valve No. 4 Actuator Power Return	V8	HDC Control Box	Left Suspension Port 11 Shutoff Valve No. 4 Actuator	1044	18 – 32VDC per MIL-STD-1275 Power Return
g	20	Left Bump Stop Cylinder Extend Shutoff Valve Power	V9	HDC Control Box	Left Bump Stop Cylinder Extend Shutoff Valve	1045	18 – 32VDC per MIL-STD-1275
h	20	Left Bump Stop Cylinder Extend Shutoff Valve Power Return	V9	HDC Control Box	Left Bump Stop Cylinder Extend Shutoff Valve	1046	18 – 32VDC per MIL-STD-1275 Power Return
k	20	Right Bump Stop Cylinder Extend Shutoff Valve Power	V10	HDC Control Box	Right Bump Stop Cylinder Extend Shutoff Valve	1047	18 – 32VDC per MIL-STD-1275
m	20	Right Bump Stop Cylinder Extend Shutoff Valve Power Return	V10	HDC Control Box	Right Bump Stop Cylinder Extend Shutoff Valve	1048	18 – 32VDC per MIL-STD-1275 Power Return
n	20	Left Hand Suspension Lower Shutoff Valve Power	V11	HDC Control Box	Left Hand Suspension Lower Shutoff Valve	1049	18 – 32VDC per MIL-STD-1275

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
p	20	Left Hand Suspension Lower Shutoff Valve Power Return	V11	HDC Control Box	Left Hand Suspension Lower Shutoff Valve	1050	18 – 32VDC per MIL-STD-1275 Power Return
q	20	Suspension Relief Valve Port 9 Shutoff Valve Power	V12	HDC Control Box	Suspension Relief Valve Port 9 Shutoff Valve	1051	18 – 32VDC per MIL-STD-1275
r	20	Suspension Relief Valve Port 9 Shutoff Valve Power Return	V12	HDC Control Box	Suspension Relief Valve Port 9 Shutoff Valve	1052	18 – 32VDC per MIL-STD-1275 Power Return
s	20	Suspension Relief Valve – Main Accumulator Shutoff Valve Power	V13	HDC Control Box	Suspension Relief Valve – Main Accumulator Shutoff Valve	1053	18 – 32VDC per MIL-STD-1275
t	20	Suspension Relief Valve – Main Accumulator Shutoff Valve Power Return	V13	HDC Control Box	Suspension Relief Valve – Main Accumulator Shutoff Valve	1054	18 – 32VDC per MIL-STD-1275 Power Return
u	20	Winch Control Shutoff Valve Power	V14	HDC Control Box	Winch Control Shutoff Valve	1055	18 – 32VDC per MIL-STD-1275
v	20	Winch Control Shutoff Valve Power Return	V14	HDC Control Box	Winch Control Shutoff Valve	1056	18 – 32VDC per MIL-STD-1275 Power Return

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
w	20	Right Hand Suspension Raise Shutoff Valve Power	V15	HDC Control Box	Right Hand Suspension Raise Shutoff Valve	1057	18 – 32VDC per MIL-STD-1275
x	20	Right Hand Suspension Raise Shutoff Valve Power Return	V15	HDC Control Box	Right Hand Suspension Raise Shutoff Valve	1058	18 – 32VDC per MIL-STD-1275 Power Return
y	20	Left Hand Suspension Raise Shutoff Valve Power	V16	HDC Control Box	Left Hand Suspension Raise Shutoff Valve	1059	18 – 32VDC per MIL-STD-1275
z	20	Left Hand Suspension Raise Shutoff Valve Power Return	V16	HDC Control Box	Left Hand Suspension Raise Shutoff Valve	1060	18 – 32VDC per MIL-STD-1275 Power Return
AA	20	Apron Cylinder Retract Shutoff Valve Power	V17	HDC Control Box	Apron Cylinder Retract Shutoff Valve	1061	18 – 32VDC per MIL-STD-1275
BB	20	Apron Cylinder Retract Shutoff Valve Power Return	V17	HDC Control Box	Apron Cylinder Retract Shutoff Valve	1062	18 – 32VDC per MIL-STD-1275 Power Return
CC	20	Left Suspension Port 9 to Port 2 Shutoff Valve No. 4 Actuator Power	V18	HDC Control Box	Valve Left Suspension Port 9 to Port 2 Shutoff Valve No. 4 Actuator	1063	18 – 32VDC per MIL-STD-1275
DD	20	Left Suspension Port 9 to Port 2 Shutoff Valve No. 4 Actuator Power Return	V18	HDC Control Box	Valve Left Suspension Port 9 to Port 2 Shutoff Valve No. 4 Actuator	1064	18 – 32VDC per MIL-STD-1275 Power Return

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J2: Mates with Umbilical Cable Connector W4P2							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
EE	20	Suspension Relief Valve Port 17R Shutoff Valve Power	V19	HDC Control Box	Suspension Relief Valve Port 17R Shutoff Valve	1065	18 – 32VDC per MIL-STD-1275
FF	20	Suspension Relief Valve Port 17R Shutoff Valve Power Return	V19	HDC Control Box	Suspension Relief Valve Port 17R Shutoff Valve	1066	18 – 32VDC per MIL-STD-1275 Power Return
GG	20	Ejector Cylinder Extend to Main Accumulator Shutoff Valve Power	V20	HDC Control Box	Ejector Cylinder Extend to Main Accumulator Shutoff Valve	1067	18 – 32VDC per MIL-STD-1275
HH	20	Ejector Cylinder Extend to Main Accumulator Shutoff Valve Power Return	V20	HDC Control Box	Ejector Cylinder Extend to Main Accumulator Shutoff Valve	1068	18 – 32VDC per MIL-STD-1275 Power Return

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
A	20	Spare Transducer Signal Output 1		Pressure Transducer	HDC Control Box		0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
B	20	Spare Transducer Signal Output Return 1		HDC Control Box	Pressure Transducer		HDC Control Box Signal Output Return
C	20	Spare Transducer Signal Output 2		Pressure Transducer	HDC Control Box		0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
D	20	Spare Transducer Signal Output Return 2		HDC Control Box	Pressure Transducer		HDC Control Box Signal Output Return
E	20	Spare Transducer Signal Output 3		Pressure Transducer	HDC Control Box		0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
F	20	Spare Transducer Signal Output Return 3		HDC Control Box	Pressure Transducer		HDC Control Box Signal Output Return
G	20	Spare Transducer Signal Output 4		Pressure Transducer	HDC Control Box		0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
H	20	Spare Transducer Signal Output Return 4		HDC Control Box	Pressure Transducer		HDC Control Box Signal Output Return
J	20	CANH		HDC Control Box			
K	20	CANL		HDC Control Box			
L	20	CAN BUS SHIELD		HDC Control Box			
M	20	Spare					
N	20	Spare					
P	20	Spare					
R	20	Spare					
S	20	Shared Transducer Signal Output Functions utilizing Shared Transducer: Right Hand Suspension Raise Pressure Apron Cylinder Retract Pressure Right Hand Suspension Lower Pressure Left Hand Suspension Lower Pressure	T1	Pressure Transducer	HDC Control Box	1000	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
S (cont)	20	Winch Control Pressure Left Hand Suspension Raise Pressure	T1	Pressure Transducer	HDC Control Box	1000	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
T	20	Shared Transducer Signal Output Return	T1	HDC Control Box	Pressure Transducer	1001	HDC Control Box Signal Output Return
U	20	Ejector Control Valve Extend Pressure Signal Output	T2	Pressure Transducer	HDC Control Box	1002	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
V	20	Ejector Control Valve Extend Pressure Signal Output Return	T2	HDC Control Box	Pressure Transducer	1003	HDC Control Box Signal Output Return
W	20	Right Main Hydraulic Pressure Signal Output	T3	Pressure Transducer	HDC Control Box	1004	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
X	20	Right Main Hydraulic Pressure Signal Output Return	T3	HDC Control Box	Pressure Transducer	1005	HDC Control Box Signal Output Return
Y	20	Left Main Hydraulic Pressure Signal Output	T4	Pressure Transducer	HDC Control Box	1006	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
Z	20	Left Main Hydraulic Pressure Signal Output Return	T4	HDC Control Box	Pressure Transducer	1007	HDC Control Box Signal Output Return
a	20	Right Suspension Port 3 Pressure No. 1 Actuator Signal Output	T5	Pressure Transducer	HDC Control Box	1008	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
b	20	Right Suspension Port 3 Pressure No. 1 Actuator Signal Output Return	T5	HDC Control Box	Pressure Transducer	1009	HDC Control Box Signal Output Return
c	20	Left Suspension Port 3 Pressure No. 1 Actuator Signal Output	T6	Pressure Transducer	HDC Control Box	1010	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
d	20	Left Suspension Port 3 Pressure No. 1 Actuator Signal Output Return	T6	HDC Control Box	Pressure Transducer	1011	HDC Control Box Signal Output Return
e	20	Left Manifold Port 9 Pressure Signal Output	T7	Pressure Transducer	HDC Control Box	1012	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
f	20	Left Manifold Port 9 Pressure Signal Output Return	T7	HDC Control Box	Pressure Transducer	1013	HDC Control Box Signal Output Return
g	20	Right Bump Stop Cylinder Retract Pressure Signal Out	T8	Pressure Transducer	HDC Control Box	1014	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
h	20	Right Bump Stop Cylinder Retract Pressure Signal Output Return	T8	HDC Control Box	Pressure Transducer	1015	HDC Control Box Signal Output Return
k	20	Left Bump Stop Cylinder Retract Pressure Signal Output	T9	Pressure Transducer	HDC Control Box	1016	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
m	20	Left Bump Stop Cylinder Retract Pressure Signal Output Return	T9	HDC Control Box	Pressure Transducer	1017	HDC Control Box Signal Output Return
n	20	Left Bump Stop Cylinder Extend Pressure Signal Output	T10	Pressure Transducer	HDC Control Box	1018	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
p	20	Left Bump Stop Cylinder Extend Pressure Signal Output Return	T10	HDC Control Box	Pressure Transducer	1019	HDC Control Box Signal Output Return
q	20	Right Bump Stop Cylinder Extend Pressure Signal Output	T11	Pressure Transducer	HDC Control Box	1020	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
r	20	Right Bump Stop Cylinder Extend Pressure Signal Output Return	T11	HDC Control Box	Pressure Transducer	1021	HDC Control Box Signal Output Return

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
s	20	Sprung/Unsprung Control Valve Port 11 Pressure Signal Output	T12	Pressure Transducer	HDC Control Box	1022	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
t	20	Sprung/Unsprung Control Valve Port 11 Pressure Signal Output Return	T12	HDC Control Box	Pressure Transducer	1023	HDC Control Box Signal Output Return
u	20	Suspension Relief Valve Pressure Signal Output	T13	Pressure Transducer	HDC Control Box	1024	0.5VDC – 0 PSIG 9.5VDC – 4000 PSIG
v	20	Suspension Relief Valve Pressure Signal Output Return	T13	HDC Control Box	Pressure Transducer	1025	HDC Control Box Signal Output Return
w	20	Pressure Transducer Excitation (+)		HDC Control Box	Pressure Transducer	1026A	15VDC +/- 0.5VDC, Ripple and Noise: 200 mVpk - pk
x	20	Pressure Transducer Excitation (-)		HDC Control Box	Pressure Transducer	1027A	HDC Control Box Pressure Transducer Power Return
y	20	Pressure Transducer Excitation (+)		HDC Control Box	Pressure Transducer	1026B	15VDC +/- 0.5VDC, Ripple and Noise: 200 mVpk - pk
z	20	Pressure Transducer Excitation (-)		HDC Control Box	Pressure Transducer	1027B	HDC Control Box Pressure Transducer Power Return
AA	20	Pressure Transducer Excitation (+)		HDC Control Box	Pressure Transducer	1026C	15VDC +/- 0.5VDC, Ripple and Noise: 200 mVpk - pk
BB	20	Pressure Transducer Excitation (-)		HDC Control Box	Pressure Transducer	1027C	HDC Control Box Pressure Transducer Power Return
CC	20	Pressure Transducer Excitation (+)		HDC Control Box	Pressure Transducer	1026D	15VDC +/- 0.5VDC, Ripple and Noise: 200 mVpk - pk

Table 4. HDC Control Box Connectors – Pin Designation Signal Names/Identification - Continued

Connector J3: Mates with Umbilical Cable Connector W4P3							
Pin Number	AWG	Signal Name Description	Reference Designator	Signal Source	Signal Designation	Signal Circuit No.	Signal Description
DD	20	Pressure Transducer Excitation (-)		HDC Control Box	Pressure Transducer	1027D	HDC Control Box Pressure Transducer Power Return
EE	20	Signal Output Shield		HDC Control Box	Pressure Transducer	1028A	HDC Control Box Signal Output Shield (Chassis Ground)
FF	20	Signal Output Shield		HDC Control Box	Pressure Transducer	1028B	HDC Control Box Signal Output Shield (Chassis Ground)
GG	20	Signal Output Shield		HDC Control Box	Pressure Transducer	1028C	HDC Control Box Signal Output Shield (Chassis Ground)
HH	20	Signal Output Shield		HDC Control Box	Pressure Transducer	1028D	HDC Control Box Signal Output Shield (Chassis Ground)

NOTE

- **The probability of a stuck solenoid valve is low and would occur after a hydraulic maintenance test is performed where a solenoid valve was energized (to change status) as part of a specific test.**
- **Numbers in parenthesis (possible consequences) correspond to vehicle hydraulic line numbers as shown on M9 ACE HDC hydraulic system schematic (FP-1 through FP-6).**

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V1-Shutoff valve - ejector control valve extend	• Can't extend ejector cylinder or can't retract ejector cylinder. • Can't dump load or can't retract ejector to fill load. • Can't fold or unfold apron.
Solenoid Valve V2-Shutoff valve - No. 1 actuator right front	SPRUNG MODE: • No hydraulic fluid return (11) from right front wheel valve. • Wheel valve stays in unsprung position. • No hydraulic fluid supply (9) to right front actuators 1 & 2. • Front right of vehicle will not be raised. • Right front of vehicle will drag or bottom out. • No suspension shock absorbing capability on right front side. UNSPRUNG MODE: • No hydraulic fluid supply (11) to right front wheel valve. • Wheel valve stays in sprung position. • No hydraulic fluid return (3) connection from actuators 1 & 2 to DCV. • Undesired hydraulic fluid supply (9) to front right actuators 1 & 2. • Right front of vehicle is raised to sprung position. • Undesired suspension dampening on right front side. UNSPRUNG-LOWER: • No hydraulic fluid supply (17) to front right actuator 1. • No hydraulic fluid return (3) from right front actuators 1 & 2. • Front right of vehicle will not be lowered. UNSPRUNG-RAISE: • No hydraulic fluid supply (3) to right front actuators 1 & 2. • No hydraulic fluid return (17) from right front actuators 1 & 2. • Front right of vehicle cannot be raised but is already in sprung/raised position.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V3-Shutoff valve - No. 1 actuator left front	SPRUNG MODE: • No hydraulic fluid return (11) from left front wheel valve. • Wheel valve stays in unsprung position. • No hydraulic fluid supply (9) to left front actuators 1 & 2. • Front left of vehicle will not be raised. • No suspension shock absorbing capability on left front side. UNSPRUNG MODE: • No hydraulic fluid supply (11) to left front wheel valve. • Wheel valve stays in sprung position. • No hydraulic fluid return (3) connection from actuators 1 & 2 to DCV. • Undesired hydraulic fluid supply (9) to front left actuators 1 & 2. • Left front of vehicle is raised to sprung position. • Undesired suspension dampening on left front side. UNSPRUNG-LOWER: • No hydraulic fluid supply (17) to front left actuator 1. • No hydraulic fluid return (3) from left front actuators 1 & 2. • Front left of vehicle will not be lowered. UNSPRUNG-RAISE: • No hydraulic fluid supply (3) to left front actuators 1 & 2. • No hydraulic fluid return (17) from left front actuators 1 & 2. • Front left of vehicle cannot be raised but is already in sprung/raised position.
Solenoid Valve V4-Shutoff valve - No. 4 left actuator port 9	SPRUNG MODE: • No hydraulic fluid supply (9) to left rear wheel valve. • Wheel valve in unsprung position. • No hydraulic fluid supply (9) to left rear actuators 3 & 4. • Rear left of vehicle will not be raised. • Left rear of vehicle will drag or bottom out. • No suspension shock absorbing capability on rear left side. UNSPRUNG MODE: • No hydraulic fluid supply (9) to left and right rear wheel valves. • No hydraulic fluid supply to left actuators 3 & 4 and right actuators 3 & 4. • Rear of vehicle will not be raised.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V5-Shutoff valve - right hand suspension	SPRUNG MODE: • No hydraulic fluid return (17). • Delay in intermediate valve operation. • Delay in raising right front side. UNSPRUNG MODE-LOWER: • No hydraulic fluid supply (17 lower) to intermediate wheel control valve. • No hydraulic fluid supply (17) to right front actuator 1. • Inability to completely lower right front side of vehicle. UNSPRUNG MODE-RAISE: • No hydraulic fluid return (17) from right front actuator 1 & 2. • Hydraulic fluid will return through (7).
Solenoid Valve V6-Shutoff valve - No. 3 left actuator	SPRUNG MODE: • No hydraulic fluid supply (9) to left rear intermediate actuator 3. • Rear left of vehicle partially raised. • Left rear of vehicle will bottom out. • Possible vehicle damage. • Partial suspension shock absorbing capability on rear left side. UNSPRUNG MODE: • No hydraulic fluid supply (9) to left rear intermediate actuator 3. • Rear left of vehicle will only be partially raised.
Solenoid Valve V7-Shutoff valve - No. 3 actuator, left suspension port 2	SPRUNG MODE: • No hydraulic fluid supply (9) to left rear intermediate actuator 3. • Rear left of vehicle partially raised. • Left rear of vehicle will bottom out. • Partial suspension shock absorbing capability on rear left side. UNSPRUNG MODE: • No hydraulic fluid supply (9) to left rear intermediate actuator 3. • Rear left of vehicle will only be partially raised.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V8-Shutoff valve - No. 4 left actuator	SPRUNG MODE: • No hydraulic fluid return (11) from left rear wheel valve. • Wheel valve in unsprung position. • No suspension shock absorbing capability on rear left side. UNSPRUNG MODE: • No hydraulic fluid supply (11) to left rear wheel valve. • Wheel valve in sprung position. • Undesired suspension shock absorbing capability on rear left side. • Right rear actuators maintain position or lower. • Rear actuators maintain sprung position.
Solenoid Valve V9-Shutoff valve - Front left bump stop extend	SPRUNG MODE: • No hydraulic fluid return (11) from left side spring stop cylinder (extend). • Left front wheel road arm upper travel not limited. • Suspension can bottom out. • Track may be thrown if vehicle is backed. UNSPRUNG MODE: • No hydraulic fluid supply (11) to left side stop cylinder (retract). • Left front wheel road arm upper travel limited. • Left front of vehicle cannot be lowered to doze or scrape.
Solenoid Valve V10-Shutoff valve - Front right bump stop extend	SPRUNG MODE: • No hydraulic fluid return (11) from right side spring stop cylinder (extend). • Right front wheel road arm upper travel not limited. • Suspension can bottom out. • Track may be thrown if vehicle is backed. UNSPRUNG MODE: • No hydraulic fluid return (11) to right side stop cylinder (retract). • Right front wheel road arm upper travel limited. • Right front of vehicle cannot be lowered to doze or scrape.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V11-Shutoff valve - Left hand suspension lower	SPRUNG MODE: • No impact. UNSPRUNG MODE-LOWER: • No hydraulic fluid supply (17 lower) to intermediate wheel control valve. • No hydraulic fluid supply (17) to left front actuator 1. • Inability to completely lower left front side of vehicle. • Degraded dozing and scraping. UNSPRUNG MODE-RAISE: • No hydraulic fluid supply (17) from left front actuators 1 & 2. • Hydraulic fluid will return through (7).
Solenoid Valve V12-Shutoff valve - Suspension relief valve port 9	SPRUNG MODE: • Inability to charge main accumulator. • Delayed response in suspension adjustment if compensating pump can't keep up with system demand. • Relief valve inactive. • Possible hydraulic system damage if compensating pump fails to regulate pressure.
Solenoid Valve V13-Shutoff valve - Suspension relief valve, main accumulator	SPRUNG MODE: • Inability to charge main accumulator. • Delayed response in suspension adjustment if compensating pump can't keep up with system demand.
Solenoid Valve V14-Shutoff valve - Winch control valve	• Can't supply hydraulic fluid to, or return fluid from, winch motor. • Can't pay out or pay in winch.
Solenoid Valve V15-Shutoff valve - Right hand suspension raise/lower relief	UNSPRUNG MODE-RAISE: • No hydraulic fluid supply (3) to right front actuators 1 & 2 through right front wheel valve. • Right front of vehicle cannot be raised (Was raised in sprung mode and now supply is cut off and cannot get 3500 psi (24131.65 kPa) pressure.)) UNSPRUNG MODE-LOWER: • No hydraulic fluid return (3) from front actuators 1 & 2 through right front wheel valve. • Can't lower right front of vehicle. • Can't doze or fill load evenly.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V16-Shutoff valve - Left hand suspension raise/lower relief	UNSPRUNG MODE-RAISE: • No hydraulic fluid supply (3) to left front actuators 1 & 2 through left front wheel valve. • Can't raise left front of vehicle (Was raised in sprung mode and now supply is cut off and cannot get 3500 psi (24131.65 kPa) pressure.)) UNSPRUNG MODE-LOWER: • No hydraulic fluid supply (3) from front actuators 1 & 2 through left front wheel valve. • Can't lower left front of vehicle. • Degraded dozing or scraping capability.
Solenoid Valve V17-Shutoff valve - Apron retract	• No hydraulic fluid supply going to (raise) or from (lower) apron cylinders. • Apron can't be raised or lowered. • Can't unload or can't retain load in bowl.
Solenoid Valve V18-Shutoff valve - No. 4 actuator, left suspension port 9 to port 2 (normally closed)	STUCK OPEN SPRUNG MODE: • Compensating pressure continuously supplied to left rear actuators 3 & 4. UNSPRUNG MODE: • Compensating pressure at 2850 psi (19650.06 kPa) continuously supplied to left rear actuators 3 & 4 and right rear actuators 3 & 4. If this is normal pressure in unsprung mode, there is no impact.

Table 5. POSSIBLE SYMPTOMS OF FAILED HDC SYSTEM COMPONENTS - Continued

HDC SYSTEM	POSSIBLE CONSEQUENCES
Solenoid Valve V19-Shutoff valve - Suspension relief valve port 17R (normally closed)	STUCK OPEN SPRUNG MODE: • Compensating pump pressure is directed to reservoir return. • No hydraulic fluid supply (9) to wheel valves. • No hydraulic fluid supply (9) to actuators. • Vehicle will not be raised. • Track may be thrown if vehicle is backed. • No suspension shock absorbing capability. UNSPRUNG MODE: • Main accumulator/compensating pump pressure is directed to right front intermediate control valve. • Main accumulator pressure is directed to right front actuator lower side. • No vehicle change in height since raise side pressure is trapped. UNSPRUNG MODE-LOWER: • No impact. UNSPRUNG MODE-RAISE: • Hydraulic fluid supply is directed to return.
Solenoid Valve V20-Shutoff valve - Ejector cylinder extend to main accumulator (normally closed).	STUCK OPEN: • Undesired compensating pressure on ejector cylinder extend. • Ejector will slowly extend due to leakage. UNSPRUNG MODE: • Maximum suspension pressure 2000 psi (13789.51 kPa). • Vehicle can't be fully raised.
Solenoid Valve V21-Shutoff valve - (manual)	• No hydraulic fluid supply to 5/15 micron filters, suspension, bilge pump, apron, winch, main ejector from one side of main pump. • Main pump output is cut off on one side, no flow.
Solenoid Valve V22-Shutoff valve - (manual)	• No hydraulic fluid supply to main pump filters, suspension, winch, main ejector, bilge pump, apron from one side of main pump. • Main pump output is cut off on one side, no flow.
Solenoid Valve V23-Shutoff valve - (manual)	• Cannot extend ejector cylinder or can't retract ejector cylinder. • Can't dump load or can't retract ejector to fill load. • Can't fold dozer blade.

END OF WORK PACKAGE

TROUBLESHOOTING SYMPTOM 0006 00

SCOPE

This portion of the work package contains information on locating faults and causes of hydraulic malfunctions based on specific symptoms that may develop in the M9 ACE that incorporates the HDC System.

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, Table 1. Go to the work package referenced for that symptom. All possible malfunctions cannot be listed. If the specific malfunction is not listed in this symptom index, refer to the vehicle hydraulic schematic diagram for additional information or reference data.

Table 1. TROUBLESHOOTING SYMPTOM INDEX

END OF WORK PACKAGE

ALL HYDRAULIC FUNCTIONS INOPERATIVE 0007 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

Reference
TM 5-2350-262-20-2

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

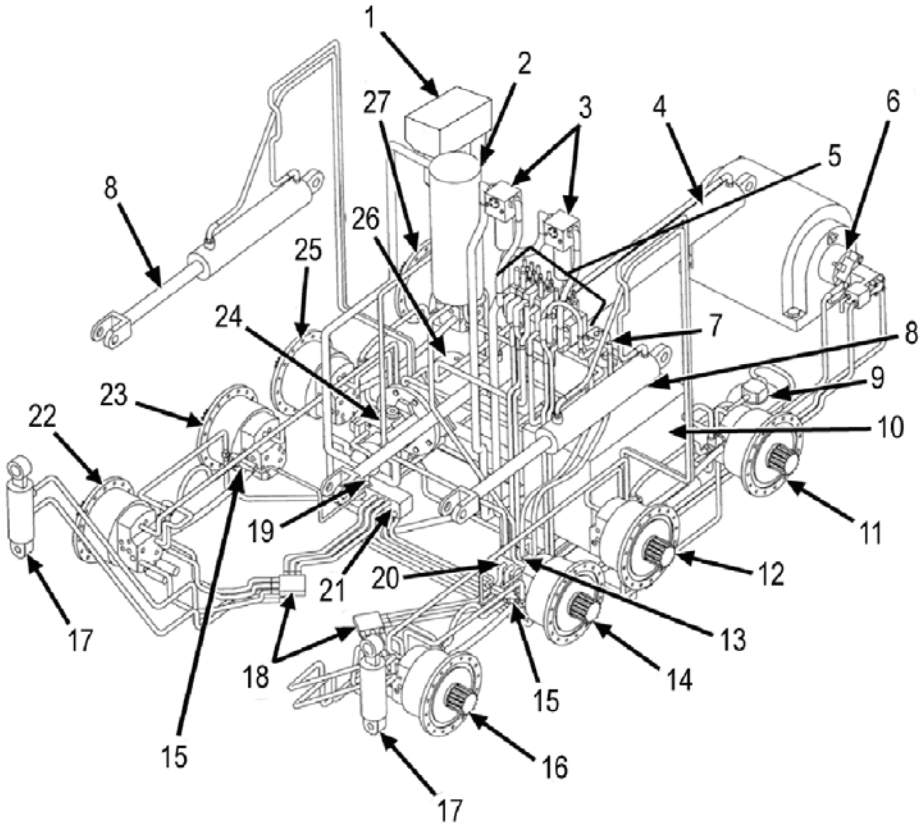
The hydraulic control valves on the directional control valve bank are activated by mechanical linkages from the operator's compartment which then activate hydraulic functions of the vehicle.

WARNING

High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the 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 HDC hydraulic system schematic (FP-1 through FP-6).



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

Figure 1. Hydraulic Circuit

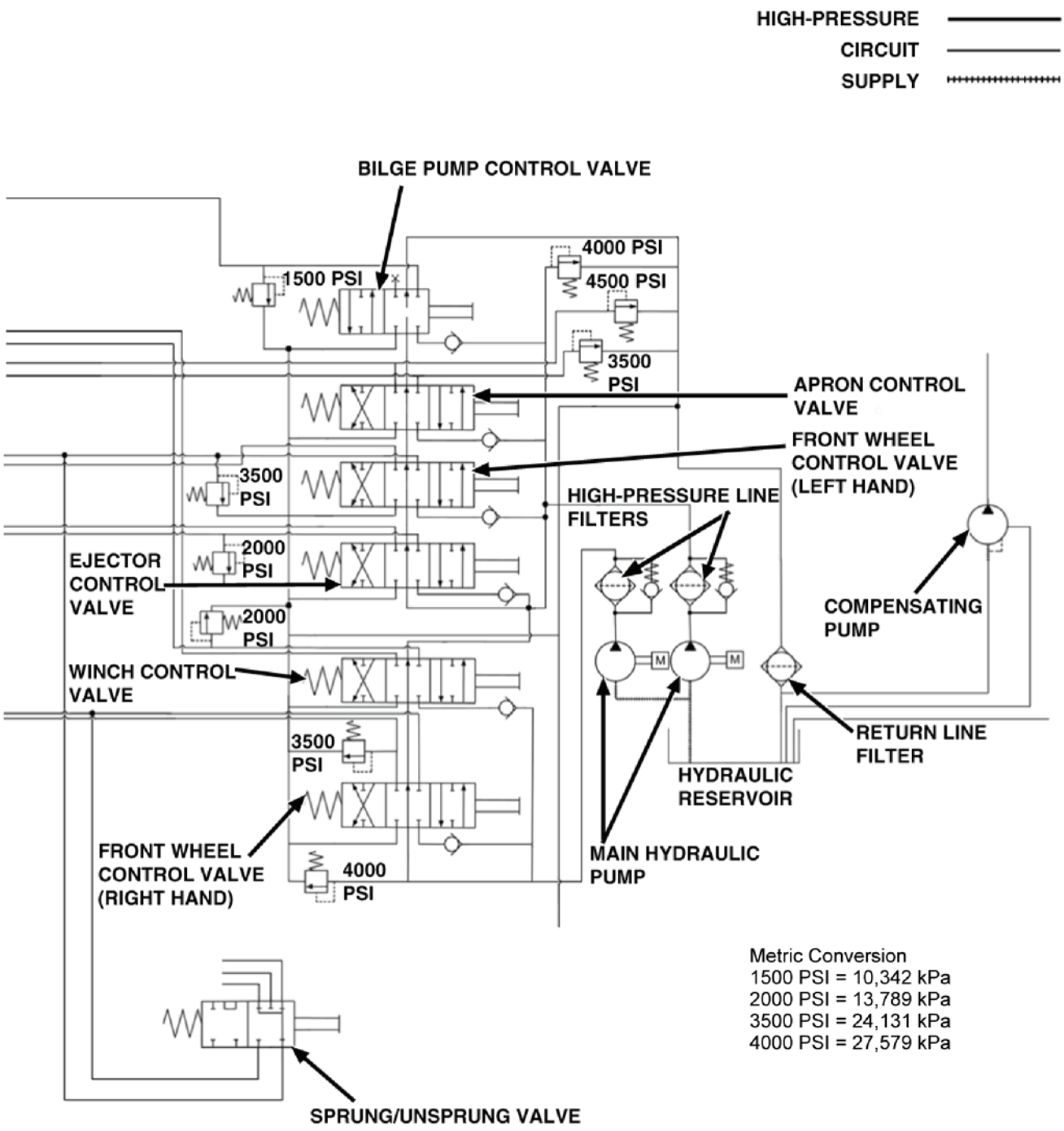
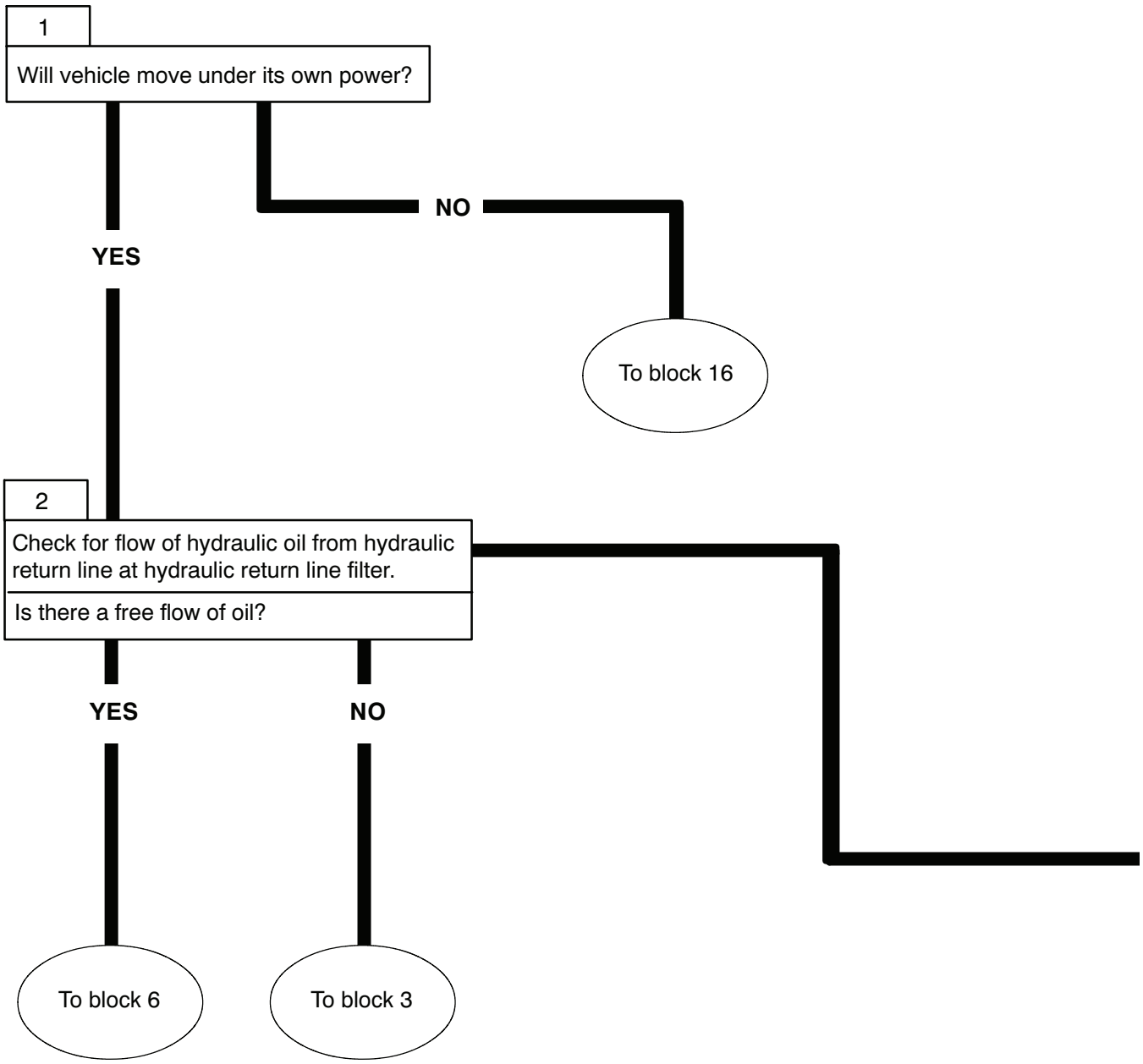


Figure 2. Hydraulic Controls Schematic


1
Will vehicle move under its own power?
NO
YES
To block 16
2
Check for flow of hydraulic oil from hydraulic return line at hydraulic return line filter.
Is there a free flow of oil?
YES
NO
To block 6
To block 3

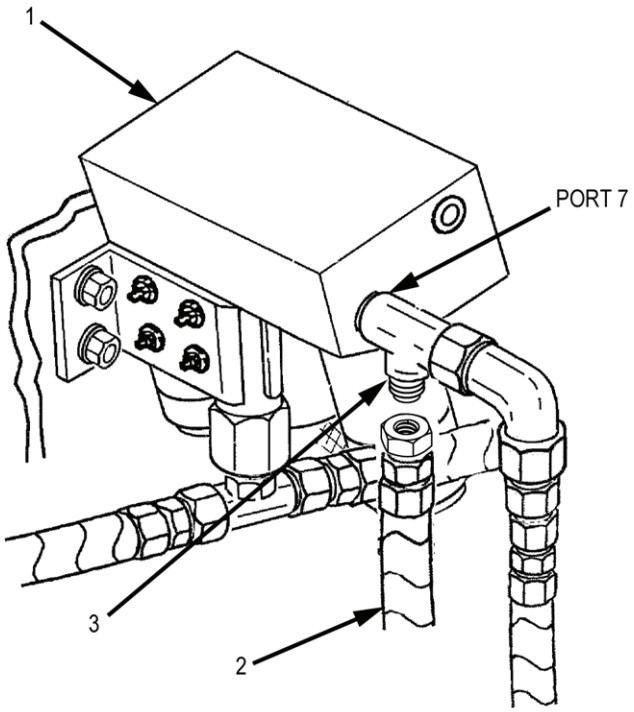


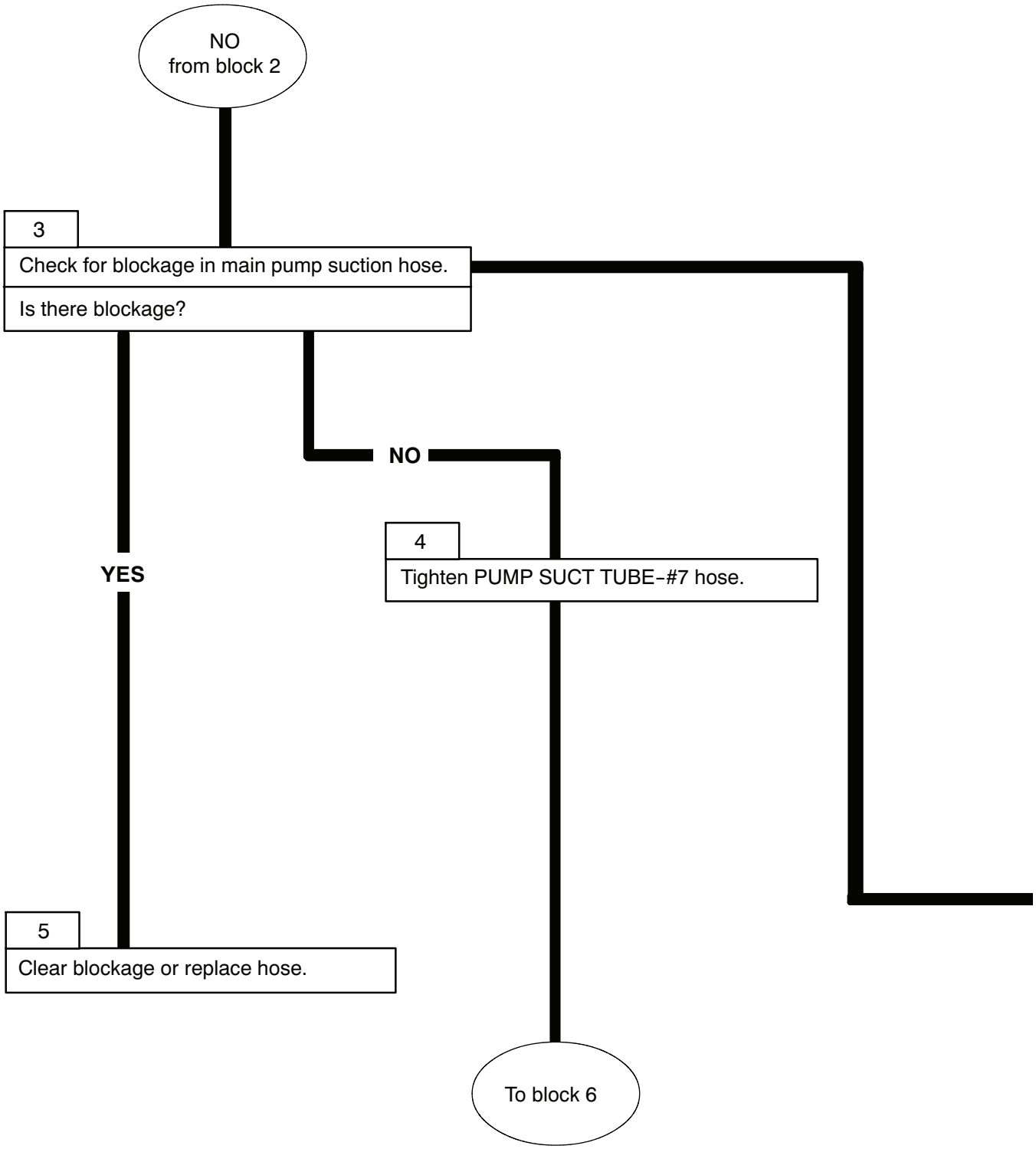
Figure 3. Hydraulic Return Line Filter

OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

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


NO
from block 2
3
Check for blockage in main pump suction hose.
Is there blockage?
NO
YES
4
Tighten PUMP SUCT TUBE-#7 hose.
5
Clear blockage or replace hose.
To block 6

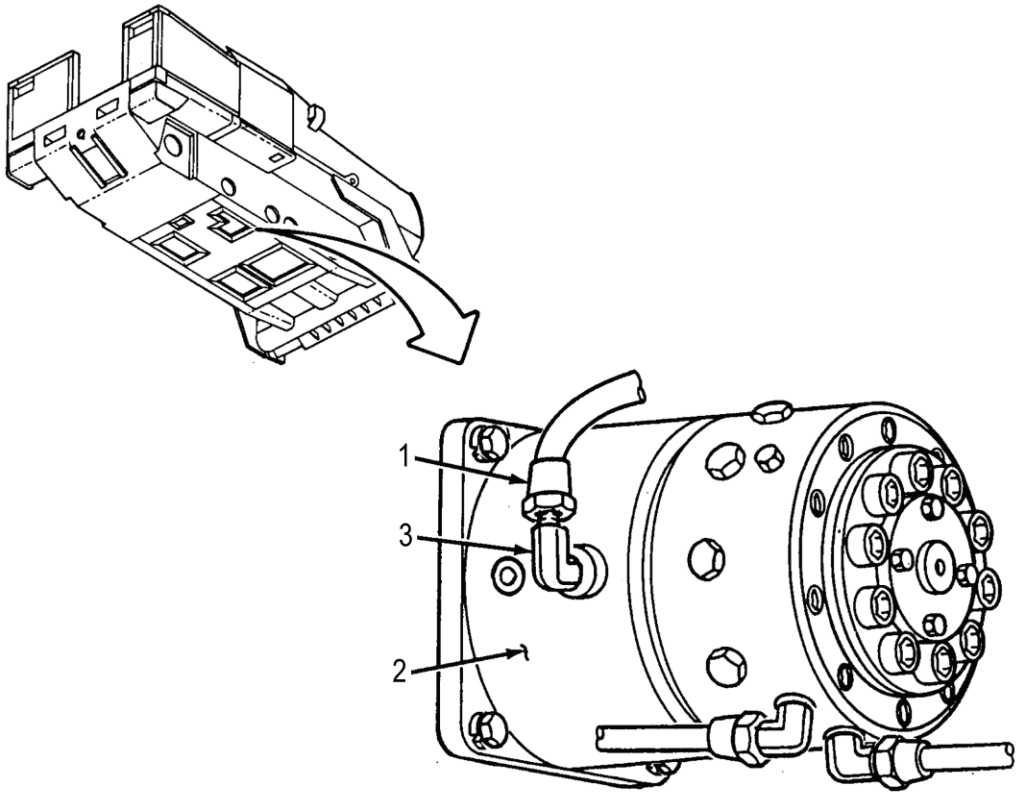


Figure 4. Main Pump

MAIN PUMP SUCTION HOSE CHECK

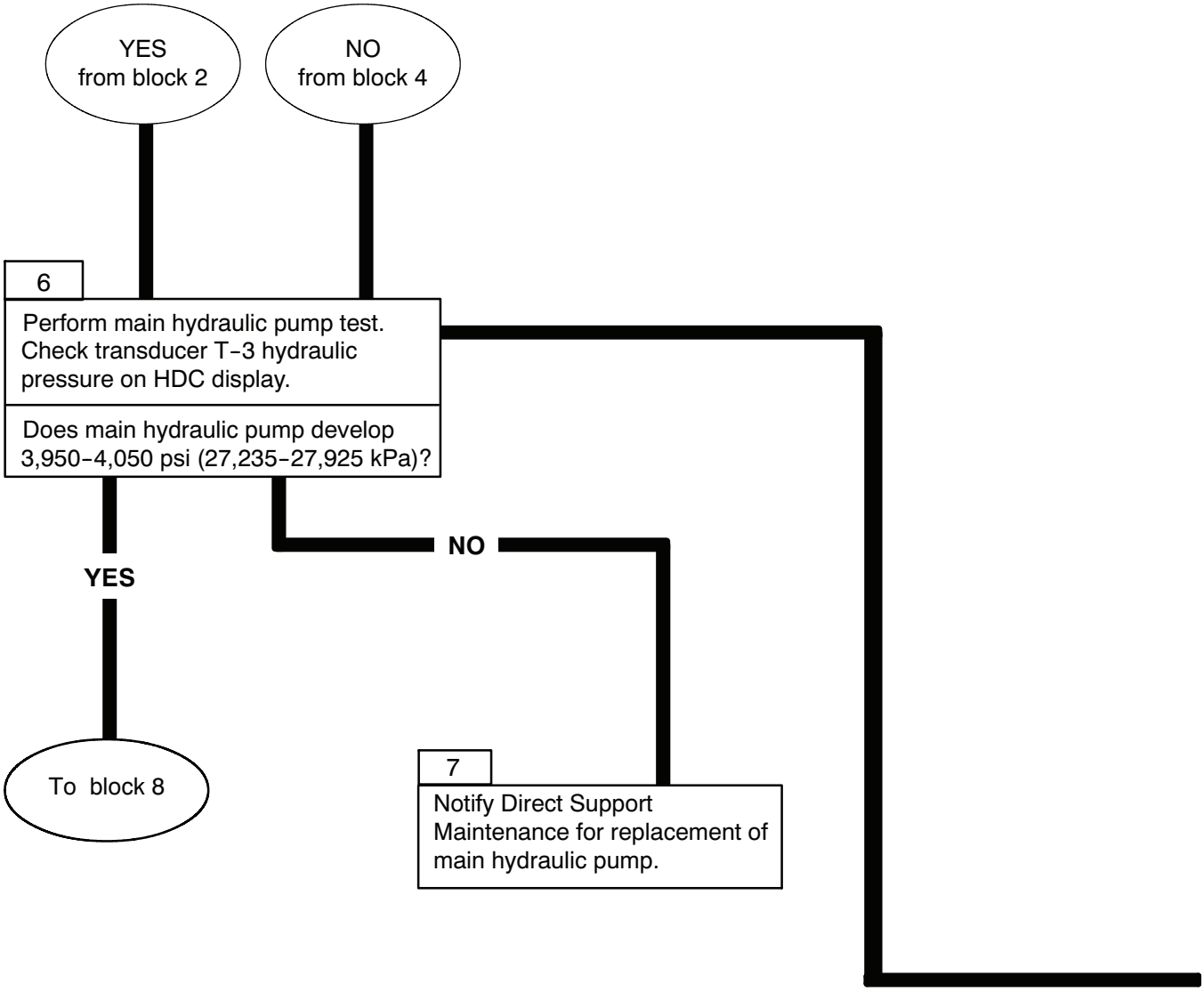
WARNING

Do not work under vehicle unless hull is 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 (Figure 4, item 1) from elbow (Figure 4, item 3) on main hydraulic pump (Figure 4, item 2). Hydraulic oil should flow freely from the loosened fitting.


YES
from block 2
NO
from block 4
6
Perform main hydraulic pump test. Check transducer T-3 hydraulic pressure on HDC display.
Does main hydraulic pump develop 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
To block 8
7
Notify Direct Support Maintenance for replacement of main hydraulic pump.

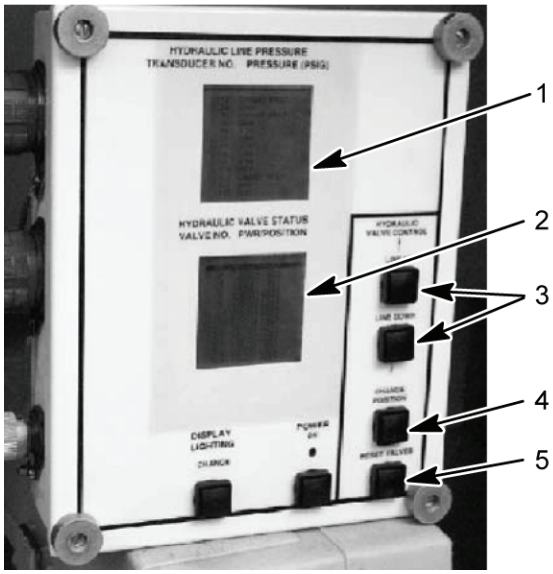


Figure 5. HDC Control Box

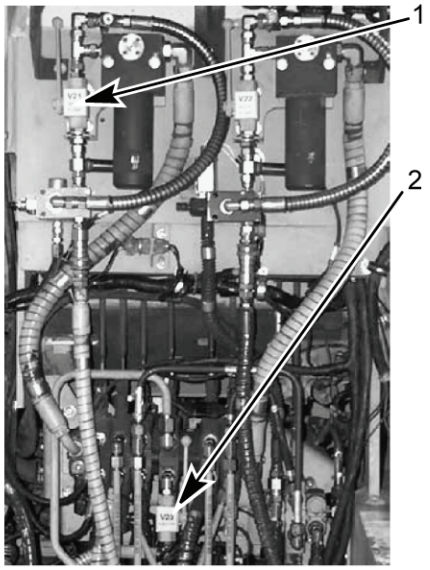


Figure 6. DCV Bank

MAIN HYDRAULIC PUMP TEST

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 5) on the HDC control box.
- Ensure right main hydraulic pressure inhibit valve V21 (Figure 5, item 1) is fully opened.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 6, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 5, item 3), select V1 on the HDC display (Figure 5, item 2). Close V1 on the HDC display (Figure 5, item 2) by selecting the CHANGE POSITION button (Figure 5, item 4) on the HDC control box.
- Continued on page 0007 00-11.

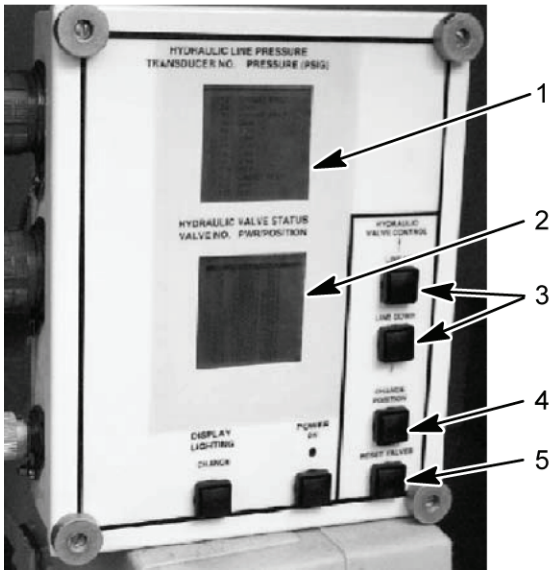


Figure 7. HDC Control Box

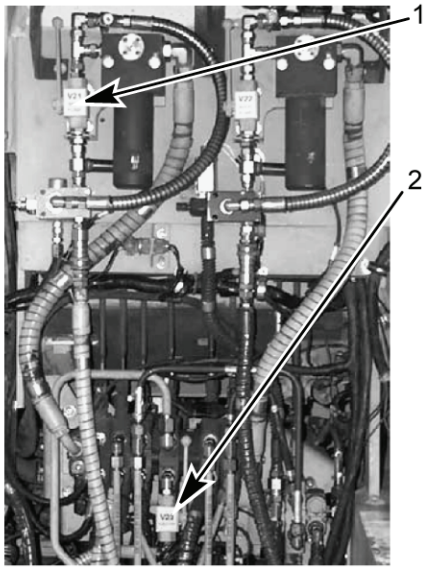
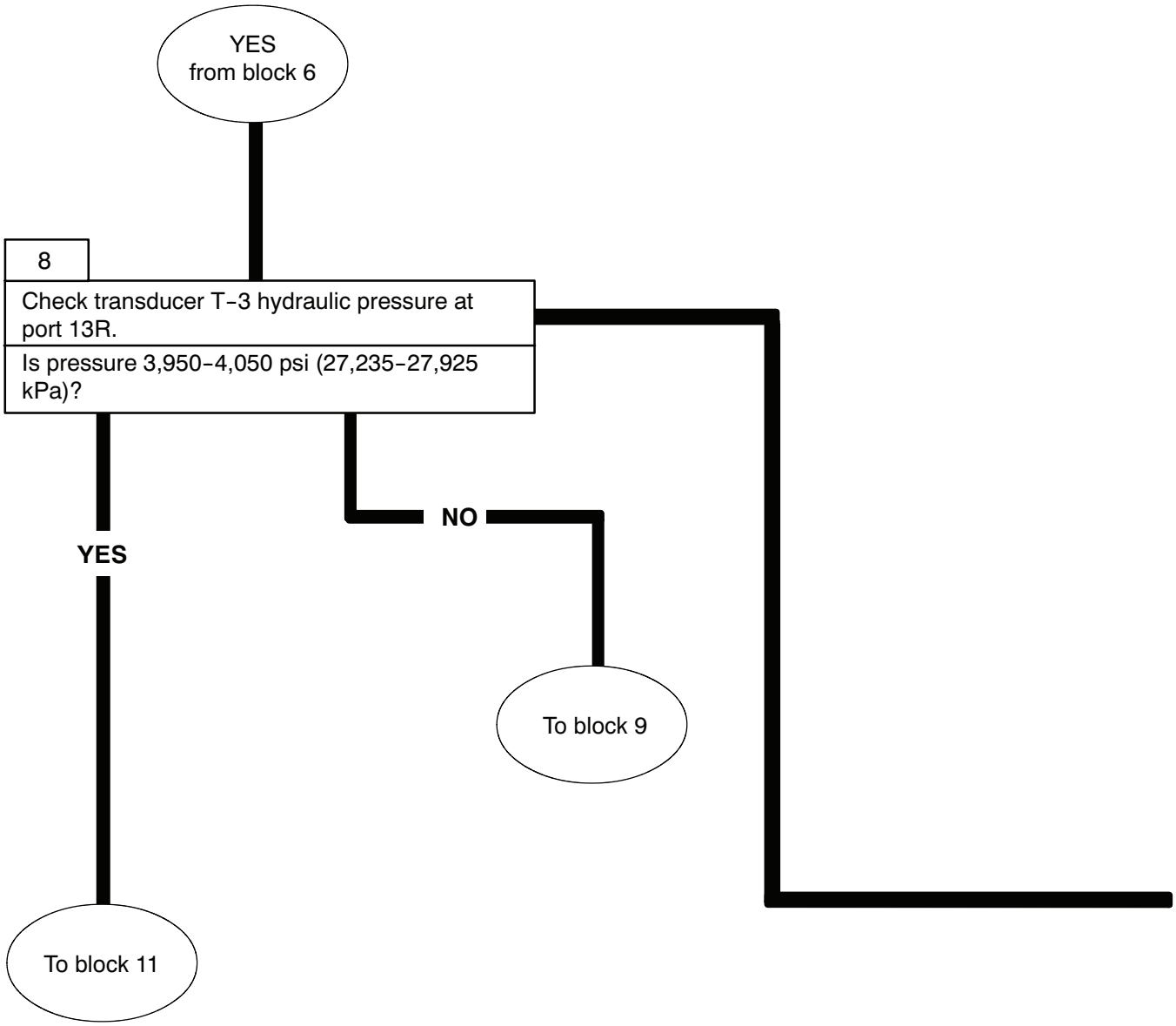


Figure 8. DCV Bank

MAIN HYDRAULIC PUMP TEST - CONTINUED

- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 8, item 1), until transducer T-3 pressure on the HDC display (Figure 7, item 1) indicates 3,950-4,050 psi (27,235-27,925 kPa).
- Fully open right main hydraulic pressure inhibit valve V21 (Figure 8, item 1).
- Stop engine; relieve hydraulic pressure.
- Open ejector inhibit ball valve V23 (Figure 8, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 7, item 3), select V1 on the HDC display (Figure 7, item 2). Open V1 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.


YES
from block 6
8
Check transducer T-3 hydraulic pressure at port 13R.
Is pressure 3,950-4,050 psi (27,235-27,925 kPa)?
NO
YES
To block 9
To block 11

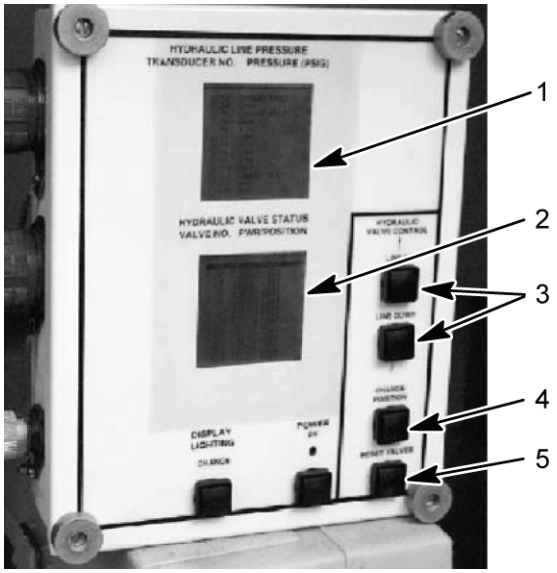
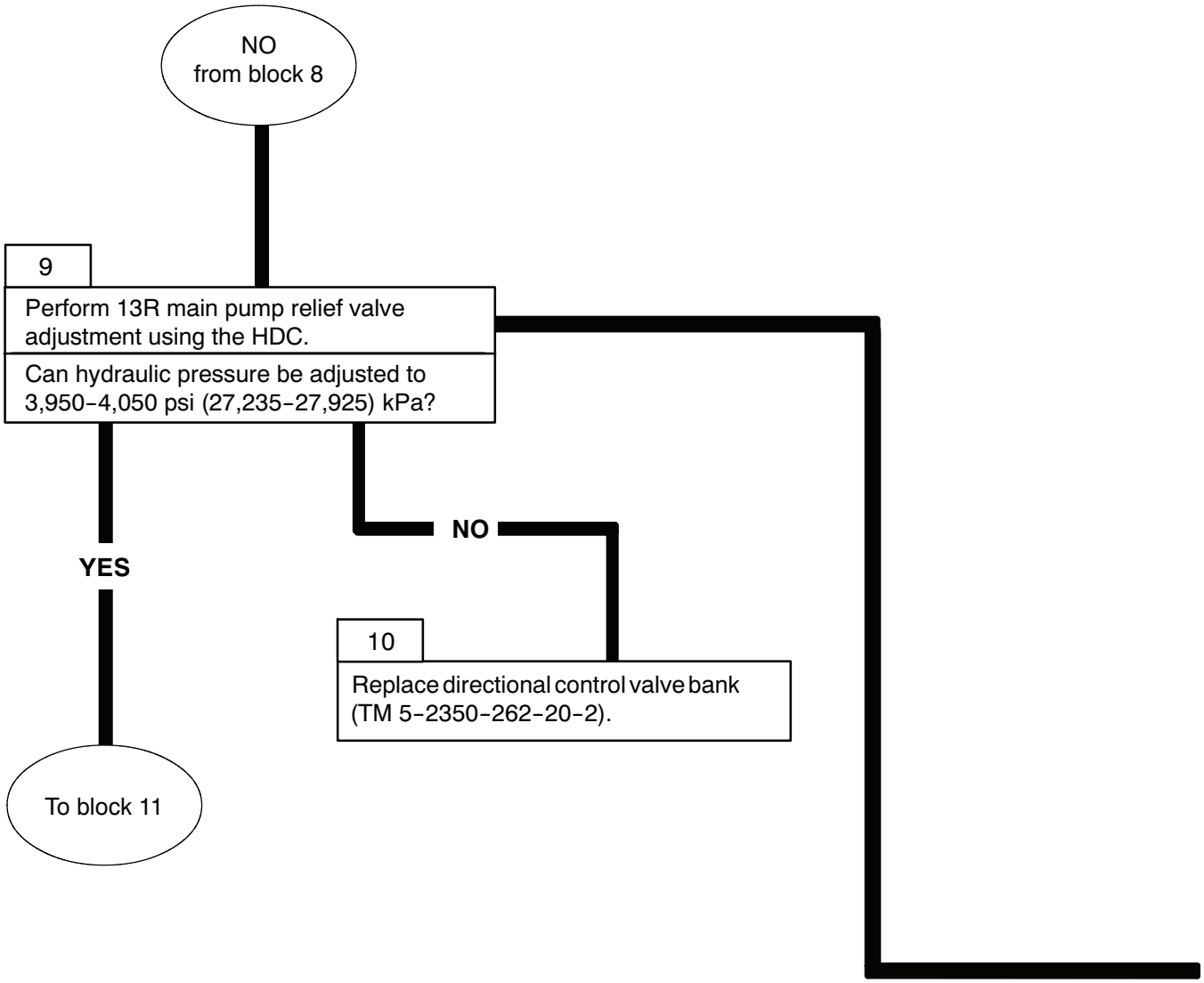


Figure 9. HDC Control Box

HYDRAULIC PRESSURE AT PORT 13R CHECK

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Close V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Have assistant start engine, move SPRUNG/UNSPRUNG lever to SPRUNG, and hold EJECTOR CONTROL lever in BACK. Read transducer T-3 pressure on the HDC display (Figure 9, item 1). If hydraulic pressure is not within limits, continue with the following step.
- While assistant is still holding EJECTOR CONTROL lever in BACK, have assistant move right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-3 pressure on the HDC display (Figure 9, item 1). If hydraulic pressure is not within limits, main relief valve 13R requires adjustment.
- Release EJECTOR CONTROL and right-hand SUSPENSION CONTROL levers.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.


NO
from block 8
9
Perform 13R main pump relief valve adjustment using the HDC.
Can hydraulic pressure be adjusted to 3,950-4,050 psi (27,235-27,925) kPa?
NO
YES
10
Replace directional control valve bank (TM 5-2350-262-20-2).
To block 11

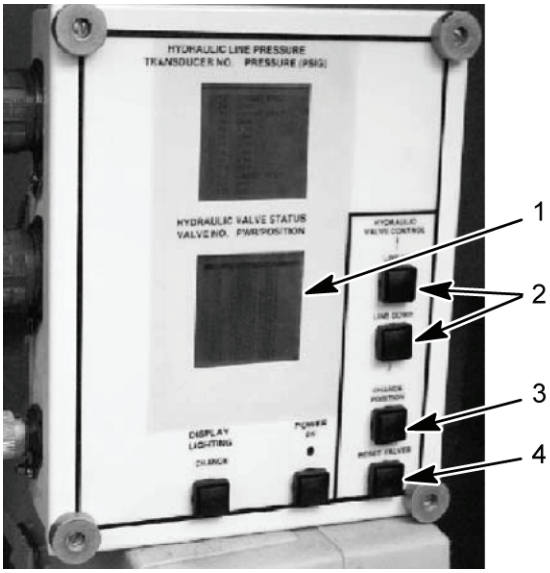


Figure 10. HDC Control Box

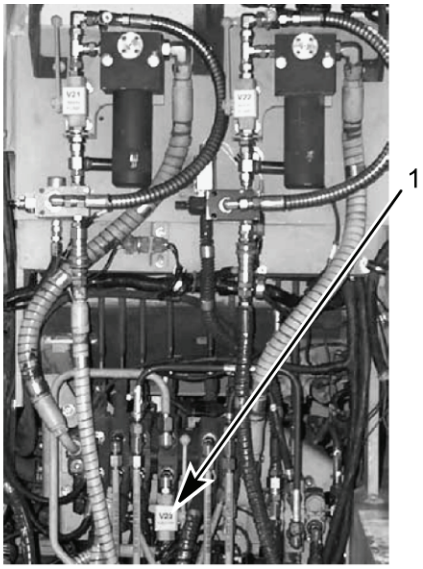


Figure 11. DCV Bank

13R MAIN PUMP RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 10, item 4) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Manually close the ejector inhibit ball valve V23 (Figure 11, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 10, item 2), select V1 on the HDC display (Figure 10, item 1). Close V1 on the HDC display (Figure 10, item 1) by selecting the CHANGE POSITION button (Figure 10, item 3) on the HDC control box.
- Continued on page 0007 00-17.

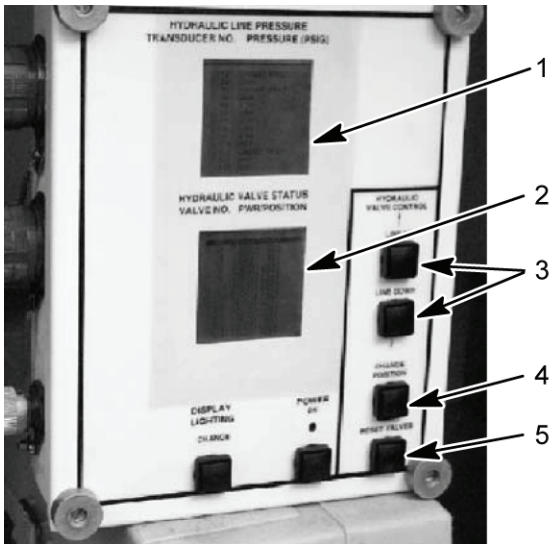


Figure 12. HDC Control Box

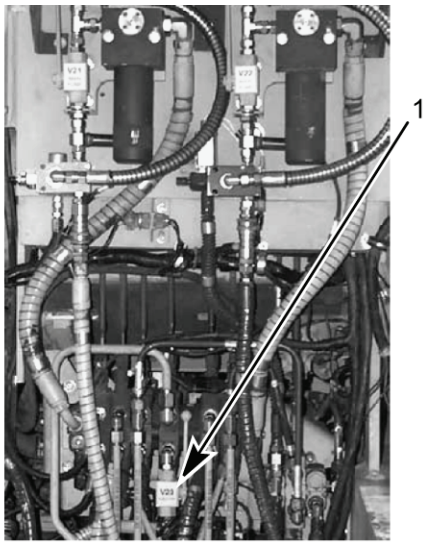


Figure 13. DCV Bank

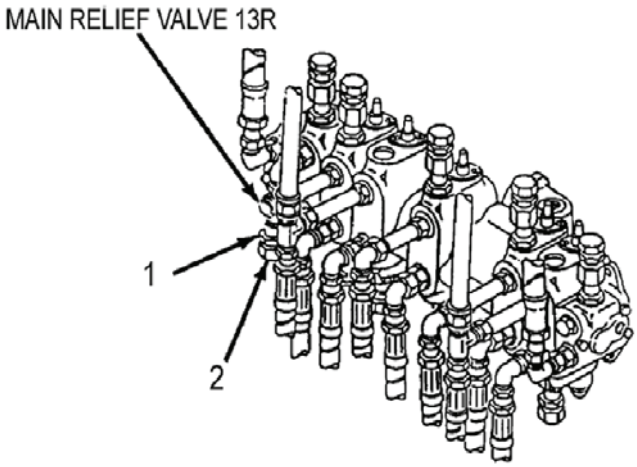
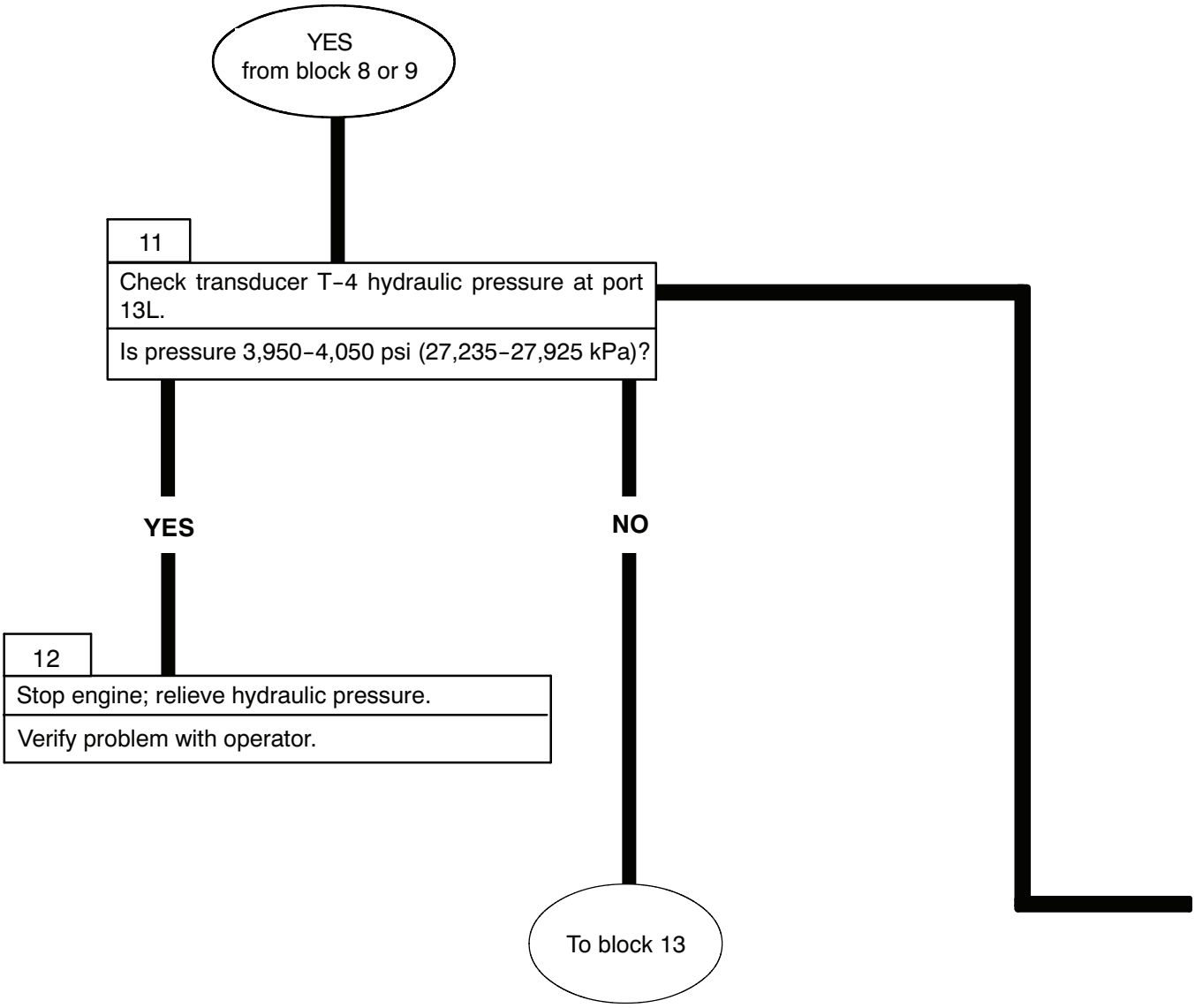


Figure 14. Main Pump Relief Valve 13R

13R MAIN PUMP RELIEF VALVE ADJUSTMENT - CONTINUED

- Loosen jam nut (Figure 14, item 1). Read transducer T-3 hydraulic pressure on the HDC display (Figure 12, item 1), as assistant moves right-hand SUSPENSION CONTROL lever to RAISE and EJECTOR CONTROL lever to BACK. Rotate relief valve adjustment (Figure 14, item 2) clockwise to increase pressure; counterclockwise to decrease pressure.
- When transducer T-3 pressure indicates 3,950-4,050 psi (27,235-27,925 kPa) on the HDC display (Figure 12, item 1), tighten jam nut (Figure 14, item 1).
- Verify pressure is now within limits by having assistant move right-hand SUSPENSION CONTROL lever to RAISE and EJECTOR CONTROL lever to BACK. Read transducer T-3 hydraulic pressure on the HDC display (Figure 12, item 1).
- Stop engine; relieve hydraulic pressure.
- Manually open ejector inhibit ball valve V23 (Figure 13, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 12, item 3), select V1 on the HDC display (Figure 12, item 2). Open V1 on the HDC display (Figure 12, item 2) by selecting the CHANGE POSITION button (Figure 12, item 4) on the HDC control box.


YES
from block 8 or 9
11
Check transducer T-4 hydraulic pressure at port 13L.
Is pressure 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
12
Stop engine; relieve hydraulic pressure.
Verify problem with operator.
To block 13

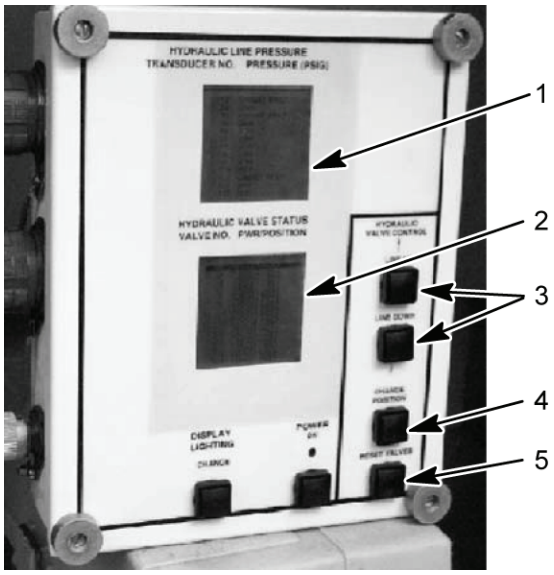
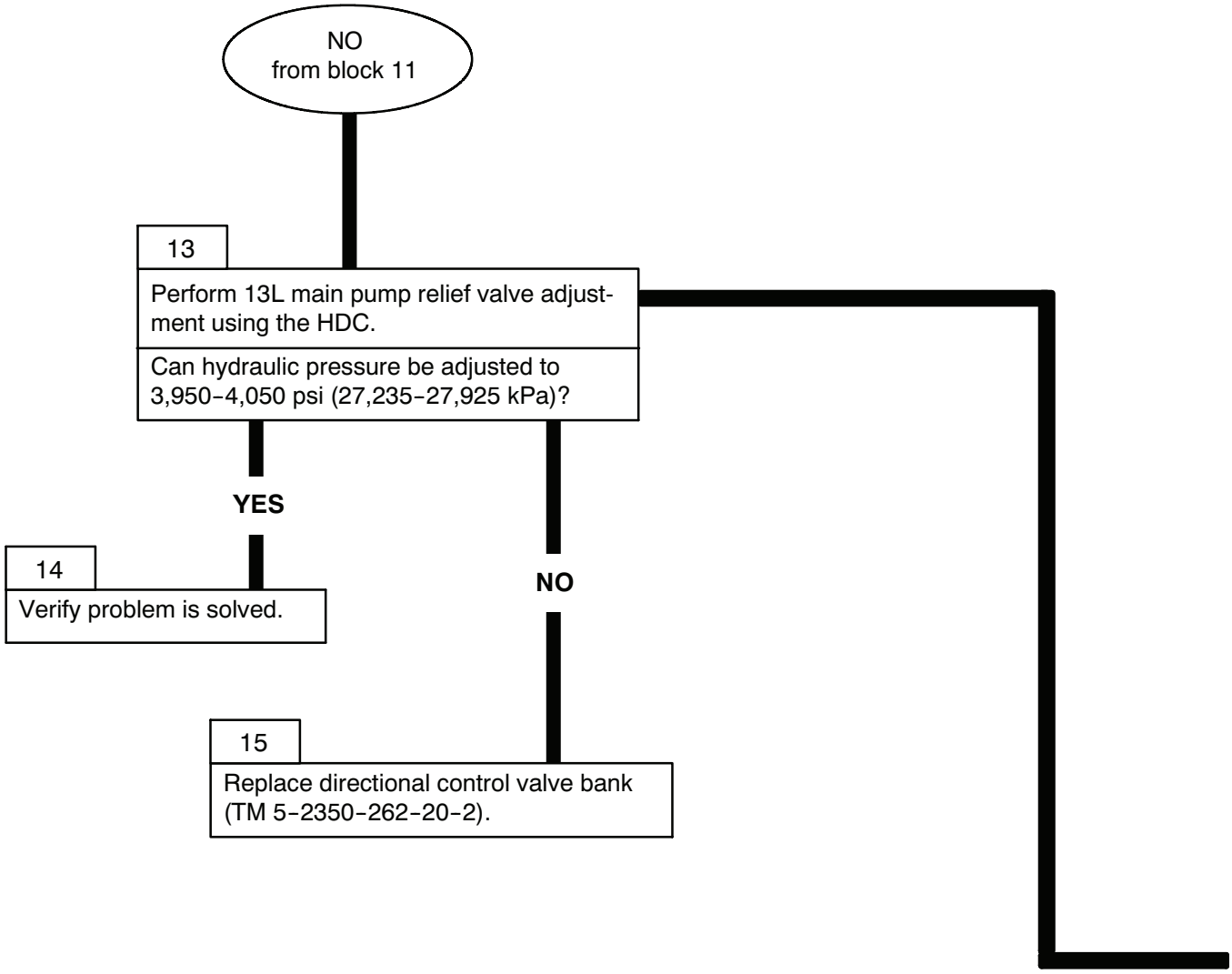


Figure 15. HDC Control Box

HYDRAULIC PRESSURE AT PORT 13L CHECK

- Stop engine and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 15, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 15, item 3), select V1 on the HDC display (Figure 15, item 2). Close V1 on the HDC display (Figure 15, item 2) by selecting the CHANGE POSITION button (Figure 15, item 4) on the HDC control box.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG, and hold EJECTOR CONTROL lever to BACK. Read tranducer T-4 hydraulic pressure on the HDC display (Figure 15, item 1). 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 transducer T-4 hydraulic pressure on the HDC display (Figure 15, item 1). If pressure is not within limits, main relief valve 13L requires adjustment.
- Release EJECTOR and SUSPENSION CONTROL levers.
- Stop engine; relieve hydraulic pressure.


NO
from block 11
13
Perform 13L main pump relief valve adjustment using the HDC.
Can hydraulic pressure be adjusted to 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
14
Verify problem is solved.
15
Replace directional control valve bank (TM 5-2350-262-20-2).

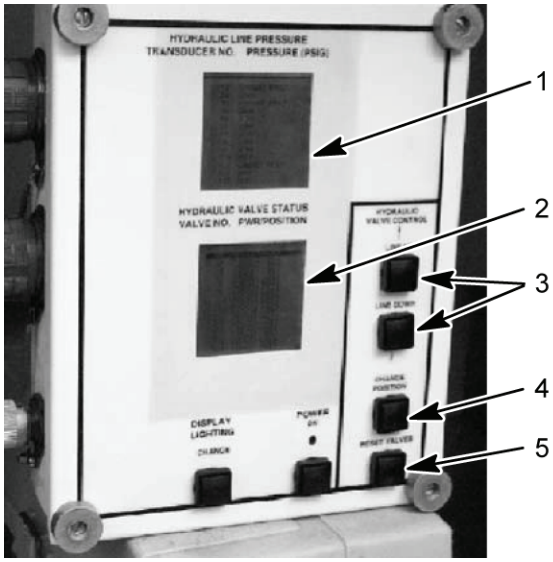


Figure 16. HDC Control Box

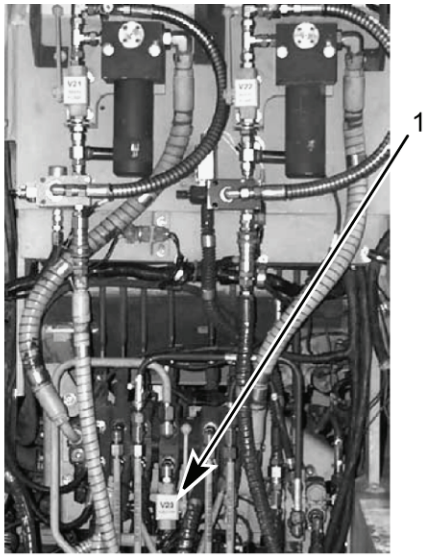


Figure 17. DCV Bank

13L MAIN PUMP RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 16, item 5) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Manually close the ejector inhibit ball valve V23 (Figure 17, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 16, item 3), select V1 on the HDC display (Figure 16, item 2). Close V1 on the HDC display (Figure 16, item 2) by selecting the CHANGE POSITION button (Figure 16, item 4) on the HDC control box.
- Continued on page 0007 00-23.

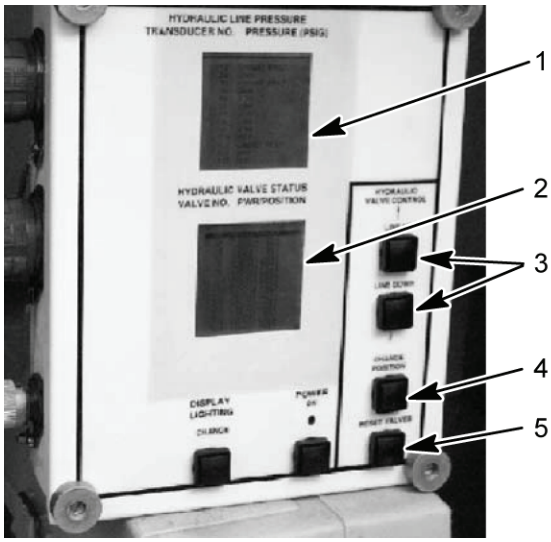


Figure 18. HDC Control Box

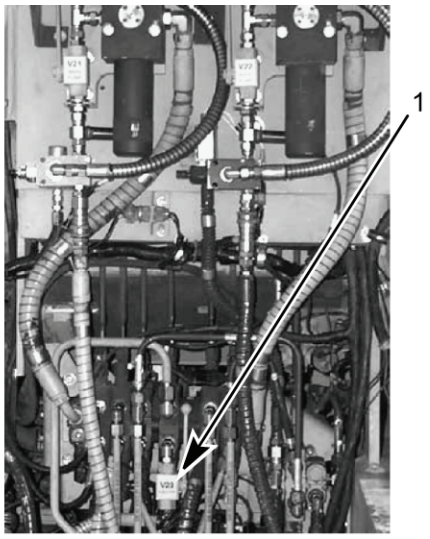


Figure 19. DCV Bank

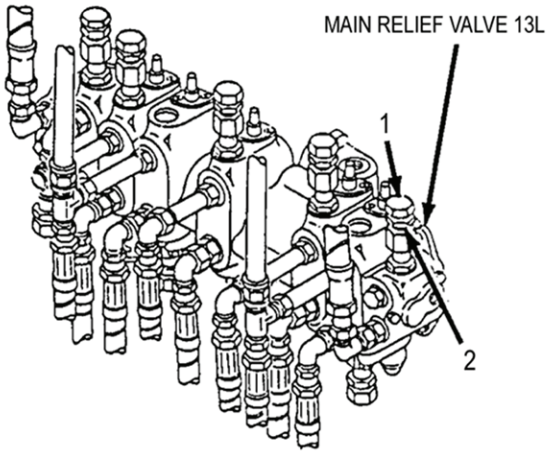
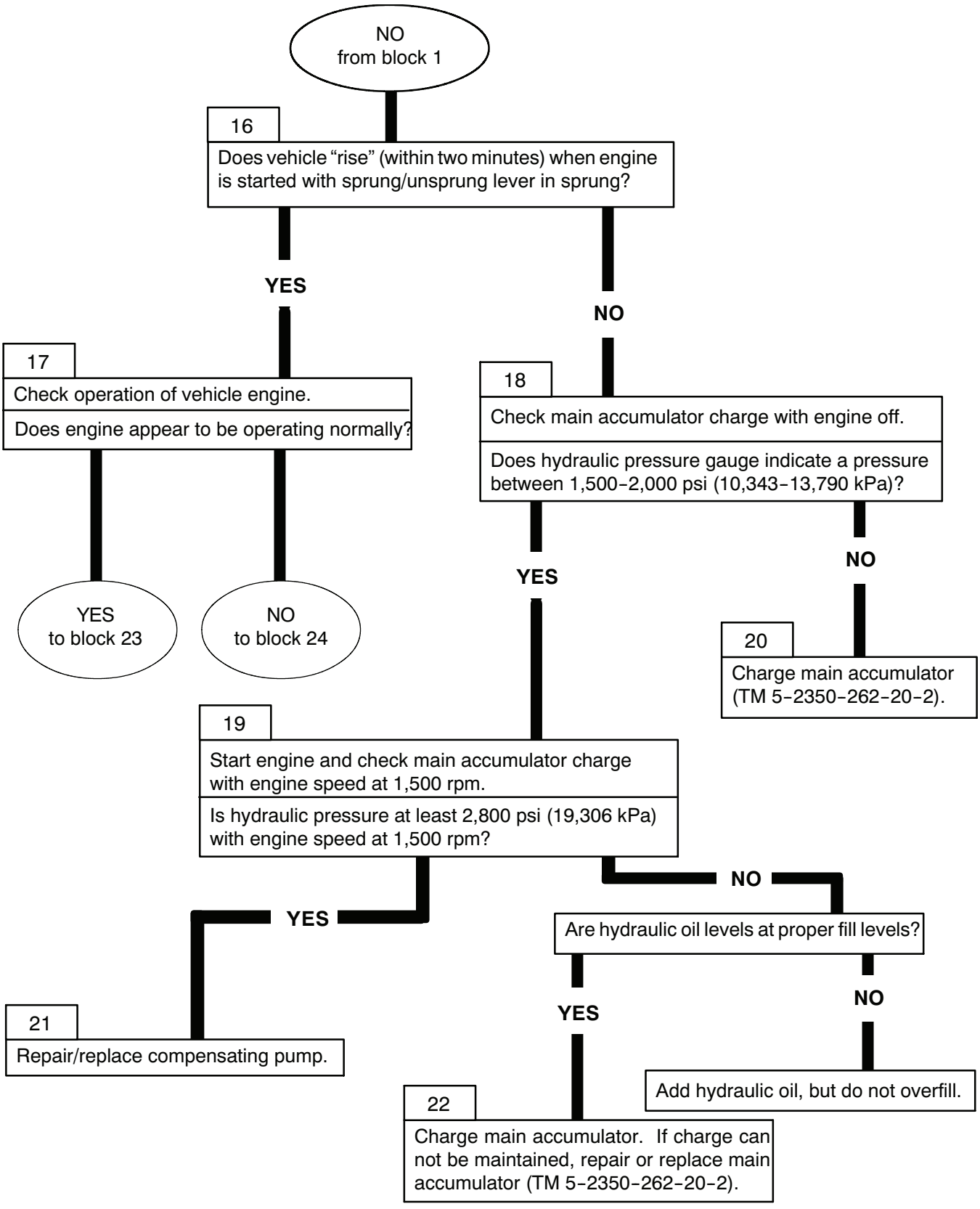


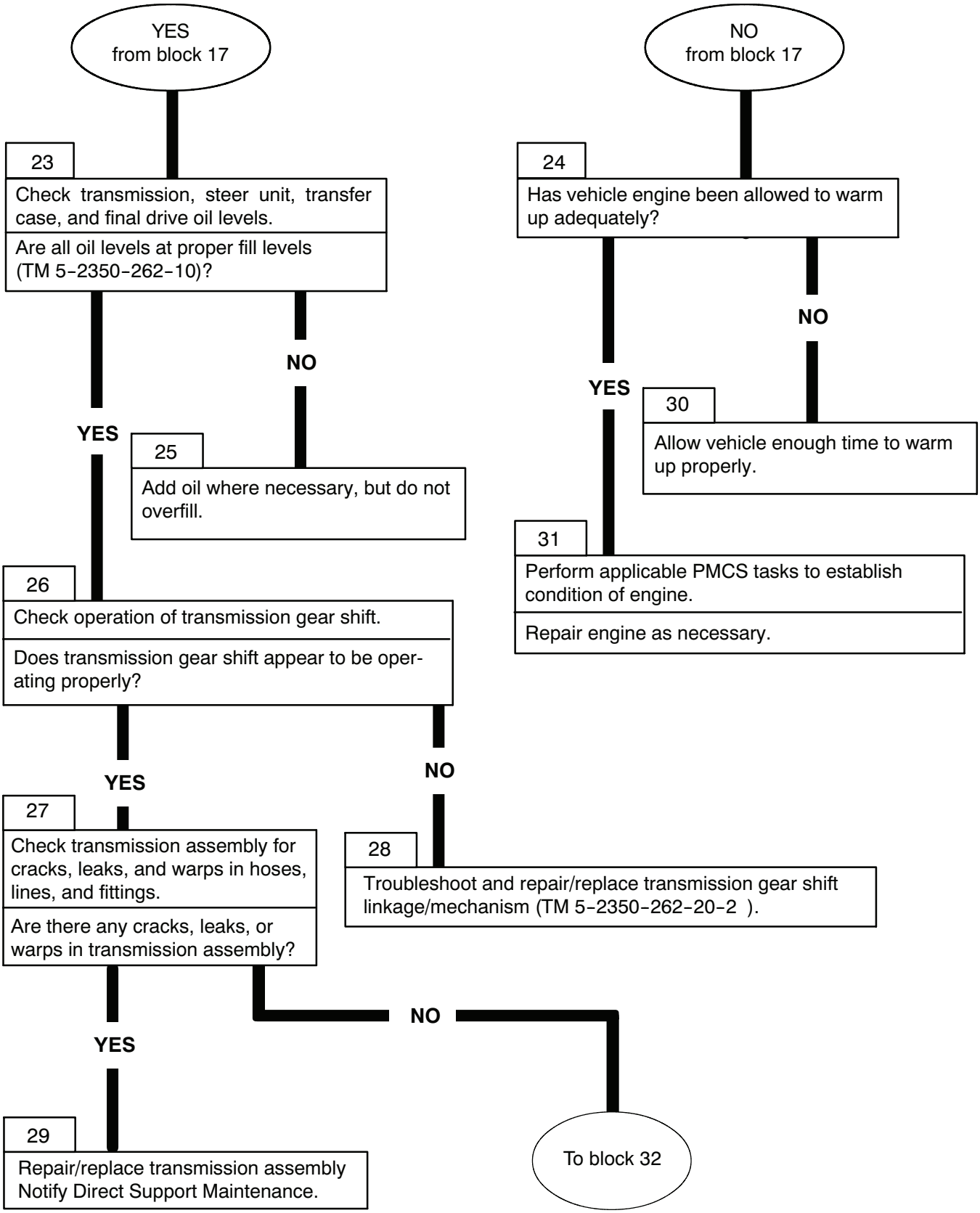
Figure 20. Main Pump Relief Valve 13L

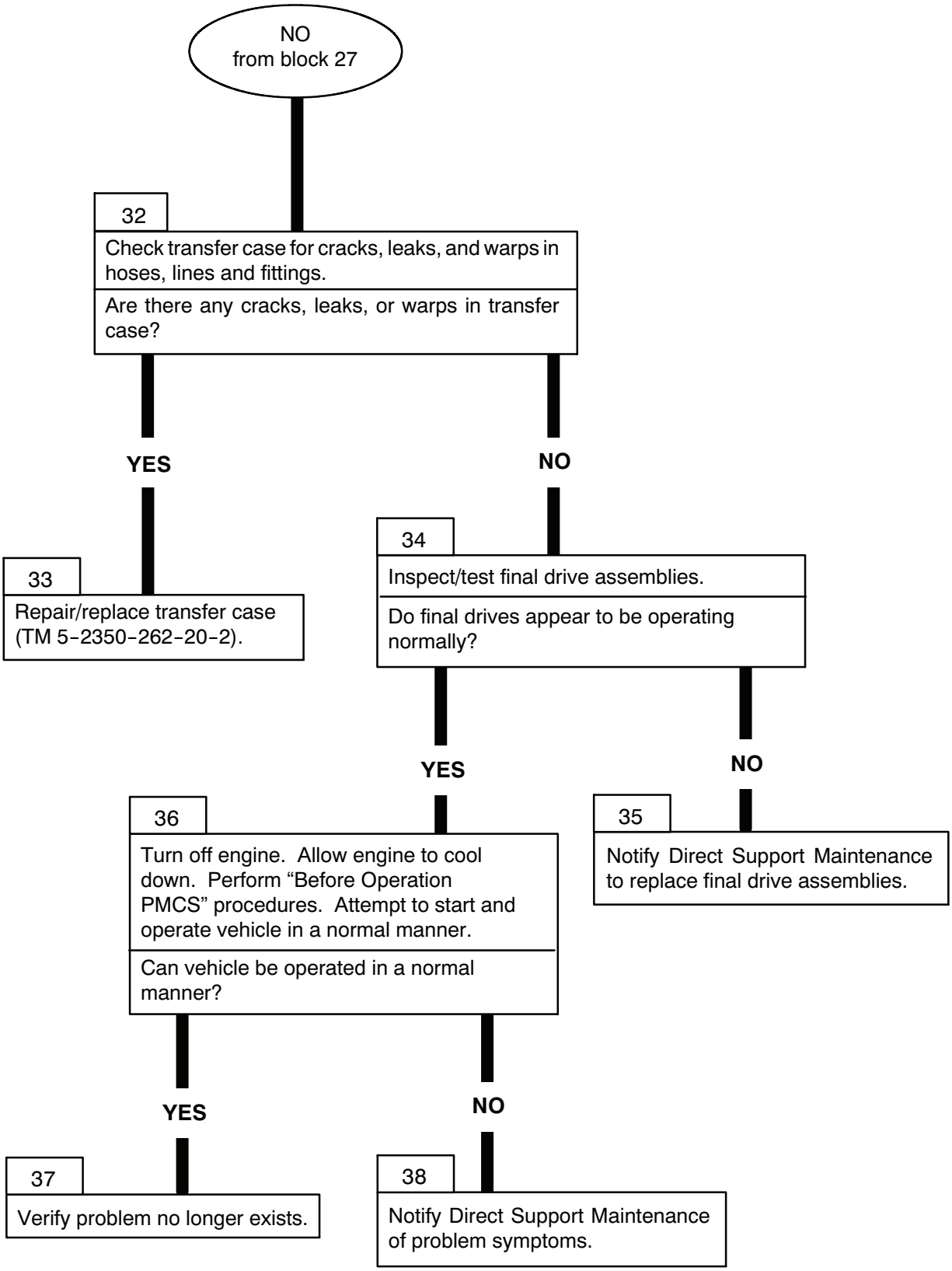
13L MAIN PUMP RELIEF VALVE ADJUSTMENT - CONTINUED

- Loosen jam nut (Figure 20, item 2). Read transducer T-4 hydraulic pressure on the HDC display (Figure 18, item 1). As assistant moves left-hand SUSPENSION CONTROL lever to RAISE and EJECTOR CONTROL lever to BACK. Rotate valve (Figure 20, item 1) clockwise to increase pressure; counterclockwise to decrease pressure.
- When transducer T-4 pressure indicates 3,950-4,050 psi (27,235-27,925 kPa), tighten jam nut (Figure 20, item 2).
- Verify pressure is now within limits by having assistant move left-hand SUSPENSION CONTROL lever to RAISE and hold EJECTOR CONTROL lever to BACK. Read transducer T-4 hydraulic pressure on the HDC display (Figure 18, item 11).
- Stop engine; relieve hydraulic pressure.
- Manually open ejector inhibit ball valve V23 (Figure 19, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 18, item 13), select V1 on the HDC display (Figure 18, item 12). Open V1 on the HDC display (Figure 18, item 12) by selecting the CHANGE POSITION button (Figure 18, item 14) on the HDC control box.

ALL HYDRAULIC FUNCTIONS INOPERATIVE - Continued 0007 00




YES
from block 17
NO
from block 17
23
Check transmission, steer unit, transfer case, and final drive oil levels.
Are all oil levels at proper fill levels (TM 5-2350-262-10)?
24
Has vehicle engine been allowed to warm up adequately?
NO
YES
NO
YES
25
Add oil where necessary, but do not overfill.
30
Allow vehicle enough time to warm up properly.
31
Perform applicable PMCS tasks to establish condition of engine.
Repair engine as necessary.
26
Check operation of transmission gear shift.
Does transmission gear shift appear to be operating properly?
YES
NO
27
Check transmission assembly for cracks, leaks, and warps in hoses, lines, and fittings.
Are there any cracks, leaks, or warps in transmission assembly?
28
Troubleshoot and repair/replace transmission gear shift linkage/mechanism (TM 5-2350-262-20-2).
NO
YES
29
Repair/replace transmission assembly
Notify Direct Support Maintenance.
To block 32



END OF WORK PACKAGE

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

0008 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

References
TM 5-2350-262-20-2

Personnel Required
Two 62B10

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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.

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

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.

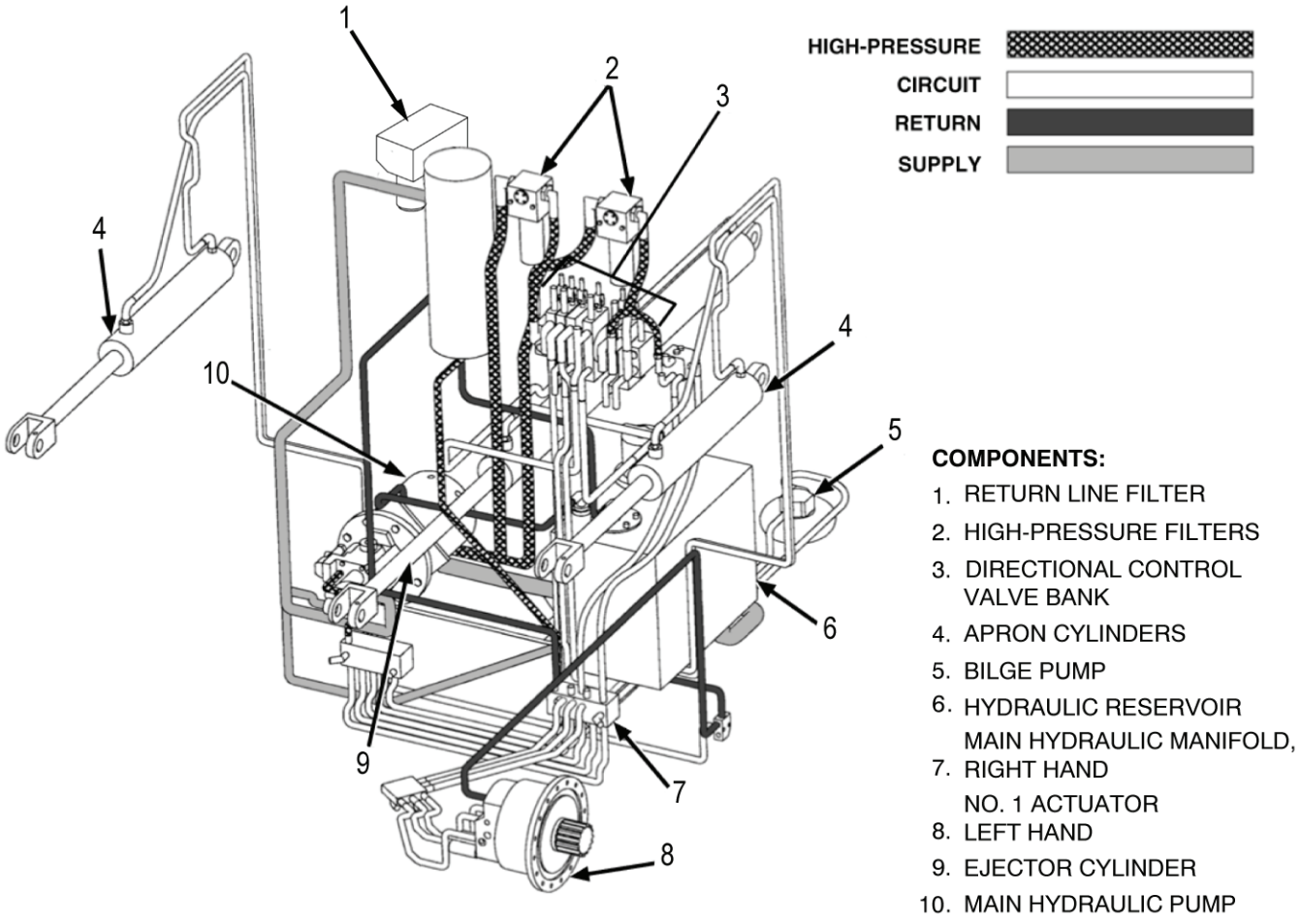


Figure 1. Apron, Bilge Pump, and Left-Hand Wheel Control Circuit

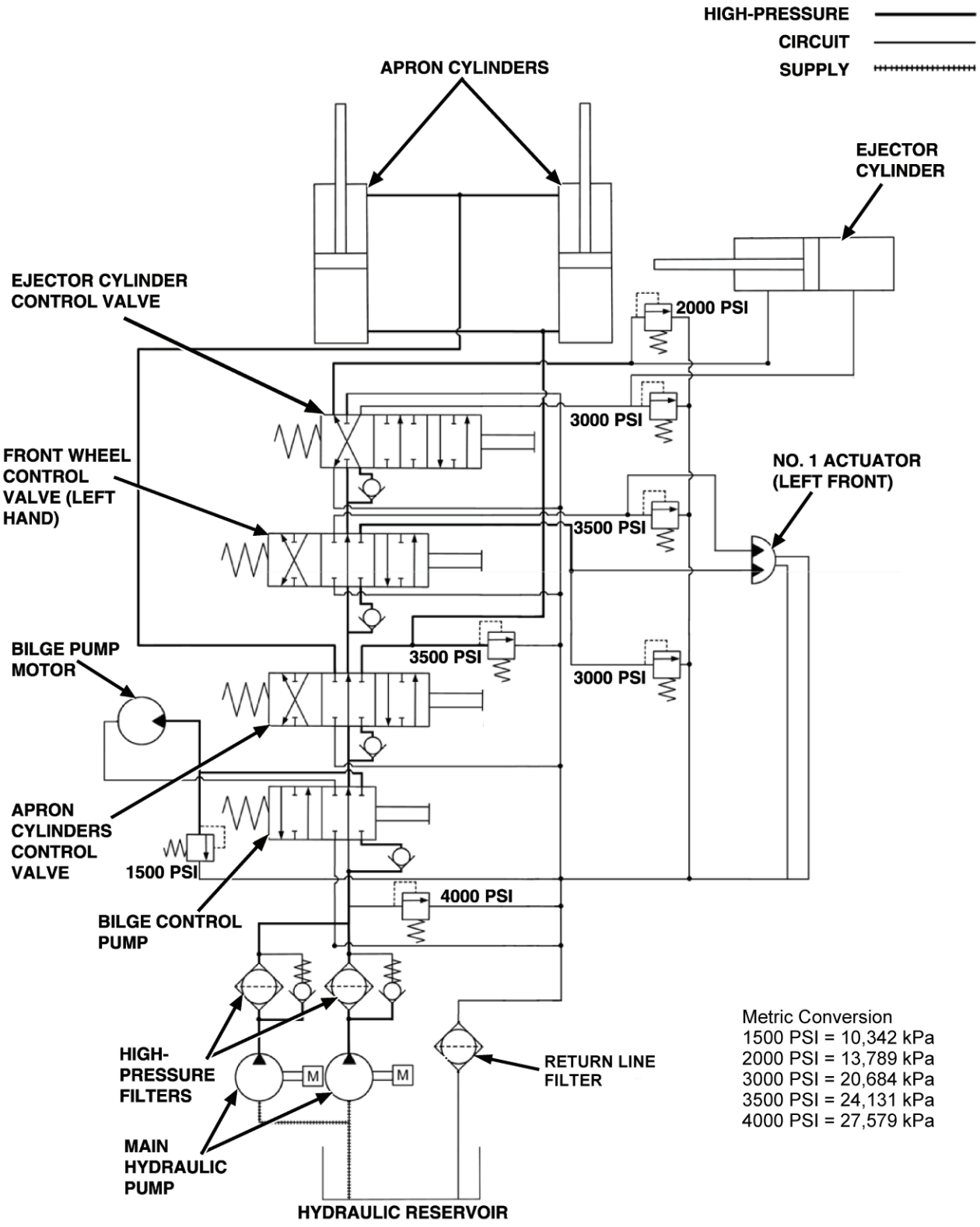
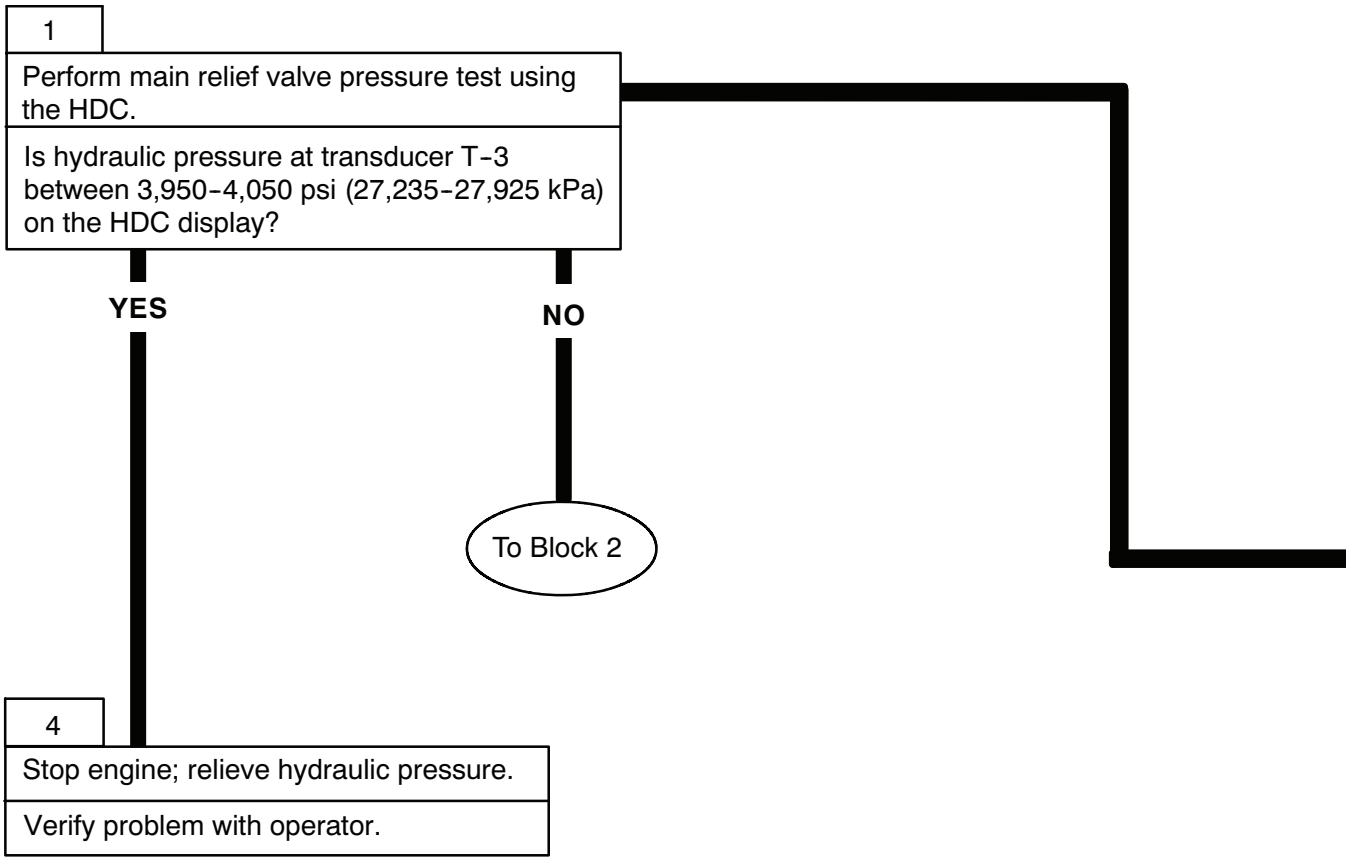


Figure 2. Apron, Bilge Pump, and Left-Hand Wheel Control Schematic

APRON, BILGE PUMP, AND LEFT-HAND WHEEL CONTROL INOPERATIVE - Continued **0008 00**



MAIN RELIEF VALVE PRESSURE TEST

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.

- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 1) on the HDC control box.

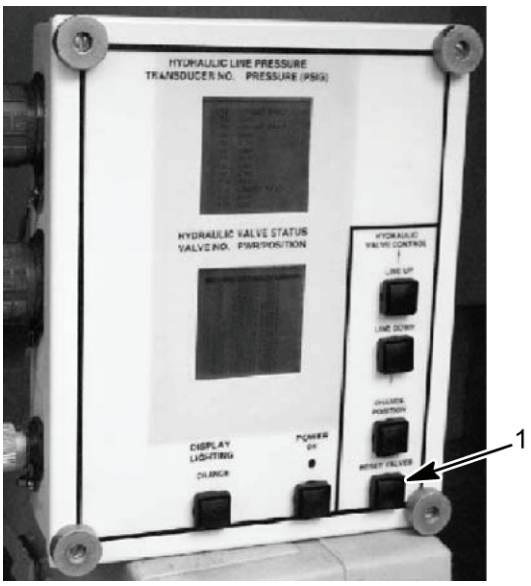


Figure 3. HDC Control Box

- Continued on page 0008 00-7.

MAIN RELIEF VALVE PRESSURE TEST - 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.**
- **Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 4, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 5, item 3), select V1 on the HDC display (Figure 5, item 2). Close V1 on the HDC display (Figure 5, item 2) by selecting the CHANGE POSITION button (Figure 5, item 4) on the HDC control box.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG and move the EJECTOR CONTROL lever to BACK. Read transducer T-3 hydraulic pressure on the HDC display (Figure 5, item 1).
- While simultaneously holding the EJECTOR CONTROL lever in BACK, have assistant move the right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-3 hydraulic pressure on the HDC display (Figure 5, item 1).

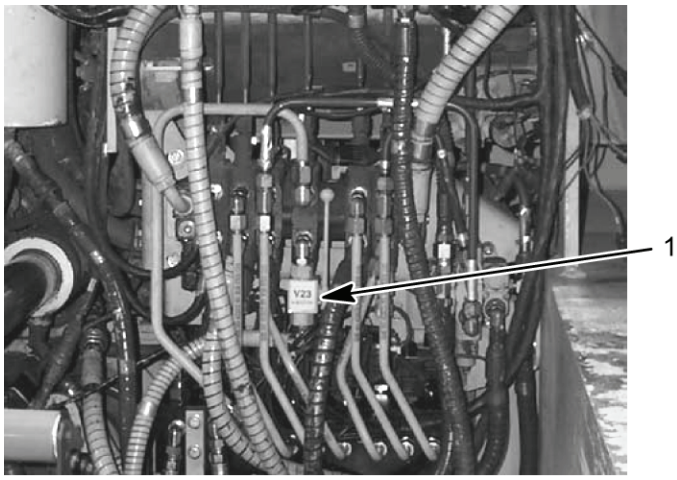


Figure 4. DCV Bank

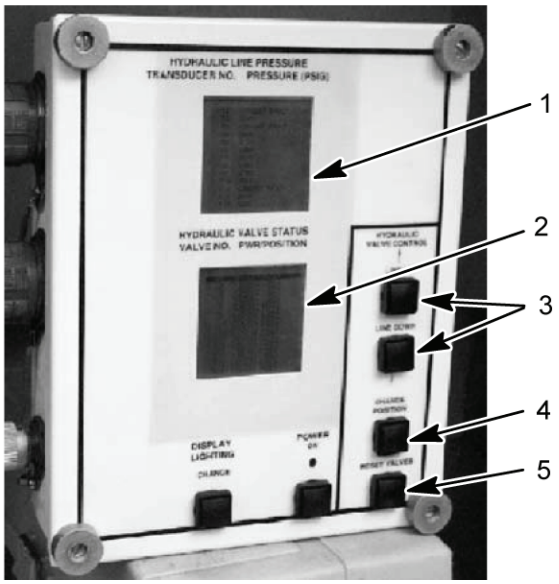
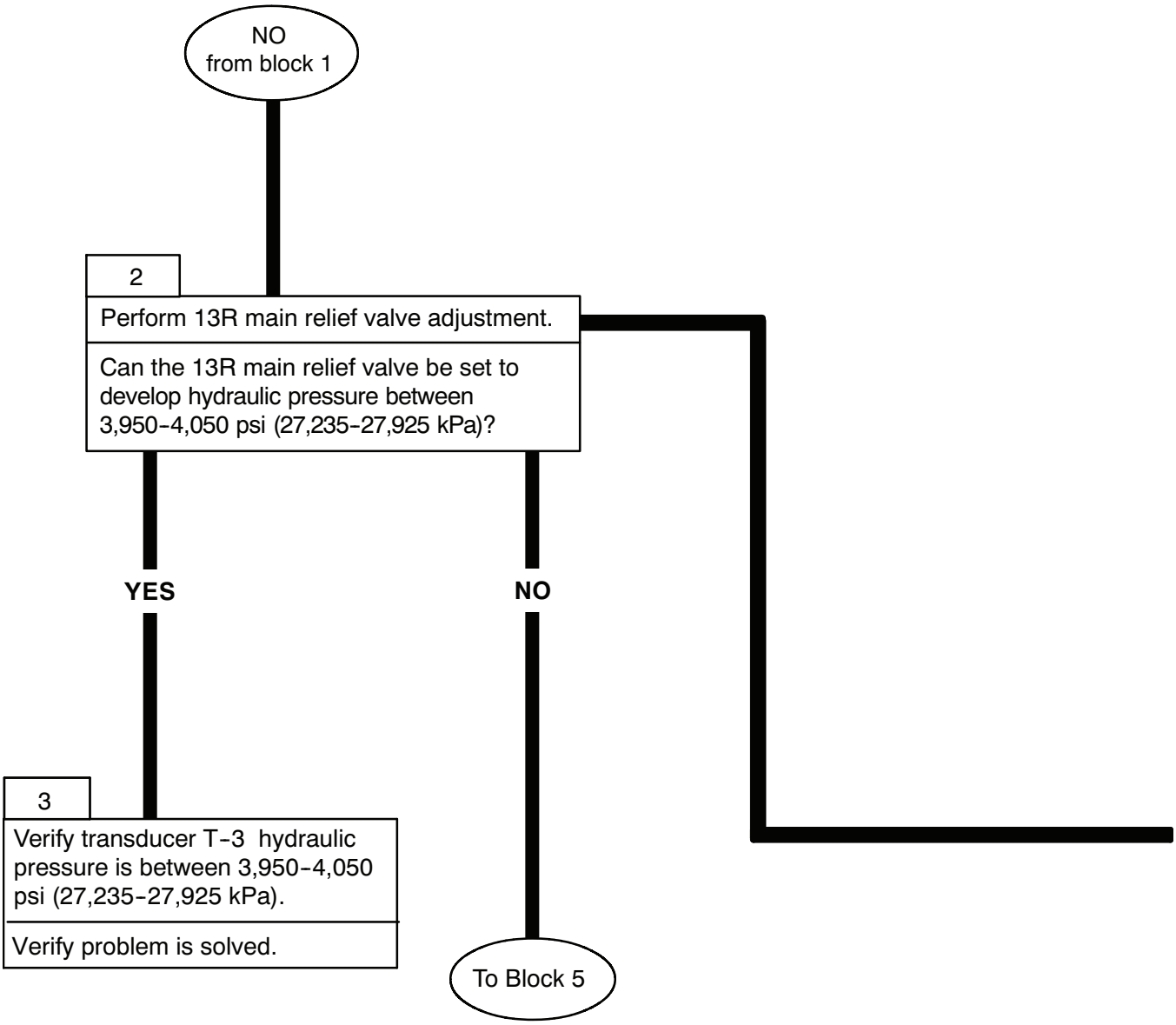


Figure 5. HDC Control Box


NO
from block 1
2
Perform 13R main relief valve adjustment.
Can the 13R main relief valve be set to develop hydraulic pressure between 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
3
Verify transducer T-3 hydraulic pressure is between 3,950-4,050 psi (27,235-27,925 kPa).
Verify problem is solved.
To Block 5

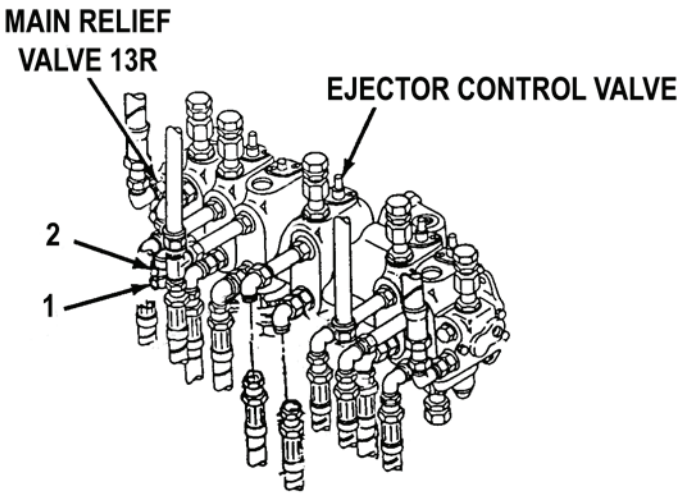


Figure 6. DCV Bank

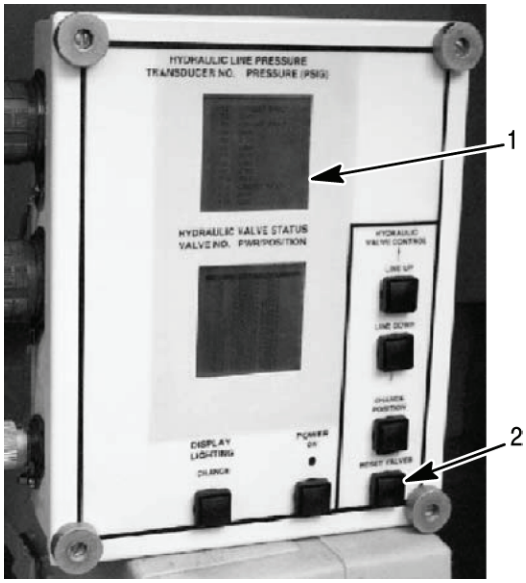
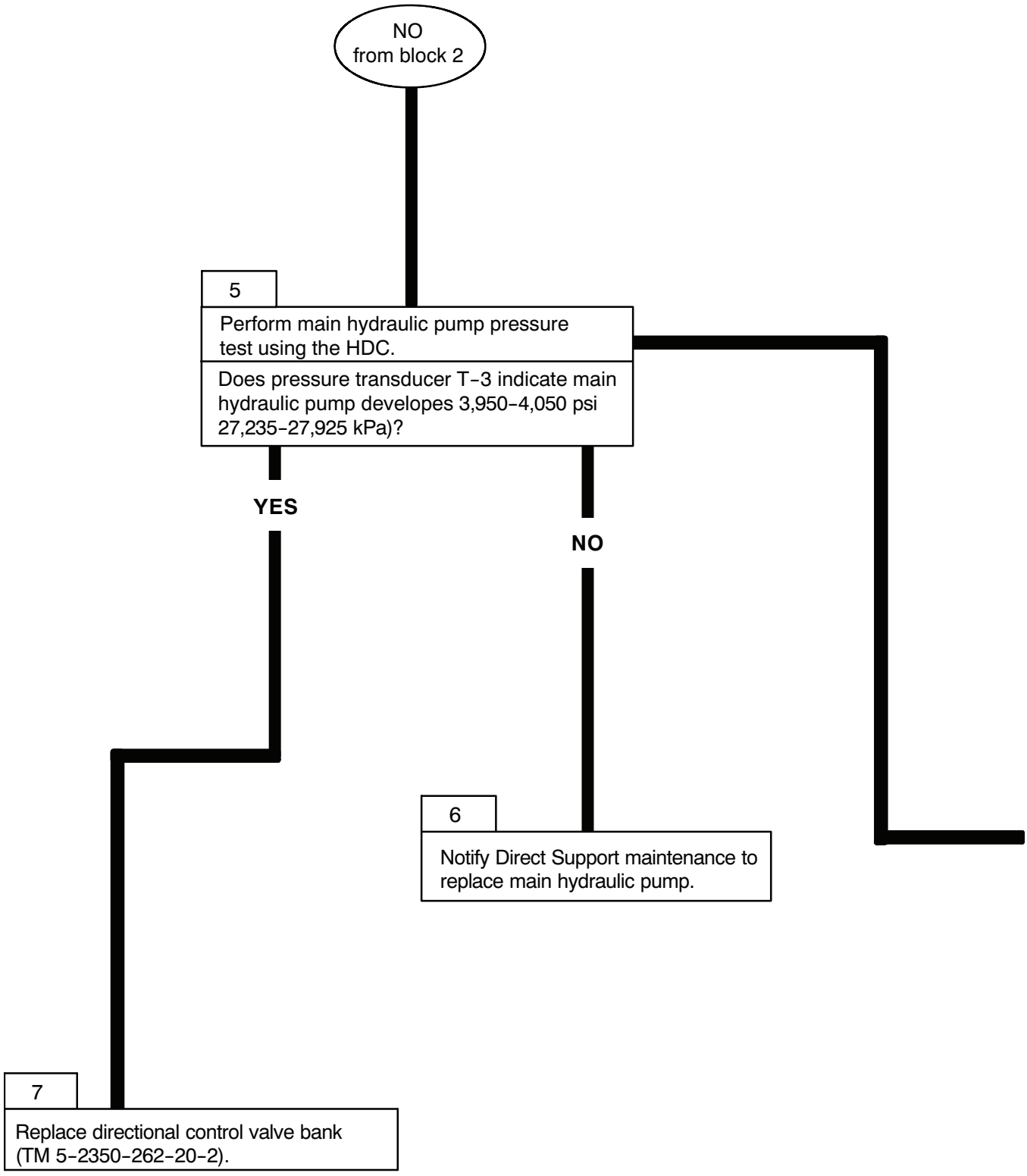


Figure 7. HDC Control Box

13R MAIN RELIEF VALVE ADJUSTMENT

- Loosen jam nut (Figure 6, item 2) on main relief valve 13R.
- Have assistant simultaneously hold EJECTOR CONTROL lever in BACK while holding the right-hand SUSPENSION CONTROL lever in RAISE.
- Read transducer T-3 hydraulic pressure on the HDC display (Figure 7, item 1).
- While reading transducer T3 hydraulic pressure on the HDC display (Figure 7, item 1), rotate adjusting screw (Figure 6, item 1) clockwise to increase pressure; counterclockwise to decrease pressure, until correct pressure is indicated. Tighten jam nut (Figure 6, item 2).
- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 2) on the HDC control box.


NO
from block 2
5
Perform main hydraulic pump pressure test using the HDC.
Does pressure transducer T-3 indicate main hydraulic pump developes 3,950-4,050 psi 27,235-27,925 kPa)?
YES
NO
6
Notify Direct Support maintenance to replace main hydraulic pump.
7
Replace directional control valve bank (TM 5-2350-262-20-2).

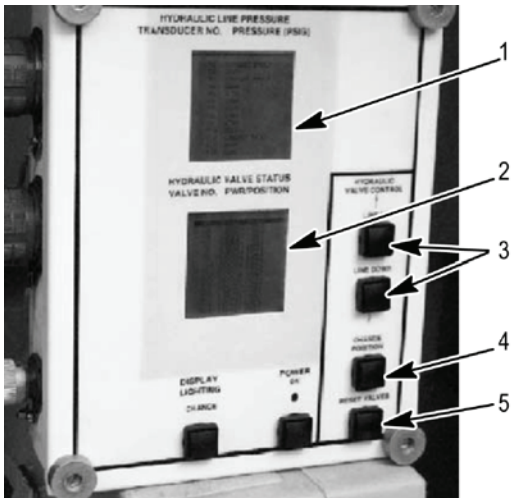


Figure 8. HDC Control Box

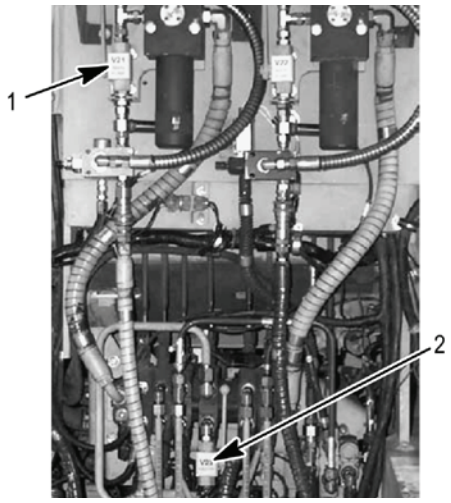


Figure 9. DCV Bank

MAIN HYDRAULIC PUMP PRESSURE 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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 8, item 5) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 9, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 8, item 3), select V1 on the HDC display (Figure 8, item 2). Close V1 on the HDC display (Figure 8, item 2) by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box.
- Ensure right main hydraulic pressure inhibit valve V21 (Figure 9, item 1) is fully open.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 9, item 1) until transducer T-3 on the HDC display (Figure 8, item 1) indicates 3,950-4,050 psi (27,235-27,925 kPa).
- Open right main hydraulic pressure inhibit valve V21 (Figure 9, item 1).
- Stop engine; relieve hydraulic pressure.
- Open ejector inhibit ball valve V23 (Figure 9, item 2) on the DCV bank.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 8, item 5) on the HDC control box.

END OF WORK PACKAGE

APRON WILL NOT RAISE

0009 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.

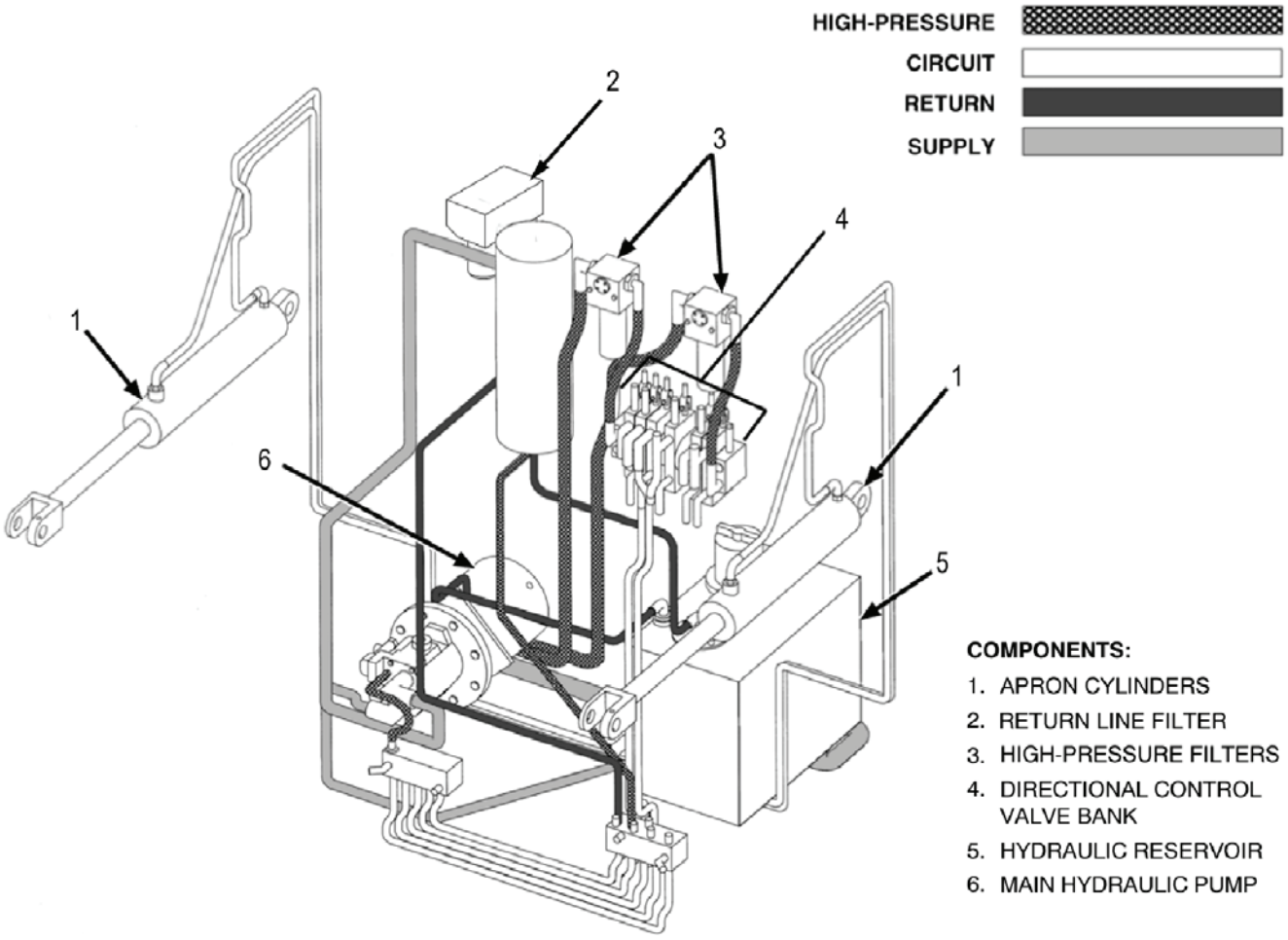


Figure 1. Apron Hydraulic Circuit

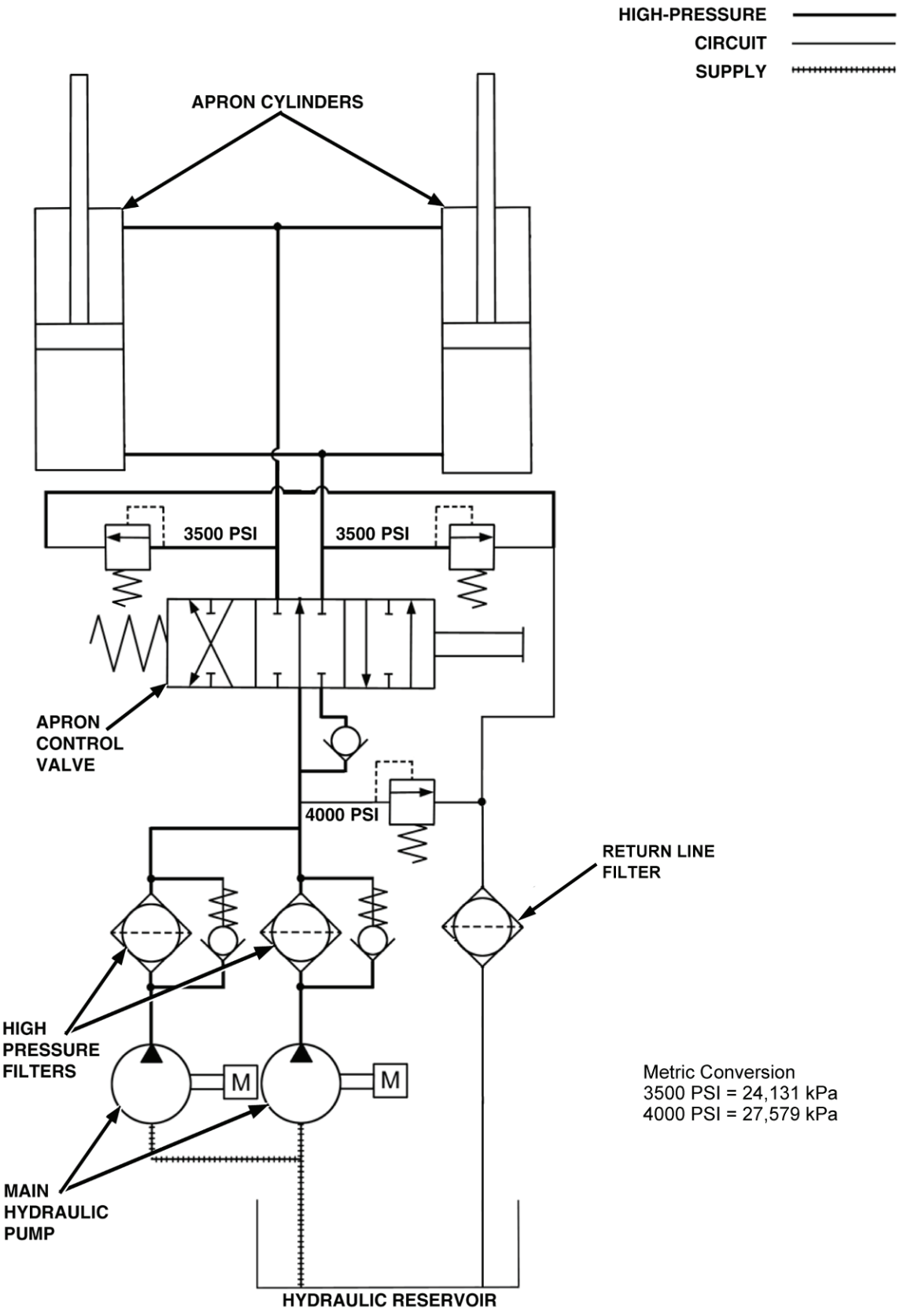
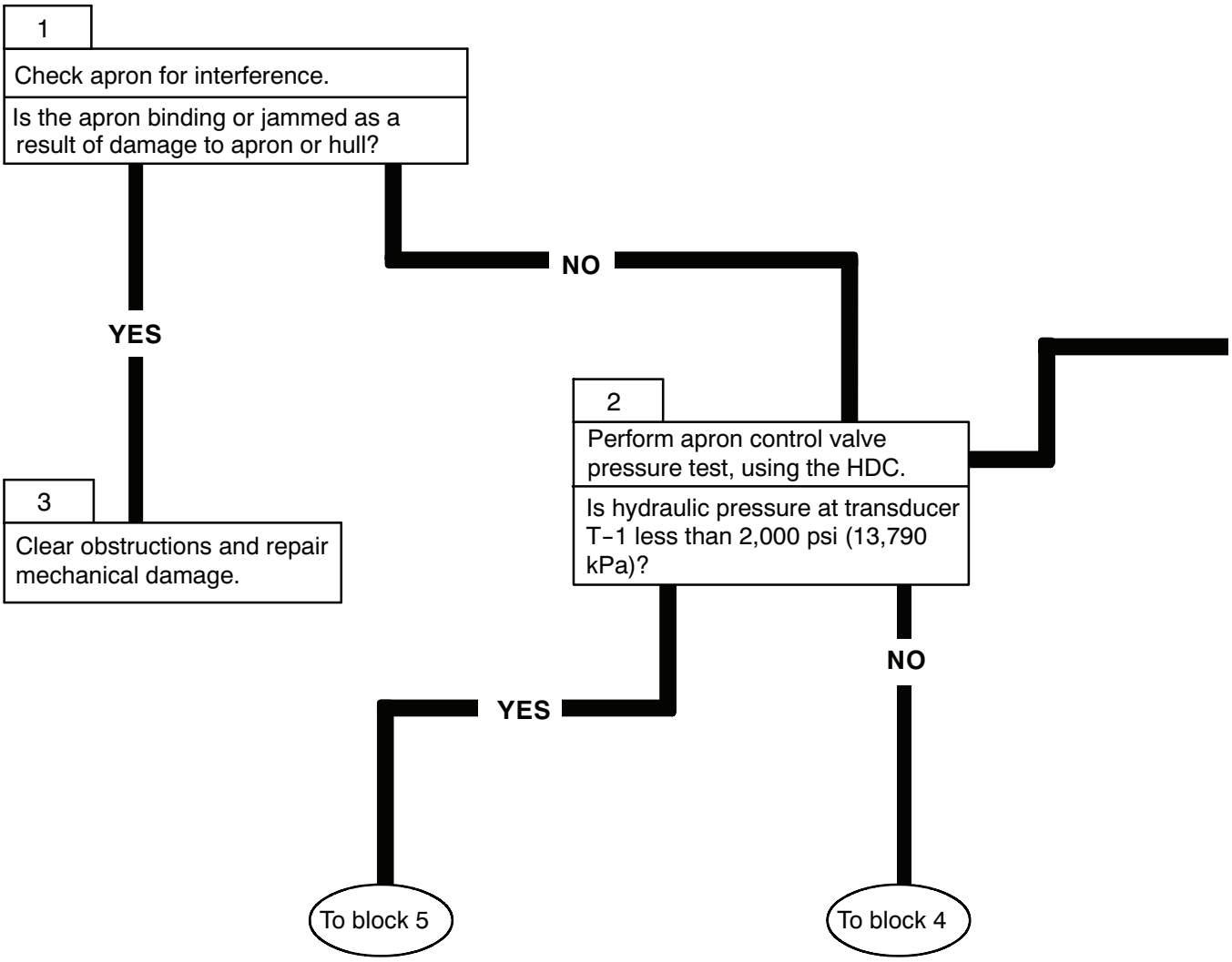


Figure 2. Apron Hydraulic Schematic

APRON WILL NOT RAISE - Continued **0009 00**



APRON CONTROL VALVE PRESSURE TEST.

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.

- Start engine.
- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 3, item 3), select V17 on the HDC display (Figure 3, item 2). Close V17 on the HDC display (Figure 3, item 2) by selecting the CHANGE POSITION button (Figure 3, item 4) on the HDC control box.
- Have assistant start engine and hold APRON CONTROL lever in UP position (RAISE).
- Read transducer T-1 hydraulic pressure on the HDC display (Figure 3, item 1).

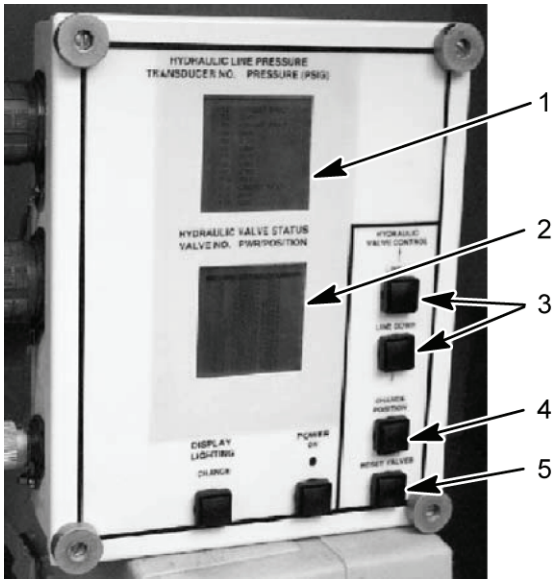
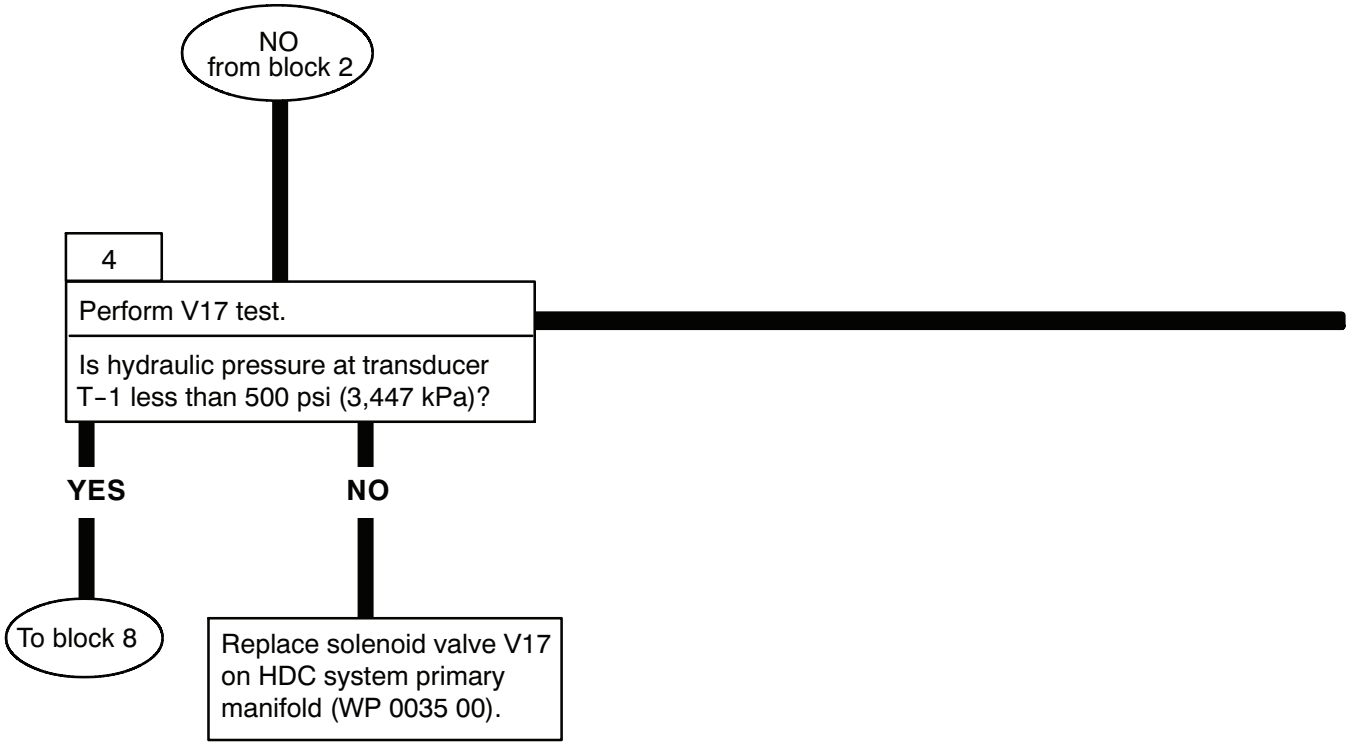


Figure 3. HDC Control Box


NO
from block 2
4
Perform V17 test.
Is hydraulic pressure at transducer T-1 less than 500 psi (3,447 kPa)?
YES
NO
To block 8
Replace solenoid valve V17 on HDC system primary manifold (WP 0035 00).

VALVE V17 TEST.

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 4, item 5) on the HDC control box.
- Wait for transducer T-1 hydraulic pressure on the HDC display (Figure 4, item 1) to drop below 500 psi (3,447 kPa).
- Using LINE UP or LINE DOWN button (Figure 4, item 3), select V17 on the HDC display (Figure 4, item 2). Close V17 on the HDC display (Figure 4, item 2) by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box.
- Have assistant start engine (if engine not already running) and move APRON CONTROL lever to UP position (RAISE). Read transducer T-1 hydraulic pressure on the HDC display (Figure 4, item 1).
- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 4, item 5) on the HDC control box.

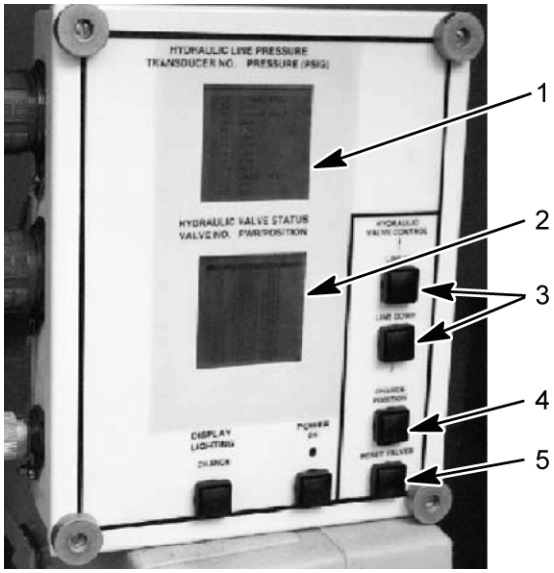
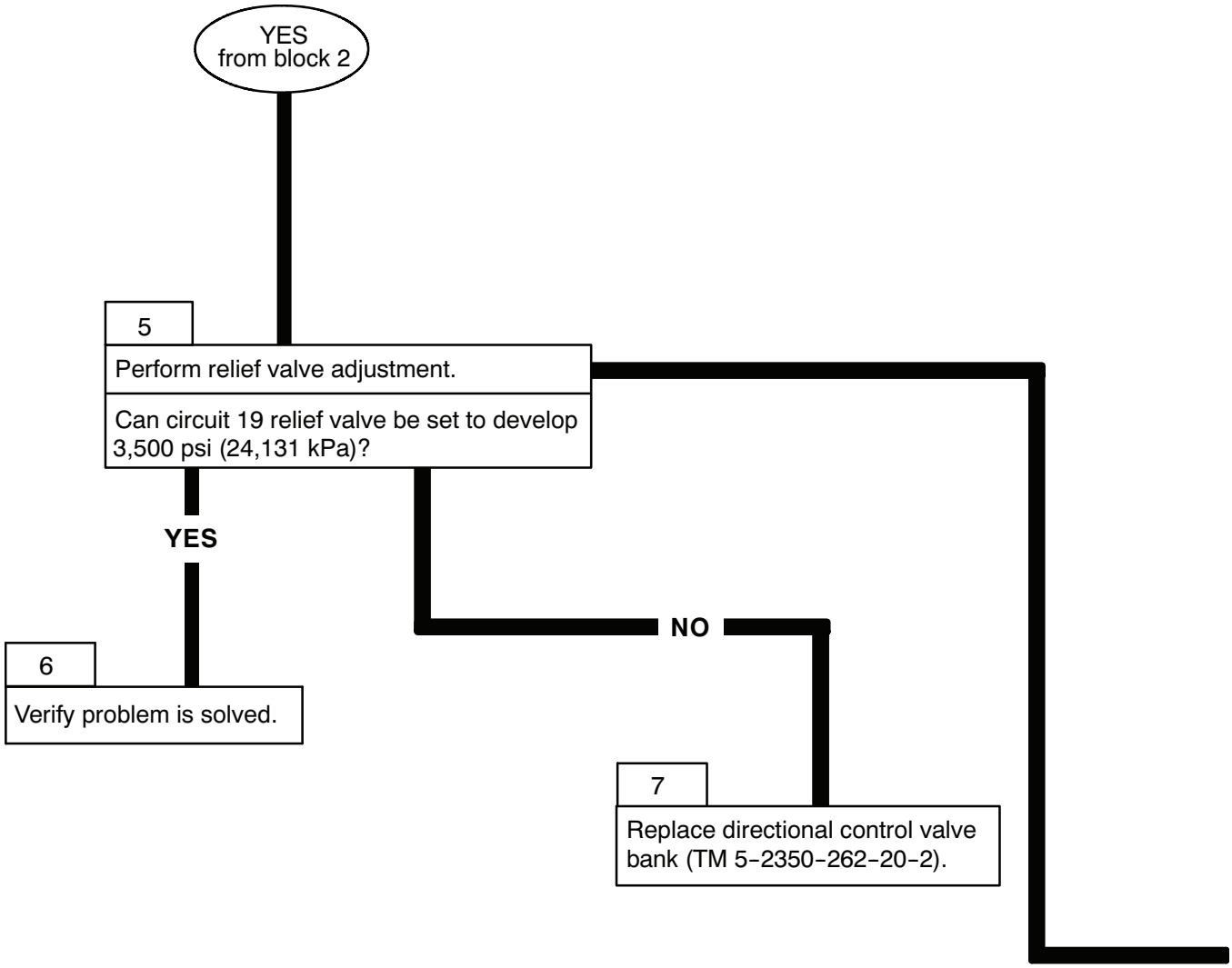


Figure 4. HDC Control Box


YES
from block 2
5
Perform relief valve adjustment.
Can circuit 19 relief valve be set to develop 3,500 psi (24,131 kPa)?
YES
NO
6
Verify problem is solved.
7
Replace directional control valve bank (TM 5-2350-262-20-2).

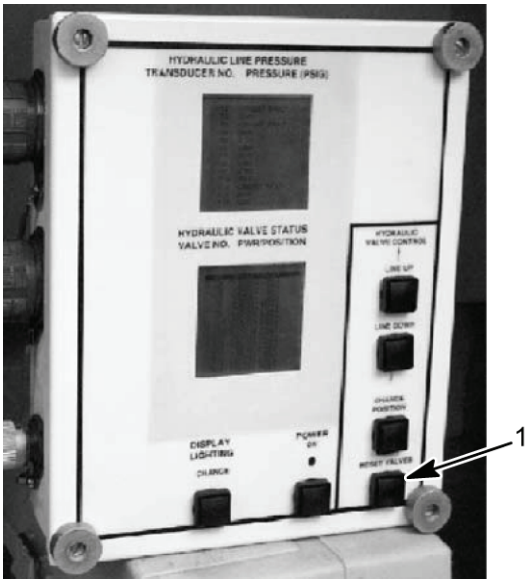


Figure 5. HDC Control Box

CIRCUIT 19 RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 1) on the HDC control box.

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

- Continued on page 0009 00-11.

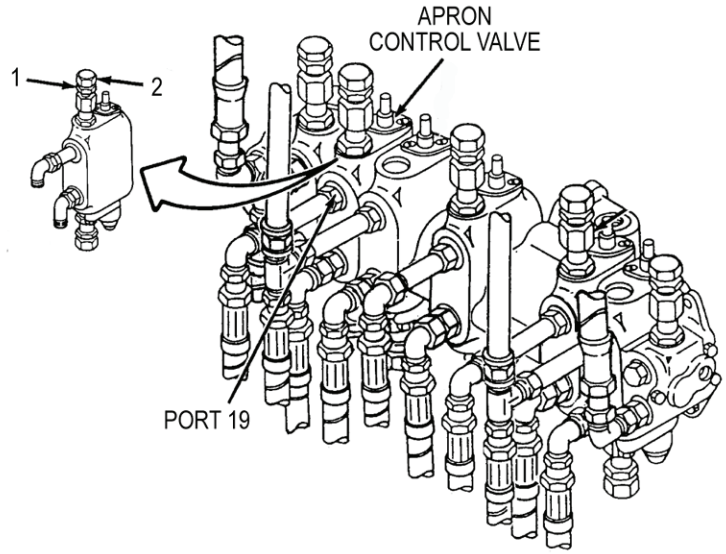


Figure 6. Apron Control Pressure Relief Valve

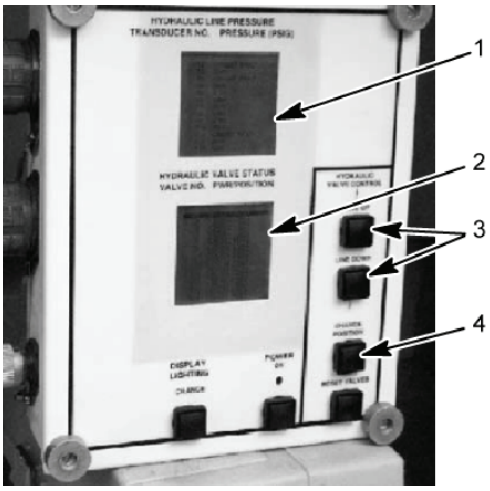


Figure 7. DCV Bank

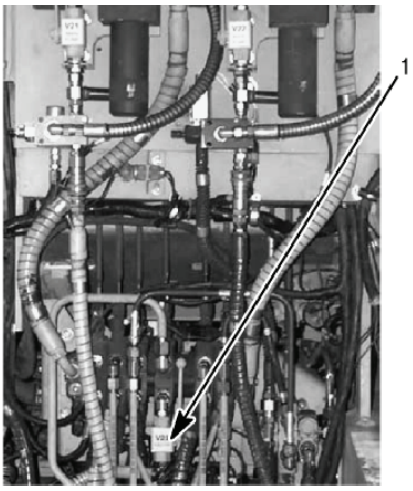


Figure 8. HDC Control Box

CIRCUIT 19 RELIEF VALVE ADJUSTMENT - CONTINUED

- Stop engine and relieve hydraulic pressure.
- Manually close ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 7, item 3), select V1 on the HDC display (Figure 7, item 2). Close V1 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box. Select V17 on the HDC display (Figure 7, item 2). Close V17 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.
- Have assistant start engine and hold APRON CONTROL lever to UP position.
- Loosen jam nut (Figure 6, item 1) on apron control pressure relief valve. Read transducer T-1 hydraulic pressure on the HDC display (Figure 7, item 1). Have assistant hold APRON CONTROL lever in UP position. Rotate valve adjustment (Figure 6, item 2) clockwise to increase pressure, counterclockwise to decrease pressure, until hydraulic pressure is a minimum of 3,500 psi (24,131 kPa).
- Continued on page 0009 00-13.

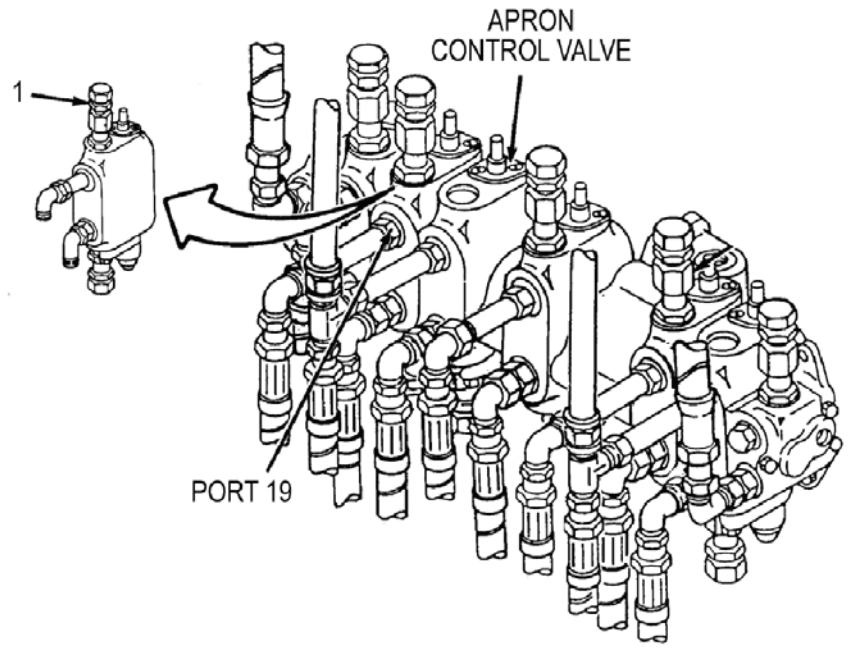


Figure 9. Apron Control Valve

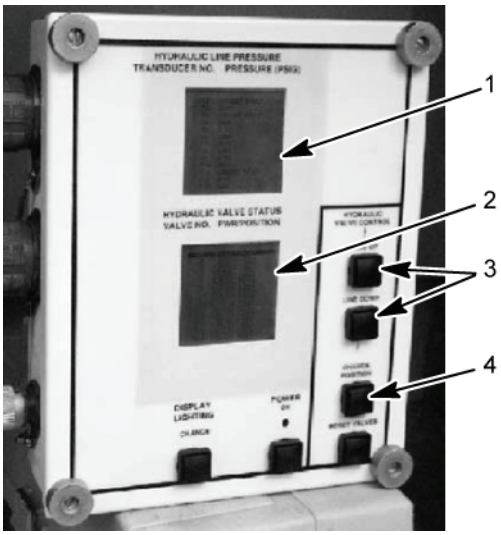


Figure 10. HDC Control Box

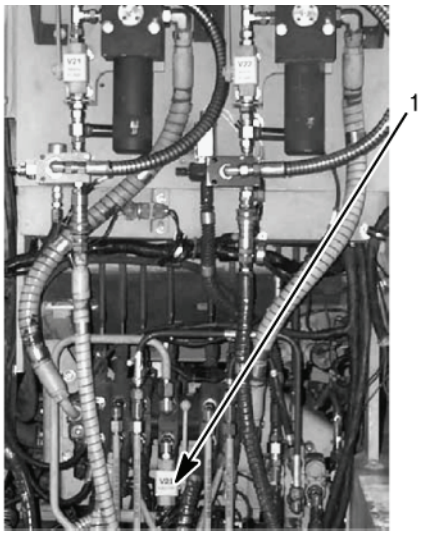
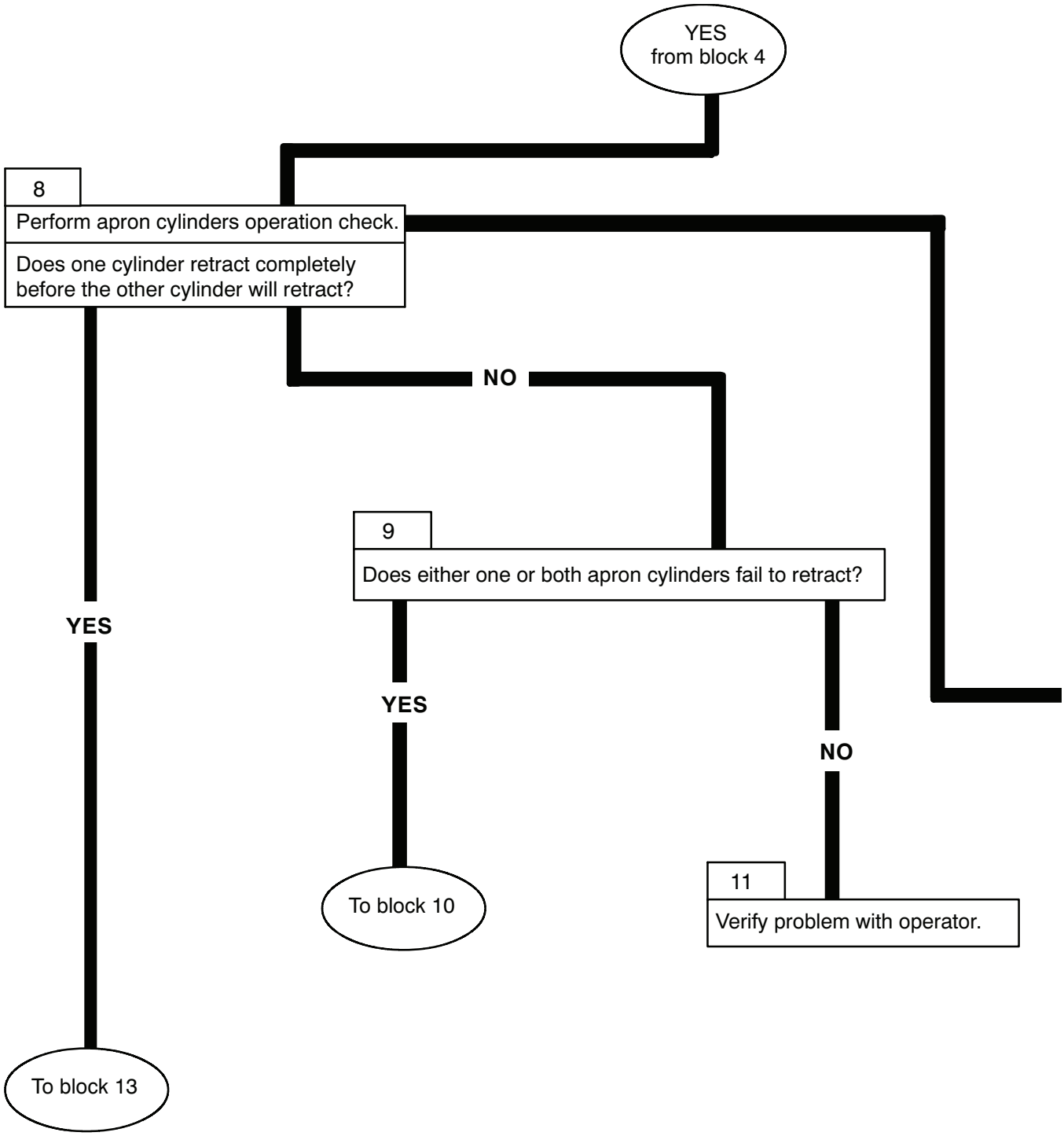


Figure 11. DCV Bank

CIRCUIT 19 RELIEF VALVE ADJUSTMENT - CONTINUED

- When transducer T-1 hydraulic pressure on the HDC display (Figure 10, item 1) indicates 3,500 psi (24,131 kPa); tighten jam nut (Figure 9, item 1).
- Stop engine; relieve hydraulic pressure.
- Manually open ejector inhibit ball valve V23 (Figure 11, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 10, item 3), select V1 on the HDC display (Figure 10, item 2). Open V1 on the HDC display (Figure 10, item 2) by selecting the CHANGE POSITION button (Figure 10, item 4) on the HDC control box. Select V17 on the HDC display (Figure 10, item 2). Open V17 on the HDC display (Figure 10, item 2) by selecting the CHANGE POSITION button (Figure 10, item 4) on the HDC control box.

APRON WILL NOT RAISE - Continued **0009 00**



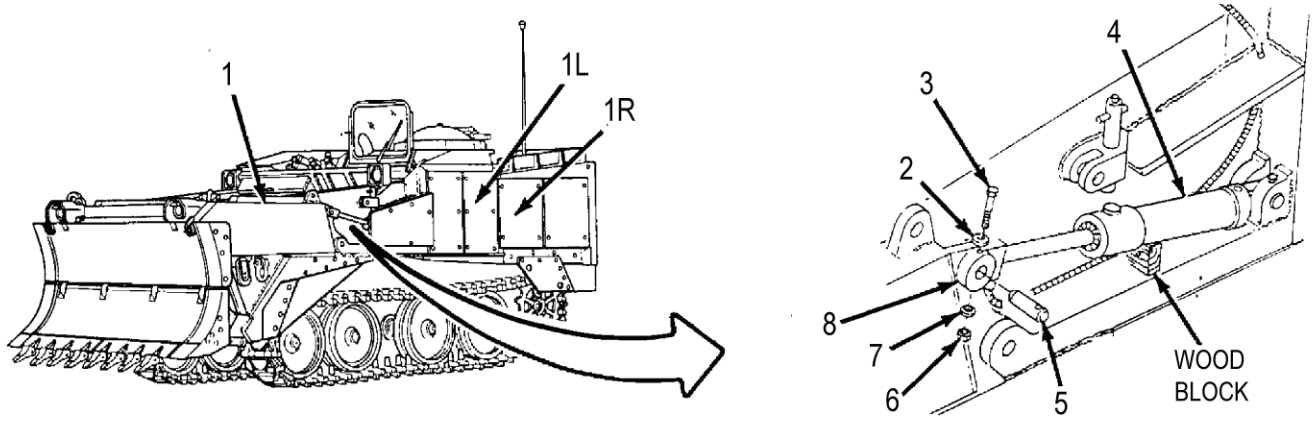


Figure 12. Apron Cylinders Operation Check

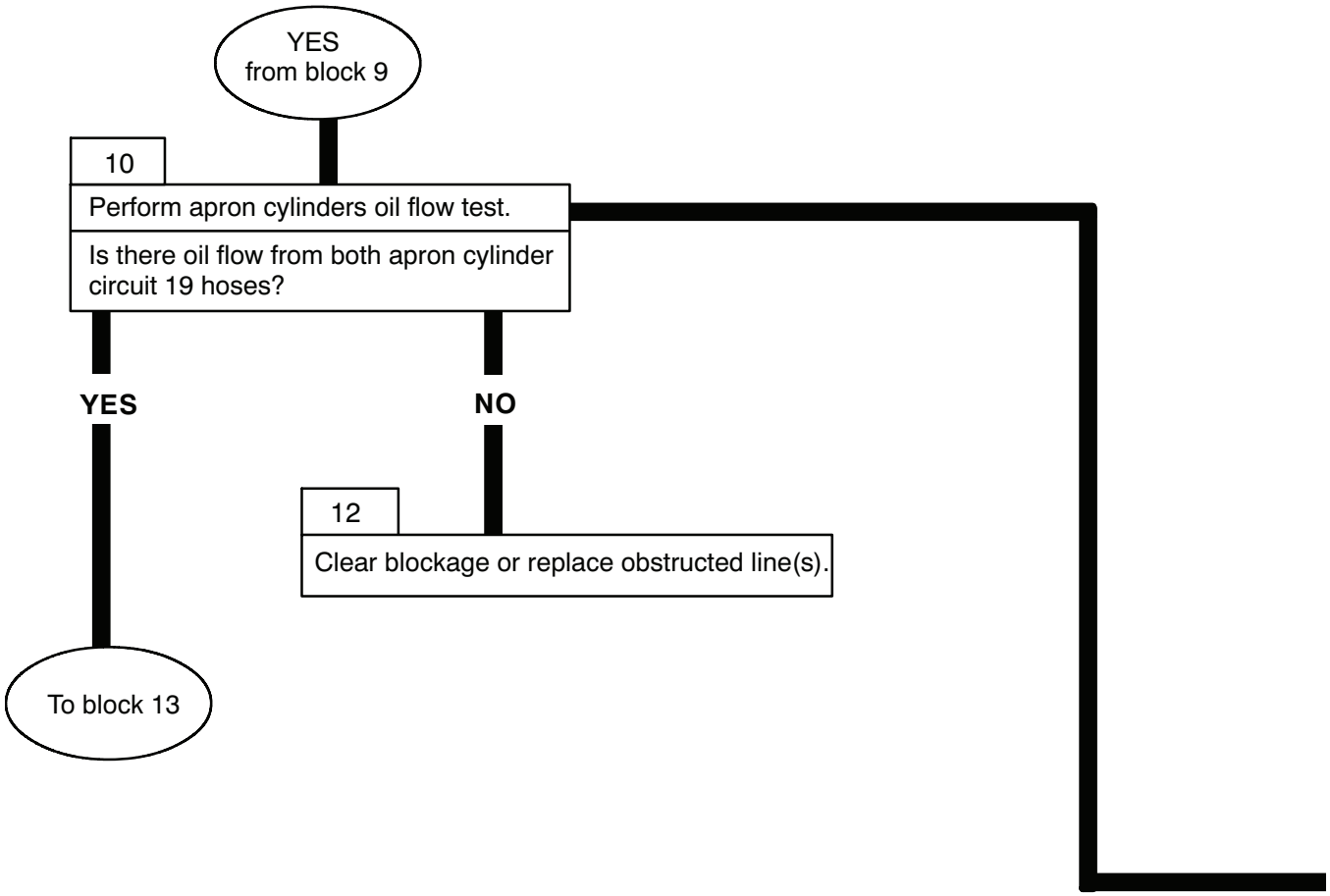
APRON CYLINDERS OPERATION CHECK

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.
- With apron (Figure 12, item 1) lowered, remove exterior armor plates 1L and 1R. Remove bolt (Figure 12, item 3), nut (Figure 12, item 6), two washers (Figure 12, item 2 and item 7), and clevis pin (Figure 12, item 5) from rod end (Figure 12, item 8) of both apron cylinders (Figure 12, item 4). Block apron cylinders (Figure 12, item 4).
- Start engine and hold APRON CONTROL lever in UP position. Observe movement of apron cylinders (Figure 12, item 4).

APRON WILL NOT RAISE - Continued **0009 00**



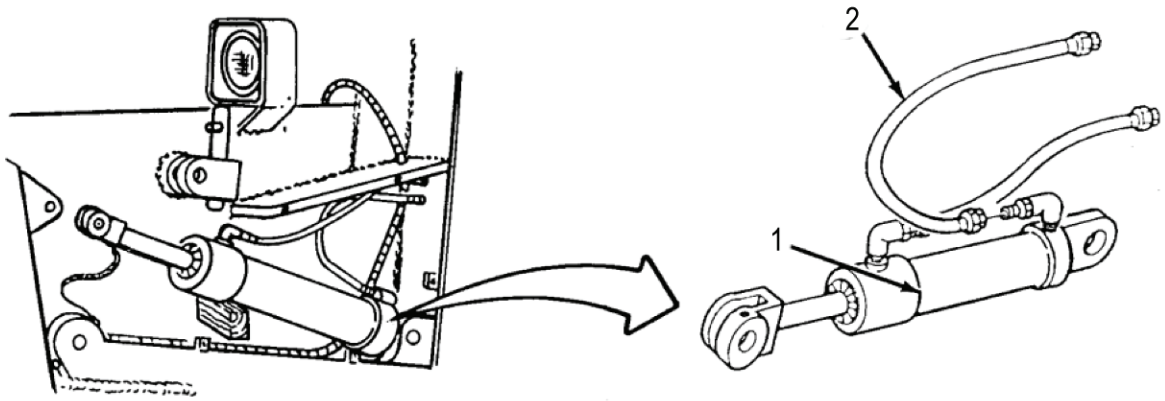


Figure 13. Apron Cylinders Oil Flow Test

APRON CYLINDERS OIL FLOW TEST

NOTE

Have suitable container ready to catch oil.

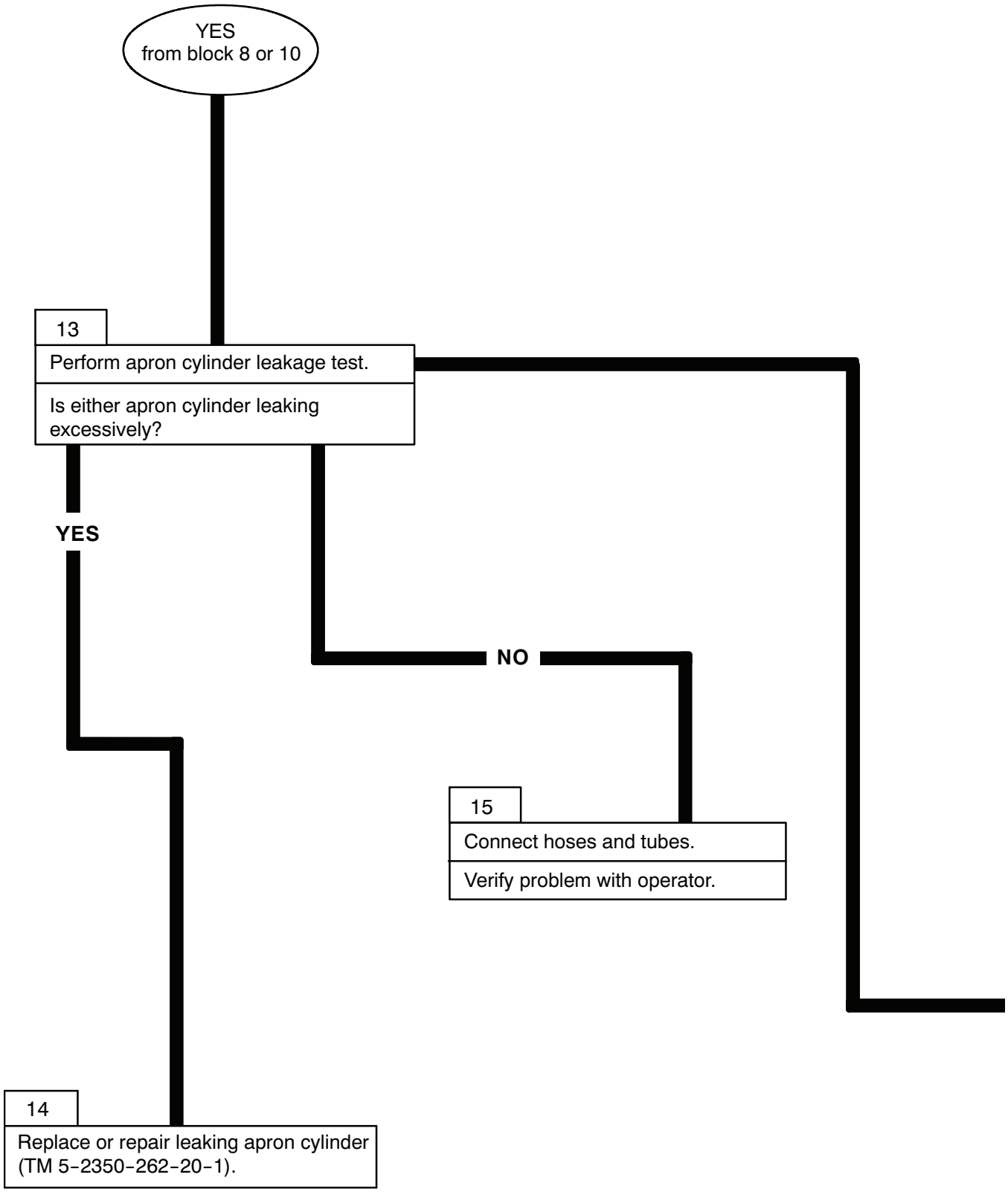
- Extend apron cylinders (Figure 13, item 1) fully. Stop engine. Relieve hydraulic pressure by moving APRON CONTROL lever UP and DOWN several times, and disconnect left and right APRON CYL-#19 hoses (Figure 13, item 2) from apron cylinders (Figure 13, item 1). Hold open end of each hose (Figure 13, item 2) 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 (Figure 13, item 2) to cylinders (Figure 13, item 1).

APRON WILL NOT RAISE - Continued **0009 00**



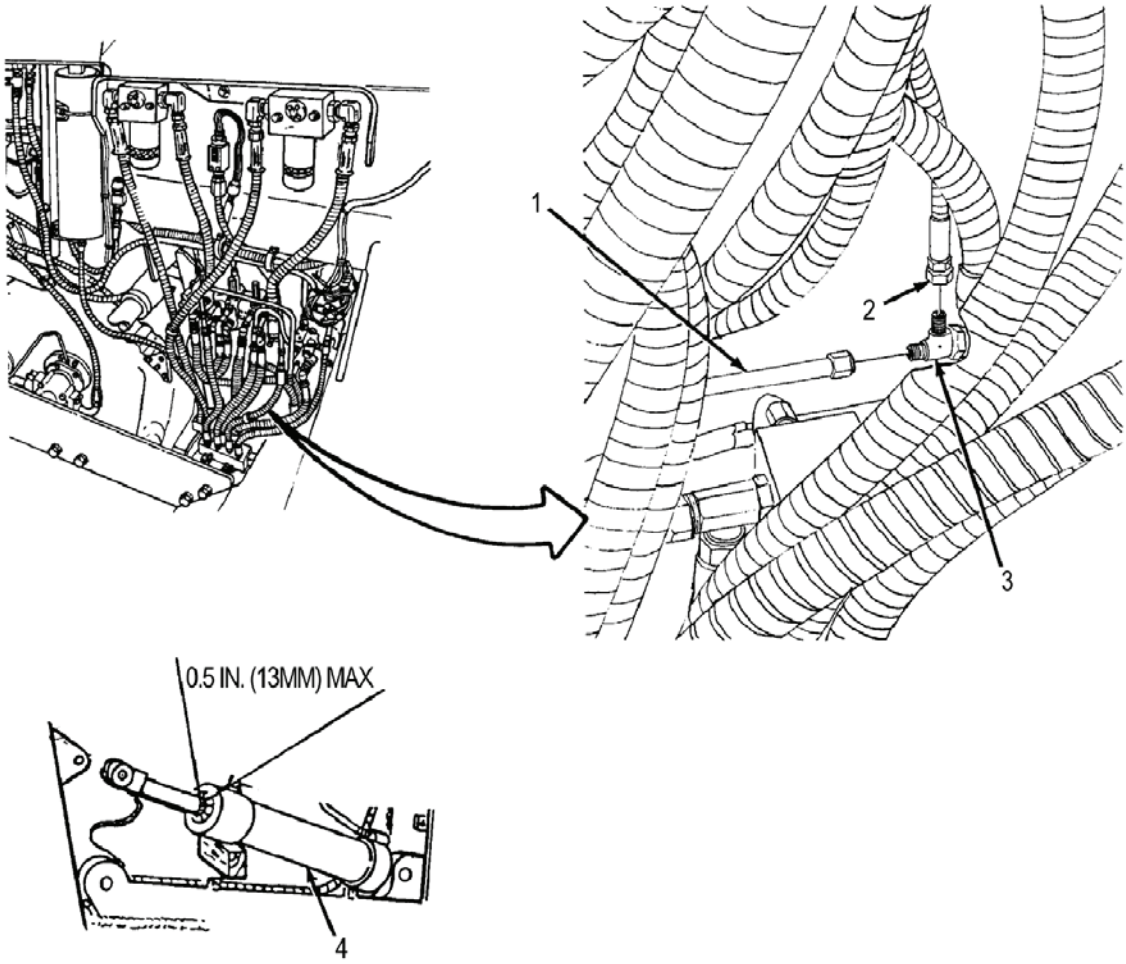


Figure 14. Apron Cylinders Leakage Test

APRON CYLINDER LEAKAGE TEST

NOTE

Have suitable container ready to catch oil.

- Have assistant start engine, and retract cylinders (Figure 14, item 4) approximately halfway. Stop engine; relieve hydraulic pressure.
- Disconnect CKT-20 (REAR) TEE hose (Figure 14, item 2) and CKT-20 (REAR) TEE tube (Figure 14, item 1) from tee (Figure 14, item 3) on hull floor. Plug hose (Figure 14, item 2) and tube (Figure 14, item 1), and cap tee (Figure 14, item 3).
- Start engine and have assistant hold APRON CONTROL lever in UP position. Measure cylinder rod extension of both apron cylinders (Figure 14, item 4). 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 (Figure 14, item 4) again. If extension rate is greater than 0.5 in. (13 mm) per minute, cylinder is leaking excessively.
- Stop engine; relieve hydraulic pressure.

END OF WORK PACKAGE

BUMP STOPS INOPERATIVE 0010 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0031 00
WP 0032 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

NOTE

Perform these procedures for left or right bump stop.

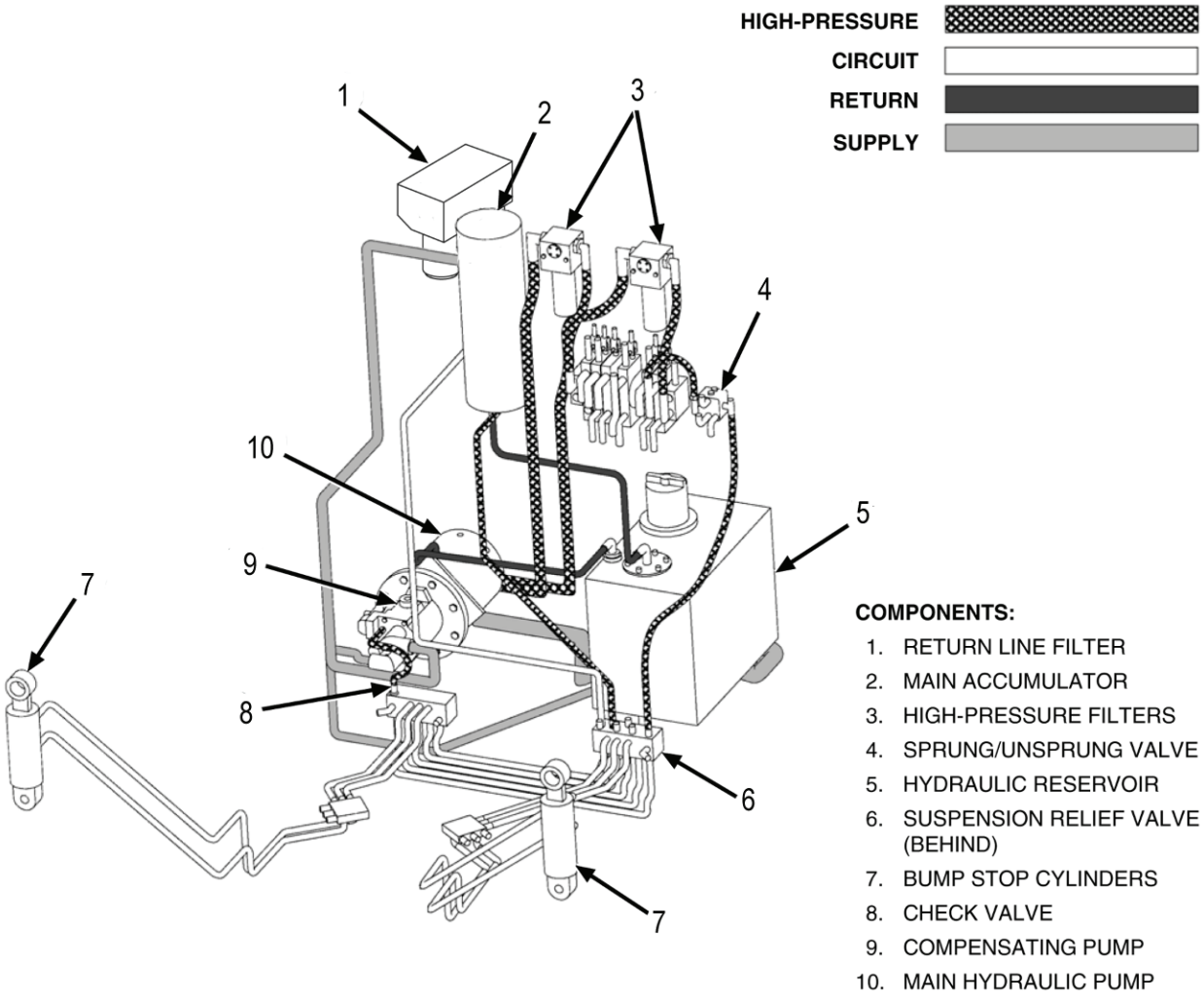


Figure 1. Bump Stop Circuit

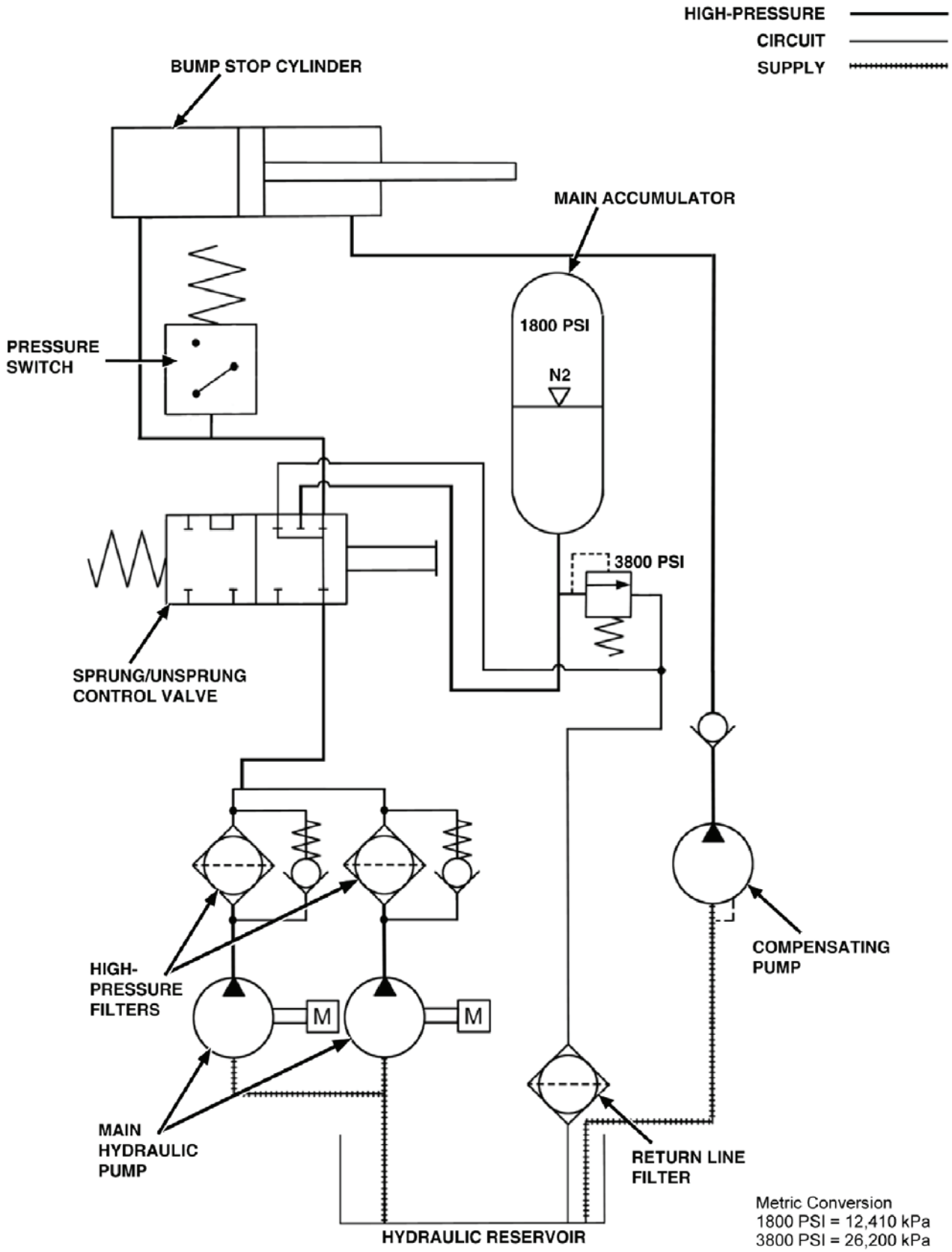
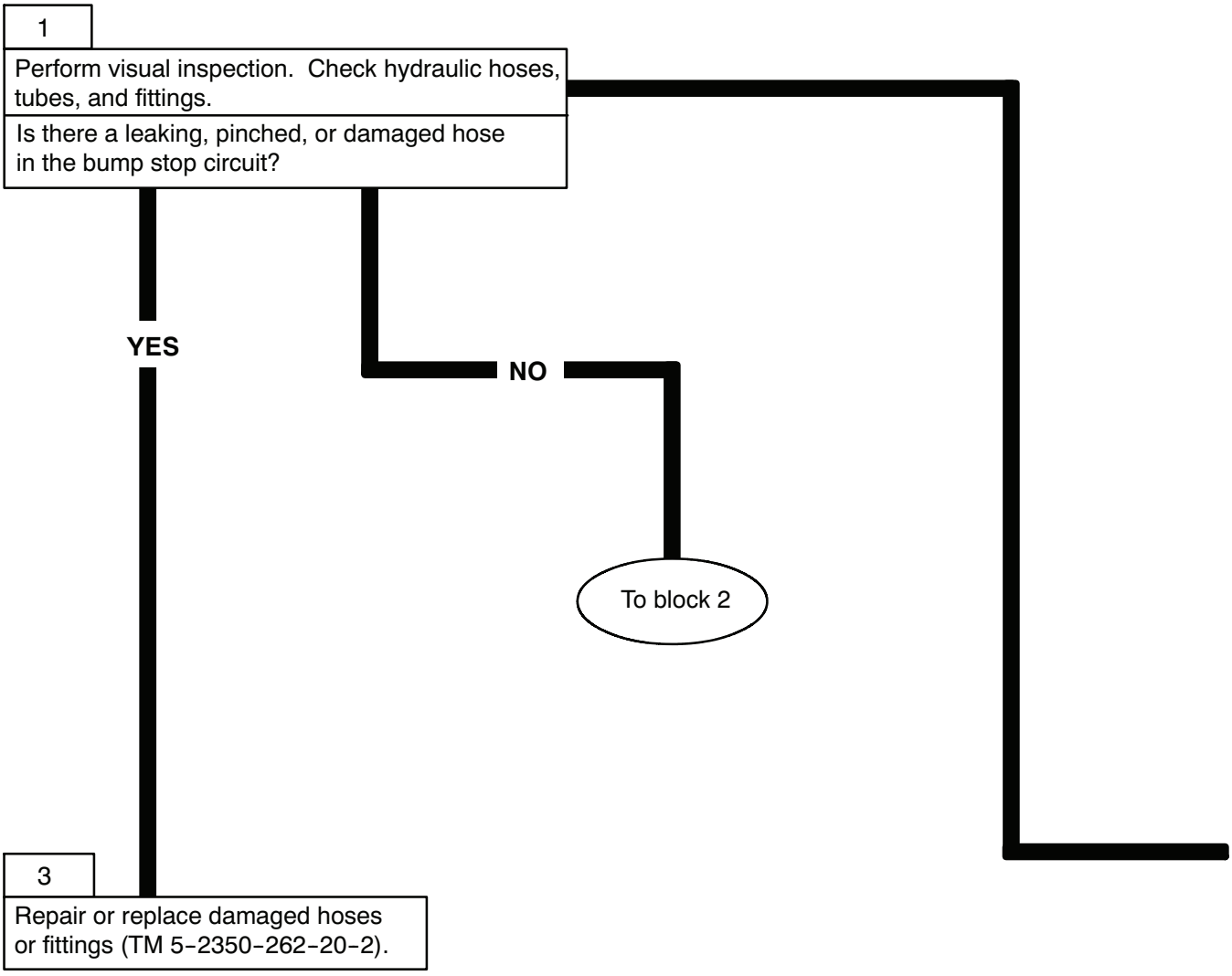


Figure 2. Bump Stop Schematic

BUMP STOPS INOPERATIVE - Continued **0010 00**



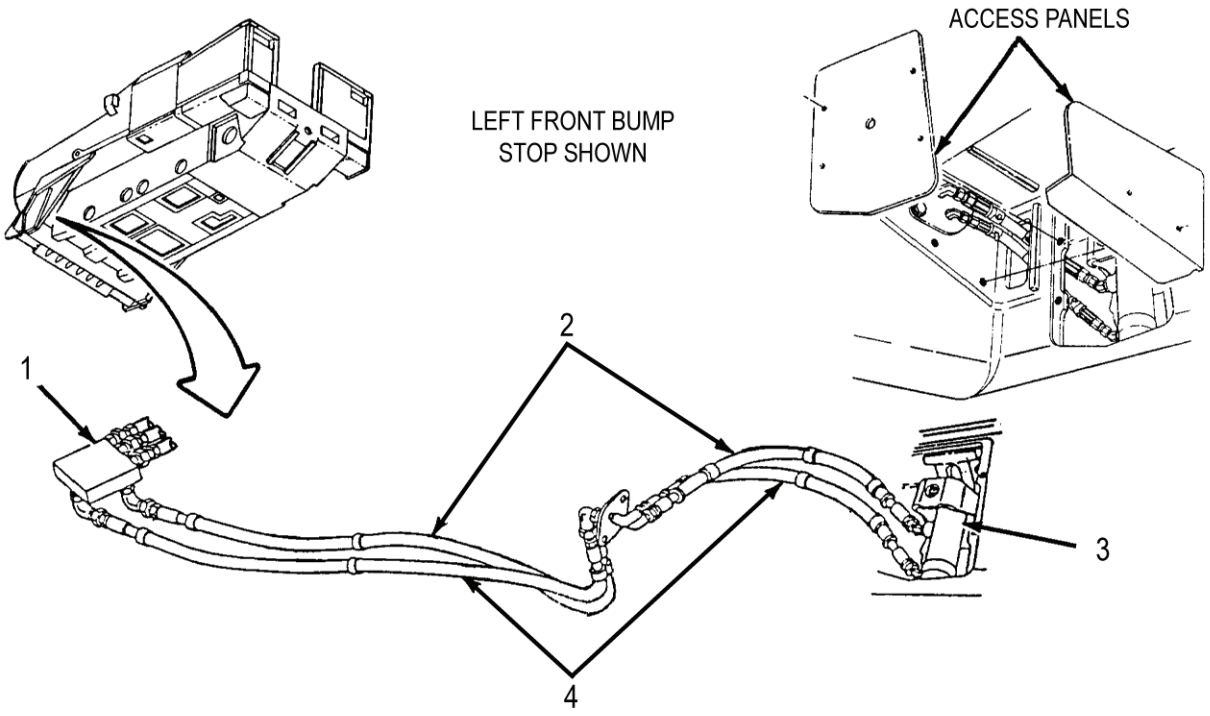
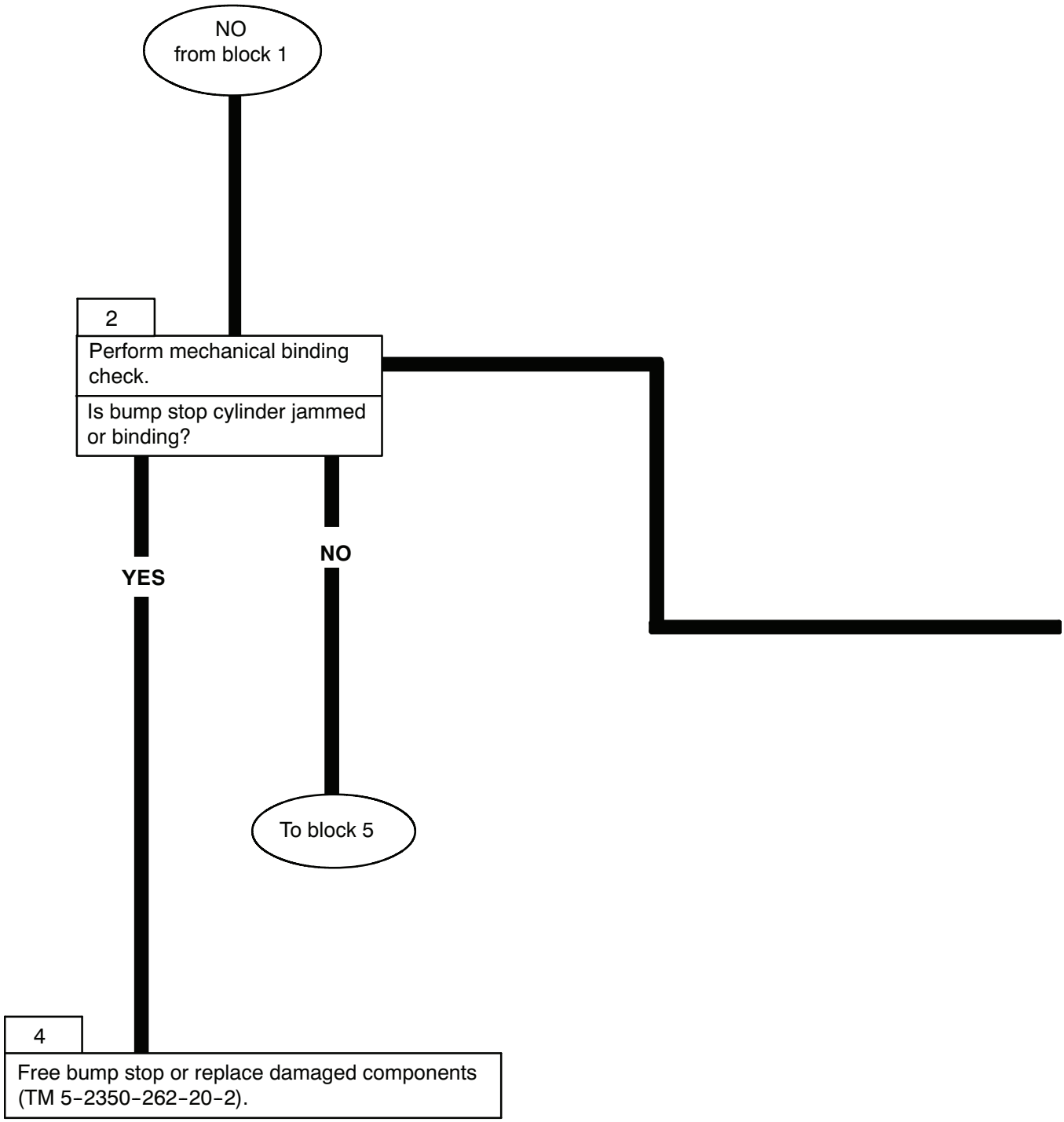


Figure 3. Left Front Bump Stop

VISUAL INSPECTION

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

BUMP STOPS INOPERATIVE - Continued **0010 00**



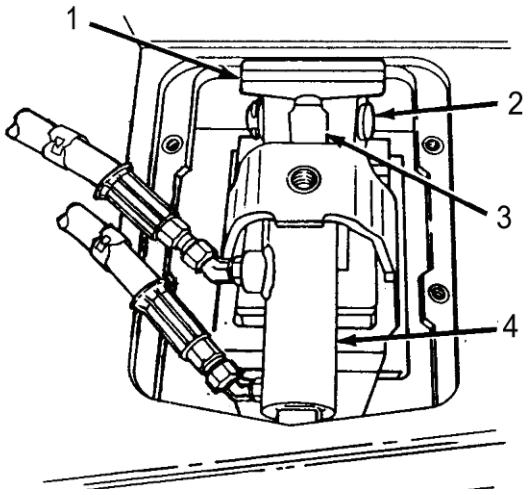
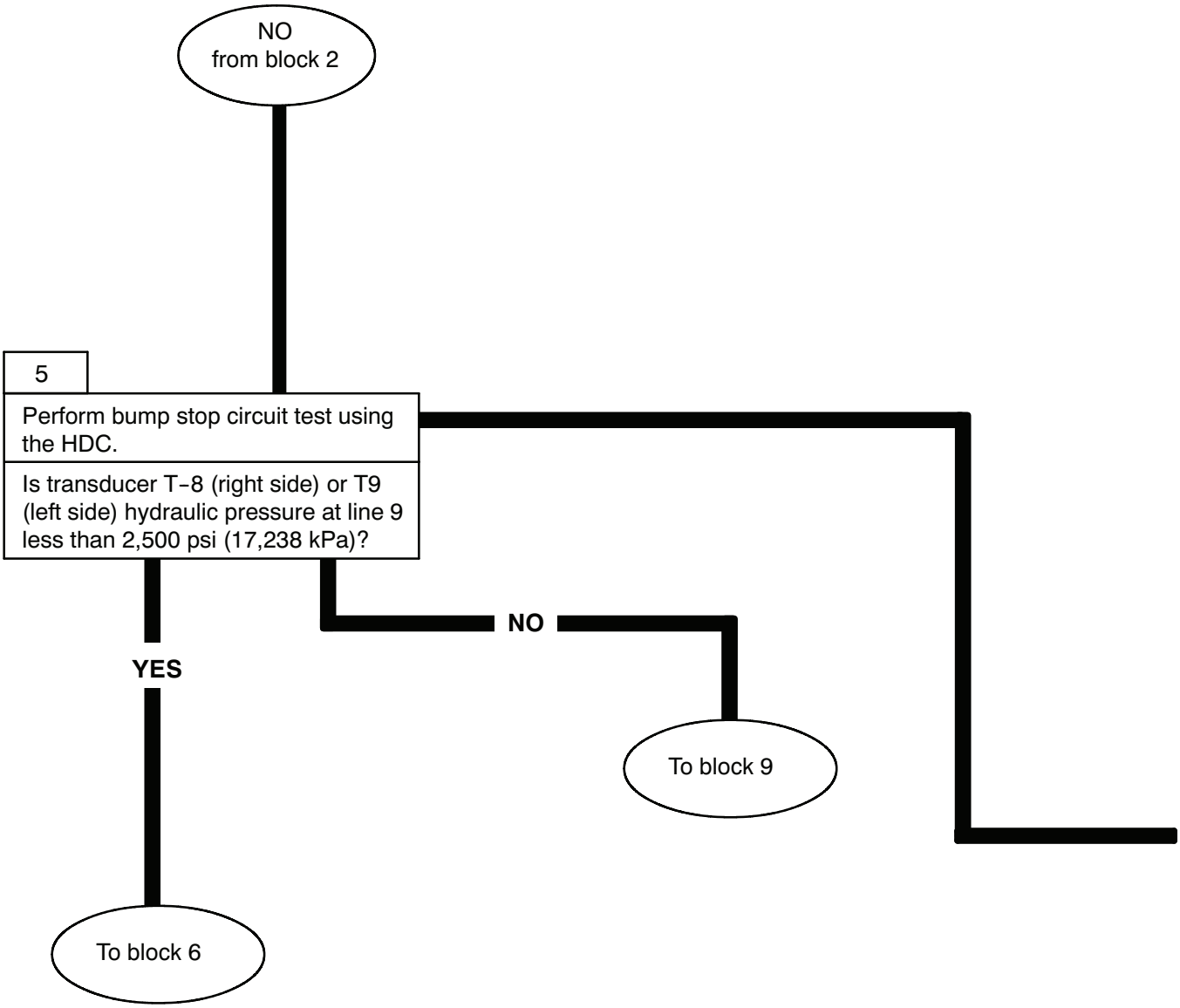


Figure 4. Left Front Bump Stop

MECHANICAL BINDING CHECK

- Clear debris from area of bump stop (Figure 4, item 1).
- 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 (Figure 4, item 4). Check for missing or damaged components including cylinder rod (Figure 4, item 3), cylinder rod connecting pin (Figure 4, item 2), and bump stop (Figure 4, item 1).
- Leave SPRUNG/UNSPRUNG lever in SPRUNG to support later test.

BUMP STOPS INOPERATIVE - Continued **0010 00**



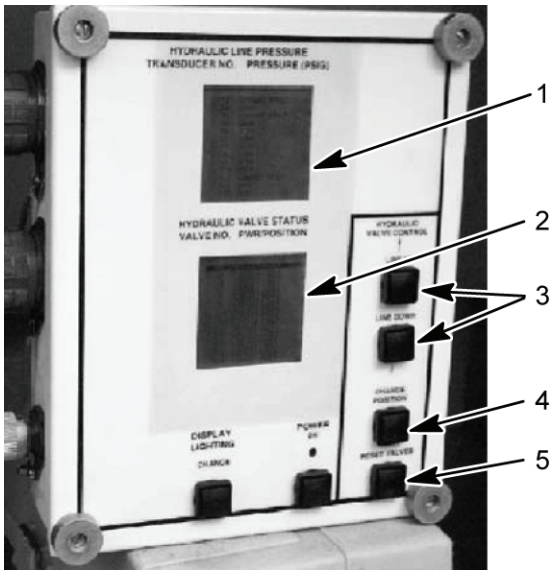
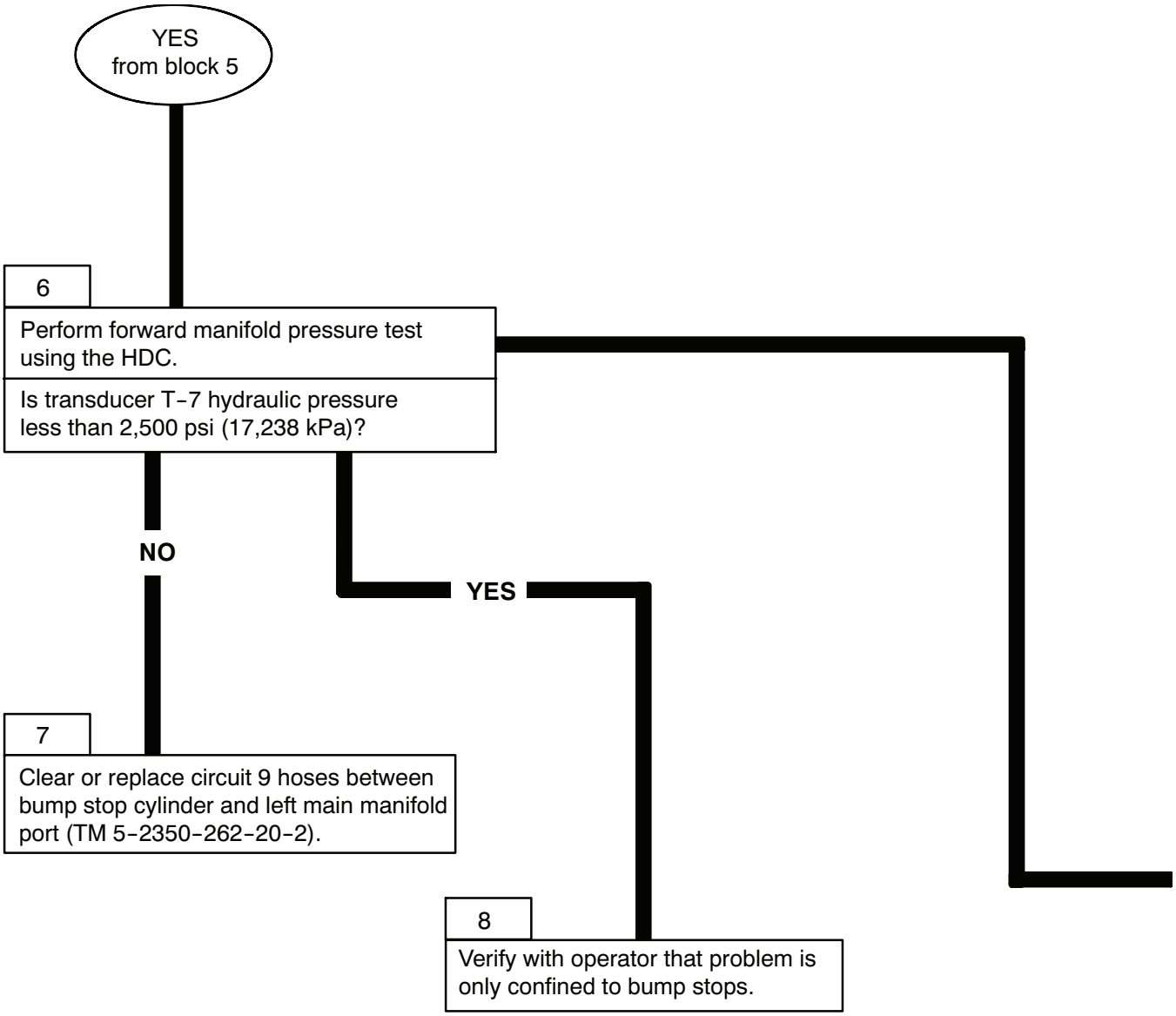


Figure 5. HDC Control Box

LEFT AND RIGHT BUMP STOP CIRCUIT TEST

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 5) on the HDC control box.
- Have assistant start engine and place vehicle in SPRUNG mode.
- For left side bump stop circuit, close left forward manifold valve, by using LINE UP or LINE DOWN button (Figure 5, item 3), select V9 on the HDC display (Figure 5, item 2). Close V9 on the HDC display (Figure 5, item 2), by selecting the CHANGE POSITION button (Figure 5, item 4) on the HDC control box. Read transducer T-9 hydraulic pressure on the HDC display (Figure 5, item 1).
- For right side bump stop circuit, close right forward manifold valve, by using LINE UP or LINE DOWN button (Figure 5, item 3), select V10 on the HDC display (Figure 5, item 2). Close V10 on the HDC display (Figure 5, item 2), by selecting the CHANGE POSITION button (Figure 5, item 4) on the HDC control box. Read transducer T-8 hydraulic pressure on the HDC display (Figure 5, item 1).

BUMP STOPS INOPERATIVE - Continued **0010 00**



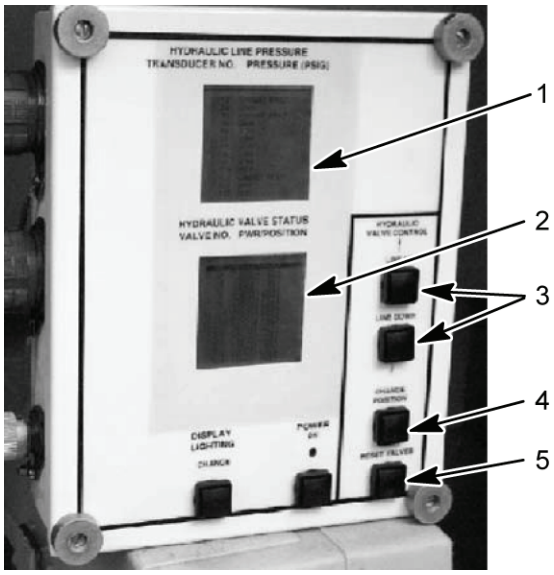
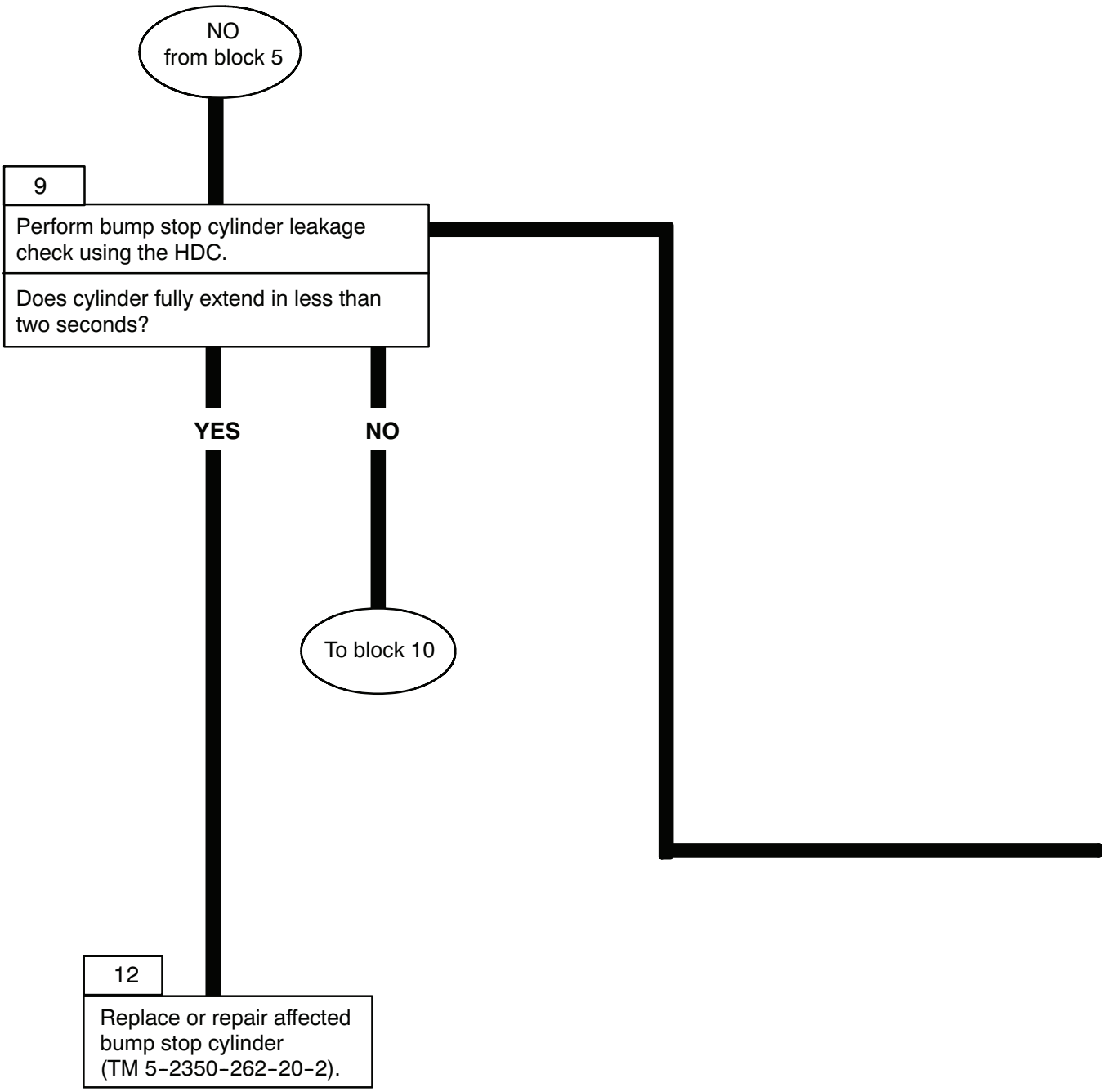


Figure 6. HDC Control Box

LEFT AND RIGHT FORWARD MANIFOLD PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.
- Start engine.
- For left forward manifold pressure, close left forward manifold valve. Using LINE UP or LINE DOWN button (Figure 6, item 3), select V9 on the HDC display (Figure 6, item 2). Close V9 on the HDC display (Figure 6, item 2), by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box. Read transducer T-7 hydraulic pressure on the HDC display (Figure 6, item 1).
- For right forward manifold pressure, close right forward manifold valve. Using LINE UP or LINE DOWN button (Figure 6, item 3), select V10 on the HDC display (Figure 6, item 2). Close V10 on the HDC display (Figure 6, item 2), by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box. Read transducer T-7 hydraulic pressure on the HDC display (Figure 6, item 1).
- Stop engine and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.


NO
from block 5
9
Perform bump stop cylinder leakage check using the HDC.
Does cylinder fully extend in less than two seconds?
YES
NO
To block 10
12
Replace or repair affected bump stop cylinder (TM 5-2350-262-20-2).

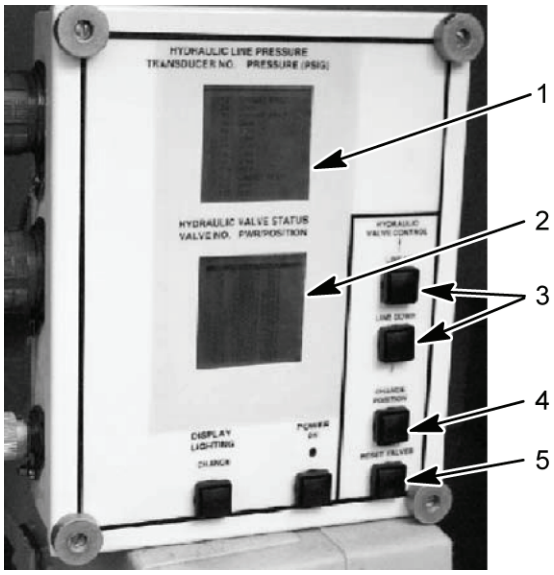
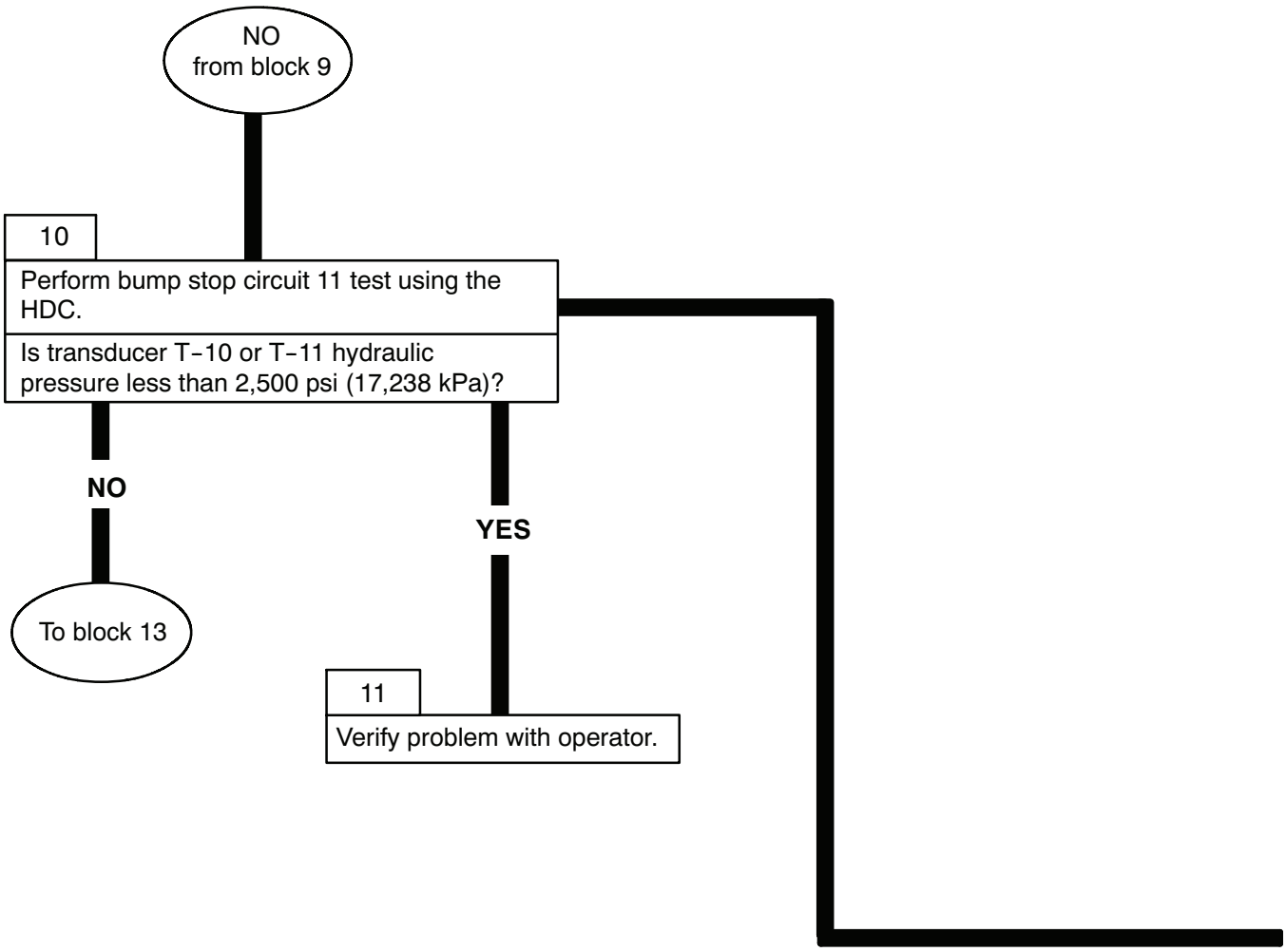


Figure 7. HDC Control Box

BUMP STOP CYLINDER LEAKAGE TEST

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 5) on the HDC control box.
- Move SPRUNG/UNSPRUNG lever to UNSPRUNG.
- For left bump stop circuit; using LINE UP or LINE DOWN button (Figure 7, item 3), select V10 on the HDC display (Figure 7, item 2). Close V10 on the HDC display (Figure 7, item 2), by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.
- For right bump stop circuit; using LINE UP or LINE DOWN button (Figure 7, item 3), select V9 on the HDC display (Figure 7, item 2). Close V9 on the HDC display (Figure 7, item 2), by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.
- 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.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 5) on the HDC control box.

BUMP STOPS INOPERATIVE - Continued **0010 00**



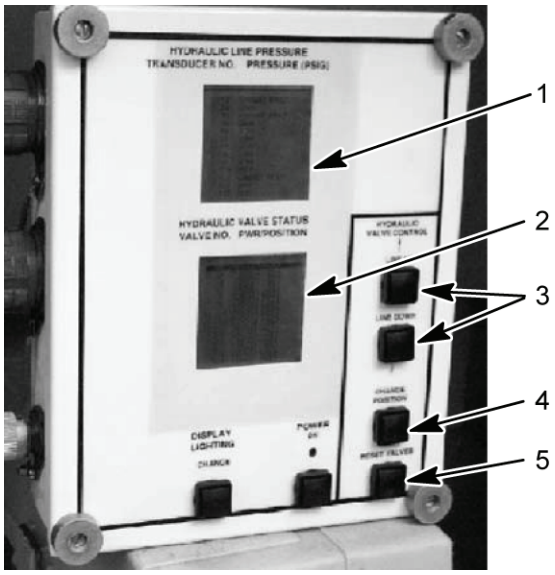
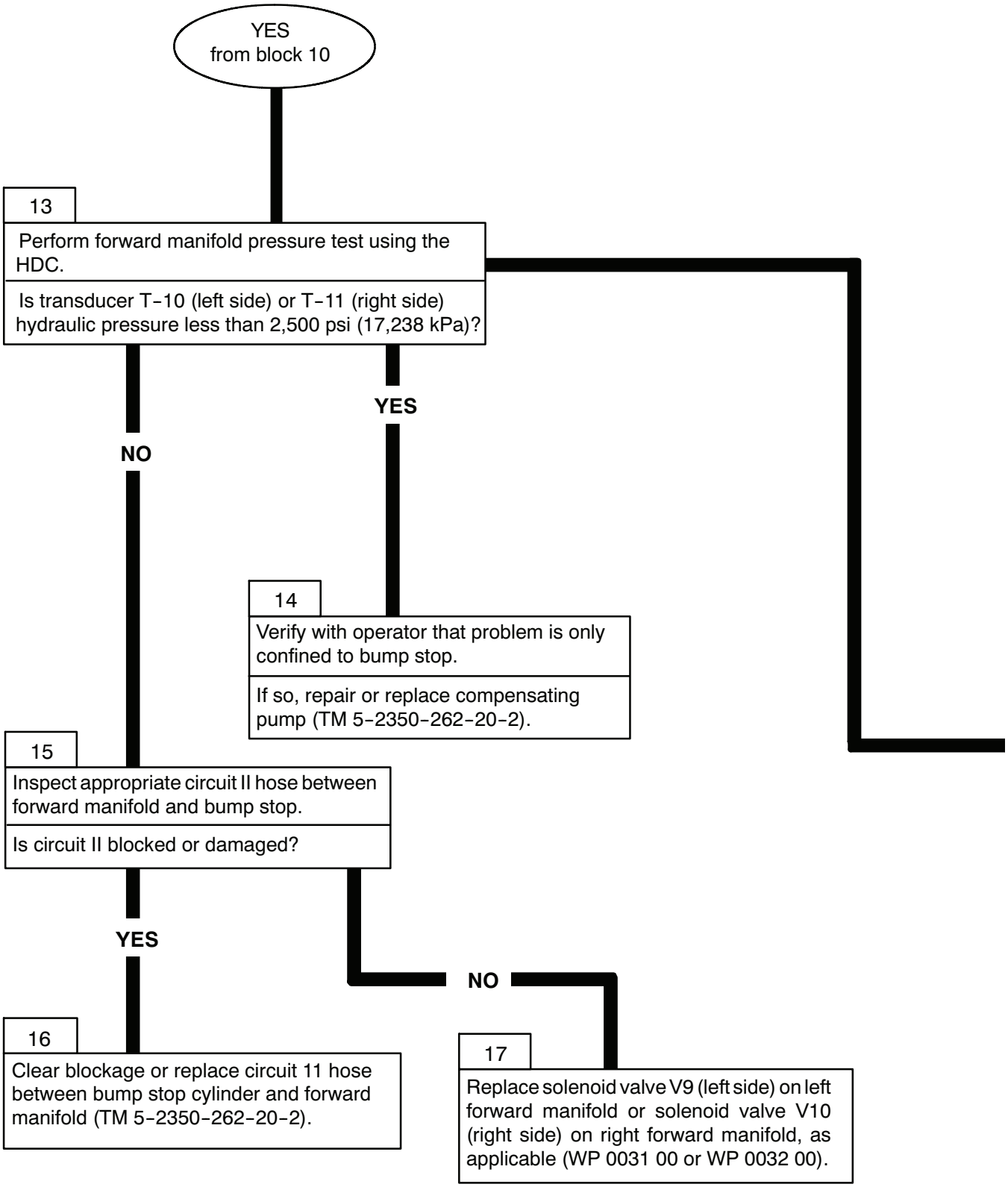


Figure 8. HDC Control Box

BUMP STOP CIRCUIT 11 TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 8, item 5) on the HDC control box.
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG.
- For left bump stop circuit; Using LINE UP or LINE DOWN button (Figure 8, item 3), select V10 on the HDC display (Figure 8, item 2). Close V10 on the HDC display (Figure 8, item 2), by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box. Read transducer T10 hydraulic pressure on the HDC display (Figure 8, item 1).
- For right bump stop circuit; Using LINE UP or LINE DOWN button (Figure 8, item 3), select V9 on the HDC display (Figure 8, item 2). Close V9 on the HDC display (Figure 8, item 2), by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box. Read transducer T-11 hydraulic pressure on the HDC display (Figure 8, item 1).
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 8, item 5) on the HDC control box.
- Stop engine and relieve hydraulic pressure.


YES
from block 10
13
Perform forward manifold pressure test using the HDC.
Is transducer T-10 (left side) or T-11 (right side) hydraulic pressure less than 2,500 psi (17,238 kPa)?
YES
NO
14
Verify with operator that problem is only confined to bump stop.
If so, repair or replace compensating pump (TM 5-2350-262-20-2).
15
Inspect appropriate circuit II hose between forward manifold and bump stop.
Is circuit II blocked or damaged?
YES
NO
16
Clear blockage or replace circuit 11 hose between bump stop cylinder and forward manifold (TM 5-2350-262-20-2).
17
Replace solenoid valve V9 (left side) on left forward manifold or solenoid valve V10 (right side) on right forward manifold, as applicable (WP 0031 00 or WP 0032 00).

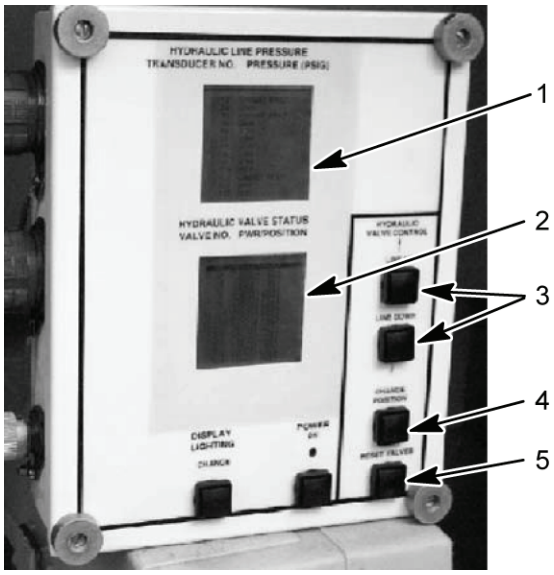


Figure 9. HDC Control Box

LEFT AND RIGHT FORWARD MANIFOLD PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG.
- For left forward manifold pressure; Using LINE UP or LINE DOWN button (Figure 9, item 3), select V9 on the HDC display (Figure 9, item 2). Close V9 on the HDC display (Figure 9, item 2), by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box. Read transducer T-10 hydraulic pressure on the HDC display (Figure 9, item 1).
- For right forward manifold pressure; Using LINE UP or LINE DOWN button (Figure 9, item 3), select V10 on the HDC display (Figure 9, item 2). Close V10 on the HDC display (Figure 9, item 2), by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box. Read transducer T-11 hydraulic pressure on the HDC display (Figure 9, item 1).
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Stop engine and relieve hydraulic pressure.

END OF WORK PACKAGE

EJECTOR CREEPS

0011 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 on the DCV control bank.

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

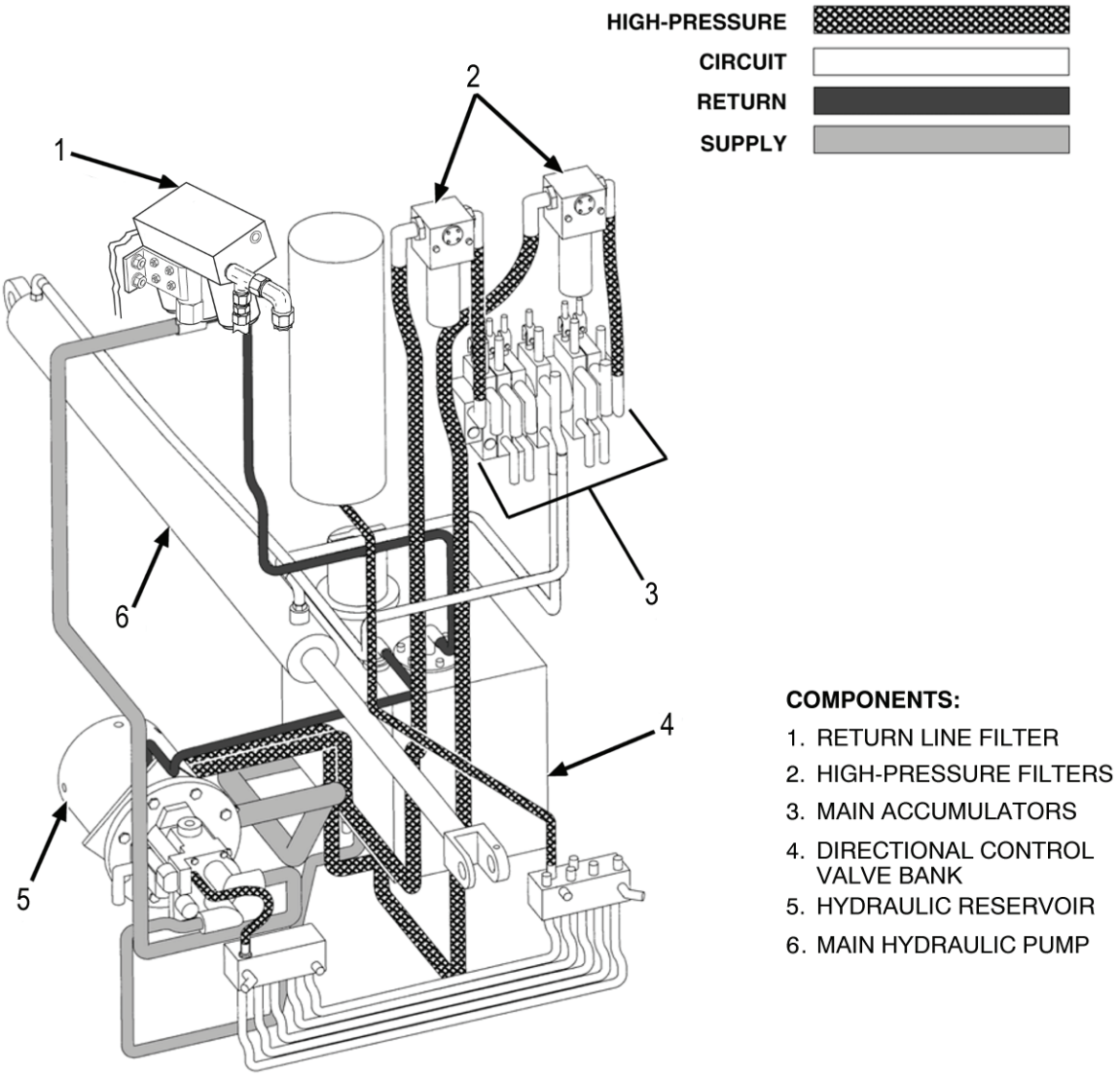


Figure 1. Ejector Hydraulic Circuit

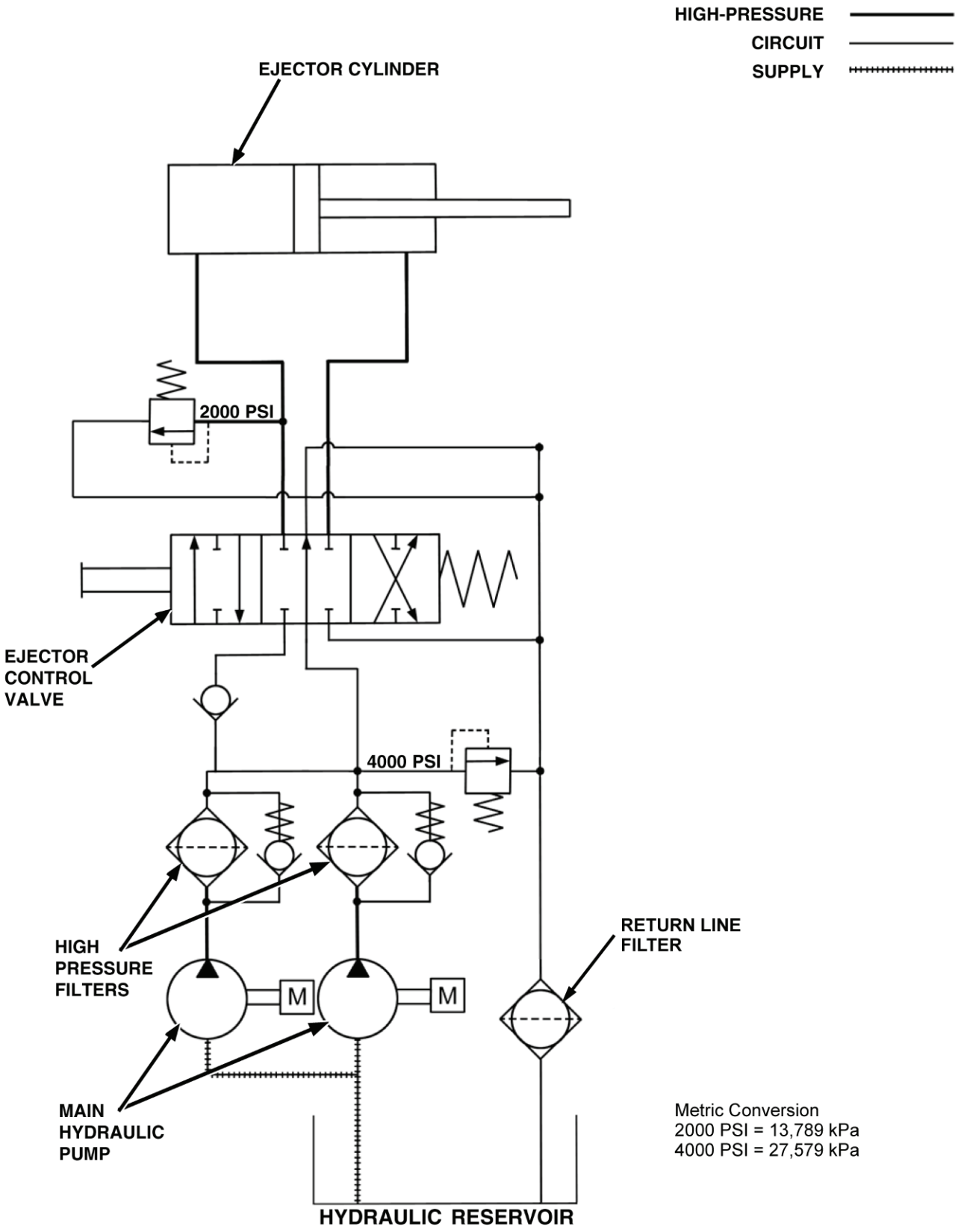
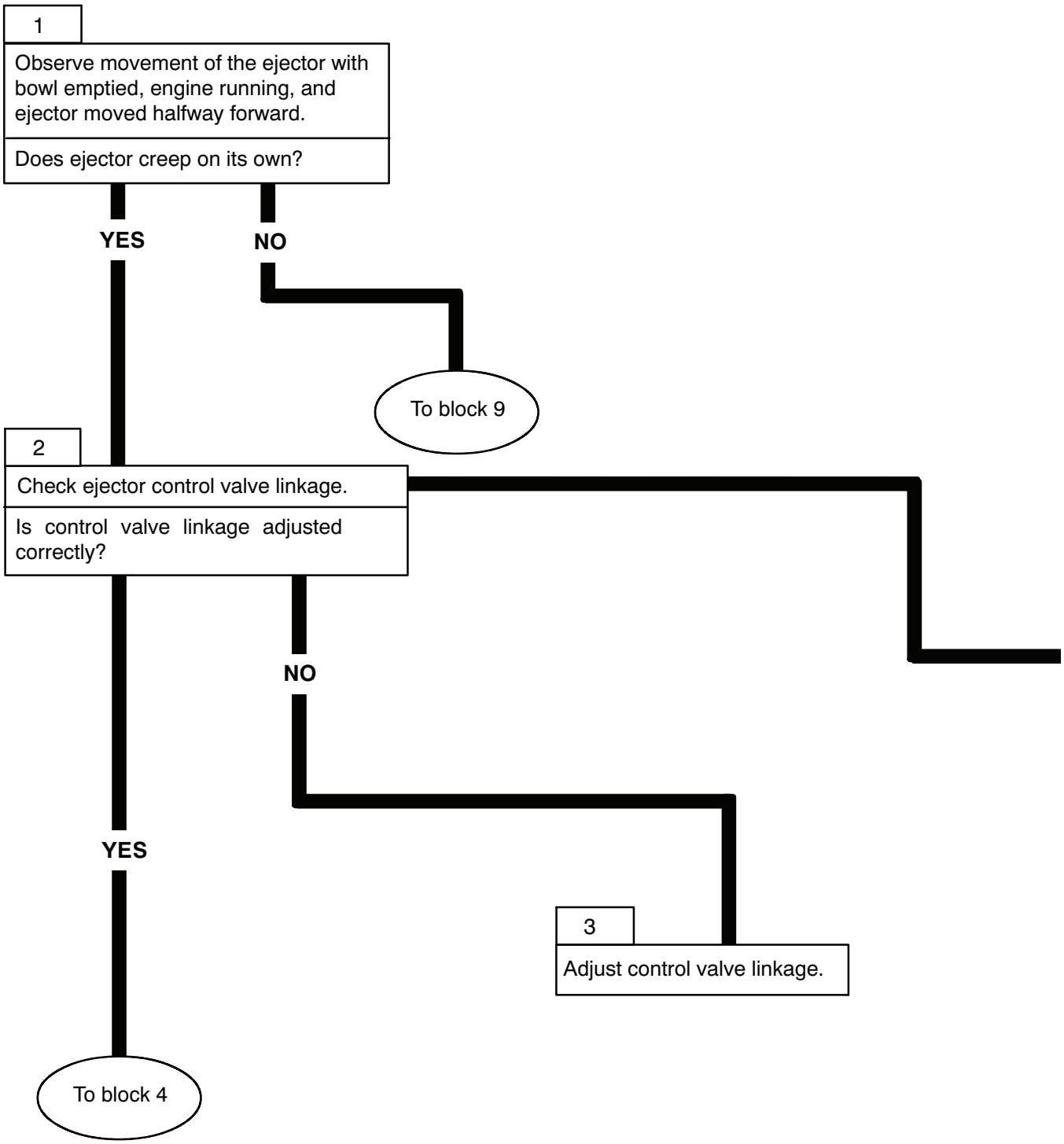


Figure 2. Ejector Hydraulic Schematic

EJECTOR CREEPS - Continued **0011 00**



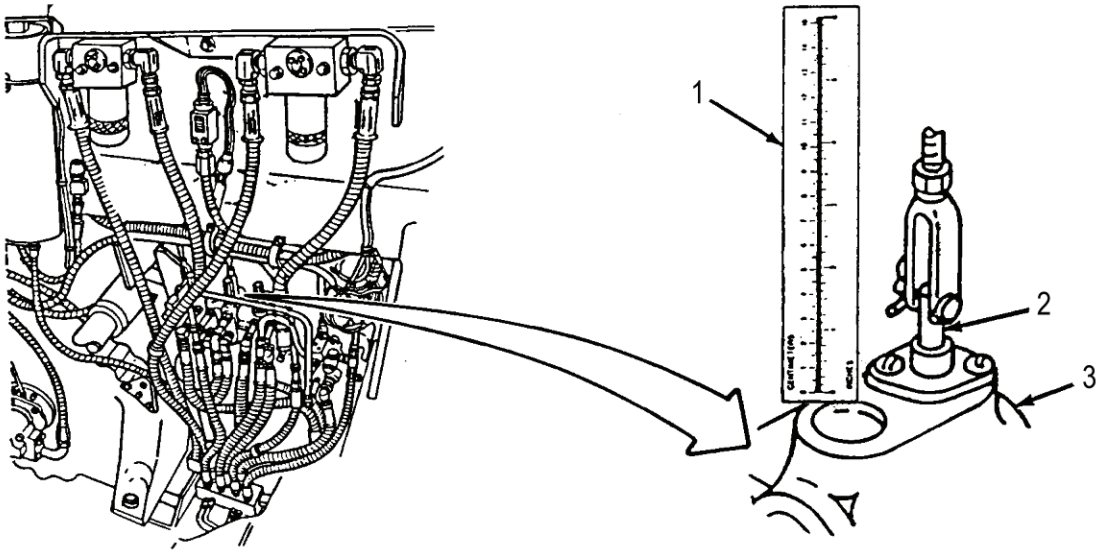
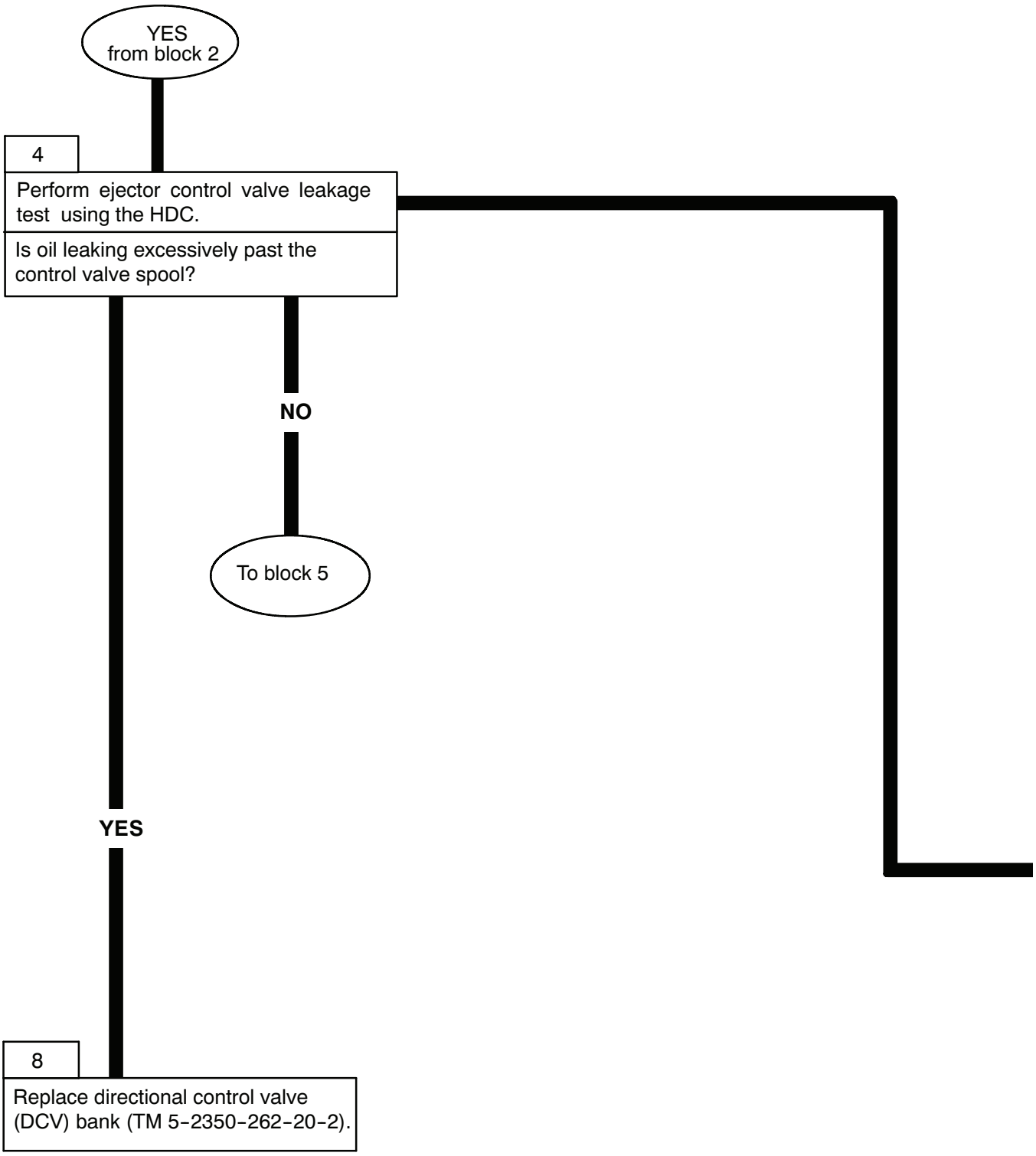


Figure 3. Ejector Control Valve Linkage

EJECTOR CONTROL VALVE LEAKAGE TEST

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

EJECTOR CREEPS - Continued **0011 00**



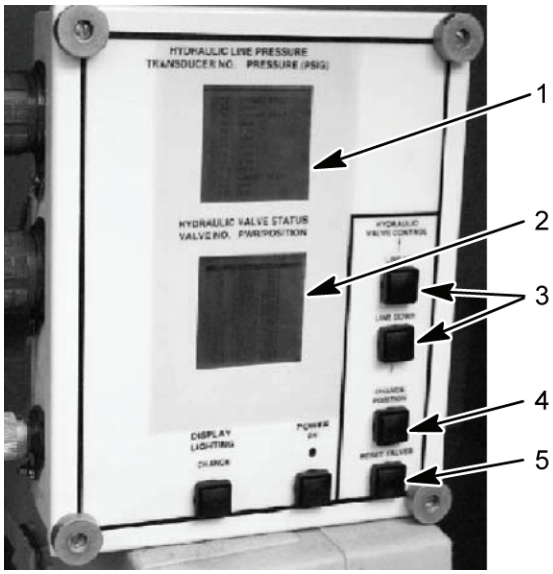


Figure 4. HDC Control Box

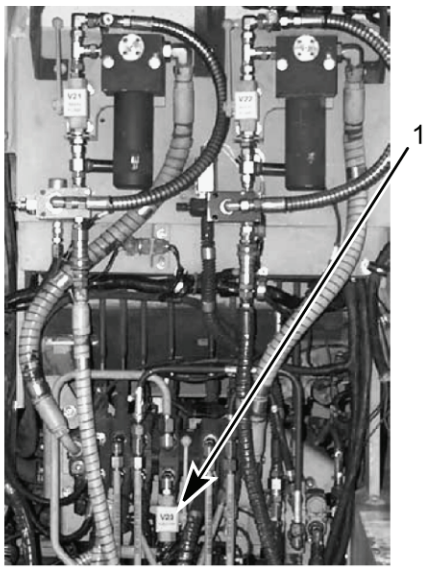
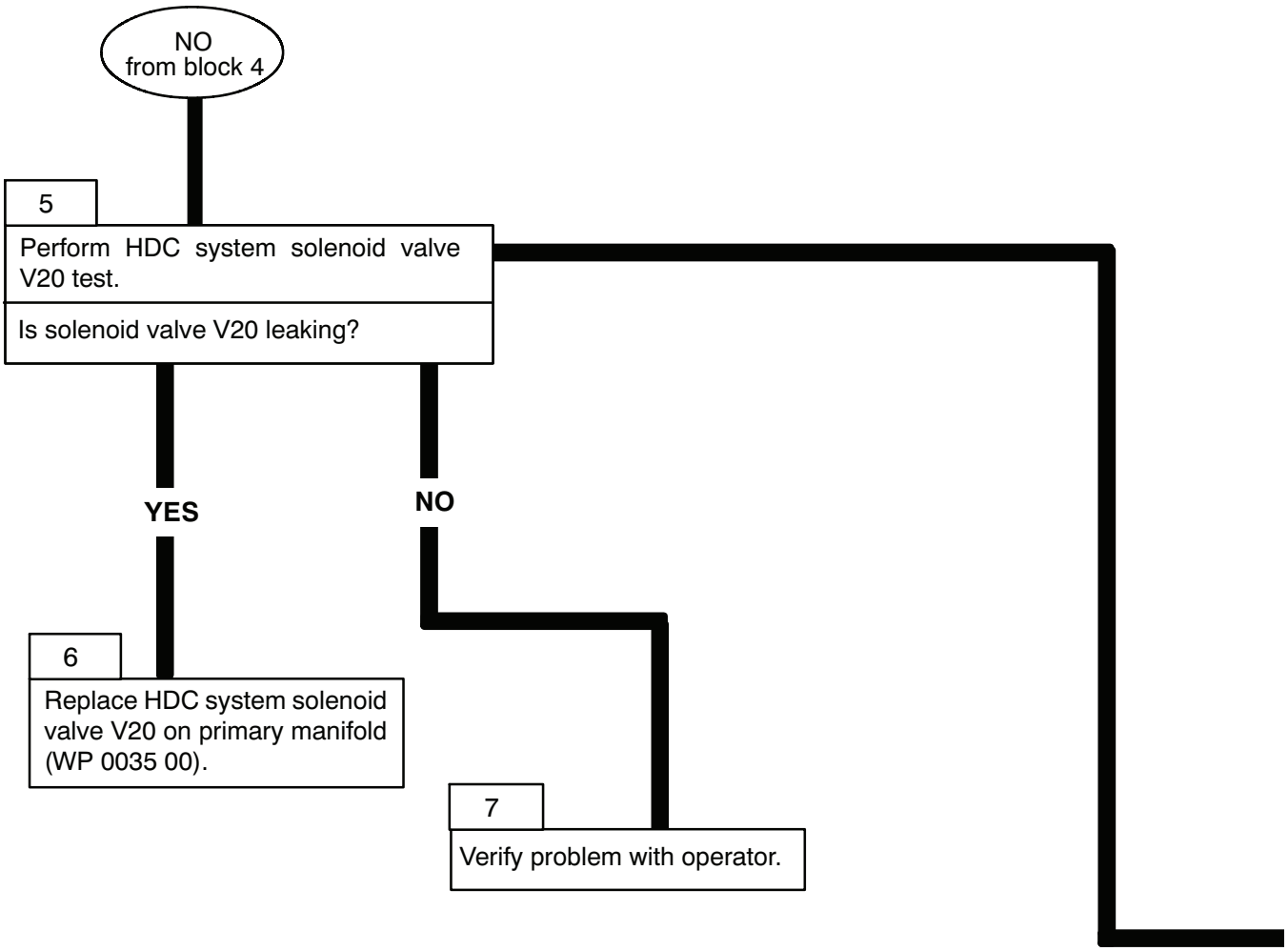


Figure 5. DCV Bank

EJECTOR CONTROL VALVE LEAKAGE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 4, item 5) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 5, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 4, item 3), select V1 on the HDC display (Figure 4, item 2). Close V1 on the HDC display (Figure 4, item 2), by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box. Select V12 on the HDC display (Figure 4, item 2). Close V12 on the HDC display (Figure 4, item 2), by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box. Select V20 on the HDC display (Figure 4, item 2). Open V20 on the HDC display (Figure 4, item 2), by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box. Select V13 on the HDC display (Figure 4, item 2). Close V13 on the HDC display (Figure 4, item 2) by selecting change position button (Figure 4, item 4) on the HDC control box.
- Start engine and hold EJECTOR CONTROL lever in the FORWARD or BACK position until transducer T-2 hydraulic pressure on the HDC display (Figure 4, item 1) 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 the pressure loss for one minute. If pressure loss is greater than 100 psi (690 kPa) per minute, oil is leaking excessively past the ejector control valve spool.
- Stop engine and relieve hydraulic pressure.
- Enable ejector by manually opening the ejector inhibit ball valve V23 (Figure 5, item 1) on the DCV bank.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 4, item 5) on the HDC control box.

EJECTOR CREEPS - Continued **0011 00**



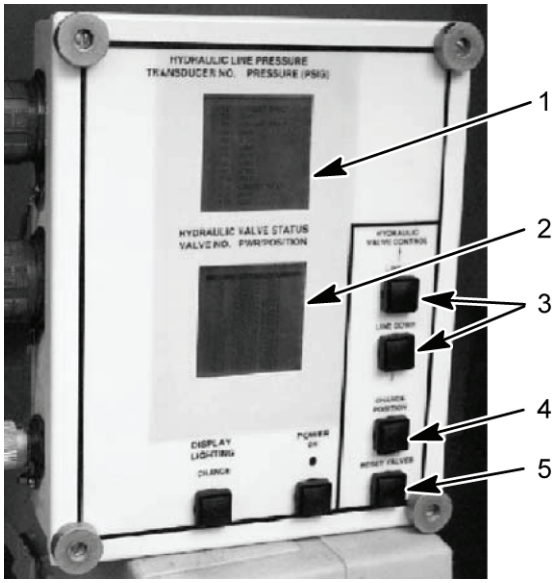
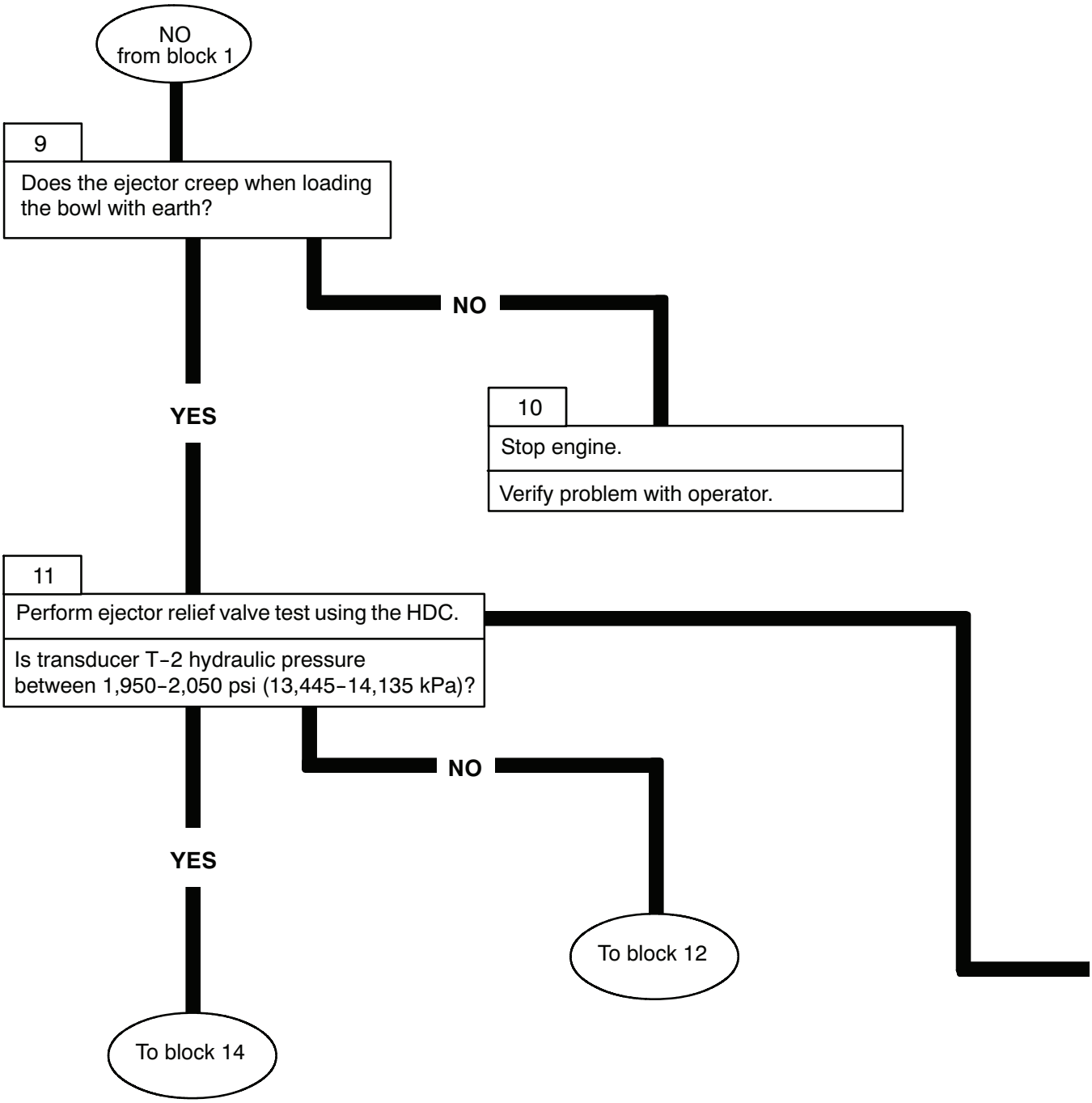


Figure 6. HDC Control Box

SOLENOID VALVE V20 TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.
- Start engine and leave it running.
- Wait until transducer T13 hydraulic pressure on the HDC display (Figure 6, item 1) is greater than 2,000 psi (13789.51 kPa).
- Using LINE UP or LINE DOWN button (Figure 6, item 3), select V12 on the HDC display (Figure 6, item 2). Close V12 on the HDC display (Figure 6, item 2), by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Allow hydraulic pressure to stabilize for thirty seconds, then time the pressure loss for one minute at pressure transducer T13 as indicated on HDC display (Figure 6, item 1). If pressure loss is greater than 100 psi (690 kPa) per minute, solenoid valve V20 is leaking.
- Stop engine and relieve hydraulic pressure.

EJECTOR CREEPS - Continued **0011 00**



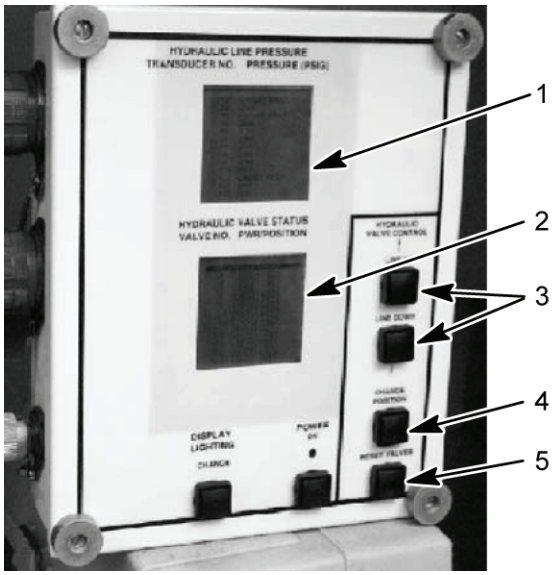


Figure 7. HDC Control Box

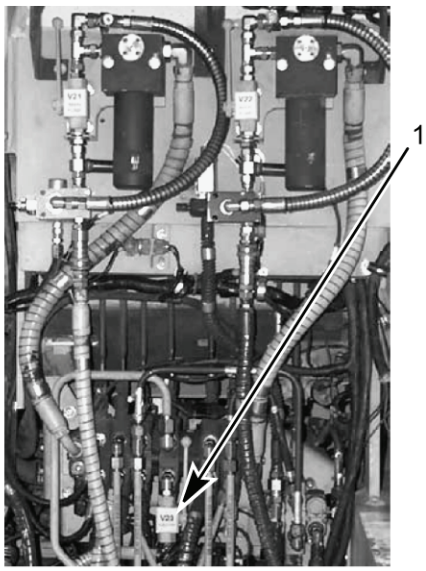


Figure 8. DCV Bank

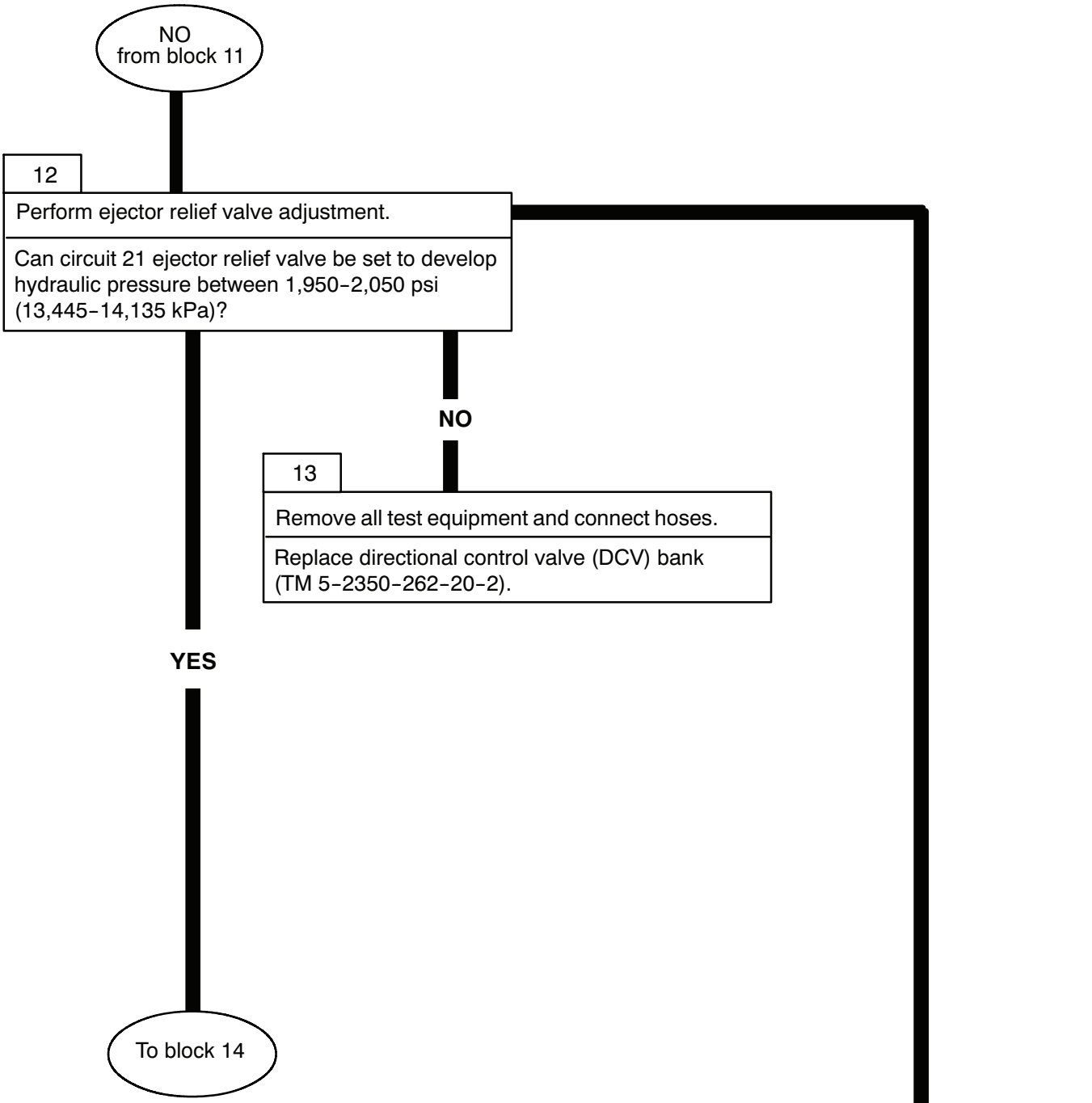
EJECTOR RELIEF VALVE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 5) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 7, item 3), select V1 on the HDC display (Figure 7, item 2). Close V1 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read transducer T-2 hydraulic pressure on the HDC display (Figure 7, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening the ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 7, item 3), select V1 on the HDC display (Figure 7, item 2). Open V1 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.


NO
from block 11
12
Perform ejector relief valve adjustment.
Can circuit 21 ejector relief valve be set to develop hydraulic pressure between 1,950-2,050 psi (13,445-14,135 kPa)?
NO
13
Remove all test equipment and connect hoses.
Replace directional control valve (DCV) bank (TM 5-2350-262-20-2).
YES
To block 14

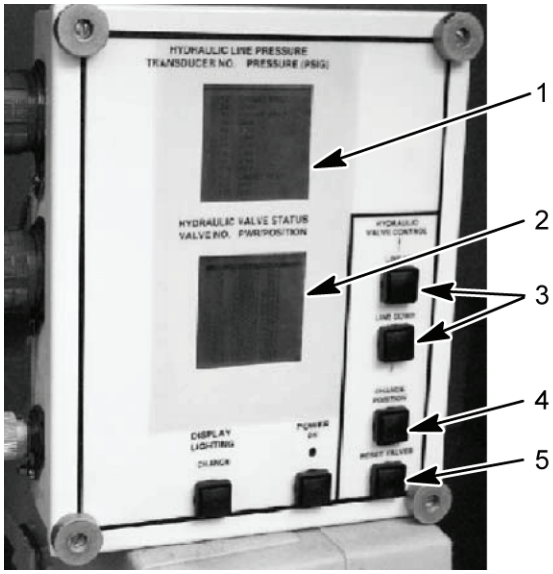


Figure 9. HDC Control Box

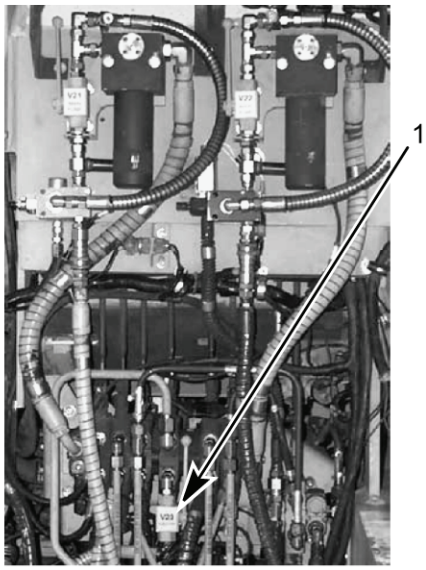


Figure 10. DCV Bank

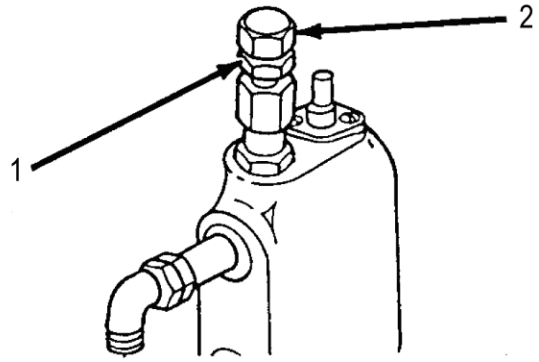
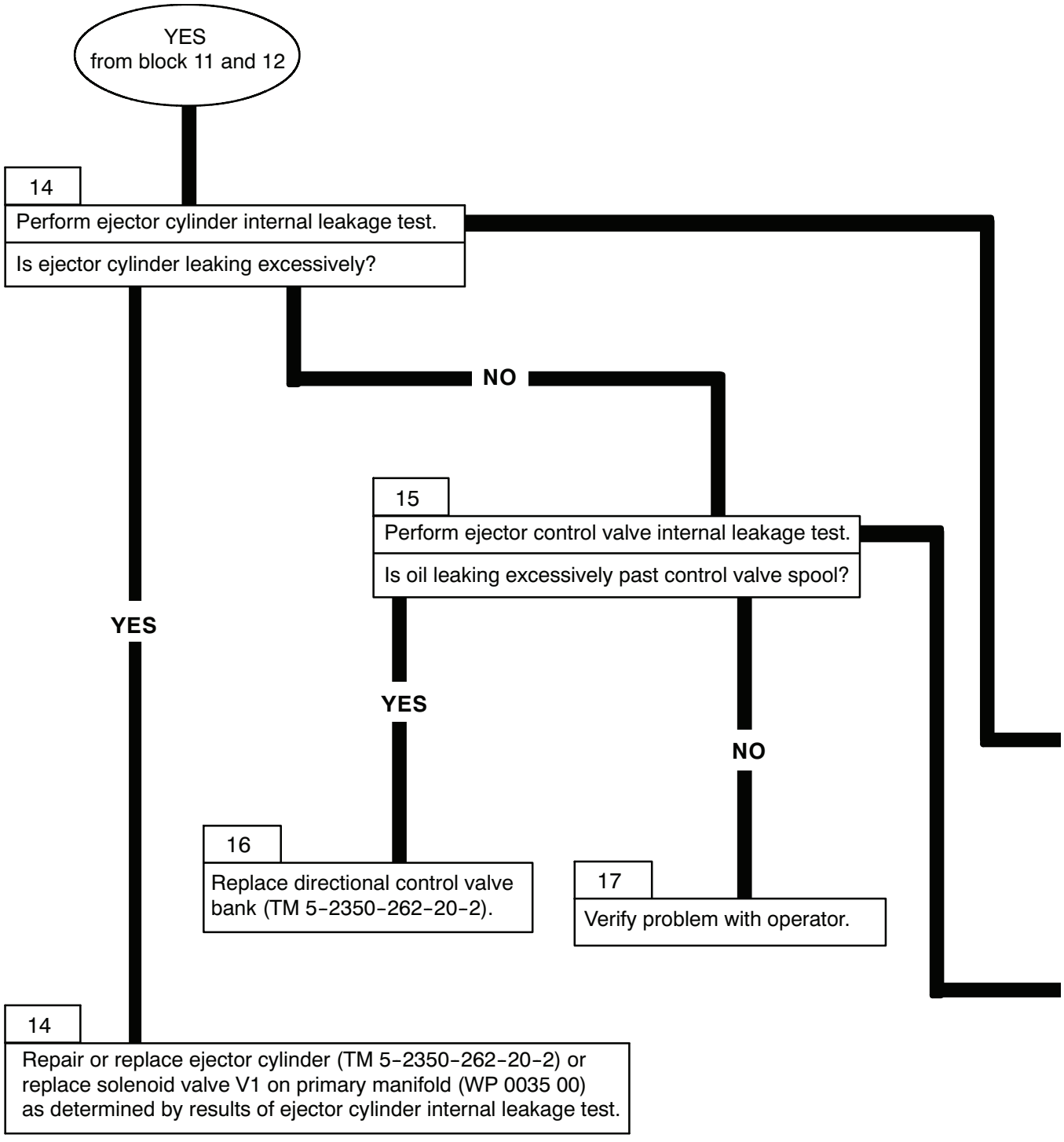


Figure 11. Ejector Relief Valve Adjustment

EJECTOR RELIEF VALVE ADJUSTMENT

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 10, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Close V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read transducer T-2 hydraulic pressure on the HDC display (Figure 9, item 1).
- Loosen jam nut (Figure 11, item 1) on ejector relief valve and turn adjusting screw (Figure 11, item 2) clockwise (to increase pressure) or counterclockwise (to increase pressure) until pressure is within limits. Tighten jam nut (Figure 11, item 1).
- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.

EJECTOR CREEPS - Continued **0011 00**



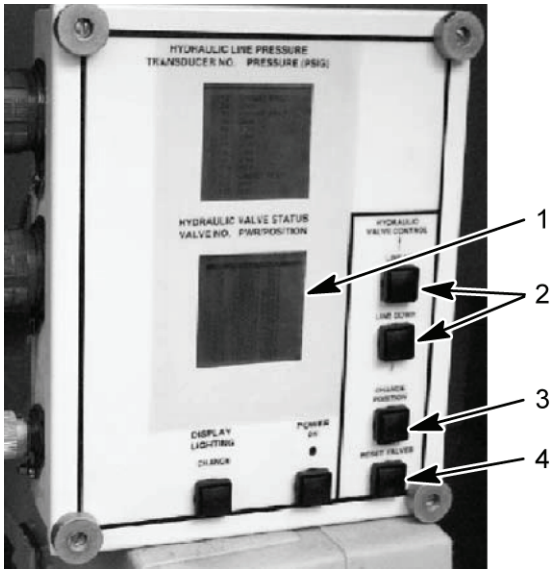


Figure 12. HDC Control Box

EJECTOR CYLINDER INTERNAL LEAKAGE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 12, item 4) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 12, item 2), select V1 on the HDC display (Figure 12, item 1). Close V1 on the HDC display (Figure 12, item 1), by selecting the CHANGE POSITION button (Figure 12, item 3) on the HDC control box.
- 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 forward (extends) more than 0.5 in. (13 mm), the ejector cylinder is leaking excessively. If the ejector has moved backwards (retracts) more than 0.5 in. (13 mm), solenoid valve V1 on the primary manifold is leaking.
- Stop engine and relieve hydraulic pressure.

Follow ejector control valve leakage test from block 4.

END OF WORK PACKAGE

EJECTOR DOES NOT EXTEND OR RETRACT 0012 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 position, 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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

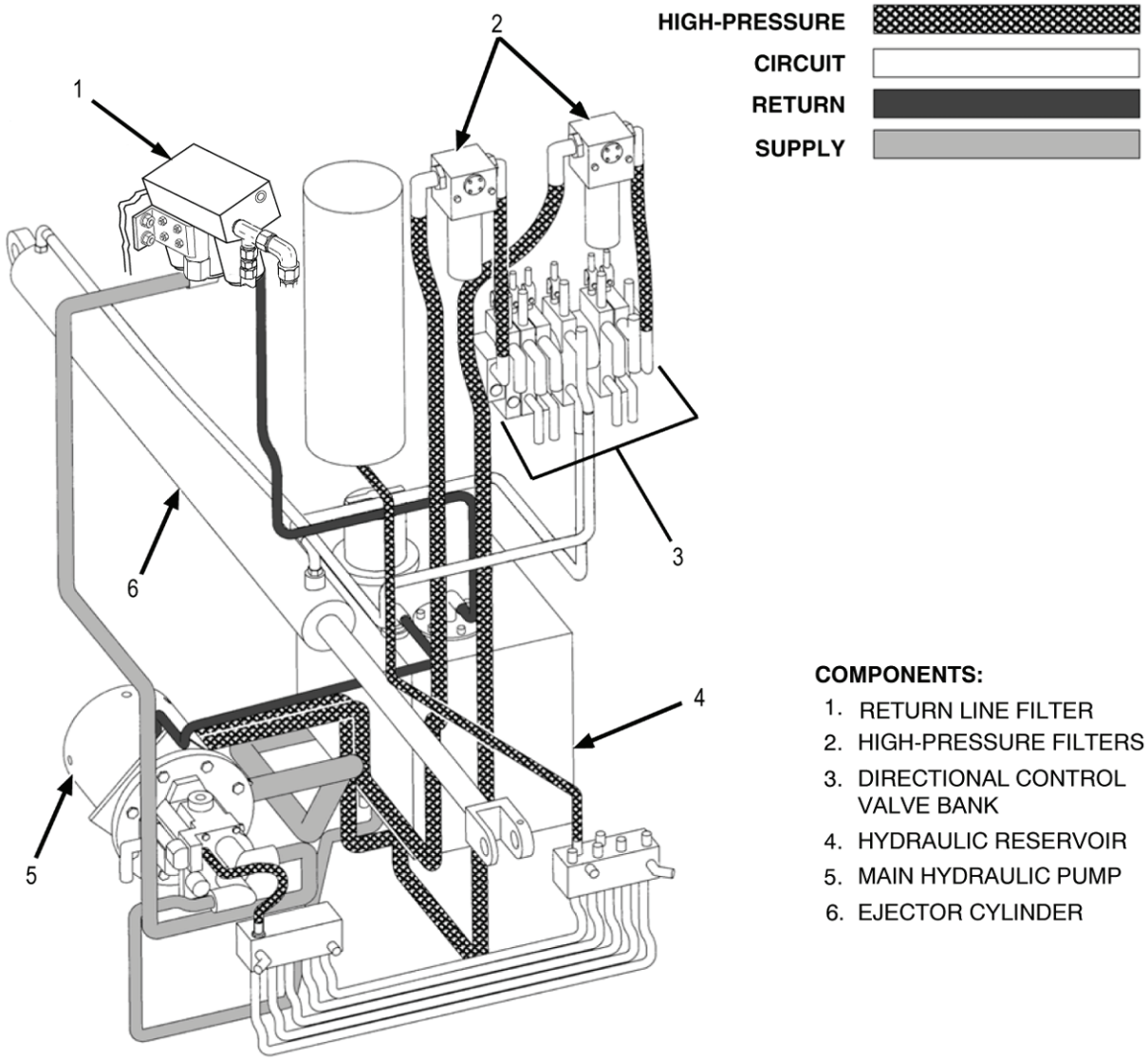


Figure 1. Ejector Hydraulic Circuit

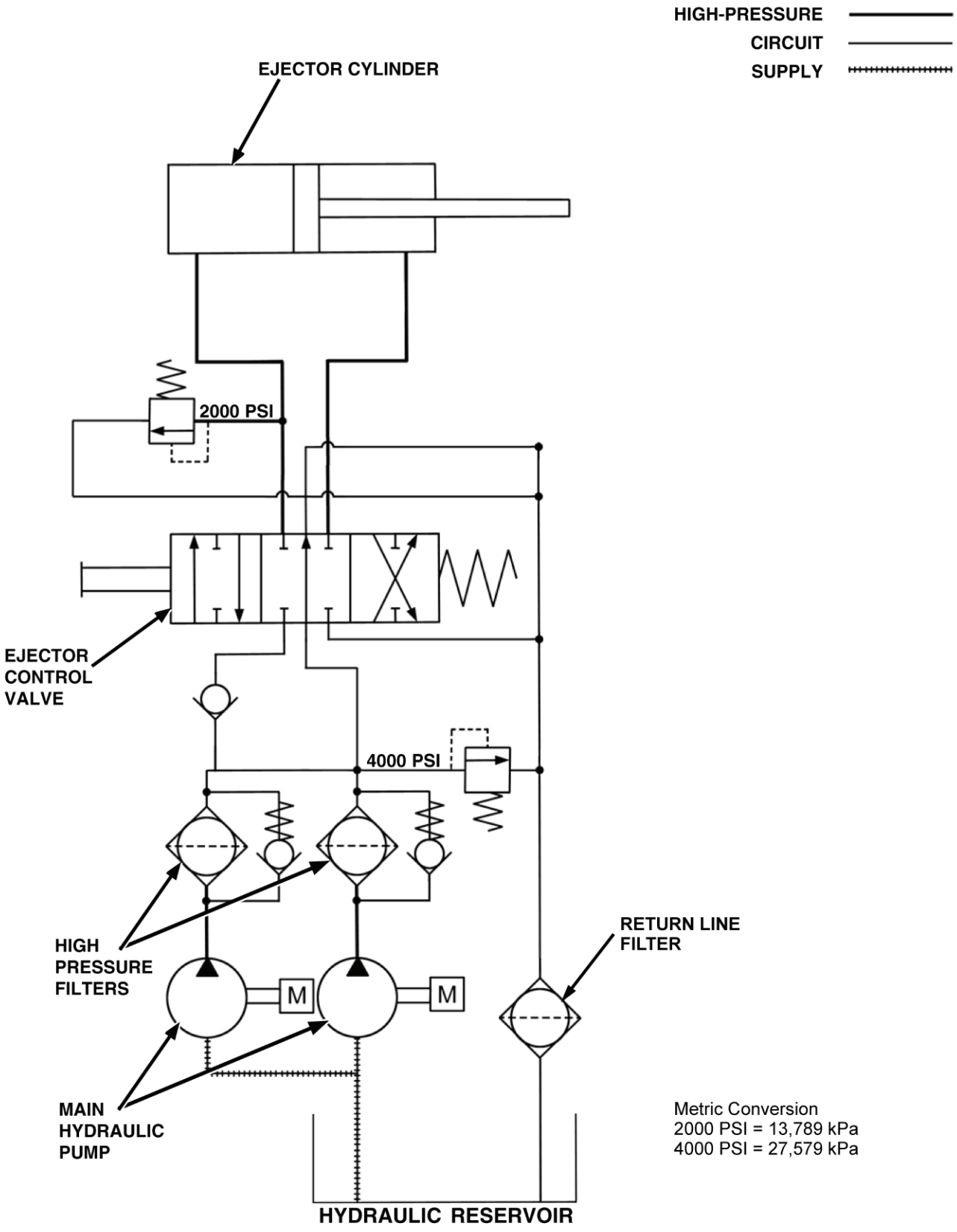
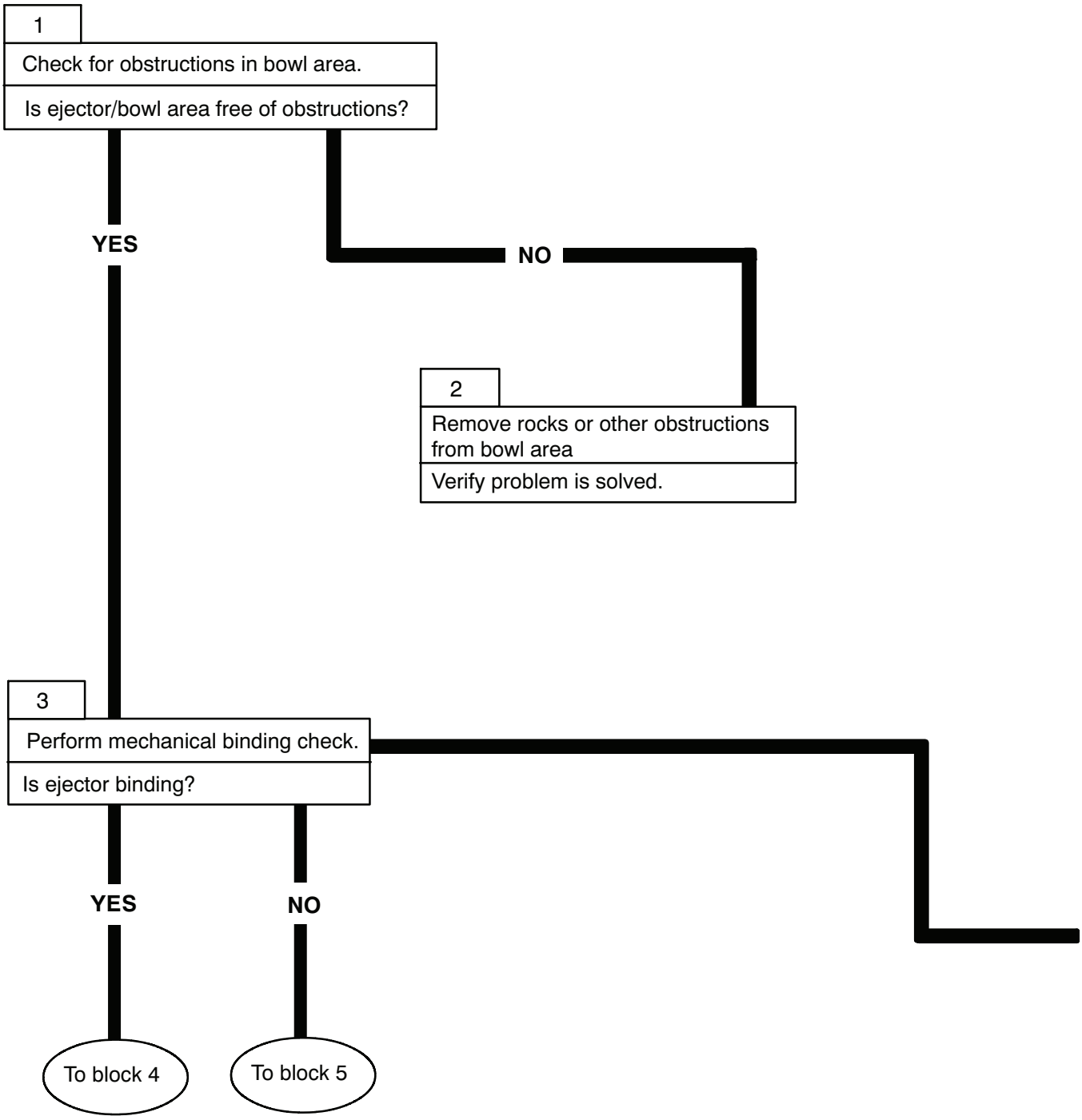


Figure 2. Ejector Hydraulic Schematic

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



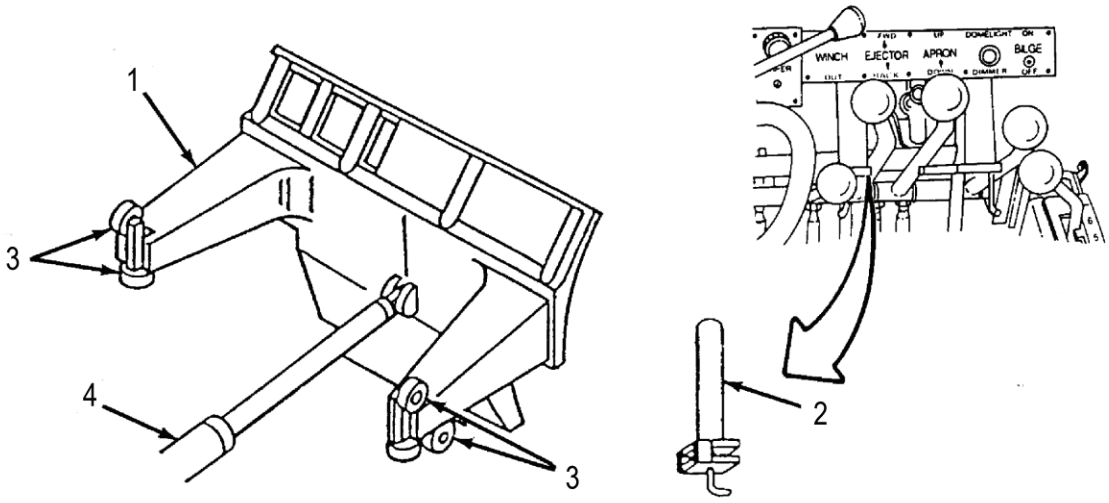


Figure 3. Ejector

MECHANICAL BINDING 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.**
- **Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Start engine, operate ejector (Figure 3, item 1), and check for mechanical binding. Check ejector (Figure 3, item 1), rollers (Figure 3, item 3), and ejector hydraulic cylinder (Figure 3, item 4) for damage or jamming. Check that ejector lock (Figure 3, item 2) is not restricting movement of control lever.
- Continued on page 0012 00-7.

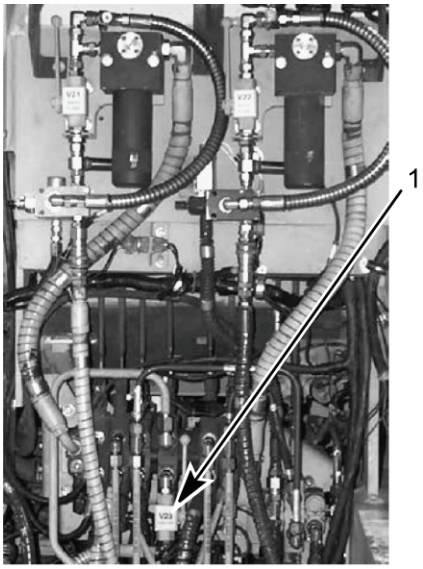
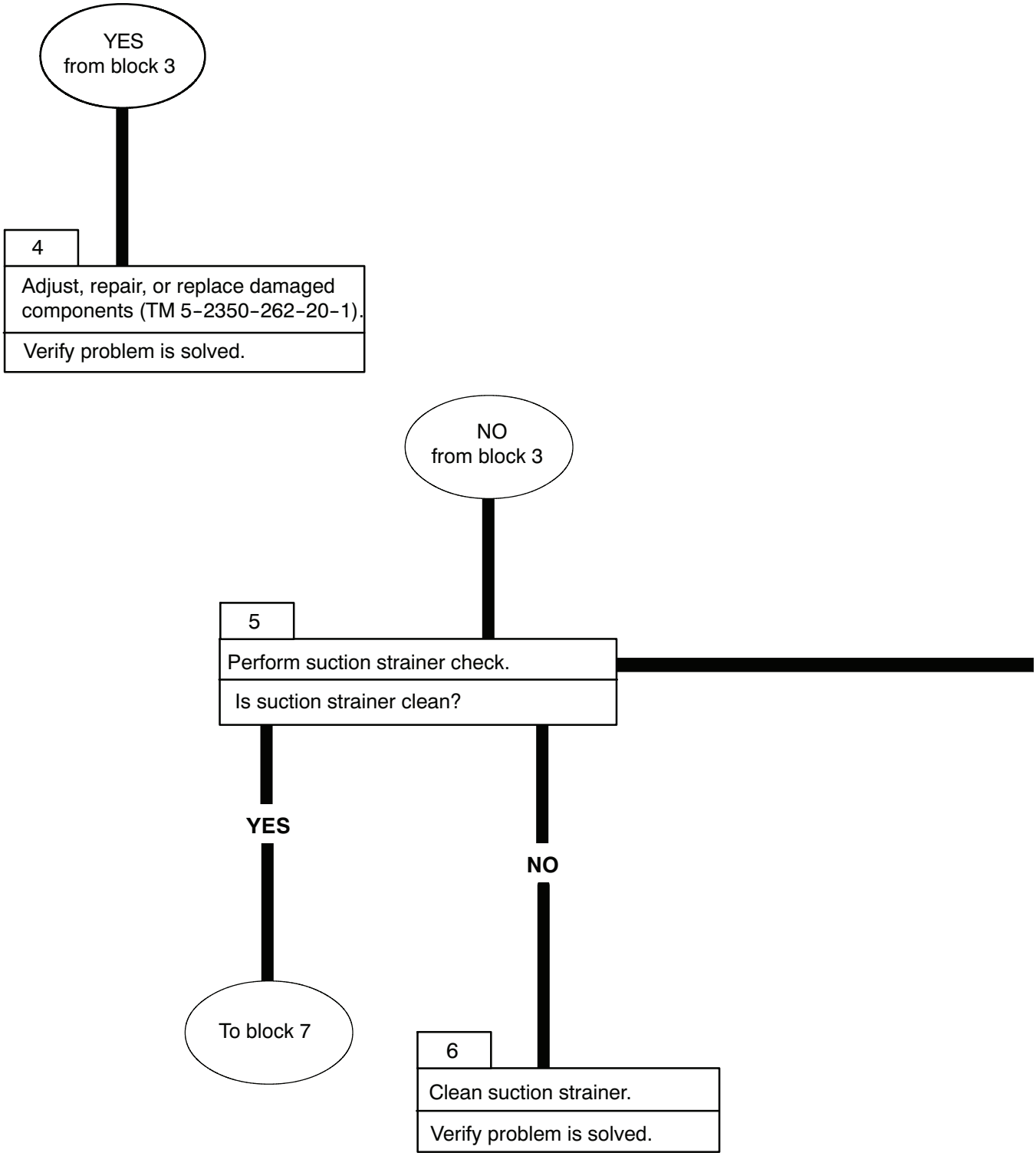


Figure 4. DCV Bank

MECHANICAL BINDING CHECK - CONTINUED

- Check that ejector inhibit ball valve V23 (Figure 4, item 1) is in the open position.
- Stop engine; relieve hydraulic pressure.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



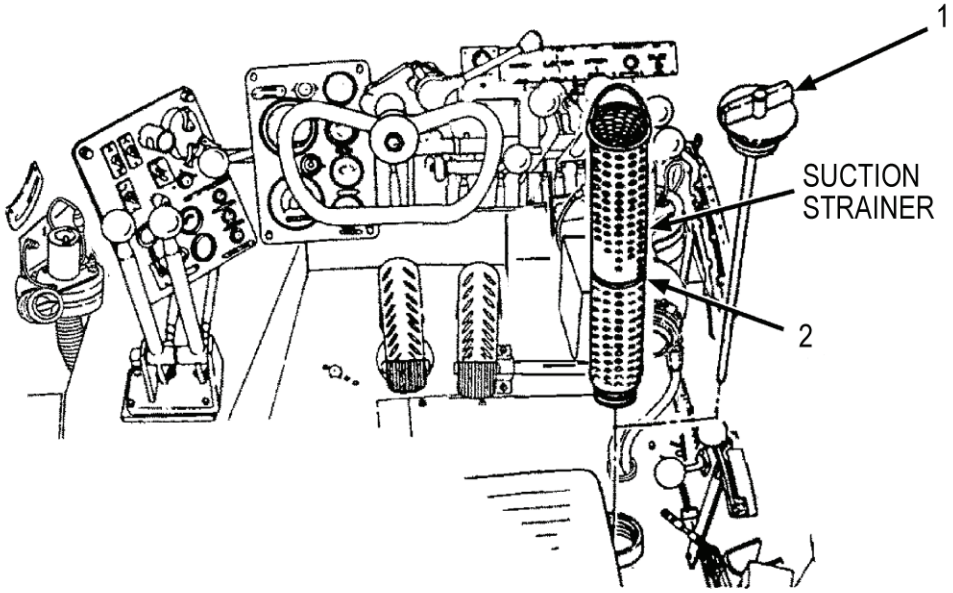
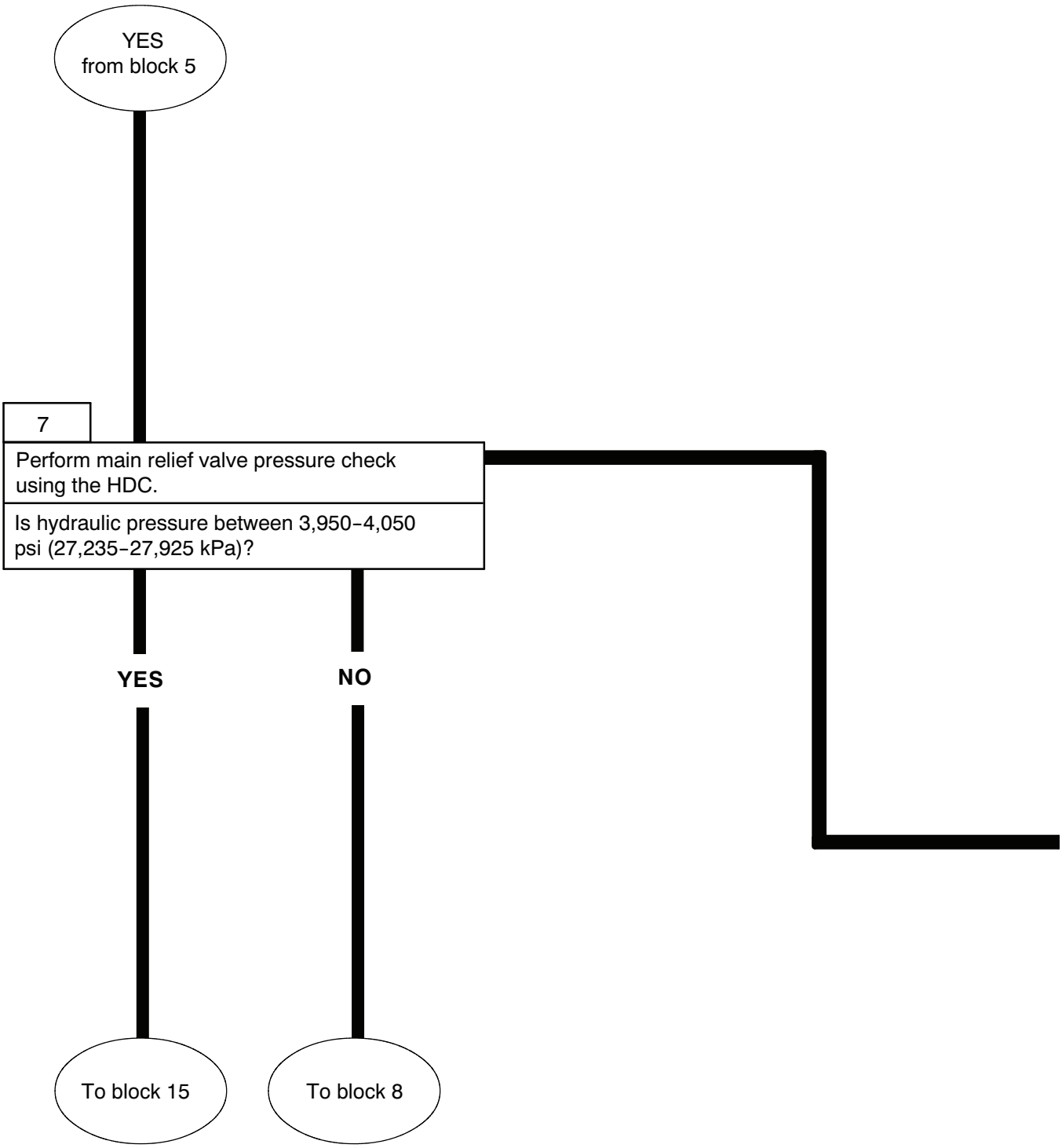


Figure 5. Suction Strainer

SUCTION STRAINER CHECK

- Slowly loosen hydraulic tank dipstick (Figure 5, item 1) to release pressure and remove dipstick.
- Remove suction strainer (Figure 5, item 2) and inspect for clogged ports or obstructions.
- If dirt, obstructions, or debris is found, clear and clean suction strainer (Figure 5, item 2).
- Replace suction strainer (Figure 5, item 2) and dipstick (Figure 5, item 1).

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



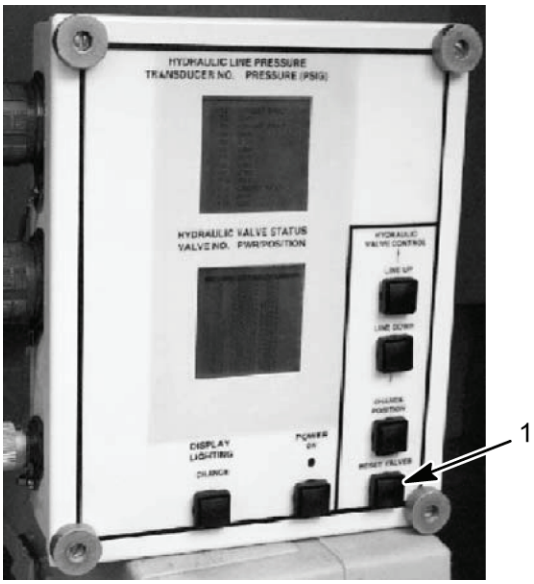


Figure 6. HDC Control Box

LEFT AND RIGHT MAIN RELIEF VALVE PRESSURE CHECK

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Continued on page 0012 00-13.

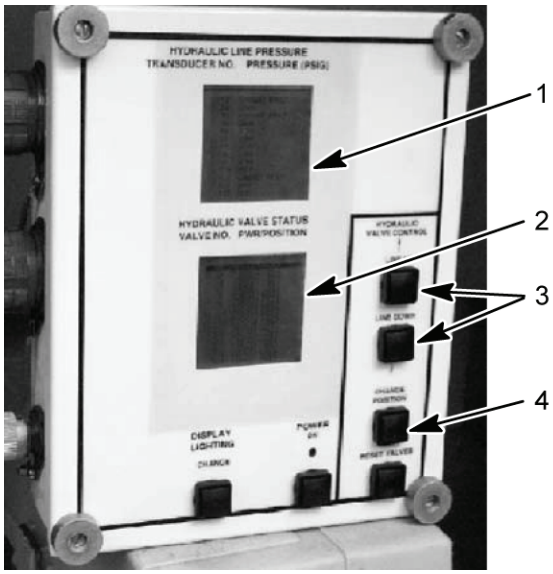


Figure 7. HDC Control Box

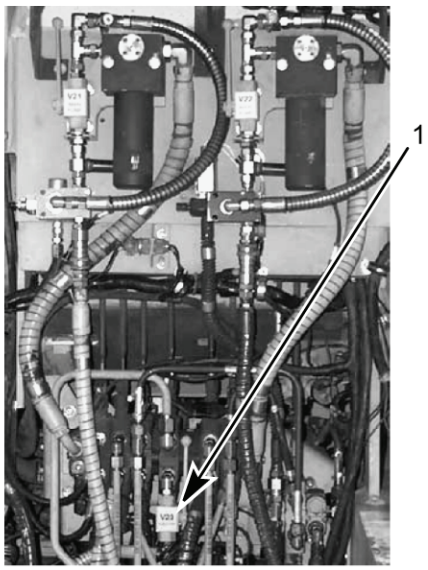
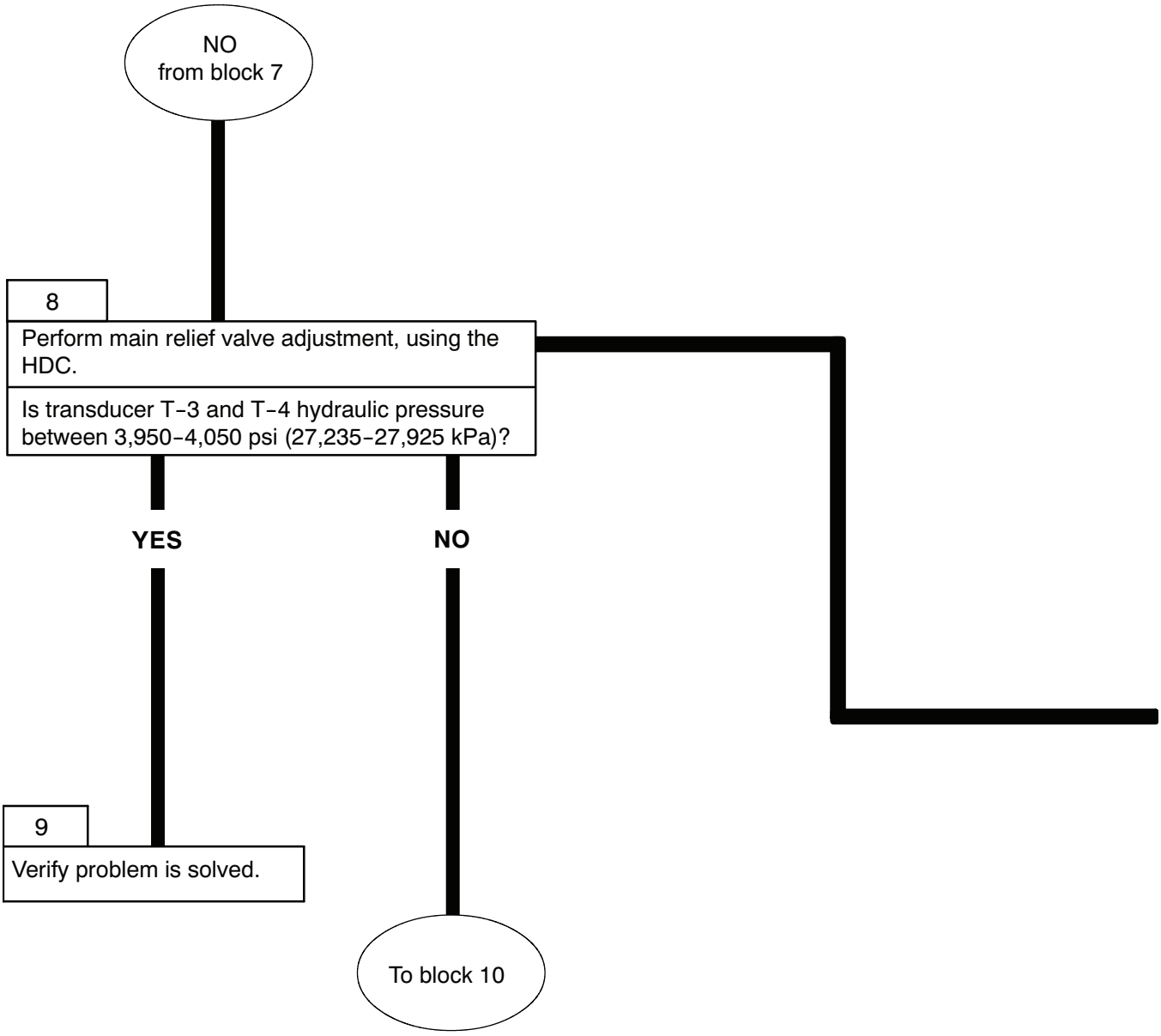


Figure 8. DCV Bank

LEFT AND RIGHT MAIN RELIEF VALVE PRESSURE CHECK - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 7, item 3), select V1 on the HDC display (Figure 7, item 2). Close V1 on the HDC display (Figure 7, item 2) by selecting the CHANGE POSITION button (Figure 7, item 4) on the HDC control box.
- Start vehicle engine.
- To test 13R circuit: With SPRUNG/UNSPRUNG control valve in SPRUNG mode, actuate left SUSPENSION CONTROL valve to RAISE position. Read transducer T-3 hydraulic pressure on the HDC display (Figure 7, item 1).
- To test 13L circuit: With SPRUNG/UNSPRUNG control valve in SPRUNG mode, actuate right SUSPENSION CONTROL valve to RAISE position. Read transducer T-4 hydraulic pressure on the HDC display (Figure 7, item 1).
- Stop engine; relieve hydraulic pressure.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



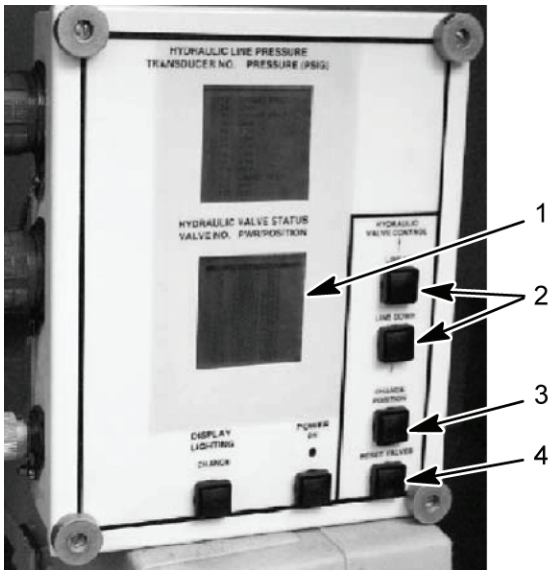


Figure 9. HDC Control Box

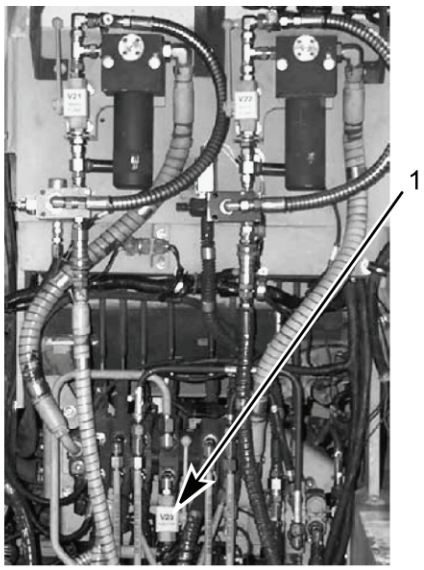


Figure 10. DCV Bank

MAIN RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 4) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 10, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 9, item 2), select V1 on the HDC display (Figure 9, item 1). Close V1 on the HDC display (Figure 9, item 1) by selecting the CHANGE POSITION button (Figure 9, item 3) on the HDC control box.
- Continued on page 0012 00-17.

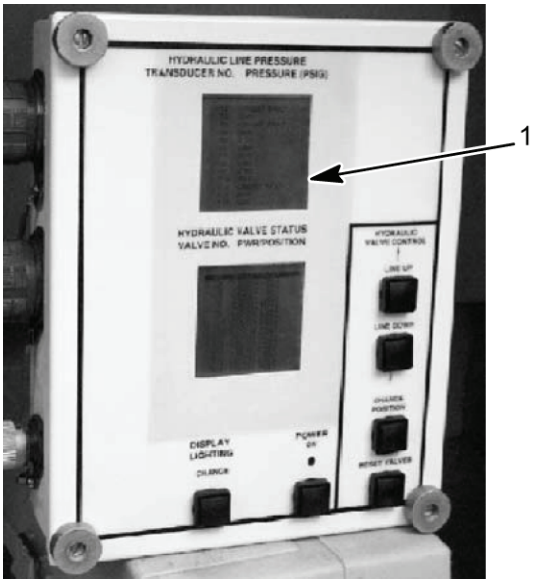


Figure 11. HDC Control Box

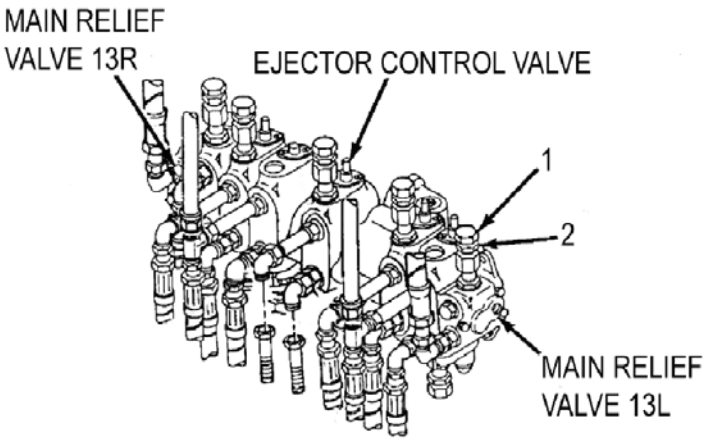


Figure 12. Main Relief Valve 13L and 13R

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

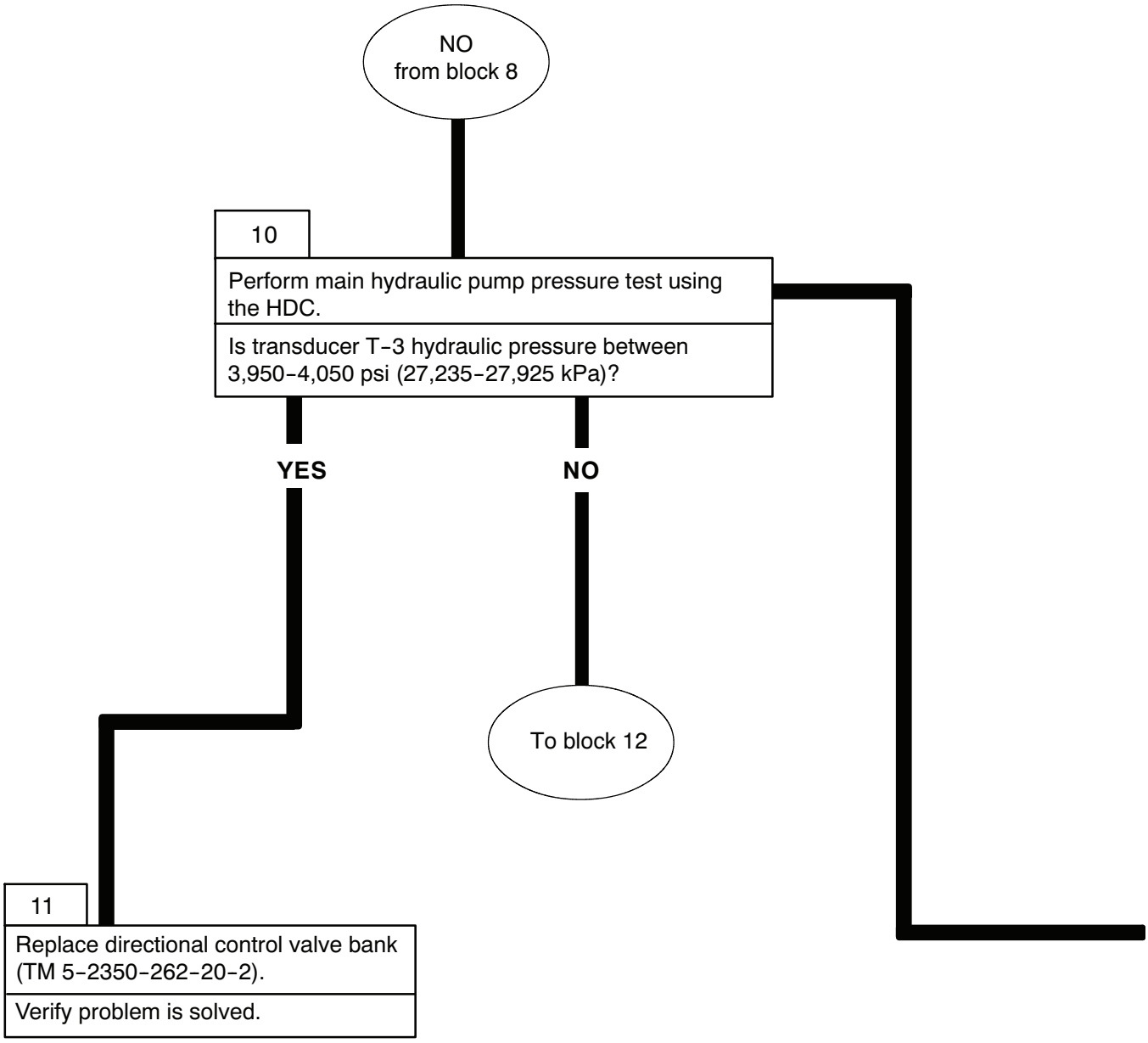
MAIN RELIEF VALVE 13L

- With the SPRUNG/UNSPRUNG lever still 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 transducer T-4 hydraullic pressure on the HDC display (Figure 11, item 1). Adjust the main relief valve 13L by loosening jam nut (Figure 12, item 2) and rotating adjustment screw (Figure 12, item 1) clockwise to increase pressure; counterclockwise to decrease pressure. When hydraulic pressure is within limits, tighten jam nut (Figure 12, item 2).
- Stop engine; relieve hydraulic pressure.

MAIN RELIEF VALVE 13R

- Repeat the previous steps using the right-hand SUSPENSION CONTROL lever, main relief valve 13R, and read T-3 pressure. Adjustment for main relief valve 13R is on underside of main relief valve 13R.
- Stop engine; relieve hydraulic pressure.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



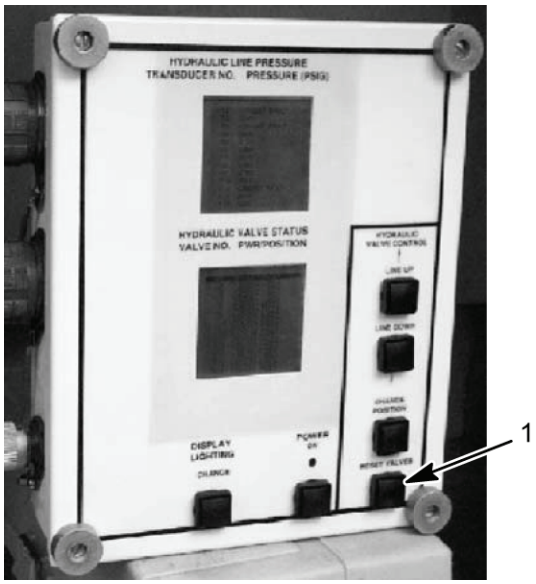


Figure 13. HDC Control Box

MAIN HYDRAULIC PUMP PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 13, item 1) on the HDC control box.

WARNING

- **Before performing any troubleshooting in bowl, move ejector forward and disable it from hydraulic system. 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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Continued on page 0012 00-21.

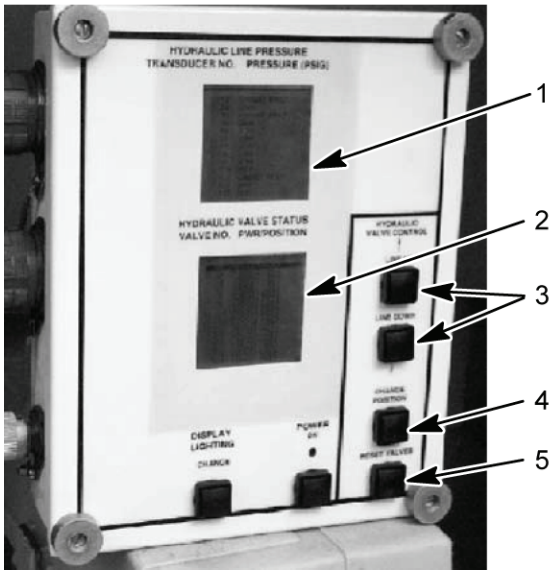


Figure 14. HDC Control Box

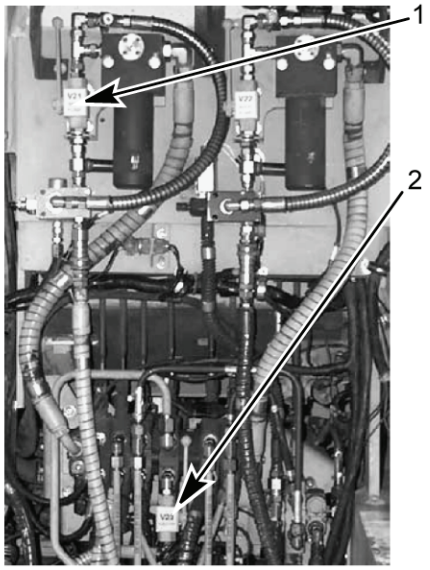
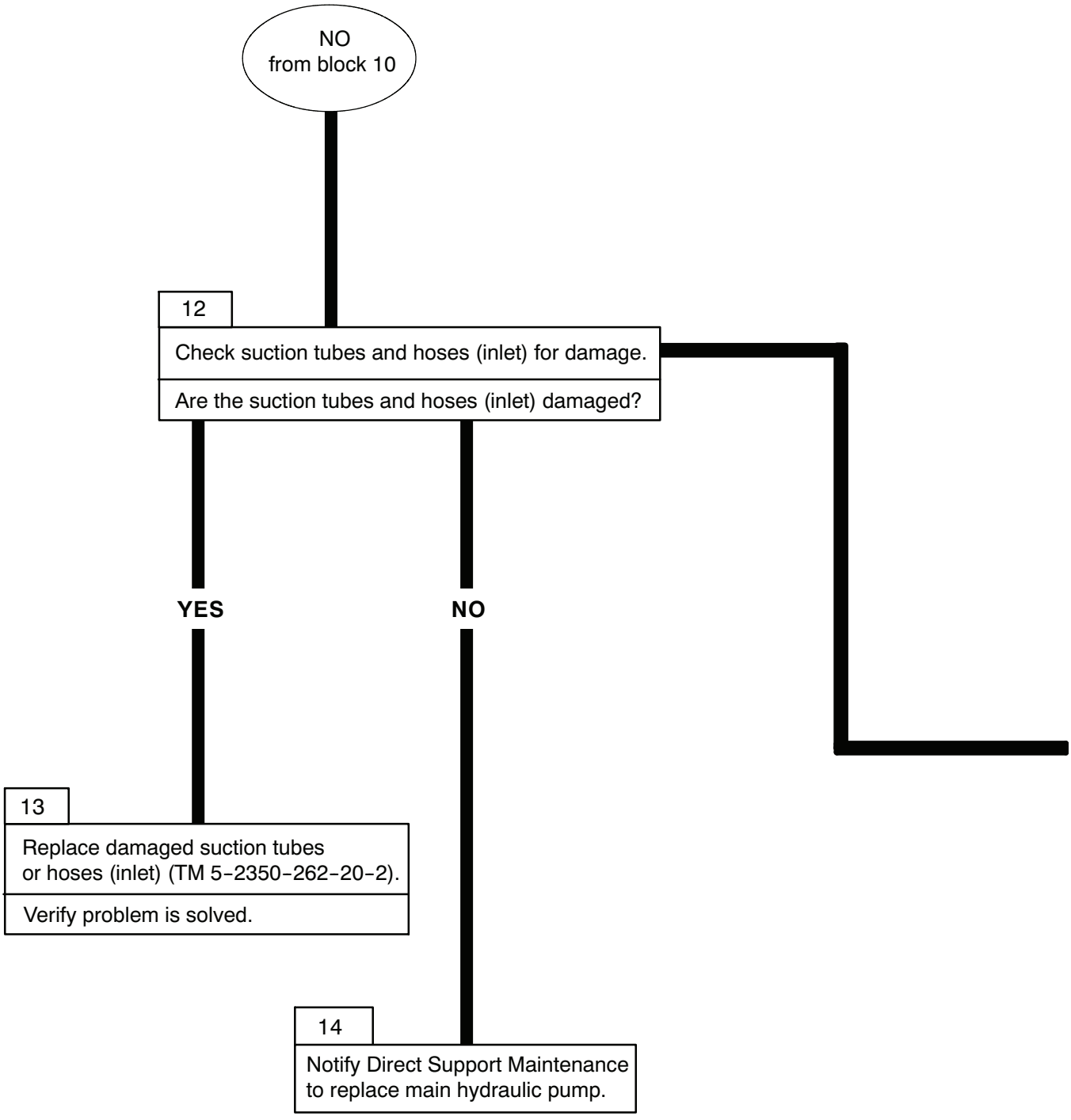


Figure 15. DCV Bank

MAIN HYDRAULIC PUMP PRESSURE TEST - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 15, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 14, item 3), select V1 on the HDC display (Figure 14, item 2). Close V1 on the HDC display (Figure 14, item 2) by selecting the CHANGE POSITION button (Figure 14, item 4) on the HDC control box.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 15, item 1), until transducer T-3 hydraulic pressure on the HDC display (Figure 14, item 1) indicates 3,950-4,050 psi (27,235-27,925 kPa).
- Fully open right main hydraulic pressure inhibit valve V21 (Figure 15, item 1) on the DCV bank.
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening ejector inhibit ball valve V23 (Figure 15, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 14, item 3), select V1 on the HDC display (Figure 14, item 2). Open V1 on the HDC display (Figure 14, item 2) by selecting the CHANGE POSITION button (Figure 14, item 4) on the HDC control box.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



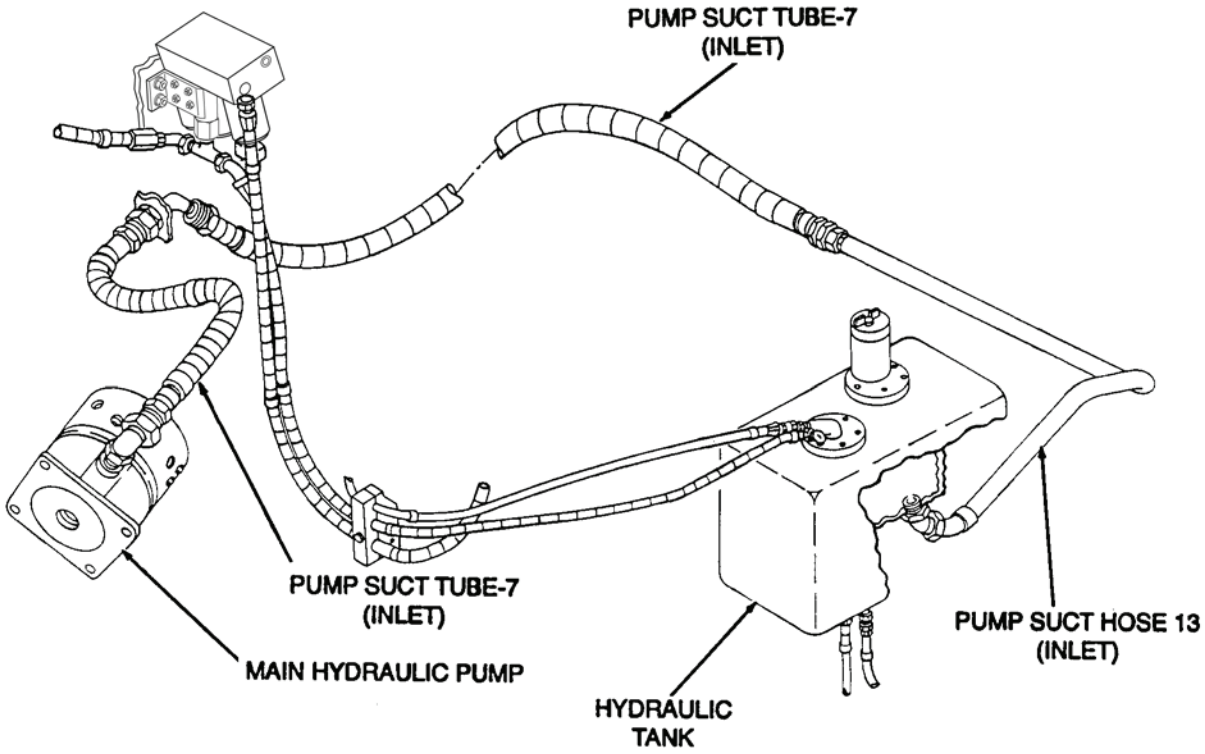
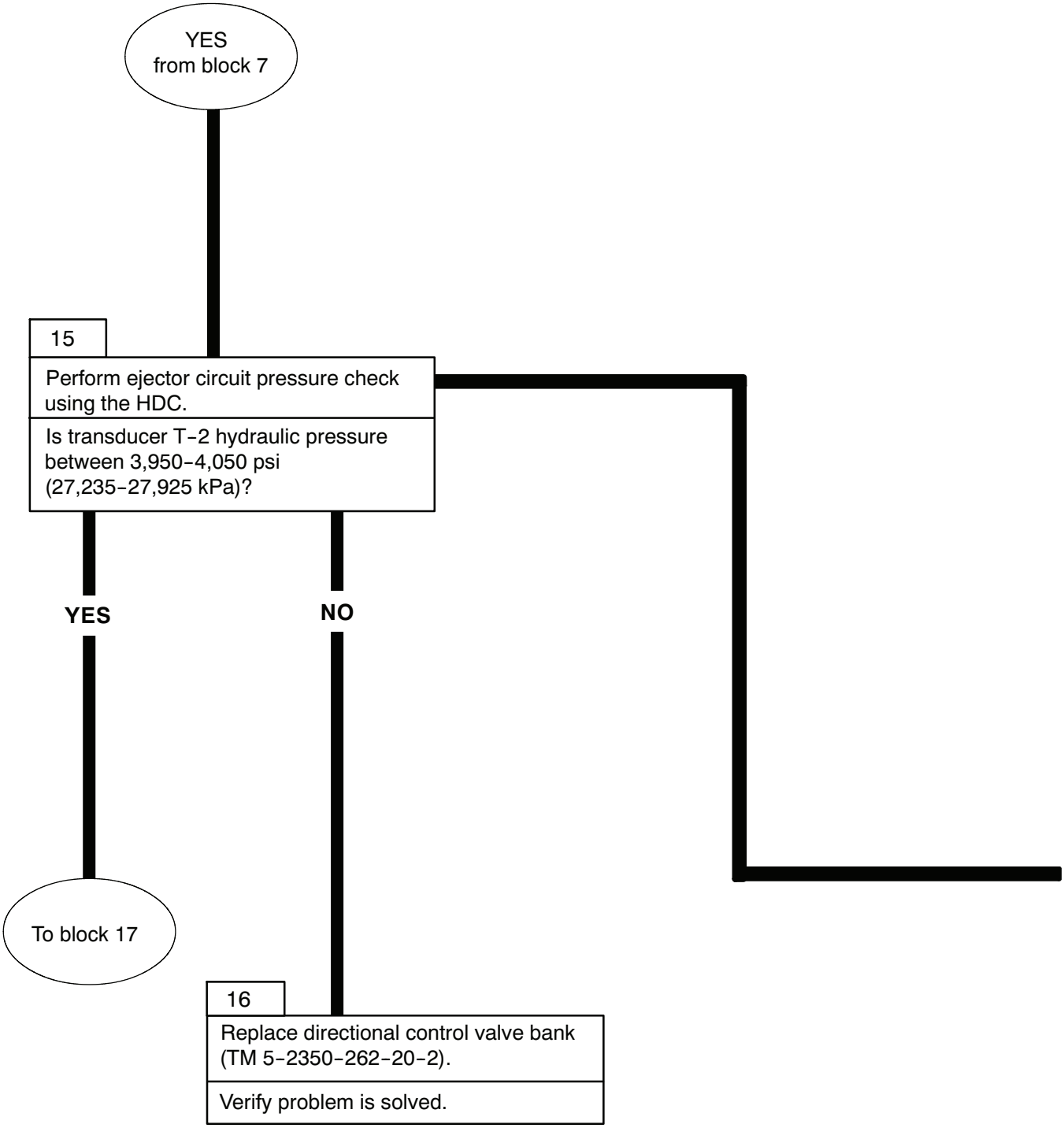


Figure 16. Suction Tubes and Hoses

SUCTION TUBES AND HOSES (INLET) CHECK

Inspect suction tubes and hoses (inlet).


YES
from block 7
15
Perform ejector circuit pressure check using the HDC.
Is transducer T-2 hydraulic pressure between 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
To block 17
16
Replace directional control valve bank (TM 5-2350-262-20-2).
Verify problem is solved.

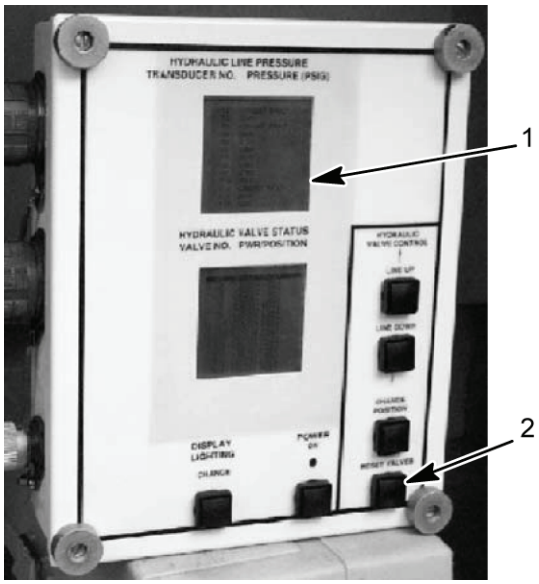


Figure 17. HDC Control Box

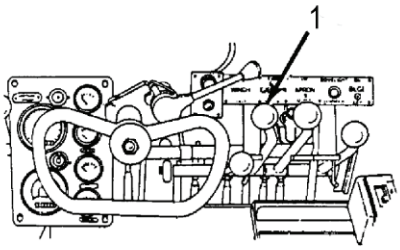


Figure 18. Ejector Control

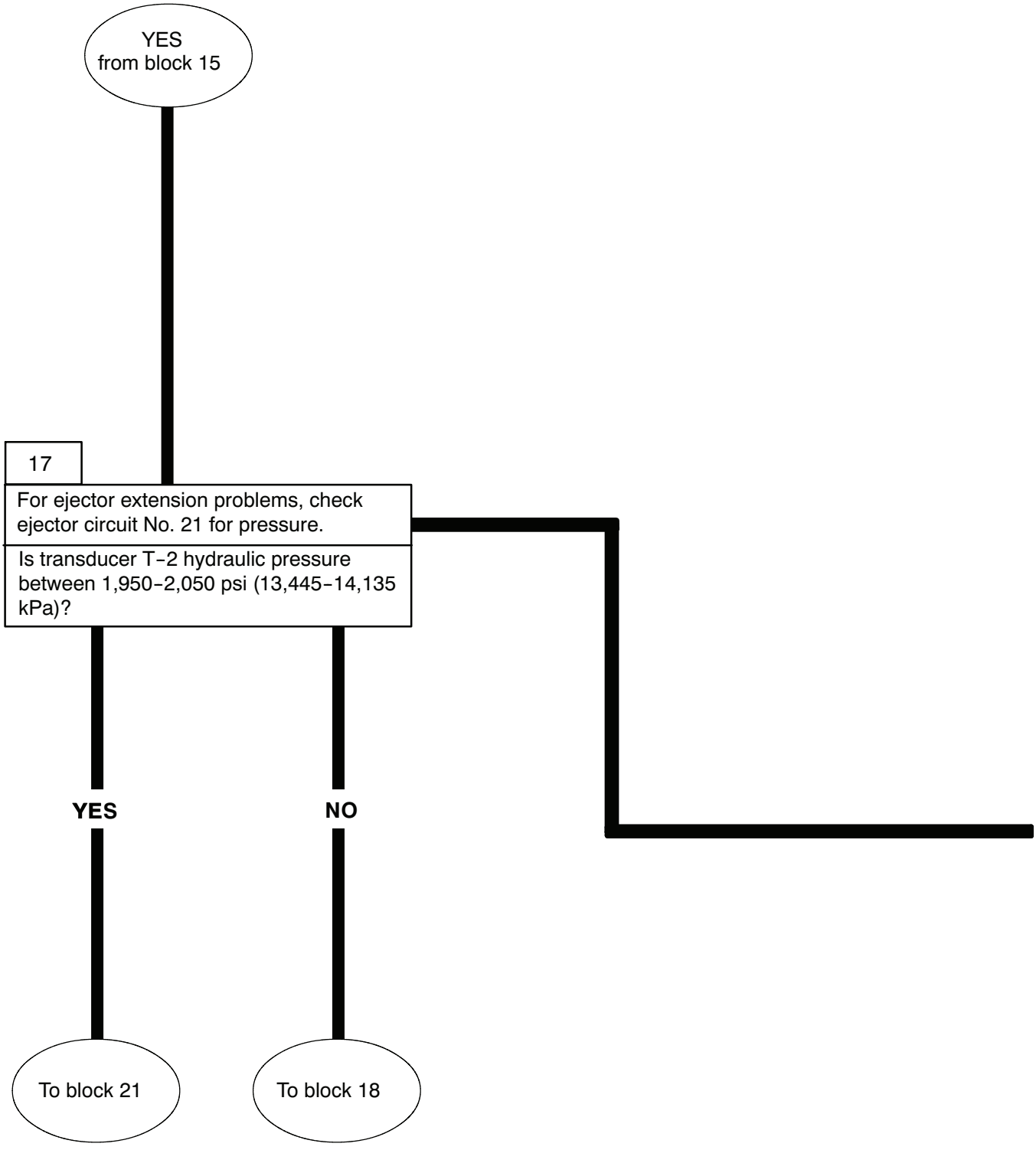
EJECTOR CIRCUIT PRESSURE CHECK

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.**
- **Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 17, item 2) on the HDC control box.
- Have assistant start engine and actuate EJECTOR CONTROL lever (Figure 18, item 1) to BACK position. Read transducer T-2 hydraulic pressure on the HDC display (Figure 17, item 1). Pressure should be 3,950-4,050 psi (27,235-27,925 kPa).
- Stop engine; relieve hydraulic pressure.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



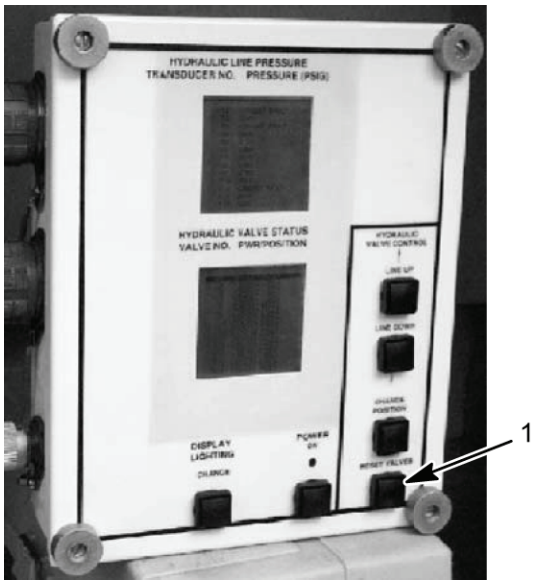


Figure 19. HDC Control Box

EJECTOR CIRCUIT PRESSURE CHECK

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 19, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Start engine, move ejector halfway forward; stop engine and relieve hydraulic pressure.
- Continued on page 0012 00-29.

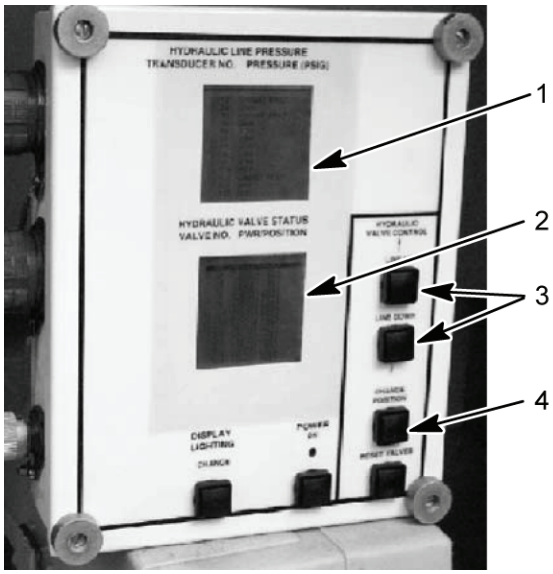


Figure 20. HDC Control Box

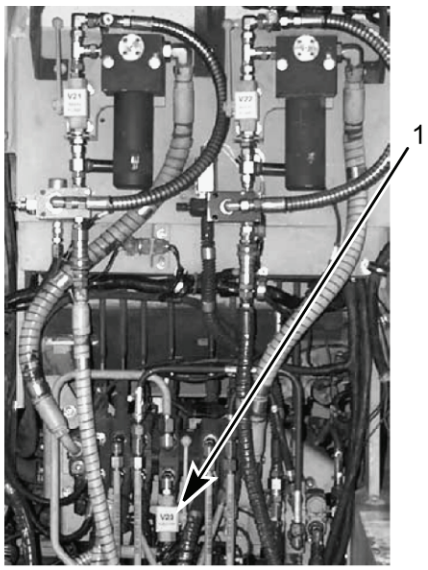
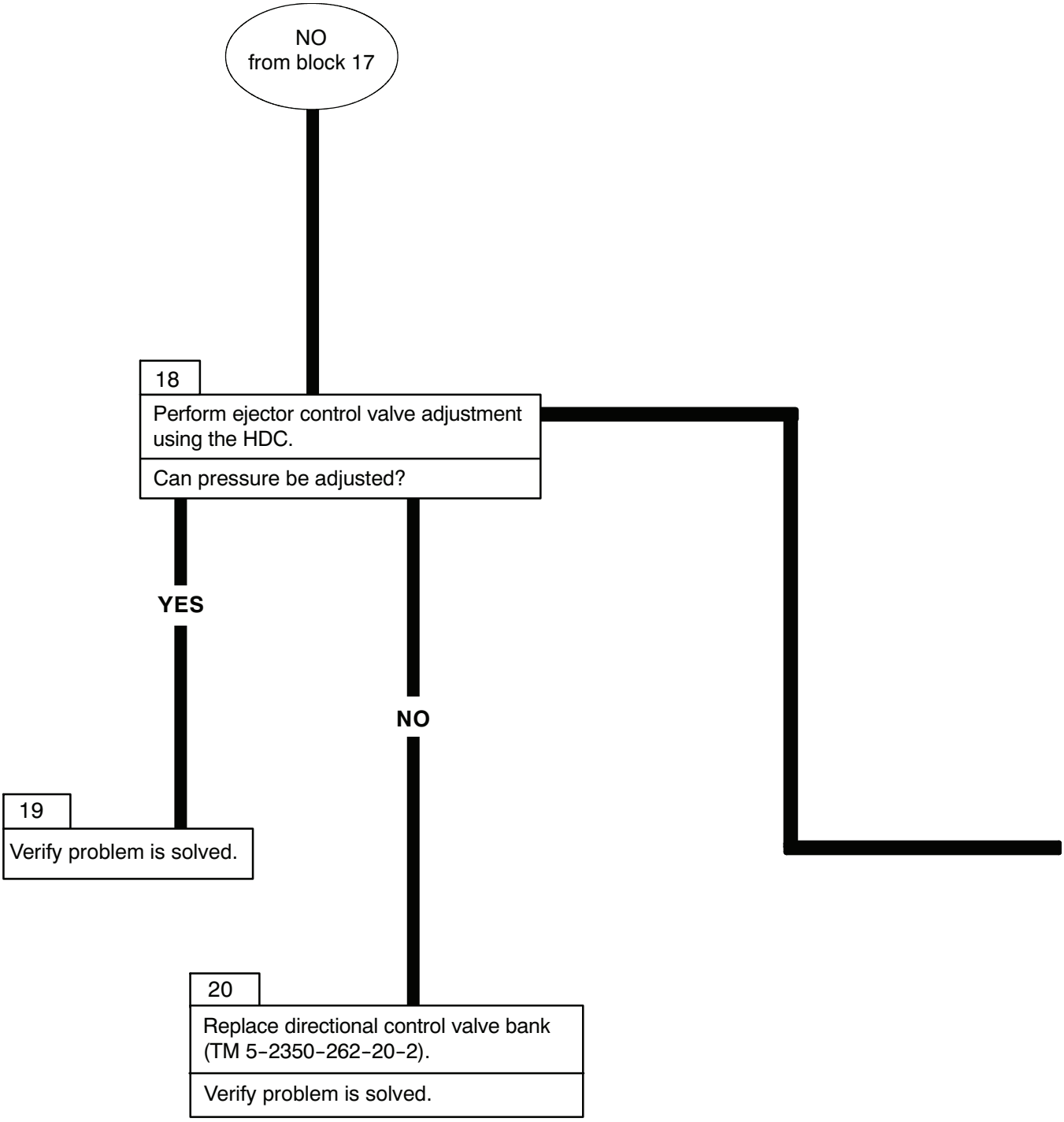


Figure 21. DCV Bank

EJECTOR CIRCUIT PRESSURE CHECK - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 21, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 20, item 3), select V1 on the HDC display (Figure 20, item 2). Close V1 on the HDC display (Figure 20, item 2), by selecting the CHANGE POSITION button (Figure 20, item 4) on the HDC control box.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read transducer T-2 hydraulic pressure on the HDC display (Figure 20, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening ejector inhibit ball valve V23 (Figure 21, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 20, item 3), select V1 on the HDC display (Figure 20, item 2). Open V1 on the HDC display (Figure 20, item 2), by selecting the CHANGE POSITION button (Figure 20, item 4) on the HDC control box.

EJECTOR DOES NOT EXTEND OR RETRACT - Continued **0012 00**



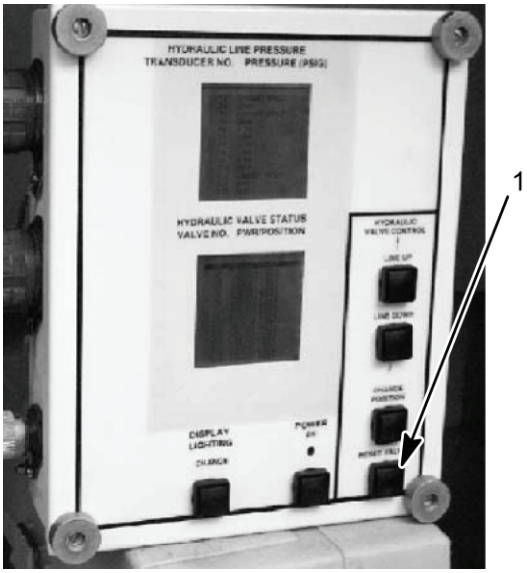


Figure 22. HDC Control Box

EJECTOR CONTROL VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 22, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand in front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Continued on page 0012 00-33.

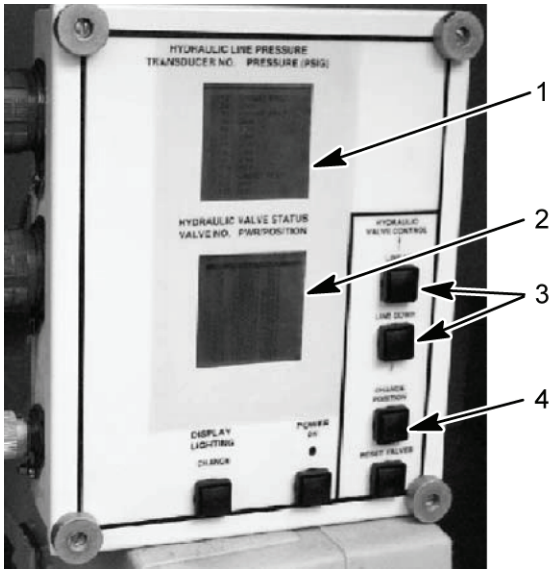


Figure 23. HDC Control Box

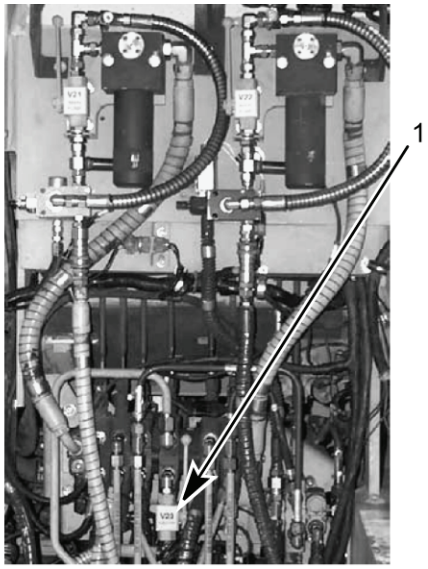


Figure 24. DCV Bank

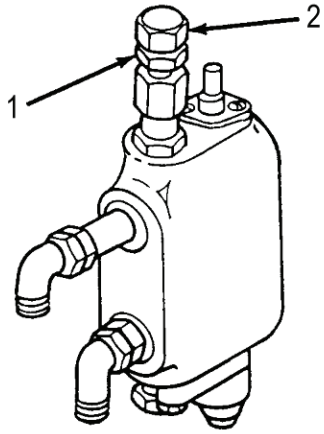
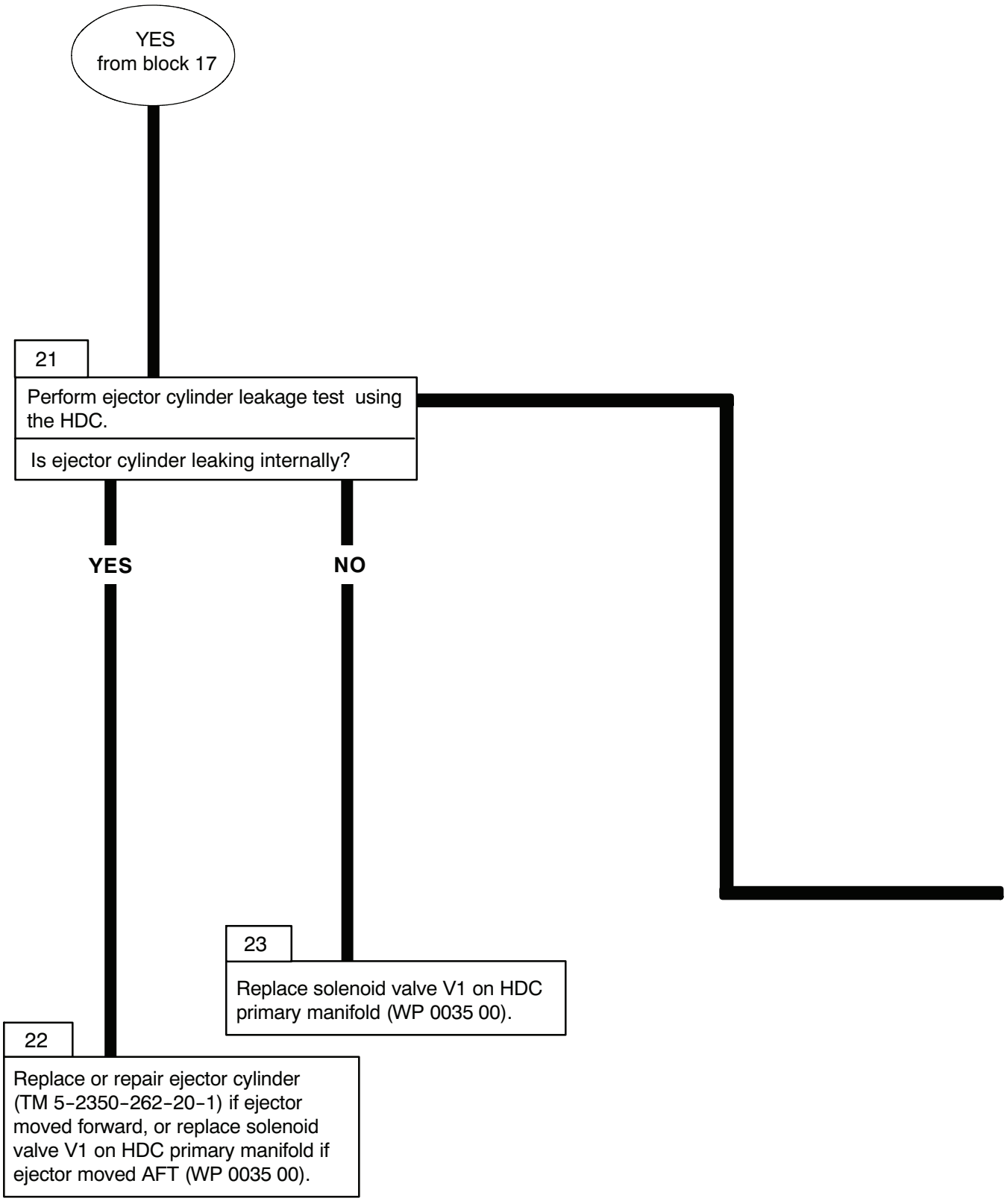


Figure 25. Ejector Control Valve

EJECTOR CONTROL VALVE ADJUSTMENT - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 24, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 23, item 3), select V1 on the HDC display (Figure 23, item 2). Close V1 on the HDC display (Figure 23, item 2) by selecting the CHANGE POSITION button (Figure 23, item 4) on the HDC control box.
- Start engine. With the engine at idle speed and EJECTOR CONTROL lever in FORWARD position, loosen jam nut (Figure 25, item 1) on ejector control valve and turn adjusting screw (Figure 25, item 2) clockwise to increase pressure; counterclockwise to decrease pressure. Transducer T-2 hydraulic pressure on the HDC display (Figure 23, item 1) should indicate 1,950-2,050 psi (13,445-15,135 kPa).
- Stop engine; relieve hydraulic pressure
- Manually open the ejector inhibit ball valve V23 (Figure 24, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 23, item 3), select V1 on the HDC display (Figure 23, item 2). Close V1 on the HDC display (Figure 23, item 2) by selecting the CHANGE POSITION button (Figure 23, item 4) on the HDC control box.


YES
from block 17
21
Perform ejector cylinder leakage test using the HDC.
Is ejector cylinder leaking internally?
YES
NO
23
Replace solenoid valve V1 on HDC primary manifold (WP 0035 00).
22
Replace or repair ejector cylinder (TM 5-2350-262-20-1) if ejector moved forward, or replace solenoid valve V1 on HDC primary manifold if ejector moved AFT (WP 0035 00).

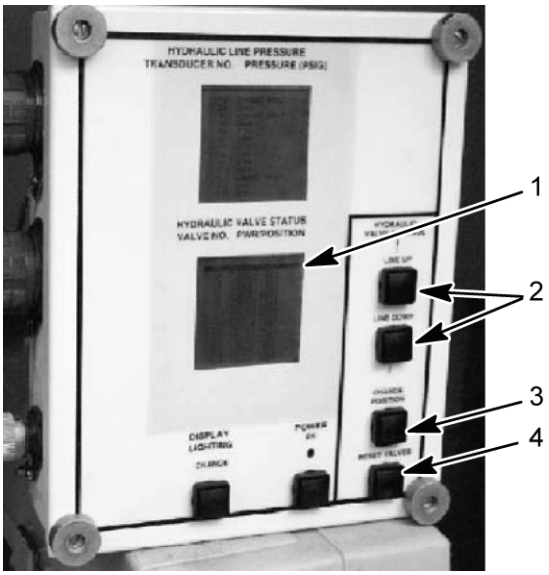


Figure 26. HDC Control Box

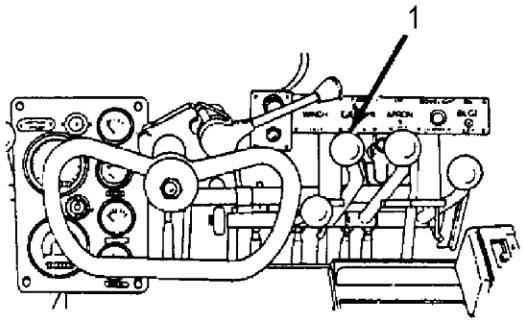


Figure 27. Ejector Control Lever

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand in front of dozer while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 26, item 4) on the HDC control box.
- Have assistant actuate EJECTOR CONTROL lever (Figure 27, item 1) to move ejector forward 3/4 of full travel.
- Stop engine and relieve hydraulic pressure
- Close main ejector valve (V1) on HDC primary manifold. Using LINE UP or LINE DOWN button (Figure 26, item 2), select V1 on the HDC display (Figure 26, item 1). Close V1 on the HDC display (Figure 26, item 1), by selecting the CHANGE POSITION button (Figure 26, item 3) on the HDC control box.
- Continued on page 0012 00-37.

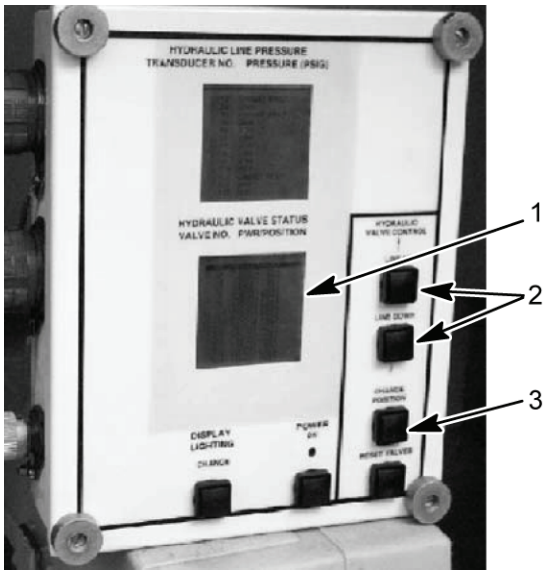


Figure 28. HDC Control Box

EJECTOR CYLINDER LEAKAGE TEST - CONTINUED

- Have assistant start engine and 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 forward more than 0.5 in. (13mm), the ejector cylinder is leaking excessively. If cylinder moves aft more than 0.5 in. (13mm), solenoid valve V1 on HDC primary manifold valve is leaking.
- Open main ejector valve; by using LINE UP or LINE DOWN button (Figure 28, item 2), select V1 on the HDC display (Figure 28, item 1). Open V1 on the HDC display (Figure 28, item 1), by selecting the CHANGE POSITION button (Figure 28, item 3) on the HDC control box.

END OF WORK PACKAGE

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

0013 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0031 00
WP 0032 00
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

NOTE

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

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

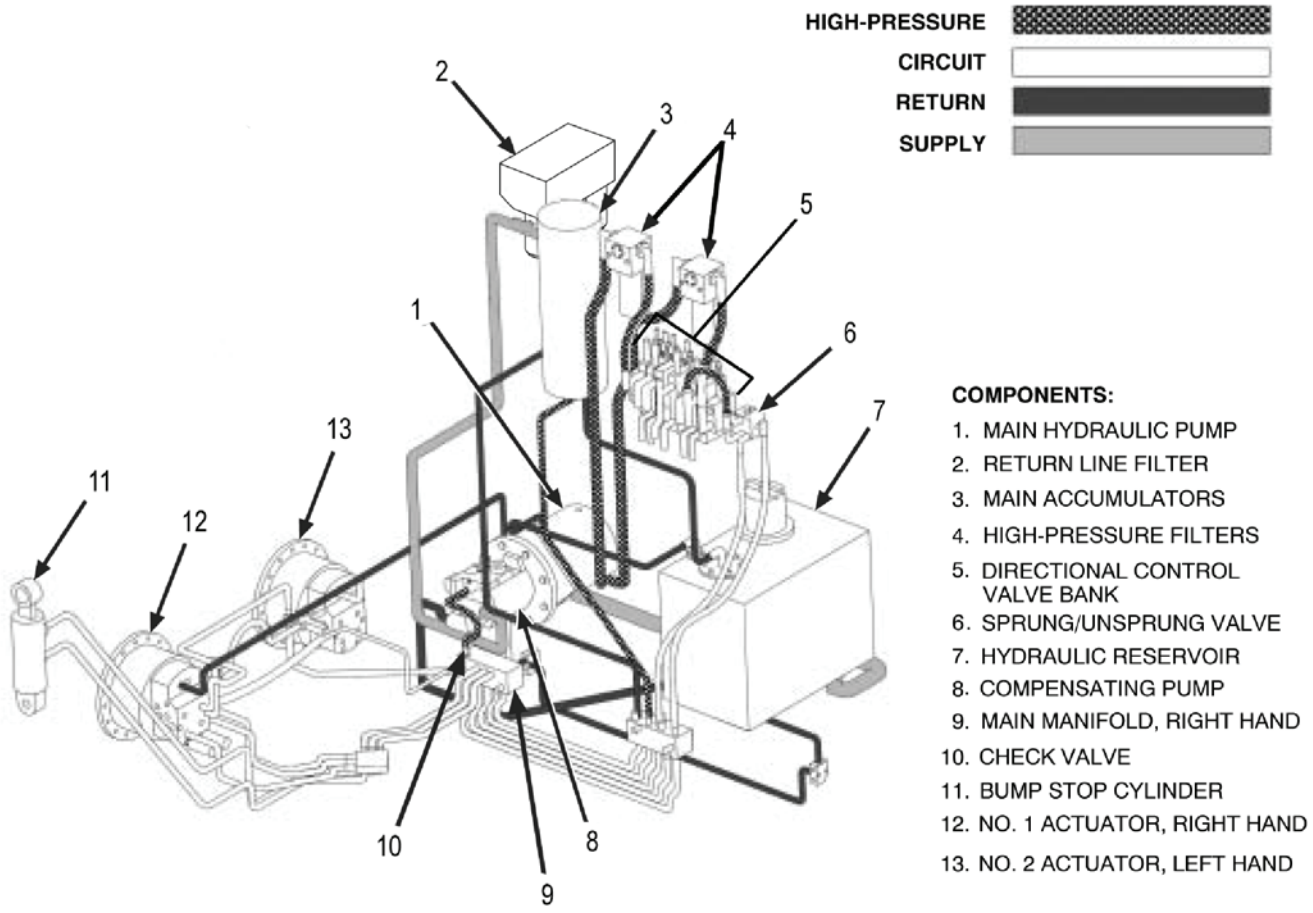


Figure 1. Front Suspension Raise/Lower Circuit

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

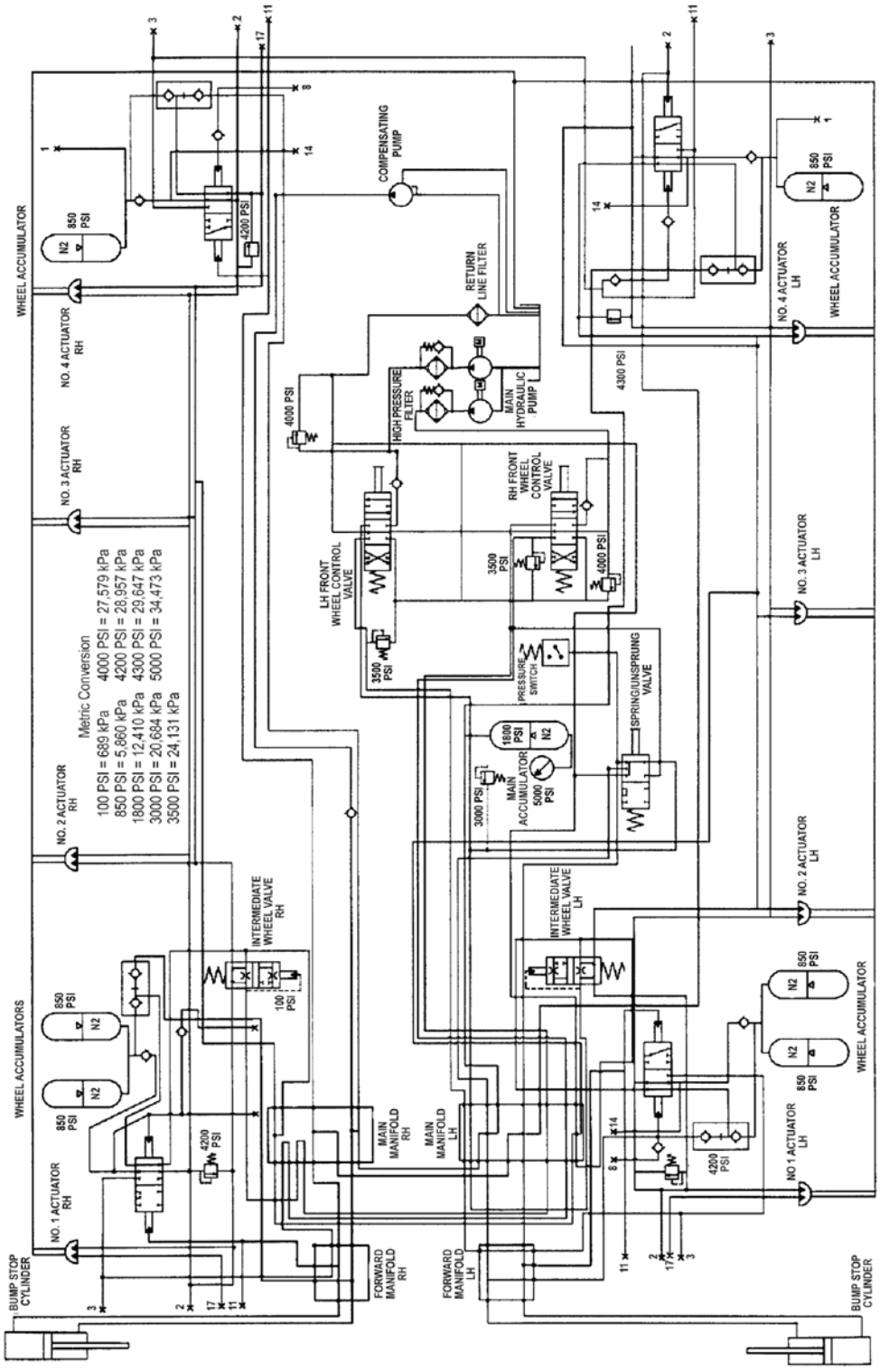
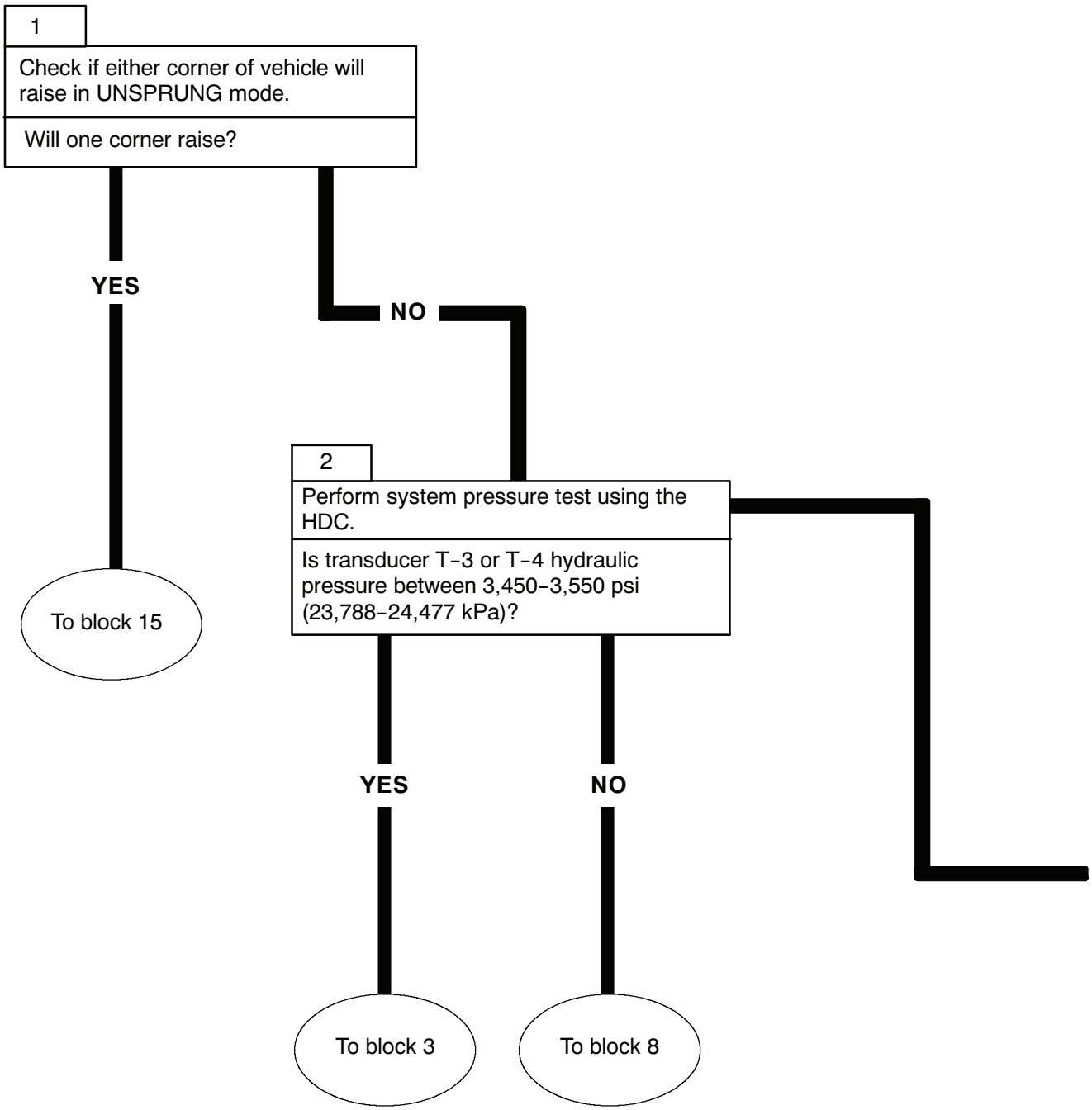


Figure 2. Front Suspension Raise/Lower Schematic

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



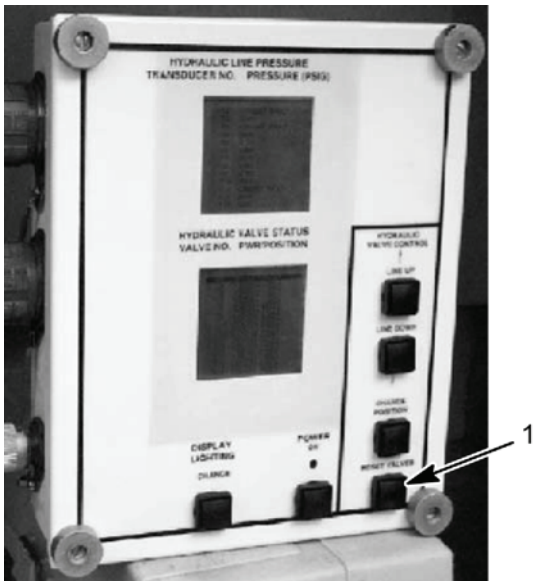


Figure 3. HDC Control Box

SYSTEM PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0013 00-7.

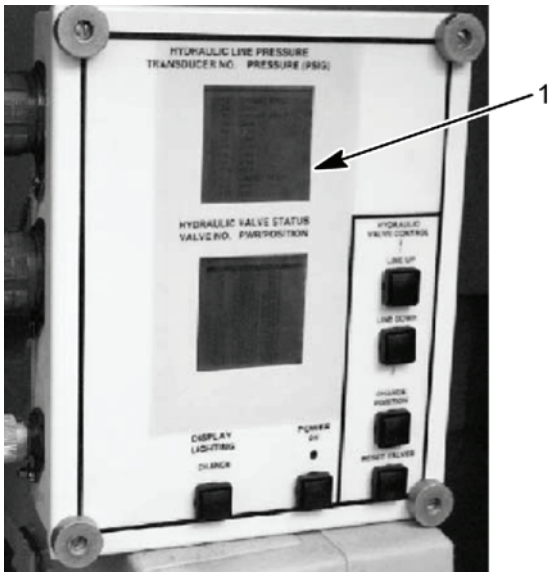


Figure 4. HDC Control Box

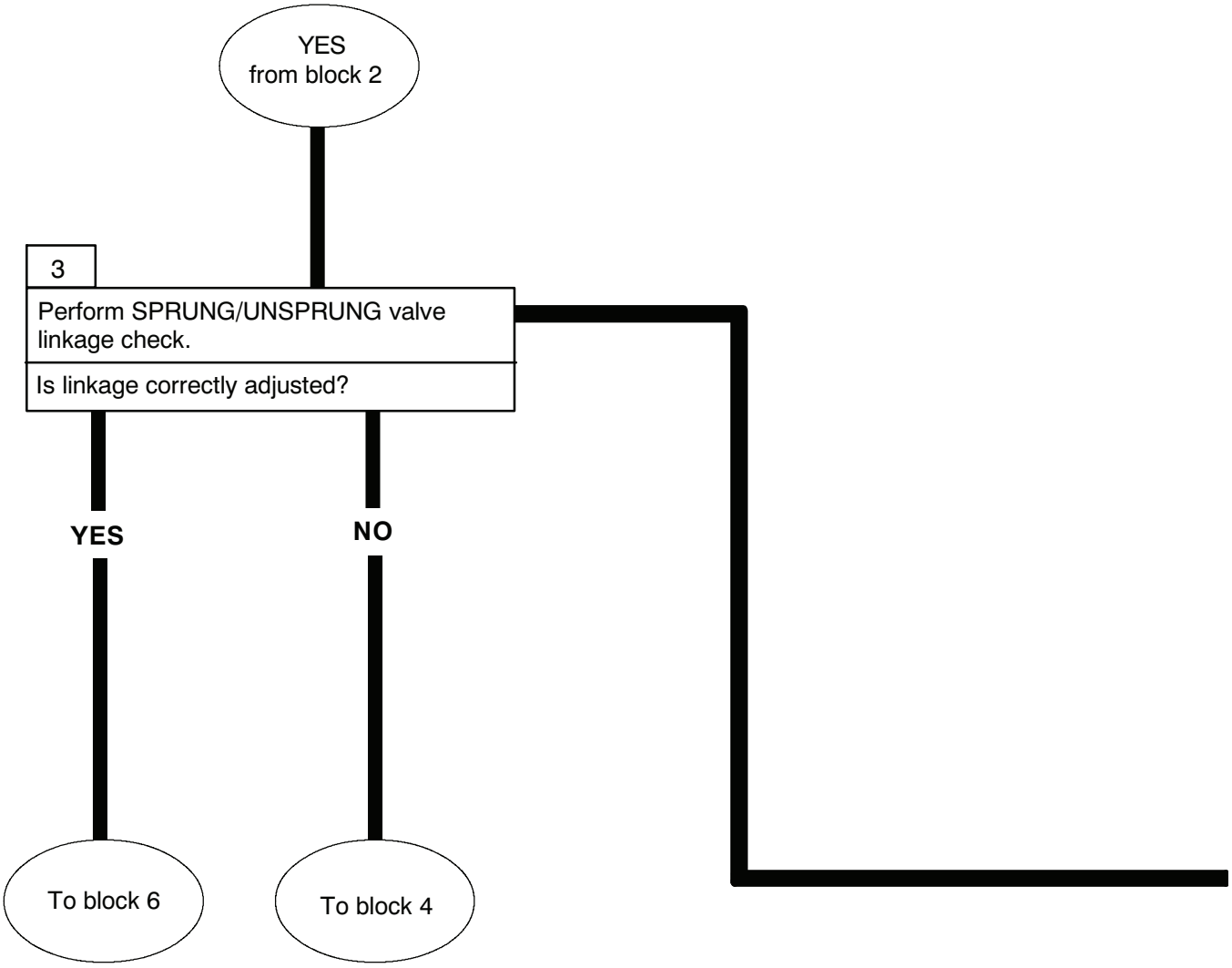
SYSTEM PRESSURE TEST - CONTINUED

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

- Start engine, move ejector forward, engage ejector lock.
- Stop engine, and relieve hydraulic pressure.
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to RAISE.
- To read 13R circuit pressure, read transducer T-3 hydraulic pressure on the HDC display (Figure 4, item 1).
- To read 13L circuit pressure, read transducer T-4 hydraulic pressure on the HDC display (Figure 4, item 1).
- Move SUSPENSION CONTROL lever to NEUTRAL.
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



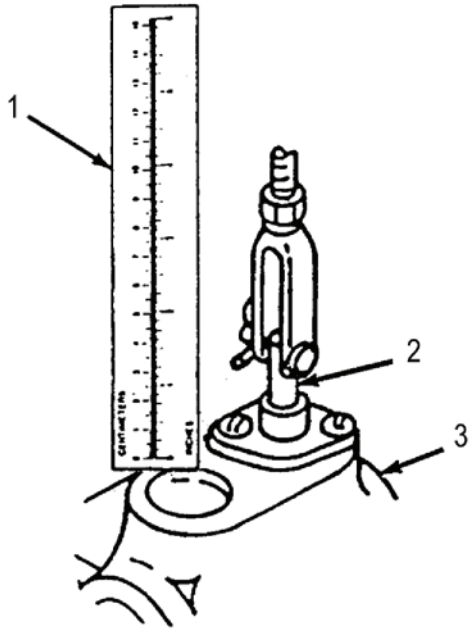


Figure 5. Control Valve Linkage

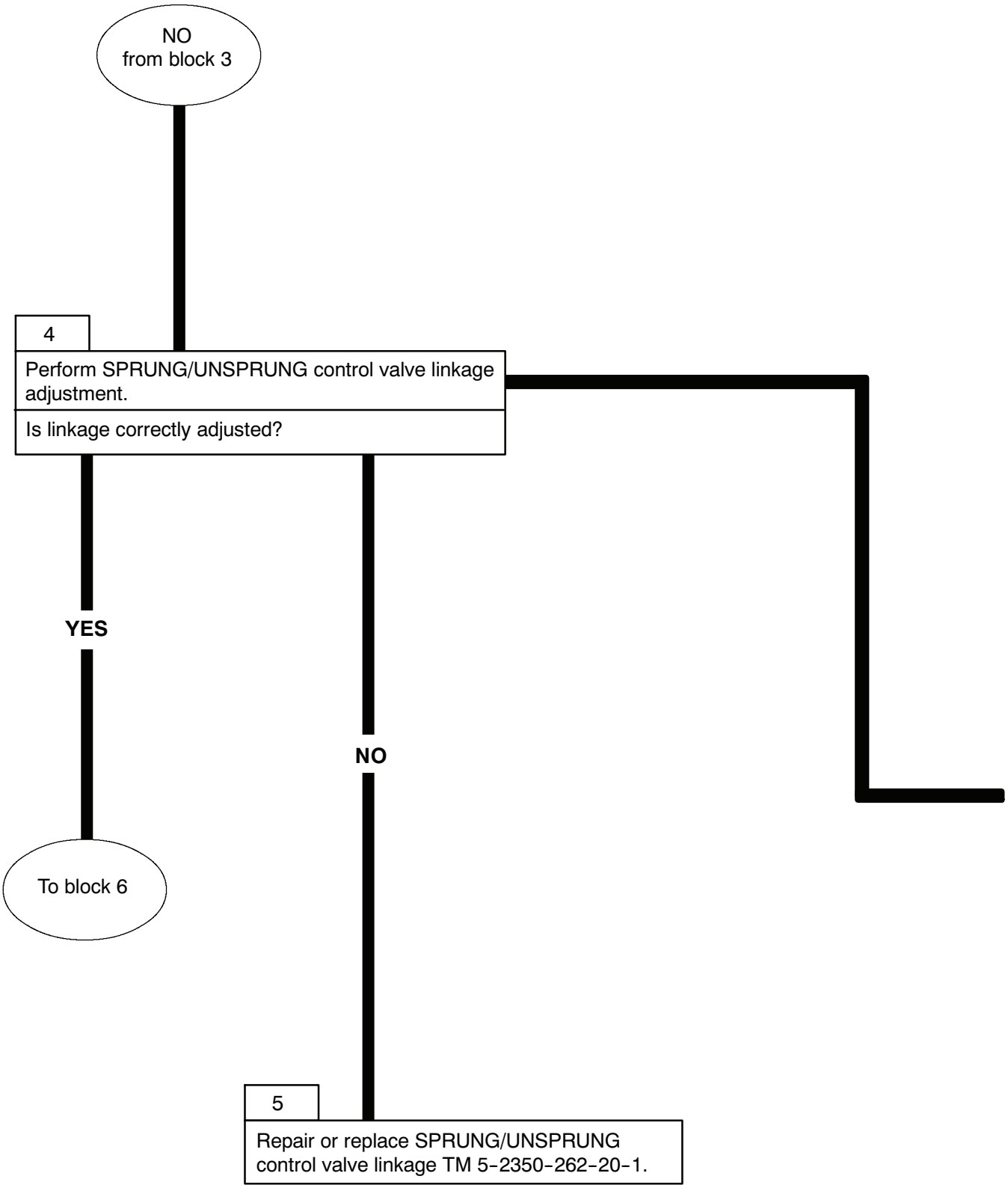
SPRUNG/UNSPRUNG CONTROL VALVE LINKAGE CHECK

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 or death to personnel.

- Hold measuring device (Figure 5, item 1) on face of SPRUNG/UNSPRUNG control valve (Figure 5, item 3). Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance plunger (Figure 5, item 2) travels as lever is moved. Distance of travel should be 9/32 in. (7 mm).

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



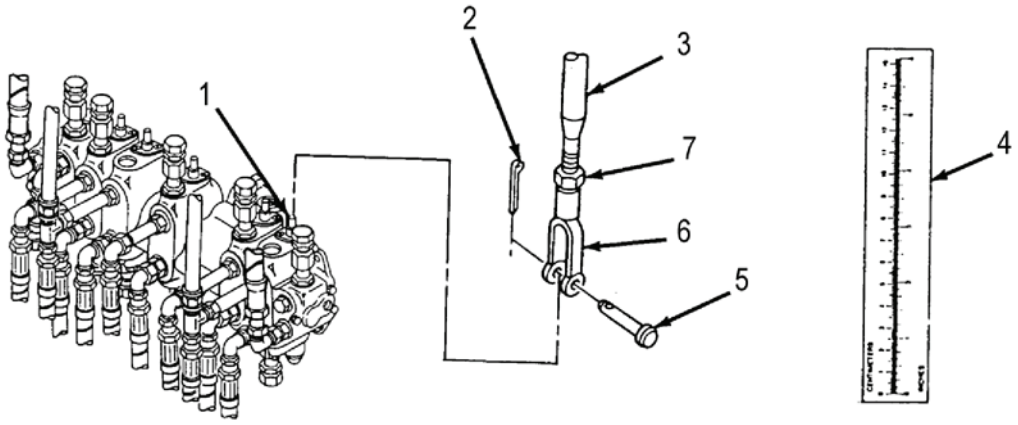


Figure 6. Sprung/Unsprung Control Valve Linkage

SPRUNG/UNSPRUNG CONTROL VALVE 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 the SPRUNG/UNSPRUNG control rod.

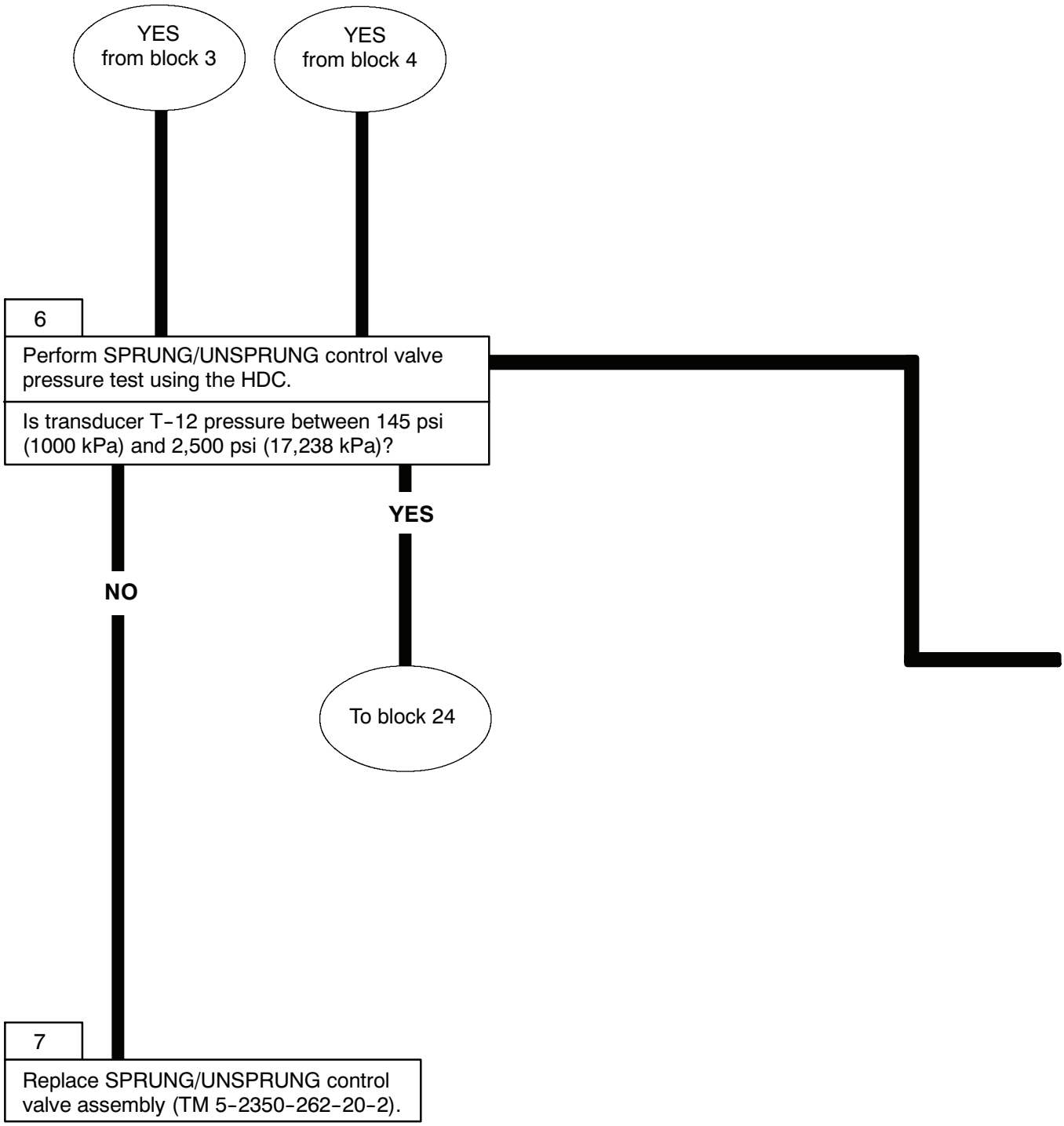
- Note position of control valve plunger (Figure 6, item 1) when SPRUNG/UNSPRUNG control lever is in NEUTRAL (off) position.

NOTE

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

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

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



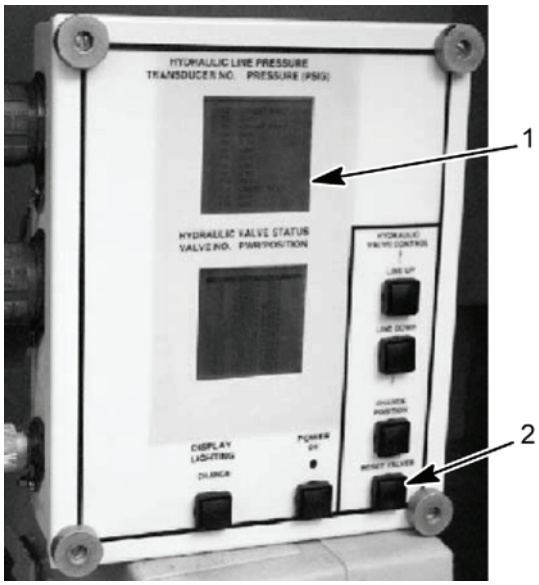
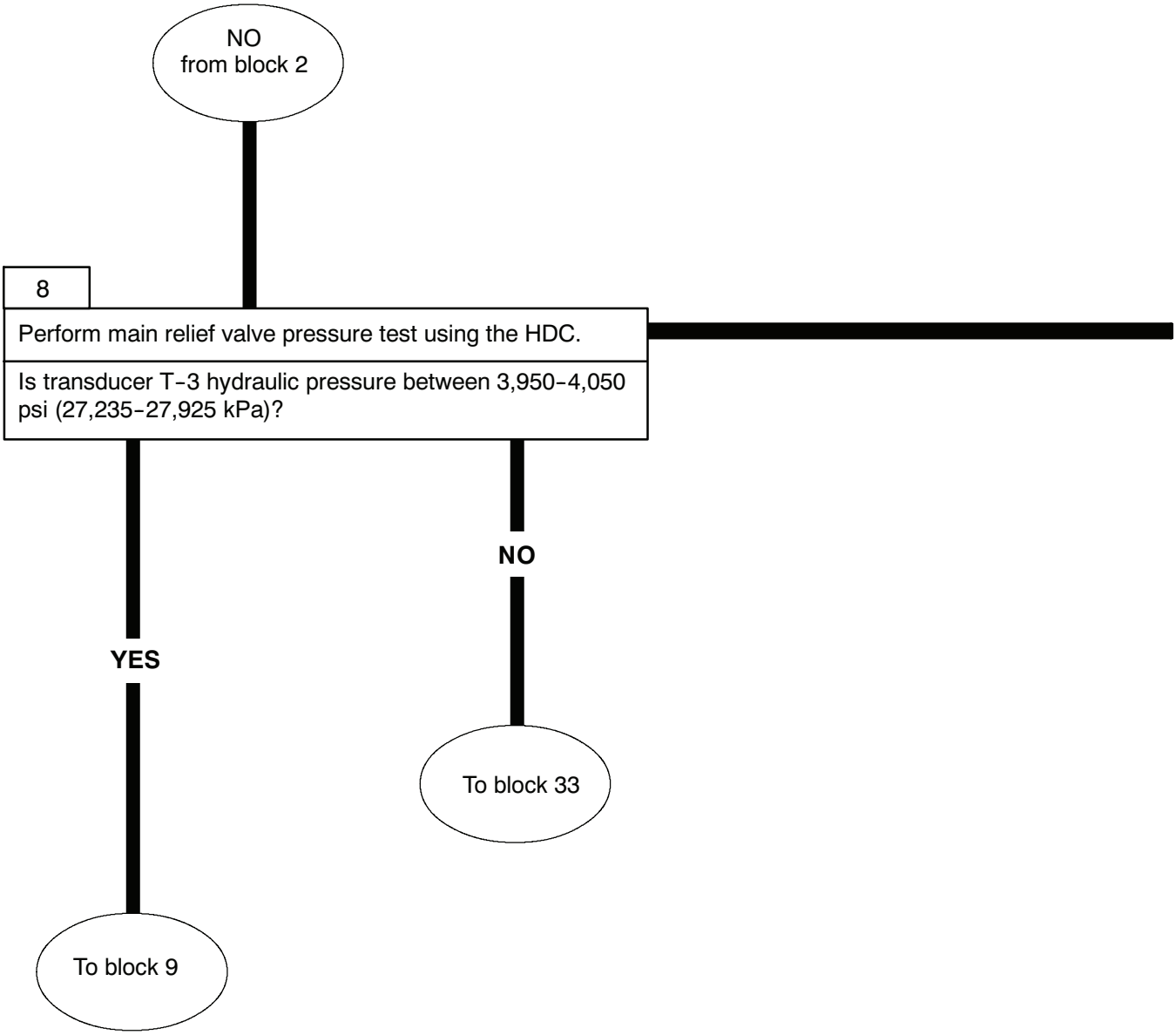


Figure 7. HDC Control Box

SPRUNG/UNSPRUNG CONTROL VALVE PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 2) on the HDC control box.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG several times. Read transducer T-12 hydraulic pressure on the HDC display (Figure 7, item 1). Hydraulic pressure should be less than 145 psi (1000 kPa) in SPRUNG mode and greater than 2,500 psi (17,238 kPa) in UNSPRUNG mode.
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

MAIN RELIEF VALVE PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 8, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 8, item 3), select V1 on the HDC display (Figure 8, item 2). Close V1 on the HDC display (Figure 8, item 2) by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box.
- Have assistant start engine and move ejector forward.
- Move SPRUNG/UNSPRUNG lever to SPRUNG and move EJECTOR CONTROL lever to BACK. Read transducer T-3 hydraulic pressure on the HDC display (Figure 8, item 1).
- While simultaneously holding EJECTOR CONTROL lever in BACK, have assistant move right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-3 hydraulic pressure on the HDC display (Figure 8, item 1).
- Using LINE UP or LINE DOWN button (Figure 8, item 3), select V1 on the HDC display (Figure 8, item 2). Open V1 on the HDC display (Figure 8, item 2) by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box.
- Stop engine and relieve hydraulic pressure.

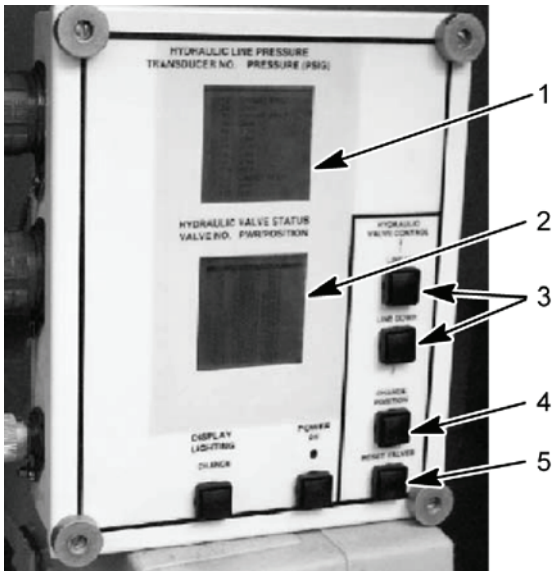
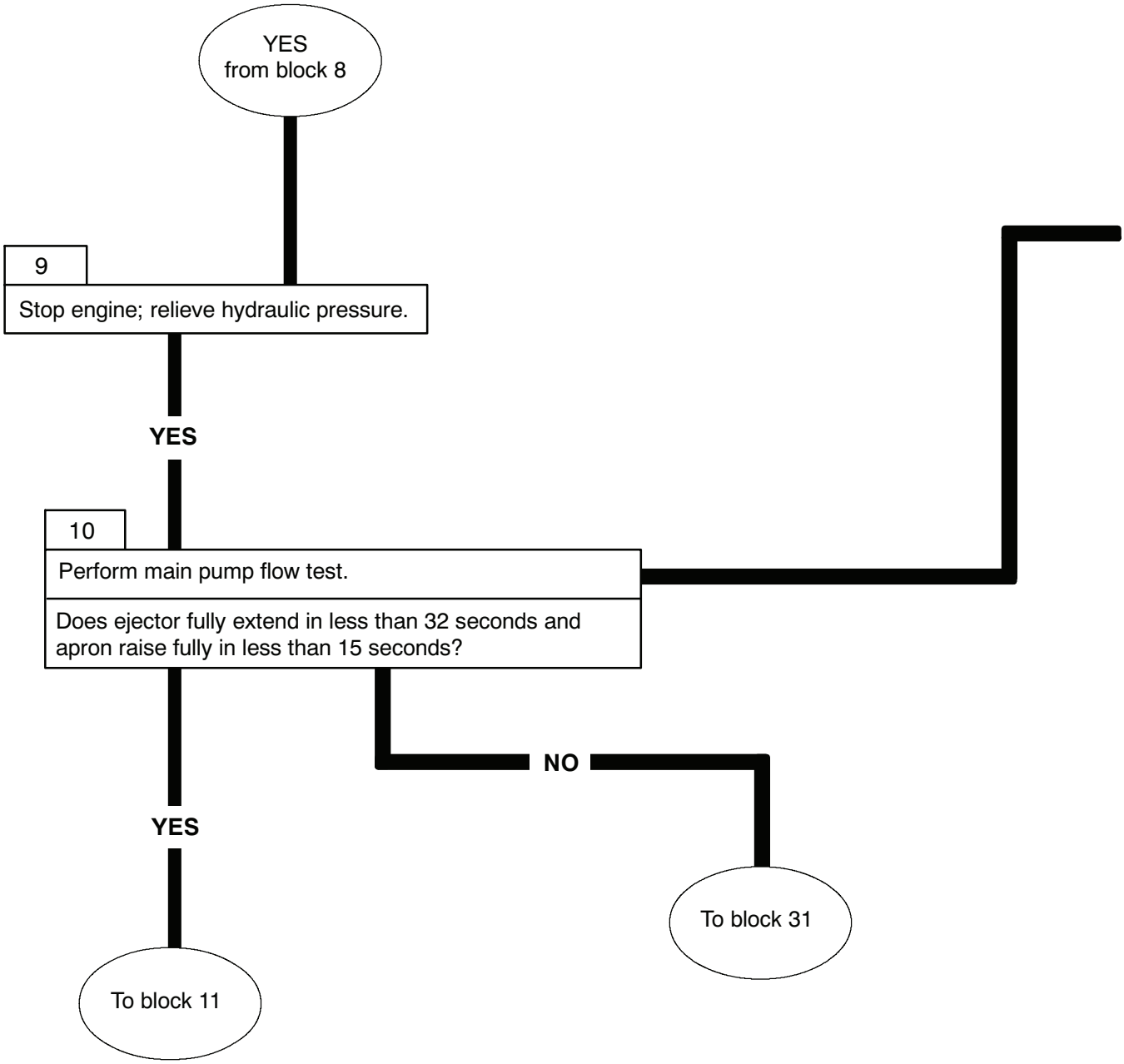


Figure 8. HDC Control Box

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

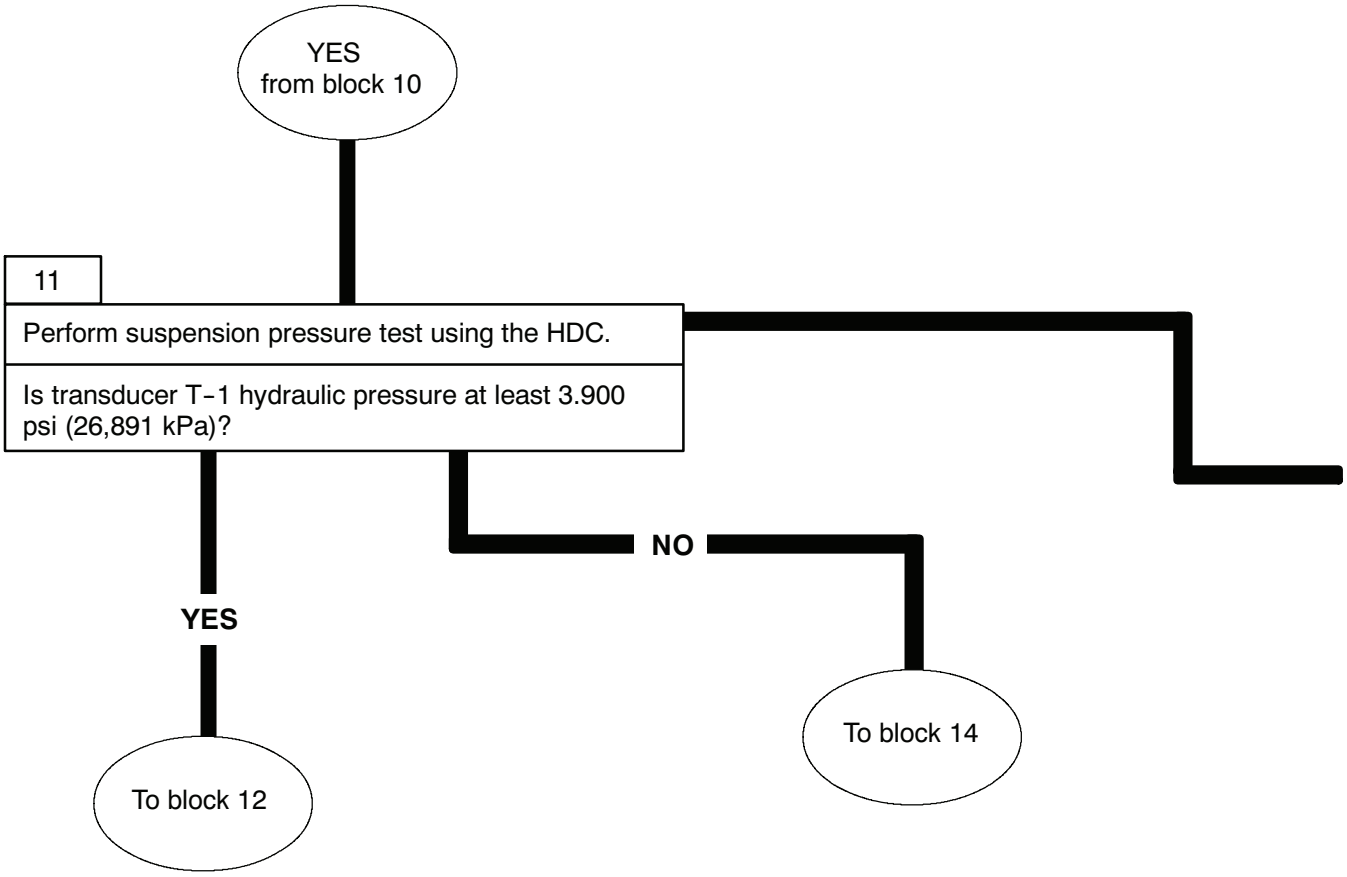
MAIN PUMP FLOW TEST

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.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



LEFT AND RIGHT SUSPENSION PORT 17 PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.

NOTE

Perform this test for ports 17R and 17L on the directional control valve (DCV) bank. Use the right-hand SUSPENSION CONTROL lever for port 17R and the left-hand SUSPENSION CONTROL lever for port 17L.

- Port 17L: Using LINE UP or LINE DOWN button (Figure 9, item 3), select V11 on the HDC display (Figure 9, item 2). Close V11 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Port 17R: Repeat previous step for port 17R, but close V5 instead of V11.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to LOWER. Read 17L or 17R circuit pressure from transducer T-1 hydraulic pressure on the HDC display (Figure 9, item 1).
- Port 17L: Using LINE UP or LINE DOWN button (Figure 9, item 3), select V11 on the HDC display (Figure 9, item 2). Open V11 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Port 17R: Repeat previous step for port 17R, but open V5 instead of V11.
- Stop engine; relieve hydraulic pressure. Remove all test equipment and connect hose.

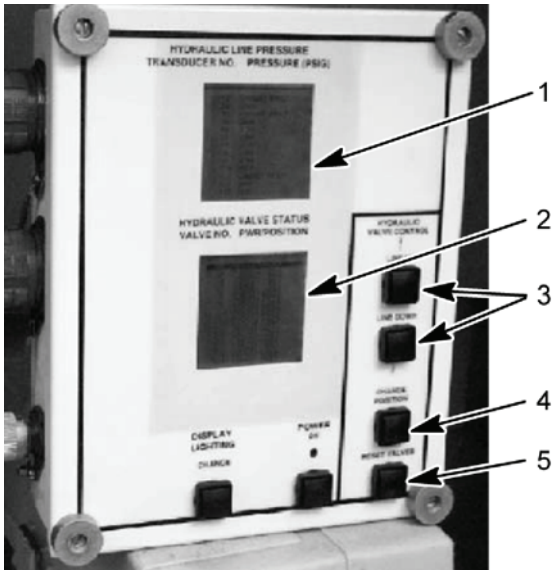
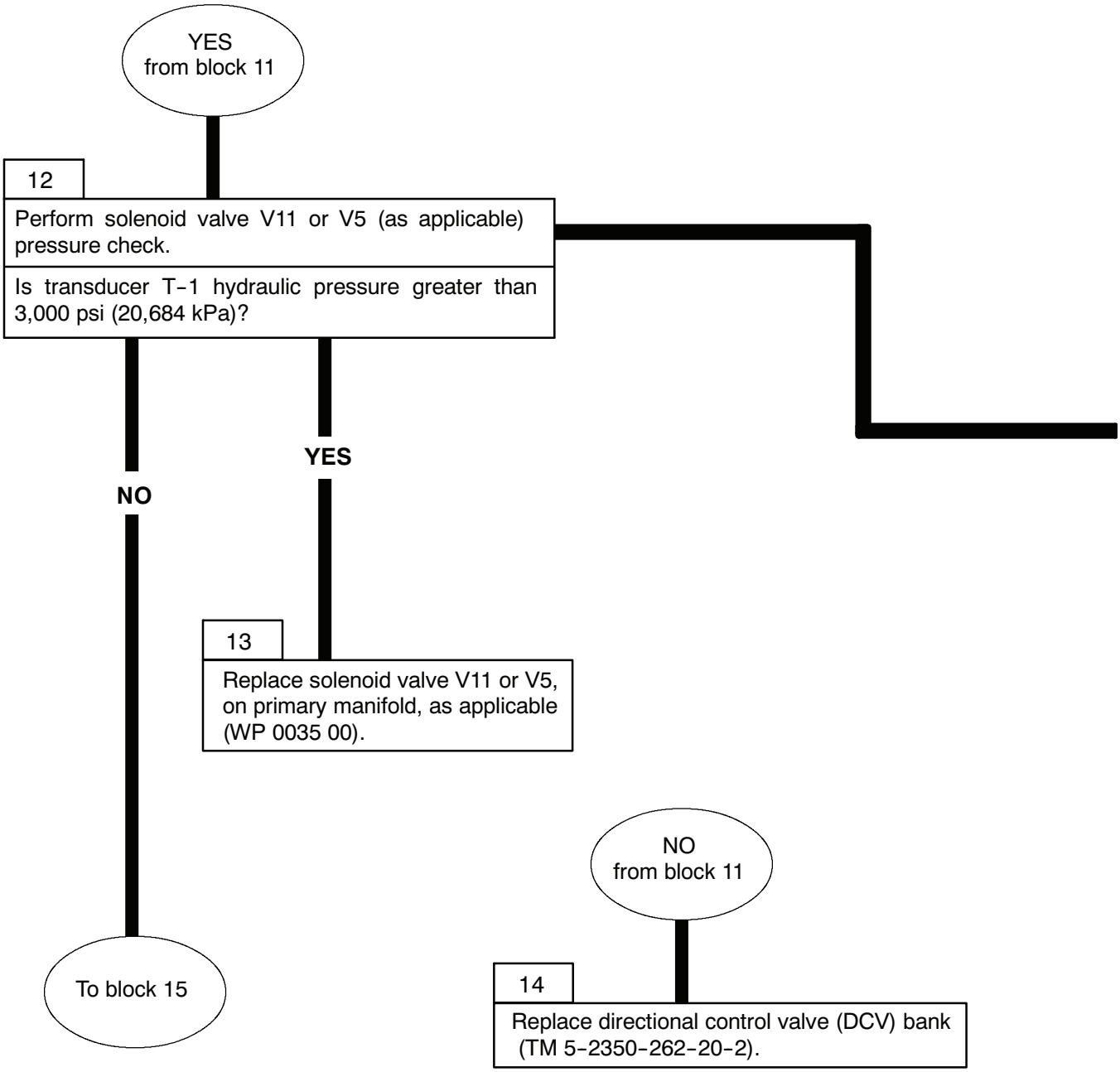


Figure 9. HDC Control Box

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

SOLENOID VALVE V11 OR V5 CHECK

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 10, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 10, item 3), select V1 on the HDC display (Figure 10, item 2). Close V1 on the HDC display (Figure 10, item 2) by selecting the CHANGE POSITION button (Figure 10, item 4) on the HDC control box.
- Verify that transducer T-1 hydraulic pressure on the HDC display (Figure 10, item 1), reads less than 500 psi (3447.379 kPa).
- Have assistant start engine and place the vehicle in UNSPRUNG mode.
- For solenoid valve V11 (circuit 17L): Have assistant move the left SUSPENSION CONTROL lever to LOWER.
- Verify that transducer T-1 hydraulic pressure on the HDC display (Figure 10, item 1), reads greater than 3,000 psi (20684.27 kPa). (This indicates that V11 has directed flow from the suspension to transducer T1, which now reads the system relief valve pressure setting.) If pressure is 3,000 psi (20684.27 kPa) or more, solenoid valve V11 on primary manifold, is bad.
- For solenoid valve V5 (circuit 17R): Have assistant move the right SUSPENSION CONTROL lever to LOWER.
- Verify that transducer T-1 hydraulic pressure on the HDC display (Figure 10, item 1), reads greater than 3,000 psi (20684.27 kPa). (This indicates that V5 has directed flow from the suspension to transducer T1, which now reads the system relief valve pressure setting.) If pressure is 3,000 psi (20684.27 kPa) or more, solenoid valve V11 on primary manifold, is bad.
- Stop engine; relieve hydraulic pressure.

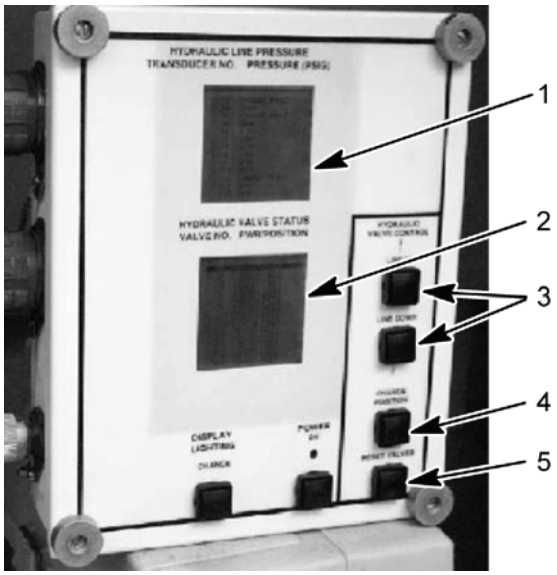
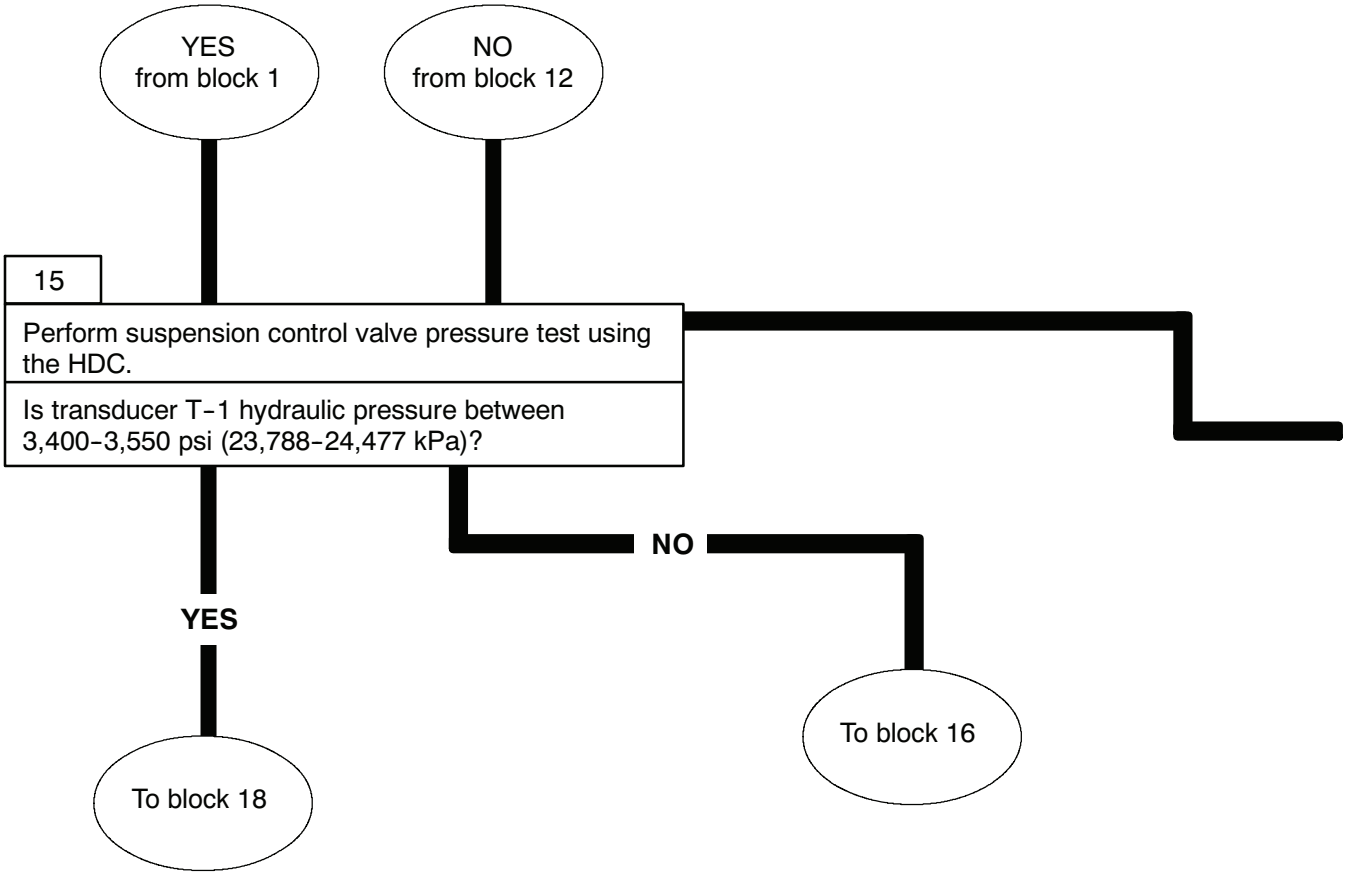


Figure 10. HDC Control Box

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



SUSPENSION CONTROL VALVE PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 11, item 5) on the HDC control box.

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.

- Port 3R: Using LINE UP or LINE DOWN button (Figure 11, item 3), select V15 on the HDC display (Figure 11, item 2). Close V15 on the HDC display (Figure 11, item 2) by selecting the CHANGE POSITION button (Figure 11, item 4) on the HDC control box.
- Port 3L: Repeat previous step for port 3L and close V16 instead of V15.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to RAISE. Read transducer T-1 hydraulic pressure on the HDC display (Figure 11, item 1).
- Port 3R: Using LINE UP or LINE DOWN button (Figure 11, item 3), select V15 on the HDC display (Figure 11, item 2). Open V15 on the HDC display (Figure 11, item 2) by selecting the CHANGE POSITION button (Figure 11, item 4) on the HDC control box.
- Port 3L: Repeat previous step for port 3L and open V16 instead of V15.

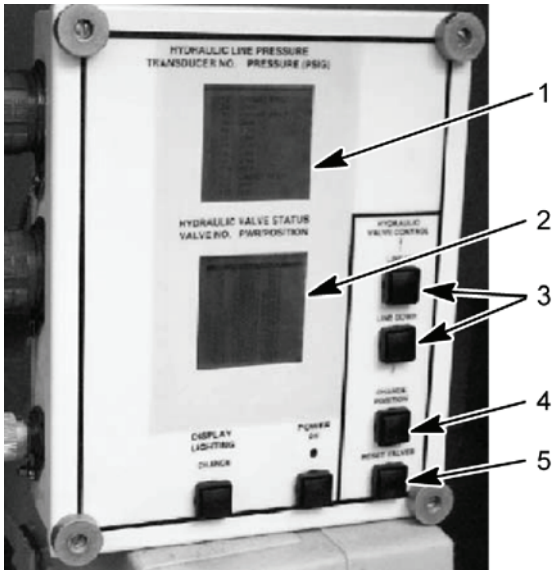
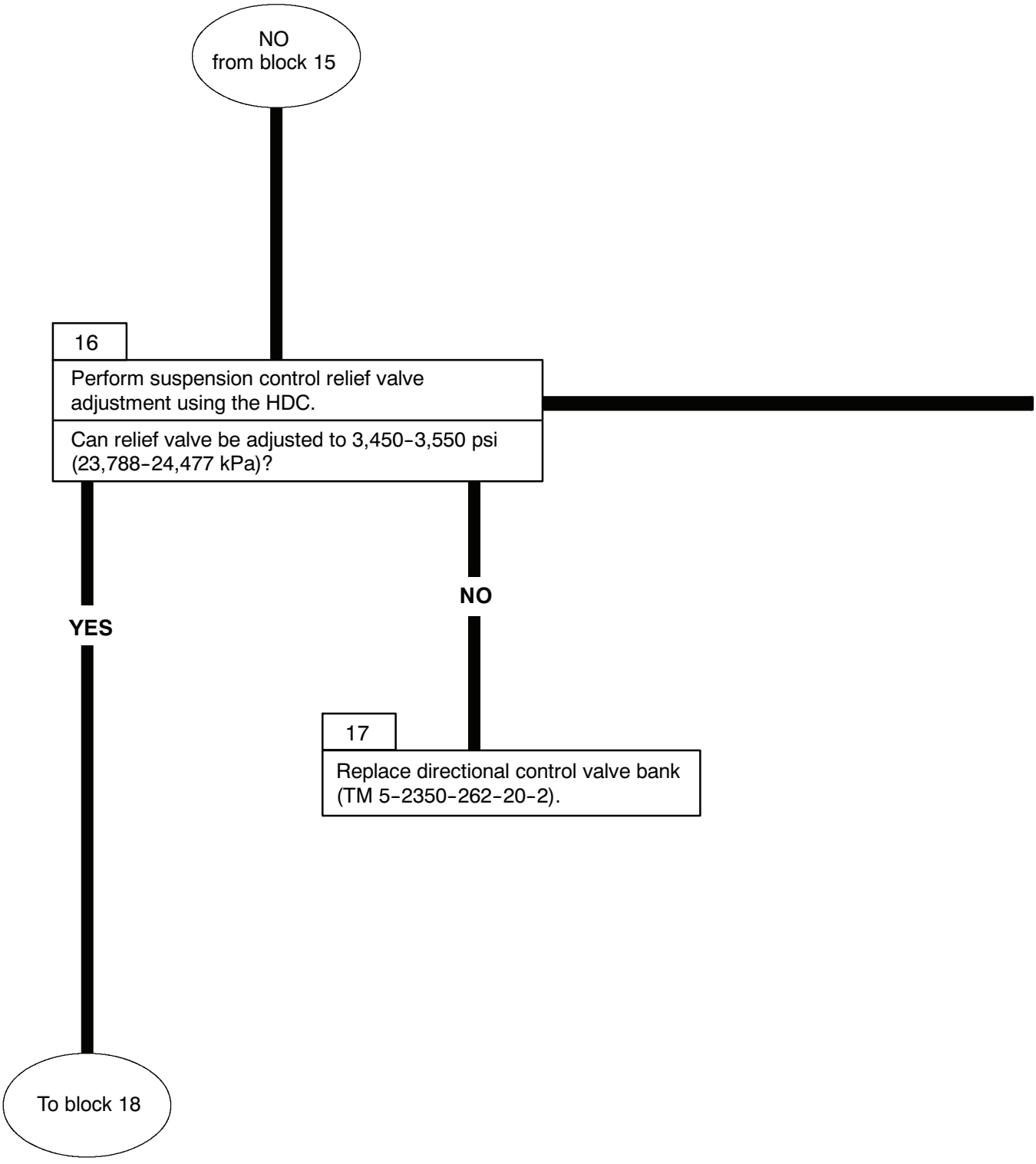


Figure 11. HDC Control Box

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**

SUSPENSION CONTROL RELIEF VALVE ADJUSTMENT

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 12, item 5) on the HDC control box.

NOTE

If left corner of vehicle will not raise, perform this adjustment at relief valve 3L and actuate left-hand SUSPENSION CONTROL lever. If right corner of vehicle will not raise, perform this adjustment at relief valve 3R and actuate right-hand SUSPENSION CONTROL lever.

- Port 3R RELIEF VALVE: Using LINE UP or LINE DOWN button (Figure 12, item 3), select V15 on the HDC display (Figure 12, item 2). Close V15 on the HDC display (Figure 12, item 2) by selecting the CHANGE POSITION button (Figure 12, item 4) on the HDC control box.
- Port 3L relief valve: Repeat previous step for port 3L and close V16 instead of V15.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG and SUSPENSION CONTROL lever to RAISE. Read transducer T-1 hydraulic pressure on the HDC display (Figure 12, item 1).
- Loosen jam nut (Figure 13, item 1) and turn adjusting screw (Figure 13, item 2) clockwise to increase pressure; counterclockwise to decrease pressure, as necessary. Adjust pressure to within limits, and tighten jam nut (Figure 13, item 1).
- Stop engine; relieve hydraulic pressure.
- Port 3R relief valve: Using LINE UP or LINE DOWN button (Figure 12, item 3), select V15 on the HDC display (Figure 12, item 2). Open V15 on the HDC display (Figure 12, item 2) by selecting the CHANGE POSITION button (Figure 12, item 4) on the HDC control box.
- Port 3L relief valve: Repeat previous step for port 3L and open V16 instead of V15.

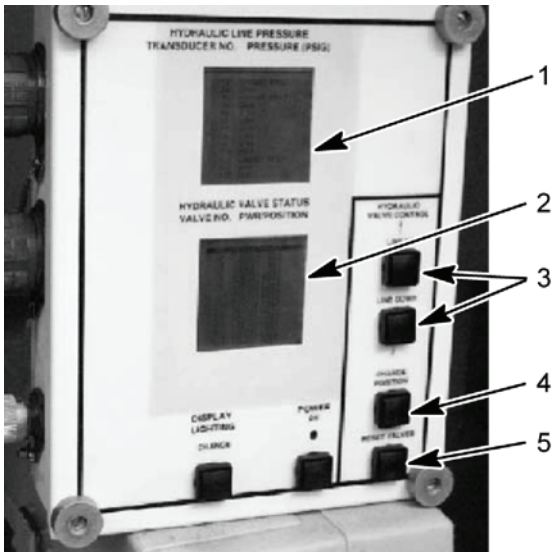


Figure 12. HDC Control Box

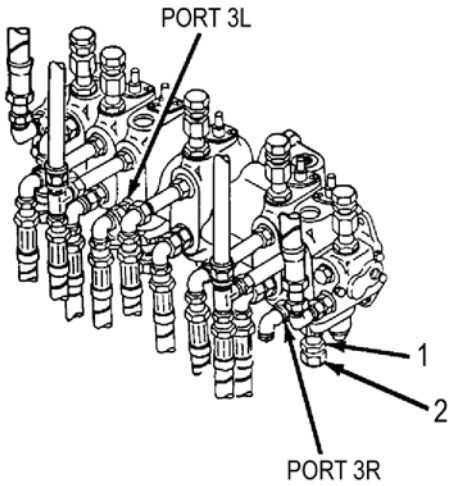
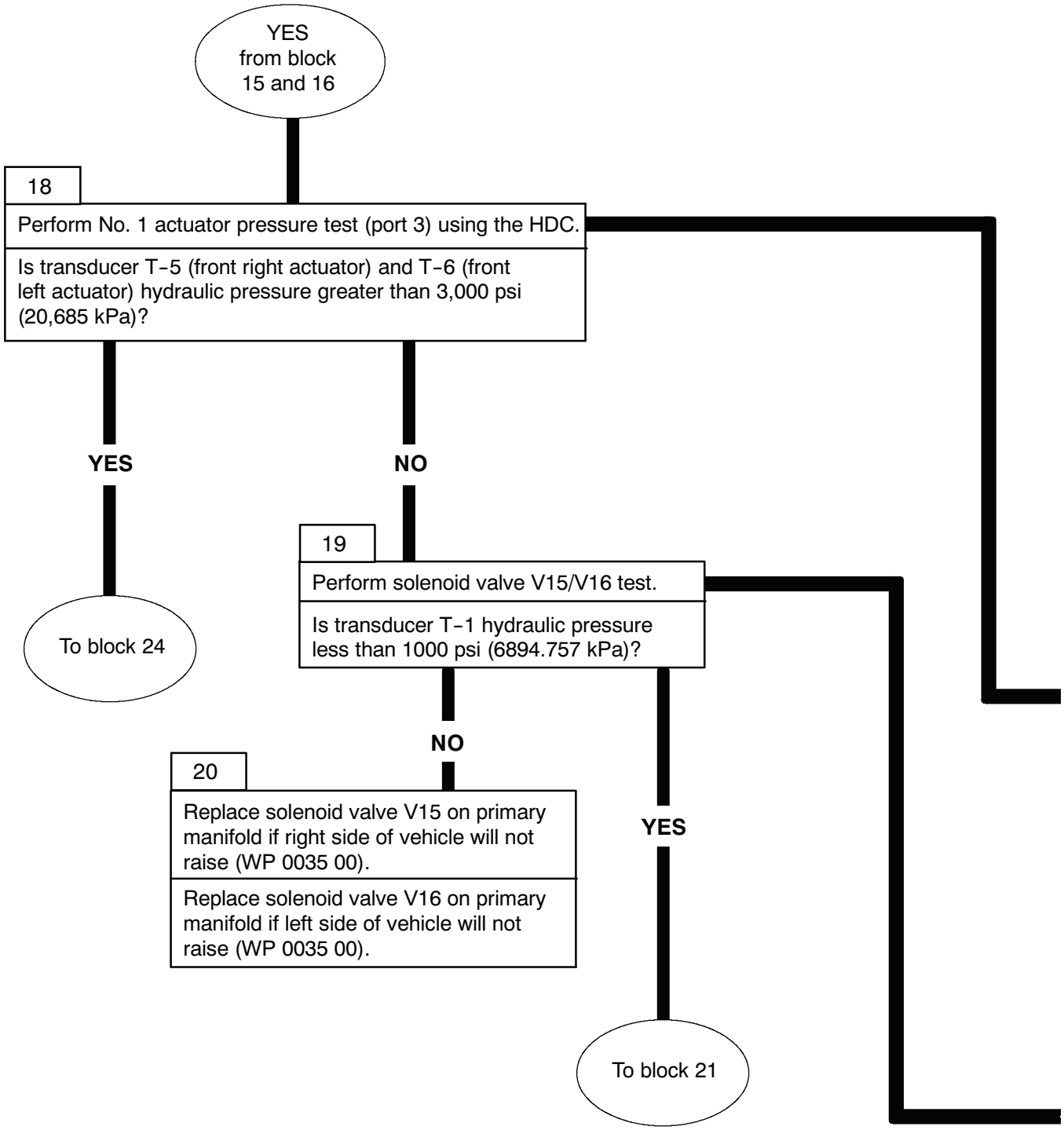


Figure 13. Suspension Control Relief Valve Adjustment

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



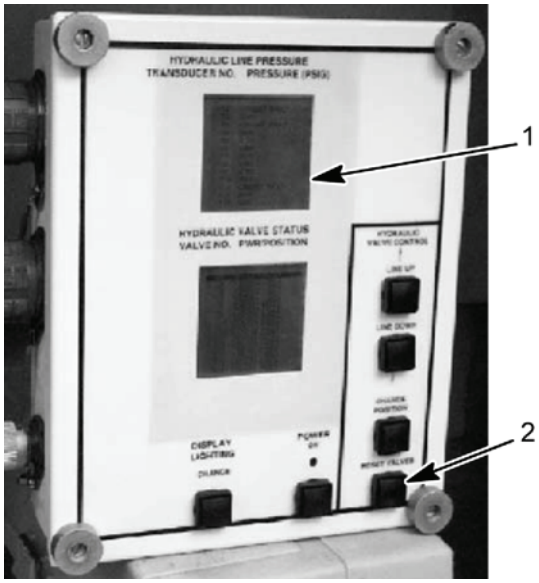


Figure 14. HDC Control Box

NO. 1 ACTUATOR PRESSURE TEST (PORT 3)

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 14, item 2) on the HDC control box.

NOTE

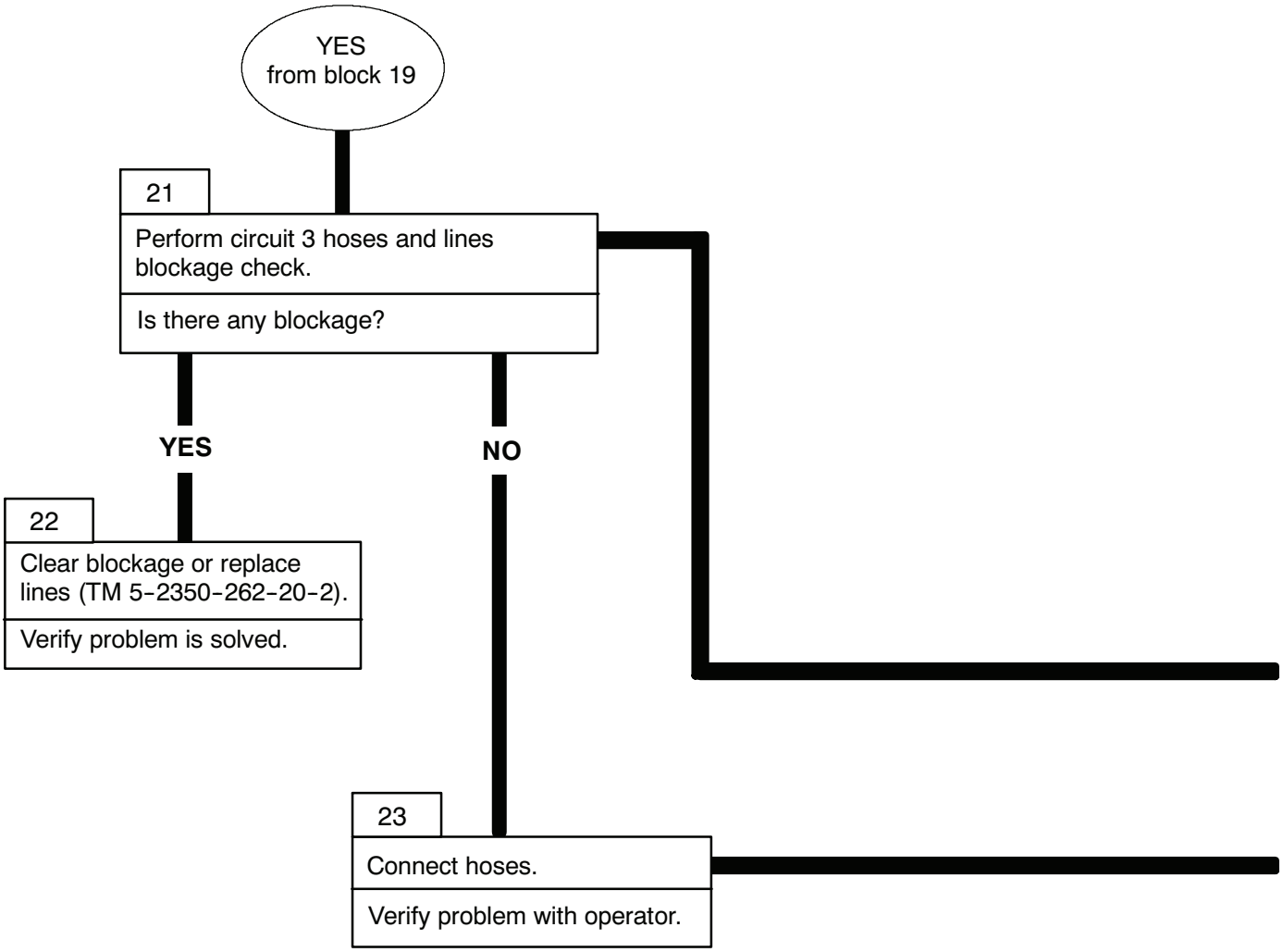
This test is performed at No. 1 actuator of front corner which will not raise.

- Start engine. Place SPRUNG/UNSPRUNG lever in SPRUNG. Move (right or left, as applicable) SUSPENSION CONTROL lever to RAISE. Read transducer T-5 (front right actuator) or T-6 (front left actuator) hydraulic pressure on the HDC display (Figure 14, item 2).
- Stop engine; relieve hydraulic pressure.

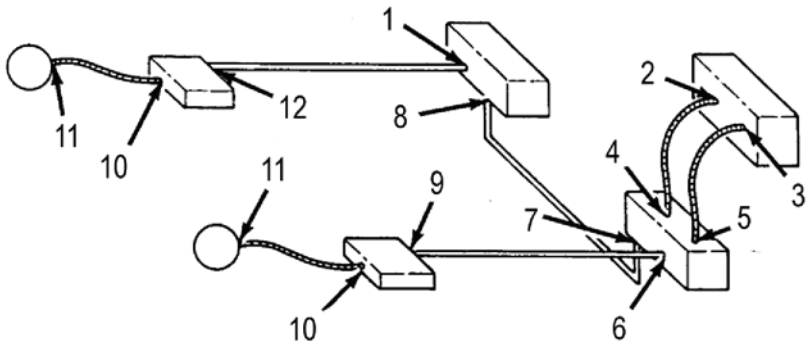
SOLENOID VALVE V15/V16 TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 14, item 2) on the HDC control box.
- Start engine.
- Wait until transducer T-1 hydraulic pressure on the HDC display (Figure 14, item 1) is less than 500 psi (3447.379 kPa).
- Move SUSPENSION CONTROL lever (left-hand or right-hand lever, as applicable) to RAISE.
- Read transducer T-1 hydraulic pressure on the HDC display (Figure 14, item 1).
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



LINE IDENTIFIERS:

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

Figure 15. Circuit 3 Components, Hoses and Lines

CIRCUIT 3 HOSES AND LINES BLOCKAGE CHECK

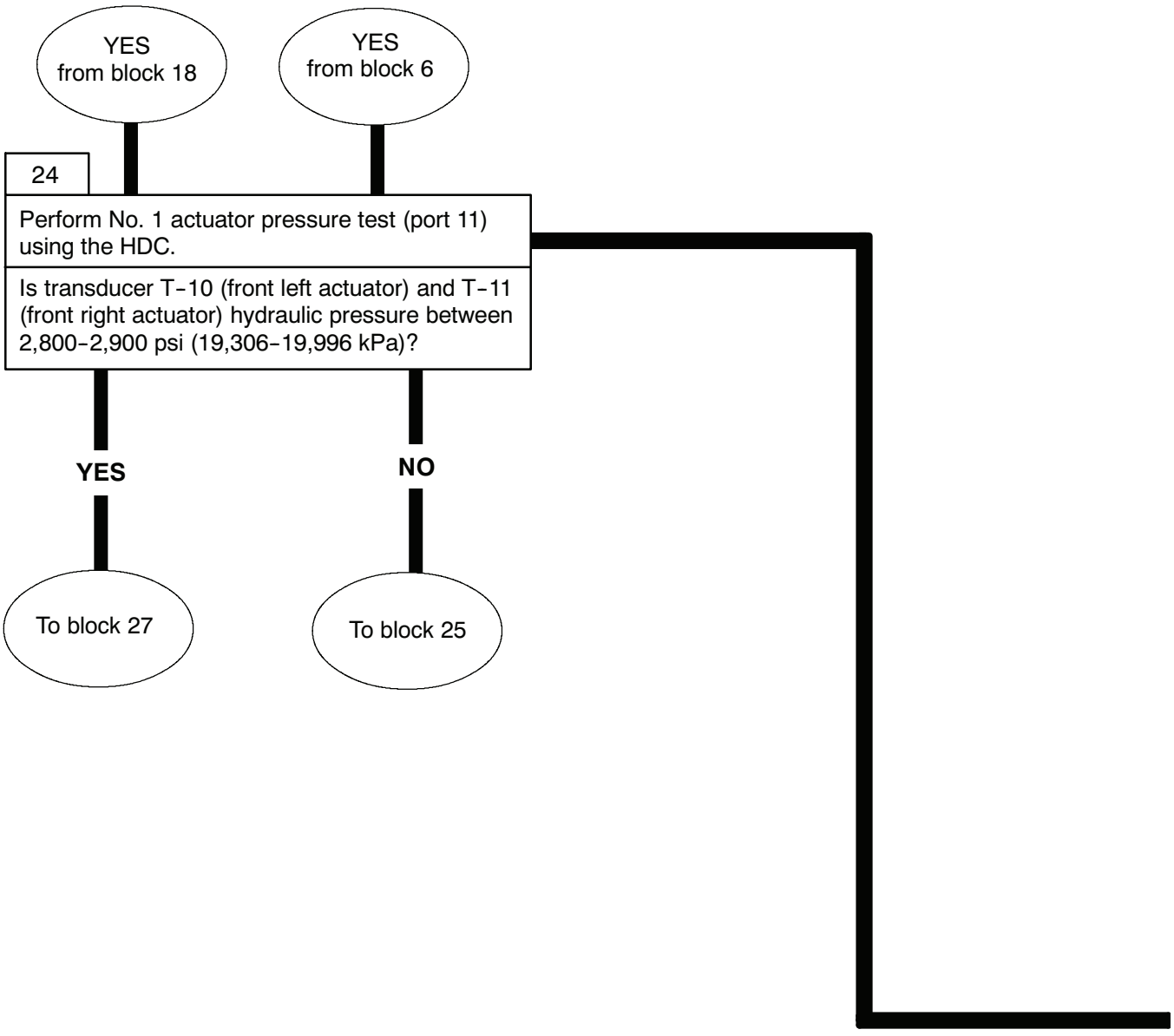
WARNING

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

- 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.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



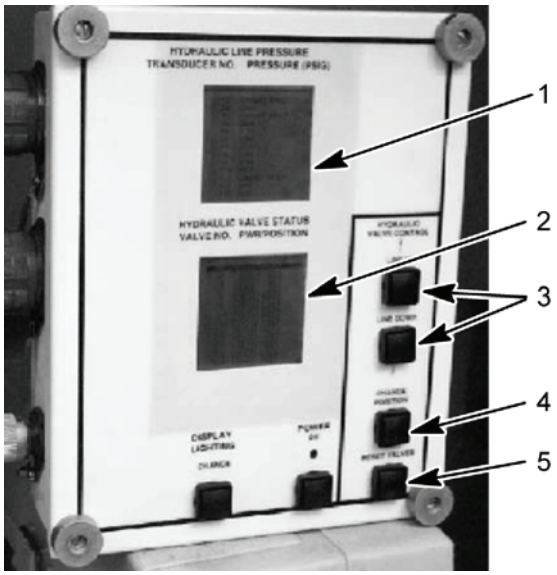


Figure 16. HDC Control Box

NO. 1 ACTUATOR PRESSURE TEST (PORT 11)

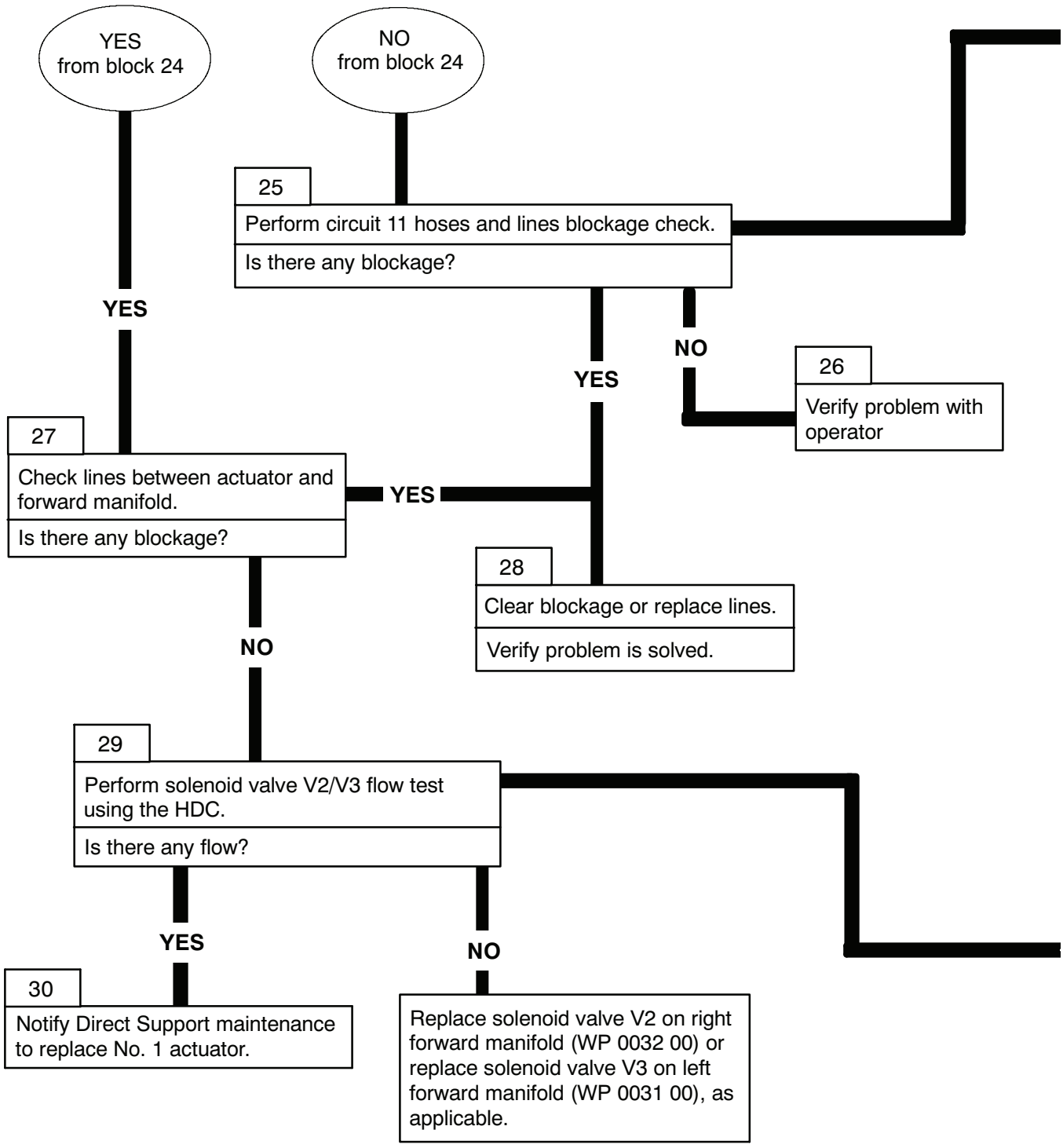
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 16, item 5) on the HDC control box.

NOTE

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

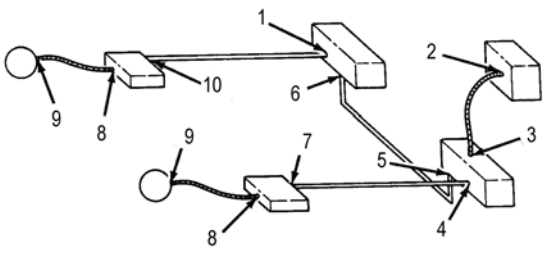
- To test RIGHT No. 1 front actuator that will not rise; Using LINE UP or LINE DOWN button (Figure 16, item 3) on the HDC control box, select V2 on the HDC display (Figure 16, item 2). Using the CHANGE POSITION button (Figure 16, item 4), close V2 on the HDC display (Figure 16, item 2).
- Start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Read transducer T-11 hydraulic pressure on the HDC display (Figure 16, item 1).
- Using LINE UP or LINE DOWN button (Figure 16, item 3) on the HDC control box, select V2 on the HDC display (Figure 16, item 2). Using the CHANGE POSITION button (Figure 16, item 4), open V2 on the HDC display (Figure 16, item 2).
- To test LEFT No. 1 front actuator that will not rise; Using LINE UP or LINE DOWN button (Figure 16, item 3) on the HDC control box, select V3 on the HDC display (Figure 16, item 2). Using the CHANGE POSITION button (Figure 16, item 4), close V3 on the HDC display (Figure 16, item 2).
- Move SPRUNG/UNSPRUNG lever to UNSPRUNG. Read transducer T-10 hydraulic pressure on the HDC display (Figure 16, item 1).
- Using LINE UP or LINE DOWN button (Figure 16, item 3) on the HDC control box, select V3 on the HDC display (Figure 16, item 2). Using the CHANGE POSITION button (Figure 16, item 4), open V3 on the HDC display (Figure 16, item 2).
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



CIRCUIT 11 HOSES AND LINES BLOCKAGE CHECK

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



LINE IDENTIFIERS:

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

Figure 17. Circuit 11 Components, Hoses and Lines

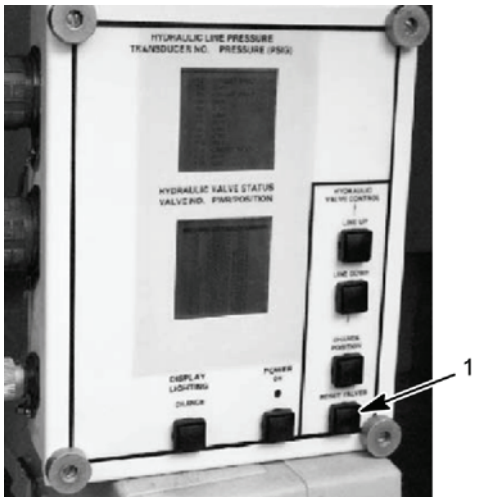


Figure 18. HDC Control Box

SOLENOID VALVE V2/V3 FLOW TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 18, item 1) on the HDC control box.

WARNING

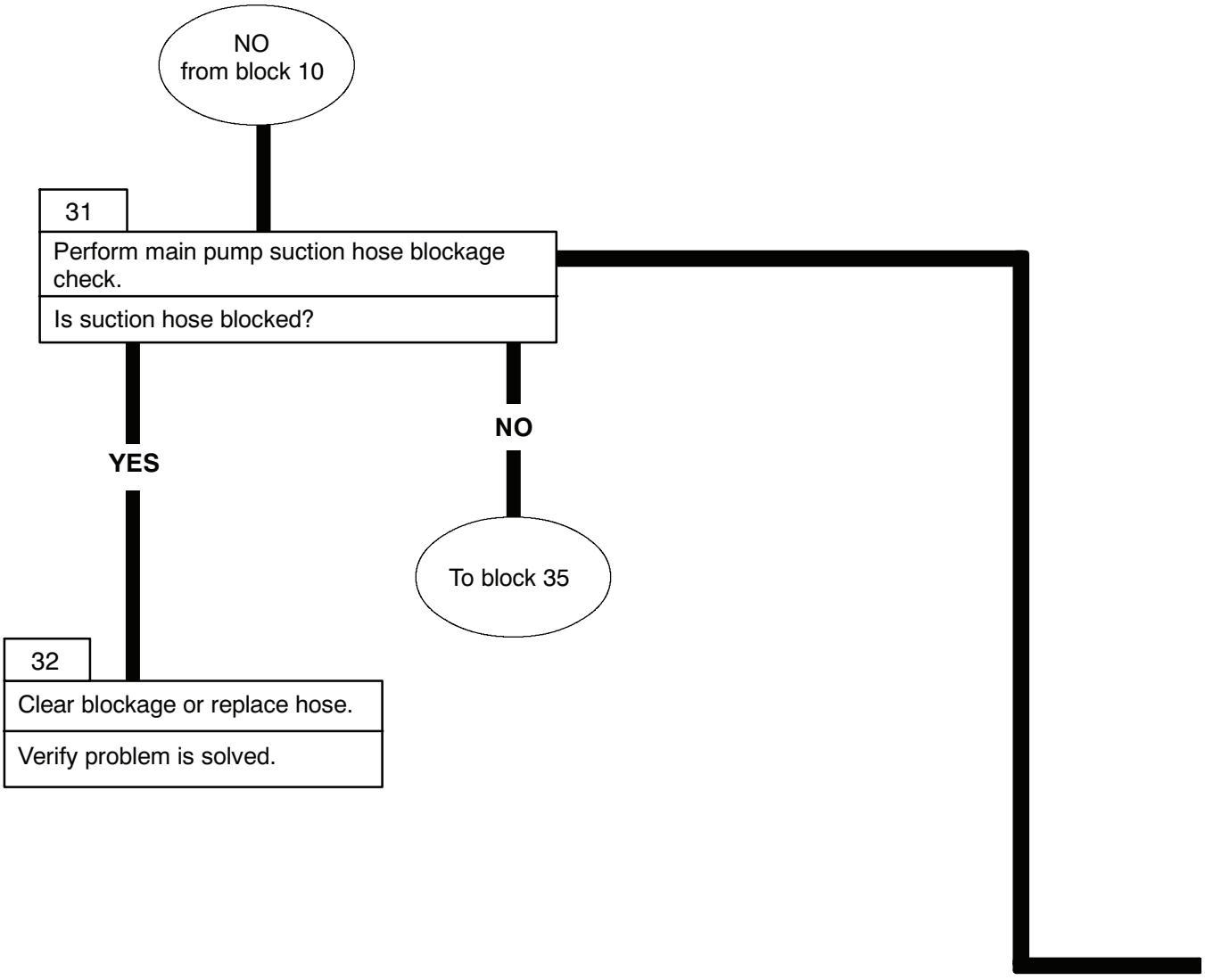
Do not work under vehicle unless hull is blocked and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Disconnect right forward manifold line 11 for solenoid valve V2.
- Disconnect left forward manifold line 11 for solenoid valve V3.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG.
- Observe flow.
- Stop engine; relieve hydraulic pressure.
- Reconnect right forward manifold line 11 for solenoid valve V2.
- Reconnect left forward manifold line 11 for solenoid valve V3.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



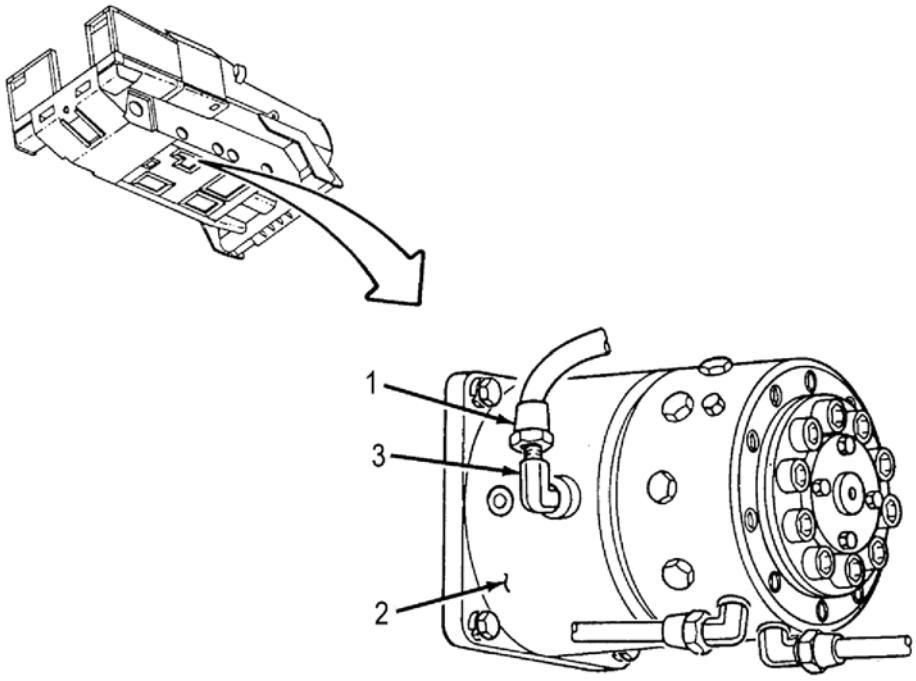


Figure 19. Main Pump Suction Hose Blockage Test

MAIN PUMP SUCTION HOSE BLOCKAGE CHECK

WARNING

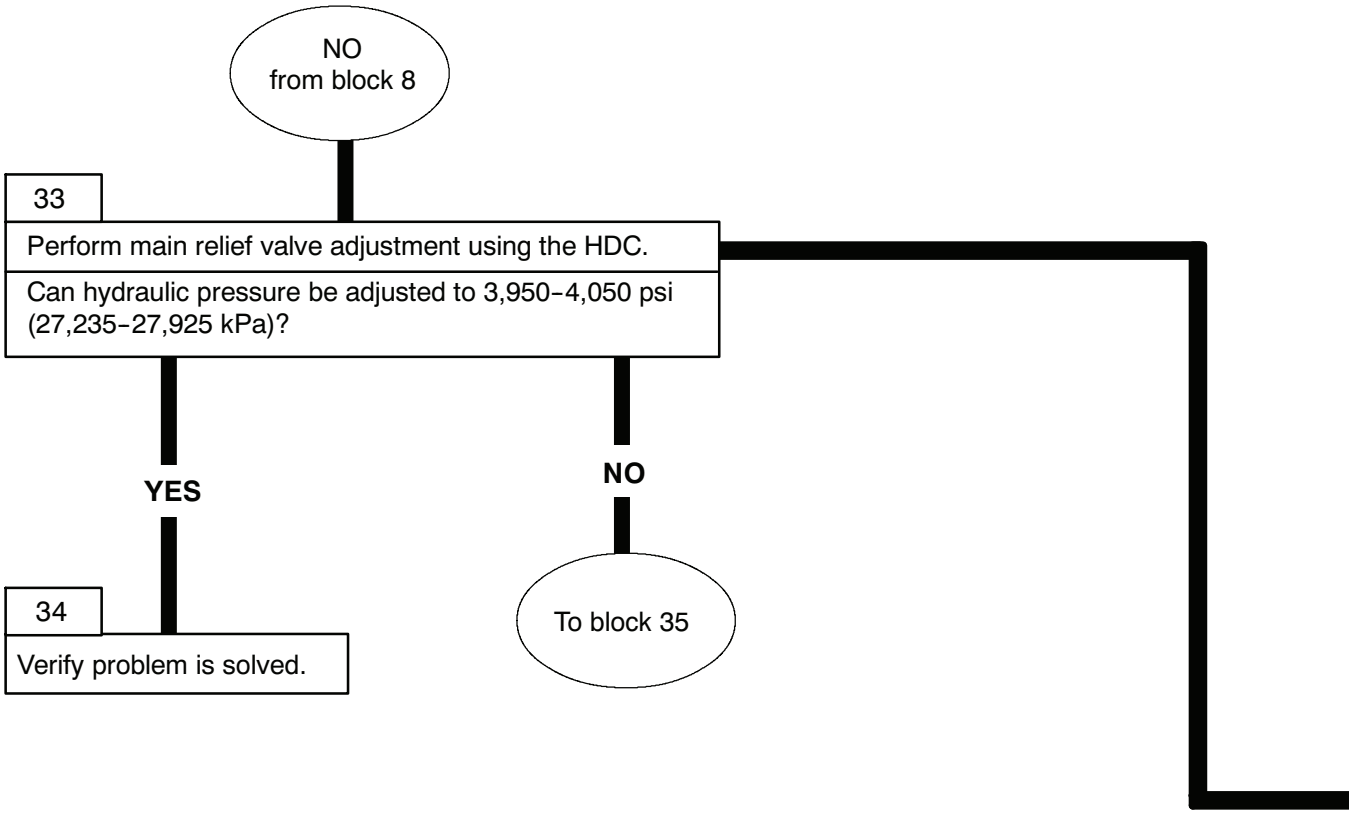
Do not work under vehicle unless hull has been properly blocked or allowed to settle on bump stops. Failure to comply may result in severe injury or death to personnel.

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure.
- Loosen, but do not disconnect, PUMP SUCT TUB-7 (Figure 19, item 1) from elbow (Figure 19, item 3) on main hydraulic pump (Figure 19, item 2). Hydraulic oil should flow freely from the loosened fitting. Reconnect line.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



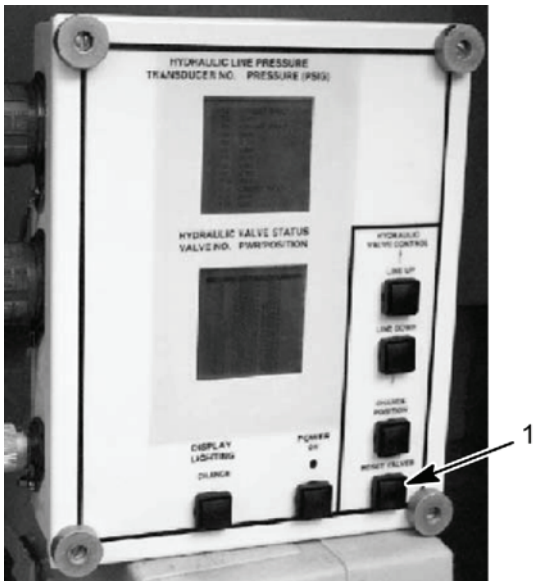


Figure 20. HDC Control Box

MAIN RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 20, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Continued on page 0013 00-39.

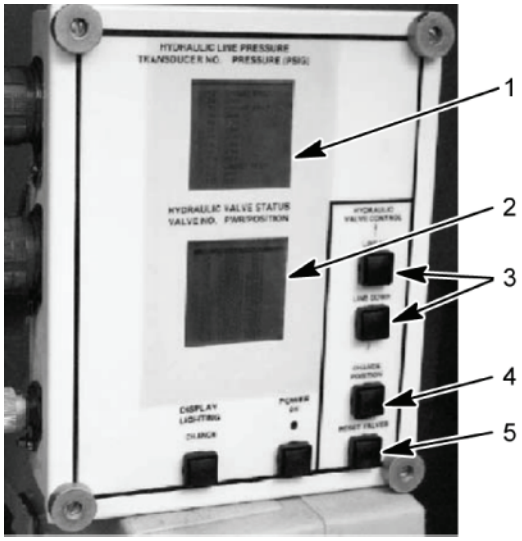


Figure 21. HDC Control Box

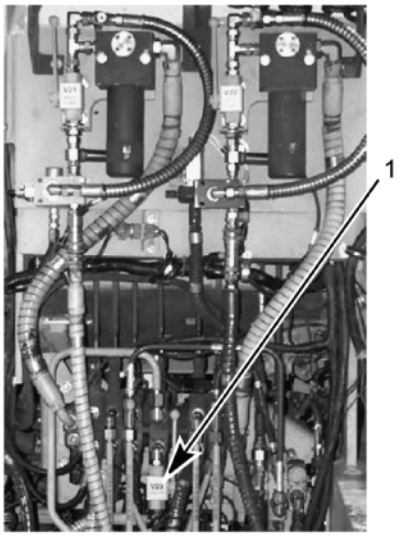


Figure 22. DCV Bank

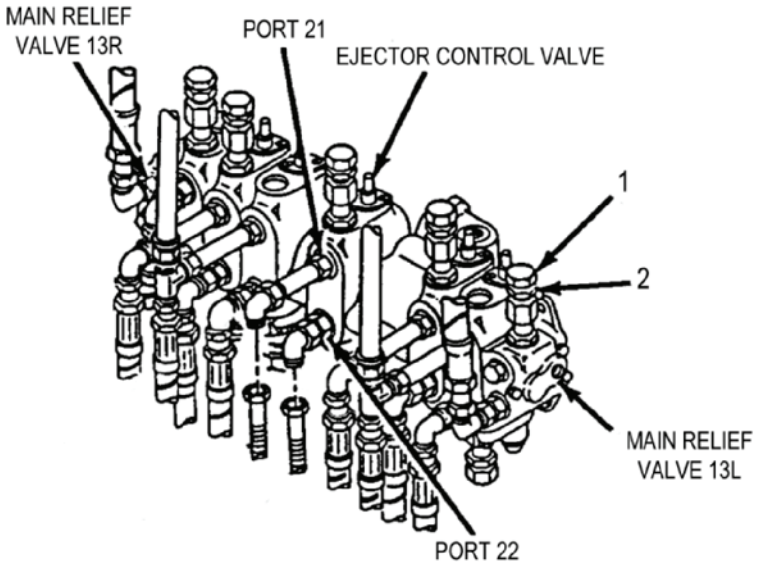


Figure 23. Main Relief Valve

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 22, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 21, item 3), select V1 on the HDC display (Figure 21, item 2). Close V1 on the HDC display (Figure 21, item 2) by selecting the CHANGE POSITION button (Figure 21, item 4) on the HDC control box.
- With 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. Observe transducer T-4 hydraulic pressure on the HDC display (Figure 21, item 1). If pressure is not within limits adjust the main relief valve 13L by loosening jam nut (Figure 23, item 2) and rotating adjustment screw (Figure 23, item 1) clockwise to increase pressure; counter clockwise to decrease pressure. When hydraulic pressure is within limits, tighten jam nut (Figure 23, item 2).
- Continued on page 0013 00-41.

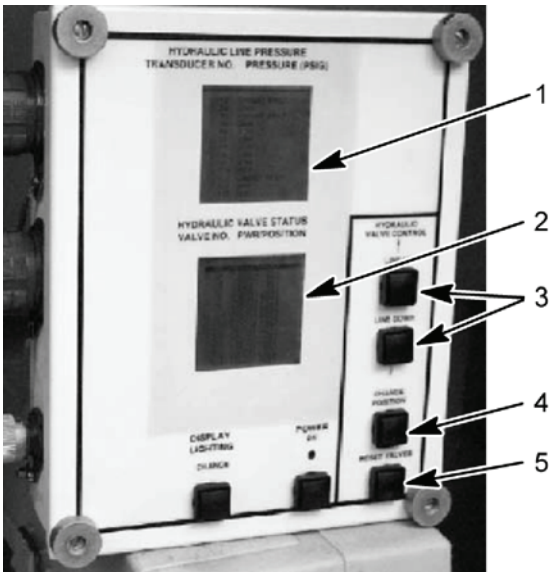


Figure 24. HDC Control Box

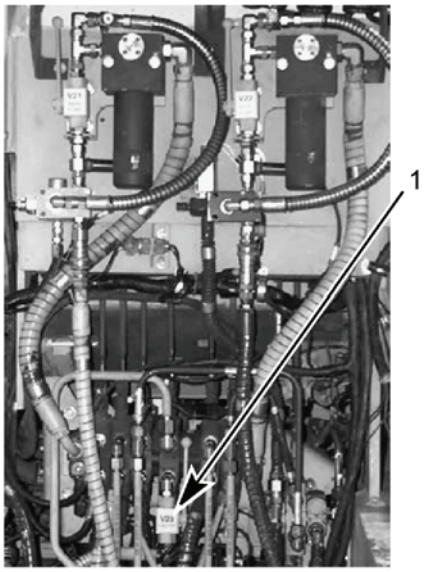
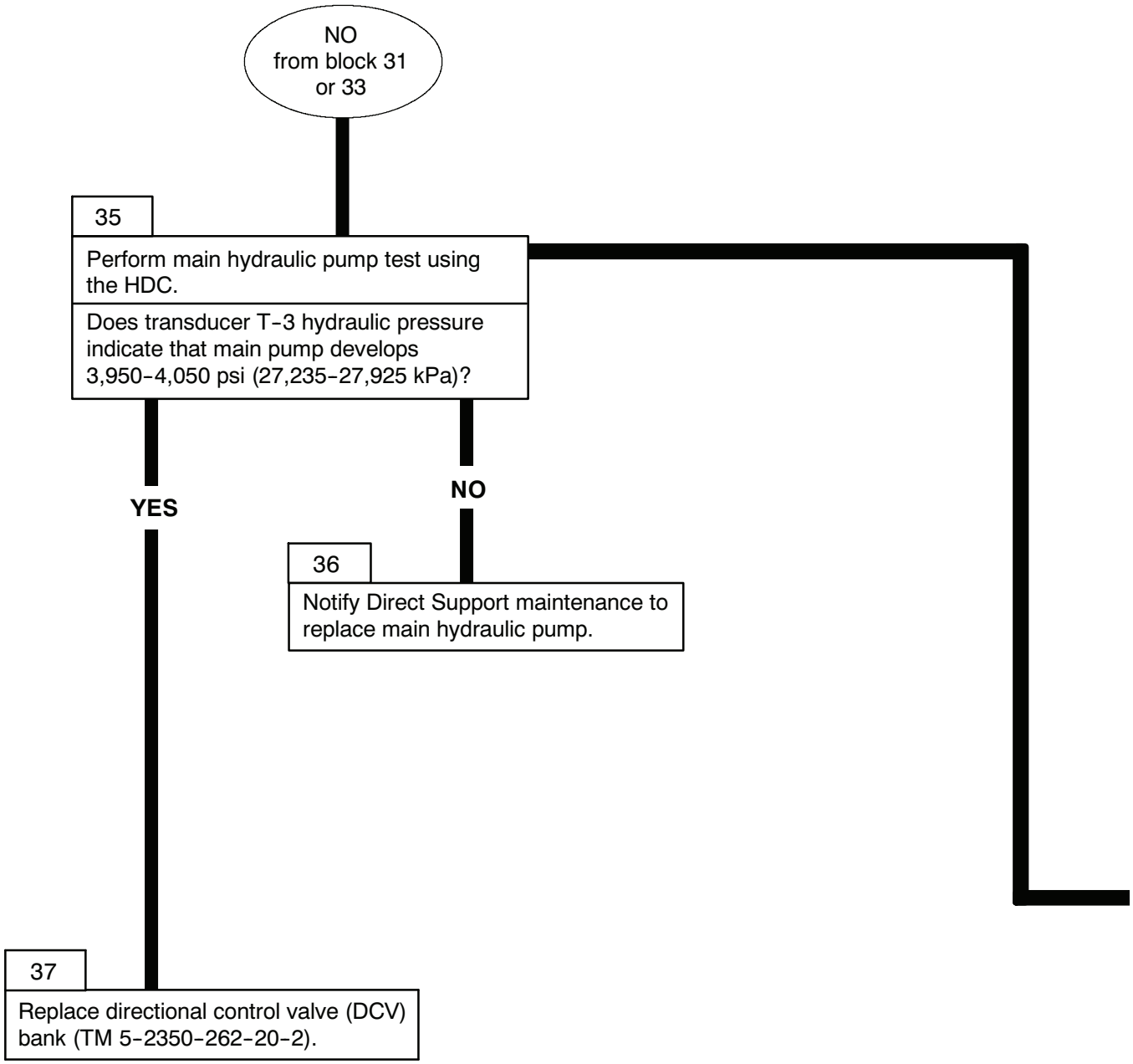


Figure 25. DCV Bank

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- Stop engine; relieve hydraulic pressure.
- Repeat the previous steps for main relief valve 13R using the right-hand SUSPENSION CONTROL lever and observe transducer T-3 hydraulic pressure on the HDC display (Figure 24, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening ejector inhibit ball valve V23 (Figure 25, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 24, item 3), select V1 on HDC display (Figure 24, item 2). Open V1 on the HDC display (Figure 24, item 2) by selecting the CHANGE POSITION button (Figure 24, item 4) on the HDC control box.

FRONT CORNER (LEFT OR RIGHT) RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0013 00**



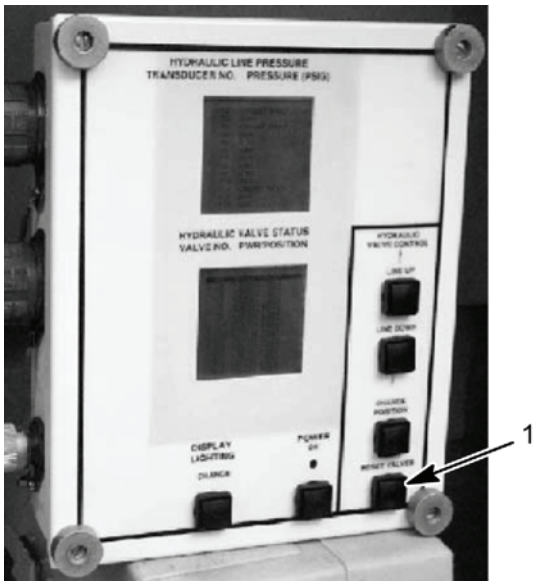


Figure 26. HDC Control Box

MAIN HYDRAULIC PUMP TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 26, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0013 00-45.

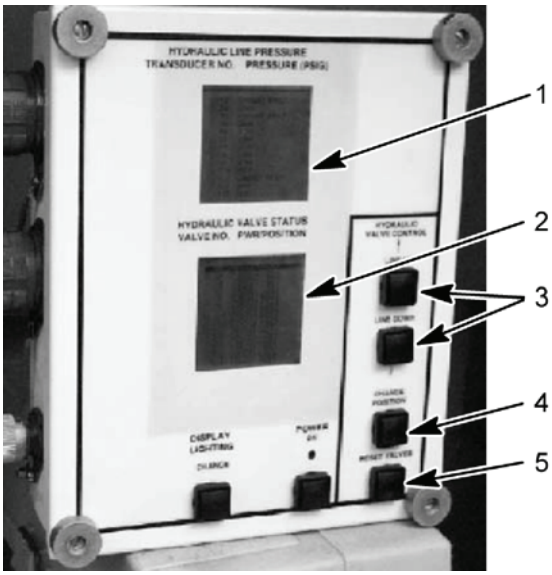


Figure 27. HDC Control Box

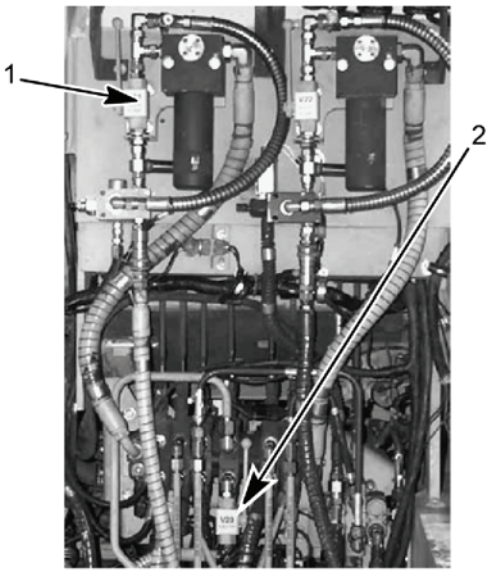


Figure 28. DCV Bank

MAIN HYDRAULIC PUMP TEST - CONTINUED

- Stop engine; relieve hydraulic pressure.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 28, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 27, item 3), select V1 on the HDC display (Figure 27, item 2). Close V1 on the HDC display (Figure 27, item 2) by selecting the CHANGE POSITION button (Figure 27, item 4) on the HDC control box.
- Ensure right main hydraulic pressure inhibit valve V21 (Figure 28, item 1) is fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 28, item 1), until transducer T-3 hydraulic pressure on the HDC display (Figure 27, item 1) reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Fully open right main hydraulic pressure inhibit valve V21 (Figure 28, item 1).
- Stop engine; relieve hydraulic pressure.
- Open ejector inhibit ball valve V23 (Figure 28, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 27, item 3), select V1 on the HDC display (Figure 27, item 2). Open V1 on the HDC display (Figure 27, item 2) by selecting the CHANGE POSITION button (Figure 27, item 4) on the HDC control box.

END OF WORK PACKAGE

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

0014 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

NOTE

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

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**

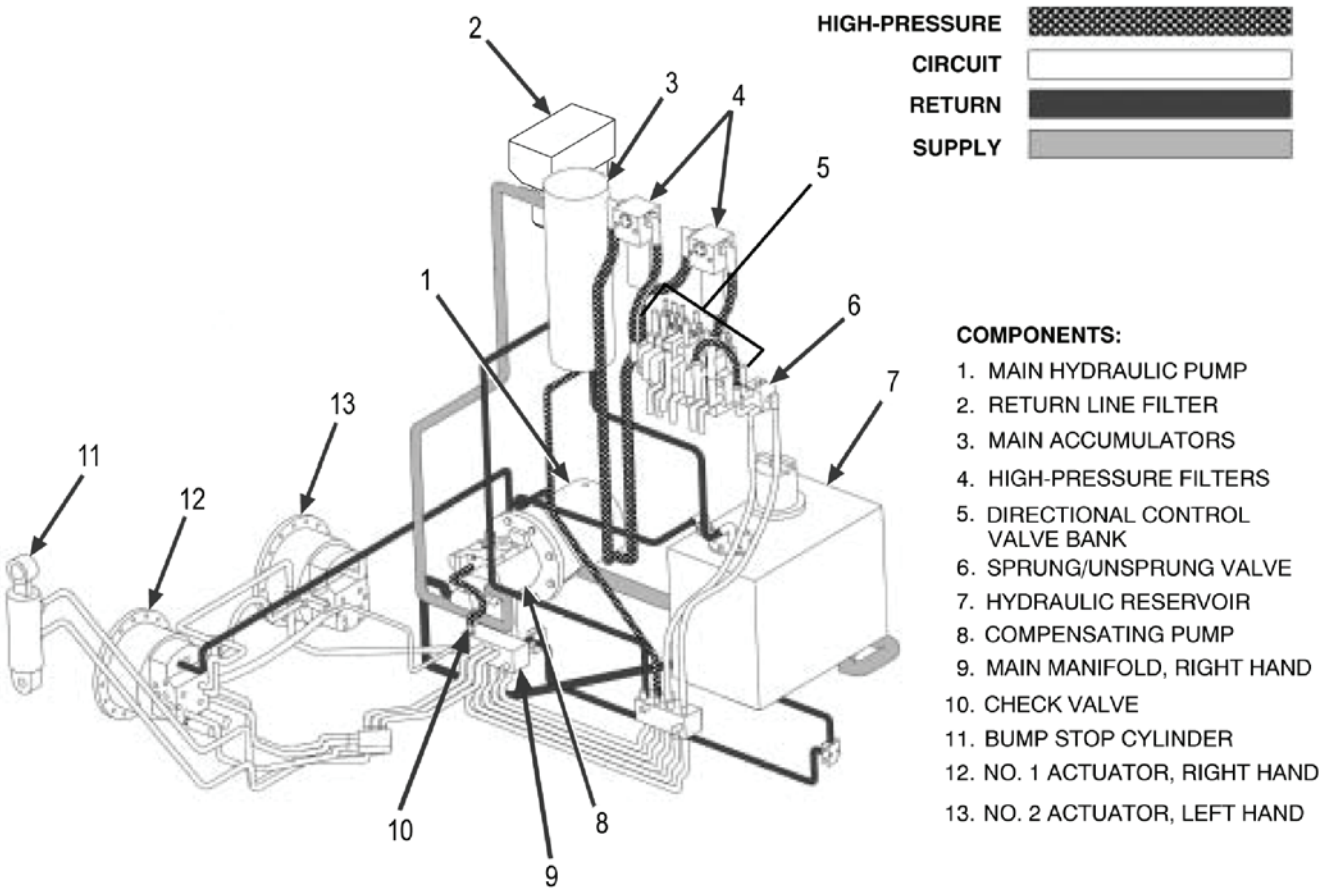


Figure 1. Front Suspension Raise/Lower Circuit

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**

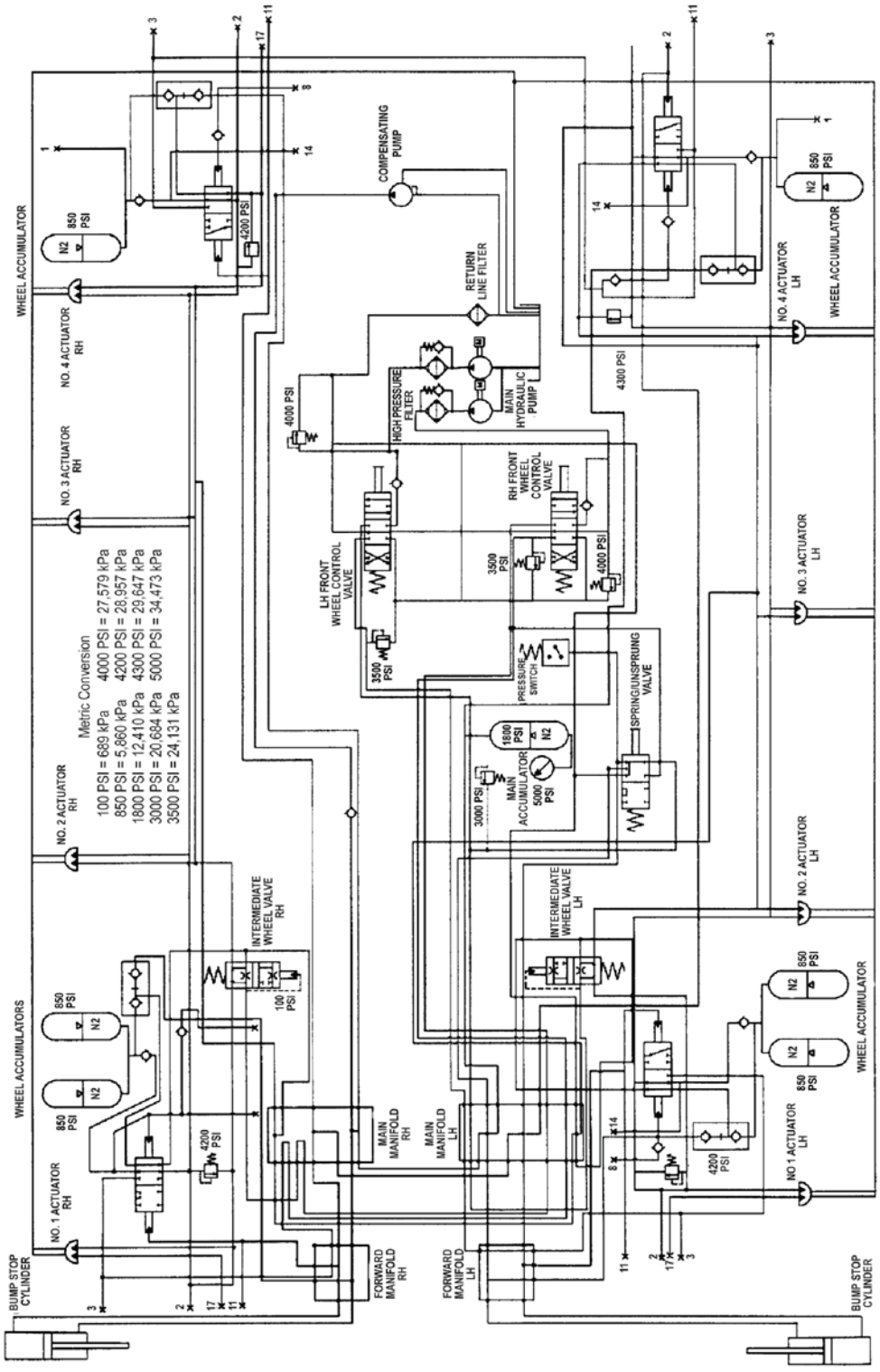
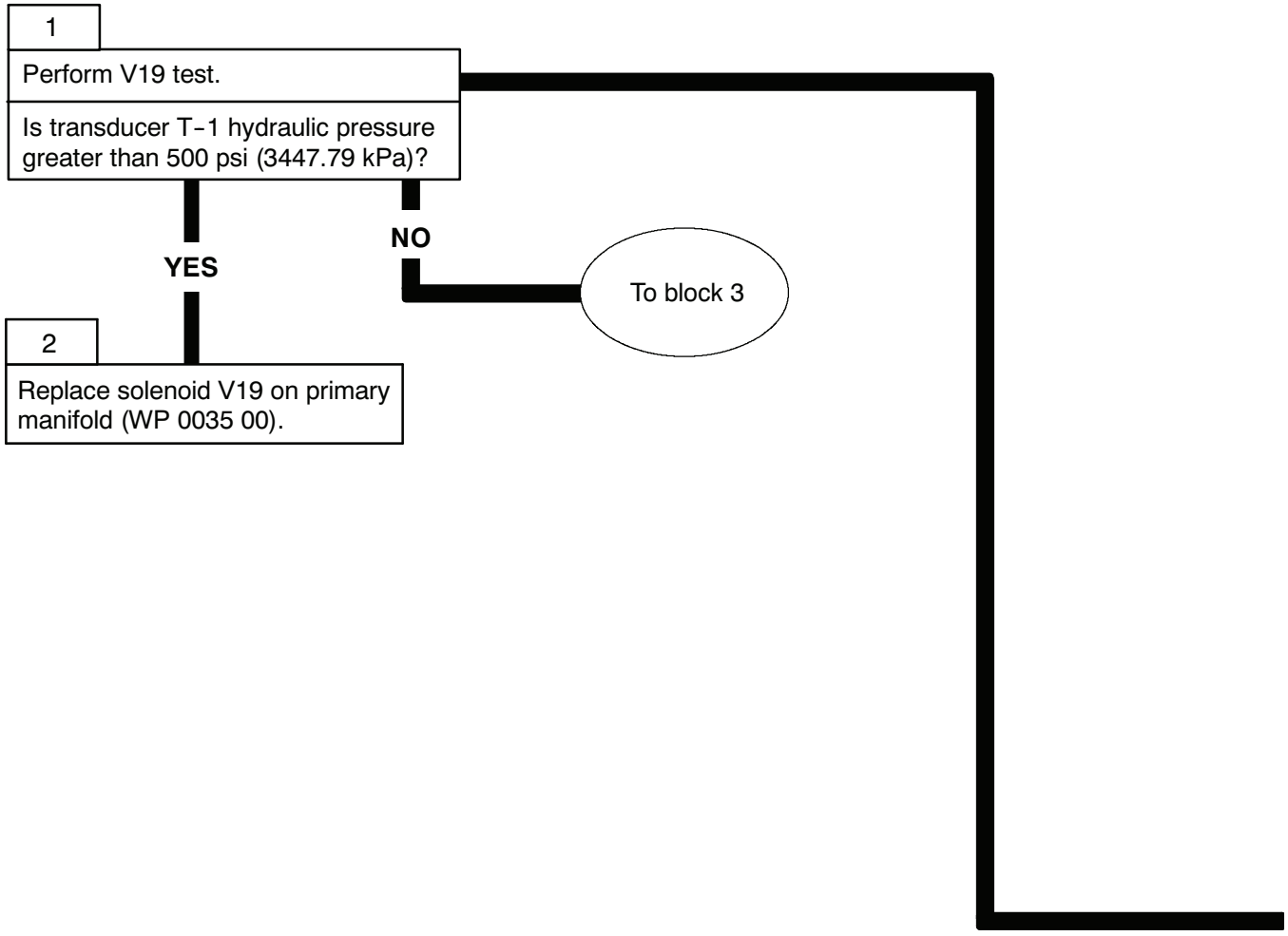


Figure 2. Front Suspension Raise/Lower Schematic

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**

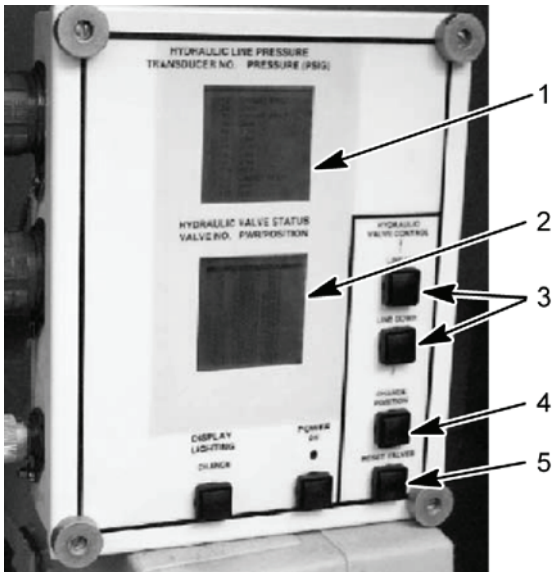
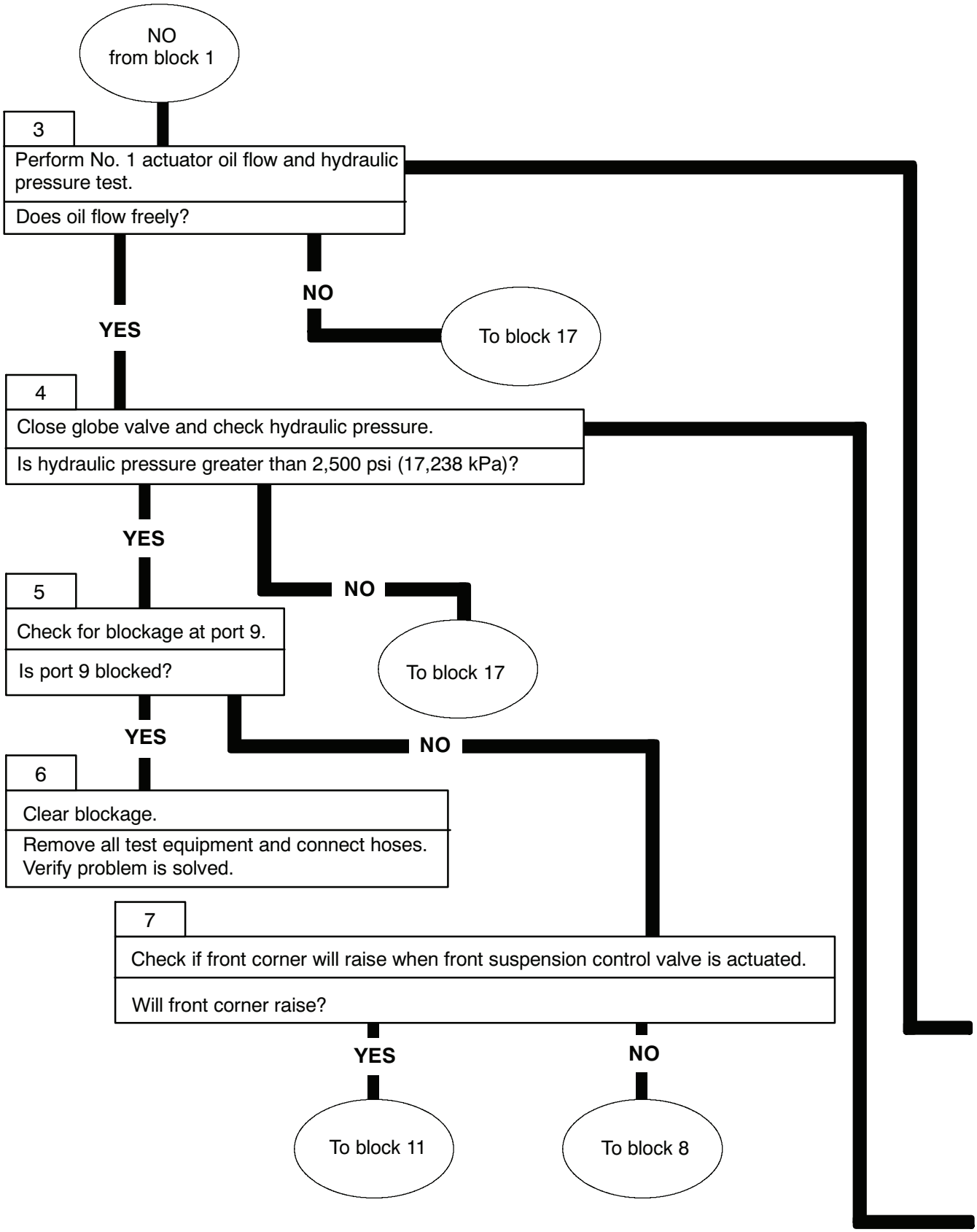


Figure 3. HDC Control Box

SOLENOID VALVE V19 TEST

- Start engine.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 3, item 3) on the HDC control box. Select V5 on the HDC display (Figure 3, item 2), and using the CHANGE POSITION button (Figure 3, item 4), close V5 on the HDC display (Figure 3, item 2).
- Move SPRUNG/UNSPRUNG lever to UNSPRUNG. Read transducer T-1 hydraulic pressure on the HDC display (Figure 3, item 1).
- Using LINE UP or LINE DOWN button (Figure 3, item 3) on the HDC control box, select V5 on the HDC display (Figure 3, item 2). Using the CHANGE POSITION button (Figure 3, item 4), open V5 on the HDC display (Figure 3, item 3).
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



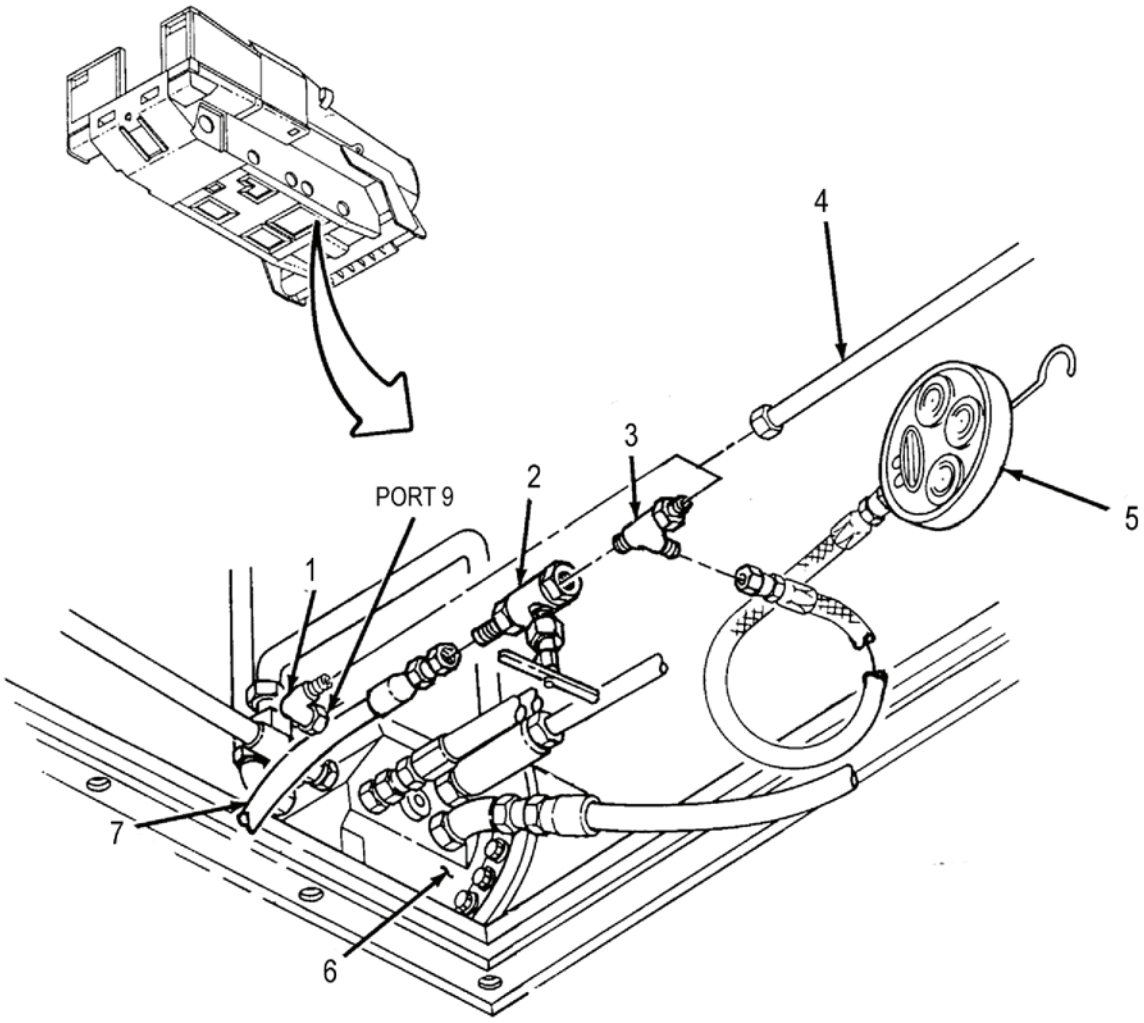


Figure 4. No. 1 Right Actuator

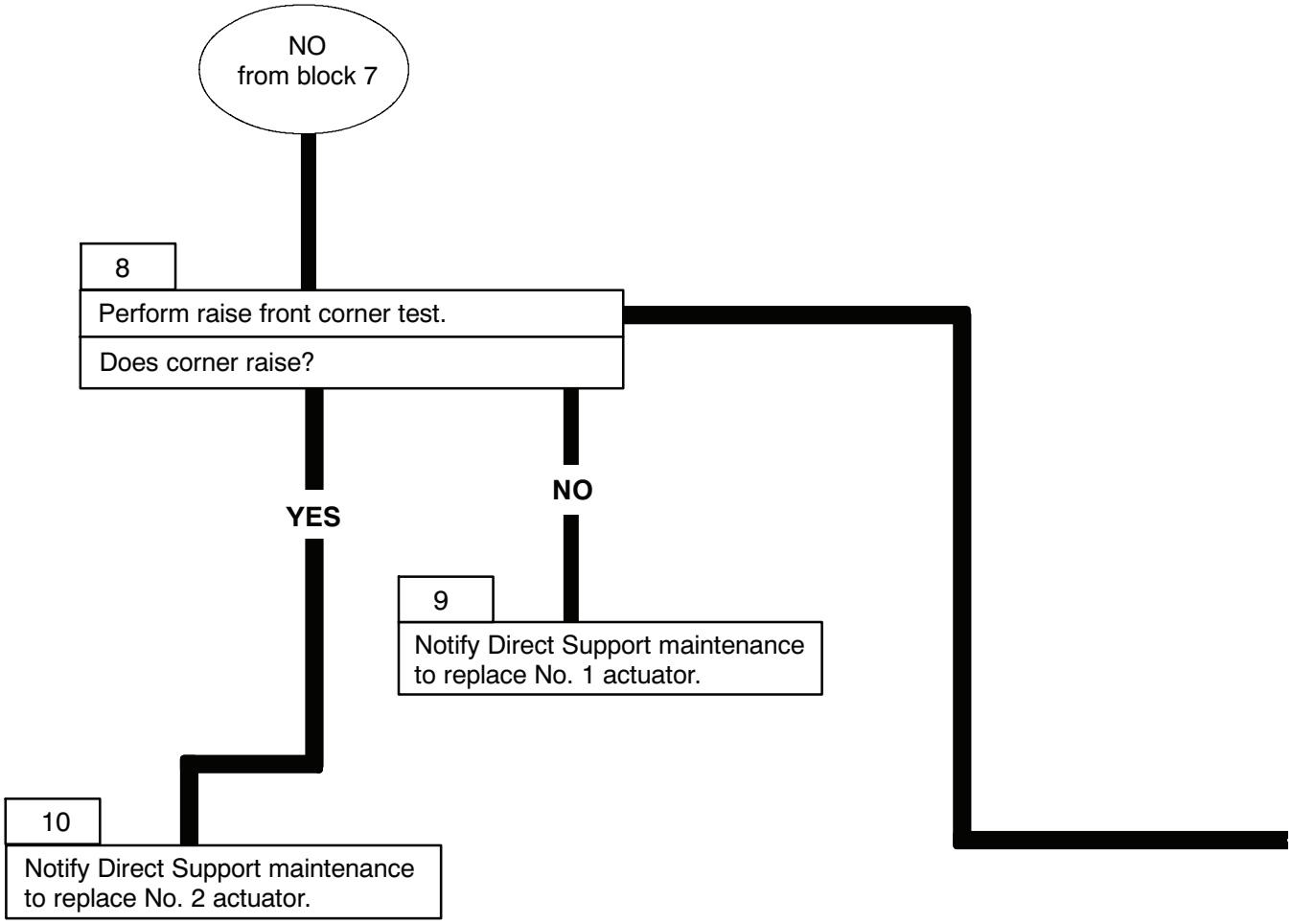
NO. 1 ACTUATOR OIL FLOW AND HYDRAULIC PRESSURE TEST

NOTE

Have suitable container ready to catch oil.

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

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**

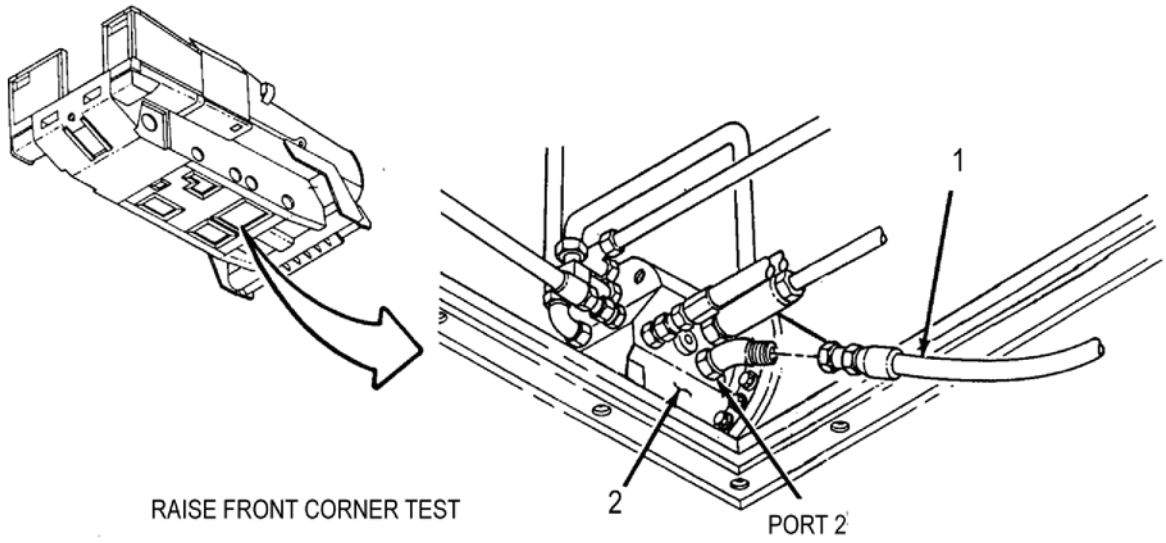


Figure 5. No. 1 Right Actuator

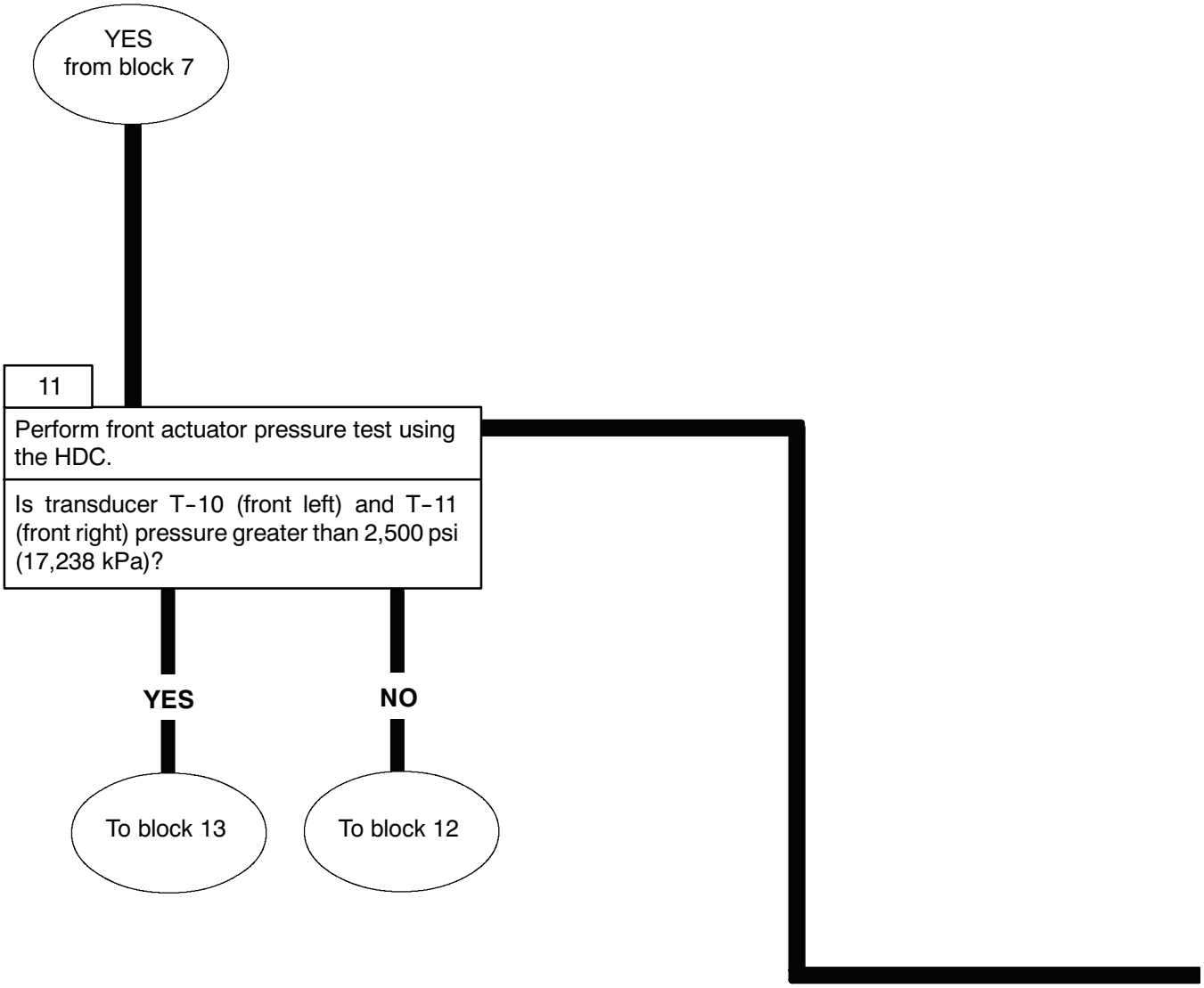
RAISE FRONT CORNER TEST

NOTE

Have suitable container ready to catch oil.

- Disconnect SPNSN UNIT-2 hose (Figure 5, item 1) from port 2 on No. 1 actuator (Figure 5, item 2). Cap and plug port 2 and SPNSN UNIT-2 hose (Figure 5, item 1).
- Start engine. Move SPRUNG/UNSPRUNG lever to SPRUNG mode.
- Stop engine; relieve hydraulic pressure and connect hoses.

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



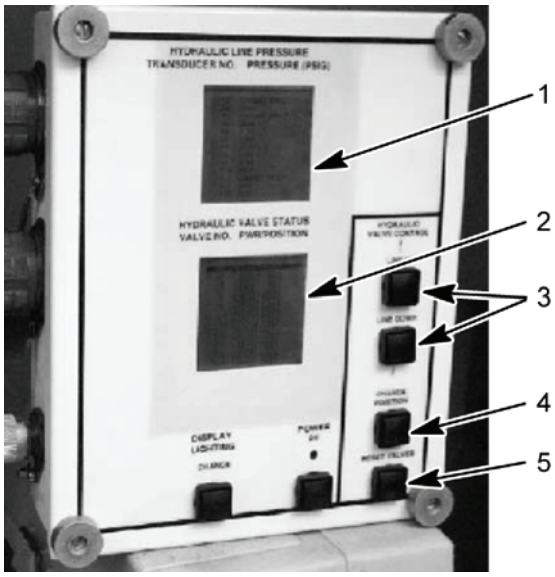
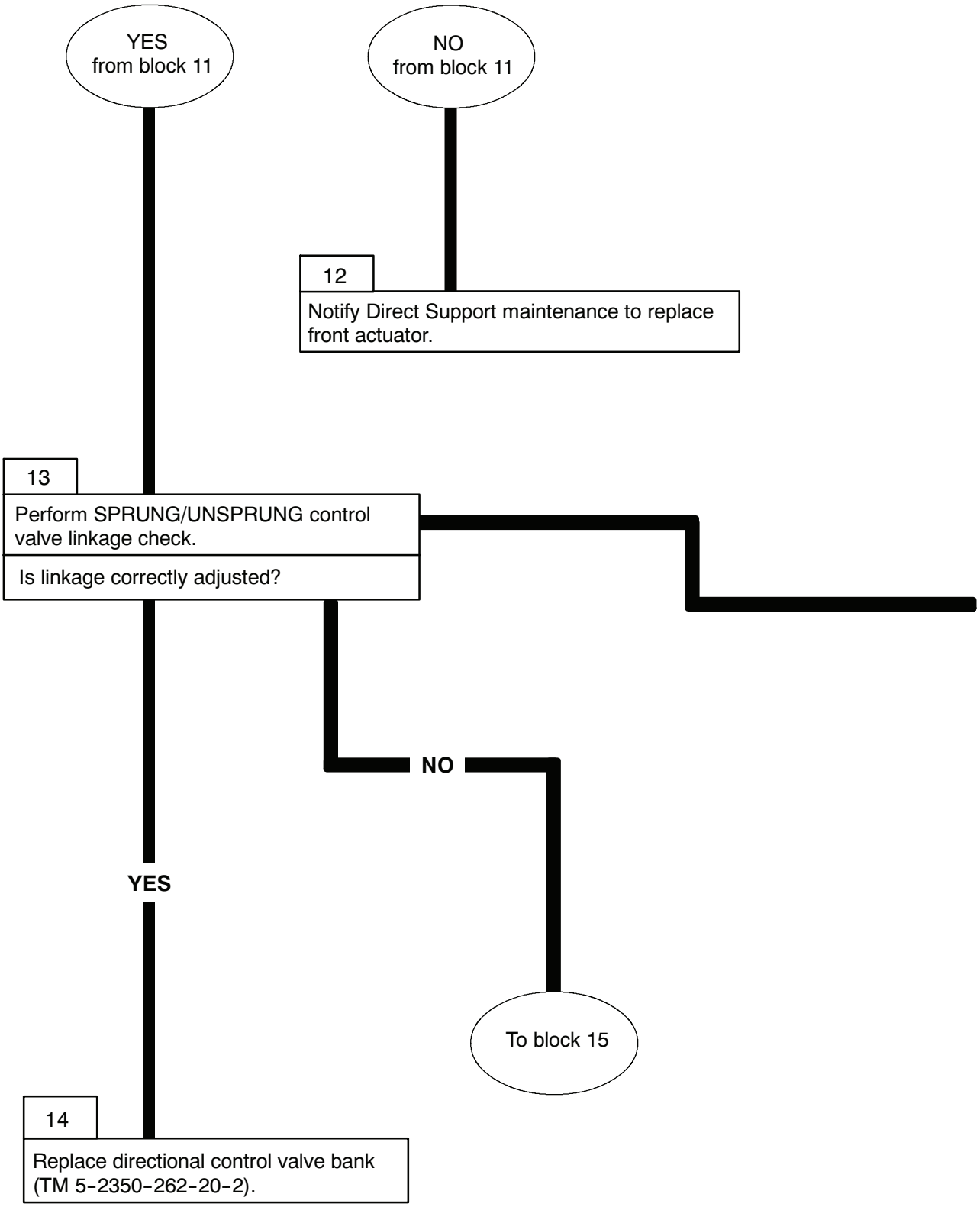


Figure 6. HDC Control Box

FRONT ACTUATOR PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.
- For front left: Using LINE UP or LINE DOWN button (Figure 6, item 3), select V3 on the HDC display (Figure 6, item 2). Close V3 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Have assistant start engine and move the SPRUNG/UNSPRUNG lever to the UNSPRUNG mode. Read transducer T-10 hydraulic pressure on the HDC display (Figure 6, item 1).
- Using LINE UP or LINE DOWN button (Figure 6, item 3), select V3 on the HDC display (Figure 6, item 2). Open V3 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- For front right: Using LINE UP or LINE DOWN button (Figure 6, item 3), select V2 on the HDC display (Figure 6, item 2). Close V2 on the HDC display (Figure 6, item 2), by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Have assistant keep SPRUNG/UNSPRUNG lever in the UNSPRUNG mode. Read transducer T-11 hydraulic pressure on the HDC display (Figure 6, item 1).
- Using LINE UP or LINE DOWN button (Figure 6, item 3), select V2 on the HDC display (Figure 6, item 2). Open V2 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



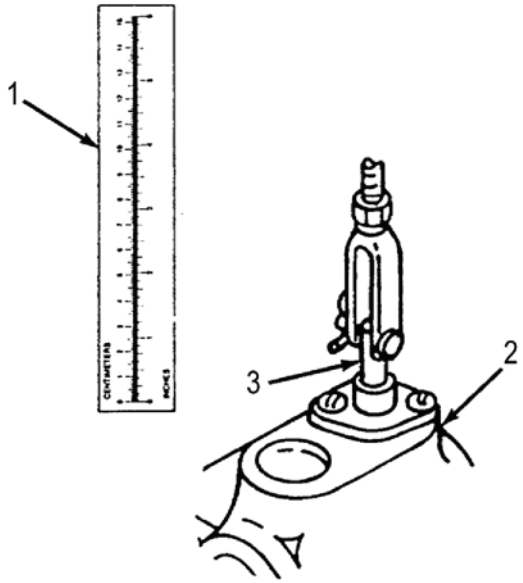
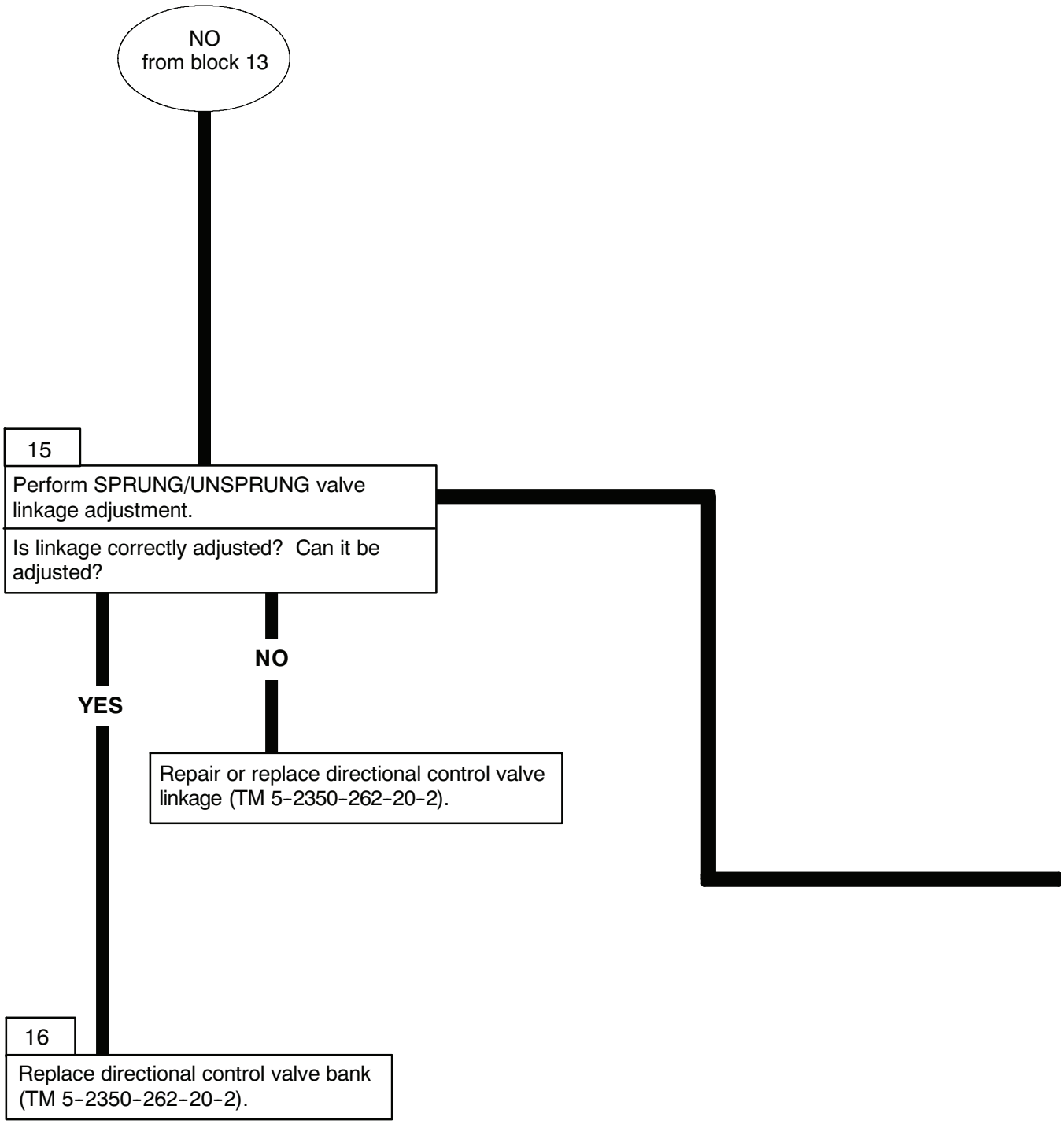


Figure 7. SPRUNG/UNSPRUNG Control Valve Linkage

SPRUNG/UNSPRUNG CONTROL VALVE LINKAGE CHECK

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

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



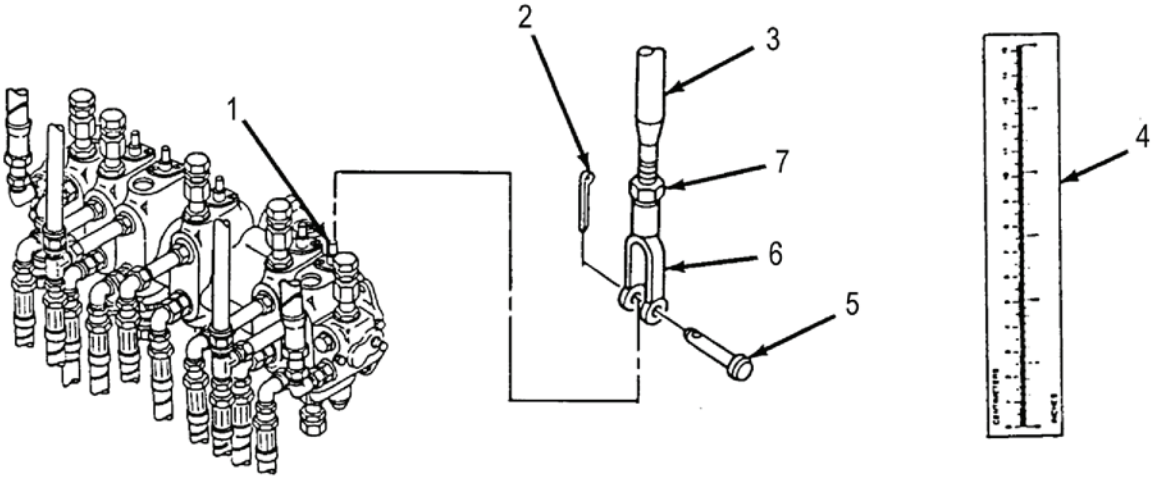


Figure 8. SPRUNG/UNSPRUNG Valve Linkage

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

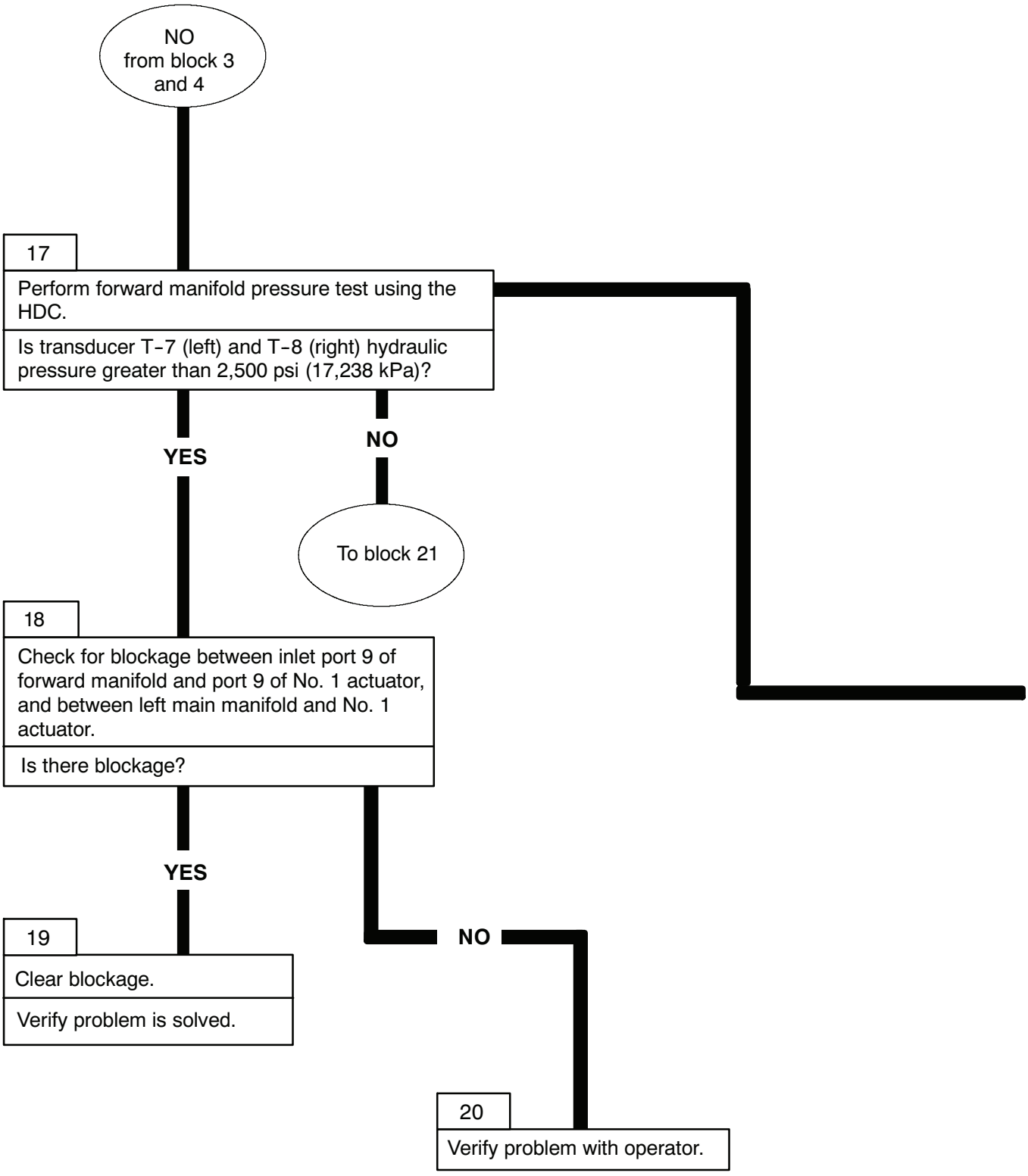
- Note position of control valve plunger (Figure 8, item 1) when SPRUNG/UNSPRUNG control lever is in neutral (off) position.

NOTE

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

- Remove cotter pin (Figure 8, item 2), straight pin (Figure 8, item 5), and clevis (Figure 8, item 6) from control valve plunger (Figure 8, item 1). Discard cotter pin (Figure 8, item 2).
- Loosen jam nut (Figure 8, item 7). Turn clevis (Figure 8, item 6) clockwise to shorten rod (Figure 8, item 3), counterclockwise to lengthen rod (Figure 8, item 3).
- Hold measuring device (Figure 8, item 4) on face of SPRUNG/UNSPRUNG control valve. Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance of plunger travel.
- Adjust clevis (Figure 8, item 6) so plunger (Figure 8, item 1) travel distance is correct (9/32 in. (7 mm)).
- When proper adjustment has been made, coat threads of rod (Figure 8, item 3) with sealing compound primer and sealing compound. Tighten jam nut (Figure 8, item 7) against clevis (Figure 8, item 6).
- Connect clevis (Figure 8, item 6) to control valve plunger (Figure 8, item 1) with straight pin (Figure 8, item 5) and new cotter pin (Figure 8, item 2).

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**

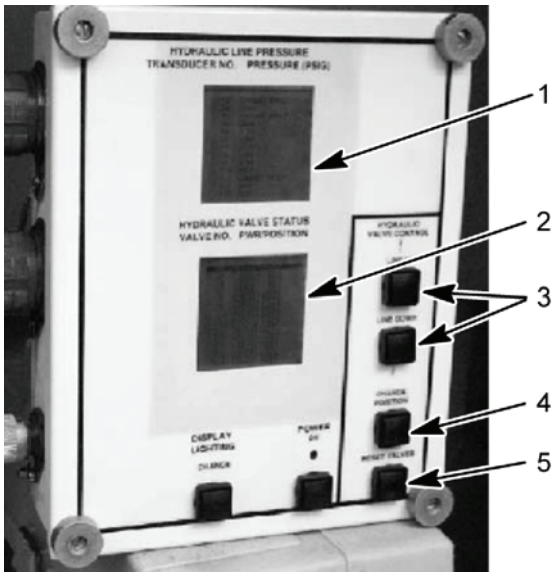


Figure 9. HDC Control Box

FORWARD MANIFOLD PRESSURE TEST

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- For front left (left forward manifold): Using LINE UP or LINE DOWN button (Figure 9, item 3), select V9 on the HDC display (Figure 9, item 2). Close V9 on the HDC display (Figure 9, item 2), by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Have assistant start engine and move the SPRUNG/UNSPRUNG control valve lever to SPRUNG mode. Read transducer T-7 hydraulic pressure on the HDC display (Figure 9, item 1).
- Continued on page 0014 00-19.

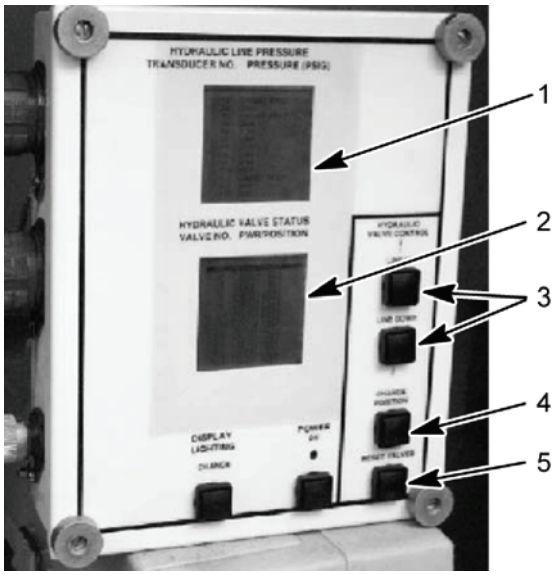
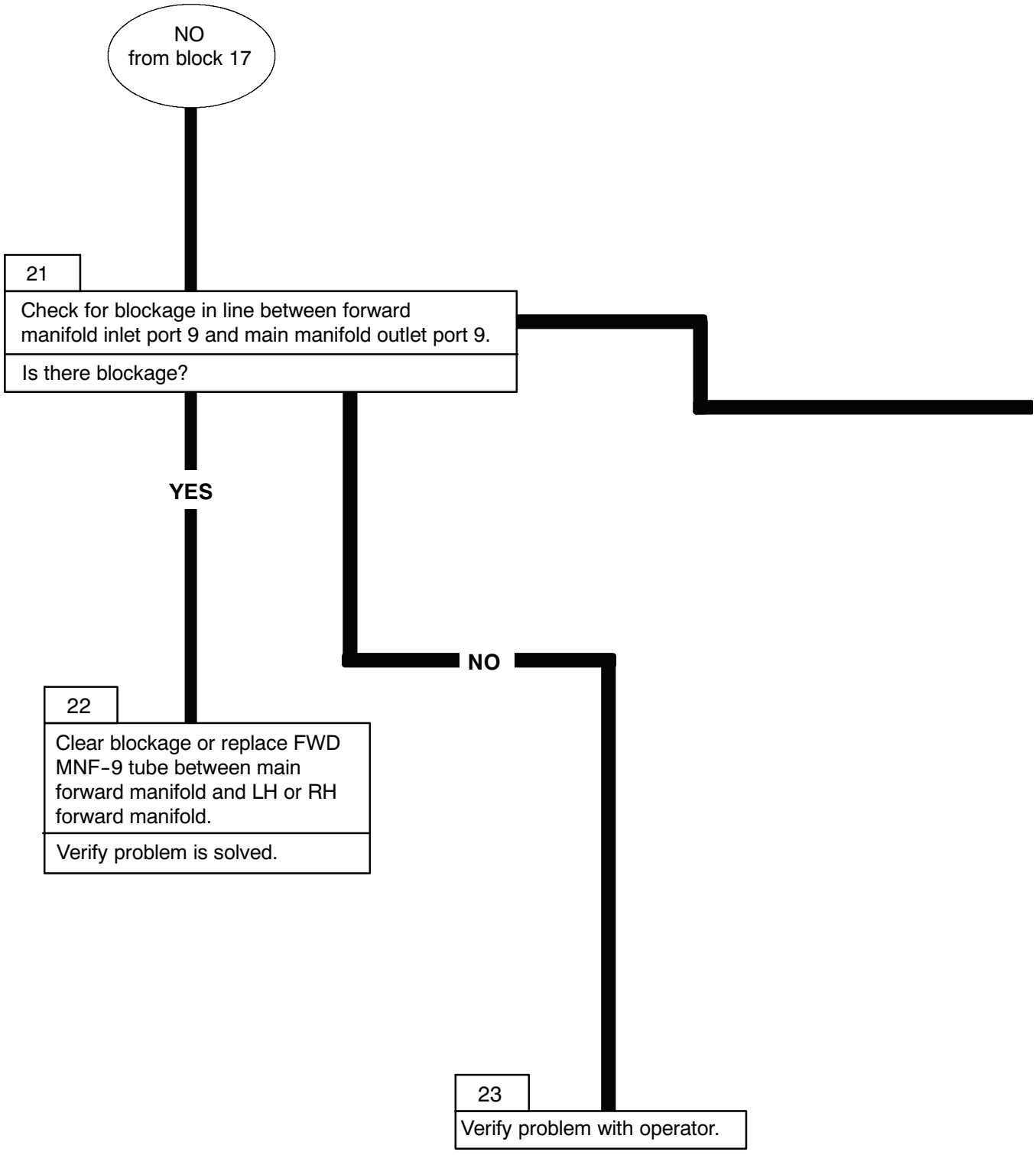


Figure 10. HDC Control Box

FORWARD MANIFOLD PRESSURE TEST - CONTINUED

- For front right (right forward manifold): Using LINE UP or LINE DOWN button (Figure 10, item 3), select V10 on the HDC display (Figure 10, item 2). Close V10 on the HDC display (Figure 10, item 2), by selecting the CHANGE POSITION button (Figure 10, item 4) on the HDC control box.
- With the SPRUNG/UNSPRUNG control valve lever still in the SPRUNG mode, read transducer T-8 hydraulic pressure on the HDC display (Figure 10, item 1).
- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 10, item 5) on the HDC control box.

FRONT CORNER (LEFT OR RIGHT) RAISES IN UNSPRUNG, BUT NOT SPRUNG MODE - Continued **0014 00**



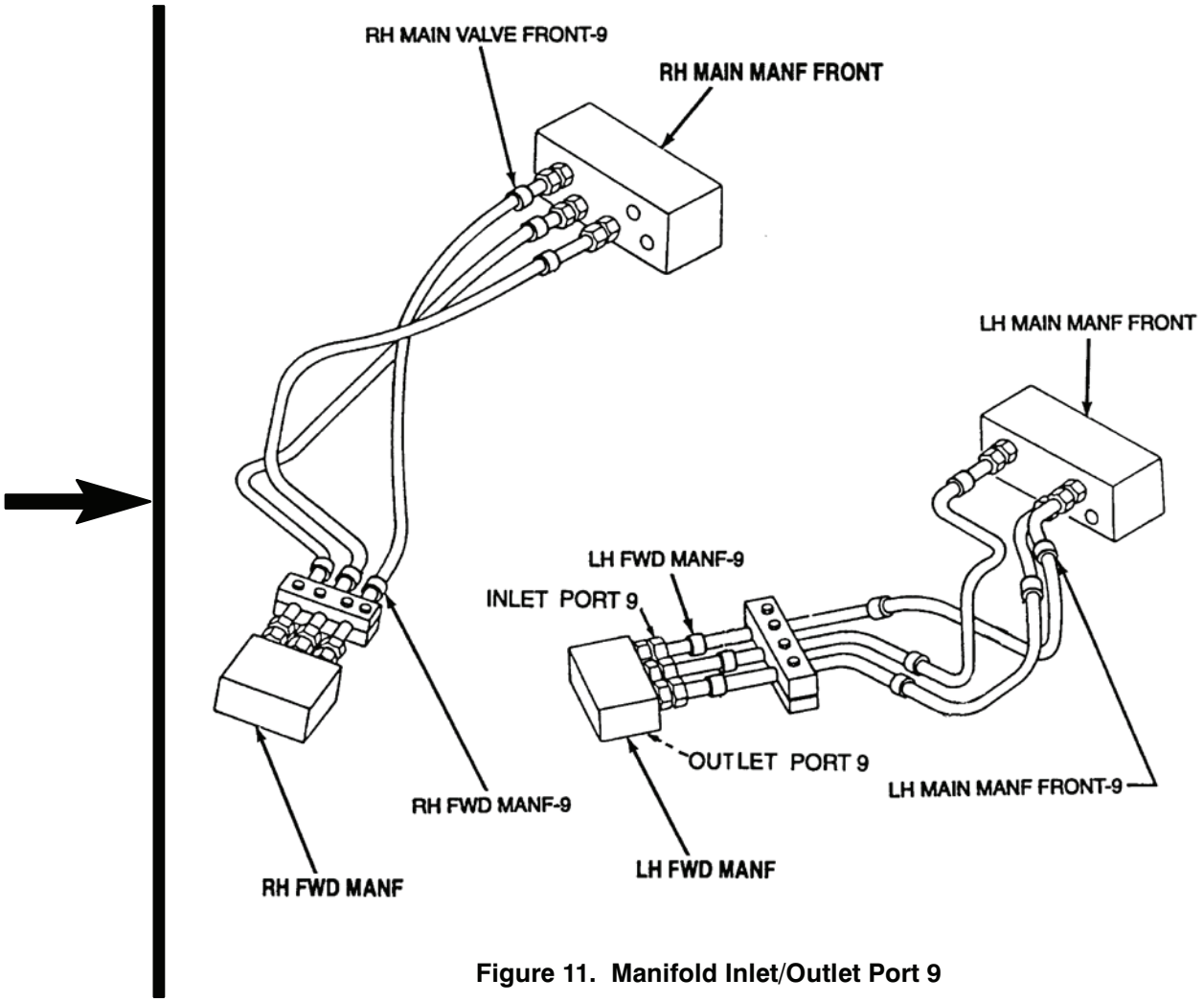


Figure 11. Manifold Inlet/Outlet Port 9

END OF WORK PACKAGE

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

0015 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

NOTE

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

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**

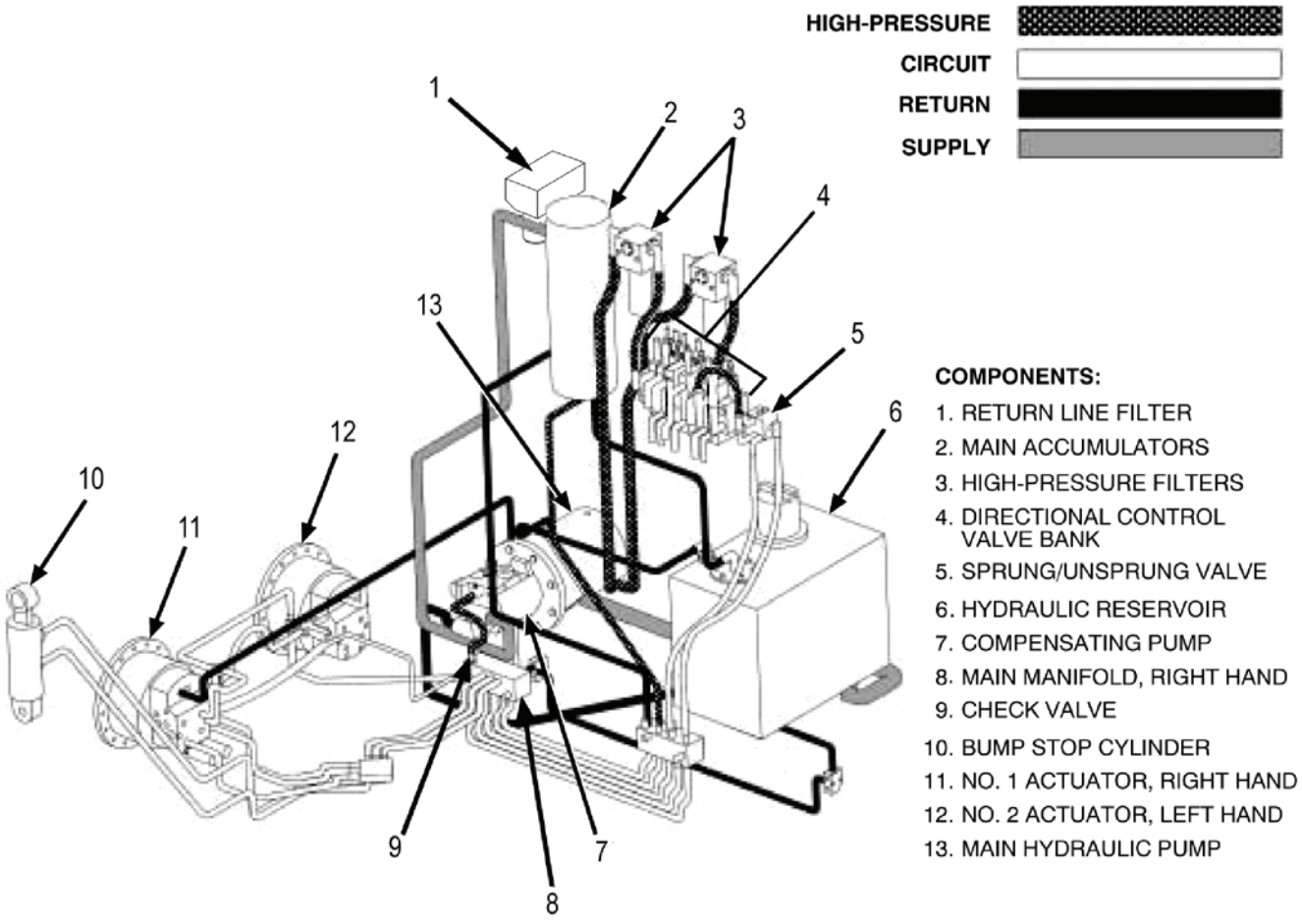


Figure 1. Front Suspension Raise/Lower Circuit

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**

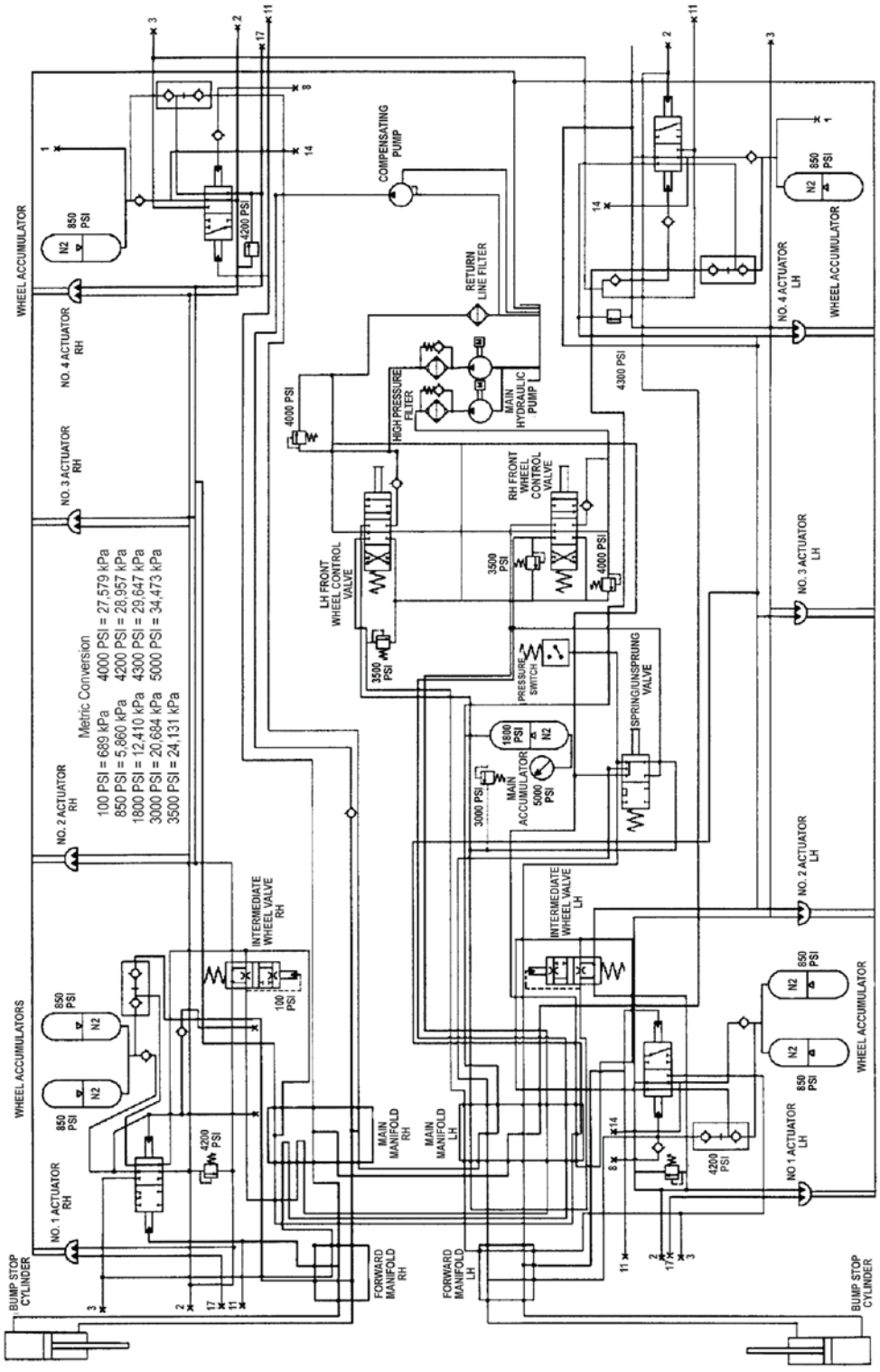
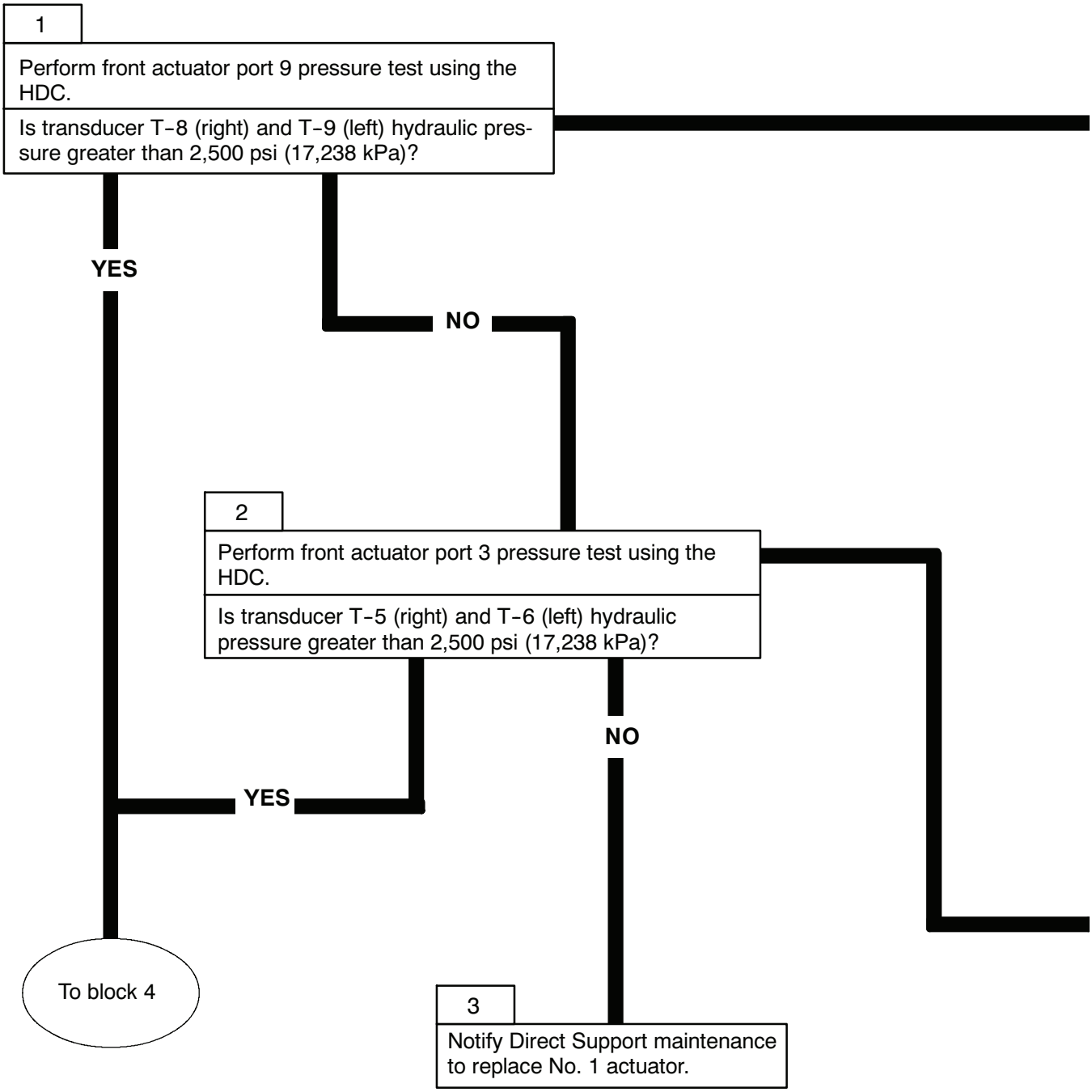


Figure 2. Front Suspension Raise/Lower Schematic

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**



FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**

FRONT ACTUATOR PORT 9 PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 2) on the HDC control box.
- Have assistant start engine and move the SPRUNG/UNSPRUNG lever to the SPRUNG mode. Read transducer T-8 (right) and T-9 (left) hydraulic pressure on the HDC display (Figure 3, item 1).

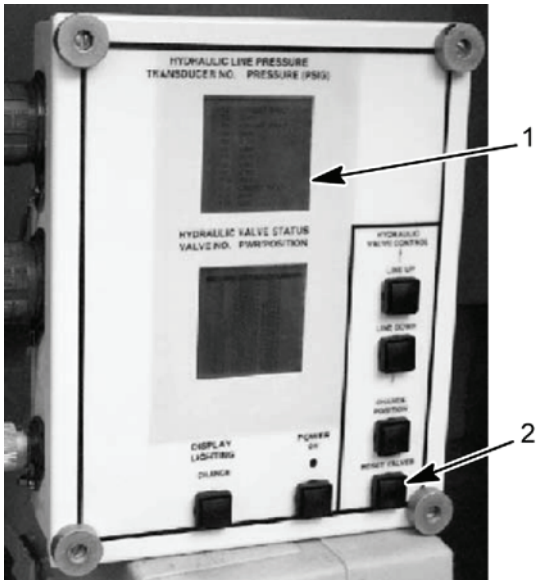
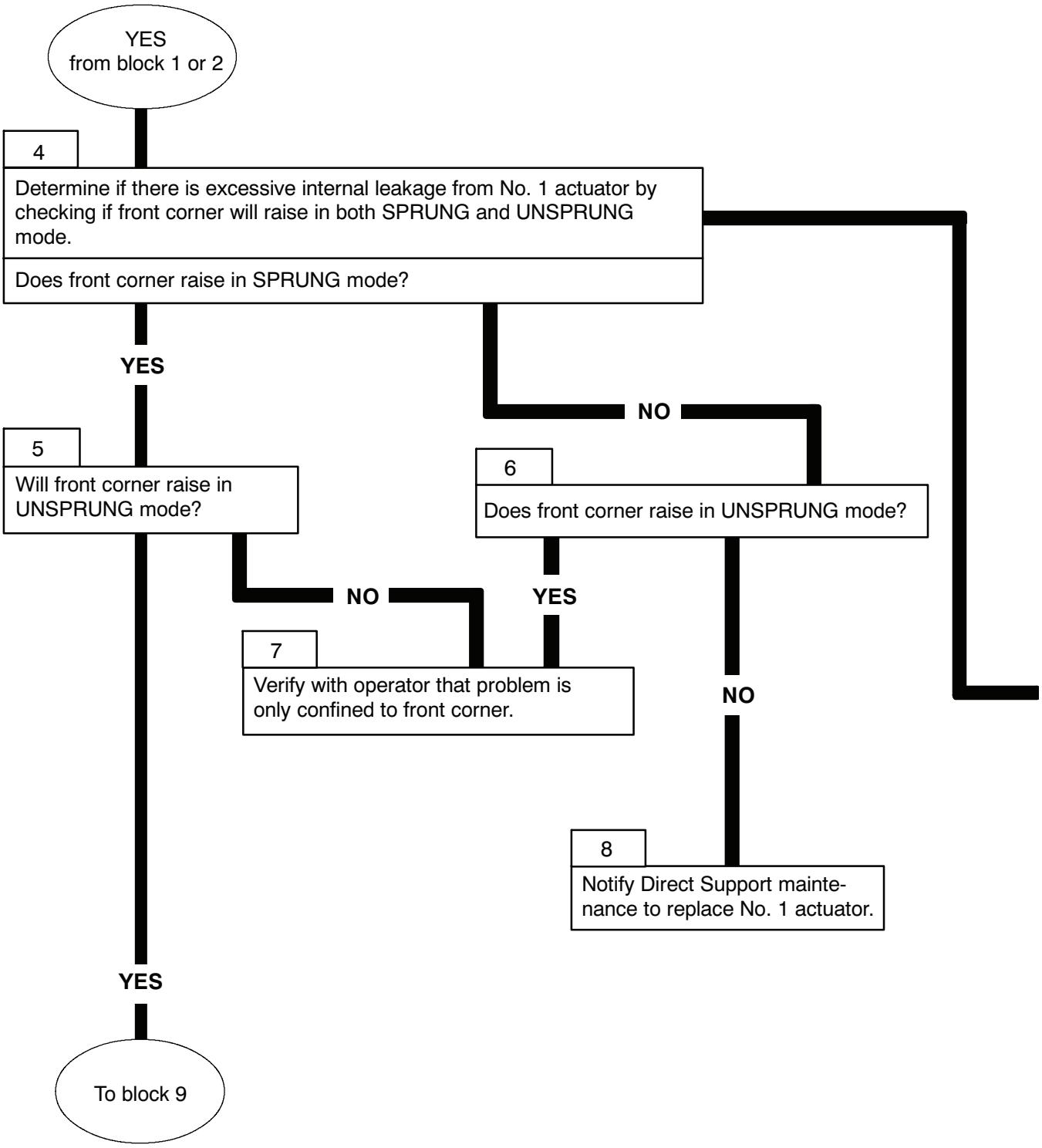


Figure 3. HDC Control Box

FRONT ACTUATOR PORT 3 PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 2) on the HDC control box.
- Have assistant start engine and move the SPRUNG/UNSPRUNG lever to the UNSPRUNG mode and SUSPENSION CONTROL lever to RAISE. Read transducer T-5 (right) and T-6 (left) hydraulic pressure on the HDC display (Figure 3, item 1).
- Stop engine; relieve hydraulic pressure.

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**



FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**

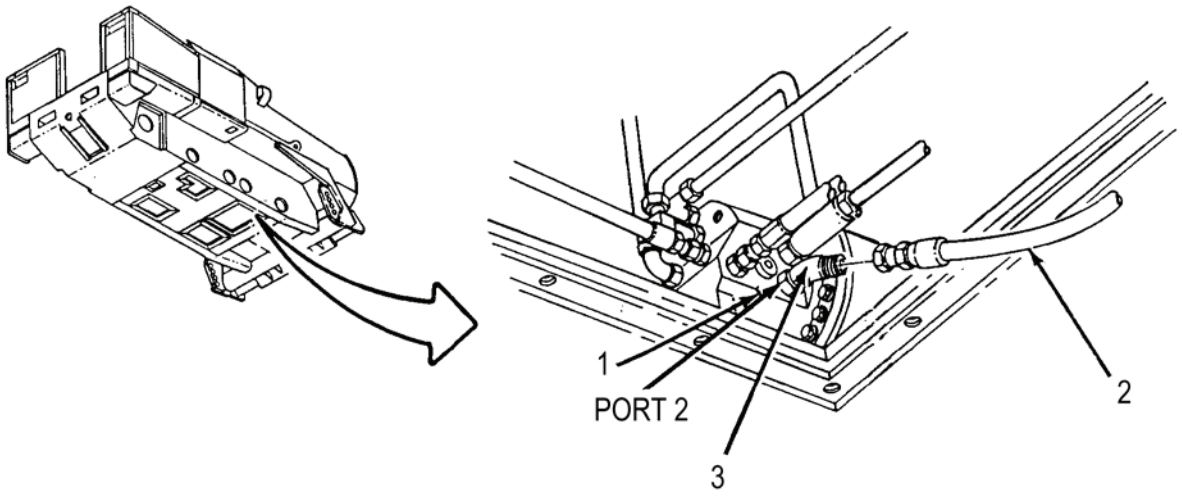


Figure 4. No. 1 Right Actuator Depicted

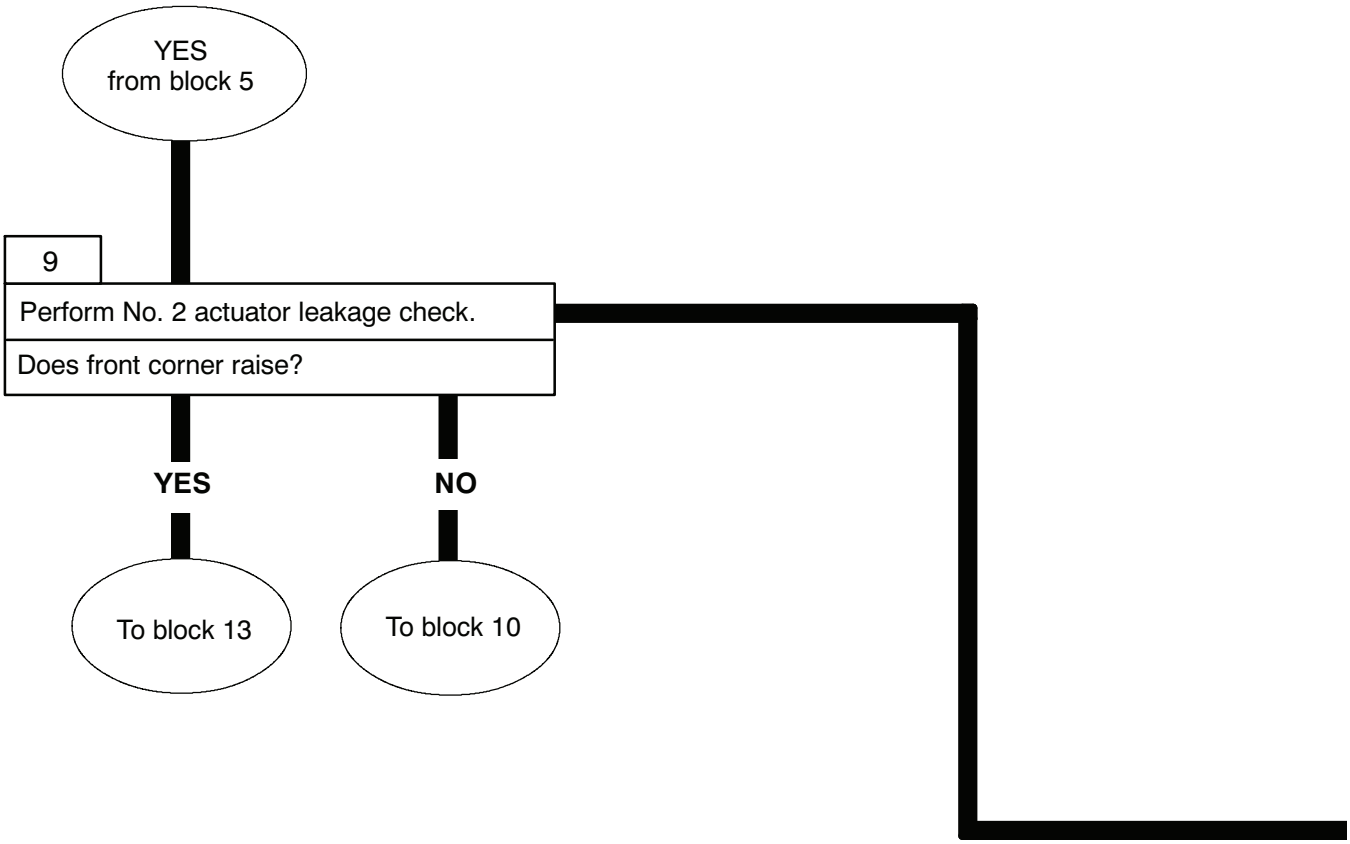
NO. 1 ACTUATOR LEAKAGE CHECK

NOTE

Have suitable container ready to catch oil.

- Disconnect NO 1 SPNSN UNIT-2 hose (Figure 4, item 2) from elbow (Figure 4, item 3) at port 2 on No. 1 actuator (Figure 4, item 1). Cap elbow (Figure 4, item 3) and plug hose (Figure 4, item 2).
- 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.

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**



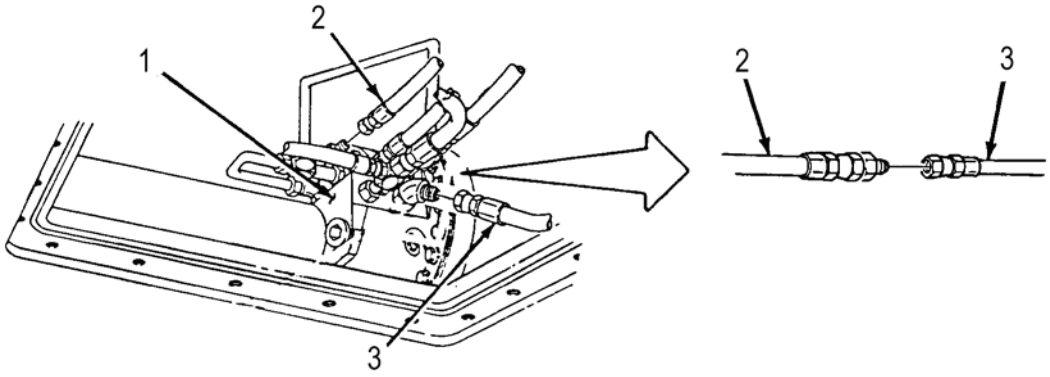


Figure 5. No. 1 Right Actuator Depicted

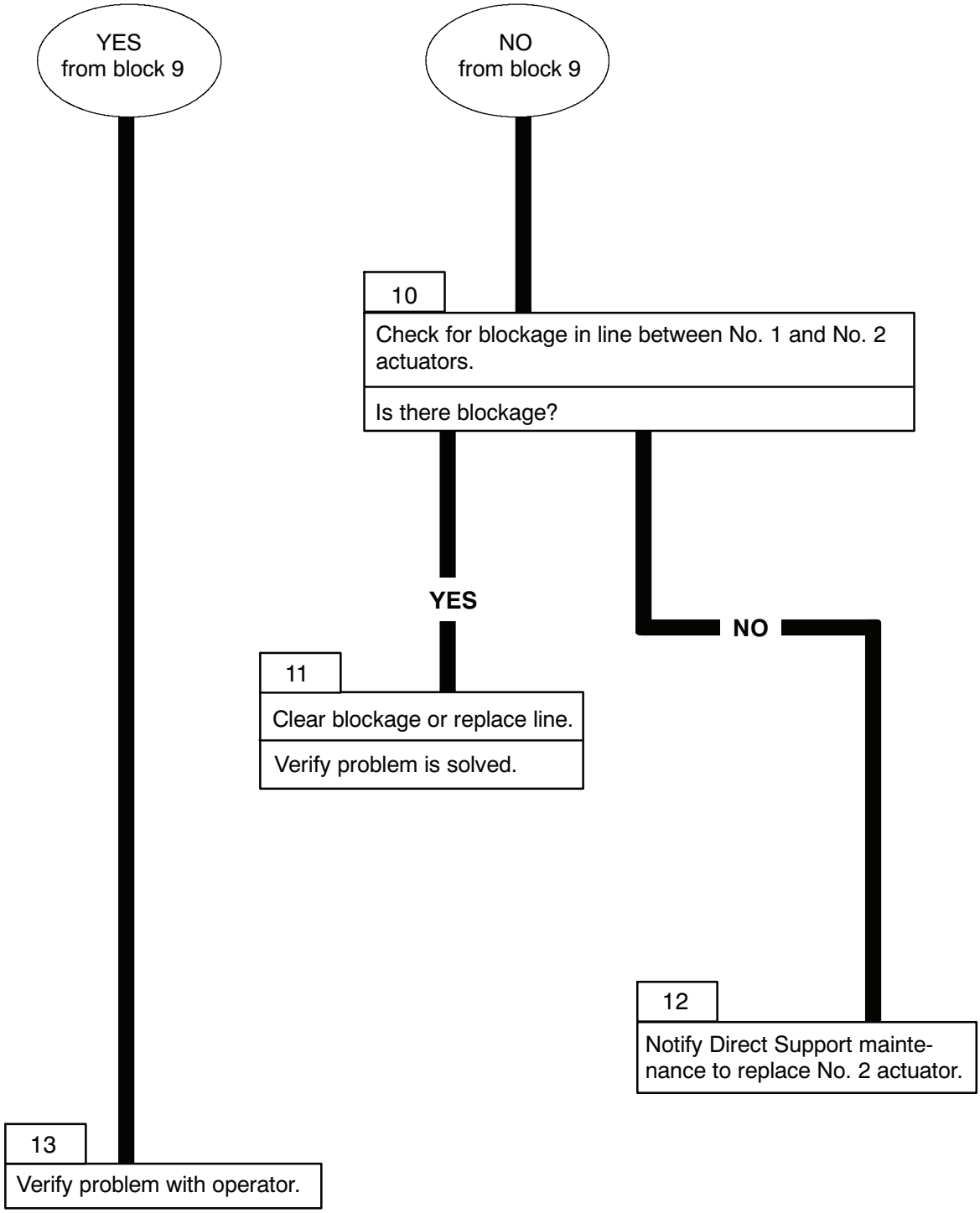
NO. 2 ACTUATOR LEAKAGE CHECK

NOTE

Have suitable container ready to catch oil.

- Connect NO 1 SPNSN UNIT-2 hose (Figure 5, item 3) to NO 1 SPNSN UNIT-3 hose (Figure 5, item 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 (Figure 5, item 1).
- Stop engine; relieve hydraulic pressure and connect lines.

FRONT CORNER (LEFT OR RIGHT) DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0015 00**



END OF WORK PACKAGE

HYDRAULIC OIL OVERHEATS 0016 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)
Hydraulic Tester (gauge) (WP 0071 00, item 4)
Charging Device (WP 0071 00, item 3)

Personnel Required
Two 62B10

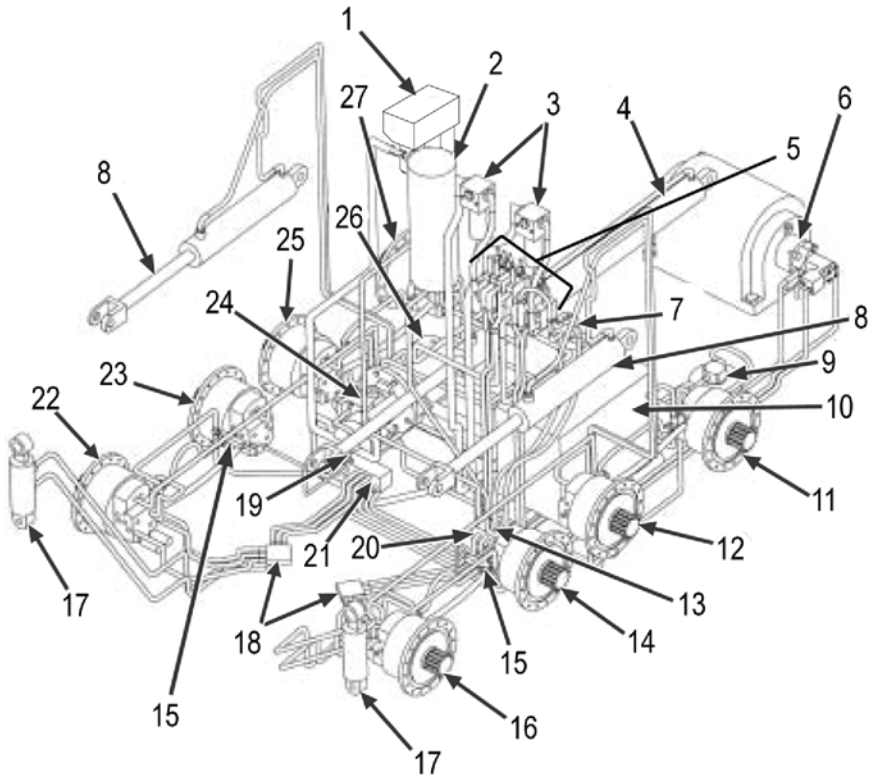
References
TM 5-2350-262-20-2
WP 0035 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury 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 ACTUTUATOR, 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

Figure 1. Hydraulic Circuit

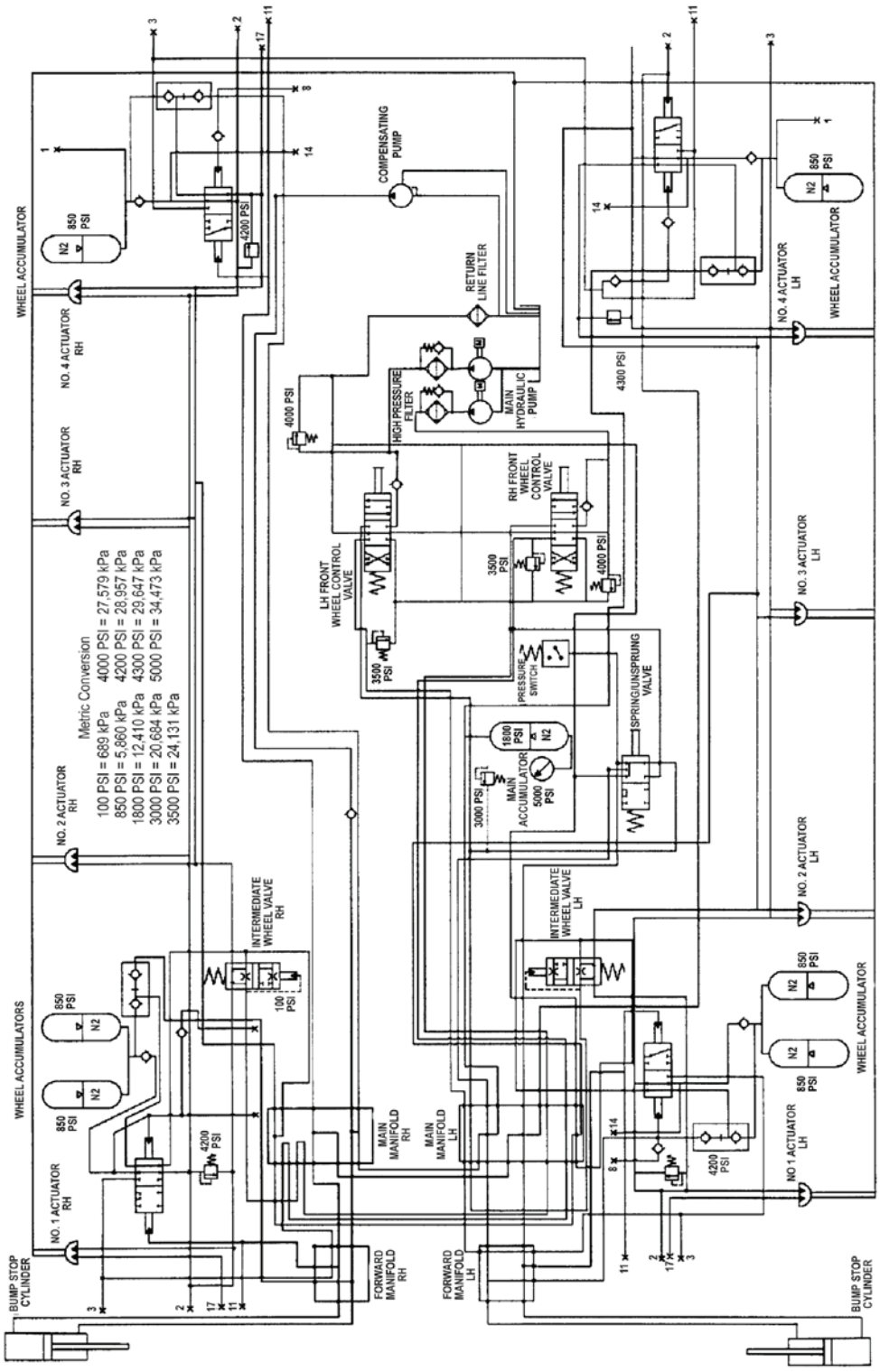
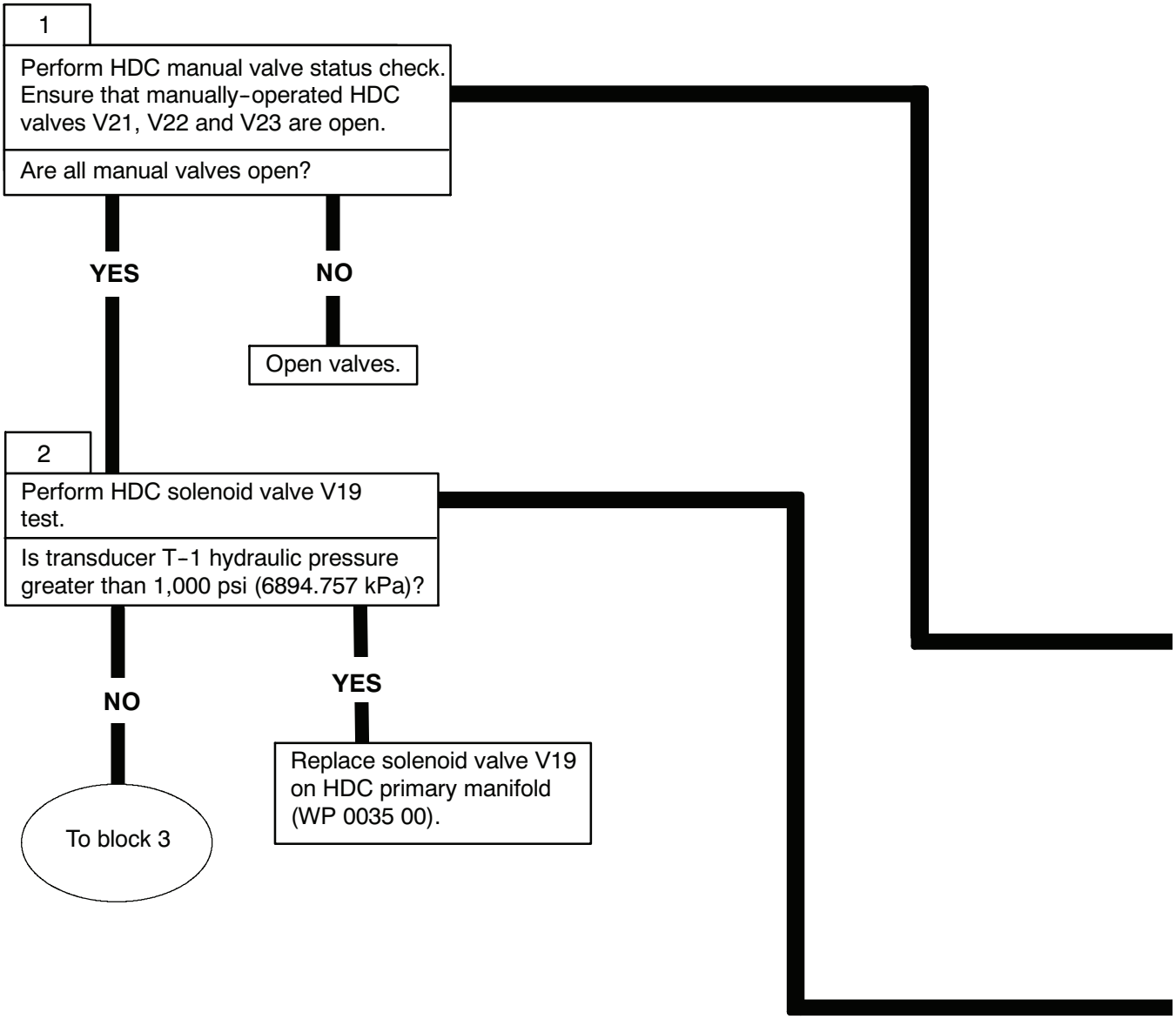


Figure 2. Hydraulic Flow Schematic


1
Perform HDC manual valve status check. Ensure that manually-operated HDC valves V21, V22 and V23 are open.
Are all manual valves open?
YES
NO
Open valves.
2
Perform HDC solenoid valve V19 test.
Is transducer T-1 hydraulic pressure greater than 1,000 psi (6894.757 kPa)?
NO
YES
To block 3
Replace solenoid valve V19 on HDC primary manifold (WP 0035 00).

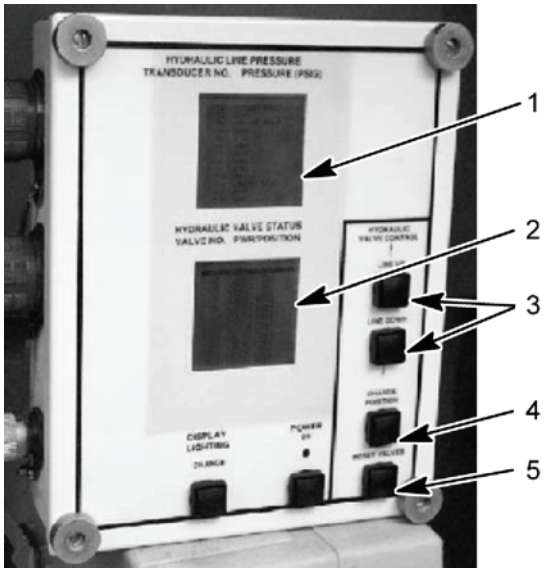


Figure 3. HDC Control Box

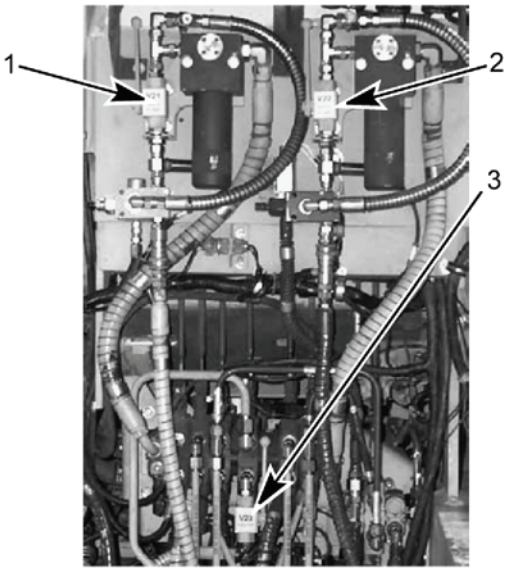


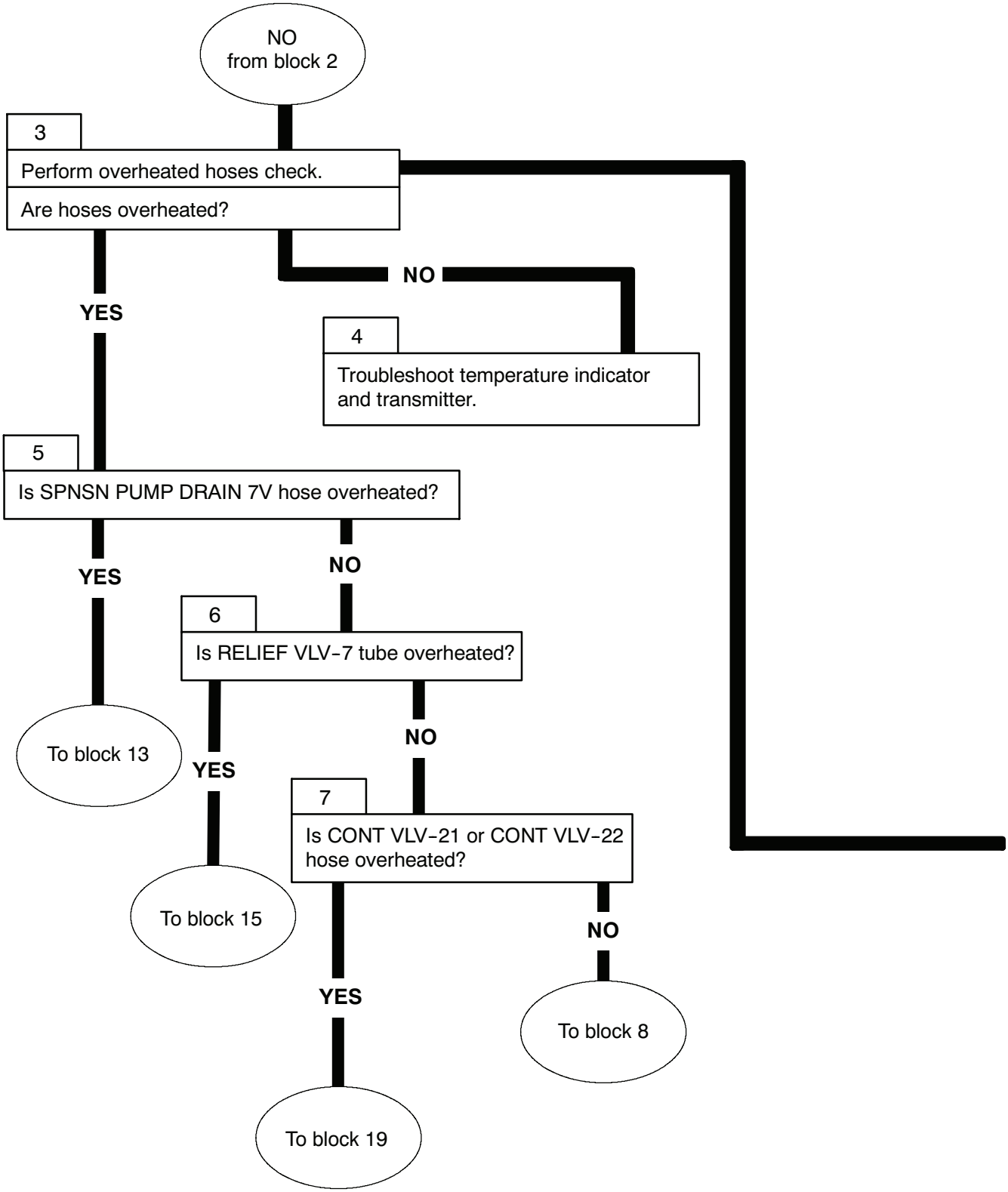
Figure 4. DCV Bank

HDC MANUAL VALVE STATUS CHECK

- Check status of manually-operated valves V21 (Figure 4, item 1), V22 (Figure 4, item 2), and V23 (Figure 4, item 3).
- Ensure these manually-operated valves are completely open.

HDC SOLENOID VALVE V19 TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 5) on the HDC control box.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever to SPRUNG mode.
- Using LINE UP or LINE DOWN button (Figure 3, item 3), select V5 on the HDC display (Figure 3, item 2). Close V5 on the HDC display (Figure 3, item 2) by selecting the CHANGE POSITION button (Figure 3, item 4) on the HDC control box.
- Have assistant move SPRUNG/UNSPRUNG lever to UNSPRUNG mode. Read transducer T-1 hydraulic pressure on the HDC display (Figure 3, item 1).
- Using LINE UP or LINE DOWN button (Figure 3, item 3), select V5 on the HDC display (Figure 3, item 2). Open V5 on the HDC display (Figure 3, item 2) by selecting the CHANGE POSITION button (Figure 3, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.


NO
from block 2
3
Perform overheated hoses check.
Are hoses overheated?
NO
YES
4
Troubleshoot temperature indicator and transmitter.
5
Is SPNSN PUMP DRAIN 7V hose overheated?
YES
NO
6
Is RELIEF VLV-7 tube overheated?
To block 13
YES
NO
7
Is CONT VLV-21 or CONT VLV-22 hose overheated?
To block 15
NO
YES
To block 8
To block 19

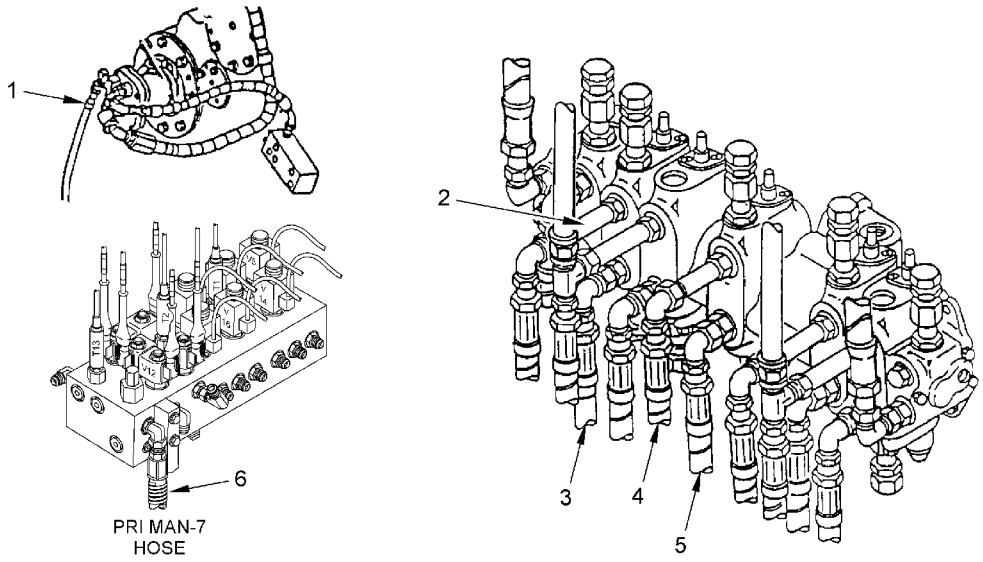


Figure 5. Manifold Hoses

OVERHEATED HOSES CHECK

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.**
- **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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

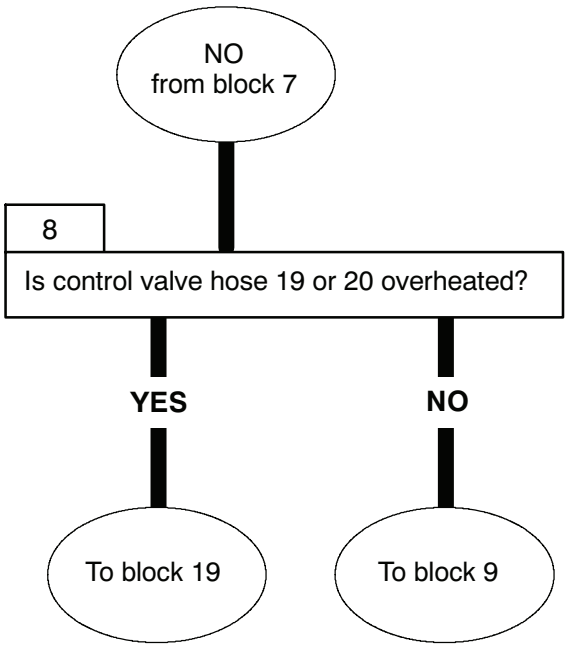
NOTE

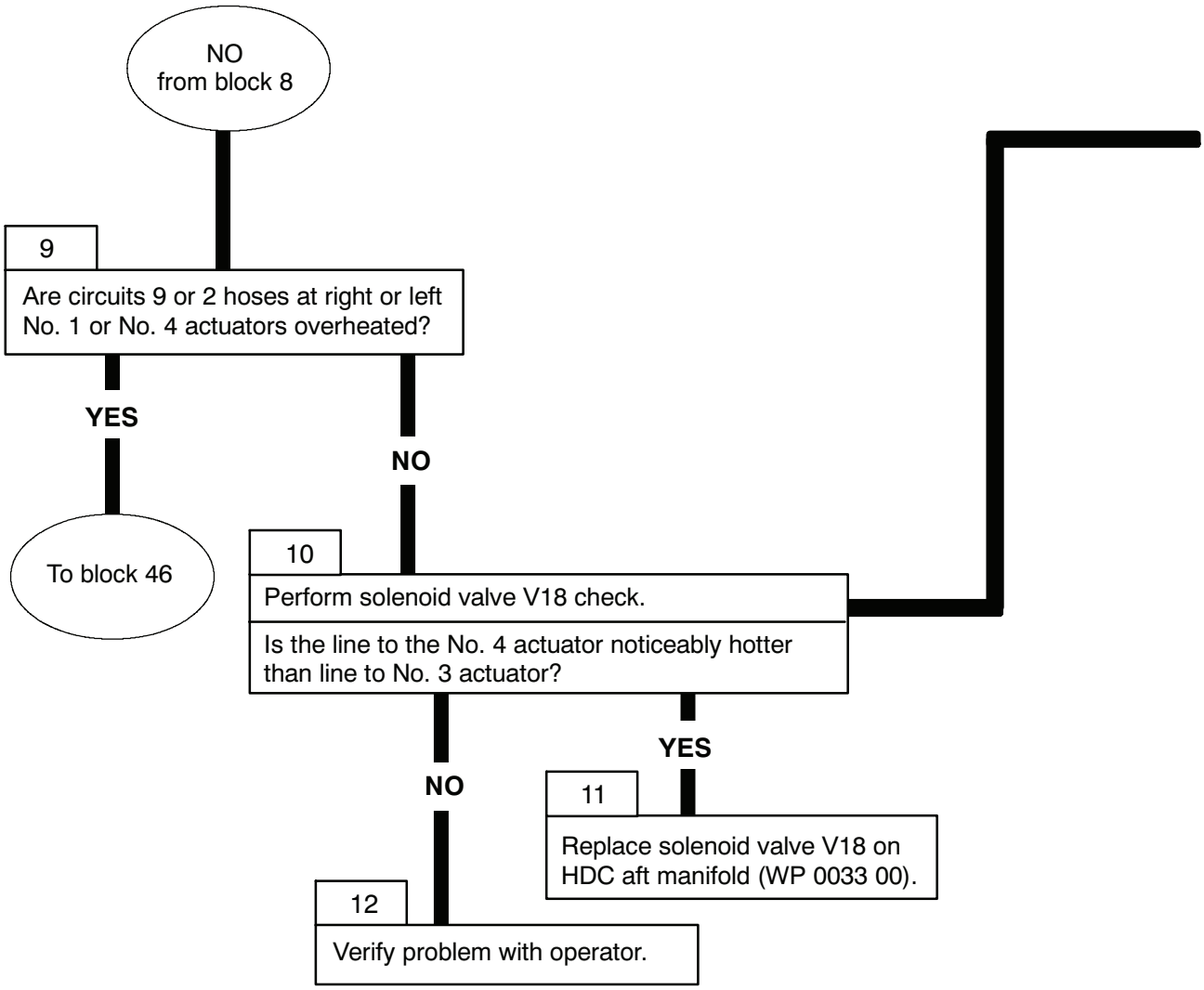
Begin this procedure with the engine cold.

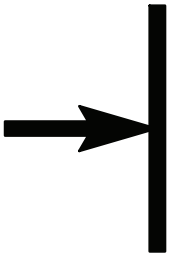
- Start engine and allow engine to run for about five minutes before testing for overheating.
- As engine warms, carefully feel CONT VLV-19 (Figure 5, item 2), CONT VLV-20 (Figure 5, item 3), SPNSN PUMP DRAIN-7V hose (Figure 5, item 1), relief VLV-7 tube (Figure 5, item 6), CONT VLV-21 hose (Figure 5, item 4), and CON VLV-22 hose (Figure 5, item 5) with an ungloved hand. Hoses should feel warm but not hot.
- Continued on page 0016 00-9.

OVERHEATED HOSES CHECK - CONTINUED

- Cycle apron and ejector control levers for total oil flow through the systems.
- Operate vehicle for 1/2 hour. Stop and repeat the previous two steps every 10 minutes to check if an overheated hose or tube can be detected.
- Stop engine; relieve hydraulic pressure.

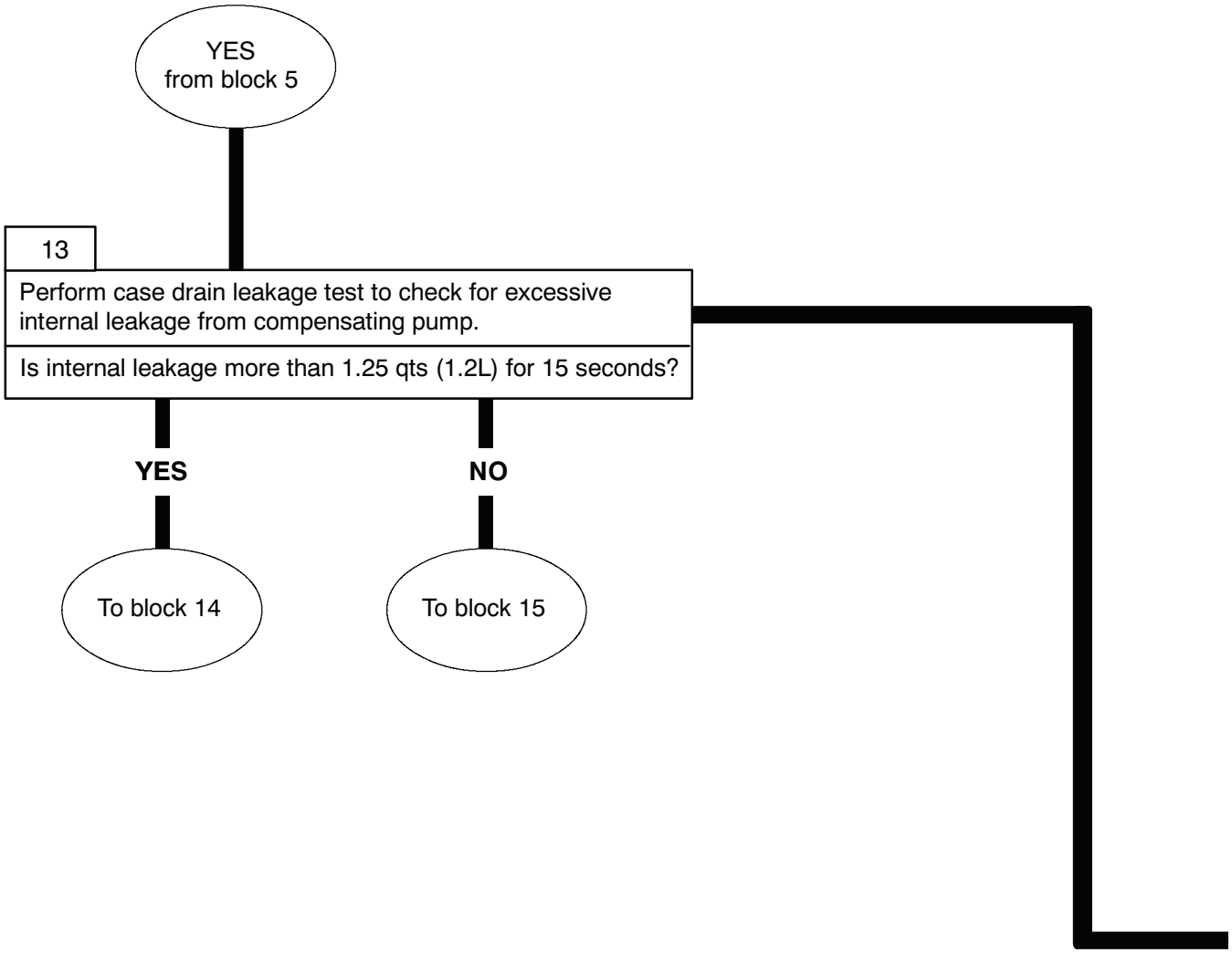

NO
from block 7
8
Is control valve hose 19 or 20 overheated?
YES
NO
To block 19
To block 9


NO
from block 8
9
Are circuits 9 or 2 hoses at right or left No. 1 or No. 4 actuators overheated?
YES
To block 46
NO
10
Perform solenoid valve V18 check.
Is the line to the No. 4 actuator noticeably hotter than line to No. 3 actuator?
YES
11
Replace solenoid valve V18 on HDC aft manifold (WP 0033 00).
NO
12
Verify problem with operator.



HDC SOLENOID VALVE V18 TEST

- Start engine and allow to run for 5 minutes before testing for overheating.
- Feel the circuit No. 2 line between the HDC system aft manifold and the No. 4 left actuator, and the circuit No. 2 line between the aft manifold and the No. 3 left actuator.
- Stop engine; relieve hydraulic pressure.


YES
from block 5
13
Perform case drain leakage test to check for excessive internal leakage from compensating pump.
Is internal leakage more than 1.25 qts (1.2L) for 15 seconds?
YES
NO
To block 14
To block 15

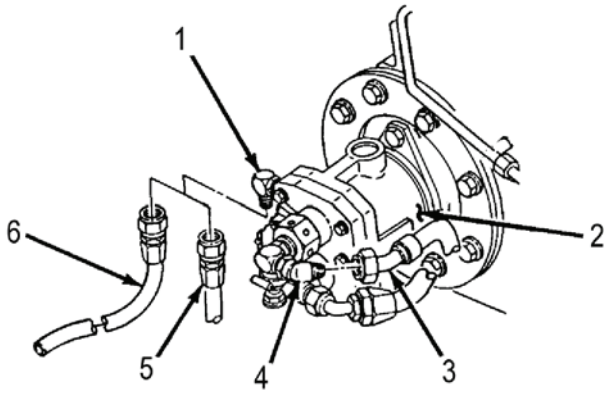


Figure 6. Compensating Pump

CASE DRAIN LEAKAGE TEST

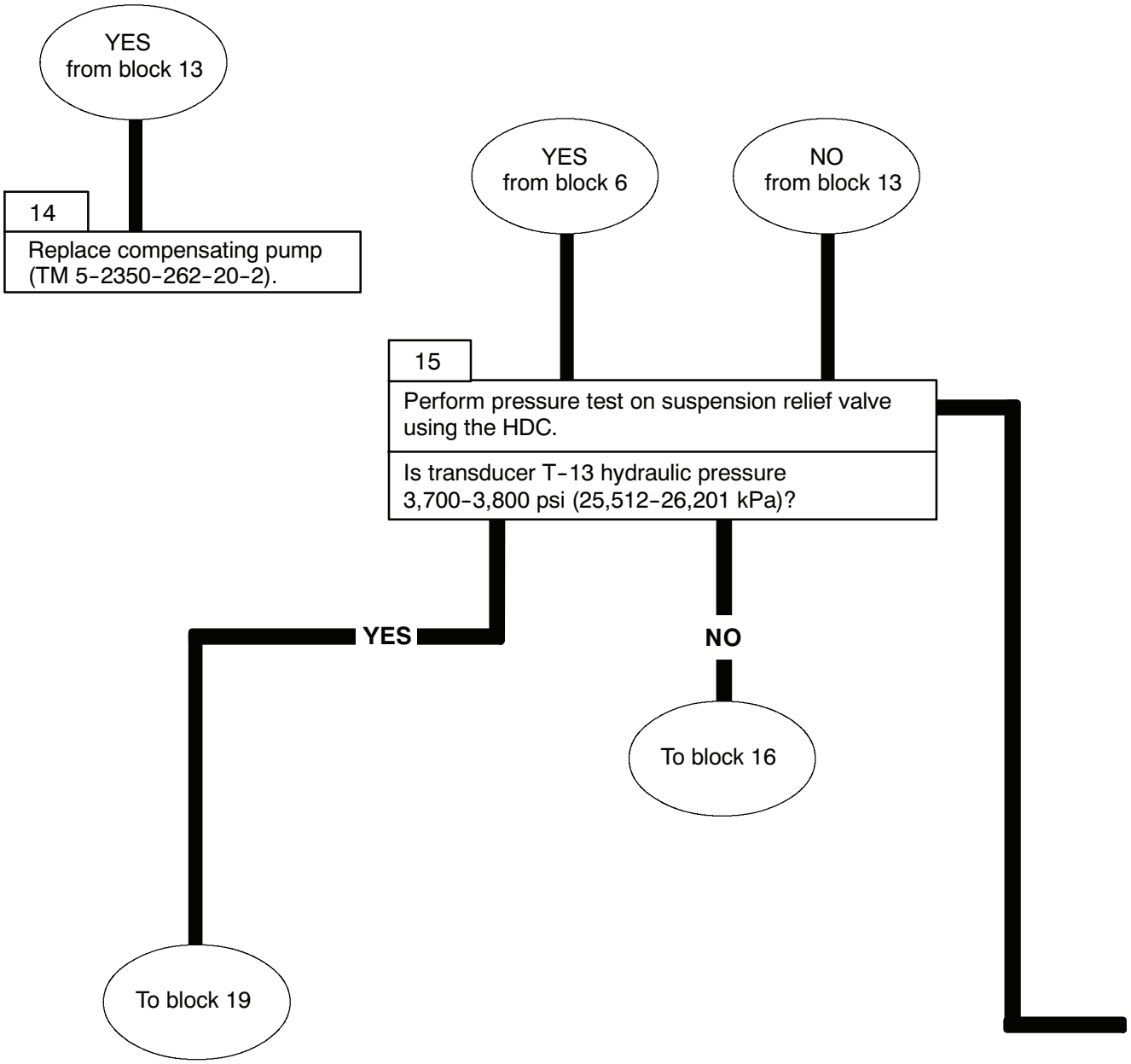
WARNING

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 (Figure 6, item 3) from elbow (Figure 6, item 4) on compensating pump (Figure 6, item 2). Cap elbow (Figure 6, item 4) and plug hose (Figure 6, item 3).
- Disconnect SPNSN PUMP DRAIN-7V hose (Figure 6, item 5) from elbow (Figure 6, item 1). Plug hose (Figure 6, item 5). Connect drain hose (Figure 6, item 6) to elbow (Figure 6, item 1).
- Hold end of drain hose (Figure 6, item 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.


YES
from block 13
14
Replace compensating pump
(TM 5-2350-262-20-2).
YES
from block 6
NO
from block 13
15
Perform pressure test on suspension relief valve
using the HDC.
Is transducer T-13 hydraulic pressure
3,700-3,800 psi (25,512-26,201 kPa)?
YES
NO
To block 16
To block 19

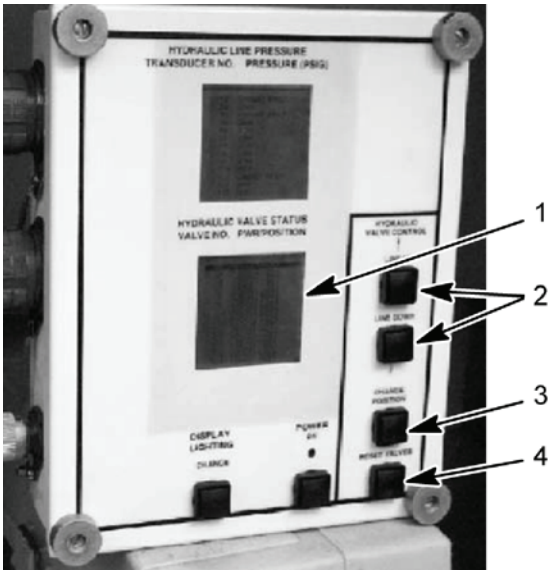


Figure 7. HDC Control Box

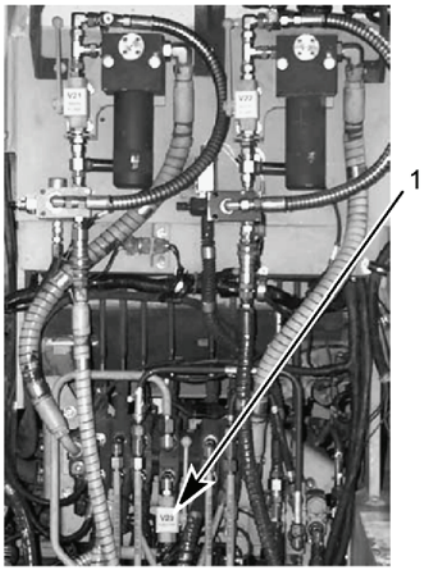


Figure 8. DCV Bank

SUSPENSION RELIEF VALVE PRESSURE 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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Start engine, move ejector forward, engage ejector lock.
- Stop engine and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 4) on the HDC control box.
- Manually close the ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 7, item 2) on the HDC control box, select V5 on the HDC display (Figure 7, item 1). Using the CHANGE POSITION button (Figure 7, item 3), close V5 on the HDC display (Figure 7, item 1). Repeat step for V12, V13, and V19; closing V12 and V13, and opening V19.
- Continued on page 0016 00-19.

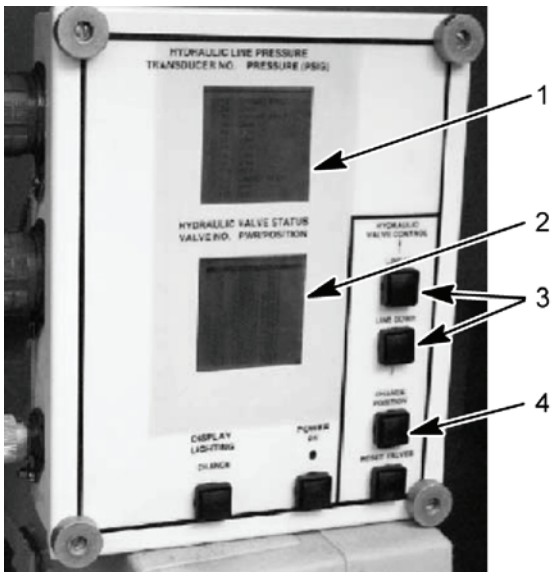


Figure 9. HDC Control Box

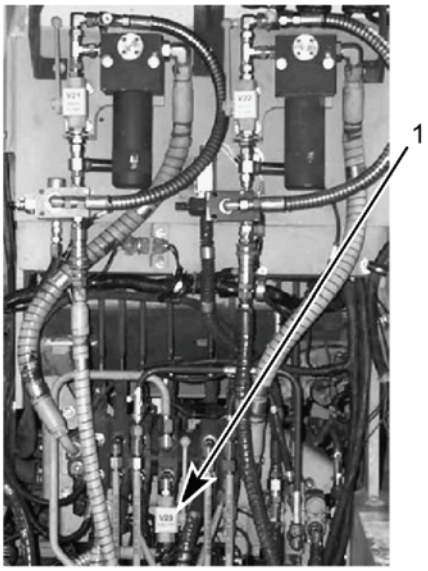
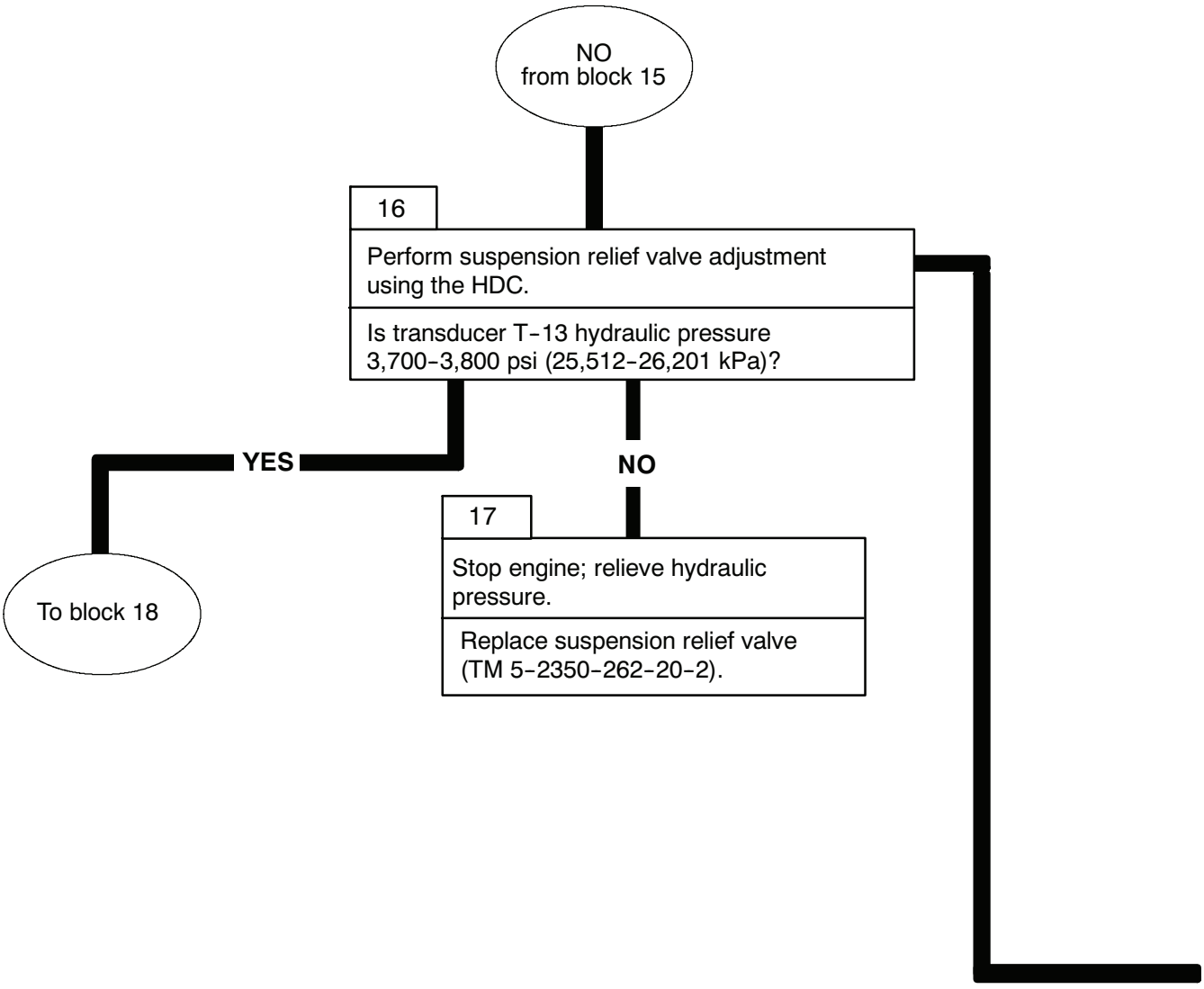


Figure 10. DCV Bank

SUSPENSION RELIEF VALVE PRESSURE TEST - CONTINUED

- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG and right SUSPENSION CONTROL lever to LOWER. Read transducer T-13 pressure on the HDC display (Figure 9, item 1).
- Stop engine; relieve hydraulic pressure.
- Using LINE UP or LINE DOWN button (Figure 9, item 3) on the HDC control box, select V5 on the HDC display (Figure 9, item 2). Using the CHANGE POSITION button (Figure 9, item 4), open V5 on the HDC display (Figure 9, item 2). Repeat step for V12, V13 and V19, opening V12 and V13, and closing V19.
- Manually open the ejector inhibit ball valve V23 (Figure 10, item 1) on the DCV bank.


NO
from block 15
16
Perform suspension relief valve adjustment using the HDC.
Is transducer T-13 hydraulic pressure 3,700-3,800 psi (25,512-26,201 kPa)?
YES
NO
To block 18
17
Stop engine; relieve hydraulic pressure.
Replace suspension relief valve (TM 5-2350-262-20-2).

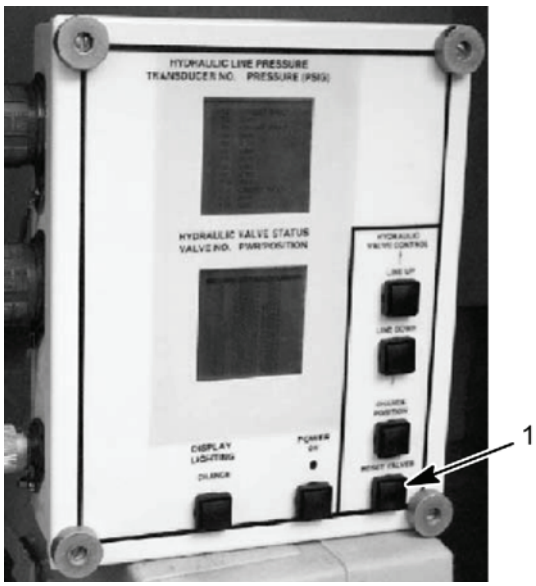


Figure 11. HDC Control Box

SUSPENSION RELIEF VALVE 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.**
- **Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 11, item 1) on the HDC control box.
- Continued on page 0016 00-23.

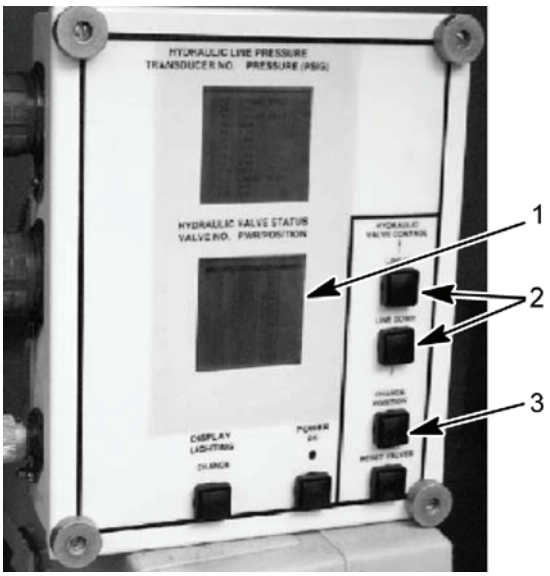


Figure 12. HDC Control Box

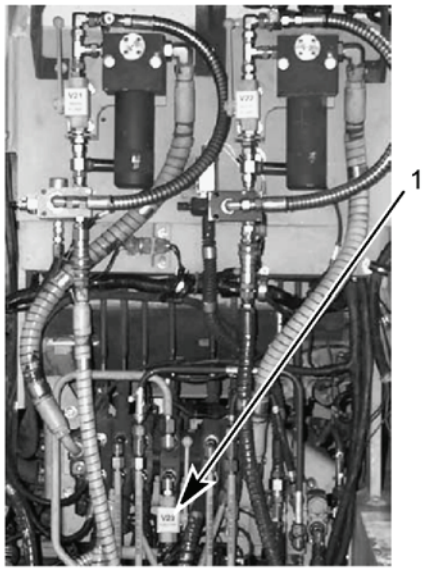


Figure 13. DCV Bank

SUSPENSION RELIEF VALVE ADJUSTMENT - CONTINUED

- Manually close the ejector inhibit ball valve V23 (Figure 13, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 12, item 2) on the HDC control box; select V5 on the HDC display (Figure 12, item 1). Using the CHANGE POSITION button (Figure 12, item 3), close V5 on the HDC display (Figure 12, item 1). Repeat steps for V12, V13 and V19, closing V12 and V13, and opening V19.
- Start engine.
- Continued on page 0016 00-25.

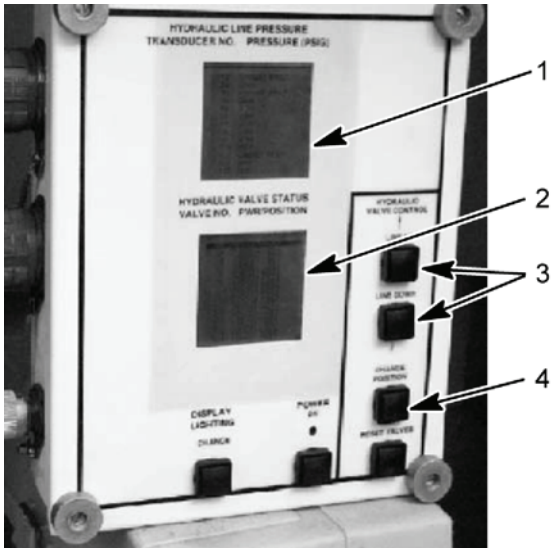


Figure 14. HDC Control Box

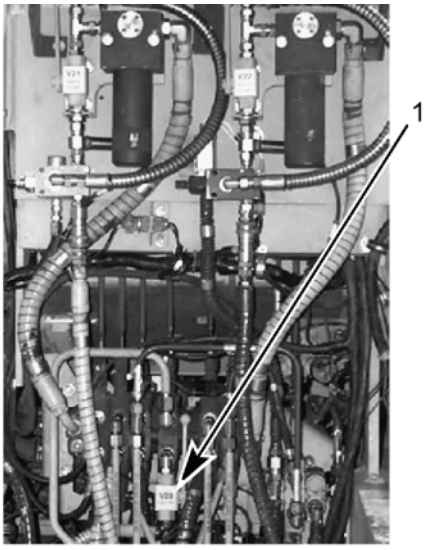


Figure 15. DCV Bank

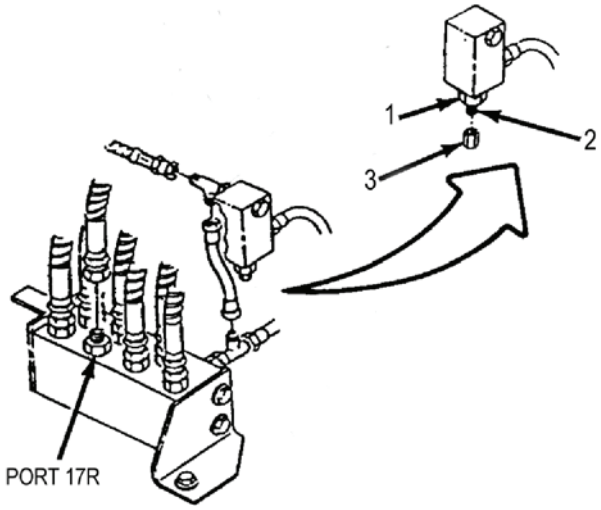
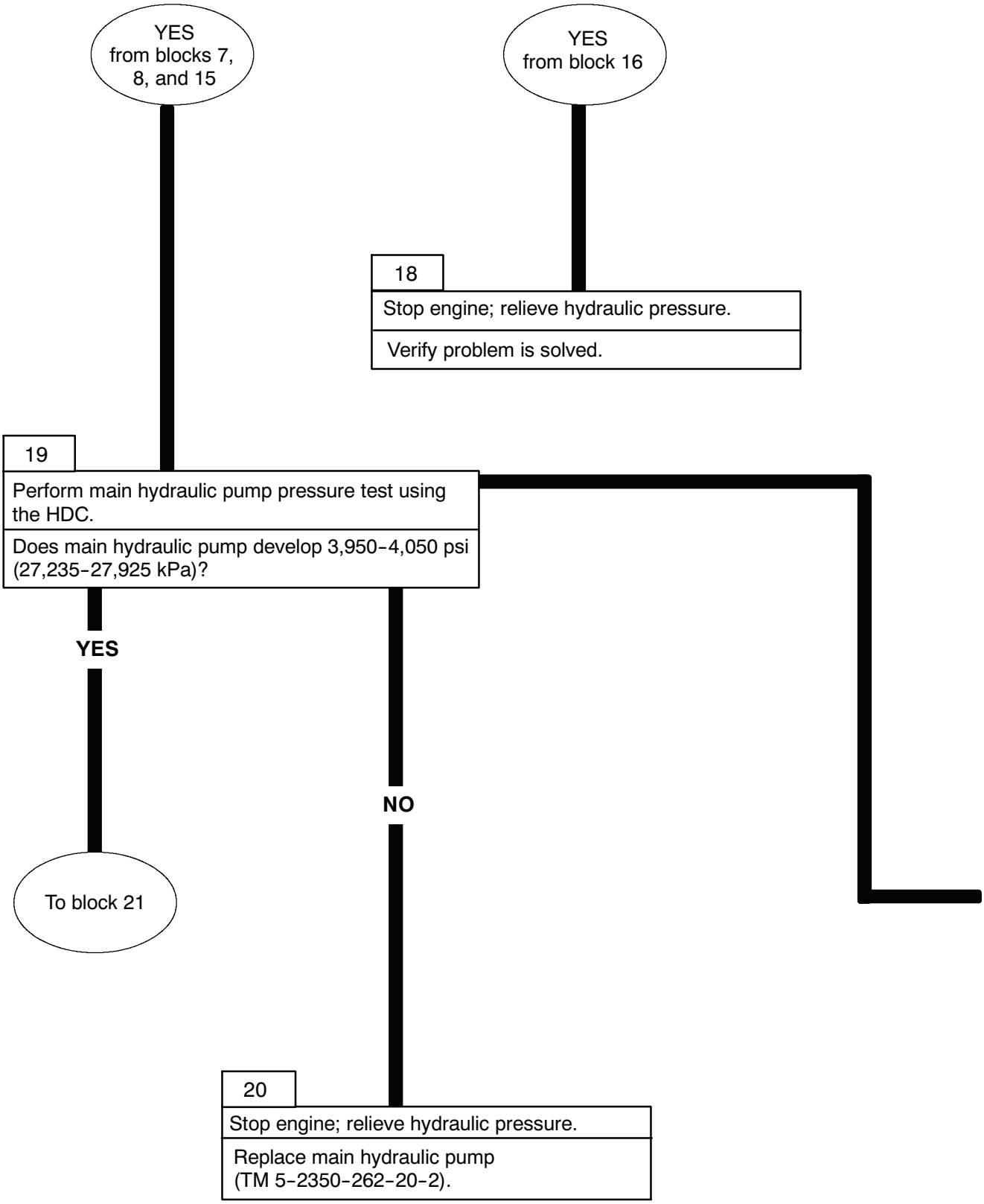


Figure 16. Suspension Relief Valve

SUSPENSION RELIEF VALVE ADJUSTMENT - CONTINUED

- Adjust the pressure as follows: remove cap (Figure 16, item 3) from suspension relief valve adjusting shaft (Figure 16, item 2) and loosen jam nut (Figure 16, item 1).
- Turn adjusting shaft (Figure 16, item 2) clockwise to increase pressure; counterclockwise to decrease pressure. Read transducer T-13 hydraulic pressure on the HDC display (Figure 14, item 1). Turn adjusting shaft (Figure 16, item 2) to obtain proper pressure indication on transducer T-13 (Figure 14, item 1) on the HDC control box. Tighten jam nut (Figure 16, item 1) and replace cap (Figure 16, item 3).
- Stop engine; relieve hydraulic pressure.
- Using LINE UP or LINE DOWN button (Figure 14, item 3) on the HDC control box, select V5 on the HDC display (Figure 14, item 2). Using the CHANGE POSITION button (Figure 14, item 4), open V5 on the HDC display (Figure 14, item 2). Repeat step for V12, V13 and V19; opening V12 and V13, and closing V19.
- Manually open the ejector inhibit ball valve V23 (Figure 15, item 1) on the DCV bank.


YES
from blocks 7, 8, and 15
YES
from block 16
18
Stop engine; relieve hydraulic pressure.
Verify problem is solved.
19
Perform main hydraulic pump pressure test using the HDC.
Does main hydraulic pump develop 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
To block 21
20
Stop engine; relieve hydraulic pressure.
Replace main hydraulic pump (TM 5-2350-262-20-2).

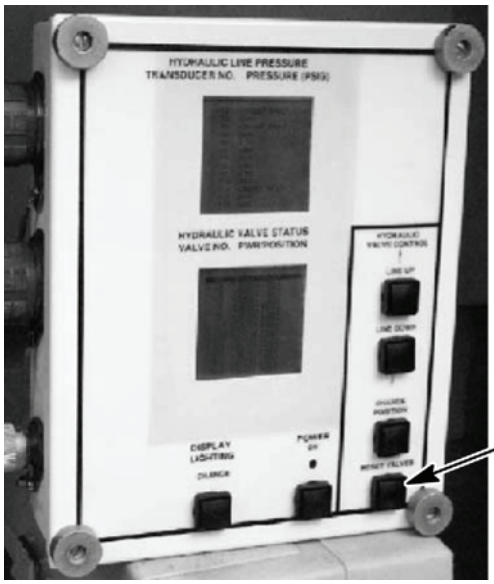


Figure 17. HDC Control Box

MAIN HYDRAULIC PUMP 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.**
- **Ensure right main hydraulic pressure inhibit valve V21 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.**

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 17, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Continued on page 0016 00-29.

MAIN HYDRAULIC PUMP PRESSURE TEST - CONTINUED

- Stop engine; relieve hydraulic pressure.
- Ensure right main hydraulic pressure inhibit valve V21 (Figure 18, item 2) is fully opened.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 18, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 19, item 3), select V1 on the HDC display (Figure 19, item 2). Close V1 on the HDC display (Figure 19, item 2) by selecting the CHANGE POSITION button (Figure 19, item 4) on the HDC control box.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 18, item 2), until transducer T-3 hydraulic pressure on the HDC display (Figure 19, item 1) indicates 3,950-4,050 psi (27,235-27,925 kPa).
- Open right main hydraulic pressure inhibit valve V21 (Figure 18, item 2) fully.
- Stop engine; relieve hydraulic pressure.
- Open ejector inhibit ball valve V23 (Figure 18, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 19, item 3), select V1 on the HDC display (Figure 19, item 2). Open V1 (Figure 19, item 2) on the HDC display by selecting the CHANGE POSITION button (Figure 19, item 4) on the HDC control box.

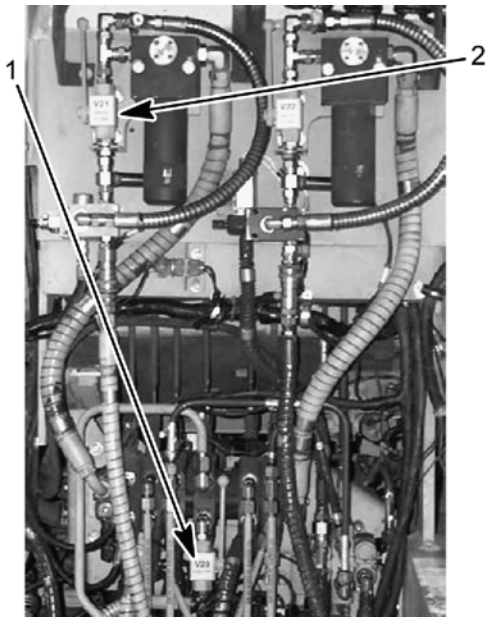


Figure 18. DCV Bank

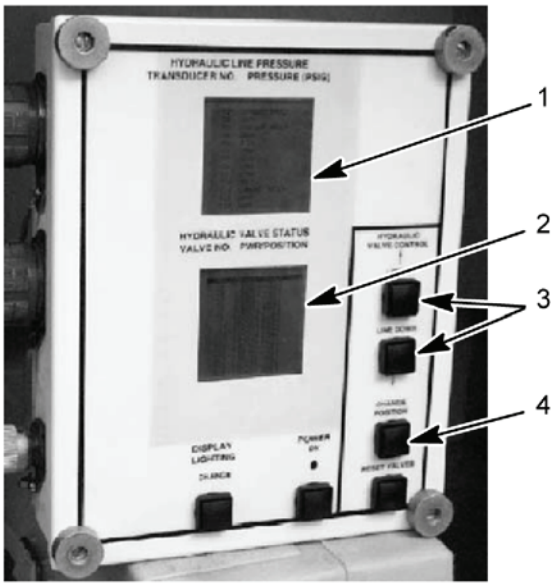
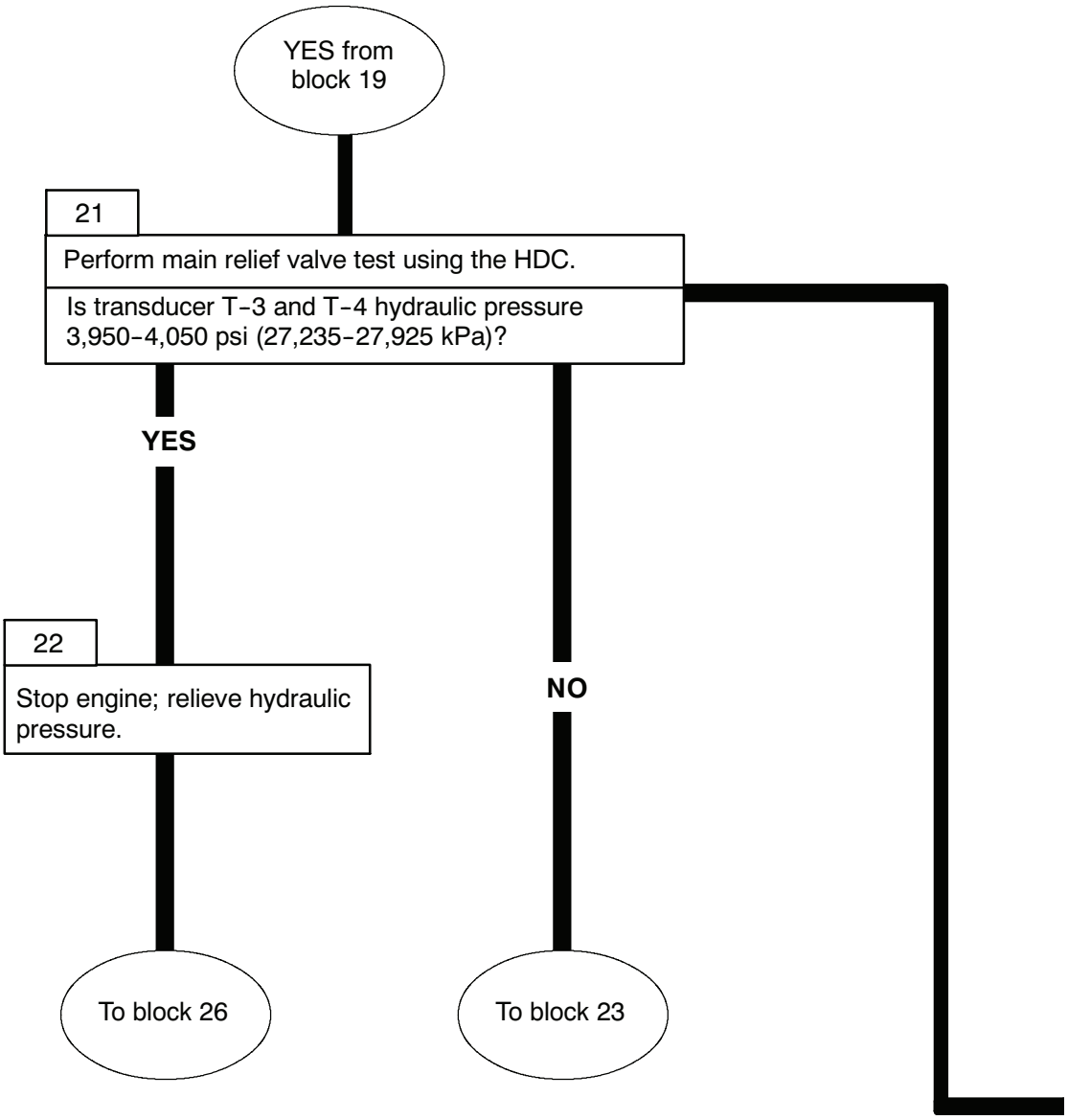


Figure 19. HDC Control Box


YES from block 19
21
Perform main relief valve test using the HDC.
Is transducer T-3 and T-4 hydraulic pressure 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
22
Stop engine; relieve hydraulic pressure.
To block 26
To block 23

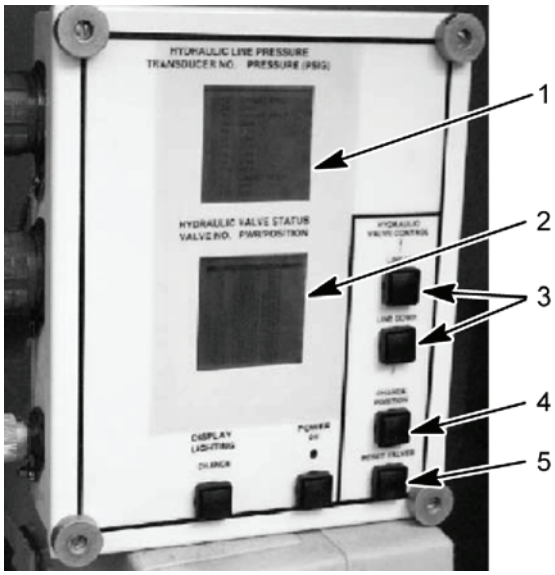


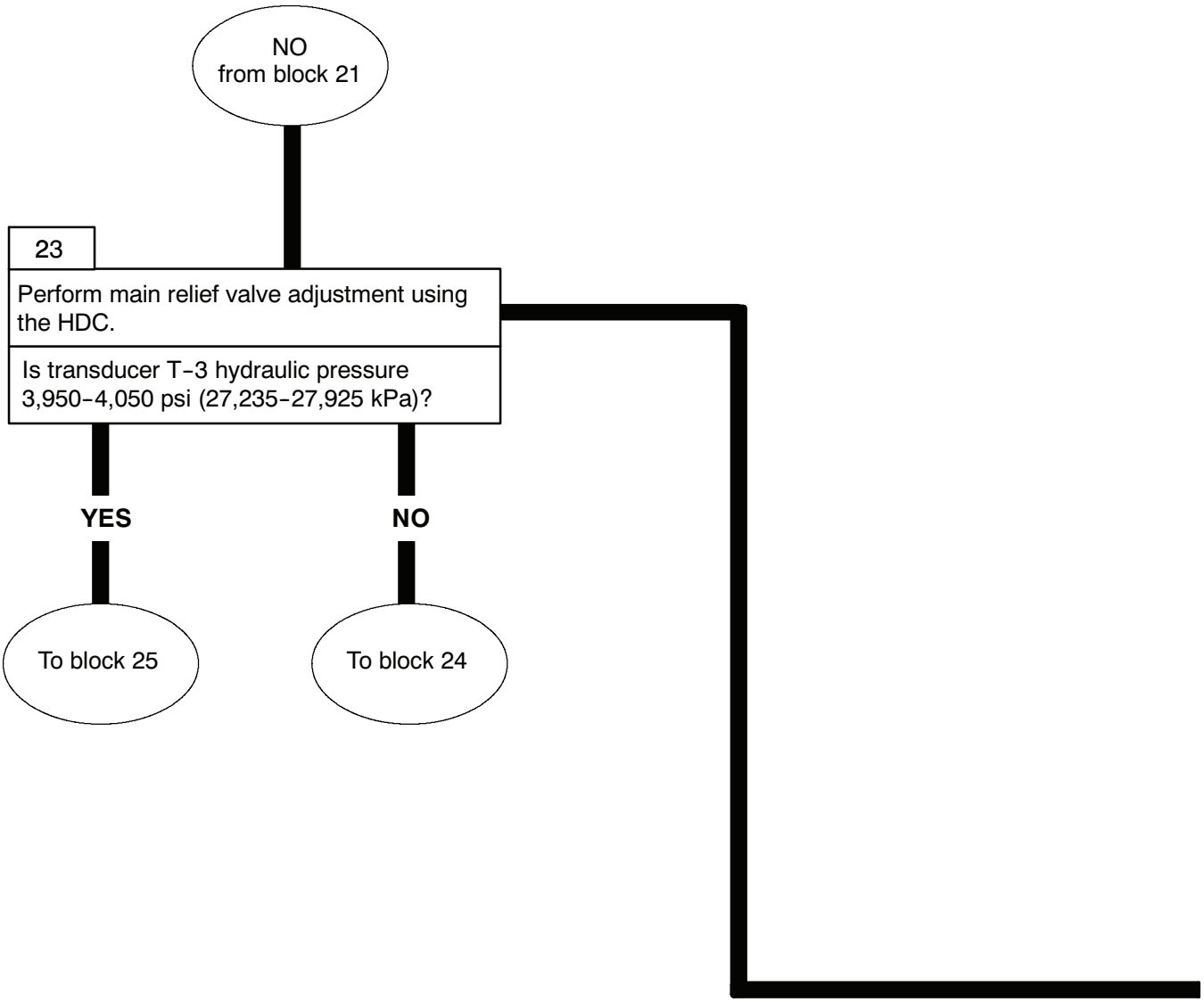
Figure 20. HDC Control Box

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.

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 20, item 5) on the HDC control box.
- Start engine, move ejector forward.
- Using LINE UP or LINE DOWN button (Figure 20, item 3), select V1 on the HDC display (Figure 20, item 2). Close V1 on the HDC display (Figure 20, item 2) by selecting the CHANGE POSITION button (Figure 20, item 4) on the HDC control box.
- Have assistant hold EJECTOR CONTROL lever in BACK. Read transducer T-3 (13R) and T-4 (13L) pressure valves individually on the HDC display (Figure 20, item 1). Check main relief valves 13R and 13L as follows:
- For 13R; 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 transducer T-3 hydraulic pressure on the HDC display (Figure 20, item 1). If the pressure is not within limits, adjust the main relief valve 13R.
- For 13L; Repeat steps for main relief valve 13L (pressure transducer T4) moving the left-hand SUSPENSION CONTROL lever to RAISE while at the same time holding the EJECTOR CONTROL lever in BACK.
- Read transducer T-4 hydraulic pressure on the HDC display (Figure 20, item 1).
- Using LINE UP or LINE DOWN button (Figure 20, item 3), select V1 on the HDC display (Figure 20, item 2). Open V1 on the HDC display (Figure 20, item 2) by selecting the CHANGE POSITION button (Figure 20, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.


NO
from block 21
23
Perform main relief valve adjustment using the HDC.
Is transducer T-3 hydraulic pressure 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
To block 25
To block 24

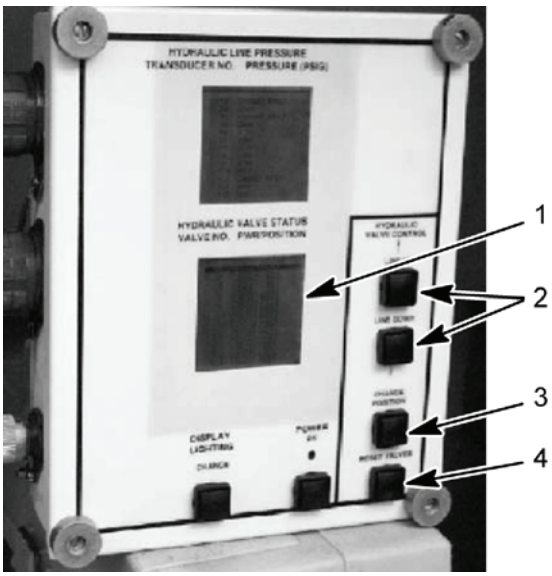


Figure 21. HDC Control Box

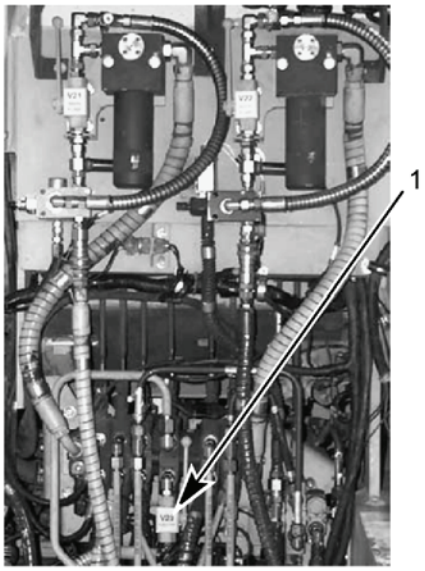


Figure 22. DCV Bank

MAIN RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 21, item 4) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Disable ejector; manually close V23 (Figure 22, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 21, item 2), select V1 on the HDC display (Figure 21, item 1). Close V1 on the HDC display (Figure 21, item 1) by selecting the CHANGE POSITION button (Figure 21, item 3) on the HDC control box.
- Continued on page 0016 00-35.

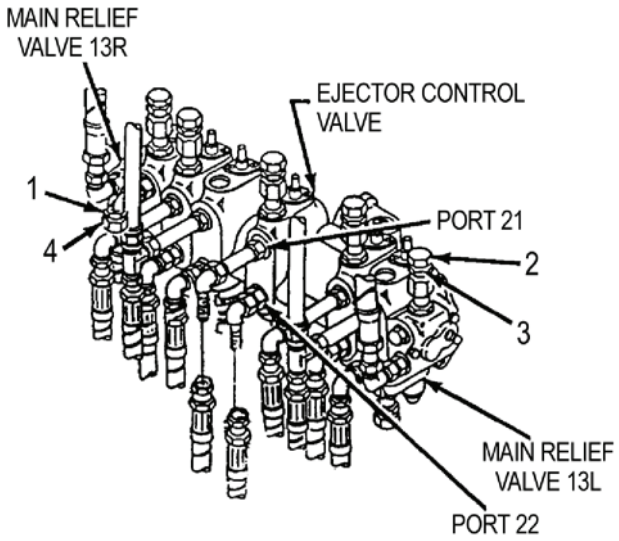


Figure 23. Main Pump Relief Valves

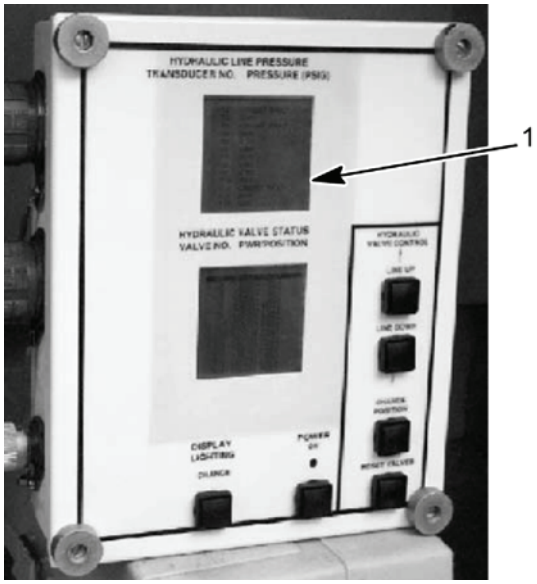


Figure 24. HDC Control Valve

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- Loosen jam nut (Figure 23, item 1) on main relief valve 13R.
- For 13R; have assistant simultaneously hold EJECTOR CONTROL lever in BACK while holding the right-hand SUSPENSION CONTROL lever in RAISE.
- Rotate adjusting screw (Figure 23, item 4) on main relief valve 13R clockwise to increase pressure or counterclockwise to decrease pressure. Once indication from transducer T-3 on the HDC display (Figure 23, item 1) hydraulic pressure is within desired limits, tighten jam nut (Figure 24, item 1).
- Continued on page 0016 00-37.

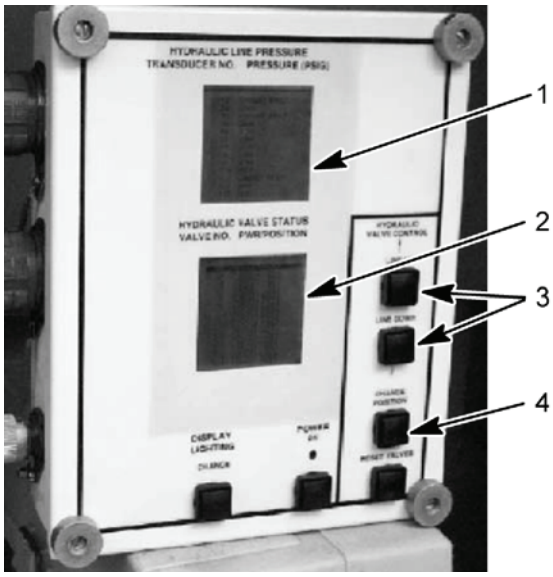


Figure 25. HDC Control Box

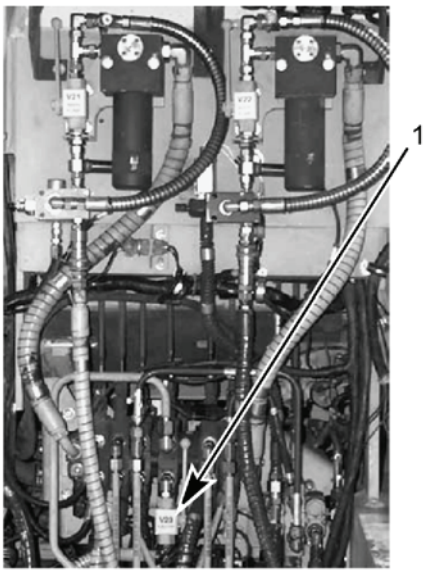


Figure 26. DCV Bank

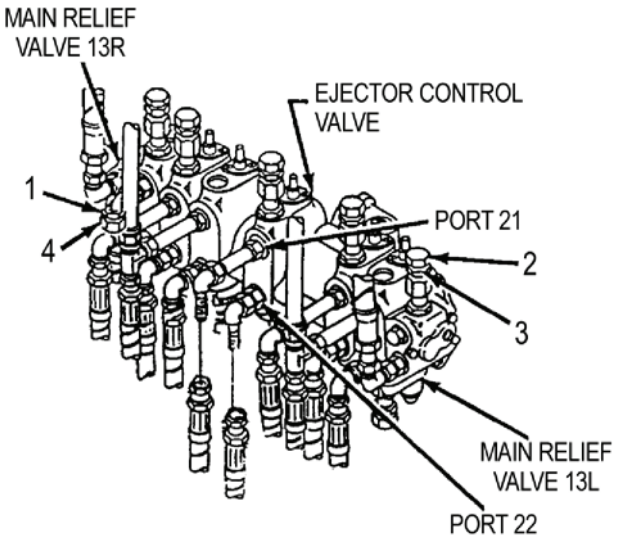
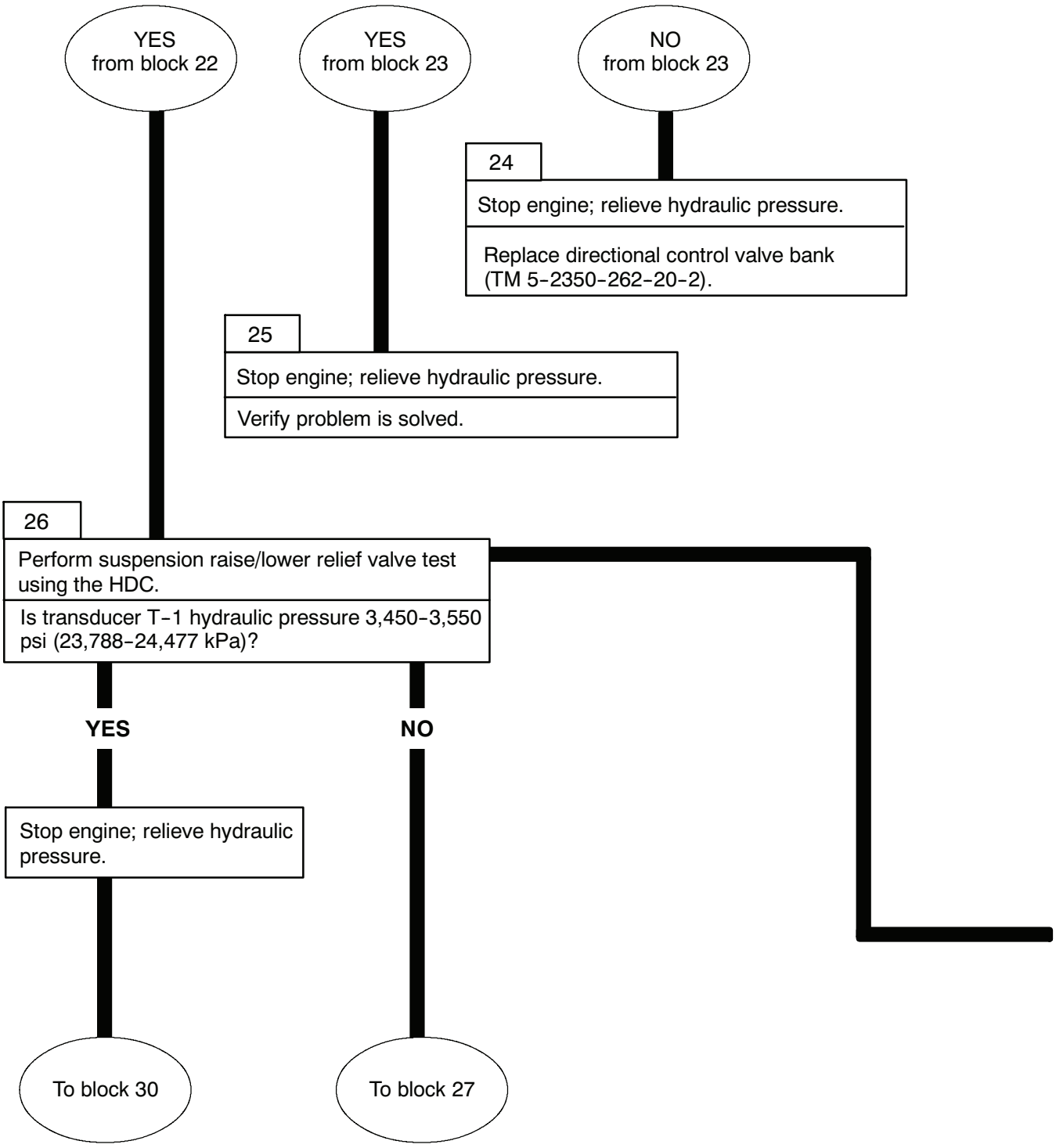


Figure 27. Main Pump Relief Valves

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- For 13L; repeat the previous steps for main relief valve 13L using the left-hand SUSPENSION CONTROL lever. Reference main relief valve 13L jam nut (Figure 27, item 3), adjusting screw (Figure 27, item 2), and pressure transducer T4 (Figure 25, item 1) on HDC display, when adjusting the 13L main relief valve.
- Stop engine; relieve hydraulic pressure.
- Enable ejector; manually open V23 (Figure 26, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 25, item 3), select V1 on the HDC display (Figure 25, item 2). Open V1 on the HDC display (Figure 25, item 2) by selecting the CHANGE POSITION button (Figure 25, item 4) on the HDC control box.


YES
from block 22
YES
from block 23
NO
from block 23
24
Stop engine; relieve hydraulic pressure.
Replace directional control valve bank (TM 5-2350-262-20-2).
25
Stop engine; relieve hydraulic pressure.
Verify problem is solved.
26
Perform suspension raise/lower relief valve test using the HDC.
Is transducer T-1 hydraulic pressure 3,450-3,550 psi (23,788-24,477 kPa)?
YES
NO
Stop engine; relieve hydraulic pressure.
To block 30
To block 27

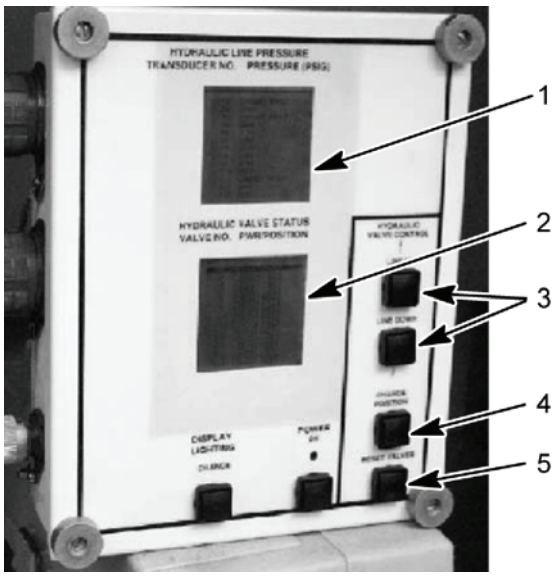


Figure 28. HDC Control Box

SUSPENSION RAISE/LOWER RELIEF VALVE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 28, item 5) on the HDC control box.

NOTE

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

- For 3R; using LINE UP or LINE DOWN button (Figure 28, item 3), select V15 on the HDC display (Figure 28, item 2). Close V15 on the HDC display (Figure 28, item 2) by selecting the CHANGE POSITION button (Figure 28, item 4) on the HDC control box.
- Have assistant start engine. Move right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-1 hydraulic pressure on the HDC display (Figure 28, item 1).
- Using LINE UP or LINE DOWN button (Figure 28, item 3), select V15 on the HDC display (Figure 28, item 2). Open V15 on the HDC display (Figure 28, item 2) by selecting the CHANGE POSITION button (Figure 28, item 4) on the HDC control box.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 28, item 5) on the HDC control box.
- For 3L; using LINE UP or LINE DOWN button (Figure 28, item 3), select V16 on the HDC display (Figure 28, item 2). Close V16 on the HDC display (Figure 28, item 2) by selecting the CHANGE POSITION button (Figure 28, item 4) on the HDC control box.
- Continued on page 0016 00-41.

SUSPENSION RAISE/LOWER RELIEF VALVE TEST - CONTINUED

- Have assistant start engine (if not already running).
- Move left-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-1 hydraulic pressure on the HDC display (Figure 29, item 1).
- Using LINE UP or LINE DOWN button (Figure 29, item 3), select V16 on the HDC display (Figure 29, item 2). Open V16 on the HDC display (Figure 29, item 2) by selecting the CHANGE POSITION button (Figure 29, item 4) on the HDC control box.

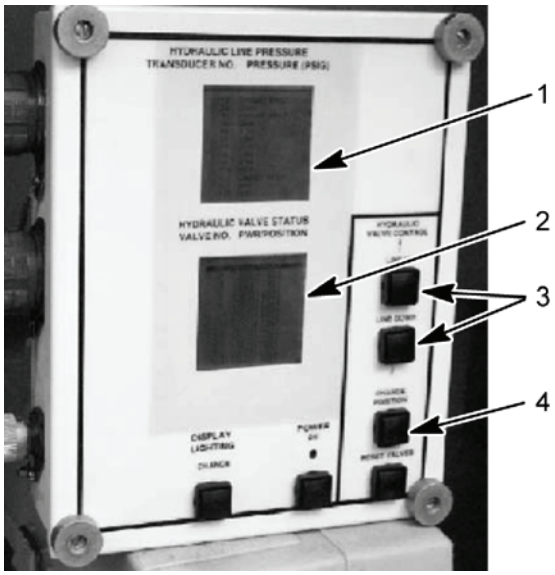
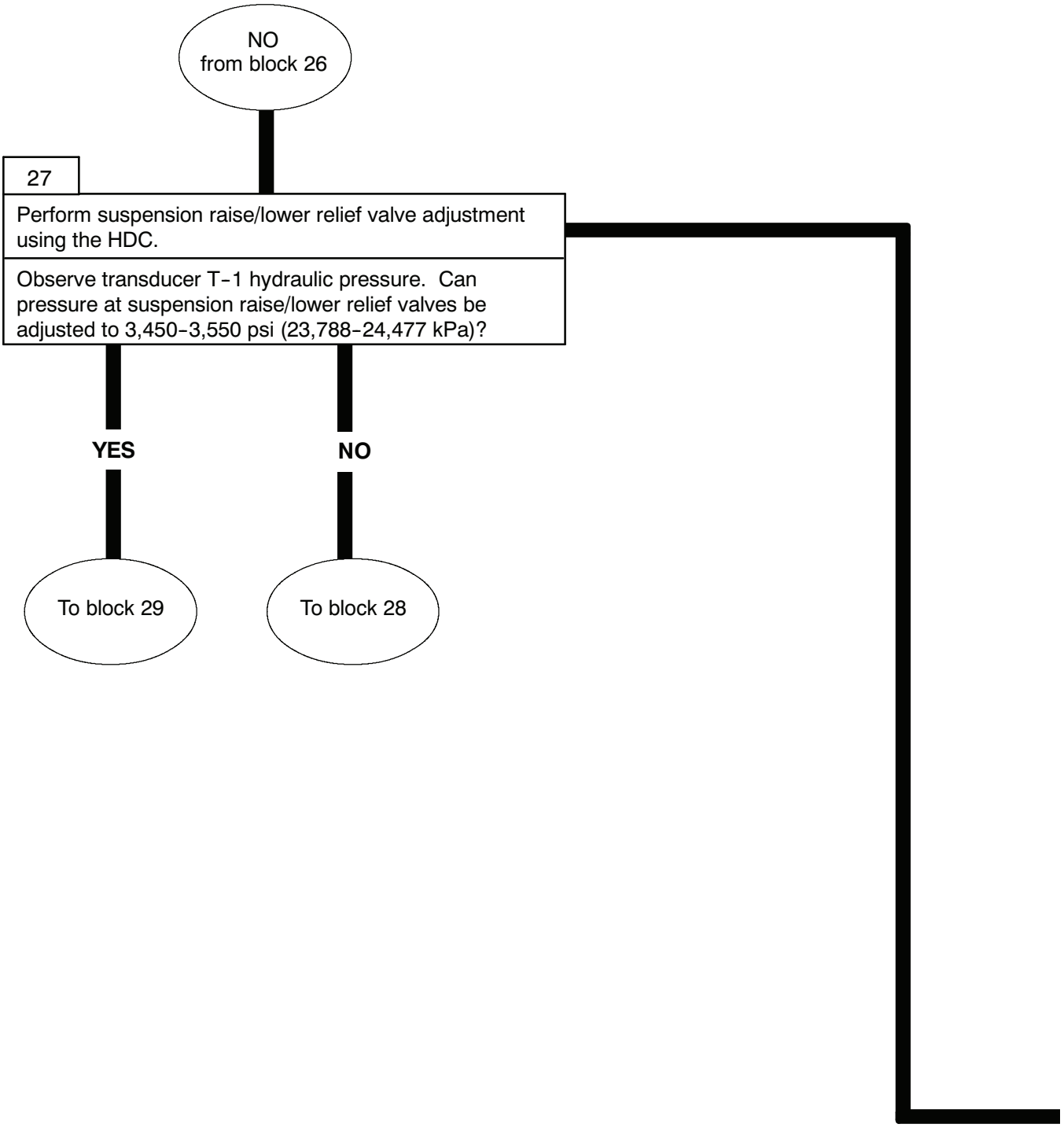


Figure 29. HDC Control Box


NO
from block 26
27
Perform suspension raise/lower relief valve adjustment using the HDC.
Observe transducer T-1 hydraulic pressure. Can pressure at suspension raise/lower relief valves be adjusted to 3,450-3,550 psi (23,788-24,477 kPa)?
YES
NO
To block 29
To block 28

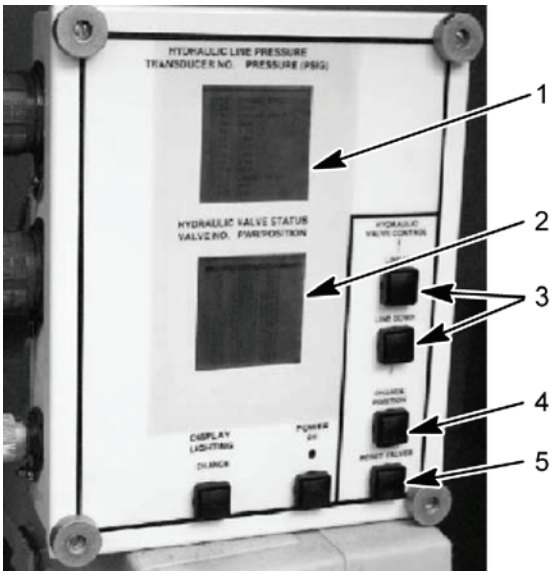


Figure 30. HDC Control Box

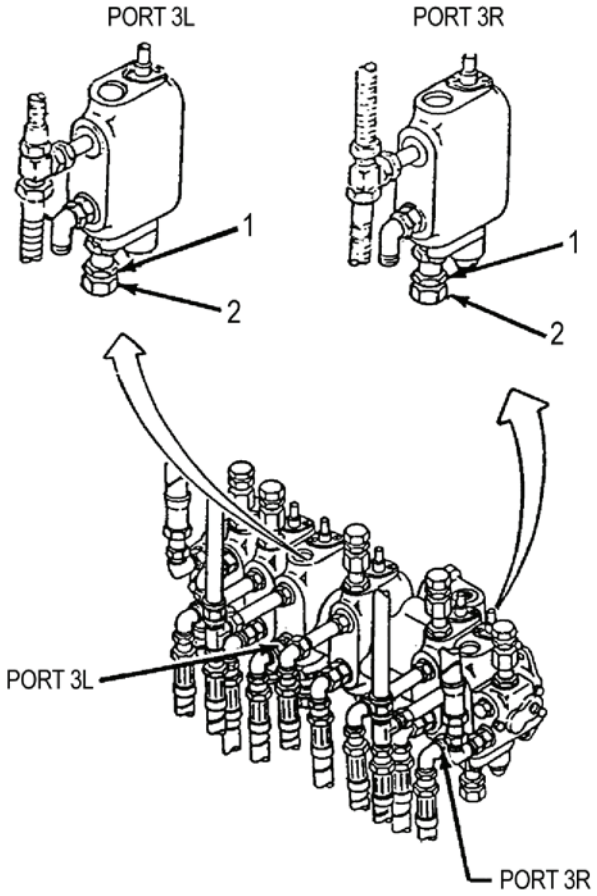


Figure 31. Suspension Relief Valve Port 3L and Port 3R

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 30, item 5) on the HDC control box.
- For port 3R relief valve; loosen jam nut (Figure 31, item 1) on port 3R suspension raise/lower relief valve.
- Using LINE UP or LINE DOWN button (Figure 30, item 3), select V15 on the HDC display (Figure 30, item 2). Close V15 on the HDC display (Figure 30, item 2) by selecting the CHANGE POSITION button (Figure 30, item 4) on the HDC control box.
- With right-hand SUSPENSION CONTROL lever still in the RAISE position, and observing transducer T-1 hydraulic pressure on the HDC display (Figure 30, item 1), turn adjusting screw (Figure 31, item 2) clockwise to increase pressure or counter-clockwise to decrease pressure, until desired pressure is indicated.
- Tighten jam nut (Figure 31, item 1).
- Continued on page 0016 00-45.

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT - CONTINUED

- Using LINE UP or LINE DOWN button (Figure 32, item 3), select V15 on the HDC display (Figure 32, item 2). Open V15 on the HDC display (Figure 32, item 2) by selecting the CHANGE POSITION button (Figure 32, item 4) on the HDC control box.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 32, item 5) on the HDC control box.
- For port 3L relief valve; loosen jam nut (Figure 33, item 1) on port 3L suspension raise/lower relief valve.
- Using LINE UP or LINE DOWN button (Figure 32, item 3), select V16 on the HDC display (Figure 32, item 2). Close V16 on the HDC display (Figure 32, item 2) by selecting the CHANGE POSITION button (Figure 32, item 4) on the HDC control box.
- With left-hand SUSPENSION CONTROL lever still in the RAISE position, and observing transducer T-1 hydraulic pressure on the HDC display (Figure 32, item 1), turn adjusting screw (Figure 33, item 2) clockwise to increase pressure or counterclockwise to decrease pressure until desired pressure is indicated.
- Tighten jam nut (Figure 33, item 1).
- Using LINE UP or LINE DOWN button (Figure 32, item 3), select V16 on the HDC display (Figure 32, item 2). Open V16 on the HDC display (Figure 32, item 2) by selecting the CHANGE POSITION button (Figure 32, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.

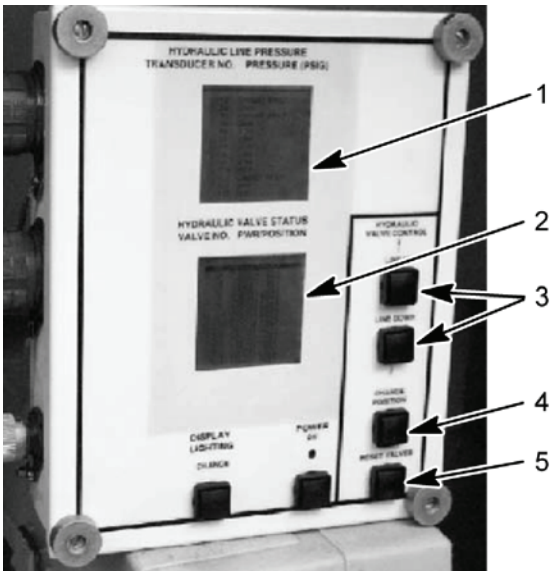


Figure 32. HDC Control Box

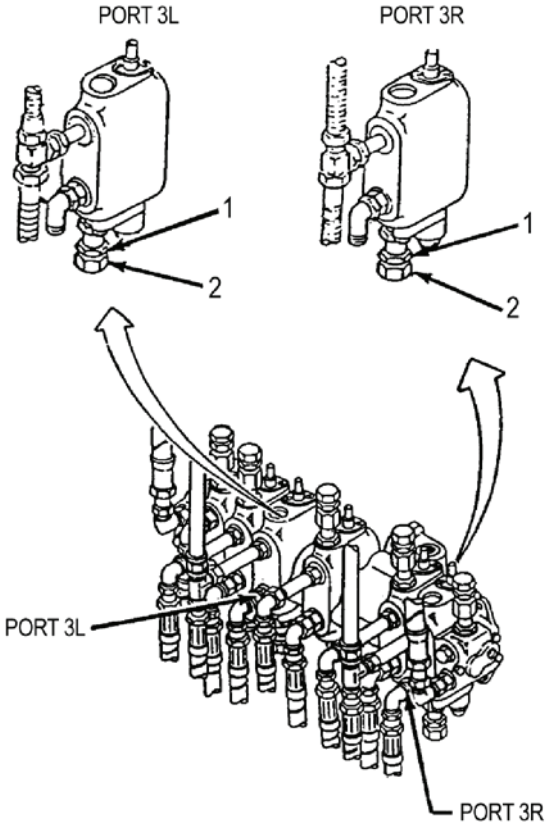
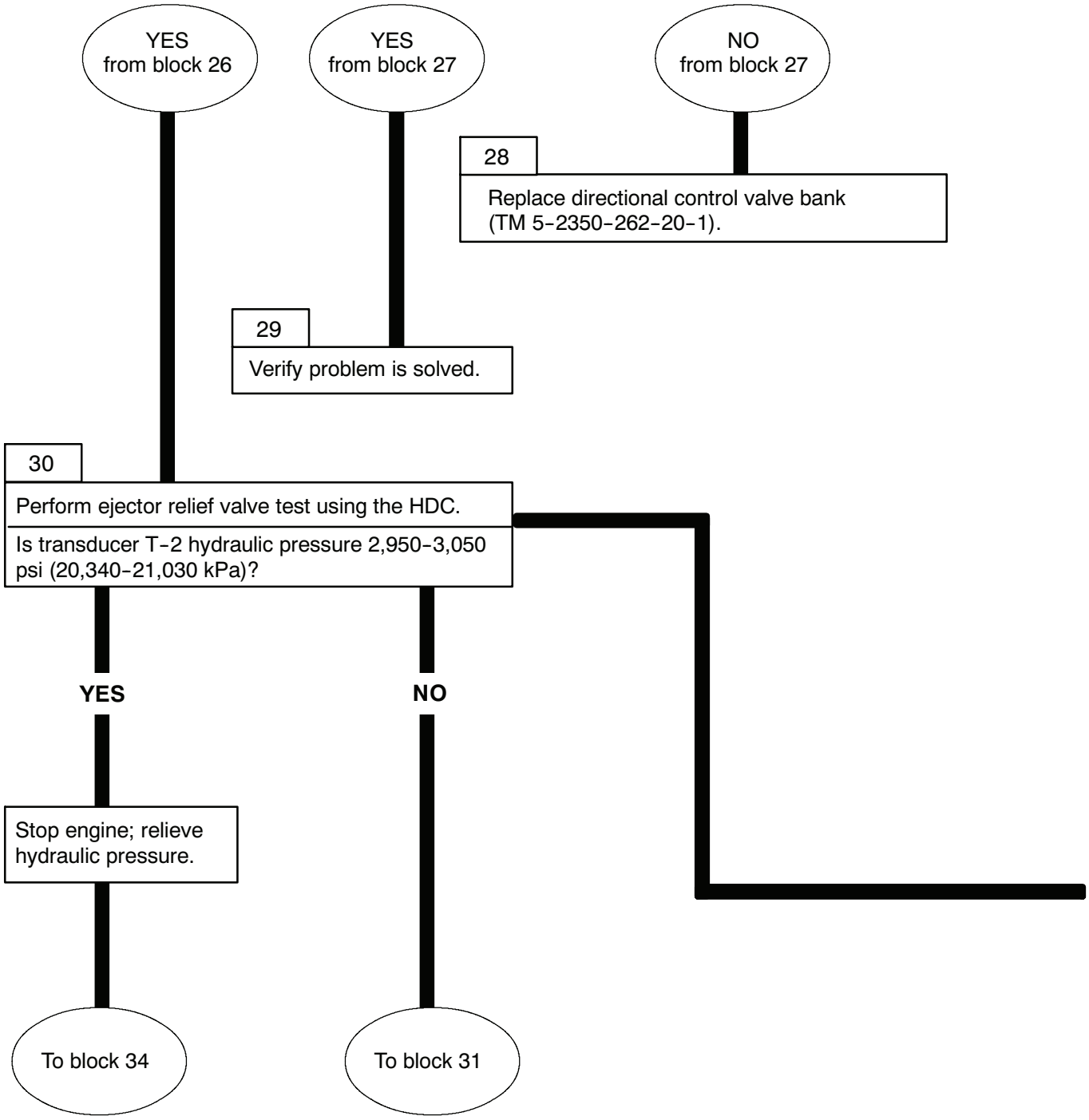


Figure 33. Suspension Relief Valve Port 3L and Port 3R

HYDRAULIC OIL OVERHEATS - Continued **0016 00**



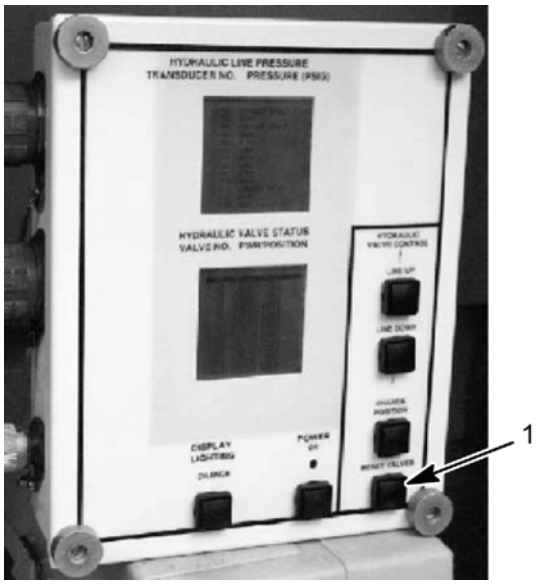


Figure 34. HDC Control Box

EJECTOR RELIEF VALVE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 34, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Move ejector halfway forward.
- Stop engine and relieve hydraulic pressure.
- Continued on page 0016 00-49.

EJECTOR RELIEF VALVE TEST - CONTINUED

- Disable ejector; manually close V23 (Figure 35, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 36, item 3), select V1 on the HDC display (Figure 36, item 2). Close V1 on the HDC display (Figure 36, item 2) by selecting the CHANGE POSITION button (Figure 36, item 4) on the HDC control box.
- Have assistant start engine and hold EJECTOR CONTROL lever in the FORWARD position. Read transducer T-2 hydraulic pressure on the HDC display (Figure 36, item 1).

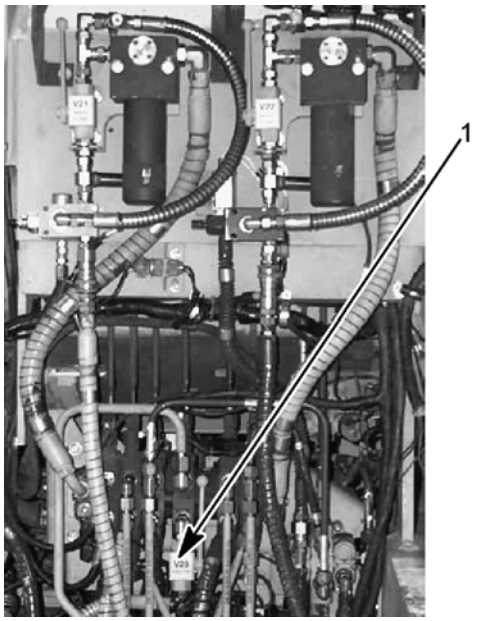


Figure 35. DCV Bank

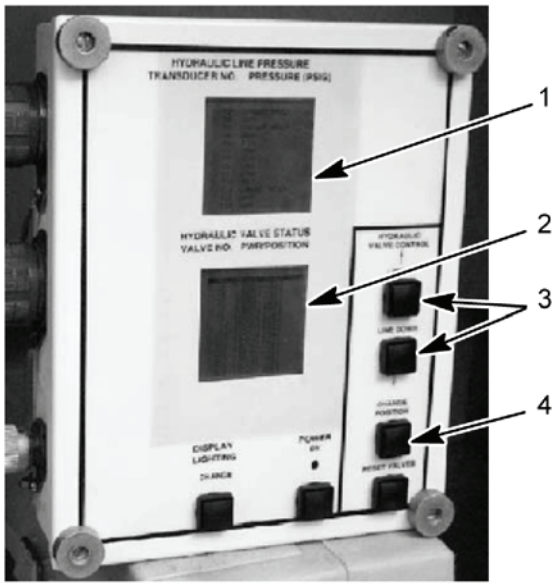
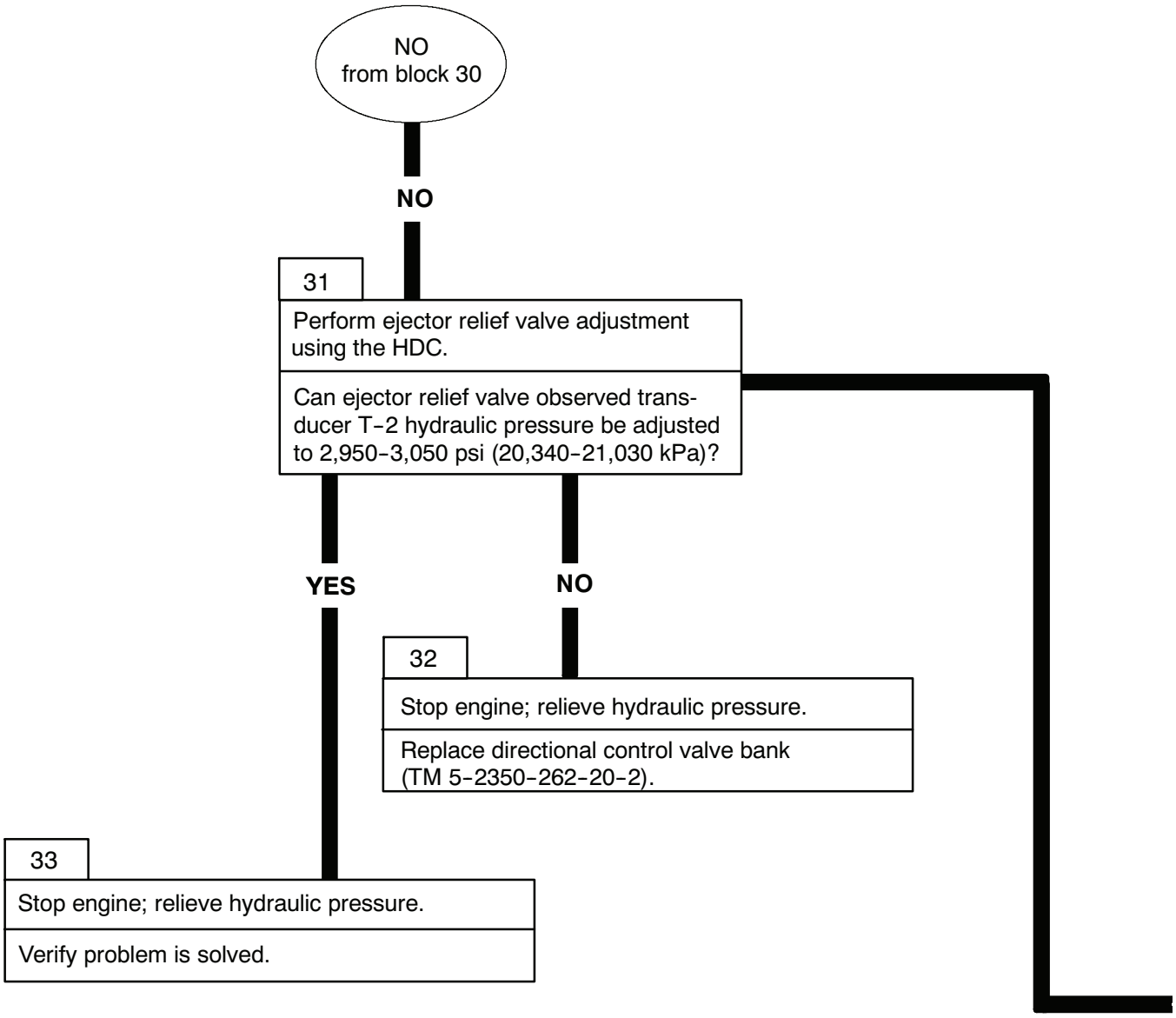


Figure 36. HDC Control Box


NO
from block 30
NO
31
Perform ejector relief valve adjustment using the HDC.
Can ejector relief valve observed transducer T-2 hydraulic pressure be adjusted to 2,950-3,050 psi (20,340-21,030 kPa)?
YES
NO
32
Stop engine; relieve hydraulic pressure.
Replace directional control valve bank (TM 5-2350-262-20-2).
33
Stop engine; relieve hydraulic pressure.
Verify problem is solved.

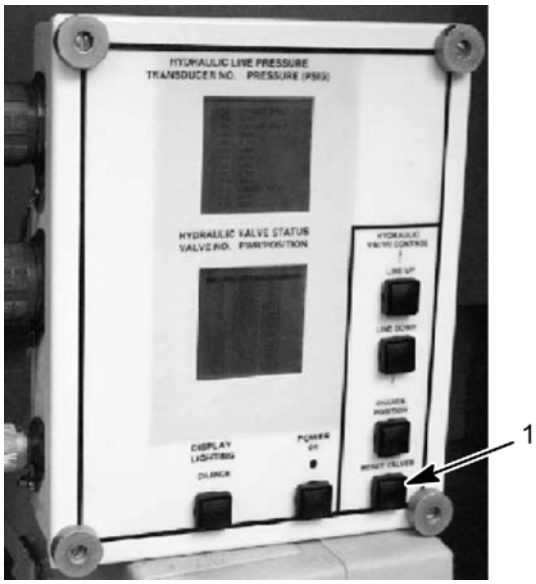


Figure 37. HDC Control Box

EJECTOR RELIEF VALVE ADJUSTMENT

- Stop engine and relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 37, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0016 00-53.

EJECTOR RELIEF VALVE ADJUSTMENT - CONTINUED

- Disable ejector; manually close V23 (Figure 38, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 39, item 3), select V1 on the HDC display (Figure 39, item 2). Close V1 on the HDC display (Figure 39, item 2) by selecting the CHANGE POSITION button (Figure 39, item 4) on the HDC control box.
- Start engine.
- Loosen jam nut (Figure 40, item 1) on ejector relief valve.
- While observing transducer T-2 hydraulic pressure on the HDC display (Figure 39, item 1); turn relief valve adjustment (Figure 40, item 2) clockwise (to increase pressure) or counterclockwise (to decrease pressure) until hydraulic pressure is within limits. Tighten jam nut (Figure 40, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector; manually open V23 (Figure 38, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 39, item 3), select V1 on the HDC display (Figure 39, item 2). Open V1 on the HDC display (Figure 39, item 2) by selecting the CHANGE POSITION button (Figure 39, item 4) on the HDC control box.

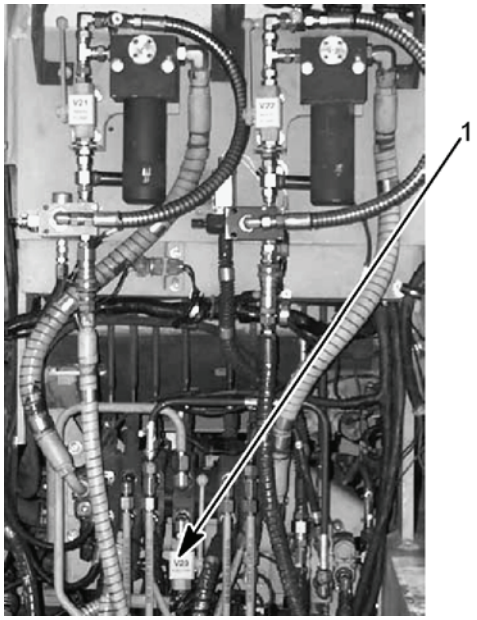


Figure 38. DCV Bank

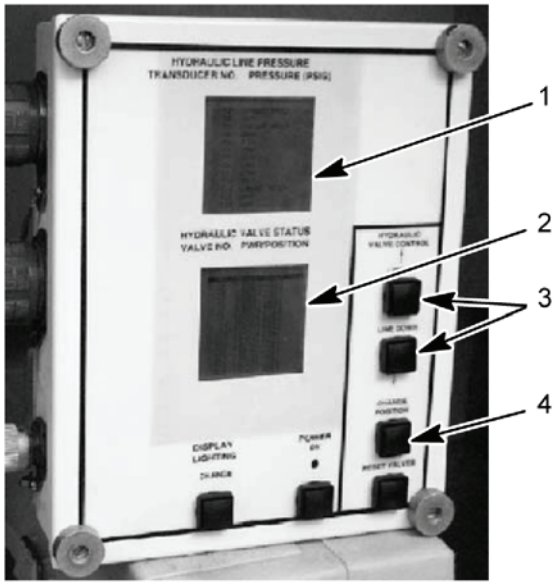


Figure 39. HDC Control Box

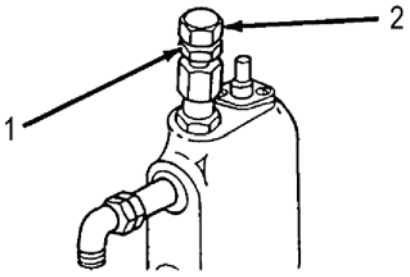
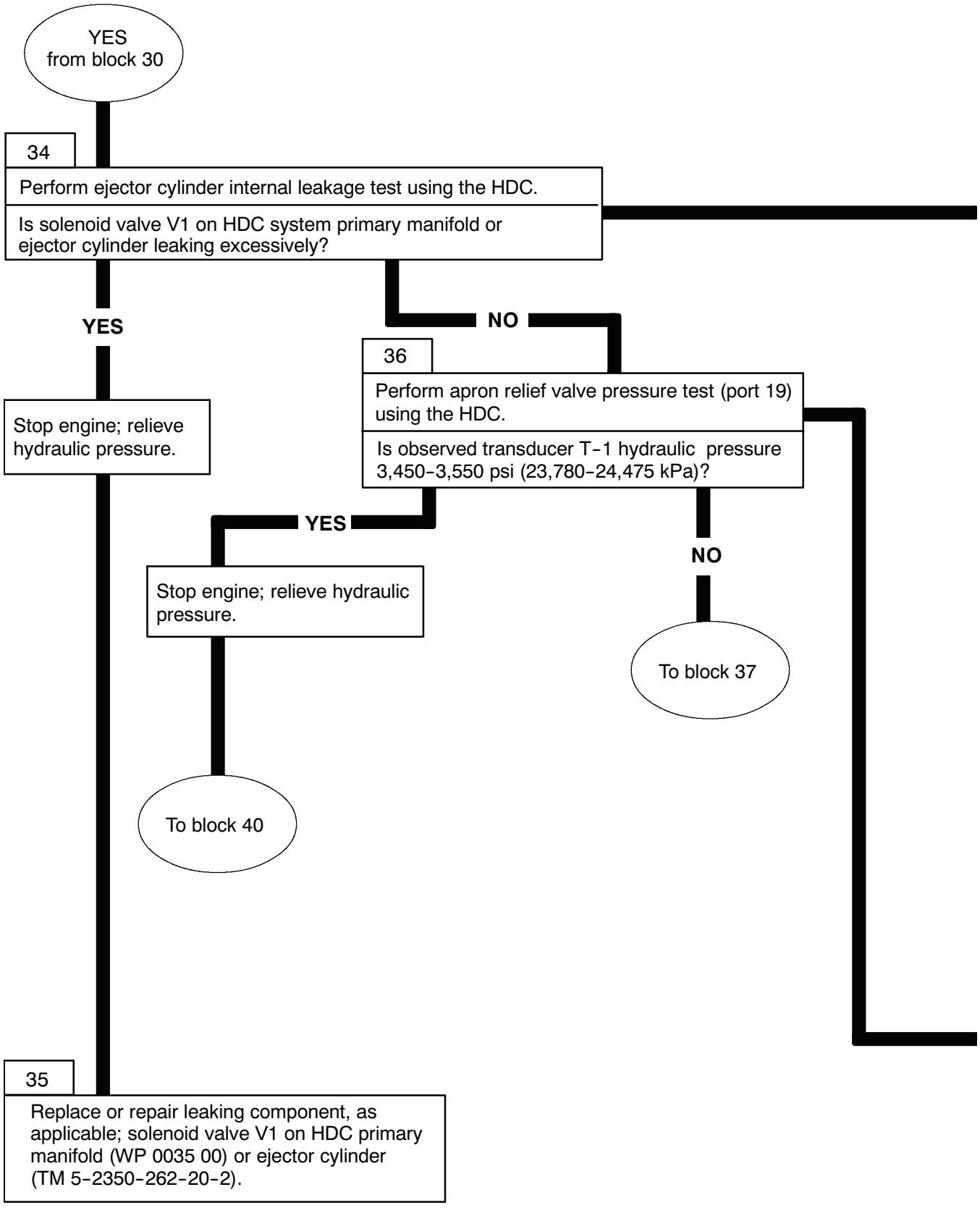


Figure 40. Ejector Relief Valve


YES
from block 30
34
Perform ejector cylinder internal leakage test using the HDC.
Is solenoid valve V1 on HDC system primary manifold or ejector cylinder leaking excessively?
YES
NO
Stop engine; relieve hydraulic pressure.
36
Perform apron relief valve pressure test (port 19) using the HDC.
Is observed transducer T-1 hydraulic pressure 3,450-3,550 psi (23,780-24,475 kPa)?
YES
NO
Stop engine; relieve hydraulic pressure.
To block 37
To block 40
35
Replace or repair leaking component, as applicable; solenoid valve V1 on HDC primary manifold (WP 0035 00) or ejector cylinder (TM 5-2350-262-20-2).

EJECTOR CYLINDER INTERNAL LEAKAGE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 41, item 4) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 41, item 2), select V1 on the HDC display (Figure 41, item 1). Close V1 on the HDC display (Figure 41, item 1) by selecting the CHANGE POSITION button (Figure 41, item 3) on the HDC control box.
- 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 forward more than 1/2 in (12mm), the ejector cylinder is leaking excessively. If the ejector has moved aft more than 1/2 in (12mm), solenoid valve V1 on the HDC primary manifold is leaking.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 41, item 4) on the HDC control box.

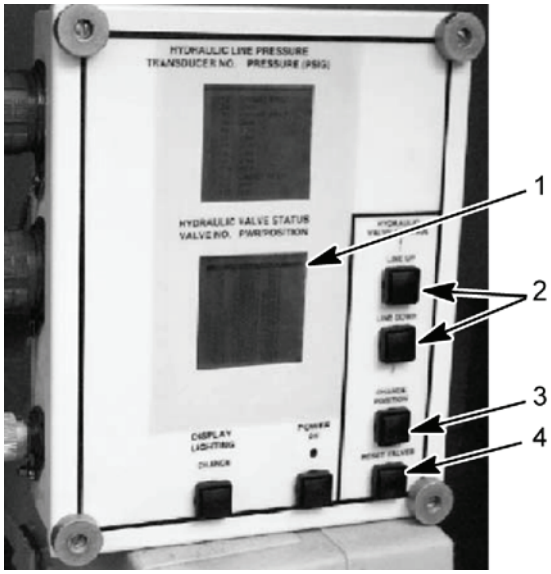


Figure 41. HDC Control Box

APRON RELIEF VALVE PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 41, item 4) on the HDC control box.
- Continued on page 0016 00-57.

APRON RELIEF VALVE PRESSURE TEST - CONTINUED

- Move ejector forward, engage ejector lock.
- Using LINE UP or LINE DOWN button (Figure 42, item 3), select V17 on the HDC display (Figure 42, item 2). Close V17 on the HDC display (Figure 42, item 2), by selecting the CHANGE POSITION button (Figure 42, item 4) on the HDC control box.
- Have assistant start engine and hold APRON CONTROL lever in the UP position. Read transducer T-1 hydraulic pressure on the HDC display (Figure 42, item 1). If pressure is low, adjust apron RAISE relief valve.

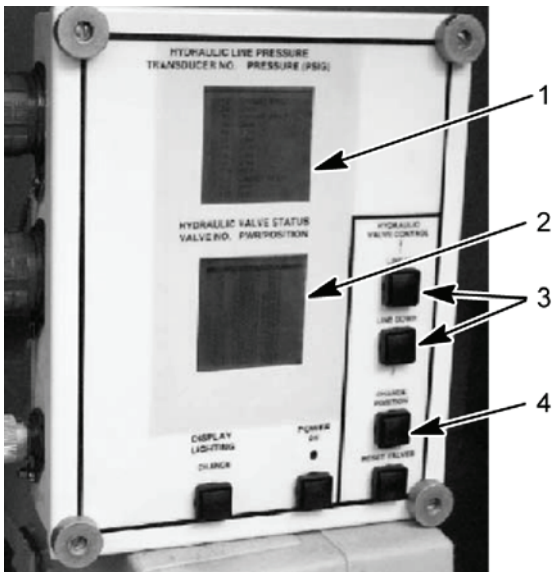
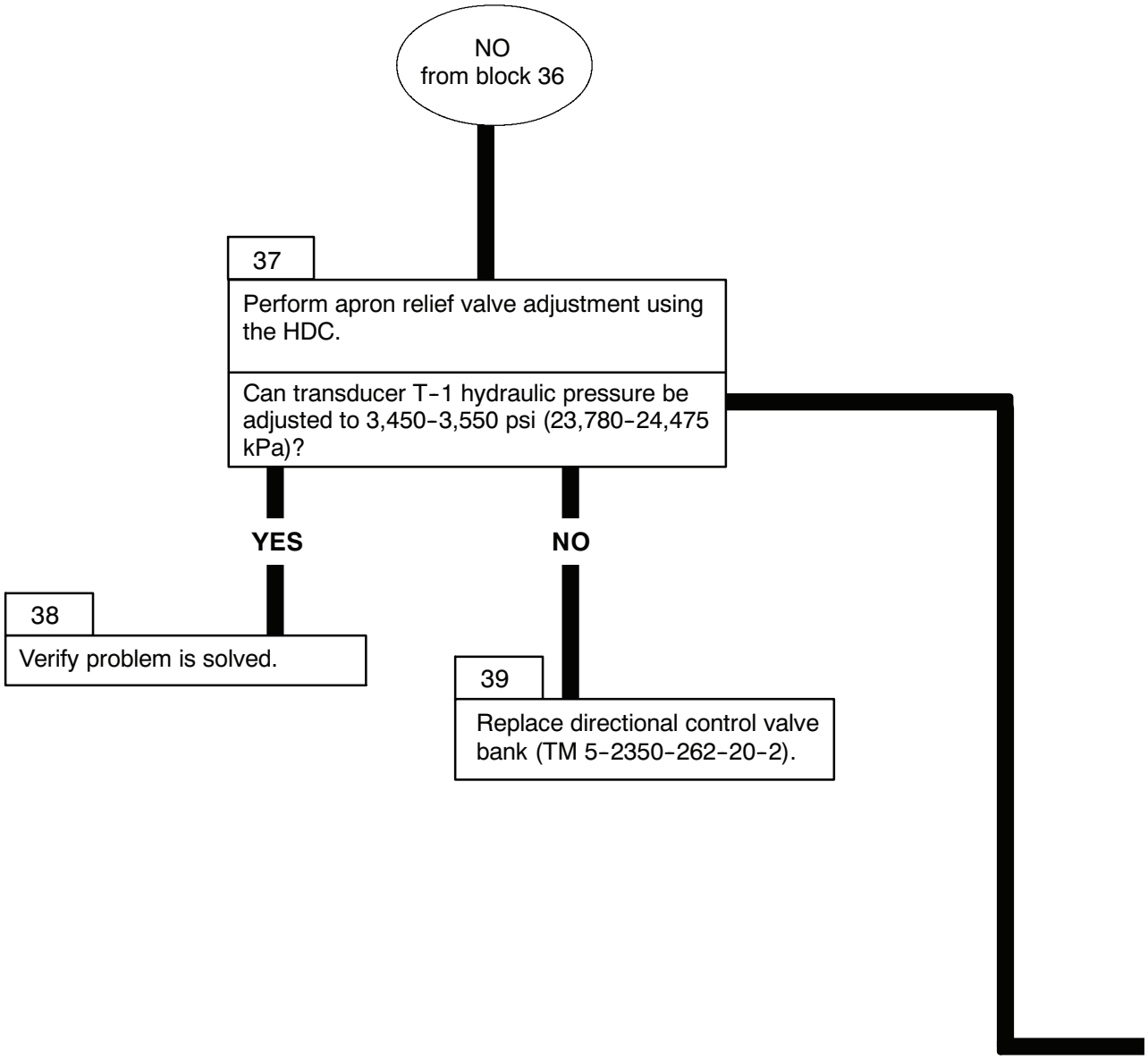


Figure 42. HDC Control Box


NO
from block 36
37
Perform apron relief valve adjustment using the HDC.
Can transducer T-1 hydraulic pressure be adjusted to 3,450-3,550 psi (23,780-24,475 kPa)?
YES
NO
38
Verify problem is solved.
39
Replace directional control valve bank (TM 5-2350-262-20-2).

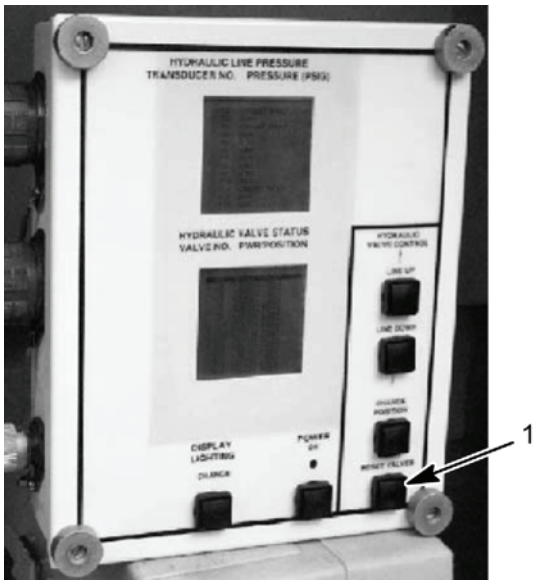


Figure 43. HDC Control Box

APRON RELIEF VALVE ADJUSTMENT

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 43, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**
- Continued on page 0016 00-61.

APRON RELIEF VALVE ADJUSTMENT - CONTINUED

- Disable ejector; manually close V23 (Figure 45, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 44, item 3), select V1 on the HDC display (Figure 44, item 2). Close V1 on the HDC display (Figure 44, item 2) by selecting the CHANGE POSITION button (Figure 44, item 4) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 44, item 3), select V17 on the HDC display (Figure 44, item 2). Close V17 on the HDC display (Figure 44, item 2) by selecting the CHANGE POSITION button (Figure 44, item 4) on the HDC control box.
- Start engine.
- As assistant holds APRON CONTROL lever in the UP position, loosen jam nut (Figure 46, item 1) while observing transducer T-1 hydraulic pressure on the HDC display (Figure 44, item 1).
- Rotate adjusting screw (Figure 46, item 2) clockwise to increase pressure; counter-clockwise to decrease pressure, as necessary to obtain desired pressure. Tighten jam nut (Figure 46, item 1).
- Stop engine; relieve hydraulic pressure.
- Manually open V23 (Figure 45, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 44, item 3), select V1 on the HDC display (Figure 44, item 2). Open V1 on the HDC display (Figure 44, item 2) by selecting the CHANGE POSITION button (Figure 44, item 4) on the HDC control box. Using LINE UP or LINE DOWN button (Figure 44, item 3), select V17 on the HDC display (Figure 44, item 2). Open V17 on the HDC display (Figure 44, item 2) by selecting the CHANGE POSITION button (Figure 44, item 4) on the HDC control box.

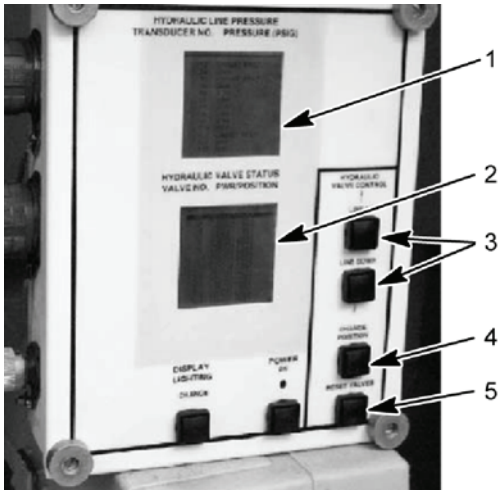


Figure 44. HDC Control Box

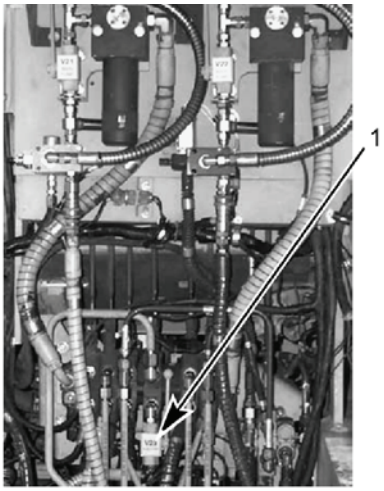


Figure 45. DCV Bank

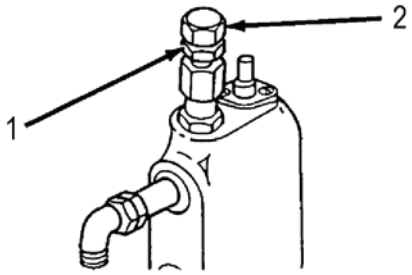
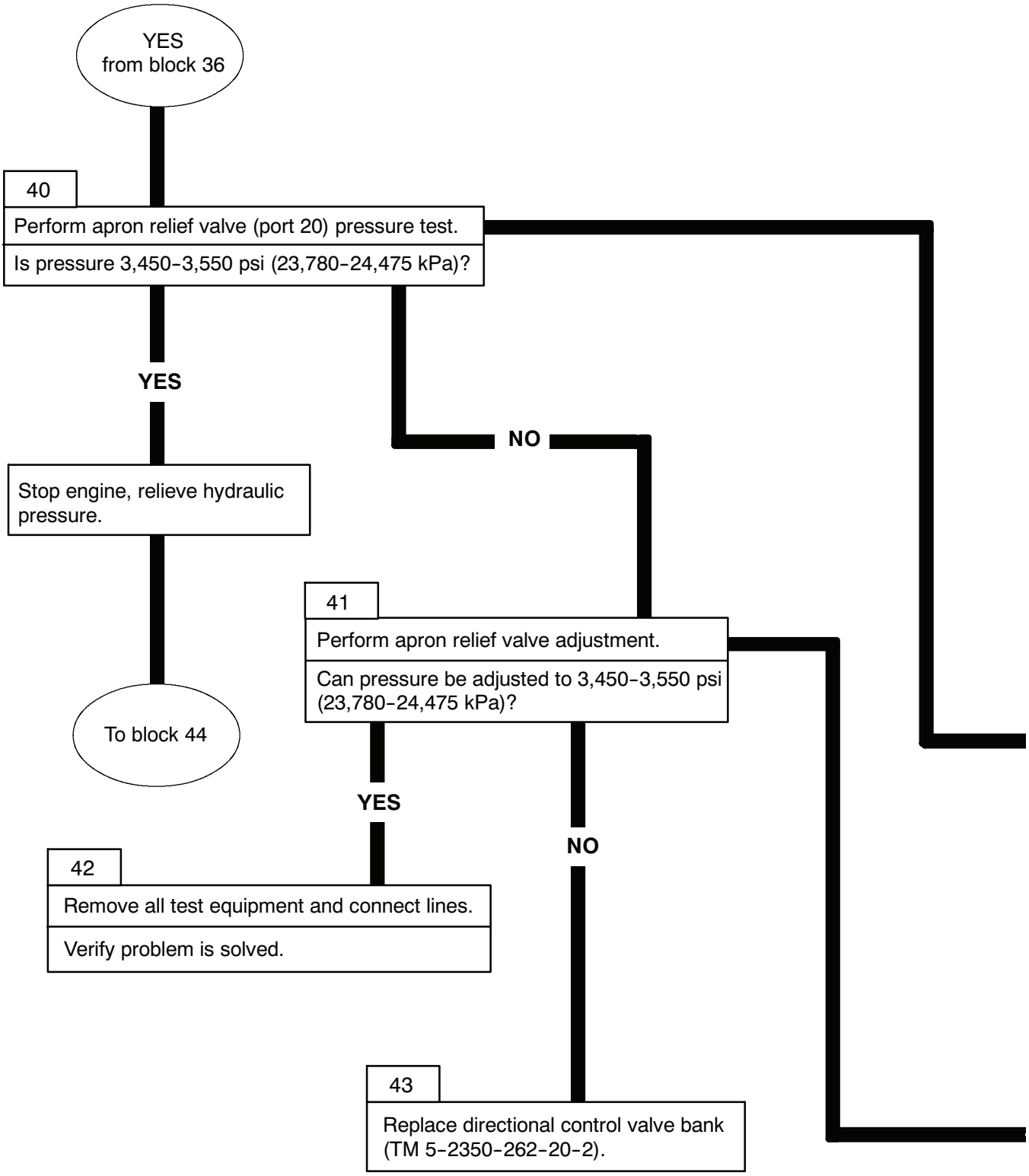


Figure 46. Apron Relief Valve


YES
from block 36
40
Perform apron relief valve (port 20) pressure test.
Is pressure 3,450-3,550 psi (23,780-24,475 kPa)?
YES
NO
Stop engine, relieve hydraulic pressure.
To block 44
41
Perform apron relief valve adjustment.
Can pressure be adjusted to 3,450-3,550 psi (23,780-24,475 kPa)?
YES
NO
42
Remove all test equipment and connect lines.
Verify problem is solved.
43
Replace directional control valve bank (TM 5-2350-262-20-2).

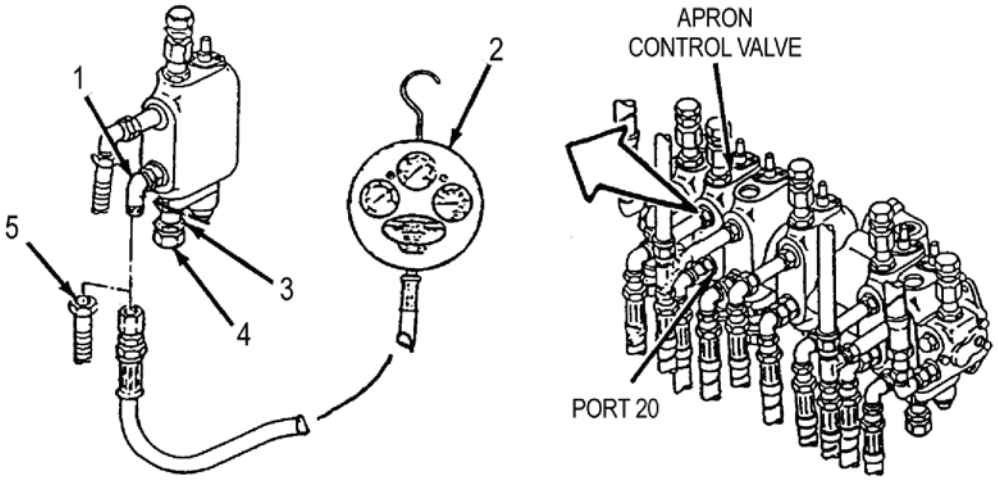


Figure 47. Apron Control Valve

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.

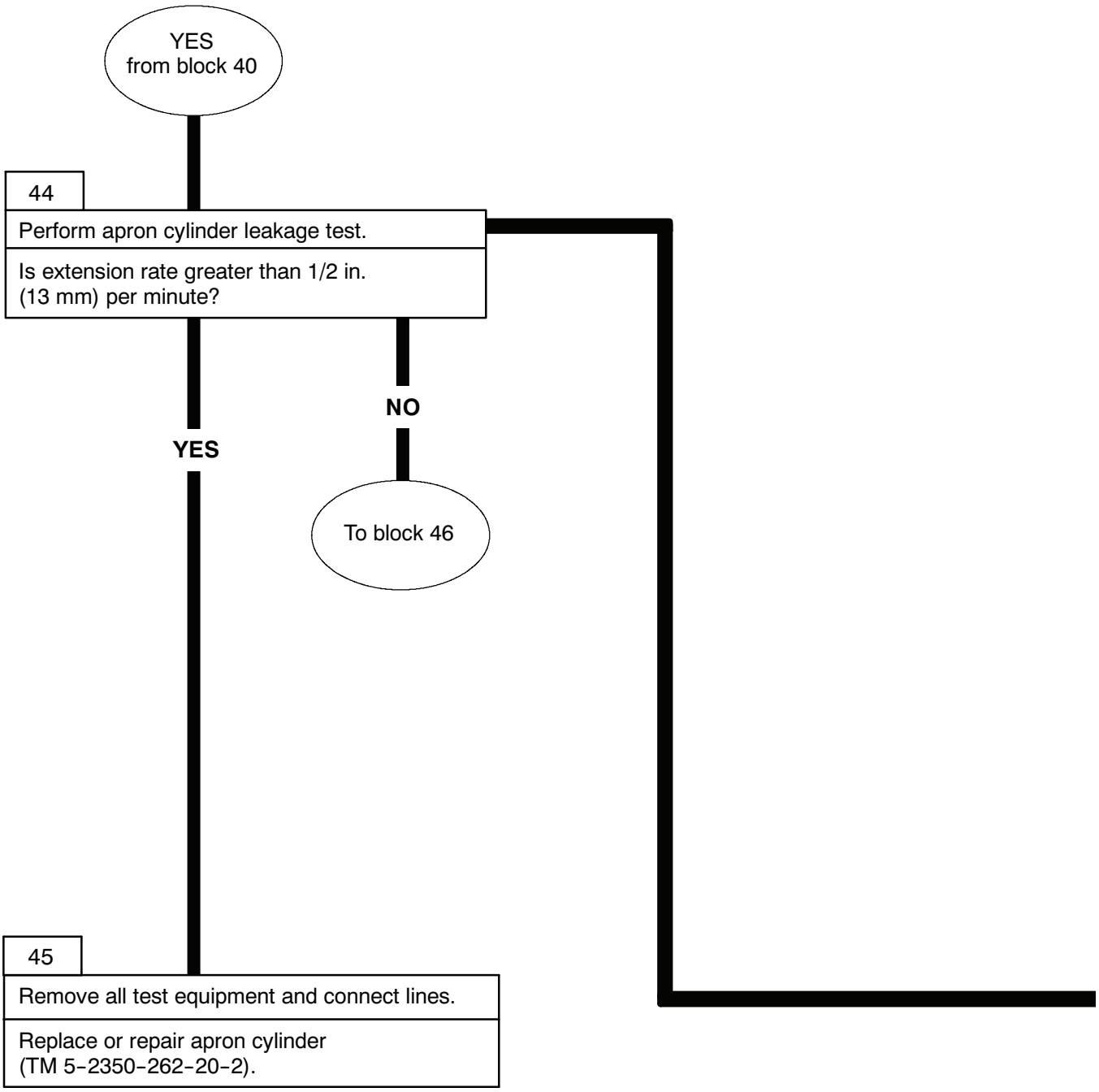
NOTE

Have suitable container ready to catch oil.

- Start engine, move ejector forward, engage ejector lock.
- Stop engine; relieve hydraulic pressure.
- Disconnect CONT VLV-20 hose (Figure 47, item 5) from elbow (Figure 47, item 1) at port 20 of apron control valve. Connect pressure measuring device (Figure 47, item 2) to elbow (Figure 47, item 1). Plug hose (Figure 47, item 5).
- Have assistant start engine and hold APRON CONTROL lever in DOWN position. Read pressure measuring device (Figure 47, item 2).

APRON RELIEF VALVE ADJUSTMENT

- As assistant holds APRON CONTROL lever DOWN, loosen jam nut (Figure 47, item 3) and rotate adjusting screw (Figure 47, item 4) clockwise to increase pressure; counterclockwise to decrease pressure. When adjustment is completed, tighten jam nut (Figure 47, item 3).
- Stop engine; relieve hydraulic pressure.


YES
from block 40
44
Perform apron cylinder leakage test.
Is extension rate greater than 1/2 in.
(13 mm) per minute?
NO
YES
To block 46
45
Remove all test equipment and connect lines.
Replace or repair apron cylinder
(TM 5-2350-262-20-2).

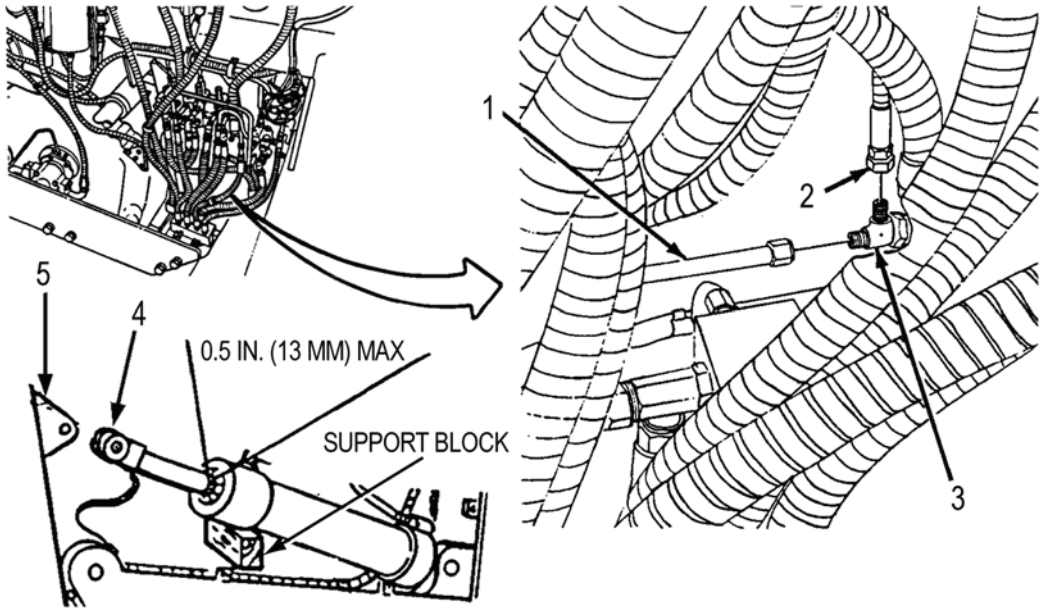


Figure 48. Apron Cylinder Leakage Test

APRON CYLINDER LEAKAGE TEST

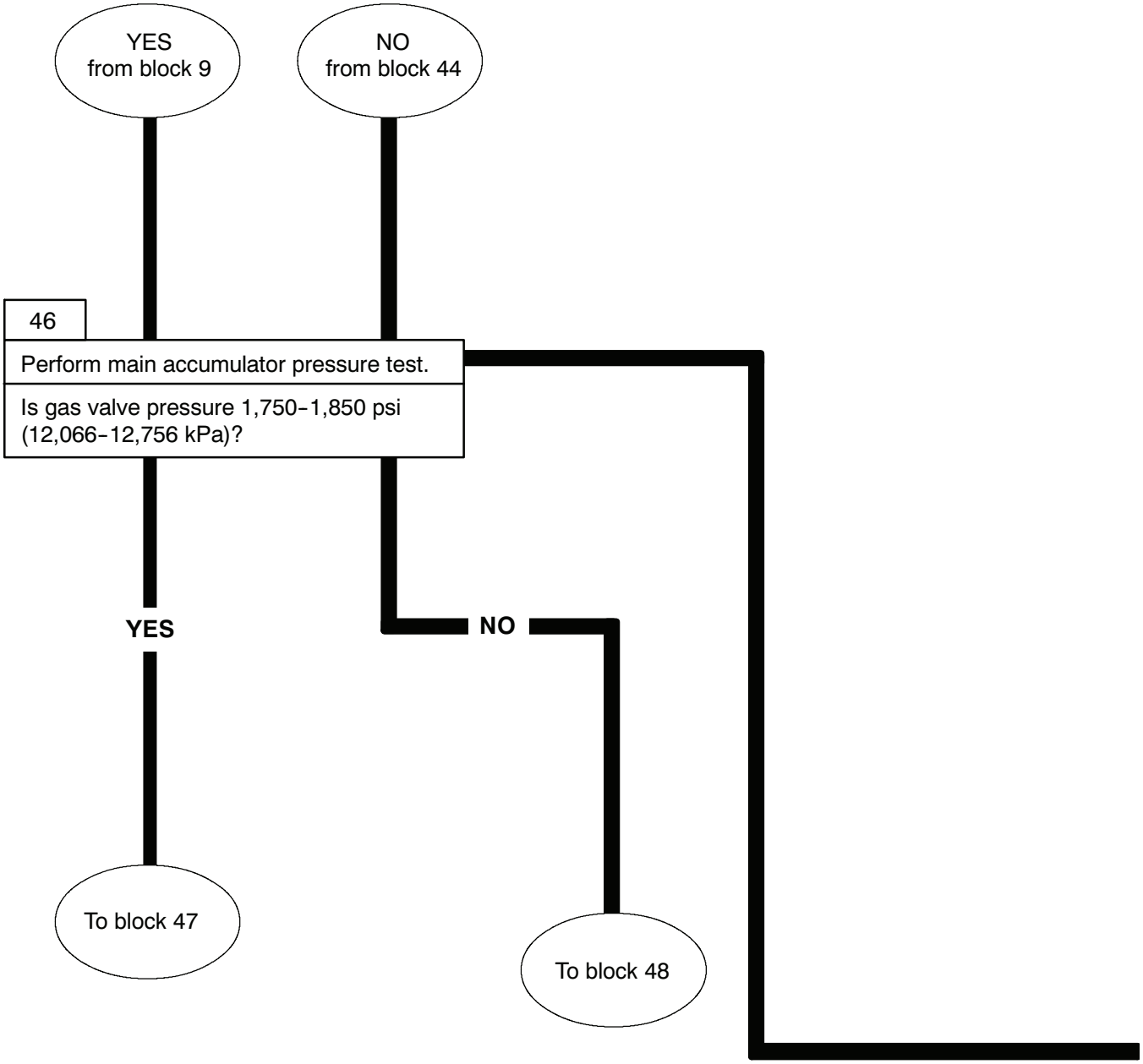
CAUTION

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 (Figure 48, item 4) from apron (Figure 48, item 5).
- Retract cylinder rods (Figure 48, item 4) approximately halfway.
- Stop engine; relieve hydraulic pressure.
- Disconnect CKT-20 (REAR) TEE hose (Figure 48, item 2) and CKT-20 (REAR) TEE tube (Figure 48, item 1) from tee (Figure 48, item 3) 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 (Figure 48, item 4). Continue to hold APRON CONTROL lever in UP position for one minute. Measure the extension of both cylinder rods (Figure 48, item 4) 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.


YES
from block 9
NO
from block 44
46
Perform main accumulator pressure test.
Is gas valve pressure 1,750-1,850 psi (12,066-12,756 kPa)?
YES
NO
To block 47
To block 48

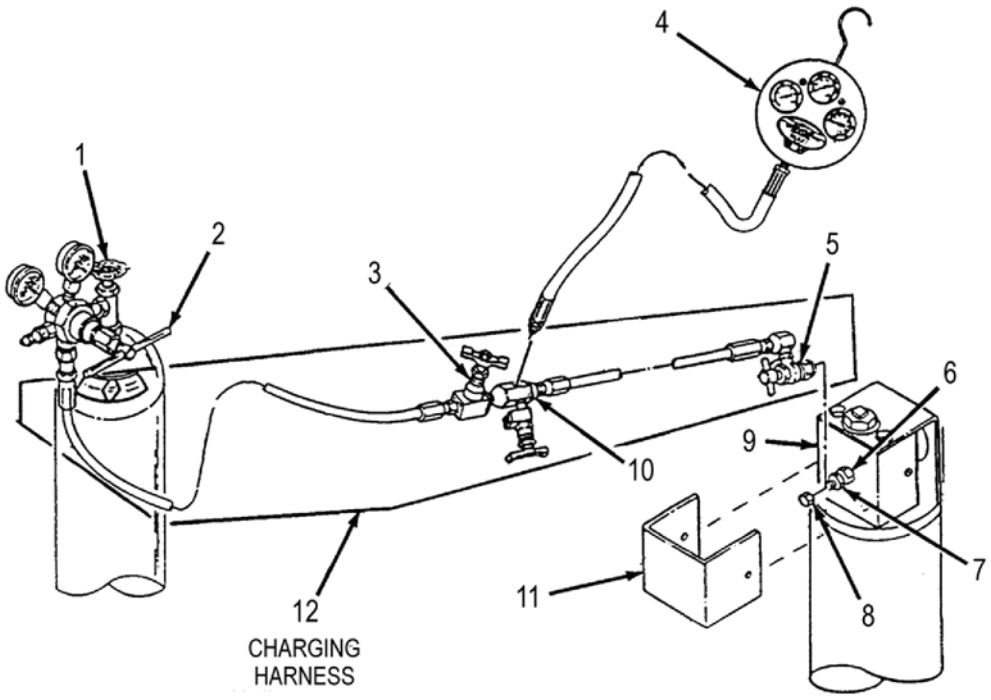


Figure 49. Main Hydraulic Accumulator

MAIN HYDRAULIC ACCUMULATOR PRESSURE TEST

WARNING

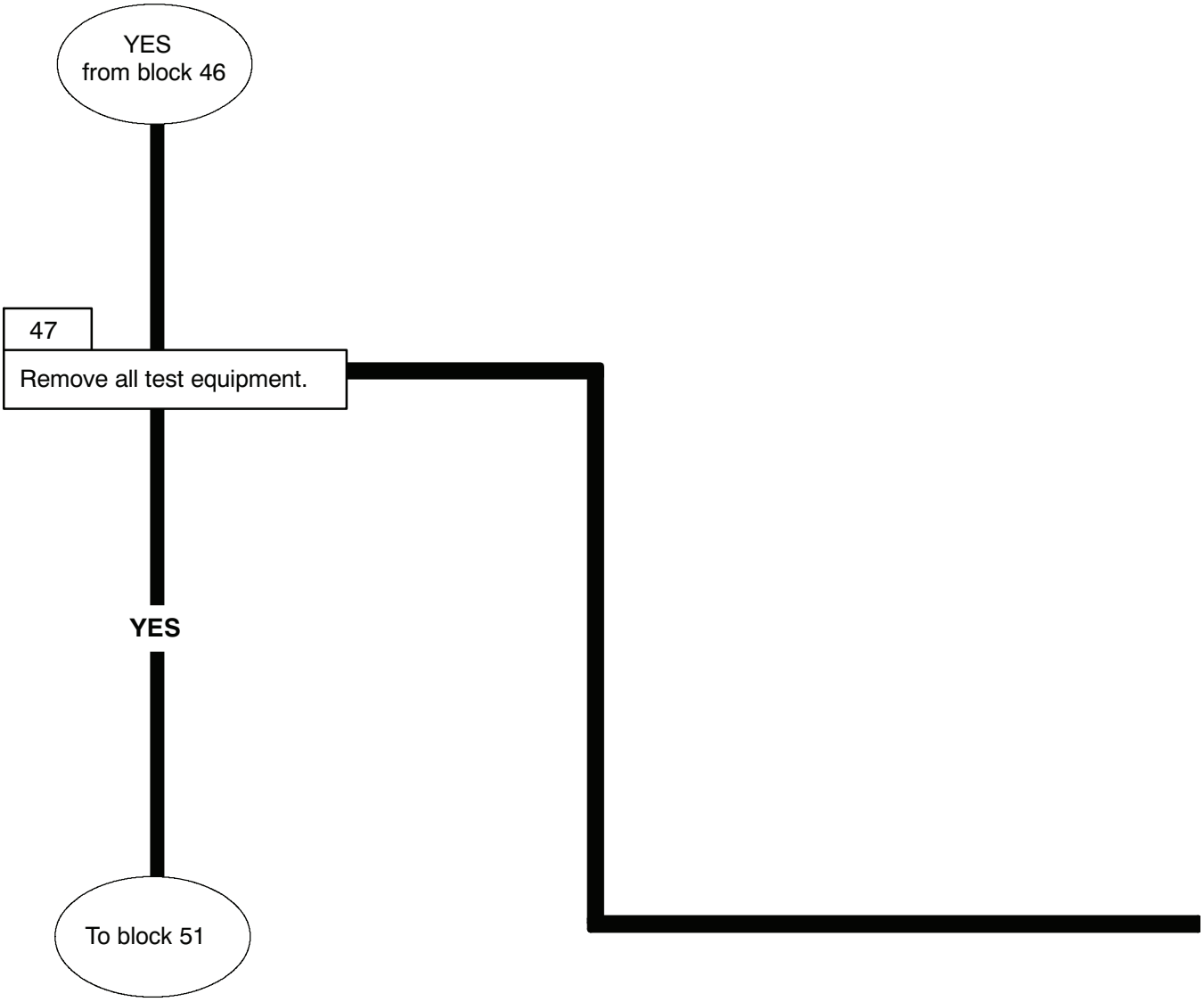
- **High-pressure nitrogen gas is used in this equipment. Keep hands and face away from valves and hose ends. Failure to comply may result in severe injury or death to personnel.**
- **Do not breathe nitrogen gas. Failure to comply may result in severe injury or death to personnel.**

- Connect pressure measuring device (Figure 49, item 4) to bleed valve (Figure 49, item 10) on charging harness (Figure 49, item 12). Close shutoff valve (Figure 49, item 3).
- Open nitrogen tank valve (Figure 49, item 1) and adjust regulator valve (Figure 49, item 2) to 50 psi (353 kPa).
- Open shutoff valve (Figure 49, item 3) for about 10 seconds to clear charging hoses. Close valve (Figure 49, item 3).
- Remove valve guard (Figure 49, item 11). Remove charge valve cap (Figure 49, item 8) from charge valve assembly (Figure 49, item 6) on accumulator (Figure 49, item 9).
- Loosely connect adapter valve (Figure 49, item 5) to charge valve (Figure 49, item 6) and again open shutoff valve (Figure 49, item 3) for about 10 seconds. Close shutoff valve (Figure 49, item 3). Fully tighten adapter valve (Figure 49, item 5).

NOTE

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

- Open charge valve (Figure 49, item 6) by loosening nut (Figure 49, item 7). Read pressure measuring device (Figure 49, item 4).


YES
from block 46
47
Remove all test equipment.
YES
To block 51

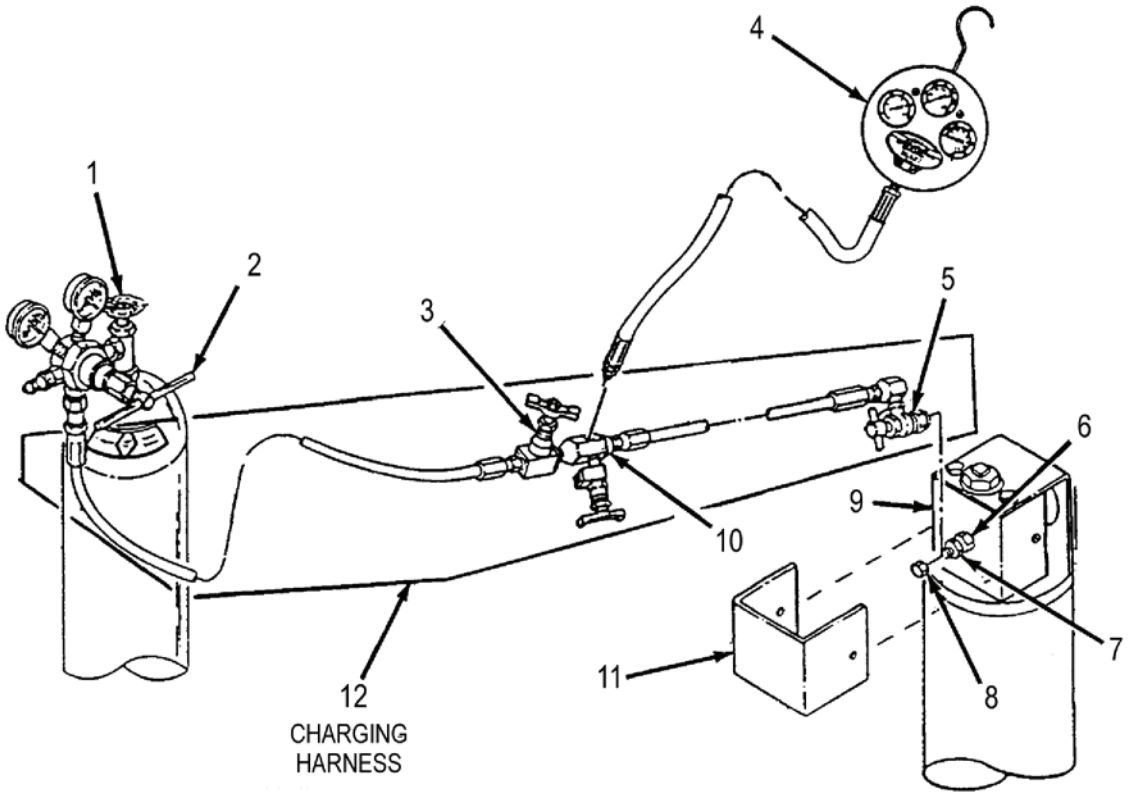
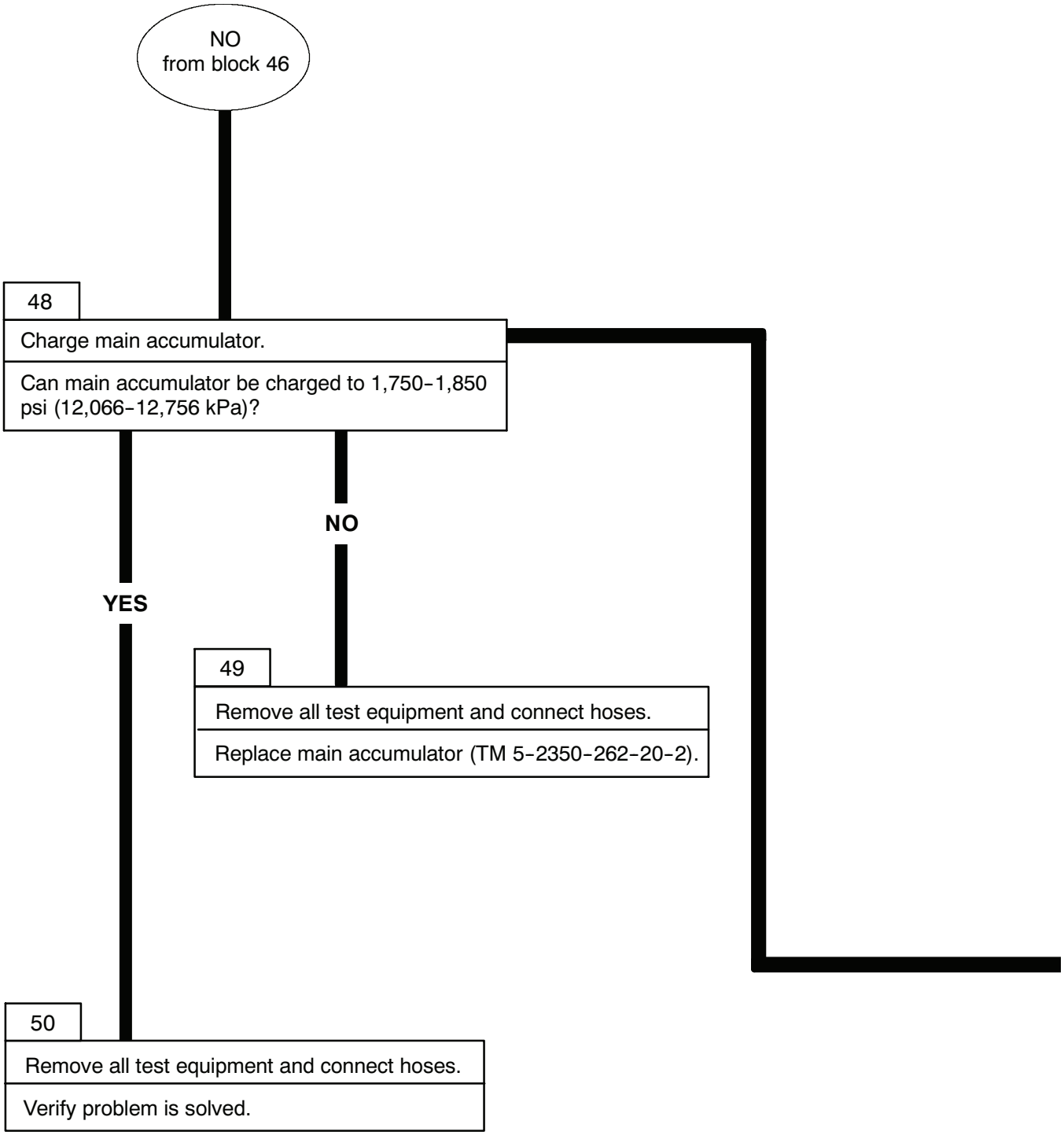


Figure 50. Main Hydraulic Accumulator

MAIN HYDRAULIC ACCUMULATOR PRESSURE TEST - CONTINUED

Tighten nut (Figure 50, item 7) on charge valve (Figure 50, item 6). Close nitrogen tank valve (Figure 50, item 1). Back off regulator valve (Figure 50, item 2), open bleed valve (Figure 50, item 10), and bleed hose pressure to 0 psi. Remove adapter valve (Figure 50, item 5) from charge valve (Figure 50, item 6). Remove pressure measuring device (Figure 50, item 4) from bleed valve (Figure 50, item 10) on charging harness (Figure 50, item 12). Install charge valve cap (Figure 50, item 8) on charge valve (Figure 50, item 6). Install valve guard (Figure 50, item 11).


NO
from block 46
48
Charge main accumulator.
Can main accumulator be charged to 1,750-1,850 psi (12,066-12,756 kPa)?
NO
YES
49
Remove all test equipment and connect hoses.
Replace main accumulator (TM 5-2350-262-20-2).
50
Remove all test equipment and connect hoses.
Verify problem is solved.

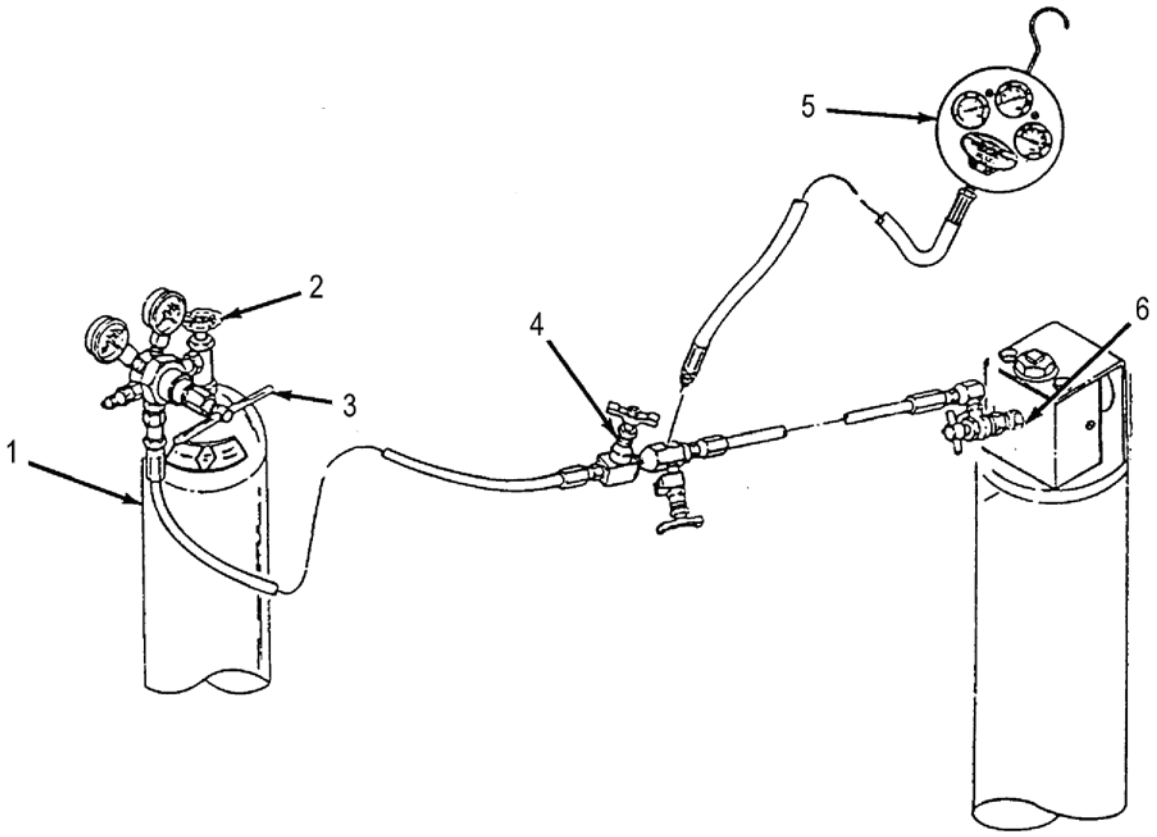


Figure 51. Main Accumulator Charging

MAIN ACCUMULATOR CHARGING

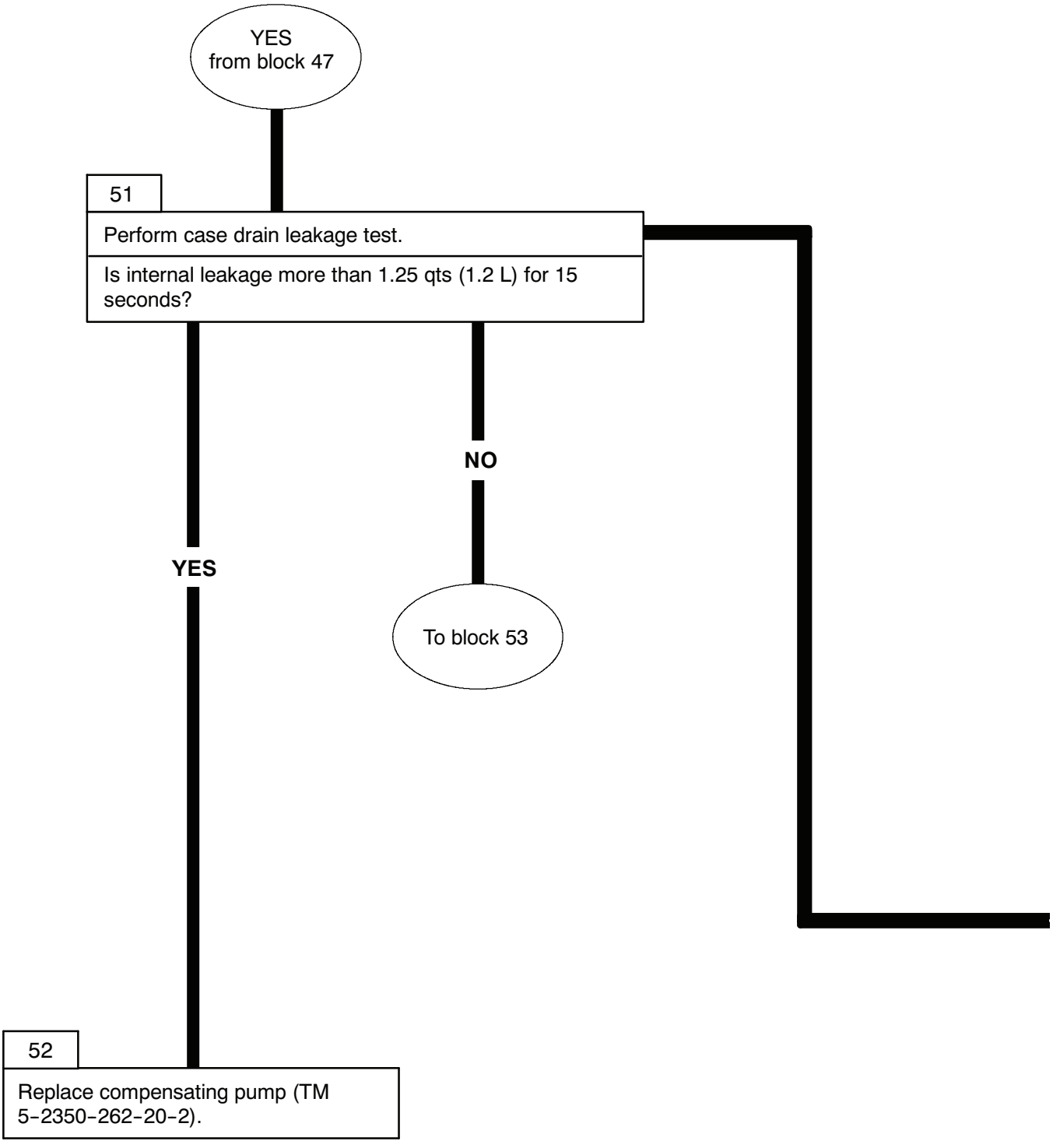
CAUTION

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 (Figure 51, item 3) on nitrogen tank (Figure 51, item 1) to 1.750-1,850 psi (12,066-12,756 kPa).
- Open shutoff valve (Figure 51, item 4). Read pressure measuring device (Figure 51, item 5). When pressure reaches 1.750-1,850 psi (12,066-12,756 kPa), close shutoff valve (Figure 51, item 4), nitrogen tank valve (Figure 51, item 2), and accumulator charge valve (Figure 51, item 6).
- Wait 15 minutes and open charge valve (Figure 51, item 6). Read pressure measuring device (Figure 51, item 5) to determine if accumulator can retain the charge.


YES
from block 47
51
Perform case drain leakage test.
Is internal leakage more than 1.25 qts (1.2 L) for 15 seconds?
NO
To block 53
YES
52
Replace compensating pump (TM 5-2350-262-20-2).

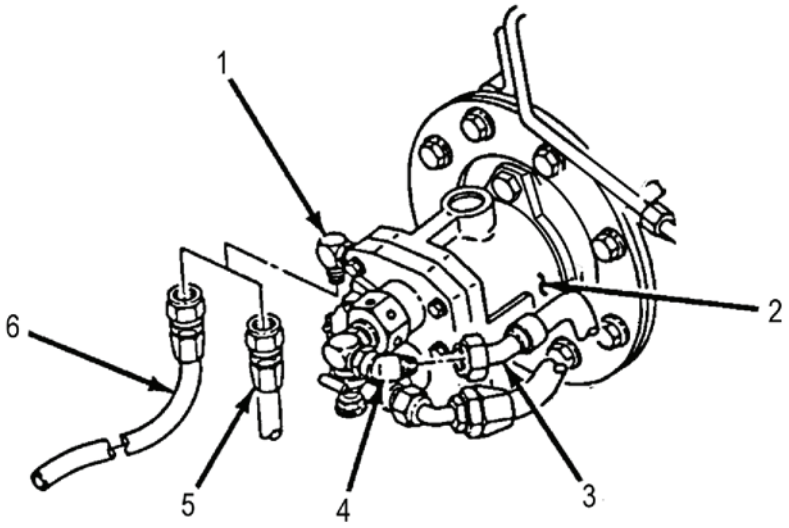


Figure 52. Compensating Pump

CASE DRAIN LEAKAGE TEST

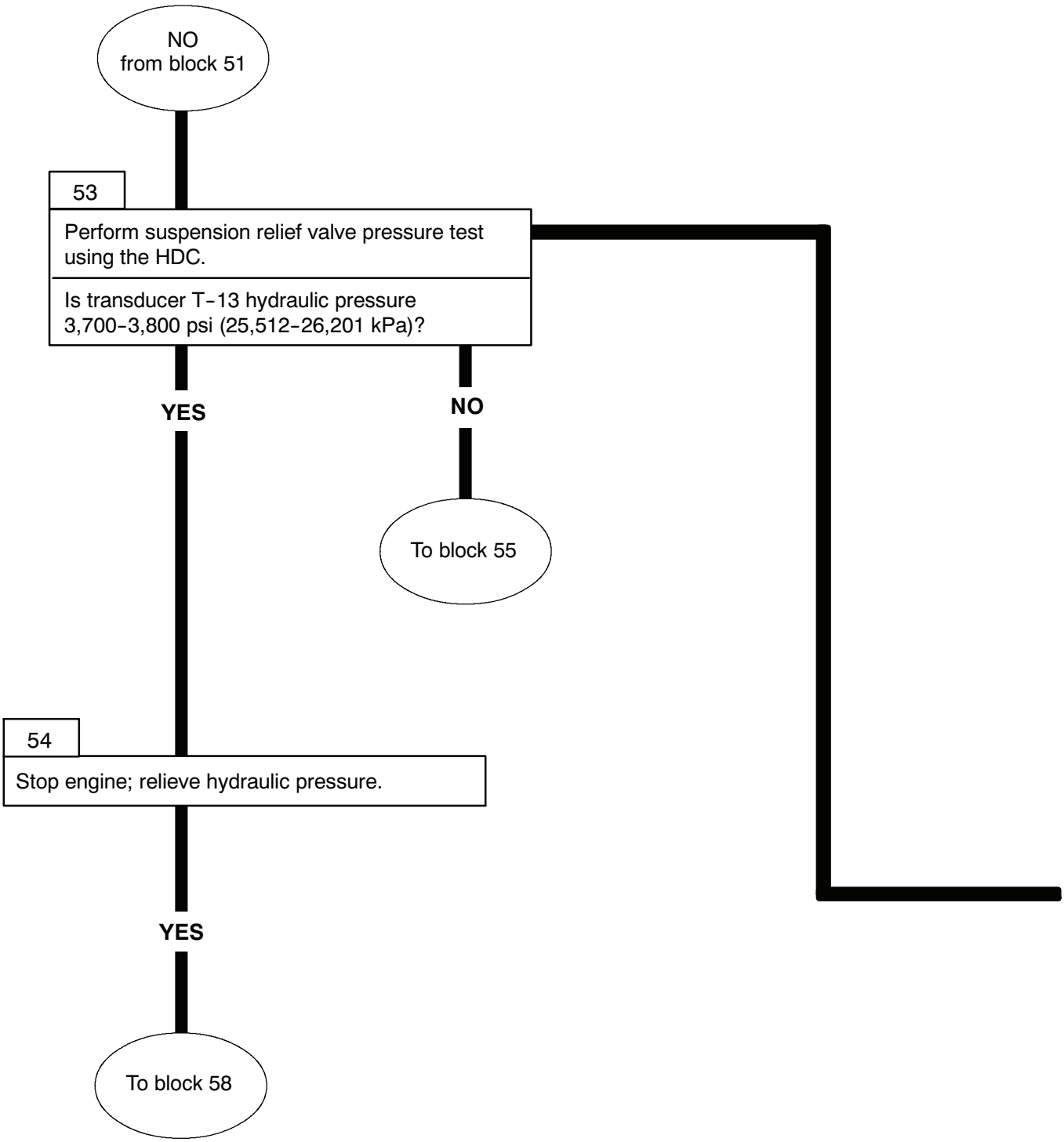
WARNING

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 (1.9L) 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 (Figure 52, item 3) from elbow (Figure 52, item 4) on compensating pump (Figure 52, item 2). Cap elbow (Figure 52, item 4) and plug hose (Figure 52, item 3).
- Disconnect SPNSN PUMP DRAIN-7V hose (Figure 52, item 5) from elbow (Figure 52, item 1). Plug hose (Figure 52, item 5). Connect drain hose (Figure 52, item 6) to elbow (Figure 52, item 1).
- Hold end of drain hose (Figure 52, item 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.


NO
from block 51
53
Perform suspension relief valve pressure test using the HDC.
Is transducer T-13 hydraulic pressure 3,700-3,800 psi (25,512-26,201 kPa)?
YES
NO
To block 55
54
Stop engine; relieve hydraulic pressure.
YES
To block 58

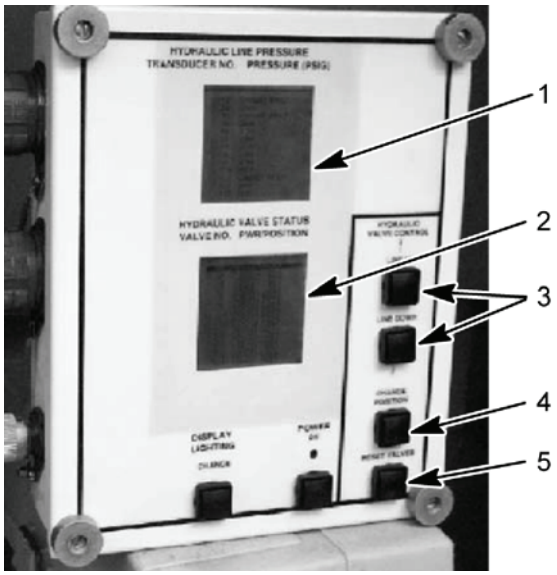


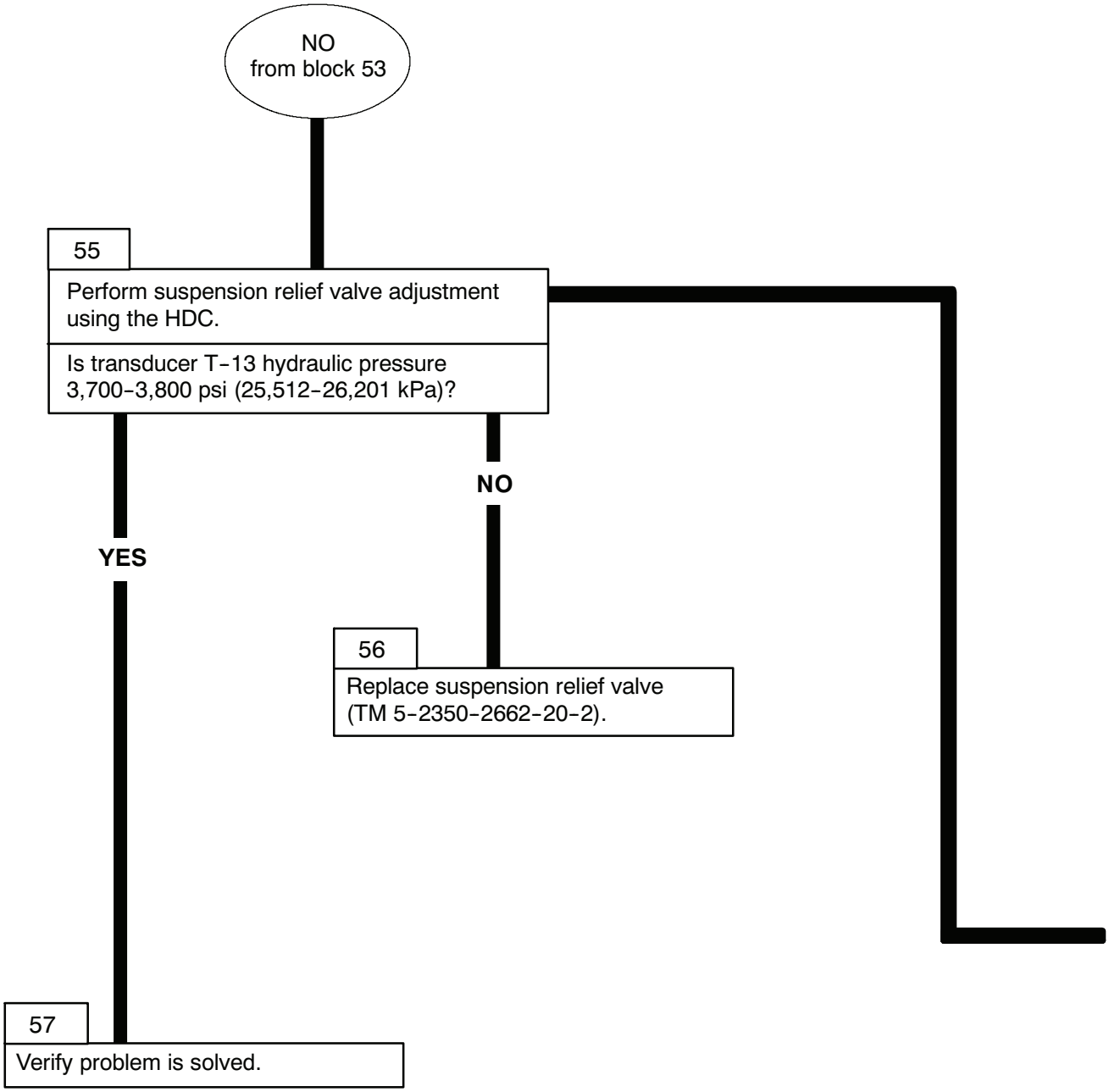
Figure 53. HDC Control Box

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.

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 53, item 5) on the HDC control box.
- Start engine; move ejector forward, engage ejector lock.
- Stop engine and relieve hydraulic pressure.
- Using LINE UP or LINE DOWN button (Figure 53, item 3) on the HDC control box, select V5 on the HDC display (Figure 53, item 2). Using the CHANGE POSITION button (Figure 53, item 4), close V5 on the HDC display (Figure 53, item 2). Repeat steps and close V12 and V13, and open V19.
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG and right-hand SUSPENSION CONTROL lever to LOWER. Read transducer T-13 hydraulic pressure on the HDC display (Figure 53, item 1).
- Using LINE UP or LINE DOWN button (Figure 53, item 3) on the HDC control box, select V5 on the HDC display (Figure 53, item 2). Using the CHANGE POSITION button (Figure 53, item 4), open V5 on the HDC display (Figure 53, item 2). Repeat steps and open V12 and V13, and close V19.


NO
from block 53
55
Perform suspension relief valve adjustment using the HDC.
Is transducer T-13 hydraulic pressure 3,700-3,800 psi (25,512-26,201 kPa)?
NO
YES
56
Replace suspension relief valve (TM 5-2350-2662-20-2).
57
Verify problem is solved.

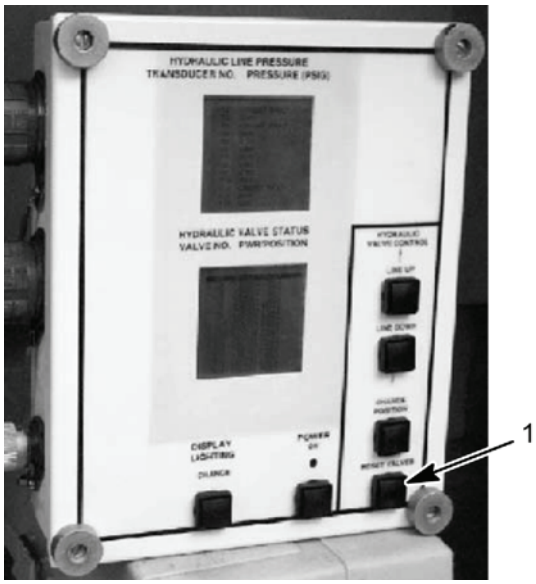


Figure 54. HDC Control Box

SUSPENSION RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 54, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0016 00-79.

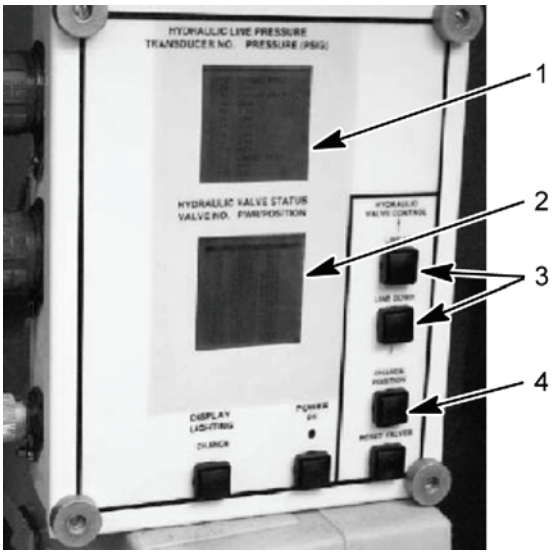


Figure 55. HDC Control Box

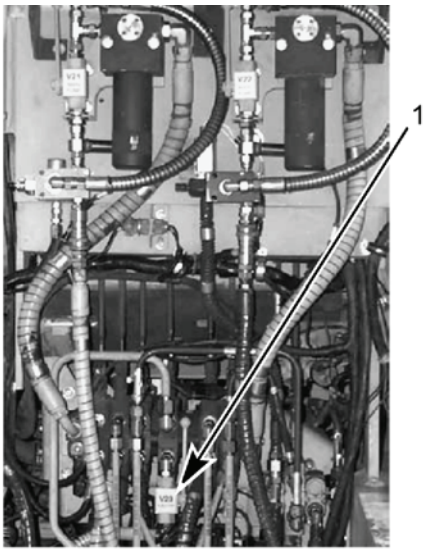


Figure 56. DCV Bank

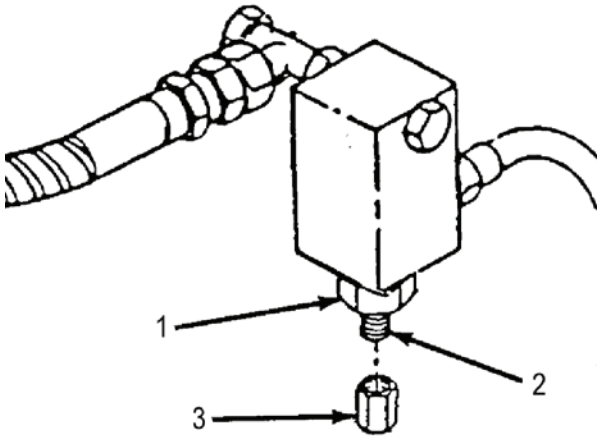


Figure 57. Suspension Relief Valve

SUSPENSION RELIEF VALVE ADJUSTMENT - CONTINUED

- Stop engine and relieve hydraulic pressure.
- Manually close the ejector inhibit ball valve V23 (Figure 56, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 55, item 3) on the HDC control box, select V5 on the HDC display (Figure 55, item 2). Using the CHANGE POSITION button (Figure 55, item 4), close V5 on the HDC display (Figure 55, item 2). Repeat last two steps for V12, V13 and V19; closing V12 and V13, and opening V19.
- Start engine.
- Remove cap (Figure 57, item 3) from suspension relief valve adjusting shaft (Figure 57, item 2) and loosen jam nut (Figure 57, item 1). Observe transducer T-13 hydraulic pressure on the HDC display (Figure 55, item 1). Turn adjusting shaft (Figure 57, item 2) clockwise to increase pressure or counterclockwise to decrease pressure, as necessary, to obtain desired pressure. Tighten jam nut (Figure 57, item 1) and replace cap (Figure 57, item 3).
- Continued on page 0016 00-81.

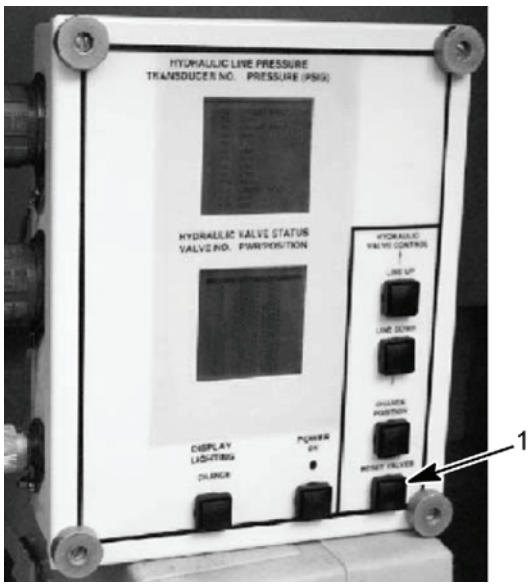


Figure 58. HDC Control Box

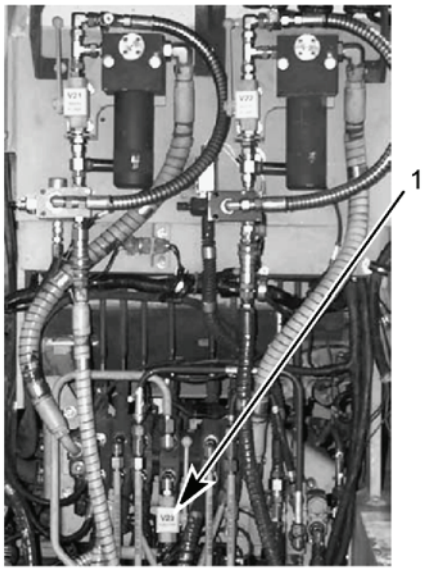
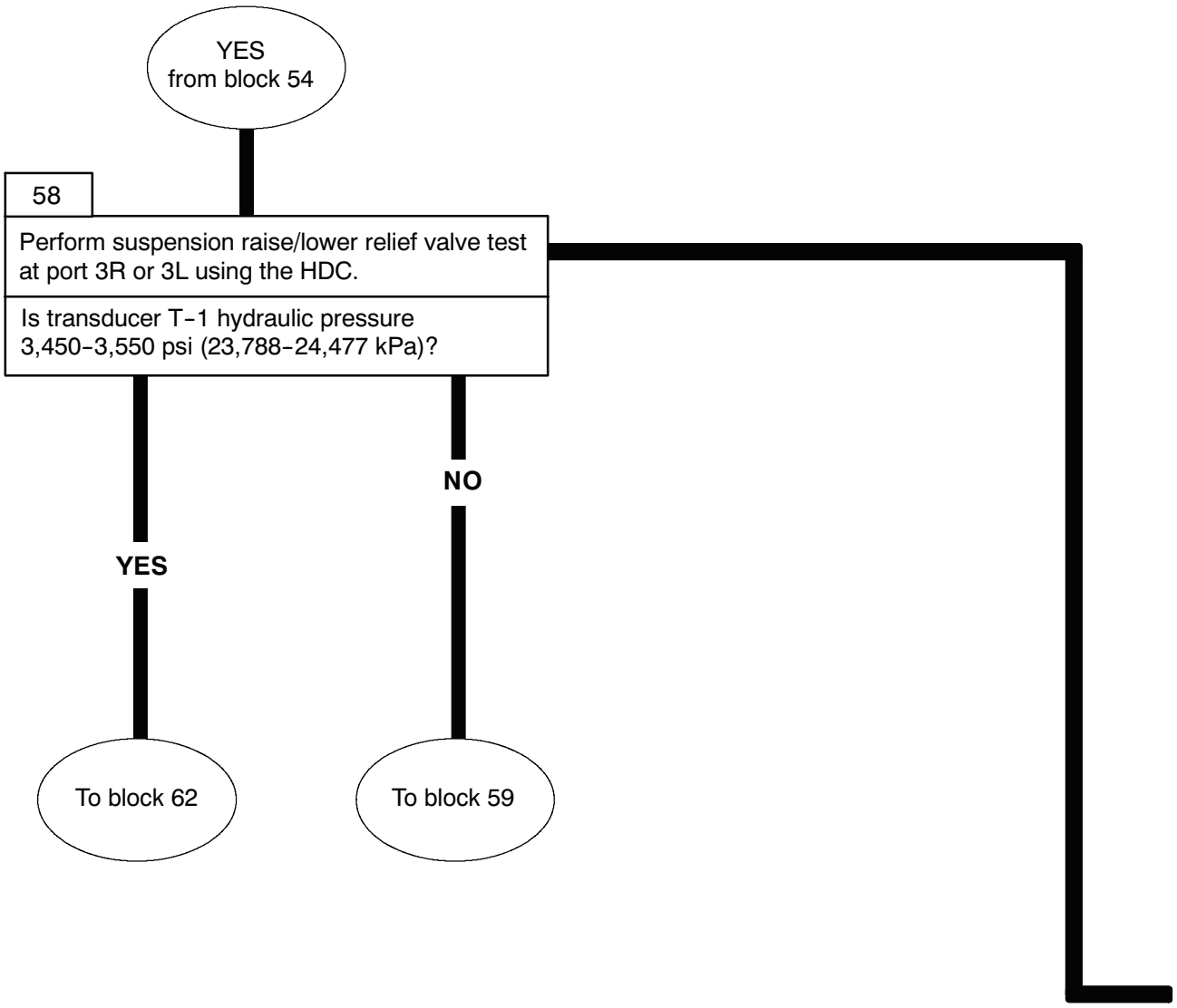


Figure 59. DCV Bank

SUSPENSION RELIEF VALVE ADJUSTMENT - CONTINUED

- Stop engine and relieve hydraulic pressure.
- Manually open the ejector ball valve V23 (Figure 59, item 1) on the DCV bank.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 58, item 1) on the HDC control box.


YES
from block 54
58
Perform suspension raise/lower relief valve test at port 3R or 3L using the HDC.
Is transducer T-1 hydraulic pressure 3,450-3,550 psi (23,788-24,477 kPa)?
NO
YES
To block 62
To block 59

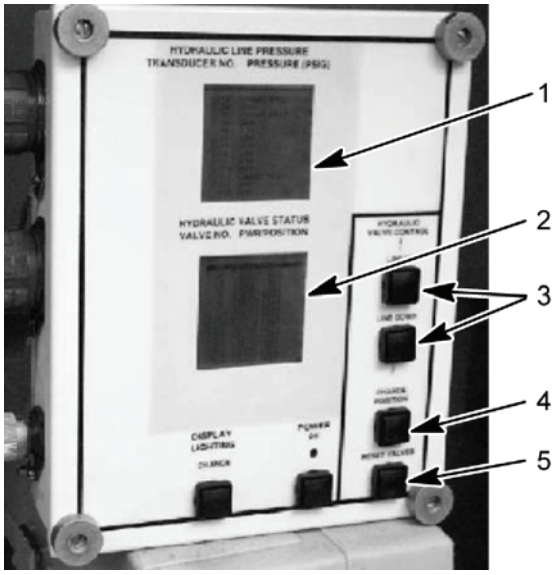


Figure 60. HDC Control Box

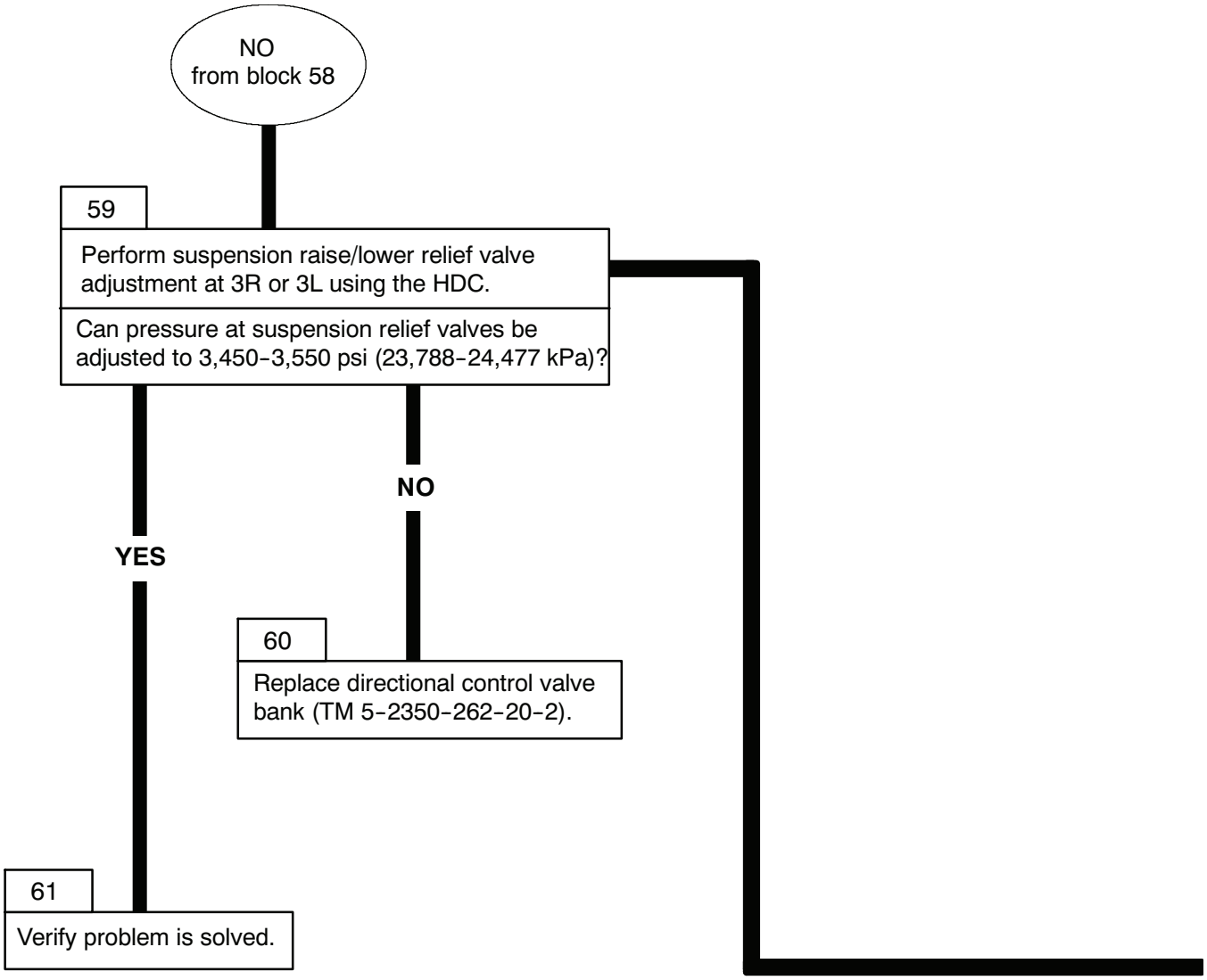
SUSPENSION RAISE/LOWER RELIEF VALVE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 60, item 5) on the HDC control box.

NOTE

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

- For 3R; using LINE UP or LINE DOWN button (Figure 60, item 3), select V15 on the HDC display (Figure 60, item 2). Close V15 on the HDC display (Figure 60, item 2) by selecting the CHANGE POSITION button (Figure 60, item 4) on the HDC control box.
- Have assistant start engine and move right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-1 hydraulic pressure on the HDC display (Figure 60, item 1).
- Using LINE UP or LINE DOWN button (Figure 60, item 3), select V15 on the HDC display (Figure 60, item 2). Open V15 on the HDC display (Figure 60, item 2) by selecting the CHANGE POSITION button (Figure 60, item 4) on the HDC control box.
- For 3L; repeat the above steps, closing and opening solenoid valve V16 as instructed, using the left-hand SUSPENSION CONTROL lever, and monitoring the hydraulic pressure at transducer T-1.


NO
from block 58
59
Perform suspension raise/lower relief valve adjustment at 3R or 3L using the HDC.
Can pressure at suspension relief valves be adjusted to 3,450-3,550 psi (23,788-24,477 kPa)?
NO
YES
60
Replace directional control valve bank (TM 5-2350-262-20-2).
61
Verify problem is solved.

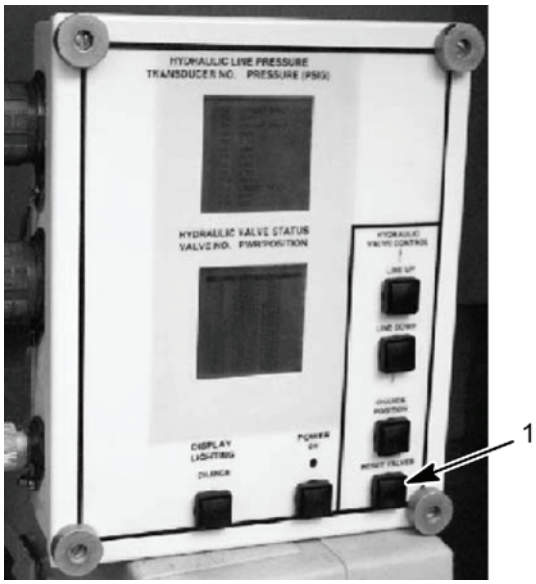


Figure 61. HDC Control Box

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 61, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0016 00-87.

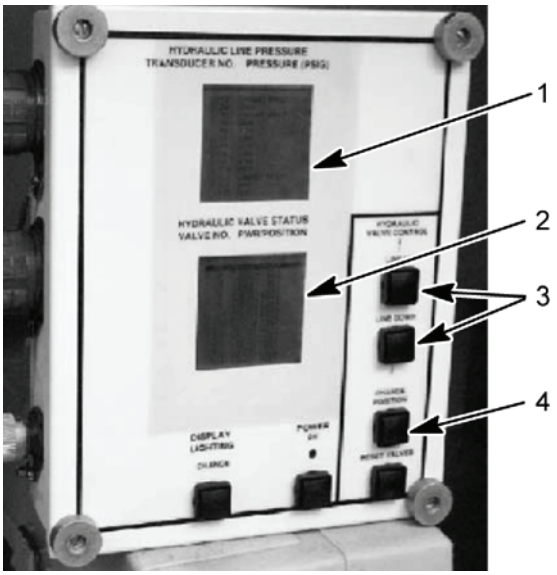


Figure 62. HDC Control Box

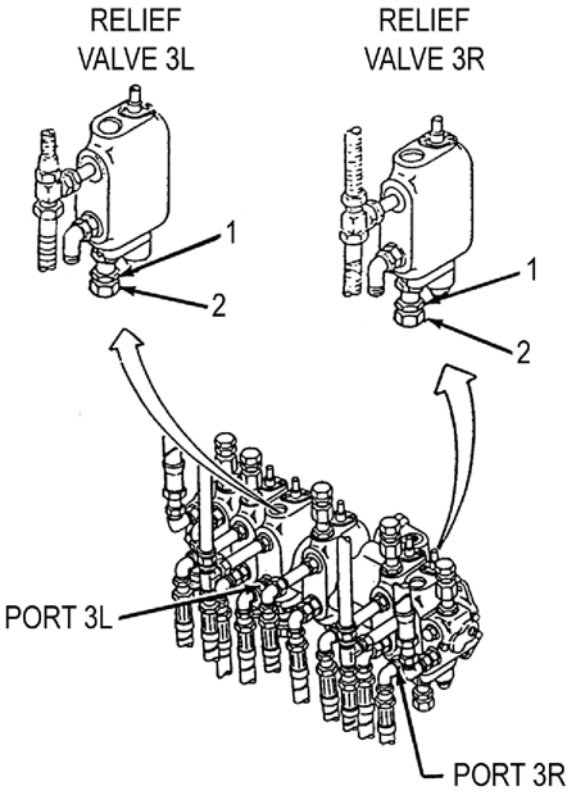
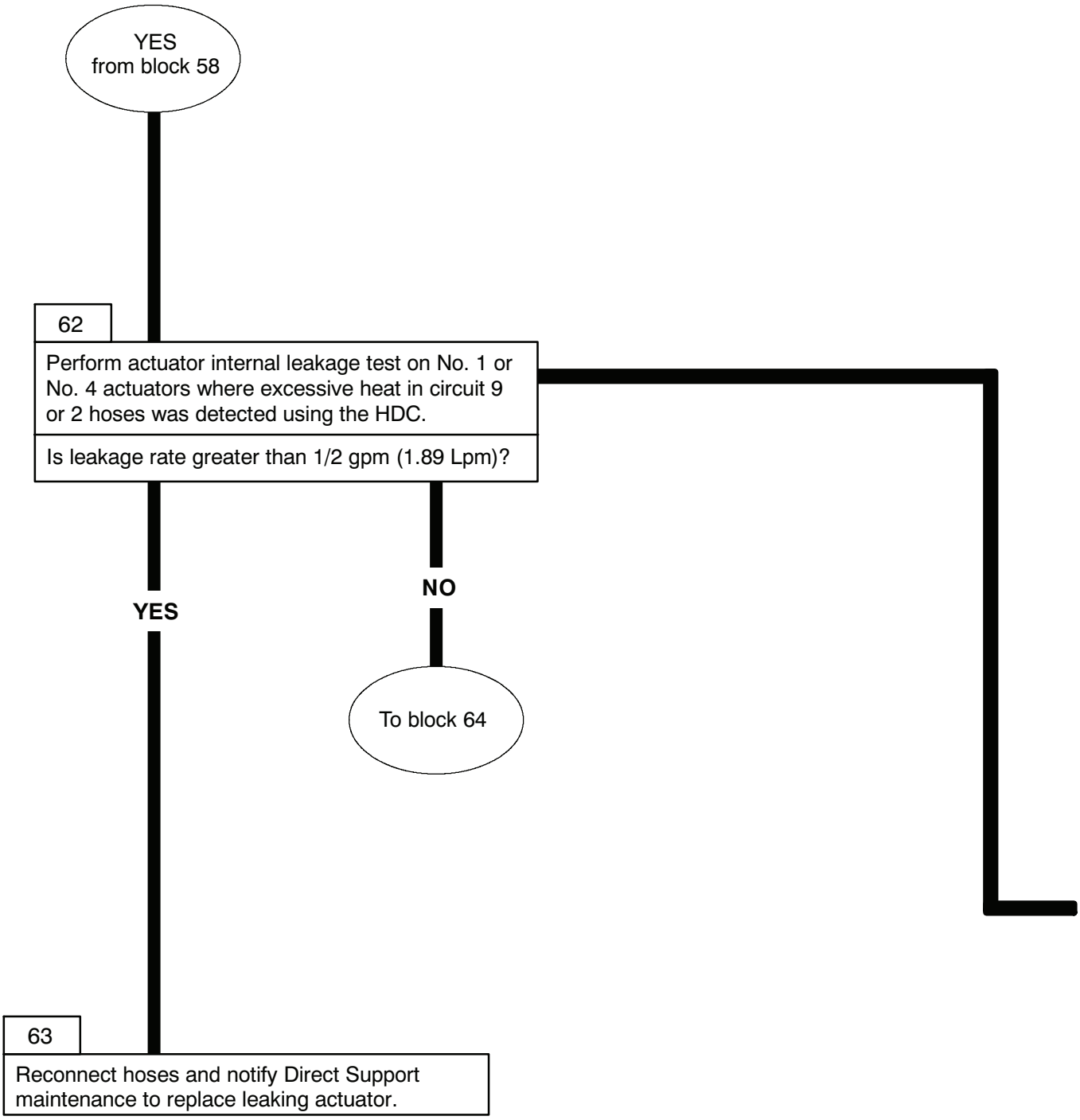


Figure 63. Suspension Raise/Lower Relief Valve 3L and Relief Valve 3R

SUSPENSION RAISE/LOWER RELIEF VALVE ADJUSTMENT - CONTINUED

- For 3R; Using LINE UP or LINE DOWN button (Figure 62, item 3), select V15 on the HDC display (Figure 62, item 2). Close V15 on the HDC display (Figure 62, item 2) by selecting the CHANGE POSITION button (Figure 62, item 4) on the HDC control box.
- Loosen jam nut (Figure 63, item 1) on port 3R of suspension raise/lower relief valve.
- With right-hand SUSPENSION CONTROL lever in the RAISE position, while observing transducer T-1 hydraulic pressure on the HDC display (Figure 62, item 1), turn suspension raise/lower relief valve 3R adjusting screw (Figure 63, item 2), clockwise to increase pressure or counterclockwise to decrease pressure, until desired pressure is indicated.
- Tighten jam nut (Figure 63, item 1).
- Using LINE UP or LINE DOWN button (Figure 62, item 3), select V15 on the HDC display (Figure 62, item 2). Open V15 on the HDC display (Figure 62, item 2) by selecting the CHANGE POSITION button (Figure 62, item 4) on the HDC control box.
- For 3L; repeat the above steps closing and opening solenoid valve V16, using the left-hand SUSPENSION CONTROL lever, adjusting the suspension raise/lower relief valve 3L adjusting screw (Figure 63, item 2) for port 3L, and monitoring the hydraulic pressure at transducer T-1.
- Stop engine; relieve hydraulic pressure.


YES
from block 58
62
Perform actuator internal leakage test on No. 1 or No. 4 actuators where excessive heat in circuit 9 or 2 hoses was detected using the HDC.
Is leakage rate greater than 1/2 gpm (1.89 Lpm)?
YES
NO
To block 64
63
Reconnect hoses and notify Direct Support maintenance to replace leaking actuator.

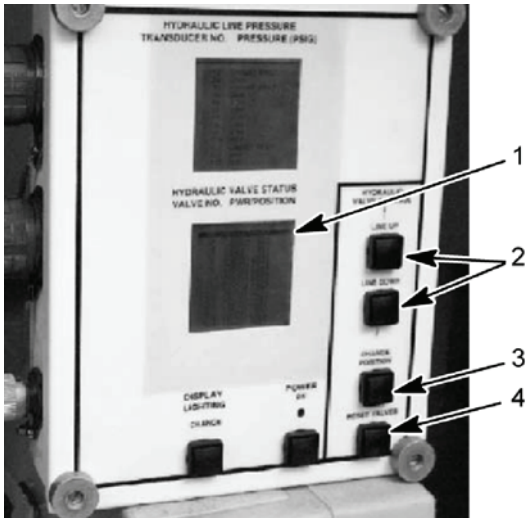


Figure 64. HDC Control Box

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

- First procedure below, using the HDC system, is for No. 4 left actuator internal leakage test. Manual procedures for No. 4 right, No. 1 left, and No. 1 right actuators are the same but the HDC system is not used during the test. 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.

No. 4 Left Actuator (using HDC system)

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 64, item 4) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 64, item 2) on the HDC control box, select V4 on the HDC display (Figure 64, item 1). Using the CHANGE POSITION button (Figure 64, item 3), close V4 on the HDC display (Figure 64, item 1). Repeat steps for V7 and V8; closing V7 and opening V18.
- Catch oil in a graduated 2 gal (7.6 L) container.
- With suspension in SPRUNG mode start engine and check leakage from ports 7, 7B, and 17.
- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 64, item 4) on the HDC control box.
- Continued on page 0016 00-91.

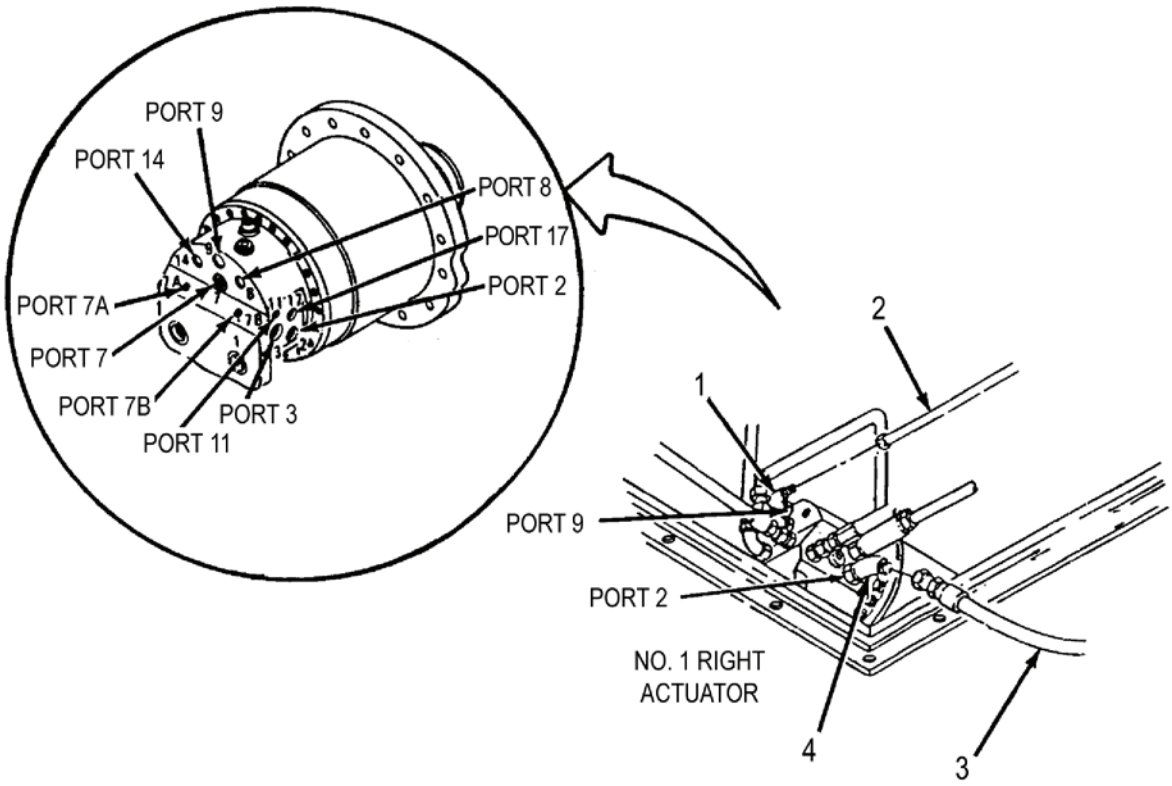
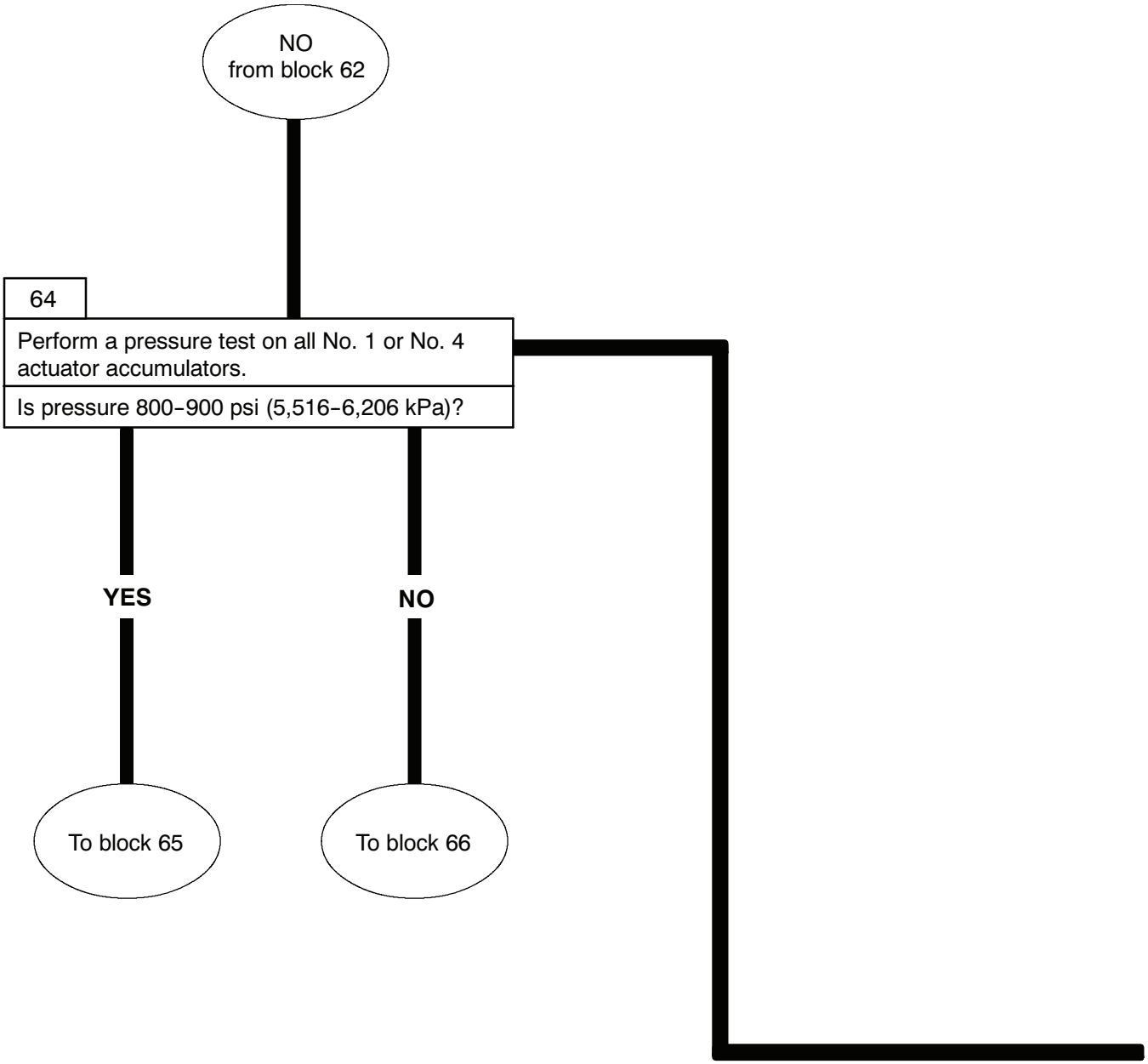


Figure 65. Right-Hand Corner Actuators

ACTUATOR INTERNAL LEAKAGE TEST - CONTINUED

No. 4 right actuator, No. 1 left actuator, and No. 1 right actuator manual procedure.

- Stop engine; relieve hydraulic pressure.
- Disconnect SPNSN UNIT-9 hose (Figure 65, item 2) from elbow (Figure 65, item 1) on port 9 of No. 1 right actuator. Cap elbow (Figure 65, item 2).
- Disconnect CORNER SPNSN UNIT-2 hose (Figure 65, item 3) from elbow (Figure 65, item 4) on port 2 of No. 1 right actuator. Plug hose (Figure 65, item 3). Connect hose (Figure 65, item 2) to elbow (Figure 65, item 4) on port 2.
- Catch oil in a graduated 2 gal. (7.6L) container.
- With suspension in SPRUNG mode, start engine and check for leakage from ports 7, 7B and 17.
- Stop engine; relieve hydraulic pressure.


NO
from block 62
64
Perform a pressure test on all No. 1 or No. 4 actuator accumulators.
Is pressure 800-900 psi (5,516-6,206 kPa)?
YES
NO
To block 65
To block 66

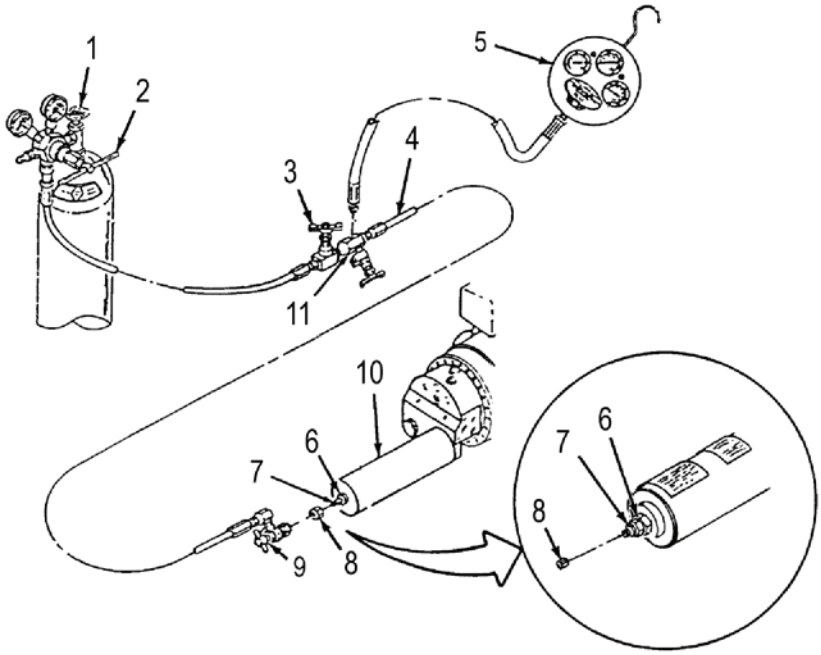


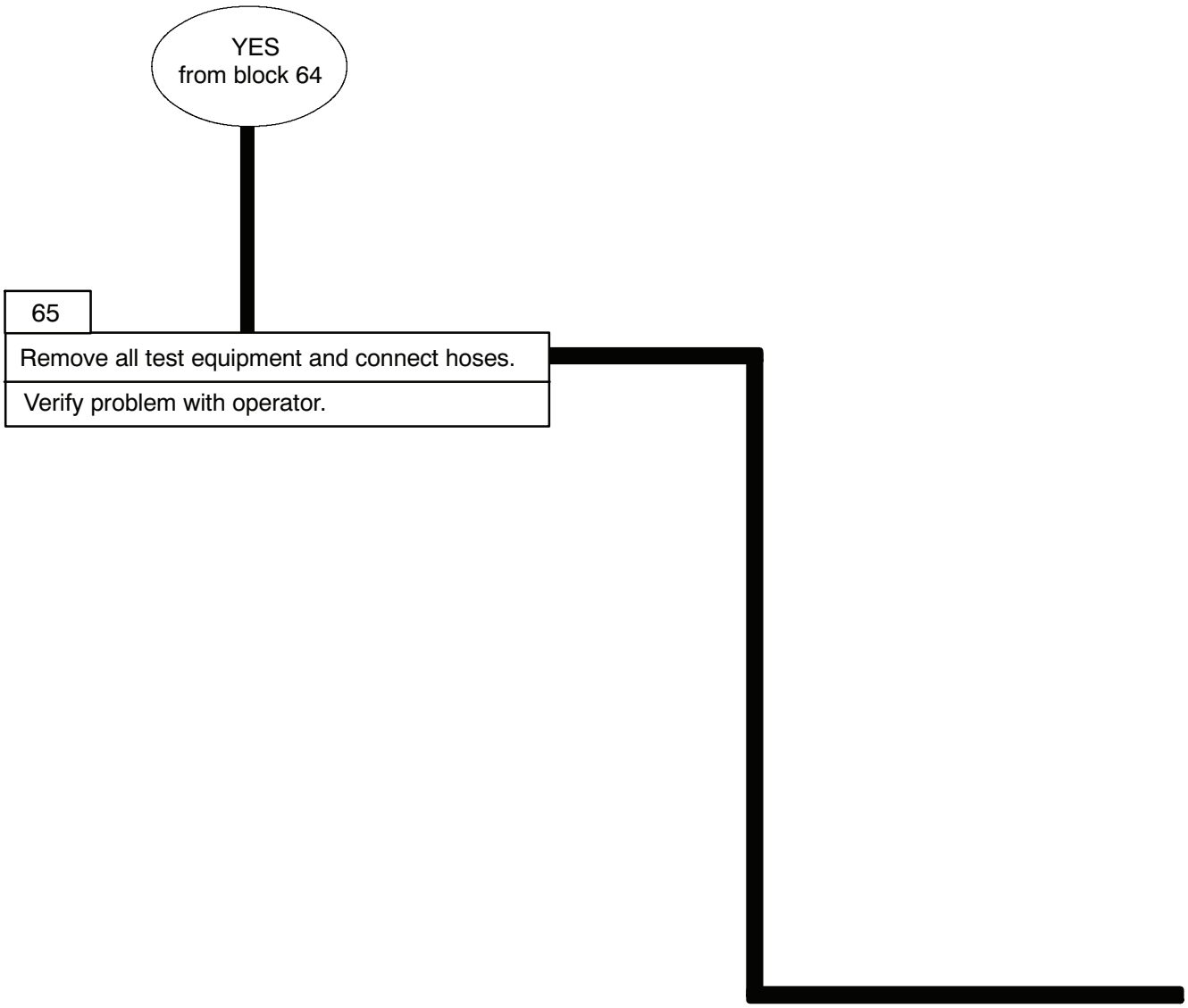
Figure 66. Actuator Accumulator Pressure Test

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 (Figure 66, item 5) to bleed valve (Figure 66, item 11) on charging harness (Figure 66, item 4). Close shutoff valve (Figure 66, item 3).
- Open nitrogen tank valve (Figure 66, item 1) and adjust regulator valve (Figure 66, item 2) to 50 psi (353 kPa).
- Open shutoff valve (Figure 66, item 3) for about 10 seconds to clear charging hoses. Close shutoff valve (Figure 66, item 3).
- Remove charge valve cap (Figure 66, item 8).
- Loosely connect adapter valve (Figure 66, item 9) to charge valve (Figure 66, item 7) on actuator accumulator (Figure 66, item 10).
- Open shutoff valve (Figure 66, item 3) for about 10 seconds. Close shutoff valve (Figure 66, item 3). Tighten adapter valve (9).
- Open charge valve (Figure 66, item 7) by loosening nut (Figure 66, item 6). Read pressure measuring device (Figure 66, item 1).
- Continued on page 0016 00-95.


YES
from block 64
65
Remove all test equipment and connect hoses.
Verify problem with operator.

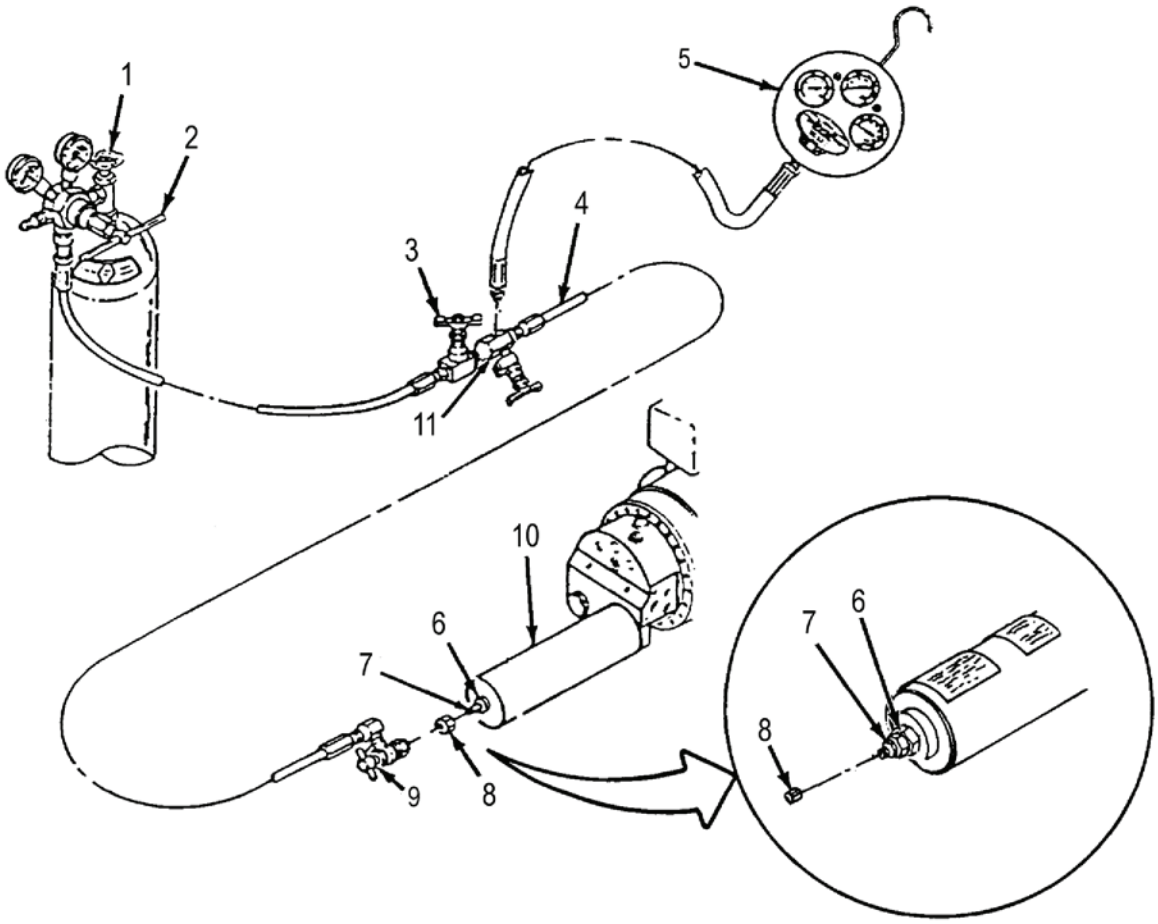
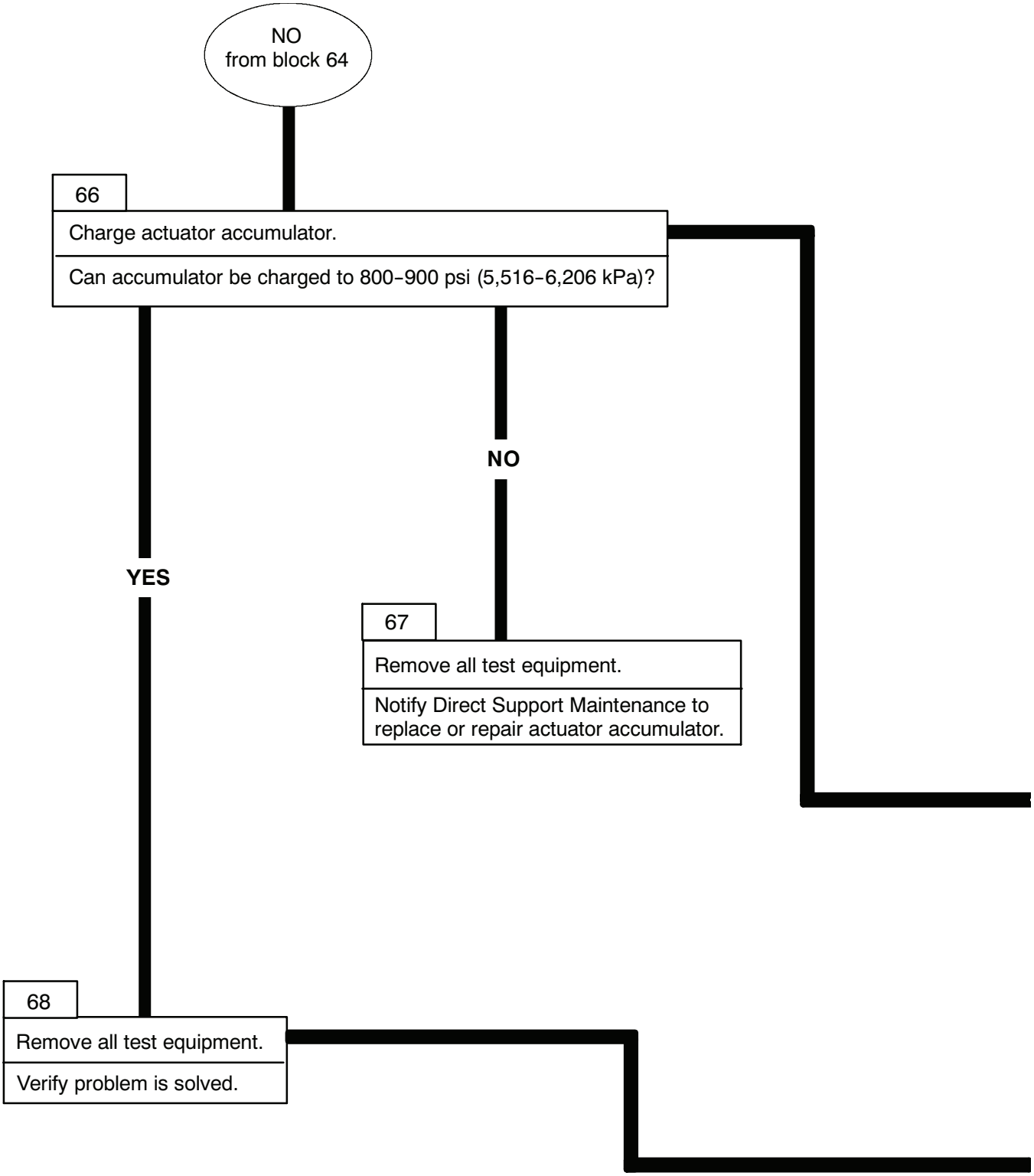


Figure 67. Actuator Accumulator Pressure Test

ACTUATOR ACCUMULATOR PRESSURE TEST - CONTINUED

Tighten nut (Figure 67, item 6) on actuator accumulator (Figure 67, item 6). Close nitrogen tank valve (Figure 67, item 1) to ease pressure. Open bleed valve (Figure 67, item 11), bleed line pressure to 0 psi. Remove adapter valve (Figure 67, item 10) from actuator accumulator (Figure 67, item 10). Remove pressure measuring device (Figure 67, item 5) from bleed valve (Figure 67, item 11) on charging harness (Figure 67, item 4). Install valve cap (Figure 67, item 8) on actuator accumulator (Figure 67, item 10).


NO
from block 64
66
Charge actuator accumulator.
Can accumulator be charged to 800-900 psi (5,516-6,206 kPa)?
NO
YES
67
Remove all test equipment.
Notify Direct Support Maintenance to replace or repair actuator accumulator.
68
Remove all test equipment.
Verify problem is solved.

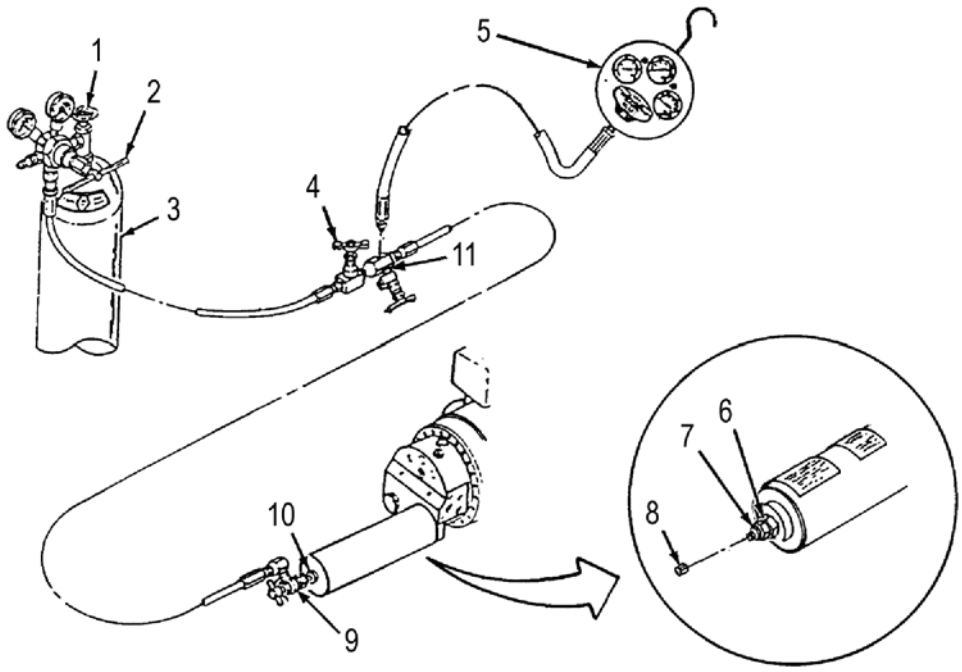


Figure 68. Actuator Accumulator Charging

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 (Figure 68, item 2) on nitrogen tank (Figure 68, item 3) to 800-900 psi (5,516-6,206 kPa).
- Open shutoff valve (Figure 68, item 4). Read pressure measuring device (Figure 68, item 5).
- When pressure reaches 800-900 psi (5,516-6,206 kPa), close shutoff valve (Figure 68, item 4), nitrogen tank valve (Figure 68, item 1), and accumulator charge valve (Figure 68, item 10).
- Wait 15 minutes and open accumulator charge valve (Figure 68, item 10). Read pressure measuring device (Figure 68, item 5) to determine if accumulator can retain the charge.

Tighten nut (Figure 68, item 7) on charge valve (Figure 68, item 10). Close nitrogen tank valve (Figure 68, item 1). Back off regulator valve (Figure 68, item 2), open bleed valve (Figure 68, item 11), and bleed hose pressure to 0 psi. Remove adapter valve (Figure 68, item 9) from charge valve (Figure 68, item 10). Remove pressure measuring device (Figure 68, item 5) from bleed valve (Figure 68, item 11) on charging harness. Install charge valve cap (Figure 68, item 8) on actuator accumulator (Figure 68, item 6).

END OF WORK PACKAGE

LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE

0017 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

References
WP 0033 00

Personnel Required
Two 62B10

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

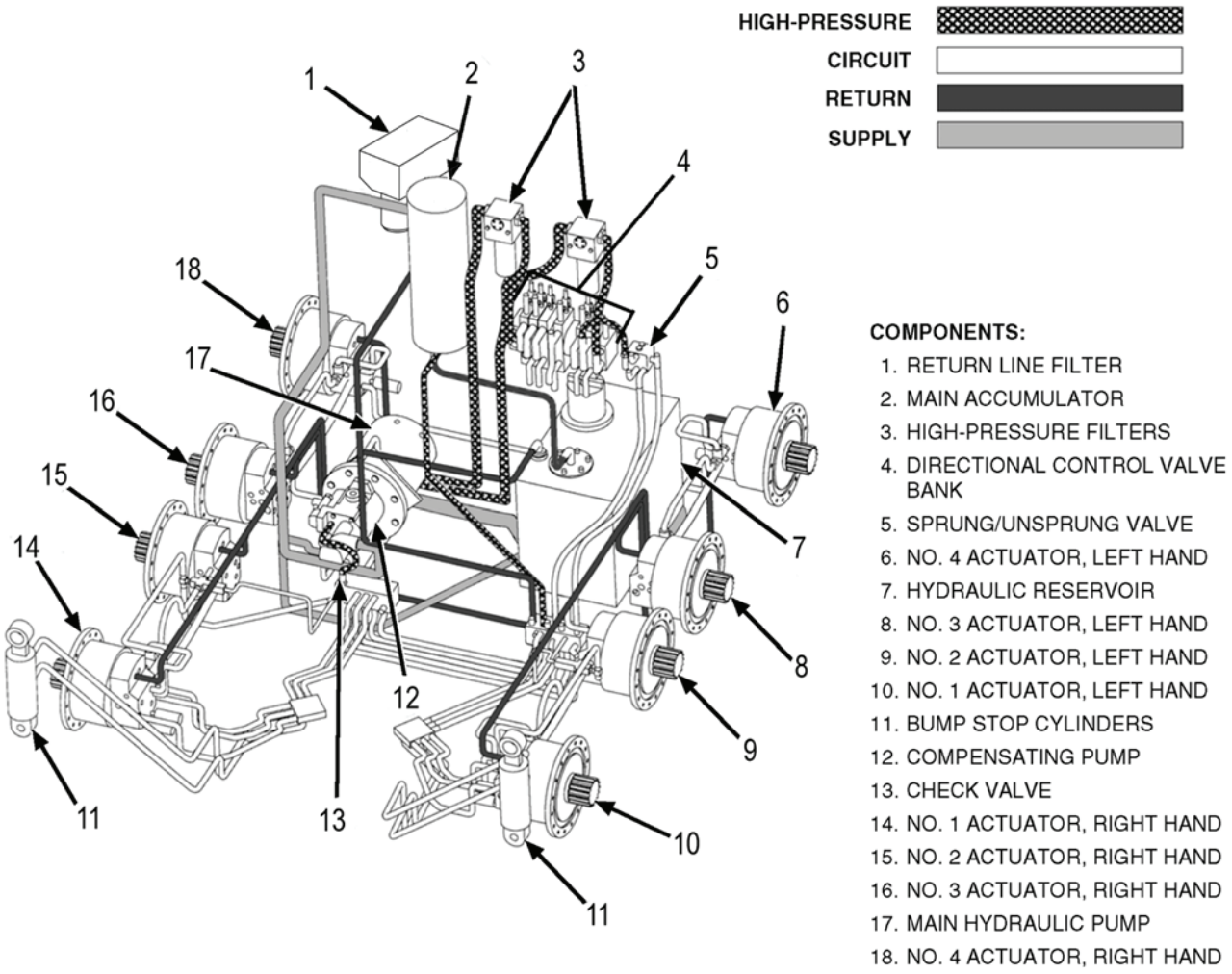


Figure 1. Suspension Circuit

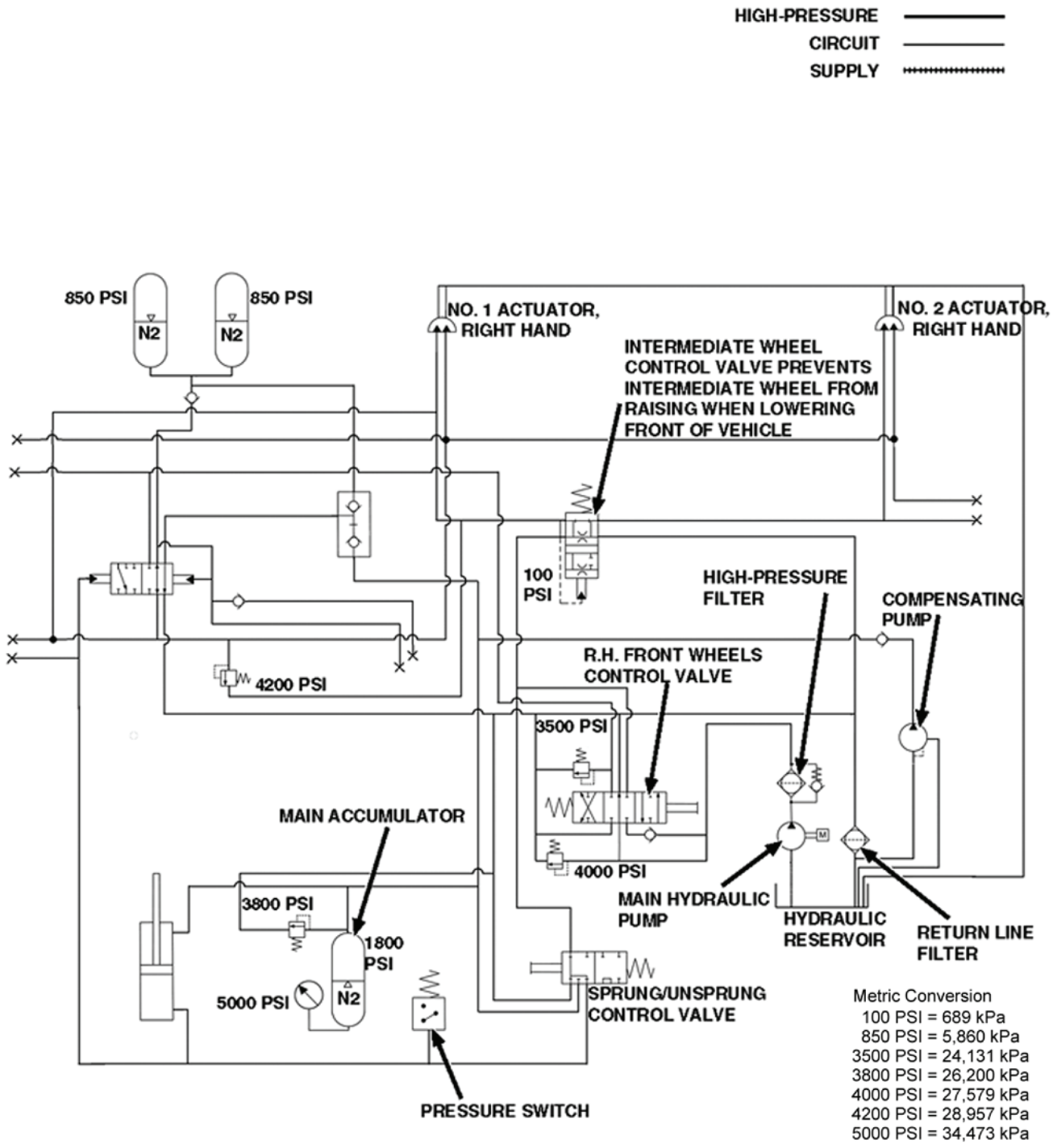
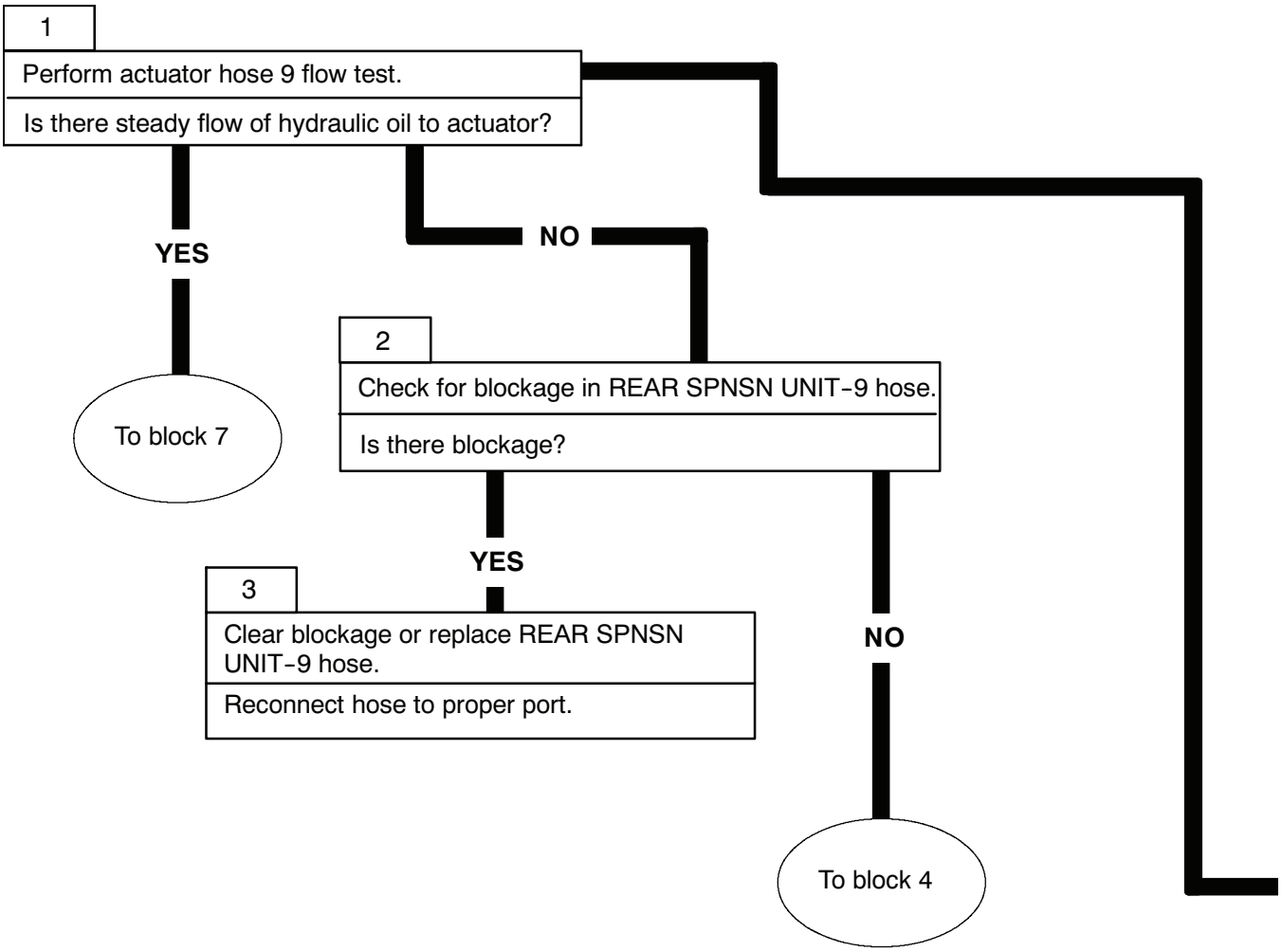


Figure 2. Suspension Schematic


1
Perform actuator hose 9 flow test.
Is there steady flow of hydraulic oil to actuator?
YES
NO
To block 7
2
Check for blockage in REAR SPNSN UNIT-9 hose.
Is there blockage?
YES
NO
3
Clear blockage or replace REAR SPNSN UNIT-9 hose.
Reconnect hose to proper port.
To block 4

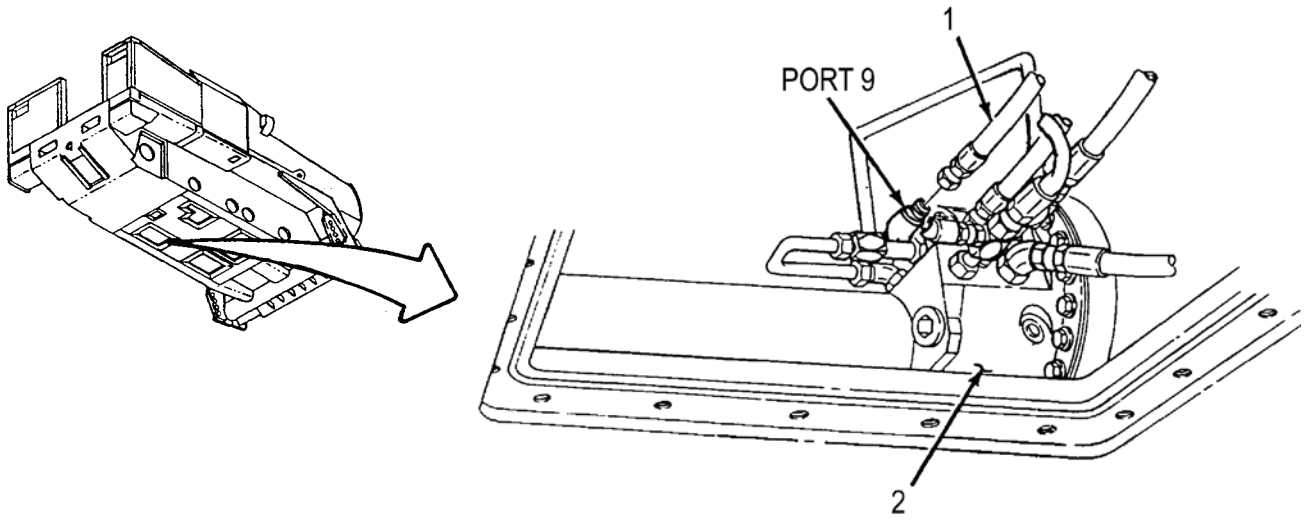


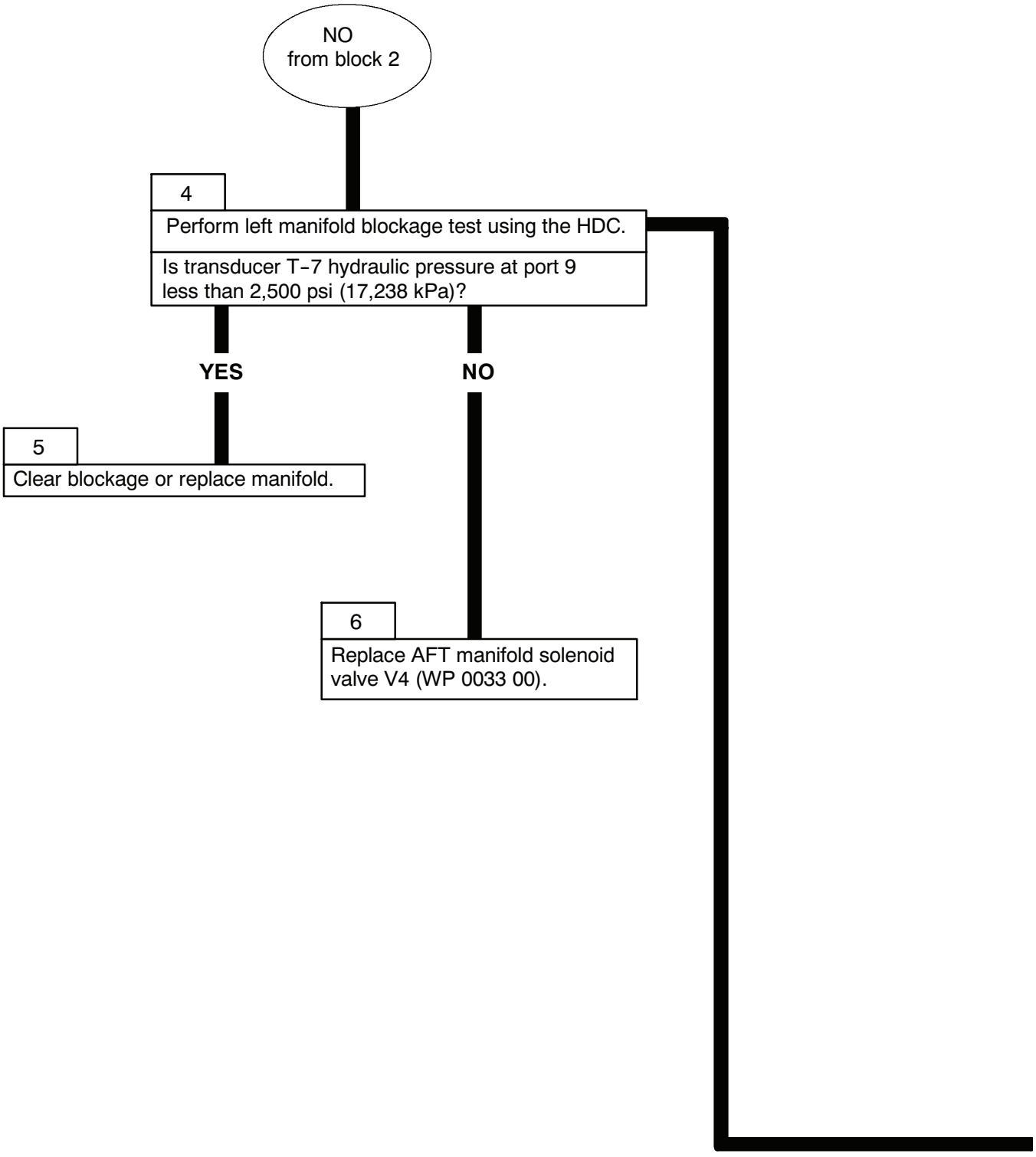
Figure 3. Left Actuator

HOSE 9 FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Stop engine; relieve hydraulic pressure. Disconnect REAR SPNSN UNIT-9 hose (Figure 3, item 1) from port 9 on No. 4 left actuator (Figure 3, item 2). Cap port 9.
- Connect drain hose to open end of REAR SPNSN UNIT-9 hose (Figure 3, item 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.


NO
from block 2
4
Perform left manifold blockage test using the HDC.
Is transducer T-7 hydraulic pressure at port 9 less than 2,500 psi (17,238 kPa)?
YES
NO
5
Clear blockage or replace manifold.
6
Replace AFT manifold solenoid valve V4 (WP 0033 00).

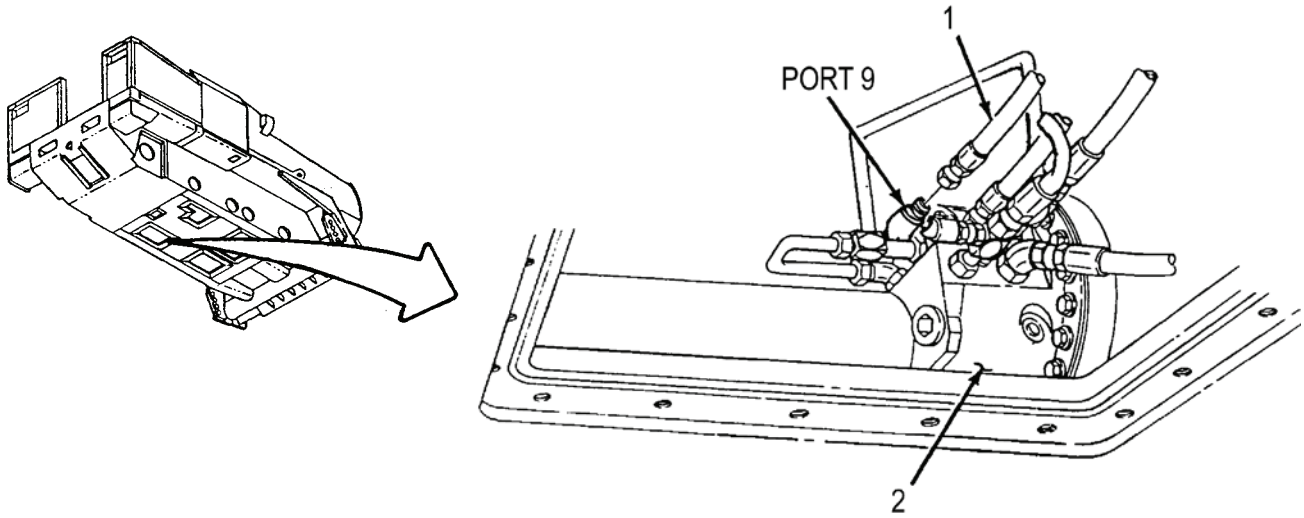


Figure 4. Left Actuator

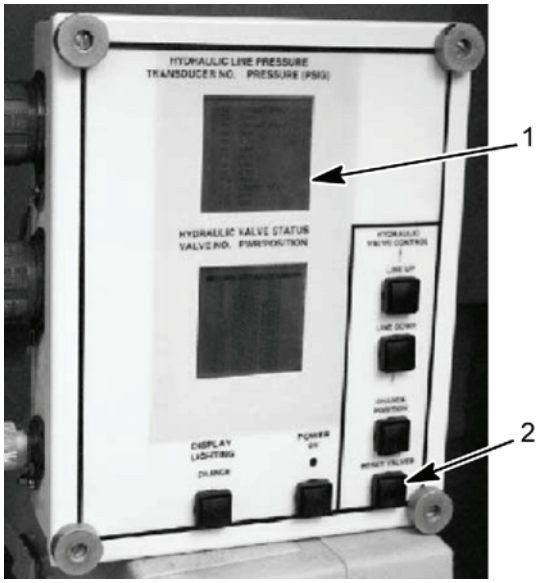
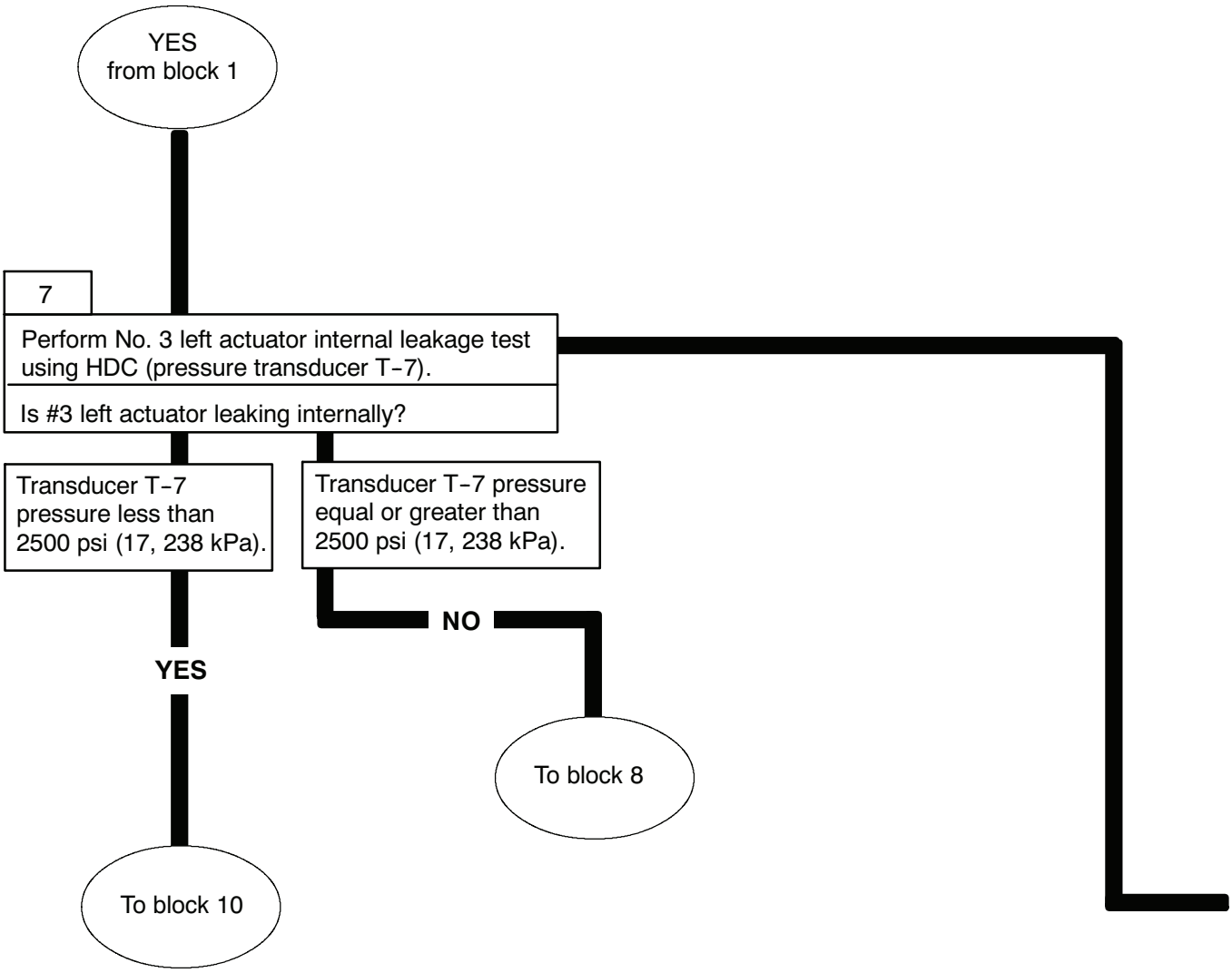


Figure 5. HDC Control Box

LEFT MANIFOLD BLOCKAGE TEST

- Connect REAR SPNSN UNIT-9 hose (Figure 4, item 1) to port 9 on No. 4 left actuator (Figure 4, item 2).
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 2) on the HDC control box.
- Start engine; read transducer T-7 hydraulic pressure on the HDC display (Figure 5, item 1).
- Stop engine; relieve hydraulic pressure.

LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0017 00**



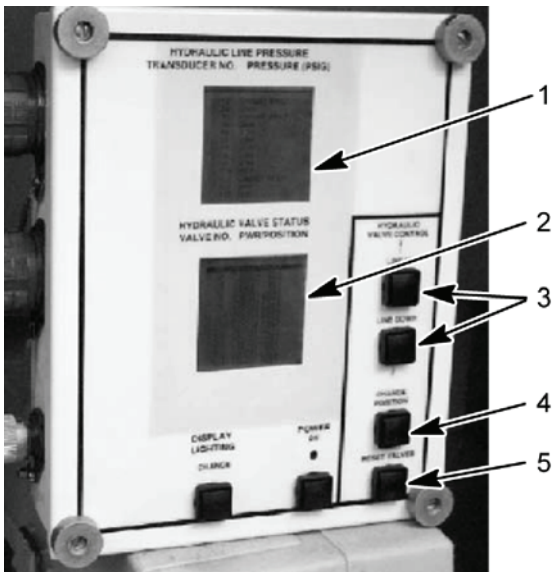
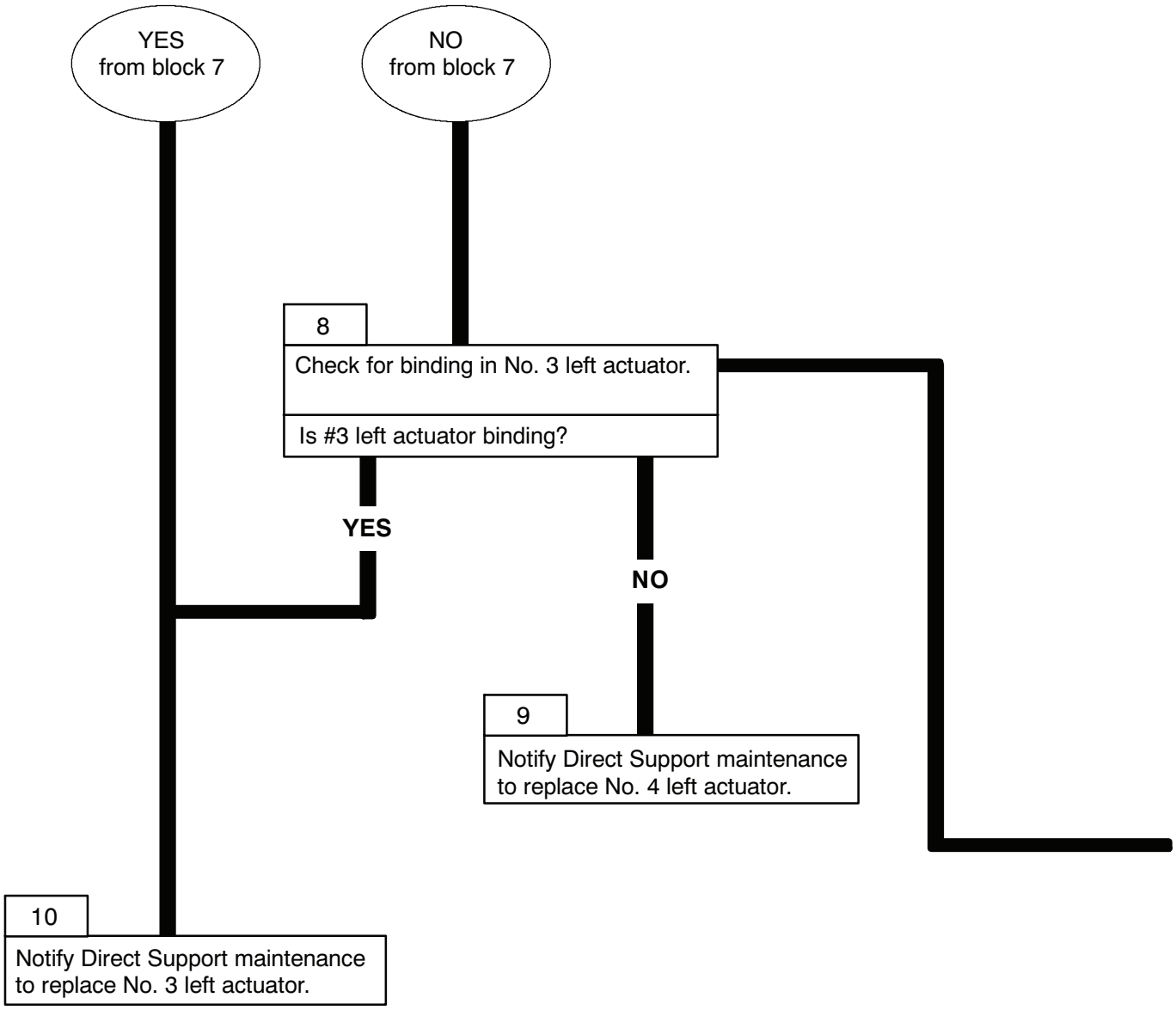


Figure 6. HDC Control Box

No. 3 LEFT ACTUATOR INTERNAL LEAKAGE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 6, item 3) on the HDC control box, select V4 on the HDC display (Figure 6, item 2). Using the CHANGE POSITION button (Figure 6, item 4), close V4 on the HDC display (Figure 6, item 2). Repeat steps and close V6 and open V18.
- Start engine and observe that transducer T-7 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.
- Using LINE UP or LINE DOWN button (Figure 6, item 3) on the HDC control box, select V4 on the HDC display (Figure 6, item 2). Using the CHANGE POSITION button (Figure 6, item 4), open V4 on the HDC display (Figure 6, item 2). Repeat steps and open V7 and close V18.

LEFT REAR CORNER DOES NOT RAISE IN SPRUNG OR UNSPRUNG MODE - Continued **0017 00**



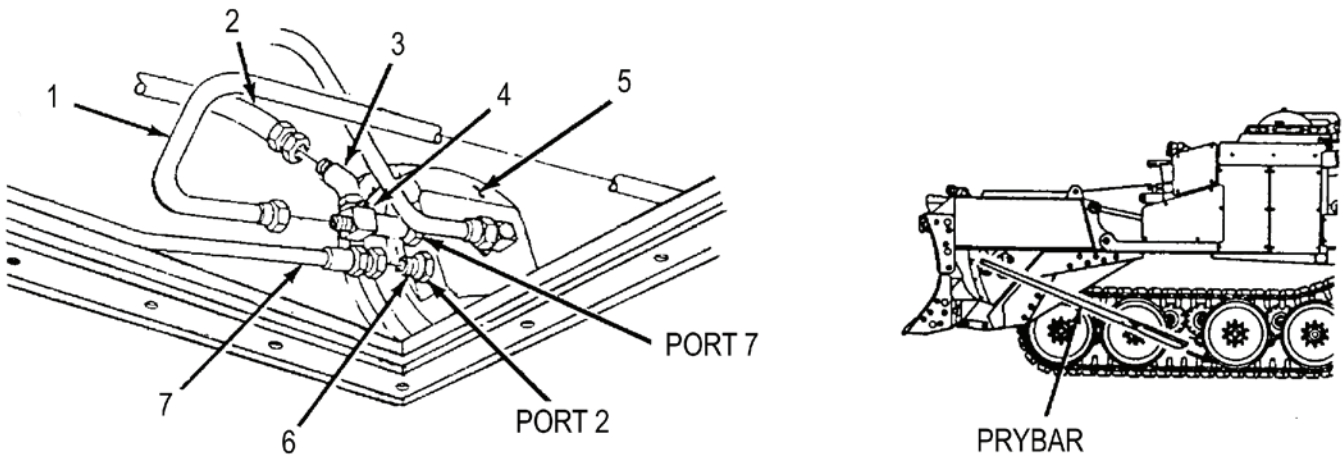


Figure 7. No. 3 Left Actuator

No. 3 LEFT ACTUATOR INTERNAL BINDING CHECK

NOTE

Have suitable container ready to catch oil.

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

END OF WORK PACKAGE

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE 0018 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2
WP 0033 00

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

The rear of the 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; circuit 11 operates UNSPRUNG mode.

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times with engine off. Failure to comply may result in severe injury to personnel.**

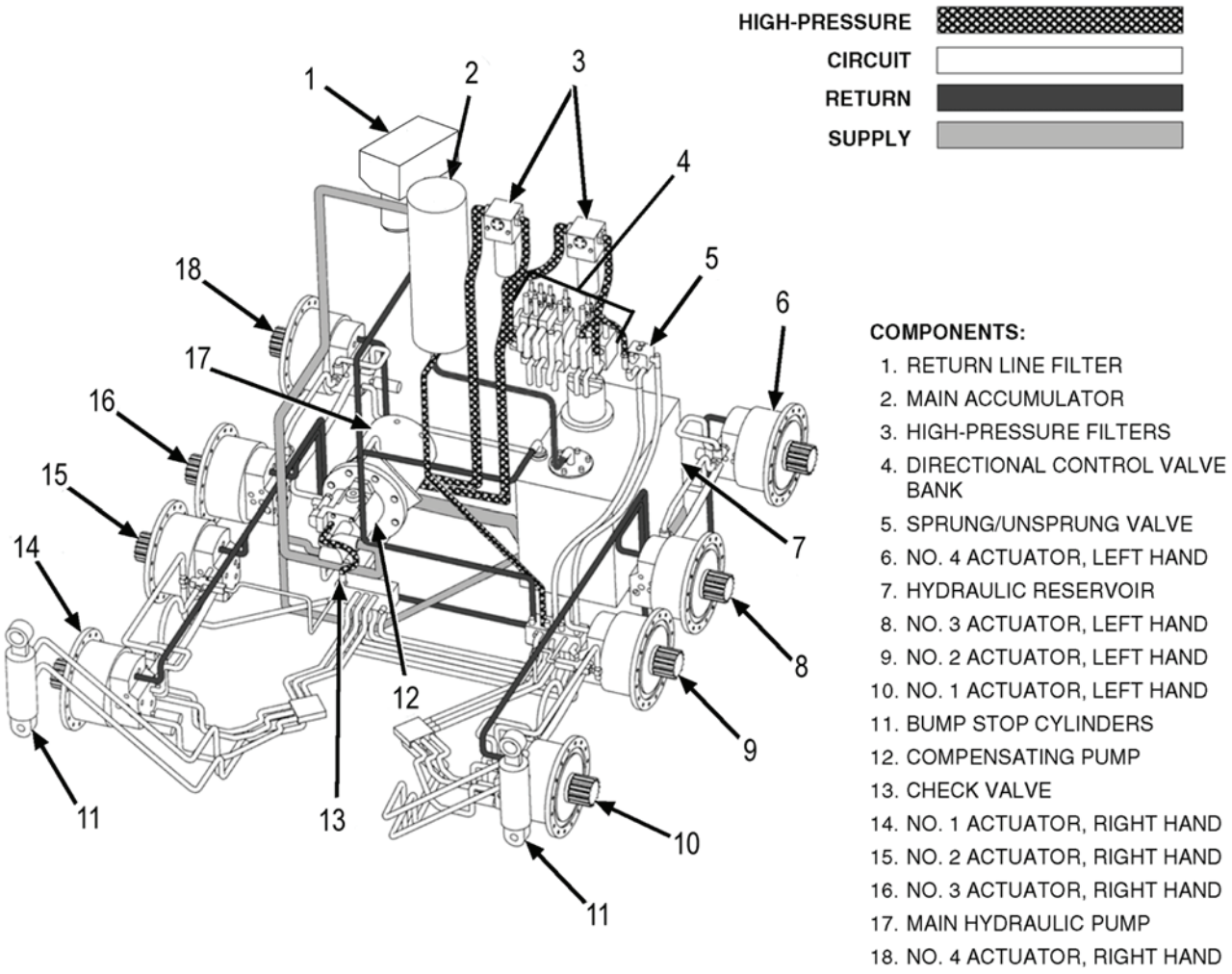


Figure 1. Suspension Circuit

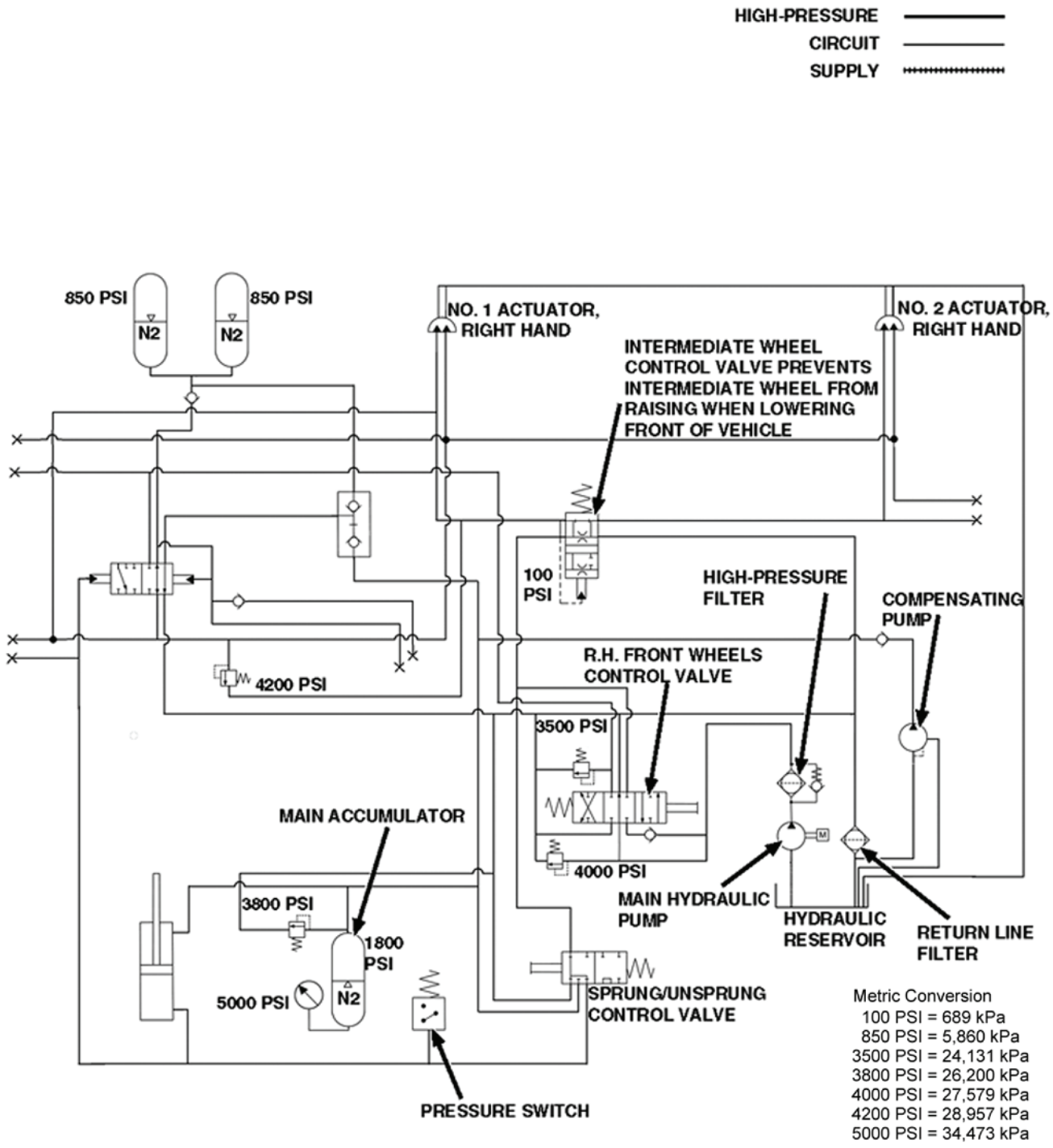
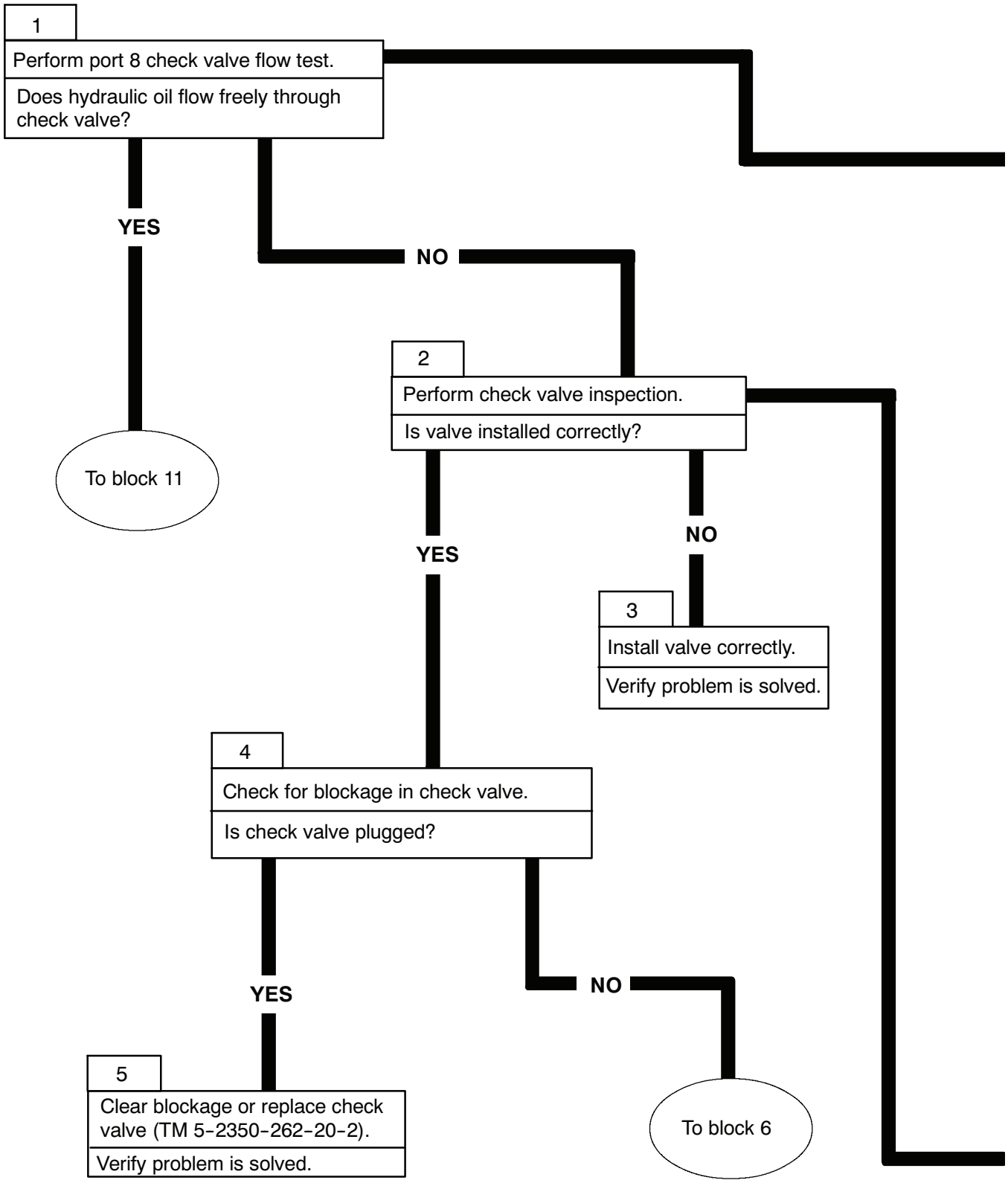


Figure 2. Suspension Schematic


1
Perform port 8 check valve flow test.
Does hydraulic oil flow freely through check valve?
YES
NO
To block 11
2
Perform check valve inspection.
Is valve installed correctly?
YES
NO
3
Install valve correctly.
Verify problem is solved.
4
Check for blockage in check valve.
Is check valve plugged?
YES
NO
5
Clear blockage or replace check valve (TM 5-2350-262-20-2).
Verify problem is solved.
To block 6

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 (Figure 3, item 4) from check valve (Figure 3, item 1) at port 8 on No. 4 left actuator (Figure 3, item 2). Plug end of LH 4 SPNSN UNIT-8 hose (Figure 3, item 4).
- Connect drain hose to check valve (Figure 3, item 1).
- 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.

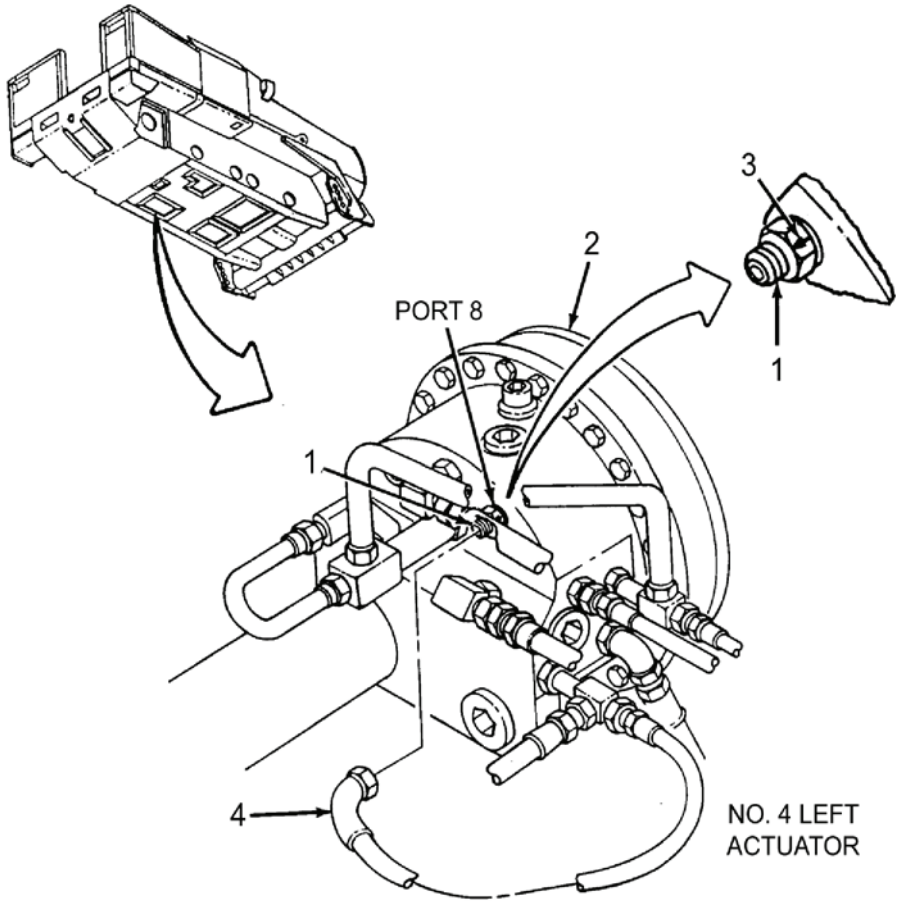
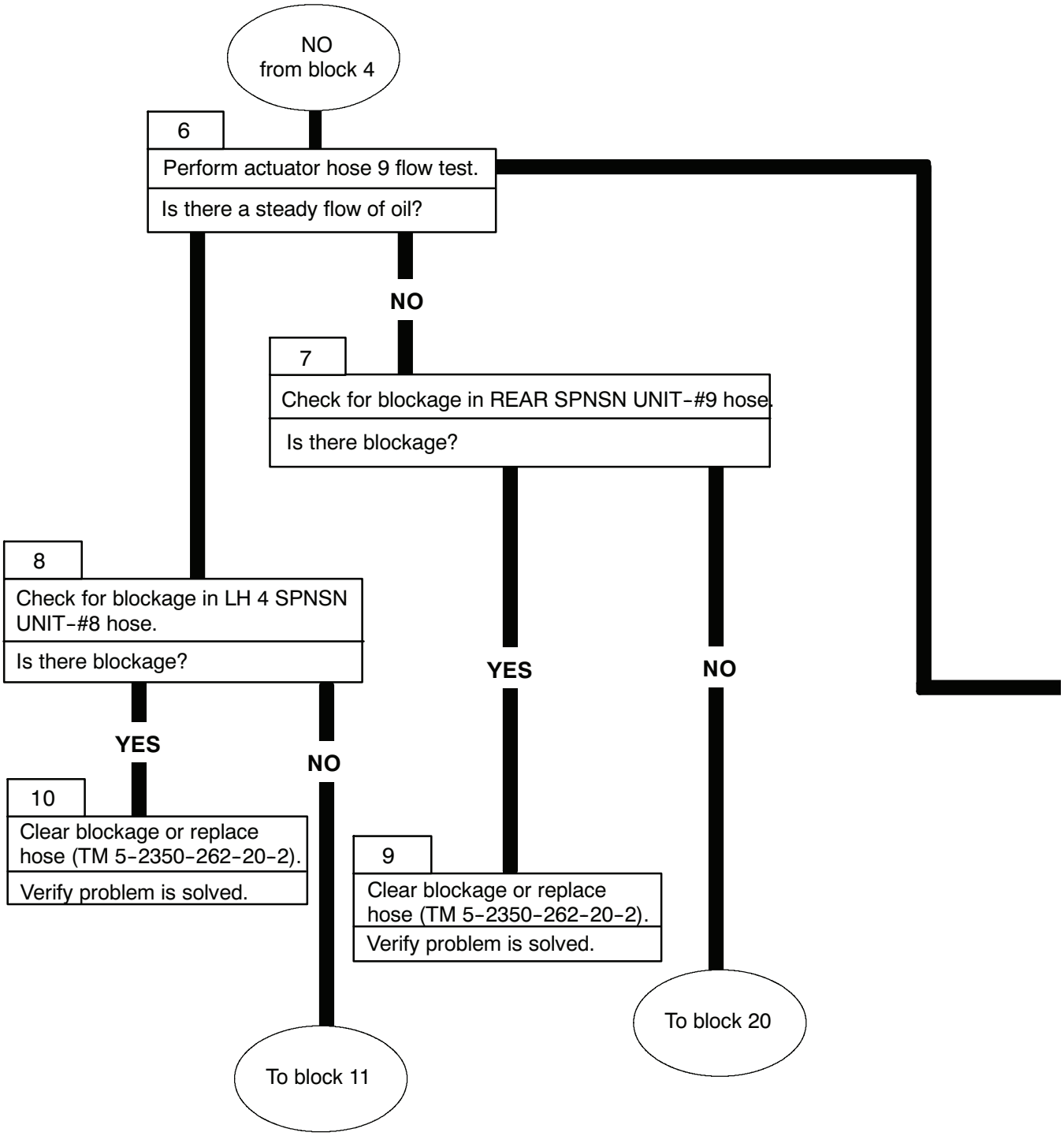


Figure 3. No. 4 Left Actuator Port 8 Check Valve

CHECK VALVE INSPECTION

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

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0018 00**



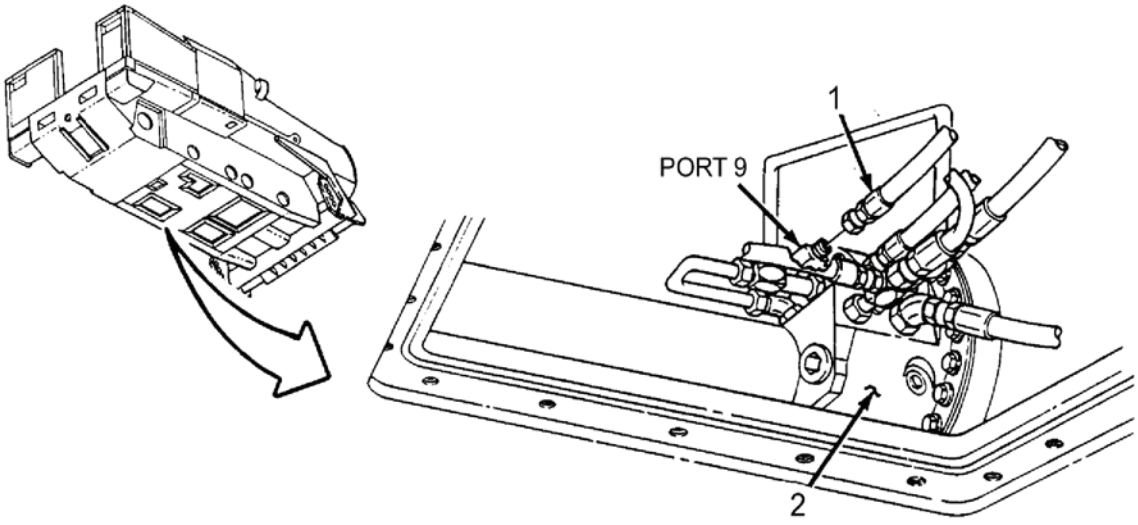


Figure 4. No. 4 Left Actuator

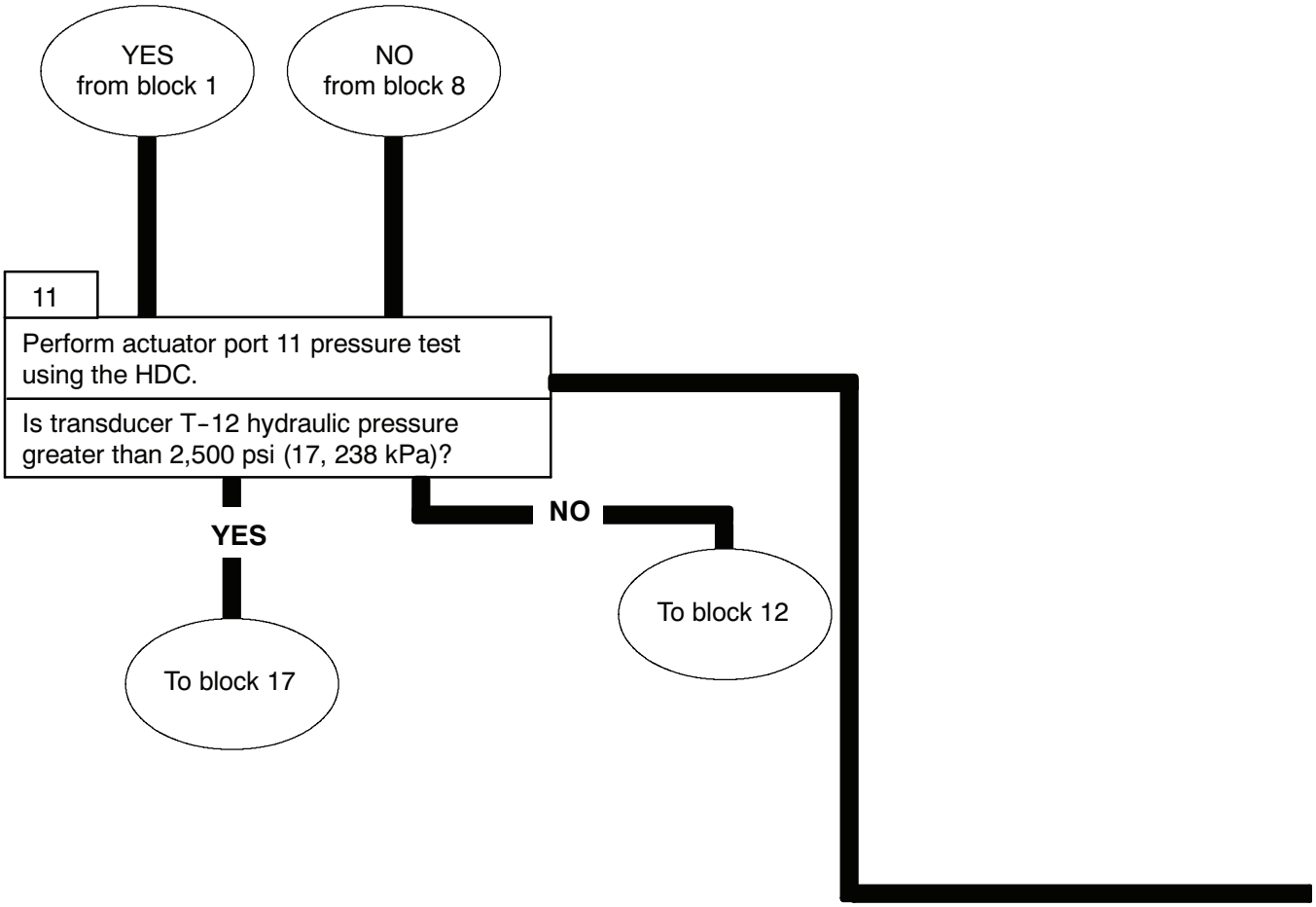
ACTUATOR HOSE 9 FLOW TEST

NOTE

Have suitable container ready to catch oil.

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

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0018 00**



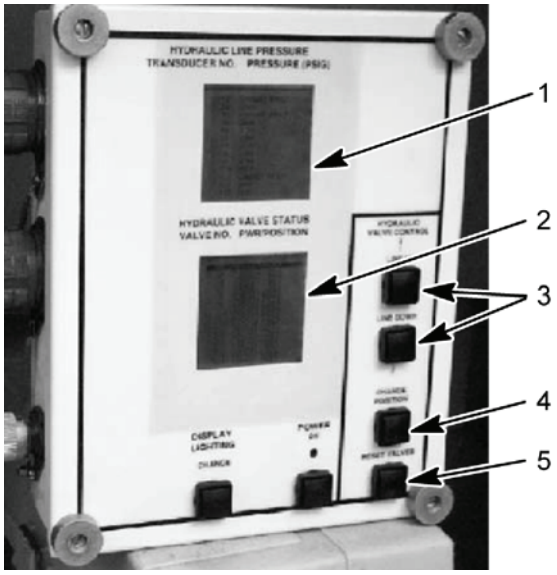
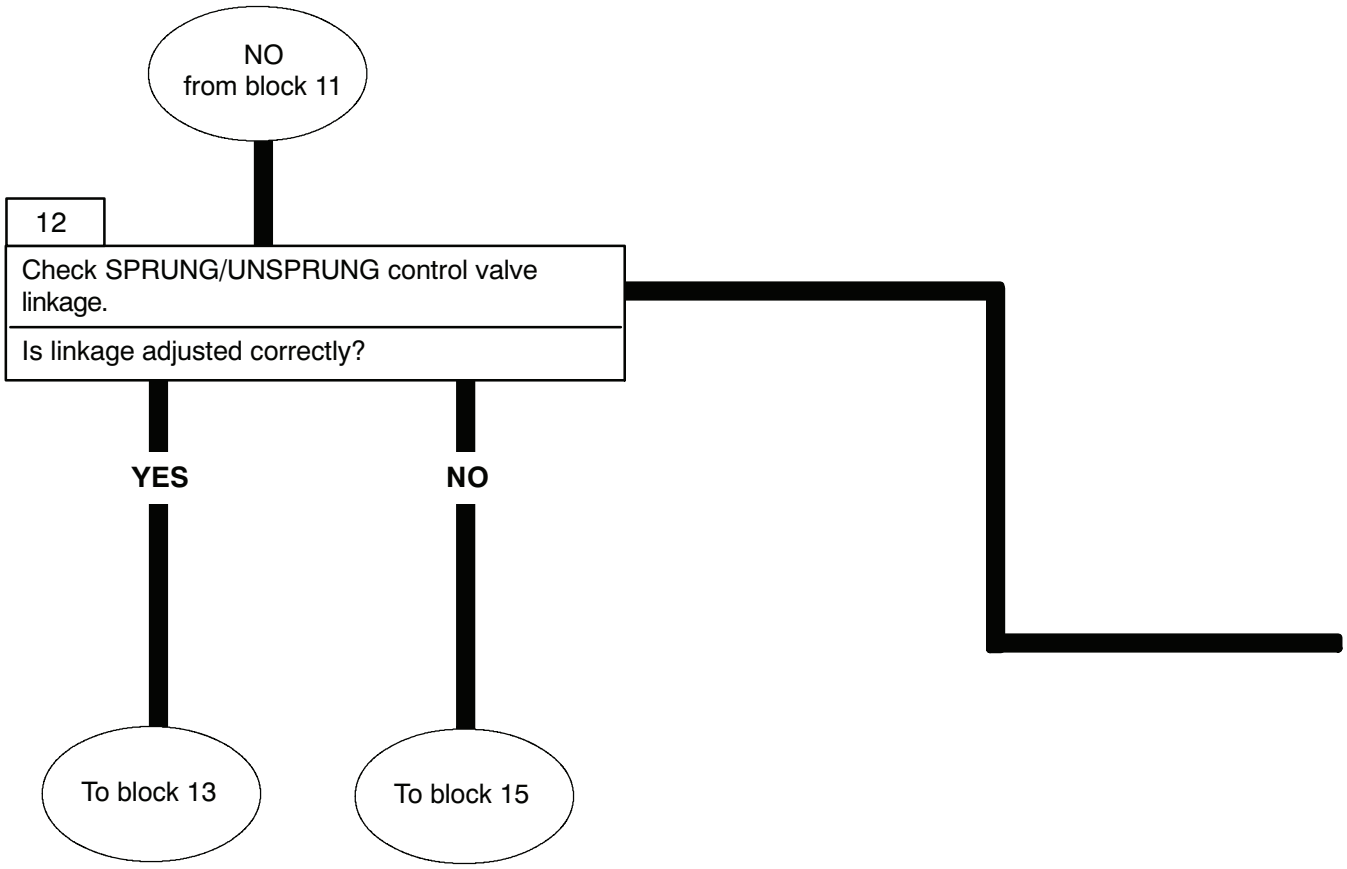


Figure 5. HDC Control Box

ACTUATOR PORT 11 PRESSURE TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 5) on the HDC control box.
- Using LINE UP or LINE DOWN button (Figure 5, item 3) on the HDC control box, select V8 on the HDC display (Figure 5, item 2). Using the CHANGE POSITION button (Figure 5, item 4), close V8 on the HDC display (Figure 5, item 2).
- Have assistant start engine and move SPRUNG/UNSPRUNG lever to UNSPRUNG. Observe transducer T-12 hydraulic pressure on the HDC display (Figure 5, item 1).
- Using LINE UP or LINE DOWN button (Figure 5, item 3) on the HDC control box, select V8 on the HDC display (Figure 5, item 2). Using the CHANGE POSITION button (Figure 5, item 4), open V8 on the HDC display (Figure 5, item 2).
- Stop engine; relieve hydraulic pressure.


NO
from block 11
12
Check SPRUNG/UNSPRUNG control valve linkage.
Is linkage adjusted correctly?
YES
NO
To block 13
To block 15

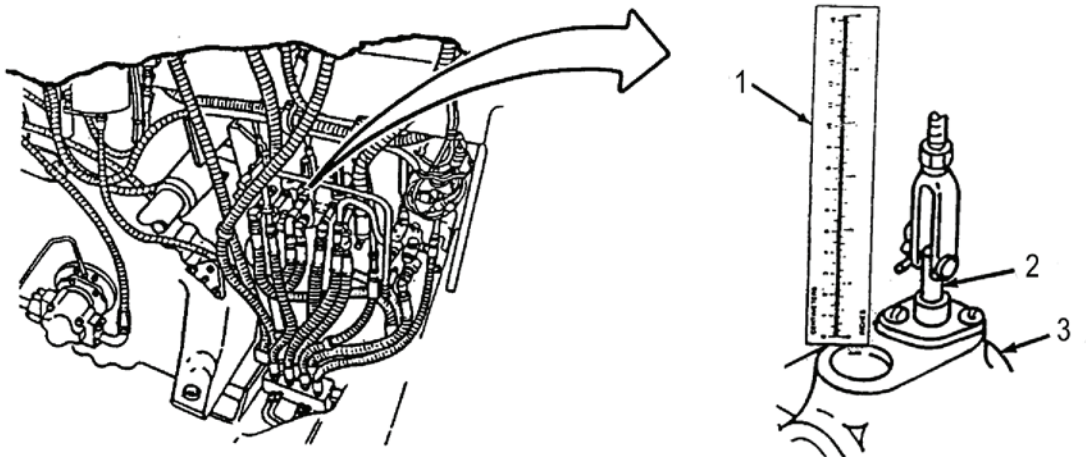
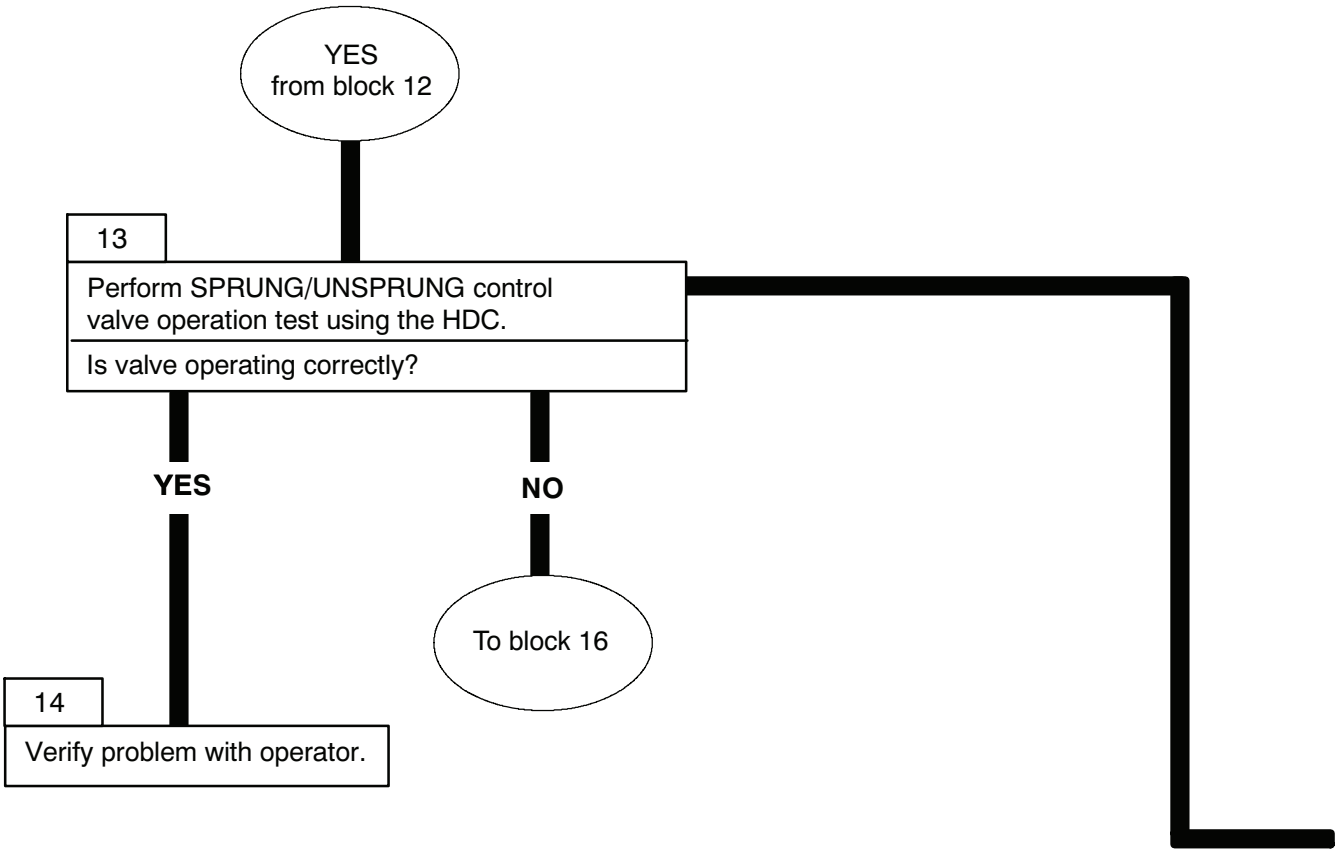


Figure 6. SPRUNG/UNSPRUNG Control Valve Linkage

SPRUNG/UNSPRUNG CONTROL VALVE LINKAGE CHECK

Hold measuring device (Figure 6, item 1) on face of SRUNG/UNSPRUNG control valve (Figure 6, item 3). Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG modes. Measure the distance that the plunger (Figure 6, item 2) travels as the lever is moved. Distance of travel should be 9/32 in. (7 mm).

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0018 00**



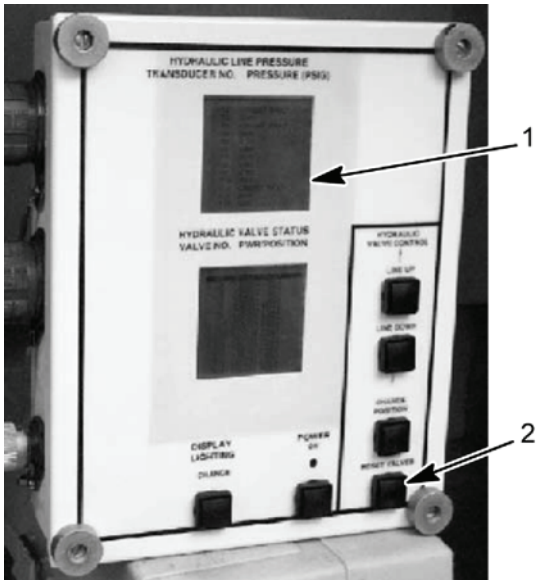
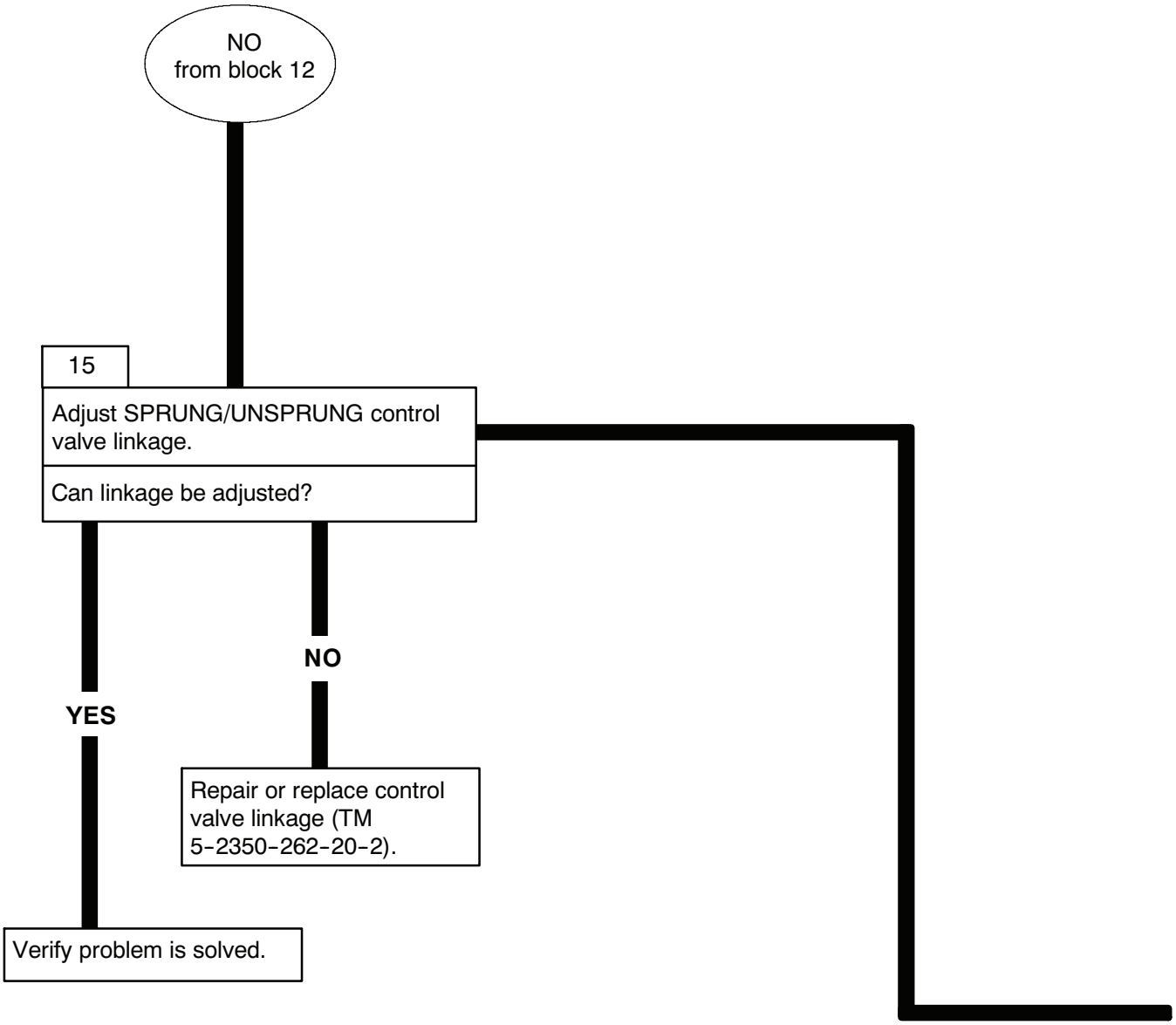


Figure 7. HDC Control Box

SPRUNG/UNSPRUNG CONTROL VALVE OPERATION TEST

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 2) on the HDC control box.
- Start engine and have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG several times. Observe transducer T-12 hydraulic pressure on the HDC display (Figure 7, item 1). Hydraulic pressure should be less than 145 psi (1,000 kPa) in SPRUNG mode and greater than 2,500 psi (17,238 kPa) in UNSPRUNG mode.
- Stop engine; relieve hydraulic pressure.


NO
from block 12
15
Adjust SPRUNG/UNSPRUNG control valve linkage.
Can linkage be adjusted?
NO
YES
Repair or replace control valve linkage (TM 5-2350-262-20-2).
Verify problem is solved.

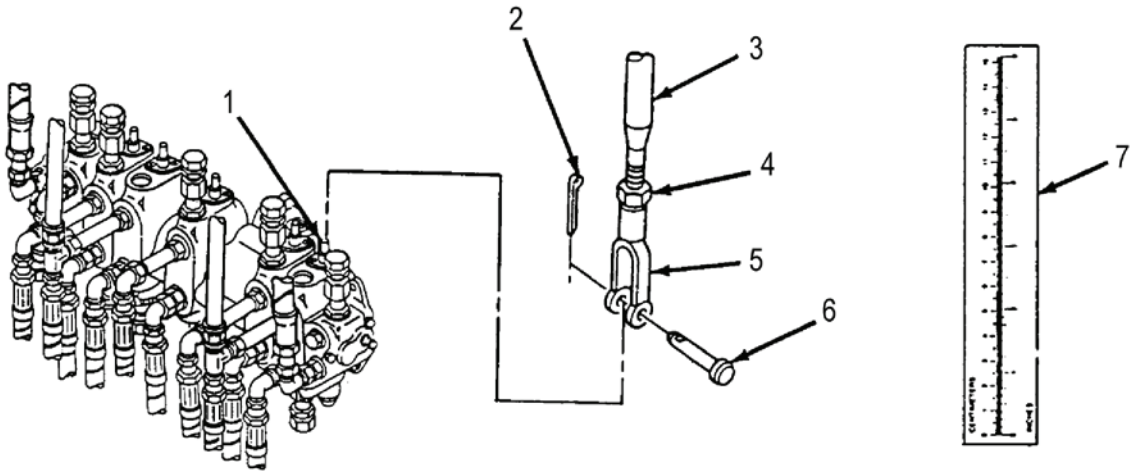


Figure 8. SPRUNG/UNSPRUNG Control Valve Control Rod Travel

SPRUNG/UNSPRUNG CONTROL VALVE 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 the SPRUNG/UNSPRUNG control rod.

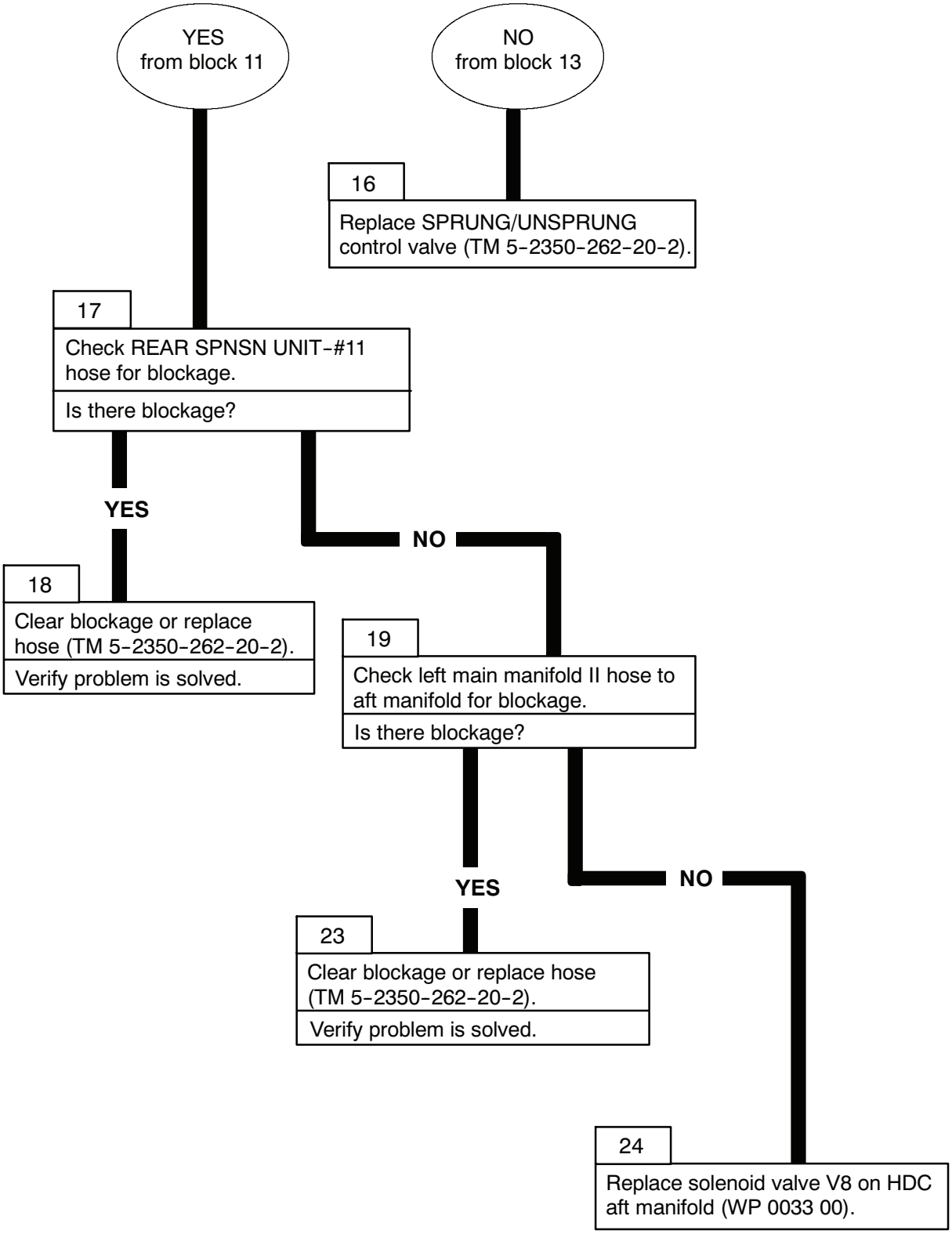
- Note position of control valve plunger (Figure 8, item 1) when SPRUNG/UNSPRUNG control lever is in neutral (off) position.

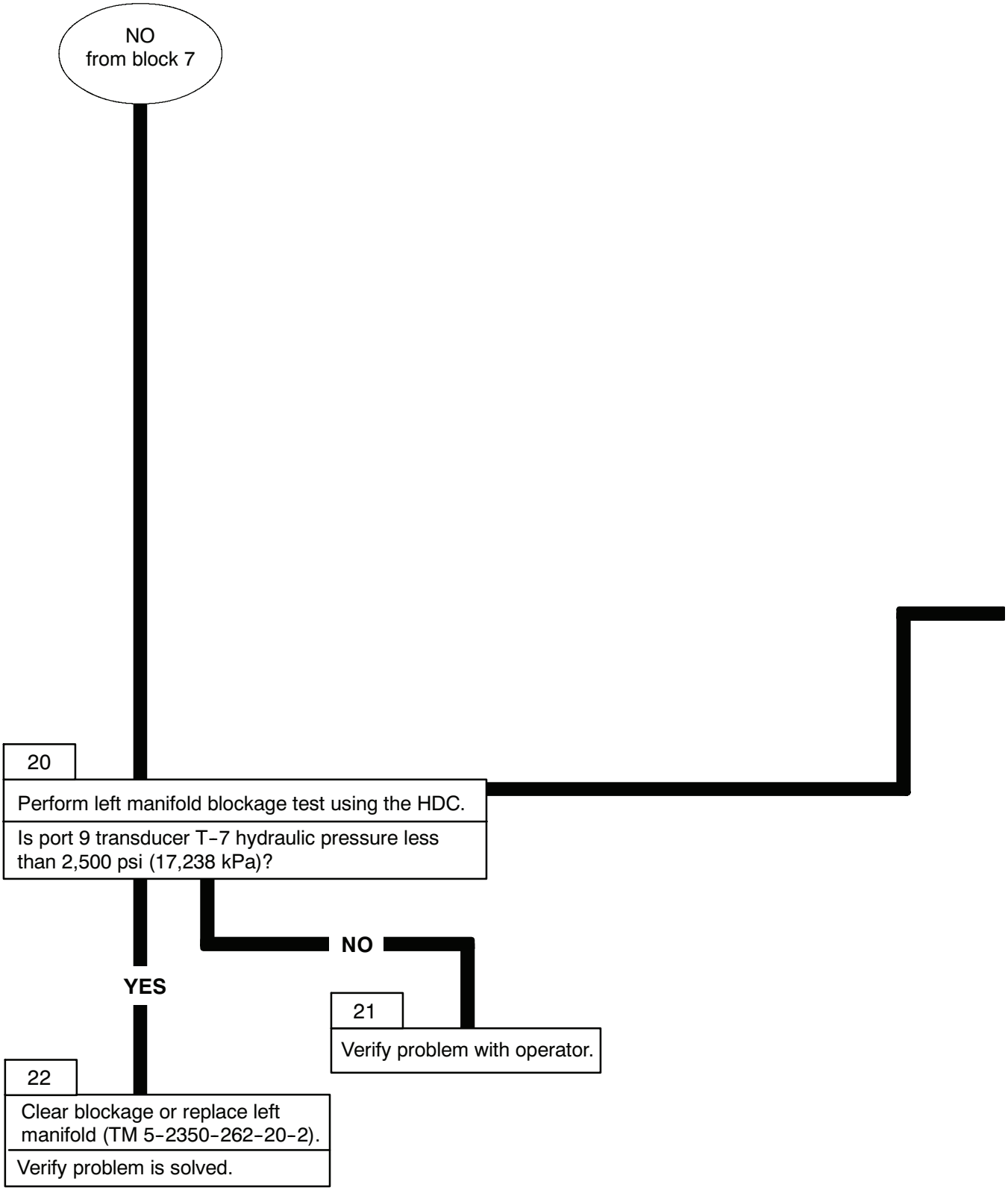
NOTE

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

- Remove cotter pin (Figure 8, item 2), straight pin (Figure 8, item 6), and clevis (Figure 8, item 5) from control valve plunger (Figure 8, item 1). Discard cotter pin (Figure 8, item 2).
- Loosen jam nut (Figure 8, item 4). Turn clevis (Figure 8, item 5) clockwise to shorten rod (Figure 8, item 3) and counterclockwise to lengthen rod (Figure 8, item 3) as necessary to obtain correct control valve plunger (Figure 8, item 1) travel.
- Hold measuring device (Figure 8, item 7) on face of SPRUNG/UNSPRUNG control valve. Have assistant move SPRUNG/UNSPRUNG lever between SPRUNG and UNSPRUNG mode. Measure distance of plunger travel.
- When rod (Figure 8, item 3) is adjusted for the desired length of travel, coat threads of rod (Figure 8, item 3) with sealing compound primer and sealing compound. Tighten jam nut (Figure 8, item 4) against clevis (Figure 8, item 5).
- Connect clevis (Figure 8, item 5) to control valve plunger (Figure 8, item 1) with straight pin (Figure 8, item 6) and new cotter pin (Figure 8, item 2).

REAR OF VEHICLE RAISES IN SPRUNG, BUT NOT UNSPRUNG MODE - Continued **0018 00**




NO
from block 7
20
Perform left manifold blockage test using the HDC.
Is port 9 transducer T-7 hydraulic pressure less than 2,500 psi (17,238 kPa)?
NO
YES
21
Verify problem with operator.
22
Clear blockage or replace left manifold (TM 5-2350-262-20-2).
Verify problem is solved.

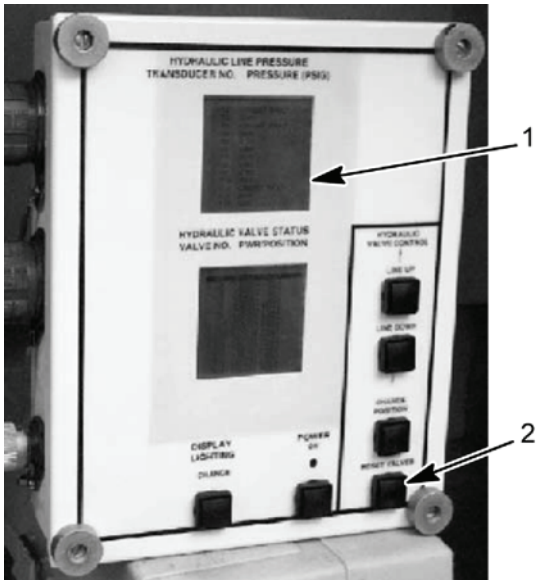


Figure 9. HDC Control Box

LEFT MANIFOLD BLOCKAGE TEST

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 2) on the HDC control box.
- Start engine; read transducer T-7 hydraulic pressure on the HDC display (Figure 9, item 1).
- Stop engine; relieve hydraulic pressure.

END OF WORK PACKAGE

VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS 0019 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Three 62B10

References
TM 5-2350-262-20-2

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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

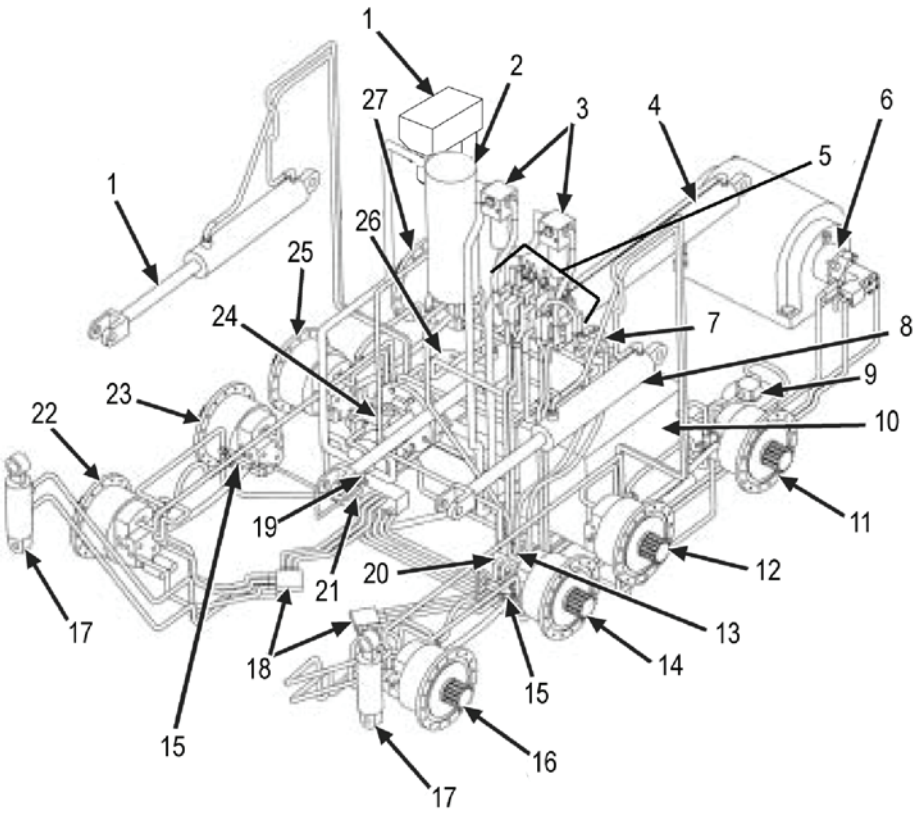
WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times with engine off. Failure to comply may result in severe injury or death to personnel.**

NOTE

Perform this procedure when all driver controls are inoperative. Refer to vehicle hydraulic system schematic diagram (FP-1 through FP-6).



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

Figure 1. Driver Control Circuit

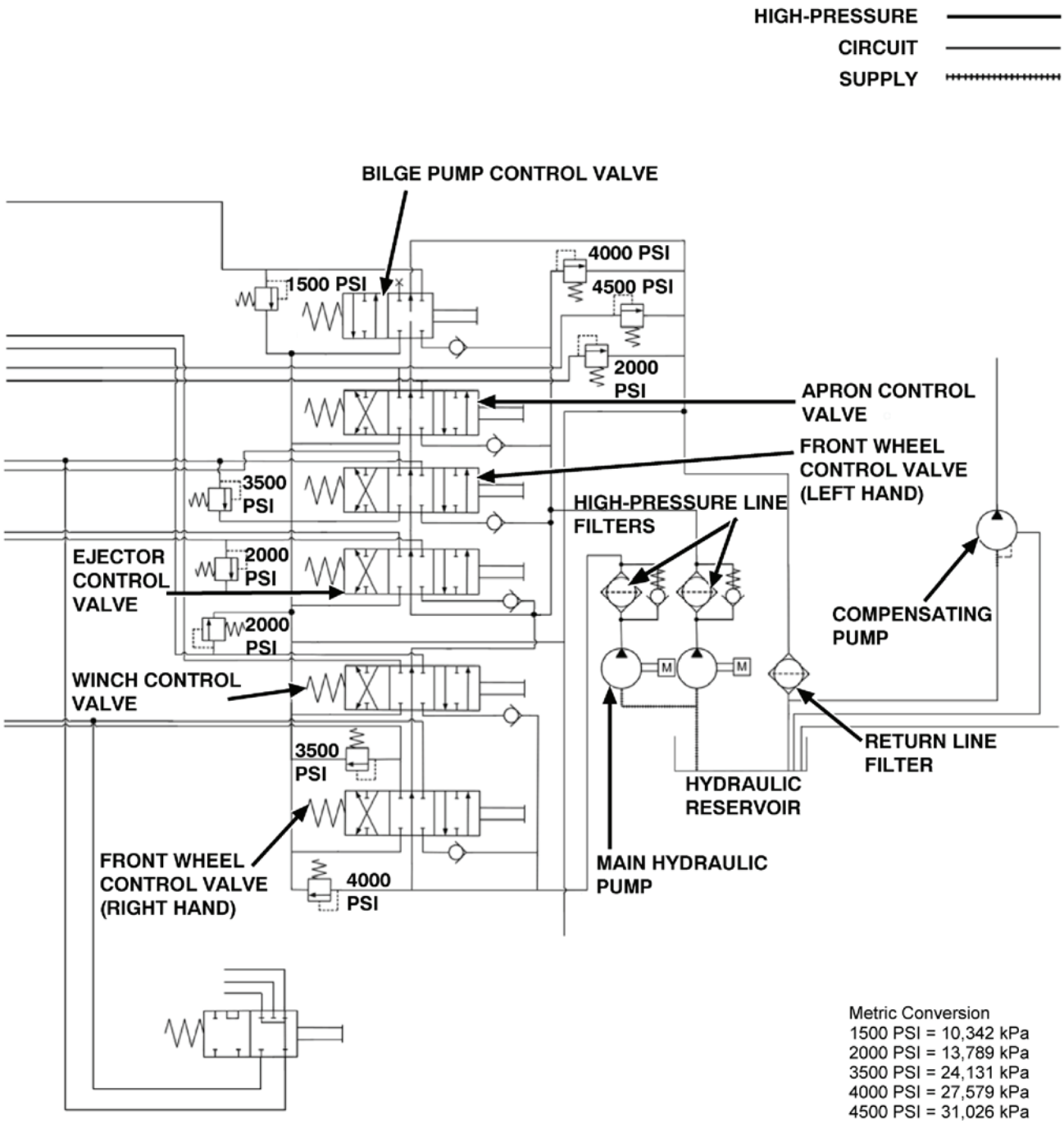
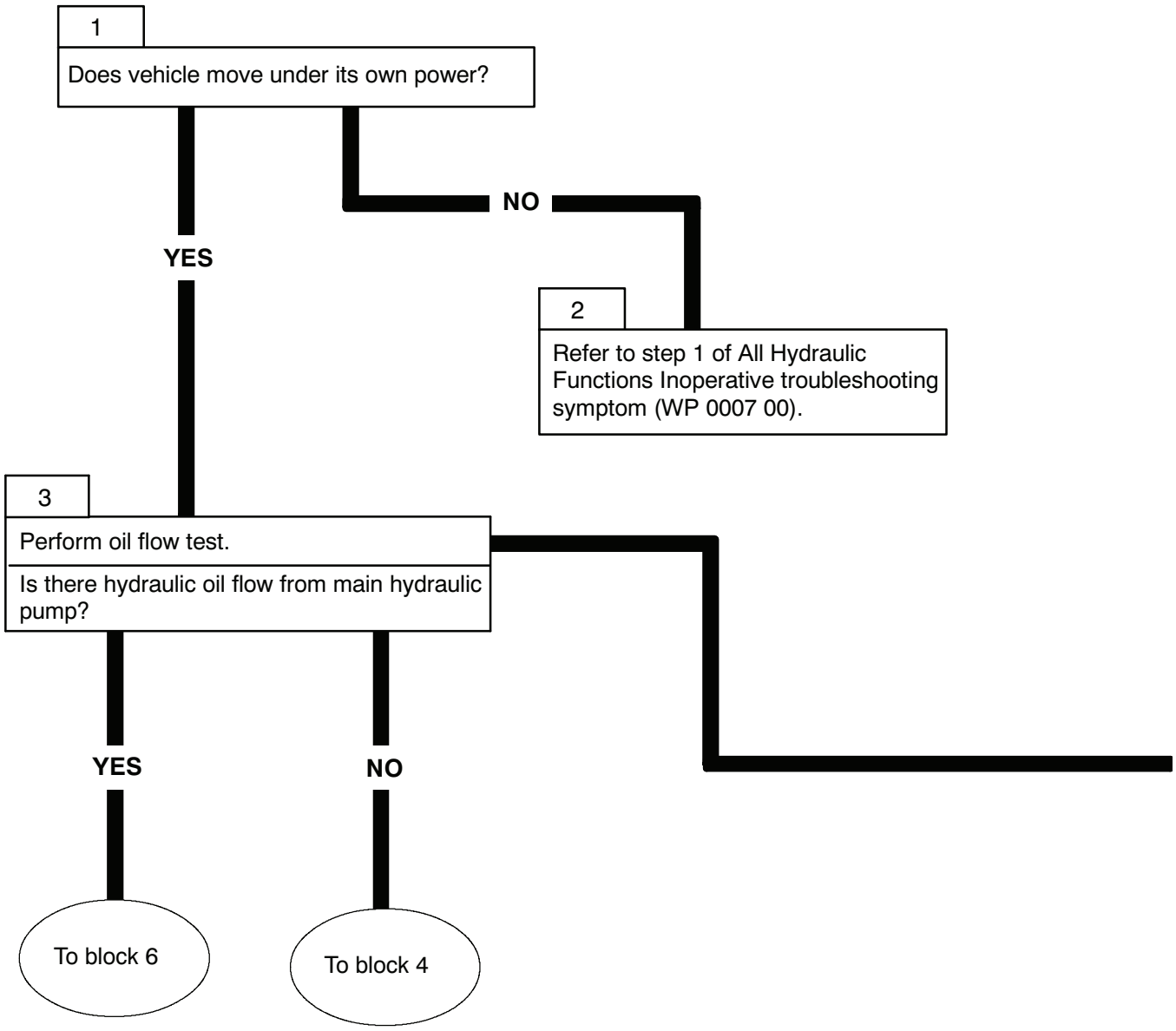


Figure 2. Driver Control Schematic

VEHICLE DOES NOT RESPOND TO DRIVER CONTROLS - Continued 0019 00



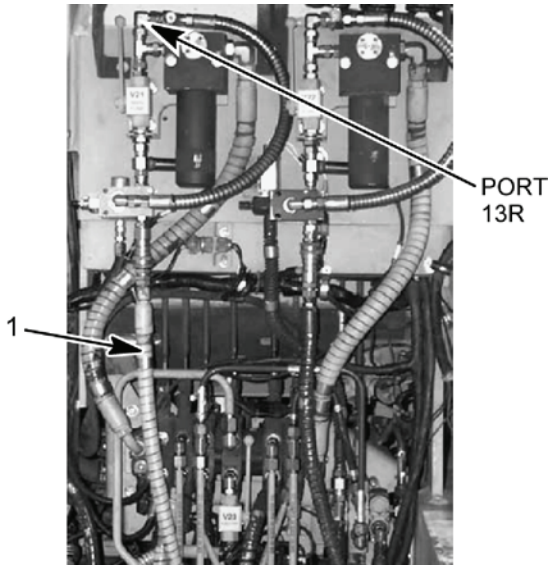


Figure 3. High-Pressure Filter Inlet Port 13R

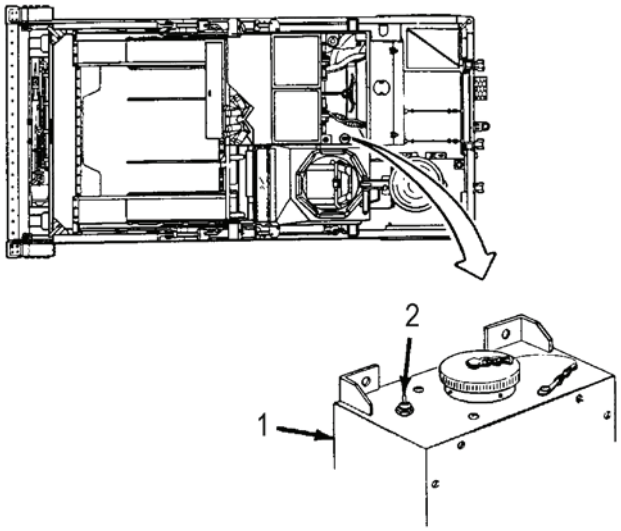


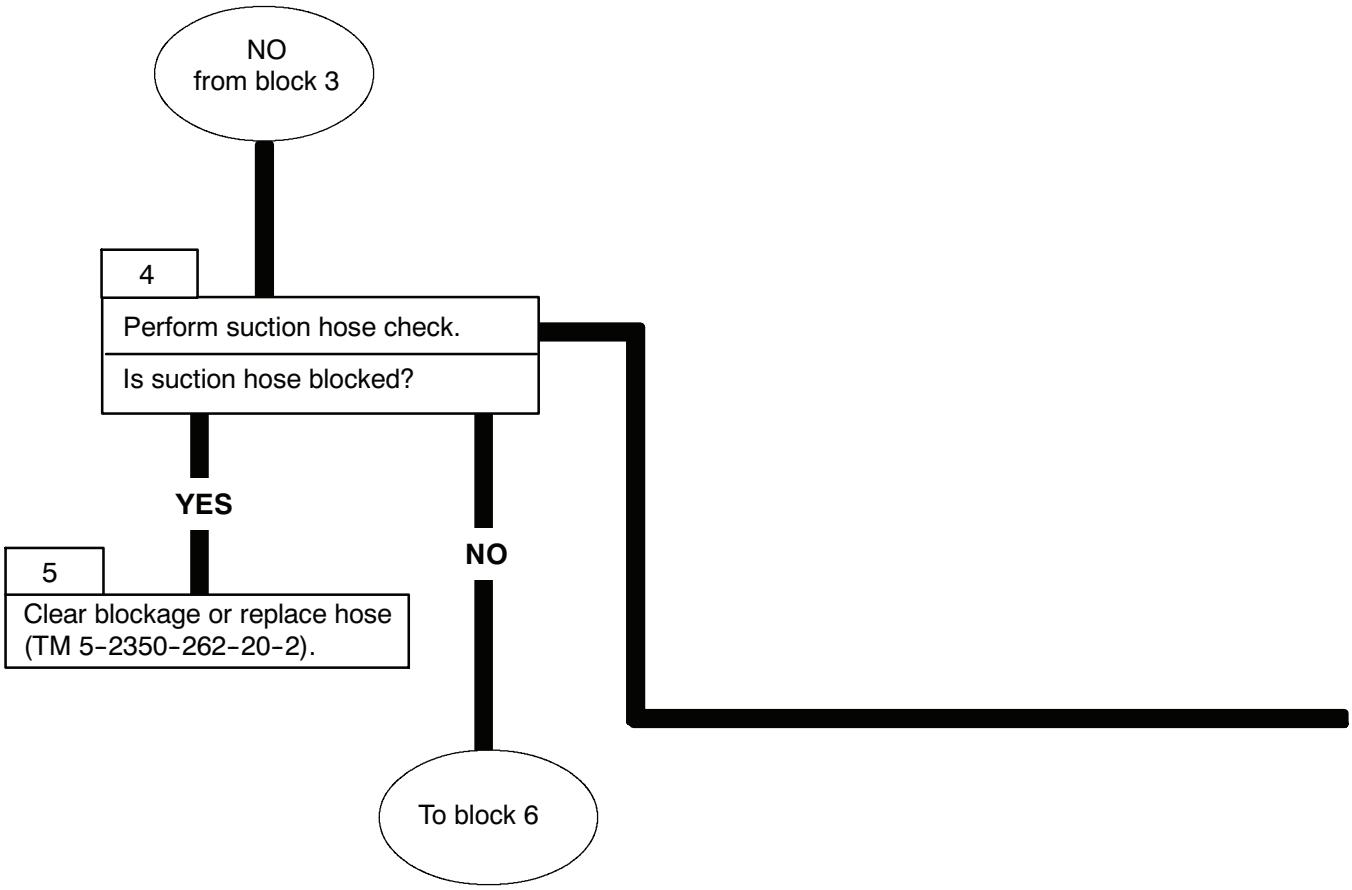
Figure 4. STE/ICE-R Interface Box

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 (Figure 3, item 1) from high-pressure filter inlet port 13R.
- While assistant one is holding disconnected end of hose (Figure 3, item 1) over container, assistant two will hold fuel solenoid shutoff toggle switch (Figure 4, item 2) on STE/ICE-R interface box (Figure 4, item 1) in shutoff position. Crank engine for approximately 15 seconds. Hydraulic oil should flow freely.


NO
from block 3
4
Perform suction hose check.
Is suction hose blocked?
YES
NO
5
Clear blockage or replace hose
(TM 5-2350-262-20-2).
To block 6

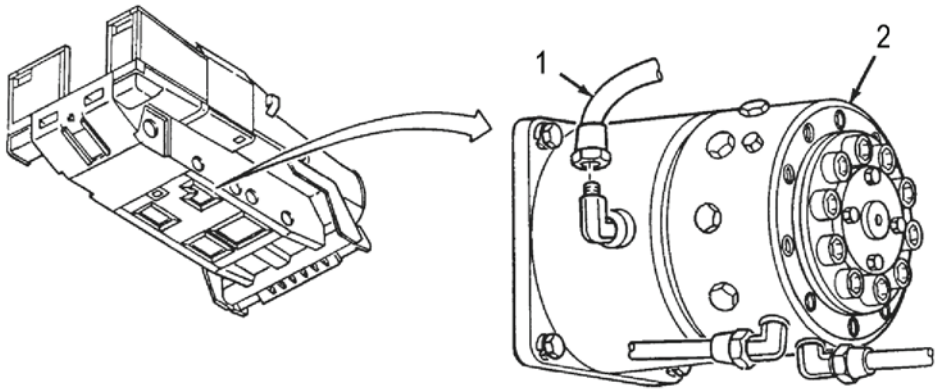


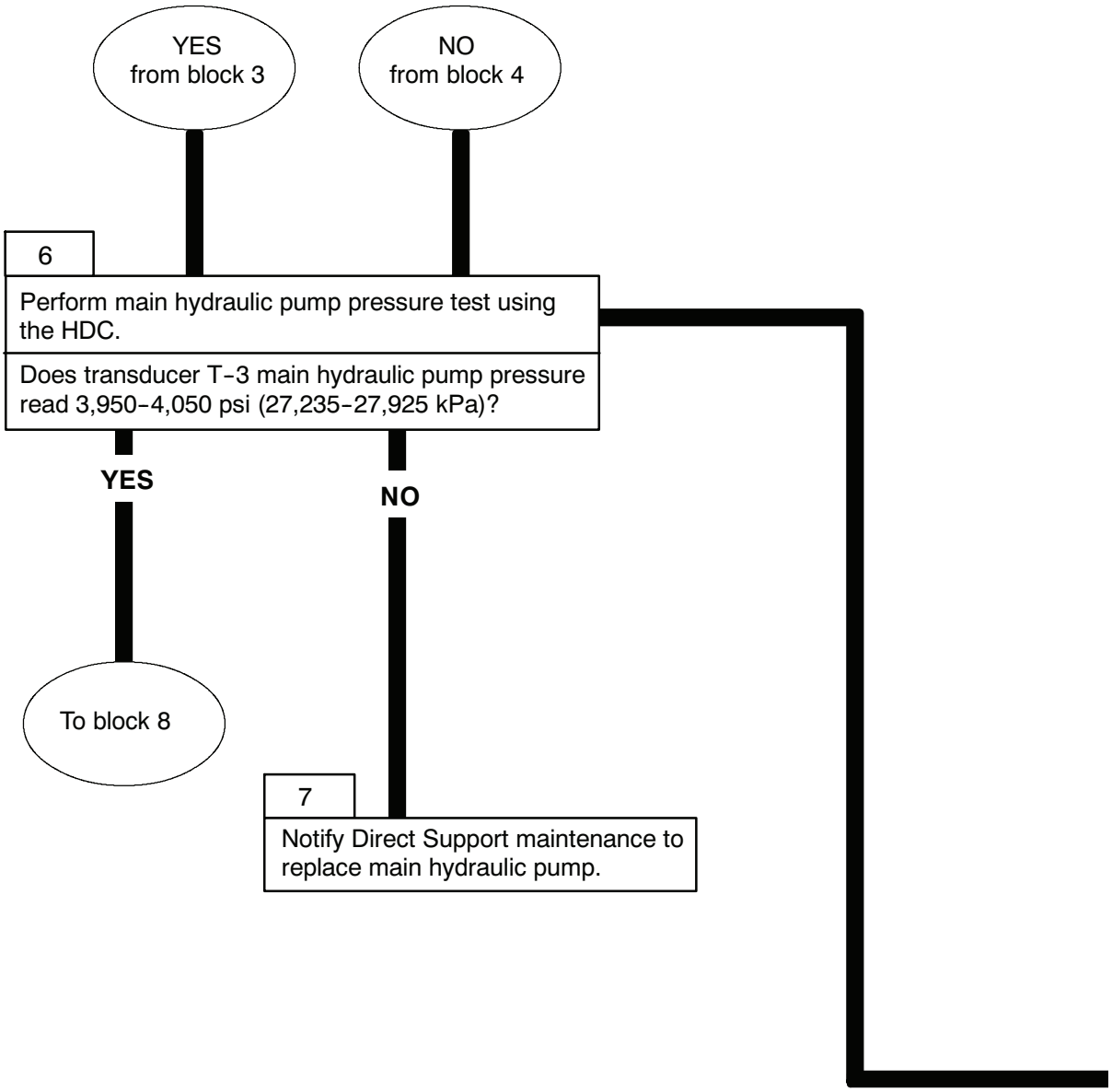
Figure 5. Main Hydraulic Pump Suction Hose

SUCTION HOSE CHECK

NOTE

Have suitable container ready to catch oil.

- Loosen PUMP SUCT TUBE-7 hose (Figure 5, item 1) approximately three-quarters of the way at main hydraulic pump (Figure 5, item 2). Hydraulic oil should flow freely.


YES
from block 3
NO
from block 4
6
Perform main hydraulic pump pressure test using the HDC.
Does transducer T-3 main hydraulic pump pressure read 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
To block 8
7
Notify Direct Support maintenance to replace main hydraulic pump.

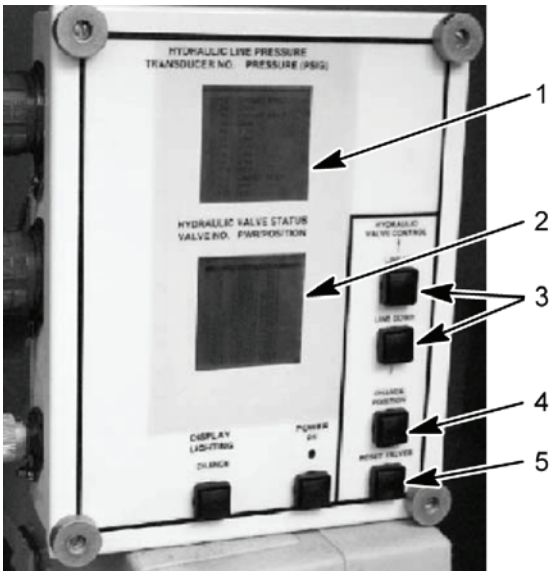


Figure 6. HDC Control Box

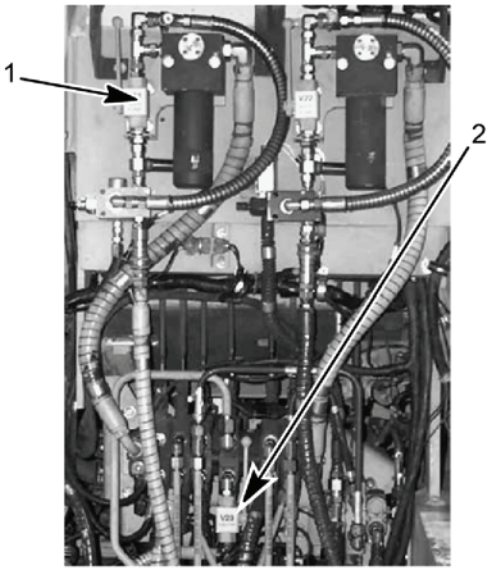


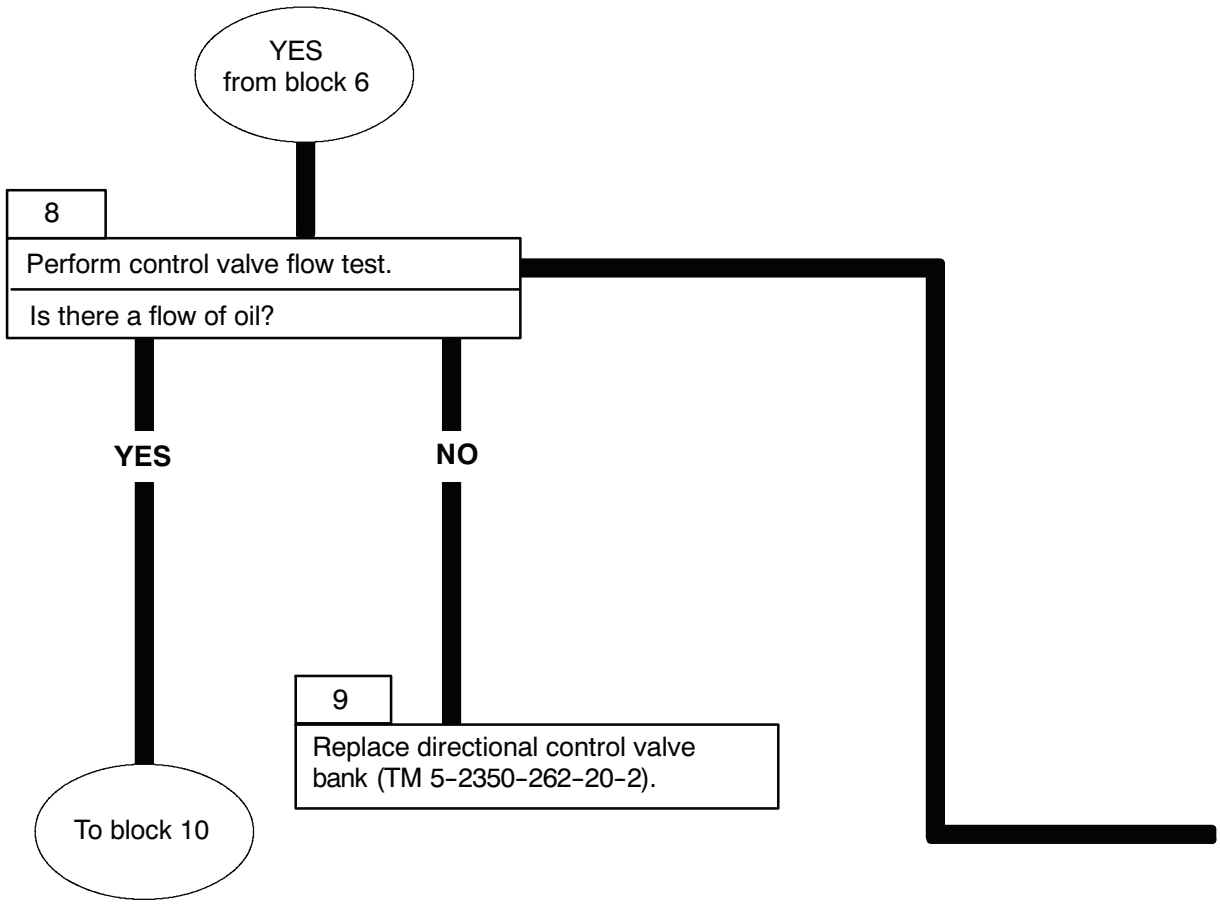
Figure 7. DCV Bank

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 right main hydraulic pressure inhibit valve V21 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.**

- Stop engine, relieve hydraulic pressure (if not previously done).
- Ensure right main hydraulic pressure inhibit valve V21 (Figure 7, item 1) is fully opened.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 6, item 5) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 7, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 6, item 3), select V1 on the HDC display (Figure 6, item 2). Close V1 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close right main hydraulic pressure inhibit valve V21 (Figure 7, item 1) until transducer T-3 on the HDC display (Figure 6, item 1) indicates 3,950-4,050 psi (27,235-27,925 kPa).
- Fully open right main hydraulic pressure inhibit valve V21 (Figure 7, item 1).
- Stop engine; relieve hydraulic pressure.
- Manually open ejector inhibit ball valve V23 (Figure 7, item 2) on the DCV bank. Ensure both valves are fully open.
- Using LINE UP or LINE DOWN button (Figure 6, item 3), select V1 on the HDC display (Figure 6, item 2). Open V1 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.


YES
from block 6
8
Perform control valve flow test.
Is there a flow of oil?
YES
NO
9
Replace directional control valve bank (TM 5-2350-262-20-2).
To block 10

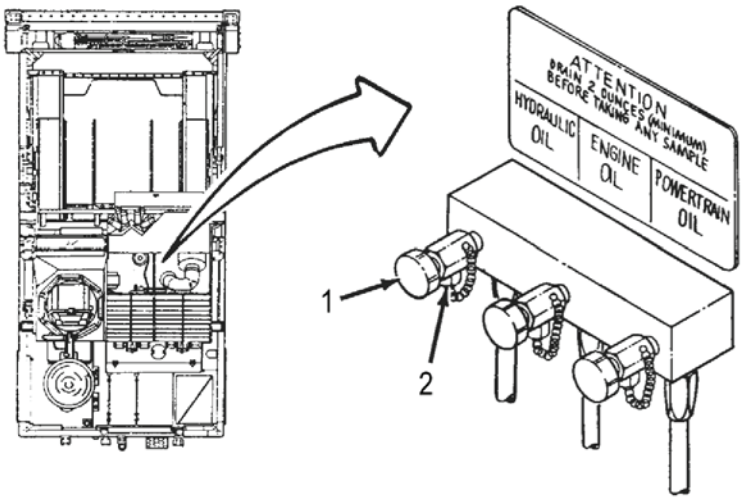


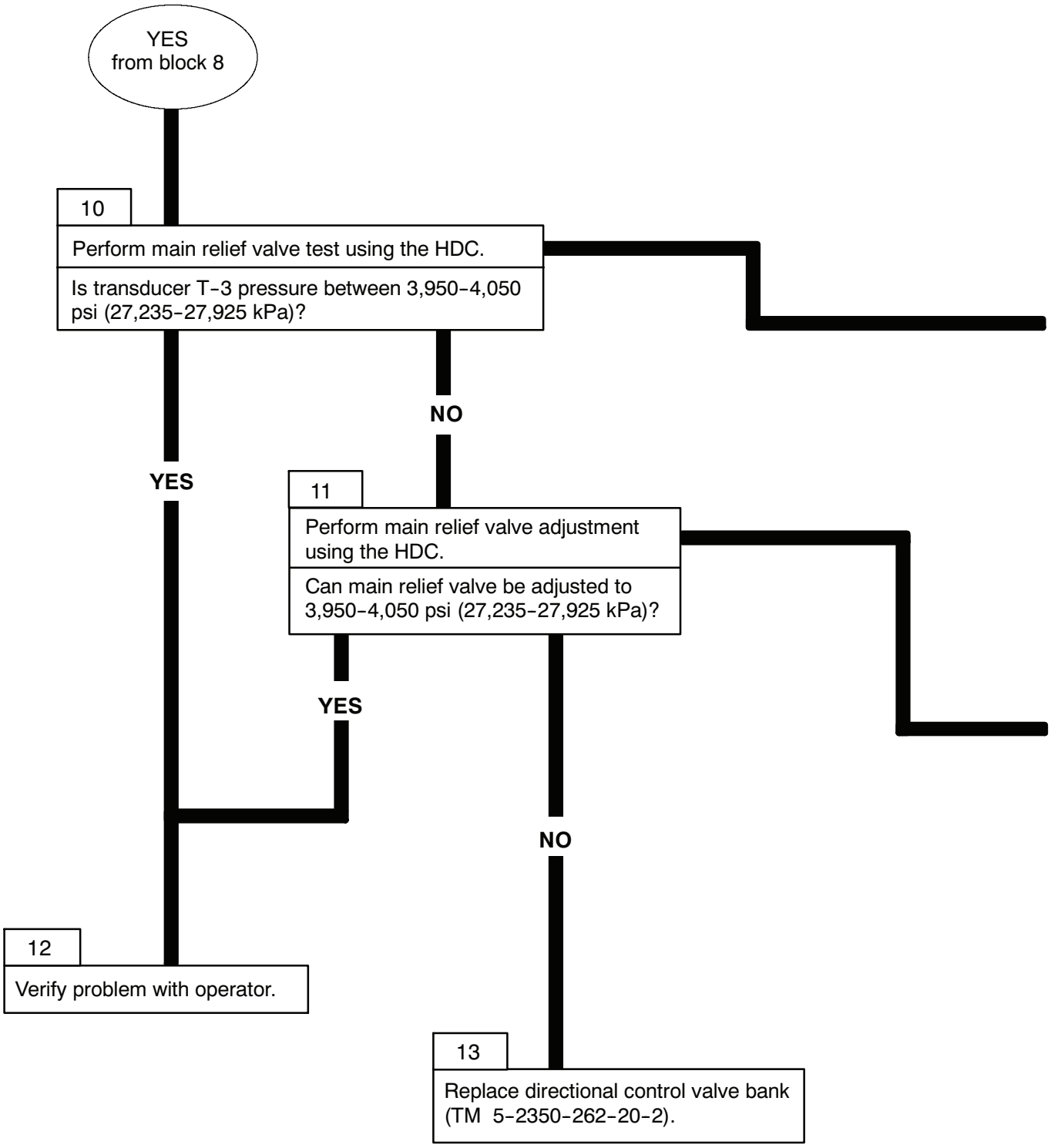
Figure 8. Hydraulic System Sample Control Valve

CONTROL VALVE FLOW TEST

NOTE

Have suitable container ready to catch oil.

- Start engine. Remove cap (Figure 8, item 2) from hydraulic system sample valve (Figure 8, item 1).
- Open valve (Figure 8, item 1) by turning it clockwise. Hold valve (Figure 8, item 1) open for several seconds. Oil should flow freely from sample valve (Figure 8, item 1).
- Close valve (Figure 8, item 1), and replace cap (Figure 8, item 2). Stop engine; relieve hydraulic pressure.


YES
from block 8
10
Perform main relief valve test using the HDC.
Is transducer T-3 pressure between 3,950-4,050 psi (27,235-27,925 kPa)?
NO
YES
11
Perform main relief valve adjustment using the HDC.
Can main relief valve be adjusted to 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
12
Verify problem with operator.
13
Replace directional control valve bank (TM 5-2350-262-20-2).

MAIN RELIEF VALVE TEST

- Stop engine; relieve hydraulic pressure (if not already done).
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 10, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Close V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG and move EJECTOR CONTROL lever to BACK. Read transducer T-3 hydraulic pressure on the HDC display (Figure 9, item 1).
- While holding the EJECTOR CONTROL lever to BACK, have assistant move the right-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-3 hydraulic pressure on the HDC display (Figure 9, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening the ejector inhibit ball valve V23 (Figure 10, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Open V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.

MAIN RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Continued on page 0019 00-15.

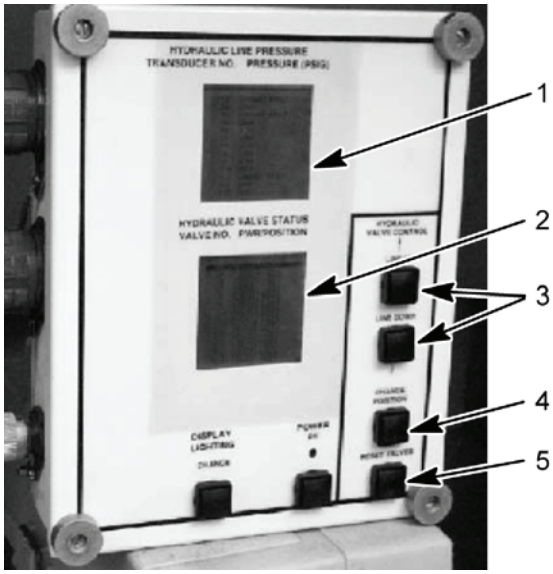


Figure 9. HDC Control Box

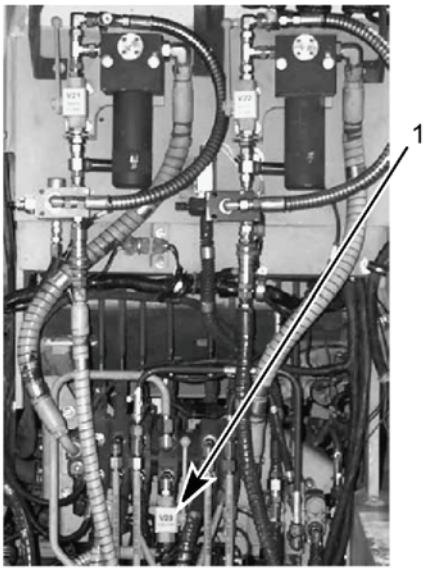


Figure 10. DCV Bank

MAIN RELIEF VALVE ADJUSTMENT - 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.**
- **Do not stand or work in bowl area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand in front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 12, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 11, item 3) select V1 on the HDC display (Figure 11, item 2). Close V1 on the HDC display (Figure 11, item 2) by selecting the change position button (Figure 11, item 4) on the HDC control box.
- Continued on page 0019 00-17.

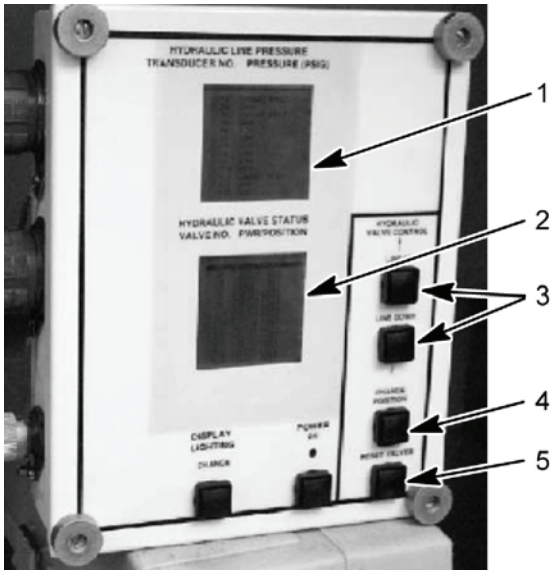


Figure 11. HDC Control Box

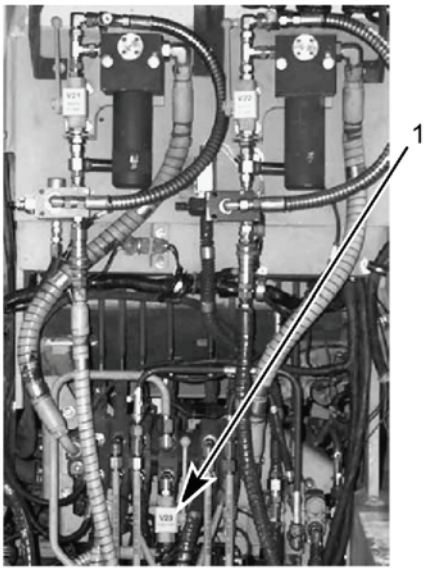


Figure 12. DCV Bank

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- Loosen jam nut (Figure 13, item 1) 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 to RAISE.
- Rotate adjusting screw (Figure 13, item 2) clockwise to increase pressure and counterclockwise to decrease pressure as necessary to obtain desired pressure. Tighten jam nut (Figure 13, item 1).
- Stop engine; relieve hydraulic pressure.
- Enable ejector by manually opening the ejector inhibit ball valve V23 (Figure 15, item 1) on the DCV bank.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 14, item 5) on the HDC control box.

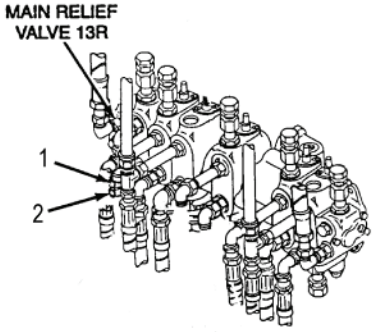


Figure 13. Main Relief Valve 13R

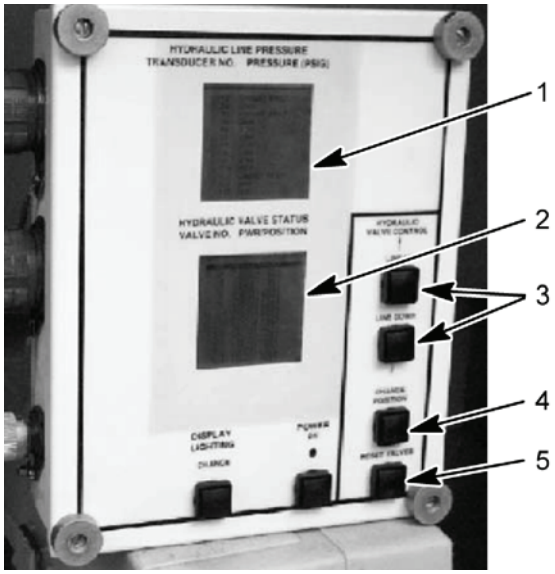


Figure 14. HDC Control Box

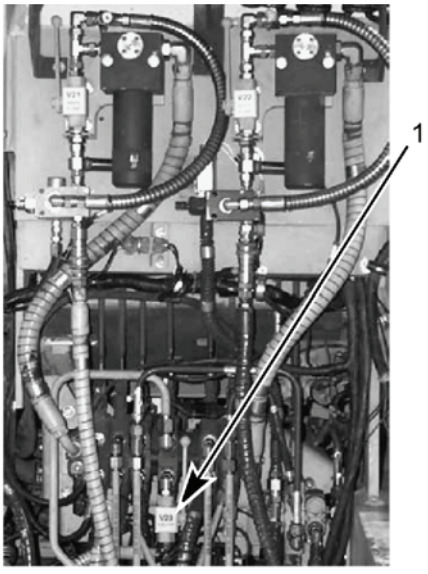


Figure 15. DCV Bank

END OF WORK PACKAGE

WINCH AND RIGHT-HAND WHEEL CONTROL INOPERATIVE 0020 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

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

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system pressure component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times with engine off. Failure to comply may result in severe injury to personnel.**

NOTE

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

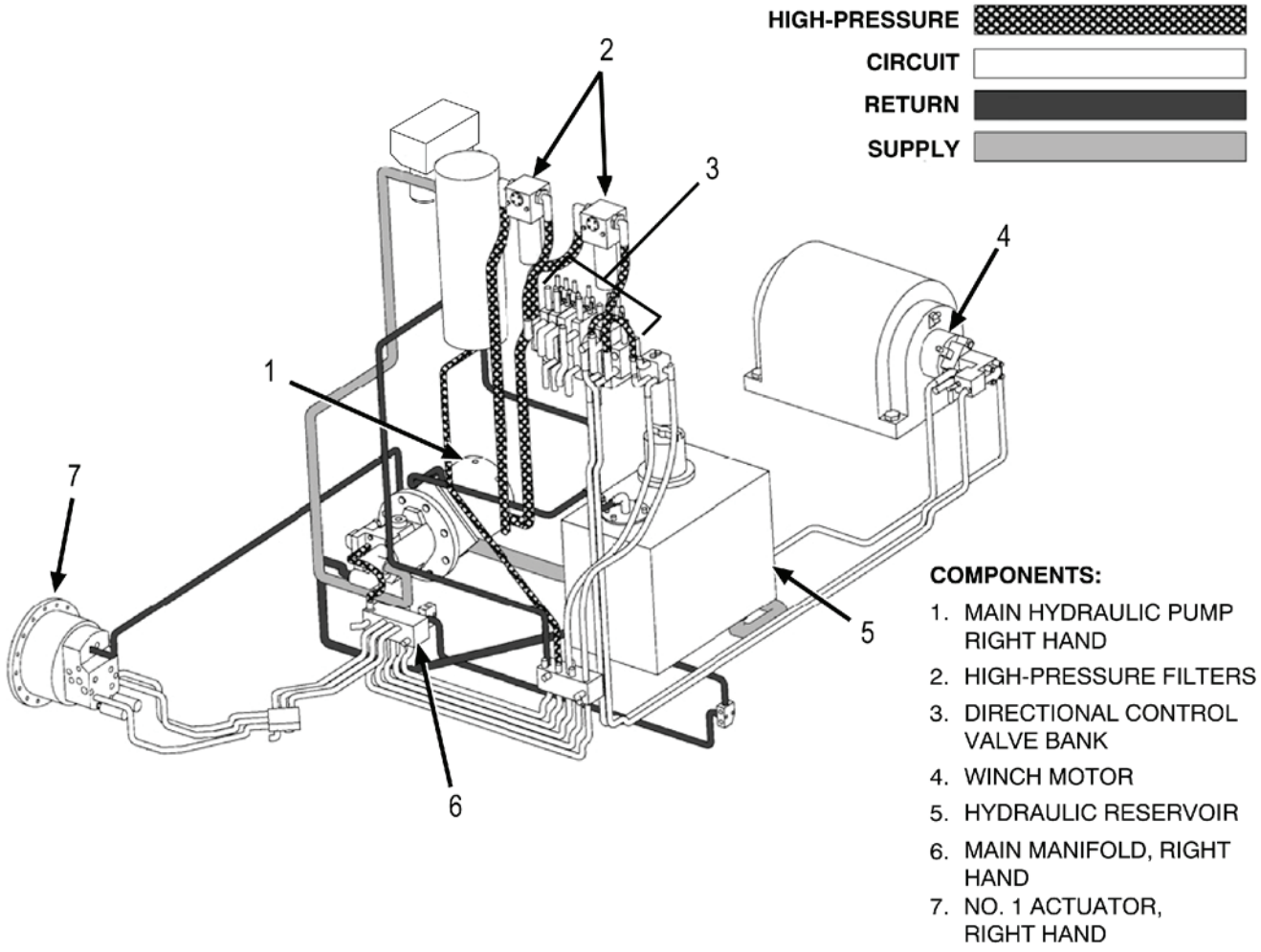


Figure 1. Outboard Hydraulic Valve Bank Circuit

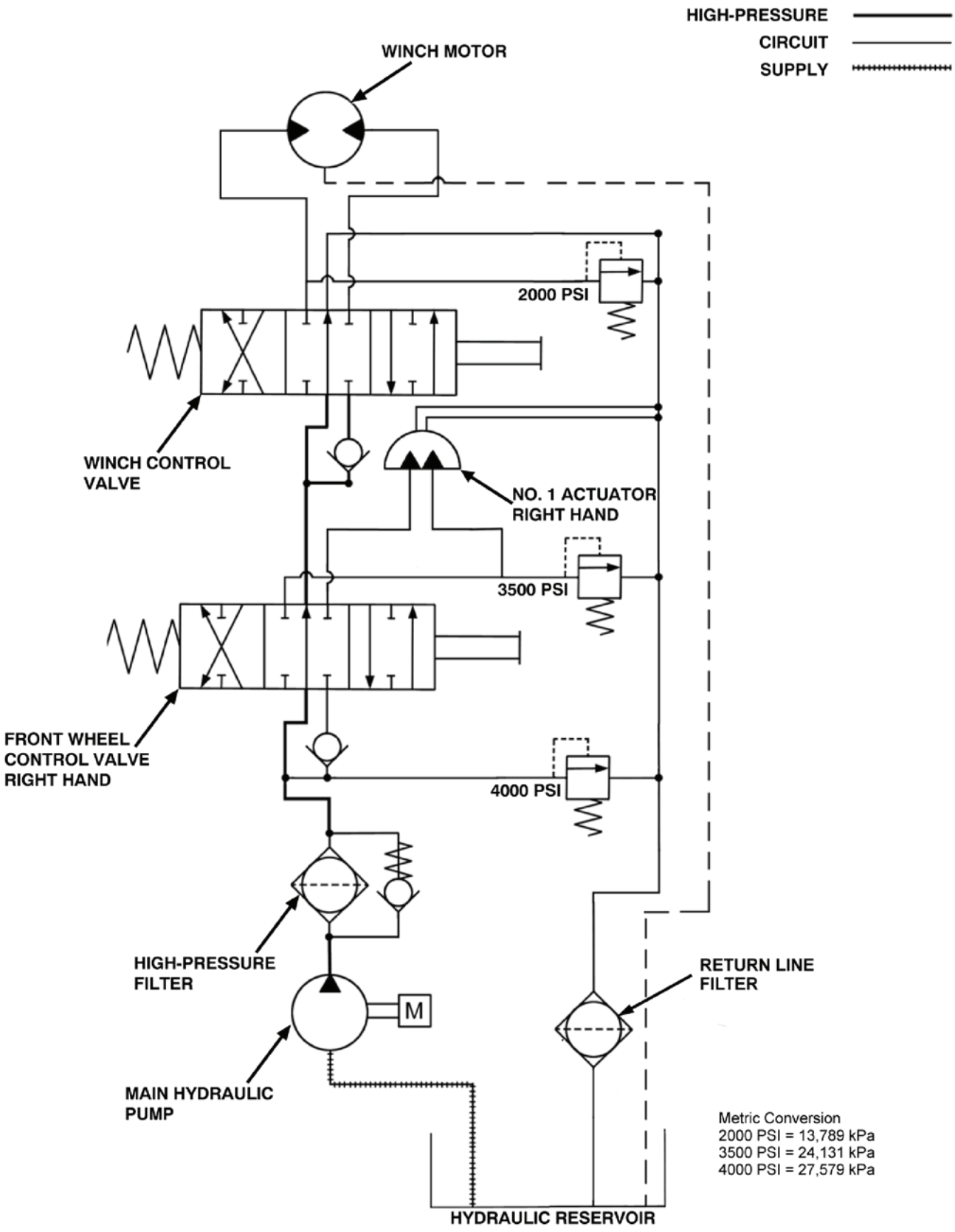
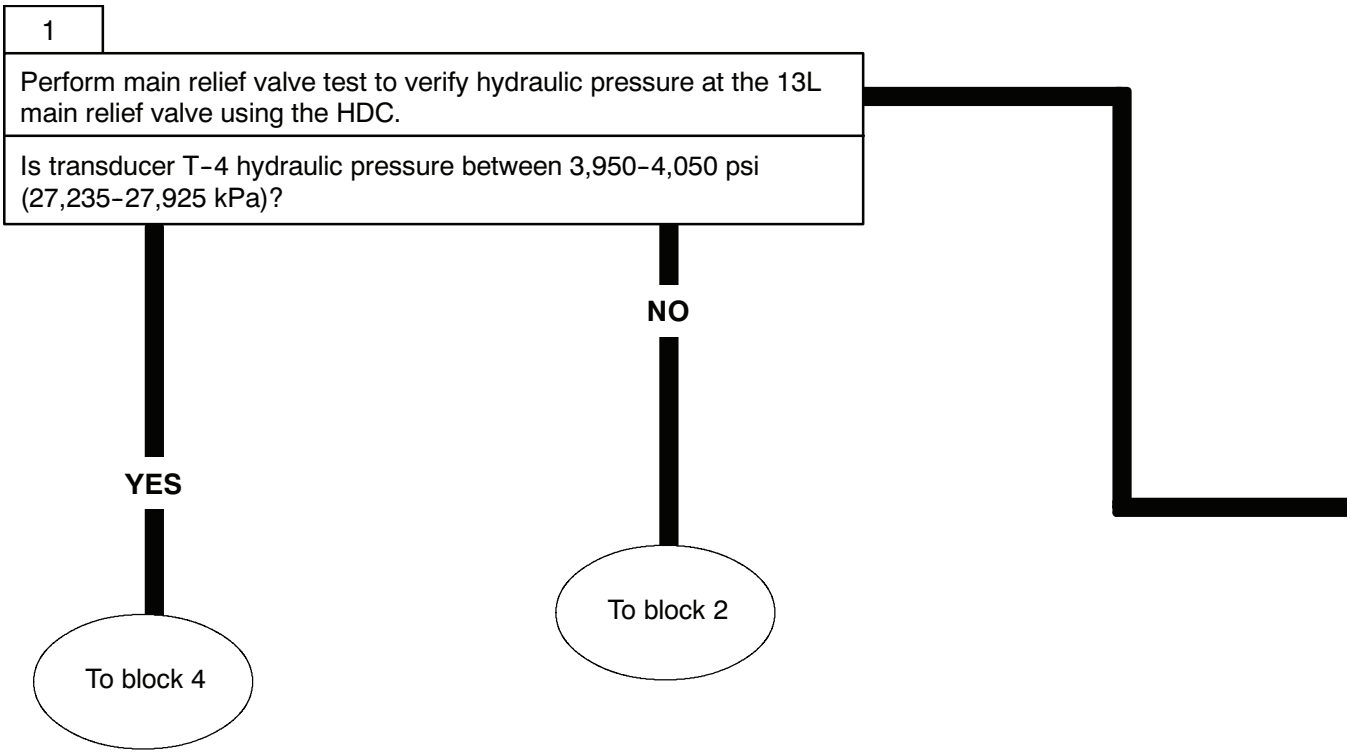


Figure 2. Outboard Hydraulic Valve Bank Schematic

WINCH AND RIGHT-HAND WHEEL CONTROL INOPERATIVE - Continued **0020 00**



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.

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 4, item 5) on the HDC control box.
- Move ejector forward, stop engine, and relieve hydraulic pressure.
- Disable ejector by manually closing ejector inhibit ball valve V23 (Figure 3, item 1) on the DCV bank.
- Using LINE UP or LINE DOWN button (Figure 4, item 3), select V1 on the HDC display (Figure 3, item 2). Close V1 on the HDC display (Figure 4, item 2) by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box.
- Have assistant start engine, move the SPRUNG/UNSPRUNG lever to SPRUNG, and move EJECTOR CONTROL lever to BACK. Read transducer T-4 hydraulic pressure on the HDC display (Figure 4, item 1).
- While simultaneously holding the EJECTOR CONTROL lever in BACK, have assistant move left-hand SUSPENSION CONTROL lever to RAISE. Read transducer T-4 hydraulic pressure on the HDC display (Figure 4, item 1).
- Using LINE UP or LINE DOWN button (Figure 4, item 3), select V1 on the HDC display (Figure 4, item 2). Open V1 on the HDC display (Figure 4, item 2) by selecting the CHANGE POSITION button (Figure 4, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.

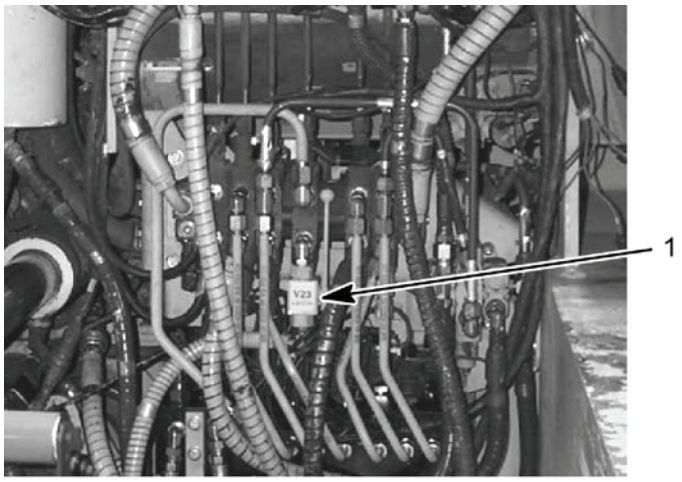


Figure 3. DCV Bank

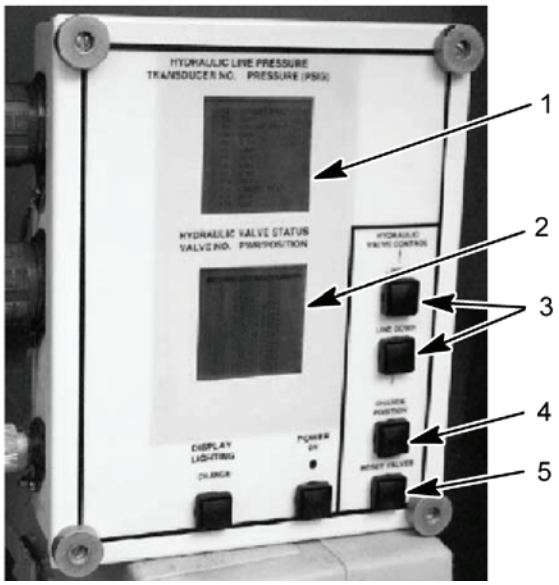
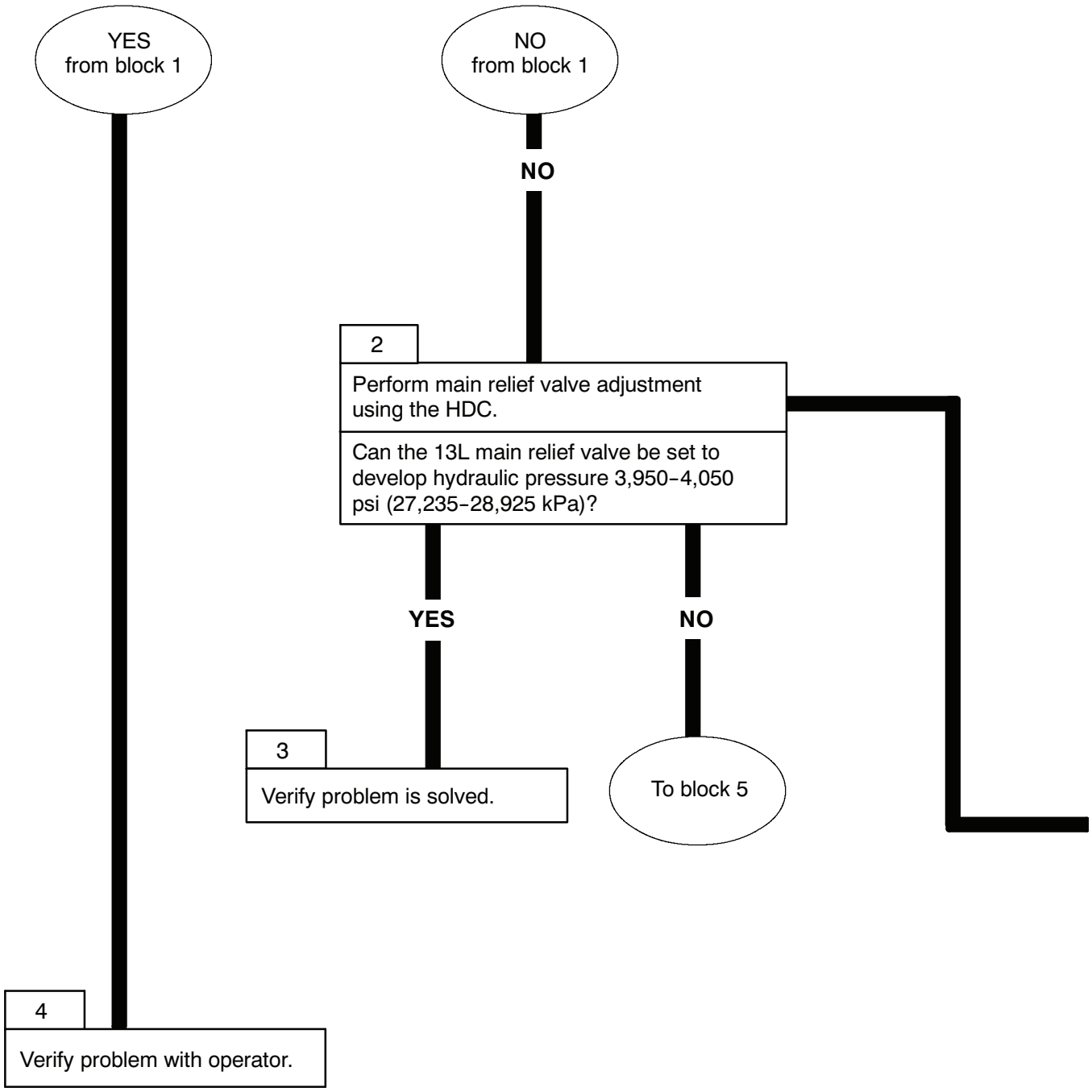


Figure 4. HDC Control Box


YES
from block 1
NO
from block 1
NO
2
Perform main relief valve adjustment using the HDC.
Can the 13L main relief valve be set to develop hydraulic pressure 3,950-4,050 psi (27,235-28,925 kPa)?
YES
NO
3
Verify problem is solved.
To block 5
4
Verify problem with operator.

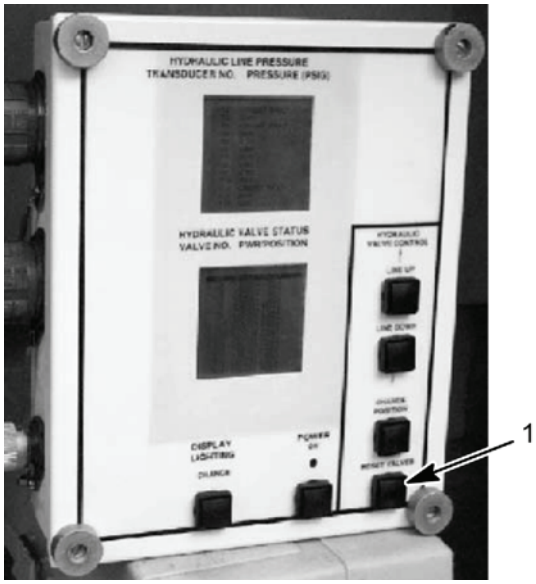


Figure 5. HDC Control Box

MAIN RELIEF VALVE ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 5, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**

- Continued on page 0020 00-9.

MAIN RELIEF VALVE ADJUSTMENT - CONTINUED

- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 7, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 8, item 3), select V1 on the HDC display (Figure 8, item 2). Close V1 on the HDC display (Figure 8, item 2) by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box.
- Loosen jam nut (Figure 6, item 2) on main relief valve 13L.
- Have assistant start engine and simultaneously hold EJECTOR CONTROL lever in BACK while holding left-hand SUSPENSION CONTROL lever is RAISE.
- While observing transducer T-4 hydraulic pressure on the HDC display (Figure 8, item 1); rotate adjusting screw (Figure 6, item 1) clockwise to increase hydraulic pressure, counterclockwise to decrease hydraulic pressure until desired pressure is obtained; tighten jam nut.

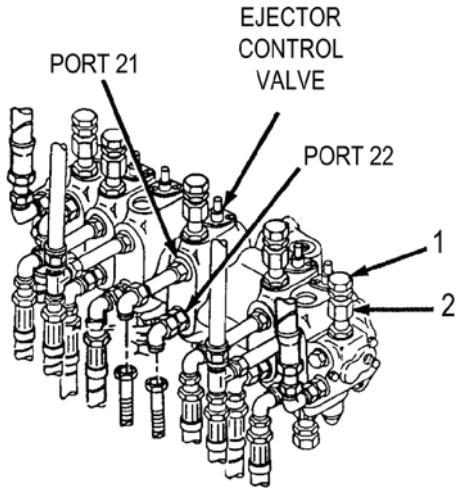


Figure 6. Main Relief Valve 13L

- Stop engine; relieve hydraulic pressure.
- Manually open the ejector inhibit ball valve V23 (Figure 7, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 8, item 3), select V1 on the HDC display (Figure 8, item 2). Open V1 on the HDC display (Figure 8, item 2) by selecting the CHANGE POSITION button (Figure 8, item 4) on the HDC control box.

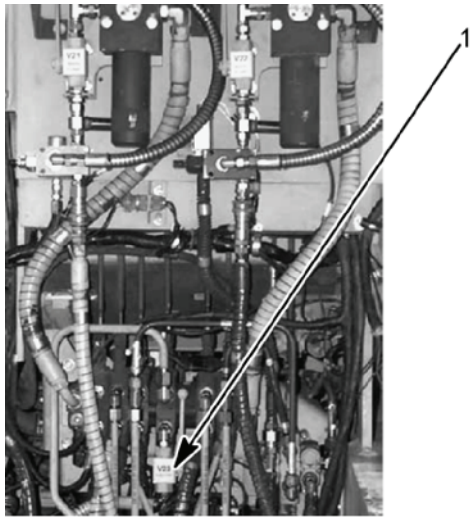


Figure 7. DCV Bank

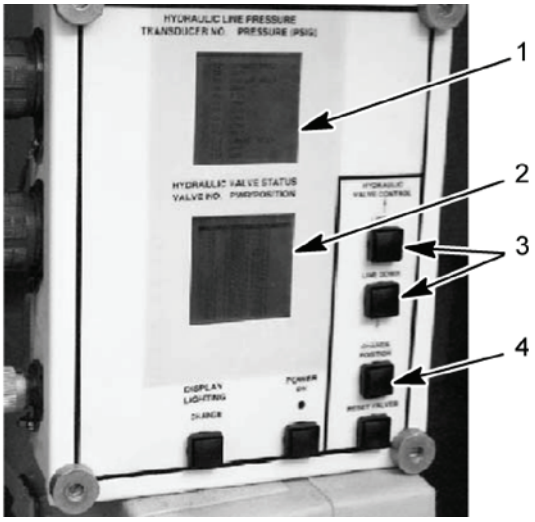
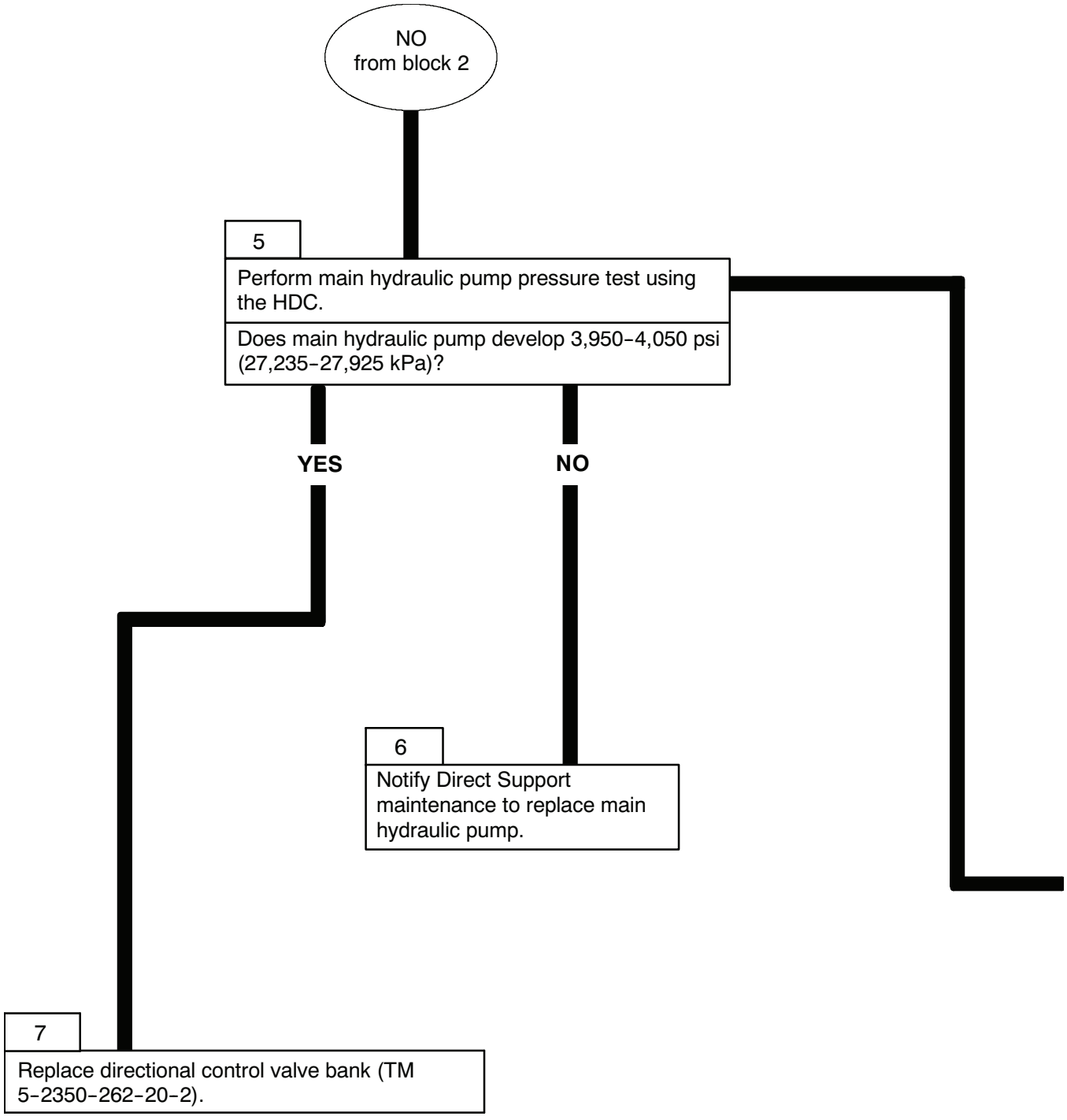


Figure 8. HDC Control Box


NO
from block 2
5
Perform main hydraulic pump pressure test using the HDC.
Does main hydraulic pump develop 3,950-4,050 psi (27,235-27,925 kPa)?
YES
NO
6
Notify Direct Support maintenance to replace main hydraulic pump.
7
Replace directional control valve bank (TM 5-2350-262-20-2).

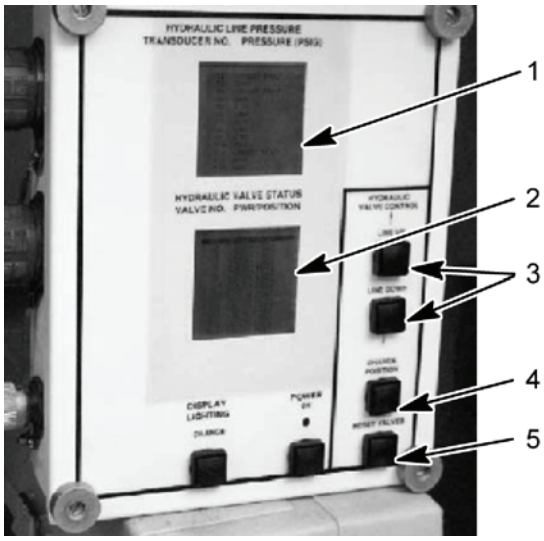


Figure 9. HDC Control Box

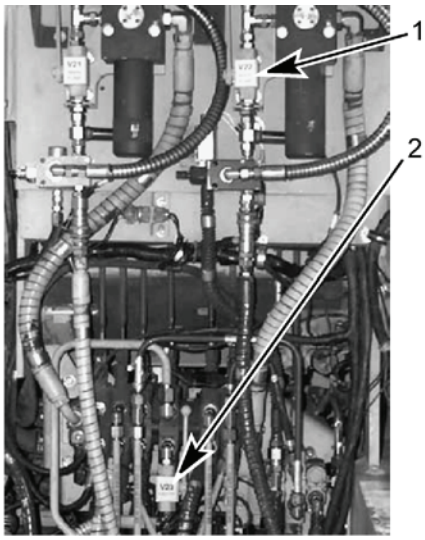


Figure 10. DCV Bank

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 left main hydraulic pressure inhibit valve V22 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.**

- Stop engine; relieve hydraulic pressure.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 9, item 5) on the HDC control box.
- Disable ejector by manually closing the ejector inhibit ball valve V23 (Figure 10, item 2) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Close V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Ensure left main hydraulic pressure inhibit valve V22 (Figure 10, item 1) is fully opened.
- Have assistant start engine and allow engine to idle (750-800 rpm). Slowly close left main hydraulic pressure inhibit valve V22 (Figure 10, item 1), until transducer T-4 on the HDC display (Figure 9, item 1) reaches 3,950-4,050 psi (27,235-27,925 kPa).
- Open left main hydraulic pressure inhibit valve V22 (Figure 10, item 1) fully.
- Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Open V1 (Figure 9, item 2) on the HDC display by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.
- Open ejector inhibit ball valve V23 (Figure 10, item 2).

END OF WORK PACKAGE

WINCH WILL NOT PULL RATED LOAD

0021 00

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required
Two 62B10

References
TM 5-2350-262-20-2

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

The winch hydraulic motor receives oil flow from the 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 oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury 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.

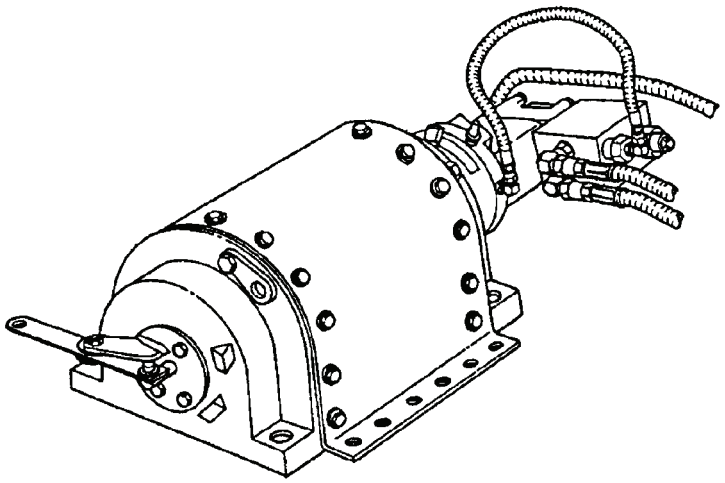


Figure 1. 35,000 LB (15,890 KG) Winch

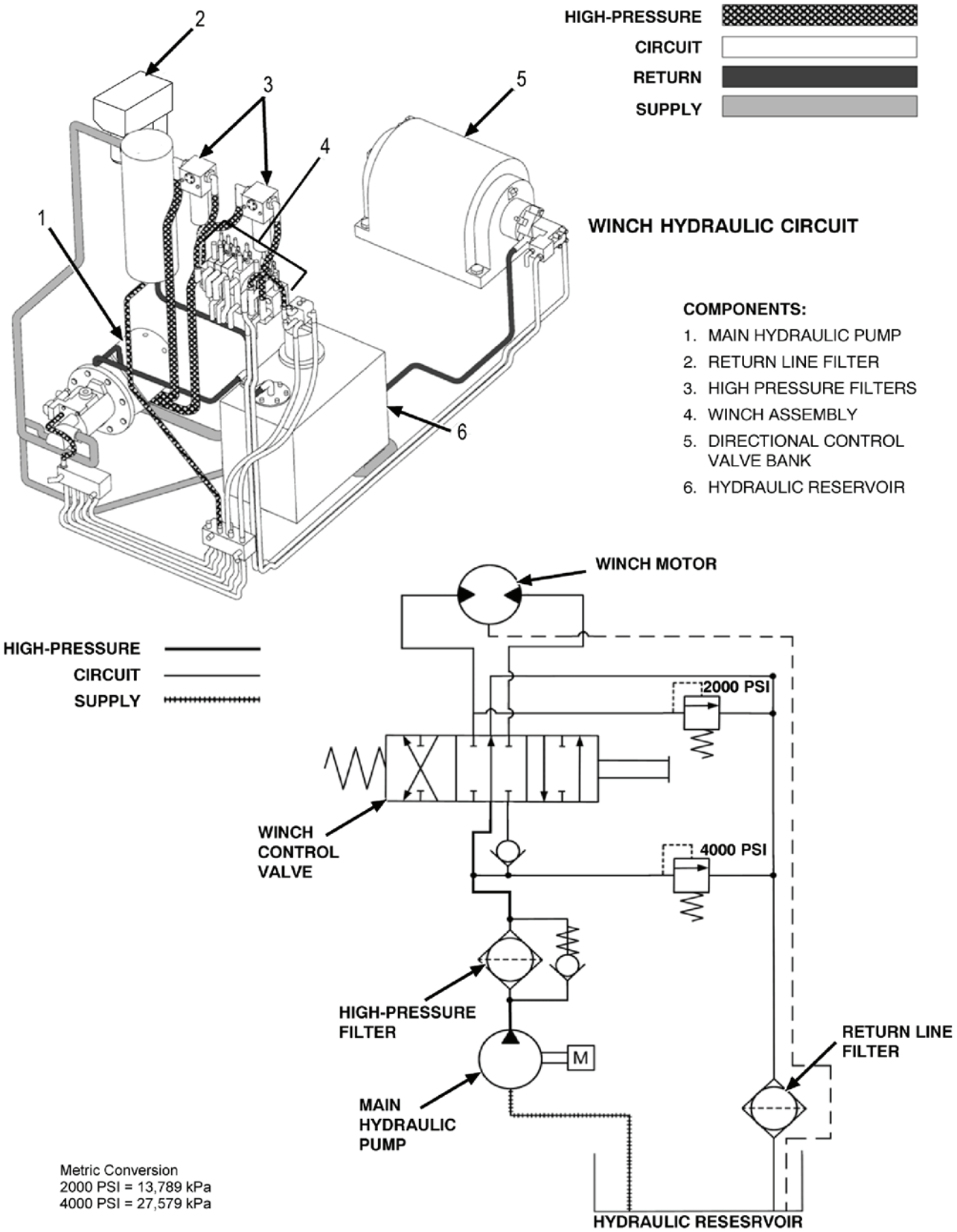
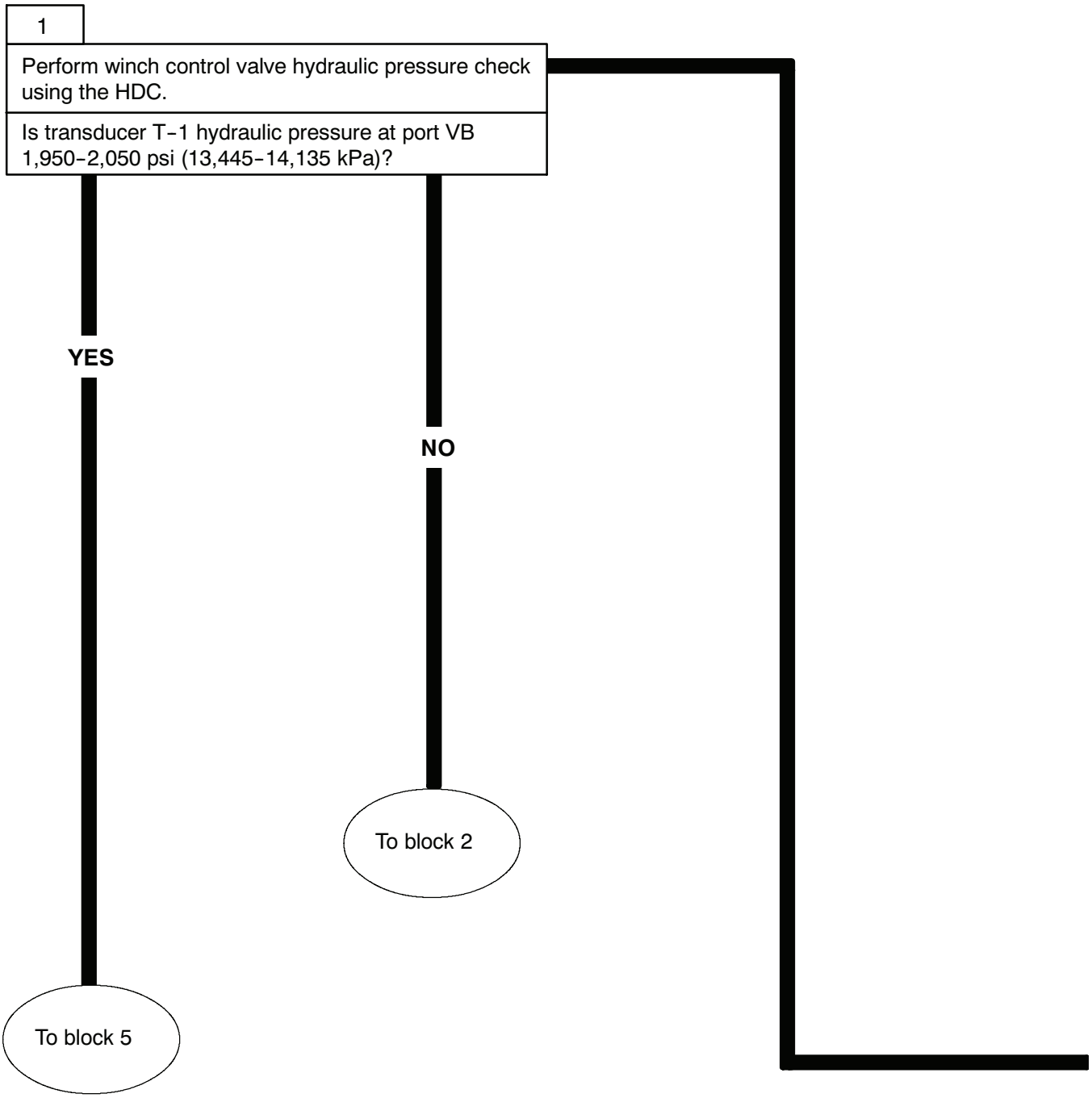


Figure 2. Winch Hydraulic Schematic

WINCH WILL NOT PULL RATED LOAD - Continued **0021 00**



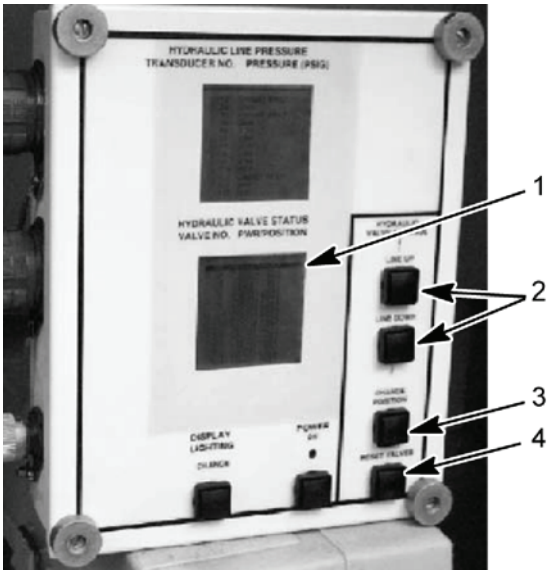


Figure 3. HDC Control Box

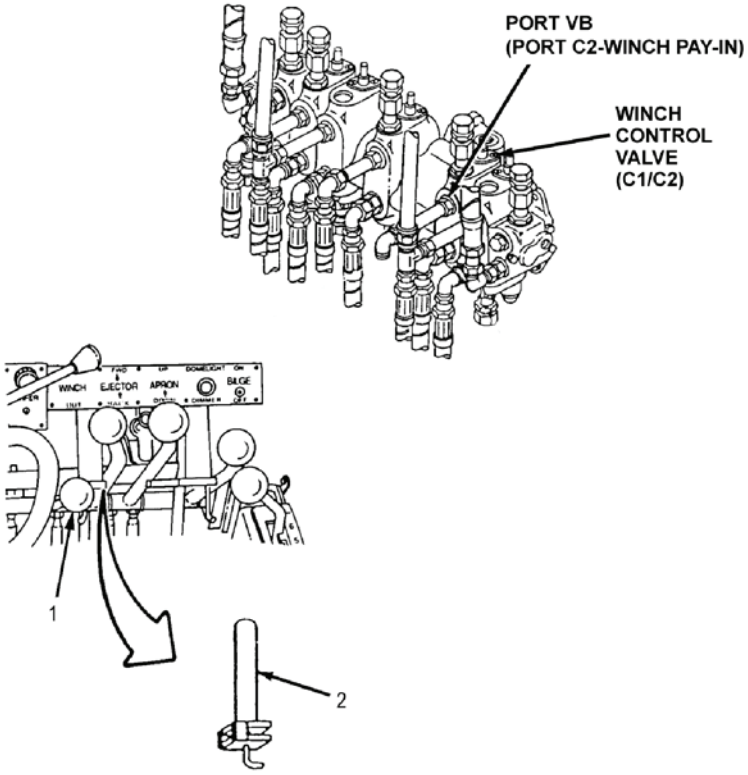


Figure 4. Winch Control and Ejector Lock

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.

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 3, item 4) on the HDC control box.
- Start vehicle engine and move ejector forward. Stop engine and relieve hydraulic pressure.
- Engage ejector lock (Figure 4, item 2).
- Using LINE UP or LINE DOWN button (Figure 3, item 2), select V14 on the HDC display (Figure 3, item 1). Close V14 on the HDC display (Figure 3, item 1) by selecting the CHANGE POSITION button (Figure 3, item 3) on the HDC control box.
- Continued on page 0021 00-7.

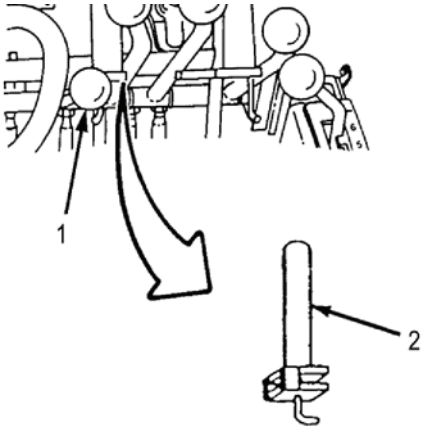


Figure 5. Winch Control

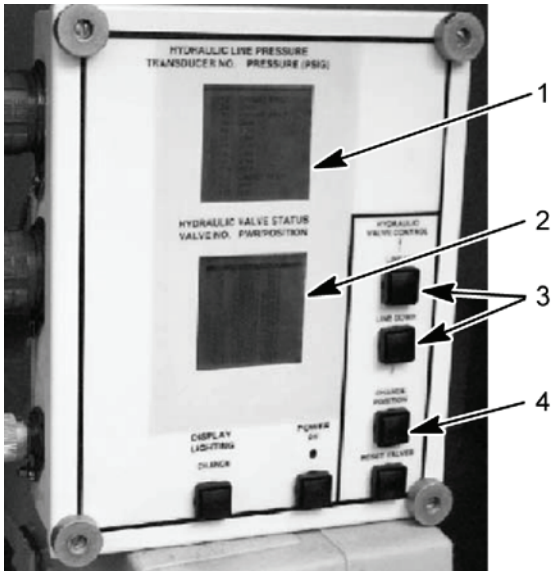
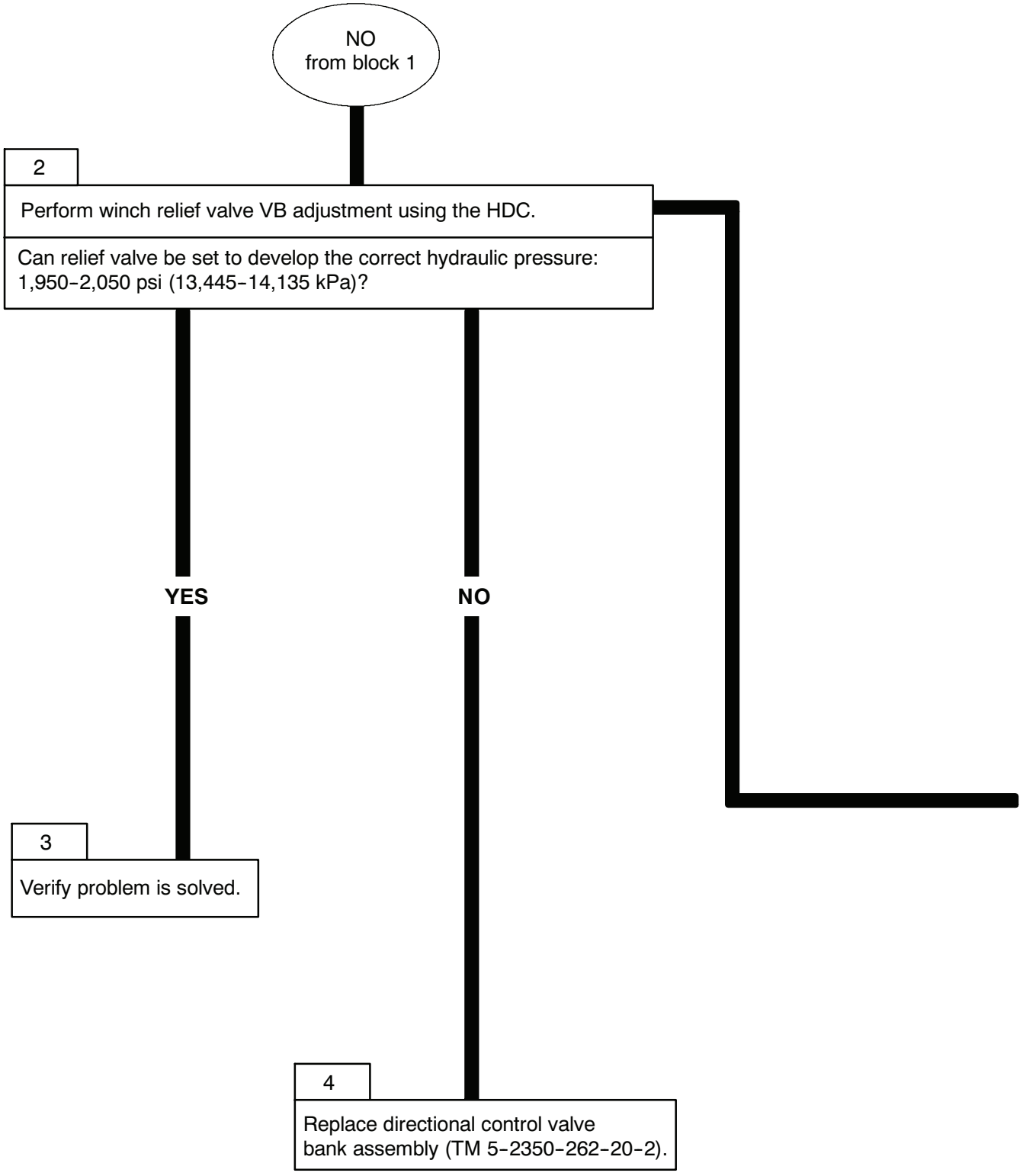


Figure 6. HDC Control Box

WINCH CONTROL VALVE HYDRAULIC PRESSURE CHECK - CONTINUED

- Have assistant start vehicle engine and hold WINCH CONTROL lever (Figure 5, item 1) in PAY IN position. Read transducer T-1 hydraulic pressure on the HDC display (Figure 6, item 1).
- Return WINCH CONTROL lever (Figure 5, item 1) to NEUTRAL position.
- Using LINE UP or LINE DOWN button (Figure 6, item 3), select V14 on the HDC display (Figure 6, item 2). Open V14 on the HDC display (Figure 6, item 2) by selecting the CHANGE POSITION button (Figure 6, item 4) on the HDC control box.
- Stop engine; relieve hydraulic pressure.

WINCH WILL NOT PULL RATED LOAD - Continued **0021 00**



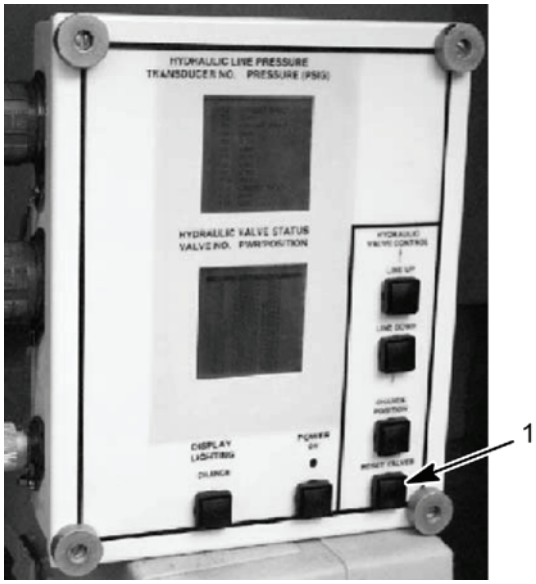


Figure 7. HDC Control Box

WINCH RELIEF VALVE VB ADJUSTMENT

- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 7, item 1) on the HDC control box.

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury to personnel.**

- Continued on page 0021 00-11.

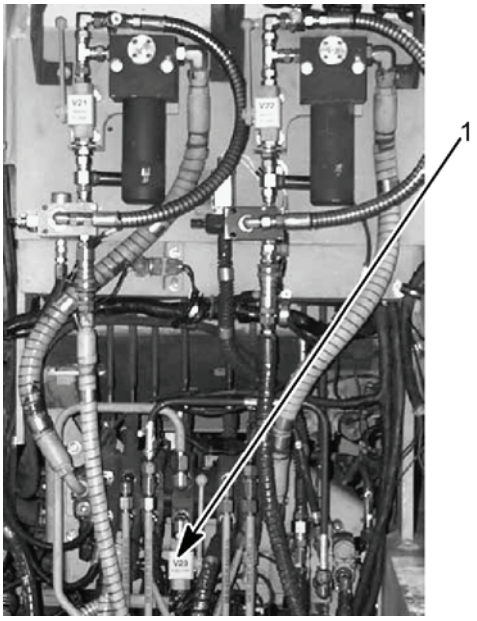


Figure 8. DCV Bank

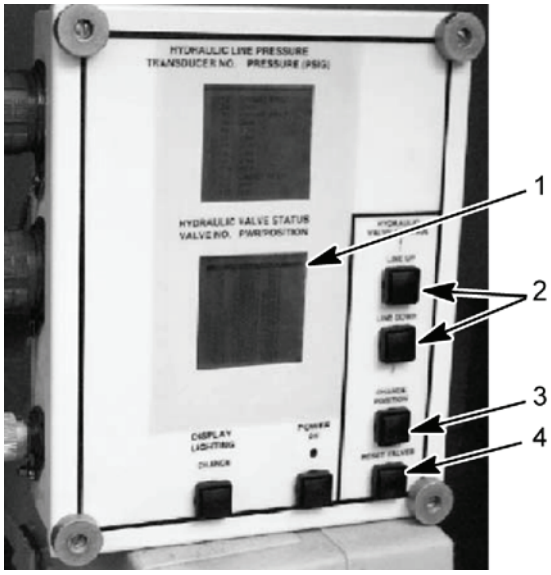


Figure 9. HDC Control Box

WINCH RELIEF VALVE VB ADJUSTMENT - CONTINUED

- With engine off, disable ejector; manually close the ejector inhibit ball valve V23 (Figure 8, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 9, item 3), select V1 on the HDC display (Figure 9, item 2). Close V1 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Select V14 on the HDC display (Figure 9, item 2). Close V14 on the HDC display (Figure 9, item 2) by selecting the CHANGE POSITION button (Figure 9, item 4) on the HDC control box.
- Have assistant start engine and hold WINCH CONTROL in PAY IN position. Read transducer T-1 hydraulic pressure on the HDC display (Figure 9, item 1).
- Continued on page 0021 00-13.

WINCH RELIEF VALVE VB ADJUSTMENT - CONTINUED

- While observing transducer T-1 hydraulic pressure on the HDC display (Figure 9, item 1), loosen jam nut (Figure 10, item 2) and turn relief valve adjustment screw (Figure 10, item 1), clockwise to increase pressure; counterclockwise to decrease pressure until desired pressure is obtained. Tighten jam nut (Figure 10, item 2).
- Stop engine and relieve hydraulic pressure.; Open ejector inhibit ball valve V23 (Figure 11, item 1) on the DCV bank. Using LINE UP or LINE DOWN button (Figure 12, item 2), select V1 on the HDC display (Figure 12, item 1). Open V1 (Figure 12, item 1) on the HDC display by selecting the CHANGE POSITION button (Figure 12, item 3) on the HDC control box.
- Repeat for V14; Open V14.
- Reset all HDC solenoid valves by selecting the RESET VALVES button (Figure 12, item 4) on the HDC control box.

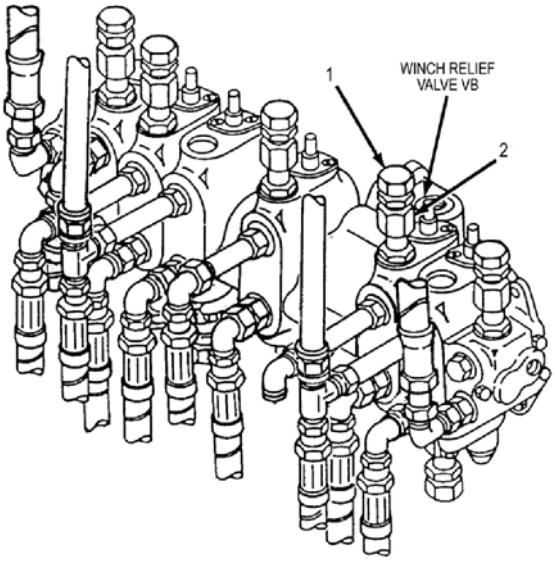


Figure 10. Winch Relief Valve

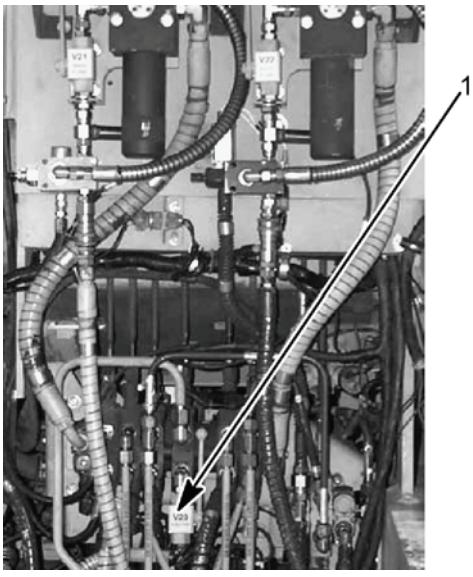


Figure 11. DCV Bank

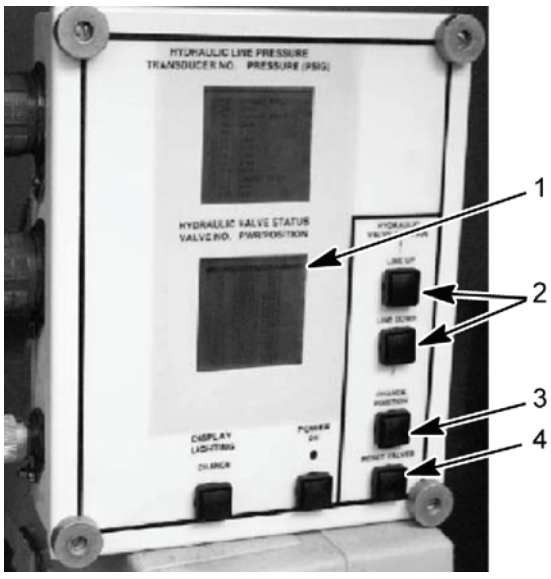
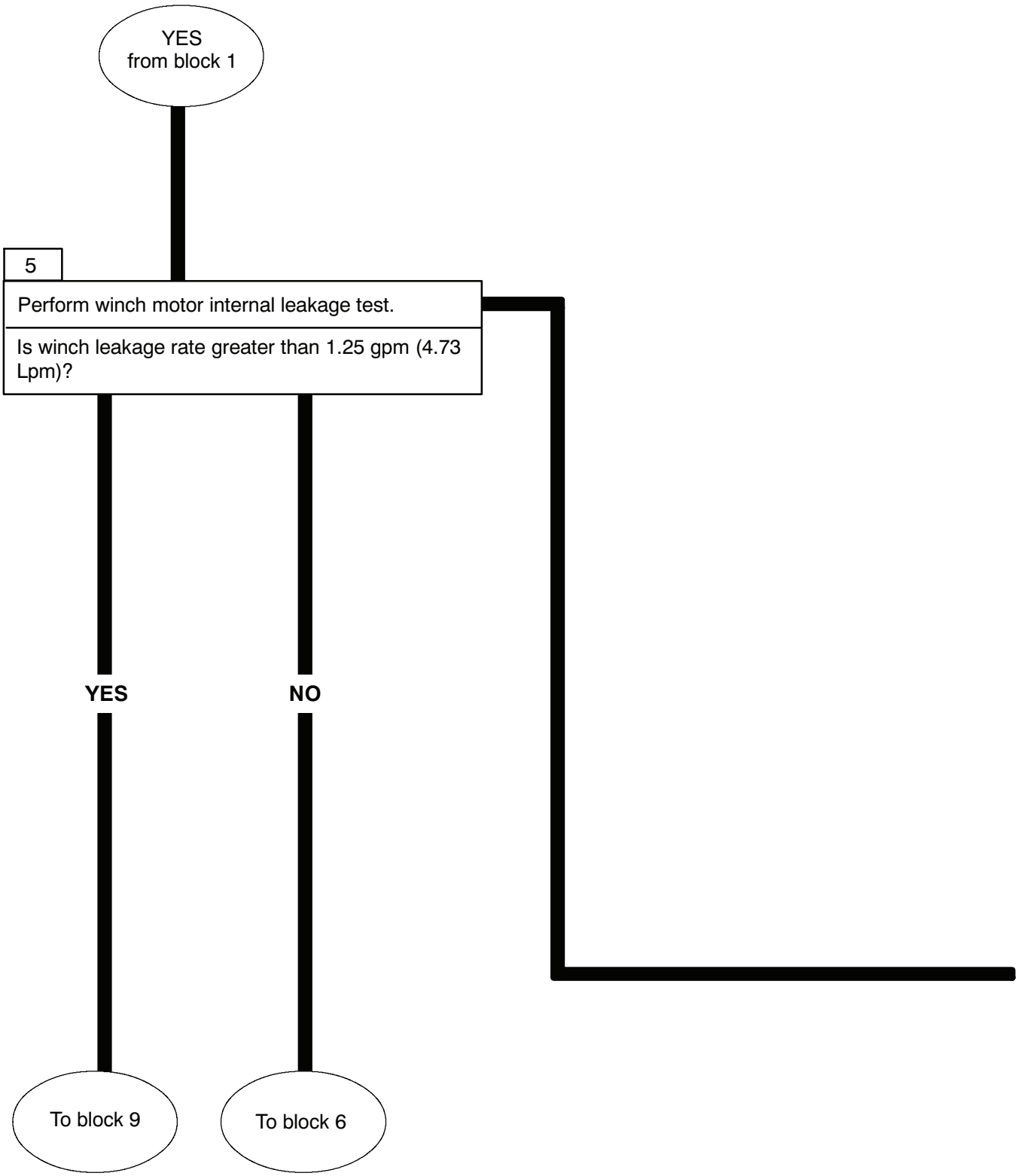


Figure 12. HDC Control Box


YES
from block 1
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

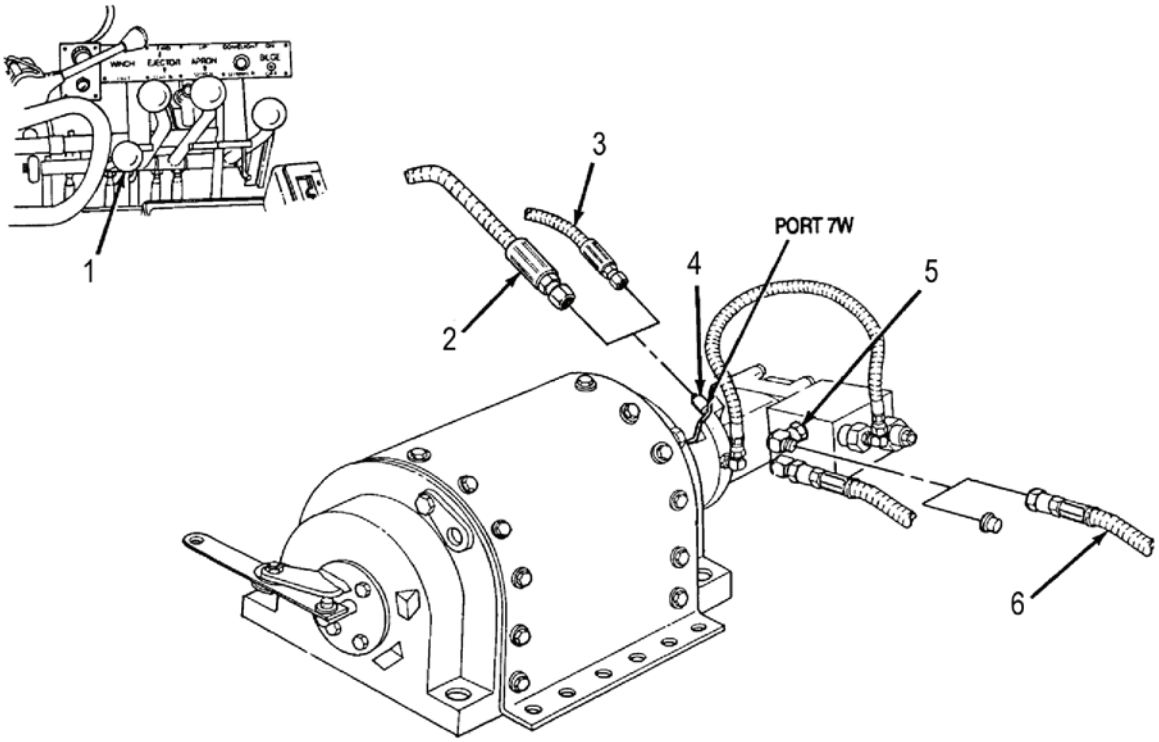


Figure 13. Winch Motor

WINCH MOTOR INTERNAL LEAKAGE TEST

NOTE

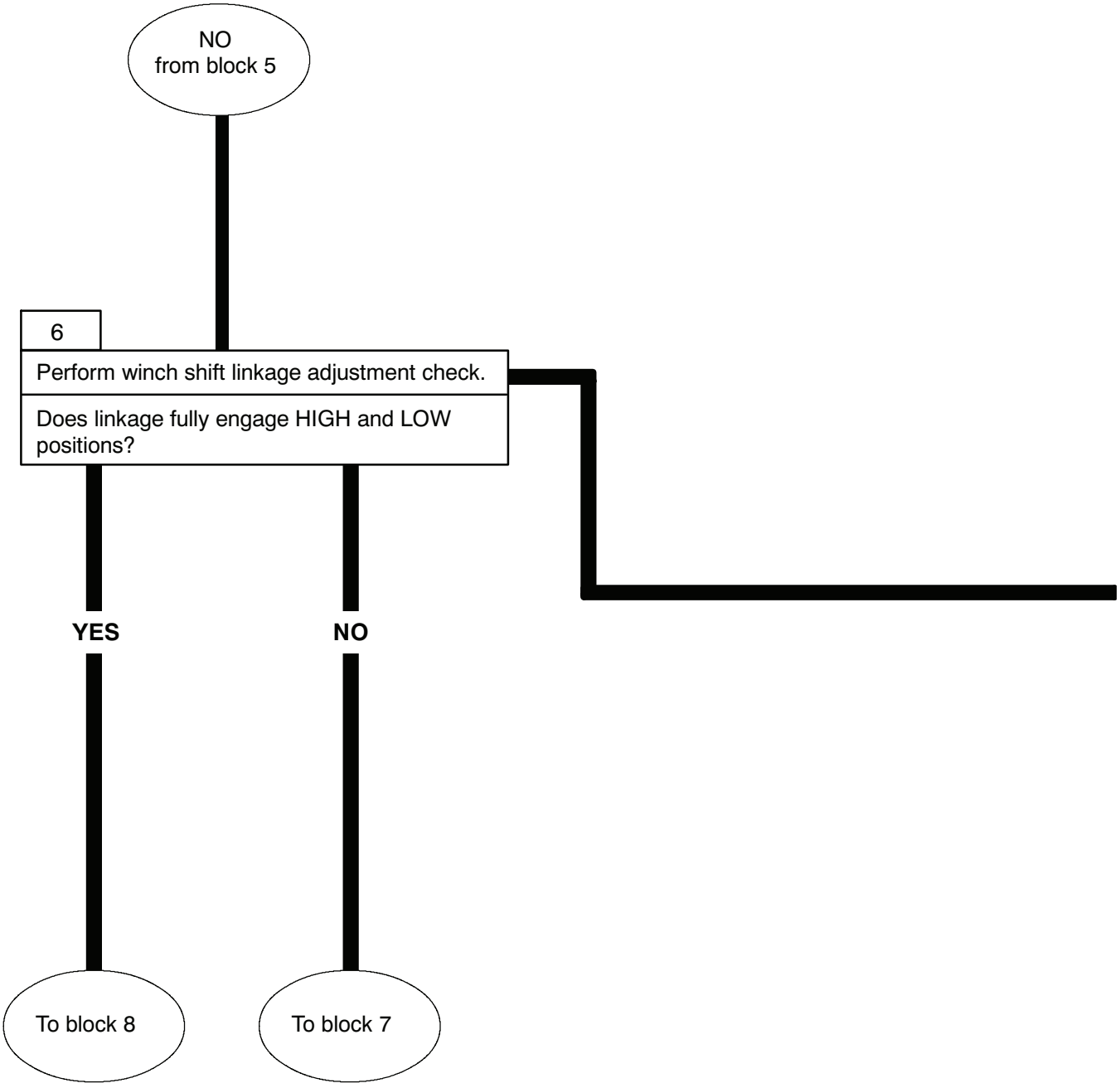
Have suitable container ready to catch oil.

- Disconnect WINCH DRAIN-7W hose (Figure 13, item 3) from winch motor port 7W and plug hose (Figure 13, item 3). Connect drain hose (Figure 13, item 2) to elbow (Figure 13, item 4) on port 7W and place end of hose (Figure 13, item 2) in container.
- Disconnect CONT-VLV-VA (FWD) hose (Figure 13, item 6) from winch. Plug hose (Figure 13, item 6) and cap elbow (Figure 13, item 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 (Figure 13, item 1) in PAY IN position. With lever held in PAY IN position and oil flowing, move drain hose 7W (Figure 13, item 2) to a graduated container for exactly 15 seconds. Return WINCH CONTROL lever (Figure 13, item 1) to NEUTRAL position.
- Measure oil in graduated container. Allowable internal leakage flow from drain hose (Figure 13, item 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.


NO
from block 5
6
Perform winch shift linkage adjustment check.
Does linkage fully engage HIGH and LOW positions?
YES
NO
To block 8
To block 7

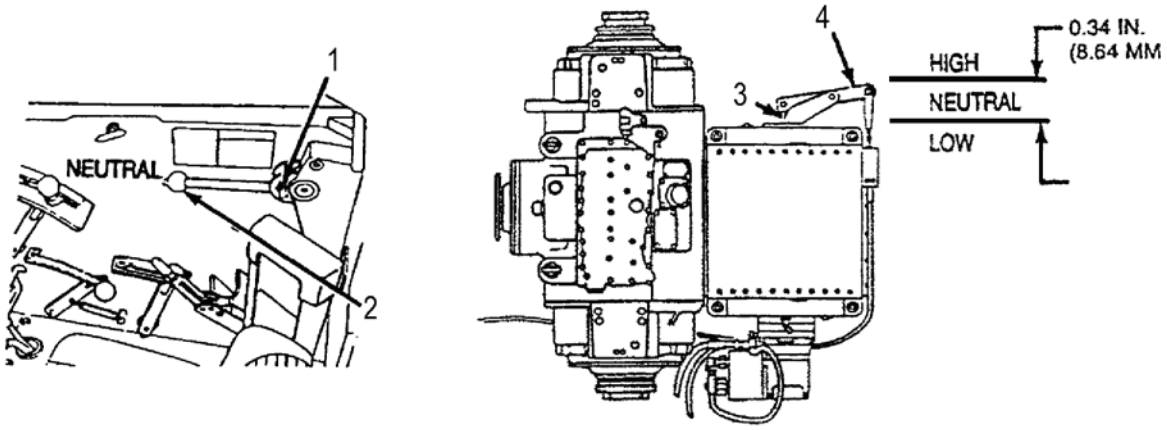
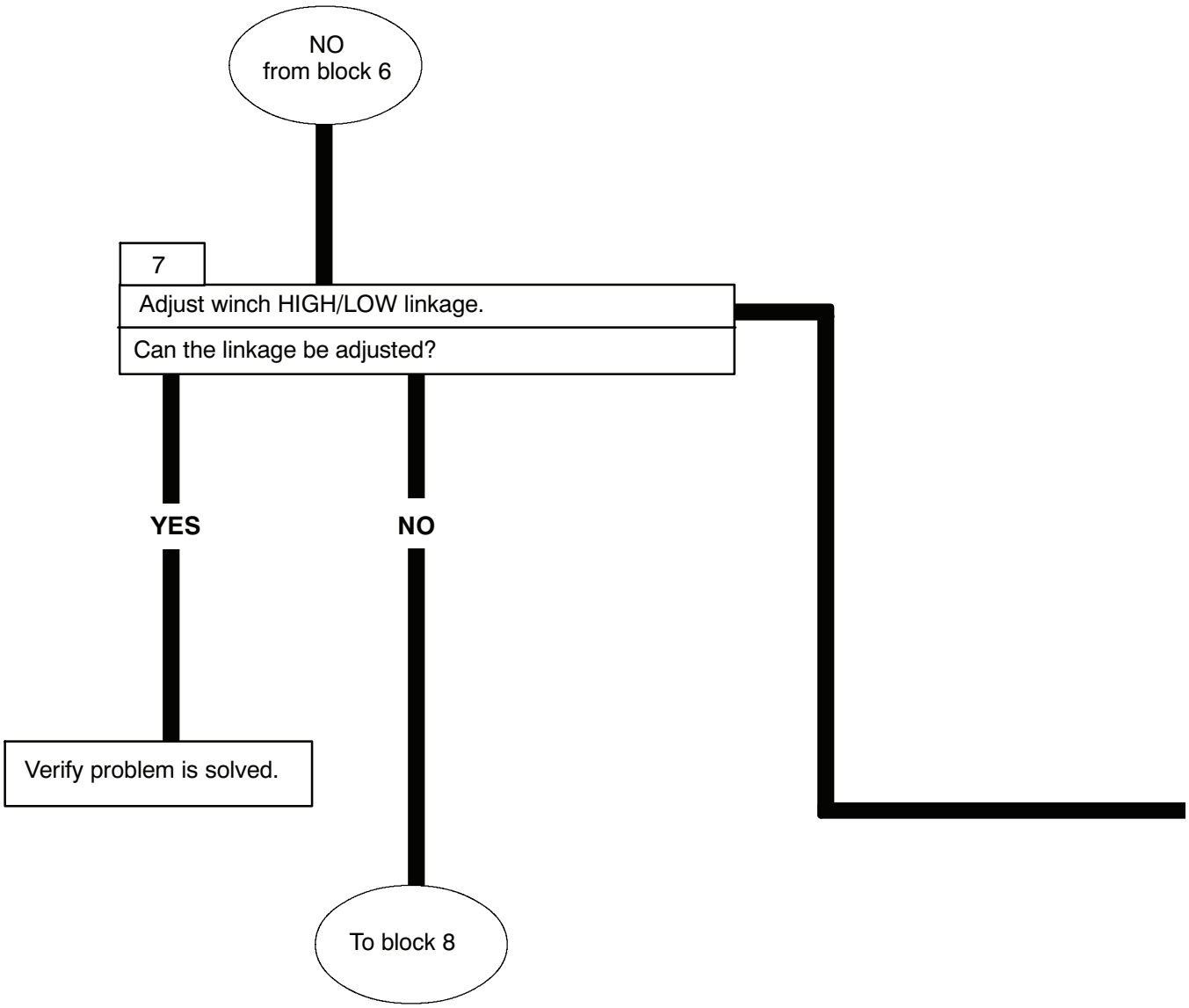


Figure 14. Winch Shift Linkage

SHIFT LINKAGE ADJUSTMENT CHECK

- Set control lever (Figure 14, item 2) in NEUTRAL detent (Figure 14, item 1).
- Move lever (Figure 14, item 4) from side to side and measure for proper shift rod (Figure 14, item 3) NEUTRAL position. Shift rod (Figure 14, item 3) 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 (Figure 14, item 3) NEUTRAL travel is not within limits.


NO
from block 6
7
Adjust winch HIGH/LOW linkage.
Can the linkage be adjusted?
YES
NO
Verify problem is solved.
To block 8

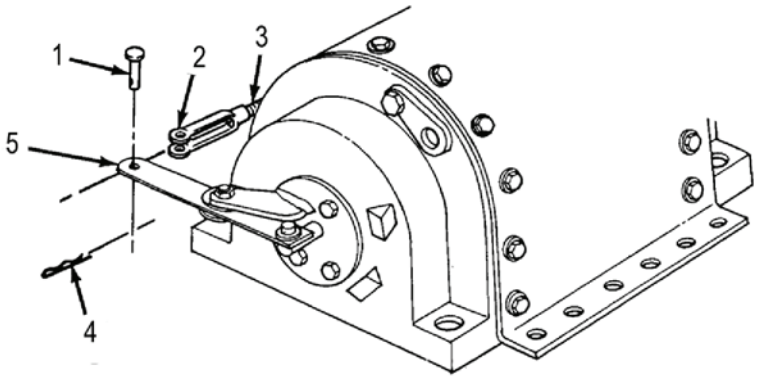


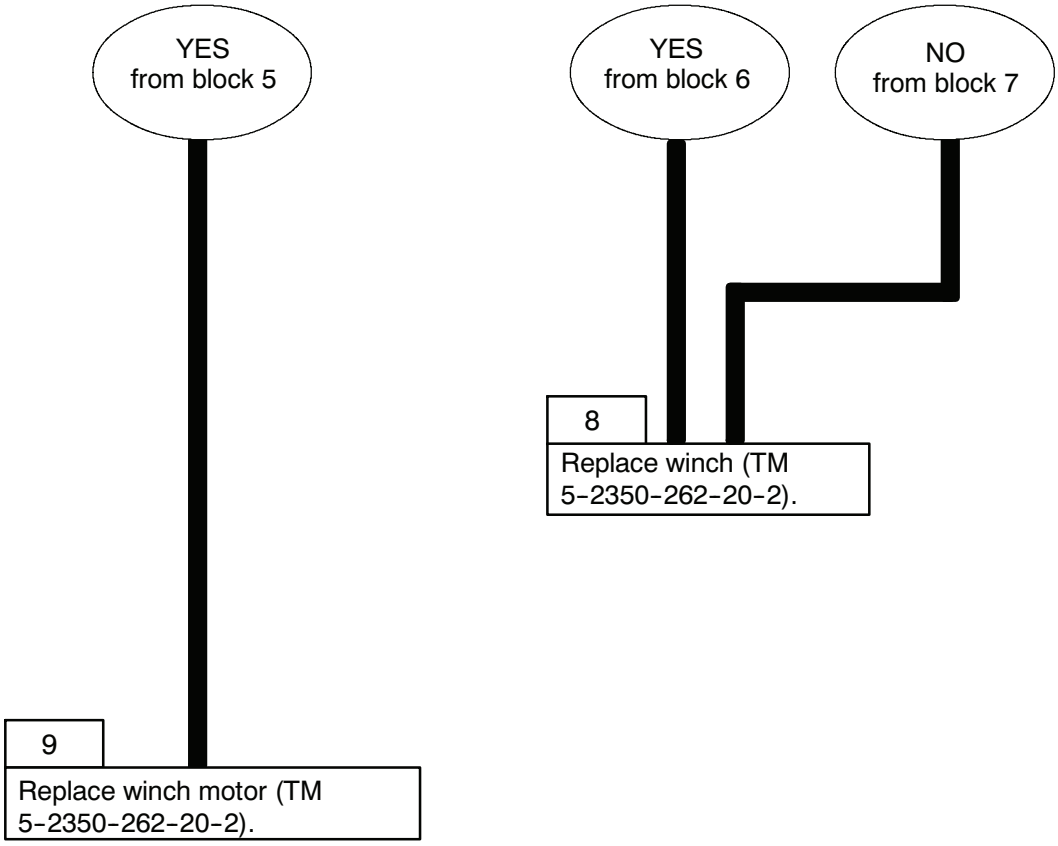
Figure 15. Winch Linkage

WINCH HIGH/LOW LINKAGE 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. (8.64 mm).

- Remove cotter pin (Figure 15, item 4) and clevis pin (Figure 15, item 1) from clevis (Figure 15, item 2) and control lever (Figure 15, item 5). Discard cotter pin (Figure 15, item 4).
- Pull shift rod (Figure 15, item 3) out as far as possible. This is the end of travel in the high-gear position.
- Push shift rod (Figure 15, item 3) back in 1.220 in. (30.99 mm) to locate center of NEUTRAL position.
- Adjustment can be made by turning clevis (Figure 15, item 2) clockwise for NEUTRAL position out; counterclockwise for NEUTRAL position in.
- Install clevis (Figure 15, item 2) on control lever (Figure 15, item 5) with clevis pin (Figure 15, item 1) and new cotter pin (Figure 15, item 4). Verify shift rod (Figure 15, item 3) is within NEUTRAL travel limits.
- Operate winch and check for proper operation. If winch does not function properly, notify Direct Support maintenance.



END OF WORK PACKAGE

APPARENT HDC SYSTEM PROBLEM

0022 00

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required

Two 62B10

References

WP 0005 00
WP 0006 00
WP 0024 00
WP 0027 00
WP 0028 00
WP 0029 00

References - Continued

WP 0030 00
WP 0031 00
WP 0032 00
WP 0033 00
WP 0034 00
WP 0035 00
WP 0037 00

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle on jack stands (TM 5-2350-262-20-1)

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system pressure has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**

- **Transmission shifting lines are pressurized. Do not disconnect lines, fittings, or accumulator unless transmission shift control valve pressure has been relieved. Discharge transmission shift accumulator by moving shift control lever through all forward and reverse ranges several times, with engine off. Failure to comply may result in severe injury to personnel.**

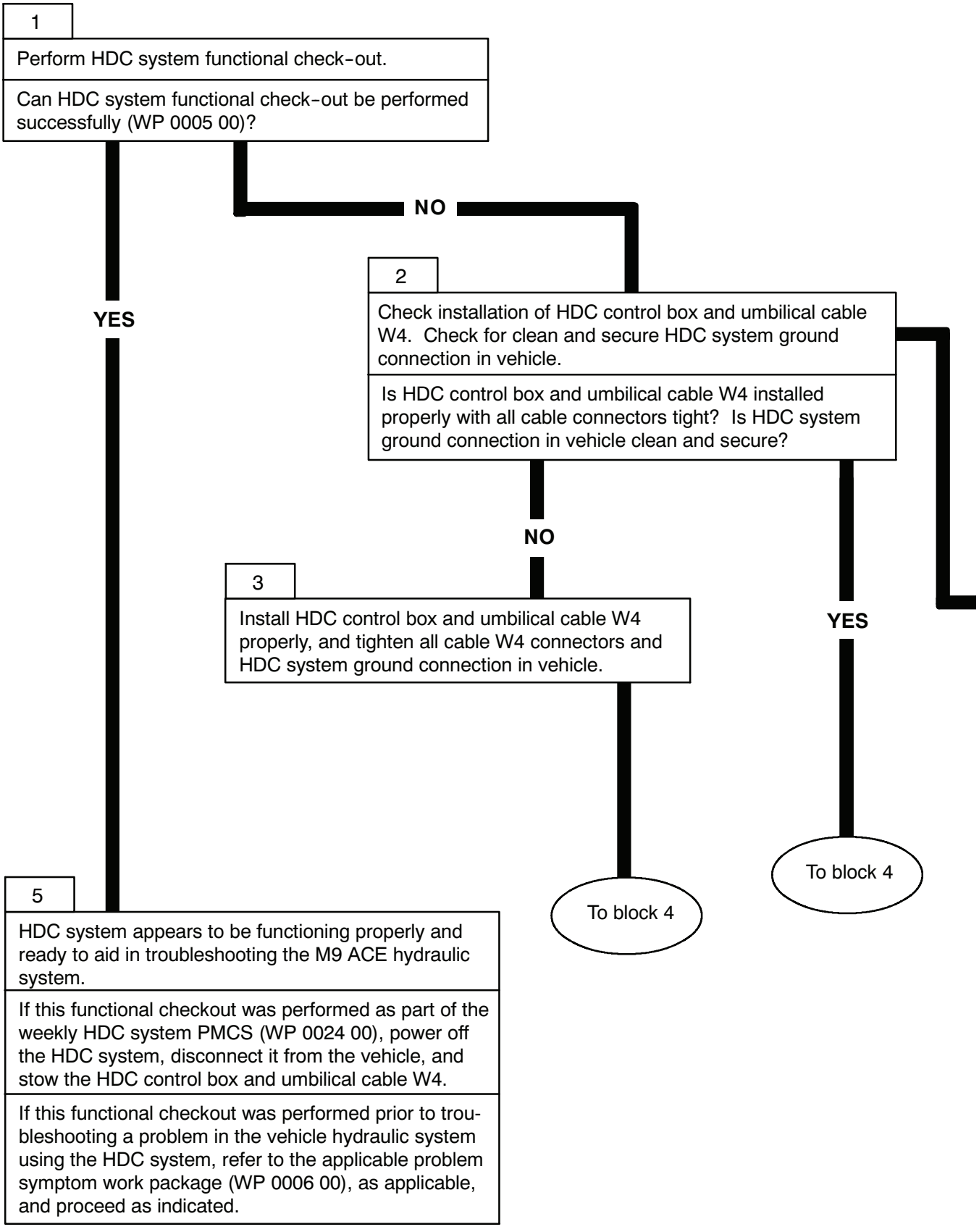

1
Perform HDC system functional check-out.
Can HDC system functional check-out be performed successfully (WP 0005 00)?
NO
YES
2
Check installation of HDC control box and umbilical cable W4. Check for clean and secure HDC system ground connection in vehicle.
Is HDC control box and umbilical cable W4 installed properly with all cable connectors tight? Is HDC system ground connection in vehicle clean and secure?
NO
YES
3
Install HDC control box and umbilical cable W4 properly, and tighten all cable W4 connectors and HDC system ground connection in vehicle.
To block 4
To block 4
5
HDC system appears to be functioning properly and ready to aid in troubleshooting the M9 ACE hydraulic system.
If this functional checkout was performed as part of the weekly HDC system PMCS (WP 0024 00), power off the HDC system, disconnect it from the vehicle, and stow the HDC control box and umbilical cable W4.
If this functional checkout was performed prior to troubleshooting a problem in the vehicle hydraulic system using the HDC system, refer to the applicable problem symptom work package (WP 0006 00), as applicable, and proceed as indicated.

Figure 1. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket

Figure 2. Umbilical Cable Assembly W4 Connections to HDC Control Box

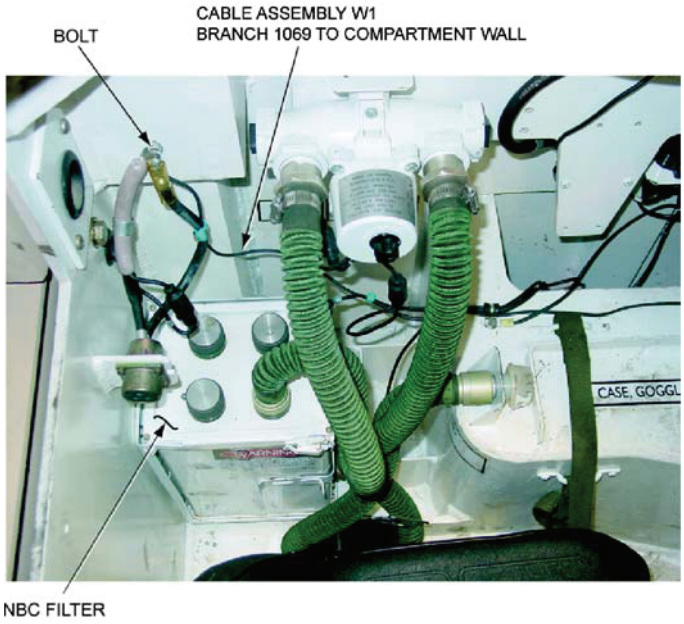
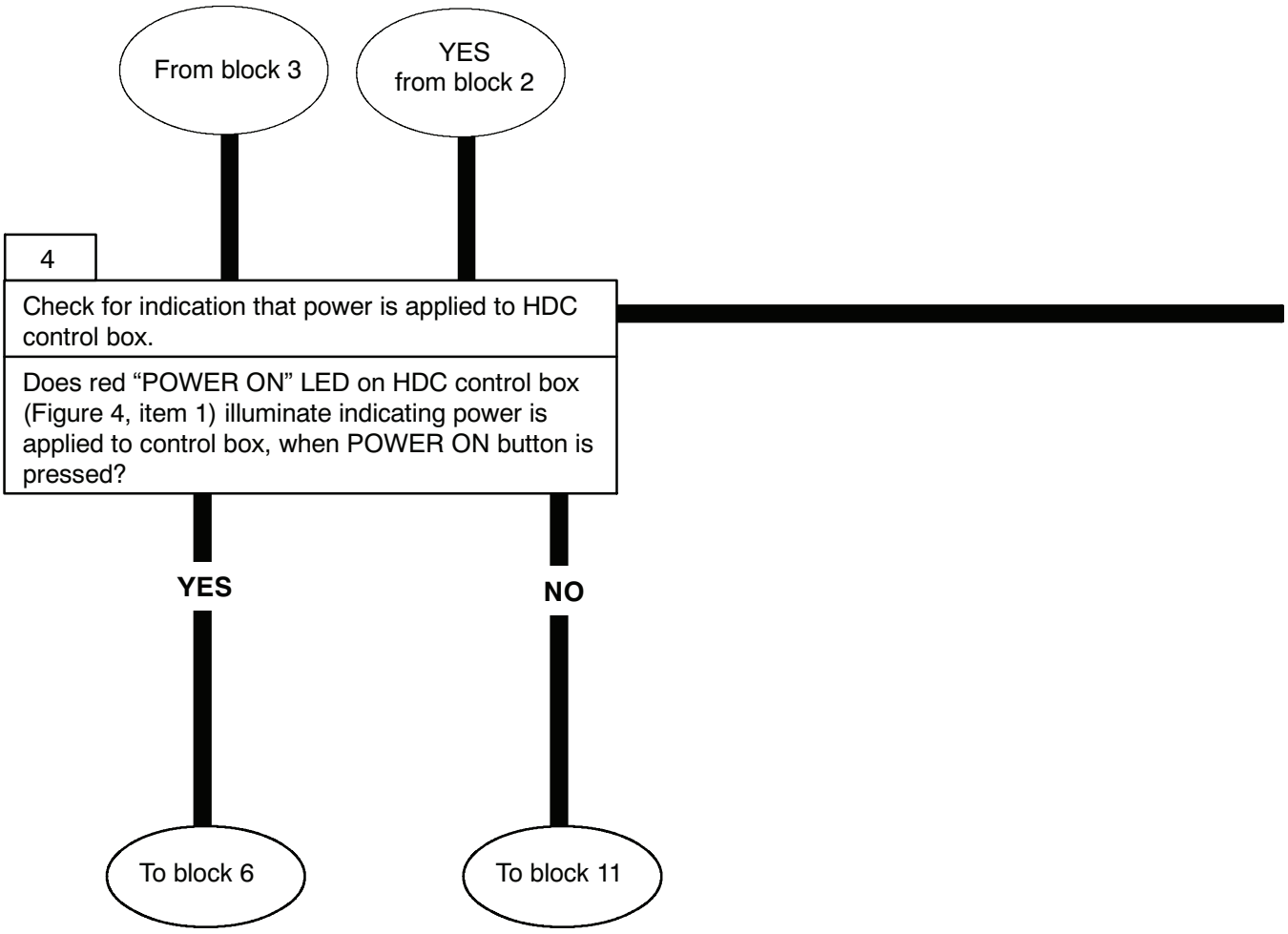


Figure 3. HDC System Ground Connection in Vehicle

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



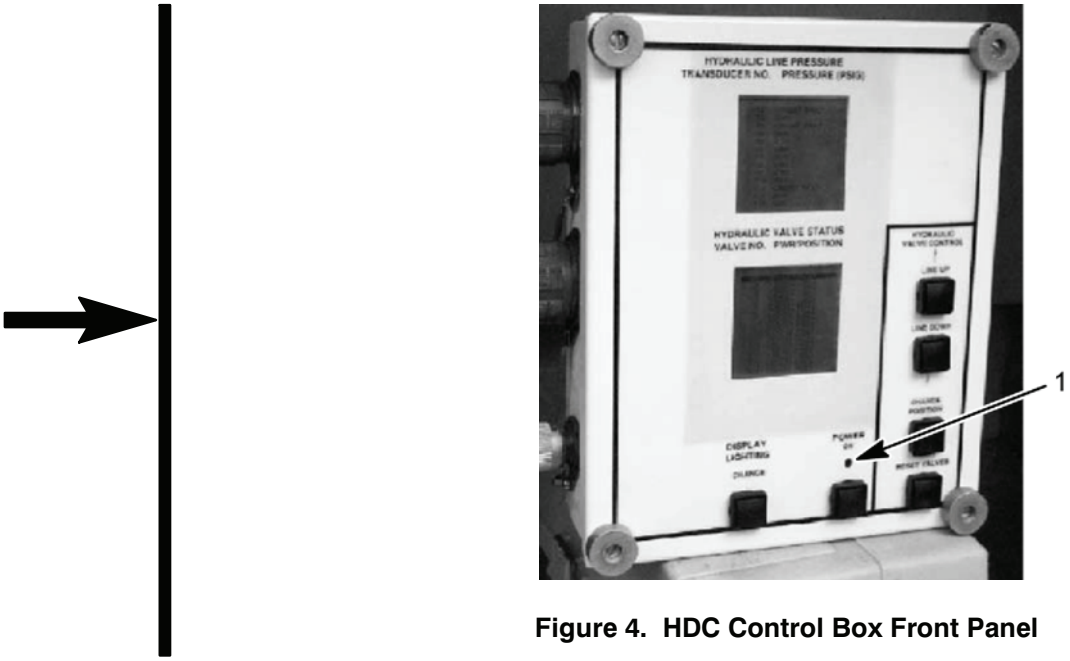
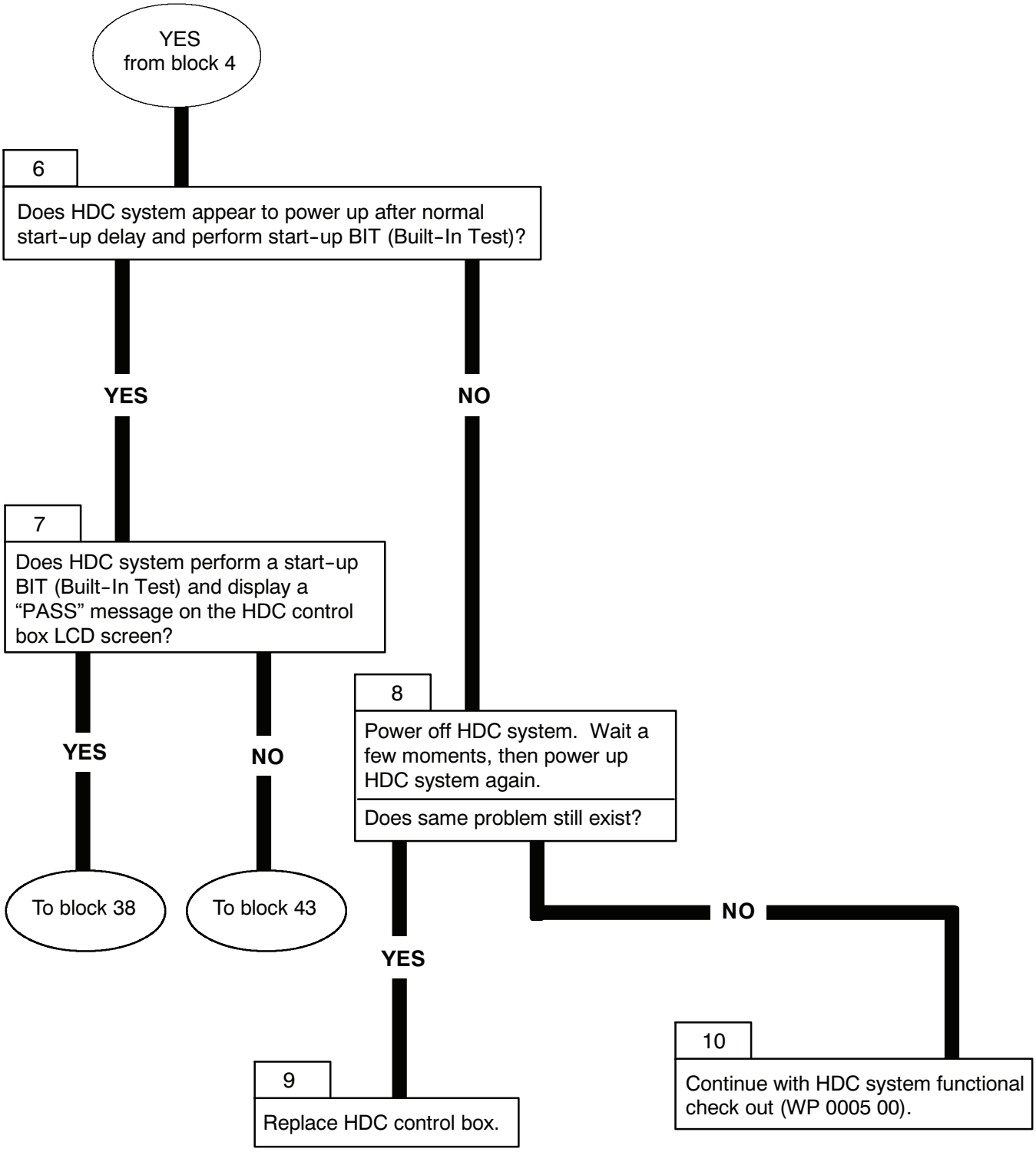


Figure 4. HDC Control Box Front Panel

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**

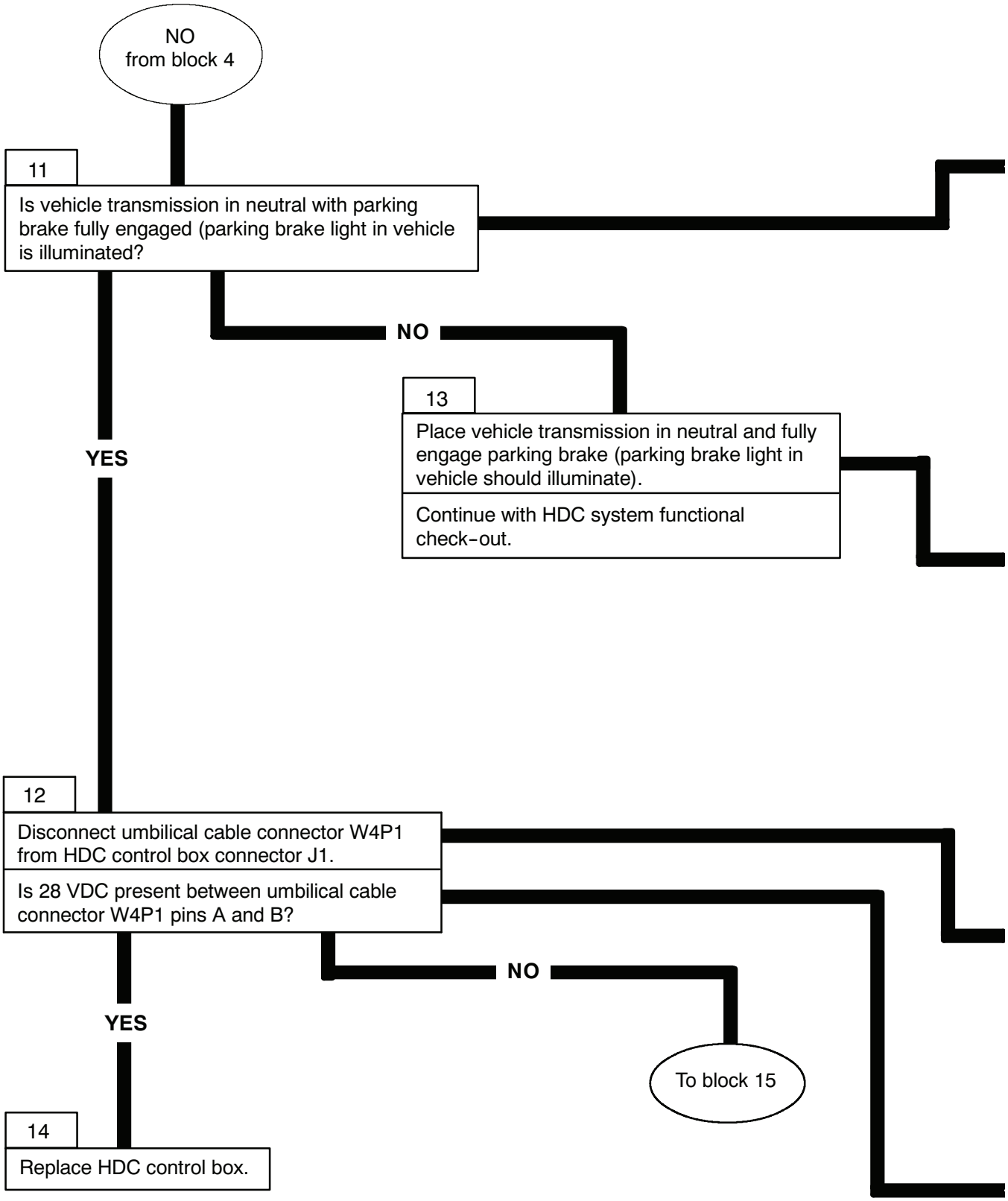


Figure 5. Vehicle Transmission in Neutral with Parking Brake Fully Engaged

Figure 6. Parking Brake Light Location

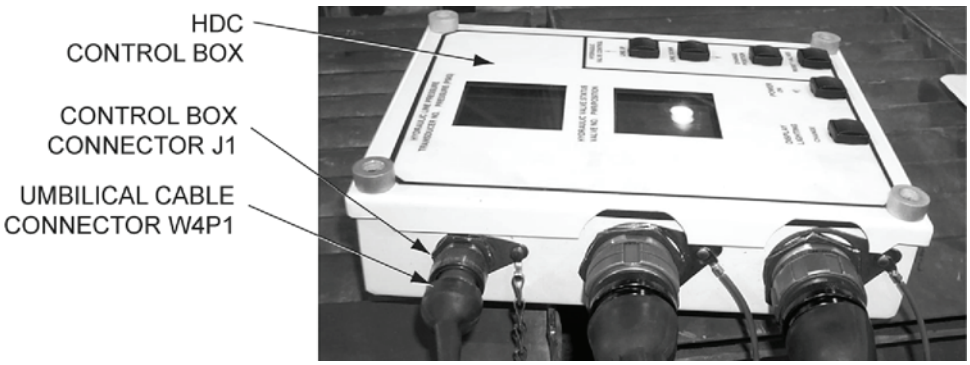


Figure 7. Umbilical Cable Assembly W4 Connections to HDC Control Box

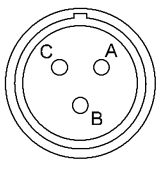


Figure 8. Pin Layout for Connector W4P1

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**

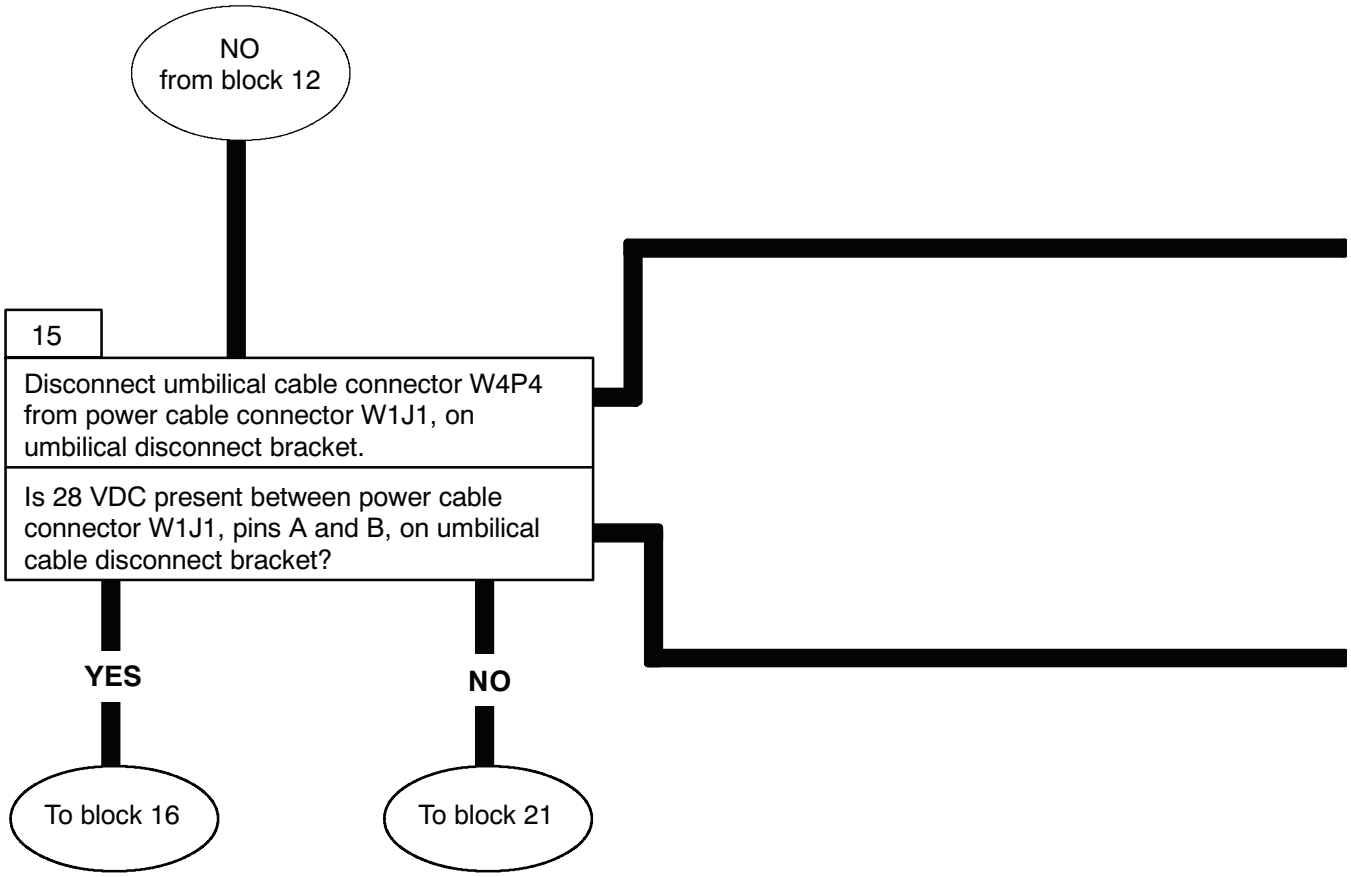
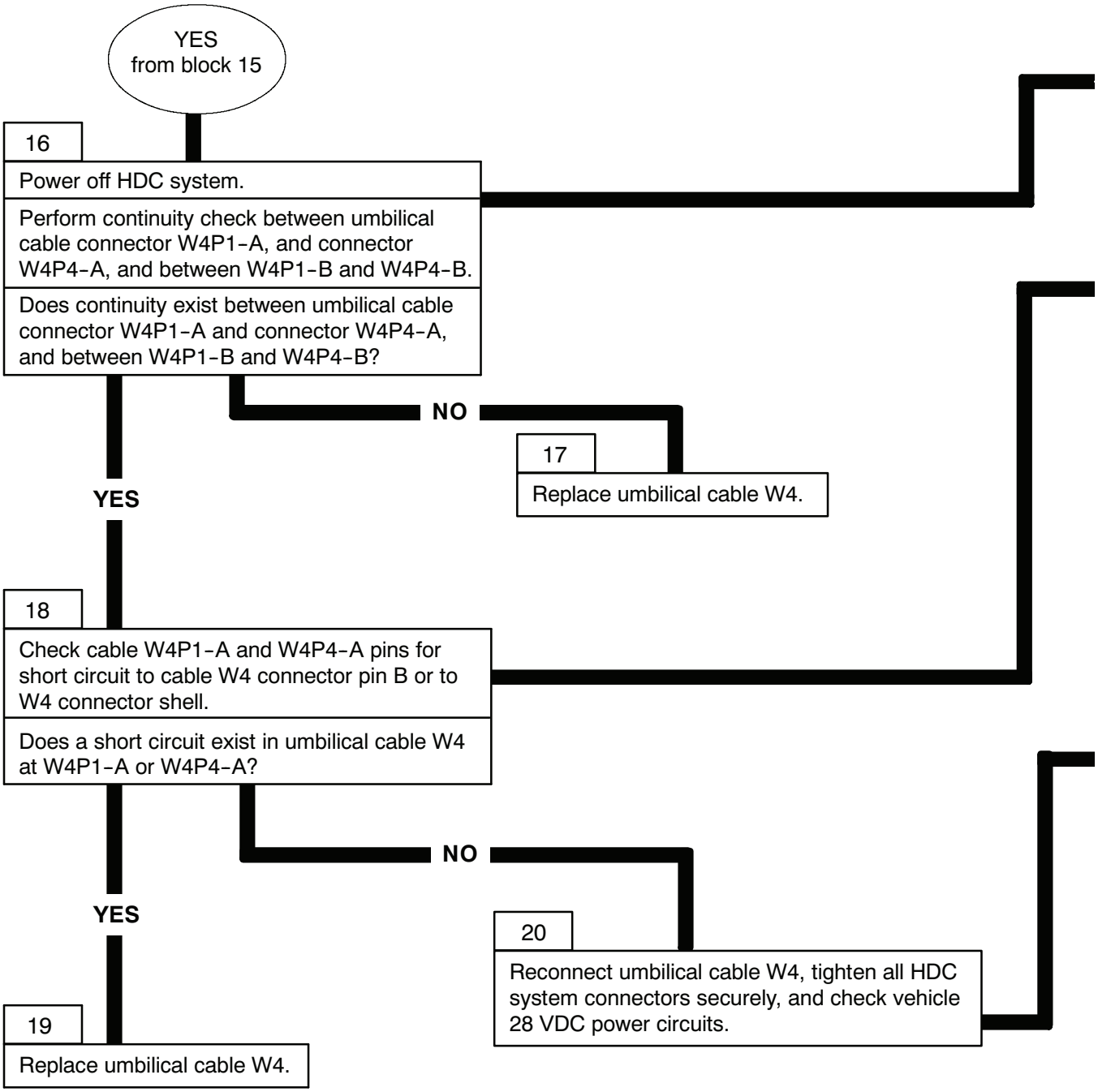


Figure 9. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket

Figure 10. Pin Layout for Connector W1J1

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



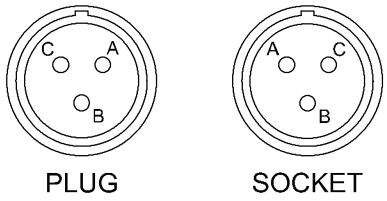
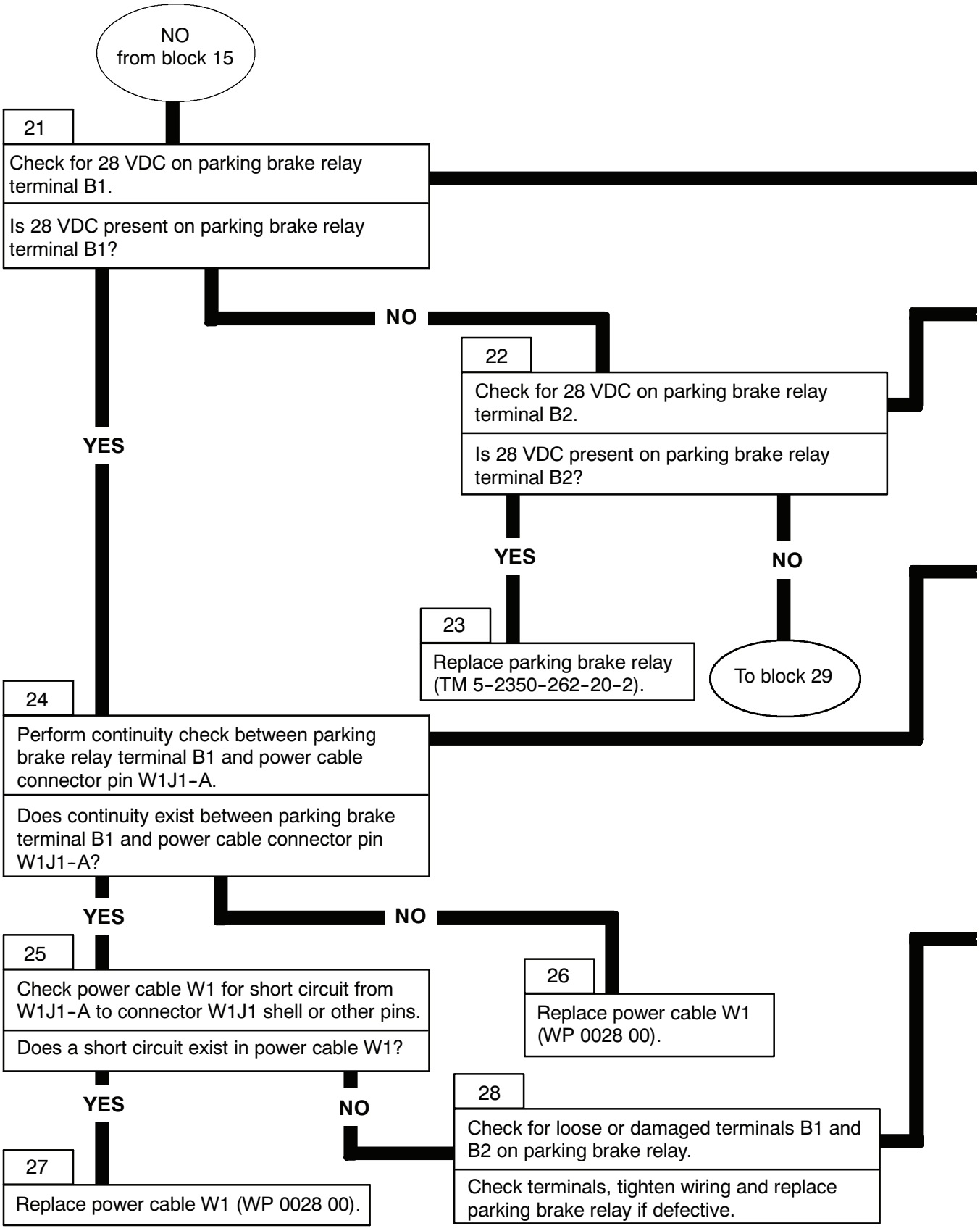


Figure 11. Pin Layout for Connectors W4P1 and W4P4

Figure 12. Umbilical Cable Assembly W4 Connections to HDC Control Box

Figure 13. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket


NO
from block 15
21
Check for 28 VDC on parking brake relay terminal B1.
Is 28 VDC present on parking brake relay terminal B1?
NO
YES
22
Check for 28 VDC on parking brake relay terminal B2.
Is 28 VDC present on parking brake relay terminal B2?
YES
NO
23
Replace parking brake relay (TM 5-2350-262-20-2).
To block 29
24
Perform continuity check between parking brake relay terminal B1 and power cable connector pin W1J1-A.
Does continuity exist between parking brake terminal B1 and power cable connector pin W1J1-A?
YES
NO
25
Check power cable W1 for short circuit from W1J1-A to connector W1J1 shell or other pins.
Does a short circuit exist in power cable W1?
26
Replace power cable W1 (WP 0028 00).
YES
NO
27
Replace power cable W1 (WP 0028 00).
28
Check for loose or damaged terminals B1 and B2 on parking brake relay.
Check terminals, tighten wiring and replace parking brake relay if defective.

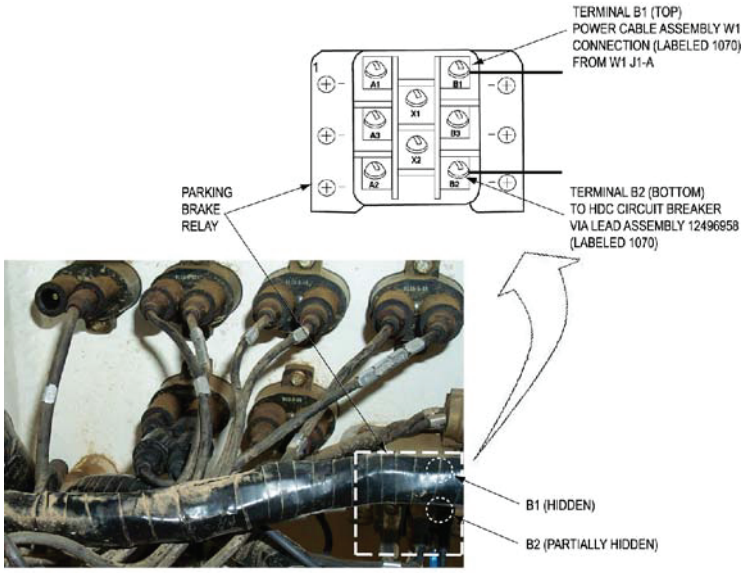


Figure 14. HDC Power Cable Assembly W1 Connection to Parking Brake Relay

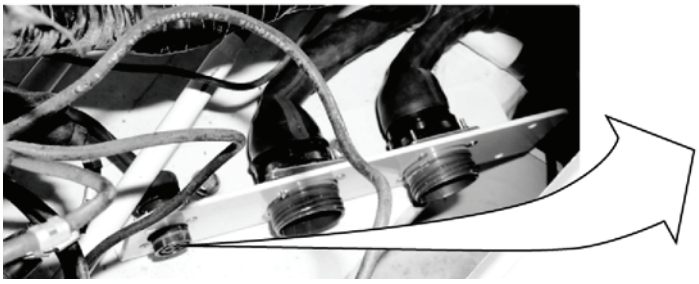


Figure 15. Location of Power Cable Assembly Connector W1J1

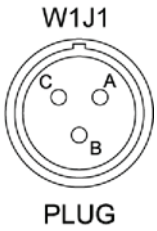


Figure 16. Pin Layout

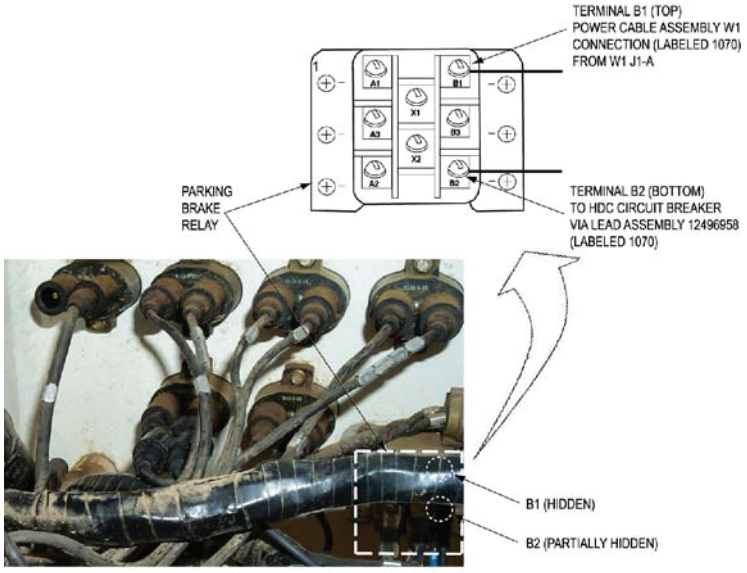
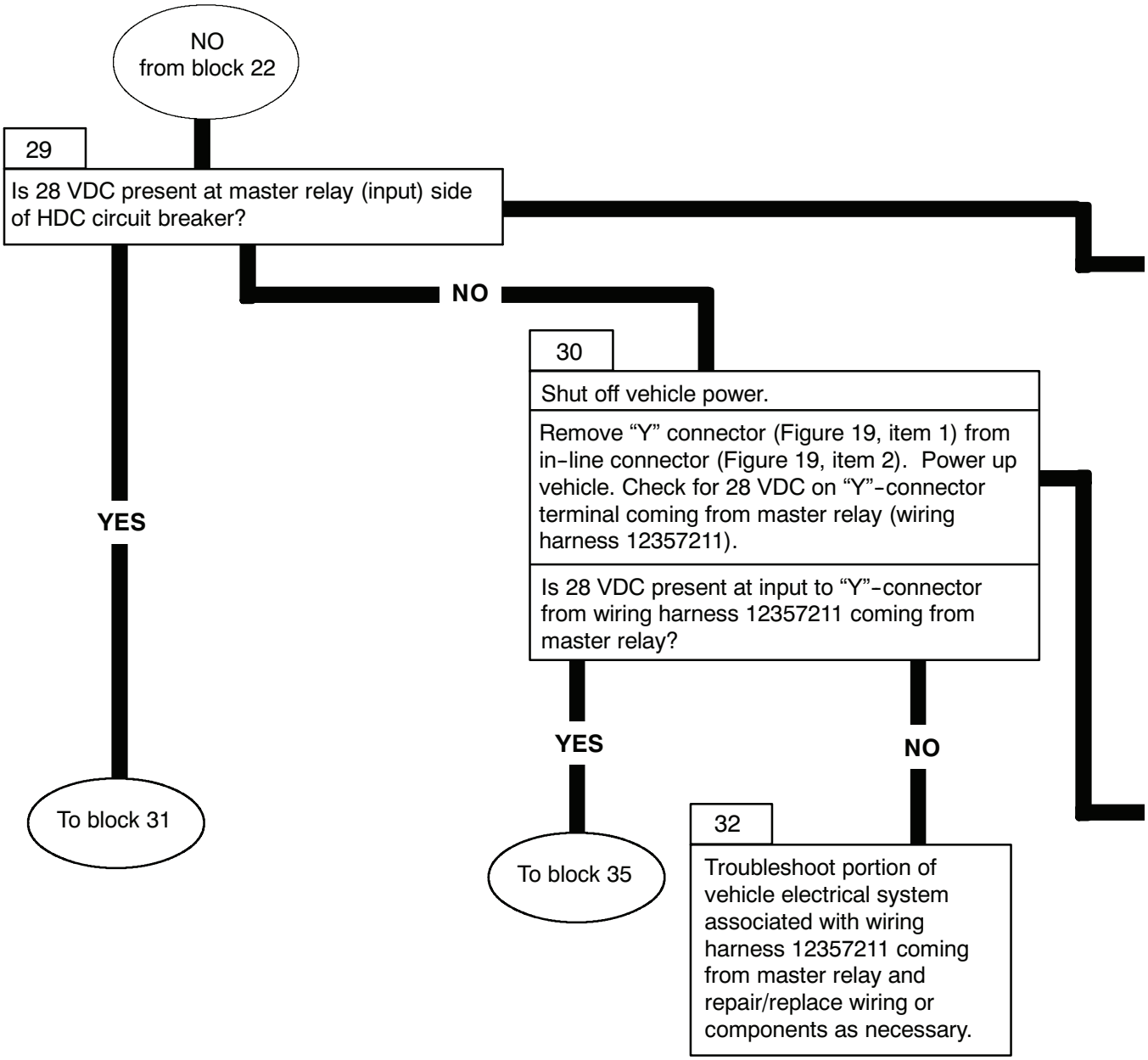


Figure 17. Parking Brake Relay Terminals


NO
from block 22
29
Is 28 VDC present at master relay (input) side of HDC circuit breaker?
YES
To block 31
NO
30
Shut off vehicle power.
Remove "Y" connector (Figure 19, item 1) from in-line connector (Figure 19, item 2). Power up vehicle. Check for 28 VDC on "Y"-connector terminal coming from master relay (wiring harness 12357211).
Is 28 VDC present at input to "Y"-connector from wiring harness 12357211 coming from master relay?
YES
To block 35
NO
32
Troubleshoot portion of vehicle electrical system associated with wiring harness 12357211 coming from master relay and repair/replace wiring or components as necessary.

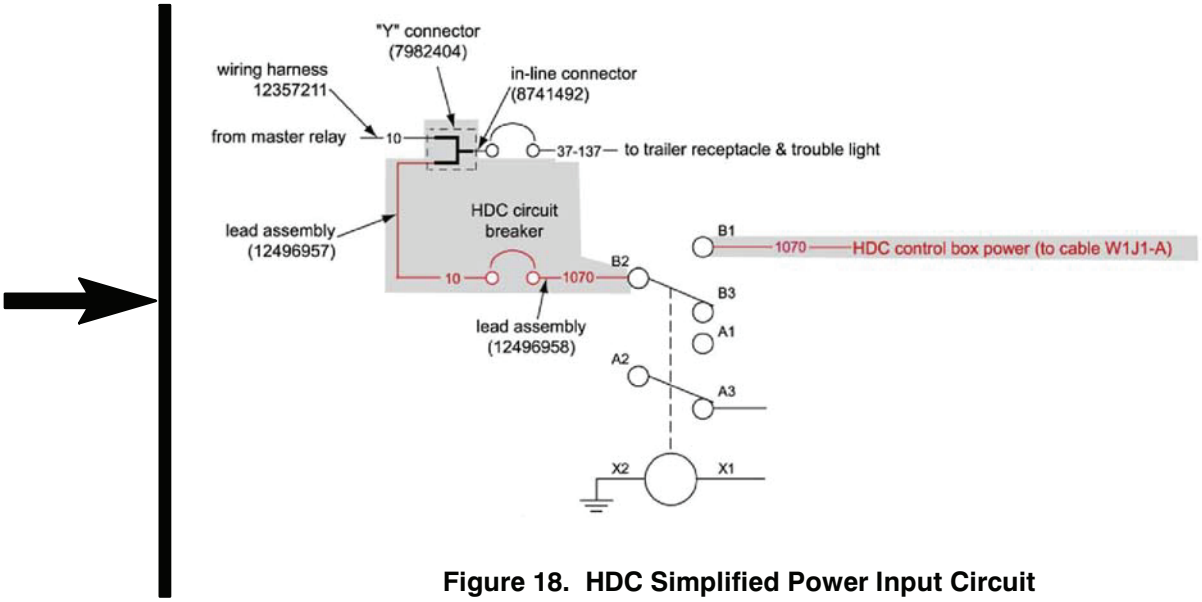


Figure 18. HDC Simplified Power Input Circuit

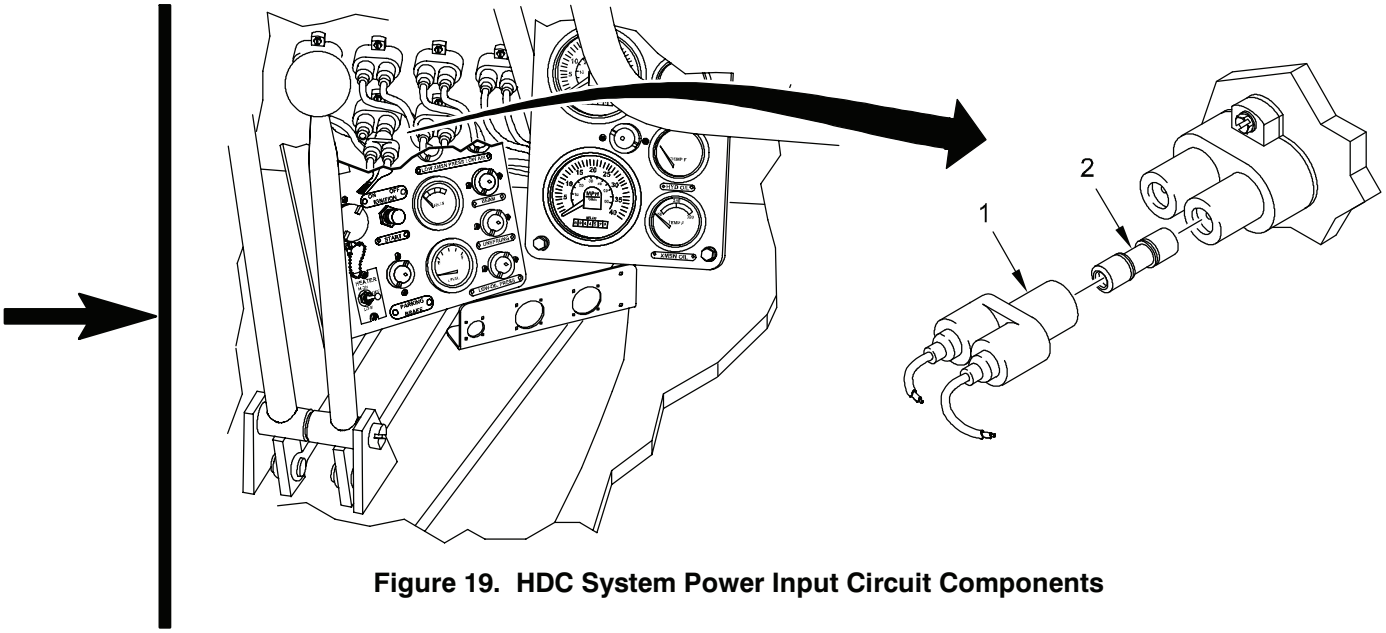
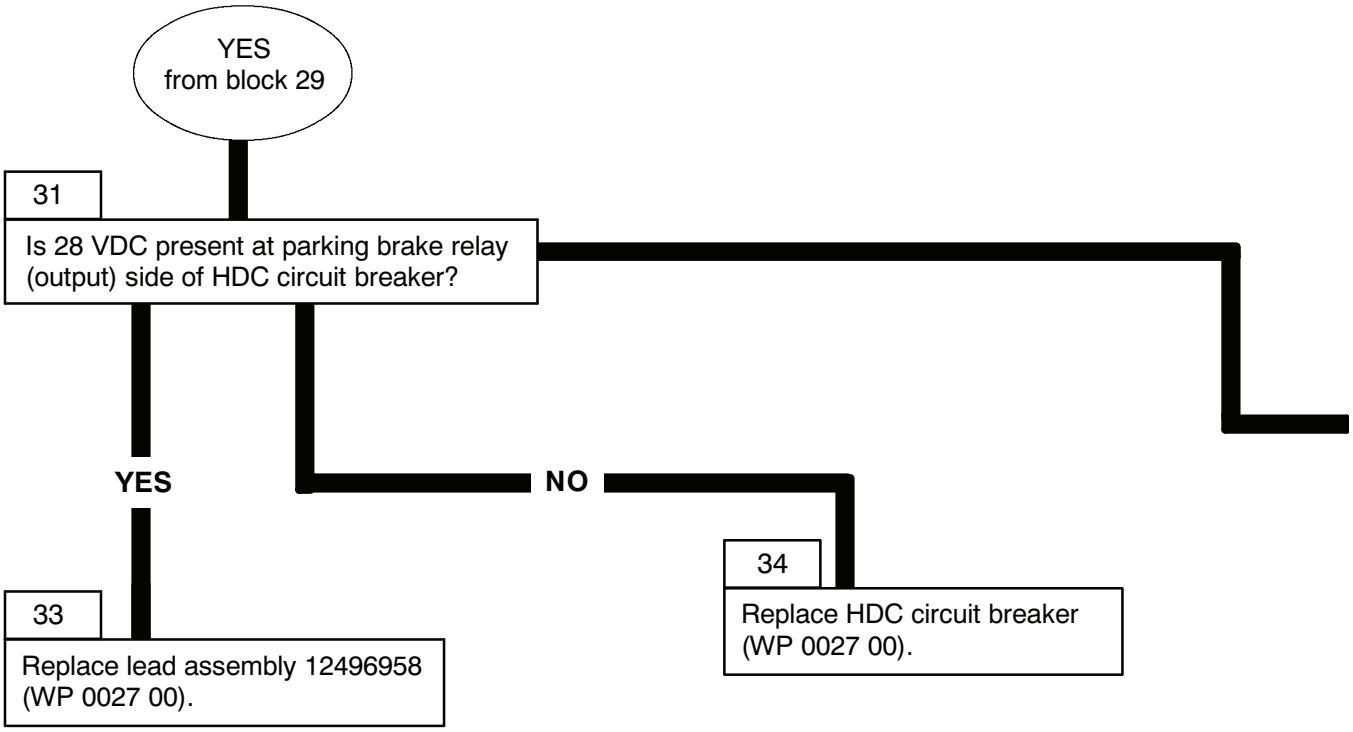


Figure 19. HDC System Power Input Circuit Components

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



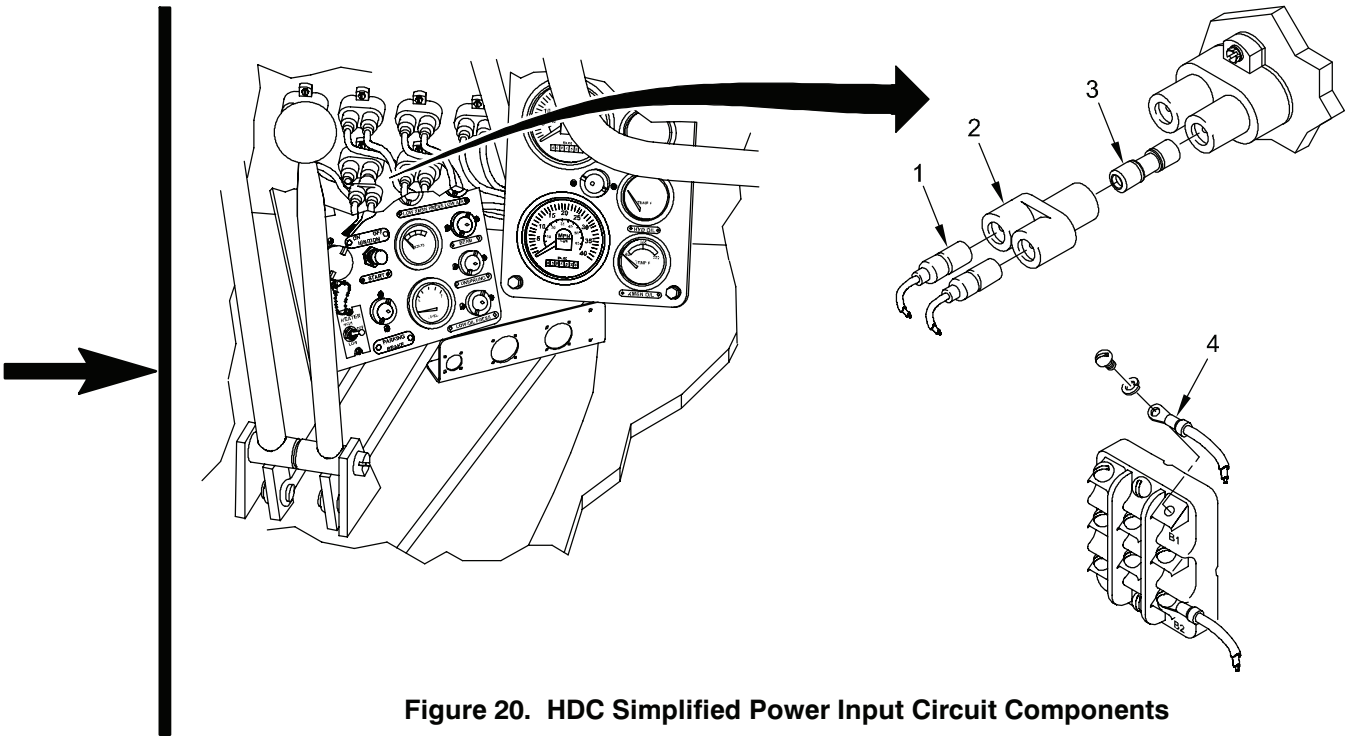
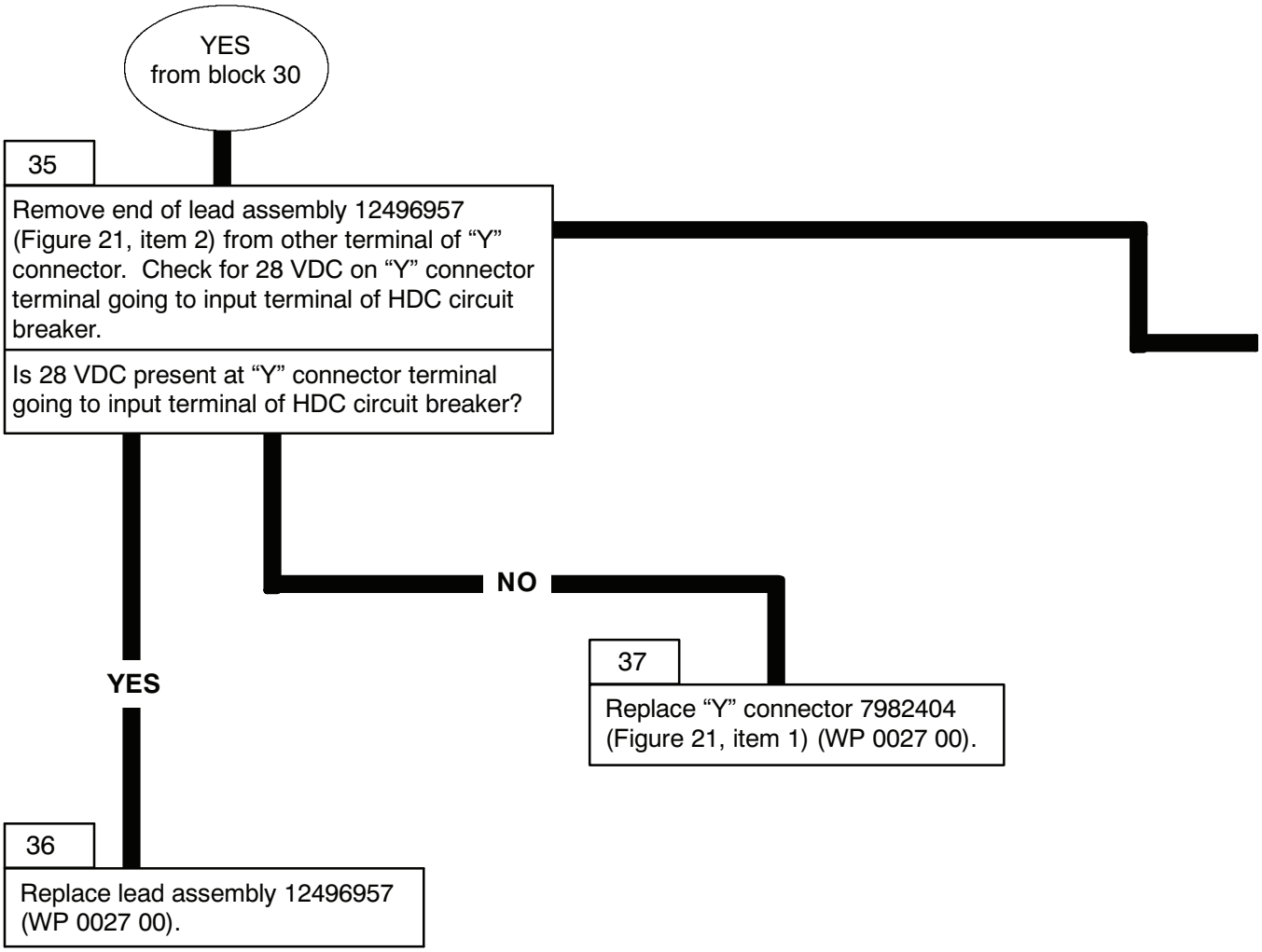


Figure 20. HDC Simplified Power Input Circuit Components


YES
from block 30
35
Remove end of lead assembly 12496957 (Figure 21, item 2) from other terminal of "Y" connector. Check for 28 VDC on "Y" connector terminal going to input terminal of HDC circuit breaker.
Is 28 VDC present at "Y" connector terminal going to input terminal of HDC circuit breaker?
NO
37
Replace "Y" connector 7982404 (Figure 21, item 1) (WP 0027 00).
YES
36
Replace lead assembly 12496957 (WP 0027 00).

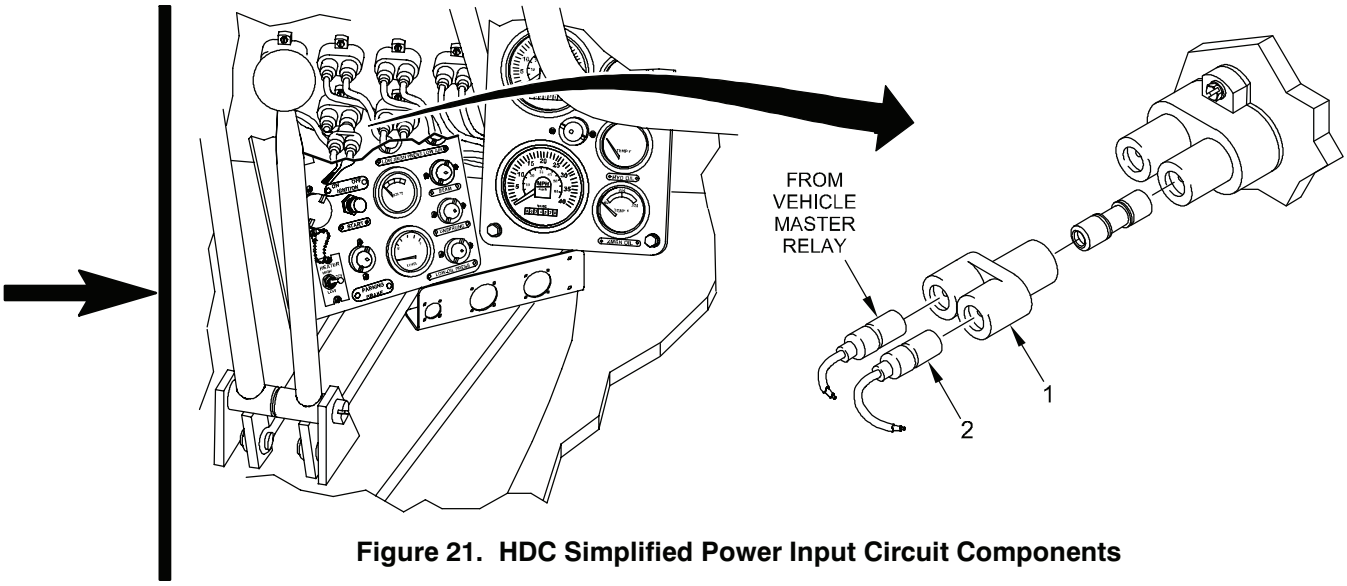
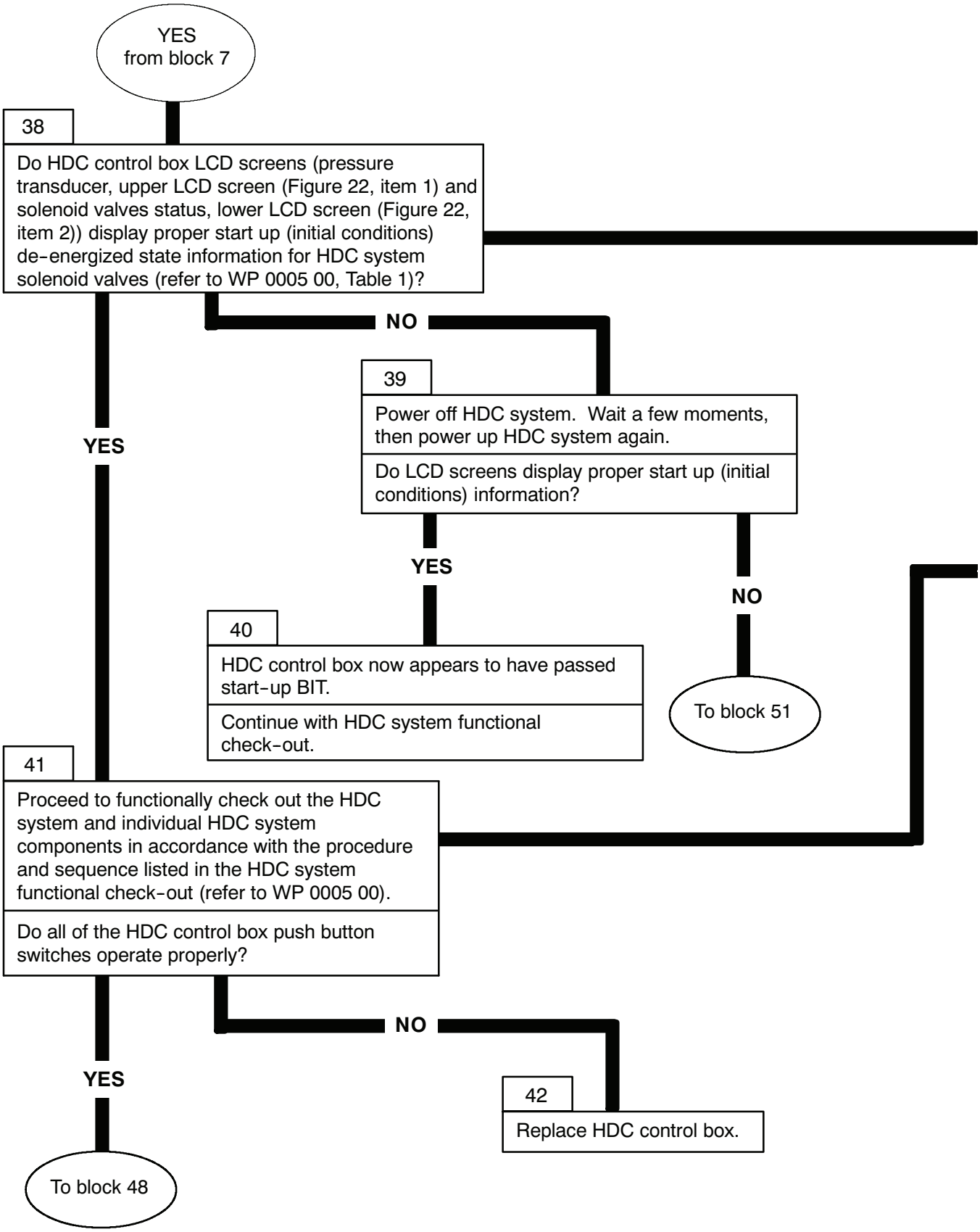


Figure 21. HDC Simplified Power Input Circuit Components

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



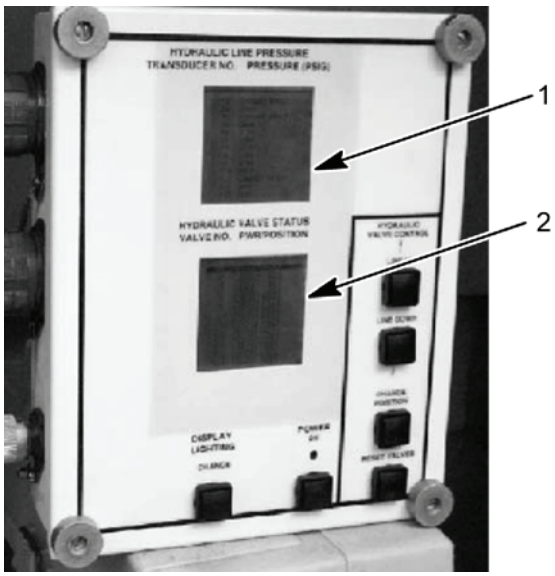
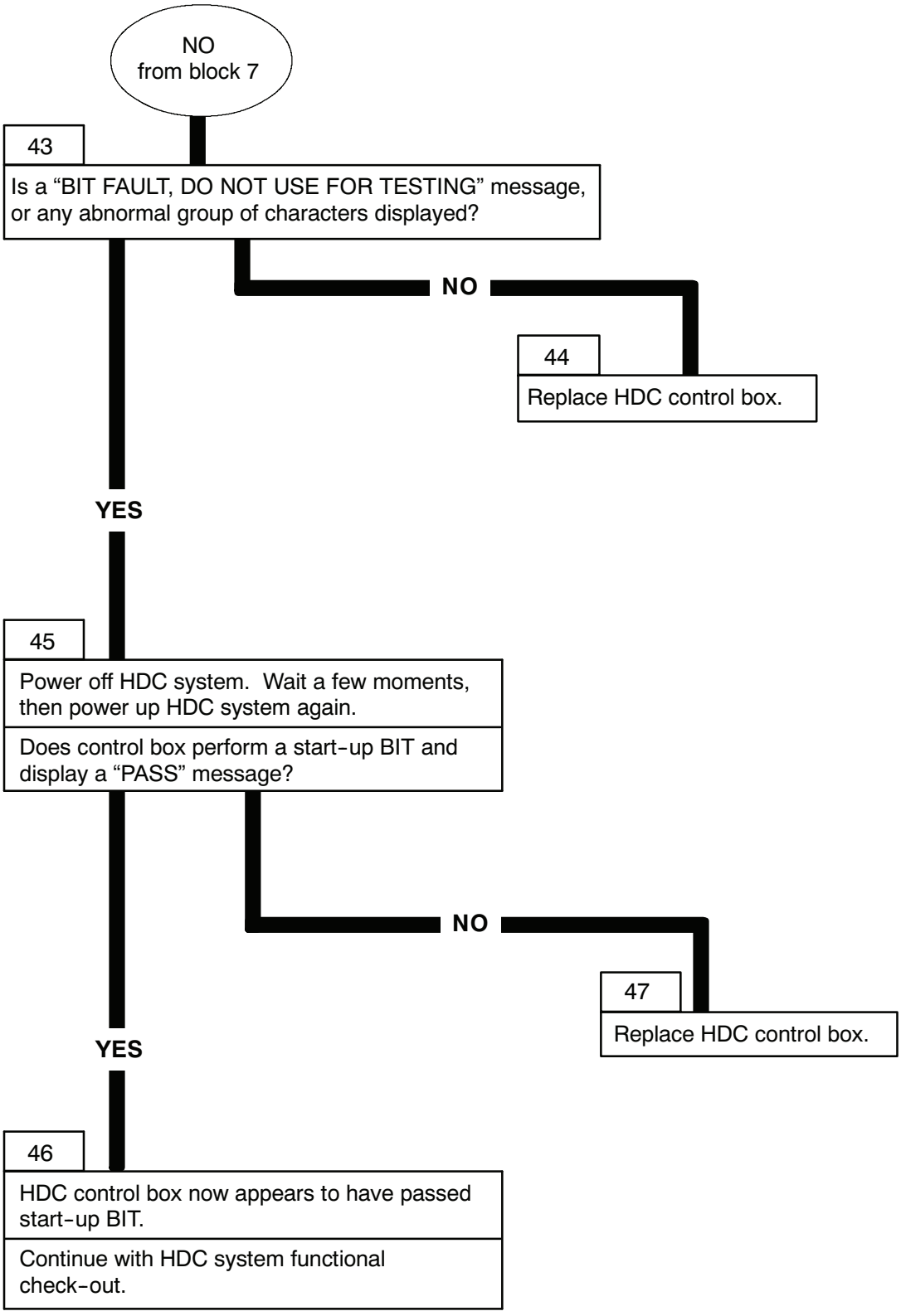


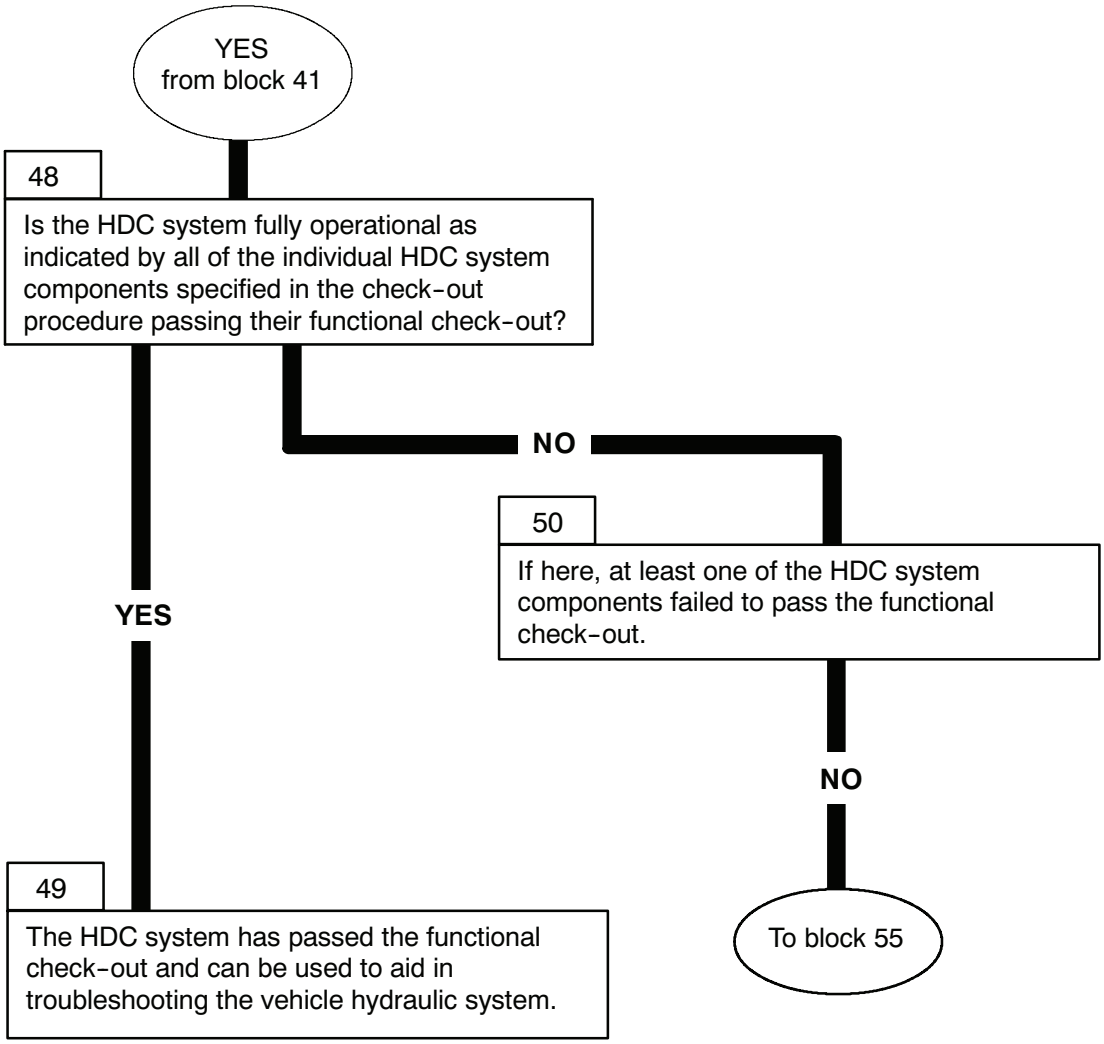
Figure 22. HDC Control Box Front Panel

Refer to WP 0005 00 for HDC System Functional Check-out.

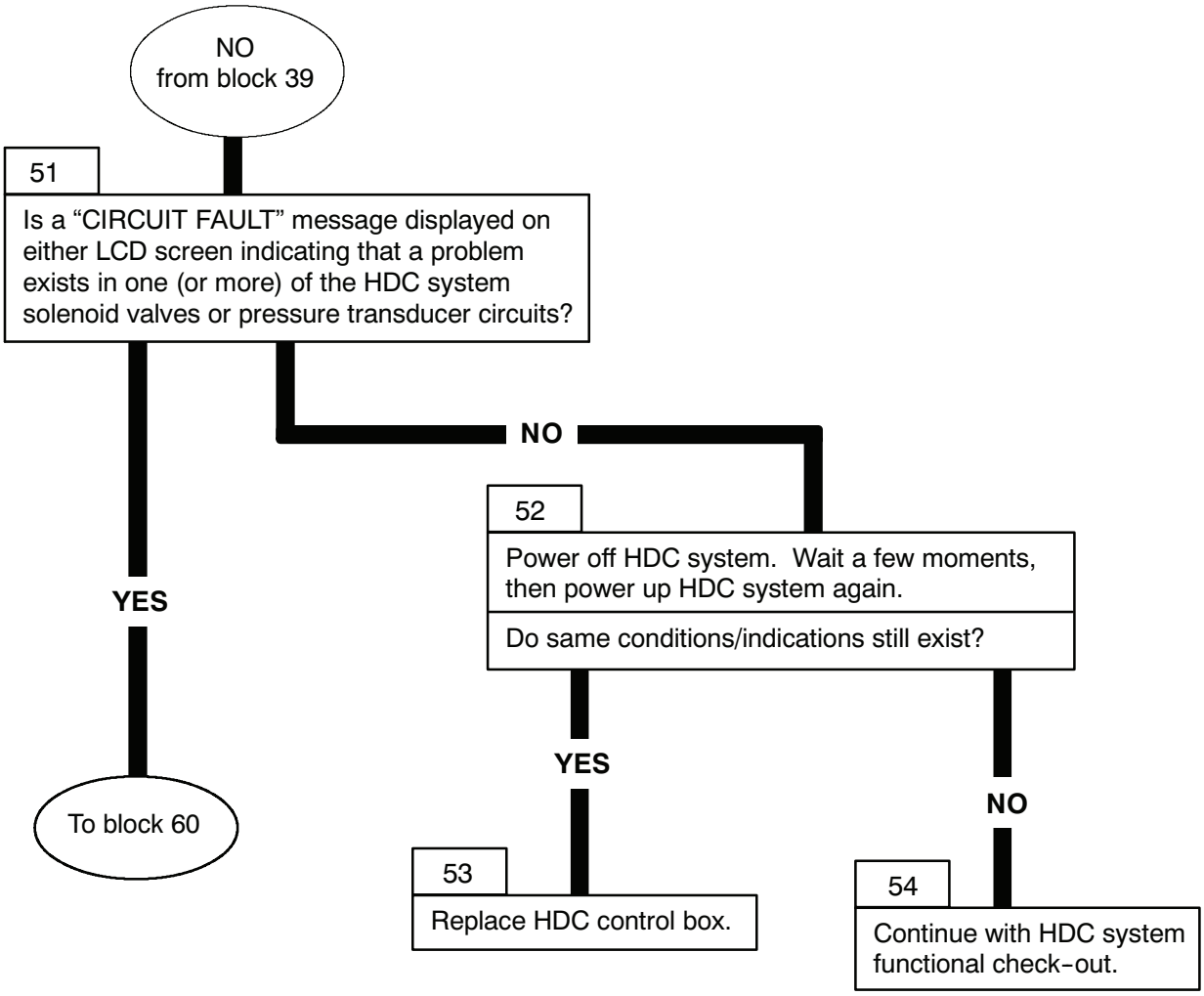
APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



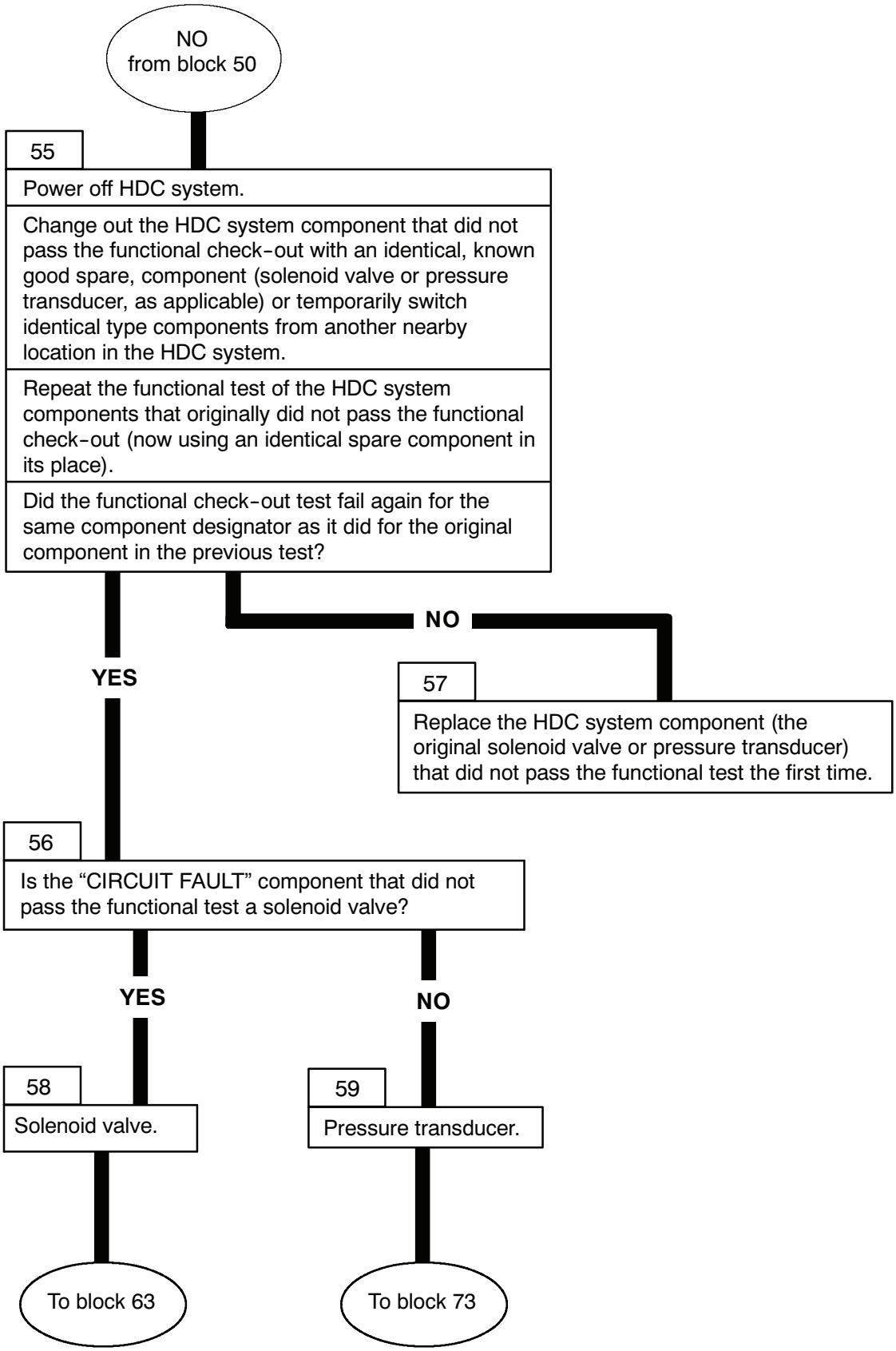
APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**



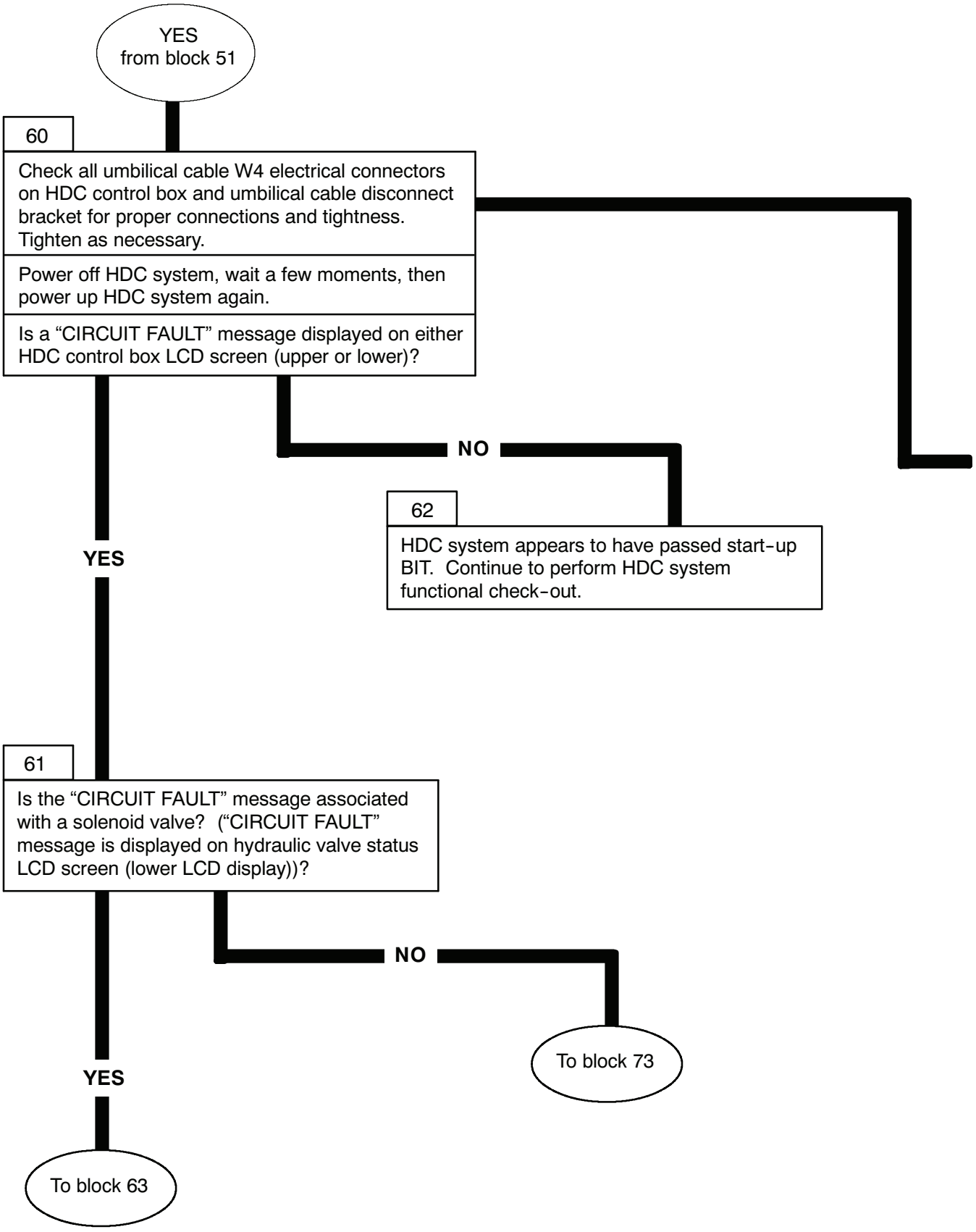
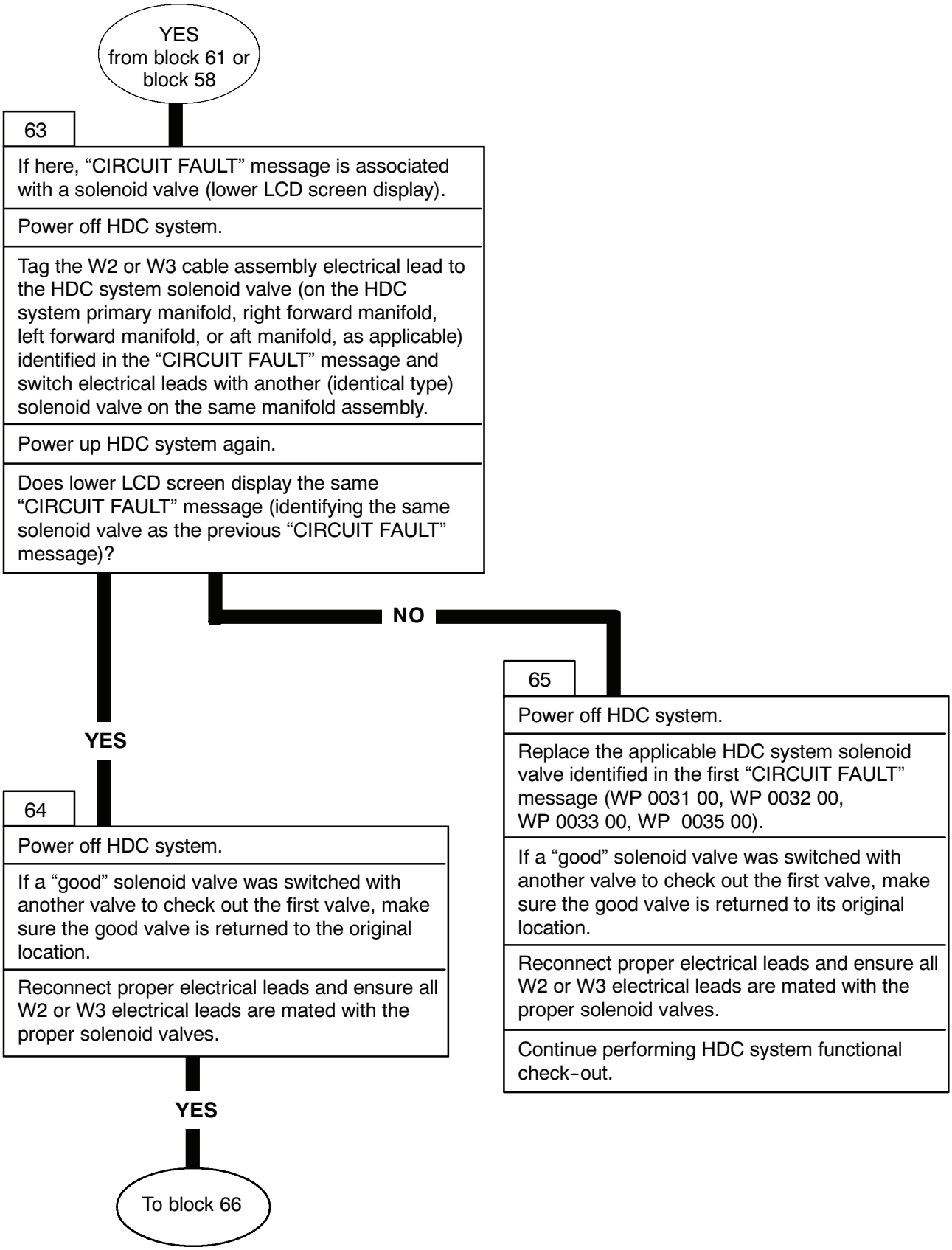

YES
from block 51
60
Check all umbilical cable W4 electrical connectors on HDC control box and umbilical cable disconnect bracket for proper connections and tightness. Tighten as necessary.
Power off HDC system, wait a few moments, then power up HDC system again.
Is a “CIRCUIT FAULT” message displayed on either HDC control box LCD screen (upper or lower)?
NO
62
HDC system appears to have passed start-up BIT. Continue to perform HDC system functional check-out.
YES
61
Is the “CIRCUIT FAULT” message associated with a solenoid valve? (“CIRCUIT FAULT” message is displayed on hydraulic valve status LCD screen (lower LCD display))?
NO
To block 73
YES
To block 63

Figure 23. Umbilical Cable Assembly W4 Connections to HDC Control Box

Figure 24. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket


YES
from block 61 or
block 58
63
If here, “CIRCUIT FAULT” message is associated with a solenoid valve (lower LCD screen display).
Power off HDC system.
Tag the W2 or W3 cable assembly electrical lead to the HDC system solenoid valve (on the HDC system primary manifold, right forward manifold, left forward manifold, or aft manifold, as applicable) identified in the “CIRCUIT FAULT” message and switch electrical leads with another (identical type) solenoid valve on the same manifold assembly.
Power up HDC system again.
Does lower LCD screen display the same “CIRCUIT FAULT” message (identifying the same solenoid valve as the previous “CIRCUIT FAULT” message)?
NO
YES
65
Power off HDC system.
Replace the applicable HDC system solenoid valve identified in the first “CIRCUIT FAULT” message (WP 0031 00, WP 0032 00, WP 0033 00, WP 0035 00).
If a “good” solenoid valve was switched with another valve to check out the first valve, make sure the good valve is returned to its original location.
Reconnect proper electrical leads and ensure all W2 or W3 electrical leads are mated with the proper solenoid valves.
Continue performing HDC system functional check-out.
64
Power off HDC system.
If a “good” solenoid valve was switched with another valve to check out the first valve, make sure the good valve is returned to the original location.
Reconnect proper electrical leads and ensure all W2 or W3 electrical leads are mated with the proper solenoid valves.
YES
To block 66

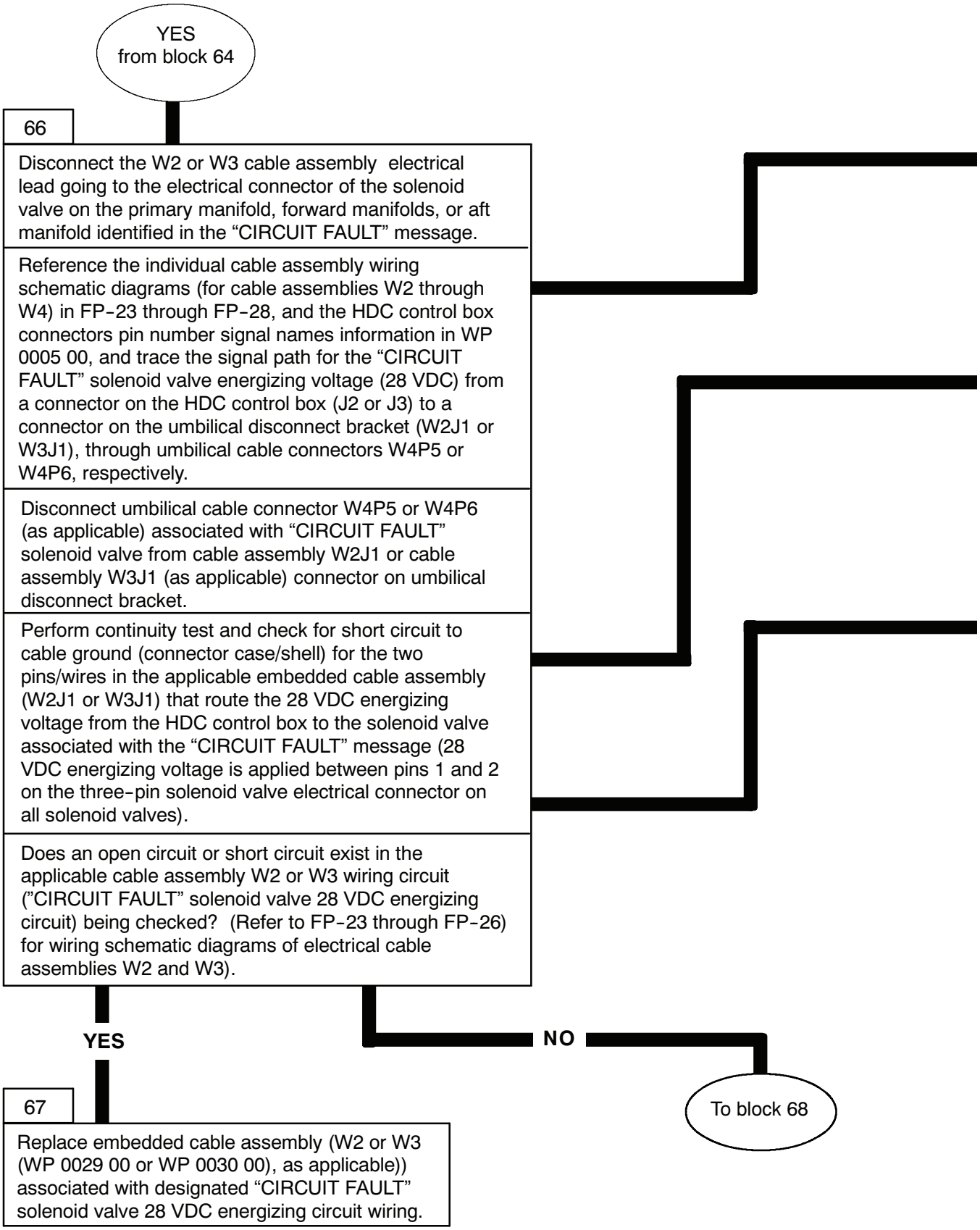
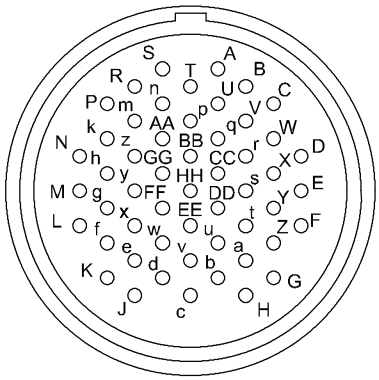

YES
from block 64
66
Disconnect the W2 or W3 cable assembly electrical lead going to the electrical connector of the solenoid valve on the primary manifold, forward manifolds, or aft manifold identified in the "CIRCUIT FAULT" message.
Reference the individual cable assembly wiring schematic diagrams (for cable assemblies W2 through W4) in FP-23 through FP-28, and the HDC control box connectors pin number signal names information in WP 0005 00, and trace the signal path for the "CIRCUIT FAULT" solenoid valve energizing voltage (28 VDC) from a connector on the HDC control box (J2 or J3) to a connector on the umbilical disconnect bracket (W2J1 or W3J1), through umbilical cable connectors W4P5 or W4P6, respectively.
Disconnect umbilical cable connector W4P5 or W4P6 (as applicable) associated with "CIRCUIT FAULT" solenoid valve from cable assembly W2J1 or cable assembly W3J1 (as applicable) connector on umbilical disconnect bracket.
Perform continuity test and check for short circuit to cable ground (connector case/shell) for the two pins/wires in the applicable embedded cable assembly (W2J1 or W3J1) that route the 28 VDC energizing voltage from the HDC control box to the solenoid valve associated with the "CIRCUIT FAULT" message (28 VDC energizing voltage is applied between pins 1 and 2 on the three-pin solenoid valve electrical connector on all solenoid valves).
Does an open circuit or short circuit exist in the applicable cable assembly W2 or W3 wiring circuit ("CIRCUIT FAULT" solenoid valve 28 VDC energizing circuit) being checked? (Refer to FP-23 through FP-26) for wiring schematic diagrams of electrical cable assemblies W2 and W3).
YES
NO
To block 68
67
Replace embedded cable assembly (W2 or W3 (WP 0029 00 or WP 0030 00), as applicable)) associated with designated "CIRCUIT FAULT" solenoid valve 28 VDC energizing circuit wiring.

Figure 25. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket

Refer to FP-21 Solenoid Valve Electrical Wiring Diagram.



PLUG

Figure 26. Upper Cable Assembly W2J1 and Lower Cable Assembly W3J1 Electrical Connections

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**

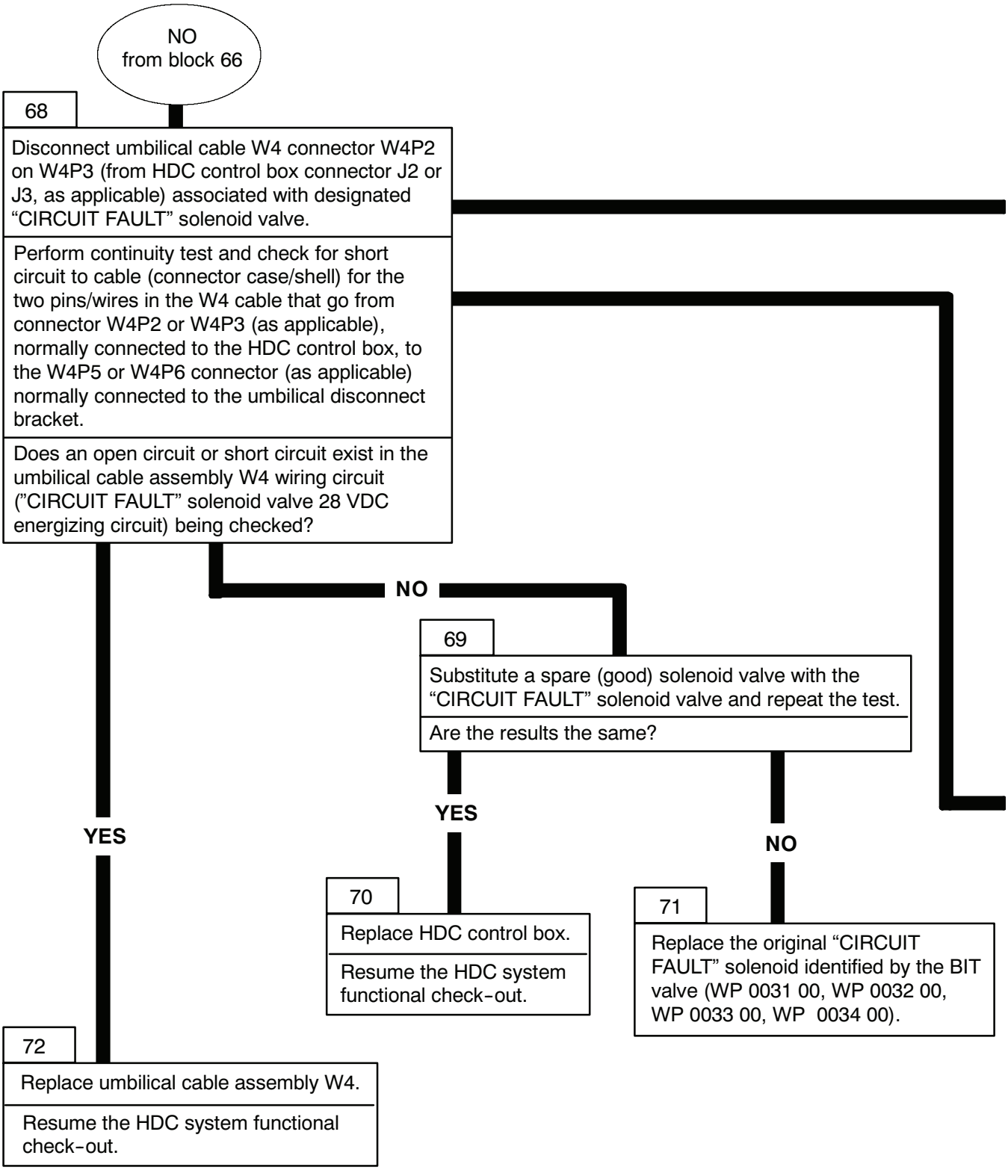
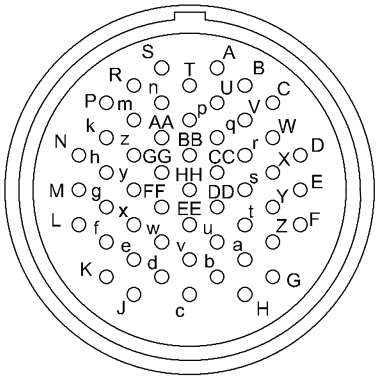
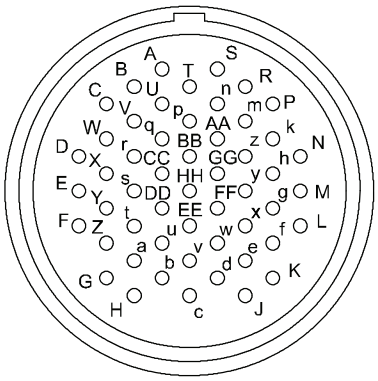


Figure 27. Umbilical Cable Assembly W4P2 and W4P3 Connections to HDC Control Box



PLUG

Figure 28. Umbilical Cable Assembly W4P2 and W4P3 Electrical Connections



SOCKET

Figure 29. Umbilical Cable Assembly W4P5 and W4P6 Electrical Connections

APPARENT HDC SYSTEM PROBLEM - Continued **0022 00**

NO
from block 59
or block 61

73

If here, "CIRCUIT FAULT" message is associated with a pressure transducer (upper LCD screen display).

Power off HDC system.

Tag the W2 or W3 cable assembly electrical lead to the hydraulic pressure transducer identified in the "CIRCUIT FAULT" message and switch electrical leads with another (or spare) hydraulic pressure transducer. If a spare of another pressure transducer is not nearby, temporarily exchange the identified pressure transducer with another pressure transducer from elsewhere in the vehicle.

Power up HDC system again.

Does upper LCD screen display the same "CIRCUIT FAULT" message (identifying the same hydraulic pressure transducer as the previous "CIRCUIT FAULT" message)?

NO

75

Power off HDC system.

Replace the applicable HDC system pressure transducer identified in the first "CIRCUIT FAULT" message (WP 0031 00, WP 0032 00, WP 0035 00, WP 0037 00).

If a "good" pressure transducer was switched with another pressure transducer to check out the first transducer, make sure the good transducer is returned to the original location.

Reconnect proper electrical leads and ensure all W2 or W3 electrical leads are mated with the proper pressure transducer.

Continue performing HDC system functional check-out.

YES

74

Power off HDC system.

If a "good" pressure transducer was switched with another pressure transducer to check out the first transducer, make sure the good transducer is returned to the original location.

Reconnect proper electrical leads and ensure all W2 or W3 electrical leads are mated with the proper pressure transducer.

YES

To block 76

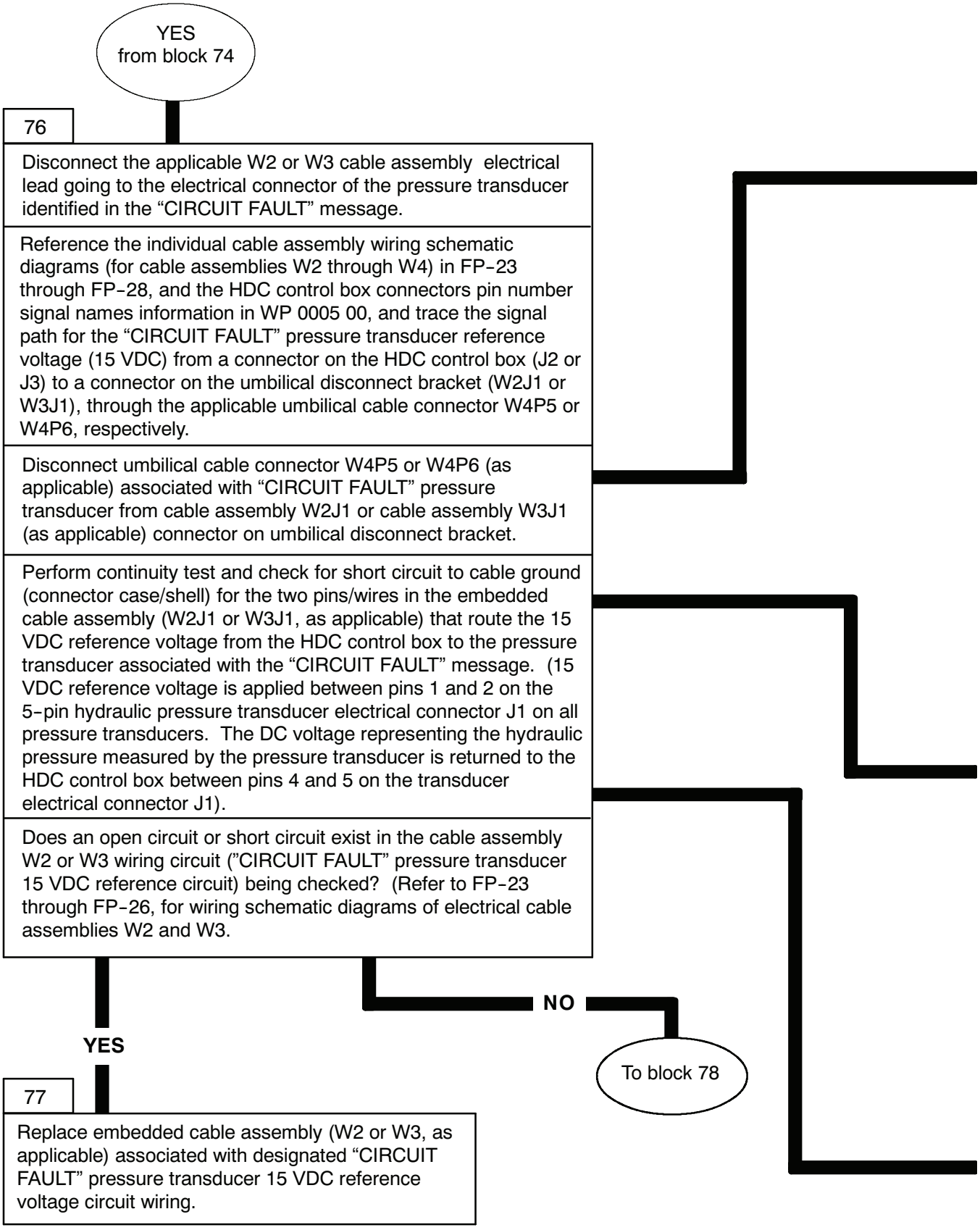

YES
from block 74
76
Disconnect the applicable W2 or W3 cable assembly electrical lead going to the electrical connector of the pressure transducer identified in the "CIRCUIT FAULT" message.
Reference the individual cable assembly wiring schematic diagrams (for cable assemblies W2 through W4) in FP-23 through FP-28, and the HDC control box connectors pin number signal names information in WP 0005 00, and trace the signal path for the "CIRCUIT FAULT" pressure transducer reference voltage (15 VDC) from a connector on the HDC control box (J2 or J3) to a connector on the umbilical disconnect bracket (W2J1 or W3J1), through the applicable umbilical cable connector W4P5 or W4P6, respectively.
Disconnect umbilical cable connector W4P5 or W4P6 (as applicable) associated with "CIRCUIT FAULT" pressure transducer from cable assembly W2J1 or cable assembly W3J1 (as applicable) connector on umbilical disconnect bracket.
Perform continuity test and check for short circuit to cable ground (connector case/shell) for the two pins/wires in the embedded cable assembly (W2J1 or W3J1, as applicable) that route the 15 VDC reference voltage from the HDC control box to the pressure transducer associated with the "CIRCUIT FAULT" message. (15 VDC reference voltage is applied between pins 1 and 2 on the 5-pin hydraulic pressure transducer electrical connector J1 on all pressure transducers. The DC voltage representing the hydraulic pressure measured by the pressure transducer is returned to the HDC control box between pins 4 and 5 on the transducer electrical connector J1).
Does an open circuit or short circuit exist in the cable assembly W2 or W3 wiring circuit ("CIRCUIT FAULT" pressure transducer 15 VDC reference circuit) being checked? (Refer to FP-23 through FP-26, for wiring schematic diagrams of electrical cable assemblies W2 and W3.
NO
To block 78
YES
77
Replace embedded cable assembly (W2 or W3, as applicable) associated with designated "CIRCUIT FAULT" pressure transducer 15 VDC reference voltage circuit wiring.

Figure 30. Umbilical Cable Assembly W4 Connection to Umbilical Cable Disconnect Bracket

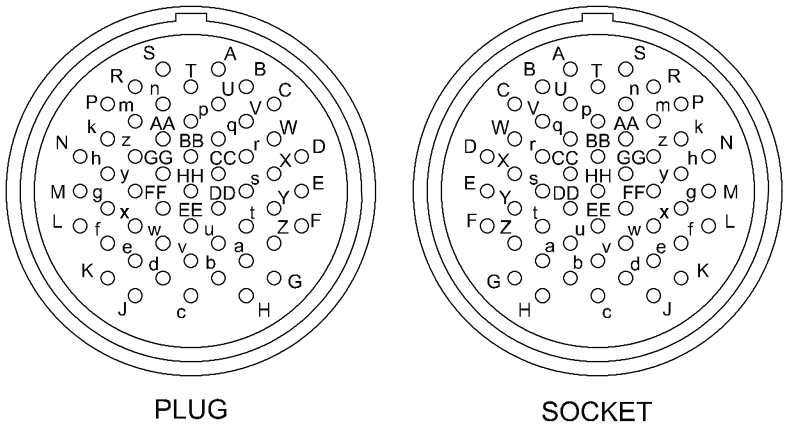


Figure 31. Pin Locations for W2J1 and W3J1 Connectors

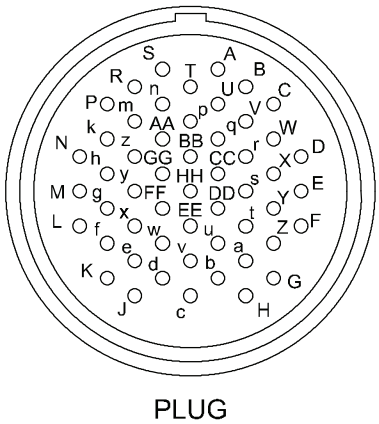


Figure 32. Upper Cable Assembly W2 and Lower Cable Assembly W3 Electrical Connections

Refer to FP-19 Hydraulic Pressure Transducer Electrical Wiring Diagram.

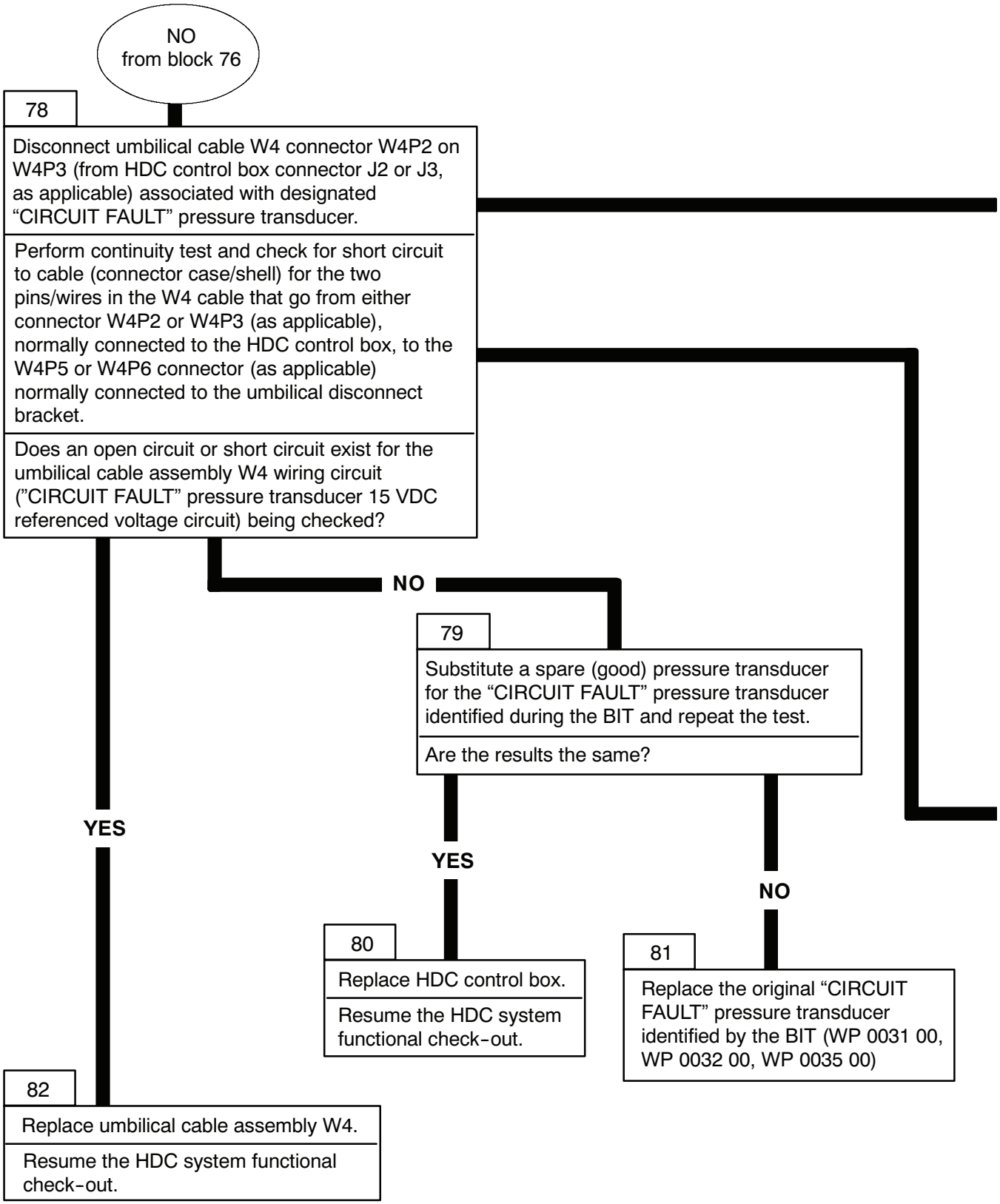
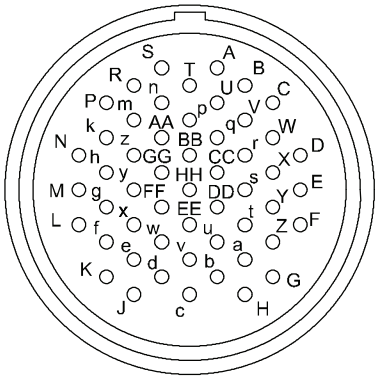
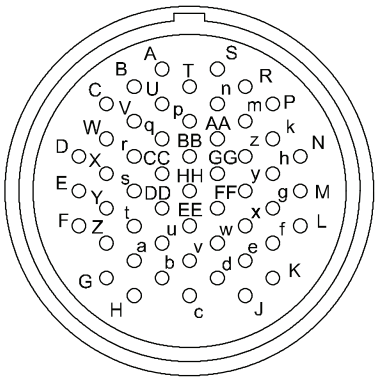

NO
from block 76
78
Disconnect umbilical cable W4 connector W4P2 on W4P3 (from HDC control box connector J2 or J3, as applicable) associated with designated "CIRCUIT FAULT" pressure transducer.
Perform continuity test and check for short circuit to cable (connector case/shell) for the two pins/wires in the W4 cable that go from either connector W4P2 or W4P3 (as applicable), normally connected to the HDC control box, to the W4P5 or W4P6 connector (as applicable) normally connected to the umbilical disconnect bracket.
Does an open circuit or short circuit exist for the umbilical cable assembly W4 wiring circuit ("CIRCUIT FAULT" pressure transducer 15 VDC referenced voltage circuit) being checked?
NO
79
Substitute a spare (good) pressure transducer for the "CIRCUIT FAULT" pressure transducer identified during the BIT and repeat the test.
Are the results the same?
YES
YES
NO
80
Replace HDC control box.
Resume the HDC system functional check-out.
81
Replace the original "CIRCUIT FAULT" pressure transducer identified by the BIT (WP 0031 00, WP 0032 00, WP 0035 00)
82
Replace umbilical cable assembly W4.
Resume the HDC system functional check-out.

Figure 33. Umbilical Cable Assembly W4 Connections to HDC Control Box



PLUG

Figure 34. Umbilical Cable Assembly W4P2 and W4P3 Electrical Connectors



SOCKET

Figure 35. Umbilical Cable Assembly W4P5 and W4P6 Electrical Connectors

END OF WORK PACKAGE

CHAPTER 3

MAINTENANCE INSTRUCTIONS

WORK PACKAGE INDEX

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

0023 00

THIS WORK PACKAGE COVERS:

Preventive Maintenance Checks and Services

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

This work package contains the Preventive Maintenance Checks and Services required for the M9 ACE HDC System. PMCS is a scheduled, step-by-step inspection and service of the vehicle and vehicle components. It purpose is to keep the vehicle in good condition and to identify and correct problems before costly and time-consuming repairs are needed.

MAINTENANCE FORMS AND RECORDS

Use DA Form 2404, Equipment Inspection and Maintenance Worksheet, to record periodic maintenance service performed and faults corrected. The item number on the DA Form 2404 must be the same as the item number of the PMCS. For information on maintenance forms and records, see DA Pam 738-750.

MECHANIC PARTICIPATION

The operator may perform operator PMCS (TM 5-2350-262-10) and may also help unit maintenance perform unit PMCS and lubrication in accordance with (TM 5-2350-262-10).

INTERVALS

HDC PMCS should be performed every week.

END OF WORK PACKAGE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INSTRUCTIONS

0024 00

THIS WORK PACKAGE COVERS:

Preventive Maintenance Checks and Services

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

This work package contains the Preventive Maintenance Checks and Services for the M9 ACE HDC System.

Table 1. Unit Level Preventive Maintenance Check and Services for M9 ACE HDC System

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1.	Weekly	ACE Vehicle	Ensure that all operator PMCS, (before operation through weekly), in TM 5-2350-262-10 have been completed prior to performing Unit PMCS on the M9 ACE HDC system.	Any condition would prevent safe operation of vehicle.
2.	Weekly	Nuts, Bolts, and Screws	Check for loose parts by looking for cracked or chipped paints around screws and bolt heads. Check for missing or broken cotter pins or lock wire.	Nuts, bolts, or screws missing, loose, stripped, or improperly installed.
3	Weekly	HDC System Components	a. Clean HDC system components. They should be free of dirt, oil and hydraulic fluids. b. Check condition of Umbilical Disconnect Bracket and attached cables in Driver's Compartment.	Any condition would prevent safe operation of vehicle Bracket is not secured and/or cables are missing or broken.

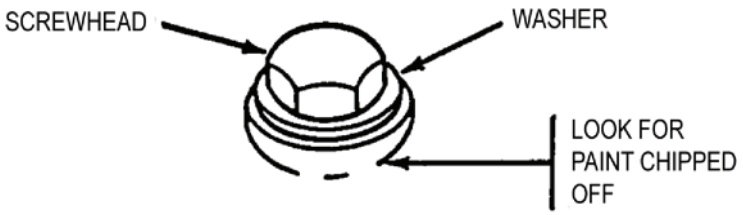


Figure 1. Bolt

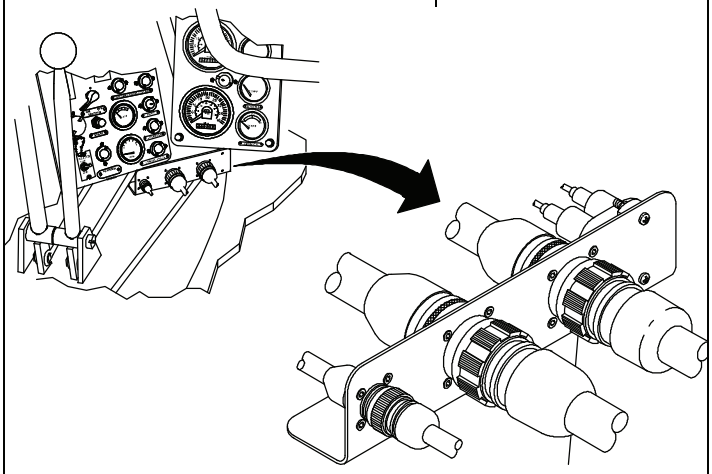


Figure 2. HDC Bracket

Table 1. Unit Level Preventive Maintenance Check and Services for M9 ACE HDC System - Continued

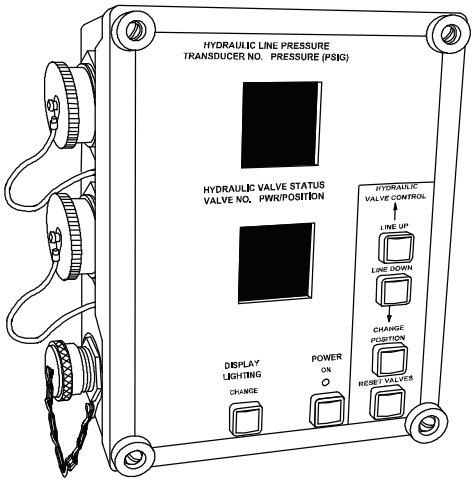
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
4	Weekly	HDC System Electrical Components	a. Check that all HDC electrical connections and connectors are clean and tight.	
			b. Check condition of HDC Control Box and Umbilical Cable Assembly W4.	Any condition would prevent safe operation of vehicle.
			 **Figure 3. HDC Control Box**	
			c. Check condition of HDC Upper Cable Assembly W2 and Lower Cable Assembly W3.	
			d. Check HDC system solenoid valves and pressure transducer electrical connectors for proper connections and tight fit. Tighten as required.	Any condition would prevent safe operation of vehicle.

Table 1. Unit Level Preventive Maintenance Check and Services for M9 ACE HDC System - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	Weekly	HDC System Hydraulic Components	a. Check all HDC hydraulic hoses, tubes and fittings for damage, loose clamps, improper routing, leaks and chafing.	Any condition would prevent safe operation of vehicle.
5 (cont)	Weekly	HDC System Hydraulic Components	b. Check fittings for evidence of leaks and looseness. Do not overtighten hoses, tubes, or fittings.	
6	Weekly	Primary Manifold/DCV bank	Ensure that the seven hydraulic metal tubes connected between primary manifold and DCV bank are tight and that there are no leaking fittings.	Any condition would prevent safe operation of vehicle.

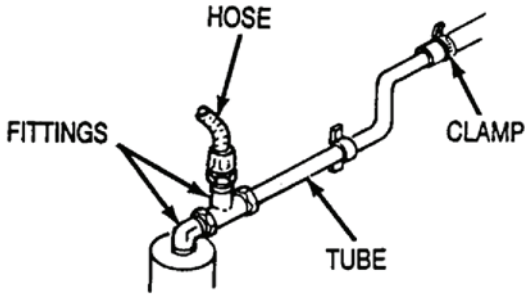


Figure 4. Hydraulic Hoses, Tubes, and Fittings

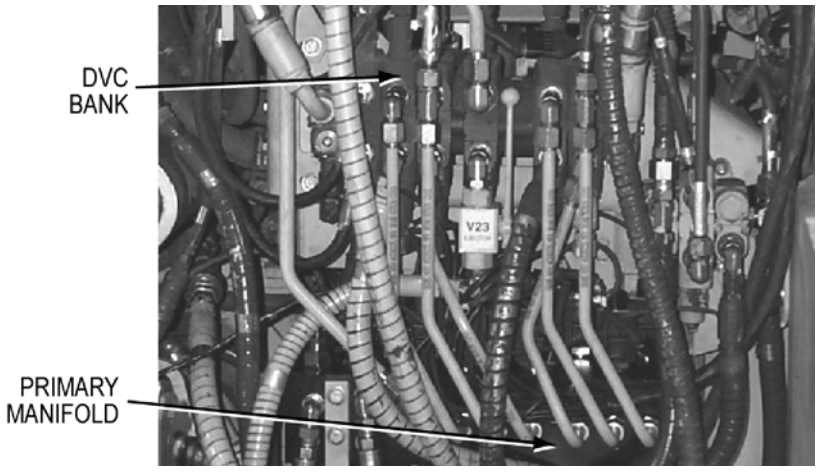


Figure 5. Hydraulic Metal Tubes

Table 1. Unit Level Preventive Maintenance Check and Services for M9 ACE HDC System - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Weekly	HDC System Pressure transducers	Check that all HDC system pressure transducers all tightly seated in adaptors.	Any condition would prevent safe operation of vehicle.
8	Weekly		Perform M9 ACE HDC system Functional Check-Out procedure. If the HDC system does not pass all portions of the Functional Check-Out procedure, refer to work package (WP 0022 00) and proceed to troubleshoot as applicable.	Any condition would prevent safe operation of vehicle.

REPLACE HDC STOWAGE BRACKET

0025 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

None

Personnel Required

Two 62B10

Equipment Conditions

HDC control box removed (WP 0004 00)
Vehicle MASTER power OFF (TM 5-2350-262-10)
Driver's seat forward (TM 5-2350-262-10)

REMOVAL

1. Loosen two jam nuts (Figure 1, item 2) on two threaded rods (Figure 1, item 1) at compartment bulkhead.
2. Remove two threaded rods (Figure 1, item 1) two washers (Figure 1, item 3) and stowage bracket (Figure 1, item 4) from compartment bulkhead.

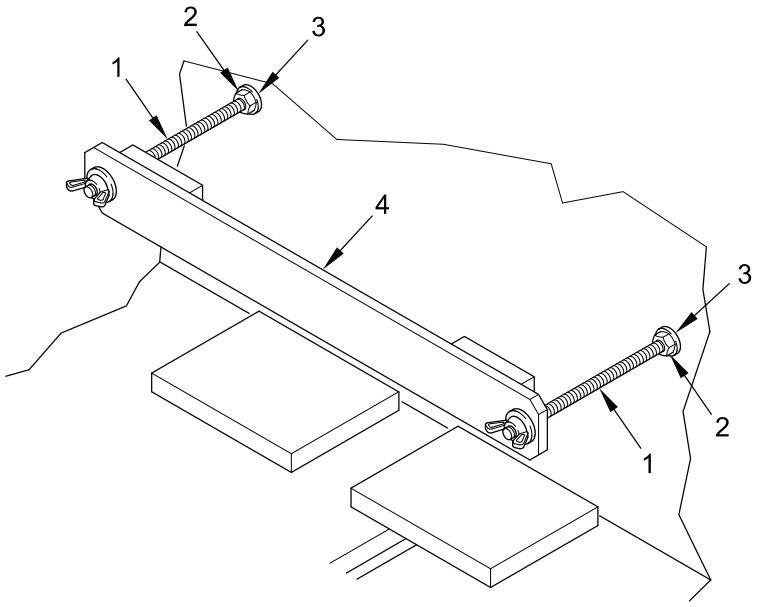


Figure 1. HDC Stowage Bracket

END OF TASK

INSTALLATION

1. Install stowage bracket (Figure 2, item 4) with two washers (Figure 2, item 3) and two threaded rods (Figure 2, item 1) onto compartment bulkhead.
2. Tighten two jam nuts (Figure 2, item 2) against bulkhead to secure two threaded rods (Figure 2, item 1).

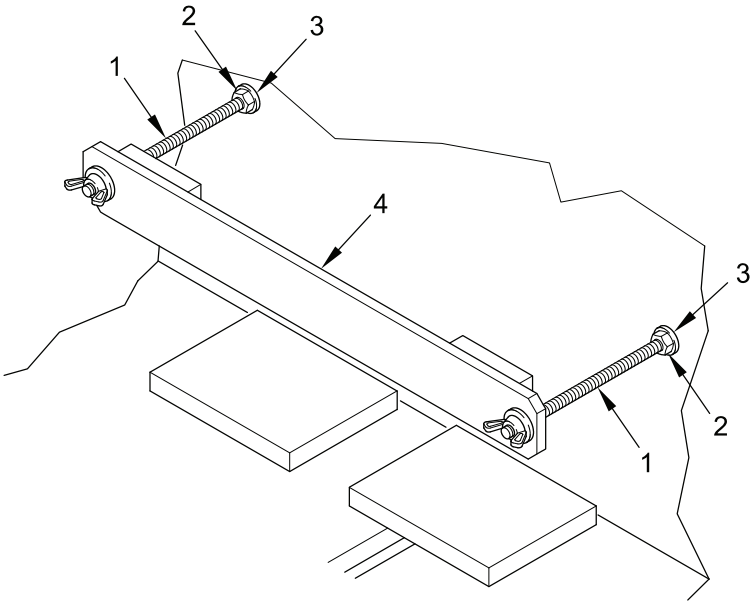


Figure 2. HDC Stowage Bracket

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install HDC control box (WP 0004 00).
2. Return Driver's seat to ready position (TM5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE HDC DISCONNECT BRACKET 0026 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)

Materials/Parts
Screws (2), self-locking (WP 0072 00, item 14)
Washer, lock (2) (WP 0072 00, item 13)

Personnel Required
Two 62B10

REMOVAL

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

REPLACE HDC DISCONNECT BRACKET - Continued **0026 00**

REMOVAL - CONTINUED

1. Remove dust caps (Figure 1, item 6) from wiring harness connectors W1J1 (Figure 1, item 10), W2J1 (Figure 1, item 11), and W3J1 (Figure 1, item 4).
2. Remove four screws (Figure 1, item 8), nutplate (Figure 1, item 1), and wiring harness connector W1J1 (Figure 1, item 10) from disconnect bracket (Figure 1, item 9).
3. Remove four screws (Figure 1, item 7), nutplate (Figure 1, item 2), and wiring harness connector W2J1 (Figure 1, item 11) from disconnect bracket (Figure 1, item 9).
4. Remove four screws (Figure 1, item 5), nutplate (Figure 1, item 3), and wiring harness connector W3J1 (Figure 1, item 4) from disconnect bracket (Figure 1, item 9).

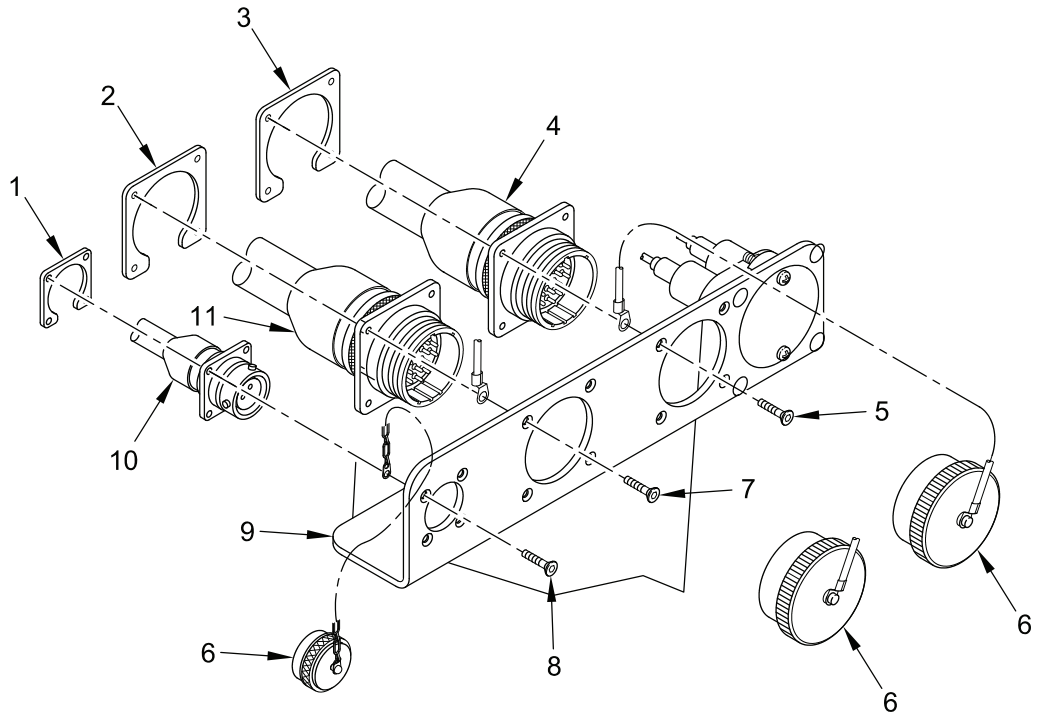


Figure 1. Replacing HDC Disconnect Bracket

REMOVAL - CONTINUED

5. Disconnect circuit 10 (Figure 2, item 8) and circuit 1070 (Figure 2, item 5) connectors from HDC circuit breaker (Figure 2, item 11).
6. Remove two nuts (Figure 2, item 9), two lockwashers (Figure 2, item 10), two screws (Figure 2, item 12), and HDC circuit breaker (Figure 2, item 11) from HDC disconnect bracket (Figure 2, item 17). Discard lockwashers.
7. Remove two self-locking screws (Figure 2, item 6), two flat washers (Figure 2, item 7), and disconnect bracket (Figure 2, item 17) from bulkhead. Discard self-locking screws.

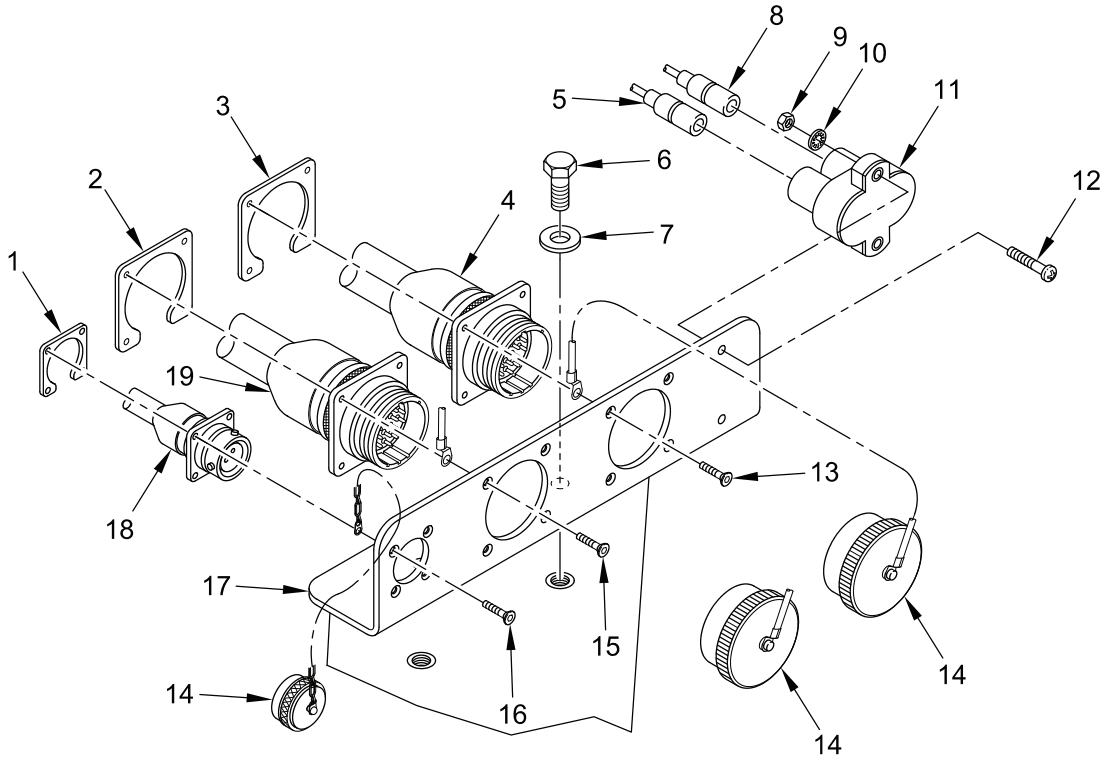


Figure 2. Install HDC Disconnect Bracket

END OF TASK

INSTALLATION

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

1. Install disconnect bracket (Figure 3, item 17) on bulkhead with two flat washers (Figure 3, item 7) and two new self-locking screws (Figure 3, item 6).
2. Install HDC circuit breaker (Figure 3, item 11) with two screws (Figure 3, item 12), two new lockwashers (Figure 3, item 10), and two nuts (Figure 3, item 9) to HDC disconnect bracket (Figure 3, item 17).
3. Connect circuit 1070 (Figure 3, item 5) and circuit 10 (Figure 3, item 8) connectors to HDC circuit breaker (Figure 3, item 11).
4. Connect wiring harness connector W3 J1 (Figure 3, item 4) to disconnect bracket (Figure 3, item 17) with nutplate (Figure 3, item 3) and four screws (Figure 3, item 13).
5. Connect wiring harness connector W2 J1 (Figure 3, item 19) to disconnect bracket (Figure 3, item 17) with nutplate (Figure 3, item 2) and four screws (Figure 3, item 15).
6. Connect wiring harness connector W1 J1 (Figure 3, item 18) to disconnect bracket (Figure 3, item 17) with nutplate (Figure 3, item 1) and four screws (Figure 3, item 16).
7. Install dust caps (Figure 3, item 14) on wiring harness connectors W3J1 (Figure 3, item 4), W2J1 (Figure 3, item 19), and W1J1 (Figure 3, item 18).

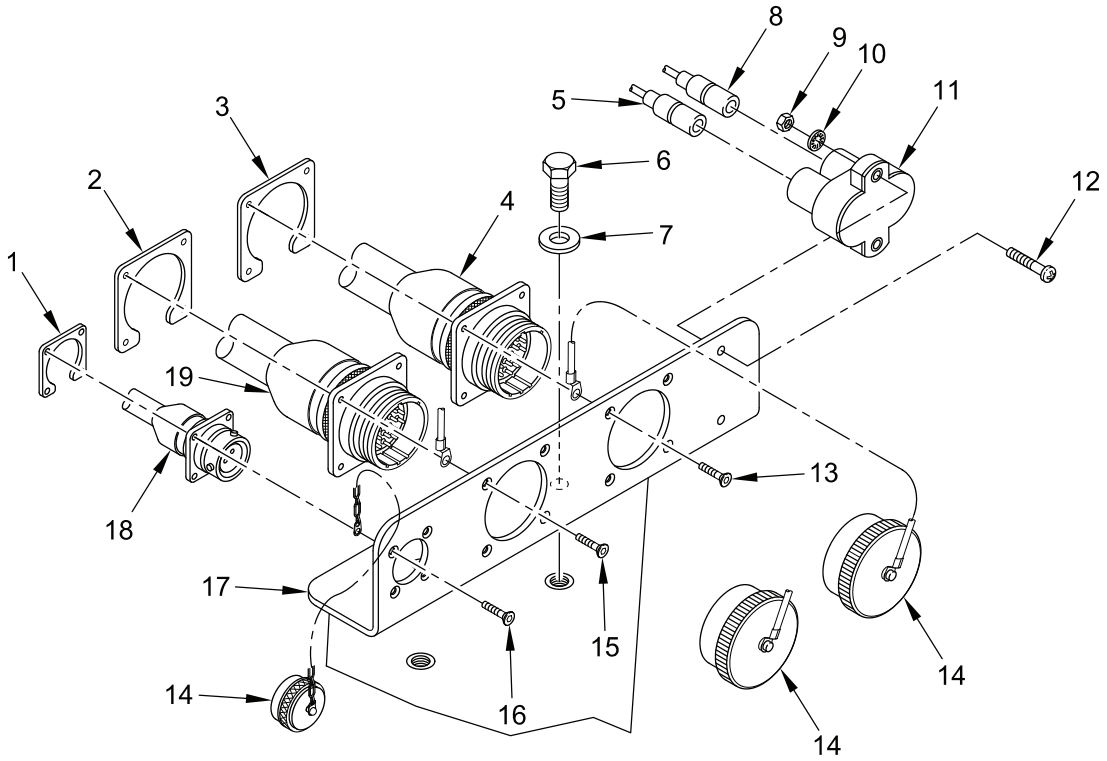


Figure 3. Install HDC Disconnect Bracket

END OF TASK

END OF WORK PACKAGE

REPLACE HDC CIRCUIT BREAKER AND POWER DISTRIBUTION COMPONENTS

0027 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Equipment Conditions

Vehicle MASTER power OFF (TM5-2350-262-10)

Materials/Parts

Screw, self-locking (2) (WP 0072 00, item 14)
Washer, lock (2) (WP 0072 00, item 13)

Personnel Required

Two 62B10

REMOVAL

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

REPLACE HDC CIRCUIT BREAKER AND POWER DISTRIBUTION COMPONENTS - Continued **0027 00**

REMOVAL - CONTINUED

1. Remove two self-locking screws (Figure 1, item 2), two flat washers (Figure 1, item 1), and disconnect bracket (Figure 1, item 9) from bulkhead. Discard self-locking screws.
2. Disconnect circuit 10 (Figure 1, item 4) and circuit 1070 (Figure 1, item 3) connectors from HDC circuit breaker (Figure 1, item 7).
3. Remove two nuts (Figure 1, item 5), two lockwashers (Figure 1, item 6), two screws (Figure 1, item 8), and HDC circuit breaker (Figure 1, item 7) from HDC disconnect bracket (Figure 1, item 9). Discard lockwashers.

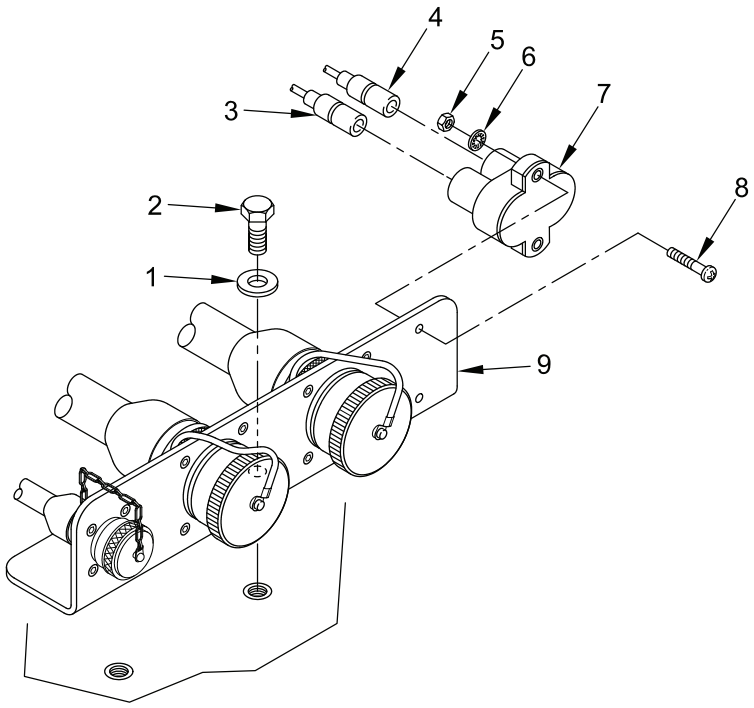


Figure 1. Removing HDC Circuit Breaker

REPLACE HDC CIRCUIT BREAKER AND POWER DISTRIBUTION COMPONENTS - Continued **0027 00**

REMOVAL - CONTINUED

4. Remove lead assembly 1070 (Figure 2, item 6), from terminal B2 on parking brake relay (Figure 2, item 5). Discard lockwasher.
5. Remove lead assemblies (Figure 2, item 1), "Y" -connector (Figure 2, item 2), and in-line connector (Figure 2, item 3) from trailer receptacle and trouble light circuit breaker (Figure 2, item 4) located behind driver's compartment switch and gauge panel.

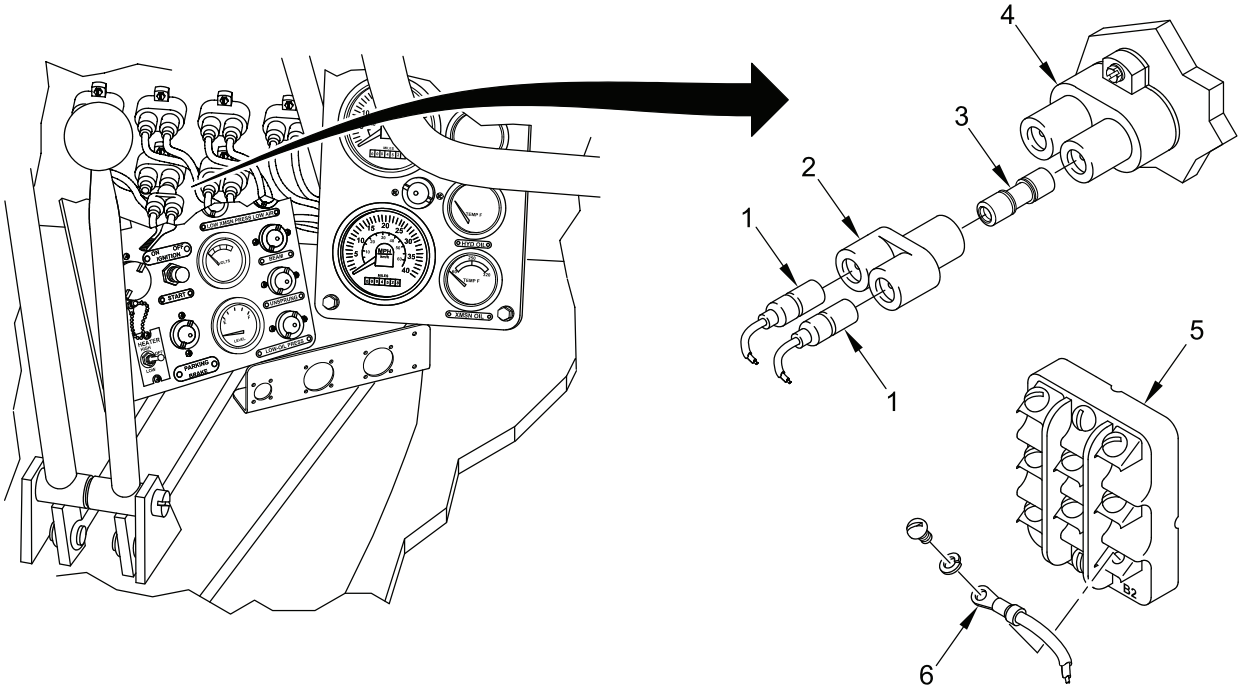


Figure 2. Removing Power Distribution Components

END OF TASK

REPLACE HDC CIRCUIT BREAKER AND POWER DISTRIBUTION COMPONENTS - Continued **0027 00**

INSTALLATION

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

NOTE

Wiring connections to parking brake relay should be made using screws attached to relay. New lockwashers should be used. If attaching screws are damaged or missing, obtain new screws locally.

1. Install in-line connector (Figure 3, item 3), "Y" -connector (Figure 3, item 2), and lead assemblies (Figure 3, item 1), in right terminal or trailer receptacle and trouble light circuit breaker (Figure 3, item 4), located behind driver's compartment switch and gauge panel.
2. Install lead assembly 1070 (Figure 3, item 6) on terminal B2 of parking brake relay (Figure 3, item 5) with new lockwasher.

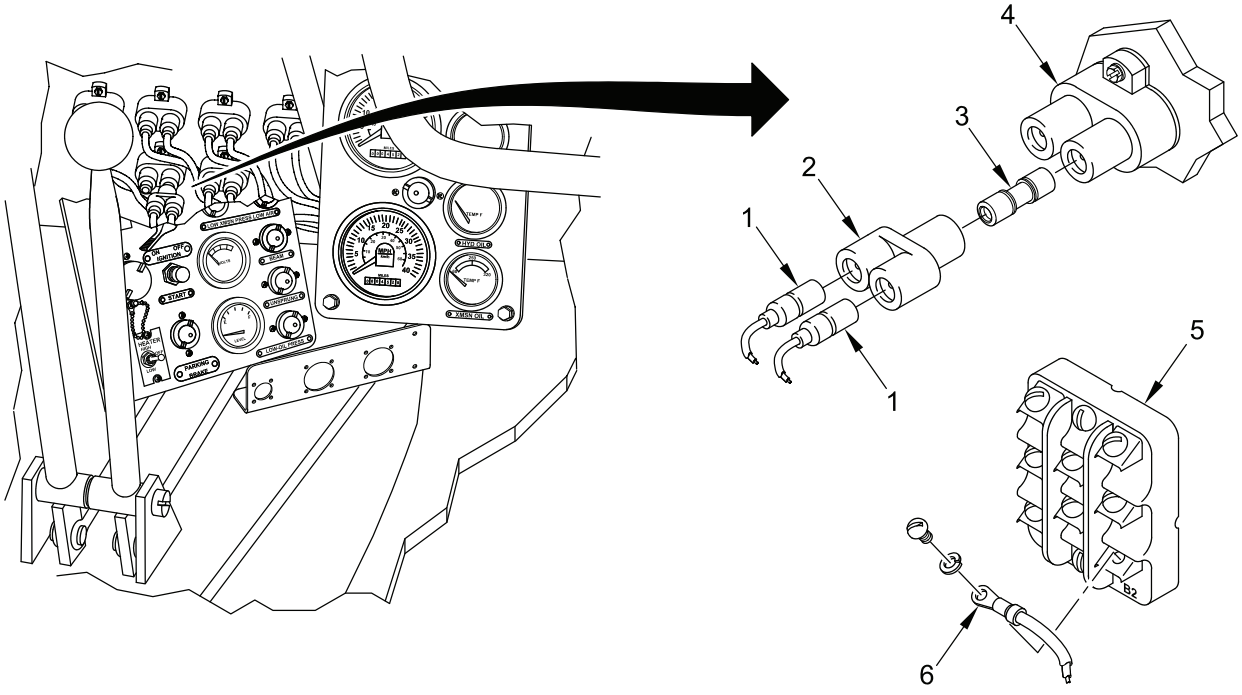


Figure 3. Installing Power Distribution Components

REPLACE HDC CIRCUIT BREAKER AND POWER DISTRIBUTION COMPONENTS - Continued **0027 00**

INSTALLATION - CONTINUED

3. Install HDC circuit breaker (Figure 4, item 7) with two screws (Figure 4, item 8), two new lockwashers (Figure 4, item 6), and to nuts (Figure 4, item 5) to HDC disconnect bracket (Figure 4, item 9).
4. Connect circuit 1070 (Figure 4, item 3) and circuit 10 (Figure 4, item 4) connectors to HDC circuit breaker (Figure 4, item 7).
5. Install disconnect bracket (Figure 4, item 9) on bulkhead with two flat washers (Figure 4, item 1) and two self-locking screws (Figure 4, item 2).

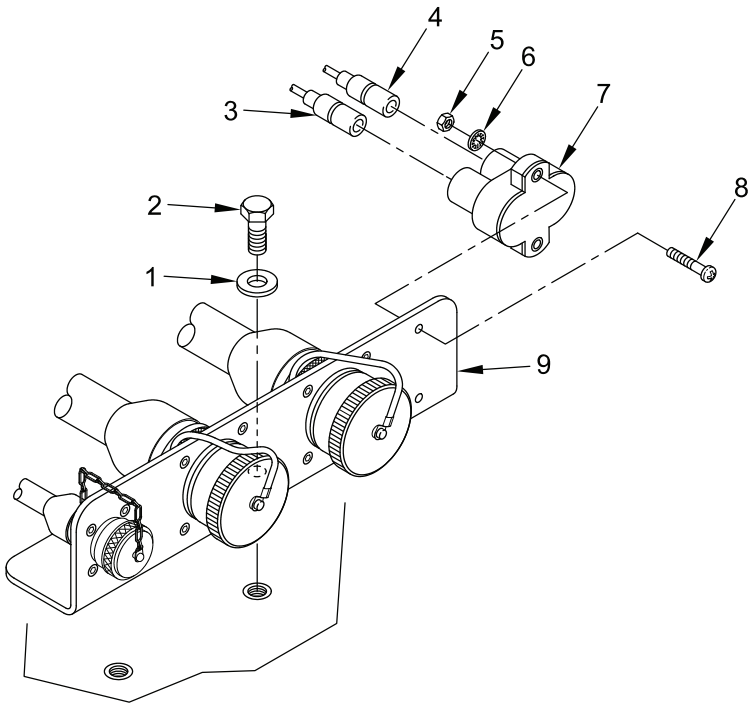


Figure 4. Installing HDC Circuit Breaker

END OF TASK

END OF WORK PACKAGE

REPLACE WIRING HARNESS W1

0028 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required

Two 62B10

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)

Apron locked in full-up position (TM 5-2350-262-10)

Ejector to front of vehicle (TM 5-2350-262-10)

REMOVAL

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

REPLACE WIRING HARNESS W1 - Continued **0028 00**

REMOVAL - CONTINUED

1. Remove screw (Figure 1, item 1), lockwasher (Figure 1, item 2), and wiring harness W1 lead 1070 (Figure 1, item 3) from parking brake relay (Figure 1, item 4) terminal B1.
2. Remove bolt (Figure 1, item 10), from the compartment wall above the NBC filter and remove wiring harness lead 1069 (Figure 1, item 11).
3. Remove dust cap (Figure 1, item 8), four screws (Figure 1, item 6), nutplate (Figure 1, item 5) and wiring harness W1 connector J1 (Figure 1, item 9) from HDC disconnect bracket (Figure 1, item 7).
4. Pull wiring harness W1 leads 1070 (Figure 1, item 3) and 1069 (Figure 1, item 11) through wire clamps and remove wiring harness W1 from vehicle.

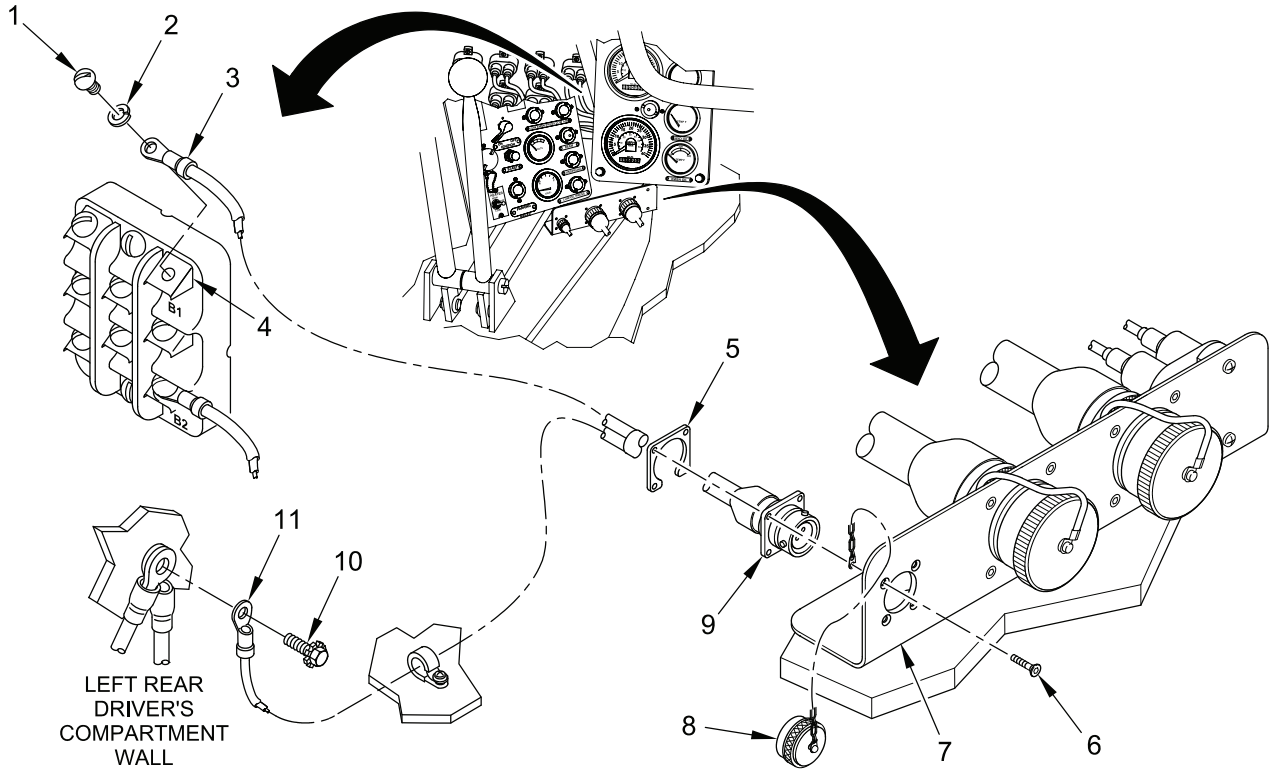


Figure 1. Removing Wiring Harness W1

END OF TASK

INSTALLATION

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

1. Thread wiring harness W1 leads 1070 (Figure 2, item 3) and 1069 (Figure 2, item 11) through wire clamps to parking brake relay and battery box.
2. Connect wiring harness W1 connector J1 (Figure 2, item 9) to HDC disconnect bracket (Figure 2, item 7) with nutplate (Figure 2, item 5), and four screws (Figure 2, item 6). Attach dust cap (Figure 2, item 8) to connector J1.
3. Install wiring harness W1 lead 1069 (Figure 2, item 11) on compartment wall above the NBC filter with bolt (Figure 2, item 10).
4. Install wiring harness W1 lead 1070 (Figure 2, item 3) on parking brake relay (Figure 2, item 4) with new lockwasher (Figure 2, item 2) and screw (Figure 2, item 1).

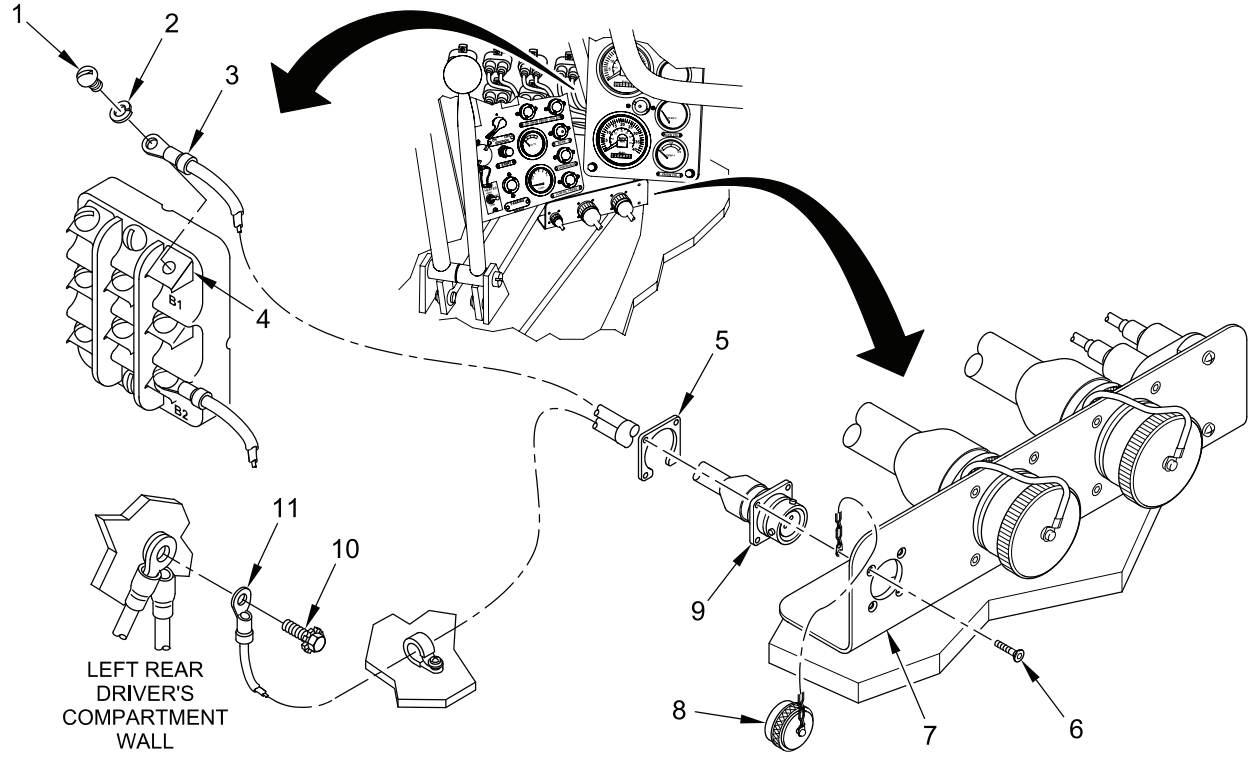


Figure 2. Installing Wiring Harness W1

END OF TASK

FOLLOW-ON MAINTENANCE

1. Return apron to stowed position (TM 5-2350-262-10).
2. Return ejector to stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE WIRING HARNESS W2

0029 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

Tie down straps (A/R) (WP 0070 00, item 10)

Personnel Required

Two 62B10

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)

Apron locked in full-up position (TM 5-2350-262-10)

Ejector to front of vehicle (TM 5-2 350-262-10)

REMOVAL

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

REPLACE WIRING HARNESS W2 - Continued **0029 00**

REMOVAL - CONTINUED

1. At the main hydraulic pump left and right high-pressure filter area, remove wiring harness W2 connector P3 (Figure 1, item 6) from transducer T3 (Figure 1, item 5), wiring harness W2 connector P4 (Figure 1, item 4) from transducer T4 (Figure 1, item 3), and wiring harness W2 connector P30 (Figure 1, item 1) from transducer T12 (Figure 1, item 2).

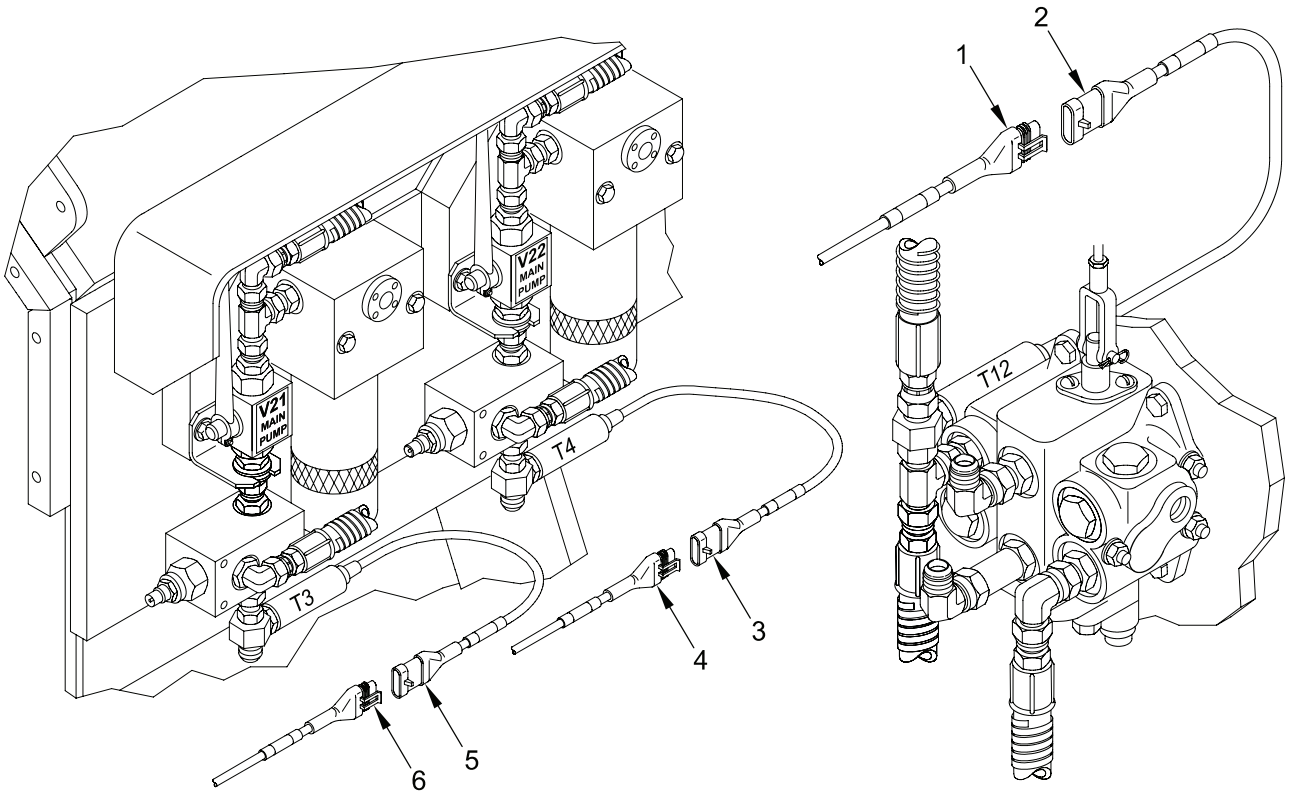


Figure 1. Removing Wiring Harness W2 From Filter Area

REPLACE WIRING HARNESS W2 - Continued **0029 00**

REMOVAL - CONTINUED

2. In the vehicle bowl bottom area, remove wiring harness W2 connector P7 (Figure 2, item 7) from transducer T7 at left main manifold (Figure 2, item 6).
3. In the vehicle bowl at the HDC main manifold remove wiring harness W2 connectors as follows: P1, P5, P11, P12, P13, P14, P15, P16, P17, P19, and P20 (Figure 2, item 4) from valves V1, V5, V11, V12, V13, V14, V15, V16, V17, V19, and V20 (Figure 2, item 3).
4. In the vehicle bowl at the HDC main manifold remove wiring harness W2 connectors as follows: P2, P31, and P32 (Figure 2, item 1) from transducers T2, T1, and T13 (Figure 2, item 2).

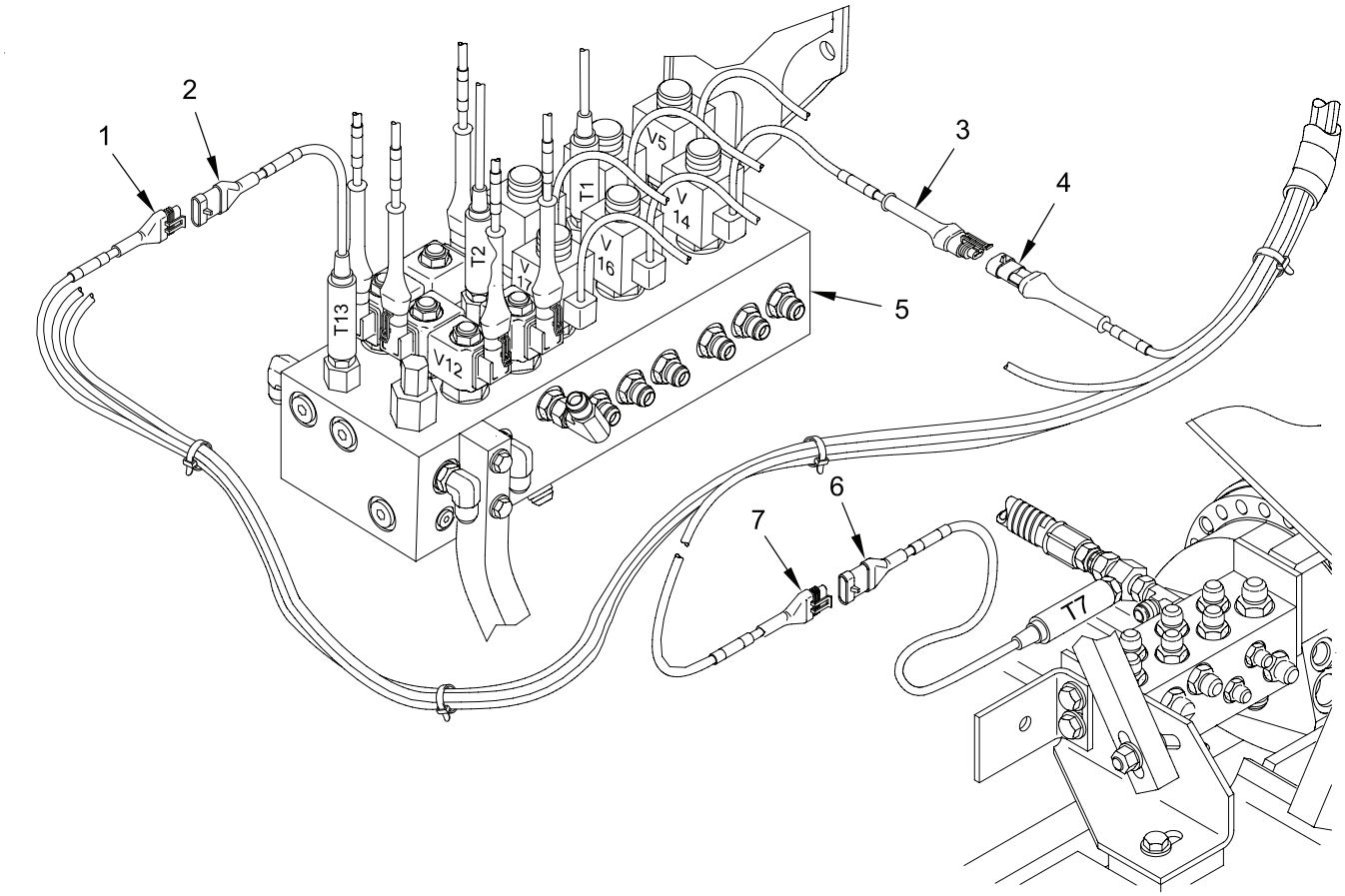


Figure 2. Removing Wiring Harness W2 From Main Manifold

REMOVAL - CONTINUED

5. Remove dust cap (Figure 3, item 4), four screws (Figure 3, item 3), nutplate (Figure 3, item 1), and wiring harness W2 connector J1 (Figure 3, item 2) from HDC disconnect bracket (Figure 3, item 5).

6. Cut and remove tie down straps, pull leads through wire clamps, and remove wiring harness from vehicle. Discard tie down straps.

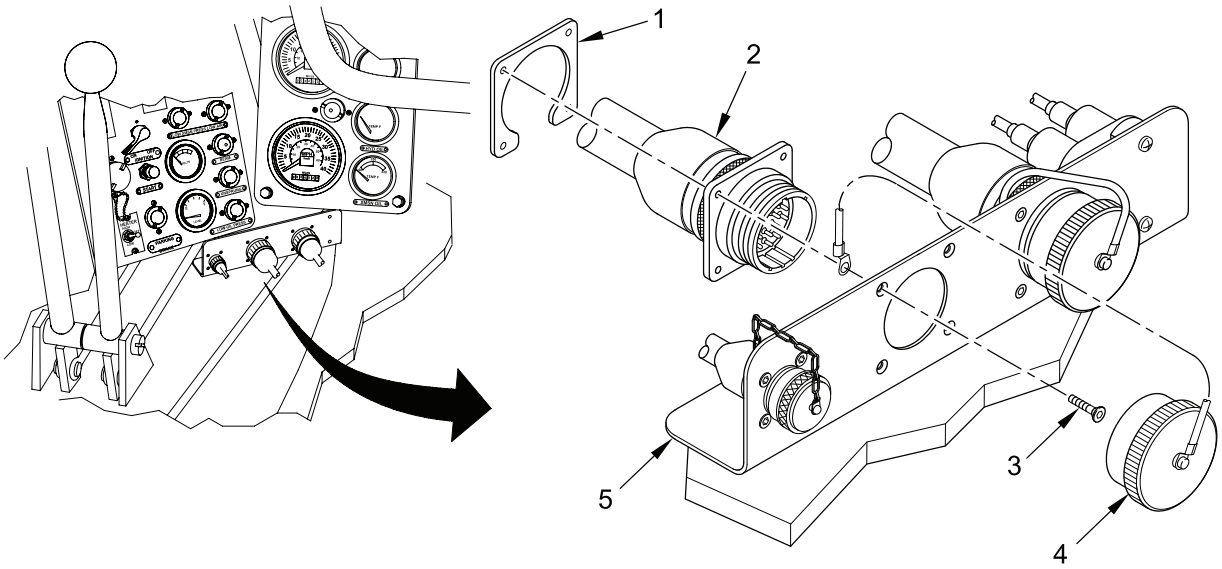


Figure 3. Removing Wiring Harness W2 Connector J1 At Disconnect Bracket

END OF TASK

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

1. Thread wiring harness leads through wire clamps and secure harness with new tie down straps.

2. Install wiring harness W2 connector J1 (Figure 3, item 2) to HDC disconnect bracket (Figure 3, item 5) with nutplate (Figure 3, item 1), and four screws (Figure 3, item 3). Attach dust cap (Figure 3, item 4) to connector J1.

REPLACE WIRING HARNESS W2 - Continued **0029 00**

INSTALLATION - CONTINUED

3. In the vehicle bowl at the HDC main manifold connect wiring harness W2 connectors as follows: P2, P31, and P32 (Figure 4, item 1) to transducers T2, T1, and T13 (Figure 4, item 2).
4. In the vehicle bowl at the HDC main manifold connect wiring harness W2 connectors as follows: P1, P5, P11, P12, P13, P14, P15, P16, P17, P19, and P20 (Figure 4, item 4) to valves V1, V5, V11, V12, V13, V14, V15, V16, V17, V19, and V20 (Figure 4, item 3).
5. In the vehicle bowl bottom area connect wiring harness W2 connector P7 (Figure 4, item 7) to transducer T7 at left main manifold (Figure 4, item 6).

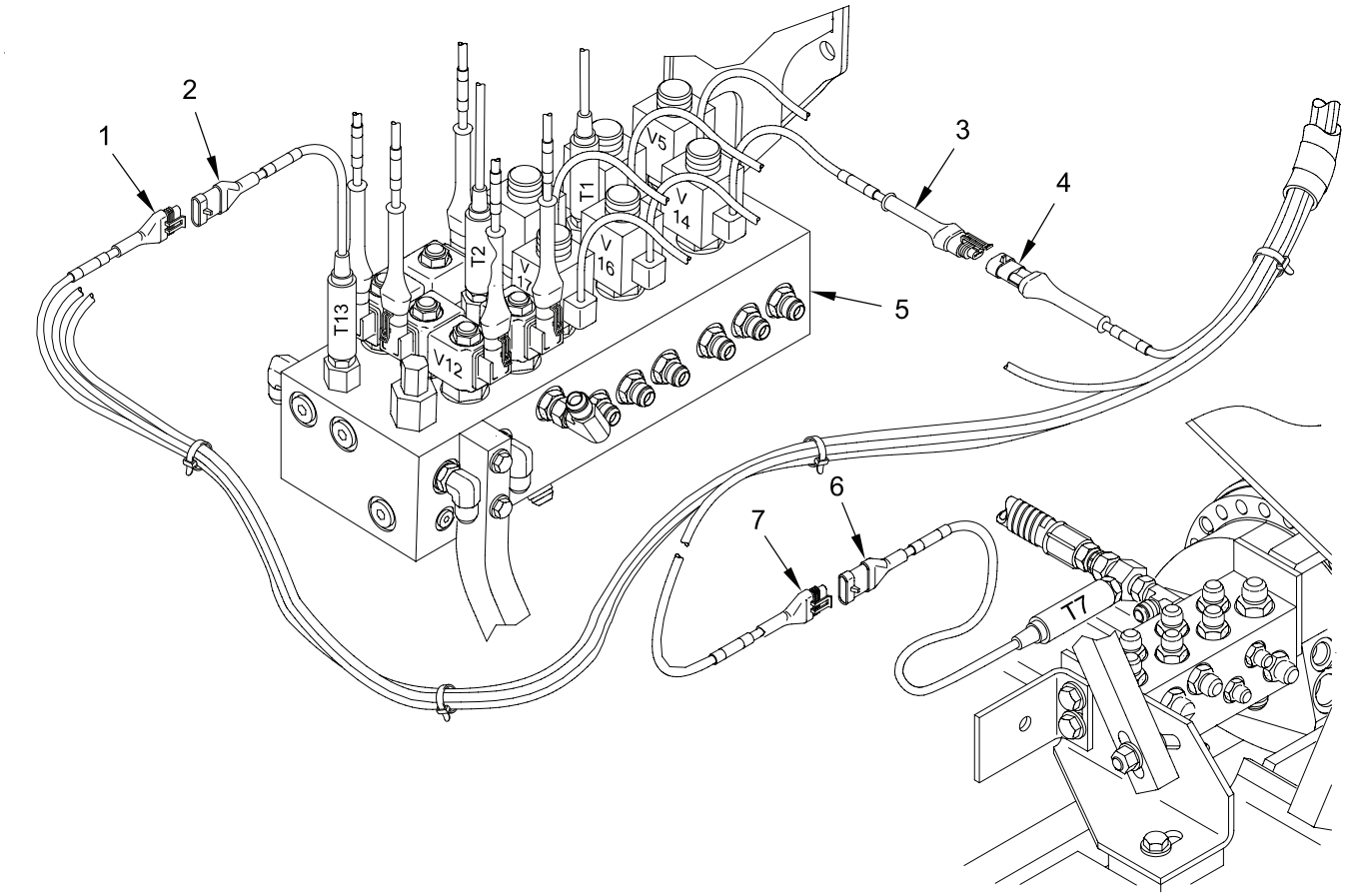


Figure 4. Installing Wiring Harness W2 To Main Manifold

INSTALLATION - CONTINUED

6. At the main hydraulic pump left and right high-pressure filter area connect wiring harness W2 connector P3 (Figure 5, item 6) to transducer T3 (Figure 5, item 5), wiring harness W2 connector P4 (Figure 5, item 4) to transducer T4 (Figure 5, item 3), and wiring harness W2 connector P30 (Figure 5, item 1) to transducer T12 (Figure 5, item 2).

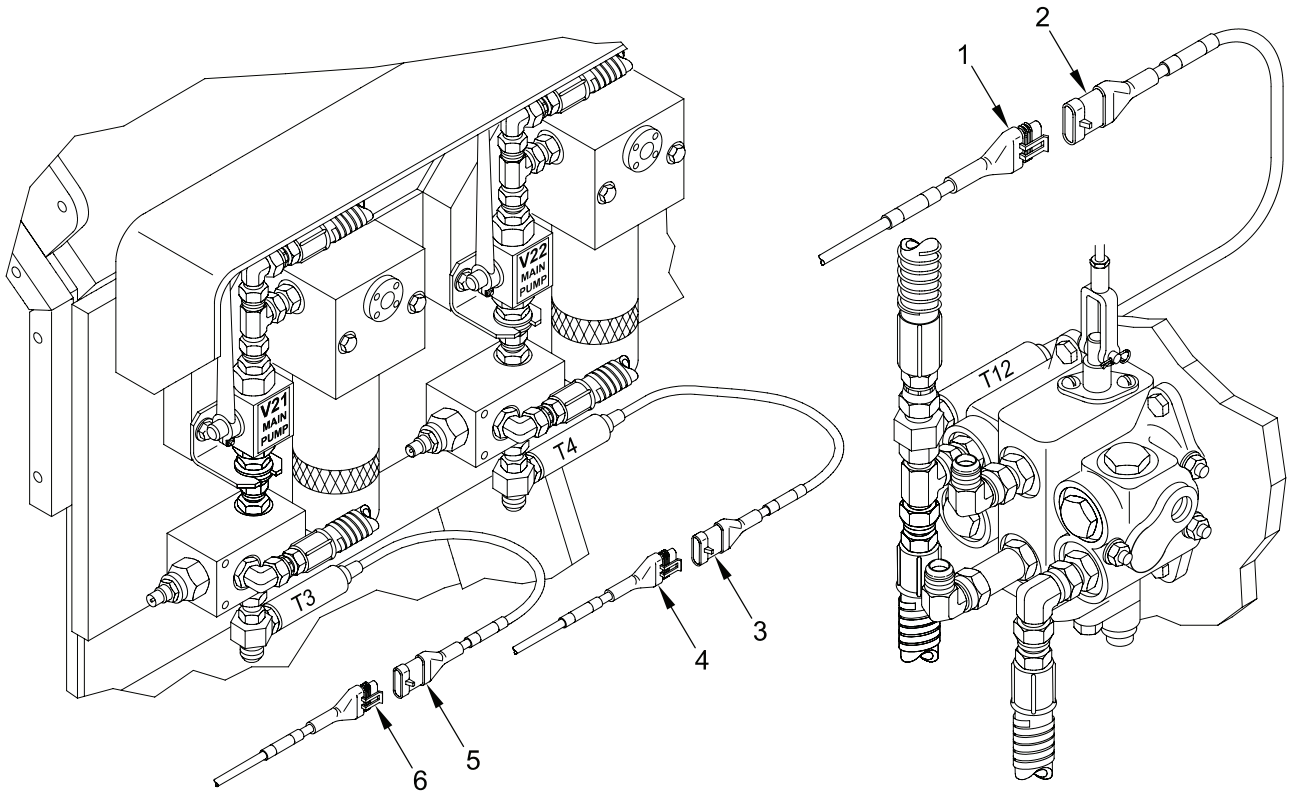


Figure 5. Installing Wiring Harness W2 To Filter Area

END OF TASK

FOLLOW-ON MAINTENANCE

1. Return vehicle ejector to stowed position (TM 5-2350-262-10).
2. Return vehicle apron to stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE WIRING HARNESS W3

0030 00

THIS WORK PACKAGE COVERS:
Removal, Installation

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts
Tie down straps (A/R) (WP 0070 00, item 10)

Personnel Required
Two 62B10

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Apron locked in full-up position (TM 5-2350-262-10)
Ejector to front of vehicle (TM 5-2350-262-10)
Hull raised on jack stands (TM 5-2350-262-20-1)
Hull access plates removed (TM 5-2350-262-20-1)

REMOVAL

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

REPLACE WIRING HARNESS W3 - Continued **0030 00**

REMOVAL - CONTINUED

1. Remove dust cap (Figure 1, item 5), four screws (Figure 1, item 4), nutplate (Figure 1, item 1), and wiring harness W3 connector J1 (Figure 1, item 2) from HDC disconnect bracket (Figure 1, item 3).
2. Remove wiring harness W3 connector P5 (Figure 1, item 7) from transducer T5 (Figure 1, item 6) at forward right actuator #1 (Figure 1, item 8).
3. Remove wiring harness W3 connector P31 (Figure 1, item 10) from transducer T6 (Figure 1, item 11) at forward left actuator #1 (Figure 1, item 9).

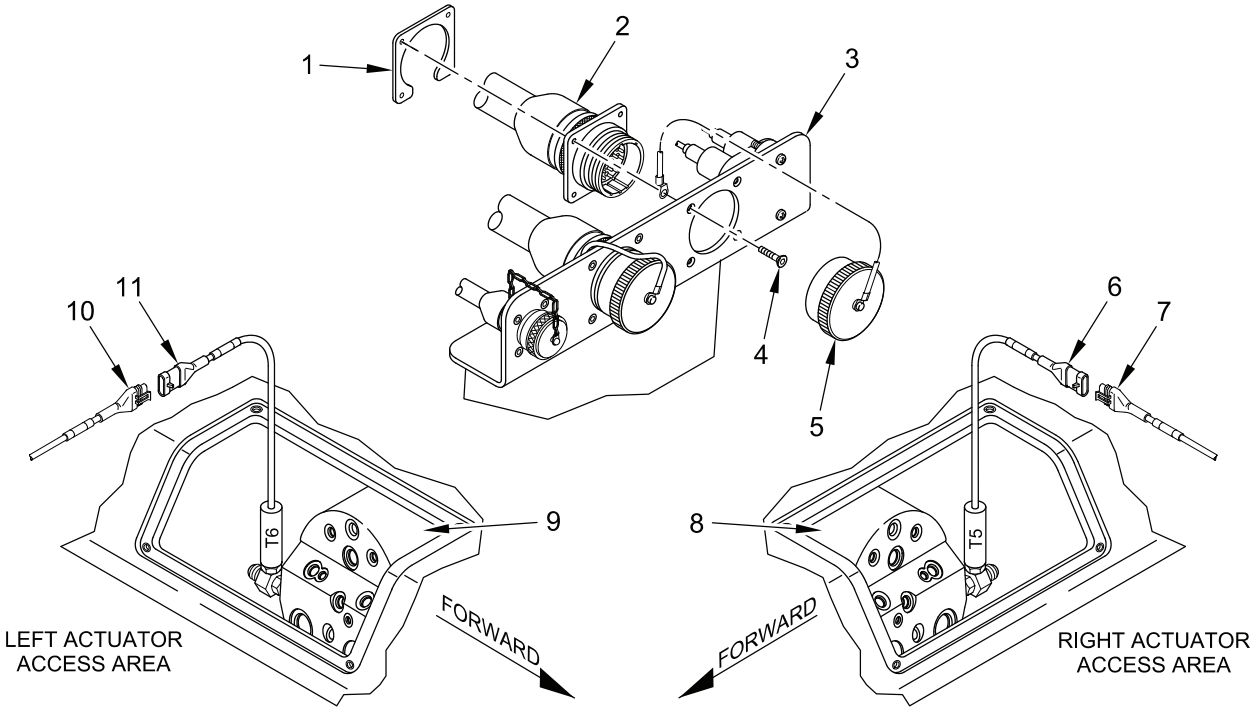


Figure 1. Removing Wiring Harness W3 From Disconnect Bracket And Actuator Area

REMOVAL - CONTINUED

WARNING

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

4. From access under vehicle, remove the following W3 wiring harness connectors from the forward right manifold (Figure 2, item 23): connector P2 (Figure 2, item 20) from valve V2 (Figure 2, item 21), connector P10 (Figure 2, item 19) from valve V10 (Figure 2, item 22), and connector P11 (Figure 2, item 1) from transducer T11 (Figure 2, item 2).
5. From access under vehicle, remove the following W3 wiring harness connectors from the forward left manifold (Figure 2, item 9): connector P3 (Figure 2, item 7) from valve V3 (Figure 2, item 8), connector P9 (Figure 2, item 6) from valve V9 (Figure 2, item 5), and connector P30 (Figure 2, item 4) from transducer T10 (Figure 2, item 3).
6. From access under vehicle, remove the following W3 wiring harness connectors from the aft manifold (Figure 2, item 12): connector P4 (Figure 2, item 25) from valve V4 (Figure 2, item 11), connector P6 (Figure 2, item 14) from valve V6 (Figure 2, item 13), connector P7 (Figure 2, item 16) from valve P7 (Figure 2, item 15), connector P8 (Figure 2, item 18) from valve V8 (Figure 2, item 17), and connector P18 (Figure 2, item 24) from valve V18 (Figure 2, item 10).

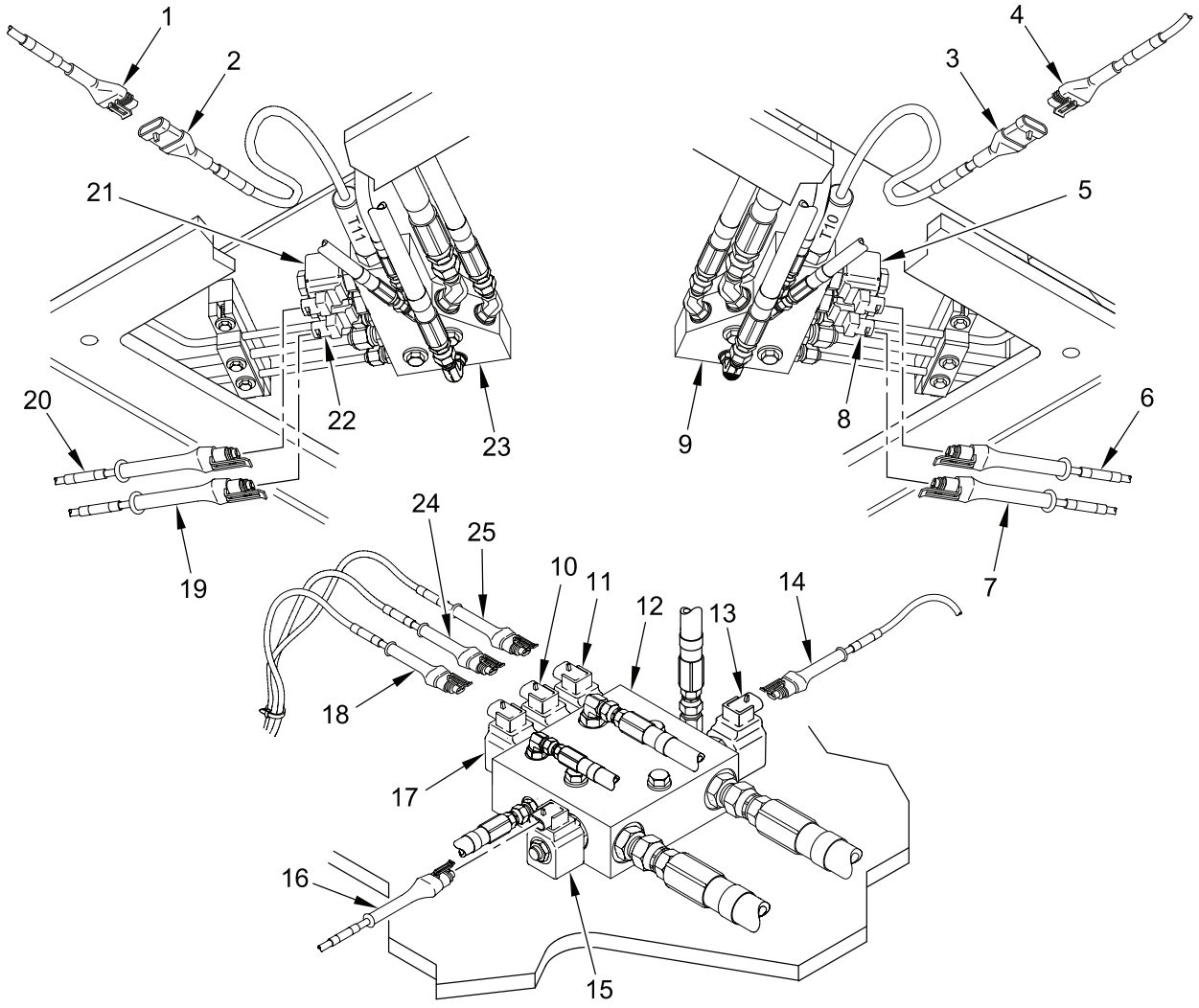


Figure 2. Accessing Wiring Harness W3 From Under Vehicle

REPLACE WIRING HARNESS W3 - Continued **0030 00**

REMOVAL - CONTINUED

7. Remove wiring harness W3 connector P32 (Figure 3, item 3) from transducer T9 (Figure 3, item 2) at left sprung stop cylinder (Figure 3, item 1).

8. Remove wiring harness W3 connector P33 (Figure 3, item 6) from transducer T8 (Figure 3, item 5) at right sprung stop cylinder (Figure 3, item 4).

9. Remove tie down straps, open cable clamps, and remove wiring harness W3 from vehicle. Discard tie down straps.

END OF TASK

INSTALLATION

WARNING

Ensure that vehicle power is off and battery disconnected. Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery positive terminal, a direct short will result, causing instant heating of tools, tool damage, battery damage, or battery explosion. Failure to comply may result in severe injury or death.

1. Position wiring harness W3 in vehicle, secure in cable clamps, and secure with new tie down straps.

2. Connect wiring harness W3 connector P33 (Figure 3, item 6) to transducer T8 (Figure 3, item 5) at right sprung stop cylinder (Figure 3, item 4).

3. Connect wiring harness W3 connector P32 (Figure 3, item 3) to transducer T9 (Figure 3, item 2) at left sprung stop cylinder (Figure 3, item 1).

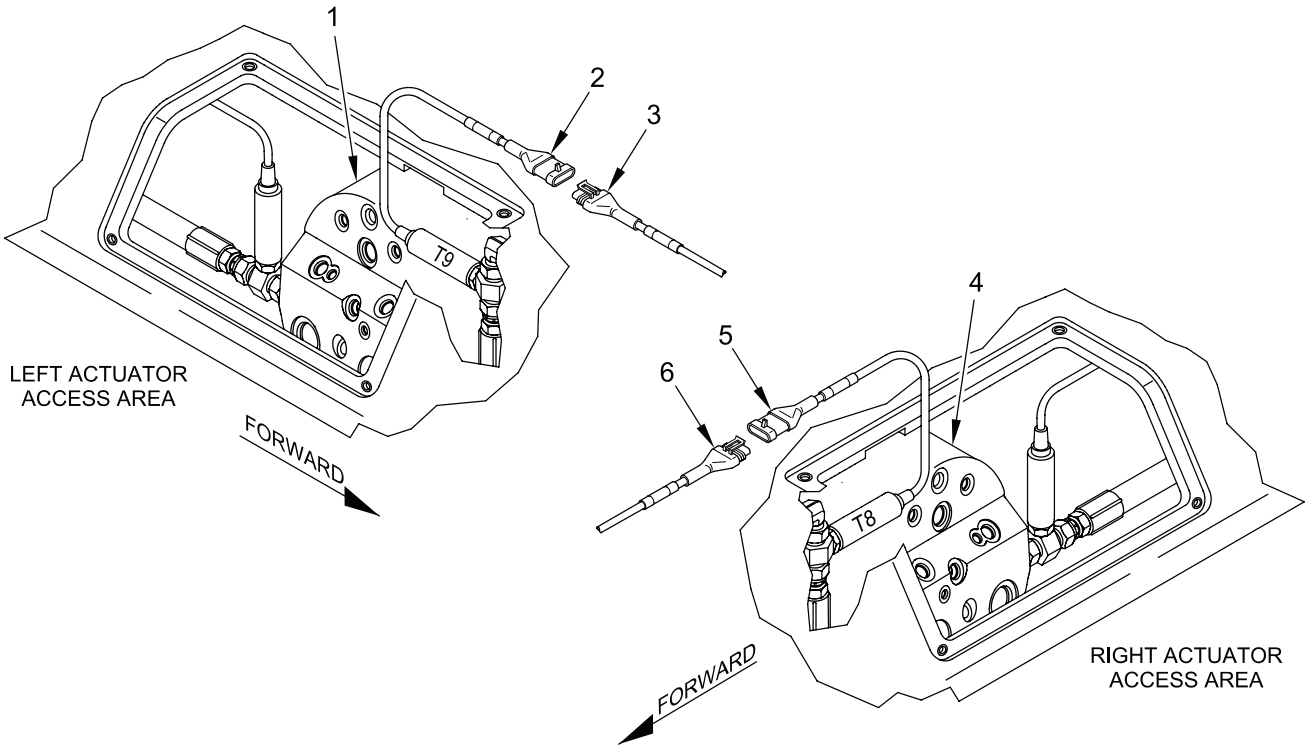


Figure 3. Installing Wiring Harness W3 At Actuator Area

INSTALLATION - CONTINUED

WARNING

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

4. From access under vehicle, connect the following W3 wiring harness connectors to the aft manifold (Figure 4, item 12): connector P4 (Figure 4, item 25) to valve V4 (Figure 4, item 11), connector P6 (Figure 4, item 14) to valve V6 (Figure 4, item 13), connector P7 (Figure 4, item 16) to valve P7 (Figure 4, item 15), connector P8 (Figure 4, item 18) to valve V8 (Figure 4, item 17), and connector P18 (Figure 4, item 24) to valve V18 (Figure 4, item 10).
5. From access under vehicle, connect the following W3 wiring harness connectors to the forward left manifold (Figure 4, item 9): connector P3 (Figure 4, item 7) to valve V3 (Figure 4, item 8), connector P9 (Figure 4, item 6) to valve V9 (Figure 4, item 5), and connector P30 (Figure 4, item 4) to transducer T10 (Figure 4, item 3).
6. From access under vehicle connect the following W3 wiring harness connectors to the forward right manifold (Figure 5, item 23): connector P2 (Figure 5, item 20) to valve V2 (Figure 5, item 21), connector P10 (Figure 5, item 19) to valve V10 (Figure 5, item 22), and connector P11 (Figure 5, item 1) to transducer T11 (Figure 5, item 2).

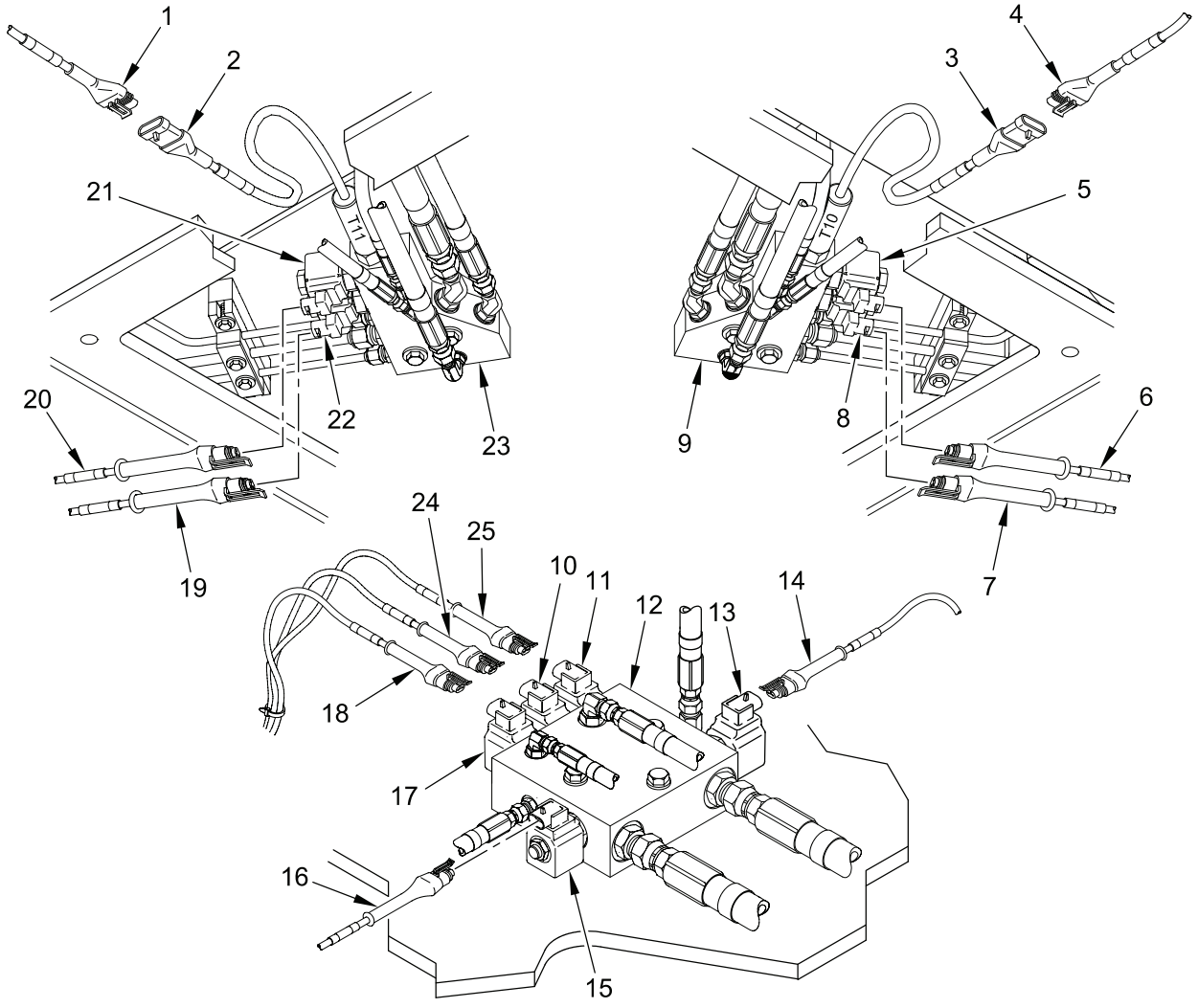


Figure 4. Installing Wiring Harness W3 Connections Under Vehicle

REPLACE WIRING HARNESS W3 - Continued **0030 00**

INSTALLATION - CONTINUED

7. Connect wiring harness W3 connector P31 (Figure 5, item 10) to transducer T6 (Figure 5, item 11) at forward left actuator #1 (Figure 5, item 9).
8. Connect wiring harness W3 connector P5 (Figure 5, item 7) to transducer T5 (Figure 5, item 6) at forward right actuator #1 (Figure 5, item 8).
9. Install wiring harness W3 connector J1 (Figure 5, item 2) to HDC disconnect bracket (Figure 5, item 3) with nutplate (Figure 5, item 1), and four screws (Figure 5, item 4). Attach dust cap (Figure 5, item 5) to connector J1.

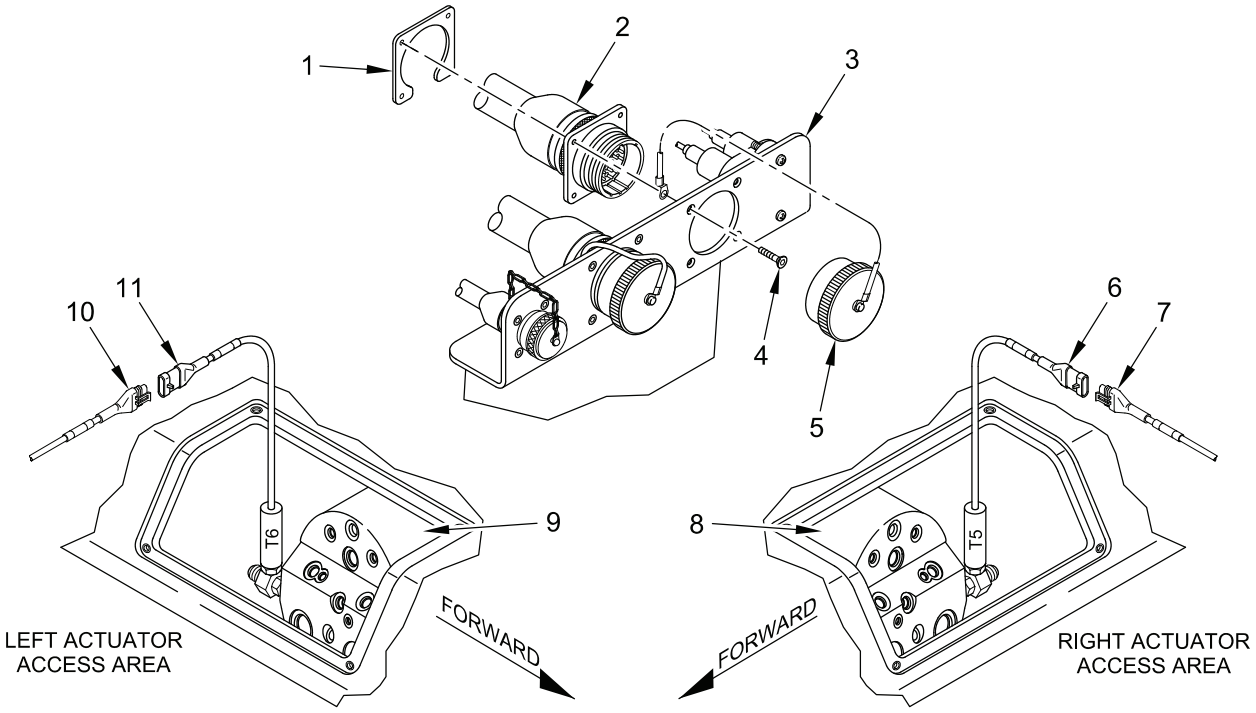


Figure 5. Installing Wiring Harness W3 To Disconnect Bracket And Actuator Area

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install hull access plates (TM 5-2350-262-20-1).
2. Remove vehicle from jack stands and lower hull (TM 5-2350-262-20-1).
3. Return ejector to stowed position (TM 5-2350-262-10).
4. Return apron to stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPAIR HDC FORWARD LEFT MANIFOLD ASSEMBLY 0031 00

THIS WORK PACKAGE COVERS:

Removal, Disassembly, Assembly, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

Dust protective caps (2) (WP 0070 00, item 1)
Dust protective caps (2) (WP 0070 00, item 2)
Dust protective caps (4) (WP 0070 00, item 3)
Dust protective plugs (2) (WP 0070 00, item 5)
Dust protective plugs (2) (WP 0070 00, item 6)
Dust protective plugs (4) (WP 0070 00, item 7)
O-ring (3) (WP 0072 00, item 7)
O-rings (4) (WP 0072 00, item 8)
O-rings (2) (WP 0072 00, item 9)
O-rings (2) (WP 0072 00, item 5)
O-rings (2) (WP 0072 00, item 6)
Teflon backups (4) (WP 0072 00, item 1)

Materials/Parts - Continued

Self-locking screws (2) (WP 0072 00, item 17)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Hydraulic pressure relieved (WP 0004 00)
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle hull raised and on jack stands (TM 5-2350-262-20-1)
Hull access plates removed (TM 5-2350-262-20-1)

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.**

NOTE

- All removal steps are accomplished through access under vehicle.
- Tag all hydraulic lines and wiring harness leads being disconnected to assist in installation.

REMOVAL

1. Remove wiring harness W3 connectors P3 and P9 (Figure 1, item 6) from two two-way (NO) valves V3 and V9 (Figure 1, item 5) on left forward manifold (Figure 1, item 9).
2. Remove wiring harness W3 connector P30 (Figure 1, item 3) from transducer T10 (Figure 1, item 4) on left forward manifold (Figure 1, item 9).

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

3. Remove five hydraulic hoses (Figure 1, item 2) and three hydraulic tubes (Figure 1, item 1) from left forward manifold (Figure 1, item 9).
4. Remove two self-locking screws (Figure 1, item 7), two flat washers (Figure 1, item 8), and left forward manifold (Figure 1, item 9) from vehicle. Discard self-locking screws.

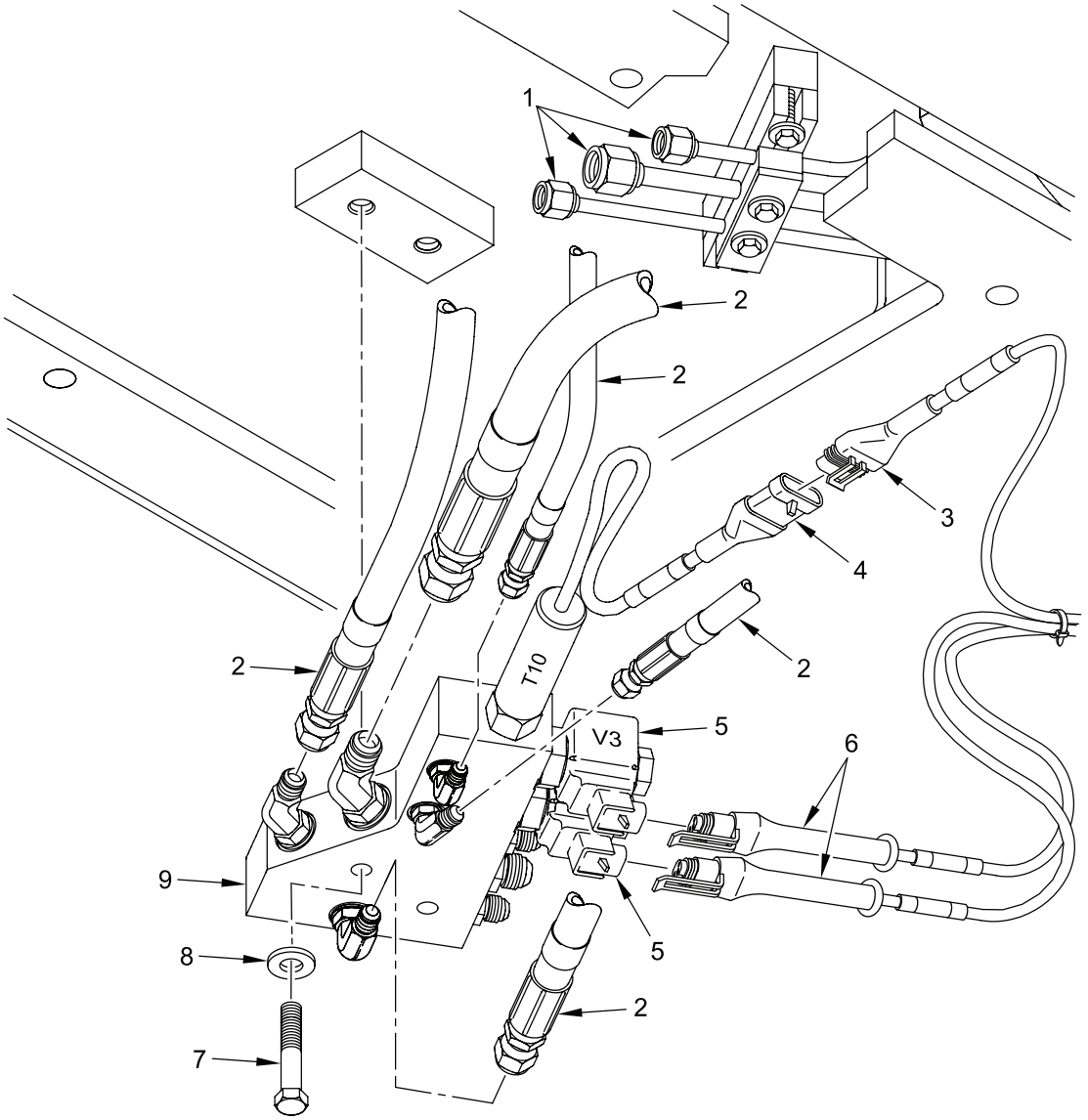


Figure 1. Removing HDC Forward Left Manifold Assembly

END OF TASK

DISASSEMBLY

CAUTION

- **Disassembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing forward left manifold in vice, exercise extreme care not to mar any surfaces or damage components**

1. Remove two adapters (Figure 2, item 3), two o-rings (Figure 2, item 4), two adapters (Figure 2, item 13), two o-rings (Figure 2, item 14), adapter (Figure 2, item 11), o-ring (Figure 2, item 12), adapter (Figure 2, item 17), o-ring (Figure 2, item 16), two adapters (Figure 2, item 1), and two o-rings (Figure 2, item 2) from left forward manifold (Figure 2, item 15). Discard o-rings.
2. Remove two two-way (NO) valves V3 and V9 (Figure 2, item 10), two teflon backups (Figure 2, item 7), two o-rings (Figure 2, item 8), two teflon backups (Figure 2, item 7), two o-rings (Figure 2, item 9), transducer T10 (Figure 2, item 6), and o-ring (Figure 2, item 5) from left forward manifold (Figure 2, item 15). Discard o-rings and telfon backups.

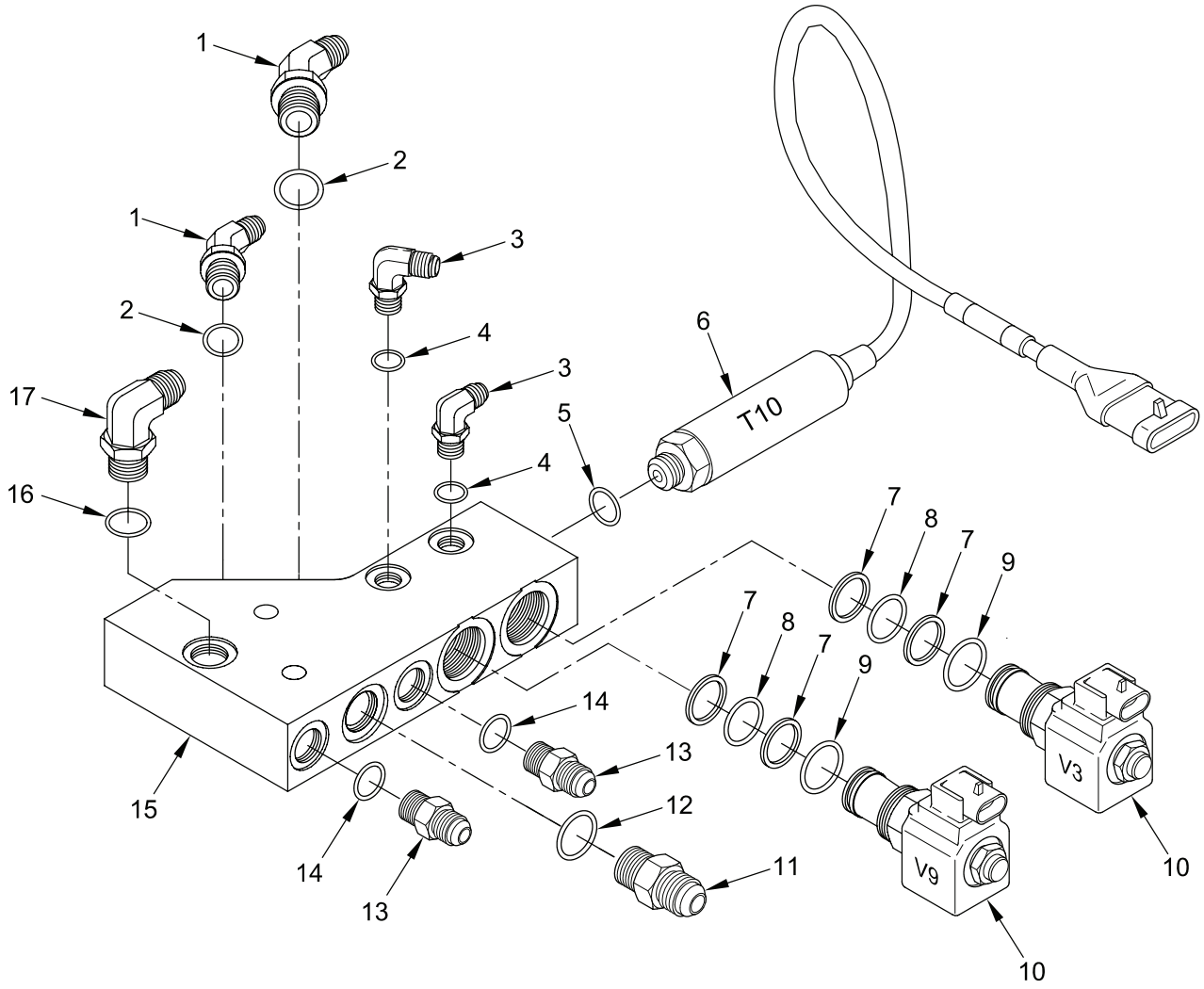


Figure 2. Disassembly of HDC Forward Left Manifold

END OF TASK

ASSEMBLY

CAUTION

- **Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing forward left manifold in vice, exercise extreme care not to mar any surfaces or damage components**
- **Do not over torque.**

1. Install new o-ring (Figure 3, item 5), transducer T10 (Figure 3, item 6), two new o-ring (Figure 3, item 9), two new telfon backups (Figure 3, item 7), two new o-rings (Figure 3, item 8), two new teflon backups (Figure 3, item 7), and two two-way (NO) valves V3 and V9 (Figure 3, item 10) into left forward manifold (Figure 3, item 15).
2. Install two o-rings (Figure 3, item 2), two adapters (Figure 3, item 1), o-ring (Figure 3, item 16), adapter (Figure 3, item 17), o-ring (Figure 3, item 12), adapter (Figure 3, item 11), two new o-rings (Figure 3, item 14), two adapters (Figure 3, item 13), two new o-rings (Figure 3, item 4), and two adapters (Figure 3, item 3) into left forward manifold (Figure 3, item 15).

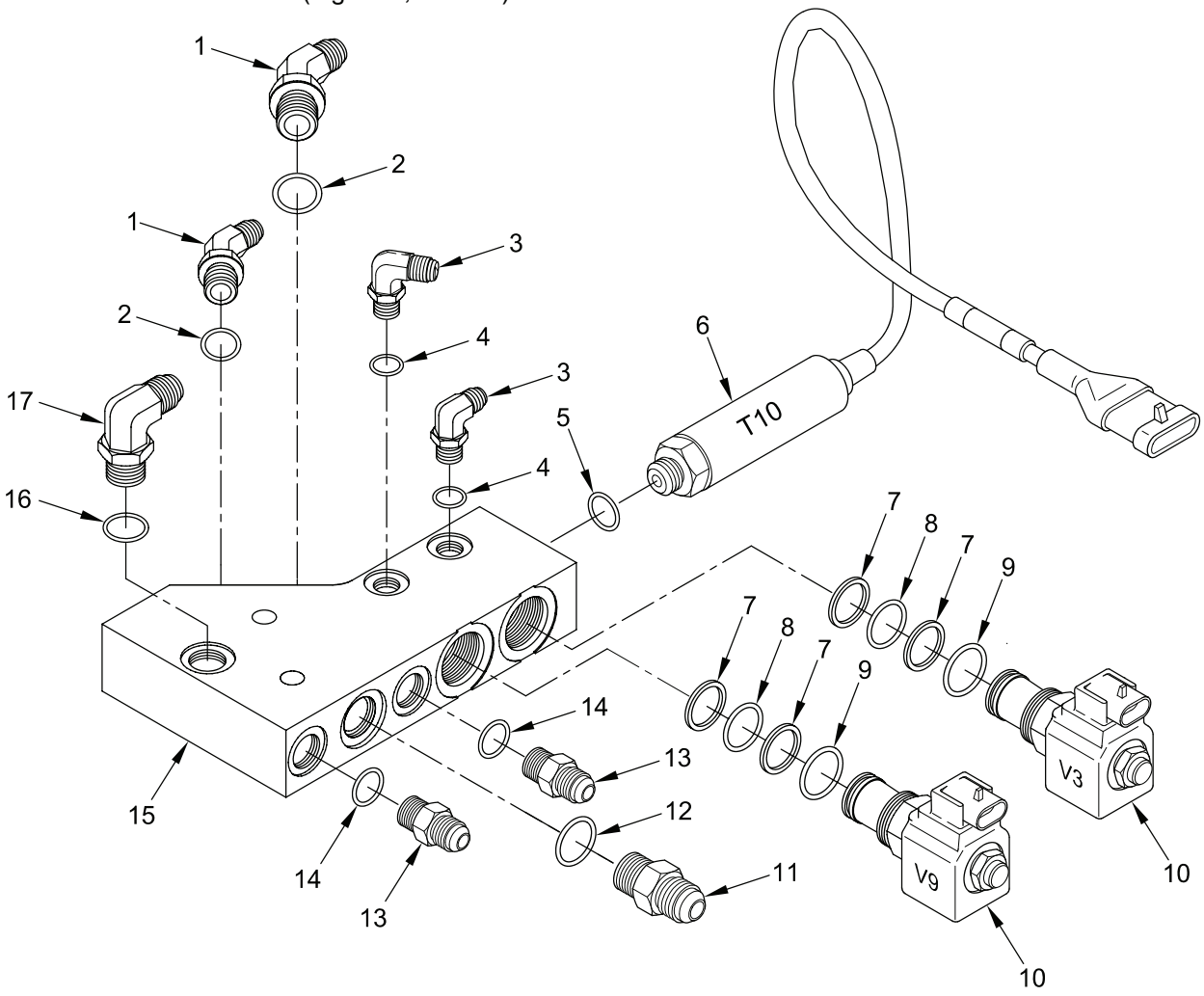


Figure 3. Assembly of HDC Forward Left Manifold

END OF TASK

INSTALLATION

NOTE

- Installation steps are accomplished through access under vehicle.
- After installation is complete, remove tags from all hydraulic lines and wiring harness leads.

WARNING

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

1. Install left forward manifold (Figure 4, item 9) using two flat washers (Figure 4, item 8) and two new self-locking screws (Figure 4, item 7).
2. Connect wiring harness W3 connector P30 (Figure 4, item 3) to transducer T10 (Figure 4, item 4) on left forward manifold (Figure 4, item 9).
3. Connect wiring harness W3 connectors P3 and P9 (Figure 4, item 6) to two two-way (NO) valves V3 and V9 (Figure 4, item 5) on left forward manifold (Figure 4, item 9).
4. Remove all caps and plugs from hydraulic fittings.
5. Connect five hydraulic hoses (Figure 4, item 2) and three hydraulic tubes (Figure 4, item 1) to left forward manifold (Figure 4, item 9).

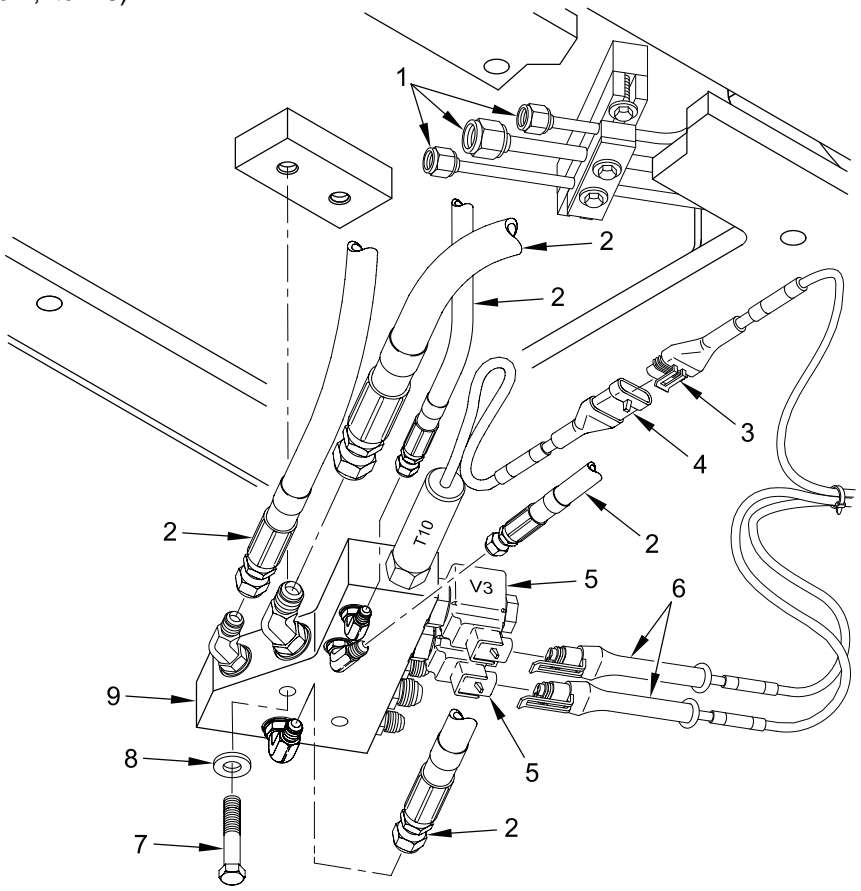


Figure 4. Installing HDC Forward Left Manifold Assembly

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install hull access plates (TM 5-2350-262-20-1).
2. Remove vehicle from jack stands and lower hull (TM 5-2350-262-20-1).
3. Bring hydraulic system to operating pressure (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPAIR HDC FORWARD RIGHT MANIFOLD ASSEMBLY 0032 00

THIS WORK PACKAGE COVERS:

Removal, Disassembly, Assembly, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)
Adapter, Socket Wrench (WP 0071 00, item 1)
Wrench Set, Crowfoot (WP 0071 00, item 11)

Materials/Parts

Dust protective caps (2) (WP 0070 00, item 1)
Dust protective caps (2) (WP 0070 00, item 2)
Dust protective caps (4) (WP 0070 00, item 3)
Dust protective plugs (2) (WP 0070 00, item 5)
Dust protective plugs (2) (WP 0070 00, item 6)
Dust protective plugs (4) (WP 0070 00, item 7)
O-ring (3) (WP 0072 00, item 7)
O-rings (4) (WP 0072 00, item 8)
O-rings (2) (WP 0072 00, item 9)
O-rings (2) (WP 0072 00, item 5)
O-rings (2) (WP 0072 00, item 6)
Self-locking screws (2) (WP 0072 00, item 17)
Teflon backups (4) (WP 0072 00, item 1)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Hydraulic pressure relieved (WP 0004 00)
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle hull raised and on jack stands (TM 5-2350-262-20-1)
Hull access plates removed (TM 5-2350-262-20-1)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.**

NOTE

- All removal steps are accomplished through access under vehicle.
- Tag all hydraulic lines and wiring harness leads being disconnected to assist in installation.

REMOVAL - CONTINUED

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

1. Remove five hydraulic hoses (Figure 1, item 1) and three hydraulic tubes (Figure 1, item 2) from forward right manifold (Figure 1, item 3).
2. Remove wiring harness W3 connectors P2 and P10 (Figure 1, item 7) from two two-way (NO) valves V2 and V10 (Figure 1, item 6), and wiring harness W3 connector P11 (Figure 1, item 9) from transducer T11 (Figure 1, item 8).
3. Remove two self-locking screws (Figure 1, item 5), two flat washers (Figure 1, item 4), and forward right manifold (Figure 1, item 3) from vehicle. Discard screws.

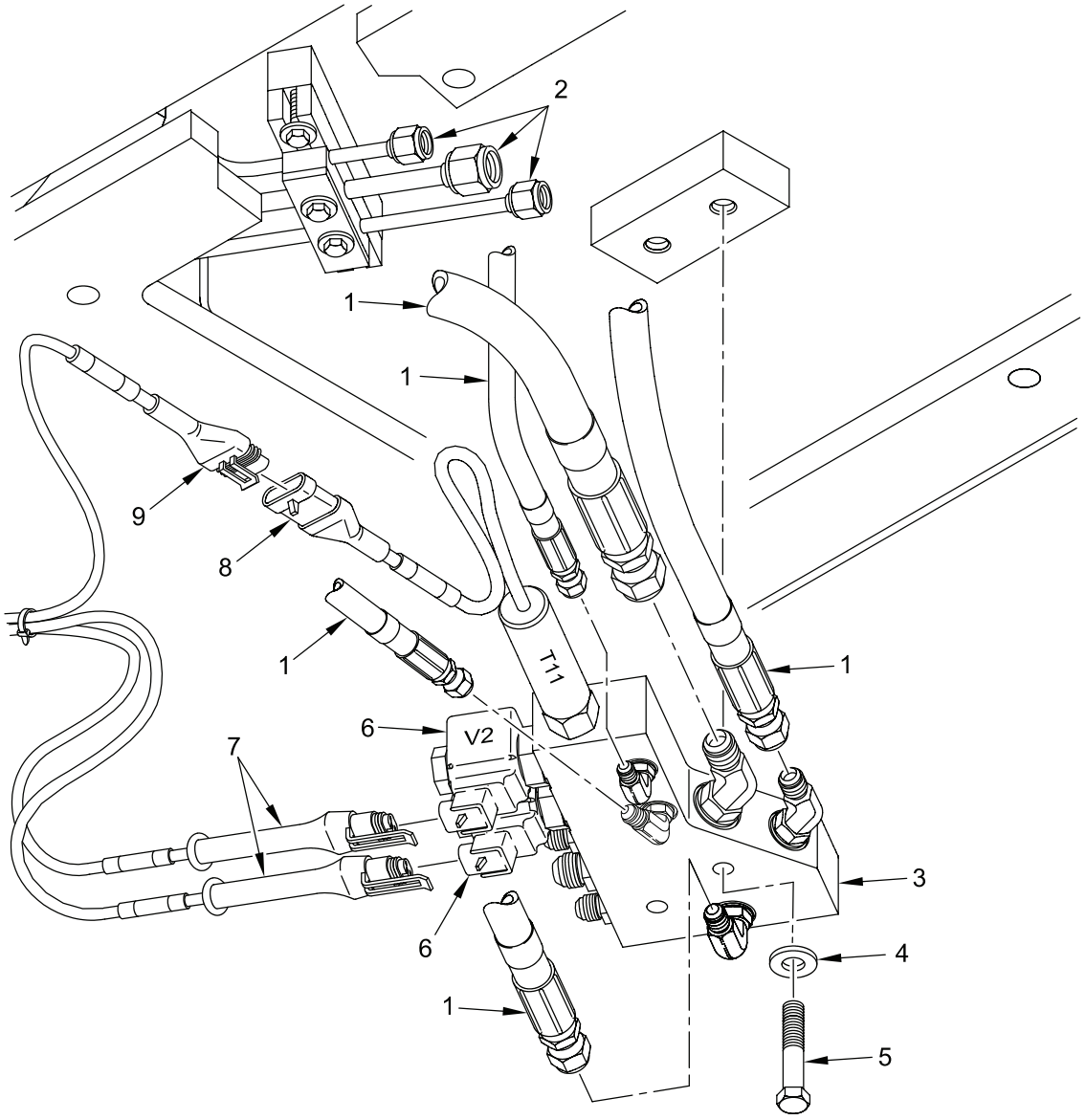


Figure 1. Removing HDC Forward Right Manifold

END OF TASK

DISASSEMBLY

CAUTION

- **Disassembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing forward right manifold in vice, exercise extreme care not to mar any surfaces or damage components**

1. Remove two adapters (Figure 2, item 4), two o-rings (Figure 2, item 3), two adapters (Figure 2, item 11), two o-rings (Figure 2, item 10), adapter (Figure 2, item 13), o-ring (Figure 2, item 12), adapter (Figure 2, item 7), o-ring (Figure 2, item 8), two adapters (Figure 2, item 6), and two o-rings (Figure 2, item 5), from right manifold (Figure 2, item 9). Discard o-rings.
2. Remove two two-way (NO) valves V2 and V10 (Figure 2, item 14), two teflon backups (Figure 2, item 16), two o-rings (Figure 2, item 17), two teflon backups (Figure 2, item 16), two o-rings (Figure 2, item 15), transducer T11 (Figure 2, item 1), and o-ring (Figure 2, item 2) from right manifold (Figure 2, item 9). Discard o-rings and teflon backups.

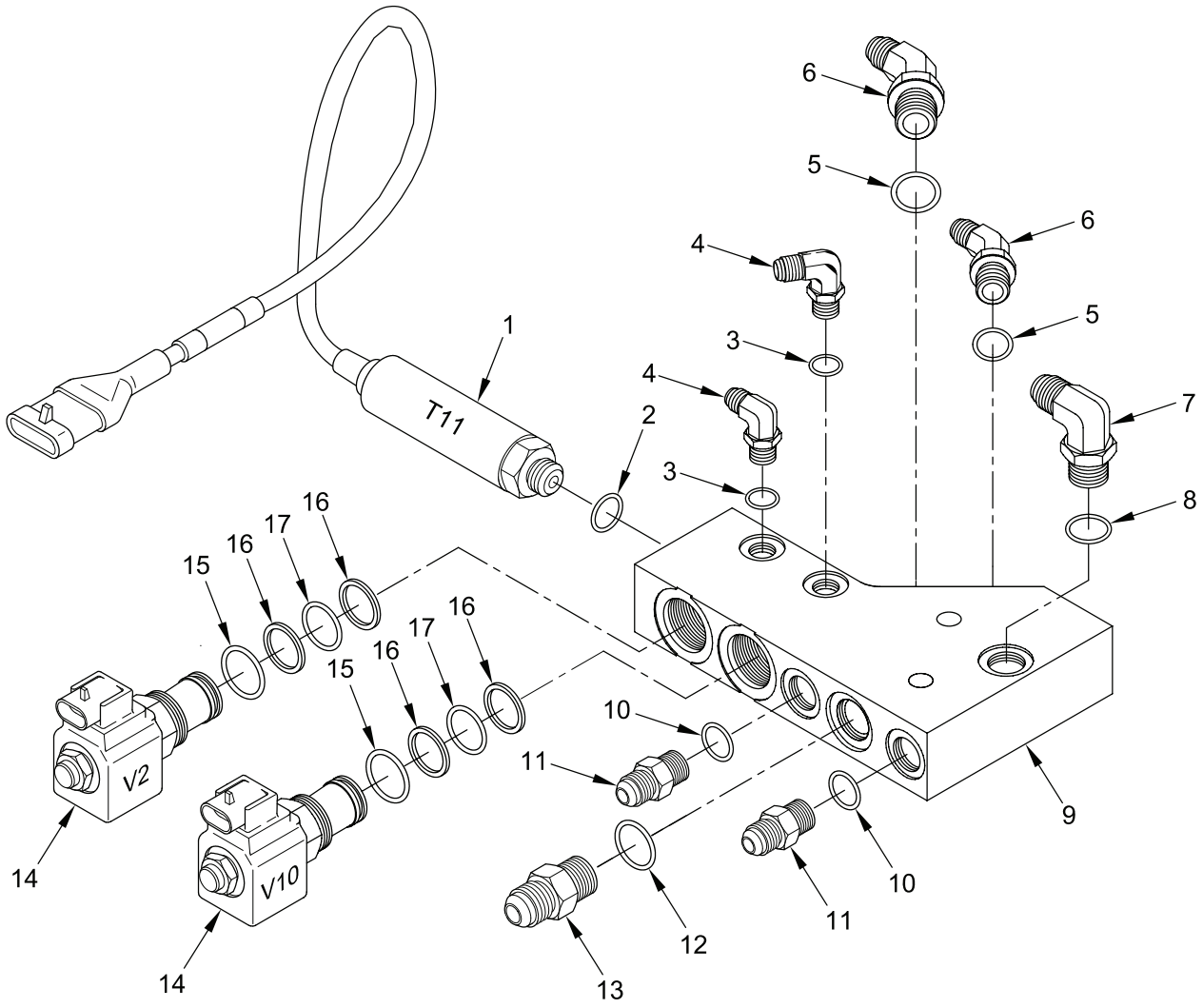


Figure 2. Disassembly of HDC Forward Right Manifold

END OF TASK

ASSEMBLY

CAUTION

- **Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing forward right manifold in vice, exercise extreme care not to mar any surfaces or damage components**
- **Do not over torque.**

1. Install new o-ring (Figure 3, item 2), transducer T11 (Figure 3, item 1), two o-rings (Figure 3, item 15), two new telfon backups (Figure 3, item 16), two new o-rings (Figure 3, item 17), two new telfon backups (Figure 3, item 16), and two two-way (NO) valves V2 and V10 (Figure 3, item 14) into right forward manifold (Figure 3, item 9).
2. Install two o-rings (Figure 3, item 5), two adapters (Figure 3, item 6), o-ring (Figure 3, item 8), adapter (Figure 3, item 7), o-ring (Figure 3, item 12), adapter (Figure 3, item 13), two new o-rings (Figure 3, item 10), two adapters (Figure 3, item 11), two new o-rings (Figure 3, item 3), and two adapters (Figure 3, item 4) into right forward manifold (Figure 3, item 9).

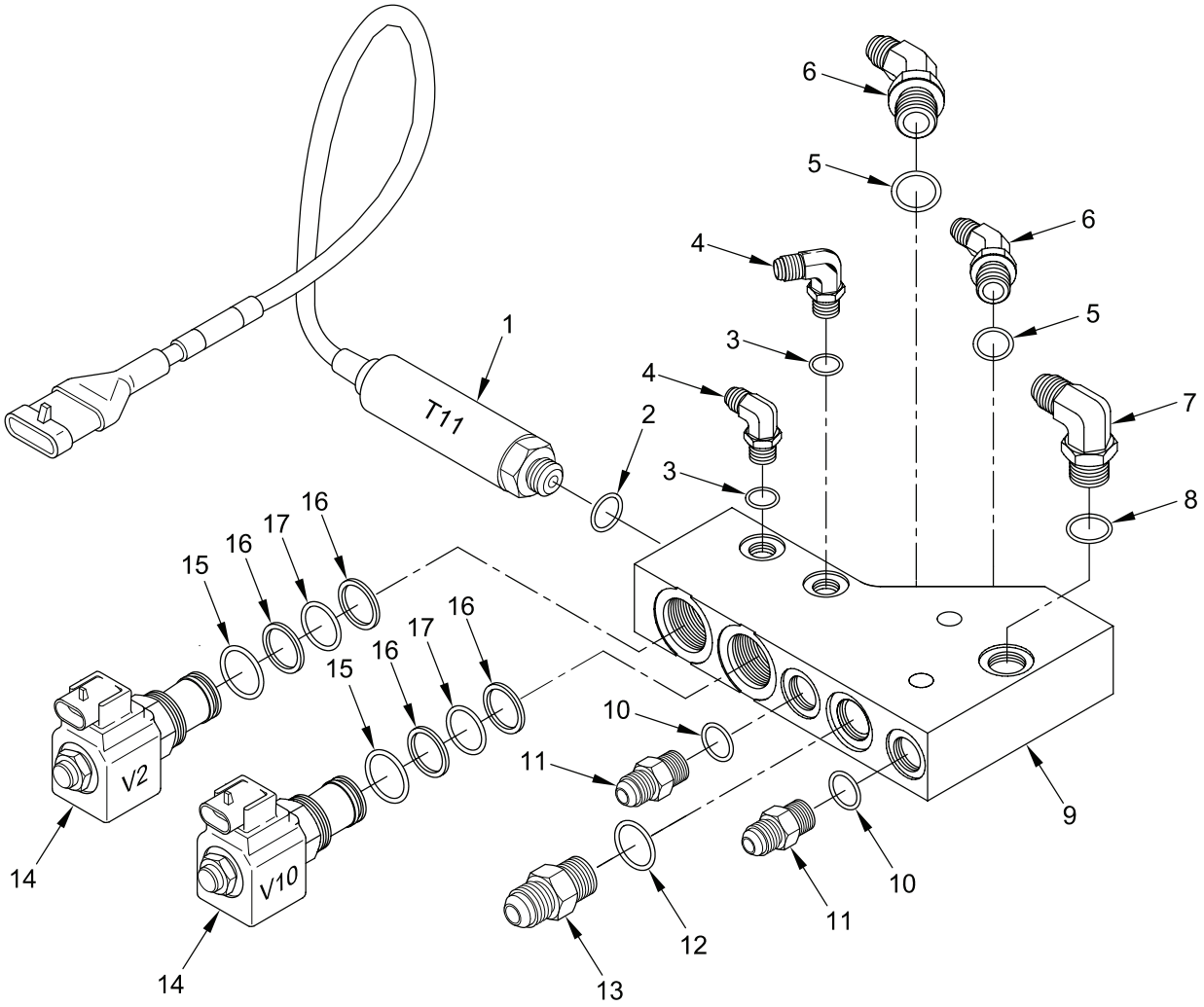


Figure 3. Assembly of HDC Forward Right Manifold

END OF TASK

INSTALLATION

WARNING

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

NOTE

- Installation steps are accomplished through access under vehicle.
- After installation is complete, remove tags from all hydraulic lines and wiring harness leads.

1. Install right forward manifold (Figure 4, item 3) using two flat washers (Figure 4, item 4) and two new self-locking screws (Figure 4, item 5).
2. Connect wiring harness W3 connector P11 (Figure 4, item 9) to transducer T11 (Figure 4, item 8), on right forward manifold (Figure 4, item 3).
3. Connect wiring harness W3 connectors P2 and P10 (Figure 4, item 7) to two two-way (NO) valves V2 and V10 (Figure 4, item 6), on right forward manifold (Figure 4, item 3).
4. Remove all caps and plugs from hydraulic fittings.
5. Connect five hydraulic hoses (Figure 4, item 1) and three hydraulic tubes (Figure 4, item 2) to right forward manifold (Figure 4, item 3).

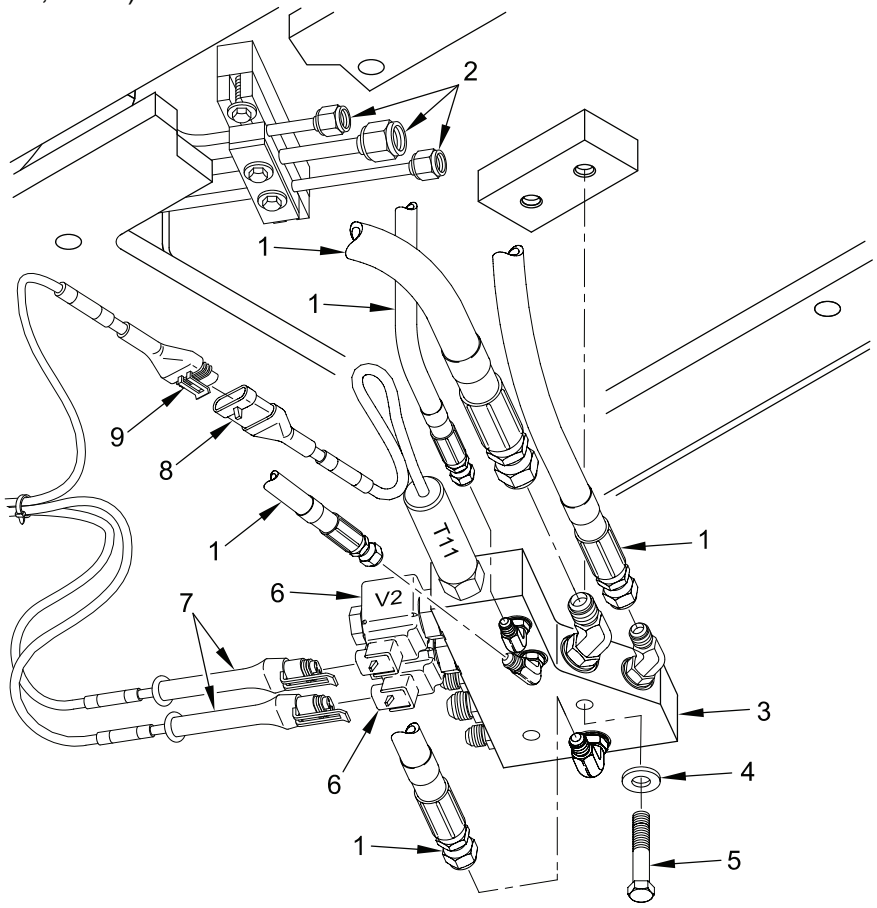


Figure 4. Installing HDC Forward Right Manifold

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install hull access plates (TM 5-2350-262-20-1).
2. Remove vehicle from jack stands and lower hull (TM 5-2350-262-20-1).
3. Bring hydraulic system to operating pressure (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPAIR HDC AFT MANIFOLD ASSEMBLY 0033 00

THIS WORK PACKAGE COVERS:

Removal, Disassembly, Assembly, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)
Adapter, Socket Wrench (WP 0071 00, item 1)
Wrench Set, Crowfoot (WP 0071 00, item 11)

Materials/Parts

Dust protective caps (2) (WP 0070 00, item 1)
Dust protective caps (2) (WP 0070 00, item 2)
Dust protective caps (4) (WP 0070 00, item 3)
Dust protective plugs (2) (WP 0070 00, item 5)
Dust protective plugs (4) (WP 0070 00, item 6)
Dust protective plugs (2) (WP 0070 00, item 7)
O-rings (2) (WP 0072 00, item 8)
O-rings (2) (WP 0072 00, item 11)
O-ring (WP 0072 00, item 9)
O-rings (2) (WP 0072 00, item 7)
O-rings (5) (WP 0072 00, item 5)
O-rings (5) (WP 0072 00, item 6)
Teflon backups (10) (WP 0072 00, item 1)

Materials/Parts - Continued

Self-locking screws (3) (WP 0072 00, item 18)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Hydraulic pressure relieved (WP 0004 00)
Vehicle MASTER power OFF (TM 5-2350-262-10)
Vehicle hull raised and on jack stands (TM 5-2350-262-20-1)
Hull access plates removed (TM 5-2350-262-20-1)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.**

REMOVAL - CONTINUED

NOTE

- All removal steps are accomplished through access under vehicle.
- Tag all hydraulic lines and wiring harness leads being disconnected to assist in installation.

1. Remove wiring harness W3 connectors P4, P6, P7, P8, and P18 (Figure 1, item 1) from five two-way valves V4, V6, V7, V8 and V18 (Figure 1, item 2) on aft manifold (Figure 1, item 6).

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

2. Remove six hydraulic hoses (Figure 1, item 3) from aft manifold (Figure 1, item 6).
3. Remove three self-locking screws (Figure 1, item 4), three flat washers (Figure 1, item 5), and aft manifold (Figure 1, item 6) from vehicle.

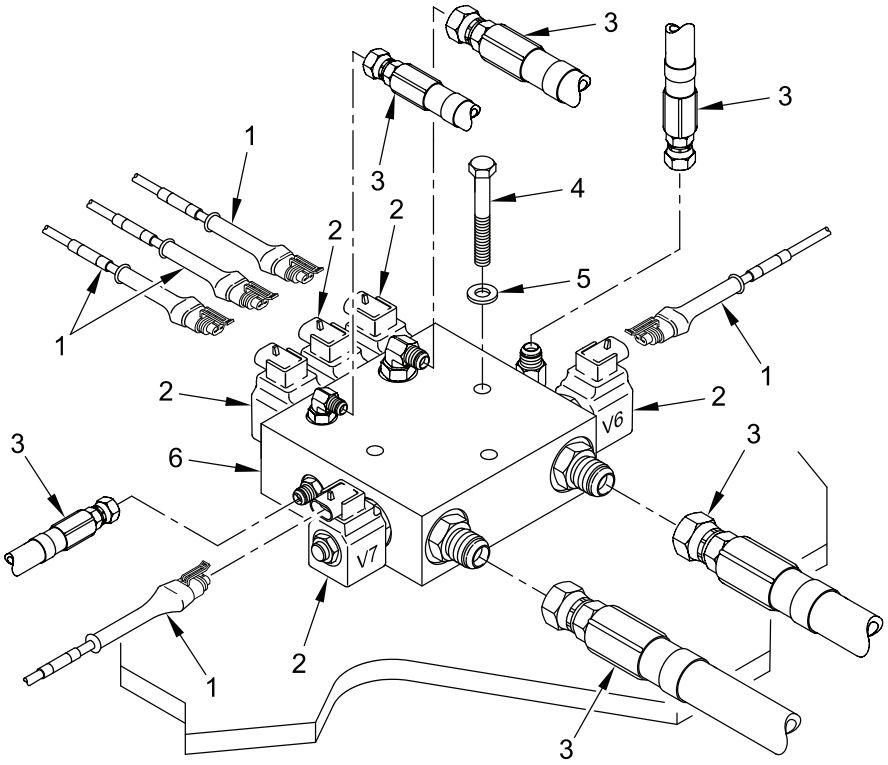


Figure 1. Removing HDC Manifold Assembly

END OF TASK

DISASSEMBLY

CAUTION

- **Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing aft manifold in vice, exercise extreme care not to mar any surfaces or damage components**

1. Remove adapter (Figure 2, item 11), two adapters (Figure 2, item 10), two o-rings (Figure 2, item 9), two adapters (Figure 2, item 13), two o-rings (Figure 2, item 12), plug (Figure 2, item 8), o-ring (Figure 2, item 7), two adapters (Figure 2, item 5), and two o-rings (Figure 2, item 6) from aft manifold (Figure 2, item 14). Discard o-rings.
2. Remove four two-way (NO) valves V4, V6, V7, and V8 (Figure 2, item 1), one two-way (NC) valve, (Figure 2, item 15), five teflon backups (Figure 2, item 3), five o-rings (Figure 2, item 4), five teflon backups (Figure 2, item 3), and five o-rings (Figure 2, item 2) from aft manifold (Figure 2, item 14). Discard o-rings and teflon backups.

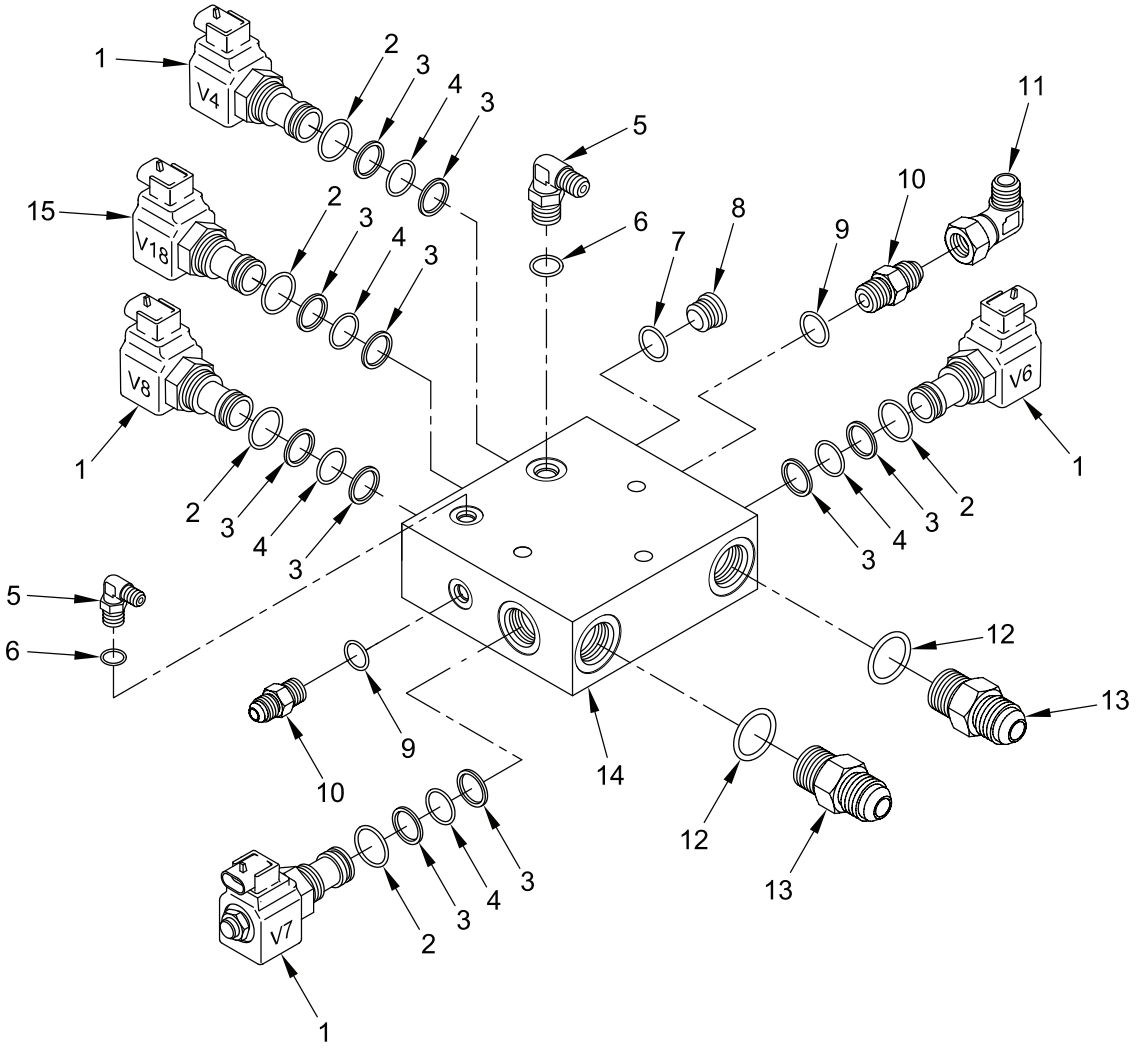


Figure 2. Disassembly of HDC Manifold Assembly

END OF TASK

ASSEMBLY

CAUTION

- **Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing aft manifold in vice, exercise extreme care not to mar any surfaces or damage components**
- **Do not over torque.**

1. Install five new o-rings (Figure 3, item 2), five new teflon backups (Figure 3, item 3), five new o-rings (Figure 3, item 4), five new teflon backups (Figure 3, item 3), one two-way (NC) valve V18, (Figure 3, item 15), and four two-way (NO) valves V4, V6, V7, and V8 (Figure 3, item 1) into aft manifold (Figure 3, item 14).
2. Install two new o-rings (Figure 3, item 6), two adapters (Figure 3, item 5), new o-ring (Figure 3, item 7), plug (Figure 3, item 8), two new o-rings (Figure 3, item 12), two adapters (Figure 3, item 13), two new o-rings (Figure 3, item 9), two adapters (Figure 3, item 10), and adapter (Figure 3, item 11) into aft manifold (Figure 3, item 14).

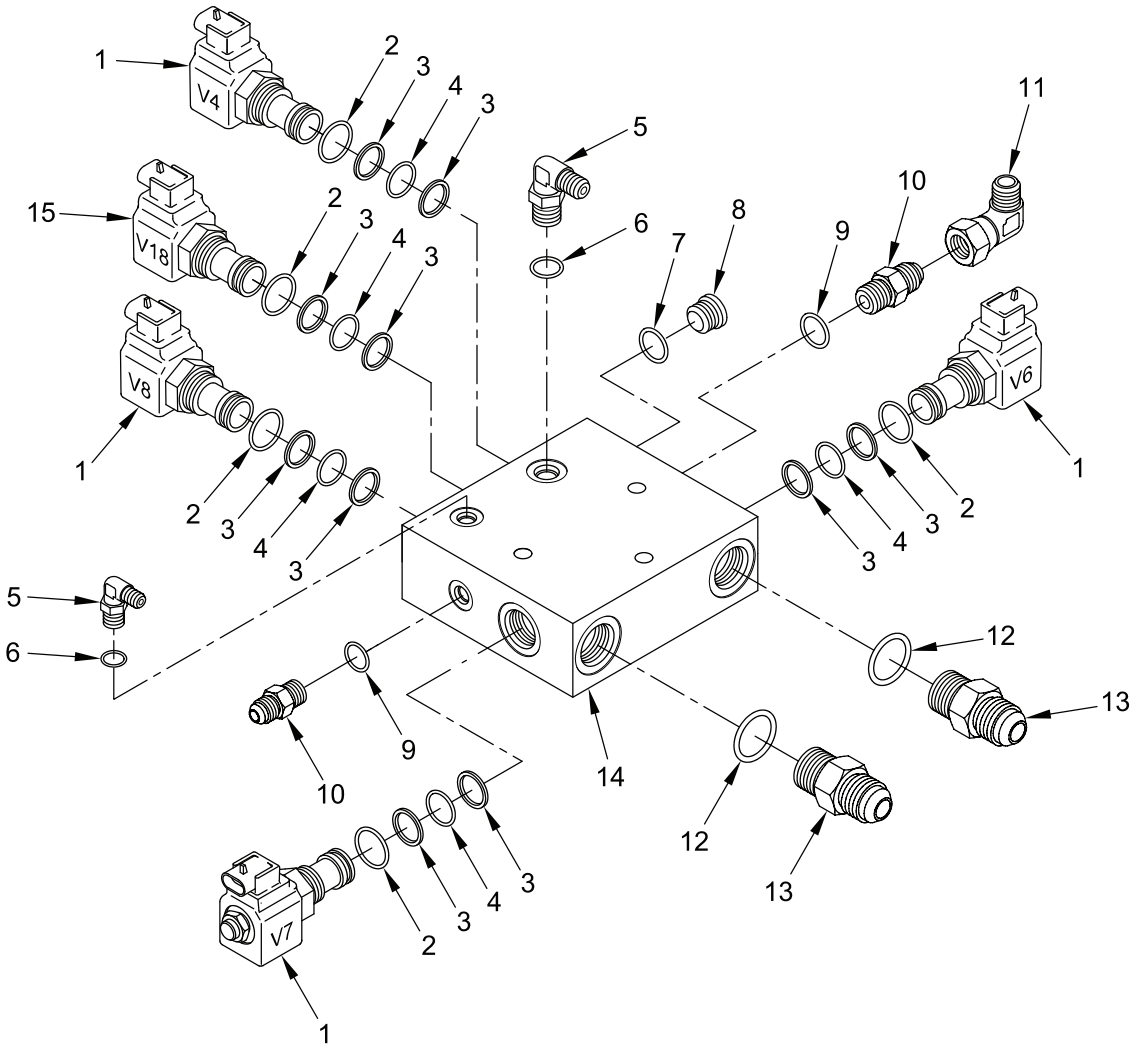


Figure 3. Assembly of HDC Aft Manifold

END OF TASK

INSTALLATION

WARNING

Do not work under vehicle unless hull is on jack stands and apron lockpins are installed. Failure to comply may result in severe injury or death to personnel.

NOTE

- Installation steps are accomplished through access under vehicle.
- After installation is complete, remove tags from all hydraulic lines and wiring harness leads.

1. Install aft manifold (Figure 4, item 6) in vehicle with three new self-locking screws (Figure 4, item 4) and three flat washers (Figure 4, item 5).
2. Remove caps from adapters and plugs from hydraulic hose connector ends and connect six hydraulic hoses (Figure 4, item 3) to aft manifold (Figure 4, item 6).
3. Connect wiring harness W3 connectors P4, P6, P7, P8, and P18 (Figure 4, item 1) to five two-way valves V4, V6, V7, V8 and V18 (Figure 4, item 2) on aft manifold (Figure 4, item 6).
4. Remove tags from all hydraulic hoses and wiring harness W3 connectors.

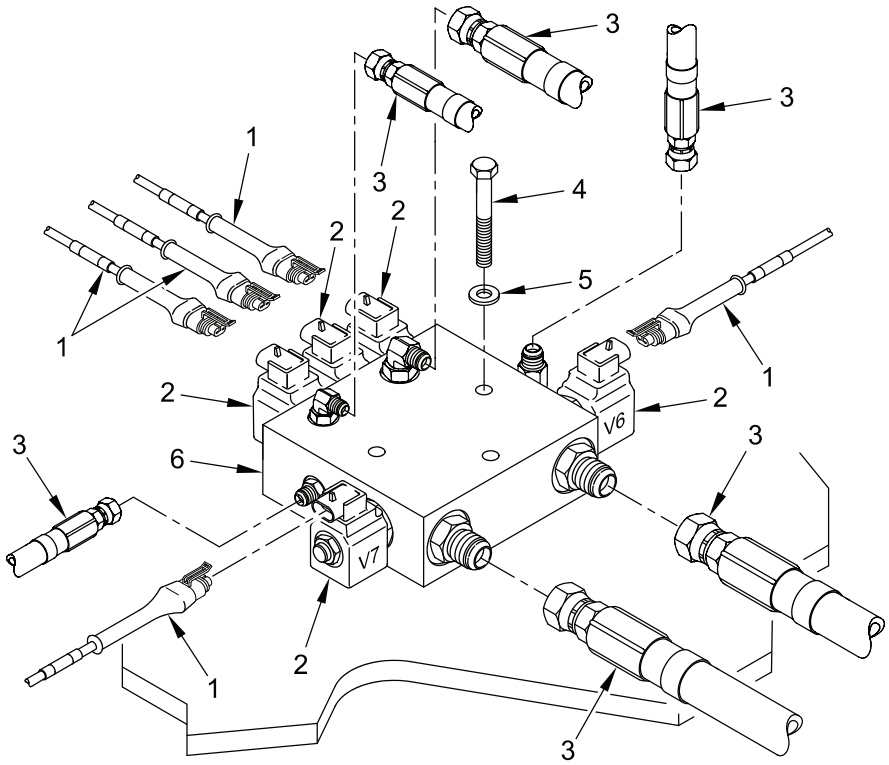


Figure 4. Installing HDC Aft Manifold Assembly

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install hull access plates (TM 5-2350-262-20-1).
2. Remove vehicle from jack stands and lower hull (TM 5-2350-262-20-1).
3. Bring hydraulic system to operating pressure (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE HDC PRIMARY MANIFOLD ASSEMBLY AND MOUNTING BRACKET

0034 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

Dust protective caps (16) (WP 0070 00, item 2)
Dust protective caps (2) (WP 0070 00, item 3)
Dust protective plugs (16) (WP 0070 00, item 6)
Dust protective plugs (2) (WP 0070 00, item 7)
Self-locking nut (WP 0072 00, item 10)
Self-locking screws (11) (WP 0072 00, item 15)
Self-locking screws (2) (WP 0072 00, item 17)
Self-locking screws (3) (WP 0072 00, item 20)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)
Apron locked in full-up position (TM5-2350-262-10)
Ejector to front of vehicle (TM 5-2350-262-10)
Hydraulic pressure relieved (WP 0004 00)
Directional control valve bank removed (TM 5-2350-262-20-2)
Sprung/Unsprung valve removed (TM 5-2350-262-20-2)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

REPLACE HDC PRIMARY MANIFOLD ASSEMBLY AND MOUNTING BRACKET - Continued **0034 00**

REMOVAL - CONTINUED

NOTE

Tag all hydraulic lines and wiring harness leads being disconnected to assist in installation.

1. Remove 17 hydraulic hoses and tubes (Figure 1, item 6) from primary manifold (Figure 1, item 5). Plug ends of hoses and tubes and cap ends of adapters to prevent leakage.
2. Remove wiring harness W2 connectors P1, P5, P11, P12, P13, P14, P15, P16, P17, P19, and P20 (Figure 1, item 3) from valves V1, V5, V11, V12, V13, V14, V15, V16, V17, V19, and V20 (Figure 1, item 4) at primary manifold (Figure 1, item 5).
3. Remove wiring harness W2 connectors P2, P31, and P32 (Figure 1, item 1) from transducers T2, T1, and T13 (Figure 1, item 2) at primary manifold (Figure 1, item 5).

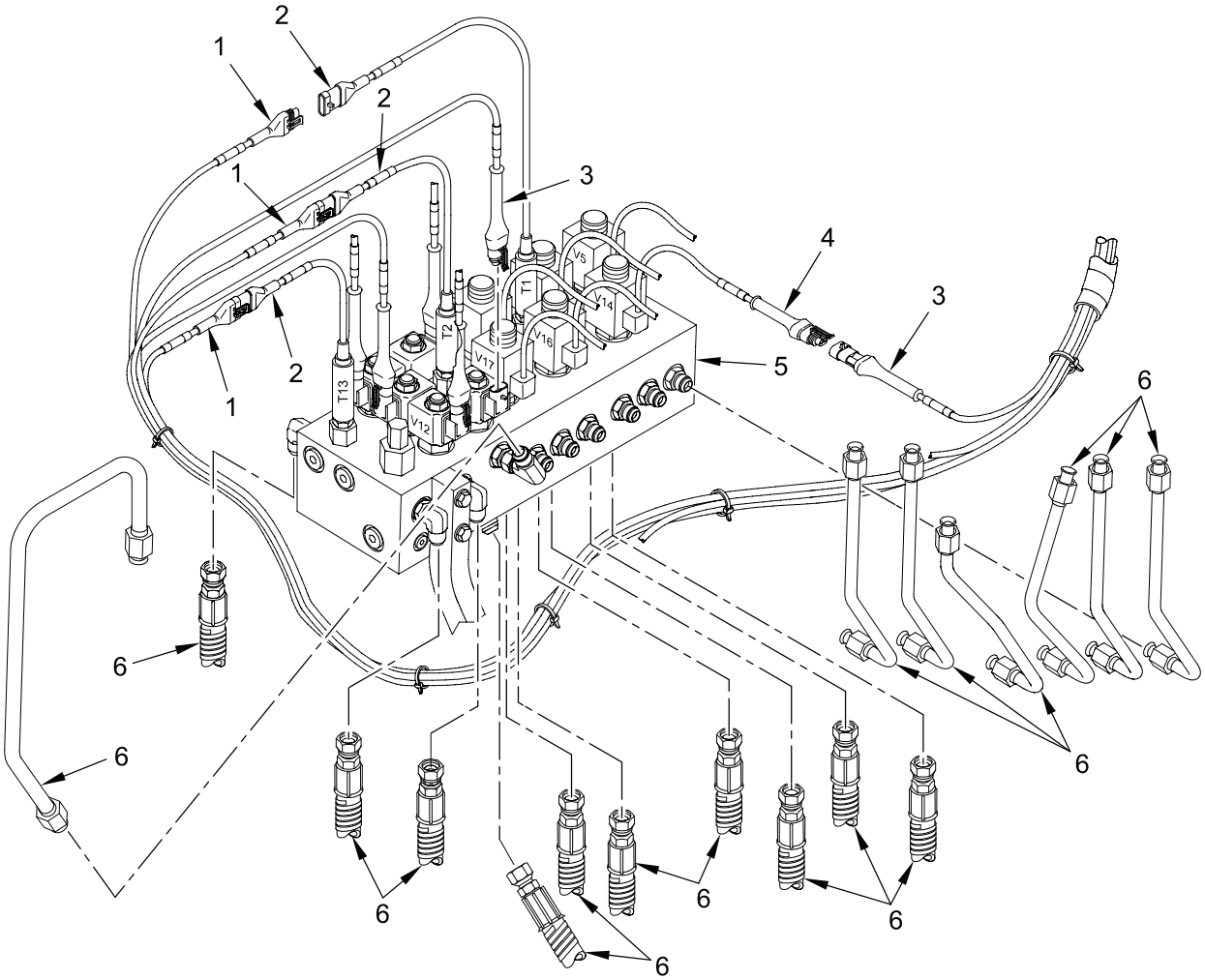


Figure 1. Removing HDC Primary Manifold Assembly and Mounting Bracket

REPLACE HDC PRIMARY MANIFOLD ASSEMBLY AND MOUNTING BRACKET - Continued **0034 00**

REMOVAL - CONTINUED

4. Remove two self-locking screws (Figure 2, item 6), two flat washers (Figure 2, item 5), screw (Figure 2, item 8), three flat washers (Figure 2, item 9), self-locking nut (Figure 2, item 12), and lateral support bracket (Figure 2, item 13) from primary manifold (Figure 2, item 4) and hull floor support bracket (Figure 2, item 7). Discard self-locking screws and self-locking nut.
5. Remove three self-locking screws (Figure 2, item 11), three flat washers (Figure 2, item 10), and hull floor support bracket (Figure 2, item 7). Discard self-locking screws.
6. Fully supporting weight of primary manifold (Figure 2, item 4), remove seven self-locking screws (Figure 2, item 2), seven flat washers (Figure 2, item 3), and primary manifold (Figure 2, item 4) with mounting plate (Figure 2, item 1). Discard self-locking screws.
7. Remove four self-locking screws (Figure 2, item 15), four flat washers (Figure 2, item 14), and mounting plate (Figure 2, item 1) from primary manifold (Figure 2, item 4). Discard self-locking screws.

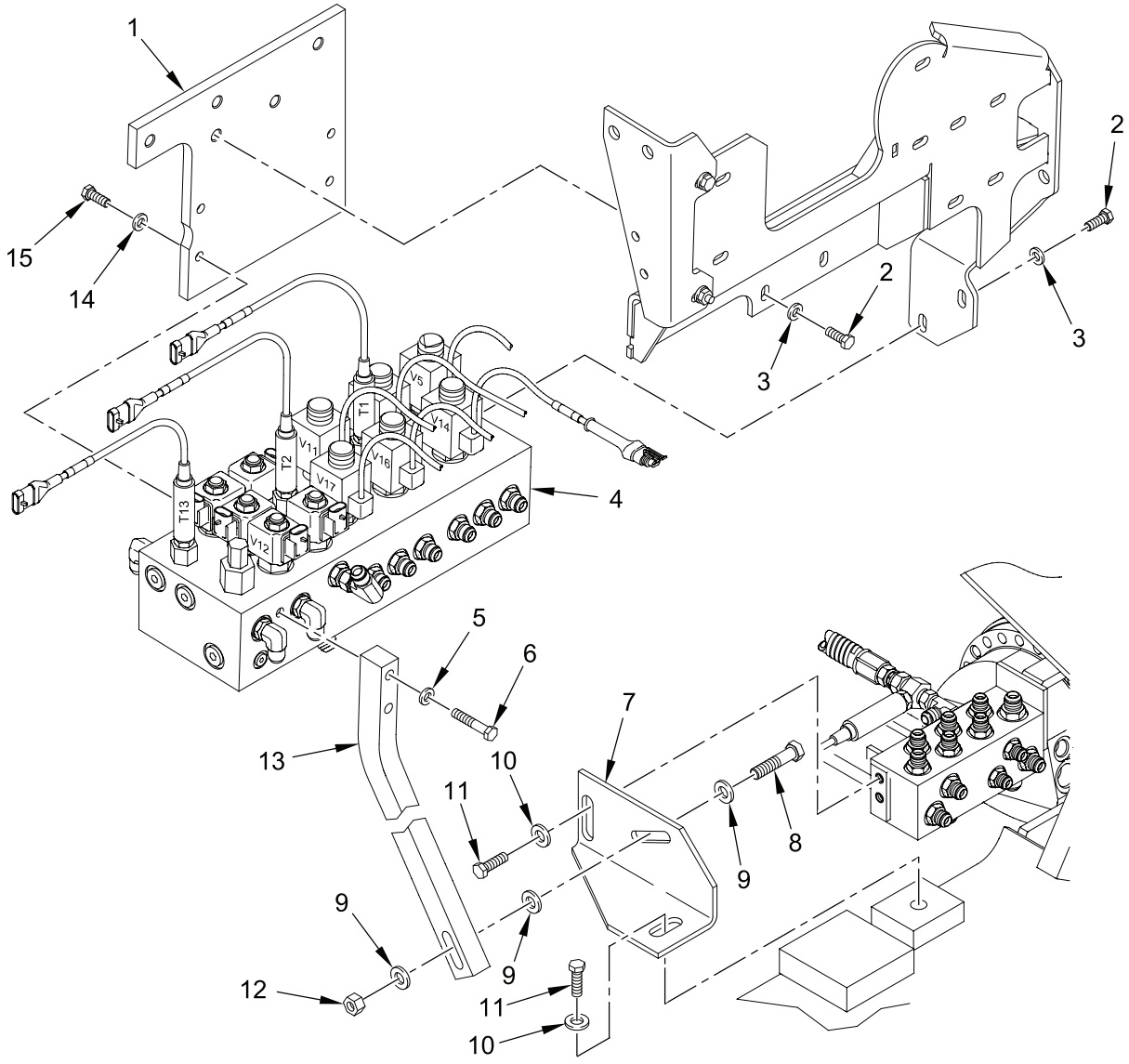


Figure 2. Removing HDC Primary Manifold Assembly and Mounting Bracket

END OF TASK

INSTALLATION

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

1. Install mounting plate (Figure 3, item 1) on primary manifold (Figure 3, item 4) with four flat washers (Figure 3, item 14) and four new self-locking screws (Figure 3, item 15).
2. Supporting weight of primary manifold (Figure 3, item 4), install primary manifold (Figure 3, item 4) with seven flat washers (Figure 3, item 3) and seven new self-locking screws (Figure 3, item 2).
3. Install hull floor support bracket (Figure 3, item 7) with three flat washers (Figure 3, item 10) and three new self-locking screws (Figure 3, item 11).
4. Install lateral support bracket (Figure 3, item 13) with new self-locking nut (Figure 3, item 12), three flat washers (Figure 3, item 9), screw (Figure 3, item 8), two flat washers (Figure 3, item 5), and two new self-locking screws (Figure 3, item 6).

REPLACE HDC PRIMARY MANIFOLD ASSEMBLY AND MOUNTING BRACKET - Continued **0034 00**

INSTALLATION - CONTINUED

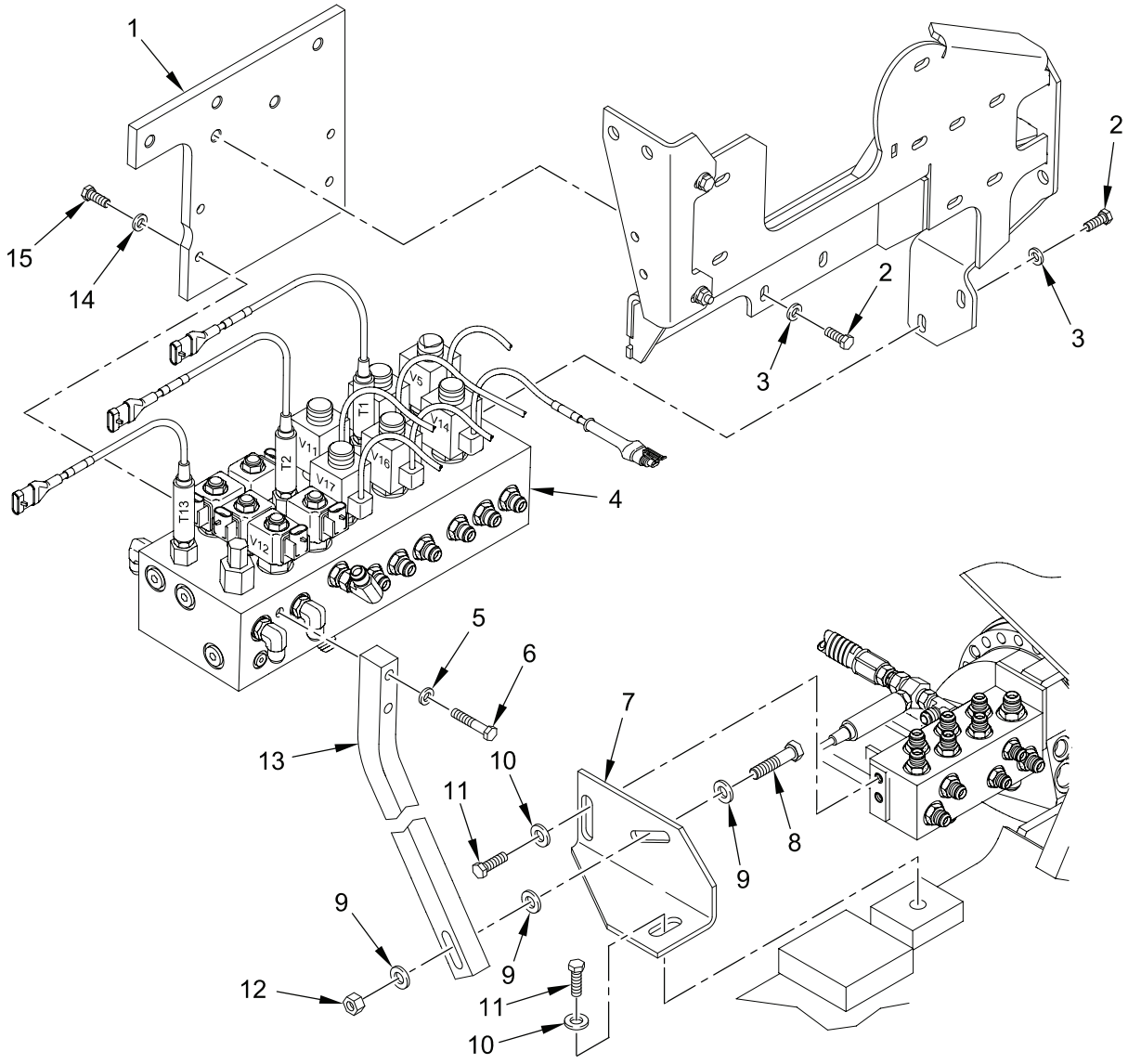


Figure 3. Installing HDC Primary Manifold Assembly and Mounting Bracket

REPLACE HDC PRIMARY MANIFOLD ASSEMBLY AND MOUNTING BRACKET - Continued **0034 00**

INSTALLATION - CONTINUED

5. At primary manifold (Figure 4, item 5) connect wiring harness W2 connectors P2, P31, and P32 (Figure 4, item 1) to transducers T2, T1, and T13 (Figure 4, item 2).
6. At primary manifold (Figure 4, item 5) connect wiring harness W2 connectors P1, P5, P11, P12, P13, P14, P15, P16, P17, P19, and P20 (Figure 4, item 3) to valves V1, V5, V11, V12, V13, V14, V15, V16, V17, V19, and V20 (Figure 4, item 4).
7. Remove caps from adapters and plugs from 17 hydraulic hoses and tubes and connect 17 hydraulic hoses and tubes (Figure 4, item 6) to primary manifold (Figure 4, item 5).

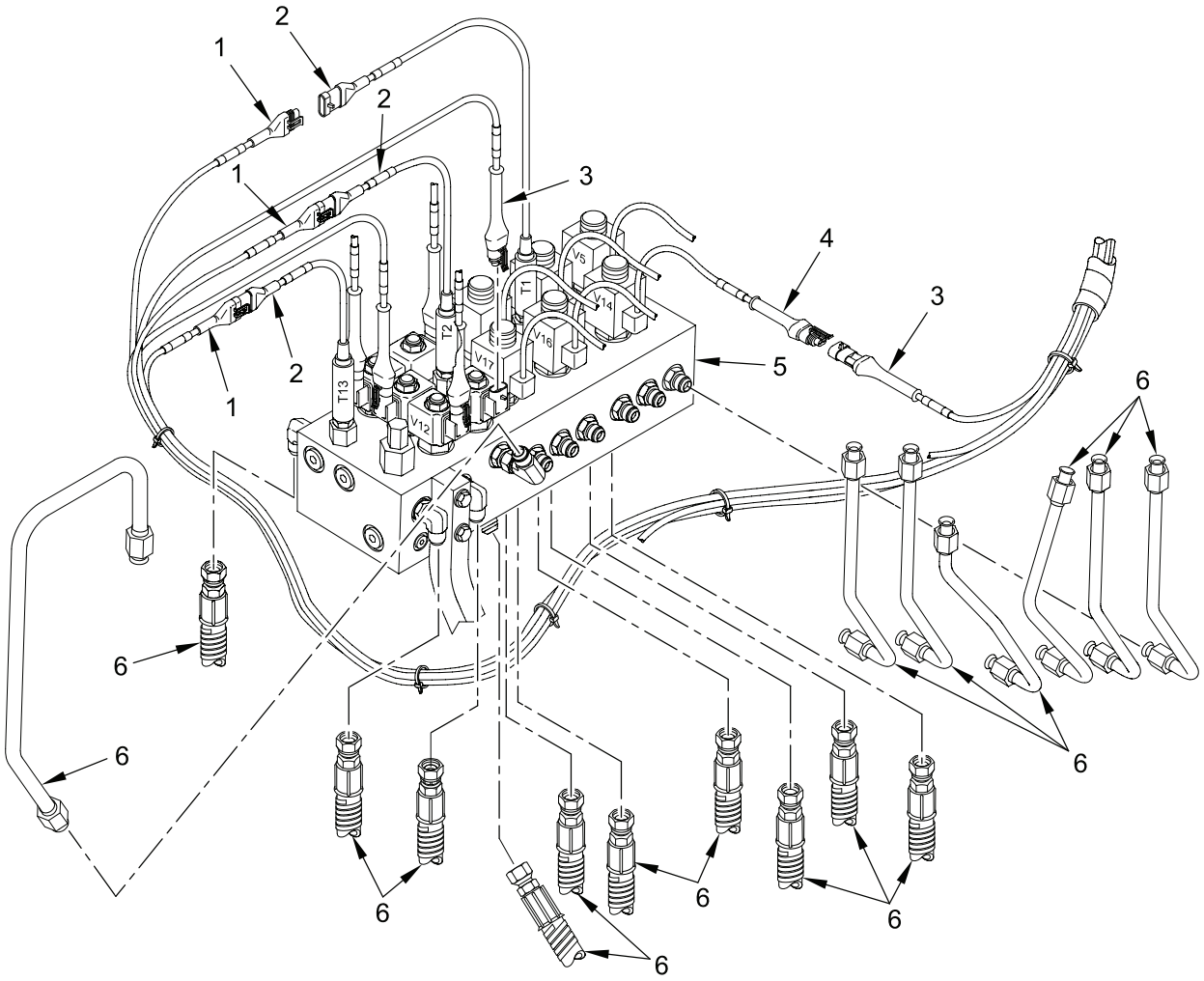


Figure 4. Installing HDC Primary Manifold Assembly and Mounting Bracket

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install Sprung/Unsprung valve (TM 5-2350-262-20-2).
2. Install directional control valve bank (TM 5-2350-262-20-2).
3. Restore hydraulic pressure to system (TM 5-2350-262-10).
4. Return ejector to properly stowed position (TM 5-2350-262-10).
5. Return apron to properly stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPAIR HDC PRIMARY MANIFOLD

0035 00

THIS WORK PACKAGE COVERS:

Disassembly, Assembly

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Personnel Required

Two 62B10

Materials/Parts

O-rings (6) (WP 0072 00, item 11)
O-ring (6) (WP 0072 00, item 4)
O-rings (6) (WP 0072 00, item 5)
Teflon backups (12) (WP 0072 00, item 2)
Teflon backups (12) (WP 0072 00, item 3)
O-rings (5) (WP 0072 00, item 5)
O-rings (5) (WP 0072 00, item 6)
Teflon backups (10) (WP 0072 00, item 1)
O-rings (11) (WP 0072 00, item 7)
O-rings (2) (WP 0072 00, item 8)
O-rings (21) (WP 0072 00, item 9)
Wiping rags (WP 0070 00, item 9)

Equipment Conditions

Primary manifold removed from vehicle (WP 0034 00)

DISASSEMBLY

CAUTION

- **Disassembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing primary manifold in vice, exercise extreme care not to mar any surfaces or damage components**

REPAIR HDC PRIMARY MANIFOLD - Continued **0035 00**

DISASSEMBLY - CONTINUED

1. Remove 15 adapters (Figure 1, item 8), 15 o-rings (Figure 1, item 9), two adapters (Figure 1, item 1), and two o-rings (Figure 1, item 2), from primary manifold (Figure 1, item 3). Discard o-rings.
2. Remove five plugs (Figure 1, item 5), five o-rings (Figure 1, item 4), plug (Figure 1, item 10), o-ring (Figure 1, item 11), six plugs (Figure 1, item 7), and six o-rings (Figure 1, item 6) from primary manifold (Figure 1, item 3). Discard o-rings.

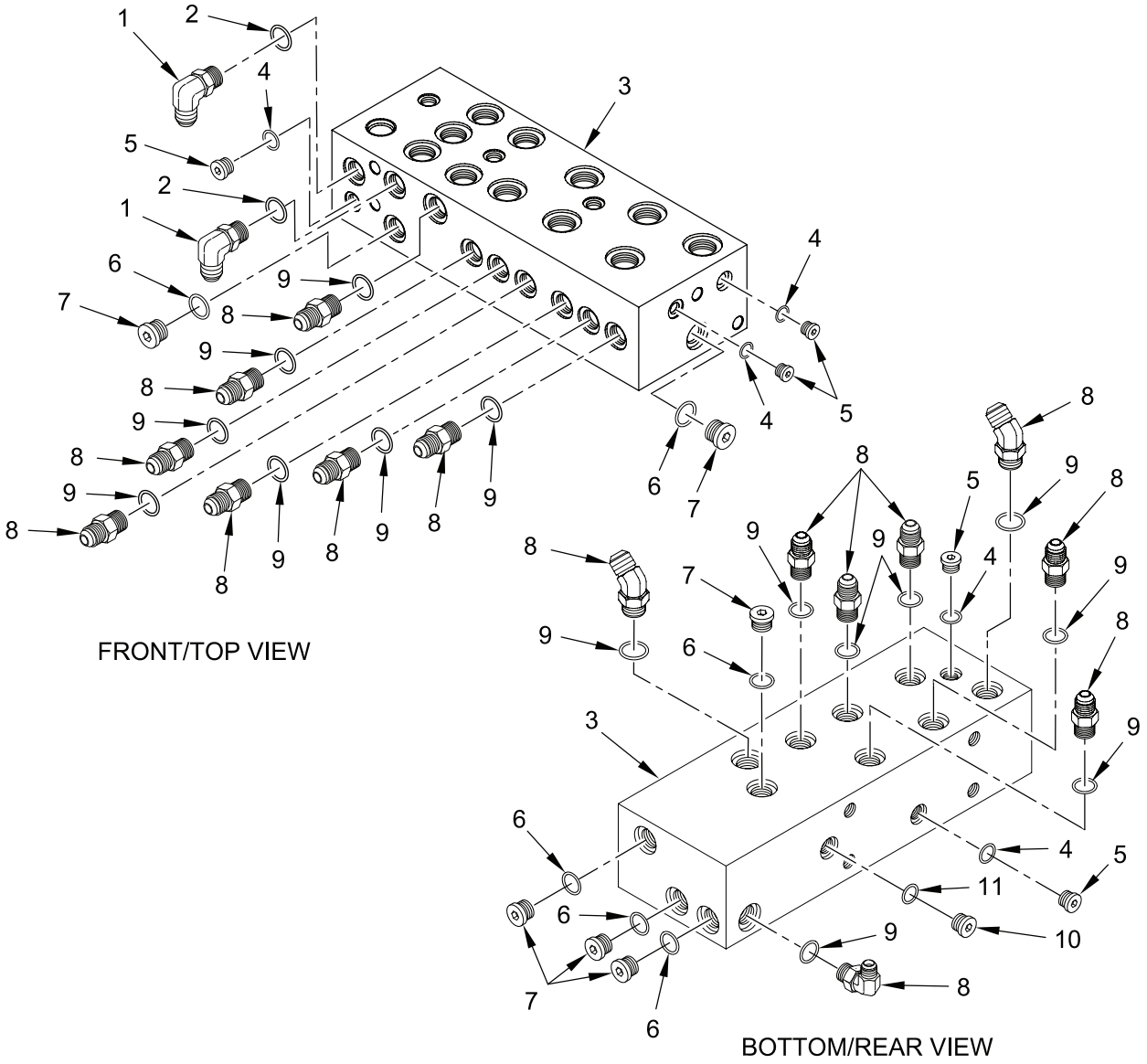


Figure 1. Removing Adapters and Plugs From Primary Manifold

DISASSEMBLY - CONTINUED

3. Remove three transducers (Figure 2, item 7), three o-rings (Figure 2, item 8), and relief valve (Figure 2, item 5), from primary manifold (Figure 2, item 15). Discard o-ring.
4. Remove six three-way valves (Figure 2, item 9), six teflon backups (Figure 2, item 13), six o-rings (Figure 2, item 14), six teflon backups (Figure 2, item 13), six teflon backups (Figure 2, item 11), six o-rings (Figure 2, item 12), six teflon backups (Figure 2, item 11) and six o-rings (Figure 2, item 10) from primary manifold (Figure 2, item 15). Discard o-rings and teflon backups.
5. Remove two NC valves (Figure 2, item 1), two teflon backups (Figure 2, item 3), two o-rings (Figure 2, item 4), two teflon backups (Figure 2, item 3), and two o-rings (Figure 2, item 2), from primary manifold (Figure 2, item 15). Discard o-rings and teflon backups.
6. Remove three NO valves (Figure 2, item 6), three o-rings (Figure 2, item 2), three teflon backups (Figure 2, item 3), three o-rings (Figure 2, item 4) and three teflon backups (Figure 2, item 3), from primary manifold (Figure 2, item 15). Discard o-rings and teflon backups.

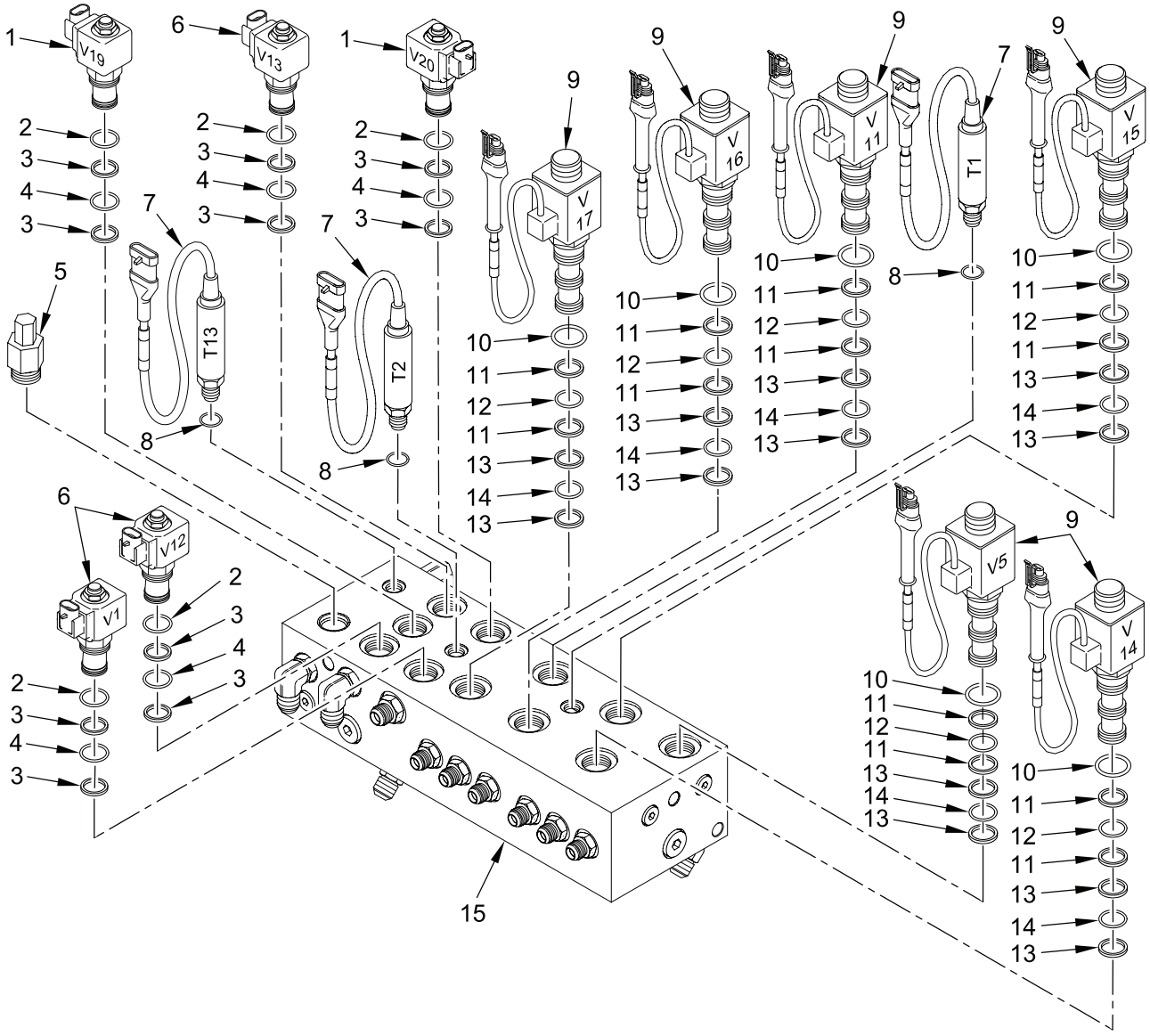


Figure 2. Removing Transducers and Valves From Primary Manifold

END OF TASK

ASSEMBLY

CAUTION

- **Assembly should be performed in a clean environment and protective dust covers or caps should be installed on all openings to prevent contamination. Dirt can damage parts and cause malfunctions.**
- **When securing primary manifold in vice, exercise extreme care not to mar any surfaces or damage components**
- **Do not over torque.**

1. Install three new o-rings (Figure 3, item 2), three new teflon backups (Figure 3, item 3), three new o-rings (Figure 3, item 4), three new teflon backups (Figure 3, item 3), and three NO valves (Figure 3, item 6), on primary manifold (Figure 3, item 15).
2. Install two new o-rings (Figure 3, item 2), two new teflon backups (Figure 3, item 3), two new o-rings (Figure 3, item 4), two new teflon (Figure 3, item 3), and two NC valves (Figure 3, item 1).
3. Install six new o-rings (Figure 3, item 10), six new teflon backups (Figure 3, item 11), six new o-rings (Figure 3, item 12), six new teflon backups (Figure 3, item 11), six new teflon backups (Figure 3, item 13), six new o-rings (Figure 3, item 14), six new teflon backups (Figure 3, item 13) and six three-way valves (Figure 3, item 9), on primary manifold (Figure 3, item 15).

ASSEMBLY - CONTINUED

4. Install relief valve (Figure 3, item 5), three o-rings (Figure 3, item 8), and three transducers (Figure 3, item 7) on primary manifold (Figure 3, item 15).

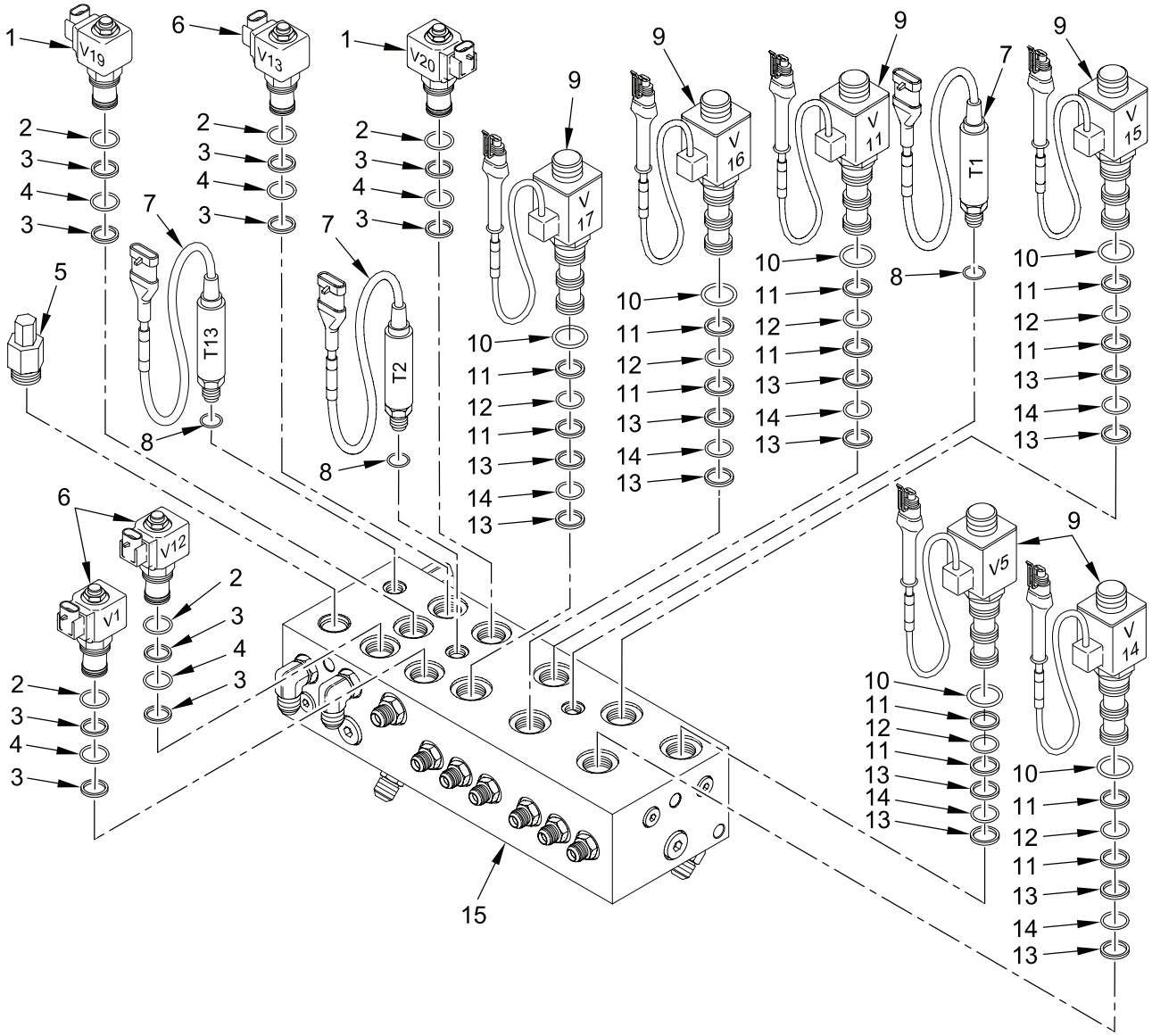


Figure 3. Installing Valves and Transducers On Primary Manifold

ASSEMBLY - CONTINUED

5. Install six new o-rings (Figure 4, item 6), six plugs (Figure 4, item 7), new o-ring (Figure 4, item 11), plug (Figure 4, item 10), five new o-rings (Figure 4, item 4), and five plugs (Figure 4, item 5) on primary manifold (Figure 4, item 3).

6. Install two new o-rings (Figure 4, item 2), two adapters (Figure 4, item 1), 15 new o-rings (Figure 4, item 9), and 15 adapters (Figure 4, item 8) on primary manifold (Figure 4, item 3).

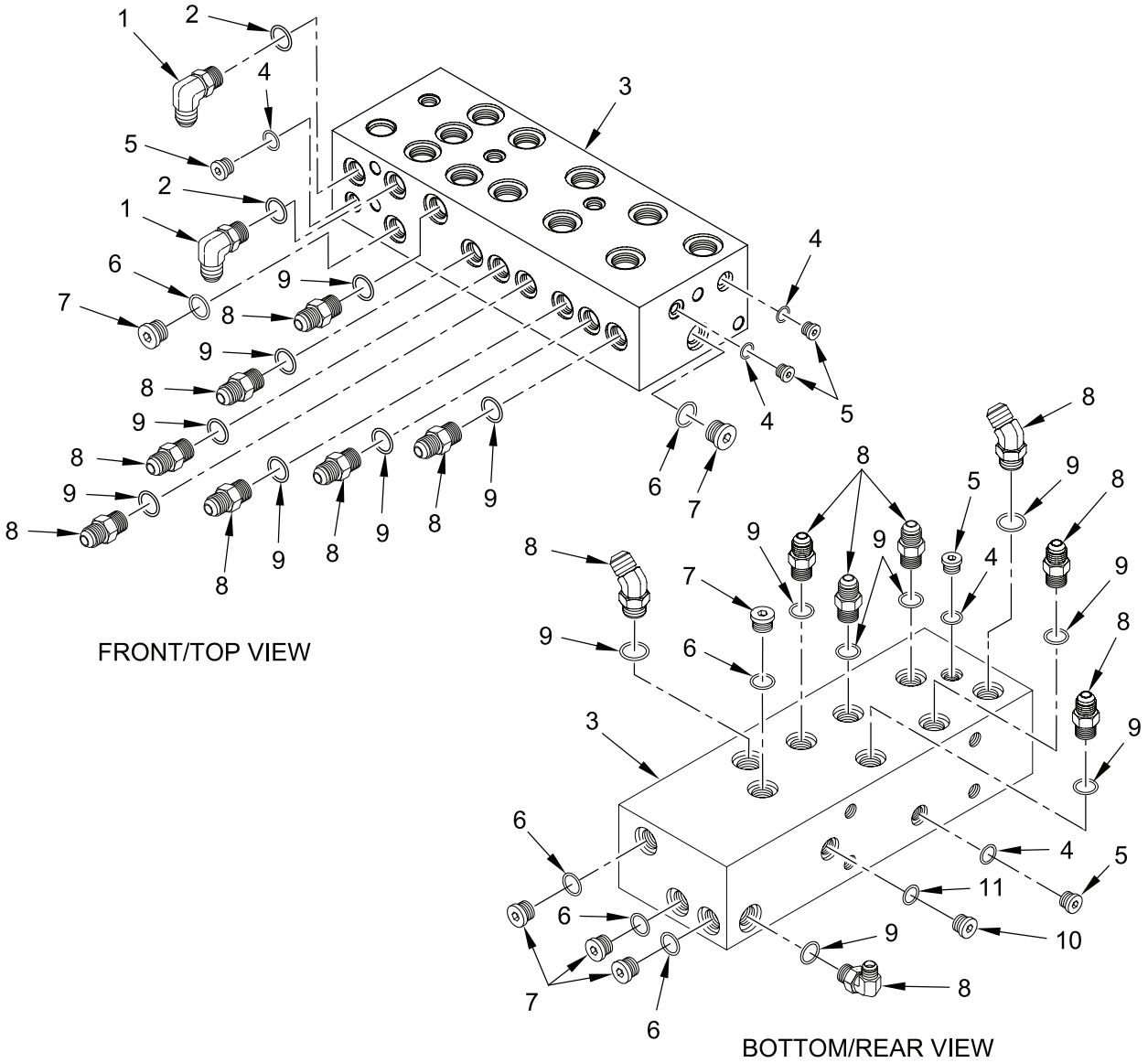


Figure 4. Installing Plugs and Adapters On Primary Manifold

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install primary manifold (WP 0034 00).

END OF TASK

END OF WORK PACKAGE

REPLACE VALVE V21 (V22), RELIEF VALVE, AND BYPASS HOSE 0036 00

THIS WORK PACKAGE COVERS:
Removal, Installation

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts
Dust protective caps (4) (WP 0070 00, item 3)
Dust protective plugs (WP 0070 00, item 7)
O-rings (14) (WP 0072 00, item 9)
Wiping rags (WP 0070 00, item 9)

Personnel Required
Two 62B10

Equipment Conditions
Vehicle MASTER power OFF (TM 5-2350-262-10)
Filter guard protective bracket removed (TM 5-2350-262-20-2)
Hydraulic pressure relieved (WP 0004 00)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

REPLACE VALVE V21 (V22), RELIEF VALVE, AND BYPASS HOSE - Continued **0036 00**

REMOVAL - CONTINUED

NOTE

- The procedure for replacing valve V21, relief valve, and bypass hose is identical for valve V22, relief valve and bypass hose. This task covers the V21 valve, relief valve, and bypass hose.

1. Remove bypass hose (Figure 1, item 4), adapter (Figure 1, item 5), and o-ring (Figure 1, item 6) from relief valve (Figure 1, item 3). Discard o-ring.
2. Remove adapter (Figure 1, item 8) and o-ring (Figure 1, item 9) from bottom of relief valve (Figure 1, item 3) and tee (Figure 1, item 7). Discard o-ring.
3. Remove adapter (Figure 1, item 1), o-ring (Figure 1, item 2), and relief valve (Figure 1, item 3) from bulkhead bracket (Figure 1, item 10). Discard o-ring.

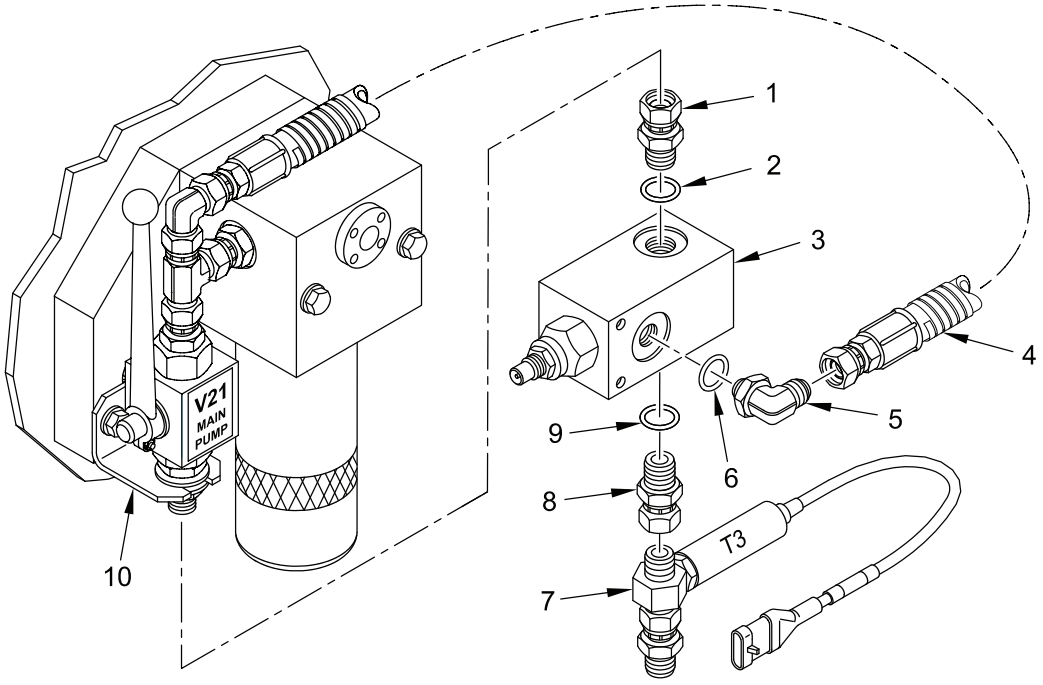


Figure 1.

REPLACE VALVE V21 (V22), RELIEF VALVE, AND BYPASS HOSE - Continued **0036 00**

REMOVAL - CONTINUED

4. Remove adapter (Figure 2, item 11), two flat washers (Figure 2, item 9), o-ring (Figure 2, item 12), and valve V21 (Figure 2, item 13) from bulkhead bracket (Figure 2, item 8). Discard o-ring.
5. Remove adapter (Figure 2, item 6) and o-ring (Figure 2, item 7) from top of valve V21 (Figure 2, item 13), and valve V21 (Figure 2, item 13) from tee (Figure 2, item 14). Discard o-ring.
6. Remove bypass hose (Figure 2, item 2) from adapter (Figure 2, item 1).
7. Remove adapter (Figure 2, item 1) from tee (Figure 2, item 14) and tee (Figure 2, item 14) from adapter (Figure 2, item 3).
8. Remove adapter (Figure 2, item 3) and o-ring (Figure 2, item 4) from filter (Figure 2, item 5). Discard o-ring.

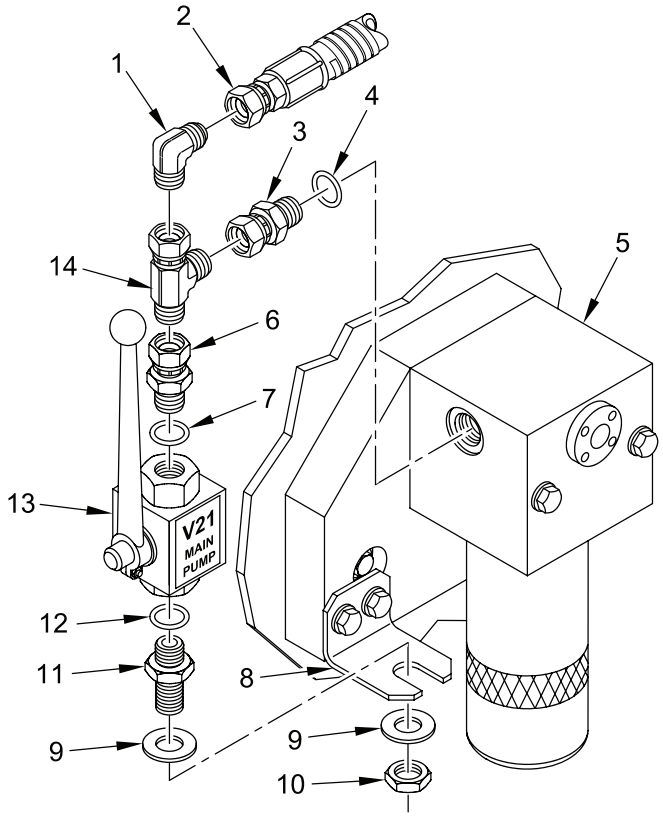


Figure 2. Removing Valve V21 (V22), Relief Valve, and Bypass Hose

END OF TASK

INSTALLATION

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

1. Install new o-ring (Figure 3, item 4) and adapter (Figure 3, item 3) into filter (Figure 3, item 5).
2. Install tee (Figure 3, item 14) on adapter (Figure 3, item 3) and adapter (Figure 3, item 1) on to top of tee (Figure 3, item 14).
3. Install bypass hose (Figure 3, item 2) onto adapter (Figure 3, item 1).
4. Install new o-ring (Figure 3, item 7) with adapter (Figure 3, item 6) on top of valve V21 (Figure 3, item 13).
5. Install valve V21 (Figure 3, item 13), new o-ring (Figure 3, item 12), two flat washers (Figure 3, item 9), and adapter (Figure 3, item 11) on bulkhead bracket (Figure 3, item 8) and tee (Figure 3, item 14).

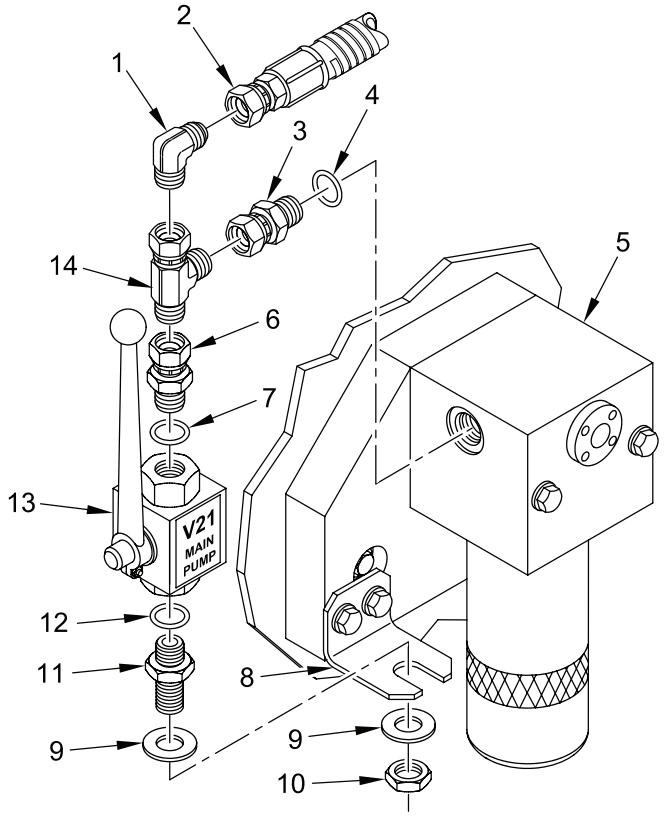


Figure 3. Removing Valve V21 (V22), Relief Valve, and Bypass Hose

INSTALLATION - CONTINUED

6. Install new o-ring (Figure 4, item 2) and adapter (Figure 4, item 1) on relief valve (Figure 4, item 3) and attach to bulkhead bracket (Figure 4, item 10).
7. Install new o-ring (Figure 4, item 9) and adapter (Figure 4, item 8) on relief valve (Figure 4, item 3) and attach tee (Figure 4, item 7) to adapter (Figure 4, item 8).
8. Install new o-ring (Figure 4, item 6) and adapter (Figure 4, item 5) on relief valve (Figure 4, item 3) and attach bypass hose (Figure 4, item 4) to adapter (Figure 4, item 5).

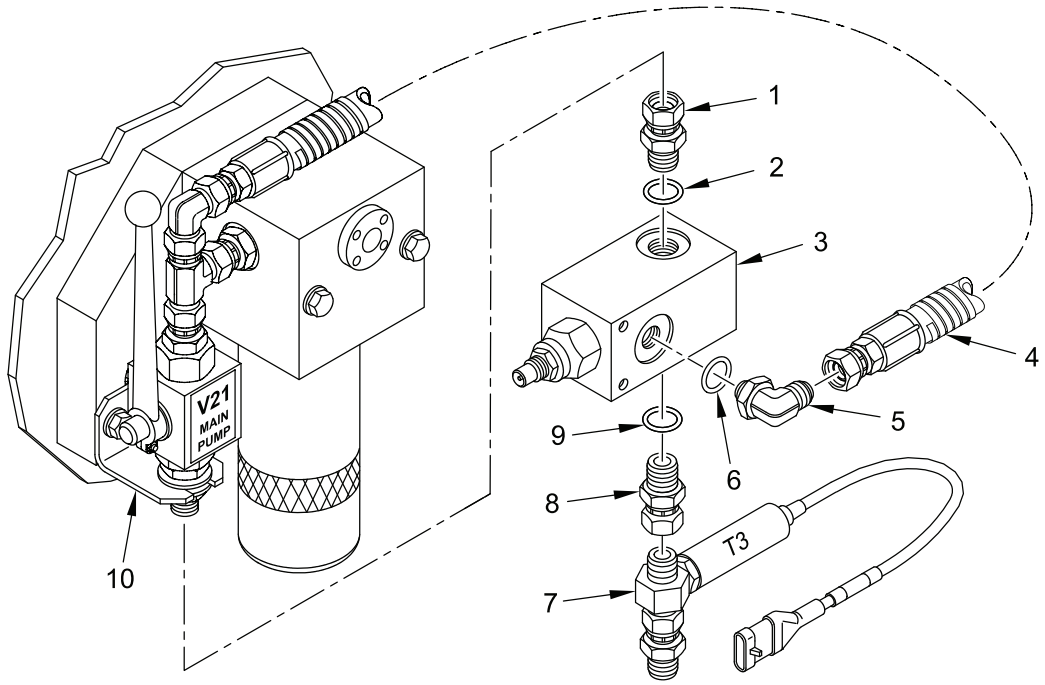


Figure 4. Installing Valve V21 (V22), Relief Valve, and Bypass Hose

WARNING

Ensure right main hydraulic pressure inhibit valve V22 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.

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install filter guard protective bracket (TM 5-2350-262-20-2).
2. Restore hydraulic pressure (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE TRANSDUCER

0037 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)
Adapter, Socket Wrench (WP 0071 00, item 1)
Wrench Set, Crowfoot (WP 0071 00, item 11)

Materials/Parts

O-rings (13) (WP 0072 00, item 7)
Dust protective plugs (13) (WP 0070 00, item 5)

Personnel Required

Two 62B10

Equipment Conditions

Vehicle MASTER power OFF (TM 5-2350-262-10)
Hydraulic pressure relieved (WP 0004 00)
Filter guard protective bracket removed for transducers T3, T4, and T12 (TM 5-2350-262-20-2)
Vehicle hull raised and on jack-stands for transducers T5 and T6 (TM 5-2350-262-20-1)
Hull access plates removed for transducers T5 and T6 (TM 5-2350-262-20-1)
Apron locked in full-up position for transducer T7 (TM 5-2350-262-10)
Ejector to front of vehicle for transducer T7 (TM 5-2350-262-10)

REMOVAL

NOTE

- All transducers are removed and replaced in the same manner. This task covers the removal and replacement of only one transducer.
- Refer to Table 1. HDC Pressure Transducer Locations for the location of each pressure transducer.
- Tag electrical connector and hydraulic hose/tube to assist in installation. Plug fitting that transducer is removed from to prevent leakage.

Table 1. HDC Pressure Transducer Locations

Transducer	Location	WP #
T3, T4, T12	Main Hydraulic filter area	WP 0029 00
T5, T8	Right Actuator Access Area	WP 0030 00
T6, T9	Left Actuator Access Area	WP 0030 00
T7	Left Main manifold	WP 0050 00
T1, T2, T13	Primary Manifold	WP 0035 00
T10	Left Forward Manifold	WP 0031 00
T11	Right Forward Manifold	WP 0032 00

REPLACE TRANSDUCER - Continued **0037 00**

REMOVAL - CONTINUED

1. If wiring harness and connector are connected, disconnect transducer connector (Figure 1, item 2) from wiring harness connector (Figure 1, item 1).
2. Remove transducer (Figure 1, item 3) from component.

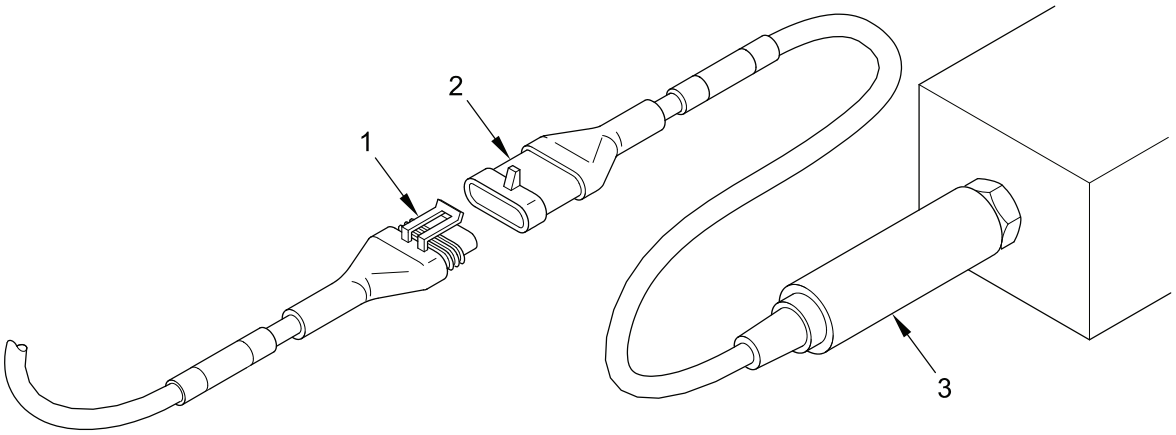


Figure 1. Transducer

END OF TASK

INSTALLATION

1. Install transducer (Figure 1, item 3) on component.
2. Connect transducer connector (Figure 1, item 2) to wiring harness connector (Figure 1, item 1).

END OF TASK

END OF WORK PACKAGE

REPLACE MANUAL SHUTOFF VALVE V23

0038 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)

Materials/Parts

O-rings (2) (WP 0072 00, item 9)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

Equipment Conditions

Ejector moved to front of vehicle (TM 5-2350-262-10)
Apron locked in full-up position (TM 5-2350-262-10)
Hydraulic tubes and hoses removed from directional control valve bank for access (TM 5-2350-262-20-2)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

CAUTION

Cap or plug all oil port and ends of hoses and tubes when oil hoses or tubes are disconnected or removed to prevent contamination. Failure to comply may result in damage to equipment.

REPLACE MANUAL SHUTOFF VALVE V23 - Continued **0038 00**

REMOVAL - CONTINUED

1. Remove hose (Figure 1, item 5) from bottom adapter (Figure 1, item 4) of manual shutoff valve V23 (Figure 1, item 2).
2. Remove adapter (Figure 1, item 4) and o-ring (Figure 1, item 3) from bottom of manual shutoff valve V23 (Figure 1, item 2). Discard o-ring.
3. Remove manual shutoff valve V23 (Figure 1, item 2) and o-ring (Figure 1, item 6) from adapter (Figure 1, item 7) at port 22 of directional control valve bank (Figure 1, item 1). Discard o-ring.

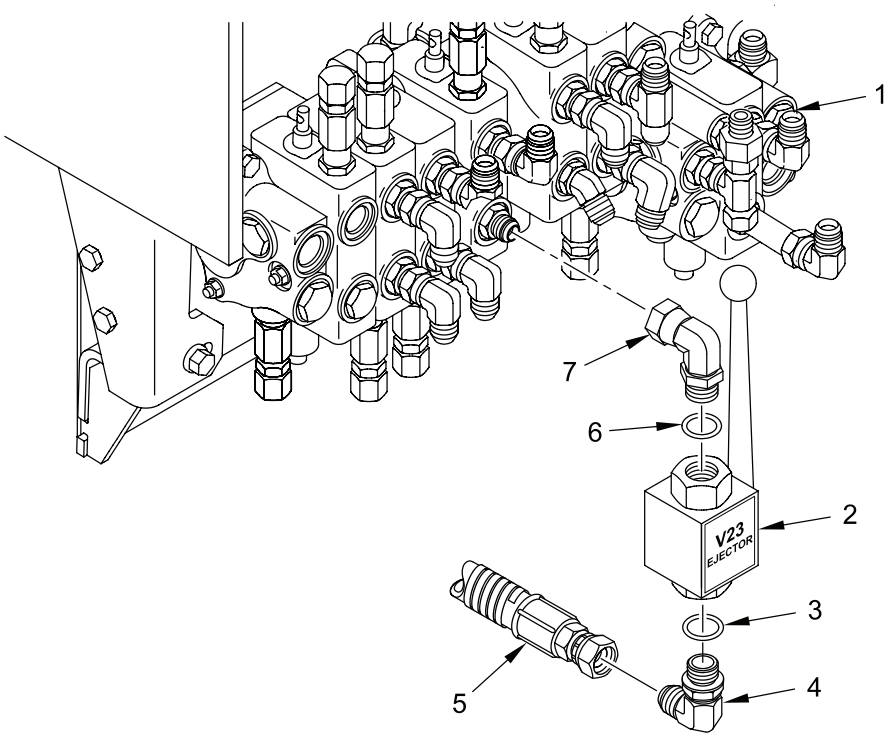


Figure 1. Removing Manual Shutoff Valve V23

END OF TASK

INSTALLATION

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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

1. At directional control valve bank (Figure 2, item 1) port 22 adapter (Figure 2, item 7), install new o-ring (Figure 2, item 6) and manual shutoff valve V23 (Figure 2, item 2).
2. Install new o-ring (Figure 2, item 3) and adapter (Figure 2, item 4) in bottom port of manual shutoff valve V23 (Figure 2, item 2).
3. Connect hose (Figure 2, item 5) to bottom adapter (Figure 2, item 4) of manual shutoff valve V23 (Figure 2, item 2).

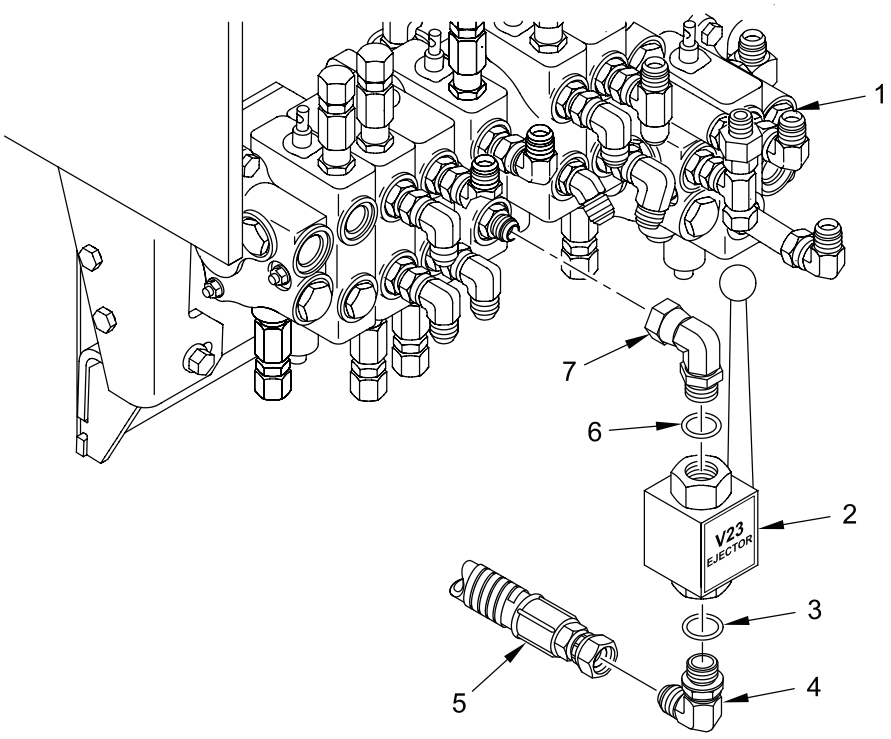


Figure 2. Installing Manual Shutoff Valve V23

END OF TASK

FOLLOW-ON MAINTENANCE

1. Connect all hydraulic tubes and hoses to directional control valve bank (TM 5-2350-262-20-2).
2. Return apron to stowed position (TM 5-2350-262-10).
3. Return ejector to stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

REPLACE HDC INTERCONNECTING HYDRAULIC HOSES AND TUBES 0039 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (WP 0071 00, item 7)
Adapter, Socket Wrench (WP 0071 00, item 1)
Wrench Set, Crowfoot (WP 0071 00, item 11)

Materials/Parts

Dust protective caps (2) (WP 0070 00, item 1)
Dust protective caps (2) (WP 0070 00, item 2)
Dust protective caps (2) (WP 0070 00, item 3)
Dust protective caps (2) (WP 0070 00, item 4)
Dust protective plugs (2) (WP 0070 00, item 5)
Dust protective plugs (2) (WP 0070 00, item 6)
Dust protective plugs (2) (WP 0070 00, item 7)
Dust protective plugs (2) (WP 0070 00, item 8)
Wiping rags (WP 0070 00, item 9)

Personnel Required

Two 62B10

References

TM 5-2350-262-20-2

Equipment Conditions

Hydraulic pressure relieved (WP 0004 00)
Vehicle MASTER power OFF (TM 5-2350-262-10)
Apron locked in full-up position for hoses in the filter area (TM 5-2350-262-10)
Ejector to front of vehicle for hoses in the filter area (TM 5-2350-262-10)
Vehicle hull raised and blocked for hoses and tubes at the primary manifold and aft manifolds (TM 5-2350-262-20-1)
Hull access plates removed for hoses and tubes at the primary and aft manifolds (TM 5-2350-262-20-1)

REMOVAL

WARNING

- **High oil pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. After hydraulic system has been relieved, wait at least 4 minutes before disconnecting any hose or fitting. Ensure each of the hydraulic control levers is moved several times through all positions and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury or death to personnel.**
- **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 area unless ejector lock is engaged. Do not stand in bowl to observe roller guide travels. Failure to comply may result in severe injury or death to personnel.**
- **When folding dozer blade, work on blade latches from side of vehicle only. Do not stand In front of dozer blade while retracting ejector. Failure to comply may result in severe injury or death to personnel.**

REPLACE HDC INTERCONNECTING HYDRAULIC HOSES AND TUBES - Continued **0039 00**

REMOVAL - CONTINUED

NOTE

- The initial setup in this task indicates the materials/parts, references, and equipment conditions required to replace all associated HDC hydraulic tubes and hoses. You need only to requisition the items and perform the steps necessary for the hose or tube that you are replacing.
- Though in different locations, all hydraulic tubes and hoses are disconnected and removed in the same manner. This task covers the replacement of only one hose. For location and configuration of hoses and tubes, refer to TM 5-2350-262-20-2.

1. Remove hose (Figure 1, item 3) from adapter (Figure 1, item 4) on primary manifold assembly (Figure 1, item 5). Plug hose (Figure 1, item 3) and cap adapter (Figure 1, item 4) on manifold to prevent leakage.
2. Remove other end of hose (Figure 1, item 3) from adapter (Figure 1, item 2) on main accumulator (Figure 1, item 1). Plug hose (Figure 1, item 3) and cap adapter (Figure 1, item 2) to prevent leakage.

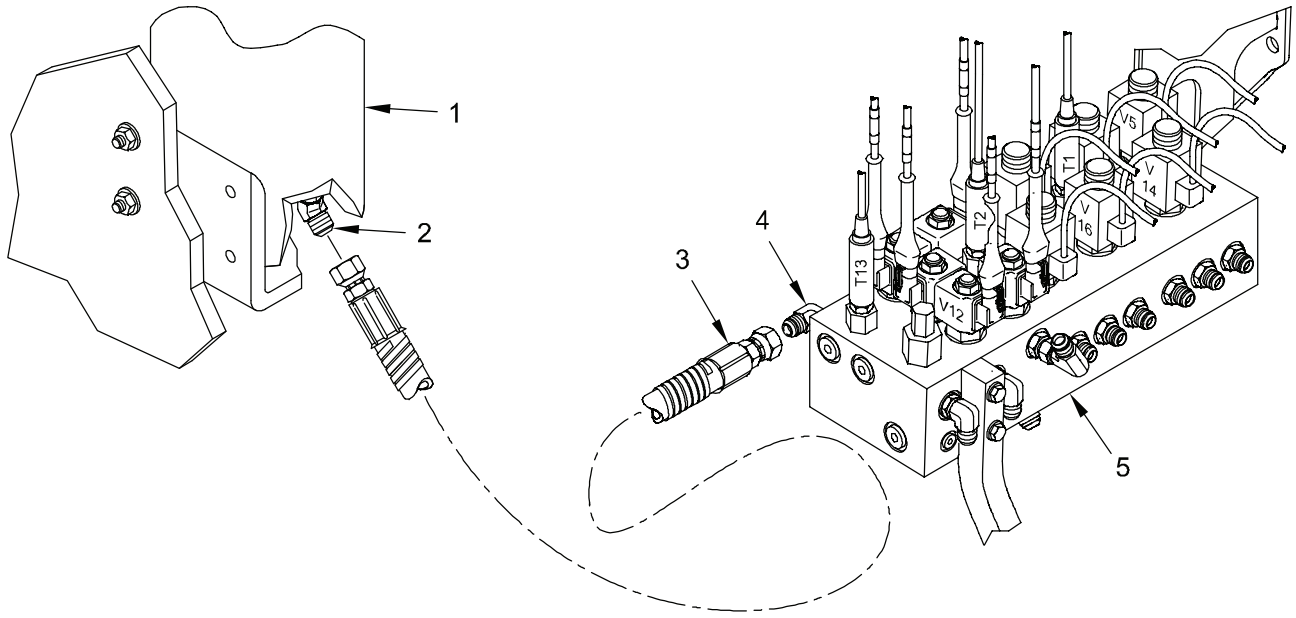


Figure 1. Replacing HDC Interconnecting Hydraulic Hoses and Tubes

END OF TASK

INSTALLATION

1. Install hose (Figure 1, item 3) at main accumulator (Figure 1, item 1) adapter (Figure 1, item 2).
2. Install other end of hose (Figure 1, item 3) at primary manifold (Figure 1, item 5) on adapter (Figure 1, item 4).

END OF TASK

FOLLOW-ON MAINTENANCE

1. Install hull access plates (TM 5-2350-262-20-1).
2. Unblock and lower vehicle (TM 5-2350-262-20-1).
3. Recharge hydraulic system (TM 5-2350-262-10).
4. Return apron to stowed position (TM 5-2350-262-10).
5. Return ejector to stowed position (TM 5-2350-262-10).

END OF TASK

END OF WORK PACKAGE

CHAPTER 4

PARTS INFORMATION

WORK PACKAGE INDEX

INTRODUCTION TO REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL) 0040 00

SCOPE

This RPSTL lists and authorizes spares and repair parts, special tools, special Test, Mesaurement and Diagnostic Equipment (TMDE), and other special support equipment required for performance of Unit, Direct Support, and General Support maintenance of the Armored Combat Earthmover, M9 (including depot maintenance spares and repair parts). It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

GENERAL

In addition to the introduction work package, this RPSTL is divided into the following sections:

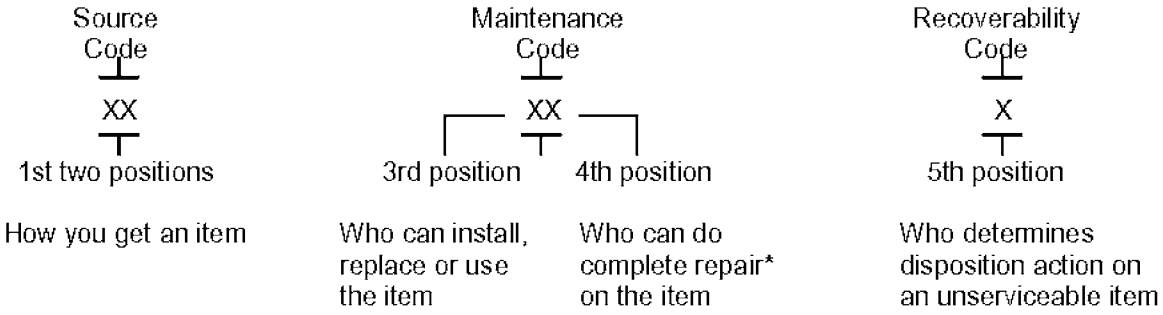
1. ***Repair Parts List Work Package.*** Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts shall be listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
2. ***Special Tools List Work Package.*** Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
3. ***Cross Reference Indexes Work Package.*** There are two cross-reference indexes work packages in this RPSTL: The National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The NSN Index work package refers you to the figure and item number. The P/N Index work package refers you to the figure and item number.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE.

1. ***Item No. [Column (1)].*** Indicates the number used to identify items called out in the illustration.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

2. ***SMR Code [Column (2)].*** The SMR code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



** complete repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "repair" function in a use/user environment in order to restore serviceability to a failed item.*

3. ***Source Code.*** The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

Code	*Application/Explanation*
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request/ requisition items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code. **Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be requested/ requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

Code	*Application/Explanation*
MO — Made at UM/AVUM level MF — Made at DS/AVUM level MH — Made at GS level ML — Made at Specialized Repair Activity (SRA) MD — Made at Depot	Items with these codes are not to be requested/ requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
AO — Assembled by UM/AVUM Level AF — Assembled by DS/AVIM Level AH — Assembled by GS Category AL — Assembled by SRA AD — Assembled by Depot	Items with these codes are not to be requested/ requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

XA — Do not requisition an 'XA'-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)

XB — If an 'XB' item is not available from salvage, order it using the CAGE and part number given.

XC — Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.

XD — Item is not stocked. Order an 'XD'-coded item through normal supply channels using the CAGE and part number given, if no NSN is available.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA".

4. ***Maintenance Code.*** Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

a. THIRD POSITION. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

Maintenance Code	Application/Explanation
C	Crew or operator maintenance done within unit maintenance.
O	Unit level maintenance can remove, replace, and use the item.
F	Direct support maintenance can remove, replace, and use the item.
H	General support maintenance can remove, replace, and use the item.
D	Depot level can remove, replace, and use the item.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

b. FOURTH POSITION. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

Maintenance Code	Application/Explanation
O	Unit is the lowest level that can do complete repair of the item.
F	Direct support is the lowest level that can do complete repair of the item.
H	General support is the lowest level that can do complete repair of the item.
D	Depot is the lowest level that can do complete repair of the item.
L	Reparable item. Repair restricted to designated Specialized Repair Activity.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

5. Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

Recoverability Code	Application/Explanation
Z	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O	Reparable item. When uneconomically reparable, condemn and dispose of the item at the unit level.
F	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support level.
H	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	Reparable item. Condemnation and disposal not authorized belowSpecialized Repair Activity (SRA).
A	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

6. ***NSN [Column (3)].*** The NSN for the item is listed in this column.

7. ***CAGEC [Column (4)].*** The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

8. ***Part Number [Column (5)].*** Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

9. ***Description and Usable on Code (UOC) [Column (6)].*** This column includes the following information:

a. The federal item name, and when required, a minimum description to identify the item.

b. P/Ns of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.

c. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.

d. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE - Continued

e. ***QTY [Column (7)].*** The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGE FORMAT AND COLUMNS.

1. ***National Stock Number (NSN) Index Work Package.***

a. STOCK NUMBER COLUMN. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN
(e.g., 5385-01-574-1476)
NIIN

When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

b. FIG. COLUMN. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

c. ITEM COLUMN. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. ***Part Number (P/N) Index Work Package.*** P/Ns in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9, and each following letter or digit in like order).

a. PART NUMBER COLUMN. Indicates the P/N assigned to the item.

b. FIG. COLUMN. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

c. ITEM COLUMN. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

SPECIAL INFORMATION

1. ***Usable on Code.*** Not Applicable.

2. ***Fabrication Instructions.*** Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in TM 5-2350-262-20-2 and TM 5-2350-262-34.

3. ***Index Numbers.*** Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / P/N index work packages and the bulk material list in the repair parts list work package.

HOW TO LOCATE REPAIR PARTS

1. ***When NSNs or P/Ns Are Not Known:***

a. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

b. Find the figure covering the functional group or the subfunctional group to which the item belongs.

c. Identify the item on the figure and note the number(s).

EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGE FORMAT AND COLUMNS - Continued

d. Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. ***When NSN Is Known:***

a. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

b. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. ***When P/N Is Known.***

a. If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.

b. Look up the item on the figure in the applicable repair parts list work package. Verify that the item is the one you are looking for.

ABBREVIATIONS

The abbreviations used in this publication are common in trade practice and MIL-STD-12, Military Standard Abbreviations for Use on Drawings, and in Specifications, Standards, and Technical Documents.

ABBREVIATION - Continued

Abbreviation	Explanation
AAL	Additional Authorization List
AC	Alternating Current
ACE	Armored Combat Earthmover
ADPTR	Adapter
A/R	As Required
ASSY	Assembly
BLK	Black
BII	Basic Issue Items
BOI	Basis of Issue
BRG	Bearing
CAGEC	Commercial and Government Entity Code
CKT BKR	Circuit Breaker
CL	Class
COEI	Components of End Item
CONN	Connector
CTSK	Countersunk
DEG	Degree
DIA	Diameter
DS	Direct Support
EA	Each
ELEC	Electrical
Ext	External
F	Forward
FIG	Figure
FIL	Fillister
FILH	Fillister Head
FL	Flat
FLH	Flat Head
FT	Foot
GA	Gauge
GND	Ground
GR	Grade
GS	General Support
H	High
HD	Head
HD	Hundred
HDLS	Headless
HEX	Hexagon
HEX HD	Hexagon Head
ID	Inside Diameter
ILLUS	Illustration
IN	Inch
INC	Incorporated
INTL	Internal
L	Low
LB	Pound
LG	Length
LH	Left Hand
LKWR	Lock Wire
LUB	Lubricate
LVL	Level

Abbreviation	Explanation
MACH	Machine
MFD	Manufactured
MIL	Military
MS	Military Standard
MTG	Mounting
NIIN	National Item Identification Number
NO	Number
NOM	Nominal
NPN	No Part Number
NSN	National Stock Number
OD	Outside Diameter
OVE	On-Vehicle Equipment
OVS	Oversize
P/N	Part Number
PG	Package
PSI	Pounds per Square Inch
Qty	Quantity
R	Reverse
RBR	Rubber
RD	Round
RH	Right Hand
RLF	Relief
RLR	Roller
RND	Round
RPSTL	Repair Parts and Special Tools List
SAE	Society of Automotive Engineers
SCH	Socket Head
SKT	Socket
SLTD	Slotted
SLVG	Sleeving
SMR	Source, Maintenance, and Recoverability
SP	Speed
SPEC	Specification
SQ	Square
STD	Standard
STE/ICE-R	Simplified Test Equipment for Internal Combustion Engines-Reprogrammable
STL	Steel
STR	Straight
SYN	Synthetic
THD	Thread
THK	Thick
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
TRH	Truss Head
TRK	Track
U/M	Unit of Measure
UN	Unified
V	Variable (in column 7 only)

ABBREVIATION - Continued

Abbreviation	Explanation
V	Volt
VDC	Direct-Current Volts
WG	Wire Gauge
WP	Water Pump
WSHR	Washer
XMSN	Transmission
YD	Yard

END OF WORK PACKAGE

DIRECT SUPPORT MAINTENANCE
HYDRAULIC DIAGNOSTIC CENTER CONTROL BOX

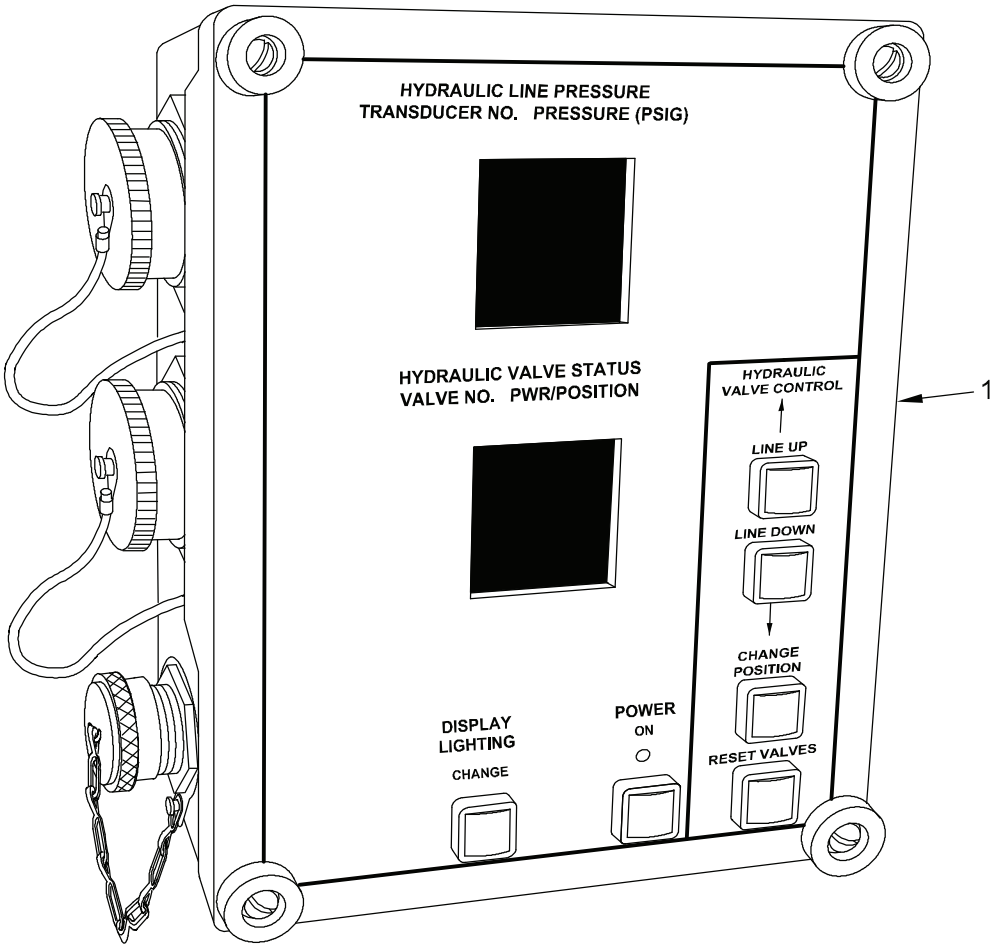


Figure 1. Hydraulic Diagnostic Center Control Box

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 1. HYDRAULIC DIAGNOSTIC CENTER CONTROL BOX	
1	PAODD	6110-01-537-8428	19207	12496937	CONTROL BOX, HDC	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
HYDRAULIC DIAGNOSTIC CENTER STOWAGE BRACKET

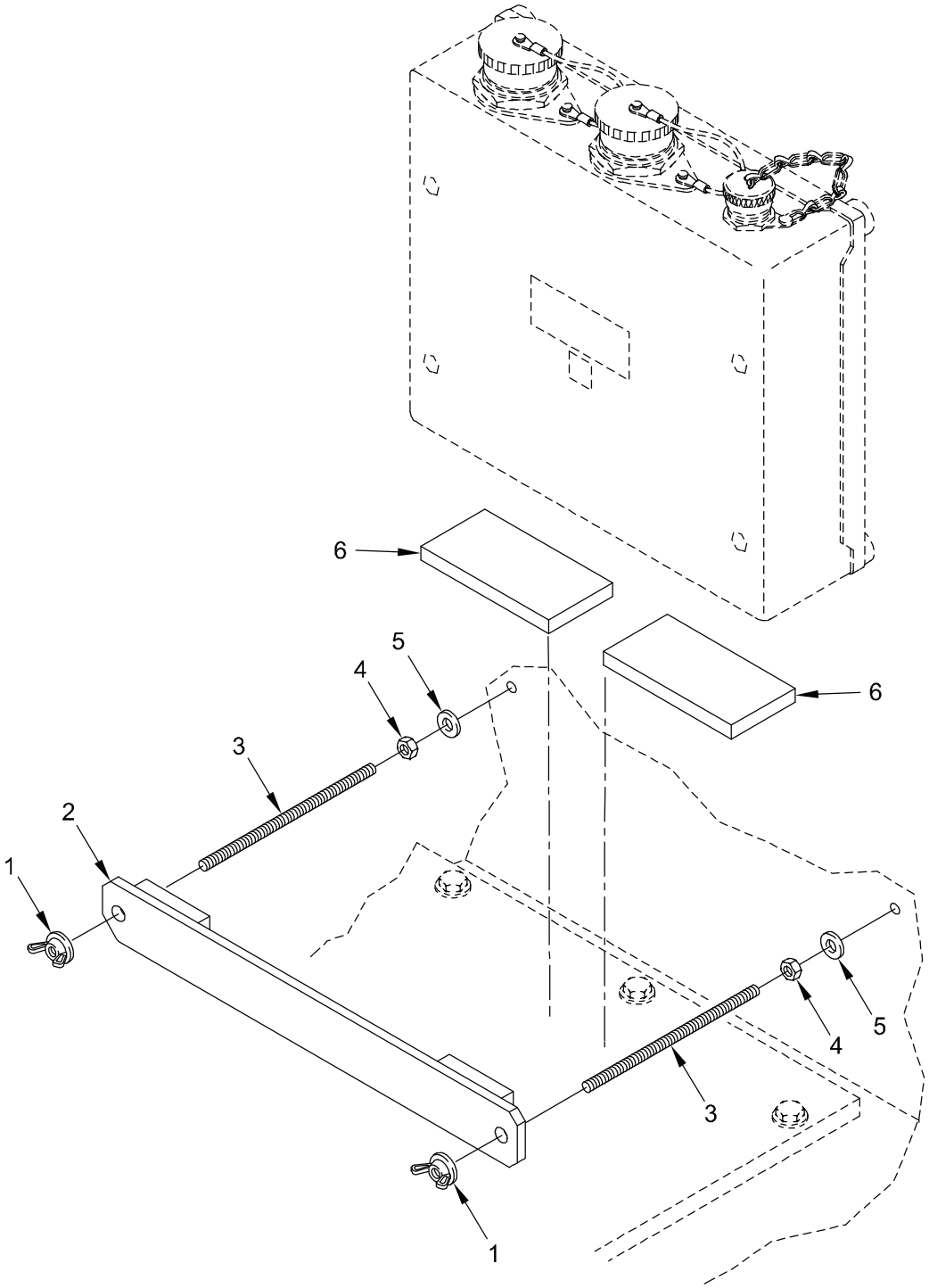


Figure 2. Hydraulic Diagnostic Center Stowage Bracket

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 2. HYDRAULIC DIAGNOSTIC CENTER STOWAGE BRACKET	
1	PAOZZ	5310-00-815-1073	19207	10917219	NUT, WING	2
2	PAOZZ	5340-01-536-9863	06085	12496933	RETAINER	1
3	PAOZZ	5307-01-536-0580	80205	NAS1454C4A-0504	ROD, THREADED	2
4	PAOZZ	5310-00-761-6882	96906	MS51967-2	NUT, JAM	2
5	PAOZZ	5310-00-285-8124	96906	MS27183-50	WASHER, FLAT	2
6	PAOZZ	2590-01-536-1519	19207	12496932	PAD, RUBBER	2
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
HYDRAULIC DIAGNOSTIC CENTER DISCONNECT BRACKET

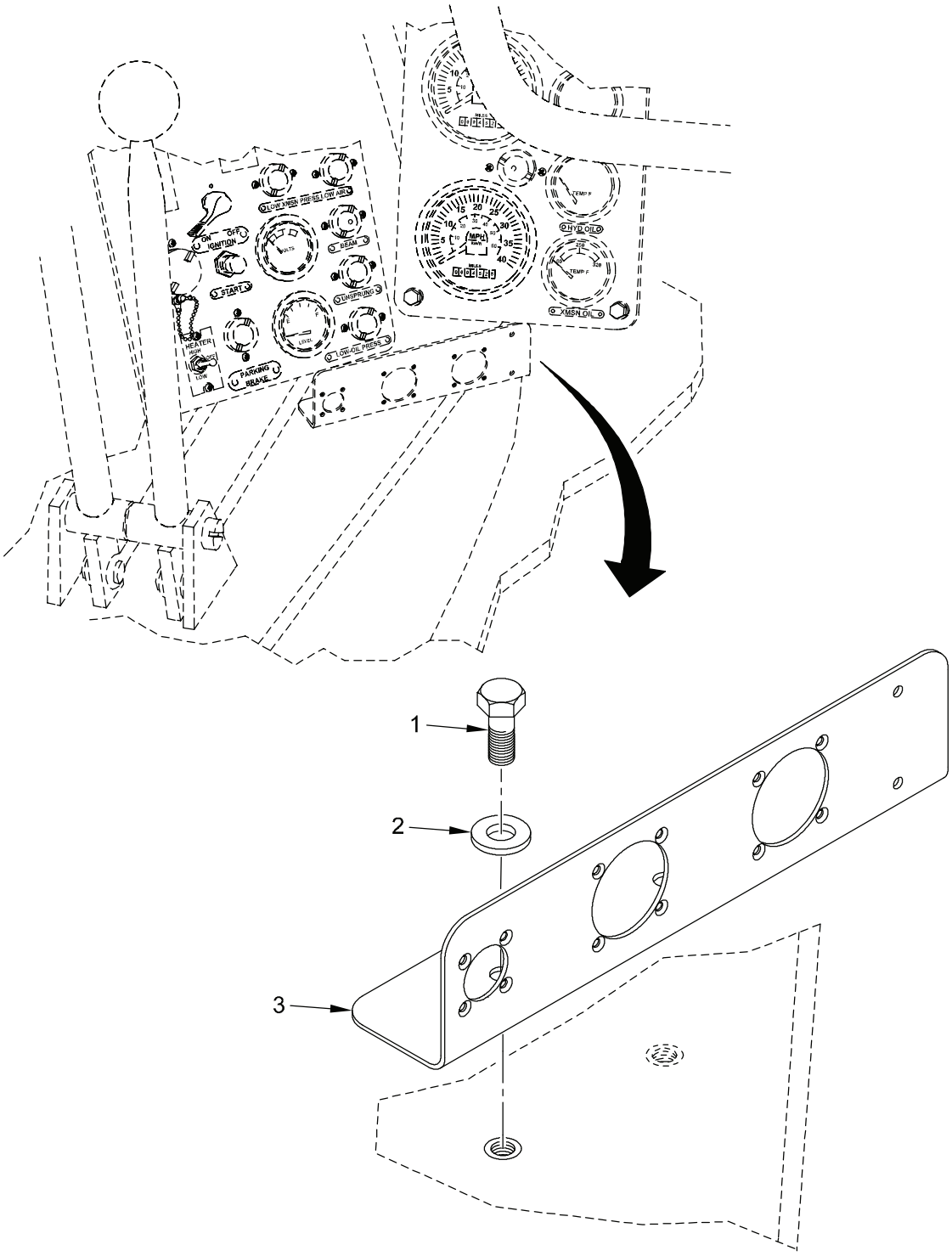


Figure 3. Hydraulic Diagnostic Center Disconnect Bracket

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 3. HYDRAULIC DIAGNOSTIC CENTER DISCONNECT BRACKET	
1	PAOZZ	5306-01-175-7558	80204	B1821BH025C075L	SCREW, SELF-LOCKING	2
2	PAOZZ	5310-00-285-8124	96906	MS27183-50	WASHER, FLAT	2
3	PAOZZ	2590-01-536-3813	19207	12496964	PLATE, DISCONNECT	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
HYDRAULIC DIAGNOSTIC CENTER CIRCUIT BREAKER

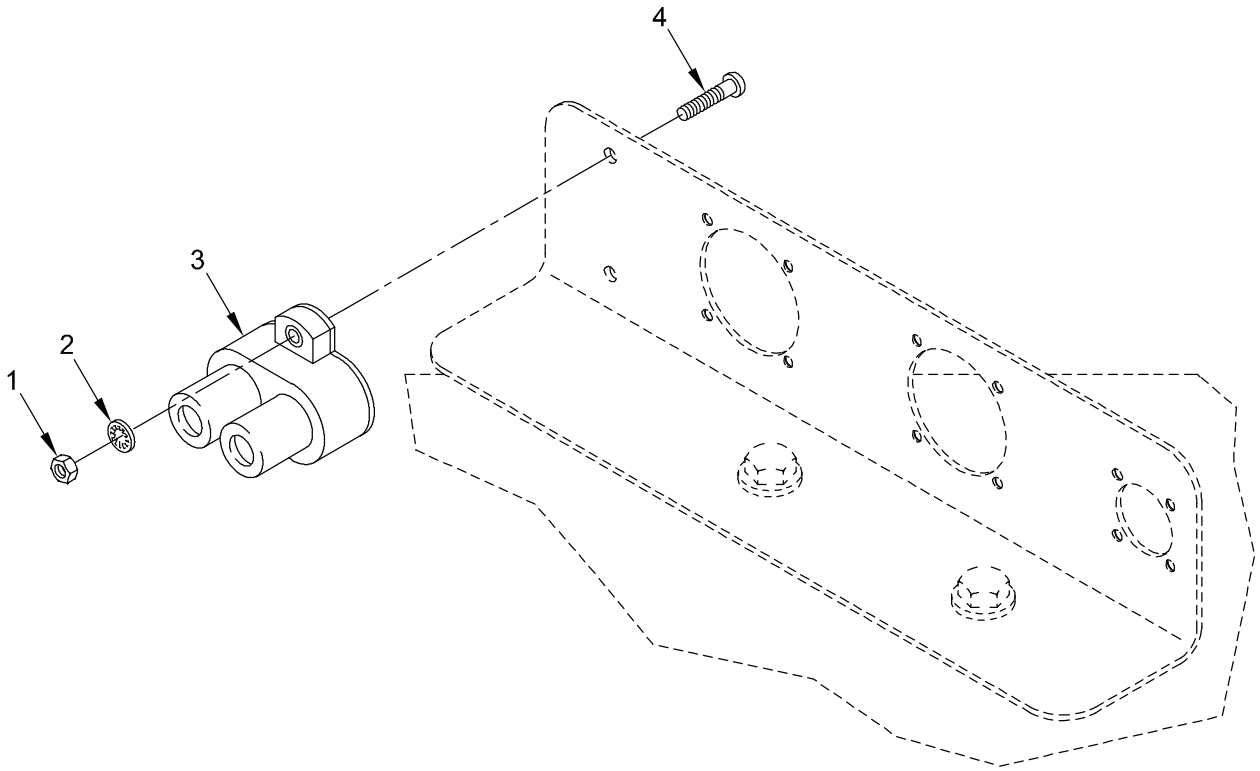


Figure 4. Hydraulic Diagnostic Center Circuit Breaker

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 4. HYDRAULIC DIAGNOSTIC CENTER CIRCUIT BREAKER	
1	PAOZZ	5310-00-934-9757	96906	MS35649-282	NUT, PLAIN HEXAGON	2
2	PAOZZ	5310-00-559-0070	96906	MS35333-38	WASHER, LOCK	2
3	PAOZZ	5925-01-430-2318	58536	AA55571/01-001	CIRCUIT BREAKER	1
4	PAOZZ	5305-00-984-6197	96906	MS35206-249	SCREW, MACHINE	2
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
HDC POWER MODIFICATION

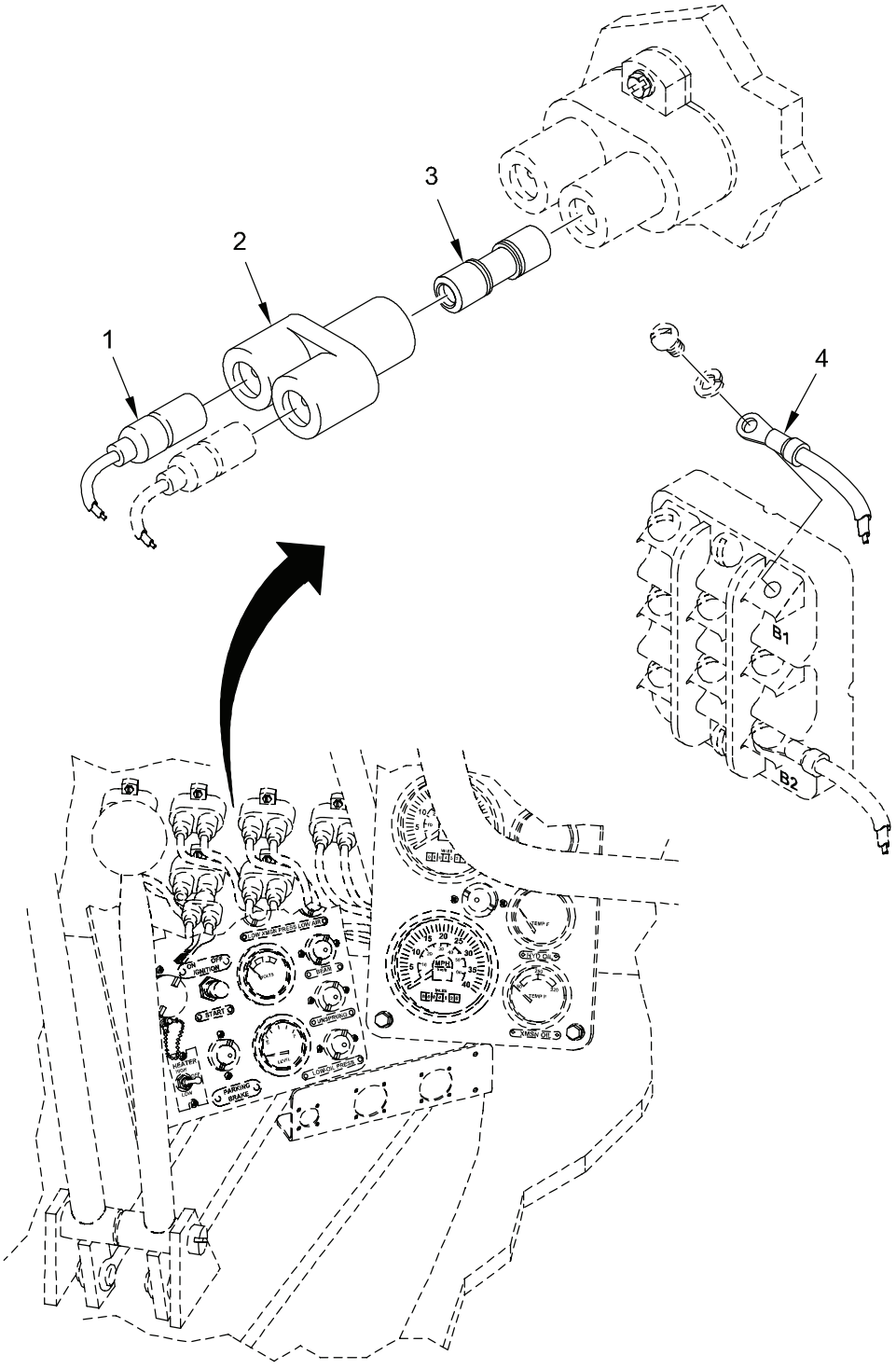


Figure 5. HDC Power Modification

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 5. HDC POWER MODIFICATION	
1	PAOZZ	6150-01-536-3072	19207	12496957	LEAD ASSEMBLY	1
2	PAOZZ	5935-00-900-6281	19207	MS27147-1	Y-CONNECTOR	1
3	PAOZZ	5335-00-807-4109	19207	8741492	CONNECTOR, IN-LINE	1
4	PAOZZ	6150-01-536-2015	19207	12496958	LEAD ASSEMBLY	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
WIRING HARNESS W1

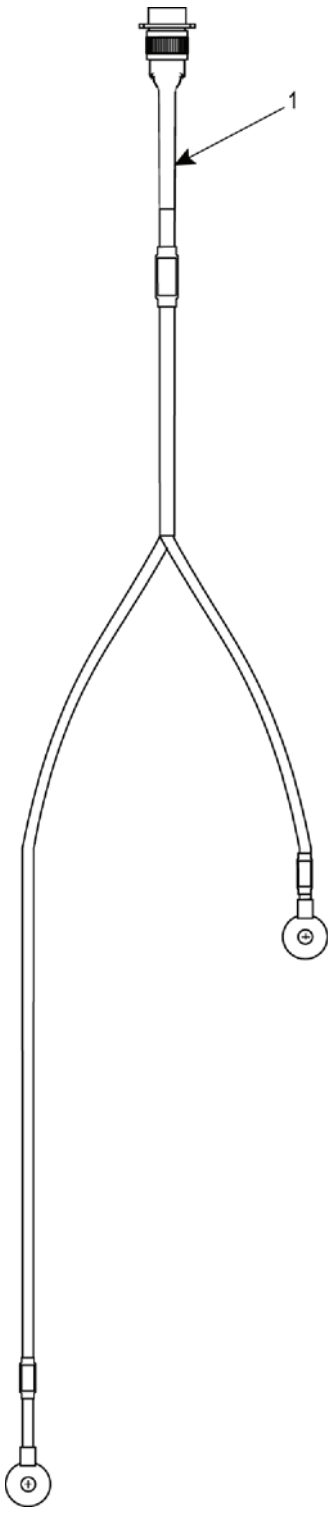


Figure 6. Wiring Harness W1

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 6. WIRING HARNESS W1	
1	PAOZZ	6150-01-536-1117	19207	12496953	WIRING HARNESS, BRANCHED	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
WIRING HARNESS W2

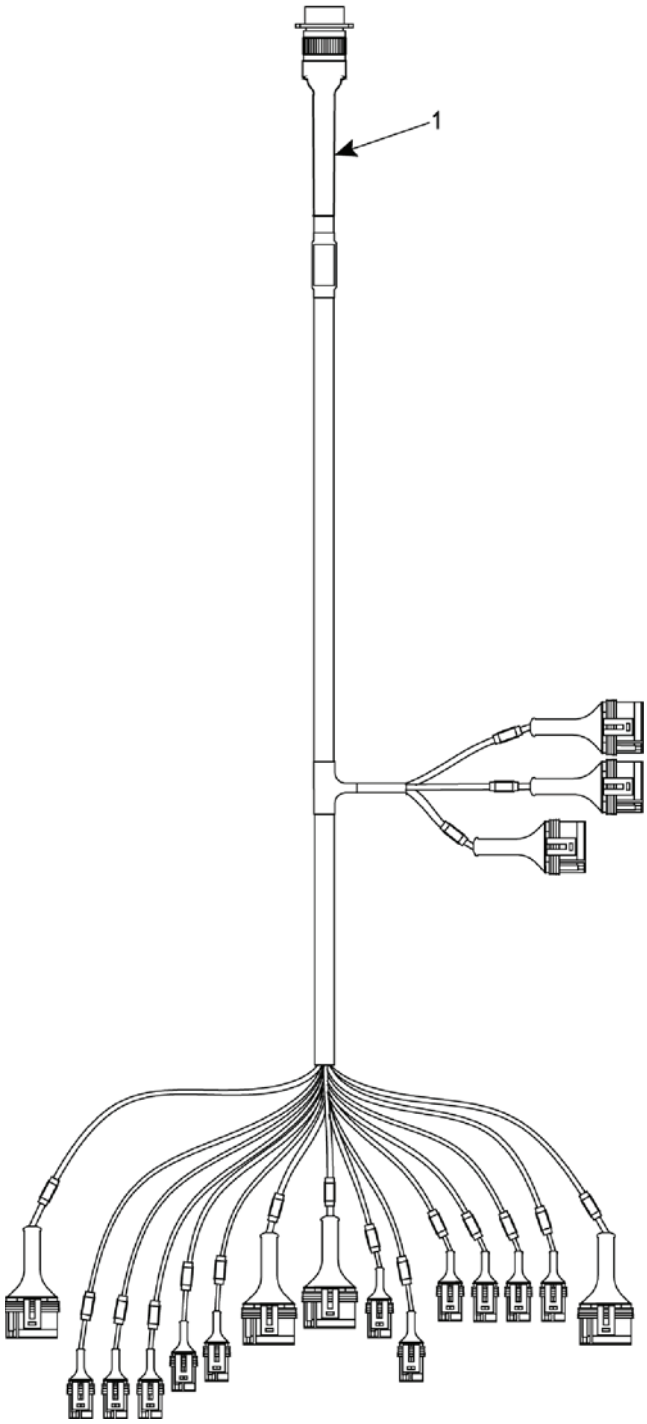


Figure 7. Wiring Harness W2

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 7. WIRING HARNESS W2	
1	PAOZZ	6150-01-536-2129	19207	12496954	WIRING HARNESS, BRANCHED	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
WIRING HARNESS W3

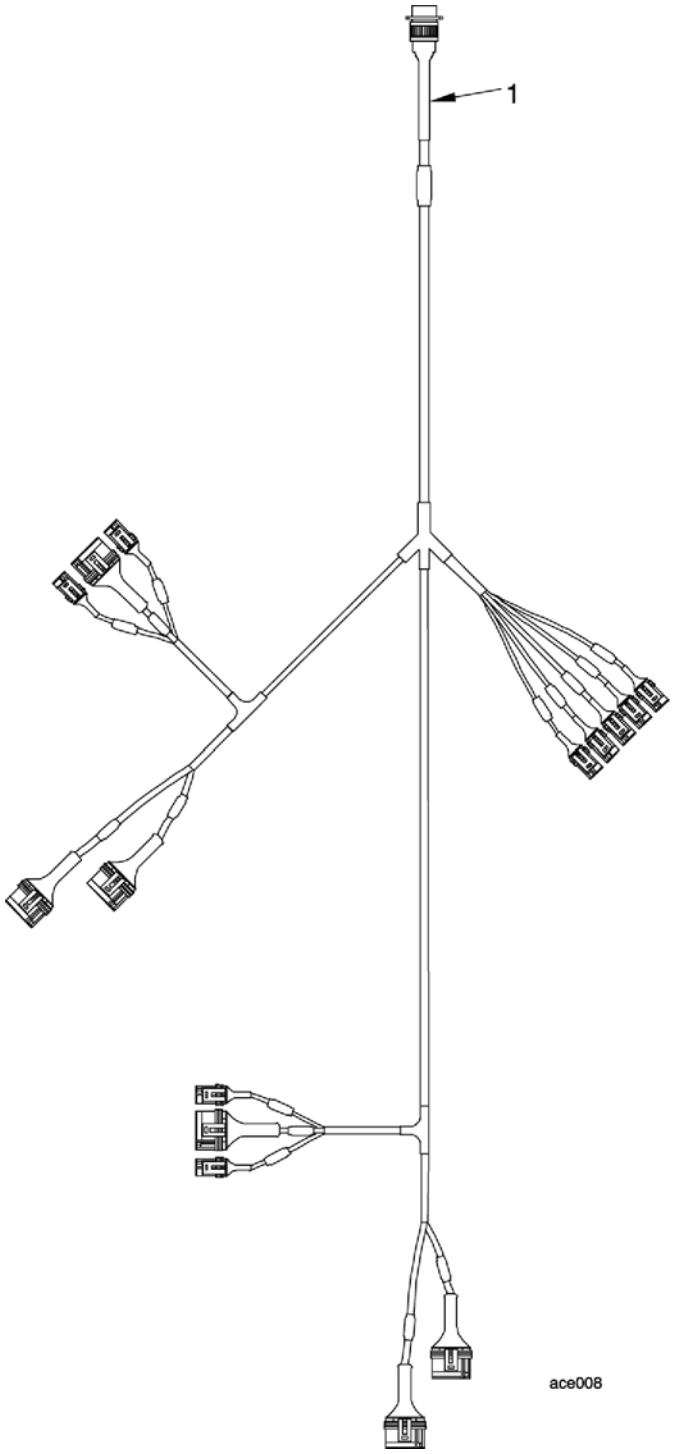


Figure 8. Wiring Harness W3

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 8. WIRING HARNESS W3	
1	PAOZZ	6150-01-536-3311	19207	12496955	WIRING HARNESS, BRANCHED	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
WIRING HARNESS W4

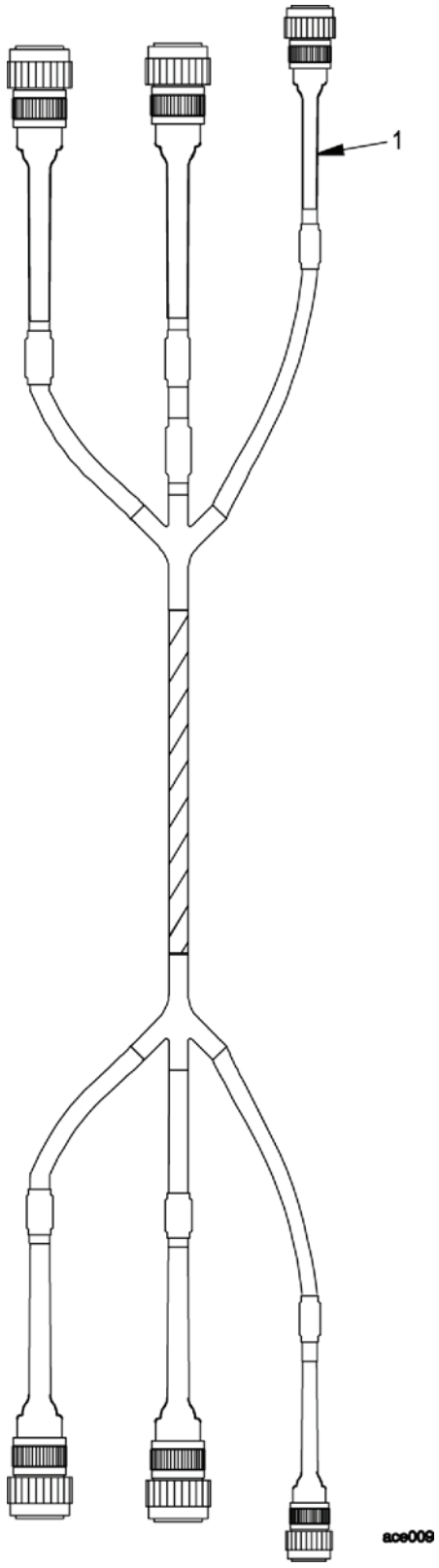


Figure 9. Wiring Harness W4

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 9. WIRING HARNESS W4	
1	PAOZZ	6150-01-536-5854	19207	12496956	WIRING HARNESS, BRANCHED	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
PRESSURE TRANSDUCERS T3, T4, T5, T6, T7, T8, T9 AND T12 (TRANSDUCER T4 SHOWN)

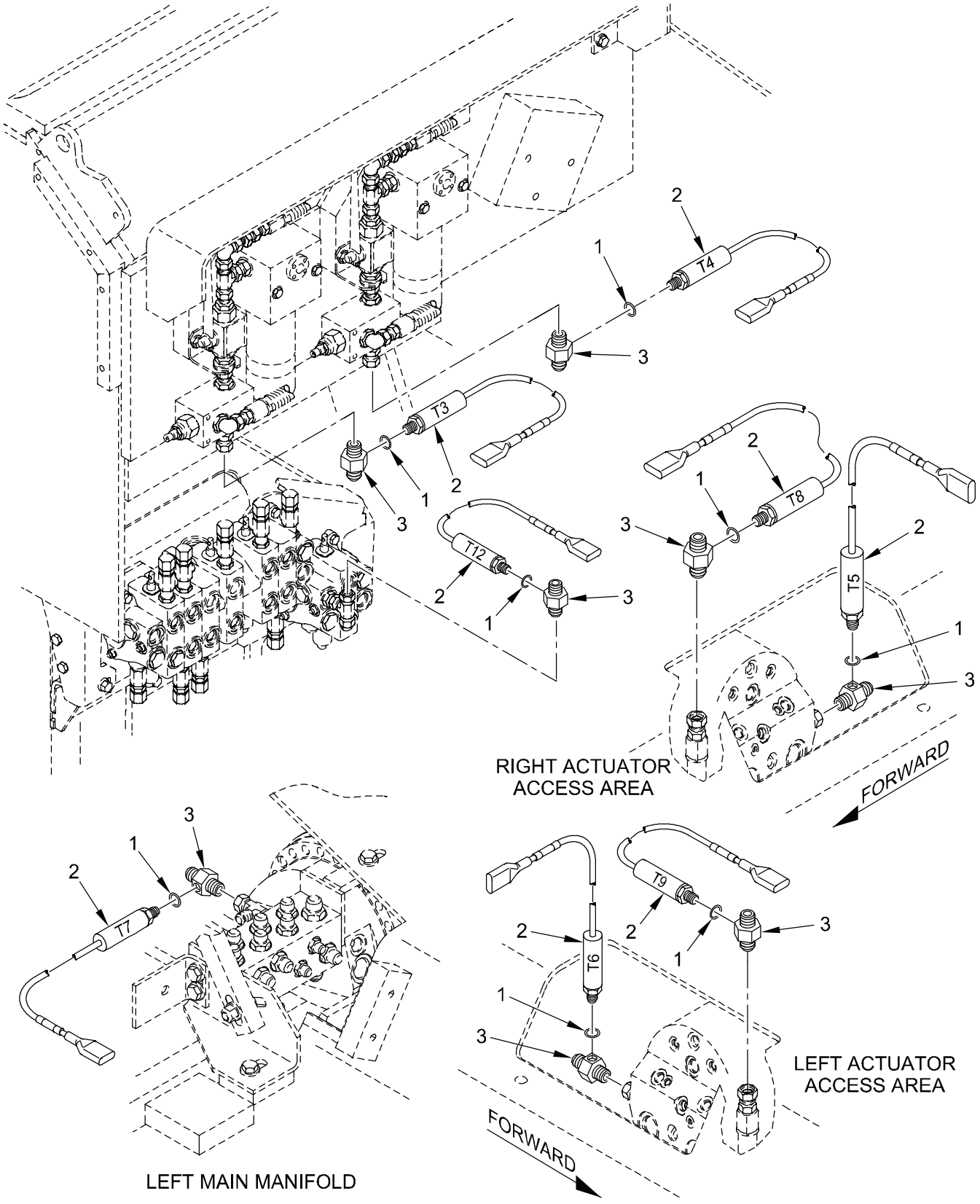


Figure 10. Pressure Transducers T3, T4, T5, T6, T7, T8, T9 and T12

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 10. PRESSURE TRANSDUCERS T3, T4, T5, T6, T7, T8, T9 AND T12	
1	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING, -4	8
2	PAOZZ	6695-01-536-2040	19207	12496923	TRANSDUCER, PRESSURE	8
3	PAOZZ	4730-01-537-0516	30780	8-4XHX6G5TP	ADAPTER, DIAGNOSTIC TEE, -8	8
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
MOUNTING BRACKETS, PRIMARY MANIFOLD

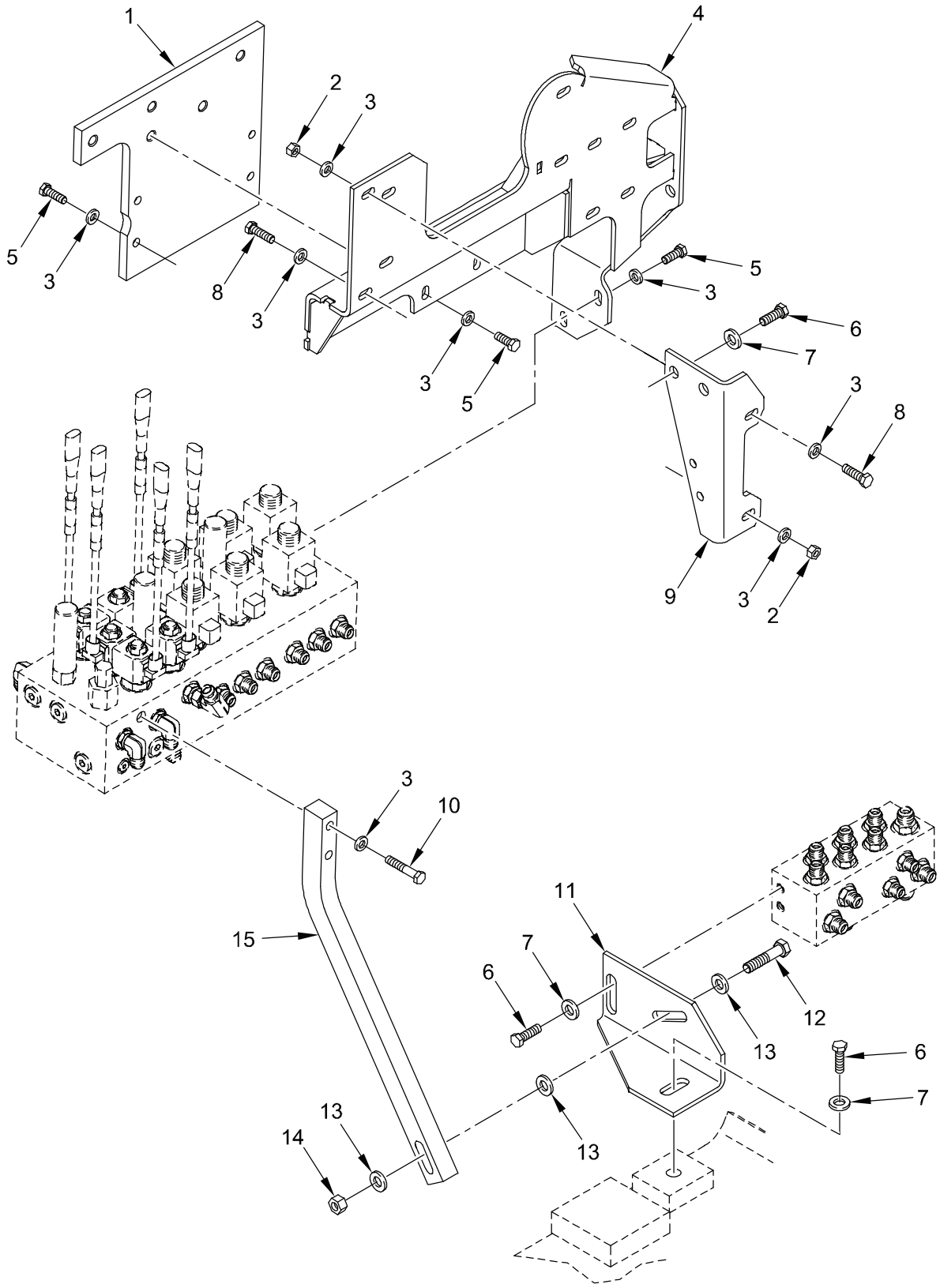


Figure 11. Mounting Brackets, Primary Manifold

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 11. MOUNTING BRACKETS, PRIMARY MANIFOLD	
1	PAOZZ	5340-01-536-1486	19207	12496959	PLATE, MOUNTING	1
2	PAOZZ	5310-00-483-8790	80205	MS17829-6C	NUT, SELF-LOCKING	2
3	PAOZZ	5310-00-877-5972	19207	10910174-3	WASHER, FLAT	17
4	PAOZZ	2590-01-537-2318	19207	12496944	BRACKET, OUTBOARD	1
5	PAOZZ	5306-01-114-0963	80204	B1821BH038C100L	SCREW, SELF-LOCKING	11
6	PAOZZ	5306-01-205-2799	80204	B1821BH050C113L	SCREW, SELF-LOCKING	8
7	PAOZZ	5310-00-809-5998	96906	MS27183-18	WASHER, FLAT	8
8	PAOZZ	5305-00-068-0511	80204	B1821BH038C125N	SCREW	2
9	PAOZZ	5340-01-536-2060	19207	12496952	BRACKET, INBOARD ANGLE	1
10	PAOZZ	5306-01-194-0591	80204	B1821BH038C200L	SCREW, SELF-LOCKING	2
11	PAOZZ	5340-01-536-4160	19207	12496927	BRACKET, ANGLE	1
12	PAOZZ	5305-00-543-2866	80204	B1821BH050C250N	SCREW	1
13	PAOZZ	5310-00-866-4417	19207	10910174-5	WASHER, FLAT	3
14	PAOZZ	5310-00-565-4287	80205	MS17829-8C	NUT, SELF-LOCKING	1
15	PAOZZ	5340-01-536-7170	19207	12496924	BRACE, LATERAL	1

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
PRIMARY MANIFOLD ASSEMBLY

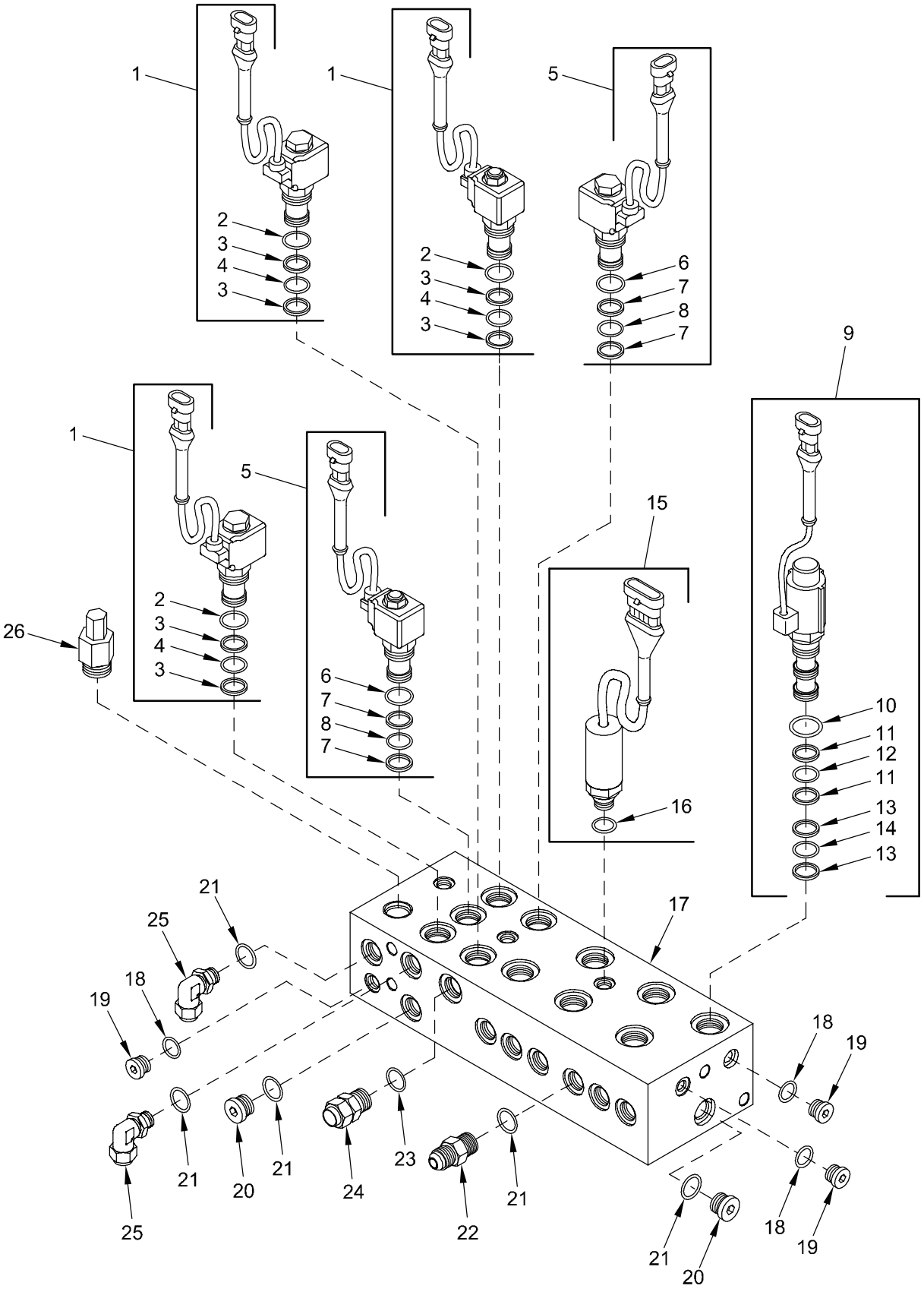


Figure 12. Primary Manifold Assembly (Sheet 1 of 2)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 12. PRIMARY MANIFOLD ASSEMBLY	
1	PAOZZ	4810-01-536-2997	19207	12496925	VALVE, NORMALLY OPEN	3
2	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	3
3	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	6
4	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	3
5	PAOZZ	4810-01-536-6609	19207	12496926	VALVE, NORMALLY CLOSED	2
6	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	2
7	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	6
8	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	2
9	PAOZZ	4810-01-536-5871	19207	12496936	VALVE, 3-WAY	6
10	PAOZZ	5331-00-251-8839	81343	MS28778-12	.O-RING	6
11	PAOZZ	5330-00-720-3652	96906	MS28774-019	.TEFLON BACKUP	12
12	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	6
13	PAOZZ	5330-00-839-1846	96906	MS28774-018	.TEFLON BACKUP	12
14	PAOZZ	5331-00-618-0799	81343	MS28775-018	.O-RING	6
15	PAOZZ	6695-01-536-2040	19207	12496923	TRANSDUCER, PRESSURE	3
16	PAOZZ	5330-01-331-8137	96906	MS28778-4	.O-RING	3
17	PAOZZ	4730-01-536-3025	19207	12496935	MANIFOLD, PRIMARY	1
18	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING	8
19	PAOZZ	5365-01-200-1519	19207	12335054-2	PLUG	5
20	PAOZZ	5365-01-228-0730	19207	12335054-5	PLUG	6
21	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	21
22	PAOZZ	4730-01-156-4835	46717	AC-1-310	ADAPTER, STRAIGHT	11
23	PAOZZ	5331-00-108-5691	96906	MS28778-10	O-RING	2
24	PAOZZ	4730-01-192-9590	96906	MS51526A-10	ADAPTER, STRAIGHT	1
25	PAOZZ	4730-00-822-5609	96906	MS51527A-8	ADAPTER, 90-DEGREE	2
26	PAOZZ	4820-00-550-6786	8Z296	1A30-F-60SV	VALVE, RELIEF	1
27	PAOZZ	4730-00-936-2172	96906	MS51528A10	ADAPTER, 45-DEGREE	1
28	PAOZZ	4730-01-236-2682	96906	MS51528A8	ADAPTER, 45-DEGREE	1
29	PAOZZ	5365-01-242-4564	19207	12335054-4	PLUG	1
30	PAOZZ	5331-00-804-5695	96906	MS28778-6	O-RING	2

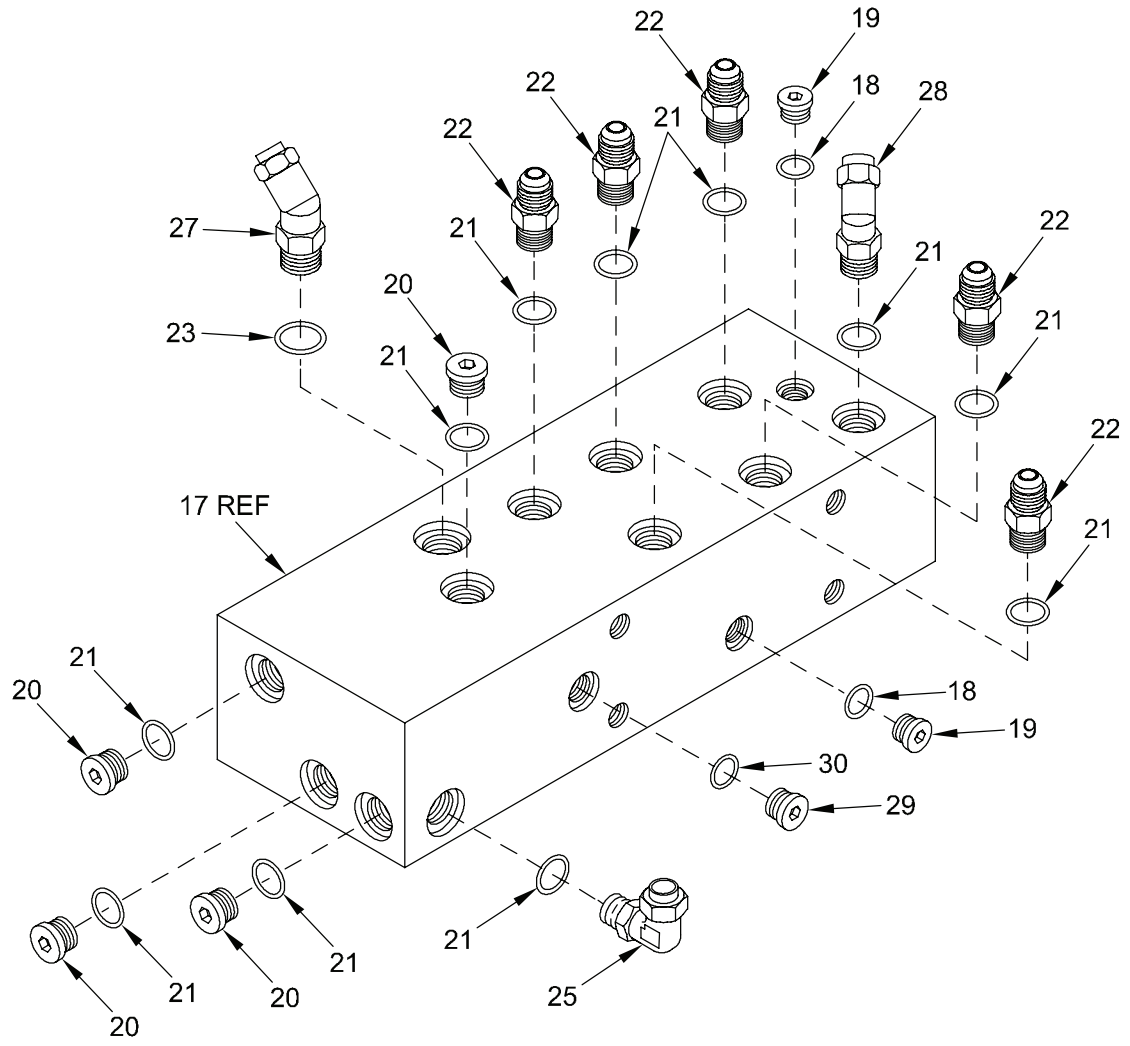


Figure 12. Primary Manifold Assembly (Sheet 2 of 2)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 12. PRIMARY MANIFOLD ASSEMBLY	
1	PAOZZ	4810-01-536-2997	19207	12496925	VALVE, NORMALLY OPEN	3
2	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	3
3	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	6
4	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	3
5	PAOZZ	4810-01-536-6609	19207	12496926	VALVE, NORMALLY CLOSED	2
6	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	2
7	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	6
8	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	2
9	PAOZZ	4810-01-536-5871	19207	12496936	VALVE, 3-WAY	6
10	PAOZZ	5331-00-251-8839	81343	MS28778-12	.O-RING	6
11	PAOZZ	5330-00-720-3652	96906	MS28774-019	.TEFLON BACKUP	12
12	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	6
13	PAOZZ	5330-00-839-1846	96906	MS28774-018	.TEFLON BACKUP	12
14	PAOZZ	5331-00-618-0799	81343	MS28775-018	.O-RING	6
15	PAOZZ	6695-01-536-2040	19207	12496923	TRANSDUCER, PRESSURE	3
16	PAOZZ	5330-01-331-8137	96906	MS28778-4	.O-RING	3
17	PAOZZ	4730-01-536-3025	19207	12496935	MANIFOLD, PRIMARY	1
18	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING	8
19	PAOZZ	5365-01-200-1519	19207	12335054-2	PLUG	5
20	PAOZZ	5365-01-228-0730	19207	12335054-5	PLUG	6
21	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	21
22	PAOZZ	4730-01-156-4835	46717	AC-1-310	ADAPTER, STRAIGHT	11
23	PAOZZ	5331-00-108-5691	96906	MS28778-10	O-RING	2
24	PAOZZ	4730-01-192-9590	96906	MS51526A-10	ADAPTER, STRAIGHT	1
25	PAOZZ	4730-00-822-5609	96906	MS51527A-8	ADAPTER, 90-DEGREE	2
26	PAOZZ	4820-00-550-6786	8Z296	1A30-F-60SV	VALVE, RELIEF	1
27	PAOZZ	4730-00-936-2172	96906	MS51528A10	ADAPTER, 45-DEGREE	1
28	PAOZZ	4730-01-236-2682	96906	MS51528A8	ADAPTER, 45-DEGREE	1
29	PAOZZ	5365-01-242-4564	19207	12335054-4	PLUG	1
30	PAOZZ	5331-00-804-5695	96906	MS28778-6	O-RING	2

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
FORWARD LEFT MANIFOLD ASSEMBLY

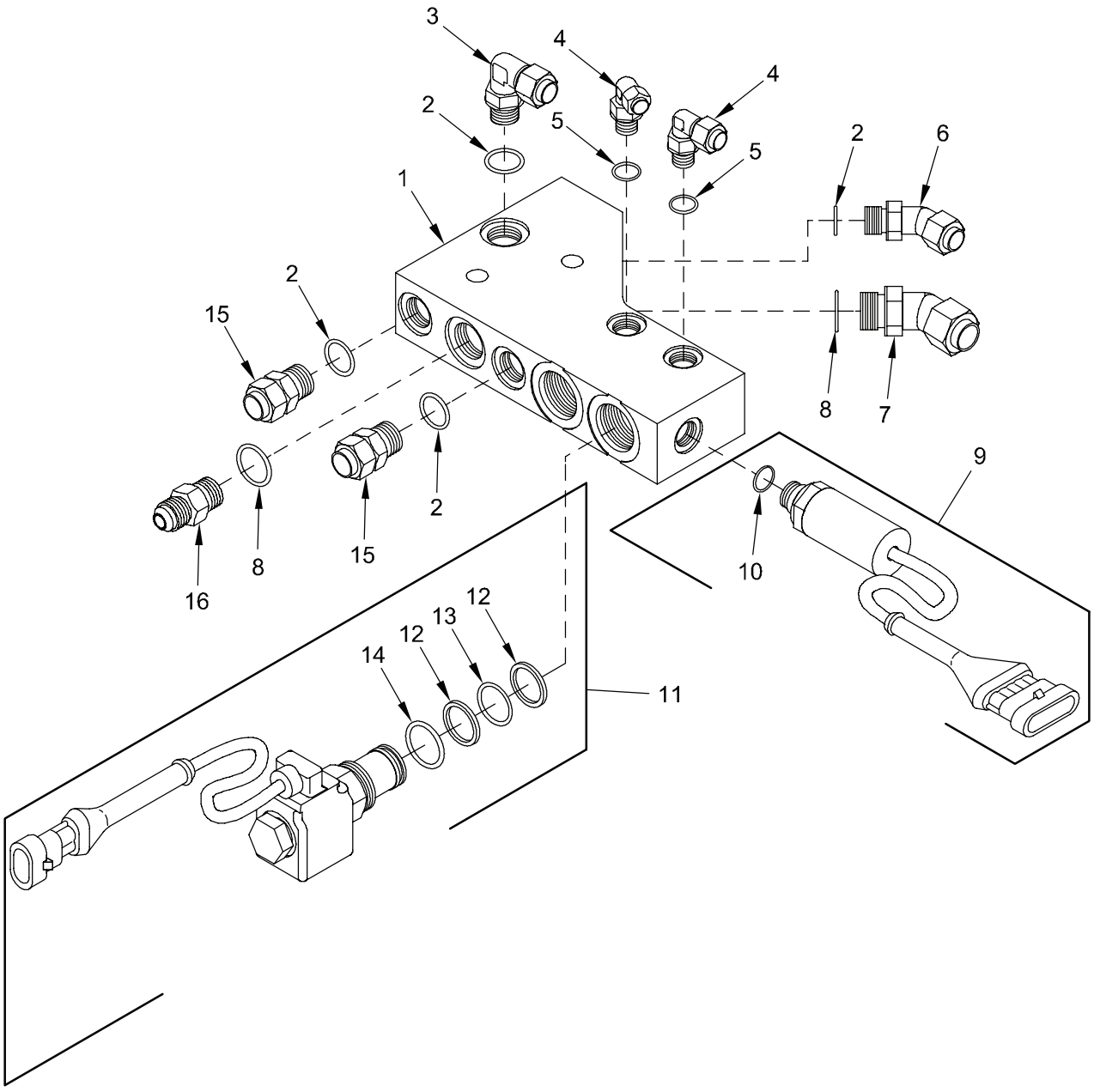


Figure 13. Forward Left Manifold Assembly

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY

FIGURE 13. FORWARD LEFT MANIFOLD ASSEMBLY

1	PAOZZ	4730-01-536-2677	19207	12496934	MANIFOLD	1
2	PAOZZ	5331-00-804-5695	96906	MS28778-6	O-RING	4
3	PAOZZ	4730-00-143-3941	96906	MS51527A6	ELBOW, 90-DEGREE	1
4	PAOZZ	4730-00-585-2309	96906	MS51527A4	ELBOW, 90-DEGREE	2
5	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING	2
6	PAOZZ	4730-00-679-9766	19207	13211E8916-6	ELBOW, 45-DEGREE	1
7	PAOZZ	4730-00-062-5470	19207	13211E8916-1	ELBOW- 45-DEGREE	1
8	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	2
9	PAOZZ	6695-01-536-2040	19207	12496923	TRANSDUCERD, PRESSURE	1
10	PAOZZ	5330-01-331-8137	96906	MS28778-4	.O-RING	1
11	PAOZZ	4810-01-536-2997	19207	12496925	VALVE	2
12	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	4
13	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	2
14	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	2
15	PAOZZ	4730-00-491-9576	96906	MS51525A6	ADAPTER, STRAIGHT	2
16	PAOZZ	4730-01-156-4835	46717	AC-1-310	ADAPTER, STRAIGHT	1

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
FORWARD RIGHT MANIFOLD ASSEMBLY

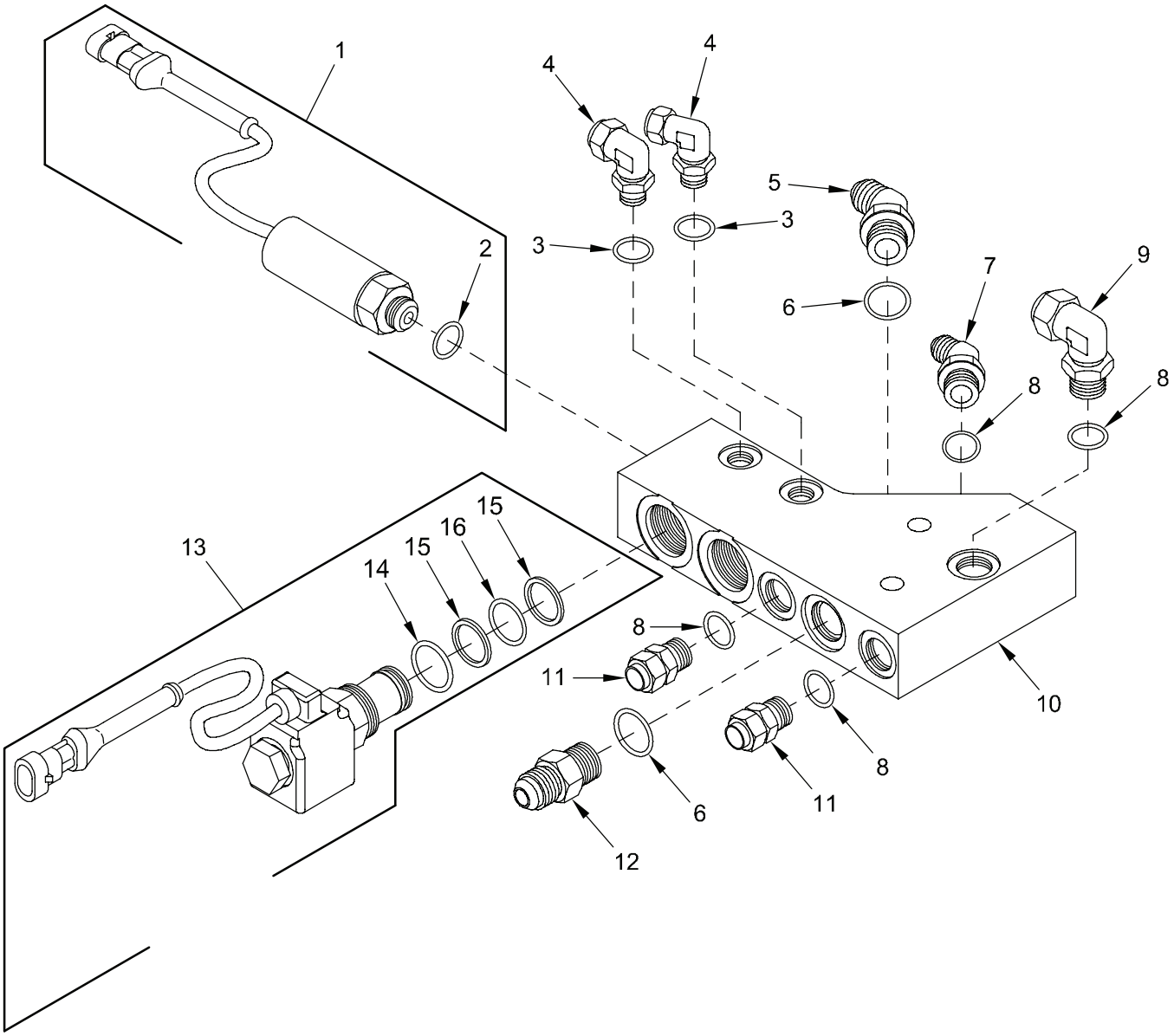


Figure 14. Forward Right Manifold Assembly

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 14. FORWARD RIGHT MANIFOLD ASSEMBLY	
1	PAOZZ	6695-01-536-2040	19207	12496923	TRANSDUCER, PRESSURE	1
2	PAOZZ	5330-01-331-8137	96906	MS28778-4	.O-RING	1
3	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING	2
4	PAOZZ	4730-00-585-2309	96906	MS51527A4	ADAPTER, 90-DEGREE	2
5	PAOZZ	4730-00-062-5470	19207	13211E8916-1	ADAPTER, 45-DEGREE	1
6	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	2
7	PAOZZ	4730-00-679-9766	19207	13211E8916-6	ADAPTER, 45-DEGREE	1
8	PAOZZ	5331-00-804-5695	96906	MS28778-6	O-RING	4
9	PAOZZ	4730-00-143-3941	96906	MS51527A6	ADAPTER, 90-DEGREE	1
10	PAOZZ	4730-01-536-5726	19207	12496948	MANIFOLD	1
11	PAOZZ	4730-00-491-9576	96906	MS51525A6	ADAPTER, STRAIGHT	2
12	PAOZZ	4730-01-156-4835	46717	AC-1-310	ADAPTER, STRAIGHT	1
13	PAOZZ	4810-01-536-2997	19207	12496925	VALVE, NORMALLY OPEN	2
14	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	2
15	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	4
16	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	2

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
AFT MANIFOLD ASSEMBLY

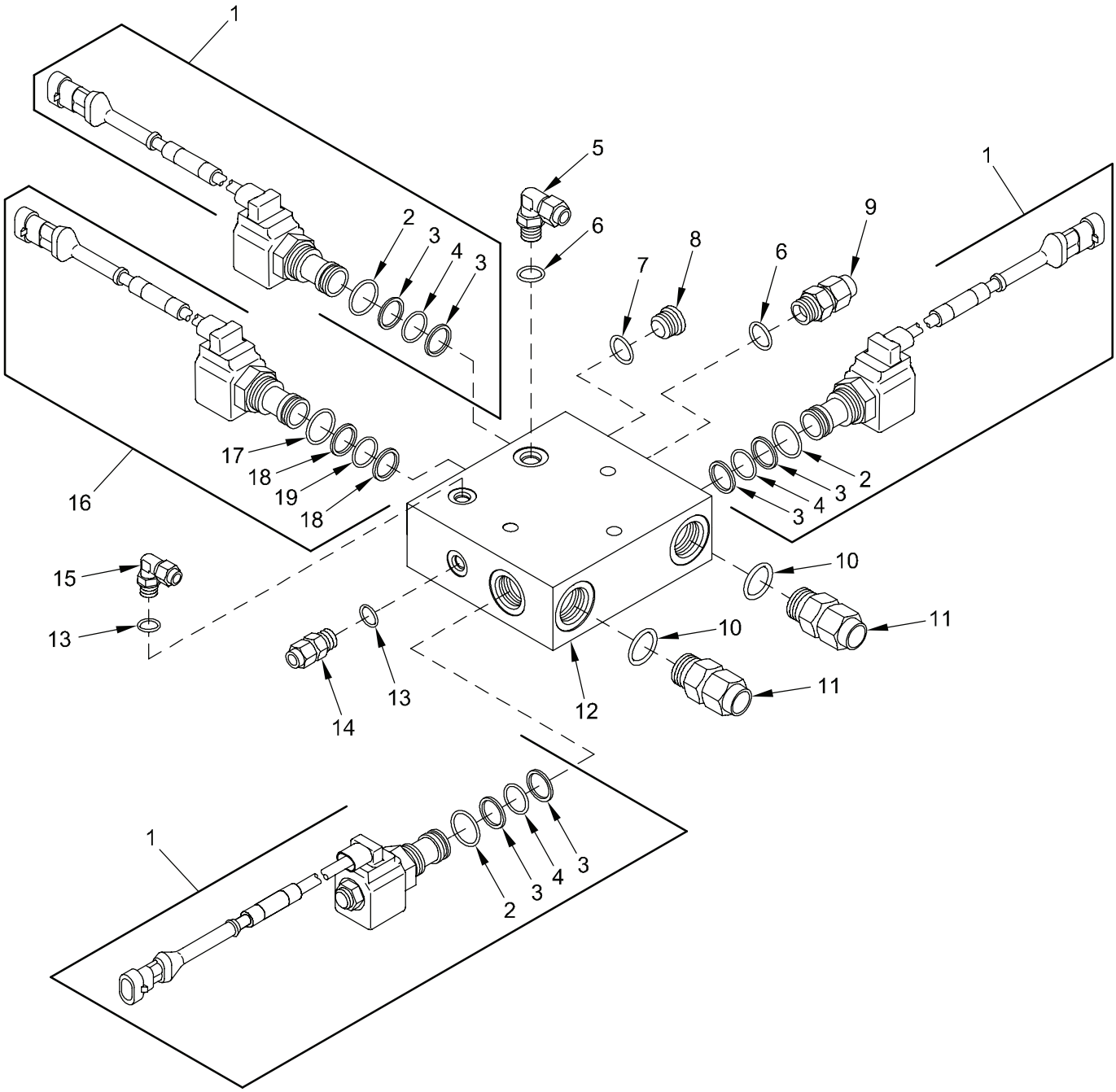


Figure 15. Aft Manifold Assembly

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 15. AFT MANIFOLD ASSEMBLY	
1	PAOZZ	4810-01-536-2997	19207	12496925	VALVE, NORMALLY OPEN	3
2	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	3
3	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	6
4	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	3
5	PAOZZ	4730-00-143-3941	96906	MS51527A6	ADAPTER, 90-DEGREE	1
6	PAOZZ	5331-00-804-5695	96906	MS28778-6	O-RING	2
7	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	1
8	PAOZZ	5365-01-228-0730	19207	12335054-5	PLUG	1
9	PAOZZ	4730-00-491-9576	96906	MS51525A6	ADAPTER, STRAIGHT	1
10	PAOZZ	5331-01-219-7930	96906	MS28778-12	O-RING	2
11	PAOZZ	4730-00-710-5571	96906	MS51525A12	ADAPTER, STRAIGHT	2
12	PAOZZ	4730-01-543-4250	19207	12496938	MANIFOLD	1
13	PAOZZ	5330-01-331-8137	96906	MS28778-4	O-RING	2
14	PAOZZ	4730-01-007-5232	96906	MS51525A4	ADAPTER, STRAIGHT	1
15	PAOZZ	4730-00-585-2309	96906	MS51527A4	ADAPTER, 90-DEGREE	1
16	PAOZZ	4810-01-536-6609	19207	12496926	VALVE, NORMALLY CLOSED	1
17	PAOZZ	5331-01-514-0923	81343	MS28775-118	.O-RING	1
18	PAOZZ	5330-01-118-5705	96906	MS27595-019	.TEFLON BACKUP	2
19	PAOZZ	5331-00-551-8441	96906	MS28775-019	.O-RING	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
MAIN PUMP HYDRAULIC FILTER AREA, RIGHT SIDE AND LEFT SIDE (LEFT SIDE SHOWN)

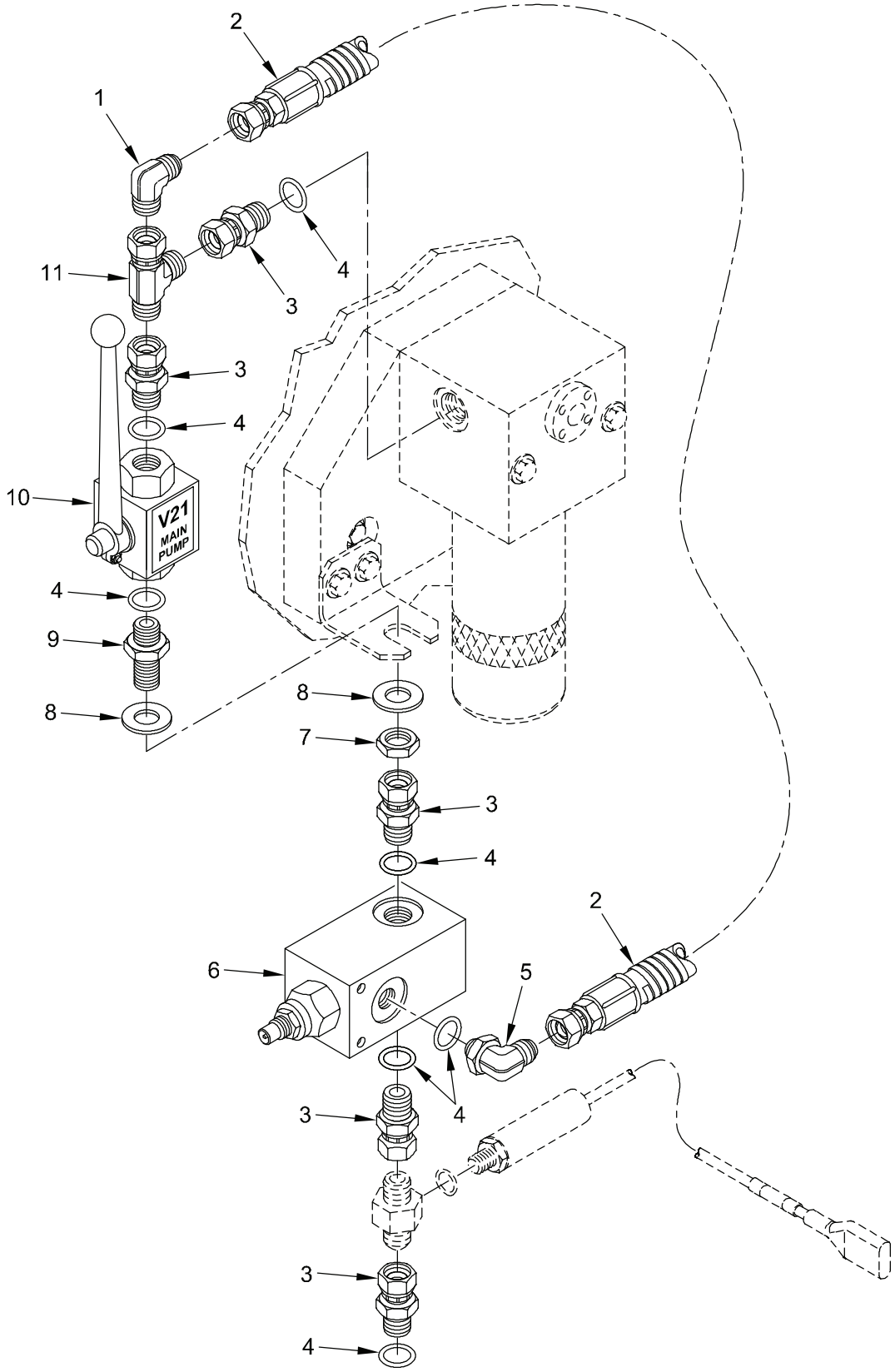


Figure 16. Main Pump Hydraulic Filter Area, Right Side and Left Side (Left Side Shown)

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 16. MAIN PUMP HYDRAULIC FILTER AREA, RIGHT AND LEFT SIDE	
1	PAOZZ	4730-01-284-2195	30780	8-6-ETXS	UNION, ELBOW	2
2	PAOZZ	4720-01-536-7713	19207	13214E2501-12	HOSE, BYPASS	2
3	PAOZZ	4730-01-441-9417	30780	8F650X-SS	ADAPTER, SWIVEL	4
4	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING, -8	14
5	PAOZZ	4730-00-225-0699	19207	13211E9018-12	ADAPTER, 90-DEGREE	2
6	PAOZZ	4820-01-550-0151	8Z296	1A30-01-V8ST1-D-430	VALVE, RELIEF (V21 LEFT)	1
6	PAOZZ	4820-01-158-4066	8Z296	1A30-01-V-8S-E-D	VALVE, RELIEF (V22 RIGHT)	2
7	PAOZZ	5310-01-143-9017	96906	MS51860-56Z	JAMNUT	4
8	PAOZZ	5310-00-877-7527	19200	10910174-8	WASHER, FLAT	2
9	PAOZZ	4730-01-536-8399	30780	8WF50X	ADAPTER, -8	2
10	PAOZZ	4820-01-536-6135	09990	BVHP-08-SSS-1NG	VALVE, BALL MANUAL	2
11	PAOZZ	4730-01-054-3881	96906	MS51523B8	NUT, SWIVEL TEE	2
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
HYDRAULIC FILTER MOUNTING MODIFICATION

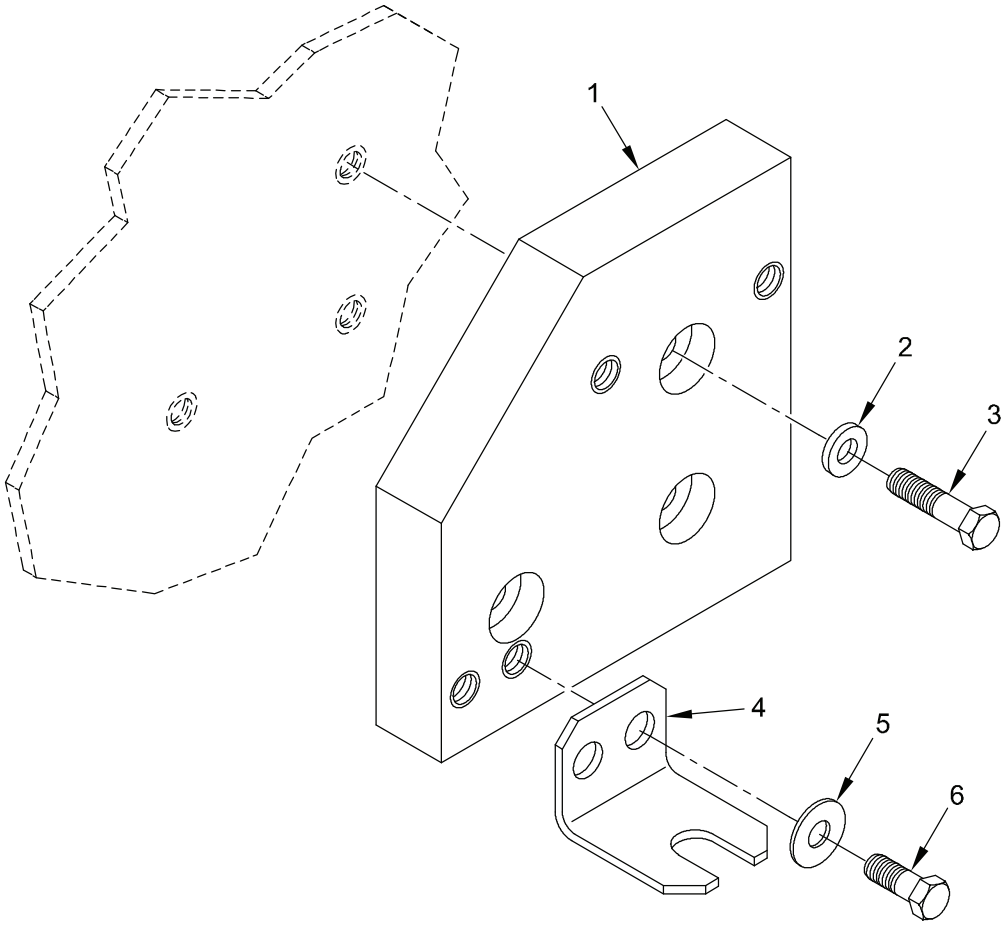


Figure 17. Hydraulic Filter Mounting Modification

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY

FIGURE 17. HYDRAULIC FILTER MOUNTING MODIFICATION

1	PAOZZ	5340-01-536-3775	19207	12496966	PLATE, MOUNTING	2
2	PAOZZ	5310-00-877-5972	19207	10910174-3	WASHER, FLAT	6
3	PAOZZ	5306-00-119-6763	80204	M1821BH038C150L	SCREW, SELF-LOCKING	6
4	PAOZZ	5340-01-541-5407	19207	12496967	BRACKET, SUPPORT	2
5	PAOZZ	5310-00-080-6004	96906	MS27183-14	WASHER, FLAT	4
6	PAOZZ	5306-01-114-0963	80204	B1821BH038C100L	SCREW, SELF-LOCKING	4

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
HDC PRIMARY MANIFOLD ASSEMBLY HYDRAULIC TUBES AND HOSES

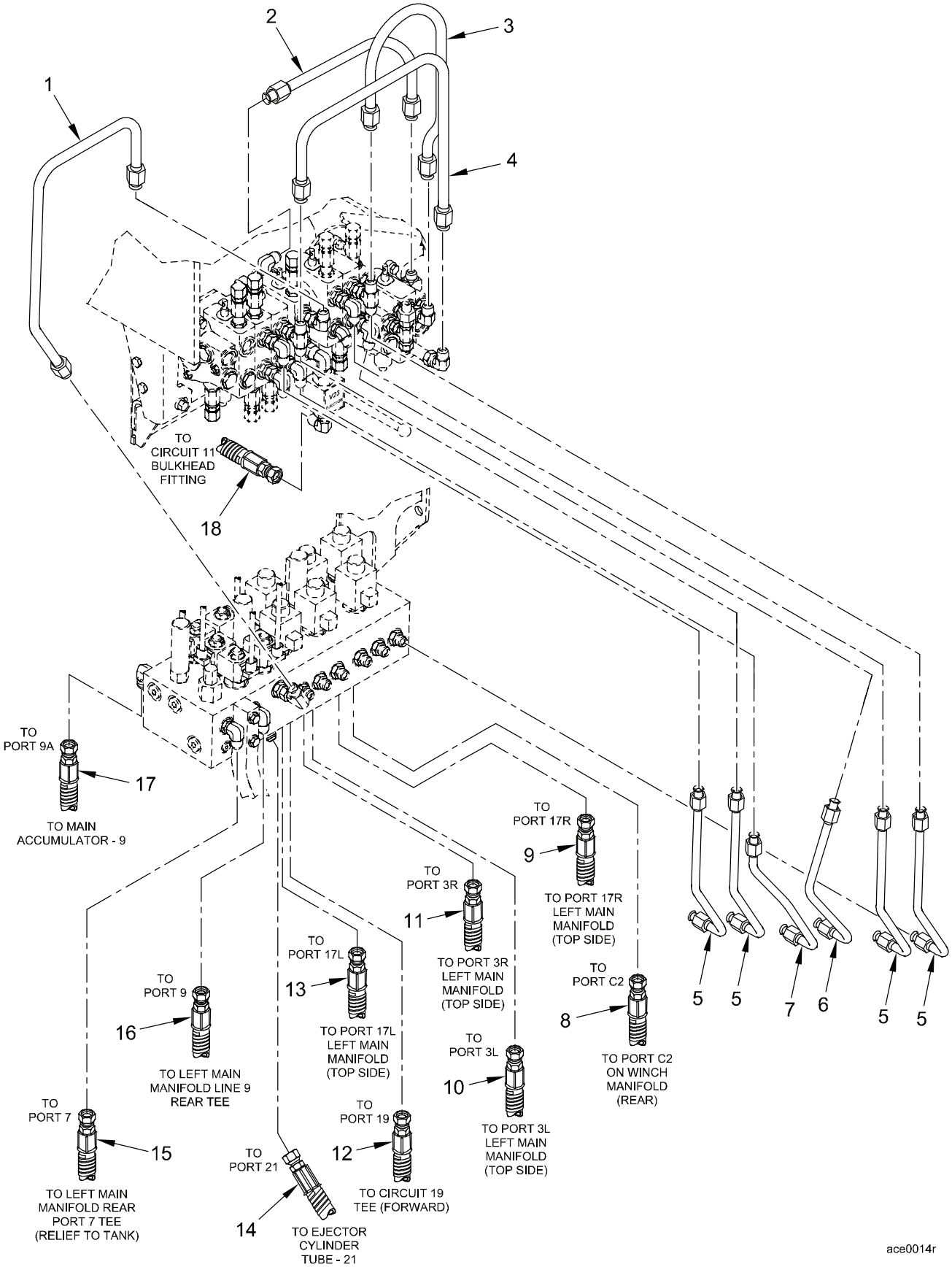


Figure 18. HDC Primary Manifold Assembly Hydraulic Tubes and Hoses

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 18. PRIMARY MANIFOLD ASSEMBLY HYDRAULIC TUBES AND HOSES	
1	PAOZZ	4710-01-543-3418	19207	12496941	TUBE, HYDRAULIC, LARGE	1
2	PAOZZ	4710-01-179-9200	97403	13211E9566	TUBE ASSEMBLY, METAL	1
3	PAOZZ	4710-01-179-7634	97403	13211E9563	TUBE ASSEMBLY, METAL	1
4	PAOZZ	4710-01-179-9199	97403	13211E9565	TUBE ASSEMBLY, METAL	1
5	PAOZZ	4710-01-543-0840	19207	12496940	TUBE, HYDRAULIC, SMALL	4
6	PAOZZ	4710-01-543-3416	19207	12496939	TUBE, HYDRAULIC, DIAGONAL	1
7	PAOZZ	4710-01-543-5071	19207	12496963	TUBE, HYDRAULIC, SMALL DIAGONAL	1
8	PAOZZ	4720-01-563-6545	19207	13214E2478-3	HOSE ASSEMBLY, NONMETAL	1
9	PAOZZ	4720-01-536-6678	19207	13214E2457-21	HOSE ASSEMBLY, NONMETAL	1
10	PAOZZ	4720-01-543-4246	19207	13214E2457-25	HOSE ASSEMBLY, NONMETAL	1
11	PAOZZ	4720-01-543-1165	19207	13214E2457-24	HOSE ASSEMBLY, NONMETAL	1
12	PAOZZ	4720-01-536-7657	19207	13214E2457-22	HOSE ASSEMBLY, NONMETAL	1
13	PAOZZ	4720-01-543-4241	19207	13214E2457-23	HOSE ASSEMBLY, NONMETAL	1
14	PAOZZ	4720-01-181-6462	19207	13214E2473-3	HOSE ASSEMBLY, NONMETAL	1
15	PAOZZ	4720-01-536-9957	19207	13214E2457-18	HOSE ASSEMBLY, NONMETAL	1
16	PAOZZ	4720-01-536-6252	19207	13214E2457-19	HOSE ASSEMBLY, NONMETAL	1
17	PAOZZ	4720-01-536-8277	19207	13214E2457-20	HOSE ASSEMBLY, NONMETAL	1
18	PAOZZ	4720-01-249-2026	97403	13214E2457-9	HOSE ASSEMBLY, NONMETAL	1

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
LEFT MAIN MANIFOLD MODIFICATION

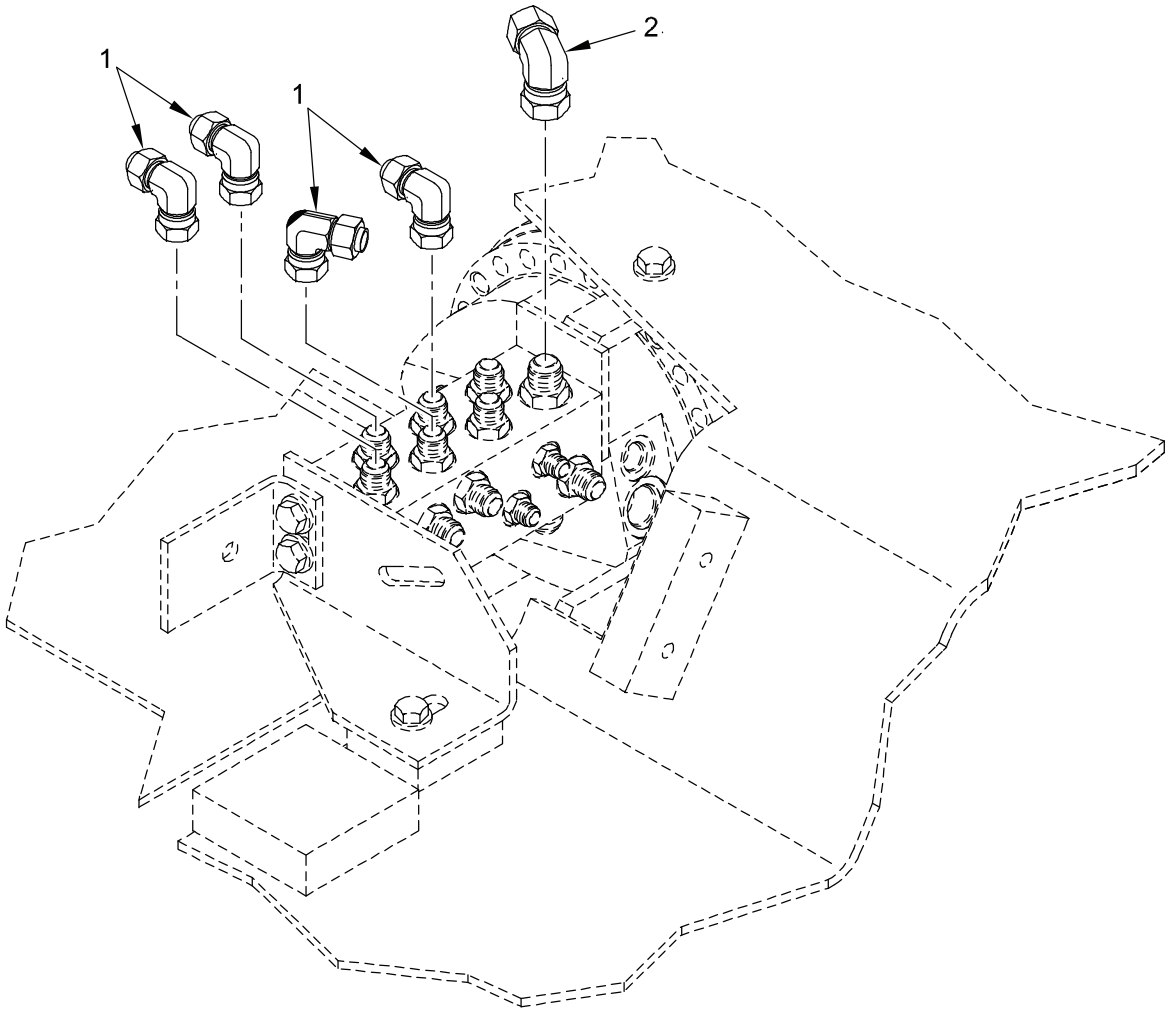


Figure 19. Left Main Manifold Modification

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY

FIGURE 19. LEFT MAIN MANIFOLD MODIFICATION

1	PAOZZ	4730-00-812-2434	96906	MS51521A8	ELBOW, SWIVEL NUT	4
2	PAOZZ	4730-01-139-1585	96906	MS51521A10	ELBOW, SWIVEL NUT	1

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
FORWARD LEFT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS

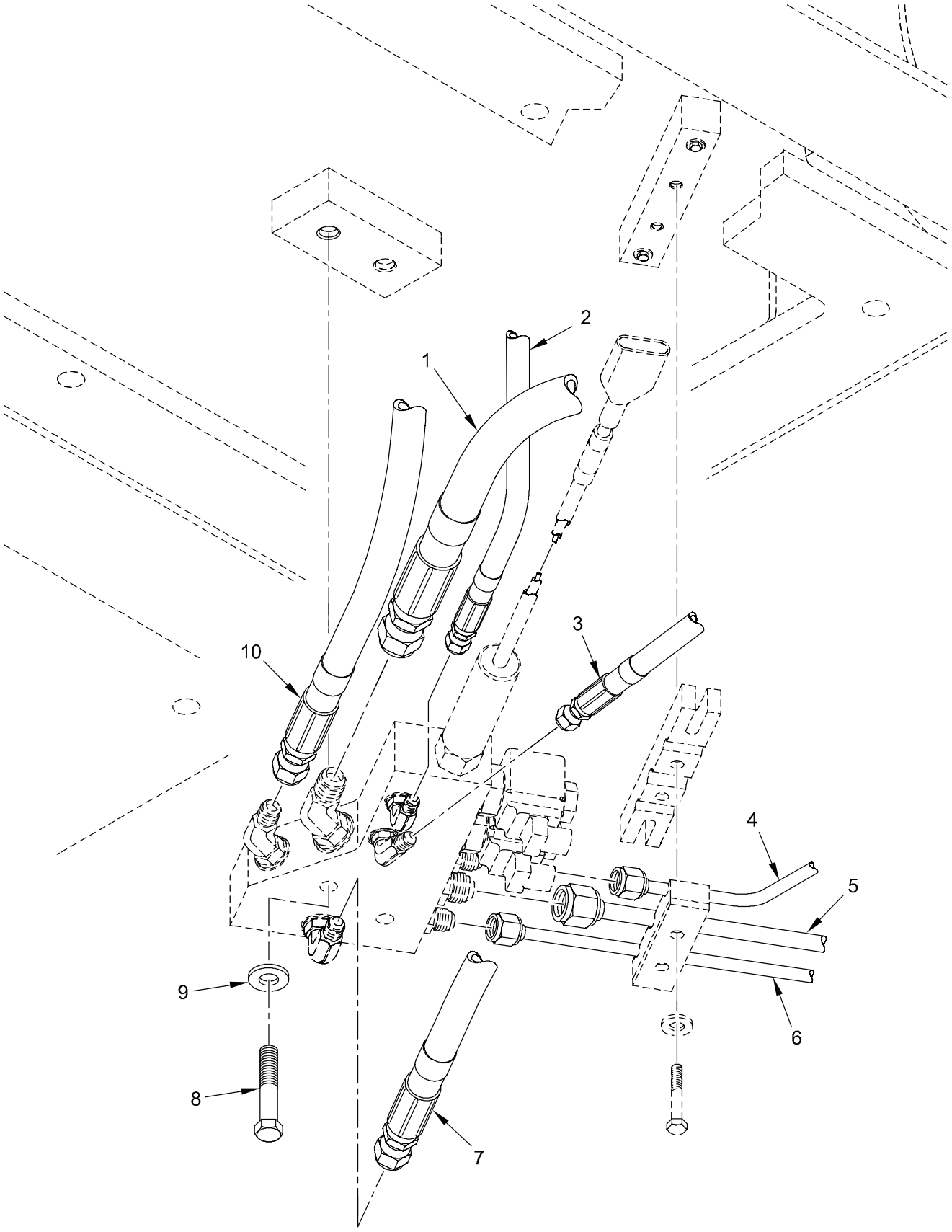


Figure 20. Forward Left Manifold Mounting and Hose Interconnections

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 20. FORWARD LEFT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS	
1	PAOZZ	4720-01-195-3838	97403	13214E2495-2	HOSE ASSEMBLY, NONMETAL	1
2	PAOZZ	4720-01-541-1308	19207	13214E2495-8	HOSE ASSEMBLY, NONMETAL	1
3	PAOZZ	4720-01-541-0697	97403	13214E2495-9	HOSE ASSEMBLY, NONMETAL	1
4	PAOZZ	4710-01-179-7619	97403	13214E2751	TUBE ASSEMBLY, METAL	1
5	PAOZZ	4710-01-179-7623	97403	13214E2755	TUBE ASSEMBLY, METAL	1
6	PAOZZ	4710-01-179-7621	97403	13214E2753	TUBE ASSEMBLY, METAL	1
7	PAOZZ	4720-01-181-6166	98441	A1270-1	HOSE ASSEMBLY, NONMETAL	1
8	PAOZZ	5306-01-194-0591	80204	B1821BH038C200L	SCREW, SELF-LOCKING	2
9	PAOZZ	5310-00-877-5972	19207	10910174-3	WASHER, FLAT	2
10	PAOZZ	4720-01-195-3841	97403	13214E2501-1	HOSE ASSEMBLY, NONMETAL	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
FORWARD RIGHT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS

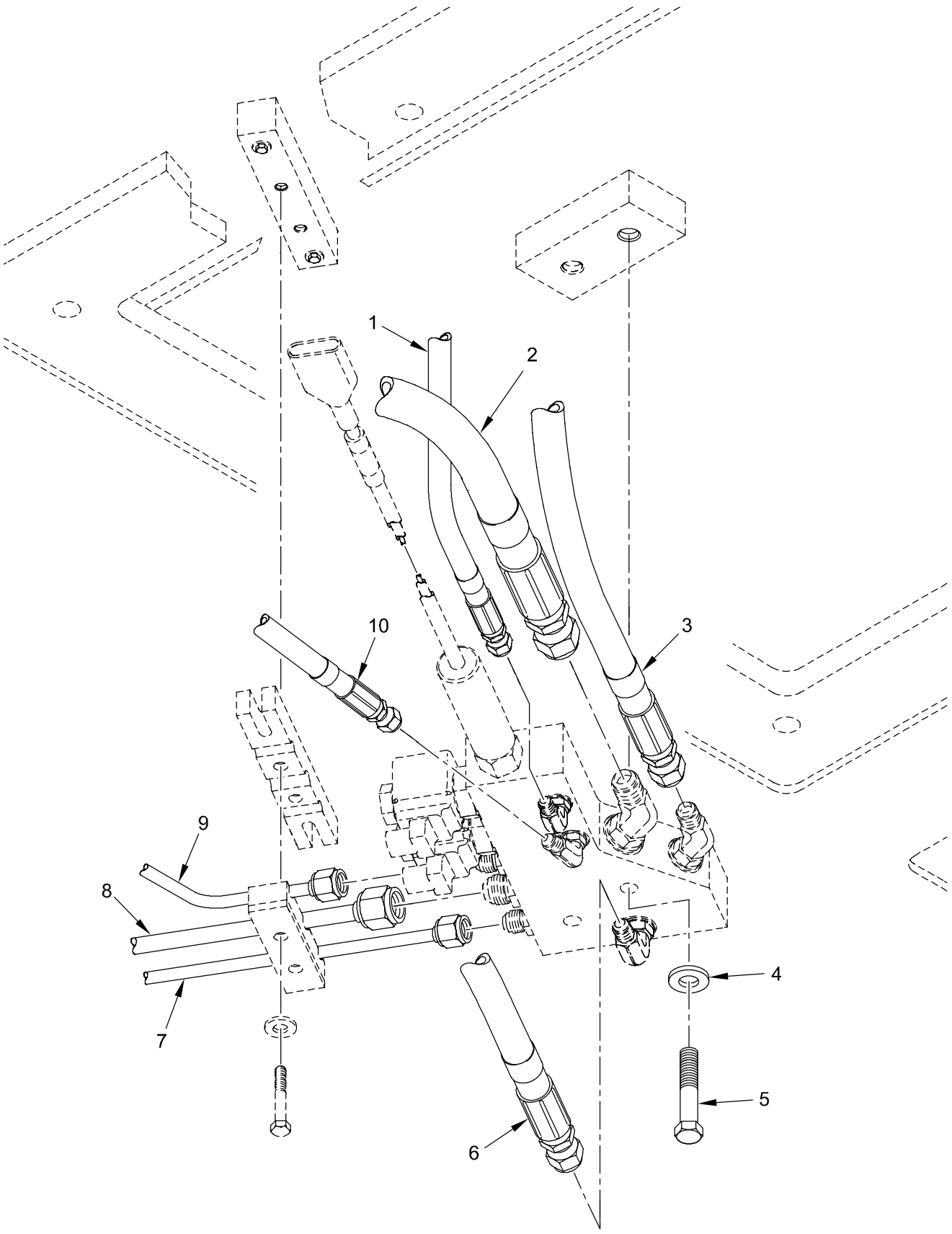


Figure 21. Forward Right Manifold Mounting and Hose Interconnections

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 21. FORWARD RIGHT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS	
1	PAOZZ	4720-01-541-1308	19207	13214E2495-8	HOSE ASSEMBLY, NONMETAL	1
2	PAOZZ	4720-01-195-3838	97403	13214E2495-2	HOSE ASSEMBLY, NONMETAL	1
3	PAOZZ	4720-01-195-3841	97403	13214E2501-1	HOSE ASSEMBLY, NONMETAL	1
4	PAOZZ	5310-00-877-5972	19207	10910174-3	WASHER , FLAT	2
5	PAOZZ	5306-01-194-0591	80204	B1821BH038C200L	SCREW, SELF-LOCKING	2
6	PAOZZ	4720-01-181-6166	98411	A1270-1	HOSE ASSEMBLY, NONMETAL	1
7	PAOZZ	4710-01-179-7620	97403	13214E2752	TUBE ASSEMBLY, METAL	1
8	PAOZZ	4710-01-179-7622	97403	13214E2754	TUBE ASSEMBLY, METAL	1
9	PAOZZ	4710-01-179-7618	97403	13214E2750	TUBE ASSEMBLY, METAL	1
10	PAOZZ	4720-01-541-0697	19207	13214E2495-9	HOSE ASSEMBLY, NONMETAL	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
AFT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS

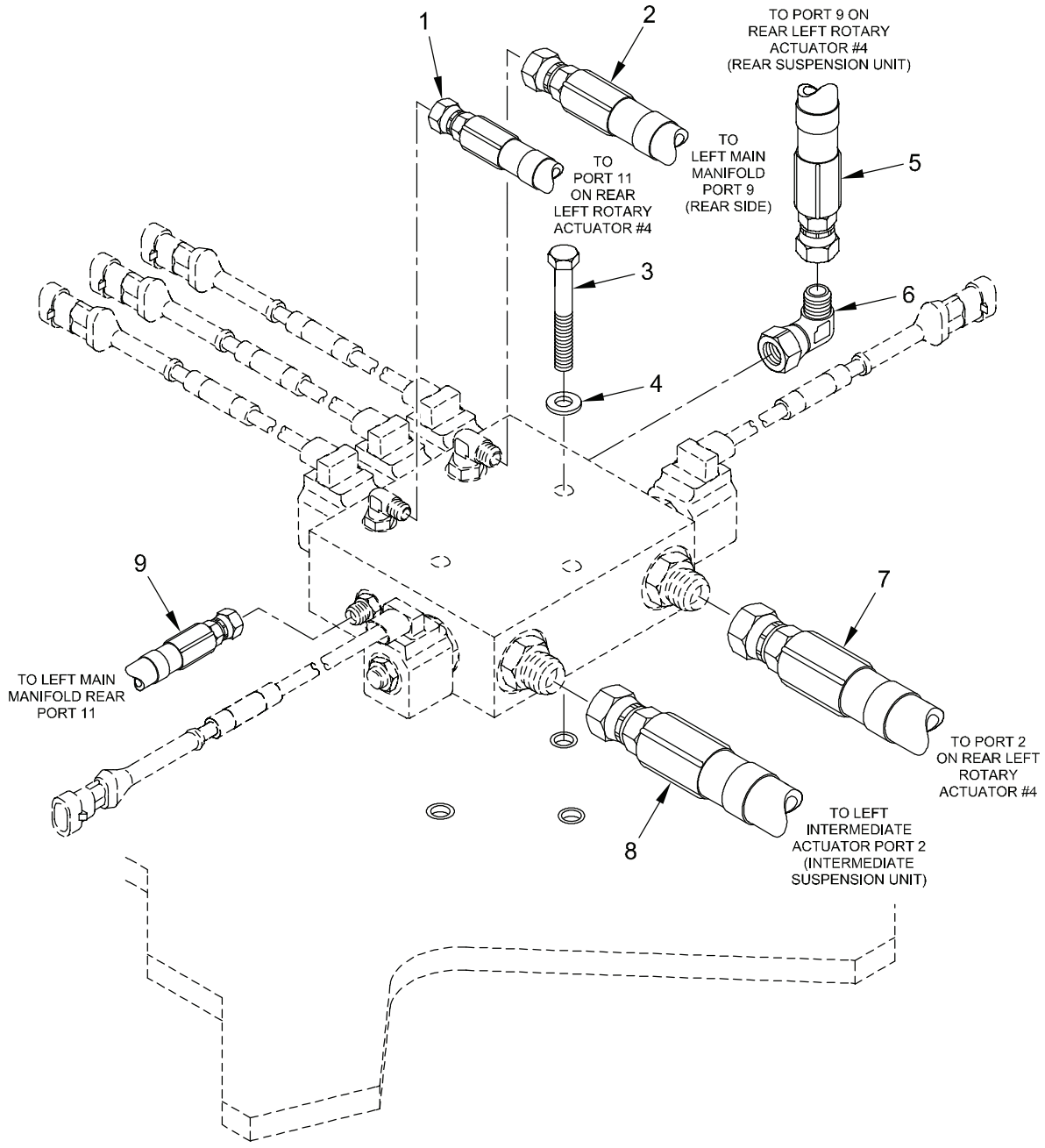


Figure 22. Aft Manifold Mounting and Hose Interconnections

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 22. AFT MANIFOLD MOUNTING AND HOSE INTERCONNECTIONS	
1	PAOZZ	4720-01-540-6760	97403	13214E2495-7	HOSE ASSEMBLY, NONMETAL	1
2	PAOZZ	4720-01-446-7545	97403	13214E2501-7	HOSE ASSEMBLY, NONMETAL	1
3	PAOZZ	5305-01-449-7391	80204	B1821BH038C325L	SCREW, SELF-LOCKING	3
4	PAOZZ	5310-00-877-5972	19207	10910174-3	WASHER, FLAT	3
5	PAOZZ	4720-01-537-0586	97403	13214E2501-11	HOSE ASSEMBLY, NONMETAL	1
6	PAOZZ	4730-00-618-5372	96906	MS51521A6	ADAPTER, 90-DEGREE	1
7	PAOZZ	4720-01-536-8728	97403	13214E2486-2	HOSE ASSEMBLY, NONMETAL	1
8	PAOZZ	4720-01-538-3157	97403	13214E2486-3	HOSE ASSEMBLY, NONMETAL	1
9	PAOZZ	4720-01-536-8024	97403	13214E2495-6	HOSE ASSEMBLY, NONMETAL	1
					END OF FIGURE	

DIRECT SUPPORT MAINTENANCE
DCV BANK MODIFICATION

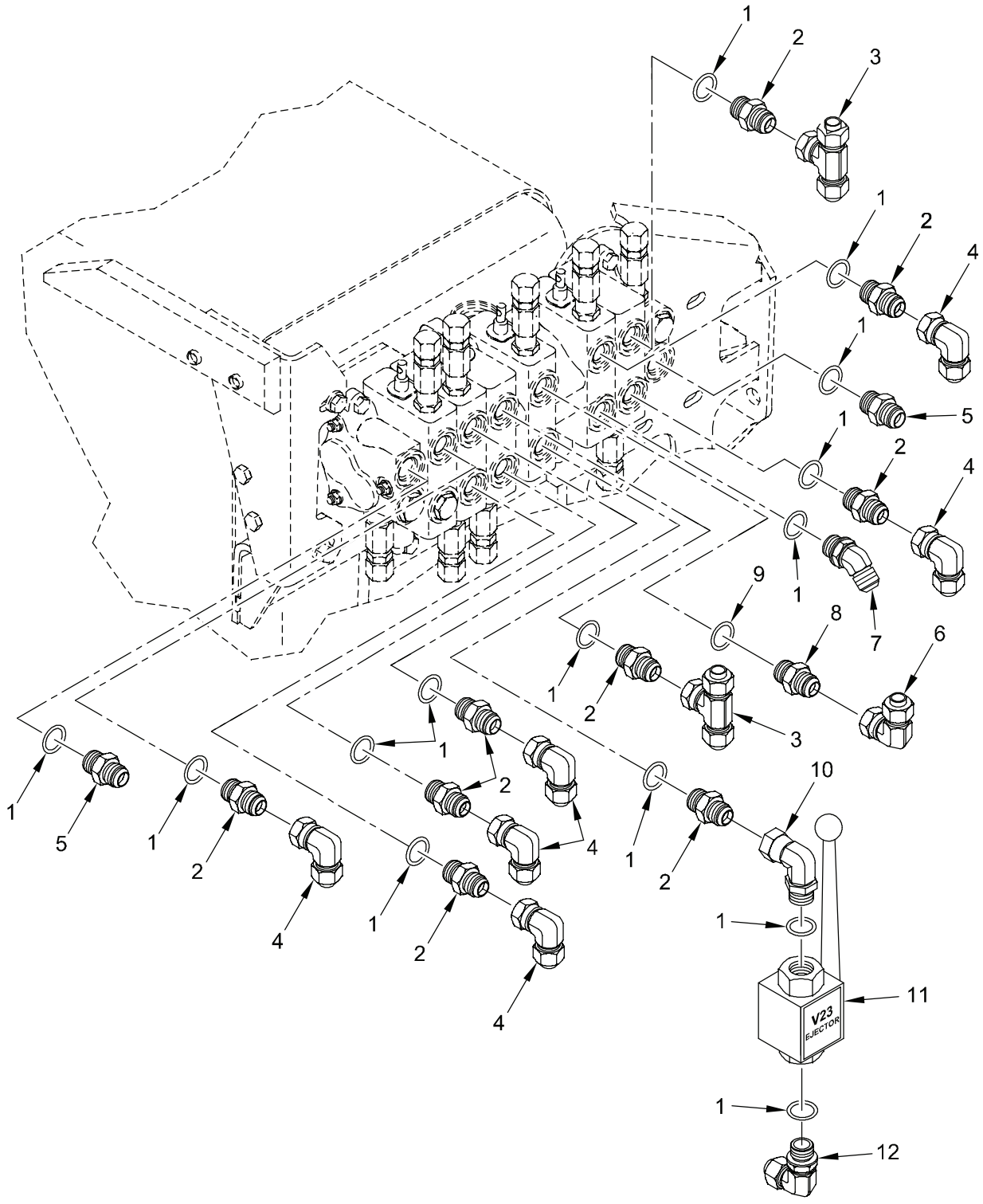


Figure 23. DCV Bank Modification

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY

FIGURE 23. DCV BANK MODIFICATION

1	PAOZZ	5331-00-808-0794	96906	MS28778-8	O-RING	14
2	PAOZZ	4730-01-156-4835	46717	AC-1-310	ADAPTER. STRAIGHT	9
3	PAOZZ	4730-01-042-0228	96906	MS51524A8	TEE, TUBE	2
4	PAOZZ	4730-00-812-2434	96906	MS51521A8	ELBOW, TUBE	6
5	PAOZZ	4730-00-224-7757	30780	12-8-F50X-S	ADAPTER, STRAIGHT	2
6	PAOZZ	4730-01-139-1585	96906	MS51521A10	ELBOW, TUBE	1
7	PAOZZ	4730-00-062-5470	96906	MS51528B8	ELBOW, TUBE	1
8	PAOZZ	4730-00-623-3889	96906	MS51525B10	ADAPTER, TUBE TO BOSS	1
9	PAOZZ	5331-01-306-9602	96906	MS28778-10	O-RING	1
10	PAOZZ	4730-01-536-9912	30780	8AOEX6	ADAPTER, 90-DEGREE	1
11	PAOZZ	4820-01-536-6135	09990	BVHP-08-SSS-ING	VALVVE, BALL (V23)	1
12	PAOZZ	4730-00-822-5609	96906	MS51527A8	ADAPTER, 90-DEGREE	1

END OF FIGURE

DIRECT SUPPORT MAINTENANCE
HULL/EJECTOR INTERFERENCE MODIFICATION

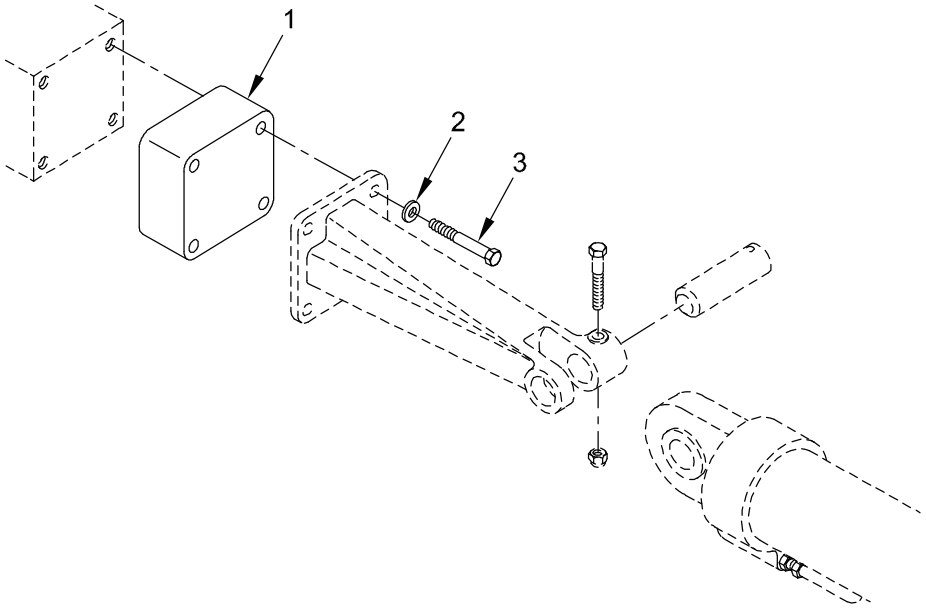


Figure 24. Hull/Ejector Interference Modification

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					FIGURE 23. Hull/Ejector Interference Modification	
1			19207	12488667	SPACER PLATE, EJECTOR CYLINDER	1
2	PAOZZ	5310-00-585-3243	81343	MS9320-16	WASHER, FLAT	4
3	PAOZZ	5306-01-206-8396	80205	NASM51095-446	BOLT, MACHINE	4
					END OF FIGURE	

CROSS REFERENCE INDEXES
NSN NUMBER INDEX

NSN Number	Figure	Item	NSN Number	Figure	Item
4730-00-062-5470	13	7	4730-00-710-5571	15	11
	14	5	5330-00-720-3652	12	11
	23	7	5310-00-761-6882	2	4
5305-00-068-0511	11	8	5331-00-804-5695	12	30
5310-00-080-6004	17	5		13	2
5331-00-108-5691	12	23		14	8
5306-00-119-6763	17	3		15	6
4730-00-143-3941	13	3	5335-00-807-4109	5	3
	14	9	5331-00-808-0794	12	21
	15	5		13	8
4730-00-225-0699	16	5		14	6
5331-00-251-8839	12	10		15	7
5310-00-285-8124	2	5		16	4
	3	2		23	1
5310-00-483-8790	11	2	5310-00-809-5998	11	7
4730-00-491-9576	13	15	4730-00-812-2434	19	1
	14	11		23	4
	15	9	5310-00-815-1073	2	1
5305-00-543-2866	11	12	4730-00-822-5609	12	25
4820-00-550-6786	12	26		23	12
5331-00-551-8441	12	4	5330-00-839-1846	12	13
	12	8	5310-00-866-4417	11	13
	12	12	5310-00-877-5972	11	3
	13	13		17	2
	14	16		20	9
	15	4		21	4
	15	19		22	4
5310-00-559-0070	4	2	5310-00-877-7527	16	8
5310-00-565-4287	11	14	5935-00-900-6281	5	2
4730-00-585-2309	13	4	5310-00-934-9757	4	1
5310-00-585-3243	24	2	4730-00-936-2172	12	27
	14	4	5305-00-984-6197	4	4
	15	15	4730-01-007-5232	15	14
5331-00-618-0799	12	14	4730-01-042-0228	23	3
4730-00-618-5372	22	6	4730-01-054-3881	16	11
4730-00-623-3889	23	8	5306-01-114-0963	11	5
4730-00-679-9766	13	6		17	6
	14	7	5330-01-118-5705	12	3

CROSS REFERENCE INDEXES
NSN NUMBER INDEX

NSN Number	Figure	Item
5330-01-118-5705	12	7
	13	12
	14	15
	15	3
	15	18
4730-01-139-1585	19	2
	23	6
5310-01-143-9017	16	7
4730-01-156-4835	12	22
	13	16
	14	12
4820-01-158-4066	16	6
5306-01-175-7558	3	1
4710-01-179-7618	21	9
4710-01-179-7619	20	4
4710-01-179-7620	21	7
4710-01-179-7621	20	6
4710-01-179-7622	21	8
4710-01-179-7623	20	5
4710-01-179-7634	18	3
4710-01-179-9199	18	4
4710-01-179-9200	18	2
4720-01-181-6166	20	7
	21	6
4720-01-181-6462	18	14
4730-01-192-9590	12	24
5306-01-194-0591	11	10
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	21	5
4720-01-195-3838	20	1
	21	2
4720-01-195-3841	20	10
	21	3
5365-01-200-1519	12	19
5306-01-205-2799	11	6
5306-01-206-8396	3	
5331-01-219-7930	15	10
5365-01-228-0730	12	20
5365-01-228-0730	15	8
4730-01-236-2682	12	28
5365-01-242-4564	12	29
4720-01-249-2026	18	18
4730-01-284-2195	16	1
5331-01-306-9602	23	9
5330-01-331-8137	10	1
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5925-01-430-2318	4	3
4730-01-441-9417	16	3
4720-01-446-7545	22	2
5305-01-449-7391	22	3
5331-01-514-0923	12	2
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5307-01-536-0580	2	3
6150-01-536-1117	6	1
5340-01-536-1486	11	1
2590-01-536-1519	2	6
6150-01-536-2015	5	4
6695-01-536-2040	10	2
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	14	1
5340-01-536-2060	11	9
6150-01-536-2129	7	1
4730-01-536-2677	13	1
4810-01-536-2997	12	1
	13	11

CROSS REFERENCE INDEXES
NSN NUMBER INDEX

NSN Number	Figure	Item
4810-01-536-2997	14	13
	15	1
4730-01-536-3025	12	17
6150-01-536-3072	5	1
6150-01-536-3311	8	1
5340-01-536-3775	17	1
2590-01-536-3813	3	3
5340-01-536-4160	11	11
4730-01-536-5726	14	10
6150-01-536-5854	9	1
4810-01-536-5871	12	9
4820-01-536-6135	16	10
4720-01-536-6252	18	16
4810-01-536-6609	12	5
4810-01-536-6609	15	16
4720-01-536-6678	18	9
5340-01-536-7170	11	15
4720-01-536-7713	16	2
4720-01-536-7657	18	12
4720-01-536-8024	22	9
4720-01-536-8277	18	17
4730-01-536-8399	16	9
4720-01-536-8728	22	7
4730-01-536-9912	23	10
5340-01-536-9863	2	2
4720-01-536-9957	18	15
4730-01-537-0516	10	3
4720-01-537-0586	22	5
2590-01-537-2318	11	4
6110-01-537-8428	1	1
4720-01-538-3157	22	8
4720-01-540-6760	22	1
4720-01-541-0697	20	3
4720-01-541-0697	21	10
4720-01-541-1308	20	2
4720-01-541-1308	21	1
5340-01-541-5407	17	4
4710-01-543-0840	18	5
4720-01-543-1165	18	11
4710-01-543-3416	18	6
4710-01-543-3418	18	1
4720-01-543-4241	18	13
4720-01-543-4246	18	10
4710-01-543-5071	18	7
4820-01-550-0151	16	6
4720-01-563-6545	18	8

END OF WORK PACKAGE

CROSS REFERENCE INDEXES
PART NUMBER INDEX

CROSS REFERENCE INDEXES
PART NUMBER INDEX

CROSS REFERENCE INDEXES
PART NUMBER INDEX

Part Number	Figure	Item	Part Number	Figure	Item
MS28778-4	12	16	MS51523B8	16	11
	12	18	MS51524A8	23	3
	13	5	MS51525A12	15	11
	13	10	MS51525A4	15	14
	14	2	MS51525A6	13	15
	14	3		14	11
	15	13		15	9
MS28778-6	12	30	MS51525B10	23	8
	13	2	MS51526A-10	12	24
MS28778-6	14	8	MS51527A4	13	3
	15	6		14	4
MS28778-8	12	21		15	15
	13	8	MS51527A6	13	4
	14	6		14	9
	15	7		15	5
	16	4	MS51527A-8	23	12
	23	1	MS51527A-8	12	25
MS28778-10	23	9	MS51528A10	12	27
MS35206-249	4	4	MS51528A8	12	28
MS35333-38	4	2	MS51528B8	23	7
MS35649-282	4	1	MS51860-56Z	16	7
MS51521A10	19	2	MS51967-2	2	4
	23	6	MS9320-16	24	2
MS51521A6	22	6	NAS1454C4A-0504	2	3
MS51521A8	19	1	NASM51095-446	24	3
	23	4			

END OF WORK PACKAGE

CHAPTER 5

SUPPORTING INFORMATION

WORK PACKAGE INDEX

UNIT MAINTENANCE
REFERENCES

SCOPE

This work package lists all field manuals, forms, technical manuals and miscellaneous publications referenced in this manual.

FIELD MANUALS

First Aid for Soldiers	FM 21-11

FORMS

Recommended Change to Publications	DA Form 2028

TECHNICAL MANUALS

Operator's Manual for Armored Combat Earthmover (ACE), M9 (2350-00-808-7100)	TM5-2350-262-10
Unit Maintenance Manual for Armored Combat Earthmover (ACE), M9 Vol. 1	TM 5-2350-262-20-1
Unit Maintenance Manual for Armored Combat Earthmover (ACE), M9 Vol. 2	TM 5-2350-262-20-2
Unit Maintenance Repair Parts and Special Tools List for Armored Combat Earthmover (ACE), M9	TM 5-2350-262-14& P

END OF WORK PACKAGE

UNIT MAINTENANCE
MAINTENANCE ALLOCATION CHART (MAC)

INTRODUCTION

The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit – includes two subcolumns, C (operator/crew) and O (unit) maintenance.
Direct Support – includes an F subcolumn.
General Support – includes an H subcolumn.
Depot – includes a D subcolumn.

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms.
4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.
6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. “Replace” is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

9. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

- The following definitions are applicable to the "repair" maintenance function:
- Services. Inspect, test, service, adjust, align, calibrate, and/or replace.
- Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).
- Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).
- Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above.)

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

C Operator or crew maintenance
O Unit maintenance
F Direct support maintenance
L Specialized repair activity (SRA)
H General support maintenance
D Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) Nomenclature. Name or identification of the tool or test equipment.

Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) Tool Number. The manufacturer's part number, model number, or type number.

Explanation of Columns in the Remarks

Column (1) Remarks Code. The code recorded in column (6) of the MAC.

Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE
ACE HDC
MAINTENANCE ALLOCATION CHART (MAC)

Table 1. MAC for ACE HDC

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
			C	O	F	H	D		
A2	Stowage Bracket	Remove/Replace		0.5				8	
AJ	Disconnect Bracket	Remove/Replace		1.0				8	
AJ	Circuit Breaker and power distribuition components	Remove/Replace		1.0				8	
AJ	Wiring Harness W1	Remove/Replace		1.0				8	
AJ	Wiring Harness W2	Remove/Replace		2.5				8	
AJ	Wiring Harness W3	Remove/Replace		4.0				8	
AR	Forward Left Manifold Assembly	Remove/Replace/ Repair		2.5				1, 8, 12	
AR	Forward Right Manifold Assembly	Remove/Replace/ Repair		2.5				1, 8, 12	
AR	Aft Manifold Assembly	Remove/Replace/ Repair		2.5				1, 8, 12	
AR	Primary Manifold Assembly and Mounting Brackets	Remove/Replace		4.5				1, 8, 12	
AR	Primary Manifold	Repair		2.5				1, 8, 12	
AR	Valve V21 (V22), Relief Valve, and Bypass Hose	Remove/Replace		2.5				8	
AR	Transducer	Remove/Replace		0.5				1, 8, 12	
AR	Manual Shut-Off Valve V23	Remove/Replace		1.5				8	
AR	Inter-Connecting Hydraulic Hoses and Tubes	Remove/Replace		1.5				1, 8, 12	

Table 2. Tools and Test Equipment for ACE HDC

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	Adapter, socket wrench	5120-00-240-8702	GAX-1
2	O	Bushing, pipe	4730-00-873-0110	C3109X6X2
3	O	Charging Device	4940-01-046-7109	12252157
4	O	Hydraulic Tank/Plug	5120-01-222-7934	12355501
5	O	Hydraulic tester (guage)	4940-00-595-5720	GS-5
6	O	Jack Stands	2590-01-228-5802	12355345
7	O	Plug, hydraulic tank	5120-01-222-7934	12355501
8	O	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	SC5180-90-CL-N26
9	O	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC4910-95CLA31
10	O	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power	4910-00-754-0706	SC4910-95CLA62
11	O	Suitable Lifting Device		
12	O	Wrench Set, Crowfoot	5120-01-302-4387	5705566

Table 3. Remarks for ACE HDC

REMARK CODES	REMARKS

END OF WORK PACKAGE

UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE
HYDRAULIC DIAGNOSTIC CENTER
EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

Scope

This work package lists expendable and durable items that you will need to operate and maintain the HDC. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50–970, Expendable/Durable Items (Except Medial, Class V Repair Parts, and Heraldic Items), CTA 50–909, Field and Garrison Furnishings and Equipment or CTA 8–100, Army Medical Department Expendable/Durable Items.

Explanation Of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use brake fluid (WP098, item 5)).

Column (2) Level.This column identifies the lowest level of maintenance that requires the listed item (include as applicable: *C= Operator/Crew, O = Unit/AVUM, F = Direct Support/AVIM, H + General Support, D = Depot).*

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc."

Table 1. Expendable and Durable Items List

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Name, Description, Part Number/(CAGEC)	(5) (U/I)
1	O	5340-01-065-9917	Cap, dust protective, 1/4 inch (MIL-C-5501/7-F3) (81349)	EA
2	O	5340-00-061-1831	Cap, dust protective, 3/8 inch (MIL-C-5501/9-F6) (81349)	EA
3	O	5340-01-063-1192	Cap, dust protective, 1/2 inch (MIL-C-5501/7-F8) (81349)	EA
4	O	N/A	Cap, dust protective, 3/4 inch (MIL-C-5501/11-F12) (81349)	EA
5	O	5340-01-109-7061	Plug, dust protective, 1/4 inch (MIL-C-5501/7-F4) (81349)	EA
6	O	5340-00-682-1857	Plug, dust protective, 3/8 inch (MIL-C-5501/1-F6) (81349)	EA
7	O	5340-01-085-4234	Plug, dust protective, 1/2 inch (MIL-C-5501/7-F10) (81349)	EA
8	O	5340-00-882-5070	Plug, dust protective, 3/4 inch (MIL-C-5501/7-F15) (81349)	EA
9	O	7920-00-205-1711	Rags, wiping, 50 LB bale, A-A-2522 (58536) (81349)	LB
10	O	5975-00-074-2072	Tie down strap, electrical (MS3367-1-9) (96906)	HD
11	O	9150-00-186-6668	Hydraulic Oil - HDO 10W M2104-3-10W (81349)	GAL
12	O	7930-01-342-5316	Simple Green 13006 1Z575	GAL
13	O	6520-01-140-5364	Eye Protection 652000C093171 (89875)	EA

Table 1. Expendable and Durable Items List - Continued

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Name, Description, Part Number/(CAGEC)	(5) (U/I)
14	O	8415-01-463-5927	Chemical Gloves Small 8415-01-463-5927 (80244)	BX
15	O	8415-01-463-5934	Chemical Gloves Medium 8415-01-463-5934 (80244)	BX
16	O	8415-01-463-5928	Chemical Gloves Large 8415-01-463-5928 (80244)	BX
17	O	8030-00-889-3534	Tape, Teflon 1/4" AA58092--2--1 (58536)	EA
18	O	8030-00-889-3535	Tape, Teflon 1/2" 16030A (84180)	EA
19	O	8040-00-273-8717	Rubberized Adhesive 12A68BT1--51 (81755)	TU

END OF WORK PACKAGE

UNIT MAINTENANCE
TOOL IDENTIFICATION LIST

INTRODUCTION

Scope

This work package list all common tools and supplements and special tools/fixtures needed to maintain the HDC.

Explanation Of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and referenced in the initial setup to identify the item (e.g " Extractor WP 00090. Item 32)").

Column (2) Item Name. This column lists the item by noun nomenclature and other descriptive features (e.g. "Gauge, belt tension").

Column (3) National Stock Number (NSN). This is the National Stock Number assigned to the item; use it to requisition the item.

Column (4) Part Number/(CAGEC). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. The manufacturer's Commercial and Government Entity Code (CAGEC) is also included.

Column (5) Reference. This column identifies the authorizing supply catalog or RPSTL for items listed in this work package.

Table 1. HDC Tool Identification List

(1) Item Number	(2) Item Name	(3) National Stock Number (NSN)	(4) Part Number/ (CAGEC)	(5) Reference
1	Adapter, socket wrench	5120-00-240-8702	GAX-1 (55719)	TM 5-2350-262-24P
2	Bushing, pipe	4730-00-873-0110	C3109X6X2 (79470)	TM 5-2350-262-24P
3	Charging Device	4940-01-046-7109	12252157 (19200)	TM 5-2350-262-24P
4	Hydraulic tester (gauge)	4940-00-595-5720	GS-5 (08832)	TM 5-2350-262-24P
5	Jack Stands	2590-01-228-5802	12355345 (19207)	TM 5-2350-262-24P
6	Plug, hydraulic tank	5120-01-222-7934	12355501 (19207)	TM 5-2350-262-24P
7	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	SC5180-90-CL-N26 (50980)	TM 5-2350-262-24P
8	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC4910-95CLA31 (19204)	TM 5-2350-262-24P

Table 1. HDC Tool Identification List - Continued

(1) Item Number	(2) Item Name	(3) National Stock Number (NSN)	(4) Part Number/ (CAGEC)	(5) Reference
9	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power	4910-00-754-0706	SC4910-95CLA62 (19204)	TM 5-2350-262-24P
10	Suitable Lifting Device			
11	Wrench Set, Crowfoot	5120-01-302-4387	5705566 (19207)	TM 5-2350-262-24P

END OF WORK PACKAGE

UNIT MAINTENANCE
MANDATORY REPLACEMENT PARTS LIST

MANDATORY REPLACEMENT PARTS LIST

This work package includes a list of all mandatory replacement parts reference in the task initial setups and procedures. These are items that must be replaced during maintenance whether they have failed or not. This includes items based on usage intervals such as miles, time, rounds fired, etc.

Table 2. Mandatory Replacement Parts List

Item No.	Part Number/ CAGEC	National Stock Number (NSN)	Nomenclature	Qty
1	MS27595-019	5330-01-118-5705	Backup, telfon	18
2	MS28774-018 (96906)	5330-00-839-1846	Backup, telfon	12
3	MS28774-019 (96906)	5330-00-720-3652	Backup, telfon	12
4	MS28775-018 (96906)	5331-00-618-0799	O-ring	6
5	MS28775-019 (96906)	5331-00-551-8441	O-ring	14
6	MS28775-118	5331-01-514-0923	O-ring	12
7	MS28778-4 (81343)	5331-00-805-2966	O-ring	27
8	MS28778-6 (96906)	5331-00-804-5695	O-ring	12
9	MS28778-8 (96906)	5331-00-808-0794	O-ring	42
10	MS17829-8C	5310-00-565-4287	Nut, self-locking	1
11	MS28778-10 (96906)	5331-01-306-9602	O-ring	1
12	MS28778-12 (96906)	5331-01-291-7930	O-ring	8
13	MS35333-38 (80205)	5310-00-559-0070	Lockwasher	8
14	B1821BH025C075L (80204)	5306-01-175-7558	Screw, self-locking	8
15	B1821BH038C100L (80204)	5306-01-114-0963	Screw, self-locking	11
16	B1821BH038C150L (80204)	5306-01-119-6763	Screw, self-locking	6
17	B1821BH038C200L (80204)	5306-01-194-0591	Screw, self-locking	6
18	B1821BH038C325L (80204)	5305-01-449-7391	Screw, self-locking	3

UNIT MAINTENANCE
MANDATORY REPLACEMENT PARTS LIST

Table 2. Mandatory Replacement Parts List - Continued

Item No.	Part Number/ CAGEC	National Stock Number (NSN)	Nomenclature	Qty
19	B1821BH038C450L (80204)	5305-00-857-6886	Screw, self-locking	4
20	B1821BH050C113L	5306-01-205-2799	Screw, self-locking	3

END OF WORK PACKAGE

ALPHABETICAL INDEX

ALPHABETICAL INDEX - CONTINUED

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. APPLICABLE STANDARDS / SPECIFICATIONS:
   A. INTERPRET DRAWING IAW MIL-STD-100.
   B. DIMENSIONING AND TOLERANCING IAW ANSI Y14.5M-1982.

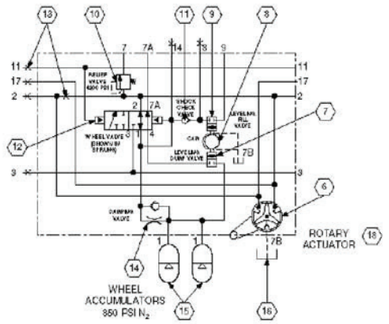
(2) LINE TO TRACK ADJUSTOR CIRCUIT. TRACK ADJUSTOR CIRCUIT NOT SHOWN.

(3) INTERMEDIATE WHEEL CONTROL VALVE PREVENTS INTERMEDIATE WHEEL FROM FROM RAISING WHEN LOWERING FRONT OF VEHICLE

(4) PRESSURE COMPENSATED VARIABLE DISPLACEMENT PUMP: 18 GPM FLOW AT 2400 RPM, 2850 PSI COMPENSATOR SETTING (MAINTAINS 2850 PSI OUTLET PRESSURE WHENEVER FLOW DEMAND DOES NOT EXCEED FLOW CAPACITY)

(5) MAIN PUMP: DOUBLE OR SPLIT FLOW FIXED DISPLACEMENT PUMP 26 GPM @ 2400 PSI (13 PER SIDE)

DETAIL SCHEMATIC OF TYPICAL CORNER ACTUATOR. SEE NOTE 17 FOR PORT PASSAGE AND INTERNAL PASSAGE CODE



(6) ROTARY ACTUATOR SHAFT (MOUNTS ROAD WHEEL ARM)

(7) LEVELING DUMP VALVE: OPENED BY CAM TO DRAIN ACCUMULATORS AND LOWER VEHICLE WHEN VEHICLE IS TOO HIGH

(8) CAM: BOLTED TO ACTUATOR SHAFT, OPENS AND CLOSES LEVELING VALVES AT APPROPRIATE POINTS OF SHAFT ROTATION (AT APPROPRIATE VEHICLE HEIGHT)

(9) LEVELING FILL VALVE: OPENED BY CAM TO REPLENISH ACCUMULATORS AND RAISE VEHICLE WHEN VEHICLE IS TOO LOW

(10) RELIEF VALVE: PROTECTS UNIT FROM HIGH PRESSURE SURGES

(11) SHOCK LOAD AND REPLENISHING CHECK VALVE. PERMITS REPLENISHING OF ACCUMULATOR VIA PORT 9, BUT PREVENTS ACCUMULATOR PRESSURE SURGES FROM ENTERING CIRCUIT No.9

(12) WHEEL VALVE:
A. IN "SPRUNG" (SHOWN) ACTUATOR SHAFT IS HYDRAULICALLY CONNECTED TO ACCUMULATORS (SUSPENSION HAS SPRINGS), AND FLOW FROM LEVELING DUMP VALVE CAN RETURN TO TANK THRU PORT 7A
B. IN "UNSPRUNG" MODE (PORT 11 PRESSURIZED), ACTUATOR SHAFT IS ISOLATED FROM ACCUMULATORS (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

(13) PORTS 11,17,2 AND 3 ARE PLUGGED ON L.H. OR R.H. SIDE OF UNIT DEPENDING ON DESIRED DIRECTION OF SHAFT ROTATION. WHEN PLUGS ARE INSTALLED AS SHOWN, PRESSURE TO PORT 2 WILL CAUSE C.W. SHAFT ROTATION

(14) DAMPENING VALVE: PERMITS FREE FLOW INTO ACCUMULATOR SO THEY CAN RAPIDLY ABSORB SUSPENSION SHOCKS, BUT RESTRICTS FLOW RATE FROM ACCUMULATORS TO PROVIDE SMOOTH REACTION TO SUSPENSION SHOCKS

(15) WHEEL ACCUMULATORS (850 PSI DRY N_2) ATTACH TO PORT 1 OF ROTARY ACTUATOR. FUNCTION AS SUSPENSION SPRINGS WHEN VEHICLE IS IN "SPRUNG" MODE

(16) CASE DRAIN

17. ROTARY ACTUATOR PORT AND INTERNAL PASSAGE CODE

1. WHEEL ACCUMULATOR TO WHEEL VALVE AND LEVELING DUMP VALVE (size -14)

2. EXTERNAL PORT AND PASSAGES TO WHEEL VALVE AND ACTUATOR SHAFT VANES (PRESSURIZED TO RAISE VEHICLE) (size -12)

3. EXTERNAL PORT AND PASSAGES TO WHEEL VALVE (PRESSURIZED TO RAISE VEHICLE WHEN IN "UNSPRUNG" MODE) (size -8)

4. EXTERNAL PASSAGE FROM LEVELING DUMP VALVE TO WHEEL VALVE

7. EXTERNAL PORT FOR RELIEF VALVE OUTLET FLOW (size -8)

7A. EXTERNAL PORT AND PASSAGE FROM WHEEL VALVE (CARRIES LEVELING DUMP VALVE FLOW WHEN VEHICLE IS IN "UNSPRUNG" MODE) (size -6)

7B. EXTERNAL PORT AND PASSAGE FROM DRAIN CHAMBER (size -6)

8. EXTERNAL PORT AND AUXILIARY PASSAGE TO WHEEL ACCUMULATOR AND FROM PORT 9 (size -4)

9. EXTERNAL PORT AND PASSAGE THRU LEVELING FILL VALVE TO WHEEL ACCUMULATOR (PRESSURIZED TO CHARGE ACCUMULATOR WHEN LEVELING FILL VALVE IS HOLD OPEN BY CAM) (size -6)

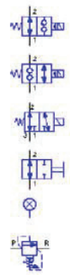
11. EXTERNAL PORT AND PASSAGE TO WHEEL VALVE (PRESSURIZED TO SHIFT WHEEL VALVE INTO "UNSPRUNG" MODE) ((size -4)

14. EXTERNAL PORT AND AUXILIARY PASSAGE TO WHEEL ACCUMULATOR

17. EXTERNAL PORT AND PASSAGES TO ACTUATOR SHAFT VANES (PRESSURIZED TO LOWER VEHICLE WHEN IN "UNSPRUNG" MODE, IS RETURN LINE PASSAGE WHEN RAISING VEHICLE IN BOTH "SPRUNG" AND "UNSPRUNG" MODE) (size -8)

(18) FOR ESTIMATING PURPOSE THE SIZE OF THE ROTARY ACTUATOR AS AN EQUIVALENT THREE LOBE MOTOR IS 825 CU.IN.

ADDED GRAPHIC SYMBOLS



SOLENOID VALVE, POPPET, 2 POSITION, 2 WAY, BIDIRECTINAL, NORMALLY OPEN

SOLENOID VALVE, POPPET, 2 POSITION, 2 WAY, BIDIRECTINAL, NORMALLY CLOSED

SOLENOID VALVE, SPOOL, 2 POSITION, 3 WAY, BIDIRECTIONAL, SIDE CYLINDER PORT

SHUT-OFF VALVE

PRESSURE TRANSDUCER

PRESSURE RELIEF

COLOR SCHEME

- RESERVOIR AND RETURN/DRAIN LINES
- PUMP PRESSURE LINES
- WHEEL SUSPENSION AND HEIGHT CONTROL
- SPRUNG/UNSPRUNG CONTROL CIRCUIT
- MAIN EJECTOR AND APRON CIRCUITS
- WINCH AND BILGE CIRCUITS
- FORWARD AND MAIN MANIFOLDS
- PRESSURE TRANSDUCERS AND VALVES
- NEW TUBES AND HOSES FROM HDC

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	PRODUCT BASELINE ERR GSDU4462	05-09-30	DMA

CAD MAINTAINED DRAWING. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY. DO NOT REVISE DRAWING MANUALLY.

DRAWING CONTENT:

SHEET 1: NOTES AND DOCUMENT REVISION CONTROL

SHEET 2: M9 ACE HDC HYDRAULIC SCHEMATIC

SHEET 3: VEHICLE SCHEMATIC BEFORE REWORK

ACE00202 1

PART NO.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS

CONTRACT NUMBER

CONTRACTOR
United Defense, L.P.
Ground Systems Division
Arlington, Virginia 22209

DRAWN BY J.BAJWA — DATE

CHECKED — ENGINEER — DRAWING APPROVAL

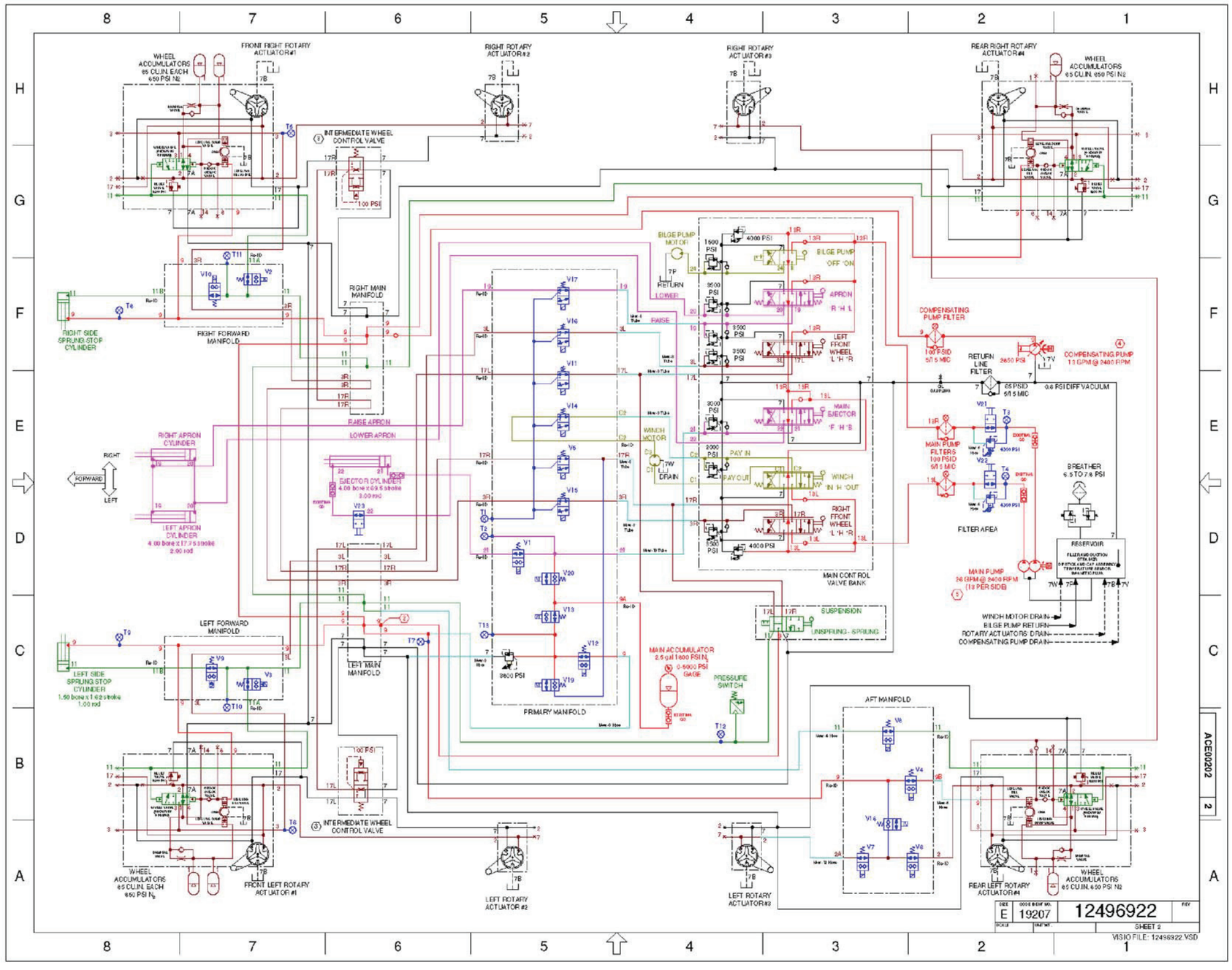
U.S. Army Tank-Automotive and Armaments Command
Warren, Michigan 48397-5000

M9 ACE HDC HYDRAULIC SCHEMATIC

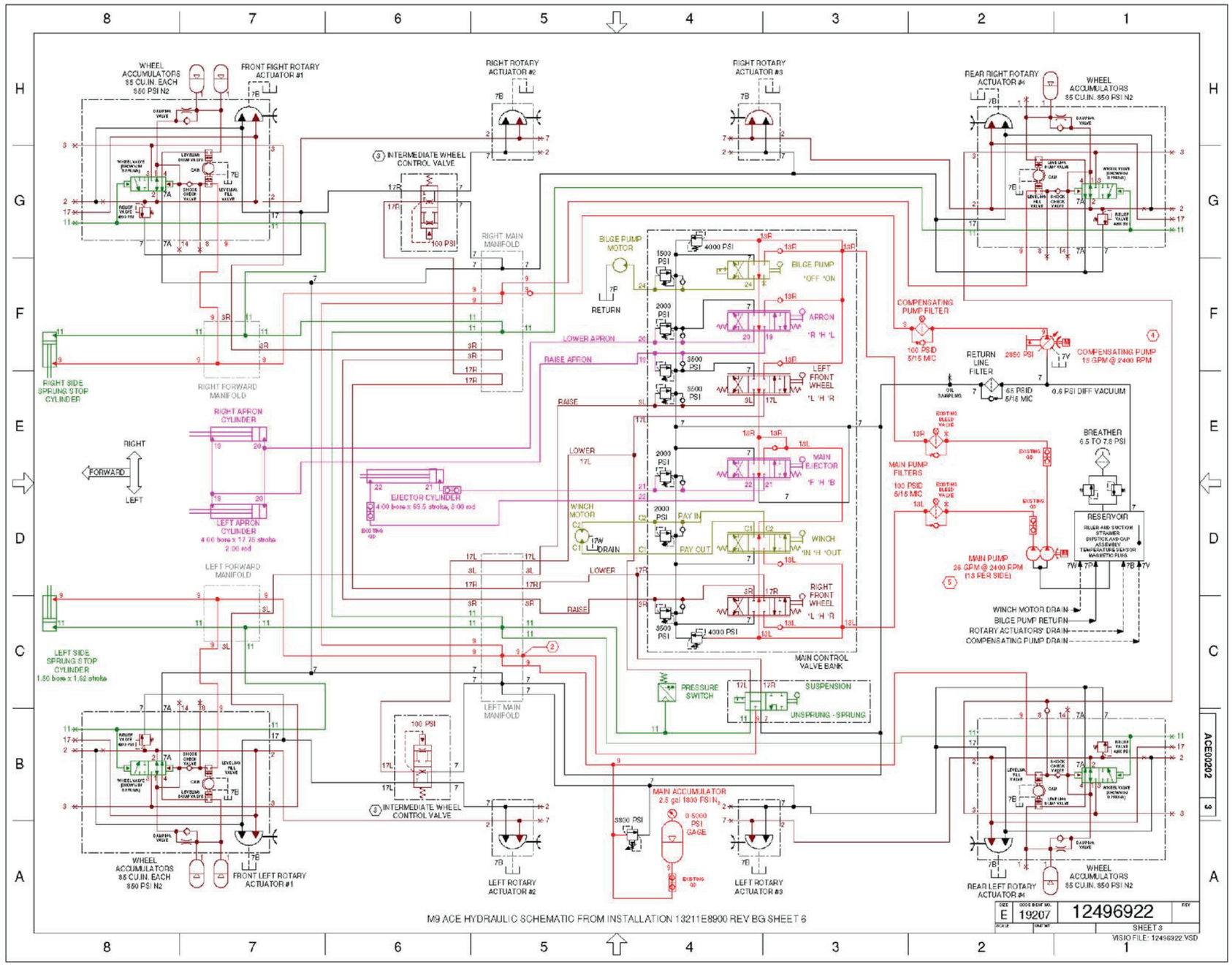
SIZE E — CODE IDENT NO. 19207 — 12496922

SCALE — LINE WT. — SHEET 1 OF 3

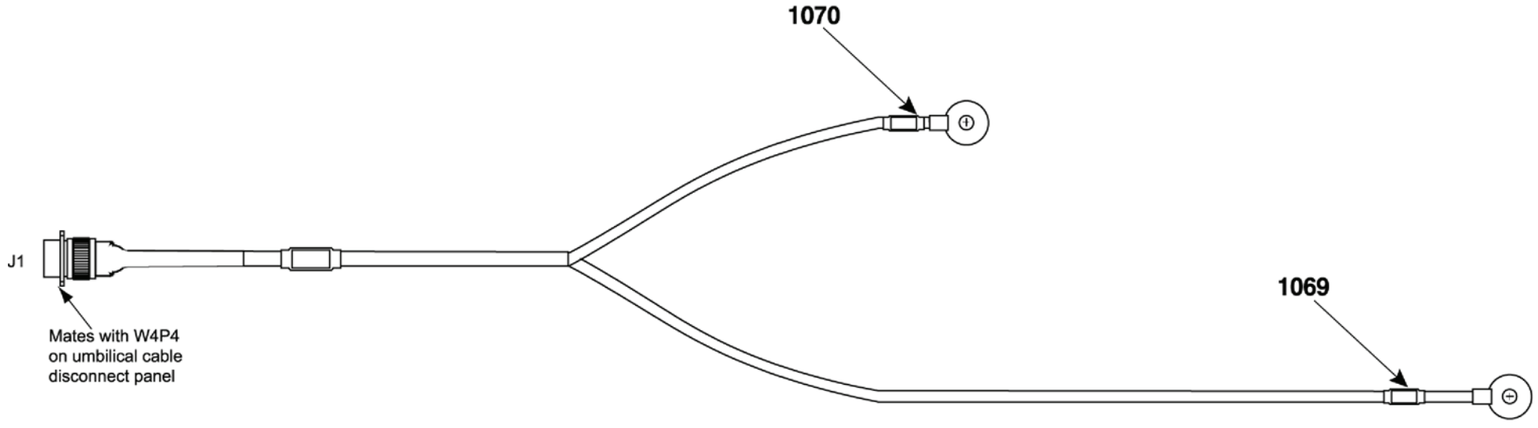
VISIO FILE: 12496922.VSD

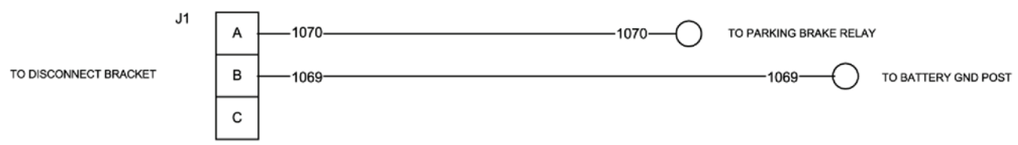


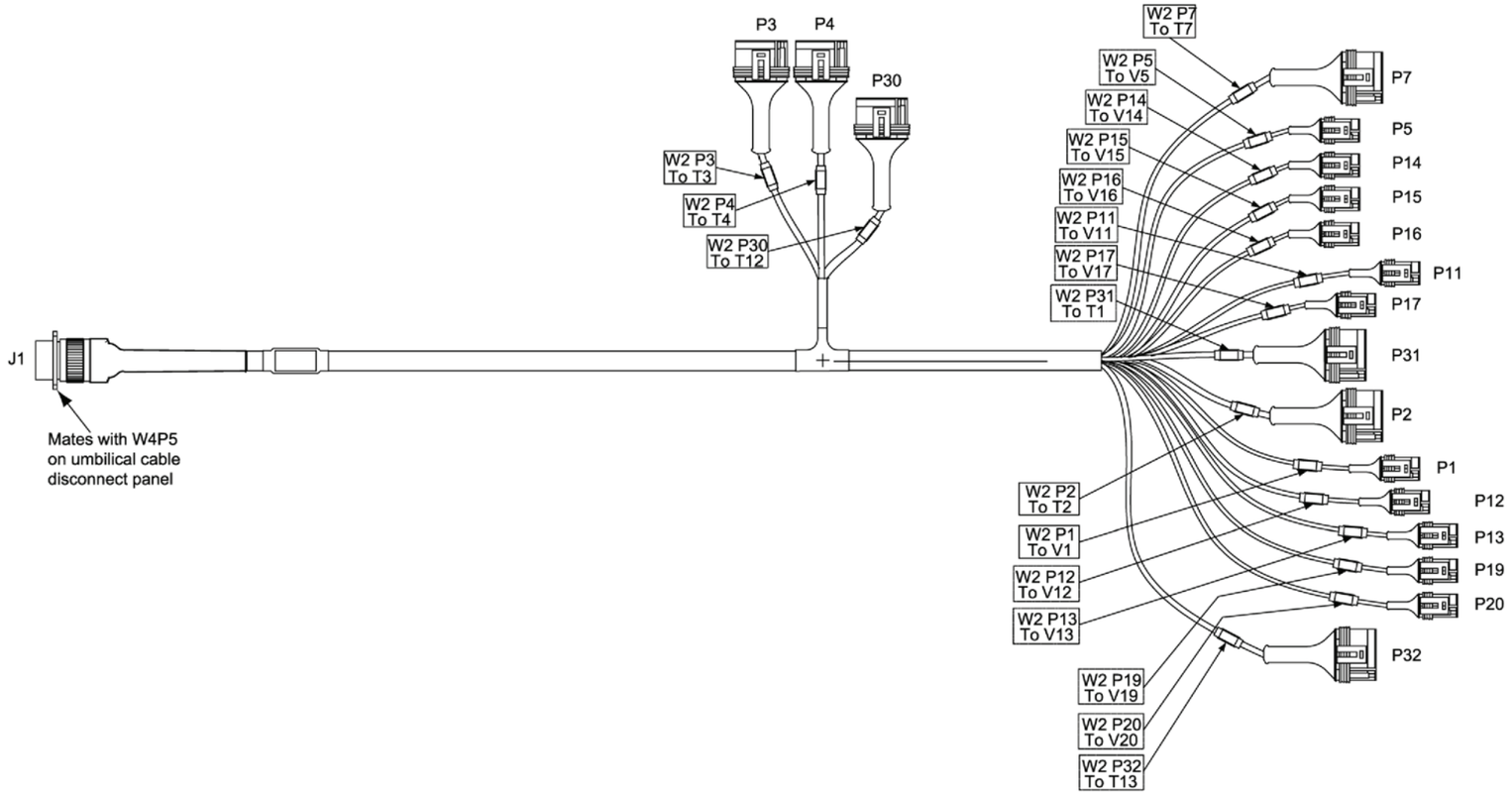
FO 1. 2 of 3 M9 ACE HDC
HYDRAULIC SCHEMATIC
FP-3/(FP-4 blank)



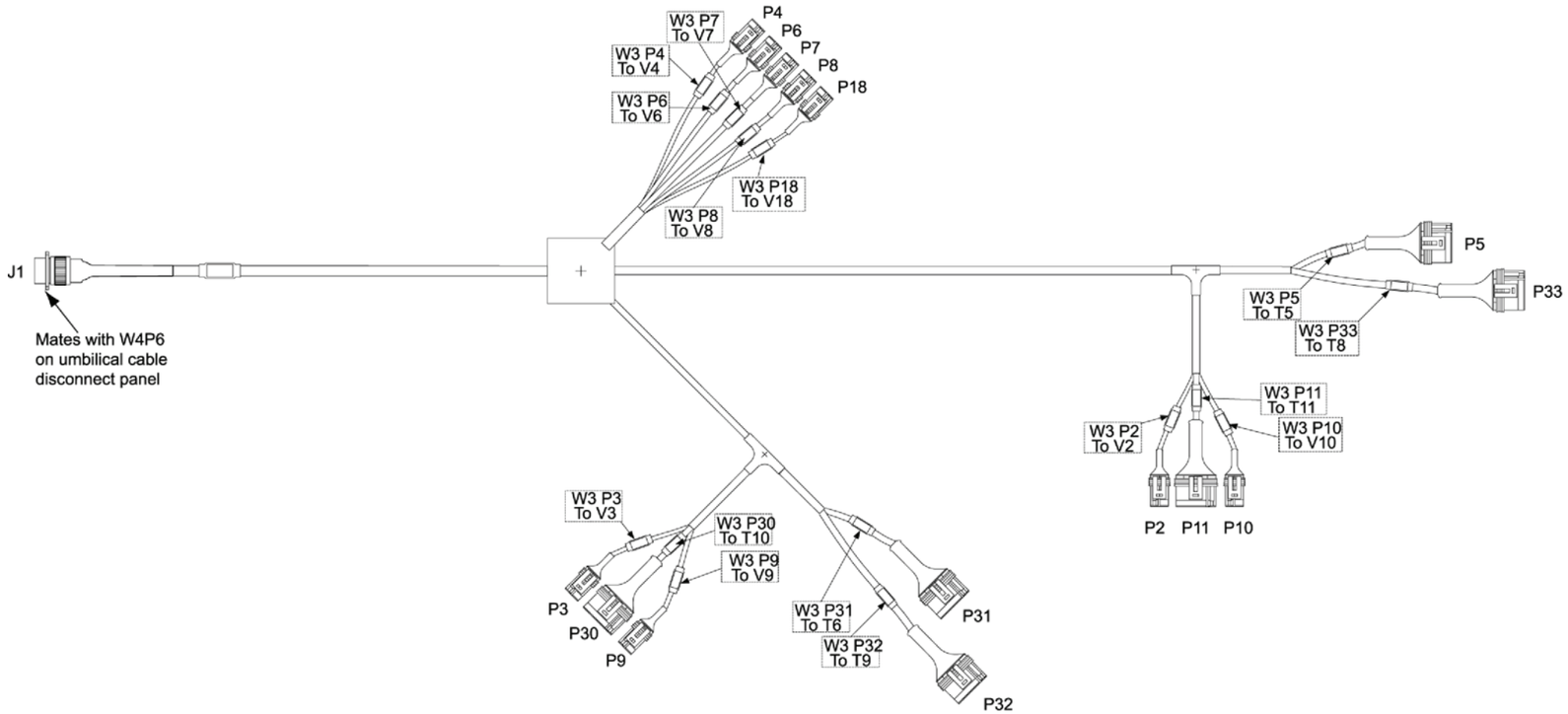
FO 1. 3 of 3 M9 ACE HDC
HYDRAULIC SCHEMATIC
FP-5/(FP-6 blank)


1070
J1
1069
Mates with W4P4
on umbilical cable
disconnect panel

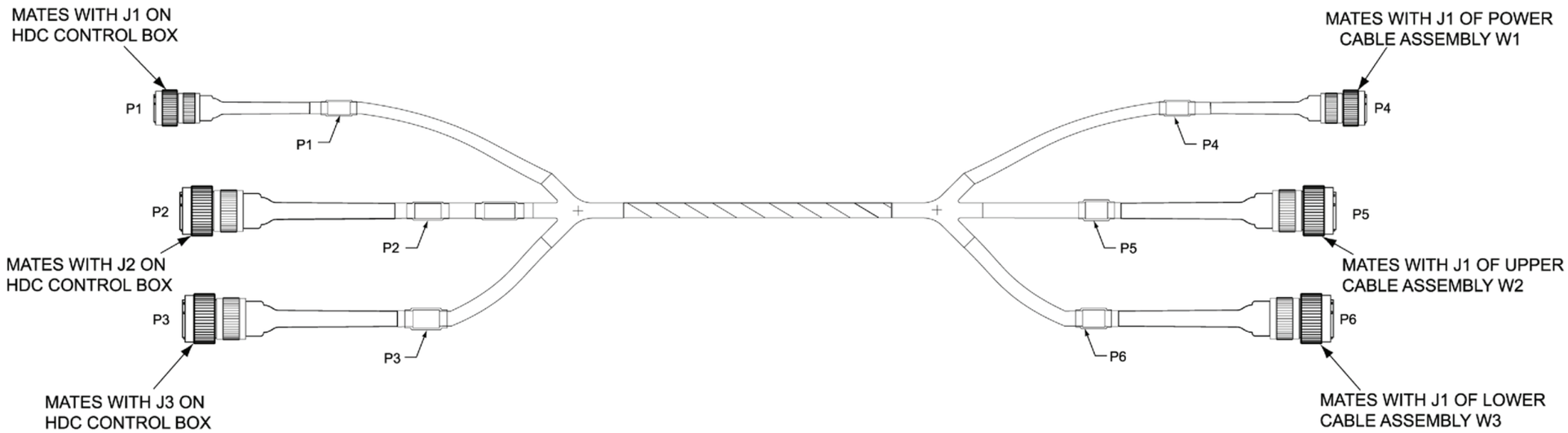

J1
A
B
C
1070
1070
TO PARKING BRAKE RELAY
TO DISCONNECT BRACKET
1069
1069
TO BATTERY GND POST



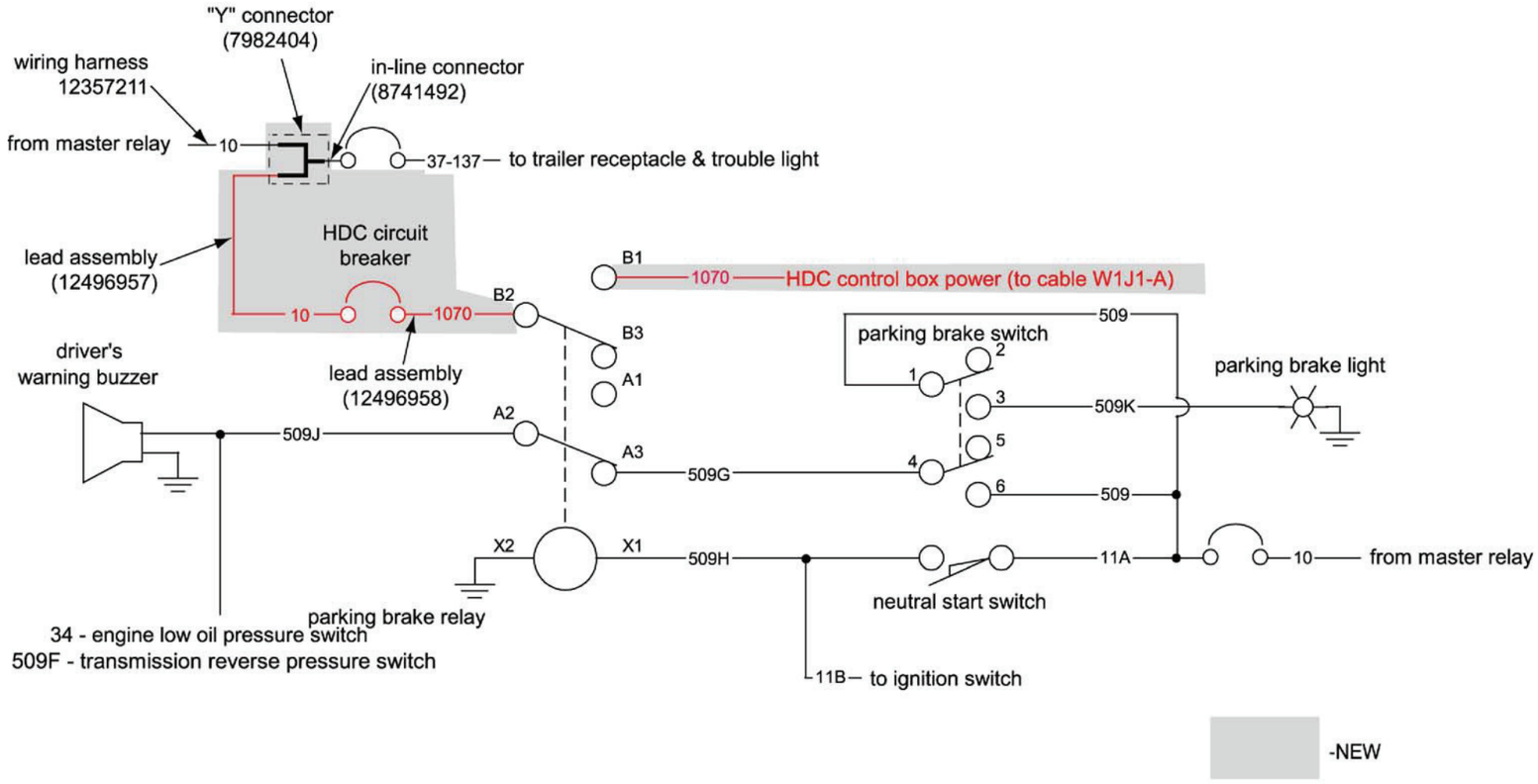
FO 3. UPPER CABLE ASSEMBLY W2



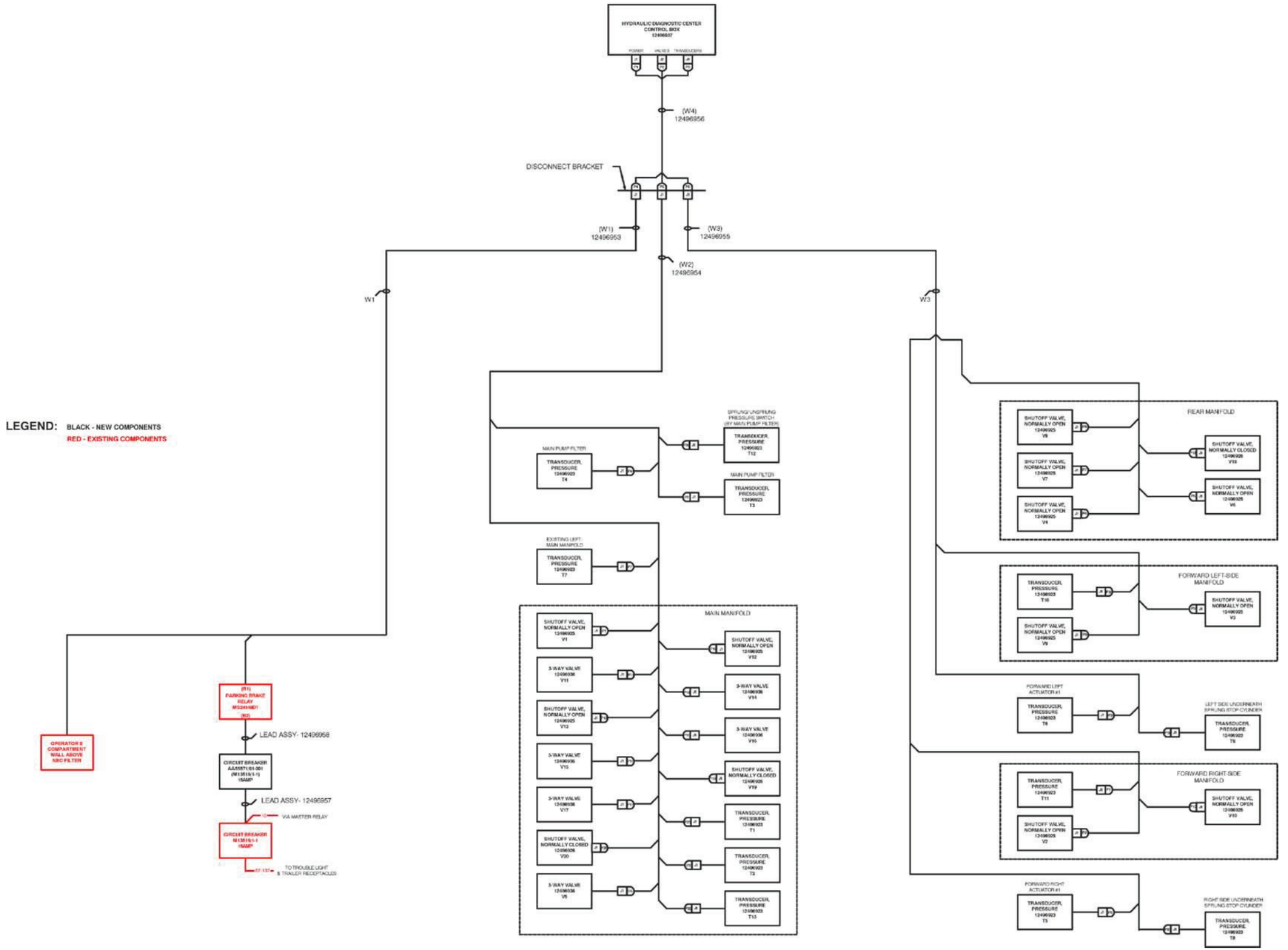
FO 4. LOWER CABLE ASSEMBLY W3
FP-11/(FP-12 blank)



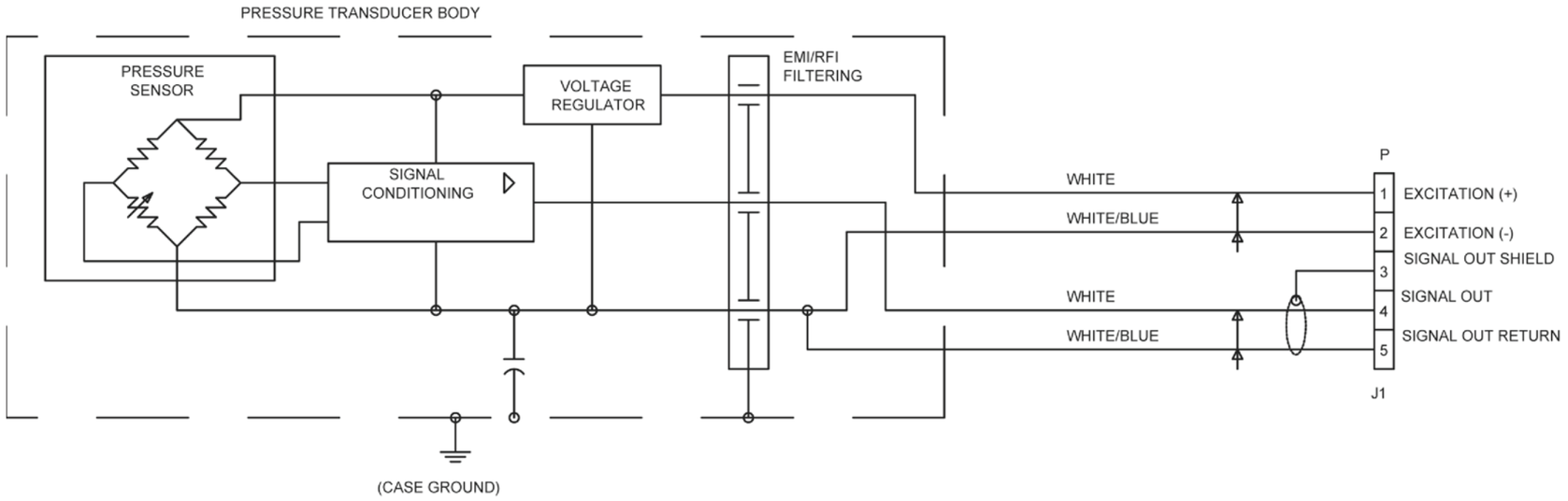
FO 5. UMBILICAL CABLE ASSEMBLY W4



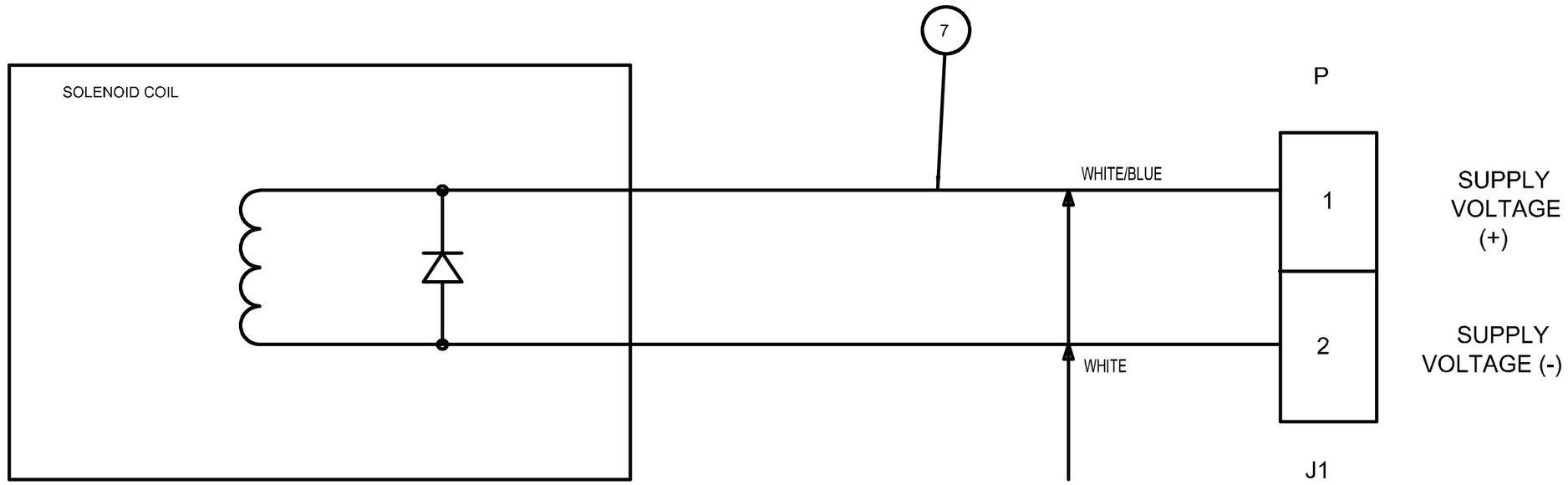
FO 6. SIMPLIFIED ELECTRICAL SCHEMATIC DIAGRAM OF HDC SYSTEM POWER DISTRIBUTION



FO 7. HDC SYSTEM ELECTRICAL INTERCONNECTION DIAGRAM
FP-17/(FP-18 blank)

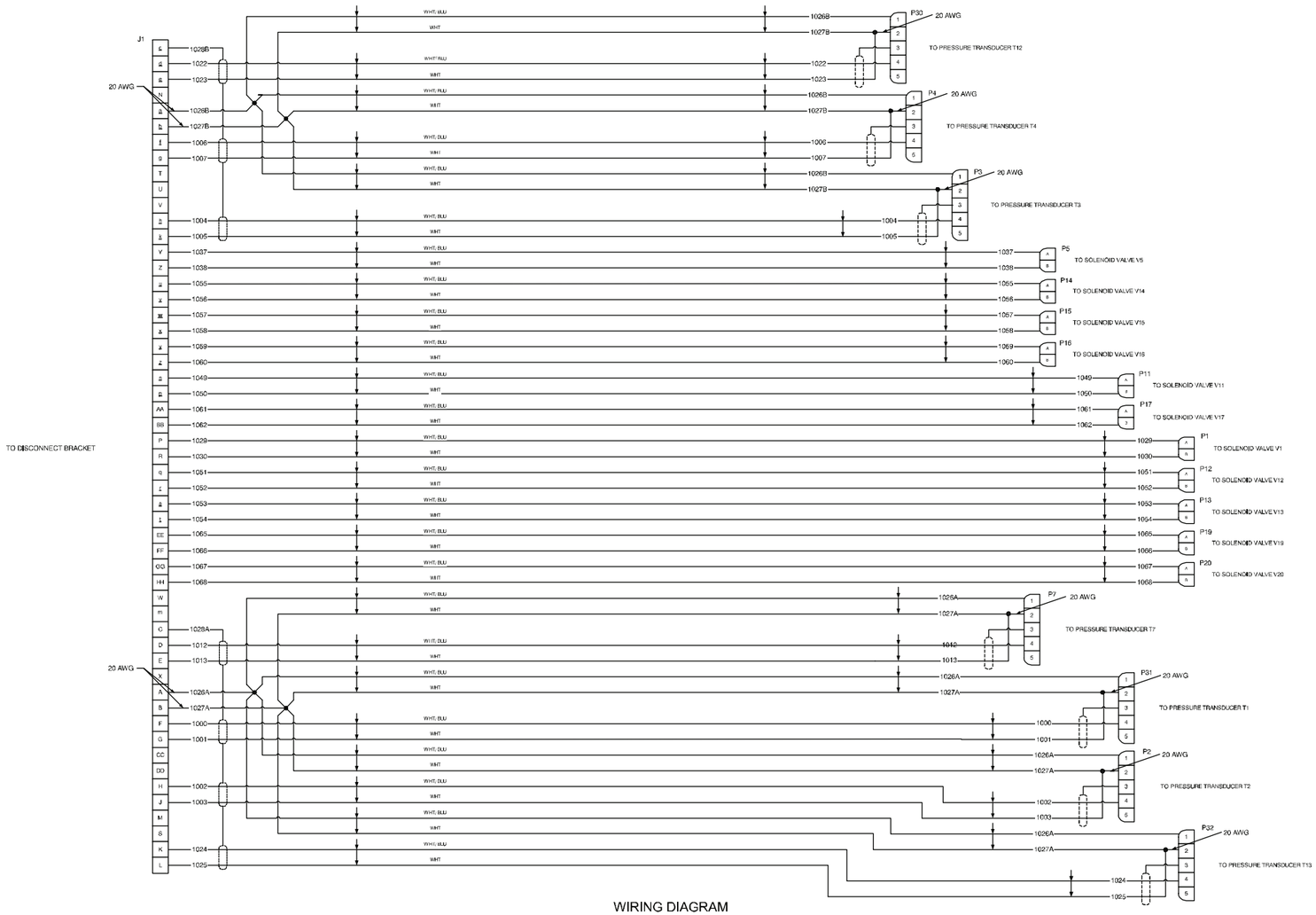


PRESSURE TRANSDUCER ELECTRICAL DIAGRAM



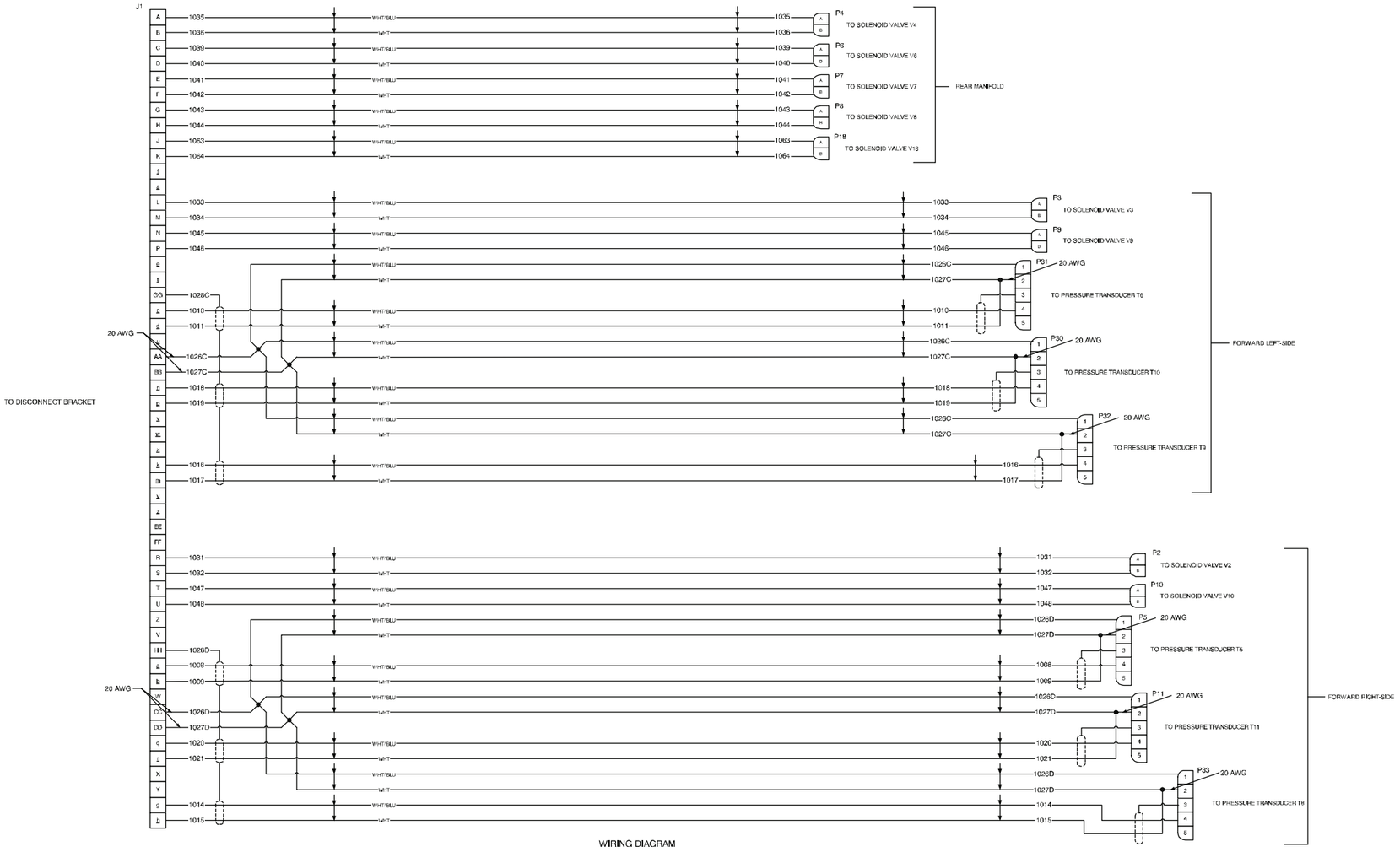
SOLENOID COIL
ELECTRICAL DIAGRAM

FO 9. SOLENOID VALVE ELECTRICAL DIAGRAM FP-21/(FP-22 blank)



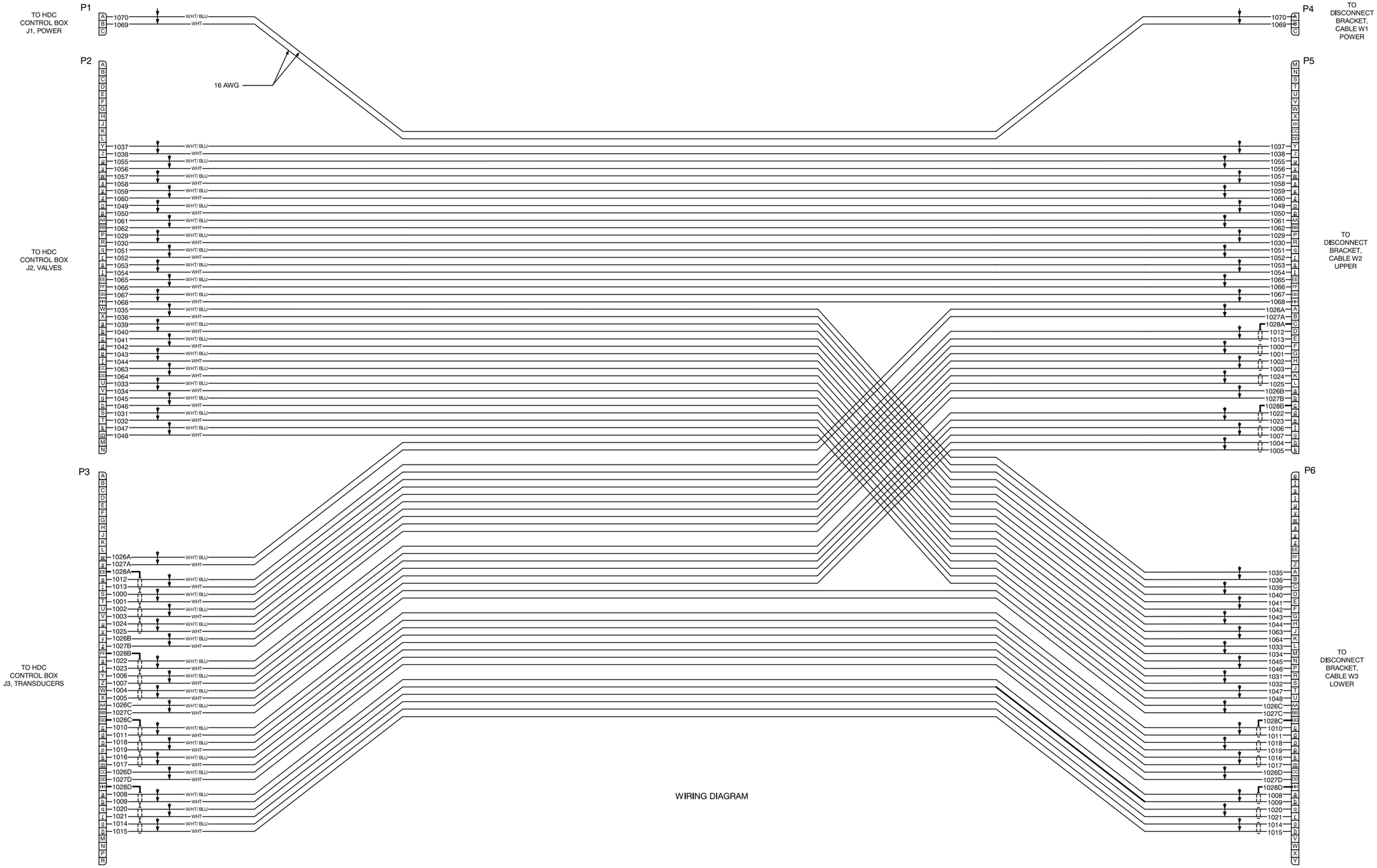
WIRING DIAGRAM

FO 10. W2 WIRING DIAGRAM
FP-23/(FP-24 blank)



WIRING DIAGRAM

FO 11. W3 WIRING DIAGRAM
FP-25/(FP-26 blank)



FO 12. W4 WIRING DIAGRAM
FP-27/(FP-28 blank)

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (*reverse)* for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	Date
TO: (*Forward to proponent of publication or form) (Include ZIP Code)*	FROM: *(Activity and location) (include ZIP code)*	

PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-2350-378-24&P		Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Hydraulic Diagnostic Center (HDC) Supporting Armored Combat Earthmover (ACE), M9 (2350-00-808-7100)

ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include Zip Code)*	DATE

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE
TM 5-2350-378-24&P		Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Hydraulic Diagnostic Center (HDC) Supporting Armored Combat Earthmover (ACE), M9 (2350-00-808-7100)

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

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RECOMMENDED CHANGES TO PUBLCIATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (*reverse)* for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	Date
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By Order of the Secretary of the Army:

GEORGE W. CASEY, JR
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0831105

DISTRIBUTION: To be distributed in accordance with the initial distribut ion requirements for IDN: 256982 requirements for TM 5-2350-378-24&P.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

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

WEIGHTS

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

LIQUID MEASURE

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

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

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

TEMPERATURE

5/9 (°F – 32) = °C
212° Fahrenheit is equivilent to 100° Celcius
90° Fahrenheit is equivilent to 32.2° Celcius
32° Fahrenheit is equivilent to 0° Celcius
(9/5 x °C) + 32 = °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